

DOLRE

Dispositifs pour **O**uvrage d'art avec **L**imiteur et **R**épartiteur d'**E**fforts
(Device for civil engineering structures with limiter and efforts dispatcher)

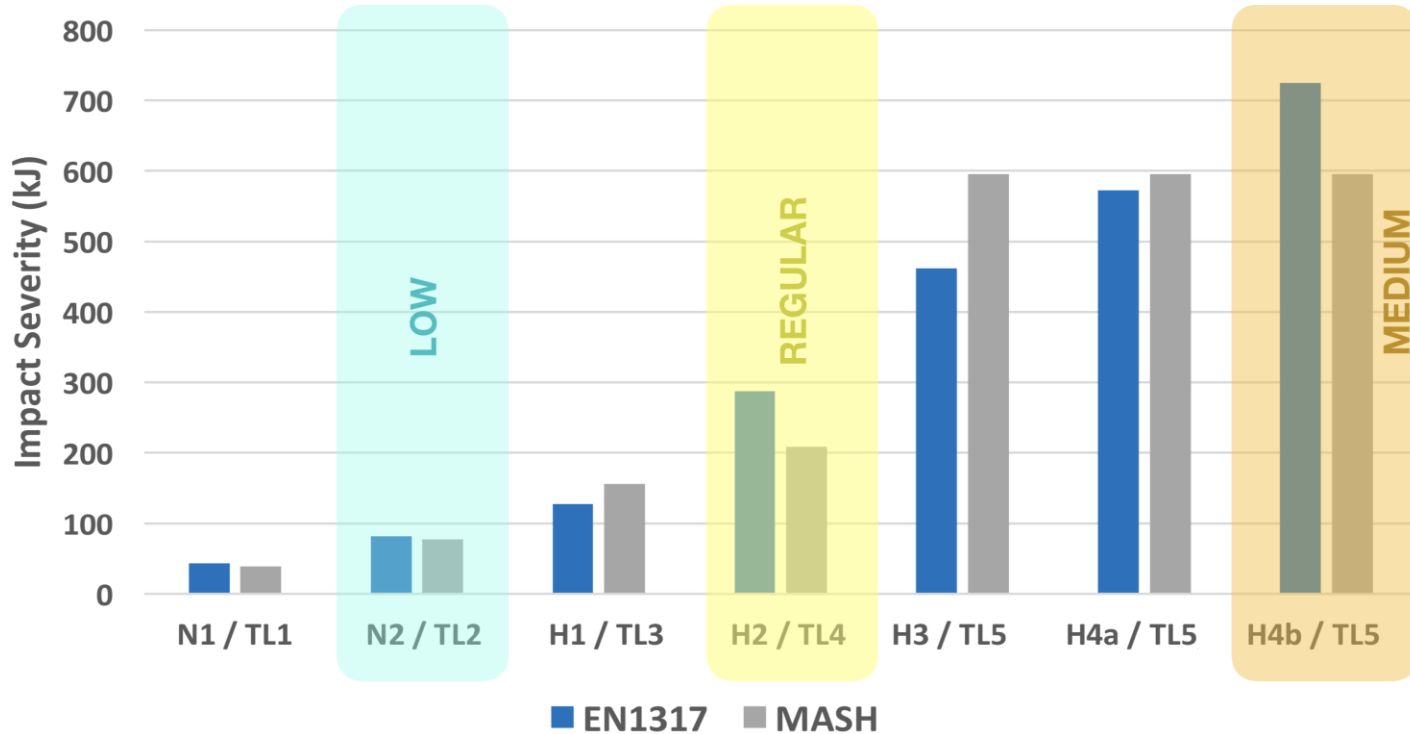


- LB Australia – Innovative products, 25y, Smart Cushion, DOLRE
- GD Tech – European Aerospace, 150+ Engineers, Expert Crash FEA
- IF3 - GD Tech Australian partner, Bridge Parapet / Deck FEA
- DESAMI – 20y Belgium, France Bridge Parapets, Designer DOLRE



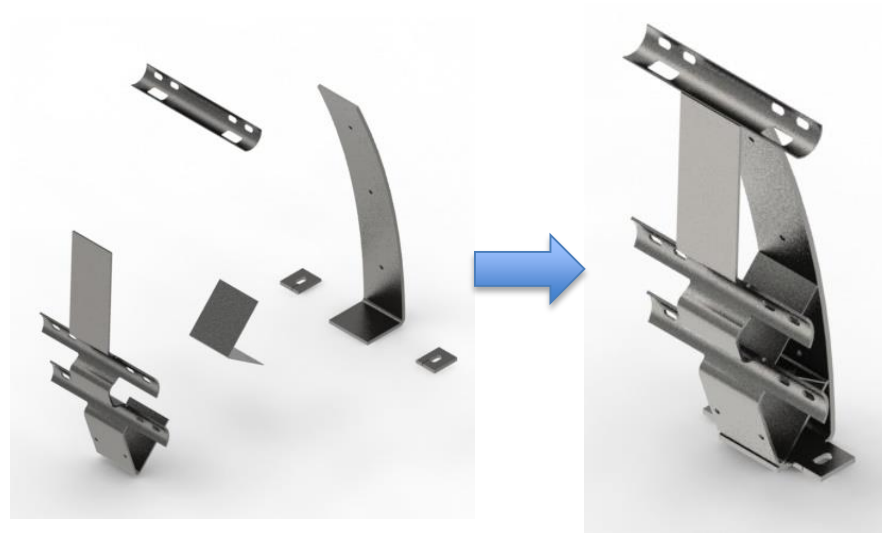


➤ EN1317, MASH, AS5100



➤ Description : Products DOLRE

- Energy absorbing post
- Fabricated assembly from metal plate
- Easy to inspect for damage





- No visible fasteners on the front side
- Open design for the posts



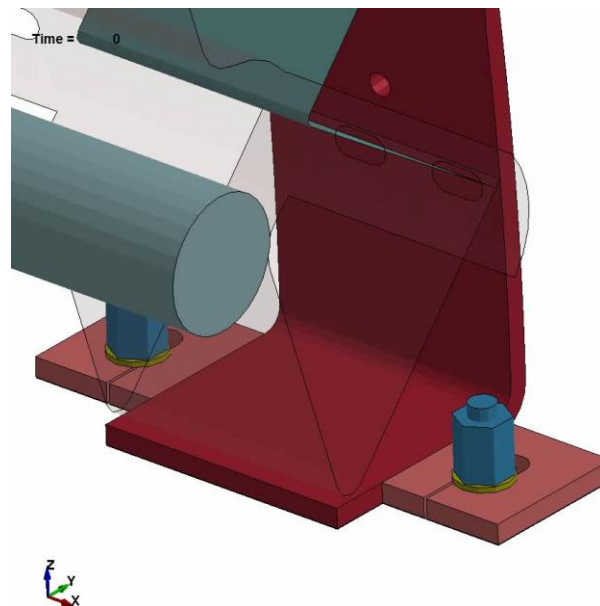
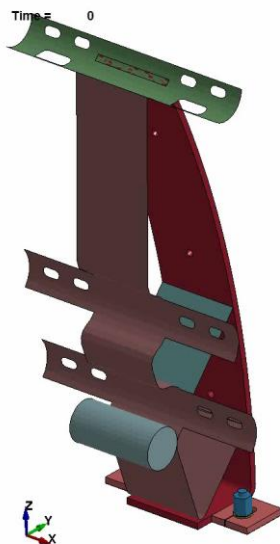
PATENTED

- Innovative fused disconnection at the plates
 - Provides an upper limit to the loads transmitted to the deck
 - Prevents damage to the anchors during an impact

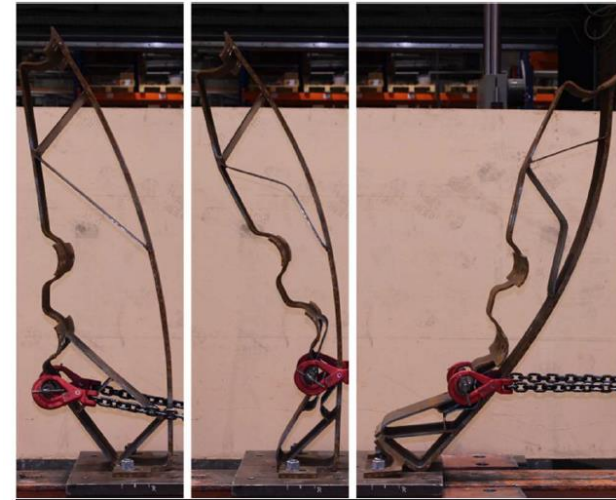
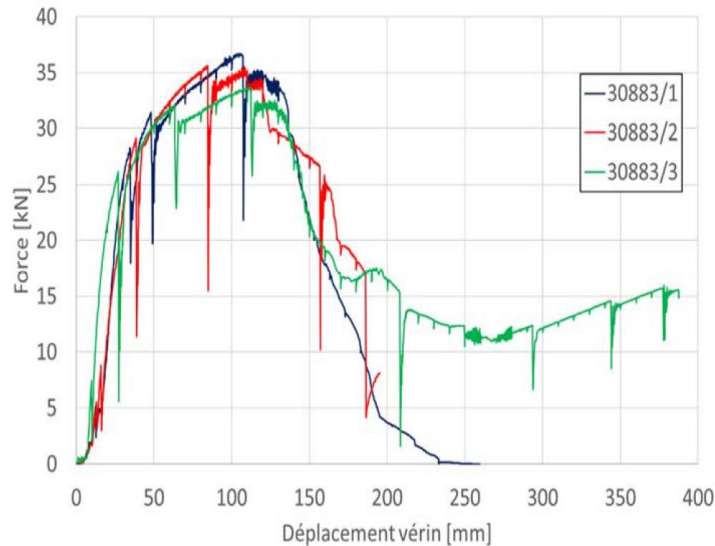


➤ Optimising the design

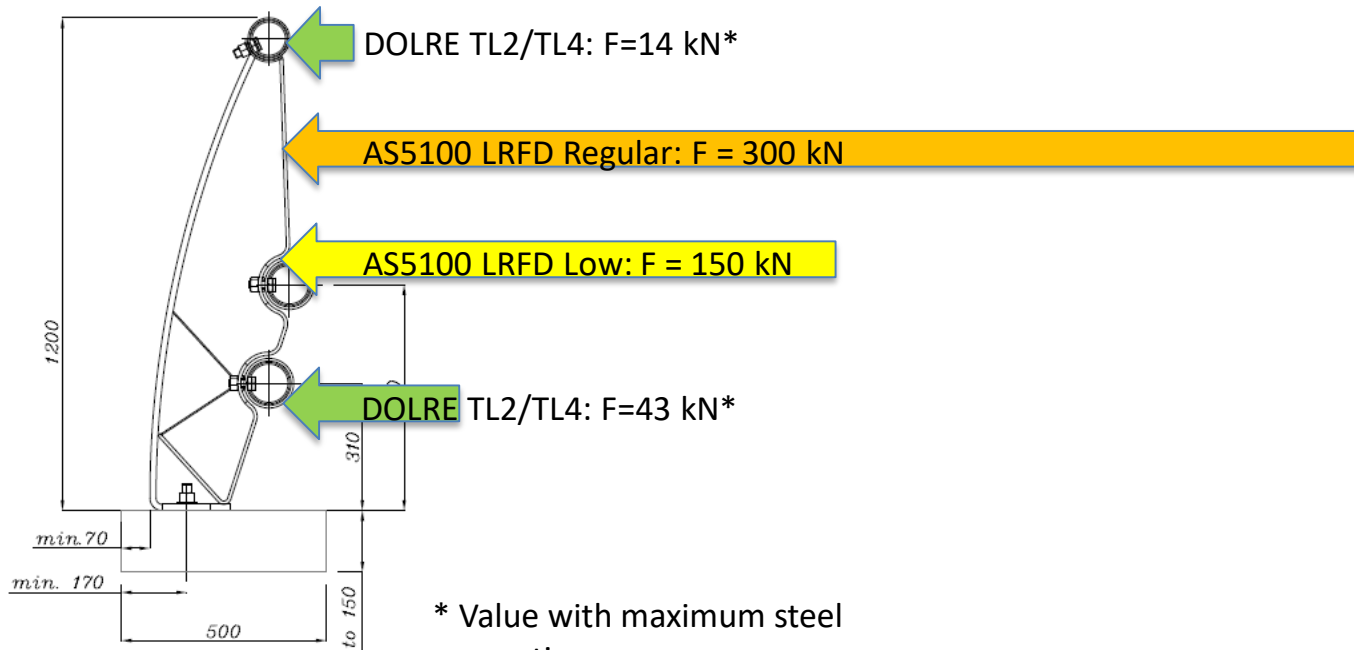
- Minimise the transmitted forces
- Ensure a consistent and reliable mechanism



- Determination of transmitted forces with push-out test (according to EN 1317)

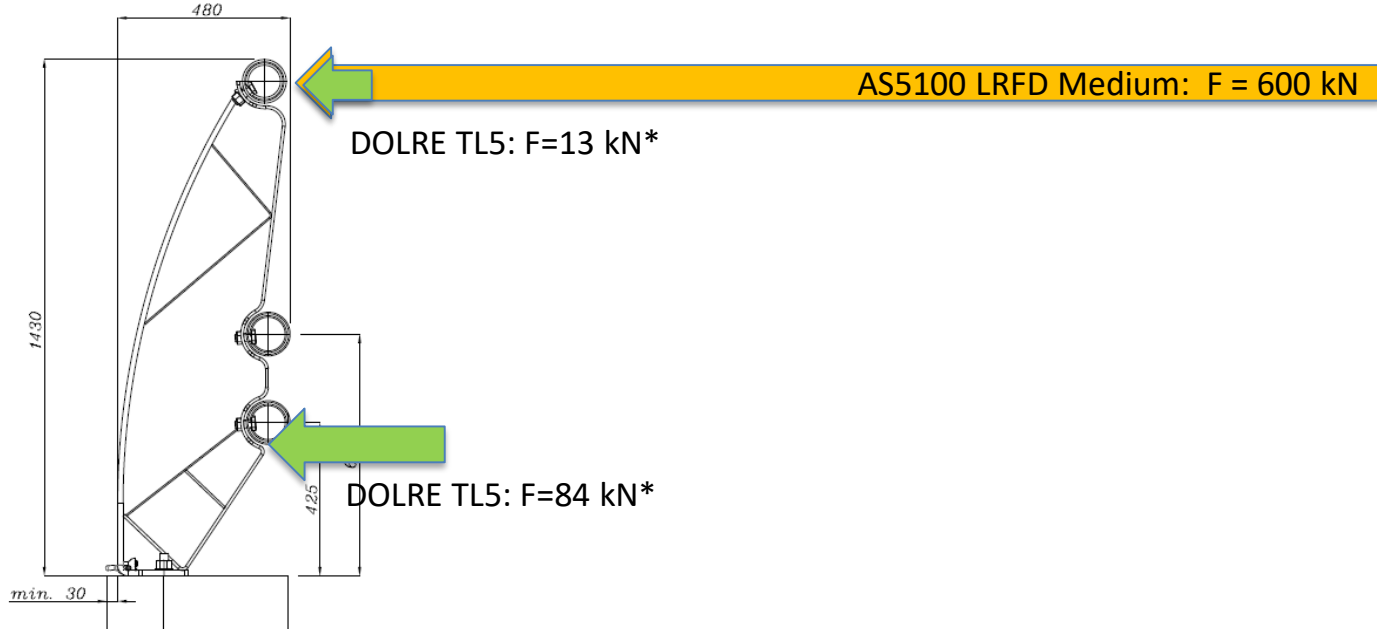


- With the same performances, large reduction of transmitted forces to the bridge



* Value with maximum steel properties

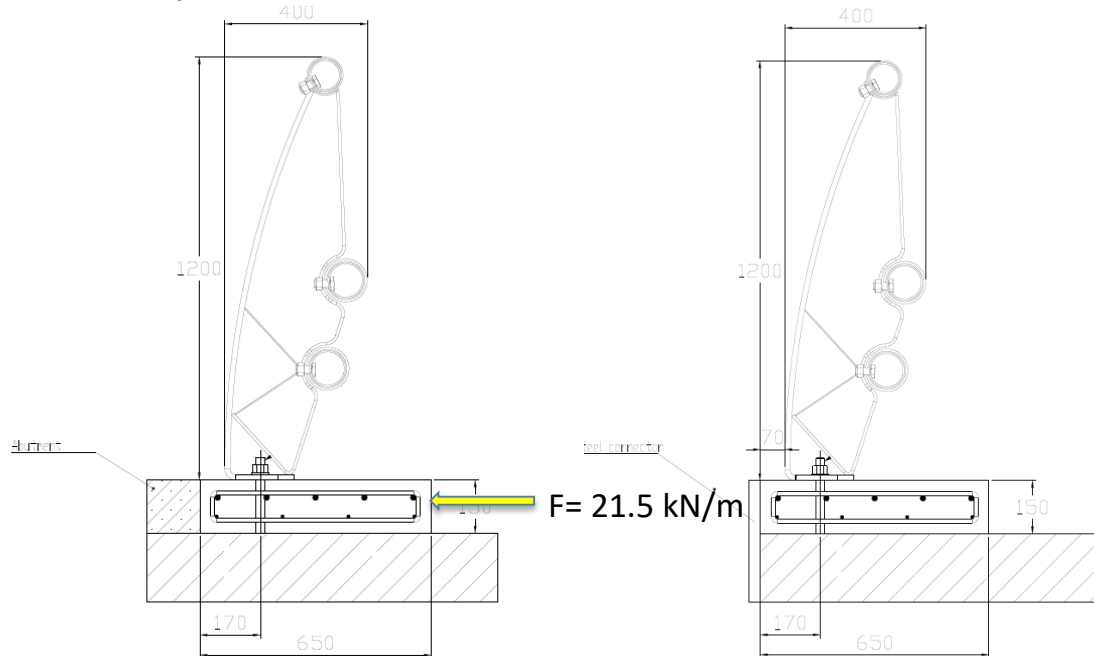
- With the same performances, large reduction of transmitted forces to the bridge



* Value with maximum steel properties

➤ DOLRE on non-anchored slab

- No damage to water proofing
- Transverse load only

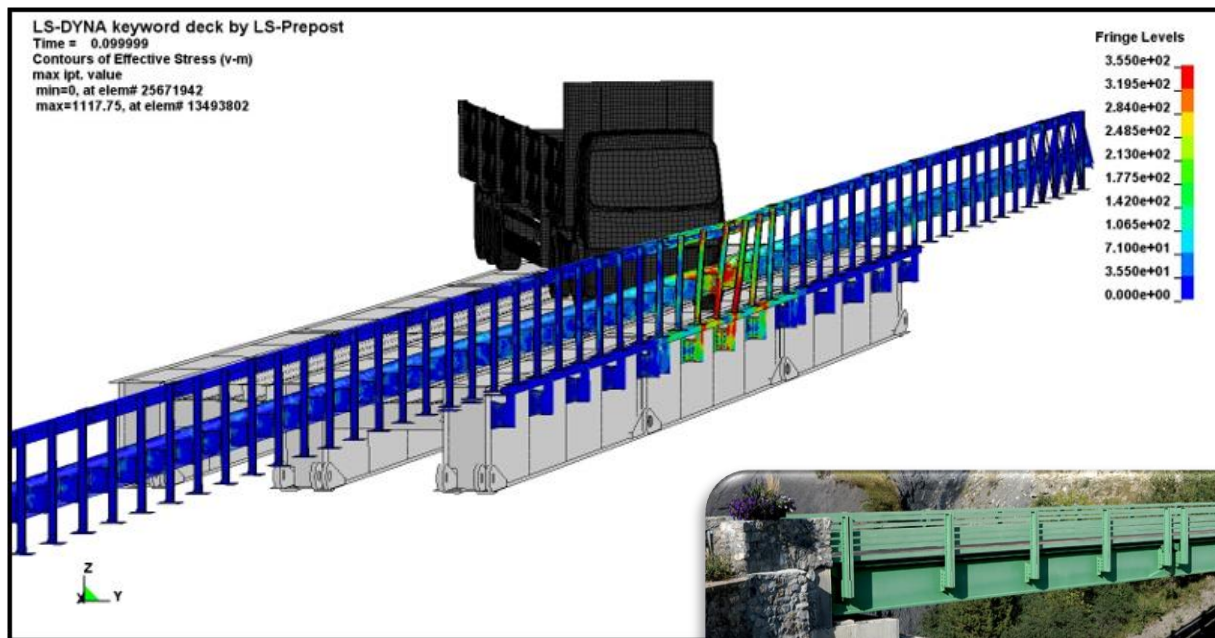


Bridge to upgrade: Highway E19 near to Nivelles (Belgium)



- [illegible]

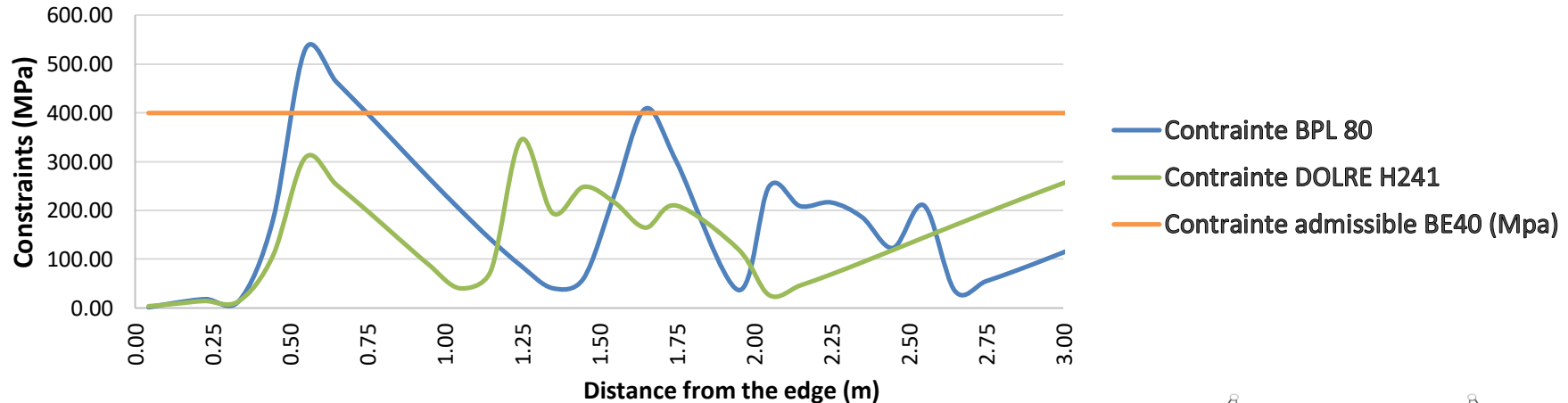
3. Implementation on pre-fabricated bridges

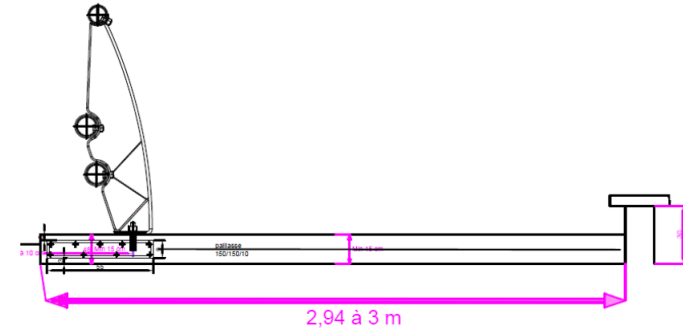


- Calculate the loadings from available parapets
 - BPL 80 ($M = 45 \text{ kN.m}$, $V = 180 \text{ kN}$)
 - DOLRE ($M = 14 \text{ kN.m}$, $V = 43 \text{ kN}$)
- Compare to the capacity of the deck



Constraints in the deck





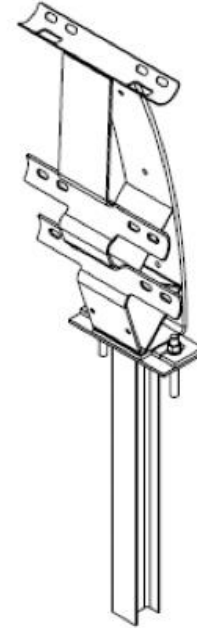
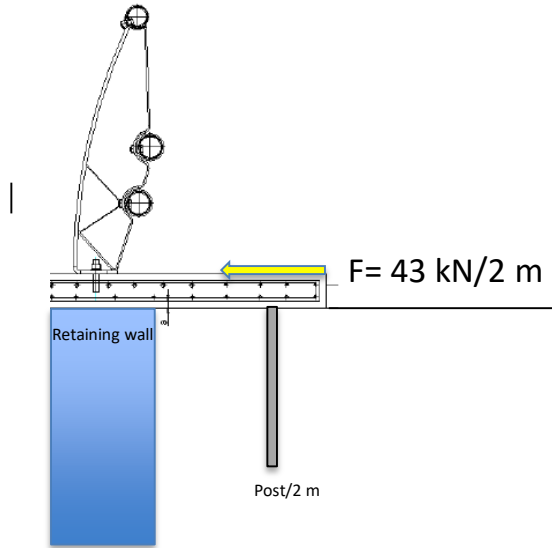
- Rungis – France Highway A106 into the airport
- Existing structure can comfortably support the upgraded parapet
- Limited work time due to high traffic volumes
- 1 anchor every meter was used as there was no abutment
- The 120m of parapet was installed in 2 days



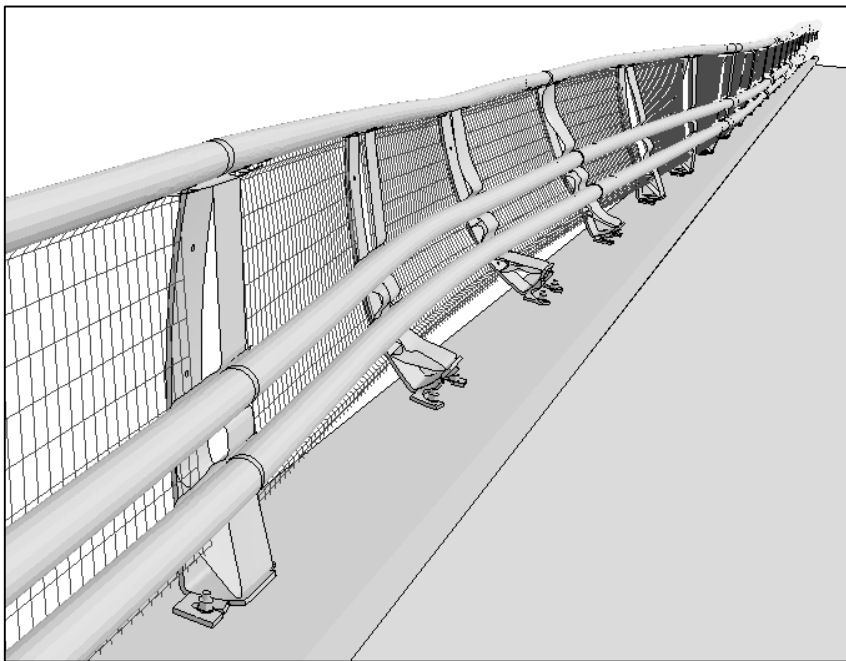
- Pre-assembled sections off site
- Rapid installation, maintenance and removal
- Minimise bridge closure
- Reduce flood surge on deck



- Placement on retaining wall with non-anchored slab
- Driven into soil for continuity of barrier off the deck
- Reusable semi-permanent road barrier

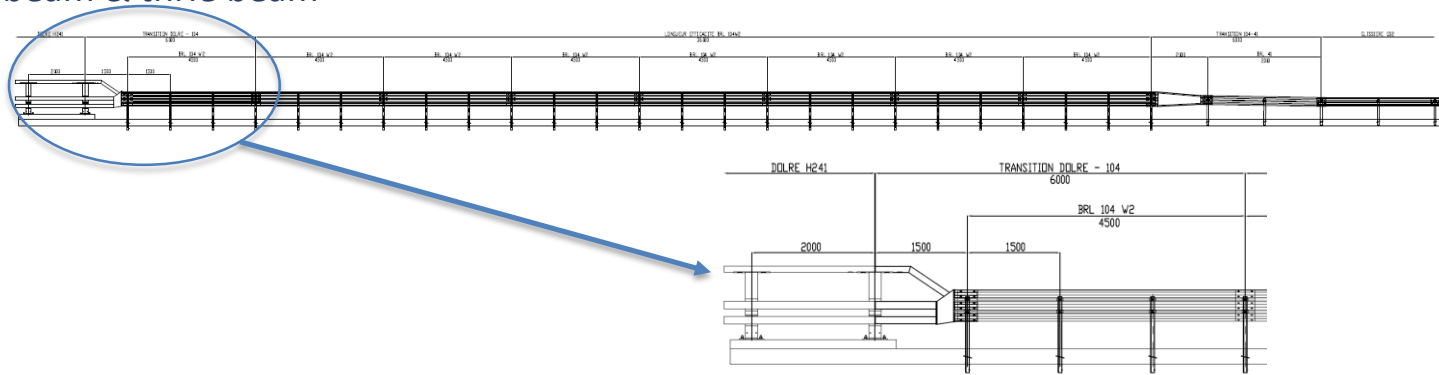


➤ Infill mesh for TL2 & TL4 – Virtual test

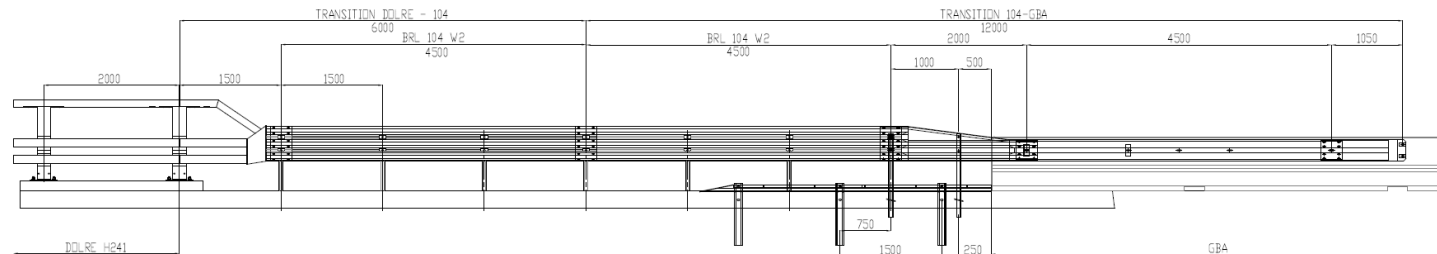


➤ Transition to steel guardrail for TL2 & TL4

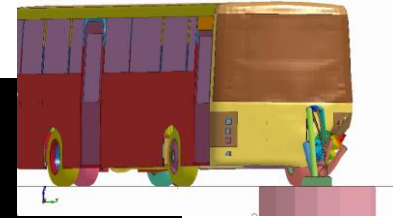
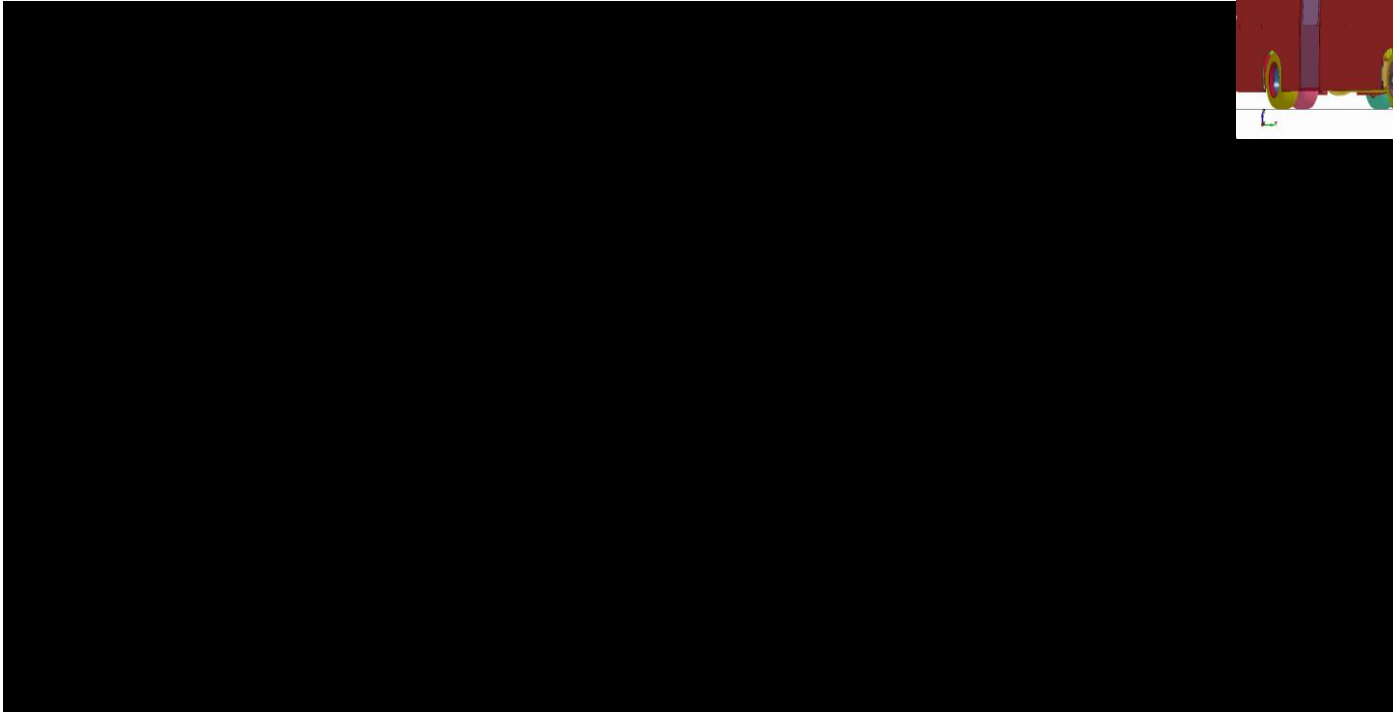
- W beam & thrie beam



➤ Transition to concrete barrier

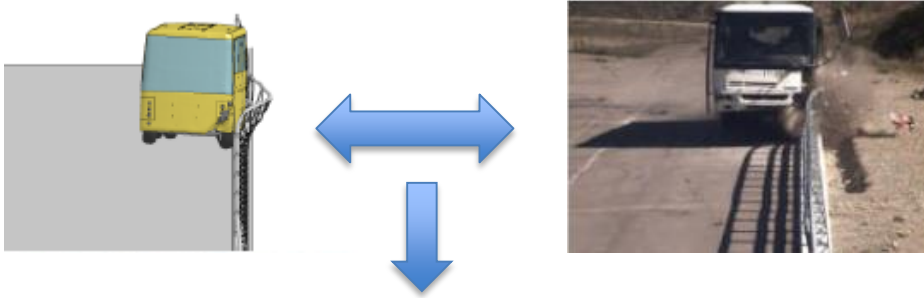


➤ Virtual tested (EN1317)



AUSTROADS ASBAP AS/NZS 3845

EN1317



MASH



AS/NZS 5100:2017

nellydavies⁷

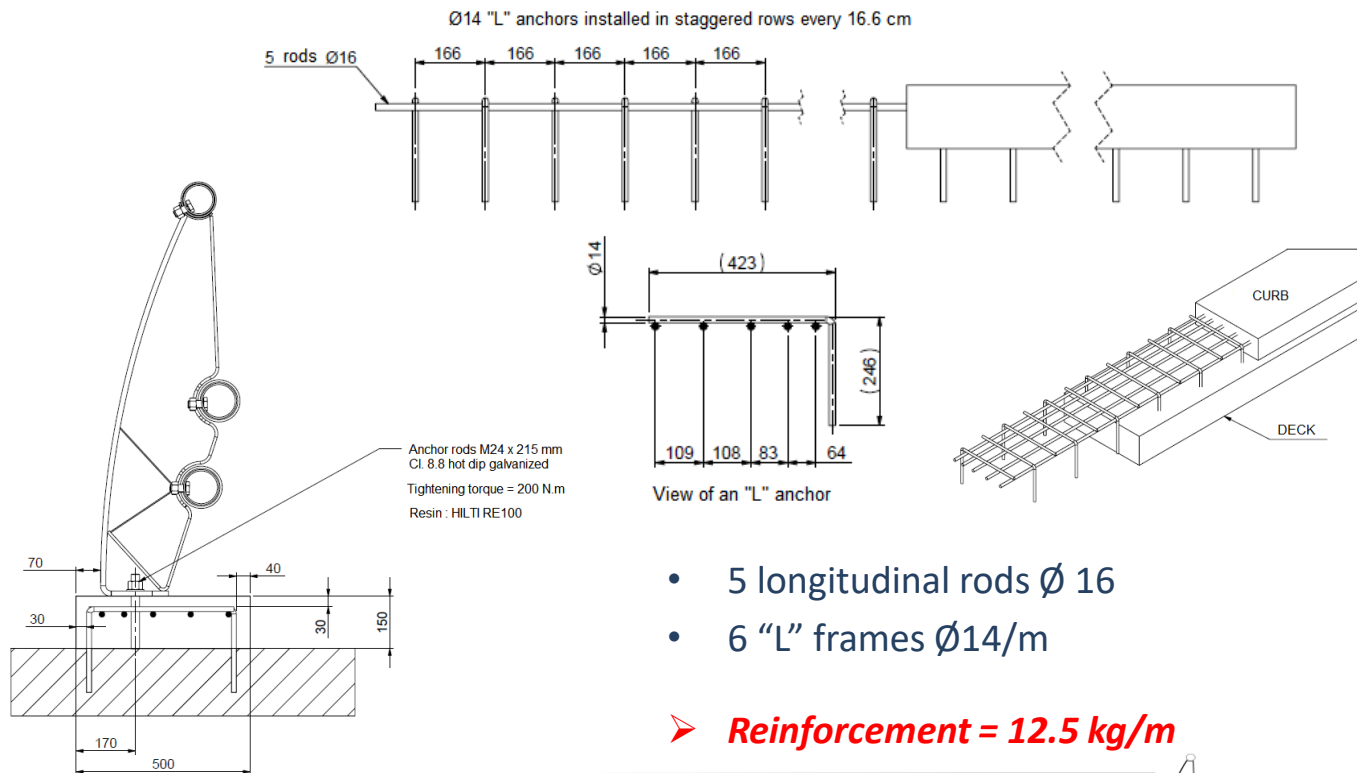
Low
Regular
Medium

Thank You





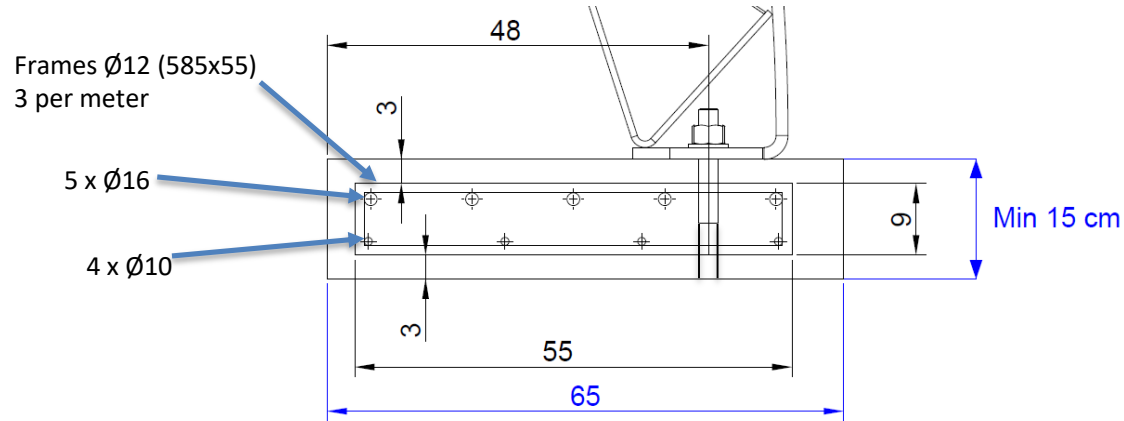
➤ Concrete beam reinforcement TL2 & TL4



- 5 longitudinal rods Ø 16
- 6 "L" frames Ø14/m

➤ **Reinforcement = 12.5 kg/m**

➤ Concrete beam reinforcement TL4 on non-anchored slab



- Longitudinal rods Ø 16
 - 5 rods Ø16 (upper)
 - 4 rods Ø10 (lower)
- Transversal = 3 frames Ø12/m
- **Reinforcement = 13.9 kg/m**

Containment level (EN 1317)	N2	H2	H2 (LNA)	H4b
Containment level (MASH)	TL2	TL4	TL4 LNA**	TL5
ASI (light vehicle)	B	B	B	B
W (heavy vehicle)	W3	W4	W3	W6
VI (heavy vehicle)	VI 3	VI 3	VI 3	VI 9
Tested length* (m)	60	60	60	60
Efficiency length (m)	20	20	20	20
Post spacing (m)	6	2	2	1,5

* Except extremities and/or connections

** LNA = non-anchored slab



➤ Containment Level :

- N2 W3 ASI B → Spacing = 6 m (TL2)
- H2 W4 ASI B → Spacing = 2 m (TL4)
- H2 W3 ASI B → Spacing = 2 m (TL4)
- H4b W6 ASI B → Spacing = 1.5 m (TL5)

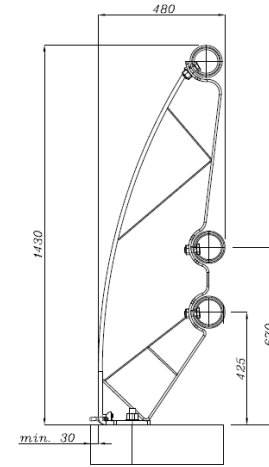
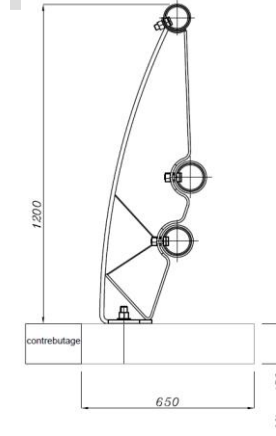
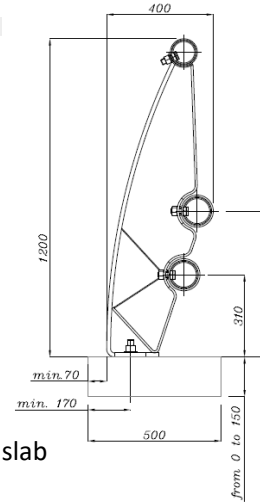
➤ 2 POSTS → 4 PRODUCTS

• TL2 & TL4

- Height = 1.2m
- Width = 0.4m
- Rear overhang ≥ 0.07 m
- slab width
 - 0.5 m for TL2 and regular TL4
 - 0.65 + abutment for DOLRE on non-anchored slab
- slab height = 0 to 0.15m
 - Tested with 0.15 m
 - Simulated with no slab

• TL5

- Height = 1.4m
- Width = 0.48m
- Rear overhang ≥ 0.03 m
- slab width = /
- slab height = 0 m
 - tested with no slab





The image features a map of Europe and Australia. In Europe, three locations are marked with blue lines and labels: Valenciennes (with a building photo), Liege (with a building photo), and Bordes (with a building photo). The GDTECH engineering logo is also present. In Australia, the location Sydney is marked with the if3 logo. Contact information is provided for each location: *Dane.Hansen@if3.com.au* for Sydney, and *Joseph.Marria@GDTech.eu* for Liege. The text "Independent Engineering Office" is written in blue. At the bottom, a blue box contains the text: "Pick one of our IF3/GDTech brochure on our exhibition booth".

Valenciennes

Liege

Dane.Hansen@if3.com.au

if3 Sydney

Joseph.Marria@GDTech.eu

GDTECH engineering

Bordes

Independent Engineering Office

Pick one of our IF3/GDTech brochure on our exhibition booth

3 Vehicles according to international standards

EU standards:

GENERIC VEHICLES

Geo Metro [900kg]	Dodge Neon [1300kg]	Ford Taurus [1500kg]	MAN [10 Tons]	Bus [13 Tons]	Truck [16 Tons]	Truck [30 Tons]	Truck [38 Tons]
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SPECIFIC VEHICLES
(Validated TR16303)

Peugeot 205 [900kg]	BMW [1500kg]	MAN [10 Tons]	Renault Agora Line [13 Tons]	Cougar SETRA [18 Tons]	Renault 270 DCI [16 Tons]	Truck [30 Tons]	Renault Premium Metaco [38 Tons]
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US standards:

Geo Metro [820C]	Toyota Yaris [1100C]	Chevrolet C2500 [2000P]	Chevrolet Silverado [2270P]	Truck [10000S]	Van trailer [36000V]	Truck trailer [36000T]
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Other possible vehicles:

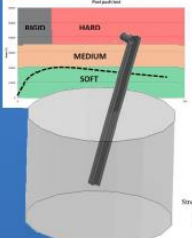
620kg	800kg	Toyota Camri [1450kg]	Caravan [2050kg]	Van [2150kg]	Explorem [2250kg]	Mixer truck	Forklift	Dummies
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16 Tons	25 Tons	26 Tons	44 Tons	60 Tons
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if3

5 Advanced models and lab Tests

Soil



Plastic



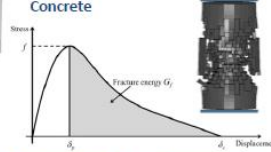
Glass



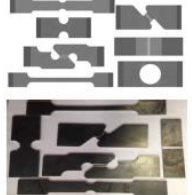
Wood



Concrete



Steel



Dynamic tests



Static tests



Detailed reports

Joseph.marra@gdtech.eu / 0032 479430459

6 Detailed reports

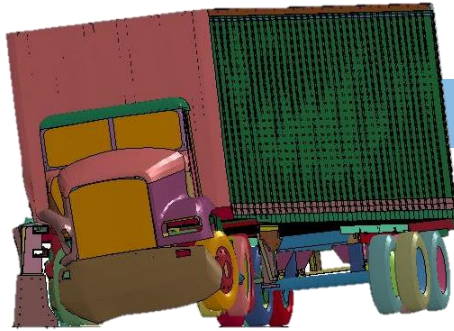
Simulation reports



3D Viewer of animated results



Von Mises Stress
Plastic Strain
Displacement ...



1. TL5 tests on an Australian bridge barrier

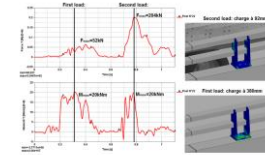
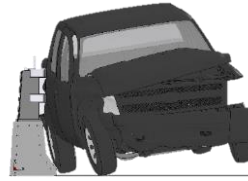
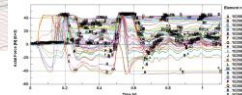
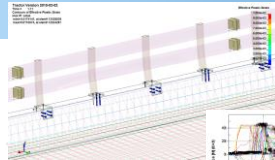
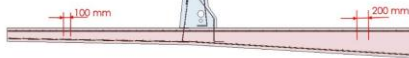


Figure 13: Shear force and Moment at post number 22

2. Evaluation of a 44 tons impact (Whitten Bridge)



Why choose the DOLRE ?

<u>Bridge structure</u>	New	Existing
Aesthetic	★	★
Width	★	★
Reinforcement	/	★ ★ ★
<u>Non-anchored concrete beam</u>		
Water protection	/	★ ★
Work schedule	/	★ ★