

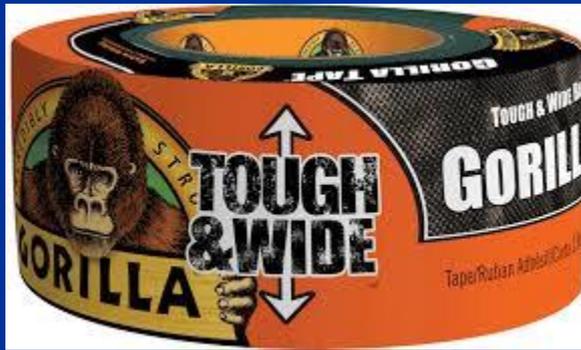
# Montgomery County's Emergency Bridge Repairs

Stephanie Goff, P.E., P.S., Senior Engineer

Ben Moore, Bridge Superintendent



# Duct Tape, Gorilla Glue and Flex Seal can fix all, Right?



# Overview

- Emergency repairs/modifications we have made with our crews to slab and box beam bridges to keep them open to traffic until they can be replaced
- Some repairs made with our crews to repair damaged bridges/culverts to extend their life
- Non-traditional methods used for construction with our crew

# McEwen Bridge



- 4 Span continuous reinforced concrete slab with cap pile substructure
- Spans: 38'-47'6"-47'6"-38'
- Roadway 44' f/f guardrail
- Built 1983
- Bridge to be rehabbed in 2018

# McEwen Bridge

## Bridge Overall Condition



# McEwen Bridge

Bridge Condition 2011



# McEwen Bridge

Jacks Added in 2012



# McEwen Bridge

Jacks Added in 2012



# Lyons Bridge



- 4 Span continuous reinforced concrete slab with cap pile substructure
- Spans: 32'-40'-40'-32'
- Roadway 68' f/f guardrail
- Built 1984
- Bridge to be rehabbed in 2022

# Lyons Bridge

Condition 2013 Inspection



# Lyons Bridge

Condition 2014 Inspection



# Lyons Bridge

Condition 2014 Inspection



# Lyons Bridge

Condition 2015 Inspection



# Lyons Bridge

Condition 2015 Inspection



# Lyons Bridge

## Condition 2015 Inspection



# Lyons Bridge

## Condition 2015 Inspection



# Lyons Bridge

Jacks Installed in 2016



# Lyons Bridge

Jacks Installed in 2016



# Alex Bell Bridge



- 3 Span prestressed concrete adjacent box beams on reinforced concrete piers and abutments on piles
- Spans: 39'2"-40'5"-39'2"
- Roadway 36' f/f guardrail
- Built 1982
- Bridge to be rehabbed in 2017

# Alex Bell Bridge

Condition in 2016



# Alex Bell Bridge

Condition in 2016



# Alex Bell Bridge

Condition in 2016



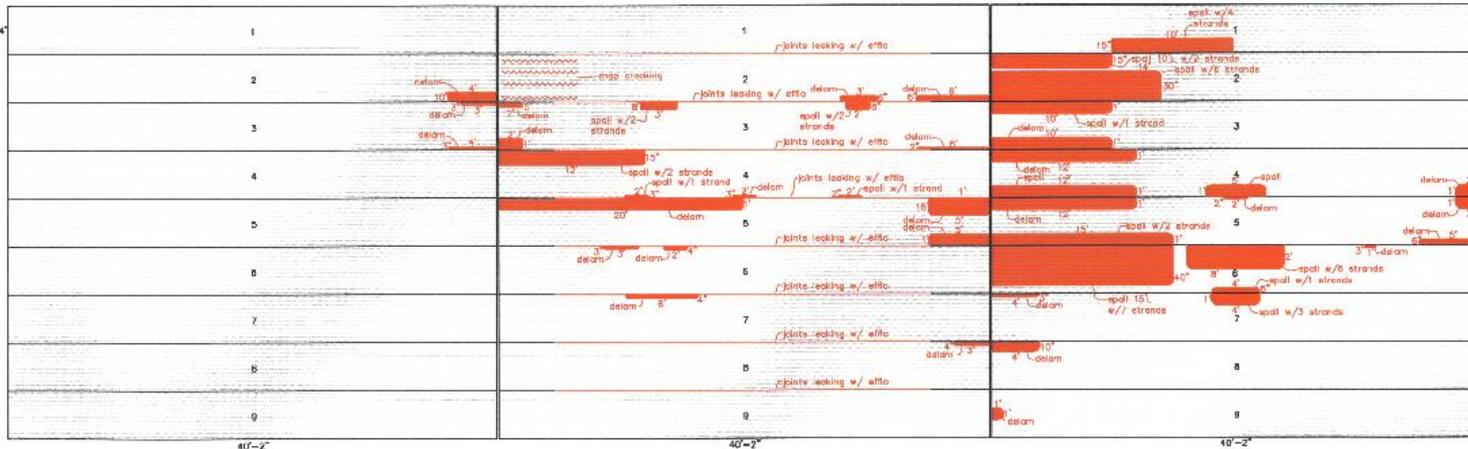
# Alex Bell Bridge





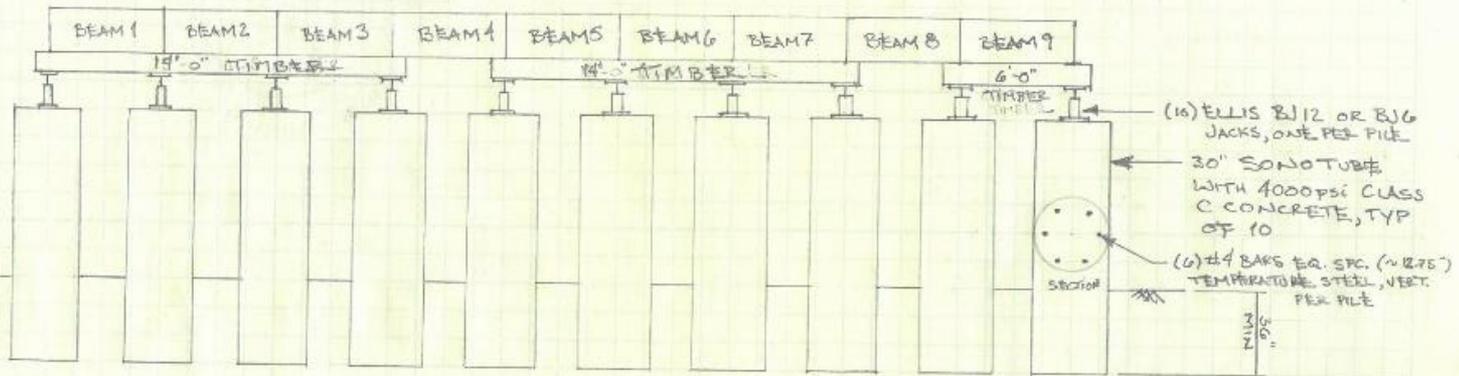
# Alex Bell Bridge

Alex Bell Road  
 Superstructure Inspection Drawing  
 Washington Township  
 WHG-C0078-1.52  
 5752531  
 $\frac{1}{8}'' = 1'$   
 8/16/2016



# Alex Bell Bridge

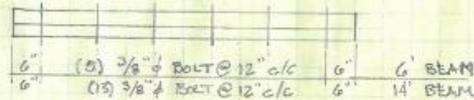
4/4  
 DAVID SHIELDS 8/15/2016  
 ALEX-BELL TEMPORARY  
 PILE DESIGN  
 DWG. 78-1.52



TIMBER SPECS: SOUTHERN PINE, NO 2 GRADE, OR BETTER  
 $F_b = 0.850 \text{ ksi MIN}$   
 $F_v = 0.165 \text{ ksi MIN}$

(2) 6x6 NOMINAL DIMENSIONS, MINIMUM, BOLT LAMINATED, SEE BELOW  
 INCKING FOR TREATMENT PERMITTED

LAMINATING DETAIL:



# Alex Bell Bridge

Temporary Shoring added in 2016



# Alex Bell Bridge

Temporary Shoring added in 2016



# Alex Bell Bridge

Temporary Shoring added in 2016



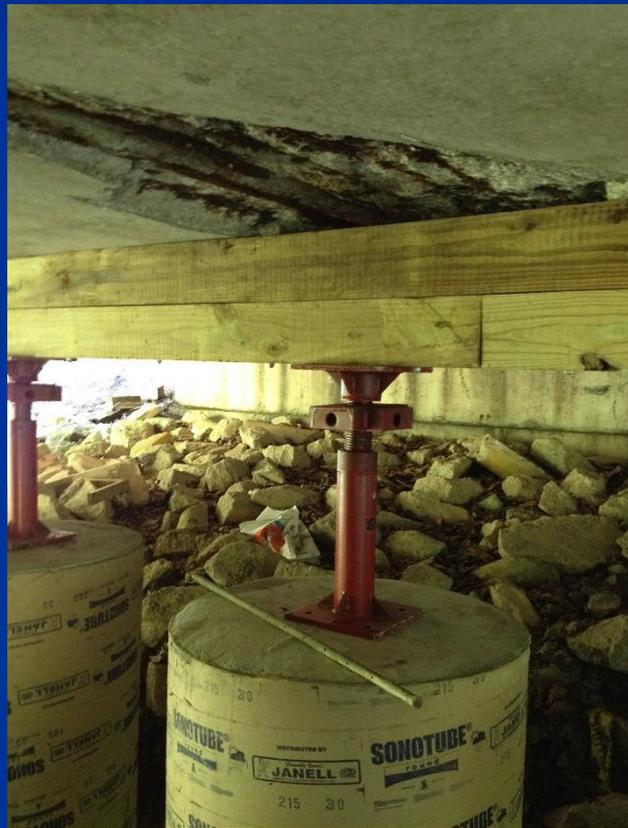
# Alex Bell Bridge

Temporary Shoring added in 2016



# Alex Bell Bridge

Temporary Shoring added in 2016



# Alex Bell Bridge

## Temporary Shoring added in 2016



- Was able to get the lumber from Home Depot in stock

# Ellis Jacks

Adjustable Steel High Load Bridge Jack - Ellis Manufacturing Co. Page 3 of 10



**\$210** per BJ-3 1 reviews

The Ellis Bridge Jack / Modular Building Jack can support up to 80,000 pounds. It is the most rugged and durable screw jack Ellis offers. This screw jack comes standard in 4 sizes, see below for details. Availability: In Stock

Item #   Quantity

Make Selection

Item #	Range Of Adjustment	Safe Load Capacity	Weight	Price
BJ-3	10" - 13"	80,000 Lbs.	50 lb	\$210
BJ-6	13" - 19"	80,000 Lbs	60 lb	\$241.25
BJ-9	16" - 25"	80,000 lbs	63.5 lb	\$263
BJ-12	19" - 32"	80,000 Lbs.	70 lb	\$283.75
BJ-21	29.5" to 50.5"	80,000 Lbs.	117 lb	\$368.75

share:

<https://ellismanufacturing.com/collections/screw-jacks/products/ellis-bridge-jack> 3/22/2017

- Top and bottom plates measuring 1/2" x 9" x 9" for support, the ACME screw is 2 and 1/2" diameter and greased for easy turning and capable of extending a full 3" (BJ-3), 6" (BJ-6) and 12" (BJ-12).
- The Ellis bridge jacks while weighing 45 lbs (BJ-3), 60 lbs (BJ-6) and 70 lbs (BJ-12) can support loads up to 80,000 lbs
- While the jacks were tested for over 200,000 lbs, they recommend applying a 2.5 to 1 safety factor when gauging the load rating capacity of these jacks

# Mile Road Bridge



- Single Span prestressed concrete adjacent box beams on abutments on piles
- Span: 45'
- Roadway 24 f/f guardrail
- Built 1963
- Bridge to be replaced in 2017

# Mile Road Bridge

Bridge Condition in 2015



# Mile Road Bridge

Bridge Condition in 2015



# Mile Road Bridge

Bridge Condition in 2015

Broken Tie Rod Found



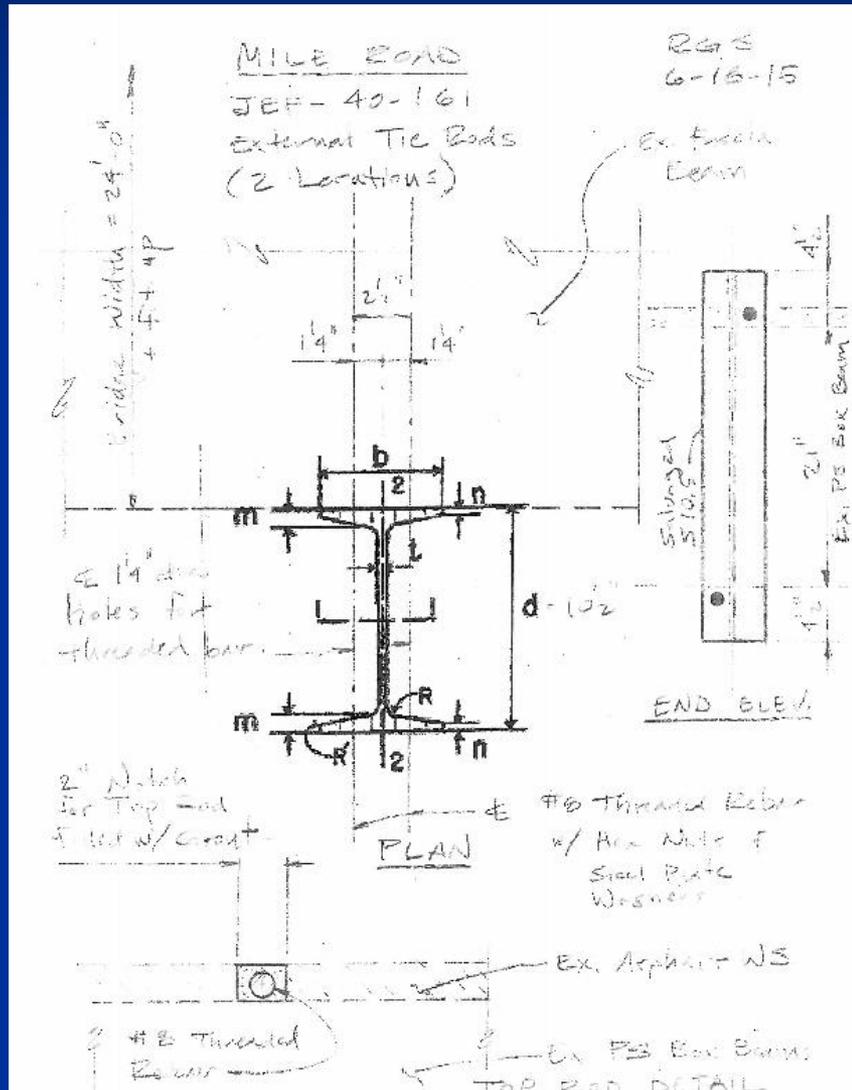


# Mile Road Bridge

- Bridge closed due to emergency and temporary bridge repair completed



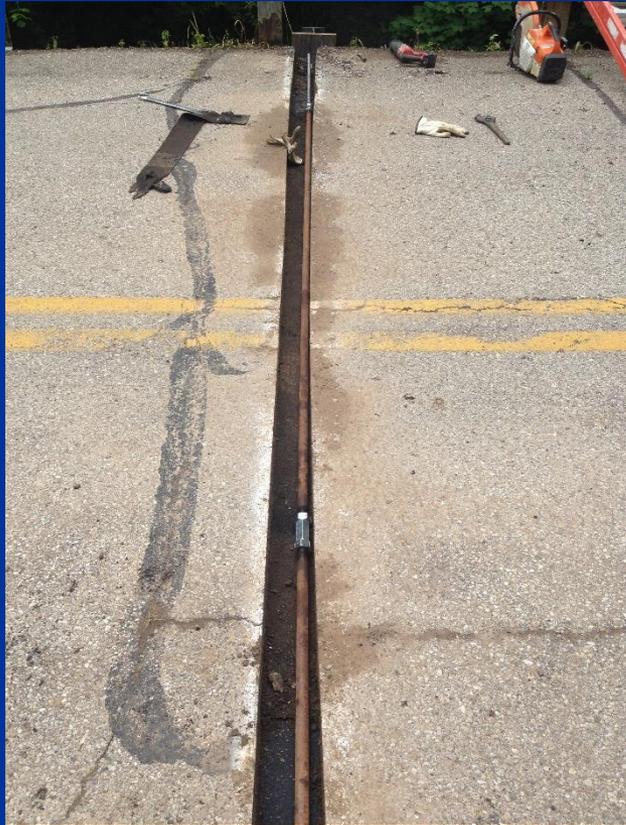
# Mile Road Bridge



- Used #8 all-thread rods with couplers
- Used 2 1/2" rough sawed oak boards
- Used guardrail posts
- Two rods on top of beam
- Two rods on the bottom of the beam

# Mile Road Bridge

Asphalt sawcut to top of beams for system installation



# Mile Road Bridge

System installed



# Mile Road Bridge

Used guardrail posts



# Mile Road Bridge

System installed on top and bottom of beams



# Mile Road Bridge

System installed on top and bottom of beams



# Mile Road Bridge

System installed on top and bottom of beams



# Mile Road

Asphalt and AC sealed



# Chicken Bristle Culvert



## Replacement of Structure

- Replacement of structure using a rotary wrecker
  - 60 ton rotator wrecker truck
  - Rent less than \$1000
  - Wreckers typically available same day vs scheduling a crane weeks out; can reschedule easy for weather
  - Setup of 15 minutes; used outriggers on plates
  - Able to set the section in less than half hour
- Manholes section weight approx. 32,000 lbs; 12' in diameter



# Chicken Bristle Culvert

## Replacement of Structure



# Chicken Bristle Culvert

## Replacement of Structure



# Chicken Bristle Culvert

## Replacement of Structure

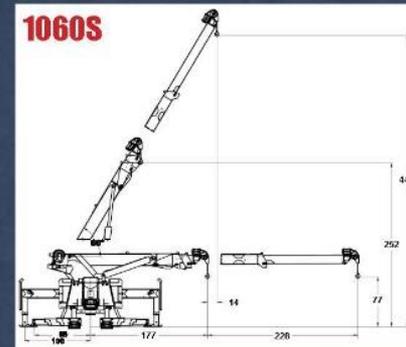
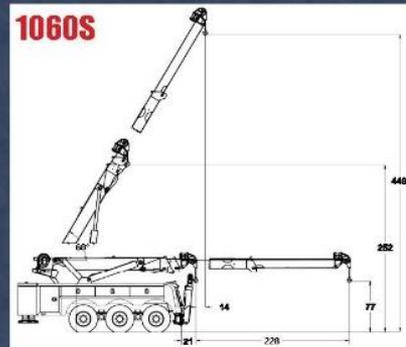
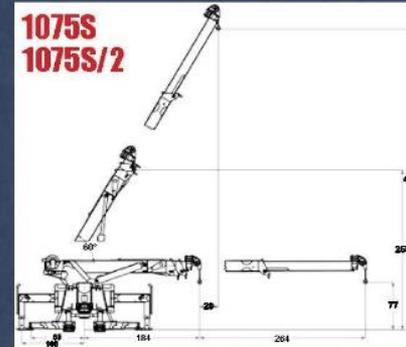
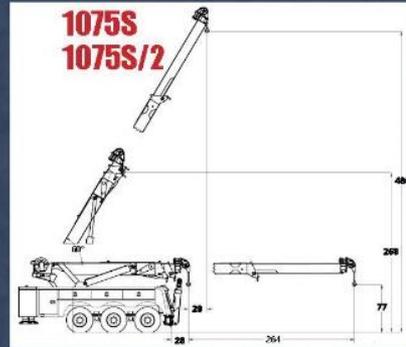


# Chicken Bristle Culvert

## Replacement of Structure



# Chicken Bristle Culvert



## BOOM SPECIFICATIONS

Boom Specifications	Boom Structural Rating (S.A.E.)		Maximum Angle	Maximum Hook Height	Reach Past Tailboard at Minimum Boom Angle
	Retracted 30°	Extended 30°			
1040S 2-Stage	80,000 lbs.	25,000 lbs.	55°	352"	156"
1050S 3-Stage	120,000 lbs.	34,000 lbs.	60°	443"	269"
1075S 3-Stage	150,000 lbs.	38,000 lbs.	60°	480"	292"
1075S/2 3-Stage	150,000 lbs.	38,000 lbs.	60°	480"	292"

## WINCH SPECIFICATIONS

Winch Specifications	Winch Capacity	Winch Type	Cable Specs. 6x37 I.W.R.C.	Air Cable Tensioners
1040S	(2) 35,000 lbs.	Planetary 2-Speed	3/4" x 200'	Standard
1060S	(2) 50,000 lbs.	Planetary 2-Speed	3/4" x 250'	Standard
1075S/2	(2) 50,000 lbs.	Planetary 2-Speed	3/4" x 250'	Standard
1075S	(2) 60,000 lbs.	Planetary 2-Speed	7/8" x 250'	Standard

## DRAG WINCH SPECIFICATIONS

Winch Capacity	Winch Type	Cable Specs. 6x37 I.W.R.C.	Cable Tensioners
35,000 lbs.	Planetary 2-Speed	5/8" x 200'	Air
50,000 lbs.	Planetary 2-Speed	3/4" x 250'	Air
Deal 35,000 lbs.	Planetary 2-Speed	5/8" x 250'	Air
Turret Mounted Drag 30,000 lbs.	Planetary	3/16" x 222' or 5/8" x 200'	Spring

# Dayton Farmersville



- Three Span prestressed concrete adjacent box beams on abutments on piles
- Span: 61'6"-61'6"-43'
- Roadway 30 f/f guardrail
- Built 2002
- Determined steel hit when inserting dowel rod for box beams

# Dayton Farmersville

Bearing seat being lost



# Dayton Farmersville

- Used hydraulic jacks to bring beam up and bottle jacks are for safety caution
- Used beams off of King Richard that we tore out and blocks are guardrail spacer blocks screwed together
- Pocket welded so the system pivots



# Dayton Farmersville



# Dayton Farmersville



# Dayton Farmersville



# Chambersburg Bridge



- Single Span prestressed concrete adjacent box beams on abutments on piles
- Span: 30'
- Roadway 28'
- Built 1963
- Bridge replaced in 2016

# Chambersburg Bridge

## Condition of Exterior Beams in 2014



# Chambersburg Bridge

## Condition of Exterior Beams in 2014



# Chambersburg Bridge

Hole found in top



Beams from underside



# Chambersburg Bridge

Hole investigated

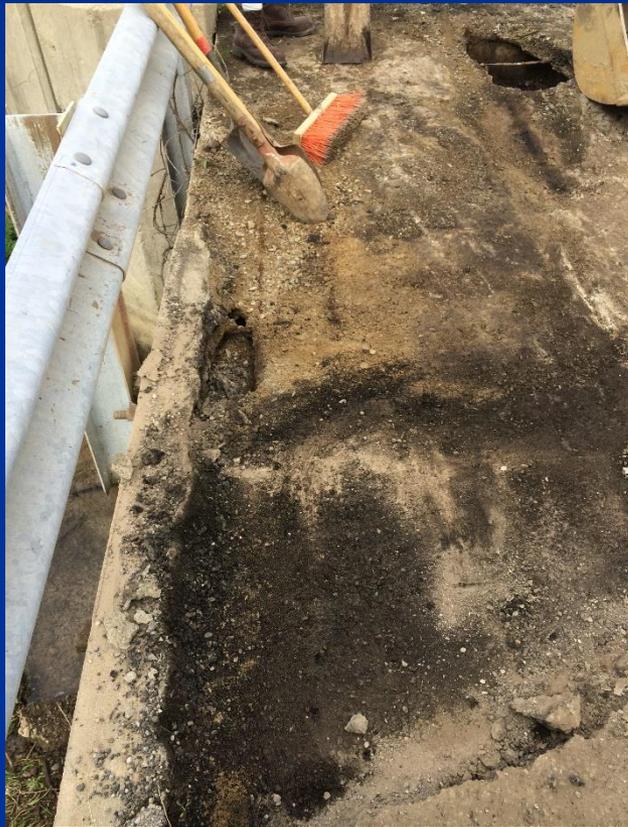


Dual chamber box beams



# Chambersburg Bridge

Investigated top of beams



# Chambersburg Bridge

Plated and monitored until replaced in 2016



# Chambersburg Bridge

## Monitoring 2016



# Chambersburg Bridge

Monitoring 2016



# Chambersburg Bridge

Replaced June 2016

