PREPARED FOR:

NEUVOKAS™

Neuvokas Corp.

13206 #6 Rd, PO BOX 220
Ahmeek, MI 49901
(906) 934-2661

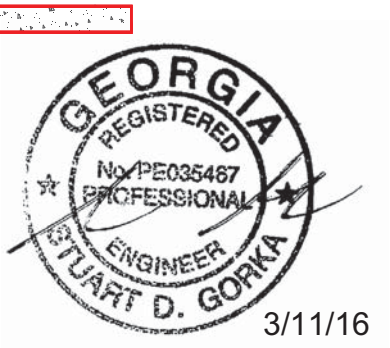
DESIGN COMPUTATIONS FOR:

1,500 Gallon Capacity Tank
(Septic or Grease Trap)
AASHTO H-10 Loading

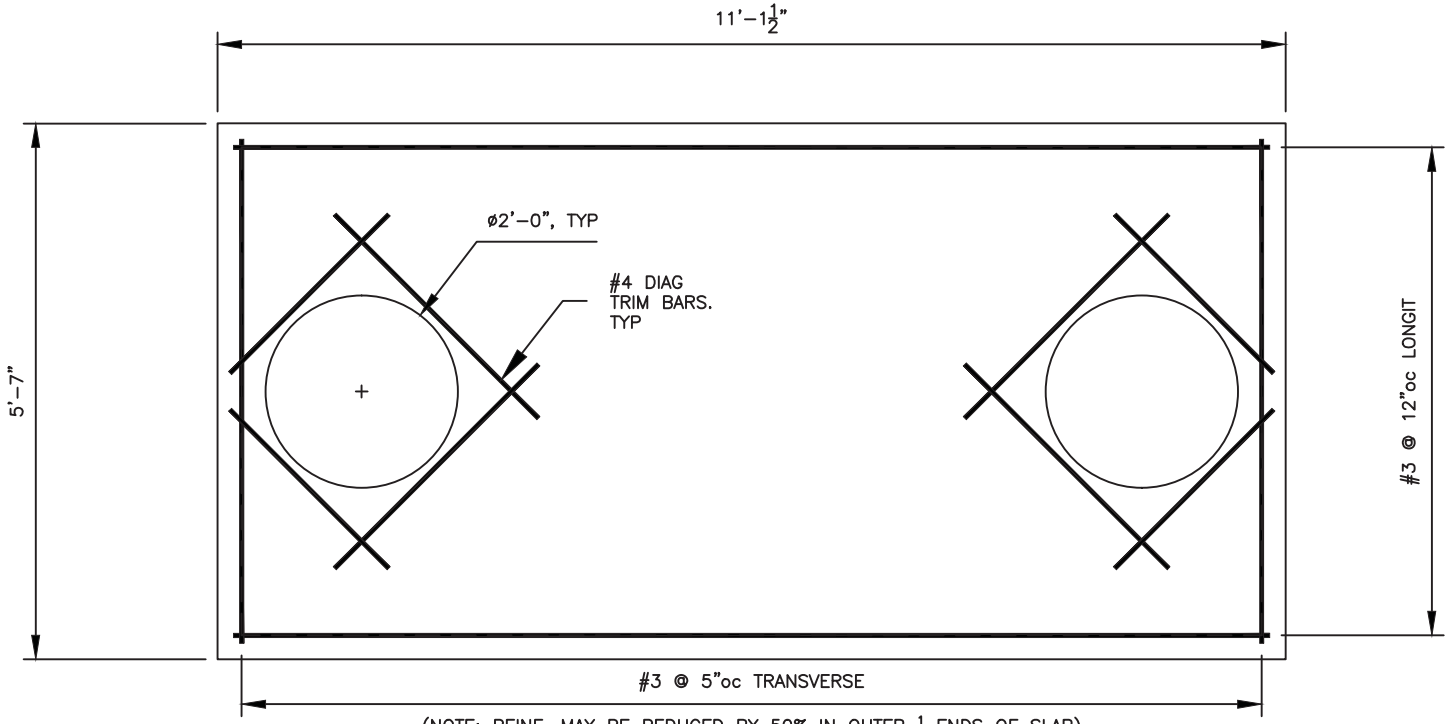
SPECIALTY ENGINEERING SERVICES PROVIDED BY:

Concrete Engineering Solutions, LLC

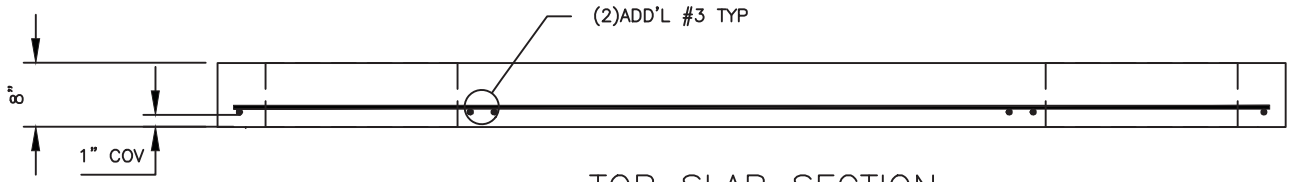
101 Pineview Estates
Mountain Top, PA 18707
Phone: 570-868-2081
Fax: 570-868-2082



3/11/16



TOP SLAB PLAN



TOP SLAB SECTION

NOTES:
1. DESIGN IS IN ACCORDANCE WITH ASTM C1227, ACI440 AND C890
2. LIVE LOAD = A-8 (AASHTO H-10)
3. EARTH FILL FOR DESIGN = 1' - 2'
4. WATER TABLE ASSUMED AT 6' BELOW GRADE
5. CONCRETE STRENGTH = 5000psi
6. REINFORCING: NEUVOKAS GATORBAR PER ASTM 7205 (Fu=145KSI)
7. PIPE OPENINGS, SIZE AND LOCATION, AS REQUIRED
   7.1. PROVIDE ADDITIONAL REINFORCING AROUND OPENINGS >12" EQUAL TO THE BARS INTERRUPTED BY THE OPENING, ½ EACH SIDE AND IN THE SAME PLANE
   7.2. ADD (2)#3 DIAGONAL TRIM BARS AT OPENINGS
8. LIFTING AND HANDLING SHALL CONFORM TO OSHA STANDARDS

PREPARED FOR:

NEUVOKAS™
13206 #6 Rd, PO BOX 220
AHMEEK, MI 49901
(906) 934-2661

REV.NO.	DATE	REVISION

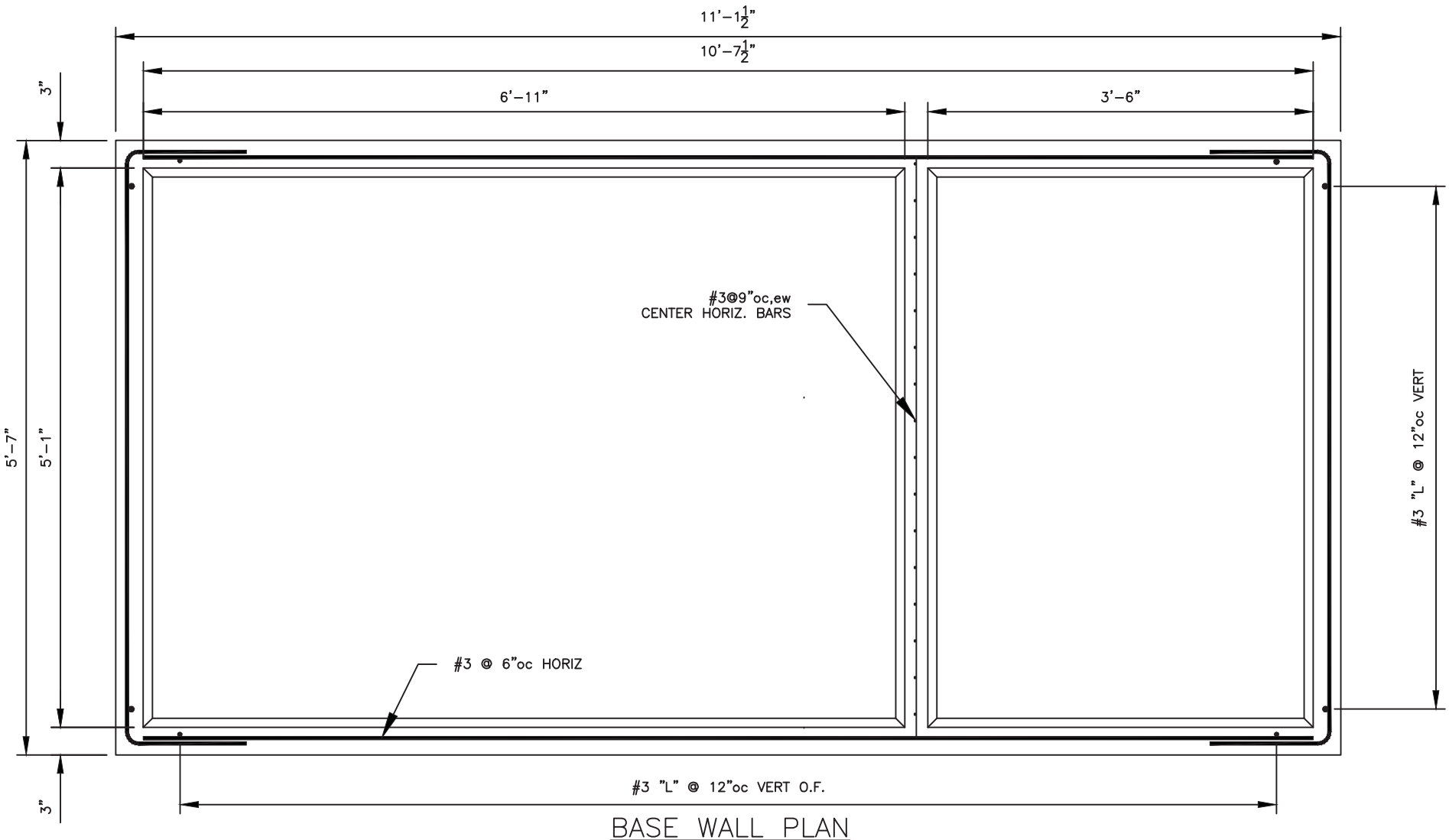
SPECIALTY ENGINEERING PROVIDED BY:

CONCRETE ENGINEERING SOLUTIONS, LLC
101 PINE VIEW ESTATES
MOUNTAIN TOP, PA 18707
PHONE: 570-868-2081
FAX: 570-868-2082

SHEET TITLE: SUMMARY DETAIL

PROJECT: 1,500 GALLON 2-COMPARTMENT SEPTIC TANK

SCALE: N.T.S.	DATE: 3/11/16	DRWN BY: SDG	DWG. I.D. S-01
CES PROJ. NO.: 16-95.01			SHT. NO. 1 OF 3



BASE WALL PLAN

NOTES:
1. DESIGN IS IN ACCORDANCE WITH ASTM C1227, ACI440 AND C890
2. LIVE LOAD = A–8 (AASHTO H–10)
3. EARTH FILL FOR DESIGN = 1' – 2'
4. WATER TABLE ASSUMED AT 6' BELOW GRADE
5. CONCRETE STRENGTH = 5000psi
6. REINFORCING: NEUVOKAS GATORBAR PER ASTM 7205 (Fu=145KSI)
7. PIPE OPENINGS, SIZE AND LOCATION, AS REQUIRED
   7.1. PROVIDE ADDITIONAL REINFORCING AROUND OPENINGS >12" EQUAL TO THE BARS INTERRUPTED BY THE OPENING, ½ EACH SIDE AND IN THE SAME PLANE
   7.2. ADD (2)#3 DIAGONAL TRIM BARS AT OPENINGS
8. LIFTING AND HANDLING SHALL CONFORM TO OSHA STANDARDS

PREPARED FOR:

NEUVOKAS™
13206 #6 Rd, PO BOX 220
AHMEEK, MI 49901
(906) 934-2661

REV.NO.	DATE	REVISION

SPECIALTY ENGINEERING PROVIDED BY:

CONCRETE ENGINEERING SOLUTIONS, LLC
101 PINE VIEW ESTATES
MOUNTAIN TOP, PA 18707
PHONE: 570-868-2081
FAX: 570-868-2082

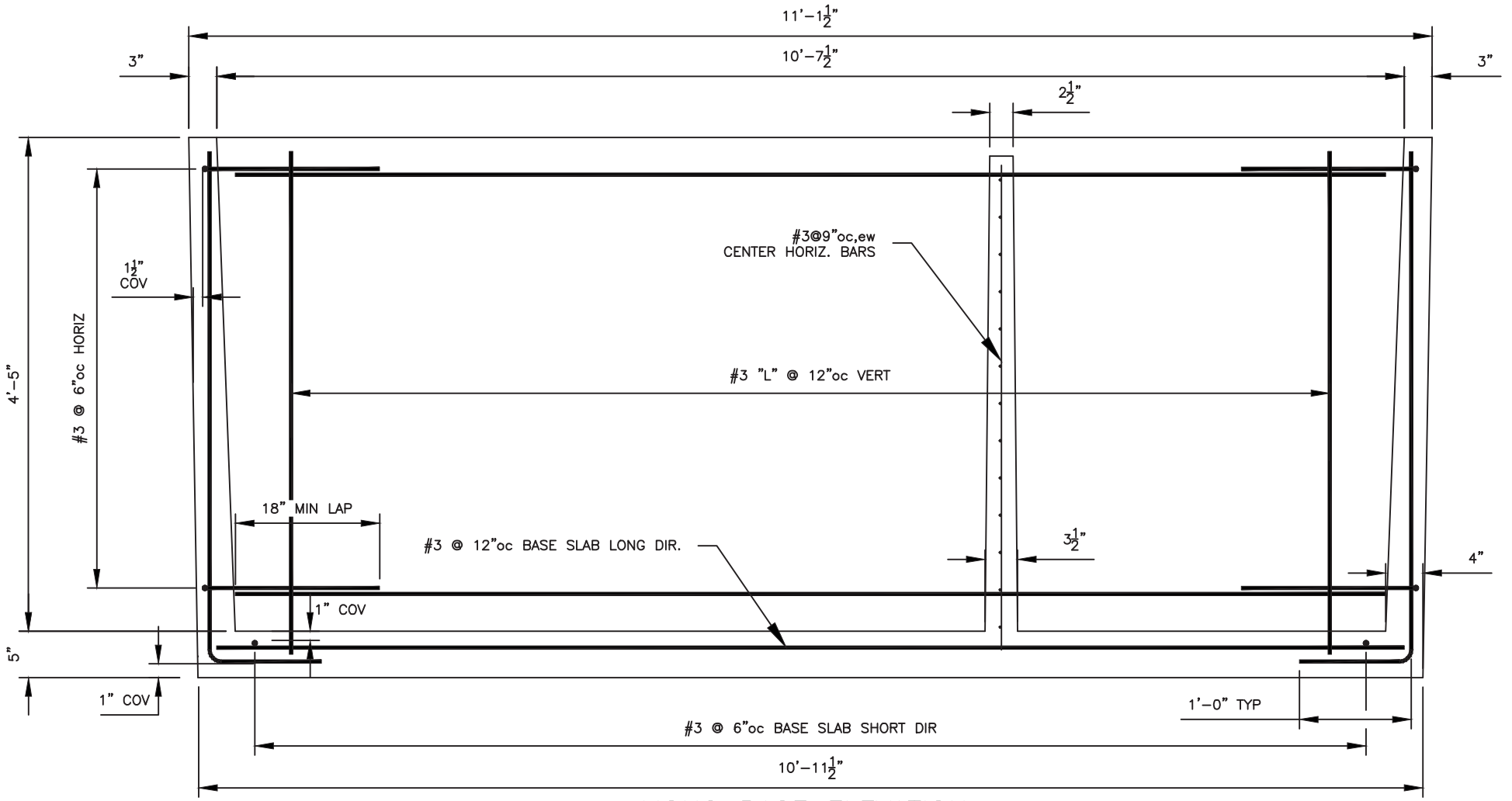
SHEET TITLE: SUMMARY DETAIL

PROJECT: 1,500 GALLON 2–COMPARTMENT SEPTIC TANK

SCALE: N.T.S.	DATE: 3/11/16	DRWN BY: SDG	DWG. I.D. S–02
CES PROJ. NO.: 16–95.01			SHT. NO. 2 OF 3

CES Project No. 16-95.01

Design By: SDG 3/11/16



MONO BASE ELEVATION

NOTES:
1. DESIGN IS IN ACCORDANCE WITH ASTM C1227, ACI440 AND C890
2. LIVE LOAD = A-8 (AASHTO H-10)
3. EARTH FILL FOR DESIGN = 1' - 2'
4. WATER TABLE ASSUMED AT 6' BELOW GRADE
5. CONCRETE STRENGTH = 5000psi
6. REINFORCING: NEUVOKAS GATORBAR PER ASTM 7205 (Fu=145KSI)
7. PIPE OPENINGS, SIZE AND LOCATION, AS REQUIRED
   7.1. PROVIDE ADDITIONAL REINFORCING AROUND OPENINGS >12" EQUAL TO THE BARS INTERRUPTED BY THE OPENING, ½ EACH SIDE AND IN THE SAME PLANE
   7.2. ADD (2)#3 DIAGONAL TRIM BARS AT OPENINGS
8. LIFTING AND HANDLING SHALL CONFORM TO OSHA STANDARDS

PREPARED FOR:

NEUVOKAS™
13206 #6 Rd, PO BOX 220
AHMEEK, MI 49901
(906) 934-2661

REV.NO.	DATE	REVISION

SPECIALTY ENGINEERING PROVIDED BY:

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101 PINE VIEW ESTATES
MOUNTAIN TOP, PA 18707
PHONE: 570-868-2081
FAX: 570-868-2082

SHEET TITLE: SUMMARY DETAIL

PROJECT: 1,500 GALLON 2-COMPARTMENT SEPTIC TANK

SCALE: N.T.S.	DATE: 3/11/16	DRWN BY: SDG	DWG. I.D. S-03
CES PROJ. NO.: 16-95.01			SHT. NO. 3 OF 3

CONCRETE ENGINEERING SOLUTIONS, LLC
101 PINEVIEW ESTATES
MOUNTAIN TOP, PA 18707
PHONE:570-868-2081
FAX: 570-868-2082

Client: Neuvokas	Description: Tank Design 2-Compartment
Project Name: Standard Tank Design	1,500 Gallon Tank
Calculated By SDG Date: 3/11/2016	Basalt Fiber Reinforced Polymer

Maximum Inside Dimensions

Length	10.46	ft
Width	4.58	ft
Height	4.42	ft

Member Thickness

Top Slab	8.00	in
Walls	3.50	in
Base Slab	5.00	in

Base Extension 0.00 in LS 0.00 in SS

	AASHTO	ASTM
Design Live Load	HS 10	A- 8

Wheel Load	8	kips
Impact	1.3	
Earth Fill For Design	2.00	ft Max
	1.00	ft Min
Top of Cover Above Grade	0.00	ft
Lateral Earth Pressure, ka =	0.333	
EP(h)	40	pcf (dry)
	82	pcf (saturated)
Surcharge	40	psf
Max Depth	8.00	ft
Water Table Elevation	6.00	ft below grade

Materials

Concrete Strength, f'c =	5000	psi
Tensile Strength, fu* =	145000	psi
Allowable ffu = 0.7 fu* =	101500	psi
Concrete Density, Wc	150	pcf
Soil Density, Ws	120	pcf
Water Density, Ww	62.4	pcf

Load Factors

Live Load	1.6
Dead Load	1.2
Earth Load	1.6

Structure Watertight?	Yes
Minimum Floatation SF	1.1

Structure Components:		
Mono Top Riser Height	0.00	ft
Riser #1 Height	4.42	ft
Riser #2 Height	0.00	ft
Riser #3 Height	0.00	ft
Mono Base Riser Height	0.00	ft
Total Inside Height	4.42	ft

Depth		Lateral Earth Pressure				Concrete	
t-o-w	b-o-w	Pe top	Pe bot	Surch	Avg	Vol	Wgt
(ft)	(ft)	(psf)	(psf)	(psf)	(psf)	(cy)	(Tons)
2.67	2.67	107	107	40	147	1.41	2.85
2.67	7.08	107	328	40	257	1.49	3.02
7.08	7.08	328	328	40	368	0.00	0.00
7.08	7.08	328	328	40	368	0.00	0.00
7.08	7.08	328	328	40	368	0.88	1.78
					Totals	3.78	7.65

** Openings not subtracted

CONCRETE ENGINEERING SOLUTIONS, LLC
101 PINEVIEW ESTATES
MOUNTAIN TOP, PA 18707
PHONE:570-868-2081
FAX: 570-868-2082

Client: Neuvokas	Description: Tank Design 2-Compartment
Project Name: Standard Tank Design	1,500 Gallon Tank
Calculated By SDG Date: 3/11/16	References

(1) AASHTO Standard Speciciations for Highway Bridges, 17th Edition

(2) ASTM C857 "Minimum Structural Design Loading for Underground Precast Concrete Utility Structures

(3) ACI318 & ACI440

(4) "Moments and Reactions for Rectangular Plates" Engineering Monograph 27, U.S. Bureau of Reclamation

http://www.usbr.gov/pmts/hydraulics_lab/pubs/EM/EM27.pdf

Ec = 57000*√f'c = 4031 ksi (1) 8.7.1

Ef = 6000 ksi (1) 8.7.2

n = Ef / Ec = 1.49 (1) 8.15.3.4

Mcr = fr * b * T^2/6 T = Member Thickness (1) 8.13.3

Member Design Width, b = 12 in

Moment Equations

Plate Fixed on 3 sides, M = Wavg x H^2 x Cm

Cm/Cv = Moment or Shear Coefficient from Ref (4)

interpolated to the nearest 0.1

L/H Ratio of 4 or greater considered a cantilever

Simple Span Moments = W x S^2/8 (Uniform)

,= P * S/4 (Concentrated)

Fixed End Moments = W * L^2/12

Shear Equations

Plate Fixed on 3 sides, V = Wavg x H x Cv

Shear Capacity, Vn = 2 √f'c *bd (1) 8.16.6.1

Minimum Flexural Reinforcing

Mu > 1.2Mcr =; Waived if As Prov > 4/3As Req

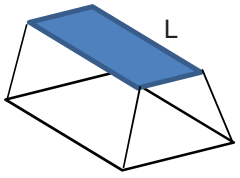
(1) 8.17.7.1.1 and 8.17.7.1.2

For Concentrated Wheel Load

Distribution Width, e = 4 + .06S (1) 3.24.3

For Wheel Load Distributed Through Fill (2) and (3)

W DLA = (W+1.75Fill)*(L+1.75Fill)



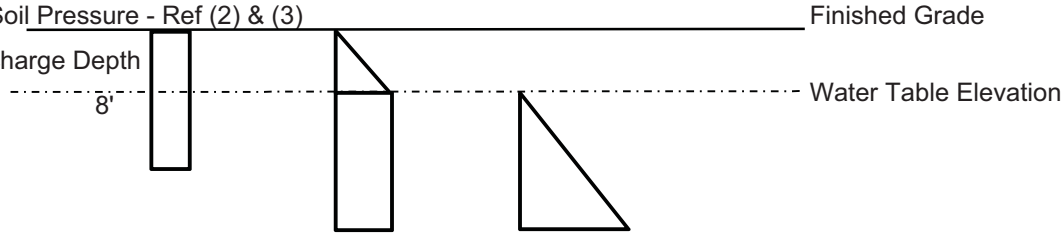
p = As/bd

k = √(rn2 * 2rn) - rn

j = 1 - k/3

Fs = M/(As * j * d)

Lateral Soil Pressure - Ref (2) & (3)



LL Surcharge	EP(h)Dry	EP(h) Saturated
0.5% Wheel Load	Ka * Ws * H	(Ww + Ka * (Ws - Ww)) * H

CONCRETE ENGINEERING SOLUTIONS, LLC
101 PINEVIEW ESTATES
MOUNTAIN TOP, PA 18707
PHONE:570-868-2081
FAX: 570-868-2082

Client: Neuvokas	Description: Tank Design 2-Compartment
Project Name: Standard Tank Design	1,500 Gallon Tank
Calculated By SDG Date: 3/11/16	Top Slab Design - Concentrated Load, Min Fill

Span 4.87 ft Short Dir 10.75 ft Long Dir

Design As a 1-Way Slab? Yes Distribution Steel (As/S^.5) Used for Long Direction

Single Layer of Reinforcing? Yes

Dead Load			Live Load		
Earth Fill	120	psf	Wheel Load, Pw =	8	kips/ft
Concrete	100	psf	Impact, I	1.3	
Other		psf	Distribution Width, e	4.292	ft
Total	220	psf	Strip Load =P+I/e	2.42	kips/ft

Bar Cover 1.00 in

Moments	Short Dir. B.F.		Long Dir. B.F.	
Portion Of Unform Load	1.000		0.000	
Dead Load Moment, Mdl	0.65	kip-ft	0.00	kip-ft
Portion Of Concentrated Loa	1.000	Short	0.000	Long
Live Load Moment, Mll	2.953	kip-ft	0.00	kip-ft
Mu =	5.508	kip-ft	0.00	kip-ft

Vu = 4.52 kips (DL*Span/2*DLF + P*LLF)

*See Following Sheet For Capacity & FRP Reinforcing.

Client: Neuvokas
Project Name: Standard Tank Design
Structure Name: 1,500 Gallon Tank

Member: Top Slab

Member Thickness:	8.0"
Bar Cover:	1.0"
Concrete Strength, f'c:	5000 PSI
Beam Width, b:	12.0"
Factored Moment, Mu:	**5.93 K-FT**
Service Moment, Ms:	**3.60 K-FT**

Calculate Flexural Capacity:

Bar Size/Spacing: #3 @ 5.0" o.c. (Af Provided =0.27 sq.in./ft.)

Mn=Af*ffu(d-β1*cb/2): 14.35 k-ft

cb=εcu/(εcu+εfu)*d= 1.03"

Where, β1=[0.85-.05*(f'c-4ksi)]= 0.80

d=Thickness-Cover-1/2Bar Dia.= 6.81"

Check Min A_s Provided:

Minimum Reinforcement, pf,ts =0.0015≤ 0.0051 ≤0.0036

Note, If Middle Value > 0.0036, Use 0.0036.

Af,min= 0.35 Sq.in./ft. **NG** **, 4/3 As Provided, OK**

Check Max Bar Spacing & Serviceability:

ρf = Af / b * d = 0.00324 Ef= 6000 psi

ρfb=β1*f'c/ftu*Ef∗εcu/(Ef*εcu+ffu) = 0.00490 ffu= 101500 psi

Check if Tension-Controlled: ρf/ρfb = 0.661 (If Greater than 1.0, compression-controlled)

ϕMn= **7.89 k-ft** ϕ= 0.55 (0.55 if tension controlled,

Mu= **5.93 k-ft** **OK** 0.65 if compression)

smax=1.15E_fw/(f_{fs}*k_b)-2.5c_c ≤ 0.92*Ef*w/(f_{fs}*k_b) kb=0.7

8.21 < **8.94** w=0.028

(Say OK) **OK** nf=1.49

k=SQRT(2pf*nf+(pf*nf)^2)- 0.094

Icr=bd^3/3*k^3+nf*Af*d^2(' 16.083

cc= 1.188

ffs=Ms*nf*d(1-k)/Icf= 24.69 ksi

Check Creep Rupture: ffs Max = 0.5ffu= 50.75 ksi **OK**

(Under Sustained Loading)

Check Shear:

Factored Shear, Vu:	**4.52 KIPS**		
Shear Capacity, ϕVn:	**5.43 KIPS**	**OK**	(Based Upon Unreinforced Concrete)

(φVn=0.6(4/3*√f'c*b*h/1000)

CONCRETE ENGINEERING SOLUTIONS, LLC
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MOUNTAIN TOP, PA 18707
PHONE:570-868-2081
FAX: 570-868-2082

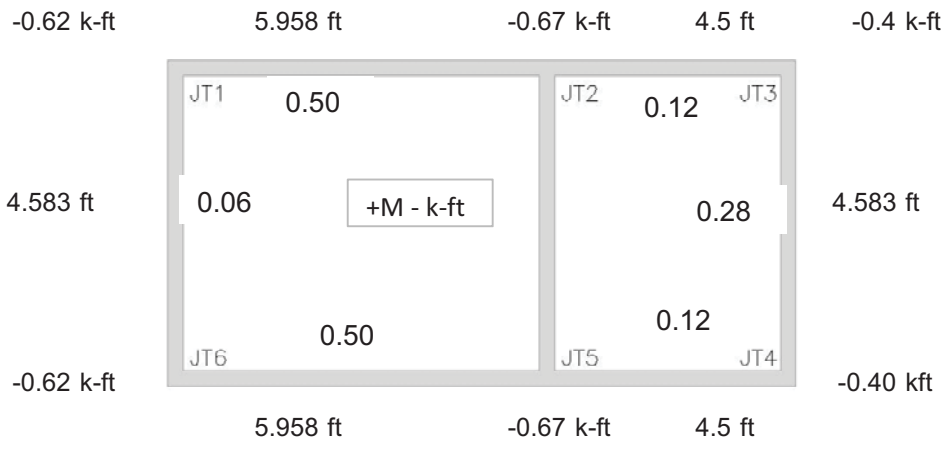
Client: Neuvokas
Project Name: Standard Tank Design
Calculated By SDG Date: 3/11/16

Description: Tank Design 2-Compartment
1,500 Gallon Tank

Uniform Load, w = 0.257 ksf

Carry over 0.5

Joint	1	2	2	3	3	4	4	5	5	6	6	1
Thickness	3.50	in	3.50	in	3.50	in	3.50	in	3.50	in	3.50	in
Seg Length	5.96	ft	4.50	ft	4.58	ft	4.5	ft	5.958	ft	4.583	ft
Dist Factor	0.435	0.430	0.570	0.505	0.495	0.495	0.505	0.570	0.430	0.435	0.565	0.565
FEM	0.76	-0.76	0.43	-0.43	0.45	-0.45	0.43	-0.43	0.76	-0.76	0.45	-0.45
1st Dist	-0.14	0.14	0.19	-0.01	-0.01	0.01	0.01	-0.19	-0.14	0.14	0.18	-0.18
Carryover	0.07	-0.07	0.00	0.09	0.00	0.00	-0.09	0.00	0.07	-0.07	-0.09	0.09
2nd Dist	-0.07	0.03	0.04	-0.05	-0.05	0.05	0.05	-0.04	-0.03	0.07	0.09	-0.09
Carryover	0.02	-0.03	-0.02	0.02	0.02	-0.02	-0.02	0.02	0.03	-0.02	-0.04	0.04
3rd Dist	-0.03	0.03	0.03	-0.02	-0.02	0.02	0.02	-0.03	-0.03	0.03	0.03	-0.03
Carryover	0.01	-0.01	-0.01	0.02	0.01	-0.01	-0.02	0.01	0.01	-0.01	-0.02	0.02
4th Dist	-0.01	0.01	0.01	-0.01	-0.01	0.01	0.01	-0.01	-0.01	0.01	0.02	-0.02
Carryover	0.01	-0.01	-0.01	0.01	0.01	-0.01	-0.01	0.01	0.01	-0.01	-0.01	0.01
5th Dist	-0.01	0.01	0.01	-0.01	-0.01	0.01	0.01	-0.01	-0.01	0.01	0.01	-0.01
Carryover	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6th Dist	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sum	0.62	-0.67	0.67	-0.40	0.40	-0.40	0.40	-0.67	0.67	-0.62	0.62	-0.62
+M =	0.50	k-ft	0.12	k-ft	0.28	k-ft	0.12	k-ft	0.50	k-ft	0.06	k-ft
Reactions (k)	0.76	0.78	0.64	0.52	0.59	0.59	0.52	0.64	0.78	0.76	0.59	0.59



*See Following Sheet For Capacity & FRP Reinforcing.

Client: Neuvokas
Project Name: Standard Tank Design
Structure Name: 1,500 Gallon Tank

Member: Walls (Outside Face)

Member Thickness:	3.5"
Bar Cover:	1.5"
Concrete Strength, f'c:	5000 PSI
Beam Width, b:	12.0"
Factored Moment, Mu:	**1.07 K-FT**
Service Moment, Ms:	**0.67 K-FT**

Calculate Flexural Capacity:

Bar Size/Spacing: #3 @ 6.0" o.c. (Af Provided =0.22 sq.in./ft.)

Mn=Af*ffu(d-β1*cb/2): **1.71 k-ft**

cb=εcu/(εcu+εfu)*d= 0.44"

Where, β1=[0.85-.05*(f'c-4ksi)]= 0.80

d=Thickness-Cover-1/2Bar Dia.= 1.81"

Check Min A_s Provided:

Minimum Reinforcement, pf,ts =0.0015≤ 0.0092 ≤0.0036

Note, If Middle Value > 0.0036, Use 0.0036.

Af,min= 0.15 Sq.in./ft. **OK**

Check Max Bar Spacing & Serviceability:

ρf = Af / b * d = 0.01016 Ef= 6000 psi

ρfb=β1*f'c/ftu*Ef*εcu/(Ef*εcu+ffu) = 0.00875 ffu(Bends)= 56840 psi

(0.56*ffu)

Check if Tension-Controlled: ρf/ρfb = 1.160 (If Greater than 1.0, compression-controlled)

ϕMn= **1.11 k-ft** ϕ= 0.65 (0.55 if tension controlled,

Mu= **1.07 k-ft** **OK** 0.65 if compression)

smax=1.15E_fw/(f_{fs}*k_b)-2.5c_c ≤ 0.92*Ef*w/(f_{fs}*k_b) kb=0.7

8.79 < **10.41** w=0.028

OK nf=1.49

k=SQRT(2pf*nf+(pf*nf)^2)- 0.159

Icr=bd^3/3*k^3+nf*Af*d^2(´ 0.860

cc= 1.688

ffs=Ms*nf*d(1-k)/Icf= 21.21 ksi

Check Creep Rupture: ffs Max = 0.5ffu= 28.42 ksi **OK**

(Under Sustained Loading)

Check Shear:

Factored Shear, Vu:	**1.23 KIPS**	=0.257KSF*5.96'/2*1.6LF	
Shear Capacity, ϕVn:	**2.38 KIPS**	**OK**	(Based Upon Unreinforced Concrete)

(φVn=0.6(4/3*√f'c*b*h/1000)

Client: Neuvokas
Project Name: Standard Tank Design
Structure Name: 1,500 Gallon Tank

Member: Walls (Inside Face)

Member Thickness:	3.5"
Bar Cover:	1.6"
Concrete Strength, f'c:	5000 PSI
Beam Width, b:	12.0"
Factored Moment, Mu:	**0.80 K-FT**
Service Moment, Ms:	**0.50 K-FT**

Calculate Flexural Capacity:

Bar Size/Spacing: #3 @ 6.0" o.c. (Af Provided =0.22 sq.in./ft.)

Mn=Af*ffu(d-β1*cb/2): **3.01 k-ft**

cb=εcu/(εcu+εfu)*d= 0.26"

Where, β1=[0.85-.05*(f'c-4ksi)]= 0.80

d=Thickness-Cover-1/2Bar Dia.= 1.71"

Check Min A_s Provided:

Minimum Reinforcement, pf,ts =0.0015≤ 0.0051 ≤0.0036

Note, If Middle Value > 0.0036, Use 0.0036.

Af,min= 0.15 Sq.in./ft. **OK**

Check Max Bar Spacing & Serviceability:

ρf = Af / b * d = 0.01075 Ef= 6000 psi

ρfb=β1*f'c/ftu*Ef∗εcu/(Ef*εcu+ffu) = 0.00490 ffu= 101500 psi

Check if Tension-Controlled: ρf/ρfb = 2.193 (If Greater than 1.0, compression-controlled)

ϕMn= **1.95 k-ft** ϕ= 0.65 (0.55 if tension controlled,

Mu= **0.80 k-ft** **OK** 0.65 if compression)

smax=1.15E_fw/(f_{fs}*k_b)-2.5c_c ≤ 0.92*Ef*w/(f_{fs}*k_b) kb=0.7

11.98 < **13.16** w=0.028

OK nf=1.49

k=SQRT(2pf*nf+(pf*nf)^2)- 0.164

Icr=bd^3/3*k^3+nf*Af*d^2(- 0.763

cc= 1.788

ffs=Ms*nf*d(1-k)/Icf= 16.78 ksi

Check Creep Rupture: ffs Max = 0.5ffu= 50.75 ksi **OK**

(Under Sustained Loading)

CONCRETE ENGINEERING SOLUTIONS, LLC
101 PINEVIEW ESTATES
MOUNTAIN TOP, PA 18707
PHONE:570-868-2081
FAX: 570-868-2082

Client: Neuvokas	Description: Tank Design 2-Compartment
Project Name: Standard Tank Design	1,500 Gallon Tank
Calculated By SDG Date: 3/11/16	Base Slab Design

Span	4.87 ft Short Dir	10.75 ft Long Dir			
Design As1-Way?	No				
Single Layer of Reinforcing?	Yes				
Dead Load			Live Load		
Earth Fill	240 psf		Wheel Load, Pw	8 kips/ft	
Concrete	206 psf		Number Of Wheels	2	
Other	psf		Bearing Area	57 SF	
Total	446 psf	<-Controls	Unform Live Load	280 ksf	
Hydrostatic	94 psf				
Bar Cover	1.00 in			1.5	

Moments	Short Dir. T.F.	Long Dir. T.F.
Portion of Unform Load	0.964	0.036
Dead Load Moment, Mdl	1.28 kip-ft	0.23 kip-ft
Live Load Moment, Mll	0.804 kip-ft	0.14 kip-ft
Mu =	2.82 kip-ft	0.51 kip-ft
Factored Shear, Vu	2.31 kips	0.19 kips

*See Following Sheet For Capacity & FRP Reinforcing.

Client: Neuvokas
Project Name: Standard Tank Design
Structure Name: 1,500 Gallon Tank

Member: Base Slab

Member Thickness:	5.0"
Bar Cover:	1.0"
Concrete Strength, f'c:	5000 PSI
Beam Width, b:	12.0"
Factored Moment, Mu:	**2.82 K-FT**
Service Moment, Ms:	**2.08 K-FT**

Calculate Flexural Capacity:

Bar Size/Spacing: #3 @ 6.0" o.c. (Af Provided =0.22 sq.in./ft.)

Mn=Af*ffu(d-β1*cb/2): 6.69 k-ft

cb=εcu/(εcu+εfu)*d= 0.57"

Where, β1=[0.85-.05*(f'c-4ksi)]= 0.80

d=Thickness-Cover-1/2Bar Dia.= 3.81"

Check Min A_s Provided:

Minimum Reinforcement, pf,ts =0.0015≤ 0.0051 ≤0.0036

Note, If Middle Value > 0.0036, Use 0.0036.

Af,min= 0.22 Sq.in./ft. **OK**

Check Max Bar Spacing & Serviceability:

ρf = Af / b * d = 0.00483 Ef= 6000 psi

ρfb=β1*f'c/ftu*Ef*εcu/(Ef*εcu+ffu) = 0.00490 ffu= 101500 psi

Check if Tension-Controlled: ρf/ρfb = 0.985 (If Greater than 1.0, compression-controlled)

ϕMn= **3.68 k-ft** ϕ= 0.55 (0.55 if tension controlled,

Mu= **2.82 k-ft** **OK** 0.65 if compression)

$s_{max}=1.15E_f w/(f_{fs}*k_b)-2.5c_c \le 0.92*Ef*w/(f_{fs}*k_b)$ kb=0.7

5.99 < **7.17** w=0.028

(Say OK) **NG** nf=1.49

k=SQRT(2pf*nf+(pf*nf)^2)- 0.113

Icr=bd^3/3*k^3+nf*Af*d^2(´ 4.080

cc= 1.188

ffs=Ms*nf*d(1-k)/Icf= 30.80 ksi

Check Creep Rupture: ffs Max = 0.5ffu= 50.75 ksi **OK**

(Under Sustained Loading)

Check Shear:

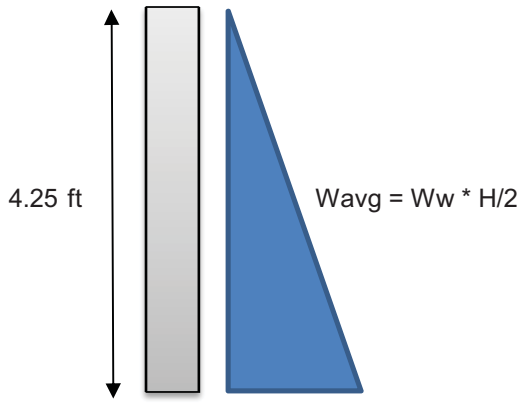
Factored Shear, Vu:	**2.31 KIPS**		
Shear Capacity, ϕVn:	**3.39 KIPS**	**OK**	(Based Upon Unreinforced Concrete)

(φVn=0.6(4/3*√f'c*b*h/1000)

CONCRETE ENGINEERING SOLUTIONS, LLC
101 PINEVIEW ESTATES
MOUNTAIN TOP, PA 18707
PHONE:570-868-2081
FAX: 570-868-2082

Client: Neuvokas	Description: Tank Design 2-Compartment
Project Name: Standard Tank Design	1,500 Gallon Tank
Calculated By SDG Date: 3/11/16	Compartment Wall Design

Height, H	4.25	ft
Width	4.58	ft
Thickness	3	in
Avg Hyd. Pressure, Wavg	133	psf
Horiz Moment, M	0.35	kip-ft
Mu = M * 1.6	0.56	kip-ft
Horiz Shear, V	0.30	kips
Vu = V * 1.6	0.49	kips



*See Following Sheet for Capacities and Reinforcing.

Client: Neuvokas
Project Name: Standard Tank Design
Structure Name: 1,500 Gallon Tank

Member: Baffle

Member Thickness:	3.0"
Bar Cover:	1.4"
Concrete Strength, f'c:	5000 PSI
Beam Width, b:	12.0"
Factored Moment, Mu:	**0.56 K-FT**
Service Moment, Ms:	**0.35 K-FT**

Calculate Flexural Capacity:

Bar Size/Spacing: #3 @ 9.0" o.c. (Af Provided =0.15 sq.in./ft.)

Mn=Af*ffu(d-β1*cb/2): 1.68 k-ft

cb=εcu/(εcu+εfu)*d= 0.22"

Where, β1=[0.85-.05*(f'c-4ksi)]= 0.80

d=Thickness-Cover-1/2Bar Dia.= 1.44"

Check Min A_s Provided:

Minimum Reinforcement, pf,ts =0.0015≤ 0.0051 ≤0.0036

Note, If Middle Value > 0.0036, Use 0.0036.

Af,min= 0.13 Sq.in./ft. **OK**

Check Max Bar Spacing & Serviceability:

ρf = Af / b * d = 0.00854 Ef= 6000 psi

ρfb=β1*f'c/ftu*Ef*εcu/(Ef*εcu+ffu) = 0.00490 ffu= 101500 psi

Check if Tension-Controlled: ρf/ρfb = 1.741 (If Greater than 1.0, compression-controlled)

ϕMn= **1.09 k-ft** ϕ= 0.65 (0.55 if tension controlled,

Mu= **0.56 k-ft** **OK** 0.65 if compression)

$s_{max}=1.15E_f w/(f_{fs}*k_b)-2.5c_c \le 0.92*Ef*w/(f_{fs}*k_b)$ kb=0.7

9.32 < **10.58** w=0.028

OK nf=1.49

k=SQRT(2pf*nf+(pf*nf)^2)- 0.147

Icr=bd^3/3*k^3+nf*Af*d^2(' 0.367

cc= 1.563

ffs=Ms*nf*d(1-k)/Icf= 20.86 ksi

Check Creep Rupture: ffs Max = 0.5ffu= 50.75 ksi **OK**

(Under Sustained Loading)

Check Shear:

Factored Shear, Vu:	**0.49 KIPS**		
Shear Capacity, ϕVn:	**2.04 KIPS**	**OK**	(Based Upon Unreinforced Concrete)

(φVn=0.6(4/3*√f'c*b*h/1000)

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MOUNTAIN TOP, PA 18707
PHONE:570-868-2081
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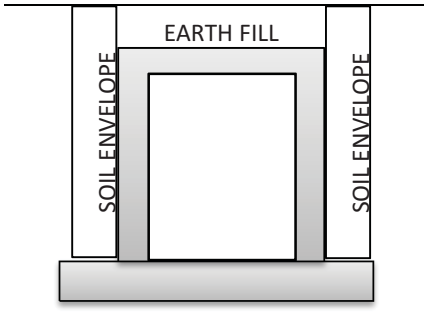
Client: Neuvokas	Description: Tank Design 2-Compartment
Project Name: Standard Tank Design	1,500 Gallon Tank
Calculated By SDG Date: 3/11/16	Buoyancy Check

Bottom of Base Slab BFG	7.5	ft
Top of Cover Slab BFG	2.00	ft
Water Table BFG	6.00	ft
Structure Footprint (w/o Extension)	57.04	sf
Downward Forces		
Earth Fill	13690	lbs
Concrete	15308	lbs
Soil Envelope	0.0	lbs
Holes	-2136	lbs
Compartment Wall	846	lbs
Total	27707	lbs
Upward Buoyant Force	5339	lbs
Difference	22368	lbs
Safety Factor	5.2	OK
Add Soil Wedge?	No	
	10	

No Base Extension



Subtract for Holes:

Top Slab			Qty	Vol (cf)	Wgt (lbs)
	24.in	Diam	(2)	4.19	628.3
.in	x	.in	(0)	0.00	0
Fill				12.57	1508
Walls					
	.in	Diam	(4)	0.00	0
.in	x	.in	(0)	0.00	0
Base Slab					
	.in	Diam	(0)	0.00	0
.in	x	.in	(0)	0.00	0
		Total		16.76	2136