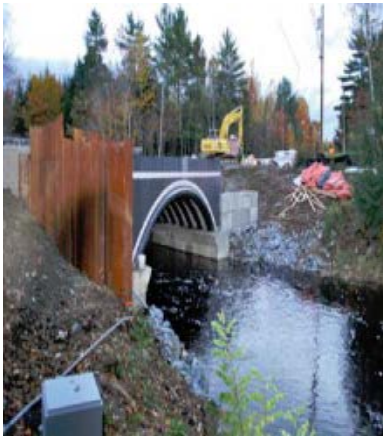


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NEW BRIDGE MATERIAL DESIGN OPTIONS

Presenter: Christine Mizioch

Title: Vice President, Accelerated Project Delivery

Agency/Affiliation: The Metric Group

Event: Florida Transportation Builders Association

Session Title: New Bridge Material Design Options

Date: March 20, 2012

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WHAT IS TIG?

TIG is dedicated to sharing high-payoff, market-ready technologies among transportation agencies across the United States.

TIG promotes technological advancements in transportation, sponsors technology transfer efforts and encourages implementation of those advancements.

TIG reports to the Standing Committee on Highways (SCOH).

For more information visit <http://tig.transportation.org>.

The Lead States Team



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Kenneth Sweeney
MaineDOT

Christine Mizioch (formerly MassDOT)
The Metric Group

Dale Peabody
MaineDOT

Mansour Mike Mohseni
Colorado DOT

David Sherlock
MaineDOT

Larry Parent
Advanced Structures & Composites Center
University of Maine

Dr. Tadeusz C. Alberski
NYSDOT

Lou Triandifilou
FHWA
Turner-Fairbank

Raja Jildeh
Michigan DOT

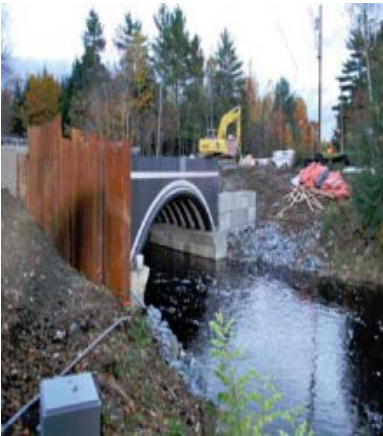
Stacy McMillan
MissouriDOT

Stephen Von Vogt
Maine Composites Alliance



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THE CHALLENGE:

- **Crumbling Infrastructure**



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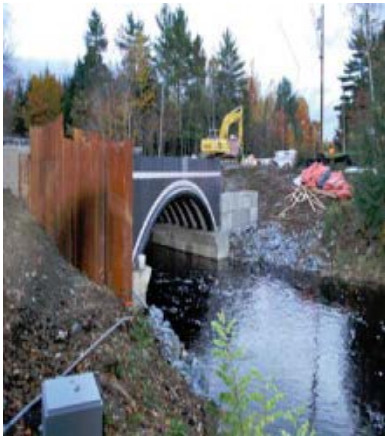
THE ANSWER:

- **Rigidified FRP Arch Bridges (“Bridge in a Backpack”)**
- **Hybrid Composite Beam**



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BRIDGE IN A BACKPACK

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WHAT IS BRIDGE IN A BACK PACK?



“Hybrid bridge system combining benefits of high-performance composites with cast-in-place concrete”

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BENEFITS

SUSTAINABILITY

SIMPLIFIED CONSTRUCTION

**MINIMIZED TRAFFIC OBSTRUCTION
AND DETOURS**

REDUCED CARBON FOOTPRINT

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EARLY PROJECTS: 2008-2009



Neal Bridge
Maine DOT Demonstration Project
2008

**First Installation of
Composite Arch System**

**34' Span, 23 Arches
(12" Diameter)**

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EARLY PROJECTS: 2008-2009

First Commercial Installation by AIT

First Project Awarded on a Low-Cost Basis, Competing Against Traditional Materials

Design-Build Project

28' Span, 12 Arches (12" Diameter)



McGee Bridge
Anson, ME
2009

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THIRD GENERATION BRIDGES



**Jenkins Bridge
Bradley, ME**

**28' Span
Composite Panel Headwall
14 Arches (12" Diameter)**



**Royal River Bridge
Auburn, ME**

**38' Span
Precast T-Wall Headwall
13 Arches (12" Diameter)**

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THIRD GENERATION BRIDGES



Perkins Bridge
Belfast, ME

48' Span
Precast T-Wall Headwall
16 Arches (15" Diameter)



Tom Frost Memorial Bridge
Hermon, ME

45' Span
Snowmobile/Pedestrian
3 Arches (12" Diameter)

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EXPANDING IN NEW ENGLAND: 2011



**Scott Reservoir
Outlet
Fitchburg, MA**

**Part of MASS DOT
Accelerated Bridge
Program**

**38' Span
Composite Panel Headwall
15 Arches (12" Diameter)**

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EXPANDING IN NEW ENGLAND: 2011



Pinkham Notch, NH
24' Span
Composite Panel Headwall
6 Arches (12" Diameter)

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EXPANDING IN NEW ENGLAND: 2011



Caribou, ME

**Largest Span Bridge to Date
54' Span
Precast Panel Headwall
22 Arches (15" Diameter)**

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Proposed AASHTO LRFD Guide Specifications for Design of Concrete-Filled FRP Tubes for Flexural and Axial Members

- **Generic in nature – applies to all CFFT's**
- **Presented to AASHTO's T-6 (FRP) Committee in May 2011, currently under review**

PROPOSED AASHTO LRFD GUIDE SPECIFICATIONS FOR DESIGN OF CONCRETE-FILLED FRP TUBES FOR FLEXURAL AND AXIAL MEMBERS

DRAFT # 4

DATE 5/10/2011

Authors:

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NATIONAL & INTERNATIONAL INTEREST

U.S. Interest

Proposals submitted for
“Bridge-in-a-Backpack™” in 11
States

AIT has begun dialogue with
over 20 states about potential
future projects

International Interest

Working on proposals, and/or in
discussion on future work in the
following countries:

- United Arab Emirates
- Trinidad
- Russia
- Nigeria
- Panama
- Mexico
- Canada



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NATIONAL RECOGNITION

2011 Focus Technology



**AASHTO Technology
Implementation Group**



American Society of Civil Engineers

2011 Charles Pankow Award for Innovation



Engineering Excellence Award

Royal River Bridge, Auburn, ME

Kleinfelder|SEA Consultants and Maine DOT



2010 Award for Composites Excellence

Most Creative Application

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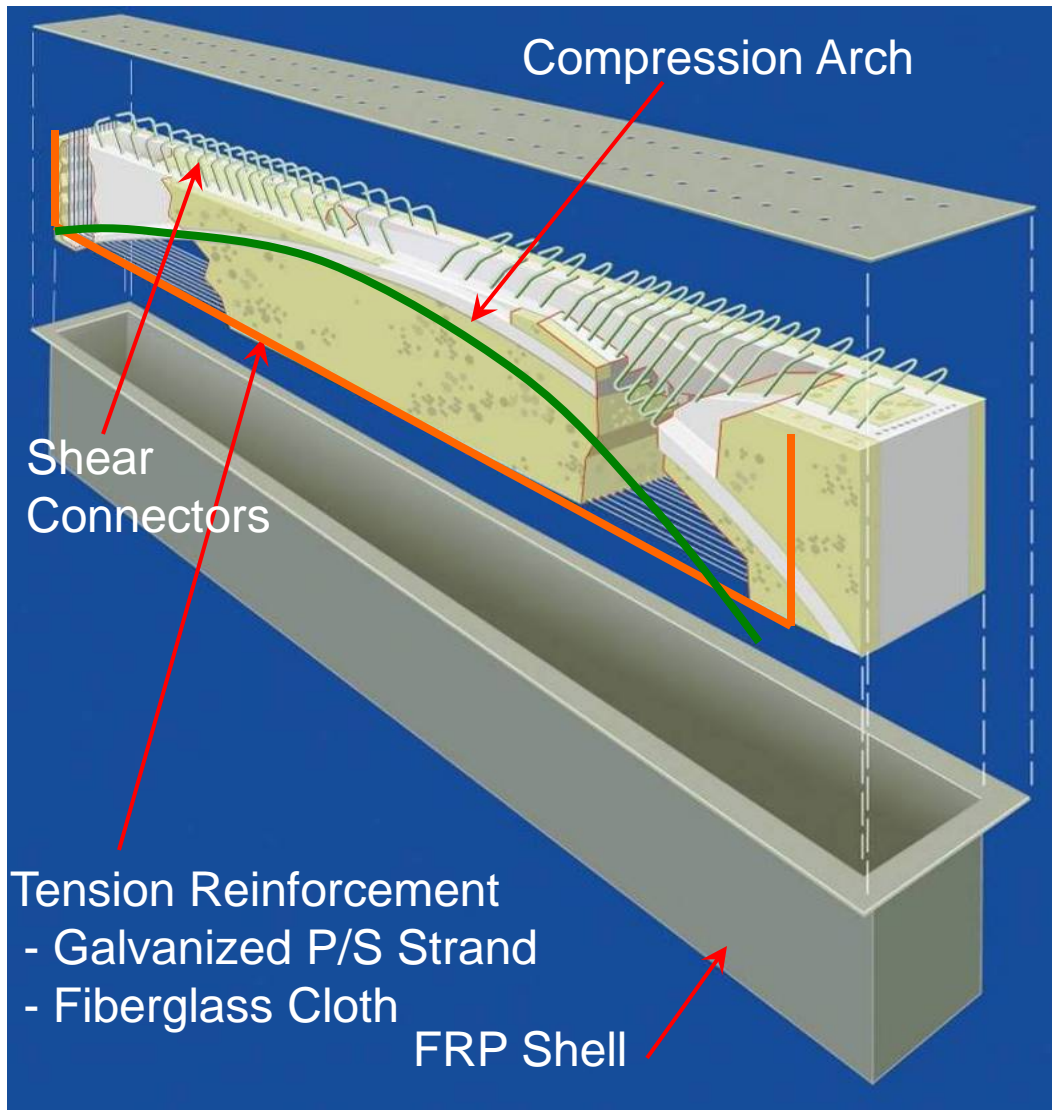
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BUILD BETTER®
WITH
HYBRID COMPOSITE BEAMS
(HCB®)

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WHAT IS THE HCB?

“Tied Arch in A Fiberglass Box”

Structural Member Using
Different Building Materials

Cost-Effective Composite
Beam

Stronger, Lighter,
Corrosion Resistant

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BENEFITS OF THE HCB

SUSTAINABILITY

(100+ Year Service Life, No cracking/spalling/rusting, Never Needs Painting)

CONGESTION RELIEF

(Perfect for Modular Bridge Installation “ABC”, Reduced traffic congestion during construction)

LIGHTWEIGHT

(Shipping and Erection weight is 10% of Concrete Beam, 33% of Steel Beam)

REDUCED CARBON FOOTPRINT

(Uses 80% Less Cement, Reduces Number of Delivery Trucks, Allows for Smaller Cranes)

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PROJECTS COMPLETED/CONTRACTED

11/2007	30'	Railroad Bridge at TTCI	Colorado
08/2008	57'	High Road Bridge	Illinois
10/2009	31'	Route 23 Bridge	New Jersey
03/2011	42'	Railroad Span for BNSF	Colorado
06/2011	540'	Knickerbocker Bridge	Maine
07/2011	100'	Research Pier in Machias	Maine
06/2011	180'	Safe & Sound Bridge B0439	Missouri
03/2012	106'	Safe & Sound Bridge B0410	Missouri
07/2012	100'	Safe & Sound Bridge B0478	Missouri



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WORLD'S 1st COMPOSITE RAIL BRIDGE

First Installation of an HCB

Completed through HSR and NCHRP
IDEA Program of Transportation
Research Board

30' Span for Class 1 Railroads

Subjected to 237 Million Gross Tons of
Heavy Axle Freight Traffic



FAST Loop at TTCI
Pueblo, CO
Nov 2007

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1st HCB HIGHWAY BRIDGE

First Commercial Installation of an HCB
Bridge through FHWA-IBRD Grant

Entire Bridge shipped on One Truck

57' Span

6 beams
Installed in
1 day



High Road Bridge
Lockport, IL
Aug 2008

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STAGED CONSTRUCTION USING HCB

Easy installation in congested urban environment

6' wide planks at 2,000 lbs. per pick

31' Span

6 beams for
each half
installed in
3 hours



Route 23
Cedar Grove, NJ
Oct 2009

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HELPING WITH SAFE & SOUND

Three HCB bridges included as part of Missouri DOT
Safe & Sound Project – 800 bridge program



- B0410 – 106' Single-Span Bridge
- B0478 – 100' Two-Span Bridge
- B0439 – 180' Three-Span Bridge

Bridge B0439
Jackson Mill, MO
Nov 2011

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WORLD'S LONGEST COMPOSITE BRIDGE

Funded by Maine Composite Initiative
8-Span Bridge with 60' and 70' Spans
for total length of 540' (shorter end
Spans)
Competitive on Cost Basis



Knickerbocker Bridge
Boothbay, ME
June 2011

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ANTICIPATED PROJECTS: 2012

I-15 Overpass in Utah
Manderfield, UT
(\$1M FHWA – HFL Grant)

Tide Mill Bridge
Westmorland County, VA

Dry Branch Bridge
Charleston, WV
106' single span
IBRD Grant

Potomac Hollow Bridge
Allegheny County, MD
26'-6" single span on 31 degree skew
IBRD Grant



B0410 – Lockwood, MO – July 2012
106 ft. span w/60 in. HCB Double Box

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NATIONAL RECOGNITION

2011 Focus Technology



AASHTO Technology
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CONSTRUCTION INNOVATION FORUM®

2010 Nova Award



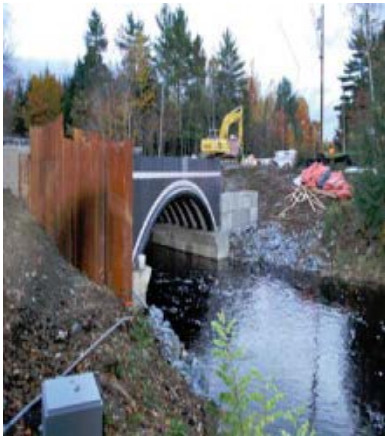
National Grand Award
High Road Bridge, Lockport, IL
Teng & Associates – Consultants



2010 Award for Composites Excellence
Infinite Possibility

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TIG Team Activities

- Established web-based information and tech resources.
- Created information/promotional materials
- Highways for L.I.F.E. webinar conducted (100 participants)
- AASHTO design spec for concrete-filled tube arch approved by bridge subcommittee.

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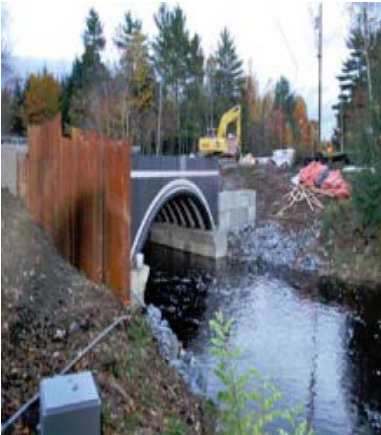


TIG Team Activities (cont'd)

- Presentations completed at FL Transportation Builders Assn., FDOT Structural Engineers Mtg, WASHTO, MAASTO (additional presentations planned)
- Fire resistance, maintenance and inspection guidelines in development by UMaine AEWC Center.
- Individual State assistance underway (MT, others)
- Case studies in development

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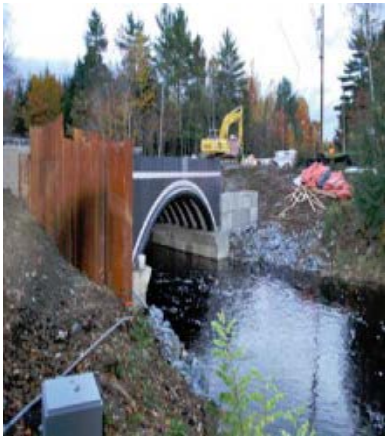


NEW BRIDGE MATERIAL DESIGN OPTIONS

QUESTIONS?

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For more information, visit

<http://tig.transportation.org>

and click on

New Bridge Material Design Options