NRA Structures Standards Update

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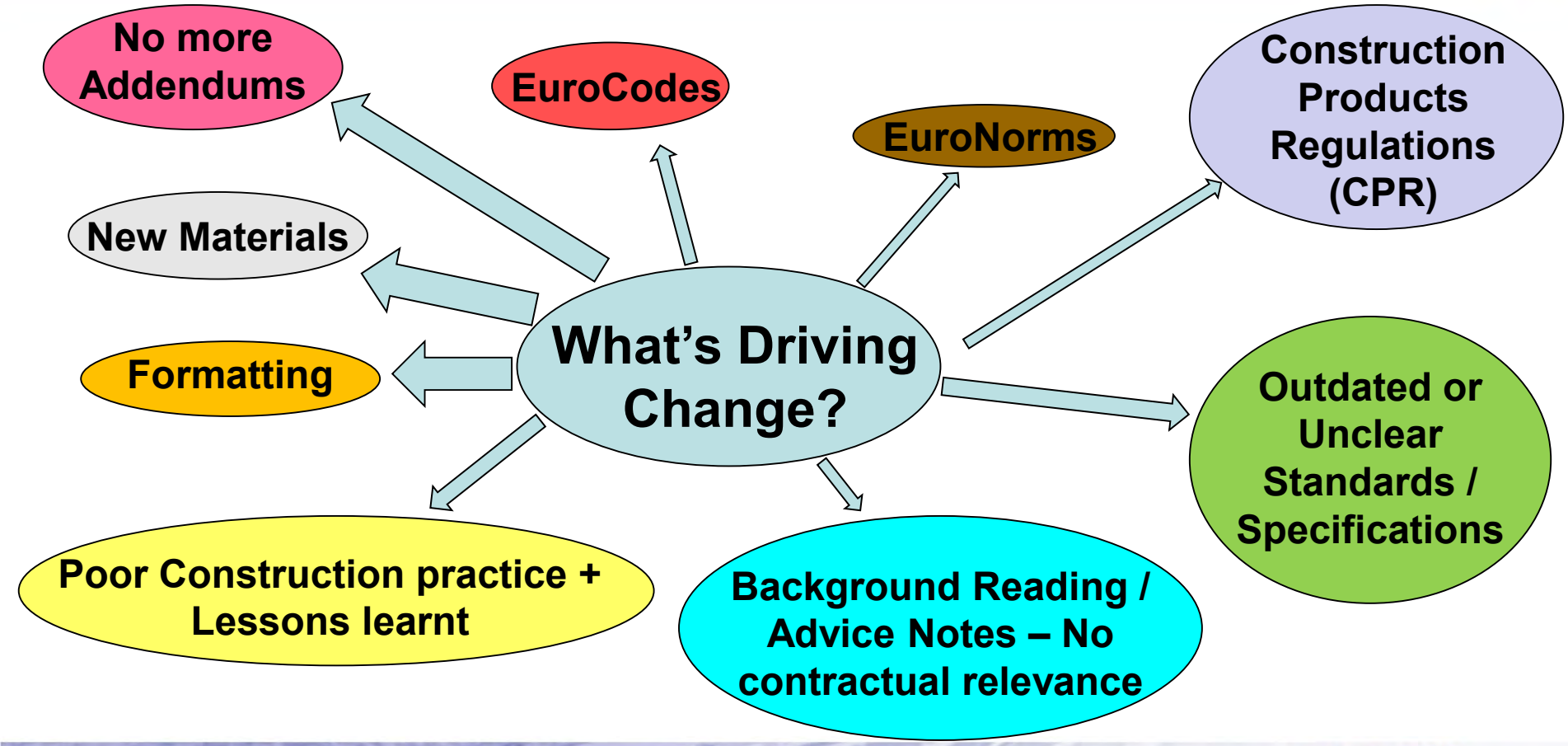
Project Manager
Structures

April 2015

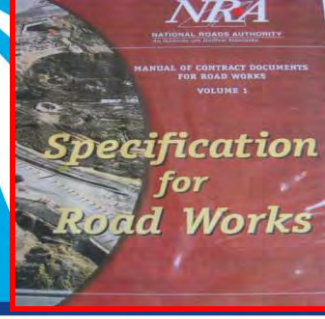
Presentation Outline

- Drivers of Change
- Structures Specification – NRA Manual Contract Documents Road Works (NRA MCDRW)
- Structures Standards – NRA Design Manual for Roads & Bridges (NRA DMRB)
- The Evolving EuroCodes
- NRA Weigh-In-Motion (WIM)

Drivers of Change



Structures Specifications – NRA MCDRW



Specification			Document or Series Date
NRA MCDRW Part	Document or Series Number	Document or Series Title	
Volume 1	1600	Piling and Diaphragm Walling *(including Erratum No. 1, March 2011)*	December 2010
Volume 1	1700	Structural Concrete	December 2013
Volume 1	1800	Structural Steelwork	June 2014
Volume 1	1900	Protection of Steelwork Against Corrosion	June 2014
Volume 1	2000	Waterproofing for Concrete Structures	December 2010
Volume 1	2100	Bridge Bearings	March 2011
Volume 1	2200	Parapets (Not Used)	March 2013
Volume 1	2300	Bridge Expansion Joints and Sealing of Gaps	December 2010
Volume 1	2400	Brickwork, Blockwork and Stonework	December 2013
Volume 1	2500	Special Structures	June 2014
Volume 1	2600	Miscellaneous	December 2010

NRA SD 02 Volume Contents

5 new documents have been published recently

Working on updating 3 others – available 2015

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An tÚdarás um Bóithre Náisiúnta
National Roads Authority
Network Management

Structures Specifications – NRA MCDRW

Series 1700 *(December 2013)* - *Structural Concrete*

Overview

- EuroCodes **(IS EN 1992)** based on assumption of construction and workmanship (execution) to **IS EN 13670** (Construction Management; Falsework & Formwork; Reinforcement; Prestressing; Concreting; Precast Elements; and Geometrical Tolerances)
- New Series 1700 now aligned with IS EN 13670 (Concrete Execution Code)
- New Series 1700 is based on new HA Series 1700 (rewritten for Ireland)
- Full review and update of all product standards referenced within Series 1700 to ensure compliance with the latest EuroNorms
- Provides general requirements to Designers compiling contract specific structural concrete specifications on NRA schemes

Structures Specifications – NRA MCDRW

Series 1700 -

Structural Concrete

Items of Note:

- Execution Specification (1701.3)
  - Before commencement of construction of any works the execution specification relevant to that works must be complete and available (Table NG 17/1)
- Execution Class (1701.4)
  - All works shall be built in accordance with Execution Class 3
  - A set of requirements specifying quality levels for construction of the works (Inspection of Material & Products; Inspection of Execution; Documentation of Inspection)
- Self Compacting Concrete (1706.3)
  - Not permitted for any insitu works
  - If proposed in factory produced precast elements - prior approval of ER required
  - If approved by ER – Shall conform to IS EN 206-9 & Testing to IS EN 12350-8 to 12

Structures Specifications – NRA MCDRW

Series 1700 -

Structural Concrete

Items of Note:

- Trial Panels (1708.1)
  - This is not new! But we don't get them on-site?
  - Required (prior to works) for all exposed concrete
  - To demonstrate surface finish can be achieved by the methods proposed
- Curing of Concrete (1710.5)
  - Curing Class 3 (Cl 8.5 of IS EN 13670 & Annex F) required
  - Duration – function of the development of 28 days compressive strength (50%)
  - Concrete must be protected against harmful effects of weather (rain, temperature etc)
- Geometrical Tolerances (1728)
  - Tolerances have been provided for road structures
  - Irrespective of geometrical tolerances used - Modified partial safety factors (IS EN 1992-1-1 / IS EN 13369) not permitted

Structures Specifications – NRA MCDRW

Series 1700 -

Structural Concrete

Items of Note:

- CE Marking of Precast Products
  - IS EN 13670 considers precast elements to be products. The key standards are:
    - IS EN 15050 – Bridge Elements
    - IS EN 14844 – Box Culverts

Structures Specifications – NRA MCDRW

Series 1800 *(June 2014)* - *Structural Steelwork*

Overview

- Old Series 1800 based on BS 5400 Part 6 - now obsolete
- EuroCodes **(IS EN 1993)** based on assumption of executing to **IS EN 1090-2**
- New Series 1800 based on IS EN 1090-2 (Steel Execution Code)
- Based on new Highways Agency Series 1800 (rewritten for Ireland) which in turn is based on BSi PD 6705 (Recommendations for the execution of steel bridges to EN 1090-2)
- Provides general requirements to Designers compiling contract specific structural steelwork specifications in accordance with IS EN 1090-2
- Aim is to ensure technically sound choices are made, resulting in bridges being executed as economical as possible, whilst maintaining the level of reliability implicit of IS EN 1990 & IS EN 1993

Structures Specifications – NRA MCDRW

Series 1800 -

Structural Steelwork

Main Differences between IS EN 1090-2 & BS 5400-6

- User Decision:
  - 200 NDPs within IS EN 1090-2 compared to 39 within BS 5400-6
- Scope of Application:
  - IS EN 1090-2 applies to all types of structural steelwork (BS 5400-6 specific to bridges)
- Reference Standards:
  - IS EN 1090-2 references over 100 new European standards many of which replace British Standards (referenced within BS 5400-6)
- Material Grades:
  - Range for plates & sections has increased from S460 (BS 5400-6) to S690 (IS EN 1090-2)

Structures Specifications – NRA MCDRW

Series 1800 -
Structural Steelwork

Main Differences between IS EN 1090-2 & BS 5400-6

- Product Forms:
  - IS EN 1090-2 covers high strength cables (BS 5400-6 did not)
- Execution Methods:
  - IS EN 1090-2 allows laser & plasma cut holes (not covered in BS 5400-6)
- Personnel Qualification:
  - IS EN 1090-2 has qualification requirements for welding co-ordinators, welders & weld inspectors. BS 5400-6 did not address this.
- Quality Management:
  - IS EN 1090-2 addresses the subject of quality documentation & quality plans in a more explicit manner.

Structures Specifications – NRA MCDRW

Series 1800 -

Structural Steelwork

Main Differences between IS EN 1090-2 & BS 5400-6

- Quality Control:
  - IS EN 1090-2 is based on Factory Production Control (FPC) which is on-going and testing is not specific to any particular contract or structure. BS 5400-6 does not address FPC.
- Acceptance Levels:
  - As a result of FPC, target quality levels must be high enough to cover the most quality sensitive design situations. BS 5400-6 quality based on fitness for purpose.
- Geometrical Tolerances:
  - IS EN 1090-2 has more comprehensive requirements than BS 5400-6.
- Surface Treatment:
  - IS EN 1090-2 covers the application of surface coatings (BS 5400-6 did not)

Structures Specifications – NRA MCDRW

Series 1800 -

Structural Steelwork

Items of Note:

- CE Marking of Products
  - Open Sections – IS EN 10025-1
  - Hollow Sections – IS EN 10210-1
  - Plates – IS EN 10025-1
- CE Marking of fabricated structural steelwork
  - Fabricated structural steelwork – IS EN 1090-1
- Execution Class
  - Consequence Class (CC) + Service Category (SC) + Production Category (PC) = Execution Class (EXC1, EXC2, EXC3 or EXC4)
  - For bridges **EXC3** shall generally (Cl. 1804.1.2) – i.e. EXC4 for long span bridges

Structures Specifications – NRA MCDRW

Series 1800 -

Structural Steelwork

Items of Note:

- Responsibility of Main Contractor to carry out due diligence of Steelwork Contractor
- Steelwork Contractor appointed must have an Execution Class equal to that required for the project (EXC3 typically)
- Compliance with IS EN 1090-1 is no small task and places obligations on the steelwork contractor that are onerous and take significant time to put in place
- Steelwork Contractor must demonstrate compliance with the CPR and CE Marking:
  - Factory Production Control (FPC) Certificate – issued by a notified body
  - Welding Certificate – issued by a notified body
  - Declaration of Performance (DoP) – issued by steelwork contractor

Steel Construction Certification Scheme Limited

SCCS

EC Certifica
of
Factory Production C

2273 – CPR –

In compliance with Regulation 305/2011/EU of the European P
(the Construction Products Regu
it has been stated that the const

Structural Components for S

Harmonised	Type / Execution Class of the Constru
BS EN 1090-1: 2009 + A1:2011	Load bearing and welded structural stee to EXC 4 according to BS EN 1090-2:20

placed on the mark

Thompson Project Ma

and produced in the fac

Newacre, Athy Road, Carl

is submitted by the manufacturer to the initial type-testing of the
further testing of samples taken at the factory in accordance with
No. 2273 – Steel Construction Certification Scheme Ltd - has per
the factory production control and performs the continuous surve
production control

Attestation	This certificate attests that all production control described **BS EN 1090-1: 2009 + A1:20**
Date of first issue	**July 2014**
Date of this issue	**19 July 2014**
Date of next Surveillance	by **18 July 2015**
Validity Period	This certificate remains valid harmonised standard in refere factory or the FPC itself are n

Chairman:
D Woodward

Steel Construction Certification Scheme Limited

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2273 – C

In compliance with I.S. EN 1090-1:20
This V
annex to the EC-Certificate of the F
This Welding Certificate is only valid in conjun
Construction

Manufacturer	**Thom**
Facilities of the Manufacturer:	**Newacre,**
Standard	**I.S. EN 109**
Execution Class	up to EXC
Welding Process(es)	135 – MAG 111 – manu
Base Material(s)	Up to S355 Up to S355 Up to S355 Up to S355
Responsible Welding Coordinator	Gerry McC
Alternate	Willie Doyle
Attestation	This certific of welding implemente
Date of first issue	**July 2014**
Date of this issue	**19 July 20**
Date of next Surveillance	by **18 July**
Validity Period	This certificate rema standard in referenc are not modified sig

Chairman:
D Woodward

CE Thompson Of Carlow SCCS

Declaration of Performance

Job No. 8003 Newcastlewest Footbridge

Type:	Welded steel components in accordance with Drawing Nos G1-G3 F1 M1-M35 and Volume A; Works requirement book 1 specification.
Intended use/s:	Steel structures or composite steel and concrete structures where the components can be made from hot rolled, cold-formed steel. Steel material from which components are made can be in various shapes/profiles e.g. plates, sheet, strip, bars, castings or forgings.
Manufacturer:	Thompson Project Management Ltd, Newacre, Athy Road, Co Carlow.
System of assessment and verification of constancy of performance:	System 2+
Notified Body:	Steel Construction Certification Scheme 4, Whitehall Court. Westminster London, SW1A 2ES
Notified Body No:	2273

Steel Construction Certificate Scheme has performed (i) initial inspection of the manufacturing plant and factory product control and (ii) continuous surveillance, assessment and evaluation of factory production control and issued Factory Production Control certificate 2273-CPR-0255 and Welding certificate 2273-CPR-0255-WC.

Structures Specifications – NRA MCDRW

Series 1800 *(December 2014)* –

Road Construction Details – Steelwork for Structures ***(RCD/1800/1 to RCD/1800/9)***

Overview

- RCDs updated to reflect a revised sign clamping detail for each of the groups – ensures future versatility
- RCDs updated to take account of the EuroCodes (all BS references removed)
- RCDs updated to take account of the EuroNorms
- The purpose of the Family Groups is to ensure a consistency of structural form across the network

Structures Specifications – NRA MCDRW

Series 1800 –

Road Construction Details – Steelwork for Structures ***(RCD/1800/1 to RCD/1800/9)***

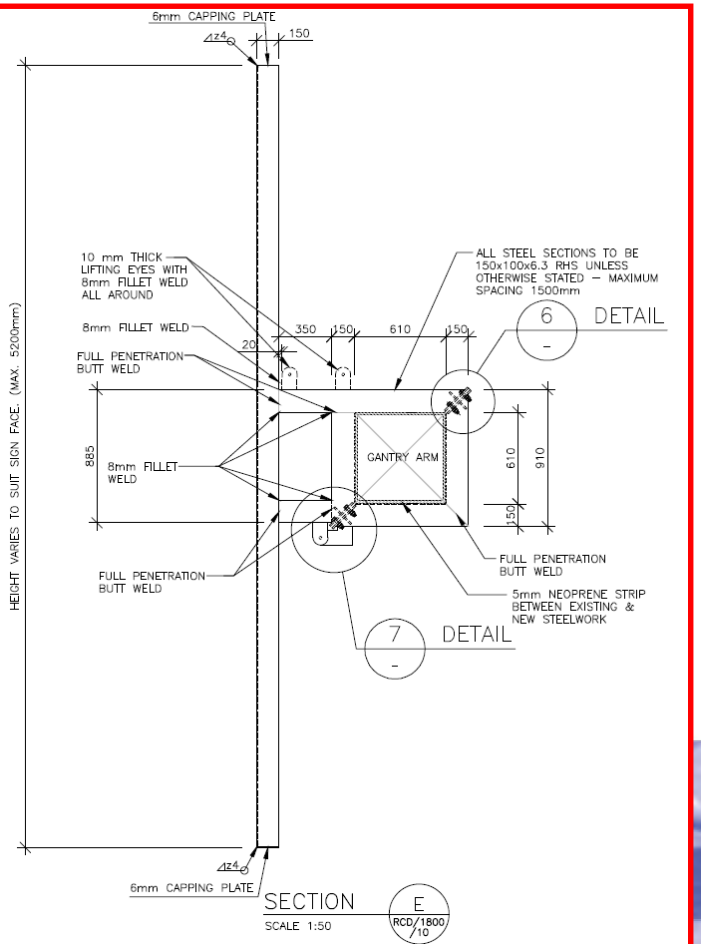
Items of Note

- All Gantry's require an independent Design & Check to be undertaken
- All Gantry legs < 4.5m from edge of carriageway shall be designed for impact (regardless of presence of vehicle restraint system)
- All section sizes and details are minimum indicative sizes only
- It is the responsibility of the Designer to avoid clashes of the clamps and steelwork
- A 750mm concrete plinth has been introduced for all Family Groups
- All splices and connections to be fully top coated after assembly - All gaps to be sealed

Structures Spe
– NRA MCDRW

Series 1800 –

Road Construction Details – St



Structures Specifications – NRA MCDRW

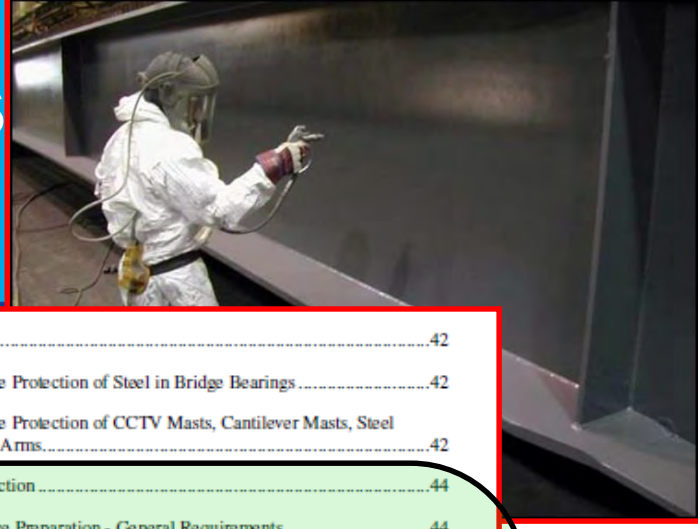
Series 1900 *(June 2014)* -

Protection of Steelwork against Corrosion

Overview

- Based on new Highways Agency Series 1900 (rewritten for Ireland)
- Takes account of updates made to NRA BD 35/14 (Quality Assurance Scheme for Paints
- No changes to maintenance painting clauses (1970 to 1984)
- Compatible with IS EN 1090-2 – Execution of Steel Structures
- Provides guidance to Designers compiling contract specific specifications pertain to surface preparation and corrosion protection
- Provides guidance to those undertaking the works
- Aim to provide economic safe working life from steel assets

Structures Specifications – NRA MCDRW



PROTECTION OF STEELWORK AGAINST CORROSION

Contents

Main Changes

Maintenance Painting Section Remains

NRA
An tÚdarás um Bóithre Náisiúnta
National Roads Authority
Network Management

Structures Specifications – NRA MCDRW

Series 1900 -

Protection of Steelwork against Corrosion

Items of Note:

- Update of Table 19/1 (Permissible Paint Item Numbers)
  - 2 added / 16 deleted
- Update of Table 19/2B (System Requirements for Bridges)
  - Minimum dft for the system increased from 475 to 525 microns
- Paint Testing is Required - CREST is Testing Authority
  - has always been required but not typically undertaken!!
  - 'A' samples (quality assurance) – if >500 litres (previously 1000 litres)
  - 'B' samples (application control) – required in all cases

Structures Specifications – NRA MCDRW

Series 1900 -

Protection of Steelwork against Corrosion

Items of Note:

- Independent Painting Inspection Firm Required
  - Shall be employed by the Contractor
  - Inspect & Test all corrosion protection systems in-shop and on-site
  - Personnel – shall be certified painting inspectors (Level 2 Icorr Cert / CIP Level 2)
  - ER must review and approve CVs
  - Inspectors Report required to be submitted to ER within 5 days of inspection
- Thermally sprayed metal coating – excluded from general protection of bridges
- Aluminium – preferred thermally sprayed metal coating (where appropriate – bearings, CCTV masts, lighting columns)
- Zinc metal spray no longer permissible

Structures Specifications – NRA MCDRW

Series 1900 -

II	Steelwork **Except** Bearings, CCTV Masts, Cantilever Masts, Steel Lighting Columns and Bracket Arms	Difficult Access	High build, quick drying Epoxy (two-pack) system or High Build Glass Flake Epoxy System with an epoxy acrylic, polyurethane or polysiloxane finish.

II	**Item No**		109	112	112	167, 168, 169 or 185	400 (450 if Item 185 finish is specified)
	Min dry film thickness per coat (µm)		50	125	125	50 or 100*	
	Item No		110	123	167, 168, 169 or 185		525 (575 if Item 185 finish is specified)
	Min dry film thickness (µm)		25	400	50 or 100*		
	Item No		111	112	112	167, 168, 169 or 185	425 (475 if Item 185 finish is specified)
	Min dry film thickness (µm)		75	125	125	50 or 100*	

APPENDIX 19/1
(SPECIFICATION FOR HIGHWAY WORKS) Sheet No. 1
FORM HA/P1 (NEW WORKS) PAINT SYSTEM SHEET

1. CONTRACT TITLE: M9 Kilcullen Services Area
STRUCT Ref. ST02 and ST03

GRID REF: Refer to Drawings

2. DATE OF ISSUE OF DOCUMENTS TO TENDERERS: November 2014

3. ENVIRONMENT AND ACCESSIBILITY INLAND- DIFFICULT ACCESS

4. REQUIRED DURABILITY OF SYSTEM
NO MAINTENANCE up to 12 years
MINOR MAINTENANCE from 12 years
MAJOR MAINTENANCE after 20 years

5. COLOUR OF FINISH:

Grey BS 4800 00A09

6. PAINT SYSTEM TO BE APPLIED OVER:
AREA REF: A,D, E AREA DESCRIPTION: Structural Steelwork (for Contract Surface of HSFG. Bolted Joints see Area C)

PROTECTIVE SYSTEM TYPE: II

7. DETAILS	1st Coat	2nd Coat	3rd Coat	
DTp Registered Description	Zinc Phosphate Blast Primer 2 pack	2 Pack Glass Flake Epoxy	2 Pack Polyurethane Finish	
Item No. & Colour	110 - 08 C 35	123 – 11480 (Grey)	169 - 55610	
Date Registered by DTp and BBA Cert No.	27/03/2014 08/H135 (PS5)	27/03/2014 08/H135 (PS1)	27/03/2014 08/H135 (PS13)	
Brand Name and Manufacturers Ref No.	HEMPADUR 1555E	HEMPADUR MULTI-STRENGTH GF 35870	HEMPATHANE 55610	
Data Sheet Ref No.	1555E	35870	55610	
Where applied	Shop	Shop	Shop	

Structures Specifications – NRA MCDRW

Series 2400 *(December 2013)* -

Brickwork, Blockwork & Stonework

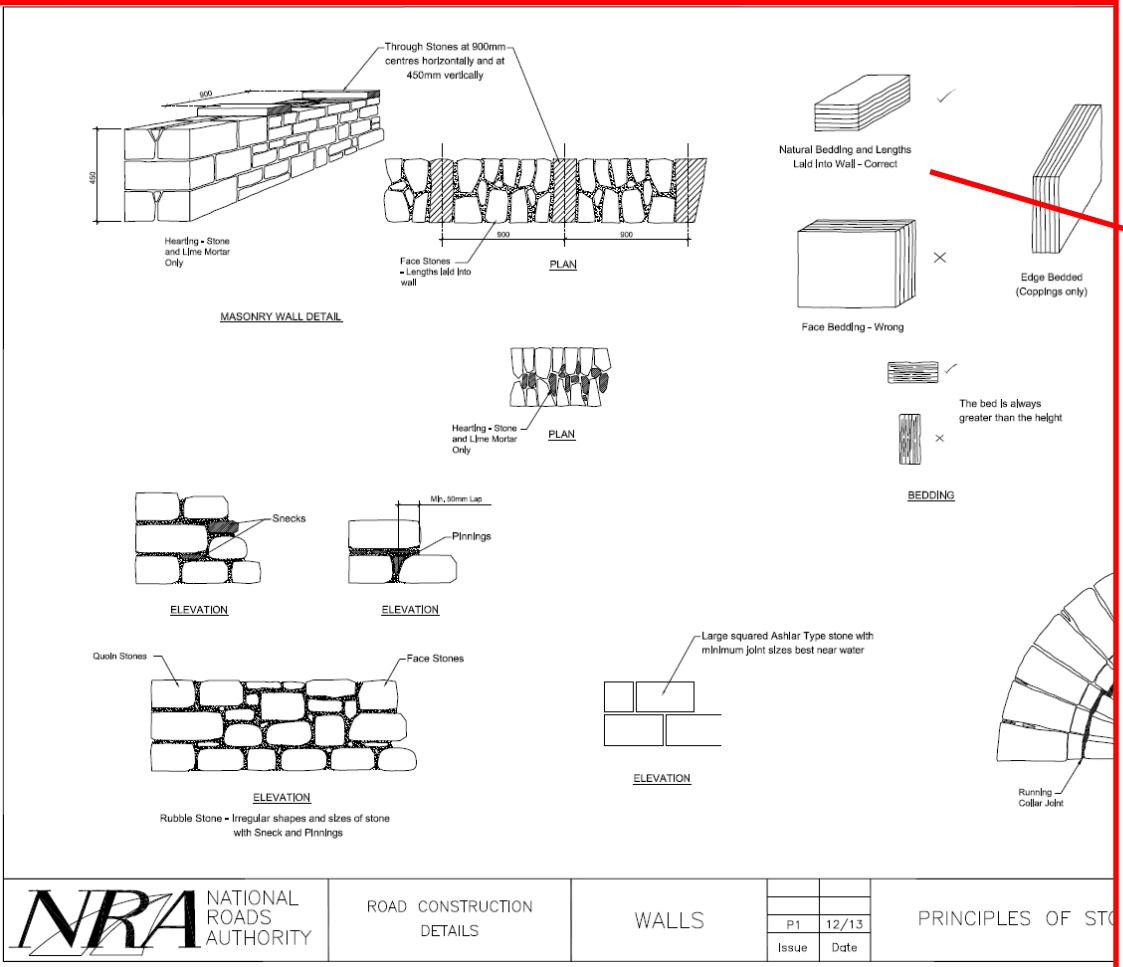
Items of Note

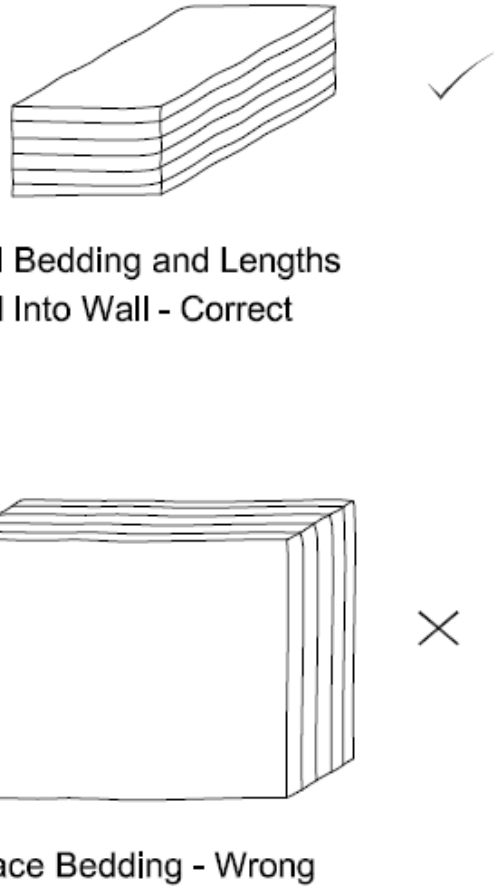
- New Clauses pertaining to the Masonry Repointing of Historic Structures have been added
  - (17) Clauses 2401 to 2416 pertain to brickwork, blockwork & stonework within new construction
  - (16) Clauses 2450 to 2465 pertain to historic structures
- A Lime Mortar shall be used for the repointing of all Historic Structures (and any other structure originally constructed using a lime mortar)
- Series 2400 has been updated to reflect the latest EuroNorms – All outdated British Standards have been removed (e.g. BS 4027 ~ IS EN 197-1)
- A new RCD (RCD/2400/7) pertaining to the Principles of Stonemasonry has been created

Structures Specifications – NRA MCDRW

Series 2400 *(December 2013)* -

Road Construction Details – Walls (RCD/2400/7)





Structures Specifications – NRA MCDRW

Series 2500 *(June 2014)* -

Road Construction Details – Special Structures ***(RCD/2500/1 to RCD/2500/3)***

Overview

- Concern about poor quality agricultural underpasses being constructed beneath the national road network
- These were typically one off developments and were constructed with little or no consideration to NRA standards (sub-standard)
- Aim to produce a set of RCDs that would inform all parties of keys issues to be addressed (prior to any works being undertaken)
- Pulls together all NRA requirements into one location
- An extensive set of drawing notes have been included (RCD/2500/3)

Structures Specifications – NRA MCDRW

Series 2500 -

Road Construction Details – Special Structures ***(RCD/2500/1 to RCD/2500/3)***

Items of Note

- Design:
  - Chartered Engineer with previous National Road Design Experience required
  - Prior to Planning Application a TAR must be submitted to the NRA for approval
  - No gabions permitted as part of any earth retention system
  - Eurocodes / EuroNorms & NRA DMRB & NRA MCDRW
- Vehicle Restraint System:
  - In accordance with NRA TD 19 for approach / departure lengths, working widths
- Execution:
  - Road opening licence required from the relevant LA
  - Construction Sequence & Traffic Management to be agreed with LA (and addressed within TAR)

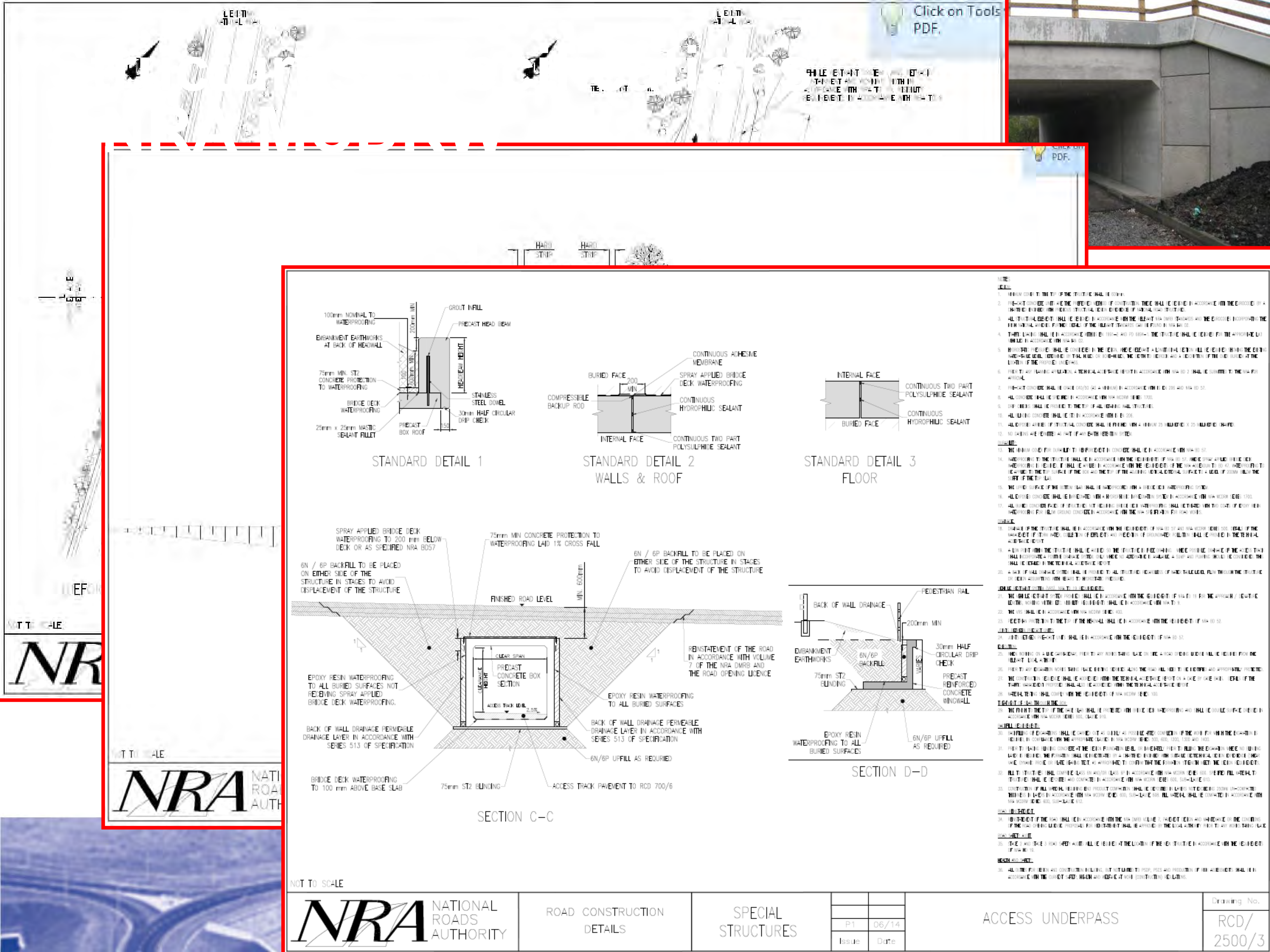
Structures Specifications – NRA MCDRW

Series 2500 -

Road Construction Details – Special Structures ***(RCD/2500/1 to RCD/2500/3)***

Items of Note

- Road Safety Audit:
  - Stage 2 & Stage 3 Road Safety Audits required (NRA HD 19)
- Road Reinstatement:
  - Proposals must be approved by the LA prior to any works taking place (condition of the road opening licence)
- Health and Safety:
  - PSDP, PSCS & Risk Assessments required in accordance with Safety, Health & Welfare (Construction) Regulations



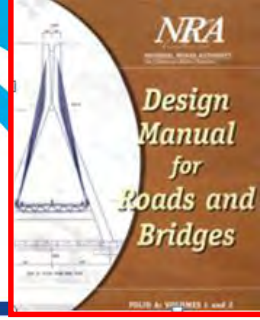
Click on Tools
PDF.
HARD STRIP
HARD STRIP
NOT TO SCALE
GROUT INFILL
PRECAST HEAD BEAM
100mm NOMINAL TO WATERPROOFING
EMBANKMENT EARTHWORKS AT BACK OF HEADWALL
75mm MIN. ST2 CONCRETE PROTECTION TO WATERPROOFING
BRIDGE DECK WATERPROOFING
25mm x 25mm MASTIC SEALANT FILLET
PRECAST BOX ROOF
STAINLESS STEEL DOWEL
30mm HALF CIRCULAR DRIP CHECK
HEADWALL HEIGHT
200mm MIN
STANDARD DETAIL 1
BURIED FACE
COMPRESSIBLE BACKUP ROD
CONTINUOUS ADHESIVE MEMBRANE
SPRAY APPLIED BRIDGE DECK WATERPROOFING
CONTINUOUS HYDROPHILIC SEALANT
INTERNAL FACE
CONTINUOUS TWO PART POLYSULPHIDE SEALANT
200 MIN
STANDARD DETAIL 2
WALLS & ROOF
INTERNAL FACE
CONTINUOUS TWO PART POLYSULPHIDE SEALANT
CONTINUOUS HYDROPHILIC SEALANT
BURIED FACE
STANDARD DETAIL 3
FLOOR
SPRAY APPLIED BRIDGE DECK WATERPROOFING TO 200 mm BELOW DECK OR AS SPECIFIED NRA BD57
75mm MIN CONCRETE PROTECTION TO WATERPROOFING LAID 1% CROSS FALL
6N / 6P BACKFILL TO BE PLACED ON EITHER SIDE OF THE STRUCTURE IN STAGES TO AVOID DISPLACEMENT OF THE STRUCTURE
FINISHED ROAD LEVEL
MIN. 600mm
CLEAR SPAN
PRECAST CONCRETE BOX SECTION
CLEARANCE HEIGHT
ACCESS TRACK LEVEL
2.5%
EPOXY RESIN WATERPROOFING TO ALL BURIED SURFACES NOT RECEIVING SPRAY APPLIED BRIDGE DECK WATERPROOFING.
REINSTATEMENT OF THE ROAD IN ACCORDANCE WITH VOLUME 7 OF THE NRA DMRB AND THE ROAD OPENING LICENCE
EPOXY RESIN WATERPROOFING TO ALL BURIED SURFACES
BACK OF WALL DRAINAGE PERMEABLE DRAINAGE LAYER IN ACCORDANCE WITH SERIES 513 OF SPECIFICATION
6N/6P UPFILL AS REQUIRED
BRIDGE DECK WATERPROOFING TO 100 mm ABOVE BASE SLAB
75mm ST2 BLINDING
ACCESS TRACK PAVEMENT TO RCD 700/6
SECTION C-C
PEDESTRIAN RAIL
BACK OF WALL DRAINAGE
200mm MIN
EMBANKMENT EARTHWORKS
6N/6P BACKFILL
30mm HALF CIRCULAR DRIP CHECK
VARIES
75mm ST2 BLINDING
PRECAST REINFORCED CONCRETE WINGWALL
EPOXY RESIN WATERPROOFING TO ALL BURIED SURFACES
6N/6P UPFILL AS REQUIRED
SECTION D-D
NOTES
NOT TO SCALE
NRA
NATIONAL ROADS AUTHORITY
ROAD CONSTRUCTION DETAILS
SPECIAL STRUCTURES
P1
06/14
Issue
Date
ACCESS UNDERPASS
Drawing No.
RCD/2500/3

Structures Specifications – NRA MCDRW

Look Ahead (Future Work 2015) – 4 new documents planned for 2015

- NRA Series 2000 **Waterproofing for Concrete Structures**:
  - To be rewritten from scratch to suit the Irish market
  - To be reviewed in conjunction with planned update of BD47 & BA47
- NRA Series 2100 **Bridge Bearings**:
  - To be rewritten from scratch to suit the Irish market
  - To be reviewed in conjunction with planned update of BD20
- NRA Series 2300 **Bridge Expansion Joints & Sealing of Gaps**:
  - To be rewritten from scratch to suit the Irish market
  - To be reviewed in conjunction with planned update of BD33 & BA26
- NRA Series 5500 **Structural Concrete Repairs**:
  - No NRA specification pertaining to concrete repair to date
  - To be based upon draft HA Concrete Repair Specification
  - IS EN 1504 Products & Systems for the Protection/Repair of Concrete Structures

Structures Standards – NRA DMRB



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National Roads Authority

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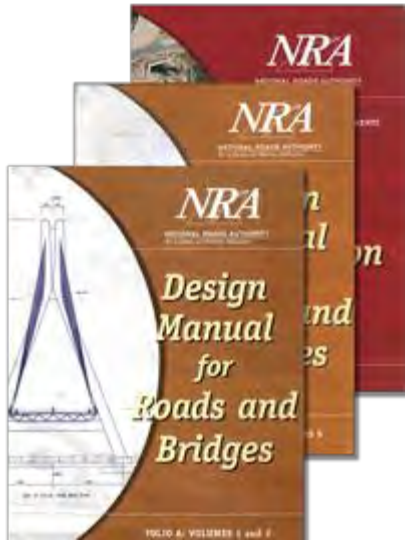
NRA Standards

NRA DMRB

NRA Design Manual for Roads and Bridges

The Volume Contents and Alphanumeric Index document (Volume 0, Section 1, Part 1 of the NRA DMRB) provides a list, volume by volume, of the current documents of the Design and Construction for Roads and Bridges, as implemented in Ireland. It also provides an index in alpha-numeric order.
This document is updated regularly and may be used as a check of the current status of the NRA DMRB and the implementation documents.

Title	Folders/Files
Volume 0:Introduction and Contents	(0/5)
Volume 1: Highway Structures: Approval procedures and general design	(0/15)
Volume 2: Highway Structures: Design (Substructures and Special Structures) Materials	(0/37)
Volume 3: Highway Structures: Inspection and Maintenance	(0/50)



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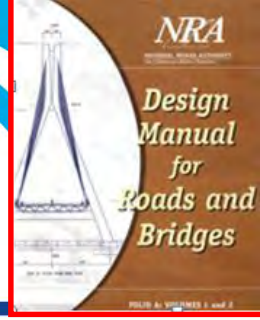
Structures Standards – NRA DMRB



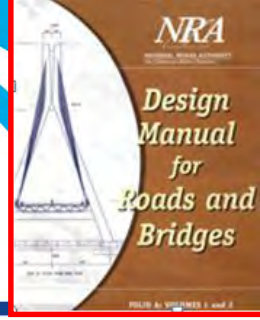
NRA GD 02 – Volume Contents

Volume 1 – Structures – Approval Procedures & General Design

11 Documents Withdrawn

Section	Number	Title
1.2.1	BD 36	Evaluation of Maintenance Costs in Comparing Alternative Designs for Highway Structures
1.2.2	BA 28	Evaluation of Maintenance Costs in Comparing Alternative Designs for Highway Structures
1.3.4	BA 40	Tack Welding of Reinforcing Bars
1.3.13	BA 53	Bracing Systems and the Use of U-Frames in Steel Highway Bridges
1.3.14	BD 10	Design of Highway Structures in Areas of Mining Subsidence
1.3	BA 19	The Use of BS 5400: Part 3
1.3	BA 24	Early Thermal Cracking of Concrete
1.3.15	BA 84	Use of Stainless Steel Reinforcement in Highway Structures
1.3	BE 23	Shear Key Decks
1.3	BE 5	Rules for the Design and Use of Freyssinet Concrete Hinges in Highway Structures.
1.3.8	BA 57	Design for Durability

Structures Standards – NRA DMRB



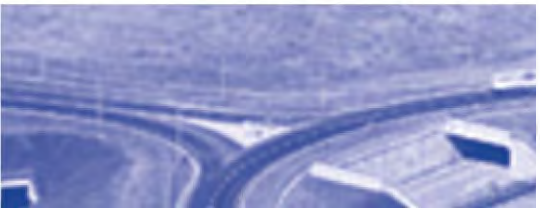
NRA GD 02 Volume 1

9 documents retained

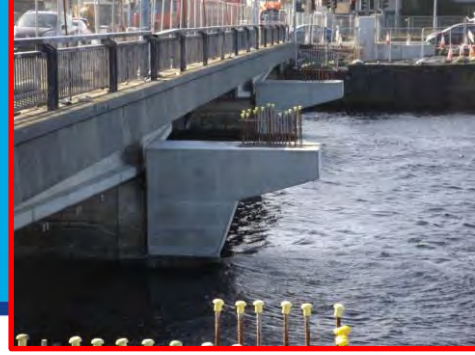
1 new document added

Standard or Advice Note			NRA Addendum or Standard Dated	UK DMRB Reference Document
DMRB Part	Number	Title		
Section 1: Approval Procedures				
1.1.1A	NRA BD 2*	Technical Approval of Road Structures on Motorways and Other National Roads	January 2009	N/A
Section 2: Other Procedural Documents				
1.2.3	NRA BD 95*	Treatment of Existing Structures on Highway Widening Schemes.	December 2014	N/A
Section 3: General Design				
1.3.5	NRA BD 60*	Use of I.S. EN 1991-1-7 for the Design of Accidental Actions	December 2010	N/A
1.3.6	*BA 59*	*Design of Highway Bridges for Hydraulic Action*	-	*May 1994*
1.3.7	NRA BD 57*	Design for Durability	December 2010	N/A
1.3.11	*BA 41*	*The Design and Appearance of Bridges*	-	*February 1998*
1.3.16	BD 84	Strengthening of Concrete Bridge Supports Using Fibre Reinforced Polymers	December 2002	August 2002
1.3.17	*BD 90*	*Design of FRP Bridges and Highways Structures*	-	*May 2005*
1.3.18	*BD 85*	*Strengthened Highway Structures Using Externally Bonded Fibre Reinforced Polymer*	-	*November 2008*

Table 1: Standards and Advice Notes Available for Use in Ireland



Structures Standards – NRA DMRB

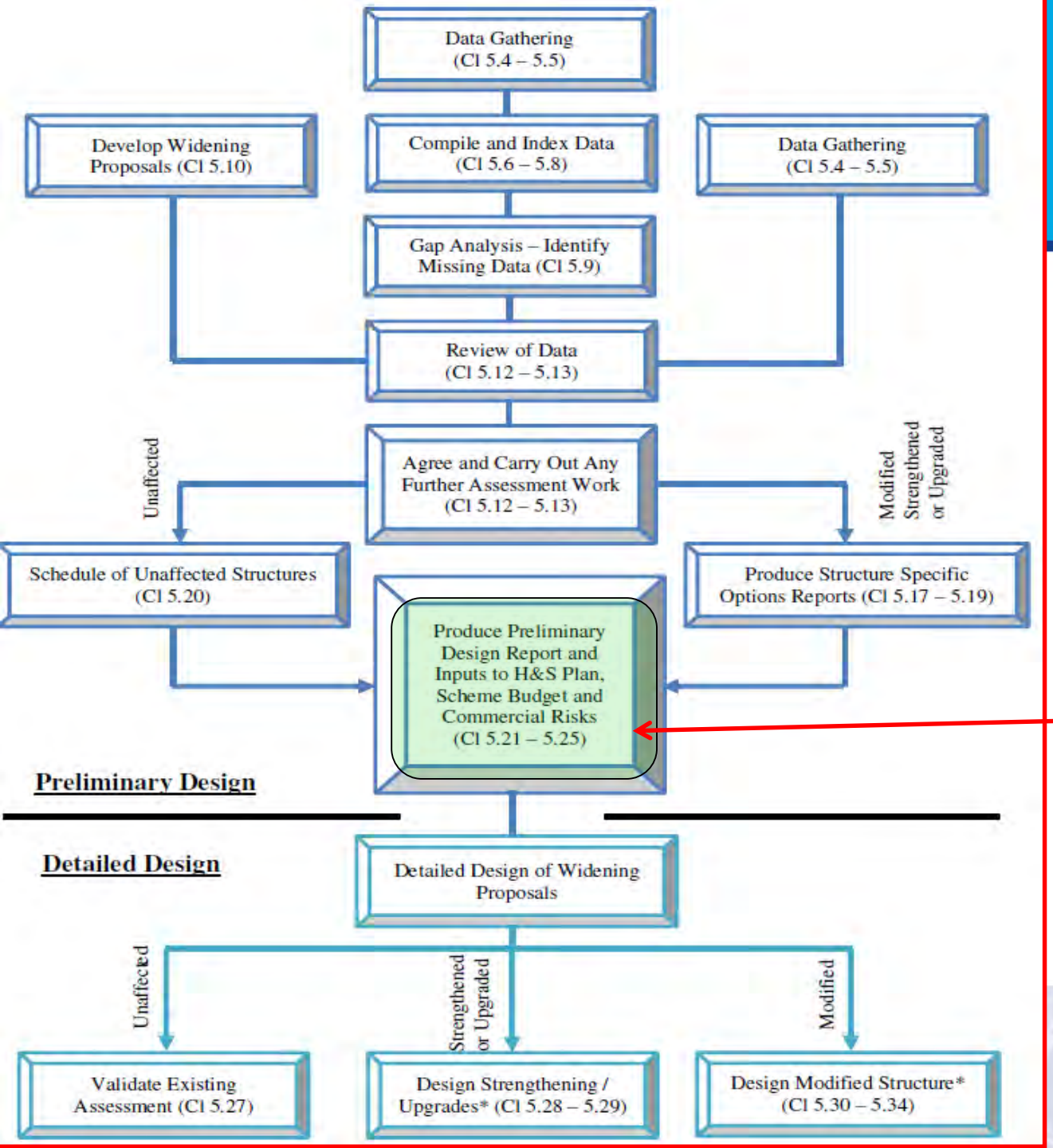


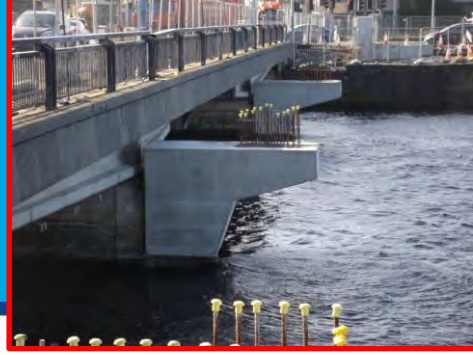
NRA BD 95/14 *(Dec 2014)* -

Treatment of Existing Structures on Road Widening Schemes

Overview

- Provides requirements for the treatment of existing structures affected by road widening schemes
- Based on HA BD 95/07 (rewritten for Ireland)
- Describes the process to be applied through preliminary & detailed design
- Provides advice to commonly encountered situations (typical current design standard requirements not met by existing structures) – Appendix B
- Reuse as much existing infrastructure as possible where economical to do so (e.g. Departures for existing non-compliances?)
- Clarifies the requirements for Assessment of Existing structures (Review of Existing Assessment Form – REAF – Appendix A)





The Procedure for Dealing with Existing Structures - Process Flow Chart

Everything should combine to form the Preliminary Design Report (PDR) – this occurs within Phase 1 to 4 of a scheme

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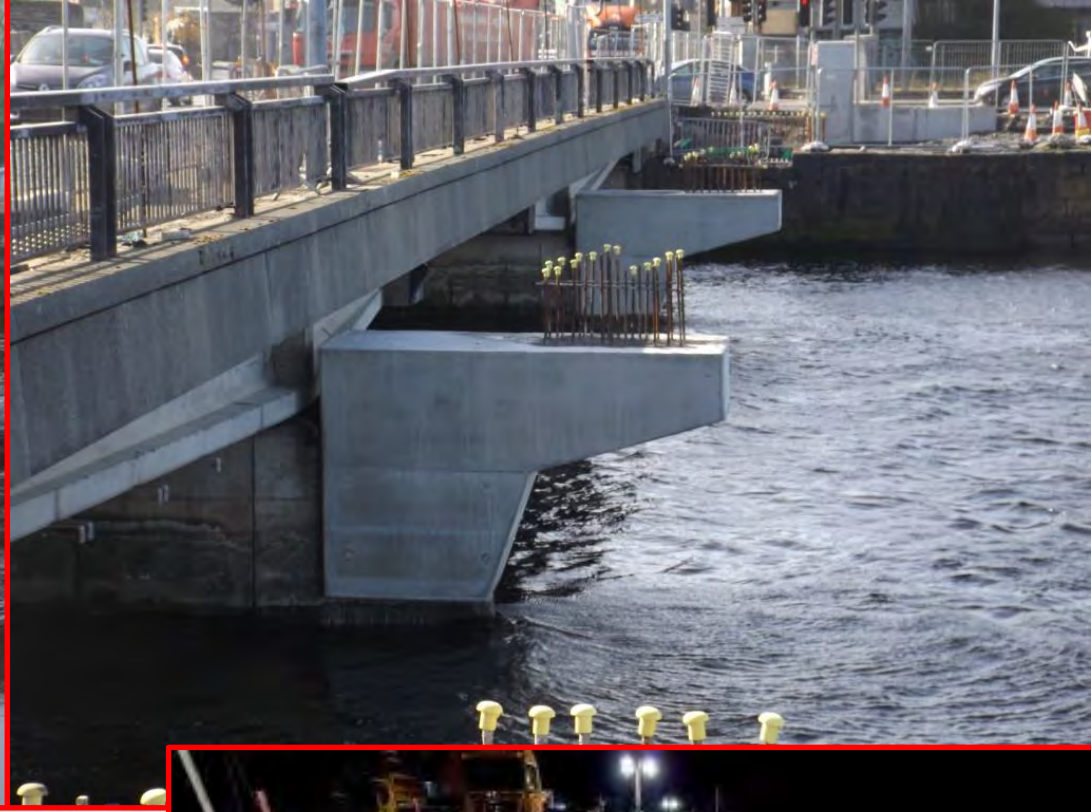
A.1. Review of Existing Assessment Form (REAF)

1	**Structure Details**			
	Structure Name	*<Structure Name>*		
	Eirspan Structure Number	*<e.g. KY-N86-021.00>*		
	Northing : Easting			
	Date Commissioned	*<Date that the structure came into service>*		
	Bridge Spans	*<Name of road, railway, river etc.>*		
	Minimum Headroom	*<Minimum headroom>*		
	Bridge Carries	*<Name of road, railway etc>*		
	Brief Description of Structure			
	Give a brief description of the structure including structural type (deck, substructure and foundations). Identify any unusual features or modifications since first constructed.			
2	**Existing Assessment Details**			
	Inspection for Assessment Date	*<Date>*	Recorded Condition	*<Condition Factor>*
	Assessment Date	*<Date>*	Report Number	*<Report Number>*
	Assessing Engineer		Company	
	Current Assessed Capacity			
	HA	*<eg 40te>*	HB	*<eg 30HB>*
	Parapet	*<eg N2 with mesh infill assessed as satisfactory>*		
	Pier Impact	*<eg Passes to NRA BD 48>*		
	Certification	*<Record if certificates exist>*		
	Calculations	*<Record if calculations exist>*		
	As built drawings	*<Record if as built drawings exist>*		
	Comments on Assessment			
	<A brief summary of the assessment method and findings.>			

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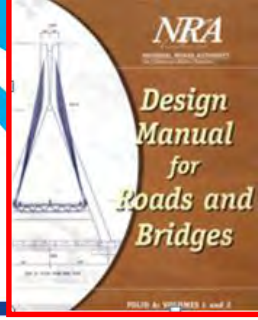
Structures Standards – NRA DMRB



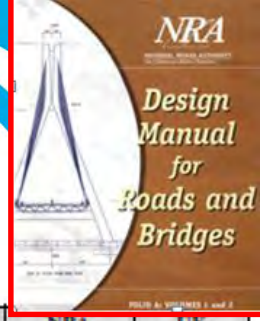
NRA GD 02 – Volume Contents

Volume 2 – Structures – Design & Materials

16 Documents Withdrawn

Section	Number	Title
2.1.1	BD 41	Reinforced Clay Brickwork Retaining Walls of Pocket-Type and Grouted-Cavity Type Construction
2.1.2	BD 42	Design of Embedded Retaining Walls and Bridge Abutments
2.1.3	BD 68	Crib Retaining Walls
2.1.4	BA 68	Crib Retaining Walls
2.1.5	BD 70	Strengthened/Reinforced Soils and Other Fills for Retaining Walls and Bridge Abutments
2.1	BD 30	Backfilled Retaining Walls and Bridge Abutments
2.1.7	BA 80	Use of Rockbolts
2.2.1	BD 26	Design of Lighting Columns
2.2.2	BA 48	Pedestrian Protection at Head Walls, Wing Walls and Retaining Walls
2.2.11	BD 83	Design of CCTV Masts
2.2.13	BD 88	Design of Cantilever Masts for Traffic Signals and/or Speed Cameras
2.3.2	BA 37	Priority Ranking of Existing Parapets
2.3.7	BA 82	Formation of Continuity Joints for Use in Bridge Decks
2.3.9	BA 92	The use of recycled Aggregates in Structural Concrete
2.4.2	BA 27	Quality Assurance Scheme for Paints and Similar Protective Coatings
2.2	BE 7	Departmental Standard (Interim) Motorway Sign/Signal Gantries

Structures Standards – NRA DMRB



Standard or Advice Note			NRA Addendum or Standard Dated	UK DMRB Reference Document
DMRB Part	Number	Title		
Section 2: Special Structures				
2.2.1	NRA BD 94*	Design of Minor Structures	December 2014	N/A
2.2.4	NRA BD 51*	Design Criteria for Portal and Cantilever Sign/Signal Gantries	December 2014	N/A
2.2.5	*BD 65*	*Design Criteria for Collision Protection Beams*	-	*February 1997*
2.2.6	BD 12	Design of Corrugated Steel Buried Structures with Spans Greater Than 0.9 Metres and up to 8 Metres [and Correction, February 2002]	December 2002	November 2001
2.2.7	BD 67	Enclosure of Bridges	December 2000	August 1996
2.2.8	*BA 67*	*Enclosure of Bridges*	-	*August 1996*
2.2.8	BD 29	Design Criteria for Footbridges	July 2004	August 2004
2.2.8A	NRA TD 19*	Safety Barriers (including Amendment No. 1, dated December 2014)	June 2014	N/A
2.2.9	BD 78	Design of Road Tunnels	December 2000	August 1999
2.2.10	BD 82	Design of Buried Rigid Pipes	December 2000	August 2000
2.2.14	*BD 91*	*Unreinforced Masonry Arch Bridges*	-	*November 2004*
Section 3: Materials and Components				
2.3.1	BD 20	Bridge Bearings. Use of BS 5400: Part 9: 1983	December 2000	October 1992
2.3.3	NRA BD 52*	The Design of Road Bridge Parapets	March 2013	N/A
2.3.4	BD 47	Waterproofing and Surfacing of Concrete Bridge Decks	December 2000	August 1999
2.3.5	*BA 47*	*Waterproofing and Surfacing of Concrete Bridge Decks*	-	*August 1999*
2.3.6	BD 33	Expansion Joints for Use in Highway Bridge Decks	December 2000	November 1994

Table 2: Standards and Advice Notes Available for Use in Ireland

Standard or Advice Note			NRA Addendum or Standard Dated	UK DMRB Reference Document
DMRB Part	Number	Title		
2.3.7	*BA 26*	*Expansion Joints for Use in Highway Bridge Decks*	-	*November 1994*
2.3	*BA 36*	*The Use of Permanent Formwork*	-	*February 1991*
2.3.8	BD 7	Weathering Steel for Highway Structures	December 2002	November 2001
Section 4: Paints and Other Protective Coatings				
2.4.1	NRA BD 35*	Quality Assurance Scheme for Paints and Similar Protective Coatings [and Errata Sheet, February 2008]	June 2014	-
2.4	BD 43	Criteria and Materials for the Impregnation of Concrete Highway Structures [*Note: BD 43/90 has been superseded in the UK by BD 43/03, but BD 43/90 is still valid in Ireland.*]	December 2000	*April 1990*
2.4.3	*BA 85*	*Coatings for Concrete Highway Structures and Ancillary Structures*	-	*May 2004*

Table 2 Continued: Standards and Advice Notes Available for Use in Ireland

NRA GD 02
Volume 2

19 documents retained
3 new documents added

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Structures Standards – NRA DMRB

NRA BD 94/14 *(Dec 2014)* -

Design of Support Structures for Roadside Furniture

Overview

- Replaces NRA Addendums to BD26 (Design of Lighting Columns); BD83 (Design of CCTV Masts); & BD88 (Design of Cantilever Masts for Traffic Signals and/or Speed Cameras)
- Standalone NRA BD - Covers the design of support structures for roadside furniture (Lighting Columns; Masts to support CCTV, Traffic Signals, Speed Cameras; Traffic Signs)
- It incorporates the provisions of IS EN 40 (Lighting Columns) & IS EN 12899 (Fixed Vertical Road Traffic Signs)
- To be used when designing a support structure from first principles (typically these support structures are supplied as proprietary products – off the shelf)
- All proprietary products should be checked for compliance with this standard

Structures Standards – NRA DMRB

NRA BD 94/14 *(Dec 2014)* -

Design of Support Structures for Roadside Furniture

Items of Note:

- Foundations (Chapter 11) – Support Structures typically off the shelf but foundations responsibility of Design Engineer
- A TAR is required for certain minor structures (e.g. High Masts for lighting or cameras) in accordance with NRA BD2 (CAT 1)
- All design shall be in accordance with the Eurocodes
- Design Working Life (Cl 5.2) shall be in compliance with IS EN 1990 – Working Life Category 3 (up to 50 years for masts supporting lighting columns / traffic signals) & Working Life Category 4 (50-120 years for high mast lighting)
- Fatigue Criteria (Cl 5.10 – 5.16) – dependent on geometrical configuration & fabrication


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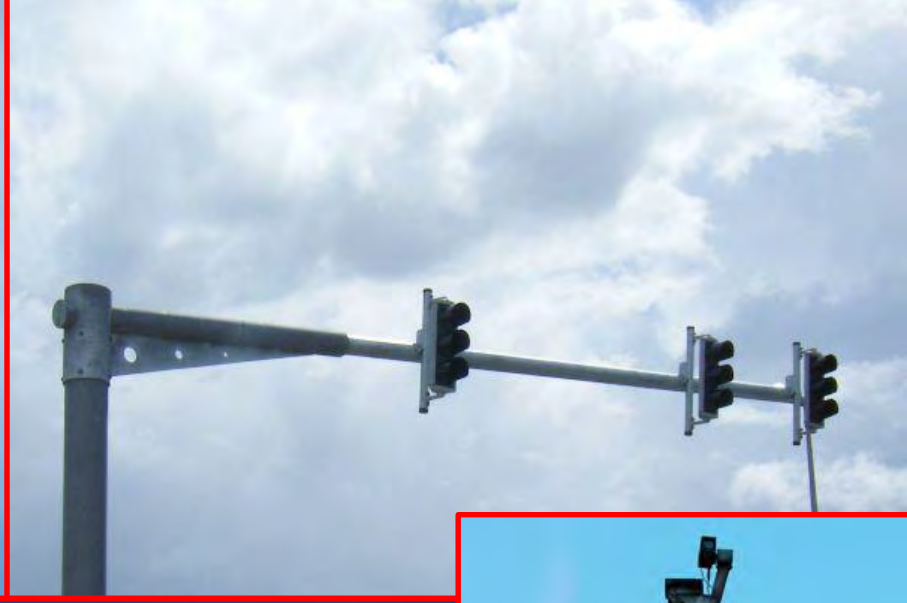


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Structures Standards – NRA DMRB

NRA BD 51/14 *(Dec 2014)* -

Portal and Cantilever Sign / Signal Gantries

Overview

- Replaces NRA Addendum to HA BD51/98 (17 years old)
- Based on new Highways Agency BD51/14 (rewritten for Ireland)
- Sets out the structural design requirements for Gantries (in terms of the EuroCodes)
- Updated to comply with the EuroCodes & EuroNorms (removal of obsolete references)
- Linked to the Series 1800 RCDs (Gantry groups 1 to 5) – all plate sizes are minimum sizes (prohibited to reduce plate / weld sizes)
- Relevant to any sign structure that cantilevers out over the carriageway / hard shoulder
- Identification Plates shall be attached to each new structure

Structures Standards – NRA DMRB

NRA BD 51/14 -

Portal and Cantilever Sign / Signal Gantries

Items of Note

- 60 year design life for gantry structures
- 5.8m vertical clearance required
- The limiting Structural Deformations (serviceability limit state) for gantries (Table 3.1) specified within BD51/98 have been retained
- Vehicle impact loading specified is similar to that stated within the NA to IS EN 1991-1-7
- The combined effects of axial compression / tension; torsion & biaxial bending must be checked
- Must check if a gantry is dynamically sensitive
- Supports within 4.5m of carriageway – must design for impact (regardless of VRS)

Structures Standards – NRA DMRB

NRA BD 35/14 *(June 2014)* -

Quality Assurance Scheme for Paints and similar Protective Coatings

BD 35/14

QUALITY ASSURANCE SCHEME FOR PAINTS AND SIMILAR PROTECTIVE COATINGS

Contents

Chapter

- Provides details of the quality assurance scheme for paints
- Provides Specifiers; Designers; & Supervisors of works guidance on the operation of the quality assurance scheme for paints
- Provides Manufacturers; Certifiers; & Testers of paints with paint material requirements

Structures Standards – NRA DMRB

NRA BD 35/14 -

Quality Assurance Scheme for Paints and similar Protective Coatings

- Replaces NRA addendum to BD 35/99 – completely outdated (16 years old)
- Based on Highways Agency BD35/14 (rewritten for Ireland)
- Updated Appendix A – Manual of Paints for Structural Steelwork
- Provides data on paints permitted for use on NRA painting contracts
- 2 items added (Item No. 109, 167)
- 16 items deleted (Item No. 14, 32, 35, 47, 50, 70, 74, 124, 132, 133, 134, 135, 141, 150, 151, 156)
- Changes based on extensive research programme conducted in UK
- Developed in conjunction with industry
- Balance of performance v cost v traffic disruption on national roads
- For maintenance painting – refer to NRA BD 87 & contract specific requirements

Structures Standards – NRA DMRB

NRA BD 35/14 -

Quality Assurance Scheme for Paints and similar Protective Coatings

Quality Assurance Scheme

1. Certification of Paints
   - BBA HAPAS (or equivalent) required for all paint systems (www.bbacerts.co.uk)
   - Ensures required level of corrosion protection
   - Certification must be submitted to ER for approval
2. Testing of ‘A’ and ‘B’ samples
   - Requirements specified in Series 1900
   - Independent Testing Authority – CREST (or equivalent)

HAPAS

PPG Protective and Marine Coatings
Unit 3, Wates Way
The Village
Crofter Lane
South Normanton
Derbyshire DE55 2DS
Tel: 01773 814520 Fax: 01773 814521
e-mail: procoat@ppg.com
website: www.ppgpmc.com

BBA APPROVAL INSPECTION TESTING CERTIFICATION
TECHNICAL APPROVALS FOR CONSTRUCTION

HAPAS Certificate
07/H124
Product Sheet 7

PAINTS FOR CORROSION PROTECTION OF STRUCTURAL STEELWORK IN HIGHWAY APPLICATIONS

SIGMADUR 540 – TO HA ITEM NO. 167

This HAPAS Certificate is issued by the British Board of Agrément (BBA), supported by the Highways Agency (HA) acting on behalf of the overseeing organisations of the Department for Transport, Transport Scotland, the Welsh Assembly Government and the Department for Regional Development, Northern Ireland), the Association of Directors of Environment, Economy, Planning and Transport (ADEPT), the Local Government Technical Advisers' Group and industry bodies. HAPAS Agrément Certificates are normally each subject to a review every five years.

PRODUCT GROUPS AND SUMMARY OF CERTIFICATE

This Certificate relates to SigmaDur 540, a two-pack, gloss, epoxy acrylic topcoat for use as an anti-corrosion coating as part of a specification for the corrosion protection of structural steelwork in Highway Applications, in accordance with the Manual of Contract Documents for Highway Works, Volumes 1 and 2, where Item No. 167 is specified.

HAPAS CERTIFICATION INCLUDES:

- factors relating to compliance with HAPAS requirements
- factors relating to compliance with Regulations where applicable
- independently verified technical specification
- assessment criteria and technical investigations
- design considerations
- installation guidance
- regular surveillance of production
- formal three-yearly review.

KEY FACTORS ASSESSED

Corrosion resistance — a complete paint system incorporating the product, when applied in accordance with this Certificate, will provide satisfactory resistance to corrosion of the substrate steel (see section 6).

Durability — a complete paint system, based on the product described in this Certificate, can be expected to perform satisfactorily for a period greater than 15 years before its first major maintenance (see section 8).

The BBA has awarded this HAPAS Certificate to the company named above for the product described herein. This product has been assessed by the BBA as being fit for its intended use provided it is installed, used and maintained as set out in this Certificate.

On behalf of the British Board of Agrément

Date of First Issue: 31 May 2012

Simon Wroe
Head of Approvals — Materials

Greg Cooper
Chief Executive

The BBA is a UKAS accredited certification body — Number 113. The schedule of the current scope of accreditation for product certification is available in pdf format via the UKAS link on the BBA website at www.bbacerts.co.uk

Readers are advised to check the validity and issue number of this Agrément Certificate by either referring to the BBA website or contacting the BBA direct.

British Board of Agrément
Bucknalls Lane
Garston, Watford
Herts WD25 9BA

tel: 01923 665300
fax: 01923 665301
e-mail: mail@bba-star.co.uk
website: www.bbacerts.co.uk

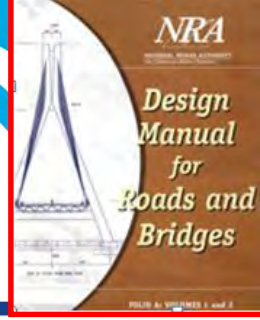
ds

and similar Protective Coatings

	Item No. 167
GISTERED DESCRIPTION:	Epoxy Acrylic Finish (two-pack)
LOURS:	As the manufacturer's declared colour given with reference to BS 4800 and/or BS 381C where appropriate
E:	As a decorative semi-gloss finish for new works or maintenance
Y FILM THICKNESS (dft in µm):	Dft range: As described in the manufacturer's data sheet.
ILD AND METHOD OF PLICATION:	NB / AS or B*
TLINE COMPOSITION:	
Pigment Volume Concentration (%):	As described in manufacturer's declared formulation
Pigment:	Rutile Titanium Dioxide (IS EN ISO 591-1:2000) and tinting pigments as described in the manufacturer's declared formulation
Medium:	Carboxy functional styrene acrylic with separately packed liquid epoxy resin cure agent, as described in the manufacturer's declared formulation
Volatile:	As described in manufacturer's declared formulation.
Mixing Properties	As described in manufacturer's declared formulation.

* May be brush applied to small areas only

Structures Standards – NRA DMRB

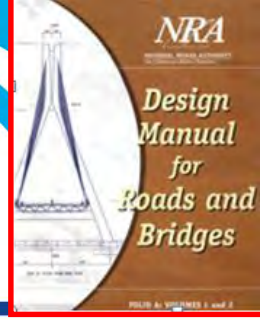


NRA DMRB Volume 2 – Structures: Design & Materials

Look Ahead (Future Work 2015) – 4 new documents planned

1. New NRA BD - Expansion Joints
   - BD33 ***Expansion Joints for Use in Highway Bridge Decks*** + BA47 ***Expansion Joints for Use in Highway Bridge Decks***
2. New NRA BD – Hydrophobic Pore Liner / Coatings
   - BD43 ***Criteria and Materials for the Impregnation of Concrete Highway Structures*** + BA 85 ***Coatings for Concrete Highways Structures & Ancillary Structures***
3. New NRA BD – Waterproofing & Surfacing
   - BD47 ***Waterproofing & Surfacing of Concrete Bridge Decks*** + BA47 ***Waterproofing & Surfacing of Concrete Bridge Decks***
4. New NRA BD – Bridge Bearings
   - BD20 ***Bridge Bearings: Use of BS 5400 Part 9 (1983)***

Structures Standards – NRA DMRB



Standard or Advice Note			NRA Addendum or Standard Dated	UK DMRB Reference Document
DMRB Part	Number	Title		
Section 1: Inspection				
3.1.1	NRA BD 54*	Management of Post Tensioned Concrete Bridges	June 2014	-
3.1.2	NRA BA 50*	Post-tensioned Concrete Bridges - Planning, Organisation and Methods for Carrying Out Special Inspections	June 2014	-
3.1.3	NRA BA 93*	Structural Assessment of Bridges with Deck Hinges	June 2014	-
3.1.4	NRA BA 86*	Advice Notes on the Non-destructive Testing of Road Structures	June 2014	-
Section 2: Maintenance				
3.2.1	NRA BD 87*	Maintenance Painting of Steelwork	June 2014	-
3.2.4	*BD 89*	*The Conservation of Highways Structures*		*November 2003*
Section 3: Repair				
3.3.1	NRA BA 43*	Strengthening, Repair and Monitoring of Post-tensioned Concrete Bridge Decks	June 2014	-
3.3.2	*BD 27*	*Materials for the Repair of Concrete Highway Structures*		*November 1986*
3.3.3	NRA BA 35*	Inspection and Repair of Concrete Road Structures	June 2014	-
3.3.4	NRA BA 83*	Cathodic Protection for Use in Reinforced Concrete Road Structures	June 2014	-
3.3.5	NRA BA 87*	Management of Corrugated Steel Buried Structures	June 2014	-
3.3.6	NRA BA 88*	Management of Buried Concrete Box Structures	June 2014	-

Table 3: Standards and Advice Notes Available for Use in Ireland

NRA GD 02 Volume Contents

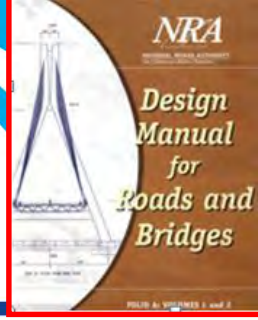
Volume 3
Structures – Inspection & Maintenance

Until recently Volume 3 was not formally implemented – background reading only

41 Documents Added:

- **Section 1 Inspection – 4**
- **Section 3 Repair - 5**

Structures Standards – NRA DMRB



Standard or Advice Note			NRA Addendum or Standard Dated	UK DMRB Reference Document
DMRB Part	Number	Title		
Section 4: Assessment				
3.4.1	NRA BD 21*	The Assessment of Road Bridges and Structures (including Erratum No. 1, dated December 2014)	June 2014	-
3.4.2	NRA BA 16*	The Assessment of Road Bridges and Structures.	June 2014	-
3.4.3	NRA BA 38*	Assessment of the Fatigue Life of Corroded or Damaged Reinforcing Bars	June 2014	-
3.4.4	NRA BA 39*	Assessment of Reinforced Concrete Half-joints	June 2014	-
3.4.5	NRA BD 48*	The Assessment and Strengthening of Road Bridge Supports	June 2014	-
3.4.6	NRA BA 54*	Load Testing for Bridge Assessment	June 2014	-
3.4.7	NRA BA 55*	The Assessment of Bridge Substructures and Foundations, Retaining Walls and Buried Structures	June 2014	-
3.4.8	NRA BA 52*	The Assessment of Concrete Road Structures Affected by Alkali Silica Reaction	June 2014	-
3.4.9	NRA BD 56*	The Assessment of Steel Road Bridges and Structures	June 2014	-
3.4.10	NRA BA 51*	The Assessment of Concrete Structures Affected by Steel Corrosion	June 2014	-
3.4.11	NRA BD 44*	The Assessment of Concrete Road Bridges and Structures	June 2014	-
3.4.12	NRA BA 44*	The Assessment of Concrete Road Bridges and Structures	June 2014	-
3.4.13	NRA BD 61*	The Assessment of Composite Road Bridges and Structures	June 2014	-
3.4.14	NRA BD 79*	The Management of Sub-standard Road Structures	June 2014	-
3.4.16	NRA BD 81*	Use of Compressive Membrane Action in Bridge Decks	June 2014	-
3.4.18	NRA BD 101*	Structural Review and Assessment of Road Structures	June 2014	-

Table 3 Continued: Standards and Advice Notes Available for Use in Ireland

NRA GD 02 Volume Contents

Volume 3
Structures – Inspection & Maintenance

41 Documents Added:

- **Section 4 Assessment – 16**

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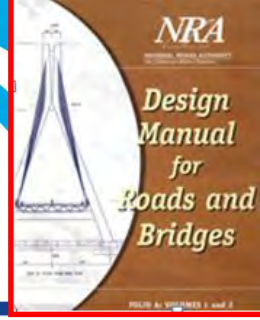
Network Management

Structures Standards – NRA DMRB



Standard or Advice Note			NRA Addendum or Standard Dated	UK DMRB Reference Document
DMRB Part	Number	Title		
Section 3: Standards and Advice Notes superseded by Eurocodes but required for Assessment				
3.5.1	NRA BA 9*	The use of BS 5400 Part 10: 1980 – code of practice for fatigue	June 2014	-
3.5.2	NRA BD 9*	The use of BS 5400 Part 10: 1980 – code of practice for fatigue	June 2014	-
3.5.3	NRA BD 13*	Design of steel bridges. Use of BS 5400-3:2000	June 2014	-
3.5.4	NRA BD 15*	General Principles for the Design and Construction of Bridges: Use of BS 5400 : Part 1 : 1988	June 2014	-
3.5.5	NRA BD 16*	Design of composite bridges. Use of BS 5400: Part 5: 1979	June 2014	-
3.5.6	NRA BD 24*	The design of concrete highway bridges and structures. Use of BS 5400: Part 4: 1990	June 2014	-
3.5.7	NRA BD 28*	Early Thermal Cracking of Concrete [and Amendment No. 1, 1989]	June 2014	-
3.5.8	NRA BD 31*	The design of buried concrete box and portal frame structures	June 2014	-
3.5.9	NRA BD 37*	Loads for highway bridges	June 2014	-
3.5.10	NRA BA 42*	The Design of Integral Bridges	June 2014	-
3.5.11	NRA BD 49*	Design Rules for Aerodynamic Effects on Bridges	June 2014	-
3.5.12	NRA BA 58*	The Design of Concrete Highway Bridges and Structures with External and Unbonded Prestressing	June 2014	-
3.5.13	NRA BD 58*	The Design of Concrete Highway Bridges and Structures with External and Unbonded Prestressing	June 2014	-
3.5.14	NRA BD 74*	Foundations	June 2014	-
3.5.15	NRA BA 19*	The Use of BS 5400: Part 3: 1982	December 2014	-
3.5.16	NRA BA 24*	Early Thermal Cracking of Concrete	December 2014	-

Table 3 Continued: Standards and Advice Notes Available for Use in Ireland

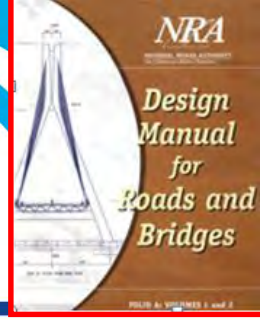
NRA GD 02 Volume Contents

Volume 3
Structures – Inspection & Maintenance

41 Documents Added:

- **Section 5 Standards & Advice Notes superseded by Eurocodes but required for assessment – 16**

Structures Standards – NRA DMRB



NRA DMRB Volume 3 – Structures: Inspection & Maintenance

Look Ahead (Future Work 2015) – **9 new documents planned**

1. NRA BD 300 ***EIRSPAN – Inventory Manual***
2. NRA BD 301 ***EIRSPAN – Principle Inspection***
3. NRA BD 302 ***EIRSPAN – Routine Inspection***
4. NRA BD 303 ***The Stage I Structural Assessment of Road Structures***
5. NRA BD 304 ***The Stage II Structural Assessment of Road Structures***
6. NRA BD 89 ***The Conservation of Road Structures***
7. NRA BD 27 ***The Protection and Repair of Concrete Road Structures***
8. NRA BD 97 ***The Assessment of Scour and other Hydraulic Actions at Road Structures***
9. NRA BD 86 ***The Assessment of Road Bridges & Structures for the Effects of Abnormal & Exceptional Abnormal Load Vehicles using SV & SOV Load Models***

Structures Standards – NRA DMRB

NRA BD 86/15 *(March 2015)* -

The Assessment of Road Bridges & Structures for the Effects of Abnormal & Exceptional Abnormal Load Vehicles using SV & SOV Load Models

What is it?:

- A standard to assess bridges for the effects of abnormal vehicles (in combination with the effects of C&U vehicles and permanent loads)
- Provides requirements on how to determine the "Vehicle Rating" and "Reserve Factor" for a particular structure

When would you use it?:

- As directed by NRA BD 101 (significant deterioration)
- In the management of Abnormal Vehicle movements
- And as agreed with the structures section of the NRA

Structures Standards – NRA DMRB

NRA BD 86/15 -

The Assessment of Road Bridges & Structures for the Effects of Abnormal & Exceptional Abnormal Load Vehicles using SV & SOV Load Models

What benefits does it provide?

- More realistic abnormal load models (v HB Load Model)
- Attainment of higher load capacity ratings (particularly for spans < 10m)
- Flexibility to modify Overload Factor & Dynamic Amplification Factor


Exceptional Abnormal Loads
~ SOV 250 to SOV 600

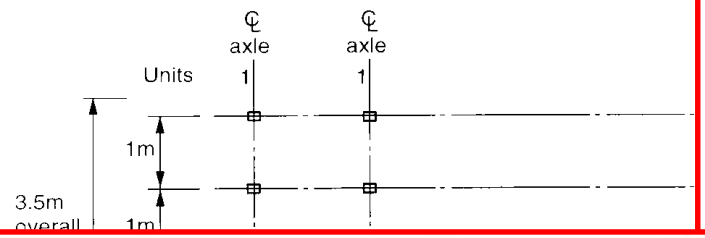

© Richard Wintle

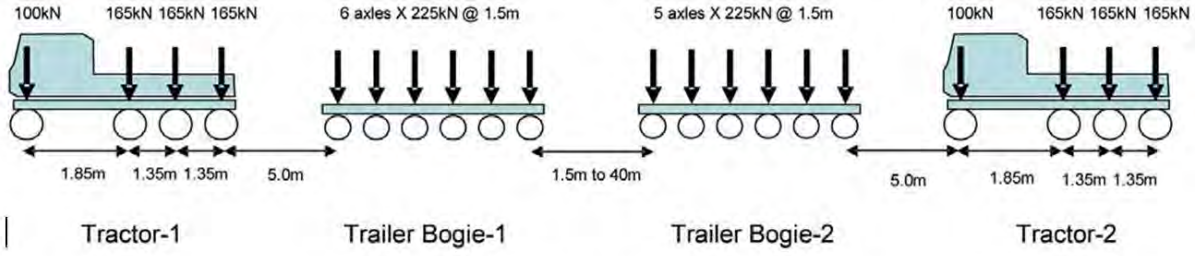

Abnormal Loads
~ SV 80 to 196

Structures Sta – NRA DMRB

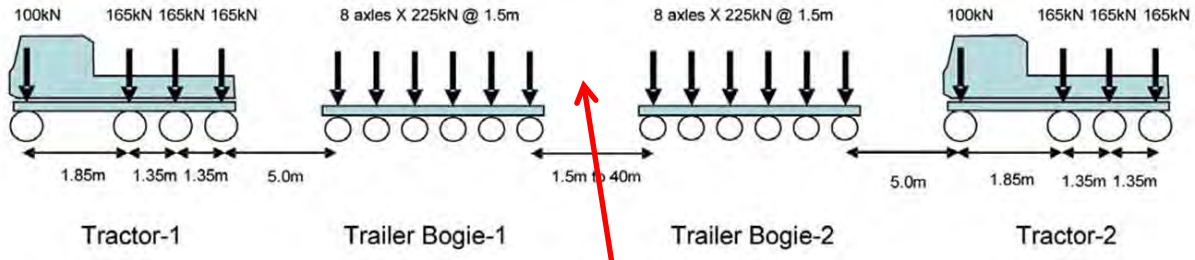
NRA BD 86/15

Abnormal & Exceptional Abi

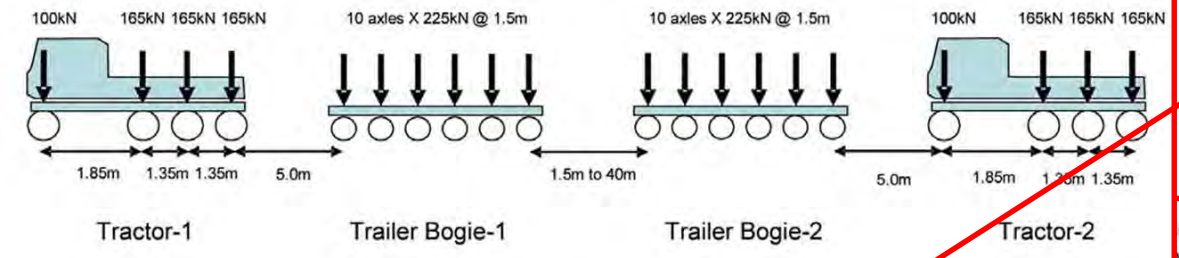




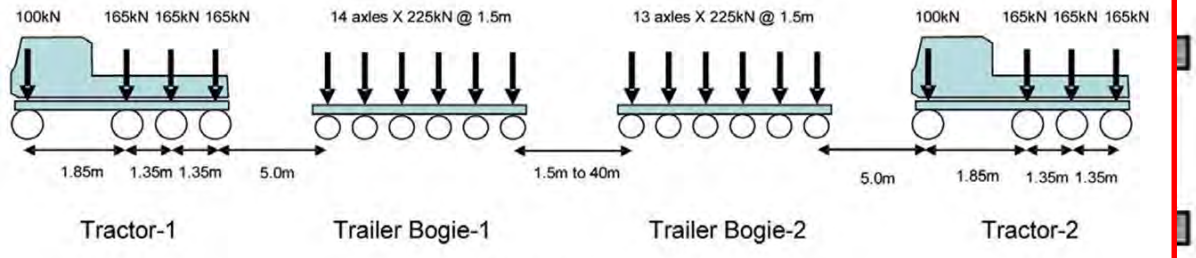
(a) SOV-250 Load Model



(b) SOV-350 Load Model



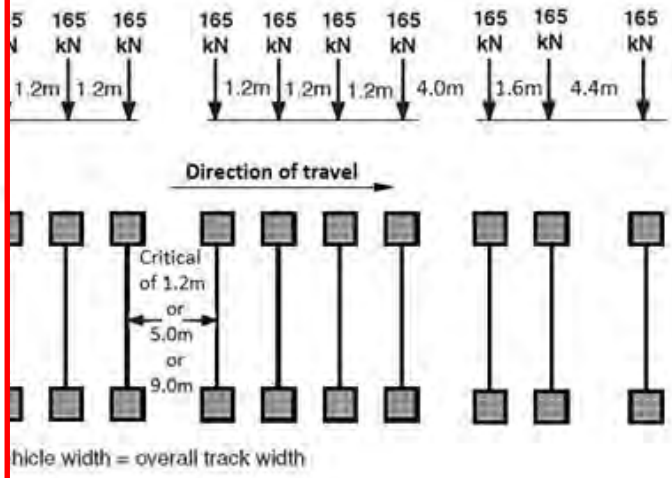
(c) SOV-450 Load Model



(d) SOV-600 Load Model

SOV Load Models

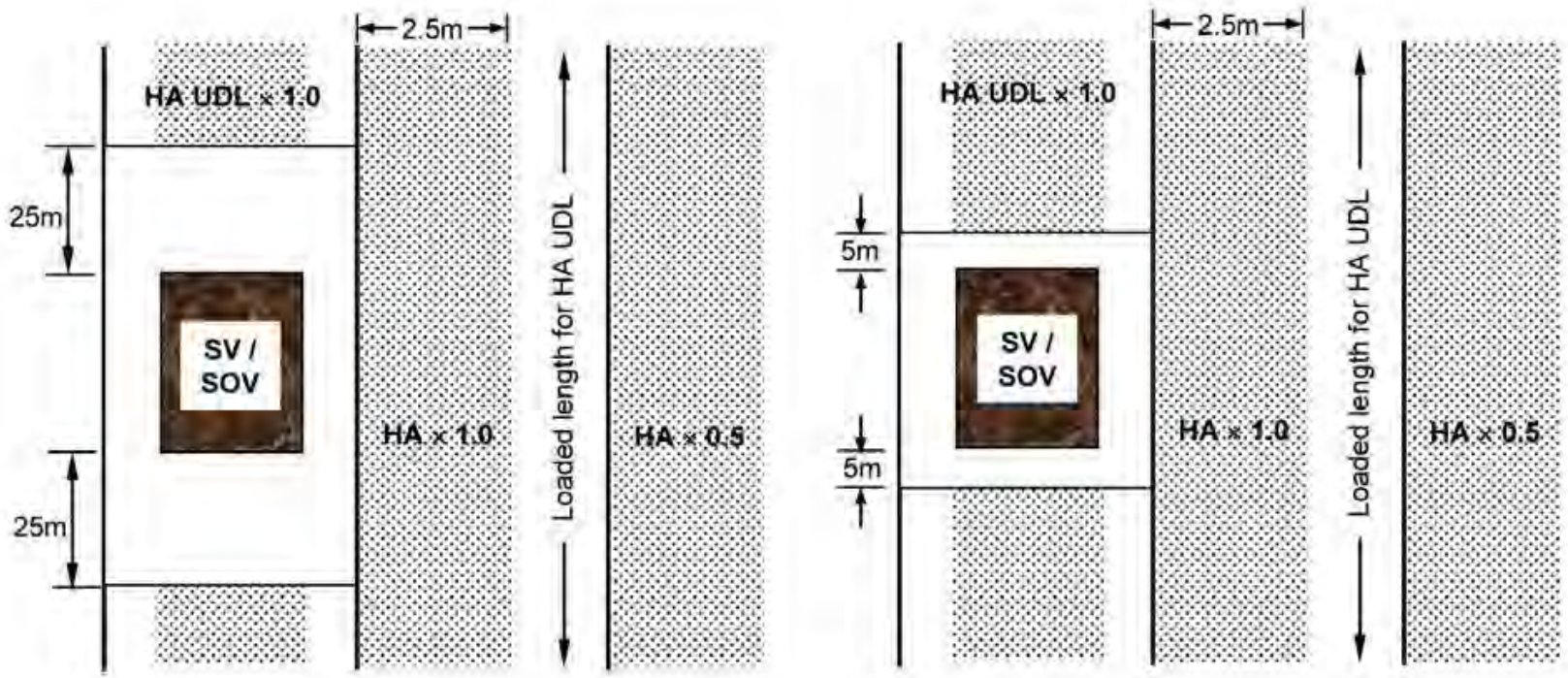
SV196 Load Model



Structures Standards – NRA DMRB

NRA BD 86/15 -

The Assessment of Road Bridges & Structures for the Effects of Abnormal & Exceptional Abnormal Load Vehicles using SV & SOV Load Models



(a) Vehicle at 'normal' speed

(b) Vehicle at 'low' speed

Structures Standards – NRA DMRB

NRA BD 86/15

-Reserve Factors – ability of a bridge to carry an abnormal load model

-Capacity/Demand Ratio > 1.0

Vehicle Assessment

Structure Name: _____

Structure Key: _____

Vehicle Type+: _____

Vehicle Speed+: Normal / Low

Method of assessment: (Line Beam / Grillage / FEM / Other (state) _____

Limit State+: SLS / ULS

+ Delete as appropriate

Element	Location of Structure	Load Effect	R_A^*	S^*	S_D^*	S_{HA}^*	Ψ_{SV}	Ψ_{SOV}	Ψ^*_{SV}	Ψ^*_{SOV}

$$\Psi_{SV} \text{ or } \Psi_{SOV} = \frac{R_A^* - (S_D^* + S_{HA}^*)}{S^*}$$

Table 3.2: Reserve Factors

NRA
An tÚdarás um Bóithre Náisiúnta
National Roads Authority
Network Management

The Evolving EuroCodes

History

- 10 EuroCode standards (58 individual parts)
  - developed between late 1970s and 2010
  - so took about 30 years to develop
- Introduced in 31st March 2010
  - design to Eurocodes becomes mandatory (CEN)
  - withdrawal of conflicting national codes
- Now 2015 (5 year review) - need to evolution to ensure:
  - remain current
  - fit for purpose

The Evolving EuroCodes

EUROCODES
BUILDING THE FUTURE

History

- European Commission (Dec 2012) – Mandate M/515
  - request CEN to develop a detailed work programme for the future activities of CEN/TC250
- CEN/TC250 respond to EC:
  - May 2013 – 138 page document
  - Over 1000 experts across Europe involved in response
  - 77 discrete tasks (evolving)
  - "Towards a second generation of EN Eurocodes"
  - 5 year Programme (2015 – 2020)
  - €10 Million Budget

The Evolving EuroCodes

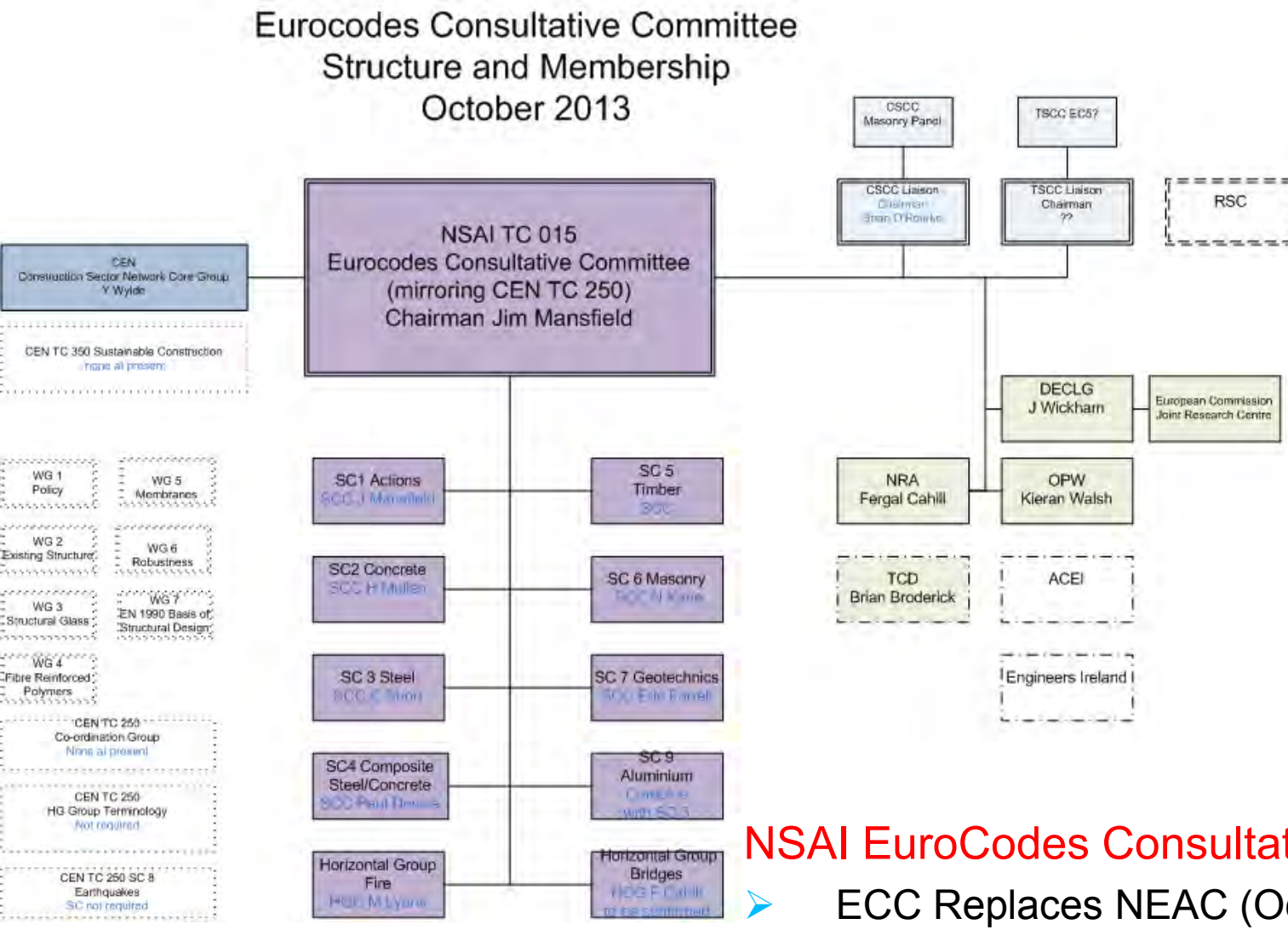
Towards a second generation of EN EuroCodes

1. Improve the existing codes (make them easier to use)
   - Feedback from practitioners – systematic reviews
   - Improve the clarity - Enhance User friendliness
   - Simply routes through the codes
   - Reduce the amount of national variation (NDPs)
   - Reduce number of alternate design methods
   - Remove rules of little practical use
   - Substantial additions required
   - Incorporate new state of the art
   - Needs of the market

The Evolving EuroCodes

Towards a second generation of EN EuroCodes

2. Develop new codes
   - Existing Structures & Assessment (WG2)
     - JRC Policy Report – "New European Technical Rules for the Assessment & Retrofitting of Existing Structures"
     - http://eurocodes.jrc.ec.europa.eu/showpublication.php?id=535
     - Purpose is to stimulate debate – NOT for use
     - Comments required by 9th September 2015
   - Structural Glass (WG3)
   - Fibre Reinforced Polymers (WG4)
   - Membrane Structures (WG5)
   - Robustness (WG6)



NSAI EuroCodes Consultative Committee

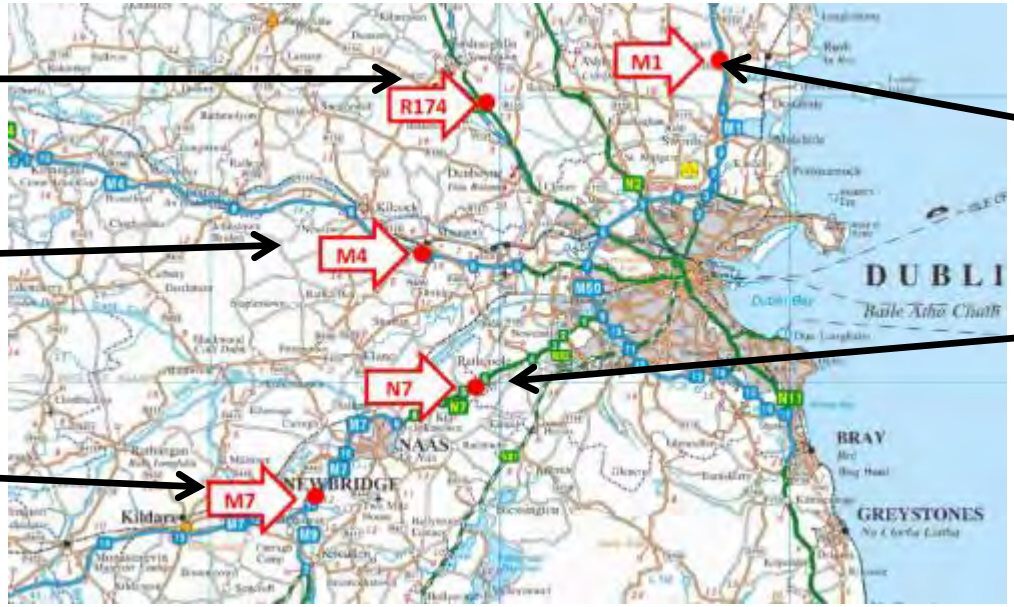
- ECC Replaces NEAC (Oct 2013)
- NSAI TC 015 – mirrors CEN/TC250
- ECC Advises NSAI on all things EuroCodes

NRA Weigh-In-Motion (WIM)

Site #2
Black Bull,
Meath

Site #3
Maynooth,
Kildare

Site #4
Lewistown,
Kildare



Site #1
Donabate, Dublin

Site #6
Citywest South,
Dublin

Site #5
Gorey, Wexford

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NRA Weigh-In-Motion (WIM)

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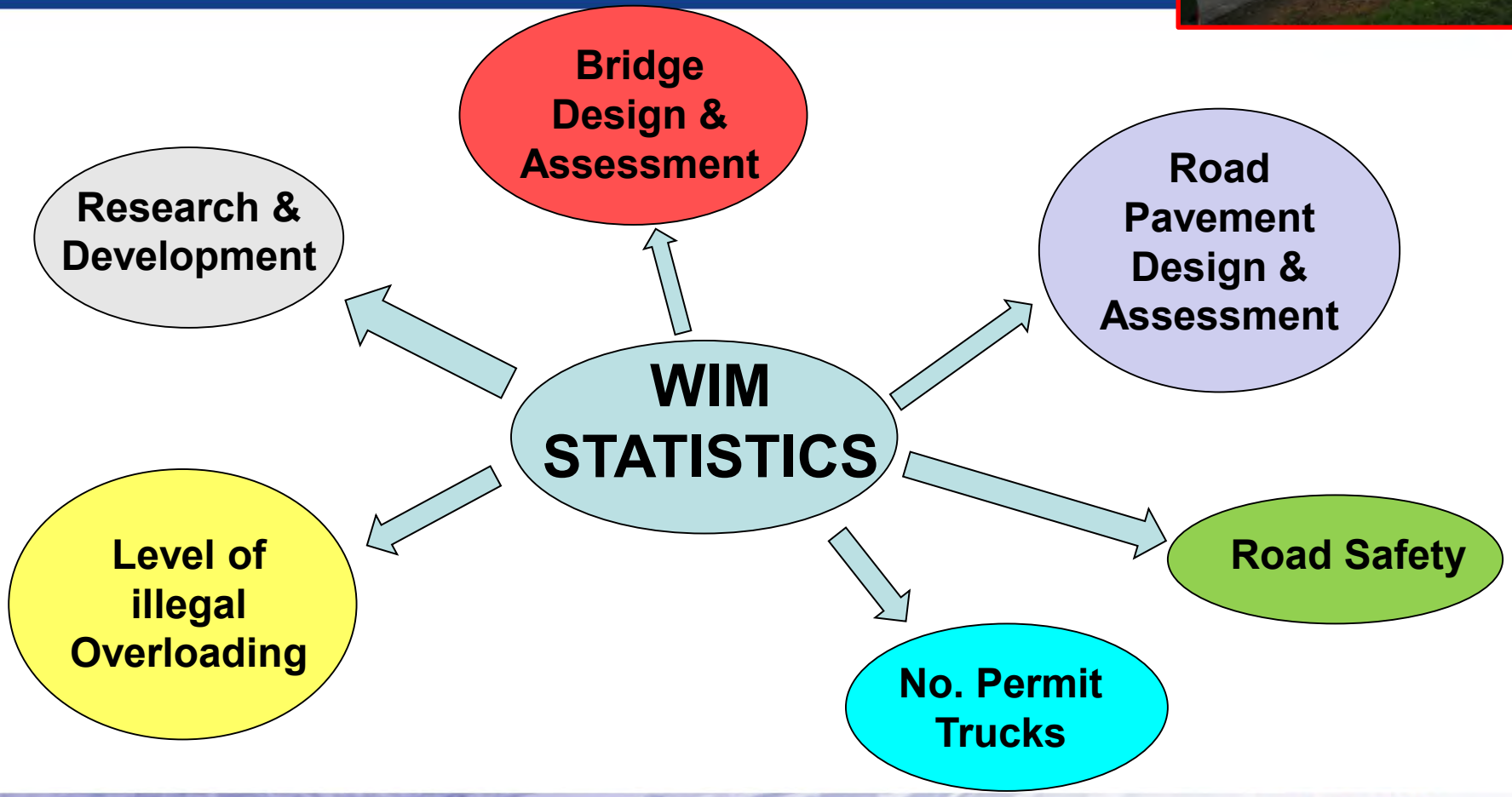
National Roads Authority
Network Management

NRA Weigh-In-Motion (WIM)

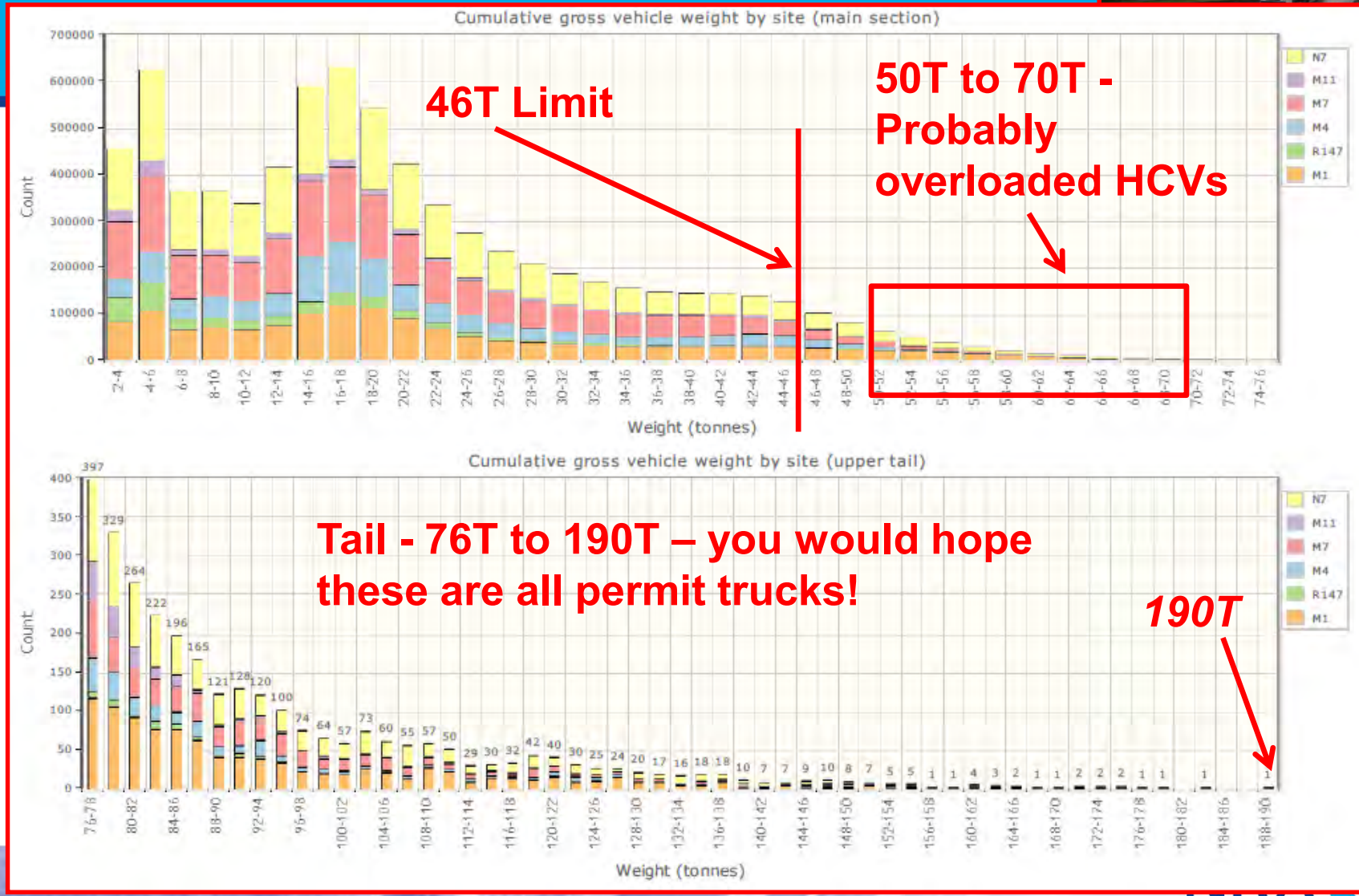
NRA Weigh-In-Motion (WIM)

- **We're blind** – The NRA have no HCV loading / overload Network Indicators
- Overloaded Trucks / Axles cause a lot of damage to Roads & Bridges
- The relationship between axle weight & pavement damage is not linear
- 4th Power Law - Overloaded Axles cause exponential damage to pavements
- Initial NRA focus – determine the state of truck loading on National Primary's
- Knowledge facilitates more efficient management & maintenance
- Need a couple of years of good data prior to any detailed analysis being conducted (.....12 months so far)

NRA Weigh-In-Motion (WIM)



NRA Weigh-In-Motion (WIM)



SECTION 3 - Cumulative GVW Histogram

One Year of Data (2014) - Across all 6 Sites

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National Roads Authority
Network Management

8 Axle – 137T

3 Axle – 48T

11T - 17T - 18T

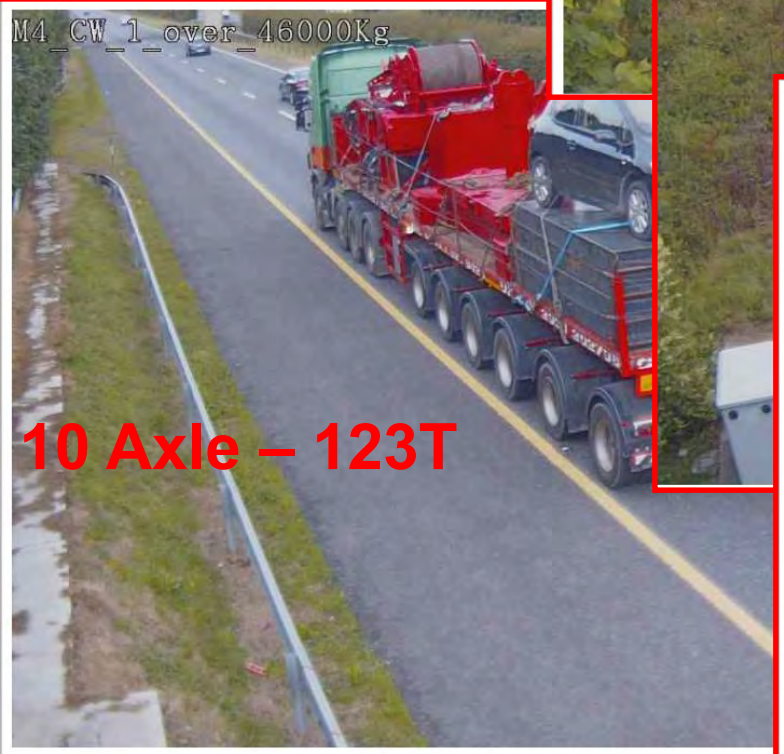
3 Axle Limit– 26T

85% Overloaded

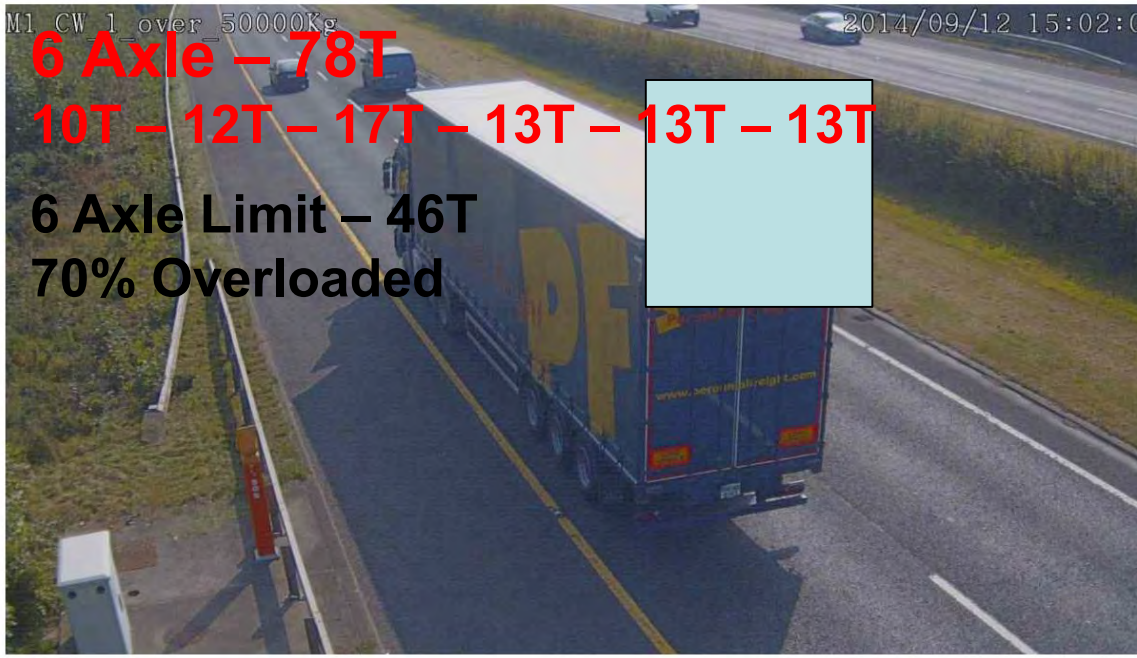
5 Axle – 72T

5 Axle Limit – 42T

71% Overloaded



10 Axle – 123T



6 Axle – 78T

10T – 12T – 17T – 13T – 13T – 13T

6 Axle Limit – 46T

70% Overloaded

NRA Weigh-In-Motion (WIM)

Engineers Ireland Presentation

- http://www.engineersireland.ie/Communications/Engineer-TV-Archive.aspx
- Communications / Engineers TV Archive
- “Traffic Monitoring Systems across the National Road Network” - (11/02/15)

Many Thanks for your Attention

Any queries, contact:

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