Kansas Local Bridge Rating Program









Presentation Outline

- Past and Present Requirements Leading to KLBRP
 - KDOT Project Manager Colby Farlow, P.E.
- Program Details
 - Consultant Team Project Manager Scott Moeder, P.E.
- Load Rating Local Bridges using BrR
 - Load Rating Engineer Derek Harth, P.E., S.E.
 - Load Rating Engineer Clark Volker, P.E.





GB







HOW DID WE GET HERE???

BRIDGE COLLAPSES

INVESTIGATIONS

FINDINGS

LAWMAKERS ATTEMPTING TO ENACT LEGISLATION OR REGULATIONS TO PREVENT IT FROM HAPPENING AGAIN



SILVER BRIDGE OVER THE OHIO RIVER- OH/WV







Built 1928, Collapsed December 1967



RESULTED IN.....

NATIONAL BRIDGE INSPECTION STANDARDS (NBIS)

- National Bridge Inventory (NBI)
- Biennial Inspections
- Inspector Qualifications
- Data Reporting Requirements



I-95 OVER MIANUS RIVER BRIDGE - CT







Built 1958, Collapsed June 1983



RESULTED IN.....

FRACTURE CRITICAL INSPECTION REQUIREMENTS

- Visual "HANDS ON" /"ARMS LENGTH" Inspection Every 2 Years
- Pin and Hanger Inspections Non-Destructive Testing (NDT) Methods Improved



NYS THRUWAY OVER SCHOHARIE CREEK BRIDGE-NY



Built 1954, Collapsed April 1987



RESULTED IN.....

- IMPROVED HYDRAULIC AND SCOUR EVALUATIONS
 - Evaluating Scour at Bridges (HEC-18)
 - Stream Stability at Highway Structures (HEC-23)
 - Need for Underwater Inspections



I-35 OVER THE MISSISSIPPI RIVER - MN







Built 1967, Collapsed August 2007



RESULTED IN.....

- STATE BY STATE AUDIT BY THE FHWA
- FOR KANSAS.....
 - State System Minimal List of Items
 - Local System Bullet Point List of Required Improvements for Compliance with the NBIS
 - Plan of Action Submitted by KDOT BLP
 - Standardization of Bridge Inspection Program
 - Standard Bridge Inspection Scopes of Services
 - Manuals
 - Inspector Requirements
 - Inspection Data Entry
 - Need for Statewide Programs



KANSAS LOCAL BRIDGE EVALUATION PROGRAM (KLBEP)

- 5 (+) YEARS / \$21.4 MILLION 2010-2015
- 6 (+) CONSULTANTS INVOLVED/CONTACT WITH LOCAL OWNERS
- IDENTIFY ALL SCOUR SUSCEPTIBLE BRIDGES
 - Evaluate scour vulnerability
 - Prepare scour plan of actions where necessary
- IDENTIFY ALL FRACTURE CRITICAL BRIDGES (Aprox. 550 Bridges)
 - Perform first fracture critical inspection
 - Load rate bridges where deemed necessary



KANSAS LOCAL BRIDGE RATING PROGRAM (KLBRP):

- 10 Year Program (\$5 Million/year) 2015-2024
- 7 Consultants Involved
- Load Rate all remaining local structures (about 19,000)
- Next step to meet current regulations
- Updates local system for changes to Legal Loads
- Delivers a valid, legal load rating for every local structure



Previous Load Ratings Projects (1990s)

- Very few included Special Haul Vehicles
- No consistency from consultant to consultant
 - Assumptions
 - Load Rating Methods
 - Stamped/Sealed by P.E.
 - Reporting methods
 - Not all counties/bridge owners took advantage of the program
 - No ability to easily modify load ratings
 - Structures w/o plans some ultra-conservative; others less so



Unfunded Mandates – The SHVs



Applicable on all bridges unless explicitly excluded by State Law...Kansas Laws do not exclude SHVs.



KLBRP - STATEWIDE CONTRACT

Transystems ratings program team leader



George Butler & Associates ratings program team leader

Scott Moeder







~19,000 Off-System Bridges Statewide





Two Teams





Completed During the 1st Year





PLAN OF ATTACK

- Step 1 Data Gathering
- Step 2 Field Investigation
- Step 3 Load Rating

Data Gathering









Field Investigation





Load Rating

NBI Bridge # : LPA Bridge ID :		ridge # : dge ID :	000700969905060 County: Osage 164 Owner: County					Inspection Key : XDHQ Year Built : 1925		XDHQ 1925	ADT : 45 ADTT : 1		
Route Carried :			W 309TH ST over Unnamed Stream				Year Reconst. : N/A			F _c : 2.5 ksi			
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LRFR Version :		n :	2014(2016 Interims) AASHTO				Overlay Type : None			Substructure: 6			
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Maximum Legal Posting Limits

NBI Bridge ID: 000700969905060 LP Bridge ID: 164





R12-6

Our Project Guidelines -

American Association of **S**tate **HIGHWAY** and **T**ransportation **O**fficials

























Code Interpretation Areas



Some common gray areas:

- What to do with unusual exterior girders?
- When is something one lane vs. two lane?
- When is a flange laterally supported?
- How much overburden is too much overburden?

Close the bridge? Or not?





Interior Girder: 2 lane distribution factor for timber deck: S/3.75 = 0.53 wheels Exterior Girder: LLDF = 1.0? Timber Deck with a cantilever? ADT = 10 vpd





Close the bridge? Or not?





Interior Girder: 1 lane distribution factor for timber deck: S/4.0 = 0.50 wheels Exterior Girder: LLDF = 1.0?



One lane or two?





Roadway width = 18'-0"

ADT = 20

S/5.5 or S/7?



When is a flange laterally braced?





Yes – braced.



No – not braced.





Maybe?























The bridge is....where?





The bridge is here.



Soil Weight = 21' x 28' x 4.0' x 120 pcf = 282,240 lbs !

Is this even a bridge anymore?





- Skewed 6o degrees +/-
- 5' max fill
- LL distribution factors?
- Impact?



Other unusual structures...

ATSTANASTO



SIL

11



Girders provided by ATSF Railroad – used railcar superstructure

> L 53-BLT 9-25

Other unusual structures...



- One lane bridge due to timber runners/signed as one lane
- Used a distribution factor of 1 wheel per railcar
- Modeled as a series of built up sections





Bourbon County Steel Girder Stringer Floorbeam Bridge 1 - 29' Simple Span Year Built Unknown No plans ADT of 75



















Bourbon County Steel Girder Bridge with Ext. Channels 2 - 21' Simple Spans Built in 1935 No plans ADT of 30



















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Bourbon County
Steel Girder Stringer Floorbeam
Bridge
2 - 25' Continuous Spans
Built in 1966
No plans
ADT of 25
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Osage County Continuous Steel Girder Bridge 4 Spans, 66' – 2 @ 80' – 68' Built in 1940 No plans ADT of 90

Bourbon County Steel Girder Bridge 1 - 22' Simple Span Built in 1954 No plans ADT of 25

