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Notes for Guidance on the Specification for Road Works Series NG 2900 - CCTV Survey of Road Drainage Systems

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- a) Reference from Sub-Clause NG2908.8 to Sub-Clause NG2908.6
- b) Spelling Rectified

CCTV SURVEY OF ROAD DRAINAGE SYSTEMS

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CCTV Survey of Road Drainage Systems

on the longevity of the pavement construction.

NG 2901 Scope

General

- 1 Closed Circuit Television (CCTV) survey of road drainage systems is the remote inspection of these systems by the insertion of a camera connected to a monitor and recording apparatus.

NG 2902 Information

General

- 1 The visual inspection of a drain pipeline by manentry is a potentially hazardous, time consuming and labour intensive operation, hence the use of CCTV survey offers a practical alternative. In practice, the vast majority of road drainage systems are of diameters too small to gain access by manentry and thus can only be inspected using remote techniques, of which CCTV survey is the most obvious.
- 2 The use of CCTV survey has been widely practiced in the water industry for many years and the apparatus and techniques have been refined and developed. There is now an increasing use of CCTV for the inspection of road drainage systems as a maintenance tool and identified benefits in terms of future expenditure to using this technique during the construction process.
- 3 The UK Highways Agency's (HA) research has shown there to be an unacceptable number of defects within the road drainage system in the UK and this is likely to be the case in the Republic of Ireland as well. The HA has also identified the need for more complete and accurate recording of the drain positions, sizes and condition. The use of CCTV survey can greatly assist in the collation of the record data and the programming of road drainage maintenance. Identifying sections of drain in poor structural condition and the consequent remedial works can have a significant effect

NG 2903 Definitions

- 1 Definitions relating to CCTV survey of road drainage systems are formally defined in Clause 2903.
- 2 It is important that a distinction is made between the Contractor engaged to undertake the survey and the individual who will perform the inspection. This is because only the individual Surveyor can hold the required current certification.

NG 2904 General Requirements

General

- 1 The extent of the drainage system comprising the survey should be marked on plans and detailed in Appendix 29/1.
- 2 The access points should have unique reference numbers and individual drains to be surveyed should be referenced. The unique reference numbers will be inserted into the Header Sheet, by the Contractor, at the start of each survey.
- 3 The location of each survey should be stated in Appendix 29/1.

Pre-cleansing

- 4 Where pre-cleansing is to form part of the contract this should be specified in Appendix 29/1 and itemised in the Bill of Quantities.
- 5 Guidance on pre-cleansing can be found in Clause 520 of the UK MCHW Vol. 1
- 6 Drains that have been pre-cleansed should be identified in Appendix 29/1.
- 7 Where the Contractor is required to undertake pre-cleansing this should be identified in Appendix 29/1.
- 8 Pre-cleansing can remove evidence of siltation problems that affect the performance of the drain and hence consideration should be given to only removing silt from those drains where it is known that the silt level will prevent access by CCTV camera. It is important to record

the location of the silt prior to its removal and the location and depths of silt removed should be reported.

Traffic

- 9 The CCTV survey of road drainage systems should usually be carried out in conjunction with other road works or programmed maintenance contracts. In these instances the contract shall be arranged so that the traffic management for the other works should afford the CCTV Surveyor the facilities to undertake the survey works within the confines of the traffic management control.
- 10 Where the survey works are to be undertaken separately from any other works, the compiler should determine the traffic management measures appropriate for the classification of road and the locations of the surveys. These requirements should be inserted into Appendix 1/17 irrespective of whether or not the Contractor will be required to provide the traffic management.
- 11 Where the Contractor is to provide the traffic management, this will be stated in the Appendix 1/17 and identified in the pricing document.

Chambers

- 12 It will be the Contractor's responsibility to raise all the access (manhole) covers necessary for gaining access to the drains for the survey. The **Employer** [Contractor] should endeavour to ensure that all chambers within the survey are accessible. Where any covers are found to be broken, damaged or fast, these should be replaced prior to the commencement of the survey. Where, during the course of the survey, covers are found to be broken, damaged or fast, the Contractor should notify the Employer's Representative who should arrange for the covers to be replaced.

Flows and blockages

- 13 Except where responsibility for clearing blockages is stated in Appendix 29/1 as being that of the Contractor any blockages identified during the course of the survey should be promptly addressed by the Employer's Representative as appropriate and the Contractor notified accordingly.

- 14 The Survey Contactor should be responsible for dealing with the flows within the drains to be surveyed. Where survey is suspended due to temporary excessive flows within the drain, this should be the Contractor's liability and the Employer should not incur any additional costs in this respect.

Site Availability

- 15 Where the Contractor's working hours are to be restricted during certain parts of the day or night, or where there are any other restrictions on access to the site, a schedule of restrictions should be provided in Appendix 1/7 and in the Schedule of Constraints in Appendix 1/13.

NG 2905 Survey Reporting

General

- 1 Where any changes to the IS EN 13508-2:2001 format of the Report are required, these should be stated in Appendix 29/1.
- 2 Where the Employer requires some items of the Survey Report to be supplied during the course of the survey, this should be made clear in the Instructions to Tenderers and these items should be stated in Appendix 29/1.

CCTV Photographs

- 3 Where the size of the photographs required is different to those specified in sub-Clause 2905.13, the required dimensions should be stated in Appendix 29/1.
- 4 The frequency of condition photographs should be specified in Appendix 29/1. The spacing between general condition photographs should not be more than 10 metres.
- 5 The format that the Contractor is required to submit the record photographs should be entered in Appendix 29/1 by the compiler.
- 6 Where the requirement for the provision of negatives is different from the specification sub-Clause 2905.19, the compiler should insert the requirements into Appendix 29/1.

Condition Grade

- 7 As part of the assessment of the survey it is good practice to develop a proposed survey programme for future surveying. The

programme should be based on the condition grade from Table NG2904/1 below and this will identify the need for work. A risk assessment should be used to set the time limit between surveys.

- Grade 1 and 2 then the survey frequency should not be more than once in 10 years and not less than once in 15 years
 - Grade 3 then the survey frequency should be no less than once in 10 years
 - Grade 4, the survey frequency should be once in 5 years
 - Grade 5, the survey frequency should be once in 1 year.
- 8 The frequency may be increased where the drain gradient or the connection of land drains may affect the performance of the drain.

Table NG 2904/1: Application of Condition Grade to piped drainage systems

Internal condition grade	Typical defect descriptions
5	Already collapsed Deformation > 10% and broken Extensive areas of fabric missing Fracture with deformation > 10%
4	Broken Deformation up to 10% and broken Fracture with deformation 6-10% Multiple fracture Serious loss of level Serious joint defects with voids or soil visible (open joint with >50mm soil or void visible or joint displacement >25% of diameter) Surface damage – spalling large Surface damage – wear large
3	Fracture with no deformation or deformation < 5% Longitudinal cracking or multiple cracking Minor loss of level

	Severe joint defects, ie open joint (large) or joint displaced (large) Surface damage – spalling medium Surface damage – wear medium
2	Circumferential crack Moderate joint defects ie open joint (medium) or joint displaced (medium) Surface damage – spalling slight Surface damage – wear slight
1	No structural defects

Notes

- 1: Deformed pipes that have subsequently been relined with a structural lining can normally be considered to have no deformation.
- 2: Exercise caution when assessing open joints since this may be a feature of pipelines for filter drains.
- 3: The Employer should be consulted where the condition of brickwork drains is to be assessed.

NG 2906 Quality

General

- 1 The Employer's Representative should ensure that the Surveyor who is to undertake the survey has current valid certification. The compiler should ensure that The Instruction for Tendering require the Tenderers to name the Surveyors proposed and to provide evidence that they hold the appropriate qualification.
- 2 All defects should be recorded on site, however, the technical judgement as to the significance of the defect in respect of road drainage systems should be made by the **Employers designer** [Specialist responsible for the design of the Works].

Quality control procedures

- 3 The 5% sample survey for quality control is to be selected by the use of randomly generated numbers.
- 4 Each Surveyor should have a different set of random numbers, which should be generated

at the end of each week and applied to the previous week's surveys.

- 5 On site, the Surveyor logs certain information about the surveys being undertaken and the order in which they are carried out. The Contractor's office staff then counts through the surveys that have taken place and selects the reports that coincide with the random numbers.
- 6 The derivation of Header accuracy is the proportion of entries made in the header fields, which are correctly entered using the correct symbols or codes.
- 7 The derivation of the Detail accuracy is the proportion of entries that are correct. A missing entry should be regarded as incorrect. The results are plotted on the Surveyor's accuracy graph.
- 8 The continued accuracy of the Surveyor is calculated by taking the mean of 5 percentage results. Both the individual survey percentages and the mean results are entered on to the Surveyors' accuracy graph.
- 9 If either two lines fall below the tolerances given in sub-Clause 2906.5 then the action is taken in accordance with sub-Clause 2906.8.

CCTV Picture quality – camera, video tape and monitor

- 10 The test device for the camera shall utilise the Marconi Resolution Chart No 1 or equivalent. Where the Contractor proposes the use of an equivalent, the details of the chart should be supplied to the Employer's Representative.
- 11 The Contractor is required in sub-Clause 2906.10 to submit the test devices for the video tape recorder and monitor to the Employer for approval.
- 12 The performance of the camera is to be demonstrated by the recording of the approved test device for a minimum of 30 seconds at the commencement of each day. The **Employer's Representative** [Specialist responsible for the design of the Works] should ensure that the demonstration recordings are reviewed on a daily basis.
- 13 It may be necessary to vary the illumination to accommodate changes in drain fabric or environment. This should be undertaken prior to the setup as the illumination,

generally, should not be varied during the survey.

NG 2907 Health and Safety Issues

General

- 1 All chambers and pipelines comprising roaddrainage systems should be treated as confined spaces. A confined space is defined as a workplace that does not have the benefit of natural ventilation. They are potentially dangerous because of the possible existence of toxic or flammable gases, deficiencies in oxygen, or the build-up of fumes due to the operations being undertaken. Where physical exertion is necessary to gain access or egress due to confinement can define a confined space.
- 2 The presence of known hazards should be stated in the preliminary Safety and Health Plan .

Zone Classification

- 3 All electrical equipment shall be suitable for use in potentially explosive atmospheres.
- 4 Unless otherwise specified in Appendix 28/1 all road drainage systems are to be classified as a place in which an explosive atmosphere consisting of a mixture with air of dangerous substances in the form of gas, vapour or mist is not likely to occur in normal operation but, if it does occur, will persist for a short period only. The Contractor shall confirm the classification with the Employer 's Representative.

Known Hazards

- 5 Any known hazards associated with the sections of drain to be surveyed shall be stated in the preliminary Health and Safety file and be incorporated into the Contractor's Health and Safety Plan. This information shall be used in the Risk Assessment before each survey is commenced.

NG 2908 Coding of Survey Information

General

- 1 The coding of survey information shall comply with IS EN 13508-2:2001 Condition of Drain and Sewer Systems Outside

Buildings, Part 2 Visual Inspection Coding Systems.

Header Information

- 2 The pipe or manhole reference shall be unique. The reference numbering shall be supplied to the Contractor by the **Employer's Representative** [Specialist responsible for the design of the Works]. The use of a numbering system that identifies the access points (chambers) by reference to the Irish Ordnance Survey grid will enable the unique numbering system to be maintained when new reference numbers are applied to chambers discovered during the course of the survey. Where a new node is located during the survey, the Contractor shall request the **Employer's Representative** [Specialist responsible for the design of the Works] to assign the node a new number which the Contractor should use in the report.
- 3 **Length of drain:** shall be measured between the exit faces of the manhole or access chamber at the point of entry to the next manhole or access chamber. These are referred to as the Node Points.
- 4 **Method of inspection:** Should always be CCTV.
- 5 **Pre-cleansing:** is to be specified by the **Employer's designer** [Specialist responsible for the design of the Works]. The minimum pre-cleansing should be sufficient to ensure that the camera can pass through the drainage system. Warning, pre-cleansing the drain may remove evidence of Service Defects within the system.
- 6 **Location:** should grade each drain in terms of its location. Graded A/B/C should determine how important the drain is in terms of consequence of failure.

- 7 **Year of construction:** where this is known the information should be included, but is more applicable to new construction.
- 8 **Name of the Surveyor:** should be the name of the Surveyor undertaking the survey and not the name of the Contractor. This should be the person for whom certification has been submitted.

NG 2909 Drain Condition Inspection

General

- 1 The **Employer** [Specialist responsible for the design of the Works] should supply the Contractor with 2 sets of plans showing the drains to be surveyed. The Survey Contractor should return one copy of the plans accurately referencing the extent of the completed survey.
- 2 Where the covers will be removed by the Employer this should be stated in Appendix 29/1.
- 3 The CCTV camera lens should be positioned to a tolerance of ± 10% of the vertical drain dimension. The Employer's Representative should check that the Contractor has procedures in place to ensure compliance with the tolerance in the positioning of the camera. Should the alignment be outside the tolerance, the survey for that section of drain should not be accepted.
- 4 The length of drain from the zero chainage to the cable calibration point should be recorded and reported. The Employer's Representative should ensure that the Contractor supplies the records for scrutiny on a daily basis.

Table NG 2908/1: Strategic grade


Grade	Position of drain
A	Transverse drain Central reserve Carrier drain in motorway/trunk road
B	Verge Shoulder
C	Remote from carriageway and verge

NG SAMPLE APPENDIX 29/1: CCTV SURVEY OF ROAD DRAINAGE SYSTEMS

[Note to the compiler: This should include]

- 1 Identification of the plans and details of the survey [2904.1]
- 2 The location of the surveys is to be detailed in accordance with sub-Clause NG2908.6 [2904.2]
- 3 Requirement for Pre-cleansing [2904.4]
- 4 Where traffic management is to be provided by the Contractor details of the Employer's requirements in respect of the traffic management should be inserted. [2904.6]
- 5 Restricted working hours or work periods outside normal hours to be scheduled. [2904.12]
- 6 Responsibility for clearing blockages to be stated. [2904.13]
- 7 The content of the survey report, including number of copies and types should be specified [2905.1]
- 8 Requirement for items of the survey report to be provided to the **Employer's Representative** [Specialist responsible for the design of the Works] during the survey. [2905.2]
- 9 Recording format should be specified [2905.5]
- 10 Changes to the coding used for the survey should be specified [2905.8]
- 11 Photograph size should be stated if different from specification [2905.13]
- 12 Requirement for colour film or digital imager should be stated [2905.13]
- 13 Photographs intervals should be defined [2905.14]
- 14 The format for the presentation of survey photographs is to be specified. [2905.18]
- 15 The format for the presentation of photograph negatives where different to the specification [2905.19]
- 16 Requirement to photograph defects, features and condition to be stated [2908.10]
- 17 Where the removal and replacement of all manhole or access chamber covers will be undertaken by the Employer, this should be stated [2909.1]



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