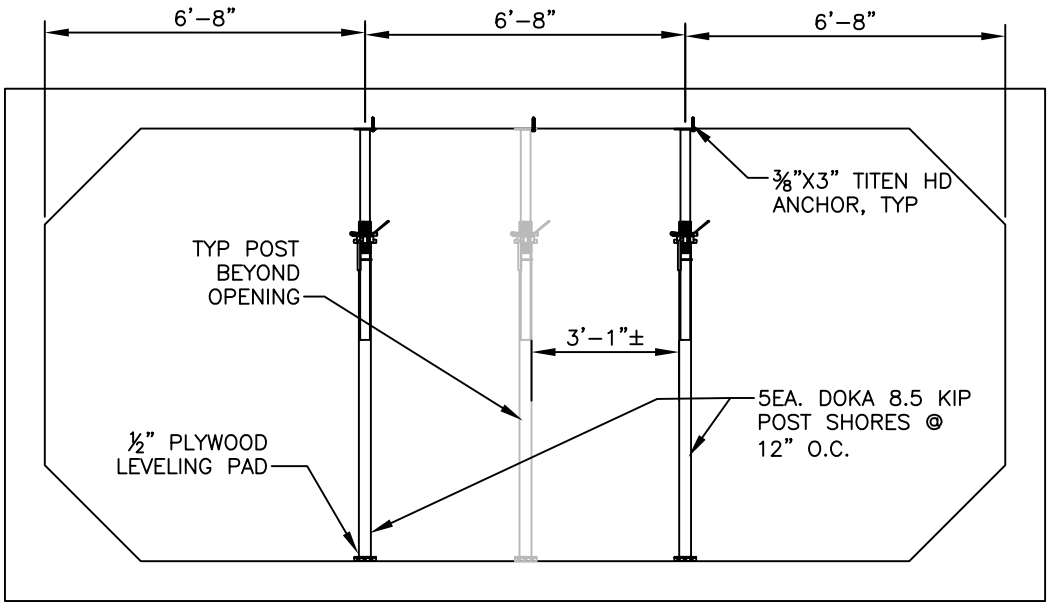
SUPPLEMENTARY CALCULATIONS

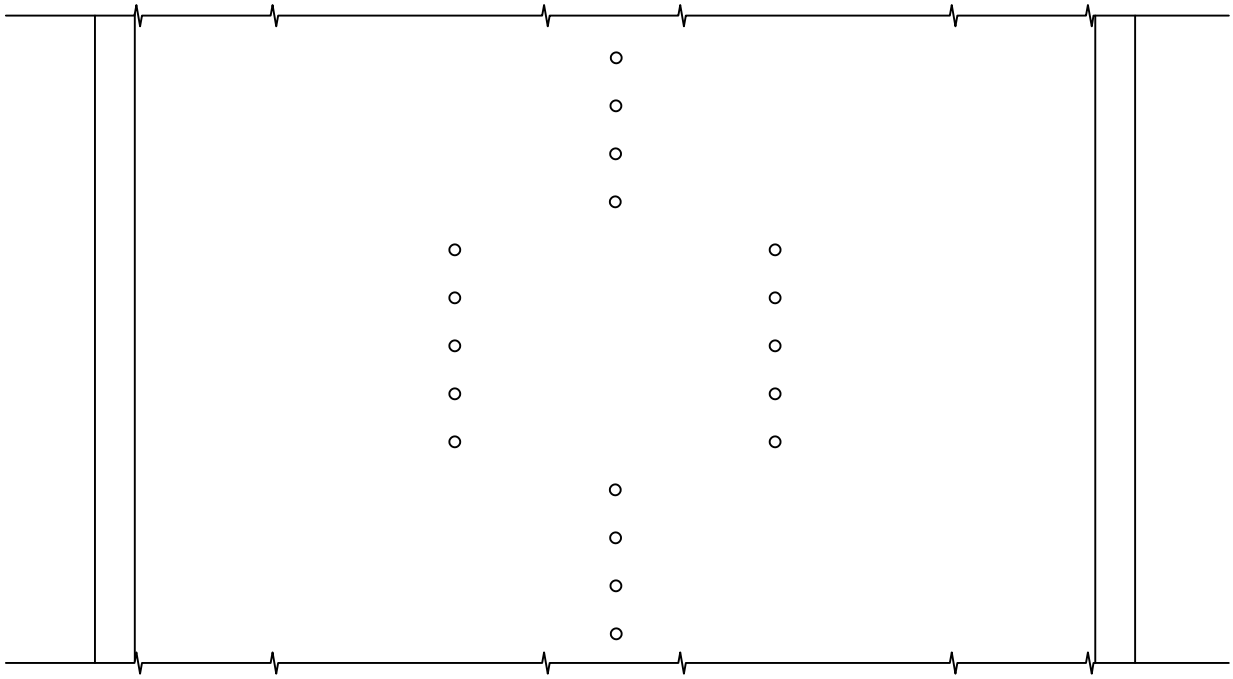
DATE:	7-17-2025
CLIENT:	SKANSKA USA CIVIL
PROJECT:	I -405 BRICKYARD
SUB-PROJECT:	BOX CULVERT TRAFFIC SHIFT
TYPE:	ACCESS POINT TEMP SHORING
REVISION:	0
PREPARED BY:	FORREST MEGARGEL

These supplementary calculations are for a revised shoring configuration to enable workers and emergency personnel to access each side of the box culvert. All external loads have remained unchanged. The bridge rating summary will not change from the original submittal which is based on a single center post configuration. That design is less conservative than this design. Load ratings are considerably higher with the 2 post configuration.

4M ENGINEERING
CIVIL – STRUCTURAL
6675 Purple Poppy Ln., Park City, UT 84098 801-380-0562



BOX CULVERT TEMP SHORING @
INTERIOR ACCESS POINTS
SCALE: 1:4



PLAN LAYOUT
INTERIOR ACCESS POINT
SCALE: 1:4

Results Grid

Fill Depth, ft:	Truck:	Member:	Load Type:
4	HL-93	Interior walls	Unfactored Dead Load (DL)

Location (ft)	Moment (kip-ft/ft)	Shear (k/ft)	Axial Force (k/ft)
0.42	0.04	0.00	-0.97
1.40	0.03	0.00	-0.97
2.38	0.03	0.00	-0.97
3.37	0.03	0.00	-0.97
4.35	0.02	0.00	-0.97
5.33	0.02	0.00	-0.97
6.32	0.01	0.00	-0.97
7.30	0.01	0.00	-0.97
8.28	0.01	0.00	-0.97
9.27	0.00	0.00	-0.97
10.25	0.00	0.00	-0.97

Close

Results Grid

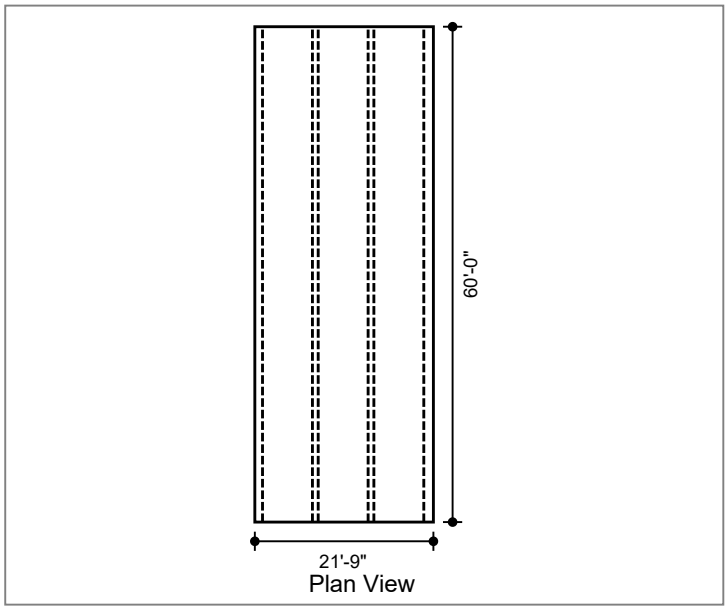
Fill Depth, ft:	Truck:	Member:	Load Type:
4	HL-93	Interior walls	Unfactored Live Load (LL)

Location (ft)	+Moment (kip-ft/ft)	-Moment (kip-ft/ft)	+Shear (k/ft)	-Shear (k/ft)	+Axial Force (k/ft)	-Axial Force (k/ft)
0.42	0.06	0.00	0.00	-0.01	0.39	-5.25
1.40	0.05	0.00	0.00	-0.01	0.39	-5.25
2.38	0.05	0.00	0.00	-0.01	0.39	-5.25
3.37	0.04	0.00	0.00	-0.01	0.39	-5.25
4.35	0.04	0.00	0.00	-0.01	0.39	-5.25
5.33	0.03	0.00	0.00	-0.01	0.39	-5.25
6.32	0.02	0.00	0.00	-0.01	0.39	-5.25
7.30	0.02	0.00	0.00	-0.01	0.39	-5.25
8.28	0.01	0.00	0.00	-0.01	0.39	-5.25
9.27	0.01	0.00	0.00	-0.01	0.39	-5.25
10.25	0.00	0.00	0.00	-0.01	0.39	-5.25

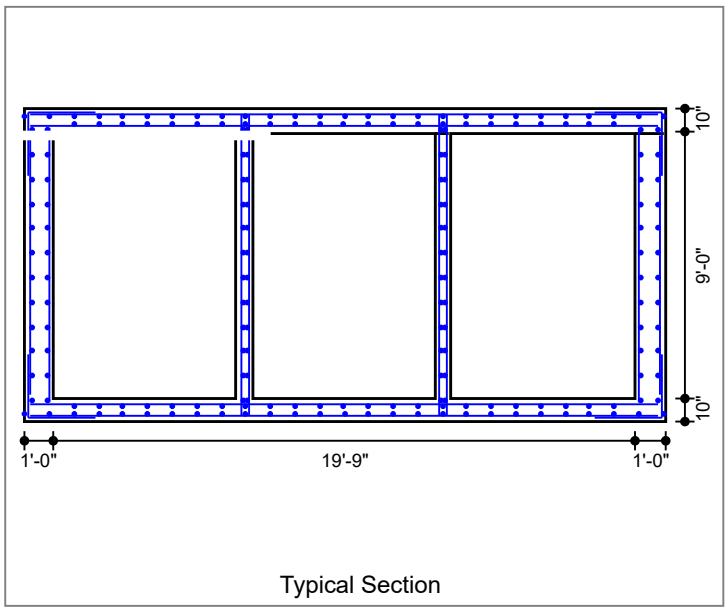
Close

Total vertical load = .97 + 5.25 = 6.22 kips/ft
Post allowable load = 8.5 kips ea.
Spacing = 12" O.C, OK

Spec.: LRFD 9th ed.
Type of Culvert: Precast



Plan View



Typical Section

Physical Dimensions

Clear Span:	6'-3"
Clear Height:	9'-0"
Top Slab:	10"
Bottom Slab:	10"
Ext. Wall:	1'-0"
Int. Wall:	6"
Fill Depth Range	
Maximum:	6.00 ft
Minimum:	4.00 ft
Increment:	0.50 ft
Length:	60'-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:	6.500 ksi
Density:	0.155 kcf
Elasticity, Ec:	5347 ksi
Type:	Normal wt
Steel	
Yield, fy:	60 ksi
Allow Stress:	36 ksi
Elasticity, Es:	29000 ksi
Soil	
Density:	0.127 kcf
Exposure Factor	
User-Defined:	1.00
Reinforcement Covers	
Ext. Cover Top Slab:	2"
Ext. Cover Bottom Slab	2"
Ext. Cover Walls	2"
Int. Cover Walls	2"
Int. Cover Top Slab	2"
Int. Cover Bottom Slab	2"

Controlling Ratings

Inventory Rating: 4.05
Operating Rating: 5.24

Loads

Live Load

Vehicle Names:	HL-93	EV 2	EV 3
	NRL - Legal Lane	NRL	Oveload 1
	Oveload 2	Type 3-3	Type 3
	Type 3S2	WA-105	
Traffic Direction:	Perpendicular		
Eq. Height of Soil:	Calculated		
Max No. of Lanes:	2		

Dead Load

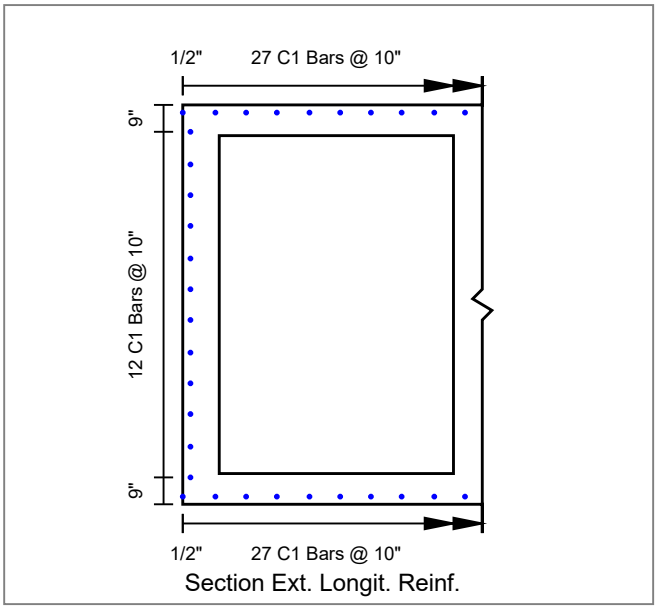
Future Wearing Surface:	0.000 klf	Lateral Soil Loads	
Additional Dead Load:	0.000 klf	Active, Ka:	0.33
Concentrated Loads:	none		

Interior Water Pressure:	no
Exterior Water Pressure:	no

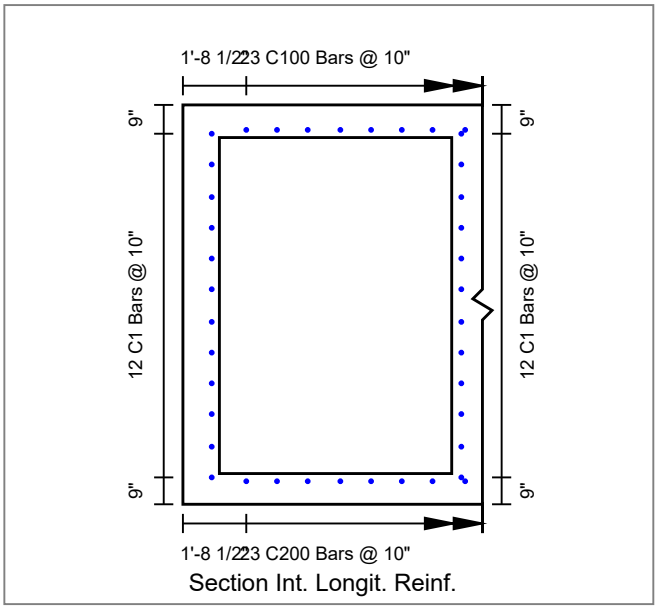
Concrete Summary
Volume of Concrete: 2.343 cy/ft Total Volume of Concrete: 140.556 cy

Reinforcing Steel Bar Schedule (lb)

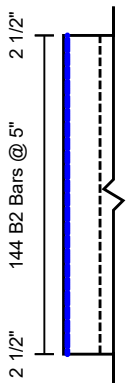
Location	Mark	Qty	Size	Spacing	Type	Length	Hor.Leg	Ver.Leg	Tot.Weight
Top Slab(Int)	A100 (AS2)	144	6	5"	S	21'-4"	--	--	4614.0
Bot Slab(Int)	A200 (AS3)	144	6	5"	S	21'-4"	--	--	4614.0
Top Slab(Ext)	A300 (AS7)	144	6	5"	S	21'-4"	--	--	4614.0
Bot Slab(Ext)	A400 (AS8)	144	6	5"	S	21'-4"	--	--	4614.0
Corner(Top)	A1 (AS1)	288	5	5"	L	4'-6"	2'-4"	2'-2"	1352.0
Corner(Bot)	A2 (AS1)	288	5	5"	L	4'-6"	2'-4"	2'-2"	1352.0
Wall(Int)	B1 (AS4)	288	5	5"	S	9'-4"	--	--	2854.0
Wall(Ext)	B2 (AS1)	288	6	5"	S	8'-10"	--	--	3893.0
Int Wall	B3	240	3	1'-0"	S	10'-3"	--	--	925.0
Longit. Top (Int)	C100 (AS5)	23	3	10"	S	59'-11"	--	--	518.0
Longit. Bot (Int)	C200	23	3	10"	S	59'-11"	--	--	518.0
Longit. Top (Ext)	C1 (AS6)	27	3	10"	S	59'-11"	--	--	608.2
Longit. Bot (Ext)	C1 (AS6)	27	3	10"	S	59'-11"	--	--	608.2
Longit. Wall (Ext)	C1 (AS6)	24	3	10"	S	59'-11"	--	--	540.7
Longit. Wall (Int)	C1 (AS6)	24	3	10"	S	59'-11"	--	--	540.7
Longit. Int	C1 (AS6)	48	3	10"	S	59'-11"	--	--	991.2
									33157



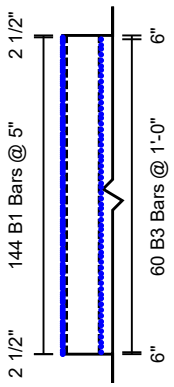
Section Ext. Longit. Reinf.



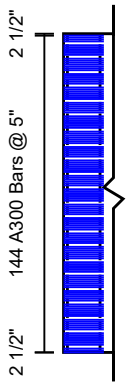
Section Int. Longit. Reinf.



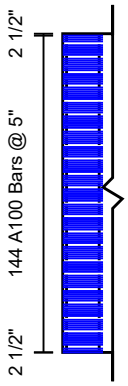
Ext. Wall Reinf.



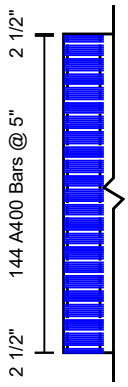
Int. Wall Reinf.



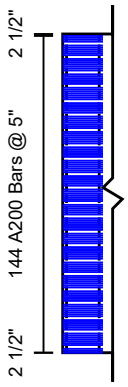
Top Slab Ext. Reinf.



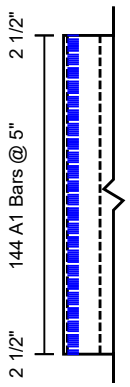
Top Slab Int. Reinf.



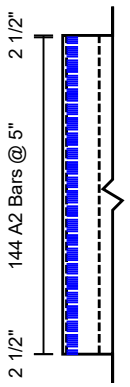
Bottom Slab Ext. Reinf.



Bottom Slab Int. Reinf.



Top Slab Corner Reinf.



Bottom Slab Corner Reinf.

RATINGS SUMMARY
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Truck	Flexure			Shear		
	RF(INV)	RF(OP)	Controlling Point	RF(INV)	RF(OP)	Controlling Point
(AA) HL-93	5.88	7.62	Top Slab, MID	4.05	5.24	Top Slab, RT
(AB) EV 2	8.71	8.71	Top Slab, MID	7.25	7.25	Top Slab, RT
(AC) EV 3	7.94	7.94	Top Slab, MID	6.52	6.52	Top Slab, RT
(AD) NRL - Le	12.50	12.50	Top Slab, MID	9.86	9.86	Top Slab, RT
(AE) NRL	8.18	8.18	Top Slab, MID	6.11	6.11	Top Slab, RT
(AF) Oveload	12.41	12.41	Top Slab, MID	10.67	10.67	Top Slab, RT
(AG) Oveload	12.41	12.41	Top Slab, MID	10.67	10.67	Top Slab, RT
(AH) Type 3-3	9.94	9.94	Top Slab, MID	7.61	7.61	Top Slab, RT
(AI) Type 3	8.18	8.18	Top Slab, MID	6.11	6.11	Top Slab, RT
(AJ) Type 3S2	8.97	8.97	Top Slab, MID	6.79	6.79	Top Slab, RT
(AK) WA-105	8.18	8.18	Top Slab, MID	6.11	6.11	Top Slab, RT

REINFORCEMENT SUMMARY
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M dimension = 1' 7" (method of equivalent capacity)
= 4' 6" (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)	144	6	STR	5.00	1.056	21- 4	4614		
Bot Slab (int)	A200 (AS3)	144	6	STR	5.00	1.056	21- 4	4614		
Top Slab (ext)	A300 (AS7)	144	6	STR	5.00	1.056	21- 4	4614		
Bot Slab (ext)	A400 (AS8)	144	6	STR	5.00	1.056	21- 4	4614		
Corner (Top)	A1 (AS1)	288	5	L-BAR	5.00	0.744	4- 6	1352	2- 4	2- 2
Corner (Bottom)	A2 (AS1)	288	5	L-BAR	5.00	0.744	4- 6	1352	2- 4	2- 2
Ext Wall (int)	B1 (AS4)	288	5	STR	5.00	0.744	9- 4	2854		
Ext Wall (ext)	B2 (AS1)	288	6	STR	5.00	1.056	8-10	3893		
Int Wall	B3	240	3	STR	12.00	0.110	10- 3	925		
Top Slab (int- 1)	C100 (AS5)	23	3	STR	10.00	0.132	59-11	518		
Bot Slab (int- 1)	C200	23	3	STR	10.00	0.132	59-11	518		
Temperature (1)	C1 (AS6)	27	3	STR	10.00	0.132	59-11	608		
Temperature (1)	C1 (AS6)	27	3	STR	10.00	0.132	59-11	608		
Temperature (1)	C1 (AS6)	24	3	STR	10.00	0.132	59-11	541		
Temperature (1)	C1 (AS6)	24	3	STR	10.00	0.132	59-11	541		
Temperature (1)	C1 (AS6)	48	3	STR	10.00	0.132	59-11	991		
							Total	33157		

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)	1.056
Transverse Top Slab - Inside Face (AS2)	1.056
Transverse Bottom Slab - Inside Face (AS3)	1.056
Transverse Side Wall - Inside Face (AS4)	0.744
Distribution Top Slab - Inside Face (AS5)	0.132
Distribution Top Slab - OutSide Face (AS6)	0.132
Transverse Top Slab - Outside Face (AS7)	1.056
Transverse Bottom Slab - Outside Face (AS8)	1.056

Notes: 1.) Final areas of steel provided must be checked in analysis mode

Filename: Bothell DBC pinned revise.etcx

Project: Bothell to Swamp Creek
Task : Box Culvert Evaluation
Client : Skanska
Job No.:

CULVERT PROPERTIES

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

Physical Dimensions

No. of Boxes: 3 Name: BoxCulvert
Clear Span : 6.2500 ft
Clear Height: 9.0000 ft Skew Angle : 0.00 deg
Length : 60.0000 ft Bottom Slab Support: Full Slab
Fill Depth Range: Maximum : 6.00 ft Minimum : 4.00 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: 10.0000 in Bot Slab: 10.0000 in
Ext Wall: 12.0000 in Int Wall: 6.0000 in
Wall Joint: Top
Releases : Moment

Material Properties

Concrete, Bot: Strength: 6.500 ksi Density: 0.155 kcf Elasticity: 5347 ksi
Concrete, Top: Strength: 5.000 ksi Density: 0.155 kcf Elasticity: 4903 ksi
Concrete, All: Type: Normal Weight Density Modification Factor : 1.00
Fr Factor : 0.24 Gamma1 : 1.60 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 : 0.127 kcf Slope Factor: 1.150
Poisson's : 0.5
Fe Factor : 1.000 (User Defined)
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 II
Override MPF: no
Override DLA: no

Vehicle: (AB) EV 2 - Permit Vehicle

Axle No.	Weight(k)	Dist. From Previous(ft)
1	24.00	0.00
2	33.50	15.00

Gage Width: 6.00 ft, Tread Width: 20.00 in, Tread Length: 10.00 in
Include Tandem: no
Lane Load: 0.00 klf, P-Moment: 0.00 k, P-Shear: 0.00 k
Combine: Truck Or Tandem Or Lane
Rating Load Factor: 1.3
Design Load Combinations: Strength II
Override MPF: no
Override DLA: no

Vehicle: (AC) EV 3 - Permit Vehicle

Axle No.	Weight(k)	Dist. From Previous(ft)
1	24.00	0.00
2	31.00	15.00
3	31.00	4.00

Gage Width: 6.00 ft, Tread Width: 20.00 in, Tread Length: 10.00 in
Include Tandem: no
Lane Load: 0.00 klf, P-Moment: 0.00 k, P-Shear: 0.00 k
Combine: Truck Or Tandem Or Lane
Rating Load Factor: 1.3
Design Load Combinations: Strength II
Override MPF: no
Override DLA: no

Vehicle: (AD) NRL - Legal Lane - Legal Vehicle

Axle No.	Weight(k)	Dist. From Previous(ft)

1	10.50	0.00
2	10.50	4.00
3	12.00	16.00
4	9.00	15.00
5	9.00	4.00
6	9.00	15.00

Gage Width: 6.00 ft, Tread Width: 20.00 in, Tread Length: 10.00 in
Include Tandem: no
Lane Load: 0.20 klf, P-Moment: 0.00 k, P-Shear: 0.00 k
Combine: Truck + Lane Or Tandem + Lane
Rating Load Factor: 2
Design Load Combinations: Strength I
Override MPF: no
Override DLA: no

Vehicle: (AE) NRL - Legal Vehicle

Axle No.	Weight(k)	Dist. From Previous(ft)
1	8.00	0.00
2	8.00	4.00
3	8.00	4.00
4	17.00	4.00
5	17.00	4.00
6	8.00	4.00
7	8.00	4.00
8	6.00	6.00

Gage Width: 6.00 ft, Tread Width: 20.00 in, Tread Length: 10.00 in
Include Tandem: no
Lane Load: 0.00 klf, P-Moment: 0.00 k, P-Shear: 0.00 k
Combine: Truck + Lane Or Tandem + Lane
Rating Load Factor: 2
Design Load Combinations: Strength I
Override MPF: no
Override DLA: no

Vehicle: (AF) Oveload 1 - Permit Vehicle

Axle No.	Weight(k)	Dist. From Previous(ft)
1	21.50	0.00
2	21.50	4.00
3	21.50	12.00
4	21.50	4.00
5	10.00	10.00

Gage Width: 6.00 ft, Tread Width: 20.00 in, Tread Length: 10.00 in
Include Tandem: no
Lane Load: 0.00 klf, P-Moment: 0.00 k, P-Shear: 0.00 k
Combine: Truck + Lane Or Tandem + Lane
Rating Load Factor: 1.2
Design Load Combinations: Strength II
Override MPF: no
Override DLA: no

Vehicle: (AG) Oveload 2 - Permit Vehicle

Axle No.	Weight(k)	Dist. From Previous(ft)
1	22.00	0.00
2	21.50	6.00
3	21.50	4.00
4	22.00	14.00
5	21.50	6.00
6	21.50	4.00
7	22.00	16.00
8	21.50	6.00
9	21.50	4.00
10	12.00	10.00

Gage Width: 6.00 ft, Tread Width: 20.00 in, Tread Length: 10.00 in
Include Tandem: no
Lane Load: 0.00 klf, P-Moment: 0.00 k, P-Shear: 0.00 k
Combine: Truck + Lane Or Tandem + Lane
Rating Load Factor: 1.2
Design Load Combinations: Strength II
Override MPF: no
Override DLA: no

Vehicle: (AH) Type 3-3 - Legal Vehicle

Axle No.	Weight(k)	Dist. From Previous(ft)
1	14.00	0.00
2	14.00	4.00
3	16.00	16.00
4	12.00	15.00
5	12.00	4.00
6	12.00	15.00

Gage Width: 6.00 ft, Tread Width: 20.00 in, Tread Length: 10.00 in
Include Tandem: no
Lane Load: 0.00 klf, P-Moment: 0.00 k, P-Shear: 0.00 k
Combine: Truck + Lane Or Tandem + Lane
Rating Load Factor: 2
Design Load Combinations: Strength I
Override MPF: no

Override DLA: no

Vehicle: (AI) Type 3 - Legal Vehicle

Axle No.	Weight(k)	Dist. From Previous(ft)
1	17.00	0.00
2	17.00	4.00
3	16.00	15.00

Gage Width: 6.00 ft, Tread Width: 20.00 in, Tread Length: 10.00 in
Include Tandem: no
Lane Load: 0.00 klf, P-Moment: 0.00 k, P-Shear: 0.00 k
Combine: Truck + Lane Or Tandem + Lane
Rating Load Factor: 2
Design Load Combinations: Strength I
Override MPF: no
Override DLA: no

Vehicle: (AJ) Type 3S2 - Legal Vehicle

Axle No.	Weight(k)	Dist. From Previous(ft)
1	15.50	0.00
2	15.50	4.00
3	15.50	22.00
4	15.50	4.00
5	10.00	11.00

Gage Width: 6.00 ft, Tread Width: 20.00 in, Tread Length: 10.00 in
Include Tandem: no
Lane Load: 0.00 klf, P-Moment: 0.00 k, P-Shear: 0.00 k
Combine: Truck + Lane Or Tandem + Lane
Rating Load Factor: 2
Design Load Combinations: Strength I
Override MPF: no
Override DLA: no

Vehicle: (AK) WA-105 - Legal Vehicle

Axle No.	Weight(k)	Dist. From Previous(ft)
1	14.00	0.00
2	14.00	4.00
3	17.00	10.00
4	17.00	32.00
5	17.00	4.00
6	7.00	4.00
7	7.00	4.00
8	12.50	11.00

Gage Width: 6.00 ft, Tread Width: 20.00 in, Tread Length: 10.00 in
Include Tandem: no
Lane Load: 0.00 klf, P-Moment: 0.00 k, P-Shear: 0.00 k
Combine: Truck + Lane Or Tandem + Lane
Rating Load Factor: 2
Design Load Combinations: Strength I
Override MPF: no
Override DLA: no

Include Lane Load : yes Max. No. of Lanes: 2
Traffic Direction : Lanes Perpendicular 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: Active, Ka: 0.33
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:	1.500	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)
Top Slab Inside	A100 (AS2)	6	5.0000
Bottom Slab Inside	A200 (AS3)	6	5.0000
Top Slab Outside	A300 (AS7)	6	5.0000
Bottom Slab Outside	A400 (AS8)	6	5.0000
Top Corner	A1 (AS1)	5	5.0000
Bottom Corner	A2 (AS1)	5	5.0000
Ext. Wall Inside	B1 (AS4)	5	5.0000
Ext. Wall Outside	B2 (AS1)	6	5.0000
Interior Wall	B3	3	12.0000
Longitudinal	C1 (AS6)	3	10.0000
Top Distribution	C100 (AS5)	3	10.0000
Bottom Distribution	C200	3	10.0000

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: Yes, Max of 2 Axles
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: no, Follow Specification
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
Slenderness : Checked K Factor: 2.00
Analysis Modeling : Use Haunches in the Structural Analysis Model: yes
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: no
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
Shear : Always Check Iterative Beta Method
Environmental : Apply duribility factors: no
Load Combinations : LRFD min/min: no

ANALYSIS RESULTS
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Top Slab Thickness = 10.00 in
Bottom Slab Thickness = 10.00 in
Exterior Wall Thickness = 12.00 in
Interior Wall Thickness = 6.00 in

Modular Ratio (N) = 5.42 Max. Steel Ratio = 0.030
Design Span = 7.00 ft Design Height = 9.83 ft

Volume of Concrete: 2.343 cy/ft Weight of Steel: 553 lb/ft

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

M dimension = 1' 7" (method of equivalent capacity)
= 4' 6" (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)	144	6	STR	5.00	1.056	21- 4	4614		
Bot Slab (int)	A200 (AS3)	144	6	STR	5.00	1.056	21- 4	4614		
Top Slab (ext)	A300 (AS7)	144	6	STR	5.00	1.056	21- 4	4614		
Bot Slab (ext)	A400 (AS8)	144	6	STR	5.00	1.056	21- 4	4614		
Corner (Top)	A1 (AS1)	288	5	L-BAR	5.00	0.744	4- 6	1352	2- 4	2- 2
Corner (Bottom)	A2 (AS1)	288	5	L-BAR	5.00	0.744	4- 6	1352	2- 4	2- 2
Ext Wall (int)	B1 (AS4)	288	5	STR	5.00	0.744	9- 4	2854		
Ext Wall (ext)	B2 (AS1)	288	6	STR	5.00	1.056	8-10	3893		
Int Wall	B3	240	3	STR	12.00	0.110	10- 3	925		
Top Slab (int- 1)	C100 (AS5)	23	3	STR	10.00	0.132	59-11	518		
Bot Slab (int- 1)	C200	23	3	STR	10.00	0.132	59-11	518		
Temperature (1)	C1 (AS6)	27	3	STR	10.00	0.132	59-11	608		
Temperature (1)	C1 (AS6)	27	3	STR	10.00	0.132	59-11	608		
Temperature (1)	C1 (AS6)	24	3	STR	10.00	0.132	59-11	541		
Temperature (1)	C1 (AS6)	24	3	STR	10.00	0.132	59-11	541		
Temperature (1)	C1 (AS6)	48	3	STR	10.00	0.132	59-11	991		
							Total	33157		

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)	1.056
Transverse Top Slab - Inside Face (AS2)	1.056
Transverse Bottom Slab - Inside Face (AS3)	1.056
Transverse Side Wall - Inside Face (AS4)	0.744
Distribution Top Slab - Inside Face (AS5)	0.132
Distribution Top Slab - OutSide Face (AS6)	0.132
Transverse Top Slab - Outside Face (AS7)	1.056
Transverse Bottom Slab - Outside Face (AS8)	1.056

Notes: 1.) Final areas of steel provided must be checked in analysis mode

Summary of Ratings Table:

Truck	ILF	OLF	Flexure Fill	Flexure Member	Flexure Location	Flexure IR	Flexure OR	Shear Fill	Shear Member	Shear Location	Shear IR	Shear OR
(AA)HL-93	1.75	1.35	4.00	2	MID	5.88	7.62	4.00	2	RT	4.05	5.24
(AB)EV 2	1.30	1.30	4.00	2	MID	8.71	8.71	4.00	2	RT	7.25	7.25
(AC)EV 3	1.30	1.30	4.00	2	MID	7.94	7.94	4.00	2	RT	6.52	6.52
(AD)NRL -	2.00	2.00	4.00	2	MID	12.50	12.50	4.00	2	RT	9.86	9.86
(AE)NRL	2.00	2.00	4.00	2	MID	8.18	8.18	4.00	2	RT	6.11	6.11
(AF)Oveloa	1.20	1.20	4.00	2	MID	12.41	12.41	4.00	2	RT	10.67	10.67
(AG)Oveloa	1.20	1.20	4.00	2	MID	12.41	12.41	4.00	2	RT	10.67	10.67
(AH)Type 3	2.00	2.00	4.00	2	MID	9.94	9.94	4.00	2	RT	7.61	7.61
(AI)Type 3	2.00	2.00	4.00	2	MID	8.18	8.18	4.00	2	RT	6.11	6.11
(AJ)Type 3	2.00	2.00	4.00	2	MID	8.97	8.97	4.00	2	RT	6.79	6.79
(AK)WA-105	2.00	2.00	4.00	2	MID	8.18	8.18	4.00	2	RT	6.11	6.11

Critical Sections Summary: Flexure

Member 1: (Exterior Wall), Thickness = 12.00 in

Design	Corr.	Load Ratings	Fill

Loc	Dist. (in)	Moment (k-ft)	A. F. (k)	Mu (k-ft)	ds (in)	Ma (k-ft)	phi	As (in2)	Mcr (k-ft)	IR	OR	Truck	Depth (ft)
BOT	5.00	-7.50	6.24	34.79	9.69	37.53	1.00	0.74	23.50	16.21	21.01	AA	6.00
MID	59.00	7.00	2.28	34.79	9.69	35.79	1.00	0.74	23.50	19.29	25.01	AA	6.00
MID-	59.00	1.35	4.58	48.30	9.63	50.21	1.00	1.06	23.50	NC	NC	AF	6.00
TOP	5.00	0.0#	1.63	34.79	9.69	35.51	1.00	0.74	23.50	NC	NC	AA	4.00

Member 2: (Top Slab), Thickness = 10.00 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	6.00	0.0#	0.97	27.35	7.69	27.70	1.00	0.74	16.32	NC	NC	AA	4.00
MID	33.60	9.22	0.75	37.74	7.63	37.99	1.00	1.06	16.32	5.88	7.62	AA	4.00
MID-	33.60	0.0#	2.66	37.74	7.63	38.63	1.00	1.06	16.32	NC	NC	AA	4.00
RT	3.00	-7.92	0.97	38.07	7.69	38.39	1.00	1.06	16.32	7.21	9.35	AA	4.00

Member 3: (Interior 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	5.00	-0.10	4.32	2.07	3.81	3.10	1.00	0.11	5.87	71.36	92.51	AA	4.00
MID	47.20	0.08	5.51	2.07	3.81	3.38	1.00	0.11	5.87	53.66	69.56	AA	4.00
TOP	5.00	0.00	9.99	2.07	3.81	4.42	1.00	0.11	5.87	NC	NC	AD	4.00

Member 4: (Bottom Slab), Thickness = 10.00 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	6.00	-6.30	5.84	27.35	7.69	29.43	1.00	0.74	16.32	17.68	22.92	AA	6.00
MID	42.00	5.19	2.49	37.74	7.63	38.57	1.00	1.06	16.32	12.64	16.39	AA	4.00
MID-	42.00	0.0#	4.94	37.74	7.63	39.39	1.00	1.06	16.32	NC	NC	AA	4.00
RT	3.00	-6.96	2.71	38.07	7.69	38.98	1.00	1.06	16.32	10.11	13.11	AA	4.00

Member 5: (Top Slab - Interior Cell), Thickness = 10.00 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	-8.44	0.98	37.74	7.63	38.07	1.00	1.06	16.32	6.64	8.61	AA	4.00
MID	42.00	3.82	0.77	37.74	7.63	37.99	1.00	1.06	16.32	12.65	16.40	AA	4.00
RT	3.00	-8.44	0.98	37.74	7.63	38.07	1.00	1.06	16.32	6.64	8.61	AA	4.00

Member 7: (Bottom Slab - Interior Cell), Thickness = 10.00 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	-7.01	2.70	37.74	7.63	38.64	1.00	1.06	16.32	9.93	12.87	AA	4.00
MID	42.00	3.94	5.70	37.74	7.63	39.64	1.00	1.06	16.32	33.09	42.89	AA	6.00
RT	3.00	-7.01	2.70	37.74	7.63	38.64	1.00	1.06	16.32	9.93	12.87	AA	4.00

- 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 = 12.00 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	13.64	4.53	4.1	6.24	9.35	28.79	3.538	31.99 a	0.00	0.00	0.00	28.26	36.64	AA	6.00
MID	59.00	0.73	7.0	2.28	9.35	26.17	3.216	29.08 a	0.00	0.00	0.00	NC	NC	AA	6.00
MID-	59.00	0.42	2.0	4.58	9.15	37.98	4.772	42.20 a	0.00	0.00	0.00	NC	NC	AF	6.00
TOP	13.64	-2.39	1.0	2.28	9.35	32.52	3.997	36.13 a	0.00	0.00	0.00	56.14	72.77	AA	6.00

Member 2: (Top Slab), Thickness = 10.00 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	13.20	4.22	5.6	0.97	7.69	20.12	3.009	22.36 a	0.00	0.00	0.00	6.71	8.69	AA	4.00
MID	42.00	0.51	8.5	1.08	7.63	21.46	3.234	23.84 a	0.00	0.00	0.00	82.13	99.99	AA	6.00
MID-	42.00	2.08	2.2	2.66	7.63	26.45	4.207	29.39 a	0.00	0.00	0.00	16.89	21.89	AA	4.00
RT	10.20	7.46	3.7	0.97	7.69	21.89	3.273	24.33 a	0.00	0.00	0.00	4.05	5.24	AA	4.00

Member 3: (Interior 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	9.32	0.01	0.1	6.04	4.32	19.57	5.207	21.75 a	0.00	0.00	0.00	NC	NC	AA	6.00
MID	59.00	0.01	0.1	8.28	4.32	19.67	5.233	21.86 a	0.00	0.00	0.00	NC	NC	AA	6.00
TOP	9.32	0.01	0.0	15.37	4.32	19.96	5.310	22.18 a	0.00	0.00	0.00	99.99	99.99	AA	4.00

Member 4: (Bottom Slab), Thickness = 10.00 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	13.20	5.23	3.6	5.84	7.69	23.54	3.520	26.16 a	0.00	0.00	0.00	13.02	16.87	AA	6.00
MID	42.00	0.60	4.9	2.98	7.63	25.35	3.822	28.17 a	0.00	0.00	0.00	NC	NC	AA	6.00
MID-	42.00	0.29	0.0	4.94	7.63	26.45	5.038	29.39 a	0.00	0.00	0.00	NC	NC	AA	4.00
RT	10.20	5.85	3.0	2.71	7.69	23.88	3.570	26.53 a	0.00	0.00	0.00	7.06	9.15	AA	4.00

Member 5: (Top Slab - Interior Cell), Thickness = 10.00 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	10.20	5.96	5.3	0.98	7.63	21.88	3.298	24.31 a	0.00	0.00	0.00	5.13	6.65	AA	4.00
MID	42.00	0.72	3.8	0.77	7.63	25.86	3.897	28.73 a	0.00	0.00	0.00	36.14	46.85	AA	4.00
RT	10.20	5.94	5.3	0.98	7.63	21.89	3.299	24.32 a	0.00	0.00	0.00	5.15	6.68	AA	4.00

Member 7: (Bottom Slab - Interior Cell), Thickness = 10.00 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	10.20	3.94	0.2	2.70	7.63	26.12	3.938	29.03 a	0.00	0.00	0.00	12.75	16.53	AA	4.00
MID	42.00	0.00	3.9	5.70	7.63	26.45	4.319	29.39 a	0.00	0.00	0.00	NC	NC	AA	6.00
RT	10.20	5.36	3.5	2.70	7.63	24.07	3.628	26.75 a	0.00	0.00	0.00	8.30	10.76	AA	4.00

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