Innovations at the County Level

May 12,2016 Brian P. Keierleber P.E.

Buchanan County Iowa

259 Bridges over 20’

25+ Railcar Bridges

2+ UHPC Bridges

5+ GRS Abutment Bridges

1 Press Brake Tub Girder Bridges

1- Maher Tadros Design

- -Bio Oil/Otta Seals

Many of our bridges are old

What we are faced with

Our System Cannot meet Today's Demands

12000 2TAHD Trailboss LowPro

10/09/10 & 10/14/10 & 10/10/18/10

Overloads Have A Cumulative Effect

We Have NOT kept up with Modern Agriculture

Postings Do Not Work unless I am there.

The sign says 3 ton Gross

WE KNOW WHAT THE RESULTS WILL BE!

The world and our economy relies on Food

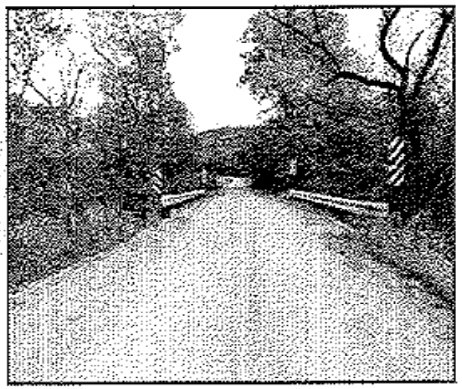
Pinned Trusses predated the Model T

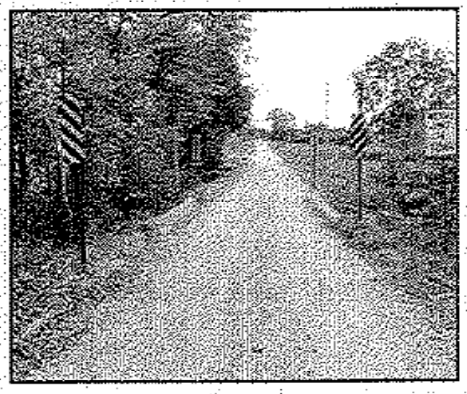
They always made it before

Weight kills

The Bridge does NOT Discriminate

Low Water Crossings are NOT Compatible with Modern Equipment





Kansas
Department of Transportation

ECONOMIC IMPACT OF CLOSING LOW-VOLUME RURAL BRIDGES

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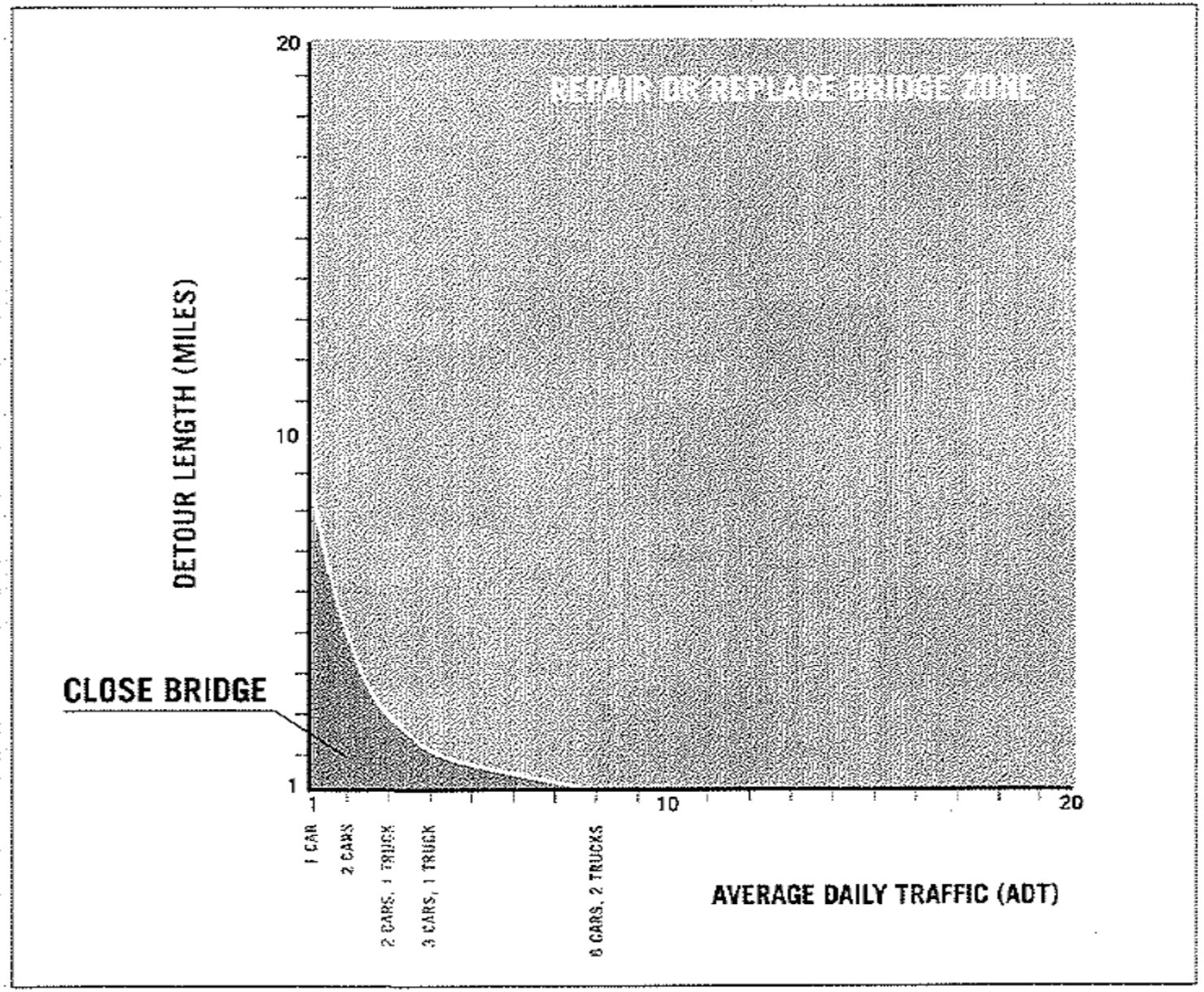


FIGURE 3. DETERMINING BRIDGE CLOSURE / REPAIR / REPLACE BASED ON ADT AND DETOUR LENGTH

New Construction Costs

- Receives about $382,000/Yr. for BRS/BROS
- 30x100 slab x $150/sf. or $450,000.

IMMEDIATE RELEASE January 14, 2014

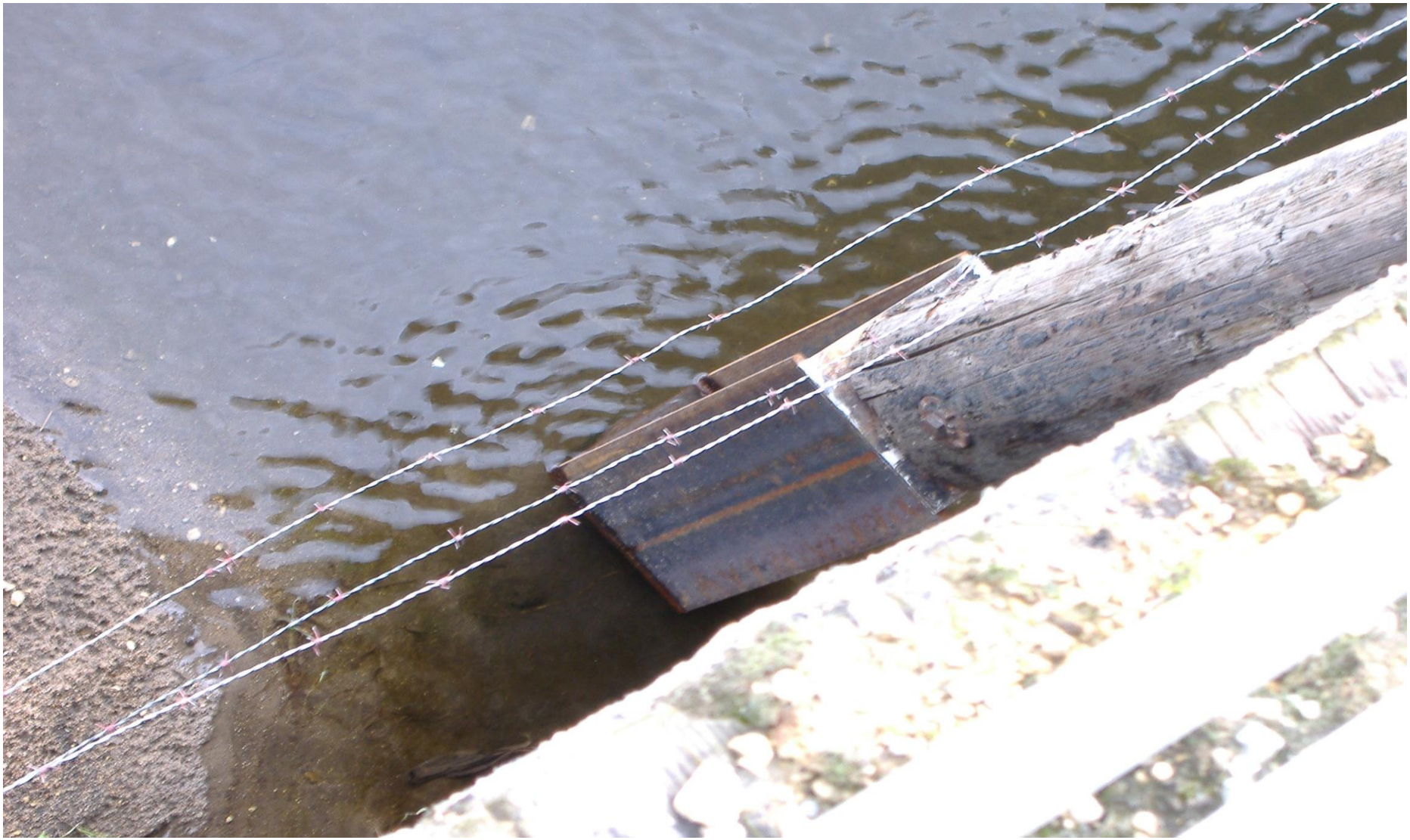
Home » News » Press Release

Kansas Company Pays $372,750 For Destruction Of Protected Bird Eggs And Nests During Bridge Repair Project In Harper County Employee Pleads Guilty to Misdemeanor

Oklahoma City, Oklahoma – Wildcat Concrete Services, Inc. ("Wildcat"), a Kansas corporation, has paid $372,750 to the North American Wetlands Conservation Fund as part of a non-prosecution agreement with the United States arising from the destruction of cliff swallow nests during a bridge repair project, announced Sanford C. Coats, United States Attorney for the Western District of Oklahoma. In addition, Richard Lee Pool, 54, of Osage City, Kansas, an employee of Wildcat, pled guilty yesterday to one misdemeanor count of violating the Migratory Bird Treaty Act.

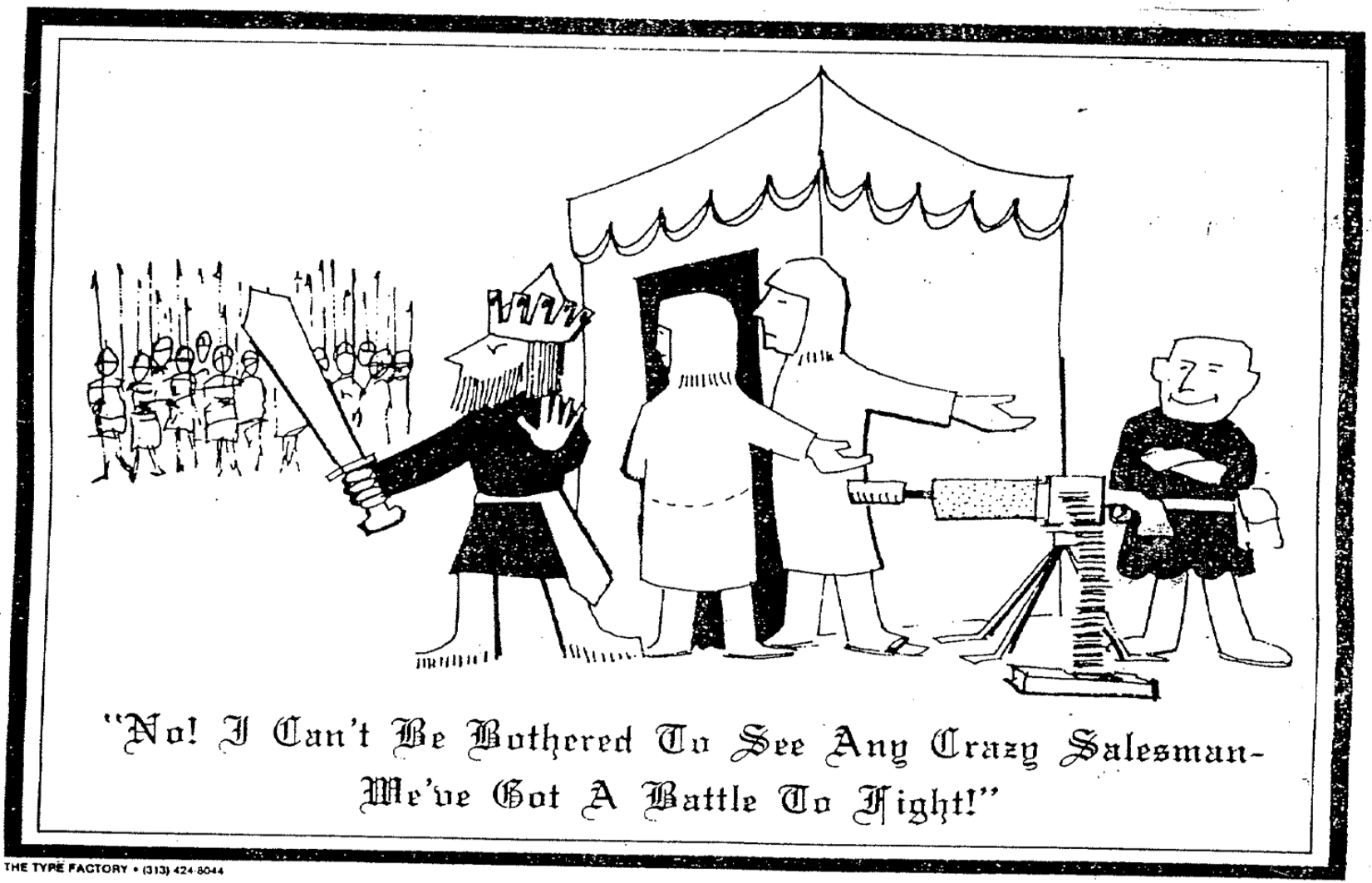
Simplified Deck Overlaying

Repairs are Band-Aids



RECYCLING CAN BE AN OPTION

OVERCOME EXISTING PREJUDICES



What I Envisioned

What My Employees Envisioned

The Final Result

Timber can be economical

In Europe they build many Timber Bridges

photos courtesy of softwoodlumberboard

South Abutment colored concrete and textured forms

GRUEN WALD Glue Laminated Bridge

Planned for a pedestrian Bridge

Future Generations will Benefit

Galvanize them and reconstruct

The beams will last longer than the deck and we can place a pier for loads

New Technologies such as e-span 140 will impact how we do business

Economical designs for spans from 40-140 ft. in length

Placing the stay in place metal decking

Decking 11 days planned 17 days

Pouring Deck

New Barrier Rail design was used

MGS Crash Test Level 3

Tested at U of Nebraska

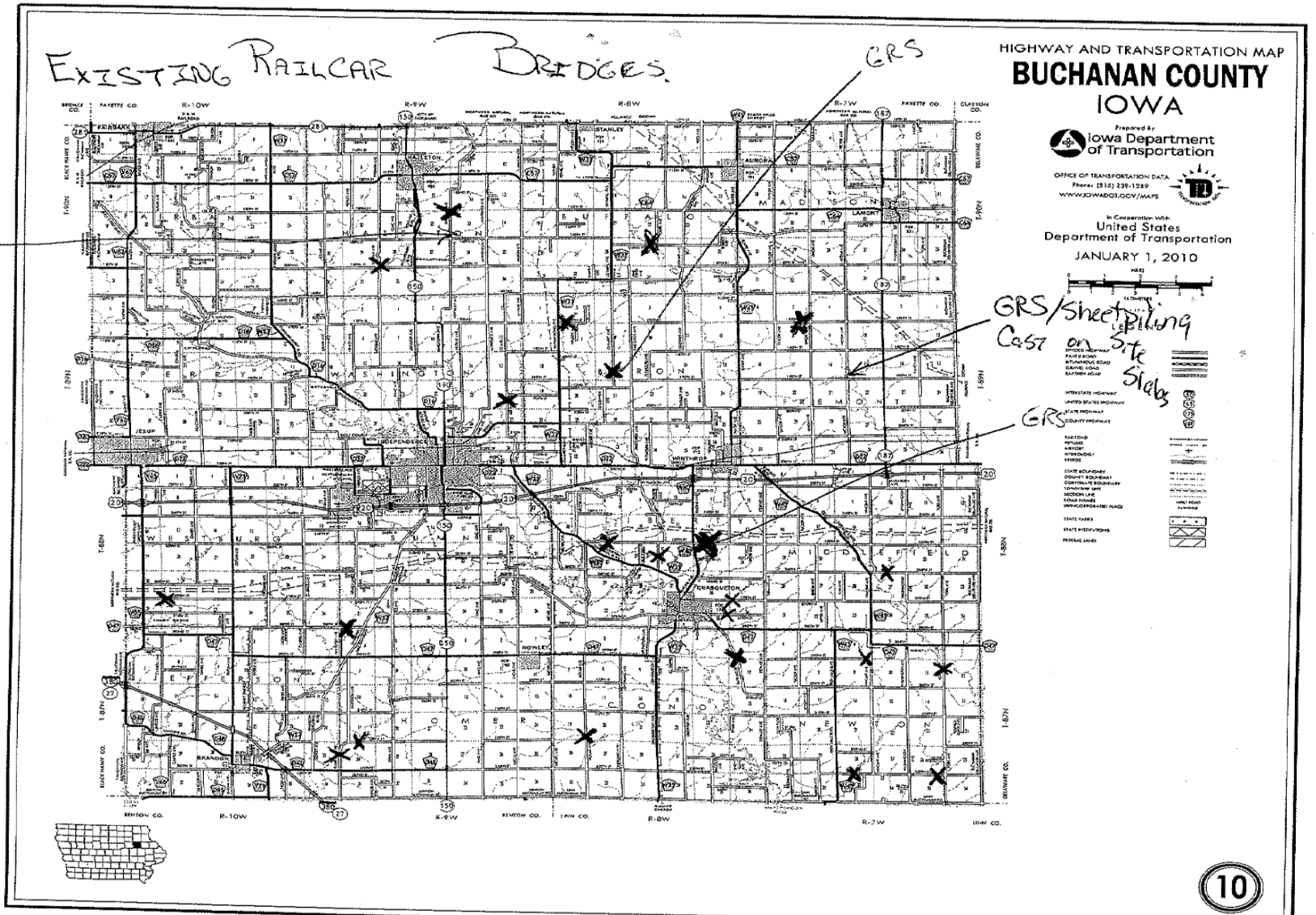
Ribbon Cutting November 1,

Incorporates many of the SHRP2 R-19 extended life concepts

We have constructed 3 with open grated decks

Be Open To New Concepts

We have constructed 25 Bridges from Railroad Flatcars



What Do They Look Like?

What They Look Like To Us

Types of Cars

- Pulp Cars
- Military
- 89’ Flatcars, Cost $19,000 (?) Delivered
- 89’ Flatcar cut to 68’, Cost $16,667 Delivered
- Total Costs range between $65,000 and $85,000

Pulp Cars

Military

89 Ft. Flatcar

68 Ft Railcar

Load Capacity

Figure 2. BCB5 RRFC Bridge Test (May 11, 2006)

- All our Bridges Carry LEGAL LOADS

Existing PCC

Stub Abutment With Sheet Piling

Sheet Piling Placed With a Vibratory Plate

GRS Abutments

Concrete Beam and Bolts

Bolted Directly

2 or 3 Cars Wide

Rock

DELIVERING THE CARS

Placement

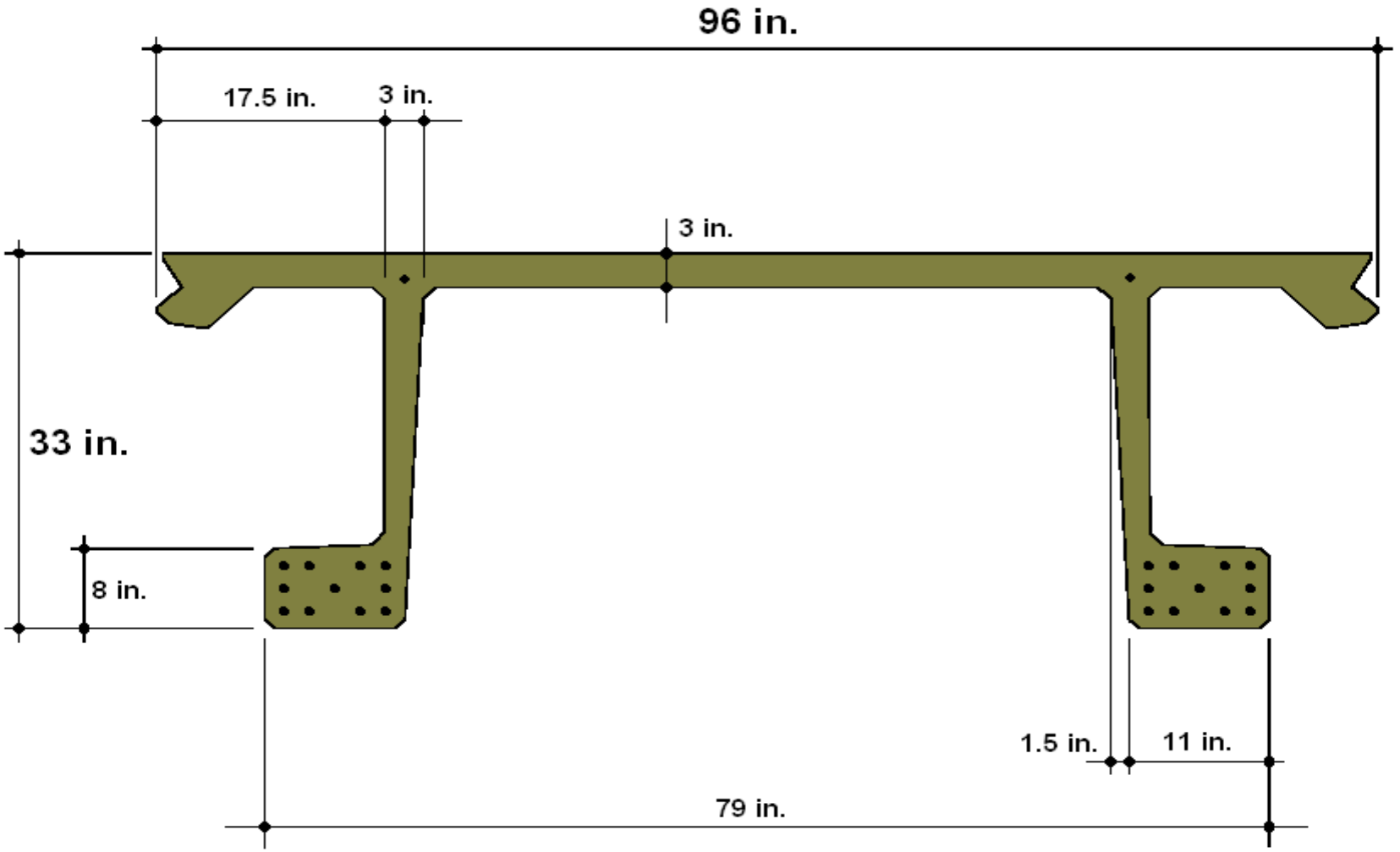
Equipment Requirements depend on the site

INFORMATION-QUESTIONS

http://www.operationsresearch.dot.state.ia.us/reports/ihrb_by_number/tr400plus.html

ULTRA HIGH PERFORMANCE CONCRETE

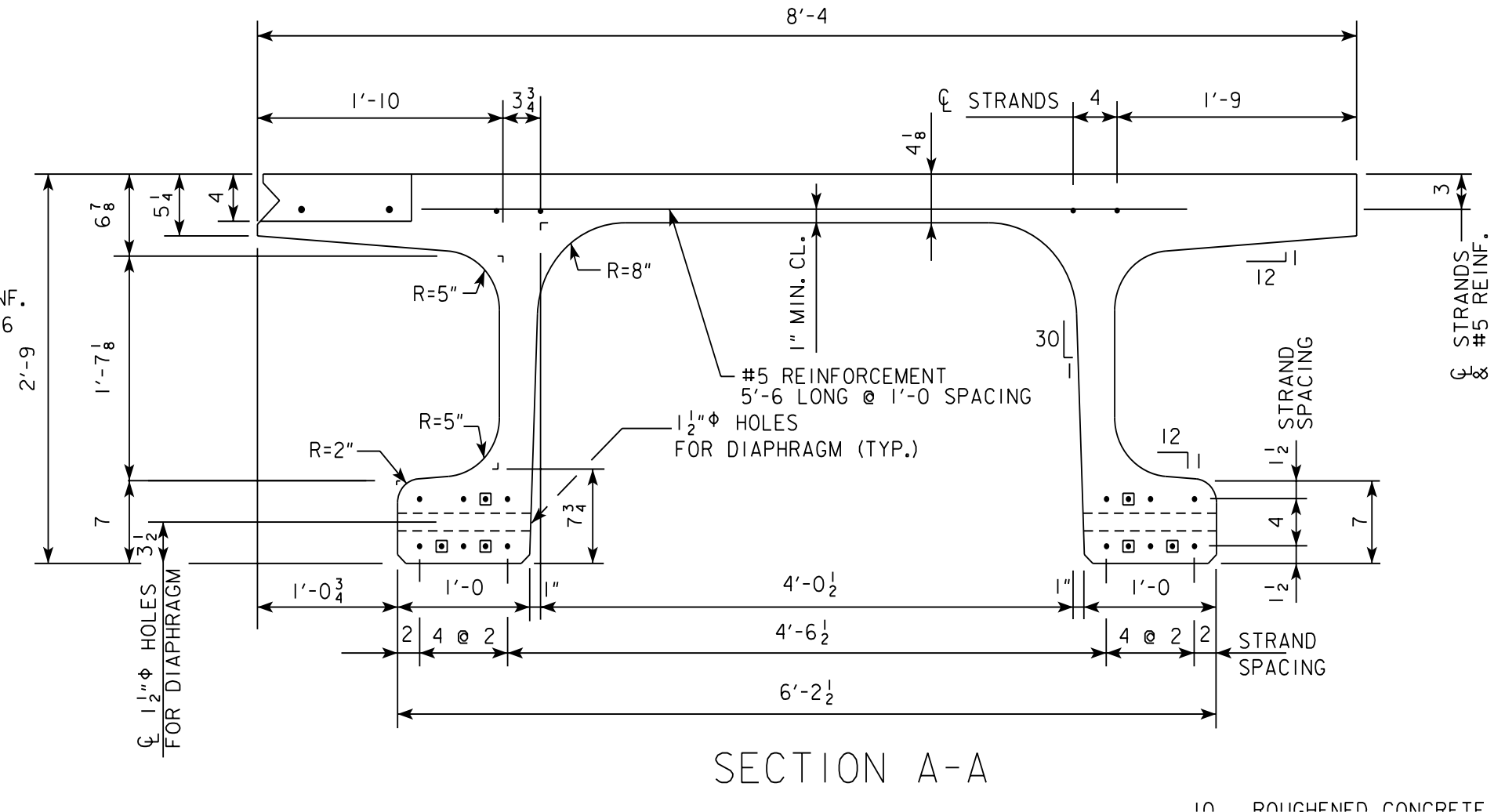
Preliminary PI Girder X-sec



UHPC Material (Negative)

- Material Expensive
- Labor and equipment intensive
  - Mixing ~ ½ hr.
  - Initial Set ~ 40 hrs.
  - Curing ~ 48 hrs. at 195 deg
- Shrinkage high
- Concern fiber distribution
- Performance of cracked section
- Deck texture is an issue

Final Section New detail



SECTION A-A

10 ROUGHENED CONCRETE

UHPC Material (Positive)

- Self Consolidating
- High compressive strength (30 ksi)
- Dense low permeability
- Low creep post-cured
- High durability
- Fibers post-cracking strength

Testing By ISU

County Constructed Forms

Placing the K-UHPC into trucks

K UHPC Bridge built with County Crews

Concrete that does NOT deteriorate from SALT in my lifetime

Preparing for Deck Overlay

Strengthen and Preserve

One UHPC Lane complete

Construction Site

- # UHPC for Local Bridge Applications
- **May 12, 2016**
  8:30 a.m. to 4:30 p.m.
- **Brandon Iowa Community Center (Map)**
  802 Main Street
  Brandon, IA 52210
- **Presentation Topics**
- Introduction to Ultra High Performance Concrete (UHPC)
- Mixing of UHPC
- Past UHPC Bridge Projects
- UHPC Joints and ABC
- UHPC as an Overlay Material
- Mud Creek Bridge
- Overlay Design
- Construction of Overlay
- Contractor's Experience
- **Events**

Geosynthetically Confined Soil Abutments (FABRIC)

COMPLETE ONE SIDE

BUILD WINGS

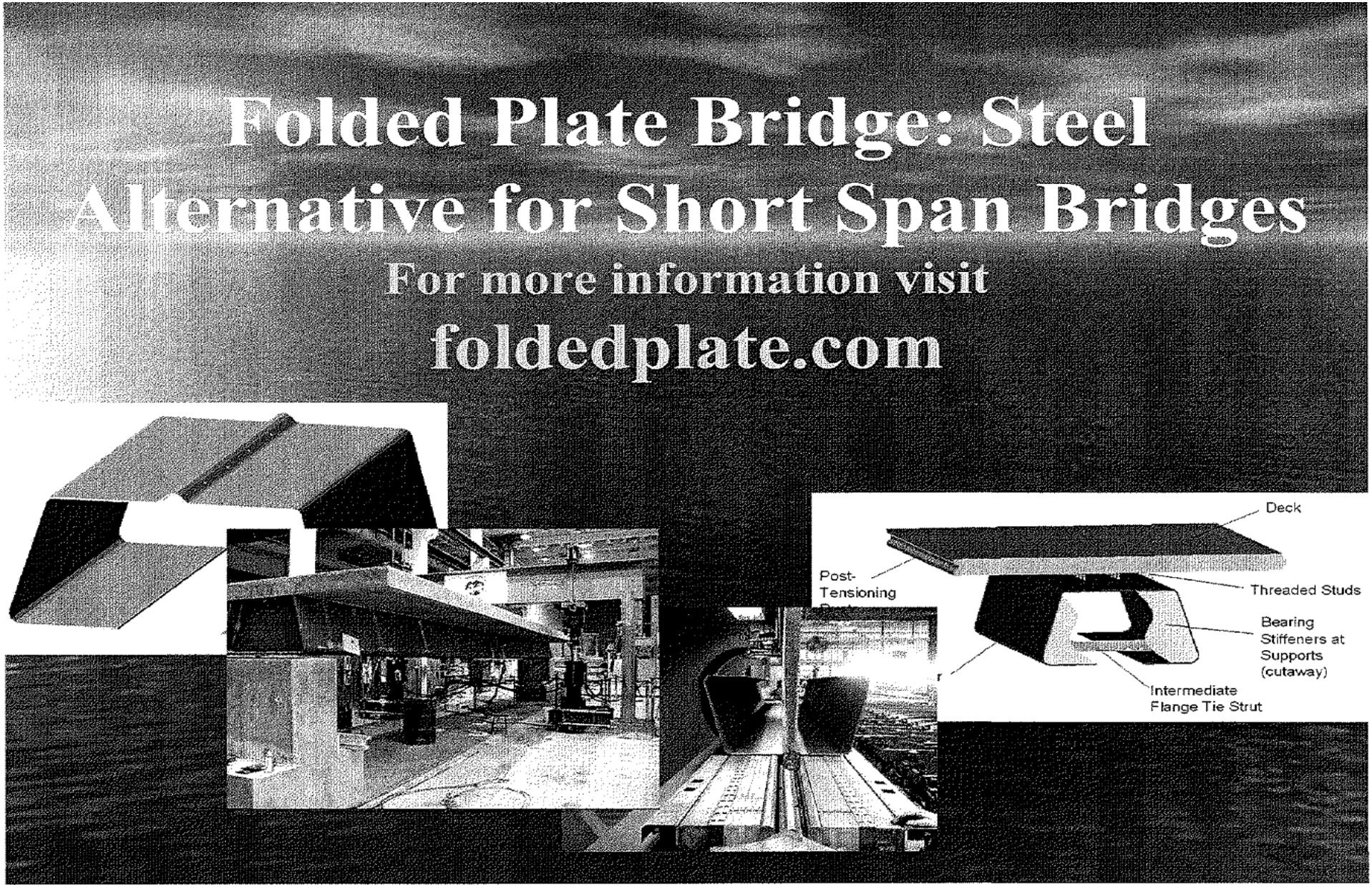
SET SUPERSTRUCTURE

COMPLETE SUPERSTRUCTURE

COMPLETE BRIDGE

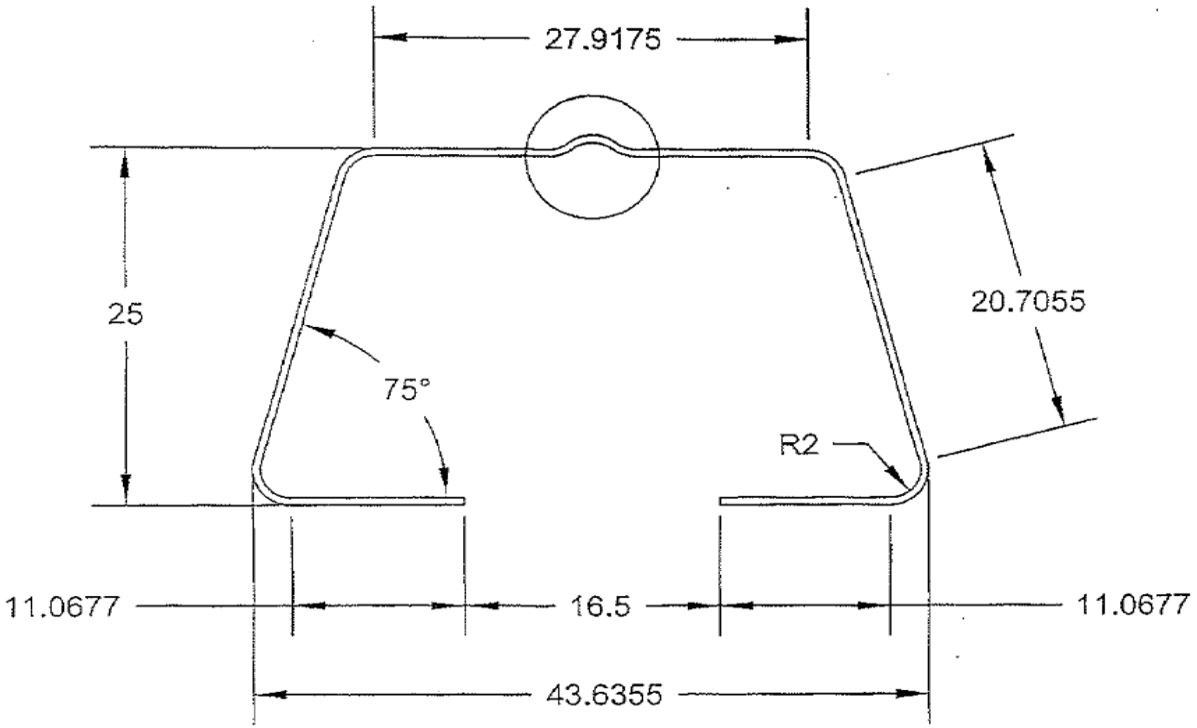
COMPLETED ABUTMENTS

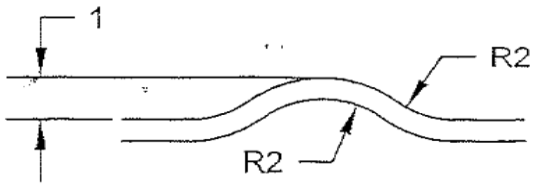
Folded Plate Steel Bridge Concepts



Atorod Azizinamini Process

Folded Plate Specime
Half Inch Plate





Detail A

Bending Dimensions

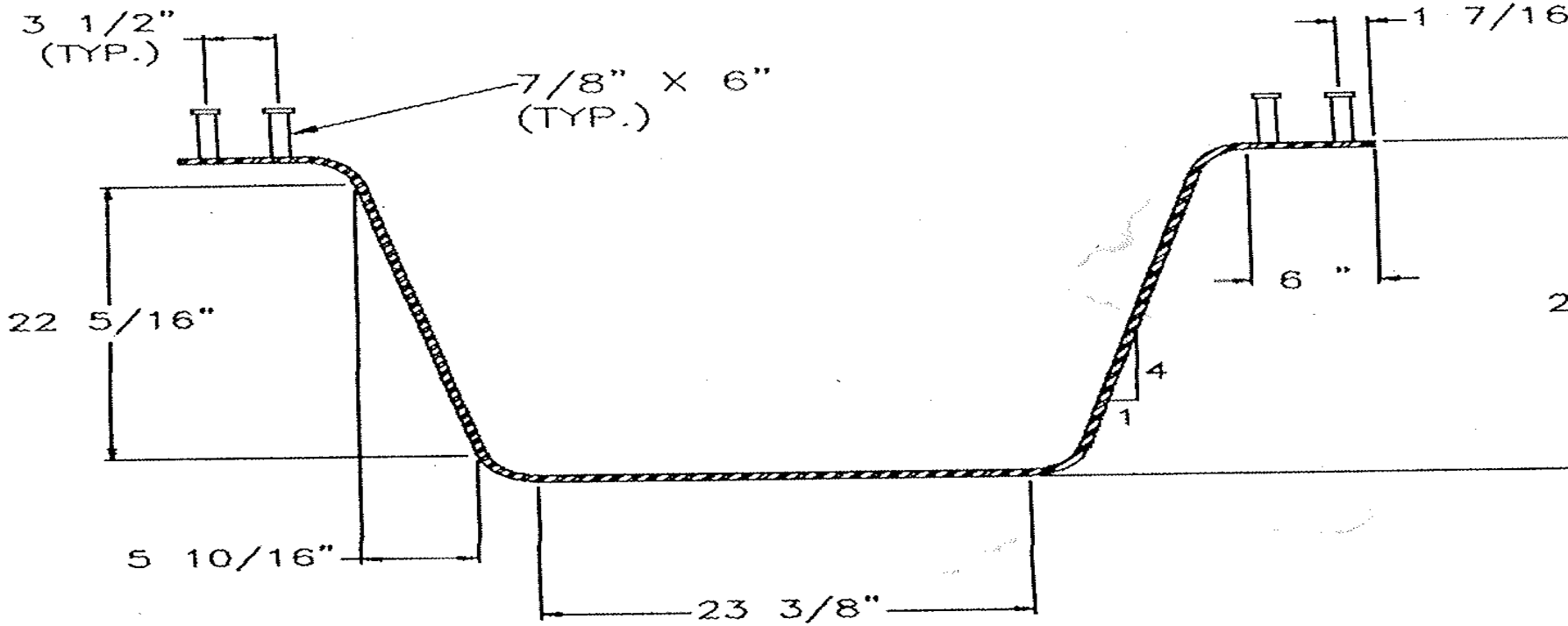
Total Plate Width = 105.6012

Dr.Karl Barth From

WestVirginiaUniversity

and Dr.Michael Barker From

The University of Wyoming



PRESS BRAKE TUB GIRDER

Press Brake Tub Girder bridge

Internal Curing Concrete

½ with IC and ½ without IC

Internal Curing

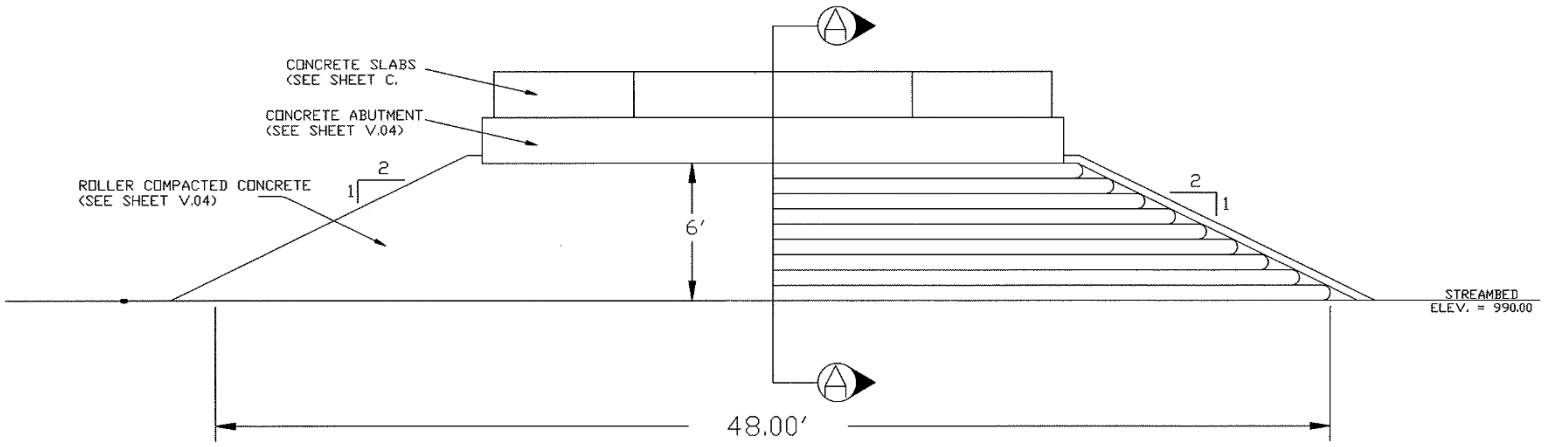
- **Reported Benefits**
  - Less shrinkage, cracking, curling
  - Better hydration & SCM reaction
    - Improved durability
    - Less cement
  - Extended service life
    - Improved economics
    - Increased sustainability

IBRD
Slabs Cast on Site and Launched with Internal Curing on GRS Abutments SUMMER of 2012

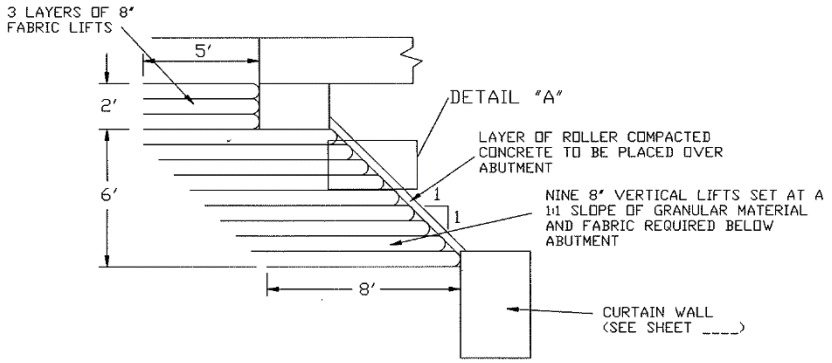
Gerstenbergers Bridge

Not all things work SAFETY rules

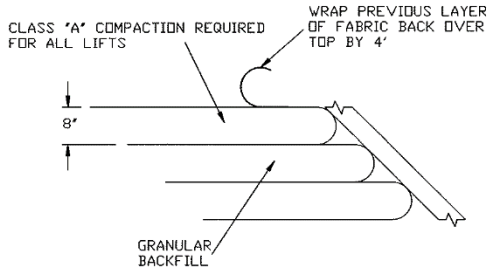
Constantly Improve The Methods



ELEVATION VIEW



SECTION A-A



DETAIL "A"

NOTES:
ALL COMPACTION SHALL MEET THE REQUIREMENTS OF CLASS "A" COMPACTION AS STATED IN THE 2009 STANDARD SPECIFICATIONS.

ROLLER COMPACTED CONCRETE IS TO BE PLACED OVER TOP OF FACES OF THE ABUTMENT AS WELL AS 10 FT BACK ON EITHER SIDE FROM THE ABUTMENT FACE.

GRANULAR BACKFILL TO CONSIST OF CLASS"A" CRUSHED STONE

52' 00" x 24' 00" C.O.S.S. Bridge
Located on Kentuckyr Ave. over Unnamed Creek
48' 00" SPAN

FOUNDATION DETAIL

STATION; 101+64.88 SKEW: 0° ahead
BUCHANAN COUNTY, IOWA FHWA # 82520

AD	BUCHANAN COUNTY	PROJECT NO.	U.01

Compacted Concrete on GRS

Angles can be decieving

2:1 sideslopes

Completed Abutment face on a 1:1

Completed Bridge

New ways to do things

GRS S a new approach

Slattery Bridge Cast on Site /GRS Abutments /Internal Curing Concrete

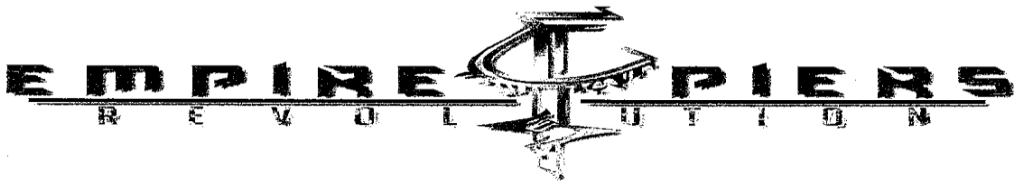
A new way to place

I still want to pull one.

Smooth Deck

Completed Structure

We need simple substructure designs



HELICAL PIER/ ANCHOR FOUNDATION SYSTEM

Technical Manual

211 Steel Street

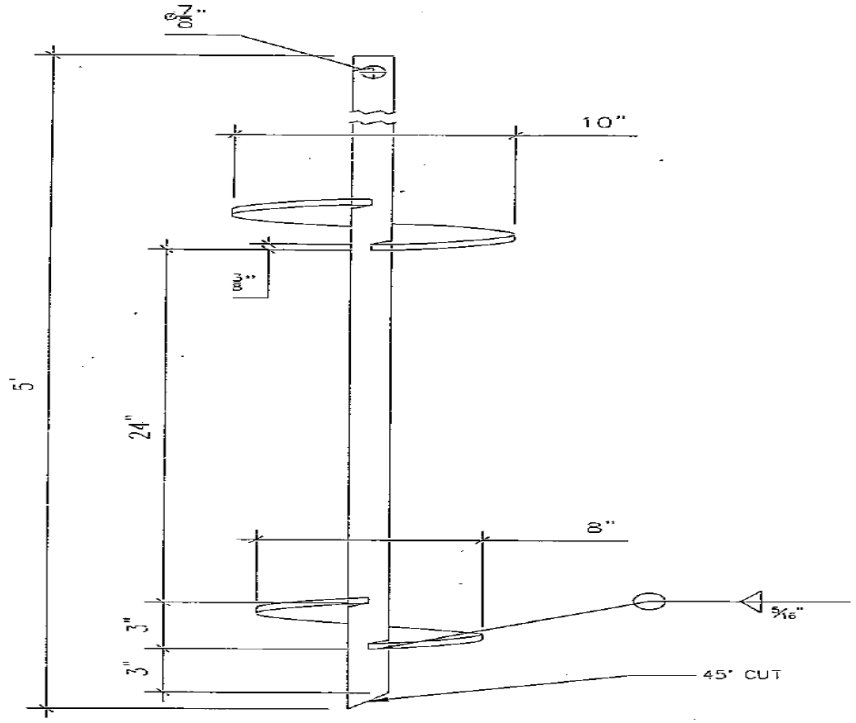
Cottleville, MO 63376

636-922-4747

www.empirepiers.com

Design Loads Range from 12.5 to 50 tons each

1½"x5'x8"x10" HELIX
PART # E1560810LG



NOTES:
- SHAFT MATERIAL – ROUND CORNERED SQUARE(RCS) STEEL BAR PER ASTM A29 GRADE 1045 WITH MILL CERT. AT 70 KSI
- FINISH HOT DIPPED GALV. PER ASTM A 123/153
- ALL WELDING TO PERFORM BY QUALIFIED WELDER TO AWS D1.1
- TORQUE STRENGTH RATING OF 5,500 FT-LBS
- ULTIMATE CAPACITY OF UNIT IS 55 KIPS (KT) =10
- ULTIMATE TENSION STRENGTH– 60 KIPS
- STEEL HELIX MATERIAL TO CONFORM TO A572 KSI 50 HELIX GEOMETRY IN ACORDANCE WITH ICC-ES AC358
- COUPLING BOLTS: ¾" DIAMETER x 3" LONG HEX HEAD PER ASTM A325
- ALL MATERIAL IS MANUFACTURED IN US.

EMPIRE PIERS
REVOLUTIONIZED

EMPIRE PIERS LLC.
211 STEEL ST.
COTTEVILLE, MO 63376

	NAME	DATE
DRAWN		
CHECKED		
ENG. APPR.		
MFG. APPR.		
PROJECT:		

MATERIAL		SIZE	DWG. NO.	REV.
FINISH		A4	E1560810LG	

Buried Soil Structures on Existing Piling

We Constructed 31 miles of Wider Shoulders and Flatter Slopes in 20 years

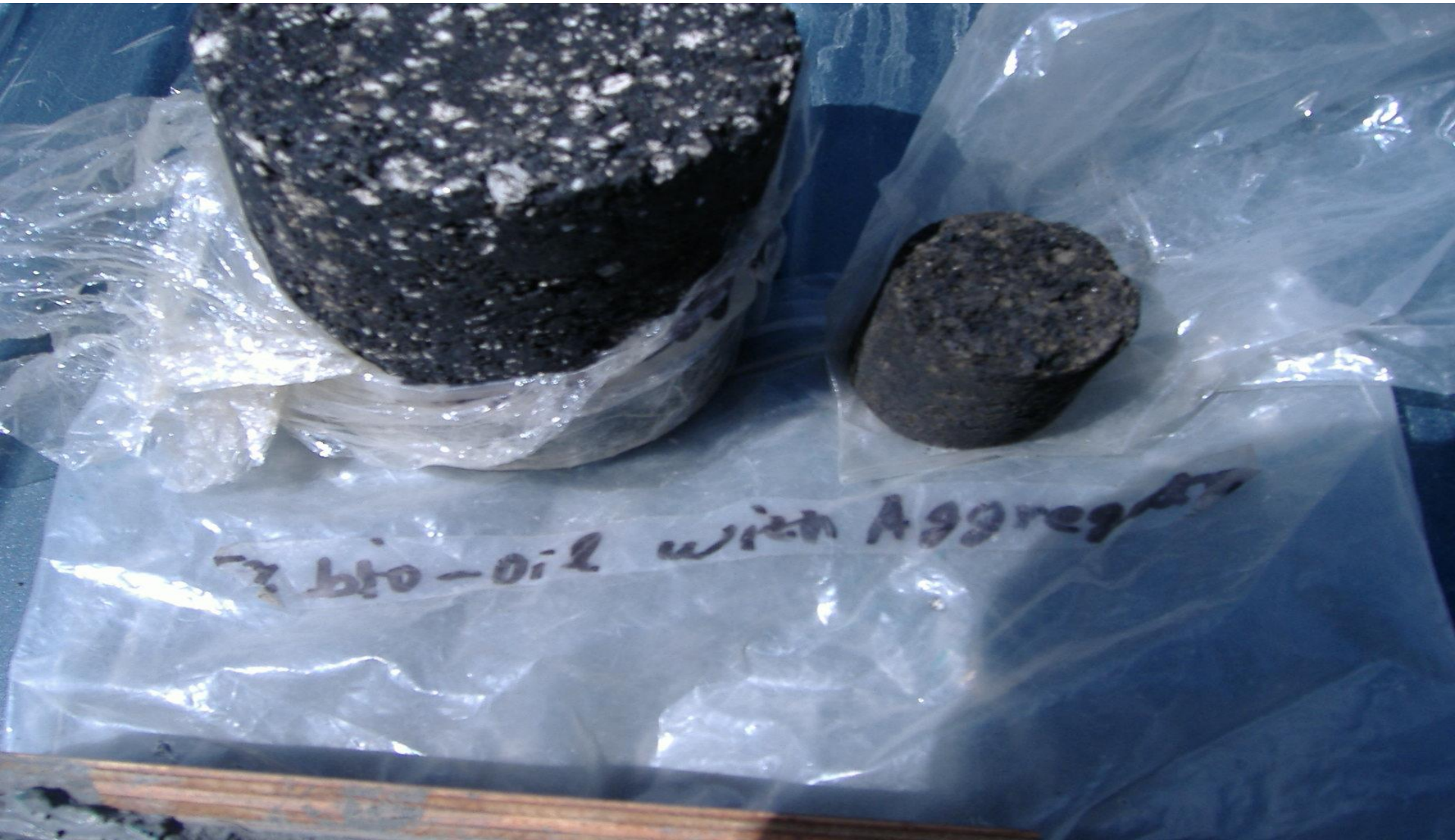
Paved shoulders with safety edge

Center Rumbles Split

Flashing Lights on Stop Signs

Completed Roundabout

Pavements from BIO-OILS



ROAD BASE STABILIZATION FROM USED SHINGLES

Economical Salt Storage

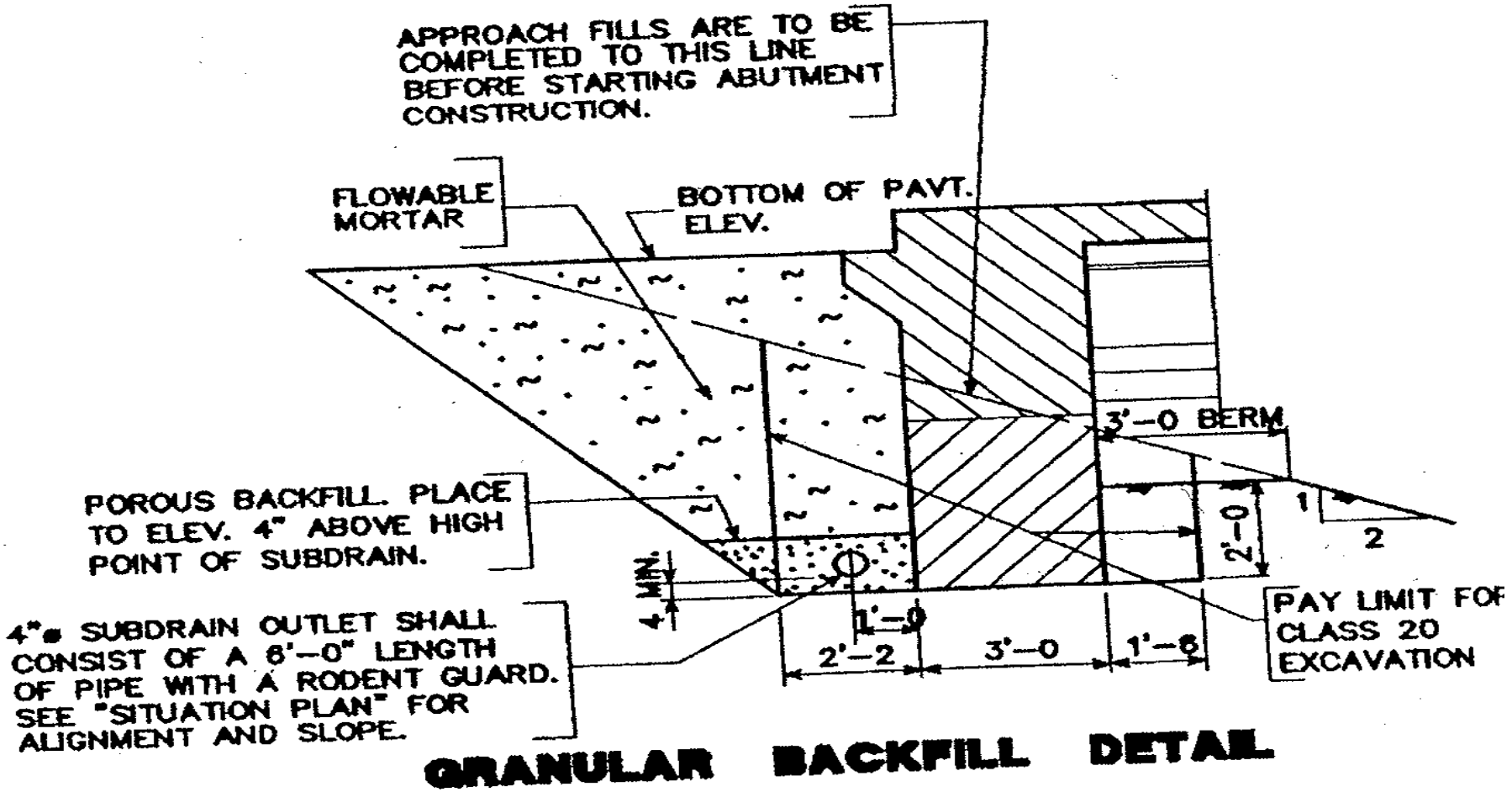
Buchanan County offers old bridges for sale

Some Solutions Are More Complicated

Be Creative

Evaluate Technologies

Eliminate The BUMP at the end of the Bridge



Not All Challenges are Bridges

Persistence Will Prevail and Preserve Others Dreams

Any Questions????