GEF Incorporated
Innovative Solutions in Fiberglass

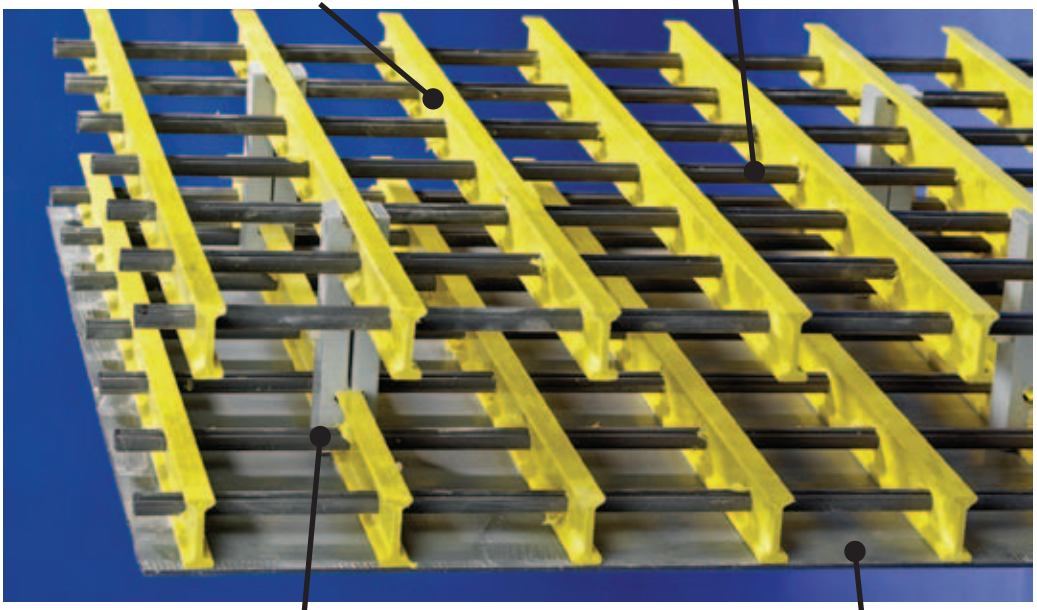
GRIDFORM™

FRP BRIDGE DECK SYSTEM

GRIDFORM™ is a stay-in-place concrete bridge deck system that is designed to replace steel rebar in reinforced concrete bridge decks. GRIDFORM™ consists of two layers of pultruded FRP I-bar grating separated by FRP shear connectors with nylon bolts. Standard GRIDFORM™ grating features I-bars (lengthwise direction) on 4" centers and cross rods (crosswise direction) on 4" spacings. GRIDFORM™ (shown below) also has a 1/8" pultruded FRP plate bonded to the bottom grating layer to create a stay-in-place concrete form.

1.5" I-bars (4" on-center perpendicular to traffic)

Three-part 0.6" x 0.5" cross rods (4" on-center parallel to traffic)



Vertical shear connectors

1/8" thick adhesively bonded plate

GRIDFORM™ OPTIONS

GRIDFORM™ is available without pultruded plate bonded to the bottom grating layer. GRIDFORM™ can also be customized by varying bar spacing and panel separation. The application pictured below was installed at Fond du Lac, Wisconsin in 2004 and utilized GRIDFORM™ with no bonded plate.

History

- Strongwell began developing the GRIDFORM™ system with the University of Wisconsin in 2001.
- First generation of the GRIDFORM™ system was installed on a bridge in Waupun, Wisconsin, in 2003.
- Second generation of the GRIDFORM™ system was installed on a vehicular bridge near Fond du Lac, Wisconsin, by the Wisconsin Department of Transportation in 2004.
- The Fond du Lac research project compared two bridges: one constructed using the GRIDFORM™ system and another constructed with conventional steel rebar reinforcement.
- Third generation of the GRIDFORM™ system was installed on a vehicular bridge in Greene County, Missouri, in 2005. A 1/8" thick FRP plate was integrated into the system and bonded to the bottom layer of grating to create the stay-in-place concrete form. *(photos below)*

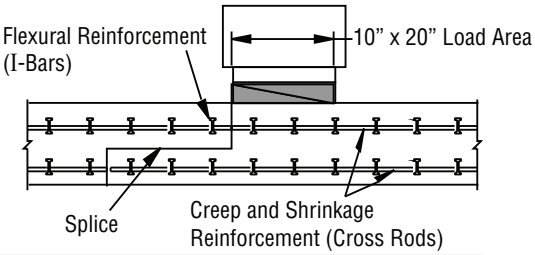


This field application in Greene County, Missouri, shows FRP panel setting and anchoring. The bridge was reconstructed in only five days.

GRIDFORM™ Test Results

Laboratory Test Results for Load Capacity of GRIDFORM™ at Various Spans

GRIDFORM™ GTG Series and Spacing	Slab Depth	Slab Span	Slab Length	Slab Width	Concrete Strength (psi)	Test Failure (kip)	Predicted Failure Loads		
							Flexure (kip) ACI 440	Punching Shear (kip) UW-Madison	Flexural Shear (kip) ACI 318
1 1/2" I-Bars at 4" o.c. 1/2" dia cross rods at 4" o.c.	7.625"	6'-4"	8'-0"	7'-0"	4350	125	97.3	115.3	122.2
1 1/2" I-Bars at 4" o.c. 1/2" dia cross rods at 4" o.c.	8"	6'-6"	7'-6"	6'-6"	5347	119.3	86	119.5	127.6
1 1/2" I-Bars at 4" o.c. 1/2" dia cross rods at 4" o.c.	8"	6'-6"	7'-6"	6'-6"	5343	120.6	93.5	120.5	127.5
1 1/2" I-Bars at 4" o.c. 1/2" dia cross rods at 4" o.c.	8"	6'-6"	7'-6"	6'-6"	5507	121.8	94.7	121.7	129.5
1 1/2" I-Bars at 4" o.c. 1/2" dia cross rods at 4" o.c.	8"	7'-6"	8'-6"	7'-8"	6854	121	107.6	121.9	158.3
1 1/2" I-Bars at 4" o.c. 1/2" dia cross rods at 4" o.c.	8"	8'-6"	9'-6"	8'-8"	4652	109.4	89.8	107.2	141.8
2" T-Bars at 4" o.c. 1/2" dia cross rods at 4" o.c.	8"	8'-6"	9'-6"	8'-8"	4630	115.7	101.9	114.2	140.1



DESIGNING WITH GRIDFORM™: The University of Wisconsin has developed software for designing decks reinforced with GRIDFORM™. The program is capable of computing bridge deck capacity including ultimate capacities of flexure, punching shear and flexural shear. Serviceability issues (i.e. slab deflection and crack width) is also incorporated into the design aid, available on Strongwell.com.

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