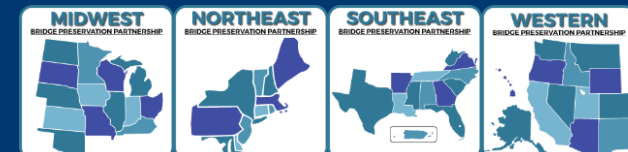
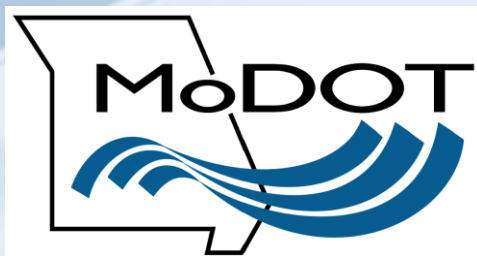


# Funding Incentives for Innovative Bridge Preservation Technologies

A Missouri DOT Case Study



# Agenda

## Why Incentivize Innovation?

- David Brodowski, P.E., TrueTech Bridge

## MoDOT's Use of 5% Additional Share For Innovation

- Arisa Prapaisilp, Missouri Department of Transportation

## Bridge Preservation Innovations on MoDOT Projects

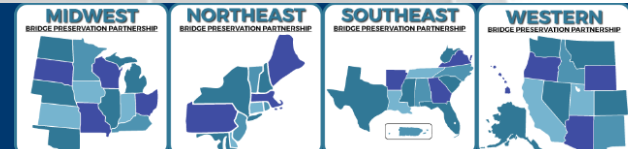
- Mike Stroia, CMC

# HISTORY

Infrastructure Innovation has driven American growth and prosperity throughout history. For over 200 years, no investment has yielded more for the United States. TrueTech Bridge is committed to innovation that will move our future of bridge building forward and help restore the state of U.S. transportation infrastructure to global leadership.

# 1806

FIRST FEDERALLY FUNDED ROAD



# Why Incentivize Innovation?



52 Institutions

52 Introductions

52 Processes

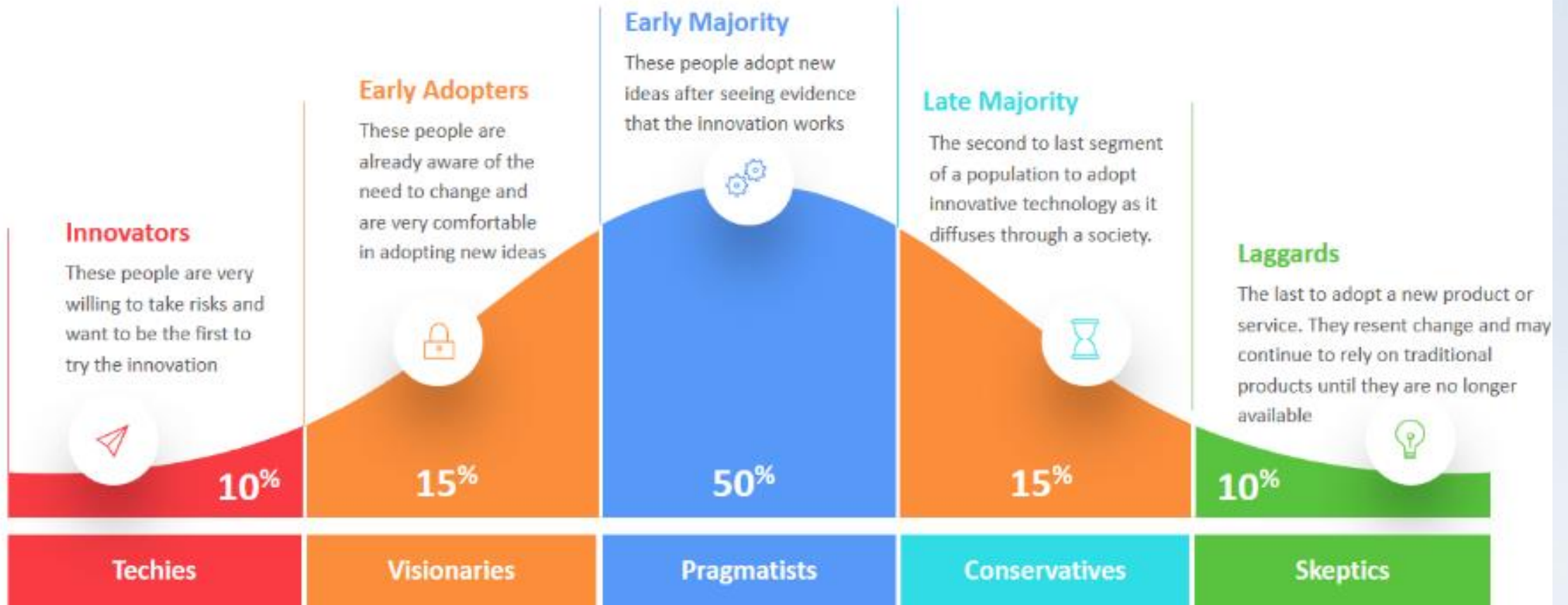
52 Biases

Difficult for industry BUT understandable for Owners:

- Climate / Geography / Environment
- Labor Force
- Material Preferences
- Traffic Constraints
- Culture

# Why Incentivize Innovation?

## DIFFUSION OF INNOVATION MODEL



# Why Incentivize Innovation?

## Mainstreaming Technologies

Victoria Sheehan – NHDOT Commissioner

*“Biggest barrier to mainstreaming technology is **uncertainty around available funding in the future.**”*

*“If I have a material that has a lower life cycle cost over it’s deployment, I might still not be able to select that product if it costs more in today’s dollars because I **only have certainty in funding for the next few years...the more predictability we have around resources the further out we can look into the future and ensure we are making smart decisions.**”*

*“It’s not about just appealing to the bridge engineer but **all individuals who are involved in every aspect of the lifecycle of the infrastructure.**”*

*“Having to report [asset performance] data to the Federal Government but **also use that data to drive decision making in our organizations has allowed us to make the case for certain investments.**”*

Credit: InfraTalk America

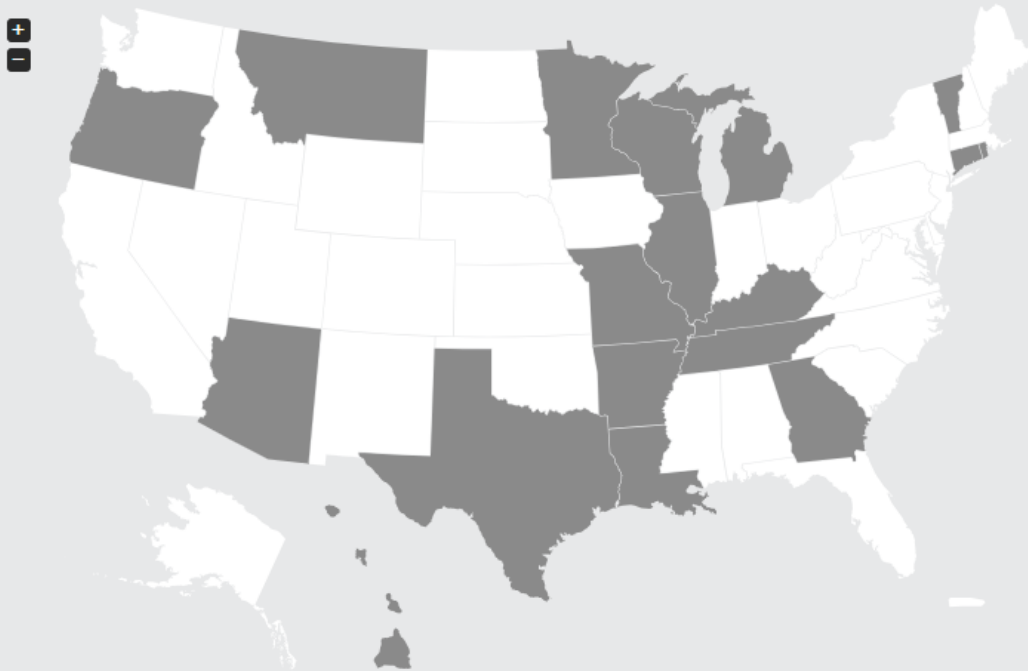


Every Innovation Starts With A Conversation

# Increased Federal Share For Innovation

[fhwa.dot.gov/innovation/resources/increased\\_federal\\_share/](https://fhwa.dot.gov/innovation/resources/increased_federal_share/)

## Increased Federal Share for Innovative Project Delivery

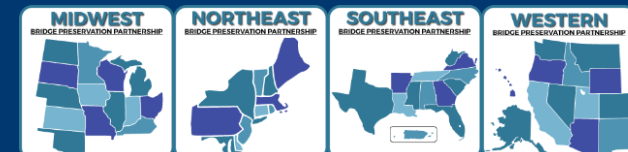


Innovative Project Delivery Methods (23 USC 120(c)(3))

Increased Federal-share up to 5% of the total project cost, not to exceed 100 percent

[Q & A](#)

State	Route	Location	Innovation	Approximate Additional Federal Share Amount
MO	I-270	Riverview Interchange in St. Louis City and St. Louis County, Missouri	Bi-State approach to project bundling	\$962,700
MO	I-270 North	from the I-70/I-270 interchange in Bridgeton, Missouri to the west of the Riverview Interchange in St. Louis, Missouri	Procure the I-270 North Project with the Design-Build method to maximize industry innovation	\$ 12,650,000
MO	I-435	I-435 from the Kansas State Line to I-49 in Jackson County	Design-Build	\$ 3,521,250
MO	I-44	Newton, Jasper, Lawrence Counties	Design-Build, Bridge Bundling, Accelerated Bridge Construction (ABC), Innovations in Maintenance of Traffic (MOT) Techniques	\$ 1,800,000
MO	I-64	St Louis County (over Conway Road), Salt Branch Creek	Galvanized Rebar and Polyester Concrete Overlay	\$1,292,000
MO	IS 44, MO 100, I-70, MO 30	Various	Targeted Overlay Pavement Solutions - MMA Wearing Surface, Polyester Polymer Concrete, Epoxy Urethane Polymer	\$1,289,950
MO	MO 744	E Kearney Street from Springfield-Branson National Airport to LeCompte Avenue	Hawk Beacon	\$78,000
MO	US 160	Christian County (Route CC) and Greene County (Route AA)	Geometric Design - continuous flow intersections	\$409,550
MO	US-54	Louisiana, MO	Design-Build	\$ 1,160,625
MO	US-54	Louisiana, MO	Design-Build	\$ 1,160,625
MO	Various	Various locations	Galvanized Rebar, Galvanized Girders, Ultra High Performance Concrete, System G Overcoat, Clear Cast Forms	\$1,649,850
MO	Various	Various	Project Delivery - Fixed-Price Variable-Scope, Bridge Bundling, Project Manager Consultant	\$3,689,950
MO	Various Locations	Various locations throughout Southeast District Bollinger, Butler, Cape Girardeau, Dunklin, Mississippi, New Madrid, Pemiscot, Reynolds, Scott, St. Francois, and Stoddard County	Design-Build, Bridge Bundling	\$1,300,000



# Why Incentivize Innovation?

## MoDOT Timetable

Webinar Intro to MoDOT

**May 2020**

**June 2020**

1<sup>st</sup> Project Identified

2<sup>nd</sup> Project Identified  
(2 new bridges)

**November 2020**

**September 2021**

3<sup>rd</sup> and 4<sup>th</sup> Projects Identified

**Fall 2022**

5<sup>th</sup> Project Identified

**June 2023**

**July 2024**

Innovation included in MoDOT's  
Engineering Policy Guide (EPG)

Incentives helped speed adoption of technology benefiting  
the Owner & Industry



Spring 2022



Summer 2024





# Owner Champions



**BRYAN A. HARTNAGEL, P.E., Ph.D.**

*State Bridge Engineer*

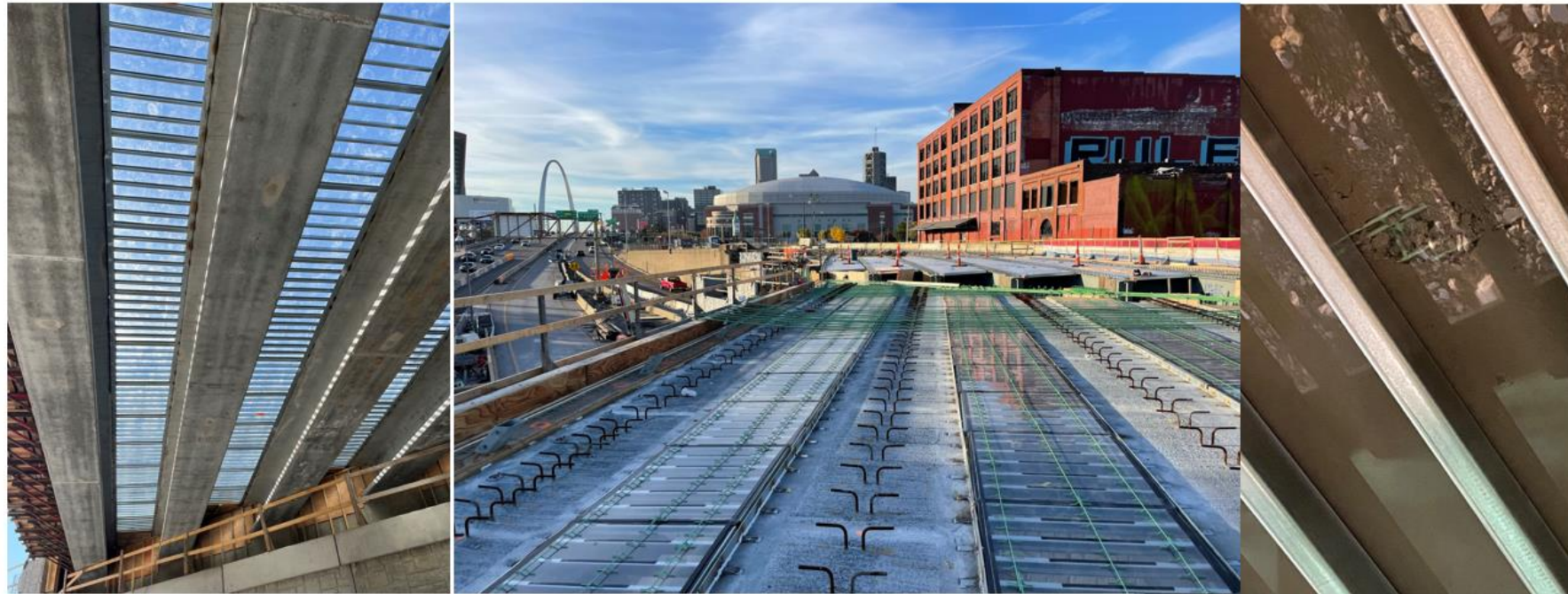
**Missouri Department of  
Transportation**

**Central Office – Bridge Division**

## Bridge Division Innovations



ClearCast deck forms, 5 bridges so far ([www.TrueTechBridge.com](http://www.TrueTechBridge.com))

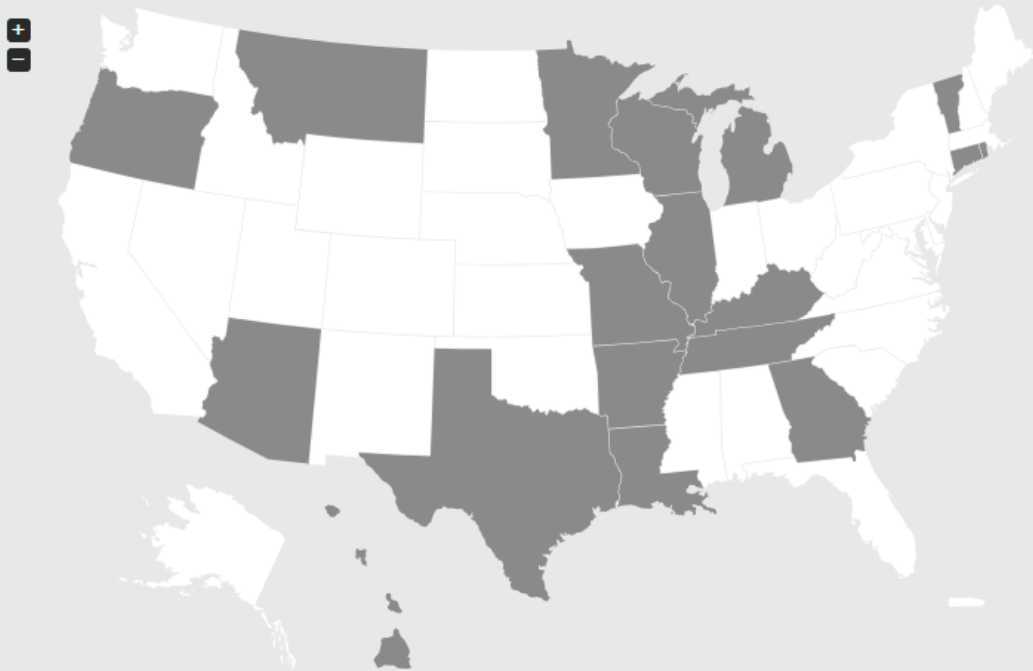


INTERNATIONAL BRIDGE CONFERENCE 2024

# Increased Federal Share For Innovation

[fhwa.dot.gov/innovation/resources/increased\\_federal\\_share/](https://fhwa.dot.gov/innovation/resources/increased_federal_share/)

## Increased Federal Share for Innovative Project Delivery



**Innovative Project Delivery Methods (23 USC 120(c)(3))**

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- Arisa Prapaisilp, Missouri Department of Transportation

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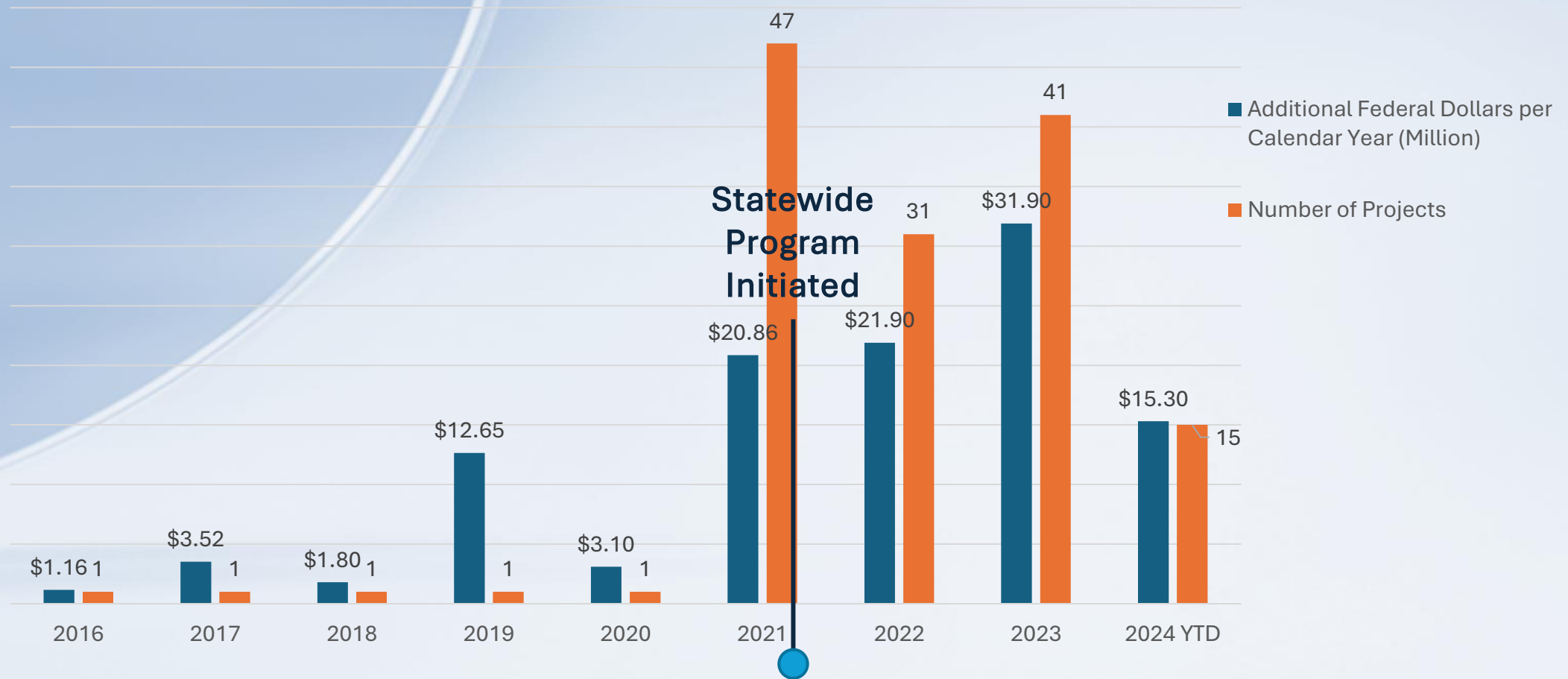
- Mike Stroia, CMC

# What's the Purpose?

- Increase Federal apportionment from 80/20 to 85/15 (or 90/10 to 95/5 for Interstates) by using innovative products, methods, or processes.
- Incentivizes MoDOT to continue innovating
  - Shorten Project Delivery
  - Enhance Safety
  - Reduce congestion
  - Integrate automation
  - Save time, money, and resources



# History of MoDOT's Additional Federal Dollars per Calendar Year



# MoDOT Approved Innovations

## Bridge

- ClearCast Forms
- Ultra High-Performance Concrete
- Polyester Concrete
- Galvanized Rebar and Girders
- System G Overcoat
- Epoxy Urethane Polymer
- MMA for concrete crack filling

## Other/Pavement

- Intelligent Compaction
- Balanced Mix Design

## Alternative Delivery Methods

- Design-Build
- Alternative Technical Concept
- Planning and Environmental Linkages (PEL) Study

## Safety Improvements

- Continuous Flow Interchange
- HAWK Traffic Beacon





## Inquiry of Increased Federal-Share for Project-Level Innovation

Survey to classify projects and prepare application for additional federal funding for Innovative projects. Please reference the list of applicable innovations (To be attached with survey invite). To be completed by Project Managers, Transportation Project Designers or Area Teams.

Innovations Listing: [FHWA List.docx](#)

FHWA FAQ: [Increased Federal-share for Project-level Innovation | Federal Highway Administration \(dot.gov\)](#)

District \*   
Select District

Project Number \*

Letting Date \*

Construction Budget \*   
In Thousands

FMIS Number \*   
Federal Aid ID Number

Program Codes \*

Innovation Category \*   
Please select the category of innovation that relates to your project

Innovation Description

Please describe the Innovation to be included in the project. Be as specific as possible and applicable.

## Gathering Projects in the STIP

- Simplistic Data Entry
- Universality
  - Applicable Statewide
- 5 minutes to submit to save 5%





# Plan of Attack

1. PM submits Innovative Project via Innovations Portal
2. Team bundles jobs by Innovation Categories
3. Teams input project data on Standard FHWA application forms
4. Receive approval
5. Carry out Project
6. Re-invest savings into Missouri



**Application Form**  
**Technology and Innovation Deployment Program (TIDP)**  
**Increased Federal Share for Project-Level Innovation**  
**23 USC 120(c)(3)**

**A. Project Information (completed by Applicant)**

<b>State</b>	Missouri
<b>Project Name</b>	J4S3454, J6S3435, J8S0836D, JSU0080
<b>Location of Project</b> (Include Route Name and general location information)	See Attached Supplemental Forms.
<b>Description of Project</b>	Bridges
<b>Anticipated Authorization Date</b>	5/15/24
<b>Approximate Additional Federal Share (\$)</b>	\$3,249,700 Combined. See Supplemental Forms
<b>Increased Federal Share (%)</b>	5%
<b>Funding Source Used</b>	<input checked="" type="checkbox"/> National Highway Performance Program (NHPP) <input checked="" type="checkbox"/> Surface Transportation Block Grant (STBG) Program <input type="checkbox"/> National Highway Freight Program (NHFP) <input type="checkbox"/> Metropolitan Planning (PL)
<b>Innovation Being Proposed</b>	Galvanized Rebar, MMA Crack Filler, Clearcast Forms, Galvabar
<b>Description of Expected Benefit</b> (include how the innovative technology or practice increases the efficiency of construction, accelerates the construction, improves the safety, improves the quality, reduces congestion from construction, and/or extends the service life of highways and bridges)	<ul style="list-style-type: none"> <li>Galvanized Rebar in Bridges: Jobs J4S3454 - The use of galvanized rebar in the above project will ultimately extend the expected Service Life of associated structures and significantly reduce the frequency of future bridge repairs. This innovation will mitigate future long-term costs by reducing the maintenance and rehabilitation of the respected structures. This innovation is currently in the</li> </ul>
<b>Describe How the Project is Innovative in your State</b> (Include how the technologies or practices proposed are new or have only rarely been used for unique or special applications and represent significant improvement to the state or local agency's conventional practice.)	These Bridge projects are innovative to Missouri, as this state does not use these construction methods or materials regularly, if at all. These practices and materials have only started being tested by MoDOT as we are trying to further enhance our State's bridge quality and life cycle.

# Federal application

# MoDOT Engineering Policy Guide

## 104.2.1 Increased Federal Share Program

### Introduction

Using Federal funding for transportation projects is a complex process as described in [EPG 123.1](#). This article describes a process that allows MoDOT to increase its federal share of a project's eligible cost by 5% for projects using project-level innovation per [CFR 23 U.S.C. 120\(c\)\(3\)](#).

### Request for Increased Federal Share

An obligation is a commitment by the Federal government to reimburse MoDOT for the Federal share of a project's eligible cost. This commitment occurs at each phase of the project and prior to advancing to the next phase. Federal aid transportation projects are developed by completing work in the following distinct work phases:

1. Preliminary Engineering (PE)
2. Right of Way (ROW)
3. Utilities, if applicable
4. Construction.

# Key Takeaways

- 5% can be applied to *entire* project including Design, Construction, and Right of Way
- MoDOT is eligible for up to 10% of certain funding types annually (NHPP, STBG, PL)
- Based on MoDOT appropriations, can receive between \$100M and \$125M

# How this helped MoDOT?

- Provide States an opportunity to introduce higher quality products
  - Longer service life = Reduction in maintenance and replacement cost
- Reward for accelerated construction
  - Utilize this reward to maintain MoDOT's aging fleet
  - Utilize this reward to execute “back-burner” projects



Bottom Line: Improve the way we deliver a World Class Transportation System

# Agenda

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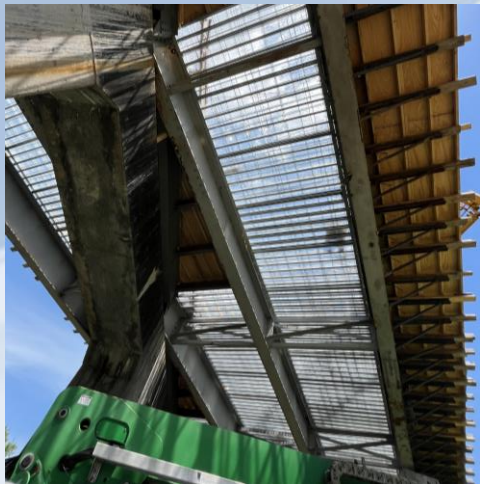
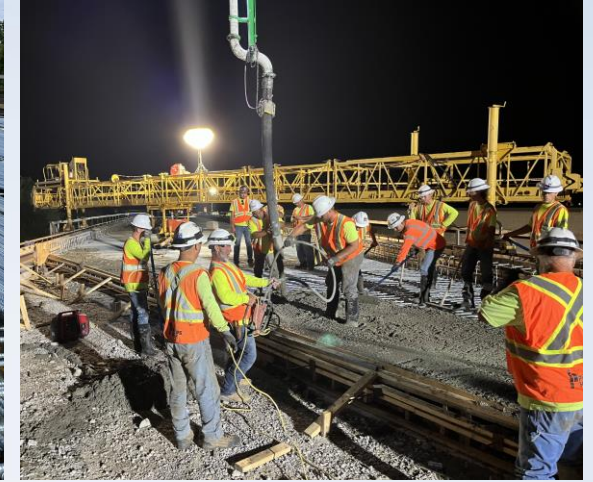
## MoDOT's Use of 5% Additional Share For Innovation

- Arisa Prapaisilp, Missouri Department of Transportation

## Bridge Preservation Innovations for MoDOT Projects

- Mike Stroia, CMC

# MoDOT Route 50 Bridge Deck Replacement



Project: 1094 Gr60 Bridge Deck Replacement

Location: Knob Noster MO

Type of Project: Concrete Bridge Deck 775 Replacement

Contractor: Hardy Group

Constructed: 2024

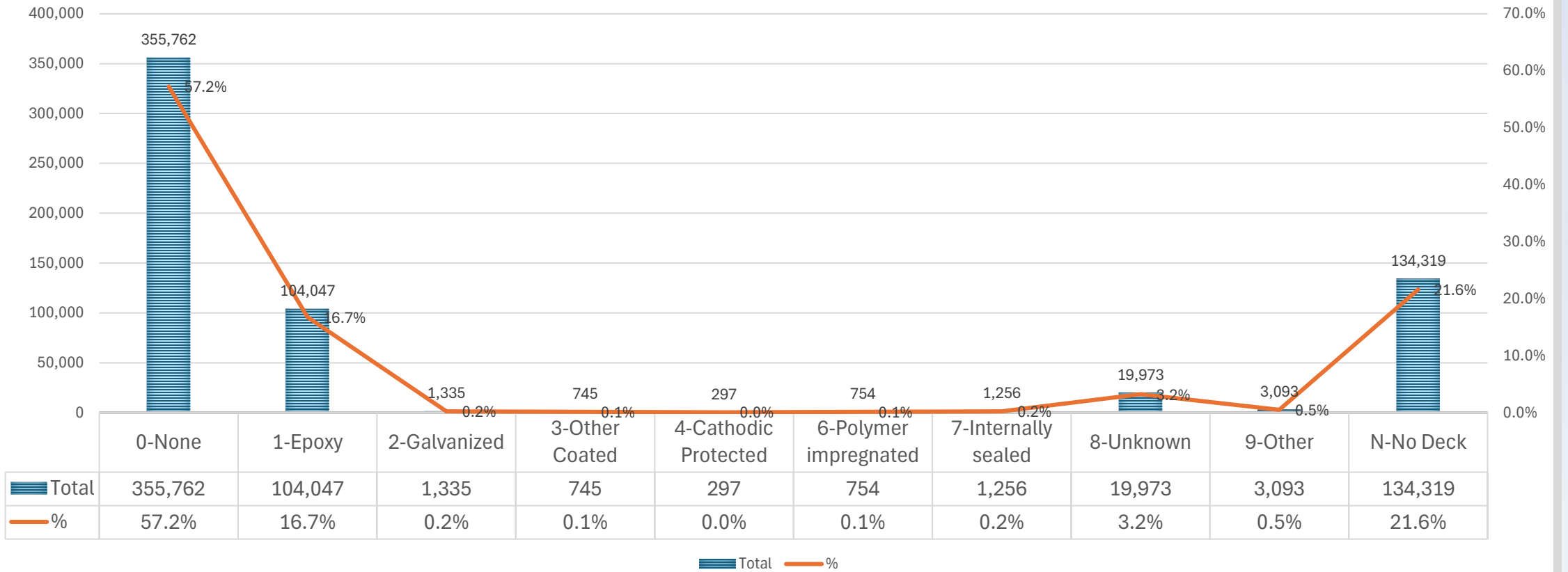


NATIONAL BRIDGE PRESERVATION CONFERENCE 2024  
Innovation for Infrastructure Resiliency

# CRR Market %

20% Corrosion resistant reinforcement

## NBI DATA





# Specifications & Benefits of Continuous Galvanized (A1094)

## SPECIFICATIONS

- ✓ Designation: ASTM A1094/A1094M - Standard Specification for Continuous Hot-Dip Galvanized Steel Bars for Concrete Reinforcement
- ✓ AASHTO M 111M/M 111-11 Zinc
- ✓ (Hot-Dip Galvanized) Coatings on Iron and Steel Products
- ✓ Coating minimum thickness (50  $\mu\text{m}$ ) 2 Mil
- ✓ Substrates = **A1035, A996, A722, A706, A615**
- ✓ Grades – 60 – 100 and up to 150 (A722)

## BENEFITS

- ✓ Longest “in service” coating for corrosion resistant steel
- ✓ Bond Strength to concrete superior to Black Steel
- ✓ Lap Splice lengths design like black steel
- ✓ Low price volatility (zinc)
- ✓ Can be used in seismic areas without concerns (A706)

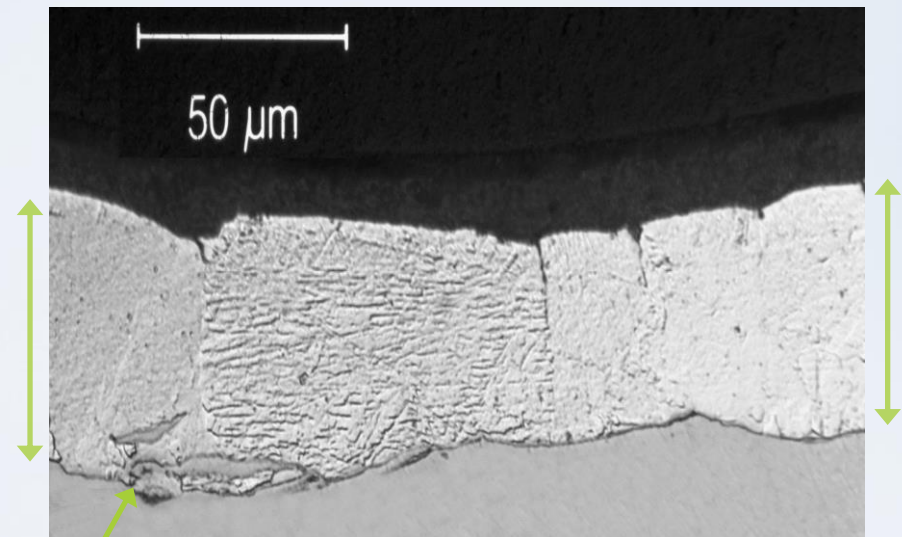
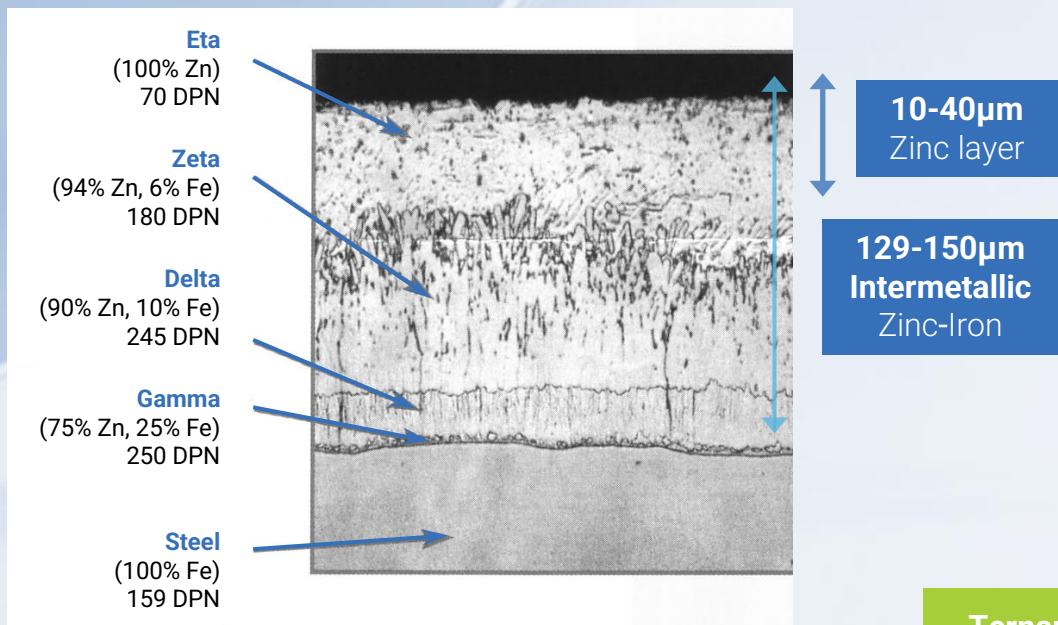


# Composition and Materials

## Cross Section Comparison of Coating

Hot-Dip Galvanized - 129 $\mu$ m min.  
(ASTM A767)

Continuously Galvanized - 50 $\mu$ m min.  
(ASTM A1094)



Ternary Layer  
 $Fe_2Al_5-XZn_x$

Source: University of South Wells Canberra (Thicker Pure Zinc Layer)



# Notable Research Initiatives

Comparison of A1094 to A767 and other CRR

- **Comprehensive Corrosion Performance for (RC) systems**
  - *Dr. Castaneda, Texas A&M / Tran-SET 19STLSU10*
- **Thicker Pure Zinc Layer**
  - *Dr. Yeomans, Galvanized rebar concrete researcher*
- **Larger Reduction of Bridge Deck Cracking**
  - *Dr. Patnaik, University of Akron / Ohio DOT*
- **Equal or Better Corrosion Performance of Reinforcing Bar**
  - *Dr. Darwin, University of Kansas / Oklahoma DOT*
- **Performance Evaluation of GalvaBar ASTM A1094 Continuous Hot Dip Galvanized Rebar**
  - *Bond Strength Testing*
- **Additional Corrosion Control Methods for Reinforced Concrete**
  - *Tran-SET Project No. 21CTAMU01, 22STTAMU53*



# Successful Implementation of Innovations

- Must solve a problem or address a pain point for Owner.
  - Must have a DOT/Owner Champion.
  - Must “work”, benefits advertised are realized.
  - Must be able to scale.
- 
- **FUNDING INCENTIVES HELP CHAMPIONS INITIATE CHANGE.**