HIGHWAYS AGENCY

RMMS MANUAL

User Manual for the Highways Agency's Routine Maintenance Management System

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Introduction

(i) General

The RMMS Manual is a single volume providing information and guidance to Maintenance Agents (MAs) on the operation of the Highways Agency's Routine Maintenance Management System (RMMS). This system implements management procedures for routine maintenance of trunk roads. It enables all inspection and other reports, complaints and third party claims to be assessed in conjunction with the inventory, previous maintenance actions and other relevant data. RMMS uses a computerised database management system (DBMS) for storing and retrieving data. Electronic data capture devices (DCDs) are used to aid data collection on site and to reduce errors during data transfer.

The RMMS Manual supersedes:

Highway RMMS Surveys - Survey Procedure
Highway Inventory Survey - Site Inspectors Manual
Highway Inspection Survey - Site Inspectors Manual

The RMMS Manual, issued in its present form in April 1996, is of loose leaf construction to facilitate updates supplied by the Highways Agency and to enable the MA to include additional information which is relevant to the MA's network. The Manual is divided into four parts:

Part 1: Survey
Part 2: Inventory
Part 3: Inspection
Part 4: System

Part 1 forms an introduction to the RMMS and provides general information concerning network referencing and a guide to survey procedures.

Part 2 contains information on items which should be recorded in the inventory of the RMMS database, more specific information on survey procedures and advice on carrying out inventory surveys. Photographs are included to clarify inventory items.

Part 3 provides information on conducting inspection surveys, including guidance on defects which should be entered into the RMMS database, details of inspection frequencies, lists of defect codes and suggested treat codes. Where appropriate, photographs are included to assist in the identification of defects.

Part 4 explains the philosophy behind the RMMS and is of particular relevance to Engineers responsible for the system.

(ii) List of Abbreviations Used

Throughout the RMMS Manual, the following abbreviations are used.

(a) Road Category

When classifying a road, one of the following alphanumeric characters should be used:

M - Motorway
T - All purpose trunk road
A - A classification
B - B classification
C - C classification
U - Unclassified

(b) Class / Index

The class / index of a road is used uses 6 alphanumeric characters as follows:

D4M-R- & D4M-R*	=	Dual	4 lane motorway	Rural
D4M-U- & D4M-U*	=	Dual	4 lane motorway	Urban
D3M-R- & D3M-R*	=	Dual	3 lane motorway	Rural
D3M-U- & D3M-U*	=	Dual	3 lane motorway	Urban
D2M-R- & D2M-R*	=	Dual	2 lane motorway	Rural
D2M-U- & D2M-U*	=	Dual	2 lane motorway	Urban
D4APR- & D4APR*	=	Dual	4 lane all purpose	Rural
D4APU- & D4APU*	=	Dual	4 lane all purpose	Urban
D3APR- & D3APR*	=	Dual	3 lane all purpose	Rural
D3APU- & D3APU*	=	Dual	3 lane all purpose	Urban
D2APR- & D2APR*	=	Dual	2 lane all purpose	Rural
D2APU- & D2APU*	=	Dual	2 lane all purpose	Urban
S4APR-	=	Single	4 lane all purpose	Rural
S4APU-	=	Single	4 lane all purpose	Urban
S3APR-	=	Single	3 lane all purpose	Rural
S3APU-	=	Single	3 lane all purpose	Urban
S2APR-	=	Single	2 lane all purpose	Rural
S2APU-	=	Single	2 lane all purpose	Urban
S1AP--	=	Single 1 lane all purpose		

When motorway slip roads are referenced they should be given one of the following class / index abbreviations.

S1M--- & S1M--*	=	Single 1 lane motorway
S2M--- & S2M--*	=	Single 2 lane motorway
S3M--- & S3M--*	=	Single 3 lane motorway
S4M--- & S4M--*	=	Single 4 lane motorway

Notes:

1. Where the '-' character is shown in the above abbreviations, a space character should be typed.

2. On dual carriageway roads it is essential that one of the two carriageways is nominated as the side to hold shared items. The nominated side is indicated by an asterisk (*). An example of a shared item is a lighting point on the central reserve of a motorway.

(c) General

The following general abbreviations are used in this Manual:

CHART	-	Computerised Highway Assessment of Ratings and Treatments
DBMS	-	Database Management System
DCD	-	Data Capture Device
HA	-	Highways Agency
MA	-	Maintenance Agent
NIS	-	Network Information System
OSD	-	Operations Support Division
RMMS	-	Routine Maintenance Management System

(iii) Enquiries

Enquiries concerning the content of this Manual should be addressed to:

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(iv) Amendments Summary

Amendment Set	Issue Date	Part No.	Page No.	Initials	Date
0	April 1996	All	All		

PART 1 - SURVEY

CONTENTS

1.1 Introduction

This Part describes the Network Referencing and Survey Procedures required for the operation of RMMS.

In order to maintain a systematic record of the extent and condition of the highway network, a 'model' of the network must be created within the RMMS database. This model is constructed by assigning a unique reference for each section of the network; Chapter 1.2 describes the network referencing system. The referencing system is based upon that used in CHART (as described in the Trunk Road Maintenance Manual: Volume 1).

Once the highway network has been defined, information from surveys of the extent and condition of the network can be stored on the database in a structured format. Chapter 1.3 describes various conventions, procedures and guiding principles to be adopted when undertaking surveys in order to ensure consistency in the database record.

1.2 Network Referencing

1.2.1 General

The Highways Agency's road network is defined such that a unique identifier may be given to any location on the network.

The RMMS requires the highway network to be divided into **Links** which are in turn divided into **Sections.** The combination of the Link Code and Section Number is referred to as the Section Identifier. A **Node** is specified at each end of the section and is used to identify a fixed point on the road surface. Location across the highway is specified by the use of **Cross Sectional Position** codes.

Network definition is primarily a desk exercise but should be checked by site visits. Inventory and detailed inspection surveys cannot be undertaken until the sections to be surveyed have been defined.

The formulation of the unique identifier is described in the Trunk Road Maintenance Manual: Volume 1 and in Chapter 4.3 of this Manual.

1.2.2 Links and Road Parts

A link is a length of road which is known by a unique ten character alphanumeric code (e.g. 9999A303_1). This code comprises the agent code (first 4 characters), the road classification number (next 5 characters) and the section group number (last character). Where the road classification is less than 5 characters the appropriate number of spaces should be entered prior to the section group number.

A Road Part is a motorway or an all purpose trunk road, as defined by the road classification number, within a MA's area of responsibility. Where a MA operates in more than one area, separate sets of road parts will need to be prepared for each commission.

1.2.3 Sections

Each link is divided into convenient sections which possess the same physical and classification characteristics e.g. construction type. The section length may vary from a minimum of 25m to a maximum of 9999m. The section is identified by a 2 digit Section Number (i.e. 00 to 99).

The optimum section lengths are 2000m for rural areas and 1000m for urban areas; it is recommended that these lengths are adjusted as necessary. Lengths longer than the optimal can make it difficult for an inventory or detailed inspection survey to be carried out within one working day.

The addition of the 2 digit Section Number to the 10 character Link Code forms a 12 character Section Identifier which is used in the CHART referencing system.

The section should conform as far as possible to the following rules:

(i) No section should have a road number which either changes along its length, contains more than one named street or changes its classification within its length.

(ii) Sections should normally start and end at junctions, though not necessarily at every junction, and sections must not cross other sections. Where a major and minor road intersect, the minor road must be divided but major roads need not be divided.

(iii) Each section should preferably be of uniform carriageway construction throughout.

(iv) Each section should be without large changes in traffic flow and the speed limit must remain unchanged along its length.

(v) On motorways, where possible, the sections should start and end at kilometre marker posts.

(vi) It is recommended that sections start and end at fixed objects (e.g. bridges).

(vii) Slip roads must be separate sections. The limit of the section (i.e. node) is the intersection of the nearside channel lines (solid white lines).

(viii) Each carriageway of a dual carriageway must be considered separately. Roundabouts and very large junction areas must also be separate sections.

Exact measurement of Section lengths is essential, particularly where surveys may be undertaken in the reverse direction to that specified in the Section file.

1.2.4 Nodes

Nodes must be established at the ends of sections. Each node represents a fixed definable point on the road surface to which chainage can be related.

Nodes also assist with the correlation of the data with other network systems such as the Highways Agency‘s Network Information System (NIS).

In the RMMS database, the start and end nodes define the direction of survey. The following conventions must be followed:

(i) For dual carriageways the start and end of a Section must be specified in the direction of traffic flow.

(ii) On single carriageway roads the start and end nodes of a Section should define the normal survey direction.

(iii) Inventory items or defects lying outside the node positions must be recorded at the chainage of the node, e.g. at approaches to roundabouts.

Typical examples of node positions at various locations are detailed diagrammatically in the Trunk Road Maintenance Manual: Volume 1.

The installation of ground markers in the form of thermoplastic cores (previously metal road studs or paint pads) provides positive identification of the position of nodes and assists in the accurate location of highway survey data.

1.2.5 Cross-Sectional Position

Location across the highway is defined using a single character code. These are entered by the survey team at the time of data collection. The following are a list of codes currently in use:

KEY	POSITION
1	Left Outside Verge (including side slopes)
2	Left Footway
3	Left Verge
4	Lane 1 (hard shoulder on motorway)
5	Lane 2 (left lane on motorway)
6	Lane 3 (middle lane on motorway)
7	Lane 4 (right lane on motorway)
8	Right Verge
9	Right Footway
0	Right Outside Verge (including side slopes)
Q	Acceleration splay
W	Lane for left turning traffic *
E	Lane for right turning traffic * or Lane 5 on motorway
R	Bus Lane - other traffic prohibited at all times * or Lane 6 on motorway
T	Crawler Lane *
Y	Other - undefined *

* To be used where extra width is created (not where existing lane use is redesignated).

An optional overlay for fitting over the keyboard of the data capture device is available to assist in the recording of the cross-sectional positions. The details of which keys are applicable to various road types are shown in Table 1.2.1.

	KEY										
ROAD TYPE	1	2	3	4	5	6	7	8	9	0	Others
Motorway 3 Lane			Verge	Lane 1	Lane 2	Lane 3	Lane 4	Central Reserve			QWERTY
Dual C'way	O/S Verge	Foot-way	Verge	Lane 1	Lane 2	Lane 3		Central Reserve			QWERTY
Single 3 lane	O/S Verge	Foot-way	Verge	Lane 1	Lane 2	Lane 3		Verge	Foot-way	O/S Verge	QWERTY
Single 2 Lane	O/S Verge	Foot-way	Verge	Lane 1	Lane 2			Verge	Foot-way	O/S Verge	QWERTY
Single 1 Lane	O/S Verge	Foot-way	Verge	Lane 1				Verge	Foot-way	O/S Verge	QWERTY

$ Cross-sectional position keys E and R are used for motorway lane 5 and 6 respectively.

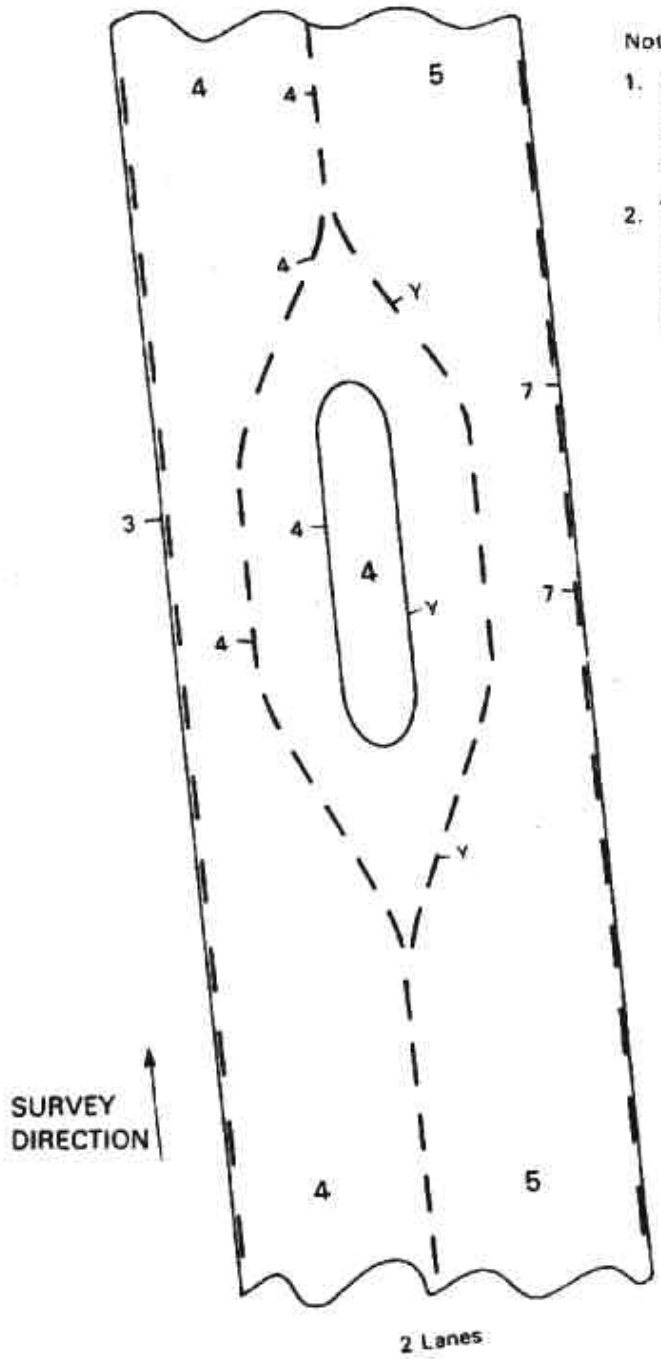
Table 1.2.1 - Overlay Format

If a section is surveyed in the reverse direction the cross-sectional positions **must** be entered facing towards the position at which the survey was started, i.e. look backwards.

Examples showing the conventions for cross-sectional position at various locations are included in Annex 1.2.1. It is important that consistency is achieved by all inspectors and therefore where an inspector is unclear in which cross-sectional position an item occurs, the convention should be determined by the Maintenance Engineer and additional examples provided to supplement Annex 1.2.1.

Care should be taken when recording the cross-sectional positions of inventory items and defects at complex junctions and roundabouts. To assist in this it is recommended that diagrams of the complex junctions are drawn and the cross-sectional position defined before the survey commences. A library of cross-sectional position solutions for particular junctions can be built up and copies of these added to Annex 1.2.1. Subsequent surveys can be undertaken with consistent definition of cross-sectional positions.

Annex 1.2.1
Examples of Cross-Sectional Positions



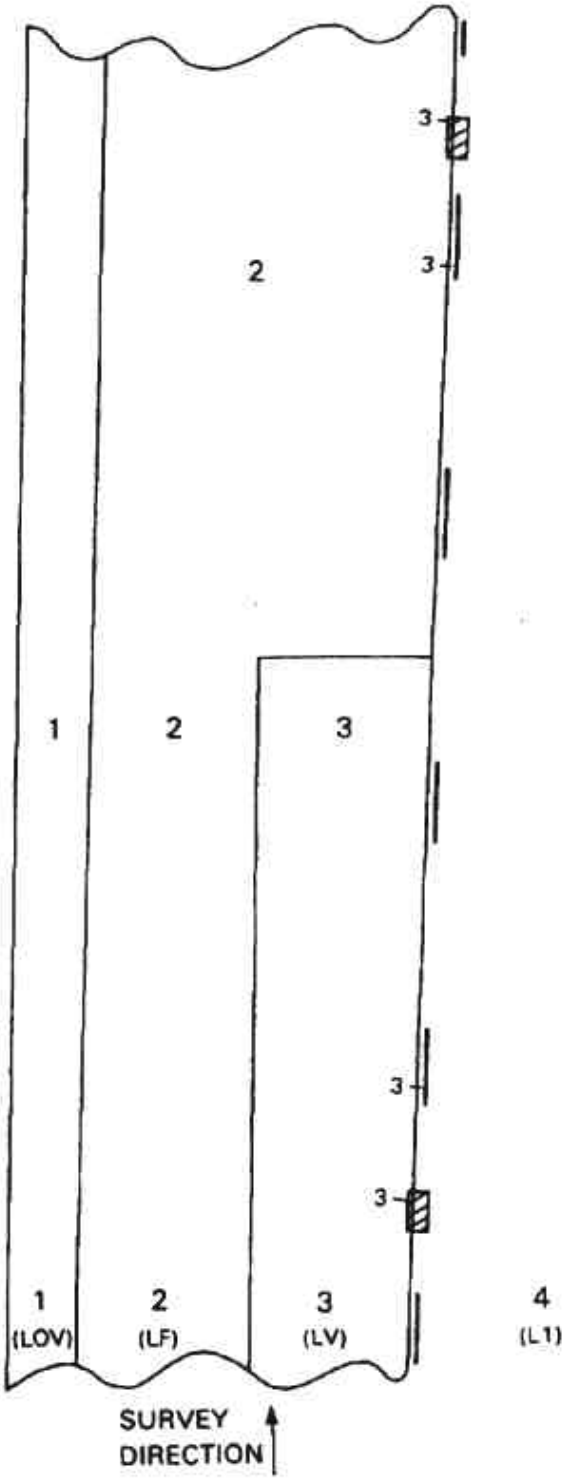
Notes

1. White line markings/kerbs/gullies etc. present at the left or right hand edge of the carriageway should be recorded in position 3 or 7 as appropriate

2. Because it is not possible to have two identical continuous items running in the same cross-sectional position, position Y has been used to record white line marking and kerbing (around the right of the island)

Figure 1

This example shows the Cross–Sectional Positions at the left hand side of a carriageway where a verge (3) ends and a footway (2) has an increased width.



Notes

1. The 'running' position of left footway retains its cross–sectional position until it ends, even though the verge ceases.
2. Items positioned at the left hand edge of the carriageway continue to be recorded in position 3 despite the absence of a verge.
3. Similar rules apply for the right hand side of a carriageway.

1 = Left outside verge
2 = Left footway
3 = Left verge
4 = Lane 1
= Gully

Figure 2

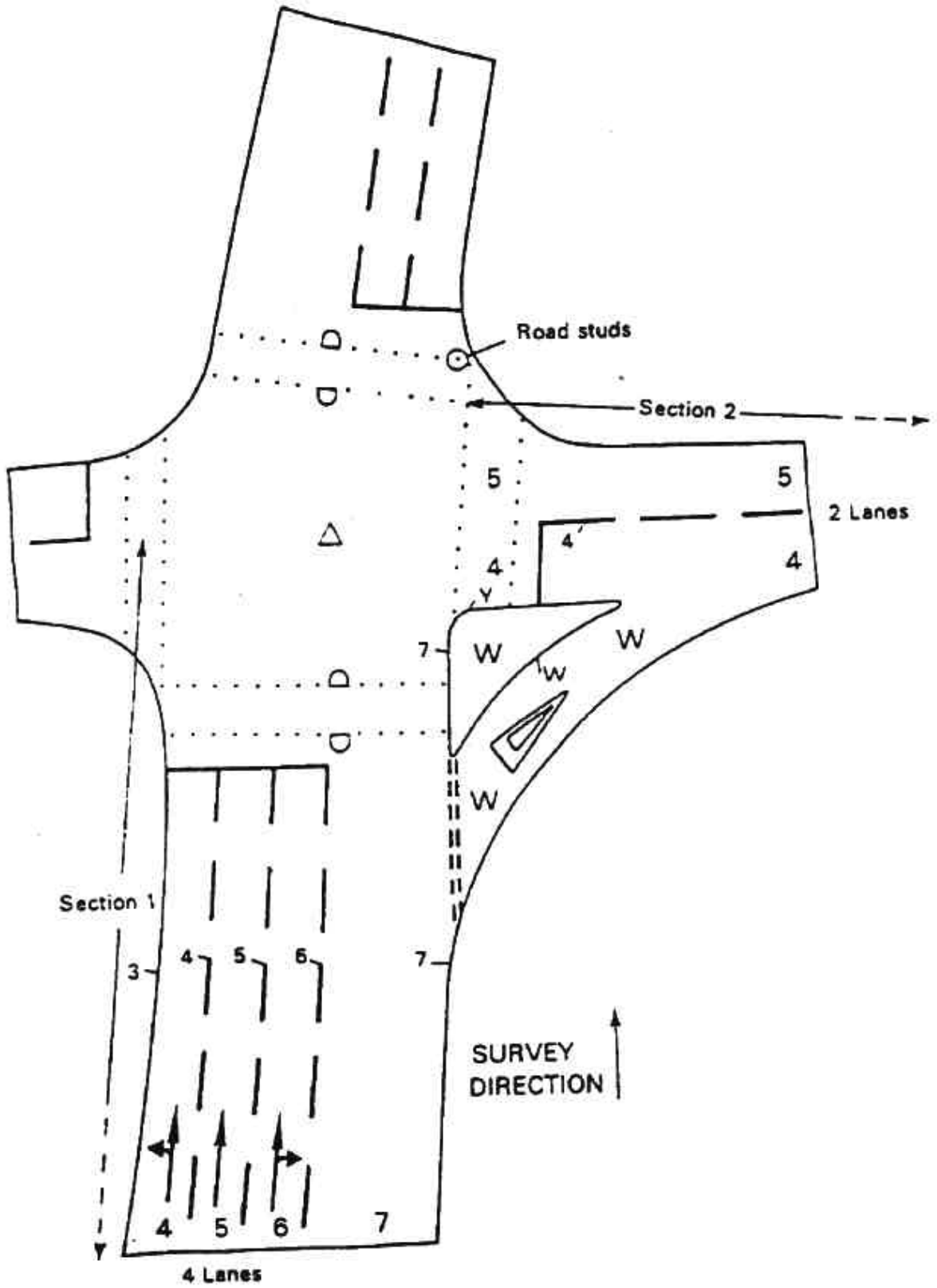

Road studs
Section 2
5
5
2 Lanes
4
4
4
Y
7
W
W
W
W
Section 1
3
4
5
6
7
SURVEY
DIRECTION
4
5
6
7
4 Lanes

Figure 3

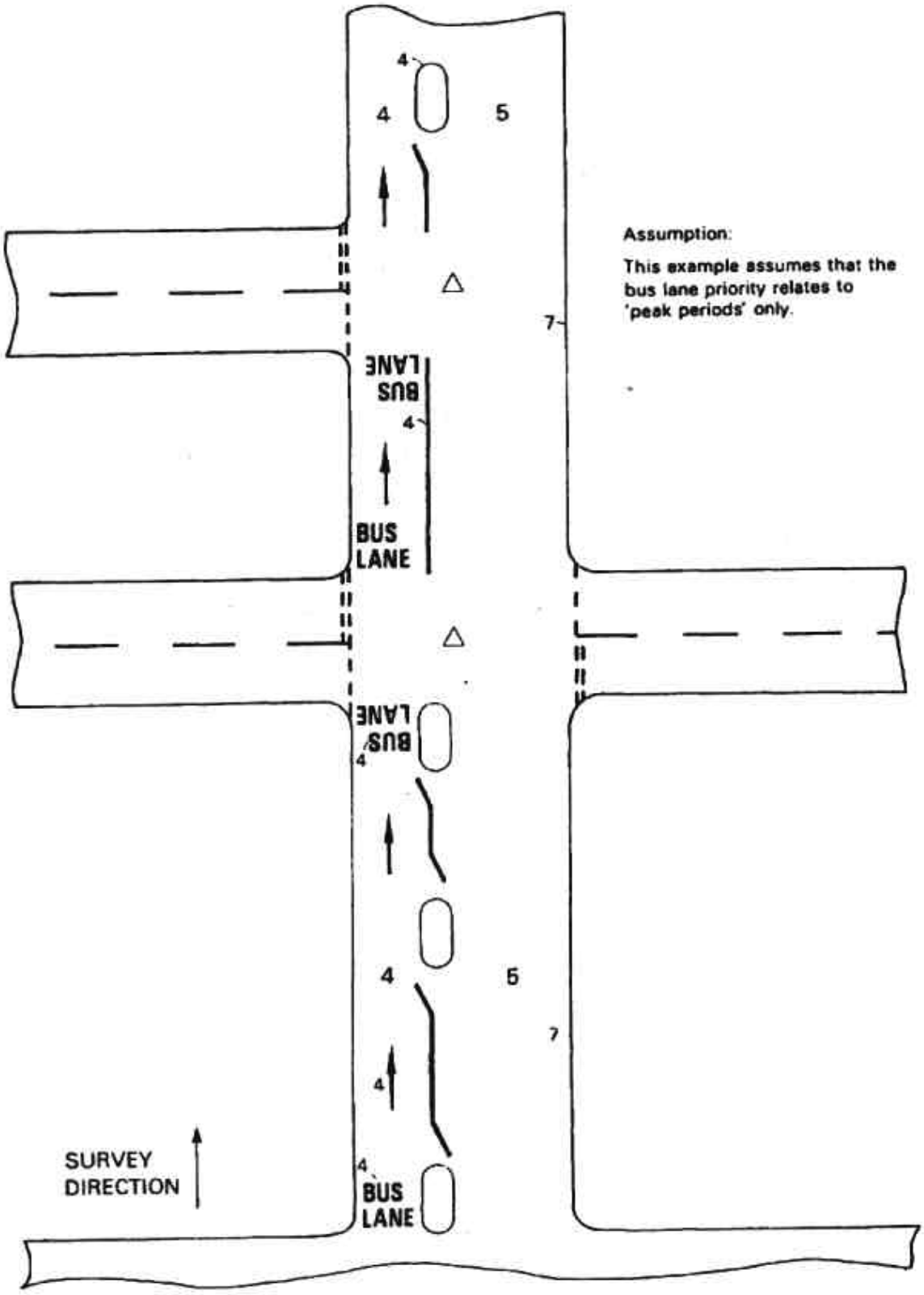

4
4
5
Assumption:
This example assumes that the bus lane priority relates to 'peak periods' only.
7
BUS LANE
4
BUS LANE
BUS LANE
4
4
5
7
4
SURVEY DIRECTION
4
BUS LANE

Figure 4

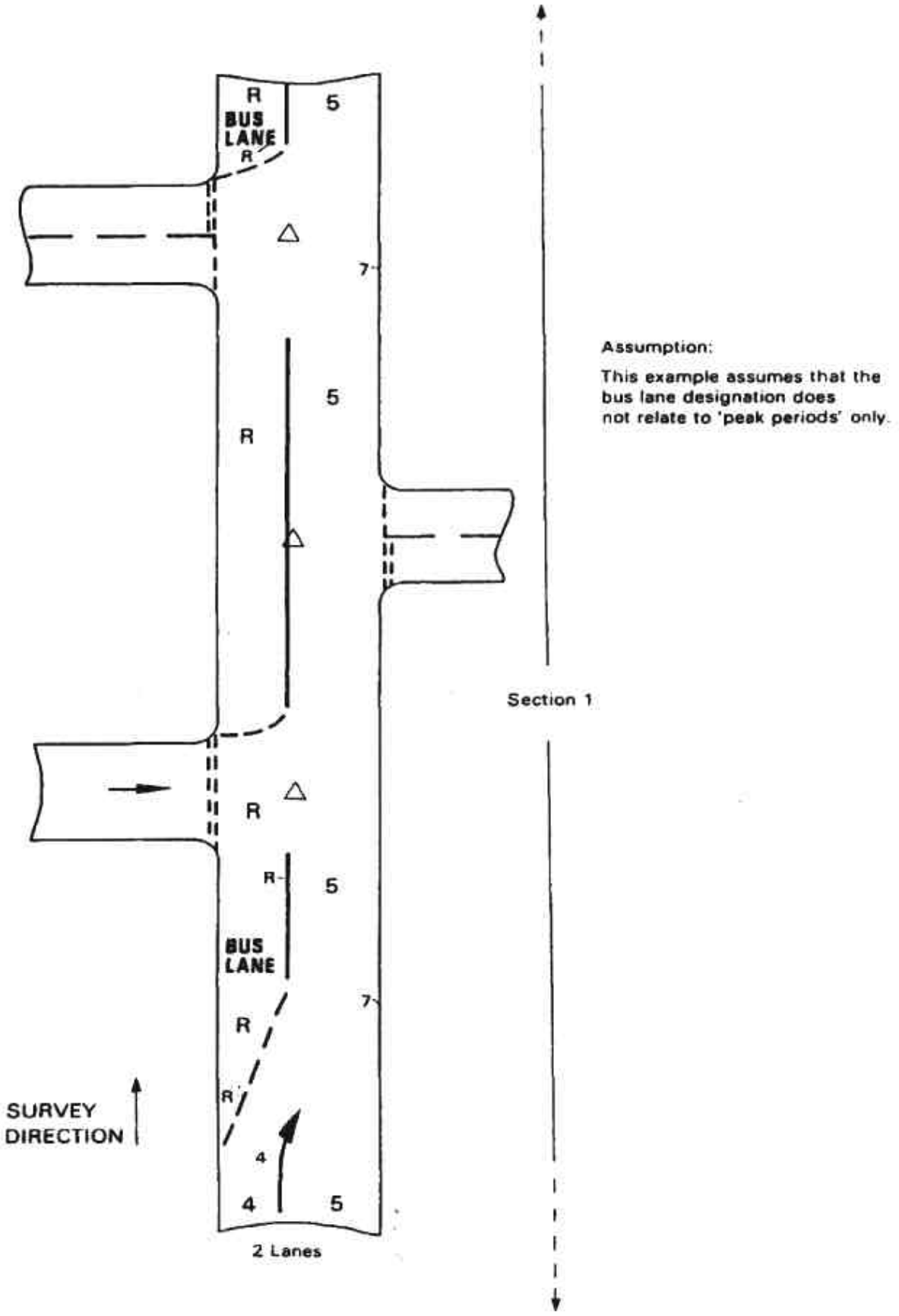

R
BUS
LANE
R
5
7
5
R
R
5
BUS
LANE
7
R
R
4
4
5
2 Lanes
SURVEY
DIRECTION
Section 1
Assumption:
This example assumes that the bus lane designation does not relate to 'peak periods' only.

Figure 5

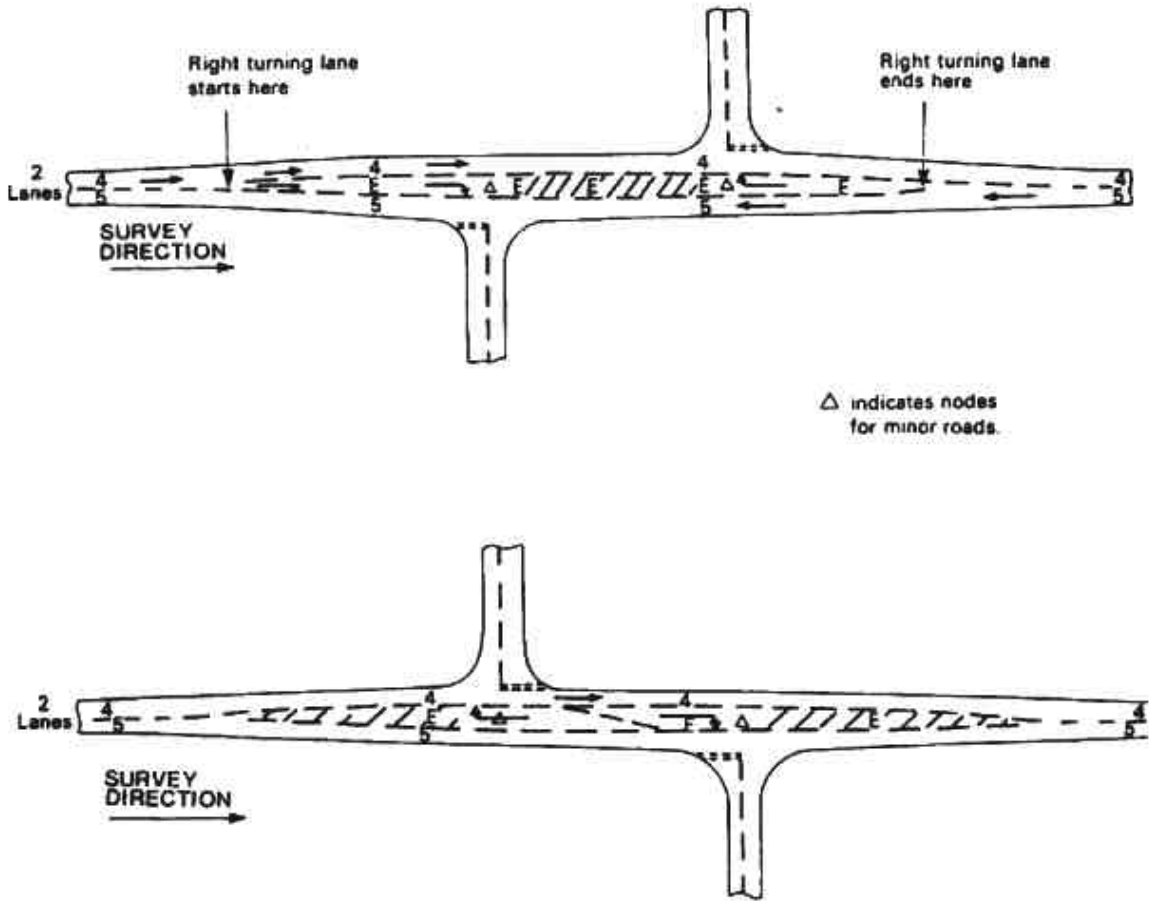

Right turning lane starts here
Right turning lane ends here
2 Lanes
SURVEY DIRECTION
△ indicates nodes for minor roads.
2 Lanes
SURVEY DIRECTION

Figure 6

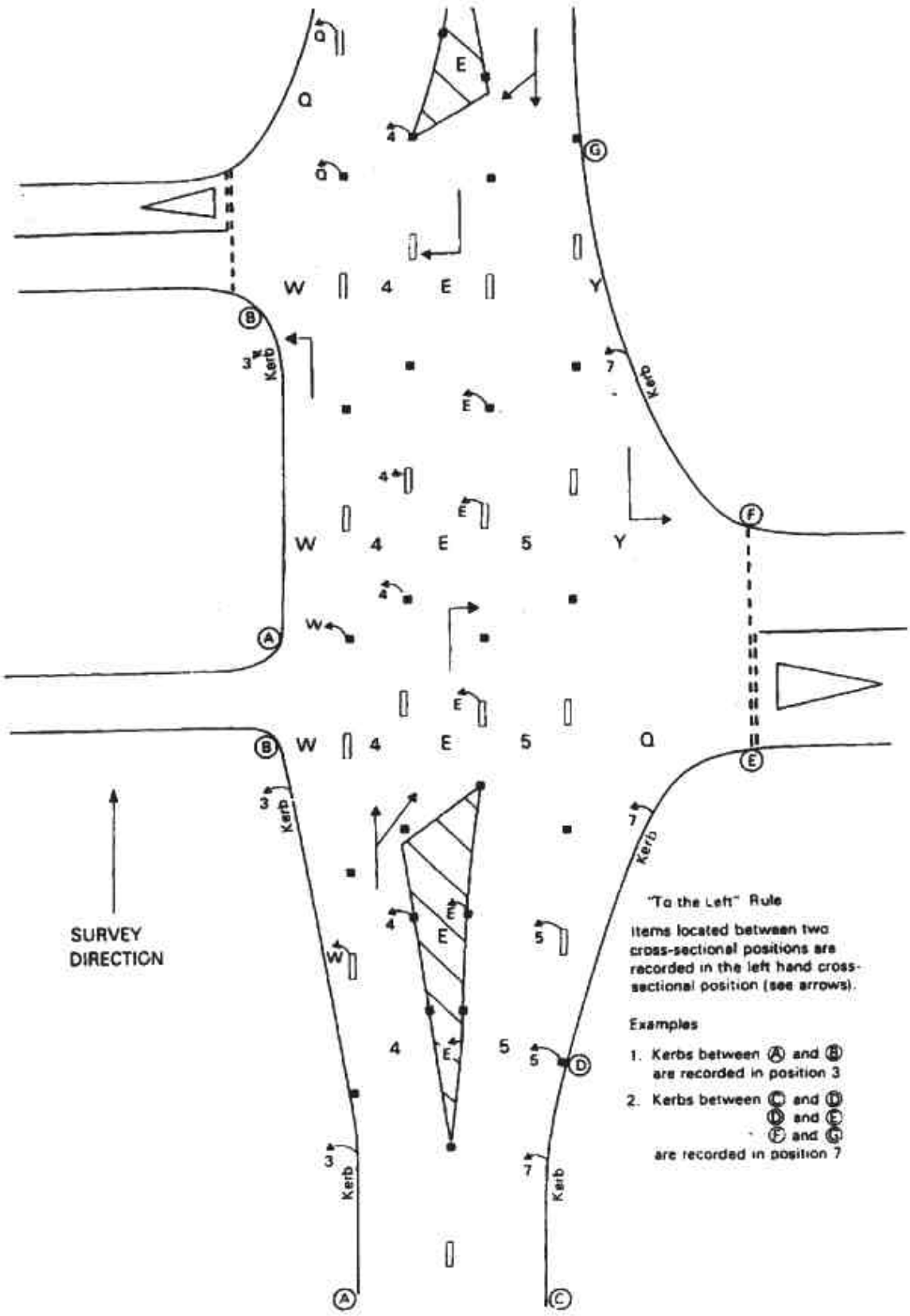
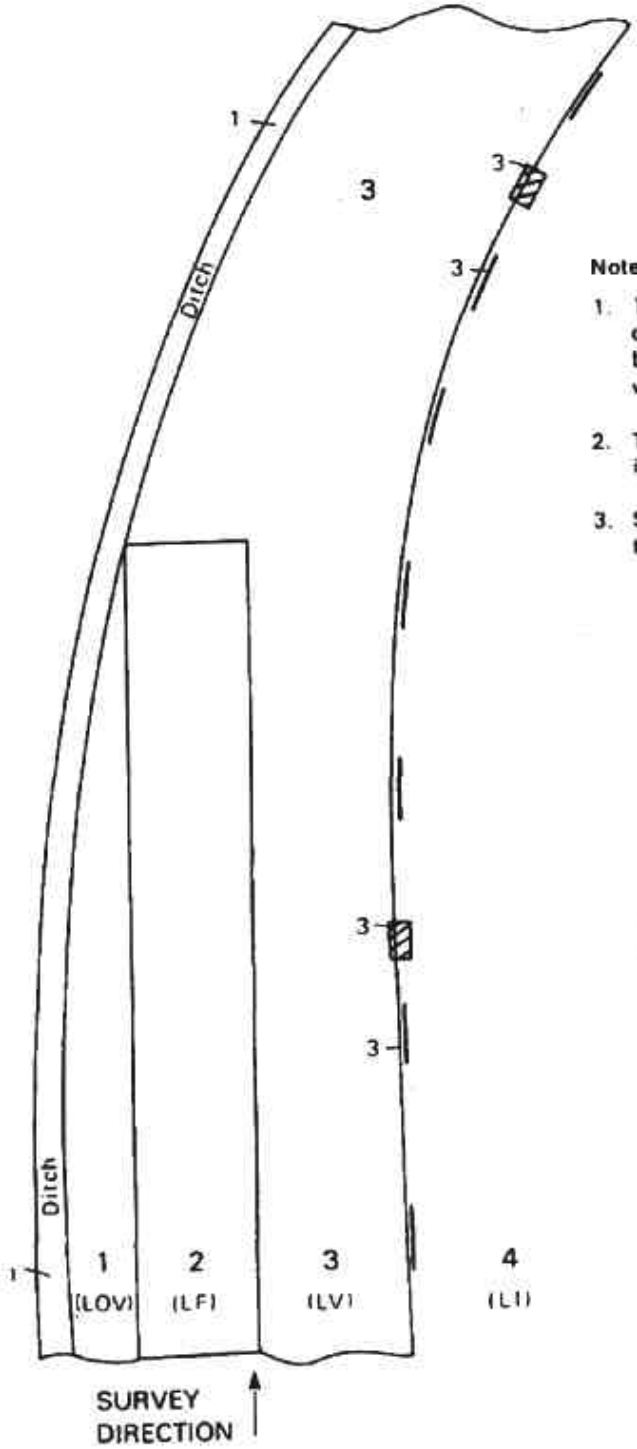

SURVEY DIRECTION
"To the Left" Rule
Items located between two cross-sectional positions are recorded in the left hand cross-sectional position (see arrows).
Examples
1. Kerbs between A and B are recorded in position 3
2. Kerbs between C and D
D and E
F and G
are recorded in position 7
Kerb
W
E
Y
Q

Figure 7

This example shows the Cross-Sectional Positions at the left hand side of a carriageway where a footway (2) ends a verge (3) has an increased width.



Notes:

1. The 'running' position of left verge retains its cross-sectional position until it ends but will be recorded as changing its width at the point where position 2 (LF) ends.
2. The ditch is recorded in position (LOV) until it ends.
3. Similar rules apply for the right hand side of the carriageway.

1 = Left outside verge
2 = Left footway
3 = Left verge
4 = Lane 1
= Gully

Figure 8

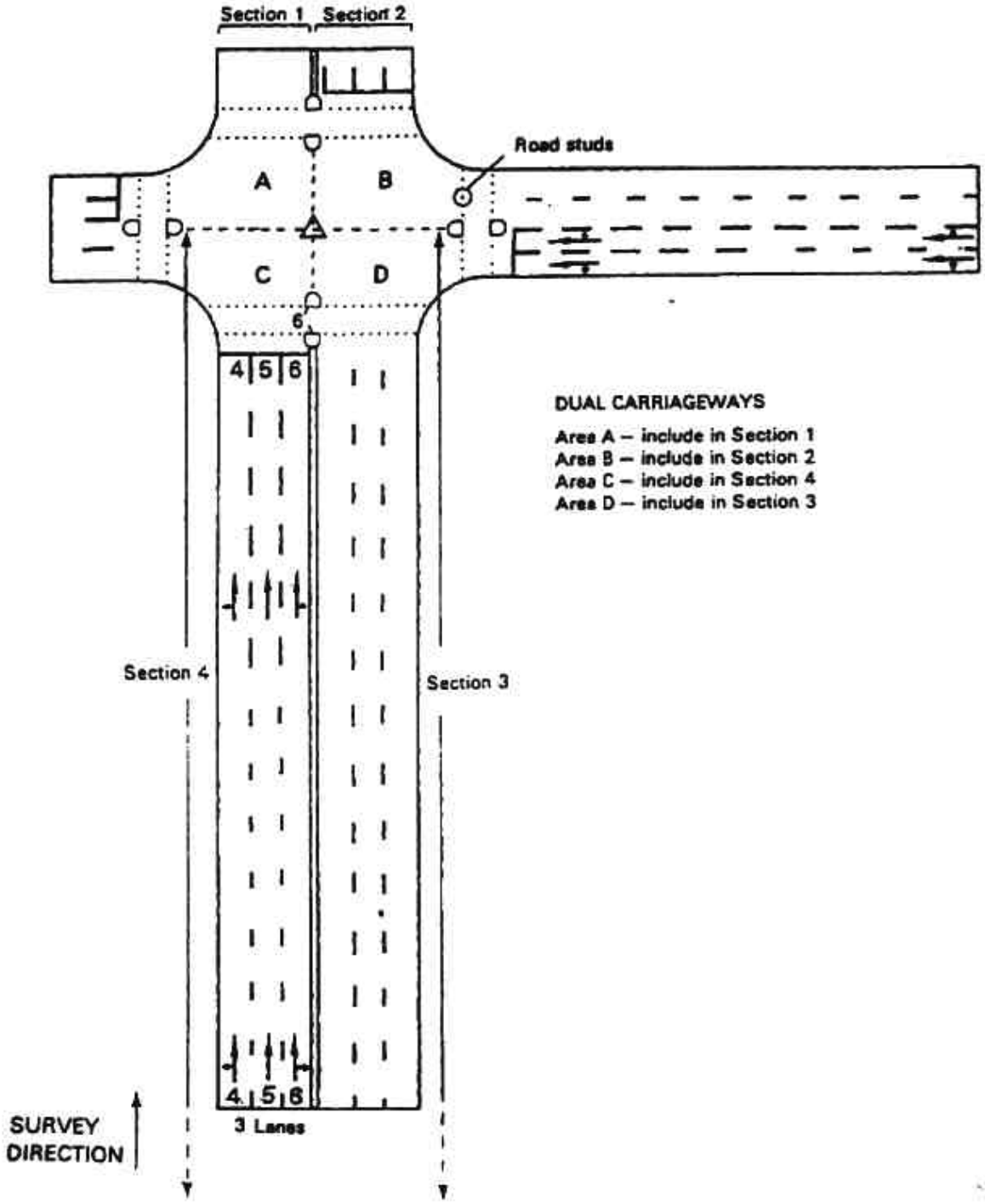

Section 1
Section 2
Road studs
A
B
C
D
6
4 5 6
DUAL CARRIAGEWAYS
Area A – include in Section 1
Area B – include in Section 2
Area C – include in Section 4
Area D – include in Section 3
Section 4
Section 3
4 5 6
3 Lanes
SURVEY DIRECTION

Figure 9

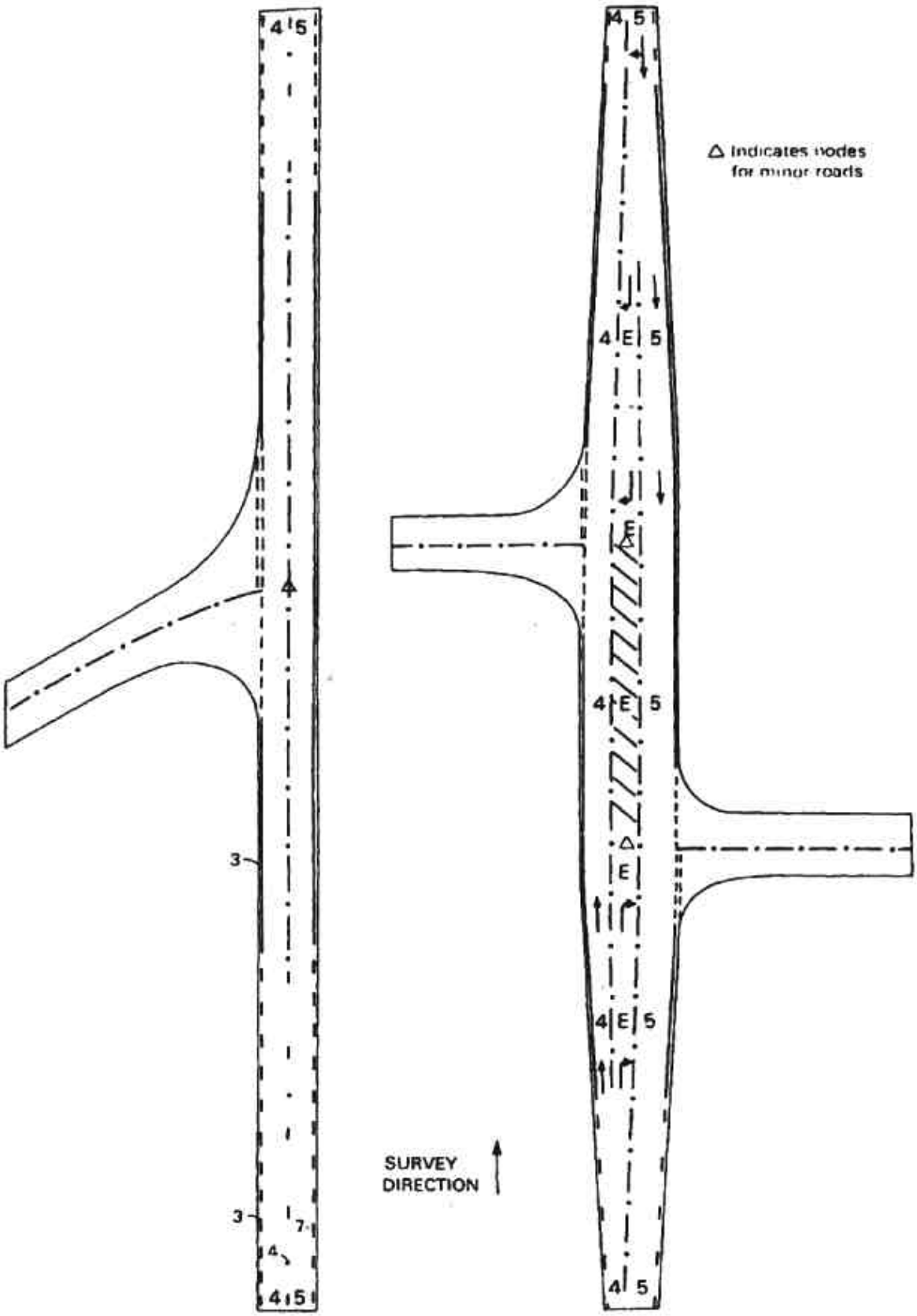


Figure 10

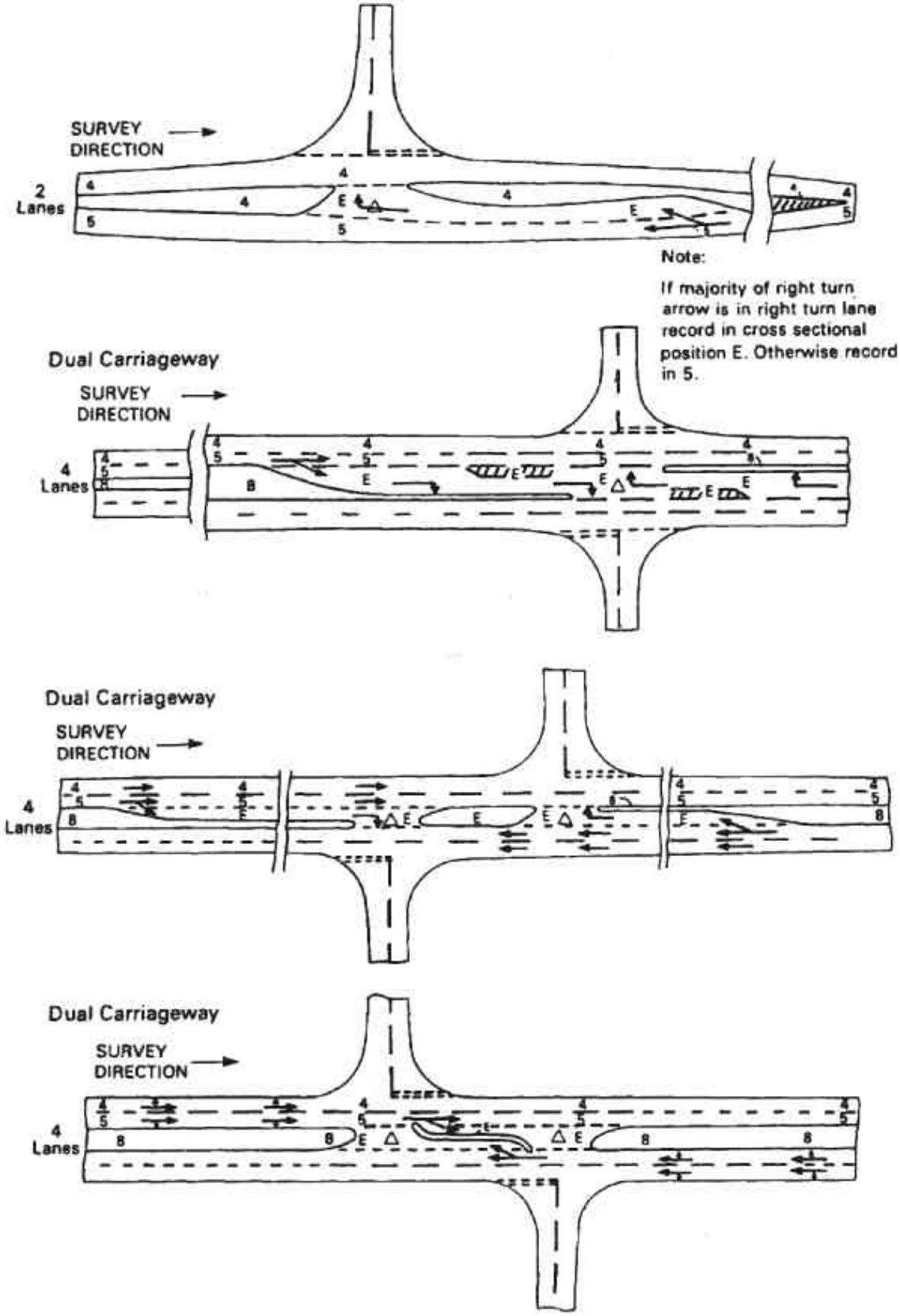

SURVEY DIRECTION
2 Lanes
Note:
If majority of right turn arrow is in right turn lane record in cross sectional position E. Otherwise record in 5.
Dual Carriageway
SURVEY DIRECTION
4 Lanes
Dual Carriageway
SURVEY DIRECTION
4 Lanes
Dual Carriageway
SURVEY DIRECTION
4 Lanes

Figure 11

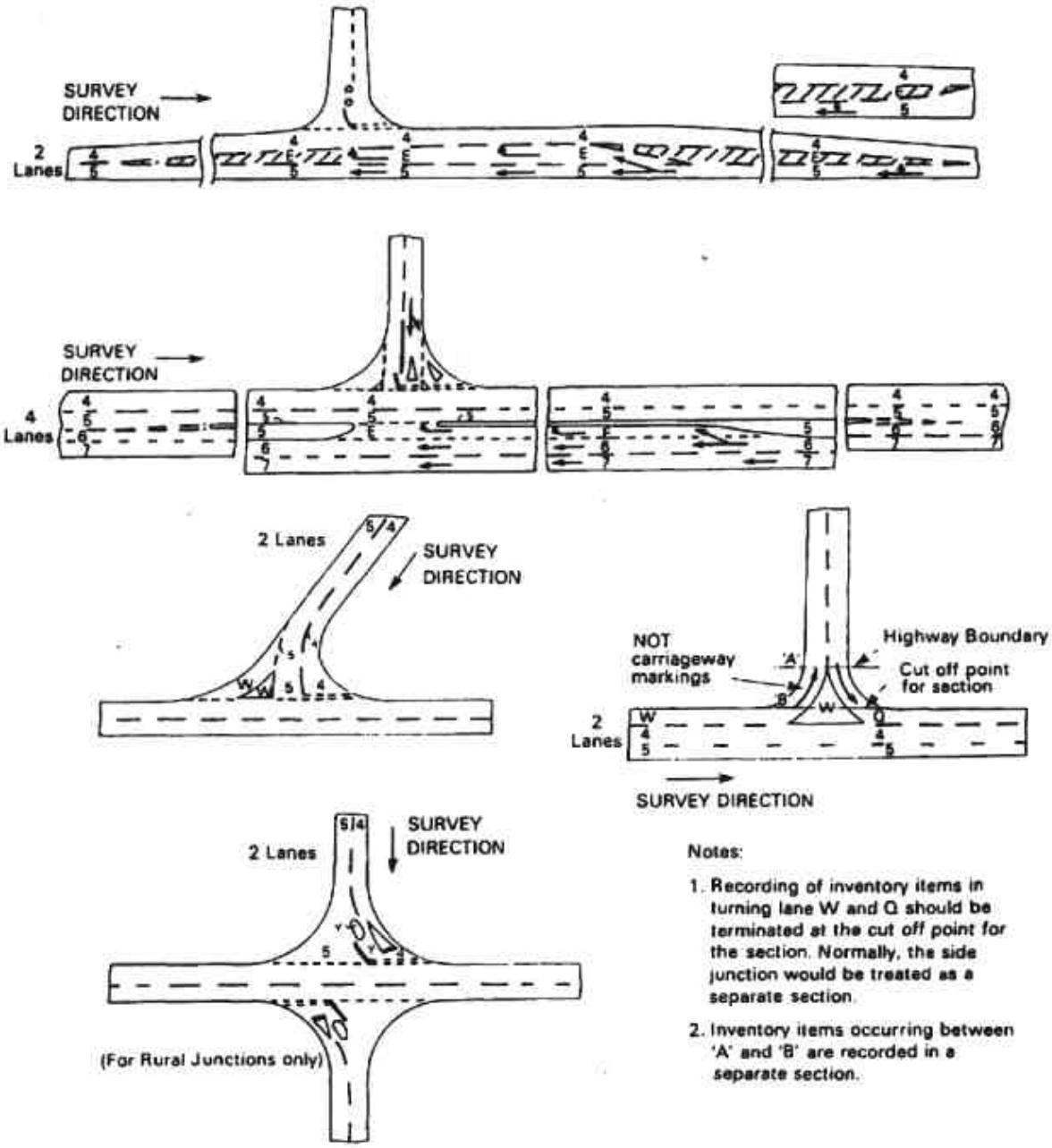

SURVEY DIRECTION
2 Lanes
SURVEY DIRECTION
4 Lanes
2 Lanes
SURVEY DIRECTION
NOT carriageway markings
Highway Boundary
Cut off point for section
2 Lanes
SURVEY DIRECTION
2 Lanes
SURVEY DIRECTION
(For Rural Junctions only)
Notes:
1. Recording of inventory items in turning lane W and Q should be terminated at the cut off point for the section. Normally, the side junction would be treated as a separate section.
2. Inventory items occurring between 'A' and 'B' are recorded in a separate section.

Figure 12

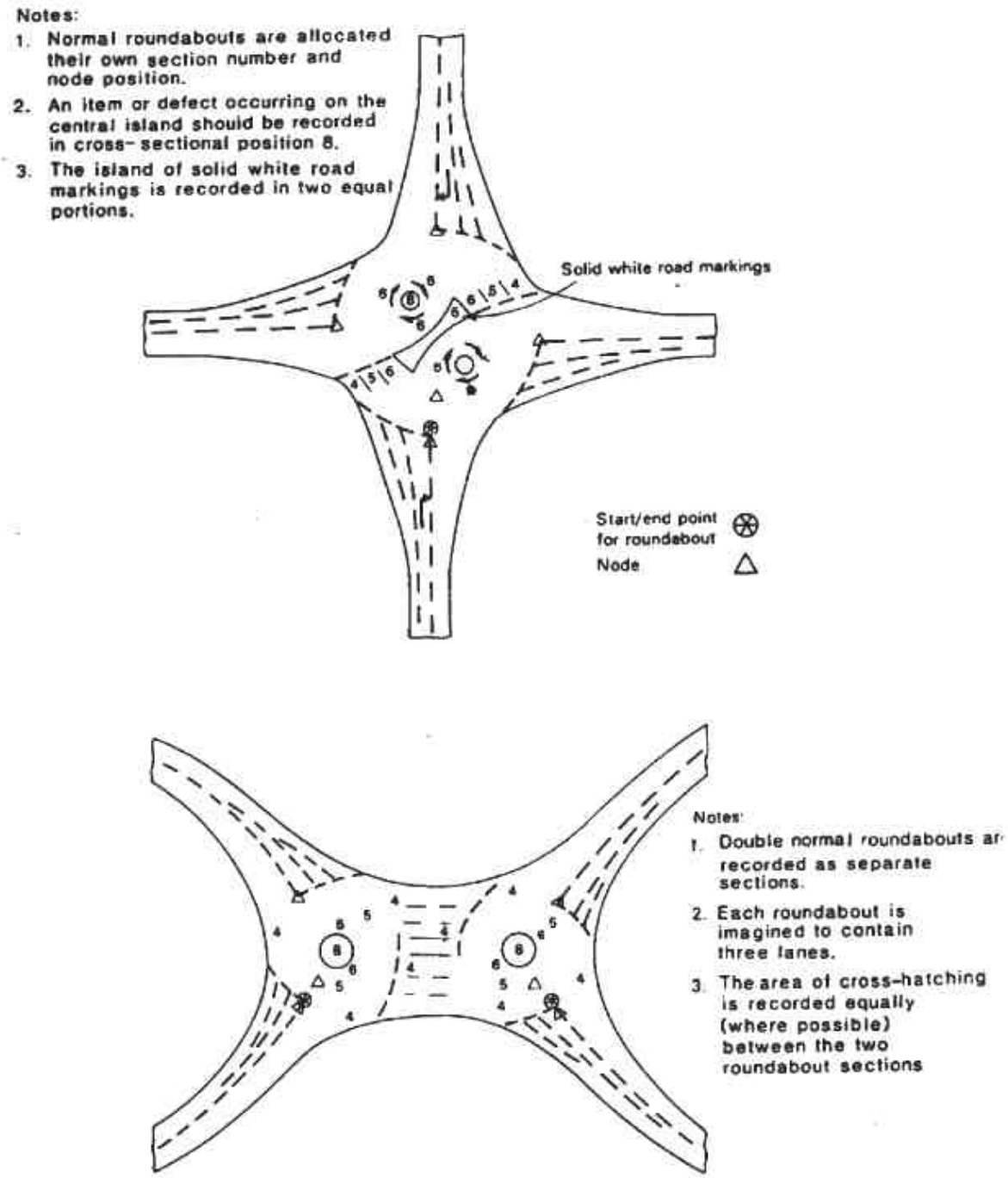

Notes:
1. Normal roundabouts are allocated their own section number and node position.
2. An item or defect occurring on the central island should be recorded in cross-sectional position 8.
3. The island of solid white road markings is recorded in two equal portions.
Solid white road markings
Start/end point for roundabout
Node
Notes:
1. Double normal roundabouts ar recorded as separate sections.
2. Each roundabout is imagined to contain three lanes.
3. The area of cross-hatching is recorded equally (where possible) between the two roundabout sections

Figure 13

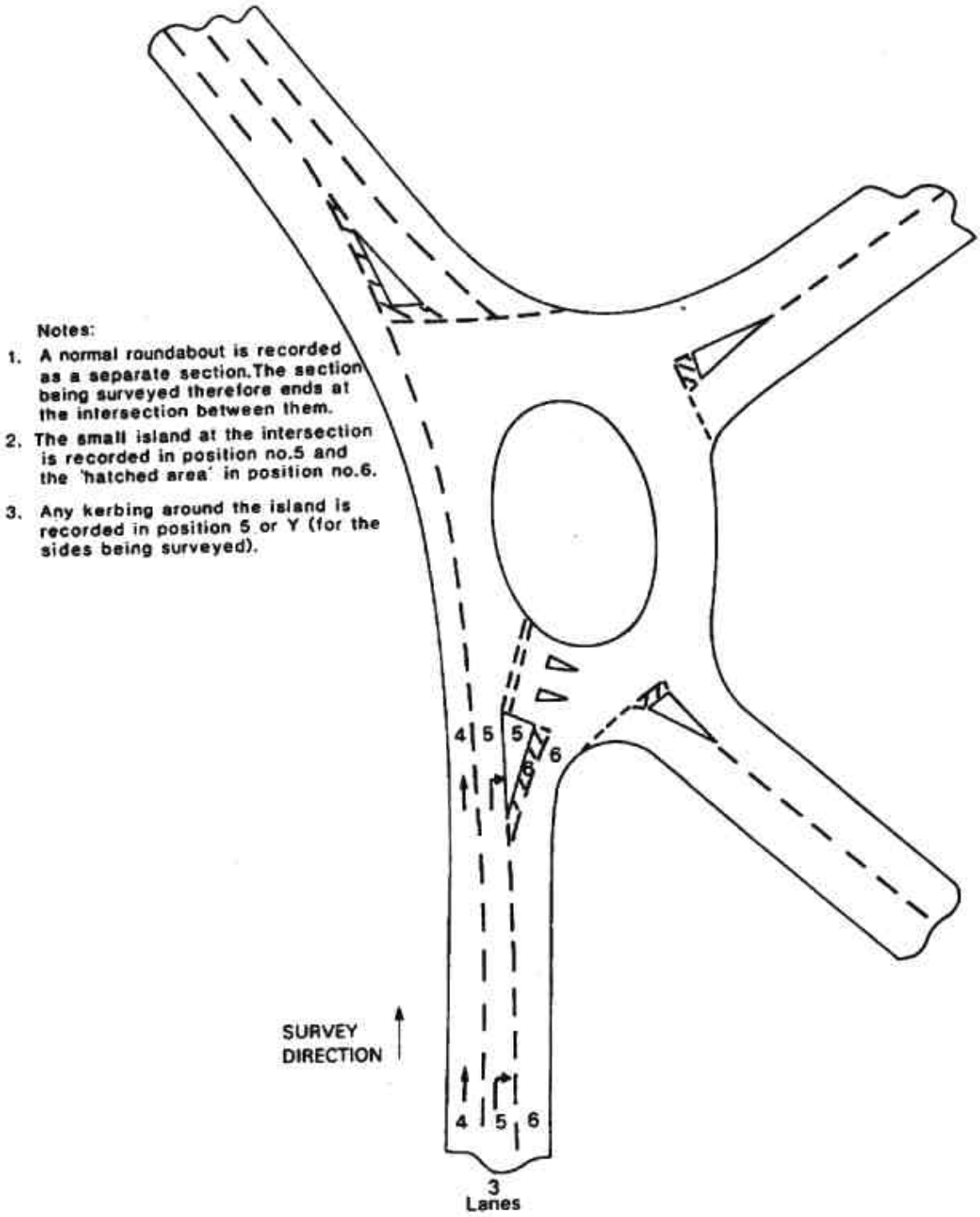

Notes:
1. A normal roundabout is recorded as a separate section. The section being surveyed therefore ends at the intersection between them.
2. The small island at the intersection is recorded in position no.5 and the 'hatched area' in position no.6.
3. Any kerbing around the island is recorded in position 5 or Y (for the sides being surveyed).
4 5 5 6 6
SURVEY DIRECTION
4 5 6
3 Lanes

Figure 14

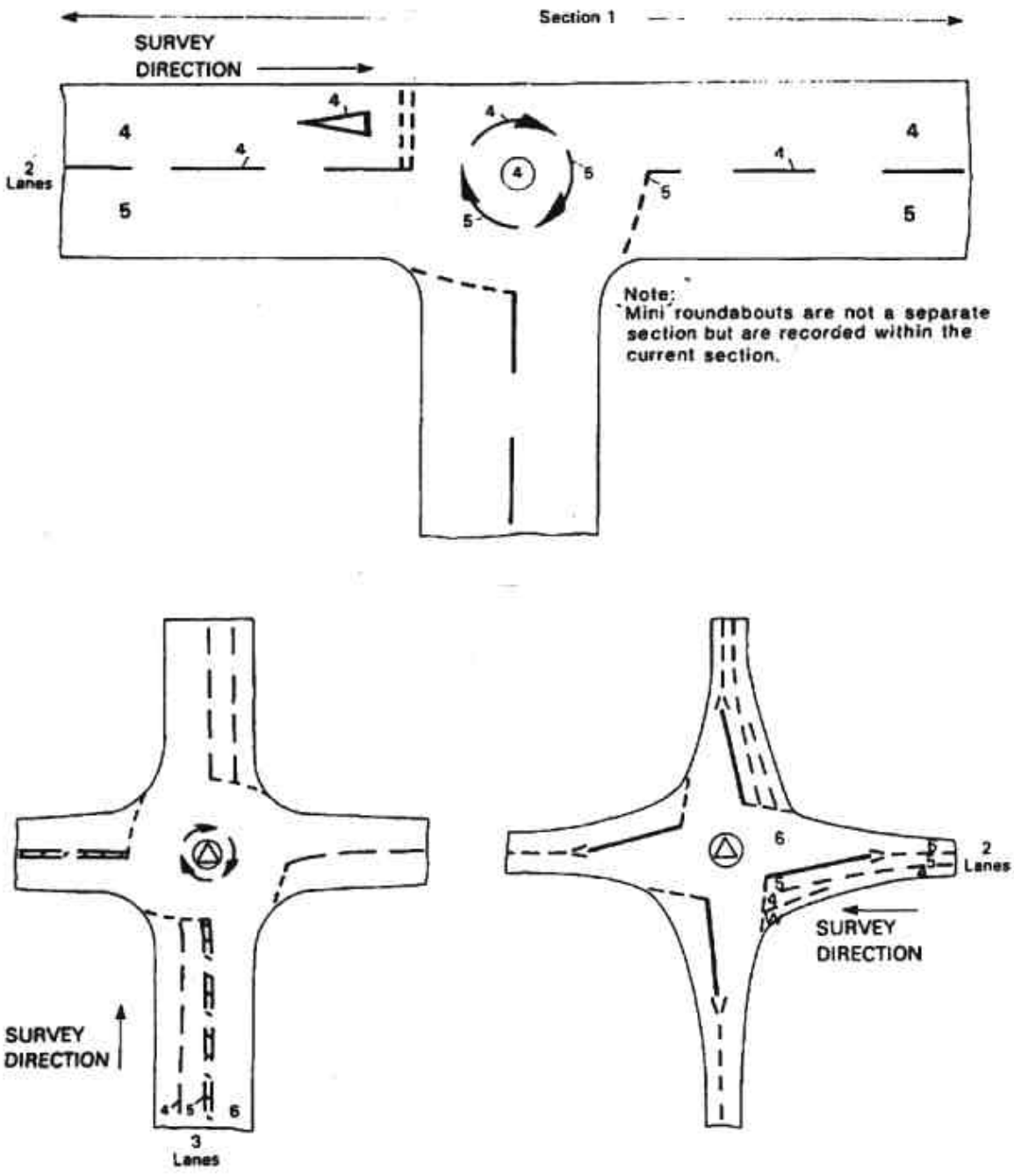

Section 1
SURVEY
DIRECTION
2
Lanes
Note:
Mini roundabouts are not a separate section but are recorded within the current section.
SURVEY
DIRECTION
3
Lanes
6
2
Lanes
SURVEY
DIRECTION

Figure 15

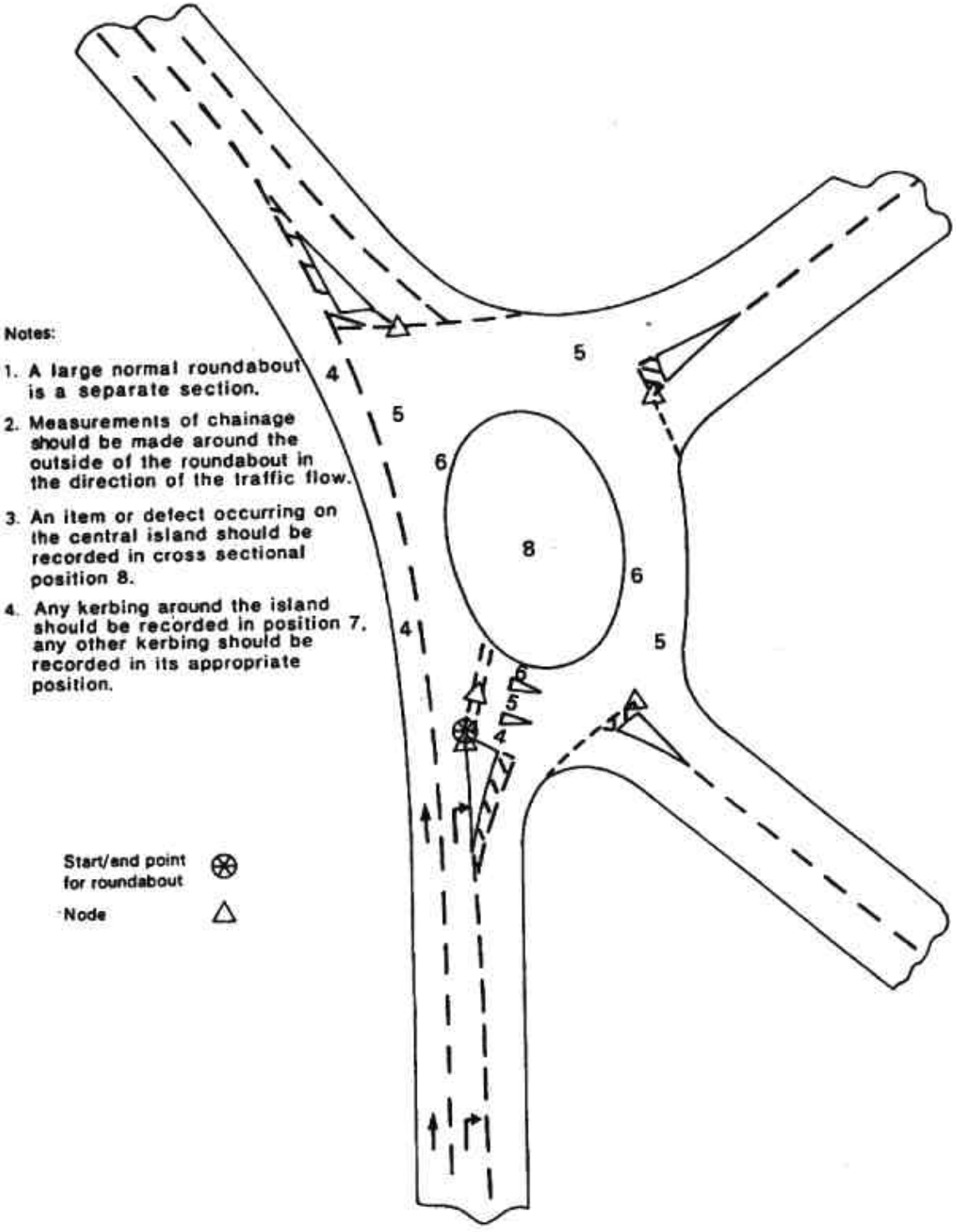

Notes:
1. A large normal roundabout is a separate section.
2. Measurements of chainage should be made around the outside of the roundabout in the direction of the traffic flow.
3. An item or defect occurring on the central island should be recorded in cross sectional position 8.
4. Any kerbing around the island should be recorded in position 7, any other kerbing should be recorded in its appropriate position.
Start/end point for roundabout
Node
4
5
6
8
6
5
5
4
6
5
4

Figure 16

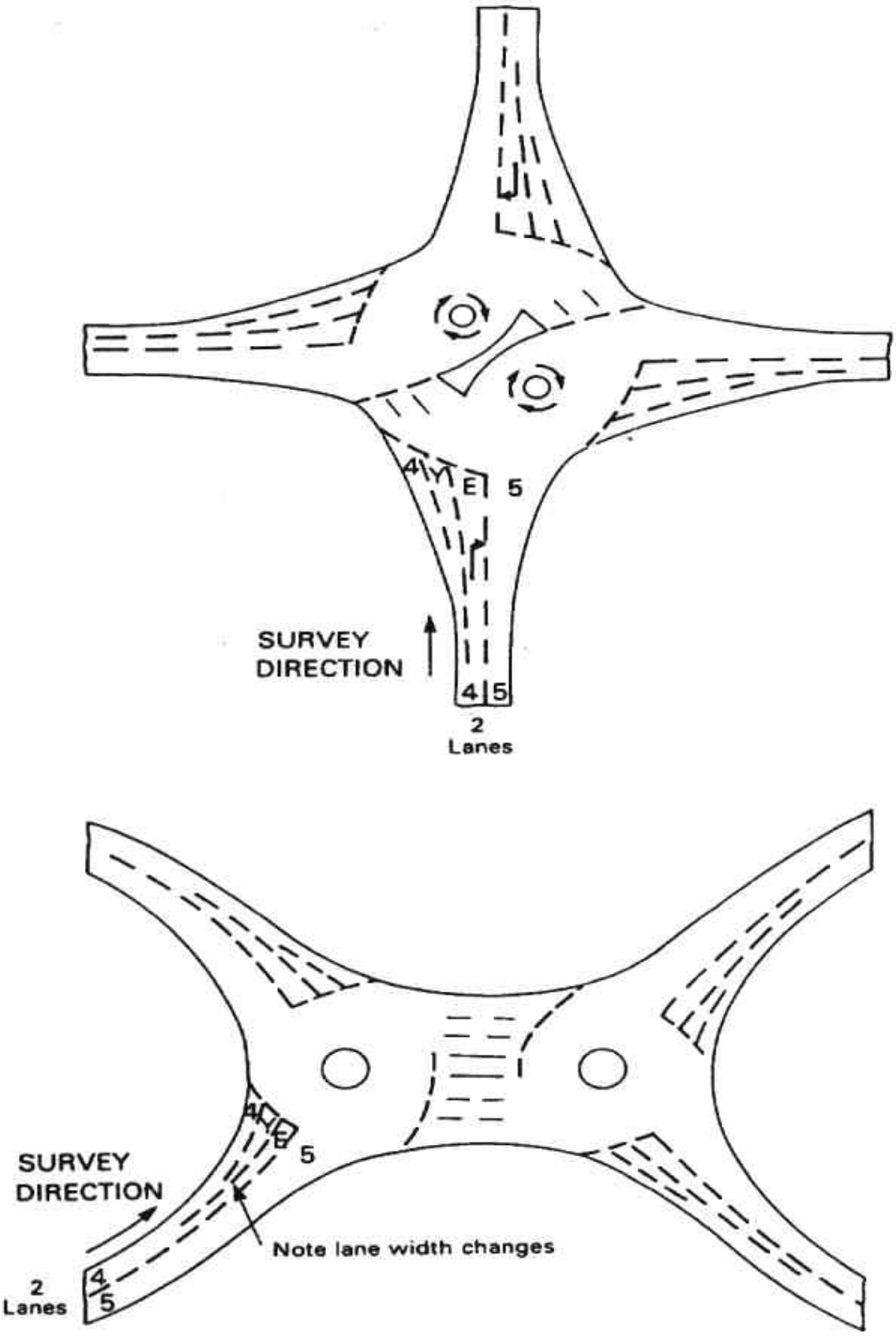

4
E
5
SURVEY
DIRECTION
4
5
2
Lanes
4
5
SURVEY
DIRECTION
Note lane width changes
2
Lanes
4
5

Figure 17

1.3 Survey Procedure

1.3.1 General

Once the network has been defined in terms of Links and Sections, inventory and inspection surveys may be undertaken.

There are a number of rules and conditions which should be applied when conducting surveys, as follows:

(i) In general, all chainage measurements should be made along the left-hand edge of the carriageway (hard shoulder on motorways) from start node to end node as specified in the RMMS database, in the direction of the traffic flow.

(ii) It is recommended that sections are surveyed in the direction of traffic flow but surveys in the reverse direction are supported by the system and may be used (e.g. for safety reasons). If a survey is carried out in the reverse direction to that specified by the start and end nodes in the RMMS database, i.e. against the traffic on dual carriageways and in the reverse direction on single lane roads, the cross-sectional positions must be entered facing the position at which the survey started (looking backwards).

(iii) The Inspector must be informed of the survey direction indicated by the RMMS database before starting his measurements.

(iv) An item or defect along the left-hand edge of the carriageway such as a kerb, channel block, gully or edge road marking should be recorded in the left-hand cross-sectional position 3. If these items occur along the right-hand edge of the carriageway they should be recorded in cross-sectional position 7 for up to 4 lanes and 'E' or 'R' for 5 and 6 lanes respectively.

(v) If an inventory item or a defect occurs at the boundary of two cross-sectional positions, it should be recorded in the cross-sectional key position to its left (the left-hand rule).

(vi) An item or defect on the left highway boundary should be recorded in the cross-sectional position immediately to its right (i.e. cross-sectional position 1).

(vii) As defined in the class / index details of the network referencing system, one section of a dual carriageway or motorway contains an asterisk (*). An item or defect therefore, which occurs in the central reserve of a dual carriageway or motorway and which is common to both sections **MUST** only be recorded in the nominated section.

Examples:

double guardrail	- record in nominated section
double bracket lamp column	- record in nominated section
single guardrail	- record in relevant section
single bracket lamp column	- record in relevant section
uni-directional sign	- record in relevant section
bridges	- record in nominated section

(viii) For items which require an identity code, an asterisk (*) should be entered if the identity code is not present or unreadable.

(ix) A large roundabout (not mini) is designated as a separate section and its start / end point will be identified. Measurements of chainage should be made around the outside of the roundabout in the direction of the traffic flow. An item or defect occurring on the central island should be recorded in cross-sectional position 8.

(x) Side junctions, bellmouth junctions and roundabouts should be defined as separate sections. Similarly, service roads and some redundant highway lay-bys may need to be treated as separate sections.

(xi) Any item outside the highway boundary, but adversely affecting the highway (e.g. overhanging trees) should be recorded under cross-sectional position 1 if on the left and cross-sectional position 0 if on the right.

(xii) It is not possible to have two identical continuous items running in the same cross-sectional position. Position Y should be used for one of them. In the case of point items, it is necessary to 'move' one item by 1 metre when recording chainage.

(xiii) On all but obvious 'constant cross section' roads such as motorways, widths should be checked at least every 100m and changes recorded. At every 100m ensure that all "clocked-on" items are still running, no new ones are present and unrecorded.

(xiv) All measurements of area calculated within RMMS are calculated as rectangles. Therefore, where the width of an area changes, an average measurement of width should be taken and entered at the start of the change.

(xv) All inventory items have an off-site entry to denote ownership. This entry may be either Highways Agency, County, District or Other.

1.3.2 Standard Procedures and Consistency

There are a number of guiding principles which will assist with the inventory and inspection surveys. It is important that all inventory items are recorded in a consistent way; to do this an inspector must be instructed clearly about the following:

(i) The start and end of the section.
(ii) Reverse direction.
(iii) Working systematically from left to right.
(iv) Following the inventory rules exactly.
(v) The maintenance requirements.
(vi) Carrying a notebook (unless a notebook facility is being used within the data capture device).

The Highway Maintenance Engineer should ensure that where there is any confusion (e.g. over cross-sectional positions), he is informed and ensures future surveys are consistent, possibly by the inclusion of text or diagrams in this manual.

The Code of Practice has been developed to encourage maintenance in a planned programme of works rather than random repairs; one of its aims is to achieve consistency. The following points should therefore be considered when an inspection survey is undertaken:

(i) Identify the activity first and then select the appropriate defect code.
(ii) Record the defect as seen, not the cause.
(iii) When deciding the defect category, cyclists, pedestrians and local circumstances should not be forgotten.
(iv) Record sufficient information for the repair to be carried out.

All surveys (other than Safety Patrols which have not identified any defects) should be recorded on a DCD and then down loaded into the RMMS database. The standard procedure to adopt when conducting a survey is as follows:

(i) Load the main survey program on to the DCD and run it.
(ii) Conduct the survey bearing in mind guiding principles previously described.
(iii) Transfer the recorded DCD data file onto tape, floppy disk or database.
(iv) Produce the listings if required.
(v) Clear the data file.
(vi) Repeat until surveying is complete.
(vii) Quit the program.

PART 2 - INVENTORY

CONTENTS

CONTENTS (continued)

Chapter

CONTENTS (continued)

Chapter

2.1 Introduction

2.1.1 General

Part 2 describes in detail those items on Motorways and all-purpose Trunk Roads which are to be recorded as inventory items within the RMMS database and subsequently inspected in accordance with the Code of Practice issued within the Highways Agency's Trunk Road Maintenance Manual: Volume 2.

Items identified during the inventory survey are entered into the data capture device and then downloaded onto the RMMS database.

Part 2 is divided into chapters, the numbering system corresponding to that used in Part 2 of the Trunk Road Maintenance Manual: Volume 2.

Inventory items are detailed within the most appropriate chapter; the information therein, includes:

(i) A definition or description of each item.
(ii) A schedule of details to be entered into the DCD, including details of units of measurement and ranges for data input.
(iii) Details of conventions which should be adopted in defining the item.
(iv) Rules which should be adhered to in defining the item.
(v) Where deemed appropriate, relevant photographs are included. The loose leaf format also enables individual MA's to insert additional photographs.

2.1.2 Additional Item Codes

The following are not inventory items but are items which may be selected from the DCD for specific purposes:

(i) Obstacle 'OB'

This item allows the number of obstacles to mowing operations such as sign posts to be recorded, hence giving the MA an indication of ease of maintenance.

Principally each verge that is selected within the DCD is provided with a counter. Once an obstacle to mowing is identified, the inspector may enter the item OB and update the counter accordingly. It should be noted that this only provides an indication of the total number of obstacles and not their locations.

The input procedure is described in greater detail within Chapter 2.10.

(ii) Lighting Point Repeat Facility 'LR'

This item has been provided for speeding up the recording of lighting point data where a series of identical lighting points occur within a section. It is described in greater detail in Chapter 2.19.

(iii) Notebook Facility 'NT'

This item has been provided to enable an inspector to record notes directly on the DCD; particularly inventory errors and extra inventory codes not defined in the RMMS, such as litter bins or seats. The notebook facility may be used to describe in more detail an inventory item. For example, gabions are recorded as "Retaining Wall - Other", the text "Gabion" may then be entered into the notebook.

When the code NT is entered as an inventory item code, the following menu is displayed:

1 = INVENTORY ERROR
2 = INSPECTORS NAME
3 = TIME (HHMM)
4 = EXTRA INVENTORY
5 = OTHER

Having selected one of the options 1 to 5 the inspector can then enter up to 40 characters of text as his note.

All notes are printed on the listings:

(i) at the position where they were noted on the Map Print,
(ii) at the beginning of each section of the Detailed Print.

2.1.3 Sign Dimensions

To simplify the entry of sign sizes a set of default dimensions, i.e. width and height, have been specified for triangular, rectangular and circular signs. They are listed in the DCD Software and can be changed by the user to meet his requirements.

Since the sign dimensions are recorded to the nearest 0.1m the width and heights listed cover a range of ±0.05m from the value stated. If a size does not conform to the default values the width and height should be entered directly when prompted for on the DCD.

The mounting height of a sign is defined as the height from the bottom of the sign to the road level.

2.1.4 Item Length

The inventory items in this Part are categorised as either 'Point' or 'Continuous'.

(i) Point items are those that occur at a specific location along the section and have virtually the same start and end chainage. A point item is located by its cross-sectional position, its chainage from the start of the section and its section identifier.

(ii) Continuous items are those that occur over a particular length and have a start and end chainage. A continuous item is located by its start and end chainage, section identifier and usually cross-sectional position (although there are some exceptions where the cross-sectional position is not required including transverse culverts, carriageway, bridges etc.).

2.1.5 Double Counting

In general when collecting inventory data, only the position of the end node should be recorded in the DCD to avoid double counting. However, it may be necessary to record the position of the start node if it would not otherwise be recorded (e.g. at the MA's boundary or on the exits from roundabouts).

Care should be taken to avoid double counting of other inventory items at start and end sections, e.g carriageway, lighting points, signs etc.

2.1.6 Inventory Survey Procedure

Survey Procedures to be adopted when undertaking an inventory survey are detailed in Chapter 1.3 of this Manual.

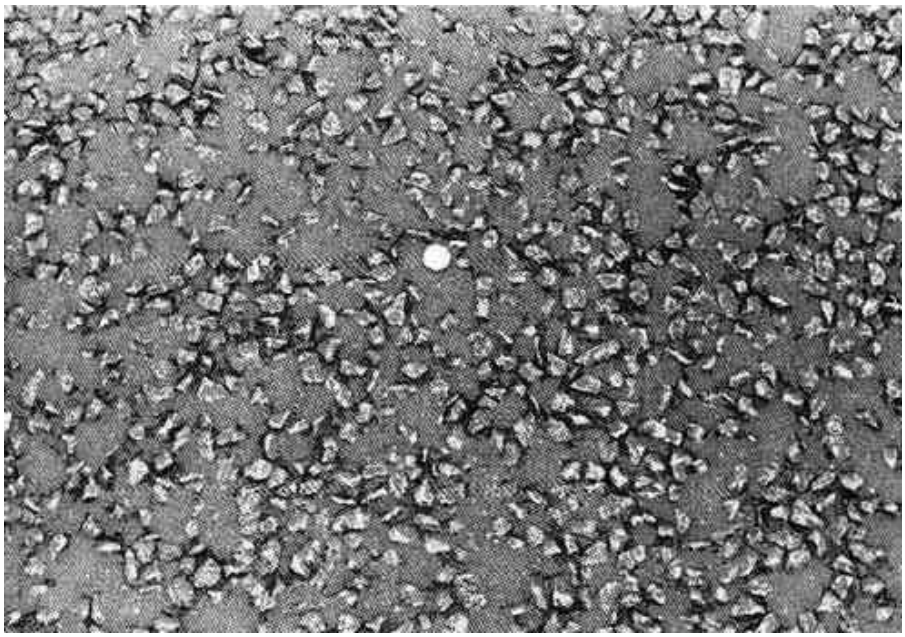
2.1.7 Intermediate

The Intermediate feature may be used to amend the details of a particular continuous inventory item whilst the item remains running. For example, where the carriageway surface type changes but the carriageway continues.

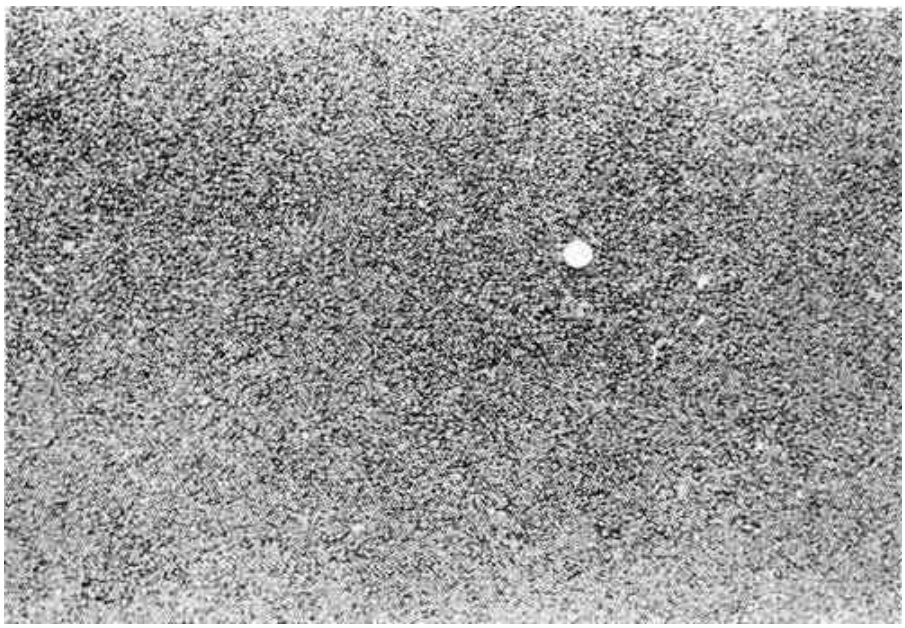
2.2 Surface Options

2.2.1 General

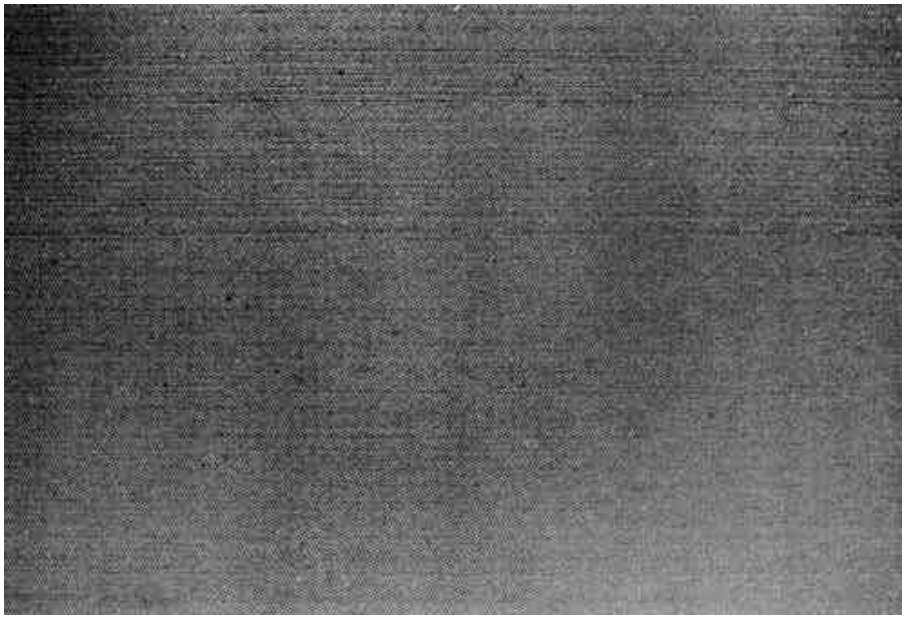
Throughout the inventory items listed in Part 2, reference is made to various surface options. The photographs included in this chapter are provided to assist in the identification of these surface types.



Photograph 2.2.1 Hot Rolled Asphalt (HRA)
A carpet of asphalt into which 14 or 20 mm nominal size chippings have been rolled.



Photograph 2.2.2 Bituminous Macadam (Bitmac)
An even mixture of stone, sand and bitumen (or tar) varying in nominal size from 6 to 40 mm.



Photograph 2.2.3 Concrete

Photograph 2.2.4 Surface Dressed
Single-sized chippings (sometimes pre-coated with bitumen) stuck to a road surface with a film of binder (bitumen, catonic emulsion, etc). The size can vary from 6 to 20 mm.

Photograph 2.2.5 Grass

Photograph 2.2.6 Gravel

Photograph 2.2.7 Concrete Flags

Photograph 2.2.8 Block Paving

Photograph 2.2.9 Unmade

2.3 Carriageway

2.3.1 Carriageway

That part of the road or highway constructed for use by vehicular traffic, but excluding hard shoulders, lay-bys and crossovers.

2.3.1.1 Input Details

Site Entries:

Item Code	{CW}		
Chainage	{----}	(To nearest metre)	
Surface	{--}	1 = Rolled Asphalt 2 = Bitmac 3 = Concrete	4 = Surfaced Dressed 10 = Other
Width	{----}	(To nearest 0.1 metres [0.0 < W < 99.9])	

2.3.1.2 Convention

A carriageway is defined as a continuous item with no cross-sectional position.

2.3.1.3 Rules

(i) Intermediate - use this entry when surface type or width changes but the carriageway continues.

(ii) Widths should be checked at least every 100m and changes recorded particularly when they are not obvious.

(iii) Slip roads entering the main carriageway section are separate sections. Their presence should be indicated by the crossover (XO) item. The width of the crossover is measured from the intersection of the slip road at right angle across its lane.

(iv) Areas of high skid resistant surfacing should be recorded using the notebook facility (NT).

2.3.1.4 Notes

For details of surface options see Chapter 2.2.

2.3.2 Hard Shoulder

A surfaced strip, usually of one traffic lane width, adjacent to and abutting a carriageway intended for use by vehicles in the event of difficulty or during obstruction of the carriageway.

2.3.2.1 Input Details

Site Entries:

Item Code	{HS}	
Cross-Sectional Position Function Keys	(See Section 1.2.5)	
Chainage	{----}	(To nearest metre)
Surface	{--}	1 = Rolled Asphalt 2 = Bitmac 3 = Concrete 4 = Surface Dressed 10 = Other
Width	{----}	(To nearest 0.1 metres [0.0 < W < 99.9])

2.3.2.2 Convention

A hard shoulder is defined as a continuous item.

2.3.2.3 Rules

(i) A hard shoulder is usually recorded in cross-sectional position 4.

(ii) Intermediate - use this entry when surface type or width changes but the hard shoulder continues.

2.3.2.4 Notes

For details of surface options see Chapter 2.2.

2.3.3 Lay-by

A part of the highway set aside for vehicles to draw out of the traffic lanes and wait for short periods.

2.3.3.1 Input Details

Site Entries:

Item Code	{LB}		
Cross-Sectional Position Function Keys	(See Section 1.2.5)		
Chainage	{----}	(To nearest metre)	
Surface	{--}	1 = Rolled Asphalt 2 = Bitmac 3 = Concrete	4 = Surface Dressed 8 = Block Paving 10 = Other
Width	{----}	(To nearest 0.1 metres [0.5 < W < 10.0])	

2.3.3.2 Convention

A lay-by is defined as a continuous item.

2.3.3.3 Rules

(i) A lay-by on the left should be recorded in the cross-sectional position of the verge, i.e. 3. A lay-by on the right should be recorded in cross-sectional position 7 for up to 4 lanes.

(ii) Intermediate - use this entry when surface type or width of the lay-by changes but the lay-by continues.

(iii) If the verge or footway terminates over the length of the lay-by, they should be “clocked off” and re-started on the other side of the lay-by if they are present.

2.3.3.4 Notes

For details of surface options see Chapter 2.2.

2.3.4 Crossover

A pedestrian or vehicular crossing of a footway, verge or central reserve. Includes minor junctions, driveways, field entrances and central reserve crossovers.

2.3.4.1 Input Details

Site Entries:

Item Code	{XO}		
Cross-Sectional Position Function Keys	(See Section 1.2.5)		
Chainage	{----}	(To nearest metre)	
Surface	{--}	1 = Rolled Asphalt 2 = Bitmac 3 = Concrete 4 = Surface Dressed	5 = Grass 6 = Gravel 10 = Other
Width	{----}	(To nearest 0.1 metres [0.1 < W <99.9])	
Text	{----------}	(20 Characters maximum)	
Sweeping Method	{-}	1 = Machine 2 = Hand	3 = No Sweeping

2.3.4.2 Convention

A crossover is defined as a point item.

2.3.4.3 Rules

(i) A crossover should be recorded in the cross-sectional position that is actually crossed, ie the verge, footway, etc.

(ii) A crossover occurs when the surface type is different to the surface of the item crossed.

(iii) Continuous items which are crossed should **NOT** be “clocked off” by the inventory program.

(iv) A text entry (maximum 20 characters) to describe the crossover is required (eg factory entrance).

(v) Central reserve crossovers should be recorded even when barriers are present to prevent the passage of vehicles.

(vi) A crossover should be used to indicate slip roads abutting the carriageway (see section 2.3.1.3).

2.3.4.4 Notes

For details of surface options see Chapter 2.2.

2.3.5 Central Island

An obstruction in the highway to split traffic into lanes and / or to provide a pedestrian refuge.

2.3.5.1 Input Details

Site Entries:

Item Code	{CI}		
Cross-Sectional Position Function Keys	(See Section 1.2.5)		
Chainage	{----}	(To nearest metre)	
Surface	{--}	1 = Rolled Asphalt	6 = Gravel
		2 = Bitmac	8 = Blocks
		3 = Concrete	10 = Other
		5 = Grass	
Width	{----}	(To nearest 0.1 metres [0.1 < W < 99.9])	

2.3.5.2 Convention

A central island is defined as a continuous item.

2.3.5.3 Rules

(i) Intermediate - use this entry only when either the surface type or width of the island changes but the island continues.

(ii) A central island should be recorded in the cross-sectional key position of the lane immediately adjacent on its left-hand side.

(iii) The width of a central island should be the “average” width. If distinct changes in width occur intermediate measurements should be recorded.

(iv) Other inventory items situated on a central island should be allocated the same cross-sectional position as the island. On single lane roads the right-hand kerb of the island should be recorded with cross-sectional position Y if a right-hand carriageway kerb exists.

(v) Hatched road markings associated with a central island are a separate inventory item (see section 2.16.1).

(vi) Central islands constructed in two parts with a pedestrian refuge should be treated as a single inventory item. If information about the pedestrian refuge (eg surface type) is required, use crossover (XO) to record the details.

(vii) A roundabout not defined as a separate section should be treated as a central island.

(viii) A mini roundabout with a raised centre should be regarded as a central island. However, a mini roundabout without a raised centre should be regarded as transverse and special road markings (see section 2.16.3).

(ix) The maintainable grass width of a central island (if required) can be recorded using the verge item (Chapter 2.10).

2.3.5.4 Notes

For details of surface options see Chapter 2.2.

2.3.6 Central Reserve

An area that separates the carriageways of a dual carriageway road.

2.3.6.1 Input Details

Site Entries:

Item Code	{CR}		
Cross-Sectional Position Function Keys	(See Section 1.2.5)		
Chainage	{----}	(To nearest metre)	
Surface	{--}	1 = Rolled Asphalt	5 = Grass
		2 = Bitmac	6 = Gravel
		3 = Concrete	8 = Blocks
		4 = Surface Dressed	10 = Other
Width	{----}	(To nearest 0.1 metres [0.1 < W < 99.9])	

2.3.6.2 Convention

A central reserve is defined as a continuous item.

2.3.6.3 Rules

(i) A central reserve should be recorded in the cross-sectional position 8 and in the nominated section (*).

(ii) Intermediate - use this entry when either the surface type or width of the central reserve changes but the reserve continues.

(iii) The width of a central reserve should be the “average” width. If distinct changes in width occur, intermediate measurements should be recorded.

(iv) Other inventory items situated on a central reserve should be allocated the same cross-sectional position as the reserve.

(v) An item which occurs in the central reserve of dual carriageways and motorways and which is common to both sections **MUST** be recorded in the nominated section only, indicated by an asterisk (*) in the class/index details of the network referencing system.

An item distinctly associated with both directions (e.g. single safety fences with separate posts) should be recorded in the section to which it applies.

(vi) Hatched road markings associated with a central reserve are a separate inventory item.

(vii) When the central reserve is crossed by a crossover (XO) it is allowed to continue and not "clocked off" by the inventory program. Thus crossover is used to record a change of surface which avoids termination and re-commencement of the central reserve.

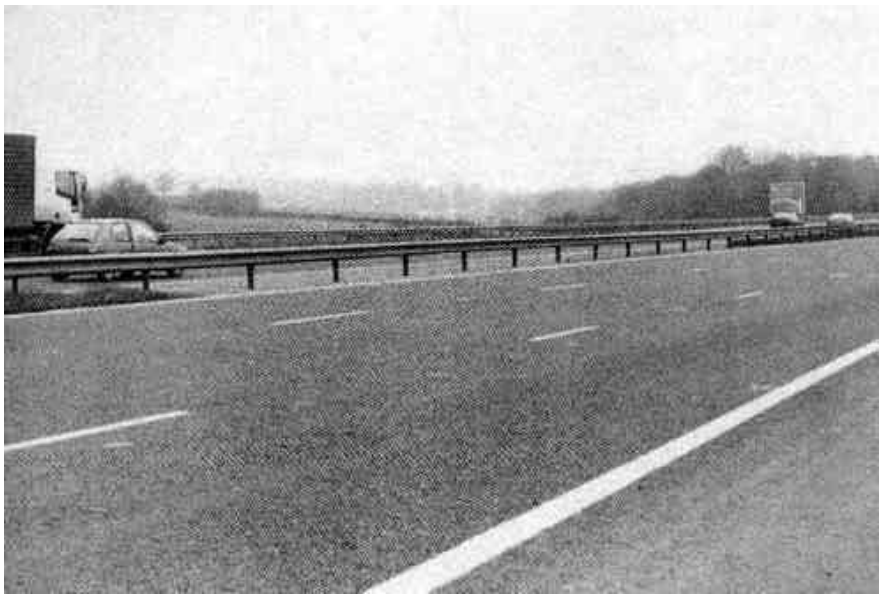
(viii) The maintainable grass width of a central reserve (if required) can be recorded using the verge item (see Chapter 2.10).

2.3.6.4 Notes

For details of surface options see Chapter 2.2.

Photograph 2.3-1: Hard Shoulder

Photograph 2.3-2: Lay -by



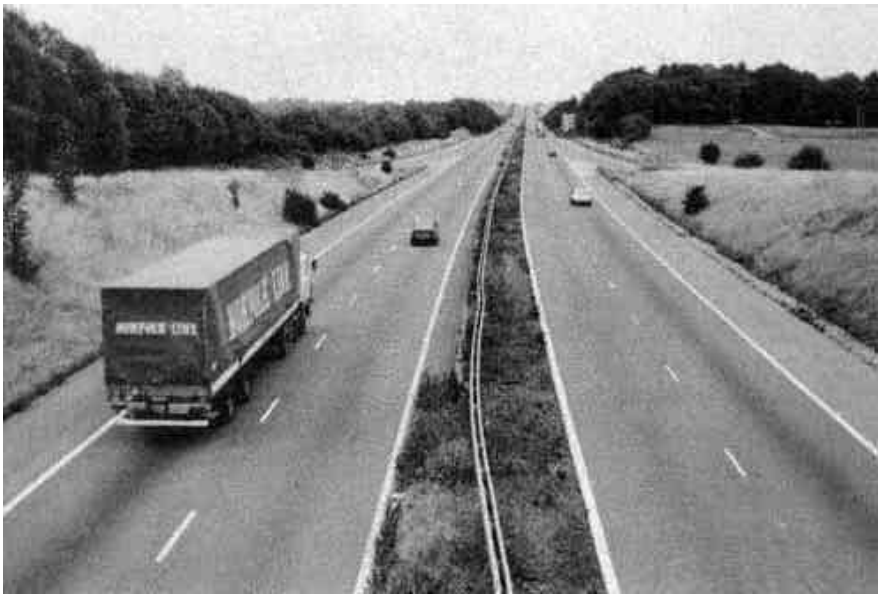
Photograph 2.3-3: Crossover

Photograph 2.3-4: Crossover

Photograph 2.3-5: Crossover

Photograph 2.3-6: Central Island

Photograph 2.3-7: Central Island



Photograph 2.3-8: Central Reserve

2.4 Footways and Cycle Tracks

2.4.1 Footway

A part of the highway reserved exclusively for pedestrians.

2.4.1.1 Input Details

Site Entries:

Item Code	{FW}		
Cross-Sectional Position Function Keys	(See Section 1.2.5)		
Chainage	{----}	(To nearest metre)	
Surface	{--}	1 = Rolled Asphalt 2 = Bitmac 3 = Concrete 4 = Surface Dressed	7 = Concrete Flags 8 = Block Paving 10 = Other
Width	{----}	(To nearest 0.1metres [0.5 < W < 99.9])	
Sweeping Method	{-}	1 = Machine 2 = Hand	3 = No Sweeping

2.4.1.2 Convention

A footway is defined as a continuous item.

2.4.1.3 Rules

(i) A footway is usually recorded in cross-sectional position 2 when on the left and position 9 when on the right of the carriageway.

(ii) Intermediate - use this entry when surface type width or the sweeping type changes but the footway continues.

(iii) When a footway is crossed by a crossover (XO) it is allowed to continue and not “clocked off” by the inventory program. Thus crossover is used to record a change of surface which avoids termination and re-commencement of the footway.

(iv) The normal requirement is that trunk road footways shall not be swept by the MA (refer to the Trunk Road Maintenance Manual: Volume 2, Chapter 1.12 for details), in this case enter code 3 = NONE for sweeping method.

(v) When a footway and cycle track occur together, the item which has the principal use takes priority, and no entry is required for the other item. If in doubt, the entry for FW takes priority.

2.4.1.4 Notes

For details of surface options see Chapter 2.2.

2.4.2 Cycle Track

A part of the highway reserved specifically for the use of pedal cycles.

2.4.2.1 Input Details

Site Entries:

Item Code	{CT}		
Cross-Sectional Position Function Keys	(See Section 1.2.5)		
Chainage	{----}	(To nearest metre)	
Surface	{--}	1 = Rolled Asphalt 2 = Bitmac 3 = Concrete	4 = Surface Dressed 10 = Other
Width	{----}	(To nearest 0.1 metres [1.0 < W < 10.0])	

2.4.2.2 Convention

A cycle track is defined as a continuous item.

2.4.2.3 Rules

(i) A cycle track is either recorded in the cross-sectional position of the footway or as part of a highway lane.

(ii) Intermediate - use this entry when surface or width changes but the cycle track continues.

(iii) When a cycle track is crossed by a crossover (XO) it is allowed to continue and not “clocked off” by the inventory program. Thus crossover is used to record a change of surface which avoids termination and re-commencement of the cycle track.

(vi) When a cycle track and footway occur together, the item which has the principal use takes priority, and no entry is required for the other item. If in doubt, the entry for FW takes priority.

2.4.2.4 Notes

For details of surface options see Chapter 2.2.

Photograph 2.4-1: Footway

Photograph 2.4-2: Cycle Track

2.5 Covers, Gratings, Frames and Boxes

2.5.1 General

The inventory items relating to covers, gratings, frames and boxes are described within Chapter 2.7, Highway Drainage, in the following sections:

Item	Section
Gully	2.7.1
Interceptor	2.7.2
Catchpit	2.7.3
Manhole	2.7.4
Piped Grip	2.7.5

2.6 Kerbs, Edgings and Pre-formed Channels

2.6.1 Kerb

A border, usually upstanding, of natural or man-made material at the edge of a carriageway or hard shoulder.

2.6.1.1 Input Details

Site Entries:

Item Code	{KB}		
Cross-Sectional Position Function Keys	(See Section 1.2.5)		
Chainage	{----}	(To nearest metre)	
Material	{-}	1 = Concrete 2 = Natural Stone	3 = Extruded Asphalt 4 = Other
Type	{-}	1 = Normal 2 = Safety Kerb	3 = Other

2.6.1.2 Convention

A kerb is defined as a continuous item.

2.6.1.3 Rules

(i) Kerbs located on the left-hand side of the carriageway are recorded in cross-sectional position 3. Those on the right-hand edge of the carriageway should be recorded in position 7 for up to 4 lanes and position E or R for 5 and 6 lanes respectively.

(ii) Intermediate - use this entry when surface type or width changes but the hard shoulder continues.

(iii) When a kerb is crossed by a crossover (XO) it is allowed to continue and not “clocked off” by the inventory program.

(iv) A combined kerb and drainage unit should **NOT** be recorded under this item. It should be recorded under the inventory item Channel, (see section 2.6.2).

2.6.2 Channel

A narrow **longitudinal** strip, generally near the edge of the carriageway, constructed to carry and lead away surface water.

2.6.2.1 Input Details

Site Entries:

Item Code	{CH}		
Cross-Sectional Position Function Keys	(See Section 1.2.5)		
Chainage	{----}	(To nearest metre)	
Block Type	{-}	1 = Continuous Concrete	4 = Metal Grating
		2 = Pre-formed Concrete Blocks	5 = Comb. Kerb & Channel
		3 = Natural Stone	6 = Other

2.6.2.2 Convention

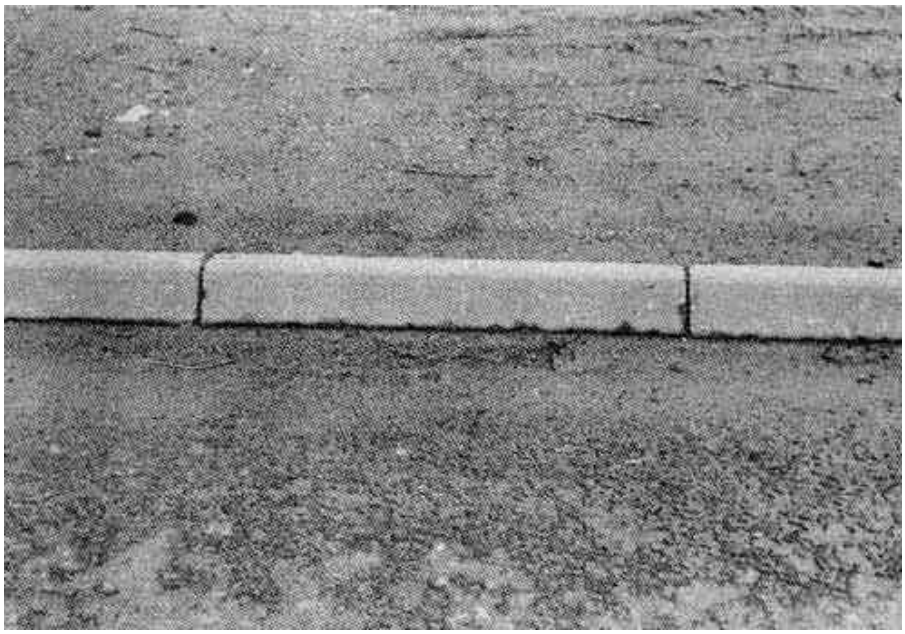
A channel is defined as a continuous item.

2.6.2.3 Rules

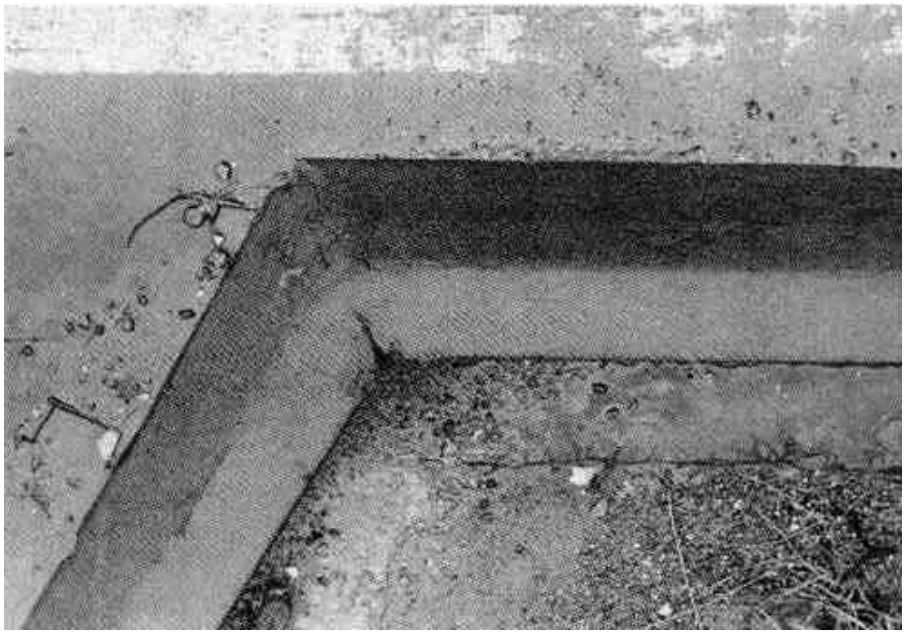
(i) Channels should always be recorded in cross-sectional position 3 if they are along the left-hand edge of the carriageway and cross-sectional position 7 if they are on the right for up to 4 lanes. Cross-sectional positions E or R are used for 5 and 6 lanes respectively.

(ii) Intermediate - use this entry when the channel type changes but the channel continues.

(iii) A lined channel not running parallel to the carriageway is recorded under the inventory item grip (see section 2.7.6).



Photograph 2.6-1: Kerb - Concrete

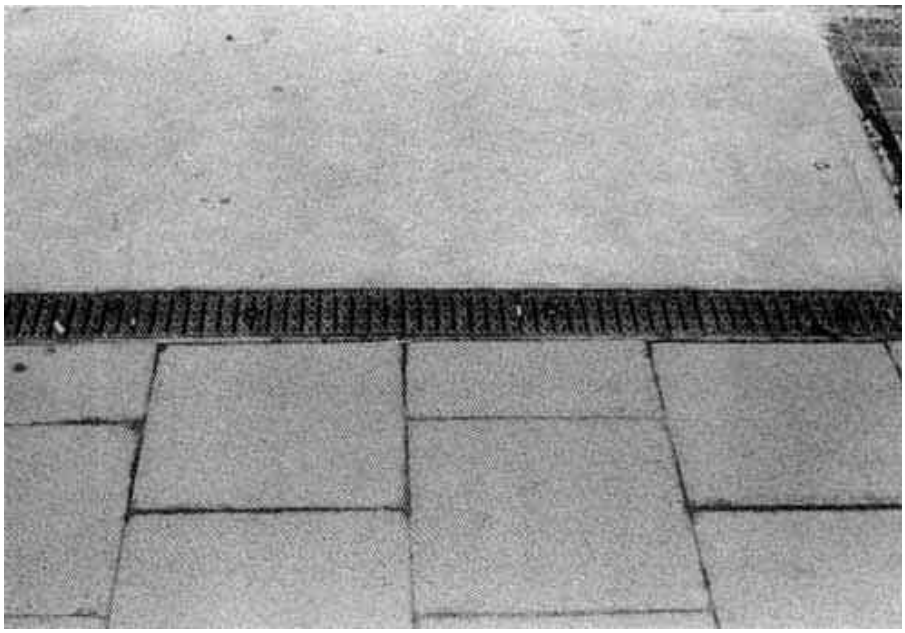


Photograph 2.6-2: Kerb - Extruded Asphalt

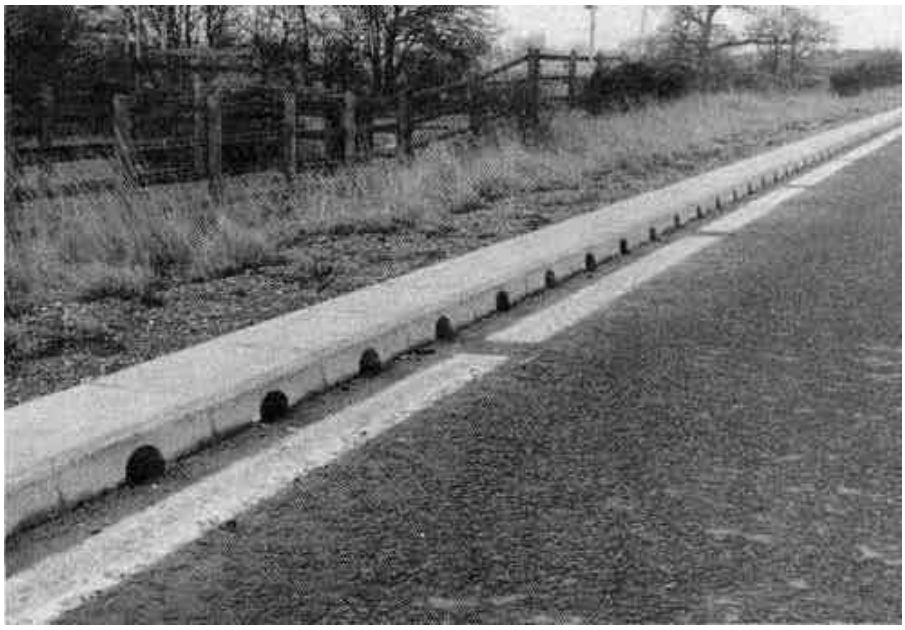
Photograph 2.6-3: Kerb - Safety

Photograph 2.6-4: Channel - Continuous Concrete

Photograph 2.6-5: Channel - Pre-formed Concrete Blocks



Photograph 2.6-6: Channel - Metal Grating



Photograph 2.6-7: Combined Kerb and Channel

Photograph 2.6-8: Combined Kerb and Channel

2.7 Highway Drainage

2.7.1 Gully

A chamber at the side of the road connected to a drainage system to receive surface water and to trap debris. The chamber is usually surmounted by a grating.

2.7.1.1 Input Details

Site Entries:

Item Code	{GY}	
Cross-Section Position	Function Keys	(See Section 1.2.5)
Chainage	{----}	(To nearest metre)
Type	{----}	(Alphanumeric - See Rule (vi))

2.7.1.2 Convention

A gully is defined as a point item.

2.7.1.3 Rules

(i) Gullies located on the left-hand edge of the carriageway should be recorded in position 3. Those on the right-hand edge of the carriageway should be recorded in position 7 for up to 4 lanes and position E or R for 5 lanes and 6 lanes respectively.

(ii) A gully which occurs in a central reserve and collects water from both carriageways (e.g. at a crossover), should be recorded in cross-sectional position 8 but **ONLY** in the nominated section, indicated by an asterisk (*) in the class/index details of the network referencing system.

(iii) A gully is a chamber which requires periodic emptying and is usually surmounted by a grating. A grating and other ironwork which is not associated with a gully (i.e. which will not require emptying) should **NOT** be recorded.

(iv) Footway gullies are included in this inventory item and should be recorded in the cross-sectional position of the footway.

(v) Gullies should be recorded in the cross-sectional position of the grating or entry point even though the gully pot may be located in a different cross-sectional position (eg side entry gullies in a central reserve).

(vi) The type of gully should be recorded by entering a 4 character code which represents the manufacturer and type. E.g. Brickhouse Dudley, “Chevron” Heavy Duty = BDCH. A schedule of types including photographs should be produced by the MA and may be inserted into this manual.

2.7.2 Interceptor

A structure similar to a catchpit (see section 2.7.3) at the point where surface water enters a drainage system and designed to prevent unwanted material entering the system.

2.7.2.1 Input Details

Site Entries:

Item Code	{IN}	
Cross-Sectional Position	Function Keys	(See Section 1.2.5)
Chainage	{----}	(To nearest metre)

2.7.2.2 Convention

An interceptor is defined as a point item.

2.7.2.3 Rules

(i) It may not always be possible to identify an interceptor without prior knowledge. The presence of an interceptor should be verified before this inventory item is recorded.

2.7.3 Catchpit

A pit provided in a drainage system to collect silt or solid material and prevent it from blocking inaccessible parts of the drains.

2.7.3.1 Input Details

Site Entries:

Item Code	{CP}	
Cross-Sectional Position	Function Keys	(See Section 1.2.5)
Chainage	{----}	(To nearest metre)

2.7.3.2 Convention

A catchpit is defined as a point item.

2.7.3.3 Rules

(i) Unless it is clear that a catchpit exists below a manhole cover, the chamber should be recorded under the inventory item manhole (MH). However, if a catchpit is definitely present, the chamber should be recorded as a catchpit and the cover should **NOT** be recorded separately.

2.7.4 Manhole

A chamber constructed to give access to a drain, sewer or other underground service.

2.7.4.1 Input Details

Site Entries:

Item Code	{MH}	
Cross-Sectional Position	Function Keys	(See Section 1.2.5)
Chainage	{----}	(To nearest metre)

Off Site Entries:

See Rules (i)

2.7.4.2 Convention

A manhole is defined as a point item.

2.7.4.3 Rules

(i) A manhole should only be recorded if it does not occur with a catchpit or interceptor or if it is not known what is beneath. If in doubt, a note of link identifier, section, chainage and cross-sectional position should be made. This will include all highway authority manholes plus (indistinguishable) sewer authority manholes, but **NOT** BT or other undertaker's apparatus.

(ii) Manholes which occur in the central reserve of dual carriageways and motorways and which are common to both sections **MUST** be recorded in the nominated section only, indicated by an asterisk (*) in the class/index details of the network referencing system.

2.7.5 Piped Grip

A piped conduit across the verge of a road to lead surface water away from the carriageway.

2.7.5.1 Input Details

Site Entries:

Item Code	{PG}	
Cross-Sectional Position	Function Keys	(See Section 1.2.5)
Chainage	{----}	(To nearest metre)
Length	{----}	(To nearest metre [1 < L < 30])

2.7.5.2 Convention

A piped grip is defined as a point item.

2.7.5.3 Rules

(i) A piped grip should be recorded in the cross-sectional position of the offlet. Where the offlet is located in the kerb, it should be recorded in the cross-sectional position of the kerb.

(ii) Ironwork associated with a piped grip (including gratings not surmounting a gully) should **NOT** be recorded as a separate inventory item.

(iii) A kerb offlet (weir) associated with a piped grip is **NOT** a separate inventory item (i.e. gully inlet with no pot).

2.7.6 Grip

A shallow trench, usually across the verge of a road, to lead surface water away from the carriageway.

2.7.6.1 Input Details

Site Entries:

Item Code	{GP}	
Cross-Sectional Position	Function Keys	(See Section 1.2.5)
Chainage	{----}	(To nearest metre)
Width	{----}	(To nearest 0.1 metres [0.1 < W < 5.0])
Length	{----}	(To nearest 0.1 metres [0.1 < L < 9.9])
Type	{-}	1 = Lined 2 = Unlined

2.7.6.2 Convention

A grip is defined as a point item.

2.7.6.3 Rules

(i) A grip should be recorded over each cross-sectional position it crosses.

(ii) Both hand-cut grips (unlined) and pre-formed concrete (lined) types should be recorded.

2.7.7 Ditch

A trench adjacent to a carriageway for drainage, generally running parallel to the carriageway.

2.7.7.1 Input Details

Site Entries:

Item Code	{DI}		
Cross-Sectional Position	Function Keys	(See Section 1.2.5)	
Chainage	{----}	(To nearest metre)	
Type	{-}	1 = Lined	2 = Unlined

2.7.7.2 Convention

A ditch is defined as a continuous item.

2.7.7.3 Rules

(i) A ditch on the left highway boundary line is recorded in cross-sectional position 1 and if on the right highway boundary line in position 0.

(ii) When a ditch is crossed by a crossover (XO) it is allowed to continue and not “clocked off” by the inventory program.

2.7.8 Filter Drain

A field drain, usually adjacent and running parallel to a carriageway, surrounded by granular material such as gravel, within which may be laid a porous or perforated pipe.

2.7.8.1 Input Details

Site Entries:

Item Code	{FD}	
Cross-Sectional Position	Function Keys	(See Section 1.2.5)
Chainage	{----}	(To nearest metre)

2.7.8.2 Convention

A filter drain is defined as a continuous item.

2.7.8.3 Rules

(i) Filter drains which occur in the central reserve of dual carriageways and motorways and which are common to both sections **MUST** be recorded in the nominated section only, indicated by an asterisk (*) in the class/index details of the network referencing system.

(ii) When a filter drain is crossed by a crossover (XO) it is allowed to continue and not “clocked off” by the inventory program.

(iii) Counterfort drains are recorded as a separate item (see section 2.7.9).

2.7.9 Counterfort Drain

A field drain, other than a filter drain running parallel to a carriageway, surrounded by granular material such as gravel. Includes herringbone and intercepting drains.

2.7.9.1 Input Details

Site Entries:

Item Code	{CD}	
Cross-Sectional Position	Function Keys	(See Section 1.2.5)
Chainage	{----}	(To nearest metre)

2.7.9.2 Convention

A counterfort drain is defined as a continuous item.

2.7.9.3 Rules

(i) The start chainage of a counterfort drain occurs when the measuring wheel is level with the point at which the drain is first encountered.

The end chainage occurs when the measuring wheel is level with the point at which the drain is last encountered.

2.7.10 Culvert

An enclosed channel or large pipe for conveying water below ground , usually under a road.

2.7.10.1 Input Details

Site Entries:

Item Code	{CV}	
Chainage	{----}	(To nearest metre)

Off- Site Entries:

Length	{----}	(To nearest 0.5 metres)
Diameter	{----}	(To nearest 0.1 metre)

2.7.10.2 Convention

A culvert is defined as a point item, but with no cross-sectional position.

2.7.10.3 Rules

(i) Culverts parallel to the carriageway should be recorded at their mid-point (a written note of their length and diameter should be taken).

(ii) Culverts which occur in the central reserve of dual carriageways and motorways and which are common to both sections **MUST** be recorded in the nominated section only, indicated by an asterisk (*) in the class/index details of the network referencing system.

(iii) All culverts should be recorded in this section, including those classed as structures.

2.7.11 Balancing Pond

A catchment area adjacent to a carriageway to collect surface run-off following heavy rain and then discharge it into a highway drainage system.

2.7.11.1 Input Details

Site Entries:

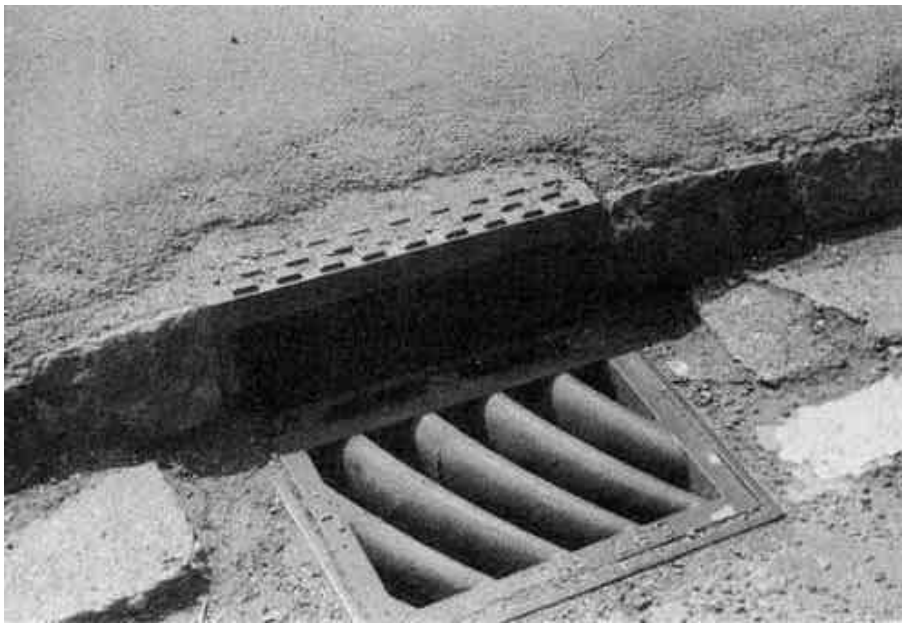
Item Code	{BP}	
Cross-Sectional Position	Function Keys	(See Section 1.2.5)
Chainage	{----}	(To nearest metre)
Distance From Carriageway	{----}	(To nearest metre [1 < D < 9999])

Off-Site Entries:

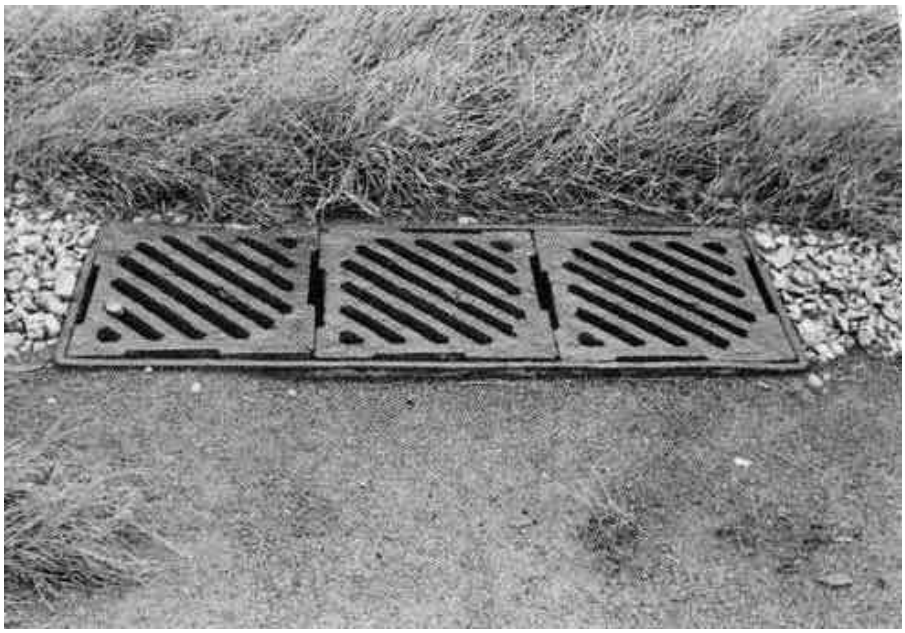
Outflow Control	{-}	1 = No Outflow Control 2 = Outfall Flow Regulating Device

2.7.11.2 Rules

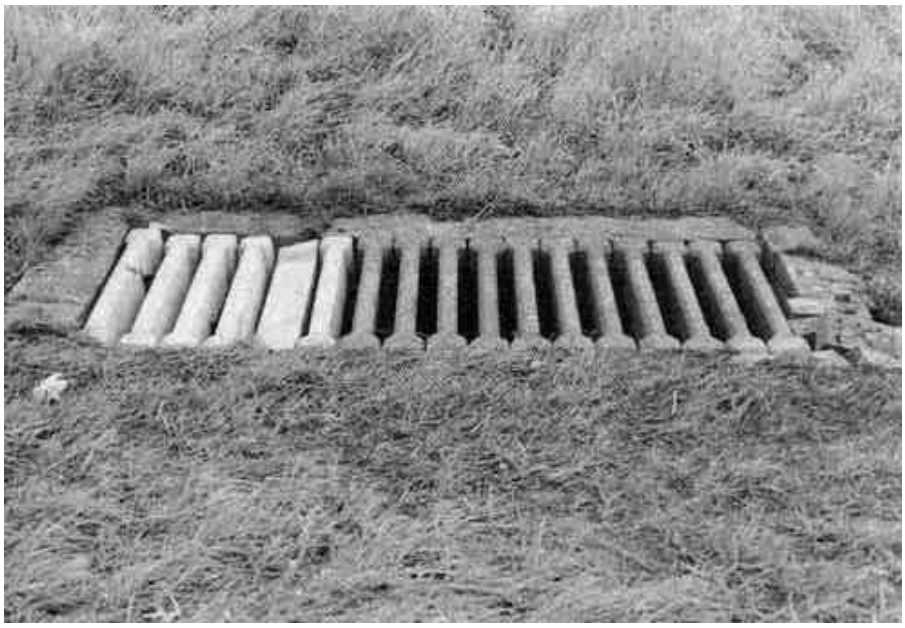
(i) Balancing Ponds do not necessarily occur within the highway boundary and may be located some distance from the carriageway.



Photograph 2.7-1: Gully



Photograph 2.7-2: Catchpit



Photograph 2.7-3: Catchpit

Photograph 2.7-4: Piped Grip

Photograph 2.7-5: Unlined Grip

Photograph 2.7-6: Lined Ditch

Photograph 2.7-7: Unlined Ditch

Photograph 2.7-8: Filter Drain

Photograph 2.7-9: Counterfort Drain

Photograph 2.7-10: Culvert

Photograph 2.7-11: Balancing Pond

2.8 Communication Installations

2.8.1 Communication Cabinet

A cabinet containing electronic equipment associated with communication installations, traffic signals and other highway features.

2.8.1.1 Input Details

Site Entries:

Item Code	{CC}	
Cross-Sectional Position Function Keys	(See Section 1.2.5)	
Chainage	{----}	(To nearest metre)
Identity Code	{--------}	(Alphanumeric)
Type	{----}	(As defined by the MA)

2.8.1.2 Convention

A communication cabinet is defined as a point item.

2.8.1.3 Rules

(i) When the cabinet identity code is either not present or unreadable, and asterisk (*) should be entered.

(ii) Control boxes at traffic signals are also included in this item CC.

(iii) The type of cabinet should be recorded by entering a 4 character code which represents its type. For the following common types the preferred codes are listed and others may be added if required.

Type	Code
Lucy	LUCY
Klippon	KLIP
600	D600
609	D609
Terminal Bridge Unit	TBUN
Mains Cabinet	MCAB
Autoflex	AUTO
Plessey	PLES
Henley	HENY
British Relay	BRRY
Unknown	UNKN

(iv) Cameras, fog detectors, weather stations etc can also be recorded under this item. Type codes can be added to the above list as required.

(v) Additional photographs may be supplied by the MA to identify items applicable to his network.

2.8.2 Detector Loop

A wire loop embedded in the road surface to detect the presence or speed of a vehicle.

2.8.2.1 Input Details

Site Entries:

Item Code	{DL}		
Cross-Sectional Position Function Keys	(See Section 1.2.5)		
Chainage	{----}	(To nearest metre)	
Type	{-}	1 = Traffic Counter 2 = Traffic Signals	3 = Other

2.8.2.2 Convention

A detector loop is defined as a point item.

2.8.2.3 Rules

(i) A detector loop should be recorded in each cross-sectional position in which it occurs. An entry of Y may be used to indicate a loop extends across the full width of the carriageway.

2.8.3 Emergency Telephone Box

A telephone located adjacent to the carriageway, solely for use in an emergency.

2.8.3.1 Input Details

Site Entries:

Item Code	{TB}
Cross-Sectional Position Function Keys (See Section 1.2.5)	
Chainage	{----}
Identity Code	{--------}

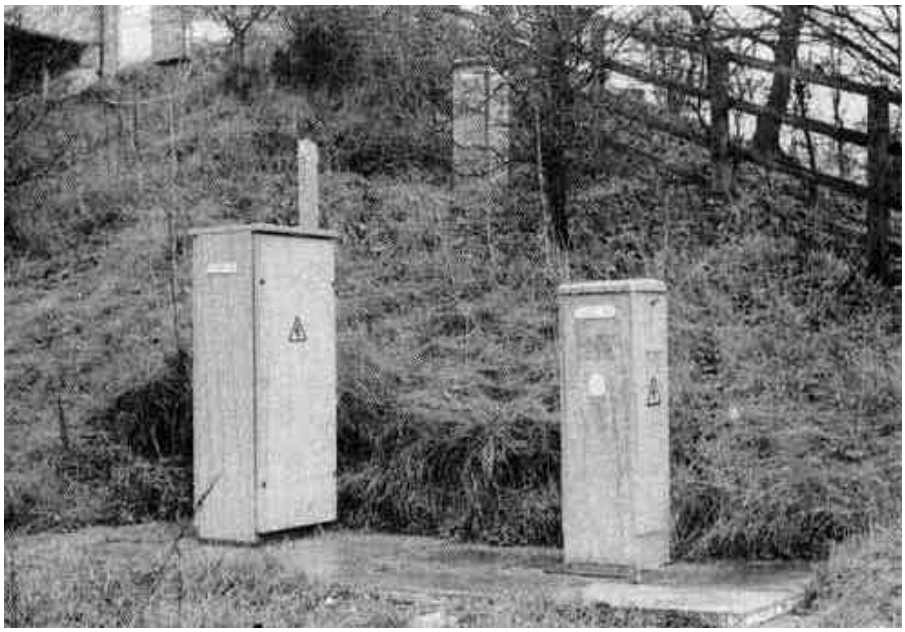
2.8.3.2 Convention

An emergency telephone box is defined as a point item.

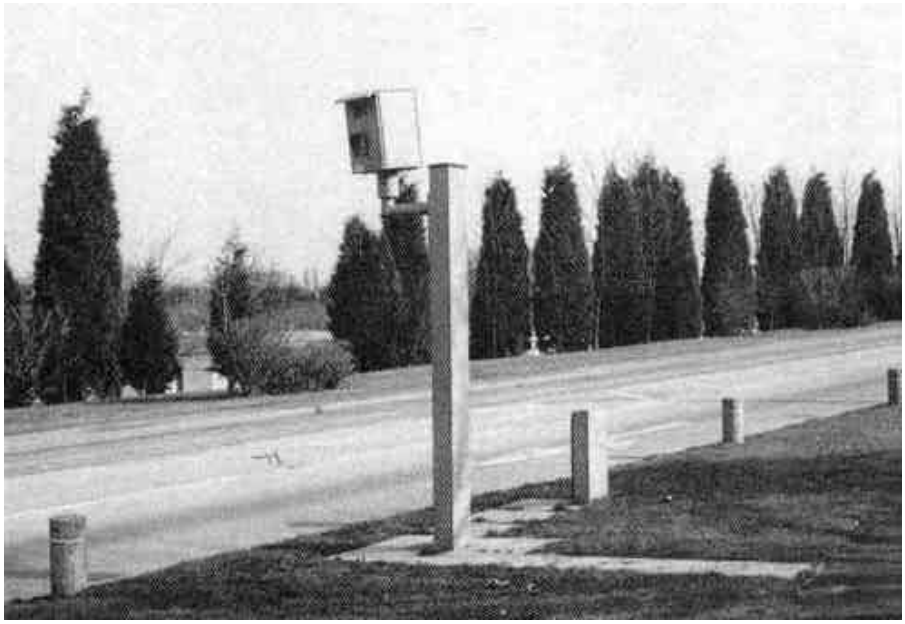
2.8.3.3 Rules

(i) If an identity code is not present or unreadable, an asterisk (*) should be used.

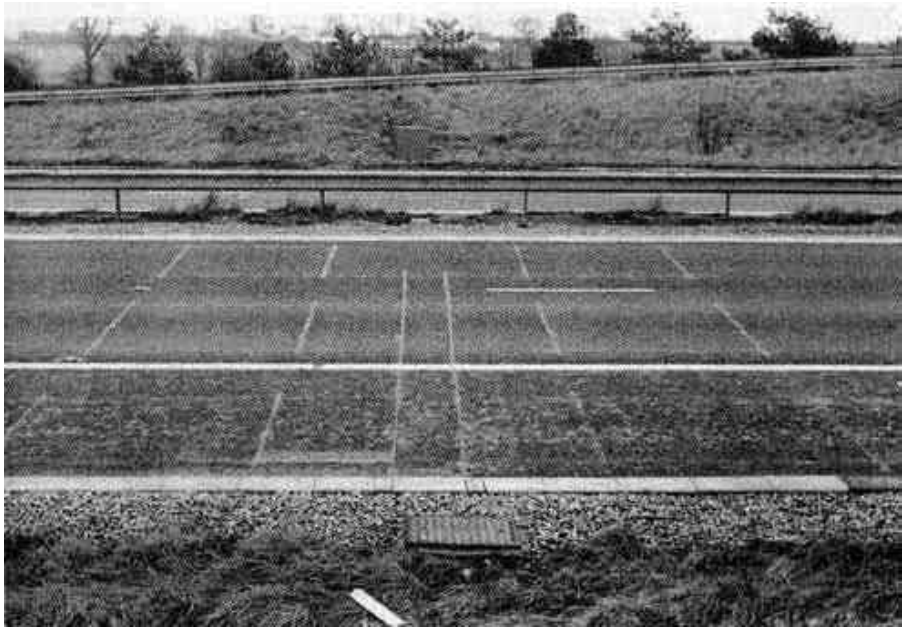
(ii) Only emergency telephone boxes which are the sole responsibility of the Highways Agency should be recorded.



Photograph 2.8-1: Communications Cabinet



Photograph 2.8-2: Communications Cabinet (Camera)



Photograph 2.8-3: Detector Loop (Traffic Counter)

Photograph 2.8-4: Emergency Telephone Box

2.9 Embankments and Cuttings

2.9.1 Embankments and Cuttings

An embankment is an area where the carriageway has been raised above existing ground level usually using earth or rock construction.

A cutting is an area where the carriageway is below existing ground level within an excavation.

2.9.1.1 Input Details

Site Entries:

Item Code	{EC}	
Cross-Sectional Position Function Keys	(See Section 1.2.5)	
Chainage	{----}	(To nearest metre)
Angle	{--}	(To nearest 5 degrees [-90 < < 90])
Height	{---}	(To nearest 5 metres [0 < H < 100])

2.9.1.2 Convention

An embankment or cutting is defined as a continuous item**.**

2.9.1.3 Rules

(i) Intermediate - use this entry when either the angle or height of the embankment / cutting changes but the embankment / cutting continues.

(ii) When an embankment / cutting is crossed by a crossover (XO) it is allowed to continue and not “clocked off” by the inventory program.

(iii) To distinguish between an embankment and a cutting, the angle should be recorded as positive for an embankment (e.g. 30) and negative for a cutting (e.g. -30).

(iv) The actual angle should be recorded to the nearest 5 degrees, where possible.

(v) Minor occurrences, less than 3 metres in height, should be ignored at the MA’s discretion.

(vi) Record side slopes between slip road and main carriageway as part of and relative to the main carriageway.

(vii) A central reserve slope should be recorded as part of and relative to the nominated section (*) except where it comprises two slopes, in which case each is recorded with adjacent carriageway sections.

(viii) The maintainable grass width of an embankment / cutting, if required, can be recorded using the verge item (VG).

Photograph 2.9-1: Embankment

Photograph 2.9-2: Cutting

2.10 Grassed Areas

2.10.1 Verge

The part of the highway outside the carriageway.

2.10.1.1 Input Details

Site Entries:

Item Code	{VG}	
Cross-Sectional Position	Function Keys	(See Section 1.2.5)
Chainage	{----}	(To nearest metre)
Actual Width	{----}	(To nearest 0.1 metres [0.0 < W < 99.9])
Maintained Width	{----}	(To nearest 0.1 metres [0.0 < W < 99.9])
Angle	{-}	1 = Level 3 = Steep 2 = Inclined

2.10.1.2 Convention

A verge is defined as a continuous item.

2.10.1.3 Rules

(i) The maintained verge width is the “maintainable” width including visibility splays and if in doubt should be regarded as a single swathe width.

(ii) Intermediate - use this entry when the width or angle but the verge continues.

(iii) When a verge is crossed by a crossover (XO) it is allowed to continue and not “clocked off” by the inventory program.

(iv) Left or right verges and left or right outside verges should be recorded separately so that obstacles to mowing can be counted.

2.10.1.4 Obstacles (OB)

This item allows a rolling count of verge items which may be obstacles to mowing operations to be recorded during an inventory survey. It may only be used whilst the verge item is running.

To update the counter enter the item code OB.

The following is displayed on screen showing cross-sectional position, name of verge and total number of obstacles for the verges currently running.

Example:

(Cross-Sectional Position)	(Name of Verge)	(No. of Obstacles)	
1	LOV	1	(LOV = left outside verge)
3	LV	2	(LV = left verge)
8	RV	0	(RV = right verge)
0	ROV	3	(ROV = right outside verge)

Select cross-sectional position code : {1, 3, 8, 0} e.g. {3}

Update Counter : {enter number of additional obstacles} e.g. {2}

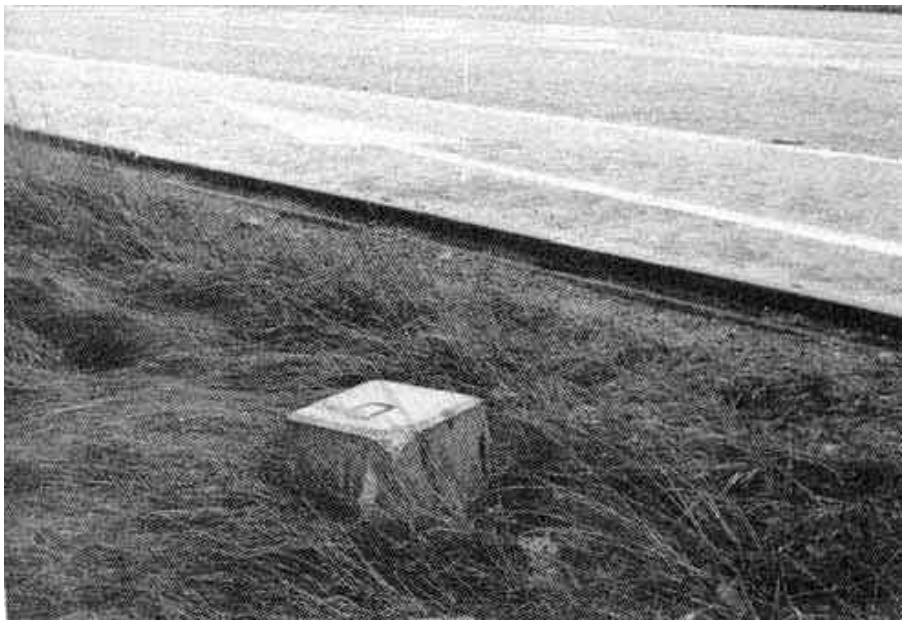
Entering a value will update the selected counter.

Screen now shows:

1	LOV	1
3	LV	4
8	RV	0
0	ROV	3

Press the ESC key to return to the item code prompt.

Photograph 2.10-1: Obstacle to mowing



Photograph 2.10-2: Obstacle to mowing

2.11 Hedges and Trees

2.11.1 Hedge

A fence consisting of bushes or small trees.

2.11.1.1 Input Details

Site Entries:

Item Code	{HG}	
Cross-Sectional Position	Function Keys	(See Section 1.2.5)
Chainage	{----}	(To nearest metre)

2.11.1.2 Convention

A hedge is defined as a continuous item.

2.11.1.3 Rules

(i) A hedge should be recorded in the cross-sectional position in which it occurs.

(ii) Hedges which have been laid to provide stockproof barriers and are the responsibility of the Highways Agency should be recorded.

(iii) Only hedges which front onto the highway and which are the responsibility of the Highways Agency or which, although the responsibility of others may cause nuisance or obstruction to the highway, are to be recorded in this inventory item.

(iv) Hedges which occur in the central reserve of dual carriageways and motorways and which are common to both sections **MUST** be recorded in the nominated section only, indicated by an asterisk (*) in the class/index details of the network referencing system.

(v) When a hedge is crossed by a crossover (XO) it is allowed to continue and not “clocked off” by the inventory program.

(vi) If there is any doubt as to the ownership of the hedge, then it should be recorded.

2.11.2 Tree

A perennial plant with a single woody, self-supported trunk and branches.

2.11.2.1 Input Details

Site Entries:

Item Code	{TR}	
Cross-Sectional Position	Function Keys	(See Section 1.2.5)
Chainage	{----}	(To nearest metre)

2.11.2.2 Convention

A tree is defined as a point item.

2.11.2.3 Rules

(i) Only trees with a diameter and height greater than 0.2 metres and 1 metre respectively should be recorded.

(ii) Only trees which are the responsibility of the Highways Agency or which, although the responsibility of others may cause nuisance or obstruction to the highway, should be recorded. If there is any doubt as to the ownership, then the presence of trees should be recorded.

(iii) The exact location of a tree or trees is not required. Their existence is noted by a single entry in cross-sectional position Y at chainage 0 in the relevant section prior to completion of the section.

(iv) Additional trees which are significant or affect the highway by overhanging the carriageway can be recorded if required.

2.12 Sweeping and Cleaning

2.12.1 General

There is no inventory item relating to sweeping and cleaning operations.

2.13 Safety Fences and Barriers

2.13.1 Safety Fence

A vehicle restraint system in the form of a continuous barrier erected alongside a carriageway, including safety barriers on bridges.

2.13.1.1 Input Details

Site Entries:

Item Code	{SF}		
Cross-Sectional Position	Function Keys	(See Section 1.2.5)	
Chainage	{----}	(To nearest metre)	
Type	{-}	1 = Tensioned 2 = Untensioned	3 = Concrete 4 = Wire
Shape	{-}	1 = Single Sided	2 = Double Sided
Post	{-}	1 = Wood 2 = Metal	3 = Other
Beam Profile	{-}	1 = Corrugated 2 = Box	3 = Other

2.13.1.2 Convention

A safety fence is defined as a continuous item.

2.13.1.3 Rules

(i) Intermediate - use this entry when the type, shape or post type of the fence change but the fence continues.

(ii) Safety fences which occur in the central reserve of dual carriageways and motorways and which are common to both sections **MUST** be recorded in the nominated section only, indicated by an asterisk (*) in the class/index details of the network referencing system.

(iii) A safety fence with separate posts should be recorded in the section to which it applies.

2.13.2 Pedestrian Guard Rail

A protective fence, usually on the edge of a footway intended to restrain pedestrians from stepping on to the carriageway or other area likely to be hazardous.

2.13.2.1 Input Details

Site Entries:

Item Code	{PR}		
Cross-Sectional Position	Function Keys	(See Section 1.2.5)	
Chainage	{----}	(To nearest metre)	
Material	{-}	1 = Steel 2 = Alloy	3 = Timber 4 = Other

2.13.2.2 Convention

A pedestrian guard rail is defined as a continuous item.

2.13.2.3 Rules

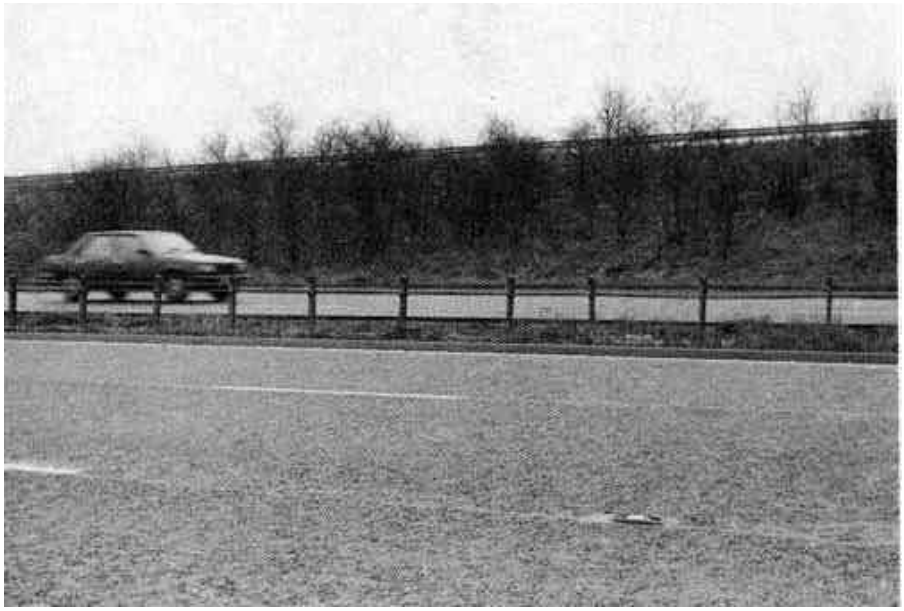
(i) A pedestrian guard rail associated with a footway should be recorded on the cross-sectional position of the footway (left or right).

(ii) Intermediate - use this entry when the material from which the guard rail is made, changes but the guard rail continues.

Photograph 2.13-1: Tensioned, Double Sided, Metal, Corrugated Safety Fence

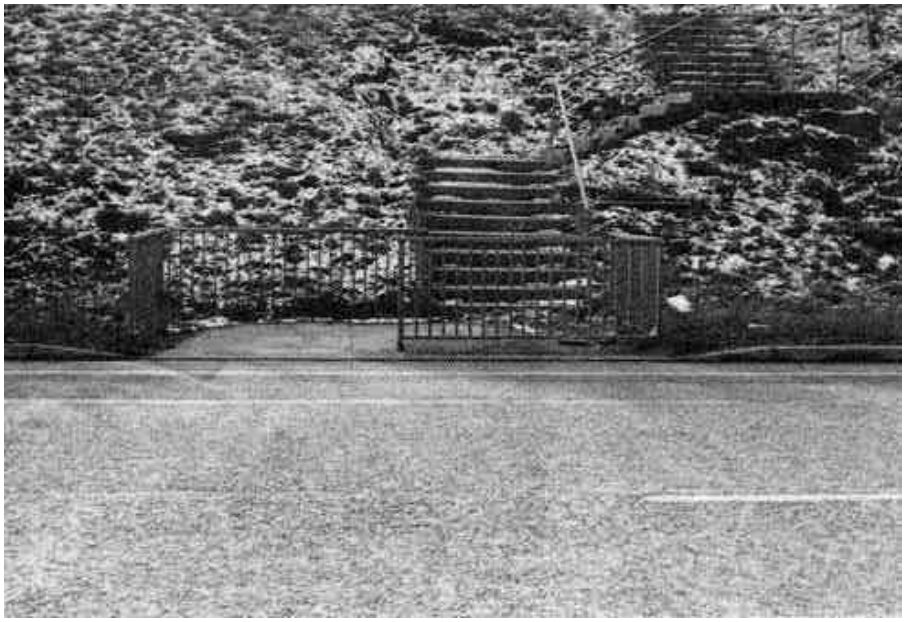
Photograph 2.13-2: Untensioned, Single Sided, Metal, Box Safety Fence

Photograph 2.13-3: Concrete Safety Barrier

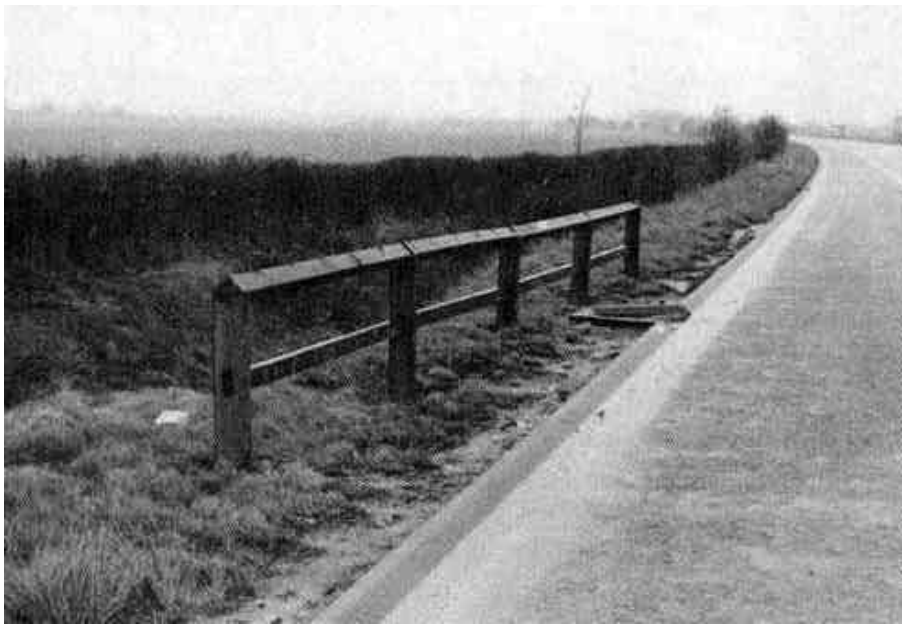


Photograph 2.13-4: Wire Rope Safety Fence

Photograph 2.13-5: Pedestrian Guard Rail



Photograph 2.13-6: Pedestrian Guard Rail



Photograph 2.13-7: Timber Pedestrian Guard Rail

2.14 Fences, Walls, Screens and Environmental Barriers

2.14.1 Fences and Barriers

A boundary fence, wall or barrier for screening noise, headlight glare or to prevent access.

2.14.1.1 Input Details

Site Entries:

Item Code	{FB}		
Cross-Sectional Position	Function Keys	(See Section 1.2.5)	
Chainage	{----}	(To nearest metre)	
Type	{-}	1 = Anti-glare 2 = Noise 3 = Wire	4 = Wall 5 = Wood 6 = Other
Stockproof	{-}	1 = Mesh 2 = Additional Rail 3 = Wire Strand	4 = None 5 = Other

2.14.1.2 Convention

A fence or barrier is defined as a continuous item.

2.14.1.3 Rules

(i) A fence along the left-hand highway boundary should be recorded in cross-sectional position 1 (i.e. to its right) and in cross-sectional position 0 if it is on the right-hand highway boundary.

(ii) Intermediate - use this entry when the type of fence or barrier changes but the fence or barrier continues.

(iii) All fences and barriers for which the Highways Agency is responsible should be recorded (not private). If there is any doubt of their ownership, they should be included.

(iv) Crash barriers are recorded under the inventory item of safety fence (SF).

(v) When a fence or barrier is crossed by a crossover (XO) it is allowed to continue and not “clocked off” by the inventory program.

(vi) Fences and barriers which occur in the central reserve of dual carriageways and motorways and which are common to both sections **MUST** be recorded in the nominated section only, indicated by an asterisk (*) in the class/index details of the network referencing system.

2.14.2 Retaining Wall

A structure constructed to resist lateral pressure from the adjoining ground, or to maintain a mass of earth in position.

2.14.2.1 Input Details

Site Entries:

Item Code	{RW}		
Cross-Sectional Position	Function Keys	(See Section 1.2.5)	
Chainage	{----}	(To nearest metre)	
Type	{-}	1 = Mass Concrete	5 = Brick
		2 = Reinforced Concrete	6 = Sheet Piles
		3 = Reinforced Earth	7 = Other
		4 = Stone	
Height	{----}	(To nearest 0.1 metres [0.0 < H < 99.9])	

2.14.2.2 Convention

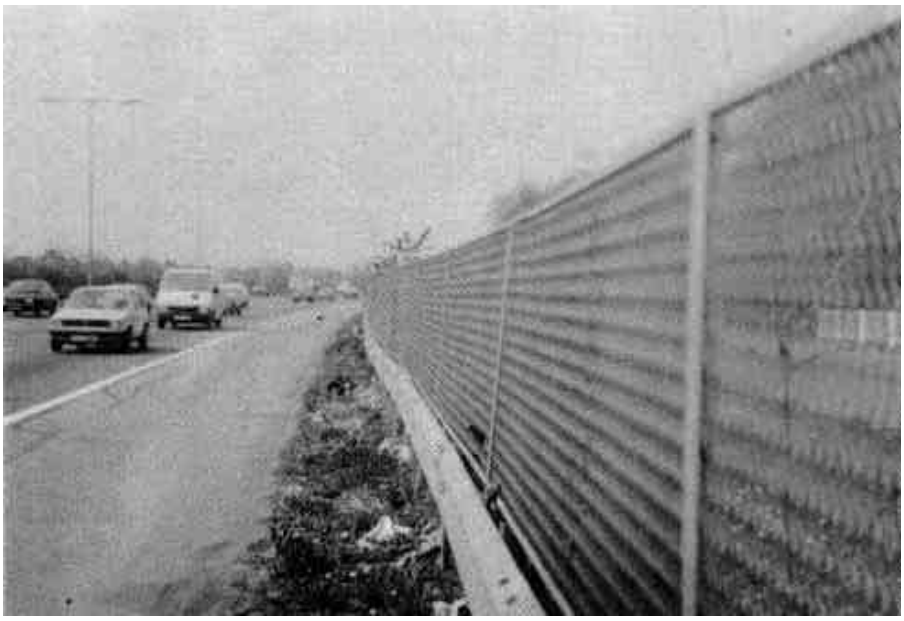
A retaining wall is defined as a continuous item.

2.14.2.3 Rules

(i) Intermediate - use this entry when the height of a wall changes but the wall continues.

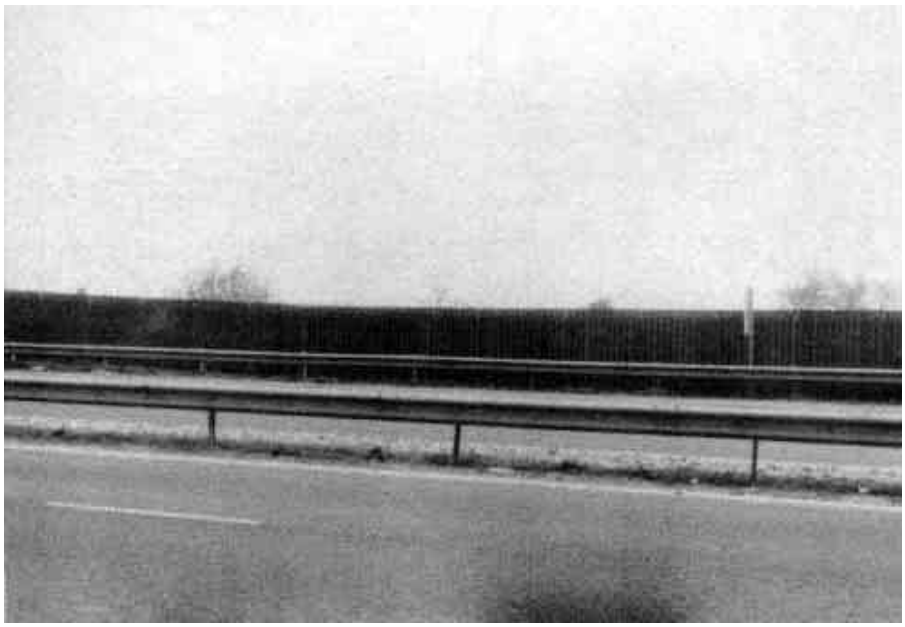
(ii) A wall along the left-hand highway boundary should be recorded in cross-sectional position 1 (i.e. to its right) and in cross-sectional position 0 if it is on the right-hand highway boundary.

(iii) Gabions should be recorded as type OTHER.

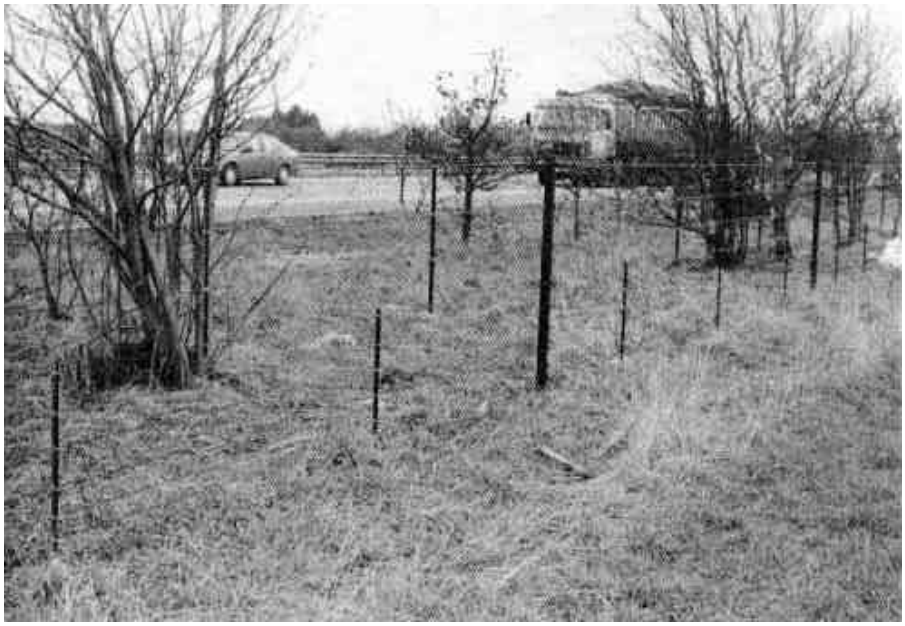


Photograph 2.14-1: Anti-Glare Fencing

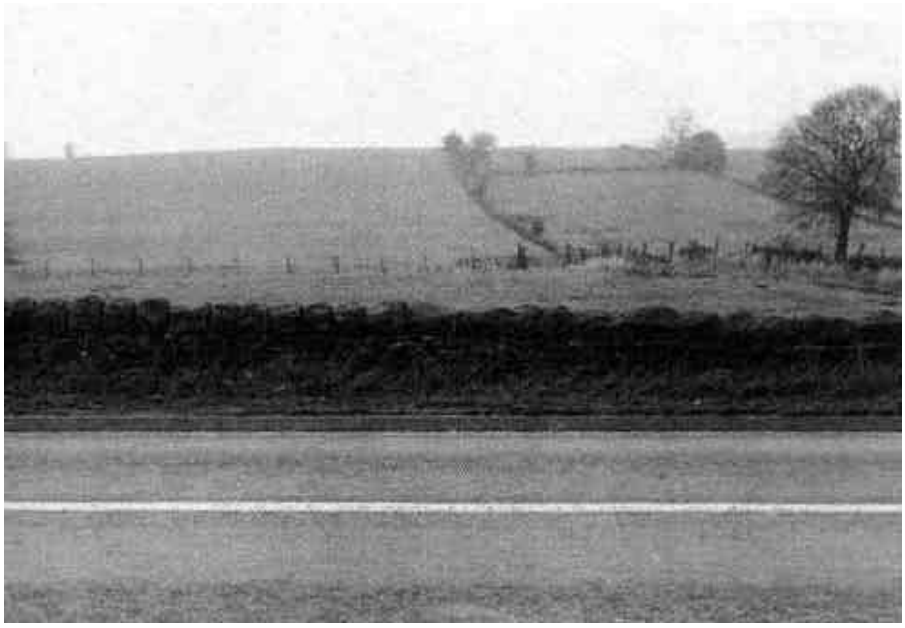
Photograph 2.14-2: Anti-Glare Fencing



Photograph 2.14-3: Noise Barrier

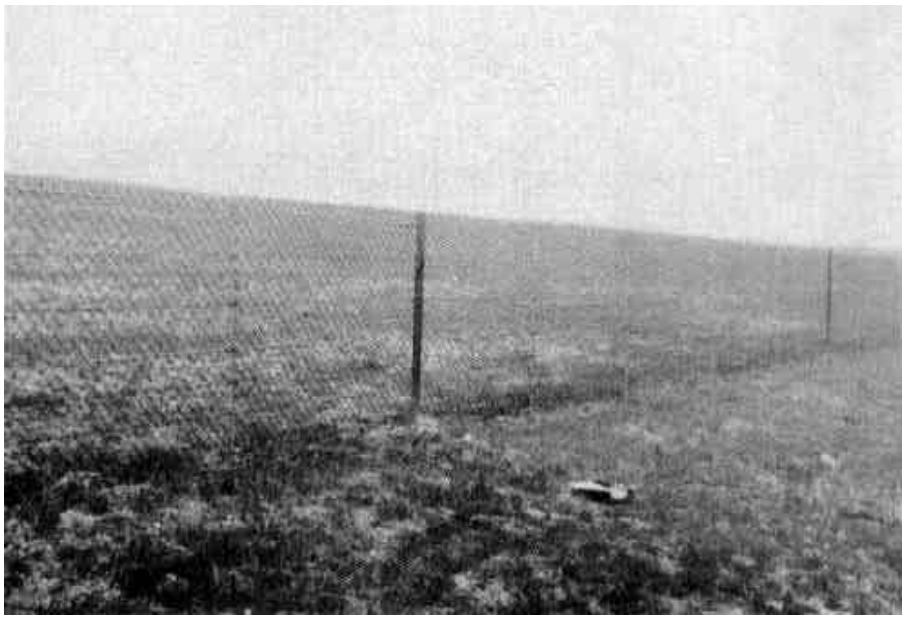


Photograph 2.14-4: Wire Fencing



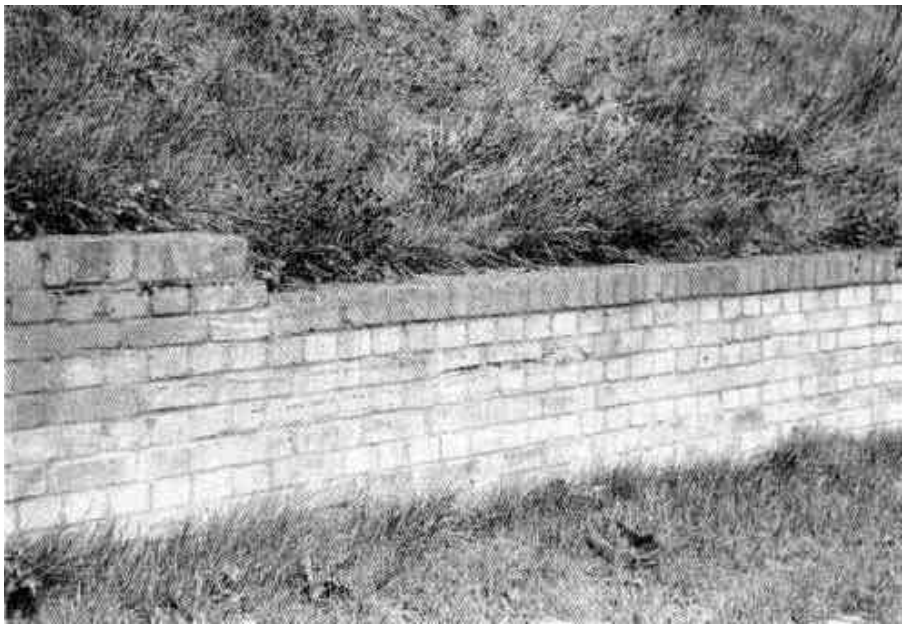
Photograph 2.14-5: Wall

Photograph 2.14-6: Wood Boundary Fence



Photograph 2.14-7: Mesh Boundary Fence

Photograph 2.14-8: Reinforced Concrete Retaining Wall



Photograph 2.14-9: Brick Retaining Wall

Photograph 2.14-10: Gabion (OTHER) Retaining Wall

2.15 Road Studs

2.15.1 Road Studs

A stud placed in the carriageway to guide traffic.

2.15.1.1 Input Details

Site Entries:

Item Code	{RS}		
Cross-Sectional Position	Function Keys (See Section 1.2.5)		
Chainage	{----}	(To nearest metre)	
Type	{-}	1 = Catseye 2 = Stick on/Single Sided 3 = Stick on/Double Sided	4 = Non-reflective 5 = Other
Class	{-}	1 = Prohibitory 2 = Warning/Informatory	3 = Other
Spacing	{----}	(To nearest 0.1 metres [0.1 < S < 25.0])	
Colour	{-}	1 = White 3 = Red 4 = Amber	5 = Green 6 = Other

2.15.1.2 Convention

Road studs are defined as a continuous item.

2.15.1.3 Rules

(i) This item is for longitudinal road studs only.

(ii) For the purposes of this inventory item, all depressible road studs should be recorded as “catseyes”.

(iii) Lines of studs shared between lanes should be recorded as part of the lane adjacent to their left.

(iv) Intermediate - use this entry when the type, class, spacing or colour of the road studs change but the studs continue.

(v) Transverse road studs associated with a pedestrian crossing are **NOT** recorded. These studs are incorporated in the inventory item pedestrian crossing (see section 2.18.2).

(vi) Road studs along the right-hand edge of hatched road markings should be recorded with a cross-sectional position of Y.

(vii) Road studs occuring at the boundary between lanes should be recorded in the cross-sectional position of the lane to their left.

(viii) Use 1 = PROHIBITORY (usually red or amber) for studs which occur in continuous single or double lines and 2 = WARNING/INFORMATORY (usually white or green) for studs which occur in dotted lines and where road markings are non-prohibitory or advisory.

(ix) White studs may also be prohibitory when employed in a double white line system.

Photograph 2.15-1: Depressible Catseye road stud

Photograph 2.15-2: Stick on road stud

2.16 Road Markings

2.16.1 Hatched Road Markings

Road markings on the carriageway with a distinctive hatched design.

2.16.1.1 Input Details

Site Entries:

Item Code	{LH}		
Cross-Sectional Position	Function Keys (See Section 1.2.5)		
Chainage	{----}	(To nearest metre)	
Width	{----}	(To nearest 0.1 metres [0.1 < W < 99.9])	
Material	{-}	1 = Thermoplastic Spray 2 = Thermoplastic Screed	3 = Paint 6 = Other
Pattern	{-}	1 = Diagonal 2 = Chevron 3 = Cross	4 = Solid 5 = Bars 6 = Other
Type of Edge Line	{-}	1 = Prohibitory 2 = Warning/Informatory	3 = None

2.16.1.2 Convention

Hatched road markings are defined as a continuous item.

2.16.1.3 Rules

(i) Intermediate - use this entry when the width, material or pattern changes but the markings continue.

(ii) The cross-sectional position OTHER (Y on the keyboard) should be used to indicate that bars (transverse yellow bar markings) or cross hatching (e.g. box junctions) extend across the whole of the carriageway.

(iii) Lines around the edge of hatched road markings should be included as part of the hatching and **NOT** recorded as a separate inventory item.

(iv) The width of an area of hatched markings should be the “average” width. In the case of a tapered marking this will occur roughly half way along its length. If distinct changes in width occur, rule (i) applies.

(v) Diagonally hatched road markings can occur in a variety of situations. In the following cases they should be allocated to the cross-sectional position indicated:

(a) As an extension to a central reserve at the end of a dual carriageway and in the same section. Record in cross-sectional position 8 in the nominated section.

(b) As an extension to a central reserve at the end of a dual carriageway and in a different section. Record in the cross-sectional position of the lane immediately adjacent on the left-hand side.

(c) Where hatching occurs between two lanes, record it in the cross-sectional position of the lane immediately adjacent on the left-hand side.

(vi) Road studs associated with road markings are recorded as a separate inventory item, see Chapter 2.15.

(vii) If road markings occur at the boundary of two cross-sectional positions, they should be recorded in the cross-sectional position to their left.

2.16.2 Longitudinal Road Markings

Road markings which lie along the carriageway or along the edge of the carriageway.

2.16.2.1 Input Details

Site Entries:

Item Code	{LL}		
Cross-Sectional Position	Function Keys (See Section 1.2.5)		
Chainage	{----}	(To nearest metre)	
Class	{-}	1 = Double 2 = Single	4 = Hazard 5 = Other
Colour	{-}	1 = White 2 = Yellow	3 = Red 7 = Conservation Yellow
Type	{-}	1 = Broken 2 = Unbroken 3 = Broken & Unbroken	4 = Zig-Zag 5 = Other
Material	{-}	1 = Thermoplastic Spray 2 = Thermoplastic Screed 3 = Paint	6 = Other 7 = Raised Edge Rib
Length	{----}	(To nearest 0.1 metres [0.0 < L < 10.0])	
Gap	{----}	(To nearest 0.1 metres [0.0 < G < 25.0])	
Width	{----}	(To nearest 0.01 metres [0.00 < W < 9.99])	

2.16.2.2 Convention

A longitudinal road marking is defined as a continuous item.

2.16.2.3 Rules

(i) The length and gap entries only apply to broken lines and should be entered as 0 for other types.

(ii) Intermediate - use this entry when the class, colour, type, material, length or gap change but the markings continue.

(iii) For the “broken” and “broken and unbroken” type options the length and gap of the broken line should be recorded.

(iv) The zig-zag lines at zebra crossings are an integral part of the crossing and should **NOT** be recorded separately.

(v) Where a road marking lies on the boundary between two lanes, it should be recorded in the left-hand lane position.

(vi) A left-hand edge line should be recorded in cross-sectional position 3. A right-hand edge line should be recorded in position 7 for up to 4 lanes and position E or R for 5 lanes and 6 lanes respectively.

(vii) Single or double yellow edge markings should be recorded as single or double, yellow and in the appropriate cross-sectional position.

(viii) A longitudinal solid white line lying one metre from the left-hand edge of the carriageway is recorded in cross-sectional position 3. If it is on the right-hand side it is recorded in position 7 for up to 4 lanes and position E or R for 5 and 6 lanes respectively.

2.16.3 Transverse and Special Road Markings

Road markings which lie across the carriageway, on the kerb, at the edge of the carriageway or are special markings.

2.16.3.1 Input Details

Site Entries:

Item Code	{RM}		
Cross-Sectional Position	Function Keys (See Section 1.2.5)		
Chainage	{----}	(To nearest metre)	
Class	{-}	1 = Stop 2 = Give-way 3 = Words 4 = Roundabout	5 = Arrow 6 = Loading 7 = Other
Colour	{-}	1 = White 2 = Yellow	3 = Red 7 = Conservation Yellow
Material	{-}	1 = Thermoplastic Spray 2 = Thermoplastic Screed	3 = Paint 6 = Other
Width	{----}	(To nearest 0.1 metres [0.1 < W < 99.9])	

2.16.3.2 Notes

‘1 = STOP’ is a continuous line.
‘2 = GIVE WAY’ is a broken line
‘3 = WORDS’ - e.g. BUS STOP, STOP, SLOW, TURN LEFT.

2.16.3.3 Convention

Transverse and special road markings are defined as **POINT** items.

2.16.3.4 Rules

(i) If a road marking occurs at the boundary between lanes it should be recorded in the cross-sectional positional position to its left.

(ii) Lines and symbols associated with 3 = WORDS e.g. the solid line associated with the word STOP, should be recorded separately. Except in the case of a bus bay within the carriageway whereby the lines defining the bay and the words BUS STOP should be recorded as one item. The triangle associated with a give-way line should be recorded as 2 = GIVE WAY.

(iii) Two or more words which are connected should be recorded as one entry, e.g. BUS STOP.

(iv) Road markings are to be recorded for each cross-sectional position in which they occur.

(v) Double road markings on the kerb are to be recorded as one entry for each occurrence.

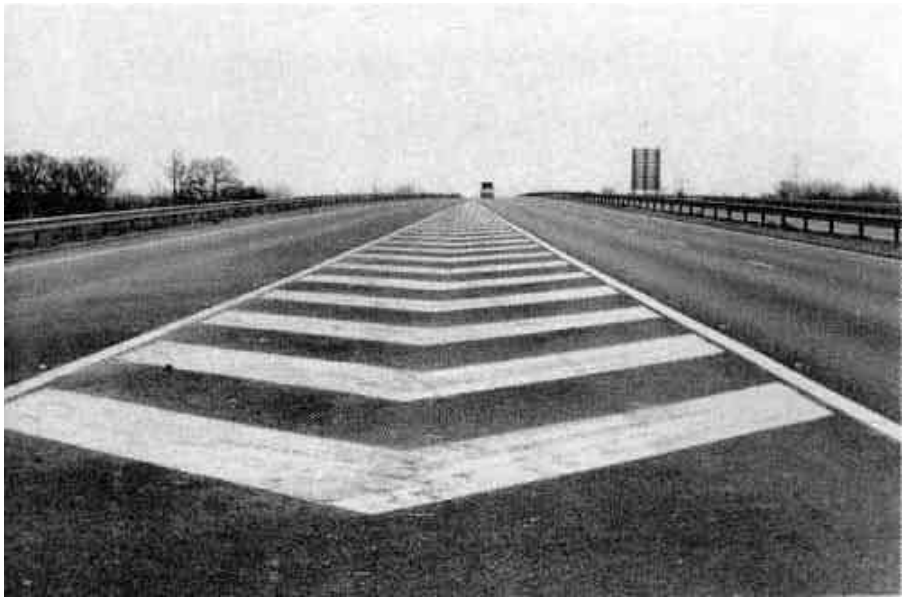
(vi) The chainage of a transverse road marking should be recorded at the point which is first encountered.

(vii) A mini roundabout with a raised centre should **NOT** be recorded. It should be recorded as a central island.

(viii) VASCAR and other speed enforcement road markings should be recorded under this inventory item as class = OTHER.

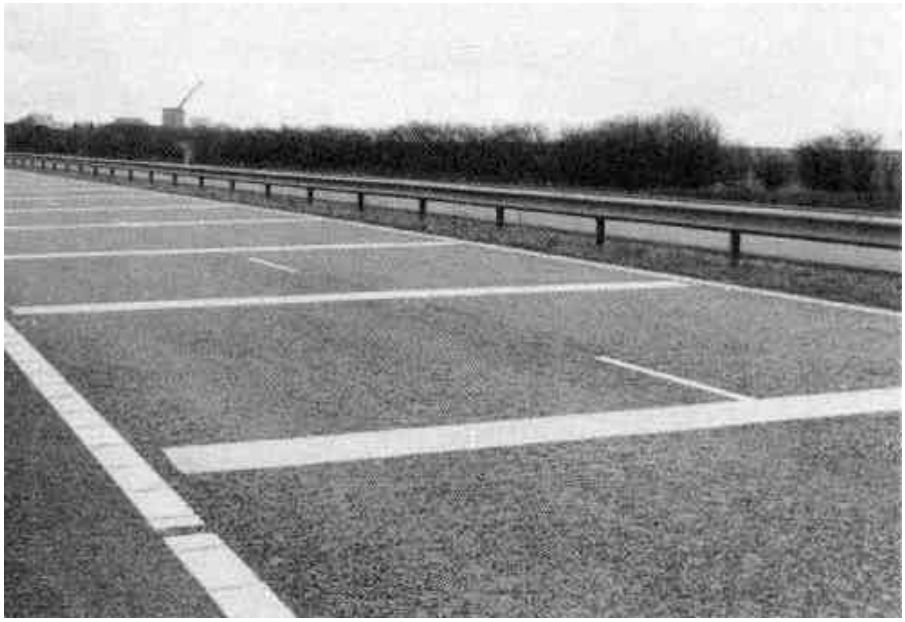
(ix) Width is measured transversely across the carriageway.

Photograph 2.16-1: Hatched Road Markings - Diagonal



Photograph 2.16-2: Hatched Road Markings - Chevron

Photograph 2.16-3: Hatched Road Markings - Cross

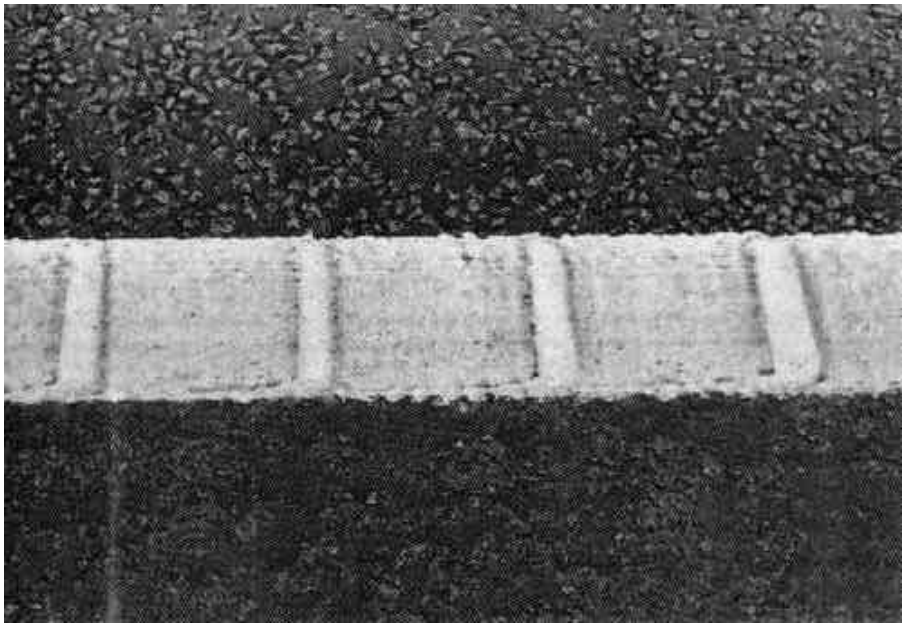


Photograph 2.16-4: Hatched Road Markings - Bars

Photograph 2.16-5: Longitudinal Road Markings - Double Yellow

Photograph 2.16-6: Longitudinal Road Markings - Broken and Unbroken

Photograph 2.16-7: Longitudinal Road Markings - Zig-zag



Photograph 2.16-8: Longitudinal Road Markings - Raised Edge Rib

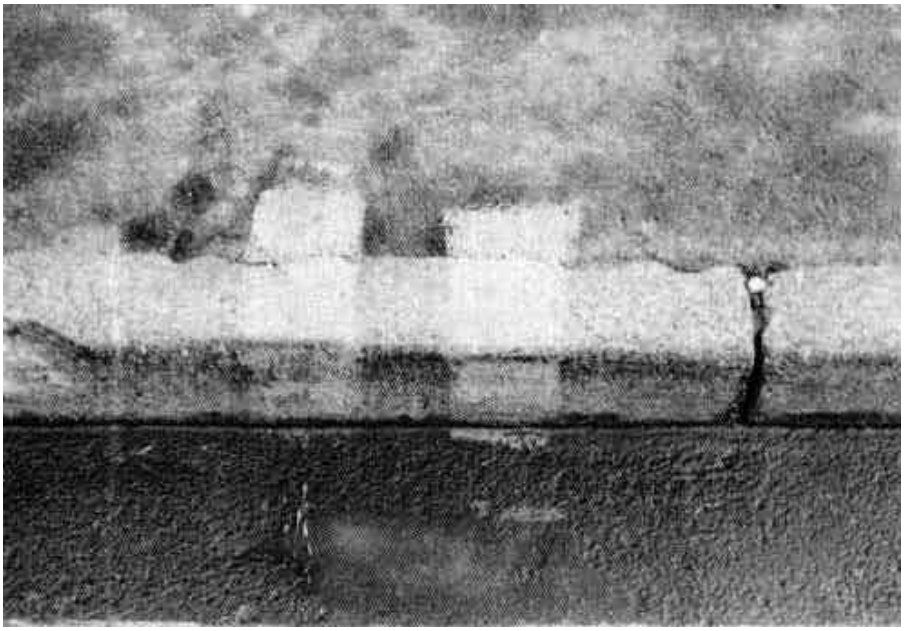
Photograph 2.16-9: Transverse and Special Road Markings - Stop

Photograph 2.16-10: Transverse and Special Road Markings - Words

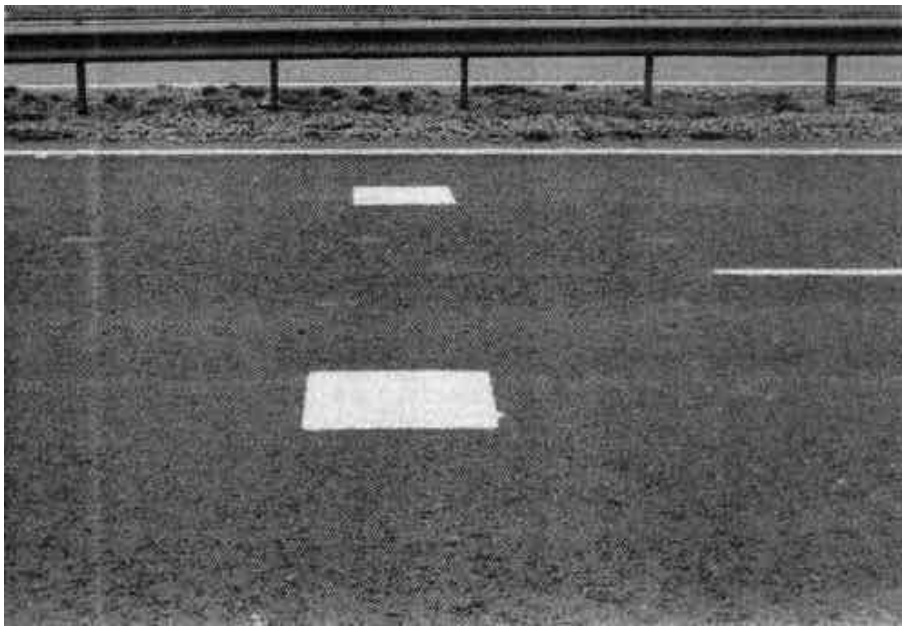
Photograph 2.16-11: Transverse and Special Road Markings - Words

Photograph 2.16-12: Transverse and Special Road Markings - Roundabout

Photograph 2.16-13: Transverse and Special Road Markings - Arrows



Photograph 2.16-14: Transverse and Special Road Markings - Loading



Photograph 2.16-15: Transverse and Special Road Markings - Other (VASCAR)

2.17 Road Traffic Signs

2.17.1 Signs

A sign, signal or other device for the purpose of regulating, warning, guiding or informing traffic.

2.17.1.1 Input Details

Site Entries:

Item Code	{SG}	
Cross-Sectional Position	Function Keys	(See Section 1.2.5)
Chainage	{----}	(To nearest metre)
Identity Code	{--------}	(Alphanumeric)
Category	{-}	1 = Warning 2 = Regulatory 3 = Informatory 4 = Hazard Warning 5 = Matrix 6 = Message 7 = Other 8 = Bus, Tram & Cycle
Illuminated	{-}	1 = No 2 = Internal 3 = External 4 = Remote 5 = Reflectorised
Diagram Number	{------}	(Refer to the Traffic Signs Regulations and General Directions)
Mounting Height	{----}	(To nearest 0.5 metres [0.1 < H < 25.0])
Mounting Method	{-}	1 = Post 2 = Bridge 3 = Gantry 4 = Wall 5 = Lamp Post 6 = Traffic Signal 7 = Other
Standard Size Code	{--}	Options R1 R2 R3 T1 T2 T3 C1 C2 C3 (or press ENTER only to input actual width and height)
Width	{----}	(To nearest 0.1 metres [0.1 < W < 200.0])
Height	{----}	(To nearest 0.1 metres [0.1 < H < 10.0])
Ownership	{-}	1 = Highways Agency 2 = County 3 = District 4 = Unknown

Off-Site Entries:

Photograph Number	{--------}	(Alphanumeric)
Installation Date	{DD/MM/YY}	

See Annex 2.19.1 for electrical details.

2.17.1.2 Convention

A sign is defined as a point item.

2.17.1.3 Rules

(i) Only permanent signs should be recorded.

(ii) If an identity code is not present or unreadable, an asterisk (*) should be used.

(iii) Categories

1 = Warning (usually triangular diagram numbers 501 to 580)
2 = Regulatory (usually circular diagram numbers 601 to 662)
3 = Informatory (usually rectangular diagram numbers 701 to 925)

(iv) Care should be taken when selecting a diagram number. If the inspector is unsure, an asterisk (*) should be entered, and an off-site entry made by the Highway Maintenance Engineer.

(v) The mounting height is the distance from the lower edge of the sign to the road surface.

(vi) If two identical signs occur on the same post they must be recorded as two signs occurring one metre apart.

(vii) Where signs share a common lighting arrangement the offsite lighting details should only be recorded against one of the signs. Both signs should be recorded as lit.

(viii) The control box (even when not integral) is assumed to be included with the sign.

(ix) If the sign dimensions do not conform to the pre-defined ‘standard’ values, enter the width and height directly.

(x) Signs which occur in the central reserve of dual carriageways and motorways and which are common to both sections **MUST** be recorded in the nominated section only, indicated by an asterisk (*) in the class/index details of the network referencing system. However, uni-directional signs should be recorded in the section to which they apply.

(xi) Signs on a gantry should be recorded in the cross-sectional position to which they apply.

(xii) Black and white edge of carriageway marker posts should not be recorded under this item; they should be recorded as a safety bollard (see section 2.17.2).

2.17.1.4 Guidance on Sign Dimensions

	Horizontal Width (metres)	Vertical Height (metres)
Triangular Signs T1	0.5	0.6
T2	0.7	0.8
T3	0.8	0.9
Rectangular Signs R1	0.5	0.5
R2	0.7	1.2
R3	1.5	0.7
Circular Signs C1	0.3	0.3
C2	0.6	0.6
C3	0.9	0.9

Since sign dimensions are recorded to the nearest 0.1m the width and heights above cover a range of ±0.05m from the value stated. If a size does not conform to the above values enter the width and height directly.

2.17.2 Safety Bollards

A device placed on a refuge or traffic island to warn drivers of those obstructions, or to prevent the passage of vehicles.

2.17.2.1 Input Details

Site Entries:

Item Code	{SB}	
Cross-Sectional Position	Function Keys	(See Section 1.2.5)
Chainage	{----}	(To nearest metre)
Identity Code	{--------}	(Alphanumeric)
Illuminated	{-}	1 = No 3 = Reflectorised 2 = Internal 4 = Other
Type	{----}	(Alphanumeric - See Rule (v))
Sign Diagram Number	{------}	(Alphanumeric)

Off-Site Entries:

See Annex 2.19.1 for electrical details.

2.17.2.2 Convention

A bollard is defined as a point item.

2.17.2.3 Rules

(i) Bollards usually occur in conjunction with an central island or central reserve and care should be taken to ensure they are given the same cross-sectional position.

(ii) When an identity code is either not present or unreadable an asterisk (*) should be entered.

(iii) Where no sign is present or no sign diagram number can be determined, an asterisk (*) should be entered.

(iv) Where a bollard occurs with no island, it should be allocated to the lane immediately adjacent on the left-hand side.

(v) The type of bollard should be recorded by entering a 4 character code.

a) Where a bollard is placed to warn drivers of an obstruction, the preferred codes for the following common types may be used:

Type	Code
Haldo	HALD
Morrison	MORR
GEC/Claudgen	CLAU
Bergo	BERG
Forest City	FORC
Franco	FRAN
Hale and Hale	HALE
Pearce Gowshall	PGOW
Unknown	UNKN

b) Where bollards are installed to prevent the passage of vehicles or for any other reason than for (a) above, the following suggested codes may be used:

Type	Code
Concrete	CONC
Metal	METL
Wooden	WOOD
Plastic	PLAS

Either list of codes may be extended by the MA as required.

(vi) Plastic bollards permanently installed on Emergency Crossover Points should be recorded under this item using type ECP and diagram number 578.

(vii) Black and white edge of carriageway marker posts should be recorded as a bollard with diagram number 560 if the reflector is circular or 561 if the reflector is rectangular.

2.17.3 Reference Marker Point

An item specifically placed to indicate the position within the highway network.

2.17.3.1 Input Details

Site Entries:

Item Code	{RF}		
Cross-Sectional Position	Function Keys	(See Section 1.2.5)	
Chainage	{----}	(To nearest metre)	
Type	{-}	1 = Marker Post 2 = Node Studs 3 = Bar Code 4 = Paint Pad	5 = Thermoplastic Cores 6 = Other
Identity Code	{--------}	(Alphanumeric)	

2.17.3.2 Convention

A marker point is defined as a point item.

2.17.3.3 Rules

(i) Only marker points which refer to the Highways Agency's network should be recorded.

(ii) If an identity code is not present or is unreadable, an asterisk (*) should be entered.

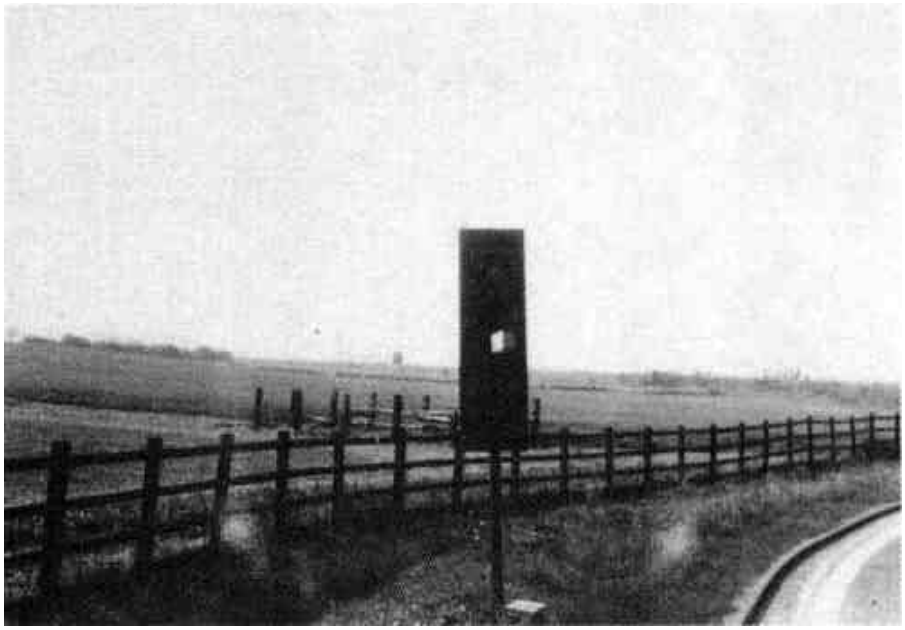
(iii) In general when collecting inventory data, only the position of the end node should be recorded in the DCD to avoid double counting. However, it may be necessary to record the position of the start node if it would not otherwise be recorded (e.g. at the MA's boundary or on the exits from roundabouts).

Photograph 2.17-1: Sign - Warning

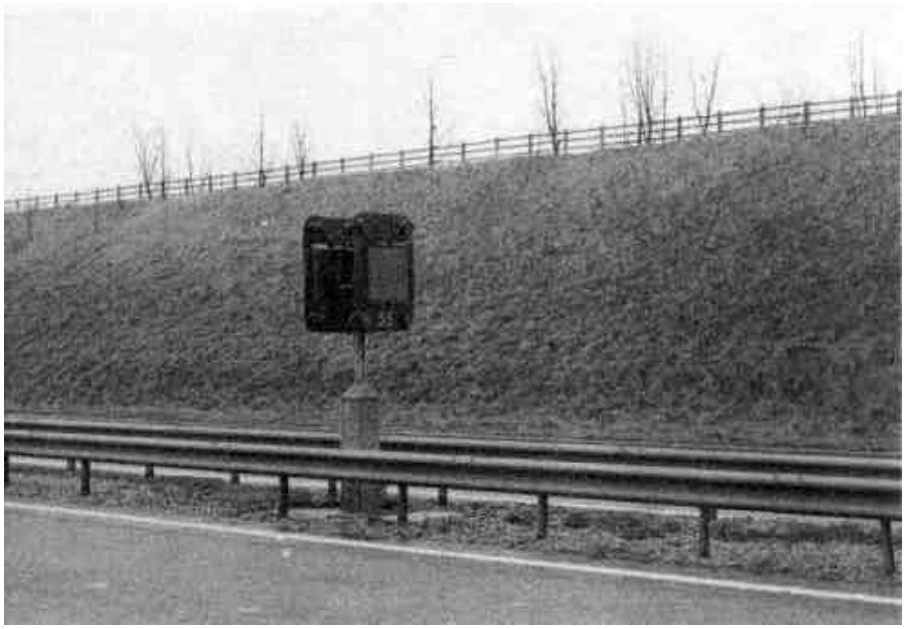
Photograph 2.17-2: Sign - Regulatory

Photograph 2.17-3: Sign - Regulatory

Photograph 2.17-4: Sign - Informatory



Photograph 2.17-5: Sign - Hazard Warning

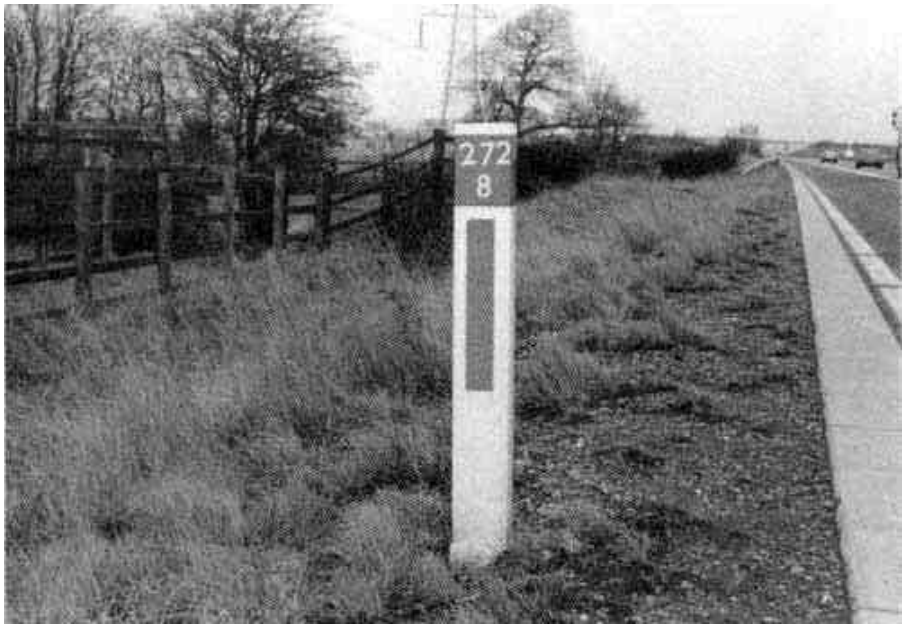


Photograph 2.17-6: Sign - Matrix

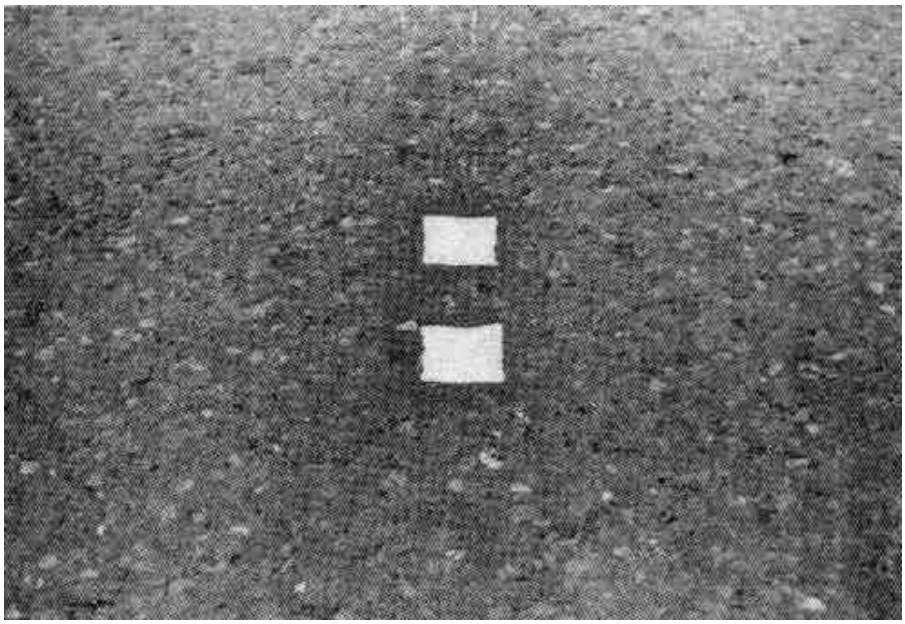
Photograph 2.17-7: Safety Bollard

Photograph 2.17-8: Safety Bollard

Photograph 2.17-9: Safety Bollard



Photograph 2.17-10: Reference Marker Point - Marker Post



Photograph 2.17-11: Reference Marker Point - Node Stud

Photograph 2.17-12: Reference Marker Point - Bar Code

Photograph 2.17-13: Reference Marker Point - Paint Pad

Photograph 2.17-14: Reference Marker Point - Thermoplastic Cores

2.18 Road Traffic Signals

2.18.1 Traffic Signals

A system of different coloured lights, including arrow-shaped lights, for stopping streams of traffic or permitting them to move.

2.18.1.1 Input Details

Site Entries:

Item Code	{TS}		
Cross-Sectional Position	Function Keys	(See Section 1.2.5)	
Chainage	{----}	(To nearest metre)	
Identity Code	{--------}	(Alphanumeric)	
Manufacturer	{-}	1 = Plessey 2 = GEC	3 = Other
Number of Lamp Units	{--}	(Numeric [0 < N < 25])	
Mounting Method	{-}	1 = Post 2 = Arm	3 = Wall 4 = Other
Type	{-}	1 = Traffic Control Junction 2 = Pelican	3 = Other

Off-Site Entries:

Layout	{---}	(See Annex 2.18.1)
Installation Date	{DD/MM/YY}	

See Annex 2.19.1 for electrical details

2.18.1.2 Convention

A traffic signal is defined as a point item.

2.18.1.3 Rules

(i) Each post supporting a set of traffic signals must be included as a separate inventory item. When there is doubt as to which section a post is in, it should be recorded in the section which contains the control box.

(ii) Each lamp unit of a traffic signal is counted separately.

(iii) If an identity code is not present or is unreadable, an asterisk (*) should be used.

(iv) Wattage is recorded as total wattage for all lamps in the traffic signal.

(v) Approved traffic signal layouts are provided for guidance in this section.

(vi) Only approved traffic signal layouts should be recorded. New layouts should be submitted to the Highways Agency for allocation of a layout number.

(vii) Control cabinets associated with a set of traffic signals are a separate inventory item. They should be recorded as a communication cabinet (see section 2.8.1).

(viii) Lights associated with a pelican crossing are recorded under this inventory item.

2.18.2 Pedestrian Crossing

A transverse strip of carriageway marked to indicate where pedestrians have priority to cross the road.

2.18.2.1 Input Details

Site Entries:

Item Code	{PX}		
Chainage	{----}	(To nearest metre)	
Type	{-}	1 = Pelican 2 = Zebra	3 = Other
Material	{-}	1 = Thermoplastic Spray 2 = Thermoplastic Screed 3 = Paint	4 = Sheet 5 = Studs Only 6 = Other

2.18.2.2 Convention

A pedestrian crossing is defined as a point item.

2.18.2.3 Rules

(i) Each individual lighting post associated with a pedestrian crossing is a separate inventory item and should be recorded separately under Traffic Signals (TS) (see section 2.18.1).

(ii) All road markings and studs associated with a pedestrian crossing are an integral part of the crossing and should **NOT** be recorded separately.

(iii) Beacons associated with a pedestrian crossing (Zebra) must be recorded separately under lighting point, with identity code = ZEBRA, see Chapter 2.19.

(iv) Any associated control boxes should be recorded separately under communications cabinet (CC) (see section 2.8.1)

Annex 2.18.1

Traffic Signal Layout Diagrams

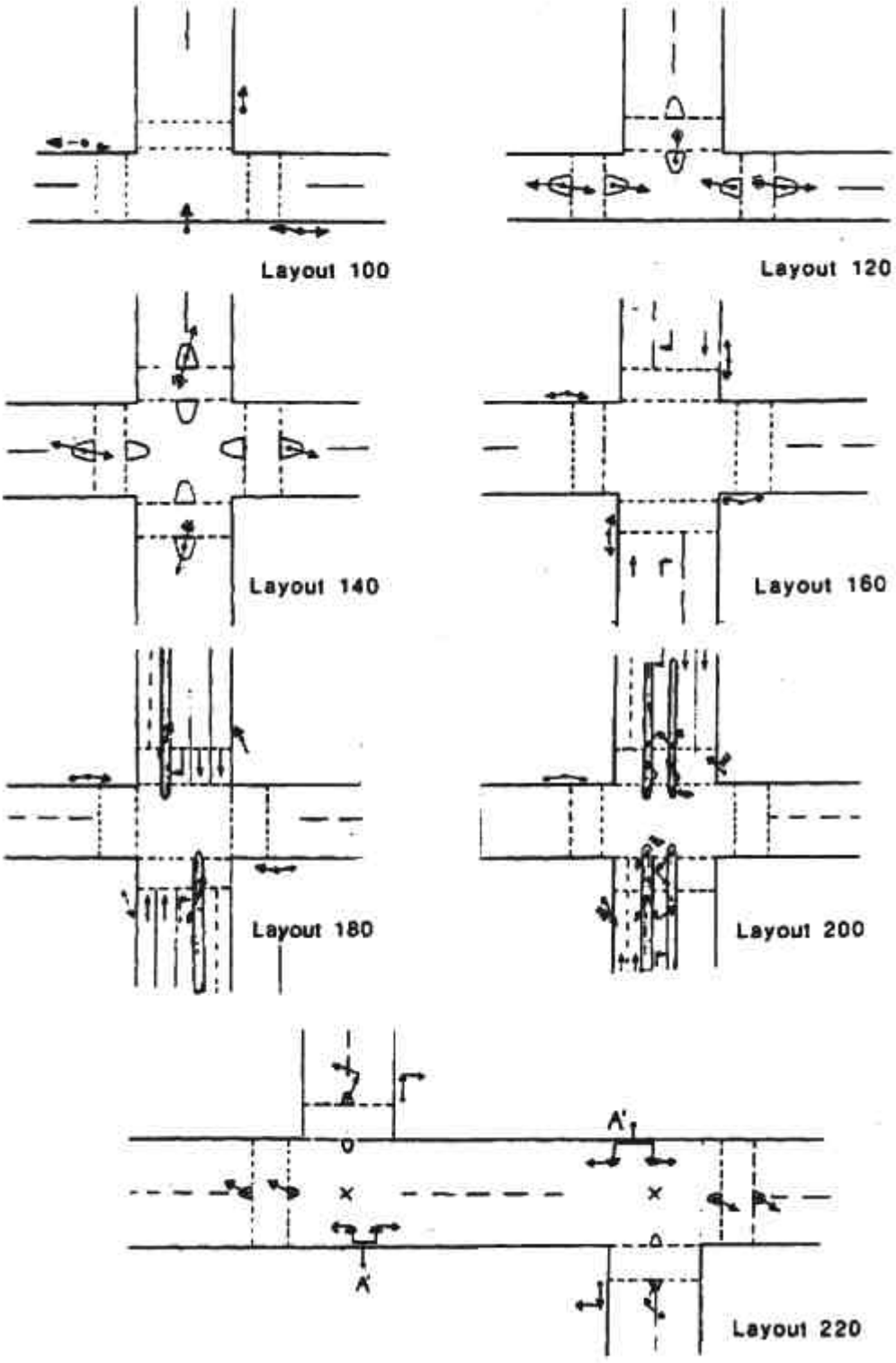


Figure 1

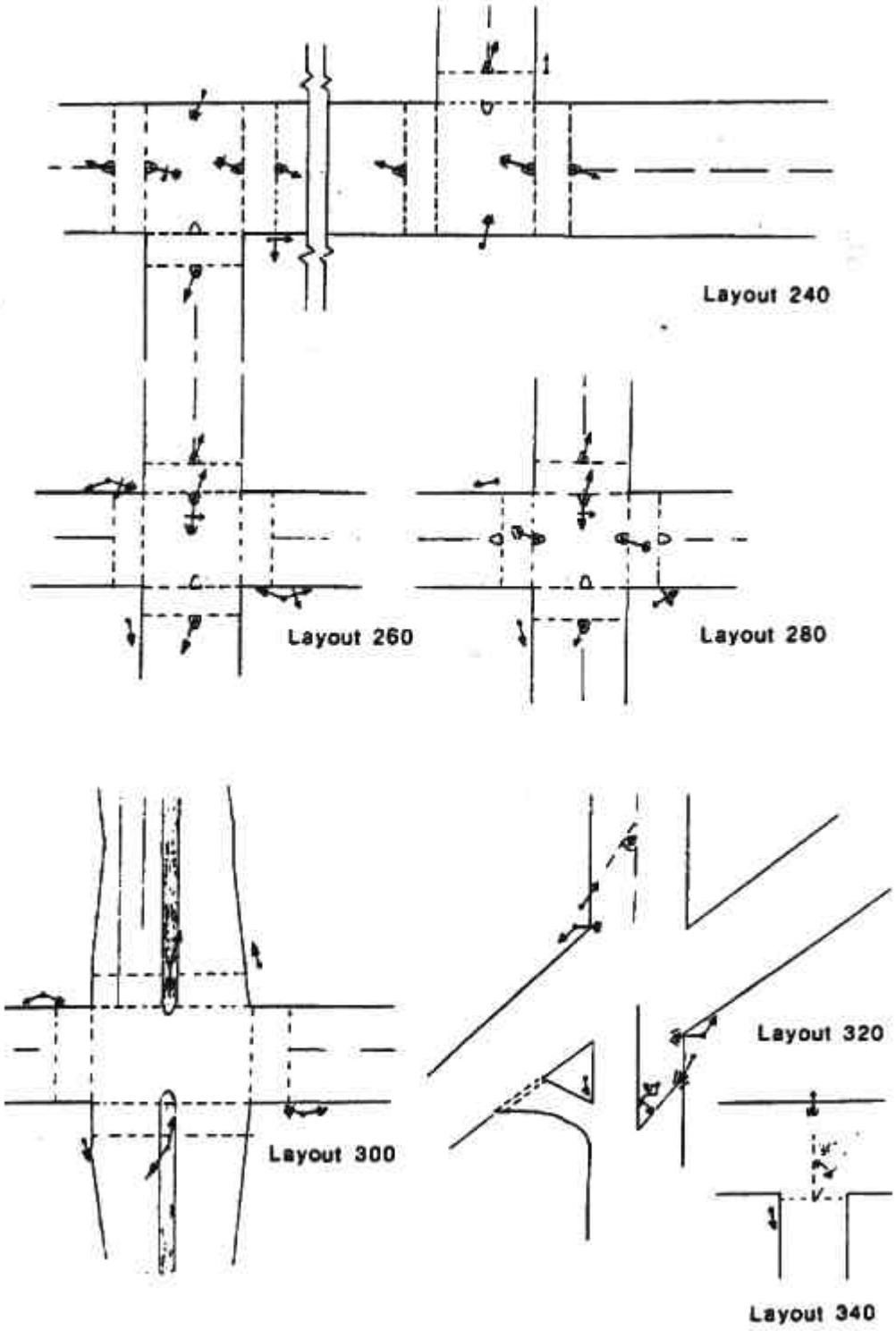
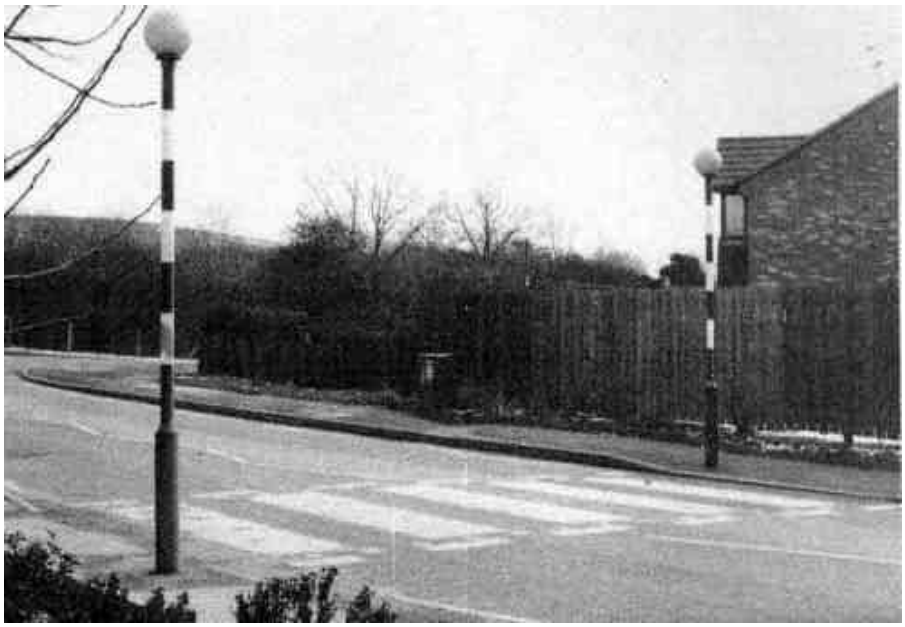

Layout 240
Layout 260
Layout 280
Layout 300
Layout 320
Layout 340

Figure 2

Photograph 2.18-1: Traffic Signals - Traffic Control Junction

Photograph 2.18-2: Pedestrian Crossing - Pelican (And Traffic Signals - Pelican)



Photograph 2.18-3: Pedestrian Crossing - Zebra

2.19 Road Lighting

2.19.1 Lighting Point

A lighting installation usually consisting of a column, lantern housing and lamp.

2.19.1.1 Input Details

Site Entries:

Item Code	{LP}		
Cross-Sectional Position	Function Keys	(See section 1.2.5)	
Chainage	{----}	(To nearest metre)	
Identity Code	{--------}	(Alphanumeric)	
Column Type	{-}	1 = Concrete 2 = Steel 3 = Aluminium	4 = None 5 = High mast 6 = Other
Height	{----}	(To nearest 0.1 metres [0.0 < H < 50.0])	
Mounting Bracket	{-}	1 = Single 2 = Double 3 = Triple 4 = Catenary	5 = Post Top 6 = Wall Mounted 7 = Other

Off-Site Entries:

See Annex 2.19.1 for electrical details.

2.19.1.2 Convention

A lighting point is defined as a point item.

2.19.1.3 Rules

(i) If an identity code is not present or is unreadable, an asterisk (*) should be entered.

(ii) Posts made of more than one material should be entered as type 6 = OTHER.

(iii) Catenary lighting should be recorded as follows:

(a) The first lamp unit after a column should be recorded in conjunction with the column using LP.

(b) The next lamp unit should be recorded with column type 4 = NONE using LP.

(c) The remaining lamp units up to the next column should be recorded using the lighting point repeat facility (LR).

(d) The last lamp unit and the last column at the end of the catenary lighting should be recorded together using LP.

(iv) A lighting point with double bracket or post top and a shared column which occurs in the central reserve of a dual carriageway or motorway and which is common to both sections **MUST** be recorded in the nominated section only, indicated by an asterisk (*) in the class/index details of the network referencing system.

(v) A lighting point with a single bracket on a separate column should be recorded in the section to which it applies.

(vi) Beacons associated with a pedestrian crossing (Zebra) must be recorded separately under this item, lighting point, with identity code ZEBRA.

2.19.1.4 Repeat Facility

Where several identical lighting points occur a facility is provided to repeat the common information by entering LR for the item code. The operator will be asked to enter cross-sectional position, chainage and identity code only and the remaining details will be assumed to be the same as for the last LP entry.

Annex 2.19.1

Guide to Lighting Points

1. Group A Lighting

The following roads, if provided with road lighting, will be lit to Group A standards:

a) Motorways
b) Trunk Roads
c) County Principal Roads
d) Other Classified Roads (A, B or C)

Lamp Type	Abbreviation	Power (W)	Mounting Height (m)
Low Pressure Sodium	SOX	135	10
Low Pressure Sodium	SOX	180	12
Low Pressure Sodium	SLI	140	10
Low Pressure Sodium	SLI	200	12
High Pressure Sodium	SON	150	10 (or 8)
High Pressure Sodium	SON	250	12
High Pressure Sodium	SON	400	12
High Pressure Mercury	MBF	400	12

Table 1 - Examples of typical Group A lighting

2. Group B Lighting

Group B lighting is usually used on other classes of road such as:

a) Side roads (sometimes classified B or C but relatively lightly trafficked)
b) Roads in residential areas

Lamp Type	Abbreviation	Power (W)	Mounting Height (m)
Low Pressure Sodium	SOX	35	5
Low Pressure Sodium	SOX	55	6
Low Pressure Sodium	SOX	90	8
High Pressure Sodium	SON	70	5
High Pressure Sodium	SON	150	8 - 10
Fluorescent	MCFE	2 x 40	5
High Pressure Mercury	MBF	80	5
High Pressure Mercury	MBF	125	5 - 6
High Pressure Mercury	MBF	250	8

Table 2 - Examples of typical Group B lighting

3. Mounting Brackets

A number of different types of mounting bracket have been identified:

1.	Single	5.	Post top
2.	Double	6.	Wall mounted
3.	Triple	7.	Other - covers any other option.
4.	Catenary		

4. Electrical Details

For those inventory items with electrical details i.e.

SB - Safety Bollard
LP - Lighting Point
SG - Sign
TS - Traffic Signal

the following **off-site** entries are required by the RMMS database.

Electricity Board [1 to 14]	- from menu (see section 5)
Operating Hours	- from menu (see section 6a)
Installation Date	- YY/MM/DD
Configuration Number [1 to 999]	- reference to details held in the electrical configuration file.

For each different electrical configuration the following details are required:

Configuration number	- cross reference to inventory item
Distribution pattern	- 4 characters (see section 6b)
Lamp type 1	- 4 characters (see section 6c)
Wattage for lamp type 1	- integer
Number of lamp type 1	- integer
Lamp type 2	- 4 characters (see section 6c)
Wattage for lamp type 2	- integer
Number of lamp type 2	- integer
Lamp type 3	- 4 characters (see section 6c)
Wattage for lamp type 3	- integer
Number of lamp type 3	- integer
Total chargeable wattage	- integer
Description of configuration	- up to 20 characters

5. Electricity Boards in England and Wales

East Midlands EB
Eastern Electricity
London Electricity
MANWEB
Midlands EB
National Power PLC
Northern Electric
NORWEB
Powergen
SEABOARD
South Wales EB
Southern Electric
South Western EB
Yorkshire Electric

6. Acceptable codes and their definition for Operating Hours , Distribution Pattern and Lamp Type are as follows:

a) Operating Hours

Code	Definition
CONT	Continuous
DTOD	Dusk to dawn
DMEM	Dusk to midnight and 0530 to dawn
DTOM	Dusk to midnight
STOS	Sunset to sunrise
SMES	Sunset to midnight and 0530 to sunrise
STOM	Sunset to midnight
SCPX	School Crossing and Pedestrian Crossing
LUX1	LUX settings 40 - 80 or 35 - 70
LUX2	LUX settings 50 on - 100 off
LUX3	LUX settings 100 on - 200 off
UNKN	Unknown

b) Distribution Pattern

Code	Definition
CO	Cut off
SCO	Sharp cut off
OTHR	Other cut off

c) Lamp Type

Code	Definition
SLI	Low pressure sodium, linear
SOX	Low pressure sodium, U-bend on standard control gear
SOXL	Low pressure sodium, U-bend on low-loss control gear
SOXE	Low pressure sodium, U-bend on new-type low-loss gear
SON	High pressure sodium, elliptical envelope
SONT	High pressure sodium, clear tubular envelope
MBF	High pressure mercury
MCF	High pressure mercury, tubular fluorescent
MBI	Mercury halide
TF	Tungsten
TH	Tungsten halogen
MBTL	Mercury tungsten halogen

Photograph 2.19-1: Double Mounting (Foreground)
Single Mounting (Background)

Photograph 2.19-2: High Mast Column

Photograph 2.19-3: Beacon (ZEBRA)

2.20 Highway Structures

2.20.1 Overbridge

A structure which spans the road being surveyed and which carries another road, railway, pedestrians or other feature.

2.20.1.1 Input Details

Site Entries:

Item Code	{BO}		
Chainage	{----}	(To nearest metre)	
Identity Code	{--------}	(Alphanumeric)	
Type	{-}	1 = Road 2 = Rail 4 = Canal 5 = Footway	6 = Gantry 7 = Tunnel 8 = Other

2.20.1.2 Convention

An overbridge is defined as a continuous item.

2.20.1.3 Rules

(i) When the bridge identity code is either not present or unreadable, an asterisk (*) should be entered.

(ii) The start chainage of an overbridge occurs when the measuring wheel is level with the start of the structure. The end chainage occurs when the measuring wheel is level with the end of the structure. Hence, an overbridge passing diagonally over the road being surveyed will have a total recorded width greater than its nominal width.

(iii) On dual carriageways, an overbridge should only be recorded in the nominated section, indicated by an asterisk (*) in the class/index details of the network referencing system, but the start and end chainage should be assessed in respect of the total length spanning both carriageways.

(iv) Tunnels, footbridges and gantries are recorded under this inventory item.

2.20.2 Underbridge

A structure carrying the road being surveyed over another road, railway, river, ravine or other feature.

2.20.2.1 Input Details

Site Entries:

Item Code	{BU}		
Chainage	{----}	(To nearest metre)	
Identity Code	{--------}	(Alphanumeric)	
Type	{-}	1 = Road	4 = Canal
		2 = Rail	5 = Footway
		3 = River	8 = Other

2.20.2.2 Convention

An underbridge is defined as a continuous item starting and finishing on some convenient feature such as the expansion joints or the ends of the parapets.

2.20.2.3 Rules

(i) An underbridge has no cross-sectional position.

(ii) When the bridge identity code is either not present or unreadable, an asterisk (*) should be entered.

(iii) Whereas parapets are part of the bridge and need not be recorded separately, a safety fence over a bridge should be recorded under its own inventory item.

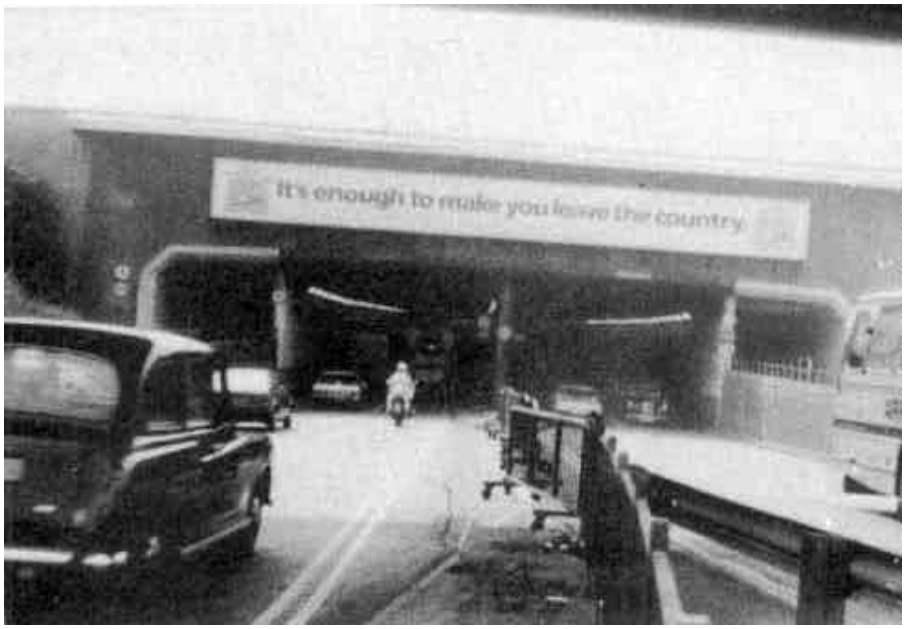
(iv) The start and end of an underbridge occurs when the measuring wheel is level with some feature of the under bridge such as an expansion joint or the end of a parapet. The feature should be consistent for the whole of the MA's network.

(v) On dual carriageways, an underbridge should only be recorded in the nominated section, indicated by an asterisk (*) in the class/index details of the network referencing system, but should be assessed in respect of the total length spanning both carriageways.

Photograph 2.20-1: Overbridge - Road

Photograph 2.20-2: Overbridge - Rail

Photograph 2.20-3: Overbridge - Gantry



Photograph 2.20-4: Overbridge - Tunnel

Photograph 2.20-5: Underbridge - Road

Photograph 2.20-6: Underbridge - River

PART 3 - INSPECTION

CONTENTS

Chapter

CONTENTS (continued)

Chapter

3.1 Introduction

3.1.1 General

The Highways Agency's Code of Practice for routine maintenance of motorways and all-purpose trunk roads is incorporated in the Trunk Road Maintenance Manual: Volume 2. The Code calls for inspections to be carried out on a regular basis and sets out procedures for and frequencies of inspections to determine what routine maintenance tasks are required.

This Part describes in detail the defects which should be identified when conducting these inspection surveys and the procedures for recording the defects on the RMMS database.

There are two types of inspection, Safety Inspections and Detailed Inspections:

(i) Safety Inspections, including Lamp Scouts, are usually carried out from a slow moving vehicle in order to identify defects which are likely to be dangerous or of serious inconvenience to the public, or in response to a report from the Police or the public.

(ii) Detailed Inspections can be either Non-Specialist or Specialist and are carried out at less frequent intervals than safety inspections in order to establish programmes of work for routine maintenance tasks not requiring urgent rectification.

For both detailed and safety inspections it is necessary to record details of defects together with sufficient information about their location, the date and time they were inspected, and what action will be required in order to rectify them. All this information is entered onto the RMMS database in a systematic format via electronic data capture devices (DCDs) and the use of inspection codes and defect codes. Annex 3.1.1 contains a schedule of the information prompted for by the DCD program when undertaking inspection surveys.

This chapter includes general information on the recording of inspection surveys. Chapter 3.2 summarises, in tabular format, the inspection intervals / frequencies set in the RMMS database.

The remaining chapters, Chapters 3.3 to 3.19 inclusive, contain for each maintenance activity the relevant details required by the inspector to undertake and record an inspection survey. This information includes:

(i) A list of the various inspection codes relating to an activity and a schedule of the inventory items to which they apply.
(ii) A definition of each activity.
(iii) A schedule of defect codes specific to the activity, divided into specialist and non-specialist defects. This schedule includes the defect attribute, unit of measurement, and minimum and maximum values.
(iv) Notes on specific individual defects. (where applicable)
(v) General notes on defects. (where applicable)
(vi) A list of suggested applicable treat codes.
(vii) Where deemed appropriate, relevant photographs are included. The loose leaf format also enables individual MA's to insert additional photographs as required.

It should be noted that the order and content of Chapters 3.3 to 3.19 cross-reference to those in the Code of Practice (Part 1 of the Trunk Road Maintenance Manual: Volume 2). Thus for example the activity Footways and Cycle Tracks is considered in Chapter 3.4 of this Manual and in Chapter 1.4 of the Code of Practice whilst Road Studs are detailed in Chapter 3.15 of this Manual and in Chapter 1.15 of the Code of Practice.

3.1.2 Categories of Defects

Having identified a defect, the Inspector is required to use his judgement in deciding when remedial action will be necessary and to make recommendations on what work is required. In the Code of Practice, two categories of defect are defined.

Category 1 defects which require prompt attention because they represent an immediate or imminent hazard or because there is a risk of short term structural deterioration. Repairs should be made within 24 hours (or 28 days provided temporary repairs have been instigated within 24 hours).

Category 2 all other defects.

Category 2 defects should be repaired within planned programmes of work. Three sub-categories, 2.1 (High), 2.2 (Medium) and 2.3 (Low) have been provided within RMMS to allow defects to be prioritised. The timescales associated with these sub-categories are at the discretion of the MA, although the target for treatment of the low priority defects should be considered to be the target treatment time given in Chapter 3.2. These priorities should be considered, together with access requirements, other works upon the road network, traffic levels and the need to minimise traffic management, in compiling the programmes of works.

3.1.3 Treat Codes

The DCD prompts for the insertion of a Treat Code. This is optional and intended to serve three main functions:

(i) to provide a shorthand method for an inspector to record a standard treatment to rectify a defect. He would then only use the appropriate text fields to provide additional information to enable the repair to be carried out.

(ii) to provide a mechanism for back analysis of data recorded to examine treatment carried out.

(iii) to provide one possible method of linking RMMS defects to independent costing and ordering systems.

A complete list of treat codes as listed on the DCD is included in Annex 3.1.2 and a list of suggested applicable treat codes is included for each activity to assist inspectors; these may be expanded as required by the MA.

Annex 3.1.1

Entries Prompted For By The Data Capture Device

1. Detailed Inspection

The example below details the prompts given by the Data Capture Device in the order in which they occur for a detailed inspection.

1.1 Section Header

LINK IDENTIFIER: {----------} (Up to 10 alphanumeric characters)

SECTION NUMBER: {--} (Numeric between 0 and 99)

REVERSE DIRECTION: {-} (Y or N)

INSPECTOR: {---} (Up to 3 alphanumeric characters)

TYPE: (detailed) is automatically recorded by the program.

INITIATION: {---} (NRM, POL, PBL, DUM or OTH)

WEATHER: {----} (FINE, RAIN , SNOW or FOG)

ROAD CONDITION: {----} (DRY, WET, SNOW or ICE)

START OF SECTION: {-} (Y or N)

NEW ACTIVITY CODE LIST: {-} (Y or N)
This stage allows you to enter the new set of activities which you are going to inspect within this section if starting a survey, or of they are different from the activities that you inspected in the previous section.

ACTIVITY CODE: {--} (2 alphanumeric characters)

INVENTORY CODE: {--} (2 alphanumeric characters from list provided)

CROSS SECTIONAL POSITION: {-} (Any digit Q, W, E, R, T, Y)

CHAINAGE: {----} (Numeric between 0 and 9999)

LOCATION (Optional): {----------} (Up to 40 alphanumeric characters)

IDENTITY CODE: {--------} (Up to 8 alphanumeric characters)
Road Traffic Signs, Road Lighting and Communications Equipment Only

DIAGRAM NUMBER: {------} (Up to 6 alphanumeric characters)
Road Traffic Signs only

ROAD STUDS CLASS: {-} (1 or 2)

(Prohibitory or Advisory)
Road Studs only

1.2 Defects

DEFECT CODE: {----} (4 alphanumeric characters)

ATTRIBUTE (if appropriate): {---} (Numeric between 0 and 999)
(e.g. area / length / number)

1.3 Decisions

Depending upon the nature of the defect, one or more of the following menus / questions may be asked.

Does the defect require 24 hour action {-} (Y/ N)

ACTION 1 = Immediate {-} (1, 2 or 3)
2 = Temporary
3 = Permanent

ACTION 1 = Temporary {-} (1 or 2)
2 = Permanent

ACTION 1 = Immediate {-} (1 or 2)
2 = Permanent

CAT2 Priority (Permanent Action) 1 = High Priority 2 = Medium Priority 3 = Low Priority {-} (1, 2 or 3)

Is temporary repair being undertaken now? {-} (Y or N)

Is permanent repair being undertaken now? {-} (Y or N)

1.4 Action

Depending upon the action logic taken any of the following prompts will appear:

Record Immediate Action Taken
Record Temporary Action Taken
Record Permanent Action Taken
Record Recommended Temporary Action
Record Recommended Permanent Action

TREAT CODE (Optional): {----} (/ followed by 3 alphanumeric characters)

RECORD ACTION: {----------} (Up to 40 alphanumeric characters)

DATE and TIME are automatically recorded from the DCD ‘s calendar / clock for actions taken at the time of inspection.

A list of suggested treatment category codes to indicate relevant remedy codes for the repair of defects is given for each inspection activity code. These codes are used in conjunction with the 40 character action text to fully describe the repairs necessary for the defects found. The combination of the treat code (if used) and the text must be adequate to initiate the repairs. If the text is too long it can be abbreviated, however, inspectors are discouraged from using abbreviations unnecessarily.

2. Safety Inspection

The example below details the prompts given by the Data Capture Device in the order in which they occur for a safety inspection.

2.1 Section Header

REVERSE DIRECTION: {-} (Y or N)

INSPECTOR: {---} (Up to 3 alphanumeric characters)

INITIATION: {---} (NRM, PAT, POL, PBL, DUM or OTH)

WEATHER: {----} (FINE, RAIN, SNOW or FOG)

ROAD CONDITION: {----} (DRY, WET, SNOW or ICE)

START OF SECTION: {-} (Y or N)

CURRENT FULL OR NEW ACTIVITY CODE LIST: {-} (C, F or N)
This stage automatically lists the current activity codes and allows you to enter the new set of activities which you are going to inspect within this section if starting a survey, or of they are different from the activities that you inspected in the previous section.

LINK IDENTIFIER: {----------} (Up to 10 alphanumeric characters)

SECTION NUMBER: {--} (Numeric between 0 and 99)

Note: TYPE (Safety) is automatically recorded by the program.

2.2 Activities

ACTIVITY CODE: {--} (2 alphanumeric characters)

INVENTORY CODE: {--} (2 alphanumeric characters from list provided)

CROSS SECTIONAL POSITION: {-} (Any digit Q, W, E, R, T, Y)

CHAINAGE: {----} (Numeric between 0 and 9999)

LOCATION (Optional): {----------} (Up to 40 alphanumeric characters)

IDENTITY CODE: {--------} (Up to 8 alphanumeric characters)
Road Traffic Signs, Road Lighting and Communications Equipment only

DIAGRAM NUMBER: {------} (Up to 6 alphanumeric characters)
Road Traffic Signs only

ROAD STUDS CLASS: {-} (1 or 2)
(Prohibitory or Advisory)
Road Studs only

2.3 Defects

DEFECT CODE: {----} (4 alphanumeric characters)

ATTRIBUTE (if appropriate): {---} (Numeric between 0 and 999)
(e.g. area / length / number)

2.4 Decisions

Depending upon the nature of the defect, one or more of the following menus / questions may be asked.

ACTION 1 = Immediate {-} (1, 2 or 3)
2 = Temporary
3 = Permanent

ACTION 1 = Temporary {-} (1 or 2)
2 = Permanent

ACTION 1 = Immediate {-} (1 or 2)
2 = Permanent

Is temporary repair being undertaken now? {-} (Y or N)

Is permanent repair being undertaken now? {-} (Y or N)

2.5 Action

Depending upon the action logic taken any of the following prompts will appear:

Record Immediate Action Taken
Record Temporary Action Taken
Record Permanent Action Taken
Record Recommended Temporary Action
Record Recommended Permanent Action

TREAT CODE (Optional): {----} (/ followed by 3 alphanumeric characters)

RECORD ACTION: {----------} (Up to 40 alphanumeric characters)

DATE and TIME are automatically recorded from the DCD ‘s calendar / clock for actions taken at the time of inspection.

A list of suggested treatment category codes to indicate relevant remedy codes for the repair of defects is given for each inspection activity code. These codes are used in conjunction with the 40 character action text to fully describe the repairs necessary for the defects found. The combination of the treat code (if used) and the text must be adequate to initiate the repairs. If the text is too long it can be abbreviated however, inspectors are discouraged from using abbreviations unnecessarily.

Annex 3.1.2

Treat Codes

/AJL	Adjust level, refix / relay.
/CAR	Carbonise.
/CIN	Concrete insitu.
/CLO	Clean only.
/CLR	Clean and repaint.
/CLU	Clear / unblock.
/CUG	Clear undergrowth.
/CUT	Cut / trim.
/DED	Dutch elm disease.
/DEF	Defluffing.
/EXC	Excavate / clearance.
/FLT	Fillet, mortar / asphalt.
/HAU	Haunch (unspecified).
/LRS	Level and reseed.
/POL	Pollarding.
/PRA	Patch - edge key and asphalt only
/PRB	Patch - edge key and bitmac only.
/PRC	Patch - edge key and bitmac and asphalt.
/PRD	Patch - complete excavation and bitmac.
/PRE	Patch - complete excavation and bitmac and asphalt.
/PRF	Patch - no excavation and asphalt only.
/PRG	Patch - no excavation and bitmac only.
/PRH	Patch - no excavation and bitmac and asphalt.
/PRI	Patch using hot rolled asphalt.
/PVN	Provide new.
/RCS	Reconstruct.
/REM	Re-mark.
/REP	Repair.
/RES	Resurface existing.
/RFX	Refix.
/RGA	Renew guide post arm.
/RGL	Regulate.
/RRS	Remove and reinstate surface.
/RSC	Resurface carriageway.
/RST	Reinstate trench.
/SBP	Sideback verge prior to other works.
/SBV	Sideback verge.
/SDR	Surface dress.
/SOB	Seal / overband.
/SSL	Slurry seal.
/STM	Structural maintenance programme.
/STR	Surface treatment (unspecified)
/WSP	Weedspray / weed treatment.

3.2 Intervals and Frequencies

3.2.1 General

The following tables provide a summary of the inspection intervals and frequencies set in the RMMS database. It should be noted that these are only a summary of the settings in the RMMS database; the full inspection requirements are defined in Part 1 of the Trunk Road Maintenance Manual: Volume 2.

In a number of instances, the RMMS database defines only a single inspection interval / frequency (e.g. 6 months for balancing ponds) although two or more possible inspection frequencies may be given for that activity in the Code of Practice, depending upon the specific circumstances. In these cases, the most onerous frequency has been set within the RMMS database; it is intended that MAs utilise the available facility to reset frequencies for any individual item, to ensure that the frequencies set on their database are appropriate to their network.

Activity Code	Text	Urban or Rural	Int or Frq	Inspection Interval / Frequency	Local Variation Allowed	CAT 1- Repair Time Allowed		CAT 2- Target Date
						temp	perm	
MC	Minor carriageway repairs - APTRs	U	Int	6 months		24 hours	28 days	6 months
MC	Minor carriageway repairs - APTRs	R	Int	12 months		24 hours	28 days	6 months
MC	Minor carriageway repairs - motorways	-	Int	12 months		24 hours	28 days	6 months
CM	Concrete minor c'way repairs -APTRs	U	Int	6 months		24 hours	28 days	6 months
CM	Concrete minor c'way repairs - APTRs	R	Int	12 months		24 hours	28 days	6 months
CM	Concrete minor c'way repairs - motorways	-	Int	12 months		24 hours	28 days	6 months
FC	Footways and cycle tracks	U	Int	6 months		24 hours	28 days	6 months
FC	Footways and cycle tracks	R	Int	3 years		24 hours	28 days	6 months
CG	Covers and gratings	-	Int	12 months		24 hours	28 days	6 months
KC	Kerb / channel - APTRs	U	Int	6 months		24 hours	28 days	6 months
KC	Kerb / channel - APTRS	R	Int	12 months		24 hours	28 days	6 months
KC	Kerb / channel - motorways	-	Int	12 months		24 hours	28 days	6 months
KC	Kerb / channel (no carriageway)	U	Int	12 months		24 hours	28 days	6 months
KC	Kerb / channel (no carriageway)	R	Int	3 years		24 hours	28 days	6 months
PD	Piped drain	-	Int	10 years	Y	24 hours	28 days	12 months
GC	Gully / catchpit / interceptor	-	Int	12 months		24 hours	28 days	12 months
PG	Piped grips < 5m	-	-	none		24 hours	28 days	6 months
PG	Piped grips > 5m	-	Int	10 years	Y	24 hours	28 days	6 months
GP	Grips	-	-	none		24 hours	28 days	6 months
DI	Ditch	-	Int	5 years	Y	24 hours	28 days	6 months
FD	Filter / counterfort drain	-	Int	5 years	Y	24 hours	28 days	12 months
CV	Culverts	-	Int	12 months		24 hours	28 days	6 months
AI	Headwall / aprons etc	-	Int	12 months		24 hours	28 days	6 months
FL	Flooding	-	-	none		24 hours	24 hours	
BF	Stockproofing	-	Int	6 months	Y	24 hours	7 days	6 months
BT	Stockproofing	-	Int	6 months	Y	24 hours	7 days	6 months
FB	SF metal / concrete	-	Int	2 years	Y	24 hours	7 days	6 months
BF	FB metal / concrete	-	Int	2 years	Y	24 hours	7 days	6 months
BT	FB timber	-	Int	2 years	Y	24 hours	7 days	6 months
FF	Safety fence loose bolts	-	Int	2 years	Y	24 hours	7 days	6 months
GA	Grassed areas	-	-	none		24 hours	5 days	
HT	Hedges and trees (general)	-	Int	12 months		24 hours	5 days	
RS	Road studs (prohibitory)	-	Int	12 months		24 hours	24 hours	
RS	Road studs (warning and advisory)	-	Int	12 months		24 hours	RS report	RS report
RM	Road markings	-	Int	2 years	Y	24 hours	28 days	12 months
SG	Signs face / struct / fixing	-	Int	2 years		24 hours	28 days	6 months
TS	Traffic signals hardware	-	Int	6 months		24 hours	28 days	6 months
LP	Lamp columns	-	Int	1 years		24 hours	28 days	6 months
CX	Emergency phone	-	Int	28 days		24 hours	28 days	6 months
CA	CC: alignment / clean / servicability	-	Int	3 months		24 hours	28 days	6 months
CZ	Transmission stations	-	Int	12 months		24 hours	28 days	6 months
CI	Comms cabinets: hardware	-	Int	2 years		24 hours	28 days	6 months
EC	Embankments and cuttings	-	Int	12 months		24 hours	28 days	12 months
LC	Litter grade C	-	-	none		28 days	28 days	28 days
LD	Litter grade D	-	-	none		7 days	7 days	7 days
SC	Sweeping and cleaning	-	-	none		24 hours	1 day	12 months

Table 3.2.1 - Non-Specialist Inspections

Activity Code	Text	Urban or Rural	Int or Frq	Inspection Interval / Frequency	Local Variation Allowed	CAT 1- Repair Time Allowed		CAT 2- Target Date
						temp	perm	
BP	Bal. ponds: no outflow control	-	Int	2 years	Y	24 hours	28 days	6 months
BP	Bal. ponds: outfall flow	-	-	6 months	Y	24 hours	28 days	6 months
AS	Sluices / tidal flaps etc	-	-	6 months		24 hours	28 days	6 months
AP	Pumps / special equipment	-	Int	as recomm.		24 hours	28 days	6 months
FN	Tension of safety fences	-	Int	2 years	Y	24 hours	7 days	6 months
HX	DTp hedges / trees: soundness	-	Int	5 years		24 hours	5 days	
HN	Non-DTp hedges / trees: soundness	-	Int	5 years		24 hours	5 days	
RC	RS conspicuity (prohibitory)	-	Int	12 months		24 hours	24 hours	
RC	RS conspicuity (warn and advisory)	-	Int	12 months		24 hours	RS report	RS report
SR	Road markings skid resistance	-	-	as req.		24 hours	28 days	12 months
SM	Signs: moving parts	-	Int	12 months		24 hours	28 days	6 months
SE	Signs: electrics	-	Int	2 years		24 hours	28 days	6 months
SV	Signs: visibility	-	-	none		24 hours	28 days	6 months
TM	TS: electro-mechanical parts	-	Int	28 days		24 hours	28 days	6 months
TE	TS: electrical	-	Int	5 years		24 hours	28 days	6 months
LE	Lamp columns: electrical	-	Int	12 months		24 hours	28 days	28 days
CB	Comms cabinet: cable ducts	-	Int	12 months		24 hours	28 days	6 months
CE	Comms cabinet: electrical	-	Int	12 months	Y	24 hours	28 days	28 days
ES	Embankment / cutting condition	-	Int	5 years		24 hours	28 days	12 months

Table 3.2.2 - Specialist Inspections

SS	Signs lamp failure	-	Int	28 days		24 hours	24 hours	
SL	LC lamp failure - APTRs	-	Int	14 days		24 hours	14 days	14 days
SL	LC lamp failure - motorways	-	Int	28 days		24 hours	14 days	14 days

Table 3.2.3 - Lamp Scout Inspections

Activity Code	Text	Urban or Rural	Int or Frq	Inspection Interval / Frequency	Local Variation Allowed	CAT 1- Repair Time Allowed		CAT 2- Target Date
						temp	perm	
64	Gullies / catchpits: empty	-	Freq	1 per year	Y			
65	Grips: recut	-	Freq	1 per year	Y			
66	Ditches: clean	-	Int	5 years	Y			
67	Grassed areas: visibility cut	-	Freq	1 per year	Y			
68	Grassed areas: swaithe cut	-	Freq	1 per year	Y			
69	Grassed areas: treat vegetation	-	Freq	1 per year	Y			
70	Cleaning: sweep kerbed c'way	U	-	as req.	Y			
70	Cleaning: sweep kerbed c'way	R	-	as req.	Y			
71	Cleaning: apply herbicide	-	-	as req.	Y			
72	Cleaning: sweep footway	-	-	as req.	Y			
73	Cleaning: sweep cycle tracks	-	-	as req.	Y			
74	Cleaning: scavenge verge	-	-	as req.	Y			
75	Cleaning: lay-by / hard shoulder	-	-	as req.	Y			
76	Signs: clean	-	-	as req.	Y			
77	Signs: bulk lamp change	-	Int	2 years				
78	TS: bulk change signals	-	Int	3 months				
79	TS: bulk change buttons	-	Int	6 months				
80	TS: clean lenses	-	Int	12 months				
81	Road lighting (RL): clean	-	Int	12 months	Y			
82	RL: bulk change SLI / SLI-HO lamps	-	Int	12 months				
83	Not Used							
84	RL: bulk ch. SOX /SOX-E/MCFE/SL/PL	-	Int	18 months				
85	RL: blk ch. SON/SON-T/MBFU /SOX-Plus	-	Int	2 years				
86	Saftey inspection (M/way)	-	Int	7 days				
86	Safety inspection (APR)	-	Int	28 days	Y			
87	Detailed inspection < 12 months	-	Int	6 months				
88	Detailed inspection > 12 months	-	Int	12 months				
89	Safety inspection < 12 months	-	Int	6 months				
90	Safety inspection > 12 months	-	Int	12 months				
91	Lamp inspection motorways	-	Int	28 days				
92	Lamp inspection APTRs	-	Int	14 days				
93	Inventory surveys	-	-	as req.				

Table 3.2.4 - Cyclic Maintenance

3.3 Carriageway

3.3.1 Minor Carriageway Repairs - Flexible

The following inspection code relates to this activity:

Minor Carriageway Repairs MC

The following inventory items are applicable to this inspection activity:

Central Island	CI	Hard Shoulder	HS
Central Reserve	CR	Lay-by	LB
Carriageway	CW	Crossover	XO

3.3.1.1 Definition

Minor carriageway repairs do **NOT** relate to larger scale work needed to strengthen the carriageway or to work linked with structural maintenance, including surface dressing.

3.3.1.2 Non-Specialist Defects

Description	Code	Attribute	Units	Min	Max
Localised cracking *Cracking confined to a discrete area of the carriageway and not associated with structural maintenance activities.*	LOCK	area	sq metres	1	200
Localised edge deterioration *Cracking confined to a discrete area of the carriageway and not associated with structural maintenance activities.*	LODT	length	metres	1	50
Surfacing joints *Open or excessive joints.*	SRJT	length	metres	1	50
Cracking around ironwork	CKIR	area	sq metres	1	200
Patch - adjacent cracking	PACK	area	sq metres	1	200
Patch - loss of material (fretting)	PLMT	area	sq metres	1	200
Patch - difference in level *Difference in level of a patch with the surrounding carriageway.*	PDLV	area	sq metres	1	200
Trench RI - adjacent cracking *Cracking around a reinstated trench.*	TACK	area	sq metres	1	200
Trench RI - loss of material *Loss of material (fretting) from a reinstated trench.*	TLMT	area	sq metres	1	200

Non-Specialist Defects (continued)

Trench RI - difference in level *Difference in level between a reinstated trench and the surrounding carriageway.*	TDLV	area	sq metres	1	200
Pothole	POTH	area	sq metres	1	50
Single crack	SCRK	length	metres	1	50
Patch - material cracking *Cracking of the material used for patching.*	PMCK	area	sq metres	1	200
Trench RI - material cracking *Cracking of the material used to reinstate the trench.*	TMCK	area	sq metres	1	200
Blacktop fretting *Loss of material from the carriageway surface.*	BFRT	area	sq metres	1	200
Other	OTHR				
None	NONE				

3.3.1.3 General Notes

(i) Detailed inspections should only record those types of defect likely to require routine maintenance rather than to establish general structural condition.

(ii) Some defects recorded may be repaired within structural maintenance work due to be carried out within the timescale of the detailed inspection frequencies.

(iii) Where a large number of cracks occur within an area of the carriageway, it is acceptable to make a single entry provided a reasonable estimate of the length of cracking within that area is recorded.

(iv) Particular attention should be paid to potholes and other localised carriageway defects since these may often constitute an immediate or imminent hazard.

(v) There is more than one inspection interval defined for this inspection activity in the Code of Practice. The most onerous interval has been set within the RMMS database and it is intended that MAs utilise the available facility to ensure that the appropriate intervals for the individual items are established.

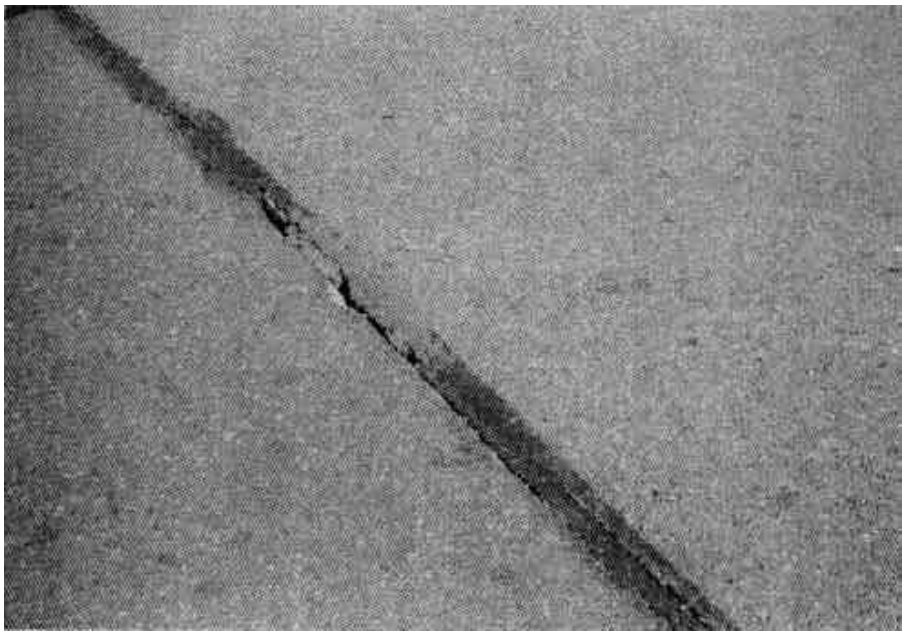
3.3.1.4 Treat Codes

Suggested treat codes applicable to this activity are:

/CAR	Carbonise.
/HAU	Haunch (unspecified) - general reconstruction.
/PRA	Patch - edge key and asphalt only.
/PRB	Patch - edge key and bitmac only.
/PRC	Patch - edge key and bitmac and asphalt.
/PRD	Patch - complete excavation and bitmac only.
/PRE	Patch - complete excavation and bitmac and asphalt.
/PRF	Patch - no excavation and asphalt only.
/PRG	Patch - no excavation and bitmac only.
/PRH	Patch - no excavation and bitmac and asphalt.
/PRI	Patch using hot rolled asphalt.
/RES	Resurface existing flexible construction.
/RGL	Regulate - overlay using a machine.
/RST	Reinstate trench.
/SDR	Surface dress.
/SOB	Seal / overband
/SSL	Slurry seal.
/STR	Surface treatment (unspecified).
/WSP	Weedspray.

Photograph 3.3.1-1: LOCK - Localised Cracking

Photograph 3.3.1-2: LODT - Localised edge deterioration



Photograph 3.3.1-3: SRJT - Surfacing joints

Photograph 3.3.1-4: CKIR - Cracking around ironwork

Photograph 3.3.1-5: PACK - Patch - adjacent cracking

Photograph 3.3.1-6: PLMT - Patch - loss of material

Photograph 3.3.1-7: PDLV - Patch - Difference in level

Photograph 3.3.1-8: TACK - Trench RI - adjacent cracking

Photograph 3.3.1-9: TLMT - Trench RI - loss of material

Photograph 3.3.1-10: TDLV - Trench RI - difference in level

Photograph 3.3.1-11: POTH - Pothole

3.3.2 Minor Carriageway Repairs - Concrete

The following inspection code relates to this activity:

Minor carriageway repairs - Concrete CM

The following inventory items are applicable to this inspection activity:

Central Island	CI	Hard Shoulder	HS
Central Reserve	CR	Lay-by	LB
Carriageway	CW	Crossover	XO

3.3.2.1 Definition

Minor carriageway repairs do **NOT** relate to larger scale work needed to strengthen the carriageway or to work linked with structural maintenance including surface dressing.

3.3.2.2 Non-Specialist Defects

Description	Code	Attribute	Units	Min	Max
Joint seals	JTSL				
Shallow spalling at joints / cracks	SSPL				
Deep spalling at joints	DSPL				
Opening of longitudinal joint	OLJT	length	metres	1	100
Stepping at joint / crack	STEP				
Vertical movement under traffic	VMVT				
Evidence of pumping	EPMP				
Settlement / ponding	SETT	area	sq metres	1	250
Cracking	CRCK	area	sq metres	1	250
Failed overbanding / sealed cracks	OVSD				
Surface crazing	SRCZ	area	sq metres	1	100
Scaling	SCAL	area	sq metres	1	100
Miscellaneous surface defects	MSRF	area	sq metres	1	100
Surface texture worn	SRTX	area	sq metres	1	250
Initiate skid test	SKID	length	metres	1	30
Failed repair	RFAL				
Other	OTHR				
None	NONE				

3.3.2.3 General Notes

(i) Detailed inspections should only record those types of defect likely to require routine maintenance rather than to establish general structural condition.

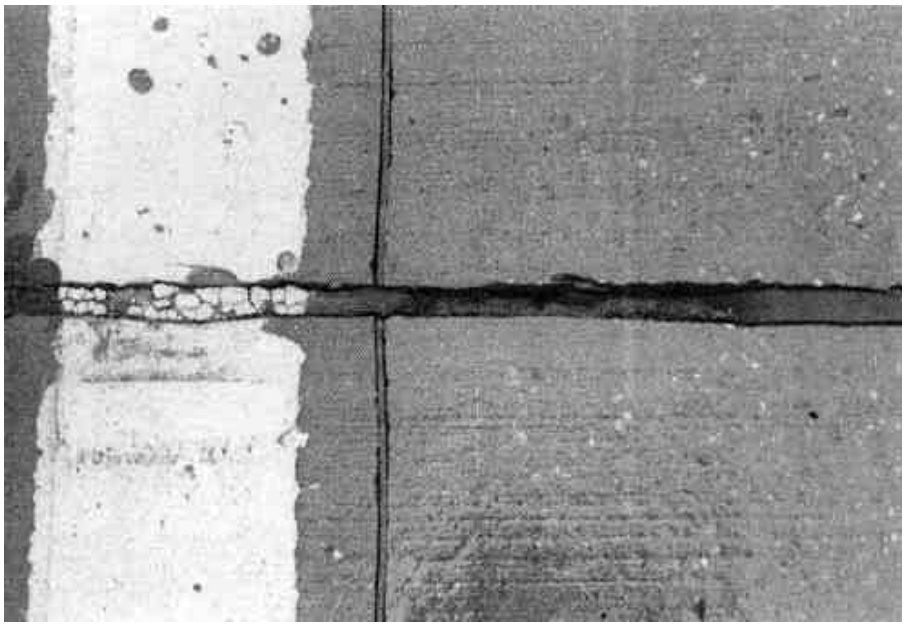
(ii) Some defects recorded may be repaired within structural maintenance work due to be carried out within the timescale of the detailed inspection frequencies.

(iii) There is more than one inspection interval defined for this inspection activity in the Code of Practice. The most onerous interval has been set within the RMMS database and it is intended that MAs utilise the available facility to ensure that the appropriate intervals for the individual items are established.

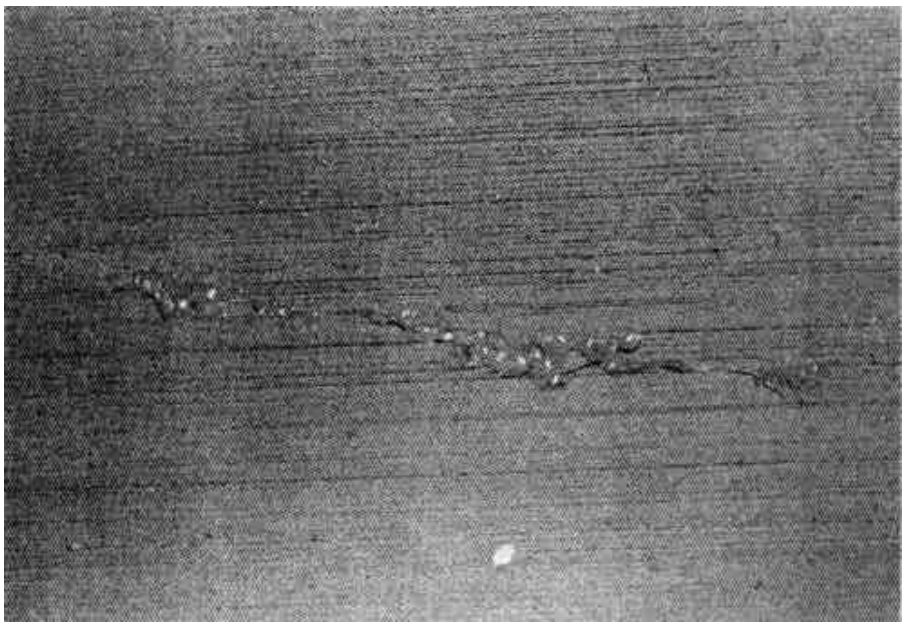
3.3.2.4 Treat Codes

Suggested treat codes applicable to this activity are:

/CIN	Concrete insitu (lay concrete to form slab on site).
/PRA	Patch - edge key and asphalt only.
/RCS	Reconstruct (as specified by Engineer).
/RGL	Regulate carriageway levels (in materials specified by Engineer).
/SDR	Surface dress.
/SOB	Seal / overband.
/STR	Surface treatment (unspecified) required.
/WSP	Weedspray.

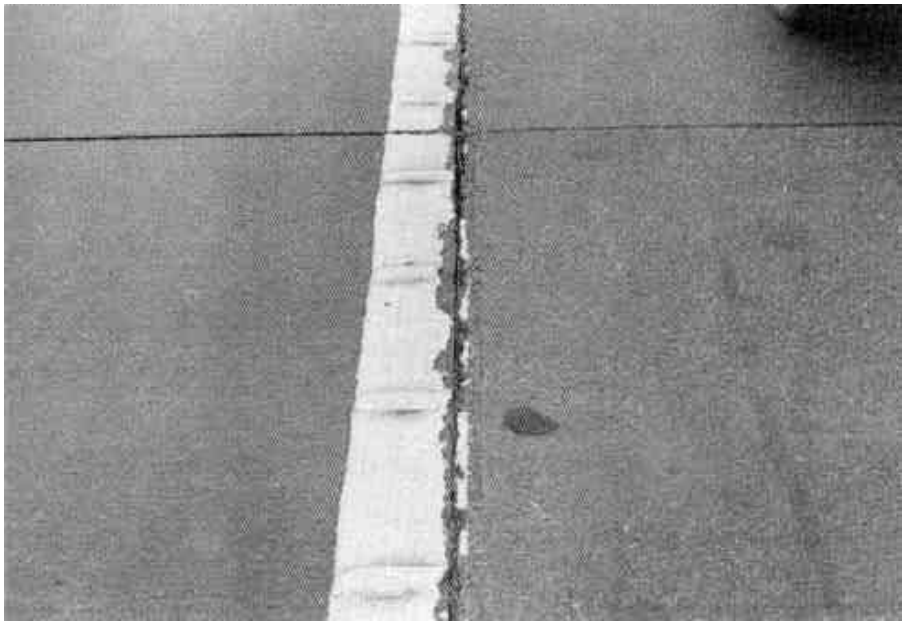


Photograph 3.3.2-1: JTSL - Joints seals

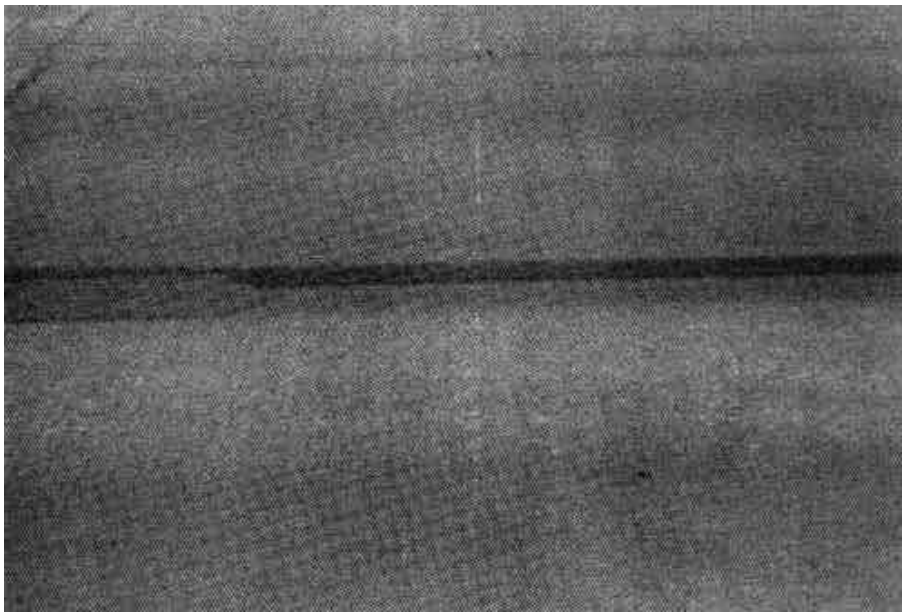


Photograph 3.3.2-2: SSPL - Shallow spalling at joints / cracks

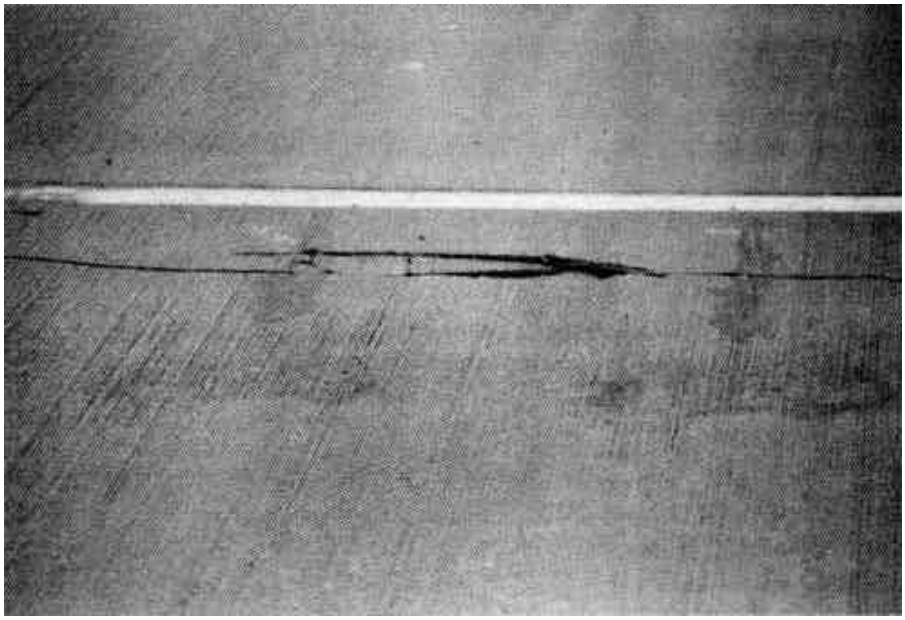
Photograph 3.3.2-3: DSPL - Deep spalling at joints



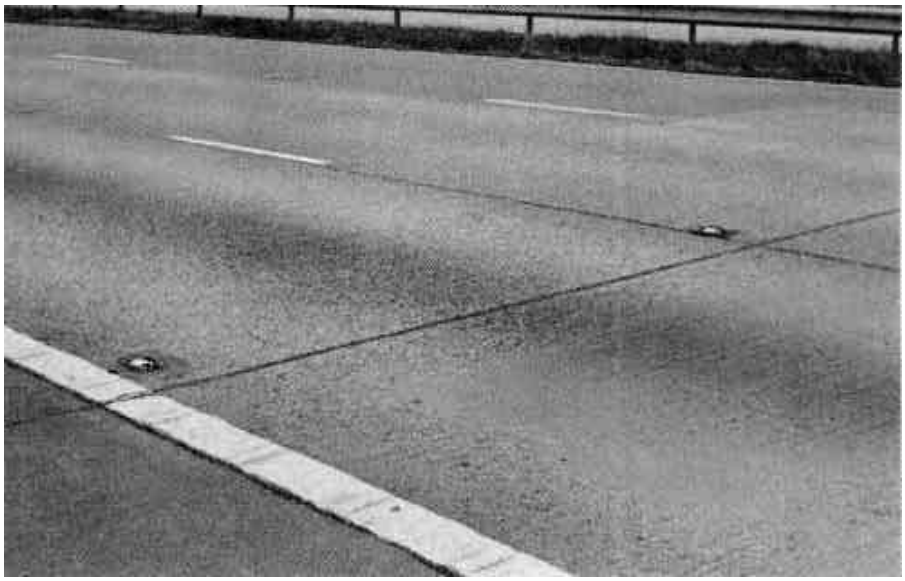
Photograph 3.3.2-4: OLJT - Opening of longitudinal joint



Photograph 3.3.2-5: STEP - Stepping at joint



Photograph 3.3.2-6: CRCK - Cracking



Photograph 3.3.2-7: SRTX - Surface texture worn

Photograph 3.3.2-8: RFAL - Failed repair

3.4 Footways and Cycle Tracks

The following inspection code relates to this activity:

Footways and Cycle Tracks FC

The following inventory items are applicable to this inspection activity:

Footway FW Cycle Track CT

3.4.1 Definition

An area for pedestrians / bicycles within the trunk road boundary, including subways, underbridges, overbridges and other footways which are the responsibility of the Highways Agency but which may fall outside the trunk road boundary.

3.4.2 Non-Specialist Defects

Description	Code	Attribute	Units	Min	Max
Standing water.	STWT	length	metres	1	50
Slab profile - uneven/trips/gap>20mm.	SLPF	area	sq metres	1	200
Slab cracking.	SLCK	area	sq metres	1	200
Slab rocking.	SROK	area	sq metres	1	200
Block profile.	BKPF	area	sq metres	1	200
Black top - potholes > 25mm.	BPOT	area	sq metres	1	200
Black top - local cracking. *Cracking confined to a discrete area of the footway / cycle track.*	BLCK	area	sq metres	1	200
Black top - extensive cracking. *Cracking affecting the major part of a footway / cycle track.*	BECK	area	sq metres	1	500
Black top - fretting. *Loss of material from the footway / cycle track surface.*	BFRT	area	sq metres	1	200
Failed patch - adjacent cracking.	FPCK	area	sq metres	1	200
Failed patch - loss of material. *Loss of material (fretting) from an existing area of patching.*	FLMT	area	sq metres	1	200
Failed patch - difference in level.	FDLV	area	sq metres	1	200
Overgrown by vegetation.	OVGV	length	metres	1	100
Trench RI - adjacent cracking. *Cracking around a reinstated trench.*	RACK	area	sq metres	1	200

Non-Specialist Defects (continued)

Trench RI - loss of material. *Loss of material (fretting) from a reinstated trench.*	RLMT	area	sq metres	1	200
Trench RI - difference in level.	RDLV	area	sq metres	1	200
Other.	OTHR				
None.	NONE				

3.4.3 Notes on Defects

(a) STWT — Water greater than 10mm deep which restricts the footway width to less than 500mm or is likely to cause pedestrians to use the adjacent carriageway.

(b) SLPF — Includes ridges, projections, sharp edges (trips), cracks and gaps which are greater than 20mm.

© BKPF — Includes ridges, projections, sharp edges (trips), cracks and gaps which are greater than 20mm.

(d) BPOT — Includes potholes and small area depressions greater than 25mm in depth which are creating a hazard.

(e) FDLV — Includes ridges, projections, sharp edges (trips), cracks and gaps which are greater than 20mm and also depressions greater than 25mm in depth which are creating a hazard.

(f) SLCK — Cracked slabs should not be replaced as a routine maintenance operation unless there is a need to reset the slab because of some other defect.

(g) RDLV — Applies when a trench has subsided or has been left proud following reinstatement and includes ridges, projections, sharp edges (trips), cracks and gaps which are greater than 20mm and also depressions greater than 25mm in depth which are creating a hazard.

3.4.4 General Notes

(i) When interpreting defects recorded during an inspection survey, care should be taken to differentiate between those relating to routine maintenance and those applicable to structural maintenance.

(ii) Correction of defects arising from the activities of Public Utilities should not be charged to the Highways Agency if they are still within the timescale of the New Roads and Street Works Act 1991 or any locally agreed arrangement.

(iii) Particular consideration should be given to defects, such as trips, which may constitute an immediate danger to pedestrians and/or cyclists.

(iv) There is more than one inspection interval defined for this inspection activity in the Code of Practice. The most onerous interval has been set within the RMMS database and it is intended that MAs utilise the available facility to ensure that the appropriate intervals for the individual items are established.

3.4.5 Treat Codes

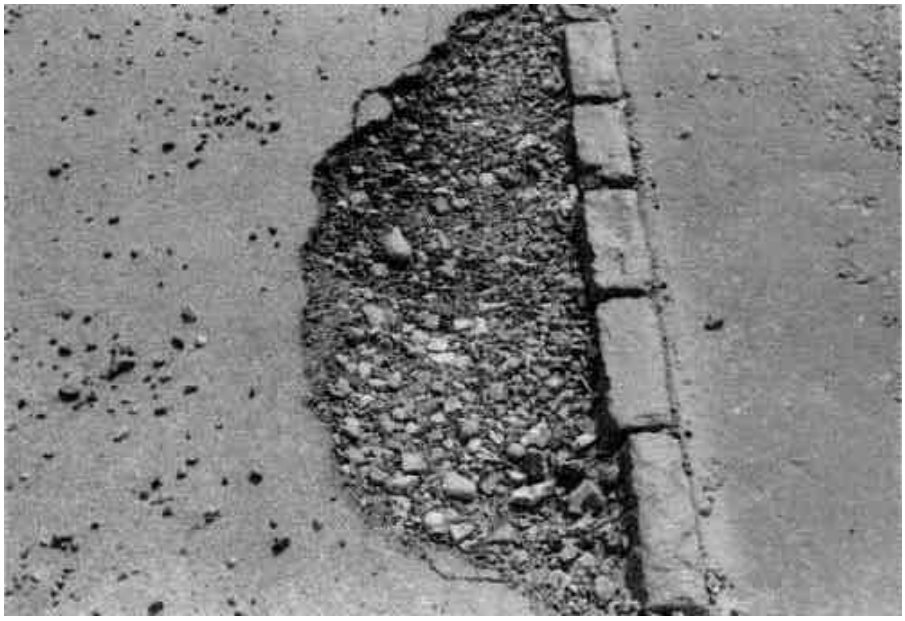
Suggested treat codes applicable to this activity are:

/AJL	Adjust level of an area of slabs (add text to indicate number and sizes of any new slabs required).
/CAR	Carbonise.
/CIN	Concrete insitu (lay concrete to form slab on site).
/HAU	Haunch (unspecified) - general reconstruction.
/PRA	Patch - edge key and asphalt only.
/PRB	Patch - edge key and bitmac only.
/PRC	Patch - edge key and bitmac and asphalt.
/PRD	Patch - complete excavation and bitmac only.
/PRE	Patch - complete excavation and bitmac and asphalt.
/PRF	Patch - no excavation and asphalt only.
/PRG	Patch - no excavation and bitmac only.
/PRH	Patch - no excavation and bitmac and asphalt.
/PRI	Patch using hot rolled asphalt.
/PVN	Provide new slabbing where none has previously existed.
/RCS	Reconstruct footway (as specified by Engineer).
/RES	Resurface existing flexible construction.
/RFX	Refix an individual slab.
/RGL	Regulate footway level.
/RST	Reinstate and trench.
/SDR	Surface dress.
/SOB	Seal / overband.
/SSL	Slurry seal.
/STR	Surface treatment (unspecified).
/WSP	Weedspray.

Photograph 3.4-1: SLPF - Slab Profile - uneven/trips/gap > 20mm

Photograph 3.4-2: SLCK - Slab cracking

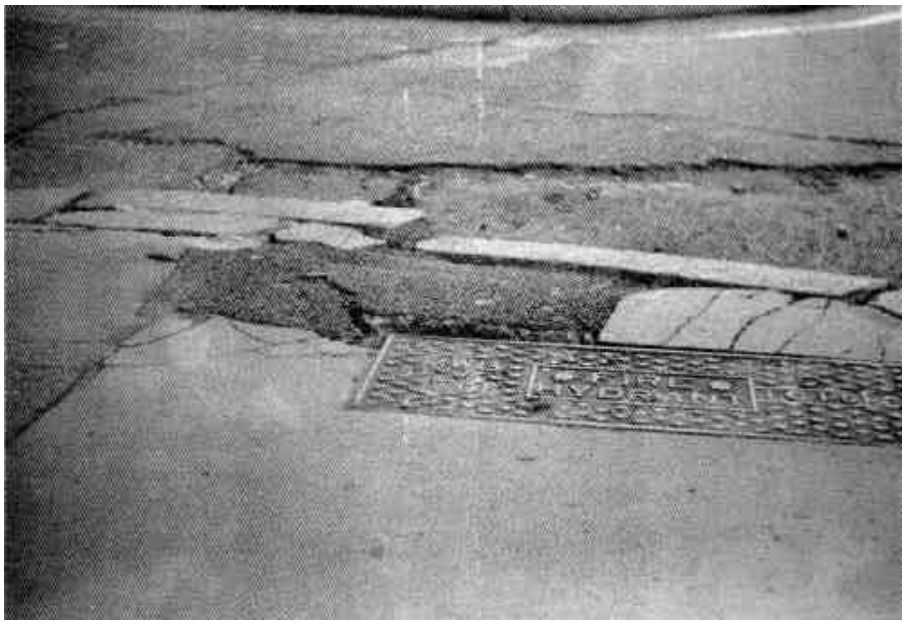
Photograph 3.4-3: BKPF - Block profile



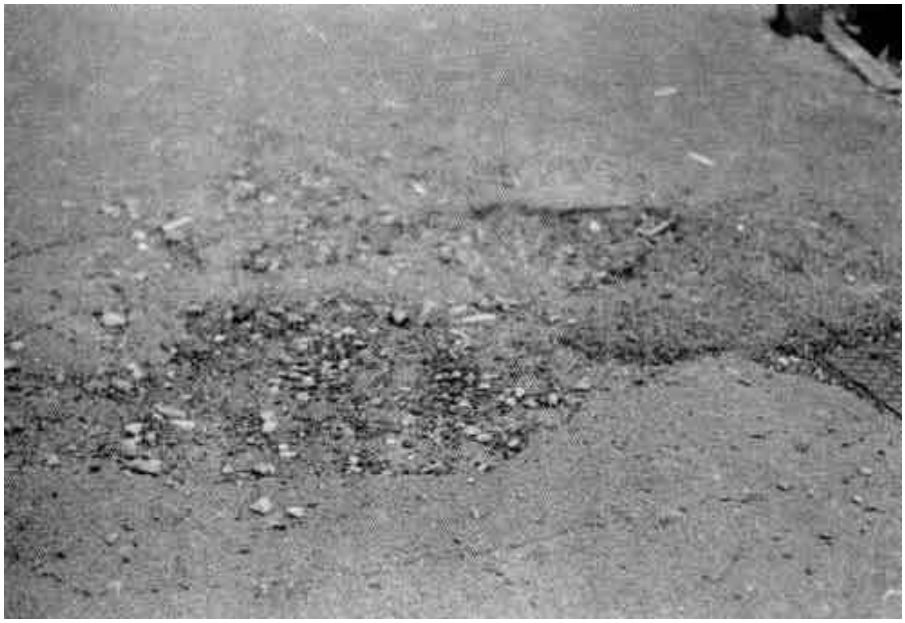
Photograph 3.4-4: BPOT - Black top - pothole

Photograph 3.4-5: BLCK - Black top - local cracking

Photograph 3.4-6: BECK - Black top - extensive cracking

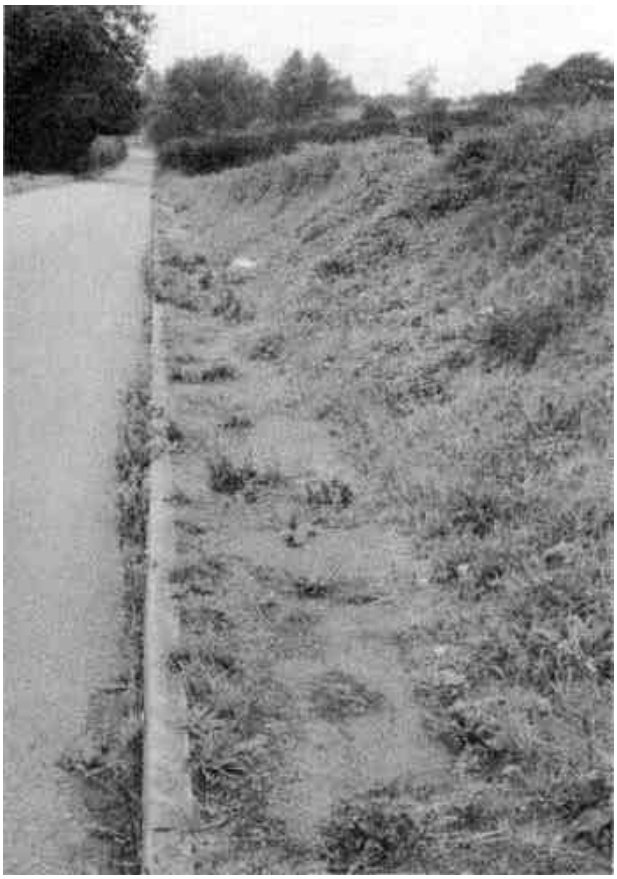


Photograph 3.4-7: FPCK - Failed patch - adjacent cracking



Photograph 3.4-8: FLMT - Failed patch - loss of material

Photograph 3.4-9: FDLV - Failed patch - difference in level



Photograph 3.4-10: OVGV - Overgrown by vegetation

Photograph 3.4-11: RLMT - Trench RI - loss of material

Photograph 3.4-12: RDLV - Trench RI - difference in level

3.5 Covers, Gratings, Frames and Boxes

The following inspection code relates to this activity:

Covers, Gratings, Frames and Boxes	CG

The following inventory items are applicable to this inspection activity:

Catchpit	CP	Manhole	MH
Gully	GY	Piped Grip	PG
Interceptor	IN		

3.5.1 Definition

This section relates to the repairs to and replacement of (where necessary) all types of covers, gratings, frames and boxes which are the responsibility of the Highways Agency.

3.5.2 Non-Specialist Defects

Description	Code	Attribute	Units	Min	Max
Difference in level with road. *Differential levels between items and abutting carriageway, footway or cycle track surface exceeding 20mm.*	IDLV				
Difference in component levels. *Differential levels between different components exceeding 20mm.*	ICLV				
Rocking under load.	IRLD				
Cracked or broken.	IBCK				
Missing.	MISS				
Parallel gratings.	PARL				
Smooth surface.	SMTH				
Blockage. Applies to surface water catchment items.	BLOK	percentage	per cent	1	100
Seized.	SIEZ	percentage	per cent	1	100
Other.	OTHR				
None.	NONE				

3.5.3 Notes on Defects

(a) IRLD Rocking covers or gratings may constitute an immediate hazard, particularly if the relative movement under load exceeds 10mm. In urban areas a rocking cover or grating may give rise to complaints regarding noise and if so should be identified as a defect with an appropriately high priority for treatment.

(b) IBCK Particular consideration should be given to cracked or broken items which may be in danger of collapse and thus liable to cause a hazard.

(c) MISS Attention should be paid to missing items, which are likely to constitute a hazard.

(d) PARL Gullies and other gratings in carriageways and cycle tracks which have gaps more than 20mm wide parallel to the normal line of movement of pedal and motor cycles should be classed as defects.

(e) SMTH Worn covers which may cause pedal and motor cycle users to skid in wet conditions should generally be considered to constitute an immediate hazard.

3.5.4 General Notes

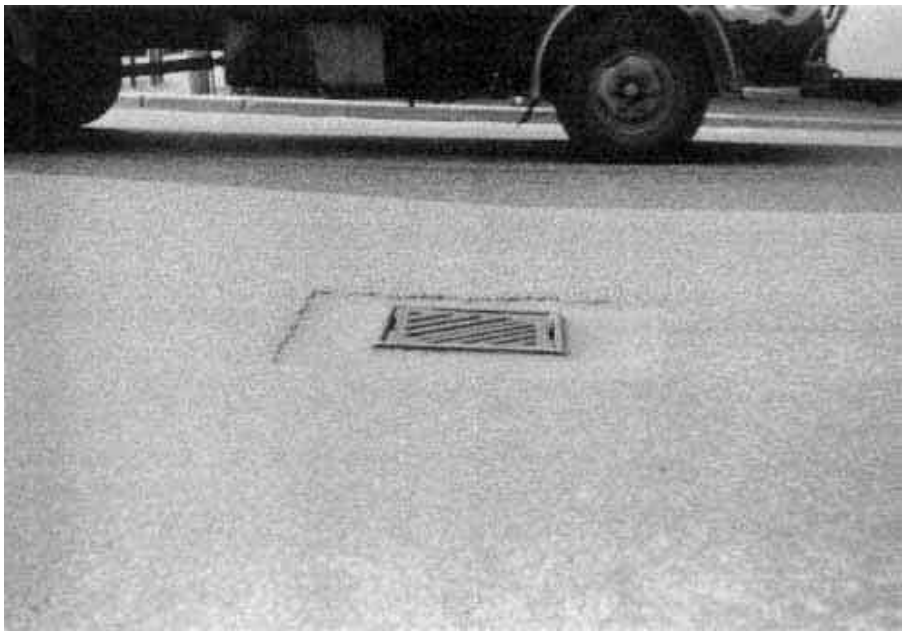
(i) Covers situated in verges which are traversed by pedestrians should not be ignored. Lower standards may however be applicable.

(ii) The majority of covers in carriageways, footways and cycle tracks are the responsibility of the Public Utilities and other parties. Hazardous defects should be coned and/or temporarily repaired and the owners notified. If permanent repairs are not then carried out in the appropriate time by the owners, the Agent should carry them out and seek to recover the costs from the owners.

3.5.5 Treat Codes

Suggested treat codes applicable to this activity are:

/AJL Adjust the level of the ironwork.
/FLT Use a fillet of mortar / asphalt to remove a trip at ironwork.
/PVN Provide new ironwork where none has previously existed.
/REP Repair some aspect of ironwork (add text to specify).



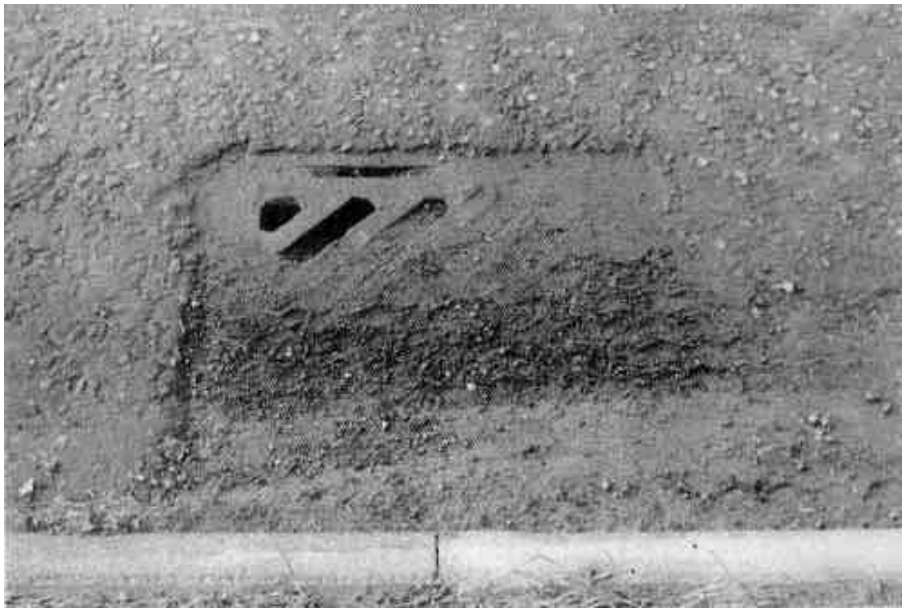
Photograph 3.5-1: IDLV - Difference in level with road

Photograph 3.5-2: ICLV - Difference in component levels

Photograph 3.5-3: IBCK - Cracked or broken

Photograph 3.5-4: MISS - Missing

Photograph 3.5-5: SMTH - Smooth surface



Photograph 3.5-6: BLOK - Blockage

3.6 Kerbs, Edgings and Pre-formed Channels

The following inspection code relates to this activity:

Kerbs, Edgings and Pre-formed Channels KC

The following inventory items are applicable to this inspection activity:

Channel CH Kerb KB

3.6.1 Definition

This section relates to the minor repairs to all types of kerbs, edgings and pre-formed channels, as described in Chapter 2.6.

3.6.2 Non-Specialist Defects

Description	Code	Attribute	Units	Min	Max
Vertical projection > 20mm. *Vertical projections greater than 20mm.*	EVPJ	length	metres	1	50
Horizontal projection > 50mm. *Horizontal projections greater than 50mm.*	EHPJ	length	metres	1	50
Loose / rocking.	ELRK	length	metres	1	50
Damaged.	DAMG	length	metres	1	50
Channel block alignment.	CHAL	length	metres	1	50
Missing.	MISS	length	metres	1	50
Impeded water flow (detritus).	IMWF	length	metres	1	50
Weed growth.	WEED	length	metres	1	100
Other.	OTHR				
None.	NONE				

3.6.3 Notes on Defects

(a) ELRK Loose or rocking items which are creating or are likely to create a hazard.

(b) DAMG Damaged or shattered items which are creating or are likely to create a hazard or lead to loss of support or protection.

(c) CHAL Poor local alignment of pre-formed channels which could give rise to danger or nuisance from standing water or damage to the highway structure caused by water penetration.

(d) IMWF Detritus at the edge of the carriageway preventing overedge run-off and / or flow along the channel which could give rise to danger or nuisance from standing water or damage to the highway structure by water penetration.

(e) WEED Vegetation growth at the edge of the carriageway preventing over-edge run-off and/or flow along the channel which could give rise to danger or nuisance from standing water or damage to the highway structure by water penetration.

3.6.4 General Notes

(i) Short, sometimes isolated, lengths of kerb serving gullies should not be overlooked.

(ii) There is more than one inspection interval defined for this inspection activity in the Code of Practice. The most onerous interval has been set within the RMMS database and it is intended that MAs utilise the available facility to ensure that the appropriate intervals for the individual items are established.

3.6.5 Treat Codes

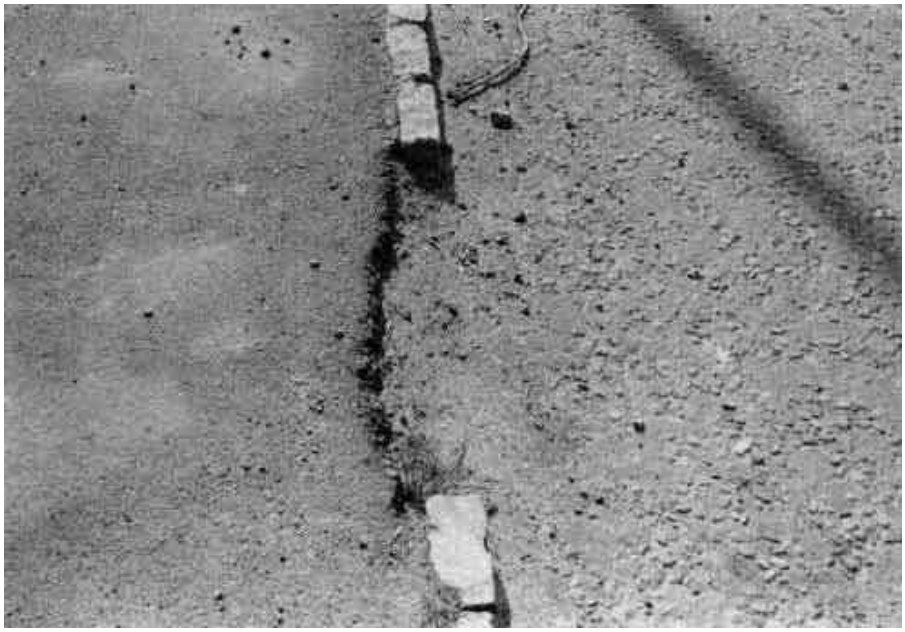
Suggested treat codes applicable to this activity are:

/AJL	Adjust level (add text to specify).
/FLT	Use a fillet of mortar / asphalt to remove a trip.
/PVN	Provide new where none has previously existed.
/RFX	Refix an individual section
/RRS	Remove and reinstate with a suitable material (add text to specify).
/WSP	Weedspray.

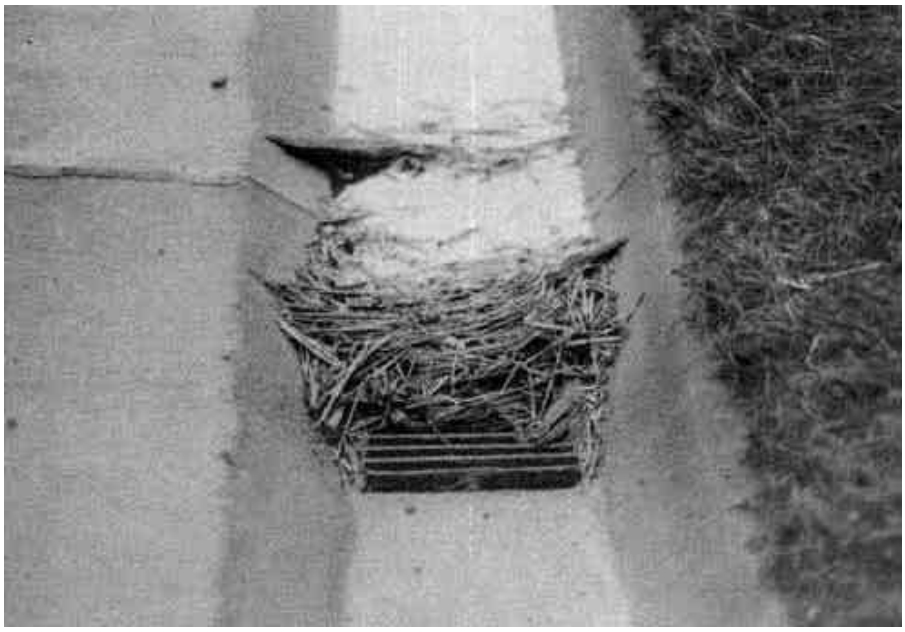
Photograph 3.6-1: EVPJ - Vertical projection > 20mm

Photograph 3.6-2: EHPJ - Horizontal projection > 20mm

Photograph 3.6-3: DAMG - Damaged



Photograph 3.6-4: MISS - Missing



Photograph 3.6-5: IMWF - Impeded water flow

3.7 Highway Drainage

3.7.1 Piped Drainage Systems

The following inspection code relates to this activity:

Piped Drainage Systems PD

The following inventory items are applicable to this inspection activity:

Counterfort Drain	CD	Gully	GY
Filter Drain	FD	Piped Grip	PG

3.7.1.1 Definition

All types of piped drained systems including slot drains. Large culverts as defined in Chapter 2.1.9 of the Trunk Road Maintenance Manual: Volume 2 are excluded.

3.7.1.2 Non-Specialist Defects

Description	Code	Attribute	Units	Min	Max
Blockage.	BLOK	length	metres	1	100
Other malfunction.	OMAL				
Flooding.	FLOD	area	sq metres	1	500
Drainage damage to road / verge.	DRRD	length	metres	1	100
Flood nuisance to properties.	NPRP				
Flood nuisance to services.	NSER				
Silted.	SILT	length	metres	1	100
Roots present.	ROOT				
Cracking.	CRCK	area	sq metres	1	200
Deformation.	DEFM	percentage	per cent	1	100
Collapsed.	COLP				
Alignment irregular.	LINE				
Standing water.	STWT	length	metres	1	100
Scour.	SCOR				
Other.	OTHR				
None.	NONE				

3.7.1.3 General Notes

(i) A schedule of piped drainage systems excluding gully connections, slot drains and piped grip connections is required by the Highways Agency.

(ii) Maximum use should be made of emptying and cleansing operations to check that piped drainage systems are operating satisfactorily.

(iii) Symptoms of blockage or fault which should normally prompt a detailed inspection are, backing up and flooding at the entry points to the system, dry outfalls, wet areas and the presence of lush vegetation.

(iv) Before any work is carried out, ownership of the drainage system should be determined.

3.7.1.4 Treat Codes

Suggested treat codes applicable to this activity are:

/AJL	Adjust level of pipe.
/CLU	Clear and unblock pipe.
/PVN	Provide new pipe where none has previously existed.
/REP	Repair pipe (add text to specify).

Photograph 3.7.1-1: BLOK - Blockage

3.7.2 Gullies, Catchpits and Interceptors

The following inspection code relates to this activity:

Highway Drainage: Gullies, Catchpits and Interceptors GC

The following inventory items are applicable to this inspection activity:

Catchpit	CP	Interceptor	IN
Gully	GY		

3.7.2.1 Definition

This section relates to the removal of detritus and other substances from the traps of all types of highway gullies, catchpits and interceptors and the inspection of them and their operation.

3.7.2.2 Non-Specialist Defects

Description	Code	Attribute	Units	Min	Max
Damaged.	DAMG				
Collapsed.	COLP				
Silted.	SILT	length	metres	1	100
Blockage.	BLOK	percentage	per cent	1	100
Shaft defective.	SHFT				
Chamber / benching / pot defective.	CHAM				
Invert / sump defective.	INVT				
Ancillaries defective.	ANCS				
Other.	OTHR				
None.	NONE				

3.7.2.3 General Notes

(i) This section does **NOT** relate to ironwork associated with gullies, catchpits and interceptors. Ironwork is considered in Chapter 3.5 (Covers, Gratings, Frames and Boxes).

(ii) A schedule of all gullies, catchpits and interceptors is required by the Highways Agency. It should be prepared on road by road basis giving details of agreed emptying frequencies.

3.7.2.4 Treat Codes

Suggested treat codes applicable to this activity are:

/AJL	Raise or lower the level of a chamber (add text to specify).
/CLU	Clear or unblock a chamber.
/FLT	Use a fillet of mortar / asphalt to direct water into a chamber.
/PVN	Provide a new chamber where one has previously existed.
/REP	Repair an existing chamber (add text to specify).
/RGL	Regulate carriageway / apron levels around a chamber.

3.7.3 Piped Grips

The following inspection code relates to this activity:

Highway Drainage: Piped Grips PG

The following inventory item is applicable to this inspection activity:

Piped Grip PG

3.7.3.1 Definition

Short lengths of pipe carrying water from a channel across the verge direct to a ditch, filter drain or soakaway, without a gully-pot but sometimes with a grating.

3.7.3.2 Non-Specialist Defects

Description	Code	Attribute	Units	Min	Max
Blockage.	BLOK	percentage	per cent	1	100
Detritus / Refuse. *Presence of detritus likely to impede the function of the piped grip.*	DETR				
Broken.	BROK				
Other.	OTHR				
None.	NONE				

3.7.3.3 General Notes

(i) Gratings where fitted should be dealt with under Chapter 3.5 (covers, gratings, frames and boxes.)

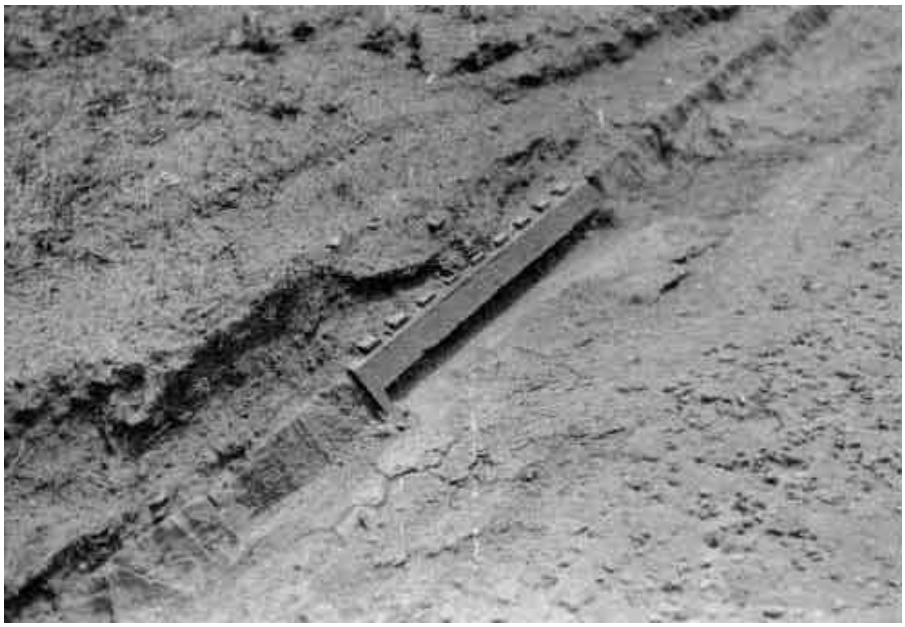
(ii) A schedule of piped grips greater than 5m in length is required by the Highways Agency.

(iii) Detailed inspection of piped grips should only be carried out if pipe lengths exceed 5m, there is evidence of blockage, some other fault or a complaint has been received.

3.7.3.4 Treat Codes

Suggested treat codes applicable to this activity are:

/AJL Adjust level of pipe.
/CLU Clear and unblock pipe.
/PVN Provide new pipe where none has previously existed.
/REP Repair pipe (add text to specify).



Photograph 3.7.3-1: BLOK - Blockage

3.7.4 Grips

The following inspection code relates to this activity:

Highway Drainage: Grips GP

The following inventory item is applicable to this inspection activity:

Grip GP

3.7.4.1 Definition

An open channel cut across rural verges leading to ditches or filter drains and ending at an appropriate distance from the carriageway or hard shoulder.

3.7.4.2 Non-Specialist Defects

Description	Code	Attribute	Units	Min	Max
Weed growth.	WEED	length	metres	1	100
Detritus / refuse. *Presence of detritus or refuse within a grip.*	DETR				
Blockage.	BLOK	percentage	per cent	1	100
Flooding.	FLOD	area	sq metres	1	500
Other.	OTHR				
None.	NONE				

3.7.4.3 General Notes

(i) Detailed inspection of grips should only be carried out if there is evidence of blockage, some other fault or a complaint has been received.

3.7.4.4 Treat Codes

Suggested treat codes applicable to this activity are:

/CLU Clear or unblock a grip where detritus etc has built up.
/EXC Excavate a new grip or re-form an existing grip.

Photograph 3.7.4-1: WEED - Weed growth

3.7.5 Ditches

The following inspection code relates to this activity:

Highway Drainage: Ditches DI

The following inventory item is applicable to this inspection activity:

Ditch DI

3.7.5.1 Definition

A channel adjacent to the highway for drainage.

3.7.5.2 Non-Specialist Defects

Description	Code	Attribute	Units	Min	Max
Weed growth.	WEED	length	metres	1	100
Collapsed bank.	CLBK	length	metres	1	100
Obstruction.	OBST	length	metres	1	50
Deposited rubbish.	DRUB				
Silted.	SILT	length	metres	1	100
Flooding.	FLOD	area	sq metres	1	500
Other.	OTHR				
None.	NONE				

3.7.5.3 General Notes

(i) A schedule of ditches which are the responsibility of the Highways Agency either by virtue of ownership or by agreement with land owners / occupiers is required.

3.7.5.4 Treat Codes

Suggested treat codes applicable to this activity are:

/CLU Clear or unblock a ditch where detritus etc has built up.
/CUT Cut back vegetation.
/EXC Excavate a new ditch or re-form an existing ditch.

Photograph 3.7.5-1: WEED - Weed growth

Photograph 3.7.5-2: OBST - Obstruction

Photograph 3.7.5-3: DRUB - Deposited rubbish

3.7.6 Filter Drains

The following inspection code relates to this activity:

Highway Drainage: Filter Drains FD

The following inventory items are applicable to this inspection activity:

Counterfort Drain CD Filter Drain FD

3.7.6.1 Definition

A field drain, usually adjacent to a carriageway that may or may not incorporate a properly formed invert or collection pipe. This inspection item also includes counterfort drains.

3.7.6.2 Non-Specialist Defects

Description	Code	Attribute	Units	Min	Max
Weed growth.	WEED	length	metres	1	100
Filter drain damaged.	FMDM	length	metres	1	50
Filter material displaced.	FMDS	length	metres	1	50
Silted.	SILT	length	metres	1	100
Flooding.	FLOD	area	sq metres	1	500
Other.	OTHR				
None.	NONE				

3.7.6.3 General Notes

(i) Maximum use should be made of emptying and cleansing operations to check that filter drains are operating satisfactorily.

(ii) When sub-surface blockages are suspected (e.g. because of the presence of ponding), trial pits may be required to determine the nature and extent of the defect.

(iii) Replacement of filter media may need to be considered as a special scheme which should be part of the normal planned programme of works.

3.7.6.4 Treat Codes

Suggested treat codes applicable to this activity are:

/CLU Clear or unblock a filter drain where detritus etc. has built up.
/EXC Excavate granular material and replace with new (add text to specify).
/RGL Regulate granular material.

Photograph 3.7.6-1: WEED - Weed growth

Photograph 3.7.6-2: FMDS - Filter material displaced

3.7.7 Culverts

The following inspection code relates to this activity:

Highway Drainage: Culverts CV

The following inventory item is applicable to this inspection activity:

Culvert CV

3.7.7.1 Definition

This section relates only to the maintenance of the free flow of water through culverts. Should the following types have less than two head walls, then they are covered by the Piped Drainage activity (see section 3.7.1).

(a) Arch or slab concrete or masonry culverts with diameters or spans between 2 and 3 metres and cover greater than 1 metre.

(b) Arch or slab concrete or masonry culverts with diameters or spans less than 2 metres.

(c) Corrugated metal culverts with diameters less than 0.9 metres.

(d) Smaller culverts with sufficient cover to spread highway loading outside their perimeter.

3.7.7.2 Non-Specialist Defects

Description	Code	Attribute	Units	Min	Max
Scour.	SCOR				
Free flow impeded. *Inadequate flow of water through the culvert.*	FRFL				
Silted.	SILT	length	metres	1	100
Roots present.	ROOT				
Cracking.	CRCK	area	sq metres	1	200
Deformation.	DEFM	percentage	per cent	1	100
Collapsed.	COLP				
Alignment irregular.	LINE				
Standing water.	STWT	length	metres	1	100
Other.	OTHR				
None.	NONE				

3.7.7.3 General Notes

(i) Smaller culverts are generally short lengths of pipe which are treated as piped drainage systems.

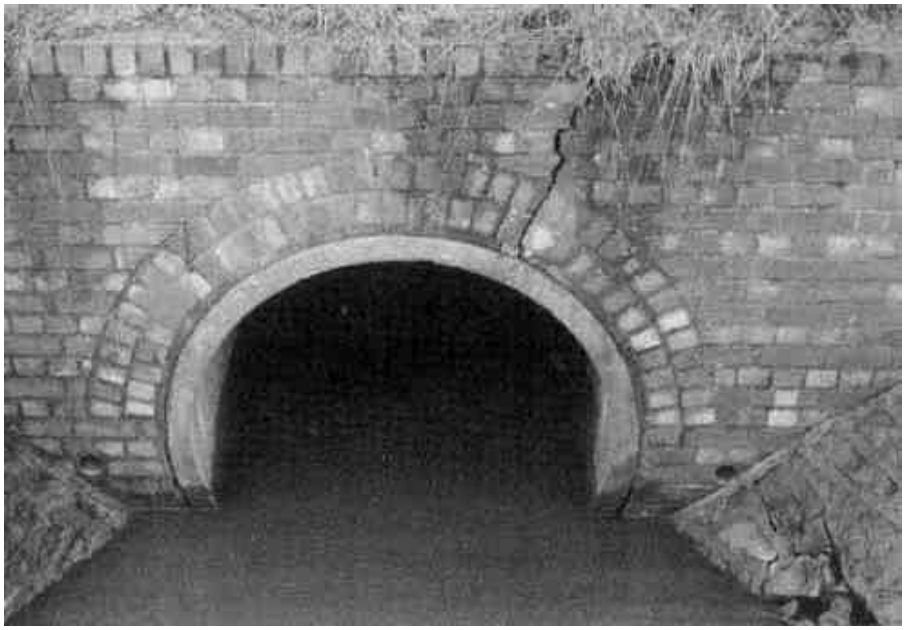
(ii) Larger culverts should be maintained as structures and are outside the scope of the RMMS.

3.7.7.4 Treat Codes

Suggested treat codes applicable to this activity are:

/CLU	Clear / unblock culvert.
/PVN	Provide new culvert.
/REP	Repair culvert

Photograph 3.7.7-1: FRFL - Free flow impeded



Photograph 3.7.7-2: CRCK - Cracking

3.7.8 Balancing Ponds

The following inspection code relates to this activity:

Highway Drainage: Balancing Ponds BP (Specialist)

The following inventory item is applicable to this inspection activity:

Balancing Pond BP

3.7.8.1 Definition

A catchment area adjacent to the carriageway provided for flood control purposes where the storm run-off from highway surfaces is too rapid to be safely dealt with by the receiving water courses.

3.7.8.2 Specialist Defects

Description	Code	Attribute	Units	Min	Max
Function outfall regulating device. *Damage or obstruction to the pond outlet which will affect the controlled rate of discharge.*	OUTF				
Blockage of inlet. *Blockage of feeder pipe or ditch.*	INLT				
Blockage of outlet. *Blockage of outlet pipe or ditch.*	OUTL				
Silted. *Silting in the pond causing a loss of storage capacity.*	SILT	length	metres	1	100
Erosion of banks / walls / bunds. *Damage or erosion to the pond banks, walls or bunds.*	ERSN				
Surcharge. *Excess water overflowing from the balancing pond.*	SURC				
Other.	OTHR				
None.	NONE				

3.7.8.3 General Notes

(i) Balancing ponds may sometimes be situated some distance from the highway.

(ii) A schedule identifying the location of balancing ponds is required by the Highways Agency.

(iii) There is more than one inspection interval defined for this inspection activity in the Code of Practice. The most onerous interval has been set within the RMMS database and it is intended that MAs utilise the available facility to ensure that the appropriate intervals for the individual items are established.

3.7.8.4 Treat Codes

Suggested treat codes applicable to this activity are:

/CLU Clear or unblock balancing pond eg. inlet or outlet (add text to specify).
/CUG Clear undergrowth from around balancing pond.
/EXC Excavate detritus to re-form balancing pond.
/PVN Provide a new balancing pond where none has existed previously (e.g. to prevent flooding).

3.7.9 Ancillary Items

The following inspection codes relate to this activity:

Highway Drainage: Headwalls and Aprons	AI
Highway Drainage: Sluices and Tidal Flaps	AS (Specialist)
Highway Drainage: Pumps and Specialised Equipment	AP (Specialist)

There are no inventory items applicable to this inspection activity.

3.7.9.1 Definition

This section includes headwalls, aprons, sluices, tidal flaps and pumps.

3.7.9.2 Non-Specialist Defects

Description	Code	Attribute	Units	Min	Max
Pump malfunction.	PUMP				
Sluice malfunction.	SLUI				
Tidal flap malfunction.	TIDL				
Headwall / apron condition.	HAFL				
Other.	OTHR				
None.	NONE				

3.7.9.3 Specialist Defects

Description	Code	Attribute	Units	Min	Max
Pump malfunction.	PUMP				
Sluice malfunction.	SLUI				
Tidal flap malfunction.	TIDL				
Headwall / apron condition.	HAFL				
Trash screen blocked.	TRSH				
Penstock malfunction.	PSTK				
Other.	OTHR				
None.	NONE				

3.7.9.4 General Notes

(i) A schedule of the more important ancillary items is required by the Highways Agency, including all sluices, tidal flaps and pumps.

3.7.9.5 Treat Codes

Suggested treat codes applicable to this activity are:

/CLO	Clean only (add text to specify).
/CLR	Clean and repaint (add text to specify).
/PVN	Provide new item (add text to specify).
/REP	Repair (Add text to specify).

3.7.10 Flooding

The following inspection code relates to this activity:

Highway Drainage: Flooding FL

The following inventory items are applicable to this inspection activity:

Balancing Pond	BP	Filter Drain	FD
Counterfort Drain	CD	Grip	GP
Channel	CH	Gully	GY
Catchpit	CP	Interceptor	IN
Culvert	CV	Manhole	MH
Ditch	DI	Piped Grip	PG

3.7.10.1 Definition

Flooding of the highway caused by the inadequate provision or operation of highway drainage facilities.

3.7.10.2 Non-Specialist Defects

Description	Code	Attribute	Units	Min	Max
Flooding.	FLOD	area	sq metres	1	500
		cause	characters	1	40
Other.	OTHR				
None.	NONE				

3.7.10.3 General Notes

(i) The cause of flooding shall be ascertained and if necessary proposals for action submitted to the Highways Agency.

(ii) Particular attention should be paid to areas where excessive water is standing on the carriageway or where water is discharging onto and / or flowing across the highway, causing an immediate or imminent hazard.

3.7.10.4 Treat Codes

Suggested treat codes applicable to this activity are:

/CLU Clear or unblock (add text to specify).
/PVN Provide new drainage (add text to specify).
/RGL Regulate levels (add text to specify).

Photograph 3.7.10-1: FLOD - Flooding

Photograph 3.7.10-2: FLOD - Flooding

3.8 Communications Installations

The following inspection codes relate to the activity Communications Equipment:

Communications Equipment: Hardware	CI	[CC,SG,TB]
Communications Equipment: Emergency Phones	CX	[CC,TB]
Communications Equipment: Alignment	CA	[CC]
Communications Equipment: Transmission Stations	CZ	[CC]
Communications Equipment: Cable Ducts	CB (Specialist)	[CC,TB,SG]
Communications Equipment: Electrical	CE (Specialist)	[CC,TB,SG]

The following inventory items are applicable to this inspection activity:

Communication Cabinet	CC	Emergency Telephone Box	TB
Signs	SG		

3.8.1 Definition

This chapter includes telephones, matrix signals, loop detectors, meteorological and surveillance equipment, transmission stations, cabinets, power distribution equipment, generators, communication cables and ancillary equipment. It does **NOT** include specialised electrical / electronic plant.

3.8.2 Non-Specialist Defects

Description	Code	Attribute	Units	Min	Max
Not watertight. *Housing or surroundings are not water tight.*	WTGT				
Damaged.	DAMG				
Difficult access to cabinet / security impaired.	ACES				
Physical condition of hardware.	PHCD				
Dirty lantern / matrix.	DIRT				
Activator misaligned.	ACTM				
Impaired visibility.	VISA				
Inadequately drained.	INDR				
Other.	OTHR				
None.	NONE				

3.8.3 Specialist Defects

Description	Code	Attribute	Units	Min	Max
Condition of cable runs.	CCAB				
Breakdown in communications system.	BCOM				
Visibility cable duct marker / joints.	VCBM				
No electricity supply.	NOSP				
Other.	OTHR				
None.	NONE				

3.8.4 General Notes

(i) Particular consideration should be given to defective communication equipment which either by its condition or lack of operation constitutes an immediate or imminent hazard.

3.8.5 Treat Codes

Suggested treat codes applicable to this activity are:

/CLO Clean only.
/CLR Clean and repaint.
/CUG Clear undergrowth to improve access to cabinet.
/REP Repair cabinet.
/RFX Refix a part of the cabinet.
/SBV Side back verge around cabinet / flags.

3.9 Embankments and Cuttings

The following inspection code relates to this activity:

Embankments and Cuttings EC
Embankments and Cuttings: ES (Specialist)

The following inventory item is applicable to this inspection activity:

Embankments and Cuttings EC

3.9.1 Definition

This section relates to the slippage of the material within an embankment or cutting or surface sliding of material down an embankment or cutting.

3.9.2 Non-Specialist Defects

Description	Code	Attribute	Units	Min	Max
Initiate geotechnical investigation.	INGI				
Other.	OTHR				
None.	NONE				

3.9.3 Specialist Defects

Description	Code	Attribute	Units	Min	Max
Slip (non-rock). *Deep seated slippage of the material within an embankment or cutting as typified by the classic slip circle.*	SLIP	length	metres	1	50
Slide (non-rock). *Surface sliding of material down an embankment or cutting.*	SLID	length	metres	1	50
Rock slide.	RSLI	length	metres	1	50
Seepage.	SEEP	length	metres	1	50
Inadequately drained.	INDR	length	metres	1	50
Foundation failure.	FOUN	length	metres	1	50
Other.	OTHR				
None.	NONE				

3.9.4 Notes on Defects

(a) INGI — Measurements concerning the structure of an embankment or cutting will not normally be carried out at the time of normal inspections. This code should be used to indicate the need for a specialist inspection.

3.9.5 Treat Codes

There are no suggested treat codes applicable to this activity. Add text for details of suggested remedial work.

3.10 Grassed Areas

The following inspection code relates to this activity:

Grassed Areas GA

The following inventory items are applicable to this inspection activity:

Central Island	CI	Embankments and Cuttings	EC
Central Reserve	CR	Verge	VG

3.10.1 Definition

This section relates to the maintenance of grassed verges, central reserves, roundabout islands and cutting and embankment slopes.

3.10.2 Non-Specialist Defects

Description	Code	Attribute	Units	Min	Max
Inadequate visibility.	IVIS	length	metres	1	200
		area	sq metres	1	500
Risk to pedestrians.	RPED	length	metres	1	50
Overgrown footway / carriageway.	OVER	length	metres	1	50
Injurious weeds.	IWED	area	sq metres	1	50
Other.	OTHR				
None.	NONE				

3.10.3 Notes on Defects

(a) IVIS This is particularly critical at junctions, bends and accesses but also includes the visibility of signs and motorway marker posts.

The normal criteria will be to ensure minimum stopping distance but where drivers might be tempted to overtake on fast bends the full overtaking sight distance should be achieved provided verge space is available.

For minor accesses e.g. farms, the extent of cutting will depend on the usage of the access and the corresponding traffic speed and density on the highway.

(b) IWED Includes injurious weeds as listed in the Weeds Act 1959 (i.e. Spear Thistle, Creeping or field Thistle, Curled Dock, Broad Leafed dock and common Ragwort) and the Wildlife and Countryside Act 1981 (i.e. Japanese Knotweed and Giant Hogweed). In addition, wild beet in sugar beet growing areas and wild oats in cereal growing areas may also cause a nuisance and should be included

3.10.4 Treat Codes

Suggested treat codes applicable to this activity are:

/CUT	Cut or trim grass.
/LRS	Level or re-seed grass.
/SBP	Side back a grass verge as an isolated task.
/SBV	Side back a grass verge prior to other work (specify other work by adding text).
/WSP	Weedspray.

3.11 Hedges and Trees

The following inspection codes relate to this activity:

Hedges and Trees: General	HT	[HG,TR]
Hedges and Trees (HA): Soundness	HN (Specialist)	[HG,TR]
Hedges and Trees (Non-HA): Soundness	HX (Specialist)	[HG,TR]

The following inventory items applicable to this inspection activity:

Hedge HG Tree TR

3.11.1 Definition

This section relates to the maintenance of hedges and trees which are the responsibility of the Highways Agency or which, although the responsibility of others are causing a nuisance or obstruction to the highway.

3.11.2 Non-Specialist Defects

Description	Code	Attribute	Units	Min	Max
Unstable. *Accidental or other damage results in an unstable tree / branch.*	UNST				
Dead tree.	DTRE	height	metres	1	25
Dying / diseased tree. *Any sign of wilting or die-back.*	DYTR	height	metres	1	25
Dying / dead branch.	DBRA	length	metres	1	25
		height	metres	1	25
Obstructed sightline.	OBSL				
Obstructed sign / lighting point etc.	OBSN				
Hedges not stockproof.	HNST	length	metres	1	50
Initiate specialist inspection.	INSI				
Overhanging / overgrown. *Branches / trees overgrown or overgrowing onto the carriageway.*	OVER	length	metres	1	25
		height	metres	1	25
Other.	OTHR				
None.	NONE				

3.11.3 Specialist Defects

Description	Code	Attribute	Units	Min	Max
Unstable. *Accidental or other damage results in an unstable tree / branch.*	UNST				
Dead tree.	DTRE	height	metres	1	25
Dying / diseased tree. *Any sign of wilting or die-back.*	DYTR	height	metres	1	25
Dying / dead branch.	DBRA	length	metres	1	25
		height	metres	1	25
Other.	OTHR				
None.	NONE				

3.11.4 Notes on Defects

(a) INSI Specialist inspections of hedges and trees will not normally be carried out during a normal detailed inspection. This code should be used to indicate the need for such an inspection.

3.11.5 General Notes

(i) A schedule of hedges and trees, including specific reference to hedges which have been laid to provide stockproof barriers, is required by the Highways Agency.

(ii) Any defects associated with dead or dying trees / branches or diseased trees should be referred to a competent person.

(iii) Detailed inspections should be carried out in accordance with Circular Roads 52/75.

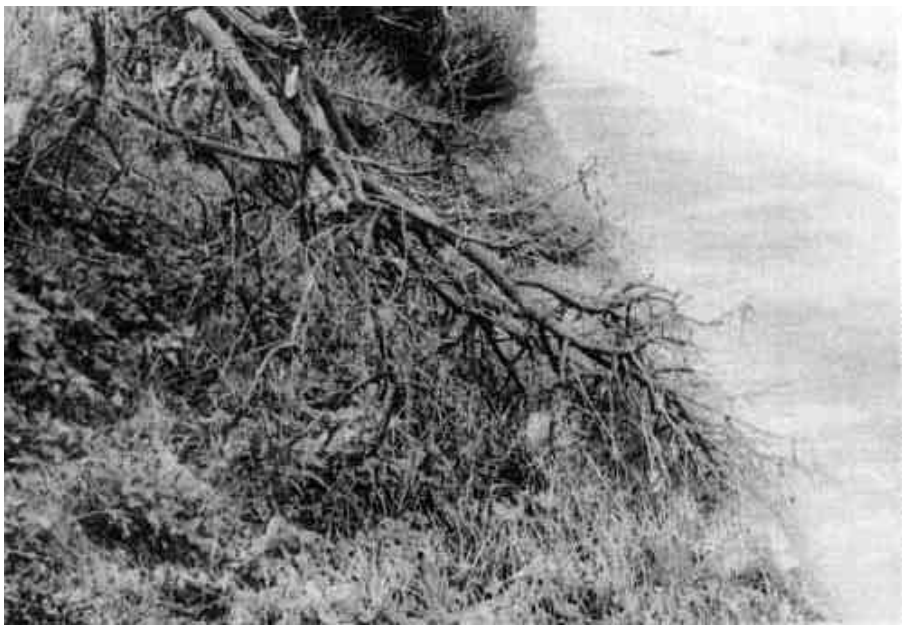
(iv) Particular attention should be paid to trees, shrubs and hedges, which by virtue of their position or condition constitute a hazard to road users.

3.11.6 Treat Codes

Suggested treat codes applicable to this activity are:

/CUT Cut or trim hedge or tree branches (add text to specify).
/DED Tree has Dutch Elm Disease.
/DEF Tree requires de-fluffing.
/POL Tree requires Pollarding.
/RRS Remove tree and reinstate with suitable material.

Photograph 3.11-1: DTRE - Dead tree



Photograph 3.11-2: DBRA - Dying / dead branch

3.12 Sweeping and Cleaning

The following inspection codes relate to this activity:

Sweeping and Cleansing	SC
Litter Grade C	LC
Litter Grade D	LD

The following inventory items are applicable to this inspection activity:

Channel	CH	Footway	FW
Central Island	CI	Hard Shoulder	HS
Central Reserve	CR	Lay-By	LB
Cycle Track	CT	Verge	VG
Carriageway	CW	Crossover	XO
Embankments and Cuttings	EC	Kerb	KB

3.12.1 Definition

This section relates to the removal of litter from motorways and strategic routes, and on associated lay-bys, paved areas and verges, the sweeping and cleansing of all channels and motorway hard shoulders, cleansing and removal of debris from traffic lanes, hard shoulders, verges and central reserves and footway and cycle track sweeping.

3.12.2 Non-Specialist Defects

Description	Code	Attribute	Units	Min	Max
Litter Grade C.	LITC	area	sq metres	1	500
Litter Grade D.	LITD	area	sq metres	1	500
Excessive muck. *Need for sweeping/cleansing in channels, motorway hardshoulders, traffic lanes, verges, central reserves, footways and cycle tracks.*	MUCK	length	metres	0	500
		area	sq metres	0	500
Need for herbicide. *Growth of grass or other vegetation between the channel and kerb which is likely to obstruct the flow of water or cause structural deterioration.*	HERB	length	metres	0	200
		area	sq metres	0	500
Debris in traffic lane.	DBTL	length		0	200
		area	sq metres	0	500
Debris in hard shoulder.	DBHS	length	metres	0	200
		area	sq metres	0	500
Other.	OTHR				
None.	NONE				

3.12.3 General Notes

(i) No detailed inspections should be carried out and reliance should be placed on regular safety inspections.

(ii) The four levels of cleanliness are detailed below:

Grade A:	no litter or refuse.
Grade B:	area predominantly free, apart from small items such as cigarette ends and ring pulls.
Grade C:	widespread distribution of small items (as Grade B) and larger items including beverage containers, fast food packs, animal faeces etc.
Grade D:	heavily littered with small and large items, with accumulations along edges.

(iii) On motorways and strategic routes, and on associated lay-bys, the standards to be achieved after cleaning should be Grade A (paved areas) and Grade B (verges).

If the duty authority receives notification that the standard has fallen to grade C, the area should be restored to the aforementioned grades within four weeks of the notification.

If the duty authority receives notification that the standard has fallen to grade D, the areas should be restored to the aforementioned grades within one week of notification.

(iv) Debris and spillages in the carriageway or hardshoulder should be cleared as soon as possible.

(v) Serious and extensive accumulations of detritus, leaf-fall and litter should be removed as soon as possible to prevent further unnecessary maintenance work.

3.12.4 Treat Codes

Suggested treat codes applicable to this activity are:

/CLO	Clean only (add text to specify extent).
/WSP	Weedspray.

Photograph 3.12-1: LITD - Litter grade D

Photograph 3.12-2: MUCK - Excessive muck

Photograph 3.12-3: DBHS - Debris in hard shoulder

3.13 Safety Fences and Barriers

The following inspection codes relate to the activity Fences and Barriers:

Boundary Fences: Metal / Concrete	BF	[FB,PR,RW]
Boundary Fences: Timber	BT	[FB,PR,RW]
Safety Fences: Metal / Concrete	FB	[SF,PR,RW]
Safety Fences: Steel - Tension	FN (Specialist)	[SF]

The following inventory items are applicable to this inspection activity:

Fences and Barriers	FB	Retaining Wall	RW
Pedestrian Guard Rail	PR	Safety Fence	SF

3.13.1 Definition

All types of boundary fences and walls, anti-glare screen fences, noise barriers, pedestrian guard rails and fences, and tensioned / untensioned vehicle safety fences / barriers.

Does **NOT** include parapets and guard rails on bridges and other structures or the structural elements of noise barriers.

3.13.2 Non-Specialist Defects

Description	Code	Attribute	Units	Min	Max
Rotten - Wood fence	RWDF	length	metres	1	50
Rotten - wood post (fence / barrier)	RWDP				
Corroded - metal (fence / barrier)	CMTF	length	metres	1	50
Corroded - metal post (fence / barrier)	CMTP				
Corroded - concrete fence	CCTF	length	metres	1	50
Corroded - concrete post	CCTP				
Missing - section of fence / barrier	MISS	length	metres	1	50
Accident damage	ACCD	length	metres	1	100
		height	metres	1	25
Damaged / deformed - fence / barrier	DAMM	length	metres	1	50
Loose panel	LOSP	number			
Loose anchor	LOSA	number			
Loose bolt	LOSB	number			
No tension (metal fence)	NTEN	length	metres	1	50
Not stockproof	NSTK	length	metres	1	50

Non-Specialist Defects (continued)

Safety fence - too high	SBTH	length	metres	1	999
		height	millimetres	0	999
Safety fence - too low	SBTL	length	metres	1	999
		height	millimetres	0	999
Other.	OTHR				
None.	NONE				

3.13.3 Specialist Defects

Description	Code	Attribute	Units	Min	Max
Loose tension bolts	LTEN				
Incorrect tension	CORT				
Other.	OTHR				
None.	NONE				

3.13.4 General Notes

(i) Particular attention should be paid to damaged or missing fences or barriers as these may often constitute an immediate or imminent hazard.

(ii) Whilst undertaking the specialist inspection activity FN, the tension of all loose bolts should be reset.

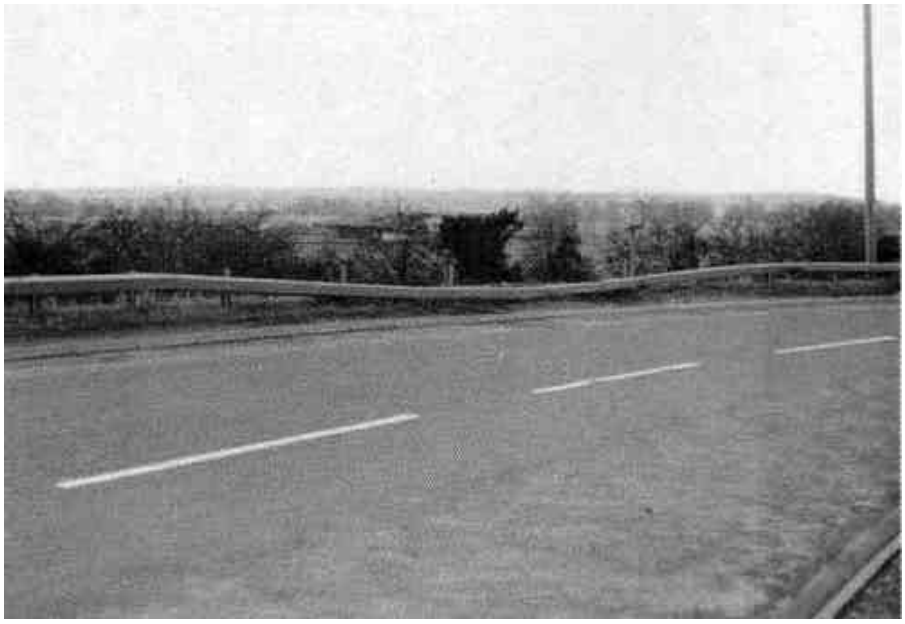
3.13.5 Treat Codes

Suggested treat codes applicable to this activity are:

/CUG Clear undergrowth around barrier / fence.
/CLR Clean and re-paint barrier / fence.
/PVN Provide new barrier / fence where none has previously existed..
/REP Repair barrier / fence (add text to specify).
/RRS Remove a barrier / fence and reinstate with suitable material.
/WSP Weed treatment (add text to specify).

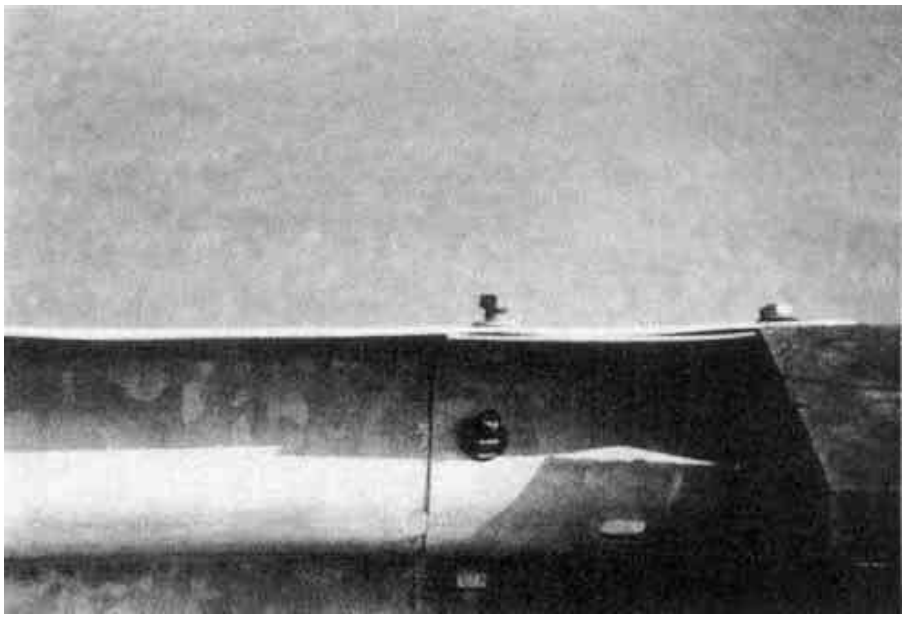
Photograph 3.13-1: RWDF - Rotten wood fence

Photograph 3.13-2: MISS - Missing



Photograph 3.13-3: ACCD - Accident damage

Photograph 3.13-4: DAMM - Damaged / deformed



Photograph 3.13-5: LOSB - Loose bolt

Photograph 3.13-6: NSTK - Not stockproof

3.14 Fences, Walls, Screens and Environmental Barriers

All types of boundary fences and walls, anti-glare screen fences, noise barriers, etc. are included under Chapter 3.13 (Safety Fences and Barriers).

3.15 Road Studs

The following inspection codes relate to this activity:

Road studs: General	RS
Road studs: Conspicuity	RC (Specialist)

The following inventory item is applicable to this inspection activity:

Road Stud	RS

3.15.1 Definition

Reflective and non-reflective road studs of all types and colours including depressible road studs.

3.15.2 Non-Specialist Defects

Description	Code	Attribute	Units	Min	Max
Loose catseye casing.	LCAS	number		1	50
Loose catseye rubber.	LCAR	number		1	50
Loose studs.	LSTD	number		1	50
Initiate conspicuity / catseye test.	REFC				
Initiate conspicuity / stud test.	REFS				
Damaged catseye.	DAMC	number		1	50
Damaged stud.	DAMS	number		1	50
Missing catseye.	MISC	number		1	50
Missing stud.	MISS	number		1	50
Perished rubber.	PRUB	number		1	50
Missing reflector.	MISR	number		1	50
Other.	OTHR				
None.	NONE				

3.15.3 Specialist Defects

Description	Code	Attribute	Units	Min	Max
Conspicuity catseye test failure.	REFF	number		0	50
Conspicuity stud test failure.	REFT	number		0	50
Other.	OTHR				
None.	NONE				

3.15.4 Notes on Defects

(a) REFC & REFC — Measurement of road stud conspicuity will not normally be carried out at the time of normal inspections. This code should be used to indicate the need for a specialist inspection.

(b) REFF & REFT — Loss of reflectivity greater than 25% on straight roads or large radius curves or loss of reflectivity greater than 10% on bends where road markings are mandatory. (NB Inspections to be carried out at night).

3.15.5 General Notes

(i) Displaced road studs lying on the carriageway, hard shoulder or in lay-bys should be removed immediately.

(ii) Loose road studs, particularly those of the depressible type, should be removed immediately.

(iii) All depressible road studs should be considered as “catseyes” for inspection purposes.

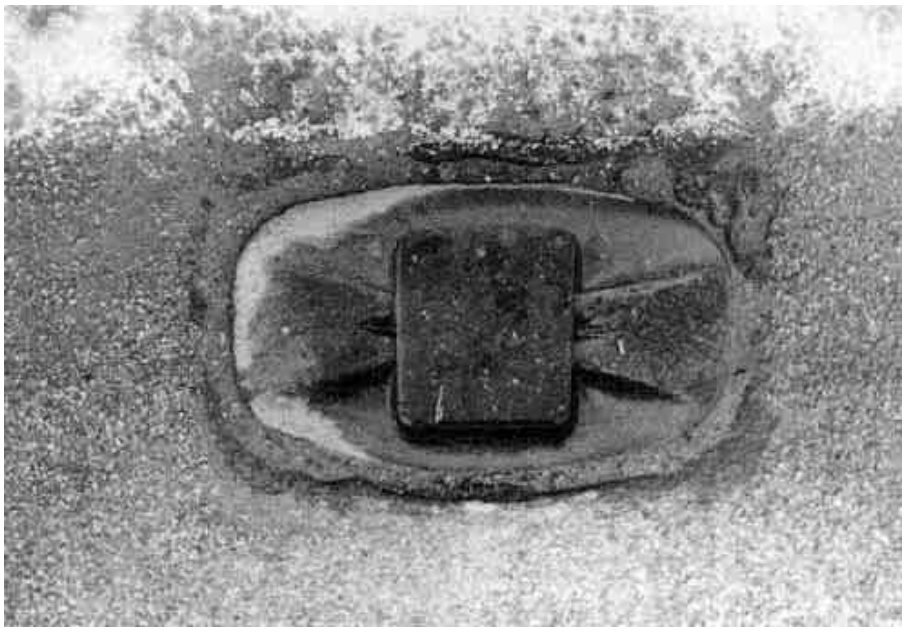
3.15.6 Treat Codes

Suggested treat codes applicable to this activity are:

/AJL Adjust level of a road stud.
/REP Repair a road stud.
/RFX Refix a road stud.

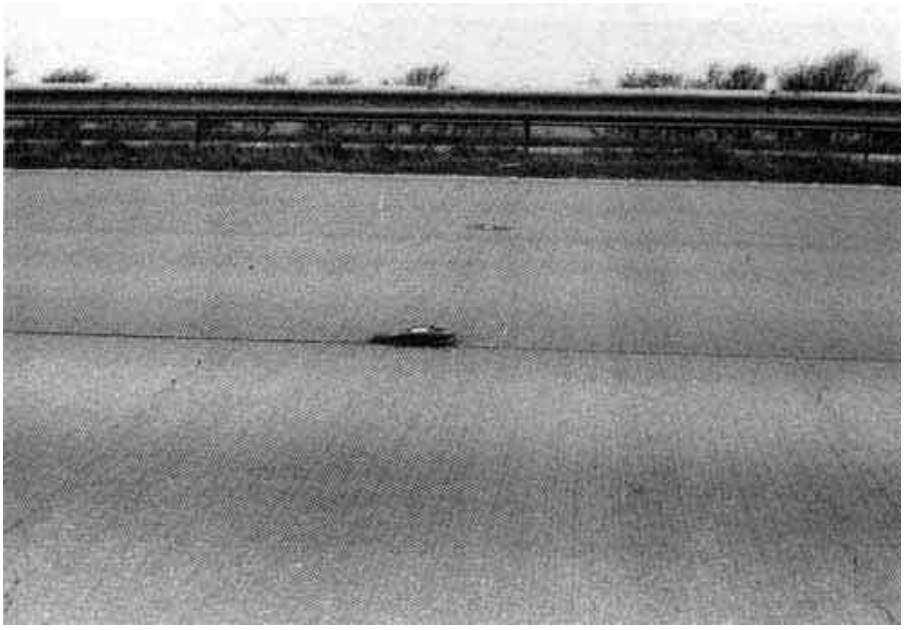
Photograph 3.15-1: LCAS - Loose Catseye casing

Photograph 3.15-2: LCAR - Loose Catseye rubber



Photograph 3.15-3: DAMC - Damaged Catseye

Photograph 3.15-4: DAMS - Damaged stud



Photograph 3.15-5: MISC - Missing Catseye
(NB. displaced catseyes should be removed immediately)

Photograph 3.15-6: MISR - Missing reflector

3.16 Road Markings

The following inspection codes relate to this activity:

Road Markings:	RM	[PX,RM,RF,LH,LL]
Road Markings: (Skid / Reflectivity)	SR (Specialist)	[PX,RM,LH,LL]

The following inventory items are applicable to this inspection activity:

Pedestrian Crossing	PX	Reference Marker Point	RF
Transverse and Special Road Markings	RM	Hatched Road Markings	LH
		Longitudinal Road Markings	LL

3.16.1 Definition

This section relates to all road markings in paint or thermoplastic materials.

3.16.2 Non-Specialist Defects

Description	Code	Attribute	Units	Min	Max
Wear (e.g. erosion).	WEAR	length	metres	1	999
		% remaining	per cent	1	100
Spread.	SPRD	length	metres	1	30
		% of original	per cent	1	100
Colour.	COLR	length	metres	1	100
		percentage	per cent	1	100
Initiate skid test.	SKID	length	metres	1	30
Initiate retro-reflectivity measurement.	RETR	length	metres	0	100
Missing node marker.	MIRF				
Other.	OTHR				
None.	NONE				

3.16.3 Specialist Defects

Description	Code	Attribute	Units	Min	Max
Skid resistance test failure.	SKIT	length	metres	1	30
		SRV		0	99
Retro-reflectivity test failure.	RETT	length	metres	0	30
Other.	OTHR				
None.	NONE				

3.16.4 Notes on Defects

(a) WEAR Action to be taken when % remaining is less than 70%.

(b) SPRD Action to be taken when spread exceeds +10% of original dimension.

(c) COLR Paint markings should have a luminance factor of greater than 60%.
Thermoplastic markings should have a luminance factor greater than 45%.

(d) SKID Measurement of skid resistance will not normally be carried out at the time of an inspection. This code should be used to initiate a test.

(e) RETR Measurements of retro-reflectivity will not normally be carried out during a normal inspections. This code should be used to indicate the need for a specialist inspection.

(f) SKIT Skid resistance measurements of letters, numerals and arrows are a specialist inspection usually carried out by an authority's materials laboratory.

(g) RETT These inspections should be undertaken at night.

3.16.5 General Notes

(i) The appropriate values of wear, spread, colour and retro-reflectivity can be estimated by visual inspection or measured.

3.16.6 Treat Codes

Suggested treat codes applicable to this activity are:

/PVN Provide new wording / line where none have previously existed (subject to the agreement of the Traffic Engineer).
/STR Identify which have been surface treated and require new words / lines.
/REM Re-mark words / lines (faded / worn / partially obliterated).

Photograph 3.16-1: WEAR

3.17 Road Traffic Signs

The following inspection codes relate to this activity:

Signs: Face/structure/fixings	SG	[RF,SB,SG]
Signs: Lamp Failures	SS	[SB,SG]
Signs: Visibility Inspection	SV (Specialist)	[SG]
Signs: Moving Parts	SM (Specialist)	[SG]
Signs: Electrical	SE (Specialist)	[SB,SG]

The following inventory items are applicable to this inspection activity:

Reference Marker Point RF	Sign	SG
Safety Bollard	SB	

3.17.1 Definition

This section relates to all road traffic signs including permanent bollards.

3.17.2 Non-Specialist Defects

Description	Code	Attribute	Units	Min	Max
Initiate target distance measurement.	TRGD				
Initiate legibility distance measurement.	LEGD				
Initiate surface luminance check.	SFLM				
Initiate surface colour check.	SFCL				
Physical condition of fittings.	COFT				
Physical condition of frame.	COFR				
Physical condition of post.	COPT				
Lamp on during day.	LPON				
Lamp failure.	LAMP				
Moving part malfunction. *Refers to moving parts of secret and variable message signs.*	MOVP				
Electrical condition.	COEL				
Exposed wiring.	EXPW				
Surface corrosion.	SFCO				
Accident damage.	ACCD				
Loss of surface / paint covering.	LOPT				
Obscured sign.	OBSG				

Non-Specialist Defects (continued)

Dirty sign.	DIRT				
Missing.	MISS				
Damaged. *Damage other than accident damage.*	DAMG				
Pointing wrong way.	RWAY				
Other.	OTHR				
None.	NONE				

3.17.3 Specialist Defects

Description	**Code**	**Attribute**	**Units**	**Min**	**Max**
Target distance test failure.	TRGT	length	metres	0	200
Legibility distance (direct) failure.	LEGF	length	metres	0	200
Surface luminance test failure. *Inadequate retro-reflectivity.*	SFLN				
Surface colour test failure.	SFCT				
Lamp failure.	LAMP				
Moving part malfunction. *Refers to moving parts of secret and variable message signs.*	MOVP				
PECU failure.	PECU				
Timeswitch failure.	TMSW				
No electricity supply.	NOSP				
No fuse.	FUSE				
Electrical condition.	COEL				
Exposed wiring.	EXPW				
Other.	OTHR				
None.	NONE				

3.17.4 General Notes

(i) A schedule of all authorised signs together with details of cleaning frequencies is required by the Highways Agency.

(ii) Measurements of Target Distance (TRGD), Legibility Distance (LEGD), Surface Luminance (SFLM) and Surface Colour (SFCL) will not normally be made at the time of an inspection. These codes should therefore only be used to initiate these tests.

(iii) Missing cylinders from emergency crossings should be considered as an immediate hazard.

(iv) Particular attention should be paid to damaged, defective, displaced or missing traffic signs. Depending on the sign category and nature of the defect, these defects may constitute an immediate hazard.

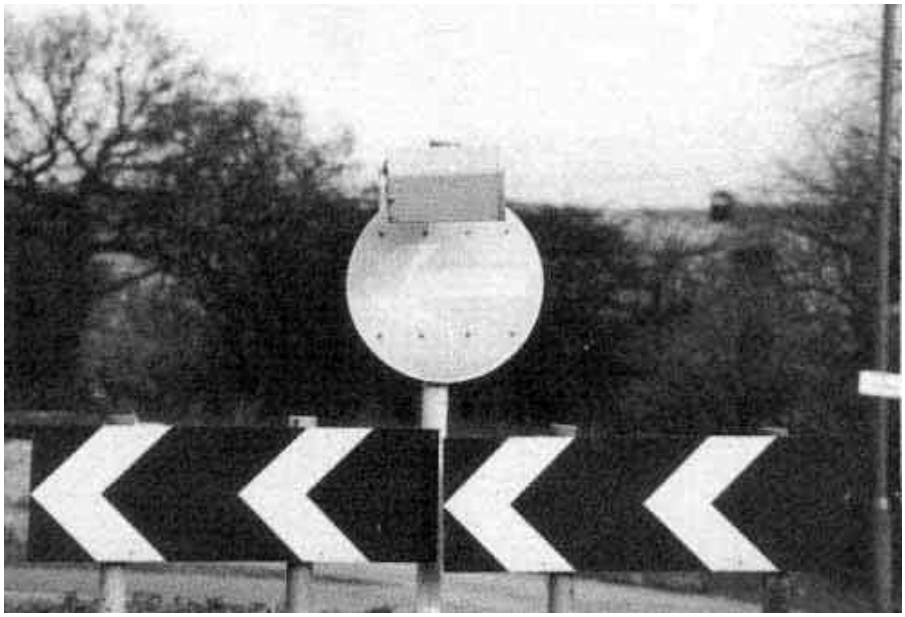
(v) Particular attention should be paid to dirty or obscured traffic signs since these may often constitute an immediate hazard.

3.17.5 Treat Codes

Suggested treat codes applicable to this activity are:

/CLO Clean sign only
/CUG Clear undergrowth from around sign.
/PVN Provide a new sign where none has previously existed.
/REP Repair a sign or post possibly involving some replacement (add text to specify).
/RFX Refix a loose sign or post.
/RRS Remove a sign and / or post and reinstate with suitable material.
/WSP Weedspray around sign (add text to specify).

Photograph 3.17-1: SFLM - Initiate surface luminance check



Photograph 3.17-2: SFCL - Initiate surface colour check

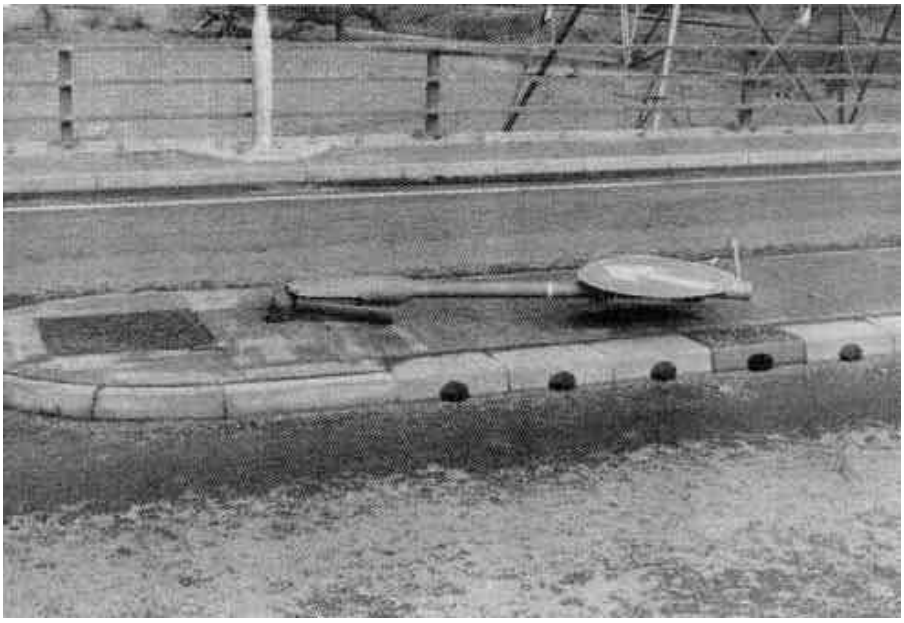
Photograph 3.17-3: COFT - Physical condition of fittings

Photograph 3.17-4: COFR - Physical condition of frame

Photograph 3.17-5: COPT - Physical condition of post

Photograph 3.17-6: EXPW - Exposed wiring

Photograph 3.17-7: SFCO - Surface corrosion

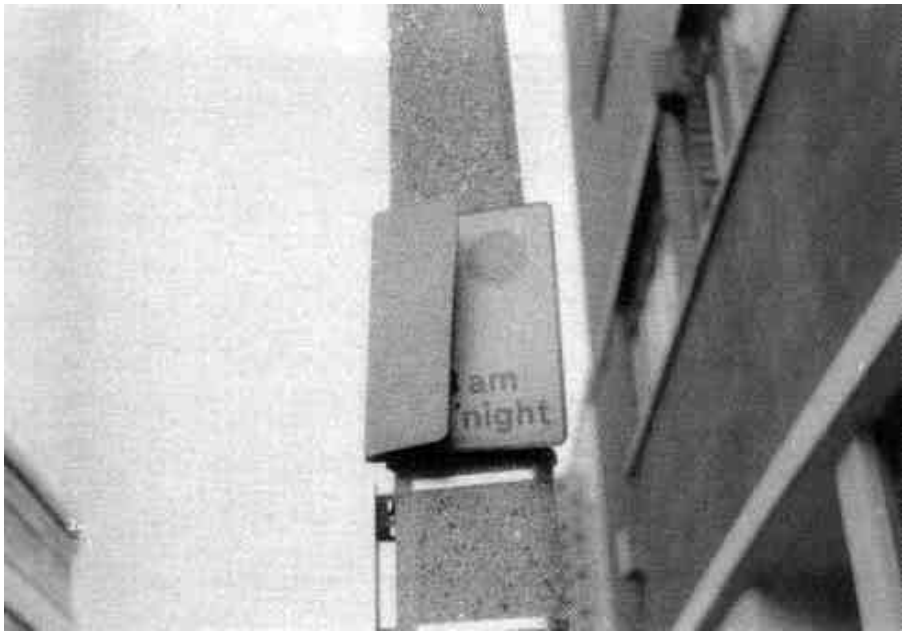


Photograph 3.17-8: ACCD - Accident damage

Photograph 3.17-9: OBSG - Obscured sign

Photograph 3.17-10: DIRT - Dirty sign

Photograph 3.17-11: MISS - Missing



Photograph 3.17-12: DAMG - Damaged

Photograph 3.17-13: RWAY - Pointing wrong way

3.18 Road Traffic Signals

The following inspection codes relate to this activity:

Traffic Signals: Hardware	TS	[DL,TS]
Traffic Signals: TSC & AUX Equipment	TA (Specialist)	[CC,TS]
Traffic Signals: Electro-Mechanical Parts	TM (Specialist)	[TS]
Traffic Signals: Electrical	TE (Specialist)	[CC,DL,TS]

The following inventory items are applicable to this inspection activity:

Communication Cabinet	CC	Traffic Signal	TS
Detector Loop	DL		

3.18.1 Definition

This section relates to the routine maintenance of permanent traffic signals at junctions or outside emergency vehicle stations and at controlled pedestrian crossings.

3.18.2 Non-Specialist Defects

Description	Code	Attribute	Units	Min	Max
Equipment wiring and earth condition.	EQWE				
Equipment cabinet condition.	EQCB				
Condition of base seals.	CBSL				
Presence of gas.	PGAS				
Hardware physical condition.	HPCD				
Condition of buttons / detectors.	CBDT				
Condition of regulatory sign/illumination. *Condition of regulatory signs associated with traffic signals and the condition of their illumination.*	CRSI				
Condition of pole wiring / earth.	CPWE				
Alignment or obscuration. *Alignment, cleanliness and visibility of signal heads.*	ALOB				
Condition of loop / feeder.	CLOF				
Audible circuit failure.	AUDC				
Damaged.	DAMG				
Signals stuck.	STUK				
Lamp failure.	LAMP				

Non-Specialist Defects (continued)

Counter / loop damaged.	CDAM				
Condition poles / caps / heads / boards.	PLCD				
No data sheets.	NDTA				
Difficult access to cabinet.	ACES				
Faulty mast arm assembly.	MAST				
Other.	OTHR				
None.	NONE				

3.18.3 Specialist Defects

Description	Code	Attribute	Units	Min	Max
Equipment wiring and earth condition.	EQWE				
Condition of pole wiring / earth.	CPWE				
No fuse.	FUSE				
Audible circuit failure.	AUDC				
No electricity supply.	NOSP				
Controller failure.	NOOP				
Speed assessment equipment failure.	SPED				
Dimming unit failure.	LDIM				
Phase times incorrect.	TIME				
Red lamp monitor circuit fault.	RLMC				
Link failure.	LINK				
WAIT lamp failure.	WAIT				
Push button failure.	PUSH				
Other.	OTHR				
None.	NONE				

3.18.4 General Notes

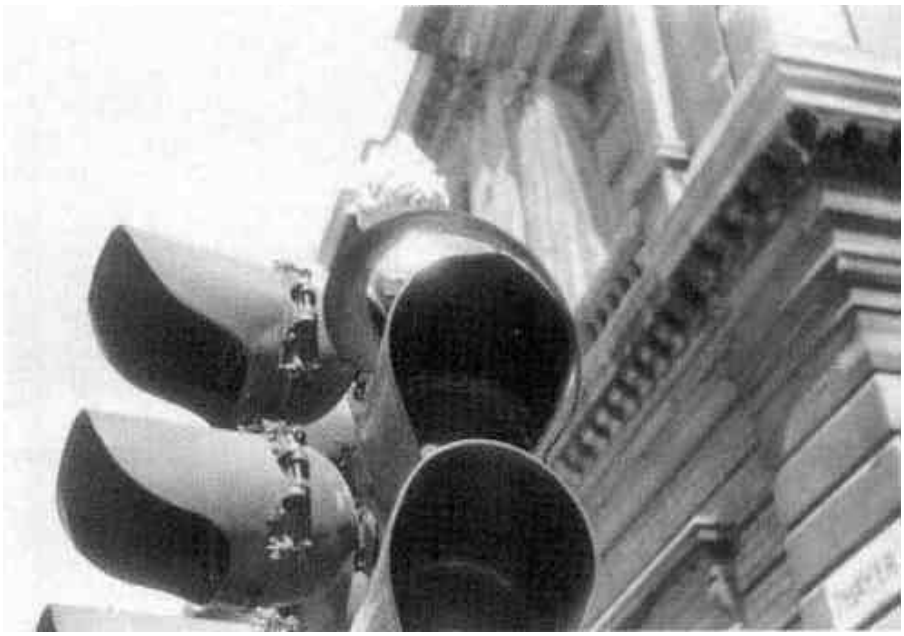
(i) Particular attention should be paid to damaged, defective, displaced or missing traffic signals. These are likely to constitute an immediate hazard.

(ii) Dirty or obscured signals should generally be considered to constitute an immediate or imminent hazard.

3.18.5 Treat Codes

Suggested treat codes applicable to this activity are:

/CLO	Clean only.
/CLR	Clear undergrowth from around traffic signal.
/PVN	Provide a new signal where none has previously existed.
/REP	Repair traffic signal possibly involving some replacement (add text to specify).
/RFX	Refix a loose section of the traffic signal.



Photograph 3.18-1: HPCD - Hardware physical condition

3.19 Road Lighting

The following inspection codes relate to this activity:

Road Lighting: Columns	LP
Road Lighting: Lamp Failures	SL
Road Lighting: Electrical	LE (Specialist)

The following inventory item is applicable to this inspection activity:

Lighting Point LP

3.19.1 Definition

This section relates to the routine maintenance of road lighting installations.

3.19.2 Non-Specialist Defects

Description	Code	Attribute	Units	Min	Max
Lighting failure.	LFAL				
PECU failure. *Photo-electric circuit failure.*	PECU				
Lamp on during day.	LPON				
Time switch failure.	TMSW				
Electrical condition.	ELCN				
Wiring deterioration.	WDET				
Exposed wiring.	EXPW				
Corrosion of columns.	CCOR				
Need for tree pruning.	NTPR				
Missing (door / lamp / bowl).	MISP	number	---	1	50
Damaged post / column. *Damage to post or column other than accident damage.*	DAMG				
Loss of surface paint / coating.	LOPT				
Obscured lamp.	OBLP				
Accident damage.	ACCD				
Physical condition of fittings.	COFT				
No electrical supply.	NOSP				

Non-Specialist Defects (continued)

Other.	OTHR				
None.	NONE				

3.19.3 Specialist Defects

Description	Code	Attribute	Units	Min	Max
Lamp failure.	LAMP				
PECU failure. *Photo-electric circuit failure.*	PECU				
Time switch failure.	TMSW				
Wiring deterioration.	WDET				
No electrical supply.	NOSP				
No fuse.	FUSE				
Other.	OTHR				
None.	NONE				

3.19.4 General Notes

(i) Particular attention should be paid to damaged or defective lighting equipment since this may often constitute an immediate or imminent hazard, especially where the electrical condition is at fault.

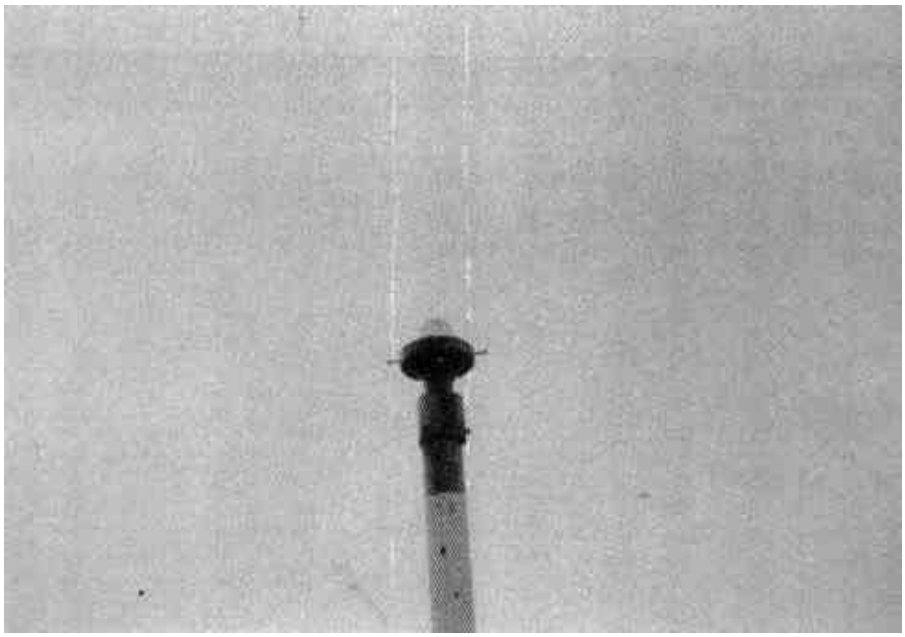
3.19.5 Treat Codes

Suggested treat codes applicable to this activity are:

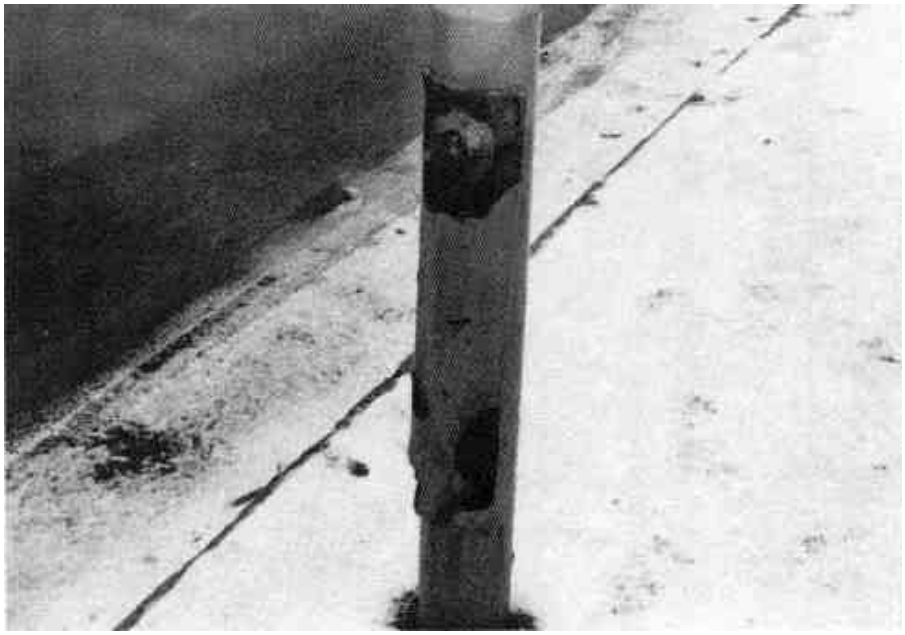
/CLO Clean only.
/CLR Clean and repaint a lamp post.
/PVN Provide a new lighting point where none has previously existed.
/REP Repair a lighting point (add text to specify).
/RFX Refix a section of a lighting point (add text to specify).
/RRS Remove a street lamp and replace with suitable material.

Photograph 3.19-1: LPON - Lamp on during day

Photograph 3.19-2: EXPW - Exposed wiring

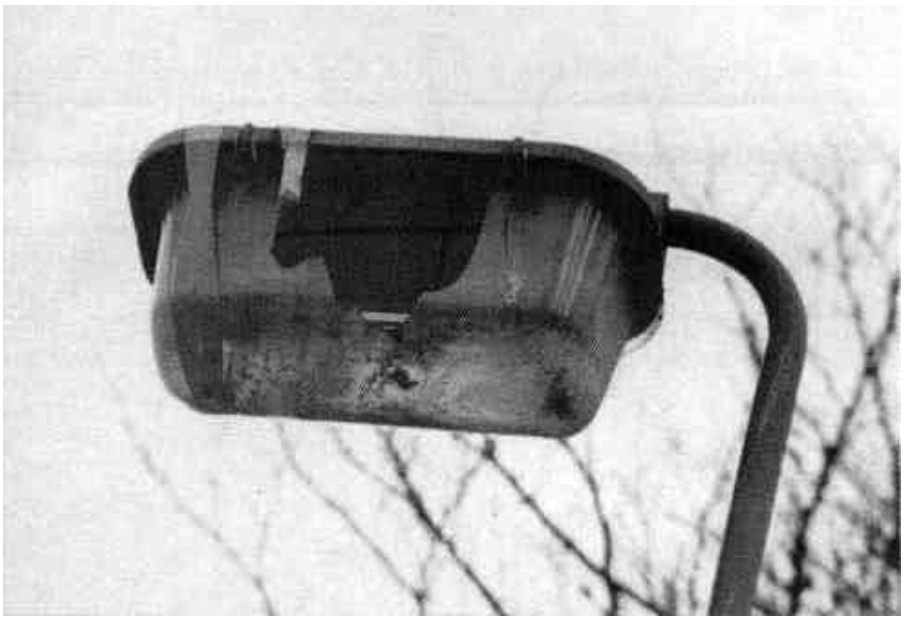


Photograph 3.19-3: MISP - Missing bowl

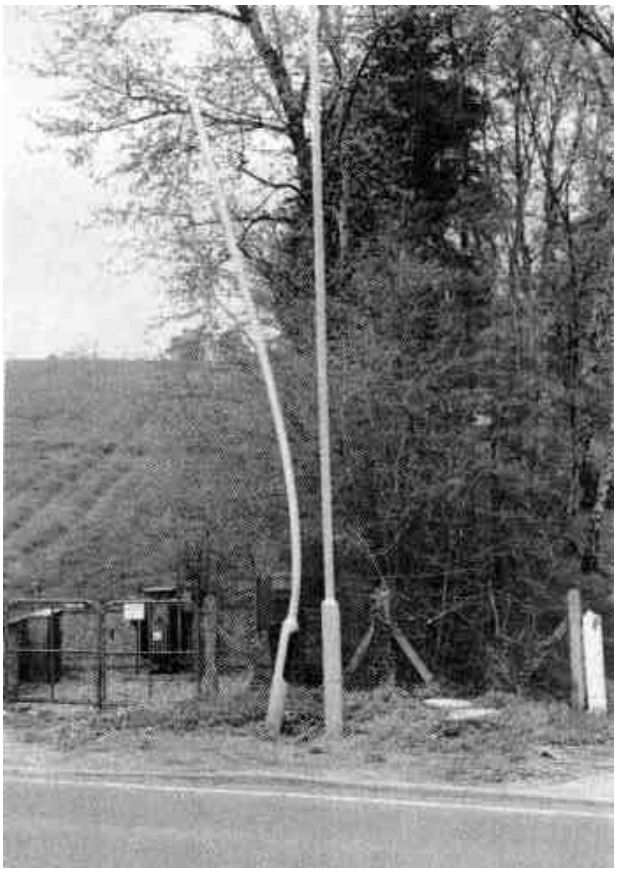


Photograph 3.19-4: DAMG - Damaged post / column

Photograph 3.19-5: LOPT - Loss of surface paint



Photograph 3.19-6: COFT - Physical condition of fittings



Photograph 3.19-7: ACCD - Accident damage

PART 4 - SYSTEM

CONTENTS

Chapter

4.1 Introduction

4.1.1 Origins of Part 4

The Engineers Handbook, previously issued as Appendix 6 to the Highway Inspection Survey Site Inspectors Manual, was introduced to explain the philosophy behind the Routine Maintenance Management System (RMMS) and to highlight some of its main aspects. This Part comprises the text of that handbook, with appropriate minor updates and clarifications, together with an additional section (4.10.3) describing the latest system enhancements.

This Part is intended to provide an overview of RMMS for managing engineers who may not be fully familiar with the detail of the system; it should provide continuity when changes of staff or responsibility occur. Details and technical points which are documented fully elsewhere have not been included, but when reference has been made to them the source is noted. In some cases the main points have been re-iterated for clarity. This Part has been written in general terms, and as such is system independent. It is to complement the system specific RMMS manual supplied by developers.

4.1.2 The Code of Practice

The Code of Practice for Routine Maintenance (Ref. 1) was first published in 1985 along with Trunk Road Management and Maintenance Notice TRMM 4/85 (Ref. 2) which together required MAs to begin implementation of management procedures for routine maintenance work. These documents have subsequently been amended and incorporated in the Trunk Road Maintenance Manual: Volume 2 (Ref 3). The management procedures have now been computerised and reside within RMMS.

The intention of the Code was to provide a working management aid to ensure consistency of standards and value for money. This would be achieved by collecting and maintaining an inventory of highway items affecting routine maintenance, conducting regular inspections to identify non-structural defects, and recommending any remedial actions necessary. The system was to work in parallel with the structural assessment and treatment procedures in existence at that time and with those since developed further.

4.1.3 Computer System

In order to carry out the Highways Agency's instructions, MAs have been provided with computer systems to cover the two main aspects of RMMS;

(i) data collection.
(ii) data filing, maintenance and usage.

Early in the development of RMMS, the Husky Hunter was identified as an appropriate data capture device (DCD) for use in the site collection of the necessary data. Programs for the DCD to record inventory (INVENT), conduct safety inspections (SAFINS) and detailed inspections (INSPEC) have been issued to MAs to enable them to record data in a consistent way and these have been regularly updated as feedback from users has been received. It should be noted that other suitable data capture devices are now available.

4.1.4 Data Collection

The data capture software and equivalent paper systems were fully trialed in 1984/5 during a pilot study lasting nine months and involving Hertfordshire County Council. During this phase, the site collection procedures were established and a set of comprehensive manuals prepared (Ref. 4, 5 and 6); these have all now been incorporated within this RMMS Manual. To complement these manuals a stand-alone self-training package (Ref. 7, 8 and 9) was produced and issued through a series of training courses held at

RTCC Cardington. The paper systems were shown by the trials not to be practical and the computerised data collection routines are now the only method of data capture for RMMS.

4.1.5 Data Filing, Maintenance and Usage

It was originally intended to provide all MAs with a standard data handling system but for commercial reasons beyond the Department's (now Highways Agency's) control this did not prove possible. A second course of action allowing individual developers to produce database systems to meet the requirements of a specification based on the Department's prototype RMMS was eventually followed (Ref. 10). Several alternative systems running on micro, mini and mainframe computers are currently approved having passed a compliance test to the Highways Agency's satisfaction and all MAs were required to have these fully operational from April 1990. This component is commonly referred to as 'the Database'.

4.1.6 Three Counties Trial

The entire RMMS system was tested in trials starting in 1985 involving three County Councils (Northamptonshire, Humberside and Lancashire) during which a prototype version of the database was assessed and user requirements applicable to these counties were established. The specification of the requirement is largely based on this work and all the findings were incorporated into a Structural Systems Analysis and Design Method (SSADM) logical design.

4.1.7 Phased Implementation

The Code of Practice was originally produced in a form which would allow continual updating as new requirements become known. The phased implementation of the requirements of the Code was required to match development of the data capture software and the database specification. The main elements of RMMS, the Code, the DCD and the Database, form part of an evolving system. New features are proposed to accommodate enhancements being made to other aspects of the Highways Agency's work such as the Network Information System (NIS) and the IHMS system.

4.1.8 Modules

There are seven principle modules within RMMS;

- Network.
- Inventory.
- Frequency of Inspections.
- Inspections.
- Cyclic Maintenance.
- Works Order Interface.
- Audits and Reports.

A separate section has been allocated to each where the main points relating to them are covered.

4.1.9 Organisation

Many MAs have appointed a System Manager, an engineer or database manager, to co-ordinate and control the flow of information to and from the system and this approach is strongly recommended.

The way in which a MA sets up its RMMS will depend on its organisation. In practice, many MAs wish to arrange access to the data in both central and remote locations. The amount of interaction at each level is different depending on the required use, and the way in which the information is used varies between MAs. In general, the maintenance of the network and inventory components is viewed as a central management function with a regular flow of updated information being transferred to any remote locations e.g. divisional offices. The Inspection module however, requires day to day transfer of data at the working end and it is envisaged that data would be transferred to the central manager on an appropriate periodic basis. All audits would be carried out on the central system.

4.1.10 Setting Up

As previously stated, the concept of phase implementation is important when establishing the RMMS procedures for the first time. As well as enabling staff to gradually become used to the new aspects, there is a logical sequence in which the modules should be set up because some of the modules are dependent on the existence of other parts of the system.

4.1.11 Network

To set RMMS up from scratch, it is first necessary to enter details of the network to be managed so that data collected can be given the attributes of Link Identifier, Section number, Chainage and Cross-sectional position by an inspector at the time of the relevant survey. (See Chapter 4.3).

4.1.12 Node Studs

An integral part of the referencing procedure is the installation of permanent road markers at the section node locations and the most recent details of how this is to be done are contained in the Trunk Road Maintenance Manual: Volume 1. (Ref. 11).

4.1.13 Inventory

Once the network has been entered, the next logical step is to input details of the Inventory of the roads to be managed which is by nature a one-off occurrence although it is appreciated that the inventory will have to be periodically checked and reviewed with additions and deletions required from time to time as circumstances change. (See Chapter 4.4).

4.1.14 Frequency

It is not essential in RMMS to have all of the inventory information on the database before the Inspection procedures can be implemented but certain of the features of the system require the presence of the inventory before they can be used. For example, the frequency of inspections and cyclic maintenance activities are calculated based on at least one inventory item of a type being present in a section. The calculation of these frequencies is the next logical step. (See Chapter 4.5).

4.1.15 Inspections

If the instructions contained in the Code have been followed, the various inspection procedures will have been in operation since 1985 or 1986. A history of inspections carried out is important but it is not necessary to load old inspection data onto the database. This should be archived and retained for the statutory period laid down by the Code. (See Chapter 4.6). Inspections carried out using the latest versions of the collection software after the installation of the 'approved' version of the database should of course be fully maintained on the system and will be subject to audit checks from time to time.

4.1.16 Works Order Interface

The features designed into the database allow the grouping of defects recorded to form programmable work and via the Works Order Interface this can be transferred to a MA's chosen works ordering system. (See Chapter 4.8). The system also produces details of cyclic maintenance work required. (See Chapter 4.7). Allied to this aspect it is necessary to establish mechanisms for the works order details to be issued and carried out and subsequently for details of work done and cost incurred to be fed back into the system. It is important to note that all routine maintenance carried out on trunk roads will be subject to audit via RMMS although it may be carried out by contractors or different sections within an authority e.g. street lighting. It is acceptable for an alternative system to monitor work organised in this way but the data on RMMS must be up to date.

4.1.17 Audits

Nine audits have been included in RMMS which have been designed to monitor various features of the data and provide useful feedback to both the Highways Agency and the System Manager. Analyses are carried out at Activity and Defect level with inspection performance and budget expenditure information amongst the details produced. (See Chapter 4.9).

4.1.18 Archiving

The final procedure to establish involves the archiving of completed works order details and rectified defects. This will not become a problem until enough surveys have been carried out to generate a large amount of data and this feature has been added to the database specification to be implemented during 1990 as part of Amendment Set V. (See Chapter 4.10) (Ref. 12).

4.1.19 System Components

The various components of RMMS and their relationship are shown in Diagram 1. (See Chapter 4.12).

4.2 RMMS User Benefits

4.2.1 Groups of Users

The main users of RMMS can be broadly defined as the following groups;

(i) The Highways Agency
(ii) Highway Maintenance Engineers
(iii) The System Manager
(iv) Highway Inspectors
(v) Maintenance Personnel or Contractors
(vi) Other interested parties.

Some of the benefits of RMMS to each group of users are listed below and are detailed further at the appropriate point in the manual;

4.2.2 Highways Agency

(i) To monitor the effectiveness of the standards defined in the Code of Practice.
(ii) To monitor the effectiveness of the maintenance process in use on the trunk road and motorway network.
(iii) To allow checks on the performance of individual MAs.
(iv) To provide a record of work and repairs undertaken.
(v) To provide time series data on the results of adopting particular maintenance strategies.
(vi) To allow estimates of resource requirements and budget preparation to be made.
(vii) To provide summaries of expenditure against the IHMS sub sub item codes.

4.2.3 Highway Maintenance Engineers

(i) To provide quantified reports related to routine maintenance work.
(ii) To monitor the effectiveness of the standards defined in the Code of Practice.
(iii) To monitor the effectiveness of the maintenance processes in use on a MAs network.
(iv) To provide a record of maintenance work and repairs undertaken.
(v) To allow estimates of resource requirements and budget preparation to be made.
(vi) To monitor expenditure against the IHMS sub sub item codes.

4.2.4 The System Manager

(i) To provide a method of maintaining and updating comprehensive network and inventory information.
(ii) To produce listings of inventory items which provide quantitative information related to routine maintenance activities.
(iii) To produce schedules of inspections due to be carried out at any particular time following the frequencies defined in the Code of Practice for Routine Maintenance and maintain a history of their occurrence.
(iv) To produce schedules of cyclic maintenance tasks to be carried out at any particular time as required by the Code of Practice for Routine Maintenance and keep a record of work done.
(v) To produce programmes of repair work based on the findings of regular routine inspections and investigations of complaints.
(vi) To generate works orders based on inspection records and cyclic maintenance histories.
(vii) To maintain a record of maintenance work and repairs undertaken.

4.2.5 Highway Inspectors

(i) To provide a checklist of inventory for use during inspections.
(ii) To provide schedules of inspections to be carried out following the frequencies defined in the Code of Practice.
(iii) To produce programs of work based on the findings of regular routine inspections.
(iv) To generate works orders based on inspection records and cyclic maintenance histories.
(v) To provide a record of maintenance work and repairs undertaken.

4.2.6 Other Parties

(i) To provide data for tender quotations.
(ii) To answer ad hoc enquiries.

4.3 Network Referencing

4.3.1 CHART Referencing

The referencing system used by RMMS is the CHART referencing method. A brief summary follows below and full details of the RMMS requirement are given in Part 1 of this Manual. It is a requirement of all MAs to submit full details of their network referencing to the Highways Agency and a validation contract has ensured that a uniform approach has been adopted nationally.

4.3.2 Links

In RMMS terminology a 'Link' comprises a series of sections which form a uniform traffic route and its 'Identifier' is 10 characters long. The link identifier is built up from the agent code defined in the Trunk Road Maintenance Manual: Volume 1 (4 characters) (Ref. 11), the designated road number (up to 5 characters) and the link sub-division or group number (last of 10 characters).

The data held on the database for a link is;

(i) **Link** - Up to 80 characters of text to fully describe the Link.

(ii) **Region** - Up to 4 digits to denote the Highways Agency Region:

9903	-	London (LRO)
9914	-	Midland (MLO)
9915	-	Northern (NRO)
9916	-	Southern (SRO)

(iii) **Number of Sections** - The number of sections in the LINK between 1 and 99.

(iv) **Road Type & Number** - E.g. A123, M999 etc.

4.3.3 Sections

The basic unit of referencing however, is the section and it is at this level that the majority of information is held. The complete list of fields available is;

(i) **Section Description** - Up to 80 characters of text to fully describe the Section.

(ii) **Class / Index** - A 6 character field to denote the make-up of the Section:

Character 1	-	Dual (D) or Single (S) carriageway.
Character 2	-	Number of lanes.
Character 3 & 4	-	All-purpose trunk road (AP) or Motorway (M-).
Character 5	-	Urban (U) or Rural (R) or Sub-urban (S).
Character 6	-	* or blank indicates whether the section is the Nominated Section of a dual carriageway which will hold the shared items and defects.

(iii) **Inspection Category** - A, B or C as defined in the Code of Practice, related to traffic flow.

(iv) **Agent Sub-organisation** - A 4 character code to represent an Agent's sub-organisation.

(v) **Consulting Agent** - A 4 character code to represent a consulting agent (if appropriate).

(vi) **Division** - A 4 character code to represent a division.

(vii) **District** - A 4 character code to represent a district.

(viii) **Agent Authority** - A 4 digit number; the Authority's Agent Code.

(ix) **Depot** - A 4 character code to represent a depot.

(x) **Start Node** - A 5 digit Node number.

(xi) **End Node** - A 5 digit Node number.

(xii) **Length (Metres)** - The length of the section as measured by the inventory survey.

(xiii) **Start Node Easting** - A 6 digit OS Grid Reference.

(xiv) **Start Node Northing** - A 6 digit OS Grid Reference.

(xv) **End Node Easting** - A 6 digit OS Grid Reference.

(xvi) **End Node Northing** - A 6 digit OS Grid Reference.

(xvii) **Speed Limit** - The speed limit applicable to the section.

(xviii) **Parish** - A 4 character code to represent the parish.

(xix) **Section Status** - From O = Open, P = Proposed or U = In Use but not officially opened.

(xx) **Date Opened** - Date when the section was opened.

The use of some of the above is optional and will depend on an MA's organisation and practice

4.3.4 Class/Index

The items which are essential for full operation of the system are Class/Index, Inspection Category and urban/rural split which are used by the routines which calculate the frequency of regular inspections or cyclic maintenance. (See Chapter 4.5).

When determining where the start and end of sections occur, it is usual to allocate a node at the major junctions. In addition, further section boundaries should be introduced if any of the above criteria change so that the section details are uniform throughout the whole section. E.g. at Division, District or Parish boundaries and at changes in the number of lanes or speed limit.

4.3.5 Reverse Direction

The data from surveys will be held on the database in the direction of traffic flow on dual carriageways and in the direction of increasing section number on single carriageways. This is designated as the 'normal' direction. If for safety reasons however, it is necessary to survey in the 'reverse' direction, i.e. facing oncoming traffic on dual carriageways, a feature has been included in the data capture software to allow this.

4.3.6 Nominated Sections

The separate halves of a dual carriageway must be different sections with one half 'nominated' to hold the details of inventory in the central reserve which are shared between the two sections. Roundabouts are a single separate section.

4.3.7 Database Fields

Text description fields are included on the database for both links and sections. Use of these fields is essential for users of the system who are not fully familiar with the referencing, in particular those persons carrying out repair work.

The five fields; Agent Sub-Organisation, Consulting Agent, Division, District and Parish are free-format four character fields which can be optionally used at an MA's discretion to sub-divide their networks in line with their organisational structure. Reports from the database can be selected on the basis of any of these fields.

If not already known, the section length can be estimated when the network is first installed and inserted later from the collected inventory data. The length of a section is defined as the chainage of the reference marker point (studs) at the end of the section and is used to check whether the chainage of items or defects has been correctly recorded.

The Ordnance Survey grid references for the nodes at each end of a section are included for future compatibility with digital mapping and other GIS applications.

4.3.8 Routes

To assist with the organisation of data into routine and cyclic maintenance activities, the facility to define 'Routes' as a set of sections, within the system has been included. By defining the order of sections, which may be in more than one link, it is possible to define routes for such activities as sweeping, gully emptying or grass cutting and at a later stage extract inventory information relative to that route and activity for inclusion in annual tender or similar documents.

4.3.9 Cross-Sectional Position

The position of an inventory item or defect within a section is recorded by chainage and cross-sectional position. The longitudinal distance measured to the nearest metre along the left-hand edge of the carriageway forms the chainage and the single characters, 0 to 9, Q, W, E, R, T and Y, define its location across the highway. Full details of cross-sectional position can be found in Part 1 of this Manual and the key points are summarised below. The various positions across the highway were simply defined to coincide with the top two rows of keys of the data capture device as follows;

1	=	Left outside verge	Q	=	Acceleration splay
2	=	Left footway	W	=	Lane for left turning traffic
3	=	Left verge	E	=	Lane for right turning traffic
4	=	Lane 1	R	=	Bus lane
5	=	Lane 2	T	=	Crawler lane
6	=	Lane 3	Y	=	Other
7	=	Lane 4			
8	=	Right verge			
9	=	Right footway			
0	=	Right outside verge			

The concept of cross-sectional position is the key to locational referencing in RMMS and is the most difficult idea to convey to new inspectors. After a very short period of applying the rules, any illogicalities are quickly resolved and the rule becomes second nature. Persons new to the system can often find the idea complicated but it does work very well in practice.

When data is recorded in the 'reverse' direction, the chainages are automatically adjusted by the software prior to loading onto the database. It is not possible for the software to reverse the cross-sectional positions and a surveyor or inspector must look backwards when assigning a cross-sectional position to an item or defect and allocate it as though the survey was being conducted in the normal direction. The data capture software contains a message to remind an operative to do this at the appropriate point.

4.3.10 Unique Location

The RMMS network referencing system allows an inventory item or defect to be located to within a few metres on the national trunk road network. The first four characters identify the area of authority, the next part identifies the road number and the section definition locates them to within a few kilometres. The chainage provides the final location usually to within a metre subject to the limitations imposed by some of the inventory collection rules such as for signs. (See Chapter 4.4).

4.3.11 Network Reports

There are four basic reports available from the network module of the database;

(i) Carriageway report
(ii) Link report
(iii) Section report
(iv) Route report

It is possible to select reports for the following range criteria to suit an MAs organisation.

- the entire authority.
- a range of links or sections.
- a single link or section.
- a range of routes.
- a single route.
- by Agent Sub-organisation.
- by Consulting Agent.
- by Roadpart (see Chapter 4.10).
- by Division.
- by District.
- by Parish.

An example of a carriageway report is shown in Figure 1 (see Chapter 4.12) and it provides a breakdown of total recorded carriageway lengths over the selected range. The Class/Index field is used as the basis of the breakdown and totals of e.g. dual or singe carriageway, 2 or 3 lane carriageway and urban/rural split can be quickly determined.

The Link, Section and Route reports provide similar information in the form of a tabulated listing of the section details given earlier in Chapter 4.3, for the selected range criteria. Part of a section report is shown in Figure 2 (Chapter 4.12).

4.4 Inventory

4.4.1 Point or Continuous

Inventory items fall into one of two categories;

(i) 'Point' items which occur at a discrete chainage and cross-sectional position.
(ii) 'Continuous' items which have a distinct start and end chainage.

4.4.2 Unique Key

Every item of inventory is recorded so that it can be uniquely stored by the database software. For Point items the item code, chainage and cross-sectional position are the key fields used and for Continuous items, item code, cross-sectional position and range of chainage must be unique. In practice, where items such as two left-hand footways exist, one of them must be recorded in cross-sectional position Y = Other for it to be accepted onto the database. Duplicate Point items, e.g. two manholes at the same location, must be recorded one metre apart.

In the case of the 'Signs' item an extra consideration is taken into account because multiple signs frequently occur on the same post. For signs, the diagram number defined in the Traffic Signs Regulations (Ref. 13) is used as an additional key field. Provided the diagram numbers of two signs are different they are recognised as two separate items. Where identical signs occur at a location, such as back to back speed limit signs, it is again necessary to record them one metre apart.

4.4.3 Routine Maintenance Needs

The limitation imposed by this method of recording is not a significant factor when considering overall routine maintenance needs and it should be stressed that the inventory items chosen for inclusion in RMMS and their recorded attributes are to assess routine maintenance requirements. E.g. Footway.

- surface material
- width (m)
- sweeping method

Engineers should be aware of these limitations and not expect the data output from the system to be more accurate than the techniques used to record it. No attempt has been made to address structural maintenance problems, which will be dealt with by a separate system.

4.4.4 Groups of Items

The main routine maintenance activities covered by the Code of Practice and their relevant inventory items are fully listed in Annex 4.4.1.

It can be seen that there is no one to one relationship between routine maintenance activity and inventory item and many items apply to more than one routine maintenance heading. E.g. the 'Safety Fences: metal/concrete' (FB) Activity covers;

- pedestrian guardrails (PR)
- retaining walls (RW)
- safety fences (SF)

and the 'Fences and Barriers' inventory item is included under the following Activities;

- boundary fences: metal/concrete (BF)
- boundary fence: timber (BT)

In addition the inventory items, overbridge (BO) and underbridge (BU), are included as features mainly to assist in locating other items in the system.

4.4.5 Notebook Facility

From time to time, an inspector will encounter an inventory item which is not on the standard list and wish to make a note of its presence; E.g. salt bins, or sign storage bunkers. A dummy item 'Notebook (NT)' has been included for this purpose which allows a short text field to be recorded at the time of a survey. Messages can also be recorded using this code.

4.4.6 Use of Data

Once collected, the RMMS inventory will provide a pool of data which can be accessed by a variety of users to provide information either in the form of a standard report, e.g. a gully emptying schedule for inclusion in an annual tender document, or on the basis of an ad hoc enquiry, e.g. inventory details relating to a proposed surface dressing scheme.

4.4.7 Accuracy

The accuracy of data required is dependent on its perceived use and a level of around 95% in terms of location, correctness and completeness has proved achievable for the first pass of inventory collection using the RMMS procedures. Because the system is ongoing and in day to day use, the accuracy of the inventory will improve with time until an optimum level has been reached. It is important to attain virtually 100% accuracy for items such as lighting points or gullies but for other items like verges the difference between 95% and 98% accuracy on area will not significantly affect routine maintenance expenditure on that item and the additional effort required to achieve a greater degree of accuracy will not necessarily be cost effective.

The desired and achievable level of accuracy will also depend on the nature of the road being surveyed. For example, the width of a motorway will not change significantly over the length of a section and because of its long bends the chainage measurement taken at its left-hand edge will be reasonably accurate. Any area calculated from this data should therefore be a reasonable reflection of the true area. On a rural trunk road however, the width will frequently change and because of the probability of more bends, the chainage will often be less accurate. Inspectors are instructed to record data so that when the chainage they have used and the width measured are multiplied together, a reasonable representation of the area is produced. This is often subjective and will as a consequence be less accurate. It is however, less critical when viewed in routine maintenance terms.

4.4.8 Updating

A continual problem with the accuracy of inventory is the effect of works carried out since the data was collected or last checked. Three approaches are possible for keeping records up to date;

(i) a record keeping system whereby all changes arising e.g. from new construction or repair are notified to the database manager when they occur. This method has been successfully used by at least one county council (Ref. 14).

(ii) a complete resurvey of the network at intervals which reflect the importance and changeability of each road.

(iii) regular checks of the inventory by personnel carrying out inspections surveys.

4.4.9 Data Capture Software

Changes to the inventory data collection program are ongoing. Amendments are issued by the software developers and MAs should update their inventory using the current data collection program.

4.4.10 Database

The database, which can be viewed as an electronic filing cabinet within which the information in different files can be related to produce usable output, contains all the necessary features to enable full editing of the inventory. All data collected is validated for correctness and completeness before it is automatically loaded into the system. It can then be viewed as required and additions, deletions or alterations made as necessary. Information can be deleted globally, by item, cross-sectional position or within desired chainage constraints. This is useful when major changes are made to the road network as with a new road alignment.

4.4.11 Off-Site Entries

In addition to the data collected on site, the RMMS requires further details to be added into the database as 'off-site entries'. These include the electrical details of lighting points, bollards and signs and an optional reference number to a photograph library of non-standard road signs. In the latter case the number will be unique for every item but there will be many similar lighting points existing along extensive lengths of the network.

4.4.12 Attributes

Most inventory items have a set of attributes associated with them e.g. for light points they are;

- Identity Code
- Column Type
- Height
- Mounting Bracket

In order to be flexible, these have been standardised in RMMS. Their format is always the same and an attribute can apply to more than one item. E.g. Identity Code is always an 8 character string and also applies to Bollard, Overbridge, Underbridge, Communications Cabinet, Emergency Telephone Box and Signs.

4.4.13 Individual Items

Full details of how each separate item should be recorded can be found in Part 2 of this Manual. There are some points however which deserve further emphasis as follows;

(a) **General Width Measurements.** Where measurements of width will be used solely to determine areas by calculation, an average width of e.g. a hatched road marking or central island, is specified regardless of whether the item has a standard or tapering profile. For guidance an inspector is told to record the width which when multiplied by the recorded length gives a reasonable value of area for that item.

(b) **Type.** The items bollard (SB), kerb (KB), gully (GY) and communications cabinet (CC) have an additional 'type' field associated with them. This has been specified as a free-format four character field which can be used for any desired purpose.

(c) **Bollards (SB).** This item is generally for electrical safety bollards but by using the 'type' field outlined above it is possible to record concrete guardposts, reflective posts etc. under this item.

(d) **Carriageway (CW).** Hard shoulders were originally recorded under this item but because these often have a different surface type to the main carriageway, a new item HS was introduced. Some resurvey is necessary to convert old data to the new format. On roads with a frequently changing width, measurements should be taken only when changes are significant. An accurate record of overall area is required.

(e) **Central Reserves (CR).** A central reserve and items therein which are common to both halves of a dual carriageway, should be recorded in the nominated section. It is not necessary to change the location of a filter drain which alternates from one side of the central reserve barrier to the other.

(f) **Crossovers (XO).** Crossovers are not specifically inventory items but have a use in RMMS related to the calculation of verge areas. They were originally introduced to avoid the need to stop and re-start multiple verge entries particularly on residential roads and also to provide an indication of location in featureless areas. They occur across verges, footways and central reserves and consist of a different surface material type to that of the item being crossed. Linear items which exist over them, such as kerbs, are not affected when a crossover is recorded. The convention of using cross-sectional positions W and E to indicate that all existing running items are crossed, on the left and right respectively, has been included to save recording effort.

(g) **Embankments and Cuttings (EC).** To distinguish between an embankment and cutting, a positive or negative angle is recorded respectively. The angle and height are only recorded approximately and minor occurrences, less than three metres in height, are frequently ignored at a MAs discretion.

(h) **Retaining Walls (RW).** These were originally recorded as a type of fence and barrier (FB) but were allocated their own item code in version 2.20.

(i) **Footways (FW).** A field to indicate the sweeping requirements of footways is included.

(j) **Interceptors (IN).** Inspectors must be provided with the locations of known interceptors so that they can be recorded.

(k) **Kerbs (KB).** When recording kerbs only changes in material type are noted. Dropped kerbs are ignored.

(l) **Lighting Points (LP).** These are the only items in RMMS which have a repeat facility in the data capture software, lighting point repeat (LR). This facility should be used with care so that incorrect details are not copied by mistake. The height of lighting points are difficult to determine in practice; they can be measured using an optical measuring device or accurately estimated.

(m) **Lay-bys (LB).** Lay-bys which have resulted from a by-passed short section of road may contain other inventory items such as gullies or kerbs and these should be referenced as separate sections.

(n) **Manholes (MH).** These are restricted to highway drainage covers and do not include the covers of other statutory undertakers or covers of less than man-entry size.

(o) **Pedestrian Crossings (PX).** Only the road marking component of a pedestrian crossing is recorded under this item. It includes any integral studs, transverse 'stop' lines and zig-zags at zebra crossings.

(p) **Hatched Road Markings (LH).** As well as the more obvious hatched markings, yellow bars and box junctions are included under this item. Cross-sectional position Y is used to indicate these type of markings occur across the full width of the carriageway. All edge lines are included but any road studs are separate items.

(q) **Longitudinal Road Markings (LL).** These include zig-zags except at pedestrian crossings. Use of the 'edge' option under type should be avoided and either 'single' or 'double' should be used instead so that this distinction can be made. This has been removed from INVENT.224 and later versions.

(r) **Transverse Road Markings (RM).** There are certain limitations contained under this item e.g. give-way lines and triangles can only be distinguished from each other from their height and the form of any 'words' cannot be recorded.

(s) **Signs (SG).** Identical signs (same chainage, same cross-sectional position and same diagram number) are recorded one metre apart as explained earlier. Those MAs wishing to make a record of the details shown on non-standard signs can cross-reference the inventory details to a library of photographs or drawings by using the 'sign photo number' field provided. During an inventory survey, signs will be found that are not shown on the diagrams normally carried by the surveyors. It is necessary in these cases to make a careful drawing of each such sign so that the correct exact diagram number can be allocated back at the office.

(t) **Trees (TR).** It is not possible to record the precise location of every tree on the trunk road network especially where small 'forests' occur. The definition of a tree in Part 2 of this Manual requires that only trees with a diameter of greater than 20cm when measured one metre from the ground, are recorded. The convention is to record a single tree in a section at chainage zero and in cross-sectional position Y. This will cause the inspections required by the Code to be initiated at the required time periods. Additional trees which are significant or affect the highway by overhanging the carriageway can be recorded if desired.

(u) **Verges (VG).** This is the only item in RMMS which triggers the requirement for grass-cutting. All areas to be cut whether they occur on central islands or reserves, on embankments and cuttings or as sight splays must be recorded as verges as well as any other applicable codes. Only an approximate record of 'actual width' is required and the measurement of 'maintained width' is the important measurement. In practice, a splay's width will be cut in addition to sight-lines. The number of 'obstacles to mowing' (OB) is recorded only as an indication of difficulty.

4.4.14 Inventory Schedules

The following types of Inventory Schedule can be produced from RMMS either from standard reports or the ad hoc facility;

- Full Output
- Pocket Book
- Map Print
- Detailed Print
- Signs
- Lighting
- Road Markings
- Surface Treatment
- Inventory Quantities
- Lighting audit
- Lighting Validation

each of which are further described below. The examples given in this manual are intended to illustrate the capability of the database by demonstrating potential uses but their exact format may differ between systems.

A **full output** is a tabulated listing of all fields held for individual inventory items. The schedule can cover a single inventory type or a series of items defined by the user and can include off-site entries if wanted. An example of a Full Output is included as Figure 3 (Chapter 4.12).

A **pocket book** is an abbreviated listing of the entire inventory or selected items in A5 size allowing it to be bound into small booklets. It is envisaged that these booklets would be produced for all sections within a particular inspectors area thereby providing him with a portable summary of his inventory. An example of a page from a Pocket Book is included in Figure 4 (Chapter 4.12) and suggested possible uses include;

(i) to provide a listing of the collected inventory which can be checked for accuracy at the time of an Inspection survey.

(ii) as a substitute for measuring chainage from the start node of a Section during Safety and Detailed Inspections. It would only be necessary to locate a defect relative to the nearest item.

(iii) as a locational aid during CHART or other assessment surveys to ensure consistency of defect location between subsequent surveys.

A **map print** is a diagrammatic representation of inventory items within a Section produced directly from the DCD. An example is shown in Figure 5 (Chapter 4.12).

It can be seen from the example that Chainage is listed down the left-hand side of the schedule and items are sorted into chainage order. A “v” denotes the start of a continuous item and a “^” its end. The abbreviations across the top of the print-out represent cross-sectional position codes and mean;

LO - Left Outside Verge
LF - Left Footway (or Cycle Track)
LV - Left Verge
L1 - Lane 1 of the Carriageway
L2 - Lane 2 of the Carriageway
L3 - Lane 3 of the Carriageway
L4 - Lane 4 of the Carriageway
RV - Right Verge

RF - Right Footway (or Cycle Track)
RO - Right Outside Verge
AC - Acceleration Splay
LT - Lane for Left Turning traffic
RT - Lane for Right Turning traffic
BL - Bus Lane
CL - Crawler Lane
TO - Other

A **detailed print** is an alphabetic listing of inventory items within a Section produced directly from the DCD. An example is shown in Figure 6 (Chapter 4.12).

A **Sign** Schedule is similar to the Full Output described above but includes Safety Bollards and a summary of sizes. An example is included as Figure 7 (Chapter 4.12).

A **lighting** Schedule is a listing of all items with an electrical component i.e. Lighting Points, Signs, Safety Bollards and Traffic Signals. An example is shown in Figure 8 (Chapter 4.12). After each Section a useful summary can be included, in this case the number of units existing in each cross-sectional position and a count of each type of lamp. Finally, the number of rechargeable Watts accredited to each applicable electricity board can be summarised.

A **road marking** Schedule is a listing of Road Markings and Road Studs. An example is shown in Figure 9 (Chapter 4.12) and it can be seen that where applicable the items have been quantified.

A **surface treatment** Schedule is a listing of the inventory which would be affected by surface treatment work such as surface dressing or overlays. An example is shown in Figure 10 (Chapter 4.12)and as with the road marking schedule, items have been quantified when applicable.

An **inventory quantities** Schedule totals the number of chosen inventory items in a particular range by number, length or area as appropriate. An example is shown in Figure 11 (Chapter 4.12).

4.4.15 Inventory Audits

The **lighting validation** Schedule identifies any areas where data required by the Electrical Audit is deficient. An example is given in Figure 12 (Chapter 4.12). See Chapter 4.9 for further details.

The **electrical audit** is required by the Department, and is explained in Chapter 4.9. An example is shown in Figure 13 (Chapter 4.12).

Annex 4.4.1

Relationship Between Inventory Item and Maintenance Activity

Routine Maintenance Activity		Inventory Item	Code
Minor Carriageway Repairs	-	carriageway	(CW)
	-	central island	(CI)
	-	central reserve	(CR)
	-	crossover	(XO)
	-	hard shoulder	(HS)
	-	lay-by	(LB)
Footways and Cycle Tracks	-	cycle track	(CT)
	-	footway	(FW)
Covers, Gratings, Frames and Boxes	-	catchpit	(CP)
	-	gully	(GY)
	-	interceptor	(IN)
	-	manhole	(MH)
	-	piped grip	(PG)
Kerbs, Edging and Pre-formed Channels	-	channel	(CH)
	-	kerb	(KB)
Highway Drainage	-	balancing pond	(BP)
	-	catchpit	(CP)
	-	channel	(CH)
	-	counterfort drain	(CD)
	-	culvert	(CV)
	-	ditch	(DI)
	-	filter drain	(FD)
	-	grip	(GP)
	-	gully	(GY)
	-	interceptor	(IN)
	-	manhole	(MH)
	-	piped grip	(PG)
Motorway Communications Installations	-	communications cabinet	(CC)
	-	signs	(SG)
	-	telephone box	(TB)
Embankments and Cuttings	-	embankments and cuttings	(EC)
Grassed Areas	-	central island	(CI)
	-	central reserve	(CR)
	-	embankments & cuttings	(EC)
	-	verge	(VG)

Hedges and Trees	-	hedge	(HG)
	-	tree	(TR)
Litter/Sweeping and Cleaning	-	carriageway	(CW)
	-	central island	(CI)
	-	central reserve	(CR)
	-	channel	(CH)
	-	crossover	(XO)
	-	verge	(VG)
	-	embankment/cutting	(EC)
	-	cycle track	(CT)
	-	footway	(FW)
	-	hard shoulder	(HS)
	-	lay-by	(LB)
	-	kerb	(KB)
Fences and Barriers	-	fences and barriers	(FB)
	-	pedestrian guardrail	(PR)
	-	retaining wall	(RW)
	-	safety fence	(SF)
Road Studs	-	road studs	(RS)
Road Markings	-	pedestrian crossing	(PX)
	-	hatched road markings	(LH)
	-	reference marker point	(RF)
	-	road markings (longitudinal)	(LL)
	-	road markings (transverse)	(RM)
Road Traffic Signs	-	bollards	(SB)
	-	reference marker point	(RF)
	-	signs	(SG)
Traffic Signals	-	detector loop	(DL)
	-	traffic signals	(TS)
	-	communications cabimet	(CC)
Road Lighting	-	lighting points	(LP)

4.5 Frequency of Inspections and Cyclic Maintenance

4.5.1 Inspection

4.5.1.1 Types of Inspection

There are two types of routine inspection defined in the Code of Practice, (see Chapter 4.6 for further details);

(i) Safety Inspections
(ii) Detailed Inspections

The required frequency of Safety Inspections is related to the road classification, (i.e. traffic usage), and Detailed Inspections are governed by maintenance activity.

4.5.1.2 Safety Inspections

Table 1.1.1 of the Trunk Road Maintenance Manual: Volume 2 (Ref. 3) lists the motorways and trunk roads applicable to each Inspection Category which determine when Safety Inspections are conducted as follows;

A = weekly with daily safety patrol
B = weekly
C = monthly.

Separate night-time surveys to record lamp outages are specified to occur at 28 day intervals on motorways and 14 day intervals on trunk roads. The data capture program, SAFINS, can be configured for either Safety Inspections or Lamp Scouts as appropriate.

4.5.1.3 Detailed Inspections

The Trunk Road Maintenance Manual: Volume 2, Part 1 (Ref. 3) provides details of 26 different Activities or sub-divisions of Activities related to the IHMS sub sub item codes. These Activities are:

Minor Carriageway Repairs
Footways and Cycle Tracks
Covers, Gratings, Frames and Boxes
Kerbs, Edgings and Pre-formed Channels
Highway Drainage
- Piped Drainage Systems
- Gullies, Catchpits and Interceptors
- Piped Grips
- Grips
- Ditches
- Filter Drains
- Culverts
- Balancing Ponds
- Ancillary Items
- Flooding

Motorway Communication Installations
Embankments and Cuttings
Grassed Areas
Hedges and Trees

Sweeping and Cleaning
Safety Fences and Barriers
Fences, Walls, Screens and Environmental Barriers
Road Studs
Road Markings
Road Traffic Signs
Road Traffic Signals
Road Lighting

Within each Activity, the maintenance requirements for defects which are identified as a result of inspections or from complaints received, are set out. Where appropriate a frequency of Detailed Inspection is given for the activity or for a particular component of the activity e.g. the safety fences and barriers section includes the following inspections;

- steel and wire rope safety fences at intervals of 2 years in respect of mounting height, surface protective treatment and structural condition.
- pedestrian guard rails at intervals of 2 years in respect of surface protective treatment and structural condition.
- concrete barriers at intervals of 2 years in respect of height and structural condition.

Urban or Rural

In some cases there is a different frequency specified for the same item in urban and rural environments. Within RMMS, Urban is defined as sections with a speed limit of 40 mph or less and Rural greater than 40 mph.

4.5.2 Cyclic Maintenance

As well as maintenance requirements for defects, the cyclical maintenance requirements of each activity are specified where appropriate. The frequency is given either as a time interval or as the number of occurrences within a year as shown in Figure 14 (Chapter 4.12). For those activities where the cyclic works will completely rectify any defects found e.g. grips (recutting), grassed areas (cutting) or sweeping and cleaning, no formal Detailed Inspection is needed although it is recognised that if an inspector finds defective items under these Activities, he may wish to bring forward the date of the next schedule occurrence to rectify them. Flooding which is apparent at the time of an inspection should also be noted and it is necessary to arrange for a proportion of the surveys to be undertaken following or during heavy rain.

4.5.3 Local Variations

The Code recognises that all situations cannot be covered using the general set of rules and allows, for some activities, Local Variations of inspection frequency or cyclic maintenance timing. Up to three such variations within a section may be agreed with the MA's Regional Office for each activity in the Code and a facility to hold this information is included in RMMS. (See Figure 15, Chapter 4.12).

4.5.4 Work Due Schedule

Detailed Inspections have first been separated into 'Specialist' and Non-Specialist' with two different description files having been included in the data capture programs. SPCINS.DSC and INSPEC.DSC respectively. Routines in the database then calculate all inspection and cyclic maintenance frequencies for every section on the network having first determined that appropriate items are contained in the inventory i.e. gully emptying and inspection schedules are produced only if gullies exist within the section. It is

then straightforward to calculate the date on which work will become due by combining the frequency or interval with the date of the last appropriate inspection. When details of inspections are loaded from the data capture device, the date of the next inspection is calculated automatically. Similarly, when the date of cyclic work carried out is fed back onto the database, the next occurrence is scheduled. Local variations are taken into consideration and the most frequent interval is used to calculate work done. A typical 'Work Done' Schedule is shown in Figure 16 (Chapter 4.12).

4.6 Inspections

4.6.1 Types of Inspection

The two kinds of surveys defined by the Code of Practice are;

(i) **Safety Inspections.** These are designed to identify those defects which are likely to create a danger to the public and therefore require immediate or urgent attention. They shall be carried out at frequencies which reflect the importance of a particular road.

(ii) **Detailed Inspections.** These are carried out at less frequent intervals than Safety Inspections and are designed primarily to establish programmes of routine maintenance tasks not requiring urgent execution. Requirements for Detailed Inspections are set out in the Code of Practice.

An inspector should have a basic working knowledge of the inventory collection system and he should be provided with general inventory details for the sections he will be inspecting. The 'Pocket Book' described earlier under inventory schedules and shown in Figure 4 is a suitable format for this. Any complex situations which warrant special attention can also be identified in these booklets by adding diagrams if necessary.

4.6.2 Safety Inspections

Safety Inspections are normally carried out from a slow moving vehicle fitted with an automatic distance recorder although some circumstances may require further investigation on foot. Data is recorded on the data capture device using the SAFINS program provided, which also covers lamp scouts. As well as the routine Safety Inspections, it will be necessary to respond to complaints made by the police, public or colleagues and to the occurrence of major accidents or adverse weather. The type of survey i.e. NoRMal/ POLice/ PUBlic/ OTHer is noted by the system; this list has been extended in Amendment Set VII (Ref 15)to include DUMmy and PATrol.

It is a requirement to carry out a proportion of Safety Inspections either during or immediately following periods of heavy rain so that the functionality of the highway drainage systems can be assessed. It is also important to make a note of all sections that have been inspected and where no defects have been found, i.e. nil returns, so that a full record of survey history is maintained.

4.6.3 Detailed Inspections

Detailed Inspections are generally walked surveys made using a standard measuring wheel and data must be recorded using the INSPEC program which can be configured for either specialist or non-specialist surveys. Information collected during Safety Inspections may provide contributory information for a Detailed survey. For example, to monitor a temporary repair awaiting permanent work or when an inspector does not consider a defect to have been severe enough to warrant an urgent repair. Structural defects are not recorded in RMMS but information from a Detailed Inspection may bring forward a CHART, MARCH or similar structural survey.

On lengths of 3 lane or wider motorway and trunk road, it is usual to survey from the hard shoulder or left-hand verge/footway. The Code requires that every two years a survey is conducted from the central reserve or coned outside lane. It is preferable if this coincides with coning for other work but special arrangements may be necessary if this cannot be achieved.

4.6.4 Types of Action

Once a defect has been found, there are three possible actions which can occur within RMMS.

(i) **Immediate Action.** This is action taken which is not a repair and which takes place at the time of the inspection. It commonly includes the placing of signs or cones, contacting a depot for an emergency repair or invoking PUSWA procedures. It is considered to be part of the normal duties of a safety inspector and is not an additional charge to the Highways Agency.

(ii) **Temporary Action.** This can be either taken at the time of the inspection or recommended by the inspector. If carried out, the date and time will be noted by the data capture software and the action will be transferred to the database as completed. Any recommendations can if necessary be amended by a more senior person at a later date.

(iii) **Permanent Action.** As with temporary action, this can either be taken at the time of the inspection or recommended.

4.6.5 Categories

There are two categories of defect defined in the Code;

(i) Category 1 (Urgent)
(ii) Category 2 (Programmable)

By definition, only Category 1 defects are identified by Safety Inspections.

4.6.6 Action Required

The consequence of recording a defect as Category 1 is that some form of action must take place within 24 hours. The action can be permanent to fully rectify the defect or can be temporary pending a permanent repair. By taking temporary action, the permanent work can be deferred by anything up to a maximum of 28 days from when it was first identified. The date and time at which a defect is found is logged when it is entered into the data capture device and all dates by which action is required are calculated by the system.

When recording a defect, an inspector is led through a series of questions by the data capture software. He must consider whether a defect can be left for inclusion in a planned programme of works or conversely whether some form of action must take place within 24 hours. It is on this basis that a defect is categorised as either Category 1 or Category 2. If it is considered that a defect does not need 24 hour action and is safe to be left, it then becomes a Category 2 defect which the inspector can prioritise for treatment if required. He is prompted to define the Category 2 defect as Low, Medium or High Priority, for which a MA can assign appropriate time intervals. The target timescale for treatment of a Low Priority defect should be the target treatment time defined in the “Intervals and Frequencies” tables (See Chapter 3.2).

4.6.7 Display Warnings

The minimum requirement of the Code is to display warning notices and/or make safe any defect which poses a hazard to road users or pedestrians. The hazard should then be reported to the appropriate parties at the earliest practical opportunity depending on the nature of the defect. This includes the removal of debris from traffic lanes and the removal of loose road studs.

4.6.8 Replacement of Road Studs and Road Markings

For the Activities of Road Studs and Road Markings there are special criteria laid down in the code for replacement of these items. When road studs are missing, the initial requirement is to fill any cavities as soon as possible to make them safe and when a percentage loss level specified in the Code is reached, implement their replacement. Studs associated with prohibitory lines which have a legal requirement are

exempt from this requirement and they should be replaced within 24 hours. A similar approach related to wear and loss of reflectivity is adopted for road markings where percentage remaining and percentage of original are considered. (See Chapter 4.10).

4.6.9 Data Capture Software

The entry of information onto the data capture device is achieved using a series of codes in a similar way to those used in the inventory module. First an inspector enters details related to location such as Link Identifier and the Section Number and then, depending on the type of survey, a record must be made of all activities which are covered by an inspection. For Safety Inspections this is assumed to be all activities unless the inspector indicates differently by defining a list of those covered. For Detailed Inspections a list of all the appropriate activities must be recorded. This information is used as a record of 'nil returns'. If an activity appears on the list it signifies that every item covered by that activity has been inspected and the only defects present are those contained in the remainder of the file. Clearly an inspector may record defects, particularly those affecting safety, for unscheduled Activities. It cannot be assumed that all other similar items have also been inspected.

A restriction of the Safety Inspections is that only complete sections can be recorded; there is no facility for part-sections. For Detailed Inspections however, a start and end chainage can be entered when full sections are not completed.

4.6.10 Activity and Defect Codes

To record a defect an inspector must enter the appropriate activity code:

E.g. MC = Minor Carriageway Repairs
FC = Footways and Cycle Tracks

A list of possible defects for that activity is then presented as defined in the relevant section of the Code from which a four character defect code, e.g. CKIR - cracking around ironwork or POTH = pothole, must be selected. In addition, the general purpose codes OTHR = other or NONE = none are always available. OTHR is used together with a short text entry to cover unusual defects or situations and NONE can be used either to correct a wrong entry or to record that an inspection has occurred, perhaps in response to a complaint, and no defect is considered to exist.

4.6.11 Actions

Having decided upon the Category of a defect the decision as to the appropriate combination of Immediate, Temporary and Permanent action is made, followed by the entry of any relevant text when prompted. In this way a record of location, full details of work carried out and recommendations for future repairs can be made. It is important to record

(i) enough information for the defect to be easily found
(ii) the exact nature of the repair
(iii) details of any materials necessary
(iv) the urgency if not covered by the Category 1 and 2 response times.

4.6.12 TREAT Codes

To simplify the input of text, the use of 'TREAT' Codes has been included in the system. TREAT codes are shorthand (3 character) abbreviations of treatments preceded by a '/' to distinguish them from other codes used by RMMS e.g. /RFX - refix or /PVN - provide new. A short standard list has been drawn up

and suggested codes for each activity are included in Part 3 of this Manual. The use of TREAT codes not only provides a quicker method of data entry for the inspector but with careful design can supply the mechanism for back analysis of defect information. For example, all incidences of footway patching or relaying kerbs over a given time period can be grouped together. The same field can also be used to link information held in other databases, particularly in costing and treatment systems, by defining a linking relationship.

4.6.13 Fast Action Listings

At the end of each days work, data is automatically transferred to the computer holding the database system and actions to be carried out within 24 hours should be immediately printed out for execution. Where access to the 'host' machines is not possible at short notice, a printer can be connected directly to the data capture device and Category 1 listings (Fast Action Listings or FAL) produced. Before being accepted by the database, all data is validated and a check is made to see that all Links and Sections in the data exist in the network module.

4.6.14 Record Current Condition

When carrying out surveys, an inspector should always make a record of the existing highway condition which prevails at the time of the survey. A defect should not be ignored because he knows it has been recorded previously or is awaiting action already initiated. A 'snapshot picture' of the condition at that particular time is in effect taken. All defects are automatically 'date and time stamped' by the collection software. If a defect is not rediscovered it is considered to have been dealt with. However, if a defect is on a works order it would be kept alive.

4.6.15 Match/Unmatch

To account for duplicate recording of the same defect, RMMS includes a match/unmatch facility. Defects having the same Activity Code and Defect Code occurring in the same cross-sectional position and within 5 metres of each other are assumed by the system to be the same defect and the later one supersedes the previous one in the database. All details attached to the old defect are automatically transferred to the new one. If this is not the case then the database manager can manually over-rule the system and unmatch the linked defects. Conversely, if the chainage difference was greater than 5 metres or if different Activity or Defect Codes have been used, then a manual matching facility exists. At the same time a defect can be recategorised if desired but it should be noted that if changing from Category 1 to Category 2, any recorded Immediate or Temporary actions will be lost as they are not appropriate for the latter Category. See also Diagram 2 (Chapter 4.12).

4.6.16 No Relationship to Exact Inventory Item

When a defect is recorded, it is currently not linked to the specific inventory item although in some cases e.g. a damaged sign, there is enough information to do so. A history of inspection carried out and the items covered is kept within the database (see Figure 17, Chapter 4.12) and if necessary in the future the information can be related if desired and appropriate. It is important not to preclude the recording of a defect because of discrepancies in the inventory or out of date information. The purpose of RMMS inspections is to record and rectify defects.

4.6.17 Defect Listing

The defect information is extensively used by the Works Order Interface described further in Chapter 4.8 below, and various defect listings can be obtained directly from the inspection module. These can be selected by such parameters as location, category, outstanding work and serial number. Typical details which can be displayed for an individual defect are shown in Figure 18 (Chapter 4.12).

4.6.18 Inspection Audits

Details of Inspection Audits are given in Chapter 4.9 below.

4.7 Cyclic Maintenance

As well as recording defects from inspections the RMMS requires a record of cyclic maintenance work carried out. As previously explained in Chapter 4.5, the system calculates any cyclic work which is due and when combined with the cyclic maintenance history, a projection of work due can be achieved. Before the first schedule of work due under cyclic maintenance can be produced by the system it is necessary to input the date of the last appropriate cyclical work and this will need continual updating as work is completed. The relevant information should be fed back onto the database at regular intervals and a new set of projected work dates are automatically computed. Reports similar to Figure 16 (Chapter 4.12) can be produced.

As for inspections, local variations can be agreed for cyclic maintenance works and up to three such variations can apply to a single section.

Use of the cyclic maintenance modules provides information for the forward planning of tasks and resources and where work is contracted out, useful information to assist with estimating can be provided.

Enhancements to the cyclic maintenance module of RMMS have been made in the amendment sets and further details can be found in Chapter 4.10.

4.8 The Works Order Interface

The Works Order Interface (WOI) in RMMS provides the ability to review defects recorded from time to time and group them together so that relevant works orders can be issued to rectify them. RMMS does not provide a works ordering system but is designed to interact with the variety of such systems already used by MAs.

4.8.1 Grouping of Defects

Defects can be grouped together within a Highways Agency expenditure code by maintenance Activity, Defect Code, or TREAT Code (Chapter 4.6). They can then be reviewed in an aggregated form to determine whether a sufficient quantity of outstanding work has accumulated to merit raising a works order (See Figure 19, Chapter 4.12). By applying unit costs, which are not currently included in RMMS, to the total quantities of each classification of work the estimated cost of the order can be determined.

4.8.2 Immediate Works Orders

As well as the normal works order produced by the interface (described below) the need to produce orders for work which cannot wait or which have already been undertaken has been recognised. When defects are rectified at the time of the inspection as e.g. the replacement of part of a lighting unit, it will be necessary in some cases to recharge the cost of materials used. Also, because of the urgency of dealing with Category 1 defects, an instruction to carry out repairs may have been produced using the FAL routines before the defect has been loaded onto the database. In these cases, the system allows an 'Immediate Works Order' to be raised manually so that urgent repairs can be instigated. The numbers and details of the orders can then be fed back to the system either at the time data is loaded into the database or at a later date. In this way a record of treatment undertaken is maintained and the mechanism for recharging the cost, provided.

4.8.3 Programmable Defects

The major function of the WOI is to deal with the Category 2, programmable, defects. The 'Defect Review' facility mentioned above can be used to group together similar defects so that the total quantity and status of each can be assessed and an engineering decision made regarding the treatment required. A review of all defects recorded on works orders can also be carried out as in Figure 20 (Chapter 4.12). Details of the works order can then be input e.g. number, cost code, estimated cost etc. The system attaches all selected defects to that works order which can then be issued. At this point a MA can implement their normal procedures for dealing with the work. An example of the information contained on an RMMS Works Order is given in Figure 21 (Chapter 4.12).

4.8.4 Work Completed

When work has been completed it is necessary to feed back information, including completion date and actual cost, through the WOI so that defects can be marked as rectified. At this point it is possible to exclude defects which were on the works order but have not been repaired for some reason and return them to the general 'pool' so that they can be re-allocated at a later date.

4.8.5 Links to IHMS

Further information about Works Orders and the link between RMMS and IHMS can be found in Chapters 4.10 and 4.11 below.

4.9 Audits

4.9.1 Types

There are currently 8 inspection audits and 1 inventory audit within RMMS. These are known as;

A Audit = Analysis of defect and actions by Activity
B Audit = Analysis of defects and actions within an Activity
C Audit = Analysis of time to complete actions by Activity
D Audit = Analysis of time to complete actions within an Activity
E Audit = Electrical audit (inventory)
F Audit = Analysis of defects for Point and Continuous Inventory items
I Audit = Analysis of Inspections
M Audit = Analysis of Cyclic Maintenance Activities
T Audit = Sub sub item.

The **A Audit** produces a list of the number of defects recorded for each Activity over the selected range of roads, with a breakdown of the percentages of Immediate, Temporary, Permanent Category 1 and Permanent Category 2 actions for each. An example of an A Audit is given in Figure 22.

The **B Audit** produces the same information as the A Audit but performs the analysis on each Defect Code within a single Activity. An example of a B Audit is given in Figure 23.

The **C Audit** displays two tables. The first shows a breakdown of 24 hour actions, whether they have been completed and whether they were on time or late by 0 - 6 days, 7 - 28 days or over 28 days. The second table covers actions required between 28 and 91 days showing whether completed, completed on time and completed 0 - 27, 28 - 90 or over 90 days late. An example of a C Audit is given in Figure 24.

The **D Audit** performs an identical function to the C Audit for the defects within a selected Activity. An example of a D Audit is given in Figure 25.

The **E Audit** is currently the only audit produced from the inventory module. In addition to the actual audit, further routines may be included to identify where details of the electrical component of the appropriate items, Lighting Point (LP), Safety Bollard (SB), Signs (SG) and Traffic Signals (TS), have not been input to the database. An example of a typical Electrical Error Report was given earlier as Figure 12.

The **E Audit** report shows a breakdown of the chargeable kilowatts in each operating hours group split by ownership and summed for each section of road covered by the report. An example of an E Audit is given earlier in Figure 13. This is the only audit which is not date related.

The **F Audit** provides an analysis of the number of items and defects for both ‘Point’ and ‘Continuous’ inventory items. An index of either Defects per item or Defects per kilometre is calculated. An example of an F Audit is given in Figure 28.

The **I Audit** displays a record of when inspection surveys have been conducted and whether they were on time, 1-27, 28-90, 91-182 or greater than 183 days late. An example of an I Audit is given in Figure 26.

The **M Audit** covers the Cyclic Maintenance Activities of RMMS. The report shows the number of sections requiring Cyclic Maintenance and the frequency specified by the Code of Practice. The expected frequency, taking into consideration any local variations, and actual frequency are compared and the difference between the two is given. An example of an M Audit is shown in Figure 29.

An example of a **T Audit** is given in Figure 27 and its purpose is to monitor expenditure against the IHMS sub sub codes. The amount allocated to each expenditure code can be input into the system and the amounts expended and already allocated are obtained from the WOI. A balance of the remaining amounts for each code is also shown.

4.9.2 Managing Information

It will be necessary to produce all the audit reports for submission to the Highways Agency at regular intervals. In addition, the routines can be run at any time and can provide useful management information relating to RMMS operations. It is possible to check for example:

(i) whether any particular inspection team is recording a higher proportion of Category 1 defects than others,

(ii) whether the number of defects being recorded by different teams is similar. Occasional resurveys over the same lengths are useful to assess the nature of any problems,

(iii) whether the required dates for action are being met. This will assist an engineer to judge whether the work is not being done because of inefficiency or because of legitimate practical constraints,

(iv) whether there is a need to discuss a Local Variation with the Regional Office because of the abnormally high incidence of a particular defect such as blocked gullies.

Ultimately the performance of different MAs could be compared.

Annex 4.9.1

Notes for Guidance on I-Audit

1 General

I-Audit provides summary information on the number of Safety and Detailed Inspections which have been performed on a selected part of the network and for a selected time period. These notes have been produced in order to provide an explanation of the values calculated and reported within the Audit.

The I-Audit is notionally divided into six parts. These are:

Part 1 - Summary Safety Inspection Data;
Part 2 - Weekly Safety Inspection Data;
Part 3 - Monthly Safety Inspection Data;
Part 4 - Summary Information on Detailed Intervals;
Part 5 - Summary of Detailed Inspections for all activities;
Part 6 - Table of Detailed Inspections by activity.

2 Part 1 - Summary Safety Inspection Data

2.1 General

This part provides a summarised report of the Safety Inspections carried out, on the selected network, to enable performance to be monitored. Part 2 and Part 3 provide more detailed analysis of sections that are inspected weekly and monthly respectively.

2.2 Total Number of Sections

Total of sections open for the selected network at any time during the Audit period. These are the sections on which the Audit is based.

2.3 Number of Sections with no Safety Intervals Set

Sections which have not had Safety Inspection Intervals set. The safety Inspection Interval determines how often that section should be inspected. Valid Safety Inspection Intervals are W - Weekly, M -Monthly and N - Not Appropriate. All sections should have a Safety Inspection Interval set. This is done via the network maintenance facility.

2.4 Number of Sections Checked with Safety Intervals

The number of sections for which Safety Inspections are required to be carried out; i.e. Safety Inspection Interval of ‘W’ and ‘M’.

2.5 Number of Sections with no Safety Inspections Recorded

Sections with no Safety Inspections recorded within the Period of Audit.

3 Part 2 - Weekly Safety Inspection Data

3.1 General

This part provides detailed analysis of sections with a Weekly Safety Inspection Interval.

3.2 Number of Sections with a Weekly Safety Interval

Sections which qualify for Weekly Inspection; ie Safety Inspection Interval = 'W'.

3.3 Number of Weekly Safety Records Checked

Total number of Weekly Inspections carried out within Audit Period.

3.4 Number of Weekly Safety Inspections Expected

Total number of Weekly Safety Inspections which should have been performed within the Audit Period.

3.5 On Time

Total number of Weekly Safety Inspections which were performed within 7 days of the preceding inspection.

3.6 < 3 days late

Total number of Weekly Safety Inspections which were performed on the 8th or 9th day after the preceding inspection.

3.7 3-7 days late

Total number of Weekly Safety Inspections which were performed between 10 and 14 days (inclusive) after the preceding inspection.

3.8 > 7 days late

Total number of Weekly Safety Inspections which were performed over 14 days after the preceding inspection.

3.9 Total Checked

Total number of Weekly Safety Inspections that were checked for timeliness.

3.10 Number of Sections With Inspections Overdue

Total number of sections with a Weekly Safety Inspection Interval where, at the end of the Audit Period, a Safety Inspection was overdue; i.e. the last Safety Inspection was more than 7 days prior to the end of the Audit Period.

This figure does not include any sections which have not had any Safety Inspections carried out at all within the Audit Period. This figure is reported in Section 2.5.

4 Part 3 - Monthly Safety Inspection Data

4.1 General

This part provides detailed analysis of sections with a Monthly Safety Inspection Interval set.

4.2 Number of Sections with a Monthly Safety Interval

Sections which qualify for Monthly Inspection; ie Safety Inspection Interval = 'M'.

4.3 Number of Monthly Safety Inspection Records Checked

Total number of Monthly Safety Inspections carried out within Audit period.

4.4 Number of Monthly Safety Inspections Expected

Total number of Monthly Safety Inspections which should have been performed within the Audit Period.

4.5 On Time

The schedule for monthly inspections is calculated by taking the inspection prior to the audit period and adding calendar months to the date of that inspection. For example, if the last inspection was on the 12 December then inspections would be due on 12 January, 12 February etc.

This has been done to emulate current working practices whereby the date of the monthly inspections are pre-set at the beginning of the financial year.

4.6 < 14 days late

Total number of Monthly Safety Inspections which were performed up to 13 days after the day when the inspection should have been performed.

4.7 14-28 days late

Total number of Monthly Safety Inspections which were performed between 14 and 28 days (inclusive) after the day the inspection should have been performed.

4.8 > 28 days late

Total number of Monthly Safety Inspections which were performed over 28 days after the day that the inspection should have been performed.

4.9 Total Checked

Total number of Monthly Inspections which were checked for timeliness.

4.10 Number of Sections with Inspections Overdue

Total number of sections with a Monthly Safety Inspection Interval where, at the end of the Audit Period, a Safety Inspection was overdue. Sections where there is more than one calendar month between the end of the audit period and the date that the last inspections was expected, will contribute to this count.

This will not account for sections which have had no Monthly Safety Inspections at all within Audit Period. This figure is reported in Section 2.5.

5 Part 4 - Summary Information on Detailed Intervals

5.1 General

Parts 4, 5 and 6 analyse Detailed Inspections. Part 4 provides information about which sections have had Detailed Inspection Intervals calculated. Part 5 analyses Detailed Inspections that have been carried out for all activities. Part 6 analyses Detailed Inspection performance by Activity. This is to enable performance to be monitored against the Code of Practice Inspection Intervals.

5.2 Total Number of Sections with no Detailed Interval Calculated

Total number of Sections which have not had a Detailed Inspection Interval calculated. The Detailed Inspection Interval is determined according to the Section Class and Inventory Items present. An action should be taken to calculate Inspection Intervals for all newly created sections using the Default Interval calculation process.

5.3 Total Number of Sections with Default Intervals Calculated

Total number of Sections which have had a Detailed Inspection Interval calculated.

6 Part 5 - Summary of Detailed Inspections for all activities

6.1 General

The purpose of this part of the audit is to provide an overall picture of the effectiveness of the Detailed Inspection programme.

6.2 Number of Sections with no detailed Inspections Recorded

Number of sections which have not been inspected for any Activity within the period.

6.3 Number of Section Activities not done in Period

This is the summation of all the activities, by Section which could have been inspected, but were not inspected within the Audit Period.

A section which qualifies for 20 activities, but has not been inspected at all within the Audit Period would contribute 20 to this count (not 1).

The count includes all activities valid for each Section even if they were not due to have been carried out within the Audit Period. For example, if the selected Audit Period is 12 months and a Section is valid for an Activity which has an Inspection Interval of six months, then the Section will be counted in this total. Additionally for an Activity with a five year Inspection Interval for the same Audit Period, the section will still contribute to the total. This inevitably leads to an overestimate of the eligible total for some activities.

6.4 Number of Sections with at least one detailed Inspection in Period

Total number of Sections which have been inspected at least once (for any activity) within the period.

6.5 Number of Section Activities Overdue in Period

This is the summation of all the Activities, by Section, which were overdue at the end of the Audit period, i.e. the Interval between the last date on which the Activity was inspected and the end of the Audit Period was greater than the required Inspection Interval.

A section for which 10 activities were overdue at the end of the Audit Period would contribute 10 to this count (not 1).

7 Part 6 - Table of Detailed Inspections by Activity

7.1 General

This part of the audit allows the Detailed Inspection programme to be monitored by Inspection Activity.

Percentage Late in the following calculations is defined as:

100* (Period since last Inspection - Inspection Interval) / Inspection Interval

7.2 On Time

Total number of Detailed Inspections done on time for an Activity. A Detailed Inspection is deemed to be late if the time period between two inspections for that Activity is greater than the Interval specified for that Activity within the Code of Practice.

7.3 < 50% late

Total number of Detailed Inspections which are less than 50% late for an Activity.

7.4 < 110% late

Total number of Detailed Inspections which are between 50% and 110% late.

7.5 > 110% late

Total number of Detailed Inspections which are over 110% late.

7.6 Expected

By dividing the length of the audit period by the inspection interval of the activity and summing for all sections to which the activity applies, the number of times the activity should have been inspected over all the sections is calculated.

7.7 Total

Total number of all Detailed Inspections done for an Activity.

7.8 Overdue

This is the total number of Sections for which the Activity was overdue at the end of the Audit Period, i.e. the interval between the last date on which the Activity was inspected and the end of the Audit Period was greater than the required Inspection Interval.

7.9 < 50% late

This is the total number of Sections for which the Activity was overdue at the end of the Audit Period, but by less than 50% of its required Inspection Interval.

7.10 < 110% late

This is the total number of Sections for which the Activity was overdue at the end of the Audit Period, but by between 50% and 110% of its required Inspection Interval.

7.11 > 110%

This is the total number of Sections for which the Activity was overdue at the end of the Audit Period, but by more than 110% of its required Inspection Interval.

7.12 Eligible

The total number of Sections that are eligible for this Activity. A Section will be included if the selected Audit Period is greater than the Inspection Interval for an Activity. For example, if the selected Audit Period is 12 months and a Section is valid for an Activity which has an Inspection Interval of six months, then the Section will be counted in this total. Also, for an Activity with a five year Inspection Interval for the same Audit Period, the section will not contribute to the total. This leads to an underestimate of the Eligible Total for some Activities.

This column can be used to gauge how many of the sections on the network should be inspected for any given Activity within the limitations listed above. If the number of sections eligible for a commonly occurring Activity such as MC, is low compared to the total number of sections, it may indicate that the "Activity Defaults" have not been run for all sections. Under normal circumstances the Eligible Total should approximately equal the total number of sections for an Activity such as MC.

7.13 Never Inspected

This is the total number of sections for which the Activity is valid, but which have not been inspected for that Activity at any time up to the end of the Audit Period.

This column is to be used to determine whether some sections have been overlooked for inspections. For activities such as MC, this column should show a low figure under normal circumstances, indicating that sections have been regularly inspected. Conversely, a high figure would suggest that there may be a problem with MC inspections.

4.10 Enhancements to RMMS

4.10.1 Introduction

Since RMMS was released and through feedback from users, several minor areas where enhancements are desirable have been identified. So that these can be introduced into the system, arrangements have been made with the User Groups of each of the database systems. Host MAs have been appointed by each group to ensure that the enhancements contained in the Amendment Sets are implemented to the Highways Agency's specification.

4.10.2 Amendment Set V (1990)

4.10.2.1 General

There were four new areas addressed by this set of amendments (Ref 12);

(i) inventory item ownership,
(ii) merging and splitting sections,
(iii) Works Orders for cyclic maintenance,
(iv) archiving of completed defects.

4.10.2.2 Inventory Ownership

Situations exist where inventory items within a section of trunk road are not the responsibility of the Highways Agency and vice versa. To enable these to be recorded on the same database, an additional field of 'ownership' was added to the attributes file discussed in Chapter 4.4. It may not be necessary to complete this field for every item if a default of Highways Agency ownership is assumed. Only county, borough or privately owned items need therefore be updated. It is possible to maintain a record of items owned by the Highways Agency which occur on non-trunk roads, as frequently occurs at junctions.

4.10.2.3 Merge/Split Sections

Changes to the national trunk road referencing details highlighted the need for routines to enable future changes to be made. When new sections are created or old sections removed from the network it is necessary to either merge sections together to form new sections or split existing sections into parts. A new feature was introduced to enable changes to be made to the network and adjusts other database information accordingly. It is not just the inventory that was affected, but also defects, survey histories, inspection and cyclic maintenance frequencies.

4.10.2.4 Works Order for Cyclic Maintenance

The original specification for RMMS only covered works orders to rectify the defects found by the surveys etc. It soon became apparent that a method of ordering and recharging cyclic maintenance was needed and Amendment Set V provided this. Additional IHMS expenditure codes for cyclic maintenance were added to the system and the WOI was extended to cover them.

4.10.2.5 Archiving

As the use of the RMMS database progresses the files gradually fill with data for defects which have been rectified by the system and completed works order records. A method of archiving these to free file space was included in the amendments together with procedures for retrieving archived data should it be needed in future. Data collected in RMMS must be kept for a minimum of six years to fulfil legal requirements.

4.10.3 Amendment Set VI (1991)

4.10.3.1 General

There were seven new areas addressed by this set of amendments, (Ref 16);

(i) compatibility with IHMS,
(ii) amendments to resolve double counting of inventory and inspection data,
(iii) the addition of 2 new audits and an Audit Analysis File,
(iv) road stud inspection amendments,
(v) the addition of an Inventory Interface File,
(vi) partial inspections by cross-sectional position,
(vii) the sub-categorisation of Cat. 2 defects.

4.10.3.2 Compatibility

The Integrated Highway Maintenance System (IHMS), part of the Highways Agency's Network Information System (NIS), is to be used by all MAs to submit bids for funds and technical approval of schemes to maintain its motorway and all purpose trunk roads. It will also be used by MAs to submit details of yearly maintenance outturn costs. Module 1 (IHMS1) of the system was been introduced in 1991 for bids and outturns for the financial year 1992-93. This computerised system replaced the paper based TR121A System. Further modules IHMS2/3 now exist. (Ref 11)

4.10.3.3 Road Part

The basic referencing unit for IHMS is the Road Part. This is a motorway or all purpose trunk road, as defined by road classification number within a MA's area of responsibility. The relationship between a Road Part and CHART Link/Sections is shown in Diagram 3 (Chapter 4.12).

4.10.3.4 Sub Sub Item

The IHMS sub sub item code identifies the various types of work for which bids may be made for a given Road Part. Sub sub item has a three tier structure comprising item code, sub item code and sub sub item code. For example, sub sub item 02.01.01 refers to the item code 02 (road repair schemes), sub item code 01 (minor carriageway repairs) and sub sub item code 01 (flexible). The WOI has been amended so that Works Orders are raised by a combination of Road Part and sub sub item code.

4.10.3.5 Schemes

There are five discrete values of item code within IHMS against which MAs must bid, each defining a scheme of repair. Three of these schemes are applicable to RMMS;

(i)	Road Schemes	(item code 02)
(ii)	Summary Schemes	(item code 08)
(iii)	Renewal Schemes	(item code 01)

Further details of these are given in Chapter 4.11 below, together with more information on the sources of RMMS related data for input into IHMS.

4.10.3.6 Double Counting

It has been found that when data is collected nationally, double counting of inventory and inspection data can occur when a CHART section is in more than one Road Part. To prevent this, a new inventory ownership field of 'Duplicate' was introduced. Where an inventory item exists in more than one system, as might occur at the boundary of two MAs, i.e. one MA is holding the data for maintenance purposes and a second for emergency situations, the MA responsible for maintenance should set the ownership to 'DTp' and the other MA should use the field 'Duplicate'.

4.10.3.7 Audit Interface File

As well as the new F Audit and M Audit (detailed in Chapter 4.9) an Audit Interface File (AIF) was added. This facility ensures that data from all the Audits are combined into a single file facilitating easy submission to the Highways Agency when requested. When the Audit Interface Files are produced the system will prompt for the MA Code and produce a file for 'DTp' owned items.

4.10.3.8 Road stud Module

For consistency throughout RMMS, the classes of road stud have been standardised as either 'Prohibitory' or 'Warning and Informatory'. The Code of Practice, requires for legal reasons, that when the number of defective, 'Prohibitory' road studs exceed the required standard, they are replaced within 24 hours. An inspector is therefore prompted by the DCD to enter the road stud class at the time of the survey. A Category 1 defect with no temporary action is recorded where a 'Prohibitory' road stud is found to be missing. In the case of a 'Warning and Informatory' stud, immediate action can be taken if necessary and temporary action to fill any cavities should occur within 24 hours. The permanent action (i.e. replacement of the stud), regardless of whether temporary action was taken, need not occur until the loss of reflectivity specified in the Code has been reached i.e. 25% loss on straight lengths or 10% loss on bends.

Permanent action should then be carried out within 3 months of the discovery of the defective road stud which puts the total percentage of defective studs over the appropriate threshold limit. The road stud module keeps track of how many defective studs have been recorded and by comparing this figure with the total quantity in the inventory, identifies the percentage loss of roadstuds. Once the loss exceeds 10% a Road stud report is automatically generated by the system so that an engineer can judge from the distribution of the lost studs whether repair work should take place at that time. The report will continue to be generated until the defective studs have been repaired. Additionally, once the loss exceeds 25%, the system automatically sets the 'required by' date for all roadstuds defects to 3 months from the date of the last inspection. However, the Engineer, having examined the distribution pattern, can again reset the 'required by' date if he does not consider it necessary to replace the road studs. The report can also be run independently as required. (See Diagram 4).

4.10.3.9 Inventory Interface File

An additional routine was added to the database inventory module so that data held can be exported in a standard format, the Inventory Interface File (IIF), for input to other NIS application (e.g. street lighting) or to separate systems. The format of the file is similar to the format of the DCD inventory data file, INVENT, DAT, with three exceptions;

(i) the date fields are different to meet the needs of the new applications i.e. in INVENT.DAT the format is YYMMDD and in the IIF it is DDMMYY,
(ii) offsite entries for items with an electrical component are included in the IIF,
(iii) the menu fields are standard 4 letter codes in the IIF not numeric as in INVENT.DSC.

An example listing of part of an Inventory Interface File is given in Figure 30 (Chapter 4.12).

4.10.3.10 Partial Inspections

The Code requires that every two years a survey is conducted from the central reserve or coned outside lane of 3 lane or wider dual carriageways. During these surveys the other lanes may not be inspected. To distinguish these 'Partial' surveys from 'Normal' surveys an inspector will choose the option OTH (Other at the 'Initiation' prompt on the DCD. A Partial Inspection such as, OTH, PBL and POL would not mean that the whole of the section was inspected. The calculation of the next survey date by the system only occurs therefore if the 'Initiation' was NRM (Normal) which signifies that the whole section was inspected.

It is also possible to limit the raising of Works Orders to selected cross-sectional positions to accommodate defects from this source or to limit the order to those defects within a lane closure.

4.10.3.11 Prioritisation of Category 2 Defects

As previously stated in Chapter 4.6, there are two categories of defect defined in the Code;

(i) Category 1 (Urgent)
(ii) Category 2 (Programmable)

Category 1 defects must be dealt with, either temporarily or permanently, within 24 hours and Category 2 defects are dealt with through Works Programmes. From feedback from users of RMMS, the latter case was considered not to be suitable for all situations and a further facility enabling prioritisation was introduced;

(i) Category 2.1 (high priority)
(ii) Category 2.2 (medium priority)
(iii) Category 2.3 (low priority)

The response times for Category 2.1 and Category 2.2 defects can be locally defined on the database for each Activity, to suit an individual MA's needs. Category 2.3 target treatment times are those defined in Chapter 3.2 of this Manual.

The use of Category 2 prioritisation is optional and if desired, the prompt for these can be suppressed on the DCD by changing the appropriate parameter file (i.e. INSPEC.PAR) which will cause all Category 2 defects to be recorded as Category 2.3.

4.10.3.12 Scheduling Forward to Cyclic Maintenance

In practice, it is sometimes necessary to split a cyclic maintenance activity onto more than one works order e.g. to coincide with lane closures on motorways. A facility was included so that when completing a cyclic maintenance works order, the user can specify whether the 'next maintenance date' should be automatically calculated by the system. To do this, the system prompts the user 'calculate the next maintenance date?' and if 'Yes' is answered the calculation is carried out. If 'No' is entered, it is assumed that further cyclic maintenance for the specified activity and section is still due and the completion date for the activity is not reset.

4.10.3.13 Implementation of Amendment Set VI

In order for the enhancements made in Amendment Set VI to be fully implemented it was necessary for the database to be updated at the same time as the 1991 DCD programs to ensure that the Activity and Defect codes in both parts of the system were compatible. Minor changes to the data file format were also made in the 1991 DCD software. It was also necessary to ensure all works orders raised against the old DTp Expenditure Codes were completed or cancelled to effect a cut-off between the two methods of reporting. All Works Orders completed before the cut-off date retained their original DTp Expenditure Code and those raised and completed after the cut-off date feature the new IHMS sub sub item codes. Those works orders cancelled just prior to the cut-off date needed to be raised again under the appropriate new IHMS codes.

4.10.4 Amendment Set VII (1996)

4.10.4.1 General

There are six new areas addressed by this set of amendments, (Ref 15);

(i) weather and road condition,
(ii) safety patrol requirements,
(iii) dummy inspections,
(iv) changes to C and D Audits,
(v) I Audit 28 day safety inspection amendments,
(vi) insurance claims report.

4.10.4.2 Weather and Road Condition

Recording details of weather and road condition has become mandatory. To achieve this, two new fields of "Weather" and "Road Condition" have been entered to the DCD software and are located after the "INIT" field. This change is included for both Detailed and Safety Inspections.

4.10.4.3 Safety Patrol Requirements

It is a requirement that all Safety Patrols are documented, although this information should not be stored within RMMS. It is suggested that a checklist of key features (e.g. junctions) might be produced on which inspectors indicate the time of passing the feature during the Safety Patrol. Safety Patrol checklist sheets may then be archived and used should third party claims be received.

If a Category 1 defect is discovered during a Safety Patrol then it must be entered into RMMS. To achieve this, the inspector shall enter the defects into the DCD on return to the office. The inspector shall select "safety inspection" as the summary type of inspection in the DCD but then select a new mnemonic "PAT" within the "INIT" field. Defects can then be recorded into the RMMS in a conventional manner.

4.10.4.4 Dummy Inspections

Occasionally inspections cannot be carried out because access to the carriageway is restricted, for example due to major maintenance work. This would result in a misleading interpretation of MA's performance being represented in the I Audit. To address this, inspectors may log a dummy inspection for either a safety or detailed inspection by selecting the mnemonic "DUM" within the "INIT" field of the DCD. The I Audit will record the inspection as undertaken and will show the number of dummy safety and detailed inspections, the percentage of dummy safety inspections to the total number of safety inspections and the percentage of dummy detailed inspections to the total number of detailed inspections.

If a detailed inspection is performed and a defect previously found is not re-found, RMMS records the defect as being rectified. This automatic rectification of defects which are not re-found is **NOT** carried out for dummy inspections.

4.10.4.5 Changes to C and D Audits

Category 2 defects are no longer required to be treated within a defined period, but should be repaired within a planned programme of work.

The C and D Audits are to remain within the system so that MAs may assess the progress of defect treatments. Failure to achieve the target treatment date does not constitute a non-compliance for Category 2 defects.

4.10.4.6 I Audit 28 day Safety Inspection Amendment

The frequency of monthly safety inspections has altered from calender month to 28 days. The I Audit has been amended accordingly.

4.10.4.7 Insurance Claims Report

An Insurance Claims Report (Figure 31) has been provided to list the history of inspections, defects and actions for a specific length of road between user defined dates. The report consists of 2 parts, a summary report and an inspection defect report which may be run independently or together.

The summary report identifies all inspections meeting the user criteria. Details listed include the activity, date of inspection and initials of the inspector.

The inspection defect report includes the defects, locations and where appropriate works orders pertaining to a particular user defined inspection.

4.11 Relationship Between RMMS And IHMS

4.11.1 Bid Types

Diagram 5 shows the 5 bid types present in IHMS and from this it can be seen that only the following have a relationship to RMMS

- (01) Renewal Bids
- (02) Roads Bids
- (08) Summary Bids

4.11.2 Renewal Bids

This type of bid covers Major and Intermediate Capital Works Schemes with a cost exceeding £100,000. The bids are related to the nature of the scheme and at the time they are compiled the information held in RMMS will not relate to the proposed works. A possible exception may be where existing items are to be re-used and in this instance ad hoc database queries may provide relevant information. Full details of the items required by the bid are listed in Annex 2.7.1 of the Trunk Road Maintenance Manual: Volume 1 (Ref. 11).

4.11.3 Road Bids

Generally a Road Bid will include bids for cyclic maintenance activities and for the rectification of RMMS Category 1 defects. They are built up from the list given in Annex 2.7.2 of the Trunk Road Maintenance Manual: Volume 1 (Ref. 11). for each Road Part allocated to a MA. Not all items on the list are contained in RMMS but for those that are the required input is either

(a) an estimated cost for the projected financial period,
(b) an inventory quantity.

The T Audit for the previous financial year will provide a record of expenditure for that period and can be used to assist in establishing the required bid amounts.

Annex 4.11.1 shows the required inventory/network information which can be obtained from the various schedules or from ad hoc database enquiries.

4.11.4 Summary Bids

Summary Bids are required for each Road Part allocated to a MA and can include capital expenditure for small schemes, where the cost of the works is less than £100,000, together with programmes of work generated by RMMS to rectify Category 2 defects. Full details of the items required by the bid are listed in Annex 2.7.5 of the Trunk Road Maintenance Manual: Volume 1 (Ref. 11).. The quantities requested are derived from the proposed amounts of new items to be provided or can be estimated by using previous years data obtained from the RMMS Audit routines.

4.11.5 Monitoring Outturn

When budget amounts have been allocated for each sub sub item code they can be entered into the database and the T Audit can be run at any time to provide a breakdown of Actual Cost, Committed Expenditure and Remaining Balance for each code.

For Renewal Schemes, no cost information is directly applicable to RMMS defects although these will be rectified when the works are carried out. To remove these from the RMMS database and provide an audit trail of repair, it is necessary to raise a works order under the bucket code 01.00.00 which will be zero costed.

Summary schemes can be raised for one of two reasons

a) to correct RMMS Cat 2 defects (designated 'Cat 2 Schemes')
b) for small improvement schemes of value less than £100,000 (designated 'Non Cat 2 Schemes').

The defects corrected by 'Cat 2 Schemes' are covered by raising works orders for each relevant sub sub item code and defects for 'Non Cat 2 Schemes' are, as for Renewal Schemes, zero costed against the bucket code 08.00.00.

Works Orders for Road Schemes, which cover Cat 1 defects and Cyclic Maintenance, are raised directly against the appropriate sub sub item code.

Annex 4.11.1

Relationship between RMMS and IHMS

Sub Sub Item Code	RMMS Inspection Activity	Required Inventory/Network Information
02 01 01	MC	
02	CM	
02 01	FC	FW area + CT area
02	KC	KB length + CH length
03 01	CG	
02	GP PD PG 65	
03	GC	GY number + CP number +IN number
04	64	(GY number X freq) + (CP number X freq) + (IN number X freq)
05	DI	DI length
06	66	DI length to be cleansed
07	FD	
08	BP CV	
09	AI AP AS FL	
04 02	FB FF FN FT	SF length + PR length + RW length
02	BF	(FB length (type < > WOOD))+ (PR length (type < > TIMB))+
03	BT	(FB length (type = WOOD))+ (PR length (type = TIMB))
05 01	GA	
02	67	VG maintained area (minus length for 1m swathe) X freq
03	48	VG length X freq
04	69	(total maintained area will assist)
06 01	HN HY HX	
07 02	70	
03	70	
04	72	
05	72	
06	73	
07	73	
08	71	
09	74	
10	75	
08 01	SE SG SM SS 76 77	
02	RM SR	
03	RC RS	RS number
09 01	TA TD TE TM TS 80	TS number + (DL number (TRCO only))
02	78 79	TS number

Sub Item	Sub Code	RMMS Inspection Activity	Required Inventory/Network Information
02	10 01	SL	(lighting schedule will assist)
	02	LP 81	(lighting schedule will assist)
	03	LE	(lighting schedule will assist)
	04	82	Number SLI lamps X freq
	05	84	Number SOX lamps X freq
	06	85	Number SON/MBF lamps X freq
	11 01	CA CB CI CX CF CY CE CZ CO 83	
	16 01	87	CW (Urban) length X freq
	02	87	CW (Rural) length X freq
	03	88	
	04	86	CW (Urban) length X freq
	05	86	CW (Rural) length X freq
	06	89	
	07	90 SV	
	08	92	CW length X freq (normally 6)
	09	92	CW length X freq (normally 12)
	10	93	

4.12 Figures and Diagrams

```
CLASS/INDEX REPORT         Link : 4400M1   2  All Sections
================================================================================

Class/Index     Length

  D3M R*        45256m
  S2M R         10932m

================================================================================
End of Listing
================================================================================
```

Figure 1 - Carriageway Report

```
NETWORK REPORT FOR LINK                        File : FIG2.OUT
================================================================================
Link Identifier : 4400M1   2
Description     : M1 MOTORWAY NORTHBOUND FROM JUNC 30(BARLB'GH) TO JUNC 38(HAIGH)

   Region     :   9909     Road Type     : M1      No. Of Sections : 61
================================================================================

NETWORK REPORT FOR SECTION                     File : FIG2.OUT
================================================================================

Link Identifier : 4400M1   2
Section No.     : 01
Description     : MP 239/9 (J30 ENTRY SLIP) TO MP 241/9 (COUNTY BOUNDARY)

 Inspection Cat. : 1          Class/Index    : D3M R*       Length (m)     :2045

    Start Node :30102         Start Northing :37750        Start Easting    :44716
    End Node   :14115         End Northing   :37943        End Easting      :44780

Speed Limit : 70 mph    Division : *         Cons. Agent     : 7915   Parish : *
District    : 1000      Agent    : 4400      Agent Sub. Org  : *      Depot  : *
Status      : Open                           Date Opened     : *

----------------------------------------

Link Identifier : 4400M1   2
Section No.     : 02
Description     : MP 241/9 (COUNTY BOUNDARY) TO MP 242/1 (WOODALL ENTRY SLIP)

 Inspection Cat. : 1          Class/Index    : D3M R*       Length (m)     :201

    Start Node :14115         Start Northing :37943         Start Easting  :44780
    End Node   :90101         End Northing   :37963         End Easting    :44783

Speed Limit : 70 mph      Division : *       Cons. Agent    : 7915    Parish : *
District    : 4415        Agent    : 4400    Agent Sub. Org : *       Depot  : *
Status      : Open                           Date Opened    : *

================================================================================
```

Figure 2 - Network Report

```
FULL INVENTORY LIST         CARRIAGEWAY          Link : 4400M1   2  Section : 14
================================================================================

LINK       SN STRT  END SURF WDTH

4400M1   2 14    0  190 RASH 10.8
================================================================================
FULL INVENTORY LIST          CATCHPIT           Link : 4400M1   2  Section : 14
================================================================================
 LINK       SN CHAN XP

4400M1   2 14   41 RV
     2.        129 RV
     3.        189 RV
================================================================================
FULL INVENTORY LIST       CENTRAL RESERVE       Link : 4400M1   2  Section : 14
================================================================================
 LINK       SN STRT  END XP SURF WDTH

4400M1   2 14    0  190 RV GRSS  4.0
================================================================================
FULL INVENTORY LIST        FILTER DRAIN         Link : 4400M1   2  Section : 14
================================================================================
 LINK       SN STRT  END XP

4400M1   2 14    0  190 RV
================================================================================
FULL INVENTORY LIST           GULLY             Link : 4400M1   2  Section : 14
================================================================================
 LINK       SN CHAN XP TYPE

4400M1   2 14   13 LE FMNT
     2.         29 LE FMNT
================================================================================
FULL INVENTORY LIST        HARD SHOULDER        Link : 4400M1   2  Section : 14
================================================================================
 LINK       SN STRT  END XP SURF WDTH

4400M1   2 14    0   48 L1 RASH  3.1
================================================================================
FULL INVENTORY LIST           KERB              Link : 4400M1   2  Section : 14
================================================================================
```

```
LINK       SN STRT  END XP  MAT TYPE

4400M1   2 14    0   29 LE EXAS NORM
================================================================================
FULL INVENTORY LIST      REF. MARKER POINT       Link : 4400M1   2  Section : 14
================================================================================
 LINK       SN CHAN XP TYPE  IDEN

4400M1   2 14    0 L2 THPC 00140
================================================================================
End of Listing
================================================================================
```

Figure 3 - Full Inventory Report

```
16/02/96          ** 4400M1   2   14  **       Page    1
=========================================================
START NODE: 00140
END   NODE: 00141
LENGTH(M) :  190

TITLE     : MP 252/4 TO MP 252/6

=========================================================

   ITEM                   START  END     XSECT       IDENT
Carriageway.................0  190 (           )
Long. Rd Marks..............0   48 (   4       )
Long. Rd Marks..............0  190 (    5      )
Long. Rd Marks..............0  190 (     6     )
Central Reserve.............0  190 (       8   )
Filter Drain................0  190 (       8   )
Road Studs..................0  190 (    5      )
Road Studs..................0  190 (     6     )
Hard Shoulder...............0   48 (   4       )
Kerb........................0   29 (  3        )
Ref. Marker Point...........0      (    5      ) 00140
Verge.......................0   29 (  3        )
Long. Rd Marks..............0    6 (  3        )
Long. Rd Marks..............0  190 (      7    )
Road Studs..................0  190 (      7    )
Safety Fence................0  190 (       8   )
Road Studs..................0   31 (   4       )
Gully.....................13      (  3        )
Gully.....................29      (  3        )
Road Studs..................31  190 (   4       )
Catchpit....................41      (       8   )
Hatched Rd Mark.............48  190 (   4       )
Catchpit...................129      (       8   )
Catchpit...................189      (       8   )
=========================================================
 End of Listing
=========================================================
```

Figure 4 - Pocket Book

INVENTORY MAP PRINT Input File : FIG5.HNT Listing Date : 16/02/96
Survey Date : 16/02/96 Link : 4400M1 2
Section : 14 From START To END
MP 252/4 TO MP 252/6

Chain	No X Pos	Cross Sectional Position														
		LO	LF	LV	L1	L2	L3	L4	RV	RF	RO	AC	LT	RT	BL	CL	OT
0	..	..	..	LLv	..	RF	..	..	..	..	..	..	..	..	..	..	..
0	..	..	..	KBv	..	..	..	..	..	..	..	..	..	..	..	..	..
0	..	..	..	VGv	RSv	..	..	..	..	..	..	..	..	..	..	..	..
0	..	..	..	3	HSv	..	..	..	..	..	..	..	..	..	..	..	..
0	CWv	..	..	3	LLv	..	..	..	CRv	..	..	..	..	..	..	..	..
0	1	..	..	3	3	LLv	LLv	LLv	FDv	..	..	..	..	..	..	..	..
0	1	..	..	3	3	RSv	RSv	RSv	SFv	..	..	..	..	..	..	..	..
6	1	..	..	LL^	3	2	2	2	3	..	..	..	..	..	..	..	..
13	1	..	..	GY	3	2	2	2	3	..	..	..	..	..	..	..	..
29	1	..	..	KB^	3	2	2	2	3	..	..	..	..	..	..	..	..
29	1	..	..	VG^	3	2	2	2	3	..	..	..	..	..	..	..	..
29	1	..	..	GY	3	2	2	2	3	..	..	..	..	..	..	..	..
31	1	..	..	..	RS^	2	2	2	3	..	..	..	..	..	..	..	..
31	1	..	..	..	RSv	2	2	2	3	..	..	..	..	..	..	..	..
41	1	..	..	..	3	2	2	2	CP	..	..	..	..	..	..	..	..
48	1	..	..	..	HS^	2	2	2	3	..	..	..	..	..	..	..	..
48	1	..	..	..	LL^	2	2	2	3	..	..	..	..	..	..	..	..
48	1	..	..	..	LHv	2	2	2	3	..	..	..	..	..	..	..	..
129	1	..	..	..	2	2	2	2	CP	..	..	..	..	..	..	..	..
189	1	..	..	..	2	2	2	2	CP	..	..	..	..	..	..	..	..
190	CW^	..	..	..	2	2	2	2	CR^	..	..	..	..	..	..	..	..
190	..	..	..	..	LH^	LL^	LL^	LL^	FD^	..	..	..	..	..	..	..	..
190	..	..	..	..	RS^	RS^	RS^	RS^	SF^	..	..	..	..	..	..	..	..

Section Summary

Item	Total
CARRIAGEWAY	1
CATCHPIT	3
CENTRAL RESERVE	1
FILTER DRAIN	1
GULLY	2
HARD SHOULDER	1
KERB	1
REF. MARKER POINT	1
HATCHED RD MARK	1
LONG. RD MARKS	5
ROAD STUDS	5
SAFETY FENCE	1
VERGE	1
No. of items in this section	24

Figure 5 - Map Print

```
INVENTORY DETAILED PRINT   Input File : FIG6.HNT         Listing Date : 16/02/96
Survey Date : 16/02/96     Link : 4400M1   2
    Section : 14 From START To   END
MP 252/4 TO MP 252/6
================================================================================
CARRIAGEWAY

    Start Chainage    : 0
    End Chainage      : 190

    SURFACE           : ROLLED ASPHALT
    WIDTH(M)          : 10.80
================================================================================
CATCHPIT

    Chainage          : 41              Cross Sec. Posn.  : RH VERGE
================================================================================

    Chainage          : 129             Cross Sec. Posn.  : RH VERGE
================================================================================

    Chainage          : 189             Cross Sec. Posn.  : RH VERGE
================================================================================
CENTRAL RESERVE

    Start Chainage    : 0               Cross Sec. Posn.  : RH VERGE
    End Chainage      : 190

    SURFACE           : GRASS           WIDTH(M)          : 4.00
================================================================================
FILTER DRAIN

    Start Chainage    : 0               Cross Sec. Posn.  : RH VERGE
    End Chainage      : 190
================================================================================
GULLY

    Chainage          : 13              Cross Sec. Posn.  : LH VERGE

    TYPE              : FMNT

================================================================================

    Chainage          : 29              Cross Sec. Posn.  : LH VERGE

    TYPE              : FMNT
```

```
================================================================================

HARD SHOULDER

    Start Chainage    : 0              Cross Sec. Posn.  : LANE 1
    End Chainage      : 48

    SURFACE           : ROLLED ASPHALT
    WIDTH(M)          : 3.09
================================================================================
```

Figure 6 - Detailed Print

```
INVENTORY SIGNS SCHEDULE     Input File : FIG7.SGN       Listing Date : 16/02/96
Link : 4400M1   2                                Section : 21 From START To END
Section Description : MP 258/3 (DISTRICT BOUNDARY) TO MP 259/5 (J34 EXIT SLIP)
================================================================================

   Link    Sc It X       Diag       Identity Mounting                 Photo
Identifier No Cd S Chan Number Cat.  Number  Hght Mthd Wdth Hght Own  No
========== == == = ==== ====== ==== ======== ==== ==== ==== ==== ==== ==========

4400M1   2 21 SG 3  444 906    INFO 1/2 MILE  1.6 POST  4.6  3.6 DTP
           21 SG 3  799 754V   INFO FLAP      1.3 POST  3.6  1.6 DTP
           21 SG 3  964 823    INFO 300 YDS   1.1 POST  0.7  1.2 DTP
           21 SG 8  976 6022   MATX 4592A     2.0 POST  1.0  1.3 DTP
           21 SG 8  977 6022   MATX 4592B     2.0 POST  1.0  1.3 DTP
           21 SG 3 1053 824    INFO 200 YDS   1.3 POST  0.7  1.2 DTP
           21 SG 3 1150 825    INFO 100 YDS   1.1 POST  0.7  1.2 DTP
           21 SG 3 1197 754V   INFO FLAP      0.8 POST  2.6  0.9 DTP
================================================================================
 End of Listing
================================================================================
```

Figure 7 - Sign Schedule

```
INVENTORY LIGHTING SCHEDULE  Input File : FIG8.LIG       Listing Date : 16/02/96
Link : 4400M1   2                              Section : 21 From START To END
================================================================================

Section : 21 MP 258/3 (DISTRICT BOUNDARY) TO MP 259/5 (J34 EXIT SLIP)
=======
Chan X It  Ident   Col  Mnt. Mnt.      Chrg      Oper Elec Lamp Lamp Lamp No.
     P Cd   Code   Type Hght Brck Dstb Watt Ownr Hour Bord  No  Type Watt Lamp
==== = == ======== ==== ==== ==== ==== ==== ==== ==== ==== ==== ==== ====
 444 3 SG 1/2 MILE       1.6 POST         0 DTP
 799 3 SG FLAP           1.3 POST         0 DTP
 964 3 SG 300 YDS        1.1 POST         0 DTP
 976 8 SG 4592A          2.0 POST         0 DTP
 977 8 SG 4592B          2.0 POST         0 DTP
1053 3 SG 200 YDS        1.3 POST         0 DTP
1150 3 SG 100 YDS        1.1 POST         0 DTP
1197 3 SG FLAP           0.8 POST         0 DTP


Summary for Section 21
======================

Number in each cross sectional position
---------------------------------------
   1   2   3   4   5   6   7   8   9   0   Q   W   E   R   T   Y
   .   .   6   .   .   .   .   2   .   .   .   .   .   .   .   .



Total chargeable Watts for :                                        0
================================================================================
 End of Listing
================================================================================
```

Figure 8 - Lighting Schedule

MARKINGS AND STUDS File : FIG9.SEC

Link : 4400M1 2 Section : 14 Length : 190m DUAL 3 LANE MOTORWAY

==========

Road Studs

Colour	Type	X Section	Total Length	Spacing	Number
White	Catseye	Lane 2	190m	18.00m	11
White	Catseye	Lane 3	190m	18.00m	11
Red	Catseye	Lane 1	31m	9.00m	4
Red	Catseye	Lane 1	159m	3.00m	54
Amber	Stick on/DBLE Sided	R-Edge L	190m	9.00m	22

				Total :	102

Long. Rd Marks

Colour	Type	X Section	Total Len	Length	Gap	Width
White	Single	L-Edge L	6m	0.00m	0.00m	0.20m
White	Single	Lane 1	48m	0.00m	0.00m	0.20m
White	Single	Lane 2	190m	2.00m	7.00m	0.10m
White	Single	Lane 3	190m	2.00m	7.00m	0.10m
White	Single	R-Edge L	190m	2.00m	7.00m	0.10m

Hatched Rd Mark

Type	Cross Section	Total Area
Thermoplastic Screed	Lane 1	568sqm (approx.)

Trans/Spec Marks

None Found

Pedestrian Crossing

None Found

==========

End of listing

==========

Figure 9 - Road Marking Schedule

SURFACE TREATMENT SCHEDULE Input File : FIG10.SEC Listing Date : 16/02/96

Link : 4400M1 2 Section : 14/0000m to /9999m

Carriageway

Type	Total Area
Rolled Asphalt	2052sqm (approx.)

Footway

None Found

Road Studs

Colour	Type	X Section	Total Length	Spacing	Number
White	Catseye	Lane 2	190m	18.00m	11
White	Catseye	Lane 3	190m	18.00m	11
Red	Catseye	Lane 1	31m	9.00m	4
Red	Catseye	Lane 1	159m	3.00m	54
Amber	Stick on/DBLE Sided	R-Edge L	190m	9.00m	22
				Total :	102

Long. Rd Marks

Colour	Type	X Section	Total Len	Length	Gap	Width
White	Single	L-Edge L	6m	0.00m	0.00m	0.20m
White	Single	Lane 1	48m	0.00m	0.00m	0.20m
White	Single	Lane 2	190m	2.00m	7.00m	0.10m
White	Single	Lane 3	190m	2.00m	7.00m	0.10m
White	Single	R-Edge L	190m	2.00m	7.00m	0.10m

Hatched Rd Mark

Type	Cross Section	Total Area
Thermoplastic Screed	Lane 1	568sqm (approx.)

Trans/Spec Marks

None Found

Pedestrian Crossing

None Found

```
Channel
       None Found

 Gully
        Cross Section                   Number

     L-Edge L                              2
                                        ------
                                Total :      2
                                        ------

================================================================================
End of listing
================================================================================
```

Figure 10 - Surface Treatment Schedule

```
QUANTIFIED INVENTORY      Listing Date : 16/02/96      Input File : FIG11.SEC
Range : 4400M1   2/14/START - 4400M1   2/14/END
MP 252/4 TO MP 252/6
================================================================================
Inventory Item                          Number

Catchpit                (CP)              3
Gully                   (GY)              2
Ref. Marker Point       (RF)              1
================================================================================
Inventory Item                  Xsec        Length   Number Records

Central Reserve         (CR)    8          190m              1
                                          ==========        =======
                                           190m              1
                                          ==========        =======

Kerb                    (KB)    3           29m              1
                                          ==========        =======
                            Rural          29m              1
                                          ==========        =======

Long. Rd Marks          (LL)    3            6m              1
Long. Rd Marks          (LL)    4           48m              1
Long. Rd Marks          (LL)    5          190m              1
Long. Rd Marks          (LL)    6          190m              1
Long. Rd Marks          (LL)    7          190m              1
                                          ==========        =======
                                           624m              5
                                          ==========        =======

Road Studs              (RS)    4          190m              2
Road Studs              (RS)    5          190m              1
Road Studs              (RS)    6          190m              1
Road Studs              (RS)    7          190m              1
                                          ==========        =======
                                           760m              5
                                          ==========        =======

Safety Fence            (SF)    8          190m              1
                                          ==========        =======
                                           190m              1
                                          ==========        =======
 ===============================================================================
Inventory Item                  Xsec       Length          Area      Number Recs
 Carriageway             (CW)               190m        2052sq.m            1
                                          ==========  ==============        =======
                                           190m        2052sq.m            1
                                          ==========  ==============        =======

Hard Shoulder           (HS)    4           48m         148sq.m            1
                                          ==========  ==============        =======

          48m         148sq.m             1
                                          ==========  ==============        =======
```

```
Verge                    (VG)    3           29m           58sq.m             1
                                     ===========  ==============        =======
                              Rural          29m           58sq.m             1
                                     ===========  ==============        =======

================================================================================
 End of Listing
================================================================================
```

Figure 11 - Inventory Quantities Schedule

```
Electrical Error Report

================================================================================

 STATUS IT LINK/SECTION   DIST X ID NO.  OP.HRS OWN BOARD  CONFIG

------------------------------------------

 OK     LP 4400A631 0/10   13  5 VN1      DTOD  DTP  YOEL SON1C

 OK     LP 4400A631 0/10   25  5 VN2      DTOD  DTP  YOEL SON1C

 OK     LP 4400A631 0/10   40  4 VN3      DTOD  DTP  YOEL SON1C

 OK     LP 4400A631 0/10   54  5 VN4      DTOD  DTP  YOEL SON1C

 OK     LP 4400A631 0/10   69  4 VN5      DTOD  DTP  YOEL SON1C

 OK     LP 4400A631 0/10   83  5 VN6      DTOD  DTP  YOEL SON1C

 OK     LP 4400A631 0/10  101  4 VN7      DTOD  DTP  YOEL SON1C

 OK     LP 4400A631 0/10  115  5 VN8      DTOD  DTP  YOEL SON1C

 OK     LP 4400A631 0/10  131  4 VN9      DTOD  DTP  YOEL SON1C

 OK     LP 4400A631 0/10  146  5 VN10     DTOD  DTP  YOEL SON1C

 OK     LP 4400A631 0/10  162  4 VN11     DTOD  DTP  YOEL SON1C

 OK     LP 4400A631 0/10  177  5 VN12     DTOD  DTP  YOEL SON1C

 OK     LP 4400A631 0/10  193  4 VN13     DTOD  DTP  YOEL SON1C

 OK     LP 4400A631 0/10  206  5 VN14     DTOD  DTP  YOEL SON1C

 OK     LP 4400A631 0/10  223  4 VN15     DTOD  DTP  YOEL SON1C

 OK     LP 4400A631 0/10  239  5 VN16     DTOD  DTP  YOEL SON1C

 OK     LP 4400A631 0/10  254  4 VN17     DTOD  DTP  YOEL SON1C

 OK     LP 4400A631 0/10  270  5 VN18     DTOD  DTP  YOEL SON1C

 OK     LP 4400A631 0/10  285  4 VN19     DTOD  DTP  YOEL SON1C

 OK     LP 4400A631 0/10  301  5 VN20     DTOD  DTP  YOEL SON1C

 OK     LP 4400A631 0/10  316  4 VN21     DTOD  DTP  YOEL SON1C

 OK     LP 4400A631 0/10  331  5 VN22     DTOD  DTP  YOEL SON1C

 OK     LP 4400A631 0/10  347  4 VN23     DTOD  DTP  YOEL SON1C

 OK     LP 4400A631 0/10  362  5 VN24     DTOD  DTP  YOEL SON1C

 OK     LP 4400A631 0/10  377  4 VN25     DTOD  DTP  YOEL SON1C

 OK     LP 4400A631 0/10  392  5 VN26     DTOD  DTP  YOEL SON1C

 ERROR  LP 4400A631 0/10  408  4 VN27           DTP

 OK     LP 4400A631 0/10  423  5 VN28     DTOD  DTP  YOEL SON1C

 OK     LP 4400A631 0/10  439  4 VN29     DTOD  DTP  YOEL SON1C

 OK     LP 4400A631 0/10  456  5 VN30     DTOD  DTP  YOEL SON1B

 OK     LP 4400A631 0/10  473  4 VN31     DTOD  DTP  YOEL SON1C

 OK     LP 4400A631 0/10  492  5 VN32     DTOD  DTP  YOEL SON1C
```

```
OK    LP 4400A631 0/10  511  4 VN33     DTOD  DTP  YOEL SON1C
OK    LP 4400A631 0/10  529  5 VN34     DTOD  DTP  YOEL SON1C
OK    LP 4400A631 0/10  547  4 VN35     DTOD  DTP  YOEL SON1C
OK    LP 4400A631 0/10  563  5 VN36     DTOD  DTP  YOEL SON1C
OK    LP 4400A631 0/10  578  4 VN37     DTOD  DTP  YOEL SON1C
OK    LP 4400A631 0/10  593  5 VN38     DTOD  DTP  YOEL SON1C
OK    LP 4400A631 0/10  609  4 VN39     DTOD  DTP  YOEL SON1C
OK    LP 4400A631 0/10  624  5 VN40     DTOD  DTP  YOEL SON1C
OK    LP 4400A631 0/10  639  4 VN41     DTOD  DTP  YOEL SON1C
OK    LP 4400A631 0/10  656  5 VN42     DTOD  DTP  YOEL SON1C
OK    LP 4400A631 0/10  670  4 VN43     DTOD  DTP  YOEL SON1C
OK    LP 4400A631 0/10  686  5 VN44     DTOD  DTP  YOEL SON1C
OK    LP 4400A631 0/10  701  4 VN45     DTOD  DTP  YOEL SON1C
OK    LP 4400A631 0/10  720  5 VN46     DTOD  DTP  YOEL SON1C
OK    LP 4400A631 0/10  732  4 VN47     DTOD  DTP  YOEL SON1C
OK    LP 4400A631 0/10  748  5 VN48     DTOD  DTP  YOEL SON1C
OK    LP 4400A631 0/10  763  4 VN49     DTOD  DTP  YOEL SON1C
OK    LP 4400A631 0/10  779  5 VN50     DTOD  DTP  YOEL SON1C
ERROR SG 4400A631 0/10   12  8 *              DTP
ERROR SG 4400A631 0/10   14  8 *              DTP
ERROR SG 4400A631 0/10   15  8 *              DTP
ERROR SG 4400A631 0/10   16  8 *              DTP
ERROR SG 4400A631 0/10  361  8 101/50         DTP
OK    SG 4400A631 0/10  642  1 MRS14    DTOD  DTP  YOEL F2-1
OK    SG 4400A631 0/10  789  8 *        CONT  DTP  YOEL A1-1
OK    SG 4400A631 0/10  790  8 *        CONT  DTP  YOEL A1-1
OK    SG 4400A631 0/10  796  3 *        CONT  DTP  YOEL A1-1
OK    SG 4400A631 0/10  797  3 616      CONT  DTP  YOEL A1-1
ERROR TS 4400A631 0/10  792  3 *              DTP
ERROR TS 4400A631 0/10  792  8 *              DTP
```

Figure 12 - Lighting Validation Schedule

```
E_AUDIT : Electrical Audit
================================================================================

Chargeable Wattage : Lighting Points

 Electricity Board : Yorkshire Electric

   ==== Chargeable Kilowatts in Each Operating Hours Group ====

                 CONT    DTOD    DMEM    DTOM    STOS    SMES
                 STOM    SCPX    LUX1    LUX2    LUX3    UNKN
----------------------------------------
4400A631 0       0.000  28.500   0.000   0.000   0.000   0.000
                 0.000   0.000   0.000   0.000   0.000   0.000
----------------------------------------
Total            0.000  28.500   0.000   0.000   0.000   0.000
                 0.000   0.000   0.000   0.000   0.000   0.000
================================================================================
```

Figure 13 - Electrical Audit

DEFAULT FREQUENCY INITIALISATION Link : 4400M1 2 Section : 14

Road Type : MOTORWAY
Area Type : RURAL
Speed Limit : 70 Mph

Non-Specialist Activities	Date Last Inspected	Frequency/ Interval
AI - Highway Drainage:headwall/aprons		1 Year
CG - Covers gratings frames & boxes	09/09/94	1 Year
FB - Safety fences:metal/concrete		2 Years
FD - Highway drainage:filter drains		5 Years
FF - Safety fences:bolts		2 Years
GA - Grassed areas		Not Scheduled
GC - Highway drainage:gully catchpit&incpt	09/09/94	1 Year
KC - Kerbs edging preformed channels	24/08/95	6 Months
MC - Minor carriageway repairs	24/08/95	6 Months
PD - Highway drainage:piped drainage systems		10 Years
RM - Road markings		2 Years
RS - Roadstuds:general		1 Year
SG - Signs(face/struct/fixings)	03/02/93	2 Years
Specialist Activities		
AP - Highw drainage:specialised equip		Not Scheduled
AS - Highw drainage(sluices/tidal flaps)		2 Per Year
FN - Safety fences:steel-tension		5 Years
RC - Road studs:conspicuity	27/06/95	1 Year
SR - Road markings:skid resist		Not Scheduled
Cyclic Maintenance Activities		
64 - Gullies, Catchpits : Empty	21/08/94	1 Per Year
67 - Grassed Areas : Visibility Cut		1 Year
68 - Grassed Areas : Swathe Cut		1 Year
69 - Grassed Areas : Treat Vegetation		1 Year
70 - Cleansing : Sweep Kerbed Roads	02/08/94	1 Per Year
74 - Cleansing : Scavenge Verge	21/08/94	Not Scheduled
75 - Cleansing : Clean Lay-bys/Hardshoulders		1 Per Year

```
86 - Safety Inspection                                          Not Scheduled
87 - Detailed Inspection (<= 12 Mth Interval)                   Not Scheduled
88 - Detailed Inspection ( > 12 Mth Interval)                   Not Scheduled
89 - Specialist Inspection (<= 12 Mth Intval)                   Not Scheduled
90 - Specialist Inspection ( > 12 Mth Intval)                   Not Scheduled
91 - Lamp Outage Inspection at night (summer)                   Not Scheduled
92 - Lamp Outage Inspection at night (winter)                   Not Scheduled
93 - Inventory Surveys                                          Not Scheduled

Missing Inventory Attributes

SF - Safety Fence                     Date Installed
RF - Ref. Marker Point                Date Installed

================================================================================
End of Listing
================================================================================
```

Figure 14 - Frequency Initialisation Report

```
LOCAL VARIATIONS                                        Listing Date : 16/02/96
Link: 4400M1   2 Section : 90
================================================================================

Activity                                    Inspection Type     Variation

1.  64 - Gullies, Catchpits : Empty         Cyclic                 1
2.  64 - Gullies, Catchpits : Empty         Cyclic                 2
3.  70 - Cleansing : Sweep Kerbed Roads     Cyclic                 1
4.  70 - Cleansing : Sweep Kerbed Roads     Cyclic                 2
5.  74 - Cleansing : Scavenge Verge         Cyclic                 1
6.  74 - Cleansing : Scavenge Verge         Cyclic                 2

================================================================================
 End of Listing
================================================================================



LOCAL VARIATIONS                                        Listing Date : 16/02/96
Link: 4400M1   2 Section : 90
Activity : 64 - Gullies, Catchpits: Empty
================================================================================

          Inspection Frequency : 12 Per Year
          Date Approved        : 16/03/94
          Approval Reference   : YHNMD/JC
          Start Chainage       : 0
          End Chainage : 894
          Variation No.        : 1


================================================================================
 End of Listing
================================================================================
```

Figure 15 - Local Variations Report

```
INSPECTION WORK REPORT         Link : 4400M1   2   Section : 14
================================================================================

                                    Inspection    Date Last  Date Due For
Non Specialist Activities            Interval     Inspected   Inspection

AI Highway Drainage:headwall/apron   1 Year        Has not been surveyed
CG Covers gratings frames & boxes    1 Year        09/09/94    09/09/95   LATE
FB Safety fences:metal/concrete      2 Years       Has not been surveyed
FD Highway drainage:filter drains    5 Years       Has not been surveyed
FF Safety fences:bolts               2 Years       Has not been surveyed
GA Grassed areas                  Not Scheduled    Has not been surveyed
GC Highway drainage:gully catchpit   1 Year        09/09/94    09/09/95   LATE
KC Kerbs edging preformed channels   6 Months      24/08/95    24/02/96
MC Minor carriageway repairs         6 Months      24/08/95    24/02/96
PD Highway drainage:piped drainage  10 Years       Has not been surveyed
RM Road markings                     2 Years       Has not been surveyed
RS Roadstuds:general                 1 Year        Has not been surveyed
SG Signs(face/struct/fixings)        2 Years       03/02/93    03/02/95   LATE

Specialist Activities

AP Highw drainage:specialised equiNot Scheduled    Has not been surveyed
AS Highw drainage(sluices/tidal fl   2 Per Year    Has not been surveyed
FN Safety fences:steel-tension       5 Years       Has not been surveyed
RC Road studs:conspicuity            1 Year        27/06/95    27/06/96
SR Road markings:skid resist      Not Scheduled    Has not been surveyed

Lamp Scout Activities

No record(s) found.
                                     Interval/      Last    Date Due/     Comment/
Cyclical Maintenance Activities      Frequency      Done    Works Order   Chainage

64 Gullies, Catchpits : Empty        1 Per Year  21/08/94
67 Grassed Areas : Visibility Cut    1 Year      Not Done
68 Grassed Areas : Swathe Cut        1 Year      Not Done
69 Grassed Areas : Treat Vegetatio   1 Year      Not Done
70 Cleansing : Sweep Kerbed Roads    1 Per Year  02/08/94
74 Cleansing : Scavenge Verge     Not Scheduled  21/08/94
75 Cleansing : Clean Lay-bys/Hards   1 Per Year  Not Done
86 Safety Inspection              Not Scheduled  Not Done
87 Detailed Inspection (<= 12 Mth Not Scheduled  Not Done
88 Detailed Inspection ( > 12 Mth Not Scheduled  Not Done
89 Specialist Inspection (<= 12 MtNot Scheduled  Not Done
90 Specialist Inspection ( > 12 MtNot Scheduled  Not Done
91 Lamp Outage Inspection at nightNot Scheduled  Not Done
92 Lamp Outage Inspection at nightNot Scheduled  Not Done
93 Inventory Surveys              Not Scheduled  Not Done

Safety Inspection

Safety Inspections to be Carried out every    7 Days plus daily Safety Patrols

Last Safety Inspection on : 14/02/96  Next on : 21/02/96
================================================================================
```

```
End of Listing
================================================================================
```

Figure 16 - Work Due Schedule

```
Survey History          Link : 4400M1   2   Section : 05
================================================================================

    Survey No.   Date   Start Chain   End Chain      Inspector        DSC Used

1.      294    04/03/92     0          9999         FF             Safety DSC
2.     3793    05/03/92     0          9999         JTH            Non-Specialist
3.      609    12/03/92     0          9999         AAR            Safety DSC
4.      924    18/03/92     0          9999         JTH            Safety DSC
5.     1244    25/03/92     0          9999         AAR            Safety DSC
6.     2299    30/03/92     0          9999         JTH            Non-Specialist
7.     1565    01/03/92     0          9999         FF             Safety DSC

================================================================================
End of Listing
================================================================================
```

Figure 17 - Survey History Report

```
INSPECTION DEFECT REPORT      Link : 4400M1   2    Section : 14
FULL  Listing by ACTIVITY, ALL CATEGORIES and ALL DEFECTS
================================================================================

Activity        : MC - Minor carriageway repairs
Item Code       : HS - Hard Shoulder                Category : 2.3
Defect          : BFRT - Blacktop-fretting
Location        :
Serial Number   : AY5021                      Defect Status  : Compltd S-78709
Xsec Position   : Lane 1                      Chainage       :    2
Survey Type     : Non Specialist (Detailed)   How Initiated  : Normal
Defect Date     : 15/12/94                    Survey Time    : 13:22

Defect Attributes
 Area(sq m)      : 35
 Permanent Action

Action Text     : PRI 35 SQ MTR HRA
Work Done       :
Treatment Code  : /PRI                        Required Date  : 15/06/95
                                              Local Required : 15/06/95
                                              Date Work Done : 24/08/95
Works Order No  : Not Yet Set
 ------------------------------------------------------------------------------
 Activity        : MC - Minor carriageway repairs
Item Code       : CW - Carriageway                  Category : 2.3
Defect          : LOCK - Localised cracking
Location        :
Serial Number   : AD5588                      Defect Status  : Compltd S-38914
Xsec Position   : Lane 2                      Chainage       :    4
Survey Type     : Non Specialist (Detailed)   How Initiated  : Normal
Defect Date     : 29/09/92                    Survey Time    : 14:58

Defect Attributes
 Area(sq m)      : 35
 Permanent Action

Action Text     : PATCH 35 SQ MTRS WITH HRA
Work Done       :
Treatment Code  : /PRI                        Required Date  : 29/03/93
                                              Local Required : 29/03/93
                                              Date Work Done : 31/01/94
Works Order No  : Not Yet Set
================================================================================
End of Listing
================================================================================
```

Figure 18 - Defect Listing

```
DEFECT REVIEW                Link : 4400M1   2    Section : 05
================================================================================


Defects  NOT  in any Works Order

Activity  Defect  Category  Number     Status         Summed Attributes

   CX      OTHR       2         1   Outstanding
   MC      BFRT       2         5   Outstanding   Area(sq m)           :    165
   MC      POTH       2         2   Outstanding   Area(sq m)           :      2
   MC      SRJT       2         1   Outstanding   Length(m)            :      3
   RC      REFF       2        17   Outstanding   Number               :     46
   RC      REFF       2        20      Late       Number               :    339

--------------------------------------------------------------------------------

Defects INCLUDED in Works Orders

Activity  Defect  Category  Number     Status         Summed Attributes

   BT      DAMM       1         4      Late       Length(m)            :     12
   CI      OTHR       2         2   Outstanding
   CI      OTHR       2         2      Late
   CS      OTHR       2         1   Outstanding
   CV      SILT       2         3      Late       Length(m)            :     15
   FB      ACCD       1         5      Late       Length(m)            :     74
                                                   Height(m)            :      5
   KC      DAMG       2         2      Late       Length(m)            :      3
   RS      DAMS       1         1      Late       Number               :      1

--------------------------------------------------------------------------------
================================================================================
End of Listing
================================================================================
```

Figure 19 - Defect Review

```
SUMMARY OF ALL WORKS ORDERS                        Road Part : 4400A1
================================================================================

W/O Number    Raised  Def No AC Dfct Link       Sn Chan Xs Cat   Date   Actions

2041/2       20/01/95 AW2651 SL LAMP 4400A1   0  3  225 L2 1   19/01/95       P*
                      AW2652 SL LAMP 4400A1   0  3  249 L2 1   19/01/95       P*
2080/5       03/02/95 AW2767 SL LAMP 4400A1   0  3  183 LE 1   01/02/95       P*
2114/3       22/02/95 AZ2140 SL LAMP 4400A1   0  3   88 LE 1   20/02/95       P*
2177/3       16/03/95 AZ2427 SL LAMP 4400A1   0  2   15 RV 1   15/03/95       P*
                      AZ2788 SL LAMP 4400A1   0  3  249 LE 1   01/05/95       P*
2249/3       21/04/95
2276/4       02/05/95 AZ2787 SL LAMP 4400A1   0  3  148 RV 1   01/05/95       P*
2467         07/08/95 AX5338 MC LOCK 4400A1   0  3    3 L1 2.3 24/11/94       P*
                      AX5339 MC LOCK 4400A1   0  3   56 L1 2.1 24/11/94       P*
                      AX5340 MC LOCK 4400A1   0  3  108 L1 2.1 24/11/94       P*
2479/8       21/08/95 BA4561 BT DAMM 4400A1   0  3  145 LO 1   07/08/95       P*
2494/5       24/08/95 BA2928 SL LAMP 4400A1   0  2   15 RV 1   01/08/95       P*
                      BA2930 SL LAMP 4400A1   0  3   58 LE 1   01/08/95       P*
                      BB2535 SL LAMP 4400A1   0  2  161 RV 1   02/11/95       P*
                      BB2584 SL LAMP 4400A1   0  2  161 RV 1   16/11/95       P+
2566/1       05/09/95
2566/2       05/09/95
2566/3       05/09/95
2739/2       27/11/95 BB2584 SL LAMP 4400A1   0  2  161 RV 1   16/11/95       P*
================================================================================
End of Listing
================================================================================
```

Figure 20 - Works Order Summary

```
WORKS ORDER ISSUE
================================================================================

            *** 2467 ***

Road Part            : 4400A1
Description          : A1T CARRIAGEWAY RESURFACING 1995

Date Issued          : 03/01/96

Date Raised          : 07/08/95

Estimated Cost       :

Sub-sub-item Code    : 020101 - MINOR CARRIAGEWAY REPAIRS - FLEXIBLE

LA Expenditure Code  :

Cross Sections       : All

Work to be Completed : 08/08/95

Work Awarded to      : TMC4

Number of Defects    : 1

Link                 : 4400A1   0
A1 TRUNK ROAD - REDHOUSE INTERCHANGE

Sections/Maintenance Activities                                    Start End
                                                                   Chainages
03 - NORTHBOUND ENTRY SLIP ROAD A1 TRUNK AT REDHOUSE
 ------------------------------------------------------------------------------
WORKS ORDER ISSUE             Link : 4400A1   0    Section : 03
Works Order No : 2467 - A1T CARRIAGEWAY RESURFACING 1995
================================================================================
 Activity        : MC - Minor carriageway repairs
Item Code        : CW - Carriageway
                                          Category : 2.1
Defect           : LOCK - Localised cracking
Location         : SIDE OF L/P MSW 52
Serial Number    : AX5339
Xsec Position    : Lane 1                 Chainage       :   56
Defect Date      : 24/11/94

Defect Attributes

Area(sq m)       : 15

Permanent Action

Recommended Repair : PRI 15 SQ MTRS WITH HRA
```

```
Treatment          : /PRI - Patch using hot rolled asphalt

================================================================================
End of Listing
================================================================================
```

Figure 21 - Works Order

A_AUDIT : Analysis of Defects Roadpart : 4400M1

Period : 01/01/95 to 31/12/95 ACTIONABLE DEFECTS

		--No. of Defects--			--CAT1 Defect/Actions--			
		Total	CAT1	CAT2	Perm Only	Immd Perm	Temp Perm	Imm+Tmp +Perm
	Activity							
BT	Boundary fences:timber	277	277	0	276	1	0	0
CG	Covers gratings frames & boxes	2	2	0	2	0	0	0
CI	Communications equipment:hardware	76	0	76	0	0	0	0
CV	Highway drainage:culverts	34	0	34	0	0	0	0
CX	Comm Equipt:emergency phones	68	1	67	1	0	0	0
FB	Safety fences:metal/concrete	160	152	8	152	0	0	0
FF	Safety fences:bolts	53	48	5	48	0	0	0
FN	Safety fences:steel-tension	68	53	15	53	0	0	0
GA	Grassed areas	2	2	0	2	0	0	0
GC	Highway drainage:gully catchpit&inc	1	1	0	1	0	0	0
KC	Kerbs edging preformed channels	1	1	0	1	0	0	0
MC	Minor carriageway repairs	887	16	871	10	0	6	0
RC	Road studs:conspicuity	1982	1	1981	1	0	0	0
RS	Roadstuds:general	3	3	0	1	0	2	0
SC	Sweeping & cleansing	25	6	19	6	0	0	0
SG	Signs(face/struct/fixings)	15	13	2	11	1	1	0
SL	Road Lighting (Lamps)	15	15	0	15	0	0	0
SS	Road Traffic Signs (Lamps)	35	35	0	35	0	0	0
	Total	3704	626	3078	615	2	9	0

NON-ACTIONABLE DEFECTS

		--No. of Defects--			--CAT1 Defect/Actions--			
		Total	CAT1	CAT2	Perm	Immd Perm	Temp Perm	Imm+Tmp
CG	Covers gratings frames & boxes	1	1	0	1	0	0	0
CI	Communications equipment:hardware	21	0	21	0	0	0	0
CX	Comm Equipt:emergency phones	21	0	21	0	0	0	0
FB	Safety fences:metal/concrete	15	1	14	1	0	0	0
FF	Safety fences:bolts	27	24	3	24	0	0	0

FN Safety fences:steel-tension		40	6	34	6	0	0	0
MC Minor carriageway repairs		5	5	0	0	0	5	0
SL Road Lighting (Lamps)		6	6	0	6	0	0	0
SS Road Traffic Signs (Lamps)		21	21	0	21	0	0	0
	Total	157	64	93	59	0	5	0

Total Defects = 3953 Actionable = 3704

Non-Actionable = 157

Superseded = 92

Figure 22 - A-Audit

B_AUDIT : Analysis of Defects for Activity SG Signs(face/struct/fixings)

Roadpart : 4400M1

Period : 01/01/95 to 31/12/95 ACTIONABLE DEFECTS

Defect		--No. of Defects-- Total	CAT1	CAT2	--CAT1 Defect/Actions-- Perm Only	Immd Perm	Temp Perm	Imm+Tmp +Perm
COFT	Physical condition of fittings	1	1	0	0	1	0	0
ACCD	Accident damage	6	6	0	6	0	0	0
MISS	Missing	2	2	0	2	0	0	0
DAMG	Damaged	1	1	0	1	0	0	0
OTHR	Other	5	3	2	2	0	1	0
	Total	15	13	2	11	1	1	0

Period : 01/01/95 to 31/12/95 NON-ACTIONABLE DEFECTS

Defect		--No. of Defects-- Total	CAT1	CAT2	--CAT1 Defect/Actions-- Perm Only	Immd Perm	Temp Perm	Imm+Tmp +Perm
	Total	0	0	0	0	0	0	0

Total Defects = 15 Actionable = 15
Non-Actionable = 0
Superseded = 0

Figure 23 - B-Audit

C_AUDIT : Analysis of Time to Complete Category 1/2 Actions

Roadpart : 4400M1

24 HOUR ACTIONS (IMMD, TEMP & PERM CAT1's)

Period : 01/01/95 to 31/12/95

	NO OF 24 HR ACTIONS	-------COMPLETED------- ON TIME %	>0-6 DAYS LATE%	7-27 DAYS LATE%	28+ DAYS LATE%	NOT RECORDED AS BEING COMPLETE%
BT Boundary fences:timber	278	4	31	15	2	48
CG Covers gratings frames & boxes	3	33	0	0	0	67
CX Comm Equipt:emergency phones	1	0	0	0	0	100
FB Safety fences:metal/concrete	153	3	22	8	1	66
FF Safety fences:bolts	72	96	0	0	0	4
FN Safety fences:steel-tension	59	97	0	0	0	3
GA Grassed areas	2	0	0	0	0	100
GC Highway drainage:gully catchpit&inc	1	0	0	0	0	100
KC Kerbs edging preformed channels	1	0	0	0	0	100
MC Minor carriageway repairs	21	0	24	14	0	62
RC Road studs:conspicuity	1	0	0	0	0	100
RS Roadstuds:general	5	0	0	0	0	100
SC Sweeping & cleansing	6	0	17	0	0	83
SG Signs(face/struct/fixings)	13	8	0	15	23	54
SL Road Lighting (Lamps)	21	0	0	29	38	33
SS Road Traffic Signs (Lamps)	56	0	5	38	30	27
Total	693	21	19	13	5	42

Total Number 24 Hour Actions = 693

7 DAY/28 DAY/3 MONTH ACTIONS (DEFERRED PERM CAT1's)

Period : 01/01/95 to 31/12/95

ACTIONS	NO OF 7/28 DAY 3 MONTH	-------COMPLETED------- ON TIME %	>0-27 DAYS LATE%	28-90 DAYS LATE%	91+ DAYS LATE%	NOT RECORDED AS BEING COMPLETE%
MC Minor carriageway repairs	11	9	0	18	18	55

SG Signs(face/struct/fixings)	1	100	0	0	0	0
Total	12	17	0	17	17	49

Total Number of CAT-1 7/28 Day 3 Month Actions = 12

ACTIONS (PERM CAT2's)

Period : 01/01/95 to 31/12/95

		-TARGET COMPLETION DATE-				
	NO OF ACTIONS	ON TIME %	>0-90 DAYS LATE%	91-180 DAYS LATE%	180+ DAYS LATE%	NOT RECORDED AS BEING COMPLETE%
CI Communications equipment:hardware	164	48	1	0	0	51
CS Comm Equipt:matrix signals	17	0	0	0	0	100
CV Highway drainage:culverts	34	26	0	0	3	71
CX Comm Equipt:emergency phones	88	64	0	0	0	36
FB Safety fences:metal/concrete	22	64	0	0	0	36
FF Safety fences:bolts	8	38	0	0	0	62
FN Safety fences:steel-tension	49	69	0	0	0	31
MC Minor carriageway repairs	871	0	0	0	0	100
RC Road studs:conspicuity	1981	0	0	0	0	100
SC Sweeping & cleansing	19	0	0	0	0	100
SG Signs(face/struct/fixings)	2	0	0	0	0	100
Total	3255	6	0	0	0	94

Total Number of CAT-2 Actions = 3255

Figure 24 - C-Audit

D_AUDIT : Analysis of Time to Complete Category 1/2 Actions by Activity

Roadpart : 4400M1

Activity : MC - Minor carriageway repairs

24 HOUR ACTIONS (IMMD, TEMP & PERM CAT1's)

Period : 01/01/95 to 31/12/95

	NO OF 24 HR ACTIONS	-------COMPLETED------- ON TIME %	>0-6 DAYS LATE%	7-27 DAYS LATE%	28+ DAYS LATE%	NOT RECORDED AS BEING COMPLETE%
SRJT Surfacing joints	1	0	0	0	0	100
SCRK Single crack	2	0	0	100	0	0
POTH Pothole	17	0	29	6	0	65
BFRT Blacktop-fretting	1	0	0	0	0	100
Total	21	0	24	14	0	62

Total Number 24 Hour Actions = 21

Activity : MC - Minor carriageway repairs

7 DAY/28 DAY/3 MONTH ACTIONS (DEFERRED PERM CAT1's)

Period : 01/01/95 to 31/12/95

	NO OF 7/28 DAY 3 MONTH ACTIONS	-------COMPLETED------- ON TIME %	>0-27 DAYS LATE%	28-90 DAYS LATE%	91+ DAYS LATE%	NOT RECORDED AS BEING COMPLETE%
SCRK Single crack	2	0	0	0	100	0
POTH Pothole	9	11	0	22	0	67
Total	11	9	0	18	18	55

Total Number of CAT-1 7/28 Day 3 Month Actions = 11

Activity : MC - Minor carriageway repairs

ACTIONS (PERM CAT2's)

Period : 01/01/95 to 31/12/95

		-TARGET COMPLETION DATE-				
	NO OF ACTIONS	ON TIME %	>0-90 DAYS LATE%	91-180 DAYS LATE%	180+ DAYS LATE%	NOT RECORDED AS BEING COMPLETE%
LOCK Localised cracking	90	1	2	0	0	97
SRJT Surfacing joints	180	1	0	0	0	99
PLMT Patch-loss of material	3	0	0	0	0	100
POTH Pothole	32	0	0	0	0	100
BFRT Blacktop-fretting	557	0	0	0	0	100
OTHR Other	9	0	0	0	0	100
Total	871	0	0	0	0	100

Total Number of CAT-2 Actions = 871

Figure 25 - D-Audit

```
I_AUDIT : Inspection Audit         Roadpart : 4400A1
================================================================================
Period : 01/01/95 to 31/12/95

Safety Inspection Summary

Total Number of Sections                          :    2
      ************
Number of Sections With no Safety Intervals Set     :    0
      ************
Number of Sections Checked With Safety Intervals    :    2
Number of Sections no Safety Inspections Recorded   :    0

Weekly Safety Inspections

Number of Sections With a Weekly Safety Interval    :    2
Number of Weekly Safety Inspection Records Checked  :  104
Number of Weekly Safety Inspections Expected        :  104

          On Time                :   94
          <3 Days Late           :   10
          3-7 Days Late          :    0
          >7 Days Late           :    0

          Total Checked          :  104

Number of Sections With Inspections Overdue         :    0

28 Day Safety Inspections

Number of Sections With a 28 Day Safety Interval    :    0
Number of 28 Day Safety Inspection Records Checked  :    0
Number of 28 Day Safety Inspections Expected        :    0

          On Time                :    0
          <14 Days Late          :    0
          14-28 Days Late        :    0
          >28 Days Late          :    0

          Total Checked          :    0

Number of Sections With Inspections Overdue         :    0
================================================================================
Detailed Inspection Summary

Total Number of Sections With no Detailed Intervals Calculated     :    0
Total Number of Sections With Detailed Intervals Calculated        :    2

      *************************

Summary of Detailed Inspections for all Activities

Number of Sections With no Detailed Inspection Recorded            :    0
Number of Section Activities not done in Period                    :   31
Number of Sections With at Least One Detailed Inspection in Period :    2
Number of Section Activities overdue in Period                     :   13
 ---------------------------------------------------------------------------
```

Figure 26/1 - I-Audit

I_AUDIT : Inspection Audit Roadpart : 4400A1

Period : 01/01/95 to 31/12/95

Activity	NO OF INSPECTIONS					NO OF SECTIONS				
	On Time	<50% Late	<110% Late	>110% Late	Total	Expected	Over Due	<50% Late	<110% Late	>110% Late	Eligible	Never Insp
AI Highway Drainage:headwall/aprons	0	0	0	0	0	2	0	0	0	0	2	2
AS Highw drainage(sluices/tidal flaps)	0	0	0	0	0	0	0	0	0	0	2	2
BF Boundary fences:metal/concrete	0	0	0	0	0	0	0	0	0	0	1	1
BT Boundary fences:timber	0	0	0	0	0	0	0	0	0	0	1	1
CG Covers gratings frames & boxes	0	0	0	0	0	2	2	0	2	0	2	0
CY Comm Equipt:motorwarn unit	0	0	0	0	0	2	0	0	0	0	2	2
EC Embankments/cuttings	0	0	0	0	0	1	0	0	0	0	1	1
ES Embankments/cuttings:specialist	0	0	0	0	0	0	0	0	0	0	1	1
FB Safety fences:metal/concrete	0	0	0	0	0	0	0	0	0	0	2	2
FD Highway drainage:filter drains	0	0	0	0	0	0	0	0	0	0	2	2
FF Safety fences:bolts	0	0	0	0	0	0	0	0	0	0	1	1
FN Safety fences:steel-tension	0	0	0	0	0	0	0	0	0	0	2	2
GC Highway drainage:gully catchpit&incpt	0	0	0	0	0	2	2	0	2	0	2	0
HN Hedges & trees:non DTp	1	0	0	0	1	0	0	0	0	0	0	0
HT Hedges & trees:DTp gen	0	0	0	0	0	1	1	0	0	1	1	0
HX Hedges/trees:soundness	1	0	0	0	1	0	0	0	0	0	0	0
KC Kerbs edging preformed channels	0	0	0	0	0	4	2	0	0	2	2	0
LE Road lighting:electrical	0	0	0	0	0	0	0	0	0	0	2	2
LP Road lighting:columns												

```
            0     0     0     0     0     0     0     0     0     0     2     2
MC Minor carriageway repairs
            0     0     0     0     0     4     2     0     0     2     2     0
PD Highway drainage:piped drainage systems
            0     0     0     0     0     0     0     0     0     0     2     2
RC Road studs:conspicuity
            2     0     0     0     2     2     0     0     0     0     2     0
RM Road markings
            0     0     0     0     0     0     0     0     0     0     2     2
RS Roadstuds:general
            0     0     0     0     0     2     0     0     0     0     2     2
SE Signs:electrics
            0     0     0     0     0     0     0     0     0     0     2     2
SG Signs(face/struct/fixings)
            0     0     0     0     0     0     2     2     0     0     0     0
SL Road Lighting (Lamps)
           11     7     4    10    32    52     2     2     0     0     2     0
SS Road Traffic Signs (Lamps)
           24     6     0     2    32    26     0     0     0     0     2     0
SV Signs:visibility inspection
            0     0     0     0     0     2     0     0     0     0     2     2
-------------------------------------------------------------------------------
Total      39    13     4    12    68   102    13     4     4     5    46    31
===============================================================================
```

Figure 26/2 - I-Audit

```
T_AUDIT : SUB SUB ITEM Audit for Roadpart : 4400A1
================================================================================
 Period : 01/04/94 to 31/03/95          Road Scheme
                 ------INSPECTION ACTIVITIES------ --CYCLIC ACTIVITIES---
                --SPENT--- COMMITTED- UNCOMMITTED --SPENT--- -COMMITTED-
  SUB  AC  ALLOC SPENT  NO  COMMT  NO  DFCTS ESTMD SPENT  NO  COMMT  NO
  SUB  CD AMOUNT (WO'S  OF  (WO'S  OF   NOT  COST  (WO'S  OF  (WO'S  OF  UNCOMMITTED
 ITEM            COMP) DFCT UCMP) DFCT ON WO RPAIR COMP) CYCL PLND) CYCL   BALANCE
020101       588     0    0     0    0     0     0     0    0     0    0     588
020202       400     0    0     0    0     0     0     0    0     0    0     400
020301       141     0    0     0    0     0     0     0    0     0    0     141
020303       200     0    0     0    0     0     0     0    0     0    0     200
020304       122     0    0     0    0     0     0     0    0     0    0     122
020401       939     0    0     0    0     0     0     0    0     0    0     939
020403 BT    100     0    1     0    0     0     0     0    0     0    0     100
```

```
020501 GA    100     0    0     0    0     1     0     0     0     0     0     100
020502       400     0    0     0    0     0     0     0     0     0     0     400
020504       238     0    0     0    0     0     0     0     0     0     0     238
020701       250     0    0     0    0     0     0     0     0     0     0     250
020801       657     0    0     0    0     0     0     0     0     0     0     657
020802       200     0    0     0    0     0     0     0     0     0     0     200
020803       227     0    0     0    0     0     0     0     0     0     0     227
021001 SL   1000   338   20     0    2     0     0     0     0     0     0     662
021002       500     0    0     0    0     0     0     0     0     0     0     500
021003       499     0    0     0    0     0     0     0     0     0     0     499
021005       782     0    0     0    0     0     0     0     0     0     0     782
021101       100     0    0     0    0     0     0     0     0     0     0     100
021601       334     0    0     0    0     0     0     0     0     0     0     334
021602       934     0    0     0    0     0     0     0     0     0     0     934
021605       942     0    0     0    0     0     0     0     0     0     0     942
021606       191     0    0     0    0     0     0     0     0     0     0     191
021607        64     0    0     0    0     0     0     0     0     0     0      64
021608        16     0    0     0    0     0     0     0     0     0     0      16
021609        23     0    0     0    0     0     0     0     0     0     0      23
-------------------------------------------------------------------------------
Total       9947   338   21     0    2     1     0     0     0     0     0    9609
===============================================================================
```

Figure 27 - T-Audit

F_AUDIT : Analysis of Defects for Point & Continuous Inventory Items by Activity

Roadpart : 4400A1

Period : 01/01/95 to 31/12/95

Activity Code/ Inventory Item	Point Cont	---Point Items--- Total No of Items	Numbr of Dfcts	Dfcts Per Item	---Continuous Items-- Total KM	Number of Defects	Defects Per KM
CA Comm Equipt:alignment/clean							
SG Signs	P	13	0	0.00			
CB Comm Equipt:cable ducts							
SG Signs	P	13	0	0.00			
CE Comm Equipt:electrical							
SG Signs	P	13	0	0.00			
CG Covers gratings frames & boxes							
CP Catchpit	P	10	0	0.00			
GY Gully	P	1	0	0.00			
MH Manhole	P	3	0	0.00			
CI Communications equipment:hardware							
SG Signs	P	13	0	0.00			
CS Comm Equipt:matrix signals							
SG Signs	P	13	0	0.00			
FL Highway drainage:flooding							
CP Catchpit	P	10	0	0.00			
GY Gully	P	1	0	0.00			
MH Manhole	P	3	0	0.00			
GC Highway drainage:gully catchpit&i							
CP Catchpit	P	10	0	0.00			
GY Gully	P	1	0	0.00			
LE Road lighting:electrical							
LP Lighting Point	P	23	0	0.00			
LP Road lighting:columns							
LP Lighting Point	P	23	0	0.00			
PD Highway drainage:piped drainage s							
GY Gully	P	1	0	0.00			
RC Road studs:conspicuity							
RS Road Studs	C				1	6	6
RM Road markings							
RF Ref. Marker Point	P	4	0	0.00			
LL Long. Rd Marks	C				1	0	0
RS Roadstuds:general							
RS Road Studs	C				1	0	0
SE Signs:electrics							
SG Signs	P	13	0	0.00			
SG Signs(face/struct/fixings)							
RF Ref. Marker Point	P	4	0	0.00			
SG Signs	P	13	0	0.00			
SL Road Lighting (Lamps)							
LP Lighting Point	P	23	14	0.61			
SM Signs:moving parts							
SG Signs	P	13	0	0.00			
SR Road markings:skid resist							
LL Long. Rd Marks	C				1	0	0
SS Road Traffic Signs (Lamps)							
SV Signs:visibility inspection							
SG Signs	P	13	0	0.00			

```
------------------------------------------------------------------------------
               Total     54    14   0.61    2      6      6
==============================================================================
```

Figure 28 - F-Audit

M_AUDIT : Analysis of Cyclic Maintenance Activities

Roadpart : 4400A1

Period : 01/01/95 to 31/12/95

Activity	Sect Class	Sect Envmnt	Total No of Sections	C.O.P. Freqncy P.A.	No of Sections with LV	Expected Freqncy P.A.	Actual Freqncy P.A.	% Diff From Expected
64 Gullies, Catchpits : Empty								
	AP	R	2	1.00	0	1.00	1.00	0
67 Grassed Areas : Visibility Cut								
	AP	R	1	1.00	0	1.00	0.00	-100
68 Grassed Areas : Swathe Cut								
	AP	R	1	1.00	0	1.00	0.00	-100
69 Grassed Areas : Treat Vegetation								
	AP	R	1	1.00	0	1.00	0.00	-100
70 Cleansing : Sweep Kerbed Roads								
	AP	R	1	1.00	0	1.00	1.00	0
71 Cleansing : Apply Herbicide								
	AP	R	1	1.00	0	1.00	0.00	-100
81 Road Lighting : Clean								
	AP	R	2	0.50	0	0.50	0.00	-100

Figure 29 - M-Audit

```
"A,RMMSINV,200296,4400"
"B,4400A1   0,02,512  ,10198"
"C,BO, ,   5,  11,A6384520,ROAD"
"C,CW, ,   0, 209,RASH,  7.69"
"C,CP,8,  20,  20"
"C,CP,8,  76,  76"
"C,CP,8, 133, 133"
"C,CR,8,   0,  43,CONC,  4.00"
"C,CR,8,  43, 209,GRSS,  4.00"
"C,FD,8,  43, 209"
"C,LP,8,   5,   5,MS13    ,OTHR,  5.00,WALL"
"D,    ,    ,      ,    ,    ,    ,    ,    ,    ,    ,    ,    ,    ,DTP "
"C,LP,8,  11,  11,MS11    ,OTHR,  5.00,WALL"
"D,    ,    ,      ,    ,    ,    ,    ,    ,    ,    ,    ,    ,    ,DTP "
"C,LP,8,  18,  18,MS9     ,STEE,  8.00,DBLE"
"D,    ,    ,      ,    ,    ,    ,    ,    ,    ,    ,    ,    ,    ,DTP "
"C,LP,8,  49,  49,MS7     ,STEE, 12.00,DBLE"
"D,    ,    ,      ,    ,    ,    ,    ,    ,    ,    ,    ,    ,    ,DTP "
"C,LP,8,  85,  85,MS5     ,STEE, 12.00,DBLE"
"D,    ,    ,      ,    ,    ,    ,    ,    ,    ,    ,    ,    ,    ,DTP "
"C,LP,8, 120, 120,MS3     ,STEE, 12.00,DBLE"
"D,    ,    ,      ,    ,    ,    ,    ,    ,    ,    ,    ,    ,    ,DTP "
"C,LP,8, 161, 161,MS1     ,STEE, 12.00,DBLE"
"D,    ,    ,      ,    ,    ,    ,    ,    ,    ,    ,    ,    ,    ,DTP "
"C,LP,8, 201, 201,TB1/2   ,STEE, 12.00,DBLE"
"D,    ,    ,      ,    ,    ,    ,    ,    ,    ,    ,    ,    ,    ,DTP "
"C,RF,5,   0,   0,THPC,00512   "
"C,LL,4,   0, 209,SING,WHIT,BKEN,THSC,  1.00,  1.00,  0.20"
"C,LL,5,   0, 209,SING,WHIT,BKEN,THSC,  2.00,  7.00,  0.10"
"C,LL,7,   0, 209,SING,WHIT,UNBK,RDER,  0.00,  0.00,  0.20"
"C,RS,4,   0, 209,CATS,AVIS,  8.00,GREE"
"C,RS,5,   0, 209,CATS,AVIS, 18.00,WHIT"
"C,RS,7,   0, 209,STDB,PROH,  9.00,AMBR"
"C,SF,8,   0,  18,UTEN,SING,MTAL,BOX "
"C,SF,8,  18, 209,TENS,SING,MTAL,CORR"
"C,SG,8, 183, 183,*       ,INFO,EXTL,570   ,  1.20,POST,  2.00,  1.10,DTP "
"D,    ,    ,      ,    ,    ,    ,    ,    ,    ,    ,    ,    ,    ,DTP "
"C,SG,8, 184, 184,*       ,INFO,EXTL,642   ,  2.20,POST,  0.89,  0.89,DTP "
"D,    ,    ,      ,    ,    ,    ,    ,    ,    ,    ,    ,    ,    ,DTP "
"Z,   1,    27,    10"
```

Figure 30 - Example Inventory Interface File Listing

```
INSURANCE REPORT
================================================================================
Survey Date Range      : 01/01/95 - 11/01/95
Selected Activities    : ALL
Range                  : Link : 4400M1   2  Section : 04
--------------------------------------------------------------------------------

Link: 4400M1   2  Section: 04  Class/Index: D3M R*  Length:  564
MP 242/6 (MID WOODALL SERVICES) TO MP 243/1 (WOODALL SERVICES ENTRY SLIP)
Safety Inspections to be Carried out every 7 Days plus daily Safety Patrols
--------------------------------------------------------------------------------

Survey No.     Date     Inspector  How Initiated      Type
   59266     03/01/95      AAR       Normal         Detailed

   Defect  Actv  Defect  Xsec  Chain   W/O Number  Completed   Sup By  Surv Comp
   AW4815   CX    ACES    LE    0004                01/02/95              59466
   AW4816   CX    OTHR    LE    0004                01/02/95              59466
--------------------------------------------------------------------------------

Survey No.     Date     Inspector  How Initiated      Type
   57844     06/01/95      TJ        Normal         Safety

   Defect  Actv  Defect  Xsec  Chain   W/O Number  Completed   Sup By  Surv Comp
--------------------------------------------------------------------------------

Survey No.     Date     Inspector  How Initiated      Type
   60168     09/01/95      JTH       Normal         Detailed

   Defect  Actv  Defect  Xsec  Chain   W/O Number  Completed   Sup By  Surv Comp
--------------------------------------------------------------------------------

Survey No.     Date     Inspector  How Initiated      Type
   58061     11/01/95      AAR       Normal         Safety

   Defect  Actv  Defect  Xsec  Chain   W/O Number  Completed   Sup By  Surv Comp
================================================================================
End of Listing
================================================================================
```

Figure 30 - Example Inventory Interface File Listing

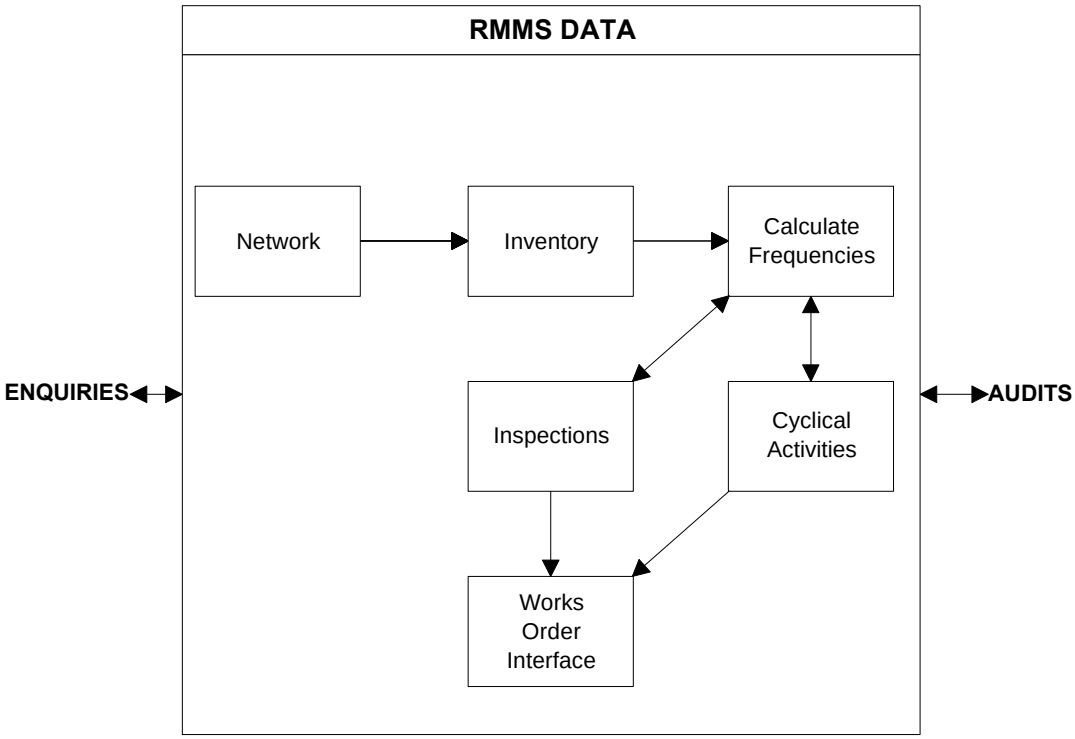


Diagram 1 - System Components

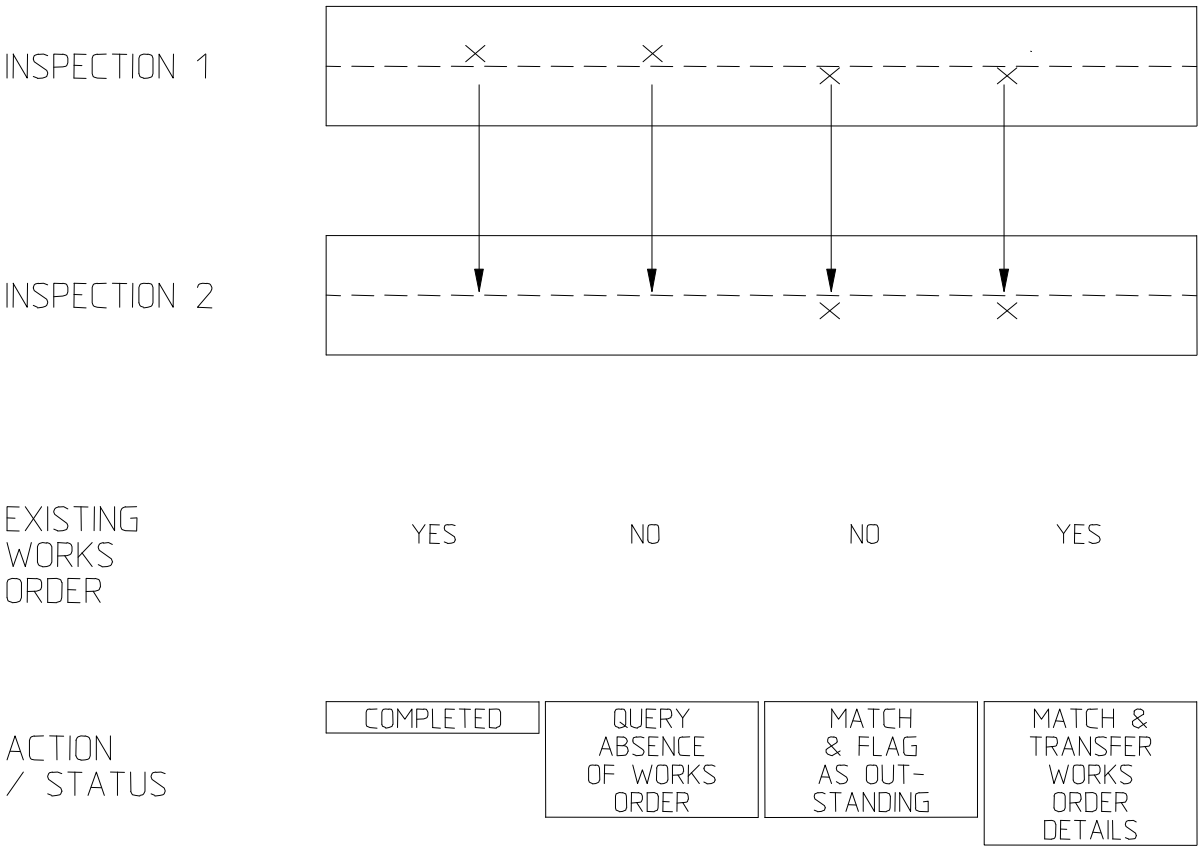


Diagram 2 - Conditions For Defect Matching

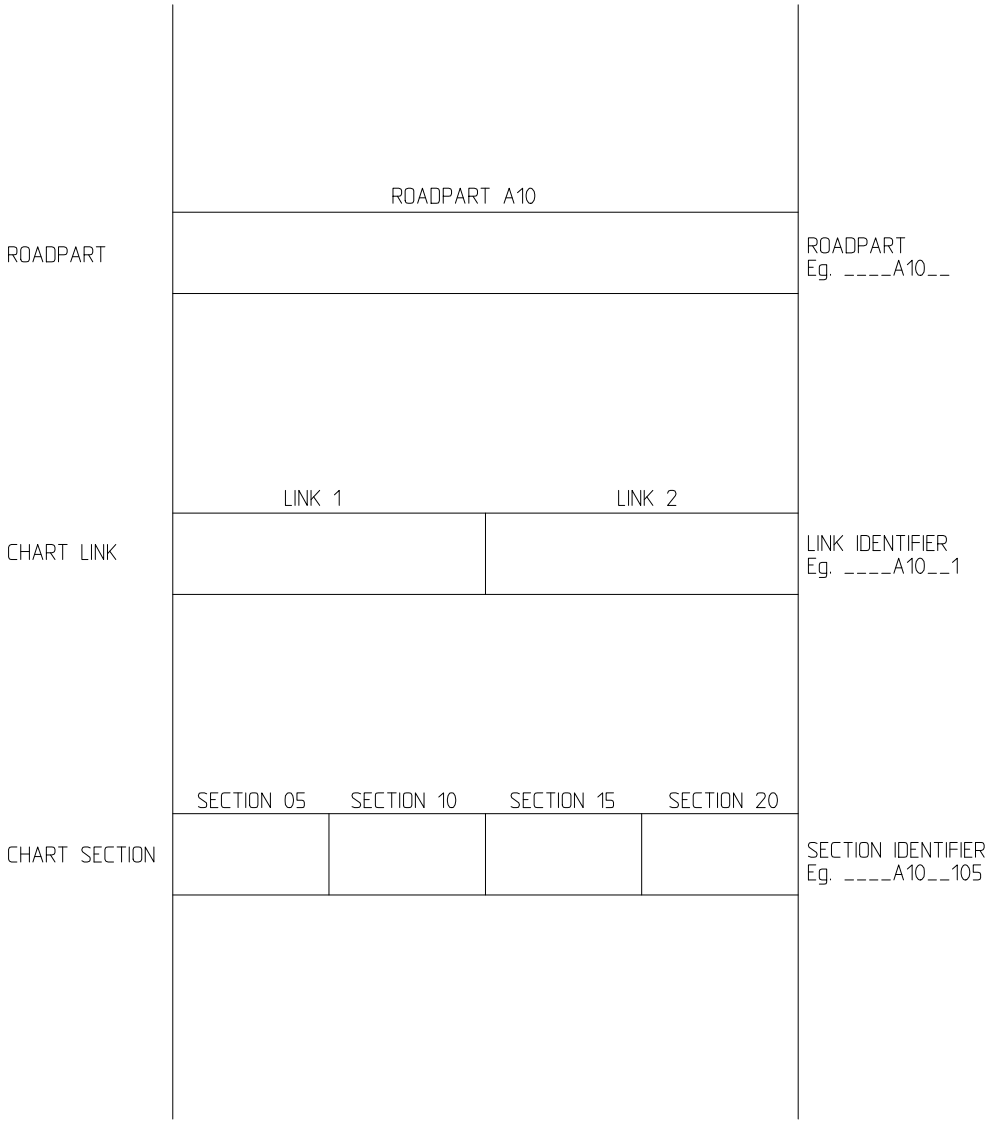


Diagram 3 - Relationship Between Road Part and Chart Link / Section

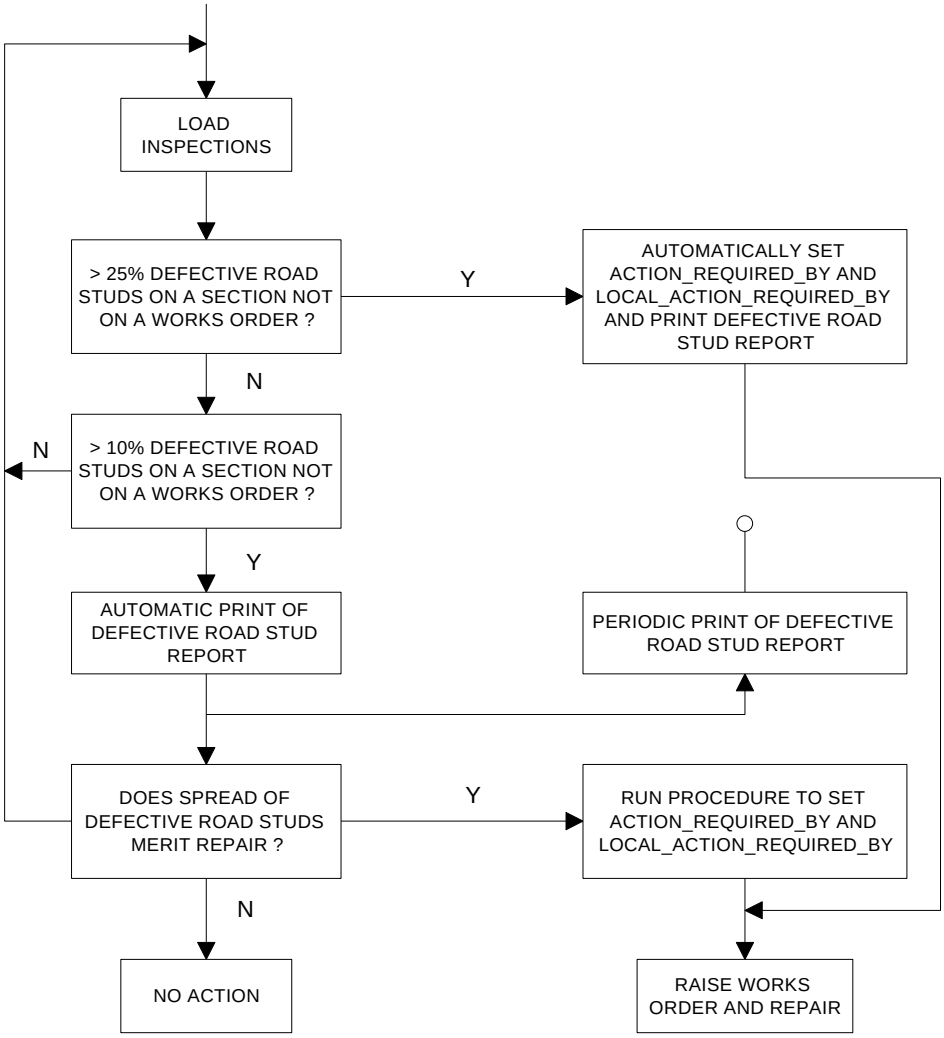


Diagram 4 - Flowchart: Setting of Action Dates for Advisory Road Stud Defects

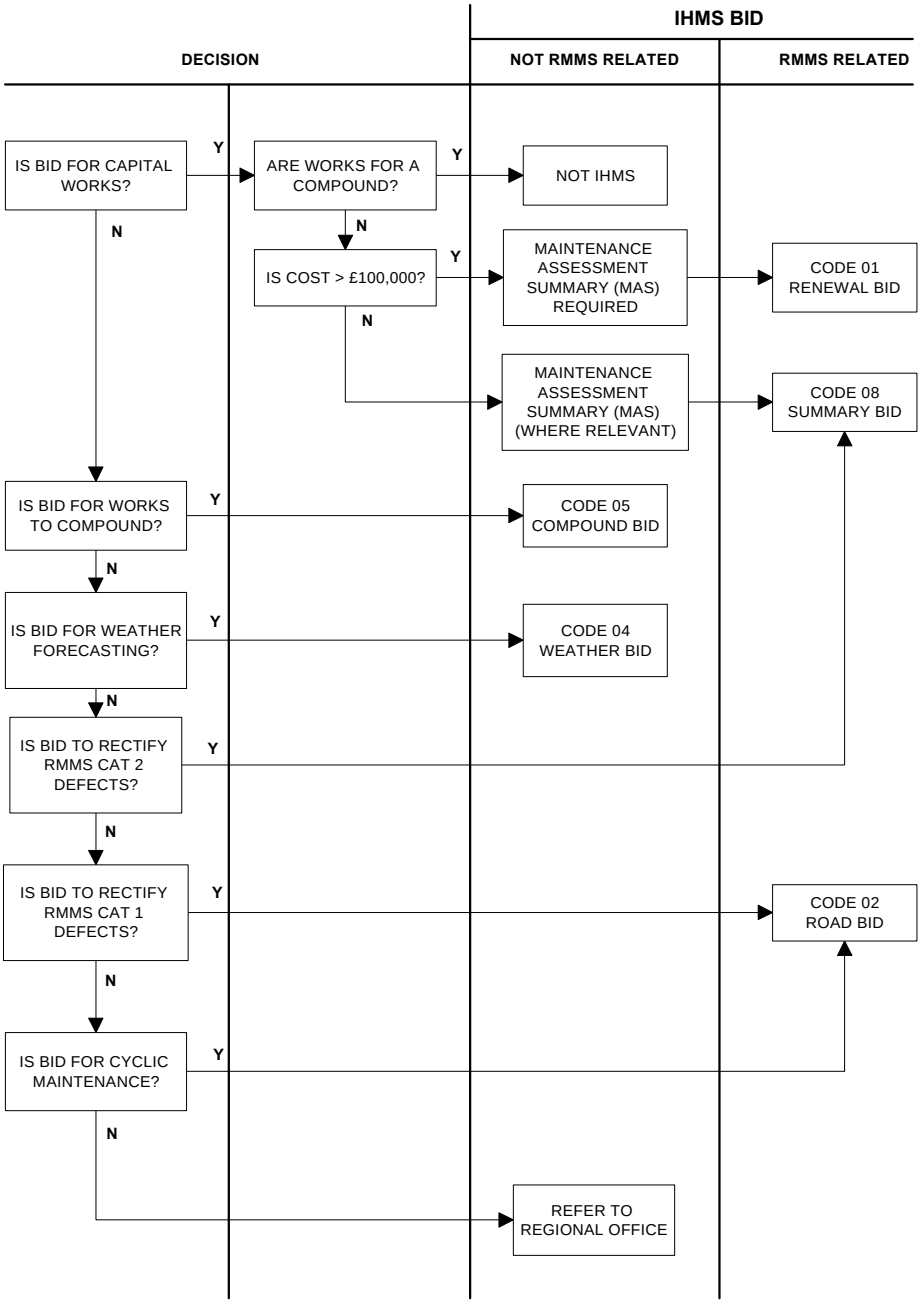


Diagram 5 - Flowchart: IHMS Bids

4.13 References

1 Department of Transport - Code of Practice for Routine Maintenance.

2 Department of Transport - Trunk Road Management and Maintenance Notice - TRMM No. 4/85 - Code of Practice for Routine Maintenance of Motorways and All Purpose Trunk Roads.

3 Highways Agency - Trunk Road Maintenance Manual: Volume 2.

4 Department of Transport - Routine Maintenance Management System. Highway RMMS Surveys - Survey Procedure.

5 Department of Transport - Routine Maintenance Management System. Highway Inventory Survey - Site Inspectors Manuals.

6 Department of Transport - Routine Maintenance Management System. Highway Inspection Survey - Site Inspectors Manual.

7 Department of Transport - Routine Maintenance Management System. RMMS Training Package - Part A - General Information (with Slides and Viewfoils).

8 Department of Transport - Routine Maintenance Management System. RMMS Training Package - Part B - Highway Inventory Survey (with Slides and Viewfoils).

9 Department of Transport - Routine Maintenance Management System. RMMS Training Package - Part C - Highway Inspection Survey (with Slides and Viewfoils).

10 Not used.

11 Department of Transport - Trunk Road Maintenance Manual: Volume 1.

12 Not used.

13 The Traffic Signs Regulation and General Directions 1994. HMSO.

14 PM SIMM. Adapting RMMS - A County View. Highways and Transportation February 1990.