DEPARTMENT OF THE ARMY
MISSISSIPPI RIVER COMMISSION, CORPS OF ENGINEERS
VICKSBURG, MISSISSIPPI 39180

ANSWER REPLY TO:
PRESIDENT, MISSISSIPPI RIVER COMMISSION
CORPS OF ENGINEERS
P. O. BOX 80
VICKSBURG, MISSISSIPPI 39180

CEMRC-ED-GS

29 DEC 87

MEMORANDUM FOR: Commander, New Orleans District, ATTN: CELMV-ED-F

SUBJECT: Sheet Pile Wall Design Criteria

1. The final "E-99 Sheet Pile Wall Load Test Report (ref 5c, encl 3)" is enclosed along with our responses (ref 5b, encl 2) to the CELMN-ED comments in the 1st End to ref 5a (encl 1).

2. Also enclosed is a CEWES-GE memorandum which summarizes the results of a finite element study (see 2d and 3d endorsements to ref 5a). In short, this study indicates that, for a sheet pile wall driven into a levee founded on very soft to soft clays, the majority of lateral sheet pile movement during flood loading will likely be due to deep seated foundation movement and not due to sheet pile flexural deflection. Driving the sheet pile deeper has little effect on overall levee stability, or after some limiting depth, on flexural deflection at the top of the wall. This data reinforces the conclusions reached in the E-99 report that excessive sheet pile penetrations are not warranted.

3. Based on the E-99 report and the CEWES-GE study, the following design criteria have been developed and should be followed to determine the required penetration for sheet pile floodwalls founded in soft clays.

Q Case

F.S. = 1.5 with water to flowline or SWL
F.S. = 1.25 with water to freeboard (net levee grade) for river levees or with SWL and waveload for hurricane protection levees
F.S. = 1.0 with SWL & 2' freeboard

S-Case

F.S. = 1.2 with water to flowline or SWL + waveload (if applicable) for hurricane protection levees
F.S. = 1.0 with water to freeboard (net levee grade) for river levees

Select the maximum penetration from the above analyses. Since the E-99 test section, at maximum head, had about a 3:1 penetration to head ratio, the above design procedure should primarily be applied to this or greater penetration to head ratios. The primary intent of this revised criteria is to prevent excessive sheet pile penetrations which do not improve either sheet pile or overall levee stability. If the penetration to head ratio is less than about 3:1, increase it to 3:1 or to that required by the S-case, F.S. = 1.5, whichever results in the least penetration. Further study may allow this restriction to be eliminated.

* use SWL or flowline to calculate head for

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2. Also enclosed is a CEWES-GE memorandum which summarizes the results of a finite element study (see 2d and 3d endorsements to ref 5a). In short, this study indicates that, for a sheet pile wall driven into a levee founded on very soft to soft clays, the majority of lateral sheet pile movement during flood loading will likely be due to deep seated foundation movement and not due to sheet pile flexural deflection. Driving the sheet pile deeper has little effect on overall levee stability, or after some limiting depth, on flexural deflection at the top of the wall. This data reinforces the conclusions reached in the E-99 report that excessive sheet pile penetrations are not warranted.

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FACSIMILE HEADER SHEET
(ENG 303-1-R)

FROM (Name) R. Jackson	OFFICE SYMBOL CELMV-ED-G	TELEPHONE NO. X 5898	RELEASER'S SIGNATURE		
TO (Name) C. Kim	OFFICE SYMBOL CELMN-ED-FS	TELEPHONE NO. X103 2	# PAGES 20	PRECEDENCE Priority	DTG