

Job Name: 26-1827 - INDOT R-46095-A Dubois County Roundabout
Job Location: Bretzville, IN
Contractor: Ragle, Inc.

Plant: 100

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Tech: Jared - F
PC: A. Chambers

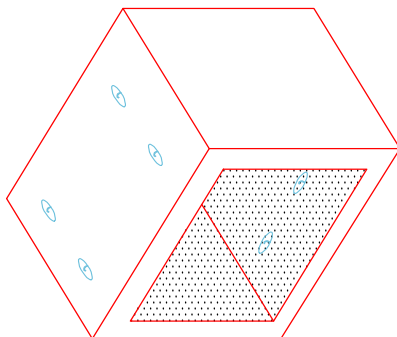
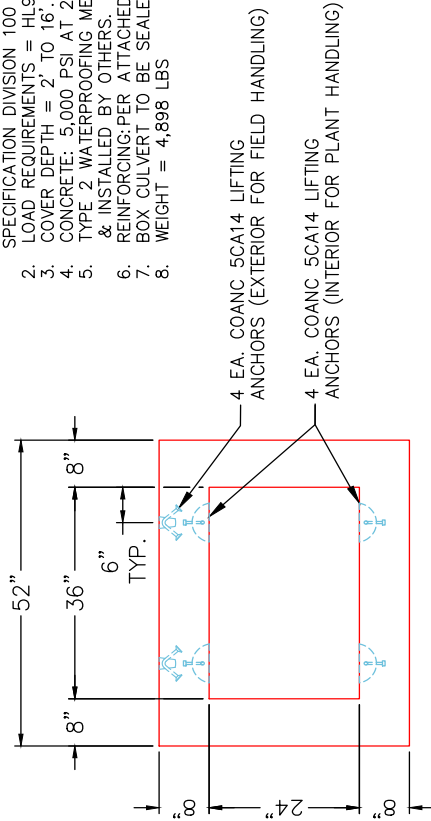


Structure ID: 3X2 BOX CULVERT

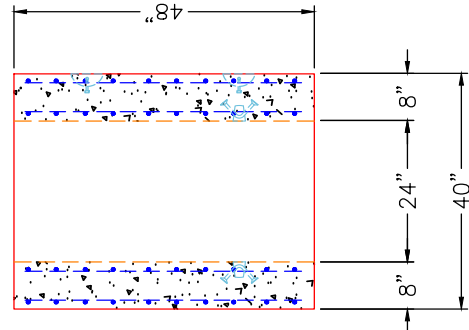
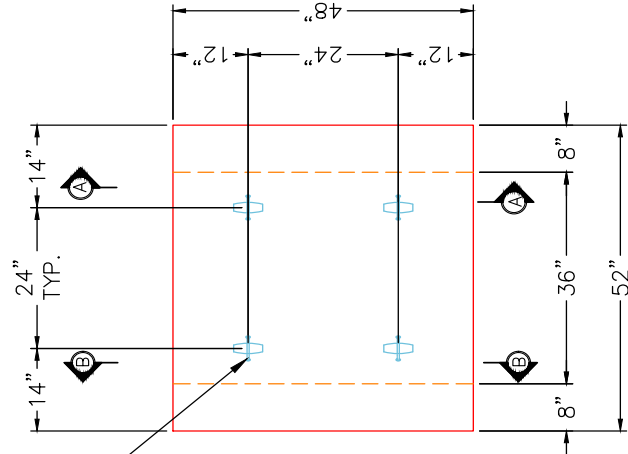
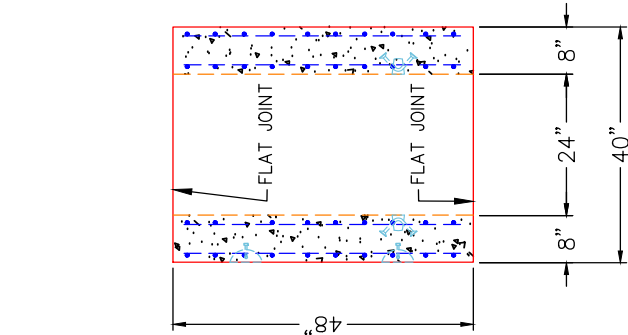
P1 BC024036-08WLF-FTFB BOX CULVERT (08W/08F/08T) No Haunch Flat/Flat Variable Ht F/F

NOTES:

1. BOX CULVERT IS DESIGNED PER INDOT STANDARD SPECIFICATION DIVISION 100 SECTION 106.01(c).
2. LOAD REQUIREMENTS = HL93.
3. COVER DEPTH = 2' TO 16'.
4. CONCRETE: 5,000 PSI AT 28 DAYS.
5. TYPE 2 WATERPROOFING MEMBRANE TO BE PROVIDED & INSTALLED BY OTHERS.
6. REINFORCING: PER ATTACHED CALCULATIONS.
7. BOX CULVERT TO BE SEALED WITH CS-102 ROLL
8. WEIGHT = 4,898 LBS



**COMPONENT
ISOMETRIC VIEW**



Coating (Int):
Coating (Ext):

Seam Up: Flat
Seam Dn: Flat

Wall Thickness: 8"
Floor Height: 0"

Height (Int): 48"
Height (Ext): 48"

Weight (Net): 4898 lb
Volume (Net): 1.25cu.yd

INFRASTRUCTURE PRECAST (ICAST)

Project : Dubois Co. Roundabout

Task :

Job No. : 26-1827

Client: Ragle inc.

File: 3x2 BC Four Sided (no haunch) - 26-1827 Dubois Co. Roundabout.etcx

Sht _____ of _____

By: J. Horsley

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Roundabout.etcx

Spec.: LRFD 9th ed.

Type of Culvert: Precast

Physical Dimensions

Clear Span:	3'-0"
Clear Height:	2'-0"
Top Slab:	8"
Bottom Slab:	8"
Ext. Wall:	8"
Fill Depth:	16.00 ft
Length:	4'-0"
Skew Angle:	0.00 deg
Bottom Slab Support:	Full Slab
Top Haunch, Width:	0"
Top Haunch, Height:	0"
Bottom Haunch, Width:	0"
Bottom Haunch, Height:	0"

Material Properties

Concrete	
Strength, f'c:	5.000 ksi
Density:	0.150 kcf
Elasticity, Ec:	4266 ksi
Type:	Normal wt

Steel	
Yield, fy:	60 ksi
Allow Stress:	36 ksi
Elasticity, Es:	29000 ksi

Soil	
Density:	0.120 kcf

Exposure Factor
Class 2 Exposure

Reinforcement Covers

Ext. Cover Top Slab:	2"
Ext. Cover Bottom Slab	1"
Ext. Cover Walls	1"
Int. Cover Walls	1"
Int. Cover Top Slab	1"
Int. Cover Bottom Slab	1"

Controlling Ratings

Inventory Rating: 1000.00

Operating Rating: 1000.00

Loads

Live Load

Vehicle Names:	KY HL-93
Traffic Direction:	Parallel
Eq. Height of Soil:	3.94 ft (Calc'd)

Dead Load

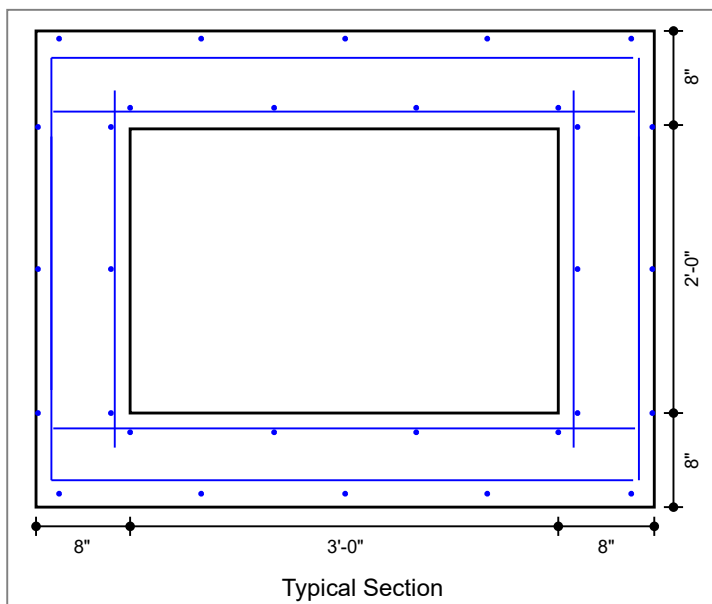
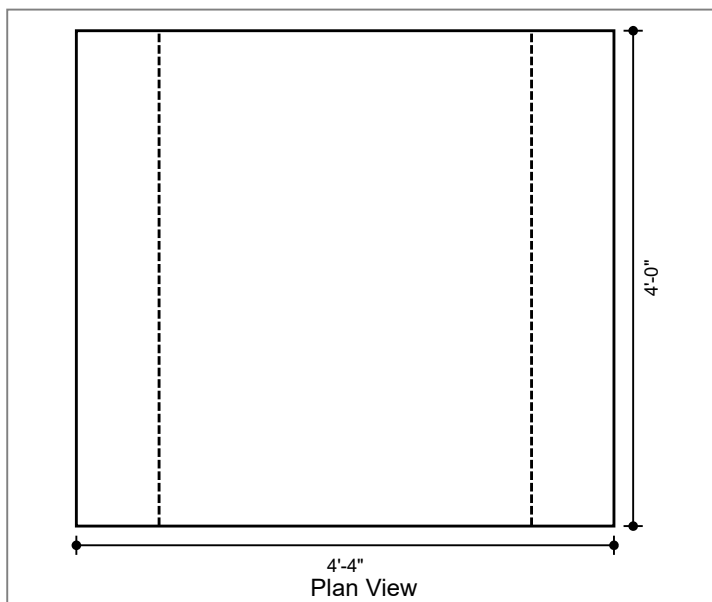
Future Wearing Surface:	0.000 klf
Additional Dead Load:	0.000 klf
Concentrated Loads:	none

Lateral Soil Loads

Eq. Fluid Press. Max:	60.00 pcf
Eq. Fluid Press. Min:	30.00 pcf

Interior Water Pressure: yes, head pressure = 0 ft

Exterior Water Pressure: no



INFRASTRUCTURE PRECAST (ICAST)

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Sht _____ of _____

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Ck: _____

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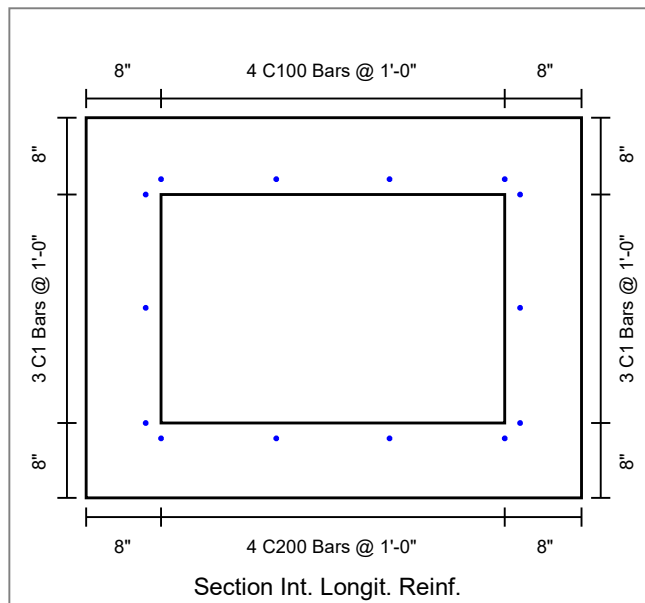
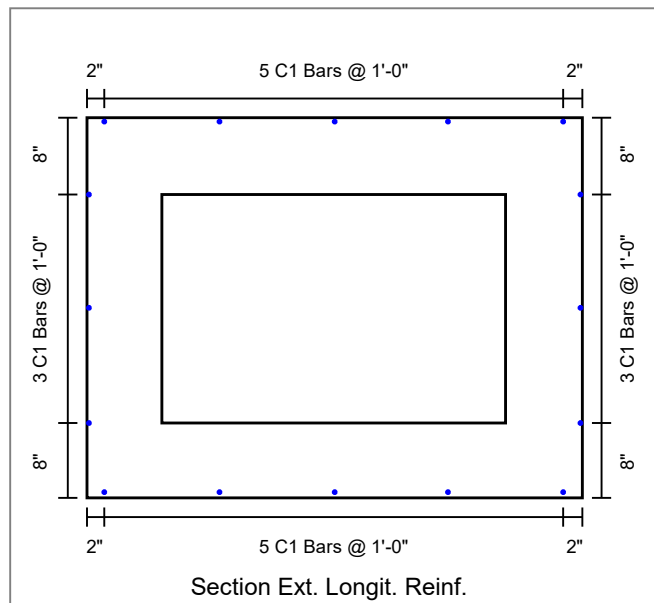
Roundabout.etcx

Concrete Summary

Volume of Concrete: 0.313 cy/ft Total Volume of Concrete: 1.251 cy

Reinforcing Steel Bar Schedule (lb)

Location	Mark	Qty	Size	Spacing	Type	Length	Center	Ver. Leg	Tot. Weight
Top Slab(Int)	A100 (AS2)	5	5	10"	S	4'-1"	--	--	21.0
Bot Slab(Int)	A200 (AS3)	5	5	10"	S	4'-1"	--	--	21.0
Corner(Top)	A1 (AS1)	5	5	10"	U	8'-9"	4'-1"	2'-4"	46.0
Corner(Bot)	A2 (AS1)	5	5	10"	U	8'-11"	4'-1"	2'-5"	47.0
Wall(Int)	B1 (AS4)	10	5	10"	S	2'-6"	--	--	26.0
Longit. Top (Int)	C100 (AS5)	4	5	1'-0"	S	3'-11"	--	--	16.0
Longit. Bot (Int)	C200	4	5	1'-0"	S	3'-11"	--	--	16.0
Longit. Top (Ext)	C1 (AS6)	5	5	1'-0"	S	3'-11"	--	--	20.5
Longit. Bot (Ext)	C1 (AS6)	5	5	1'-0"	S	3'-11"	--	--	20.5
Longit. Wall (Ext)	C1 (AS6)	6	5	1'-0"	S	3'-11"	--	--	24.6
Longit. Wall (Int)	C1 (AS6)	6	5	1'-0"	S	3'-11"	--	--	24.6
									283



INFRASTRUCTURE PRECAST (ICAST)

Project : Dubois Co. Roundabout

Task :

Job No. : 26-1827

Client: Ragle inc.

File: 3x2 BC Four Sided (no haunch) - 26-1827 Dubois Co. Roundabout

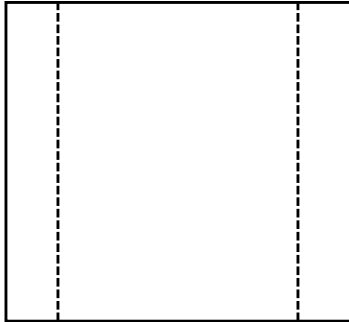
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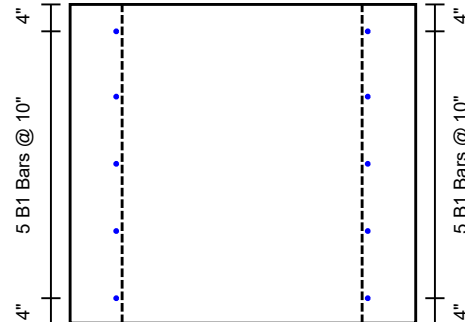
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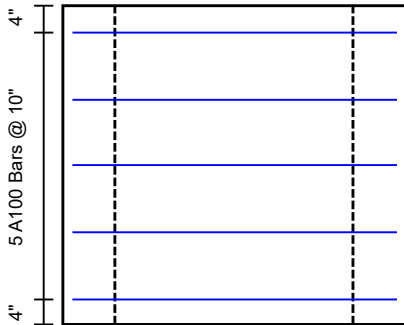
Roundabout



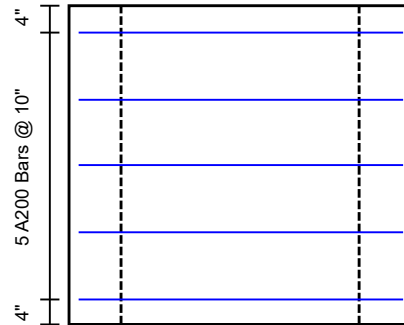
Ext. Wall Reinf.



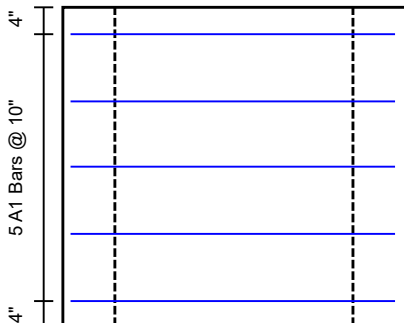
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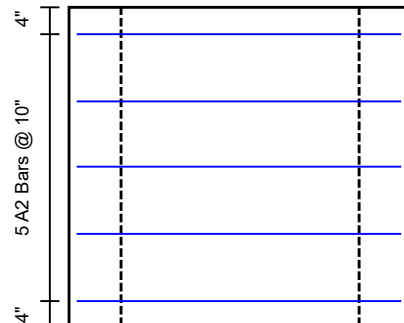
Top Slab Int. Reinf.



Bottom Slab Int. Reinf.



Top Slab Corner Reinf.



Bottom Slab Corner Reinf.

Project: Dubois Co. Roundabout
 Task :
 Client : Ragle inc.
 Job No.: 26-1827

CULVERT PROPERTIES

Type of Culvert: Precast Specification : LRFD 9th Edition
 Operating Mode : Analysis

Physical Dimensions

No. of Boxes: 1 Name: BoxCulvert
 Clear Span : 3.0000 ft Fill Depth : 16.00ft
 Clear Height: 2.0000 ft Skew Angle : 0.00 deg
 Length : 4.0000 ft Bottom Slab Support: Full Slab
 Haunches: Top, Length: 0.0000 in Height: 0.0000 in
 Bottom, Length: 0.0000 in Height: 0.0000 in
 Member Thicknesses: Top Slab: 8.0000 in Bot Slab: 8.0000 in
 Ext wall: 8.0000 in

Wall Joint: None

Material Properties

Concrete: Strength, f'c : 5.000 ksi Density : 0.150 kcf Elasticity, Ec: 4266 ksi
 Type : Normal weight Density Modification Factor : 1.00
 Fr Factor : 0.24 Gamma1 : 1.20 Gamma3 : 1.00 (user defined)
 Steel: Yield, fy : 60.00 ksi fss Limit : 0.60fy Elasticity, Es: 29000 ksi
 Yield, fyv : 60.00 ksi Diameter : 1.000 in Type : Rebar
 Soil: Density : 0.120 kcf Slope Factor: 1.150
 Poisson's : 0.5
 Fe Factor : 1.150 (Maximum for Compacted Fill)
 Serviceability, Gamma-e: 0.75

Loads

Live Load: Vehicle: (AA) KY HL-93 - Design Vehicle
 Axle No. Weight(k) Dist. From Previous(ft)
 1 10.00 0.00
 2 40.00 14.00
 3 40.00 14.00
 Gage width: 6.00 ft, Tread width: 20.00 in, Tread Length: 10.00 in
 Include Tandem: yes
 Tandem: Axle 1: 25.00 k, Axle 2: 25.00 k, Axle Spacing: 4.00 ft
 Lane Load: 0.64 klf, P-Moment: 0.00 k, P-Shear: 0.00 k
 Combine: Truck + Lane Or Tandem + Lane
 Inventory Rating Load Factor: 1.75 Operating Rating Load Factor: 1.35
 Design Load Combinations: Strength I
 Override MPF: no
 Override DLA: no
 Include Lane Load : no Max. No. of Lanes: 1
 Traffic Direction : Lanes Parallel to Main Reinforcement
 Neglect Live Load if: Fill > 8 ft and Fill > Clear Span
 Apply Surcharge at Fill Depths > 2 ft : yes
 Compute Surcharge Depth: yes
 Dead Load: Future wearing Surface : 0.00 klf Add. Dead Load : 0.00 klf
 Concentrated Loads : none
 Lateral Soil Loads: Max. Equiv. Fluid Press.: 60.00 pcf Min. Equiv. Fluid Press. : 30.00 pcf
 Include Additional Uniform Horiz. Load: no
 Include Additional Uniform Vert. Load: no
 Buoyancy Check : no
 Fluid Pressures : Apply water Press. : yes, interior only
 : Interior Pressure Head : 0.00 ft
 Foundation Model : Uniform Loads
 Seismic Analysis : Do not include

Load and Resistance Factors

	Max	Min		
DC:	1.250	0.900		
DW:	1.500	0.650		
EV:	1.300	0.900		
EH:	1.350	0.900		
WA:	1.000			
EQ:	1.000			
LL I	: 1.750	LL II : 1.350	LL Legal : 1.750	LL Extreme : 0.500
Ductility:	1.000	Importance: 1.000	Redundancy, non-earth: 1.000	Redundancy, earth: 1.050
Condition:	1.000	System : 1.000		
Phi Shear:	0.900	Phi Moment: 1.000	PM Compression: 0.750	PM Tension : 1.000
Load Factor Multipliers, Design Mode:	1.00	Analysis Mode:	1.00	

Reinforcement

Reinforcement Covers : Exterior Interior
Top Slab: 2.0000 in 1.0000 in
Walls : 1.0000 in 1.0000 in
Bot Slab: 1.0000 in 1.0000 in

Assigned reinforcement:

Location	Mark	Size	Spacing (in)
Top Slab Inside	A100 (AS2)	5	10.0000
Bottom Slab Inside	A200 (AS3)	5	10.0000
Top Corner	A1 (AS1)	5	10.0000
Bottom Corner	A2 (AS1)	5	10.0000
Ext. Wall Inside	B1 (AS4)	5	10.0000
Longitudinal	C1 (AS6)	5	12.0000
Top Distribution	C100 (AS5)	5	12.0000
Bottom Distribution	C200	5	12.0000

Analysis Options

Live Load Analysis =====
Automatically Set Traffic Direction to Account for Skew Effects: No
Limit LL Distribution width to Culvert Length for: Fills < 2 ft
Combine Longitudinal Axle Distribution Overlaps: Yes, Max of 2 Axles
Combine Transverse Axle Distribution Overlaps: No
Axle Placement Increment for Moving Load Analysis: 20
Include Impact on Bottom Slab: Yes
Always Distribute Wheel Load: Yes
Approach Slab will be Used: No

Live Load Deflection Criteria =====
Deflection Criteria: 1/800
Always check deflections: No

Slenderness =====
Not Checked

Additional Analysis Points =====
Evaluate Top of Walls: No
Evaluate Bottom of Walls: No
Evaluate Right Slabs: No
Evaluate Left Slabs: No

Reinforcement =====
Always Include Distribution Steel: No
Distribution Slab Provided: No
User Defined Longitudinal Steel: Yes
Max. As used in Vc Calcs: 2.00 in²/ft
Distribute Minimum Reinforcement per Face: Yes
Use individual Member Thicknesses for Min Steel: No
Epoxy coat steel: No
Use M-dimension for bar length calcs.: No
Individual top and bottom slab design: Yes
Individual interior and exterior wall design: Yes

Shear =====
Check Iterative Beta Method Only When Appropriate

Environmental =====
Apply durability factors: No

Additional Load Combinations =====
LRFD min/min: No

Critical Sections at Corners =====
Flexure critical section location: 1.5 member depth
Shear critical section location: dv beyond support
Use Max. Moment with Max. Shear at the Critical Section for Shear: Yes
Include depth of haunch for critical sections: No

Flexure =====
Ignore Axial Thrust: No
Use Eq. 12.10.4.2.4a-1: Yes Nu Multiplier: 1.00
Ignore fatigue: No
Use table 12.5.5-1 for P-M: No

Structural Analysis Modeling =====
Use Haunches in the Structural Analysis Model: Yes

Approaching wheel Load =====
Use for Design: No
Use for Rating: No

ANALYSIS RESULTS
=====

Top Slab Thickness = 8.00 in
Bottom Slab Thickness = 8.00 in
Exterior Wall Thickness = 8.00 in

Modular Ratio (N) = 6.80 Max. Steel Ratio = 0.025
Design Span = 3.67 ft Design Height = 2.67 ft
Design Fill Depth = 16.00 ft

Volume of Concrete: 0.313 cy/ft weight of Steel: 71 lb/ft

Note: Design and analysis results do not include force effects from stripping and handling stages

M dimension = 1' 8" (method of equivalent capacity)
 = 2' 2" (method of contraflexure - ASTM)

Reinforcing Steel Schedule

Location	Bar Mark	Qty	Size	Type	Spacing (in)	As,prv (in2/ft)	Length (ft-in)	Wgt (lbs)	H Leg (ft-in)	V Leg (ft-in)
Top Slab (int)	A100 (AS2)	5	5	STR	10.00	0.372	4- 1	21		
Bot Slab (int)	A200 (AS3)	5	5	STR	10.00	0.372	4- 1	21		
Corner Top-U	A1 (AS1)	5	5	U-BAR	10.00	0.372	8- 9	46	2- 4	2- 4
Corner Bottom-U	A2 (AS1)	5	5	U-BAR	10.00	0.372	8-11	47	2- 5	2- 5
Ext wall (int)	B1 (AS4)	10	5	STR	10.00	0.372	2- 6	26		
Top slab (int- 1)	C100 (AS5)	4	5	STR	12.00	0.310	3-11	16		
Bot Slab (int- 1)	C200	4	5	STR	12.00	0.310	3-11	16		
Temperature (1)	C1 (AS6)	5	5	STR	12.00	0.310	3-11	21		
Temperature (1)	C1 (AS6)	5	5	STR	12.00	0.310	3-11	21		
Temperature (1)	C1 (AS6)	6	5	STR	12.00	0.310	3-11	25		
Temperature (1)	C1 (AS6)	6	5	STR	12.00	0.310	3-11	25		
Total								283		

Note: A denotes flexural steel, B denotes vertical steel, C denotes longitudinal steel

AS Bar Marks

Location	As prv in2/ft
Transverse Side wall - Outside Face (AS1)	0.372
Transverse Top Slab - Inside Face (AS2)	0.372
Transverse Bottom Slab - Inside Face (AS3)	0.372
Transverse Side wall - Inside Face (AS4)	0.372
Distribution Top Slab - Inside Face (AS5)	0.310
Distribution Top Slab - Outside Face (AS6)	0.310
Transverse Top Slab - Outside Face (AS7)	0.000
Transverse Bottom Slab - Outside Face (AS8)	0.000

Notes: 1.) Final areas of steel provided must be checked in analysis mode
3.) AS7 and AS8 not required - corner steel has been extended

Summary of Ratings Table:

Flexure								Shear				
Truck	ILF	OLF	Fill	Member	Location	IR	OR	Fill	Member	Location	IR	OR
(AA)KY HL-	1.75	1.35	16.00	1	BOT	NC	NC	16.00	1	BOT	NC	NC

Critical Sections Summary: Flexure

Member 1: (Exterior wall), Thickness = 8.00 in

Loc	Dist. (in)	Design Moment (k-ft)	Corr. A. F. (k)	Mu (k-ft)	ds (in)	Ma (k-ft)	phi	As (in2)	Mcr (k-ft)	Load Ratings IR	Load Ratings OR	Truck	Fill Depth (ft)
BOT	4.00	-2.07	5.75	12.03	6.69	13.71	1.00	0.37	6.87	NC	NC	AA	16.00
MID	16.00	0.00	3.63	12.03	6.69	13.10	1.00	0.37	6.87	NC	NC	AA	16.00
MID-	16.00	-1.74	5.75	12.15	6.75	13.83	1.00	0.37	6.87	NC	NC	AA	16.00
TOP	4.00	-1.95	5.75	12.03	6.69	13.71	1.00	0.37	6.87	NC	NC	AA	16.00

Member 2: (Top Slab), Thickness = 8.00 in

Loc	Dist. (in)	Design Moment (k-ft)	Corr. A. F. (k)	Mu (k-ft)	ds (in)	Ma (k-ft)	phi	As (in2)	Mcr (k-ft)	Load Ratings IR	Load Ratings OR	Truck	Fill Depth (ft)
LT	4.00	-0.66	1.89	10.17	5.69	10.73	1.00	0.37	6.87	NC	NC	AA	16.00
MID	22.00	3.10	0.78	12.03	6.69	12.26	1.00	0.37	6.87	NC	NC	AA	16.00
MID-	22.00	0.0#	1.91	0.00	6.00	0.63	1.00	0.00	6.87	NC	NC	AA	16.00

Eriksson Culvert v6.4.1
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 Filename: 3x2 BC Four Sided (no haunch) - 26-1827 Dubois Co. Roundabout.etcx
 RT 4.00 -0.66 1.89 10.17 5.69 10.73 1.00 0.37 6.87 NC

Sht:____of____
 By:J. Horsley Chk:____
 7/20/2026 11:50:22 AM
 Culvert p. 4 of 7
 NC NC AA 16.00

Member 4: (Bottom Slab), Thickness = 8.00 in

Loc	Dist. (in)	Design	Corr.	Mu	ds	Ma	phi	As (in2)	Mcr (k-ft)	Load Ratings		Truck	Fill Depth (ft)
		Moment (k-ft)	A. F. (k)							IR	OR		
LT	4.00	-0.73	2.12	12.03	6.69	12.66	1.00	0.37	6.87	NC	NC	AA	16.00
MID	22.00	3.25	0.91	12.03	6.69	12.30	1.00	0.37	6.87	NC	NC	AA	16.00
MID-	22.00	0.0#	2.10	NaN	7.00	NaN	1.00	NaN	6.87	NC	NC	AA	16.00
RT	4.00	-0.73	2.12	12.03	6.69	12.66	1.00	0.37	6.87	NC	NC	AA	16.00

- A 0.0 design moment indicates no negative moments at this location. Check the 'Load Combination Results' table to determine if a positive moment exists.

Critical Sections Summary: Vertical Shear

Member 1: (Exterior Wall), Thickness = 8.00 in

Loc	Dist. (in)	Design	Corr.	Corr.	Dv	phi*Vn	Beta	Vc (k)	Vs (k)	Av (in2)	Max. Spac (in)	Load Ratings		Truck	Fill Depth (ft)
		Shear (k)	Moment (k-ft)	A. F. (k)								IR	OR		
BOT	9.85	0.82	-2.1	5.75	6.47	9.87	2.000	10.97 b	0.00	0.00	0.00	NC	NC	AA	16.00
MID	16.00	0.06	0.0	3.63	6.47	9.87	2.000	10.97 b	0.00	0.00	0.00	NC	NC	AA	16.00
MID-	16.00	0.02	-1.7	5.75	6.53	9.97	2.000	11.08 b	0.00	0.00	0.00	NC	NC	AA	16.00
TOP	9.85	-0.74	-2.0	5.75	6.47	9.87	2.000	10.97 b	0.00	0.00	0.00	NC	NC	AA	16.00

Member 2: (Top Slab), Thickness = 8.00 in

Loc	Dist. (in)	Design	Corr.	Corr.	Dv	phi*Vn	Beta	Vc (k)	Vs (k)	Av (in2)	Max. Spac (in)	Load Ratings		Truck	Fill Depth (ft)
		Shear (k)	Moment (k-ft)	A. F. (k)								IR	OR		
LT	9.76	3.20	-0.7	1.89	5.69	13.02	n/a	14.47 c	0.00	0.00	0.00	NC	NC	AA	16.00
MID	22.00	0.00	3.1	0.78	6.69	15.31	n/a	17.01 c	0.00	0.00	0.00	NC	NC	AA	16.00
MID-	22.00	0.00	0.0	1.91	6.00	13.74	n/a	15.26 c	0.00	0.00	0.00	NC	NC	AA	16.00
RT	9.76	3.20	-0.7	1.89	5.69	13.02	n/a	14.47 c	0.00	0.00	0.00	NC	NC	AA	16.00

Member 4: (Bottom Slab), Thickness = 8.00 in

Loc	Dist. (in)	Design	Corr.	Corr.	Dv	phi*Vn	Beta	Vc (k)	Vs (k)	Av (in2)	Max. Spac (in)	Load Ratings		Truck	Fill Depth (ft)
		Shear (k)	Moment (k-ft)	A. F. (k)								IR	OR		
LT	9.85	3.36	-0.7	2.12	6.69	15.31	n/a	17.01 c	0.00	0.00	0.00	NC	NC	AA	16.00
MID	22.00	0.00	3.2	0.91	6.69	15.31	n/a	17.01 c	0.00	0.00	0.00	NC	NC	AA	16.00
MID-	22.00	0.00	0.0	2.10	7.00	NaN	n/a	NaN c	0.00	0.00	0.00	NC	NC	AA	16.00
RT	9.85	3.36	-0.7	2.12	6.69	15.31	n/a	17.01 c	0.00	0.00	0.00	NC	NC	AA	16.00

Vc Calculation By: a - Iterative Beta, b - Constant Beta, c - Box Culvert, d - Standard/Arema

Analysis Results: Fill Depth = 16.00 ft

Load Parameters:

Fe = 1.15 Surcharge Depth : -1.00 ft

Applied Horizontal Loads: (k/ft)

Load Description	Bottom of wall	Top of wall
Live Load Surcharge	0.000	0.000
Internal Water Pressure	-0.125(4.0in)	0.000(-4.0in)
External Water Pressure	0.000(0.0in)	0.000(0.0in)
Horizontal Earth Load	1.140	0.980

Applied Uniform Bottom Slab Loads: (k/ft)

Load Description	
Dead Load	0.245
Vertical Earth	2.208
Wearing Surface	0.000

Unfactored Moments due to All Loads: (k-ft)

M-PT	Mdc	Mev	Mdw	Meh	Mls	Mwa	Mgw
Member 1: (Exterior wall)							
Bottom							
1- 0	-0.18	-1.43	0.00	-0.27	0.00	0.02	0.00
1- 1	-0.16	-1.43	0.00	0.08	0.00	-0.01	0.00
1- 2	-0.15	-1.43	0.00	0.35	0.00	-0.02	0.00
1- 3	-0.14	-1.43	0.00	0.53	0.00	-0.04	0.00
1- 4	-0.12	-1.43	0.00	0.64	0.00	-0.04	0.00
1- 5	-0.11	-1.43	0.00	0.68	0.00	-0.04	0.00
1- 6	-0.10	-1.43	0.00	0.64	0.00	-0.03	0.00
1- 7	-0.09	-1.43	0.00	0.52	0.00	-0.02	0.00
1- 8	-0.07	-1.43	0.00	0.33	0.00	-0.01	0.00
1- 9	-0.06	-1.43	0.00	0.07	0.00	0.00	0.00
1-10	-0.05	-1.43	0.00	-0.26	0.00	0.01	0.00
Top							

Unfactored Shears due to All Loads: (k)

	Vdc	Vev	Vdw	Veh	Vls	Vwa	Vgw
Member 1: (Exterior wall)							
Bottom							
1- 0	0.05	0.00	0.00	1.45	0.00	-0.08	0.00
1- 1	0.05	0.00	0.00	1.15	0.00	-0.08	0.00
1- 2	0.05	0.00	0.00	0.85	0.00	-0.06	0.00
1- 3	0.05	0.00	0.00	0.56	0.00	-0.03	0.00
1- 4	0.05	0.00	0.00	0.27	0.00	0.00	0.00
1- 5	0.05	0.00	0.00	-0.02	0.00	0.01	0.00
1- 6	0.05	0.00	0.00	-0.30	0.00	0.03	0.00
1- 7	0.05	0.00	0.00	-0.57	0.00	0.04	0.00
1- 8	0.05	0.00	0.00	-0.85	0.00	0.04	0.00
1- 9	0.05	0.00	0.00	-1.11	0.00	0.05	0.00
1-10	0.05	0.00	0.00	-1.38	0.00	0.05	0.00

Member 2: (Top Slab)

Left							
2- 0	-0.05	-1.43	0.00	-0.26	0.00	0.01	0.00
2- 1	0.01	-0.10	0.00	-0.26	0.00	0.01	0.00
2- 2	0.06	0.94	0.00	-0.26	0.00	0.01	0.00
2- 3	0.09	1.68	0.00	-0.26	0.00	0.01	0.00
2- 4	0.11	2.13	0.00	-0.26	0.00	0.01	0.00
2- 5	0.12	2.28	0.00	-0.26	0.00	0.01	0.00
2- 6	0.11	2.13	0.00	-0.26	0.00	0.01	0.00
2- 7	0.09	1.68	0.00	-0.26	0.00	0.01	0.00
2- 8	0.06	0.94	0.00	-0.26	0.00	0.01	0.00
2- 9	0.01	-0.10	0.00	-0.26	0.00	0.01	0.00
2-10	-0.05	-1.43	0.00	-0.26	0.00	0.01	0.00
Right							

Member 4: (Bottom Slab)

Left							
4- 0	-0.18	-1.43	0.00	-0.27	0.00	0.02	0.00
4- 1	-0.03	-0.10	0.00	-0.27	0.00	0.02	0.00
4- 2	0.09	0.94	0.00	-0.27	0.00	0.02	0.00
4- 3	0.17	1.68	0.00	-0.27	0.00	0.02	0.00
4- 4	0.22	2.13	0.00	-0.27	0.00	0.02	0.00
4- 5	0.24	2.28	0.00	-0.27	0.00	0.02	0.00
4- 6	0.22	2.13	0.00	-0.27	0.00	0.02	0.00
4- 7	0.17	1.68	0.00	-0.27	0.00	0.02	0.00
4- 8	0.09	0.94	0.00	-0.27	0.00	0.02	0.00
4- 9	-0.03	-0.10	0.00	-0.27	0.00	0.02	0.00
4-10	-0.18	-1.43	0.00	-0.27	0.00	0.02	0.00
Right							

Unfactored Thrusts due to All Loads: (k)

Member	Pdc	Pev	Pdw	Peh	Pls	Pwa
1	0.18	4.05	0.00	0.00	0.00	0.00
2	-0.05	0.00	0.00	1.38	0.00	-0.05
4	0.05	0.00	0.00	1.45	0.00	-0.08

----- No analysis truck, live load neglected -----

Serviceability Check: Crack Control

Bar Mark	Location	Moment (k-ft)	Thrust (k)	Fss (ksi)	Spacing (in)	Allow (in)
A1	Top Corner Bar	-1.4	4.23	2.18	10.00	99.99
A2	Bot Corner Bar	-1.5	4.23	2.61	10.00	99.99
A100	Top Slab (int)	2.3	0.59	11.03	10.00	34.54
A200	Bot Slab (int)	2.4	0.69	11.50	10.00	33.04

Strength Limit State at Critical Sections: Flexure

Member 1: (Exterior wall), Thickness = 8.00 in

Loc	Dist. (in)	Design Moment (k-ft)	Corr. A. F. (k)	Mu (k-ft)	ds (in)	Ma (k-ft)	phi	As (in2)	Mcr (k-ft)	Load Ratings IR	OR
BOT	4.00	-2.07	5.75	12.03	6.69	13.71	1.00	0.37	6.87	NC	NC
MID	16.00	0.00	3.63	12.03	6.69	13.10	1.00	0.37	6.87	NC	NC
MID-	16.00	-1.74	5.75	12.15	6.75	13.83	1.00	0.37	6.87	NC	NC
TOP	4.00	-1.95	5.75	12.03	6.69	13.71	1.00	0.37	6.87	NC	NC

Member 2: (Top Slab), Thickness = 8.00 in

Loc	Dist. (in)	Design Moment (k-ft)	Corr. A. F. (k)	Mu (k-ft)	ds (in)	Ma (k-ft)	phi	As (in2)	Mcr (k-ft)	Load Ratings IR	OR
LT	4.00	-0.66	1.89	10.17	5.69	10.73	1.00	0.37	6.87	NC	NC
MID	22.00	3.10	0.78	12.03	6.69	12.26	1.00	0.37	6.87	NC	NC
MID-	22.00	0.0#	1.91	0.00	6.00	0.63	1.00	0.00	6.87	NC	NC
RT	4.00	-0.66	1.89	10.17	5.69	10.73	1.00	0.37	6.87	NC	NC

Member 4: (Bottom slab), Thickness = 8.00 in

Loc	Dist. (in)	Design Moment (k-ft)	Corr. A. F. (k)	Mu (k-ft)	ds (in)	Ma (k-ft)	phi	As (in2)	Mcr (k-ft)	Load Ratings IR	OR
LT	4.00	-0.73	2.12	12.03	6.69	12.66	1.00	0.37	6.87	NC	NC
MID	22.00	3.25	0.91	12.03	6.69	12.30	1.00	0.37	6.87	NC	NC
MID-	22.00	0.0#	2.10	NaN	7.00	NaN	1.00	NaN	6.87	NC	NC
RT	4.00	-0.73	2.12	12.03	6.69	12.66	1.00	0.37	6.87	NC	NC

Notes: Mu - Resisting moment under pure flexure, Ma - Allowable moment under applied axial load
 # - A 0.0 design moment indicates no negative moments at this location. Check the 'Load Combination Results' table to determine if a positive moment exists.

Strength Limit State at Critical Sections: Vertical Shear

Member 1: (Exterior wall), Thickness = 8.00 in

Loc	Dist. (in)	Design Shear (k)	Corr. Moment (k-ft)	Corr. A. F. (k)	Dv (in)	phi*vn (k)	Beta	Theta	Vc (k)	Vs (k)	Av (in2)	Max. Spac (in)	Load Ratings IR	OR
BOT	9.85	0.82	-2.1	5.75	6.47	9.87	2.000	45.00	10.97 b	0.00	0.00	0.00	NC	NC
MID	16.00	0.06	0.0	3.63	6.47	9.87	2.000	45.00	10.97 b	0.00	0.00	0.00	NC	NC
MID-	16.00	0.02	-1.7	5.75	6.53	9.97	2.000	45.00	11.08 b	0.00	0.00	0.00	NC	NC
TOP	9.85	-0.74	-2.0	5.75	6.47	9.87	2.000	45.00	10.97 b	0.00	0.00	0.00	NC	NC

Member 2: (Top Slab), Thickness = 8.00 in

Loc	Dist. (in)	Design Shear (k)	Corr. Moment (k-ft)	Corr. A. F. (k)	Dv (in)	phi*vn (k)	Beta	Theta	Vc (k)	Vs (k)	Av (in2)	Max. Spac (in)	Load Ratings IR	OR
LT	9.76	3.20	-0.7	1.89	5.69	13.02	n/a	n/a	14.47 c	0.00	0.00	0.00	NC	NC
MID	22.00	0.00	3.1	0.78	6.69	15.31	n/a	n/a	17.01 c	0.00	0.00	0.00	NC	NC
MID-	22.00	0.00	0.0	1.91	6.00	13.74	n/a	n/a	15.26 c	0.00	0.00	0.00	NC	NC
RT	9.76	3.20	-0.7	1.89	5.69	13.02	n/a	n/a	14.47 c	0.00	0.00	0.00	NC	NC

Member 4: (Bottom slab), Thickness = 8.00 in

Loc	Dist. (in)	Design Shear (k)	Corr. Moment (k-ft)	Corr. A. F. (k)	Dv (in)	phi*vn (k)	Beta	Theta	Vc (k)	Vs (k)	Av (in2)	Max. Spac (in)	Load Ratings IR	OR
LT	9.85	3.36	-0.7	2.12	6.69	15.31	n/a	n/a	17.01 c	0.00	0.00	0.00	NC	NC
MID	22.00	0.00	3.2	0.91	6.69	15.31	n/a	n/a	17.01 c	0.00	0.00	0.00	NC	NC
MID-	22.00	0.00	0.0	2.10	7.00	NaN	n/a	n/a	NaN c	0.00	0.00	0.00	NC	NC
RT	9.85	3.36	-0.7	2.12	6.69	15.31	n/a	n/a	17.01 c	0.00	0.00	0.00	NC	NC

Vc Calculation By: a - Iterative Beta, b - Constant Beta, c - Box Culvert, d - Standard/Arema

M-PT	+Moment	-Moment	+Axial	-Axial	+Shear	-Shear
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Bottom						
1- 0	-1.763	-2.552	3.635	5.755	2.115	0.914
1- 1	-1.260	-2.113	3.635	5.755	1.687	0.720
1- 2	-0.871	-1.945	3.635	5.755	1.266	0.552
1- 3	-0.594	-1.819	3.635	5.755	0.850	0.391
1- 4	-0.427	-1.736	3.635	5.755	0.440	0.229
1- 5	-0.368	-1.697	3.635	5.755	0.064	0.019
1- 6	-0.416	-1.702	3.635	5.755	-0.102	-0.378
1- 7	-0.569	-1.751	3.635	5.755	-0.269	-0.770
1- 8	-0.826	-1.846	3.635	5.755	-0.438	-1.155
1- 9	-1.185	-1.985	3.635	5.755	-0.609	-1.535
1-10	-1.644	-2.388	3.635	5.755	-0.779	-1.908
Top						

Left						
2- 0	-1.644	-2.388	1.908	1.891	5.755	3.635
2- 1	-0.271	-0.489	0.779	1.891	4.604	2.908
2- 2	1.206	0.489	0.779	1.908	3.453	2.181
2- 3	2.261	1.155	0.779	1.908	2.302	1.454
2- 4	2.894	1.555	0.779	1.908	1.151	0.727
2- 5	3.105	1.688	0.779	1.908	0.000	0.000
2- 6	2.894	1.555	0.779	1.908	-0.727	-1.151
2- 7	2.261	1.155	0.779	1.908	-1.454	-2.302
2- 8	1.206	0.489	0.779	1.908	-2.181	-3.453
2- 9	-0.271	-0.489	0.779	1.891	-2.908	-4.604
2-10	-1.644	-2.388	1.908	1.891	-3.635	-5.755
Right						

Left						
4- 0	-1.763	-2.552	2.098	2.115	6.088	3.875
4- 1	-0.322	-0.543	0.914	2.115	4.870	3.100
4- 2	1.241	0.510	0.914	2.098	3.653	2.325
4- 3	2.357	1.221	0.914	2.098	2.435	1.550
4- 4	3.026	1.647	0.914	2.098	1.218	0.775
4- 5	3.250	1.789	0.914	2.098	0.000	0.000
4- 6	3.026	1.647	0.914	2.098	-0.775	-1.218
4- 7	2.357	1.221	0.914	2.098	-1.550	-2.435
4- 8	1.241	0.510	0.914	2.098	-2.325	-3.653
4- 9	-0.322	-0.543	0.914	2.115	-3.100	-4.870
4-10	-1.763	-2.552	2.098	2.115	-3.875	-6.088
Right						