

Session 25

Michael DeFreese

Metal Dek

Polymer Coated Stay-In-Place Metal Bridge Deck Forms

Topic Description

A corrosion resistant stay-in-place metal bridge deck form system has been developed to substitute for costly and laborious removable wooden forms. The galvanized metal forms are comprised of galvanized steel to which a 10-mil polyethylene sheet is thermally applied. Based on the results of several pilot projects using the coated forms, the Department is moving toward including these as a standard on future projects.

Speaker Biography

Session 25

Rod Powers

FL. Dept. of Transportation

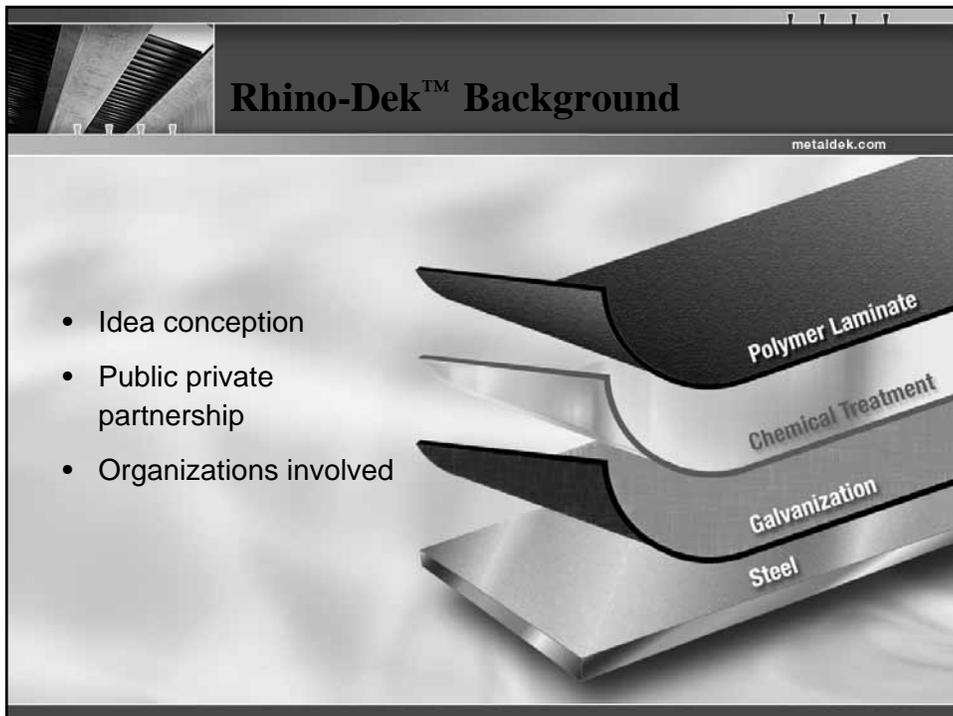
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Speaker Biography

Rod is the Department's State Corrosion Technologist based at the State Materials Office in Gainesville. He, along with Task Team members from the Offices of Structures Design and Construction worked with several industries to develop polyethylene coated stay in place metal bridge deck forms for use in corrosive environments.





This slide features a dark header with a small image of the product on the left. The title "Rhino-Dek™ Benefits" is centered in the header. Below the header, the slide is split into two vertical panels. The left panel contains a bulleted list of five benefits. The right panel shows a close-up, low-angle view of the Rhino-Dek product's corrugated surface and supporting structure.

Rhino-Dek™ Benefits

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- Rapid Installation
- Creates a working platform
- Reduces work hazards
- Reduced construction cost
- No forms to remove



This slide features a dark header with a small image of the product on the left. The title "Rhino-Dek™" is centered in the header. Below the header, the slide is split into two vertical panels. The left panel contains a bolded heading followed by a bulleted list of three features. The right panel shows a close-up, low-angle view of the Rhino-Dek product's corrugated surface and supporting structure.

Rhino-Dek™

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Designed for brackish and salt water environments:

- Corrosion Resistant
- Abrasion resistant
- UV stable



Organizations & Partners

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- **Polymer laminate:**
Dow Chemical Company
- **Laminate applicator:**
U.S Coaters, LLC.
- **Rhino-Dek™ Forms:**
The Metal Dek Group®, CSi®
- **Project Partner:**
Florida DOT
State Materials: Structures
Design: Construction





Corrosion: Salt Spray

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ASTM B117, ASTM D-610, ASTM D-714, ASTM D-1654

Test Sample	Front Face	Bend	Scribe	Edge	Total
G210 w/Polymer Laminate	7	3	5 (3/16")	4	19
G60 w/Polymer Laminate	7	3	0 (>1")	0	10
G210	0	0	NA	NA	0

- 7200 hours exposure
- Rating scale: 0 = total failure; 10 = like new (higher rating is better)



Corrosion: Freeze/Thaw

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ASTM A-742

Test Sample	Front Face	Bend	Scribe	Edge	Total
G210 w/Polymer Laminate	10	10	10	10	40
G60 w/Polymer Laminate	10	10	10	10	40
G210	3	5	NA	NA	8

- 7200 hours exposure
- Rating scale: 0 = total failure; 10 = like new (higher rating is better)



Corrosion: Cleveland Condensation

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ASTM D-2246, ASTM D-2247

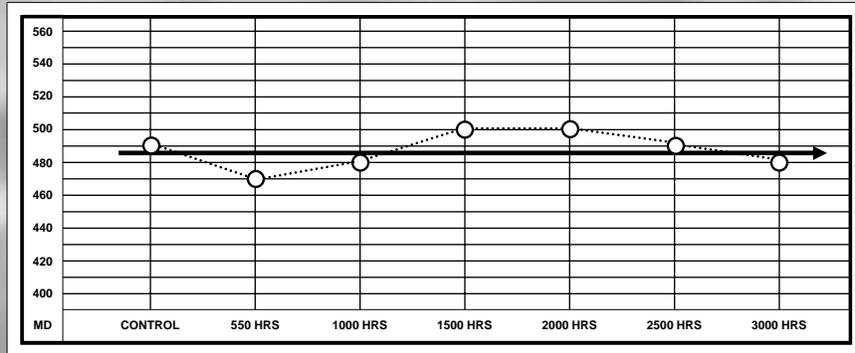
Test Sample	Front Face	Bend	Scribe	Edge	Total
G210 w/Polymer Laminate	10	NA	9 (1/64")	NA	19
G60 w/Polymer Laminate	10	NA	10	NA	20
G210	3	NA	NA	NA	3

- 6900 hours exposure
- Rating scale: 0 = total failure; 10 = like new (higher rating is better)

Corrosion: UV Stability

metaldok.com

Polymer Laminate Percentage Elongation Study



- ASTM test method D-882
- UV testing at 8 hours of UV light and 4 hours of condensation at 37C

FDOT Study

metaldok.com

Rhino-Dek™ Polymer Laminate Testing

Testing	Partially Submerged in 3% NaCl	Partially Submerged in 3% NaCl	Partially Submerged in Saturated lime water	Salt Fog With 5% NaCl	Salt Fog With 5% NaCl
Test	T1	T2	T3	T5	T10
Exposure	Tank	Tank	Tank	Chamber	Chamber
Score	YES	YES	YES	NO	YES
Sample Back	Embedded In Grout	Coated Back w/Liquid Coat	Embedded In Grout		Embedded In Grout
Other	Neat Grout		Neat Grout	Coat Face Up	Neat Grout

Source: FDOT

- Rate performance using ASTM B117

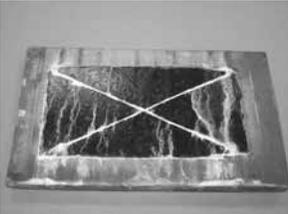


FDOT Coating Test Comparisons

metaldek.com

6 Months in Salt Fog Exposure

Rhino-Dek™
 No visible sign of coating damage at scribe, ASTM D1654 rating of 9 Visible corrosion of substrate within scribe.



FDOT 3 - Coat Paint System
 No visible sign of coating damage at scribe, ASTM D1654 rating of 9, possible contaminant between base and top coat.



Testing by Florida Department of Transportation

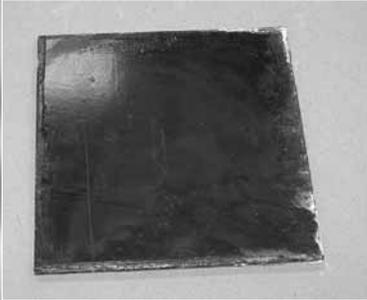


FDOT Coating Test Comparisons

metaldek.com

10 Weeks in Salt Fog Exposure

Rhino-Dek™ (sheared edge coating)
 No visible sign of coating damage, ASTM D610 rating of 10.



Testing by Florida Department of Transportation



FDOT Coating Test Comparisons

metaldek.com

6 Months in Sulfate Tank Exposure

Rhino-Dek™
 No visible sign of coating damage at scribe, ASTM D1654 rating of 10.



FDOT 3 - Coat Paint System
 Coating disbondment at scribe, ASTM D1654 rating of 7, Visible corrosion of substrate within scribe and under disbonded coating.



Testing by Florida Department of Transportation



FDOT Coating Test Comparisons

metaldek.com

6 Months in 3.5% NaCl Tank Exposure

Rhino-Dek™
 No visible sign of coating damage at scribe, ASTM D1654 rating of 10, Visible corrosion of substrate within scribe.



FDOT 3 - Coat Paint System
 Minimal coating disbondment at scribe, ASTM D1654 rating of 8, Visible corrosion of substrate within scribe and under disbonded coating.



Testing by Florida Department of Transportation

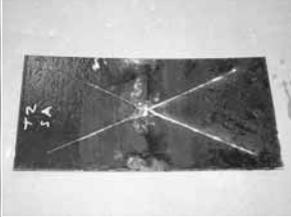


FDOT Coating Test Comparisons

metaldek.com

6 Months in 3.5% NaCl Tank Exposure

Rhino-Dek™
 No visible sign of coating damage at scribe,
 ASTM D1654 rating of 10 Visible corrosion of
 substrate within scribe.



FDOT 3 - Coat Paint System
 No visible sign of coating damage at scribe,
 ASTM D1654 rating of 10 Minor corrosion visible
 of substrate within scribe.



Testing by Florida Department of Transportation



Rhino-Dek™ Case Study

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Trout River



Project Components

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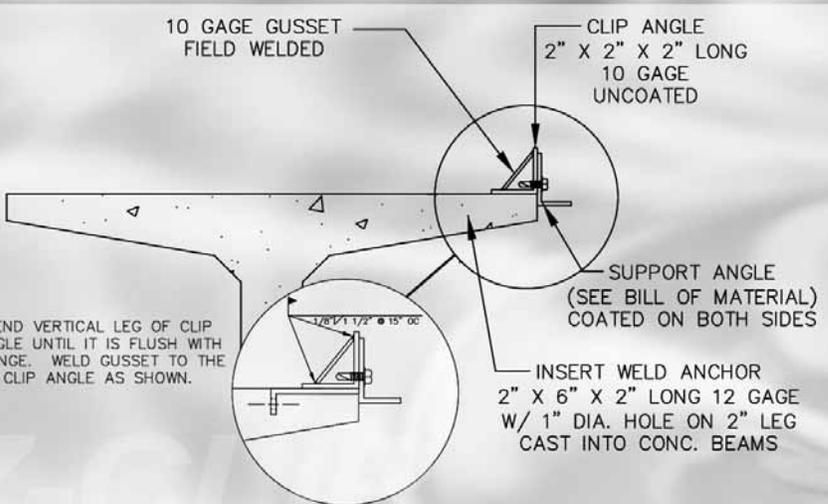
- 2.5 x 8 forms
- 10 gauge support angle
- Sheet closure (skews)
- Closure angle
- Z-clip insert
- Void Filler
- Self-tapping screws





Trout River Bridge

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10 GAGE GUSSET
FIELD WELDED

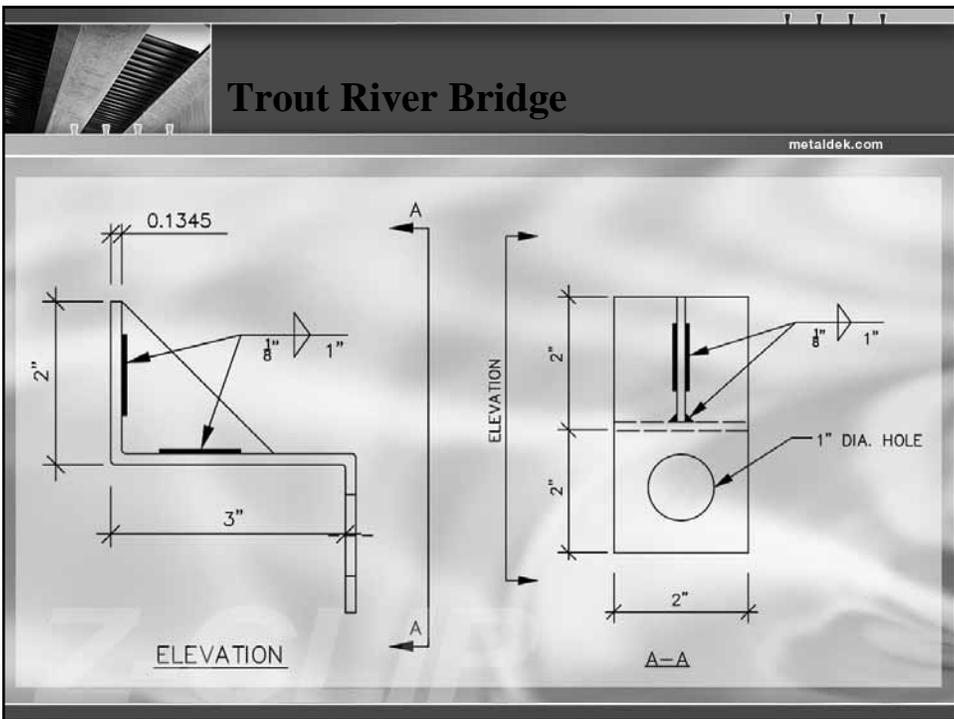
CLIP ANGLE
2" X 2" X 2" LONG
10 GAGE
UNCOATED

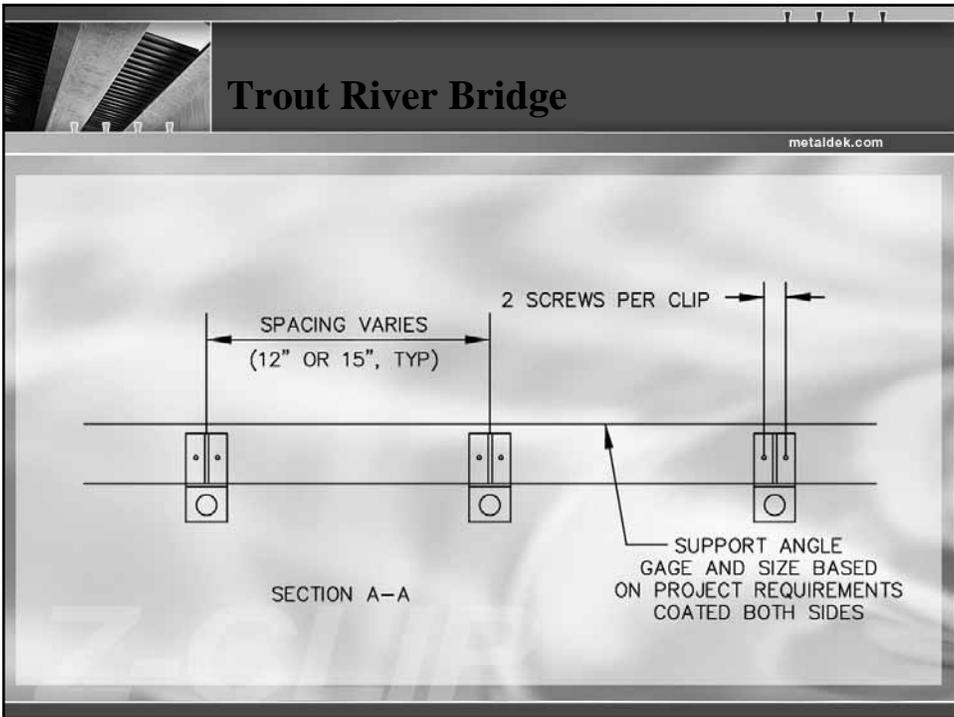
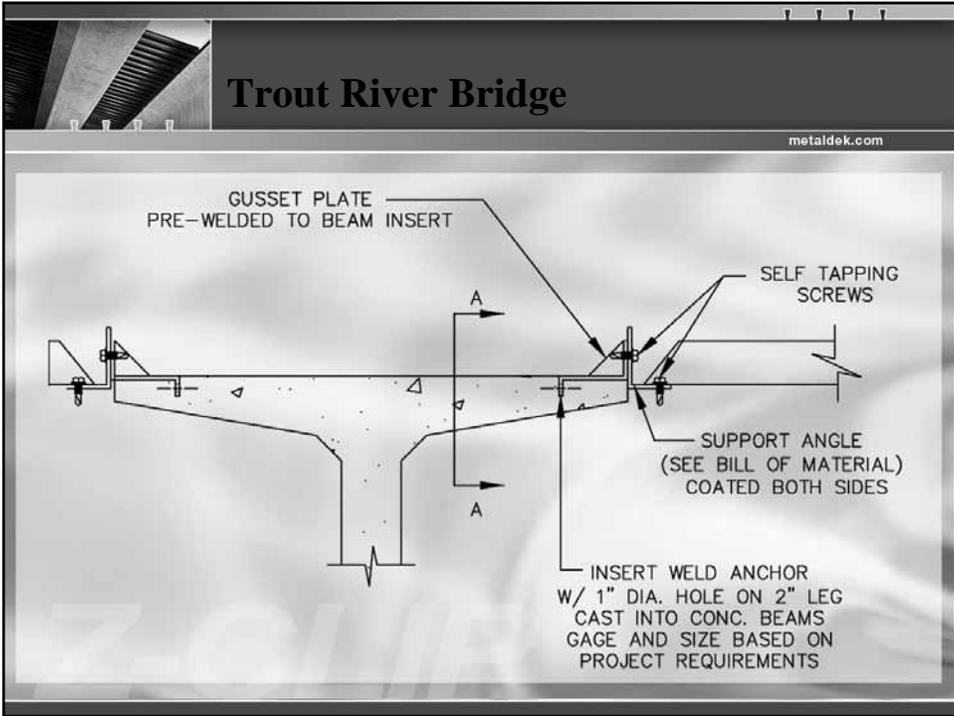
SUPPORT ANGLE
(SEE BILL OF MATERIAL)
COATED ON BOTH SIDES

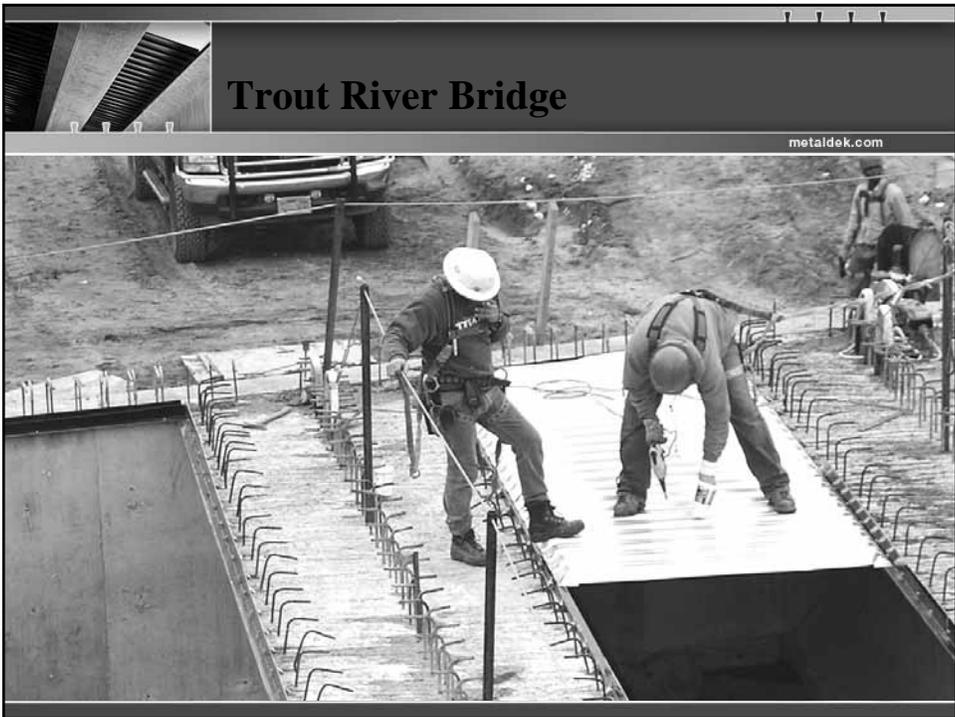
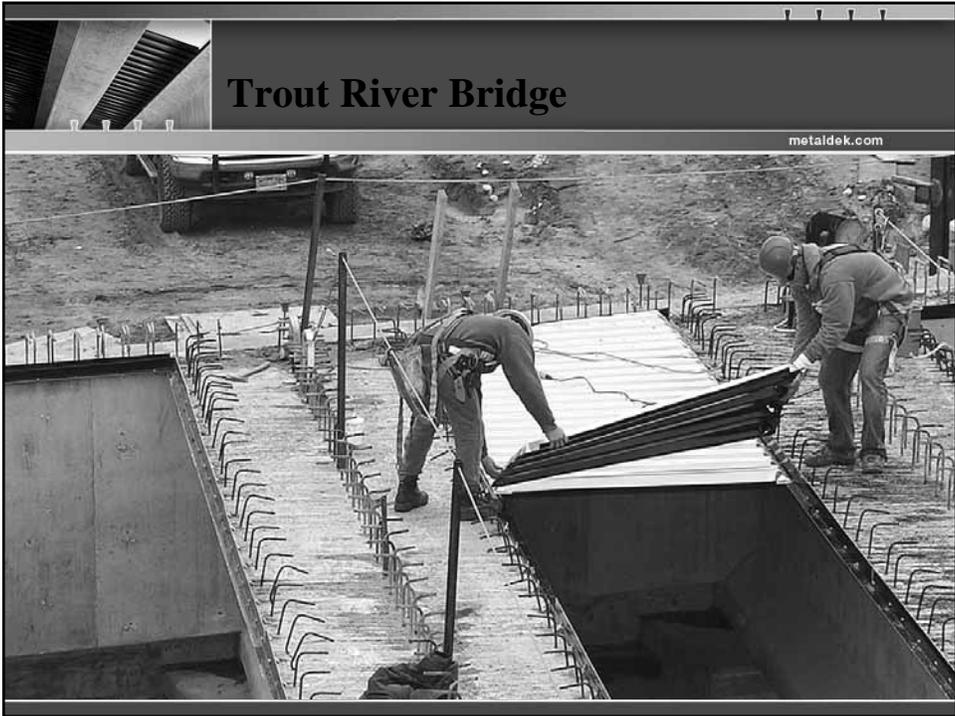
INSERT WELD ANCHOR
2" X 6" X 2" LONG 12 GAGE
W/ 1" DIA. HOLE ON 2" LEG
CAST INTO CONC. BEAMS

BEND VERTICAL LEG OF CLIP
ANGLE UNTIL IT IS FLUSH WITH
FLANGE. WELD GUSSET TO THE
CLIP ANGLE AS SHOWN.

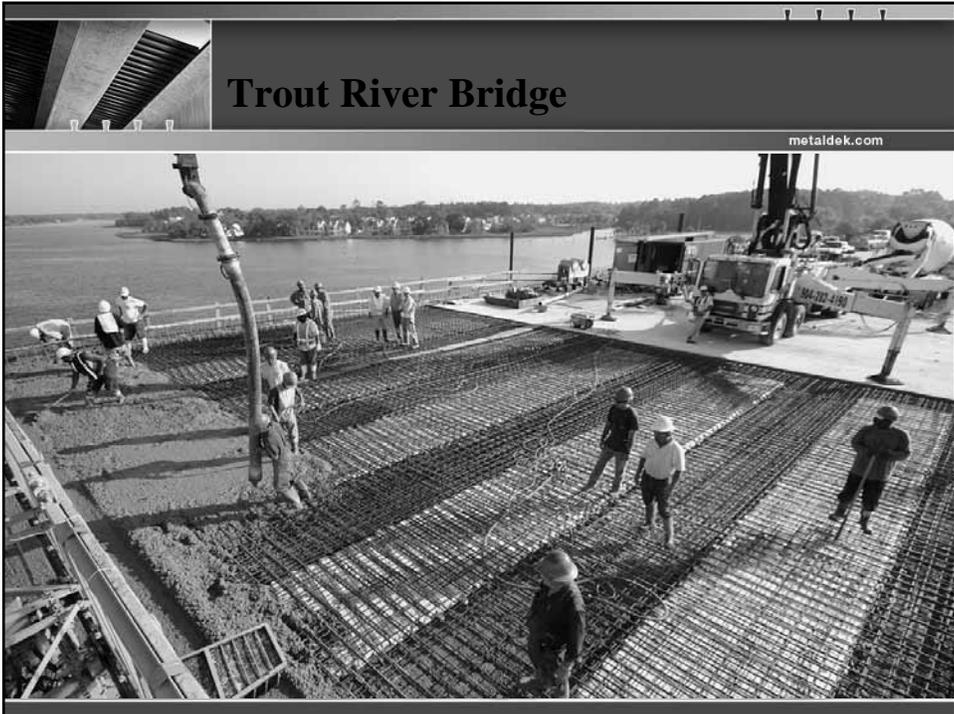
$1/8" \times 1 1/2" \bullet 15^\circ 00'$

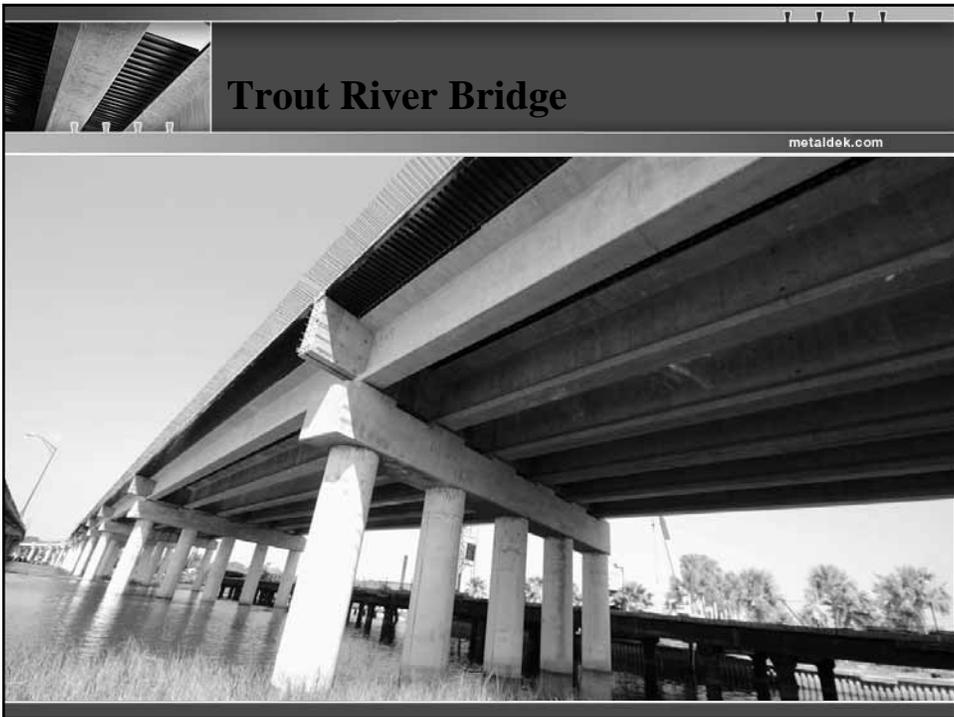
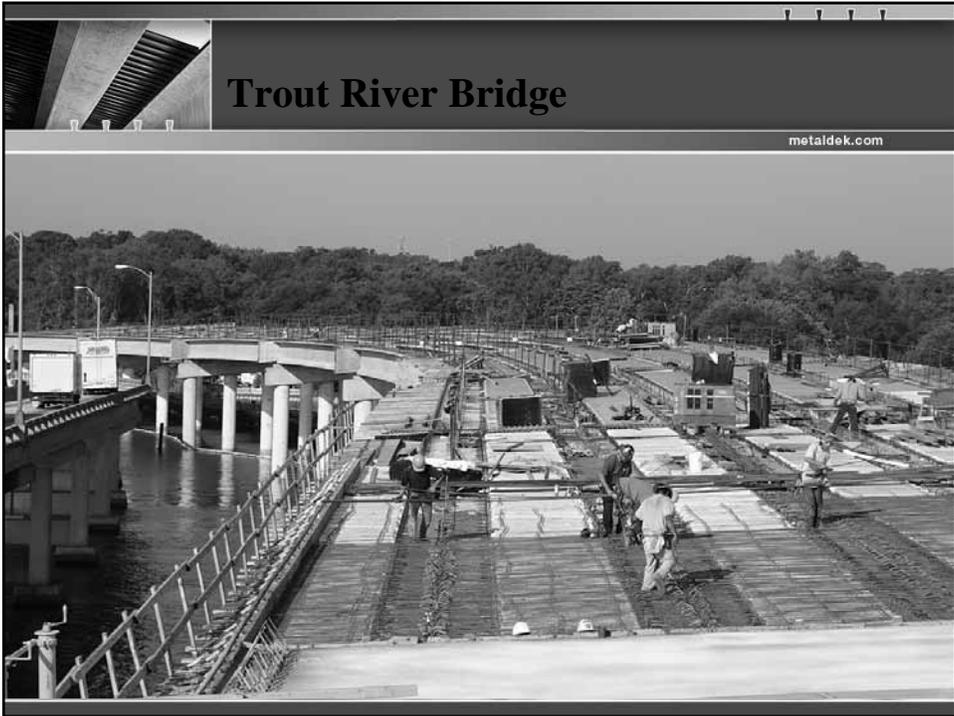














Rhino-Dek™ Projects

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Completed

- Bridge of Lions - *St. Augustine, FL - Tidewater Construction*

Active

- I-95 over Trout River - *Jacksonville, FL - Hal Jones Contractors*
- I-10 over Escambia Bay - *Pensacola, FL - Tidewater / Flatiron JV*
- Jewfish Creek - *Key Largo, FL - Granite Construction*

Potential

- West Bay Bridge - *Panama City, FL - APAC Major Projects Group*
- 12th Ave Bridge - *Miami, FL - Kiewit Southern*
- John's Pass - *St. Petersburg, FL - Flatiron Constructors*



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