The Strategic Local Government Asset Assessment Project

Webinar 2

Basic Vehicle/ Bridge Interactions

Webinar Topics

SESSION	TOPIC
1	About the Strategic Local Government Asset Assessment Project
2	Basic Vehicle/ Bridge Interactions
3	Asset Assessment Framework
4	Tier 1 Assessments
5	Interpreting Engineering Reports for Access Decision Making
6	Vehicles and Route Assessment
7	Applying Conditions for Heavy Vehicle Access
8	NHVR Portal – Digital Asset Management

Webinar Presenters

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Contents

11:00 - 11:05	Welcome	Todd Wellard
11:05 - 11:50	Basic Vehicle/ Bridge Interactions	Dr Neal Lake
11:50 - 12:00	QNA	All

Session format

- QnA (end and in chat)
- Please mute microphones
- Session recorded and will be emailed with slides
- Please watch in order as designed to build on knowledge

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SLGAAP - Stay connected

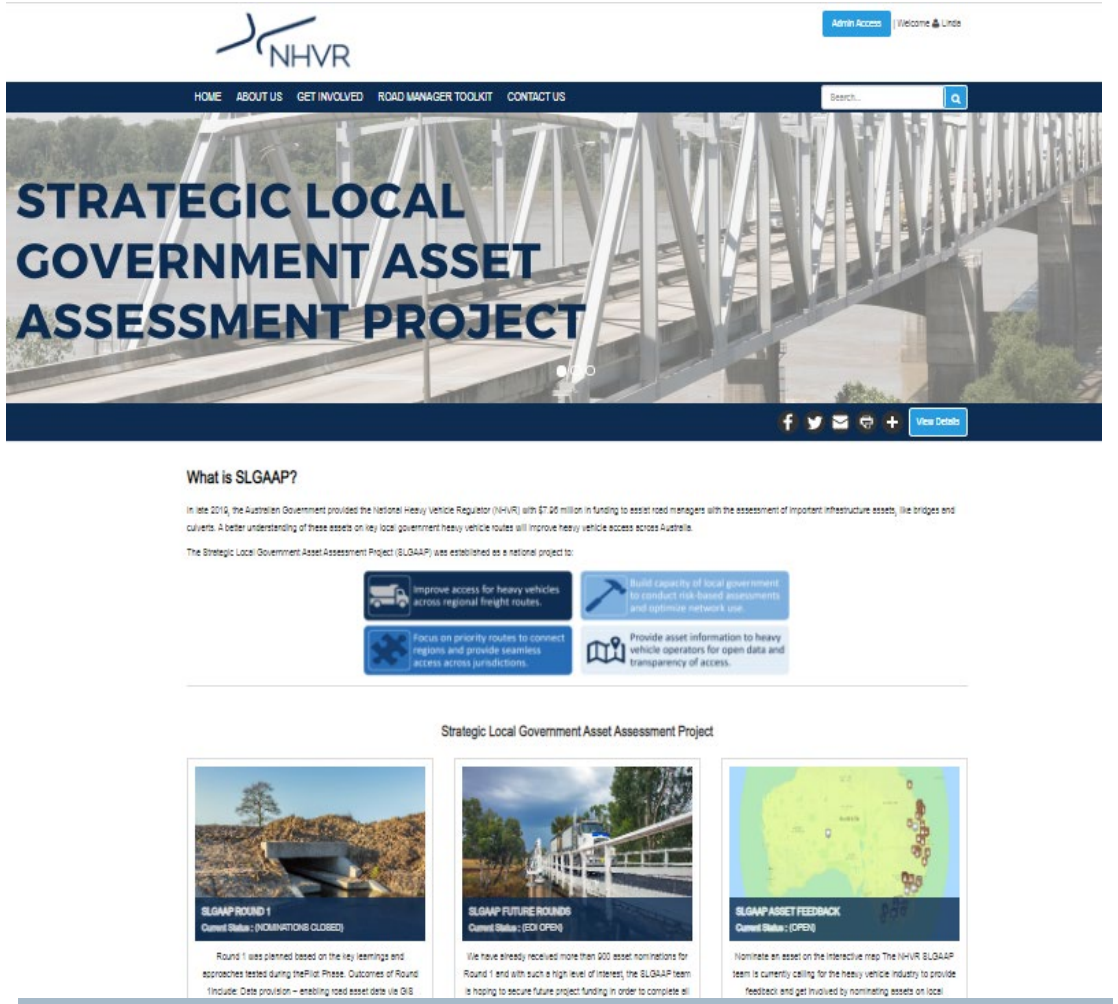
Road Manager Toolkit

01 PLAN

02 COMPARE

03 ASSESS

04 INTERPRET



Visit the SLGAAP Website to keep updated with all of the project news and progress.
https://nhvr.engagementhub.com.au
E: roadassetproject@nhvr.gov.au

Basic Bridge Vehicle Interactions

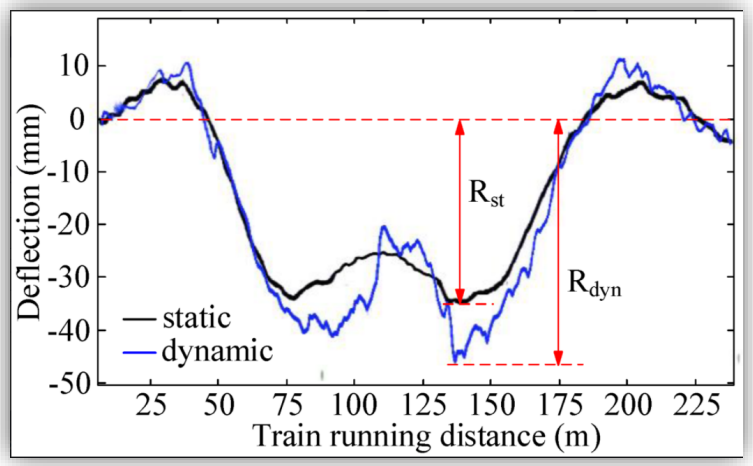
Neal Lake

Basic Vehicle/ Bridge Interactions

Key outcomes from today

Understand the critical parameters associated with vehicle loading effect

- Concentration of Mass
- Bridge Configurations
- Live Load Factors
- Dynamic Load Allowance
- The impact of vehicle position, GCW and bridge type on sharing of loads across a structure



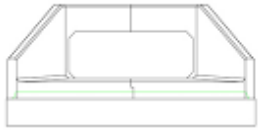
Load Magnitude and Concentration

Question: Which one is worse?

GML 118.5 t

HML 33.5t

GML 68.5 t



Critical parameters associated with load magnitude

*Both **gross vehicle mass** and **distribution of mass** are critical particularly as it relates to **bridge span**.*

Therefore we need to consider

- axle loadings
- axle spacings
- bridge configuration (span and continuity)
- Ground contact width and transverse positioning (will discuss this later)

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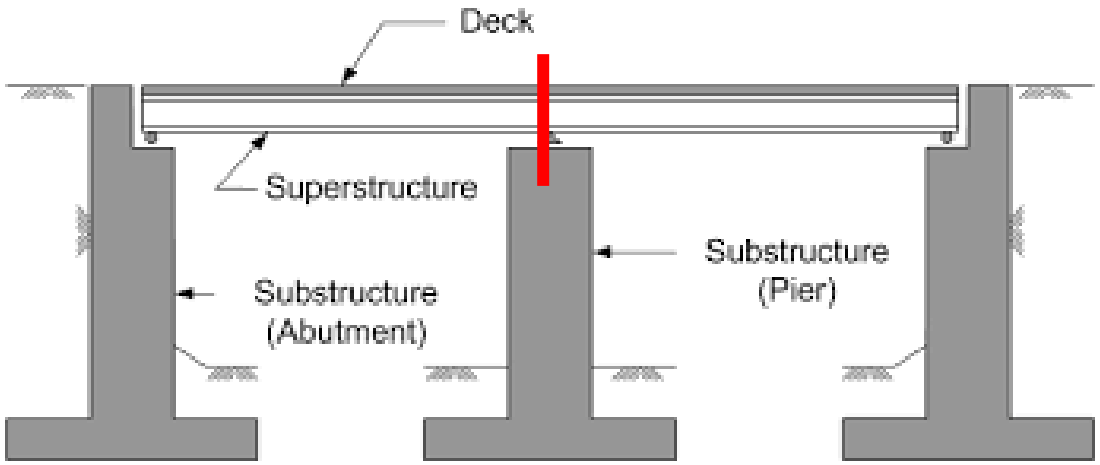
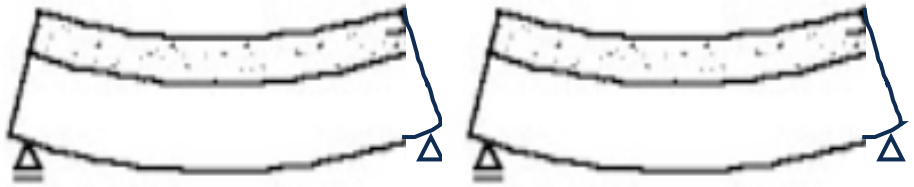
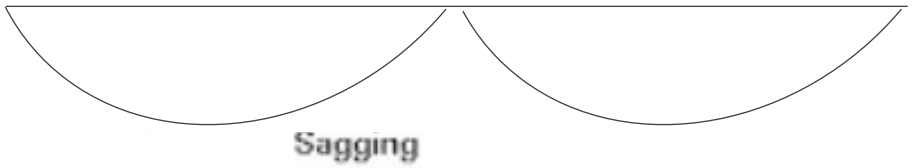
Bridge Configuration

2 key configurations

- Simply Supported
- Continuous







Live load Factors

- Used to account for the chance that a vehicle is **overloaded**
- Should be equivalent to a 0.5% chance of occurring in 100 years (1 in 2000-year RI)
- Code has never been calibrated in Australia

LLFs should not be thought of as fixed via code provisions. Think about possible dialogues with operators to improve compliance.

Live Load Factors

Typical Values for application vehicles (AS5100.7)	
Normal traffic	*2.0*
Cranes	*1.6*
Volumetric	*1.6……but!*
Road Train and B-Double	
IAP/Onboard Mass	*1.8……but!*
Heavy Load Platforms	*1.5 ……but!!!*
Other OSOM	***?***

How well do we actually know the spread of potential masses?

- Measures to ensure compliance are critical here and should guide assumptions

Who decides the LLF – the road manager.

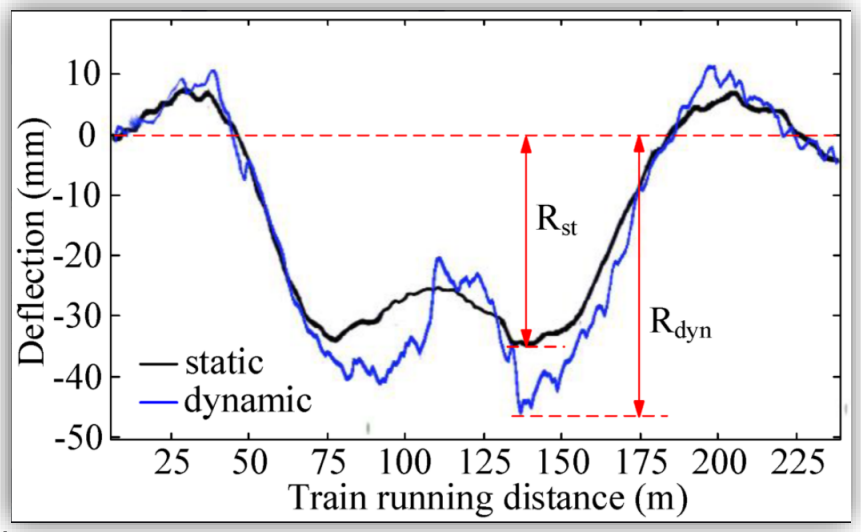
Live Load Factors in Australian Standard

Typical Values for design vehicles (AS5100.7)

W7	*2.0*
W80/A160	*1.8*
SM1600	*1.8*
T44	*2.0*
MS18 or HS20-S16	*2.0*
HLP320/HLP400	*1.5*

Dynamic Load Allowance

- Current code requires 1.4 for most vehicles
- Historically it has been lower
- Slow moving HLP loads DLA is 1.1 (< 10km/h)

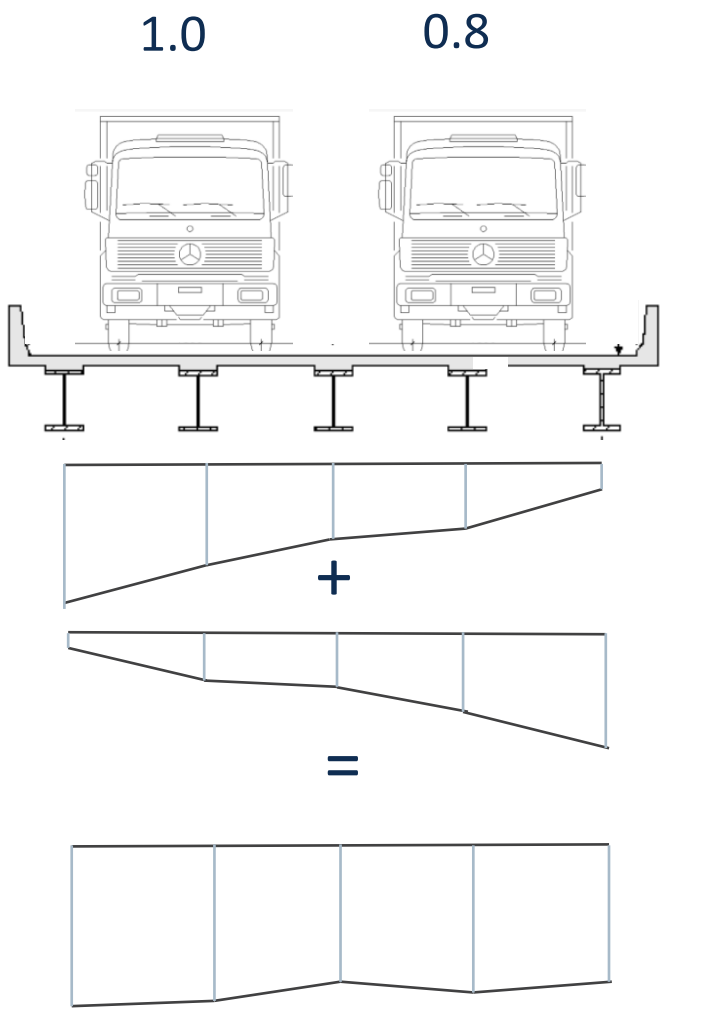


Is affected by:

- Bridge dynamic response (geometry, stiffness)
- Vehicle dynamic response (mass, suspension, geometry, speed)
- Interaction amplification effects
- Road profile (vehicle excitation)
- Limited research has been conducted at the ultimate limit state

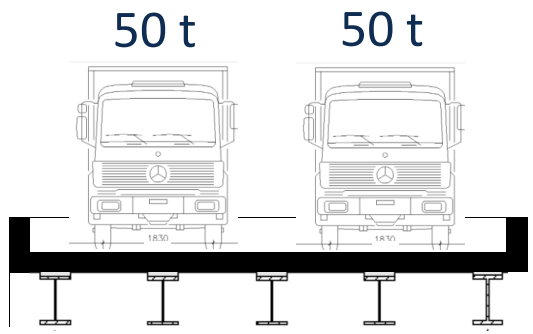
Multiple Presence (Associated Lane Factor)

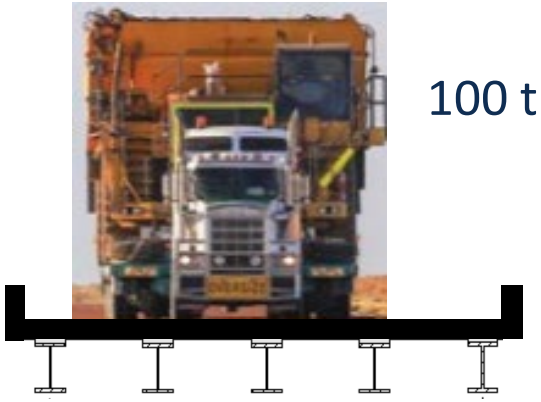
- Currently it is 1.0, 0.8, 0.4 for subsequent lanes in AS5100.
- ALF factors have varied in value and approach over time (previously have been applied as an overall reduction based on number of multiple presence lanes)
- The ALF reduces the load in the additional lanes to, in concept to maintain overall consistency with a 1 in 2000-year chance of load occurrence. This has not been calibrated in Australia.
- In the real world this is very dependent on traffic volume
- Current approaches are likely conservative in low volume situations

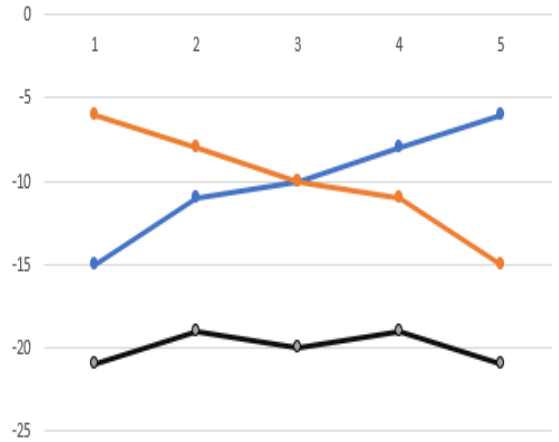


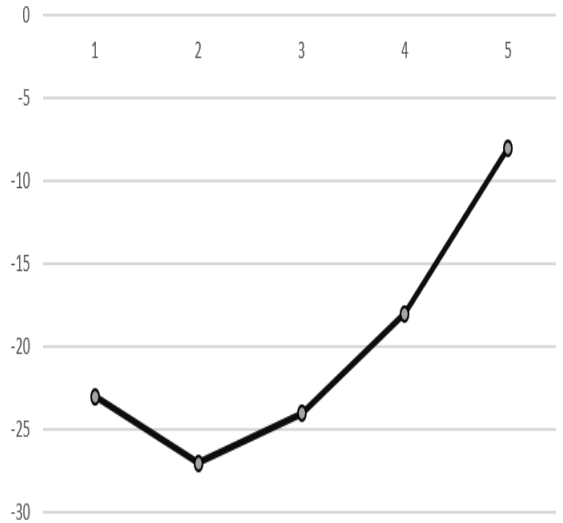
Transverse Distribution of Load

- Sharing of loads between girders
- Critical variables:
  - Bridge family
  - Lateral position of load
  - Ground Contact Width









Questions

1. *Can the case on the left be compared to the right without considering transverse distribution*
2. *Is it different for midspan moment vs critical shear*
3. *And what about LLF, DLA, ALF?*

What is Bridge Capability?

- Essentially it is defined by the biggest vehicle that you know can safely cross the structure

Question: Can you compare gross vehicle mass only??

- Need to consider
  - axle loadings
  - axle spacings
  - bridge configuration (span and continuity)
  - Ground contact width and transverse positioning
  - Live Load Factor
  - Associated Lane Factors

We will develop a more precise definition of bridge capability in upcoming webinars

Recapping the main points

- Critical parameters associated with load magnitude
  - axle loadings
  - axle spacings
  - bridge configuration (span and continuity)
  - Ground contact width and transverse positioning (will discuss this later)
- LLF account for the chance overloading (only) and can be modified if the controls are suitable
- DLA accounts for dynamic amplification leading to an increase in the static load
- When determining the bridge capability, we must consider multiple presence of vehicles (using associated lane factors), ground contact width and lateral position of vehicles

Further Training

- Overview of heavy vehicle access landscape in Australia
- Understanding the tiers of bridge assessment
- The decision making process for bridge access
- Defining bridge capability
- Critical variables that affect assessment
- Resourcing assessments and getting the most from consultants

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Questions?

Next Webinar
Tuesday 13 July

Bridge Asset Assessment Framework

Register for the rest of the Webinar series here:
https://www.eventbrite.com.au/o/national-heavy-vehicle-regulator-11836541834

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