

DuratiNet Transnational Workshop 2010

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Maintenance & Repair of Bridge Structures

- Part A Introduction to the Irish Experience
- Part B Common Defects, Testing & Inspection
- Part C Examples of Bridge Refurbishment Projects



Part A – Introduction to the Irish Experience

Bridge Failures



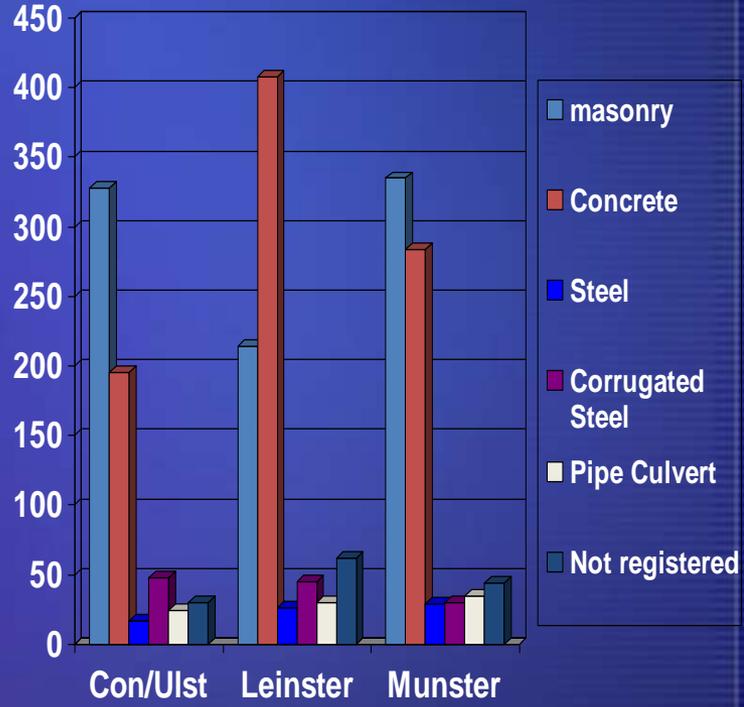
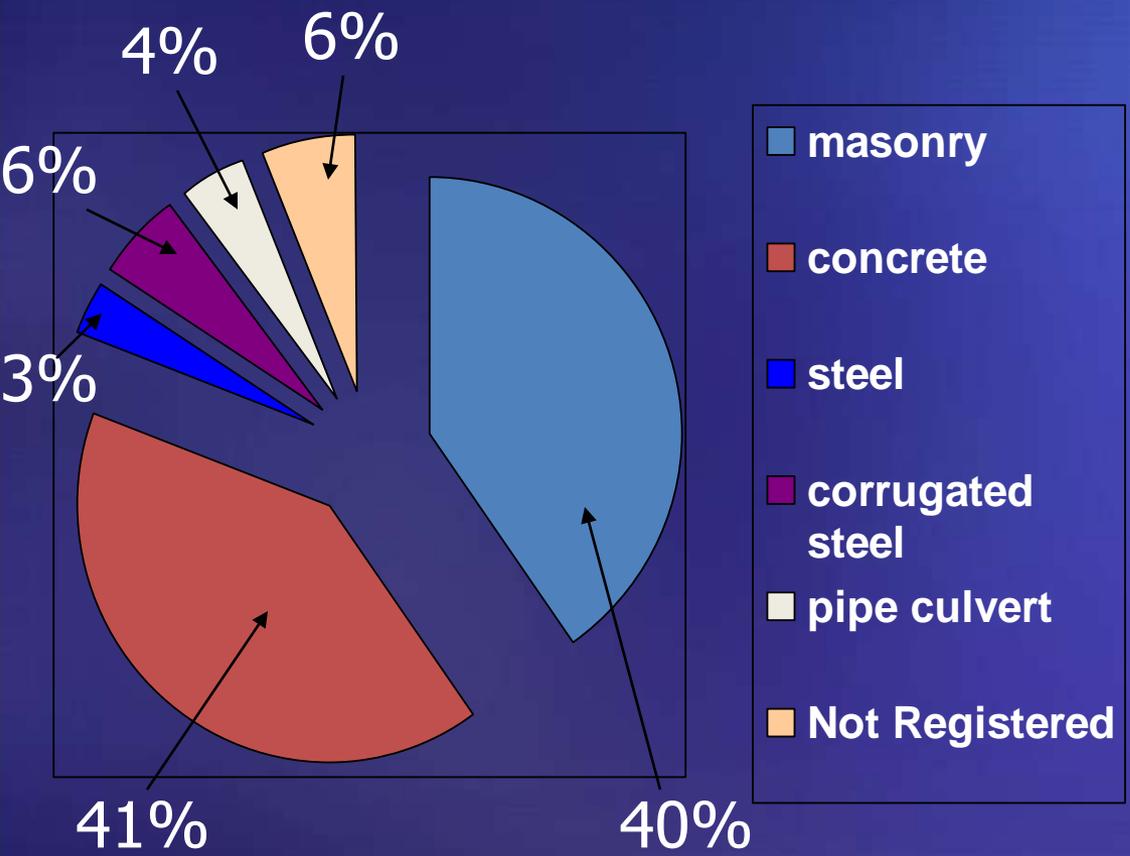
Introduction to the Irish Experience

Influencing Factors

- Maintenance History
 - Historically, investment in maintenance has been perceived to be very low
 - Both advantages and disadvantages to this
- Bridge Stock Inventory
 - Roads bridge stock consists of both very old and very new structures
 - Rail and Waterways bridge stock is predominantly very old structures
- Principal Cause of Defects
 - Corrosion (carbonation, chloride ion)
 - Alkali Silica Attack (*very limited in Ireland*)
 - Sulphate Attack (Thaumasite Attack) (*very limited in Ireland*)
 - Inadequate Design
 - Scour – undermining foundation through action of moving water
 - Impact
 - Overloading



Introduction to the Irish Experience



Part B – Common Defects, Testing & Inspection

Common Defects

Typical Causes of defects

Cause	Defect
Structure movement	<ul style="list-style-type: none">- Settlement- Sliding- Rotation- Differential movement
Water Leakage	<ul style="list-style-type: none">- Poor detailing- Failed joints- Lack of maintenance- Soft verges- Loss of pointing / masonry
Ground level changes	<ul style="list-style-type: none">- Scour- Excavation / lowering- Fill / raising

Cause	Defect
Chemical attack	<ul style="list-style-type: none">- Sulphate in groundwater- Alkali aggregate reaction- Chloride ion ingress- Carbonation
Steel corrosion	<ul style="list-style-type: none">- Poor paintwork- Low cover- Corrosion of exposed piles
Accidental	<ul style="list-style-type: none">- Impact- Overload- Design Errors- Construction Defects



Common Defects



Testing

Site tests

- Carbonation
- Schmidt hammer
- Covermeter
- Half-cell potential measurement
- Resistivity
- In-situ moisture content
- Permeability and surface absorption
- Void detection
- Internal tendon examination
- In-situ stress condition
- Capo pull off test

Laboratory tests

- Core compressive test
- Laboratory moisture content
- Density measurement
- Reinforcement yield strength
- Core expansion (ASR) test
- Petrographic analysis
- Diffusion test
- Sulphate resistance of concrete
- Chloride content
- Sulphate content
- Alkali content
- Cement Content



Part C – Examples of Bridge Refurbishment Projects

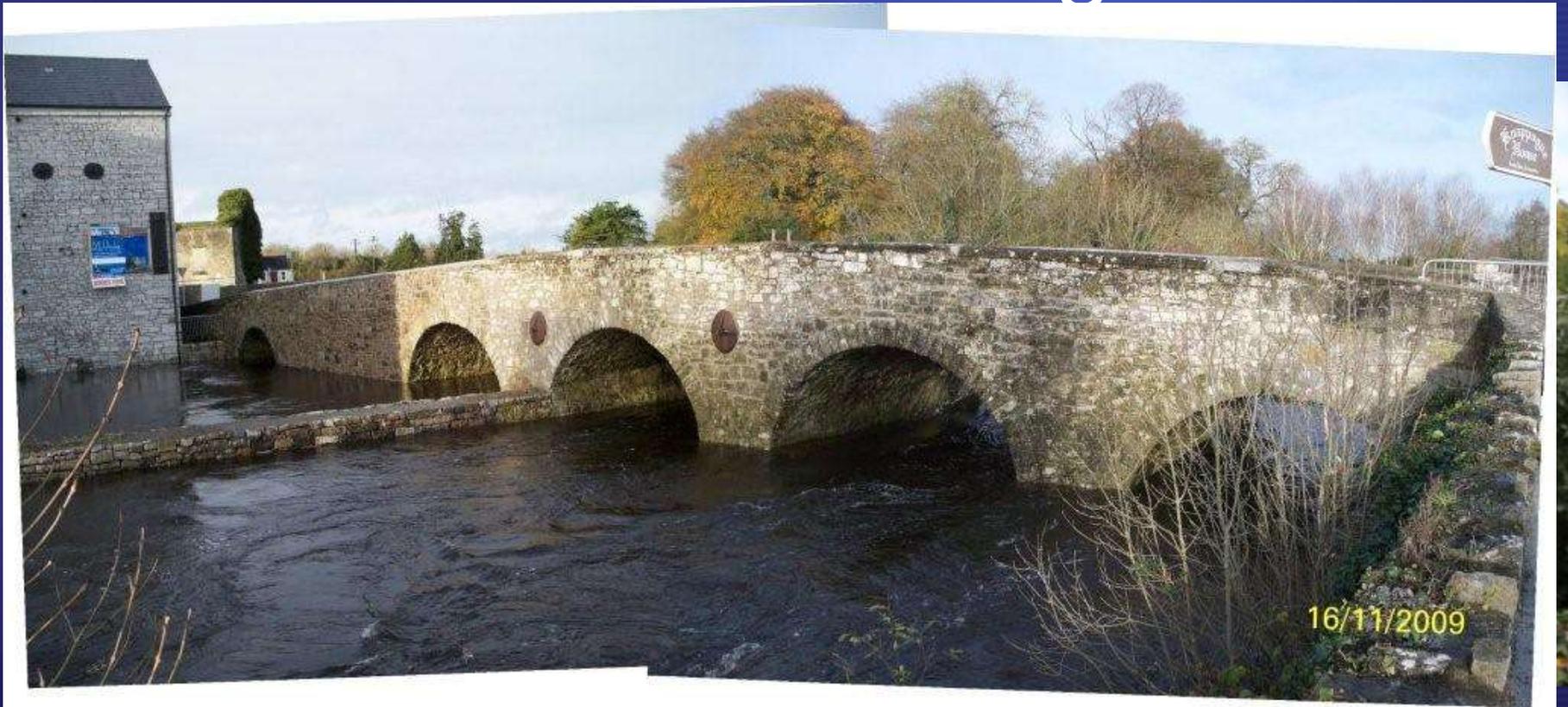
Ballysmutten Bridge



Brownsbarn Bridge



Richmond Bridge



Kenmare Bridge



Killongford Bridge



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Ferrycarrig Bridge



DSCF3773

Photos taken on the 25th January 2008

Photos by Peter Barrow Photographers - Ph: 045 401070

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