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Volume 2

Visual Data Collection for UKPMS
Chapter 7: Coarse Visual Inspection (CVI)

Document Information

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SECTION 1 COARSE VISUAL INSPECTION SURVEYS

1 Introduction

The Coarse Visual Inspection (CVI) Survey is a chainage-related survey which will generally be undertaken from a slow-moving vehicle, where traffic conditions and safety considerations permit. Footways and cycleways adjacent to the carriageway may be inspected at the same time as the carriageway itself, or could be assessed separately if desired. In urban areas where vehicles are parked continuously at the roadside, it will generally be necessary to inspect the footways on foot. It is recommended that rut depth, which is difficult to collect reliably by eye from a moving vehicle, be recorded by a complementary machine survey.

The defects collected during a CVI survey are variable chainage-related, i.e. the lengths of a feature which are affected by a defect are defined by the actual start and end chainages recorded. The CVI is also section-related, which means that for any given defect the maximum defect length that can be recorded is the length of the section.

The CVI is intended to allow rapid assessment of the network. By assessing a limited range of broadly defined defects and by recording "lateral" extents, rather than measurements of defects, it is intended that driven survey rates of typically 15 to 40 carriageway km per day can be achieved in rural areas, and rates of 10 to 15 carriageway km per day in urban areas.

2 Overview of CVI Survey Procedure

A CVI survey is normally undertaken from a slow moving vehicle, using the Minimal (simple) cross-section position method. However on Classified Roads where the lanes are definable many local authorities are now collecting CVI data at Full XSP The carriageway is assessed as a whole, and kerbs, footways and cycletracks are separately inspected for the left and the right of the carriageway. It is, however, advised that surveys should be confined to the carriageway only due to difficulties in collecting off-carriageway data from a moving vehicle.

The vehicle will typically travel at 10-15km per hour, although in defective locations and in breaks between sections there will be a need to go slower or to stop for short times to allow for data recording. A minimum of two personnel will be required for the survey, a driver and an inspector. The driver will not be expected to be actively involved in identifying and recording defects, but will concentrate on ensuring the safe passage of the vehicle.

It is recommended that a vehicle, such as a van, with a reasonably high cabin position, and with a short (or no) bonnet is used for the survey, in order that the inspector can view the road downwards rather than a long way ahead. Experience has shown that the lower sitting position in cars and similar vehicles is less suited

for use in this survey, since it is more difficult to discern defects from this viewpoint.

A CVI survey would normally be carried out in one direction as a single pass, with the defects being recorded over the full width of the highway. Where this is not possible, then the CVI survey should be undertaken in both directions, with the defects being recorded up to the road centre. In this case, Data Capture Device (DCD) software should then combine the data from both directions in the single forward direction.

The survey will normally be carried out using a DCD that has been configured to collect data to the standard method documented here, and that is able to output data to the format described in the appendices to this document. Paper recording is not recommended, except as part of training exercise, or on a small network where the expense of data capture devices and software would not be justified by the higher productivity. The vehicle should be equipped with an accurate, calibrated trip meter or odometer, configured to read in metres; ideally the trip meter should interface directly with the DCD, to eliminate the need for manual entry of chainages. The trip meter should be re-calibrated on a regular basis.

CVI surveys are normally carried out on a route of sections grouped together to minimise travel between sections. The survey is normally carried out over a whole section, with the chainage recording starting at zero metres. Some data capture software and UKPMS systems that provide an interface to such software provide facilities to create survey routes, and to allow adjoining sections to be inspected continuously, without the need to manually record the transition between sections.

CVI defects fall into four broad types, described in Table 1.

Defect Type	Description
Length Defect	Edge Defects, Kerb Defects, Off-Carriageway Defects, Longitudinal Joint Defectiveness
Lane Length Defects	Carriageway Major Cracking, CVI Rutting
Count Defects	Transverse Cracks, Transverse Joint Defectiveness
Area Defects	All Other Defects

Table 1 CVI Broad Defect Types

3 CVI Length Defects

For **length defects**, simply the chainages at which the defect starts and ends are recorded. No other attributes are recorded. Where individual defects overlap or adjoin, they may be recorded; gaps of less than 2m are ignored. Figure 1 *CVI Length Defect*, shows an example of recording a **length defect**

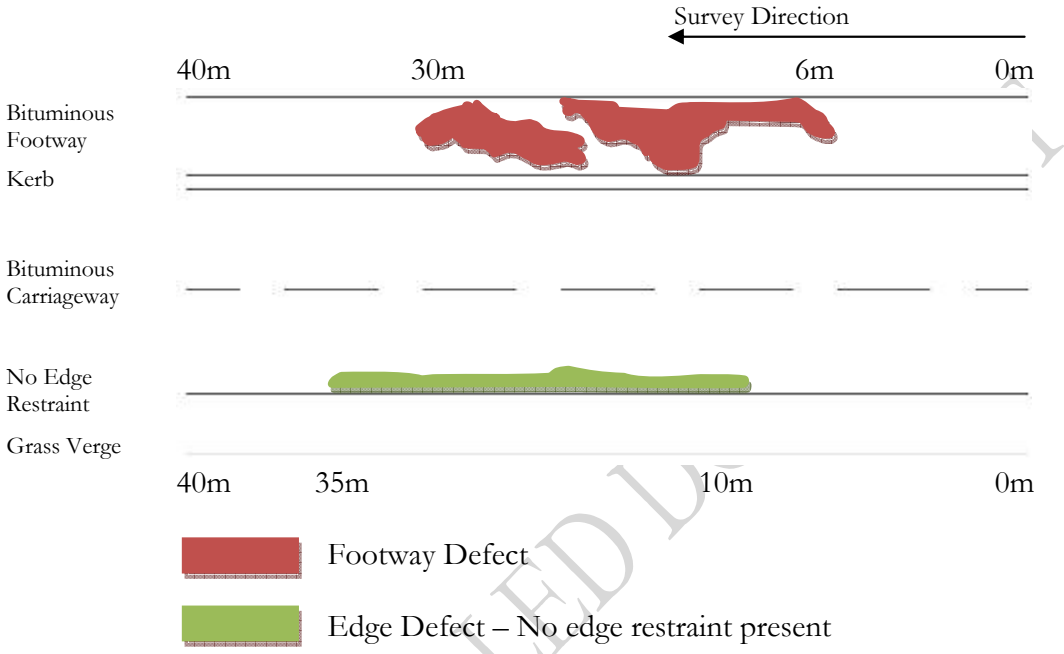


Figure 1 CVI Length Defect

4 CVI Lane Length Defects

For **lane length defects**, in addition to the start chainage and the end chainages being recorded, the number of lanes affected by the defect is also recorded. The number of lanes will depend upon the XSP referencing method being used for the survey as well as the number of lanes affected. Where the Full XSP Method is used the number of lanes affected will always be "1", since each lane is inspected separately. CVI surveys will normally be carried out using the Minimal XSP method.

In the example in Figure 2 *CVI Lane Length Defects*, using the Minimal XSP method, CVI Carriageway Major Cracking is recorded from 0 to 12m and "1" affected lane recorded. It is also recorded from 20 to 34m, with "2" as the number of lanes affected, and from 34 to 38m with "1" lane affected.

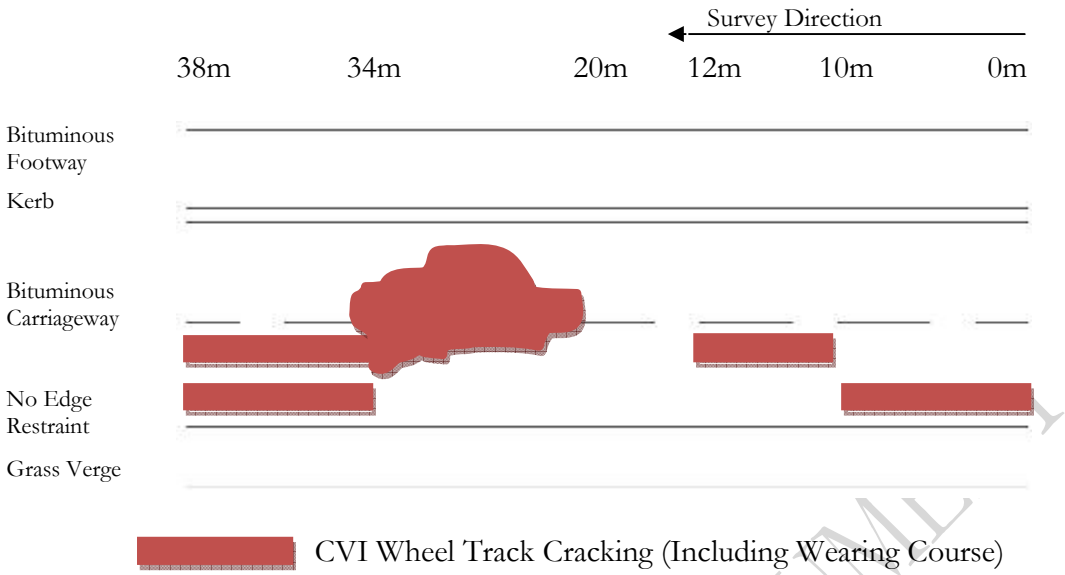


Figure 2 CVI Lane Length Defects

5 CVI Count Defects

For CVI surveys, there is a single **count defect**, of CVI Transverse/Reflection Cracking. This is recorded simply as a single chainage, at the location of the crack. Therefore, as shown in Figure 3 *CVI Count Defects,* the surveyor would record a transverse crack at chainage 10, 26, 30 and 40m.

This is different to those recorded in DVI surveys described in Chapter 8 *Detailed Visual Inspection Surveys* of Volume 2 of this UKPMS User Manual.

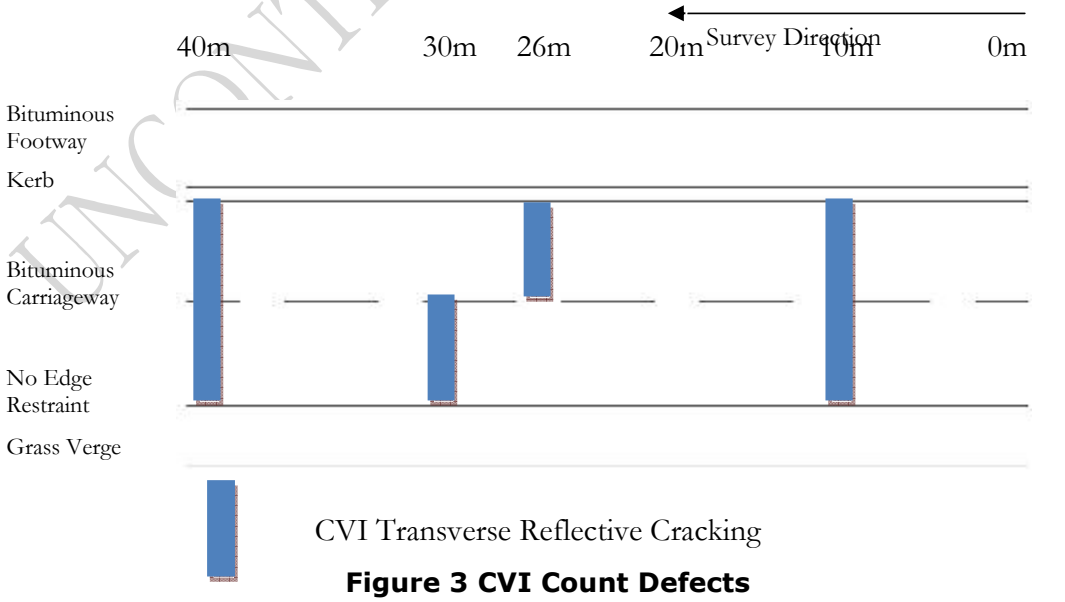


Figure 3 CVI Count Defects

6 CVI Area Defects

At each point where an **area defect** is identified, according to the definitions provided later in this Chapter, the inspector records the start chainage of the defect. Additionally for area defects, the "lateral extent" of the defect is recorded. These extents do not relate to the location of the defects across the carriageway, but to the width of the defects compared to the total carriageway width. The extent may comprise of one or more individual widths of defect.

The lateral extents are described in Table 2.

Full	Affects whole width of carriageway or lane.
¾	Affects approximately three-quarters of the width of the carriageway or lane.
½	Affects approximately half of the width of the carriageway/lane.
¼	Affects approximately one quarter of the width of the carriageway/lane.
Single	Less than ½ metre in width, such as a single crack, or a linear joint defect.

Table 2 Lateral extent of CVI Area Defects

Consistent with the coarse nature of the survey, in locations where the extent of the defect varies along the recorded length, it is acceptable to record an average lateral extent. At the end of the defect, the end chainage is recorded. Where the lateral extent, or for lane length defects the number of affected lanes changes, an end chainage is recorded and a new defect started, although proprietary Data Capture Software may provide functionality to speed this process by recording a change within the defect. In the example in Figure 4 *CVI Area Defects*, CVI Surface Deterioration is recorded from 0 to 10m with a lateral extent of "¼", from 10 to 15m with a lateral extent of "¾",, and from 15 to 25m with a lateral extent of "½". It is also recorded from 25m to 34m with a lateral extent of "single", and from 34m to 42m with a lateral extent of "½". In the latter case, an average lateral extent is reported.

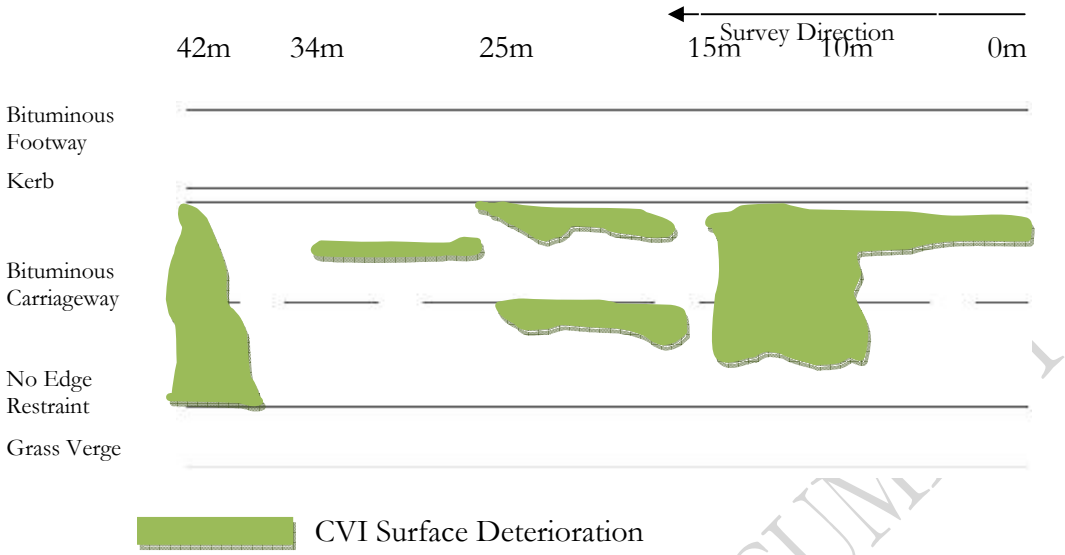


Figure 4 CVI Area Defects

Surveying continues in this manner recording each of the CVI defect types observed until the end of the section is reached.

7 Walked CVI Surveys

The CVI survey may be carried out by a surveyor or surveyors walking the route (the walked CVI survey). This approach is generally used in situations where the sections are heavily trafficked or urban networks or where parked vehicles impede the view of the carriageway and of other features. In such situations it may be necessary to carry out a walked survey.

This survey is growing in popularity and is normally undertaken using the Minimal (simple) cross-section position method, although for classified roads the Full cross-section position method is recommended. The carriageway, kerbs, footways and cycle tracks are separately inspected for the left and the right of the carriageway.

Users should be aware that due to the nature of a walked survey the results from a walked CVI survey may differ from a driven CVI survey. A walked survey tends to be more detailed because the surveyor has the opportunity to consider the defect and its extent more carefully, and to record it more precisely.

8 Collection of Wheel Track Rutting

It is recommended that, for driven CVI surveys, wheel track rutting should not be assessed visually, but that the CVI survey is augmented by machine collected rut data.

8.1 Treatment of Machine Collected Rutting in Conjunction with CVI Surveys

The recommended approach to the collection of wheel track rutting is to use a machine-based technique. In order to accommodate this as an alternative to the visual assessment of rutting, a new survey type has been created - Machine Collected Rutting for CVI (CRUT). This has a single defect that must be created externally. When carrying out an Automatic Pass, for example to produce a Performance Indicator, the appropriate Rutting Survey type must be selected in conjunction with the associated visual survey type.

The rules for creating CRUT surveys are as follows:

- Calculated as the percentage of a 20m length (except at the end of a section, where a shorter sub-section may be produced) with Rutting >= 13mm in either or both of the wheel tracks
- Currently, either laser or ultrasonic techniques are acceptable for the purpose of measuring rut depth, providing the equipment can be shown to be calibrated to +/- 2mm accuracy in recording/processing a depression (rut). The number of transverse readings taken along the road may be variable, but should be at least 1 every 2m

In practice, due to the widespread availability of SCANNER surveys vehicles, machine measurements of rut depth are likely to be made by SCANNER accredited vehicles. Further details are given in the SCANNER User Guide and Specification, available on the PCIS website. Reference should be made to the most recent version (currently 2009).

9 Rules for Post Processing CVI Surveys and Converting to HMDIF

The CVI survey procedure is designed to enable defects to be loaded using an approach which is practical for data collection from a slowly driven vehicle. Before loading this information into UKPMS the CVI data, as collected, must be converted to standard UKPMS extent codes (Local, Partial and General).

The conversion process is based upon creating 20m defect lengths (20m being chosen for compatibility with the DVI survey, which uses 20m aggregation lengths as the default option), over which the length or area of the defect is considered. Depending on the quantity of the defect within the 20m length, the defect is assigned an extent code of:

- **Local**: Between 5% and 20% (inclusive) affected
- **Partial**: Over 20% affected up to and including 40%
- **General**: Over 40% affected

There are a number of possibilities for carrying out the conversion of the CVI data as collected. Each of these is acceptable, provided that it can be shown to conform to the standard conversion rules.

1	Processing can take place on the Data Capture Device (DCD).
2	Processing can take place on downloading from the DCD.
3	A utility can be provided by the DCD supplier to carry out the conversion using the rules documented below.
4	It could be provided as part of the initial processing steps of the UKPMS Automatic Pass, as an optional addition to an accredited UKPMS system.

Table 3 Options for post-processing CVI survey data

CVI defects fall into five broad types:

- **Length defects:** Edge defects, Kerb defects, Off-Carriageway defects, Longitudinal Joint defectiveness, Longitudinal Joint defective seal.
- **Lane Length defects:** Carriageway Wheel Track Cracking, CVI Rutting.
- **Count defects:** Transverse / Reflection Cracking, Transverse Joint defectiveness, Transverse Joint defective seal.
- **"No Defect" defects:** Not Defective, Not Assessed
- **Area defects:** All other defects

Each of these types of defect is converted to provide the extent codes in a slightly different way, as described in Table 4.

The process for converting the raw defects is first to divide the section up into 20m sub-sections (except at the end of the section where a shorter sub-section may be produced). The quantity of the defect within each subsection is then expressed as a percentage using the conversion in Table 4.

Defect Type	***Attributes***	***Conversion***
Length Defects	Start Chainage End Chainage XSP	**The total length of the defect within the subsection expressed as a percentage of the sub-section length.** Total Length **Σ**(End Chainage – Start Chainage) for that part of the defect lying within the subsection.
Lane Length Defects	Start Chainage End Chainage XSP No of Lanes Affected	**The total lane length of the defect within the sub- section expressed as a percentage of the sub-section lane length.** Total Length within Sub-Section **Σ**((End Chainage – Start Chainage) x number of lanes affected) for that part of the defect lying within the sub-section. *Note that the number of lanes must be recorded at the start of each section for surveys using Minimal XSP codes. For surveys using Full XSP codes, the number of lanes is not required, as this will always be "1" for each XSP.*
Count Defects	Start Chainage End Chainage XSP	**The total number of each defect within the sub-section, multiplied by 5 and expressed as a percentage of the sub-section length.** This assumes a minimum spacing of 5 metres.
"No Defect" Defects	Start Chainage End Chainage XSP	Where a "No Defect" defect is recorded for any part of a sub-section, then if there are no other defects in that length then the whole 20m is recorded as that defect, and if there are any other defects then it is ignored.
Area Defects	Start Chainage End Chainage XSP Lateral Extent	**The total area of the defect within the sub-section expressed as a percentage of the sub-section area.** Total Area = **Σ**((End Chainage – Start Chainage) x Lateral Extent) for that part of the defect lying within the subsection. Sub-section Area = Sub-section length x 1 (as the lateral extent is the proportion of the width affected, rather than an absolute width) *Note that the 'Single' lateral extent is assumed to be 1/8 for this calculation.*

Table 4 Rules for converting CVI defects to 20m reporting lengths

The percentage obtained from the calculations described in Table 4 is converted to an extent using the following rules:

- <5%: Ignore, no length of defect created
- ≥5% and ≤20%: Local extent
- >20% and ≤40%: Partial extent
- >40%: General extent

Note that it is permissible to combine defect lengths into a longer length where the resulting 20m lengths all have the same extents.

10 Frequently Asked Questions

Q1. Can CVI defects that are very close together be combined?

If there is a gap of 2 metres or less between CVI defects then they should be combined.

Q2. Can I use the Full XSP Method for CVI Surveys?

The Full XSP method is not recommended since it is generally too detailed for the coarse survey, and requires additional effort for limited benefit. Nonetheless, Full XSP CVI surveys are permitted, and there are some sections where such an approach is of value, particularly where lane-specific treatments may be carried out, or where there are complex layouts with multiple footpaths and/or cycle paths.

Q3. What is the minimum defect extent to be recorded?

Single

Q4. What is the minimum defect Length to be recorded?

1m

Q5. Can CVI Surveys be carried out on foot?

CVI surveys may be carried out on foot, in urban locations where driven surveys are impractical, or where the features that are being inspected cannot be seen from a vehicle, for example because of parked vehicles. It is important to remember that the survey should be carried out using exactly the same procedure as the driven survey; in particular be careful not to record some of the minor instances of defects that are not included in a CVI because they cannot be easily observed from a moving vehicle.

Q6. Does an edge defect exist if there is an edge restraint i.e. kerb or channel?

No – Refer to Chapter 1 *Overview of Visual Data Collection* of Volume 2 of this UKPMS User Manual

Q7. What are the requirements for audit on a CVI Survey?

Refer to Chapter 4 QA & Audit of Volume 2 of this UKPMS User Manual

Q8. Are grass verges included as features in UKPMS?

Grass Verges are not included in the standard UKPMS rule set, however if a grassed verge does exist then consideration shall be given to its XSP when surveying paved areas.

Q9. If a bituminous patch exists at a transverse or longitudinal joint, how is it to be recorded?

If a bituminous patch touches a joint, it should be recorded as Joint Defectiveness within 1m of the joint. Outside of 1m, it should be recorded as bituminous patching. If the patch does not touch the joint, it should be recorded as Joint Defectiveness only within 0.5m of the joint.

SECTION 2 CVI DEFECT LISTING

Bituminous Carriageway

DEFECT	DEFINITION	CODE	RECORDED AS	NOTES
CVI Wheel Track Cracking	Wide single cracking or multiple cracking/coarse crazing with visible crack width >2mm within the Wheel tracks	BCKJ	Length in Metres, No. of Lanes Affected	For measurement purposes, the minimum defect length should be taken as 1m. Recorded for the wheel tracks including areas of reinstatement. A wide crack is defined as one with a width of approximately 2mm or greater. Wearing Course shall also be recorded
CVI Wearing Course Deterioration	Loss of material other than surface applied chippings from the surface course or pot holing to the degree that the original surface course is no longer discernible OR loss of material from the surface matrix to a depth greater than 20mm. Also including cracking >2mm.	BFEJ	Lateral Extent	Recorded for any part of the surface course, including the wheel tracks and areas of reinstatement. Cracking recorded for this defect which occur in the wheelpath shall also be recorded as Wheel Track Cracking
CVI Surface Deterioration	Any or all of: 1. Extensive loss of surface applied chippings with less than two thirds of chippings remaining. 2. The appearance of bituminous binder in the surface course such that the friction material is flush or covered. 3. Loss of material to the degree that the original surface course is still discernible OR loss of material from the surface matrix to a depth less than 20mm.	BSDE	Lateral Extent	Recorded for any part of the surface course, including the wheel tracks and areas of reinstatement. Minor cracking, minor chip loss and minor fatting are not recorded in CVI surveys since these defects are difficult to discern from a moving vehicle.

Bituminous Carriageway (CONTINUED)

DEFECT	DEFINITION	CODE	RECORDED AS	NOTES
CVI Settlement/ Subsidence	Local settlement or subsidence producing a difference in level greater than 30mm. This will include patches or public utility reinstatements and areas where the carriageway has heaved, for example due to tree roots.	BSES	Lateral Extent	Recorded for any part of the surface course, including the wheel tracks and areas of reinstatement.
CVI Transverse/Reflection Cracking	Single or multiple transverse cracks at regular spacing.	BTCK	Count	Only record transverse cracks where the road exhibits similarities to covered concrete
CVI Rutting	Depressions of the surface course greater than 13mm in the vehicle wheel paths relative to the remainder of the surface course.	BWTR	Length in Metres, No. of Lanes Affected	For measurement purposes, the minimum defect length should be taken as 1m. Preferably assess by machine. If this is unavailable, assess visually and check using a 2m straight edge and calibrated wedge.
Left Recorded CVI Edge Deterioration	Major cracking, fretting or deformation confined to the left edge of the carriageway, where no edge restraint is present, i.e. Kerb or Channel	BLED	Length Affected	For measurement purposes, the minimum defect length should be taken as 1m.Where cracking or fretting extends beyond the carriageway edge they will also be recorded as whole carriageway defects.

Bituminous Carriageway (CONTINUED)

DEFECT	DEFINITION	CODE	RECORDED AS	NOTES
Right Recorded CVI Edge Deterioration	Major cracking, fretting or deformation confined to the left edge of the carriageway, where no edge restraint is present, i.e. Kerb or Channel	BRED	Length Affected	For measurement purposes, the minimum defect length should be taken as 1m.Where cracking or fretting extends beyond the carriageway edge they will also be recorded as whole carriageway defects.
Not Defective	The feature is present but free from defects	BUTS	Length	For measurement purposes, the minimum defect length should be taken as 1m.
Not Assessed	The feature is present but not assessed. This may occur due to the presence of road works or parked cars or the execution of a partial survey.	BNAS	Length	For measurement purposes, the minimum defect length should be taken as 1m.

Block Carriageway

DEFECT	DEFINITION	CODE	RECORDED AS	NOTES
Major Block Deterioration	Depression, settlement or subsidence resulting in a difference in level of 13mm or greater. This will include patches or public utility reinstatements where the footway has heaved, for example due to tree roots. Rocking blocks or missing blocks.	KBLD	Lateral Extent	Recorded for any part of the surface course, including the wheel tracks and areas of reinstatement. For measurement purposes, the minimum defect length should be taken as 1m.
Minor Block Deterioration	Areas where the pattern of blocks has been disrupted resulting in loss of interlock. Cracked, spalled or otherwise damaged blocks, which have no depressions or vertical projections greater than 13mm	KBLN	Lateral Extent	Recorded for any part of the surface course, including the wheel tracks and areas of reinstatement. For measurement purposes, the minimum defect length should be taken as 1m.
Not Defective	The feature is present but free from defects	KNUS	Length	For measurement purposes, the minimum defect length should be taken as 1m.
Not assessed	The feature is present but not assessed. This may occur due to the presence of road works or parked cars or the execution of a partial survey.	KNNA	Length	For measurement purposes, the minimum defect length should be taken as 1m.

Concrete Carriageway

DEFECT	DEFINITION	CODE	RECORDED AS	NOTES
CVI Concrete Cracking	Cracking further than 500mm from the edge of the pavement or a joint including cracking associated with ironwork, and cracking in permanent concrete patches and reinstatements.	NCRA	Lateral Extent	For measurement purposes, the minimum defect length should be taken as 1m.
CVI Concrete Surface Deterioration	Loss of material from the surface of the concrete slab, including scaling, punch outs, pop outs and potholes but excluding joint or crack spalling. Also includes loss of texture.	NSCR	Lateral Extent	For measurement purposes, the minimum defect length should be taken as 1m.
CVI Settlement	Settlement resulting in a variation in level of 50mm or more.	NSTM	Lateral Extent	Includes both settlement within a single bay and settlement of a number of bays on jointed construction.
CVI Transverse Joint Defectiveness	Any or all of: Difference in level between slabs of 15mm or greater. Evidence of pumping. Evidence of dynamic movement. Loss of material from the joint edge. Cracking within 500mm of the joint, including cracking and/or spalling at the corner of the slab Patching at transverse joint	NFLT	Count	UKPMS requires joint inventory for processing of this defect

Concrete Carriageway (CONTINUED)

DEFECT	DEFINITION	CODE	RECORDED AS	NOTES
CVI Transverse Defective Seal	Defective transverse joint seal and/or loss of sealant. Typical types of damage include stripping of joint sealant, extrusion of joint seal, weed growth, hardening of the filler and loss of bond to slab edges.	NDFS	Count	Typical types of damage include stripping of joint sealant, extrusion of joint sealant, weed growth, hardening of the sealant and loss of bond to slab edges. UKPMS requires joint inventory for processing of this defect.
CVI Longitudinal Joint Defectiveness	Any or all of: Difference in level between slabs of 15mm or greater. Evidence of pumping. Evidence of dynamic movement Loss of material from the joint edge. Cracking within 500mm of the joint. Opening of longitudinal joints greater than 15mm. Patching at longitudinal joint	NJDF	Length	UKPMS requires joint inventory for processing of this defect Cracking at the corner of the slab shall be recorded with Transverse Joint Defectiveness.
CVI Longitudinal Defective Seal	Defective longitudinal joint seal and/or loss of sealant. Typical types of damage include stripping of joint sealant, extrusion of joint sealant, weed growth, hardening of the sealant and loss of bond to slab edges.	NDLS	Length	For measurement purposes, the minimum defect length should be taken as 1m. UKPMS requires joint inventory for processing of this defect.

Concrete Carriageway (CONTINUED)

DEFECT	DEFINITION	CODE	RECORDED AS	NOTES
CVI Defective Surface Dressing	Stripping, fretting or chip loss in surface dressing, thin bituminous overlays or high friction surfacing.	NDSU	Lateral Extent	Bituminous overlays greater than 20mm would be inspected as covered concrete.
CVI Bituminous Patching	Bituminous patches and reinstatements in a concrete pavement, other than those at a longitudinal or transverse joint.	NPTH	Lateral Extent	Defects in permanent patches and reinstatements are recorded as for un-patched areas. Local policy and practice in respect of routine maintenance, and public utility reinstatement will determine the circumstances under which bituminous patching is recorded
Not Defective	The feature is present but free from defects	NNDE	Length	For measurement purposes, the minimum defect length should be taken as 1m.
Not Assessed	The feature is present but not assessed. This may occur due to the presence of road works or parked cars or the execution of a partial survey.	NNOA	Length	For measurement purposes, the minimum defect length should be taken as 1m.

Bituminous Footway/Cycletrack/Verge

DEFECT	DEFINITION	CODE	RECORDED AS	NOTES
Major Bituminous Deterioration	Multiple cracking/coarse crazing occurring in any part of the surface course, including reinstatements. Loss of material. Settlement or subsidence. Isolated "spot" defects such as vertical projections or "trips" exceeding 13mm. Areas of ponding and depressions	(F/Y/V)BMD*	Length	For measurement purposes, the minimum defect length should be taken as 1m.
Minor Bituminous Deterioration	Fine cracking or crazing less than 2mm in width. Loss of material other than surface applied chippings from the surface course where the original surface course remains discernible.	(F/Y/V)BND*	Length	For measurement purposes, the minimum defect length should be taken as 1m.
Not Defective	The feature is present but free from defects	(F/Y/V)BTS*	Length	For measurement purposes, the minimum defect length should be taken as 1m.
Not assessed	The feature is present but not assessed. This may occur due to the presence of road works or parked cars or the execution of a partial survey.	(F/Y/V)BNA*	Length	For measurement purposes, the minimum defect length should be taken as 1m.

* The first letter of the code denotes the feature for Footways (F), Cycletracks (C) , and Verges (V)

Block Footway/Cycletrack/Verge

DEFECT	DEFINITION	CODE	RECORDED AS	NOTES
Major Block Deterioration	Missing blocks, or cracked or un cracked blocks associated with gradual depressions or vertical projections greater than 13mm.	(F/Y/V)KMD*	Length	For measurement purposes, the minimum defect length should be taken as 1m.
Minor Block Deterioration	Blocks which are cracked, spalled or otherwise damaged but have no depressions or vertical projections greater than 13mm.	(F/Y/V)KND*	Length	For measurement purposes, the minimum defect length should be taken as 1m.
Not Defective	The feature is present but free from defects	(F/Y/V)KTS*	Length	For measurement purposes, the minimum defect length should be taken as 1m.
Not assessed	The feature is present but not assessed. This may occur due to the presence of road works or parked cars or the execution of a partial survey.	(F/Y/V)KNA*	Length	For measurement purposes, the minimum defect length should be taken as 1m.

* The first letter of the code denotes the feature for Footways (F), Cycletracks (C) , and Verges (V)

Concrete Footway/Cycletrack/Verge

DEFECT	DEFINITION	CODE	RECORDED AS	NOTES
Major Concrete Deterioration	Settlement, subsidence and differences in level. Scaling or fretting leaving the coarse aggregate proud of the matrix or causing loss of coarse aggregate. Trips and potholes.	(F/Y/V)CMD*	Length	For measurement purposes, the minimum defect length should be taken as 1m.
Minor Concrete Deterioration	Fine cracking or crazing. Loss of material from the matrix causing exposure of the surface of the coarse aggregate.	(F/Y/V)CND*	Length	For measurement purposes, the minimum defect length should be taken as 1m.
Not Defective	The feature is present but free from defects	(F/Y/V)CTS*	Length	For measurement purposes, the minimum defect length should be taken as 1m.
Not assessed	The feature is present but not assessed. This may occur due to the presence of road works or parked cars or the execution of a partial survey.	(F/Y/V)CNA*	Length	For measurement purposes, the minimum defect length should be taken as 1m.

* The first letter of the code denotes the feature for Footways (F), Cycletracks (C) , and Verges (V)

Flagged Footway/Cycletrack/Verge

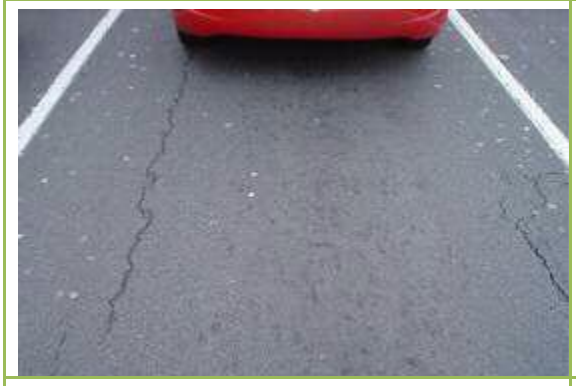
DEFECT	DEFINITION	CODE	RECORDED AS	NOTES
Major Flagged Deterioration	Flags which are cracked or un-cracked and have depressions, local settlement, subsidence or vertical projections greater than 13mm.	(F/Y/V)FMD*	Length	For measurement purposes, the minimum defect length should be taken as 1m.
Minor Flagged Deterioration	Flags which are cracked but have no depressions or vertical projections greater than 13mm.	(F/Y/V)FND*	Length	For measurement purposes, the minimum defect length should be taken as 1m.
Not Defective	The feature is present but free from defects	(F/Y/V)FTS*	Length	For measurement purposes, the minimum defect length should be taken as 1m.
Not assessed	The feature is present but not assessed. This may occur due to the presence of road works or parked cars or the execution of a partial survey.	(F/Y/V)FNA*	Length	For measurement purposes, the minimum defect length should be taken as 1m.

* The first letter of the code denotes the feature for Footways (F), Cycletracks (C) , and Verges (V)

Kerb

DEFECT	DEFINITION	CODE	RECORDED AS	NOTES
Kerb Deterioration	Disintegration or loss of material from the vertical or horizontal surfaces of the kerb, excluding chips and spalls less than 25mm in any two directions. Misalignment or displacement of kerbs by more than 50mm in a horizontal or vertical direction.	KBDT	Length Affected	For measurement purposes, the minimum defect length should be taken as 1m.
Inadequate Upstand	Lengths where the vertical height of the kerb falls below 75mm where the kerb is adjacent to the footway and below 25mm in other locations.	KDUP	Length Affected	For measurement purposes, the minimum defect length should be taken as 1m.
Not Defective	The feature is present but free from defects	AUTS	Length	For measurement purposes, the minimum defect length should be taken as 1m.
Not assessed	The feature is present but not assessed. This may occur due to the presence of road works or parked cars or the execution of a partial survey.	ANAS	Length	For measurement purposes, the minimum defect length should be taken as 1m.

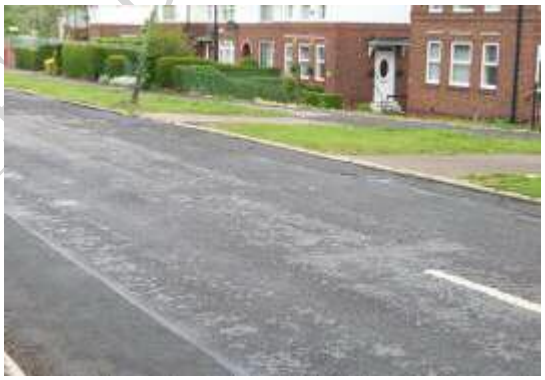
SECTION 3 CVI DEFECT DEFINITIONS AND PHOTOGRAPHS

Bituminous Carriageways	
Defect Description	**CVI Wheel Track Cracking**
Defect Code	BCKJ
Recorded As	Length in Metres, No. of Lanes Affected
	
	
Definition	Wide single cracking or multiple cracking/coarse crazing with visible crack width >2mm within the wheel tracks
Notes	For measurement purposes, the minimum defect length should be taken as 1m. Recorded for the wheel tracks including areas of reinstatement. A wide crack is defined as one with a width of approximately 2mm or greater. Wearing Course shall also be recorded

Bituminous Carriageways	
Defect Description	**CVI Wearing Course Deterioration**
Defect Code	BFEJ
Recorded As	Lateral Extent
	
	
Definition	Loss of material other than surface applied chippings from the surface course or pot holing to the degree that the original surface course is no longer discernible OR loss of material from the surface matrix to a depth greater than 20mm. Also including cracking >2mm.
Notes	Recorded for any part of the surface course, including the wheel tracks and areas of reinstatement. Cracking recorded for this defect which occur in the wheelpath shall also be recorded as Wheel Track Cracking

Bituminous Carriageways

Defect Description	**CVI Surface Deterioration**
Defect Code	BSDE
Recorded As	Lateral Extent



Definition	Any or all of: 1. Extensive loss of surface applied chippings with less than two thirds of chippings remaining. 2. The appearance of bituminous binder in the surface course such that the friction material is flush or covered. 3. Loss of material to the degree that the original surface course is still discernible OR loss of material from the surface matrix to a depth less than 20mm.
Notes	Recorded for any part of the surface course, including the wheel tracks and areas of reinstatement. Minor cracking, minor chip loss and minor fatting are not recorded in CVI surveys since these defects are difficult to discern from a moving vehicle.

Bituminous Carriageways

Defect Description	**CVI Settlement/Subsidence**
Defect Code	BSES
Recorded As	Lateral Extent




Definition	Local settlement or subsidence producing a difference in level greater than 30mm. This will include patches or public utility reinstatements and areas where the carriageway has heaved, for example due to tree roots.
Notes	Recorded for any part of the surface course, including the wheel tracks and areas of reinstatement.

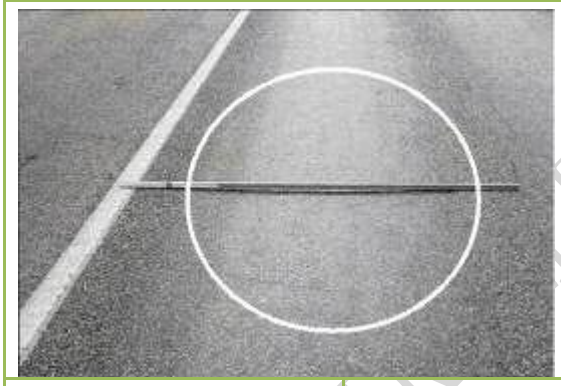
Bituminous Carriageways

Defect Description	**CVI Transverse/Reflection Cracking**
Defect Code	BTCK
Recorded As	Count

Definition	Single or multiple transverse cracks at regular spacing.
Notes	Only record transverse cracks where the road exhibits similarities to covered concrete

Bituminous Carriageways

Defect Description	**CVI Rutting**
Defect Code	BWTR
Recorded As	Length in Metres, No. of Lanes Affected



Definition	Depressions of the surface course greater than 13mm in the vehicle wheel paths relative to the remainder of the surface course.
Notes	For measurement purposes, the minimum defect length should be taken as 1m. Preferably assess by machine. If this is unavailable, assess visually and check using a 2m straight edge and calibrated wedge.

Bituminous Carriageways

Defect Description	**Left Recorded CVI Edge Deterioration**
Defect Code	BLED
Recorded As	Length Affected




Definition	Major cracking, fretting or deformation confined to the left edge of the carriageway, where no edge restraint is present, i.e. Kerb or Channel
Notes	For measurement purposes, the minimum defect length should be taken as 1m.Where cracking or fretting extends beyond the carriageway edge they will also be recorded as whole carriageway defects.

Bituminous Carriageways	
Defect Description	**Right Recorded CVI Edge Deterioration**
Defect Code	BRED
Recorded As	Length Affected
	
	
Definition	Major cracking, fretting or deformation confined to the left edge of the carriageway, where no edge restraint is present, i.e. Kerb or Channel
Notes	For measurement purposes, the minimum defect length should be taken as 1m.Where cracking or fretting extends beyond the carriageway edge they will also be recorded as whole carriageway defects.

Bituminous Carriageways	
Defect Description	**Not Defective**
Defect Code	BUTS
Recorded As	Length
	
	
Definition	The feature is present but free from defects
Notes	For measurement purposes, the minimum defect length should be taken as 1m.

Bituminous Carriageways	
Defect Description	**Not Assessed**
Defect Code	BNAS
Recorded As	Length
	
	
Definition	The feature is present but not assessed. This may occur due to the presence of road works or parked cars or the execution of a partial survey.
Notes	For measurement purposes, the minimum defect length should be taken as 1m.

Block Carriageways

Defect Description	**Major Block Deterioration**
Defect Code	KBLD
Recorded As	Lateral Extent



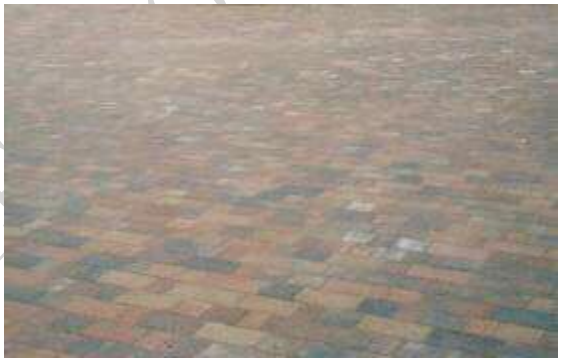

Definition	Depression, settlement or subsidence resulting in a difference in level of 13mm or greater. This will include patches or public utility reinstatements where the footway has heaved, for example due to tree roots. Rocking blocks or missing blocks.
Notes	Recorded for any part of the surface course, including the wheel tracks and areas of reinstatement. For measurement purposes, the minimum defect length should be taken as 1m.

Block Carriageways

Defect Description	**Minor Block Deterioration**
Defect Code	KBLN
Recorded As	Lateral Extent




Definition	Areas where the pattern of blocks has been disrupted resulting in loss of interlock. Cracked, spalled or otherwise damaged blocks, which have no depressions or vertical projections greater than 13mm
Notes	Recorded for any part of the surface course, including the wheel tracks and areas of reinstatement. For measurement purposes, the minimum defect length should be taken as 1m.

Block Carriageways	
Defect Description	**Not Defective**
Defect Code	KNUS
Recorded As	Length
	
	
Definition	The feature is present but free from defects
Notes	For measurement purposes, the minimum defect length should be taken as 1m.

Block Carriageways

Defect Description	**Not assessed**
Defect Code	KNNA
Recorded As	Length

Definition	The feature is present but not assessed. This may occur due to the presence of road works or parked cars or the execution of a partial survey.
Notes	For measurement purposes, the minimum defect length should be taken as 1m.

Concrete Carriageway	
Defect Description	**CVI Concrete Cracking**
Defect Code	NCRA
Recorded As	Lateral Extent
	
	
Definition	Cracking further than 500mm from the edge of the pavement or a joint including cracking associated with ironwork, and cracking in permanent concrete patches and reinstatements.
Notes	For measurement purposes, the minimum defect length should be taken as 1m.

Concrete Carriageway	
Defect Description	**CVI Concrete Surface Deterioration**
Defect Code	NSCR
Recorded As	Lateral Extent
	
	
Definition	Loss of material from the surface of the concrete slab, including scaling, punch outs, pop outs and potholes but excluding joint or crack spalling. Also includes loss of texture.
Notes	For measurement purposes, the minimum defect length should be taken as 1m.

Concrete Carriageway	
Defect Description	**CVI Settlement**
Defect Code	NSTM
Recorded As	Lateral Extent
	
	
Definition	Settlement resulting in a variation in level of 50mm or more.
Notes	Includes both settlement within a single bay and settlement of a number of bays on jointed construction.

Concrete Carriageway	
Defect Description	**CVI Transverse Joint Defectiveness**
Defect Code	NFLT
Recorded As	Count
	
	
Definition	Any or all of: Difference in level between slabs of 15mm or greater. Evidence of pumping. Evidence of dynamic movement. Loss of material from the joint edge. Cracking within 500mm of the joint, including cracking and/or spalling at the corner of the slab
Notes	UKPMS requires joint inventory for processing of this defect

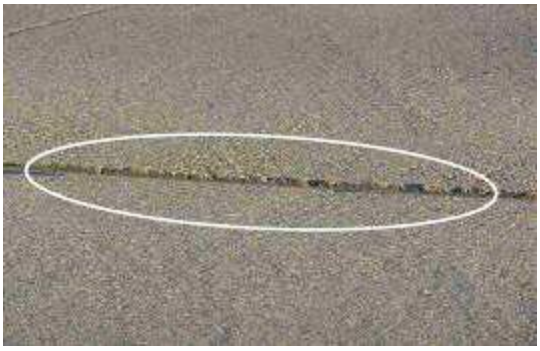
Concrete Carriageway

Defect Description	**CVI Transverse Defective Seal**
Defect Code	NDFS
Recorded As	Count

Definition	Defective transverse joint seal and/or loss of sealant. Typical types of damage include stripping of joint sealant, extrusion of joint seal, weed growth, hardening of the filler and loss of bond to slab edges.
Notes	Typical types of damage include stripping of joint sealant, extrusion of joint sealant, weed growth, hardening of the sealant and loss of bond to slab edges. UKPMS requires joint inventory for processing of this defect.

Concrete Carriageway

Defect Description	**CVI Longitudinal Joint Defectiveness**
Defect Code	NJDF
Recorded As	Length




Definition	Any or all of: Difference in level between slabs of 15mm or greater. Evidence of pumping. Evidence of dynamic movement Loss of material from the joint edge. Cracking within 500mm of the joint. Opening of longitudinal joints greater than 15mm.
Notes	UKPMS requires joint inventory for processing of this defect Cracking at the corner of the slab shall be recorded with Transverse Joint Defectiveness.

Concrete Carriageway

Defect Description	**CVI Longitudinal Defective Seal**
Defect Code	NDLS
Recorded As	Length

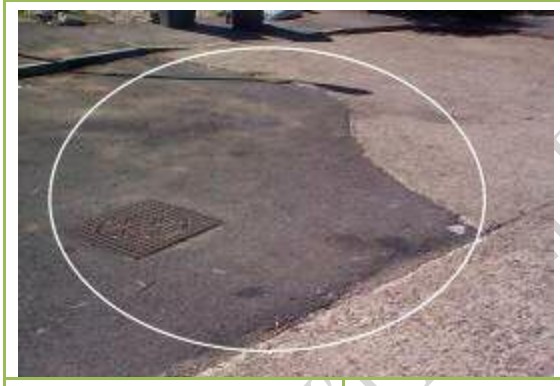
Definition	Defective longitudinal joint seal and/or loss of sealant. Typical types of damage include stripping of joint sealant, extrusion of joint sealant, weed growth, hardening of the sealant and loss of bond to slab edges.
Notes	For measurement purposes, the minimum defect length should be taken as 1m. UKPMS requires joint inventory for processing of this defect.

Concrete Carriageway	
Defect Description	**CVI Defective Surface Dressing**
Defect Code	NDSU
Recorded As	Lateral Extent
	
	
Definition	Stripping, fretting or chip loss in surface dressing, thin bituminous overlays or high friction surfacing.
Notes	Bituminous overlays greater than 20mm would be inspected as covered concrete.

Concrete Carriageway

Defect Description	**CVI Bituminous Patching**
Defect Code	NPTH
Recorded As	Lateral Extent






Definition	Bituminous patches and reinstatements in a concrete pavement, other than those at a longitudinal or transverse joint.
Notes	Defects in permanent patches and reinstatements are recorded as for un-patched areas. Local policy and practice in respect of routine maintenance, and public utility reinstatement will determine the circumstances under which bituminous patching is recorded

Concrete Carriageway

Defect Description	**Not Defective**
Defect Code	NNDE
Recorded As	Length




Definition	The feature is present but free from defects
Notes	For measurement purposes, the minimum defect length should be taken as 1m.

Concrete Carriageway	
Defect Description	**Not Assessed**
Defect Code	NNOA
Recorded As	Length
	
	
Definition	The feature is present but not assessed. This may occur due to the presence of road works or parked cars or the execution of a partial survey.
Notes	For measurement purposes, the minimum defect length should be taken as 1m.

Bituminous Footway/Cycletrack/Verge

Defect Description	**Major Bituminous Deterioration**
Defect Code	(F/Y/V)BMD* * The first letter of the code denotes the feature for Footways (F), Cycletracks (C) , and Verges (V)
Recorded As	Length

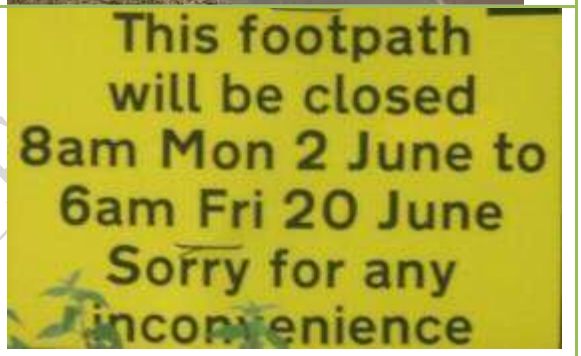
Definition	Multiple cracking/coarse crazing occurring in any part of the surface course, including reinstatements. Loss of material. Settlement or subsidence. Isolated "spot" defects such as vertical projections or "trips" exceeding 13mm. Areas of ponding and depressions
Notes	For measurement purposes, the minimum defect length should be taken as 1m.

Bituminous Footway/Cycletrack/Verge	
Defect Description	**Minor Bituminous Deterioration**
Defect Code	(F/Y/V)BND* * The first letter of the code denotes the feature for Footways (F), Cycletracks (C) , and Verges (V)
Recorded As	Length
	
	
Definition	Fine cracking or crazing less than 2mm in width. Loss of material other than surface applied chippings from the surface course where the original surface course remains discernible.
Notes	For measurement purposes, the minimum defect length should be taken as 1m.

Bituminous Footway/Cycletrack/Verge	
Defect Description	**Not Defective**
Defect Code	(F/Y/V)BTS* * The first letter of the code denotes the feature for Footways (F), Cycletracks (C) , and Verges (V)
Recorded As	Length
	
	
Definition	The feature is present but free from defects
Notes	For measurement purposes, the minimum defect length should be taken as 1m.

Bituminous Footway/Cycletrack/Verge

Defect Description	**Not assessed**
Defect Code	(F/Y/V)BNA* * The first letter of the code denotes the feature for Footways (F), Cycletracks (C) , and Verges (V)
Recorded As	Length



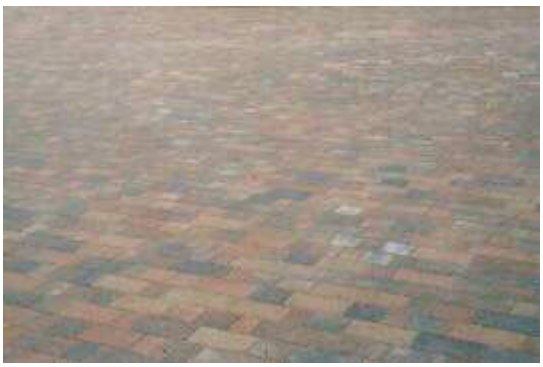
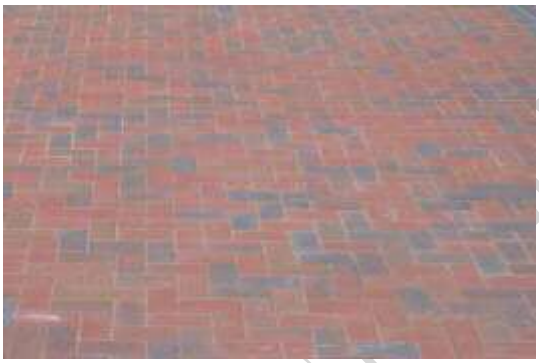
Definition	The feature is present but not assessed. This may occur due to the presence of road works or parked cars or the execution of a partial survey.
Notes	For measurement purposes, the minimum defect length should be taken as 1m.

Block Footway/Cycletrack/Verge	
Defect Description	**Major Block Deterioration**
Defect Code	(F/Y/V)KMD* * The first letter of the code denotes the feature for Footways (F), Cycletracks (C) , and Verges (V)
Recorded As	Length
	
	
Definition	Missing blocks, or cracked or un cracked blocks associated with gradual depressions or vertical projections greater than 13mm.
Notes	For measurement purposes, the minimum defect length should be taken as 1m.

Block Footway/Cycletrack/Verge

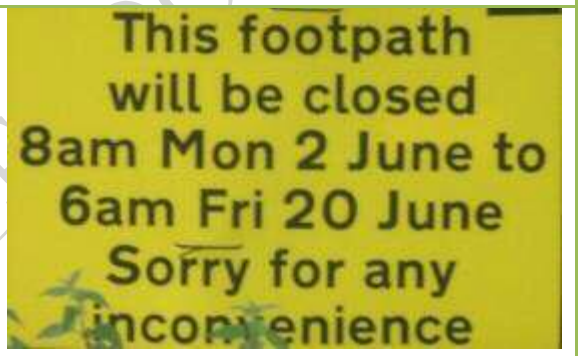
Defect Description	**Minor Block Deterioration**
Defect Code	(F/Y/V)KND* * The first letter of the code denotes the feature for Footways (F), Cycletracks (C) , and Verges (V)
Recorded As	Length

Definition	Blocks which are cracked, spalled or otherwise damaged but have no depressions or vertical projections greater than 13mm.
Notes	For measurement purposes, the minimum defect length should be taken as 1m.

Block Footway/Cycletrack/Verge	
Defect Description	**Not Defective**
Defect Code	(F/Y/V)KTS* * The first letter of the code denotes the feature for Footways (F), Cycletracks (C) , and Verges (V)
Recorded As	Length
	
	
Definition	The feature is present but free from defects
Notes	For measurement purposes, the minimum defect length should be taken as 1m.

Block Footway/Cycletrack/Verge

Defect Description	**Not assessed**
Defect Code	(F/Y/V)KNA* * The first letter of the code denotes the feature for Footways (F), Cycletracks (C) , and Verges (V)
Recorded As	Length



Definition	The feature is present but not assessed. This may occur due to the presence of road works or parked cars or the execution of a partial survey.
Notes	For measurement purposes, the minimum defect length should be taken as 1m.

Concrete Footway/Cycletrack/Verge

Defect Description	**Major Concrete Deterioration**
Defect Code	(F/Y/V)CMD* * The first letter of the code denotes the feature for Footways (F), Cycletracks (C) , and Verges (V)
Recorded As	Length

Definition	Settlement, subsidence and differences in level. Scaling or fretting leaving the coarse aggregate proud of the matrix or causing loss of coarse aggregate. Trips and potholes.
Notes	For measurement purposes, the minimum defect length should be taken as 1m.

Concrete Footway/Cycletrack/Verge

Defect Description	**Minor Concrete Deterioration**
Defect Code	(F/Y/V)CND* * The first letter of the code denotes the feature for Footways (F), Cycletracks (C) , and Verges (V)
Recorded As	Length

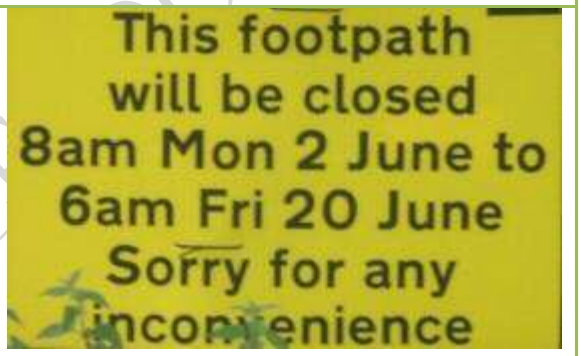



Definition	Fine cracking or crazing. Loss of material from the matrix causing exposure of the surface of the coarse aggregate.
Notes	For measurement purposes, the minimum defect length should be taken as 1m.

Concrete Footway/Cycletrack/Verge	
Defect Description	**Not Defective**
Defect Code	(F/Y/V)CTS* * The first letter of the code denotes the feature for Footways (F), Cycletracks (C) , and Verges (V)
Recorded As	Length
	
Definition	The feature is present but free from defects
Notes	For measurement purposes, the minimum defect length should be taken as 1m.

Concrete Footway/Cycletrack/Verge

Defect Description	**Not assessed**
Defect Code	(F/Y/V)CNA* * The first letter of the code denotes the feature for Footways (F), Cycletracks (C) , and Verges (V)
Recorded As	Length



Definition	The feature is present but not assessed. This may occur due to the presence of road works or parked cars or the execution of a partial survey.
Notes	For measurement purposes, the minimum defect length should be taken as 1m.

Flagged Footway/Cycletrack/Verge

Defect Description	**Major Flagged Deterioration**
Defect Code	(F/Y/V)FMD* * The first letter of the code denotes the feature for Footways (F), Cycletracks (C) , and Verges (V)
Recorded As	Length

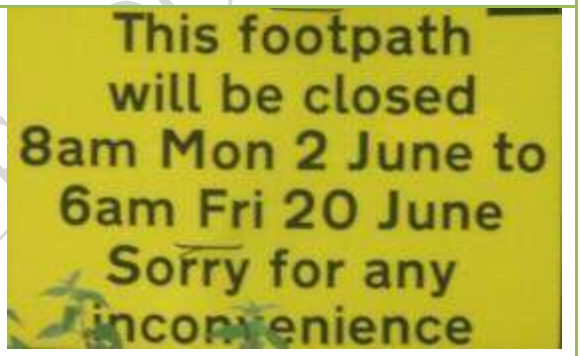
Definition	Flags which are cracked or un-cracked and have depressions, local settlement, subsidence or vertical projections greater than 13mm.
Notes	For measurement purposes, the minimum defect length should be taken as 1m.

Flagged Footway/Cycletrack/Verge	
Defect Description	**Minor Flagged Deterioration**
Defect Code	(F/Y/V)FND* * The first letter of the code denotes the feature for Footways (F), Cycletracks (C) , and Verges (V)
Recorded As	Length
   	
Definition	Flags which are cracked but have no depressions or vertical projections greater than 13mm.
Notes	For measurement purposes, the minimum defect length should be taken as 1m.

Flagged Footway/Cycletrack/Verge	
Defect Description	**Not Defective**
Defect Code	(F/Y/V)FTS* * The first letter of the code denotes the feature for Footways (F), Cycletracks (C) , and Verges (V)
Recorded As	Length
	
	
Definition	The feature is present but free from defects
Notes	For measurement purposes, the minimum defect length should be taken as 1m.

Flagged Footway/Cycletrack/Verge

Defect Description	**Not assessed**
Defect Code	(F/Y/V)FNA* * The first letter of the code denotes the feature for Footways (F), Cycletracks (C) , and Verges (V)
Recorded As	Length



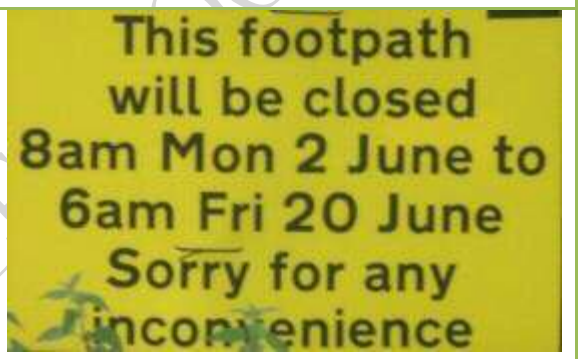
Definition	The feature is present but not assessed. This may occur due to the presence of road works or parked cars or the execution of a partial survey.
Notes	For measurement purposes, the minimum defect length should be taken as 1m.

Kerb	
Defect Description	**Kerb Deterioration**
Defect Code	KBDT
Recorded As	Length Affected
	
	
Definition	Disintegration or loss of material from the vertical or horizontal surfaces of the kerb, excluding chips and spalls less than 25mm in any two directions. Misalignment or displacement of kerbs by more than 50mm in a horizontal or vertical direction.
Notes	For measurement purposes, the minimum defect length should be taken as 1m.

Kerb	
Defect Description	**Inadequate Upstand**
Defect Code	KDUP
Recorded As	Length Affected
	
	
Definition	Lengths where the vertical height of the kerb falls below 75mm where the kerb is adjacent to the footway and below 25mm in other locations.
Notes	For measurement purposes, the minimum defect length should be taken as 1m.

Kerb	
Defect Description	**Not Defective**
Defect Code	AUTS
Recorded As	Length
Definition	The feature is present but free from defects
Notes	For measurement purposes, the minimum defect length should be taken as 1m.

Kerb	
Defect Description	**Not assessed**
Defect Code	ANAS
Recorded As	Length



Definition	The feature is present but not assessed. This may occur due to the presence of road works or parked cars or the execution of a partial survey.
Notes	For measurement purposes, the minimum defect length should be taken as 1m.