

CAUTION: Currently being re-designed as a double 9'x 7' with slope-tapered inlet

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
2 (9' x 7') CONCRETE BOX CULVERT

SEC/SUR 27 TWP 21N RGE 32W

"THIS MEDIA SHOULD
NOT BE CONSIDERED
A CERTIFIED
DOCUMENT."

DATE PREPARED
2/25/2010

ROUTE I-49	STATE MO
DISTRICT BR	SHEET NO. 1

COUNTY
McDONALD

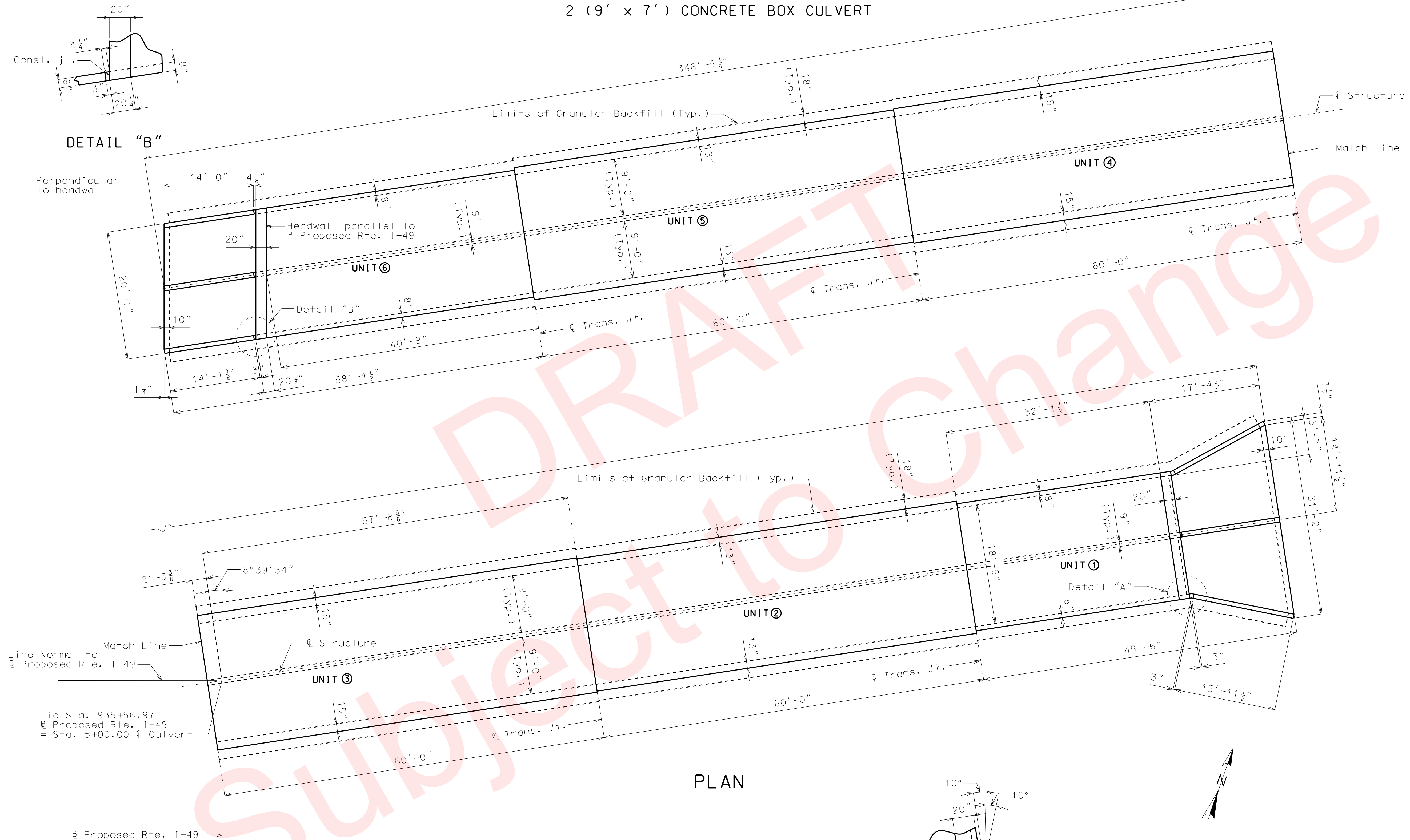
J7P0601

PROJECT NO.

BRIDGE NO.
A7053[illegible]

MoDOT
MISSOURI HIGHWAYS AND TRANSPORTATION
COMMISSION

105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)



Notes:

For General Notes, Estimated Quantities, Hydrologic Data & Location Sketch, see Sheet No. 2.

For Elevation and End Elevation, see Sheet No. 2.

For Typical Section Thru Box, see Sheet No. 3.

Note: This drawing is not to scale. Follow dimensions.

Sheet No. 1 of 4

Designed	Sept.	2007
Detailed	June	2009
Checked	July	2009

B.M.-49-01-15 ELEV. 991.40
N: 126,431.1081 E: 2,819,624.3799
20d IN 4" PERSIMMON TREE E OF CREEK CHANNEL
ON KELLY PROPERTY SE OF UTILITY SHEDS ON E
SIDE OF TREE

CULVERT OVER WHITE OAK HOLLOW CREEK

STATE ROAD FROM RTE. H TO STATE LINE
ABOUT 1.2 MILES NORTH OF STATE LINE
STA. 935+56.97

STD. 703.37
STD. 703.42
STD. 703.44
STD. 706.35

\$FILES\$ \$TIMES\$ 2/25/2010

GENERAL NOTES:

Design Specifications:

2002 - AASHTO 17th Edition
Load Factor Design

Design Unit Stresses:

Class B-1 concrete (Box Culvert) $f'_c = 4,000$ psi
Reinforcing steel (Grade 60), $f_y = 60,000$ psi

Design Loading:

HS20 Modified
Military 24,000 # Tandem Axle
Earth 120 #/ft.³
Equivalent fluid pressure
30 #/ft.³ (Min.) - 60 #/ft.³ (Max.)

Reinforcing Steel:

Minimum clearance to reinforcing steel shall
be 1-1/2", unless otherwise shown.

Miscellaneous:

Provide grading of the channel bottom within the limits of the R/W as
needed for culvert flowline elevations and transition of the channel
bed to the culvert openings.

Taper channel banks to match end of culvert opening as
required. (Roadway Item)

"Sec" refers to the sections in the standard and supplemental
specifications unless specified otherwise.

Traffic Handling:

See Roadway Plans for traffic control.

Precast Option:

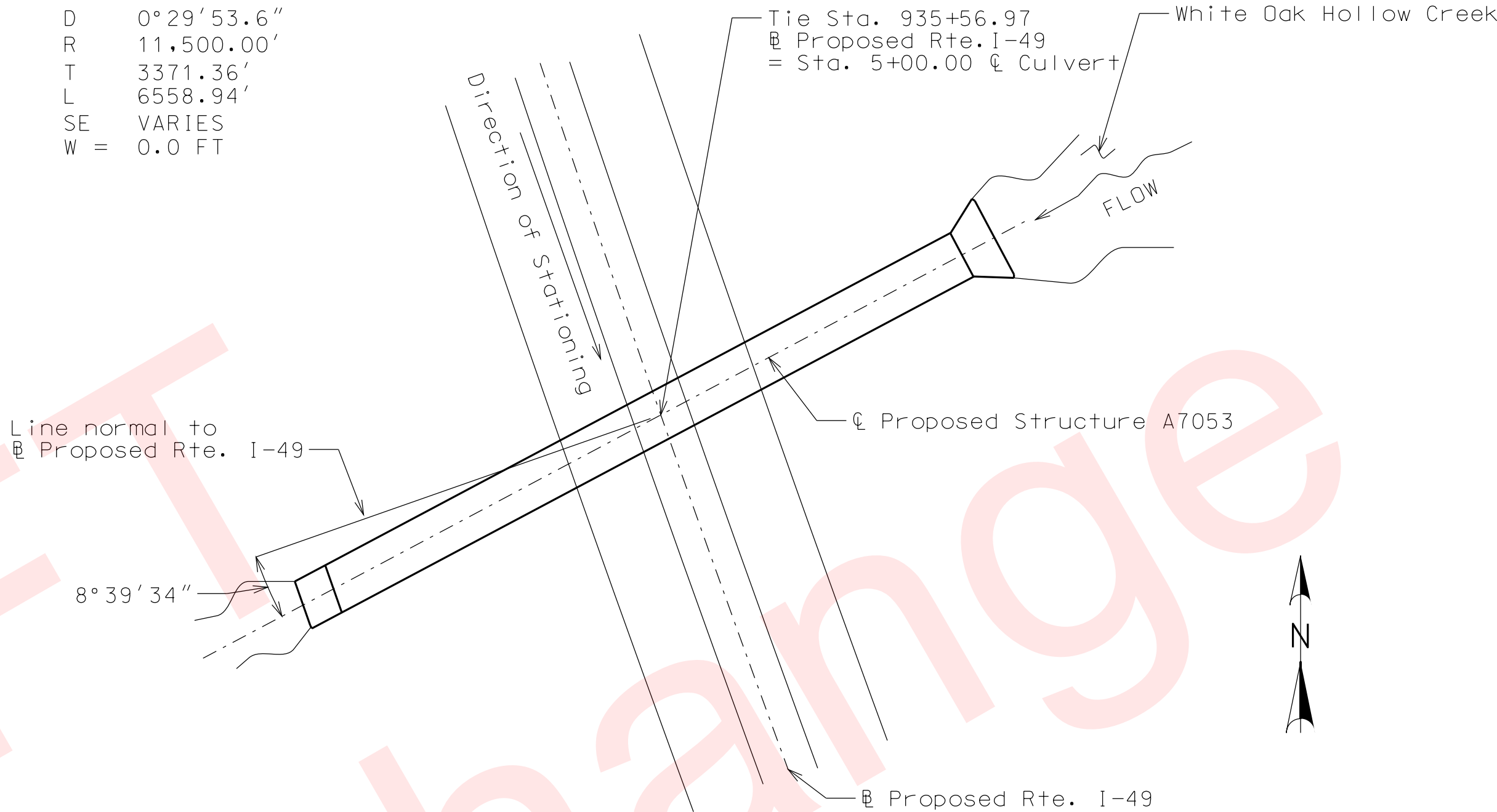
The box shown below indicating whether a precast or cip box was used
should be checked by MoDOT Construction personnel:

- ☐ Precast Box used
☐ Cast-in-Place Box used

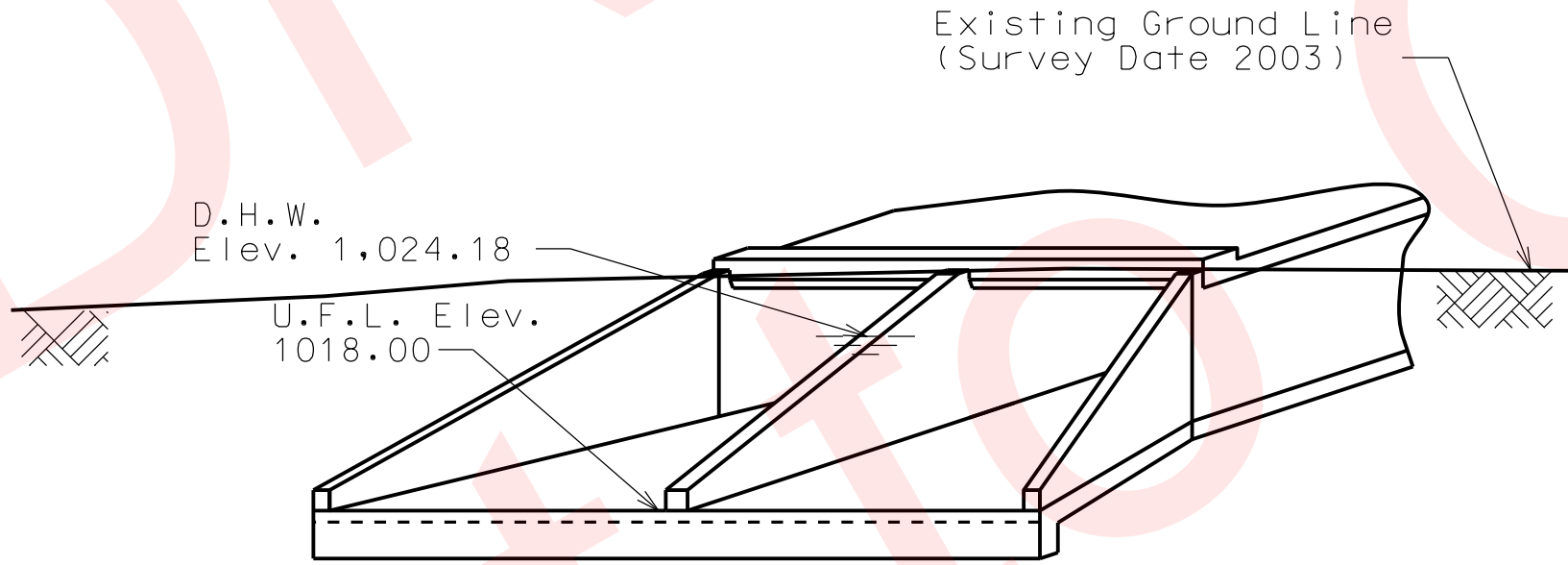
When alternate precast box sections are used, the minimum barrel
length measured along the shortest wall from the first joint to
the outside of the headwall, shall be 3'-2". Reinforcement and
dimensions for the wings and headwalls shall be in accordance
with Missouri Standard Plans drawing.

CURVE DATA

PI STA. 910+47.28
 Δ 32°40'41.69" LT.
D 0°29'53.6"
R 11,500.00'
T 3371.36'
L 6558.94'
SE VARIES
W = 0.0 FT



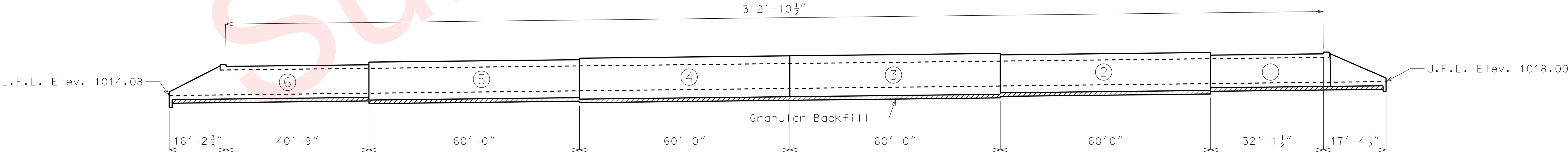
LOCATION SKETCH



END ELEVATION
(UPSTREAM)

HYDROLOGIC DATA
Drainage Area = 0.87 (sq. mi.) (Hilly)
Design High Water (DHW) Elev. = 1,024.18
Design High Water Frequency = 50 (year)
Design High Water Discharge = 866.82 (cfs)
Backwater/Base Flood Data (100 year)
High Water Elev. = 1,025.13
Design Discharge = 1,082.69 (cfs)
Estimated Backwater = 1.32 (ft)
Outlet Velocity = 15.40 (ft/sec)
Roadway Overtopping
Design Elev. (1' below shoulder) = 1,067.00
Design Discharge $\geq$ 1,840.57 (cfs)
Design Frequency $>$ 500 (year)

ESTIMATED QUANTITIES			FINAL QUANTITIES
Class 4 Excavation	cu. yard	2,540	
Class B-1 Concrete (Culverts)	cu. yard	1,189.6	
Reinforcing Steel (Culverts)	pound	99,450	



ELEVATION

Note: Dimensions are along $\varnothing$ Structure.

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DATE PREPARED
2/25/2010

ROUTE 1-49 STATE MO
DISTRICT BR SHEET NO. 2
COUNTY

McDONALD

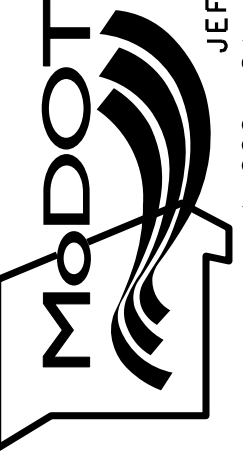
J7P0601
CONTRACT ID.

PROJECT NO.

BRIDGE NO.
A7053

DESCRIPTION	DATE

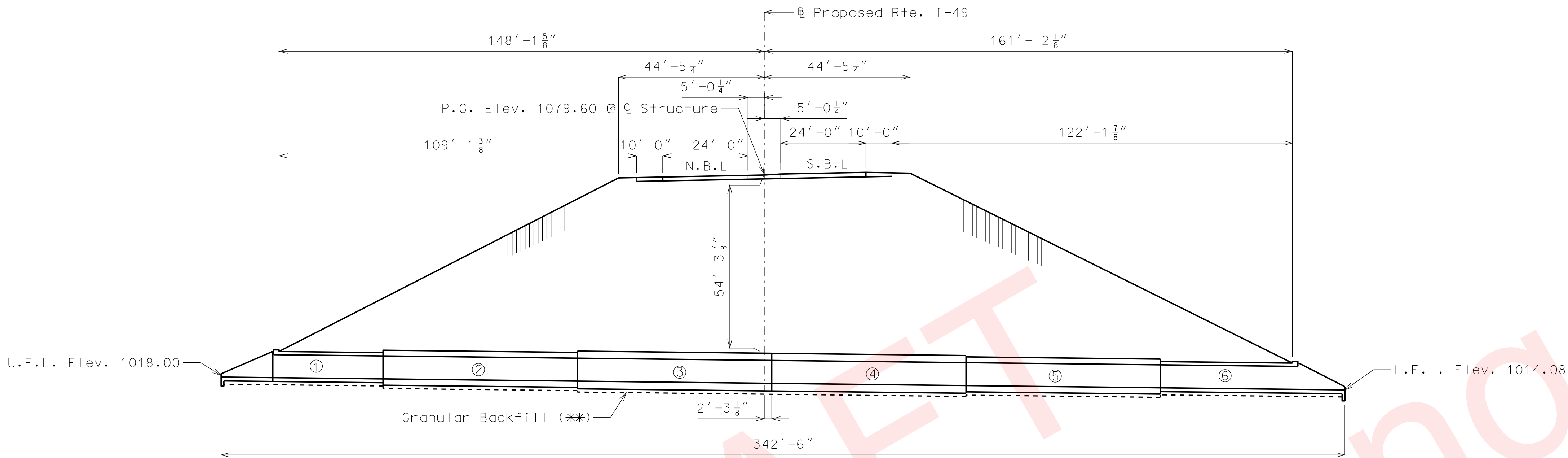
MISSOURI HIGHWAYS AND TRANSPORTATION
COMMISSION



105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.

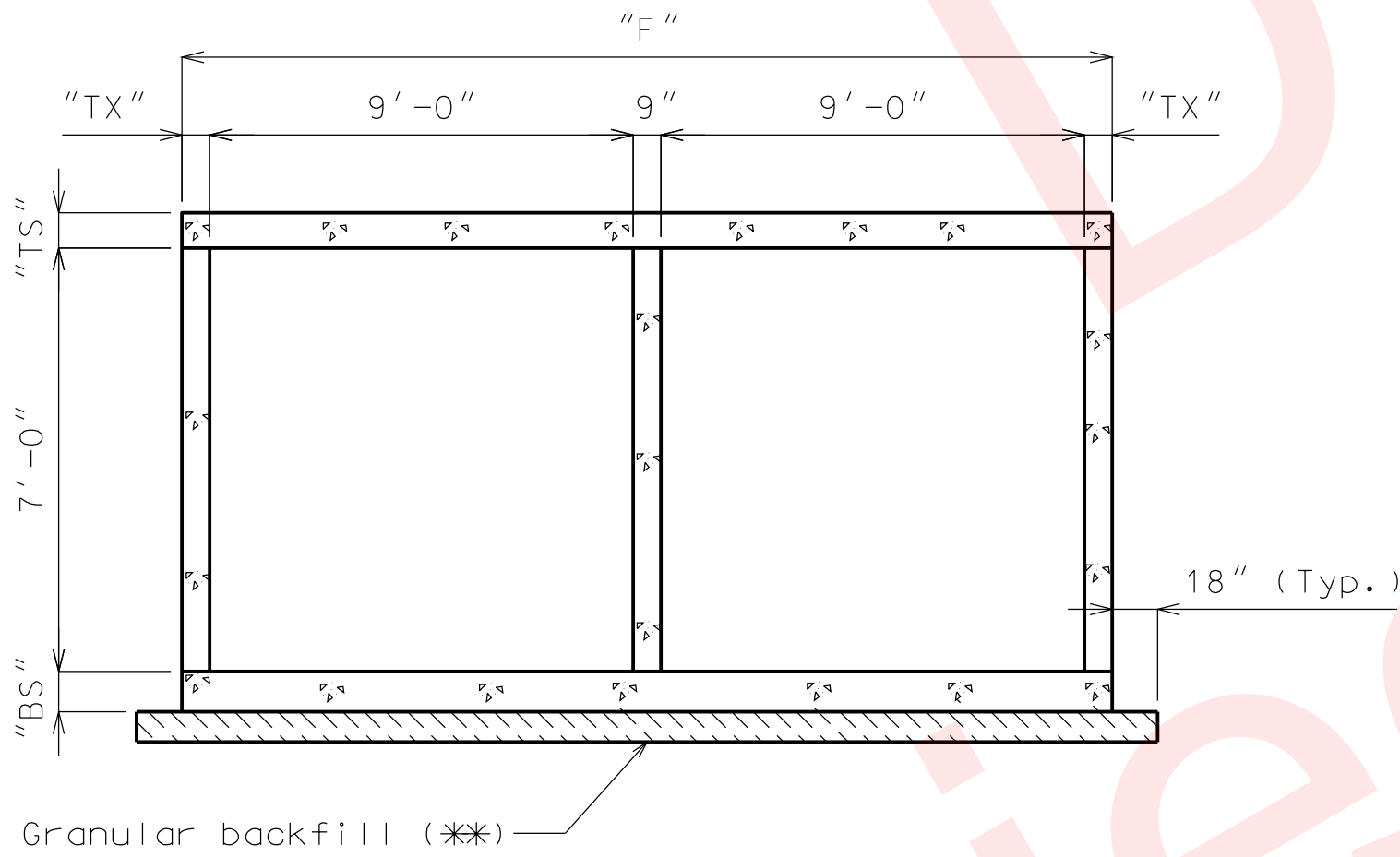
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ELEVATION

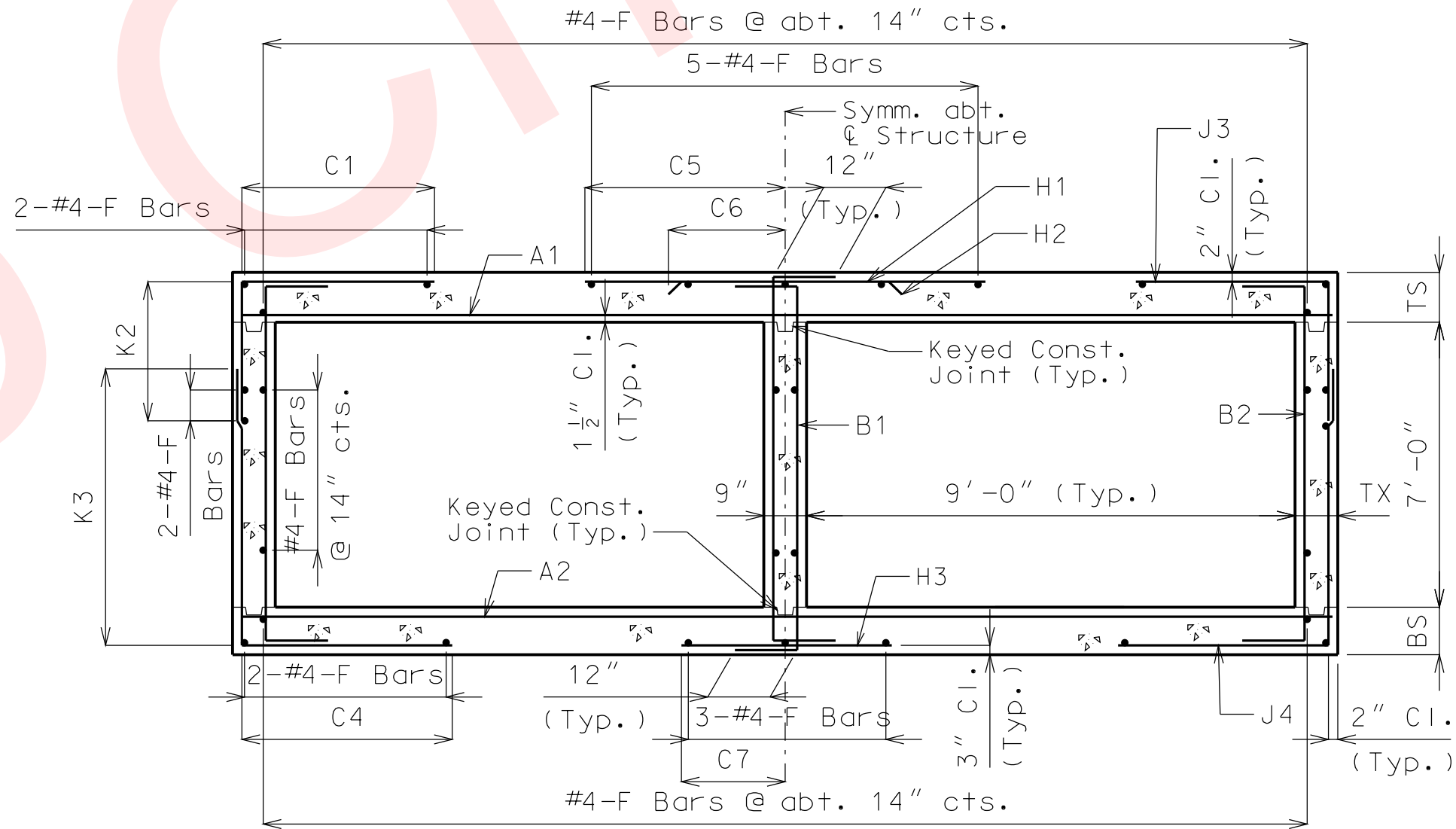
Note: Dimensions are normal to Proposed Rte. 1-49 @ Structure.

(**) If unsuitable material is encountered, excavation of unsuitable material and furnishing and placing of granular backfill shall be in accordance with Sec 206.



SECTION THRU BOX

(Normal to Structure)



TYPICAL SECTION THRU BOX

UNIT	DESIGN FILL (*)	MEMBER THICKNESS				RE INFORCEMENT TABLE																															
						TOP SLAB BARS								BOTTOM SLAB BARS								WALL BARS						COEFFICIENTS (see note)						"C" Multiplier	"K" Multiplier		
		"TS"	"BS"	"TX"	"F"	A1 Bars		J3 Bars		H1 Bars		H2 Bars		A2 Bars		J4 Bars		H3 Bars		B1 Bars		B2 Bars		F Bars		J4		H3		J3		H1		H2		S = 9 ft	HT = 7 ft
		(ft-in)	Thick	Thick	Thick	Size	c to c	Size	c to c	Size	c to c	Size	c to c	Size	c to c	Size	c to c	Size	c to c	Size	c to c	Size	c to c	Size	c to c	C4	K3	C7	C1	K2	C5	C6	in	in			
1 & 6	15'-10"	12"	14"	8"	20'-1"	4	5.5	5	7.5	6	12	6	12	4	5	5	8.5	6	5.5	5	11.5	5	11.5	4	14.0	0.22	0.89	0.42	0.24	0.32	0.38	0.22	116.5	105			
2 & 5	41'-9"	21"	24"	13"	20'-11"	5	5.5	5	8	6	12	6	12	5	6	4	6.5	7	6	5	11.5	5	11.5	4	14.0	0.30	0.83	0.43	0.31	0.34	0.39	0.29	119	124			
3 & 4	55'-7"	26"	30"	15"	21'-3"	6	7	5	7	6	14	6	14	6	7	5	10.5	7	6.5	5	11.5	5	11.5	4	14.0	0.36	0.81	0.48	0.37	0.35	0.39	0.31	120	135			

(*) Design fill height is the distance from the top of earth fill or roadway to the top of the top slab.

Notes:
Bar dimensions marked with C# or K# are the product of the coefficient and its associated multiplier.

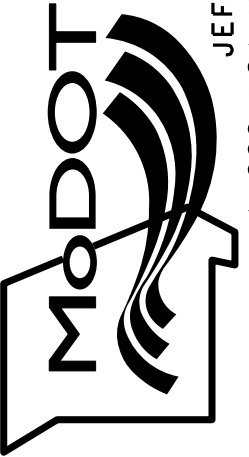
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DATE PREPARED		2/25/2010	
ROUTE	STATE	1-49	MO
DISTRICT	SHEET NO.	BR	3
COUNTY			
McDONALD			
JOB NO.			
J7P0601			
CONTRACT ID.			
PROJECT NO.			
BRIDGE NO.			
A7053			

DESCRIPTION

DATE

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION



105 WEST CAPITOL
JEFFERSON CITY, MO 65102
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IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.

CAUTION: Currently being re-designed as a double 9'x 7' with slope-tapered inlet

Doubleboxculvert Effective: Aug. 2008 Supercedes: Sep. 2006

BILL OF REINFORCING STEEL

NO.	REQ'D.	MARK NO.	LOCATION	SHAPE NO.	STIRRUP (S)	EPOXY (E)	VARIES (V)	NO. EACH	DIMENSIONS						NOMINAL LENGTH	ACTUAL LENGTH	WEIGHT		
									B	C	D or F	E	H	K					
									FT.	FT.	FT.	FT.	FT.	FT.	FT. IN.	FT. IN.	LBS.		
			Barrel Section																
			UNIT 2																
132	5	A1	Top Slab	20				1	20.583						20'-7"	20'-7"	2836		
121	5	A2	Bottom Slab	20				1	20.583						20'-7"	20'-7"	2600		
182	5	J3	Top Corner	19				1	3.513	3.074					6'-7"	6'-5"	1226		
224	4	J4	Bottom Corner	19				1	8.577	2.975					11'-7"	11'-5"	1713		
128	5	B1	Interior Wall	10				1		1.000	10.333				12'-4"	12'-1"	1612		
128	5	B2	Exterior Wall	20				1	10.333						10'-4"	10'-4"	1381		
61	6	H1	Top Slab	20				1	7.735						7'-9"	7'-9"	709		
60	6	H2	Top Slab	20				1	5.752						5'-9"	5'-9"	519		
121	7	H3	Bottom Slab	20				1	8.528						8'-6"	8'-6"	2111		
74	4	F1	Temp. Steel	20				1	59.750						59'-9"	59'-9"	2954		
			UNIT 3																
104	6	A1	Top Slab	20				1	20.917						20'-11"	20'-11"	3270		
104	6	A2	Bottom Slab	20				1	20.917						20'-11"	20'-11"	3270		
208	5	J3	Top Corner	19				1	3.937	3.700					7'-8"	7'-6"	1629		
140	5	J4	Bottom Corner	19				1	9.112	3.600					12'-9"	12'-7"	1838		
128	5	B1	Interior Wall	10				1		1.000	11.250				13'-3"	12'-12"	1734		
154	5	B2	Exterior Wall	20				1	11.250						11'-3"	11'-3"	1809		
52	6	H1	Top Slab	20				1	7.800						7'-10"	7'-10"	610		
52	6	H2	Top Slab	20				1	6.200						6'-2"	6'-2"	485		
112	7	H3	Bottom Slab	20				1	9.600						9'-7"	9'-7"	2200		
74	4	F1	Temp. Steel	20				1	59.750						59'-9"	59'-9"	2954		
			UNIT 4																
104	6	A1	Top Slab	20				1	20.917						20'-11"	20'-11"	3270		
104	6	A2	Bottom Slab	20				1	20.917						20'-11"	20'-11"	3270		
208	5	J3	Top Corner	19				1	3.937	3.700					7'-8"	7'-6"	1629		
140	5	J4	Bottom Corner	19				1	9.112	3.600					12'-9"	12'-7"	1838		
128	5	B1	Interior Wall	10				1		1.000	11.250				13'-3"	12'-12"	1734		
154	5	B2	Exterior Wall	20				1	11.250						11'-3"	11'-3"	1809		
52	6	H1	Top Slab	20				1	7.800						7'-10"	7'-10"	610		
52	6	H2	Top Slab	20				1	6.200						6'-2"	6'-2"	485		
112	7	H3	Bottom Slab	20				1	9.600						9'-7"	9'-7"	2200		
74	4	F1	Temp. Steel	20				1	59.750						59'-9"	59'-9"	2954		
			UNIT 5																
132	5	A1	Top Slab	20				1	20.583						20'-7"	20'-7"	2836		
121	5	A2	Bottom Slab	20				1	20.583						20'-7"	20'-7"	2600		
182	5	J3	Top Corner	19				1	3.513	3.074					6'-7"	6'-5"	1226		
224	4	J4	Bottom Corner	19				1	8.577	2.975					11'-7"	11'-5"	1713		
128	5	B1	Interior Wall	10				1		1.000	10.333				12'-4"	12'-1"	1612		
128	5	B2	Exterior Wall	20				1	10.333						10'-4"	10'-4"	1381		
61	6	H1	Top Slab	20				1	7.735						7'-9"	7'-9"	709		
60	6	H2	Top Slab	20				1	5.752						5'-9"	5'-9"	519		
121	7	H3	Bottom Slab	20				1	8.528						8'-6"	8'-6"	2111		
74	4	F1	Temp. Steel	20				1	59.750						59'-9"	59'-9"	2954		
			Upper End Section (UNIT 1)																
74	4	A1	Top Slab	20				1	19.750						19'-9"	19'-9"	976		
82	4	A2	Bottom Slab	20				1	19.750						19'-9"	19'-9"	1082		
108	5	J3	Top Corner	19				1	2.800	2.330					5'-2"	4'-12"	563		
100	5	J4	Bottom Corner	19				1	7.788	2.136					9'-11"	9'-9"	1022		
72	5	B1	Interior Walls	10				1		1.000	8.750				10'-9"	10'-6"	788		
72	5	B2	Exterior Walls	20				1	8.750						8'-9"	8'-9"	658		
33	6	H1	Top Slab	20				1	7.378						7'-5"	7'-5"	366		
33	6	H2	Top Slab	20				1	4.272						4'-3"	4'-3"	212		
75	6	H3	Bottom Slab	20				1	8.155						8'-2"	8'-2"	919		
74	4	F10	Temp. Steel	20				1	33.125						33'-2"	33'-2"	1638		
			Upper Wings and Headwall																
37	4	A10	Bottom Slab	20			V	1	30.921				Incr =	3.724	inches	30'-11"	30'-11"	626	
									19.750						19'-9"	19'-9"			
2	8	D1	Headwall	20				1	19.833						19'-10"	19'-10"	106		
12	5	E1	Toe	20				1	3.417						3'-5"	3'-5"	43		
10	4	F50	Flared Wings	15			V	2		14.981			Incr =	31.908	1.042	2.863	18'-0"	18'-0"	85
										4.345					1.042	2.863	7'-5"	7'-4"	
10	4	F51	Bottom Slab	20			V	2	14.822				Incr =	38.465	inches	14'-10"	14'-10"	56	
									2.000						2'-0"	2'-0"			
10	4	F52	Straight Wings	20			V	2	16.926				Incr =	29.984	inches	16'-11"	16'-11"	80	
									6.931						6'-11"	6'-11"			
4	4	F53	Bottom Slab	20			FB	1	18.877						18'-11"	18'-11"	50		
3	4	F54	Bottom Slab	20				1	17.996						17'-12"	17'-12"	36		
17	4	F55	Bottom Slab	20				1	17.996						17'-12"	17'-12"	204		
32	5	G1	Interior Walls	20			V	2	8.929				Incr =	5.370	inches	8'-11"	8'-11"	186	
									2.232						2'-3"	2'-3"			
32	5	G2	Exterior Wings	20			V	2	8.496				Incr =	5.046	inches	8'-6"	8'-6"	179	
									2.189						2'-2"	2'-2"			
34	6	H3	Bottom Slab	20				1	8.155						8'-2"	8'-2"	417		
4	7	J1	Straight Wings	20			FB	1	20.258						20'-3"	20'-3"	166		
8	7	J6	Flared Wings	20				1	21.135						21'-2"	21'-2"	346		
44	5	J5	Exterior Wings	19			V	2	8.715	2.136			Incr =	3.729	inches	10'-10"	10'-9"	342	
									2.189	2.136					4'-4"	4'-2"			

BILL OF REINFORCING STEEL

NO.	REQ'D.	MARK NO.	LOCATION	SHAPE NO.	STIRRUP (S)	EPOXY (E)	VARIES (V)	NO. EACH	DIMENSIONS						NOMINAL LENGTH	ACTUAL LENGTH	WEIGHT
									B	C	D or F	E	H	K			
									FT.	FT.	FT.	FT.	FT.	FT.	FT. IN.	FT. IN.	LBS.
21	5	R1	HeadWall	27	S			1	1.417	0.906		2.198	0.344	0.344	5'-0"	4'-11"	107
21	5	R2	HeadWall	10	S			1		0.875	1.250				3'-0"	2'-9"	61
			Lower End Section (UNIT 6)														
89	4	A1	Top Slab	20				1	19.750						19'-9"	19'-9"	1174
97	4	A2	Bottom Slab	20				1	19.750						19'-9"	19'-9"	1280
6	4	A3	Top Slab	20			V	1	17.056		Incr =	36.135	inches		17'-1"	17'-1"	38
									2.000						2'-0"	2'-0"	
138	5	J3	Top Corner	19				1	2.800	2.330					5'-2"	4'-12"	720
124	5	J4	Bottom Corner	19				1	7.788	2.136					9'-11"	9'-9"	1267
92	5	B1	Interior Walls	10				1		1.000	8.750				10'-9"	10'-6"	1006
91	5	B2	Exterior Walls	20				1	8.750						8'-9"	8'-9"	831
41	6	H1	Top Slab	20				1	7.378						7'-5"	7'-5"	455
41	6	H2	Top Slab	20				1	4.272						4'-3"	4'-3"	263
92	6	H3	Bottom Slab	20				1	8.155						8'-2"	8'-2"	1128
9	4	F60	Temp. Steel	20				1	40.681						40'-8"	40'-8"	245
1	4	F61	Temp. Steel	20				1	41.036						41'-0"	41'-0"	27
1	4	F62	Temp. Steel	20				1	41.623						41'-7"	41'-7"	28
1	4	F63	Temp. Steel	20				1	41.859						41'-10"	41'-10"	28
12	4	F64	Temp. Steel	20				1	42.184						42'-2"	42'-2"	338
1	4	F70	Temp. Steel	20				1	42.510						42'-6"	42'-6"	28
1	4	F71	Temp. Steel	20				1	42.746						42'-9"	42'-9"	29
1	4	F72	Temp. Steel	20				1	43.333						43'-4"	43'-4"	29
9	4	F73	Temp. Steel	20				1	43.687						43'-8"	43'-8"	263
1	4	F74	Temp. Steel	20				1	41.006						41'-0"	41'-0"	27
1	4	F75	Temp. Steel	20				1	41.564						41'-7"	41'-7"	28
1	4	F78	Temp. Steel	20				1	42.805						42'-10"	42'-10"	29
1	4	F79	Temp. Steel	20				1	43.362						43'-4"	43'-4"	29
36	4	F80	Temp. Steel	20			V	2	43.687		Incr =	2.122	inches		43'-8"	43'-8"	1015
									40.681						40'-8"	40'-8"	
			Lower Wings and Headwall														
37	4	A2	Bottom Slab	20				1	19.750						19'-9"	19'-9"	488
7	4	A11	Bottom Slab	20			V	1	18.425		Incr =	32.850	inches		18'-5"	18'-5"	48
									2.000						2'-0"	2'-0"	
2	8	D3	Headwall	20				1	20.062						20'-1"	20'-1"	107
12	5	E2	Heel	20				1	4.000						4'-0"	4'-0"	50
20	4	F42	Wings	20			V	4	15.378		Incr =	28.322	inches		15'-5"	15'-5"	142
									5.937						5'-11"	5'-11"	
7	4	F44	Bottom Slab	20				1	16.389						16'-5"	16'-5"	77
17	4	F45	Bottom Slab	20				1	16.389						16'-5"	16'-5"	186
30	5	G1	Interior Walls	20			V	2	8.876		Incr =	5.685	inches		8'-11"	8'-11"	174
									2.244						2'-3"	2'-3"	
30	5	G3	Exterior Wings	20			V	2	8.876		Incr =	5.685	inches		8'-11"	8'-11"	174
									2.244						2'-3"	2'-3"	
33	6	H3	Bottom Slab	20				1	8.155						8'-2"	8'-2"	405
4	8	H10	Headwall	20				1	20.062						20'-1"	20'-1"	214
12	7	J1	Wings	20			FB	1	19.148						19'-2"	19'-2"	470
38	5	J7	Wings	19			V	2	8.547	2.136	Incr =	4.202	inches		10'-8"	10'-5"	293
									2.244	2.136					4'-5"	4'-3"	
21	5	R3	HeadWall	10	S			1		1.417	1.250				4'-1"	3'-11"	85
			Totals														
4																	25651
5																	41879
6																	21891
7																	9604
8																	427
9																	0
10																	0
11			TOTALS														99450.0