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Modjeski and Masters
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1055 St. Charles Avenue
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Attention Mr. Barney Martin

Gentlemen:

Floodwall and Slope Stability Reanalysis
Sewerage and Water Board of New Orleans
Metairie Relief Canal
Station 539+00 to Station 670+00
Orleans and Jefferson Parishes, Louisiana

This report contains the results of floodwall analyses, slope stability analyses and other pertinent analyses based on revised high and low water elevations furnished by the Corps of Engineers and Modjeski and Masters. The furnished water elevations for the analyses are as follows:

<u>Locations</u>	<u>Still Water</u>	<u>Still Water + Free Board</u>	<u>Low Water</u>
Lake Ponchartrain to Veterans Blvd. Bridge	32.0 C.D.	34.0 C.D.	15.5 C.D.
Veterans Blvd. Bridge to I-10 Bridge	32.5 C.D.	35.0 C.D.	15.5 C.D.
I-10 Bridge to Railroad Bridge	33.0 C.D.	35.0 C.D.	15.5 C.D.

Subsoil stratification, soil parameters and cross-sections (except between Stations 635+00 and 670+00) are contained in our previous reports for the subject project as follows:

- a) Station 539+00 to Station 554+00. Subsoil stratification and soil parameters are shown on Figure 27 of our report dated 27 October 1981. Cross-sections are contained in

the supplemental letters to that report dated 11 November 1981 and 11 December 1981. A typical cross-section through this reach is shown on Enclosure 1 of that report.

- b) Station 554+00 to Station 635+00. Subsoil stratification and soil parameters are shown on Figure 164 of our report dated 2 November 1981. Cross-sections are shown on Figures 165, 166, 167 and 168 of the report.
- c) Station 635+00 to Station 670+00. Subsoil stratification and soil parameters are shown on Figure 164 of the report dated 2 November 1981. However, it is understood that the cross-section shown on Figure 169 of this report will be revised. In this reach, the existing levee will be raised to el 33.0 C.D. and a sheetpile floodwall driven in the levee crown one foot from the canal side edge. The top of the floodwall will be at el 35.0 C.D. and the canal and levee slopes will be 1 vertical on 3 horizontal.
- d) Station 617+50 to Station 663+00. Subsoil stratification, soil parameters and typical cross-sections are shown on Figure 20 of our report dated 23 August 1982.

Floodwall Analyses

Except for the floodwall between Stations 539+00 and 554+00 on the Jefferson side, the high water condition is critical and the floodwall will consist of cantilever sheetpiles. On the Jefferson side between Stations 539+00 and 554+00, the low water condition is critical and the floodwall will consist of sheetpiles anchored at el 25.5 C.D. A factor of safety of 1.5 was applied to the soil shear strengths to determine the required sheetpile penetration. A factor of safety of 1.0 was applied to the soil shear strengths to determine the maximum bending moment and required anchor force. Results of the computations are summarized in the following tabulation and typical lateral pressure diagrams are shown on Enclosure 1.

<u>Locations</u>	<u>Water Elev.-C.D.</u>	<u>Sheetpile Tip Elev. C.D.</u>	<u>Maximum Moment Ft.-K/L.F.</u>
① Stations 539+00 to 554+00 Orleans Side	34.0	-17.0	41.8 @ El. 10.5
② Stations 539+00 to 554+00 Jefferson Side	15.5	-27.0	41.8* @ El. 10.5
③ Stations 554+00 to 589+00 Orleans & Jefferson Sides	34.0	-17.1	23.0 @ El. 16.5

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	<u>Locations</u>	<u>Water Elev.-C.D.</u>	<u>Sheetpile Tip Elev. C.D.</u>	<u>Maximum Moment Ft.-K/L.F.</u>
④	Stations 589+00 to 614+00 Orleans & Jefferson Sides	34.0	- 2.0	14.6 @ El. 20.0
⑤	Stations 614+00 to 625+00 Orleans & Jefferson Sides	34.0	8.9	9.0 @ El. 22.0
⑥	Stations 625+00 to 635+00 Orleans & Jefferson Sides	35.0	10.4	8.9 @ El. 23.0
⑦	Stations 635+00 to 670+00 Orleans & Jefferson Sides	35.0	25.9**	0.3 @ El. 31.0

*An anchor force of 4.3 K/LF is indicated.

**A minimum penetration to El. 21.0 is recommended.

Slope Stability Analyses

Slope stability analyses of the proposed levee and canal improvements were based on a low water elevation of 15.5 C.D. in the canal and the Corps of Engineers' Method of Planes Analysis. Results of these analyses are summarized in the following tabulation and typical computations are shown on Enclosure 1.

<u>Locations</u>	<u>Factor Of Safety</u>
Stations 539+00 to 554+00 (Orleans Side)	1.418
Stations 539+00 to 554+00 (Jefferson Side)	*
Stations 554+00 to 589+00 (Both Sides)	1.211
Stations 589+00 to 614+00 (Both Sides)	1.207
Stations 614+00 to 625+00 (Both Sides)	1.217
Stations 625+00 to 635+00 (Both Sides)	1.208
Stations 635+00 to 670+00 (Both Sides)	1.297

*Analyses not performed but, by inspection, factor of safety is greater than 1.418.

Landside slope stability analyses were previously performed and results are shown on Figure 20 of our report dated 23 August 1982. However, as previously indicated, the cross-section

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shown at Station 646+00 has been revised and, therefore, additional landside stability analyses may be required. These analyses will be performed when the final levee configuration is determined and the results of the test section have been evaluated.

Settlement Analyses

The proposed cross-section between Stations 635+00 and 670+00 indicates a levee crown at el 33.0 C.D. Since the great majority of the existing levee through this reach on the Jefferson side is at el 33.0 C.D., very little fill will be required and settlement of the levee should be negligible. On the Orleans side, the existing levee crown ranges between el 30.0 and 31.0 C.D. throughout most of the reach. For purposes of the computations, a 3-ft thick fill height and a 30-ft crown width were assumed. The computations indicate a total estimated settlement of 3 to 4 inches including consolidation of the subsoils and shrinkage in the fill material.

Uplift Analysis

Reference is made to Figure 20 of our report dated 23 August 1982 which shows analyses to determine the potential for a blow-out at the landside toe of the levee due to hydrostatic uplift pressure in the underlying stratum. These analyses were revised based on the revised high water elevations furnished by the Corps of Engineers, and the results are summarized below.

<u>Locations</u>	<u>Water Elev. C.D.</u>	<u>Factor Of Safety</u>
Lake Ponchartrain to Sta. 617+50	32.0	1.03
Sta. 617+50 to Sta. 663+00	33.0	0.51
Sta. 663+00 to Pump Station	33.0	0.97

These revised computations indicate the possibility of a blow-out between Station 617+50 and the Pump Station. Unless the results of the test section indicate a substantial reduction in hydrostatic pressure, precautions must be taken to prevent a blow-out during high water conditions between Stations 617+50 and the Pump Station.

Yours very truly,
EUSTIS ENGINEERING COMPANY

LN:kd1
Enclosure 1

By 
John W. Roach, Jr.