THE GLEN WIDEFIELD - POA ANNUA INTERSECTION

EL PASO COUNTY, CO

Designed by: PRETEK GROUP

Designed for: Lindsay PRECAST

July 18, 2022 Project No. 22-206

DESIGNED BY:	CHECKED BY:
HAJIR ALI	TOM NICHOLSON
(HAA)	(TEN)
ALL PAGES	ALL PAGES

DESIGN CALCULATIONS

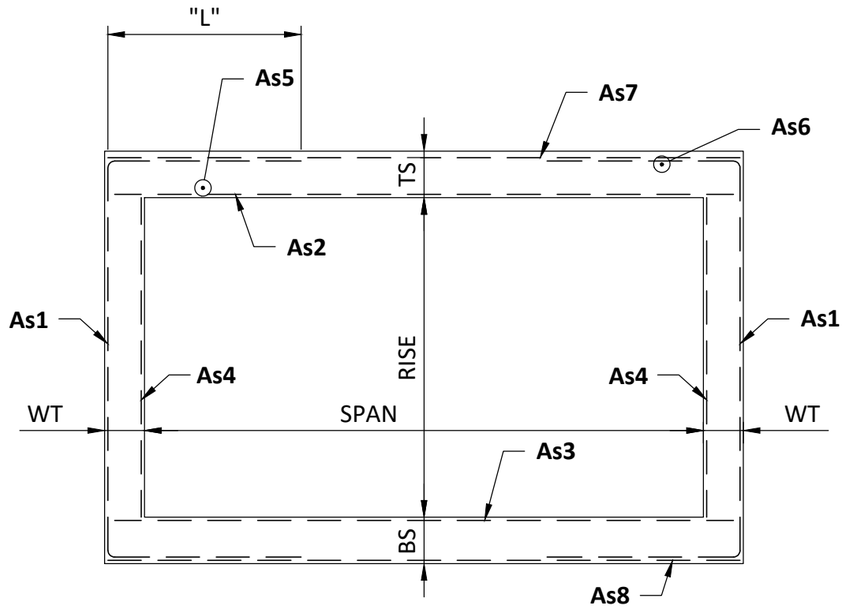
BOX CALCULATIONS **2**

■ No Exception Taken ☐ Make Corrections Noted
☐ Rejected ☐ Revise and Resubmit
☐ Submit Specified Item We are verifying with the County that the note on the Poa Annua profile (sheet 21) has been addressed.

Checking is only for general conformance with the design concept of the project and general compliance with the information given in the contract documents. Any action shown is subject to the requirements of the plans and specifications. Contractor is responsible for: dimensions which shall be confirmed and correlated at the job site; fabrication processes and techniques of construction; coordination of his work with that of all other trades; and the satisfactory performance of his work.

Kiowa Engineering Corporation
Date: July 19, 2022 By:

COLORADO LICENSED
JEFFREY JOSEPH VON HANDORF
0048002
PROFESSIONAL ENGINEER
JULY 18, 2022



BOX CULVERT REINFORCING SECTION

DESIGN DATA:

1. THIS STRUCTURE IS DESIGNED IN ACCORDANCE WITH THE AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS "LRFD BRIDGE DESIGN SPECIFICATIONS", 9TH EDITION AND INTERIM SPECIFICATIONS TO DATE.
2. CORE STRENGTH OF CONCRETE SHALL BE 6,000 PSI MINIMUM AT 28 DAYS.
3. REINFORCING STEEL SHALL BE WELDED WIRE FABRIC WITH A MINIMUM YIELD STRENGTH OF 65,000 PSI.
4. DESIGN LOAD: HL-93
5. SKEW ANGLE: N/A
6. 2" COVER ON ALL SURFACES.
7. D.E.C. - 0'-0" TO 2'-0"

SECTION CHARACTERISTICS:

SPAN: 3'-0"
RISE: 2'-0"
WT: 6" (WALL THICKNESS)
TS: 6" (TOP SLAB)
BS: 6" (BOTTOM SLAB)

AREA OF STEEL REQUIRED: (IN^2/FT)

As1 = 0.45
As2 = 0.30
As3 = 0.24
As4 = 0.15
As5 = 0.15
As6 = 0.03 (MIN)*
As7 = 0.15
As8 = 0.15

L = 2'-7"

*NOTE:
CIRCUMFERENTIAL WIRES TO HAVE 2" MIN. SPACING, 4" MAX. LONGITUDINAL WIRES TO BE SPACED NO MORE THAN 8" AND BE SIZED AT LEAST 40% OF THE LARGER WIRE SIZE (W2.5 OR D2.5). STEAL AREAS SHOWN ARE MINIMUMS REQUIRED. ADJUST MAT WIDTH AS REQUIRED DUE TO NON-STANDARD SECTION LENGTHS AND/OR END UNITS WITH KEYWAY ON ONLY THE END.

FOR APPROVAL

	DATE	DESCRIPTION	ENG
7			
6			
5			
4			
3			
2			
1			

THE GLEN WIDEFIELD - POA ANNUA INTERSECTION

LOCALE: EL PASO COUNTY

STATE: CO

PROVIDED BY:
Lindsay Precast
COLORADO DIVISION
3330 E. LAS VEGAS ST.
COLORADO SPRINGS, CO 80906
719.392.9036

DESIGNED BY:
PRETEK GROUP
P.O. BOX 351
BELLBROOK, OH 45305
800.241.0925

PROJECT NUMBER: 22-206
DATE: 7/5/2022
DESIGNED BY: HAA
DRAWN BY: HAA
CHECKED BY: TEN

S1

Project: THE GLEN WIDEFIELD
Task :
Client : LINDSAY CO
Job No.: 22-206

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
Clear Height: 2.0000 ft Skew Angle : 0.00 deg
Length : 6.0000 ft Bottom Slab Support: Full Slab
Fill Depth Range: Maximum : 2.00 ft Minimum : 0.00 ft Increment : 0.50 ft
Haunches: Top, Length: 0.0000 in Height: 0.0000 in
Bottom, Length: 0.0000 in Height: 0.0000 in
Member Thicknesses: Top Slab: 6.0000 in Bot Slab: 6.0000 in
Ext Wall: 6.0000 in
Wall Joint: None

Material Properties

Concrete: Strength,f'c : 6.000 ksi Density : 0.150 kcf Elasticity,Ec: 4877 ksi
Type : Normal Weight Density Modification Factor : 1.00
Fr Factor : 0.24 Gamma1 : 1.20 Gamma3 : 0.75
Steel: Yield,fy : 65.00 ksi fss Limit : 0.60fy Elasticity,Es: 29000 ksi
Yield,fyv : 60.00 ksi Diameter : 1.000 in Type : Mesh
Soil: Density : 0.120 kcf Slope Factor: 1.150 (B1 Installation)
Poisson's : 0.5
Fe Factor : 1.150 (Maximum for Compacted Fill)
Serviceability, Gamma-e: 1.00

Loads

Live Load: Vehicle: (AA) HL-93 - Design Vehicle

Axle No.	Weight(k)	Dist. From Previous(ft)
1	8.00	0.00
2	32.00	14.00
3	32.00	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: 0.00 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: Computed by Program
Traffic Direction : Lanes Perpendicular to Main Reinforcement
Neglect Live Load for Large Fill Depths: no
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. : no
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: 1.000
Condition: 1.000 System : 1.000
Phi Shear: 0.900 Phi Moment: 1.000 PM Compression: 0.750 PM Tension : 0.900
Load Factor Multipliers, Design Mode: 1.00 Analysis Mode: 1.00

Reinforcement

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

Assigned reinforcement:

Location	Mark	Size	Spacing (in)	# of Layers
Top Slab Inside	A100 (AS2)	W10	4.0000	1
Bottom Slab Inside	A200 (AS3)	W8	4.0000	1
Top Corner	AE1 (AS1)	W15	4.0000	1
Bottom Corner	A2 (AS1)	W15	4.0000	1
Ext. Wall Inside	B1 (AS4)	W5	4.0000	1
Longitudinal	C1 (AS6)	None	4.0000	1
Top Distribution	C100 (AS5)	W5	4.0000	1
Bottom Distribution	C200	None	4.0000	1

Analysis Options

LL Analysis : Automatically Set Traffic Direction to Account for Skew Effects: no
Limit LL Distribution Width to Culvert Length for: None
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
Deflection Criteria : 1/800
Approach Slab will be Used: 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: top bars, if fill < 2'
Use M-dimension for bar length calcs.: no

Slenderness : Checked K Factor: 2.00

Analysis Modeling : Use Haunches in the Structural Analysis Model: no

Critical Sections : 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: no

Shear : Always Check Iterative Beta Method

Environmental : Apply duribility factors: no

ANALYSIS RESULTS
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Top Slab Thickness = 6.00 in
Bottom Slab Thickness = 6.00 in
Exterior Wall Thickness = 6.00 in

Modular Ratio (N) = 5.95 Max. Steel Ratio = 0.025
Design Span = 3.50 ft Design Height = 2.50 ft

Volume of Concrete: 0.222 cy/ft

M dimension = 1' 6" (method of equivalent capacity)
= 2' 8" (method of contraflexure - ASTM)

Reinforcing Steel Schedule

Location	Mat Mark	Sheets Included	Layers	As,prv (in2/ft)
Top Slab (int)	A100 (AS2)	Top	1	0.300
Bot Slab (int)	A200 (AS3)	Bot	1	0.240
Corner Top-U	AE1 (AS1)	Top	1	0.450
Corner Bottom-U	A2 (AS1)	Bot	1	0.450
Ext Wall (int)	B1 (AS4)	L&R	1	0.150
Temperature (1)	CE1 (AS6)	Top	1	0.000
Top Slab (int- 1)	C100 (AS5)	Top	1	0.150
Bot Slab (int- 1)	C200	Bot	1	0.000
Temperature (1)	C1 (AS6)	Bot	1	0.000
Temperature (1)	C1 (AS6)	L&R	1	0.000
Temperature (1)	C1 (AS6)	L&R	1	0.000

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)	0.450
Transverse Top Slab - Inside Face (AS2)	0.300
Transverse Bottom Slab - Inside Face (AS3)	0.240
Transverse Side Wall - Inside Face (AS4)	0.150
Distribution Top Slab - Inside Face (AS5)	0.150
Distribution Top Slab - OutSide Face (AS6)	0.000
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

Sheet Inventory

Interior sheets - 4 sheet layout with no laps

Sheet Loc.	Mat Mark	Zone	Size	Line Wires Spac. (in)	Length (ft-in)	Area (in2/ft)	H leg (ft-in)	V leg (ft-in)	Cross Wires(L,tot= 5-11) Mat Mark	Size	Spac. (in)	Area (in2/ft)	Wgt (lbs)
Top	A100	Base	W10	4.00	3- 6	0.300			C100	W5	4.00	0.150	32
									(1) sheets, Total weight:				32
L&R	B1	Base	W5	4.00	2- 6	0.150		2- 6					8
									(1) sheets, Total weight:				8
Bot	A200	Base	W8	4.00	3- 6	0.240							18
									(1) sheets, Total weight:				18

Exterior sheets - 4 sheet layout with laps located in the slab

Sheet Loc.	Mat Mark	Zone	Size	Line Wires Spac. (in)	Length (ft-in)	Area (in2/ft)	H leg (ft-in)	V leg (ft-in)	Cross Wires(L,tot= 5-11) Mat Mark	Size	Spac. (in)	Area (in2/ft)	Wgt (lbs)
L&R	A1	Base	W15	4.00	9-10	0.450	3- 7	2- 8					91
	A2	Base	W15	4.00	9-10	0.450	3- 7	2- 8					91
									(2) sheets, Total weight:				182

Weight of Steel: 40 lb/ft Total weight of all sheets: 240

Notes:
Epoxy coating may be needed for A1, A300, and some C1 reinforcement, check with governing agency.
L&R - left and right, TC - top corner, BC - bottom corner, INT - interior walls, EXT - exterior walls
Nested line wires are additive to the base line wires, but nested cross wires replace base cross wires.

Adder sheets may require cross wires, check with mesh supplier.

Summary of Ratings Table:

Truck	Flexure Fill	Flexure Member	Flexure Location	Flexure IR	Flexure OR	Shear Fill	Shear Member	Shear Location	Shear IR	Shear OR
(AA) HL-93	0.00	2	MID	1.07	1.38	0.00	2	RT	1.02	1.32

Critical Sections Summary: Flexure

Member 1: (Exterior Wall), Thickness = 6.00 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	Truck	Fill Depth (ft)
BOT	3.00	-2.87	9.19	8.63	3.78	9.31	0.90	0.45	3.17	3.35	4.34	AA	0.00
MID	15.00	0.24	0.12	3.08	3.87	2.80	0.90	0.15	3.17	NC	NC	AA	0.00
MID-	15.00	-3.11	9.19	8.63	3.78	9.31	0.90	0.45	3.17	3.03	3.93	AA	0.00
TOP	3.00	-3.60	9.19	8.63	3.78	9.31	0.90	0.45	3.17	2.61	3.38	AA	0.00

Member 2: (Top Slab), Thickness = 6.00 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	Truck	Fill Depth (ft)
LT	3.00	-2.10	1.01	8.63	3.78	7.94	0.90	0.45	3.17	3.81	4.94	AA	0.00
MID	21.00	4.99	-0.27	5.95	3.82	5.31	0.90	0.30	3.17	1.07	1.38	AA	0.00
RT	3.00	-2.10	1.01	8.63	3.78	7.94	0.90	0.45	3.17	3.81	4.94	AA	0.00

Member 4: (Bottom Slab), Thickness = 6.00 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	Truck	Fill Depth (ft)
LT	3.00	-1.24	1.04	8.63	3.78	7.95	0.90	0.45	3.17	6.82	8.85	AA	0.00
MID	21.00	3.46	-0.28	4.83	3.84	4.30	0.90	0.24	3.17	1.26	1.63	AA	0.00
RT	3.00	-1.24	1.04	8.63	3.78	7.95	0.90	0.45	3.17	6.82	8.85	AA	0.00

Critical Sections Summary: Vertical Shear

Member 1: (Exterior Wall), Thickness = 6.00 in

Loc	Dist. (in)	Design Shear (k)	Corr. Moment (k-ft)	Corr. A. F. (k)	Dv (in)	phi*Vn	Beta	Vc (k)	Vs (k)	Av (in2)	Max. Spac (in)	Load Ratings IR	OR	Truck	Fill Depth (ft)
BOT	7.32	0.66	-2.4	5.62	4.32	13.26	3.672	14.73a	0.00	0.00	0.00	29.43	38.16	AA	1.99
MID	15.00	0.25	0.2	0.12	4.32	14.96	4.143	16.62a	0.00	0.00	0.00	99.99	99.99	AA	0.00
MID-	15.00	0.25	-3.1	9.19	4.32	13.40	3.710	14.89a	0.00	0.00	0.00	25.22	32.70	AA	0.00
TOP	7.32	-0.84	-3.6	9.19	4.32	12.08	3.344	13.42a	0.00	0.00	0.00	14.97	19.40	AA	0.00

Member 2: (Top Slab), Thickness = 6.00 in

Loc	Dist. (in)	Design Shear (k)	Corr. Moment (k-ft)	Corr. A. F. (k)	Dv (in)	phi*Vn	Beta	Vc (k)	Vs (k)	Av (in2)	Max. Spac (in)	Load Ratings IR	OR	Truck	Fill Depth (ft)
LT	7.32	7.04	-2.1	1.01	4.32	9.67	2.677	10.74a	0.00	0.00	0.00	1.38	1.79	AA	0.00
MID	21.00	2.96	5.0	-0.27	4.32	7.37	2.041	8.19a	0.00	0.00	0.00	2.49	3.23	AA	0.00
RT	7.32	8.81	-2.1	1.01	4.32	8.96	2.481	9.95a	0.00	0.00	0.00	1.02	1.32	AA	0.00

Member 4: (Bottom Slab), Thickness = 6.00 in

Loc	Dist. (in)	Design Shear (k)	Corr. Moment (k-ft)	Corr. A. F. (k)	Dv (in)	phi*Vn	Beta	Vc (k)	Vs (k)	Av (in2)	Max. Spac (in)	Load Ratings IR	OR	Truck	Fill Depth (ft)
LT	7.32	4.29	-0.9	1.14	3.78	10.02	3.171	11.14a	0.00	0.00	0.00	2.58	3.34	AA	2.00
MID	21.00	0.11	3.5	-0.28	4.32	8.22	2.276	9.13a	0.00	0.00	0.00	76.28	98.88	AA	0.00
RT	7.32	5.18	-1.2	1.04	4.32	10.76	2.978	11.95a	0.00	0.00	0.00	2.13	2.76	AA	0.00

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

Analysis Results: Fill Depth = 0.00 ft

Load Parameters:

Fe = 1.00 Surcharge Depth : 4.00 ft

Applied Horizontal Loads: (k/ft)

Load Description	Bottom of Wall	Top of Wall
Live Load Surcharge	0.240	0.240
Internal Water Pressure	0.000	0.000
Horizontal Earth Load	0.165	0.015

Applied Uniform Bottom Slab Loads: (k/ft)

Load Description	
Dead Load	0.182
Vertical Earth	0.000
Wearing Surface	0.000

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

M-PT	Mdc	Mev	Mdw	Meh	Mls	Mwa
Member 1: (Exterior Wall)						
Bottom						
1- 0	-0.12	0.00	0.00	-0.02	-0.05	0.00
1- 1	-0.11	0.00	0.00	0.01	0.02	0.00
1- 2	-0.10	0.00	0.00	0.03	0.07	0.00
1- 3	-0.09	0.00	0.00	0.05	0.11	0.00
1- 4	-0.09	0.00	0.00	0.05	0.13	0.00
1- 5	-0.08	0.00	0.00	0.05	0.14	0.00
1- 6	-0.07	0.00	0.00	0.04	0.13	0.00
1- 7	-0.06	0.00	0.00	0.03	0.11	0.00
1- 8	-0.05	0.00	0.00	0.02	0.07	0.00
1- 9	-0.04	0.00	0.00	0.00	0.02	0.00
1-10	-0.03	0.00	0.00	-0.02	-0.05	0.00
Top						
Member 2: (Top Slab)						
Left						
2- 0	-0.03	0.00	0.00	-0.02	-0.05	0.00
2- 1	0.01	0.00	0.00	-0.02	-0.05	0.00
2- 2	0.04	0.00	0.00	-0.02	-0.05	0.00
2- 3	0.06	0.00	0.00	-0.02	-0.05	0.00
2- 4	0.08	0.00	0.00	-0.02	-0.05	0.00
2- 5	0.08	0.00	0.00	-0.02	-0.05	0.00
2- 6	0.08	0.00	0.00	-0.02	-0.05	0.00
2- 7	0.06	0.00	0.00	-0.02	-0.05	0.00
2- 8	0.04	0.00	0.00	-0.02	-0.05	0.00
2- 9	0.01	0.00	0.00	-0.02	-0.05	0.00
2-10	-0.03	0.00	0.00	-0.02	-0.05	0.00
Right						
Member 4: (Bottom Slab)						
Left						
4- 0	-0.12	0.00	0.00	-0.02	-0.05	0.00
4- 1	-0.02	0.00	0.00	-0.02	-0.05	0.00
4- 2	0.06	0.00	0.00	-0.02	-0.05	0.00
4- 3	0.11	0.00	0.00	-0.02	-0.05	0.00
4- 4	0.15	0.00	0.00	-0.02	-0.05	0.00
4- 5	0.16	0.00	0.00	-0.02	-0.05	0.00
4- 6	0.15	0.00	0.00	-0.02	-0.05	0.00
4- 7	0.11	0.00	0.00	-0.02	-0.05	0.00
4- 8	0.06	0.00	0.00	-0.02	-0.05	0.00
4- 9	-0.02	0.00	0.00	-0.02	-0.05	0.00
4-10	-0.12	0.00	0.00	-0.02	-0.05	0.00
Right						

Unfactored Shears due to All Loads: (k)

M-PT	Vdc	Vev	Vdw	Veh	Vls	Vwa
Member 1: (Exterior Wall)						
Bottom						
1- 0	0.03	0.00	0.00	0.14	0.30	0.00
1- 1	0.03	0.00	0.00	0.11	0.24	0.00
1- 2	0.03	0.00	0.00	0.07	0.18	0.00
1- 3	0.03	0.00	0.00	0.04	0.12	0.00
1- 4	0.03	0.00	0.00	0.01	0.06	0.00
1- 5	0.03	0.00	0.00	-0.01	0.00	0.00
1- 6	0.03	0.00	0.00	-0.04	-0.06	0.00
1- 7	0.03	0.00	0.00	-0.05	-0.12	0.00
1- 8	0.03	0.00	0.00	-0.07	-0.18	0.00
1- 9	0.03	0.00	0.00	-0.07	-0.24	0.00
1-10	0.03	0.00	0.00	-0.08	-0.30	0.00
Top						
Member 2: (Top Slab)						
Left						
2- 0	0.13	0.00	0.00	0.00	0.00	0.00
2- 1	0.11	0.00	0.00	0.00	0.00	0.00
2- 2	0.08	0.00	0.00	0.00	0.00	0.00
2- 3	0.05	0.00	0.00	0.00	0.00	0.00
2- 4	0.03	0.00	0.00	0.00	0.00	0.00
2- 5	0.00	0.00	0.00	0.00	0.00	0.00
2- 6	-0.03	0.00	0.00	0.00	0.00	0.00
2- 7	-0.05	0.00	0.00	0.00	0.00	0.00
2- 8	-0.08	0.00	0.00	0.00	0.00	0.00
2- 9	-0.11	0.00	0.00	0.00	0.00	0.00
2-10	-0.13	0.00	0.00	0.00	0.00	0.00
Right						
Member 4: (Bottom Slab)						
Left						
4- 0	0.32	0.00	0.00	0.00	0.00	0.00
4- 1	0.25	0.00	0.00	0.00	0.00	0.00
4- 2	0.19	0.00	0.00	0.00	0.00	0.00
4- 3	0.13	0.00	0.00	0.00	0.00	0.00
4- 4	0.06	0.00	0.00	0.00	0.00	0.00
4- 5	0.00	0.00	0.00	0.00	0.00	0.00
4- 6	-0.06	0.00	0.00	0.00	0.00	0.00
4- 7	-0.13	0.00	0.00	0.00	0.00	0.00
4- 8	-0.19	0.00	0.00	0.00	0.00	0.00
4- 9	-0.26	0.00	0.00	0.00	0.00	0.00
4-10	-0.32	0.00	0.00	0.00	0.00	0.00
Right						

Unfactored Thrusts due to All Loads: (k) (Fill Depth = 0.00 ft)

Member	Pdc	Pev	Pdw	Peh	Pls	Pwa
1	0.13	0.00	0.00	0.00	0.00	0.00
2	-0.03	0.00	0.00	0.08	0.30	0.00
4	0.03	0.00	0.00	0.14	0.30	0.00

Analysis Truck, HL-93

Vehicle	Axle No.	Weight (k/ft)	Length (ft)	Dist. From Previous (ft)
Truck	1	3.226	1.67	
	2	3.226	1.67	6.00
Tandem	1	5.040	1.67	

	2	5.040	1.67	6.00

Live Load Parameters:

Traffic Direction is Perpendicular to Main Reinforcement
Distribution Width : 3.82 ft (+) Distribution Width: 4.75 ft (-)
Note: Distribution width is calculated for one wheel only.
Impact Factor : 1.33
Lane Load Distribution Width : 0.00 ft
Lane Load: 0.000 k/ft

Truck Positions That Cause Maximum Results:

Maximum +Moment in Top Slab

Vehicle	Axle No.	Weight (klf)	Length (ft)	Dist. From Left End (ft)
Truck	1	4.014	1.67	1.75
	2	4.014	1.67	-4.25

Maximum +Moment : 2.80 k-ft
Corresponding Moment at End : -1.66 k-ft
Coincident Bottom Slab Load : 1.91 k/ft

Maximum -Moment in Top Slab

Vehicle	Axle No.	Weight (klf)	Length (ft)	Dist. From Left End (ft)
Truck	1	3.226	1.67	1.88
	2	3.226	1.67	-4.12

Maximum -Moment : -1.34 k-ft
Corresponding Moment at Mid : 2.23 k-ft
Coincident Bottom Slab Load : 1.54 k/ft

Maximum +Shear in Top Slab

Truck	1	4.014	1.67	0.83
	2	4.014	1.67	-5.17

Maximum +Shear : 5.16 k
Corresponding Shear at Mid : -1.53 k
Coincident Bottom Slab Load : 1.91 k/ft

Maximum -Shear in Top Slab

Truck	1	3.226	1.67	2.67
	2	3.226	1.67	-3.33

Maximum -Shear : -4.15 k
Corresponding Shear at Mid : 1.23 k
Coincident Bottom Slab Load : 1.54 k/ft

Maximum +Moment in Top Slab

Tandem	1	3.136	1.67	1.75
	2	3.136	1.67	-4.25

Maximum +Moment : 2.19 k-ft
Corresponding Moment at End : -1.30 k-ft
Coincident Bottom Slab Load : 1.49 k/ft

Maximum -Moment in Top Slab

Tandem	1	5.040	1.67	1.88
	2	5.040	1.67	-4.12

Maximum -Moment : -2.10 k-ft
Corresponding Moment at Mid : 3.49 k-ft
Coincident Bottom Slab Load : 2.40 k/ft

Maximum +Shear in Top Slab

Tandem	1	3.136	1.67	0.83
	2	3.136	1.67	-5.17

Maximum +Shear : 4.03 k
Corresponding Shear at Mid : -1.20 k
Coincident Bottom Slab Load : 1.49 k/ft

Maximum -Shear in Top Slab

Tandem	1	5.040	1.67	2.67
	2	5.040	1.67	-3.33

Maximum -Shear : -6.48 k
Corresponding Shear at Mid : 1.92 k
Coincident Bottom Slab Load : 2.40 k/ft

Unfactored Moments and Shears due to Truck Loads: (k-ft, k)

	Truck				Tandem				Lane			
M-PT	Mll+	Mll-	Vll+	Vll-	Mll+	Mll-	Vll+	Vll-	Mll+	Mll-	Vll+	Vll-
Member 1: (Exterior Wall)												
Bottom												
1- 0	0.00	-1.00	0.13	-0.19	0.00	-1.57	0.10	-0.30	0.00	0.00	0.00	0.00
1- 1	0.00	-1.00	0.13	-0.19	0.00	-1.57	0.10	-0.30	0.00	0.00	0.00	0.00
1- 2	0.00	-1.01	0.13	-0.19	0.00	-1.58	0.10	-0.30	0.00	0.00	0.00	0.00
1- 3	0.00	-1.04	0.13	-0.19	0.00	-1.62	0.10	-0.30	0.00	0.00	0.00	0.00
1- 4	0.00	-1.07	0.13	-0.19	0.00	-1.68	0.10	-0.30	0.00	0.00	0.00	0.00
1- 5	0.00	-1.12	0.13	-0.19	0.00	-1.74	0.10	-0.30	0.00	0.00	0.00	0.00
1- 6	0.00	-1.16	0.13	-0.19	0.00	-1.81	0.10	-0.30	0.00	0.00	0.00	0.00
1- 7	0.00	-1.20	0.13	-0.19	0.00	-1.88	0.10	-0.30	0.00	0.00	0.00	0.00
1- 8	0.00	-1.25	0.13	-0.19	0.00	-1.95	0.10	-0.30	0.00	0.00	0.00	0.00
1- 9	0.00	-1.30	0.13	-0.19	0.00	-2.03	0.10	-0.30	0.00	0.00	0.00	0.00
1-10	0.00	-1.34	0.13	-0.19	0.00	-2.10	0.10	-0.30	0.00	0.00	0.00	0.00
Top												
Member 2: (Top Slab)												
Left												
2- 0	0.00	-1.34	5.16	0.00	0.00	-2.10	4.03	0.00	0.00	0.00	0.00	0.00
2- 1	0.47	-0.48	4.48	-0.05	0.37	-0.75	3.50	-0.08	0.00	0.00	0.00	0.00
2- 2	1.43	0.00	3.78	-0.21	1.12	0.00	2.96	-0.32	0.00	0.00	0.00	0.00
2- 3	2.18	0.00	3.08	-0.47	1.71	0.00	2.40	-0.74	0.00	0.00	0.00	0.00
2- 4	2.64	0.00	2.37	-0.86	2.06	0.00	1.86	-1.34	0.00	0.00	0.00	0.00
2- 5	2.80	0.00	1.69	-1.36	2.19	0.00	1.32	-2.12	0.00	0.00	0.00	0.00
2- 6	2.64	0.00	1.07	-1.91	2.06	0.00	0.83	-2.98	0.00	0.00	0.00	0.00
2- 7	2.18	0.00	0.59	-2.47	1.71	0.00	0.46	-3.86	0.00	0.00	0.00	0.00
2- 8	1.43	0.00	0.26	-3.04	1.12	0.00	0.20	-4.75	0.00	0.00	0.00	0.00
2- 9	0.47	-0.48	0.06	-3.60	0.37	-0.75	0.05	-5.63	0.00	0.00	0.00	0.00
2-10	0.00	-1.34	0.00	-4.15	0.00	-2.10	0.00	-6.48	0.00	0.00	0.00	0.00
Right												

Member 4: (Bottom Slab)

Left												
4- 0	0.00	-1.00	3.41	0.00	0.00	-1.57	2.66	0.00	0.00	0.00	0.00	0.00
4- 1	0.04	-0.14	2.74	0.00	0.03	-0.22	2.14	0.00	0.00	0.00	0.00	0.00
4- 2	0.84	0.00	2.07	0.00	0.66	0.00	1.62	0.00	0.00	0.00	0.00	0.00
4- 3	1.41	0.00	1.40	0.00	1.11	0.00	1.09	0.00	0.00	0.00	0.00	0.00
4- 4	1.76	0.00	0.73	0.00	1.37	0.00	0.57	0.00	0.00	0.00	0.00	0.00
4- 5	1.87	0.00	0.06	-0.05	1.46	0.00	0.05	-0.08	0.00	0.00	0.00	0.00
4- 6	1.76	0.00	0.00	-0.59	1.37	0.00	0.00	-0.92	0.00	0.00	0.00	0.00
4- 7	1.41	0.00	0.00	-1.12	1.11	0.00	0.00	-1.76	0.00	0.00	0.00	0.00
4- 8	0.84	0.00	0.00	-1.66	0.66	0.00	0.00	-2.60	0.00	0.00	0.00	0.00
4- 9	0.04	-0.14	0.00	-2.20	0.03	-0.22	0.00	-3.44	0.00	0.00	0.00	0.00
4-10	0.00	-1.00	0.00	-2.74	0.00	-1.57	0.00	-4.28	0.00	0.00	0.00	0.00
Right												

Serviceability Check: Crack Control

Bar Mark	Location	Moment (k-ft)	Thrust (k)	Fss (ksi)	Spacing (in)	Allow (in)
A1	Top Corner Bar	-2.1	5.29	7.97	4.00	43.35
A2	Bot Corner Bar	-1.7	5.29	5.04	4.00	71.17
A100	Top Slab (int)	2.9	-0.15	33.09	4.00	7.30
A200	Bot Slab (int)	2.0	-0.13	28.76	4.00	9.18
B1	Ext Wall (int)	0.1	0.13	1.78	4.00	99.99

Strength Limit State at Critical Sections: Flexure

Member 1: (Exterior Wall), Thickness = 6.00 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	3.00	-2.87	9.19	8.63	3.78	9.31	0.90	0.45	3.17	3.35	4.34
MID	15.00	0.24	0.12	3.08	3.87	2.80	0.90	0.15	3.17	NC	NC
MID-	15.00	-3.11	9.19	8.63	3.78	9.31	0.90	0.45	3.17	3.03	3.93
TOP	3.00	-3.60	9.19	8.63	3.78	9.31	0.90	0.45	3.17	2.61	3.38

Member 2: (Top Slab), Thickness = 6.00 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	3.00	-2.10	1.01	8.63	3.78	7.94	0.90	0.45	3.17	3.81	4.94
MID	21.00	4.99	-0.27	5.95	3.82	5.31	0.90	0.30	3.17	1.07	1.38
RT	3.00	-2.10	1.01	8.63	3.78	7.94	0.90	0.45	3.17	3.81	4.94

Member 4: (Bottom Slab), Thickness = 6.00 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	3.00	-1.24	1.04	8.63	3.78	7.95	0.90	0.45	3.17	6.82	8.85
MID	21.00	3.46	-0.28	4.83	3.84	4.30	0.90	0.24	3.17	1.26	1.63
RT	3.00	-1.24	1.04	8.63	3.78	7.95	0.90	0.45	3.17	6.82	8.85

Notes: Mu - Resisting moment under pure flexure, Ma - Allowable moment under applied axial load

Strength Limit State at Critical Sections: Vertical Shear

Member 1: (Exterior Wall), Thickness = 6.00 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	7.32	0.61	-2.9	9.19	4.32	13.65	3.779	29.30	15.16a	0.00	0.00	0.00	27.67	35.87
MID	15.00	0.25	0.2	0.12	4.32	14.96	4.143	28.34	16.62a	0.00	0.00	0.00	99.99	99.99
MID-	15.00	0.25	-3.1	9.19	4.32	13.40	3.710	29.52	14.89a	0.00	0.00	0.00	25.22	32.70
TOP	7.32	-0.84	-3.6	9.19	4.32	12.08	3.344	30.64	13.42a	0.00	0.00	0.00	14.97	19.40

Member 2: (Top Slab), Thickness = 6.00 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	7.32	7.04	-2.1	1.01	4.32	9.67	2.677	33.25	10.74a	0.00	0.00	0.00	1.38	1.79
MID	21.00	2.96	5.0	-0.27	4.32	7.37	2.041	36.68	8.19a	0.00	0.00	0.00	2.49	3.23
RT	7.32	8.81	-2.1	1.01	4.32	8.96	2.481	34.21	9.95a	0.00	0.00	0.00	1.02	1.32

Member 4: (Bottom Slab), Thickness = 6.00 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	7.32	4.18	-1.2	1.04	4.32	11.51	3.187	31.17	12.79a	0.00	0.00	0.00	2.87	3.72
MID	21.00	0.11	3.5	-0.28	4.32	8.22	2.276	35.26	9.13a	0.00	0.00	0.00	76.28	98.88
RT	7.32	5.18	-1.2	1.04	4.32	10.76	2.978	31.96	11.95a	0.00	0.00	0.00	2.13	2.76

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

Filename: 22-206 3X2 RCBC.etcx

Load Combination Results at Tenth Points: (k-ft, k)(Fill Depth = 0.00 ft)

M-PT	+Moment	-Moment	+Axial	-Axial	+Shear	-Shear
Member 1: (Exterior Wall)						
Bottom						
1- 0	-0.164	-3.017	0.164	9.192	0.984	-0.389
1- 1	-0.059	-2.871	0.118	9.192	0.826	-0.415
1- 2	0.070	-2.866	0.118	9.192	0.673	-0.439
1- 3	0.162	-2.921	0.118	9.192	0.525	-0.461
1- 4	0.217	-3.007	0.118	9.192	0.382	-0.480
1- 5	0.237	-3.110	0.118	9.192	0.254	-0.506
1- 6	0.223	-3.223	0.118	9.192	0.240	-0.639
1- 7	0.177	-3.344	0.118	9.192	0.228	-0.767
1- 8	0.100	-3.469	0.118	9.192	0.220	-0.889
1- 9	-0.008	-3.598	0.118	9.192	0.213	-1.007
1-10	-0.047	-3.832	0.164	9.192	0.209	-1.120
Top						
Member 2: (Top Slab)						
Left						
2- 0	-0.048	-3.833	-0.266	1.012	9.192	0.118
2- 1	0.820	-1.412	-0.266	1.012	7.973	-0.010
2- 2	2.537	-0.079	-0.266	0.602	6.718	-0.468
2- 3	3.889	-0.059	-0.266	0.602	5.449	-1.231
2- 4	4.709	-0.046	-0.266	0.602	4.188	-2.313
2- 5	4.991	-0.042	-0.266	0.602	2.959	-3.715
2- 6	4.709	-0.046	-0.266	0.602	1.836	-5.250
2- 7	3.889	-0.059	-0.266	0.602	0.967	-6.824
2- 8	2.537	-0.079	-0.266	0.602	0.353	-8.409
2- 9	0.820	-1.412	-0.266	1.012	-0.019	-9.976
2-10	-0.048	-3.833	-0.266	1.012	-0.118	-11.498
Right						
Member 4: (Bottom Slab)						
Left						
4- 0	-0.164	-3.017	-0.281	1.040	6.361	0.287
4- 1	0.028	-0.529	-0.281	1.040	5.110	0.229
4- 2	1.532	-0.067	-0.281	0.752	3.859	0.172
4- 3	2.604	-0.016	-0.281	0.752	2.609	0.115
4- 4	3.244	0.014	-0.281	0.752	1.358	0.057
4- 5	3.457	0.024	-0.281	0.752	0.108	-0.135
4- 6	3.244	0.014	-0.281	0.752	-0.057	-1.685
4- 7	2.604	-0.016	-0.281	0.752	-0.115	-3.235
4- 8	1.532	-0.067	-0.281	0.752	-0.172	-4.784
4- 9	0.028	-0.529	-0.281	1.040	-0.229	-6.334
4-10	-0.164	-3.017	-0.281	1.040	-0.287	-7.884
Right						

Analysis Results: Fill Depth = 0.50 ft

Load Parameters:

Fe = 1.03 Surcharge Depth : 4.00 ft

Applied Horizontal Loads: (k/ft)

Load Description	Bottom of Wall	Top of Wall
Live Load Surcharge	0.240	0.240
Internal Water Pressure	0.000	0.000
Horizontal Earth Load	0.195	0.045

Applied Uniform Bottom Slab Loads: (k/ft)

Load Description	
Dead Load	0.182
Vertical Earth	0.061
Wearing Surface	0.000

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

M-PT	Mdc	Mev	Mdw	Meh	Mls	Mwa
Member 1: (Exterior Wall)						
Bottom						
1- 0	-0.12	-0.04	0.00	-0.03	-0.05	0.00
1- 1	-0.11	-0.04	0.00	0.01	0.02	0.00
1- 2	-0.10	-0.04	0.00	0.04	0.07	0.00
1- 3	-0.09	-0.04	0.00	0.06	0.11	0.00
1- 4	-0.09	-0.04	0.00	0.07	0.13	0.00
1- 5	-0.08	-0.04	0.00	0.07	0.14	0.00
1- 6	-0.07	-0.04	0.00	0.06	0.13	0.00
1- 7	-0.06	-0.04	0.00	0.05	0.11	0.00
1- 8	-0.05	-0.04	0.00	0.03	0.07	0.00
1- 9	-0.04	-0.04	0.00	0.00	0.02	0.00
1-10	-0.03	-0.04	0.00	-0.02	-0.05	0.00
Top						
Member 2: (Top Slab)						
Left						
2- 0	-0.03	-0.04	0.00	-0.02	-0.05	0.00
2- 1	0.01	0.00	0.00	-0.02	-0.05	0.00
2- 2	0.04	0.02	0.00	-0.02	-0.05	0.00
2- 3	0.06	0.04	0.00	-0.02	-0.05	0.00
2- 4	0.08	0.05	0.00	-0.02	-0.05	0.00
2- 5	0.08	0.06	0.00	-0.02	-0.05	0.00
2- 6	0.08	0.05	0.00	-0.02	-0.05	0.00
2- 7	0.06	0.04	0.00	-0.02	-0.05	0.00
2- 8	0.04	0.02	0.00	-0.02	-0.05	0.00
2- 9	0.01	0.00	0.00	-0.02	-0.05	0.00
2-10	-0.03	-0.04	0.00	-0.02	-0.05	0.00
Right						
Member 4: (Bottom Slab)						
Left						
4- 0	-0.12	-0.04	0.00	-0.03	-0.05	0.00
4- 1	-0.02	0.00	0.00	-0.03	-0.05	0.00
4- 2	0.06	0.02	0.00	-0.03	-0.05	0.00
4- 3	0.11	0.04	0.00	-0.03	-0.05	0.00
4- 4	0.15	0.05	0.00	-0.03	-0.05	0.00
4- 5	0.16	0.06	0.00	-0.03	-0.05	0.00
4- 6	0.15	0.05	0.00	-0.03	-0.05	0.00
4- 7	0.11	0.04	0.00	-0.03	-0.05	0.00
4- 8	0.06	0.02	0.00	-0.03	-0.05	0.00
4- 9	-0.02	0.00	0.00	-0.03	-0.05	0.00
4-10	-0.12	-0.04	0.00	-0.03	-0.05	0.00
Right						

Unfactored Shears due to All Loads: (k)

M-PT	Vdc	Vev	Vdw	Veh	Vls	Vwa
Member 1: (Exterior Wall)						
Bottom						
1- 0	0.03	0.00	0.00	0.18	0.30	0.00
1- 1	0.03	0.00	0.00	0.14	0.24	0.00
1- 2	0.03	0.00	0.00	0.09	0.18	0.00
1- 3	0.03	0.00	0.00	0.05	0.12	0.00
1- 4	0.03	0.00	0.00	0.02	0.06	0.00
1- 5	0.03	0.00	0.00	-0.01	0.00	0.00
1- 6	0.03	0.00	0.00	-0.04	-0.06	0.00
1- 7	0.03	0.00	0.00	-0.07	-0.12	0.00
1- 8	0.03	0.00	0.00	-0.09	-0.18	0.00
1- 9	0.03	0.00	0.00	-0.10	-0.24	0.00
1-10	0.03	0.00	0.00	-0.12	-0.30	0.00
Top						
Member 2: (Top Slab)						
Left						
2- 0	0.13	0.11	0.00	0.00	0.00	0.00
2- 1	0.11	0.09	0.00	0.00	0.00	0.00
2- 2	0.08	0.06	0.00	0.00	0.00	0.00
2- 3	0.05	0.04	0.00	0.00	0.00	0.00
2- 4	0.03	0.02	0.00	0.00	0.00	0.00
2- 5	0.00	0.00	0.00	0.00	0.00	0.00
2- 6	-0.03	-0.02	0.00	0.00	0.00	0.00
2- 7	-0.05	-0.04	0.00	0.00	0.00	0.00
2- 8	-0.08	-0.06	0.00	0.00	0.00	0.00
2- 9	-0.11	-0.09	0.00	0.00	0.00	0.00
2-10	-0.13	-0.11	0.00	0.00	0.00	0.00
Right						
Member 4: (Bottom Slab)						
Left						
4- 0	0.32	0.11	0.00	0.00	0.00	0.00
4- 1	0.25	0.09	0.00	0.00	0.00	0.00
4- 2	0.19	0.06	0.00	0.00	0.00	0.00
4- 3	0.13	0.04	0.00	0.00	0.00	0.00
4- 4	0.06	0.02	0.00	0.00	0.00	0.00
4- 5	0.00	0.00	0.00	0.00	0.00	0.00
4- 6	-0.06	-0.02	0.00	0.00	0.00	0.00
4- 7	-0.13	-0.04	0.00	0.00	0.00	0.00
4- 8	-0.19	-0.06	0.00	0.00	0.00	0.00
4- 9	-0.26	-0.09	0.00	0.00	0.00	0.00
4-10	-0.32	-0.11	0.00	0.00	0.00	0.00
Right						

Unfactored Thrusts due to All Loads: (k) (Fill Depth = 0.50 ft)

Member	Pdc	Pev	Pdw	Peh	Pls	Pwa
1	0.13	0.11	0.00	0.00	0.00	0.00
2	-0.03	0.00	0.00	0.12	0.30	0.00
4	0.03	0.00	0.00	0.18	0.30	0.00

Analysis Truck, HL-93

Vehicle	Axle No.	Weight (k/ft)	Length (ft)	Dist. From Previous (ft)
Truck	1	2.361	2.24	
	2	2.361	2.24	6.00
Tandem	1	3.689	2.24	

	2	3.689	2.24	6.00

Live Load Parameters:

Traffic Direction is Perpendicular to Main Reinforcement
Distribution Width : 3.82 ft (+) Distribution Width: 4.75 ft (-)
Note: Distribution width is calculated for one wheel only.
Impact Factor : 1.31
Lane Load Distribution Width : 0.00 ft
Lane Load: 0.000 k/ft

Truck Positions That Cause Maximum Results:

Maximum +Moment in Top Slab

Vehicle	Axle No.	Weight (klf)	Length (ft)	Dist. From Left End (ft)
Truck	1	2.938	2.24	1.75
	2	2.938	2.24	-4.25

Maximum +Moment : 2.41 k-ft
Corresponding Moment at End : -1.51 k-ft
Coincident Bottom Slab Load : 1.88 k/ft

Maximum -Moment in Top Slab

Vehicle	Axle No.	Weight (klf)	Length (ft)	Dist. From Left End (ft)
Truck	1	2.361	2.24	1.65
	2	2.361	2.24	-4.35

Maximum -Moment : -1.22 k-ft
Corresponding Moment at Mid : 1.93 k-ft
Coincident Bottom Slab Load : 1.51 k/ft

Maximum +Shear in Top Slab

Truck	1	2.938	2.24	1.12
	2	2.938	2.24	-4.88

Maximum +Shear : 4.52 k
Corresponding Shear at Mid : -0.63 k
Coincident Bottom Slab Load : 1.88 k/ft

Maximum -Shear in Top Slab

Truck	1	2.361	2.24	2.38
	2	2.361	2.24	-3.62

Maximum -Shear : -3.63 k
Corresponding Shear at Mid : 0.50 k
Coincident Bottom Slab Load : 1.51 k/ft

Maximum +Moment in Top Slab

Tandem	1	2.296	2.24	1.75
	2	2.296	2.24	-4.25

Maximum +Moment : 1.88 k-ft
Corresponding Moment at End : -1.18 k-ft
Coincident Bottom Slab Load : 1.47 k/ft

Maximum -Moment in Top Slab

Tandem	1	3.689	2.24	1.65
	2	3.689	2.24	-4.35

Maximum -Moment : -1.91 k-ft
Corresponding Moment at Mid : 3.01 k-ft
Coincident Bottom Slab Load : 2.36 k/ft

Maximum +Shear in Top Slab

Tandem	1	2.296	2.24	1.12
	2	2.296	2.24	-4.88

Maximum +Shear : 3.53 k
Corresponding Shear at Mid : -0.49 k
Coincident Bottom Slab Load : 1.47 k/ft

Maximum -Shear in Top Slab

Tandem	1	3.689	2.24	2.38
	2	3.689	2.24	-3.62

Maximum -Shear : -5.67 k
Corresponding Shear at Mid : 0.79 k
Coincident Bottom Slab Load : 2.36 k/ft

Unfactored Moments and Shears due to Truck Loads: (k-ft, k)

	Truck				Tandem				Lane			
M-PT	Mll+	Mll-	Vll+	Vll-	Mll+	Mll-	Vll+	Vll-	Mll+	Mll-	Vll+	Vll-
Member 1: (Exterior Wall)												
Bottom												
1- 0	0.00	-0.94	0.09	-0.15	0.00	-1.46	0.07	-0.23	0.00	0.00	0.00	0.00
1- 1	0.00	-0.95	0.09	-0.15	0.00	-1.48	0.07	-0.23	0.00	0.00	0.00	0.00
1- 2	0.00	-0.96	0.09	-0.15	0.00	-1.50	0.07	-0.23	0.00	0.00	0.00	0.00
1- 3	0.00	-0.98	0.09	-0.15	0.00	-1.54	0.07	-0.23	0.00	0.00	0.00	0.00
1- 4	0.00	-1.01	0.09	-0.15	0.00	-1.58	0.07	-0.23	0.00	0.00	0.00	0.00
1- 5	0.00	-1.05	0.09	-0.15	0.00	-1.63	0.07	-0.23	0.00	0.00	0.00	0.00
1- 6	0.00	-1.08	0.09	-0.15	0.00	-1.69	0.07	-0.23	0.00	0.00	0.00	0.00
1- 7	0.00	-1.11	0.09	-0.15	0.00	-1.74	0.07	-0.23	0.00	0.00	0.00	0.00
1- 8	0.00	-1.15	0.09	-0.15	0.00	-1.80	0.07	-0.23	0.00	0.00	0.00	0.00
1- 9	0.00	-1.19	0.09	-0.15	0.00	-1.85	0.07	-0.23	0.00	0.00	0.00	0.00
1-10	0.00	-1.22	0.09	-0.15	0.00	-1.91	0.07	-0.23	0.00	0.00	0.00	0.00
Top												
Member 2: (Top Slab)												
Left												
2- 0	0.00	-1.22	4.52	0.00	0.00	-1.91	3.53	0.00	0.00	0.00	0.00	0.00
2- 1	0.34	-0.39	3.84	-0.04	0.27	-0.60	3.00	-0.06	0.00	0.00	0.00	0.00
2- 2	1.12	0.00	3.15	-0.15	0.87	0.00	2.46	-0.24	0.00	0.00	0.00	0.00
2- 3	1.83	0.00	2.47	-0.35	1.43	0.00	1.93	-0.54	0.00	0.00	0.00	0.00
2- 4	2.26	0.00	1.81	-0.63	1.77	0.00	1.41	-0.98	0.00	0.00	0.00	0.00
2- 5	2.41	0.00	1.24	-1.00	1.88	0.00	0.97	-1.56	0.00	0.00	0.00	0.00
2- 6	2.26	0.00	0.78	-1.45	1.77	0.00	0.61	-2.27	0.00	0.00	0.00	0.00
2- 7	1.83	0.00	0.43	-1.99	1.43	0.00	0.34	-3.10	0.00	0.00	0.00	0.00
2- 8	1.12	0.00	0.19	-2.53	0.87	0.00	0.15	-3.96	0.00	0.00	0.00	0.00
2- 9	0.34	-0.39	0.05	-3.09	0.27	-0.60	0.04	-4.82	0.00	0.00	0.00	0.00
2-10	0.00	-1.22	0.00	-3.63	0.00	-1.91	0.00	-5.67	0.00	0.00	0.00	0.00
Right												

Member 4: (Bottom Slab)

Left												
4- 0	0.00	-0.94	3.33	0.00	0.00	-1.46	2.60	0.00	0.00	0.00	0.00	0.00
4- 1	0.00	-0.10	2.67	0.00	0.00	-0.16	2.09	0.00	0.00	0.00	0.00	0.00
4- 2	0.80	0.00	2.01	0.00	0.62	0.00	1.57	0.00	0.00	0.00	0.00	0.00
4- 3	1.37	0.00	1.36	0.00	1.07	0.00	1.06	0.00	0.00	0.00	0.00	0.00
4- 4	1.71	0.00	0.70	0.00	1.33	0.00	0.54	0.00	0.00	0.00	0.00	0.00
4- 5	1.82	0.00	0.04	-0.04	1.42	0.00	0.04	-0.06	0.00	0.00	0.00	0.00
4- 6	1.71	0.00	0.00	-0.56	1.33	0.00	0.00	-0.87	0.00	0.00	0.00	0.00
4- 7	1.37	0.00	0.00	-1.09	1.07	0.00	0.00	-1.70	0.00	0.00	0.00	0.00
4- 8	0.80	0.00	0.00	-1.62	0.62	0.00	0.00	-2.53	0.00	0.00	0.00	0.00
4- 9	0.00	-0.10	0.00	-2.15	0.00	-0.16	0.00	-3.36	0.00	0.00	0.00	0.00
4-10	0.00	-0.94	0.00	-2.68	0.00	-1.46	0.00	-4.18	0.00	0.00	0.00	0.00
Right												

Serviceability Check: Crack Control

Bar Mark	Location	Moment (k-ft)	Thrust (k)	Fss (ksi)	Spacing (in)	Allow (in)
A1	Top Corner Bar	-1.9	4.75	7.69	4.00	45.07
A2	Bot Corner Bar	-1.6	4.75	5.43	4.00	65.76
A100	Top Slab (int)	2.5	-0.09	29.06	4.00	8.92
A200	Bot Slab (int)	2.0	-0.06	28.61	4.00	9.25
B1	Ext Wall (int)	0.1	0.24	0.86	4.00	99.99

Strength Limit State at Critical Sections: Flexure

Member 1: (Exterior Wall), Thickness = 6.00 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	3.00	-2.77	8.21	8.63	3.78	9.14	0.90	0.45	3.17	3.45	4.48
MID	15.00	0.23	0.21	3.08	3.87	2.81	0.90	0.15	3.17	NC	NC
MID-	15.00	-2.96	8.21	8.63	3.78	9.14	0.90	0.45	3.17	3.16	4.09
TOP	3.00	-3.34	8.21	8.63	3.78	9.14	0.90	0.45	3.17	2.79	3.62

Member 2: (Top Slab), Thickness = 6.00 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	3.00	-1.85	0.96	8.63	3.78	7.93	0.90	0.45	3.17	4.38	5.68
MID	21.00	4.37	-0.17	5.95	3.82	5.33	0.90	0.30	3.17	1.23	1.59
RT	3.00	-1.85	0.96	8.63	3.78	7.93	0.90	0.45	3.17	4.38	5.68

Member 4: (Bottom Slab), Thickness = 6.00 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	3.00	-1.14	1.02	8.63	3.78	7.94	0.90	0.45	3.17	7.64	9.91
MID	21.00	3.44	-0.15	4.83	3.84	4.32	0.90	0.24	3.17	1.27	1.65
RT	3.00	-1.14	1.02	8.63	3.78	7.94	0.90	0.45	3.17	7.64	9.91

Notes: Mu - Resisting moment under pure flexure, Ma - Allowable moment under applied axial load

Strength Limit State at Critical Sections: Vertical Shear

Member 1: (Exterior Wall), Thickness = 6.00 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	7.32	0.57	-2.8	8.21	4.32	13.51	3.741	29.42	15.01a	0.00	0.00	0.00	31.09	40.30
MID	15.00	0.19	0.2	0.21	4.32	15.39	4.261	28.06	17.10a	0.00	0.00	0.00	99.99	99.99
MID-	15.00	0.19	-3.0	8.21	4.32	13.38	3.706	29.53	14.87a	0.00	0.00	0.00	33.55	43.50
TOP	7.32	-0.73	-3.3	8.21	4.32	12.30	3.407	30.45	13.67a	0.00	0.00	0.00	18.23	23.63

Member 2: (Top Slab), Thickness = 6.00 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	7.32	6.03	-1.9	0.96	4.32	10.18	2.819	32.59	11.31a	0.00	0.00	0.00	1.71	2.22
MID	21.00	2.17	4.4	-0.17	4.32	7.84	2.171	35.85	8.71a	0.00	0.00	0.00	3.61	4.68
RT	7.32	7.52	-1.9	0.96	4.32	9.42	2.609	33.57	10.47a	0.00	0.00	0.00	1.26	1.63

Member 4: (Bottom Slab), Thickness = 6.00 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	7.32	4.17	-1.1	1.02	4.32	11.51	3.188	31.17	12.79a	0.00	0.00	0.00	2.92	3.79
MID	21.00	0.08	3.4	-0.15	4.32	8.27	2.289	35.19	9.19a	0.00	0.00	0.00	99.99	99.99
RT	7.32	5.15	-1.1	1.02	4.32	10.78	2.984	31.93	11.97a	0.00	0.00	0.00	2.17	2.82

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

Filename: 22-206 3X2 RCBC.etcx

Load Combination Results at Tenth Points: (k-ft, k)(Fill Depth = 0.50 ft)

M-PT	+Moment	-Moment	+Axial	-Axial	+Shear	-Shear
Member 1: (Exterior Wall)						
Bottom						
1- 0	-0.216	-2.887	0.304	8.206	0.976	-0.231
1- 1	-0.089	-2.774	0.215	8.206	0.807	-0.263
1- 2	0.049	-2.779	0.215	8.206	0.644	-0.292
1- 3	0.147	-2.818	0.215	8.206	0.486	-0.319
1- 4	0.206	-2.881	0.215	8.206	0.333	-0.343
1- 5	0.227	-2.958	0.215	8.206	0.195	-0.374
1- 6	0.212	-3.045	0.215	8.206	0.176	-0.517
1- 7	0.162	-3.138	0.215	8.206	0.159	-0.655
1- 8	0.078	-3.235	0.215	8.206	0.145	-0.788
1- 9	-0.039	-3.338	0.215	8.206	0.134	-0.916
1-10	-0.101	-3.551	0.304	8.206	0.125	-1.038
Top						
Member 2: (Top Slab)						
Left						
2- 0	-0.101	-3.552	-0.166	0.957	8.206	0.215
2- 1	0.592	-1.174	-0.166	0.957	6.963	0.140
2- 2	2.025	-0.067	-0.166	0.653	5.703	-0.232
2- 3	3.322	-0.029	-0.166	0.653	4.447	-0.827
2- 4	4.106	-0.007	-0.166	0.653	3.228	-1.656
2- 5	4.370	0.001	-0.166	0.653	2.171	-2.726
2- 6	4.106	-0.007	-0.166	0.653	1.307	-4.037
2- 7	3.322	-0.029	-0.166	0.653	0.634	-5.552
2- 8	2.025	-0.067	-0.166	0.653	0.148	-7.113
2- 9	0.592	-1.174	-0.166	0.957	-0.161	-8.680
2-10	-0.101	-3.552	-0.166	0.957	-0.215	-10.224
Right						
Member 4: (Bottom Slab)						
Left						
4- 0	-0.216	-2.887	-0.150	1.017	6.368	0.384
4- 1	-0.044	-0.438	-0.150	1.017	5.108	0.307
4- 2	1.484	-0.054	-0.150	0.802	3.847	0.230
4- 3	2.574	0.013	-0.150	0.802	2.587	0.153
4- 4	3.226	0.053	-0.150	0.802	1.326	0.077
4- 5	3.444	0.067	-0.150	0.802	0.079	-0.099
4- 6	3.226	0.053	-0.150	0.802	-0.077	-1.638
4- 7	2.574	0.013	-0.150	0.802	-0.153	-3.193
4- 8	1.484	-0.054	-0.150	0.802	-0.230	-4.747
4- 9	-0.044	-0.438	-0.150	1.017	-0.307	-6.302
4-10	-0.216	-2.887	-0.150	1.017	-0.384	-7.857
Right						

Analysis Results: Fill Depth = 1.00 ft

Load Parameters:

Fe = 1.05 Surcharge Depth : 4.00 ft

Applied Horizontal Loads: (k/ft)

Load Description	Bottom of Wall	Top of Wall
Live Load Surcharge	0.240	0.240
Internal Water Pressure	0.000	0.000
Horizontal Earth Load	0.225	0.075

Applied Uniform Bottom Slab Loads: (k/ft)

Load Description	
Dead Load	0.182
Vertical Earth	0.126
Wearing Surface	0.000

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

M-PT	Mdc	Mev	Mdw	Meh	Mls	Mwa
Member 1: (Exterior Wall)						
Bottom						
1- 0	-0.12	-0.08	0.00	-0.03	-0.05	0.00
1- 1	-0.11	-0.08	0.00	0.01	0.02	0.00
1- 2	-0.10	-0.08	0.00	0.05	0.07	0.00
1- 3	-0.09	-0.08	0.00	0.07	0.11	0.00
1- 4	-0.09	-0.08	0.00	0.08	0.13	0.00
1- 5	-0.08	-0.08	0.00	0.09	0.14	0.00
1- 6	-0.07	-0.08	0.00	0.08	0.13	0.00
1- 7	-0.06	-0.08	0.00	0.06	0.11	0.00
1- 8	-0.05	-0.08	0.00	0.04	0.07	0.00
1- 9	-0.04	-0.08	0.00	0.01	0.02	0.00
1-10	-0.03	-0.08	0.00	-0.03	-0.05	0.00
Top						
Member 2: (Top Slab)						
Left						
2- 0	-0.03	-0.08	0.00	-0.03	-0.05	0.00
2- 1	0.01	-0.01	0.00	-0.03	-0.05	0.00
2- 2	0.04	0.05	0.00	-0.03	-0.05	0.00
2- 3	0.06	0.09	0.00	-0.03	-0.05	0.00
2- 4	0.08	0.11	0.00	-0.03	-0.05	0.00
2- 5	0.08	0.12	0.00	-0.03	-0.05	0.00
2- 6	0.08	0.11	0.00	-0.03	-0.05	0.00
2- 7	0.06	0.09	0.00	-0.03	-0.05	0.00
2- 8	0.04	0.05	0.00	-0.03	-0.05	0.00
2- 9	0.01	-0.01	0.00	-0.03	-0.05	0.00
2-10	-0.03	-0.08	0.00	-0.03	-0.05	0.00
Right						
Member 4: (Bottom Slab)						
Left						
4- 0	-0.12	-0.08	0.00	-0.03	-0.05	0.00
4- 1	-0.02	-0.01	0.00	-0.03	-0.05	0.00
4- 2	0.06	0.05	0.00	-0.03	-0.05	0.00
4- 3	0.11	0.09	0.00	-0.03	-0.05	0.00
4- 4	0.15	0.11	0.00	-0.03	-0.05	0.00
4- 5	0.16	0.12	0.00	-0.03	-0.05	0.00
4- 6	0.15	0.11	0.00	-0.03	-0.05	0.00
4- 7	0.11	0.09	0.00	-0.03	-0.05	0.00
4- 8	0.06	0.05	0.00	-0.03	-0.05	0.00
4- 9	-0.02	-0.01	0.00	-0.03	-0.05	0.00
4-10	-0.12	-0.08	0.00	-0.03	-0.05	0.00
Right						

Unfactored Shears due to All Loads: (k)

M-PT	Vdc	Vev	Vdw	Veh	Vls	Vwa
Member 1: (Exterior Wall)						
Bottom						
1- 0	0.03	0.00	0.00	0.22	0.30	0.00
1- 1	0.03	0.00	0.00	0.17	0.24	0.00
1- 2	0.03	0.00	0.00	0.11	0.18	0.00
1- 3	0.03	0.00	0.00	0.07	0.12	0.00
1- 4	0.03	0.00	0.00	0.02	0.06	0.00
1- 5	0.03	0.00	0.00	-0.01	0.00	0.00
1- 6	0.03	0.00	0.00	-0.05	-0.06	0.00
1- 7	0.03	0.00	0.00	-0.08	-0.12	0.00
1- 8	0.03	0.00	0.00	-0.11	-0.18	0.00
1- 9	0.03	0.00	0.00	-0.13	-0.24	0.00
1-10	0.03	0.00	0.00	-0.16	-0.30	0.00
Top						
Member 2: (Top Slab)						
Left						
2- 0	0.13	0.22	0.00	0.00	0.00	0.00
2- 1	0.11	0.18	0.00	0.00	0.00	0.00
2- 2	0.08	0.13	0.00	0.00	0.00	0.00
2- 3	0.05	0.09	0.00	0.00	0.00	0.00
2- 4	0.03	0.04	0.00	0.00	0.00	0.00
2- 5	0.00	0.00	0.00	0.00	0.00	0.00
2- 6	-0.03	-0.04	0.00	0.00	0.00	0.00
2- 7	-0.05	-0.09	0.00	0.00	0.00	0.00
2- 8	-0.08	-0.13	0.00	0.00	0.00	0.00
2- 9	-0.11	-0.18	0.00	0.00	0.00	0.00
2-10	-0.13	-0.22	0.00	0.00	0.00	0.00
Right						
Member 4: (Bottom Slab)						
Left						
4- 0	0.32	0.22	0.00	0.00	0.00	0.00
4- 1	0.25	0.18	0.00	0.00	0.00	0.00
4- 2	0.19	0.13	0.00	0.00	0.00	0.00
4- 3	0.13	0.09	0.00	0.00	0.00	0.00
4- 4	0.06	0.04	0.00	0.00	0.00	0.00
4- 5	0.00	0.00	0.00	0.00	0.00	0.00
4- 6	-0.06	-0.04	0.00	0.00	0.00	0.00
4- 7	-0.13	-0.09	0.00	0.00	0.00	0.00
4- 8	-0.19	-0.13	0.00	0.00	0.00	0.00
4- 9	-0.26	-0.18	0.00	0.00	0.00	0.00
4-10	-0.32	-0.22	0.00	0.00	0.00	0.00
Right						

Unfactored Thrusts due to All Loads: (k) (Fill Depth = 1.00 ft)

Member	Pdc	Pev	Pdw	Peh	Pls	Pwa
1	0.13	0.22	0.00	0.00	0.00	0.00
2	-0.03	0.00	0.00	0.16	0.30	0.00
4	0.03	0.00	0.00	0.22	0.30	0.00

Analysis Truck, HL-93

Vehicle	Axle No.	Weight (k/ft)	Length (ft)	Dist. From Previous (ft)
Truck	1	1.849	2.82	
	2	1.849	2.82	6.00
Tandem	1	2.890	2.82	

2 2.890 2.82 6.00

Live Load Parameters:

Traffic Direction is Perpendicular to Main Reinforcement
Distribution Width : 3.82 ft (+) Distribution Width: 4.75 ft (-)
Note: Distribution width is calculated for one wheel only.
Impact Factor : 1.29
Lane Load Distribution Width : 0.00 ft
Lane Load: 0.000 k/ft

Truck Positions That Cause Maximum Results:

Maximum +Moment in Top Slab

Vehicle	Axle No.	Weight (klf)	Length (ft)	Dist. From Left End (ft)
Truck	1	2.302	2.82	1.75
	2	2.302	2.82	-4.25

Maximum +Moment : 2.06 k-ft
Corresponding Moment at End : -1.33 k-ft
Coincident Bottom Slab Load : 1.85 k/ft

Maximum -Moment in Top Slab

Vehicle	Axle No.	Weight (klf)	Length (ft)	Dist. From Left End (ft)
Truck	1	1.849	2.82	1.76
	2	1.849	2.82	-4.24

Maximum -Moment : -1.07 k-ft
Corresponding Moment at Mid : 1.65 k-ft
Coincident Bottom Slab Load : 1.49 k/ft

Maximum +Shear in Top Slab

Truck	1	2.302	2.82	1.41
	2	2.302	2.82	-4.59

Maximum +Shear : 3.89 k
Corresponding Shear at Mid : -0.14 k
Coincident Bottom Slab Load : 1.85 k/ft

Maximum -Shear in Top Slab

Truck	1	1.849	2.82	2.09
	2	1.849	2.82	-3.91

Maximum -Shear : -3.12 k
Corresponding Shear at Mid : 0.11 k
Coincident Bottom Slab Load : 1.49 k/ft

Maximum +Moment in Top Slab

Tandem	1	1.798	2.82	1.75
	2	1.798	2.82	-4.25

Maximum +Moment : 1.61 k-ft
Corresponding Moment at End : -1.04 k-ft
Coincident Bottom Slab Load : 1.45 k/ft

Maximum -Moment in Top Slab

Tandem	1	2.890	2.82	1.76
	2	2.890	2.82	-4.24

Maximum -Moment : -1.67 k-ft
Corresponding Moment at Mid : 2.58 k-ft
Coincident Bottom Slab Load : 2.33 k/ft

Maximum +Shear in Top Slab

Tandem	1	1.798	2.82	1.41
	2	1.798	2.82	-4.59

Maximum +Shear : 3.04 k
Corresponding Shear at Mid : -0.11 k
Coincident Bottom Slab Load : 1.45 k/ft

Maximum -Shear in Top Slab

Tandem	1	2.890	2.82	2.09
	2	2.890	2.82	-3.91

Maximum -Shear : -4.88 k
Corresponding Shear at Mid : 0.18 k
Coincident Bottom Slab Load : 2.33 k/ft

Unfactored Moments and Shears due to Truck Loads: (k-ft, k)

	Truck				Tandem				Lane			
M-PT	Mll+	Mll-	Vll+	Vll-	Mll+	Mll-	Vll+	Vll-	Mll+	Mll-	Vll+	Vll-
Member 1: (Exterior Wall)												
Bottom												
1- 0	0.00	-0.88	0.07	-0.09	0.00	-1.38	0.06	-0.13	0.00	0.00	0.00	0.00
1- 1	0.00	-0.90	0.07	-0.09	0.00	-1.41	0.06	-0.13	0.00	0.00	0.00	0.00
1- 2	0.00	-0.91	0.07	-0.09	0.00	-1.43	0.06	-0.13	0.00	0.00	0.00	0.00
1- 3	0.00	-0.93	0.07	-0.09	0.00	-1.45	0.06	-0.13	0.00	0.00	0.00	0.00
1- 4	0.00	-0.95	0.07	-0.09	0.00	-1.48	0.06	-0.13	0.00	0.00	0.00	0.00
1- 5	0.00	-0.97	0.07	-0.09	0.00	-1.51	0.06	-0.13	0.00	0.00	0.00	0.00
1- 6	0.00	-0.99	0.07	-0.09	0.00	-1.54	0.06	-0.13	0.00	0.00	0.00	0.00
1- 7	0.00	-1.01	0.07	-0.09	0.00	-1.57	0.06	-0.13	0.00	0.00	0.00	0.00
1- 8	0.00	-1.03	0.07	-0.09	0.00	-1.61	0.06	-0.13	0.00	0.00	0.00	0.00
1- 9	0.00	-1.05	0.07	-0.09	0.00	-1.64	0.06	-0.13	0.00	0.00	0.00	0.00
1-10	0.00	-1.07	0.07	-0.09	0.00	-1.67	0.06	-0.13	0.00	0.00	0.00	0.00
Top												
Member 2: (Top Slab)												
Left												
2- 0	0.00	-1.07	3.89	0.00	0.00	-1.67	3.04	0.00	0.00	0.00	0.00	0.00
2- 1	0.27	-0.30	3.23	-0.03	0.21	-0.47	2.52	-0.05	0.00	0.00	0.00	0.00
2- 2	0.88	0.00	2.56	-0.12	0.69	0.00	2.00	-0.19	0.00	0.00	0.00	0.00
2- 3	1.53	0.00	1.95	-0.27	1.20	0.00	1.52	-0.42	0.00	0.00	0.00	0.00
2- 4	1.93	0.00	1.42	-0.49	1.50	0.00	1.11	-0.77	0.00	0.00	0.00	0.00
2- 5	2.06	0.00	0.97	-0.78	1.61	0.00	0.76	-1.22	0.00	0.00	0.00	0.00
2- 6	1.93	0.00	0.61	-1.14	1.50	0.00	0.48	-1.78	0.00	0.00	0.00	0.00
2- 7	1.53	0.00	0.34	-1.57	1.20	0.00	0.26	-2.45	0.00	0.00	0.00	0.00
2- 8	0.88	0.00	0.15	-2.06	0.69	0.00	0.12	-3.22	0.00	0.00	0.00	0.00
2- 9	0.27	-0.30	0.04	-2.59	0.21	-0.47	0.03	-4.05	0.00	0.00	0.00	0.00
2-10	0.00	-1.07	0.00	-3.12	0.00	-1.67	0.00	-4.88	0.00	0.00	0.00	0.00
Right												

Member 4: (Bottom Slab)

Left												
4- 0	0.00	-0.88	3.25	0.00	0.00	-1.38	2.54	0.00	0.00	0.00	0.00	0.00
4- 1	0.00	-0.08	2.61	0.00	0.00	-0.13	2.04	0.00	0.00	0.00	0.00	0.00
4- 2	0.75	0.00	1.96	0.00	0.59	0.00	1.53	0.00	0.00	0.00	0.00	0.00
4- 3	1.32	0.00	1.31	0.00	1.03	0.00	1.02	0.00	0.00	0.00	0.00	0.00
4- 4	1.66	0.00	0.66	0.00	1.29	0.00	0.52	0.00	0.00	0.00	0.00	0.00
4- 5	1.77	0.00	0.04	-0.03	1.38	0.00	0.03	-0.04	0.00	0.00	0.00	0.00
4- 6	1.66	0.00	0.00	-0.53	1.29	0.00	0.00	-0.83	0.00	0.00	0.00	0.00
4- 7	1.32	0.00	0.00	-1.05	1.03	0.00	0.00	-1.64	0.00	0.00	0.00	0.00
4- 8	0.75	0.00	0.00	-1.57	0.59	0.00	0.00	-2.46	0.00	0.00	0.00	0.00
4- 9	0.00	-0.08	0.00	-2.09	0.00	-0.13	0.00	-3.27	0.00	0.00	0.00	0.00
4-10	0.00	-0.88	0.00	-2.61	0.00	-1.38	0.00	-4.09	0.00	0.00	0.00	0.00
Right												

Serviceability Check: Crack Control

Bar Mark	Location	Moment (k-ft)	Thrust (k)	Fss (ksi)	Spacing (in)	Allow (in)
A1	Top Corner Bar	-1.8	4.24	7.13	4.00	48.99
A2	Bot Corner Bar	-1.6	4.24	5.84	4.00	60.72
A100	Top Slab (int)	2.2	-0.05	25.64	4.00	10.69
A200	Bot Slab (int)	2.0	0.04	28.38	4.00	9.36
B1	Ext Wall (int)	0.1	0.35	0.10	4.00	99.99

Strength Limit State at Critical Sections: Flexure

Member 1: (Exterior Wall), Thickness = 6.00 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	3.00	-2.69	7.25	8.63	3.78	8.98	0.90	0.45	3.17	3.56	4.62
MID	15.00	0.22	0.32	3.08	3.87	2.83	0.90	0.15	3.17	NC	NC
MID-	15.00	-2.78	7.25	8.63	3.78	8.98	0.90	0.45	3.17	3.34	4.33
TOP	3.00	-3.02	7.25	8.63	3.78	8.98	0.90	0.45	3.17	3.08	3.99

Member 2: (Top Slab), Thickness = 6.00 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	3.00	-1.59	0.88	8.63	3.78	7.92	0.90	0.45	3.17	5.19	6.73
MID	21.00	3.83	-0.10	5.95	3.82	5.34	0.90	0.30	3.17	1.42	1.84
RT	3.00	-1.59	0.88	8.63	3.78	7.92	0.90	0.45	3.17	5.19	6.73

Member 4: (Bottom Slab), Thickness = 6.00 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	3.00	-1.08	1.02	8.63	3.78	7.94	0.90	0.45	3.17	8.30	10.76
MID	21.00	3.43	0.01	4.83	3.84	4.35	0.90	0.24	3.17	1.30	1.68
RT	3.00	-1.08	1.02	8.63	3.78	7.94	0.90	0.45	3.17	8.30	10.76

Notes: Mu - Resisting moment under pure flexure, Ma - Allowable moment under applied axial load

Strength Limit State at Critical Sections: Vertical Shear

Member 1: (Exterior Wall), Thickness = 6.00 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	7.32	0.57	-2.7	7.25	4.32	13.35	3.697	29.56	14.83a	0.00	0.00	0.00	33.37	43.26
MID	15.00	0.16	0.2	0.32	4.32	15.77	4.366	27.80	17.52a	0.00	0.00	0.00	99.99	99.99
MID-	15.00	0.16	-2.8	7.25	4.32	13.41	3.714	29.50	14.90a	0.00	0.00	0.00	57.19	74.13
TOP	7.32	-0.59	-3.0	7.25	4.32	12.68	3.511	30.13	14.09a	0.00	0.00	0.00	24.87	32.24

Member 2: (Top Slab), Thickness = 6.00 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	7.32	5.08	-1.6	0.88	4.32	10.80	2.990	31.91	12.00a	0.00	0.00	0.00	2.20	2.85
MID	21.00	1.70	3.8	-0.10	4.32	8.33	2.307	35.10	9.26a	0.00	0.00	0.00	4.90	6.35
RT	7.32	6.30	-1.6	0.88	4.32	10.03	2.776	32.79	11.14a	0.00	0.00	0.00	1.62	2.10

Member 4: (Bottom Slab), Thickness = 6.00 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	7.32	4.16	-1.1	1.02	4.32	11.52	3.190	31.16	12.80a	0.00	0.00	0.00	2.98	3.86
MID	21.00	0.06	3.4	0.01	4.32	8.32	2.304	35.12	9.25a	0.00	0.00	0.00	99.99	99.99
RT	7.32	5.11	-1.1	1.02	4.32	10.80	2.991	31.91	12.00a	0.00	0.00	0.00	2.22	2.88

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

Filename: 22-206 3X2 RCBC.etcx

Load Combination Results at Tenth Points: (k-ft, k)(Fill Depth = 1.00 ft)

M-PT	+Moment	-Moment	+Axial	-Axial	+Shear	-Shear
Member 1: (Exterior Wall)						
Bottom						
1- 0	-0.271	-2.804	0.451	7.253	0.991	-0.042
1- 1	-0.121	-2.686	0.317	7.253	0.813	-0.079
1- 2	0.026	-2.691	0.317	7.253	0.640	-0.113
1- 3	0.130	-2.707	0.317	7.253	0.471	-0.145
1- 4	0.193	-2.741	0.317	7.253	0.308	-0.174
1- 5	0.215	-2.783	0.317	7.253	0.160	-0.210
1- 6	0.199	-2.832	0.317	7.253	0.136	-0.363
1- 7	0.145	-2.886	0.317	7.253	0.114	-0.511
1- 8	0.055	-2.950	0.317	7.253	0.095	-0.654
1- 9	-0.070	-3.018	0.317	7.253	0.079	-0.792
1-10	-0.152	-3.202	0.451	7.253	0.065	-0.925
Top						
Member 2: (Top Slab)						
Left						
2- 0	-0.153	-3.203	-0.097	0.877	7.253	0.317
2- 1	0.453	-0.946	-0.097	0.877	6.006	0.253
2- 2	1.634	-0.053	-0.097	0.703	4.758	-0.054
2- 3	2.852	0.002	-0.097	0.703	3.592	-0.563
2- 4	3.588	0.035	-0.097	0.703	2.571	-1.255
2- 5	3.834	0.046	-0.097	0.703	1.701	-2.135
2- 6	3.588	0.035	-0.097	0.703	0.981	-3.205
2- 7	2.852	0.002	-0.097	0.703	0.412	-4.463
2- 8	1.634	-0.053	-0.097	0.703	-0.012	-5.905
2- 9	0.453	-0.946	-0.097	0.877	-0.253	-7.448
2-10	-0.153	-3.203	-0.097	0.877	-0.317	-8.991
Right						
Member 4: (Bottom Slab)						
Left						
4- 0	-0.271	-2.804	0.006	1.024	6.380	0.485
4- 1	-0.055	-0.389	0.006	1.024	5.109	0.388
4- 2	1.431	-0.041	0.006	0.853	3.837	0.291
4- 3	2.539	0.044	0.006	0.853	2.566	0.194
4- 4	3.203	0.095	0.006	0.853	1.294	0.097
4- 5	3.425	0.112	0.006	0.853	0.062	-0.077
4- 6	3.203	0.095	0.006	0.853	-0.097	-1.590
4- 7	2.539	0.044	0.006	0.853	-0.194	-3.151
4- 8	1.431	-0.041	0.006	0.853	-0.291	-4.712
4- 9	-0.055	-0.389	0.006	1.024	-0.388	-6.274
4-10	-0.271	-2.804	0.006	1.024	-0.485	-7.835
Right						

Analysis Results: Fill Depth = 1.50 ft

Load Parameters:

Fe = 1.08 Surcharge Depth : 4.00 ft

Applied Horizontal Loads: (k/ft)

Load Description	Bottom of Wall	Top of Wall
Live Load Surcharge	0.240	0.240
Internal Water Pressure	0.000	0.000
Horizontal Earth Load	0.255	0.105

Applied Uniform Bottom Slab Loads: (k/ft)

Load Description	
Dead Load	0.182
Vertical Earth	0.193
Wearing Surface	0.000

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

M-PT	Mdc	Mev	Mdw	Meh	Mls	Mwa
Member 1: (Exterior Wall)						
Bottom						
1- 0	-0.12	-0.12	0.00	-0.04	-0.05	0.00
1- 1	-0.11	-0.12	0.00	0.02	0.02	0.00
1- 2	-0.10	-0.12	0.00	0.06	0.07	0.00
1- 3	-0.09	-0.12	0.00	0.09	0.11	0.00
1- 4	-0.09	-0.12	0.00	0.10	0.13	0.00
1- 5	-0.08	-0.12	0.00	0.10	0.14	0.00
1- 6	-0.07	-0.12	0.00	0.09	0.13	0.00
1- 7	-0.06	-0.12	0.00	0.07	0.11	0.00
1- 8	-0.05	-0.12	0.00	0.04	0.07	0.00
1- 9	-0.04	-0.12	0.00	0.01	0.02	0.00
1-10	-0.03	-0.12	0.00	-0.04	-0.05	0.00
Top						
Member 2: (Top Slab)						
Left						
2- 0	-0.03	-0.12	0.00	-0.04	-0.05	0.00
2- 1	0.01	-0.01	0.00	-0.04	-0.05	0.00
2- 2	0.04	0.07	0.00	-0.04	-0.05	0.00
2- 3	0.06	0.13	0.00	-0.04	-0.05	0.00
2- 4	0.08	0.17	0.00	-0.04	-0.05	0.00
2- 5	0.08	0.18	0.00	-0.04	-0.05	0.00
2- 6	0.08	0.17	0.00	-0.04	-0.05	0.00
2- 7	0.06	0.13	0.00	-0.04	-0.05	0.00
2- 8	0.04	0.07	0.00	-0.04	-0.05	0.00
2- 9	0.01	-0.01	0.00	-0.04	-0.05	0.00
2-10	-0.03	-0.12	0.00	-0.04	-0.05	0.00
Right						
Member 4: (Bottom Slab)						
Left						
4- 0	-0.12	-0.12	0.00	-0.04	-0.05	0.00
4- 1	-0.02	-0.01	0.00	-0.04	-0.05	0.00
4- 2	0.06	0.07	0.00	-0.04	-0.05	0.00
4- 3	0.11	0.13	0.00	-0.04	-0.05	0.00
4- 4	0.15	0.17	0.00	-0.04	-0.05	0.00
4- 5	0.16	0.18	0.00	-0.04	-0.05	0.00
4- 6	0.15	0.17	0.00	-0.04	-0.05	0.00
4- 7	0.11	0.13	0.00	-0.04	-0.05	0.00
4- 8	0.06	0.07	0.00	-0.04	-0.05	0.00
4- 9	-0.02	-0.01	0.00	-0.04	-0.05	0.00
4-10	-0.12	-0.12	0.00	-0.04	-0.05	0.00
Right						

Unfactored Shears due to All Loads: (k)

M-PT	Vdc	Vev	Vdw	Veh	Vls	Vwa
Member 1: (Exterior Wall)						
Bottom						
1- 0	0.03	0.00	0.00	0.26	0.30	0.00
1- 1	0.03	0.00	0.00	0.20	0.24	0.00
1- 2	0.03	0.00	0.00	0.14	0.18	0.00
1- 3	0.03	0.00	0.00	0.08	0.12	0.00
1- 4	0.03	0.00	0.00	0.03	0.06	0.00
1- 5	0.03	0.00	0.00	-0.01	0.00	0.00
1- 6	0.03	0.00	0.00	-0.06	-0.06	0.00
1- 7	0.03	0.00	0.00	-0.10	-0.12	0.00
1- 8	0.03	0.00	0.00	-0.13	-0.18	0.00
1- 9	0.03	0.00	0.00	-0.16	-0.24	0.00
1-10	0.03	0.00	0.00	-0.19	-0.30	0.00
Top						
Member 2: (Top Slab)						
Left						
2- 0	0.13	0.34	0.00	0.00	0.00	0.00
2- 1	0.11	0.27	0.00	0.00	0.00	0.00
2- 2	0.08	0.20	0.00	0.00	0.00	0.00
2- 3	0.05	0.14	0.00	0.00	0.00	0.00
2- 4	0.03	0.07	0.00	0.00	0.00	0.00
2- 5	0.00	0.00	0.00	0.00	0.00	0.00
2- 6	-0.03	-0.07	0.00	0.00	0.00	0.00
2- 7	-0.05	-0.14	0.00	0.00	0.00	0.00
2- 8	-0.08	-0.20	0.00	0.00	0.00	0.00
2- 9	-0.11	-0.27	0.00	0.00	0.00	0.00
2-10	-0.13	-0.34	0.00	0.00	0.00	0.00
Right						
Member 4: (Bottom Slab)						
Left						
4- 0	0.32	0.34	0.00	0.00	0.00	0.00
4- 1	0.25	0.27	0.00	0.00	0.00	0.00
4- 2	0.19	0.20	0.00	0.00	0.00	0.00
4- 3	0.13	0.14	0.00	0.00	0.00	0.00
4- 4	0.06	0.07	0.00	0.00	0.00	0.00
4- 5	0.00	0.00	0.00	0.00	0.00	0.00
4- 6	-0.06	-0.07	0.00	0.00	0.00	0.00
4- 7	-0.13	-0.14	0.00	0.00	0.00	0.00
4- 8	-0.19	-0.20	0.00	0.00	0.00	0.00
4- 9	-0.26	-0.27	0.00	0.00	0.00	0.00
4-10	-0.32	-0.34	0.00	0.00	0.00	0.00
Right						

Unfactored Thrusts due to All Loads: (k) (Fill Depth = 1.50 ft)

Member	Pdc	Pev	Pdw	Peh	Pls	Pwa
1	0.13	0.34	0.00	0.00	0.00	0.00
2	-0.03	0.00	0.00	0.19	0.30	0.00
4	0.03	0.00	0.00	0.26	0.30	0.00

Analysis Truck, HL-93

Vehicle	Axle No.	Weight (k/ft)	Length (ft)	Dist. From Previous (ft)
Truck	1	1.511	3.39	
	2	1.511	3.39	6.00
Tandem	1	2.361	3.39	

	2	2.361	3.39	6.00

Live Load Parameters:

Traffic Direction is Perpendicular to Main Reinforcement
Distribution Width : 3.82 ft (+) Distribution Width: 4.75 ft (-)
Note: Distribution width is calculated for one wheel only.
Impact Factor : 1.27
Lane Load Distribution Width : 0.00 ft
Lane Load: 0.000 k/ft

Truck Positions That Cause Maximum Results:

Maximum +Moment in Top Slab

Vehicle	Axle No.	Weight (klf)	Length (ft)	Dist. From Left End (ft)
Truck	1	1.881	3.39	1.75
	2	1.881	3.39	-4.25

Maximum +Moment : 1.75 k-ft
Corresponding Moment at End : -1.12 k-ft
Coincident Bottom Slab Load : 1.82 k/ft

Maximum -Moment in Top Slab

Vehicle	Axle No.	Weight (klf)	Length (ft)	Dist. From Left End (ft)
Truck	1	1.511	3.39	1.75
	2	1.511	3.39	-4.25

Maximum -Moment : -0.90 k-ft
Corresponding Moment at Mid : 1.41 k-ft
Coincident Bottom Slab Load : 1.46 k/ft

Maximum +Shear in Top Slab

Truck	1	1.881	3.39	1.70
	2	1.881	3.39	-4.30

Maximum +Shear : 3.29 k
Corresponding Shear at Mid : 0.00 k
Coincident Bottom Slab Load : 1.82 k/ft

Maximum -Shear in Top Slab

Truck	1	1.511	3.39	1.80
	2	1.511	3.39	-4.20

Maximum -Shear : -2.64 k
Corresponding Shear at Mid : 0.00 k
Coincident Bottom Slab Load : 1.46 k/ft

Maximum +Moment in Top Slab

Tandem	1	1.469	3.39	1.75
	2	1.469	3.39	-4.25

Maximum +Moment : 1.37 k-ft
Corresponding Moment at End : -0.88 k-ft
Coincident Bottom Slab Load : 1.42 k/ft

Maximum -Moment in Top Slab

Tandem	1	2.361	3.39	1.75
	2	2.361	3.39	-4.25

Maximum -Moment : -1.41 k-ft
Corresponding Moment at Mid : 2.20 k-ft
Coincident Bottom Slab Load : 2.29 k/ft

Maximum +Shear in Top Slab

Tandem	1	1.469	3.39	1.70
	2	1.469	3.39	-4.30

Maximum +Shear : 2.57 k
Corresponding Shear at Mid : 0.00 k
Coincident Bottom Slab Load : 1.42 k/ft

Maximum -Shear in Top Slab

Tandem	1	2.361	3.39	1.80
	2	2.361	3.39	-4.20

Maximum -Shear : -4.13 k
Corresponding Shear at Mid : 0.00 k
Coincident Bottom Slab Load : 2.29 k/ft

Unfactored Moments and Shears due to Truck Loads: (k-ft, k)

	Truck				Tandem				Lane			
M-PT	Mll+	Mll-	Vll+	Vll-	Mll+	Mll-	Vll+	Vll-	Mll+	Mll-	Vll+	Vll-
Member 1: (Exterior Wall)												
Bottom												
1- 0	0.00	-0.87	0.10	-0.05	0.00	-1.36	0.08	-0.07	0.00	0.00	0.00	0.00
1- 1	0.00	-0.87	0.10	-0.05	0.00	-1.36	0.08	-0.07	0.00	0.00	0.00	0.00
1- 2	0.00	-0.87	0.10	-0.05	0.00	-1.37	0.08	-0.07	0.00	0.00	0.00	0.00
1- 3	0.00	-0.88	0.10	-0.05	0.00	-1.37	0.08	-0.07	0.00	0.00	0.00	0.00
1- 4	0.00	-0.88	0.10	-0.05	0.00	-1.38	0.08	-0.07	0.00	0.00	0.00	0.00
1- 5	0.00	-0.89	0.10	-0.05	0.00	-1.38	0.08	-0.07	0.00	0.00	0.00	0.00
1- 6	0.00	-0.89	0.10	-0.05	0.00	-1.39	0.08	-0.07	0.00	0.00	0.00	0.00
1- 7	0.00	-0.89	0.10	-0.05	0.00	-1.39	0.08	-0.07	0.00	0.00	0.00	0.00
1- 8	0.00	-0.90	0.10	-0.05	0.00	-1.40	0.08	-0.07	0.00	0.00	0.00	0.00
1- 9	0.00	-0.90	0.10	-0.05	0.00	-1.41	0.08	-0.07	0.00	0.00	0.00	0.00
1-10	0.00	-0.90	0.10	-0.05	0.00	-1.41	0.08	-0.07	0.00	0.00	0.00	0.00
Top												
Member 2: (Top Slab)												
Left												
2- 0	0.00	-0.90	3.29	0.00	0.00	-1.41	2.57	0.00	0.00	0.00	0.00	0.00
2- 1	0.22	-0.24	2.66	-0.02	0.17	-0.38	2.08	-0.04	0.00	0.00	0.00	0.00
2- 2	0.72	0.00	2.10	-0.10	0.56	0.00	1.64	-0.15	0.00	0.00	0.00	0.00
2- 3	1.29	0.00	1.59	-0.22	1.01	0.00	1.24	-0.35	0.00	0.00	0.00	0.00
2- 4	1.64	0.00	1.16	-0.40	1.28	0.00	0.91	-0.63	0.00	0.00	0.00	0.00
2- 5	1.75	0.00	0.79	-0.64	1.37	0.00	0.62	-1.00	0.00	0.00	0.00	0.00
2- 6	1.64	0.00	0.50	-0.93	1.28	0.00	0.39	-1.45	0.00	0.00	0.00	0.00
2- 7	1.29	0.00	0.28	-1.28	1.01	0.00	0.22	-2.00	0.00	0.00	0.00	0.00
2- 8	0.72	0.00	0.12	-1.68	0.56	0.00	0.09	-2.63	0.00	0.00	0.00	0.00
2- 9	0.22	-0.24	0.03	-2.14	0.17	-0.38	0.02	-3.34	0.00	0.00	0.00	0.00
2-10	0.00	-0.90	0.00	-2.64	0.00	-1.41	0.00	-4.13	0.00	0.00	0.00	0.00
Right												

Member 4: (Bottom Slab)

Left												
4- 0	0.00	-0.87	3.19	0.00	0.00	-1.36	2.49	0.00	0.00	0.00	0.00	0.00
4- 1	0.00	-0.07	2.55	0.00	0.00	-0.10	1.99	0.00	0.00	0.00	0.00	0.00
4- 2	0.71	0.00	1.91	0.00	0.55	0.00	1.50	0.00	0.00	0.00	0.00	0.00
4- 3	1.27	0.00	1.28	0.00	0.99	0.00	1.00	0.00	0.00	0.00	0.00	0.00
4- 4	1.60	0.00	0.64	0.00	1.25	0.00	0.50	0.00	0.00	0.00	0.00	0.00
4- 5	1.71	0.00	0.03	-0.02	1.34	0.00	0.02	-0.04	0.00	0.00	0.00	0.00
4- 6	1.60	0.00	0.00	-0.51	1.25	0.00	0.00	-0.80	0.00	0.00	0.00	0.00
4- 7	1.27	0.00	0.00	-1.03	0.99	0.00	0.00	-1.60	0.00	0.00	0.00	0.00
4- 8	0.71	0.00	0.00	-1.54	0.55	0.00	0.00	-2.40	0.00	0.00	0.00	0.00
4- 9	0.00	-0.07	0.00	-2.05	0.00	-0.10	0.00	-3.20	0.00	0.00	0.00	0.00
4-10	0.00	-0.87	0.00	-2.56	0.00	-1.36	0.00	-4.00	0.00	0.00	0.00	0.00
Right												

Serviceability Check: Crack Control

Bar Mark	Location	Moment (k-ft)	Thrust (k)	Fss (ksi)	Spacing (in)	Allow (in)
A1	Top Corner Bar	-1.6	3.76	6.34	4.00	55.60
A2	Bot Corner Bar	-1.6	3.76	6.50	4.00	54.19
A100	Top Slab (int)	2.0	-0.06	22.90	4.00	12.49
A200	Bot Slab (int)	2.0	0.10	28.22	4.00	9.44

Strength Limit State at Critical Sections: Flexure

Member 1: (Exterior Wall), Thickness = 6.00 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	3.00	-2.66	6.36	8.63	3.78	8.83	0.90	0.45	3.17	3.59	4.66
MID	15.00	0.20	0.42	3.08	3.87	2.85	0.90	0.15	3.17	NC	NC
MID-	15.00	-2.60	6.36	8.63	3.78	8.83	0.90	0.45	3.17	3.57	4.63
TOP	3.00	-2.66	6.36	8.63	3.78	8.83	0.90	0.45	3.17	3.51	4.55

Member 2: (Top Slab), Thickness = 6.00 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	3.00	-1.38	0.85	8.63	3.78	7.91	0.90	0.45	3.17	6.13	7.95
MID	21.00	3.38	-0.13	5.95	3.82	5.33	0.90	0.30	3.17	1.64	2.12
RT	3.00	-1.38	0.85	8.63	3.78	7.91	0.90	0.45	3.17	6.13	7.95

Member 4: (Bottom Slab), Thickness = 6.00 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	3.00	-1.06	1.14	8.63	3.78	7.96	0.90	0.45	3.17	8.68	11.26
MID	21.00	3.40	0.11	4.83	3.84	4.36	0.90	0.24	3.17	1.32	1.71
RT	3.00	-1.06	1.14	8.63	3.78	7.96	0.90	0.45	3.17	8.68	11.26

Notes: Mu - Resisting moment under pure flexure, Ma - Allowable moment under applied axial load

Strength Limit State at Critical Sections: Vertical Shear

Member 1: (Exterior Wall), Thickness = 6.00 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	7.32	0.64	-2.7	6.36	4.32	13.04	3.611	29.82	14.49a	0.00	0.00	0.00	28.91	37.47
MID	15.00	0.21	0.2	0.42	4.32	15.91	4.406	27.71	17.68a	0.00	0.00	0.00	99.99	99.99
MID-	15.00	0.21	-2.6	6.36	4.32	13.43	3.718	29.49	14.92a	0.00	0.00	0.00	99.99	99.99
TOP	7.32	-0.51	-2.7	6.36	4.32	13.12	3.633	29.75	14.58a	0.00	0.00	0.00	48.34	62.67

Member 2: (Top Slab), Thickness = 6.00 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	7.32	4.32	-1.4	0.85	4.32	11.37	3.147	31.32	12.63a	0.00	0.00	0.00	2.80	3.63
MID	21.00	1.39	3.4	-0.13	4.32	8.77	2.430	34.47	9.75a	0.00	0.00	0.00	6.31	8.19
RT	7.32	5.32	-1.4	0.85	4.32	10.61	2.939	32.10	11.79a	0.00	0.00	0.00	2.08	2.69

Member 4: (Bottom Slab), Thickness = 6.00 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	7.32	4.18	-1.1	1.14	4.32	11.53	3.192	31.15	12.81a	0.00	0.00	0.00	3.02	3.92
MID	21.00	0.05	3.4	0.11	4.32	8.37	2.317	35.05	9.30a	0.00	0.00	0.00	99.99	99.99
RT	7.32	5.11	-1.1	1.14	4.32	10.83	2.998	31.88	12.03a	0.00	0.00	0.00	2.25	2.92

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

Load Combination Results at Tenth Points: (k-ft, k)(Fill Depth = 1.50 ft)

M-PT	+Moment	-Moment	+Axial	-Axial	+Shear	-Shear
Member 1: (Exterior Wall)						
Bottom						
1- 0	-0.327	-2.817	0.604	6.359	1.091	0.088
1- 1	-0.155	-2.660	0.423	6.359	0.903	0.046
1- 2	0.001	-2.630	0.423	6.359	0.719	0.007
1- 3	0.111	-2.611	0.423	6.359	0.541	-0.030
1- 4	0.178	-2.600	0.423	6.359	0.368	-0.064
1- 5	0.202	-2.598	0.423	6.359	0.209	-0.106
1- 6	0.184	-2.603	0.423	6.359	0.180	-0.269
1- 7	0.127	-2.615	0.423	6.359	0.154	-0.427
1- 8	0.030	-2.633	0.423	6.359	0.129	-0.580
1- 9	-0.104	-2.658	0.423	6.359	0.108	-0.728
1-10	-0.213	-2.803	0.604	6.359	0.089	-0.871
Top						
Member 2: (Top Slab)						
Left						
2- 0	-0.214	-2.804	-0.134	0.845	6.359	0.423
2- 1	0.359	-0.809	-0.134	0.845	5.144	0.338
2- 2	1.381	-0.039	-0.134	0.754	4.030	0.097
2- 3	2.491	0.035	-0.134	0.754	3.030	-0.366
2- 4	3.157	0.080	-0.134	0.754	2.148	-0.978
2- 5	3.380	0.094	-0.134	0.754	1.390	-1.745
2- 6	3.157	0.080	-0.134	0.754	0.755	-2.666
2- 7	2.491	0.035	-0.134	0.754	0.242	-3.742
2- 8	1.381	-0.039	-0.134	0.754	-0.151	-4.967
2- 9	0.359	-0.809	-0.134	0.845	-0.338	-6.335
2-10	-0.214	-2.804	-0.134	0.845	-0.423	-7.829
Right						
Member 4: (Bottom Slab)						
Left						
4- 0	-0.327	-2.817	0.114	1.136	6.421	0.592
4- 1	-0.063	-0.362	0.114	1.136	5.137	0.473
4- 2	1.380	-0.026	0.114	0.904	3.852	0.355
4- 3	2.503	0.078	0.114	0.904	2.568	0.237
4- 4	3.177	0.140	0.114	0.904	1.284	0.118
4- 5	3.402	0.160	0.114	0.904	0.050	-0.063
4- 6	3.177	0.140	0.114	0.904	-0.118	-1.569
4- 7	2.503	0.078	0.114	0.904	-0.237	-3.139
4- 8	1.380	-0.026	0.114	0.904	-0.355	-4.708
4- 9	-0.063	-0.362	0.114	1.136	-0.473	-6.277
4-10	-0.327	-2.817	0.114	1.136	-0.592	-7.847
Right						

Analysis Results: Fill Depth = 1.99 ft

Load Parameters:

Fe = 1.10 Surcharge Depth : 4.00 ft

Applied Horizontal Loads: (k/ft)

Load Description	Bottom of Wall	Top of Wall
Live Load Surcharge	0.240	0.240
Internal Water Pressure	0.000	0.000
Horizontal Earth Load	0.284	0.134

Applied Uniform Bottom Slab Loads: (k/ft)

Load Description	
Dead Load	0.182
Vertical Earth	0.263
Wearing Surface	0.000

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

M-PT	Mdc	Mev	Mdw	Meh	Mls	Mwa
Member 1: (Exterior Wall)						
Bottom						
1- 0	-0.12	-0.16	0.00	-0.05	-0.05	0.00
1- 1	-0.11	-0.16	0.00	0.02	0.02	0.00
1- 2	-0.10	-0.16	0.00	0.07	0.07	0.00
1- 3	-0.09	-0.16	0.00	0.10	0.11	0.00
1- 4	-0.09	-0.16	0.00	0.12	0.13	0.00
1- 5	-0.08	-0.16	0.00	0.12	0.14	0.00
1- 6	-0.07	-0.16	0.00	0.11	0.13	0.00
1- 7	-0.06	-0.16	0.00	0.09	0.11	0.00
1- 8	-0.05	-0.16	0.00	0.05	0.07	0.00
1- 9	-0.04	-0.16	0.00	0.01	0.02	0.00
1-10	-0.03	-0.16	0.00	-0.04	-0.05	0.00
Top						
Member 2: (Top Slab)						
Left						
2- 0	-0.03	-0.16	0.00	-0.04	-0.05	0.00
2- 1	0.01	-0.01	0.00	-0.04	-0.05	0.00
2- 2	0.04	0.10	0.00	-0.04	-0.05	0.00
2- 3	0.06	0.18	0.00	-0.04	-0.05	0.00
2- 4	0.08	0.23	0.00	-0.04	-0.05	0.00
2- 5	0.08	0.25	0.00	-0.04	-0.05	0.00
2- 6	0.08	0.23	0.00	-0.04	-0.05	0.00
2- 7	0.06	0.18	0.00	-0.04	-0.05	0.00
2- 8	0.04	0.10	0.00	-0.04	-0.05	0.00
2- 9	0.01	-0.01	0.00	-0.04	-0.05	0.00
2-10	-0.03	-0.16	0.00	-0.04	-0.05	0.00
Right						
Member 4: (Bottom Slab)						
Left						
4- 0	-0.12	-0.16	0.00	-0.05	-0.05	0.00
4- 1	-0.02	-0.01	0.00	-0.05	-0.05	0.00
4- 2	0.06	0.10	0.00	-0.05	-0.05	0.00
4- 3	0.11	0.18	0.00	-0.05	-0.05	0.00
4- 4	0.15	0.23	0.00	-0.05	-0.05	0.00
4- 5	0.16	0.25	0.00	-0.05	-0.05	0.00
4- 6	0.15	0.23	0.00	-0.05	-0.05	0.00
4- 7	0.11	0.18	0.00	-0.05	-0.05	0.00
4- 8	0.06	0.10	0.00	-0.05	-0.05	0.00
4- 9	-0.02	-0.01	0.00	-0.05	-0.05	0.00
4-10	-0.12	-0.16	0.00	-0.05	-0.05	0.00
Right						

Unfactored Shears due to All Loads: (k)

M-PT	Vdc	Vev	Vdw	Veh	Vls	Vwa
Member 1: (Exterior Wall)						
Bottom						
1- 0	0.03	0.00	0.00	0.29	0.30	0.00
1- 1	0.03	0.00	0.00	0.22	0.24	0.00
1- 2	0.03	0.00	0.00	0.16	0.18	0.00
1- 3	0.03	0.00	0.00	0.10	0.12	0.00
1- 4	0.03	0.00	0.00	0.04	0.06	0.00
1- 5	0.03	0.00	0.00	-0.01	0.00	0.00
1- 6	0.03	0.00	0.00	-0.07	-0.06	0.00
1- 7	0.03	0.00	0.00	-0.11	-0.12	0.00
1- 8	0.03	0.00	0.00	-0.15	-0.18	0.00
1- 9	0.03	0.00	0.00	-0.19	-0.24	0.00
1-10	0.03	0.00	0.00	-0.23	-0.30	0.00
Top						
Member 2: (Top Slab)						
Left						
2- 0	0.13	0.46	0.00	0.00	0.00	0.00
2- 1	0.11	0.37	0.00	0.00	0.00	0.00
2- 2	0.08	0.28	0.00	0.00	0.00	0.00
2- 3	0.05	0.18	0.00	0.00	0.00	0.00
2- 4	0.03	0.09	0.00	0.00	0.00	0.00
2- 5	0.00	0.00	0.00	0.00	0.00	0.00
2- 6	-0.03	-0.09	0.00	0.00	0.00	0.00
2- 7	-0.05	-0.18	0.00	0.00	0.00	0.00
2- 8	-0.08	-0.28	0.00	0.00	0.00	0.00
2- 9	-0.11	-0.37	0.00	0.00	0.00	0.00
2-10	-0.13	-0.46	0.00	0.00	0.00	0.00
Right						
Member 4: (Bottom Slab)						
Left						
4- 0	0.32	0.46	0.00	0.00	0.00	0.00
4- 1	0.25	0.37	0.00	0.00	0.00	0.00
4- 2	0.19	0.28	0.00	0.00	0.00	0.00
4- 3	0.13	0.18	0.00	0.00	0.00	0.00
4- 4	0.06	0.09	0.00	0.00	0.00	0.00
4- 5	0.00	0.00	0.00	0.00	0.00	0.00
4- 6	-0.06	-0.09	0.00	0.00	0.00	0.00
4- 7	-0.13	-0.18	0.00	0.00	0.00	0.00
4- 8	-0.19	-0.28	0.00	0.00	0.00	0.00
4- 9	-0.26	-0.37	0.00	0.00	0.00	0.00
4-10	-0.32	-0.46	0.00	0.00	0.00	0.00
Right						

Unfactored Thrusts due to All Loads: (k) (Fill Depth = 1.99 ft)

Member	Pdc	Pev	Pdw	Peh	Pls	Pwa
1	0.13	0.46	0.00	0.00	0.00	0.00
2	-0.03	0.00	0.00	0.23	0.30	0.00
4	0.03	0.00	0.00	0.29	0.30	0.00

Analysis Truck, HL-93

Vehicle	Axle No.	Weight (k/ft)	Length (ft)	Dist. From Previous (ft)
Truck	1	1.275	3.96	
	2	1.275	3.96	6.00
Tandem	1	1.993	3.96	

2 1.993 3.96 6.00

Live Load Parameters:

Traffic Direction is Perpendicular to Main Reinforcement
Distribution Width : 3.82 ft (+) Distribution Width: 4.75 ft (-)
Note: Distribution width is calculated for one wheel only.
Impact Factor : 1.25
Lane Load Distribution Width : 0.00 ft
Lane Load: 0.000 k/ft

Truck Positions That Cause Maximum Results:

Maximum +Moment in Top Slab

Vehicle	Axle No.	Weight (klf)	Length (ft)	Dist. From Left End (ft)
Truck	1	1.587	3.96	1.98
	2	1.587	3.96	-4.02

Maximum +Moment : 1.49 k-ft
Corresponding Moment at End : -0.95 k-ft
Coincident Bottom Slab Load : 1.59 k/ft

Maximum -Moment in Top Slab

Vehicle	Axle No.	Weight (klf)	Length (ft)	Dist. From Left End (ft)
Truck	1	1.275	3.96	1.40
	2	1.275	3.96	-4.60

Maximum -Moment : -0.76 k-ft
Corresponding Moment at Mid : 1.19 k-ft
Coincident Bottom Slab Load : 1.23 k/ft

Maximum +Shear in Top Slab

Truck	1	1.587	3.96	1.98
	2	1.587	3.96	-4.02

Maximum +Shear : 2.78 k
Corresponding Shear at Mid : 0.00 k
Coincident Bottom Slab Load : 1.59 k/ft

Maximum -Shear in Top Slab

Truck	1	1.275	3.96	1.98
	2	1.275	3.96	-4.02

Maximum -Shear : -2.23 k
Corresponding Shear at Mid : 0.00 k
Coincident Bottom Slab Load : 1.28 k/ft

Maximum +Moment in Top Slab

Tandem	1	1.240	3.96	1.98
	2	1.240	3.96	-4.02

Maximum +Moment : 1.16 k-ft
Corresponding Moment at End : -0.74 k-ft
Coincident Bottom Slab Load : 1.24 k/ft

Maximum -Moment in Top Slab

Tandem	1	1.993	3.96	1.40
	2	1.993	3.96	-4.60

Maximum -Moment : -1.19 k-ft
Corresponding Moment at Mid : 1.85 k-ft
Coincident Bottom Slab Load : 1.92 k/ft

Maximum +Shear in Top Slab

Tandem	1	1.240	3.96	1.98
	2	1.240	3.96	-4.02

Maximum +Shear : 2.17 k
Corresponding Shear at Mid : 0.00 k
Coincident Bottom Slab Load : 1.24 k/ft

Maximum -Shear in Top Slab

Tandem	1	1.993	3.96	1.98
	2	1.993	3.96	-4.02

Maximum -Shear : -3.49 k
Corresponding Shear at Mid : 0.00 k
Coincident Bottom Slab Load : 1.99 k/ft

Unfactored Moments and Shears due to Truck Loads: (k-ft, k)

	Truck				Tandem				Lane			
M-PT	Mll+	Mll-	Vll+	Vll-	Mll+	Mll-	Vll+	Vll-	Mll+	Mll-	Vll+	Vll-
Member 1: (Exterior Wall)												
Bottom												
1- 0	0.00	-0.76	0.10	-0.04	0.00	-1.19	0.08	-0.06	0.00	0.00	0.00	0.00
1- 1	0.00	-0.76	0.10	-0.04	0.00	-1.19	0.08	-0.06	0.00	0.00	0.00	0.00
1- 2	0.00	-0.76	0.10	-0.04	0.00	-1.19	0.08	-0.06	0.00	0.00	0.00	0.00
1- 3	0.00	-0.76	0.10	-0.04	0.00	-1.19	0.08	-0.06	0.00	0.00	0.00	0.00
1- 4	0.00	-0.76	0.10	-0.04	0.00	-1.19	0.08	-0.06	0.00	0.00	0.00	0.00
1- 5	0.00	-0.76	0.10	-0.04	0.00	-1.19	0.08	-0.06	0.00	0.00	0.00	0.00
1- 6	0.00	-0.76	0.10	-0.04	0.00	-1.19	0.08	-0.06	0.00	0.00	0.00	0.00
1- 7	0.00	-0.76	0.10	-0.04	0.00	-1.19	0.08	-0.06	0.00	0.00	0.00	0.00
1- 8	0.00	-0.76	0.10	-0.04	0.00	-1.19	0.08	-0.06	0.00	0.00	0.00	0.00
1- 9	0.00	-0.76	0.10	-0.04	0.00	-1.19	0.08	-0.06	0.00	0.00	0.00	0.00
1-10	0.00	-0.76	0.10	-0.04	0.00	-1.19	0.08	-0.06	0.00	0.00	0.00	0.00
Top												
Member 2: (Top Slab)												
Left												
2- 0	0.00	-0.76	2.78	0.00	0.00	-1.19	2.17	0.00	0.00	0.00	0.00	0.00
2- 1	0.19	-0.21	2.25	-0.02	0.15	-0.32	1.76	-0.03	0.00	0.00	0.00	0.00
2- 2	0.61	0.00	1.77	-0.08	0.48	0.00	1.38	-0.13	0.00	0.00	0.00	0.00
2- 3	1.10	0.00	1.34	-0.19	0.86	0.00	1.05	-0.29	0.00	0.00	0.00	0.00
2- 4	1.39	0.00	0.98	-0.34	1.08	0.00	0.76	-0.53	0.00	0.00	0.00	0.00
2- 5	1.49	0.00	0.67	-0.54	1.16	0.00	0.52	-0.84	0.00	0.00	0.00	0.00
2- 6	1.39	0.00	0.42	-0.79	1.08	0.00	0.33	-1.23	0.00	0.00	0.00	0.00
2- 7	1.10	0.00	0.23	-1.08	0.86	0.00	0.18	-1.69	0.00	0.00	0.00	0.00
2- 8	0.61	0.00	0.10	-1.42	0.48	0.00	0.08	-2.22	0.00	0.00	0.00	0.00
2- 9	0.19	-0.21	0.03	-1.81	0.15	-0.32	0.02	-2.82	0.00	0.00	0.00	0.00
2-10	0.00	-0.76	0.00	-2.23	0.00	-1.19	0.00	-3.49	0.00	0.00	0.00	0.00
Right												

Member 4: (Bottom Slab)

Left												
4- 0	0.00	-0.76	2.78	0.00	0.00	-1.19	2.17	0.00	0.00	0.00	0.00	0.00
4- 1	0.00	-0.06	2.22	0.00	0.00	-0.10	1.74	0.00	0.00	0.00	0.00	0.00
4- 2	0.61	0.00	1.67	0.00	0.48	0.00	1.30	0.00	0.00	0.00	0.00	0.00
4- 3	1.10	0.00	1.11	0.00	0.86	0.00	0.87	0.00	0.00	0.00	0.00	0.00
4- 4	1.39	0.00	0.56	0.00	1.08	0.00	0.43	0.00	0.00	0.00	0.00	0.00
4- 5	1.49	0.00	0.02	-0.02	1.16	0.00	0.02	-0.03	0.00	0.00	0.00	0.00
4- 6	1.39	0.00	0.00	-0.45	1.08	0.00	0.00	-0.70	0.00	0.00	0.00	0.00
4- 7	1.10	0.00	0.00	-0.89	0.86	0.00	0.00	-1.39	0.00	0.00	0.00	0.00
4- 8	0.61	0.00	0.00	-1.34	0.48	0.00	0.00	-2.09	0.00	0.00	0.00	0.00
4- 9	0.00	-0.06	0.00	-1.79	0.00	-0.10	0.00	-2.79	0.00	0.00	0.00	0.00
4-10	0.00	-0.76	0.00	-2.23	0.00	-1.19	0.00	-3.49	0.00	0.00	0.00	0.00
Right												

Serviceability Check: Crack Control

Bar Mark	Location	Moment (k-ft)	Thrust (k)	Fss (ksi)	Spacing (in)	Allow (in)
A1	Top Corner Bar	-1.4	3.37	5.55	4.00	64.15
A2	Bot Corner Bar	-1.4	3.37	6.05	4.00	58.53
A100	Top Slab (int)	1.8	-0.05	20.50	4.00	14.46
A200	Bot Slab (int)	1.9	0.13	25.81	4.00	10.72

Strength Limit State at Critical Sections: Flexure

Member 1: (Exterior Wall), Thickness = 6.00 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	3.00	-2.41	5.62	8.63	3.78	8.71	0.90	0.45	3.17	4.04	5.23
MID	15.00	0.19	0.53	3.08	3.87	2.87	0.90	0.15	3.17	NC	NC
MID-	15.00	-2.31	5.62	8.63	3.78	8.71	0.90	0.45	3.17	4.08	5.29
TOP	3.00	-2.33	5.62	8.63	3.78	8.71	0.90	0.45	3.17	4.08	5.28

Member 2: (Top Slab), Thickness = 6.00 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	3.00	-1.22	0.88	8.63	3.78	7.92	0.90	0.45	3.17	7.16	9.28
MID	21.00	2.99	-0.11	5.95	3.82	5.34	0.90	0.30	3.17	1.90	2.47
RT	3.00	-1.22	0.88	8.63	3.78	7.92	0.90	0.45	3.17	7.16	9.28

Member 4: (Bottom Slab), Thickness = 6.00 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	3.00	-1.00	1.18	8.63	3.78	7.97	0.90	0.45	3.17	9.65	12.51
MID	21.00	3.09	0.16	4.83	3.84	4.37	0.90	0.24	3.17	1.50	1.94
RT	3.00	-1.00	1.18	8.63	3.78	7.97	0.90	0.45	3.17	9.65	12.51

Notes: Mu - Resisting moment under pure flexure, Ma - Allowable moment under applied axial load

Strength Limit State at Critical Sections: Vertical Shear

Member 1: (Exterior Wall), Thickness = 6.00 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	7.32	0.66	-2.4	5.62	4.32	13.26	3.672	29.63	14.73a	0.00	0.00	0.00	29.43	38.16
MID	15.00	0.21	0.2	0.53	4.32	16.37	4.532	27.49	18.19a	0.00	0.00	0.00	99.99	99.99
MID-	15.00	0.21	-2.3	5.62	4.32	13.74	3.805	29.22	15.27a	0.00	0.00	0.00	99.99	99.99
TOP	7.32	-0.52	-2.3	5.62	4.32	13.51	3.742	29.42	15.01a	0.00	0.00	0.00	49.70	64.43

Member 2: (Top Slab), Thickness = 6.00 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	7.32	3.81	-1.2	0.88	4.32	11.76	3.257	30.91	13.07a	0.00	0.00	0.00	3.40	4.41
MID	21.00	1.17	3.0	-0.11	4.32	9.15	2.535	33.93	10.17a	0.00	0.00	0.00	7.81	10.12
RT	7.32	4.65	-1.2	0.88	4.32	11.12	3.079	31.58	12.35a	0.00	0.00	0.00	2.56	3.31

Member 4: (Bottom Slab), Thickness = 6.00 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	7.32	3.82	-1.0	1.18	4.32	11.85	3.280	30.84	13.16a	0.00	0.00	0.00	3.54	4.58
MID	21.00	0.04	3.1	0.16	4.32	8.72	2.414	34.55	9.69a	0.00	0.00	0.00	99.99	99.99
RT	7.32	4.62	-1.0	1.18	4.32	11.20	3.102	31.49	12.45a	0.00	0.00	0.00	2.66	3.44

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

Load Combination Results at Tenth Points: (k-ft, k)(Fill Depth = 1.99 ft)

M-PT	+Moment	-Moment	+Axial	-Axial	+Shear	-Shear
Member 1: (Exterior Wall)						
Bottom						
1- 0	-0.385	-2.584	0.761	5.622	1.140	0.133
1- 1	-0.189	-2.407	0.532	5.622	0.941	0.086
1- 2	-0.025	-2.364	0.532	5.622	0.748	0.042
1- 3	0.092	-2.331	0.532	5.622	0.559	0.000
1- 4	0.162	-2.309	0.532	5.622	0.376	-0.039
1- 5	0.187	-2.296	0.532	5.622	0.208	-0.085
1- 6	0.169	-2.291	0.532	5.622	0.174	-0.259
1- 7	0.107	-2.295	0.532	5.622	0.142	-0.427
1- 8	0.004	-2.307	0.532	5.622	0.113	-0.590
1- 9	-0.139	-2.326	0.532	5.622	0.087	-0.748
1-10	-0.272	-2.476	0.761	5.622	0.063	-0.901
Top						
Member 2: (Top Slab)						
Left						
2- 0	-0.272	-2.477	-0.107	0.878	5.622	0.532
2- 1	0.291	-0.718	-0.107	0.878	4.542	0.425
2- 2	1.220	-0.024	-0.107	0.804	3.552	0.233
2- 3	2.204	0.069	-0.107	0.804	2.657	-0.208
2- 4	2.794	0.125	-0.107	0.804	1.863	-0.775
2- 5	2.991	0.144	-0.107	0.804	1.173	-1.472
2- 6	2.794	0.125	-0.107	0.804	0.587	-2.300
2- 7	2.204	0.069	-0.107	0.804	0.104	-3.258
2- 8	1.220	-0.024	-0.107	0.804	-0.279	-4.342
2- 9	0.291	-0.718	-0.107	0.878	-0.425	-5.547
2-10	-0.272	-2.477	-0.107	0.878	-0.532	-6.864
Right						
Member 4: (Bottom Slab)						
Left						
4- 0	-0.385	-2.584	0.155	1.184	5.857	0.700
4- 1	-0.071	-0.363	0.155	1.184	4.685	0.560
4- 2	1.241	-0.011	0.155	0.953	3.514	0.420
4- 3	2.266	0.112	0.155	0.953	2.343	0.280
4- 4	2.881	0.185	0.155	0.953	1.171	0.140
4- 5	3.086	0.210	0.155	0.953	0.042	-0.053
4- 6	2.881	0.185	0.155	0.953	-0.140	-1.420
4- 7	2.266	0.112	0.155	0.953	-0.280	-2.839
4- 8	1.241	-0.011	0.155	0.953	-0.420	-4.259
4- 9	-0.071	-0.363	0.155	1.184	-0.560	-5.679
4-10	-0.385	-2.584	0.155	1.184	-0.700	-7.098
Right						

Analysis Results: Fill Depth = 2.00 ft

Load Parameters:

Fe = 1.10 Surcharge Depth : 4.00 ft

Applied Horizontal Loads: (k/ft)

Load Description	Bottom of Wall	Top of Wall
Live Load Surcharge	0.240	0.240
Internal Water Pressure	0.000	0.000
Horizontal Earth Load	0.285	0.135

Applied Uniform Bottom Slab Loads: (k/ft)

Load Description	
Dead Load	0.182
Vertical Earth	0.264
Wearing Surface	0.000

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

M-PT	Mdc	Mev	Mdw	Meh	Mls	Mwa
Member 1: (Exterior Wall)						
Bottom						
1- 0	-0.12	-0.16	0.00	-0.05	-0.05	0.00
1- 1	-0.11	-0.16	0.00	0.02	0.02	0.00
1- 2	-0.10	-0.16	0.00	0.07	0.07	0.00
1- 3	-0.09	-0.16	0.00	0.10	0.11	0.00
1- 4	-0.09	-0.16	0.00	0.12	0.13	0.00
1- 5	-0.08	-0.16	0.00	0.12	0.14	0.00
1- 6	-0.07	-0.16	0.00	0.11	0.13	0.00
1- 7	-0.06	-0.16	0.00	0.09	0.11	0.00
1- 8	-0.05	-0.16	0.00	0.05	0.07	0.00
1- 9	-0.04	-0.16	0.00	0.01	0.02	0.00
1-10	-0.03	-0.16	0.00	-0.04	-0.05	0.00
Top						
Member 2: (Top Slab)						
Left						
2- 0	-0.03	-0.16	0.00	-0.04	-0.05	0.00
2- 1	0.01	-0.01	0.00	-0.04	-0.05	0.00
2- 2	0.04	0.10	0.00	-0.04	-0.05	0.00
2- 3	0.06	0.18	0.00	-0.04	-0.05	0.00
2- 4	0.08	0.23	0.00	-0.04	-0.05	0.00
2- 5	0.08	0.25	0.00	-0.04	-0.05	0.00
2- 6	0.08	0.23	0.00	-0.04	-0.05	0.00
2- 7	0.06	0.18	0.00	-0.04	-0.05	0.00
2- 8	0.04	0.10	0.00	-0.04	-0.05	0.00
2- 9	0.01	-0.01	0.00	-0.04	-0.05	0.00
2-10	-0.03	-0.16	0.00	-0.04	-0.05	0.00
Right						
Member 4: (Bottom Slab)						
Left						
4- 0	-0.12	-0.16	0.00	-0.05	-0.05	0.00
4- 1	-0.02	-0.01	0.00	-0.05	-0.05	0.00
4- 2	0.06	0.10	0.00	-0.05	-0.05	0.00
4- 3	0.11	0.18	0.00	-0.05	-0.05	0.00
4- 4	0.15	0.23	0.00	-0.05	-0.05	0.00
4- 5	0.16	0.25	0.00	-0.05	-0.05	0.00
4- 6	0.15	0.23	0.00	-0.05	-0.05	0.00
4- 7	0.11	0.18	0.00	-0.05	-0.05	0.00
4- 8	0.06	0.10	0.00	-0.05	-0.05	0.00
4- 9	-0.02	-0.01	0.00	-0.05	-0.05	0.00
4-10	-0.12	-0.16	0.00	-0.05	-0.05	0.00
Right						

Unfactored Shears due to All Loads: (k)

M-PT	Vdc	Vev	Vdw	Veh	Vls	Vwa
Member 1: (Exterior Wall)						
Bottom						
1- 0	0.03	0.00	0.00	0.29	0.30	0.00
1- 1	0.03	0.00	0.00	0.23	0.24	0.00
1- 2	0.03	0.00	0.00	0.16	0.18	0.00
1- 3	0.03	0.00	0.00	0.10	0.12	0.00
1- 4	0.03	0.00	0.00	0.04	0.06	0.00
1- 5	0.03	0.00	0.00	-0.01	0.00	0.00
1- 6	0.03	0.00	0.00	-0.07	-0.06	0.00
1- 7	0.03	0.00	0.00	-0.11	-0.12	0.00
1- 8	0.03	0.00	0.00	-0.16	-0.18	0.00
1- 9	0.03	0.00	0.00	-0.19	-0.24	0.00
1-10	0.03	0.00	0.00	-0.23	-0.30	0.00
Top						
Member 2: (Top Slab)						
Left						
2- 0	0.13	0.46	0.00	0.00	0.00	0.00
2- 1	0.11	0.37	0.00	0.00	0.00	0.00
2- 2	0.08	0.28	0.00	0.00	0.00	0.00
2- 3	0.05	0.18	0.00	0.00	0.00	0.00
2- 4	0.03	0.09	0.00	0.00	0.00	0.00
2- 5	0.00	0.00	0.00	0.00	0.00	0.00
2- 6	-0.03	-0.09	0.00	0.00	0.00	0.00
2- 7	-0.05	-0.18	0.00	0.00	0.00	0.00
2- 8	-0.08	-0.28	0.00	0.00	0.00	0.00
2- 9	-0.11	-0.37	0.00	0.00	0.00	0.00
2-10	-0.13	-0.46	0.00	0.00	0.00	0.00
Right						
Member 4: (Bottom Slab)						
Left						
4- 0	0.32	0.46	0.00	0.00	0.00	0.00
4- 1	0.25	0.37	0.00	0.00	0.00	0.00
4- 2	0.19	0.28	0.00	0.00	0.00	0.00
4- 3	0.13	0.18	0.00	0.00	0.00	0.00
4- 4	0.06	0.09	0.00	0.00	0.00	0.00
4- 5	0.00	0.00	0.00	0.00	0.00	0.00
4- 6	-0.06	-0.09	0.00	0.00	0.00	0.00
4- 7	-0.13	-0.18	0.00	0.00	0.00	0.00
4- 8	-0.19	-0.28	0.00	0.00	0.00	0.00
4- 9	-0.26	-0.37	0.00	0.00	0.00	0.00
4-10	-0.32	-0.46	0.00	0.00	0.00	0.00
Right						

Unfactored Thrusts due to All Loads: (k) (Fill Depth = 2.00 ft)

Member	Pdc	Pev	Pdw	Peh	Pls	Pwa
1	0.13	0.46	0.00	0.00	0.00	0.00
2	-0.03	0.00	0.00	0.23	0.30	0.00
4	0.03	0.00	0.00	0.29	0.30	0.00

Analysis Truck, HL-93

Vehicle	Axle No.	Weight (k/ft)	Length (ft)	Dist. From Previous (ft)
Truck	1	1.822	3.97	
	2	1.822	3.97	6.00
Tandem	1	1.424	3.97	

	2	1.424	3.97	6.00

Live Load Parameters:

Traffic Direction is Perpendicular to Main Reinforcement
Distribution Width : 3.31 ft
Impact Factor : 1.25
Lane Load Distribution Width : 0.00 ft
Lane Load: 0.000 k/ft

Truck Positions That Cause Maximum Results:

Maximum +Moment in Top Slab

Vehicle	Axle No.	Weight (klf)	Length (ft)	Dist. From Left End (ft)
Truck	1	1.822	3.97	1.98
	2	1.822	3.97	-4.02

Maximum +Moment : 1.71 k-ft
Corresponding Moment at End : -1.09 k-ft
Coincident Bottom Slab Load : 1.82 k/ft

Maximum -Moment in Top Slab

Vehicle	Axle No.	Weight (klf)	Length (ft)	Dist. From Left End (ft)
Truck	1	1.822	3.97	1.40
	2	1.822	3.97	-4.60

Maximum -Moment : -1.09 k-ft
Corresponding Moment at Mid : 1.70 k-ft
Coincident Bottom Slab Load : 1.76 k/ft

Maximum +Shear in Top Slab

Truck	1	1.822	3.97	1.98
	2	1.822	3.97	-4.02

Maximum +Shear : 3.19 k
Corresponding Shear at Mid : 0.00 k
Coincident Bottom Slab Load : 1.82 k/ft

Maximum -Shear in Top Slab

Truck	1	1.822	3.97	1.98
	2	1.822	3.97	-4.02

Maximum -Shear : -3.19 k
Corresponding Shear at Mid : 0.00 k
Coincident Bottom Slab Load : 1.82 k/ft

Maximum +Moment in Top Slab

Tandem	1	1.424	3.97	1.98
	2	1.424	3.97	-4.02

Maximum +Moment : 1.33 k-ft
Corresponding Moment at End : -0.85 k-ft
Coincident Bottom Slab Load : 1.42 k/ft

Maximum -Moment in Top Slab

Tandem	1	1.424	3.97	1.40
	2	1.424	3.97	-4.60

Maximum -Moment : -0.85 k-ft
Corresponding Moment at Mid : 1.33 k-ft
Coincident Bottom Slab Load : 1.38 k/ft

Maximum +Shear in Top Slab

Tandem	1	1.424	3.97	1.98
	2	1.424	3.97	-4.02

Maximum +Shear : 2.49 k
Corresponding Shear at Mid : 0.00 k
Coincident Bottom Slab Load : 1.42 k/ft

Maximum -Shear in Top Slab

Tandem	1	1.424	3.97	1.98
	2	1.424	3.97	-4.02

Maximum -Shear : -2.49 k
Corresponding Shear at Mid : 0.00 k
Coincident Bottom Slab Load : 1.42 k/ft

Unfactored Moments and Shears due to Truck Loads: (k-ft, k)

	Truck				Tandem				Lane			
M-PT	Mll+	Mll-	Vll+	Vll-	Mll+	Mll-	Vll+	Vll-	Mll+	Mll-	Vll+	Vll-
Member 1: (Exterior Wall)												
Bottom												
1- 0	0.00	-1.00	0.11	-0.06	0.00	-0.85	0.09	-0.04	0.00	0.00	0.00	0.00
1- 1	0.00	-1.00	0.11	-0.06	0.00	-0.85	0.09	-0.04	0.00	0.00	0.00	0.00
1- 2	0.00	-1.01	0.11	-0.06	0.00	-0.85	0.09	-0.04	0.00	0.00	0.00	0.00
1- 3	0.00	-1.04	0.11	-0.06	0.00	-0.85	0.09	-0.04	0.00	0.00	0.00	0.00
1- 4	0.00	-1.07	0.11	-0.06	0.00	-0.85	0.09	-0.04	0.00	0.00	0.00	0.00
1- 5	0.00	-1.09	0.11	-0.06	0.00	-0.85	0.09	-0.04	0.00	0.00	0.00	0.00
1- 6	0.00	-1.09	0.11	-0.06	0.00	-0.85	0.09	-0.04	0.00	0.00	0.00	0.00
1- 7	0.00	-1.09	0.11	-0.06	0.00	-0.85	0.09	-0.04	0.00	0.00	0.00	0.00
1- 8	0.00	-1.09	0.11	-0.06	0.00	-0.85	0.09	-0.04	0.00	0.00	0.00	0.00
1- 9	0.00	-1.09	0.11	-0.06	0.00	-0.85	0.09	-0.04	0.00	0.00	0.00	0.00
1-10	0.00	-1.09	0.11	-0.06	0.00	-0.85	0.09	-0.04	0.00	0.00	0.00	0.00
Top												
Member 2: (Top Slab)												
Left												
2- 0	0.00	-1.09	3.19	0.00	0.00	-0.85	2.49	0.00	0.00	0.00	0.00	0.00
2- 1	0.21	-0.29	2.58	-0.03	0.17	-0.23	2.02	-0.02	0.00	0.00	0.00	0.00
2- 2	0.70	0.00	2.03	-0.12	0.55	0.00	1.59	-0.09	0.00	0.00	0.00	0.00
2- 3	1.26	0.00	1.54	-0.27	0.98	0.00	1.21	-0.21	0.00	0.00	0.00	0.00
2- 4	1.59	0.00	1.12	-0.48	1.25	0.00	0.88	-0.38	0.00	0.00	0.00	0.00
2- 5	1.71	0.00	0.77	-0.77	1.33	0.00	0.60	-0.60	0.00	0.00	0.00	0.00
2- 6	1.59	0.00	0.48	-1.12	1.25	0.00	0.38	-0.88	0.00	0.00	0.00	0.00
2- 7	1.26	0.00	0.27	-1.54	0.98	0.00	0.21	-1.21	0.00	0.00	0.00	0.00
2- 8	0.70	0.00	0.12	-2.03	0.55	0.00	0.09	-1.59	0.00	0.00	0.00	0.00
2- 9	0.21	-0.29	0.03	-2.58	0.17	-0.23	0.02	-2.02	0.00	0.00	0.00	0.00
2-10	0.00	-1.09	0.00	-3.19	0.00	-0.85	0.00	-2.49	0.00	0.00	0.00	0.00
Right												
Member 4: (Bottom Slab)												

Left												
4- 0	0.00	-1.00	3.19	0.00	0.00	-0.85	2.49	0.00	0.00	0.00	0.00	0.00
4- 1	0.00	-0.09	2.55	0.00	0.00	-0.07	1.99	0.00	0.00	0.00	0.00	0.00
4- 2	0.70	0.00	1.91	0.00	0.55	0.00	1.49	0.00	0.00	0.00	0.00	0.00
4- 3	1.26	0.00	1.28	0.00	0.98	0.00	1.00	0.00	0.00	0.00	0.00	0.00
4- 4	1.59	0.00	0.64	0.00	1.25	0.00	0.50	0.00	0.00	0.00	0.00	0.00
4- 5	1.71	0.00	0.03	-0.03	1.33	0.00	0.02	-0.02	0.00	0.00	0.00	0.00
4- 6	1.59	0.00	0.00	-0.59	1.25	0.00	0.00	-0.50	0.00	0.00	0.00	0.00
4- 7	1.26	0.00	0.00	-1.12	0.98	0.00	0.00	-1.00	0.00	0.00	0.00	0.00
4- 8	0.70	0.00	0.00	-1.66	0.55	0.00	0.00	-1.49	0.00	0.00	0.00	0.00
4- 9	0.00	-0.09	0.00	-2.20	0.00	-0.07	0.00	-1.99	0.00	0.00	0.00	0.00
4-10	0.00	-1.00	0.00	-2.74	0.00	-0.85	0.00	-2.49	0.00	0.00	0.00	0.00
Right												

Note: Unfactored live load results computed at 2.00 ft and 0 ft fill depths, per LRFD 3.6.1.2.6

Serviceability Check: Crack Control

Bar Mark	Location	Moment (k-ft)	Thrust (k)	Fss (ksi)	Spacing (in)	Allow (in)
A1	Top Corner Bar	-1.3	3.78	4.22	4.00	85.87
A2	Bot Corner Bar	-1.3	3.78	4.08	4.00	88.80
A100	Top Slab (int)	2.0	-0.02	22.96	4.00	12.44
A200	Bot Slab (int)	2.1	0.13	28.95	4.00	9.09

Strength Limit State at Critical Sections: Flexure

Member 1: (Exterior Wall), Thickness = 6.00 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	3.00	-2.08	6.35	8.63	3.78	8.83	0.90	0.45	3.17	4.85	6.29
MID	15.00	0.19	0.53	3.08	3.87	2.87	0.90	0.15	3.17	NC	NC
MID-	15.00	-2.12	6.35	8.63	3.78	8.83	0.90	0.45	3.17	4.53	5.87
TOP	3.00	-2.15	6.35	8.63	3.78	8.83	0.90	0.45	3.17	4.52	5.86

Member 2: (Top Slab), Thickness = 6.00 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	3.00	-1.14	0.89	8.63	3.78	7.92	0.90	0.45	3.17	7.77	10.07
MID	21.00	3.38	-0.07	5.95	3.82	5.34	0.90	0.30	3.17	1.66	2.15
RT	3.00	-1.14	0.89	8.63	3.78	7.92	0.90	0.45	3.17	7.77	10.07

Member 4: (Bottom Slab), Thickness = 6.00 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	3.00	-0.90	1.14	8.63	3.78	7.96	0.90	0.45	3.17	11.02	14.29
MID	21.00	3.47	0.14	4.83	3.84	4.37	0.90	0.24	3.17	1.30	1.69
RT	3.00	-0.90	1.14	8.63	3.78	7.96	0.90	0.45	3.17	11.02	14.29

Notes: Mu - Resisting moment under pure flexure, Ma - Allowable moment under applied axial load

Strength Limit State at Critical Sections: Vertical Shear

Member 1: (Exterior Wall), Thickness = 6.00 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	7.32	0.69	-2.1	6.35	4.32	14.14	3.916	28.88	15.71a	0.00	0.00	0.00	29.70	38.50
MID	15.00	0.23	0.2	0.53	4.32	16.26	4.502	27.54	18.06a	0.00	0.00	0.00	99.99	99.99
MID-	15.00	0.23	-2.1	6.35	4.32	14.49	4.013	28.65	16.10a	0.00	0.00	0.00	99.99	99.99
TOP	7.32	-0.51	-2.1	6.35	4.32	14.13	3.912	28.90	15.70a	0.00	0.00	0.00	51.98	67.39

Member 2: (Top Slab), Thickness = 6.00 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	7.32	4.30	-1.1	0.89	3.78	9.97	3.154	31.30	11.08a	0.00	0.00	0.00	2.49	3.23
MID	21.00	1.35	3.4	-0.07	3.82	9.58	n/a	n/a	10.65c	0.00	0.00	0.00	7.12	9.23
RT	7.32	4.30	-1.1	0.89	3.78	9.97	3.154	31.30	11.08a	0.00	0.00	0.00	2.49	3.23

Member 4: (Bottom Slab), Thickness = 6.00 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	7.32	4.29	-0.9	1.14	3.78	10.02	3.171	31.23	11.14a	0.00	0.00	0.00	2.58	3.34
MID	21.00	0.05	3.5	0.14	3.84	9.63	n/a	n/a	10.70c	0.00	0.00	0.00	99.99	99.99
RT	7.32	3.80	-0.9	1.14	3.78	10.37	3.281	30.83	11.53a	0.00	0.00	0.00	3.09	4.00

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

Filename: 22-206 3X2 RCBC.etcx

Load Combination Results at Tenth Points: (k-ft, k)(Fill Depth = 2.00 ft)

M-PT	+Moment	-Moment	+Axial	-Axial	+Shear	-Shear
Member 1: (Exterior Wall)						
Bottom						
1- 0	-0.386	-2.267	0.765	6.346	1.166	0.143
1- 1	-0.190	-2.084	0.534	6.346	0.968	0.096
1- 2	-0.025	-2.054	0.534	6.346	0.774	0.052
1- 3	0.091	-2.069	0.534	6.346	0.586	0.010
1- 4	0.162	-2.111	0.534	6.346	0.402	-0.029
1- 5	0.187	-2.119	0.534	6.346	0.234	-0.076
1- 6	0.168	-2.115	0.534	6.346	0.199	-0.249
1- 7	0.107	-2.119	0.534	6.346	0.168	-0.418
1- 8	0.004	-2.131	0.534	6.346	0.139	-0.581
1- 9	-0.139	-2.149	0.534	6.346	0.112	-0.739
1-10	-0.272	-2.299	0.765	6.346	0.088	-0.892
Top						
Member 2: (Top Slab)						
Left						
2- 0	-0.273	-2.300	-0.065	0.892	6.346	0.534
2- 1	0.339	-0.670	-0.065	0.892	5.128	0.427
2- 2	1.379	-0.023	-0.065	0.805	4.012	0.254
2- 3	2.490	0.070	-0.065	0.805	3.007	-0.163
2- 4	3.156	0.126	-0.065	0.805	2.117	-0.695
2- 5	3.378	0.145	-0.065	0.805	1.347	-1.347
2- 6	3.156	0.126	-0.065	0.805	0.695	-2.117
2- 7	2.490	0.070	-0.065	0.805	0.163	-3.007
2- 8	1.379	-0.023	-0.065	0.805	-0.254	-4.012
2- 9	0.339	-0.670	-0.065	0.892	-0.427	-5.128
2-10	-0.273	-2.300	-0.065	0.892	-0.534	-6.346
Right						
Member 4: (Bottom Slab)						
Left						
4- 0	-0.386	-2.267	0.143	1.143	6.580	0.703
4- 1	-0.071	-0.350	0.143	1.143	5.264	0.562
4- 2	1.400	-0.010	0.143	0.954	3.948	0.422
4- 3	2.551	0.113	0.143	0.954	2.632	0.281
4- 4	3.242	0.186	0.143	0.954	1.316	0.141
4- 5	3.472	0.211	0.143	0.954	0.049	-0.049
4- 6	3.242	0.186	0.143	0.954	-0.141	-1.227
4- 7	2.551	0.113	0.143	0.954	-0.281	-2.368
4- 8	1.400	-0.010	0.143	0.954	-0.422	-3.508
4- 9	-0.071	-0.350	0.143	1.143	-0.562	-4.649
4-10	-0.386	-2.267	0.143	1.143	-0.703	-5.790
Right						