

Countermeasures

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Countermeasures

Countermeasures are an important and necessary part of bridge maintenance. Not only must the countermeasure restore the safety of the structure, but guard against future assaults. This often has to be completed in a short time and on a shoe string budget.

This document will display some of the different types of countermeasures that have been used both successfully and unsuccessfully in Oklahoma.

U.S. 281 Spur Side Drain

Structure #: Size: 6'x3' RCB

Problem Type: Channel Degradation with channel slope greater than 8.8%.

Location: Both upstream and downstream of side drain was degrading

Solution: Scourstop

Cost/Outcome:

Notes: The cross drain is located 2 miles north of I-40. Completed in 2009. This solution has performed well.

BEFORE



AFTER



BEFORE



AFTER



NBI 13374 S.H. 53 over Unnamed Creek

Structure #: 1016 0054X Size: 3-10'x14'x36' RCB

Problem Type: Downstream Degradation

Location: Undermining of outlet and inlet

Solution: Placement of Jersey Barriers and Riprap.

Cost/Outcome: \$ 15,000; Repair is working.

Notes: Completed in 2008.

BEFORE

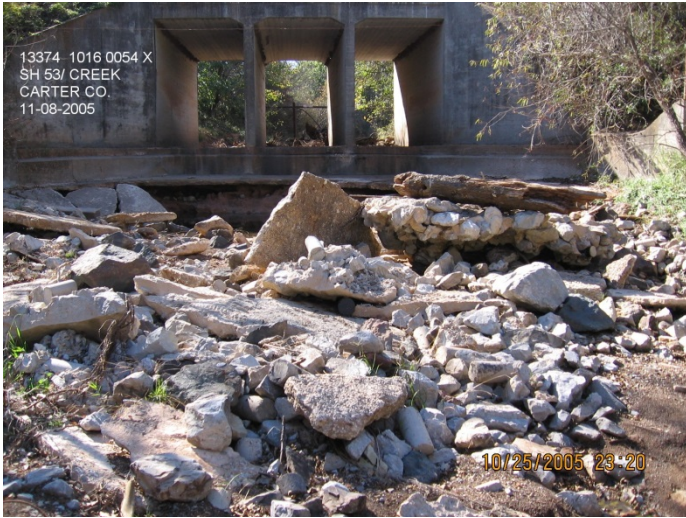


AFTER



BEFORE

AFTER



NBI 12975 S.H. 8 over Unnamed Creek

Structure #: 4718 0302X Size: 3-10'x5'x56.8' SK 45°

Problem Type: Degrading Channel

Location: Downstream side of RCB

Solution: Placement of Riprap.

Cost/Outcome:

Notes: Completed in 2011.

BEFORE



AFTER



BEFORE



AFTER



NBI 14748 over Whispering Creek

Structure #: 72N3874E0630001

Structure Size and Type: 3-10'x10'x48' RCB

Problem Type: Downstream Degradation

Location: Downstream

Solution: Bridge Scour Reconstruction

Cost/Outcome: \$28,730.00

Notes: Ecology Blocks, Rip Rap, and Flow Fill Placement Used

BEFORE



AFTER



BEFORE



AFTER



NBI 16393 I-40 over Unnamed Creek

Structure #: 5569 0212X Size: (12'-14'-12')x10'x183' SK 60°

Problem Type: Degradation of Channel

Location: Upstream and downstream side of RCB

Solution: New Apron with curtain wall.

Cost/Outcome: \$ 940,614 including the Rockwell RCB NBI 16373

Notes: Completed in 1996 along with the fix of the Rockwell RCB.

BEFORE



AFTER



BEFORE



AFTER



NBI 12611 S.H. 8 over Unnamed Creek

Structure #: 0208 0156X Size: 2(10.25',2-12.5,10.25)x6'x34' SK 60°

Problem Type: Degrading Channel

Location: Upstream and Downstream

Solution: Replace failed RCB.

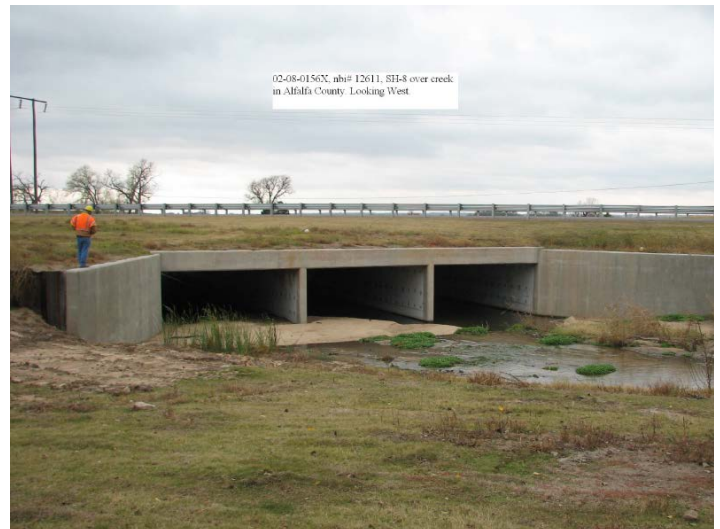
Cost/Outcome: \$ 857,000

Notes: Completed in 2009.

BEFORE



AFTER



BEFORE



AFTER



NBI 14956 U.S. 70 over Little Hauani Creek

Structure #: 4827 0271X Size: (12' - 14' - 12') x 10' x 91' RCB SK 30°

Problem Type: Degrading Channel

Location: Degradation of the channel on the downstream side of the RCB.

Solution: Build a drop outlet.

Cost/Outcome: \$ 1,500,000

Notes: Completed in 1992.

BEFORE



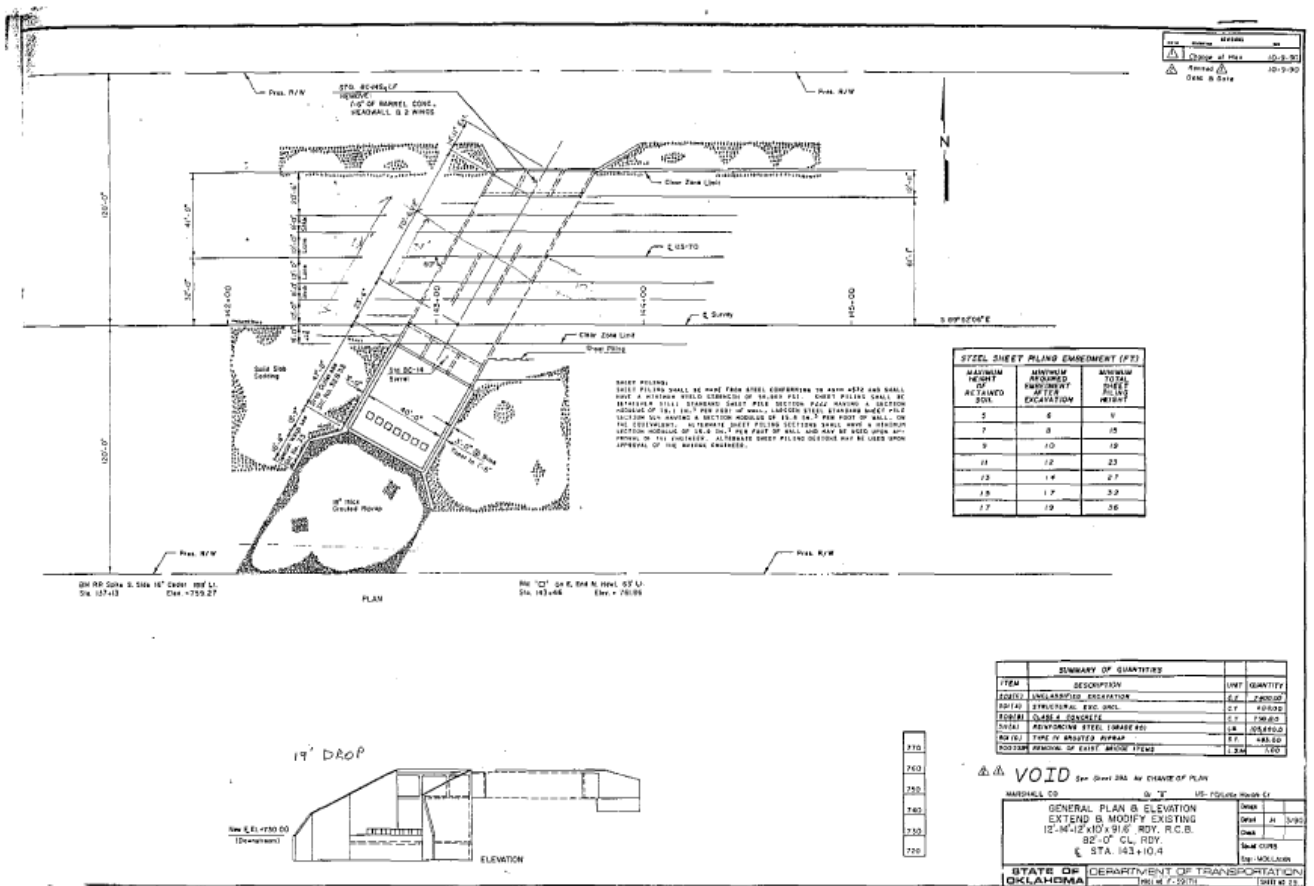
AFTER



BEFORE



AFTER



NBI 16283 I-40 over Unnamed Creek

Structure #: 5569 0148X Size: 2-10' X 7' X 182' R.C. BOX

Problem Type: Degradation of downstream channel

Location: Downstream side of RCB

Solution: Build drop Outlet

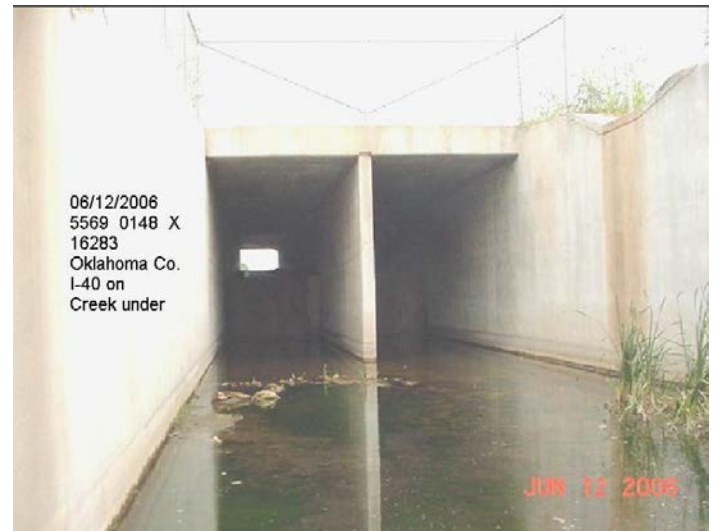
Cost/Outcome: \$ 257,000

Notes: Completed in 2003.

BEFORE



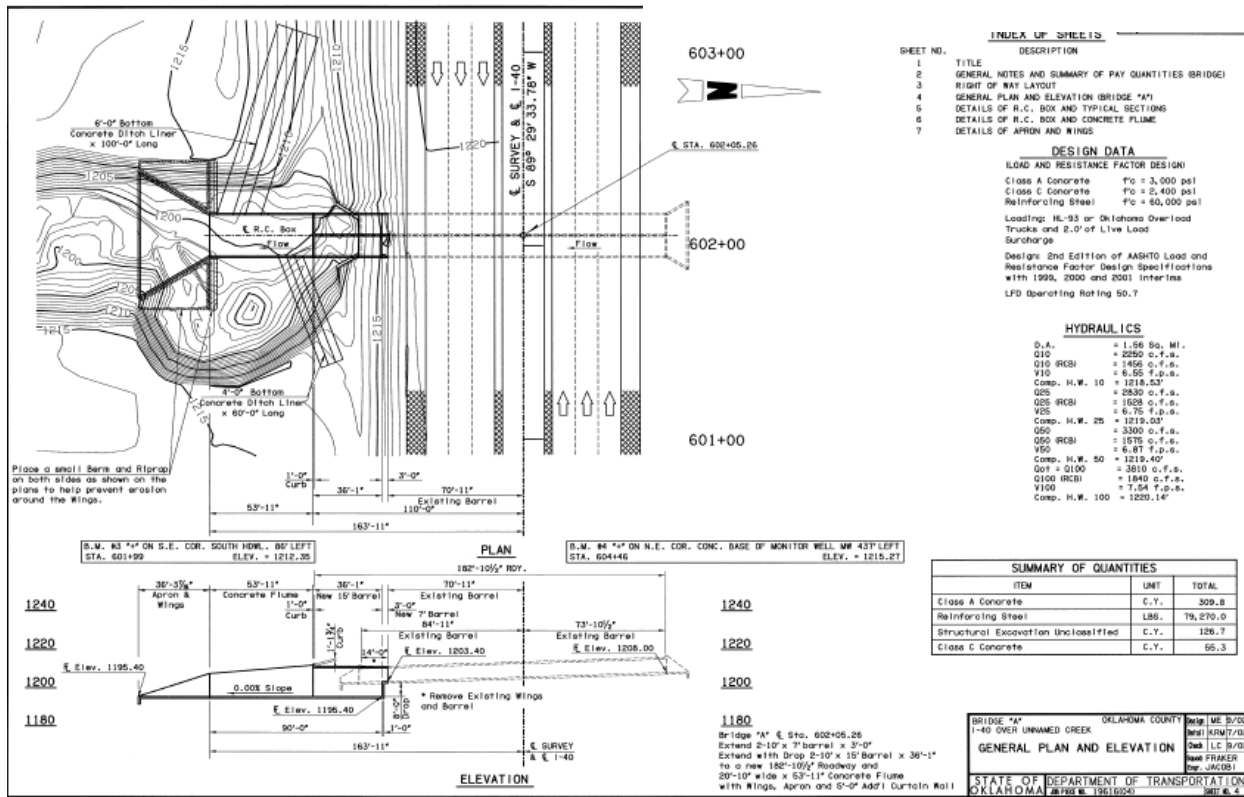
AFTER



BEFORE



AFTER



NBI 25082 S.H. 146 over Tributary to Punjo Creek

Structure #: 0851 0381X Size: BROKENBACK RCB US-2-13'X10'X60' DS-2-13'X27'X60' RCB

Problem Type: Degrading Channel

Location: Downstream of RCB

Solution: Built a drop outlet.

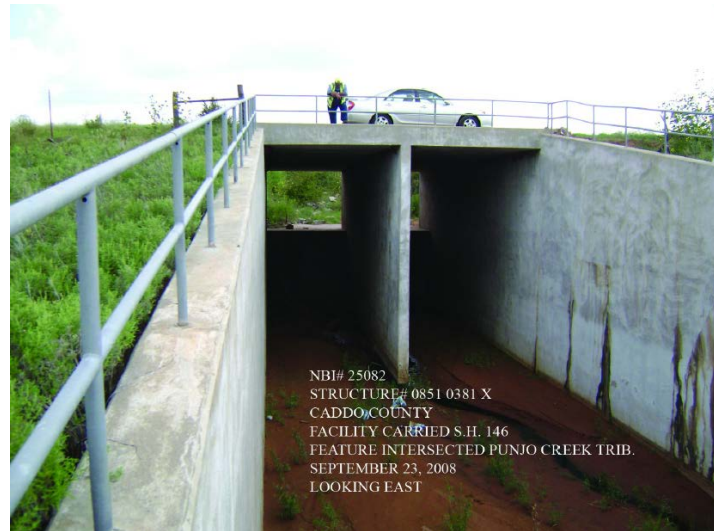
Cost/Outcome: \$ 1,376,221 including detour.

Notes: Completed in 1997. The new structure withstood Tropical Storm Erin which deposited an enormous amount of debris on the upstream side. A well vegetative channel can be seen looking through the 2010 inspection picture.

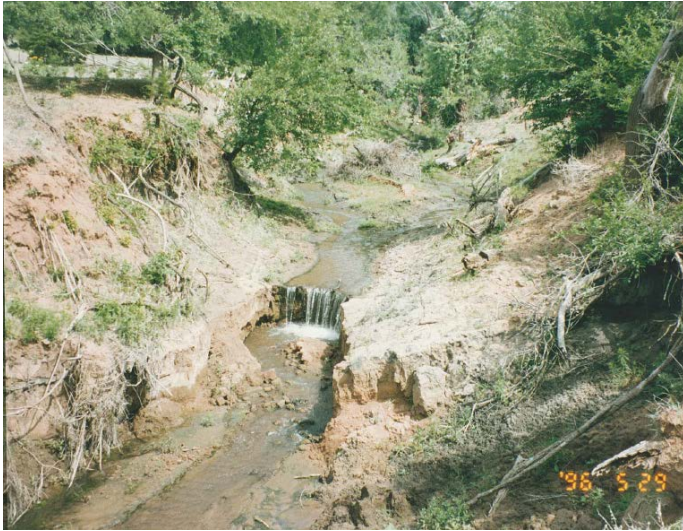
BEFORE



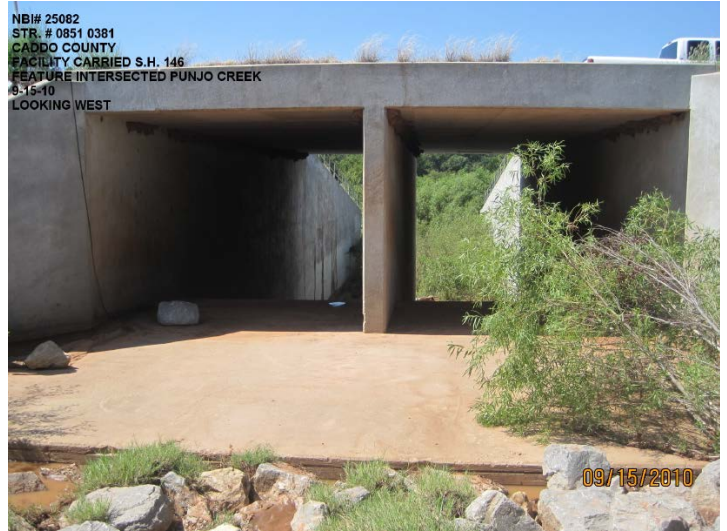
AFTER



BEFORE

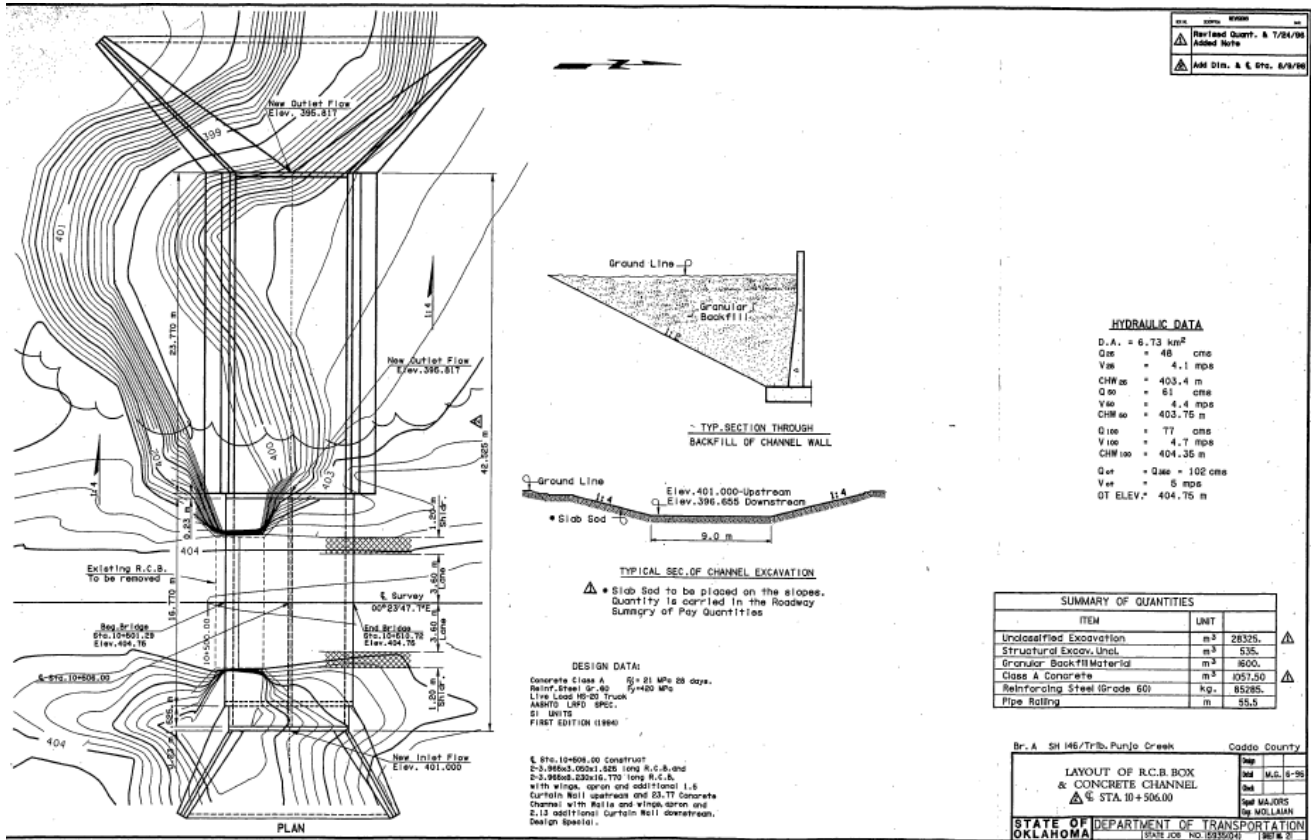


AFTER



NB# 25082
 STR. # 0851 0381
 CADDO COUNTY
 FACILITY CARRIED S.H. 146
 FEATURE INTERSECTED PUNJO CREEK
 8-15-10
 LOOKING WEST

09/15/2010



NBI 05418 S.H. 9 over Tributary to Pecan Creek

Structure #: 1411 1705X Size: 3-10'X 7'X 48' RCB SK 45° & DROP OUTLET S END

Problem Type: Downstream Degradation

Location: Downstream of RCB

Solution: Replace RCB

Cost/Outcome:

Notes: Major work including a drop outlet was completed on the downstream side in 1973. A curtain wall was added on the downstream side of the RCB in 1984.

BEFORE



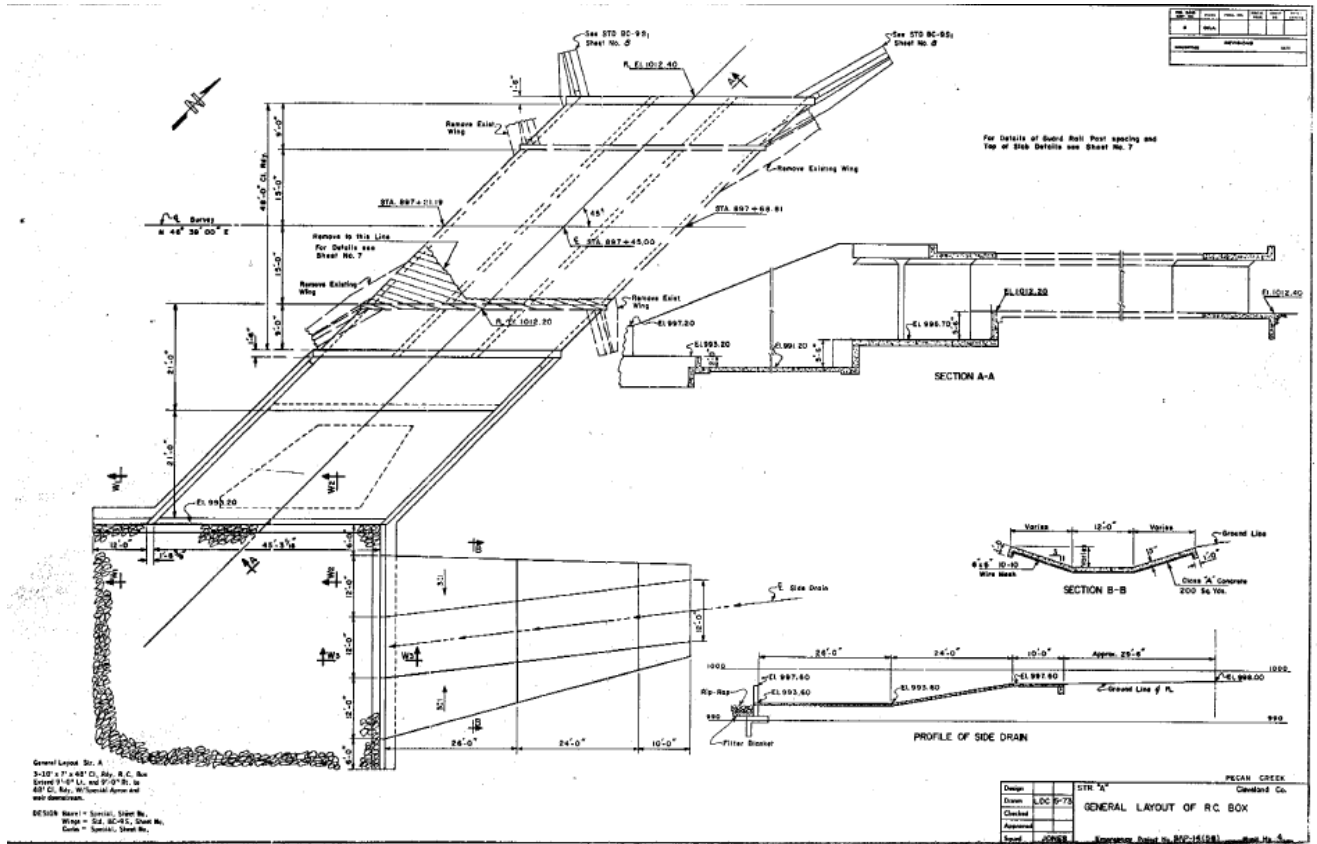
AFTER



BEFORE



AFTER



NBI 16373 Rockwell Ave over Unnamed Creek

Structure #: 55N3010E1070004 Size: (13'-17'-13')x9'x50' RCB

Problem Type: Downstream Degradation

Location: Degradation through the RCB

Solution: Replace RCB

Cost/Outcome: \$ 940,614

Notes: Completed in 1996.

BEFORE



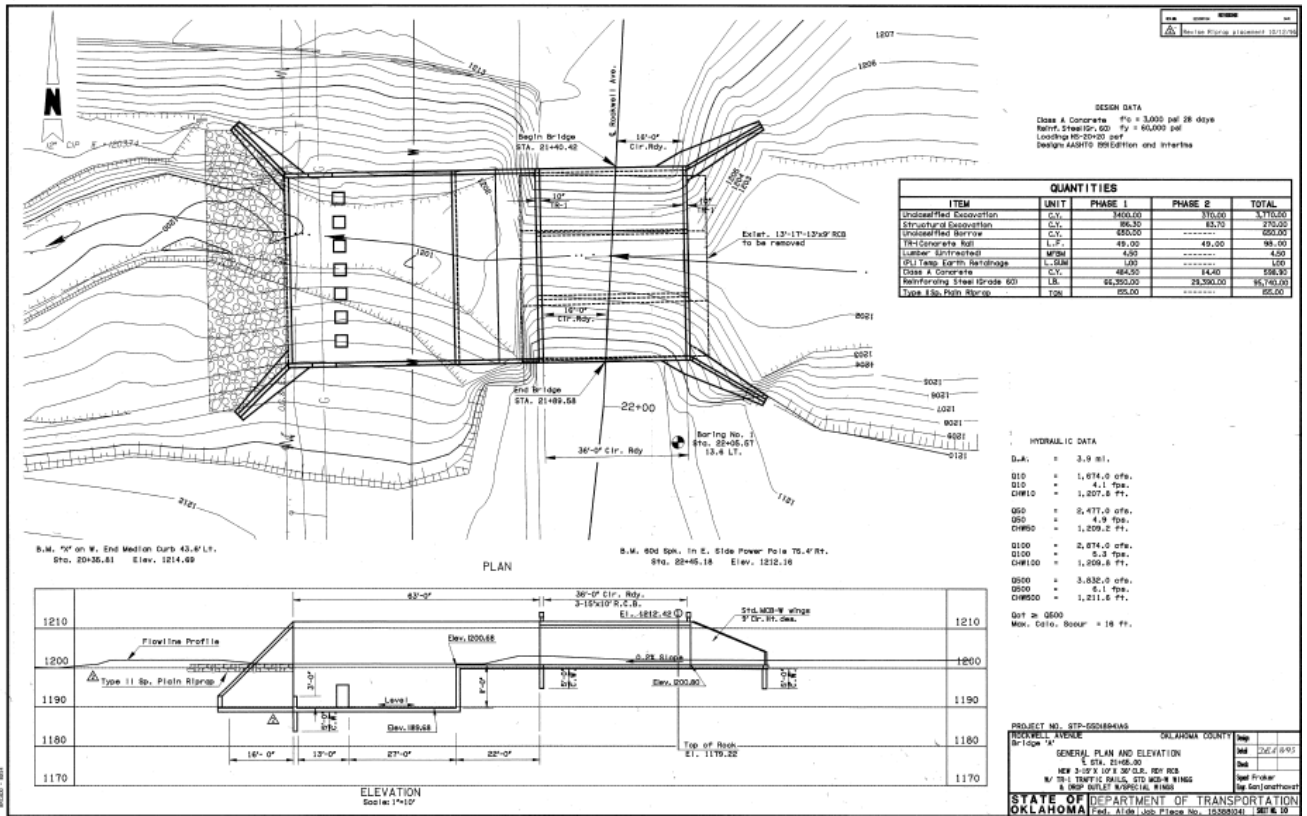
AFTER



BEFORE



AFTER



NBI 14317 I-35 over Tributary to Cottonwood Creek

Structure #: 1028 0276X Size: (12'-14'-12') X 12' X 78' R.C.BOX

Problem Type: Degradation at the inlet

Location: At the inlet of the RCB.

Solution: Replace Inlet

Cost/Outcome: \$ 758,429

Notes: Completed in 2010.

BEFORE



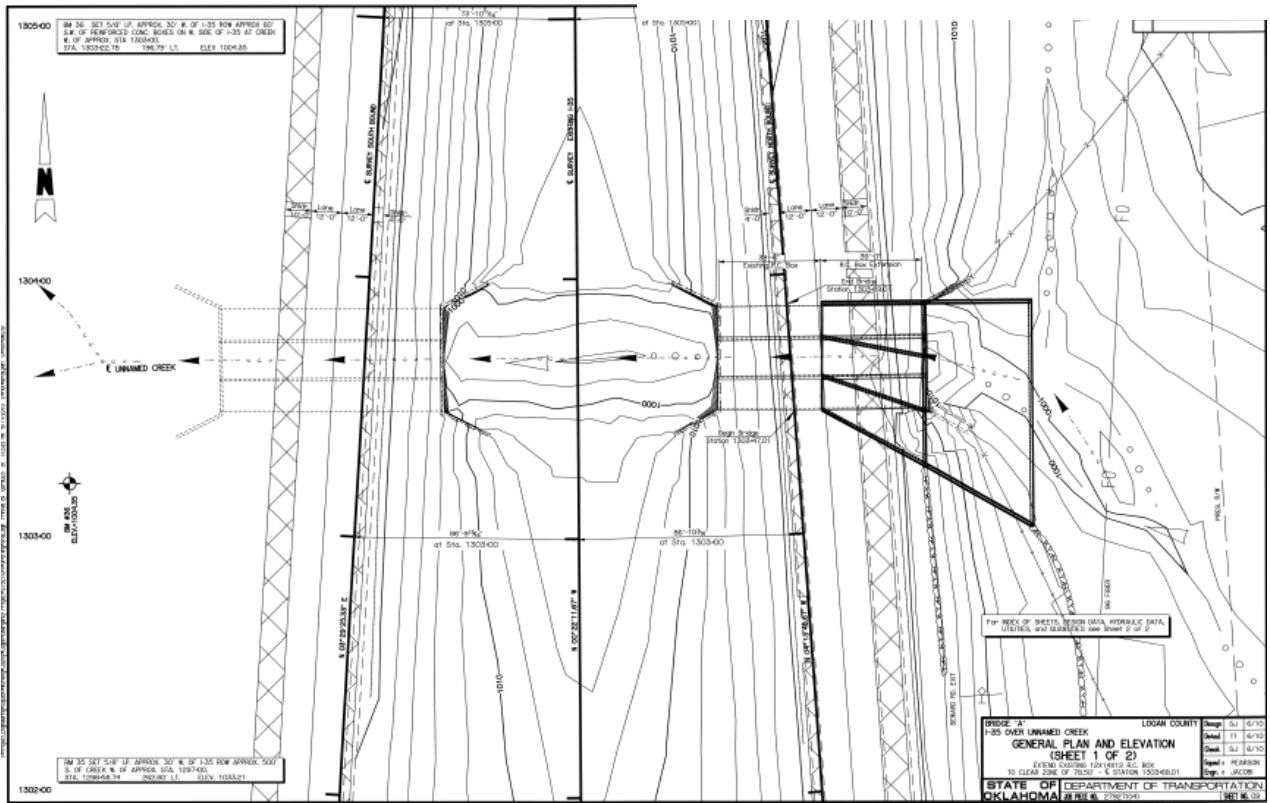
AFTER



BEFORE



AFTER



NBI 14252 S.H. 199 over Unnamed Creek

Structure #: 1004 1015X Size: 2-10'x10'x82' RCB

Problem Type: Downstream Degradation

Location: Downstream side of the RCB

Solution: Installed new apron and wings on the downstream side.

Cost/Outcome: \$ 19,000

Notes: Completed in 2009.

BEFORE



AFTER



BEFORE



AFTER



NBI 15702 I-35 over Bills Creek

Structure #: 4317 1393EX Size: 3-10'x10'x133' SK 45°

Problem Type: Downstream Degradation

Location: Downstream of RCB

Solution: Placement of Jersey Barriers and Riprap at downstream side of RCB.

Cost/Outcome: \$ 26,000

Notes: Completed in 2011.

BEFORE



AFTER



BEFORE



AFTER



NBI 14726 U.S. 70 over Unnamed Creek

Structure #: 4827 0163X Size: 2-10'x12'x138' RCB

Problem Type: Downstream Degradation

Location: Downstream side of RCB

Solution: Build drop outlet

Cost/Outcome: \$1,500,000

Notes: Completed in 1990.

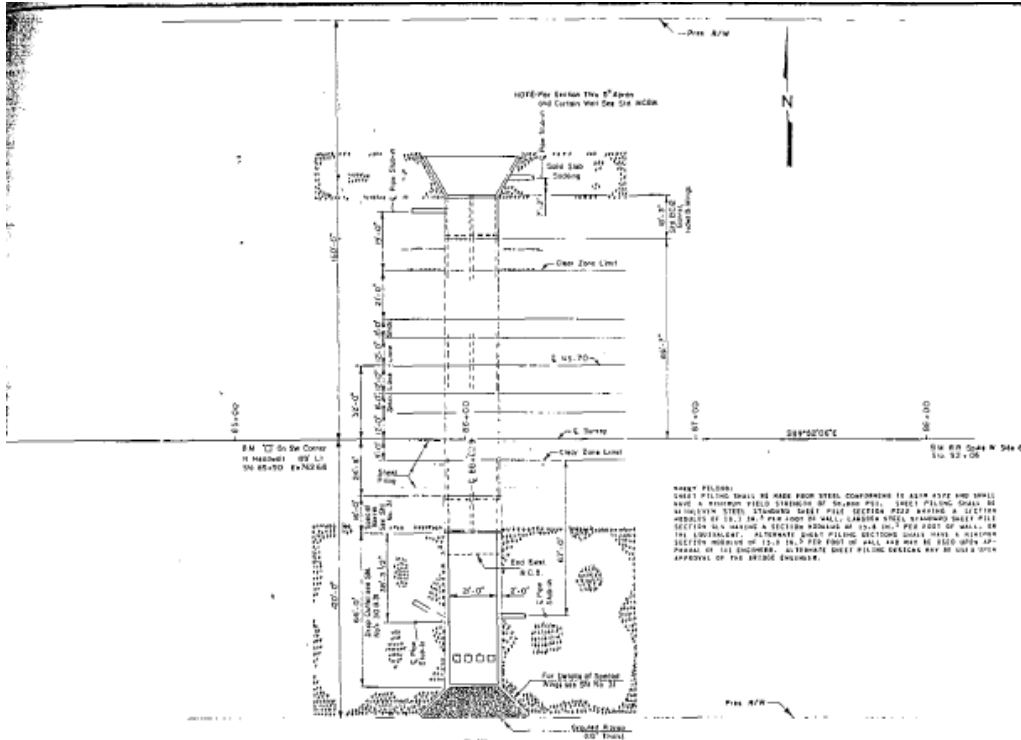
BEFORE



AFTER



DATE	DESCRIPTION	BY
12-3-90	Change of Plan	...
10-9-90	Issue & Date	...



STEEL SHEET PILING:
 SHEET PILING SHALL BE MADE FROM STEEL COMPONENTS IN ASB TYPE AND SHALL HAVE A MINIMUM YIELD STRENGTH OF 50,000 PSI. SHEET PILING SHALL BE MANUFACTURED FROM STANDARD SHEET PILING SECTIONS HAVING A SECTION MODULUS OF 18.1 IN³ PER FOOT OF WALL. LARGER STEEL SHAPING SHALL FILL SECTION ONLY HAVING A SECTION MODULUS OF 17.8 IN³ PER FOOT OF WALL. BE THE UNDERLAMENT. ALTERNATE SHEET PILING SECTIONS SHALL HAVE A SECTION MODULUS OF 12.0 IN³ PER FOOT OF WALL AND MAY BE USED WITH APPROVAL OF THE BRIDGE ENGINEER.

MAXIMUM HEIGHT OF RETAINED SOIL	MINIMUM REQUIRED EMBODIMENT AFTER EXCAVATION	MINIMUM TOTAL SHEET PILING HEIGHT
5	6	11
7	8	15
8	10	19
11	12	23
13	14	27
15	17	32
17	19	36

ITEM	DESCRIPTION	UNIT	QUANTITY
00	EXCAVATE AND OVERLAY	LSM	1.00
00107	UNCLASSIFIED EXCAVATION	CY	1222.00
00101	STRUCTURAL STEEL WING	LB	200.00
00102	STEEL PLATE & CONCRETE	CY	25.00
00103	REINFORCING STEEL WAREHOUSE	LB	43,800.00
00104	TYPE IV BROUGHT BARS	LB	500.00
00105	REMOVE EXIST. BRIDGE DECK	LSM	1.00

VOID See Sheet 20A For CHANGE OF PLAN
 MARSHALL CO. BR. W. U.S. 70 E. of CARTER CO.

GENERAL PLAN & ELEVATION
 EXTEND & MODIFY EXISTING
 2-10' WIDE 3' HIGH LONG R.C.B.
 12'-0" x 5'-0" HIGH
 STA. 85+00.5

STATE OF OKLAHOMA DEPARTMENT OF TRANSPORTATION
 DIVISION OF BRIDGE ENGINEERING

770
760
750
740
730
720

770
760
750
740
730
720

NBI 16396 I-40 over Unnamed Creek

Structure #: 5569 0445X Size: (13'-17'-13') X 10'X 173' RCB

Problem Type: Degradation

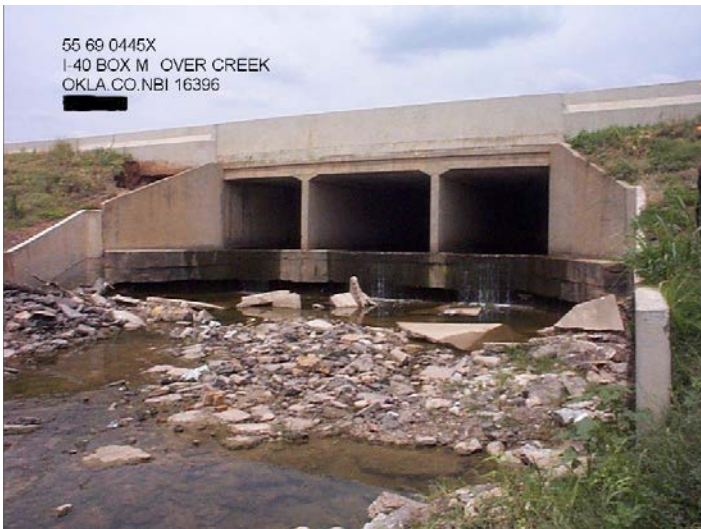
Location: Downstream of RCB

Solution: Build a drop outlet.

Cost/Outcome: \$ 85,493

Notes: Completed in 1999.

BEFORE



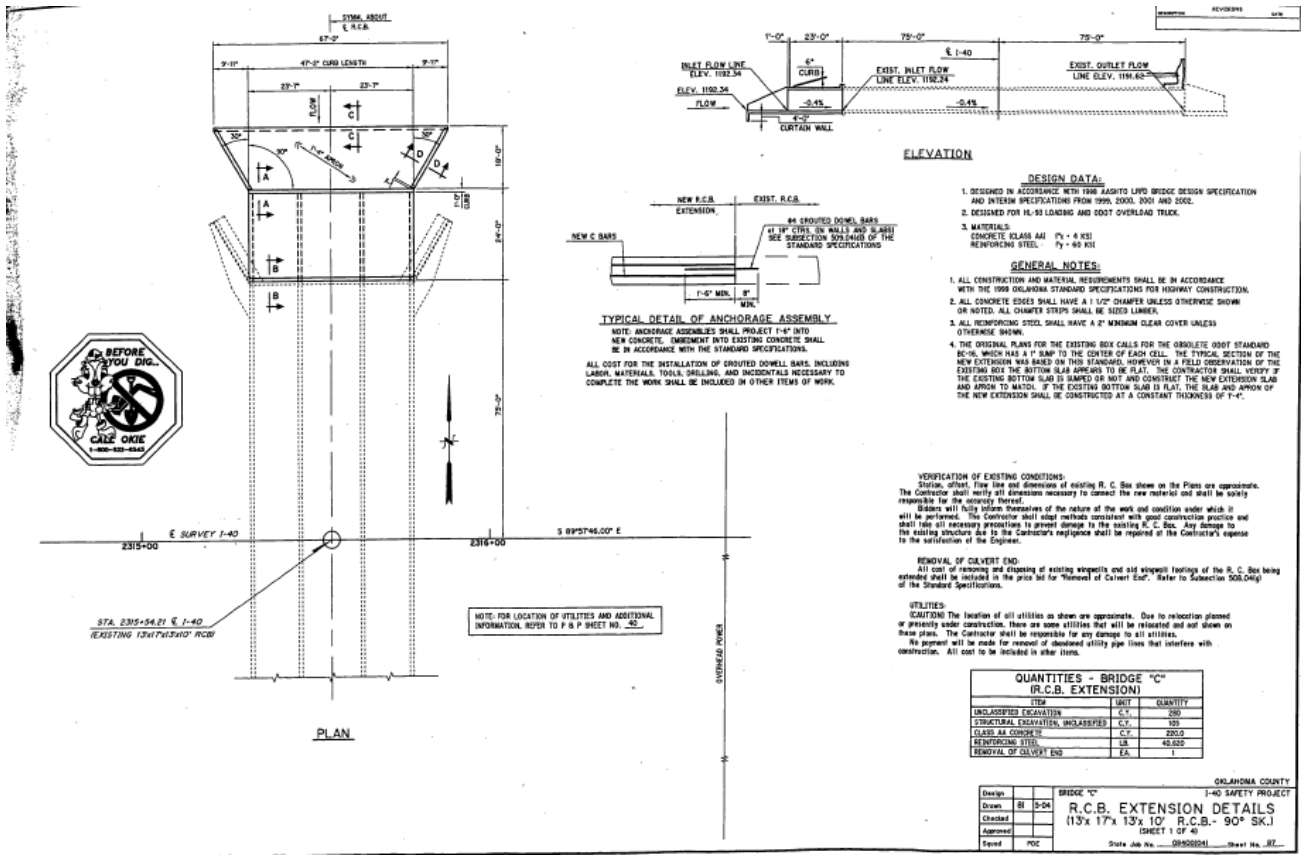
AFTER



BEFORE



AFTER



NBI 17690 S.H. 24 over Unnamed Creek

Structure #: 4412 0045 X

Structure Size and Type: 2 – 10' X 10' X 80' RDY RC Box w/ 3' additional curtain walls

Problem Type: Downstream Degradation

Location: Downstream

Solution: Placed Rip Rap at Outlet of RCB and in the channel downstream of RCB

Cost/Outcome: Placed Riprap in Channel before 2013. The downstream wing collapsed in 2015. The solution was not effective.

Notes: After the wing was replaced, grouted riprap was also placed in the channel.

BEFORE



AFTER



BEFORE



AFTER



NBI 13374 S.H. 53 over Whiskey Creek

Structure #: 1028 0276X Size: 3-10' X 14' X 36' RCB

Problem Type: Degradation with undermining

Location: North side of box

Solution: Install salvaged barrier wall

Cost/Outcome: \$15,000 / This box continues to have scour issues.

Notes: Completed in 2008.

BEFORE

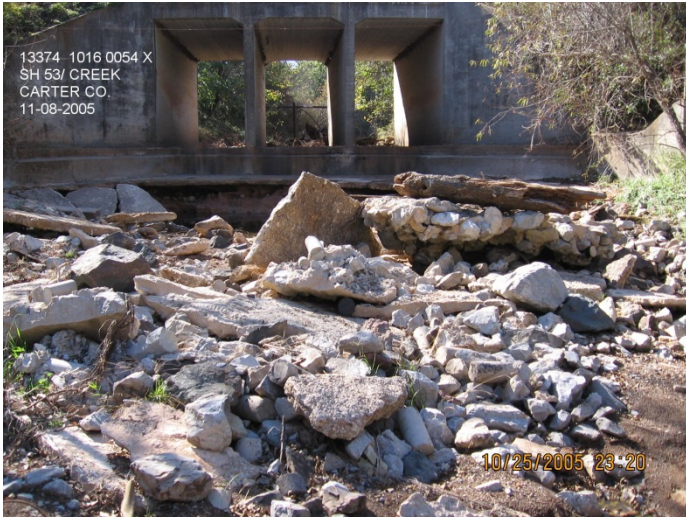


AFTER



BEFORE

AFTER



NBI 12975 S.H. 8 over Unnamed Creek

Structure #: 4718 0302X Size: 3-10' X 5' X 56.8' R.C. BOX SK. 45 DEG.

Problem Type: Degradation and undermining

Location: East side of Box

Solution: Place fill material

Cost/Outcome:

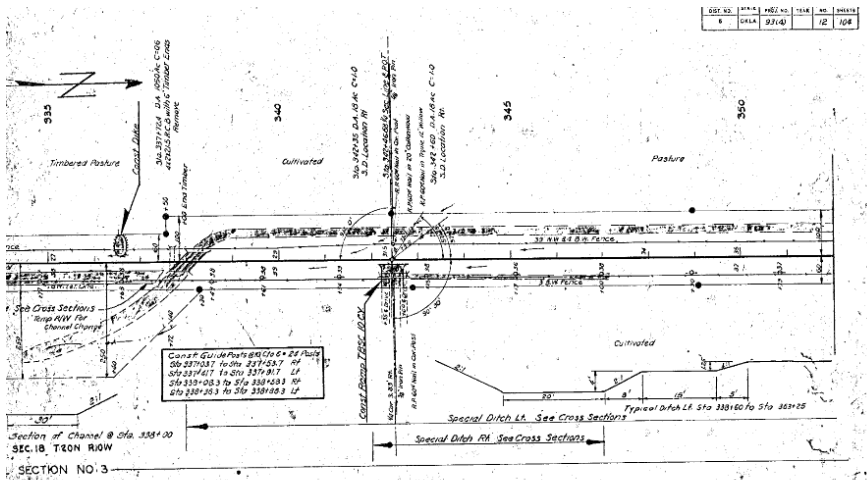
Notes: Completed in 2010.

BEFORE

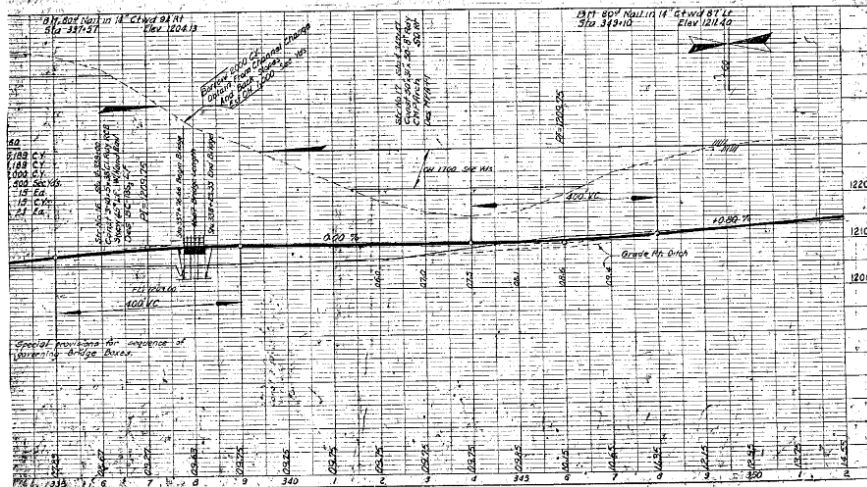


AFTER





DATE	NO.	NO.	NO.	NO.
1914	102	102	102	102



NBI 16393 I-40 over Unnamed Creek

Structure #: 5569 0212X Size: (12'-14'-12') X 10' X 183' SK. 60

DEG. Problem Type: Degradation and undermining

Location: South side of box

Solution: Placed Riprap on the downstream side of the RCB.

Cost/Outcome:

Notes: Completed in 1996 along with the fix of the Rockwell RCB.

BEFORE



AFTER



NBI 12611 S.H. 8 over Unnamed Creek

Structure #: 0208 0156X Size: 2(10.25',2-12.5,10.25)x6'x34' SK 60°

Problem Type: Degradation and undermining

Location: Upstream and Downstream

Solution: Replace failed RCB.

Cost/Outcome: \$ 857,000

Notes: Completed in 2009.

BEFORE



AFTER



BEFORE



AFTER



NBI 18418 U.S. 60 over Unnamed Cr (Near Chikaskia River)

Structure #: 3630 0147X Size: 3-10'x12'x175' RCB

Problem Type: Undermining

Location: Outlet of RCB

Solution: Placement of Riprap at the outlet.

Cost/Outcome:

Notes: Completed in 2005.

BEFORE



AFTER



BEFORE



AFTER



NBI 18418 U.S. 60 over Unnamed Cr (Near Chikaskia River)

Structure #: 3630-0147

Size: 3-10'x12'x175' RCB

Problem Type: Undermining

Location: Downstream

Solution: Placed Riprap

Cost/Outcome: This countermeasure failed.

Notes: Completed in 2005

BEFORE



AFTER



NBI 18418 U.S. 60 over Unnamed Cr (Near Chikaskia River)

Structure #: 3630-0147

Size: 3-10'x12'x175' RCB

Problem Type: Undermining

Location: Downstream

Solution: Drop with Energy Dissipaters

Cost/Outcome: \$160,000

Notes: Completed in 2010

BEFORE



AFTER



BEFORE



AFTER



NBI 14956 US 70 over Little Hauani Creek

Structure #: 4827 0271X Size: (12'-14'-12') X 10' X 91' DROP OUTLET

Problem Type: Degradation and undermining

Location: South side of RCB

Solution: Construct drop outlet with energy dissipaters

Cost/Outcome: \$1,500,000

Notes: Completed in 1993.

BEFORE



AFTER

4827 0271X
NBI# 14956
MARSHALL COUNTY
U.S. 70
LITTLE HAVANI CREEK
01/09/2007



NBI 14072 I-35 over Coffee Creek

Structure #: 5509 1113X Size: 5 (13'-17'-13')X 14' X 130' R.C.BOX W/ DROP AT EAST END

Problem Type: Channel Degradation with Undermining of RCB.

Location: Channel degradation on the downstream side

Solution: Build a broken back drop outlet with chute blocks and place gabions at the outlet.

Cost/Outcome: \$ 526,000

Notes: Completed in 1993. Most of the gabions have washed away.

AFTER



AFTER



AFTER



AFTER



S.H. 39 over Unnamed Creek

Structure #: Size: Roadway Size RCB

Problem Type: Degradation of the downstream channel with undermining of the RCB.

Location: Downstream of RCB

Solution: Build Gabions with a Contra Costa.

Cost/Outcome:

Notes: The RCB is 4.5 miles east of US 177 in Pottawatomie county. The drainage channel had degraded 11 ft.

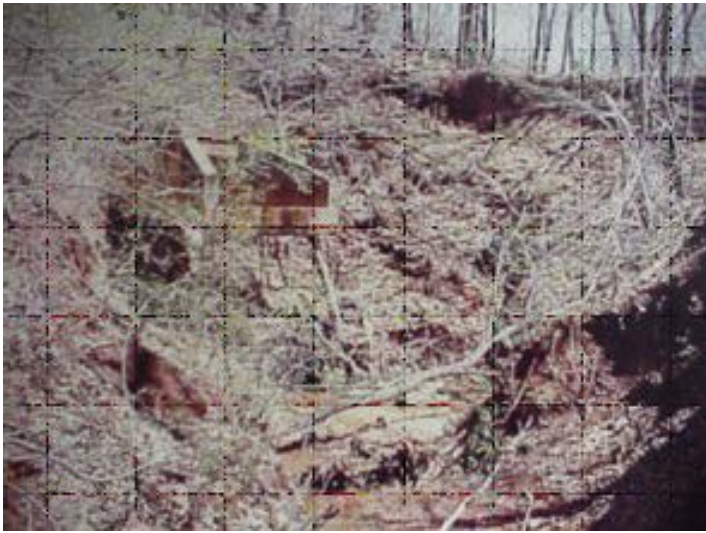
BEFORE



AFTER



BEFORE



AFTER



NBI 16283 I-40 over Unnamed Creek

Structure #: 5569 0148X Size: 2-10' X 7' X 182' R.C. BOX

Problem Type: Degradation and undermining

Location: Downstream side of RCB

Solution: Build drop Outlet

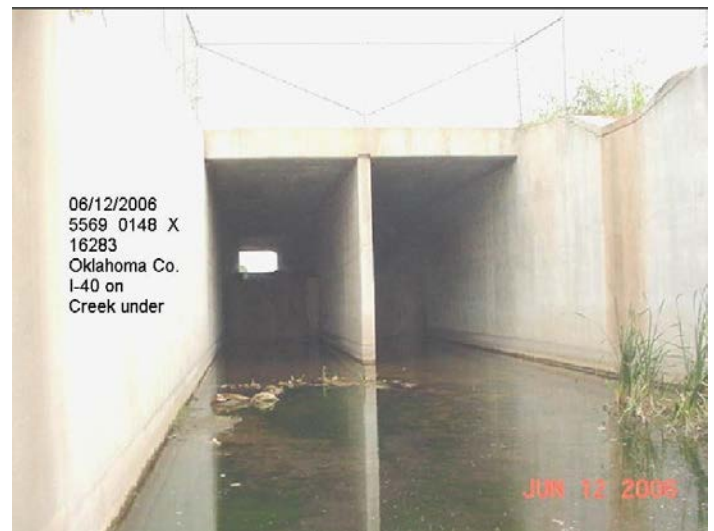
Cost/Outcome: \$ 257,000

Notes: Completed in 2003.

BEFORE



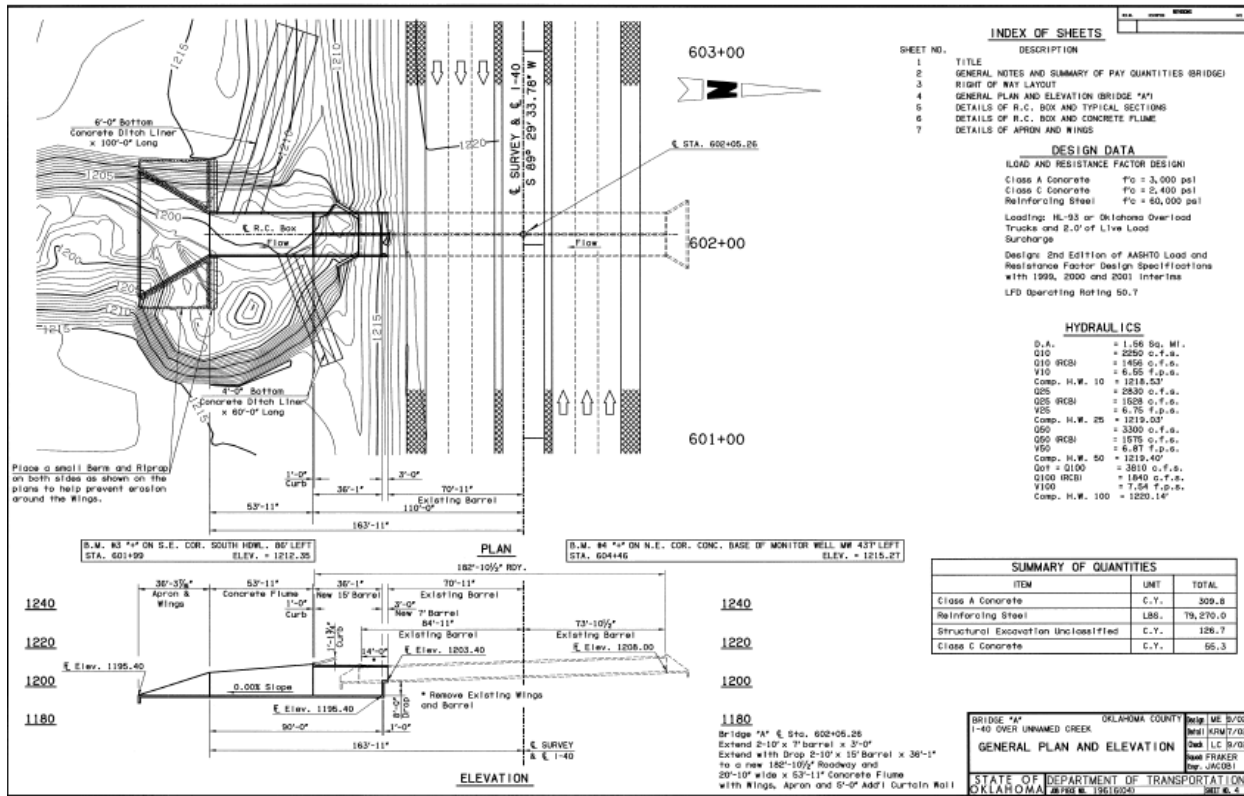
AFTER



BEFORE



AFTER



INDEX OF SHEETS	
SHEET NO.	DESCRIPTION
1	TITLE
2	GENERAL NOTES AND SUMMARY OF PAY QUANTITIES (BRIDGE)
3	RIGHT OF WAY LAYOUT
4	GENERAL PLAN AND ELEVATION (BRIDGE "A")
5	DETAILS OF R.C. BOX AND TYPICAL SECTIONS
6	DETAILS OF R.C. BOX AND CONCRETE FLUME
7	DETAILS OF APRON AND WINGS

DESIGN DATA	
LOAD AND RESISTANCE FACTOR DESIGN	
Class A Concrete	$f'_c = 3,000$ psi
Class C Concrete	$f'_c = 2,400$ psi
Reinforcing Steel	$f'_c = 60,000$ psi
Loading: HL-93 or Oklahoma Overload Trucks and 2.0' of Live Load Surcharge	
Design: 2nd Edition of AASHTO Load and Resistance Factor Design Specifications with 1995, 2000 and 2003 Interims	
LFD Operating Rating 50.7	

HYDRAULICS	
S.A.	= 1.56 Sq. Mi.
Q10	= 2550 c.f.s.
Q10 IRCBI	= 1456 c.f.s.
V10	= 6.55 f.p.s.
Comp. H.W. 10	= 1218.53'
Q25	= 2530 c.f.s.
Q25 IRCBI	= 1628 c.f.s.
V25	= 6.75 f.p.s.
Comp. H.W. 25	= 1219.03'
Q50	= 3300 c.f.s.
Q50 IRCBI	= 1976 c.f.s.
V50	= 6.81 f.p.s.
Comp. H.W. 50	= 1219.40'
Q100	= 3810 c.f.s.
Q100 IRCBI	= 1940 c.f.s.
V100	= 7.54 f.p.s.
Comp. H.W. 100	= 1220.14'

SUMMARY OF QUANTITIES		
ITEM	UNIT	TOTAL
Class A Concrete	C.Y.	509.8
Reinforcing Steel	LBS.	79,270.0
Structural Excavation Unclassified	C.Y.	129.7
Class C Concrete	C.Y.	55.3

BRIDGE "A" OKLAHOMA COUNTY **DATE** ME 8/00
 I-40 OVER UNMANNED CREEK **Drawn** KRM/7/03
GENERAL PLAN AND ELEVATION **Scale** 1/4" = 1'-0"
DESIGNED TRACER
CHECKED JACOBI
 STATE OF DEPARTMENT OF TRANSPORTATION
 OKLAHOMA **PROJECT NO.** 19516041 **SHEET NO.** 4

NBI 23278 Reno at Scott Street

Structure #: 55E1070N3100009 Size: (13'-17'-13')x15'x50' RCB

Problem Type: Degradation and Undermining

Location: Degradation of downstream channel

Solution: Replace RCB.

Cost/Outcome: \$ 680,000

Notes: Completed in 2011.

BEFORE



AFTER



BEFORE



AFTER



NBI 25082 S.H. 146 over Punjo Creek

Structure #: 0851 0381X Size: BROKENBACK RCB US-2-13'X10'X60' DS-2-13'X27'X60' RCB

Problem Type: Degradation and Undermining

Location: Downstream of RCB

Solution: Built a drop outlet.

Cost/Outcome: \$ 1,376,221 including detour.

Notes: Completed in 1997. The new structure withstood Tropical Storm Erin which deposited an enormous amount of debris on the upstream side.

BEFORE



AFTER



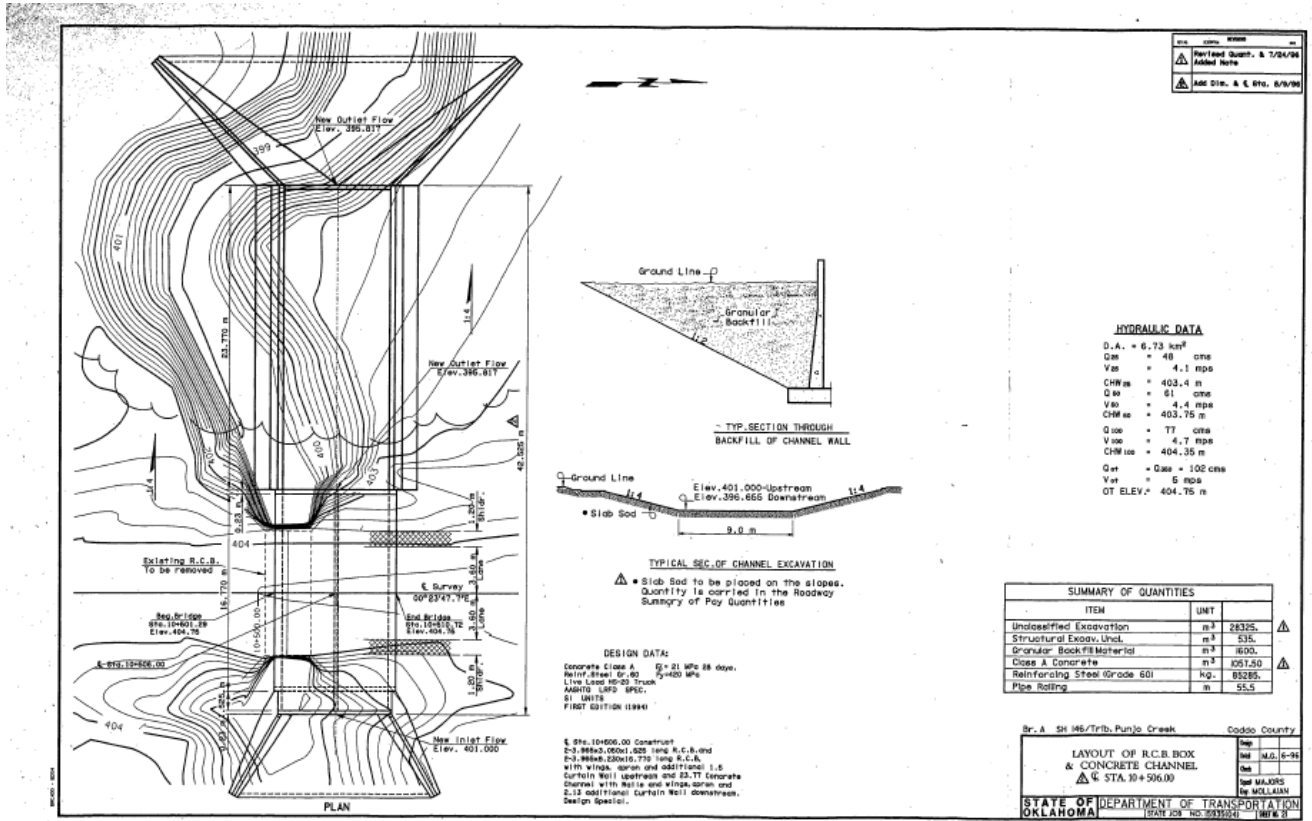
BEFORE



AFTER



NBI #: 22082 Str #: 0651 0381 X Caddo County
 Facility Carried: S.H. 148
 Feature Int.: PUNJO CREEK
 24 September, 2011
 Looking W



NBI 05418 S.H. 9 over Tributary to Pecan Creek

Structure #: 1411 1705X Size: 3-10'X 7'X 48' RCB SK 45° & DROP OUTLET S END

Problem Type: Degradation and Undermining

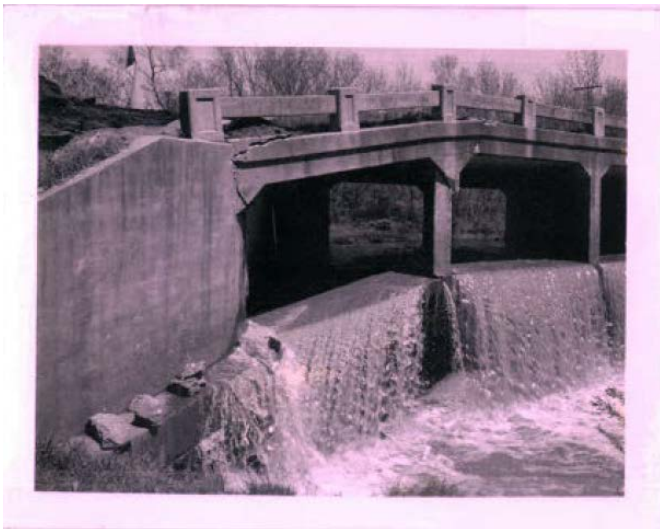
Location: Downstream of RCB

Solution: Replace RCB

Cost/Outcome:

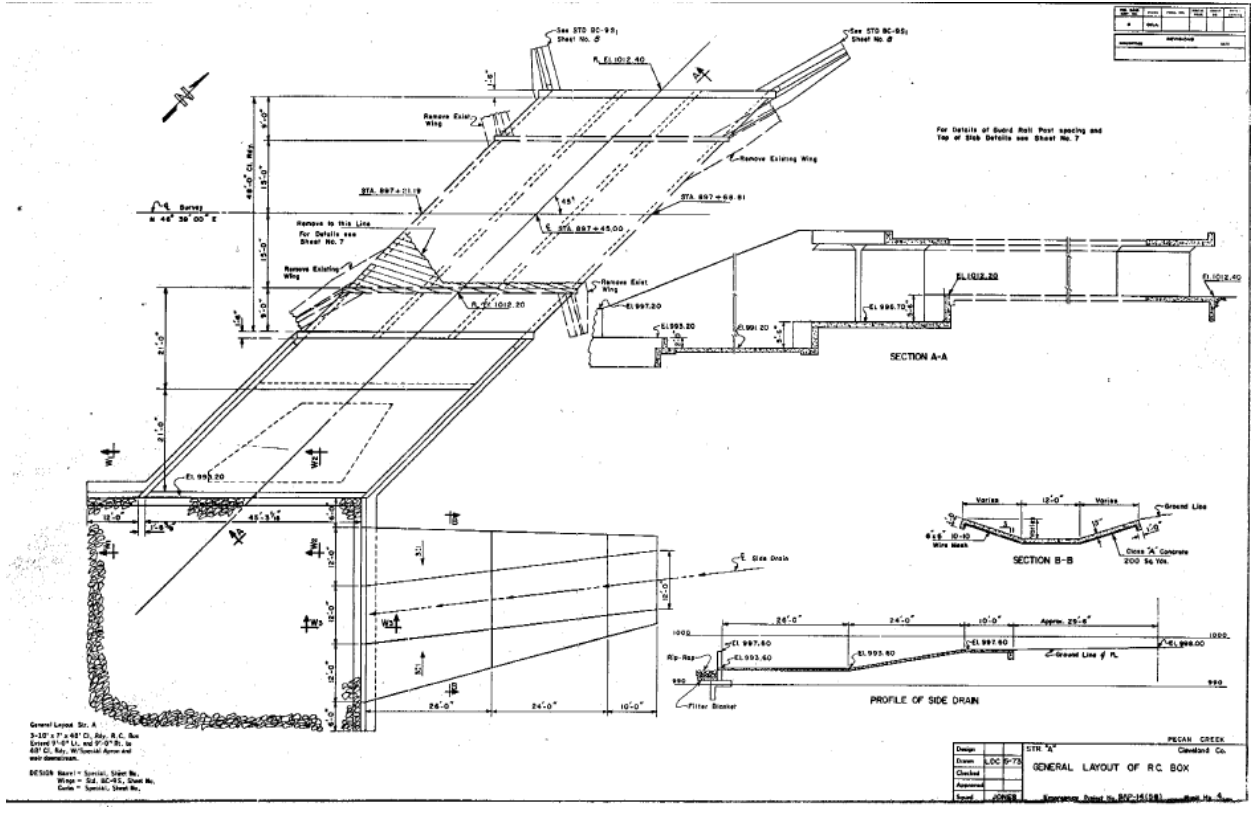
Notes: Major work including a drop outlet was completed on the downstream side in 1973. A curtain wall was added on the downstream side of the RCB in 1984.

BEFORE



AFTER



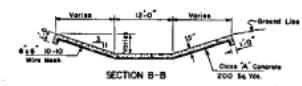


General Layout No. A
 2'-10" x 17'-4 1/2" R.C. Box, R.C. Box
 Survey 11'-0" L. and 7'-0" R. to
 887 C. Box, all corners approved
 and dimensioned.

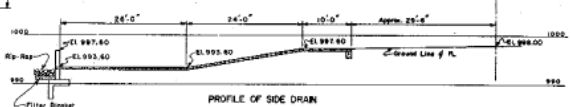
DESIGN: Survey - Station, Layout No.
 Station - STA. 887+73.17, Station No.
 Date - 11/20/83, Sheet No.

For details of Guard Rail Post spacing and
 Top of Slab Details see Sheet No. 7

SECTION A-A



PROFILE OF SIDE DRAIN



Drawn	STR 'A'	MEGAN CREEK
Station	LOC 9-73	Clarendon Co.
Checked		GENERAL LAYOUT OF R.C. BOX
Approved		
Scale	AS SHOWN	Reference Sheet to RCP-111281

NBI 16373 Rockwell Ave over Unnamed Creek

Structure #: 55N3010E1070004 Size: (13'-17'-13')x9'x50' RCB

Problem Type: Degradation and Undermining

Location: Degradation through the RCB

Solution: Replace RCB

Cost/Outcome: \$ 940,614

Notes: Completed in 1996.

BEFORE



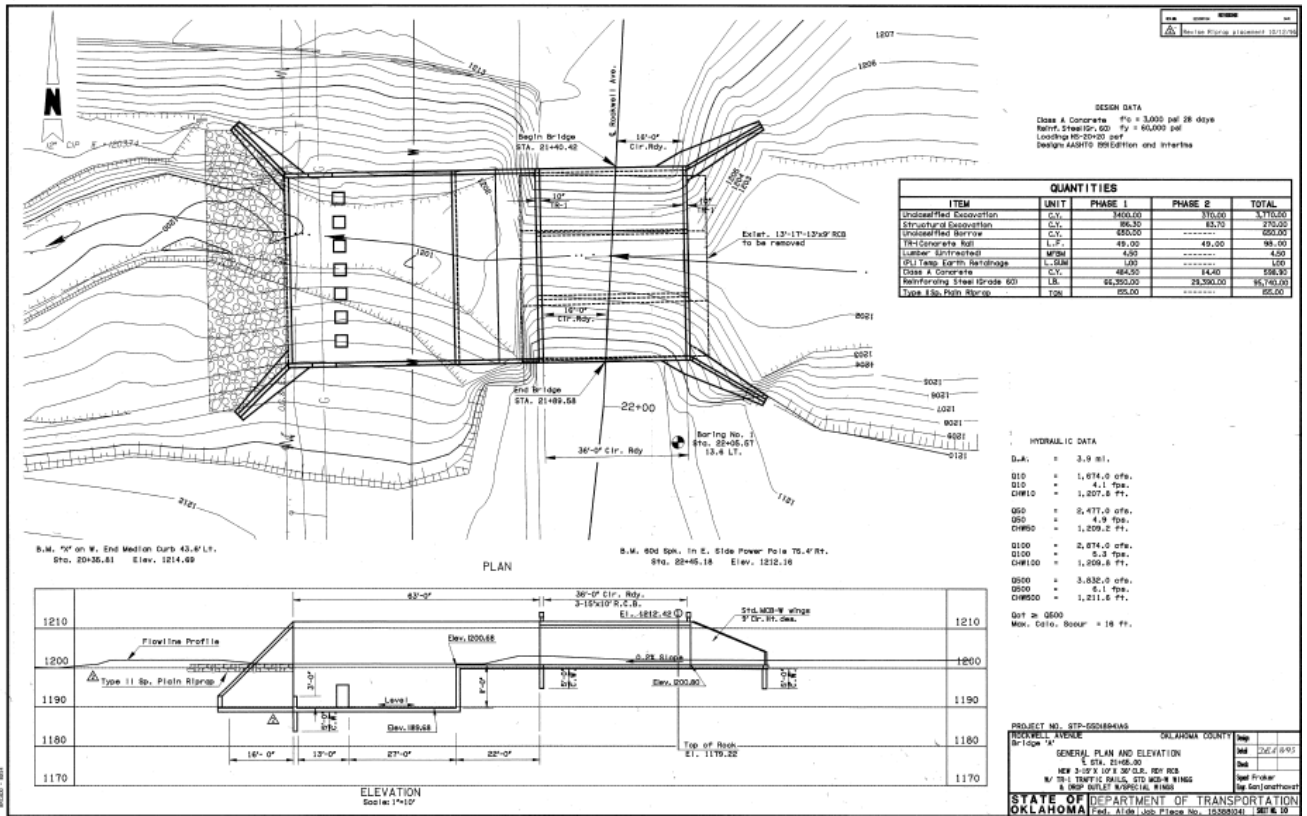
AFTER



BEFORE



AFTER



NBI 14317 I-35 over Tributary to Cottonwood Creek

Structure #: 1028 0276X Size: (12'-14'-12') X 12' X 78' R.C.BOX

Problem Type: Degradation and Undermining

Location: At the inlet of the RCB.

Solution: Replace Inlet

Cost/Outcome: \$ 758,429

Notes: Completed in 2010.

BEFORE



AFTER



NBI 14252 S.H. 199 over Unnamed Creek

Structure #: 1004 1015X Size: 2-10'x10'x82' RCB

Problem Type: Degradation and Undermining

Location: Downstream side of the RCB

Solution: Installed new apron and wings on the downstream side.

Cost/Outcome: \$ 19,000

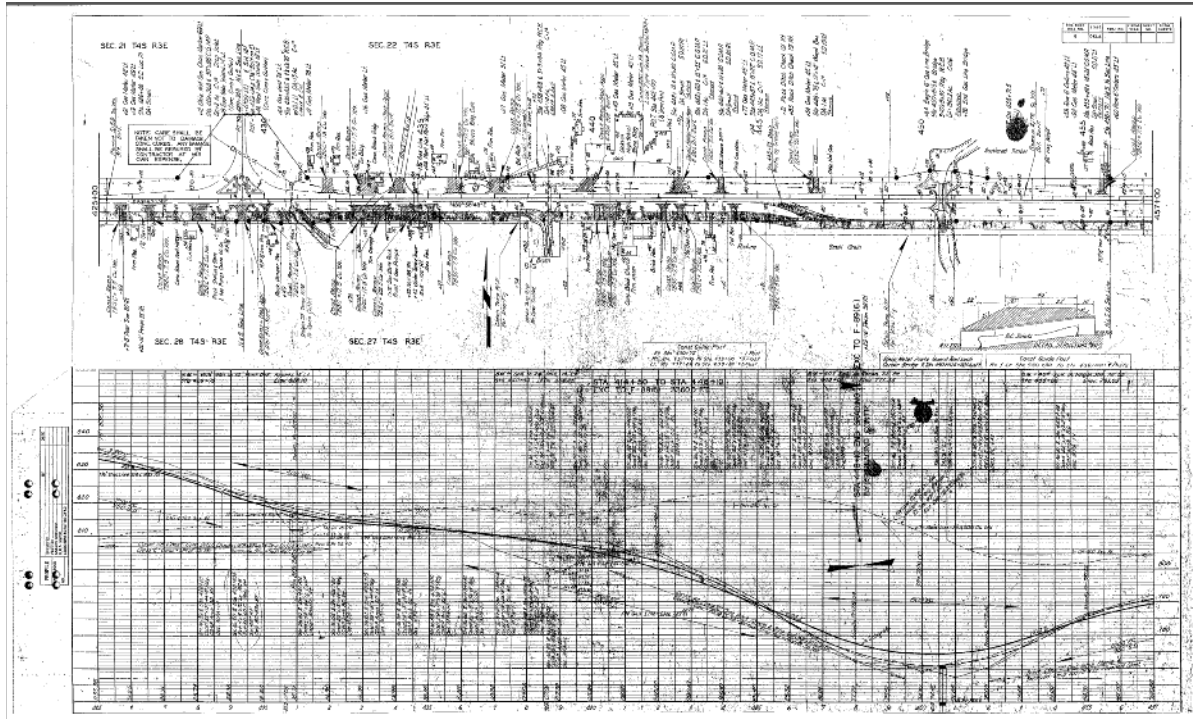
Notes: Completed in 2009.

BEFORE



AFTER





NBI 15702 I-35 over Bills Creek

Structure #: 4317 1393EX Size: 3-10'x10'x133' SK 45°

Problem Type: Degradation and Undermining

Location: Downstream of RCB

Solution: Placement of Jersey Barriers and Riprap at downstream side of RCB.

Cost/Outcome: \$ 26,000

Notes: Completed in 2011.

BEFORE



AFTER



BEFORE



AFTER



NBI 14726 U.S. 70 over Unnamed Creek

Structure #: 4827 0163X Size: 2-10'x12'x138' RCB

Problem Type: Degradation and Undermining

Location: Upstream side of RCB

Solution: Build Drop Outlet

Cost/Outcome: \$1,500,000

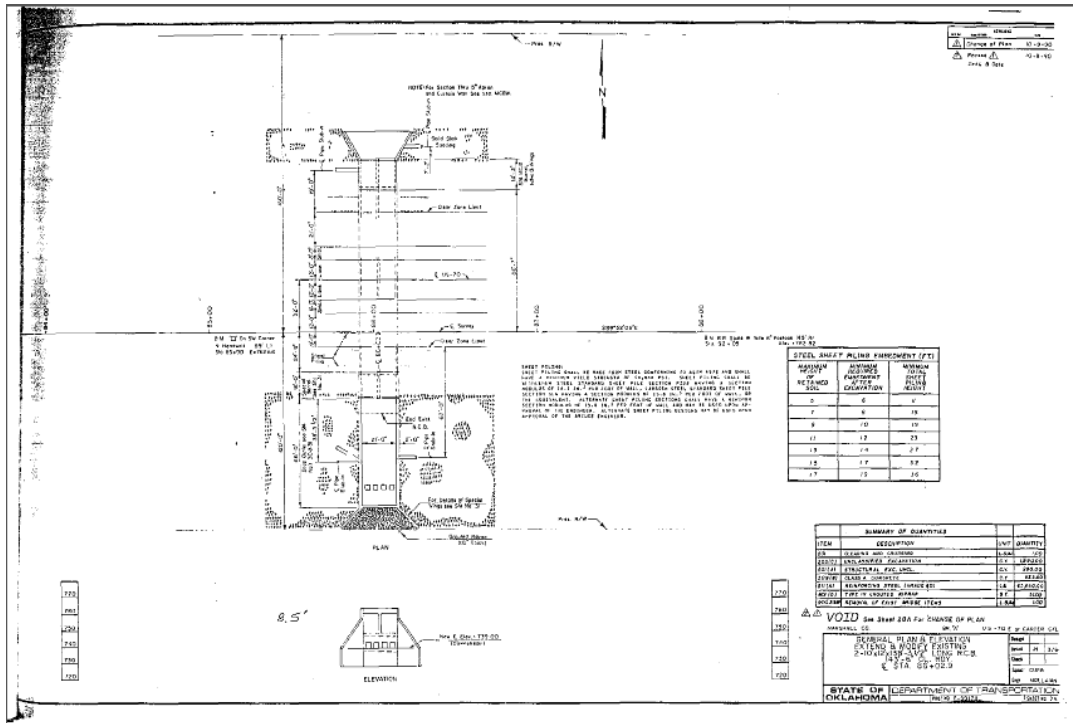
Notes: Completed in 1990.

BEFORE



AFTER





NO.	DATE	BY
1	10-1-20	
Change of Plan		
NO.	DATE	BY
1	10-1-20	
Change of Plan		

SUMMARY OF QUANTITIES		
ITEM	DESCRIPTION	QUANTITY
1	CONCRETE	1.00
2	BRICK	10.00
3	PLASTER	10.00
4	PAINT	10.00
5	ROOFING	10.00
6	GLASS	10.00
7	IRON	10.00
8	STEEL	10.00
9	WOOD	10.00
10	OTHER	10.00
11	TOTAL	100.00

SUMMARY OF QUANTITIES		
ITEM	DESCRIPTION	QUANTITY
1	CONCRETE	1.00
2	BRICK	10.00
3	PLASTER	10.00
4	PAINT	10.00
5	ROOFING	10.00
6	GLASS	10.00
7	IRON	10.00
8	STEEL	10.00
9	WOOD	10.00
10	OTHER	10.00
11	TOTAL	100.00

VOID See Sheet 100 for CHANGE OF PLAN

REVISIONS:

NO.	DATE	BY
1	10-1-20	
2	10-1-20	
3	10-1-20	
4	10-1-20	
5	10-1-20	
6	10-1-20	
7	10-1-20	
8	10-1-20	
9	10-1-20	
10	10-1-20	
11	10-1-20	
12	10-1-20	
13	10-1-20	
14	10-1-20	
15	10-1-20	
16	10-1-20	
17	10-1-20	
18	10-1-20	
19	10-1-20	
20	10-1-20	

NBI 16396 I-40 over Unnamed Creek

Structure #: 5569 0445X Size: (13'-17'-13') X 10'X 173' RCB

Problem Type: Degradation and Undermining

Location: Downstream of RCB

Solution: Extend outlet and build a drop outlet.

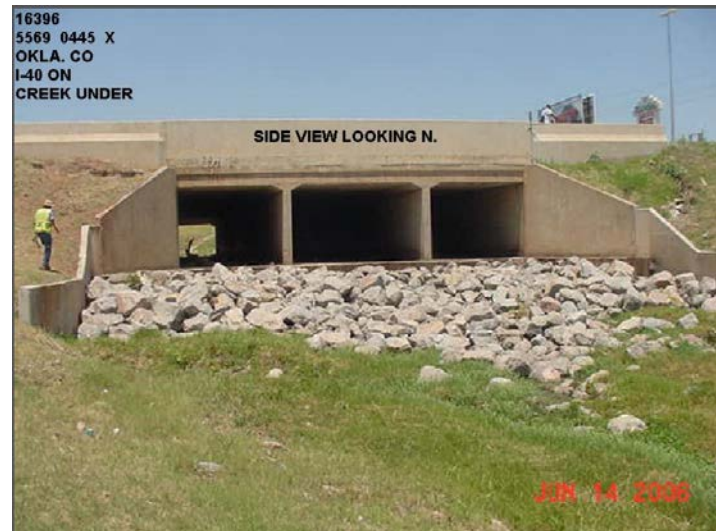
Cost/Outcome: \$ 85,493

Notes: Completed in 1999.

BEFORE



AFTER



BEFORE



AFTER



NBI 20629 I-35 over Unnamed Creek

Structure #: 5509-0464

Structure Size and Type: 2-10'x8'x1260' RCB

Problem Type: Degradation and Undermining

Location: Outlet (East Side) of RCB

Solution: Placed Riprap

Cost/Outcome: Failed after 5 years.

Notes: The riprap was placed in 2006 and lasted until 2011.

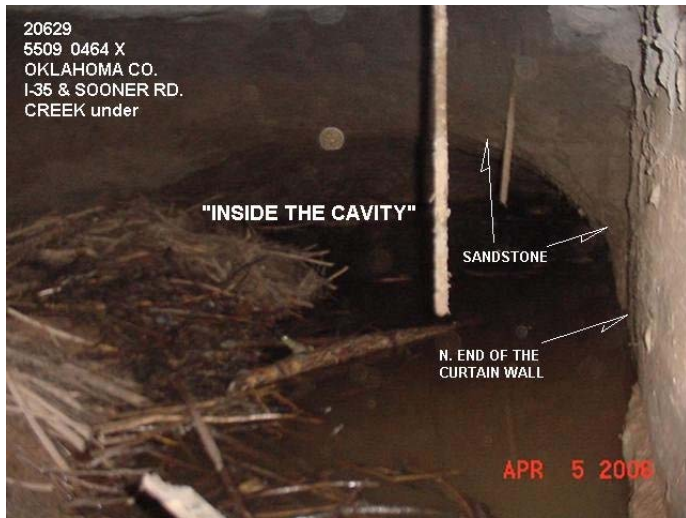
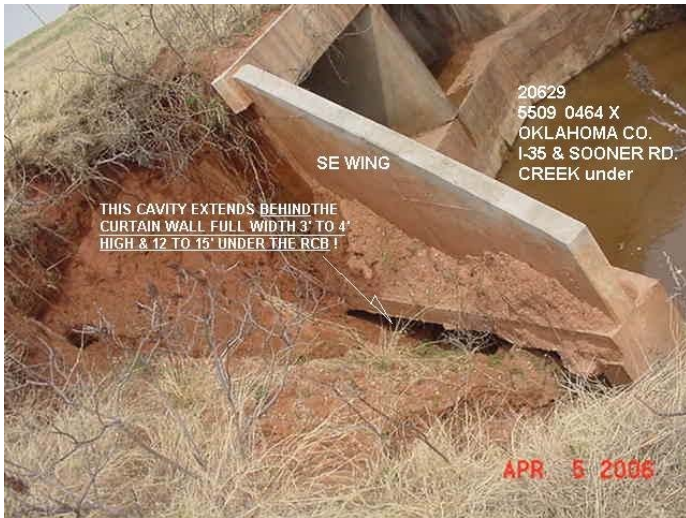
BEFORE



AFTER



BEFORE



AFTER



NBI 20629 I-35 over Unnamed Creek

Structure #: 5509-0464

Structure Size and Type: 2-10'x8'x1260' RCB

Problem Type: Degradation and Undermining

Location: Outlet (East Side) of RCB

Solution: Placed Riprap

Cost/Outcome: \$2500 and was completed in 2.5 days.

Notes: Out of spec Jersey Barrier Walls were placed at the outlet and then backfilled with riprap.

BEFORE



AFTER



BEFORE



AFTER



NBI 12611 S.H. 8 over Unnamed Creek

Structure #: 0208 0156X Size: 2(10.25',2-12.5,10.25)x6'x34' SK 60°

Problem Type: Settlement

Location: Downstream side of RCB

Solution: Replace failed RCB.

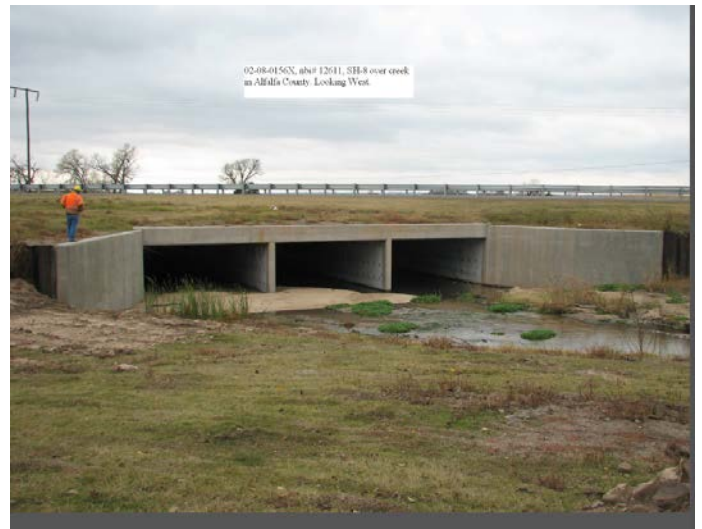
Cost/Outcome: \$ 857,000

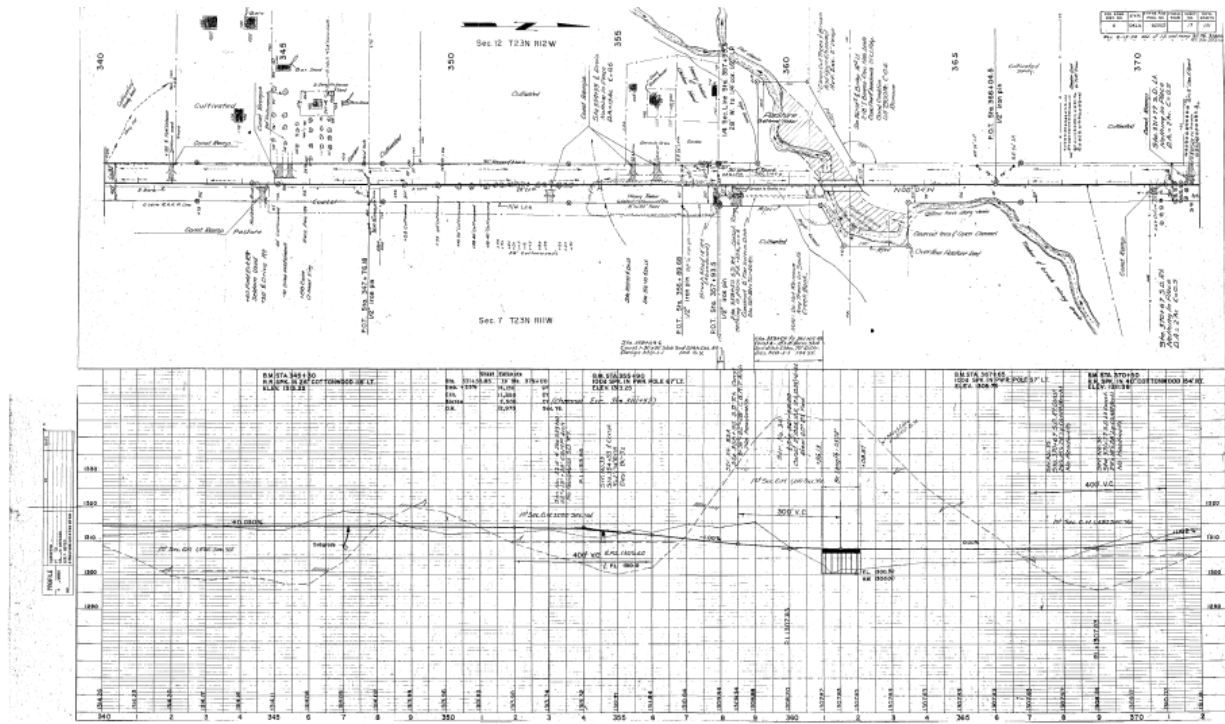
Notes: Completed in 2009.

BEFORE



AFTER





NBI 16283 I-40 over Unnamed Creek

Structure #: 5569 0148X Size: 2-10' X 7' X 182' R.C. BOX

Problem Type: Settlement

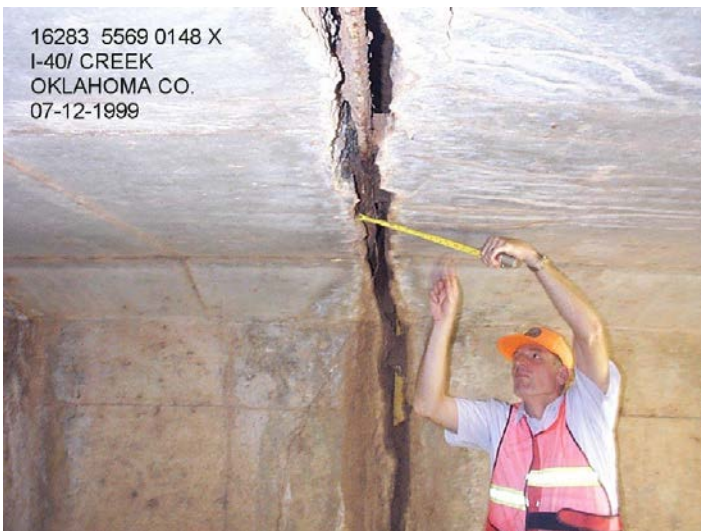
Location: Downstream side of RCB

Solution: Build drop Outlet

Cost/Outcome: \$ 257,000

Notes: Completed in 2003.

BEFORE



AFTER



NBI 23278 Reno at Scott Street

Structure #: 55E1070N3100009 Size: (13'-17'-13')x15'x50' RCB

Problem Type: Settlement

Location: Outlet of RCB

Solution: Replace RCB.

Cost/Outcome: \$ 680,000

Notes: Completed in 2011.

BEFORE



AFTER



NBI 05418 S.H. 9 over Tributary to Pecan Creek

Structure #: 1411 1705X Size: 3-10'X 7'X 48' RCB SK 45° & DROP OUTLET S END

Problem Type: Settlement

Location: Downstream of RCB

Solution: Replace RCB

Cost/Outcome:

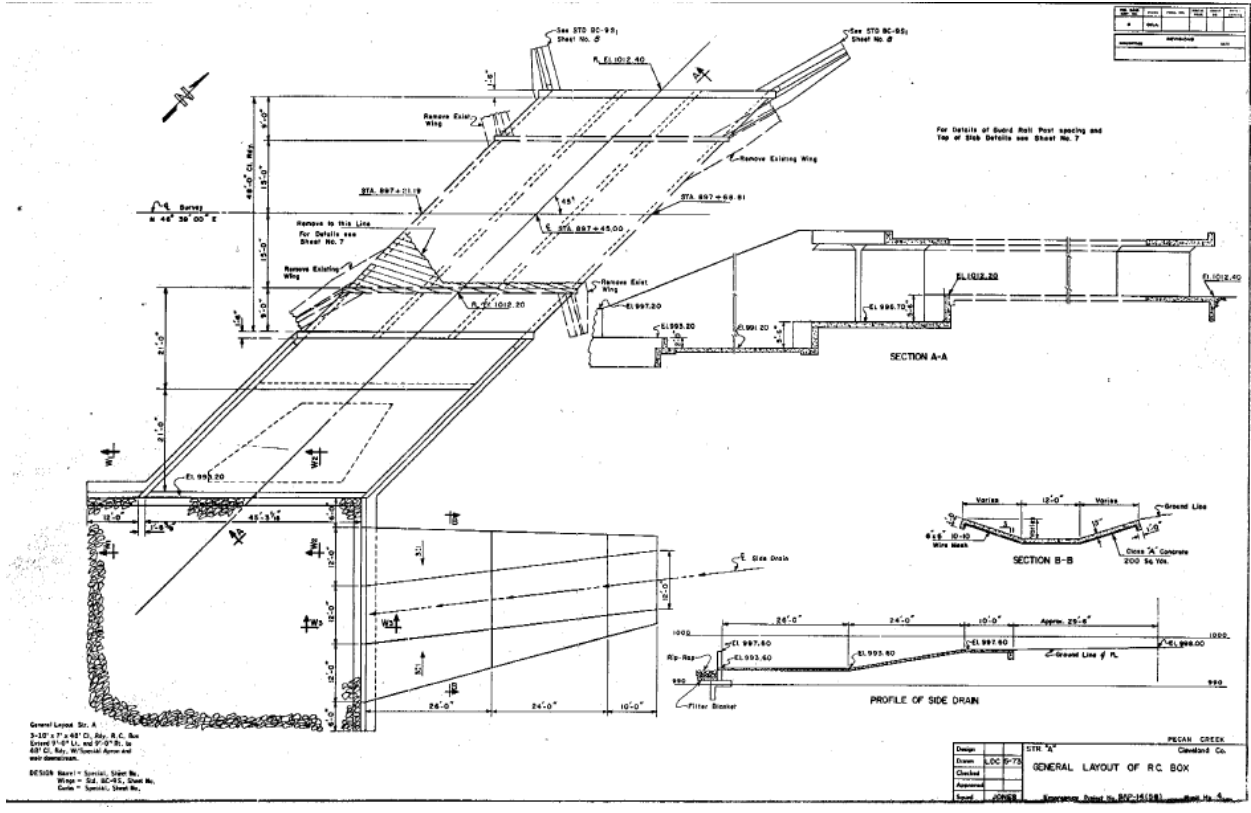
Notes: Major work including a drop outlet was completed on the downstream side in 1973. A curtain wall was added on the downstream side of the RCB in 1984.

BEFORE



AFTER



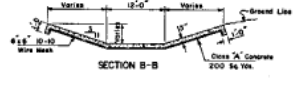


General Layout No. A
 2'-10" x 17'-4 1/2" R.C. Box, R.C. Box
 Survey 11'-0" L. and 7'-0" R. to
 887 C. Box, all corners approved
 and dimensioned.

DESIGN: Survey - Station, Station No.
 Width - 17'-4 1/2", Depth - 17'-0"
 Date - 11/11/11, Sheet No.

For details of Guard Rail Post spacing and
 Top of Slab Details see Sheet No. 2

SECTION A-A



PROFILE OF SIDE DRAIN

Drawn	STR 'A'	MEGAN CREEK
Station	LOC 9-75	Clarendon Co.
Checked		GENERAL LAYOUT OF R.C. BOX
Approved		
Scale	AS SHOWN	Reference Sheet to RCP-111081

NBI 16373 Rockwell Ave over Unnamed Creek

Structure #: 55N3010E1070004 Size: (13'-17'-13')x9'x50' RCB

Problem Type: Settlement

Location: Degradation through the RCB

Solution: Replace RCB

Cost/Outcome: \$ 940,614

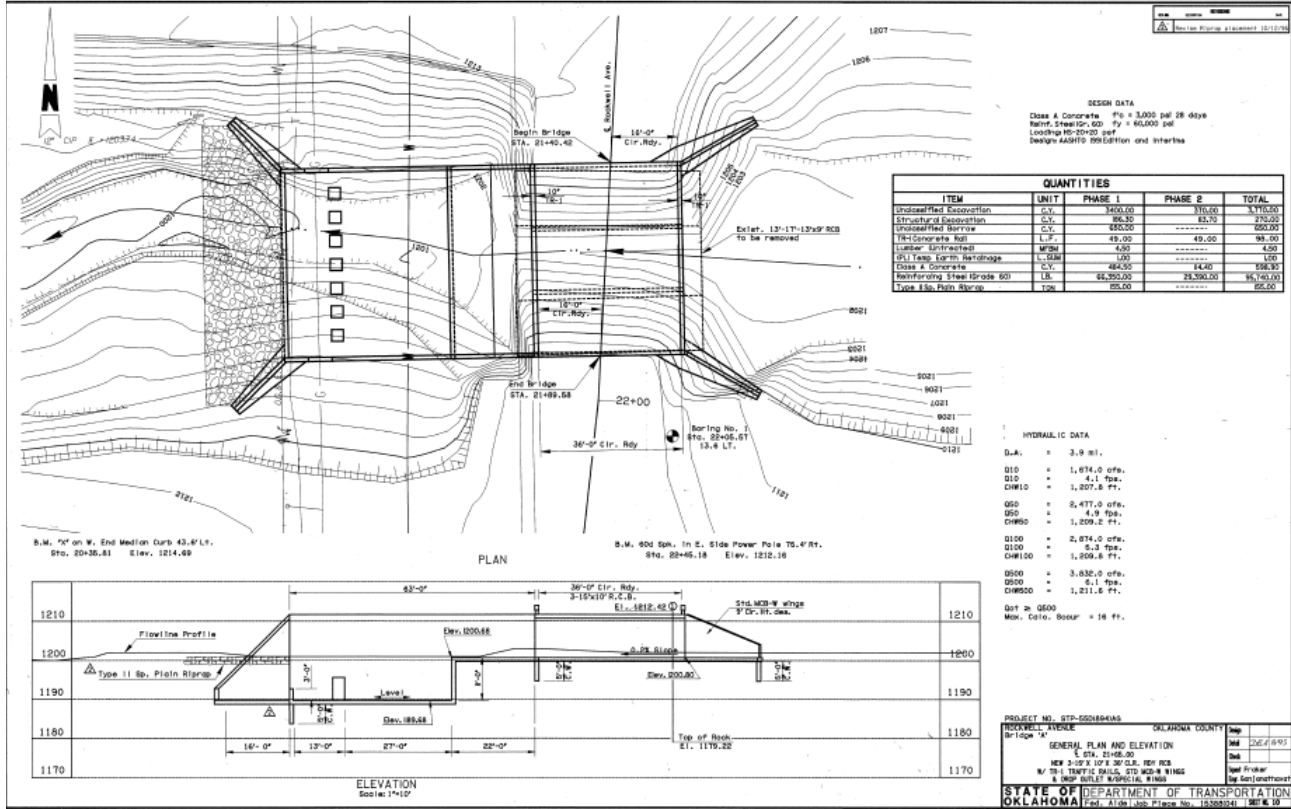
Notes: Completed in 1996.

BEFORE



AFTER





NBI 14317 I-35 over Tributary to Cottonwood Creek

Structure #: 1028 0276X Size: (12'-14'-12') X 12' X 78' R.C.BOX

Problem Type: Settlement

Location: At the inlet of the RCB.

Solution: Replace Inlet

Cost/Outcome: \$ 758,429

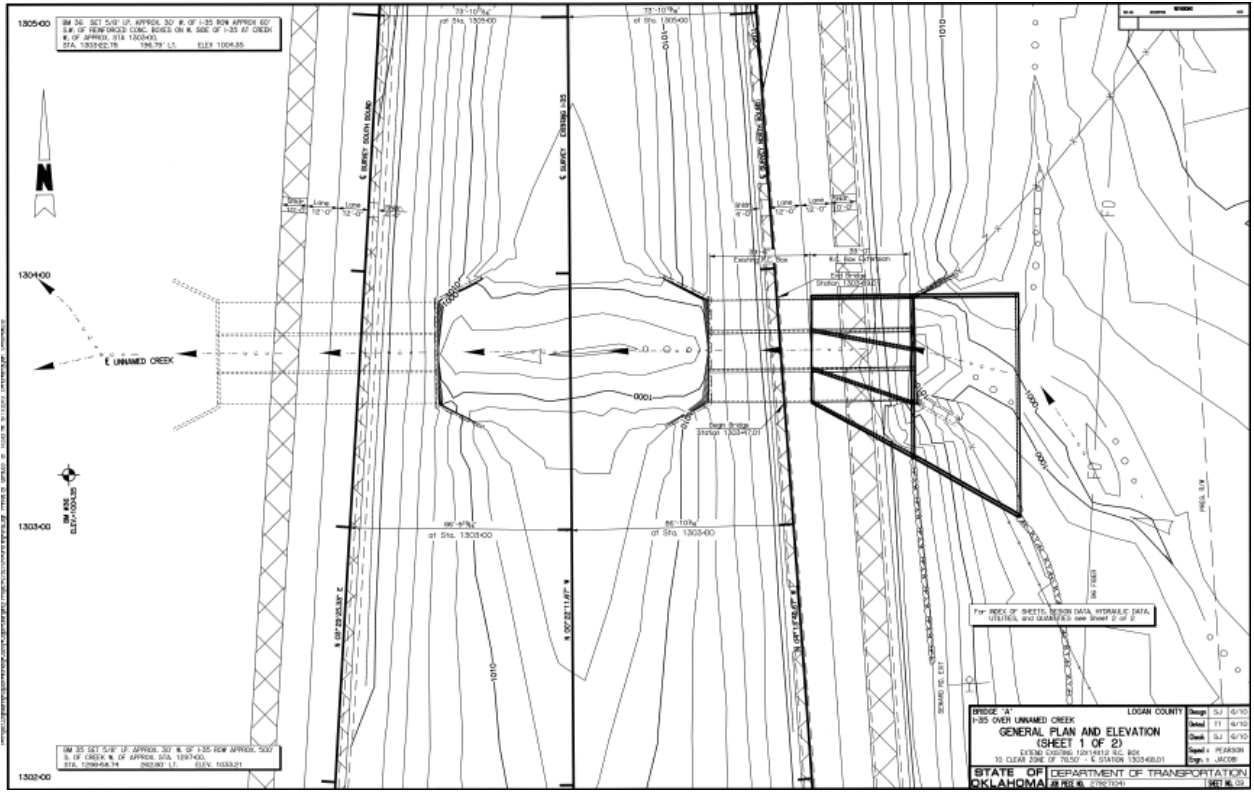
Notes: Completed in 2010.

BEFORE



AFTER





NBI 25082 S.H. 146 over Tributary to Punjo Creek

Structure #: 0851 0381X Size: BROKENBACK RCB US-2-13'X10'X60' DS-2-13'X27'X60' RCB

Problem Type: Flow Under Structure

Location: Downstream of RCB

Solution: Built a drop outlet.

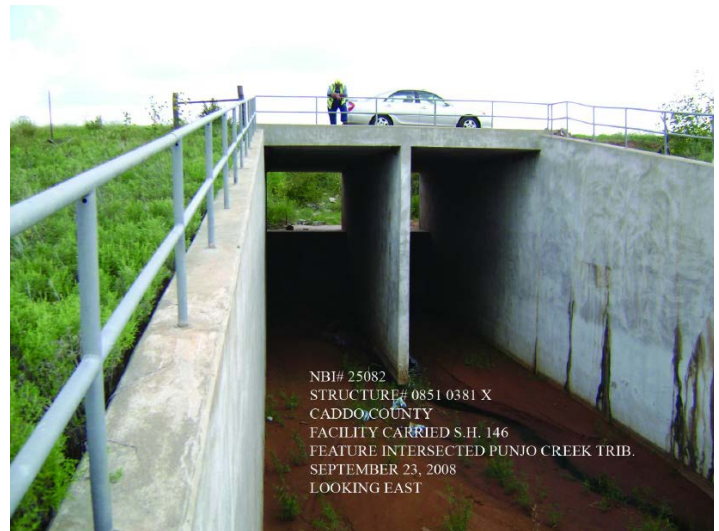
Cost/Outcome: \$ 1,376,221 including detour.

Notes: Completed in 1997. The new structure withstood Tropical Storm Erin which deposited an enormous amount of debris on the upstream side. A well vegetative channel can be seen looking through the 2010 inspection picture.

BEFORE



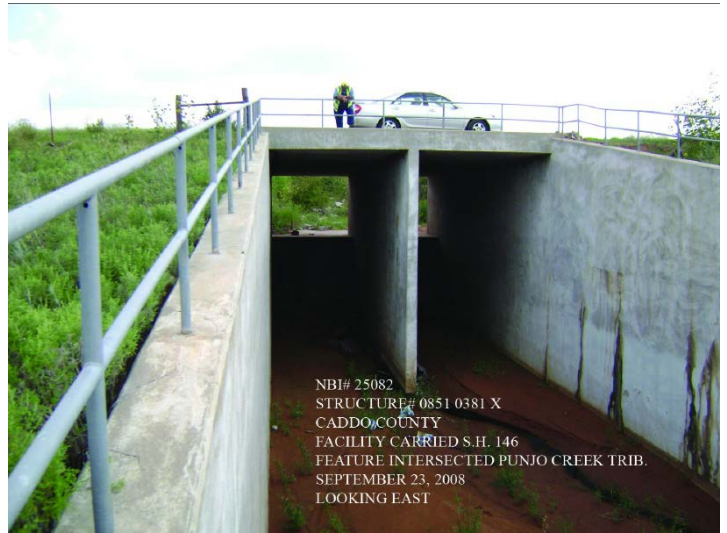
AFTER



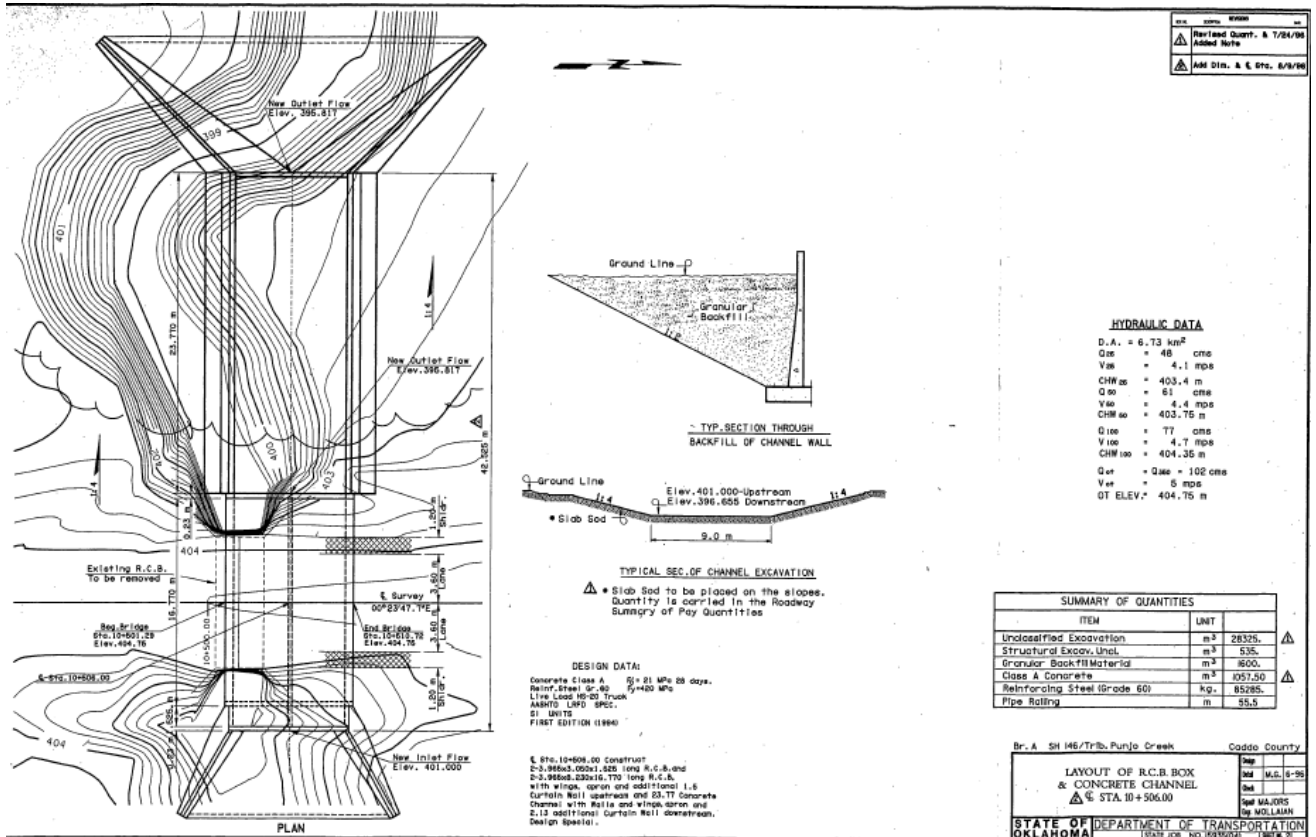
BEFORE



AFTER



NBI# 25082
 STRUCTURE# 0851 0381 X
 CADDO COUNTY
 FACILITY CARRIED S.H. 146
 FEATURE INTERSECTED PUNJO CREEK TRIB.
 SEPTEMBER 23, 2008
 LOOKING EAST



NBI 16373 Rockwell Ave over Unnamed Creek

Structure #: 55N3010E1070004 Size: (13'-17'-13')x9'x50' RCB

Problem Type: Flow Under Structure

Location: Degradation through the RCB

Solution: Replace RCB

Cost/Outcome: \$ 940,614

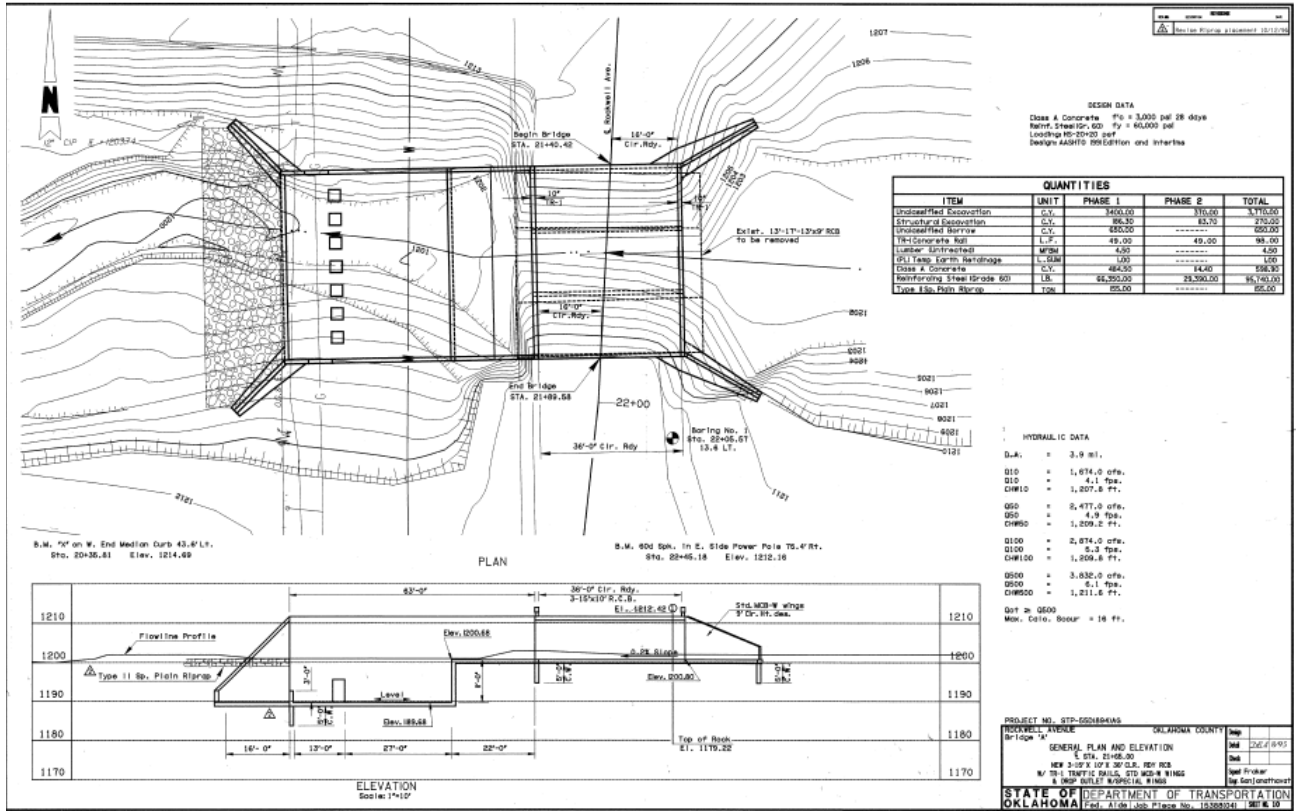
Notes: Completed in 1996.

BEFORE



AFTER





DESIGN DATA
 Class A Concrete P_c = 3,000 pcf 28 days
 Normal Steel G_c = 60,000 psi
 Looking NB-20+00 profile
 Design AASHTO 908 Edition and Interim

QUANTITIES				
ITEM	UNIT	PHASE 1	PHASE 2	TOTAL
Unclassified Excavation	C.Y.	340.00	310.00	650.00
Structural Excavation	C.Y.	96.30	83.70	180.00
Unclassified Borrow	C.Y.	825.00	-----	825.00
Structural Fill	C.Y.	49.00	49.00	98.00
Lumber - Scaffolding	M ³	4.00	-----	4.00
Wall Formwork	S.F.	120	-----	120
Class A Concrete	C.Y.	64.50	14.00	78.50
Reinforcing Steel 1/2" dia 60	LB.	24,350.00	24,350.00	48,700.00
Type I Sp. Plain Stone	TON	25.00	-----	25.00

HYDRAULIC DATA

- D.A. = 3.9 mi.
- D10 = 1,874.0 cfs.
- D15 = 4.1 fps.
- DW10 = 1,207.8 ft.
- D50 = 2,477.0 cfs.
- D55 = 4.9 fps.
- DW50 = 1,509.2 ft.
- D100 = 2,874.0 cfs.
- D100 = 5.3 fps.
- DW100 = 1,509.8 ft.
- D500 = 3,832.0 cfs.
- D500 = 6.1 fps.
- DW500 = 1,211.8 ft.

PROJECT NO. 07D-00048448 OKLAHOMA COUNTY

BRIDGE "K" 126.6/0.91

GENERAL PLAN AND ELEVATION
 S STA. 21+05.00
 NEW 3'-0" X 10'-0" S.E. REV RCB
 N/ TO 15' TYPIC SPALLS, STD M&M WINGS
 & 8" DEEP SLOTTED REINFORCING BARS

DATE PLOTTED: 10/10/2014
 BY: GARY HENNING

STATE OF OKLAHOMA DEPARTMENT OF TRANSPORTATION
 OKLAHOMA Fed. Aid. Job. File No. 10-000041 10/10/14

NBI 14317 I-35 over Tributary to Cottonwood Creek

Structure #: 1028 0276X Size: (12'-14'-12') X 12' X 78' R.C.BOX

Problem Type: Channel Alignment

Location: At outlet of the RCB.

Solution: Replace Inlet

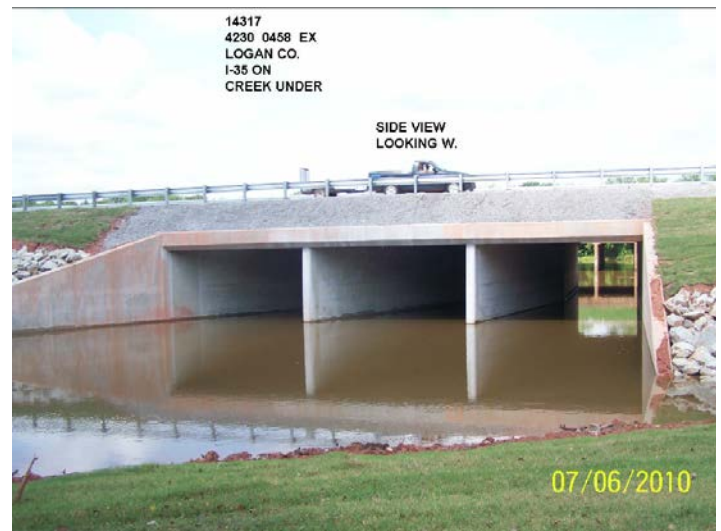
Cost/Outcome: \$ 758,429

Notes: Completed in 2010.

BEFORE



AFTER



NBI 16393 I-40 over Unnamed Creek

Structure #: 5569 0212X Size: (12'-14'-12') X 10' X 183' SK. 60 DEG.

Problem Type: Wingwall Erosion Behind

Location: South Side of Box

Solution: Placed Riprap on Downstream Side of Box

Cost/Outcome:

Notes: Completed in 1996.

BEFORE



AFTER



NBI 17690 S.H. 24 over Unnamed Creek

Structure #: 4412 0045 X

Structure Size and Type: 2 – 10' X 10' X 80' RDY RC Box w/ 3' additional curtain walls

Problem Type: Wingwall - Cracks, Loss, Erosion, or Undermining

Location: Downstream

Solution: Re-poured the wingwall and the broken section of the barrel

Cost/Outcome: \$18000

BEFORE



BEFORE

AFTER



AFTER



NBI 18418 U.S. 60 over Unnamed Creek

Structure #: 3630 0147X Size: 3-10'x12'x175' RCB

Problem Type: Wingwall Undermining

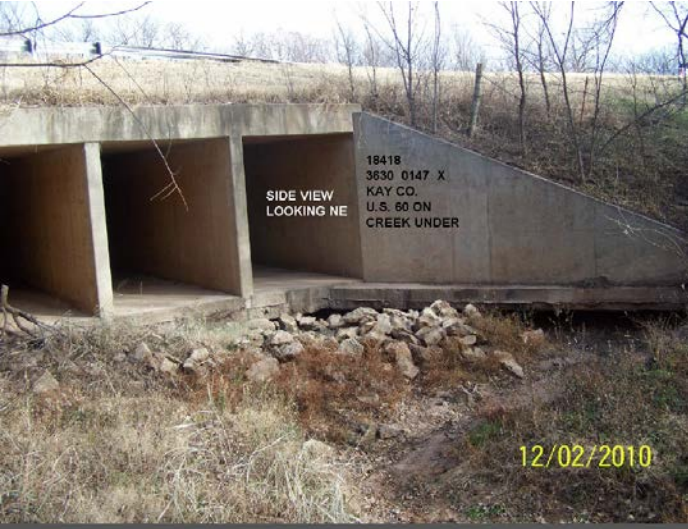
Location: Outlet of RCB

Solution: Build Drop Outlet.

Cost/Outcome: \$166,000

Notes: Completed in 2011.

BEFORE



AFTER



NBI 14956 US 70 over Little Havant Creek

Structure #: 4827 0271X Size: (12'-14'-12') X 10' X 91' DROP OUTLET

Problem Type: Wingwall Loss

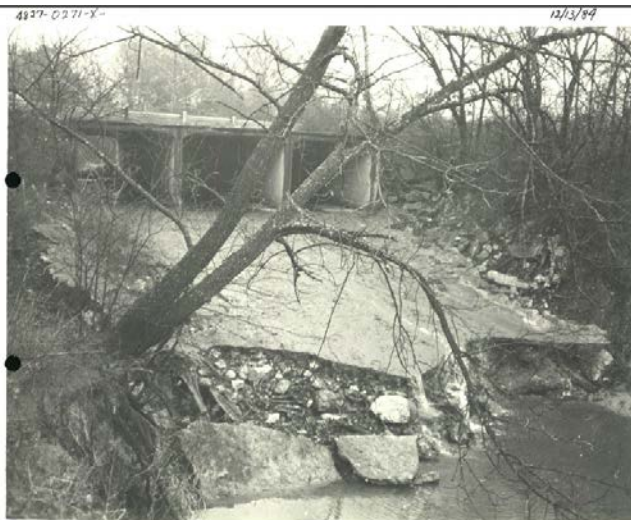
Location: South side of RCB

Solution: Construct drop outlet with energy dissipaters

Cost/Outcome: \$1,500,000

Notes: Completed in 1993.

BEFORE



AFTER



S.H. 39 over Unnamed Creek

Structure #: Size: Roadway Size RCB

Problem Type: Wingwall Erosion

Location: Downstream of RCB

Solution: Build Gabions with a Contra Costa.

Cost/Outcome:

Notes: The RCB is 4.5 miles east of US 177 in Pottawatomie county. The drainage channel had degraded 11 ft.

BEFORE



AFTER



NBI 16283 I-40 over Unnamed Creek

Structure #: 5569 0148X Size: 2-10' X 7' X 182' R.C. BOX

Problem Type: Wingwall Erosion

Location: Downstream side of RCB

Solution: Build drop Outlet

Cost/Outcome: \$ 257,000

Notes: Completed in 2003.

BEFORE



AFTER



NBI 25082 S.H. 146 over Tributary to Punjo Creek

Structure #: 0851 0381X Size: BROKENBACK RCB US-2-13'X10'X60' DS-2-13'X27'X60' RCB

Problem Type: Wingwall Erosion

Location: Downstream of RCB

Solution: Place Riprap

Cost/Outcome: \$1,376,221

Notes: Completed 1997

BEFORE



AFTER



NBI 05418 S.H. 9 over Tributary to Pecan Creek

Structure #: 1411 1705X Size: 3-10'X 7'X 48' RCB SK 45° & DROP OUTLET S END

Problem Type: Wingwall Erosion

Location: Downstream of RCB

Solution: Replace Outlet

Cost/Outcome:

Notes: Major work including a drop outlet was completed on the downstream side in 1973. A curtain wall was added on the downstream side of the RCB in 1984.

BEFORE



AFTER



NBI 14317 I-35 over Tributary to Cottonwood Creek

Structure #: 1028 0276X Size: (12'-14'-12') X 12' X 78' R.C.BOX

Problem Type: Wingwall Erosion

Location: At the inlet of the RCB.

Solution: Replace Inlet

Cost/Outcome: \$ 758,429

Notes: Completed in 2010.

BEFORE



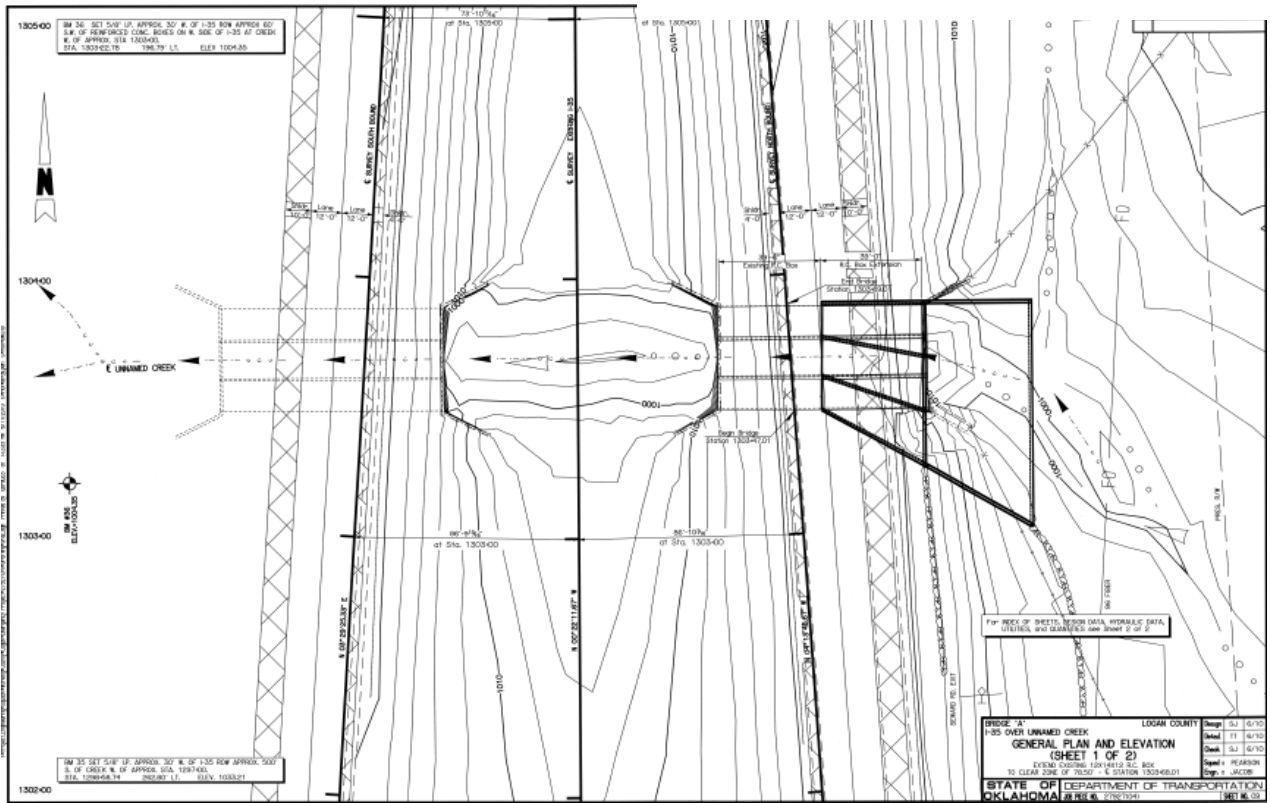
AFTER



BEFORE



AFTER



NBI 14252 S.H. 199 over Unnamed Creek

Structure #: 1004 1015X Size: 2-10'x10'x82' RCB

Problem Type: Wingwall Erosion and Cracks

Location: Downstream side of the RCB

Solution: Installed new apron and wings on the downstream side.

Cost/Outcome: \$ 19,000

Notes: Completed in 2009.

BEFORE



AFTER



NBI 15702 I-35 over Bills Creek

Structure #: 4317 1393EX Size: 3-10'x10'x133' SK 45°

Problem Type: Wingwall Erosion

Location: Downstream of RCB

Solution: Placement of Jersey Barriers and Riprap at downstream side of RCB.

Cost/Outcome: \$ 26,000

Notes: Completed in 2011.

BEFORE



AFTER



NBI 14726 U.S. 70 over Unnamed Creek

Structure #: 4827 0163X Size: 2-10'x12'x138' RCB

Problem Type: Wingwall Loss

Location: Downstream side of RCB

Solution: Build drop outlet

Cost/Outcome: \$1,500,000

Notes: Completed in 1990.

BEFORE



AFTER



NBI 16396 I-40 over Unnamed Creek

Structure #: 5569 0445X Size: (13'-17'-13') X 10'X 173' RCB

Problem Type: Wingwall Erosion

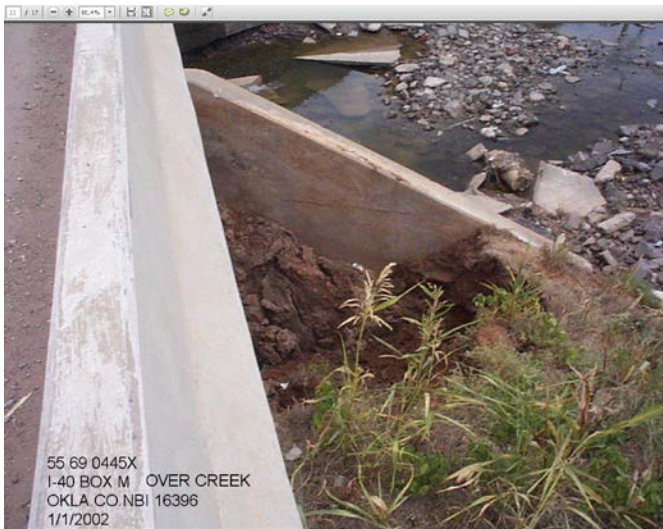
Location: Downstream of RCB

Solution: Build a drop outlet.

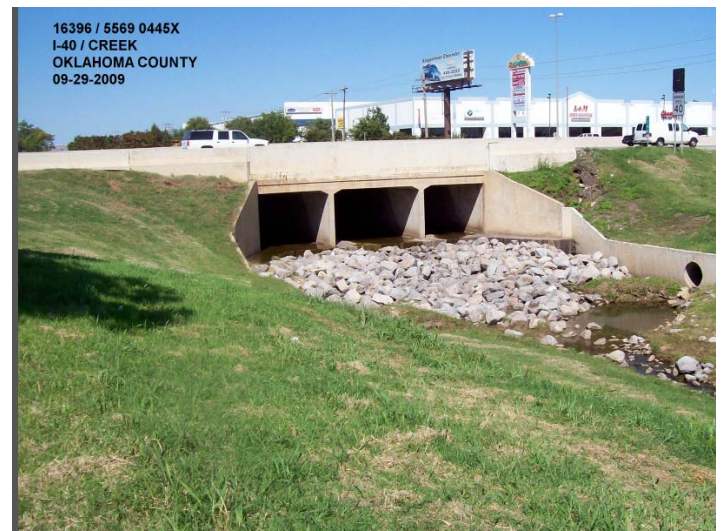
Cost/Outcome: \$ 85,493

Notes: Completed in 1999.

BEFORE



AFTER



Deflector in Wyoming

Structure #: XXXX-XXXX

Structure Size and Type: XXXX-XXXX

Problem Type: Boulders were impacting and damaging the upstream face of the RCB.

Location: Upstream

Solution: Build Deflector on upstream side of the RCB

Cost/Outcome: XXXX-XXXX

Notes: This structure is in Wyoming. The boulders coming down from the mountain were damaging the upstream face of the RCB. The deflector protects the upstream face.

BEFORE



AFTER



BEFORE

AFTER



NBI 06591 S.H. 78 over Red River

Structure #: 0720 0001 X

Structure Size and Type: 8-210' HL Truss and 4-100' Pony Truss Spans

Problem Type: Abutment or Approach Fill Loss

Location: North Abutment

Solution: Rebuild Road

Cost/Outcome: Rebuilt Road in 2015.

BEFORE



AFTER



BEFORE



AFTER



NBI 10742 S.H. 37 over Buggy Creek

Structure #: 2628 0050

Size: 2-45', 50', 2-45' Conc Girder Spans

Problem Type: Choose an item.

Location: West Side

Solution: Encased exposed abutment piles in concrete.

Cost/Outcome: NA

Notes: Worked well until the bridge was replaced in 2012

BEFORE



AFTER



BEFORE



AFTER



NBI 14114 S.H. 76 over Simon Creek

Structure #: 4316 0666X Size: 3-40' I BEAMS PILE BENT

Problem Type: Exposed abutment piles

Location: South abutment

Solution: Place CLSM in voids under abutment

Cost/Outcome: \$623,000

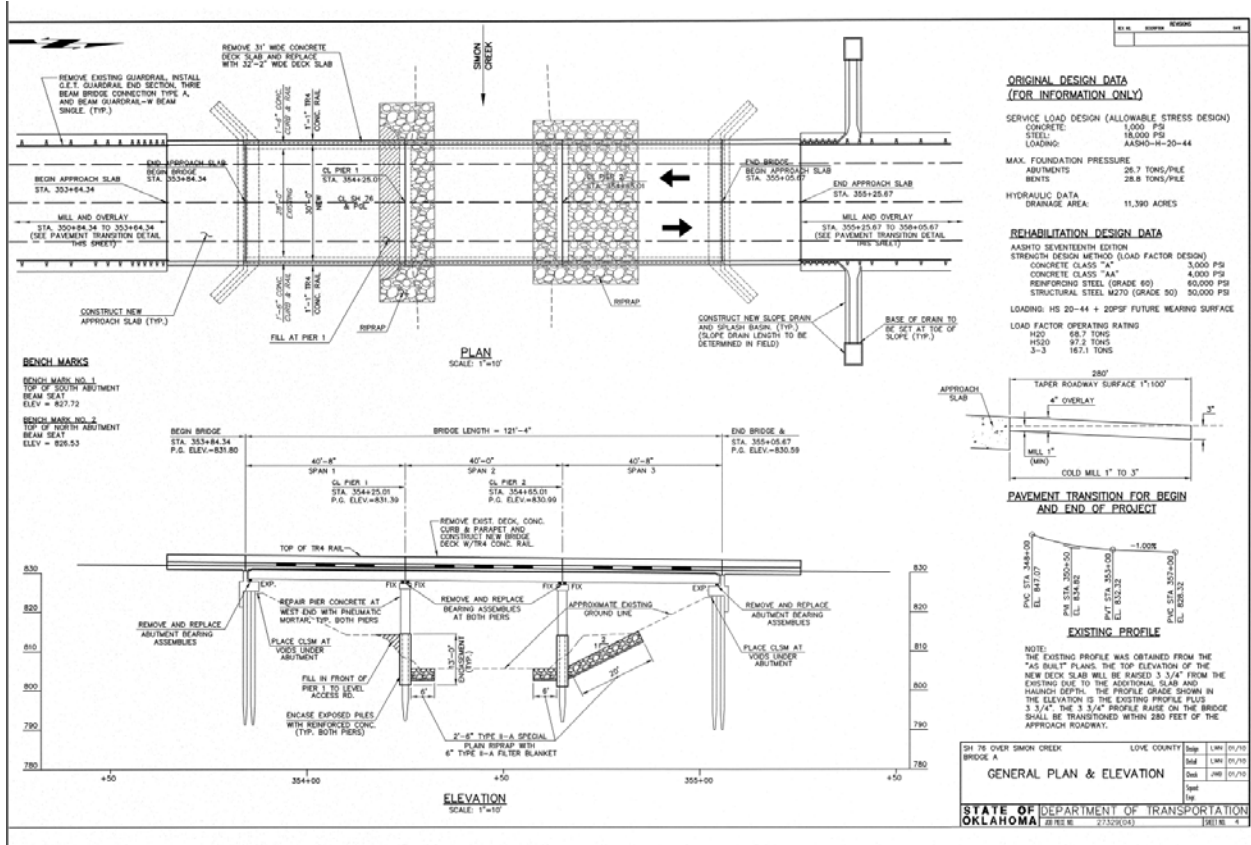
Notes: Completed in 2011

BEFORE



AFTER





NBI 16535 S.H. 81 over Flat Creek

Structure #: 3406 0802X Size: 3-50' I BEAM SPANS

Problem Type: Exposed abutment piles

Location: North Abutment

Solution:

Cost/Outcome:

Notes: No repair as of 2015.

BEFORE



AFTER



NBI 18273 US 81 over Buggy Creek

Structure #: 2612 1644 X

Structure Size and Type: 3-36' PCB Span

Problem Type: Abutment or Approach Fill Loss

Location: North and South Abutments of Bridge

Solution: Retaining wall was constructed in front of the bridge seat and rip rap was placed on the sides of the abutment to the elevation of the previous fill.

Cost/Outcome: Repairs were effective.

BEFORE



AFTER



BEFORE



AFTER



NBI 14200 S.H. 84 over North Canadian River

Structure #: 5420 0162X Size: (4-100' CONT)2-50' I-BM SPANS

Problem Type: Abutment Erosion

Location: North Abutment

Solution:

Cost/Outcome:

Notes: No Repair as of 2015.

BEFORE



AFTER



NBI 14114 S.H. 76 over Simon Creek

Structure #: 4316 0666X Size: 3-40' I BEAMS PILE BENT

Problem Type: Abutment Erosion

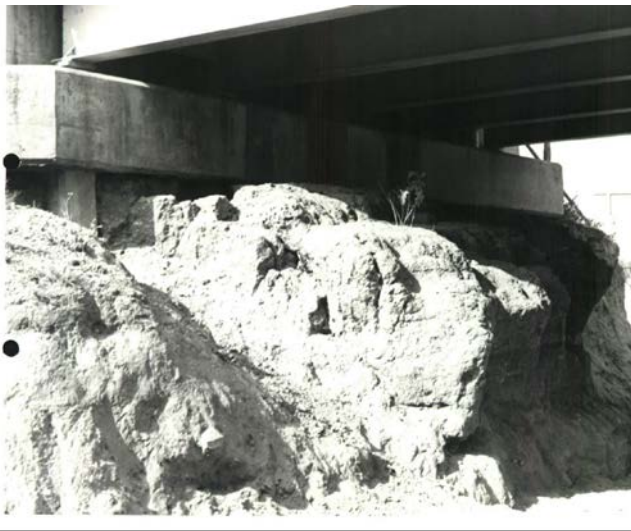
Location: Both Abutments

Solution: Bridge Rehab along with Riprap

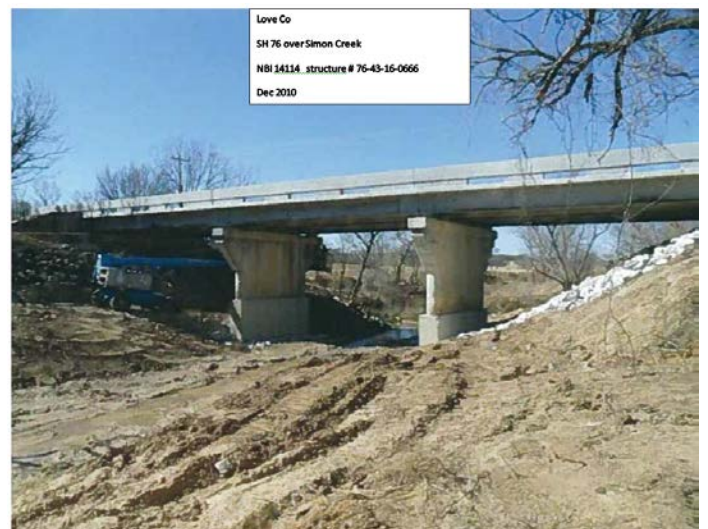
Cost/Outcome: \$623,000

Notes: Completed in 2011

BEFORE



AFTER



NBI 13121 S.H. 76 over Washita River

Structure #: 2536-0936 X

Structure Size and Type: 210' HI. Truss and 4-100' Pony Truss Spans

Problem Type: Upstream Channel Migration

Location: West Side South Bank

Solution: Jetties were added along the channel and perpendicular to the channel.

Cost/Outcome:

Notes: This has worked well until the bridge replacement in 2016.

BEFORE



AFTER



NBI 17598(WX) and 17599(EX) I-35 over Washita River

Structure #: 2546 2022(WX&EX) Size: 2(4-90') CONT. PLATE GIRDER SPANS (WX&EX)

Problem Type: Upstream Channel Migration

Location: South Bank.

Solution: Install steel jetty bank protection.

Cost/Outcome: \$ 165,000

Notes: Completed in 1980.

BEFORE



AFTER



NBI 14200 S.H. 84 over North Canadian River

Structure #: 5420 0162X Size: (4-100' CONT)2-50' I-BM SPANS

Problem Type: Upstream Channel Migration

Location: Channel migration to the south.

Solution: Box Jetties on south bank

Cost/Outcome: 1949-\$19,000, 1958-\$?, 1991-\$56,000, 1996-\$63,000

Notes: The jetties were placed and rebuilt several times. In 1996 the jetties were repaired and riprap placed at the bridge site.

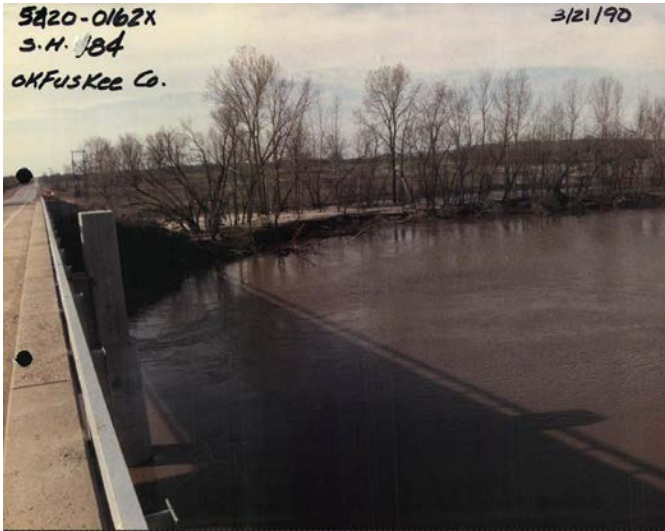
BEFORE



AFTER



BEFORE



AFTER



NBI 16535 S.H. 81 over Flat Creek

Structure #: 3406 0802X Size: 3-50' I BEAM SPANS

Problem Type: Channel migration

Location: South Pier

Solution: Backfill with Soil and Riprap

Cost/Outcome:

Notes: Completed in 2011.

BEFORE



AFTER



NBI 06591 S.H. 78 over Red River

Structure #: 0720-0001 X

Structure Size and Type: 8-210' Truss and 4-100' Pony Truss Span Bridge

Problem Type: Upstream Channel Migration

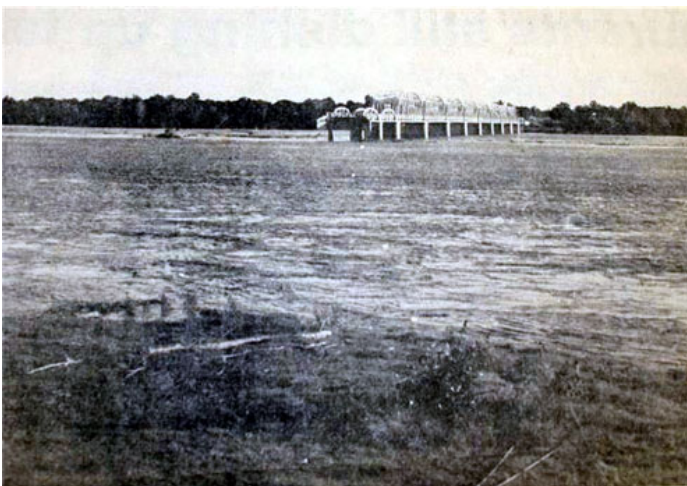
Location: North Side

Solution: Sheet Pile

Cost/Outcome: \$270,000

Notes: Project Complete in 1946

BEFORE



AFTER



NBI 13936 S.H. 89 over Mud Creek

Structure #: 3418-0157X

Size: (64' - 80' - 64' CONT) 14 - 50' I-BEAM SPANS

Problem Type: Scour at Pier 16

Location: South Side

Solution: Pier 16 redesigned to incorporate drilled shafts constructed 15' into rock.

Cost/Outcome: \$750,000.00

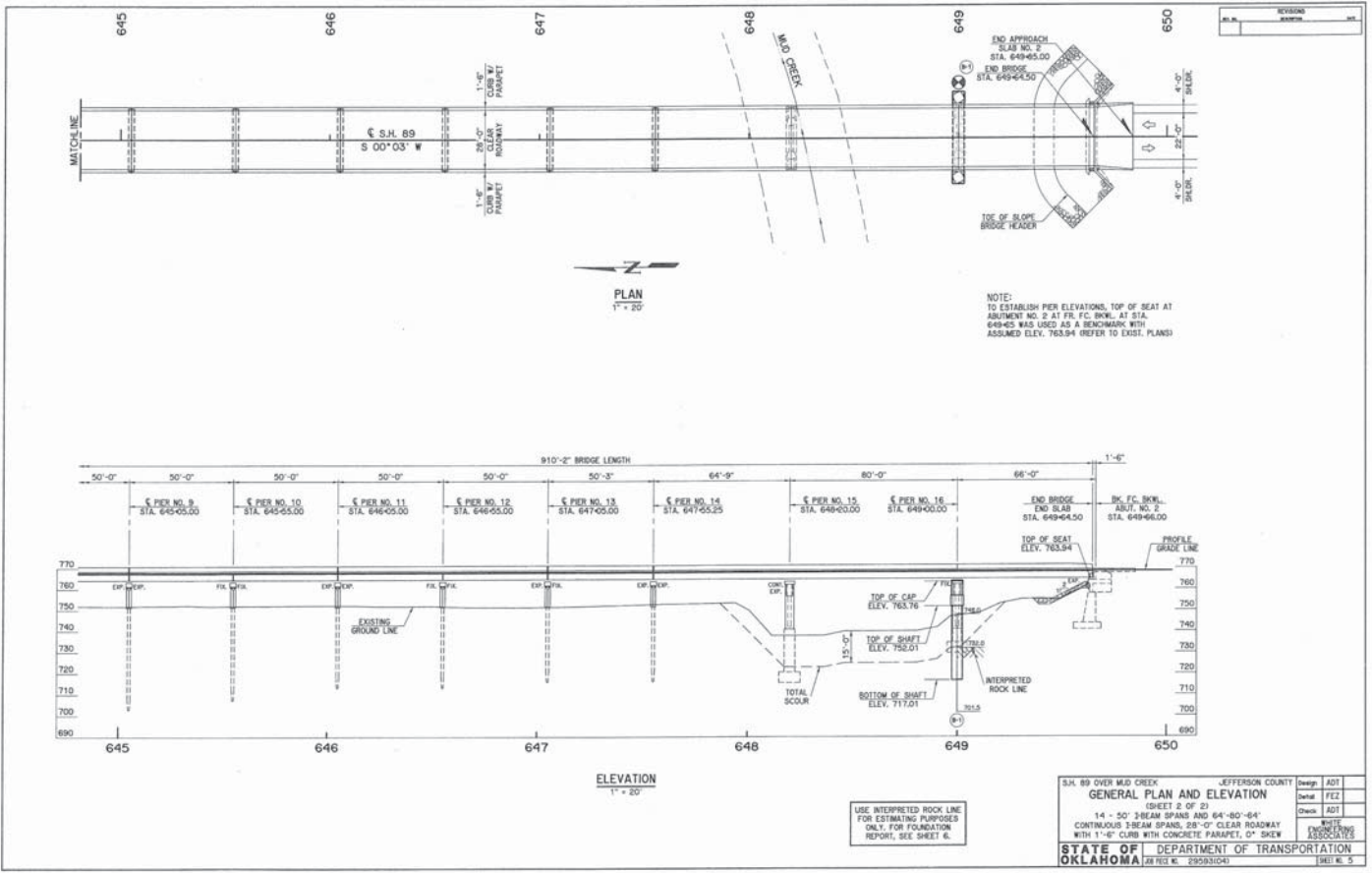
Notes: Completed in 2015.

BEFORE



AFTER





NOTE:
 TO ESTABLISH PIER ELEVATIONS, TOP OF SEAT AT
 ABUTMENT NO. 2 AT F.R.C. BOWL AT STA.
 648+45 WAS USED AS A BENCHMARK WITH
 ASSUMED ELEV. 763.94 (REFER TO EXIST. PLANS)

USE INTERPRETED ROCK LINE
 FOR ESTIMATING PURPOSES
 ONLY. FOR FOUNDATION
 REPORT, SEE SHEET 6.

S.H. 89 OVER M.D. CREEK		JEFFERSON COUNTY	Design	AD1
GENERAL PLAN AND ELEVATION			Detail	FEZ
SHEET 2 OF 2			Check	AD1
14 - 50' BEAM SPANS AND 64'-80'-64'			Drawn	AD1
CONTINUOUS 3-BEAM SPANS, 28'-0" CLEAR ROADWAY			Checked	AD1
WITH 11'-6" CURB WITH CONCRETE PARAPETS, 0% SKEW			Approved	AD1
STATE OF OKLAHOMA DEPARTMENT OF TRANSPORTATION				
OKLAHOMA 28 (REV. 4-2003) (14)				

NBI 06591 S.H. 78 over Red River

Structure #: 0720 0001

Structure Size and Type: 8-210' HL Truss and 4-100' Pony Truss Spans

Problem Type: Exposed Pier Footing

Location: South Side of Bridge at Pier 11

Solution: Drive pile next to footing. Place steel into existing footing and encase in concrete.

Cost/Outcome: \$288,000

Notes: This was an emergency project that was completed in 2017

BEFORE



AFTER



BEFORE



AFTER



NBI 17598(WX) and 17599(EX) I-35 over Washita River

Structure #: 2546 2022(WX&EX) Size: 2(4-90') CONT. PLATE GIRDER SPANS (WX&EX)

Problem Type: Exposed Pier Footing

Location: Pier 4 on North and Southbound Bridges.

Solution: Pier Replacement.

Cost/Outcome: \$ 1,154,200

Notes: Completed in 1991.

BEFORE



AFTER



NBI 14200 S.H. 84 over North Canadian River

Structure #: 5420 0162X Size: (4-100' CONT)2-50' I-BM SPANS

Problem Type: Exposed Pier Footing

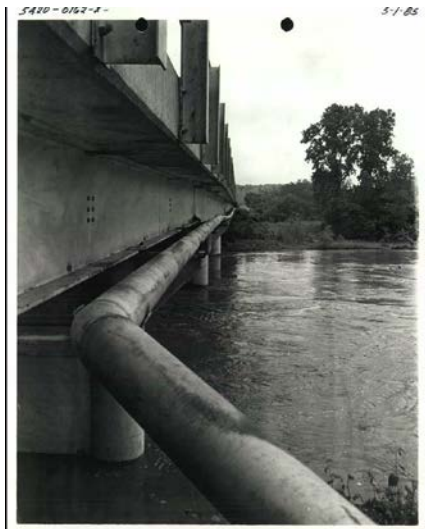
Location: Pier 2 Near South Bank

Solution: Replace Pier

Cost/Outcome: \$214,200

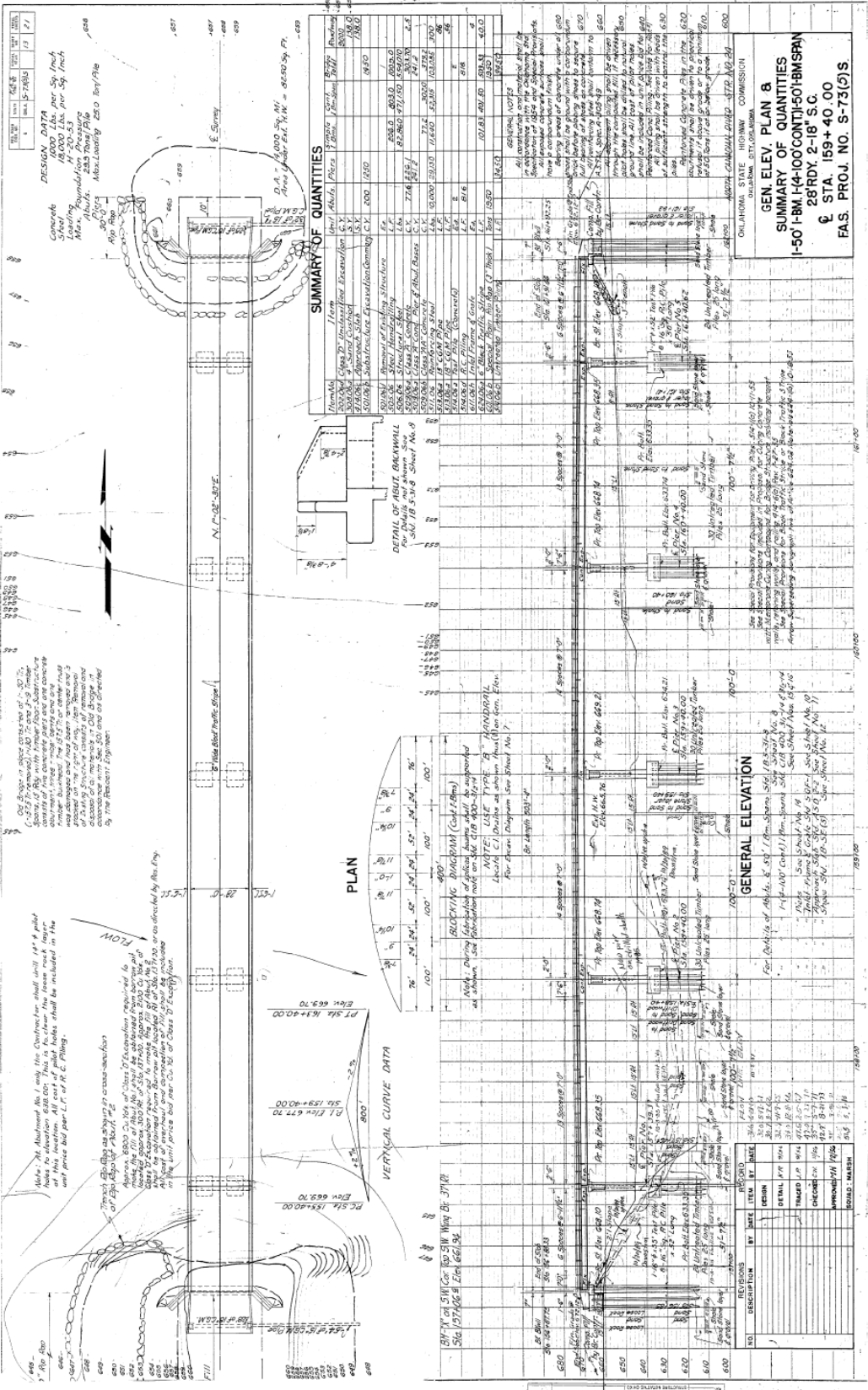
Notes: Completed in 1985.

BEFORE



AFTER





Concrete
Steel
Masonry
Foundation Pressure
Abutment
233 tons/ft²
Manufacturing 450 tons/ft²

DESIGN: 0.777
18,000 Lbs. per Sq. Inch
18,000 Lbs. per Sq. Inch
Masonry
233 tons/ft²
Manufacturing 450 tons/ft²

CONCRETE
STEEL
MASONRY
FOUNDATION PRESSURE
ABUTMENT
233 TONS/FT²
MANUFACTURING 450 TONS/FT²

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CONCRETE
STEEL
MASONRY
FOUNDATION PRESSURE
ABUTMENT
233 TONS/FT²
MANUFACTURING 450 TONS/FT²

SUMMARY OF QUANTITIES

Item	Unit	Quantity	Price	Total
1. Concrete	CY	1000	65.00	65,000.00
2. Steel	LBS	100,000	0.45	45,000.00
3. Masonry	SQ YD	1000	15.00	15,000.00
4. Foundation Pressure	SQ YD	1000	15.00	15,000.00
5. Abutment	SQ YD	1000	15.00	15,000.00
6. Manufacturing	SQ YD	1000	15.00	15,000.00
7. Total				150,000.00

DETAILS OF ABUTMENT

FOR SHEET NO. 8

Item	Unit	Quantity	Price	Total
1. Concrete	CY	1000	65.00	65,000.00
2. Steel	LBS	100,000	0.45	45,000.00
3. Masonry	SQ YD	1000	15.00	15,000.00
4. Foundation Pressure	SQ YD	1000	15.00	15,000.00
5. Abutment	SQ YD	1000	15.00	15,000.00
6. Manufacturing	SQ YD	1000	15.00	15,000.00
7. Total				150,000.00

GENERAL ELEVATION

Station	Elevation
153+00	65.00
153+20	65.00
153+40	65.00
153+60	65.00
153+80	65.00
154+00	65.00

VERTICAL CURVE DATA

Station	Elevation
153+00	65.00
153+20	65.00
153+40	65.00
153+60	65.00
153+80	65.00
154+00	65.00

PLAN

Station	Width
153+00	100'
153+20	100'
153+40	100'
153+60	100'
153+80	100'
154+00	100'

GENERAL ELEVATION

Station	Elevation
153+00	65.00
153+20	65.00
153+40	65.00
153+60	65.00
153+80	65.00
154+00	65.00

VERTICAL CURVE DATA

Station	Elevation
153+00	65.00
153+20	65.00
153+40	65.00
153+60	65.00
153+80	65.00
154+00	65.00

PLAN

Station	Width
153+00	100'
153+20	100'
153+40	100'
153+60	100'
153+80	100'
154+00	100'

GENERAL ELEVATION

Station	Elevation
153+00	65.00
153+20	65.00
153+40	65.00
153+60	65.00
153+80	65.00
154+00	65.00

VERTICAL CURVE DATA

Station	Elevation
153+00	65.00
153+20	65.00
153+40	65.00
153+60	65.00
153+80	65.00
154+00	65.00

PLAN

Station	Width
153+00	100'
153+20	100'
153+40	100'
153+60	100'
153+80	100'
154+00	100'

OKLAHOMA STATE HIGHWAY COMMISSION
OKLAHOMA CITY, OKLAHOMA

GEN. ELEV. PLAN &
SUMMARY OF QUANTITIES
I-50 I-BM 1-4-100(CONT)-501-BMSRN
E 28RDY 2-18' S.C.
E STA. 159+40.00
FAS. PROJ. NO. S-73(G)S

CONCRETE
STEEL
MASONRY
FOUNDATION PRESSURE
ABUTMENT
233 TONS/FT²
MANUFACTURING 450 TONS/FT²

CONCRETE
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CONCRETE
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MASONRY
FOUNDATION PRESSURE
ABUTMENT
233 TONS/FT²
MANUFACTURING 450 TONS/FT²

NBI 13235 S.H. 76 over Wild Horse Creek

Structure #: 1028 0276X Size: 50' I-BM (64'-80'-64' cont. I-BM) 50' I-BM SK 60° RF

Problem Type: Exposed pier footing and piles

Location: On upstream footing of Pier #3

Solution: Encase the exposed piles.

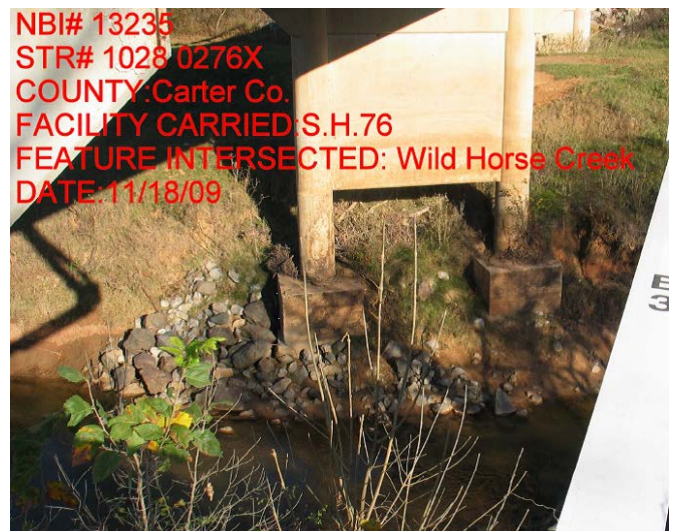
Cost/Outcome: \$ 20,000

Notes: Completed in 2007. This was a temporary solution. The bridge is scheduled for replacement in 2012. The 2011 bridge inspection photos show the repairs are performing well.

BEFORE



AFTER



BEFORE



AFTER



NBI 14114 S.H. 76 over Simon Creek

Structure #: 4316 0666X Size: 3-40' I BEAMS PILE BENT

Problem Type: Exposed Pier Footings

Location: Both Piers

Solution: Rehab Bridge

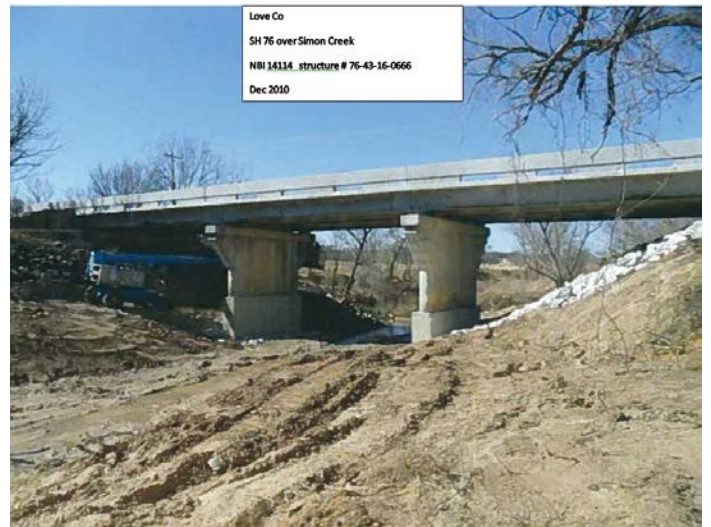
Cost/Outcome: \$623,000

Notes: Completed in 2011

BEFORE



AFTER



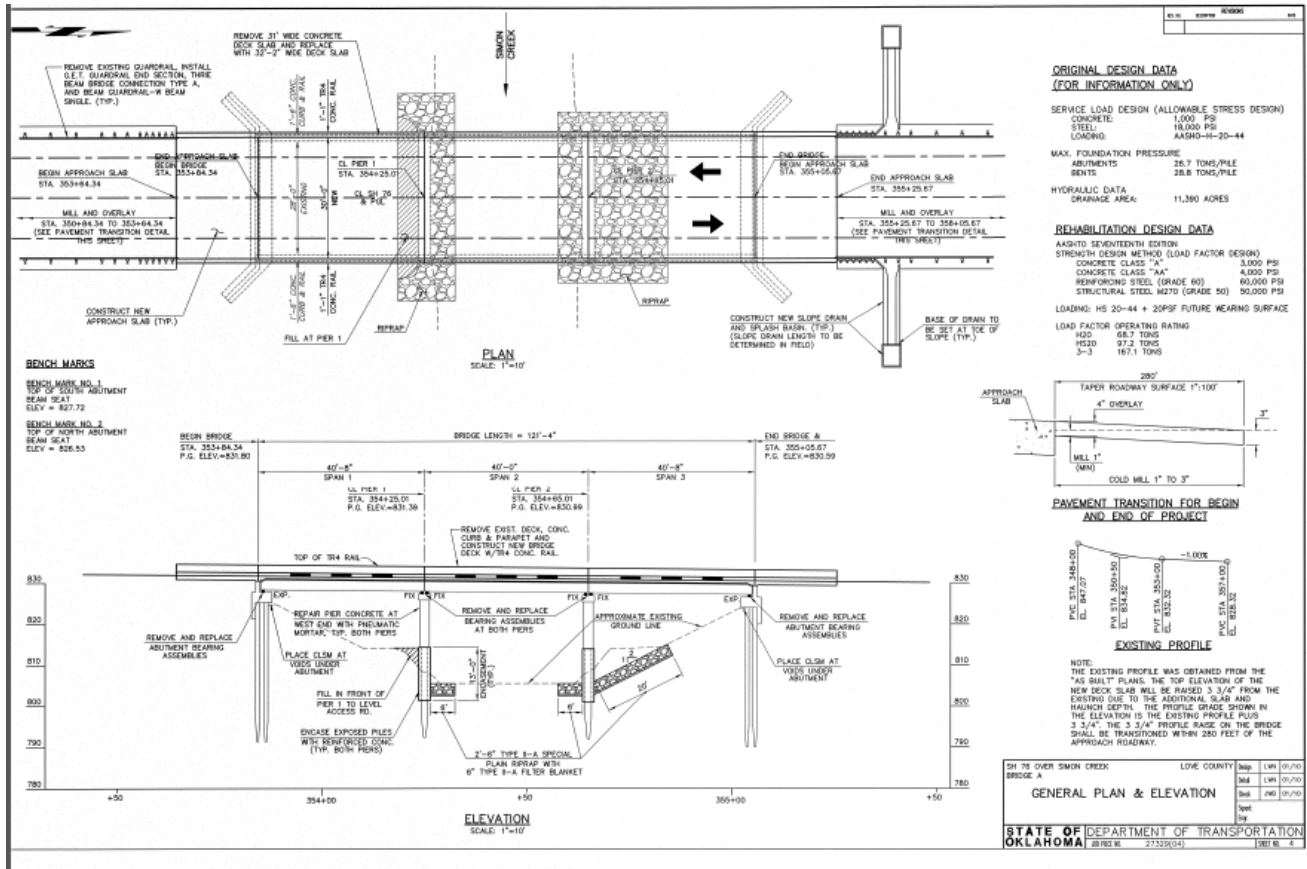
BEFORE



AFTER



Love Co
 SH 76 over Simon Creek
 NB 1A114 structure # 76-43-16-0666
 Dec 2010



NBI 17598(WX) and 17599(EX) I-35 over Washita River

Structure #: 2546 2022(WX&EX) Size: 2(4-90') CONT. PLATE GIRDER SPANS (WX&EX)

Problem Type: Channel Degradation

Location: Pier 4 on North and Southbound Bridges

Solution: Replace Pier

Cost/Outcome: \$ 1,154,200

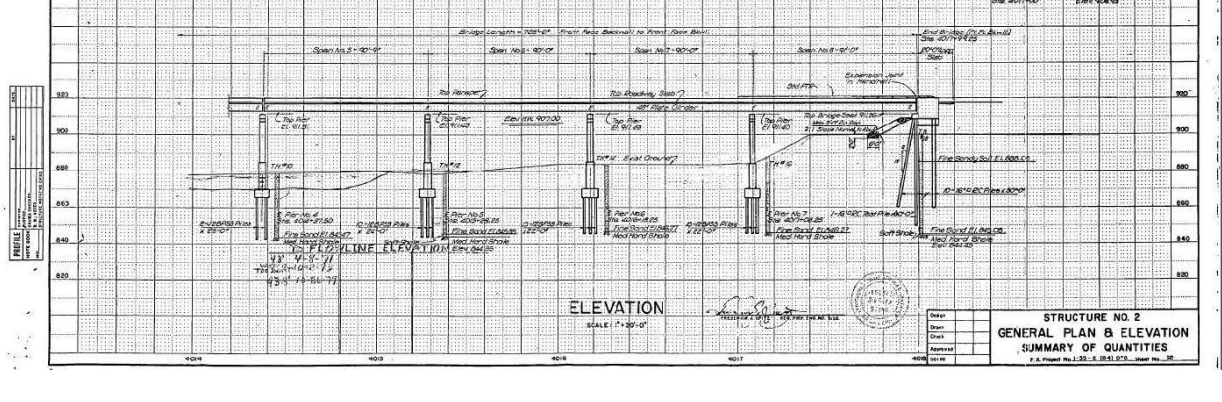
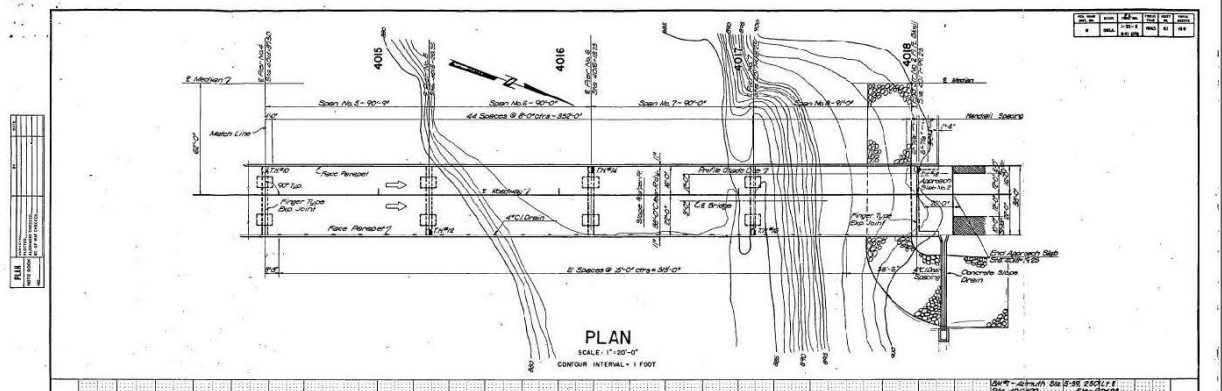
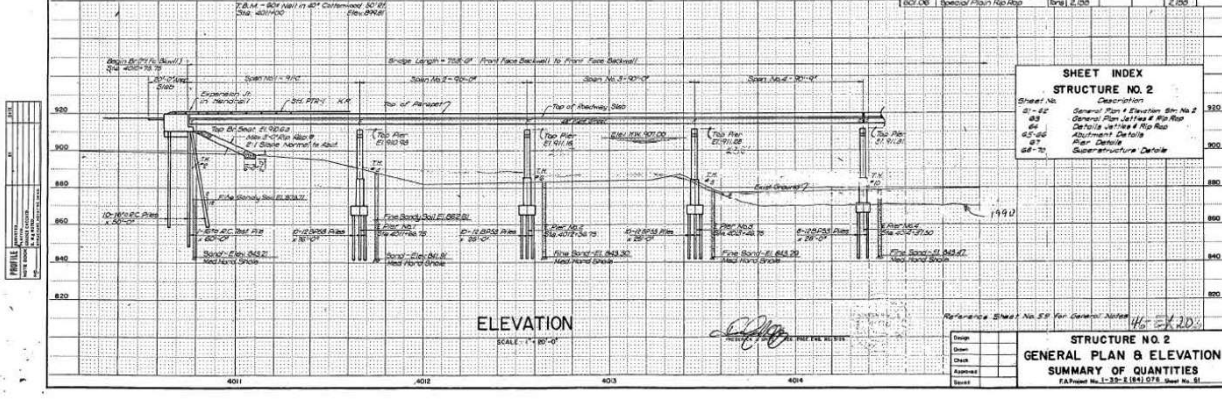
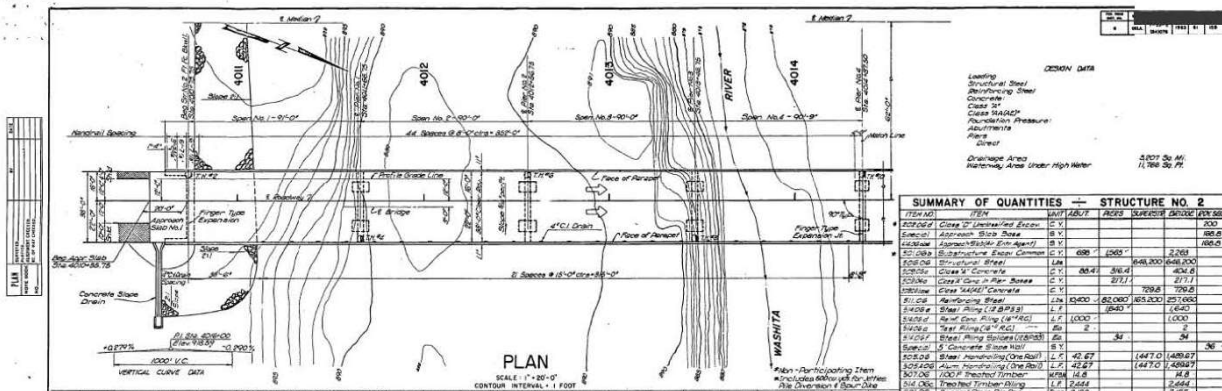
Notes: Completed in 1991.

BEFORE



AFTER





NBI 14200 S.H. 84 over North Canadian River

Structure #: 5420 0162X Size: (4-100' CONT)2-50' I-BM SPANS

Problem Type: Channel Degradation

Location: Near Pier 2 on North Side

Solution: Monitor for Now

Cost/Outcome:

Notes:

BEFORE



AFTER



NBI 13235 S.H. 76 over Wild Horse Creek

Structure #: 1028 0276X Size: 50' I-BM (64'-80'-64' cont. I-BM) 50' I-BM SK 60° RF

Problem Type: Channel Degradation

Location: On Upstream Footing of Pier 3

Solution: Encase the exposed piles.

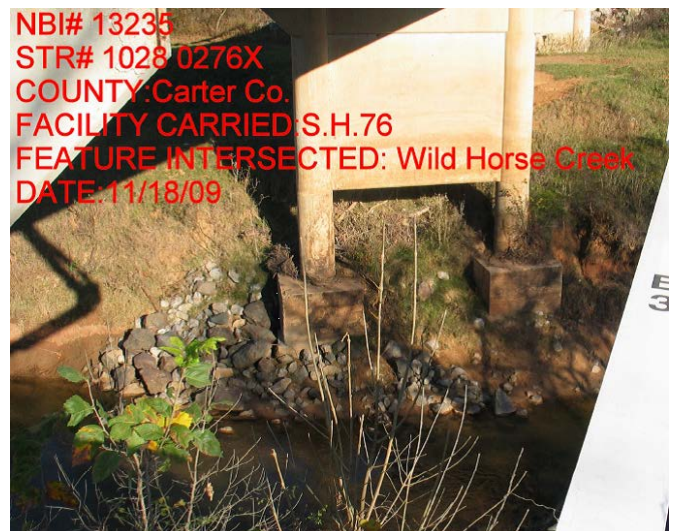
Cost/Outcome: \$ 20,000

Notes: Completed in 2007. This was a temporary solution. The bridge is scheduled for replacement in 2012. The 2011 bridge inspection photos show the repairs are performing well.

BEFORE



AFTER



BEFORE



AFTER



NBI 14114 S.H. 76 over Simon Creek

Structure #: 4316 0666X Size: 3-40' I BEAMS PILE BENT

Problem Type: Channel Degradation

Location: Both Piers

Solution: Bridge Rehab

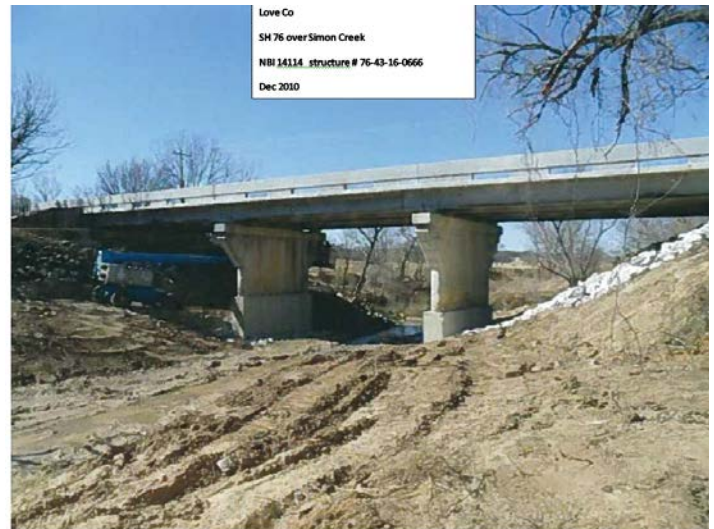
Cost/Outcome: \$623,000

Notes: Completed in 2011

BEFORE



AFTER



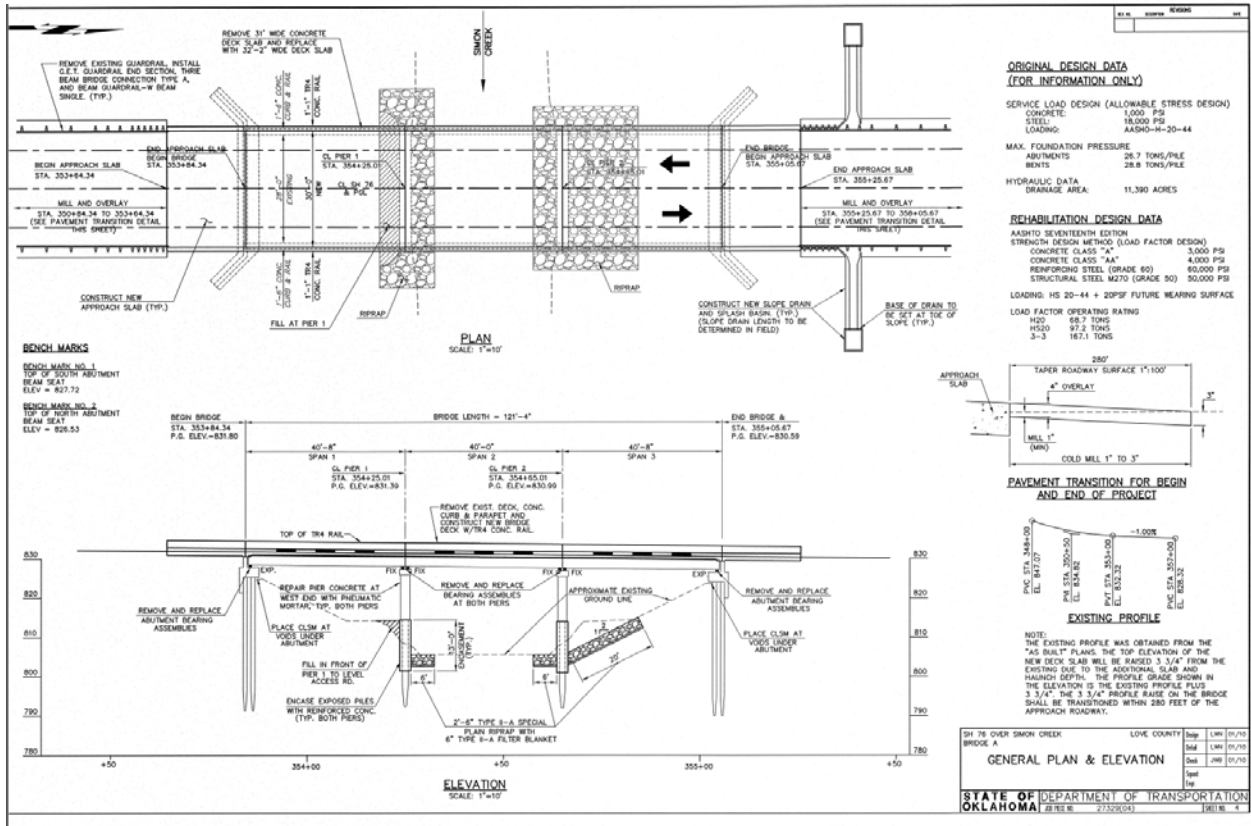
BEFORE



AFTER



Love Co
 SH 76 over Simon Creek
 NBI 14114 structure # 76-43-16-066
 Dec 2010



NBI 16535 S.H. 81 over Flat Creek

Structure #: 3406 0802X Size: 3-50' I BEAM SPANS

Problem Type: Channel Degradation

Location: South Pier

Solution: Backfill with Soil and Riprap

Cost/Outcome:

Notes: Completed in 2011.

BEFORE



AFTER



NBI 00537 S.H. 77S over Unnamed Creek

Structure #: 1028 0276X Size: 5 SK 60° RF

Problem Type: Channel Degradation

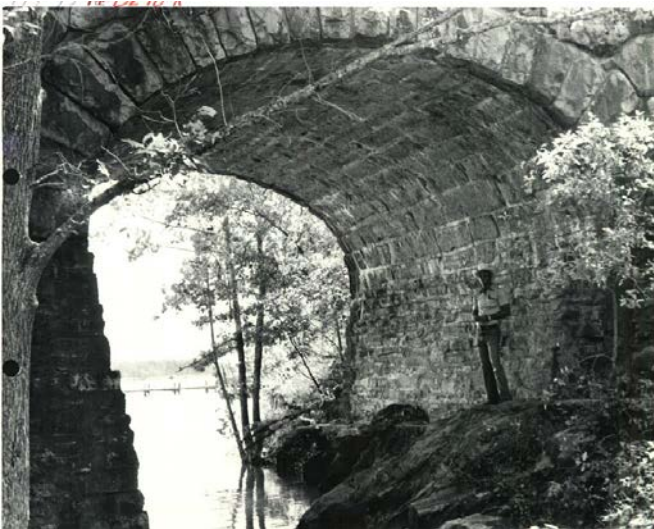
Location: Channel under Bridge

Solution: Concrete bottom and add a CMP to carry low Flows

Cost/Outcome:

Notes: Completed in 2011.

BEFORE



AFTER



BEFORE



AFTER



NBI# 00537
STR.# 4314 0270 X
LOVE CO.
S.H. 77 SCENIC @ CREEK
THRU ARCH FLOOR DAMAGE
LOOK - EAST



NBI 00537
4314 0270X
Love County
SH-77S over Creek
Through arc looking East
After countermeasures completed
2011-04-10