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

Caltrans Metric

REGISTERED CIVIL ENGINEER

July 1, 2004
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER Overcomer Y. Hor No. 45803 Exp. 12-31-06 CIVIL STATE OF CALIFORNIA

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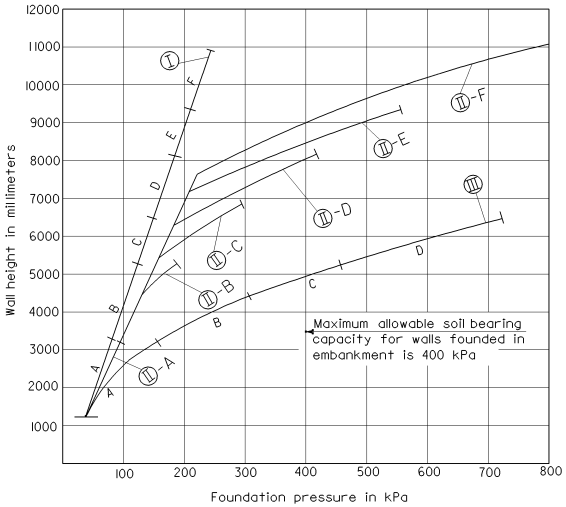
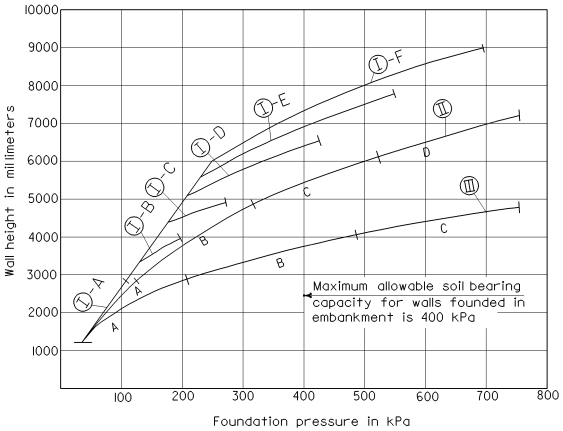


6 : 1 BATTERED WALL



VERTICAL WALL

DESIGN NOTES

1. Wall base in embankment: A minimum depth of 1500 millimeters of embankment at 95% relative soil compaction is required below the base of all walls in order to constitute an embankment condition. When the foundation pressure is between 240 and 400 kPa, embankment below the wall shall consist of "Structure Backfill" material as set forth in Section 19-3.06 of the Standard Specifications. The limits of relative compaction (95 percent) shall be as set forth in Section 19-5.03 of the Standard Specifications.

2. Wall base in original ground: Allowable soil pressure at toe of wall shall be determined by foundation site investigation. Walls that are to retain cut slopes shall be designed for lateral and toe pressures determined from site investigation data. Overall stability of slope with wall in place must be analyzed. If original ground slopes away from toe of wall, reduction in allowable bearing capacity due to slope must be considered. Walls shall not be founded in original ground having an allowable bearing capacity of less than 145 kPa. Consideration should be given to removal and replacement of unsuitable material with "Structure Backfill" material as set forth in Section 19-3.06 of the Standard Specifications. The limits of relative compaction (95 percent) shall be as set forth in Section 19-5.03 of the Standard Specifications.

3. Drainage:
   a. Internal: Section 19-3.06 of the Standard Specifications.
   b. External: If the combined height of wall and overfill (measured along face of wall and vertically from the toe of fill to top of fill) exceeds 7600 millimeters a system to drain water away from the back face of wall shall be provided. The type and extent of this system will depend on the type of backfill material expected to be used, the combined height of wall and backfill, and the location of the water table in the area.

4. Sloping Surcharge Limitations: The maximum height of fill behind any wall, or family of walls, shall not exceed 35 meters (measured vertically from the toe of the bottom wall to the top of fill behind the uppermost wall). For a family of walls the slope of a line drawn from the top of the front face of the bottom wall to the top of the front face of any intermediate or top wall, shall in no case be steeper than 1:1.5.

Material Specifications:
Steel sheets:
AASHTO M218
310 275 kPa Ultimate
227 535 kPa Yield
@ 20% Elongation
Bolts: ASTM A307 Grade A

DESIGN EXAMPLES

EXAMPLE NO. 1

Given: Wall height 7300 millimeters.
Design loading Case II.
35 meters maximum from toe of wall to top of slope.
Base in embankment (1500 millimeters depth minimum).

Select: 6:1 Battered wall. Vertical wall not permitted. Type D wall selected.
Maximum height on graph is 8050 millimeters at 400 kPa. Since the foundation pressure is 305 kPa at 7300 millimeters, the wall must be founded on a 1500 millimeters thickness of "Structure Backfill" (See Design Note 1).
A drainage system behind this wall will be required.

EXAMPLE NO. 2

Given: Wall height 8800 millimeters.
Design loading Case II. Foundation site investigation indicates lateral pressure from material above will be equivalent to 1:2 embankment slope. Base in excavation level at toe of wall. Foundation investigation determines the allowable soil bearing capacity at 300 kPa.

Select: Battered Type F wall maximum height at 400 kPa is 9000 millimeters, therefore the replacement of 1500 millimeters of excavation with "Structure Backfill" to increase the allowable soil bearing capacity to 400 kPa is required (See Design Note 1). A drainage system for this wall should be investigated.

EXAMPLE NO. 3

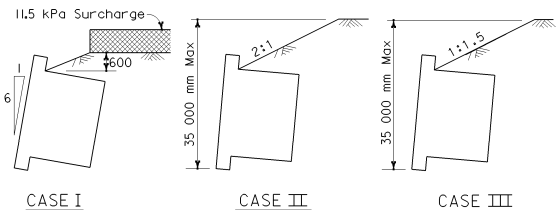
Given: Wall height 4600 millimeters.
Design loading Case III with overall height less than 35 millimeters. Base on original ground. Foundation investigation determines allowable soil bearing capacity at 200 kPa.

Select: Use a Type C Battered Wall. However foundation pressure exceeds 200 kPa, therefore the replacement of 1500 millimeters of excavation with "Structure Backfill" to increase the allowable soil bearing capacity to 400 kPa is required (See Design Note 1).

LEGEND FOR GRAPHS

A, B, C, D, E, F = Wall Type
I, II, III = Loading Case

- For description of loading case, see detail of design loading cases.
- Upper end of line indicates maximum wall height for a given wall type.



DETAIL OF DESIGN LOADING CASES

Note: Similar loading cases for vertical wall.

NOTE

For construction details see Sheet C8A.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

STEEL CRIB WALL DESIGN DATA

NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

C8C