# MOTORWAY COMMUNICATIONS

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# Motorway Communications

## NG 1501 Introduction

**1** A Motorway Communications System (MCS) includes telephones, matrix signals and the associated power supplies and control systems. The Road Authority should be consulted during the design and preparation of contract documents.

2 In the normal motorway construction contract the installation of cables, cabinets, signal posts, telephone posts and housing will be the responsibility of the Contractor. Drawings for motorway installation work should be included in the Contract as described in Clause NG 003.

**3** Normally the Road Authority will be directly responsible for the installation of the matrix signals and the commissioning of the whole system and will arrange this work by means of a separate contract.

4 The Road Authority is responsible for arranging with the electricity supplier for provision of a power supply for the communi-cations system. The Road Authority is responsible for negotiating the provision of connections to a telecommunications carrier's private wire network where required. In both cases negotiations must be initiated and the interface cabinets erected in sufficient time to ensure that completion of the system is not delayed and power supplies to Cabinets must be available at the time of installation.

## NG 1502 General Requirements

**1** Motorways should not be opened to traffic unless the telephone system is operational.

2 It is essential that the communications installation is installed and successfully tested 4 weeks before opening to allow adequate time for commissioning.

**3** If a Contract contains Sectional completions it may be necessary to make provision in Appendix 15/1 for the appropriate part or parts of the system to be completed 4 weeks before completion of each Section. Testing in sections may also be required.

## NG 1504 Site Records

1 As-built drawings which should include inserts to a larger scale where layouts are complex, should be produced by the Engineer from daily records. The Contractor should maintain record drawings as described in this Clause. Should additional information be required on the record drawings this should be described in Appendix 15/1. If considered practical, one set of drawings can be used for recording both motorway communications and road lighting details (see NG 1402).

## NG 1506 Cables

1 Cables will normally be supplied by the Contractor as specified in Appendix 15/1. The Engineer's site staff must check the manufacturer's test certificate for each drum of cable before it is installed.

2 Communications cable lengths in excess of 550 metres are not permitted and lengths less than 450 metres for longitudinal cables should be allowed only on agreement with the Road Authority who will provide the appropriate loading schedule.

**3** The Road Authority must be consulted whenever it is proposed to use any cable not complying with the cable specification.

## NG 1507 Cable Laying

**1** All communications equipment must be sited within the motorway boundary. Experience has shown that the best location for longitudinal cables is near the motorway boundary fence. Special attention should be paid to the relative positions of cables, drains, environmental/noise barriers and safety fences, tree planting areas, signs and lighting columns during the design to prevent subsequent construction or main-tenance operations damaging the cables.

2 Where practicable, provision should be made for an additional length of the main longitudinal cable at the site of each terminal cabinet to allow for future re-terminations.

**3** Ducts must be provided in accordance with the NRA Road Construction Details and with

Clause 501. The position of ducts should be adjusted from the standard spacing so that they coincide with the siting of equipment and to keep the length of cabling in verges to a minimum. Additional ducts may be required to meet the specific design being catered for. The position of ducts in existing motorways to be used where new schemes overlap them should be ascertained and accurately located on the ground and on the Drawings before tenders are invited. Draw pits for cables may be necessary in long ducts, (e.g. in viaducts and other lengthy structures).

**4** As an alternative to laying cables in trench the Contractor may, subject to the Engineer's approval use a purpose-built cable laying machine. It should be of a type approved by the Engineer and capable of forming a slit in the soil before guiding and laying the cable and marker tape without strain. A sand surround to the cable need not be provided if this method of laying is used.

5 If alternative methods of laying cables in trenches are offered and approved the Contractor may elect to use multi-passes of the purpose built cable laying machine in order to lay several parallel cables instead of laying all the cables in one operation. Care must be taken in such cases to ensure that cables already laid are not damaged by subsequent passes of the machine.

## NG 1508 Installation of Cabinets and Signal Posts

**1** Cabinets are generally expected to be sited near the boundary fences. However, some locations, e.g. cut/fill lines may put them in a position where they are particularly vulnerable to damage from vehicles leaving the carriageway. In such cases they should be protected by means of safety fencing or the extension of an existing safety fence. It is recommended that a safety fence should always be provided when equipment is located near the hardshoulder. Signal posts should be protected in accordance with the current requirements for the provision of safety fences.

**2** Power supplies may be provided from a supply point which is either near to or remote from a group of communications cabinets. Where the supply point is greater than 100 metres away from a group or across a main carriageway then an additional power cabinet should be provided in the group.

3 Paved areas are required to form platforms adjoining cabinets and gantry bases for maintenance purposes. Easy access must be available to the cabinets as heavy testing equipment needs to be carried to them in all weather conditions. Slopes exceeding 1 in 3 should be provided with steps, and crossings should be provided over ditches, where appropriate. In some cases it may be necessary to site cabinets on a slope thus involving the construction of suitable platforms. All such details should be included in Appendix 15/1.

## NG 1510 Installation of Telephone Posts and Housings

**1** Telephone housings should be installed so that the rear of the housing faces on-coming traffic- except that when located next to safety fencing the housing should be turned through 90° to allow access to the instrument from the traffic side of the safety fence.

**2** In the interests of safety it is imperative that telephones which have not been commissioned and are, therefore, not available for use are covered with "Not in Use" bags.

## NG 1511 Cable Joints

**1** Joints in any cables are most undesirable and are only permitted in power cable when prior written approval for the jointing of the cable has been given by the Road Authority.

**2** In power supply cables for communications, approval will not be given for more than one joint in any one cable between terminations, or where the combined length of the 2 cables to be jointed is less than 70 metres.

3 Shortage of cable through incorrect measurement, wilful damage, cable faults, cable damage or such other causes will not be accepted as a justification for cable joints. Such circumstances must be overcome by the Contractor installing a completely new length of cable.

**4** Where joints are permitted, joint markers must be provided and these must be accurately recorded on the record drawings.

5 Minor sheath repairs to communications cable may be permitted in accordance with the cable specification, where approved by the Engineer.

## NG 1512 Installation of Ancillary Items

**1** Distributive and protective devices must be specified in Appendix 15/1 and may include fused cut-outs, distribution boxes, miniature circuit breakers and/or residual current devices (RCD's) of a suitable rating.

**2** Where required, post mounted entry stop signals, which comprise a 1 metre square target board on a post must be positioned on site to ensure that they are clearly visible before entering on to the motorway and will not be obscured by signs or other street furniture.

## NG 1516 Termination of Power Supply Cables for Communications

1 The requirements for termination of power supply cables must be fully detailed on the Drawings, cross-referenced in Appendix 15/1.

## NG 1517 Earthing and Bonding

1 The provisions of Clause 1516 are to cover the interna] earthing and bonding of the system. In some areas the requirements of the electricity supplier or the results of testing may require additional earth(s) to be provided and these requirements must be incorporated in the design. Specific requirements for earthing and bonding are to be detailed in Appendix 15/1.

## NG 1518 Cable Testing

**1** The Road Authority should be consulted about testing requirements.

**2** Details of cable tests, frequency, reporting etc. are to be shown in Appendix 1/5.

**3** The cable sections upon which Stage 2 tests are to be carried out must be stated in Appendix 15/1. They are best shown on the loading schedule or on a cable drawing. Sections to be tested may comprise the complete length of longitudinal cable in the Contract or such shorter lengths as circumstances may demand. In some cases tests may also be called for on lengths of cable which include lengths previously laid under another contract. If faults are revealed on the latter or any tests fail to produce results which meet performance requirements, the Engineer should seek advice immediately from the Road Authority.

## NG 1519 Labelling and Numbering

**1** The importance of labelling cannot be over-stressed and compliance with the Specification is essential to future maintenance operations. Where alternatives are proposed, the prior approval of the Road Authority should be obtained to such proposals.

## NG 1520 Loading

**1** In certain special situations, and wherever a cable length is less than 450 metres it becomes necessary to build out the circuits with appropriate capacitors inserted into the terminators and a loading drawing/ schedule agreed with the Road Authority shall be provided in Appendix 15/1 as part of the Contract. Where significant changes are made in the lengths of longitudinal cables the Road Authority must be advised without delay.

## NG 1521 Removal and Resiting of Existing Equipment

**1** It may be necessary to make provision for the removal and re-siting of existing communications equipment, particularly at a new motorway interchange with an existing motorway where re-routing of cables is required.

**2** Boxes and cabinets and their contents are worth recovery for re-use, but plinths and cables are not. If any equipment is not immediately required it can be stored for future use by the Road Authority. The location of the store should be described in Appendix 2/3.

**3** Existing cables which are no longer required should be removed where to do so will not result in consequential damage to the existing in-service cables in order to prevent interference with the operation of the communications system.

4 Clear instructions should be given in Appendix 15/1 as to the removal and disposal of equipment.

## NG 1523 Loop Detectors

1 This Clause covers only the installation of the loops and cabinets.

2 Inductive loops should have a minimum clearance of 50 mm above road reinforcement and slots should be at least 1 m, in the lateral plane from any ferrous objects such as metal reinforcement bars, chamber covers etc. Also, in concrete roads, slots should not be cut less than 1.5 m from transverse joints between adjacent concrete sections. Where these requirements cannot be met, detailed discussions/tests will be required in order to establish the design of a viable system.

3 Clause 1217 covers the requirements of the installation of loop detectors and the UK Department of Transport HCD G Series Drawings may be used as Contract Drawings where appropriate. The designer should ensure that the location and type of loop configuration is shown on suitable drawings and that consideration has been given to the effect of any slab reinforcement in the concrete. He should also include sufficient ducts in the Contract to accommodate the number of feeders required at a particular location.

4 Loop installations should be sited as near as possible to an existing power supply which will usually be taken from a power supply point for the communications system. Failing this an independent supply will have to be provided by negotiation with the local electricity supplier.

**5** The Road Authority will advise on the use of cold poured epoxy resin compounds. Where hot poured sealants are used, it should be noted that to avoid damage to the detector loop insulations, the Contractor may use only those for which the manufacturer's recommend pouring temperatures do not exceed 85°C.

## NG 1524 Trial Pits

1 The Engineer should describe the method of excavation of trial pits (by hand or other means) and the locations, in Appendix 15/1.

## NG SAMPLE APPENDIX 15/1: MOTORWAY COMMUNICATIONS

*[Notes to compiler:*

**1** *Appendix 15/1 should be specific for each scheme and provide all the information which a Tenderer requires. Appendix 15/1 should include references to any other specifications and drawings as necessary.*

**2** *Appendix 15/1 should include the following information as applicable:/*

(i) any additional information to be provided on records drawings *(1504.1]*

(ii) types and specification for communication cable required *[1506.1]*

(iii) types and specification for power cable required *[1506.2/*

(iv) requirements for surface reinstatement to trench *[1507.15]*

(v) termination requirements for power supply cables */1516.1J*

(vi) cable sections for stage 2 testing *[1518.3]*

(vii) description of labelling requirements for gantries, signal posts, cabinets and telephones *[ 1519.1]*

(viii) details of electrical loading requirements for communication cable */1520.1]*

(ix) resiting details of equipment *[1521.5] [provision for dismantling and storage should be made in Appendix 2/3]*

(x) details of trial pit excavation; including number, size, method of excavation and locations *[1524]*

(xi) references to drawings which show approximate positions of cable trenches, cables and their terminating cabinets */1506.3, 1507.3]*

(xii) requirements for installation of cable covers *[1507.2/*

(xiii) particular requirements for cable laying, additional protection and support */1507.5]*

(xiv) requirements for cables following the same route if different from the requirements of sub-Clause 1507.7

(xv) references to drawings which show construction of paved areas and foundations incorporating plinths for cabinets and signal posts *[1508.1]*

(xvi) reference to drawings which show construction of paved areas and foundations for telephone posts [1510.1]

(xvii) requirements for orientation of telephone housing if different from the requirements of sub-Clause 1510.2

(xviii) reference to drawings which show location of cable joints and cable joint marker blocks and details of indented *mark [1511.2, 1511.6]*
*[cross-reference should be made to the NRA Road Construction Details where appropriate]*

(xix) references to drawings which show installation details for ancillary items *[1512]*

(xx) requirements for terminating cables if different from the requirements of sub-Clause 1513.3

(xxi) requirements for reinstatement if different from the requirements of sub-Clause 1521.7

(xxii) requirements for completion and testing in Sections */1502.2]*