

COMMENTS: WALL B ( COL. 12-14)

JOB NUMBER : 12527

DESIGNED : GU

**MASS STABILITY AND MAXIMUM BEARING PRESSURE - SEISMIC LOADING CASE-LRFD METHOD**

( H = 26.60ft , B = 22.000ft)

DESIGN TYPE : LEVEL SURCHARGE

UNFACTORED EQUIV. HEIGHT L.L. SURCH.= 1.85ft or 0.25Ksf

COEFFICIENT OF ACTIVE EARTH PRESSURE =  $K_a = 0.3333$

Select Backfill = 0.135Ksf,  $\Phi_{i,sel} = 40.00deg.$ , Random Backfill = 0.135Ksf,  $\Phi_{i,random} = 30.00deg.$ , Rand.Cohesion=0.00Ksf

Foundation, Coeff. of friction of bott/wall = 0.58, Cohesion=0.00Ksf, Tributary width of Panel = 9.84ft

$f^* =$  Coefficient of apparent friction = 2.00

Horizontal Acceleration For Seismic Design =  $a_o/g = 0.62$ ,  $a_m/g = 0.620$

**MASS STABILITY- SEISMIC CASE- EXTREME EVENT I**

FACTORED VERTICAL LOADS (Kips)	MOMENT ARM	MOMENT
79.00	11.00	869.02
0.00	22.00	0.00
0.00	22.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
0.00 = $P_a \cdot 1.5 \cdot \sin(i)$	0.00	0.00
0.00 = $1/2 [ \gamma_{EQ} \cdot 0.375 \cdot A_m \cdot \gamma \cdot H^2 \cdot \sin(i) ]$	0.00	0.00
<b>79.00</b>		<b>869.02</b>

**FACTORED HORIZONTAL LOAD**

23.88 = $P_a \cdot \cos(i)$	8.87	211.74
5.55 = $0.5 P_{AE} \cdot \cos(i)$	15.96	88.61
14.81 = $\gamma_{eq} P_{IR}$	13.30	196.92
0.00	0.00	0.00
0.00	0.00	0.00
<b>44.24</b>		<b>497.27</b>

OVERDESIGN FACTORS 1) OVERTURNING 1.75  $\geq 1.0$ , OK  
 2) SLIDING 1.03  $\geq 1.0$ , OK

**INTERNAL STABILITY SUMMARY**

LEVEL	Steel Strips		Factored Re-Strip TENSION $\leq 12.60$ Kips	Factored HORIZ. STRESS (BOND)	EFFECT. LENGTH Overdesign FACTOR $\geq 1.0$
	Factored HORIZ. STRESS Ksf	DENSITY 50x4mm			
2.500	0.45	3	3.59	0.41	1.06
5.690	0.62	3	5.02	0.54	1.63
8.150	0.74	3	6.00	0.63	1.83
10.610	0.85	3	6.89	0.71	1.90
13.070	0.95	3	7.68	0.79	1.90
15.530	1.07	3	8.62	0.89	1.95
17.990	1.18	3	9.49	0.98	1.94
20.450	1.29	3	10.38	1.08	1.92
22.910	1.59	4	9.65	1.37	2.44
25.370	1.79	4	10.83	1.54	2.57

JOB NUMBER: 12527 COMMENTS: WALL B (COL 15-16)  
**MASS STABILITY AND MAXIMUM BEARING PRESSURE BY LRFD METHOD-STATIC**  
 (H = 29.60ft, B = 24.00ft) **STRENGTH I, AASHTO LRFD 2004**

DESIGN TYPE: LEVEL SURCHARGE  
 EQUIV. HEIGHT L.L. SURCH. = 1.85ft or 0.25Ksf  
 COEFFICIENT OF ACTIVE EARTH PRESSURE =  $K_a = 0.3333$   
 Select Backfill = 0.135Ksf,  $\Phi_{i,sel} = 40.00deg.$ , Random Backfill = 0.135Ksf,  $\Phi_{i,random} = 30.00deg.$ , Rand. Cohesion = 0.00Ksf  
 Foundation, Coeff. of friction of bott/wall = 0.58, Cohesion = 0.00Ksf, Tributary width of Panel = 9.84ft  
 $F' =$  Coefficient of apparent friction = 2.00

**STATIC MASS STABILITY**

FACTORED VERTICAL LOADS (Kips)	Moment Arm (ft)	Moment (Kip-ft)
95.90	12.00	1150.8
0.00	24.00	0.0
0.00	24.00	0.0
0.00	0.00	0.0
0.00	0.00	0.0
0.00	0.00	0.0
0.00	0.00	0.0
95.90		1150.85
<b>FACTORED HORIZONTAL LOAD</b>		
29.57	9.87	291.8
4.32	14.80	63.9
33.89		355.65

**OVERDESIGN FACTORS**  
 1) OVERTURNING 3.24 >=1.0, OK  
 2) SLIDING 1.63 >=1.0, OK

**Bearing Pressure**

FACTORED VERTICAL LOADS (Kips)	Moment Arm (ft)	Moment (Kip-ft)
129.47	12.00	1553.6
0.00	24.00	0.0
0.00	24.00	0.0
0.00	0.00	0.0
0.00	0.00	0.0
0.00	0.00	0.0
0.00	0.00	0.0
10.50	12.00	126.0
139.97		1679.6

**HORIZONTAL LOADS ( SAME AS FOR MASS STABILITY, static case)**  
 FACTORED BEARING PRESSURE AT TOE OF WALL = 7.40 Ksf  
 ECCENTRICITY = 2.54 ft <= B/4.00 = 6.00 ft, ok

**REINFORCED EARTH INTERNAL STABILITY SUMMARY - Coherent Gravity Steel Strips**

LEVEL	Factored Max Horiz. Stress Ksf	Factored Stress @ Facing Ksf	DENSITY 50x4mm	Factored Reinf. Tension <=9.45Kips	Factored HORIZ. STRESS (BOND) Ksf	EFFECT. LENGTH Overdesign FACTOR >=1.0	B Reinf. LENGTH ft
	2.500	0.30	3	2.45	0.12	3.00	24.000
	3.770	0.37	3	3.02	0.17	2.94	24.000
	6.230	0.50	3	4.03	0.27	2.82	24.000
	8.690	0.61	3	4.94	0.36	2.68	24.000
	11.150	0.71	3	5.77	0.45	2.53	24.000
	13.610	0.80	3	6.49	0.52	2.35	24.000
	16.070	0.88	3	7.13	0.59	2.27	24.000
	18.530	0.95	3	7.68	0.66	2.23	24.000
	20.990	1.04	3	8.41	0.74	2.22	24.000
	23.450	1.19	4	7.18	0.86	3.05	24.000
	25.910	1.34	4	8.13	1.00	3.11	24.000
	28.370	1.52	4	9.17	1.17	3.13	24.000

**Vehicle Impact/Collision on Traffic Barrier, AASHTO 11.10.10.2**

Level	Impact/Collision		Density	Total Factored Force		Factored Strip	
	For Tension Kips	For Pull-Out Kips		For Strip Tension Kips	For Pull-Out Kips	Tension <=12.60Kips	F.S Bond >= 1.0
2.500	19.680	4.920	3	27.04	7.71	9.01	3.34

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COMMENTS: WALL B ( COL. 15-16)

JOB NUMBER : 12527

DESIGNED : GU

**MASS STABILITY AND MAXIMUM BEARING PRESSURE - SEISMIC LOADING CASE-LRFD METHOD**

( H = 29.60ft , B = 24.000ft)

DESIGN TYPE : LEVEL SURCHARGE

UNFACTORED EQUIV. HEIGHT L.L. SURCH.= 1.85ft or 0.25Ksf

COEFFICIENT OF ACTIVE EARTH PRESSURE =  $K_a = 0.3333$

Select Backfill = 0.135Kcf,  $\Phi_{i,sel} = 40.00deg.$ , Random Backfill = 0.135Kcf,  $\Phi_{i,random} = 30.00deg.$ , Rand.Cohesion=0.00Ksf

Foundation, Coeff. of friction of bott/wall = 0.58, Cohesion=0.00Ksf, Tributary width of Panel = 9.84ft

$f^* =$  Coefficient of apparent friction = 2.00

Horizontal Acceleration For Seismic Design =  $a_o/g = 0.62$ ,  $a_m/g = 0.620$

**MASS STABILITY- SEISMIC CASE- EXTREME EVENT I**

FACTORED VERTICAL LOADS (Kips)	MOMENT ARM	MOMENT
95.90	12.00	1150.85
0.00	24.00	0.00
0.00	24.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
0.00 = $P_a \cdot 1.5 \cdot \sin(i)$	0.00	0.00
0.00 = $1/2 [ \gamma_{EQ} \cdot 0.375 \cdot A_m \cdot \gamma \cdot H^2 \cdot \sin(i) ]$	0.00	0.00
<b>95.90</b>		<b>1150.85</b>

**FACTORED HORIZONTAL LOAD**

29.57 = $P_a \cdot \cos(i)$	9.87	291.76
6.88 = $0.5 P_{AE} \cdot \cos(i)$	17.76	122.10
18.33 = $\gamma_{eq} P_{IR}$	14.80	271.34
0.00	0.00	0.00
0.00	0.00	0.00
<b>54.78</b>		<b>685.20</b>

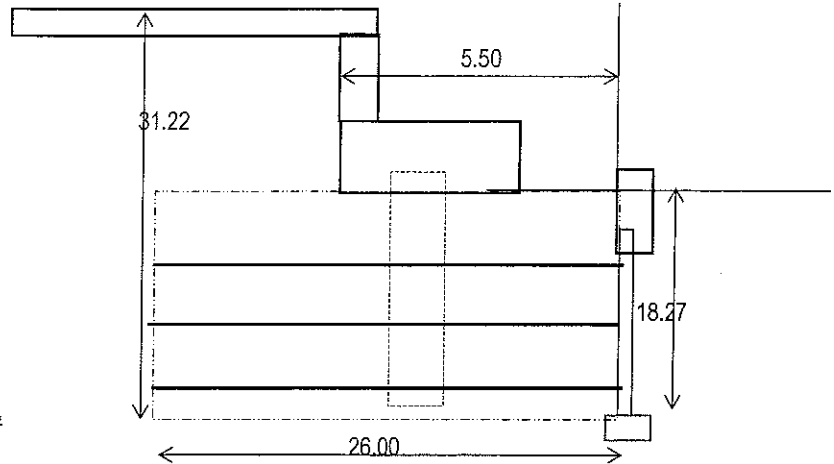
OVERDESIGN FACTORS 1) OVERTURNING 1.68  $\geq 1.0$ , OK  
 2) SLIDING 1.01  $\geq 1.0$ , OK

**INTERNAL STABILITY SUMMARY**

LEVEL	Steel Strips		Factored Re-Strip TENSION 50x4mm $\leq 12.60$ Kips	Factored HORIZ. STRESS (BOND)	EFFECT. LENGTH Overdesign FACTOR
	Factored HORIZ. STRESS Ksf	DENSITY			
2.500	0.45	3	3.64	0.41	1.13
3.770	0.52	3	4.22	0.46	1.44
6.230	0.65	3	5.28	0.56	1.81
8.690	0.77	3	6.24	0.65	1.99
11.150	0.88	3	7.09	0.73	2.05
13.610	0.97	3	7.85	0.80	2.04
16.070	1.07	3	8.63	0.88	2.03
18.530	1.17	3	9.44	0.97	2.02
20.990	1.29	3	10.38	1.07	2.03
23.450	1.58	4	9.58	1.35	2.60
25.910	1.77	4	10.69	1.51	2.75
28.370	1.96	4	11.89	1.69	2.87

JOB NUMBER : 12527  
 JOB NAME : Legacy Parkway - Segment 3  
 DESIGNED : GU  
 COMMENTS: WALL B (COL. 17-28)

( H = 18.27ft , H' = 31.22ft , B = 26.00ft)



**STATIC CASE AND SEISMIC CASE.**

**STRENGTH I**

LRFD METHOD - Mass Stability

( H = 18.27ft , H' = 31.22ft , B = 26.00ft)

Factored Vertical loads

1. R.E. mass =V1  
- shorter strip zone
2. Rectangular soil mass behind backwall

SUM VERT. FORCES=

V Kips	Arm ft	MOMENT Kip-ft
64.13	13.00	833.66
0.00	13.00	0.00
35.84	15.75	564.47
SUM VERT. FORCES=		1398.13

Factored Horizontal forces

1. Horizontal component of earthpressure =P2
  2. Horizontal earthpressure due to surcharge=P1
  3. Seismic forces a) due to global inertia (Ei1+Ei2)  
b) seismic earthpressure Eae x 50%
- SUM HORIZ. FORCES, STATIC, P1+P2=
- SUM HORIZ. FORCES, SEISMIC, P2+(PIR+Pae) =

H	Arm	MOMENT
32.90	10.41	342.33
4.55	15.61	71.07
17.41	14.05	244.61
7.65	18.73	143.27
SUM HORIZ. FORCES, STATIC, P1+P2=		413.41
SUM HORIZ. FORCES, SEISMIC, P2+(PIR+Pae) =		730.21

**SAFETY FACTORS**

	STATIC CASE		SEISMIC CASE	
SLIDING =	1.54	>=1.0 O.K.	1.00	>=1.0 O.K.
OVERTURNING =	3.38	>=1.0 O.K.	1.91	>=1.0 O.K.

LRFD METHOD - Mass Bearing Pressure

Factored Vertical loads

1. R.E. mass =V1- shorter strip zone
2. Rectangular soil mass behind backwall
3. Surcharge

SUM VERT. FORCES=

V Kips	Arm ft	MOMENT Kip-ft
86.57		1125.44
48.38	15.75	762.03
8.97		141.26
SUM VERT. FORCES=		1887.47

Horizontal Forces and Overturning moment (see SUM HORIZ. FORCES, STATIC, P1+P2= ) above

Eccentricity from soil loads and surcharge = 2.76ft

Vertical pressure from soil loads and surcharge = 7.03Ksf

STUB ABUTMENT ON PILE, ABUTMENT WIDTH= 3.00ft

HEIGHT FROM TOP OF FINISHED GRADE TO BOTTOM OF ABUTMENT= 12.95ft

DISTANCE FROM BACK FACE OF PANEL TO ABUTMENT= 2.50ft

Select Backfl =0.135Kcf, Phi.sel = 40.00deg., Random Backfl = 0.135Kcf, Phi.random =30.00deg., Rand.Cohesion=0.00Ksf

COEFFICIENT OF ACTIVE EARTH PRESSURE = Ka = 0.3333

Foundation, Coeff. of friction of bott/wall = 0.58, Cohesion=0.00Ksf, Tributary width of Panel = 9.84ft

EQUIVALENT. HEIGHT LIVE LOAD SURCHARGE = 1.85ft

Horizontal Acceleration For Seismic Design =ao/g= 0.62, am/g = 0.620

JOB NUMBER : 12527      DESIGNED : GU      COMMENTS:WALL B (COL. 17-28)  
 JOB NAME :Legacy Parkway - Segment 3  
 REINFORCED EARTH DESIGN SUMMARY FOR STATIC CASE - LRFD STRENGTH I  
 ( H = 18.27ft , H' = 31.22ft, B = 26.00ft)

STUB ABUTMENT ON PILE, ABUTMENT WIDTH= 3.00ft  
 HEIGHT FROM TOP OF FINISHED GRADE TO BOTTOM OF ABUTMENT= 12.95ft  
 DISTANCE FROM BACK FACE OF PANEL TO ABUTMENT= 2.50ft  
 Select Backfl=0.135Kcf, Phi.sel = 40.00deg., Random Backfl = 0.135Kcf, Phi.random =30.00deg., Rand.Cohesion=0.00Ksf  
 COEFFICIENT OF ACTIVE EARTH PRESSURE = Ka = 0.3333  
 f\* = Coefficient of apparent friction = 2.00  
 ANGLE OF SKEW OF REINFORCING STRIPS : 15.00DEG.

Level	Factored Max Hor. Stress Ksf	Factored Stress @Fac'g Ksf	DENSITY	Factored Reinf.Tension <=9.45Kips	Fact.Hor.Stress (Bond) Ksf	Effect.Length Safety Factor >=1.0	Strip Length (ft)
0.17	0.80	0.80	3	6.65	0.50	2.53	26.00
2.28	0.89	0.89	3	7.47	0.58	2.30	26.00
4.74	0.99	0.99	3	8.31	0.65	2.21	26.00
7.20	1.08	1.08	3	9.02	0.74	2.08	26.00
9.66	1.16	1.16	4	7.25	0.84	2.96	26.00
12.12	1.26	1.26	4	7.88	0.94	3.14	26.00
14.58	1.35	1.35	4	8.46	1.03	3.29	26.00
17.04	1.43	1.43	4	8.98	1.12	3.43	26.00

**SEISMIC**

Horizontal Acceleration For Seismic Design =ao/g= 0.62, am/g = 0.620

Level	Factored Max Hor. Stress Ksf	Density	Factored Reinf.Tension <=12.60Kips	Effect.Length Safety Factor >=1.0
0.17	0.67	3	6.59	2.10
2.28	0.78	3	7.43	1.96
4.74	0.88	3	8.38	1.91
7.20	0.97	3	9.22	1.85
9.66	1.05	4	7.82	2.54
12.12	1.15	4	8.51	2.72
14.58	1.24	4	9.16	2.89
17.04	1.32	4	9.76	3.04

JOB NUMBER : 12527

COMMENTS: WALL B ( COL. 29-30)

MASS STABILITY AND MAXIMUM BEARING PRESSURE BY LRFD METHOD-STATIC  
( H = 31.20ft , B = 26.000ft) STRENGTH I, AASHTO LRFD 2004

DESIGN TYPE : LEVEL SURCHARGE

EQUIV. HEIGHT L.L. SURCH.= 1.85ft or 0.25Ksf

COEFFICIENT OF ACTIVE EARTH PRESSURE = Ka = 0.3333

Select Backfil = 0.135Ksf, Phi.set = 40.00deg., Random Backfil = 0.135Ksf, Phi.random = 30.00deg., Rand.Cohesion=0.00Ksf

Foundation, Coeff. of friction of bolt/wall = 0.58, Cohesion=0.00Ksf, Tributary width of Panel = 9.84ft

f\* = Coefficient of apparent friction = 2.00

STATIC MASS STABILITY

FACTORED VERTICAL LOADS (Kips)	Moment Arm (ft)	Moment (Kip-ft)
109.51	13.00	1423.7
0.00	26.00	0.0
0.00	26.00	0.0
0.00	0.00	0.0
0.00	0.00	0.0
0.00	0.00	0.0
0.00	0.00	0.0
109.51		1423.66
<b>FACTORED HORIZONTAL LOAD</b>		
32.85	10.40	341.7
4.55	15.60	71.0
37.40		412.66

OVERDESIGN FACTORS 1) OVERTURNING 3.45 >=1.0, OK  
2) SLIDING 1.69 >=1.0, OK

Bearing Pressure

FACTORED VERTICAL LOADS (Kips)	Moment Arm (ft)	Moment (Kip-ft)
147.84	13.00	1921.9
0.00	26.00	0.0
0.00	26.00	0.0
0.00	0.00	0.0
0.00	0.00	0.0
0.00	0.00	0.0
0.00	0.00	0.0
11.37	13.00	147.9
159.22		2069.8

HORIZONTAL LOADS ( SAME AS FOR MASS STABILITY, static case)

FACTORED BEARING PRESSURE AT TOE OF WALL= 7.65 Ksf

ECCENTRICITY= 2.59 ft <= B/4.00 = 6.50 ft, ok

REINFORCED EARTH INTERNAL STABILITY SUMMARY - Coherent Gravity

LEVEL	Factored	Factored	DENSITY	Factored	Factored	EFFECT.	B
	Max	Stress		Reinf.			
	Horiz.	@	50x4mm	Tension	STRESS	Overdesign	LENGTH
	Stress	Facing		<=9.45Kips	(BOND)	FACTOR	ft
	Ksf	Ksf			Ksf	>=1.0	
2.500	0.30	0.30	3	2.45	0.12	3.31	26.000
5.370	0.46	0.46	3	3.68	0.24	3.16	26.000
7.830	0.57	0.57	3	4.62	0.33	3.02	26.000
10.290	0.68	0.68	3	5.46	0.41	2.87	26.000
12.750	0.77	0.77	3	6.21	0.49	2.69	26.000
15.210	0.85	0.85	3	6.85	0.56	2.49	26.000
17.670	0.92	0.92	3	7.41	0.62	2.44	26.000
20.130	0.98	0.98	3	7.89	0.68	2.37	26.000
22.590	1.11	1.11	3	8.96	0.79	2.47	26.000
25.050	1.25	1.25	4	7.58	0.91	3.38	26.000
27.510	1.41	1.41	4	8.51	1.05	3.45	26.000
29.970	1.57	1.57	5	7.62	1.20	4.34	26.000

Vehicle Impact/Collision on Traffic Barrier, AASHTO 11.10.10.2

Level	Impact /Collision		Density	Total Factored Force.		Factored Strip	
	For Tension	For Pull-Out		For Strip Tension	For Pull-Out	Tension	F.S.Bond
	Kips	Kips		Kips	Kips	<=12.60Kips	>= 1.0
2.500	19.680	4.920	3	27.04	7.71	9.01	3.62

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COMMENTS: WALL B ( COL. 29-30)

JOB NUMBER : 12527

DESIGNED : GU

**MASS STABILITY AND MAXIMUM BEARING PRESSURE - SEISMIC LOADING CASE-LRFD METHOD**

( H = 31.20ft , B = 26.000ft)

DESIGN TYPE : LEVEL SURCHARGE

UNFACTORED EQUIV. HEIGHT L.L. SURCH.= 1.85ft or 0.25Ksf

COEFFICIENT OF ACTIVE EARTH PRESSURE =  $K_a = 0.3333$

Select Backfill = 0.135Kcf,  $\Phi_{i,sel} = 40.00deg.$ , Random Backfill = 0.135Kcf,  $\Phi_{i,random} = 30.00deg.$ , Rand.Cohesion=0.00Ksf

Foundation, Coeff. of friction of bott/wall = 0.58, Cohesion=0.00Ksf, Tributary width of Panel = 9.84ft

$f^* =$  Coefficient of apparent friction = 2.00

Horizontal Acceleration For Seismic Design =  $a_o/g = 0.62$ ,  $a_m/g = 0.620$

**MASS STABILITY- SEISMIC CASE- EXTREME EVENT I**

FACTORED VERTICAL LOADS (Kips)	MOMENT ARM	MOMENT
109.51	13.00	1423.66
0.00	26.00	0.00
0.00	26.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
0.00 = $P_a \cdot 1.5 \cdot \sin(i)$	0.00	0.00
0.00 = $1/2 [ \gamma_{EQ} \cdot 0.375 \cdot A_m \cdot \gamma \cdot H^2 \cdot \sin(i) ]$	0.00	0.00
<b>109.51</b>		<b>1423.66</b>

**FACTORED HORIZONTAL LOAD**

32.85 = $P_a \cdot \cos(i)$	10.40	341.68
7.64 = $0.5 P_{AE} \cdot \cos(i)$	18.72	142.99
20.37 = $\gamma_{eq} P_{IR}$	15.60	317.76
0.00	0.00	0.00
0.00	0.00	0.00
<b>60.86</b>		<b>802.43</b>

OVERDESIGN FACTORS 1) OVERTURNING 1.77  $\geq 1.0$ , OK  
 2) SLIDING 1.04  $\geq 1.0$ , OK

**INTERNAL STABILITY SUMMARY**

LEVEL	Steel Strips		Factored Re-Strip TENSION $\leq 12.60$ Kips	Factored HORIZ. STRESS (BOND)	EFFECT. LENGTH Overdesign FACTOR $\geq 1.0$
	Factored HORIZ. STRESS Ksf	DENSITY 50x4mm			
2.500	0.47	3	3.81	0.43	1.17
5.370	0.63	3	5.10	0.55	1.80
7.830	0.75	3	6.09	0.64	2.06
10.290	0.86	3	6.97	0.72	2.18
12.750	0.96	3	7.74	0.80	2.20
15.210	1.04	3	8.42	0.86	2.15
17.670	1.14	3	9.20	0.95	2.14
20.130	1.23	3	9.93	1.03	2.10
22.590	1.39	3	11.18	1.16	2.25
25.050	1.69	4	10.22	1.44	2.86
27.510	1.87	4	11.32	1.60	3.02
29.970	2.22	5	10.77	1.93	3.61

JOB NUMBER : 12527      COMMENTS: WALL B ( COL 31-33)  
**MASS STABILITY AND MAXIMUM BEARING PRESSURE BY LRFD METHOD-STATIC**  
(H = 27.00ft , B = 22.000ft)      **STRENGTH I, AASHTO LRFD 2004**

DESIGN TYPE : LEVEL SURCHARGE  
EQUIV. HEIGHT L.L. SURCH.= 1.85ft or 0.25Ksf  
COEFFICIENT OF ACTIVE EARTH PRESSURE =  $K_a = 0.3333$   
Select Backfill = 0.135Kcf,  $\Phi_{int} = 40.00deg.$ , Random Backfill = 0.135Kcf,  $\Phi_{int} = 30.00deg.$ , Rand. Cohesion = 0.00Ksf  
Foundation, Coeff. of friction of bot/wall = 0.58, Cohesion = 0.00Ksf, Tributary width of Panel = 9.84ft  
 $f^* =$  Coefficient of apparent friction = 2.00

**STATIC MASS STABILITY**

<u>FACTORED VERTICAL LOADS (Kips)</u>	<u>Moment Arm (ft)</u>	<u>Moment (Kip-ft)</u>
80.19	11.00 m	882.1
0.00	22.00	0.0
0.00	22.00	0.0
0.00	0.00	0.0
0.00	0.00	0.0
0.00	0.00	0.0
0.00	0.00	0.0
<hr/> 80.19		<hr/> 882.09

<b>FACTORED HORIZONTAL LOAD</b>		
24.60	9.00	221.4
3.94	13.50	53.2
<hr/> 28.54		<hr/> 274.59

OVERDESIGN FACTORS      1) OVERTURNING      3.21  $\geq 1.0$ , OK  
2) SLIDING      1.62  $\geq 1.0$ , OK

**Bearing Pressure**

<u>FACTORED VERTICAL LOADS (Kips)</u>	<u>Moment Arm (ft)</u>	<u>Moment (Kip-ft)</u>
108.26	11.00	1190.8
0.00	22.00	0.0
0.00	22.00	0.0
0.00	0.00	0.0
0.00	0.00	0.0
0.00	0.00	0.0
0.00	0.00	0.0
0.00	0.00	0.0
9.62	11.00	105.9
<hr/> 117.88		<hr/> 1296.7

**HORIZONTAL LOADS ( SAME AS FOR MASS STABILITY, static case)**

FACTORED BEARING PRESSURE AT TOE OF WALL= 6.80 Ksf

ECCENTRICITY= 2.33 ft  $\leq$  B/4.00 = 5.50 ft, ok

**REINFORCED EARTH INTERNAL STABILITY SUMMARY - Coherent Gravity**

**Steel Strips**

LEVEL	Factored Max Horiz. Stress Ksf	Factored Stress @ Facing Ksf	DENSITY 50x4mm	Factored Reinf. Tension $\leq 9.45$ Kips	Factored HORIZ. STRESS (BOND) Ksf	EFFECT. LENGTH Overdesign FACTOR $\geq 1.0$	B Reinf. LENGTH ft
2.500	0.30	0.30	3	2.46	0.12	2.75	22.000
6.090	0.49	0.49	3	3.98	0.27	2.59	22.000
8.550	0.61	0.61	3	4.92	0.36	2.46	22.000
11.010	0.71	0.71	3	5.76	0.45	2.31	22.000
13.470	0.81	0.81	3	6.52	0.53	2.14	22.000
15.930	0.89	0.89	3	7.20	0.60	2.16	22.000
18.390	0.97	0.97	3	7.80	0.67	2.12	22.000
20.850	1.06	1.06	3	8.55	0.76	2.08	22.000
23.310	1.21	1.21	4	7.35	0.90	2.83	22.000
25.770	1.38	1.38	4	8.38	1.06	2.86	22.000

**Vehicular Impact/Collision on Traffic Barrier, AASHTO 11.10.10.2**

Level	<u>Impact / Collision</u>		Density	<u>Total Factored Force</u>		<u>Factored Strip</u>	
	<u>For Tension</u>	<u>For Pull-Out</u>		<u>For Strip Tension</u>	<u>For Pull-Out</u>	<u>Tension</u>	<u>F.S. Bond</u>
	Kips	Kips		Kips	Kips	$\leq 12.60$ Kips	$\geq 1.0$
2.500	19.680	4.920	3	27.05	7.72	9.02	3.06



COMMENTS: WALL B ( COL. 31-33)

JOB NUMBER : 12527

DESIGNED : GU

**MASS STABILITY AND MAXIMUM BEARING PRESSURE - SEISMIC LOADING CASE-LRFD METHOD**

( H = 27.00ft , B = 22.000ft)

DESIGN TYPE : LEVEL SURCHARGE

UNFACTORED EQUIV. HEIGHT L.L. SURCH.= 1.85ft or 0.25Ksf

COEFFICIENT OF ACTIVE EARTH PRESSURE =  $K_a = 0.3333$

Select Backfl = 0.135Kcf, Phi.sel = 40.00deg., Random Backfl = 0.135Kcf, Phi.random = 30.00deg., Rand.Cohesion = 0.00Ksf

Foundation, Coeff. of friction of bott/wall = 0.58, Cohesion = 0.00Ksf, Tributary width of Panel = 9.84ft

f\* = Coefficient of apparent friction = 2.00

Horizontal Acceleration For Seismic Design =  $a_o/g = 0.62$ ,  $a_m/g = 0.620$

**MASS STABILITY- SEISMIC CASE- EXTREME EVENT I**

FACTORED VERTICAL LOADS (Kips)	MOMENT ARM	MOMENT
80.19	11.00	882.09
0.00	22.00	0.00
0.00	22.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
0.00 = $P_a \cdot 1.5 \cdot \sin(i)$	0.00	0.00
0.00 = $1/2 [ \gamma_{EQ} \cdot 0.375 \cdot A_m \cdot \gamma \cdot H_2 \cdot \sin(i) ]$	0.00	0.00
<b>80.19</b>		<b>882.09</b>

**FACTORED HORIZONTAL LOAD**

24.60 = $P_a \cdot \cos(i)$	9.00	221.43
5.72 = $0.5 P_{AE} \cdot \cos(i)$	16.20	92.67
15.25 = $\gamma_{eq} P_{IR}$	13.50	205.93
0.00	0.00	0.00
0.00	0.00	0.00
<b>45.58</b>		<b>520.04</b>

OVERDESIGN FACTORS 1) OVERTURNING 1.70 >=1.0, OK  
 2) SLIDING 1.02 >=1.0, OK

**INTERNAL STABILITY SUMMARY**

Steel Strips	Factored	Factored	Factored	EFFECT.
LEVEL	HORIZ. STRESS Ksf	DENSITY 50x4mm	Re-Strip TENSION <= 12.60Kips	LENGTH Overdesign FACTOR >=1.0
2.500	0.45	3	3.65	1.03
6.090	0.65	3	5.24	1.64
8.550	0.77	3	6.21	1.81
11.010	0.88	3	7.08	1.87
13.470	0.97	3	7.86	1.86
15.930	1.09	3	8.81	1.91
18.390	1.20	3	9.68	1.90
20.850	1.32	3	10.66	1.90
23.310	1.64	4	9.91	2.42
25.770	1.84	4	11.11	2.54



COMMENTS: WALL B ( COL. 34-36)

JOB NUMBER : 12527

DESIGNED : GU

**MASS STABILITY AND MAXIMUM BEARING PRESSURE - SEISMIC LOADING CASE-LRFD METHOD**

( H = 29.00ft , B = 21.000ft)

DESIGN TYPE : LEVEL SURCHARGE

UNFACTORED EQUIV. HEIGHT L.L. SURCH.= 1.85ft or 0.25Ksf

COEFFICIENT OF ACTIVE EARTH PRESSURE =  $K_a = 0.3333$

Select Backfl = 0.135Kcf, Phi.sel = 40.00deg., Random Backfl = 0.135Kcf, Phi.random = 30.00deg., Rand. Cohesion = 0.00Ksf

Foundation, Coeff. of friction of bott/wall = 0.58, Cohesion = 0.00Ksf, Tributary width of Panel = 9.84ft

f\* = Coefficient of apparent friction = 2.00

Horizontal Acceleration For Seismic Design =  $a_o/g = 0.24$ ,  $a_m/g = 0.290$

**MASS STABILITY- SEISMIC CASE- EXTREME EVENT I**

FACTORED VERTICAL LOADS (Kips)	MOMENT ARM	MOMENT
82.22	10.50	863.26
0.00	21.00	0.00
0.00	21.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
0.00 = $P_a \cdot 1.5 \cdot \sin(i)$	0.00	0.00
0.00 = $1/2 [ \gamma_{EQ} \cdot 0.375 \cdot A_m \cdot \gamma \cdot H_2 \cdot \sin(i) ]$	0.00	0.00
<b>82.22</b>		<b>863.26</b>

**FACTORED HORIZONTAL LOAD**

28.38 = $P_a \cdot \cos(i)$	9.67	274.38
3.09 = $0.5 P_{AE} \cdot \cos(i)$	17.40	53.78
8.24 = $\gamma_{eq} P_{IR}$	14.50	119.52
0.00	0.00	0.00
0.00	0.00	0.00
<b>39.72</b>		<b>447.68</b>

OVERDESIGN FACTORS 1) OVERTURNING 1.93 >= 1.0, OK  
 2) SLIDING 1.20 >= 1.0, OK

**INTERNAL STABILITY SUMMARY**

Steel Strips	Factored	DENSITY	Factored	Factored	EFFECT.
LEVEL	HORIZ.	50x4mm	Re-Strip	HORIZ.	LENGTH
	STRESS		TENSION	STRESS	Overdesign
	Ksf		<= 12.60Kips	(BOND)	FACTOR
					>= 1.0
2.500	0.29	3	2.33	0.25	1.51
5.630	0.46	3	3.73	0.38	2.02
8.090	0.58	3	4.72	0.47	2.13
10.550	0.70	3	5.61	0.55	2.14
13.010	0.80	3	6.42	0.63	2.07
15.470	0.89	3	7.20	0.71	2.03
17.930	0.99	3	7.97	0.79	2.05
20.390	1.09	3	8.76	0.88	2.02
22.850	1.31	4	7.93	1.09	2.68
25.310	1.49	4	9.04	1.25	2.80
27.770	1.77	5	8.57	1.52	3.42

JOB NUMBER : 12527

COMMENTS: WALL B ( COL. 37-38)

**MASS STABILITY AND MAXIMUM BEARING PRESSURE BY LRFD METHOD-STATIC**

( H = 30.80ft , B = 22.000ft)

**STRENGTH I, AASHTO LRFD 2004**

DESIGN TYPE : LEVEL SURCHARGE

EQUIV. HEIGHT L.L. SURCH = 1.85ft or 0.25Ksf

COEFFICIENT OF ACTIVE EARTH PRESSURE = Ka = 0.3333

Select Backfil = 0.135Ksf, Phi.sel = 40.00deg., Random Backfil = 0.135Ksf, Phi.random = 30.00deg., Rand.Cohesion = 0.00Ksf

Foundation, Coeff. of friction of bot/wall = 0.58, Cohesion = 0.00Ksf, Tributary width of Panel = 9.84ft

f\* = Coefficient of apparent friction = 2.00

**STATIC MASS STABILITY**

FACTORED VERTICAL LOADS (Kips)	Moment Arm (ft)	Moment (Kip-ft)
91.48	11.00	1006.2
0.00	22.00	0.0
0.00	22.00	0.0
0.00	0.00	0.0
0.00	0.00	0.0
0.00	0.00	0.0
0.00	0.00	0.0
91.48		1006.24

FACTORED HORIZONTAL LOAD		
32.02	10.27	328.7
4.49	15.40	69.2
36.51		397.88

OVERDESIGN FACTORS      1) OVERTURNING    2.53 >=1.0, OK  
                                         2) SLIDING             1.45 >=1.0, OK

**Bearing Pressure**

FACTORED VERTICAL LOADS (Kips)	Moment Arm (ft)	Moment (Kip-ft)
123.49	11.00	1358.4
0.00	22.00	0.0
0.00	22.00	0.0
0.00	0.00	0.0
0.00	0.00	0.0
0.00	0.00	0.0
0.00	0.00	0.0
0.00	0.00	0.0
9.82	11.00	105.9
133.12		1464.3

HORIZONTAL LOADS ( SAME AS FOR MASS STABILITY, static case)

FACTORED BEARING PRESSURE AT TOE OF WALL = 8.31 Ksf

ECCENTRICITY = 2.99 ft <= B/ 4.00 = 5.50 ft, ok

**REINFORCED EARTH INTERNAL STABILITY SUMMARY - Coherent Gravity**

Steel Strips

LEVEL	Factored Max	Factored Stress	DENSITY	Factored Reinf. Tension	Factored HORIZ. STRESS (BOND)	EFFECT. LENGTH Overdesign FACTOR	B Reint. LENGTH ft
	Horiz. Stress Ksf	@ Facing Ksf					
2.500	0.30	0.30	3	2.46	0.12	2.53	22.000
4.970	0.44	0.44	3	3.53	0.22	2.43	22.000
7.430	0.56	0.56	3	4.50	0.32	2.31	22.000
9.890	0.67	0.67	3	5.39	0.41	2.18	22.000
12.350	0.77	0.77	3	6.18	0.49	2.03	22.000
14.810	0.85	0.85	3	6.90	0.57	1.87	22.000
17.270	0.93	0.93	3	7.53	0.64	1.84	22.000
19.730	1.00	1.00	3	8.09	0.71	1.80	22.000
22.190	1.14	1.14	3	9.21	0.83	1.86	22.000
24.650	1.30	1.30	4	7.90	0.98	2.54	22.000
27.110	1.49	1.49	4	9.00	1.16	2.56	22.000
29.570	1.69	1.69	5	8.19	1.37	3.17	22.000

Vehicular Impact/Collision on Traffic Barrier, AASHTO 11.10.10.2

Level	Impact /Collision		Density	Total Factored Force		Factored Strip	
	For Tension Kips	For Pull-Out Kips		For Strip Tension Kips	For Pull-Out Kips	Tension <=12.60Kips	F.S.Bond >= 1.0
2.500	19.680	4.920	3	27.05	7.72	9.02	3.06

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COMMENTS: WALL B ( COL. 37-38)

JOB NUMBER : 12527

DESIGNED : GU

**MASS STABILITY AND MAXIMUM BEARING PRESSURE - SEISMIC LOADING CASE-LRFD METHOD**

( H = 30.80ft , B = 22.000ft)

DESIGN TYPE : LEVEL SURCHARGE

UNFACTORED EQUIV. HEIGHT L.L. SURCH.= 1.85ft or 0.25Ksf

COEFFICIENT OF ACTIVE EARTH PRESSURE =  $K_a = 0.3333$

Select Backfil = 0.135Kcf,  $\Phi_{i.sel} = 40.00deg.$ , Random Backfil = 0.135Kcf,  $\Phi_{i.random} = 30.00deg.$ , Rand.Cohesion=0.00Ksf

Foundation, Coeff. of friction of bott/wall = 0.58, Cohesion=0.00Ksf, Tributary width of Panel = 9.84ft

$f^* =$  Coefficient of apparent friction = 2.00

Horizontal Acceleration For Seismic Design =  $a_o/g = 0.24$ ,  $a_m/g = 0.290$

**MASS STABILITY- SEISMIC CASE- EXTREME EVENT I**

FACTORED VERTICAL LOADS (Kips)	MOMENT ARM	MOMENT
91.48	11.00	1006.24
0.00	22.00	0.00
0.00	22.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
0.00 = $P_a \cdot 1.5 \cdot \sin(i)$	0.00	0.00
0.00 = $1/2 [ \gamma_{EQ} \cdot 0.375 \cdot A_m \cdot \gamma \cdot H_2 \cdot \sin(i) ]$	0.00	0.00
<b>91.48</b>		<b>1006.24</b>

**FACTORED HORIZONTAL LOAD**

32.02 = $P_a \cdot \cos(i)$	10.27	328.70
3.49 = $0.5 P_{AE} \cdot \cos(i)$	18.48	64.43
9.30 = $\gamma_{eq} P_{IR}$	15.40	143.18
0.00	0.00	0.00
0.00	0.00	0.00
<b>44.80</b>		<b>536.32</b>

OVERDESIGN FACTORS 1) OVERTURNING 1.88  $\geq 1.0$ , OK  
 2) SLIDING 1.18  $\geq 1.0$ , OK

**INTERNAL STABILITY SUMMARY**

Steel Strips	Factored	DENSITY	Factored	Factored	EFFECT.
LEVEL	HORIZ	50x4mm	Re-Strip	HORIZ	LENGTH
	STRESS		TENSION	STRESS	Overdesign
	Ksf		$\leq 12.60$ Kips	(BOND)	FACTOR
					$\geq 1.0$
2.500	0.29	3	2.37	0.25	1.53
4.970	0.43	3	3.50	0.36	2.00
7.430	0.56	3	4.51	0.45	2.17
9.890	0.67	3	5.42	0.54	2.21
12.350	0.77	3	6.24	0.62	2.16
14.810	0.86	3	6.98	0.69	2.06
17.270	0.96	3	7.72	0.77	2.06
19.730	1.04	3	8.42	0.84	2.03
22.190	1.19	3	9.60	0.97	2.13
24.650	1.42	4	8.61	1.18	2.81
27.110	1.61	4	9.74	1.35	2.92
29.570	1.89	5	9.17	1.63	3.56

JOB NUMBER : 12527

COMMENTS: WALL B ( COL. 39-40)

MASS STABILITY AND MAXIMUM BEARING PRESSURE BY LRFD METHOD-STATIC

( H = 29.60ft , B = 21.000ft)

STRENGTH I, AASHTO LRFD 2004

DESIGN TYPE : LEVEL SURCHARGE

EQUIV. HEIGHT L.L. SURCH.= 1.85ft or 0.25Ksf

COEFFICIENT OF ACTIVE EARTH PRESSURE = Ka = 0.3333

Select Backfil = 0.135Ksf, Phi.sel = 40.00deg., Random Backfil = 0.135Ksf, Phi.random = 30.00deg., Rand.Cohesion = 0.00Ksf

Foundation, Coeff. of friction of bott/wall = 0.58, Cohesion = 0.00Ksf, Tributary width of Panel = 9.84ft

f\* = Coefficient of apparent friction = 2.00

STATIC MASS STABILITY

FACTORED VERTICAL LOADS (Kips)	Moment Arm (ft)	Moment (Kip-ft)
83.92	10.50	881.1
0.00	21.00	0.0
0.00	21.00	0.0
0.00	0.00	0.0
0.00	0.00	0.0
0.00	0.00	0.0
0.00	0.00	0.0
83.92		881.12
<b>FACTORED HORIZONTAL LOAD</b>		
29.57	9.87	291.8
4.32	14.80	63.9
33.89		355.65

OVERDESIGN FACTORS 1) OVERTURNING 2.48 >=1.0, OK  
 2) SLIDING 1.43 >=1.0, OK

Bearing Pressure

FACTORED VERTICAL LOADS (Kips)	Moment Arm (ft)	Moment (Kip-ft)
113.29	10.50	1189.5
0.00	21.00	0.0
0.00	21.00	0.0
0.00	0.00	0.0
0.00	0.00	0.0
0.00	0.00	0.0
0.00	0.00	0.0
0.00	0.00	0.0
9.19	10.50	96.5
122.47		1286.0

HORIZONTAL LOADS ( SAME AS FOR MASS STABILITY, static case)

FACTORED BEARING PRESSURE AT TOE OF WALL = 8.06 Ksf

ECCENTRICITY = 2.90 ft <= B/4.00 = 5.25 ft, ok

REINFORCED EARTH INTERNAL STABILITY SUMMARY - Coherent Gravity

Steel Strips

LEVEL	Factored Max Horiz. Stress Ksf	Factored Stress @ Facing Ksf	DENSITY 50x4mm	Factored Reinf. Tension <= 9.45Kips	Factored HORIZ. STRESS (BOND) Ksf	EFFECT. LENGTH Overdesign FACTOR >=1.0	B Reinf. LENGTH ft
3.770	0.37	0.37	3	3.02	0.17	2.35	21.000
6.230	0.50	0.50	3	4.05	0.27	2.25	21.000
8.690	0.62	0.62	3	4.98	0.37	2.13	21.000
11.150	0.72	0.72	3	5.83	0.45	1.99	21.000
13.610	0.82	0.82	3	6.60	0.54	1.84	21.000
16.070	0.90	0.90	3	7.30	0.62	1.77	21.000
18.530	0.98	0.98	3	7.92	0.69	1.76	21.000
20.990	1.08	1.08	3	8.75	0.79	1.75	21.000
23.450	1.25	1.25	4	7.54	0.94	2.39	21.000
25.910	1.43	1.43	4	8.65	1.11	2.41	21.000
28.370	1.64	1.64	5	7.93	1.33	2.99	21.000

Vehicle Impact/Collision on Traffic Barrier, AASHTO 11.10.10.2

Level	Impact/Collision		Density	Total Factored Force		Factored Strip	
	For Tension Kips	For Pull-Out Kips		For Strip Tension Kips	For Pull-Out Kips	Tension <= 12.60Kips	F.S Bond >= 1.0
2.500	19.680	4.920	3	27.05	7.72	9.02	2.92

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COMMENTS: WALL B ( COL. 39-40)

JOB NUMBER : 12527

DESIGNED : GU

**MASS STABILITY AND MAXIMUM BEARING PRESSURE - SEISMIC LOADING CASE-LRFD METHOD**

( H = 29.60ft , B = 21.000ft)

DESIGN TYPE : LEVEL SURCHARGE

UNFACTORED EQUIV. HEIGHT L.L. SURCH. = 1.85ft or 0.25Ksf

COEFFICIENT OF ACTIVE EARTH PRESSURE =  $K_a = 0.3333$

Select Backfill = 0.135Ksf,  $\Phi_{i,sel} = 40.00deg.$ , Random Backfill = 0.135Ksf,  $\Phi_{i,random} = 30.00deg.$ , Rand.Cohesion = 0.00Ksf

Foundation, Coeff. of friction of bott/wall = 0.58, Cohesion = 0.00Ksf, Tributary width of Panel = 9.84ft

$f^* =$  Coefficient of apparent friction = 2.00

Horizontal Acceleration For Seismic Design =  $a_o/g = 0.24$ ,  $a_m/g = 0.290$

**MASS STABILITY- SEISMIC CASE- EXTREME EVENT I**

FACTORED VERTICAL LOADS (Kips)	MOMENT ARM	MOMENT
83.92	10.50	881.12
0.00	21.00	0.00
0.00	21.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
0.00 = $P_a \cdot 1.5 \cdot \sin(i)$	0.00	0.00
0.00 = $1/2 [ \gamma_{EQ} \cdot 0.375 \cdot A_m \cdot \gamma \cdot H^2 \cdot \sin(i) ]$	0.00	0.00
<b>83.92</b>		<b>881.12</b>

**FACTORED HORIZONTAL LOAD**

29.57 = $P_a \cdot \cos(i)$	9.87	291.76
3.22 = $0.5 P_{AE} \cdot \cos(i)$	17.76	57.19
8.59 = $\gamma_{eq} P_{IR}$	14.80	127.09
0.00	0.00	0.00
0.00	0.00	0.00
<b>41.38</b>		<b>476.04</b>

OVERDESIGN FACTORS 1) OVERTURNING 1.85  $\geq 1.0$ , OK  
 2) SLIDING 1.17  $\geq 1.0$ , OK

**INTERNAL STABILITY SUMMARY**

Steel Strips	Factored	DENSITY	Factored	Factored	EFFECT.
LEVEL	HORIZ.	50x4mm	TENSION	STRESS	Overdesign
	STRESS		$\leq 12.60$ Kips	(BOND)	FACTOR
	Ksf				$\geq 1.0$
2.500	0.28	3	2.29	0.24	1.52
3.770	0.36	3	2.88	0.30	1.80
6.230	0.49	3	3.95	0.40	2.05
8.690	0.61	3	4.91	0.49	2.13
11.150	0.72	3	5.79	0.57	2.11
13.610	0.81	3	6.57	0.65	2.03
16.070	0.91	3	7.35	0.73	2.00
18.530	1.00	3	8.10	0.81	2.01
20.990	1.12	3	9.02	0.91	2.02
23.450	1.34	4	8.13	1.11	2.68
25.910	1.53	4	9.27	1.29	2.79
28.370	1.81	5	8.77	1.56	3.40

JOB NUMBER : 12527

COMMENTS: WALL B ( COL. 41-43)

MASS STABILITY AND MAXIMUM BEARING PRESSURE BY LRFD METHOD-STATIC

( H = 18.20ft , B = 13.000ft)

STRENGTH I, AASHTO LRFD 2004

DESIGN TYPE : LEVEL SURCHARGE

EQUIV. HEIGHT L.L. SURCH.= 1.85ft or 0.25Ksf

COEFFICIENT OF ACTIVE EARTH PRESSURE =  $K_a = 0.3333$

Select Backfill = 0.135Ksf,  $\Phi_{i,sel} = 40.00deg.$ , Random Backfill = 0.135Ksf,  $\Phi_{i,random} = 30.00deg.$ , Rand.Cohesion=0.00Ksf

Foundation, Coeff. of friction of bot/wall = 0.58, Cohesion=0.00Ksf, Tributary width of Panel = 9.84ft

$f' =$  Coefficient of apparent friction = 2.00

STATIC MASS STABILITY

FACTORED VERTICAL LOADS (Kips)	Moment Arm (ft)	Moment (Kip-ft)
31.94	6.50	207.6
0.00	13.00	0.0
0.00	13.00	0.0
0.00	0.00	0.0
0.00	0.00	0.0
0.00	0.00	0.0
0.00	0.00	0.0
31.94		207.62
<b>FACTORED HORIZONTAL LOAD</b>		
11.18	6.07	67.8
2.65	9.10	24.2
13.83		91.97
<b>OVERDESIGN FACTORS</b>		
	1) OVERTURNING	2.26 $\geq 1.0$ , OK
	2) SLIDING	1.33 $\geq 1.0$ , OK

Bearing Pressure

FACTORED VERTICAL LOADS (Kips)	Moment Arm (ft)	Moment (Kip-ft)
43.12	6.50	280.3
0.00	13.00	0.0
0.00	13.00	0.0
0.00	0.00	0.0
0.00	0.00	0.0
0.00	0.00	0.0
0.00	0.00	0.0
5.69	6.50	37.0
48.81		317.3

HORIZONTAL LOADS ( SAME AS FOR MASS STABILITY, static case)

FACTORED BEARING PRESSURE AT TOE OF WALL= 5.29 Ksf

ECCENTRICITY= 1.88 ft  $\leq B/4.00 = 3.25$  ft, ok

REINFORCED EARTH INTERNAL STABILITY SUMMARY - Coherent Gravity

Steel Strips

LEVEL	Factored Max Horiz. Stress Ksf	Factored Stress @ Facing Ksf	DENSITY 50x4mm	Factored Reinf. Tension $\leq 9.45$ Kips	Factored HORIZ. STRESS (BOND) Ksf	EFFECT. LENGTH Overdesign Factor $\geq 1.0$	B Reinf. LENGTH ft
2.500	0.31	0.31	3	2.47	0.12	1.47	13.000
4.670	0.43	0.43	3	3.46	0.22	1.39	13.000
7.130	0.56	0.56	3	4.55	0.33	1.29	13.000
9.590	0.70	0.70	3	5.62	0.44	1.21	13.000
12.050	0.83	0.83	3	6.71	0.57	1.27	13.000
14.510	0.97	0.97	3	7.86	0.72	1.25	13.000
16.970	1.13	1.13	3	9.12	0.90	1.16	13.000

Vehicular Impact/Collision on Traffic Barrier, AASHTO 11.10.10.2

Level	Impact / Collision		Density	Total Factored Force		Factored Strip	
	For Tension Kips	For Pull-Out Kips		For Strip Tension Kips	For Pull-Out Kips	Tension $\leq 12.60$ Kips	F.S. Bond $\geq 1.0$
2.500	19.680	4.920	3	27.09	7.76	9.03	1.80

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COMMENTS: WALL B ( COL. 41-43)

JOB NUMBER : 12527

DESIGNED : GU

**MASS STABILITY AND MAXIMUM BEARING PRESSURE - SEISMIC LOADING CASE-LRFD METHOD**

( H = 18.20ft , B = 13.000ft)

DESIGN TYPE : LEVEL SURCHARGE

UNFACTORED EQUIV. HEIGHT L.L. SURCH.= 1.85ft or 0.25Ksf

COEFFICIENT OF ACTIVE EARTH PRESSURE =  $K_a = 0.3333$

Select Back $\phi$  = 0.135Kcf, Phi.sel = 40.00deg., Random Back $\phi$  = 0.135Kcf, Phi.random = 30.00deg., Rand.Cohesion = 0.00Ksf

Foundation, Coeff. of friction of bot/wall = 0.58, Cohesion = 0.00Ksf, Tributary width of Panel = 9.84ft

$f^*$  = Coefficient of apparent friction = 2.00

Horizontal Acceleration For Seismic Design =  $a_o/g = 0.24$ ,  $a_m/g = 0.290$

**MASS STABILITY- SEISMIC CASE- EXTREME EVENT I**

FACTORED VERTICAL LOADS (Kips)	MOMENT ARM	MOMENT
31.94	6.50	207.62
0.00	13.00	0.00
0.00	13.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
0.00 = $P_a \cdot 1.5 \cdot \sin(i)$	0.00	0.00
0.00 = $1/2 [ \gamma_{EQ} \cdot 0.375 \cdot A_m \cdot \gamma \cdot H^2 \cdot \sin(i) ]$	0.00	0.00
<b>31.94</b>		<b>207.62</b>

**FACTORED HORIZONTAL LOAD**

11.18 = $P_a \cdot \cos(i)$	6.07	67.82
1.22 = $0.5 P_{AE} \cdot \cos(i)$	10.92	13.29
3.25 = $\gamma_{eq} P_{IR}$	9.10	29.54
0.00	0.00	0.00
0.00	0.00	0.00
<b>15.64</b>		<b>110.66</b>

OVERDESIGN FACTORS 1) OVERTURNING 1.88  $\geq 1.0$ , OK  
 2) SLIDING 1.18  $\geq 1.0$ , OK

**INTERNAL STABILITY SUMMARY**

Steel Strips	Factored	DENSITY	Factored	Factored	EFFECT.
LEVEL	HORIZ.	50x4mm	TENSION	STRESS	Overdesign
	STRESS		$\leq 12.60$ Kips	(BOND)	FACTOR
	Ksf				$\geq 1.0$
2.500	0.25	3	2.03	0.21	1.09
4.670	0.38	3	3.04	0.30	1.32
7.130	0.51	3	4.12	0.41	1.38
9.590	0.64	3	5.19	0.51	1.39
12.050	0.79	3	6.36	0.64	1.51
14.510	0.94	3	7.55	0.77	1.55
16.970	1.09	3	8.79	0.92	1.51