

**US Army Corps
of Engineers**

New Orleans District

RETURN TO
GENERAL ENGINEERING BRANCH
PERIODIC INSPECTION
STRUCTURES INSPECTION UNIT

LAKE PONTCHARTRAIN, LOUISIANA AND VICINITY
CHALMETTE AREA PLAN

**BAYOU BIENVENUE CONTROL STRUCTURE
PERIODIC INSPECTION REPORT NO. 8**

24 MARCH 1999

CEMVD-ET-EG (CEMVN-ED-GE/9 Aug 99) (11-2-240a) 3d End
Stagg/ts/5644
SUBJECT: 1999 Periodic Inspection No. 8 for Bayou Bienvenue
Control Structure

CDR, Mississippi Valley Division, Vicksburg, MS 39181-0080
19 November 1999

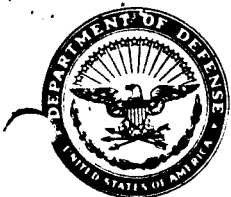
FOR Commander, New Orleans District, ATTN: CEMVN-ED-GE

Information furnished by 2d Endorsement is satisfactory. No
further action on this chain of correspondence is required.

FOR THE COMMANDER:


J. R. MCCORMICK, JR., P.E.
Acting Chief, Engineering Division

Encl
wd



REPLY TO
ATTENTION OF:

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

CEMVN-ED-GE

9 Aug 99

MEMORANDUM FOR Commander, Mississippi Valley Division,
ATTN: CEMVD-ET-EG

SUBJECT: 1999 Periodic Inspection Report No. 8 for Bayou Bienvenue Control Structure

1. Subject report is submitted for your information and concurrence (Encl 1).
2. The Technical Review was conducted as outlined in Enclosures 2 and 3.

FOR THE COMMANDER:

Robert J Farley
for GERARD S. SATTERLEE JR.
Acting Chief, Engineering Division

3 Encls.

1. Periodic Inspection
Report No. 8 (4 cys)
2. Quality Control Plan
3. Design/Review Activities

CEMVD-ET-EG (CEMVN-ED-GE/9 Aug 99) 1st End Stagg/ts/5644
SUBJECT: 1998 Periodic Inspection Report No. 8 for Bayou
Bienvenue Control Structure

CDR, Mississippi Valley Division, Vicksburg, MS 39181-0080
30 August 1999

FOR Commander, New Orleans District, ATTN: CEMVN-ED-GE

The following comments are provided on the subject report:

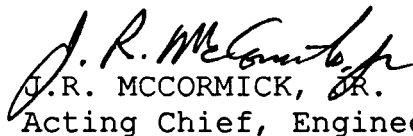
a. Paragraph 5-03e(2) Page V-6 and Paragraph 6-02d(2) Page VI-2. The referenced paragraph on page V-6, states that the "sand or grit" observed on the mechanical equipment should be removed to prevent damage to the equipment. We concur in this proposed action, and although the paragraph did not specifically state it, it was also assumed that this action would proceed as soon as possible, since sand in a bearing assembly (ball bearings, bronze bushings, etc.) is not a desirable condition. However, the referenced paragraph on page VI-2, indicates that the equipment may not be cleaned for as long as several months. Therefore, paragraph 6-02d(2) should be revised to say that the abrasive materials will be removed from the operating equipment without delay.

b. Paragraph 4-03.d.2 Channel Scour. This paragraph states the existing bank stability factor of safety is essentially 1.0 between Stations 16+50 and 18+00. A recommendation should be included in Section VI-Conclusions and Proposed Remedial Actions addressing this issue.

c. Paragraph 6-02.j. Instrumentation. This paragraph states the bench mark will be replaced prior to the next scheduled instrumentation survey in 2003. This should be established as soon as possible and surveys taken prior to the next scheduled reading for base line readings.

FOR THE COMMANDER

3 Encls
1. wd 2 cys
2-3. wd


J.R. MCCORMICK, JR.
Acting Chief, Engineering Division

CEMVN-ED-GE (CEMVN-ED-GE/9 Aug 99) 2nd End Mr. Chryssoverges/504-862-1009
SUBJECT: 1999 Periodic Inspection No. 8 for Bayou Bienvenue Control Structure

CEMVN-ED

15 October 1999

FOR Commander, Mississippi Valley Division, ATTN: CEMVD-ET-EG

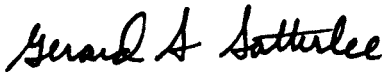
The disposition of the comments presented in the 1st endorsement follows:

a. Paragraph 5-03e(2) Page V-6 and Paragraph 6-02d(2) Page VI-2. Concur. The Orleans Levee District has been notified that the abrasive material needs to be removed from the operating machinery as soon as possible. Paragraph 6-02d(2) has been revised accordingly. See enclosure 4.

b. Paragraph 4-03.d.2 Channel Scour. Concur. The following recommendation has been added to Section VI: "The scour noted between 16+50 and 18+00 will continue to be monitored." See enclosure 5. Additional action within the purview of the inspection program is not warranted. The scoured area is over 300 feet away from the end of the guidewall and a failure of the bank slope would not impede the operation or jeopardize stability of the structure. Scour repairs were completed between ranges 13+88 and 16+00 in May 1984. The pre-repaired bank sections at ranges 15+00 and 16+00 look similar to the current bank sections between ranges 16+50 and 18+00. Surveys since 1986 have indicated a progressive erosion of the underwater slope. The underwater toe of the bank slope has migrated approximately 30 feet landward and deepened over 12 feet since the base survey was taken in April 1984.

c. Paragraph 6-02.j. Instrumentation. Concur. The paragraph has been revised to indicate that new benchmarks will be installed in FY 2000 along with base line readings taken for the settlement marks. Repainting of the identification numbers for the settlement markers will also be accomplished at the same time. See enclosure 5.

5 Encls
wd 1-3
added 2 encls
4-5. as


GERARD S. SATTERLEE, JR., P.E.
Chief, Engineering Division

**U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
QUALITY CONTROL PLAN
PERIODIC INSPECTION REPORT**

Project Title: 1999 Periodic Inspection Report No. 8 for Bayou Bienvenue Control Structure.

Authority: Authority to inspect the subject lock is provided by ER 1110-2-100, subject "Periodic Inspection and Continuing Evaluation of Completed Civil Works Structures", dated 15 February 1995. The Periodic Inspection was performed in accordance with the subject regulation.

Quality Control Plan: The Quality Control is the function whereby policies, standards, procedures, and format are used to control the quality of the work produced.

Preinspection Brochure. A preinspection brochure was prepared in advance of the project inspection in order to familiarize inspection team members with the control structure general features and project history. The brochure included a checklist that was used during the inspection to highlight areas of concern.

Periodic inspection Report. The Periodic Inspection Report presents the results and conclusions of the engineering inspection and data evaluation to evaluate the structural integrity and operational adequacy of the control structure. The report also presents recommended remedial actions to correct any noted deficiencies. The inspection and report were accomplished in accordance with the subject ER.

In-House Technical Review. The New Orleans District (NOD) performed an in-house review to achieve the desired quality control on various project tasks and to check for format, adequacy and accuracy of the report. A copy of the quality control plan is filed in Gen & Env Des Section. These reviews were conducted in-house because the necessary expertise was located within NOD. These reviews ensure the accuracy of the report and ensure the inspection and reporting were conducted in accordance with ER 1110-2-100. A copy of NOD's quality control plan with all endorsements to the report will be included with the file copy of the Periodic Inspection Report.

Periodic Inspection Team

Brown, Cunningham & Gannuch, Inc.

<u>Name</u>	<u>Function</u>	<u>Registered</u>
Silas Cunningham	Structural Engineer	Yes/Civil
Luther Newton	Project Engineer	Yes/Civil
Richard Nicholas	Electrical Engineer	Yes/Elect
Mel Stegall	Geotechnical Engineer	Yes/Civil
Robert White	Mechanical Engineer	Yes/Mech

**U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
QUALITY CONTROL PLAN
PERIODIC INSPECTION REPORT**

Corps of Engineers – New Orleans District

<u>Name</u>	<u>Function</u>	<u>Office</u>	<u>Ext.</u>	<u>Registered</u>
Walter Baomy	C/Gen & Env Des Sec	ED-GE	2656	Yes/Civil
Joseph Chryssoverges	Inspection Coordinator/ Civil Engr	ED-GE	1009	No/EIT
Brian Keller	Project Manager/ Civil Engr	OD-R	2344	No/EIT
Amy Powell	Civil Engr	OD-R	2241	No/EIT

Mississippi River Commission

<u>Name</u>	<u>Function</u>	<u>Office</u>	<u>Registered</u>
Frank Johnson	Structural Engineer	CEMVD-ET-ES	Yes/Civil

Louisiana Department of Transportation and Development

Ennis Johnson	District 02 Design
John Monzon	District 02 Design

Orleans Levee District


Steve Spencer	Chief, Engineering
C.A. Wethern	Engineering
Guy Dietsch	Electrical Maintenance

Corps of Engineers – New Orleans District - Technical Review Team


<u>Name</u>	<u>Function</u>	<u>Office</u>	<u>Ext.</u>	<u>Registered</u>
Walter Yes/Civil Baomy	C/Gen & Env Des Sec	ED-GE	2656	Yes/Civil
Glenn Felger	Review Team Manager	ED-E	2601	No/EIT
Paul Salassi	Technical Reviewer/Civil Tech	ED-GE	2714	-----

DESIGN/REVIEW ACTIVITIES

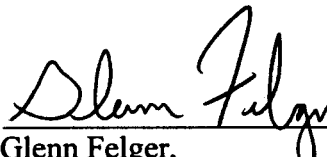
<u>TASK</u>	<u>DATE COMPLETED</u>
Prepare preinspection brochure	19 Feb 99
Preinspection meeting and finalize schedule for inspection	18 Mar 99
Perform periodic inspection	24 Mar 99
Assemble draft report	03 May 99
Perform in-house review, and resolve Comments	29 Jun 99
Prepare final report	03 Aug 99
Submit report to MRC	09 Mar 99




Joseph Chryssoverges,
Inspection Coordinator



Date



Glenn Felger,
Technical Review Manager



Date

d. Mechanical.

(1) Orleans Levee District (OLD) was notified that the wire ropes used to activate the gate sectors should be adjusted (tightened) such that they do not jump out of the sheaves as soon as the work could be scheduled. The work was completed in July 1999 by OLD.

* (2) OLD has been notified that the abrasive material needs to be removed from the operating equipment as soon as possible. *

e. Electrical.

(1) The frequency meter on the generator set will be repaired or replaced by March 2000.

(2) OLD was notified that the defective (damaged insulation) load side conductors for the east gate sector should be replaced as soon as the work could be scheduled. This work was done in July 1999 by OLD.

(3) The east gate sector indicator light system will be checked out, and as appropriate the limit switch and/or indicator light repaired or replaced. This will be done by March 2000.

(4) The lights in the control rooms will be cleaned by March 2000.

(5) When the fluorescent fixtures in the machinery recesses deteriorate such that they need replacing, high quality (more durable) gasketed fixtures will be installed.

(6) OLD was notified that the broken weather proof cover on the receptacle near the access stair should be replaced as soon as the work could be scheduled. This work was done in July 1999 by OLD.

(7) All receptacles will be replaced with GFCI type receptacles by March 2000.

f. Floodwalls. The appropriate additional "As Built" drawings showing the recently constructed floodwalls, and a narrative explaining the modifications to the floodwalls, will be included in the preinspection brochure for the Periodic Inspection No. 9.

g. Embankments. The backfill areas behind the wing walls will continue to be monitored. Any depressions noted will be filled in.

h. Guidewalls and Dolphins. Guidewall and dolphin members will be closely inspected semiannually, and deteriorated members will be replaced as necessary to maintain the integrity of the guidewalls and dolphins. Prior to the next scheduled unwatering, NOD and OLD will make a detailed inspection and evaluation of the guidewalls and dolphins, and will determine if major repairs or replacement of the guidewalls and dolphins should be undertaken.

i. OLD will evaluate removal of the dock for public safety and liability concerns.

j. Instrumentation.

* (1) NOD will re-establish reliable bench marks during FY 2000. Settlement readings will also be taken to establish base line readings and the identification numbers for the settlement markers will be repainted. *

*k. Channel Scour. The scour noted between station nos. 16+50 and 18+00 will be monitored. OLD will visually inspect the area on a semiannual basis and report any *

* problems to NOD. Surveys will continue to be taken at five year intervals. *

6-03. Next Inspection. The next periodic inspection of Bayou Bienvenue Control Structure is tentatively scheduled for March 2004.

BAYOU BIENVENUE CONTROL STRUCTURE
PERIODIC INSPECTION REPORT NO. 8

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LAKE PONTCHARTRAIN, LOUISIANA AND VICINITY
CHALMETTE AREA PLAN

BAYOU BIENVENUE CONTROL STRUCTURE

PERIODIC INSPECTION REPORT NO. 8

24 MARCH 1999

PREPARED BY:

BROWN, CUNNINGHAM & GANNUCH, INC.

FOR

U. S. ARMY ENGINEER DISTRICT

CORPS OF ENGINEERS

NEW ORLEANS, LOUISIANA

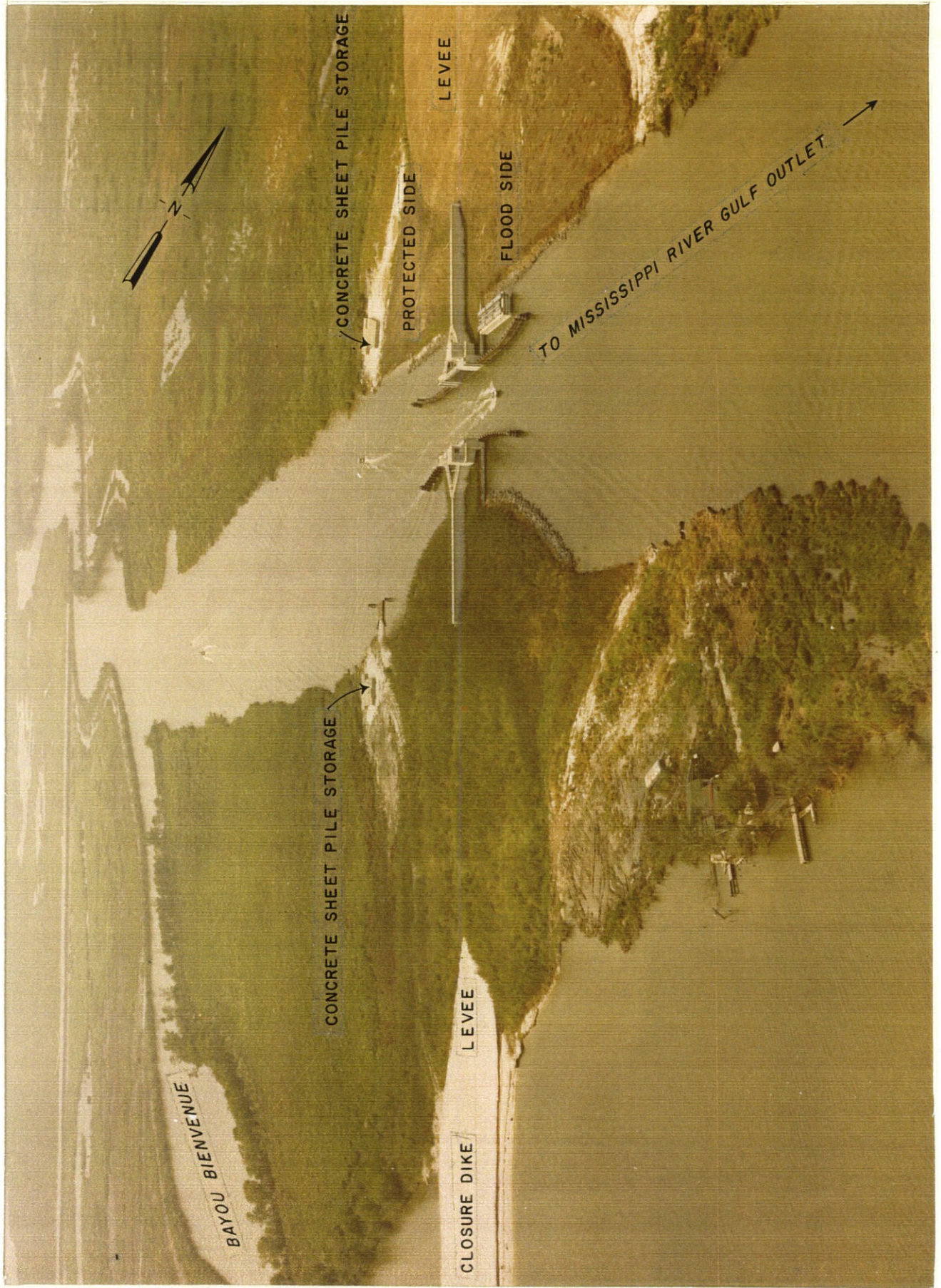


PHOTO TAKEN 27 SEPTEMBER 1974

BAYOU BIENVENUE CONTROL STRUCTURE

BAYOU BIENVENUE CONTROL STRUCTURE

SUMMARY

Periodic Inspection No. 8 of the Bayou Bienvenue Control Structure was conducted on 24 March 1999 by the Brown, Cunningham & Gannuch, Inc. inspection team, a representative of the Mississippi River Commission, representatives of the New Orleans District (NOD), the Louisiana Department of Transportation and Development (LaDOTD), and representatives of the Orleans Levee District (OLD). Observations made during the periodic inspection indicate that the structure is structurally sound and in good condition.

Some remedial actions are required. The deficiencies noted are not critical and will be corrected as discussed in Section VI.

PREVIOUS PERIODIC INSPECTION REPORTS

<u>Report No</u>	<u>Dated</u>	<u>Approved</u>
1	31 OCT 73	17 APR 74
2	27 JUL 79	30 MAY 80
3	31 MAR 83	14 MAR 84
4	7 MAR 85	17 OCT 85
5	29 MAR 88	17 JAN 89
6	25 JUL 91	17 AUG 92
7	30 MAR 94	10 MAR 95

BAYOU BIENVENUE CONTROL STRUCTURE
PERIODIC INSPECTION REPORT NO. 8

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REVISED

SEE ENCL 5

INSTRUMENTATION PLATES

APPENDIX A
MRC TRIP REPORT

APPENDIX B
CEMVN-ED-GE Trip Report of Mini-Inspection of Bayou Bienvenue Control Structure
in a dewatered condition.

APPENDIX C
Orleans Levee Board Project No. 2880-2, Bayou Bienvenue Control Structure, Second
Maintenance Cycle (Dewatering, Painting, and Miscellaneous Repairs), Final Report,
August 7, 1997.

APPENDIX D
Product Information on Coatings Applied on the Sector Gates and Needle Girders by
Orleans Levee Board.

SECTION I - INTRODUCTION

1-01. Authority. Authority is provided by ER 1110-2-100, subject "Periodic Inspection and Continuing Evaluation of Completed Civil Works Structures", dated 15 February 1995.

1-02. Purpose and Scope. The results and conclusions of the inspection and evaluation for assuring the structural integrity and operational adequacy of the control structure are presented herein.

1-03. Datum. All elevations, unless otherwise indicated, are in feet and refer to the National Geodetic Vertical Datum (N.G.V.D.), formerly Mean Sea Level (M.S.L.).

SECTION II - PROJECT DESCRIPTION AND BACKGROUND

2-01. General. The Bayou Bienvenue Control Structure is a feature of the Chalmette Area Plan of the Lake Pontchartrain, Louisiana, and Vicinity Hurricane Protection project authorized by Public Law 298, 89th Congress, 1st Session, approved 27 October 1965.

The Bayou Bienvenue Control Structure serves as part of the hurricane protection for the general area and allows water traffic to proceed normally to and from the MR-GO via Bayou Bienvenue. In addition, the structure, together with the Bayou Dupre Control Structure, provides drainage for the area enclosed by the levees. In addition to handling runoff from within the area, the Bayou Bienvenue Control Structure is required to pass drainage from the City of New Orleans.

The structure is located at the eastern edge of Orleans Parish, Louisiana, near the intersection of Bayou Bienvenue and the MR-GO. The structure is located at station 367+60.25 on the MR-GO base line, approximately 400 feet west of the original intersection of Bayou Bienvenue and the MR-GO.

The structure was constructed under Contract No. DACW29-72-C-0064, awarded in January 1972 to T.L. James & Company. It was completed in September 1974 and turned over to local interests for maintenance and operation in accordance with the conditions of local cooperation, as specified by the authorizing law.

The description of the structure, historical and other general background information, are included in Periodic Inspection Report No. 1, which also contains selected construction drawings illustrating typical sections and details. A location map is included in this report

(Plate No. BUN-1). This report is supplementary to previously numbered reports.

SECTION III - OPERATION AND MAINTENANCE DATA

3-01. Operation and Maintenance Problems. There have been no major accidents nor operating problems since the previous periodic inspection of the structure.

3-02. Actions on Deficiencies From Last Inspection. All the proposed remedial actions from the last periodic inspection report have been accomplished by the Orleans Levee District. The remedial actions were accomplished intermittently subsequent to the last inspection, with the last actions accomplished during dewatering of the structure in March 1997. Copies of the New Orleans District and Orleans Levee District reports of the March 1997 dewatering are included herein as Appendixes B and C respectively.

SECTION IV - REVIEW OF DESIGN AND ANALYSIS OF INSTRUMENTATION

4-01. Geotechnical Design Criteria.

a. A descriptive review of the design was presented in Periodic Inspection Report No. 1, 31 October 1973, and revised in September 1974. The original design criteria as presented in this review was used in comparing the original geotechnical design criteria with current geotechnical design criteria.

b. Revised Design Criteria. The following geotechnical design criteria has subsequently been revised.

(1) EM 1110-2-2906, "Design of Pile Foundations," dated 15 January 1991, updated the design requirements for pile foundations.

(2) EM 1110-2-2502, "Retaining and Flood Walls," dated 29 September 1989, updated the design requirements for retaining walls.

(3) Guidance has been provided by MVD regarding lateral earth pressures and drag forces on structures due to backfill settlements.

(4) ETL 1110-2-307, "Flotation Stability Criteria for Concrete Hydraulic Structures," dated 20 August 1987, updated the analysis requirement for flotation.

(5) The seismic risk zones have changed since the original design.

c. Impacts to Design Requirements. The impacts of revisions to the design requirements are as follows:

(1) Pile Foundation. The piling were designed using a factor of safety of 1.75 for compression and 2.0 for tension. Current criteria required a factor of safety of 2.0 for

both tension and compression for normal loading conditions if pile load tests are performed. Pile tests were performed. Also the MVD guidance on drag loads may have yielded higher pile design loads. Based on the instrumentation data, the piling have performed satisfactorily for the loading conditions they have been subjected to.

(2) "I" Type Floodwalls and Wingwalls. The analysis criteria that was used in the early 1970's required a factor of safety of 1.50 in complying active and passive pressures for the project flood loading condition for both of the "Q" case and the "S" case. In the original design analyses, the wall was analyzed for both "Q" case and the "S" case using a factory of safety of 1.5 with a static water level at the top of the wave, and using a factor safety of 1.25 with the dynamic wave force added. The factor of safety was applied to both the active and passive pressures. Current criteria requires a factor of safety of 1.5 for the "Q" case with water to the static water level and a factor of safety of 1.25 when the wave force is added. A factor of safety of 1.2 is required for the "S" case with water to the static water level and the wave loading applied. If the floodwall has no significant wave loading, only the "Q" criteria are applied. The factors of safety are also applied to both the active and passive pressures. In comparison to the current criteria, the original design analyses were more conservative for the "S" case, and were the same as the current criteria for the "Q" case.

(3) Slope Stability. The MVD slope stability design criteria for channels and levees have not changed since the early 1970's. However, the available information does not indicate that the slopes were analyzed for the long-term case. The fact that the slopes have experienced no stability problems indicates they are adequate for the long-term case. Also,

the analysis probably did not consider an earthquake loading since this did not normally influence the design. Earthquake loadings would be even less of a factor with current seismic risk zones.

(4) Cantilevered T-Walls. The loading cases used to develop the wall loads appear to be consistent with current requirements, except possibly for the effect of the MVD guidance regarding lateral earth pressures and drag loads. The pile design procedures using the developed loads meet current standards. Since the pile supported T-walls have performed satisfactorily, the original design is indicated to be adequate.

4-02. Structural Design Criteria.

a. The original structural design criteria were reviewed and compared with current design criteria. The allowable working stresses for concrete and reinforcing steel used in the original design were in accordance with Engineering Manual EM 1110-1-2101, entitled "Working Stresses for Structural Design", dated 1 November 1963 and are as follows:

<u>Concrete</u>	<u>Original Stress (psi)</u>
Compressive Strength (28 days)	3,000
Compression (flexure, with or without axial load)	1,050
Shear: Beams, without web reinforcement	60
Shear: Beams, with web reinforcement	275
Bond (deformed bars): Beams, slab, one-way footings (except top bars)	$\frac{4.8\sqrt{f_c}}{D}$ (500 max.)

Reinforcing Steel

Tension	20,000
Modular Ratio	10

b. Revised Design Criteria. The following design criteria have been revised:

(1) Engineering Manual EM 1110-1-2101, "Working Stresses for Structural Design", was updated to require the "Strength" method of analysis, similar to the requirements of the American Concrete Institute, for all concrete structures. The latest concrete design criteria is contained in EM 1110-2-2104, "Strength Design for Reinforced Concrete Hydraulic Structures", dated 30 June 1992. The latest design criteria for steel structures is contained in EM 1110-2-2105, "Design of Hydraulic Steel Structures," dated 31 March 1993 and Change 1, dated 31 May 1994.

(2) New criteria for the design of sector gates is contained in EM 1110-2-2703, "Lock Gates and Operating Equipment," dated 30 June 1994.

(3) New criteria for the design of piles and pile foundations is contained in EM 1110-2-2906, "Design of Pile Foundations," dated 15 January 1991.

(4) Guidance has been received from MVD regarding lateral earth pressures and drag loading on structures.

(5) The seismic risk zones have changed since the original design.

c. Impacts to Design Requirements. The impacts of revisions to the design requirements are as follows:

(1) A comparison of the new concrete design criteria with that utilized in the original design indicates that the design is adequate in flexure. The new design requirements for shear are more stringent than those used for the original design. In addition, it is unlikely that the amount of temperature steel provided meets the current design standards, which have been increased significantly. The latest ACI criteria for development and splice lengths has also increased significantly. A comparison with the code requirements in effect during the design of this structure indicates that the bar development and splice requirements do not meet current standards.

(2) The pile foundation design meets current standards.

(3) The sector gate was designed for a boat impact load of 120 kips. The new design criteria of 125 kips boat impact specified by EM 1110-2-2703, "Lock Gates and Operating Equipment," dated 30 June 1994, is only slightly higher. Considering the fact that the gate is only closed in advance of rising tides caused by an approaching hurricane, and remains closed until the tides recede, it is highly doubtful the gate would ever experience a boat impact approaching the design impact load.

(4) A review of available information indicates that the structure was designed considering drag forces caused by settlement of adjacent fills.

(5) The structure was not designed for seismic accelerations. The current earthquake design criteria is contained in ER 1110-2-1806 "Earthquake Design and Evaluation for Civil Works Projects," dated July 31, 1995. This document places this project in Earthquake Zone 0. Based on the ER, NOD Geotechnical Branch personnel consider the appropriate geotechnical design earthquake acceleration loading to be zero. Therefore the

earthquake loading will not be critical.

d. Conclusion. While a review of current design standards indicates that the structures (gate bay and "T" walls) do not meet several current design requirements for concrete structures, these structures are deemed adequate based on their past performance as well as the performance of other similar structures designed by "working stress" methods. In accordance with ER 1110-2-8157, "Responsibility For Hydraulic Steel Structures," dated 31 January 1997, the sector gate should be evaluated by NOD Engineering Division to determine fracture critical members, and field inspection and testing of the fracture critical members should be performed, as required.

4-03. Analysis of Instrumentation Data.

a. General. The engineering data survey measurements at Bayou Bienvenue include scour surveys with cross-sections and profiles of the approach channels and overbank areas, and elevations taken on settlement reference marks on the gate structure, the east and west concrete T-walls and the concrete sheet pile wing walls at the four corners of the structure. Joint opening measurements are made between adjacent markers on the two concrete T-walls. Analyses of the engineering measurements are presented in the following subparagraphs.

b. Settlement.

(1) Gate Bay and T-walls. Instrumentation Plate No. 2 shows the locations of the settlement reference marks on the gate bay and T-walls. The tabulated settlement data are shown on Instrumentation Plate No. 2 and the plotted data are presented on Instrumentation Plate Nos. 2, 3 and 3 A. Four markers are located on each of the east and

west floodwalls, and three markers are located on each side of the gate structure. The original readings were taken in 1974, and the maximum settlement from all data points except one is indicated to have occurred by 1992. From 1992 to 1998, a minor but persistent rebound is indicated to have occurred. The maximum settlement occurred on the ends of the T-walls at the junctures with the I-walls. The profiles of the T-walls presented on Instrumentation Plate No. 2 show this differential settlement. Total settlement of the west T-wall ranges from 0.13 feet at the gate structure to 0.66 feet at the west end. Total settlement of the east T-wall ranges from 0.06 feet at the gate structure to 0.38 feet at the east end. A slight but consistent apparent rebound of 0.04 feet to 0.10 feet is recorded in the 1993, 1995, 1996 and 1998 surveys. There may have been a slight error in the 1992 reading at Marker B-3. The gate bay structure shows a minimal total settlement of 0.04 to 0.10 feet by the 1992 readings, and minor rebound since 1992. The plotted profiles show little differential settlement. The "apparent" rebound may be due to reported problems with the bench marks. The field crew reported the following problems with the bench marks at the time of the 1998 survey:

P.B.M. – BB3: This bench mark is described as "top of 1-1/2" pipe cap encased in a 3" pipe, 6.210 NGVD". The crew found the 3" pipe with BB-3 marked on the cap. When the cap was removed, no 1-1/2" pipe was found inside. To begin the level run the top of the 3" pipe with the cap removed was used at a starting elevation of 6.210.

P.B.M. – BB2: This bench mark is also described as "top of 1-1/2" pipe encased in a 3" pipe, 6.279 NGVD". The crew found the 3" pipe which was marked BB-2 but could not remove the cap. The 3" pipe would turn in the ground and was fairly loose.

There was a rusted 1-1/2" pipe next to the 3" pipe at Elevation 6.275 relative to BB-3 (top of 3" pipe, cap removed, 6.210 NGVD).

The bench marks should be repaired or re-established before the next survey is made.

(2) Concrete Sheet Pile Wing Walls. The locations of the reference markers and the tabulated settlement data for the wing walls are presented on Instrumentation Plate No. 4. Graphical plots of the data are presented on Instrumentation Plate Nos. 5, 5A and 5B. Three reference markers are located on each wing wall. All reference points on each wall have experienced slow consistent settlement from the original 1978 readings to 1993 except reference marker SW-1 which showed slow consistent settlement until 1995. Since then, the readings show minor rebound. See the discussion in the preceding paragraph on reported problems with the bench marks. The total average settlement is 0.22 feet, with an average of 0.135 feet with 61% of the settlement occurring between the 1978 original survey and the 1980 survey. Settlement has been consistent along the reach of each wall with minor differential settlement as indicated by the readings and the plots. Apparent minor rebound has occurred since the 1995 readings.

c. Joint Openings. The locations of the two monitored horizontal joint openings on each concrete T-wall are shown on Instrumentation Plate No. 2 and measurements of the joint openings are tabulated on Instrumentation Plate Nos. 3 and 3A. The total joint openings have increased from 0.07 inches to 0.10 inches, with the majority of the widening occurring between 1974 and 1987. The last four readings (1993, 1995, 1996 and 1998) show an average joint increase of 0.01 inches, which is generally insignificant.

d. Scour Survey.

(1) Overbank Ranges. The locations of the overbank ranges for scour detection are shown on Instrumentation Plate No. BUN-6. The data plots are presented on Instrumentation Plate Nos. 7 through 10. These ranges record any scour or deposition on the banks adjacent to and behind the wing walls. The data recorded consist of the original 1984 survey and the four most recent annual surveys. The data show that the overbank areas have been relatively stable over the last four surveys. The northwest and northeast wing wall over bank areas show minor scour from the initial 1984 survey to the 1993 survey.

(2) Channel Scour. The range layout for channel scour is presented on Instrumentation Plate No. BUN-11. The profile survey is presented on Instrumentation Plate No. 12 and the cross-sections are presented on Instrumentation Plate Nos. 13 through 22. The data show that after the initial survey 1984, there was a period of scouring along the west side of the south approach channel between approximate Stations 16+50 and 18+00. The scour was more severe between approximate Stations 16+50 and 18+00 where as much as about 18 feet of scour occurred. The scour between Stations 18+00 and 22+00 ranged up to a maximum of about 10 feet. Since this period of scouring, the channel between Stations 16+50 and 22+00 has been relatively stable. However, the existing underwater slope on the west side of the south approach channel between Stations 16+50 and 18+00, inclusive, is steeper than 1V:1H. The existing bank stability factor is essentially 1.0 in this reach. Within the remainder of the channel, some of the surveys show trends toward minor erosion and some show trends of some deposition. The 1998 survey shows minor deposition for a number of areas.

SECTION V – INSPECTION

5-01. Inspection Team. Periodic Inspection No. 8 of Bayou Bienvenue Control

Structure was conducted on 24 March 1999 by the following personnel:

MISSISSIPPI RIVER COMMISSION

Mr. Frank Johnson Engineering & Technical Services Directorate

NEW ORLEANS DISTRICT

Mr. Walter Baumy	General Engineering Br.
Mr. Joseph Chryssoverges	General Engineering Br.
Mr. Brian Keller	Operations Division
Ms. Amy Powell	Operations Division

BROWN, CUNNINGHAM & GANNUCH, INC.

Mr. Luther Newton	Project Engineer
Mr. Silas Cunningham	Structural Engineer
Mr. Mel Stegall	Geotechnical Engineer
Mr. Richard Nicholas	Electrical Engineer
Mr. Bob White	Mechanical Engineer

LOUISIANA DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT

Mr. Ennis Johnson	District 02 Design
Mr. John Monzon	District 02 Design

ORLEANS LEVEE DISTRICT

Mr. Steven Spencer	Chief, Engineering
Mr. C.A. Wethern	Engineering
Mr. Guy Dietsch	Electrical Maintenance



Inspection team members standing from left to right: Mr. Dietsch, Mr. Nichols, Mr. White, Mr. Ennis Johnson, Mr. Frank Johnson, Mr. Chryssoverges, Ms. Powell, Mr. Keller, kneeling from left to right, Mr. Wethern, Mr. Stegall, Mr. Monson, Mr. Cunningham, and Mr. Baummy, not pictured, Mr. Spencer and Mr. Newton.

5-02. Orientation. A handout containing a condensed project description, team roster, and emphasized inspection items was provided by Mr. Luther Newton, Project Engineer, Brown, Cunningham & Gannuch, Inc. Mr. Newton then introduced the team members, and outlined the project features each Brown, Cunningham & Gannuch, Inc. team member would be inspecting and what they would be looking for. The plan for accomplishing the inspection was discussed and agreed upon.

5-03. Observations.

a. General. The control structure was not dewatered and was fully

operational. A detailed visual inspection was made of all features of the structure above the water level. At the time of inspection the staff gages on the floodside and landside read 0.0 and 0.4 feet, respectively. The overall condition of the structure is very good.

b. Concrete.

(1) The overall condition of the concrete was good.

(2) There are a number of small spalls on the vertical faces of the gate bay walls and "T" wall. These are small and of no consequence except aesthetically. These spalls appear to have been caused by bullet impact from vandals shooting the structure. Small spalls and hairline cracks noted during the previous inspections do not appear to have increased but should continue to be observed.

(3) A spall was noted at the back of the west gate sector recess at the top. It appears that the concrete in this area was struck by the end of the gate sector walkway plate which was subsequently trimmed. The spall presents no problem and no action is required.

(4) During the dewatering of the structure in March 1997, it was noted that there were some spalls with exposed reinforcing steel on the protected (dry) side of the concrete needles. See Photo No. 7, Appendix B. The spalls were repaired under the OLD contract for dewatering and repairs using epoxy grout.

(5) During the unwatering in March 1997, there was some seepage upward through a small crack or hole in the sill slab in the east gate bay recess. See Enclosure 2, Appendix B. The seepage was minor and it was determined at that time that no action was necessary. The area should be closely observed during the next unwatering.

(6) On the protected side vertical face on the south side of the east gate bay monolith there is an old spall from the waterline to 6 to 7 feet above the waterline. See Photo Nos. 5 and 6. No corrective action is required.

(7) The joints between the "T" wall monoliths and the joint between the "T" wall and the gate bay monoliths are spanned by neoprene sheets on the floodside. See Photo Nos. 3 and 4. At the joints between the end "T" wall monoliths and the "T" walls adjoining the gate bay monolith, settlement at the ends of the end monoliths has stretched the neoprene sheets to near their limits at the top of the wall to no deformation (stretching) at the bottom. Additionally, weathering cracks in these neoprene sheets were noted. The neoprene sheets should be observed and replaced when they no longer adequately seal the joints against leakage from the floodside. This is not critical since leakage through the joint would only be a nuisance possibly causing a very minor amount of erosion on the protected side of the "T" wall.

(8) The storage rack for the dewatering elements was in good condition. See Photo No. 7.

c. Gate.

(1) The gate sectors were in good condition. See Photo Nos. 8, 9 and 10. The gate was operated through several cycles with no apparent problems. The gate sectors were cleaned and painted and new seals installed during the 1997 unwatering (See Appendix C). The miter end of the floodside handrails were slightly bent (leaning toward the protected side). This was apparently caused when the safety chains were not disconnected before opening the gate. See Photo Nos. 11 and 12. The handrails are still sturdy and

adequate for their intended purpose, and no corrective action is required.

(2) Fracture critical welds have not been non-destructive tested in accordance with ER 1110-2-8157, "Responsibility For Hydraulic Steel Structures," dated 31 January 1997. This should be done. A visual inspection of the members above water that could be observed from the tops of the gate and structure walls did not reveal any indication of structural distress.

d. Miscellaneous Metals.

(1) Guardrails and access gates were in good condition, and had been recently painted. See Photo No. 13.

(2) Embedded metals at the needle girder recesses and the corner protection have corroded at the splash zone, but are in relatively good condition. See Photo No. 12.

(3) The Orleans Levee District has installed protective steel shutters over the control house doors and windows. See Photo No. 14. There is some appreciable corrosion of the shutter frames but no corrective action is required at the present time.

e. Mechanical.

(1) The gate operating machinery functioned well during operation of the gate through several cycles. However, the wire ropes used to activate the gate sectors were too slack and had "jumped out" of the sheaves on both gate sectors. See Photo No. 15. The wire ropes should be adjusted (tightened) such that they do not "jump out" of the sheaves when operating the gate sectors.

(2) The equipment recesses were clean and neat and had been recently painted. See Photo No. 16. However, the equipment was covered with dirt and grease and a light coat of sand or grit that appeared to have come from a sand blasting operation. See Photo No. 16. The equipment and sheaves should be cleaned to remove the dirt and sand before it gets into some of the gears, bearings or other moving parts and causes accelerated wear.

f. Electrical.

(1) Power for the control structure is provided by a diesel engine driven Onan generator, 18.75 KVA (15 kw), 480/277 volt, 3 phase, 60 Hz. See Photo No. 17. The generator set is the original one installed when the control structure was constructed some 25 years ago and now has 2,535 hours of operating time showing on its hour meter. The generator started and ran with no problems under the entire project load. The only deficiency noted was that the frequency meter did not work. It should be repaired or replaced. As a back-up a manual transfer switch is provided so that a portable generator set owned by OLD can be brought on site and plugged in to operate the structure. There is a 480 volt plug near the entrance stairs where the portable generator can be plugged in. In addition, OLD has spare batteries, alternator, starter, etc. on hand for rapid emergency repairs to the generator set. This provides for reliable redundancy for gate operation.

(2) The motor control center (MCC) was manufactured by Allis-Chalmers, who no longer makes motor control centers and similar electrical equipment. Therefore, spare parts for the MCC may be difficult, if not impossible, to find. The MCC is in satisfactory condition given its age and the environment in which it is located. See Photo

No. 18. The starters for both gate motors are less than three years old and are in like new condition. The insulation on the load side conductors for the east gate sector is "nicked" and the copper conductor is exposed. These conductors should be replaced as soon as possible to avoid a short from occurring.

(3) The west gate sector has one limit switch that serves both the open and closed points. This switch is new and worked fine. The east gate sector has limit switches which appear to be original equipment. One limit switch operates the indicator light at the control station and the other shuts down the gate motor. The limit switch for the motor shut down worked fine, but the indicator light switch did not appear to be working properly. When the gate sector reached the full open position, the green (open) indicator light came on briefly and then went out. The system should be checked out to determine if the limit switch is bad or if the indicator light is malfunctioning.

(4) The lights in the control room ("jelly jar" type) should be cleaned. The enclosed fluorescent fixtures in the machinery recesses had some cracked or damaged lenses, and were very dirty, but were all working. As the fluorescent fixtures continue to deteriorate, and replacement is needed, higher quality fixtures with stronger lenses and gaskets should be used. These fixtures will last longer and help to keep dirt and insects out of the enclosures.

(5) The weather proof cover on the duplex receptacle near the stair has been broken off and should be replaced. All receptacles should be replaced with GFCI type receptacles for safety.

g. Floodwalls. A steel sheet pile floodwall connects the east end of the east "T" wall to the levee section. See Photo No. 19. A concrete "I" wall (on steel sheet

piles) connects the west end of the west "T" wall to the levee section. See Photo No. 20. These floodwalls were originally designed to be constructed of prestressed concrete sheet piles. At the time of Periodic Inspection No. 1, 31 October 1973, approximately 30 of the 37 concrete sheet piles (I-wall) were in place on the east wall. According to the order of work established in the specifications, the concrete sheet piles were to be driven after the levee fill. The order of work established a maximum amount of time to elapse between the placement of levee fill and the driving of the piles in order that a large portion of the levee settlement would take place prior to installation of the wall. These 30 piles however, were driven prior to placement of the levee fill. Since the fill material was not in place, these piles were only embedded approximately 5 feet. This, together with the poor soil conditions at the site, resulted in the piles settling and rotating in the plane of driving. The contractor was ordered to pull the piles in order that the levee fill could be placed. In the pulling of the first pile, it was noted that the plastic interlock was torn the entire length of the pile. The contractor was then order to stop the pulling operation. A system of cables and come-alongs were then installed to hold the piles in a plumb position. At that time, it was the intention to try to hold the piles with the cable arrangement while backfilling operations proceeded.

Subsequent to Periodic Inspection No. 1, with LMVD (now MVD) concurrence, the driving of the concrete sheet piles was deleted from the contract and the driven concrete sheet piles were pulled and all the concrete sheet piles were stockpiled on both sides of the landside channel. The areas between the ends of the "T" walls and the levee embankments remained below hurricane protection levels until 1993, when PZ-22 steel sheet piles were driven to connect the "T" walls to the levee embankments. The steel sheet piles

were coated with coal tar epoxy. In 1997, on the west side, the steel sheet piles were cut off and a cast-in-place reinforced concrete "I" type floodwall was constructed thereon. "As Built" drawings of the present sheet pile and cast in place reinforced concrete floodwalls and a narrative explaining the modifications to the floodwalls should be included in the Preinspection Brochure for Periodic Inspection No. 9. Both the steel sheet pile floodwall on the east side of the structure and the reinforced concrete "I" type floodwall on the west side of the structure are in good condition and no remedial actions are required.

h. Embankments.

(1) Both levee embankments in the area of the structure were in good condition. See Photo Nos. 19 and 20. The levee on the east side had not been recently mowed.

(2) The backfill behind the wingwalls was in good condition. The "j" bulb waterstops between the wingwalls and the gate bay monolith appeared to be in good condition. There is a past history of erosion of these backfills at the juncture of the wingwalls with the gate bay monolith. A minor amount of fresh fill was noted where the northeast wingwall abuts the gate bay monolith, indicating recent loss of backfill in this area. See Photo No. 21. Continued surveillance of the backfill areas, and continued filling of depressions resulting from loss of backfill is recommended.

i. Channels.

(1) The channel slopes and riprap slope protection appear to be in good condition in the vicinity of the structure. See Photo No. 1.

(2) The visible area of bank erosion on the west bank of the south approach channel beyond the limits of riprap has no adverse impact on the operation of the project.

j. Guidewalls and Dolphins.

(1) Considering the type and size of vessels traversing this structure, the guidewalls are in reasonably good condition. See Photo No. 22. There are a number of wales (horizontal timbers) in poor condition, primarily near the splash zone. Some of the horizontal girts and tops of the batter piles are also showing advanced deterioration. See Photo No. 23. The deteriorated members should be inspected periodically and replaced as necessary to maintain the integrity of the guidewalls. Prior to the next scheduled dewatering (approximately eight (8) years from now), a detailed inspection and evaluation of the condition of the guidewalls should be made to determine if major repairs or replacement of the guidewalls should be undertaken at that time.

(2) The dolphins are in good condition. The northeast and northwest dolphins each have one broken pile but are considered still adequate considering the type and size of the vessels using the structure.

k. Boat Dock. The boat dock, constructed in the original contract for the control structure, is still in good condition. However, it is no longer used by OLD and someone has stored some sort of frame or boom on it such that it not presently useable. See Photo No. 24. OLD may wish to consider removing the dock in the interest of safety and/or liability.

1. Dewatering Elements. The dewatering elements were not on site having

been taken to Bayou Dupre Control Structure for use in dewatering that structure. The needle girders are a 56 WF 194 beam and will therefore have no fracture critical welds.

m. Instrumentation.

(1) The painted identification numbers for the settlement markers are faded, and some are unreadable. They should be repainted.

(2) Only one bench mark (PBM-BB2) could be located during the inspection. The bench mark was described as the top of the cap on a 1-1/2-inch galvanized pipe encased in a 3-inch protective casing. The protective casing was gone, the cap on the 1-1/2-inch pipe was missing, and the 1-1/2-inch pipe was in poor condition. A reliable bench mark should be established at the site prior to the next instrumentation survey.

SECTION VI - CONCLUSIONS AND PROPOSED REMEDIAL ACTIONS

6-01. Conclusions. It is considered that the Bayou Bienvenue Control Structure is structurally stable, well maintained and in good operating condition.

6-02. Proposed Remedial Actions. To insure continuation of the structural stability and operational adequacy of the control structure, unless otherwise noted the following remedial actions will be performed by the Orleans Levee District during normal maintenance.

a. Concrete.

(1) Small spalls and hairline cracks will continue to be monitored.

(2) During the next dewatering OLD and NOD will evaluate the upward seepage through the small crack or hole in the sill slab.

(3) The condition of the neoprene sheets seating joints between the "T" wall monoliths and between the "T" wall monoliths and the gate bay monolith will be monitored no less frequently than yearly.

b. Gate. Fracture critical welds above water surface as well as below the water surface will be scheduled for nondestructive testing (NDT) during the next scheduled dewatering in March 2007. The nonredundant tension chords above the water surface shall be visually inspected at each periodic inspection. Nondestructive testing will be immediately required if defects are found during the visual inspection. Drawings indicating all FCM areas will be included in the next brochure.

c. Embedded Metals. Corroded areas on embedded metals that are above normal water levels will be cleaned and painted by March 2000.



PHOTO NO. 1 – LOOKING WEST AT FLOODSIDE OF THE CONTROL STRUCTURE.



PHOTO NO. 2 – CONSTRUCTION PLAQUE ON THE NORTH CONTROL HOUSE.



PHOTO NO. 3 - NEOPRENE SHEET OVER FLOODSIDE OF JOINT BETWEEN WEST "T" WALL MONOLITHS.

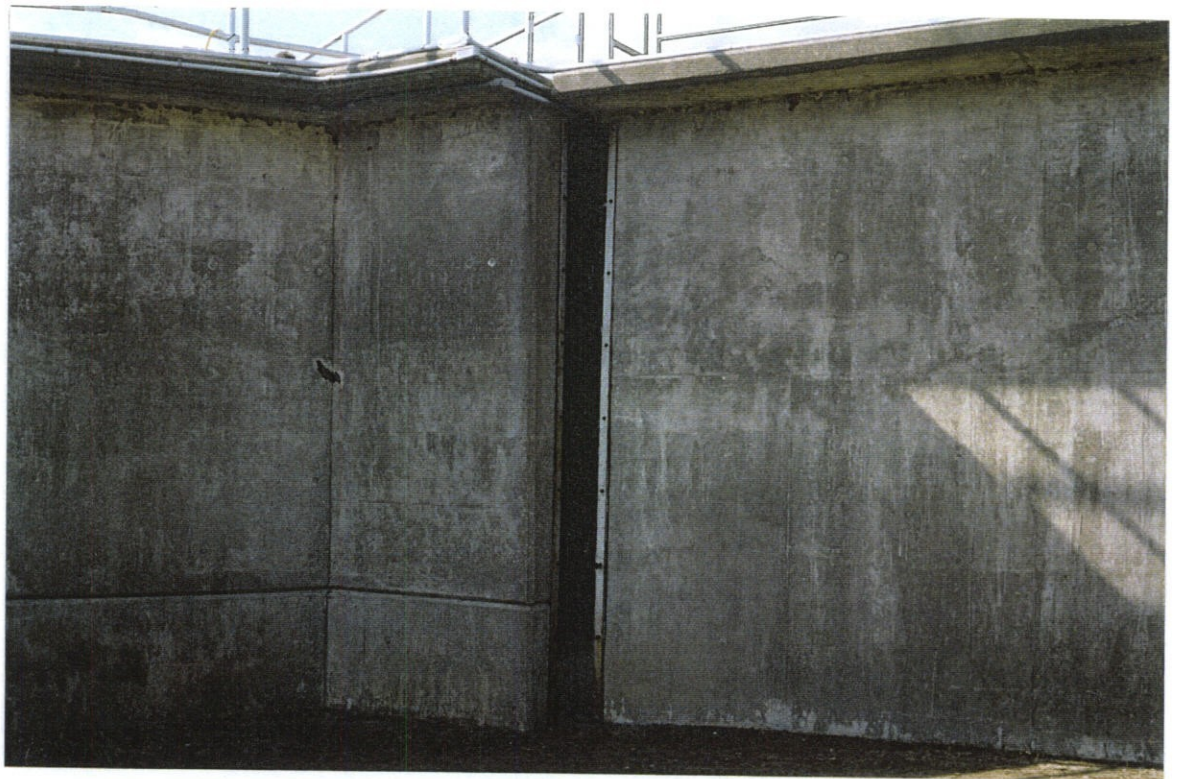


PHOTO NO. 4 - NEOPRENE SHEET OVER FLOODSIDE OF JOINT BETWEEN WEST "T" WALL MONOLITH AND GATE BAY MONOLITH.

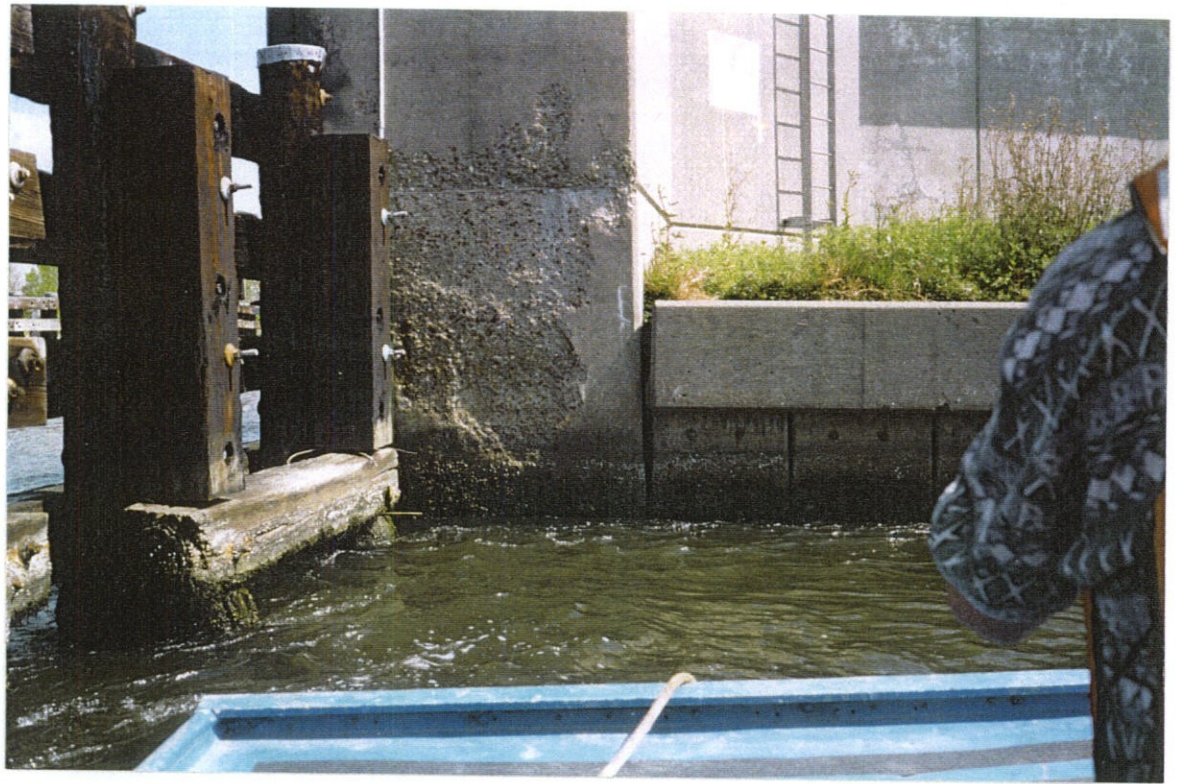


PHOTO NO. 5 – SPALL ON SOUTHSIDE PROTECTED SIDE FACE OF GATE BAY WALL.



PHOTO NO. 6 – CLOSEUP OF SPALL SHOWN IN PHOTO NO. 5.

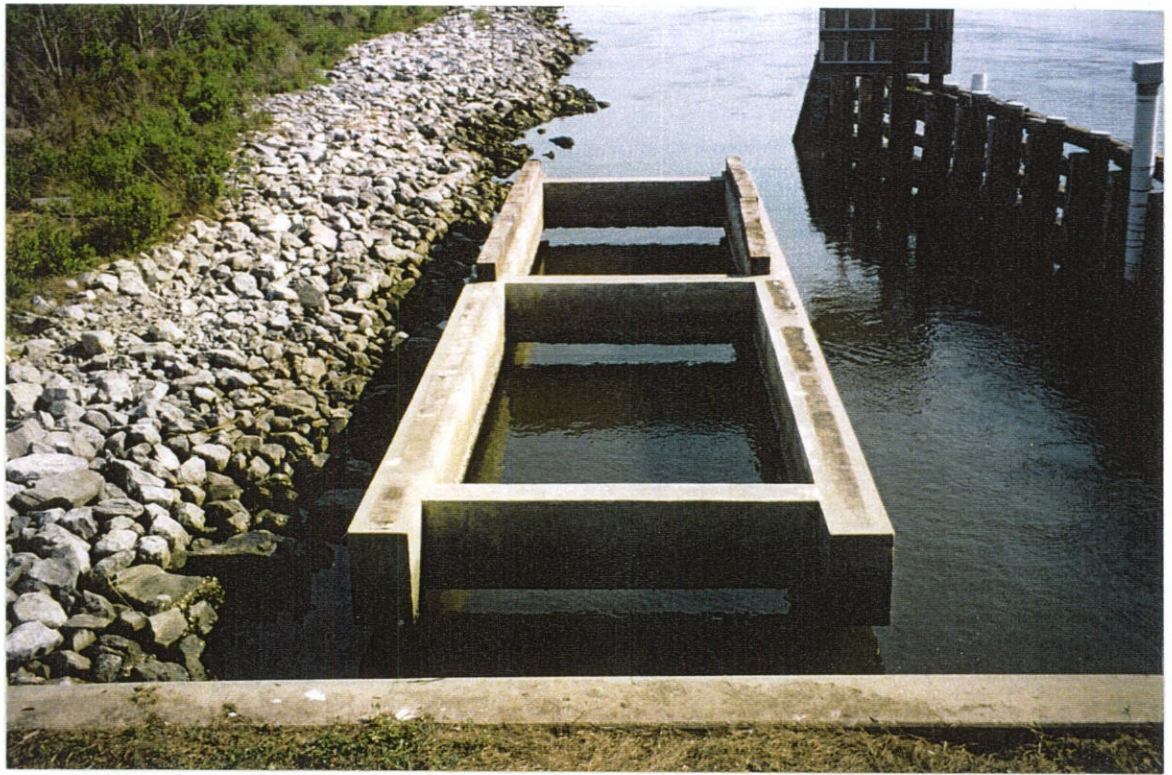


PHOTO NO. 7 – STORAGE RACK FOR DEWATERING ELEMENTS.



PHOTO NO. 8 – SECTOR GATE SKIN PLATE. NOTE BARNACLES AT SPLASH ZONE.

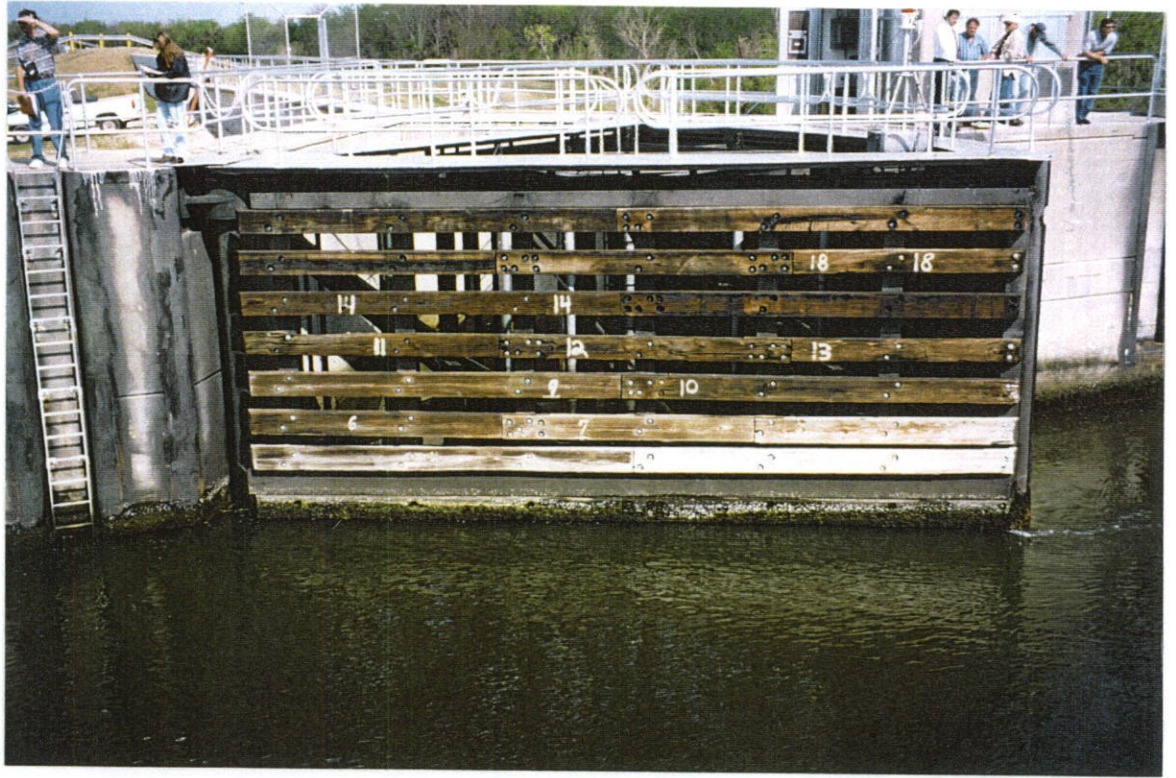


PHOTO NO. 9 – TIMBER FENDER SYSTEM ON WEST GATE SECTOR.



PHOTO NO. 10 – GATE SECTOR STRUCTURAL MEMBERS.

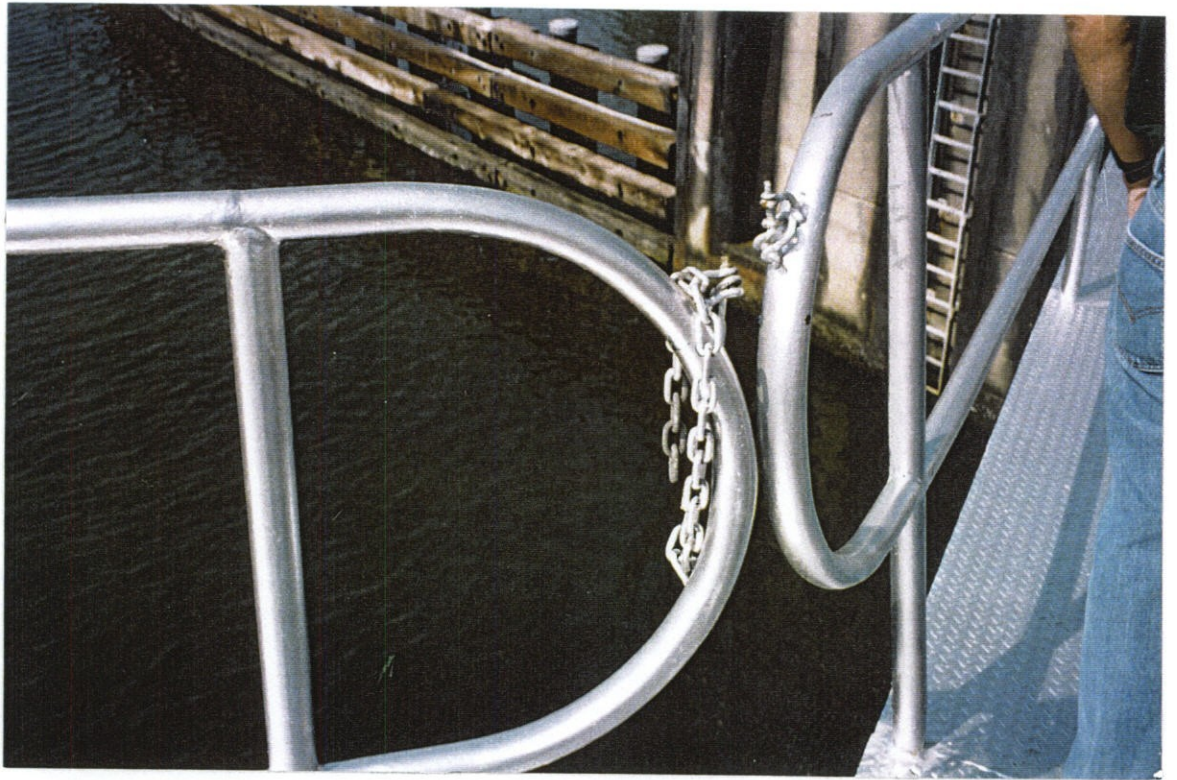


PHOTO NO. 11 – SLIGHTLY BENT (LEANING) HANDRAIL POSTS AT MITER END OF GATE SECTORS.



PHOTO NO. 12 – SLIGHTLY BENT HANDRAIL POST ON MITER END OF EAST GATE SECTOR.



PHOTO NO. 13 – WEST "T" WALLS AND CONCRETE FLOODWALLS WITH SECURITY ACCESS GATE.



PHOTO NO. 14 – STEEL SECURITY SHUTTERS ON CONTROL HOUSE WINDOWS.



PHOTO NO. 15 – WIRE ROPE SHEAVES. NOTE SLACK CABLE.

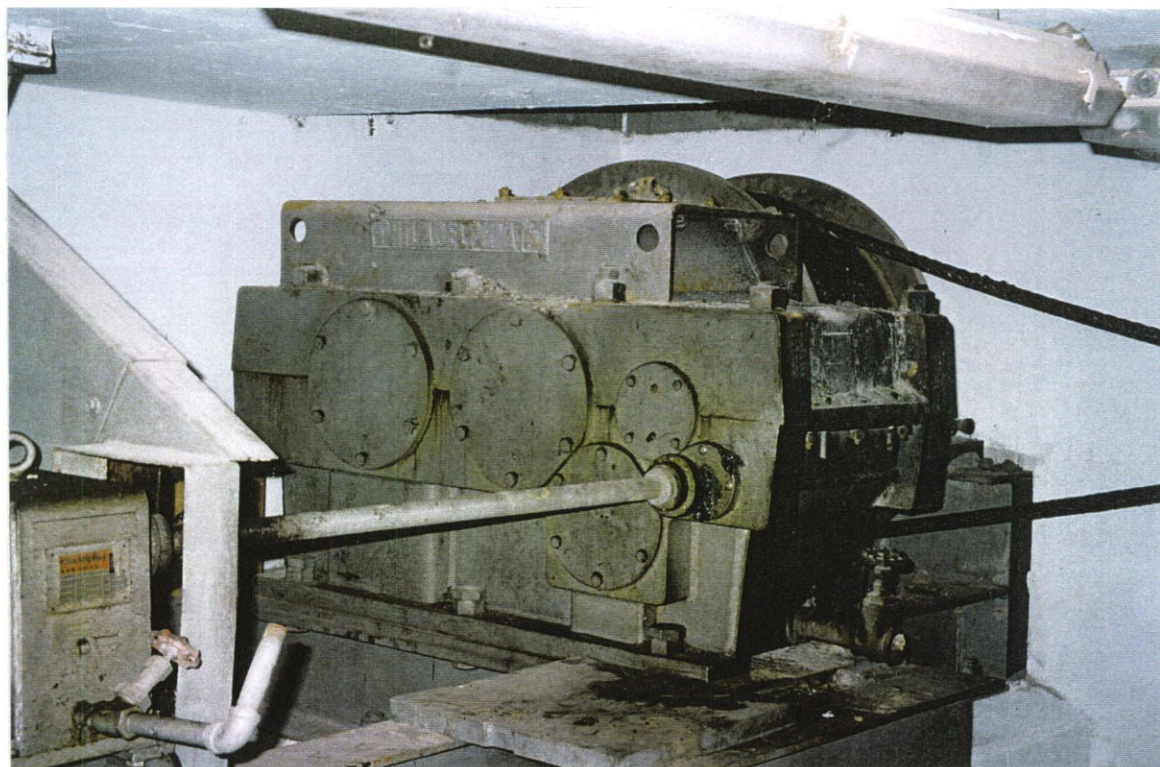


PHOTO NO. 16 – DOUBLE DRUM HOIST USED TO OPEN AND CLOSE GATE SECTOR.

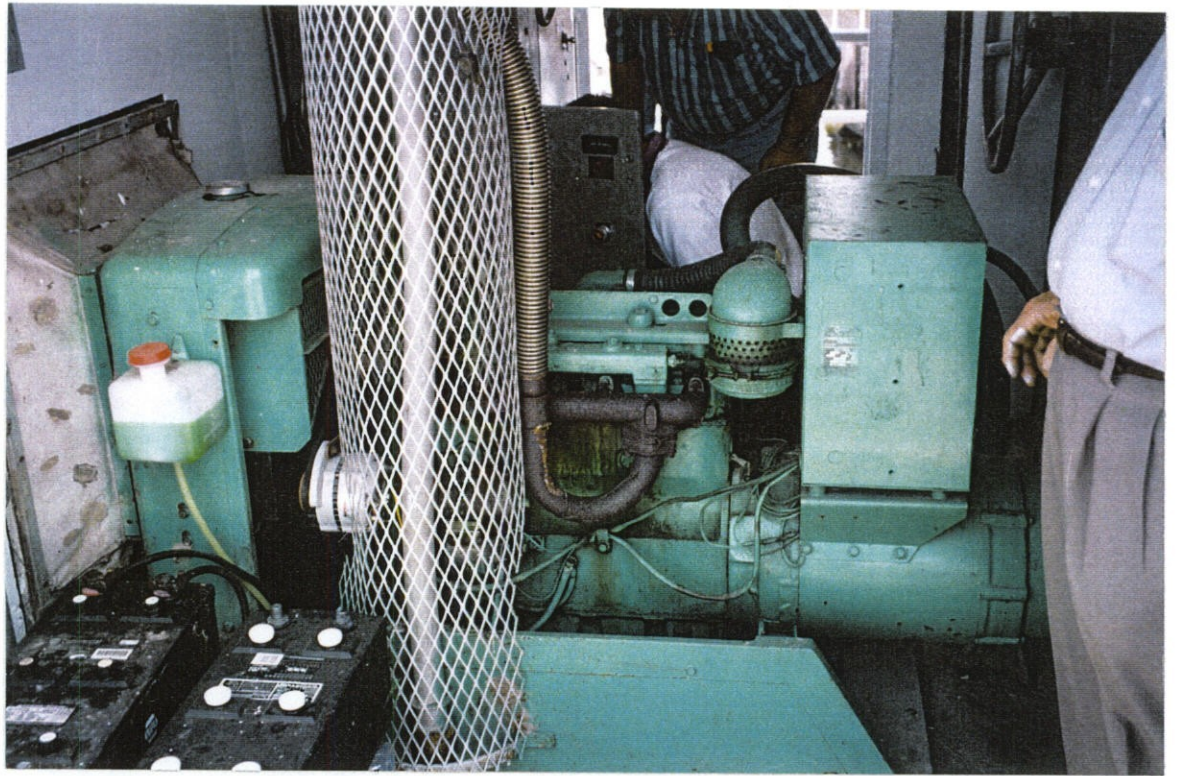


PHOTO NO. 17 – GENERATOR SET USED FOR POWER TO OPERATE THE CONTROL STRUCTURE.

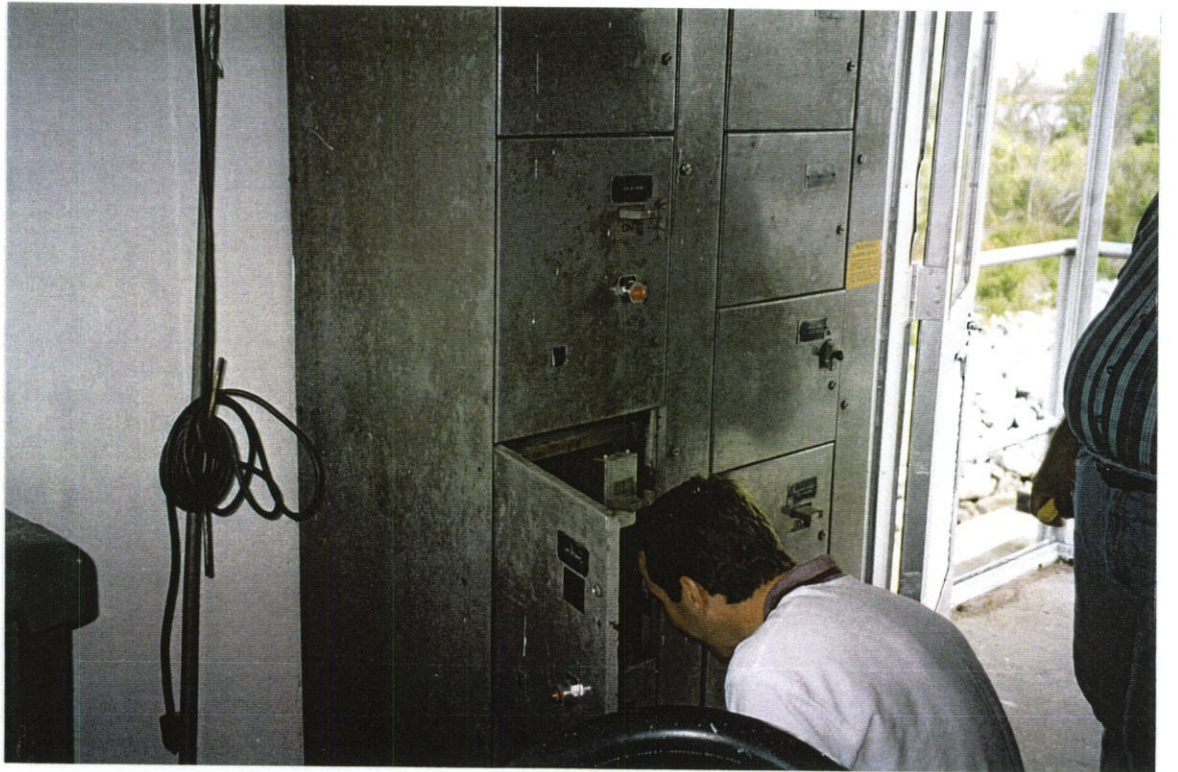


PHOTO NO. 18 – MOTOR CONTROL CENTER (MCC) LOCATED IN NORTH CONTROL HOUSE.



PHOTO NO. 19 – SHEET PILE FLOODWALL TIE IN TO LEVEE ON EAST SIDE OF STRUCTURE.



PHOTO NO. 20 – CONCRETE "I" FLOODWALL TIE IN TO LEVEE ON WEST SIDE OF STRUCTURE.



PHOTO NO. 21 – FRESH FILL BEHIND NORTHWEST WINGWALL AT ITS JUNCTURE WITH THE GATE BAY MONOLITH.



PHOTO NO. 22 – NORTHEAST TIMBER GUIDEWALL.



PHOTO NO. 23 – DETERIORATED HORIZONTAL GIRTS AND TOPS OF BATTERED PILES ON TIMBER GUIDEWALLS.



PHOTO NO. 24 – BOAT DOCK. NOTE STEEL FRAMES STORED ON DECK.

d. Mechanical.

(1) Orleans Levee District (OLD) was notified that the wire ropes used to activate the gate sectors should be adjusted (tightened) such that they do not jump out of the sheaves as soon as the work could be scheduled. The work was completed in July 1999 by OLD.

(2) Equipment and sheaves in the equipment recesses will be cleaned by March 2000.

e. Electrical.

(1) The frequency meter on the generator set will be repaired or replaced by March 2000.

(2) OLD was notified that the defective (damaged insulation) load side conductors for the east gate sector should be replaced as soon as the work could be scheduled. This work was done in July 1999 by OLD.

(3) The east gate sector indicator light system will be checked out, and as appropriate the limit switch and/or indicator light repaired or replaced. This will be done by March 2000.

(4) The lights in the control rooms will be cleaned by March 2000.

(5) When the fluorescent fixtures in the machinery recesses deteriorate such that they need replacing, high quality (more durable) gasketed fixtures will be installed.

(6) OLD was notified that the broken weather proof cover on the receptacle near the access stair should be replaced as soon as the work could be scheduled. This work was done in July 1999 by OLD.

(7) All receptacles will be replaced with GFCI type receptacles by March 2000.

f. Floodwalls. The appropriate additional "As Built" drawings showing the recently constructed floodwalls, and a narrative explaining the modifications to the floodwalls, will be included in the preinspection brochure for the Periodic Inspection No. 9.

g. Embankments. The backfill areas behind the wing walls will continue to be monitored. Any depressions noted will be filled in.

h. Guidewalls and Dolphins. Guidewall and dolphin members will be closely inspected semiannually, and deteriorated members will be replaced as necessary to maintain the integrity of the guidewalls and dolphins. Prior to the next scheduled unwatering, NOD and OLD will make a detailed inspection and evaluation of the guidewalls and dolphins, and will determine if major repairs or replacement of the guidewalls and dolphins should be undertaken.

i. OLD will evaluate removal of the dock for public safety and liability concerns.

j. Instrumentation.

(1) NOD Engineering Division contract survey party will repaint the identification numbers for the settlement markers prior to the next scheduled instrumentation survey in 2003.

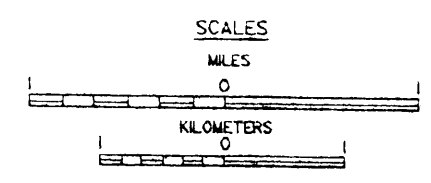
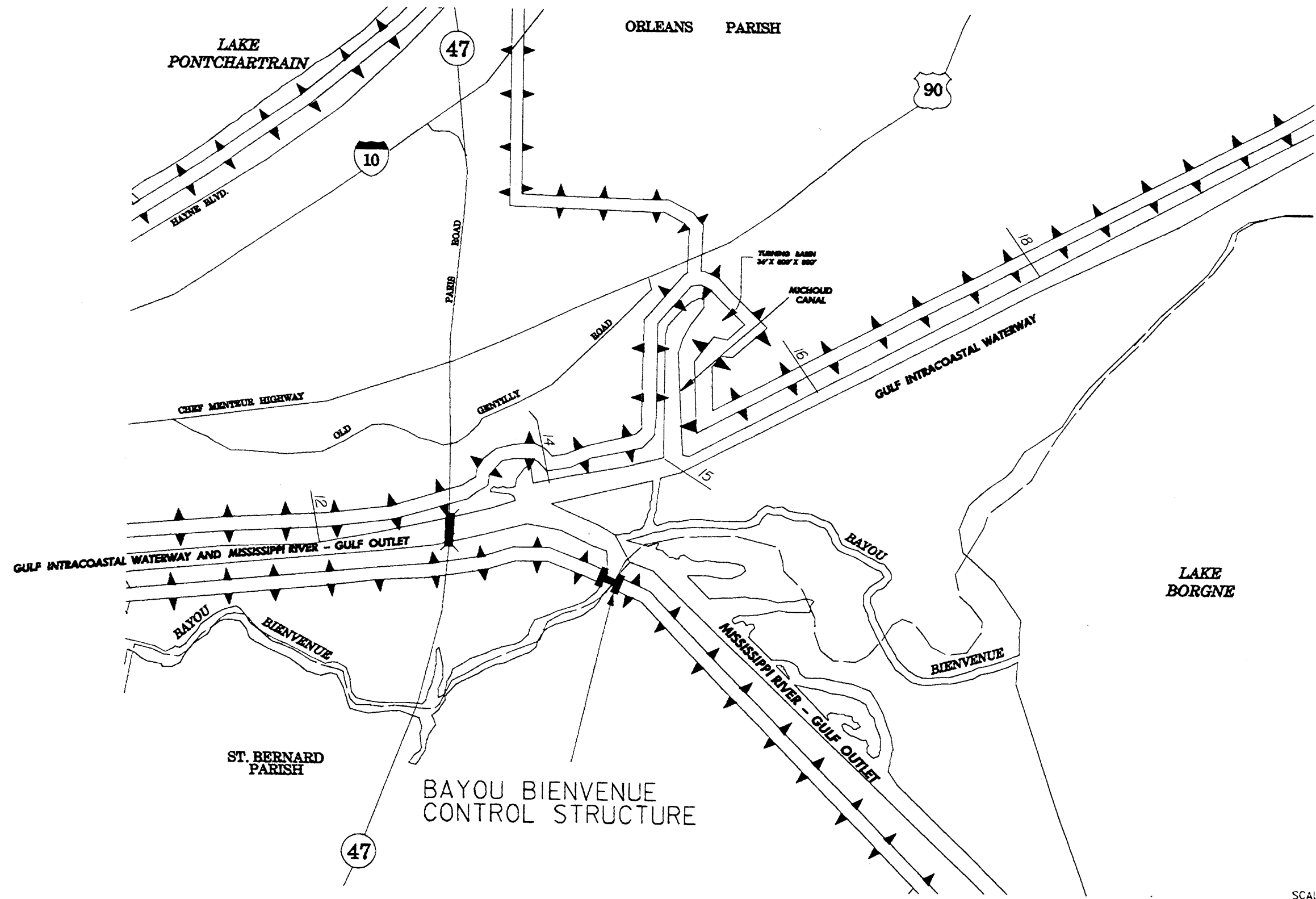
(2) NOD will establish a reliable bench mark at the structure site prior to the next scheduled instrumentation survey in 2003.

6-03. Next Inspection. The next periodic inspection of Bayou Bienvenue Control Structure is tentatively scheduled for March 2004.

INSTRUMENTATION PLATES

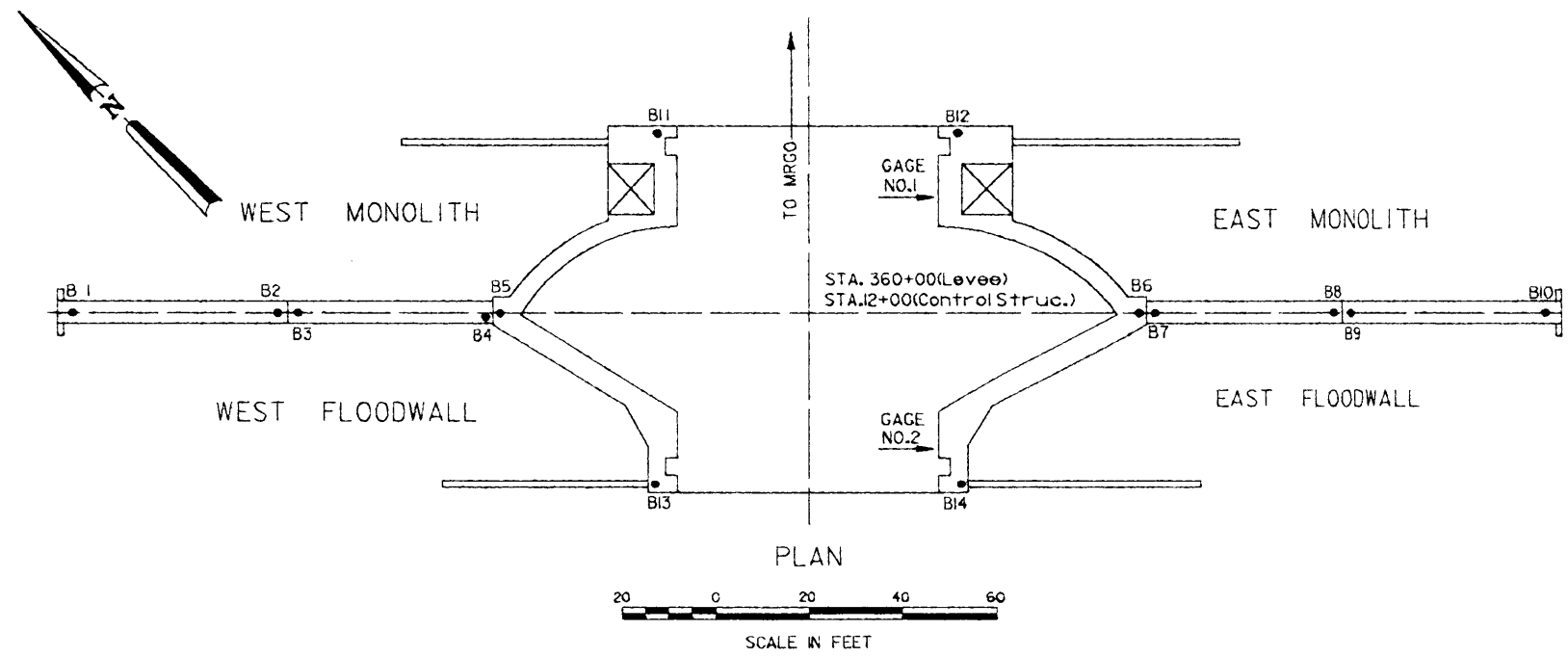
BAYOU BIENVENUE CONTROL STRUCTURE
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INSTRUMENTATION PLATES

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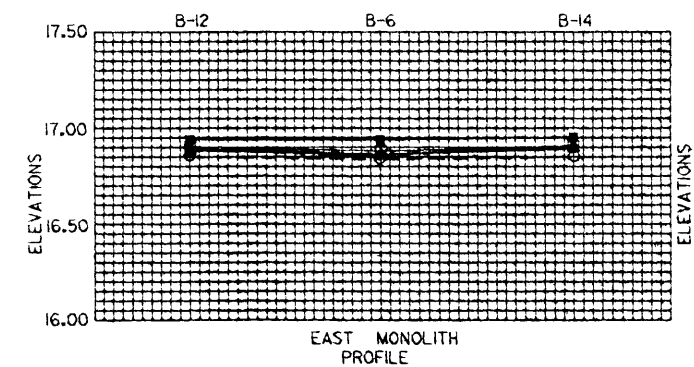
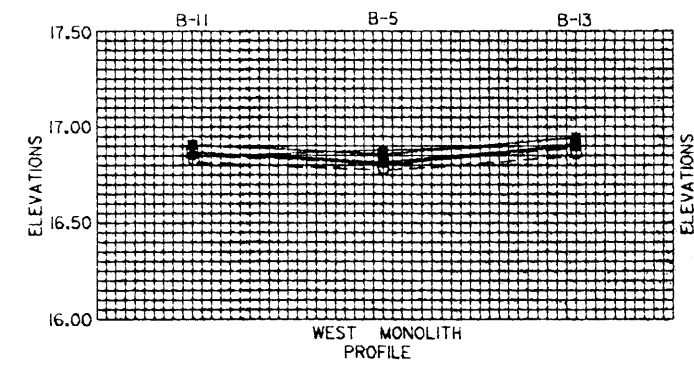
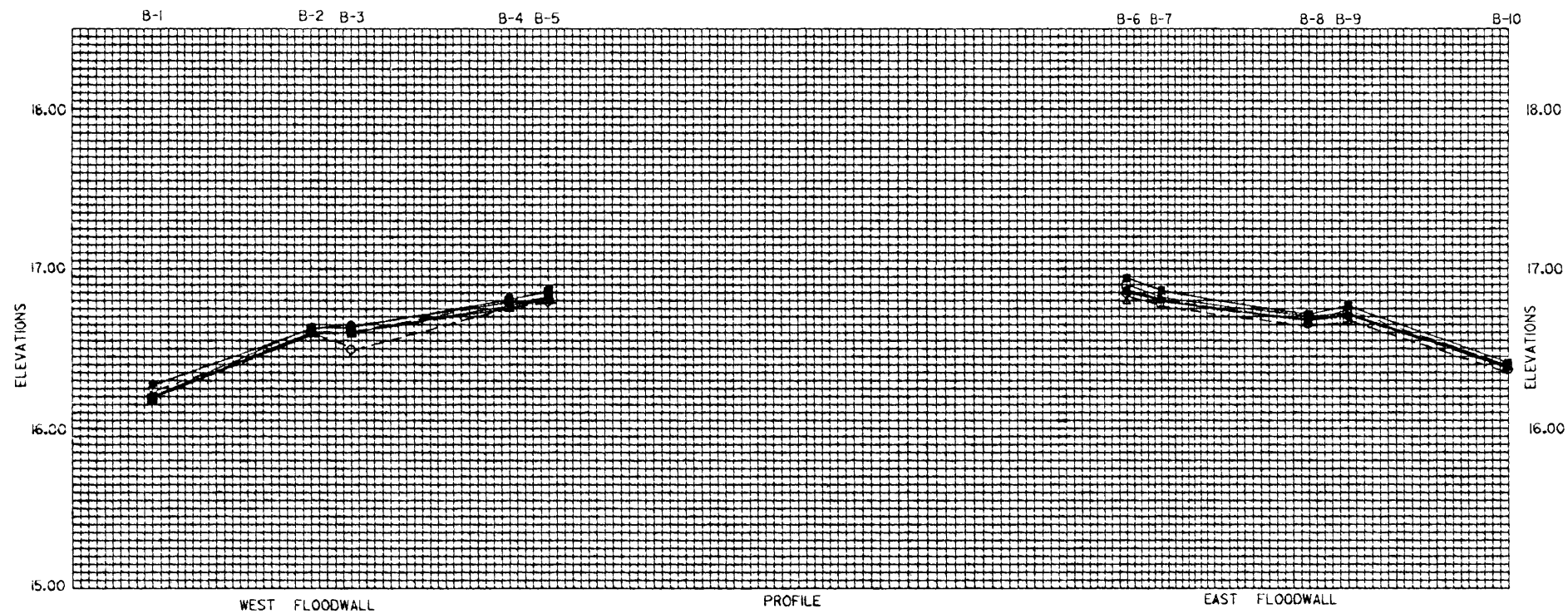


LAKE PONTCHARTRAIN AND VICINITY
 CHALMETTE AREA
 BAYOU BIENVENUE
 PERIODIC INSPECTION
 LOCATION MAP

U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
 CORPS OF ENGINEERS
 NEW ORLEANS, LOUISIANA



SETTLEMENT REFERENCE MARKS																	
NO. OF REFERENCE MARKS	B-1	B-2	B-3	B-4	B-5	B-6	B-7	B-8	B-9	B-10	B-11	B-12	B-13	B-14	TEMP	GAGE 1	GAGE 2
INITIAL DATE	6-25-74	6-25-74	6-25-74	6-25-74	6-25-74	6-25-74	6-25-74	6-25-74	6-25-74	6-25-74	6-25-74	6-25-74	6-25-74	6-25-74			
ORIGINAL READINGS	16.85	16.88	16.87	16.87	16.89	16.86	16.84	16.80	16.81	16.75	16.87	16.86	16.91	16.88	79°	1.9	1.9
DATE OF OBSERVATIONS																	
18 NOV 1991	16.28	16.64	16.64	16.78	16.82	16.87	16.81	16.68	16.72	16.41	16.87	16.89	16.90	16.90	86°	1.9	1.9
17 DEC 1992	16.23	16.59	16.49	16.74	16.79	16.84	16.78	16.65	16.68	16.37	16.83	16.86	16.86	16.87	63°	-	-
02 NOV 1993	16.20	16.60	16.60	16.80	16.80	16.88	16.82	16.69	16.72	16.40	16.87	16.89	16.90	16.90	72°	1.4	2.2
05 APR 1995	16.20	16.60	16.60	16.75	16.81	16.86	16.81	16.67	16.70	16.38	16.86	16.89	16.88	16.89	70°	1.3	1.3
04 MAR 1996	16.19	16.60	16.60	16.77	16.82	16.88	16.82	16.69	16.72	16.39	16.87	16.90	16.90	16.91	69°	0.8	0.8
12 MAR 1998	16.20	16.63	16.63	16.81	16.86	16.94	16.87	16.72	16.77	16.41	16.91	16.94	16.94	16.95	72°	3.5	1.7



- LEGEND
- ——— 18 NOV. 1991
 - ——— 17 DEC. 1992
 - △ ——— 02 NOV 1993
 - ▲ ——— 05 APR 1995
 - ——— 04 MAR 1996
 - ——— 12 MAR 1998

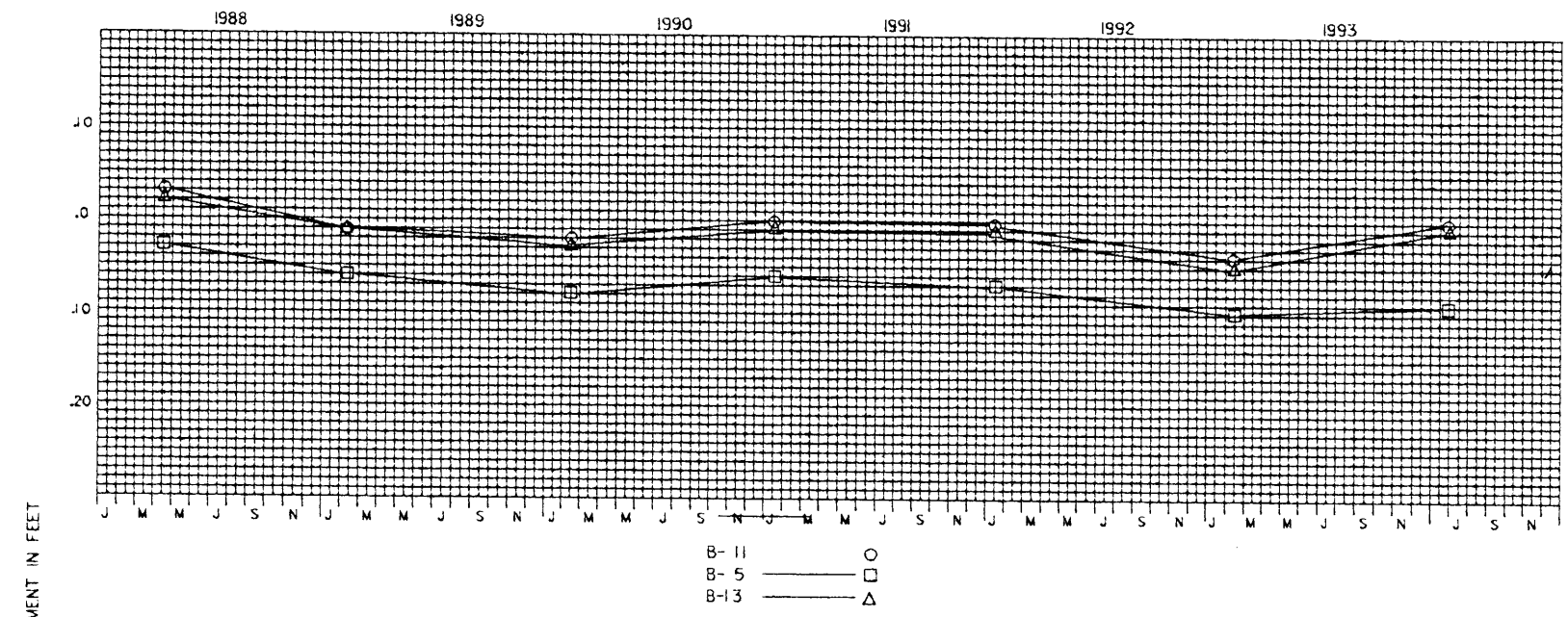
LAKE PONTCHARTRAIN AND VICINITY
BAYOU BIENVENUE
PERIODIC INSPECTION

SETTLEMENT REFERENCE MARKS
PLAN AND PROFILE

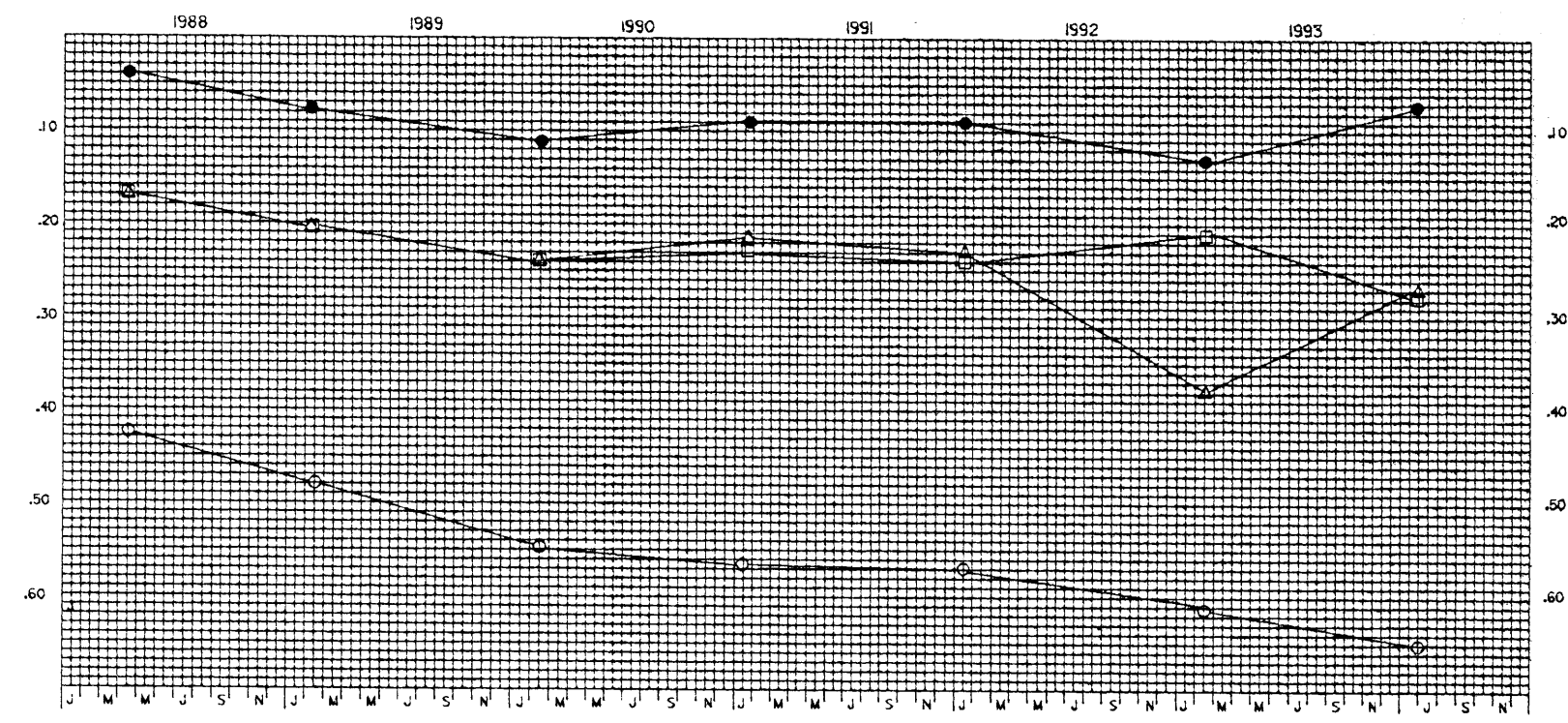
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
NEW ORLEANS, LOUISIANA

PL2

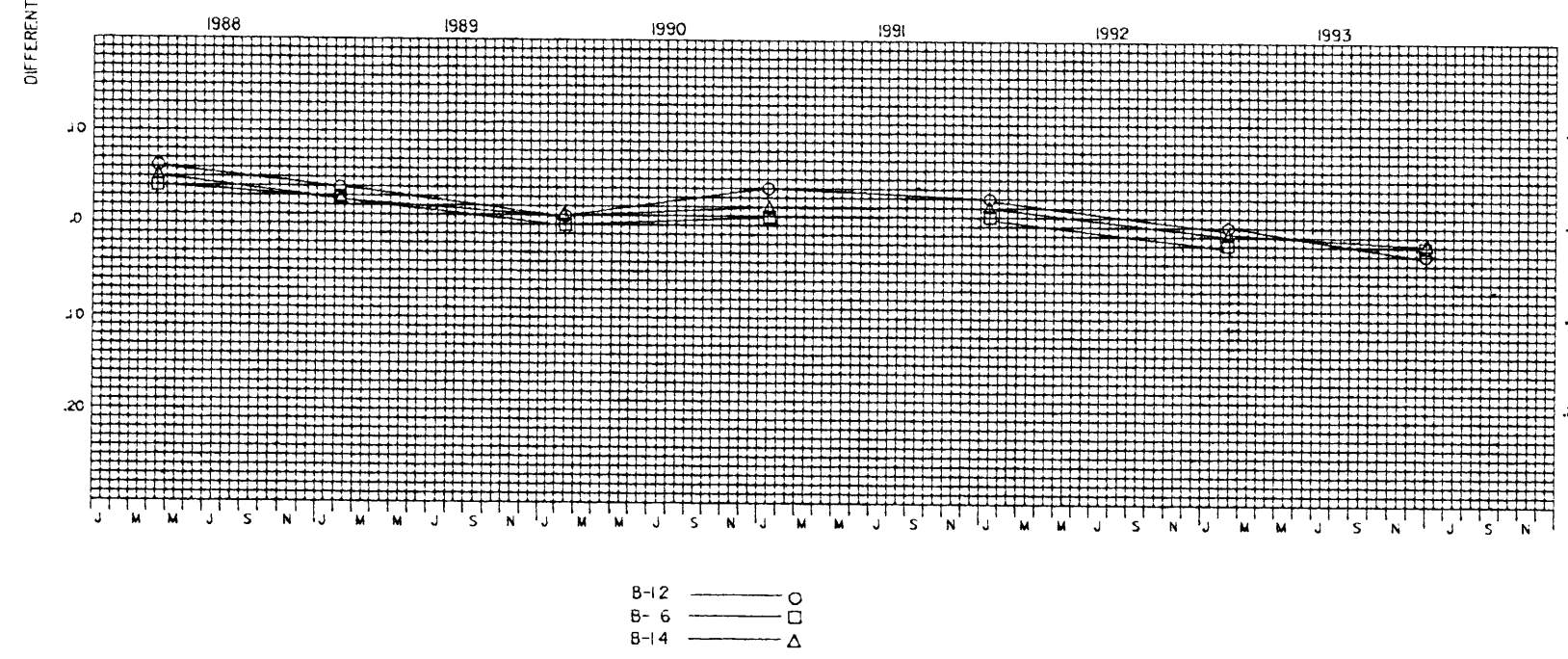
WEST MONOLITH



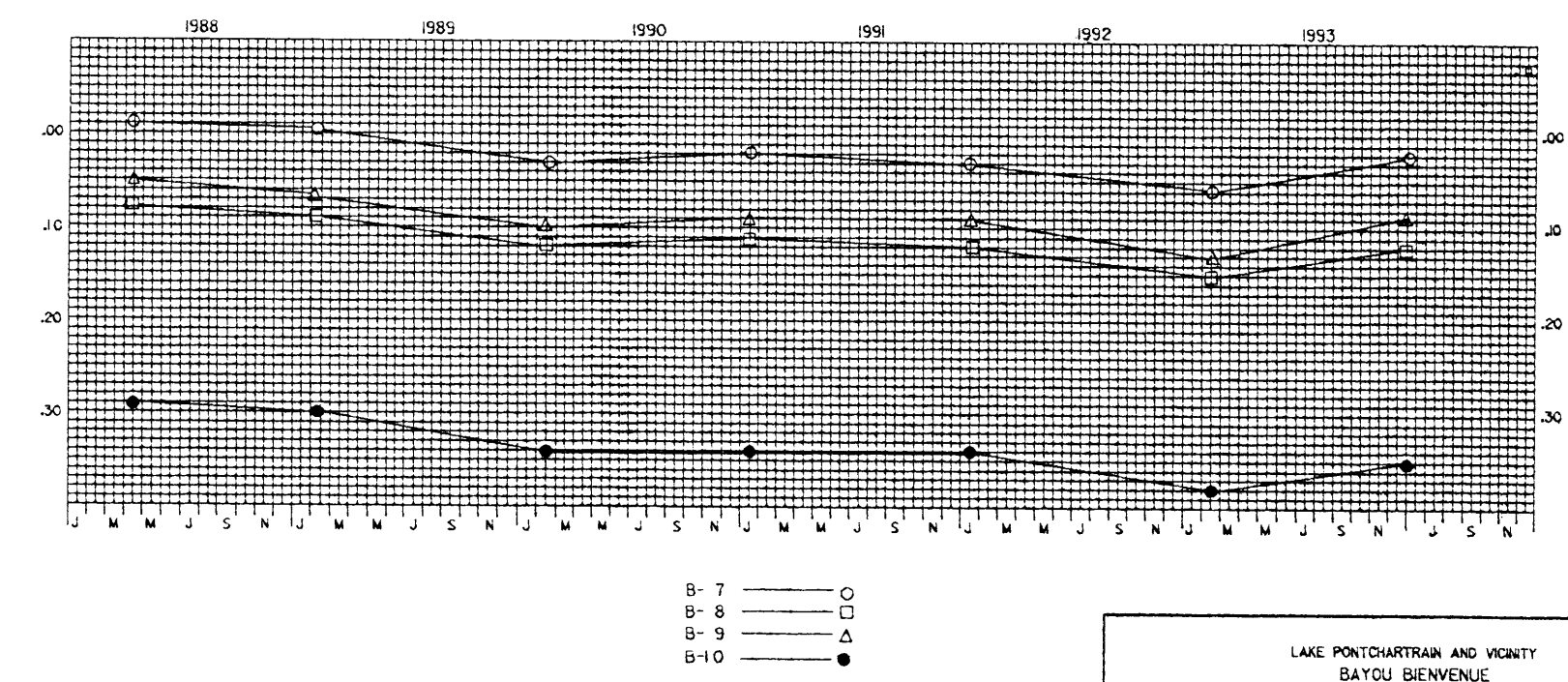
WEST FLOODWALL



EAST MONOLITH



EAST FLOODWALL



NO. OF REFERENCE MARKS	DISTANCE BETWEEN REFERENCE MARKS						
	B2T0B3	B4T0B5	B5T0B6	B1T0B12	B13T0B14	B6T0B7	B8T0B9
INITIAL DATE	4-11-74	4-11-74	4-11-74	4-11-74	4-11-74	4-11-74	4-11-74
ORIGINAL READINGS (IN.)	4.97	3.98	13.135	64.17	64.19	2.48	5.00
03 MAR. 1987	5.02	4.03	---	---	---	2.55	5.08
25 FEB. 1988	5.04	4.03	---	---	---	2.56	5.08
01 DEC. 1988	5.15	4.04	---	---	---	2.57	5.09
04 DEC. 1989	5.05	4.05	---	---	---	2.55	5.08
01 NOV. 1990	5.07	4.04	---	---	---	3.57	5.09
18 NOV. 1991	5.05	4.03	---	---	---	2.57	5.08
17 DEC. 1992	5.05	4.03	---	---	---	2.57	5.09
02 NOV 1993	5.05	4.05	---	---	---	2.58	5.08

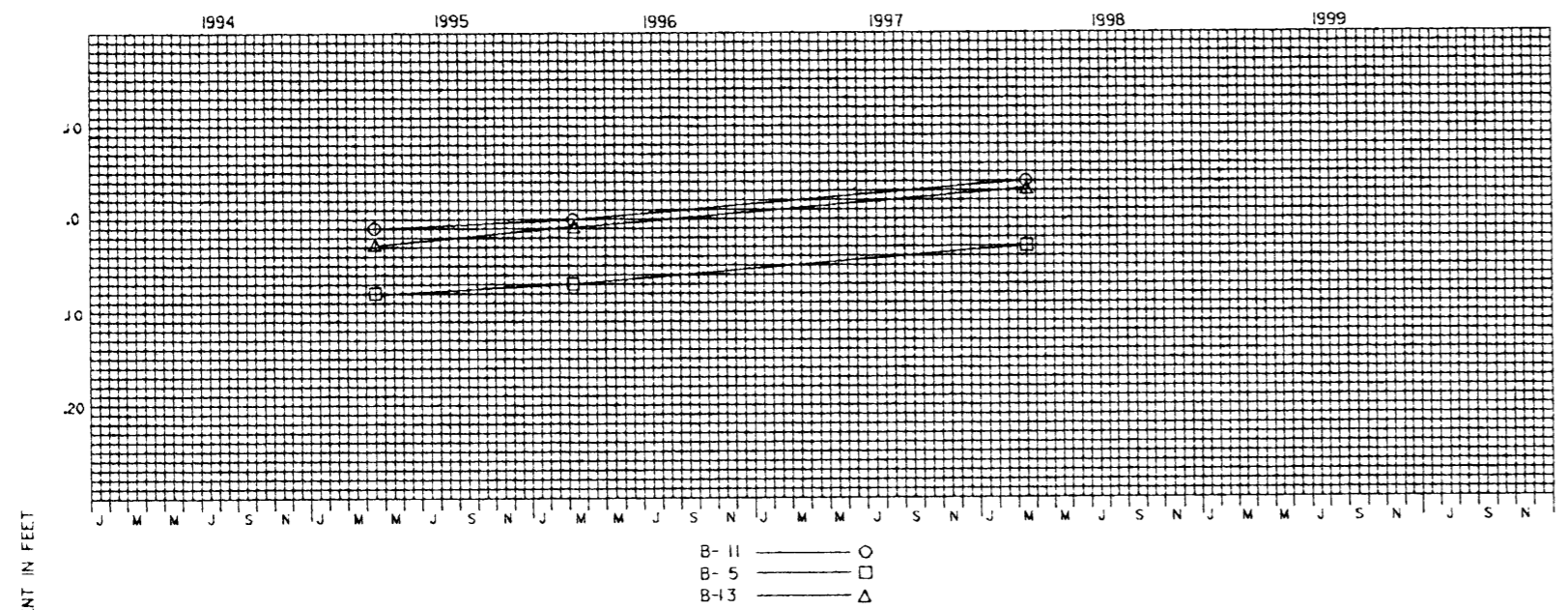
NOTE:
For location and tabulation of settlement reference marks see plate

LAKE PONTCHARTRAIN AND VICINITY
BAYOU BIENVENUE
PERIODIC INSPECTION

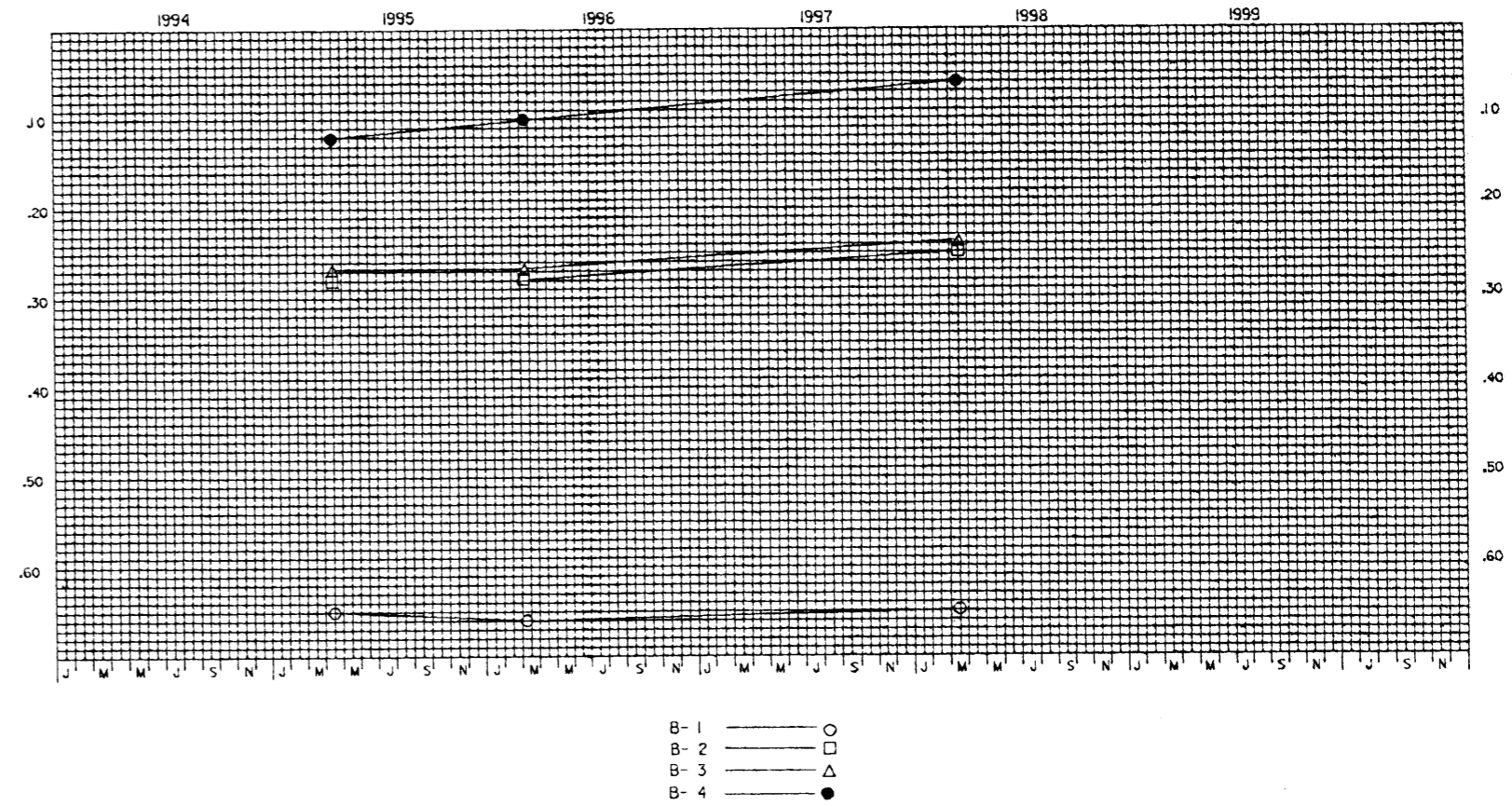
SETTLEMENT REFERENCE MARKS
DIFFERENTIAL SETTLEMENT CHART
1988 TO 1993

U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
NEW ORLEANS, LOUISIANA

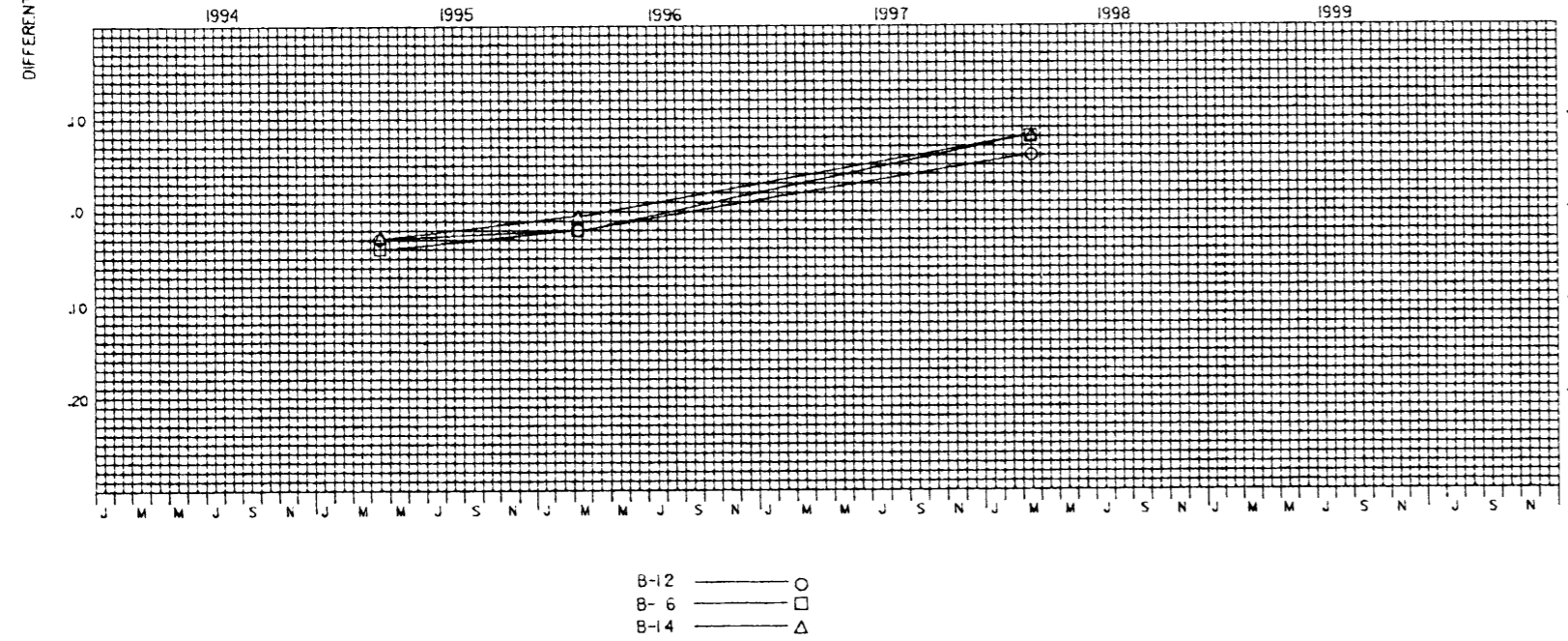
WEST MONOLITH



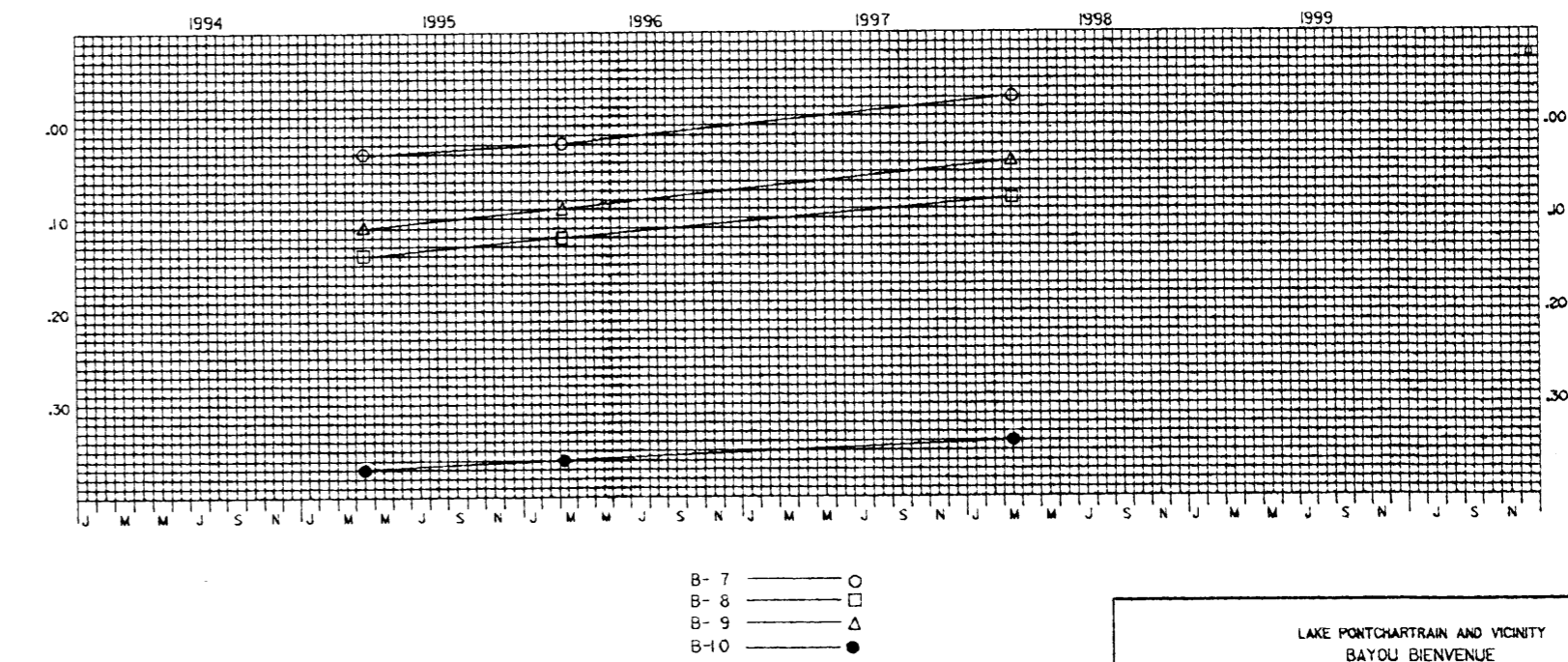
WEST FLOODWALL



EAST MONOLITH



EAST FLOODWALL



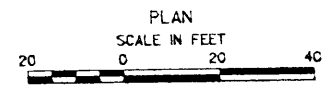
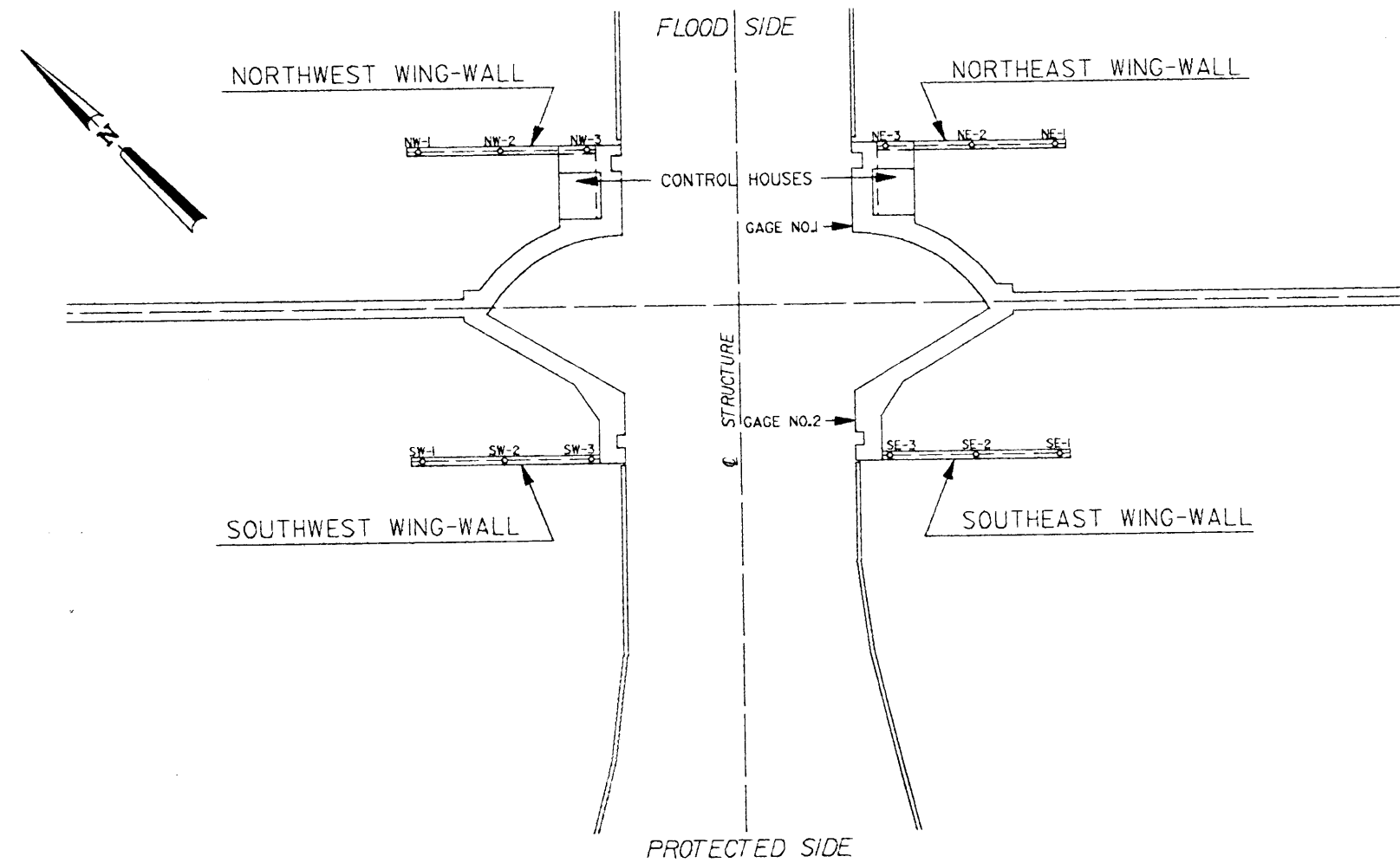
		DISTANCE BETWEEN REFERENCE MARKS						
NO. OF REFERENCE MARKS		B2T0B3	B4T0B5	B5T0B6	B11T0B12	B13T0B14	B6T0B7	B8T0B9
INITIAL DATE		4-11-74	4-11-74	4-11-74	4-11-74	4-11-74	4-11-74	4-11-74
ORIGINAL READINGS (IN.)		4.97	3.98	13 1.35	64.17	64.19	2.48	5.00
OBSERVATIONS	02 NOV 1993	5.05	4.05	---	---	---	2.58	5.08
	05 APR 1995	5.06	4.04	---	---	---	2.58	5.09
	04 MAR 1996	5.08	4.05	---	---	---	2.58	5.09
	12 MAR 1998	5.06	4.06	---	---	---	2.58	5.09

NOTE:
For location and tabulation of settlement reference marks see plate

LAKE PONTCHARTRAIN AND VICINITY
BAYOU BIENVENUE
PERIODIC INSPECTION

SETTLEMENT REFERENCE MARKS
DIFFERENTIAL SETTLEMENT CHART
1994 TO DATE

U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
NEW ORLEANS, LOUISIANA

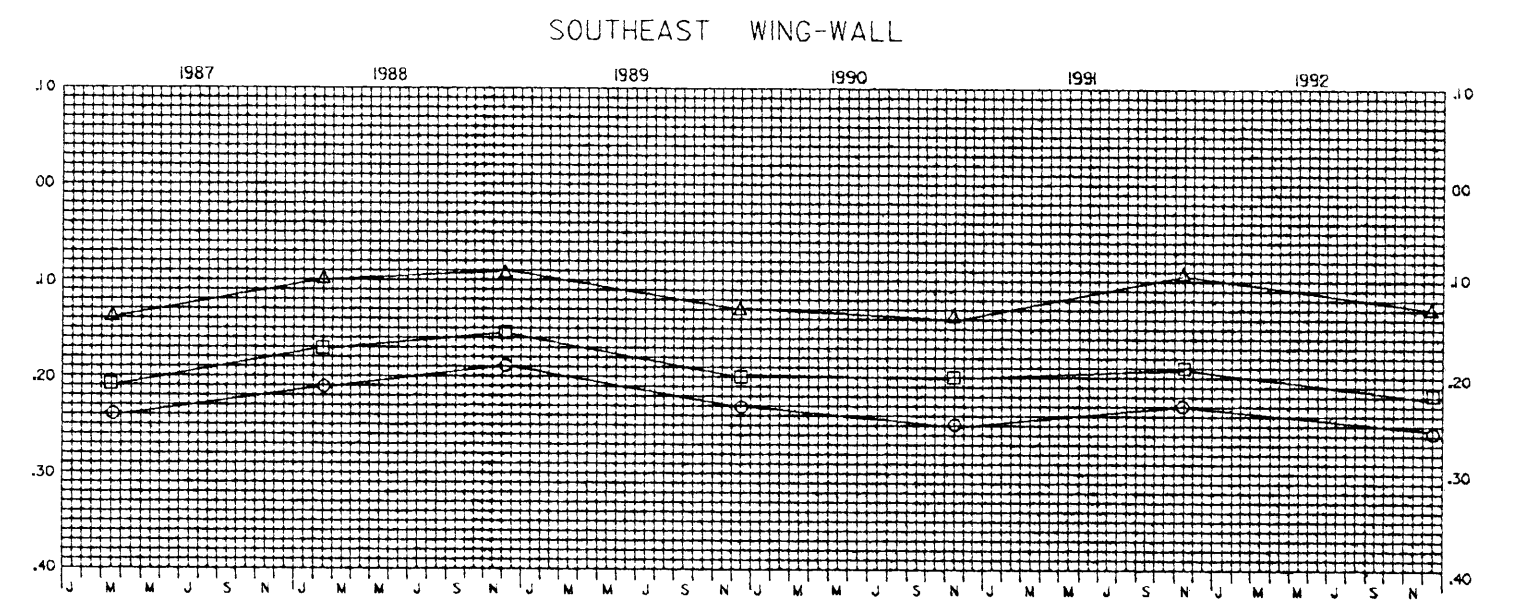
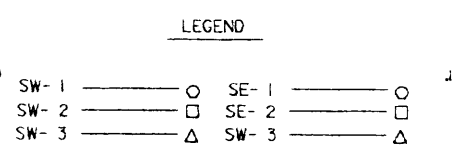
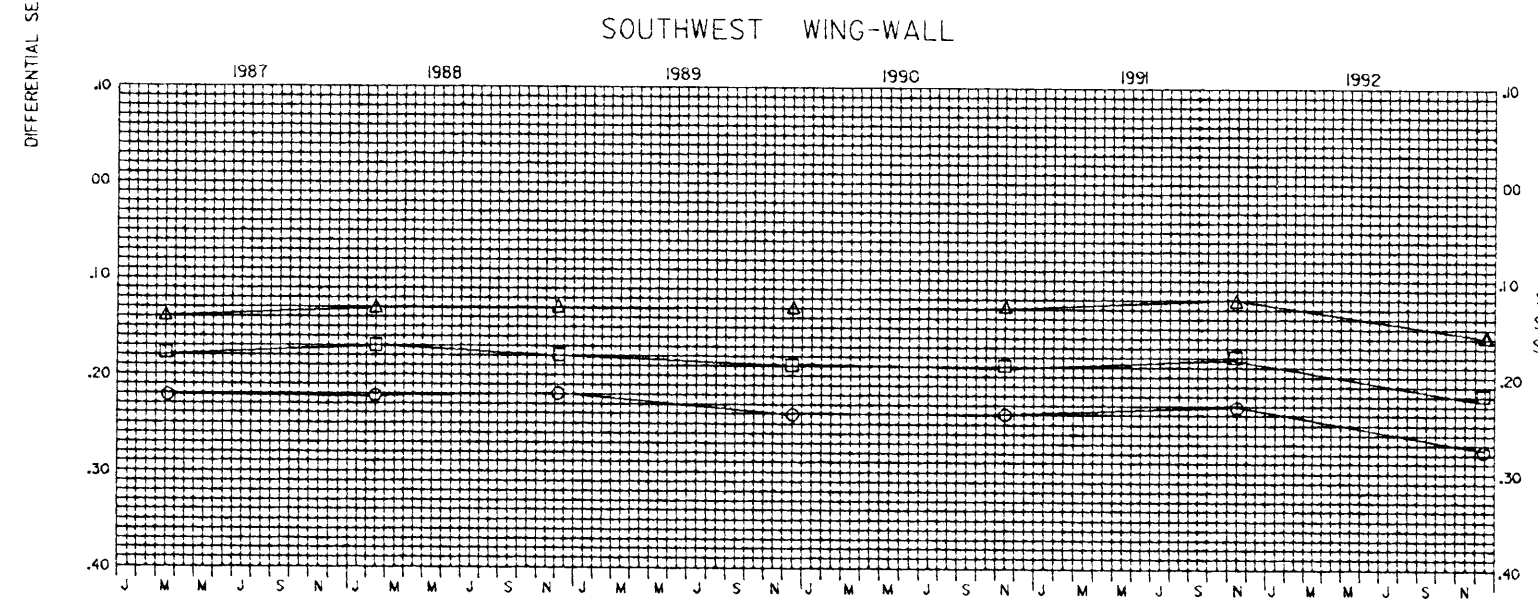
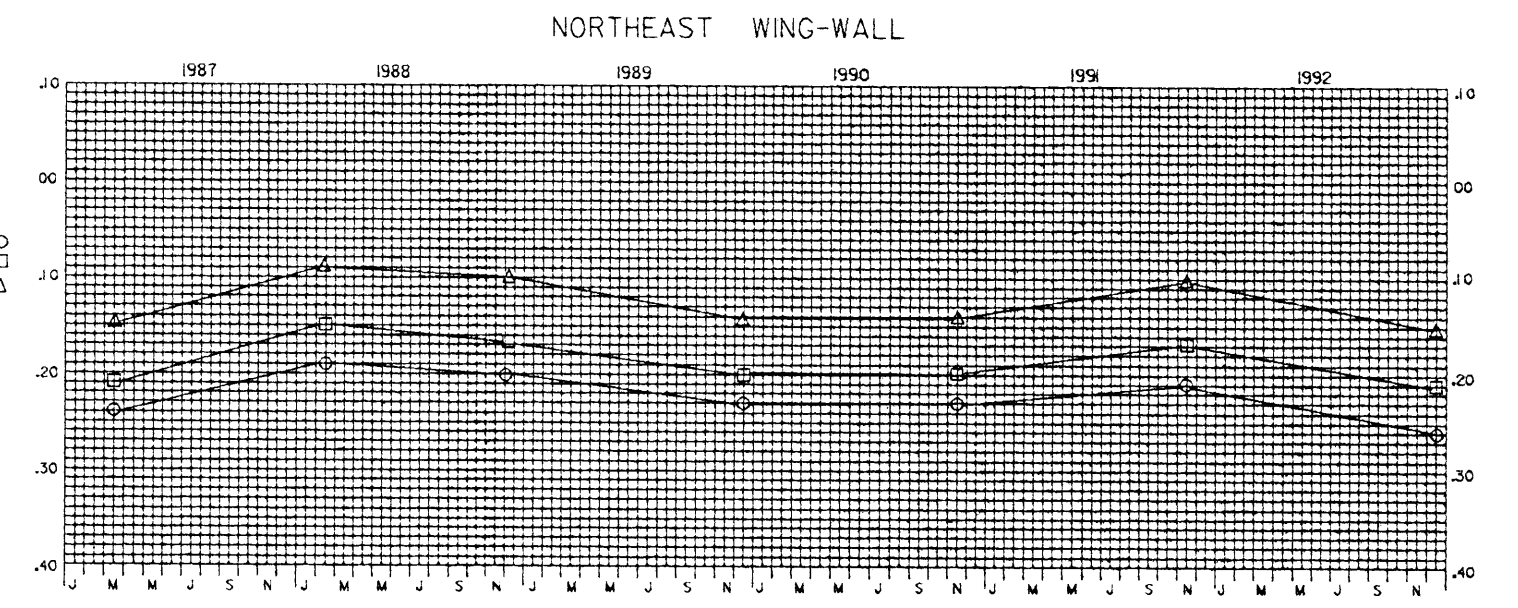
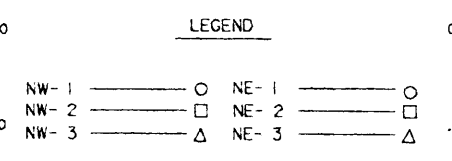
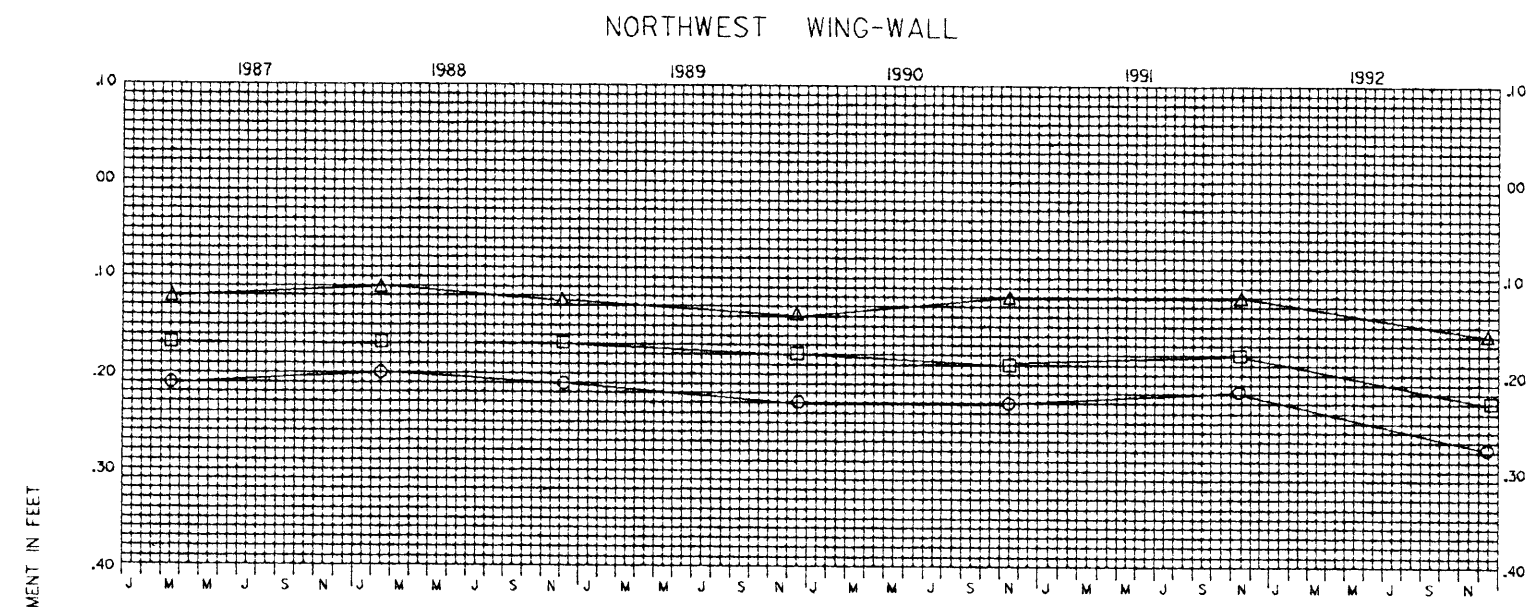


NO. OF REFERENCE MARKS	SETTLEMENT REFERENCE MARKS												TEMP	GAGE 1	GAGE 2	B.M.	ELEV.
	NW-1	NW-2	NW-3	NE-1	NE-2	NE-3	SW-1	SW-2	SW-3	SE-1	SE-2	SE-3					
INITIAL DATE	3-29-78	3-29-78	3-29-78	3-29-78	3-29-78	3-29-78	3-29-78	3-29-78	3-29-78	3-29-78	3-29-78	3-29-78	61°	0.4	0.3	BB 2	6.279
ORIGINAL READINGS	5.02	5.17	5.32	4.83	5.00	5.23	5.02	5.12	5.26	4.86	4.99	5.32					
29 FEB. 1980	4.87	5.04	5.18	4.68	4.86	5.11	4.89	5.02	5.16	4.71	4.85	5.21	58°	-0.3	0.1	BB2	6.279
11 NOV. 1980	4.86	5.02	5.22	4.67	4.84	5.13	4.86	4.98	5.13	4.70	4.85	5.19	69°	1.5	1.4	BB2	6.278
31 MAY 1982	4.81	4.99	5.16	4.62	4.80	5.07	4.81	4.84	5.09	4.66	4.80	5.17	85°	1.8	1.9	BB2	6.281
29 NOV. 1982	4.85	5.02	5.17	4.65	4.84	5.13	4.84	4.98	5.14	4.68	4.83	5.21	66°	1.1	1.6	BB3	6.280
13 APR. 1984	4.84	5.02	5.21	4.65	4.84	5.12	4.84	4.98	5.15	4.68	4.83	5.22	67°	-	1.0	BB3	6.280
22 OCT. 1984	4.84	5.03	5.20	4.62	4.83	5.07	4.82	4.97	5.15	4.65	4.75	5.19	78°	1.1	1.0	BB3	6.280
11 AUG. 1986	4.81	5.00	5.20	4.59	4.79	5.08	4.80	4.94	5.12	4.62	4.78	5.18	60°	1.9	1.7	BB3	6.280
03 MAR. 1987	4.82	5.00	5.21	4.64	4.85	5.14	4.80	4.95	5.13	4.64	4.82	5.22	50°	-0.3	0.0	BB3	6.280
25 FEB. 1988	4.81	5.00	5.20	4.63	4.84	5.13	4.80	4.94	5.13	4.67	4.83	5.23	52°	0.8	0.8	BB3	6.280
01 DEC. 1988	4.79	4.99	5.16	4.60	4.80	5.09	4.78	4.93	5.13	4.63	4.79	5.19	52°	-	-	BB3	6.280
04 DEC. 1989	4.79	4.98	5.20	4.60	4.80	5.09	4.78	4.93	5.13	4.62	4.79	5.18	80°	1.8	1.4	BB3	6.280
01 NOV. 1990	4.80	4.99	5.20	4.62	4.83	5.13	4.79	4.94	5.14	4.63	4.80	5.23	86°	1.9	1.9	BB3	6.228
18 NOV. 1991	4.80	4.94	5.16	4.57	4.79	5.08	4.74	4.90	5.10	4.60	4.77	5.19	63°	-	-	BB3	6.280
17 DEC. 1992	4.74	4.94	5.19	4.58	4.79	5.09	4.70	4.90	*	4.61	4.78	5.20	72°	1.4	2.2	BB3	6.280
02 NOV. 1993	4.80	5.00	5.19	4.58	4.78	5.07	*	*	*	4.58	4.76	5.18	70°	1.3	1.3	BB3	6.280
05 APR. 1995	4.74	4.94	5.19	4.56	4.78	5.07	*	*	*	4.60	4.77	5.20	69°	0.8	0.8	BB3	6.280
04 MAR. 1996	4.76	4.96	5.19	4.58	4.80	5.11	4.74	4.90	5.12	4.60	4.77	5.20	69°	0.8	0.8	BB3	6.280
12 MAR. 1998	4.79	5.00	5.21	4.69	4.9	5.18	4.80	4.96	5.18	4.65	4.84	5.27	75°	2.0	1.7	BB3	6.280
DATE OF OBSERVATIONS																	

• TOP OF BRASS BOLT BENT OVER.
 •• DESTROYED


LAKE PONTCHARTRAIN AND VICINITY
 BAYOU BIENVENUE
 PERIODIC INSPECTION
 WING-WALL
 SETTLEMENT REFERENCE MARKS
 PLAN AND TABULATION

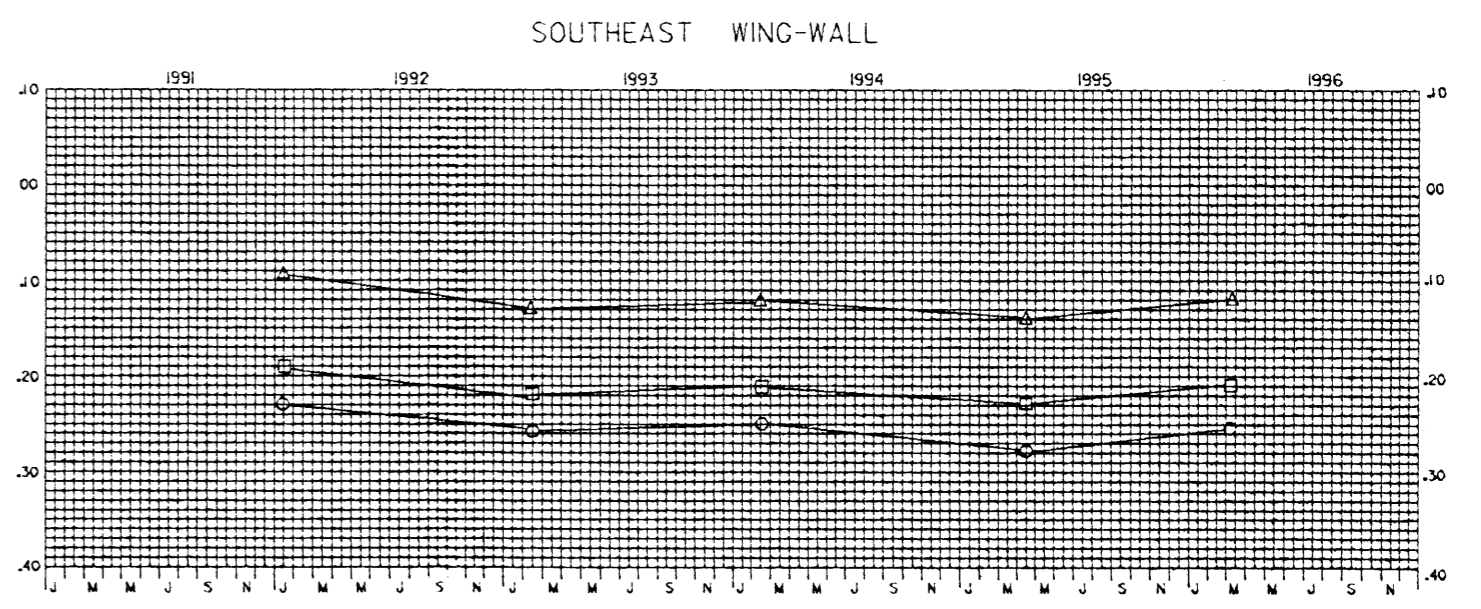
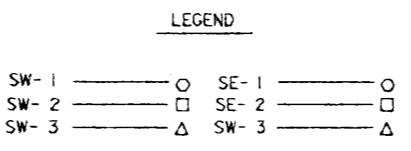
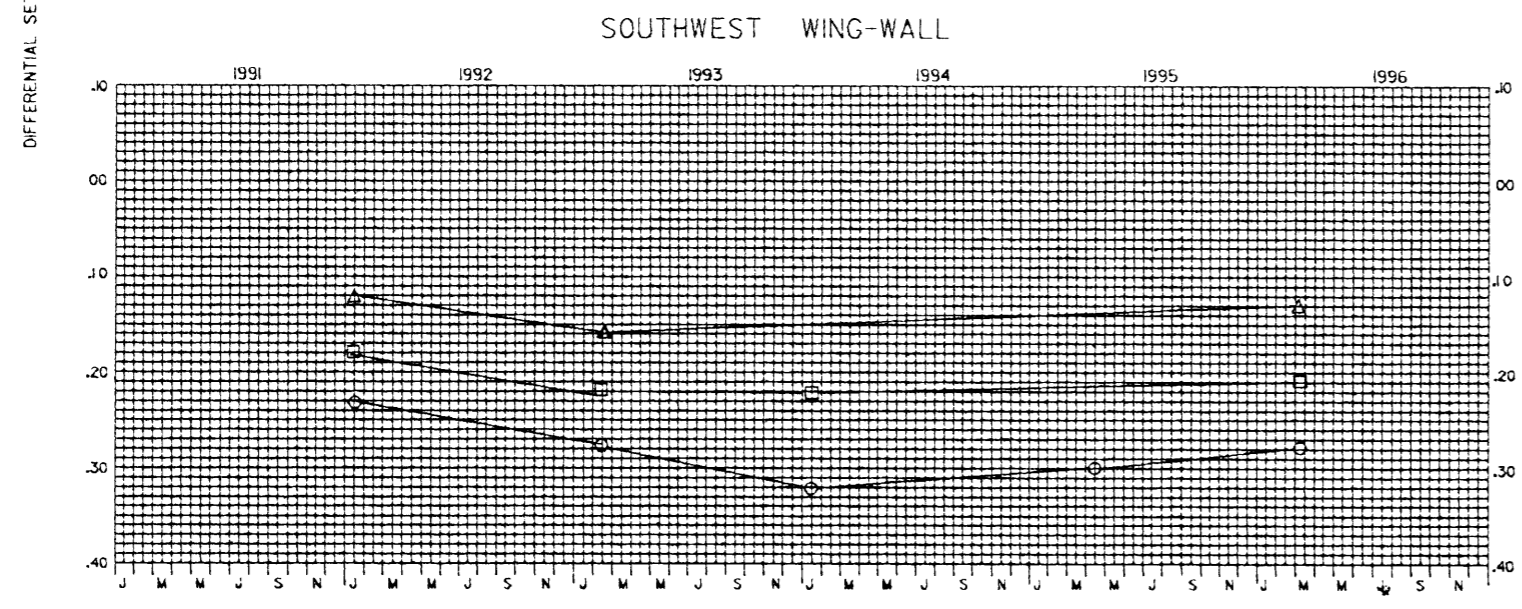
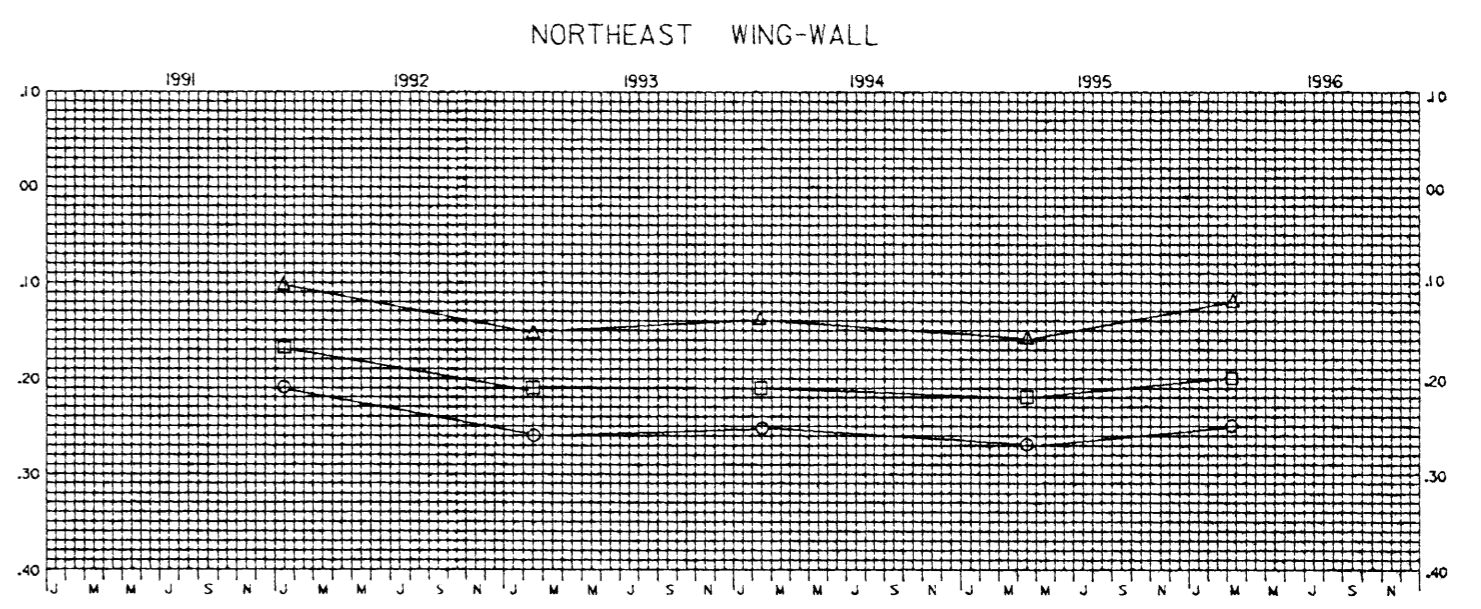
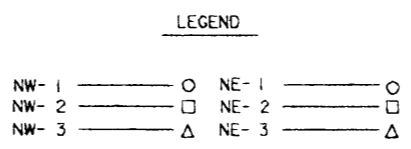
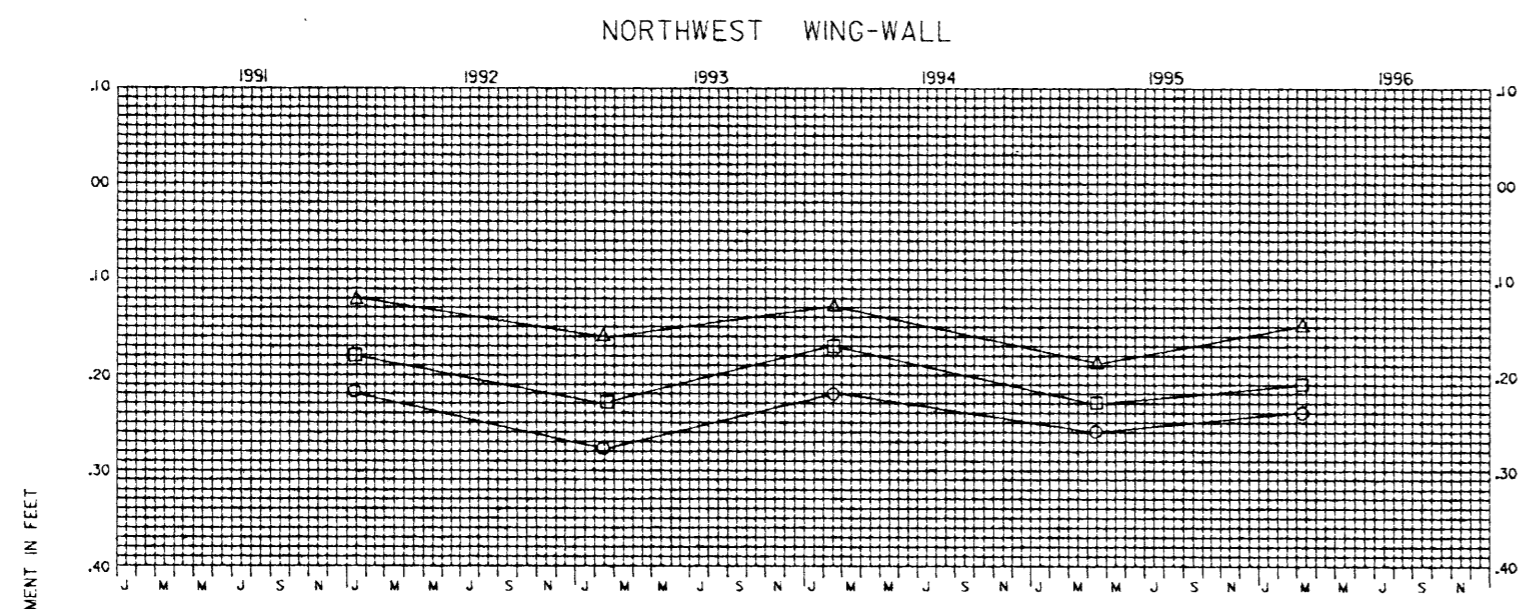
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
 CORPS OF ENGINEERS
 NEW ORLEANS, LOUISIANA



NOTE:
For location and tabulation of
settlement reference marks see
plate

LAKE PONTCHARTRAIN AND VICINITY
BAYOU BIENVENUE
PERIODIC INSPECTION
WING-WALL
SETTLEMENT REFERENCE MARKS
DIFFERENTIAL SETTLEMENT CHART
1987 TO 1992

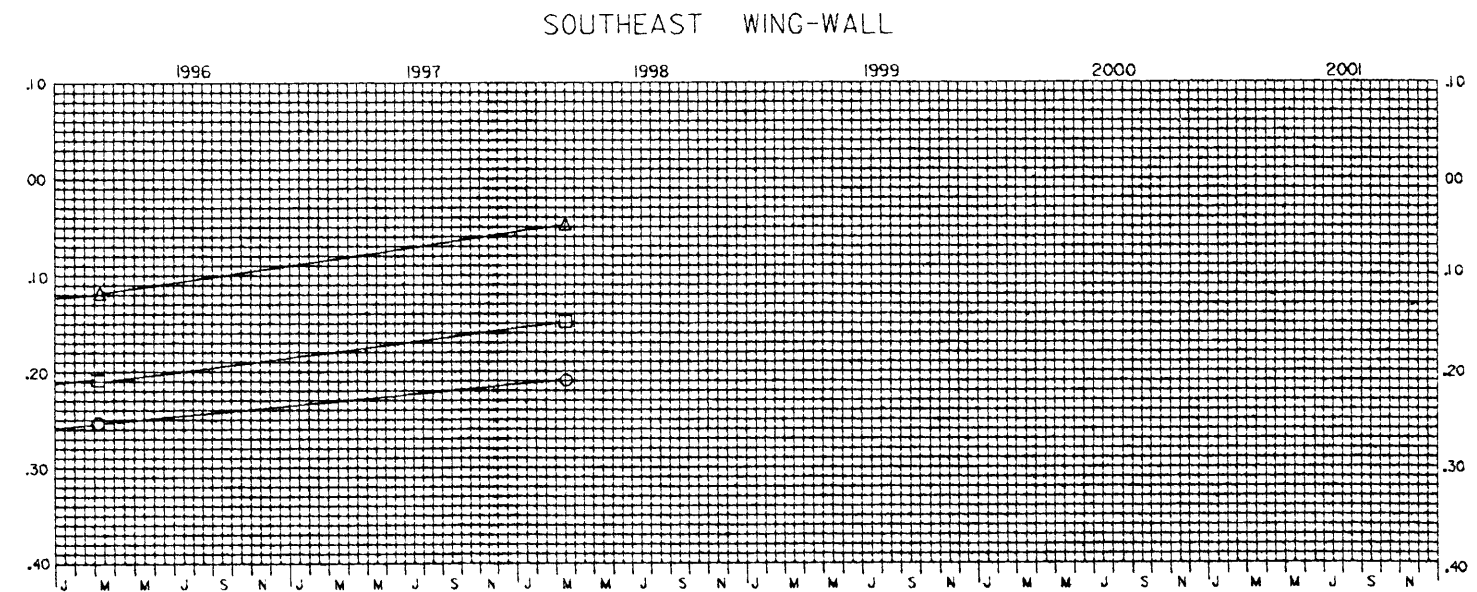
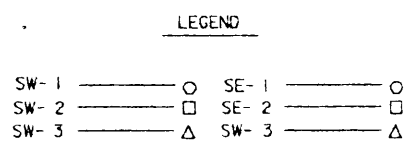
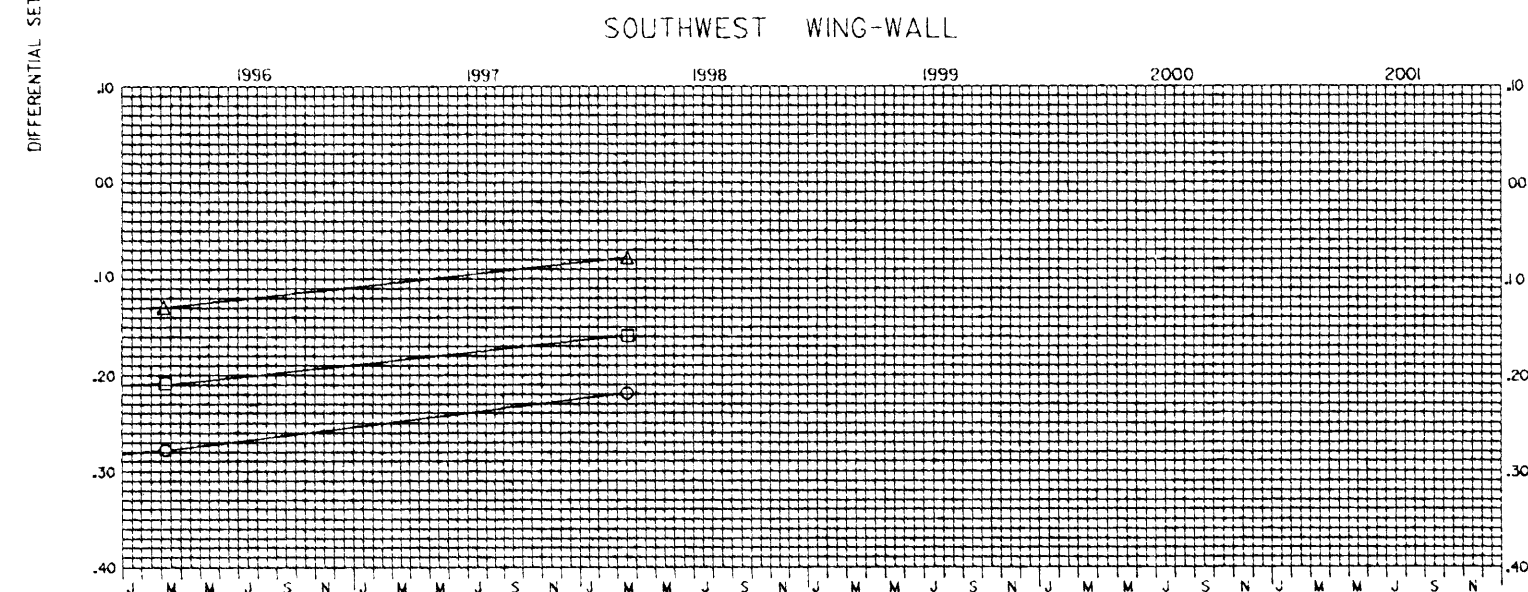
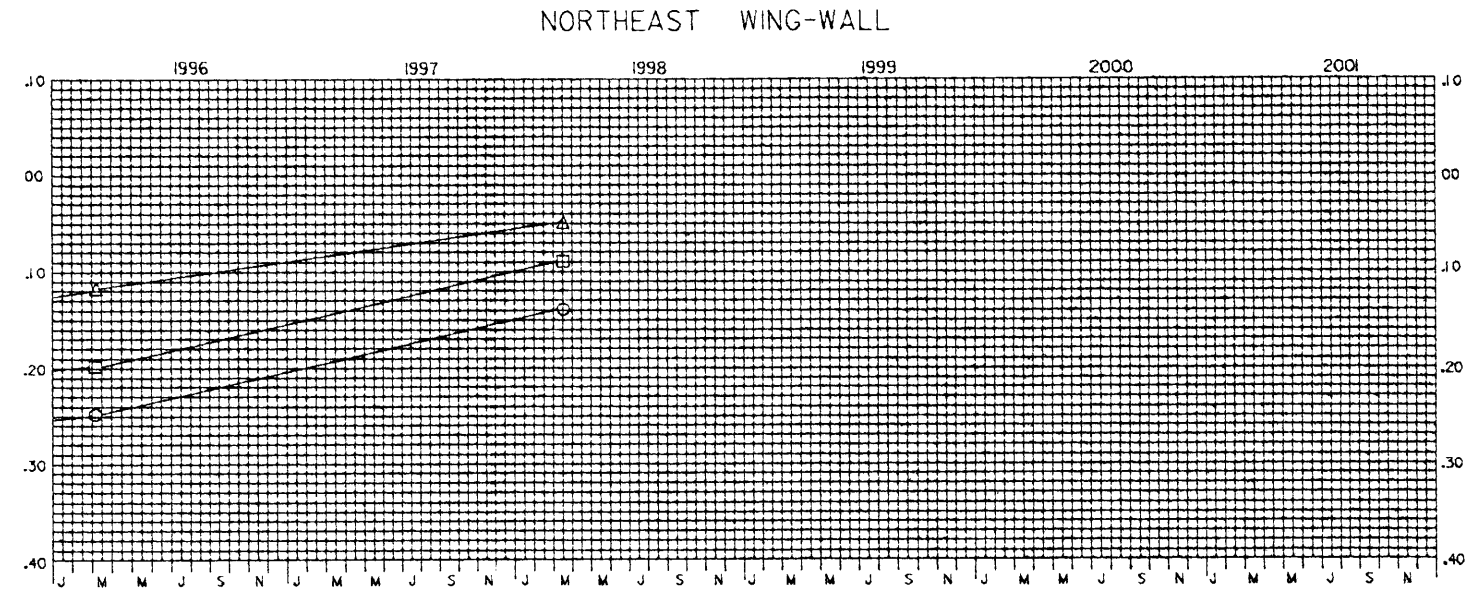
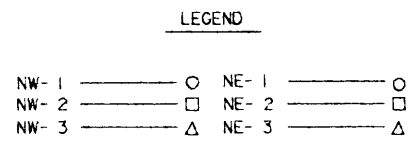
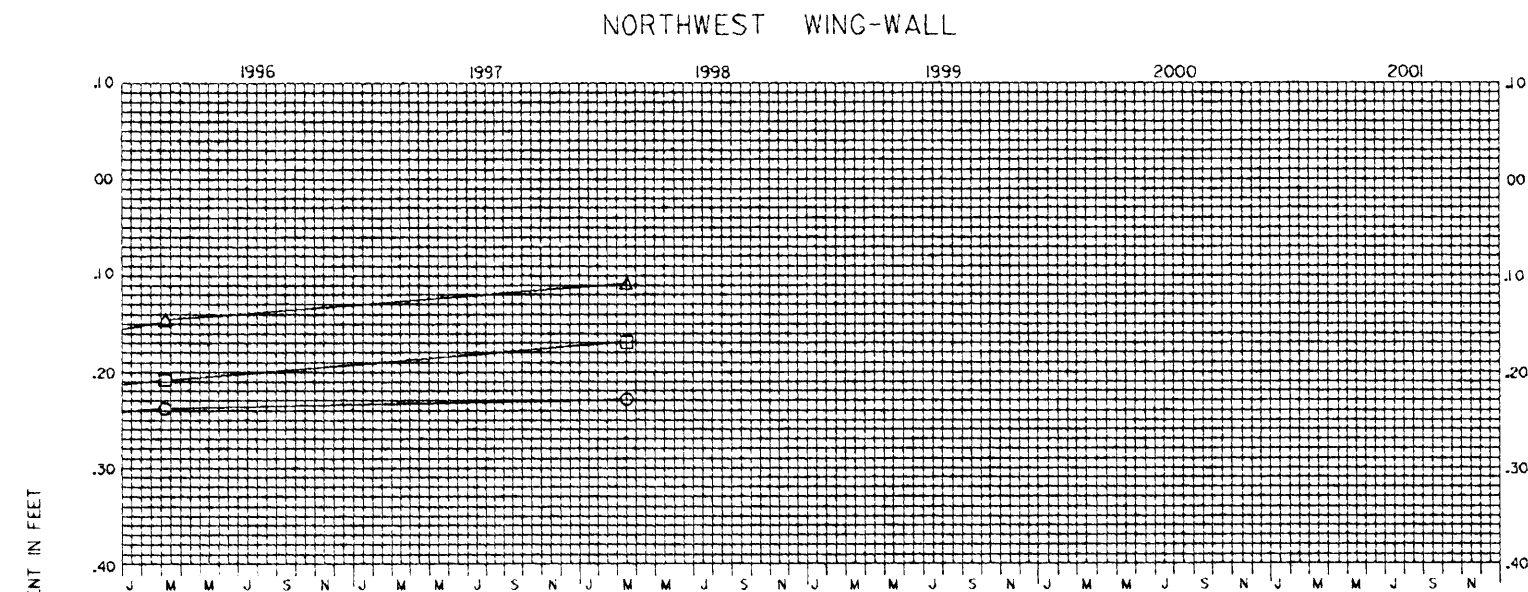
 U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
NEW ORLEANS, LOUISIANA



NOTE:
For location and tabulation of
settlement reference marks see
plate

LAKE PONTCHARTRAIN AND VICINITY
BAYOU BIENVENUE
PERIODIC INSPECTION
WING-WALL
SETTLEMENT REFERENCE MARKS
DIFFERENTIAL SETTLEMENT CHART
1991 TO 1996

U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
NEW ORLEANS, LOUISIANA

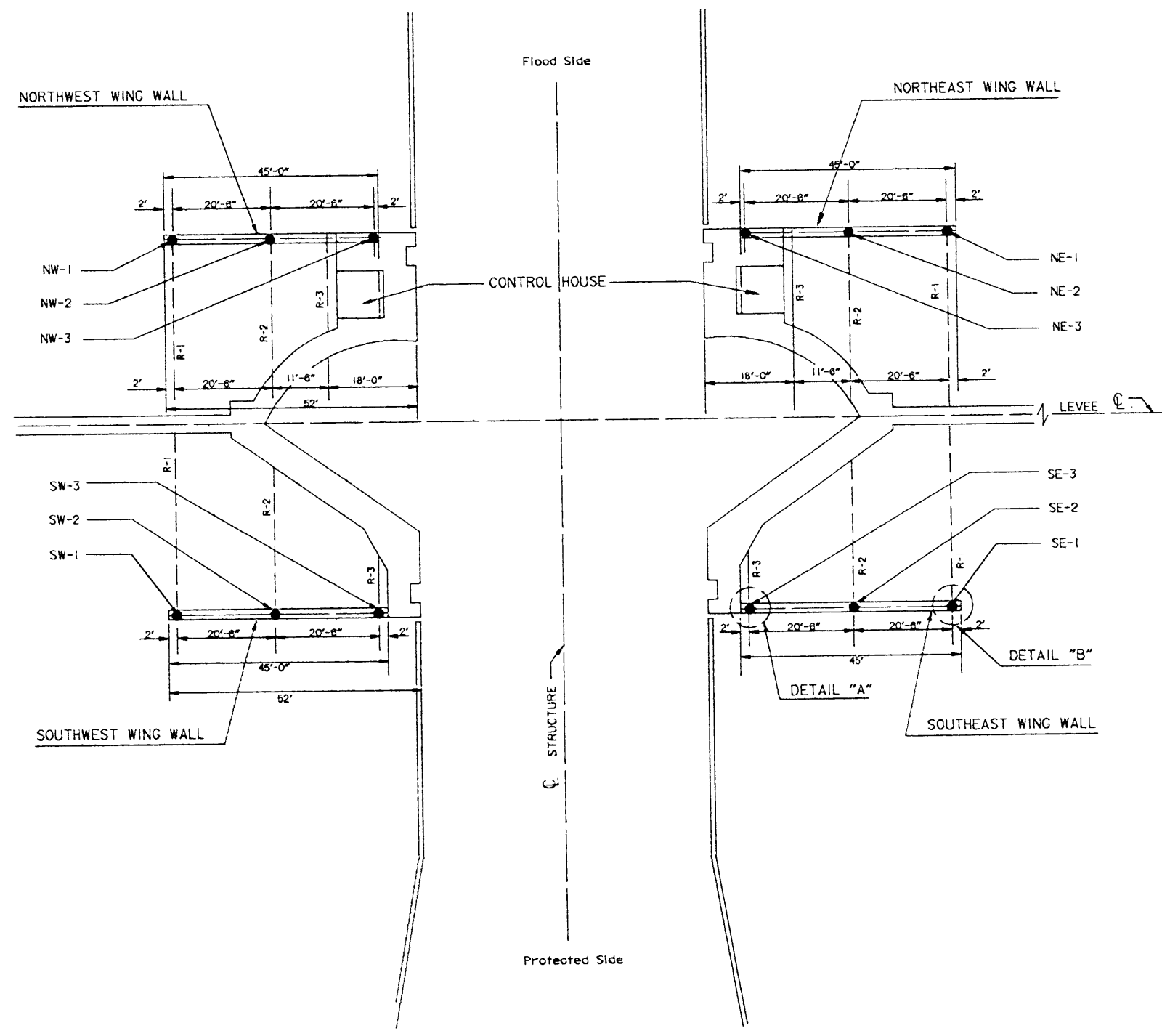


NOTE:
For location and tabulation of
settlement reference marks see
plate

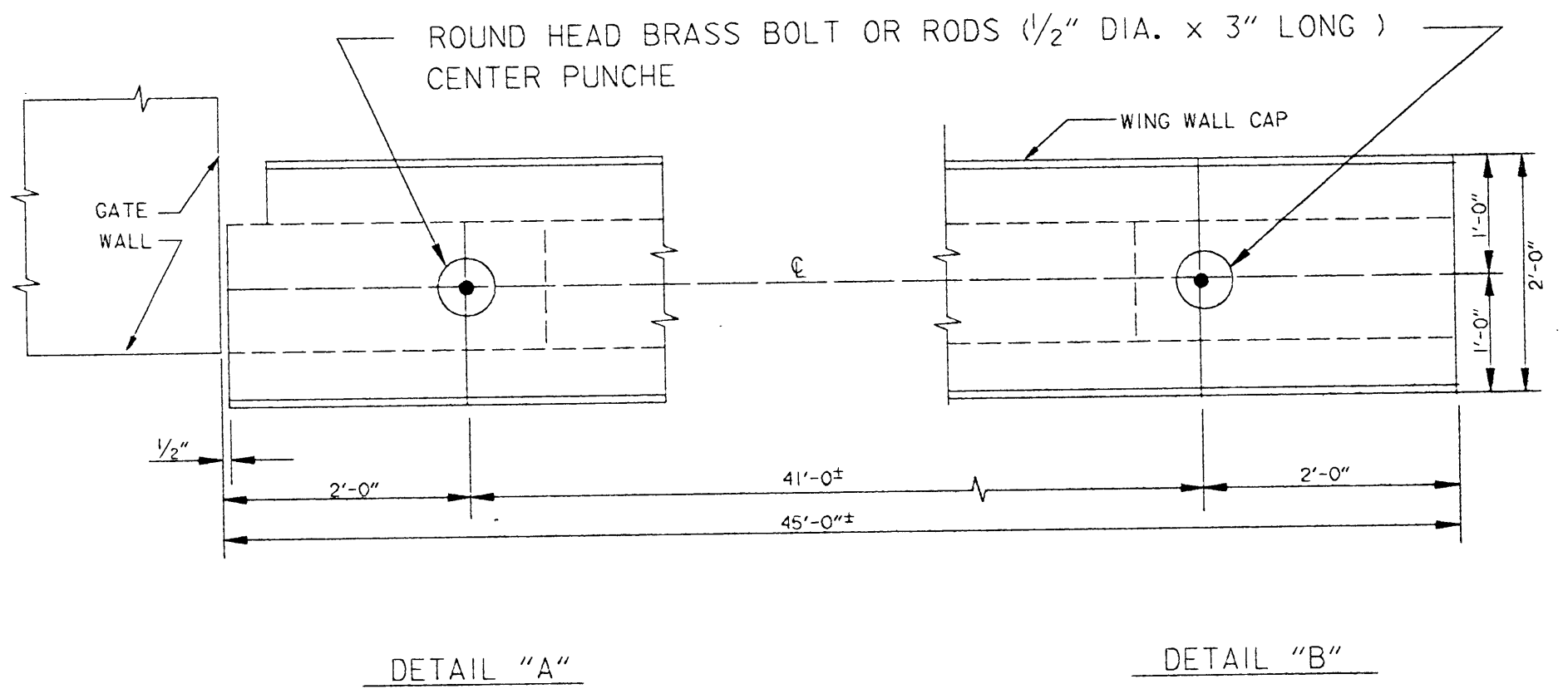
LAKE PONTCHARTRAIN AND VICINITY
BAYOU BIENVENUE
PERIODIC INSPECTION
WING-WALL
SETTLEMENT REFERENCE MARKS
DIFFERENTIAL SETTLEMENT CHART
1996 TO DATE



U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
NEW ORLEANS, LOUISIANA



PLAN
 SCALE: 1" = 20'



DETAIL "A"

DETAIL "B"

SCALE: 3/4" = 1'- 0"

LAKE PONTCHARTRAIN AND VICINTY
 BAYOU BIENVENUE
 PERIODIC INSPECTION

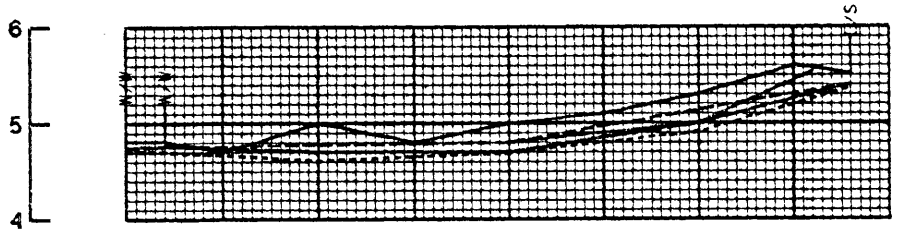
SETTLEMENT REFERENCE MARKS
 OVBANKS RANGES

U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
 CORPS OF ENGINEERS
 NEW ORLEANS, LOUISIANA

DISTANCE IN FEET

0 10 20 30 40

ELEVATION IN FEET NGVD.



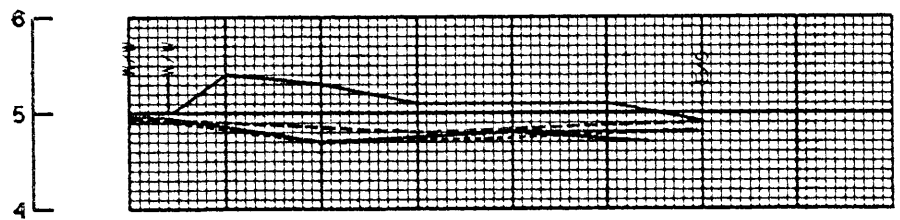
1+00.00

ELEVATION IN FEET NGVD.

LEGEND:

- 16-APR-1984
- 02-DEC-1993
- 18-APR-1995
- 19-MAR-1996
- 17-MAR-1998

ELEVATION IN FEET NGVD.

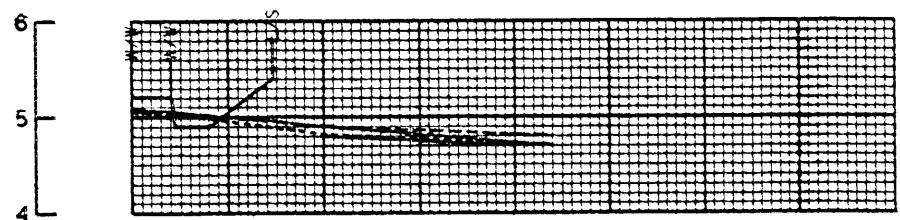


2+00.00

ELEVATION IN FEET NGVD.

NOTES:

ELEVATION IN FEET NGVD.



3+00.00

ELEVATION IN FEET NGVD.

STATION:

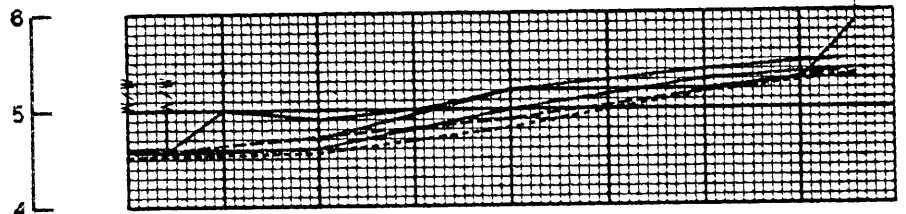
1+00.00
2+00.00
3+00.00

LAKE PONTCHARTRAIN, LA. AND VICINITY
BAYOU BIENVENUE CONTROL STRUCTURE
PERIODIC INSPECTIONS
NORTHWEST WINGWALL (FY 98)
U.S. ARMY ENGINEERS, NEW ORLEANS CORPS OF ENGINEERS

DISTANCE IN FEET

0 10 20 30 40

ELEVATION IN FEET NGVD.



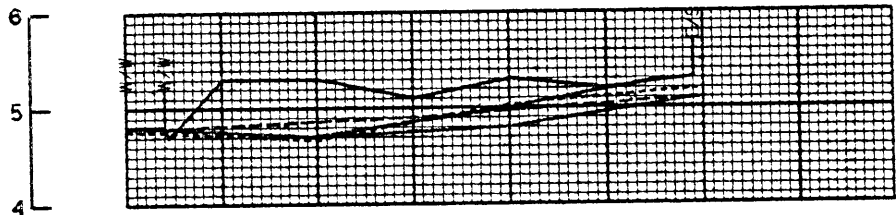
1+00.00

ELEVATION IN FEET NGVD.

LEGEND:

- 16-APR-1984
- - - 03-DEC-1993
- · · 18-APR-1995
- · - 19-MAR-1996
- - - 17-MAR-1998

ELEVATION IN FEET NGVD.

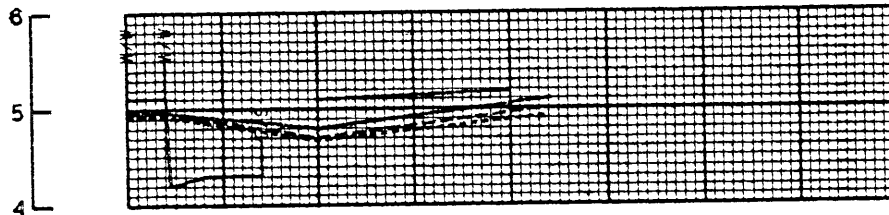


2+00.00

ELEVATION IN FEET NGVD.

NOTES:

ELEVATION IN FEET NGVD.



3+00.00

ELEVATION IN FEET NGVD.

STATION:

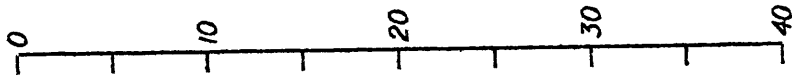
1+00.00

2+00.00

3+00.00

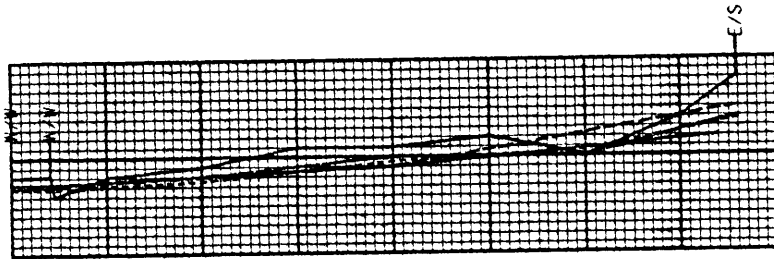
LAKE PONTCHARTRAIN, LA AND VICINITY
 BAYOU BIENVENUE CONTROL STRUCTURE
 PERIODIC INSPECTION
NORTHEAST WINGWALL (FY 98)
 U.S. ARMY ENGINEERS, NEW ORLEANS CORPS OF ENGINEERS

DISTANCE IN FEET



ELEVATION IN FEET NGVD.

6
5
4



1+00.00

ELEVATION IN FEET NGVD.

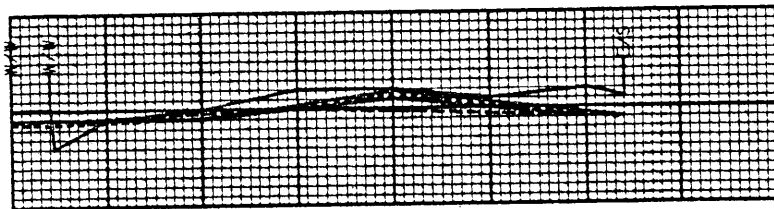
6
5
4

LEGEND:

16-APR-1984
02-DEC-1993
15-APR-1995
19-MAR-1996
17-MAR-1998

ELEVATION IN FEET NGVD.

6
5
4



2+00.00

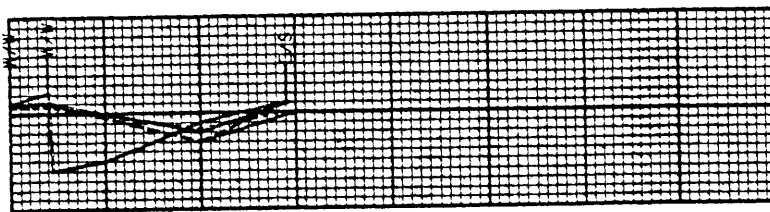
ELEVATION IN FEET NGVD.

6
5
4

NOTES:

ELEVATION IN FEET NGVD.

6
5
4



3+00.00

ELEVATION IN FEET NGVD.

6
5
4

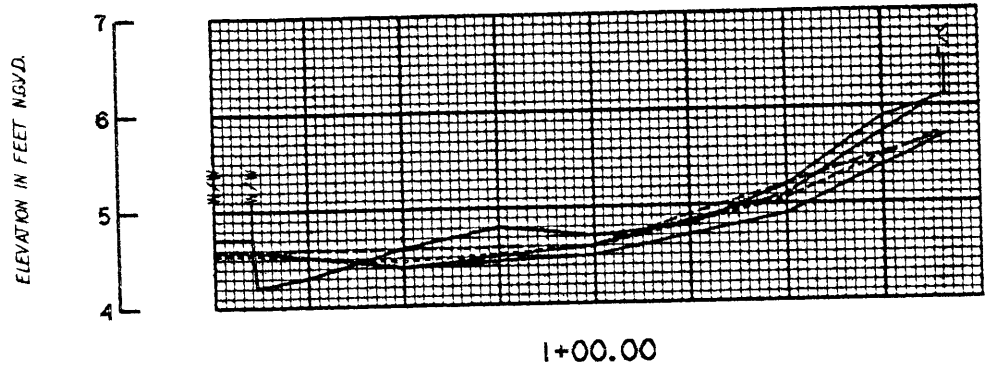
STATION:

1+00.00
2+00.00
3+00.00

LAKE PONTCHARTRAIN, LA AND VICINITY
BAYOU BIENVENUE CONTROL STRUCTURE
PERIODIC INSPECTIONS
SOUTHWEST WINGWALL (FY 98)
U.S. ARMY ENGINEERS, NEW ORLEANS CORPS OF ENGINEERS

DISTANCE IN FEET

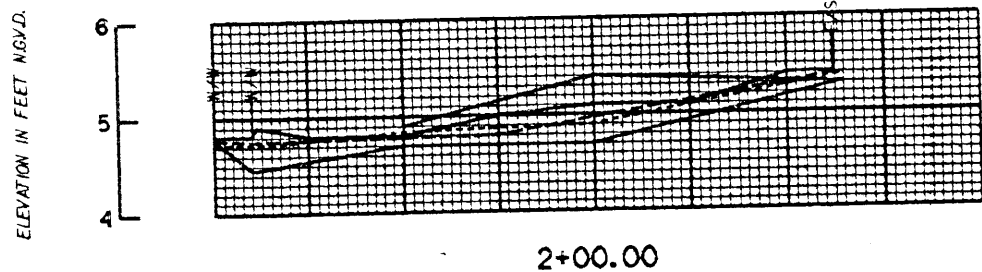
0 10 20 30 40



ELEVATION IN FEET NGVD.

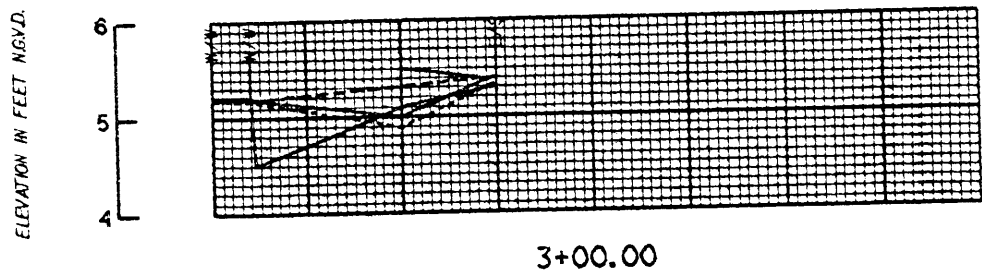
LEGEND:

- 16-APR-1984
- 02-DEC-1993
- - - 18-APR-1995
- 19-MAR-1996
- - - 17-MAR-1998



ELEVATION IN FEET NGVD.

NOTES:

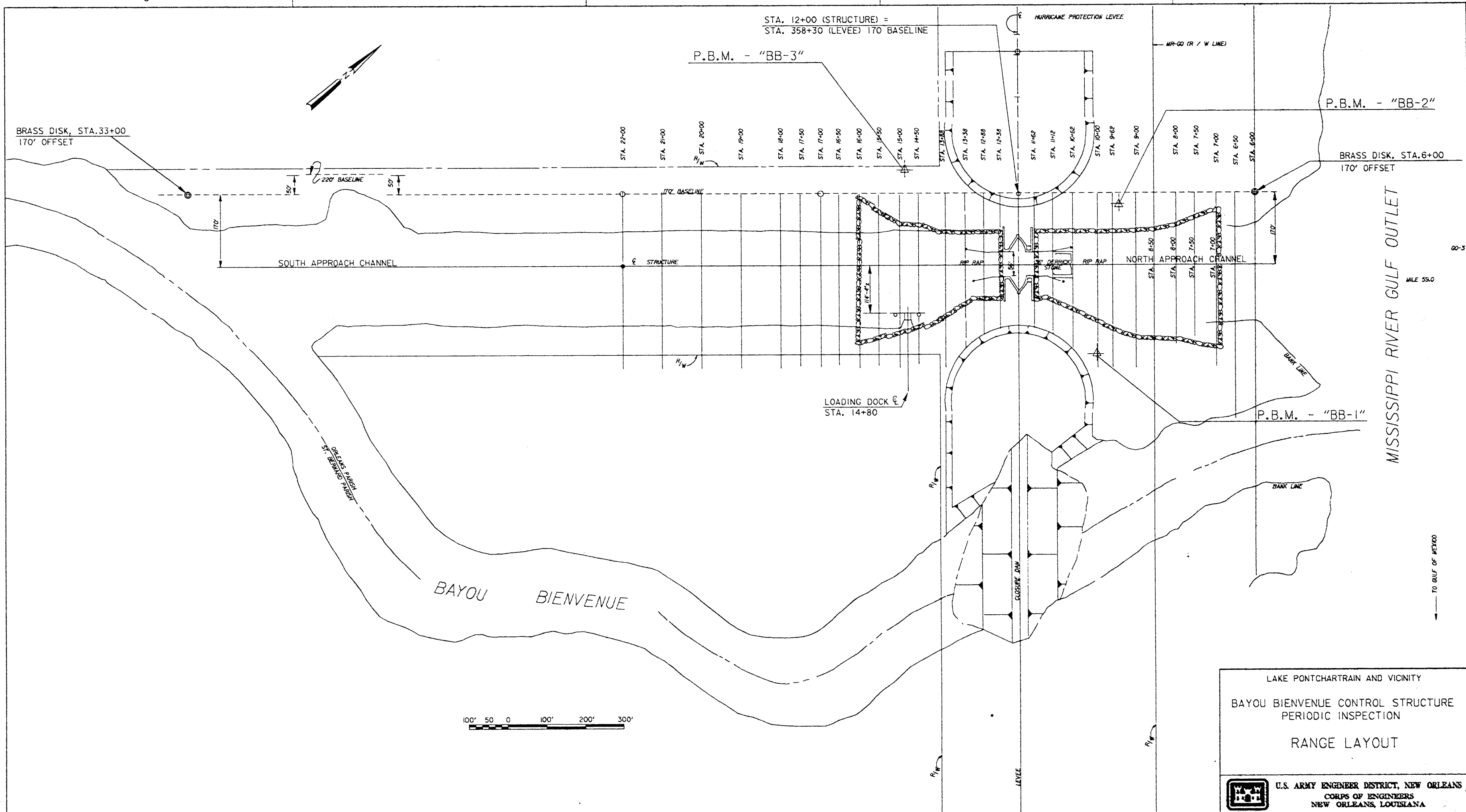


ELEVATION IN FEET NGVD.

STATION:

1+00.00
2+00.00
3+00.00

LAKE PONTCHARTRAIN LA AND VICINITY
BAYOU BIENVENUE CONTROL STRUCTURE
PERIODIC INSPECTIONS
SOUTHEAST WINGWALL (FY 98)
U.S. ARMY ENGINEERS, NEW ORLEANS CORPS OF ENGINEERS



STA. 12+00 (STRUCTURE) =
STA. 358+30 (LEVEE) 170' BASELINE

P.B.M. - "BB-3"

P.B.M. - "BB-2"

BRASS DISK, STA. 33+00
170' OFFSET

BRASS DISK, STA. 6+00
170' OFFSET

SOUTH APPROACH CHANNEL

NORTH APPROACH CHANNEL

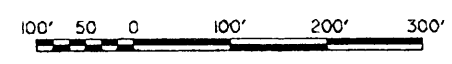
LOADING DOCK
STA. 14+80

P.B.M. - "BB-1"


MISSISSIPPI RIVER GULF OUTLET

MILE 59.0

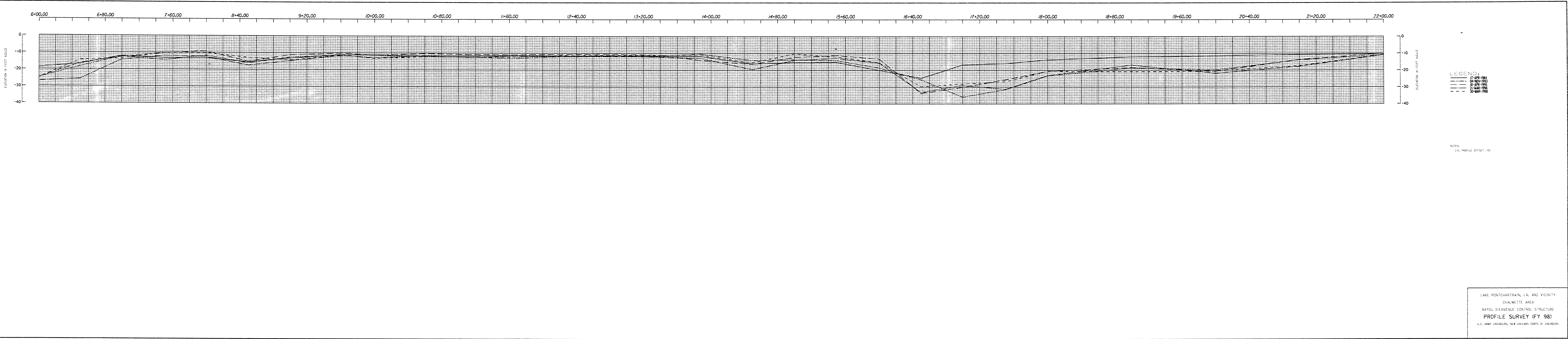
TO GULF OF MEXICO



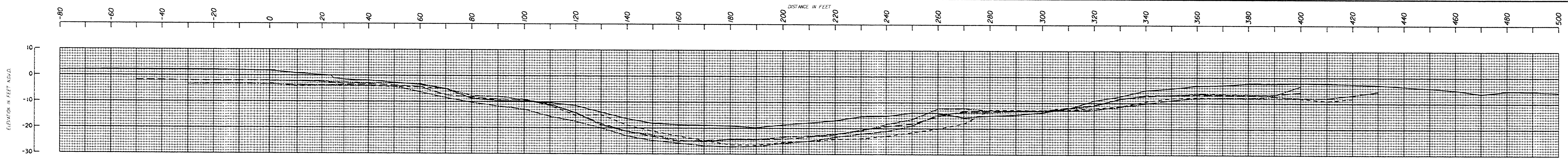
LAKE PONTCHARTRAIN AND VICINITY
BAYOU BIENVENUE CONTROL STRUCTURE
PERIODIC INSPECTION
RANGE LAYOUT



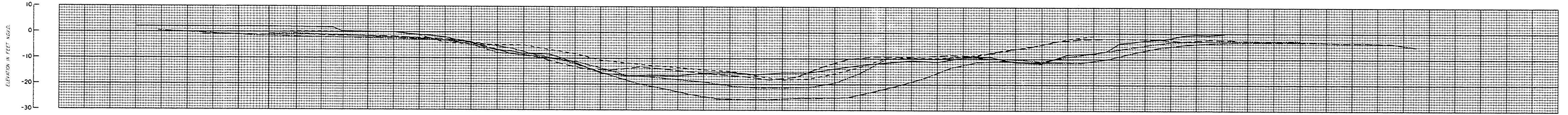
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
NEW ORLEANS, LOUISIANA



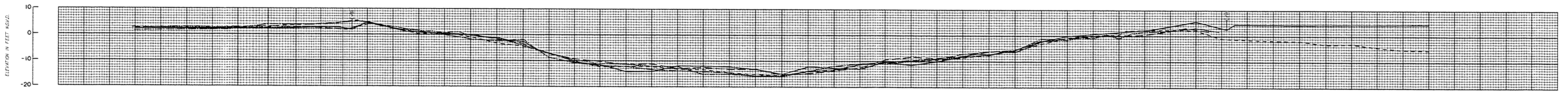
LAKE PONTCHARTRAIN, LA. AND VICINITY
 CHALMETTE AREA
 BAYOU BIENVENUE CONTROL STRUCTURE
PROFILE SURVEY (FY 98)
 U.S. ARMY ENGINEERS, NEW ORLEANS CORPS OF ENGINEERS



6+00.00



6+50.00



7+00.00

LEGEND:
 — 17-APR-1984
 - - - 04-NOV-1993
 . . . 18-APR-1995
 - · - 21-MAR-1998

NOTES:

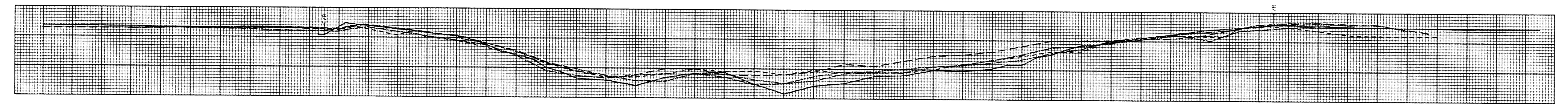
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 6+50.00
 7+00.00

LAKE PONTCHARTRAIN, LA. AND VICINITY
 CHALMETTE AREA
 BAYOU BIENVENUE CONTROL STRUCTURE
 SCOUR SURVEY (FY 98)
 U.S. ARMY ENGINEERS, NEW ORLEANS CORPS OF ENGINEERS

DISTANCE IN FEET

-60 -40 -20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320 340 360 380 400 420 440 460

ELEVATION IN FEET NGVD.



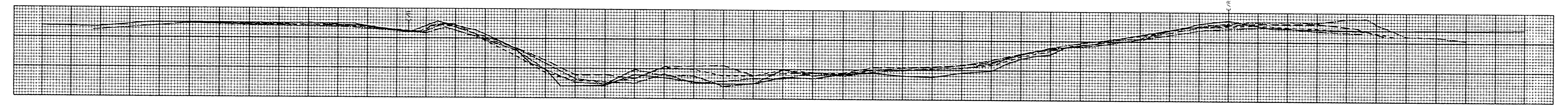
7+50.00

ELEVATION IN FEET NGVD.

LEGEND:

- 17-APR-1984
- - - 04-NOV-1993
- 18-APR-1995
- - - 21-MAR-1996
- - - 30-MAR-1998

ELEVATION IN FEET NGVD.

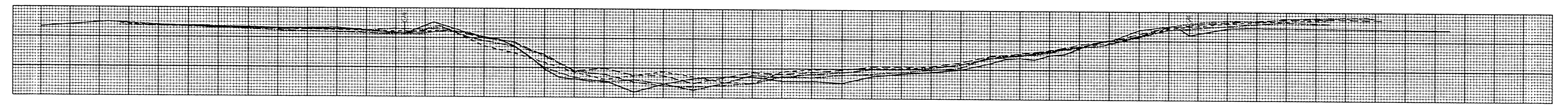


8+00.00

ELEVATION IN FEET NGVD.

NOTES:

ELEVATION IN FEET NGVD.



8+50.00

ELEVATION IN FEET NGVD.

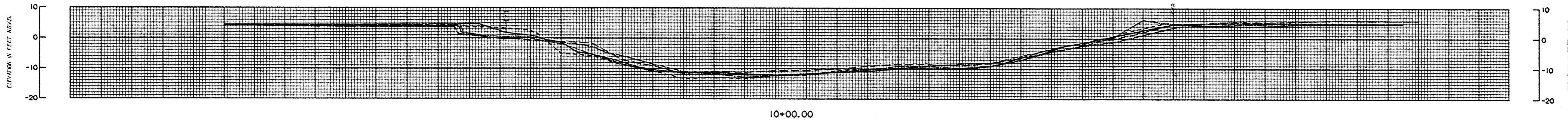
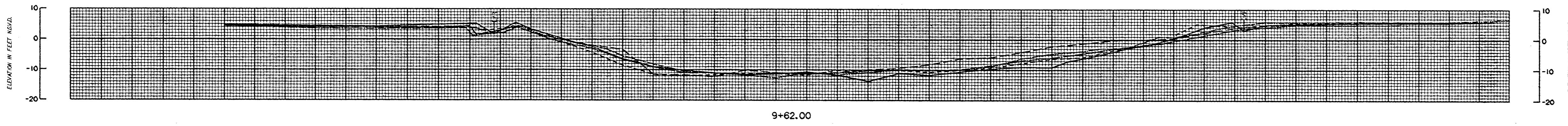
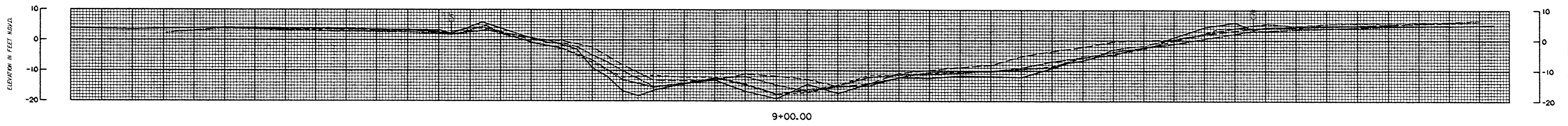
STATION:

- 7+50.00
- 8+00.00
- 8+50.00

LAKE PONTCHARTRAIN, LA. AND VICINITY
 CHALMETTE AREA
 BAYOU BIENVENUE CONTROL STRUCTURE
 SCOUR SURVEY (FY 98)
 U.S. ARMY ENGINEERS, NEW ORLEANS CORPS OF ENGINEERS

DISTANCE IN FEET

-50 -30 -10 10 30 50 70 90 110 130 150 170 190 210 230 250 270 290 310 330 350 370 390 410



LEGEND:

- 17-APR-1984
- - - 04-NOV-1993
- · · 18-APR-1995
- · - 21-MAR-1996
- - - 30-MAR-1998

NOTES:

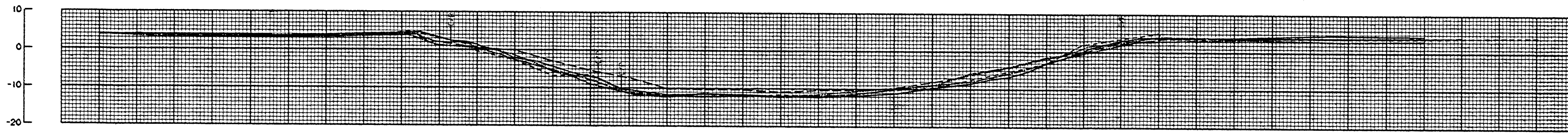
STATION:

- 9+00.00
- 9+62.00
- 10+00.00

LAKE PONTCHARTRAIN, LA. AND VICINITY
 CHALMETTE AREA
 BAYOU BIENVENUE CONTROL STRUCTURE
SCOUR SURVEY (FY 98)
 U.S. ARMY ENGINEERS, NEW ORLEANS CORPS OF ENGINEERS

DISTANCE IN FEET

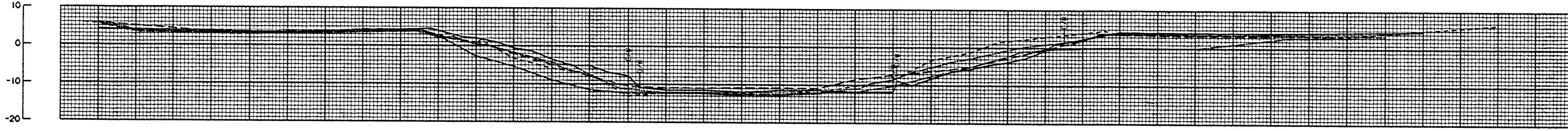
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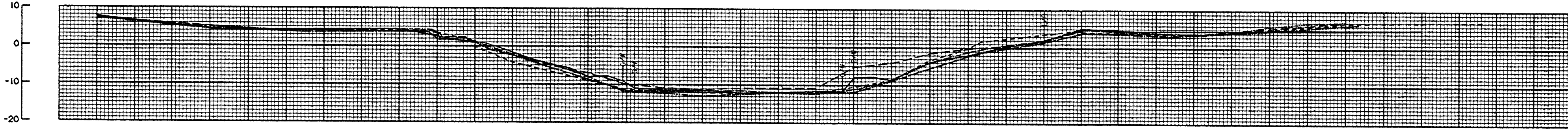
10+62.00

LEGEND:

- 17-APR-1984
- - - 04-NOV-1993
- 18-APR-1995
- - - 21-MAR-1998
- - - 30-MAR-1998



11+12.00



11+62.00

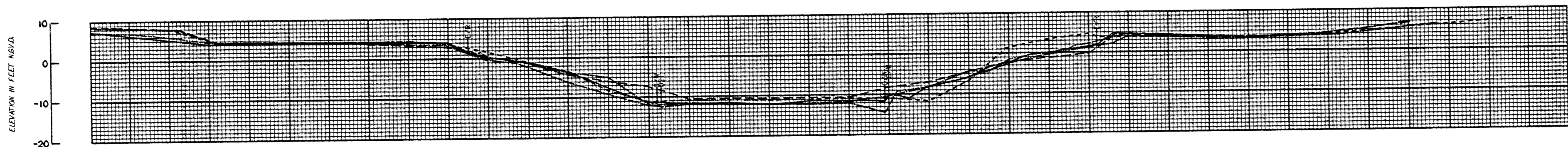
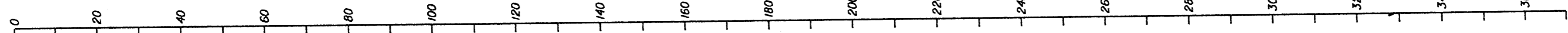
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STATION:

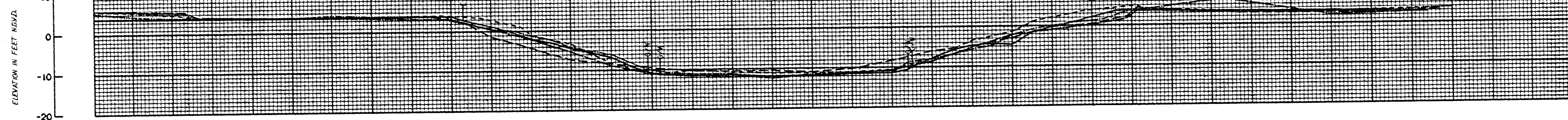
10+62.00
11+12.00
11+62.00

LAKE PONTCHARTRAIN, LA. AND VICINITY
CHALMETTE AREA
BAYOU BIENVENUE CONTROL STRUCTURE
SCOUR SURVEY (FY 98)
U.S. ARMY ENGINEERS, NEW ORLEANS CORPS OF ENGINEERS

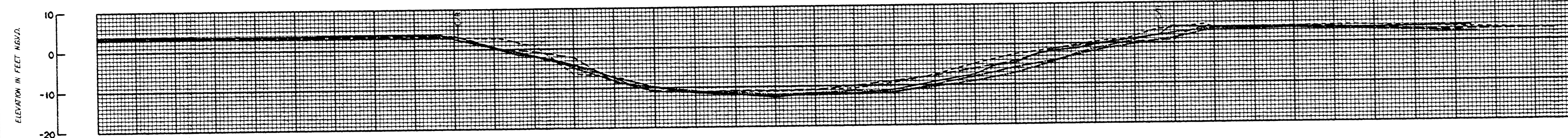
DISTANCE IN FEET



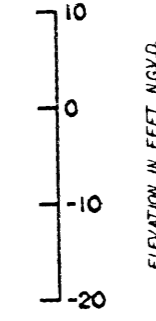
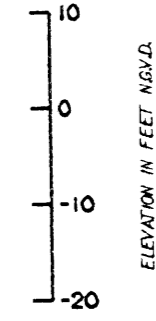
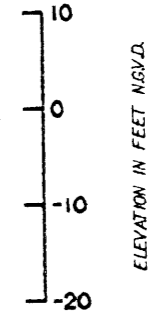
12+38.00



12+88.00



13+38.00

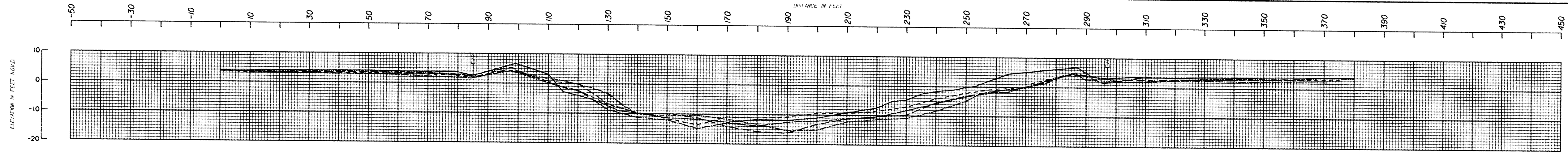


LEGEND:
17-APR-1984
04-NOV-1993
18-APR-1995
21-MAR-1996
30-MAR-1998

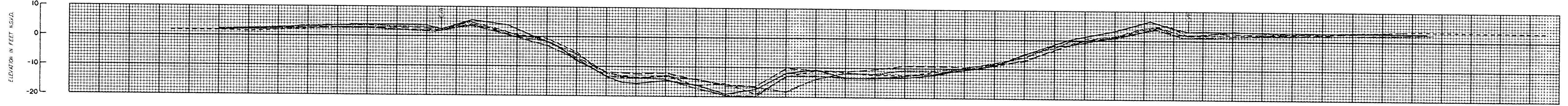
NOTES:

STATION:
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12+88.00
13+38.00

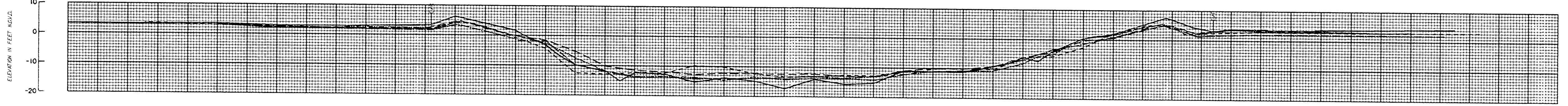
LAKE PONTCHARTRAIN, LA. AND VICINITY
CHALMETTE AREA
BAYOU BIENVENUE CONTROL STRUCTURE
SCOUR SURVEY (FY 98)
U.S. ARMY ENGINEERS, NEW ORLEANS CORPS OF ENGINEERS



13+88.00



14+50.00



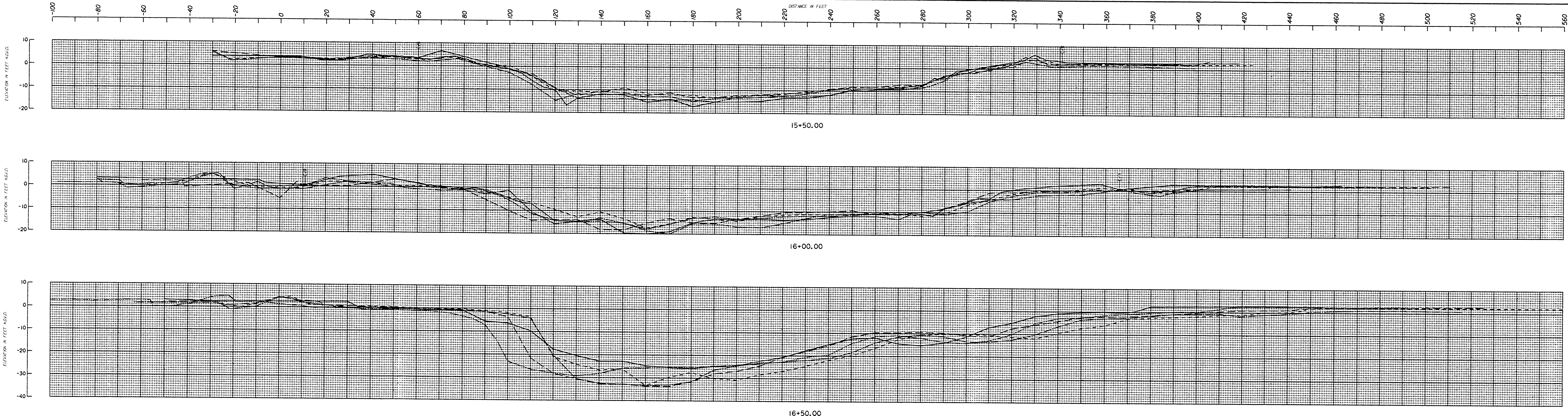
15+00.00

LEGEND:
 - - - - - 17-APR-1984
 - - - - - 04-NOV-1993
 - - - - - 18-APR-1995
 - - - - - 21-MAR-1996
 - - - - - 30-MAR-1998

NOTES:

STATION:
 13+88.00
 14+50.00
 15+00.00

LAKE PONTCHARTRAIN, LA. AND VICINITY
 CHALMETTE AREA
 BAYOU BIENVENUE CONTROL STRUCTURE
 SCOUR SURVEY (FY 98)
 U.S. ARMY ENGINEERS, NEW ORLEANS CORPS OF ENGINEERS



LEGEND:

- 17-APR-1984
- 04-NOV-1993
- 18-APR-1995
- 21-MAR-1996
- 30-MAR-1998

NOTES:

STATION:

- 15+50.00
- 16+00.00
- 16+50.00

LAKE PONTCHARTRAIN, LA. AND VICINITY
 CHALMETTE AREA
 BAYOU BIENVENUE CONTROL STRUCTURE
SCOUR SURVEY (FY 98)
 U.S. ARMY ENGINEERS, NEW ORLEANS CORPS OF ENGINEERS

DISTANCE IN FEET

-100 -80 -60 -40 -20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320 340 360 380 400 420 440 460 480 500 520 540 560 580

ELEVATION IN FEET NGVD

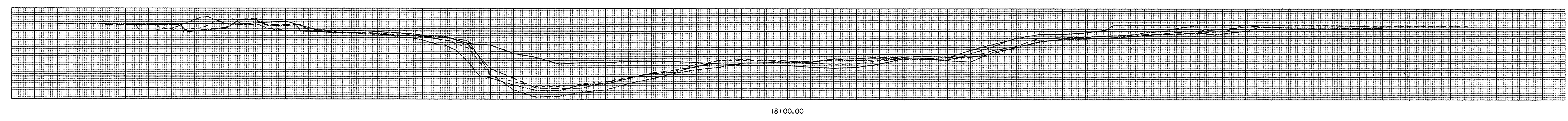
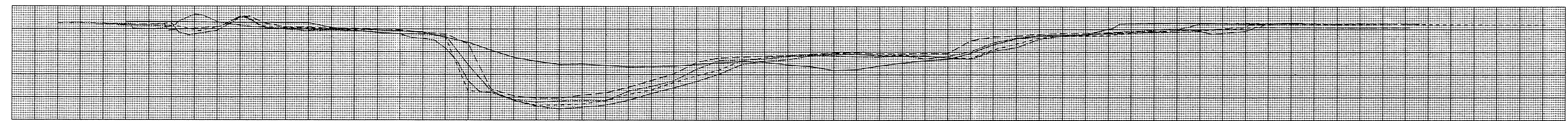
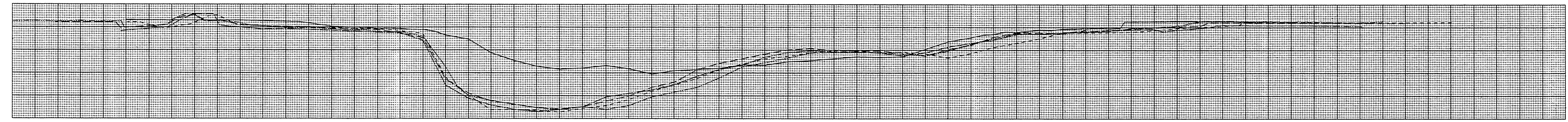
ELEVATION IN FEET NGVD

ELEVATION IN FEET NGVD

ELEVATION IN FEET NGVD

ELEVATION IN FEET NGVD

ELEVATION IN FEET NGVD



LEGEND:

- 17-APR-1964
- - - 04-NOV-1993
- · · 18-SEP-1995
- · - 21-MAR-1998

NOTES:

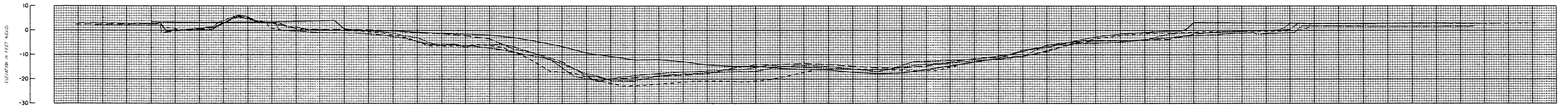
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- 17+50.00
- 18+00.00

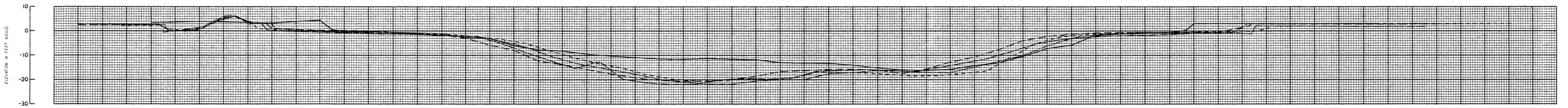
LAKE PONTCHARTRAIN, LA. AND VICINITY
 CHALMETTE AREA
 BAYOU BIENVENUE CONTROL STRUCTURE
SCOUR SURVEY (FY 98)
 U.S. ARMY ENGINEERS, NEW ORLEANS CORPS OF ENGINEERS

DISTANCE IN FEET

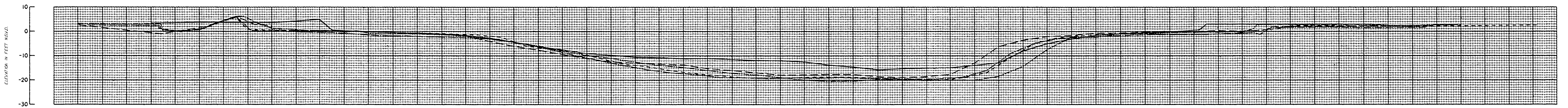
-90 -70 -50 -30 -10 10 30 50 70 90 110 130 150 170 190 210 230 250 270 290 310 330 350 370 390 410 430 450 470 490 510 530



19+00.00



20+00.00



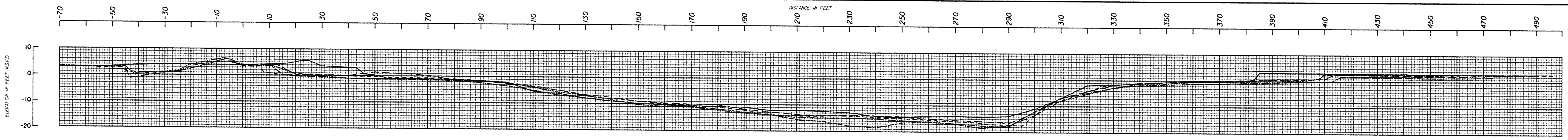
21+00.00

LEGEND:
 — 17-APR-1984
 - - - 04-NOV-1993
 . . . 18-APR-1995
 - · - · 7-APR-1996
 - - - - 30-MAR-1998

NOTES:

STATION:
 19+00.00
 20+00.00
 21+00.00

LAKE PONTCHARTRAIN, LA. AND VICINITY
 CHALMETTE AREA
 BAYOU BIENVENUE CONTROL STRUCTURE
 SCOUR SURVEY (FY 98)
 U.S. ARMY ENGINEERS, NEW ORLEANS CORPS OF ENGINEERS



22+00.00

- LEGEND:
- 17-APR-1984
 - - - 04-NOV-1993
 - 18-APR-1995
 - - - 21-MAR-1996
 - - - 30-MAR-1998

NOTES:

STATION:

22+00.00

LAKE PONTCHARTRAIN, LA. AND VICINITY
 CHALMETTE AREA
 BAYOU BIENVENUE CONTROL STRUCTURE
 SCOUR SURVEY (FY 98)
 U.S. ARMY ENGINEERS, NEW ORLEANS CORPS OF ENGINEERS

APPENDIX A
MRC Trip Report

CEMVD-ET-ES

9 April 1999

MEMORANDUM FOR RECORD

SUBJECT: Trip Report, Periodic Inspection No. 8, Bayou Bienvenue Control Structure, Orleans Parish Louisiana, New Orleans District

1. On 24 March 1999, the undersigned participated in the eighth periodic inspection of the Bayou Bienvenue Control Structure with representatives of the New Orleans District, the Orleans Levee District, the Louisiana Department of Transportation and Development (LDOTD), and the Architect-Engineer firm of Brown Cunningham & Gannuch which was contracted to conduct this inspection. Personnel participating in the inspection are listed in enclosure 1.
2. **Purpose.** This inspection was made in accordance with the provisions of ER 1110-2-100, Periodic Inspection and Continuing Evaluation of Completed Civil Works Structures, 15 February 1995. The structure was not dewatered for the inspection.
3. **Description of Project.** The Bayou Bienvenue Control Structure is a feature of the Chalmette Area Plan of the Lake Pontchartrain, Louisiana and Vicinity Hurricane Protection Project. The Bayou Bienvenue Control Structure protects the general area from hurricane tidal overflows and allows water traffic to proceed normally to and from the MR-GO via Bayou Bienvenue. In addition to handling all the runoff from within the area, the structure also discharges some water that originates in the City of New Orleans. The structure is located in Orleans Parish, Louisiana, near the intersection of Bayou Bienvenue and the MR-GO. The structure was constructed under contract No. DACW29-72-0084, awarded in May 1972 to T.L. James & Company. It was completed in September 1974 and has been turned over to local interests for operation and maintenance.
4. **Description of Structure.** The Bayou Bienvenue Control Structure consists of a reinforced concrete sector gate bay, supported on timber piles, treated timber guide walls, pile supported inverted "T" type reinforced concrete flood walls, and "I" type floodwalls connecting the gate chamber to the earthen levee on each side, and access channels. The gate bay is 75 ft in length and has a channel width of 56 ft. The elevation of the top of the gates and floodwalls is +17.5 feet NGVD, and the sill is at -10.78 feet NGVD. The sector gate is operated by electric motors with provisions for manual operation. For a more detailed description of the various components of the project, you are referred to the preinspection brochure.
5. **Observations and Recommendations.** The stage reading in the MR-GO at the time of the inspection was 0.0 NGVD and the land side reading was 0.4 NGVD. Overall, the facility was in good condition. No major problems were noted. The following are some general observations on the various components of the project.
 - a. **Flood Walls.** No discrepancies were noted in any of the floodwalls.
 - b. **Concrete Gate Monolith and Sector Gates.** The sector gates were in good condition. No structural defects were noted. The gates operated through several cycles with no problems. The concrete gate monolith was in good condition. The shallow spall on the east side of the monolith,

CEMVD-ET-ES

9 April 1999

SUBJECT: Trip Report, Periodic Inspection No. 8, Bayou Bienvenue Control Structure, Orleans Parish Louisiana, New Orleans District

on the land side, caused by a trash fire which was set too close to the structure several years ago, has not changed. No corrective action required.

c. Needle Girder Storage Rack. The concrete storage rack for the needle girders appeared to be in satisfactory condition. The concrete needles and needle girders were not at the site, as they were in use at the Bayou Dupre' Control Structure for dewatering operations.

d. Landside Boat Dock. The boat dock which is located on the south bank of the Inlet channel, about 300 feet from the control structure, was not inspected, as it is no longer used or maintained by the Levee District. Suggest the Levee District consider removing the dock in the interest of safety and/or liability.

6. Action. No immediate action required by the Division Commander at this time. CEMVN will document the findings of this inspection in a report, for submission to this office. A copy of the report will be furnished to the Orleans Levee District and the State of Louisiana (LDOTD), with a letter recommending action be taken to correct those deficiencies for which they are responsible.

7. Next Inspection. The next periodic inspection of this structure will be in March of 200~~0~~⁰¹.

1 Encl
as

Frank N. Johnson
Structural Engineer

ROUTING:

CEMVD-ET-ES
CEMVD-ET-ET (Mr. Madison)
CEMVD-ET-ET (Mr. Rush)
CEMVD-ET-EG
CEMVD-ET-EW
CEMVD-ET-C
CEMVD-ET-E
CEMVD-ET-EG (Mr. Stagg)

CF w/encl
CEMVN-ED-GE (Mr. Chrissyverges)

List of Attendees

**Bayou Bienvenue Control Structure
Periodic Inspection No. 8**

24 March 1999

Mississippi Valley Division Office

Frank N. Johnson Structures Branch, Engineering Division

New Orleans District

Walter Baomy	General Engineering Branch
Joseph Chrysoverges	General Engineering Branch
Brian Keller	Operations Division
Amy Powell	Operations Division

Brown Cunningham & Gannuch, Inc.

Luther Newton	Project Engineer
Robert White	Mechanical Engineer
Silas Cunningham	Structural Engineer
Mel Stegall	Geotechnical Engineer
Richard Nichols	Electrical Engineer

Orleans Levee District

C.A. Wethern	Engineering
Steven Spencer	Chief Engineer
Guy Dietsch	Electrical Maintenance

State of Louisiana (LDOTD)

Ennis Johnson	District 02 Design Engineer
John Monzon	District 02 Design Engineer

APPENDIX B
**CEMVN-ED-GE Trip Report of Mini-inspection of Bayou Bienvenue Control
Structure in a Dewatered Condition**

CEMVN-ED-GE

MEMORANDUM FOR: File

SUBJECT: Trip Report of Mini-Inspection of Bayou Bienvenue Control Structure in a dewatered condition.

The Orleans Levee Board was performing its second major maintenance (ten-year cycle) of Bayou Bienvenue Control Structure. The maintenance involves dewatering the structure to allow for sandblasting and painting of all metal surfaces, replacement and adjustment of the steel cables which open and close the gates, replacement of broken or deteriorated timbers, replacement of all anodes in the cathodic protection system, and cleaning the walls and floor of the structure of barnacles, oyster shells, sand, and debris.

Field inspections were performed by COE on 20 and 27 March 1997. The inspections were limited to gate bay and gates that were normal below water. The first inspection was performed by Richard Pinner (ED-GE), Mohan Desai (ED-TM), and Charles Rome (ED-GM). At the request of the Orleans Levee Board, a second inspection was performed by Richard Pinner, Charles Rome, and Walter Baumy (ED-GE) to investigate seepage in the gatebay slab.

Project Description.

General. The Bayou Bienvenue Control Structure is located on the eastern edge of Orleans Parish, Louisiana, near the intersection of Bayou Bienvenue and Mississippi River – Gulf Outlet (MRGO) channel. The control structure consists of a reinforced concrete sector gate bay supported on untreated timber piles, welded steel sector gates, treated timber guide wall, pile supported inverted T walls, and sheet pile I walls connecting the structure to the earthen levees on each side. The gate bay is 76 feet in length and has a channel width of 56 feet. The elevation of the top of the gates and floodwalls is 17.5 feet. The sector gates are operated by electric motors with provisions for manual operation.

Observation and Recommendations.

General. At the time of the inspection, the structure was unwatered. The inspections were limited to gate bay and gates that were normal below water.

Observations. The overall condition of the structure below normal water elevation was good. The following observations were noted :

- a. The metal ladders at the water surface and below were heavily corroded or rusted (see photo 1).

b. The gates were in good condition (see photos 2 and 3) except for a small section of skin plate at the waterline where the rubber seals bolted to the gates. Some of the bolt holes were enlarged because of corrosion. The gate old rubber seal appeared in good condition (see photo 4).

c. The wide flange members of the gates were in good condition. Steel members below the water had marine growth. One member showed signs of minor corrosion, (See photos 5 and 6).

d. The dewatering girders were in good condition.

e. Spalls were noticed on the protected side of concrete needles. It appeared inadequate cover above the reinforcing steel. (See photo 7)

f. Marine growth was also noticed on the concrete walls below the water line. The growth was a few inches thick (see photo 8).

g. In the gate storage recesses, there was a large amount of silt on the gate bay floor and the marine growth was thicker on the concrete walls in this area. The silt build in the recesses could stop the gates from opening completely. (See photo 8)

h. There was some seepage through a small crack or hole in the sill slab in the southeast gate bay recess. The seepage was minor and no action is necessary. See sketch 1 for seepage location.

Recommendations.

a. The metal ladders should be replaced.

b. In the vicinity of the waterline, backer plates or oversize washers should be installed with the bolts to re-bolt the gate rubber seals to the sector gates.

c. The spall areas on the concrete dewatering needles should be cleaned, exposed reinforcing steel sandblasted, and spall areas covered with epoxy grout.

d. If build up of silt in the gate bay storage recesses becomes a problem, the gate recess areas shall be cleaned by pressure hose or other approved methods.

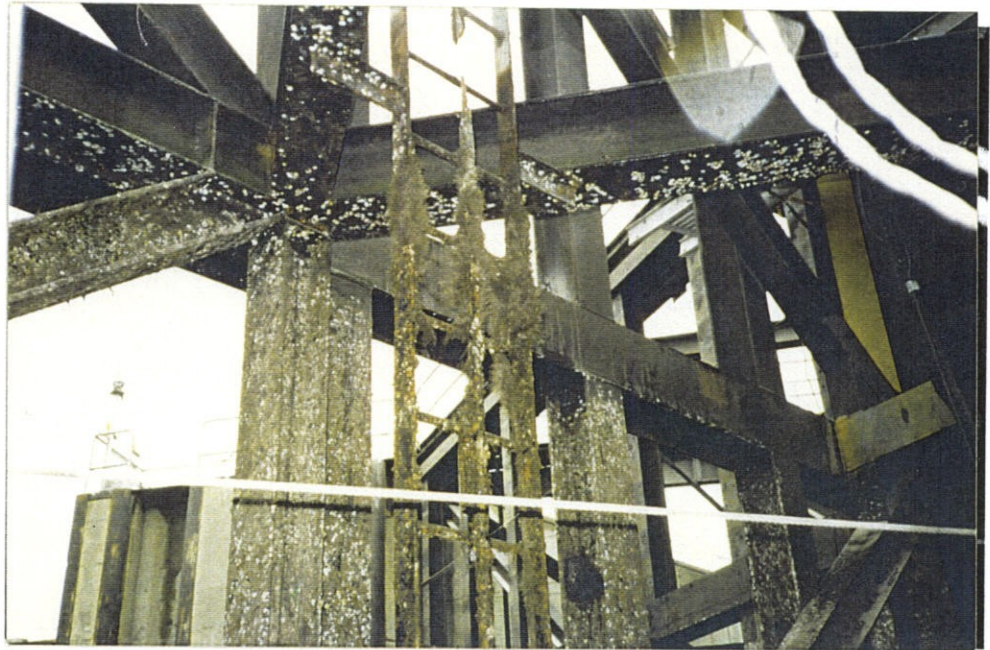


Photo 1. Corroded ladder and marine growth on wide flange members of gate below water line.

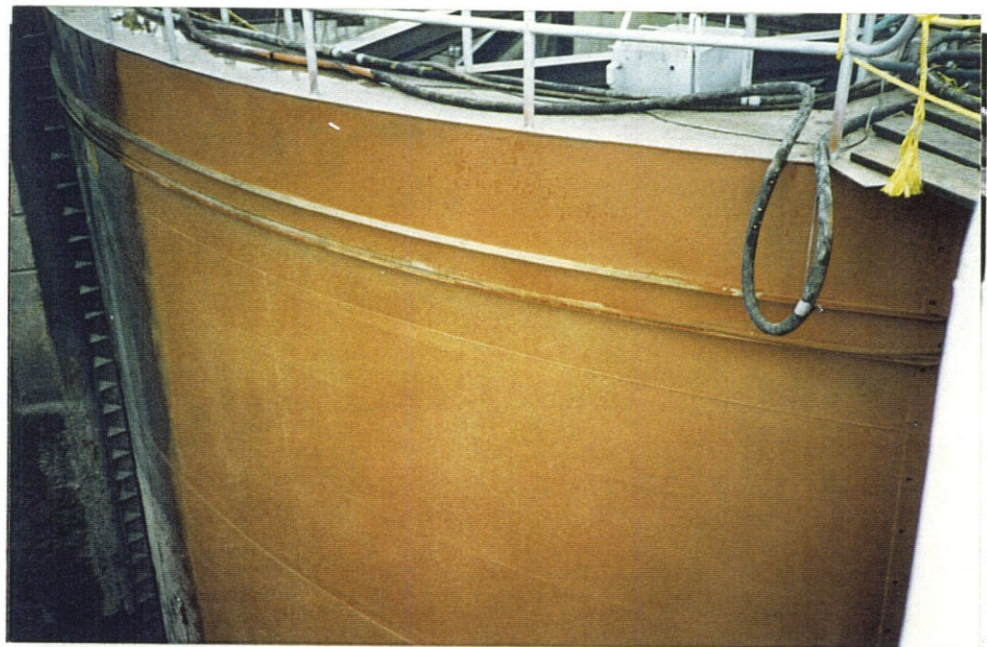


Photo 2. Sector Gate skin plate (Typical).

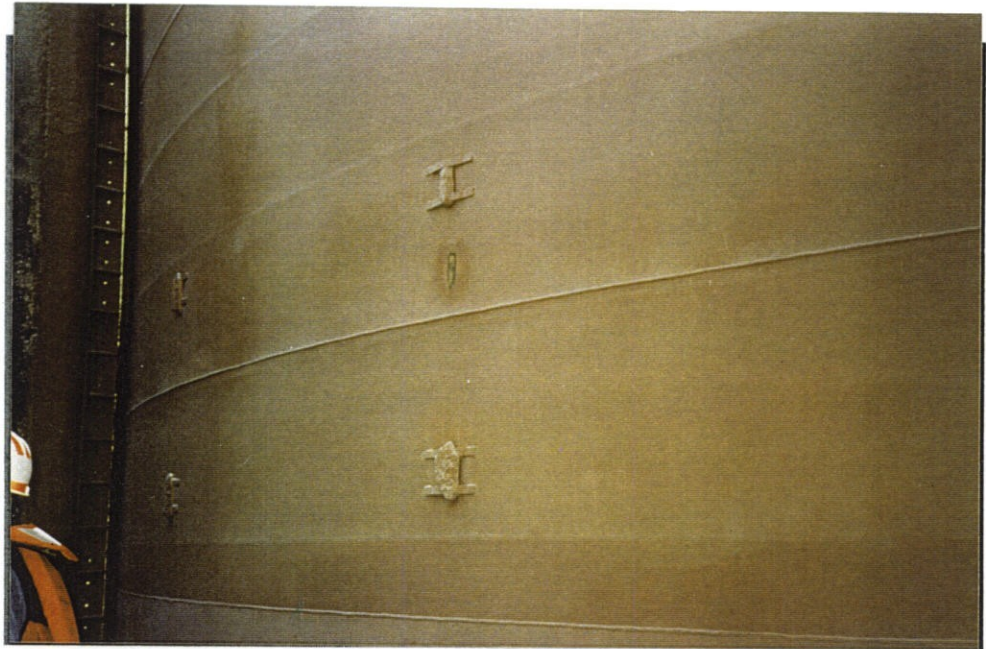


Photo 3. Sector Gate skin plate with cathodic protection system.



Photo 4. Sector Gate old rubber seal.



Photo 5. Marine growth on wide flange members of gate below waterline.



Photo 6. A wide flange member of the sector gate with corrosion.



Photo 7. Spall on protected side of concrete needles with exposed reinforcing steel. Inadequate concrete cover above reinforcing steel.



Photo 8. Gate recess area (Typical). Note silt build up against the back wall and marine growth on concrete wall.

APPENDIX C

**Orleans Levee Board Project No. 28802, Bayou Bienvenue Control Structure,
Second Maintenance Cycle (Dewatering, Painting, and Miscellaneous Repairs, Final
Report August 1, 1997.**

ORLEANS LEVEE BOARD

PROJECT NO. 28802

**Bayou Bienvenue Control Structure
Second Maintenance Cycle**

(Dewatering, Painting, and Miscellaneous Repairs)

**Final Report: August 1, 1997
Gerry Gillen**

INTRODUCTION

Project Description

The Bayou Bienvenue Control Structure is a portion of the hurricane protection system that protects the Chalmette area from hurricane flooding and tidal surges in the M.R.G.O. The structure allows water traffic to proceed normally to and from the M.R.G.O. via Bayou Bienvenue except during hurricanes or tidal surges. Together with the Bayou Dupre Control Structure, the structure provides a drainage outlet for the area enclosed by the hurricane protection system.

The structure is under the jurisdiction of the Orleans Levee District because it is in Orleans Parish just west of the Orleans and St. Bernard Parish line, approximately 400 feet west of the original intersection of Bayou Bienvenue and the M.R.G.O.

Construction of the structure was completed by the U. S. Army Corps of Engineers (USACE) and turned over to the Orleans Levee Board in October of 1974. Major maintenance, based on a ten-year cycle as outlined in the March 1981 USACE New Orleans District Operation and Maintenance Manual, is required during the life of the structure.

Dewatering is required in ten-year cycles in order to have inspections of the parts of the structure which are normally below the water surface and cannot be inspected during the scheduled monthly and yearly maintenance program. Each inspection provides corrective actions to be taken to make repairs and retain the structure in its original condition.

The ten-year cycle major maintenance involves dewatering to allow for sandblasting and painting of all metal surfaces, replacement and adjustment of the steel cables which open and close the gates, replacement of broken or deteriorated timbers, replacement of all anodes in the cathodic protection system, and cleaning the walls and floor of the structure of barnacles, oyster shells, sand, and debris.

The first ten-year cycle was completed on April 23, 1985.

The second ten-year cycle was completed on May 24, 1997.

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Plate 1	Plan and Section Drawing
Plate 2	Typical Section Drawing
Attachment 1	Bidders Tabulation Sheet
Attachment 2	Horizontal and Vertical Movements

Description of Structure

The Bayou Bienvenue Control Structure consists of a reinforced concrete sector gate bay supported on untreated timber piles, welded steel 60° section gates, treated timber guide walls, pile supported inverted "T" and "I" type floodwalls between the gate bay and earthen levee on each side of the structure, and riprap erosion protected access channels. The sector gates are operated by electric motors with provisions for manual operation. See Plates 1 & 2. The "T" type floodwalls were capped with concrete in March, 1997.

The gate bay is reinforced concrete "U" frame, 76 feet in length with a channel clearance width of 56 feet. The top of the gates, the gate bay walls, and the inverted "T" floodwalls are at elevation 17.5; and the sill is at elevation -10.78 feet. The "T" type floodwall was built to elevation 18.5 to allow for settlement. The USACE completed the "T" floodwall with a concrete cap after a period of time when all settlement ceased. Needle girders and needles are provided for the dewatering procedure. At the ends of the gate bays are concrete sheet pile wing walls with tiebacks to retain adjacent backfill. Two reinforced concrete control houses are located above the machinery space on each side of the gate bay. Control House No. 1 contains the diesel engine driven operator and electrical switchgear. Both houses contain the machinery for manual operation and control panels to start the generator and to operate the gates from either side. Pertinent data are as follows:

<u>GATES DIMENSIONS</u>	<u>FEET</u>
Width	56
Length (excluding guide walls)	76
Length of guide walls	96
Length of timber fenders	72

<u>ELEVATIONS</u>	<u>FEET (NGVD)</u>
Top of gate bay walls	17.5
Top of gates	17.5
Guide wall	10.0
Sill	-10.78
Operating floor of control houses	17.5

HYDRAULIC DESIGN CRITERIA

FEET

Maximum, differential head,
MRGO to landside

11.0

Maximum reverse head,
landside to MRGO

5.0

PROJECT DOCUMENTS

Preparation

Plans and specifications for the second maintenance cycle were designed by compiling information from the first ten-year cycle plans and specifications, a final report prepared by Alan Francingues on September 10, 1985, and an inspection report by the USACE dated July 15, 1994. The recommended construction period and seasonal period to accomplish the major maintenance is between February 20 and May 25 as documented in the 1985 Francingues report. The seasonal period provides for least impact to shrimpers was confirmed with Louisiana Wildlife and Fisheries.

In order to complete the work required in a thirty-day closure of the structure, long lead time procurement items were procured by the Orleans Levee District and stored for the contractor's use. A specification was prepared to procure the rubber seals for the structure. This procurement bid was opened on December 12, 1996 and awarded to Construction Materials, Inc. of Baton Rouge for \$6,842.32. The project number was No. 28803. The rubber seals were delivered on February 20, 1997.

The second maintenance cycle plans consisted of USACE drawings H-4-24326-1A, 6 (revised to show additional riprap limits), 8, 28, 29-31, 36-53, 55, 56, 64, 64A - Bayou Bienvenue Control Structure dated October, 1971.

The general conditions of the specifications allowed for a thirty-day gate closure, and provided for an additional thirty days to work in a restricted area, along with waivers to allow the contractor to work continuously for 24 hours if necessary, and accommodate high tide conditions. The technical specifications dealt with ten items. Differing specifications as to the first maintenance cycle are riprap placement, coal tar epoxy coating, steel replacement, pile replacement and rewatering.

The plans and specifications were reviewed and commented on by the USACE and Louisiana Department of Transportation and Development (LADOTD).

Bidding

On January 10, 1997, the Orleans Levee District notified all marine interests, by letters and fliers, that the Bayou Bienvenue Control Structure would be closed a minimum of thirty continuous days. The letter also stated that additional work near the structure may continue an additional thirty days, with marine traffic not being restricted between the hours of 5:00 - 7:00 AM and 4:00 - 6:00 PM.

On January 28, 1997, a pre-bid conference was held with very few contractor questions concerning the specifications. A site visit for the prospective bidders was also provided. One addendum was forwarded to the bidders to clarify some of the concerns. This project was advertised in the Times-Picayune on January 6, 16, and 21, 1997, and in the Daily Journal of Commerce on January 9, 1997. Bids were received and publicly opened on February 6, 1997. An itemized unit cost for each bidder and engineer's estimate is located in Attachment 1. Tabulation totals of the bids are as follows:

Kostmayer Construction, Inc.	\$374,185.00
Professional Construction Services, Inc.	\$398,250.00
Boh Bros. Construction Co. Inc., LLC	\$618,625.00

On February 19, 1997, the Orleans Levee Board passed Resolution No. 12-021997 which awarded the contract to Kostmayer Construction, Inc. for \$374,185.00. The contract was executed and a notice to proceed was issued effective March 10, 1997.

MOVEMENT MONITORING

Surveying Services

The Engineering staff scaled back the monitoring efforts for this second maintenance cycle. The reasons were that an evaluation and contingency plan, as prepared for the first cycle by McClelland Engineers, Inc. dated February 4, 1985, was applicable for the second cycle and that no significant movement occurred during the first cycle. A brief summary of the McClelland report is documented in the September '85 Francingues report.

The Orleans Levee District contracted with BFM Corporation, land surveyors, to monitor horizontal and vertical movement of the Bayou Bienvenue structure at a minimum of eight locations on the structure and two on the adjoining floodwalls. Readings were performed as follows:

Dewatering	-	Once every four hours
Next three days	-	Twice a day
Next five days	-	Once a day
Next two weeks	-	Once a week
During refilling	-	Once every four hours

A tolerance range of 1/4", or .0208 feet, from the initial readings was established. Readings which exceeded this tolerance were monitored and if the readings proceeded to increase or decrease for three consecutive intervals, a decision would have been made to re-flood the structure. During the course of the dewatering operation the horizontal readings fluctuated as high as 7/16", or .034 feet. These readings fluctuated and did not continue over three consecutive periods (some readings may have been due to survey error). The vertical readings remained within the tolerance range.

The Survey crew expended 94 hours at a cost of \$7,618.70. The monitoring results are located in Attachment 2.

CONSTRUCTION SUMMARY

Dewatering

Prior to setting the needles, the contractor elected to have a diver remove debris from the needle dam recess on the structure sill. Removed were wire rope and some small pieces of riprap. After the needle girder and needles were in position, dewatering began on March 14, 1997 at 5:00 p.m. and the structure was empty by March 15, 1997 at 10:00 P.M. The 29-hour dewatering period was specified at a 0.5 foot per hour rate. The contractor used a Bobcat front end loader to scrape the silt and build a 2' high berm about 5' from each needle dam, which resulted in the middle of the structure remaining dry and continuous pumping between the berms and needles. There was some seepage through cracks in the sill slab; however, after several days these leaks sealed themselves. The USACE made a periodic inspection of this seepage and determined that no action was necessary.

A noted observation was the build up of silt in the gate storage recess. The build up was so high against the back wall that the gates were not able to be closed all the way, resulting in added stress on the cables which caused one cable to break prior to the start of this project.

Sandblasting and Painting

This work proceeded very smoothly. Additional work authorized by change order included sandblasting and painting the needle girders and support frames. The girder and frames were originally painted with a five coat vinyl system in 1974.

Cathodic Protection

The cathodic protection anodes greatly eroded over the twelve years. The steel gate members showed no signs of corrosion except for small sections of the skin plate. The recess ladders attached to the concrete structure were greatly corroded and replaced.

The specifications measured for payment the anodes by weight. However, the standard industry weight for the specified 25 pound zinc is 24 pounds, and the 150 pound zinc is 146 pounds. The intent of the contractor was to supply as specified; however, the Engineering Department accepted the industry standard and compensated the contractor at the higher specified weights.

Timber Replacement

A field survey was performed to determine a quantity of timbers to replace. There was an overrun of 56% over the fender timbers and guide walls quantity due to some lengths under water which required replacement, and other lengths which were later determined to be unusable.

Replacement of Steel Cables

These cables were replaced in an earlier contract due to the reasons as described in the Dewatering section. The four cables were replaced at a cost of \$15,800. See Project No. 28801.

CONSTRUCTION CHANGE ORDER SUMMARY

Cleaning

A change order was processed to compensate the contractor to scrape the marine growth off of the walls which protruded approximately 6", and to remove the silt from the sill. The first maintenance cycle specifications, which was copied for this specification, only directed the contractor to remove marine growth from the steel gate frame. The USACE requested the additional cleaning for inspection of the concrete.

High Tides

There was a period of high tides around 4.0 feet MSL, but a bigger factor was the ship traffic in the MRGO which threw wakes over the needles and washed out the silt dams. A request to the Coast Guard to issue a notice to ship traffic to slow down was successful; however, the large ships must maintain a certain speed to maintain control. This occurred on two occasions and the OLD engineers accepted a contractor claim to rebuild the dikes.

Gate Adjustment

The hinge located on the top west gate was loosened from the concrete support and shims placed behind so as to allow the gate to drop and line up vertically with the opposite gate rubber seal at closure.

Pulling Needles - Flooding Structure

Prior to pulling the needles a change order was processed to repair the exposed reinforcing steel on the back side (dry side) of the concrete needles. The contractor chipped away spalled concrete, sandblasted exposed reinforcing steel, and covered areas with epoxy grout. The front sides of the needles after pulling, showed no signs of improper concrete cover over the reinforcing steel or spalling.

Cost Breakdown**CONCLUSION**

The final cost for this project, including additional change order items, is as follows:

Project No. 28801

Cable Replacement	\$ 15,800.00
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Project No. 28802

Item No. 1 - Dewatering	Lump Sum:	\$ 45,460.00
Item No. 2 - Structural Steel Replacement	1110 Lbs:	\$ 11,100.00
Item No. 3 - Sandblasting and Coating	Lump Sum:	\$140,700.00
Item No. 4 - Fender Timbers and Guide Walls	5864 Board Ft.:	\$ 30,786.00
Item No. 5 - Rubber Seals Replacement	Lump Sum:	\$ 11,645.00
Item No. 6 - Riprap	2754 Tons:	\$ 76,148.10
Item No. 7 - Derrick Stone	150 Tons:	\$ 8,700.00
Item No. 8 - Miscellaneous Work Items	Lump Sum:	\$ 34,015.00
Item No. 9 - Cathodic Protection	3600 Lbs:	\$ 18,000.00
Item No. 10 - Treated Timber Piles	8 Each:	\$ 20,800.00

Change Order No. 1

Additional Item:	Oversize stainless washers for rubber seals	Lump Sum:	\$ 600.00
Additional Item:	Clean gate bay walls and slab of debris, silt, barnacles	Lump Sum:	\$ 6,190.00
Additional Item:	Epoxy grout concrete needles	Square Feet:	\$ 9,960.00
Additional Item:	Rebuild interior sand dikes	Lump Sum:	\$ 4,220.00
Additional Item:	Sandblast and coat needle girders and supports	Lump Sum:	\$ 10,350.00

Change Order No. 2 (Final)

Quantity Adjustments (Quantities shown above)

Project No. 28803

Rubber Seals Procurement	\$ 6,842.32
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Project No. 28804

Survey Movement	\$ 7,618.70
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Total Project Cost:	\$458,635.12
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Future Recommendations

Recommendations for the third maintenance cycle are:

- Third maintenance cycle is scheduled for March, 2007.
- The skin plate at the water line has corroded especially at bolt holes. Plan to replace sections of the skin plate.
- The rubber seals should be procured with the corner pieces vulcanized.
- Have the contractor scrape clean walls and sill after dewatering.

Recommendations for periodic maintenance:

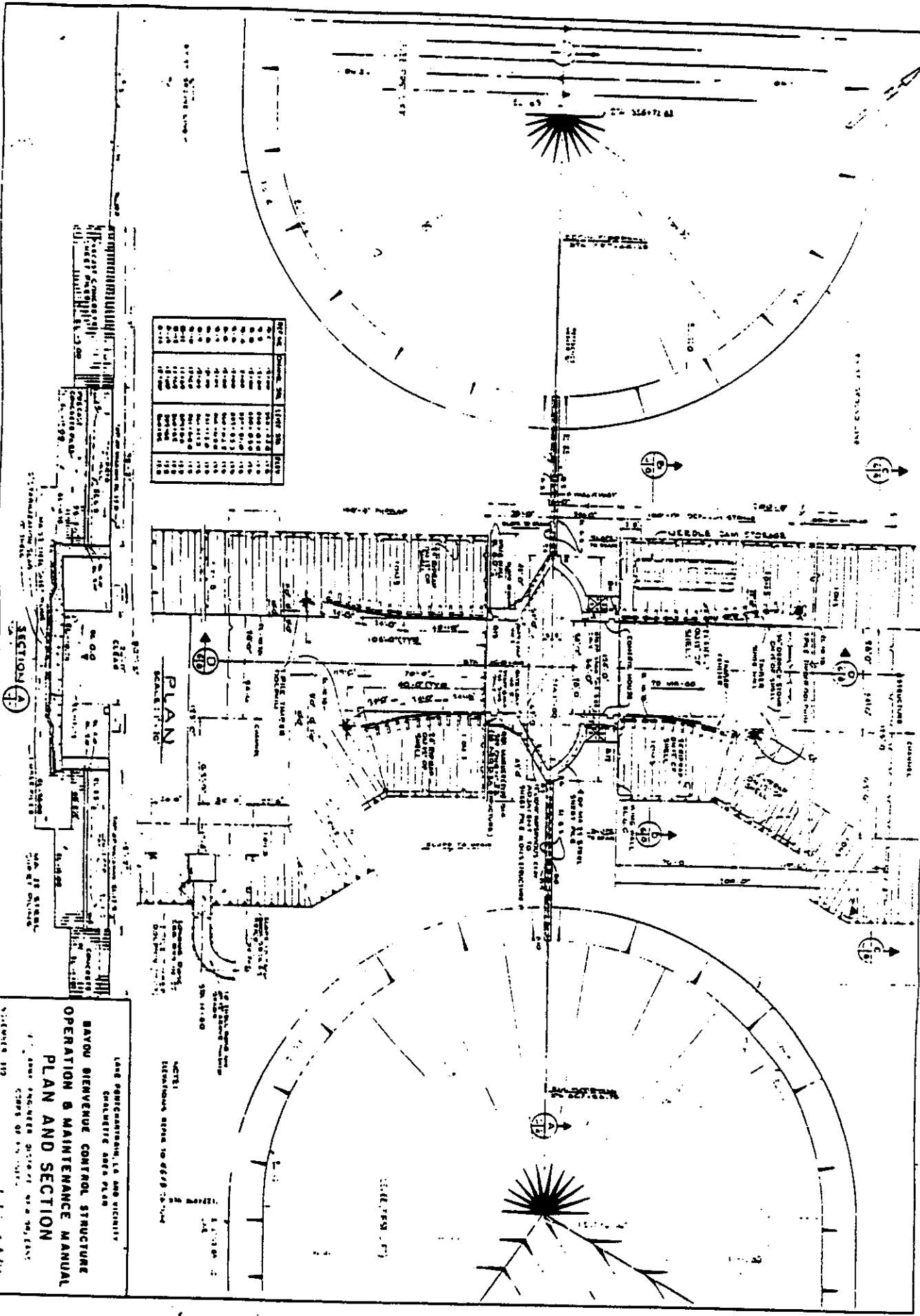
- Keep the gate storage back wall and sill free of build up by a pressure hose. This will allow the gate to close fully without added strain on the cables or steel frame.
- Replace electrical system and generator with modern equipment.

Acknowledgements

The Orleans Levee District would like to acknowledge the following individuals for their promptness and professionalism to complete this project in a timely manner.

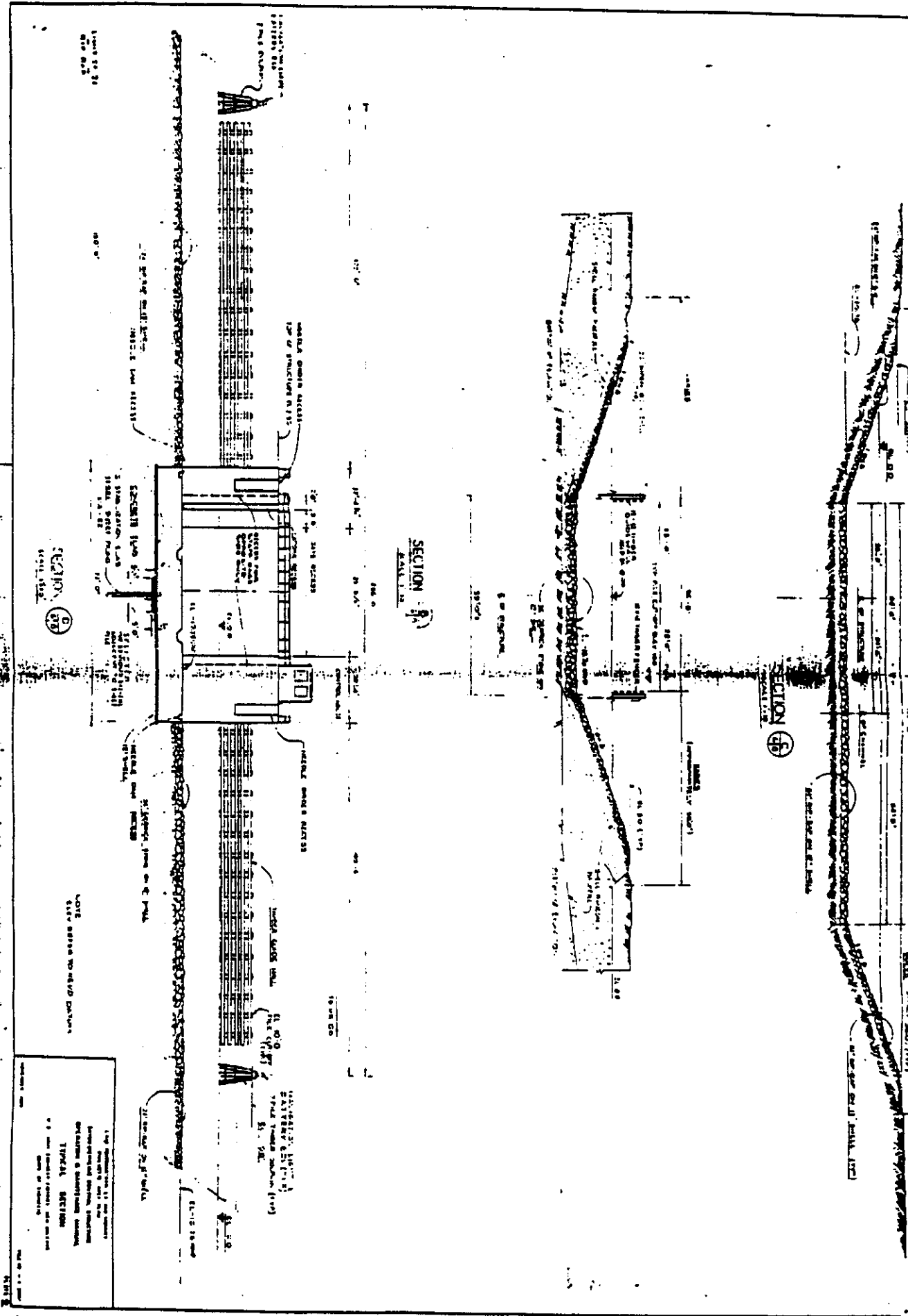
U. S. Army Corps of Engineers Representative:	Richard Pinner
Orleans Levee District Inspector:	Ed Schmidt
Kostmayer Project Manager:	Wade Hanna
Kostmayer Superintendent:	Mark Bennett

The citizens of Orleans and St. Bernard Parishes can be assured that the structure is in excellent condition and will continue to provide protection from high water events for another ten years.



NO.	DESCRIPTION	AMOUNT	UNIT	TOTAL
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LAST REVISIONS, IS AND VICINITY
 COMPLETE AREA PLAN
BAYOU REVENUE CONTROL STRUCTURE
OPERATION & MAINTENANCE MANUAL
PLAN AND SECTION
 DRAWN BY: [Name]
 CHECKED BY: [Name]
 DATE: [Date]



SECTION 8A
 (A)

SECTION 8B
 (B)

SECTION 8C
 (C)

NOTE: SEE NOTES TO REVISION DRAWING

1. See notes on drawing for materials and finish.
 2. See notes on drawing for construction details.
 3. See notes on drawing for dimensions and elevations.
 4. See notes on drawing for section cut symbols.
 5. See notes on drawing for section cut symbols.
 6. See notes on drawing for section cut symbols.
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 20. See notes on drawing for section cut symbols.

ATTACHMENT NO. 1

OLB PROJECT NO 28802
BAYOU BIENVENUE CONTROL STRUCTURE

Item No	Description	Quantity	Professional Construction		Boh Bros Construction		Kostmayer Construction		Engineers Estimate	
			Unit	Total	Unit	Total	Unit	Total	Unit	Total
1	Dewatering	LS		\$ 74,600.00		\$ 284,100.00		\$ 45,460.00		\$ 75,000.00
2	Structural Steel	1500 LBS	\$ 12.00	\$ 18,000.00	\$ 5.00	\$ 7,500.00	\$ 10.00	\$ 15,000.00	\$ 15.00	\$ 22,500.00
	Sand Blast/Coating	LS		\$ 112,000.00		\$ 109,200.00		\$ 140,700.00		\$ 75,000.00
4	Fender Timbers	3500 BFT	\$ 5.00	\$ 17,500.00	\$ 12.50	\$ 43,750.00	\$ 5.25	\$ 18,375.00	\$ 10.00	\$ 35,000.00
5	Rubber Seals	LS		\$ 19,000.00		\$ 7,700.00		\$ 11,645.00		\$ 7,500.00
6	Rip Rap	2600 TON	\$ 30.00	\$ 78,000.00	\$ 30.00	\$ 78,000.00	\$ 27.65	\$ 71,890.00	\$ 30.00	\$ 78,000.00
7	Derrick Stone	150 TON	\$ 45.00	\$ 6,750.00	\$ 42.50	\$ 6,375.00	\$ 58.00	\$ 8,700.00	\$ 35.00	\$ 5,250.00
8	Miscellaneous	LS		\$ 32,000.00		\$ 35,200.00		\$ 34,015.00		\$ 20,000.00
9	Cathodic Protection	3600 LBS	\$ 9.00	\$ 32,400.00	\$ 3.00	\$ 10,800.00	\$ 5.00	\$ 18,000.00	\$ 5.55	\$ 19,980.00
10	Timber Piles	4 EA	\$ 2,000	\$ 8,000.00	\$ 9,000	\$ 36,000.00	\$ 2,600	\$ 10,400.00	\$ 2,000	\$ 8,000.00
				<u>\$ 398,250.00</u>		<u>\$ 618,625.00</u>		<u>\$ 374,185.00</u>		<u>\$ 346,230.00</u>

FOR MONITORING
HORIZONTAL MEASUREMENTS

DATE	TIME	C-1/C-2	C-3/C-4	C-1/C-4	C-2/C-3	B-11/B-12	B-14/EI-13	B-13/B-11	B-5 B-9/B-6	B-14/B-12 BIENVILLE
3-10-97	09:00	27.690	27.435	95.750	94.055	64.230	64.255	70.025	131.59	69.985
3-14-97	19:00	27.685	27.445	95.760	94.090 ^{0.6}	64.21	64.250	70.035	131.575	69.985
3-14-97	22:04	27.680	27.43	95.760	94.06					
3-15	0:00	27.675	27.43	95.77	94.070	64.260	64.260	70.035	131.575	69.985
3/16/97	4:00	27.675	27.440	95.775 ^{0.6}	94.080 ^{0.6}	64.25	64.25	70.035 ^{0.6}	131.575	69.99
3/15/97	9:00	27.705	27.445	95.78 ^{0.6}	94.080 ^{0.6}	64.255 ^{0.6}	64.25	70.050 ^{0.6}	131.61	70.005
3/15/97	12:00	27.675	27.420	95.780 ^{0.6}	94.080 ^{0.6}	64.255 ^{0.6}	64.265	70.065 ^{0.6}	131.60	69.985
3/15/97	14:00	27.675	27.420	95.775 ^{0.6}	94.080 ^{0.6}	64.250 ^{0.6}	64.265	70.050 ^{0.6}	131.60	69.99
3/15/97	17:00	27.685	27.420	95.765	94.090 ^{0.6}	64.265 ^{0.6}	64.255	70.06	131.60	69.985
3/15/97	19:00	27.685	27.420	95.775 ^{0.6}	94.075	64.250	64.265	70.035	131.60	69.990
3/15/97	22:00	27.690	27.430	95.775 ^{0.6}	94.080 ^{0.6}	64.260 ^{0.6}	64.270	70.06 ^{0.6}	131.590	69.990
3/16/97	8:00	27.695	27.440	95.760	94.060	64.265 ^{0.6}	64.265	70.06	131.595	69.960
3-16-97	16:00	27.685	27.430	95.760	94.050	64.24	64.270	70.035	131.585	69.975

FOR MONITORING
HORIZONTAL MEASUREMENTS

DATE	TIME	C-1/C-2	C-3/C-4	C-1/C-4	C-2/C-3	B-11/B-12	B-14/B-13	B-13/B-11	B-5 B-9/B-6	B-14/B-12 BAYOU BIENVENUE
3-17-97	06:30	27.675	27.425	95.770	94.060	64.530	64.265	70.030	131.585	69.980
3-17-97	16:30 16:30	27.675	27.430	95.775 ^{0.5}	94.070 ^{0.5}	64.240	64.260	70.025	131.570	69.780
3-18-97	06:00	27.670	27.410 ^{0.5}	95.775 ^{0.5}	94.080 ^{0.5}	64.230	64.270	70.030	131.570	69.975
3-18-97	17:00h	27.670	27.430	95.770	94.070	64.230	64.270	70.030	131.575	69.975
3-19-97	16:30	27.675	27.440	95.775 ^{0.5}	94.070	64.250	64.255	70.030	131.580	69.975
3-20	16:30	27.695	27.43	95.775 ^{0.5}	94.075	64.230	64.265	70.025	131.56	69.975
3-21	15:45	27.70	27.450	95.770	94.075	64.245	64.260	70.040	131.570	69.970
3-22	15:45	27.675	27.440	95.770	94.060	64.260	64.260	70.035	131.595	69.980
3-23	16:00	27.665 ^{0.5}	27.420	95.770	94.070	64.240	64.260	70.030	131.570	69.980
3-31-97	05:45	27.695	27.440	95.775 ^{0.5}	94.055 ^{0.5}	64.250	64.265	70.035	131.575	69.975
4-7-97	0:00	27.695	27.440	95.780 ^{0.5}	94.080 ^{0.5}	64.265 ^{0.5}	64.255	70.030	131.590	69.975
4-11-97	06:45	27.695	27.415	95.785 ^{0.5}	94.070 ^{0.5}	64.260 ^{0.5}	64.270	70.030	131.575	69.975
4-11-97	08:25	27.695	27.435	95.750	94.080 ^{0.5}	64.245	64.260	70.035	131.585	69.975

FINISH

FINISH

FOR MONITORING
VERTICAL MEASUREMENTS

DATE	TIME	B-11	B-12	B-13	B-14	C-1	C-2	C-3	C-4	B-5	B-6	BM	F-1	F-2	F-3	F-4	F-5	WATER ELEVATION	
																		MR-GO	BIENVENUE
3-10	11:00	16.092	16.121	16.116	16.124	16.033	16.033	16.049	16.045	16.040		B-10 15.600							
3-14	19:00	16.073	16.123	16.110	16.124	16.028	16.035	16.055	16.049	16.038	16.082	B-10 15.600							
3-15	01:00	16.085	16.124	16.109	16.120	16.028	16.025	16.044	16.052	16.032	16.088	B-10 15.600						1.064	1.214
3-15	06:10	16.081	16.122	16.117	16.125	16.028	16.032	16.096	16.049	16.033	16.081	B-10 15.606						0.811	1.311
3-15	07:50	16.088	16.120	16.113	16.120	16.030	16.032	16.079	16.063	16.041	16.108	B-10 15.600						1.436	1.126
3-15	11:45	16.089	16.121	16.118	16.122	16.043	16.039	16.067	16.044	16.042	16.106	B-10 15.600						1.67	1.38
3-15	14:30	16.094	16.124	16.120	16.125	16.038	16.035	16.067	16.066	16.041	16.099	B-10 15.606							

FOR MONITORING
VERTICAL MEASUREMENTS

DATE	TIME	B-11	B-12	B-13	B-14	C-1	C-2	C-3	C-4	B-5	B-6	BM	WATER ELEVATION	
													F-1 F-2 F-3 F-4 F-5	MR-GO BIENVENUE BAYOU
3-15	16:30	16.099 16.126	16.126 16.120	16.124	16.124	16.032 16.032	16.033 16.032	16.067 16.068	16.062 16.062	16.050 16.053	16.103 16.102	B-10 15.602		
3-15	19:00	16.093 16.121	16.126 16.121	16.121	16.121	16.037 16.037	16.037 16.037	16.068 16.068	16.062 16.062	16.053 16.053	16.102 16.102	B-10 15.602	1.111	1.21
3-15	21:30	16.095 16.125	16.126 16.121	16.121	16.121	16.037 16.037	16.037 16.037	16.068 16.068	16.062 16.062	16.053 16.053	16.102 16.102	B-10 15.602	1.025	1.115
3-16	8:00	16.087 16.124	16.126 16.124	16.115	16.128	16.032 16.032	16.031 16.031	16.069 16.069	16.064 16.064	16.048 16.048	16.097 16.097	B-10 15.602	1.223	1.223
3-16	16:00	16.089 16.124	16.124 16.124	16.128	16.121	16.030 16.030	16.030 16.030	16.064 16.064	16.062 16.062	16.041 16.041	16.097 16.097	B-10 15.602	1.728	1.318
3-17	5:45	16.097 16.125	16.125 16.123	16.123	16.127	16.033 16.033	16.032 16.032	16.070 16.070	16.064 16.064	16.041 16.041	16.101 16.101	B-10 15.602	0.75	1.398
3-17	17:00	16.092 16.126	16.126 16.123	16.123	16.126	16.032 16.032	16.030 16.030	16.070 16.070	16.062 16.062	16.098 16.098	16.101 16.101	B-10 15.602	1.625	1.265
3-18	6:30	16.095 16.125	16.125 16.127	16.127	16.123	16.032 16.032	16.037 16.037	16.065 16.065	16.064 16.064	16.044 16.044	16.099 16.099	B-10 15.602	0.92	1.07

DE WATEC

FOR MONITORING
VERTICAL MEASUREMENTS

DATE	TIME	B-11	B-12	B-13	B-14	C-1	C-2	C-3	C-4	B-5	B-6	BM	F-1	F-2	F-3	F-4	F-5	WATER ELEVATION		
																		MR-GO	BAYOU BIENVENUE	
3-18	16:30	16.096	16.127	16.120	16.126	16.033	16.033	16.067	16.003	16.044	16.099	B-10 15.600							1.623	1.423
3-19	17:20	16.100	16.124	16.123	16.127	16.040	16.039	16.076	16.074	16.047	16.104	B-10 15.600							1.430	1.430
3-20	17:30	16.009	16.124	16.119	16.127	16.037	16.033	16.071	16.068	16.037	16.101	B-10 15.600							1.322	1.222
3-21		16.095	16.119	16.123	16.131	16.032	16.040	16.076	16.071	16.044	16.100	B-10 15.600							0.630	1.43
3-22		16.023	16.123	16.122	16.131	16.040	16.038	16.074	16.067	16.046	16.102	B-10 15.600							0.83	1.33
3-23		16.089	16.124	16.119	16.129	16.037	16.033	16.071	16.063	16.040	16.100	B-10 15.600							1.623	1.123
3-31	6:30	16.097	16.124	16.124	16.126	16.038	16.036	16.074	16.067	16.045	16.103	B-10 15.600							0.82	1.12

APPENDIX D
**Product Information on Coatings Applied on the Sector Gates and Needle Girders
by Orleans Levee District.**

The Board of Commissioners

OF THE

Orleans Levee District

SUITE 202 - ADMINISTRATION BUILDING

6001 STARS AND STRIPES BLVD.

New Orleans, La.

70126-8006

TEL 504-243-4000

PROTECTING YOU
AND YOUR FAMILY



April 21, 1997

Mr. Richard Pinner
U. S. Army Corps of Engineers
P. O. Box 60267
New Orleans LA 70160-0267

RE: OLB Project No. 28802
Bayou Bienvenue Control Structure
Second Maintenance Cycle


Dear Mr. Pinner:

Attached is product information for the coal tar epoxy and primer used on the sector gates. Also attached is the product information for Carboline 890 which was applied to the needle girder.

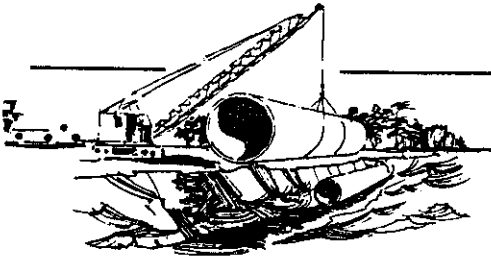
Thanks for your guidance and timely inspections for this project.

Sincerely,

Stevan G. Spencer, P. E.
Chief Engineer


SGS:GG:pns
Attached

Bitumastic® 300M



THE MOST SPECIFIED
COAL TAR EPOXY
IN THE WORLD

Bitumastic 300M is a two component, chemically cured coal tar epoxy polyamide. An important feature of this product is its ability to achieve high film build in a single application. One coat of Bitumastic 300M will do the work of two or more coats of conventional coal tar epoxies with significant savings of material and labor costs.

Recommended Uses

Bitumastic 300M combines outstanding corrosion and chemical resistance with excellent abrasion resistance. This is achieved by blending select coal tar pitch with chemically resistance epoxy.

Bitumastic 300M is designed to be applied in relatively high build films for the economical protection of steel, concrete and other suitable surfaces of structures exposed to a variety of heavy duty service conditions. Ideal for environments such as chemical plants, flood gates, locks and dams, sewage plants, bridge and piling structures, and pipeline interiors and exteriors. Also suitable for immersion and for atmospheric conditions where resistance to abrasion and chemical exposure is required.

Industries such as sewage and water treatment, chemical processing, marine, offshore exploration, oil and gas distribution, and public utilities all utilize this economical heavy duty product.

Features

Benefits

Coal Tar Epoxy Vehicle

Outstanding performance on concrete and steel, underground, in immersion, and in areas of chemical attack. Saves money, reduces downtime and repetitive maintenance repainting.

Extremely Hard Film

Excellent abrasion resistance makes the product ideal for the coating of pilings and other high wear areas.

High Build

Save time and labor by allowing single spray applied applications of film builds in excess of 30 mils dry film thickness

Economical

Provides the widest range of protection from chemical and abrasion attack at the lowest cost per mil per square foot.

Specification Compliant

Corps. of Engineers CE 200, C-200, C-200A Steel Tank Institute STI-P₃, SSPC Paint Spec 16.
Accepted by a wide range of technical end users, saving time for the specification writer and money for the customer.

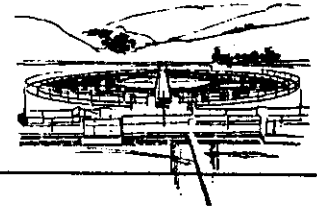
SUBMITTAL CONFORMS
WITH CONCEPT

DATE
1/18/97

[Handwritten signature]



Technical data

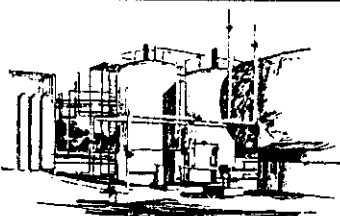


Generic Type	Coal-tar epoxy, polyamide cured			
Number of Coats	One or two. A single application of multiple passes is acceptable to achieve a dry film thickness of 16 - 20 mils (400 - 500 microns). May also be applied in a 2 coat application of 8 - 10 mils (100 - 250 microns) per coat. May be applied up to 30 - 35 mils (750 - 875 microns) in one coat if higher dry film thicknesses are desired.			
Volume Solids (theoretical)	74% ± 2%			
VOC	As supplied: 2.01 lbs / gal (241 gm/l) Thinned 20 oz / gal (16%) with Thinner 10: 2.8 lbs / gal (336 gm/l)			
Theoretical Coverage	1187 mil sq. ft. / gal (29.1 m ² /l at 25 microns)			
Recommended Dry Film Thickness	Minimum 8 mils (200 microns) (one coat)	Recommended 16 mils (400 Microns) (one or two coats)	Maximum 35 mils (875 microns) (one or two coats)	
Coverage at Recommended Thickness	8 mils (200 microns) 148 ft ² /gal (3.8m ² /l)	16 mils (400 microns) 74 ft ² /gal (1.8m ² /l)	35 mils (875 microns) 34 ft ² /gal (0.8m ² /l)	
Drying times at 16 mils DFT and 50% RH	Surface Temperature 50°F (10°C) 70°F (21°C) 90°F (32°C)	Touch 8 hours 4 hours 2 hours	Between coats (max) 24 hours 24 hours 24 hours	Immersion 14 days 7 days 5 days
	Excessive film thickness, insufficient ventilation or cooler temperatures will require longer cure times and could result in solvent entrapment and premature failure. If maximum recoat time has been exceeded the surface must be abraded by sweep blasting prior to the application of additional coatings.			
Colors	Black C900			
Thinning	May be thinned up to 20 oz / gal (16%) with Thinner 10 Use of thinners other than those supplied or approved by Carboline may adversely affect product performance and void product warranty, whether express or implied.			
Clean-Up Thinner	Thinner 10 or Thinner 2			
Surface Preparation	Remove all oil or grease from the surface to be coated with Thinner 2 or Surface Cleaner 3 (refer to surface Cleaner 3 instructions) in accordance with SSPC-SP 1. Steel: Immersion Service: Abrasive blast to a Near White Metal Finish in accordance with SSPC-SP 10, and obtain a 2 - 3 mil (50-75 micron) blast profile. Non-Immersion Service: Abrasive blast to a Commercial Finish in accordance with SSPC-SP 6, and obtain a 2 - 3 mil (50-75 micron) blast profile. Hand or Power Tool cleaning per SSPC-SP 2 or SP 3 are also acceptable. Concrete: Must be cured at least 28 days at 70°F (21°C) and 50% R.H. or equivalent time. Remove fins and other protrusions by stoning, sanding or grinding. Abrasive blast to open all surface voids and remove all form oils, incompatible curing agents, hardeners, laitance, and other foreign matter and produce a surface texture similar to that of a medium grit sandpaper. Voids in the concrete may require surfacing. Blow or vacuum off sand and dust.			
Primers	Steel: Self priming for both immersion and non-immersion service. For non-immersion service may be applied over Carbo Zinc series primers, Carboline 858 or Carboline 893. Concrete: Self priming for both immersion and non-immersion service. Thin the first coat of 300M up to 25 oz / gal (20%) and apply at a coverage rate of 200 - 300 ft ² / gal (4.8 - 7.4 m ² /l). Galvanized and Non-Ferrous Metals (non-immersion): Degrease per SSPC-SP 1 and apply one coat of Carboline Rustbond Penetrating Sealer SG or Rustbond LT at 1- 2 mils (25 - 50 microns) or abrasive sweep blast to produce a 1 mil (25 micron) profile.			

Bitumastic 300M

Mixing	Power mix Part A thoroughly then continue power mixing and slowly add Part B. Continue mixing for a minimum of 2 minutes. Note: Both Part A and Part B will thicken in viscosity when cold. For best results warm both components to room temperature before mixing.				
Mix Ratio (by volume)	Bitumastic 300 M Part A Bitumastic 300 M Part B	1 Gallon Kit Gallon can (partially filled) 1 Quart	5 Gallon Kit 5 Gallon can (partially filled) 1 Gallon		
Pot Life	Three hours at 75°F (24°C), 1 hour at 90°F (32°C) and less at higher temperatures.				
Application Conditions	Normal	Material 60-85°F (16-29°C)	Surfaces 60-85°F (16-29°C)	Ambient 60-90°F (16-32°C)	Humidity 0-80%
	Maximum	50°F (10°C)	50°F (10°C)	50°F (10°C)	0%
	Maximum	90°F (32°C)	125°F (52°C)	110°F (43°C)	90%
Application Equipment	This is a high solids coating and may require slight adjustments in spray techniques. Wet film thickness are easily and quickly achieved. The following spray equipment has been found suitable and is available from manufacturers such as Binks, DeVilbiss and Graco. Conventional: Pressure pot with dual regulators, 3/8" I.D. minimum material hose, .086" fluid tip and appropriate air cap. Airless: <i>Pump Ratio:</i> 30.1 (min)* <i>Output psi:</i> 2300 - 2500 <i>Tip Size:</i> .013-.035" <i>Material Hose:</i> 3/8" I.D. (min)** <i>GPM Output:</i> 3.0 (min) <i>Filter Size:</i> 30 mesh *Teflon packings are recommended and are available from the pump manufacturer. **Hose lengths over 50 feet should be 1/2" I.D. Brush / Roller: Recommended for touch-up areas only.				
Holiday Detection (if required)	Wet sponge types may be used if dry film thicknesses are below 20 mils (500 microns). High voltage spark testers should be used for dry film thicknesses above 20 mils (500 microns). Refer to NACE RP0188-90 for specific procedures.				
Cathodic Protection	Compatible with controlled cathodic protection.				
Topcoats	Not recommended.				
Temperature Resistance	Non-Immersion: 350°F (178°C) maximum Immersion: Depends on service. Not to exceed 120°F (49°C)				
Storage Conditions	Store Indoors: Temperature: 40-110°F (4 - 43°C) Humidity: 0 - 100%				
Shelf Life	24 months when stored indoors at 75°F (24°C)				
Shipping Weight (approximate)	Bitumastic 300M Thinner 10	1 Gallon Kit 12 lbs (5.5 kg) 8 lbs (4 kg)	5 Gallon Kit 56 lbs (25.5 kg) 39 lbs (18 kg)		
Flash Point (Setaflash)	Bitumastic 300M Part A Bitumastic 300M Part B Thinner 10	75°F (24°C) >200°F (93°C) 83°F (28°C)			

Typical Chemical Resistance



Exposure	Immersion	Splash / Spill	Fumes
Acids	Very Good	Excellent	Excellent
Alkalies	Very Good	Excellent	Excellent
Solvents	Fair - Poor	Good - Fair	Very Good
Salt	Excellent	Excellent	Excellent
Water	Excellent	Excellent	Excellent

Not Recommended For

Strong acids, immersion in ketone or aromatic solvents or in contact with potable water.

CAUTION: Prior to product usage, please see Material Safety Data Sheet for this product.

WARNING: Part A contains: Coal Tar, Xylene, Talc, Polyamide, Clay, Phenol
Part B contains: Epoxy resin.

**HARMFUL OR FATAL IF SWALLOWED.
HARMFUL IF INHALED.**

CAUTION

Contains flammable solvents. Keep away from sparks and open flames. In confined areas workmen must wear fresh airline respirators. Hypersensitive persons should wear gloves or use protective cream. All electric equipment and installations should be made and grounded in accordance with the National Electrical Code. In areas where explosion hazards exist, workmen should be required to use nonferrous tools and to wear conductive and non-sparking shoes.

MAY AFFECT THE BRAIN OR NERVOUS SYSTEM, CAUSING
DIZZINESS, HEADACHE OR NAUSEA.
MAY CAUSE EYE, NOSE, THROAT AND SKIN IRRITATION.

Information regarding safe handling and use is contained in Material Safety Data Sheet (Section VIII).
Health Hazard Data and Emergency and First Aid Procedures are referenced in the Material Safety Data Sheet (Section V).

PRODUCT EMERGENCIES 1-800-424-9300

In Case of Spillage

See information in the Material Safety Data Sheet (Section VII).

Carboline Company
St. Louis, MO 63144
MADE IN THE U.S.A.
September 96 Replaces January 1995
(0165)

**To order this product, or to receive more information about Bitumastic
Products, contact your coatings specialist:**



350 Hanley Industrial Court • St. Louis, MO 63144-1599
314-644-1000 • FAX: 314-644-4617

To the best of our knowledge the technical data contained herein are true and accurate at the date of issuance and are subject to change without prior notice. User must contact Carboline Company to verify correctness before specifying or ordering. No guarantee of accuracy is given or implied. We guarantee our products to conform to Carboline quality control. We assume no responsibility for coverage, performance or injuries resulting from use. Liability, if any, is limited to replacement of products. Prices and cost data if shown, are subject to change without prior notice. NO OTHER WARRANTY OR GUARANTEE OF ANY KIND IS MADE BY CARBOLINE, EXPRESS OR IMPLIED, STATUTORY, BY OPERATION OF LAW, OR OTHERWISE, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.



A Total Quality Company

SECTION I - PRODUCT: BITUMASTIC NO. 300-M PART A (0165A5NL)
Date: 03/04/96 Replaces 12/29/95

EMTREC TRANSPORTATION EMERGENCY PHONE NO.: 800-424-9300
PITTSBURGH POISON CONTROL CENTER HEALTH EMERGENCY NO.: 412-681-6669

SECTION II - HAZARDOUS INGREDIENTS EXPOSURE LIMITS

Table with 5 columns: CHEMICAL NAME, (A) CAS NUMBER, (B) LESS THAN WT, (C) TLV-TWA, (D) STEL, (E) CEILING. Rows include COAL TAR, TALC, XYLENE, POLYAMIDE, ETHYL BENZENE, ETHYL ALCOHOL, TDMAM PHENOL, CLAY.

Handwritten signature and date 4/10/97. Vertical stamp: ORIGINAL COPY WITH COPY DATE 4/10/97

Table with 3 columns: CHEMICAL NAME, HAZARDOUS INGREDIENTS (F), ADDITIONAL DATA, (G). Rows include COAL TAR, TALC, XYLENE, POLYAMIDE, ETHYL BENZENE, ETHYL ALCOHOL, TDMAM PHENOL, CLAY.

TABLE (A) CAS NUMBER (B) LESS THAN WT (C) TLV-TWA (D) STEL (E) CEILING (F) TOXICITY DATA (LD50/Route, LC50/Route) (G) SARA 302/SARA 313/ SARA 311-312 CATEGORIES/CERCLA. NE = not established, NR = not required, NO = no. Color Pigment Mixture may contain Iron Oxides, Titanium Dioxide, Carbon Black, and other particulates not otherwise regulated in varying amounts depending on color of product.

WHMIS CLASSIFICATION: B2 -- D2A -- D2B
HMIS/NFPA CLASSIFICATION: HEALTH 3, FLAMMABILITY 3, REACTIVITY 0,
PERSONAL PROTECTION CODE G, NFPA FIRE FIGHTING PHASE 4

SECTION III - PHYSICAL DATA:

BOILING RANGE: 173F(78C)-284F(140C). VAPOR DENSITY: Heavier than air.
EVAPORATION RATE: Slower than ether. VOLATILE BY WEIGHT 21%. VOLATILE BY VOLUME: 32%. PRODUCT WT/GAL: 10.9 LBS/U.S.GAL. 1.31 sp gr. VOC (MIXED PRODUCT THINNED TO MAXIMUM LEVEL): 3.4 LBS/U.S.GAL. 407 gm/lr.

SECTION IV - FIRE AND EXPLOSION HAZARD DATA:

FLAMMABILITY CLASSIFICATION: FLASH POINT: 75 F(23C) (Setaflash) LEL 1.0 %

PRODUCT: BITUMASTIC NO. 300-M PART A (0165A5NL)
Date: 03/04/96 Replaces 12/29/95

UEL 19.0 %.
OSHA-PAINT/FLAMMABLE/LIQUID/UN1263/PGIII, DOT-PAINT, 3, UN1263, PGIII, CANADIAN TDGA: PAINT, 3, UN1263, PGIII
EXTINGUISHING MEDIA: Dry Chemical, Foam, Carbon Dioxide, Water Fog.
UNUSUAL FIRE AND EXPLOSION HAZARDS: Vapors are heavier than air and will accumulate. Vapors will form explosive concentrations with air. Vapors travel long distances and will flashback. Use mechanical ventilation when necessary to keep percent vapor below the "Lower Explosion Level" (LEL).
SPECIAL FIRE FIGHTING PROCEDURES: Evacuate hazard area of unprotected personnel. Use a NIOSH approved self-contained breathing unit and complete body protection. Cool surrounding containers with water in case of fire exposure.

SECTION V - HEALTH HAZARD DATA:

INHALATION: May cause allergic respiratory reaction, effects may be permanent. Harmful if inhaled, may affect the brain or nervous system, causing dizziness, headache or nausea. May cause nose and throat irritation.

Carboline

May cause lung irritation.

CONTACT: May be harmful if absorbed through the skin. May cause eye burns. May cause skin burns. May cause allergic skin reaction.

NOTICE: Contains COAL TAR which can cause cancer. Risk of cancer depends on duration and level of exposure. Reports have associated repeated and prolonged occupational overexposure to solvents with permanent brain and nervous system damage.

MEDICAL CONDITIONS PRONE TO AGGRAVATION BY EXPOSURE: If sensitized to amines, epoxies or other chemicals do not use. See a physician if a medical condition exists.

PRIMARY ROUTE(S) OF ENTRY: Inhalation, Dermal, Ingestion.

EMERGENCY FIRST AID PROCEDURES: When exposed always get medical attention.

EYE CONTACT: Flush with water for 15 minutes.

SKIN CONTACT: Wash with soap and water. Remove contaminated clothing and clean before reuse.

INHALATION: Remove to fresh air. Provide oxygen if breathing is difficult. Use artificial respiration if not breathing. Get medical attention.

IF SWALLOWED: DO NOT INDUCE VOMITING!! Always get medical attention.

SECTION VI - REACTIVITY DATA:

STABILITY: This product is stable under normal storage conditions.

HAZARDOUS POLYMERIZATION: Will not occur under normal conditions.

HAZARDOUS DECOMPOSITION PRODUCTS: Carbon monoxide, nitrogen oxides, and unidentified organic compounds. Consider all smoke and fumes from burning material as very hazardous. Welding, cutting or abrasive grinding can create smoke and fumes. Do not breathe.

CONDITIONS TO AVOID: Heat, sparks, and open flames.

INCOMPATIBILITY: Avoid contact with strong oxidizing agents.

CARBOLINE CO. MATERIAL SAFETY DATA SHEET

PAGE 3 of 3

PRODUCT: BITUMASTIC NO. 300-M PART A

(0165A5NL)

Date: 03/04/96 Replaces 12/29/95

SECTION VII - SPILL OR LEAK PROCEDURES:

STEPS TO BE TAKEN IN CASE OF SPILL: Eliminate all ignition sources.

Handling equipment must be grounded to prevent sparking. Evacuate the area of unprotected personnel. Wear appropriate personal protection clothing and equipment. Follow safe handling and use guidelines in Section VIII. Contain and soak up residual with an absorbent (clay or sand). Take up absorbent material and seal tightly for proper disposal. Dispose of in accordance with local, state and federal regulations. Refer to Section II for Sara Title III and CERCLA information.

SECTION VIII - SAFE HANDLING AND USE INFORMATION:

RESPIRATORY PROTECTION: Use only with ventilation to keep levels below exposure guidelines. (Section II). User should test and monitor exposure levels to insure all personnel are below guidelines. If not sure or if not able to monitor use MSHA/NIOSH approved air-purifying respirator.

VENTILATION: Use explosion-proof ventilation when required to keep below health exposure guidelines and Lower Explosion Limit (LEL).

SKIN AND EYE PROTECTION: Recommend impervious gloves, clothing and safety glasses with side shields or chemical goggles to avoid skin and eye contact. If material penetrates to skin, change gloves and clothing.

HYGIENIC PRACTICES: Wash with soap and water before eating, drinking, applying cosmetics, or using toilet facilities. Use of a hand cleaner is recommended. Launder contaminated clothing before reuse. Leather shoes can absorb and pass through hazardous materials. Check shoes carefully after soaking before reuse.

SECTION IX - SPECIAL PRECAUTIONS:

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE: Keep away from heat, sparks, open flame, and strong oxidizing agents. Keep containers closed. Store in cool, dry place with adequate ventilation. If pouring or transferring materials, ground all containers and tools.

OTHER PRECAUTIONS: Do not weld, heat, cut or drill on full or empty containers.

The information contained herein is, to the best of our knowledge and belief accurate. However, since the conditions of handling and use are beyond our control, we make no guarantee of results, and assume no liability for damages incurred by use of this material. It is the responsibility of the user to comply with all applicable federal, state, and local laws and regulations.

Carboline

Carboline Company 350 Hanley Ind. Ct. St. Louis, MO 63144
PHONE NO. 314-644-1000 FOR INDUSTRIAL USE ONLY

CARBOLINE CO. MATERIAL SAFETY DATA SHEET
PRODUCT: BITUMASTIC NO. 300-M PART A
Date: 03/04/96 Replaces 12/29/95

(0165A5NL)

SPECIFIC STATE REGULATORY INFORMATION

NEW JERSEY

PENNSYLVANIA

Non-Hazardous Materials above 1 Percent:

Name	CAS	Pct
------	-----	-----

No materials meet this criteria

CALIFORNIA

WARNING: This product contains a chemical(s)
known to the State of California to cause
cancer, and birth defects or other reproductive harm.

Carboline Company

5644 Jefferson Hwy. • New Orleans, LA 70123-5189 • 504-733-3791 • FAX 504-734-9120



March 5, 1997

TO: MAC POSTON
Via Fax: 504-394-3542

FROM: AL CYRUS

SUBJECT: BAYOU BIENVENUE LOCKS

This letter will serve as confirmation that Carboline 893 Primer is a suitable primer for Bitumestic 300M.

I hope this information is sufficient. If I can be of further assistance, please do not hesitate to call me.

ALC/sj

cc: Wade Hanna
Via Fax: 504-837-3320

CONFIDENTIAL CONFORMS
WITH CONCEPT

DATE 4/18/97

[Handwritten signature]

Post-It® Fax Note	7671	Date	3-5	# of pages	1
To	Wade Hanna	From	Al Cyrus		
Co./Dept.		Co.			
Phone #	8818	Phone #			
Fax #	837-3320	Fax #			



CARBOLINE® 893



SELECTION DATA

GENERIC TYPE: Cross-linked epoxy.

GENERAL PROPERTIES: CARBOLINE 893 is a high solids, high build epoxy primer with excellent corrosion resistance. Can be applied by spray, brush or roller to yield a cured film which is tough and abrasion resistant. Performs extremely well under a wide variety of topcoats and application conditions.

- Excellent corrosion protection.
- Good flexibility and lower stress upon curing than most epoxy coatings.
- Excellent tolerance of damp (not wet) substrates.
- Can be spray applied at up to 6 mils dry film thickness in one coat.
- Meets the most stringent VOC (Volatile Organic Content) regulations.

RECOMMENDED USES: Recommended as a general purpose epoxy primer over abrasive blasted steel or as an intermediate coat over inorganic zinc primers. Must be topcoated with an appropriate topcoat for protection of structural steel, concrete, equipment and tank exteriors exposed to corrosive conditions. Consult Carboline Technical Service Department for other specific uses.

NOT RECOMMENDED FOR: Immersion service or splash and spillage of very strong solvents or concentrated acids.

TYPICAL CHEMICAL RESISTANCE:

Exposure	Splash and Spillage	
	Spillage	Fumes
Acids	Good	Very Good
Alkalies	Good	Excellent
Solvents	Very Good	Excellent
Salt Solutions	Excellent	Excellent
Water	Excellent	Excellent

TEMPERATURE RESISTANCE:

Continuous: 200°F (93°C)
 Non-Continuous: 250°F (121°C)

SUBSTRATES: Apply over suitably prepared metal, concrete, or other surfaces as recommended.

COMPATIBLE COATINGS: May be used as an intermediate coat over inorganic zinc primers and can be applied over or topcoated with most epoxies, polyurethanes, acrylics and others as recommended. A mist coat is required to minimize bubbling when applied over inorganic zinc.

SPECIFICATION DATA

THEORETICAL SOLIDS CONTENT OF MIXED MATERIAL:

	By Volume
CARBOLINE 893	77 ± 2%

March 98 Replaces March 91

VOLATILE ORGANIC CONTENT:

The following are nominal values.
 As supplied: 1.82 lbs/gal (195 gm/liter)
 Thinned:

Thinner	Fluid Ounces/Gal.	Pounds/Gallon	Grams/Liter
#2	12	2.08	250
#2	16	2.18	261
#33	12	2.08	250
#33	16	2.22	266
#33	32	2.75	329

RECOMMENDED DRY FILM THICKNESS PER COAT:

3 mils (75 microns) for use in mild environments or as an intermediate coat over CARBO ZINC series primers.

4-8 mils (100-150 microns) for use in more severe environments.

Dry film thicknesses in excess of 10 mils (250 microns) per coat are not recommended. Excessive film thickness over inorganic zinc may increase damage during shipping or erection.

THEORETICAL COVERAGE PER MIXED GALLON:

1235 sq. ft. (30.8 sq. m/l at 25 microns)
 412 sq. ft. at 3 mils (10.3 sq. m/l at 75 microns)
 247 sq. ft. at 5 mils (6.2 sq. m/l at 125 microns)

Mixing and application losses will vary and must be taken into consideration when estimating job requirements.

STORAGE CONDITIONS:

Store Indoors
 Temperature: 40-110°F (4-43°C) Humidity: 0-90%

SHELF LIFE: 24 months when stored at 75°F (24°C).

COLOR: Red (0500), Gray (0700), Green (0300), Yellow (0600) and White (0800) are standard.

GLOSS: Eggshell

ORDERING INFORMATION

Prices may be obtained from your Carboline Sales Representative or Carboline Customer Service Department.

APPROXIMATE SHIPPING WEIGHT:

	2's	10's
CARBOLINE 893	29 lbs. (13 kg)	143 lbs. (65 kg)
Thinner #2	9 lbs. (4 kg) in 1's	45 lbs. (20 kg) in 5's
Thinner #33	9 lbs. (4 kg) in 1's	45 lbs. (20 kg) in 5's

FLASH POINT: (Sataflash)

CARBOLINE 893 Part A	61°F (16°C)
CARBOLINE 893 Part B	59°F (15°C)
Thinner #2	24°F (-5°C)
Thinner #33	89°F (32°C)

To the best of our knowledge the technical data contained herein are true and accurate at the date of issuance and are subject to change without prior notice. User must contact Carboline Company to verify correctness before specifying or ordering. No guarantee of accuracy is given or implied. We guarantee our products to conform to Carboline quality control. We assume no responsibility for coverage, performance or injuries resulting from use. Liability, if any, is limited to replacement of products. Prices and coat data, if shown, are subject to change without prior notice. NO OTHER WARRANTY OR GUARANTEE OF ANY KIND IS MADE BY CARBOLINE, EXPRESS OR IMPLIED, STATUTORY, BY OPERATION OF LAW, OR OTHERWISE, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

0388

APPLICATION INSTRUCTIONS

Carboline® 893

These instructions are not intended to show product recommendations for specific service. They are issued as an aid in determining correct surface preparation, mixing instructions and application procedure. It is assumed that the proper product recommendations have been made. These instructions should be followed closely to obtain the maximum service from the material.

SURFACE PREPARATION: Remove all oil or grease from surface to be coated with Thinner #2 or Surface Cleaner #3 (refer to Surface Cleaner #3 Instructions) in accordance with SSPC-SP 1.

Steel: Abrasive blast to a Commercial Finish in accordance with SSPC-SP 6 and obtain a 1-2 mil (25-50 micron) blast profile.

Concrete: Apply over clean, dry recommended surface. Can be applied directly to dry concrete where an uneven surface can be tolerated. Remove laitance by abrasive blasting or other means.

Do not coat concrete treated with hardening solutions unless test patches indicate satisfactory adhesion. Concrete must cure at least 28 days at 70°F (21°C) and 50% R.H. or equivalent time.

MIXING: Power mix separately, then combine and power mix in the following proportions:

	<u>2 Gal. Kit</u>	<u>10 Gal. Kit</u>
CARBOLINE 893 Part A	1 gallon	5 gallons
CARBOLINE 893 Part B	1 gallon	5 gallons

DO NOT MIX PARTIAL KITS.

THINNING: For spray applications, may be thinned up to 16 fl. oz./gallon with Thinner #2.

For brush or roller application, may be thinned up to 32 fl. oz./gal. with Thinner #33.

Use of thinners other than those supplied or approved by Carboline may adversely affect product performance and will void product warranty whether express or implied.

POT LIFE: Four hours at 75°F (24°C) and less at higher temperatures. Pot life ends when coating loses body and begins to sag. Thinning rates above 16 ounces per gallon will shorten the working time to two hours due to reduced film build.

APPLICATION CONDITIONS:

	<u>Material</u>	<u>Surfaces</u>	<u>Ambient</u>	<u>Humidity</u>
Normal	60-85°F (16-29°C)	60-85°F (16-29°C)	60-85°F (16-29°C)	0-80%
Minimum	50°F (10°C)	50°F (10°C)	50°F (10°C)	0%
Maximum	90°F (32°C)	135°F (57°C)	110°F (43°C)	90%

Do not apply when the surface temperature is less than 5°F or 3°C above the dew point.

Special thinning and application techniques may be required above or below normal conditions.

March 98 Replaces March 91

CAUTION: CONTAINS FLAMMABLE SOLVENTS. KEEP AWAY FROM SPARKS AND OPEN FLAMES. IN CONFINED AREAS WORKMEN MUST WEAR FRESH AIRLINE RESPIRATORS. HYPERSENSITIVE PERSONS SHOULD WEAR GLOVES OR USE PROTECTIVE CREAM. ALL ELECTRIC EQUIPMENT AND INSTALLATIONS SHOULD BE MADE AND GROUNDED IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE. IN AREAS WHERE EXPLOSION HAZARDS EXIST, WORKMEN SHOULD BE REQUIRED TO USE NONFERROUS TOOLS AND TO WEAR CONDUCTIVE AND NONSPARKING SHOES.

SPRAY: This is a high solids coating and may require slight adjustments in spray techniques. Wet film thicknesses are easily and quickly achieved. The following spray equipment has been found suitable and is available from manufacturers such as Binks, DeVilbiss and Graco.

Conventional: Pressure pot equipped with dual regulators, 3/8" I.D. minimum material hose, .070" I.D. fluid tip and appropriate air cap.

Airless:
 Pump Ratio: 30:1 (min)*
 GPM Output: 3.0 (min.)
 Material Hose: 3/8" I.D. (min.)
 Tip Size: .017-.021"
 Output psi: 2100-2300
 Filter Size: 60 mesh

*Teflon packings are recommended and are available from the pump manufacturer.

BRUSH OR ROLLER: Use a medium bristle brush, or good quality short nap roller, avoid excessive rebrushing and scuffing. Two coats may be required to obtain desired appearance, hiding and recommended DFT. For best results tie-in within 10 minutes at 75°F (24°C).

DRYING TIMES: These times are at 4 mils (100 microns) dry film thickness. Excessive film thickness, insufficient ventilation or cooler temperatures will require longer cure times and could result in solvent entrapment and premature failure.

Dry to Touch: 3 hours at 75°F (24°C)
 Dry to Handle: 6 hours at 75°F (24°C)

<u>Surface Temperature</u>	<u>Dry to Topcoat</u>
50°F (10°C)	24 Hours
60°F (16°C)	18 Hours
75°F (24°C)	8 Hours
90°F (32°C)	4 Hours

If allowed to weather, chalking must be removed by water washing and then allowed to dry thoroughly prior to topcoating.

Maximum recoat times:

30 days for solvent based epoxies
 90 days for solvent based polyurethanes
 14 days for water based coatings

If maximum recoat time has been exceeded, surface must be abraded by sweep blasting prior to the application of any additional coats.

CLEANUP: Use Thinner #2.

CAUTION: READ AND FOLLOW ALL CAUTION STATEMENTS ON THIS PRODUCT DATA SHEET AND ON THE MATERIAL SAFETY DATA SHEET FOR THIS PRODUCT.



0968

Carboline Company

5644 Jefferson Hwy. • New Orleans, LA 70123-5189 • 504-733-3791 • FAX 504-734-8120



April 4, 1997

TO: MAC POSTON, WADE HANNA
Via Fax: 504-394-3542

FROM: AL CYRUS

SUBJECT: BAYOU BIENVENUE LOCKS

Dear Mac,

With respect to the needle girder beam supports, if they will be exposed to sunlight continuously or almost continuously, I recommend the following:

First Coat: Carboline 890 5 mils DFT
Second Coat: Carboline 890 5 mils DFT

I would not use coal tar epoxy due to its premature breakdown under continued UV exposure.

The above system will provide better protection at a reasonable cost to you.

Thanks for your interest.

Sincerely,

Al Cyrus
Al Cyrus

ALC/sj

attachment: Carboline 890 product data sheet

CONFIDENTIAL CONFORMING
TO THE CONTRACT
DATE 4/18/97
[Signature]



CARBOLINE® 890

VOG

SELECTION DATA

GENERIC TYPE: Cross-linked epoxy.
GENERAL PROPERTIES: CARBOLINE 890 is a self priming, high solids, high gloss, high build epoxy mastic. It can be applied by spray, brush, or roller over hand or power tool cleaned steel and is compatible with most existing coatings and tightly adhered rust. The cured film provides a tough, cleanable surface and is available in a wide variety of colors.

- Single coat corrosion protection.
- Excellent chemical resistance.
- Good flexibility and lower stress upon curing than most epoxy coatings.
- Excellent tolerance of damp (not wet) substrates.
- Very good abrasion resistance.
- Suitable replacement for Carbomastic 801.

RECOMMENDED USES: Recommended where a high performance, chemically resistant epoxy coating is desired. Offers outstanding protection for interior floors, walls, piping, equipment and structural steel or as an exterior coating for railcars, structural steel and equipment in various corrosive environments. Industrial environments include Chemical Processing, Offshore Oil and Gas, Food Processing, Pharmaceutical, Water and Waste Water Treatment, Pulp and Paper and Power Generation among others. May be used as a two coat system direct to metal or concrete for Water and Municipal Waste Water immersion. Acceptable for use in incidental food contact areas and as a lining for hopper cars carrying food grade plastic pellets when processed according to FDA criteria (ref: FDA 21 CFR 175.300). Consult Carboline Technical Service Department for other specific uses.

NOT RECOMMENDED FOR: Strong acid or solvent exposures, immersion service other than water, exterior weathering where color retention is desired, such as a finish for tank exteriors or over chlorinated rubber and latex coatings.

TYPICAL CHEMICAL RESISTANCE:

Exposure	Immersion	Splash & Spillage	Fumes
Acids	NR	Very Good	Very Good
Alkalies	NR	Excellent	Excellent
Solvents	NR	Very Good	Excellent
Salt Solutions	Excellent	Excellent	Excellent
Water	Excellent	Excellent	Excellent

TEMPERATURE RESISTANCE: (Non-immersion)
 Continuous: 250°F (121°C)
 Non-continuous: 300°F (149°C)

At temperatures above 225°F, coating discoloration and loss of gloss can be observed, without loss of film integrity.

SUBSTRATES: Apply over suitably prepared metal, concrete, or other surfaces as recommended.

COMPATIBLE COATINGS: May be applied directly over inorganic zincs, weathered galvanizing, epoxies, phenolics or other coatings as recommended. A test patch is recommended before use over existing coatings. A mist coat of CARBOLINE 890 is required when applied over inorganic zincs to minimize bubbling. May be topcoated with polyurethanes or acrylics to upgrade weathering resistance. Not recommended over chlorinated rubber or latex coatings. Consult Carboline Technical Service Department for specific recommendations.

SPECIFICATION DATA

THEORETICAL SOLIDS CONTENT OF MIXED MATERIAL:*
 CARBOLINE 890 **By Volume 75% ± 2%**

VOLATILE ORGANIC CONTENT:*
 As Supplied: 1.78 lbs./gal. (214 grams/liter)
 Thinned:

Thinner	Fluid Ounces/Gal.	Pounds/Gallon	Grams/Liter
2	8	2.08	250
2	13	2.28	271
33	18	2.38	285

*Varies with color

RECOMMENDED DRY FILM THICKNESS PER COAT:
 4-6 mils (100-150 microns).
 6-8 mils (150-200 microns) DFT for a more uniform gloss over inorganic zincs, or for use over light rust.

In more severe environments a second coat of 4-6 mils (100-150 microns) is recommended.

Dry film thickness in excess of 10 mils (250 microns) per coat is not recommended. Excessive film thickness over inorganic zinc may increase damage during shipping or erection.

THEORETICAL COVERAGE PER MIXED GALLON:
 1203 sq. ft. (30 sq. m) at 25 microns
 241 sq. ft. at 5 mils (6.0 sq. m) at 125 microns

Mixing and application losses will vary and must be taken into consideration when estimating job requirements.

STORAGE CONDITIONS: Store indoors
 Temperature: 40-110°F (4-43°C) Humidity: 0-100%

SHELF LIFE: 36 months when stored at 75°F (24°C).

COLORS: Available in Carboline Color Chart colors. Some colors may require two coats for adequate hiding.

GLOSS: High gloss (Epoxies lose gloss, discolor and eventually chalk in sunlight exposure).

ORDERING INFORMATION

Prices may be obtained from your Carboline Sales Representative or Carboline Customer Service Department.

APPROXIMATE SHIPPING WEIGHT:

	2 Gal. Kit	10 Gal. Kit
CARBOLINE 890	29 lbs. (13 kg)	145 lbs. (66 kg)

	1's	5's
THINNER #2	8 lbs. (4 kg)	38 lbs. (18 kg)
THINNER #33	8 lbs. (4 kg)	45 lbs. (20 kg)

FLASH POINT: (Setflash)
 CARBOLINE 890 Part A 89°F (32°C)
 CARBOLINE 890 Part B 71°F (22°C)
 THINNER #2 24°F (-5°C)
 THINNER #33 89°F (32°C)

June 95 Replaces December 95

To the best of our knowledge the technical data contained herein are true and accurate at the date of issuance and are subject to change without prior notice. User must contact Carboline Company to verify correctness before specifying or ordering. No guarantee of accuracy is given or implied. We guarantee our products to conform to Carboline quality control. We assume no responsibility for coverage, performance or finish resulting from use. Liability, if any, is limited to replacement of products. Prices and cost data, if shown, are subject to change without prior notice. NO OTHER WARRANTY OR GUARANTEE OF ANY KIND IS MADE BY CARBOLINE, EXPRESS OR IMPLIED, STATUTORY, BY OPERATION OF LAW, OR OTHERWISE, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

0985

APPLICATIONS INSTRUCTIONS CARBOLINE® 890

These instructions are not intended to show product recommendations for specific service. They are issued as an aid in determining correct surface preparation, mixing instructions and application procedure. It is assumed that the proper product recommendations have been made. These instructions should be followed closely to obtain the maximum service from the materials.

SURFACE PREPARATION: Remove all oil or grease from surface to be coated with Thinner #2 or Surface Cleaner #3 (refer to Surface Cleaner #3 instructions) in accordance with SSPC-SP 1.

Steel: For mild environments Hand Tool or Power Tool Clean in accordance with SSPC-SP 2, SSPC-SP 3 or SSPC-SP 11 to produce a rust-scale free surface.

For more severe environments, abrasive blast to a Commercial Finish in accordance with SSPC-SP 6 and obtain a 1 1/2 - 3 mil (40-75 micron) blast profile.

For immersion service, abrasive blast to a Near White Metal Finish in accordance with SSPC-SP10 and obtain a 1 1/2 - 3 mil (40-75 micron) blast profile.

Concrete: Must be cured at least 28 days at 70°F (21°C) and 50% R.H. or equivalent time. Remove fins and other protrusions by stoning, sanding or grinding. Abrasive blast to open all surface voids and remove all form oils, incompatible curing agents, hardeners, laitance and other foreign matter and produce a surface texture similar to that of a medium grit sandpaper. Voids in the concrete may require surfacing. Blow or vacuum off sand and dust.

MIXING: Power mix separately, then combine and power mix in the following proportions:

	2 Gal. Kit	10 Gal. Kit
CARBOLINE 890 Part A	1 gallon	5 gallons
CARBOLINE 890 Part B	1 gallon	5 gallons

THINNING: For spray applications, may be thinned up to 13 oz./gal. with Thinner #2. For hot and windy conditions, or for brush and roller application, may be thinned up to 16 oz./gal. with Thinner #33.

Use of thinners other than those supplied or approved by Carboline may adversely affect product performance and void product warranty, whether express or implied.

POT LIFE: Three hours at 75°F (24°C) and less at higher temperatures. Pot life ends when material loses film build.

APPLICATION CONDITIONS:

	Material	Surface	Ambient	Humidity
Normal	60-85°F (16-28°C)	60-85°F (16-28°C)	60-90°F (16-32°C)	0-80%
Minimum	50°F (10°C)	50°F (10°C)	50°F (10°C)	0%
Maximum	90°F (32°C)	125°F (52°C)	110°F (43°C)	90%

Do not apply or cure the material when the surface temperature is less than 5°F or 3°C above the dew point.

Special thinning and application techniques may be required above or below normal conditions.

SPRAY: This is a high solids coating and may require slight adjustments in spray techniques. Wet film thicknesses are easily and quickly achieved. The following spray equipment has been found suitable and is available from manufacturers such as Binks, DeVilbiss and Graco.

Conventional: Pressure pot equipped with dual regulators, 3/8" I.D. minimum material hose, .070" I.D. fluid tip and appropriate air cap.

June 88 Replaces December 85

CAUTION: CONTAINS FLAMMABLE SOLVENTS. KEEP AWAY FROM SPARKS AND OPEN FLAMES. IN CONFINED AREAS, WORKMEN MUST WEAR FRESH AIRLINE RESPIRATORS. HYPERSENSITIVE PERSONS SHOULD WEAR GLOVES OR USE PROTECTIVE CREAM. ALL ELECTRIC EQUIPMENT AND INSTALLATIONS SHOULD BE MADE AND GROUNDED IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE. IN AREAS WHERE EXPLOSION HAZARDS EXIST, WORKMEN SHOULD BE REQUIRED TO USE NONFERROUS TOOLS AND TO WEAR CONDUCTIVE AND NONSPARKING SHOES.

Airless:
Amp Ratio: 30:1 (min.)^{*}
GPM Output: 3.0 (min.)
Material Hose: 3/8" I.D. (min.)
Tip Size: .017-.021"
Output psi: 2100-2300
Filter Size: 60 mesh

^{*}Teflon packings are recommended and are available from the pump manufacturer.

BRUSH OR ROLLER: Use medium bristle brush, or good quality short nap roller. Avoid excessive rebrushing and re-rolling. Two coats may be required to obtain desired appearance, hiding and recommended DFT. For best results, tie-in within 10 minutes at 75°F (24°C).

DRYING TIMES: These times are based on a 5 mils (125 microns) dry film thickness. Higher film thicknesses, insufficient ventilation or cooler temperatures will require longer cure times and could result in solvent entrapment and premature failure.

Dry to Touch 2 1/2 hours at 75°F (24°C)
 Dry to Handle 6 1/2 hours at 75°F (24°C)

Surface Temperature	Recoating With itself	Dry to Topcoat	Final Cure
50°F (10°C)	12 hours	24 hours	3 days
60°F (16°C)	8 hours	18 hours	2 days
75°F (24°C)	4 hours	8 hours	1 day
90°F (32°C)	2 hours	4 hours	16 hours

Excessive humidity or condensation on the surface during curing can interfere with the cure, can cause discoloration and may result in a surface haze or blush. Any haze or blush must be removed by water washing before recoating. During high humidity conditions, it is recommended that the application be done while temperatures are increasing. For best results over "damp" surfaces, apply by brush or roller.

Maximum Recoat or Topcoat Times at 75°F (24°C):

With Epoxies - 30 days
 With Polyurethanes - 90 days

If the maximum recoat time has been exceeded, surface must be abraded by sweep blasting prior to the application of any additional coats.

Minimum cure time before immersion service is 5 days at 75°F (24°C) surface temperature. Cure at temperatures below 60°F (16°C) is not recommended for immersion service.

VENTILATION & SAFETY: WARNING: VAPORS MAY CAUSE EXPLOSION. When used as a tank lining or in enclosed areas, thorough air circulation must be used during and after application until the coating is cured. The ventilation system should be capable of preventing the solvent vapor concentration from reaching the lower explosion limit for the solvents used. In addition to ensuring proper ventilation, fresh air respirators or fresh air hoods must be used by all application personnel. Where flammable solvents exist, explosion-proof lighting must be used. Hypersensitive persons should wear clean, protective clothing, gloves and/or protective cream on face, hands and all exposed areas.

CLEANUP: Use Thinner # 2.

CAUTION: READ AND FOLLOW ALL CAUTION STATEMENTS ON THIS PRODUCT DATA SHEET AND ON THE MATERIAL SAFETY DATA SHEET FOR THIS PRODUCT.

carboline.

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