DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 1, 2006
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER Overcomer Y. Hor No. C45803 Exp. 12-31-06 CIVIL STATE OF CALIFORNIA

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FOUNDATION PRESSURE-BATTERED WALL

WALL HEIGHT — ksf

TYPE	LOADING CASE	1'-5"	2'-4"	3'-3"	4'-2"	5'-1"	6'-0"	6'-11"	7'-10"	8'-9"	9'-8"	10'-7"	11'-6"	12'-5"	13'-4"	14'-3"
A	I	0.73*	0.88*	1.02*	1.16*	1.28*	1.37*	1.45*	1.49*	1.50*	1.57*	1.88	2.25	2.67	3.13	3.67▮
	II	0.81*	0.95*	1.09*	1.22*	1.34*	1.43*	1.51*	1.56*	1.59*	1.58*	1.78	2.13	2.52	2.96	3.46▮
	III	0.94*	1.02*	1.08*	1.11*	1.10*	1.33	1.70	2.13	2.64	3.22▮					
B	I									1.34*	1.50	1.69	1.88	2.14	2.45	2.73
	II									1.40	1.64	1.90	2.18	2.49	2.83	3.18
	III									2.16	2.61	3.10	3.64▮			
C	I											1.59*	1.75	1.95	2.15	2.33
	II											1.83*	1.81	2.07	2.35	2.59
	III											2.26*	2.49	2.92	3.38	3.83
D	I															
	II															
	III															
E	I															
	II															
	III															
F	I															
	II															
	III															

TYPE	LOADING CASE	15'-2"	16'-1"	17'-0"	17'-11"	18'-10"	19'-9"	20'-8"	21'-7"	22'-6"	23'-5"	24'-4"	25'-3"	26'-2"	27'-1"
A	I														
	II														
	III														
B	I	3.05	3.40	3.79	4.23	4.69	5.21▮								
	II	3.57	3.99	4.46	4.96▮										
	III														
C	I	2.52	2.73	2.96	3.20	3.46	3.74	4.04	4.36	4.71	5.08	5.48	5.90	6.35	6.83
	II	2.85	3.13	3.43	3.75	4.08	4.44	4.83	5.24	5.67	6.14	6.63	7.15▮		
	III	4.32	4.83	5.40	6.00▮										
D	I	2.16	2.35	2.54	2.73	2.94	3.15	3.36	3.59	3.78	3.98	4.18	4.40	4.63	4.87
	II	2.65*	2.55*	2.69	2.96	3.24	3.53	3.83	4.14	4.43	4.73	5.04	5.37	5.71	6.06
	III	3.76*	3.48*	3.54	3.96	4.40	4.86	5.34	5.84	6.35	6.87	7.42	8.01	8.62▮	
E	I							2.87	3.05	3.24	3.43	3.63	3.84	4.04	4.26
	II							3.53*	3.42*	3.51	3.77	4.05	4.34	4.63	4.94
	III							5.19*	4.89*	4.61*	4.98	5.41	5.85	6.31	6.78
F	I														3.79
	II														4.14*
	III														6.09*

TYPE	LOADING CASE	28'-0"	28'-11"	29'-10"	30'-9"	31'-8"	32'-7"	33'-6"	34'-5"	35'-4"	36'-3"	37'-2"	38'-1"	39'-0"	39'-11"	40'-10"
A	I															
	II															
	III															
B	I															
	II															
	III															
C	I	7.34▮														
	II															
	III															
D	I	5.13	5.40	5.67	5.97	6.28	6.60	6.93	7.29	7.65	8.04	8.45	8.87	9.31	9.77	10.25▮
	II	6.43	6.81	7.21	7.63	8.07	8.51	8.99	9.48▮							
	III															
E	I	4.48	4.71	4.95	5.19	5.39	5.60	5.82	6.04	6.28	6.52	6.77	7.03	7.30	7.58	7.87
	II	5.26	5.58	5.92	6.27	6.59	6.92	7.26	7.61	7.97	8.35	8.73	9.13	9.54	9.96	10.39
	III	7.28	7.79	8.32	8.87	9.43	9.99	10.59	11.21	11.84▮						
F	I	3.98	4.17	4.36	4.56	4.76	4.97	5.19	5.41	5.63	5.86	6.10	6.33	6.58	6.79	7.00
	II	4.38	4.65	4.92	5.20	5.49	5.79	6.09	6.40	6.72	7.06	7.40	7.74	8.10	8.44	8.78
	III	5.81*	6.06	6.48	6.91	7.35	7.80	8.27	8.76	9.25	9.77	10.30	10.84	11.41	11.98	12.55

TYPE	LOADING CASE	41'-9"	42'-8"	43'-7"	44'-6"	45'-5"	46'-4"	47'-3"	48'-2"	49'-1"	50'-0"	50'-11"	51'-10"	52'-9"	53'-8"
A	I														
	II														
	III														
B	I														
	II														
	III														
C	I														
	II														
	III														
D	I														
	II														
	III														
E	I	8.17	8.48	8.80	9.13	9.48	9.84	10.21	10.59	10.98	11.39	11.82	12.25	12.70	13.17▮
	II	10.84	11.31	11.78▮											
	III														
F	I	7.21	7.44	7.66	7.90	8.14	8.39	8.65	8.92	9.19	9.47	9.76	10.05	10.36	10.67▮
	II	9.13	9.49	9.85	10.23	10.62	11.01	11.42	11.84	12.26	12.70	13.15	13.60	14.07▮	
	III	13.16	13.78	14.41▮											

* Indicates pressure at heel.

▮ Heavy vertical line indicates maximum allowable wall height for particular wall type and particular loading case.

DESIGN EXAMPLES

Example No. 1:

Given: Wall height 20'-0"
2:1 cut slope to be retained. Foundation site investigation indicates lateral pressure from material above will be equivalent to design loading case condition and an allowable soil bearing capacity of 5.0 ksf.

Select: Battered Type C or Type D wall. Actual H = 20'-8". Type D vertical wall can be used by increasing the allowable bearing capacity of the original ground.

Example No. 2:

Given: Wall height 9'-0"
Design Loading Case I; 2'-0" level ground surcharge plus * 0.25 ksf. of surcharge to be retained. Base founded in embankment.

Select: Battered or vertical Type A or Type B wall. Actual H = 9'-8".

Example No. 3:

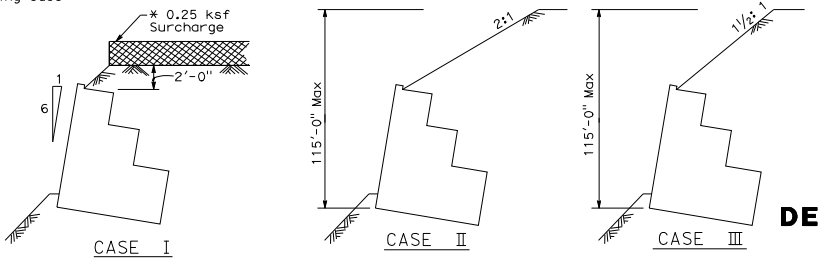
Given: Wall height 10'-0"
Design Loading Case III; 1½: 1 embankment slope to be retained. Base in original ground, sloping away from toe of wall at 2:1. Foundation investigation determines the allowable soil bearing capacity is 4.0 ksf (considering the sloping ground in front of wall).

Select: Battered Type B or Type C wall or Vertical Type C wall. Actual H = 10'-5".

Example No. 4:

Given: Wall height 30'-0"
Design Loading Case II; 2:1 embankment slope to be retained. Base in embankment (5'-0" depth minimum).

Select: Battered Type D, Type E or Type F wall or Vertical Type F wall. Actual H = 30'-9". For all types the foundation pressure is between 5.0 and 8.0 ksf. Embankment material below the wall must be "Structure Backfill" (See Design Example Footnote 1).



DETAIL OF DESIGN LOADING CASES

DESIGN EXAMPLE FOOTNOTES:

1. To constitute a "wall base in embankment" condition, a minimum of 5'-0" of embankment at 95 percent relative compaction is required below the base of the wall. When the foundation pressure is between 5.0 and 8.0 ksf, the embankment below the wall shall be constructed with structure backfill material to the limits specified for embankments constructed with relative compaction of 95 percent. The maximum allowable soil bearing capacity is 8 ksf.
2. For walls with "wall base in original ground" condition, the allowable soil bearing capacity, design lateral loads, and slope stability shall be determined by a foundation site investigation and by an analysis. Walls shall not be founded in original ground having an allowable soil bearing capacity of less than 3 ksf.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DESIGN DATA FOR REINFORCED CONCRETE CRIB WALL FOUNDATION PRESSURE-BATTERED WALL

NO SCALE

C7F

2006 STANDARD PLAN C7F

8-1-05