HIGHWAYS DEPARTMENT

GUIDANCE NOTES

ROAD INSPECTION MANUAL (RIM)

Research & Development Division

RD/GN/016C
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FOREWORD

1. The Road Inspection Manual (RIM) was first issued in 1993, which aimed to narrow the wide disparity of routine inspection methods and practice in the then three Regional Offices of the Highways Department (HyD). The objectives of the 1st version of RIM were:

   - To define a road hierarchy for inspections based on that used in MARCH system;
   - To set out the procedures for and frequencies of inspections used to determine routine maintenance tasks;
   - To reduce inconsistency in the standards for inspections adopted by the Regional Offices; and
   - To attempt extracting data from inspection for use by the MARCH system.

2. The above RIM attempting to integrate the MARCH and Detailed Inspections (DI) was to no avail because it was not practical in the workflow for converting the data in the regular DI collected by the Regional Offices to that for MARCH system for further analysis. In this connection, the Regional Offices continued to conduct the DI in which data would assist them in determining the maintenance strategy on a project level, while the MARCH inspections were conducted by the R&D Division for producing useful data to the Regional Offices for decision with regard to the network level. This arrangement is in line with the overseas two-tier practice of the network and project level inspections for the highway maintenance.

3. Since then, more maintenance offices emerged, including those for the Tsing Ma and Tsing Sha Control Areas and the Build-Operate-Transfer (BOT) projects, though the latter areas are currently maintained by others. In addition, the need of establishing a rational routing network for road inspection and the need of adopting an efficient and consistent approach in the collection, processing and recording of highway conditions warrant a review on the previous RIM.

4. The objectives of the 2nd RIM, published in 2004, were

   - To define hierarchies of carriageways, footways and cycle tracks for inspections
   - To recommend the procedures for and minimum frequencies of inspections used to determine routine maintenance tasks
   - To encourage consistency in the standards for inspections adopted by the maintenance offices in the HyD, whilst allowing flexibility for modifying the standards to cope with local variations

5. To include missing longitudinal joint filler and opened longitudinal joints in the list of defects with immediate or imminent hazard for particular attention during the then safety inspections, the 3rd version of the RIM was promulgated in 2014.

6. For this RIM, which supersedes the 3rd version, revisions are made regarding the term "safety inspection" to tally with similar inspections for other HyD assets.

7. The maintenance offices of HyD including the two Regional Offices and the Bridges & Structures Division are suggested to follow the recommendations of this RIM in preparing their road inspection regime and programmes. Operators of the BOT projects are also recommended to refer to this RIM in preparing their road inspection programmes. The maintenance offices should be open to allow local diversity where appropriate, but this will require careful management. The extent of variations should be identified and recorded together with the reasons for their adoption.

8. This RIM should be read in conjunction with the Guidance Notes on Catalogue of Road Defects (CORD) issued by the HyD. Descriptions and characteristion of road defects are not repeated here.

9. A Quick Reference Guide, covering the minimum requirements for road inspections in tabulated forms, is included in the Part II of this manual. Supplementary notes of the RIM for better understanding on the background knowledge of the road inspection requirements are included in the Part III of this manual.

10. Reference is made to the "Well-maintained Highways – Code of Practice for Highway Maintenance Management" commissioned by the UK Roads Liaison Group in July 2005 and its previous editions in preparing the framework and context of this manual with modifications to suit the prevailing local conditions.

Part I

Road Inspection Manual

ROAD INSPECTION MANUAL

1. Introduction

1.1 This manual recommends the procedures for and frequencies of inspections used to determine routine maintenance tasks. These maintenance tasks should include the maintenance operations or works necessary for maintaining and restoring the road network to serviceable and safe conditions.

1.2 The manual intends to cover all public roads including carriageways, footways and cycle tracks within the territory.

1.3 The manual provides guidance on the procedures for inspections on the following items:

(i) carriageways, footways and cycle tracks;
(ii) covers, gratings, frames and boxes;
(iii) kerbs, edging and preformed channels;
(iv) highway drainage;
(v) fences and barriers;
(vi) verges and grass areas;
(vii) road marking;
(viii) road studs; and
(ix) road traffic signs.

1.4 The manual does not include the following items:

(i) highway structures;
(ii) roadside slopes and retaining walls;
(iii) road lighting; and
(iv) road tunnels.

The procedures for and frequencies of inspections for the first 3 items are covered in the relevant Operation Procedures included in the Quality Manual (ISO 9001) of the HyD, while those for the last item are covered in Guidelines on Inspection of Road Tunnels (HQ/GN/04). Notwithstanding the above, if any defects that may cause immediate hazard to the public come to the inspection personnel's attention when he passes by the locations covered by items (i) to (iv) or other locations not maintained by HyD, the inspection personnel should notify the responsible maintenance authorities as soon as possible for remedial action.

1.5 The manual covers areas of activity in which works are primarily undertaken in the short term and are consistent with keeping the road in good working order. It does not deal with the replacement or renewal of those parts of the road which, in the long term, becomes unserviceable because of general deterioration. This will be dealt with properly within planned maintenance or rehabilitation programmes. The inspection procedures suggested in this manual will, however, assist the maintenance offices in identifying the need for major treatments. On the other hand, major incidents should require immediate and special attention, e.g. damages arising from traffic accidents, spillage of oil or bulky obstructions, damages caused by typhoon or heavy rainfall, and collapses of pavement or structures, etc. These emergencies are sometimes unpredictable and should be dealt with as soon as possible.

1.6 The recommendations of the manual may not be appropriate to all circumstances and modifications are expected to suit local conditions. Internal instructions or guidelines of the maintenance offices should be prepared and issued, if necessary, to identify these modifications, together with the reasoning for such variations.

2. Road Network Hierarchy

2.1 General

The aim of defining the road network hierarchy is to develop a pattern of routes, having regard to the traffic volume and type of traffic, for providing basis for resource allocation required in the inspections and the subsequent maintenance works. A good hierarchy should become the foundation of a coherent, consistent and auditable maintenance strategy. The road network in the territory for the purpose of this Manual is divided into two hierarchies, namely, carriageways and footways.

2.2 Carriageway Hierarchy

For adopting a coherent network classification, the carriageway classification follows the road types specified in the Transport Planning and Design Manual (TPDM), Volume 2, Chapter 3. For defining the carriageway types, maintenance offices are recommended to refer to the Annual Traffic Census published annually by the Transport Department (TD) or other relevant documents.

2.3 Footway Hierarchy

Footway inspections and maintenance should be dealt with according to the pedestrian usage under available resources and may not necessarily relate to the importance and classification of the adjoining carriageway. Two categories for footways as shown in Table 1 are recommended.

Table 1 : Footway Hierarchy

Category No.	Category Name	Brief Description
1	Footway within Pedestrianisation Schemes	Footways within the pedestrianisation schemes initiated by TD
2	Footway outside Pedestrianisation Schemes	Other footways not classified under Category 1

Notes:

(1) A footway may consist of more than one footway section and each footway section should be assigned an appropriate footway category.

(2) For the purpose of easy naming and location referencing, the start/end of those footway sections should take into account the start/end of the associated carriageway if any so that any naming or location referencing to the footway section could be made with reference to just one associated carriageway.

(3) In order to minimise the potential data maintenance effort of the footway sections, the recommended minimum length of a footway section should be the lesser of 100m or the entire length of the footway between the consecutive road junctions.

(4) The footways within TD's pedestrianisation schemes can be found on TD's website.

3. Categories of Road Defects

3.1 General

Road defects should be classified into two categories, namely:

Category (i) - those which require prompt attention because they represent an immediate or imminent hazard or because there is a risk of short term structural deterioration; and

Category (ii) - all other defects.

3.2 Category (i) Defects Remedy

Category (i) defects should be corrected or made safe as soon as reasonably practicable. In the interim, the aim should be to provide protection by displaying notices warning of the hazardous conditions according to the Code of Practice for Lighting, Signing and Guarding of Road Works. In this context, coning off or fencing off can constitute a warning notice to the public. If it is not possible to correct or make safe the defect at the time of inspection, which will generally be the case, repairs of a permanent or temporary nature should be carried out as soon as possible and in any case within a period of 48 hours except that carcass and dumping on expressways should be cleared within 24 hours. Temporary repairs should be inspected regularly as part of a Routine Inspection and permanent repairs should be completed within 28 days where practicable.

3.3 Category (ii) Defects Remedy

Category (ii) defects should be repaired within planned programmes of works, with priority depending on the degree of deficiency, traffic and site characteristics. These priorities should be considered, together with traffic level, the need to minimise traffic arrangement, other current and planned works on the related road network, and the access requirements, in compiling the programmes of works.

4. Inspection Equipment and Forms

Inspection personnel should be provided with report forms and checklists on setting out the various defects to be noted. Report forms should be completed as far as possible at the time of the inspection following which they should be deposited properly. For improving the efficiency of collecting and delivering data, and reducing hard copies of reports, portable data collection device may be used at the discretion of the maintenance offices. The inspection equipment should be used in accordance with the manufacturer's recommendations.

5. Inspection for Routine Maintenance

5.1 General

The road network should be inspected to identify the need for routine maintenance tasks. The inspections should be classified into two types, namely the Routine Inspections and Detailed Inspections, which are described in detail in the following paragraphs.

5.2 Inspection Personnel

All inspection personnel should be sufficiently responsible and competent for the tasks. They should receive adequate training and should be fully conversant with the inspection procedures and safety requirements of this manual. The maintenance offices may consider outsourcing the inspections as necessary.

6. Routine Inspections (RI)

6.1 General

RI, formerly known as Safety Inspections, are designed to identify all defects likely to create danger or serious inconvenience to users of the network. Such defects should require urgent attention and be made safe or repaired within 48 hours except that carcass and dumping on expressways should be cleared within 24 hours.

6.2 Methods for Conducting RI

RI should normally be undertaken by slow moving vehicle. Where it is impractical to properly conduct the inspection on a vehicle, e.g., when the line of sight is blocked by parked vehicles or heavy pedestrian traffic, the RI should be supplemented by an inspection on foot along the footway. However, to ensure the safety of the inspection staff, roadside gully gratings physically separated from the footways by planters should not be inspected on foot along the carriageway. RI on cycle tracks may be conducted on a slow moving bicycle.

6.3 Frequency of RI

6.3.1 The recommended minimum frequencies based on network categories are provided in the Table 2. The maintenance offices should ensure that they have sufficient resources to conduct the inspections according to the recommended minimum frequencies. In defining a RI regime, maintenance offices should also take into account other relevant factors including but not limited to:

- Traffic use, characteristics and trends
- Incident and inspection history
- Characteristics of adjoining network elements

6.3.2 Additional RI may be required in response to reports or complaints from the police, other authorities and the public as a result of major incidents, typhoon or flooding damages. A proportion of the RI should be carried out either during or immediately following a period of wet weather.

Table 2 : Recommended Minimum Frequency for RI

Feature	**Category**	**Recommended Minimum Frequency***
Carriageways	Expressway	1-2 days
	Trunk Road (Urban)	7 days
	Trunk Road (Rural)	7 days
	Primary Distributor	1 month
	District Distributor	1 month
	Local Distributor	3 months
	Rural Road	3 months
	Feeder Road	6 months
Footways	Footway within Pedestrianisation Schemes	1 month
	Footway outside Pedestrianisation Schemes	3 months
Cycle Tracks	-	6 months

* As Detailed Inspection (DI) also covers RI items, a DI is also counted as an RI as far as the inspection frequency is concerned.

6.4 Defects to be Recorded

Inspection personnel should be provided with portable data collection devices or report forms (a pro forma attached in Appendix A and an example in Appendix B) on which the normal defects found during the RI are listed. The items in the forms can be added and the format can be altered, having regard to the local circumstances and should be completed as far as possible at the time of inspections. The following defects should normally be identified and reported as they constitute an immediate or imminent hazard:

(i) potholes and other local defects, including missing longitudinal joint filler and/or opened longitudinal joints on concrete carriageways, missing paving blocks, missing/broken ironware, gully grating and cover;
(ii) excessive standing water and water discharging onto or from within, and/or flowing across the roads;
(iii) missing safety fences;
(iv) unguarded road openings;
(v) damaged street furniture protruding into carriageway or footway/cycle track; and
(vi) fallen boulders, landslip debris or any other hazardous obstructions on carriageways, footways or cycle tracks, particularly on Expressways and high speed roads.

6.5 Response for Hazardous Defects

Where defects encountered constitute an imminent or immediate hazard to the public, they should be classified as Category (i) defects and, if reasonably practicable, be corrected, made safe or otherwise protected as soon as possible according to the recommendation and procedure in paragraph 3.2 to this manual. Assistance from other parties such as the Traffic Police for traffic arrangement and the Food, Environment and Hygiene Department for clearance of rubbish may be sought if necessary.

6.6 Retention of RI Reports

For record and auditing purposes, electronic data or reports forms, including the nil returns, should be retained for a minimum period of 6 years. Reports and complaints received from other sources should be similarly recorded and retained together with details of follow-up inspections and action taken.

7. Detailed Inspections (DI)

7.1 General

(i) DI are designed to record only those types of defects likely to require routine maintenance. Nevertheless, any imminent or immediate hazards identified during a DI should also be noted.

(ii) Recommended defects to be identified and recorded and the respective codes for various items including carriageways, footways, cycle tracks, road drains, traffic signs, street furniture, kerbs, verges and other miscellaneous items are listed in Appendix C. The road defects have been produced based on the classification of defects in the Guidance Notes No. RD/GN/015 on Catalogue of Road Defects (CORD). The defects are suitably coded to allow for computer-based processing of the road defects.

(iii) The pro forma for DI is attached in Appendix D with an example in Appendix E. Items and defects not listed in the standard lists shown in the pro forma can be added and the format of the form can also be altered to suit local circumstances. Before undertaking the DI, the maintenance personnel should append a plan showing the roads to be inspected under the tables of road defects. The locations of the road defects together with the associated defect code should be marked on the sketch at the time of road inspection as far as practicable.

(iv) Where defects encountered are not covered in the inspection forms, the inspection personnel should enter the minimum wording to describe the defects on site.

(v) The RI can be conducted concurrently during the DI on the same feature. In this case there is no need for separate RI records because the DI records can also be used to serve as the SI records to be retained according to the procedures in para. 6.6.

(vi) The maintenance offices can make use of the departmental Intranet Mapping System to download the location plans of roads for inspection and reporting purposes.

7.2 Carriageways

(i) Carriageways in rural and urban roads should be covered in the DI.

(ii) DI for carriageways should desirably be carried out in intervals not exceeding 6 months. Exact timing may be determined locally to suit established procedures.

These inspections should be coordinated as fully as possible with the DI of other items in the roads as a whole.

(iii) Defects should be recorded using the defect codes under Section R for rigid carriageway, Column F for flexible carriageway or Column K for block paved carriageway as shown in Appendix D. Classification and details of carriageways defects should refer to the Guidance Notes No. RD/GN/015 on Catalogue of Road Defects (CORD).

7.3 Footways and Cycle Tracks

(i) Footways of all categories and cycle tracks should receive DI at intervals of 6 months. Exact timing may be determined by the maintenance offices to suit established procedures or prevailing site conditions.

(ii) Defects should be recorded using the defect codes under Section K of the inspection forms. Defects requiring remedies include:

(a) defective surface, including cracks, wide cracks larger than 2 mm, worn surface, and depression larger than 20 mm which pose a safety hazard to pedestrians;
(b) missing or loose blocks;
(c) defective kerbs;
(d) ravelling; and
(e) uneven surfacing.

7.4 Covers, Gratings, Frames and Boxes

(i) Inspections for covers, gratings, frames and box-outs should be carried out in conjunction with the carriageway, footway and cycle track inspections.

(ii) Defects should be recorded using the defect codes under Section D of the inspection forms. Defects requiring remedies include:

(a) gully and other gratings in carriageways and cycle tracks which have gaps more than 20 mm wide parallel to the normal line of movement of pedal and motor cycles;
(b) worn covers which constitute a skidding hazard to pedal and motor cycle users in wet conditions;
(c) cracked or broken items in danger of collapse;
(d) differential levels between items and the abutting carriageway, footway or cycle track surface exceeding 20 mm;
(e) differential levels between different components exceeding 20 mm;
(f) rocking gratings or covers with a relative movement under load exceeding 10 mm; and
(g) missing grating or covers.

(iii) During inspection of the grating of gullies and other similar surface water catchment items, an opportunity should be given to check, as far as possible, that the item is operating satisfactorily and is not, for example, partially or wholly blocked.

(iv) Gully and other gratings with defects (a) and (g) as described at item (ii) above should be modified and replaced.

(v) Those defects described in (b), (c), (f) and (g) at item (ii) above should be classified as Category (i) defects.

7.5 Exclusive Road Drains

(i) During inspections, efforts should be made to identify whether exclusive road drains including gullies, channels and underground drains are blocked. The maintenance offices should notify relevant authorities for the clearance of the blocked gullies or drains if necessary.

(ii) Remedial work should be instituted as soon as possible to repair damaged gullies.

(iii) Priority should be given to the clearance of blocked gullies/drains and repair of damaged gullies/drains located above downhill slopes, particularly during the wet season.

7.6 Fences and Barriers

(i) All types of boundary fences and walls, roadside noise barriers, pedestrian guard rails and fences, and vehicle safety fences, barriers and crash cushions should be included in the road inspections. However, parapets and guard rails on bridges and other structures including the structural elements of noise barriers are outside the purview of this manual.

(ii) The following defects, identified during inspections, should be suitably recorded by the defect codes under Section T of the inspection forms:

(a) damaged or missing barriers or fences;

(b) defects in coating and corrosion protection system; and

(c) misplaced or loose barriers or fences.

(iii) The defects described in (ii) (a) above should be classified as Category (i) defects.

(iv) Inspection of fences and barriers should be programmed together with the DI for carriageways, except for those located in footways and cycle tracks remote from carriageways.

7.7 Grassed Areas

(i) The maintenance of grassed verges, central reservations, cutting and embankment slopes, roundabout, islands and other similar areas within the highway should be covered in the DI.

(ii) Cutting or clearance of grass and vegetation to safeguard visibility at junctions, roundabouts and bends is normally the responsibility of Leisure and Cultural Services Department, except in the Expressways the maintenance of which is undertaken by HyD maintenance offices.

7.8 Road Studs

(i) The reflective and non-reflective road studs for all types and colours should be covered in the DI.

(ii) Inspections for defective or missing road studs should be carried out once per year in conjunction with the inspection of other carriageway items. On heavily trafficked roads inspections should, wherever possible, be carried out when appropriate lane closures are in operation for other maintenance works. RI from a slow moving vehicle manned by a driver and an observer will be the most appropriate procedure for assessing the general condition of road studs.

(iii) Displaced road studs lying on the carriageway, hard shoulders or lay-bys encountered should, if judged to be a hazard, be classified as Category (i) defects and be removed immediately, if reasonably practicable, otherwise road users should be protected, as far as possible. As a normal minimum, the aim should be

to display notices warning of the hazardous conditions before reporting to the office at the earliest opportunity with a request for immediate action. Such action should be completed within the shortest possible time, but in any case within a period of 48 hours.

7.9 Road Markings

(i) All road markings should be inspected at a minimum interval of one year in conjunction of the planned carriageway and cycle track inspections.

(ii) Inspections should check the serviceability of the road markings, in terms of wear, spread, colour and skid resistance.

7.10 Road Traffic Signs

(i) All road traffic sign faces, including concrete and steel bollards, should be inspected 5 years after installation and thereafter at intervals of 2 years in respect of colour and general conditions. Replacement of traffic signs should be effected when the traffic signs reach the end of the recommended replacement cycle, i.e. 7 years and 10 years after installation for Class II and Class I sheetings respectively.

(ii) Sign faces should normally be cleaned on a need basis and, when need is established, at a frequency normally once every year. Details of cleaning frequencies should be recorded on the schedule of signs.

(iii) All road traffic sign supports, brackets, bolts and fittings, etc. should be inspected 5 years after installation and thereafter at intervals of 2 years in respect of surface protective treatment and structural condition.

Part II

Quick Reference Guide

QUICK REFERENCE GUIDE

1. Introduction

This Quick Reference Guide intends to give users a cursory guide of the RIM. Further reference should be made to the Part I of the RIM for more details.

2. Road Network Hierarchy

2.1 Carriageway Hierarchy

The carriageway classification follows the road types specified in the Transport Planning and Design Manual (TPDM), Volume 2, Chapter 3.

2.2 Footway Hierarchy

Category No.	Category Name	Brief Description
1	Footway within Pedestrianisation Schemes	Footways within the pedestrianisation schemes initiated by TD
2	Footway outside Pedestrianisation Schemes	Other footways not classified under Category 1

Notes:

(1) A footway may consist of more than one footway section and each footway section should be assigned an appropriate footway category.

(2) For the purpose of easy naming and location referencing, the start/end of those footway sections should take into account the start/end of the associated carriageway if any so that any naming or location referencing to the footway section could be made with reference to just one associated carriageway.

(3) In order to minimise the potential data maintenance effort of the footway sections, the recommended minimum length of a footway section should be the lesser of 100m or the entire length of the footway between the consecutive road junctions.

(4) The footways within TD's pedestrianisation schemes can be found on TD's website.

3. Categories of Road Defects

Category	Brief Description
(i)	Hazardous defects requiring urgent attention
(ii)	Defects not requiring urgent attention

4. Types of Road Inspections

Inspections	**Objectives**
Routine	To identify defects likely to create a danger or serious inconvenience to the public
Detailed	To establish programmes of routine maintenance tasks, in project level perspective, not requiring urgent execution

5. Frequencies of Inspections

5.1 Routine Inspections

Feature	**Category**	**Recommended Minimum Frequency***
Carriageways	Expressway	1-2 days
	Trunk Road (Urban)	7 days
	Trunk Road (Rural)	7 days
	Primary Distributor	1 month
	District Distributor	1 month
	Local Distributor	3 months
	Rural Road	3 months
	Feeder Road	6 months
Footways	Footway within Pedestrianisation Schemes	1 month
	Footway outside Pedestrianisation Schemes	3 months
Cycle Tracks	-	6 months

* As Detailed Inspection (DI) also covers RI items, a DI is also counted as an RI as far as the inspection frequency is concerned.

5.2 Detailed Inspections

Inspection Items	**Frequencies (Months)**	**Defects to be Identified**
Carriageways	6	Flexible Pavement : - cracking, corrugation, depression, rutting, shoving, surface deterioration, ravelling, potholes, and hazardous obstructions
		Rigid Pavements : - cracking, joint stepping, rocking, loss of sealant, spalling, surface detects, and hazardous obstructions.
Footways and Cycle Tracks	6; in conjunction with carriageway inspections where feasible	Defective surface, missing or loose blocks, defective kerbs, and hazardous obstructions
Covers, Grating, Frames and Boxes	In conjunction with carriageway inspections	Damaged, misplaced, loosened, or missing items
Fences and Barriers	In conjunction with carriageway inspections	Damaged, misplaced, loosened or missing items, and ponding/flooding
Grassed Areas	In conjunction with carriageway inspections	Check if clearance or visibility at junctions, roundabouts, bends will be affected
Road Studs	12; in conjunction with carriageway inspections	Missing or damaged road studs
Road Marking	12; in conjunction with carriageway inspections	Faded road marking, colour, surface and darkening
Traffic Signs	24; first DI to start 5 years after installation	Check colour, serviceability and general conditions

Part III

Supplementary Notes

SUPPLEMENTARY NOTES

1. Introduction

This Part covers the supplementary notes for the RIM so that the users can have more comprehensive background knowledge of the road inspection requirements.

2. Road Network Hierarchy

2.1 Highways are major public assets highly valued by the community and their maintenance attracts a high level of public interest and concern. The starting point for the development of any realistic policy for highway maintenance must be an understanding of the nature and extent of the whole highway system. It is obvious that the more important roads will justify higher maintenance standards. The importance of a carriageway, footway or cycle track will in turn depend upon its function and the type, usage and volume of users using it.

2.2 For adopting a coherent road network classification, the carriageway classification follows that specified in the Transport Planning and Design Manual, Volume 2, Chapter 3, which is different from the MARCH system specified in the previous RIM. For defining the carriageway types, maintenance offices are recommended to refer to the Annual Traffic Census published annually by the Transport Department (TD) or other relevant documents. In case of doubt, the maintenance offices should consult respective Regional Offices of the TD.

3. Inspections for Routine Maintenance

3.1 Considerable emphasis is placed on the need for formalized inspection systems, including the types and frequencies of inspections for different types of roads, and the use of standard report forms which act as a record of inspection and also as a record of subsequent decisions and actions. The report forms in the Appendices provide the maintenance offices with a mainframe for designing their inspections forms to suit their local circumstances. The report form will be used, so far as Detailed Inspections are concerned, in conjunction with the checklists setting out the items to be inspected and the defects to be reported.

3.2 The maintenance offices should adopt reasonably consistent and well-defined approaches in addressing the safety objective, and this is reflected in this manual. Whilst flexibility for local diversity in the maintenance offices is allowed, the extent of variations such as the frequencies of routine inspections, types of defects to be recorded, etc. should be identified and recorded together with the reasons for their adoption.

3.3 As well as being in the interests of good management and safety, the inspection system is necessary in order to deal with claims which may arise as a result of alleged defects on the highway, sometimes after remedial action has been taken and site evidence of the defect obliterated. In this context, a nil report is as important as a positive report since experience has shown that oral statements are of little use on their own.

4. Road Inventory

The inventory of road features under the custody of the maintenance offices is essential for:

(i) the rational development of the maintenance budget;
(ii) the pre-planning and control of work;
(iii) the understanding of the changing demand, e.g. inclusion of new roads;
(iv) the development of output measures, e.g. cost per gully cleaned.

The maintenance offices should keep proper road inventory records and update them regularly.

5. Carriageway and Footway

5.1 The need to differentiate between routine and structural maintenance activities for work which is similar in nature is self-evident. It is usual, before carrying out resurfacing, to ensure that the underlying road structure is sound. This often requires repairs to potholes, rutting, open joints, etc., which would otherwise be carried out as routine maintenance operations. Similar comments apply to other routine maintenance activities such as repairs to ironwork and kerbs.

5.2 It may therefore be found that defects reported from inspections can be absorbed into structural repairs due to be carried out within the relevant timescale specified within this manual. But such structural work will usually be contained within a long term programme, determined on the basis of overall priorities and the availability of structural maintenance funds and other resources. These schemes often have to be deferred and this may make it necessary to carry out the originally identified routine maintenance repairs at relatively short notice.

5.3 In considering urgent repairs to non-hazardous defects, a balance has to be struck between the risk of a minor defect developing into a more major item and the cost of carrying out one-off repairs. This needs to be determined on the merits of individual cases but it is important that the two options are considered.

5.4 Damage to footways may be caused by commercial vehicles particularly in urban areas and at road junctions. In seriously affected areas, consideration should be given to the provision of standard fencing or, alternatively, consideration should be given to carrying out an improvement scheme to alleviate the problem.

5.5 Cracked pre-cast concrete footway blocks and slabs should not be replaced as a routine maintenance operation unless there is a need to reset the slab because of some other defects.

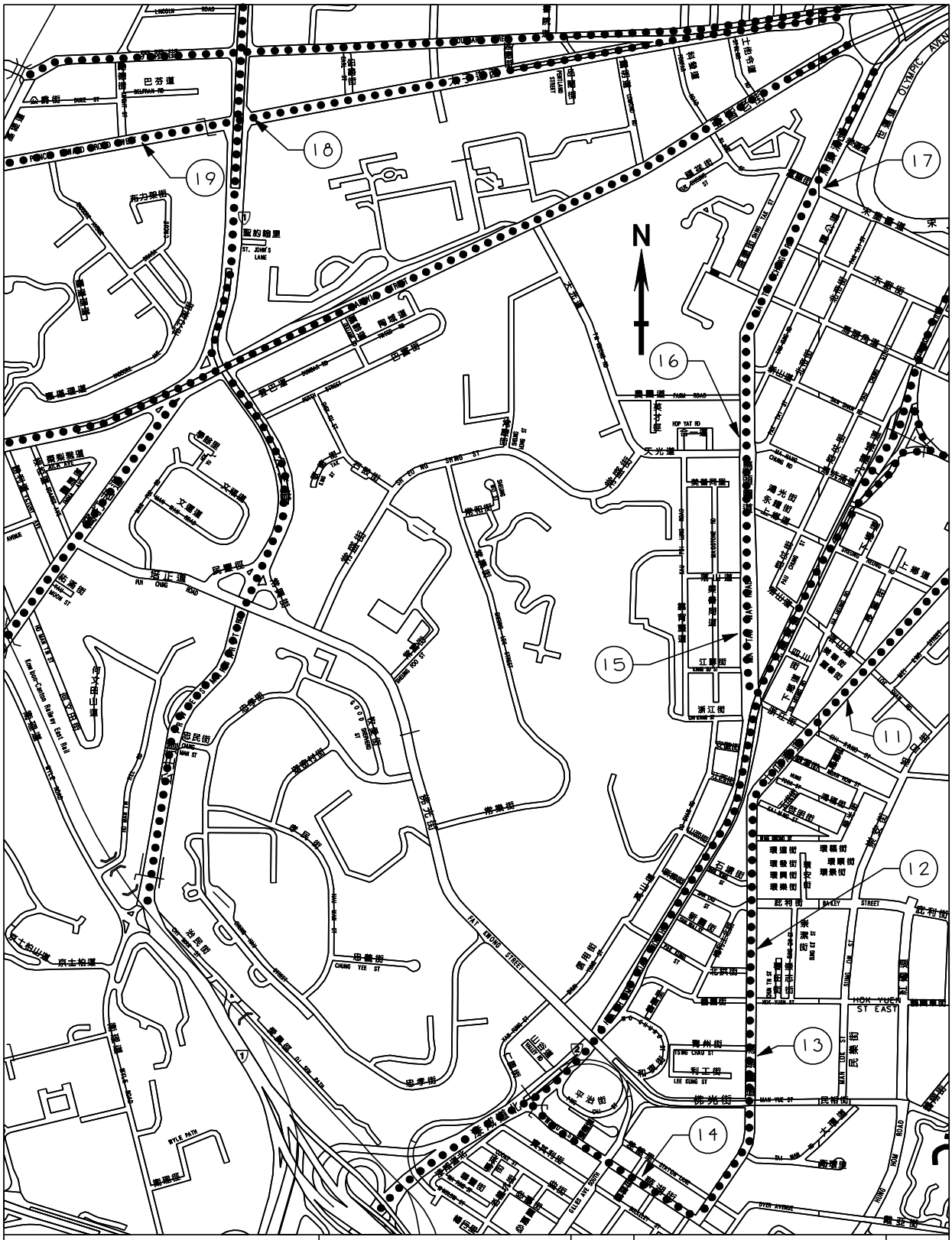
Appendices

Appendix A – Routine Road Inspection Report

Highways Department _____ Region / Division District : Road :	Inspected By : _____ Date : Seen By : _____ Date :

Locations	Defects **C. Carriageway**	**F. Footway/Cycle Track**	**D. Drainage**	**T. Street Furniture**	**M. Miscellaneous**
	a. Pot holes b. Subsided Trench c. Hazardous obstructions	a. Pot holes b. Subsidence c. Hazardous obstructions	a. Ponding /flooding b. Missing ironware/cover c. Broken ironware/cover	Damaged furniture protruding into carriageway/footway /cycle track a. guardrails b. signs/posts	To be specified by inspectors

Appendix B – Example of Routine Inspection Report



Appendix B – Example of Routine Inspection Report(Continued)

Highways Department _____KLN_____ Region / Division District : ___KC_____ Road : _____	Inspected By : _____Lam_____ Date : _____10-12-2002_____ Seen By : _____ Date : _____

Locations	Defects				
	C. Carriageway	**F. Footway/Cycle Track**	**D. Drainage**	**T. Street Furniture**	**M. Miscellaneous**
	a. Pot holes b. Subsided Trench c. Hazardous obstructions	a. Pot holes b. Subsidence c. Hazardous obstructions	a. Ponding /flooding b. Missing ironware/cover c. Broken ironware/cover	Damaged furniture protruding into carriageway/footway /cycle track a. guardrails b. signs/posts	To be specified by inspectors
11	b				
12	b				
13	a,b				
14				a	
15					Bad temporary Sign/Guard
16				b	
17				b	
18		b			
19			b		

Appendix C - List of Defect Codes

Defect Codes	Defect Description
Flexible Carriageway	
F.FC	Fine cracking
F.BC	Block cracking
F.CC	Crocodile cracking
F.DC	Diagonal cracking
F.LC	Longitudinal cracking
F.SC	Slippage cracking
F.TC	Transverse cracking
F.CR	Corrugation
F.DW	Depression w/cracks
F.DP	Depression w/o cracks
F.RU	Rutting
F.SV	Shoving
F.FL	Flushing
F.PO	Polishing
F.RW	Ravelling w/creaks
F.RV	Ravelling w/o cracks
F.PH	Potholes
F.HO	Hazardous obstructions
F.AS	Anti-skid surface worn
Rigid Carriageway	
R.BC	Block cracking
R.NC	Corner cracking
R.DC	Diagonal cracking
R.KC	Shrinkage cracking
R.LC	Longitudinal cracking
R.TC	Transverse cracking
R.SP	Joint stepping
R.RK	Rocking
R.JS	Joint sealant defect
R.SS	Surface spalling
R.BX	Box-out
R.RV	Ravelling
R.TX	Loss of textures
R.HO	Hazardous obstructions
R.AS	Anti-skid surface worn
Drainage	
D.G	Gully grating damaged, missing, blocked or sunken
D.C	Channel cover damaged, missing, blocked or sunken

Defect Codes	Defect Description
D.M	Manhole/chamber cover damaged, missing, blocked or sunken
D.P	Ponding or flooding
Traffic Signs/Street Furniture	
T.BO	Bollards
T.CB	Crash barrier
T.CC	Crash cushion
T.DS	Directional sign
T.NP	Street name plate
T.PB	Profile barrier
T.PP	Park meter post
T.RA	Railing
T.RM	Road marking
T.RS	Road stud
T.TS	Traffic sign
Kerbs/Footway/Run-in/Cycle Track/Block Paved Carriageway	
K.KB	Defective kerb
K.CK	Crack
K.DP	Depression
K.BD	Block work defects
K.RV	Ravelling
K.UN	Uneven
K.HO	Hazardous obstructions
K.AS	Anti-skid surface worn
Verge	
V.DE	Deterioration
V.GL	Grass too long
Miscellaneous	
M.ID	Illegal dump
M.UT	Unreinstated trench

Appendix D – Detailed Road Inspection Report

HIGHWAYS DEPARTMENT **_____REGION/DIVISION** **ROAD MAINTENANCE** **DETAILED INSPECTION**	Street Name _____ Section _____	District Street Code Section	File Ref. : Date of Inspection : Inspected by : Checked by : Date of Checking :

R. Rigid 1.cracking **BC** block **NC** corner **DC** diagonal **KC** shrinkage **LC** longitudinal **TC** transverse 2.**SP** joint stepping 3.**RK** rocking 4.**JS** Joint sealant defect 5.spalling **SS** surface **BX** box-out 6.surface **RV** ravelling **TX** loss of textures 7.**HO** hazardous obstructions 8. **AS** anti-skid surface worn	**F. Flexible** 1.cracking **FC** fine<2mm width **BC** block **CC** crocodile **DC** diagonal **LS** longitudinal **SC** slippage **TC** transverse 2.**CR** corrugation 3.depression **DW** w/cracks **DP** w/o cracks 4.**RU** rutting 5.**SV** shoving 6.surface **FL** flushing **PO** polishing	7.ravelling **RW** w/cracks **RV** w/o cracks 8.**PH** potholes 9.**HO** hazardous obstructions **10. AS** anti-skid surface worn **T. Street Furniture/Traffic Signs** 1.**BO** bollard 2.**CB** crash barrier 3.**CC** crash cushion 4.**DS** directional sign 5.**NP** street name plate 6.**PB** profile barrier 7.**PP** park meter post **D** damaged 8.**RA** railing **M** missing 9.**RM** road marking **B** bent 10.**RS** road stud **L** loose 11.**TS** traffic sign **F** fade	**D. Drainage/Utilities** 1.**G** gully grating 2.**C** channel cover 3.**M** manhole/chamber cover **D** damaged **M** missing **B** blocked **S** sunken 4.**P** ponding/flooding **K. Kerb/Footway/Run-in/ Cycle Track/Block Paved Carriageway** 1.**KB** defective kerb 2.**BD** Block work defects 3.surface **CK** cracks **UN** sunken **DP** depression **RV** raveling 4.**HO** hazardous obstructions 5. **AS** anti-skid surface worn	**V. Verge** 1.**DE** deterioration 2.**GL** grass too long **M. Miscellaneous** 1.**ID** illegal dump 2.**UT** unreinstated trench

(Please append road plan below :)

Appendix E – Example of Detailed Inspection Report

HIGHWAYS DEPARTMENT __KLN__**REGION/DIVISION** **ROAD MAINTENANCE** **DETAILED INSPECTION**	Street Name_Tung Choi St. Section Playing Field Rd__ to Boundary St._____	District _____MK_____ Street Code ___21578_____ Section _____072_____	File Ref. : __U21578_____ Date of Inspection :____24/2/93___ Inspected by : ___Lam_____ Checked by : _____ Date of Checking : _____

R. Rigid 1.cracking **BC** block **NC** corner **DC** diagonal **KC** shrinkage **LC** longitudinal **TC** transverse 2.**SP** joint stepping 3.**RK** rocking 4.**JS** Joint sealant defect 5.spalling **SS** surface **BX** box-out 6.surface **RV** ravelling **TX** loss of textures 7.**HO** hazardous obstructions 8. **AS** anti-skid surface worn	**F. Flexible** 1.cracking **FC** fine<2mm width **BC** block **CC** crocodile **DC** diagonal **LS** longitudinal **SC** slippage **TC** transverse 2.**CR** corrugation 3.depression **DW** w/cracks **DP** w/o cracks 4.**RU** rutting 5.**SV** shoving 6.surface **FL** flushing **PO** polishing	7.ravelling **RW** w/cracks **RV** w/o cracks 8.**PH** potholes 9.**HO** hazardous obstructions 10. **AS** anti-skid surface worn **T. Street Furniture/Traffic Signs** 1.**BO** bollard 2.**CB** crash barrier 3.**CC** crash cushion 4.**DS** directional sign 5.**NP** street name plate 6.**PB** profile barrier 7.**PP** park meter post **D** damaged 8.**RA** railing **M** missing 9.**RM** road marking **B** bent 10.**RS** road stud **L** loose 11.**TS** traffic sign **F** fade	**D. Drainage/Utilities** 1.**G** gully grating 2.**C** channel cover 3.**M** manhole/chamber cover **D** damaged **M** missing **B** blocked **S** sunken 4.**P** ponding/flooding **K. Kerb/Footway/Run-in/ Cycle Track/Block Paved Carriageway** 1.**KB** defective kerb 2.**BD** Block work defects 3.surface **CK** cracks **UN** sunken **DP** depression **RV** raveling 4.**HO** hazardous obstructions 5. **AS** anti-skid surface worn	**V. Verge** 1.**DE** deterioration 2.**GL** grass too long **M. Miscellaneous** 1.**ID** illegal dump 2.**UT** unreinstated trench

(Please append road plan below :)