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EUSTIS ENGINEERING
GEOTECHNICAL ENGINEERS
3011 28th Street • Metairie, Louisiana 70002 • 504-834-0157

31 August 1988

Modjeski and Masters
Consulting Engineers
Room 510
1055 St. Charles Avenue
New Orleans, Louisiana 70113

Attention Mr. Barney T. Martin, Jr

Gentlemen:

Geotechnical Analyses
Metairie Relief Canal
(17th Street Canal)
OLB Project No. 2043-0222
New Orleans, Louisiana

This report contains the results of revised cantilever floodwall analyses and revised slope stability analyses for the proposed modifications along the Orleans side of the Metairie Relief Canal between Stations 553+70 and 670+00. These analyses were authorized by letter dated 23 March 1988 from Mr. Alan J. Francingues, Assistant Chief Engineer for the Board of Levee Commissioners of the Orleans Levee District. The analyses were based on the following information.

1 Soil stratification and parameters contained in Eustis Engineering's report for the subject project dated 2 November 1981.

2) Cross-sections of the proposed modifications furnished by Modjeski and Masters.

3) Revised design criteria for cantilever sheetpile analyses furnished in a copy of a letter dated 4 January 1988 from the Department of the Army, Mississippi River Commission to the New Orleans District, Corps of Engineers.

4 A minimum acceptable factor of safety of 1.3 for landside and floodside slope stability analyses.

Based on soil parameters, cross-sections and flowline elevation, the project alignment was divided into eight (8) reaches for performance of the analyses, and these are shown on Enclosures 1 through 8 along with the results of the computations. Results of the cantilever sheetpile analyses are tabulated below.

Reach	Recommended Tip Elevation NGVD	Maximum Bending Moment Ft-Kips/Linear Foot Factor of Safety = 1.5
553+70 to 568+00	-12.8	13.1
568+00 to 589+00	-12.8	13.1
589+00 to 614+00	-7.9	7.3
614+00 to 625+00	-6.8	5.1
625+00 to 635+00	-4.9	5.2
635+00 to 643+00	0.6	1.9
643+00 to 663+00	0.0*	**
663+00 to 670+00	0.0*	**

*Based on seepage.
**Negligible.

It should be noted that a very small penetration and bending moment would be required in the reaches extending between Stations 643+00 to 663+00 and Stations 663+00 to 670+00 due to a flowline at el 12.6 and a levee crown at el 12.5. However, information furnished by the Corps of Engineers indicates that a minimum penetration to el 0.0 will be required for seepage.

According to Mr. George Romero of the Corps of Engineers during a recent meeting, sheetpile stress must be determined using the maximum bending moment computed from the loading condition resulting in the deepest sheetpile tip embedment. After the sheetpile has been selected to satisfy the bending moment criteria, it should be checked for deflection using the lateral pressure diagram resulting from a factor of safety of 1.0 applied to the Q-case soil strengths and a high water level 2 feet above SWL.

Analyses utilizing the Method of Planes analysis indicate a minimum factor of safety of at least 1.3 against potential landside and floodside slope stability failures in all eight reaches.

Modjeski and Masters

31 August 1988

Critical active and passive wedge locations and typical computations are shown on the enclosures

If you have any questions regarding these analyses, please call us.

Yours very truly,

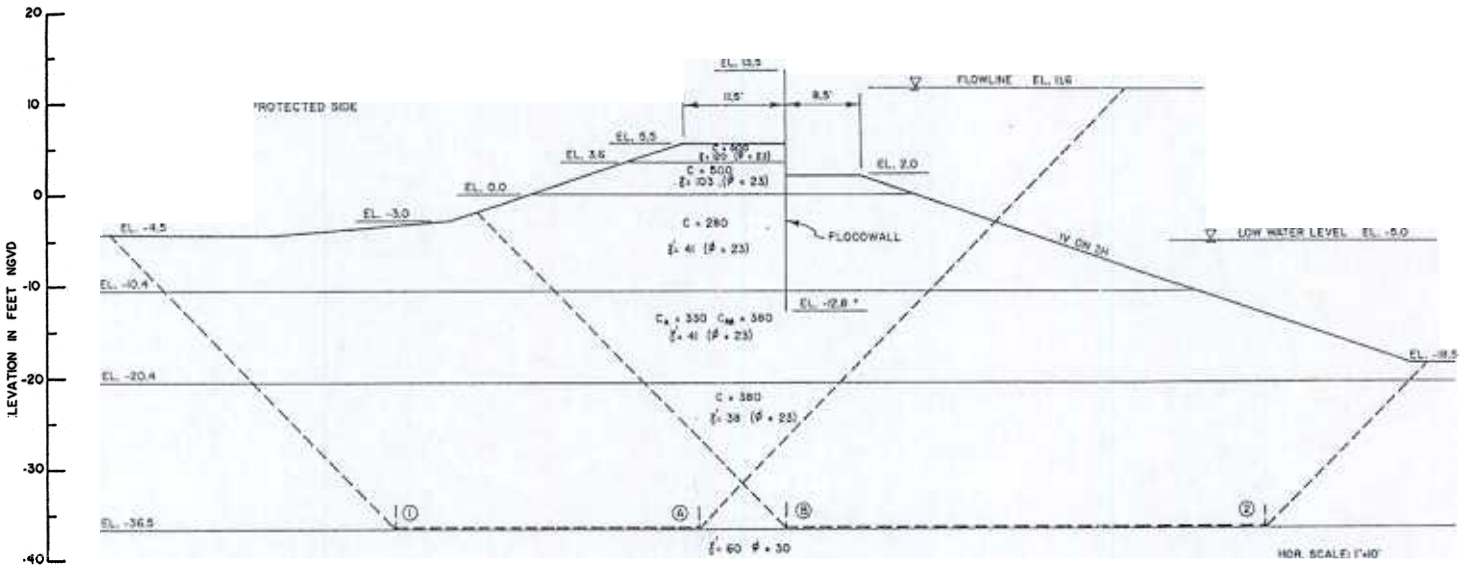
EUSTIS ENGINEERING

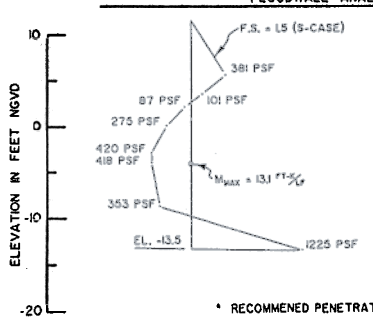
Lloyd A. Held, Jr.

L. J. Napolitano:bh

Enclosures 1 through 8

EE 10214





SEE ENCLOSURE 2

* RECOMMENED PENETRATION BASED ON 3 ON 1 RATIO

STABILITY ANALYSES

FAIL PLANE	DRIVING FORCE		RESISTING FORCE			FACTOR OF SAFETY
	D_A	D_P	R_A	R_b	R_a	
A - 1	76551	3977	22902	12970	22140	1.300
B - 2	48482	8134	23133	20130	13490	1.412

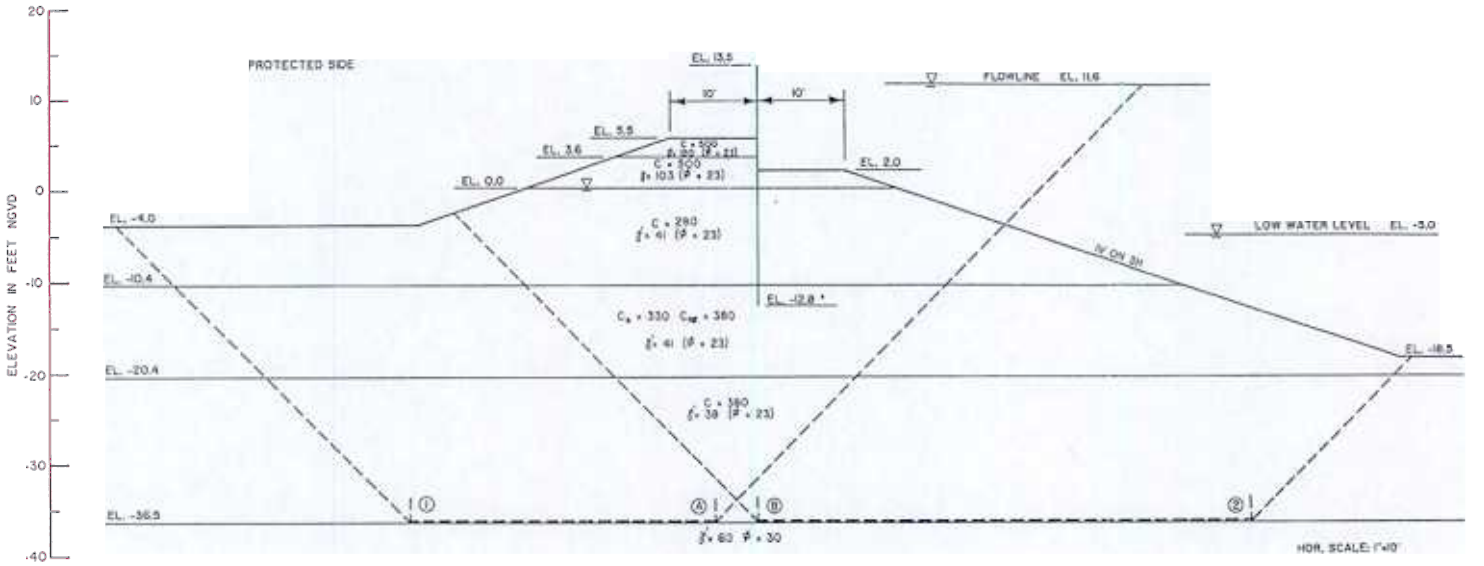
LEGEND

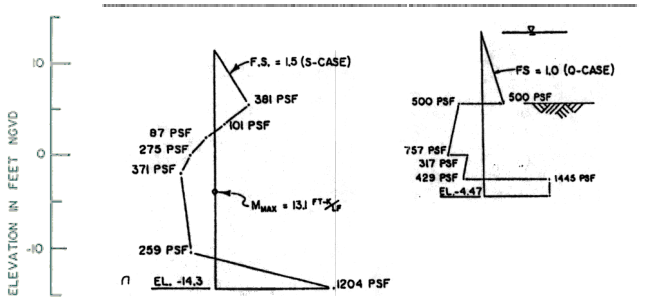
SEE ENCLOSURE 7

STA. 553+70 TO 568+00

METAIRIE RELIEF CANAL
NEW ORLEANS, LOUISIANA

ENCLOSURE 1





* RECOMMENED PENETRATION BASED ON 3 ON 1 RATIO

STABILITY ANALYSES

FAIL PLANE	DRIVING FORCE		RESISTING FORCE			FACTOR OF SAFETY
	D_A	D_P	R_A	R_B	R_P	
A - 1	76784	32884	22479	12920	22420	1.317
B - 2	46802	8134	23190	20900	13490	1.489

LEGEND

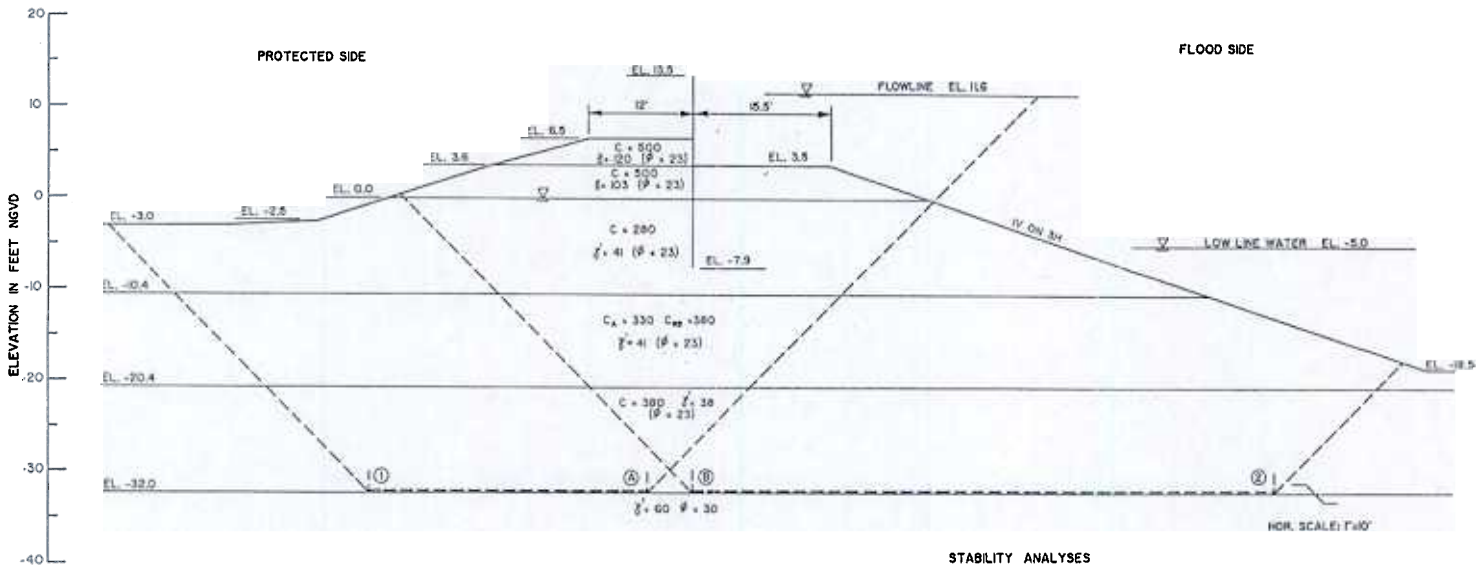
SEE ENCLOSURE 7

STA. 568+00 TO 589+00

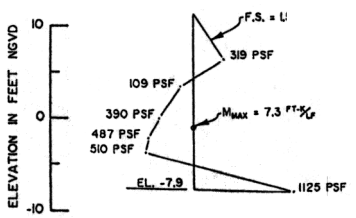
METAIRIE RELIEF CANAL
NEW ORLEANS, LOUISIANA

ENCLOSURE 2

EUSTIS ENGINEERING



FLOODWALL ANALYSES



SEE ENCLOSURE 4

STABILITY ANALYSES

FAIL PLANE	DRIVING FORCE		RESISTING FORCE			FACTOR OF SAFETY
	D_A	D_P	R_A	R_B	R_P	
A - 1	69206	25940	22291	11780	19560	1.331
B - 2	46555	5367	21733	24700	10570	1.384

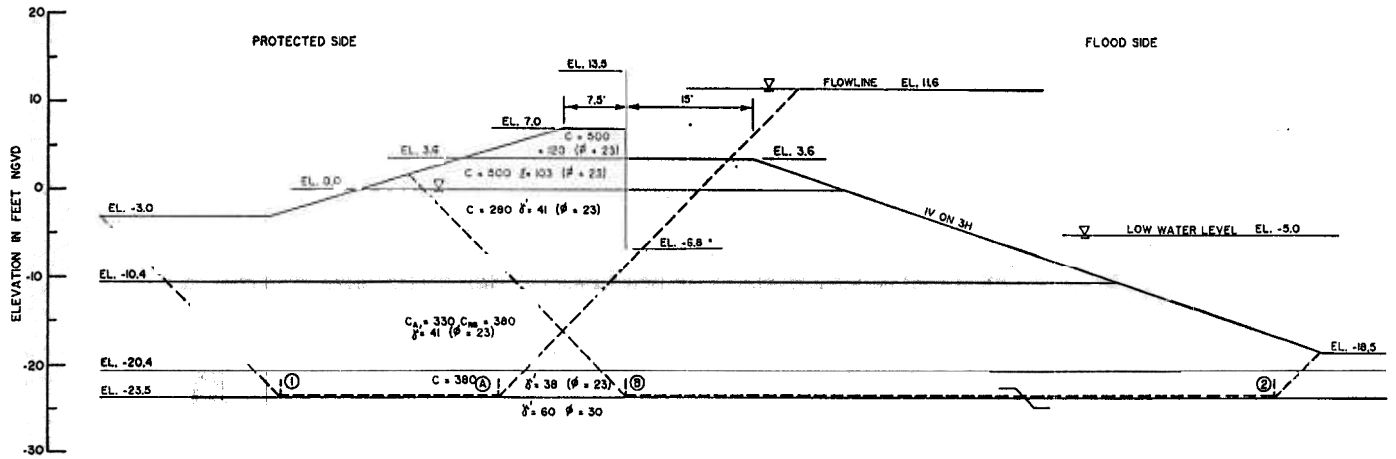
LEGEND

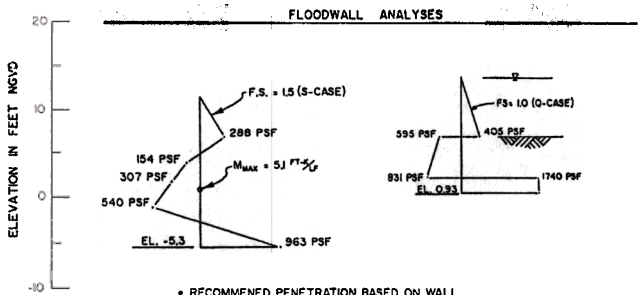
SEE ENCLOSURE 7

STA. 589+00 TO 614+00

METAIRIE RELIEF CANAL
NEW ORLEANS, LOUISIANA

ENCLOSURE 3





* RECOMMENED PENETRATION BASED ON WALL MOVEMENT TOWARDS CANAL. (M_{MAX} = 29 FT-K/LF). DESIGN FOR M_{MAX} = 5.1 FT-K/LF

STABILITY ANALYSES

FAIL PLANE	DRIVING FORCE		RESISTING FORCE			FARTOR OF SAFETY
	D_A	D_P	R_A	R_B	R_P	
A - 1	47018	16859	17824	9500	13100	1.340
B - 2	34626	735	18640	25402	3774	1.411

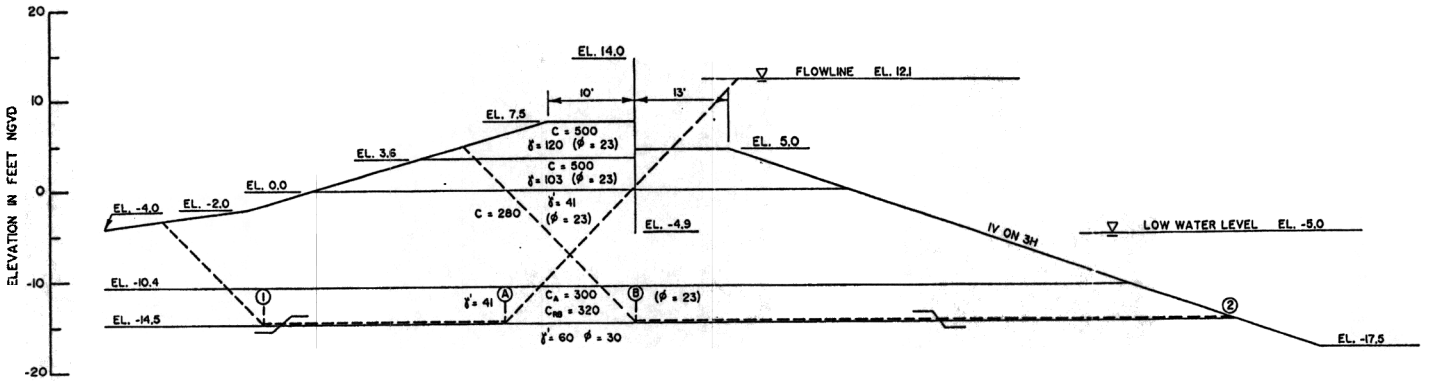
LEGEND

SEE ENCLOSURE 7

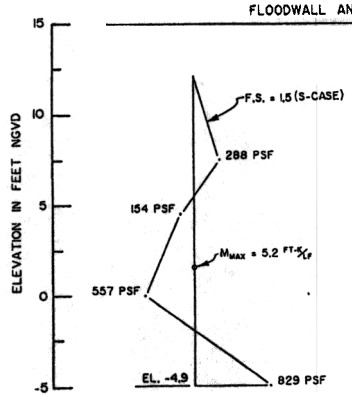
STA. 614+00 TO 625+00

METAIRIE RELIEF CANAL
NEW ORLEANS, LOUISIANA

ENCLOSURE 4



FLOODWALL ANALYSES



SEE ENCLOSURE 4

STABILITY ANALYSES

FAIL PLANE	DRIVING FORCE		RESISTING FORCE			FACTOR OF SAFETY
	D_A	D_P	R_A	R_B	R_P	
A - 1	27024	6948	12784	8640	6511	1.391
B - 2	21582	0	13169	15489	0	1.328

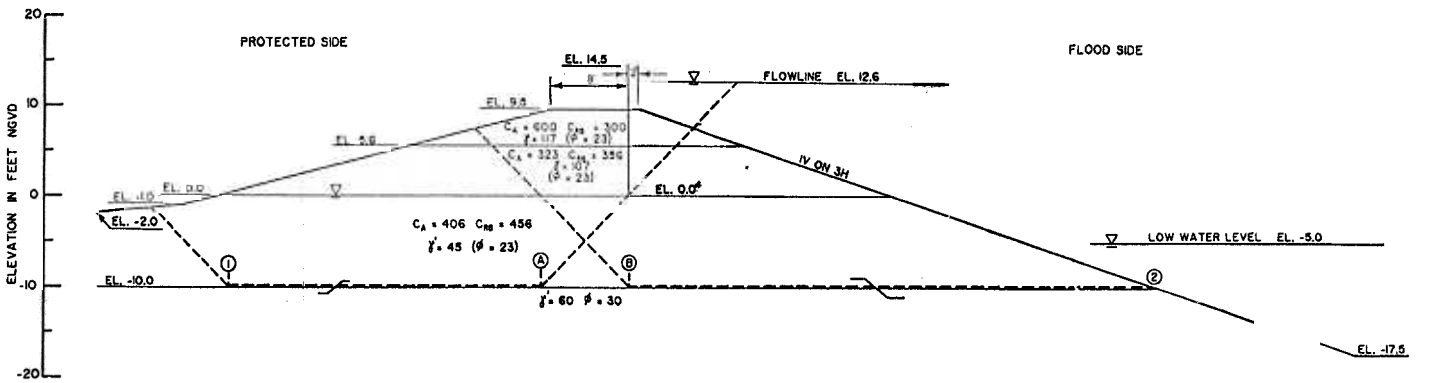
LEGEND

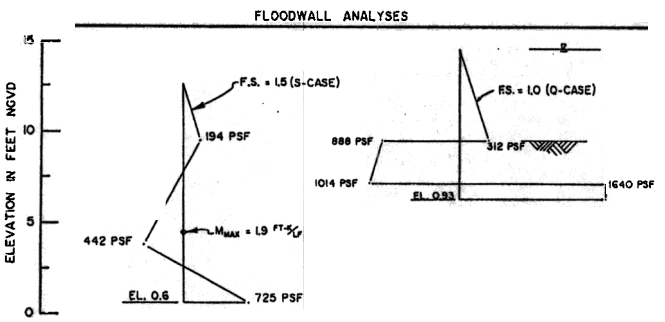
SEE ENCLOSURE 7

STA. 625+00 TO 635+00

METAIRIE RELIEF CANAL
NEW ORLEANS, LOUISIANA

ENCLOSURE 5





STABILITY ANALYSES

FAIL PLANE	DRIVING FORCE		RESISTING FORCE			FACTOR OF SAFETY
	D_A	D_P	R_A	R_B	R_P	
A - 1	19564	1937	13916	14924	7013	2.034
B - 2	18926	0	13818	18676	0	1.717

LEGEND

SEE ENCLOSURE

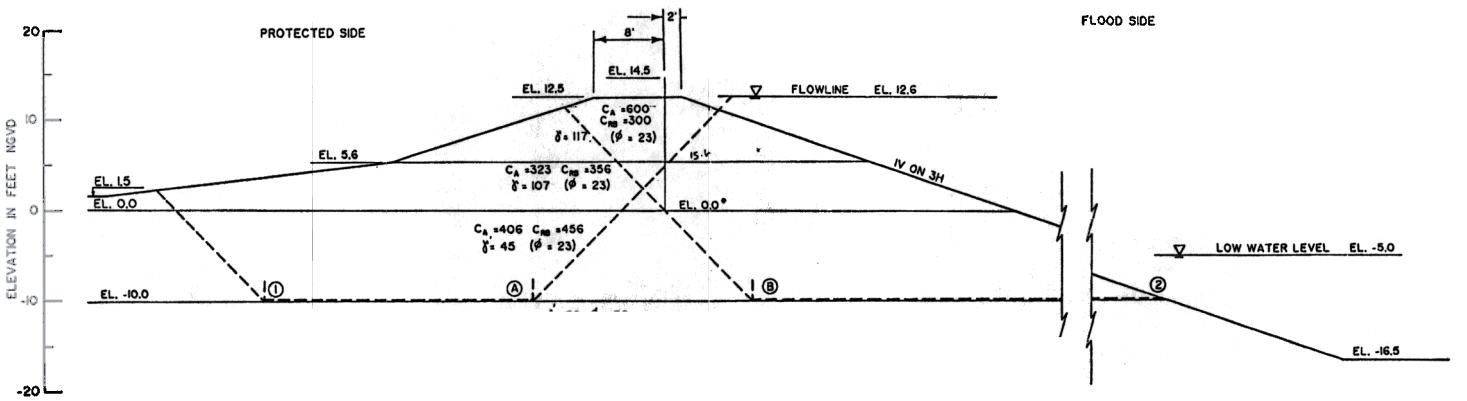
* MINIMUM TIP PENETRATION TO EL.0.0 FOR SEEPAGE.

OK

STA. 635+00 TO 643+00

METAIRIE RELIEF CANAL
NEW ORLEANS, LOUISIANA

ENCLOSURE 6



* MINIMUM TIP PENETRATION TO EL. 0.0 FOR SEEPAGE

STABILITY ANALYSES

FAIL PLANE	DRIVING FORCE		RESISTING FORCE			FACTOR OF SAFETY
	D_A	D_P	R_A	R_B	R_P	
A - 1	24248	5878	18385	13680	9553	2.266
B - 2	26116	0	18728	16231	0	1.339

8:0
3617.6
7260

LEGEND

C_A = AVERAGE COHESION IN PSF

C_{RB} = COHESION ALONG FAILURE PLANE IN PSF

γ' = SATURATED UNIT WEIGHT IN PCF

γ' = SUBMERGED UNIT WEIGHT IN PCF

ϕ = ANGLE OF INTERNAL FRICTION IN DEGREES

D_A & D_P = DRIVING FORCES IN LBS.

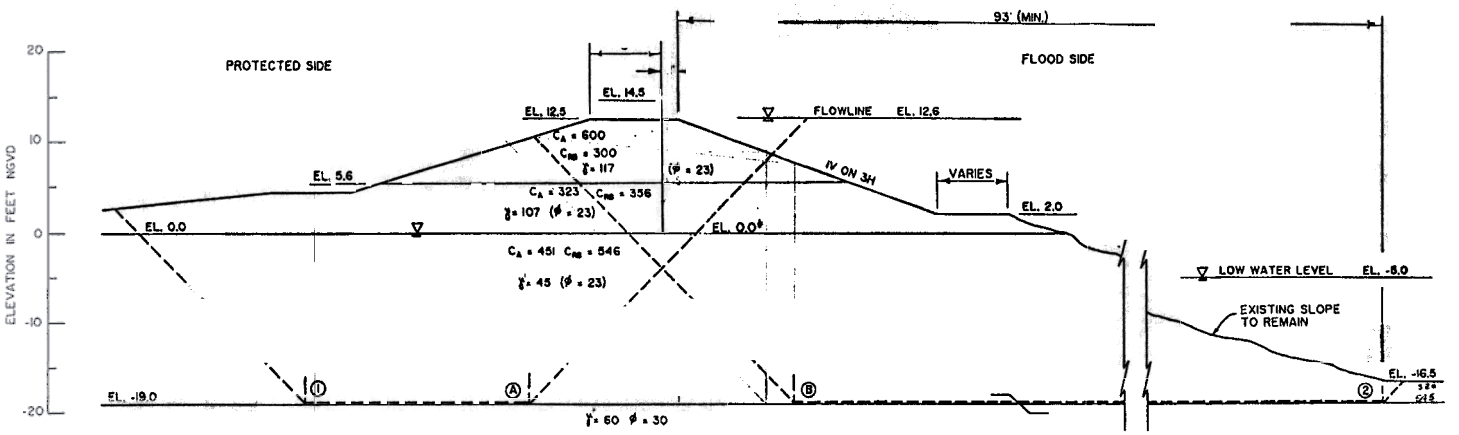
R_A R_B & R_P = RESISTING FORCES IN LBS.

M_{MAX} = MAXIMUM BENDING MOMENT IN FT-LBS

STA. 643+00 TO 663+00

METAIRIE RELIEF CANAL
NEW ORLEANS, LOUISIANA

ENCLOSURE 7



HOR. SCALE: 1"=10'

2.5' x 2' x 5.3 x 4 =

STABILITY ANALYSES

FAIL PLANE	DRIVING FORCE		RESISTING FORCE			FACTOR OF SAFETY
	D_A	D_P	R_A	F_B	R_P	
A - 1	41543	18346	24400	13650	20045	2.505
B - 2	44386	141	26682	29423	2380	1.322

$D_A - D_P$ = 44,245 25963 26711 845

2255 = (2)(2.5')(451) = 2255

LEGEND

SEE ENCLOSURE 7

STA. 663+00 TO 670+00

METAIRIE RELIEF CANAL
NEW ORLEANS, LOUISIANA

ENCLOSURE 8