Bridge Management in Ireland

International Bridge Forum
13-16 September 2009

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Ireland
Overview

- Introduction to National Roads Authority
- Bridge management organisation
- Inspection types and intervals
- Trends in bridge defects
- Research initiatives
- Engineering Services procurement
- Successes & Challenges
Introduction to National Roads Authority

- Motorways, National Primary and Secondary routes
- Transport 21 & National Development Plan
- NRA Annual Expenditure €1.4 billion (2009)
- 2,800 Bridges >2.0m span
- Historically, local level bridge maintenance
- Eirspan introduced 2001
Bridge Management Regions
National Road Bridge Types

- masonry: 35%
- concrete: 48%
- steel: 6%
- corrugated steel: 3%
- pipe culvert: 5%
- Not Registered: 3%
Eirspan Inspection Modules

- **Principal Inspection**
  - Visual inspection by bridge engineer
  - Condition rating 0-5
  - Inspection interval 1-6 years

- **Routine Inspection**
  - Annual by local authority engineer

- **Special Inspection**
  - Underwater, PTSI
Eirspan Structural Assessments

- Commenced 2003
- Approximately 1500 number total
- Stage 1 Approximately 25% complete
- MEXE & ARCHIE
- Grillage
Trends in Bridge Defects

Storm chaos

Worst winds in years

Gales lead to severe floods and damage to homes

Michael Laverty
and Cormac Murphy

THE COUNTRY woke today to the aftermath of the worst storm in years which caused flight delays, flooding and economic blockages.

A mapping up warning will now get more rigorous in many areas as winds and rain are due to cause widespread damage to homes and infrastructure in the worst-hit areas.

And while the high winds eased last night, Met Eireann warned that these conditions will persist for several days.

The weather system was triggered by the Atlantic depression, which moved in from the west and brought strong winds and heavy rain.

Two people died in Tipperary after they were caught in a wind-driven car while they were driving home from work.

A person died in Offaly when a tree fell on their car.

A woman died in Limerick when she was caught in a flash flood in her garden.

A man died in Kerry when he was caught in a storm while working on a bridge.

A man died in Galway when he was caught in a storm while working on a bridge.

A man died in Clare when he was caught in a storm while working on a bridge.

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Leenaun Bridge Moments After Collapse
Concrete Structure Condition
Corrugated Steel Culverts – 100% Section Loss
Defects: Poor Drainage on Masonry Arches
Defects: Poor Drainage – Washout of fines

![Image of rock formation with a person holding a lamp, indicating a defect in drainage.](image-url)
Defects: Poor drainage – Washout of mortar
Lime Mortar Repointing Specification

- **Technical**
  - Higher flexural strength, lower compressive strength

- **Heritage**
  - Site trials to investigate adequacy of mechanical repointing with various lime mortar mixes
  - Train contractors to use lime mortars on arch bridge repairs (3 day course)

- Develop a specification for repointing
- Ongoing refinement of specification
Repair – Lime Mortar
Endoscope survey
Research Initiatives

- **Research**
  - Masonry Arch Bridge Repointing Specification
  - Monitoring Efficiency of Concrete Repairs in an Aggressive Environment
  - Develop an assessment framework for masonry arch bridges
  - Develop a bridge network life cycle cost model
Ferrycarrig Bridge Monitoring
Efficiency of Concrete Repairs in a Marine Environment

- Pier crosshead strengthening
- Crosshead concrete repairs:
  - Standard OPC mix
  - OPC mix + increased cover
  - OPC mix + silane
  - OPC mix + mixed-in corrosion inhibitors
  - GGBS mix
- Remote monitoring of
  - Rate of chloride penetration
  - Rate of corrosion if initiation occurs
Procurement of Engineering Services

- Framework Agreements
  - Tranche 1: Call-off in Rotation
  - Tranche 2: Mini-tenders 30% price & 70% quality
  - 4 Lots of services (work type & regional split)
  - 8 consultants per Lot
  - Good vfm and reduced procurement periods
Successes

- Masonry repointing specification
- Engineering Services Framework Agreements
- Commenced use of CFRP
- RM pilot project with contractor
- Minimum requirements for bridge inspectors
Challenges

- Network level decision making 8 years on
- Local authority opposition to private contractors
- Introduction of performance scoring in traditional procurement of Works contractors
- The move to Asset Management

- Discussion – Waterproofing without red sand asphalt?