Bridge Asset Management

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Asset Management

A strategic approach that identifies the optimal allocation of resources for the management, operation, preservation and enhancement of the road and bridge infrastructure to meet the needs of current and future customers.
Ensure that the bridges stock is managed effectively

- Public Safety Paramount
- Network Availability - Minimise Intervention & Disruption
- Sustainability - Minimise Environmental Impact
- Maximise Limited Budgets - Achieve Cost Effective Solutions
- Obtain Resources to meet Future Needs
Safety always a high priority
“If a builder builds a house for a man and does not make its construction firm and the house collapses and causes the death of the owner of the house, that builder shall be put to death...”
Obtain Resources – Convince Politicians
The Scottish Cabinet
Delivering better transport sits at the heart of the Scottish Government’s intention to build a:

wealthier and fairer Scotland, healthier Scotland, safer and stronger Scotland, smarter Scotland, greener Scotland

- Transport Scotland created to deliver £3 billion capital investment programme to 2010 and beyond.
- Responsible for overseeing operation and maintenance of national rail and trunk road networks.
- Trunk road asset value £17bn – bridges £4.5bn
- Annual maintenance budget circa £24m ~ 0.53%
- Work Bank or backlog > £250m and rising
In simple terms

Bridge asset management covers all the actions that need to be carried out to ensure bridges remain safe, fit for purpose and without excessive maintenance and cost.
The reality

- All public bodies are being placed under increasing pressure to justify investment and to demonstrate that best use is being made of resources.

- Current best practice for the management of large infrastructure networks is set out in recent publications by the Department for Transport and the British Standards Institution. These publications recommend that infrastructure organisations adopt a formal asset management approach.

HENCE
Road (and bridge!) Asset Management Plan
AMP Building Blocks

- Know your assets
- Current & future demand
- Performance management framework
- Risk management
- Lifecycle plans – establish deterioration rates?
- Decision Support
- Work plan
- Financial plan
# Know your Assets

## Table 2: Structure Types and Quantities

<table>
<thead>
<tr>
<th>STRUCTURE TYPE</th>
<th>NUMBER</th>
<th>QUANTITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bridge</td>
<td>1821</td>
<td>1,093,917m³</td>
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<tr>
<td>Culvert</td>
<td>1933</td>
<td>58,220m</td>
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<tr>
<td>Retaining Wall</td>
<td>909</td>
<td>69,364m</td>
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<td>Sign/Signal Gantry</td>
<td>238</td>
<td>3,746m</td>
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<td>High Mast Light</td>
<td>620</td>
<td>16,255m</td>
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<tr>
<td>Footbridge</td>
<td>146</td>
<td>1,9994m²</td>
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</tbody>
</table>
First Generation
Bridge Management System

Old TRBDB
Risk based approach

- Parapets and entry/exit RRS
- Bridge supports
- Scour
- Vulnerable structures e.g. post-tensioned, half-joints
- Flooding
- Bridge strikes
- Assessments
- BD 79
- Abnormal loads
- Inspections
Lifecycle Plans

- Based on rate of deterioration
- Roads have scrim, deflectograph etc
- Bridges still rely on human evaluation – hence need for good inspector training
Management of Highway Structures CoP

• Harmonise current practice amongst Authorities while allowing flexibility to reflect local conditions

• Recommend a minimum level of asset stewardship

• Support Government’s 10-year Transport Plan objectives

• Support implementation of ‘Best Value’ and ‘Resource Accounting & Budgeting’

• Support the adoption of ‘whole life costing’, ‘risk management’ and ‘sustainability’ principles

• Support the implementation of a comprehensive ‘Asset Management Regime’

• Promote coordination with the management of pavement and lighting assets
Framework for a Bridge Management System

- Storage of minimum data set – format & content
  - Structure definitions; Inventory data
  - Condition data; Maintenance data; Major modifications
  - Cost data; Assessment results
- Support a range of data capture devices
- Schedule inspections and hold inspection data
- Schedule assessments and hold results
- Prioritise identified maintenance/renewal work
- Calculate BCI, KPIs, Asset Valuation
- Support in developing Asset Management Plans
- Management of abnormal loads linked to ESDAL
Framework for a Bridge Management System

- Asset Valuation
- User Interface
- Performance Indicators
- Report Generator
- Asset Database
- Works Management
- Condition & Performance Assessment
- Abnormal Load Management linked to ESDAL System
- Whole Life Costing

Decision Support Module
Prioritisation Tool
(Decision Support Tool)

- Make the right decision at the right time
- Do nothing
- Maintenance
- Refurbishment
- Widen
- Strengthen
- Replace
Prioritisation Framework

• Risk – “any event or hazard that could hinder the achievement of business goals or the delivery of stakeholder expectations”

• Risk = Likelihood x Consequences

• Stage 1: Define the Need

• Stage 2: Define the Risk Event that could occur if nothing done

• Stage 3: Assess the level of likelihood of the Risk Event

• Stage 4: Assess the level of consequence of the Risk Event

• Stage 5: Assess the level of overall risk associated with the Risk Event

• Stage 6: Identify the appropriate Priority for the Need
The Challenges

• A robust tool or methodology that will assist making the right decision at the right time

• Convince politicians of the need to invest at the right time

• Clever, cost effective asset management technology that puts bridge engineers in the lead
Learn from Mistakes
The Old & New Approach

1979
A9 Cromarty Bridge
multi-span O/A length 1400m

2008
A 876 Clackmananshire Bridge multi-span O/A length 1200m