Overview of changes to NRA Design, MCDRW Series 900

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“We can't solve problems by using the same kind of thinking we used when we created them, we have to start from new.”

Einstein
Why Change

CPR

Other Products and Processes

IAN’s + Format

Performance Issues

DOP

EN13108

Revised Series 900
Performance Issues
Why Change

• Lack of transparency in test results
• Difficulty in resolving failures in timely manner
• Lack of understanding between “asphalt as a product” and “finished works incorporating an asphalt product”
• Discontinuity between production and site
• Investigation procedures disproportionate to majority of discrepancies

• Contract Perspective
Why Change

- Design Perspective
  - Ability of site specific design
  - Suite of materials with common approach
  - Better demonstration of value for money in chosen material
  - Analytical vs empirical basis
  - Easier to exploit material properties
Why Change

- Understanding DoP and CE Marking
- CE Marking introduced to regulate mixtures (but not the Works)
- Making a declaration and compliance sits with the manufacturer
- Legal requirement with penalties for non compliance
- Families of Products / Processes
Key Changes

- **AC, HRA, SMA, PA**
  - Performance Spec; Higher BC

- **Reclaimed Asphalt**
  - Lower Quantities, Min Virgin BC

- **Surface Treatments**
  - Micro Surfacing, Surface Dressing, HFS, Retexturing

- **Miscellaneous Products**
  - Geotextiles, LEBM, PRM, Localised, and ERM.

**Works**
Key Changes - The Works

- Section 10.1 Asphalt Products
  - General
  - Preparation
  - Works Proposals
  - Transport
  - Bond Coat
  - Weather Conditions
    - Specific to the various products
  - Temperature
  - Laying
    - Specific to the various products

- Joints
- Compaction Control
  - Specific to the various products
- Performance requirements
  - Specific to the various products
- Surface Macrotexture
- Trafficking
- Aftercare
- Reinstatement of core holes
Objective

- Make the Series easier to negotiate.
- Make a clear distinction between products and the works.
- ‘As laid’ performance testing needed to confirm that the products supplied are consistent with the declared performance.
- The revision is part 1 of a 2 stage process.
Objective (Stage 2)

- Testing information gathered from the works
- Assess the data gathered from the works to determine and set future achievable performance criteria
- Also to ensure the products will perform to meet the CPR Basic Requirements for Construction Works which include,
Basic Requirements for Construction Works

- Mechanical Resistance
- Stability
- Safety
- Sustainable Use of Natural Resources
- Noise
- Durable for its expected life
- Fit for the Intended Use
• 1 – General Requirements and Definitions
• 2 – Preparatory Work
• 3 – Asphalt Concrete Products
• 4 – Hot Rolled Asphalt Products
• 5 – Stone Mastic Asphalt Products
• 6 – Porous Asphalt Products
• 7 – Surface Treatment
• 8 – Miscellaneous Products and Processes
• 9 – Reclaimed Asphalt
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ROAD PAVEMENTS – BITUMINOUS BOUND MATERIALS

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904. Not Used

905. Not Used

906. Dense Base and Binder Course Asphalt Concrete (Recipe Mixtures)

1. Dense base and binder course asphalt concrete recipe mixtures shall be asphalt concrete conforming to IS EN 13108-1, the requirements specified in this Clause and Appendix 7.1. The mixture designation shall be one of the following:

(i) AC 22 dense base 40/60 sec
(ii) AC 22 dense base 70/100 sec
(iii) AC 22 dense bind 40/60 sec
(iv) AC 22 dense bind 70/100 sec
(v) AC 20 dense bind 70/100 sec
(vi) AC 20 dense bind 70/100 sec
(vii) AC 20 HDM bind 40/60 sec
(viii) AC 20 HDM bind 60/60 sec

2. When the mixture designation is not specified in Appendix 7.1, the mixture selected by the Committee shall be notified to the Employer’s Representative prior to its use in the Works.

Compositions

5. The composition of the binder and course materials shall be continuously monitored in accordance with IS 154487 Clause 9.5 with readings taken at least every 15 minutes on alternate wheels per lane, based on the preceding average speed and speed variations. The readings shall also be taken at each control location specified in sub-Clause 10 and 11. Each gage shall be continuously calibrated on each mixture from each mixing plant and the calibration shall be continually recorded and updated based on variations between gage readings and core densities at the same location.

11. For each location, the in situ void content shall be determined in accordance with IS 154487 using the gage density from the gage reading and a minimum density taken from the mixture type setting data and updated with values from testing in accordance with sub-Clause 13.

12. The average in situ void content calculated from any six consecutive indirect gage readings shall not exceed 7%.

13. In the event of the failure to meet the requirements in sub-Clause 10, cores shall be taken at each location, and void contents determined as described in sub-Clause 20 and the evaluation of the extent of non-conformity shall be based on these. In the event of dispute or discrepancy between the
Section 3 Asphaltic Concrete

• 3.1 Mixture Designations – “AC 32 dense base 40/60 des”

• 3.2 Constituent Materials - Binder, Aggregates, Filler, Reclaimed Asphalt, Additives.

• 3.3 Product Composition – General, Compositional Grading, Binder Content, Void Content, Water Sensitivity, Stiffness, Temperature.
### Other Documents

- **HD 23** Pavement Design and Maintenance General Information
- **HD 24** Traffic Assessment
- **HD 25 /26** Pavement and Foundation Design
- **HD 300** Design of Bituminous Mixtures, Surface Treatments, and Misc Products / Processes
- **HD 28** Management of Skid Resistance
- **HD 30** Pavement Asset Repair and Renewal – Scheme Approval
- **HD 31** Pavement Asset Repair and Renewal Principles
- **HD 36** Surface Materials for New and Maintenance Construction
- **HD 37** Bituminous Mixtures, Surface Treatments Materials and Techniques
- **HD 301** Approval of Specific Products Manual
Other Documents

- Series 000, and Series 100 incl Notes for Guidance
- Series 700 and NG Series 700 Notes for Guidance
- NG Series 900 Notes for Guidance
- Method of Measurement Series 700,
- RCD’s / 700 /1 and 6
"Anyone who has never made a mistake has never tried anything new." Einstein
Thank you

Questions?
Specific changes to
NRA Design, MCDRW Series 900

Tom Casey & Edward Winterlich
National Roads Authority
In 1939 Road Research Laboratory in UK carried out a trial of 700 mixes with differing compositions.

This lead to BS1241 for tar macadams in 1945 and BS1621 for bitumen macadams in 1950.

The specifications evolved into BS 4987 and BS594 upon which current NRA 900 series is based.
Based on experience accumulated in practice vs engineering principles of performance

Limited in scope to the circumstances included in the trial vs theoretical analysis of mechanical properties capable of dealing with any design situation
The Process

Designer
Contract Documents Compiler
Contractor
Engineers Rep
Completed Works

NRA Specification for Roadwork's Series 900
Specific Responsibilities
Designer

Traffic loading; Constraints Study

Consult the DMRB

Select appropriate materials

Fit for the INTENDED USE and DURABLE for its expected LIFE
Specific Responsibilities
Contract Documents Compiler

Complete Contract Specific Documents

Completes Appendices to the Specification 1/5, 7/1 etc

How the Works meet the designers requirements

Fit for the INTENDED USE and DURABLE for its expected LIFE
Find a Producer

Demonstrate the material is compliant

Organise the works & arrange for insitu testing to be completed

Fit for INTENDED USE & DURABLE for EXPECTED LIFE
Specific Responsibilities

Producer

• Type Testing per design
• Declare the Performance of the design based on the mechanical properties of that design (not just the B/C and Grading)
• CE Mark the product.
• Test Results
• TAIT’s
Specific Responsibilities
Employers Representative

Oversees Translation of the Designers requirements into the end product

Documentation demonstrating material compliance

Pavement performance consistent with Certification

Fit for its intended Use & Durable for Expected Life

Perceptible Properties
Volume 7 of the NRA DMRB consists of a Series of Linked Documents

Mandatory with regard to Pavement Assessment

HD 23 provides an introduction and a clear chart of the Contents of each part of Volume 7.
HD 37 Bituminous Mixtures, Surface Treatments and Misc Products and Processes

- Introduction
- Base, Binder and Regulating Courses
- Hot Rolled Asphalt
- Stone Mastic Asphalt
- Porous Asphalt
- Surface Dressing
- High Friction Surfacing
- Microsurfacing
- Retexturing of Bituminous Pavements
- Geotextiles and Geotextile Related Products and Materials
- Low Energy Pavements
- Laying of Bituminous Courses
- Miscellaneous Pavement Courses and Treatments
- References and Bibliography
- Enquiries
- Annex

• Not a Technical Document
• Provides General Information associated with individual Products / Processes
• To allow the designer to make an informed choice

NRA
An tUdarás um Bóithre Nàisiúnta
Network Management
Having chosen the appropriate product / process for the Pavement design

This Document sets out technical design of the product.

In terms of its essential requirements
HD 301 Approval of Specific Products

- Introduction
- High Friction Surfacing
- Low Energy Bound Mixtures
- Retexturing
- Permanent Repair Material Systems and Localised Repair Material Systems
- References
- Enquiries
- Non Harmonised Standards
- Approval Process prTAITS
HD 30 Pavement Asset Repair and Renewal Scheme Approval

- Introduction
- Pavement Asset Repair and Renewal Scheme Approval Process
- Selection of PARR Schemes
- Data Collection
- Pavement Asset Repair and Renewal Proposal
- Procurement
- Monitoring of the Pavement Repair and Renewal Works
- Close Out of PARR Schemes
- Emergency and Isolated Pavement Repairs
- References
- Enquiries

Appendix
- Template for the PARR Scheme Proposal
- Short Form PARR Proposal for Emergency and Isolated Pavement Repairs
- Templates for NRA Regional Management Consents and Approvals
- Templates for PARR Scheme Close Out Information
HD 31 Pavement Asset Repair and Renewal Principles

- Introduction
- Review of Data from the NRA Pavement Asset Management System
- Visual Inspection Report
- Scheme Level Surveys and Investigations
- Interpretation and Analysis of Data
- Pavement Surface Treatment Options
- Structural Strengthening of the Pavement
- Pavement Drainage
- References
- Enquiries

**Appendix**
- NRA Pavement Asset Management System
- Falling Weight Deflectometer Surveys and Analysis
- Coring and Trial Pits
- Dynamic Cone Penetrometer
- Laboratory Testing
- Ground Penetrating Radar
- Carriageway Pavement Defect Types
Key Message

Consistency
Looking for consistency in the design/made/laid/performance cycles of pavements

Data Gathering
Gathering the as laid information will help to determine future specification needs

Testing
Testing of the works is imperative to feed in to the information loop

Everybody has a role
Thank you

Questions?