



University of
Pittsburgh

Swanson School
of Engineering

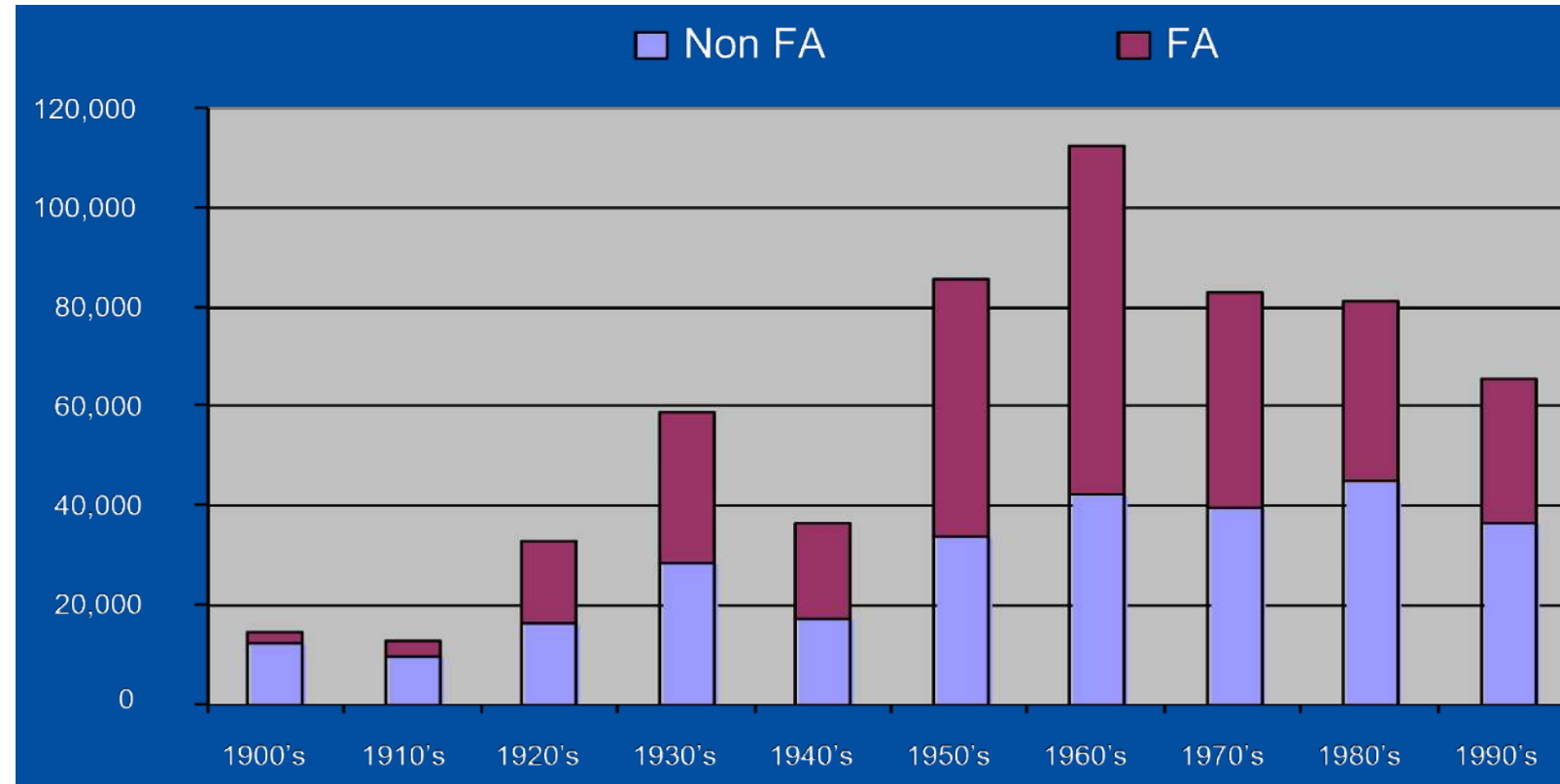
History and Evolution of the National Bridge Inspection Standards

M. Patrick Kane, PE, CBSI
GPI-Greenman-Pedersen, Inc.

- Senior Transportation Engineer (Structures)
- GPI-Greenman Pedersen, Inc.
- BSMET – University of Pittsburgh at Johnstown
- MBA – Robert Morris University
- 38 years of experience in:
 - Bridge Inspection
 - Bridge Inspection Training
 - Bridge Design and Rehabilitation
 - Project Management
 - Business Development

- 1984 – Hired by PENNDOT District 10-0
- 1985 – Completed 13-day PENNDOT NBIS course
- 1986 – Left PENNDOT for Michael Baker, Jr., Inc.
- 1987 – Started teaching PENNDOT NBIS Courses
- 1989 – FHWA NHI Training Course Development
- 1990-1994 – Hired by HDR (for more design experience)
- 1994-2000 – Left HDR for Baker to develop NHI BMS training
- 2000-2017 – Various other consultants
- 2017 – Hired by GPI and began teaching NHI Courses again

- National Bridge Inventory Data
 - 1950's and 1960's: Interstate System
- (Reference: 2000 data from 2012 BIRM)



DECEMBER 15, 1967 SILVER BRIDGE COLLAPSE

- Point Pleasant, WV
- 2,235-foot eye bar suspension bridge
- One eye bar fractured
- 46 fatalities



Required Implementation of:

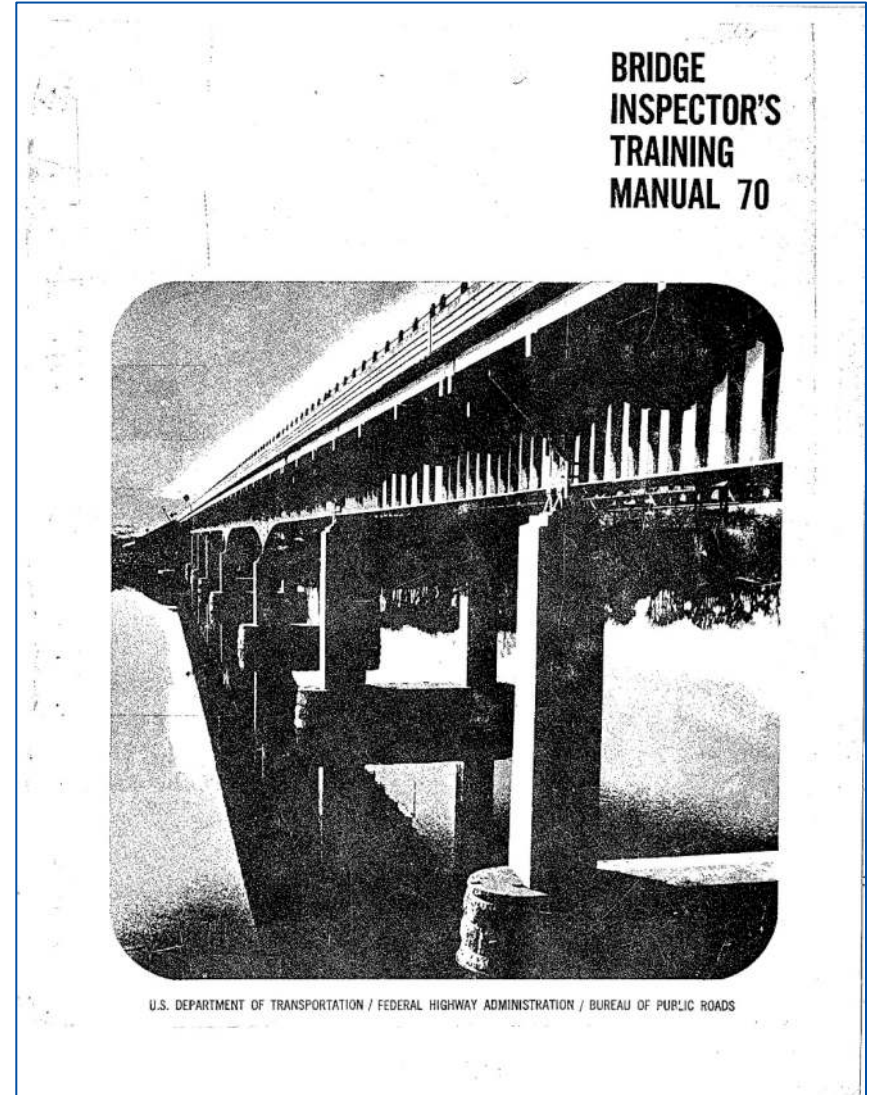
- National bridge inspection standard
- Develop a program to train bridge inspectors

Policy on:

- Inspection procedures
- Frequency of inspections
- Qualifications of personnel
- Inspection reports
- Maintenance of state bridge inventory

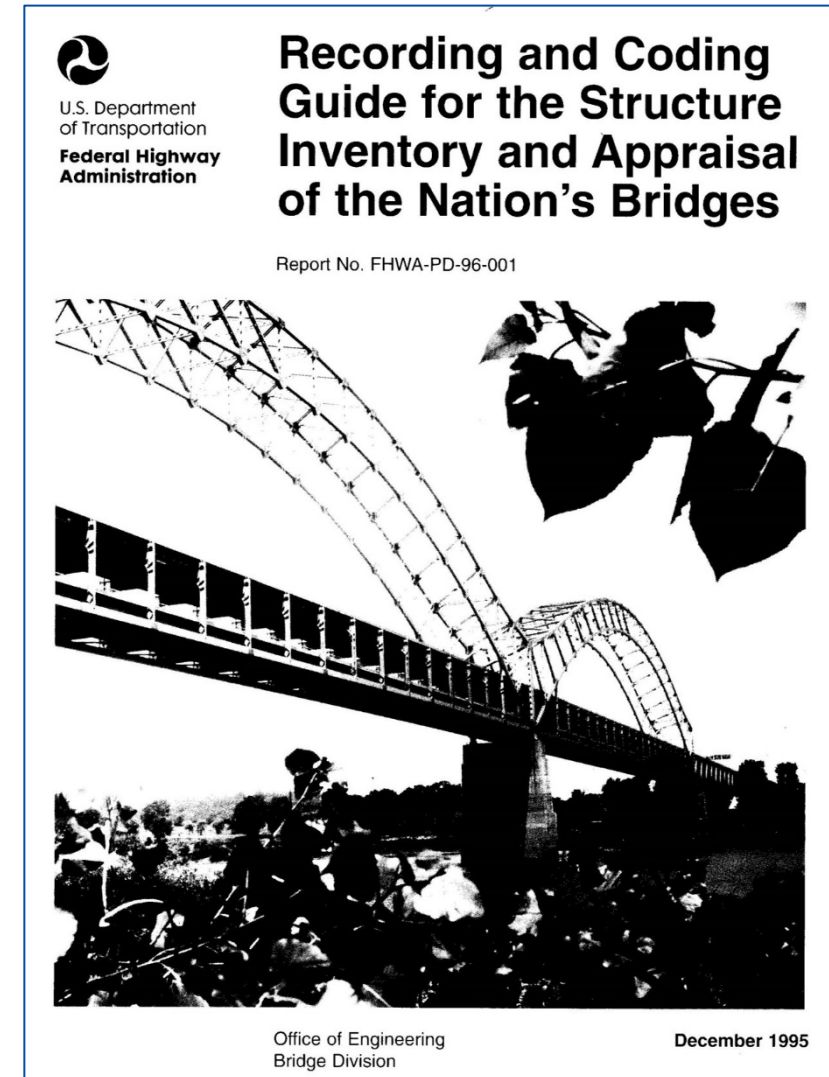
FHWA Bridge Inspector's Training Manual 70

- Set the standard for bridge inspection training
- Several supplements
- Later updates incorporated the supplements



FHWA Recording and Coding Guide for the Structure Inventory and Appraisal (SI&A) of the Nation's Bridges

(Latest version shown)



JANUARY 16, 1983

PAULDING, OHIO CULVERT COLLAPSE

- Flexible corrugated metal culvert
- Four cars plunged 20 feet into creek bed
- 5 fatalities

JUNE 28, 1983

MIANUS RIVER BRIDGE COLLAPSE

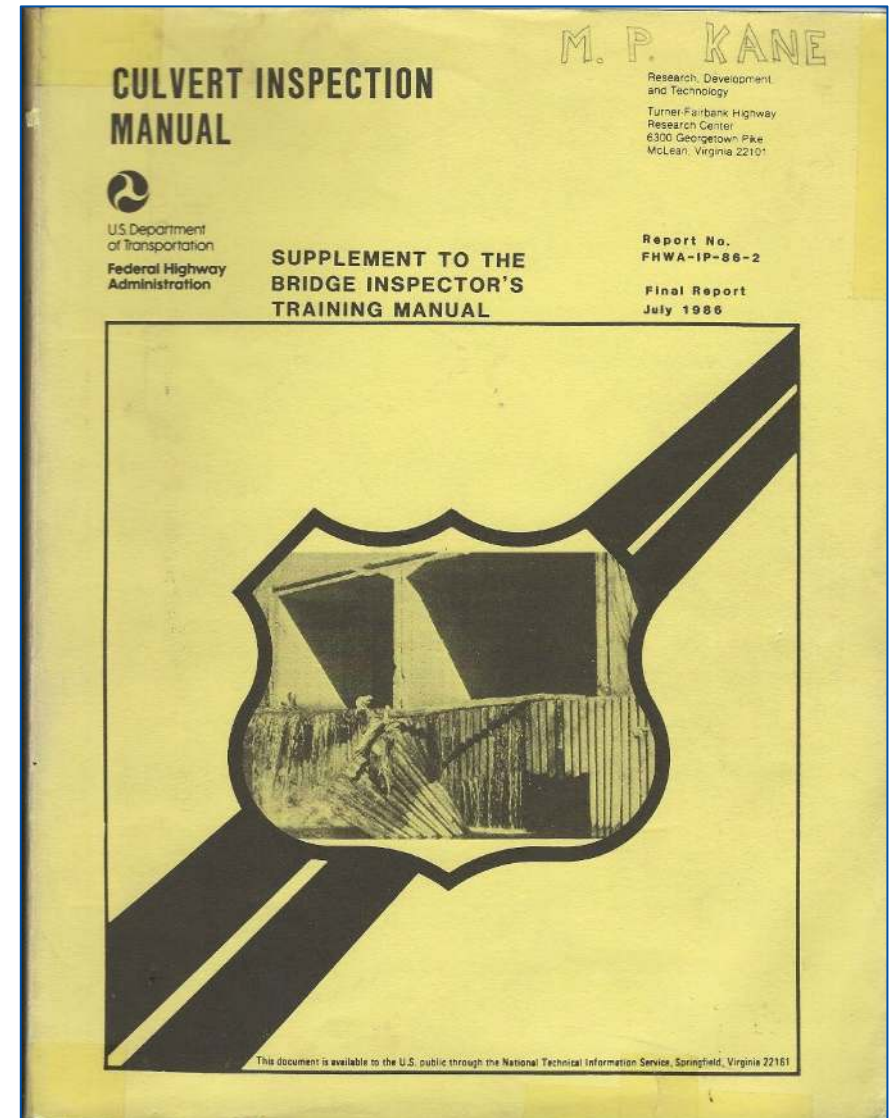
- I-95 in Connecticut
- Failed pin and hanger connection
- Non-redundant two-girder system
- Failure of entire span
- 3 fatalities



JULY 1986

Manual 70 Supplement

Included guidelines for
inspecting flexible metal
culverts



FHWA INSPECTION OF FRACTURE CRITICAL BRIDGE MEMBERS

SEPTEMBER 1986

*FHWA Inspection of
Fracture Critical Bridge
Members (Manual 70
Supplement)*

INSPECTION OF FRACTURE CRITICAL BRIDGE MEMBERS SUPPLEMENT TO THE BRIDGE INSPECTOR'S TRAINING MANUAL

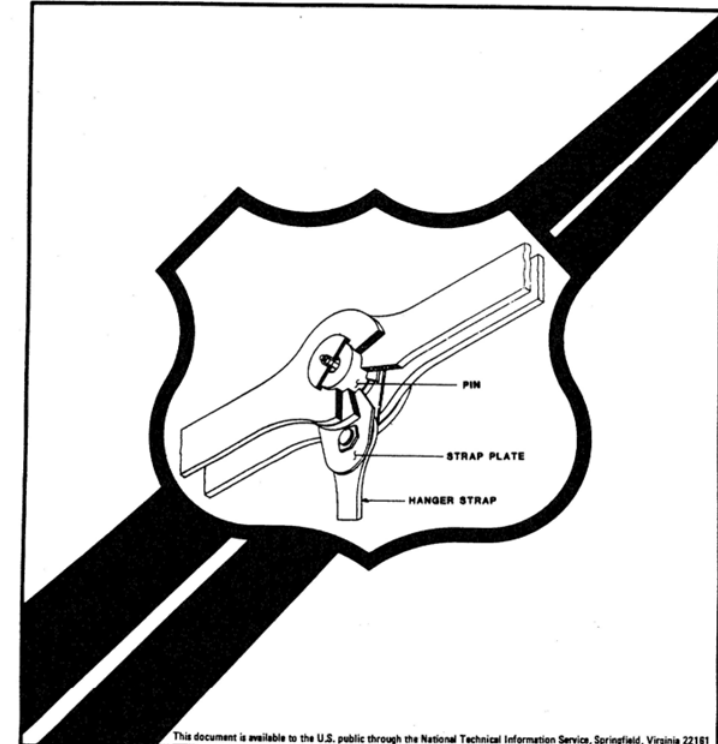


U.S. Department
of Transportation
Federal Highway
Administration

Research, Development,
and Technology
Turner-Fairbank Highway
Research Center
6300 Georgetown Pike
McLean, Virginia 22101-2296

Report No.
FHWA-IP-86-26

Final Report
September 1986



APRIL 5, 1987 SCHOHARIE CREEK COLLAPSE

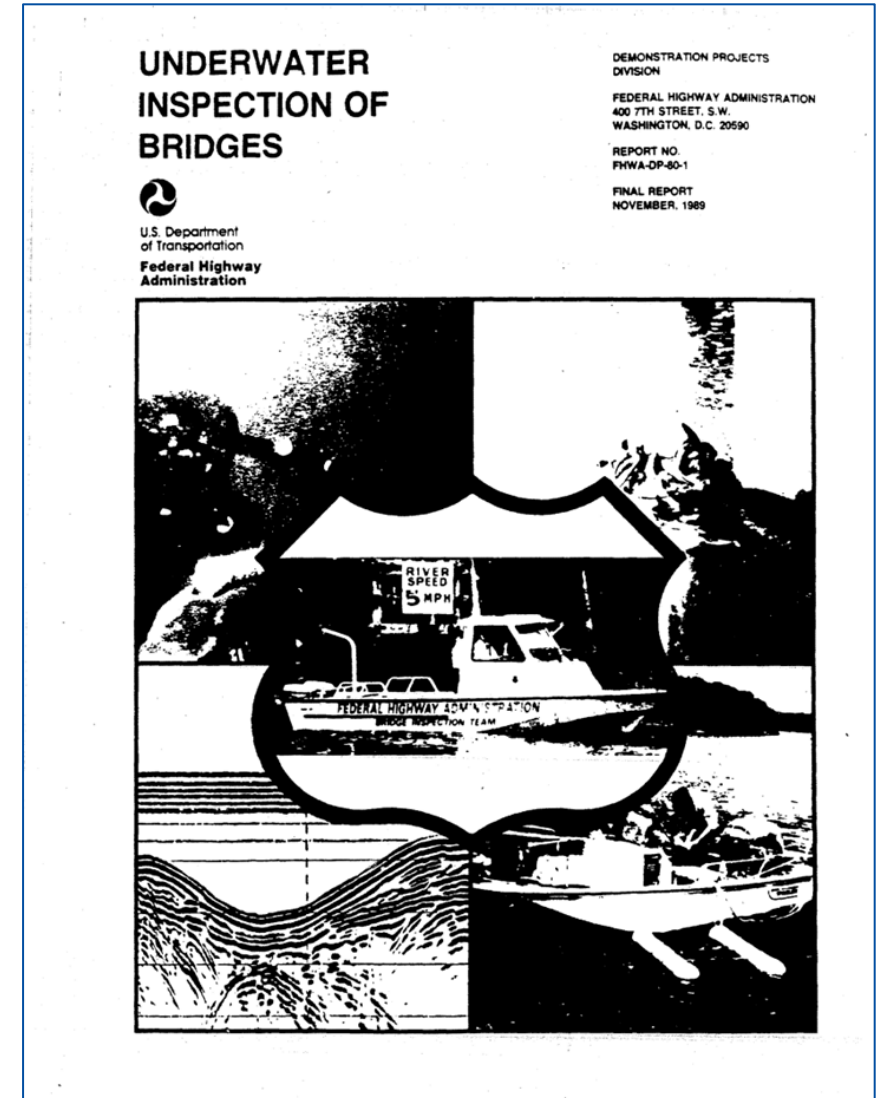
- New York State Thruway (I-90)
- Scour failure
- 10 fatalities



NOVEMBER 1989

UNDERWATER INSPECTION OF BRIDGES

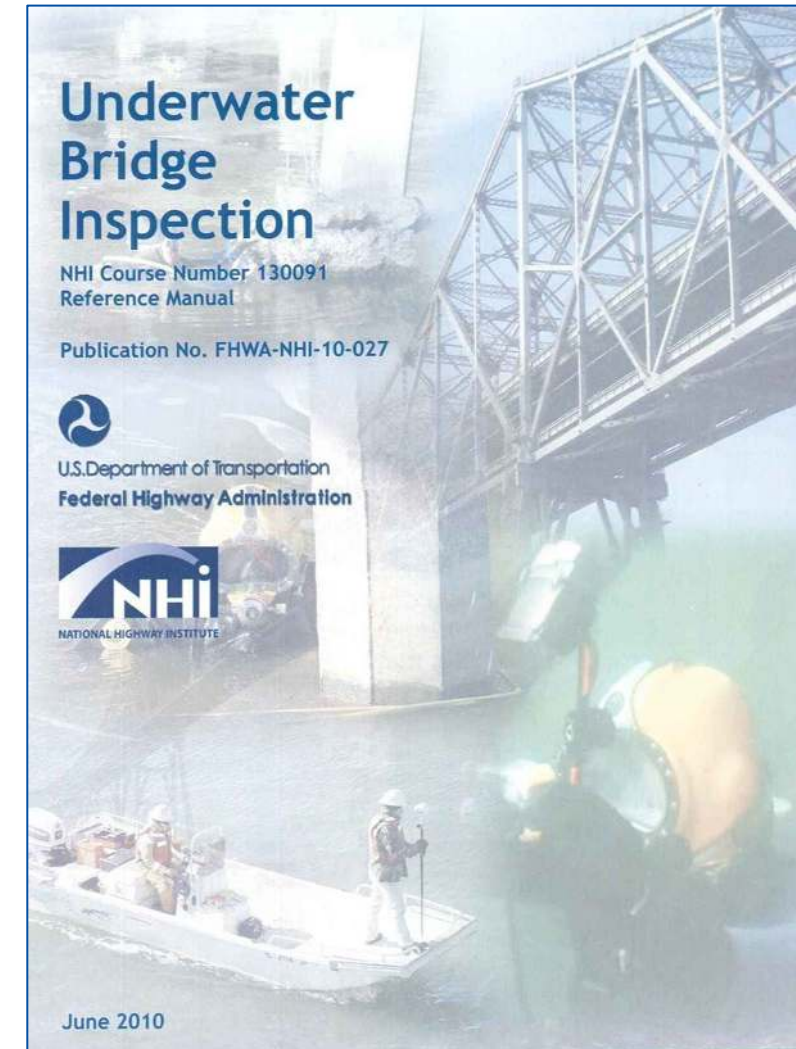
- FHWA Publication
- Followed 1988 Revisions to the NBIS, including underwater requirements
- Included discussion on defects, underwater inspection equipment and techniques, and scour investigations



- Required for all bridges continuously submerged
- Frequency not to exceed 5 years
- Later revised to require bridge inspection certification for divers

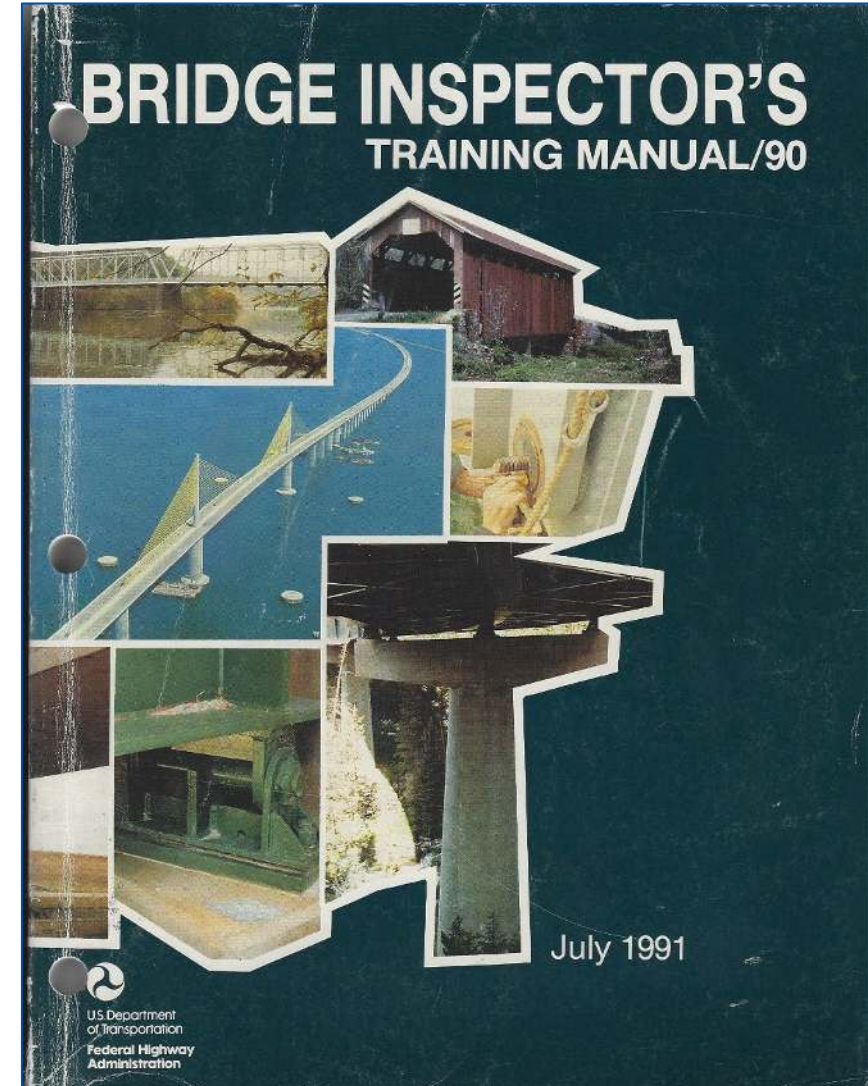


- Developed in June 2010
- 3-day Course
- Geared toward divers



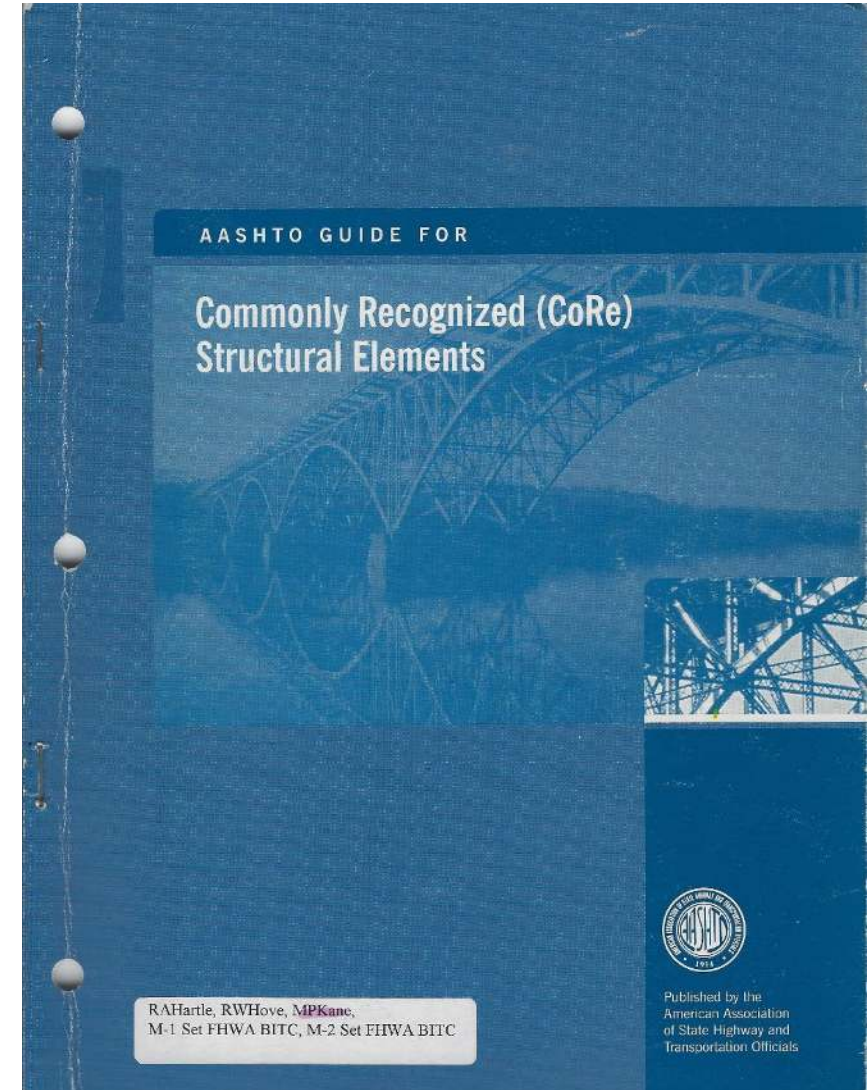
1989 - NHI TRAINING AND MANUAL 90

- Contract awarded to Michael Baker, Jr., Inc.
- First effort at nationwide training
- FHWA *Bridge Inspection Training Manual 90*
- Revision of Manual 70

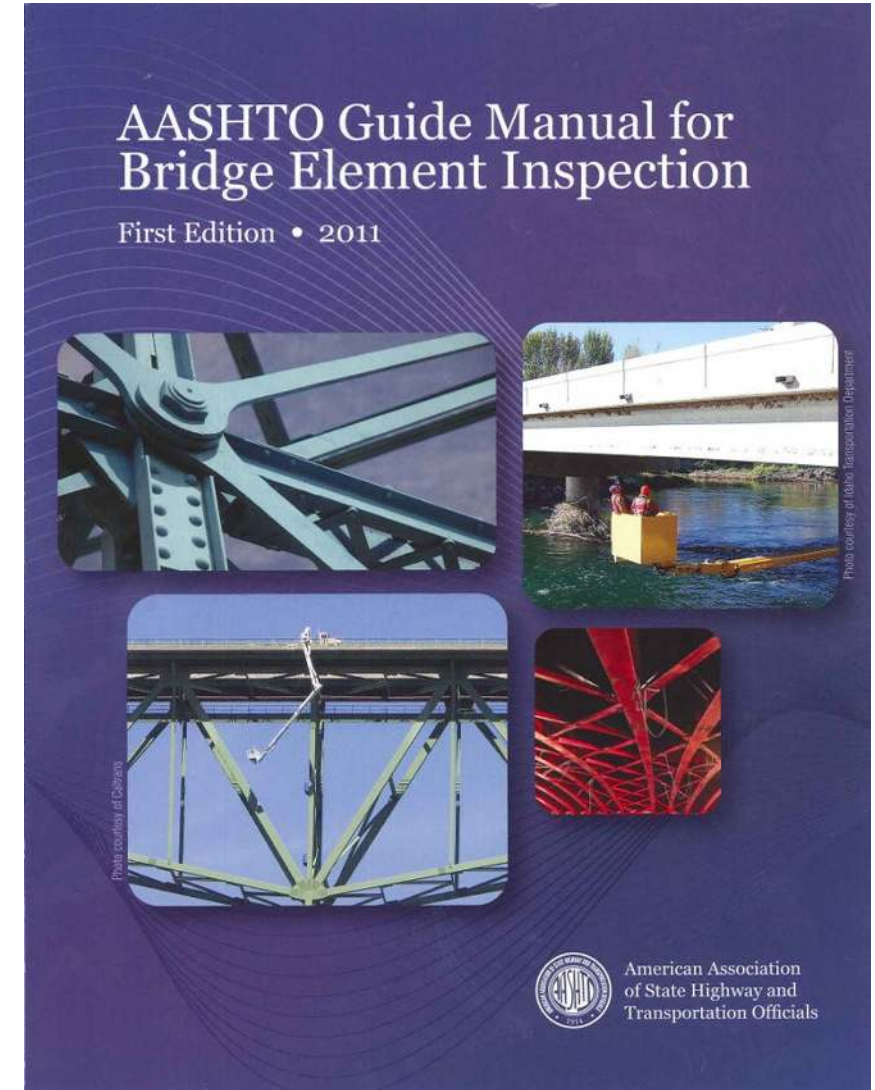


- 1991 - Intermodal Surface Transportation Efficiency Act (ISTEA)
 - Required that each state implement a comprehensive bridge management system by October 1995
- 1995 The National Highway System (NHS) Act of 1995
 - Rescinded the requirement for bridge management systems.
 - Many of the states continued to implement the Pontis BMS

AASHTO Guide for Commonly Recognized (CoRe) Structural Elements

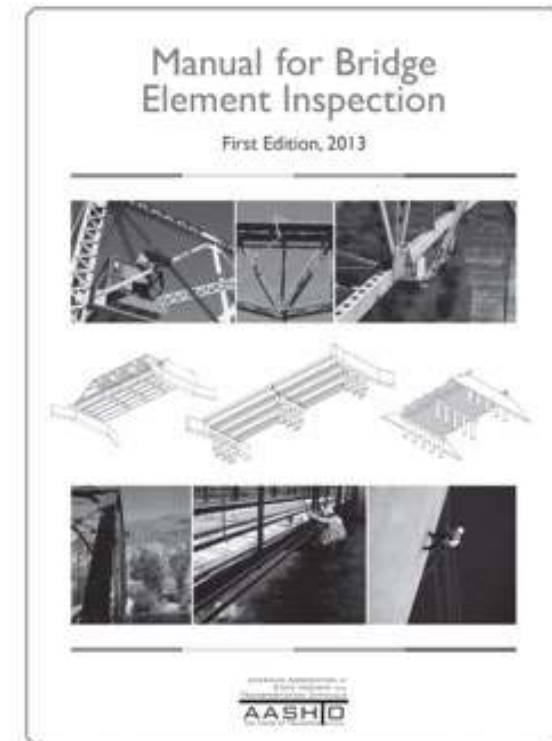


2011 AASHTO *Manual for Bridge Element Inspection*



2013 AASHTO *Manual for Bridge Element Inspection*

- Current Version



DECEMBER 27, 2005

SR 1014 LAKE VIEW DRIVE COLLAPSE

- Washington County, PA
- Over I-70
- Internal strand deterioration
- No fatalities



- Document exposed strands
- Document cracking patterns and delamination
- Describe strand corrosion
- Measure camber
- Investigate independent beam action
- Evaluate barrier and barrier connection

**Field Inspection and Forensic Investigation
of the
SR 1014 Lake View Drive Bridge
over
Interstate 70**

Final Report



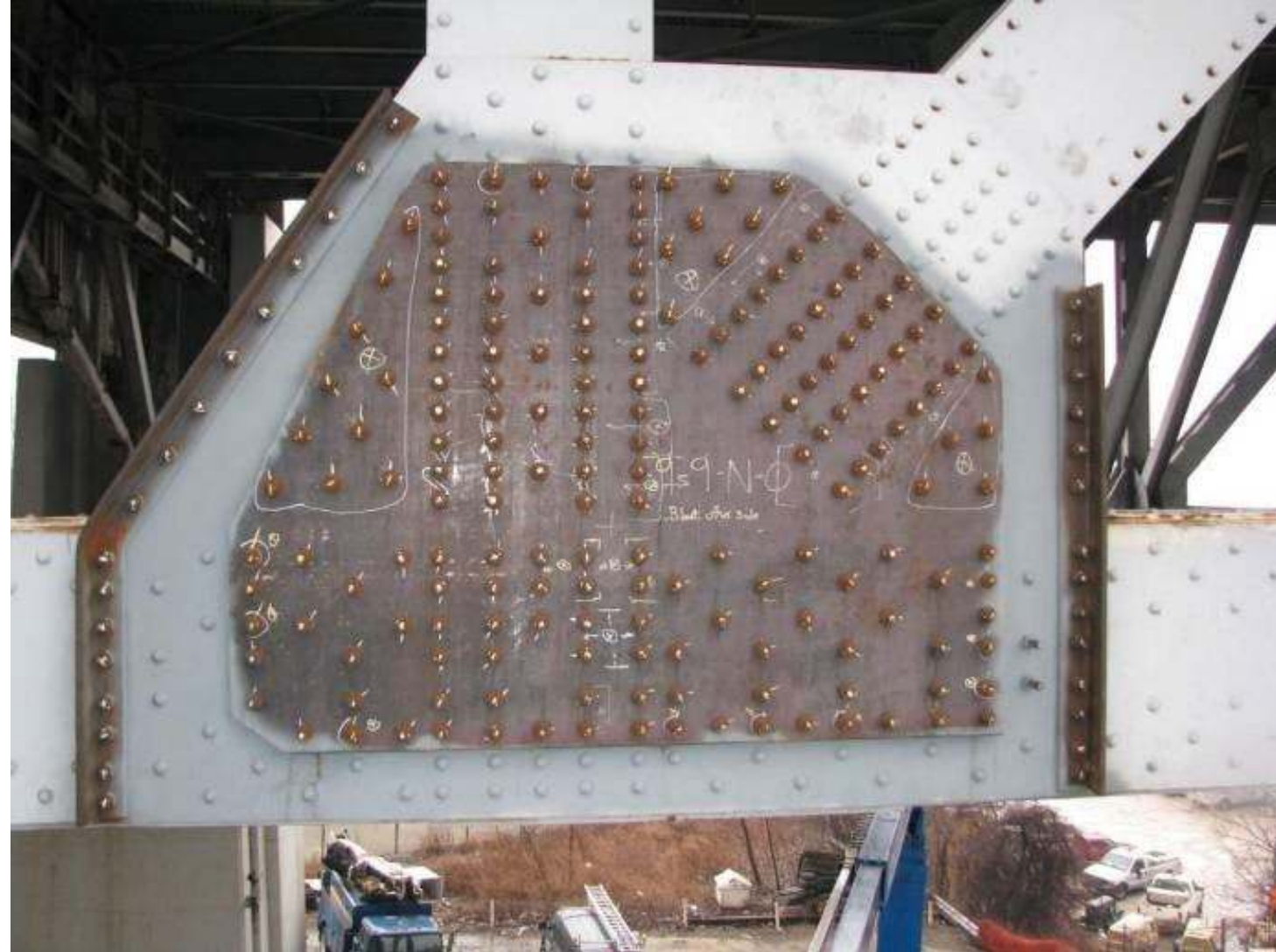
AUGUST 1, 2007

I-35W Bridge Collapse

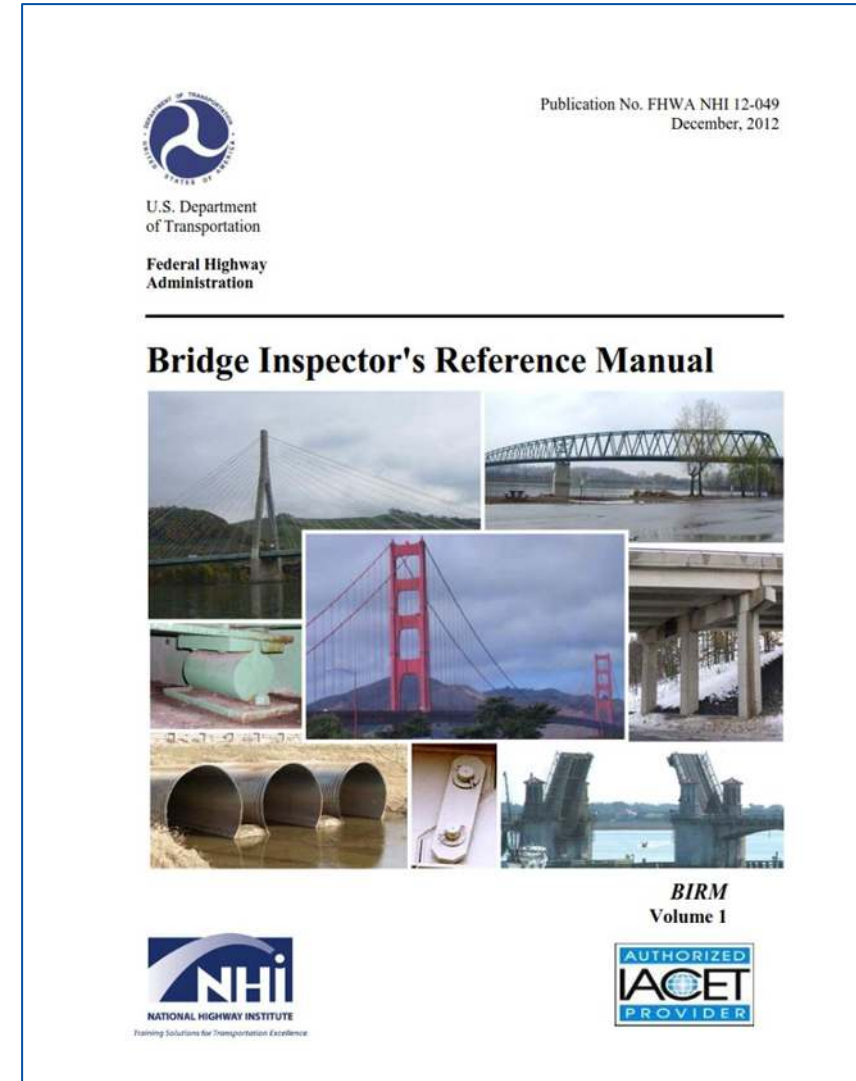
- Mississippi River
- Minneapolis, MN
- Failed Gusset Plate
- 6 fatalities



- Increased inspection emphasis
- Analysis requirements
- Some retrofits were required



- Contract awarded to Michael Baker International
- Updates to training course material
- Included revising Manual 90
- FHWA *Bridge Inspector's Reference Manual*



- 130053 - *Bridge Inspection Refresher Training (3-days)*
- 130054 – *Engineering Concepts for Bridge Inspectors (1-week)*
- 130101 – *Introduction to Safety Inspection of In-Service Bridges (Web-Based Training)*
- 130101a – *Prerequisite Assessment for Safety Inspection of In-Service Bridges (WBT)*
- 130055 – *Safety Inspection of In-Service Bridges (2-weeks)*
- 130056 – *Safety Inspection of In-Service Bridges for Professional Engineers (1-week)*

- 130078 – *Fracture Critical Inspection Techniques for Steel Bridges (3-days)*
- 130087 – *Inspection and Maintenance of Ancillary Highway Structures (3-days)*
- 130091 – *Underwater Bridge Inspection (3-days)*
- 130110 – *Tunnel Safety Inspection*
- 130125 – *Tunnel Safety Inspection Refresher*

WHAT IS NEXT?

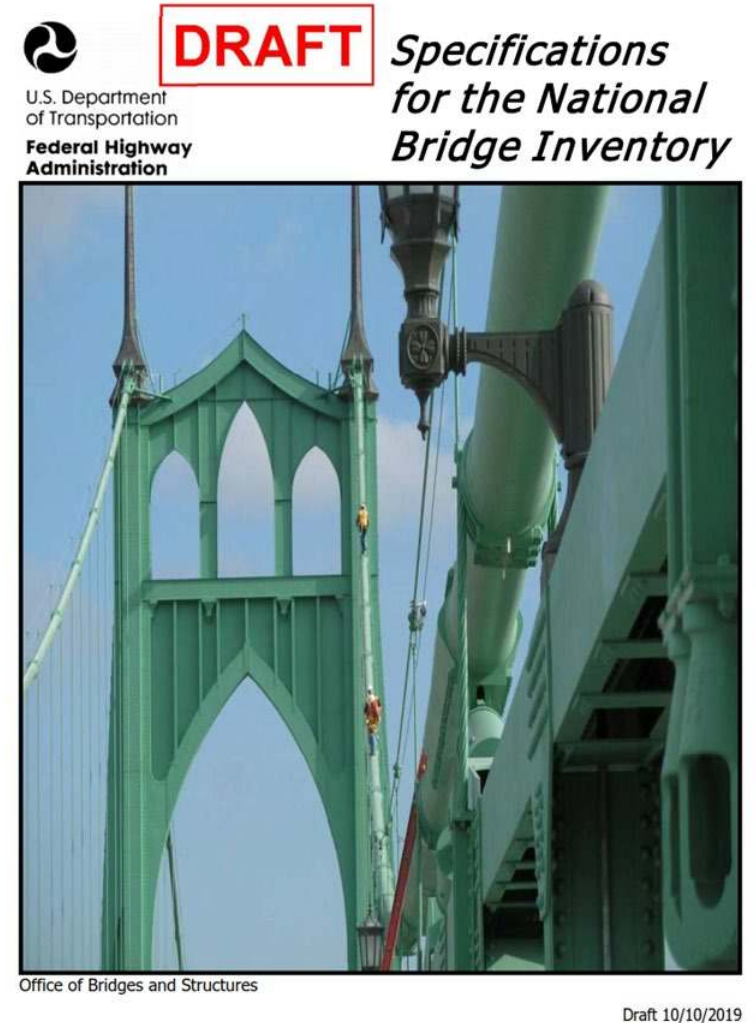


- Update National Bridge Inspection Standards
- Closing Date – March 13, 2020
- Major Overhaul of the NBI coding manual
- Incorporate technological advancements including the use of unmanned aerial systems
- Address ambiguities identified since the last update to the regulation in 2009

OCTOBER 10, 2019

SPECIFICATIONS FOR THE NATIONAL BRIDGE INVENTORY (SNBI)

- Major Overhaul of the NBI coding manual
- Comments from 3/13/2020 not yet addressed
- Implementation pending final rulemaking



THANK YOU!





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Questions?