

# ORIL update on Box Beam Bridges



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# Effectiveness of Adjacent Precast Concrete Box-Beam Connections

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The  
University  
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# Objectives

To develop insight into the performance of longitudinal joints with a particular reference to cracking and differential deflection that is believed to cause the waterproofing membrane to fail.

The specific objectives of the study are to:

- Identify the sources, causes and effects of inadequate waterproofing at the joints
- Develop preventive measures through careful evaluation of alternatives

# ***Just Add Water!***

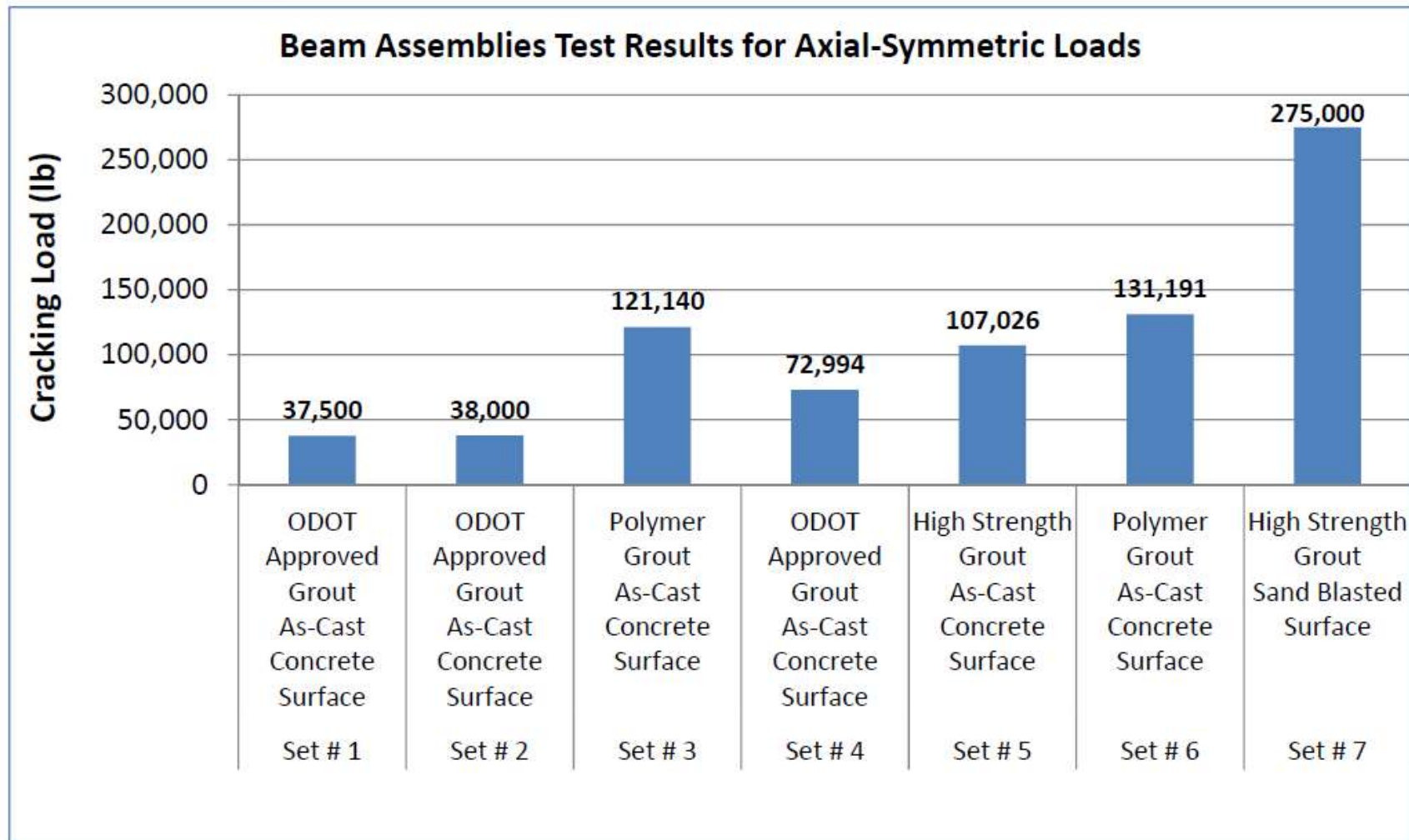
*High-strength, non-metallic, non-shrink grout designed for grouting and general construction applications. Can be mixed to a fluid, flowable, or plastic consistency requiring only the addition of water.*

- Complies with ASTM C-1107 and Army Corp of Engineers CRD 621
- Ideal for grouting steel columns, bearing plates, pre-cast concrete, and anchoring applications
- Achieves up to 10,000 psi (68.9 MPa) compressive strength for plastic consistency, 9,000 psi (62.1 MPa) for flowable consistency, and 8,000 psi (55.2 MPa) for fluid consistency at 28 days









## Failure Mode of Beam Set # 7 - Sandblasted Surface with High Strength Concrete



Flexure Failure in the Middle Concrete Unit

This Beam Assembly was  
Tested 5 Times

- 1<sup>st</sup> test – Loaded up to 100 kips
- 2<sup>nd</sup> test – Loaded up to 100 kips
- 3<sup>rd</sup> test – Loaded up to 200 kips

Tie rods were removed from both  
ends

- 4<sup>th</sup> test – Loaded up to 200 kips
- 5<sup>th</sup> test – Loaded up to 275 kips

Key Way Depth	Grout Materail	# of Specimes	Surface Roughness	Set #	Failure Load (lb)
Partial depth	ODOT-Approved List	2	Sandblasted Surface	1	800
Full depth	ODOT-Approved List	2	As-Cast	1	300
Full depth	ODOT-Approved List	2	Sandblasted Surface	1	Failure in Concrete Unit
Full depth	ODOT-Approved List	2	Sandblasted Surface	2	20,000
Full depth	HSC-Grout	2	As-Cast	1	Failure in Concrete Unit
Full depth	HSC-Grout	2	Sandblasted Surface	1	Failure in Concrete Unit
Full depth	HSC-Grout	2	Sandblasted Surface	2	32,000
Full depth	UHPG	2	Sandblasted Surface	1	Failure in Concrete Unit
Full depth	UHPG	2	Sandblasted Surface	2	8,500
Full depth	Polymer Grout	2	Sandblasted Surface	1	Failure in Concrete Unit
Full depth	Polymer Grout	2	Sandblasted Surface	2	13,000





ODOT-Approved Grout - As Cast (Set#1)



ODOT-Approved Grout - As Cast (Set#1)



HSC - As Cast

UHPG with Sandblast

HSC with Sandblast

Polymer with Sandblast

ODOT-Approved with Sandblast



ODOT-Approved Grout - As Cast (Set#1)

# Detection of Leakage Initiation Test

**Top view**



**Bottom view, some tears in the external fabric, but no leakage**







# BEFORE WATERPROOFING





# BEFORE WATERPROOFING



# AFTER WATERPROOFING





# PAVING





# PAVING







