11TH OCTOBER 2019

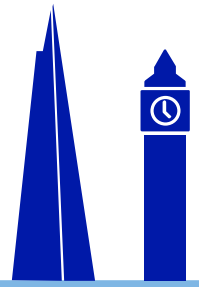
Risk Based Inspections

Duro Basic – Transport for London

EVERY JOURNEY MATTERS

Our Journey

- Time base inspection – GI's and PI's from 2000 to 2013
- RISK BASED INSPECTIONS – PI's only from 2014 to 2019
- Replace all PIs with GIs - for low risk structure types (further refinement of the initial RISK BASED Inspection) from 2018 to 2019
- RISK BASED inspection – GI's and PI's anticipated from 2020



Current State

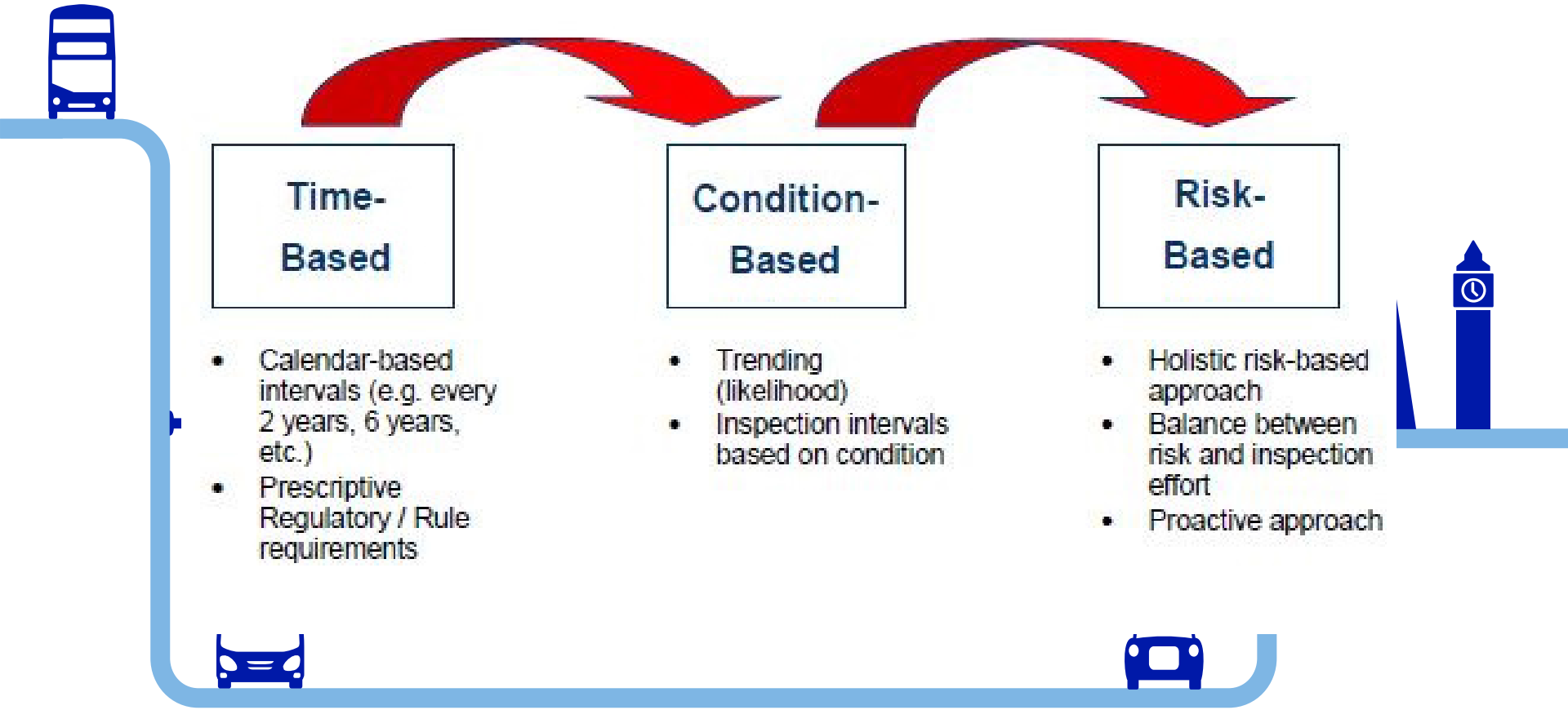
- **Prior 2017/18**
  - Funding was available
  - Typically ~ 10 structures with IM's
  - Our network – safe, operable and reliable
- **Post 2017/18**
  - Limited funding available – Investment for capital renewal posed over the last two years
  - Now over 40 structures with IM's
  - Targeted resources to manage the risk
  - Our network is safe and operable

Why RISK BASED Inspection?

- Time-based regime of General Inspections (GIs) and Principal Inspections (PIs) every two and six years respectively
- Well-Managed Highway Infrastructure: A Code of Practice was published in 2016
- BD63: Inspection of Highway Structures (2017)

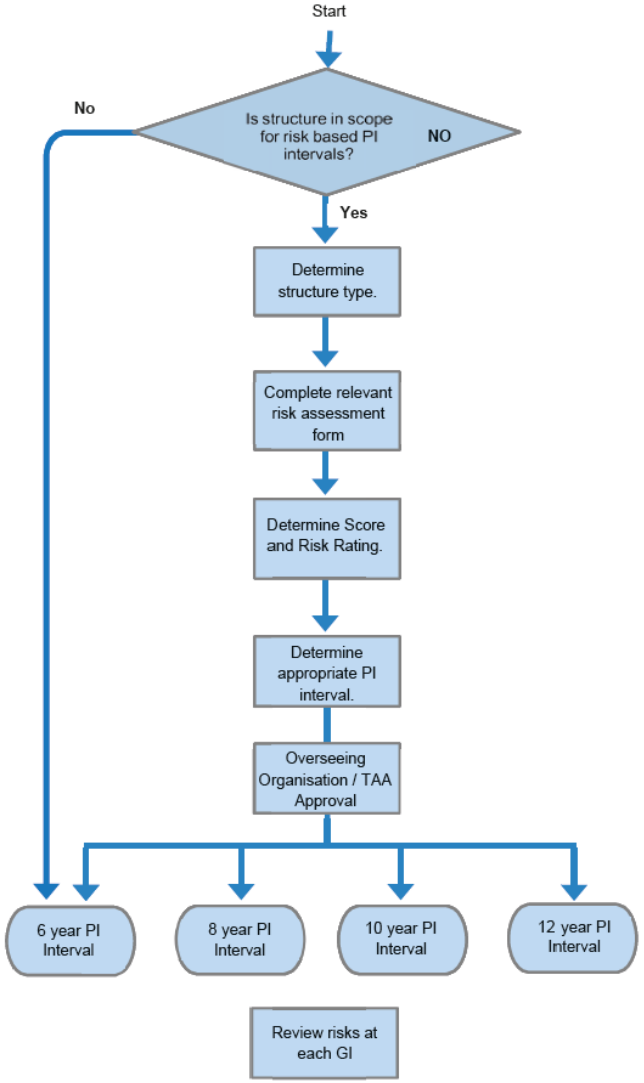
Optimal allocation of resources to manage our assets and risks

Evolution of Inspection



BD 63/17 Risk Assessment Process

- Only risk based PI intervals
- No reduction in PI frequency, just increase
- “In certain circumstances more frequent PI may be required and justifiable,...”
- BD 63 Chapter 8 Risk Assessment spreadsheet provided
- Some structures exempted from risk assessment to increase the interval between PI’s



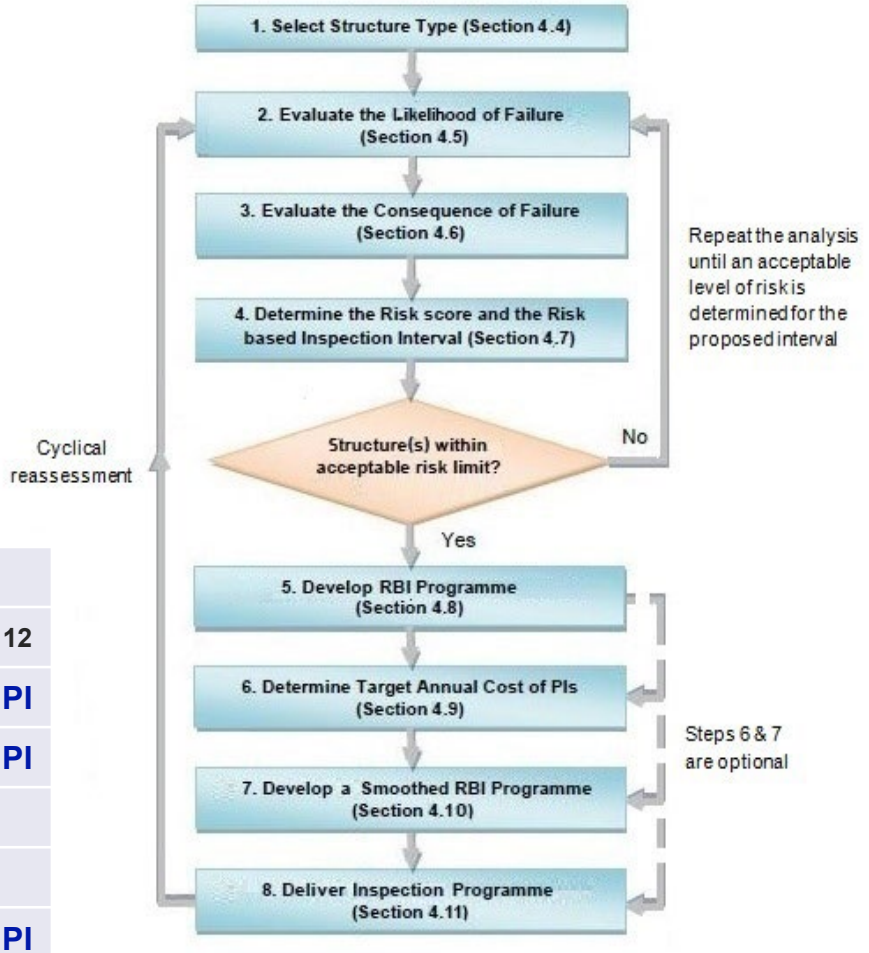
BD 63 Chapter 8 Risk Assessment

A - BRIDGES & LARGE CULVERTS	Criteria Number	Criteria	Attribute	Risk Score
A1 Structure Type	A.1.1	Structural form	Framed Span - Bridges	3
	A.1.2	Constituent material	Insitu Reinforced Concrete	4
	A.1.3	Age of the structure	10-25 years	1
	A.1.4	Headroom	Greater than 'Minimum Maintained Headroom'	1
	A.1.5	Span	10m to 25m	1
A2 Environment	A.2.1	Exposure	Moderate (Routes with de-icing salts)	1
	A.2.2	Scour	No Risk (structure not near or adjacent to waterway)	4
	A.2.3	Flooding	No Risk (structure not near or adjacent to waterway)	4
A3 Inspection / Assessment	A.3.1	Level of visual accessibility during a General Inspection	An enhanced GI has been completed in the last 6 yrs and will be undertaken between PI's.	4
	A.3.2	Likelihood of latent defects going unnoticed during a Principal Inspection	Low possibility of latent defects	3
	A.3.3	Assessment	Structural review recommends assessment as low or lesser priority	2
A4 Condition	A.4.1	Condition - Inspector's opinion	Good	3
	A.4.2	Condition Performance Indicator (Average Score)	Good (80-90)	3
	A.4.3	Condition Performance Indicator (Critical Element Score)	Good (80-90)	4
	A.4.4	Signs of Concrete Deterioration including TSA, AAR, ASR and ACR	No	3
A5 Consequences	A.5.1	Applied loading	Full Highway Loading	1
	A.5.2	Route supported	Motorway	0
	A.5.3	Obstacle crossed	Motorway	0
	A.5.4	Potential failure mode	Ductile Failure	2

LoBEG Good Practice Guide

- RISK BASED GI and PI intervals
- Increase in GI & PI frequency
- Also reduction in PI frequency
- Embedded within BridgeStation

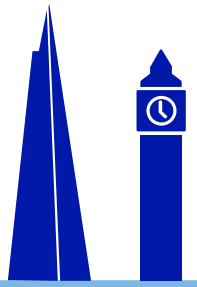
	Years											
PI Cycle	1	2	3	4	5	6	7	8	9	10	11	12
4		GI		PI		GI		PI		GI		PI
6		GI		GI		PI		GI		GI		PI
8			GI			GI		PI			GI	
10				GI			GI			PI		
12				GI				GI				PI



LoBEG Good Practice Guide

- BridgeStation Inspection Options:
  - Time base inspections (GI's and PI's)
  - Time base GI's and RISK BASED PI's
  - RISK BASED GI's and PI's
- Or just based on engineering judgement?



LoBEG Good Practice Guide

Some requirements an organisation needs to consider:

- Personnel involved in RBI are suitably competent and qualified
- Highway safety and service inspections are in place, covers affected assets and are appropriately managed
- Appropriate processes and procedures are in place
- Consistent and sufficiently comprehensive asset inventory
- Condition data is sufficient and quality assured
- Asset specific knowledge and / or issues are considered.

Are We Ready to Implement RBI?

RISK = f (Likelihood of Event, Consequence of Event)

- The current condition
- "Inspectability" of asset – can it be inspected?
- Specific known asset risk (half joints, scour, PTSI, etc.)
- Load capacity and structural assessments
- Probability of rapid deterioration
- Environment information
- Dimensions, material type, locations, etc.
- Route usage - bus route, AADF, serves hospitals, etc.
- Network disruption, diversion routes, other socio-economic impacts.
- What are other processes or procedure or inspection regimes?
- Do we have personnel which are suitably competent and qualified?

Any Questions?