Initials	Date
WS	3/12/2021

Muskogee-Sequoyah **County**

Project No. J3-2100(004)

JP # 32100(04)

SH 100 over MKARNS at WEBBERS FALLS

NBIS # 17611

Hydraulic Summary

Total Drainage Area = 104603 sq. mi

Controlled Drainage Area = 19785 sq. mi

Effective Drainage Area = 84818 sq. mi

Existing Structure: 4(100)-207-334-207-3(100)-4(100)-75 PL GIRDER

C/L Station 283+35.13

L = 1928.75 ft

$Q_{OT} \approx Yr_{freq}$ 149

Low Bm Elev = 510.48 ft

Low Bm Sta= 292+99.25

$Rdwy_{OT}$ Elev = 481.5 ft

$Rdwy_{OT}$ Sta = 245+00

Proposed Structure: 240-320-410-320-3(208) PL GIRDER

C/L Station

0 ft offset

L = 1914 ft

$Q_{OT} \approx Yr_{freq}$ 172

Low Bm Elev = 509.52 ft

Low Bm Sta= 292+95.75

$Rdwy_{OT}$ Elev = 481.5 ft

$Rdwy_{OT}$ Sta = 245+00

Detour Structure:

C/L Station

ft offset to the

Slope = ft/ft

$Q_{OT} \approx Yr_{freq}$

Inlet Elev = ft

$Detour_{OT}$ Elev = ft

$Detour_{OT}$ Sta =

Freq.	Q (cfs)	CHW (ft)	V (fps)	Contraction Scour (ft)	Pier Scour (ft)	Total Scour (ft)
2	168000	461.05	8.19			
5	265000	467.31	9.27			
10	317000	470.42	9.69			
25	394000	474.62	10.27			
50	452000	478.56	10.18			
100	509000	480.73	10.66	7.04	26.71	33.75
500	645000	484.98	11.86			
OT or 500 =Yr_{freq}	533582	481.49	10.91	7.79	26.91	34.69
Detour OT =Yr_{freq}						

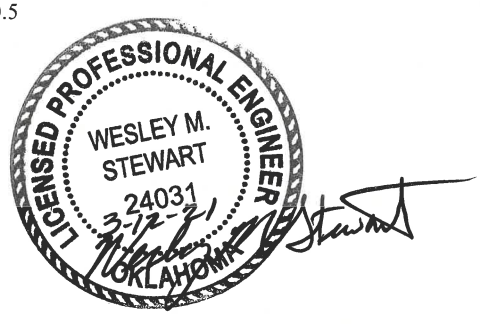
Notes:

1) Bridge modeled based on January 2019 survey data.

2) Scour calcs based on assumed values for D50 & D90 from NRCS soil report. Depths given have been calculated assuming the loamy fine sand at full scour depth.

3) Vertical clearance required is 52' above 2% Flowline Elev. 470.5

Hydraulic Design is in compliance with "Federal-Aid Policy Guide 23 CFR 650, Subpart A"



PROPOSED R/W
FEBRUARY 2021

272 273 274 275 276 277

BEGIN APPROACH SLAB NO. 1 STA. 273+36.75

BEGIN BRIDGE STA. 273+81.75

5'-0" GUARDRAIL WIDENING

8'-0"

12'-0"

12'-0"

8'-0"

5'-0" GUARDRAIL WIDENING

EXISTING R/W

B-1

C.R.L. & ℄ SURVEY S.H.100/U.S.64
N 54° 15'57.84" E

EXISTING R/W

EXISTING R/W

90° TYP.

EXISTING BRIDGE

B-2

1'-6" F-SHAPED PARAPET

40'-0" CLEAR ROADWAY

20'-0" 2%

20'-0" 2%

1'-6" F-SHAPED PARAPET

MATCH LINE STA. 278+00

EXISTING DRILLED SHAFT PIER PROTECTION (TYPICAL)

BM #109
⅜" IRON PIN
STA. 261+52 93' RT. ELEV.=477.65

BM #110
CORP OF ENGINEER'S BRASS CAP
STA. 268+08 176' RT. ELEV.=470.56

#7502
ODOT BRASS CAP
STA. 271+13 428' RT. ELEV.=467.55

#7400
½" IRON PIN
STA. 274+06 410' RT. ELEV.=464.13

PLAN
1"=20'

BEGIN BRIDGE
BEGIN SLAB
ABUTMENT NO. 1
STA. 273+81.75
F.G. ELEV. 527.55

1914'-0" TOTAL BRIDGE LENGTH

240'-0"

320'-0"

℄ PIER NO. 1
STA. 276+21.75

PROFILE GRADE LINE

FIX.

EXP. EXP.

100-YEAR FLOOD ELEVATION 480.73

MEAN HIGHWATER ELEVATION 463.39 (1)

ORDINARY LOW WATER NAVIGATION POOL ELEVATION 458.39 (1)

NORMAL POOL ELEVATION 460.39 (1)

ORDINARY HIGH WATER ELEVATION XXX.XX

EXISTING DRILLED SHAFT PIER PROTECTION (TYPICAL)

EXISTING GROUND LINE AT C.R.L.

(1) ELEVATIONS SHOWN CONVERTED TO NAV88 DATUM AND BASED ON DATUM NGV29 ELEVATIONS OF 460.00 (NORMAL POOL) AND 458.00 (NAVIGATION POOL) AS SHOWN IN PLANS OF EXISTING STRUCTURE.

MATCH LINE STA. 278+00

ELEVATION
1"=20'

273 274 275 276 277

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S.H.100/U.S.64 OVER McCLELLAN-KERR ARKANSAS RIVER NAVIGATION WATERWAY
MUSKOGEE CO. SEQUOYAH CO.

GENERAL PLAN AND ELEVATION (SHEET 1 OF 5)

240'-320'-410'-320'-(3) 208' ℄ GIRDER SPANS
40'-0" CL. RDWY. WITH F-SHAPED PARAPETS
℄ STA. 283+38.75, 0° SKEW

Design	CEG	
Detail	DRB	
Check		

WHITE ENGINEERING ASSOCIATES

STATE OF OKLAHOMA

DEPARTMENT OF TRANSPORTATION

JOB PIECE NO. 32100(04)

SHEET NO. B001

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PROPOSED R/W
FEBRUARY 2021

279 280 281 282 283

MATCH LINE STA. 278+00

MATCH LINE STA. 284+00

EXISTING SHEET PILE CELL PIER PROTECTION

300.2' EXISTING MINIMUM HORIZONTAL CLEARANCE

℄ NAVIGATION CHANNEL

EXISTING R/W

C.R.L. & ℄ SURVEY S.H.100/U.S.64
N 54°15'57.84" E

90° TYP.

B-3

B-4

1'-6" F-SHAPED PARAPET

40'-0" CLEAR ROADWAY

20'-0" 2%

20'-0" 2%

8' SHLDR.

12' LANE

12' LANE

8' SHLDR.

1'-6" F-SHAPED PARAPET

11°28'20"

78°31'40"

EXISTING BRIDGE

ARKANSAS RIVER

LOCATION OF MINIMUM VERTICAL CLEARANCE

WATER DEPTH FROM ORDINARY LOW WATER ELEVATION (TYPICAL)

EXISTING DRILLED SHAFT PIER PROTECTION (TYPICAL)

LIMITS OF NAVIGATION CHANNEL

150'-0"

150'-0"

LIMITS OF NAVIGATION CHANNEL

15.6' 18.1' 18.8' 20.5' 19.6' 18.7' 18.1' 19.0' 17.9' 19.1' 18.8' 18.0' 18.0' 17.3' 18.9'

440'

PLAN
1"=20'

1914'-0" TOTAL BRIDGE LENGTH

320'-0" 410'-0" 320'-0"

℄ PIER NO. 2
STA. 279+41.75

℄ PIER NO. 3
STA. 283+51.75

PROFILE GRADE LINE

LOCATION OF MINIMUM VERTICAL CLEARANCE ELEVATION 523.40

FIX.

300'-0" NAVIGATIONAL OPENING

52.5' VERT. CL.

52'-0" NAVIGATIONAL OPENING

52.8' VERT. CL.

52.5' VERT. CL.

EXISTING DRILLED SHAFT PIER PROTECTION (TYPICAL)

100-YEAR FLOOD ELEVATION 480.73

2% FLOWLINE ELEVATION 470.89 (1)

MEAN HIGHWATER ELEVATION 463.39 (1)

NAVIGATIONAL ENVELOPE (SHOWN AT C.R.L.)

ORDINARY HIGH WATER ELEVATION xxx.xx

ORDINARY LOW WATER NAVIGATION POOL ELEVATION 458.39 (1)

NORMAL POOL ELEVATION 460.39 (1)

EXISTING SHEET PILE CELL PIER PROTECTION (TYPICAL)

300.2' EXISTING MINIMUM HORTIZONAL CLEARNACE
(SHOWN ALONG SKEW AND UPSTREAM OF C.R.L.)

EXISTING GROUND LINE AT C.R.L.

EXISTING GROUND LINE LT.

EXISTING GROUND LINE RT.

540 530 520 510 500 490 480 470 460 450 440 430 420 410 400 390 380 360

279 280 281 282 283

(1) ELEVATIONS SHOWN CONVERTED TO NAV88 DATUM AND BASED ON DATUM NGV29 ELEVATIONS OF 470.50 (2% FLOWLINE), 460.00 (NORMAL POOL) AND 458.00 (NAVIGATION POOL) AS SHOWN IN PLANS OF EXISTING STRUCTURE.

ELEVATION
1"=20'

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S.H.100/U.S.64 OVER McCLELLAN-KERR ARKANSAS RIVER NAVIGATION WATERWAY
MUSKOGEE CO.
SEQUOYAH CO.

GENERAL PLAN AND ELEVATION (SHEET 2 OF 5)

240'-320'-410'-320'-(3) 208' ℄ GIRDER SPANS
40'-0" CL. RDWY. WITH F-SHAPED PARAPETS
℄ STA. 283+38.75, 0° SKEW

Design	CEG	
Detail	DRB	
Check		

WHITE ENGINEERING ASSOCIATES

STATE OF OKLAHOMA
DEPARTMENT OF TRANSPORTATION
JOB PIECE NO. 32100(04)
SHEET NO. B002

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PROPOSED R/W
FEBRUARY 2021

285 286 287 288 289

MATCH LINE STA. 284+00

MATCH LINE STA. 290+00

EXISTING DRILLED SHAFT PIER PROTECTION (TYPICAL)

B-5

EXISTING R/W

C.R.L. & ℄ SURVEY S.H.100/U.S.64
N 54° 15'57.84" E

90° TYP.

EXISTING BRIDGE

1'-6" F-SHAPED PARAPET

40'-0" CLEAR ROADWAY

20'-0" 2%

20'-0" 2%

1'-6" F-SHAPED PARAPET

B-6

EXISTING R/W

440 450

PLAN
1"=20'

1914'-0" TOTAL BRIDGE LENGTH

320'-0" 208'-0" 208'-0"

PROFILE GRADE LINE

℄ PIER NO. 4
STA. 286+71.75

℄ PIER NO. 5
STA. 288+79.75

EXP. EXP. FIX.

ORDINARY LOW WATER NAVIGATION POOL ELEVATION 458.39 ①

NORMAL POOL ELEVATION 460.39 ①

ORDINARY HIGH WATER ELEVATION xxx.xx

MEAN HIGHWATER ELEVATION 463.39 ①

100-YEAR FLOOD ELEVATION 480.73

EXISTING DRILLED SHAFT PIER PROTECTION (TYPICAL)

EXISTING GROUND LINE AT C.R.L.

① ELEVATIONS SHOWN CONVERTED TO NAV88 DATUM AND BASED ON DATUM NGV29 ELEVATIONS OF 460.00 (NORMAL POOL) AND 458.00 (NAVIGATION POOL) AS SHOWN IN PLANS OF EXISTING STRUCTURE.

ELEVATION
1"=20'

540 530 520 510 500 490 480 470 460 450 440 430 420 410 400 390 380

285 286 287 288 289

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S.H.100/U.S.64 OVER McCLELLAN-KERR ARKANSAS RIVER NAVIGATION WATERWAY
MUSKOGEE CO. SEQUOYAH CO.

GENERAL PLAN AND ELEVATION (SHEET 3 OF 5)
240'-320'-410'-320'-(3) 208' ℄ GIRDER SPANS
40'-0" CL. RDWY. WITH F-SHAPED PARAPETS
℄ STA. 283+38.75 0° SKEW

Design	CEG	
Detail	DRB	
Check		

WHITE ENGINEERING ASSOCIATES

STATE OF OKLAHOMA
DEPARTMENT OF TRANSPORTATION
JOB PIECE NO. 32100(04)
SHEET NO. B003

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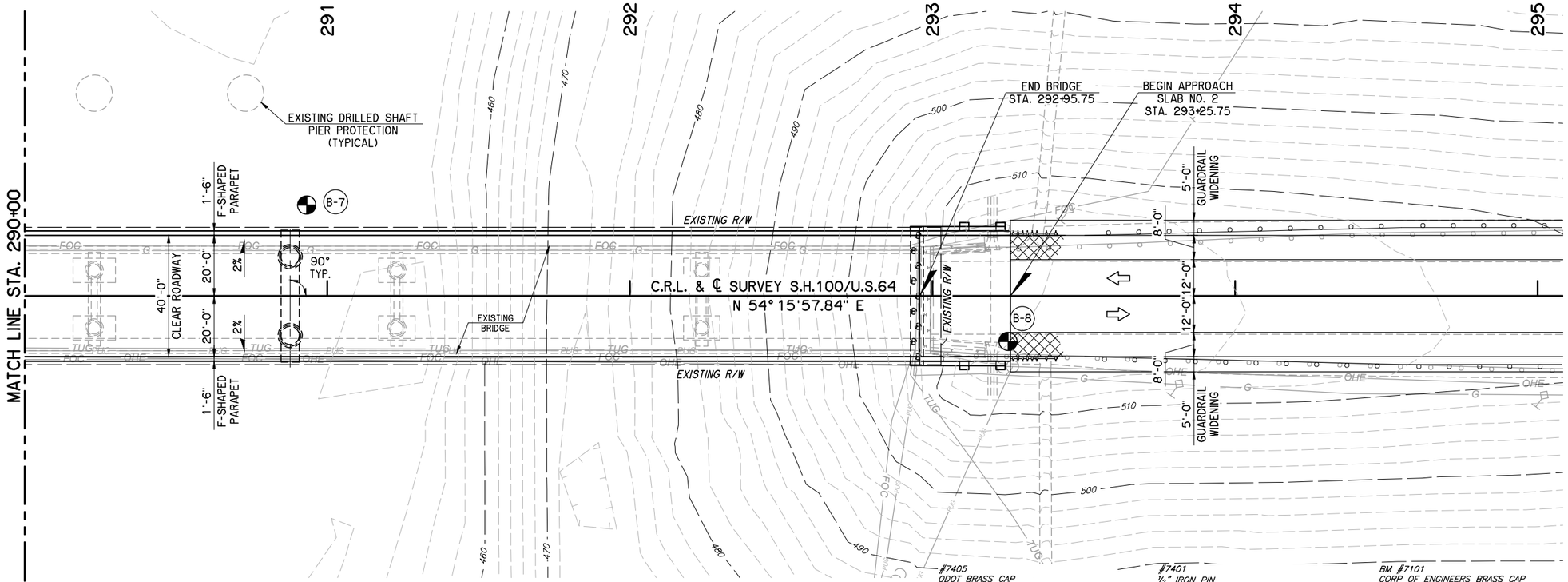
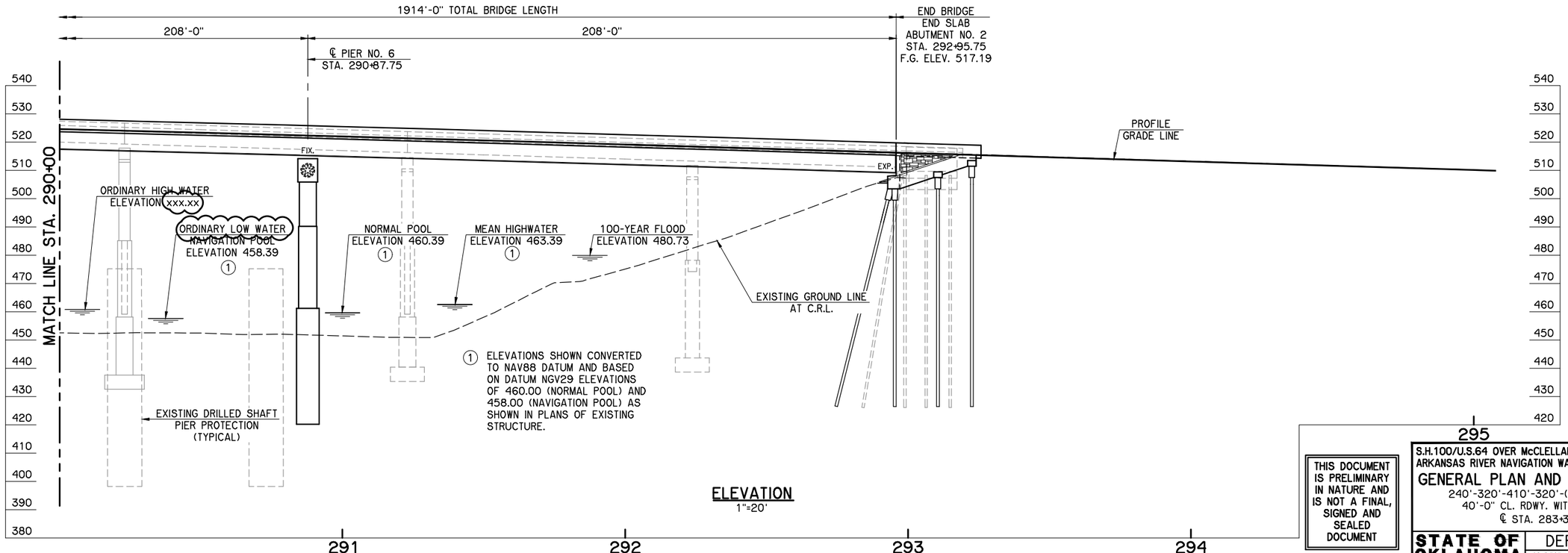
PROPOSED R/W
FEBRUARY 2021



PLAN
1"=20'



ELEVATION
1"=20'

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S.H.100/U.S.64 OVER McCLELLAN-KERR ARKANSAS RIVER NAVIGATION WATERWAY
MUSKOGEE CO. SEQUOYAH CO.

GENERAL PLAN AND ELEVATION (SHEET 4 OF 5)
240'-320'-410'-320'-(3) 208' ℄ GIRDER SPANS
40'-0" CL. RDWY. WITH F-SHAPED PARAPETS
℄ STA. 283+38.75, 0° SKEW

Design	CEG	
Detail	DRB	
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WHITE ENGINEERING ASSOCIATES

STATE OF OKLAHOMA
DEPARTMENT OF TRANSPORTATION
JOB PIECE NO. 32100(04)
SHEET NO. B004

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PROPOSED R/W
FEBRUARY 2021

SUMMARY OF BRIDGE QUANTITIES

ITEM DESCRIPTION	UNIT	ABUTMENTS	PIERS	SUPERSTR.	APPR. SLABS	TOTAL
SUBSTRUCTURE EXCAVATION COMMON	C.Y.					
CLSM BACKFILL	C.Y.					
APPROACH SLAB	S.Y.					
SAW-CUT GROOVING	S.Y.					
42" F-SHAPED PARAPET	L.F.					
STRUCTURAL STEEL	LB.					
STAINLESS STEEL FIXED BEARING ASSEMBLY	EA.					
STAINLESS STEEL EXP. BEARING ASSEMBLY	EA.					
ELASTOMERIC COATING	S.F.					
CLASS AA CONCRETE	C.Y.					
CLASS A CONCRETE	C.Y.					
REINFORCING STEEL	LB.					
EPOXY COATED REINFORCING STEEL	LB.					
PILES, FURNISHED (HP12x53)	L.F.					
PILES, DRIVEN (HP12x53)	L.F.					
PILE SPLICE, H-PILE (NON-BIDDABLE)	EA.					
WATER REPELLENT (VISUALLY INSPECTED)	S.Y.					
DRILLED SHAFTS 96" DIAMETER	L.F.					
CROSSHOLE SONIC LOGGING	EA.					
THERMAL INTEGRITY PROFILER	EA.					
MODULAR EXPANSION JOINTS	L.F.					
SEALER CRACK PREPARATION	L.F.					
SEALER RESIN	GAL.					
TYPE I-A FILTER BLANKET	TON					
6" PERFORATED PIPE UNDERDRAIN ROUND	L.F.					
6" NON-PERF. PIPE UNDERDRAIN RND.	L.F.					
REMOVAL OF EXISTING BRIDGE STRUCTURE	L.SUM					
(SP) BRIDGE NAVIGATION LIGHTING	L.SUM					

DESIGN DATA

LOAD AND RESISTANCE FACTOR DESIGN

CONCRETE CLASS AA	f'c = 4 K.S.I.
CONCRETE CLASS A	f'c = 3 K.S.I.
REINFORCING STEEL (GRADE 60)	fy = 60 K.S.I.
STRUCTURAL STEEL M270 (GRADE 50W)	Fy = 50 K.S.I.
STRUCTURAL STEEL M270 (GRADE HPS 70W)	Fy = 70 K.S.I.
STAINLESS STEEL A240 (TYPE 316)	Fy = 30 K.S.I.

LOADING:
HL-93 OR OKLAHOMA OVERLOAD TRUCK OR TYPE 315 OVERLOAD TRUCK
20 PSF FUTURE WEARING SURFACE
5 PSF STAY-IN-PLACE FORMS

DESIGN:
AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 8th EDITION
ANSI/AASHTO/AWS D1.5 BRIDGE WELDING CODE
ANSI/AWS D1.6 STRUCTURAL WELDING CODE - STAINLESS STEEL

HL93 INVENTORY RATING FACTOR: x.xx
HL93 OPERATING RATING FACTOR: x.xx

INDEX OF SHEETS

AB01 - AB02	GENERAL NOTES & SUMMARY OF PAY QUANTITIES (BRIDGE)
B001 - B005	GENERAL PLAN AND ELEVATION
B006	SEQUENCE OF BRIDGE CONSTRUCTION
B007	BRIDGE TYPICAL SECTION
B008	SUPERSTRUCTURE DETAILS
B009 - B010	NAVIGATION LIGHTING DETAILS

STANDARDS

FSHP-42-2
LECS-4-2
PUD-3-3
HP1-2
LTU-4-0

FOUNDATION DATA

ABUTMENTS

DESIGN CRITERIA	ABUTMENT 1	ABUTMENT 2
FACTORED PILE REACTION (HP 12x53) PILE LENGTH		

PIERS

DESIGN CRITERIA	PIER NO. 1	PIER NO. 2	PIER NO. 3	PIER NO. 4	PIER NO. 5	PIER NO. 6
DIAMETER	96"	96"	96"	96"	96"	96"
MINIMUM DEPTH INTO ROCK DEPTH OF ROCK NEGLECTED FOR FRICTION						
UNIT BEARING RESISTANCE BEARING RESISTANCE FACTOR FACTORED BEARING RESISTANCE						
UNIT FRICTION RESISTANCE FRICTION RESISTANCE FACTOR FACTORED FRICTION RESISTANCE						
TOTAL FACTORED RESISTANCE TOTAL FACTORED REACTION						

FACTORED PILE RESISTANCE:
DRIVE PILING THROUGH THE COMPACTED FILL AND TO A POINT BEARING ON SOLID FOUNDATION MATERIAL AT THE APPROXIMATE ELEVATION SHOWN ON THE PLANS. IF A FACTORED AXIAL LOAD RESISTANCE EQUAL TO OR GREATER THAN THE FACTORED PILE REACTION IS NOT OBTAINED AT THIS ELEVATION, CONTINUE DRIVING UNTIL SUCH IS OBTAINED. THE LENGTH OF STEEL PILING SHOWN ON THE PLANS IS FOR ESTIMATING PURPOSES ONLY.

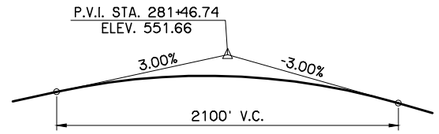
HYDRAULIC SUMMARY

TOTAL DRAINAGE AREA = 85,840.00 SQ. MILES
CONTROLLED DRAINAGE AREA = 647.00 SQ. MILES
EFFECTIVE DRAINAGE AREA = 85,193.00 SQ MILES

FREQUENCY (YEARS)	DISCHARGE (CFS)	WATER SURFACE ELEVATION (FT)	VELOCITY (FPS)	CONTR. SCOUR (FT)	PIER SCOUR (FT)	TOTAL SCOUR (FT)
2	168000	460.99	8.16			
5	265000	467.24	9.25			
10	317000	470.34	9.69			
25	394000	474.52	10.30			
50	452000	478.45	10.23	7.04	26.71	33.75
100	509000	480.73	10.67			
500	645000	484.99	11.89			
172 (OT)	533582	481.49	10.93	7.79	26.91	34.69

LOW BEAM ELEVATION = 509.78

NOTE:
FOUNDATION DESIGN BASED ON BORINGS TO NON-ERODIBLE ROCK AND NOT COMPUTED SCOUR DEPTHS.



VERTICAL CURVE DATA

PREPARED BY:

WHITE ENGINEERING ASSOCIATES, INC.

XXXXXXXX
OKLAHOMA LICENSE NO. XXXXX

DATE

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S.H.100/U.S.64 OVER McCLELLAN-KERR ARKANSAS RIVER NAVIGATION WATERWAY
MUSKOGEE CO.
SEQUOYAH CO.

GENERAL PLAN AND ELEVATION (SHEET 5 OF 5)
245'-322.5'-400'-322.5'-(3) 212' R GIRDER SPANS
40'-0" CL. RDWY. WITH F-SHAPED PARAPETS
℄ STA. 283+36.38, 0° SKEW

Design	CEG	
Detail	DRB	
Check		

WHITE ENGINEERING ASSOCIATES

STATE OF OKLAHOMA
DEPARTMENT OF TRANSPORTATION
JOB PIECE NO. 32100(04)
SHEET NO. B005

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