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Traffic Control and Communications Infrastructure Design

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National Roads Authority

Volume 9 Section 5
Part 1
NRA TA 77/13

Traffic Control and Communications Infrastructure Design

October 2013

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Summary:

This Advice Note describes the infrastructure required to support a motorways communications system. It also describes how the design process should proceed and the factors that should be taken into account.

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VOLUME 9 TRAFFIC CONTROL AND COMMUNICATIONS
SECTION 5 INFRASTRUCTURE DESIGN

PART 1

NRA TA 77/13

TRAFFIC CONTROLS AND COMMUNICATIONS INFRASTRUCTURE DESIGN

Contents

Chapter

1. INTRODUCTION

General

1.1 This NRA TD 77/13 describes the infrastructure required to support a ducted communications system network for all national road schemes in Ireland. It also describes how the design process should proceed and the factors that should be taken into account.

Scope

1.2 This Advice Note is applicable to the design and provision of infrastructure to support the Roads Authority Traffic Control and Communications Systems and equipment. It can be used within motorway communications, motorway construction and improvement schemes.

1.3 This Advice Note is intended to be used by Roads Authority staff, their consultants, Agents and maintenance contractors.

Implementation

1.4 This Advice Note should be used forthwith on all motorway communications, motorway construction and improvement schemes currently being prepared provided that, in the opinion of the Roads Authority, this would not result in significant additional expense or delay progress. The specific application of NRA TA 77/13 to particular schemes should be confirmed with the Road Authority.

2. OVERVIEW

General

2.1 The National Roads Authority operates a national cabling infrastructure for motorway communications. The standard method of cable installation is non-armoured cable in a duct network.

2.2 This method of installation has the following advantages:

a) Increased network flexibility and durability;

b) Increased system and network security;

c) Ease of cable installation and removal of redundant cable; and

d) Reduced traffic management requirements.

Ducted Cable Network

2.3 The scheme should provide a fully ducted cable network with chambers providing access to joints and terminations and for cable installation. The ducted network is sealed from gas and water.

2.4 The cable installation is fully detailed in the RCD 1500 series and includes the following main features:

a) A fully ducted cable network, including detectable marker tape;

b) Cable jointing and terminations within environmentally sealed underground enclosures; and

c) Non-armoured cable.

Cable types

2.5 The following cable types are installed:

a) Longitudinal fibre optic cable

b) Local fibre optic cable

c) Power cable to equipment

d) Coaxial cable to equipment; and,

e) Loop detector and feeder cables.

f) And any other cable necessary for the control/operation of devices.

3. NETWORK DESCRIPTION

Introduction

3.1 The network comprises the following, which are described in this chapter:

a) Cable network;

b) Duct network;

c) Roadside electronic equipment;

d) Power supplies;

3.2 The design of the network should take account of the existing cable network and the effect which the design will have upon it.

Non-Armoured Cable Network

3.3 Non armoured cable is installed in ducts.

Longitudinal Optical Fibre Cable Network

3.4 Longitudinal optic fibre cable carries data between roadside equipment and their respective control office.

3.5 Fibre splices are housed in Cable Joint Enclosures (CJE) installed inside underground chambers.

3.6 Roadside equipment is connected to adjacent longitudinal fiber optic cable via network equipment housed in roadside equipment cabinets and local fibre optic cable installed in the duct network.

Duct Network

3.7 The duct network is described fully in Chapter 7. In summary it comprises of the following on the motorway network:

a) 100mm internal diameter 4-way longitudinal ducting, local ducts to equipment and transverse ducts;

b) chambers at transverse duct locations (Type COMMS I) at 500m (tolerance +2%;-5%) intervals;

c) intermediate chambers (Type COMMS II) at 250m offset from the chambers at transverse duct locations, and where necessary to facilitate cable installation (such as at a structure, a cabinet location or change in direction);

Roadside Electronic Equipment

3.8 Roadside Electronic equipment is housed in Roadside Equipment Cabinets. They are sealed and contain thermostatically controlled heaters and power distribution units.

3.9 This equipment currently includes Traffic Monitoring Units(TMU), Automatic Number Plate Recognition (ANPR), Closed Circuit Television (CCTV), Variable Message Signs (VMS),

Automatic Traffic Counter (ATC), Automatic Incident Detection (AID), and communications equipment but is likely to vary over time.

Power Supplies

3.10 Electricity Supply Company Interface (EI) equipment is housed in electrical pillars which are installed on the motorway boundary fence line. The Electricity Supply Company's equipment and power supply cable are installed on the non-motorway side of the cabinet.

3.11 Power is distributed from the EI cabinets to the roadside equipment cabinets and then onto the equipment on the motorway. The power supply cable is routed to the roadside equipment cabinets via an isolation mini-pillar adjacent to the roadside equipment cabinet.

Protection of Existing Cable

3.12 When planning work on the existing road network, special consideration should be given to the protection of the existing traffic control and communications infrastructure. The longitudinal cable will be part of the national network in addition to its function of carrying local data from roadside electronic equipment. Any damage to the cable will therefore cause disruption to roadside electronic equipment over an extremely wide area.

3.13 An Existing Communications Report shall be produced which will include an assessment of how the scheme will affect the existing communications network and the provisions necessary to maintain the integrity of the network. Where it is impossible to avoid interruption, the existing network shall still be maintained operational to the maximum extent possible.

3.14 During the design stage the location of all cable and equipment should be determined and an assessment made of the risk of damage. In general, where works are to be undertaken on the verge containing cable and equipment, there will be a significant risk of damage. It should be noted that the opposite verge will also contain equipment and probably power supply cables which will therefore be vulnerable to damage from works on this verge.

Precautions to Avoid Damage to Existing Cable

3.15 The precautions required will depend on many factors including the risk of damage and the communications infrastructure to be provided by the scheme.

3.16 Where a contractor will be working in close proximity to existing cables or duct, the exact location of the cables and duct should be positively identified (horizontal and vertical) and marked clearly prior to the commencement of any works. It may be possible to fence off the vulnerable area with temporary fencing, taking care not to damage cable or duct whilst installing fence posts.

3.17 Consideration should be given to programming the works to avoid working adjacent to live cables wherever possible.

3.18 It will not be permissible to excavate by mechanical means in the vicinity of existing cables or ducts. This should be taken into account during the planning stage and due allowance should be made for excavation by hand as appropriate. This may affect the planned duration of site works.

Cable Damage and Replacement

3.19 All instances of damage to cable should be regarded as serious. All cable damage should be reported immediately to the Employer's Representative by the Contractor. The Road Authority should be informed as soon as practicable.

3.20 All damaged cables should be replaced at the contractor's cost. Where cable is to be replaced the complete section, between joints, must be replaced. The Road Authority will be able to advise of manufacturers of cable to the required specifications. Ideally replacement will be undertaken during the contract period. If this is not possible then all reasonable costs incurred by the Road Authority in replacing the cable, including traffic management, will be recovered from the contractor.

4. MOTORWAY CABLES

4.1 Not used

5. NETWORK DESIGN

General Procedure

5.1 This chapter deals with the design of ducted cable networks.

Design Process

5.2 The design process is iterative. All items of roadside equipment and cable joints will have their 'ideal' locations; however the most efficient design will be one which achieves the balance between ideal locations, physical constraints and cost. For instance, minor adjustments to locations may result in duct, cable or equipment savings.

5.3 The first stage in the design of a communications network is to correctly site all communications devices on 1:10000 scale drawings. This design is transferred to the 1:2500 scale drawings, and a schematic design is produced. The longitudinal cables are then designed and added to the drawings. All local cables and items of equipment are then added to the schematic design which is then transferred back to the 1:2500 scale drawings. The locations of equipment, chambers and cabinets are then checked against physical constraints and adjusted accordingly to ensure that staff access can be maintained.

Duct and Chamber Design

5.4 Following the initial schematic communications design, ducts and chambers should be positioned.

5.5 Provisional sites should then be refined to site chambers in the optimum positions.

Selection of Duct Route

5.6 One of the earliest tasks during the design is to determine the most suitable route for the longitudinal duct route. The planning of the route will involve plotting a suitable route on drawings at 1:2500 scale and a survey of the site to confirm the suitability of the chosen route.

5.7 All ducts should be laid within the road network boundary.

5.8 Where bases for equipment such as CCTV cameras or large signs coincide with the duct route these bases should be designed to allow ducts to be built in.

5.9 When planning the duct route the precise locations of all proposed and existing communications cables, duct routes and other relevant features should be plotted, from the schematic design, onto drawings at 1:2500 scale. Relevant features include:

a) Cuttings/Embankments;

b) Structures including bridges, retaining walls;

c) Drains;

d) Safety fences;

e) Lighting and other cables;

f) Gantries or verge mounted signs;

g) Noise fences;

h) Overhead and underground services;

i) Environmental mounds; and

j) Trees.

5.10 The presence of particular features may require the use of special methods of construction or special items of plant or machinery. For example, installing ducts behind safety fencing on a steep embankment would be beyond the capabilities of standard mechanical excavators. This may, in turn, require special traffic management arrangements or result in the need for night working. All such details should be included in tender documentation.

5.11 The longitudinal cable should normally be kept on the same side of the motorway throughout its length, or at least, for a substantial distance. The side chosen will depend on the balance of advantages and disadvantages after considering such features as:

a) Cuttings/Embankments;

b) Flood plains;

c) Overhead power lines or electrified railway or buried power cables;

d) Relationship to Transmission Stations and cables/ducts on adjacent sections of motorway;

e) Ease of siting cabinets including access and safety protection;

f) Ease of providing power supplies;

g) Ease of routing duct.

5.12 Ducts to local equipment should occupy the same trench as longitudinal ducts as far as possible. When choosing the route for a local duct the guidance given for longitudinal duct route selection will apply equally.

6. POWER SUPPLY DESIGN

6.1 Not used

7. CABLE DUCTS

General

7.1 The standard method of cable installation is non-armoured cable installed in duct.

7.2 The ducted network consists of 100mm internal diameter longitudinal ducts located in the verge or earthworks, offset at a nominal 2m from the back of hard shoulder, and transverse ducts at 500m centres crossing beneath the carriageway at right angles to it.

7.3 The ducted network is sealed.

7.4 Cables for street lighting must not be laid in the same duct as cables for motorway communications.

Material and Installation Standards

7.5 The material specification for ducts is provided in the 1500 Series of the Specification. Ducts are manufactured from thermoplastic material.

7.6 Each length of ducting should be fitted with a non-rotting stranded draw rope and the duct ends fitted with purpose made compression plugs providing a water, air and gas tight seal, as detailed in the 1500 Series of the Specifications.

7.7 Joints between adjacent lengths of ducts should be air and water tight. It is imperative that material such as silt, grout or concrete is prevented from entering the duct during the jointing process. Material such as this will cause damage to the cable during installation.

Longitudinal Ducts

7.8 Design standards are detailed on the Series 1500 Motorways Road Construction Detail (RCD) drawings, contained in Volume 4 of the NRA Manual of Contract Documents for Road Works (MCDRW).

7.9 The standard arrangement for longitudinal Traffic Control and Communications ducts is a group of 4 ducts of 100mm nominal internal diameter arranged in a 2x2 array. The number of ducts to be provided is detailed in Table 7.1.

Use	Road Type			
	Each Verge			One Verge
	Motorway with Lane Control Signals	Motorway	Dual Carriageway	All other roads
TCC Power	2 x 100mm			
TCC Communications	4 x 100mm	4 x 100mm	4 x 100mm	2 x 100mm
Department of Communications	2 x 100mm	2 x 100mm	2 x 100mm	2 x 100mm
Ducting reserved for third parties	2 x 100mm	2 x 100mm	2 x 100mm	2 x 100mm

Table 7.1 Ducting Provision in each verge

7.10 Ducts shall be separated laterally to allow joints to be made. It is imperative that the separation between ducts is constant along the length of the duct run, as this will ensure that deviations in alignment are kept to the absolute minimum. To ensure that ducts remain in position during installation, in particular during backfilling operations, they shall be strapped or clipped together at intervals of no more than 2m. A purpose made spacer, inserted at the strapping/clipping positions will ensure that the required spacing is maintained. Alternatively a purpose made spacer/clip can serve the dual purpose of spacing and retaining ducts.

7.11 Ideally ducts should be laid in straight lines from one chamber to the next. In practice this will rarely be achievable due to the alignment of the motorway. Ducts should be installed to a smooth alignment which follows the road layout. Any changes in horizontal or vertical alignment will form pinch points where cables will incur damage during installation.

7.12 Longitudinal ducts should be located to the rear of all other services and equipment including safety fence, drainage and lighting columns. The nominal offset from the back of the hardshoulder should be 2m. Ducts should be installed in a trench with 600 mm of cover. Trench details for ducts are given within the RCD drawings.

7.13 The optimum location for cable ducts is within a flat verge. This will automatically be achieved in areas where verge widening occurs or where additional land adjacent to the carriageway is required for other purposes, such as landscaping. However, the benefits of locating the ducts in a flat verge should be borne in mind during the early stages of design and additional verge width should be provided if there is opportunity to do so at no extra cost.

7.14 In some circumstances, it will be necessary to deviate from the nominal offset. For example, where there is limited width available or non-existent conventional verges, such as in areas of retained cutting. In these cases, the duct may be located under the hardened verge. Cable draw pits can be located either in the centre of the wheel-track zone in the hard shoulder or within the hardened verge.

7.15 Special consideration should be given to the installation of ducts at structures. If possible ducts should be buried in the hardened verge, but the presence of other services, or the design of the structure, may prohibit this and alternative arrangements should be made. It is important that 4 x 100mm ducts are provided. In the instances where it is not possible to provide 4 x 100mm ducts these locations should be marked clearly on the drawings to allow the cable designer to adjust the design accordingly. Approval to proceed will be required from the National Roads Authority where 4 x 100mm ducts are not proposed.

Geotechnical Considerations

7.16 In the majority of cases, the ducts will be located within the earthworks slopes. The excavating of trenches in these slopes can lead to problems with slope stability. The geotechnical implications of this should be checked for each scheme. The problems can be overcome by taking the necessary precautionary measures during the design stage and by maintaining high standards of workmanship and control during construction.

7.17 Consultation with the National Roads Authority at an early stage is essential. Additional information, for example from trial pits, may be required.

7.18 The excavation of a trench at the toe of a cutting should be dealt with carefully as poor design and poor workmanship could lead to a local failure of the slope. Problems can be avoided by the use of a narrow trench (typically 0.5 m) and by ensuring that, during construction, trenches are excavated in relatively short lengths and not left open for extended periods. Proper specification of trench fill material combined with high standards of compaction will also minimise the risk of failure. Where a slope is identified as being at risk special precautions will be required in both design and construction.

7.19 The excavation of a trench at the crown of an embankment slope should also be approached with care. The problem in this instance would be that the trench could act as a drain, collecting surface run-off without having an outfall. The build-up of water would, in cohesive soils, eventually saturate and weaken the surrounding soil. This problem can quite readily be avoided by the use of a properly specified and constructed trench detail and where necessary, by the use of special details such as a geotextile seal near the surface of the trench.

7.20 The location of longitudinal ducts within a flat verge, cutting and embankment is shown on the RCD drawings.

Transverse Ducts

7.21 Transverse ducts provide the means by which cables may cross carriageways from one verge to the other and from one side of a slip road to the other.

7.22 Standard provision is for a group of four 100 mm diameter ducts at nominal 500m intervals as detailed on RCD Drawings.

7.23 The RCD drawings show a typical arrangement of carriageway crossings at slip roads and link roads.

7.24 The depth of transverse ducts is dictated by the following factors:

a) the pavement construction depth;

b) the method of duct installation to be used;

c) the need to ensure that adequate protection to the duct is achieved, both during construction and under long term vehicular loading;

d) the location of drains; and,

e) whether the road is new or existing.

New Roads

7.25 For new roads, transverse ducts should be laid in a trench excavated in the material below the capping layer. Ducts should not be located within the capping layer as this could result in the formation of hard spots which could affect the surface of the carriageway above. The minimum cover to transverse ducts should be either:

a. 900 mm if the ducts are covered by a 150 mm thick concrete slab, or

b. 1200 mm if no concrete cover is provided

7.26 In all cases the ducts should be located at least 150 mm below the bottom of the capping layer, or if no capping layer is required, at least 150 mm below the formation level.

Existing Roads

7.27 Transverse ducts should be installed beneath existing carriageways, using trenchless techniques. The depths of these ducts will be dependent upon the material in which the ducts are to be located, the likely impact of the installation method on the surrounding ground and the location of drainage pipes. The minimum depths detailed above for ducts in trenches apply also to trenchless ducts, but these depths may have to be increased to ensure that the displacement of the surrounding ground does not affect the structural integrity of the pavement construction or capping layer.

7.28 It is imperative that as-built records of pavement construction drainage and other services and geotechnical records are consulted when planning trenchless crossings of motorways.

7.29 A number of reliable well proven methods of trenchless duct provision are currently available including:

a) Auger boring;

b) Guided, steerable moles;

c) Thrust boring;

d) Impact moling;

e) Pipe ramming.

7.30 Careful consideration of factors such as ground conditions and local topography will be required before choosing a method of installation. The choice of an unsuitable method can have costly implications. It should be noted that when installing ducts in this manner, it is advisable not to install ducts in close proximity to each other to avoid ducts clashing.

Special Arrangements at Structures

7.31 On long structures, special arrangements may be necessary if transverse ducting at 500 m intervals cannot be provided. Early advice should be sought from the NRA.

7.32 Special details will be required where ducts cross expansion joints.

7.33 Where separate viaducts are constructed for each carriageway, provision for cabling between the structures may be required.

Local Ducts

7.34 Local ducts are used to connect equipment to the longitudinal and transverse duct network. One of the four ducts in the longitudinal network is allocated for local cabling.

7.35 Where additional local ducts are required for cabinets and devices, they shall be 100mm internal diameter and run from the nearest chamber either directly to the equipment or, via type intermediate chambers, to the cabinet site. Separate ducts for communications and power cables shall also be provided. Local ducts forming connections to emergency roadside telephones should be 50 mm diameter.

7.36 Local ducts should be laid in the same trench as longitudinal ducts. The RCD drawings show the standard trench detail for local ducts.

7.37 Where the distance between the cabinet site and the nearest chamber on the longitudinal duct network is more than 120m, an additional chamber shall be installed, on the line of the main duct

run, at the cabinet site as shown in the RCD drawings. The ducts allocated to longitudinal cables and spare shall be continuous through the chamber at this location.

Use of Existing Ducts

7.38 Existing ducts are likely to be limited to transverse ducts and ducts at structures.

Transverse Ducts

7.39 Transverse ducts are often extremely difficult to locate on existing motorways. The most common reason for this being that duct marker posts and blocks were not provided and where they have been provided they have rarely been maintained. Inaccurate as-installed information regarding ducts is also a common problem. The Authorities should keep records of duct location and usage up to date.

7.40 As the cost of providing new transverse ducts is relatively high, the utilisation of existing ducts should be considered. This will only be acceptable where the existing ducts meet the material and installation standards, and where they occur at locations which suit the proposed cable network.

7.41 A locational survey of existing ducts should be undertaken during the design stage to establish where existing ducts can be used, where new ducts are required and where cable routes may be revised to avoid the need for new ducts.

7.42 The survey should include accurate details of duct location (chainage and offset) and type, soundness of duct, its depth, diameter and the number and type of cables installed.

7.43 Empty ducts should be proved and cleared of debris using a mandrel.

7.44 Ducts containing existing cables should be used with extreme caution as cables will probably be snaked and twisted, the duct may be damaged internally and debris may have accumulated within the duct. Wherever possible, redundant cables should be identified and removed.

Ducts at Structures

7.45 It will frequently be found that where longitudinal ducts have been installed at structures, they have been provided only for existing cables with no additional capacity. This additional capacity can generally be provided by one of the following methods:

a) At a bridge which has a safety barrier and separate fence or parapet, it is often possible to lay ducts between them;

b) At a bridge which has no separate safety fence it may be practicable to attach ducts to the outside of a parapet;

c) It may be possible to install ducts in the hardened verge;

d) It may be possible to install ducts beneath the bridge surface, using the structure itself. For example, within a concrete box section or attached to steel girder sections.

7.46 The agreement of the NRA representative responsible for the structure is required before proceeding with any of these options.

Equipment Siting on Existing Motorways

7.47 When siting telephones, signals and other equipment on existing motorways, their locations should be planned such that the number of new duct crossings is minimised.

Ducts At Junctions

7.48 Ducts should be provided at junctions as shown in within the RCD drawings. It is important that all ducts start and finish on land belonging to the Road Authority.

Marker Tape

7.49 Ducts are to be installed in a trench as detailed in the RCD drawings. The trench detail includes the installation of a detectable marker tape which will allow the ducts to be located using electronic cable detecting equipment. It is important that adjacent lengths of marker tape are jointed correctly to achieve electrical continuity.

Duct Allocation

7.50 Cables are installed into nominated ducts as detailed in the RCD drawings.

8. CHAMBERS

Chamber Types

8.1 Three types of chambers are utilised within the ducted network as described below. Details of the following chamber types are contained within the RCD drawings.

8.2 Type COMMS I - these are Main/Joint chambers. They are required to accommodate cable joints and at the junction of transverse and longitudinal ducts. They are 1.3m x 0.75m in plan and are sufficiently large to accommodate transverse, longitudinal and local ducts as well as joints and coiled cable. Minimum depth of a jointing chamber is 1.2m.

8.3 Type COMMS II - these are intermediate chambers which should be located on longitudinal duct runs where changes in direction are encountered. They may be required where cabinet sites are located at a distance of more than 120m from the nearest Type COMMS I chamber. The maximum depth of a Type COMMS II chamber is 1.0m, where a deeper chamber is required a Type COMMS I chamber should be used

8.4 Type COMMS III - these are shallow chambers and are required in front of cabinets to ensure that the duct network remains enclosed.

8.5 Additional chambers are required at other locations such as slip road crossings, changes in alignment where additional chambers will facilitate cable installation, and at structures. It should be noted that at locations where cable joints are to be installed, Type COMMS I chambers may be required for access and cable management requirements.

Chamber Siting

8.6 Type COMMS I chambers shall be located typically at 500m (+2%, -5%) intervals along the length of the longitudinal ducts. Preferably they will coincide with the position of transverse ducts.

8.7 Type COMMS II chambers should be provided, as required, on the longitudinal duct run. Type COMMS II chambers should only be required where equipment sites are further than 120m from the nearest Type COMMS I chamber and at changes of direction.

8.8 Type COMMS III chambers should be provided at cabinet sites as detailed in the RCD drawings.

8.9 Type COMMS I and II chambers will generally be located at an offset of 2.0 m from the hard shoulder. It is likely that retaining walls may therefore be required at chamber locations. They should be designed to suit scheme specific topographical/geotechnical conditions. Consideration should be given, where appropriate, to adjusting the level of the top of the chamber in order to overcome the need for a retaining wall.

8.10 Where there is a limited width available or non-existent conventional verge, such as in areas of retained cutting, chambers can be located either under the hardshoulder or within the hardened verge. It should be noted that wherever possible, chambers should be located away from obstructions or retained cuttings.

Chambers at Structures

8.11 Where ducts are installed in structures, it is likely that they will be located at a different depth and offset to the main longitudinal duct run. This is due to the physical constraints of the structure.

8.12 At all such locations a chamber should be provided to allow cables to be installed. Generally, a Type COMMS II chamber should be provided; however, where the depth of the chamber will exceed 1m a Type COMMS I chamber will be required.

8.13 The difference in offset may require the provision of two chambers at each end of a bridge.

8.14 The location of safety fencing may affect the siting and construction of the chamber.

Drainage

8.15 During the design of the duct network the drainage of water from chambers should be considered. A suitable method should be provided to allow the free drainage of water from chambers. This can be achieved either by the use of a soakaway or by a connection to the road drainage network. Liaison with the NRAs drainage engineers will be required in order to arrive at the most appropriate design.

8.16 Chambers Type COMMS I and II are provided with a sump to allow the pumping out of water.

Labelling

8.17 Chambers shall be labelled in accordance with the requirements of the Specification 1500 Series.

9. ARMOURED CABLE INSTALLATIONS

9.1 Not used

10. CABINET SITING

Positioning

10.1 Suitable sites for cabinets should be assessed at the outset of the design. This assessment should aim to identify sites which are safe both for maintenance personnel and do not present hazards to motorist that would require mitigation in the form of safety barrier. The assessment should also have due regard for cost and aesthetics. On a ducted network, cabinets should be located at the main/joint chamber sites to minimise the number of intermediate chambers required and the length of local ducts.

10.2 Since cabinets are weatherproof, but not waterproof, they should be sited well above any likely flood level.

10.3 Consideration needs to be given to reducing the number of Cabinets by grouping together devices at the one location wherever possible as this has maintenance and capital cost savings advantages.

10.4 Where the motorway is sited in a cutting or on an embankment, care should be taken to ensure that cabinets do not cause visual intrusion for local residents or users of adjacent land.

10.5 Care should be taken to ensure that proposed or existing landscape planting is located so as not to cause access problems, for maintenance of either cabinets or the landscape planting itself, or obscure cabinets in future years.

Safety Barrier

10.6 Safety barrier may be required as mitigation in the event that communication equipment cannot be located outside the clear zone of the road. NRA TD 19 sets out the requirements for safety barriers to protect motorists from hazards within the clear zone of the road.

10.7 It may be possible to site cabinets downstream of bridge piers or behind safety barrier that already exists, or is planned as mitigation for other hazards. It may be possible to site a cabinet where it can be protected by an extension to existing or planned safety barrier, which would be more acceptable on both economic and safety grounds. In such cases, the communications equipment must always remain outside of the working width of the safety barrier.

10.8 Short gaps between adjacent lengths of safety barrier should be avoided. Where necessary, additional safety barrier should be provided to close such gaps.

Retaining Walls

10.9 Special consideration should be given to the siting of cabinets in retained cuttings. Where cabinets are to be located at the top of such retaining walls, access from the hardshoulder should be provided. Where cabinets are located in cut-outs in retaining walls there may be difficulties in routing cables to cabinets.

10.10 Retaining walls required to retain cuttings for cabinets should be designed and detailed as part of the communications infrastructure.

Access

10.11 The siting of all cabinets should allow for maintenance access. The requirement is that access should be readily and easily available from a vehicle parked on the hardshoulder or maintenance bay if provided. This may require the provision of a safe means of access and egress for vehicles.

10.12 Cabinets which are sited remotely from the carriageway may require the provision of access steps as detailed within the RCD drawings.

10.13 Maintenance staff may be required to carry heavy test equipment to equipment sites. Therefore steps should be provided where access involves a gradient exceeding 1 in 2 for a height exceeding 400mm.

10.14 Paved areas, constructed from standard paving slabs, should be constructed between access steps, cabinet hardstandings, the hardshoulder and any maintenance parking bays to provide a continuous, safe path.

11. CONSTRUCTION DETAIL

Hardstanding Areas

11.1 The standard of provision for hardstandings at cabinet and sites with equipment is given within the RCD drawings. Generally, a hardstanding should be provided at every cabinet door. Where two or more cabinets occur at one site, they should be linked by a paved area.

11.2 Where cabinets are situated on cutting or embankment slopes, consideration should be given to the provision of handrailing to protect maintenance personnel from the risk of falling.

Steps

11.3 Typical access steps for cabinets are detailed within the RCD drawings.

11.4 Where steps are specified, due consideration should be given to the Health and Safety implications of the specified layout. Consideration should also be given to the provision of handrailing alongside steps and also landings with guardrails to limit the height of individual flights of steps. Steps should not protrude from the cutting in such a way to cause a hazard to the motorists.

11.5 Where steps are provided, they should be linked to cabinet sites by a path constructed from standard paving slabs.

12. REFERENCES

12.1 National Roads Authority Publications:

NRA Design Manual for Roads and Bridges (NRA DMRB)

NRA Manual of Contract Documents for Road Works (NRA MCDRW)

13. ENQUIRIES

13.1 All technical enquiries or comments on this document, or any of the documents listed as forming part of the NRA DMRB, should be sent by e-mail to infoDMRB@nra.ie, addressed to the following:

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