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PILE INSTALLATION DEMONSTRATION PROJECT (PIDP) GEOTECHNICAL REPORT

SAN FRANCISCO-OAKLAND BAY BRIDGE EAST SPAN SEISMIC SAFETY PROJECT

Prepared for

CALIFORNIA DEPARTMENT OF TRANSPORTATION

March 2001

Earth Mechanics

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March 5, 2001
Project No. 98-42-0061

California Department of Transportation
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Attention: Mr. Mark Willian
Contract Manager

Pile Installation Demonstration Project (PIDP) Geotechnical Report
San Francisco-Oakland Bay Bridge East Span Seismic Safety Project
Contract 59A0053, Task Order 6

Attached is our Pile Installation Demonstration Project (PIDP) Geotechnical Report. This report documents the installation of three 2.438-meter-diameter steel pipe piles near the planned San Francisco-Oakland Bay Bridge East Span alignment, and provides interpretation and evaluation of the results. The fieldwork was conducted between October and December 2000 under Task 6 of the subject contract. Two pile driving analyzer (PDA) systems were used to collect data during driving of a total of nine pile sections with two large hydraulic offshore pile-driving hammers (Menck MHU 500T and MHU 1700). PDA data were further evaluated using CAPWAP software to provide insight into pile behavior during both initial driving and a series of restrikes (redriving).

The report is presented in one volume that contains the main text, tables, plates and Appendices A through F.

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California Department of Transportation
March 5, 2001 (Fugro 98-42-0061)

On behalf of the project team, we appreciate the opportunity to provide geotechnical services on this project. If you have any questions or comments regarding this report, please contact our office.

Sincerely,

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SAN FRANCISCO-OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT

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CONTENTS

Page

1.0 INTRODUCTION 1-1
1.1 Background 1-1
1.2 SFOBB East Span Seismic Safety Project Description 1-1
1.2.1 SFOBB East Span Seismic Safety Project 1-1
1.2.2 Caltrans Contract for Geotechnical and Geological Investigations for the Project 1-2
1.3 Project Datum 1-3
1.4 Scope of Work for the PIDP 1-3
1.5 Report Organization 1-4
1.5.1 Main Text 1-4
1.5.2 Appendices 1-5

2.0 SITE CONDITIONS 2-1
2.1 Bathymetry 2-1
2.2 Geologic Features and Subsurface Stratigraphy 2-2
2.2.1 Principal Features and Formations 2-2
2.2.2 Subsurface Cross Sections 2-2
2.3 Description of Major Geologic Features 2-3
2.3.1 Easterly-Sloping Bedrock of the Franciscan Formation 2-3
2.3.2 Holocene- and Pleistocene-Age Marine and Alluvial Sediments 2-3
2.3.3 Channeling 2-4
2.4 Geologic Formation Description 2-4
2.4.1 Young Bay Mud (YBM) 2-5
2.4.2 Merritt-Posey-San Antonio (MPSA) Formations 2-5
2.4.3 Old Bay Mud/Upper Alameda Marine (OBM/UAM) Sediments 2-6
2.4.4 Lower Alameda Alluvial (LAA) Sediments 2-7
2.4.5 Franciscan Formation Bedrock 2-7

3.0 PILE INSTALLATION DEMONSTRATION PROJECT 3-1
3.1 Project Overview 3-1
3.2 Background 3-1
3.2.1 Introduction 3-1
3.2.2 Limitations of the Program 3-2
3.2.3 PIDP Objectives 3-3
3.2.4 PIDP Benefits 3-4
3.3 Pile Locations and Physical Parameters 3-5
3.3.1 Pile Installation Test Locations 3-5
3.3.2 Pile Parameters 3-5

CONTENTS -- CONTINUED

Page

3.4 Driving Support Systems and Pile Hammers 3-7
3.4.1 Introduction 3-7
3.4.2 Marine Installation Operations and Equipment 3-8
3.4.3 Pile Driving Hammers 3-8
3.5 Disposition of PIDP Piles 3-9
3.5.1 Benefits of Leaving the PIDP Piles In Place Until Production Piles are Driven 3-9
3.5.2 Current Status of Piles 3-10

4.0 PILE INSTALLATION OPERATIONS 4-1
4.1 Driving Operations Sequence 4-1
4.1.1 Introduction 4-1
4.1.2 Pile Specifics 4-2
4.2 Welding Operations 4-3
4.3 Driving Behavior 4-4
4.3.1 Hammer Operation and Reliability 4-4
4.3.2 Pile Run and Blow Counts 4-5
4.3.3 Pile Plug Measurements and Behavior 4-7
4.3.4 Batter Achieved and Final Pile Head Location 4-7
4.4 Pile Damage 4-8

5.0 PILE DRIVING ANALYZER SYSTEM DATA AND CAPWAP ANALYSES 5-1
5.1 Pile Driving Analyzer 5-1
5.1.1 Pile Driving Analyzer Measurements 5-1
5.1.2 PDA Data 5-1
5.2 CAPWAP Analyses 5-3
5.2.1 Introduction 5-3
5.2.2 Combined CAPWAP Analyses 5-3
5.2.3 Selection of Hammer Blows for CAPWAP Analyses 5-5
5.2.4 Results of CAPWAP Analyses 5-5

6.0 INTERPRETATION AND EVALUATION OF DRIVING DATA AND ANALYSES 6-1
6.1 Hammer Efficiency and Energy Transfer 6-1
6.1.1 Hammer Efficiency 6-1
6.1.2 Energy Transfer/System Efficiency 6-2
6.2 Driving Stresses 6-2
6.2.1 Allowable Compressive Stress 6-2
6.2.2 Measured Stresses 6-3

CONTENTS -- CONTINUED

Page

6.3 Evaluation of Static Pile Capacity, Pile Setup, and Drivability 6-5
6.3.1 Soil Resistance to Driving (SRD) 6-5
6.3.2 Pile Setup 6-7
6.3.3 Estimate of Available Geotechnical Pile Capacity 6-12
6.3.4 Evaluation of Drivability (Blow Counts) 6-13

7.0 SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS 7-1
7.1 Construction Operations 7-1
7.2 Welding/Splicing 7-1
7.3 Hammer Performance 7-2
7.4 Drivability 7-2
7.5 Pile Setup and Estimated Axial Capacity 7-3
7.6 Key Conclusions and Recommendations for Production Piles 7-3

8.0 LIMITATIONS 8-1

9.0 LIST OF TERMS 9-1

10.0 REFERENCES 10-1

TABLES

Table

Summary of Pile Properties 3-1
Summary of Hammer Technical Data 3-2
Summary of Driving Operation Sequence 4-1
Summary of Pile Installation Data 4-2
Summary of Welding Operations 4-3
Summary of Driving Data 4-4
Summary of CAPWAP Results, Pile No. 1, Section D, Menck MHU 1700 Hammer 5-1a
Summary of CAPWAP Results, Pile No. 2, Section D, Menck MHU 1700 Hammer 5-1b
Summary of CAPWAP Results, Pile No. 3, Section D, Menck MHU 1700 Hammer 5-1c

CONTENTS -- CONTINUED

PLATES

	Plate
Site Vicinity Map	1.1
Bathymetry and Marine Explorations	2.1
Site and Cross Section Location Map	2.2
Key to Cross Sections	2.3
Subsurface-Cross Section	
A1-A1′	2.4
PID1-PID1′	2.5
PID2-PID2′	2.6
PID3-PID3′	2.7
Young Bay Mud Paleochannel	2.8
Delivery of State-Furnished Piles to Pier 96	3.1
Pile Details	3.2
Bottom of Pile Section in Cradle	3.3
Pile Support Template	3.4
Preparing to Install Template Piles	3.5
Derrick Barge 24 at Primary Test Location	3.6
Sequence of Driving Operation	4.1
Driving Operations with MHU 500T and 1700 Hammers	4.2
Blow Count Profile	
Pile No. 1	4.3a
Pile No. 2	4.3b
Pile No. 3	4.3c
Soil Plug Depth Measurements	4.4
PDA Instrumentation Installation	5.1
Profile of Driving Data, Pile No. 1	
PDA 1	5.2a
PDA 2	5.2b
Profile of Driving Data, Pile No. 2	
PDA 1	5.3a
PDA 2	5.3b
Profile of Driving Data, Pile No. 3	
PDA 1	5.4a
PDA 2	5.4b
Schematic Illustration of Combined CAPWAP Analyses	5.5

CONTENTS -- CONTINUED

PLATES -- CONTINUED

Plate

PDA-Measured and Predicted Soil Resistance to Driving
Pile Nos. 1 and 2 ..... 6.1
Pile No. 3 ..... 6.2
Total Skin Friction Profiles from CAPWAP Analyses, Pile No. 1 ..... 6.3a
Unit Skin Friction Profiles from CAPWAP Analyses, Pile No. 1 ..... 6.3b
Total Skin Friction Profiles from CAPWAP Analyses, Pile No. 2 ..... 6.4a
Unit Skin Friction Profiles from CAPWAP Analyses, Pile No. 2 ..... 6.4b
Total Skin Friction Profiles from CAPWAP Analyses, Pile No. 3 ..... 6.5a
Unit Skin Friction Profiles from CAPWAP Analyses, Pile No. 3 ..... 6.5b
Calculated and Predicted Setup of Skin Friction in Clay Layers, Pile Nos. 1 through 3 ..... 6.6
Total Skin Friction Capacity Estimated from CAPWAP Analyses 6.7
Summary of Wave Equation Parameters 6.8
Predicted and Observed Blow Counts
Pile No. 1 ..... 6.9a
Pile No. 2 ..... 6.9b

APPENDICES

APPENDIX A - PDA INSTRUMENTATION AND DATA INTERPRETATION

APPENDIX B - BLOW COUNT RECORDS
Pile No. 1
Pile No. 2
Pile No. 3

APPENDIX C - PDA DATA
C-1, Driving System Performance Data
Pile No. 1
Pile 1, Section B, PDA 1
Pile 1, Section B, PDA 2
Pile 1, Section C, PDA 1
Pile 1, Section C, PDA 2
Pile 1, Section D, PDA 1
Pile 1, Section D, PDA 2

CONTENTS -- CONTINUED

APPENDICES -- CONTINUED

APPENDIX C - PDA DATA (Continued)
- C-1, Driving System Performance Data (Continued)
  - Pile No. 2
    - Pile 2, Section B, PDA 1
    - Pile 2, Section B, PDA 2
    - Pile 2, Section C, PDA 1
    - Pile 2, Section C, PDA 2
    - Pile 2, Section D, PDA 1
    - Pile 2, Section D, PDA 2
  - Pile No. 3
    - Pile 3, Section B, PDA 1
    - Pile 3, Section B, PDA 2
    - Pile 3, Section C, PDA 1
    - Pile 3, Section C, PDA 2
    - Pile 3, Section D, PDA 1
    - Pile 3, Section D, PDA 2
- C-2, PDA Data Profiles
  - Pile No. 1
    - Pile 1, Section B, PDA 1
    - Pile 1, Section B, PDA 2
    - Pile 1, Section C, PDA 1
    - Pile 1, Section C, PDA 2
    - Pile 1, Section D, PDA 1
    - Pile 1, Section D, PDA 2
    - Pile 1, Restrike No. 1, PDA 1
    - Pile 1, Restrike No. 1, PDA 2
    - Pile 1, Restrike No. 2, PDA 1
    - Pile 1, Restrike No. 2, PDA 2
    - Pile 1, Restrike No. 3, PDA 1
    - Pile 1, Restrike No. 3, PDA 2
  - Pile No. 2
    - Pile 2, Section B, PDA 1
    - Pile 2, Section B, PDA 2
    - Pile 2, Section C, PDA 1
    - Pile 2, Section C, PDA 2
    - Pile 2, Section D, PDA 1

CONTENTS -- CONTINUED

APPENDICES -- CONTINUED

APPENDIX C - PDA DATA (Continued)
- C-2, PDA Data Profiles (Continued)
  - Pile No. 2 (Continued)
    - Pile 2, Section D, PDA 2
    - Pile 2, Restrike No. 1, PDA 1
    - Pile 2, Restrike No. 1, PDA 2
    - Pile 2, Restrike No. 2, PDA 1
    - Pile 2, Restrike No. 2, PDA 2
  - Pile No. 3
    - Pile 3, Section B, PDA 1
    - Pile 3, Section B, PDA 2
    - Pile 3, Section C, PDA 1
    - Pile 3, Section C, PDA 2
    - Pile 3, Section D, PDA 1
    - Pile 3, Section D, PDA 2
    - Pile 3, Restrike No. 1, PDA 1
    - Pile 3, Restrike No. 1, PDA 2

APPENDIX D - CAPWAP DATA AND ANALYSES
- Pile No. 1, Section D
  - BOID, Blow No. 5, PDA 2
  - EOID, Blow No. 2193, PDA 1
  - EOID, Blow No. 2197, PDA 2
  - EOR, Blow No. 40, PDA 1
  - EOR, Blow No. 51, PDA 2
  - BOR2, Blow No. 1, PDA 1
  - BOR2, Blow No. 1, PDA 2
  - EOR2, Blow No. 138, PDA 1
  - BOR3, Blow No. 1, PDA 2
  - BOR3, Blow No. 2, PDA 1
  - BOR3, Blow No. 45, PDA 1
  - EOR, Blow No. 195, PDA 1

CONTENTS -- CONTINUED

APPENDICES -- CONTINUED

APPENDIX D - CAPWAP DATA AND ANALYSES (Continued)

Pile No. 2, Section D

BOID, Blow No. 5, PDA 1
EOID, Blow No. 1909, PDA 1
EOID, Blow No. 1945, PDA 2
BOR, Blow No. 3, PDA 1
BOR, Blow No. 12, PDA 2
BOR2, Blow No. 5, PDA 1
EOR2, Blow No. 90, PDA 1

Pile No. 3, Section D

BOID, Blow No. 1, PDA 1
BOID, Blow No. 1, PDA 2
EOID, Blow No. 2181, PDA 1
EOID, Blow No. 2169, PDA 2
BOR, Blow No. 1, PDA 1
BOR, Blow No. 2, PDA 2
EOR, Blow No. 26, PDA 2
EOR, Blow No. 52, PDA 1

APPENDIX E - MENCK HAMMER RECORDS

Pile No. 1

Pile 1, Section A
Pile 1, Section B
Pile 1, Section C
Pile 1, Section D
Pile 1, Restrike No. 1
Pile 1, Restrike No. 2
Pile 1, Restrike No. 3

Pile No. 2

Pile 2, Section A
Pile 2, Section B
Pile 2, Section C
Pile 2, Section D
Pile 2, Restrike No. 1
Pile 2, Restrike No. 2

SECTION 1.0
INTRODUCTION

1.0 INTRODUCTION

1.1 BACKGROUND

This report describes the Pile Installation Demonstration Project (PIDP) and presents and summarizes the findings and conclusions based on the installation of three large-diameter steel pipe piles in the San Francisco Bay. The piles installed in this study are similar to shells of the cast-in-steel-shell (CISS) piles selected to support the proposed San Francisco-Oakland Bay Bridge (SFOBB) East Span replacement structure.

This report is a geotechnical documentation and evaluation report that discusses pile installation equipment, construction methods, pile and hammer performance, and installation procedures. The report also addresses geotechnical issues such as pile drivability, pile capacity, and soil-pile setup. Field welding is briefly discussed and summarized in this report; however, a more thorough examination of the issue will be presented by the State of California Department of Transportation (Caltrans).

The PIDP also included monitoring of sound (airborne and underwater) and ground vibration attenuation, and observations of marine mammal behavior. Those issues are discussed under separate cover in a report submitted by the PIDP contractor, Manson/Dutra (a joint venture of Manson Construction Company and The Dutra Group).

1.2 SFOBB EAST SPAN SEISMIC SAFETY PROJECT DESCRIPTION

1.2.1 SFOBB East Span Seismic Safety Project

Bridge and Route Description. The existing SFOBB carries 10 lanes of Interstate 80 traffic, five eastbound and five westbound, across San Francisco Bay. The bridge is bisected longitudinally by Yerba Buena Island with the West Span(s) extending from San Francisco to Yerba Buena Island and the East Span(s) extending from Yerba Buena Island to Oakland (see Plate 1.1). The existing bridge is a double-decked structure that was constructed in the 1930s.

Earthquake Damage and Retrofit Evaluation. During the 1989 Loma Prieta earthquake, the East Span(s) of the bridge suffered considerable damage, including the collapse of one span. Recognizing the vulnerability of the structure to future earthquake shaking, Caltrans embarked on a seismic retrofit program to upgrade the bridge. In the summer of 1995, Caltrans presented their retrofit strategy for the SFOBB East Span to the Seismic Advisory Board, who suggested replacement in lieu of retrofit.

Subsequently, Caltrans developed a 30-percent design of a continuous viaduct replacement structure. In 1996, that 30-percent design was presented to the Bay Bridge Design Task Force, which had been appointed by the Metropolitan Transportation Commission (MTC) to

select a bridge type for the East Span replacement structure. The MTC and their task force then formed an Engineering and Design Advisory Panel (EDAP) that recommended a different replacement bridge type.

Replacement Bridge. Following those recommendations, Caltrans contracted with a joint venture between TY Lin International and Moffatt & Nichol Engineers (TY Lin/M&N) to develop 30-percent designs for two alternative bridge types (Phase 1 design). The two bridge-type alternatives included a cable-supported Main Span offshore from Yerba Buena Island and a Skyway structure farther to the east, as well as the associated Yerba Buena Island transition structure(s) and Oakland Shore Approach structure(s). The alternative cable-supported main structures that were considered included single-tower or dual-tower, cable-stayed and self-anchored suspension bridge structures. The timing for the design project required that Caltrans and TY Lin/M&N submit 30-percent design-level schedule and cost estimates to EDAP and MTC by May 29, 1998.

In June 1998, EDAP and MTC selected the single-tower, self-anchored suspension bridge structures and haunched concrete Skyway structures for final design. Final design of the chosen structure types and alignment was begun by the TY Lin/M&N team in late Fall 1998. The following table summarizes submission dates for various design submittals that have since been prepared. The most recent listed submittal for each component of the replacement bridge provides the basis for descriptions of structures presented in this report.

Design Submittal	Main Span	Skyway	Oakland Shore Approach
45 percent	January 1999	January 1999	January 1999
65 percent	August 1999	July 1999	August 1999
85 percent		February 2000	August 2000 (Long Structure) September 2000 (Short Structure)
100 percent		November 2000 (Draft)	

As shown on the design submittal, the Skyway structures are to be supported on 2.5-meter-diameter CISS piles. Tip elevations are planned to range from Elevation (El.) -108 to El. -93 meters (mean sea level [MSL]).

1.2.2 Caltrans Contract for Geotechnical and Geological Investigations for the Project

To support their design efforts, Caltrans contracted with Fugro-Earth Mechanics (a joint venture between Fugro West, Inc., and Earth Mechanics, Inc.) to conduct geotechnical and geological investigations and studies for the replacement bridge. Caltrans Contract 59A0053, dated August 27, 1997, authorized those studies.

Task Orders. To date, six task orders have been issued under Contract 59A0053. The six task orders include:

- Task Order No. 1 - Initial Site Characterization-Geophysical Surveys phase with a Notice to Proceed issued January 6, 1998.
- Task Order No. 2 - Project Management and Coordination with a Notice to Proceed issued January 26, 1998.
- Task Order No. 3 - Preliminary Site Exploration and Testing with a Notice to Proceed issued January 26, 1998.
- Task Order No. 4 - Probabilistic Seismic Hazard Analysis Update and Preliminary Site Response Analysis with a Notice to Proceed issued May 19, 1998.
- Task Order No. 5 - Phase 2 Site Exploration and Characterization with a Notice to Proceed issued July 23, 1998. This task order authorizes the preparation of the final site characterization and foundation design-related reports (Fugro-EM, 2001a-h).
- Task Order No. 6 - Pile Installation Demonstration Project Engineering/Monitoring with a Notice to Proceed issued December 23, 1998. This task order authorizes the scope of work described and presented in this report.

1.3 PROJECT DATUM

The horizontal and vertical datums specified by Caltrans (1997) for use on this project were as follows:

- Horizontal Datum: California Coordinate System Zone 3, NAD 1983 (meters)
- Vertical Datum: MSL Datum of 1929

Locations and elevations presented in this report are in reference to these project datums. The (MSL) datum was specified by Caltrans as being 0.942 meter above mean lower low water (MLLW) datum (e.g., to convert MLLW elevations to MSL elevations, *subtract* 0.94 meter from the MLLW elevation values). The MSL datum is similar to NGVD 29 datum.

1.4 SCOPE OF WORK FOR THE PIDP

The Task Order No. 6 PIDP work scope for Fugro-Earth Mechanics included:

- Project planning/scoping (i.e., define specific project objectives, choose site[s], select pile and hammer sizes/combinations);
- Coordination with TY Lin/M&N relative to pile and pile head design, template requirements, and specifications;
- Preparation of plans, specifications, and a cost estimate for the PIDP;

- Preparation of a Site Characterization report for the test sites (under the previously authorized Task Order 5);
- Development of pre-driving pile drivability predictions for hammer/pile combinations;
- Provision of pile driving analyzer (PDA) monitoring;
- Analyses of PDA data using the Case Pile Wave Analysis Program (CAPWAP),
- Preparation of an Evaluation, Analyses, and Documentation report to document hammer operations and efficiencies, blow count versus penetration, mobilized soil resistance for continuous driving and after setup, and establishes minimum hammer size(s) and pile acceptance criteria. (This report is the Evaluation, Analyses, and Documentation report described above.)

The original scope of work also provided for noise monitoring at two remote locations (e.g., Treasure Island and on the existing bridge) during pile driving. However, Caltrans later decided to have the PIDP Installation Contractor provide this service/data.

1.5 REPORT ORGANIZATION

1.5.1 Main Text

The main text of this Pile Installation Demonstration Project geotechnical report includes the following sections:

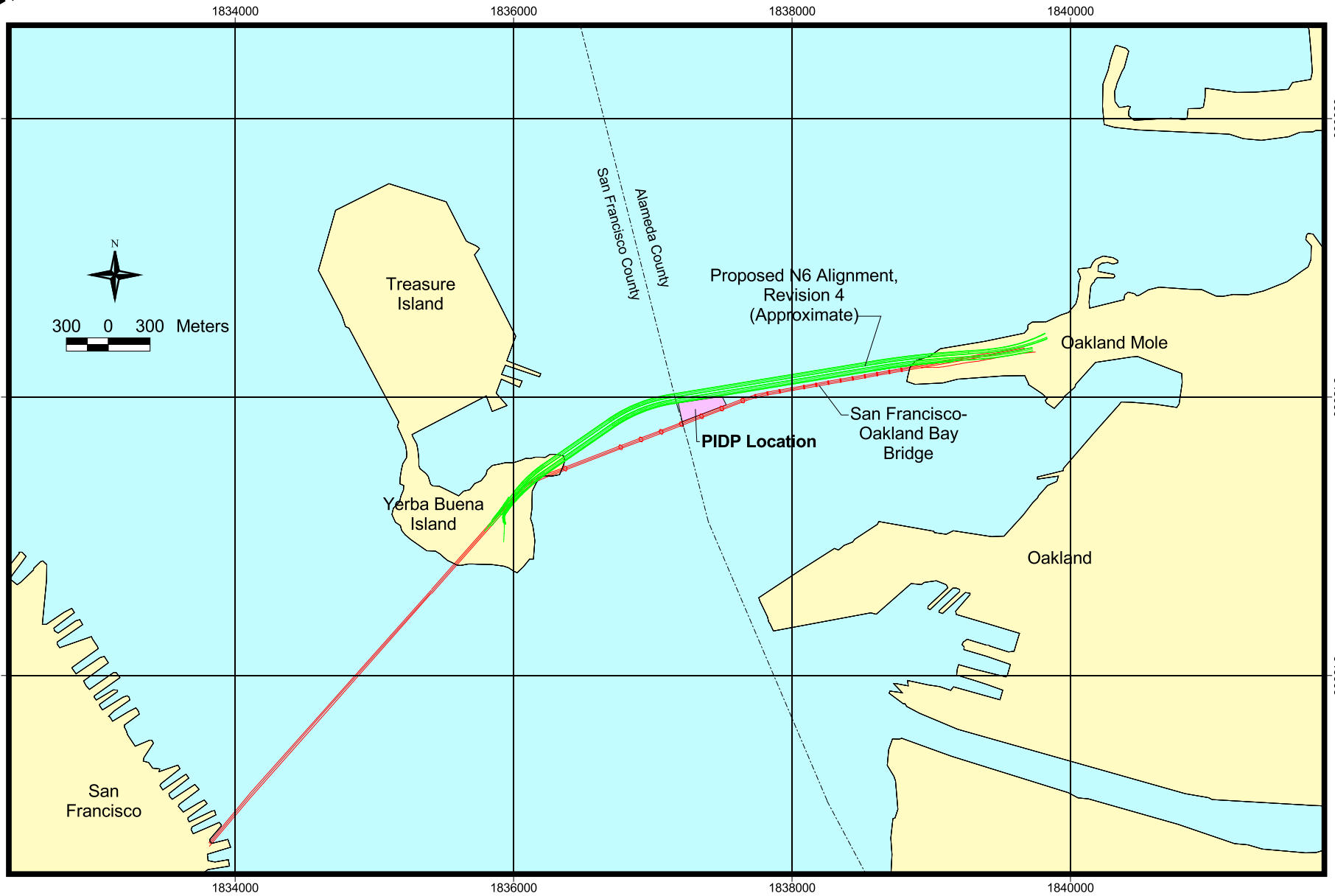
- Section 1.0 - Introduction
- Section 2.0 - Site Conditions
- Section 3.0 - Pile Installation Demonstration Program
- Section 4.0 - Pile Installation Operations
- Section 5.0 - Pile Driving Analyzer System and CAPWAP Data and Analyses
- Section 6.0 - Interpretation and Evaluation of Driving Data and Analyses
- Section 7.0 - Summary, Conclusions and Recommendations
- Section 8.0 - Limitations
- Section 9.0 - List of Terms
- Section 10.0 - References

Tables and illustrations (plates) follow the main text and provide additional data and graphical information from the PIDP.

1.5.2 Appendices

The appendices for this report include the following:

- Appendix A - PDA Instrumentation and Data Interpretation
- Appendix B - Blow Count Records
- Appendix C - PDA Data
- Appendix D - CAPWAP Data and Analyses
- Appendix E - Menck Hammer Records
- Appendix F - Logs of Test Borings



SITE VICINITY MAP

Pile Installation Demonstration Project

SFOBB East Span Seismic Safety Project

PLATE 1.1

SFOBB Task Order No. 6

Project No. 98-42-0061

Earth Mechanics

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SECTION 2.0
SITE CONDITIONS

2.0 SITE CONDITIONS

This section summarizes the relevant site conditions (including bathymetry, geologic features and subsurface stratigraphy) and describes the major geologic features that underlie the SFOBB East Span and, in particular, the PIDP locations. A detailed discussion of the SFOBB site conditions can be found in the Final Marine Geotechnical Site Characterization report (Fugro-EM, 2001d).

2.1 BATHYMETRY

As shown on Plate 2.1, the Bay bottom along the N6 alignment generally slopes from less than 0.15 percent to about 2 percent from east to west to within about 300 meters offshore Yerba Buena Island. Offshore Yerba Buena Island, the surface slopes more steeply to the east. The lowest elevation in the vicinity of the alignment is about El. -30 meters (re: MSL datum) in the deep scour depression offshore from the eastern tip of Yerba Buena Island.

A north-south-trending channel is located immediately adjacent to the east of Yerba Buena Island. Along the channel axis, the nominal elevation of the channel base is El. -15 meters. Between the existing Bridge Piers E2 and E3, however, the channel reaches a depth of El. -30 meters in a scour hole. This scour hole is about 700 by 300 meters and is elongated in a north-southwest direction. It is more than 15 meters deep relative to its outlet to the southwest. The east- and west-facing slopes of the depression, which underlie the area between the Main Span-Pylon and East Pier, are as steep as about 10 to 30 percent while the north- and south-facing slopes are more typically about 3 to 4 percent.

In addition to the prominent scour hole between existing Bridge Piers E2 and E3, there are scour depressions adjacent to a number of the bridge piers. The scour holes are typically 3 to 5 meters deep. In general, the size of the scour holes increases to the west. While they are approximately 30 to 50 meters in length around existing Bridge Pier E22, they elongate to in excess of 200 meters around existing Bridge Pier E3. To the west of existing Bridge Pier E6, the scour holes extend largely to the south of the piers. In the vicinity of the PIDP area, the bay floor slopes down to the west. The bathymetric features around the PIDP location are described below:

- A north-south-trending, approximately 5-meter-high Bay bottom slope is present at the Primary Test Location and along the eastern half of Skyway Frame 1. In this area, the Bay bottom deepens from about El. -7 to El. -12 meters over a horizontal distance of about 300 meters. In this area, the Bay bottom locally slopes as steep as about 2 percent. In the immediate vicinity of the Primary Test Location (Pile Nos. 1 and 2), the mudline elevation is approximately El. -8.9 meters.

- The Pile No. 3 Test Location is located east of the aforementioned 5-meter-high slope. The mudline elevation at the Pile No. 3 Test Location is approximately El. -7.0 meters.
- The scour hole adjacent to existing Bridge Pier E8 is up to 5 meters deep. Adjacent to the Pile No. 3 Test Location, the depression is approximately 3 meters deeper than the surrounding areas. Mudline elevation differences of approximately 2.8 meters were measured across the length of the pile template at the Pile No. 3 Test Location.

2.2 GEOLOGIC FEATURES AND SUBSURFACE STRATIGRAPHY

2.2.1 Principal Features and Formations

The geologic structure underlying the N6 alignment and the PIDP area includes the following general features:

- Easterly sloping bedrock of the Franciscan Formation
- A westerly thinning sequence of Holocene- and Pleistocene-age marine and alluvial sediments
- Extensive channeling within the Holocene- and Pleistocene-age sediments

The geologic formations that underlie the N6 alignment (or portions of the alignment) and the PIDP area are listed below in descending sequence:

- Young Bay Mud (YBM)
- Merritt-Posey-San Antonio Formations (MPSA) (sometimes simplified as the Merritt Sand)
- Old (Yerba Buena) Bay Mud (OBM)
- Upper Alameda Marine (UAM) Sediments
- Lower Alameda Alluvial (LAA) Sediments
- Franciscan Formation (FF) Bedrock

Descriptions of the sediments in each of those units are provided subsequently.

2.2.2 Subsurface Cross Sections

Four cross sections through the PIDP test locations show the soil lithology encountered in the borings, measured undrained strength data from the borings, cone penetration test (CPT) tip resistance data, and the interpreted stratigraphic contacts as imaged on the marine geophysical

records. The cross section locations are shown on Plate 2.2, and a key to the data presented on the cross sections is provided on Plate 2.3. These cross sections include:

- A longitudinal section along the proposed N6 alignment in the vicinity of the PIDP locations (Plate 2.4),
- An east-west cross section to the south of the N6 alignment and through the PIDP area (Plate 2.5),
- A north-south cross section through the Primary Test Location (Plate 2.6), and
- A north-south cross section that extends from Pier E7 of the N6 alignment to the Pile No. 3 Test Location (Plate 2.7).

2.3 DESCRIPTION OF MAJOR GEOLOGIC FEATURES

2.3.1 Easterly-Sloping Bedrock of the Franciscan Formation

The eastern spans of the existing and proposed SFOBB are underlain by Franciscan Formation bedrock that slopes to the east from Yerba Buena Island. A prominent bedrock high or nose extends to the northeast of Yerba Buena Island. Offshore, the bedrock slopes down (at an inclination of between about 2.5 horizontal to 1 vertical [2.5h:1v] to 3.5h:1v [approximately 15 to 22 degrees]) to the north, east, and southeast from the edge of the island out to about El. -70 meters on the north and El. -95 meters on the east and southeast.

Along the N6 alignment, the bedrock slope flattens about 70 meters to the west of the Main Span-East Pier. From that point, the bedrock surface continues to slope to the east, but at a flatter average slope of about 1.5 to 2 percent (approximately 0.8 to 1.2 degrees) and reaches about El. -135 meters near the tip of the Oakland Mole.

At the PIDP test locations, the top of bedrock is expected to be encountered at about El. -105 to El. -110 meters.

2.3.2 Holocene- and Pleistocene-Age Marine and Alluvial Sediments

A westerly-thinning sequence of Holocene- and Pleistocene-age marine and alluvial sediments unconformably overlay the Franciscan Formation bedrock below the PIDP location and along the N6 alignment. In general, the marine sediments (deposited during sea level high stands) are primarily clays and silts. The alluvial sediments (deposited during sea level low stands) are more commonly sands. In some depth zones, sequences that are composed of primarily fine-grained marine clays contain interbedded layers of sand. In addition, the primarily granular alluvial sequences typically contain significant quantities of fine-grained layers.

Except where eroded and then backfilled by past sequences of channeling, the inclination of the bedding of the marine and alluvial sediments is slight and, for practical purposes, the

bedding can be considered to be near horizontal. The Holocene- and Pleistocene-age marine and alluvial sediments, however, are frequently interfingered and interlayered. Thus, although the stratigraphic sequence generally can be extrapolated between borings (and geophysical tracklines), the lithologic and geotechnical properties of the soils can vary significantly over limited horizontal distances.

2.3.3 Channeling

The SFOBB East Span project area contains a series of nested, shallow, buried paleochannels. These channels include: a) east-west-trending channeling to the north of the existing SFOBB alignment (consistent with the channeling mapped by Trask and Rolston [1951]), b) south-to-north tributary channels associated with the east-west channeling, and c) north-south-oriented channeling in the western one-third of the survey area. In general, the marine clays are thicker and the alluvial sands are thinner (or absent) within the buried paleochannels.

As shown in Plate 2.8, the N6 Skyway alignment generally overlies the meandering, southern flank of the east-west-trending nested set of paleochannels, and crosses several north-south tributaries of that channel. Because of the channeling, variations in the thickness of surficial very soft to soft clay and the presence or absence of near-surface sand layers are inevitable beneath the Skyway alignment. This juxtaposition will produce significant subsurface variations across and along the N6 alignment down to at least El. -24 meters. Consequently, the extrapolation of the shallow stratigraphic conditions encountered in borings that are several tens of meters away from the PIDP test locations is somewhat approximate. This is especially true at the Pile No. 3 Test Location, which is approximately 65 meters from the nearest Fugro-Earth Mechanics boring.

The Primary Test Location is outside any of the major paleochannels while the Pile No. 3 Test Location straddles a smaller north-south-trending paleochannel that passes to the west of Bridge Pier E7.

2.4 GEOLOGIC FORMATION DESCRIPTION

The geologic formations that underlie most or all of the N6 alignment and the PIDP area include (in descending sequence):

- Young Bay Mud (YBM)
- Merritt-Posey-San Antonio (MPSA) Formations (sometimes simplified as the Merritt Sand)
- Old (Yerba Buena) Bay Mud (OBM)
- Upper Alameda Marine (UAM) Sediments

- Lower Alameda Alluvial (LAA) Sediments
- Franciscan Formation (FF) Bedrock

While the formation designations are useful, we have chosen to also describe the subsurface conditions primarily in terms of undrained shear strength (of cohesive soils) and relative density or measured cone tip resistance (of granular soils). That choice was made based on the extensive test data from the Fugro-Earth Mechanics borings and the direct applicability of the test data to foundation design and pile installation.

The typical soil designations for the formations are as follows:

Formation Designation	Typical Soil Designation
Young Bay Mud (YBM)	Very Soft to Soft or Soft to Firm Clay
Merritt-Posey-San Antonio (MPSA) Formations (also referred to as Merritt Sand)	Dense to Very Dense Sand with Stiff to Very Stiff Clay Layers
Old Bay Mud/Upper Alameda Marine (OBM/UAM) Sediments	Very Stiff to Hard Clay
Lower Alameda Alluvial (LAA) Sediments	Dense to Very Dense Sand (or Very Dense Sand) and Hard Clay

The general relative relationships of these soil strata and formations are illustrated on cross sections provided as Plates 2.4 to 2.7. The following paragraphs provide an overview of each geologic formation.

2.4.1 Young Bay Mud (YBM)

The Young Bay Mud (YBM) is a marine clay that has been deposited since the end of the last sea level low stand (approximately 11,000 years ago). The YBM occurs both as a blanket of sediments that cover the majority of the Bay bottom between Yerba Buena Island and the Oakland Mole and as infill in the geologically recent paleochannels.

The Young Bay Mud typically is composed of fat clay. The YBM within the paleochannels is very soft to firm and its undrained shear strength increases with depth. The paleochannel infill includes sand layers and/or seams within several depth intervals. The surface blanket of YBM is typically soft outside of the paleochannels. At the Primary Test Location, the YBM is between about 4.5 and 6.1 meters thick. At the Pile No. 3 Test Location, the YBM thickness is interpreted to be approximately 20 meters.

2.4.2 Merritt-Posey-San Antonio (MPSA) Formations

Beneath the Young Bay Mud, a layered sequence of sand and clay is present over portions of eastern San Francisco Bay. The Merritt-Posey-San Antonio (MPSA) Formations include dense to very dense sand with layers of stiff to very stiff sandy clay and clay. The

geophysical reflections in the MPSA Formations are generally discontinuous and suggest that individual layers are often of limited lateral extent. Borings along the existing and proposed N6 bridge alignments suggest that the MPSA Formations generally are no more than 5 to 9 meters thick. The frequently limited lateral extent of sand layers in the MPSA complicates extrapolation of the conditions observed in explorations along the N6 alignment to the Pile No.3 Test Location.

As shown on Plate 2.6, sand layers of the MPSA are approximately 7.0 to 8.5 meters thick at the Primary Test Location. As shown on Plate 2.7, the MPSA at the Pile No.3 Test Location is interpreted to be composed of only clay layers. At this location, the shallow sand layers of the MPSA are interpreted to be eroded by a north-south tributary Young Bay Mud-infilled paleochannel. Deeper sand layers observed in Boring 98-49 are interpreted to be infilling a deeper nested channel. The Pile No. 3 Test Location is interpreted to be along the flank of that channel, and the deeper sand layers are interpreted (see Plate 2.7) to pinch out between the Pile No. 3 Test Location and Boring 98-49.

2.4.3 Old Bay Mud/Upper Alameda Marine (OBM/UAM) Sediments

The Old Bay Mud and Upper Alameda Marine (OBM/UAM) sediments both consist primarily of very stiff to hard fat clay. Because the composition and geotechnical properties of the two units are similar, they are generally discussed as one combined sequence of sediments. Except where eroded by channeling, the top of the sequence typically is present from about El. -17 to El. -25 meters. Borings show that the combined typical 60-meter thickness of the two formations usually includes multiple crust layers with locally higher strength.

In the vicinity of the Pile No. 3 Test Location, exploration data along the N6 alignment suggest that the north-south-trending tributary YBM-infilled channel is underlain by a series of nested channels (see Plate 2.4) that extend down into the OBM/UAM sediments. Although infilled at depth with marine OBM/UAM clays, the sediments within the nested sequence of paleochannels at a particular elevation are interpreted to be younger than those at equivalent elevations outside the channels.

The majority of the axial pile capacity due to skin friction is derived in the OBM/UAM sediments. The marine clays that comprise the OBM/UAM sequences are generally very stiff to hard fat clays with shear strengths that increase from approximately 125 to 175 kilopascals (kPa) at the top of the sequence to about 150 to 250 kPa at the base of the sequence. The sequence also includes numerous crust layers where the undrained shear strengths are at least 25 to 100 kPa higher than the adjacent layers. In the paleochannel areas near the Pile No. 3 Test Location, the OBM/UAM sediments (except within crustal zones) at a particular elevation appear to have shear strengths that are on the order of 25 to 50 kPa lower than at equivalent elevations outside the paleochannel.

Although composed primarily of clay, the sequence includes some sand layers that tend to become more prevalent below about El. -65 meters. In the PIDP test locations, sand layers are present within the OBM/UAM sequence around El. -57 meters. In addition, a 6-meter layer of sand is present below approximately El. -68 meters in the Primary Test Location.

In addition to the sand layers present in the OBM/UAM throughout the SFOBB project area, there is a thick layer of very dense, fine to medium sand at about El. -70 meters located in the western one-third of the SFOBB project area. This sand layer has been defined as the Upper Alameda Marine Paleochannel Sand (UAM Paleochannel Sand) and appears to infill a north-south-oriented paleochannel that is incised into the top of the UAM in the western one-third of the N6 alignment. On the west, the UAM Paleochannel Sand appears to onlap the eastward-dipping Franciscan Formation bedrock. To the east, the UAM Paleochannel Sand extends to about the location of Skyway Pier E3. The UAM Paleochannel Sand likely correlates to the sand layer encountered at approximately El. -68 meters at the Primary Test Location. The UAM Paleochannel Sand also may be present at the Pile No. 3 Test Location. However, no subsurface geotechnical data are available to confirm the characteristics of the unit at that location.

2.4.4 Lower Alameda Alluvial (LAA) Sediments

The sediments below about El. -80 to El. -85 meters are interpreted to be the primarily granular Lower Alameda Alluvial (LAA) sediments. The Lower Alameda Alluvium includes a 3- to 10-meter-thick cap layer of very stiff to hard lean clay (LAA-clay cap) underlain by a sequence of primarily very dense granular alluvial sediments (LAA-sand). The LAA-sand consists of a wide range of granular sediments that include: a) very dense, poorly graded, silty fine sand and fine sand with silt; b) very dense, well-graded fine to coarse sand (or clayey fine to coarse sand) with gravel; and c) poorly to widely graded gravel with sand and silt.

The borings show that the primarily alluvial LAA sediments also include an appreciable quantity of clay layers. Interbedded within the LAA-sands are layers of hard lean and fat clay (LAA-clay interbeds). The representative undrained shear strength of the LAA-clay interbeds is typically about 350 to 400 kPa. In contrast, the representative undrained shear strength of the LAA-clay cap is about 250 kPa. At the Primary Test Location, the top of the LAA-clay cap is expected at about El. -84 to El. -88 meters with the top of the LAA-sand at approximately 2 to 4 meters below the top of the LAA-clay cap. The PIDP specified pile tip elevations (El. -102 meters) were anticipated to be approximately 10 meters into the LAA-sands.

2.4.5 Franciscan Formation Bedrock

The bedrock beneath the N6 alignment and the PIDP test locations consists primarily of thickly bedded to massive sandstone (graywacke) with thinly interbedded siltstone and claystone. The upper approximately 6 to 9 meters of bedrock are typically moderately weathered. The weathered zone is underlain by a relatively thin, 1.5- to 3-meter-thick layer of slightly weathered

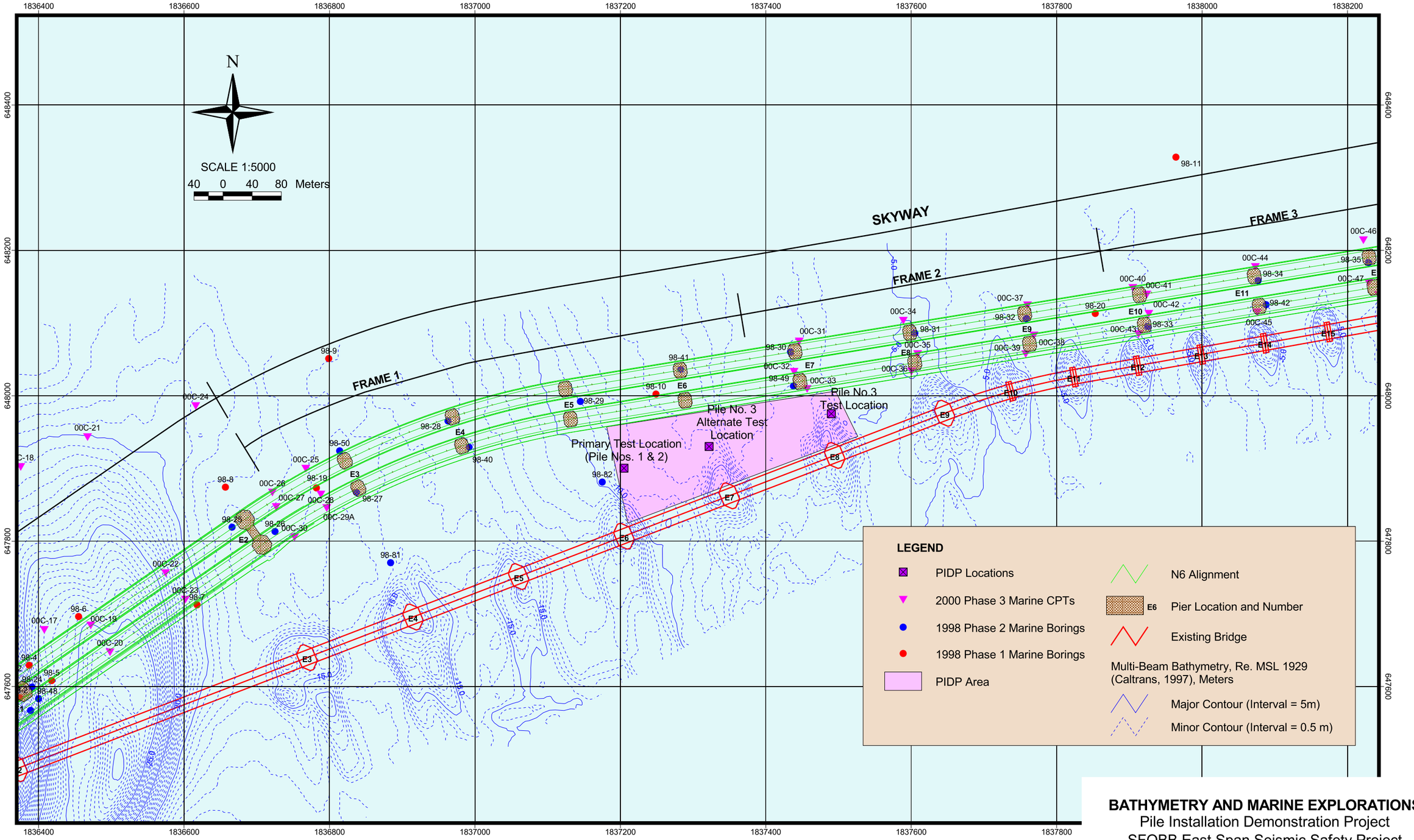
rock with up to 12 millimeters (mm) of light brown moderately weathered rock on each side of the fractures and joints.

Below the weathered zone, the fresh sandstone is typically moderately to slightly fractured with zones of intensely fractured sandstone up to about 1.5 to 1.8 meters thick in several borings.

At the PIDP test locations, the top of the moderately weathered bedrock is expected to be encountered from about El. -105 to El. -110 meters.

Earth Mechanics

FUGRO

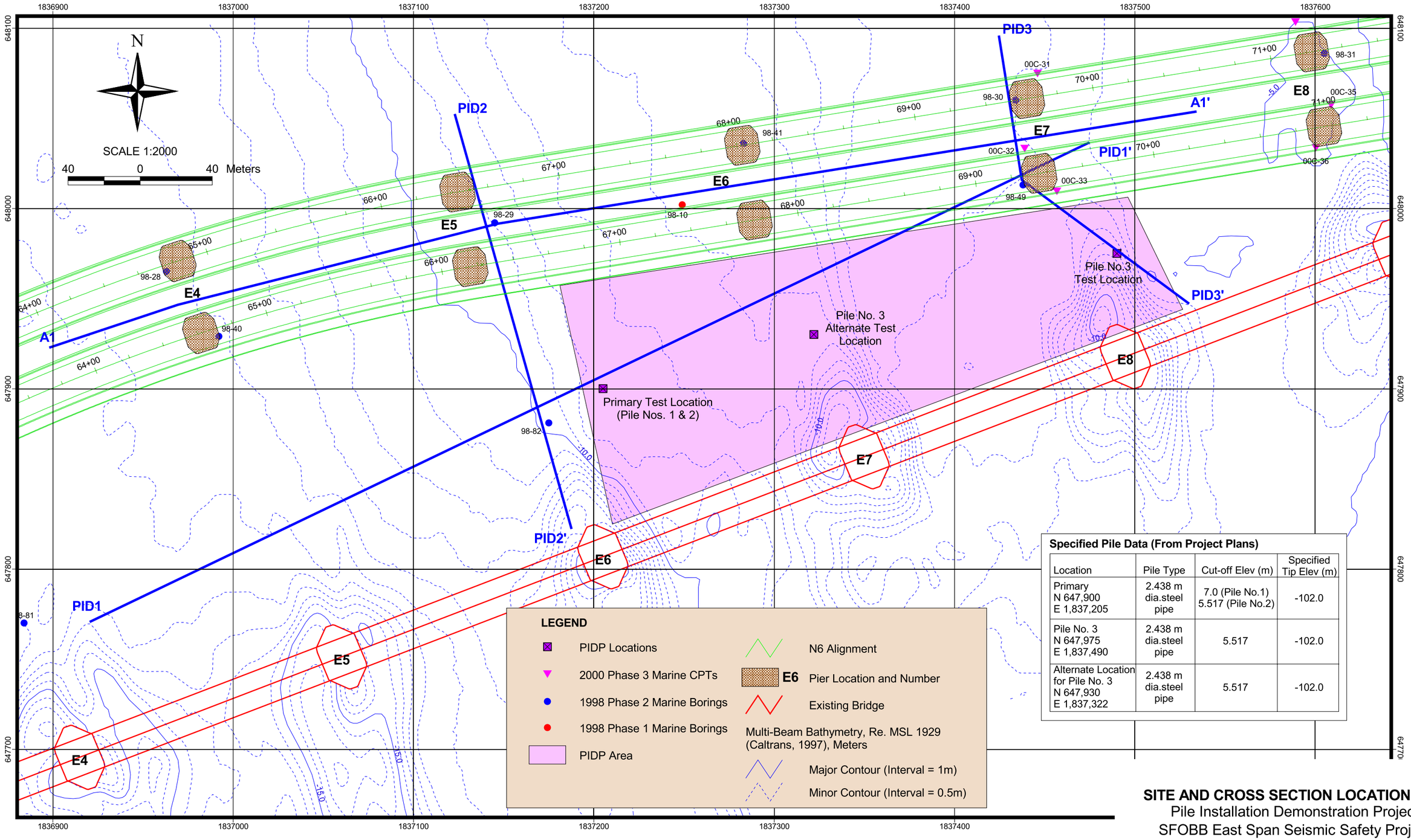


BATHYMETRY AND MARINE EXPLORATIONS
Pile Installation Demonstration Project
SFOBB East Span Seismic Safety Project

PLATE 2.1

Earth Mechanics

FUGRO



Specified Pile Data (From Project Plans)

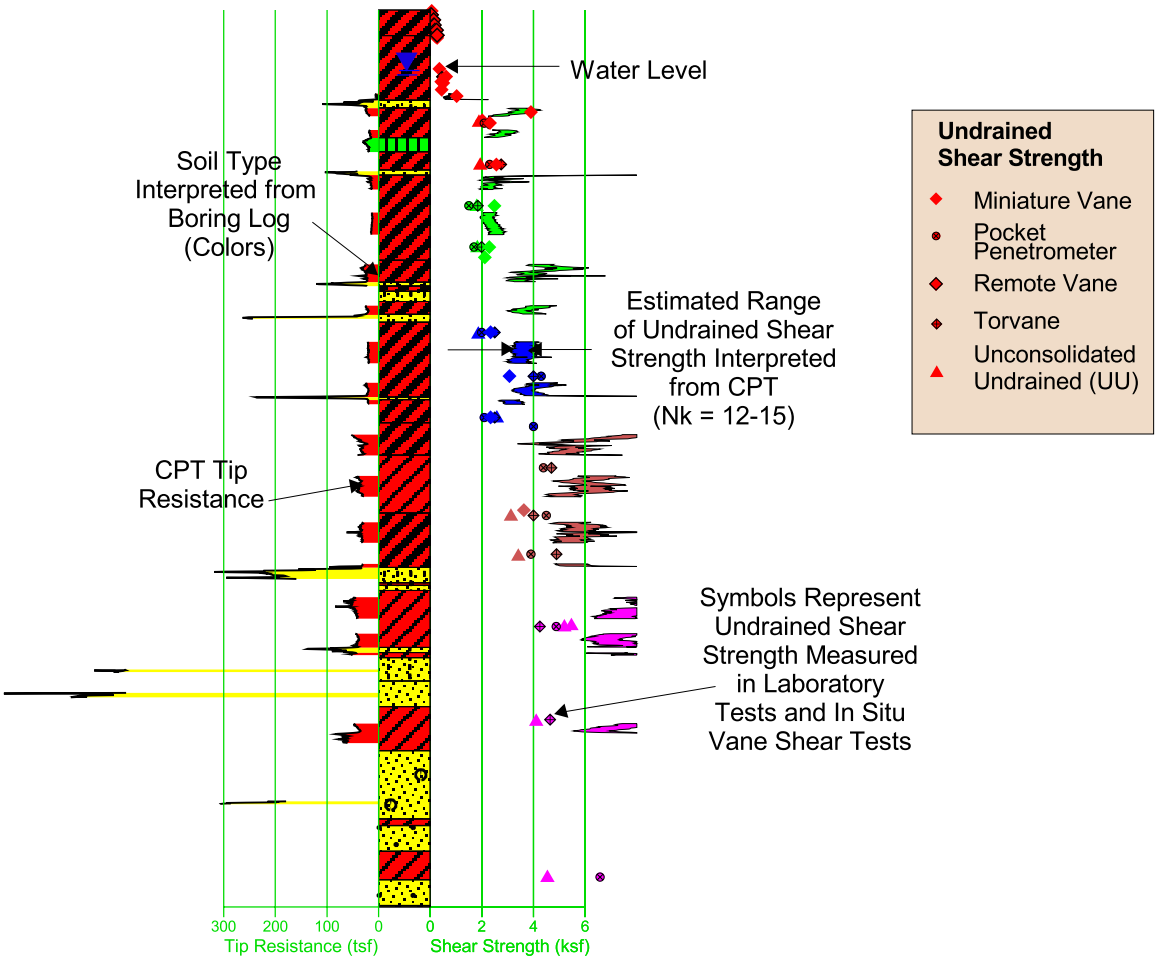
Location	Pile Type	Cut-off Elev (m)	Specified Tip Elev (m)
Primary N 647,900 E 1,837,205	2.438 m dia.steel pipe	7.0 (Pile No.1) 5.517 (Pile No.2)	-102.0
Pile No. 3 N 647,975 E 1,837,490	2.438 m dia.steel pipe	5.517	-102.0
Alternate Location for Pile No. 3 N 647,930 E 1,837,322	2.438 m dia.steel pipe	5.517	-102.0

SITE AND CROSS SECTION LOCATION MAP
Pile Installation Demonstration Project
SFOBB East Span Seismic Safety Project

PLATE 2.2

SOIL TYPES

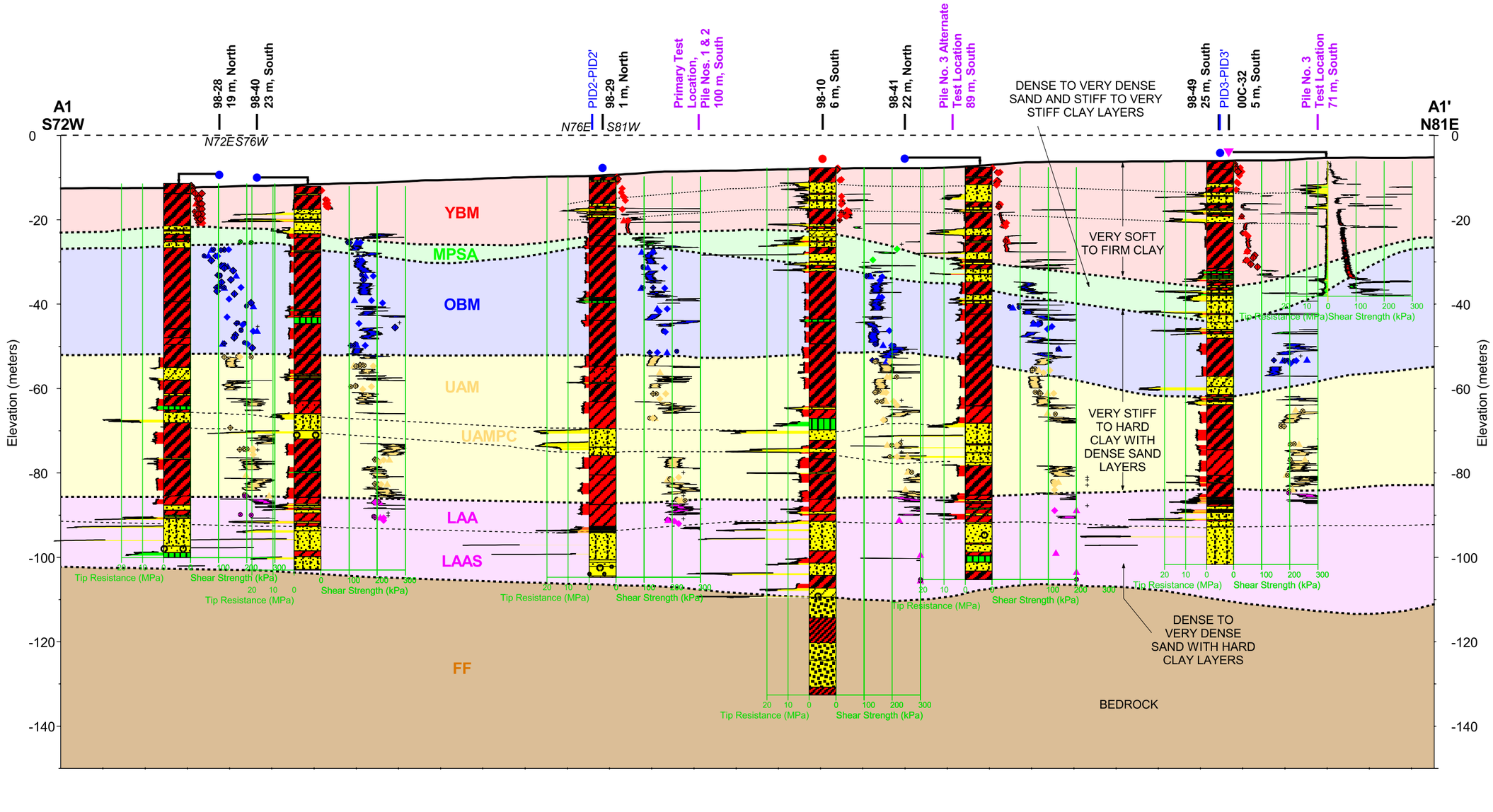
Well graded GRAVEL (GW)	Well graded SAND (SW)	Fat CLAY(CH)	Sandy SILT (ML)
Poorly graded GRAVEL (GP)	Poorly graded SAND (SP)	Sandy fat CLAY (CH)	Clayey silt (ML/CL)
GRAVEL with sand (GP or GW)	SAND with gravel (SP or SW)	Lean CLAY (CL)	Highly plastic ORGANICS (OH)
GRAVEL with clay (GP or GW)	SAND with clay (SP-SC)	Sandy lean CLAY (CL)	Low plasticity ORGANICS (OL)
Clayey GRAVEL (GC)	Clayey SAND (SC)	Silty CLAY (CL-ML)	SANDSTONE (Rx)
GRAVEL with silt (GP or GW)	Silty SAND (SM)	Elastic SILT (MH)	SILTSTONE (Rx)
Silty GRAVEL (GM)	SAND with silt (SP-SM)	SILT (ML)	CLAYSTONE (Rx)



KEY TO CROSS SECTIONS

Pile Installation Demonstration Project

SFOBB East Span Seismic Safety Project



GENERAL NOTES:

1) Stratigraphic contacts are approximate and are interpreted from CPT soundings, borings, and seismic reflection survey data. Conditions vary both along and perpendicular to the section line.

2) Refer to Key to Cross Sections for descriptions of boring and CPT data shown above.

3) Lithology for pre-1998 borings are in some instances modified from those shown on the Caltrans Log of Test Boring sheets. Modifications were made based on subsequent laboratory test results and extrapolation from adjacent 1998 borings.

SHEAR STRENGTH SYMBOLS

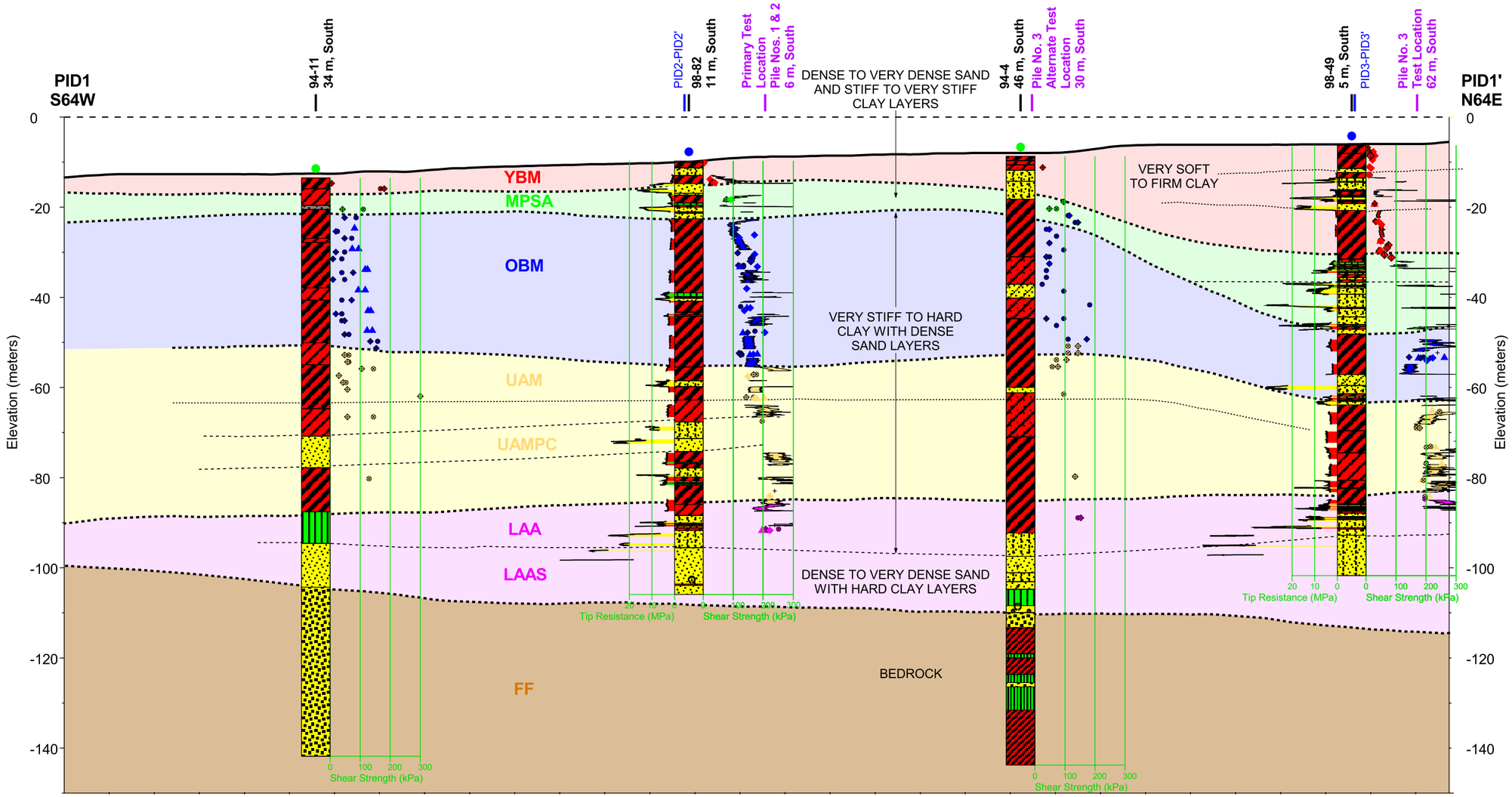
- ▲ Unconsolidated Undrained (UU)
- □ Unconfined Compression (UC)
- ⊗ Pocket Penetrometer (PP)
- ⊕ Torvane (TV)
- ◆ Miniature Vane (MV)
- ◇ Remote Vane (RV)
- + Strength Exceeds Capacity of Measuring Device

KEY TO GEOLOGIC UNITS

YBM	Young Bay Mud	LAA	Lower Alameda Alluvial
MPSA	Merritt-Posey-San Antonio Formations	LAAS	Lower Alameda Sand
OBM	Old Bay Mud	FF	Franciscan Formation
UAM	Upper Alameda Marine		
UAMPC	Upper Alameda Marine Paleochannel Sand		

SUBSURFACE CROSS SECTION A1-A1'
Pile Installation Demonstration Project
SFOBB East Span Seismic Safety Project

PLATE 2.4



10m
20m

GENERAL NOTES:

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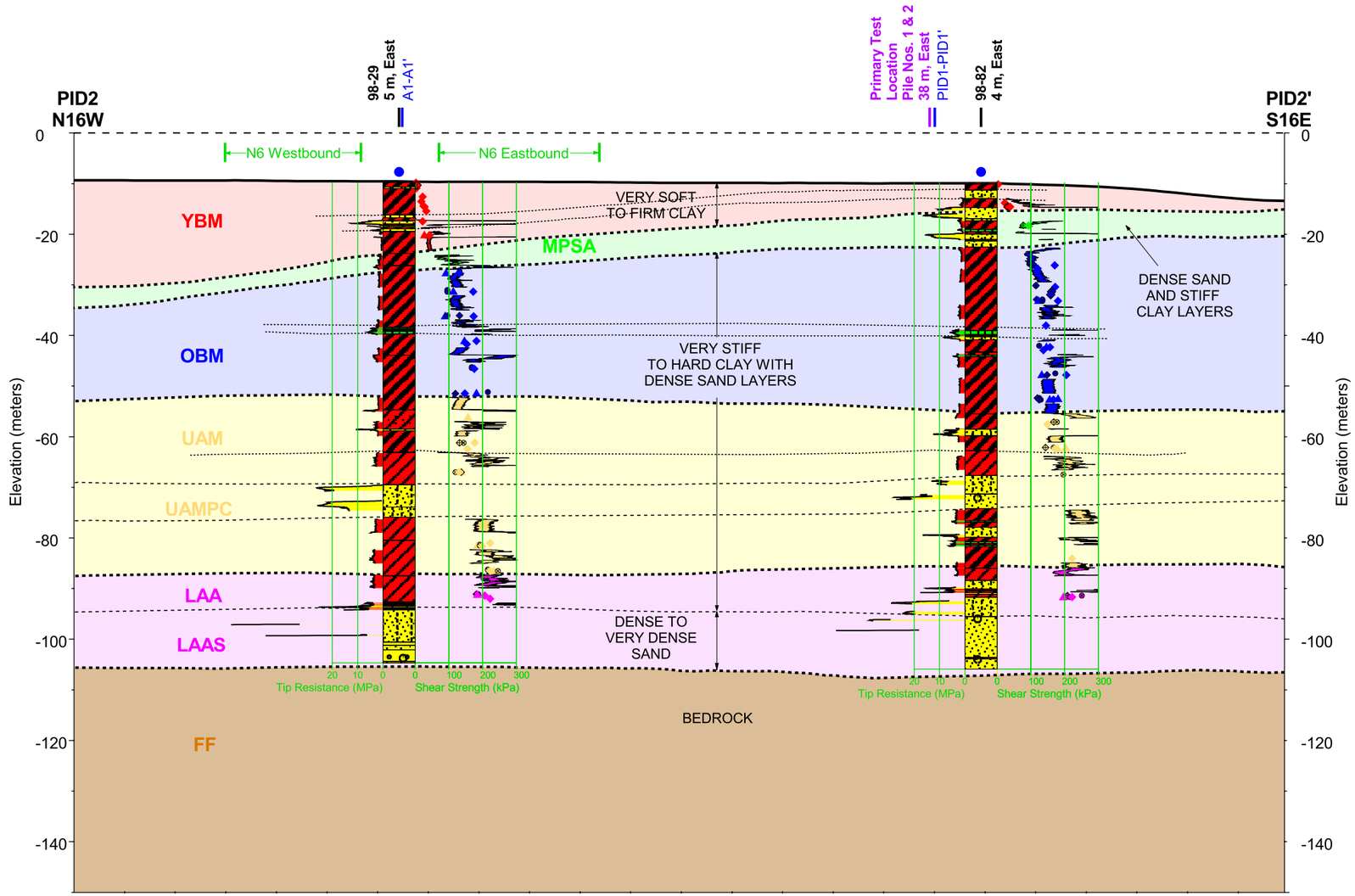
- + Strength Exceeds Capacity of Measuring Device

KEY TO GEOLOGIC UNITS

YBM	Young Bay Mud	LAA	Lower Alameda Alluvial
MPSA	Merritt-Posey-San Antonio Formations	LAAS	Lower Alameda Sand
OBM	Old Bay Mud	FF	Franciscan Formation
UAM	Upper Alameda Marine		
UAMPC	Upper Alameda Marine Paleochannel Sand		

SUBSURFACE CROSS SECTION PID1-PID1'
Pile Installation Demonstration Project
SFOBB East Span Seismic Safety Project

PLATE 2.5



10m

10m

GENERAL NOTES:

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- + Strength Exceeds Capacity of Measuring Device

KEY TO GEOLOGIC UNITS

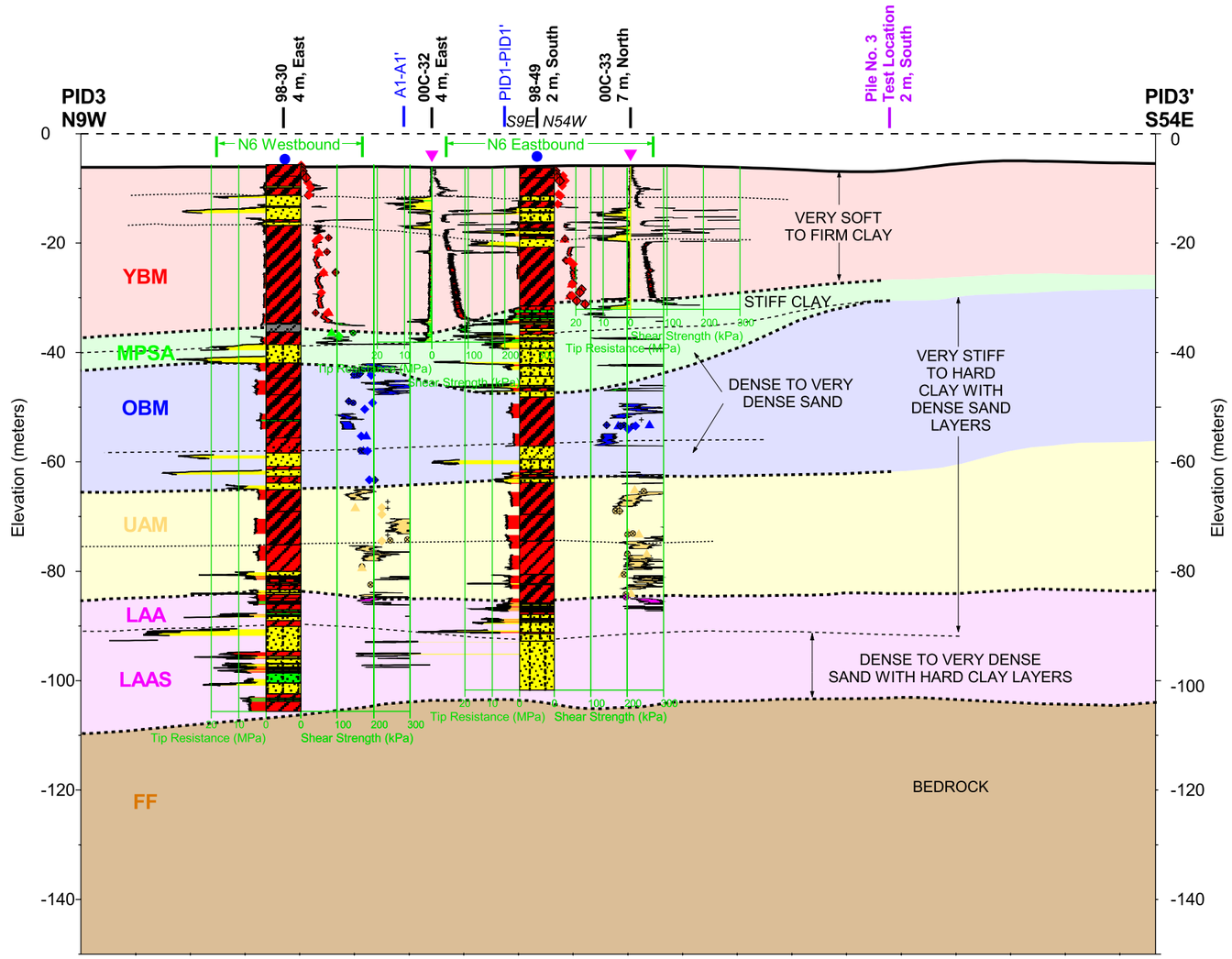
YBM	Young Bay Mud	LAA	Lower Alameda Alluvial
MPSA	Merritt-Posey-San Antonio Formations	LAAS	Lower Alameda Sand
OBM	Old Bay Mud	FF	Franciscan Formation
UAM	Upper Alameda Marine		
UAMPC	Upper Alameda Marine Paleochannel Sand		

SUBSURFACE CROSS SECTION PID2-PID2'
Pile Installation Demonstration Project
SFOBB East Span Seismic Safety Project

PLATE 2.6

Earth Mechanics

FUGRO



10m

10m

GENERAL NOTES:

1) Stratigraphic contacts are approximate and are interpreted from CPT soundings, borings, and seismic reflection survey data. Conditions vary both along and perpendicular to the section line.

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KEY TO GEOLOGIC UNITS

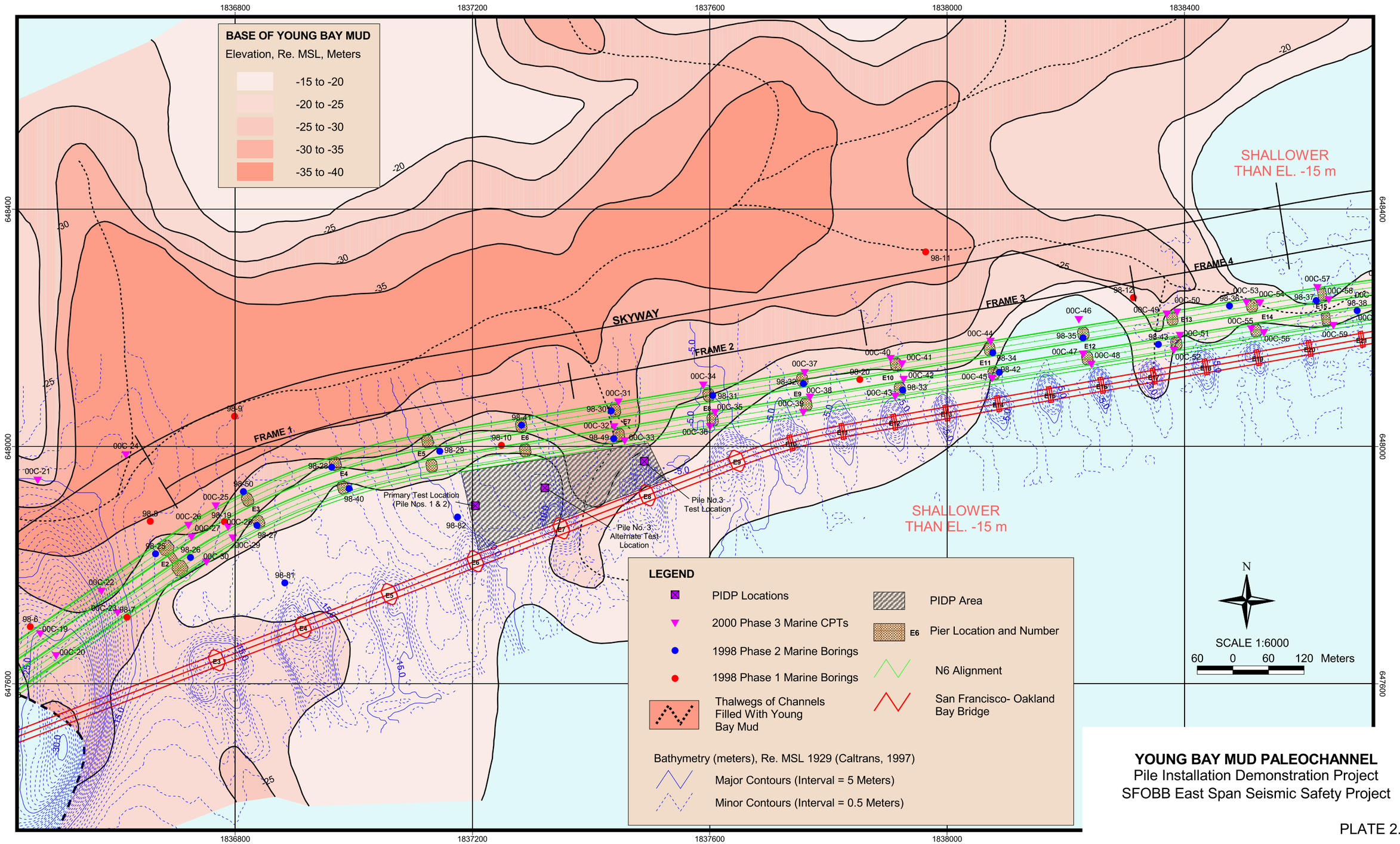
YBM	Young Bay Mud	LAAS	Lower Alameda Sand
MPSA	Merritt-Posey-San Antonio Formations	FF	Franciscan Formation
OBM	Old Bay Mud		
UAM	Upper Alameda Marine		
LAA	Lower Alameda Alluvial		

SUBSURFACE CROSS SECTION PID3-PID3'
Pile Installation Demonstration Project
SFOBB East Span Seismic Safety Project

PLATE 2.7

Earth Mechanics

FUGRO



YOUNG BAY MUD PALEOCHANNEL
Pile Installation Demonstration Project
SFOBB East Span Seismic Safety Project

PLATE 2.8

SECTION 3.0
PILE INSTALLATION
DEMONSTRATION PROJECT

3.0 PILE INSTALLATION DEMONSTRATION PROJECT

3.1 PROJECT OVERVIEW

Three piles were driven for the SFOBB East Span Seismic Safety Project PIDP between October 23 and December 13, 2000. The piles were driven by Manson/Dutra (a joint venture of Manson Construction Co. and The Dutra Group) under contract to Caltrans. The piles were 2.438-meter-OD (outside diameter), steel pipe piles with a variable wall thickness. The piles measured approximately 108.5 meters in total length. Each pile was installed in four sections (A through D) that varied in length from 26 to 30.5 meters. The pile sections were spliced in the field by welding.

The piles were installed at two locations approximately 50 and 90 meters north of the existing SFOBB East Span alignment. As shown on Plate 2.1, the Primary Test Location (where Pile Nos. 1 and 2 were installed) was approximately to the north of existing Bridge Pier E6, while the Pile No. 3 Test Location was north of existing Bridge Pier E8. Three restrikes were conducted on Pile No. 1, two restrikes were conducted on Pile No. 2, and one restrike was conducted on Pile No. 3.

The two hammers used to drive the piles, Menck MHU 500T and 1700, have rated energies (when used above water) of approximately 550 and 1,870 kilojoules (kJ), respectively. Sections B through D of each pile were monitored during initial driving and restrikes by two Pile Driving Analyzer (PDA) units. CAPWAP analyses were conducted for at least one hammer blow from: 1) initial driving of each pile's D section, and 2) each restrike.

During pile driving operations, a subcontractor to Manson/Dutra monitored: 1) airborne and underwater noise and ground vibrations, 2) the effectiveness of underwater noise attention barriers, and 3) marine mammal behavior.

3.2 BACKGROUND

3.2.1 Introduction

The foundation of the SFOBB Main Span-East Pier and Skyway structures will consist of 2.5-meter-diameter driven steel pipe piles that measure approximately 85 to 110 meters long and have non-uniform wall thickness schedules. The piles will be driven at a batter (piles driven in at an angle from vertical). The pile batter is primarily to provide more lateral resistance and associated lateral foundation stiffness during ground shaking from a seismic event. The anticipated 1 horizontal to 8 vertical (1h:8v) and 1h:12v batters are similar to the pile batter used on typical marine/offshore platforms and structures.

The use of piles of these dimensions is unprecedented in the San Francisco Bay area. Therefore, a pile installation demonstration program was deemed necessary to better understand pile handling, marine operations, and driving behavior associated with installing these large-diameter, steel pipe piles into the sediments underlying the proposed SFOBB replacement structure. According to the Engineering News Record (2000), the PIDP piles are the deepest bridge piles ever driven in the world.

Specific concerns regarding the driving of such large-diameter production piles included:

- The risk that a contractor might attempt to use an undersized hammer to drive the production piles, thereby resulting in delays to the project and significantly increasing the potential for the contractor to pursue a "changed condition" claim against Caltrans for the pile driving;
- Anticipating types of delays or claims that could happen during accelerated construction schedules; and
- Lack of experience within Caltrans and local contractors with field pile add-ons (welded splices) for the planned pile diameters and wall thickness.

Given the unprecedented nature of this work in the San Francisco Bay, the PIDP also provided Caltrans with an opportunity to gather important data regarding underwater and airborne sound pressure levels generated by the pile driving activities. In addition, it also provided an opportunity to test experimental mitigation measures that attenuate elevated underwater sound pressure levels. This information, to be analyzed and reported by others, will potentially prove valuable for forecasting anticipated impacts of pile installation activities associated with the production pile driving for the Skyway and Main Span (and Oakland Shore Approach) portions of the new bridge, which will require the installation of over 160 piles. In addition, Caltrans and the National Marine Fisheries Service (NMFS) also may use these data for similar future projects where the impact of construction-generated airborne and underwater sound on marine life is an issue.

3.2.2 Limitations of the Program

The unprecedented information developed from the PIDP should be tempered with the explicit recognition that the project involved only three piles and two locations along a bridge alignment that is over 2 kilometers (km) long. Although the characterization of site conditions across the East Span project area has been comprehensive, the natural variability in soil conditions (particularly in the dense sand layers of the Lower Alameda Alluvium) means that piles in other locations could behave differently. Pile running and drivability may be different at other locations, particularly if the contractor uses equipment and/or methods and procedures that are different than those used for the PIDP. See Section 8.0 for additional discussion on limitations.

3.2.3 PIDP Objectives

The primary objectives of the PIDP were to:

- Evaluate the minimum hammer energy required to drive battered piles through the Upper Alameda Marine Paleochannel Sands (if encountered).
- Evaluate the minimum hammer energy required to drive battered piles to design tip elevations in the Lower Alameda Alluvium.
- Determine feasibility of installing piles on a 1h: 6v (9.5-degree) batter.
- Provide pile splicing/welding experience for 2.5-meter-diameter, variable wall thickness piles (and establish quality control measures for the contractor and quality assurance measures for Caltrans inspection of welding add-ons).
- Record sound pressure and ground vibration levels generated by pile driving activities and gather marine mammal response data.
- Verify feasibility of maintaining/achieving the specified pile locations and batter tolerances.

Secondary objectives of the PIDP were to:

- Estimate the soil resistance to driving, rate and magnitude of soil setup, energy transmitted to the pile, and maximum-driving stresses for input into East Span design and construction considerations.
- Estimate the hammer energy required to drive piles through the very dense sands of the Lower Alameda Alluvial Formation. This objective was to minimize the possibility of premature refusal in the event that variations in site conditions resulted in sands being encountered at elevations higher than indicated by the geotechnical investigation.
- Demonstrate that connection welds, pile top, and pile toe are not damaged during driving. If damage occurs, however, establish criteria to minimize the possibility of damage (e.g., the maximum allowable blow count [blows per quarter meter] and maximum allowable cumulative hammer blows for a specified hammer energy level).
- Experiment with mitigation measures to reduce/attenuate underwater sound pressure levels should they be generated.

Load testing of a smaller diameter pile(s) was initially considered, but was ultimately judged to be impractical based on timing issues and site constraints.

3.2.4 PIDP Benefits

Based on the primary and secondary objectives, the information derived from the PIDP should:

- Reduce uncertainty associated with constructability, including driving support template design, pile handling, pile driving, substructure working day schedule, and foundation costs;
- Provide potential contractors with additional information that they can use to reduce contingencies when bidding on the project;
- Reduce the potential for schedule delays and claims due to the attempted use of an inadequate pile-driving hammer;
- Define and improve requirements for welding procedures and inspection; and
- Define mitigation and monitoring techniques to be used to minimize noise impacts of future pile driving activities associated with the SFOBB Seismic Safety Project.

More specifically, future contractors bidding on the SFOBB East Span replacement structure contract(s) will get helpful information for preparing competitive bids that includes:

- Information on marine equipment/spread needed to conduct the work;
- Typical preparation/shakedown time to position marine equipment;
- Pile handling methods and positioning times;
- One demonstrated scheme to construct and deploy a template to allow piles to be driven on a batter;
- Hammer performance in the field compared to the manufacturer's specifications;
- Overall hammer reliability;
- Effect of pile batter on hammer-pile performance;
- Penetration rate (driving time) as a function of penetration, soil type, hammer type and energy;
- Blow count ranges as a function of penetration, soil type, and hammer type and energy;
- Changes in blow count/penetration rate/capacity after time delays due to "setup;"
- Effect of sand layers on penetration rate and blow count;
- Hammer energy required to achieve the specified pile tip elevation (SPTE);
- Hammer energy required to restart piles after time delays;

- Pile stresses as a function of hammer energy, pile penetration, and driving resistance;
- Identification of other driving anomalies such as eccentric impacts and stresses;
- Quantitative estimates of pile capacity and driving resistance;
- Quantitative estimate of pile capacity gain over time;
- Soil plug behavior during driving and final plug location (related to the need to drill out piles and fill with concrete);
- Typical welding/splicing time and weld inspection time; and
- Development/refinement of quality assurance/quality control (QA/QC) procedures for welding and non-destructive testing (NDT).

3.3 PILE LOCATIONS AND PHYSICAL PARAMETERS

3.3.1 Pile Installation Test Locations

The PIDP was designed for two piles (Nos. 1 and 2) to be driven at one location, and a third pile (No. 3) to be driven at a second location. A third location was also selected as an alternate site for driving Pile No. 3. Plate 2.2 shows the locations and their respective coordinates.

The following criteria were used to select the test pile driving location(s):

- Provide adequate water depth for normal marine barge operations.
- Be reasonably representative of soil conditions along the new bridge alignment.
- Include sand layers above the potential end bearing sands in the Lower Alameda Alluvium.
- Be within the existing SFOBB East Span right-of-way (north side of existing bridge to reduce need to extrapolate data for new alignment), but not be too close to existing structure or piers.
- Minimize potential conflict with construction operations for new bridge (test driving locations were selected to be as far from new bridge alignment as practical and not immediately adjacent to new pier locations).
- Restrict locations to one county (Alameda County) to facilitate the permitting process.

3.3.2 Pile Parameters

Eaton Metal Products Company of Denver, Colorado, furnished piles, cover plates, and steel pipe for welding qualification to the State under a separate contract. Eaton delivered the

materials to Pier 96 in San Francisco, California. The PIDP contractor (Manson/Dutra) took delivery of the piles and moved them to Dutra's construction yard in Alameda, California (see Plate 3.1).

Pile specifications called for piles to be made of ASTM A709 Grade 50 steel with yield strength (fy) of 345 megapascals (MPa). Plate 3.2 shows pile details.

Three piles (Nos. 1, 2, and 3) were selected and manufactured for the PIDP. (Plate 3.2 shows the pile details, and Table 3.1 summarizes the wall thickness schedule and pile section weights.) The piles were 2.438-meter-OD steel pipe piles with variable wall thickness. Each pile was composed of four sections that were spliced (welded) together in the field following the driving of the previous section. Section lengths ranged from 25.9 to 30.5 meters (total pile length 112.9 to 113.4 meters). The bottom section (the one driven first) was designated as Section "A," and the top section (driven last) was designated Section "D." Each pile section is identified by a number and letter (e.g., "2C" is the third section of the second pile). The piles were identical except that Section D of Pile No. 2 was 0.5 meter longer than the D sections of Pile Nos. 1 and 3. The heaviest pile section (D) weighed approximately 107 tonnes (metric).

The tops of pile Sections A, B, and C had a 1.5-meter-long cutoff section that was to be removed following driving of the section. A cutoff section allowed the preparation of an even, smooth surface to facilitate fitup of the next pile section, particularly if there was any damage to the pile top from driving. Actual cutoff lengths varied slightly (approximately ±0.04 meter from the 1.5-meter specified length).

Pile wall thickness ranged from 40 mm along the lower part of the pile to 70 mm at the top, with a 62-mm-thick intermediate section. The change in wall thickness was located well away from the splice locations such that all field welds involved joining sections of equal wall thickness.

A 1.5-meter-long driving shoe with a wall thickness of 51 mm was welded (furnished) at the bottom of each pile's Section A. The shoe was externally flush (i.e., its outer diameter was the same as that of the pile's Section A). The tip of the shoe was beveled in the contractor's yard to provide a slight cutting edge. The recommended bevel was 6 mm at 45 degrees on both the inside and outside wall of the driving shoe.

The bottoms of pile Sections B, C, and D were fitted with a steel weld backing plate that also served as a stabbing guide (Plate 3.3), which was welded to each section in the Manson/Dutra’s Alameda yard. The stabbing guide was essentially a 0.3-meter-high hoop with a wall thickness of approximately 13 mm that was welded to the bottom inside circumference of the pile section. The backing plate/stabbing guide made it easier to stab, stabilize, and weld the pile section in the field. Note that problems with the geometry of the backing plate/stabbing guide were noted during the Ultrasonic Test (UT) verification of the welds. These issues will be addressed in more detail in a report to be prepared by Caltrans.

The contractor also was furnished with two Section E pieces, each 6.0 meters long with an outside diameter of 2.438 meters and a wall thickness of 70 mm. These pieces were used for welding qualification and related procedures.

Pile No. 1 was a vertical pile. Pile Nos. 2 and 3 were battered piles with a designed batter of 1h:6v (angle from vertical of about 9.5 degrees). This batter is considered to be significant for such large marine piles. The specified pile tip elevation was El. -102 meters for all piles, with cutoff elevations of El. +7.0 meters for Pile No. 1 and El. +5.5 meters for Pile Nos. 2 and 3.

For observation of blow counts and for computing pile penetration, piles were marked along their lengths with white lines at 0.25-meter increments and with a more prominent white line every full meter.

3.4 DRIVING SUPPORT SYSTEMS AND PILE HAMMERS

3.4.1 Introduction

The PIDP construction operation primarily involved marine construction equipment that installed a supporting template and the three PIDP piles. The general construction sequence was:

- Supporting template (a steel tubular space frame jacket with eight legs) was loaded out and positioned on the Bay bottom (Plate 3.4) at the Primary Test Location (location of Pile Nos. 1 and 2).
- Piles to support the pile-support template were driven within the jacket legs of the template using American Piledriving Equipment, Inc. (APE) King Kong vibratory hammer and a Vulcan 020 air/steam impact hammer. The template piles were then welded to the jacket leg. Plate 3.5 shows the installation of a template pile with the Vulcan 020 hammer.
- Pile No. 1 was installed (driven in four sections).
- A steel frame "tower" with a retractable "yoke" was installed on the top of the template to provide lateral support to batter Pile No. 2 during driving.
- Pile No. 2 was driven.
- Restrikes were conducted on Pile Nos. 1 and 2.
- The template (and tower) and its supporting piles were removed, repositioned to the Pile No. 3 location, and reinstalled.
- Pile No. 3 was driven (in addition, one of the template piles was driven and restruck with a small air/steam hammer)

- Template was removed and demobilized.
- All three piles were restruck.

Report Section 4.0 has more detailed information on pile installation sequence and behavior during driving.

3.4.2 Marine Installation Operations and Equipment

The Manson derrick barge DB-24 (Plate 3.6) was used for primary lifting during the PIDP. This barge has a maximum crane capacity of approximately 357 tonnes (metric). DB-24 employed a positioning system that consisted of four anchors and two spuds. Separate flat-decked barges were used to transport pile sections and hammers (resting on cradle supports) from the Alameda yard to the PIDP location.

The bottom of each pile section was fitted with a cylindrical stub (see Plate 3.3) that was welded onto either side of the pile about a quarter meter from the bottom of the pile. Each pile section was supported about a meter off the deck in a series of cradles. The special cradle support at the pile section bottom allowed the pile to rotate on the cylindrical stubs as it was lifted without damaging the pile tip or the tip of the stabbing guide on Sections B, C, and D. Similarly, the barge was protected from damage.

Each pile section was lifted by cutting approximately 80-mm-diameter holes through the pile wall on opposite sides of the pile about 0.15 meter below the section top, and attaching the lifting assembly, which consisted of hydraulically actuated rams that extended through the holes in the piles when engaged and pulled back through the hole when disengaged to release the pile.

The pile support template (Plate 3.4) was an eight-legged tubular steel space frame that measured about 20.1 meters by 7.3 meters in plan view and about 11.6 meters tall. The pile support template consisted of three levels, a lower jacket level extending from the mudline to several meters above the water line, a working platform, and a steel frame tower. Steel pipe piles (0.86-meter-OD) were installed within the annulus of each of the eight legs and welded to the leg at the top of the jacket. These piles were driven to penetrations of 18 to 30 meters. The steel frame tower (approximately 13 meters tall) was welded to the deck of the jacket template. Retractable pile-support yokes were mounted on the pile support template below the working platform and near the top of the tower. The tower and yokes provided lateral support and guidance during installation of the two batter piles.

3.4.3 Pile Driving Hammers

The contractor mobilized two hydraulic pile-driving hammers to conduct the PIDP. The smaller hammer was a Menck MHU 500T (hereafter referred to as the MHU 500) with a maximum rated energy of approximately 550 kJ (operated above water), and the larger hammer was a Menck MHU 1700 (hereafter referred to as the MHU 1700) with a maximum rated energy

of approximately 1,870 kJ (operated above water). These hammers are heavy marine construction hammers capable of driving piles underwater, although that was not necessary for this project. Table 3.2 contains basic manufacturer's information for these hammers. The MHU 500 weighs approximately 103 tonnes (metric) and the MHU 1700 hammer weighs approximately 292 tonnes.

Menck MHU hydraulic hammers are double-acting hammers in which hydraulic fluid pressure is used to lift the ram and to help accelerate it during the down stroke. The Menck MHU hammers and hydraulic systems contain an instrumentation system that provides detailed information on hammer performance and operating parameters including system oil pressures, oil flow, oil temperature, hammer stroke, measured impact velocity (and energy), mechanical efficiency, blow number, and blow rate in addition to other parameters.

Each hammer's pile sleeve was custom fitted for this contract with spacers to maintain proper alignment and fit as the hammer is positioned on the pile. The depth of the skirt from its bottom to the striking plate area where the pile top is located was about 4.7 meters for both the Menck MHU 500 and 1700 hammers.

The smaller MHU 500 hammer and the hydraulic power equipment and accessories were stored on the DB-24. The larger MHU 1700 hammer was stored on a separate barge that was towed to the site when needed. A specially designed cradle was used to hold each hammer on its respective barge deck. The cradle (similar to that shown on Plate 3.3) allowed the hammer to be lifted without damaging either the hammer or the barge deck.

The hammers were lifted with the main DB-24 crane, and positioned on the piles without using leads (free swinging hammers, as is the usual case in marine pile driving). To lift the MHU 1700, the contractor positioned the hammer barge directly between the DB-24 and the pile support template locations to avoid having to lift the large hammer from the side of the DB-24 and then swing the hammer into position. Once the hammer was lifted, the hammer barge was moved and the DB-24 was winched into position closer to the template.

3.5 DISPOSITION OF PIDP PILES

3.5.1 Benefits of Leaving the PIDP Piles in Place Until Production Piles are Driven

Caltrans decided to leave the PIDP piles in place until the production piles for the Skyway are driven to potentially obtain several benefits:

- The primary benefit is the possibility of obtaining long-term pile restrike data that incorporates long-term soil setup conditions. This will:
  - Determine if large hammers can drive these piles after very long delays.
  - Improve understanding of rate-of-increase in pile capacity with time.

  - Improve understanding of long-term pile capacity, particularly from driving large-diameter, low-displacement piles deep into and through overconsolidated clays where long-term soil-pile setup behavior is not yet documented.
  - If pile can be driven, improve understanding of long-term pile setup on driving behavior, including both increase in resistance with time and breakdown of resistance as pile is restruck.

- Skyway contractor (who may be different than the PIDP contractor) can use PIDP piles to prepare/test/modify/document driving equipment and procedures prior to production pile driving.
- Skyway contractor can use PIDP piles to prepare and test welding equipment and procedures prior to production pile driving (by adding on a small length to the top of the PIDP piles).
- Contractor has opportunity to use the PIDP piles as mooring points (or other uses) for the production pile work or other bridge work.
- Caltrans will have the opportunity to:
  - Observe marine life/growth on piles below water line.
  - Test/observe/evaluate splash-zone pile corrosion.
  - Observe/measure/document scour around the pile at the mudline.
- Preserve the opportunity to conduct axial and/or lateral load tests on the piles later.

Additional uses or benefits may be developed or proposed as the Skyway contract work evolves.

3.5.2 Current Status of Piles

The three PIDP piles are in place, each with a circular plate (diameter of 2.55 meters with 25-mm center hole) welded on to cover the pile top. Lighting fixtures have been attached per Coast Guard requirements.

Section	Pile Section Lengths		Wall Thickness (mm)	Pile Area (m^2)	Incremental Weight		Total Weight	
	Pre-Cutoff (m)	Post-Cutoff (m)			Pre-Cutoff (Tonnes, metric)	Post-Cutoff (Tonnes, metric)	Pre-Cutoff (Tonnes, metric)	Post-Cutoff (Tonnes, metric)
A	29.0	27.5	40	0.301	68.8	65.2	73.4	69.8
	1.5	1.5	51	0.382	4.5	4.5		
B	13.5	12.0	62	0.463	49.2	43.7	89.6	84.1
	17.0	17.0	40	0.301	40.4	40.4		
C	8.0	6.5	70	0.521	32.8	26.7	98.5	92.3
	18.0	18.0	62	0.463	65.6	65.6		
D	26.0	26.0	70	0.521	106.6	106.6	106.6	106.6
Totals	113.0	108.5	--	--	--	--	368.1	352.9

SUMMARY OF PILE PROPERTIES
Pile Installation Demonstration Project
SFOBB East Span Seismic Safety Project

TABLE 3.1

Hammer Data	MHU 500T	MHU 1700
Operating Data		
Maximum net impact energy above water (kJ)	550	1870
Minimum net impact energy (kJ)	50	170
Blow Rate at maximum energy and specified oil flow (bpm)	38	32
Weight Data (Tonnes, metric)		
Ram	30	94
Hammer, including Ram	54	152
Flat bottom anvil	22	41
Pile sleeve	27	99
Total weight	103	292
Dimensional Data (Meters)		
Hammer housing O.D.	1.2	2.0
Length excluding pile sleeve	12.1	14.5
Length including pile sleeve	17.1	21.4

NOTE: Data compiled from Menck Technical Guide: "Offshore Hydraulic Pile Driving Hammers, MHU."

SUMMARY OF HAMMER TECHNICAL DATA
Pile Installation Demonstration Project
SFOBB East Span Seismic Safety Project

TABLE 3.2

DELIVERY OF STATE-FURNISHED PILES TO PIER 96
Pile Installation Demonstration Project
SFOBB East Span Seismic Safety Project

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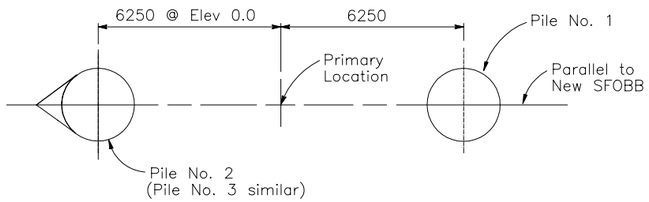
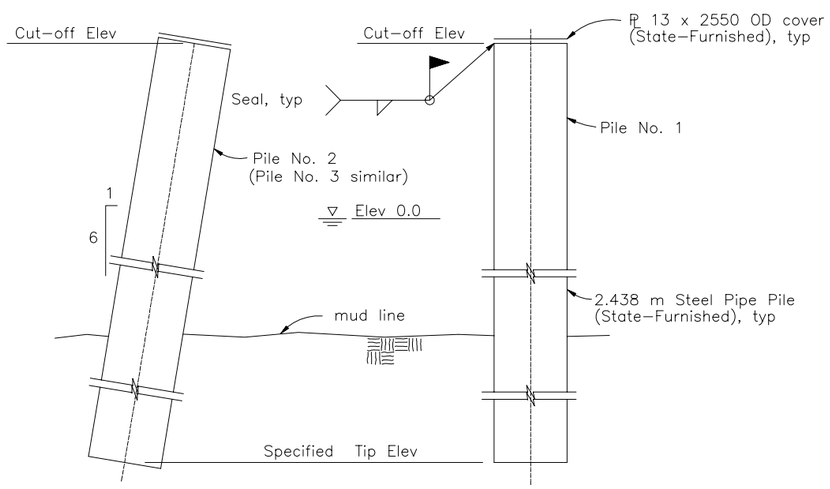
LEGEND

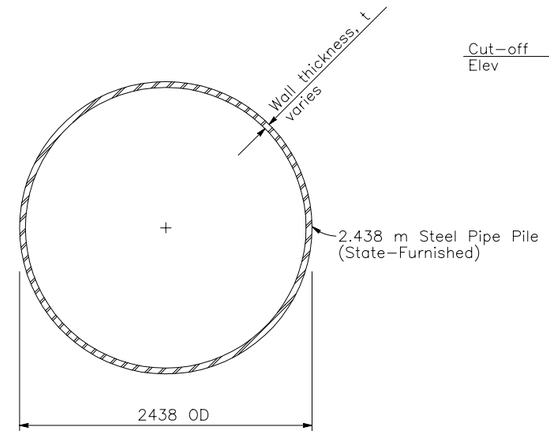
Denotes 1:6 batter pile



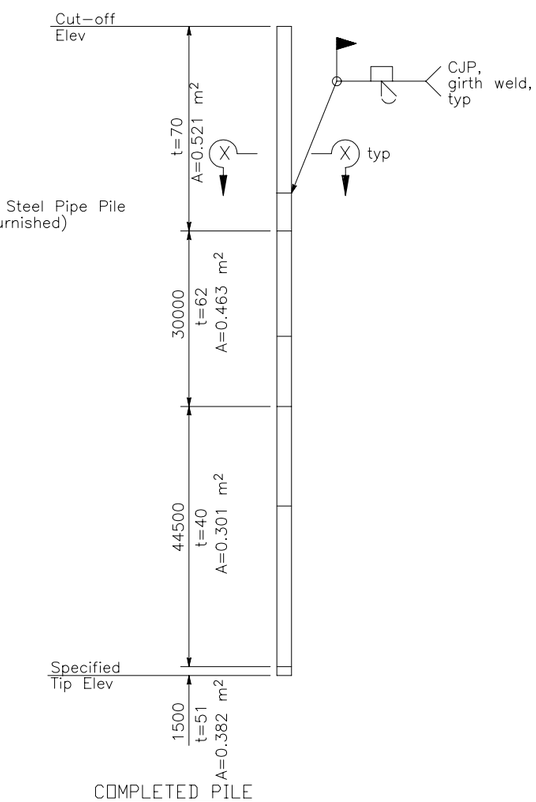
PARTIAL PLAN
No scale



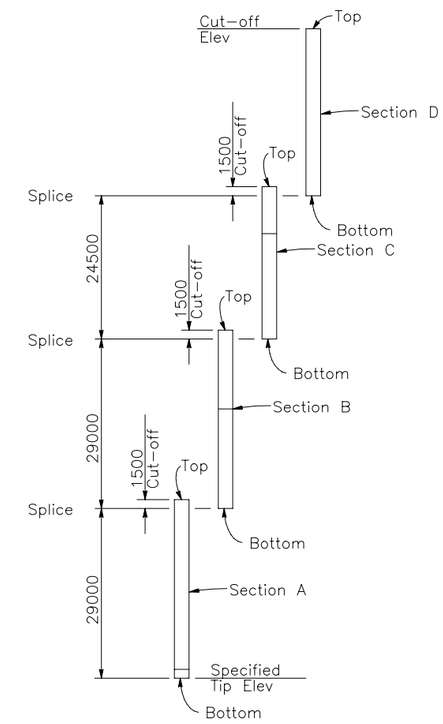
ELEVATION
No scale



SECTION X-X
1:25



COMPLETED PILE



4 STEEL-FURNISHED SECTIONS

2.438 m STEEL PIPE PILE (STATE-FURNISHED)
No scale

PILE NOTES:

1. Piles state-furnished in 4 sections each, with lengths and wall thickness shown.
2. Pile sections CJP weld spliced with the pile in a vertical or nearly vertical (battered) alignment.

All dimensions are shown in millimeters, except as noted.

NOTE: Drawing from CH2M Hill, San Francisco-Oakland Bay Bridge East Span Seismic Safety Project, Pile Installation Demonstration Project, Pile Details, Sheet 3 of 12, Revision Date 6/21/99.

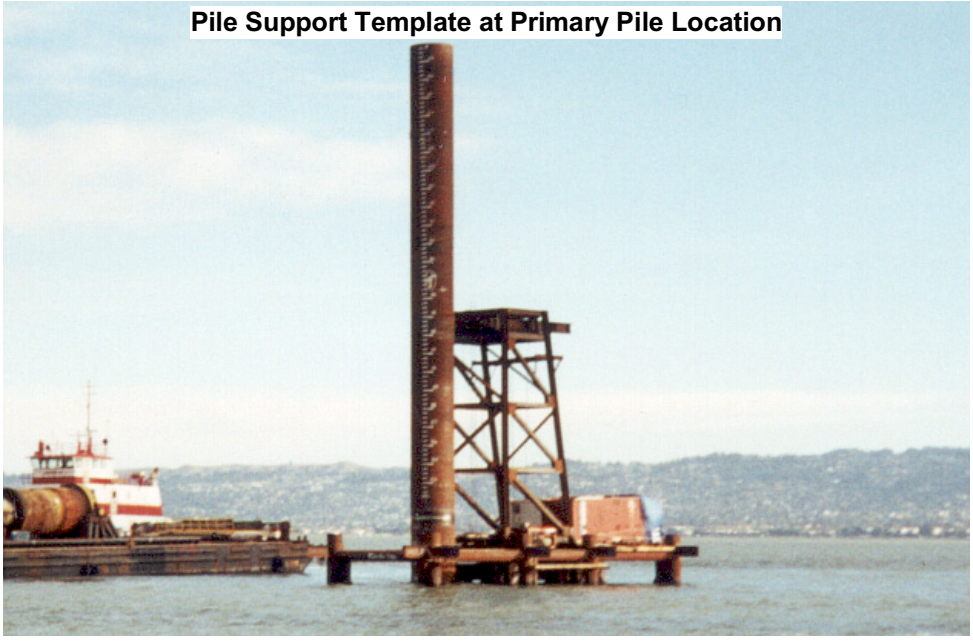
PILE DETAILS
Pile Installation Demonstration Project
SFOBB East Span Seismic Safety Project

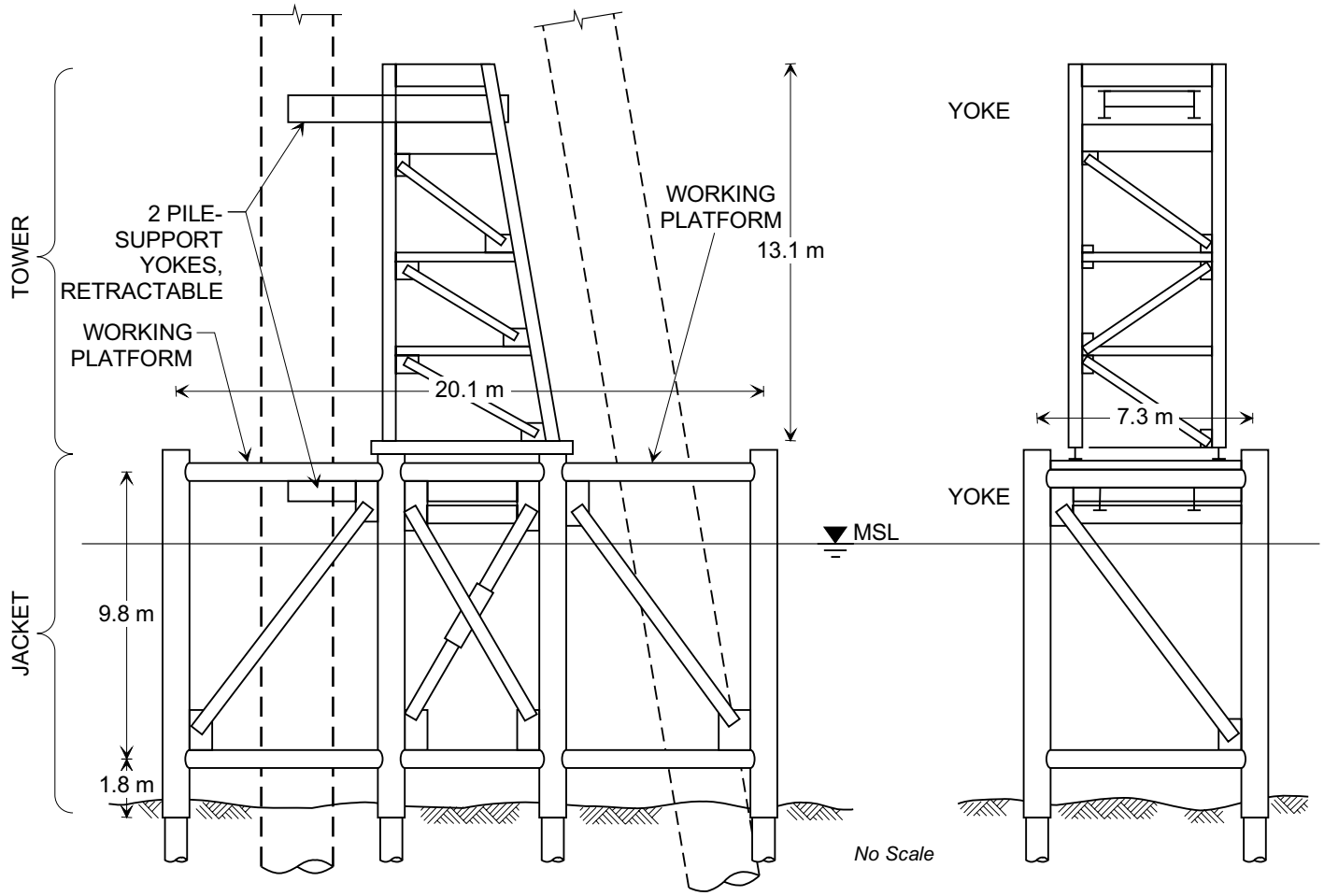
PLATE 3.2

9842\0061det.dwg(0,2,3),ps,0061det.pcp

BOTTOM OF PILE SECTION IN CRADLE
Pile Installation Demonstration Project
SFOBB East Span Seismic Safety Project

PLATE 3.3





PILE SUPPORT TEMPLATE
Pile Installation Demonstration Project
SFOBB East Span Seismic Safety Project

PLATE 3.4

PREPARING TO INSTALL TEMPLATE PILES
Pile Installation Demonstration Project
SFOBB East Span Seismic Safety Project

PLATE 3.5

DERRICK BARGE 24 AT PRIMARY TEST LOCATION
Pile Installation Demonstration Project
SFOBB East Span Seismic Safety Project

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SECTION 4.0
PILE INSTALLATION OPERATIONS

4.0 PILE INSTALLATION OPERATIONS

4.1 DRIVING OPERATIONS SEQUENCE

4.1.1 Introduction

PIDP pile driving began on October 23, 2000, with the driving of Pile No. 1, Section A and ended on December 13, 2000, with the restrike of Pile No. 3. The general sequence of events for the installation of a given pile section started with the lifting of the pile section. The length of the pile sections varied for the A through D sections (see Table 3.1). Pile add-ons (i.e., Sections B, C, and D) were hoisted into place using the stabbing guides to help position the pile over the previous section. The pile sections were field welded. Weld inspection included Ultrasonic Testing (UT). Any welding defects identified in the UT inspection were repaired and re-inspected. Finally, after the welds passed inspection, the piles were prepared for driving. The PDA instrumentation was bolted onto the pile and the pile hammer lifted and lowered into place. Each pile section was driven (during daylight hours) to the cutoff elevation for that section. Approximately 1.5 meters of pile was then cut off from pile Sections A through C. Following the pile cutoff, the contractor measured the elevation of the soil plug inside the pile. Finally, the pile was prepared for the stabbing and welding of the next pile section (if applicable).

The PIDP driving operations sequence is depicted schematically on Plate 4.1. Plate 4.1 shows the dates of driving for each pile section, the pile tip elevation at the end of driving, the type of hammer used, and the approximate weld and weld repair times between sections. A summary of start/stop times for driving operations[1] (including stabbing of the pile, welding, UT inspection, weld repair, and driving) is presented in Table 4.1. A summary of pile installation data is presented in Table 4.2. Photographs of the driving operation using both the Menck MHU 500 and 1700 hammers are shown on Plate 4.2.

Total drive time per section (the time from the first hammer blow to the end of driving, including interruptions) ranged from approximately 1 to 4.5 hours. The net drive time (the actual time the pile was being driven) ranged from approximately 20 minutes to 1 hour and 40 minutes (see Table 4.2). The relatively large differences in the total and net driving times for Pile Nos. 1 and 2 reflect the time required to retract the top and bottom yokes on the pile template during the driving of those piles. Throughout the PIDP, there were 3- to 7-day periods between the driving of subsequent sections. This time was used for the stabbing and alignment of the pile section, setup and preparation for welding, welding of the section, UT inspection of the weld, associated required welding repairs, a final UT inspection, and cleanup and preparation for driving (see Section 4.2 for a discussion of welding operations). As the project progressed, the elapsed times between the driving of pile sections improved from an average of approximately 5.5 days between pile sections for Pile No. 1 to an average of approximately 3.2 days between pile

[1] As recorded by the onsite Caltrans inspectors.

sections for Pile No. 3. This improvement can be attributed to fewer/lesser welding repairs required as the project progressed.

4.1.2 Pile Specifics

A brief summary of the driving operations sequence for each pile is discussed in the following sections. Plate 4.1 and Tables 4.1 and 4.2 present summaries of the driving operations for each pile. The pile data are often listed and discussed relative to penetration, which is defined as the length of pile embedded below the mudline. This is not the same as depth (for battered piles), which is considered the vertical distance below the mudline. However, the difference between depth and penetration is only on the order of 1 meter for the total length of the batter piles.

Pile No. 1. Section A (30.5 meters) was lowered on October 19, 2000. The pile ran approximately 6.1 meters below the mudline under the weight of the pile and MHU 500 hammer. Section A was then driven on October 23, 2000, with the MHU 500 hammer to a penetration (pile penetration below the mudline) of approximately 15.5 meters (tip elevation of El. -24.4 meters). Approximately 1.5 meters were cut off the top of Section A, after which Section B (30.5 meters) was stabbed and welded to Section A. Approximately 7 days after the driving of Section A, Section B was driven (on October 30, 2000) with the MHU 500 hammer to a penetration of approximately 44.5 meters (tip elevation of El. -53.3 meters). The relatively long interval between driving of the first two sections was associated with difficulties in the welding and inspection of the first field splice. Approximately 1.5 meters were cut off the top of Section B, after which Section C (26.0 meters) was stabbed and welded to Section B. Section C was driven on November 4, 2000, approximately 4.8 days following the driving of Section B. Section C was driven with the MHU 500 hammer to a penetration of approximately 69.0 meters (tip elevation of El. -77.9 meters). Approximately 1.5 meters were cut off the top of Section C, after which Section D (25.9 meters) was stabbed and welded to Section C. Section D was driven on November 9, 2000, also approximately 4.8 days following the end of driving of Section C. Section D was driven with the MHU 1700 hammer to a penetration of approximately 92.5 meters and a tip elevation of El. -101.4 meters. A series of three restrikes was conducted approximately 2, 11, and 33 days after the end of initial driving (November 11, November 20, and December 12, respectively).

Pile No. 2. Section A (30.5 meters) was stabbed and driven on November 3, 2000. The pile ran approximately 6.3 meters under the weight of the pile and hammer (MHU 500). The pile was then driven with the MHU 500 hammer to a penetration of approximately 15.6 meters (tip elevation of El. -24.3 meters). Approximately 1.5 meters were cut off the top of Section A, after which Section B (30.5 meters) was stabbed and welded to Section A. Approximately 9 days after the driving of Section A, Section B was driven (on November 12, 2000) with the MHU 500 hammer to a penetration of approximately 44.5 meters (tip elevation of El. -52.8 meters). The relatively long interval between driving of the two sections occurred because Pile

No. 2, Section A was driven while Pile No. 1 was being installed. However, the first field splice for Pile No. 2 was not made until after Pile No. 1 was driven to its final penetration (exclusive of restrikes). Approximately 1.5 meters were cut off the top of Section B, after which Section C (26.0 meters) was stabbed and welded to Section B. Section C was driven on November 15, 2000, approximately 3 days after the driving of Section B. Section C was driven with the MHU 500 hammer to a penetration of approximately 68.5 meters (tip elevation of El. -76.4 meters). Approximately 1.5 meters were cut off the top of Section C, after which Section D (26.0 meters) was stabbed and welded to Section C. Section D was driven on November 19, 2000, with the MHU 500 hammer to a penetration of approximately 80.75 meters (tip elevation of El. -88.5 meters). On November 19, 2000, Section D was driven an additional 1.25 meters with the MHU 1700 prior to a hammer malfunction (hydraulic oil leak). On November 20, 2000, Section D was driven to a penetration of approximately 93.25 meters (tip elevation of El. -100.9 meters). Two restrikes were conducted approximately 1 and 22 days after the end of initial driving (November 21 and December 12, 2000, respectively).

Pile No. 3. Section A (30.5 meters) was stabbed on December 1, 2000. The pile ran approximately 14.9 meters under the weight of the pile and hammer (MHU 500), and did not require any driving. Approximately 1.5 meters were cut off the top of Section A, after which Section B (30.5 meters) was stabbed and welded to Section A. Approximately 2 days after the driving of Section A, Section B was driven (on December 3, 2000) with the MHU 500 hammer to a penetration of approximately 44.0 meters (tip elevation of El. -50.4 meters). Approximately 1.5 meters were cut off the top of Section B, after which Section C (26.0 meters) was stabbed and welded to Section B. Section C was driven on December 7, 2000, approximately 3.8 days after the driving of Section B. Section C was driven with the MHU 500 hammer to a penetration of approximately 68.3 meters (tip elevation of El. -74.3 meters). Approximately 1.5 meters were cut off the top of Section C, after which Section D (26.0 meters) was stabbed and welded to Section C. Section D was driven on December 11, 2000, with the MHU 1700 hammer to a penetration of approximately 94.5 meters (tip elevation of El. -100.2 meters). One restrike was conducted approximately 2 days after the end of initial driving (December 13, 2000).

4.2 WELDING OPERATIONS

Welding operations will be addressed in a separate report by Caltrans. This section provides a brief overview of welding operations. The field welding of the large-diameter steel pipe sections proved to be a challenge for the contractor during the PIDP. Weld times were initially longer than anticipated. In the initial stages of the program, the welds often required significant repairs. The welding defects requiring repair were typically either root geometry issues or inclusion of slag and/or lack of fusion issues.

The welding times and associated required repairs typically varied with the thickness of the pile section. The Section A/B splice (which was the thinnest welded section) required

approximately 559 meters of welding passes, whereas the Section B/C and C/D welds required approximately 1,080 meters and 1,295 meters, respectively, of welding passes.

The total weld times and lengths of required repairs showed considerable improvement as the project progressed. A summary of the welding times and required repairs are provided in Table 4.3. The Pile No. 1 Section A/B splice took approximately 65 hours and required approximately 2.54 meters of weld to be repaired, whereas the Pile No. 3 Section A/B weld took approximately 34.5 hours and required 0.52 meter of repair. The total length of required repairs were approximately 9.5 meters for Pile No. 1, 3.76 meters for Pile No. 2, and 2.18 meters for Pile No. 3. For comparison, the outside pile circumference is 7.65 meters.

4.3 DRIVING BEHAVIOR

4.3.1 Hammer Operation and Reliability

Hammer Operation. Hydraulic hammers are typically efficient, highly controllable, and capable of working within a wide range of hammer strokes and energies. The strokes on the two hydraulic hammers used on this project were adjustable and allowed the hammers to be operated at applied energies that ranged from approximately 10 to 100 percent of the available hammer energy. During driving, the hammer stroke was adjusted to maintain blow counts in the range of 15 to 40 blows per quarter meter. In general, as the piles were driven deeper, the hammer stroke was increased, thereby applying a higher percentage of the available hammer energy.

The typical range of the applied hammer energy (as a percentage of the total available hammer energy) for each driven pile section is provided on Table 4.4. The smaller MHU 500 hammer was used to drive Sections A through C of all three piles and part of Pile No. 2, Section D. The hammer energy applied for the MHU 500 during the driving of A sections typically ranged from 10 to 20 percent of the total available hammer energy (approximately 550 kJ). For driving the B sections, approximately 10 to 50 percent of the total available hammer energy (MHU 500) was applied. For the C sections, the MHU 500 was operated at approximately 50 to 100 percent of the available hammer energy. At the start of driving of the D sections, the MHU 1700 was typically started at around 50 to 60 percent of the available energy (available hammer energy is approximately 1,870 kJ) and, as the pile penetrated, was increased to 100 percent at the end of driving. For all restrikes, the MHU 1700 hammer was operated at full energy.

Both hammers were very efficient, with measured system efficiencies (the ratio of the energy transferred to the pile head to the rated hammer energy) that were typically greater than the recommended minimum values for hydraulic hammers. The measured transferred energies and associated system efficiencies are discussed in more detail in Section 6.1.

Hammer Reliability. During the driving operations for the PIDP, the two hammers (MHU 500 and MHU 1700) generally performed well. The MHU 500 was the more reliable and did not suffer any work-stopping malfunctions. The MHU 1700 experienced a few episodes of erratic driving behavior and one work-stopping malfunction due to a hydraulic fluid leak. The MHU 1700 also experienced several sensor errors, which contributed to problems of erratic driving behavior. It should be noted that the MHU 1700 had not been used for over a year prior to the start of the PIDP program.

Hammer problems with the MHU 1700 were most pronounced during the driving of Pile No. 2, Section D. The hydraulic leak occurred at the beginning of driving of the Section D, causing work to stop for the day. The leak was repaired and driving was restarted the following morning. Following the restart of driving, the hammer experienced erratic behavior where the hammer operated intermittently at low stroke levels. The problems were caused by the malfunction of a sensor that indicates if the hammer is on the pile. The sensor error was overridden and the driving proceeded with the hammer operating normally thereafter.

4.3.2 Pile Run and Blow Counts

Pile run is the self-penetration of the pile into the underlying soil due to the weight of the pile and the applied weight of the hammer. The penetration to which a pile runs depends on the applied load (weight of the pile plus any applied hammer weight) and the resistance offered by the soil. A pile stops running when the resistance offered by the soil equals or exceeds the applied load.

Pile run was observed during the stabbing of Section A for all three piles. At the Primary Test Location (Pile Nos. 1 and 2) where the soft Young Bay Mud (YBM) was relatively thin (approximately 4 to 5 meters thick), the piles ran approximately 6 meters. However, at Pile No. 3 where the YBM is considerably thicker (approximately 20 meters), pile Section 3A ran approximately 15 meters to the required cutoff elevation. After Section 3B was spliced onto the pile and the hammer imparted approximately 18 blows to the pile, the pile then ran to a penetration of approximately 19 meters. Production piles are expected to run significant distances through the soft clays of the Young Bay Mud Formation, and particular attention will be required in placing and driving the first pile section at locations with a significant thickness of YBM.

Blow counts were monitored during the driving of each pile section and recorded as the number of blows required to advance the pile 0.25 meter or blows per quarter meter (bpqm). Profiles of blow count versus depth are provided for Pile Nos. 1 through 3 on Plates 4.3a through 4.3c. In addition, Table 4.4 provides a summary of the range of blow counts for each pile section.

The blow counts recorded during the initial driving of Pile Nos. 1 through 3 generally were similar for each pile and typically varied from 12 to 45 bpqm. This relatively small range of blow counts is attributed to the fact that hammer energies were controlled to maintain relatively consistent blow counts during initial driving of all pile sections. In other words, low hammer energies were used during easy driving and higher hammer energies were used as the soil resistance increased. The lower hammer energies used during the relatively easy driving in the upper soft sediments helped the contractor to: 1) maintain control of the hammer-pile system, 2) prevent the piles from running, and 3) maintain the pile alignment. As a result of controlling the hammer energies during driving, there were no significant differences in the recorded blow counts between the two hammers or within the different geologic units underlying the Young Bay Mud.

A significant increase in blow count was observed between the end of initial driving of one section and the beginning of driving of the next section. Blow counts increased by factors of two to three times during the elapsed time between the driving of two sections. The increase in blow count is due to "setup" along the soil-pile interface as well as the tendency for the piles to act plugged at the very beginning of driving after a significant period of setup. As the setup broke down and the pile began "coring" again, the blow count decreased to values closer to those observed at the end of driving of the previous section. After approximately 3 to 5 meters of driving, the blow counts typically returned to values similar to those observed at the end of initial driving of the previous section.

One of the significant observations is that the MHU 1700 hammer was able to drive the piles during initial driving to final tip elevations within the very dense sand layers of the Lower Alameda Alluvial (LAA) sediments at blow counts of less than 40 bpqm. In addition, Pile No. 2, Section D was driven to within 0.75 meter of final penetration at the end of initial driving with the MHU 1700 operating at 1,000 kJ at blow counts less than 55 bpqm. That observation suggests that the MHU 1700 likely is capable of driving the production piles to the specified tip elevation even if local variations in the elevation of the dense sand and gravel layers near the pile tip are encountered. However, it should be noted that the PIDP locations comprise only a small area of the proposed SFOBB bridge alignment and the characteristics of the Lower Alameda Alluvial sediments may vary at other locations.

Blow counts during the restrikes (the MHU 1700 was operated at full energy for all restrikes) of Pile Nos. 1 through 3 showed significant increases with time. For Pile No. 1, restrikes were conducted 2, 11, and 33 days after the end of initial driving with blow counts of 54, 144, and 330 bpqm, respectively. For Pile No. 2, where restrikes were conducted 1 and 22 days after the end of initial driving, the respective equivalent (extrapolated to 250 mm) blow counts were approximately 40 and 130 bpqm. These observed increases in blow count are due to the soil-pile setup.

Note that all observed blow counts during both initial driving and all restrikes fell under the refusal criteria stated by both API (1993a,b) and Menck.

The Menck refusal criteria (as stated in the contractor's Driving System Submittal for this project) was:

- 250 bpqm for continuous driving, and
- A maximum of 400 bpqm at restart of driving for one single penetration distance.

The API refusal criteria states:

- Pile driving refusal with a properly operating hammer is defined as the point where pile driving resistance exceeds either 250 bpqm for 1.5 consecutive meters or 650 blows per 0.25 meter of penetration.
- If there has been a delay in pile driving operations for 1 hour or longer, the refusal criteria stated above shall not apply until the pile has been advanced at least 0.3 meter following the resumption of driving. However, in no case shall the blow count exceed 650 blows per 0.15 meter of penetration.

4.3.3 Pile Plug Measurements and Behavior

Manson/Dutra measured the location of the soil plug within each pile after each pile section was driven. Table 4.2 contains the information on soil plug elevations. Plate 4.4 graphically shows the plug location where movement during driving can be inferred. In all piles, the plug moved upwards as the pile advanced. These data show that the piles did not plug during continuous driving, but instead cored through the soil like a "cookie cutter." Plug upward movement is common in large-diameter steel pipe piles driven into softer, cohesive marine soil. It is likely caused by movement into the pile interior of a fraction of the soil displaced by the volume of the steel that has been inserted into the ground.

4.3.4 Batter Achieved and Final Pile Head Location

The design batter for Pile Nos. 2 and 3 was 1h:6v, or an angle of approximately 9.5 degrees with the vertical. As reported by Caltrans, the final measured pile batter for Pile Nos. 2 and 3 were approximately 1h:6.3v and 1h:6.1v, respectively. These measurements indicate that the final pile batter of Pile Nos. 2 and 3 deviated from the specified batter by less than about 0.5 degree, which is within the tolerances for pile alignment provided in the 100% PS&E Submittal for the Skyway Structures (an angle of 1 in 100, or 0.57 degrees).

Survey measurements taken during the PIDP program indicate that the final pile head position for the three piles were within 110 mm (Pile No. 1), 90 mm (Pile No. 2), and approximately 210 mm (Pile No. 3) of the position specified on the plans. The relatively large deviation of Pile No. 3 from the specified location is attributed to the pile support template being

out of position. The 100% PS&E Submittal for the Skyway Structures specify that the piles shall be within a radial distance of 150 mm, as measured at the cutoff elevation, from the location shown in the plans. Therefore, both Pile Nos. 1 and 2 were within design tolerances while Pile No. 3's final location was approximately 60 mm outside the specified tolerance.

The contractor's installation means and methods appeared to provide adequate support to the piles during stabbing and driving. The critical element for production pile driving is the ability to either maintain the design batter throughout driving, or be able to identify and correct any misalignment problems before they become critical.

4.4 PILE DAMAGE

Piles are subjected to high stresses during the driving process due to large impact stresses at the pile head and potentially large stresses at the toe of the pile due to stress waves reflected by high end bearing soils/rock. In addition, batter piles can experience high bending stresses due to the eccentricity of the hammer and pile self weight. If not carefully controlled, these combinations of high stresses encountered during the driving process can lead to pile damage. However, during the PIDP, there did not appear to be any gross damage to the piles either physically observed or indicated by the PDA data during either initial driving or restrikes. Section 6.2 discusses in more detail the stresses that were measured in the piles during driving with respect to the pile steel yield strength.

PILE	Activity	PILE SECTIONS																
		A		B (Splice AB)					C (Splice BC)					D (Splice CD)				
		Stabbing	Driving	Stabbing	Welding	UT	Weld Repair	Driving	Stabbing	Welding	UT	Weld Repair	Driving	Stabbing	Welding	UT	Weld Repair	Driving
1	Start	0915, 10/19/00 Th	0810, 10/23/00 Mon	1745, 10/27/00 Fri	2200, 10/27/00 Fri	1345, 10/29/00 Sun	2100, 10/29/00 Sun	1605, 10/30/00 Mon	1215, 10/31/00 Tu	1600, 10/31/00 Tu	1000, 11/02/00 Th	1845, 11/02/00 Th	1400, 11/04/00 Sat	0740, 11/05/00 Sun	1245, 11/05/00 Sun	0140, 11/08/00 Wed	N/A	1050, 11/09/00 Th
	Stop	1045, 10/19/00 Th	1042, 10/23/00 Mon	1815, 10/27/00 Fri	1030, 10/29/00 Sun	2130, 10/29/00 Sun	1500, 10/30/00 Sun	1753, 10/30/00 Mon	1250, 10/31/00 Tu	0800, 11/02/00 Th	1500, 11/02/00 Th	0630, 11/04/00 Sat	1550, 11/02/00 Sat	0950, 11/05/00 Sun	1700, 11/07/00 Tu	1330, 11/08/00 Wed	N/A	1300, 11/09/00 Th
2	Start	1500, 11/02/00 Th	0900, 11/03/00 Fri	1600, 11/09/00 Th	2130, 11/09/00 Th	0300, 11/11/00 Sat	0700, 11/11/00 Sat	0850, 11/12/00 Sun	1800, 11/12/00 Sun	0040, 11/13/00 Mon	0430, 11/15/00 Wed	N/A	1050, 11/15/00 Wed	0800, 11/16/00 Th	1300, 11/16/00 Th	1330, 11/18/00 Sat	1525, 11/18/00 Sat	see note 2 below
	Stop	1730, 11/02/00 Th	1055, 11/03/00 Fri	1740, 11/09/00 Th	2130, 11/10/00 Fri	0600, 11/11/00 Sat	2130, 11/11/00 Sat	1130, 11/12/00 Sun	2107, 11/12/00 Sun	1830, 11/14/00 Tu	0630, 11/15/00 Wed	N/A	1348, 11/15/00 Wed	1100, 11/16/00 Th	0530, 11/18/00 Sat	1520, 11/18/00 Sat	1700, 11/18/00 Sat	see note 2 below
3	Start	0830, 12/01/00 Fri	N/A	1840, 12/01/00 Fri	2305, 12/01/00 Fri	2240, 12/02/00 Sat	0035, 12/03/00 Sun	1120, 12/03/00 Sun	2150, 12/03/00 Sun	0445, 12/04/00 Mon	0525, 12/06/00 Wed	0800, 12/06/00 Wed	1010, 12/07/00 Th	1800, 12/07/00 Th	0245, 12/08/00 Fri	0900, 12/10/00 Sun	1100, 12/10/00 Sun	1100, 12/11/00 Mon
	Stop	1006, 12/01/00 Fri	N/A	1920, 12/01/00 Fri	1710, 12/02/00 Sat	0020, 12/03/00 Sun	0930, 12/03/00 Sun	1327, 12/03/00 Sun	0130, 12/04/00 Mon	0130, 12/06/00 Wed	0730, 12/06/00 Wed	2230, 12/06/00 Wed	1205, 12/07/00 Th	2300, 12/07/00 Th	0500, 12/10/00 Sun	1045, 12/10/00 Sun	1700, 12/10/00 Sun	1730, 12/11/00 Mon

NOTE:

1. Time and dates were recorded and compiled by Caltrans inspectors.
2. Driving of Pile No. 2, Section D was started on 11/19/00 at around 0845 with the MHU 500T. At approximately 1639 on 11/19/00, the hammer was changed to the MHU 1700. The driving of Pile No. 2, Section D was then interrupted on 11/19/00 due to a hammer malfunction. Driving of Pile No. 2, Section D was resumed on 11/20/00 at about 0930 and completed at approximately 1130.

Pile	Restrike No.	Date
1	1	11/11/00
	2	11/20/00
	3	12/12/00
2	1	11/21/00
	2	12/12/99
3	1	12/13/00

SUMMARY OF DRIVING OPERATION SEQUENCE

Pile Installation Demonstration Project

SFOBB East Span Seismic Safety Project

TABLE 4.1

Pile	Section	Hammer[1]	Pile Details						Drive Times				
			Section Length Pre-Cutoff (m)	Cutoff Length (m)	Pile Run[2] (m)	Penetration[3] (m)	Tip El.[3,4] (m, MSL)	Plug El.[3,4] (m, MSL)	Date	Time of Driving	Total Drive Time (hr:min)	Net Drive Time (hr:min)	Time Between Sections (hr:min)
1	A	500	30.5	1.5	6.1	15.50	-24.4	-8.2	10/23/00	10:18 to 11:16	0:58	0:19	-
	B	500	30.5	1.5	-	44.50	-53.3	-7.3	10/30/00	16:58 to 17:53	0:55	0:55	173:42
	C	500	26	1.5	-	69.00	-77.9	-5.5	11/04/00	14:11 to 15:52	1:41	1:31	116:18
	D	1700	25.9	n/a	-	92.50	-101.4	-4.9	11/09/00	11:10 to 12:53	1:43	1:31	115:18
	Restrike 1	1700	-	-	-	92.75	-101.6	-	11/11/00	10:37 to 10:41	0:04	0:04	43:49
	Restrike 2	1700	-	-	-	93.00	-101.9	-4.9	11/20/00	13:59 to 14:05	0:06	0:06	208:18
	Restrike 3	1700	-	-	-	93.25	-102.1	-	12/12/00	13:39 to 13:51	0:12	0:12	494:37
2	A	500	30.5	1.5	6.3	15.60	-24.3	-8.5	11/03/00	9:12 to 10:49	1:37	0:41	-
	B	500	30.5	1.5	-	44.50	-52.8	-7.6	11/12/00	8:49 to 11:28	2:39	1:19	214:00
	C	500	26	1.5	-	68.50	-76.4	-5.8	11/15/00	10:50 to 13:48	2:58	1:36	71:22
	D	500	26.4	-	-	80.75	-88.5	-	11/19/00	8:57 to 10:55	1:58	1:17	91:09
	D	1700	-	-	-	82.00	-89.7	-	11/19/00	16:41 to 16:57	0:16	0:06	-
	D	1700	-	-	-	93.50	-101.1	-5.0	11/20/00	9:25 to 11:23	1:58	1:12	22:30
	Restrike 1	1700	-	-	-	93.65	-101.2	-	11/21/00	9:17 to 9:18	0:01	0:01	21:54
	Restrike 2	1700	-	-	-	93.85	-101.4	-	12/12/00	10:27 to 10:32	0:05	0:05	505:09
3	A	500	30.5	1.5	14.9	14.90	-21.7	-6.1	12/01/00	11:45	No driving	No driving	-
	B	500	30.5	1.5	-	44.00	-50.4	-5.3	12/03/00	11:21 to 13:25	2:04	1:04	47:36
	C	500	26	1.5	-	68.25	-74.3	-3.7	12/07/00	10:04 to 12:00	1:56	1:12	92:39
	D	1700	25.9	-	-	94.50	-100.2	-2.8	12/11/00	10:48 to 15:28	4:40	1:28	94:48
	Restrike 1	1700	-	-	-	94.80	-100.5	-	12/13/00	10:40 to 10:42	0:02	0:02	43:12

[1] 500 = Menck MHU 500T, 1700 = Menck MHU 1700.

[2] Pile run is the final penetration below mudline under the weight of the pile and hammer.

[3] Pile penetration is the length of the pile below mudline and is based on mudline elevation from multibeam bathymetry survey conducted by Fugro in May 2000.

[4] Tip elevation and plug elevation are at the end of driving.

SUMMARY OF PILE INSTALLATION DATA

Pile Installation Demonstration Project

SFOBB East Span Seismic Safety Project

TABLE 4.2

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Earth Mechanics

FUGRO

Spliced Sections	Wall Thickness (mm)	Required Length of Weld Pass (m)	Weld Time (hr)	Length of Rejected Welds (m)		Required Repair Time (hr)
				Root Geometry	Slag/Fusion	
1 A-B	40	559	36.5	1.7	0.8	18.0
1 B-C	62	1080	40.0	0.0	7.0	36.0
1 C-D	70	1302	52.0	0.0	0.0	0.0
2 A-B	40	559	24.0	3.4	0.4	14.5
2 B-C	62	1080	42.0	0.0	0.0	0.0
2 C-D	70	1302	40.5	0.0	0.0	1.5
3 A-B	40	559	18.0	0.0	0.5	9.0
3 B-C	62	1080	44.5	0.0	1.5	14.5
3 C-D	70	1302	50.0	0.0	0.2	6.0

NOTE: Weld and weld repair times recorded by Caltrans inspectors are provided in Table 4.1.

SUMMARY OF WELDING OPERATIONS
Pile Installation Demonstration Project
SFOBB East Span Seismic Safety Project

TABLE 4.3

Pile	Section	Hammer[1]	Penetration[2] (m)	Typical Range During Driving		PDA Data[3]				
				% Hammer Energy Applied	Equiv. Blow Count (bpqm)	EMX[4] (kJ)	CSX[5] (MPa)	CSI[6] (MPa)	Toe Stress[7] (MPa)	RMX[8] (MN)
1	A	500	15.50	10 to 12	15 to 40	--	--	--	--	--
	B	500	44.50	30 to 50	11 to 25	210	109	113	73	10
	C	500	69.00	50 to 100	20 to 40	447	145	152	179	22
	D	1700	92.50	50 to 90	20 to 30	1532	218	234	308	63
	Restrike 1	1700	92.75	100	55	1607	220	226	324	71
	Restrike 2	1700	93.00	100	143	1634	226	230	327	72
	Restrike 3	1700	93.25	100	330	1515	225	229	316	71
2	A	500	15.60	12 to 20	20 to 35	--	--	--	--	--
	B	500	44.50	20 to 50	18 to 25	224	113	117	87	10
	C	500	68.50	50 to 100	25 to 30	434	149	163	177	22
	D	500	80.75	100	45 to 55	413	135	143	193	38
	D	1700	93.50	60 to 100	35 to 55	1485	217	223	303	63
	Restrike 1	1700	93.65	100	40	1539	218	223	319	69
	Restrike 2	1700	93.85	100	130	1404	213	215	297	64
3	A	500	14.90	No Driving	No Driving	--	--	--	--	--
	B	500	44.00	10 to 50	<10 to 30	224	109	111	79	8
	C	500	68.25	50 to 100	20 to 25	448	151	159	157	17
	D	1700	94.50	50 to 100	13 to 40	1548	225	231	306	64
	Restrike 1	1700	94.80	100	51	1488	146	196	322	70

NOTES:

1. Hammer: 500 = Menck MHU 500, 1700 = Menck MHU 1700.
2. Pile penetration is the length of the pile below mudline and is based on mudline elevation from multibeam bathymetry survey conducted by Fugro during May 2000.
3. PDA data are from the end of driving for initial driving and at the beginning of driving for restrikes and are the average of the two PDA data sets.
4. EMX = Energy transferred to pile head by hammer.
5. SX = measured compressive stress at pile head.
6. CSI = Maximum compressive stress at pile head.
7. Toe Stress = computed total force (static + dynamic component) in pile toe divided by pile toe area.
8. RMX = maximum computed Case Method capacity with damping factor J = 0.5.

SUMMARY OF DRIVING DATA

Pile Installation Demonstration Project

SFOBB East Span Seismic Safety Project

Earth Mechanics

FUGRO

TABLE 4.4

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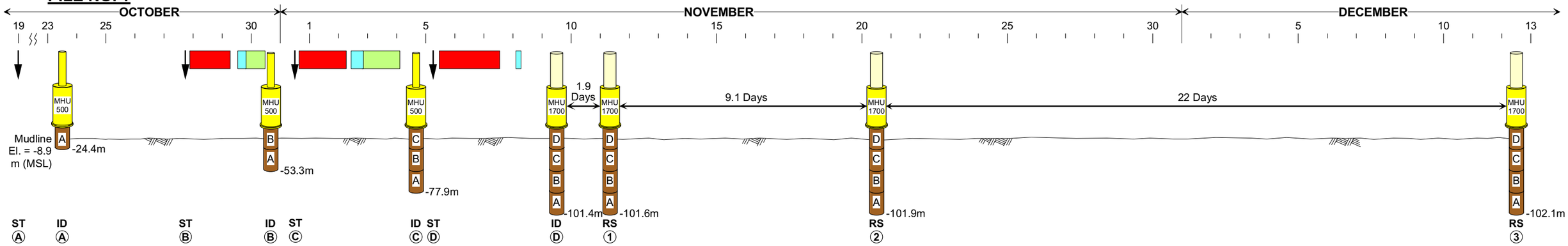
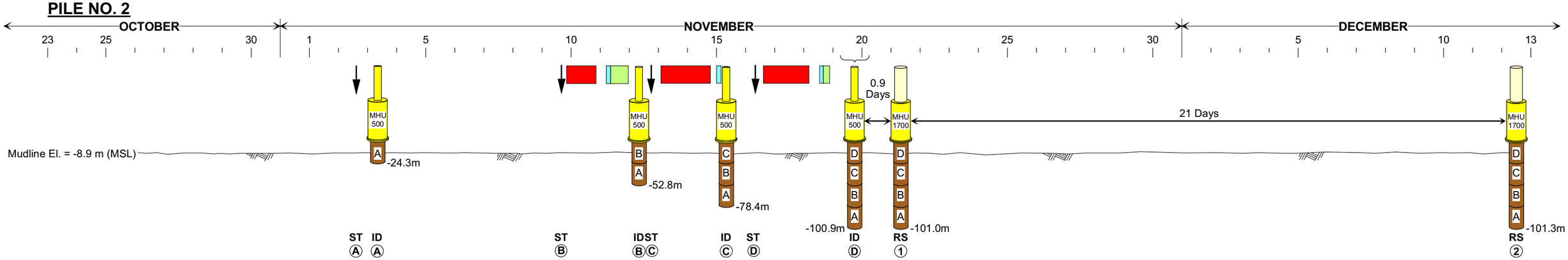
Earth Mechanics FUGRO

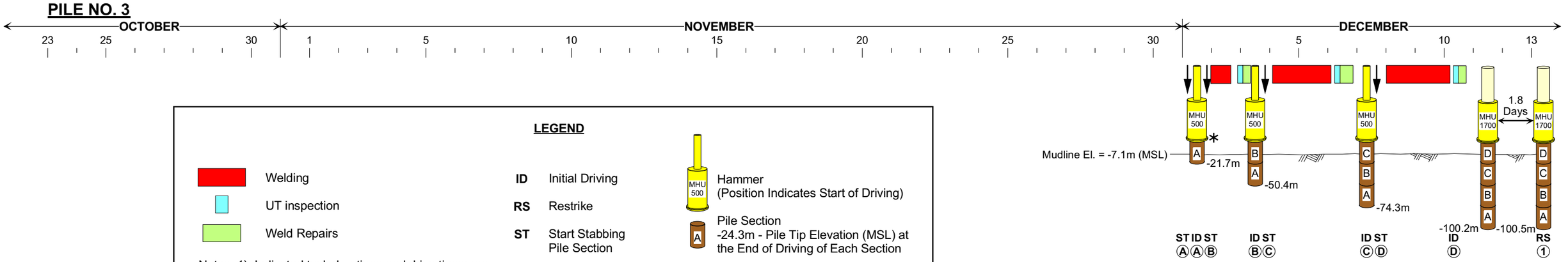
PILE NO. 1



PILE NO. 2



PILE NO. 3



LEGEND

- Welding
- UT inspection
- Weld Repairs

Notes: 1) Indicated task durations and drive times are approximate. Times recorded by Caltrans inspectors are provided on Table 4.1.
2) Drawing not to scale.

- **ID** Initial Driving
- **RS** Restrike
- **ST** Start Stabbing Pile Section
- (A) Pile Section

- Hammer (Position Indicates Start of Driving)
- Pile Section -24.3m - Pile Tip Elevation (MSL) at the End of Driving of Each Section
- * No driving required, pile ran to cutoff elevation.
- Stabbing of Pile Section

SEQUENCE OF DRIVING OPERATION
Pile Installation Demonstration Project
SFOBB East Span Seismic Safety Project

PLATE 4.1

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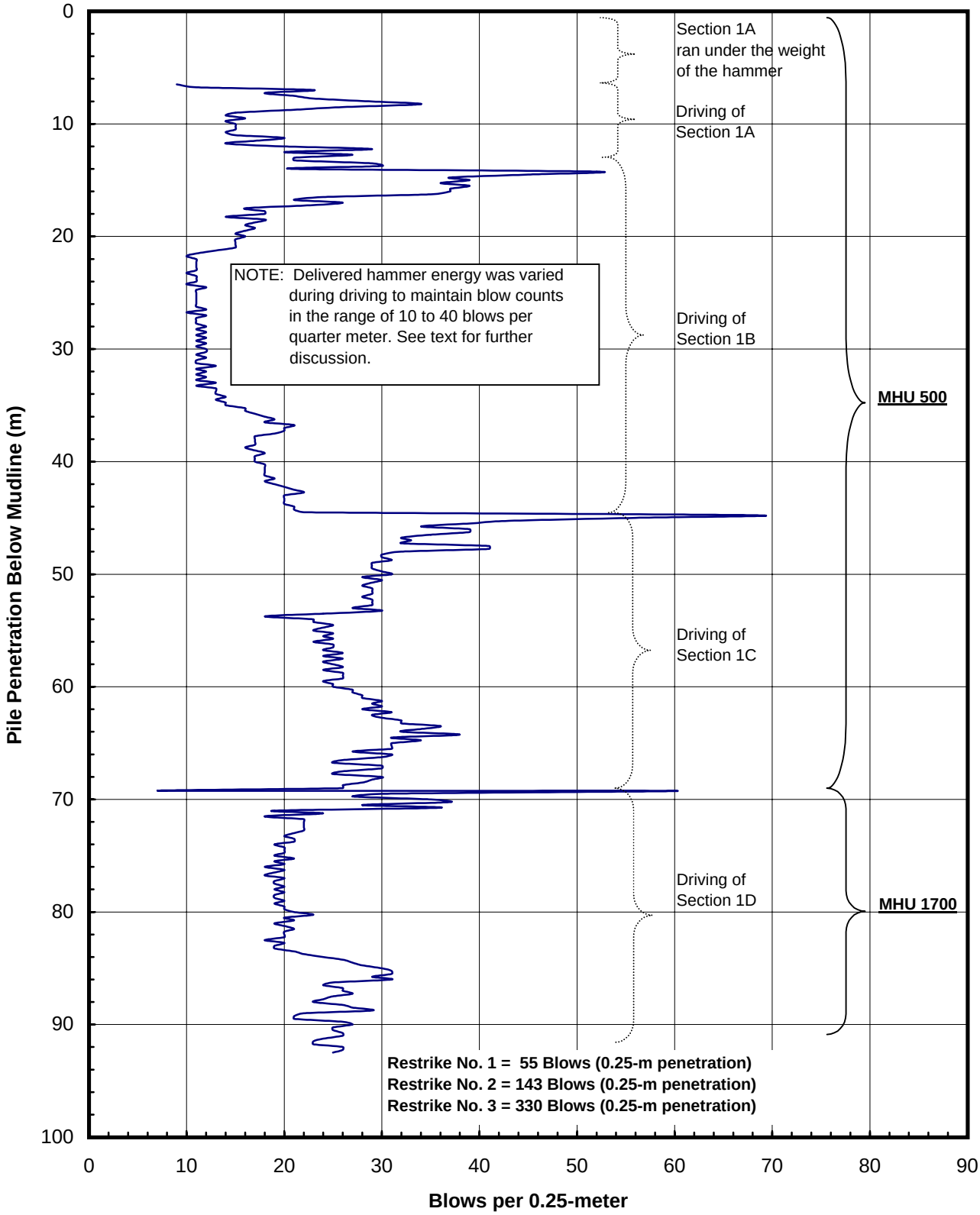
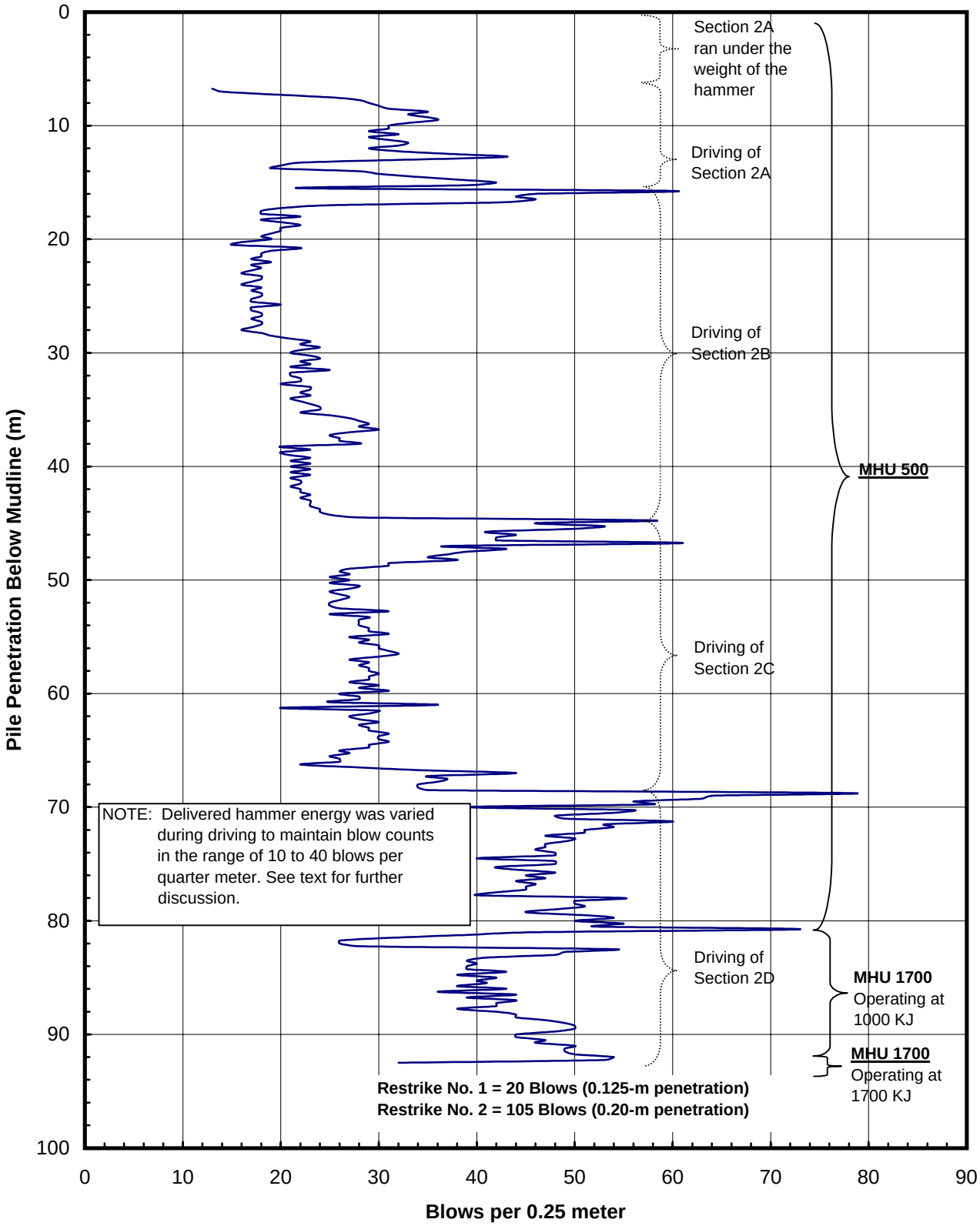
DRIVING OPERATIONS WITH MHU 500T AND 1700 HAMMERS
Pile Installation Demonstration Project
SFOBB East Span Seismic Safety Project

98420061pho1.dsf.p6



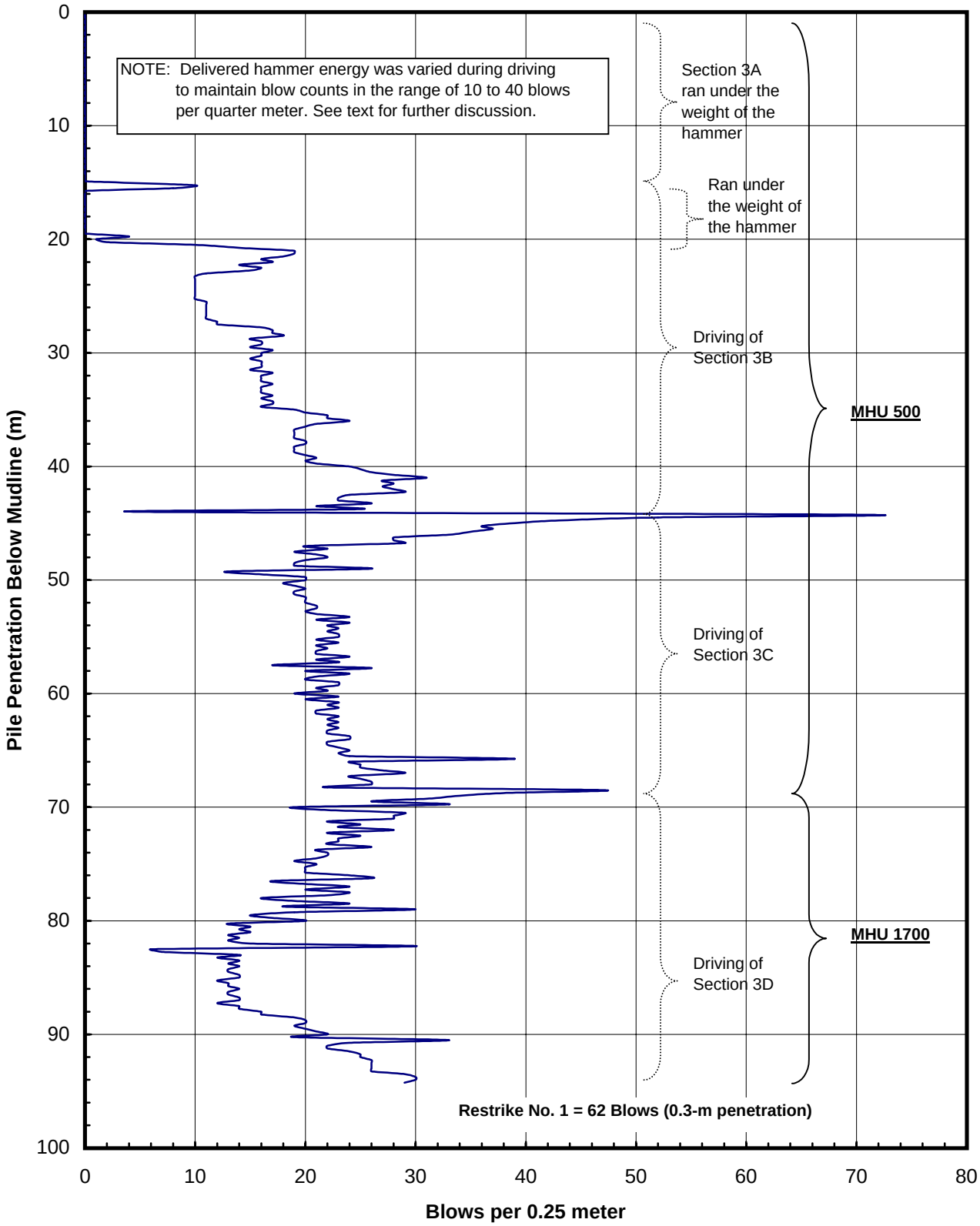
BLOW COUNT PROFILE, PILE NO. 1
Pile Installation Demonstration Project
SFOBB East Span Seismic Safety Project

PLATE 4.3a



BLOW COUNT PROFILE, PILE NO. 2
Pile Installation Demonstration Project
SFOBB East Span Seismic Safety Project

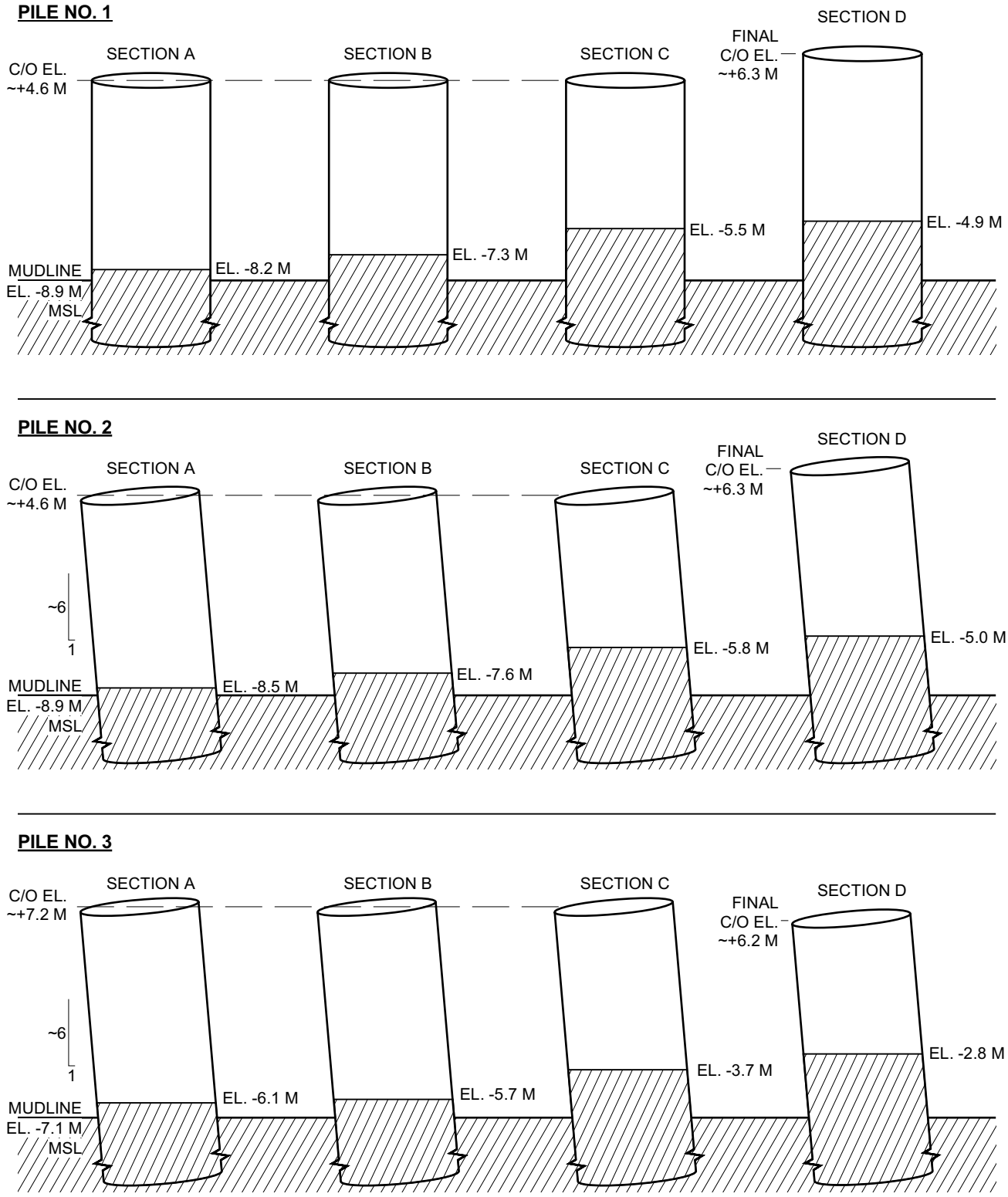
PLATE 4.3b



BLOW COUNT PROFILE, PILE NO. 3
Pile Installation Demonstration Project
SFOBB East Span Seismic Safety Project

PLATE 4.3c

Soil Plug Measurements at End of Driving Each Section



NOTE: 1) Final C/O elevations measured by Caltrans (1/31/00).
2) Drawing not to scale.

SOIL PLUG DEPTH MEASUREMENTS

Pile Installation Demonstration Project
SFOBB East Span Seismic Safety Project

9842\0061plug.dsf

SECTION 5.0
PILE DRIVING ANALYZER SYSTEM DATA AND CAPWAP ANALYSES

5.0 PILE DRIVING ANALYZER SYSTEM DATA AND CAPWAP ANALYSES

5.1 PILE DRIVING ANALYZER

A PDA system was used to monitor the three PIDP piles and all restrikes. The PDA monitoring system consisted of sets of instruments attached near the pile head to record data with a computer-based data acquisition system during driving. The instruments provided time histories of pile top force and velocity due to the impact of the hammer. These time histories were analyzed to provide important data relevant to the evaluation of driving behavior of the hammer-pile system as discussed in the next section. A more detailed description of the PDA instrumentation, data acquisition, and data reduction is provided in Appendix A.

5.1.1 Pile Driving Analyzer Measurements

PDA measurements during pile driving provide estimates of the following:

- The hammer efficiency;
- Energy transmitted to the pile and therefore the system efficiency of the hammer system;
- The maximum dynamic compressive and tensile stresses in the pile;
- The soil resistance and an indication of the distribution of resistance along the pile;
- Blow counts (hammer blows per unit penetration); and
- The presence and location of pile damage.

PDA data were obtained from four sets of accelerometers and bolt-on strain transducers that were attached at the 90-degree points around the pile circumference. The instruments were mounted about 4.9 meters below the pile top. A schematic drawing showing how the instruments were mounted is shown on Plate 5.1. During a typical PDA monitoring project, two sets of transducers are attached to opposite sides of the pile. The two additional sets of PDA instruments used for this program provided redundancy in the event that an instrument failed, and provided refined measurements of eccentric pile head stresses.

5.1.2 PDA Data

During the PDA monitoring of each pile section, nine quantities are recorded for each hammer blow. The nine quantities include both measured values (i.e., acceleration and pile head stress) and values derived from the recorded PDA data. The nine quantities recorded during the PDA monitoring for this program include:

1. Calculated maximum Case Method (RMX) capacities at an assumed soil damping (J) value of 0.5,

2. Blow count (BLC) recorded as blows per quarter meter (bpqm),
3. Measured maximum average compressive stress (CSX) recorded by the two strain gauges comprising one set of PDA gauges, and the maximum compressive stress recorded by the two strain gauges (CSI),
4. Measured maximum tensile stress in the pile (TSX),
5. Measured maximum energy (EMX) transferred to the pile top,
6. Measured ram momentum (MWO),
7. The calculated total measured Case Method static and dynamic pile resistance (RTL),
8. The measured maximum pile head velocity (VMX), and
9. The blow rate in blows per minute (BPM).

The calculated PDA quantities TSX, EMX, MWO, and the Case Method capacities RTL and RMX are explained further in Appendix A. The dynamic and static pile capacities shown on the PDA graphs (see Appendix C-2) are based on assumptions relative to the soil response and soil parameters during driving. Thus, these dynamic and static pile capacities are only an approximate indication of pile capacity rather than a measured pile capacity. Sections 6.2 and 6.3 discuss the analysis and interpretation of pile capacity in more detail.

Plots of these nine quantities versus pile penetration are provided in Appendix C-2 for each PDA-monitored pile section. Two sets of PDA data (designated PDA 1 and PDA 2) are provided for each monitored pile section, one set for each of the two pairs of PDA instruments installed on the monitored pile sections.

Profiles of key PDA data and values derived from PDA data are provided on Plates 5.2 through 5.4. The various data include hammer and system efficiencies, hammer stroke, transferred energy, compressive and tensile stresses, blow count, blow rate, and soil resistance to driving (RMX with J = 0.5). Those data are plotted along with the interpreted soil stratigraphy based on nearby explorations and geophysical data. Since there are no borings at the exact test locations, the interpreted soil stratigraphy is considered an estimate of the actual field soil condition at the PIDP test locations.. The data on Plates 5.2 through 5.4 are plotted against depth and elevation (as opposed to penetration; see Section 4.1.1 for details).

In addition to the plot of measured PDA data, tables of driving system performance data are presented in Appendix C-1. These tables include various PDA data as well as calculated values based on the PDA data averaged over each 0.25-meter penetration interval. The data presented in these tables include:

1. Pile Penetration in meters (m);
2. Blow Count in blows per quarter meter (bpqm),

3. Blow Rate in blows per minute (bpm),
4. Transmitted Energy, the same as the PDA output quantity EMX, in kilojoules (kJ),
5. System Efficiency (%), defined as the ratio of the transferred energy to the rated hammer energy,
6. Resistance to Driving, which is the same as the PDA quantity RMX, in meganewtons (MN),
7. Impact Stress, the same as the PDA output quantity CSX, in megapascals (MPa),
8. Stress at Toe in megapascals (MPa), and
9. Impact Velocity, the same as the PDA quantity VMX, in meters per second (m/sec).

The calculation of the Hammer and System Efficiencies, Resistance to Driving, and Stress at Toe are explained in Appendix A.

5.2 CAPWAP ANALYSES

5.2.1 Introduction

The force and acceleration time-history data recorded by the PDA equipment are used to perform CAPWAP (Case Pile Wave Analysis Program) analyses. These analyses estimate the compression and tensile stresses in the pile and obtain a best fit relative to the distribution and magnitude of soil resistance mobilized during advancement of the pile for a specific hammer blow.

The CAPWAP analysis is a wave equation analysis that: a) models the pile as a series of discrete masses, springs, and damping dashpots; and b) models the soil resistance by elasto-plastic springs (static resistance) and dashpots (dynamic resistance). The force and acceleration data from the PDA specify the pile force and pile motion. This leaves the unknowns of the system as the response and distribution of the soil resistance. The CAPWAP analysis entails a series of iterations in which reasonable soil parameters and a distribution of soil resistance are input. The pile is then set in motion by the measured acceleration after which the equilibrium pile head force is calculated. The calculated pile head response is then compared to the measured response. Adjustments are then made to the soil model until a satisfactory match is made between the measured and calculated pile head response.

5.2.2 Combined CAPWAP Analyses

Satisfactory CAPWAP evaluations and estimates of the ultimate pile capacity require that the hammer energy be sufficient to move the pile enough to fully mobilize the available soil resistance. As a general rule of thumb, if the blow counts are greater than approximately 100 bpqm, sufficient energy may not be transferred to the pile to fully mobilize the available

capacity. This blow count will vary depending on soil conditions and hammer system performance. When the driving hammer cannot mobilize the full soil resistance, the CAPWAP analyses may significantly underestimate the available static pile capacity. However, as described by Stevens (2000), CAPWAP analyses performed on a series of restrikes can be combined to better define the available static pile capacity when a hammer is not able to mobilize the full soil resistance. In combined CAPWAP analyses, the pile capacity is estimated using the largest resistance mobilized along a particular pile segment during initial driving or subsequent restrike(s).

The combined CAPWAP approach is illustrated schematically on Plate 5.5. Distributions of unit skin friction from CAPWAP analyses are plotted for the end of initial driving and subsequent restrike(s). A combined "best estimate" skin friction distribution is obtained by summing the largest mobilized skin friction increment values along the length of the pile. Please note that the largest increment of mobilized skin friction may come from a CAPWAP analysis performed at the end of a restrike. This is because the process of pile driving will "breakdown" the setup (see Section 6.3.2 for discussion of setup) of the skin friction in the upper portion of the pile and then may mobilize skin friction in the lower portion of the pile that was not being mobilized at the beginning of the restrike (see Plate 5.5).

Previous experience with CAPWAP analyses indicate that artificially high soil resistances are frequently calculated on pile segments immediately above the segments that do not mobilize soil resistance. Those high resistances are seen as abrupt peaks in the unit skin friction immediately above the portion of the pile for which unit skin friction is zero. This phenomenon may be attributed to the fact that this portion of the pile is no longer being moved (significantly) by the hammer, resulting in a wave reflection that may be seen by the model as an end bearing response. The "best estimate" skin friction distributions provided in this report were conservatively estimated by neglecting these peaks.

In these evaluations of skin friction from CAPWAP data, the majority of skin friction was assumed to be mobilized on the outside of the pile. That assumption is based on the following:

- A series of downhole vane shear tests was performed within a soil plug of a large-diameter steel pile driven through primarily clay soils (Stevens, 1988). The vane shear tests indicated that soon after the end of initial driving, the clay plug was weaker than the undisturbed clay by a factor ranging from about 14 near the mudline to 6 at the bottom of the soil plug. Those estimates suggest that the available unit skin friction on the inside of the pile during initial driving is approximately 20 to 30 percent of that on the outside of the pile.
- For the first few blows of a restrike, previous experience has shown that the piles are plugged rather than coring. Consequently, for those blows, only skin friction on the outside of the pile is mobilized.

5.2.3 Selection of Hammer Blows for CAPWAP Analyses

CAPWAP analyses were performed for specific hammer blows taken from the PDA data. Typically, the PDA record is taken from one of the last 10 to 15 blows at the end of initial driving. An effort was made to select blows where very clean PDA data signals were obtained, the energy transfer was relatively high, and the eccentric forces at the pile top were minimized. The analyses of the restrikes were conducted to evaluate the post-setup capacity. These analyses were generally conducted on one of the first 10 blows of the restrike. A few supplemental analyses were performed at the end of restrikes to evaluate if sufficient breakdown of setup had occurred along the upper portion of the pile to allow for mobilization of skin friction along the lower section of the pile.

5.2.4 Results of CAPWAP Analyses

The CAPWAP results are provided in Appendix C and summarized in Tables 5.1a through 5.1c for Pile Nos. 1 through 3, respectively. The summary results in Tables 5.1a through 5.1c include the total Soil Resistance to Driving (SRD), SRD-skin resistance, SRD-end bearing resistance, the side and point damping, the side and point skin friction, the calculated RMX value (J = 0.5), the transfer energy, and the match quality number. It should be noted that the calculated CAPWAP capacities listed for the restrikes in Tables 5.1a through 5.1c are not considered accurate estimates of the available pile capacity, but rather a measure of the soil resistance mobilized at the time of driving. During restrikes, the MHU 1700 generally could not transfer sufficient energy to the piles to fully mobilize the available soil resistance (see discussion in 5.2.2). The match quality number provides an indication of the similarity between the computed and measured pile head response. A match quality number of 1 indicates a perfect match. A match quality number less than 3 is generally considered a satisfactory match. The results provided in Appendix D include:

- Distributions of soil resistance, Smith damping, and quake values along the length of the pile;
- An extrema table with maximum and minimum values of force, and maximum values of compressive stress, tension stress, transferred energy, velocity, and displacement along the length of the pile;
- A summary of Case Method capacities based on a range of damping values; and
- A table of the pile profile and model.

Driving Designation	Blow No.	Penetration (m)	Blow Count (bpqm)	Mobilized SRD			Damping		Quake		Case Capacity (MN)	Transferred Energy (kJ)	Match Quality No.	Transducer Set
				Total (MN)	Skin Friction (MN)	End Bearing (MN)	Side (sec/m)	Point (sec/m)	Side Quake (mm)	Toe Quake (mm)				
BOID	5	69.00	58	36.3	28.9	7.4	0.75	1.77	2.5	2.5	42.9	642	1.98	PDA 2
EOID	2193	95.50	26	64.8	38.5	26.3	0.26	0.36	1.5	7.1	59.2	1823	1.94	PDA 1
EOID	2197	92.50	26	56.3	33.6	22.7	0.26	0.36	1.5	6.9	46.1	1221	2.30	PDA 2
EOR	40	92.75	55	76.8	63.9	13.0	0.33	0.46	3.3	4.3	61.1	1578	1.83	PDA 1
EOR	51	92.75	55	69.2	62.5	6.6	0.62	0.16	3.3	3.0	60.3	1643	1.57	PDA 2
BOR2	1	92.75	143	54.6	46.4	8.1	0.82	0.82	3.3	1.3	48.6	1292	1.99	PDA 1
BOR2	1	92.75	143	59.5	48.1	11.4	0.79	1.31	3.8	1.8	53.5	1423	1.72	PDA 2
EOR2	138	93.00	143	69.9	46.3	23.6	1.05	1.12	4.8	0.8	61.1	1582	1.38	PDA 1
BOR3	1	93.00	330	54.6	51.0	3.6	0.59	0.85	1.0	4.1	47.9	1274	1.96	PDA 2
BOR3	2	93.00	330	58.9	52.8	6.1	0.62	1.64	4.8	1.8	51.3	1318	1.50	PDA 1
BOR3	45	93.00	330	62.6	52.3	10.3	0.85	1.15	6.4	1.5	58.9	1489	1.34	PDA 1
EOR3	195	93.25	330	59.6	48.6	11.0	0.72	1.05	5.8	2.0	58.8	1412	1.32	PDA 1

NOTE: Mobilized soil resistance to driving (SRD) values underestimate the actual soil resistance due to the inability of the hammer to mobilize the available SRD. See text for additional discussion.

BOID = Beginning of Initial Driving
EOID = End of Initial Driving
BOR = Beginning of Restrike No.
EOR = End of Restrike No.
SRD = Soil Resistance to Driving, the mobilized static pile capacity during driving

SUMMARY OF CAPWAP RESULTS
Pile No. 1, Section D, Menck MHU 1700 Hammer
Pile Installation Demonstration Project
SFOBB East Span Seismic Safety Project

TABLE 5.1a

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Driving Designation	Blow No.	Penetration (m)	Blow Count (bpqm)	Mobilized SRD			Damping		Quake		Case Capacity (MN)	Transferred Energy (kJ)	Match Quality No.	Transducer Set
				Total (MN)	Skin Friction (MN)	End Bearing (MN)	Side (sec/m)	Point (sec/m)	Side Quake (mm)	Toe Quake (mm)				
BOID	5	68.50	80	31.2	25.1	6.1	0.92	1.18	2.5	1.0	34.1	395	1.62	PDA 1
EOID	1909	93.50	29	70.1	44.9	25.3	0.36	0.36	2.5	4.3	55.2	1421	2.12	PDA 1
EOID	1945	93.50	29	66.6	42.3	24.3	0.36	0.33	3.3	5.1	53.4	1539	2.14	PDA 2
BOR	3	93.50	40	61.7	53.0	8.8	0.79	1.08	5.1	1.8	55.5	1391	1.01	PDA 1
BOR	12	93.50	40	73.4	63.9	9.6	0.49	1.48	4.8	2.5	60.6	1567	1.73	PDA 2
BOR2	5	93.65	130	53.4	41.8	11.6	0.66	1.51	2.5	3.3	52.3	1360	1.77	PDA 1
EOR2	90	93.85	130	67.6	49.1	18.6	0.79	0.98	4.1	1.5	54.4	1378	1.34	PDA 1

NOTE: Mobilized soil resistance to driving (SRD) values underestimate the actual soil resistance due to the inability of the hammer to mobilize the available SRD. See text for additional discussion.

BOID = Beginning of Initial Driving
EOID = End of Initial Driving
BOR = Beginning of Restrike No.
EOR = End of Restrike No.
SRD = Soil Resistance to Driving, the mobilized static pile capacity during driving

SUMMARY OF CAPWAP RESULTS
Pile No. 2, Section D, Menck MHU 1700 Hammer
Pile Installation Demonstration Project
SFOBB East Span Seismic Safety Project

TABLE 5.1b

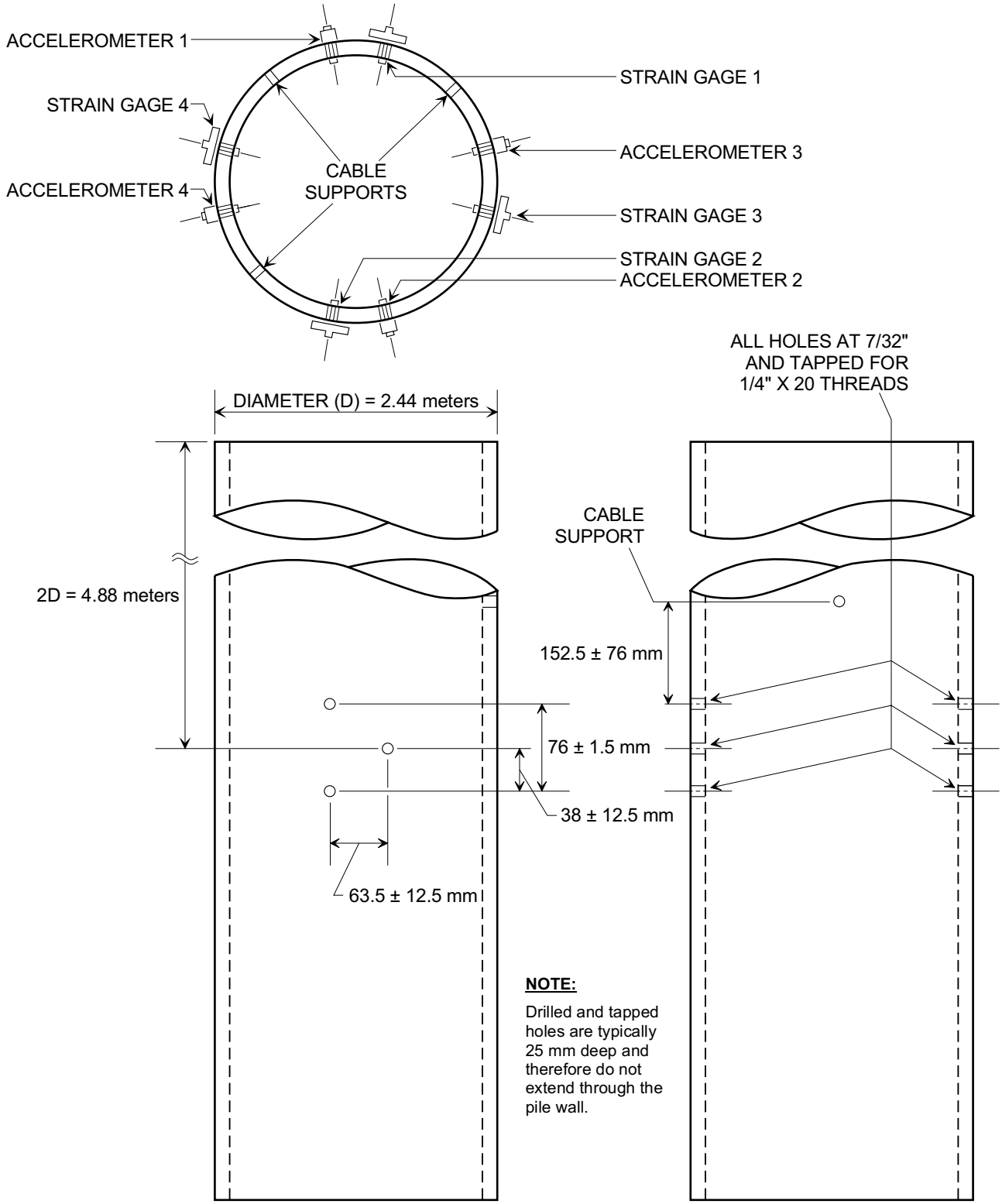
Driving Designation	Blow No.	Penetration (m)	Blow Count (bpqm)	Mobilized SRD			Damping		Quake		Case Capacity (MN)	Transferred Energy (kJ)	Match Quality No.	Transducer Set
				Total (MN)	Skin Friction (MN)	End Bearing (MN)	Side (sec/m)	Point (sec/m)	Side Quake (mm)	Toe Quake (mm)				
BOID	1	68.25	46	27.9	19.8	8.2	0.69	1.38	2.0	3.8	34.6	444	1.44	PDA 1
BOID	1	68.25	46	28.7	19.7	9.0	0.69	1.51	2.5	3.3	36.1	438	1.76	PDA 2
EOID	2181	94.50	33	62.1	33.5	28.6	0.23	0.33	1.5	8.6	52.0	1542	1.96	PDA 1
EOID	2169	94.50	33	70.4	43.1	27.3	0.33	0.36	2.0	5.3	59.5	1531	1.99	PDA 2
BOR	1	94.50	51	45.0	35.7	9.4	0.43	1.41	2.5	3.3	41.8	699	1.45	PDA 1
BOR	2	94.50	51	54.1	45.9	8.2	0.85	1.64	4.8	1.5	41.6	790	1.95	PDA 2
EOR	26	94.80	51	66.2	56.3	9.9	0.56	1.12	4.8	2.8	59.7	1460	1.31	PDA 2
EOR	52	94.80	51	61.2	51.2	10.1	0.66	0.89	3.0	2.8	58.2	1465	1.05	PDA 1

NOTE: Mobilized soil resistance to driving (SRD) values underestimate the actual soil resistance due to the inability of the hammer to mobilize the available SRD. See text for additional discussion.

BOID = Beginning of Initial Driving
EOID = End of Initial Driving
BOR = Beginning of Restrike No.
EOR = End of Restrike No.
SRD = Soil Resistance to Driving, the mobilized static pile capacity during driving

SUMMARY OF CAPWAP RESULTS
Pile No. 3, Section D, Menck MHU 1700 Hammer
Pile Installation Demonstration Project
SFOBB East Span Seismic Safety Project

TABLE 5.1c



PDA INSTRUMENTATION INSTALLATION
Pile Installation Demonstration Project
SFOBB East Span Seismic Safety Project

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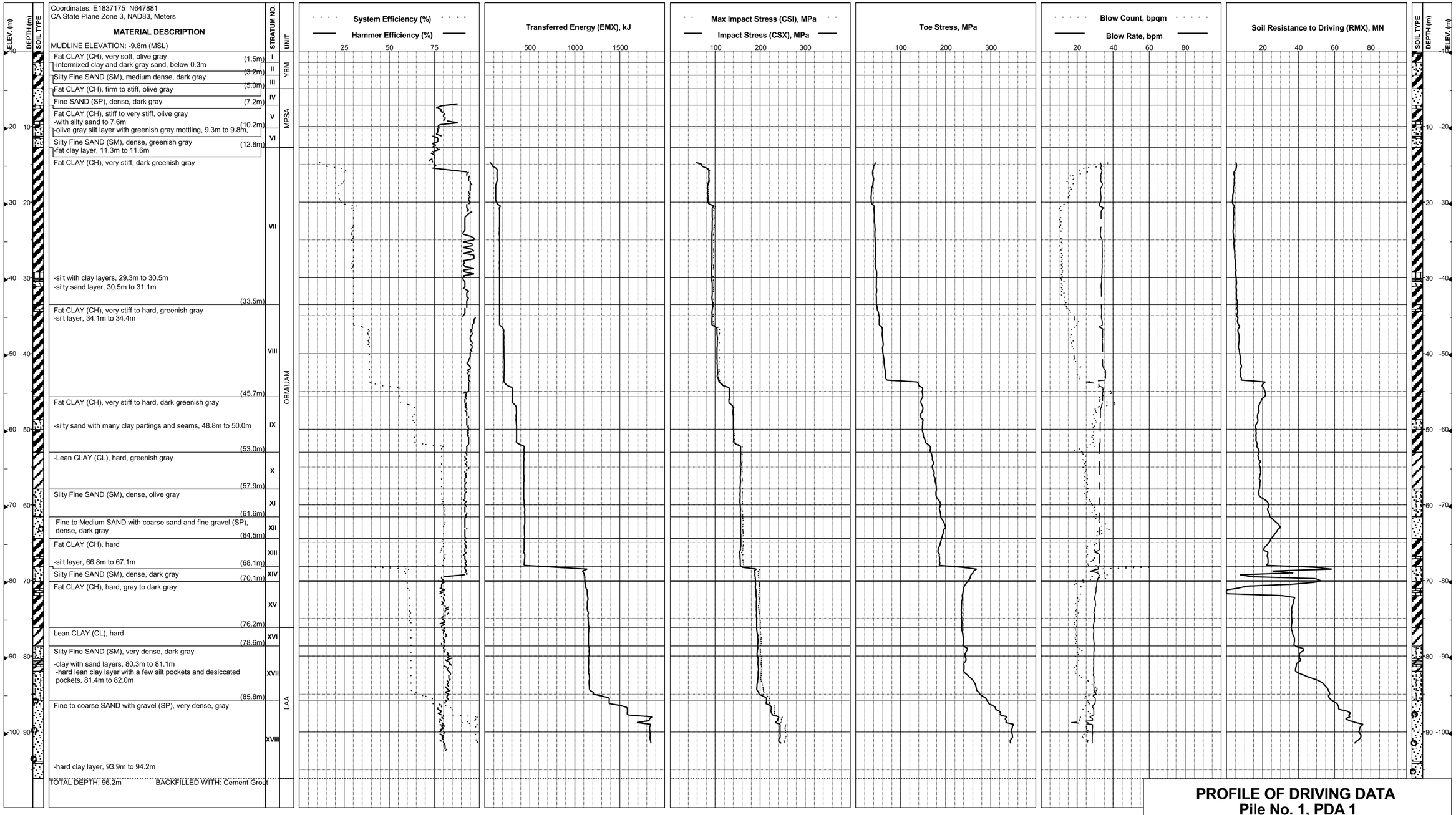
Earth Mechanics

FUGRO

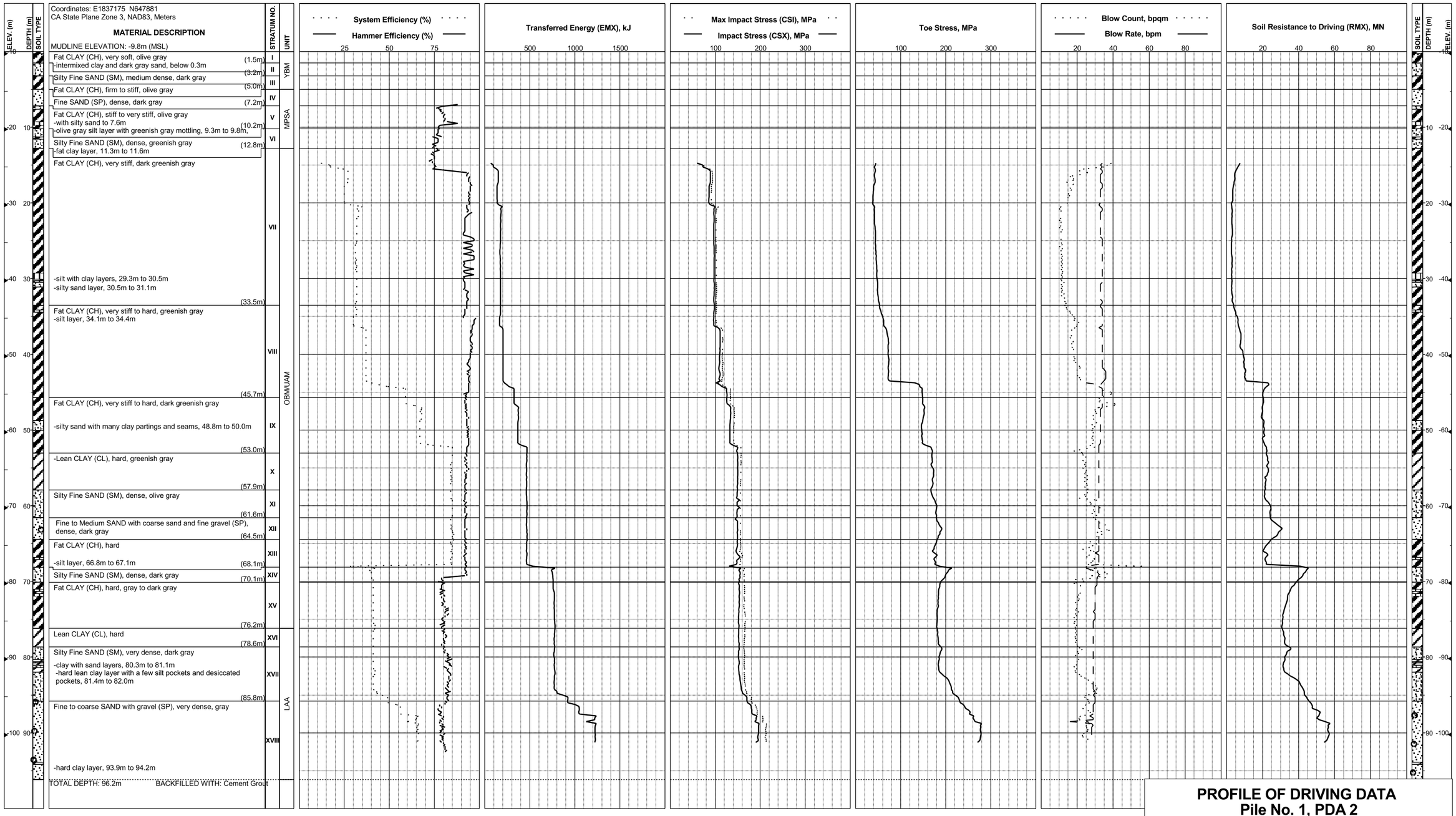


NOTE: Stratigraphy is based on Boring 98-82. Actual stratigraphy may vary at the Primary Test Location.

PROFILE OF DRIVING DATA
Pile No. 1, PDA 1
Pile Installation Demonstration Project
SFOBB East Span Seismic Safety Project

Earth Mechanics

FUGRO



NOTE: Stratigraphy is based on Boring 98-82. Actual stratigraphy may vary at the Primary Test Location.

PROFILE OF DRIVING DATA
Pile No. 1, PDA 2
Pile Installation Demonstration Project
SFOBB East Span Seismic Safety Project

Earth Mechanics

FUGRO

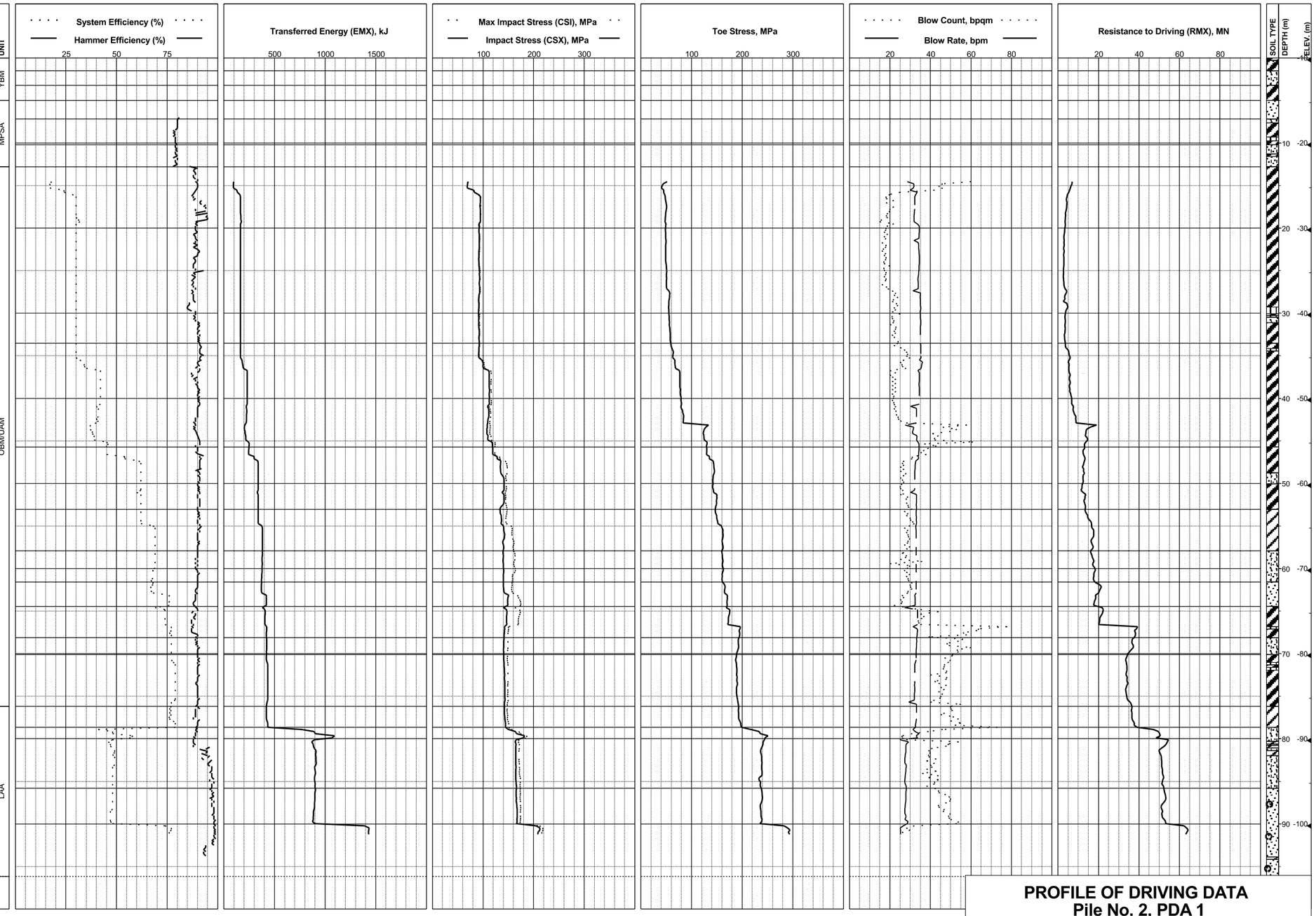
Coordinates: E1837175 N647881
CA State Plane Zone 3, NAD83, Meters

MATERIAL DESCRIPTION

MUDLINE ELEVATION: -9.8m (MSL)

Material description	Depth (m)	Stratum no.	Unit
Fat CLAY (CH), very soft, olive gray -intermixed clay and dark gray sand, below 0.3m	(1.5m)	I	YBM
Silty Fine SAND (SM), medium dense, dark gray	(3.2m)	II	
Fat CLAY (CH), firm to stiff, olive gray	(5.0m)	III	
Fine SAND (SP), dense, dark gray	(7.2m)	IV	MPSA
Fat CLAY (CH), stiff to very stiff, olive gray -with silty sand to 7.6m -olive gray silt layer with greenish gray mottling, 9.3m to 9.8m,	(10.2m)	V	
Silty Fine SAND (SM), dense, greenish gray -fat clay layer, 11.3m to 11.6m	(12.8m)	VI	
Fat CLAY (CH), very stiff, dark greenish gray -silt with clay layers, 29.3m to 30.5m -silty sand layer, 30.5m to 31.1m	(33.5m)	VII	OBM/UAM
Fat CLAY (CH), very stiff to hard, greenish gray -silt layer, 34.1m to 34.4m	(45.7m)	VIII	
Fat CLAY (CH), very stiff to hard, dark greenish gray -silty sand with many clay partings and seams, 48.8m to 50.0m	(53.0m)	IX	
-Lean CLAY (CL), hard, greenish gray	(57.9m)	X	
Silty Fine SAND (SM), dense, olive gray	(61.6m)	XI	
Fine to Medium SAND with coarse sand and fine gravel (SP), dense, dark gray	(64.5m)	XII	
Fat CLAY (CH), hard -silt layer, 66.8m to 67.1m	(68.1m)	XIII	
Silty Fine SAND (SM), dense, dark gray	(70.1m)	XIV	
Fat CLAY (CH), hard, gray to dark gray	(76.2m)	XV	
Lean CLAY (CL), hard	(78.6m)	XVI	LAA
Silty Fine SAND (SM), very dense, dark gray -clay with sand layers, 80.3m to 81.1m -hard lean clay layer with a few silt pockets and desiccated pockets, 81.4m to 82.0m	(85.8m)	XVII	
Fine to coarse SAND with gravel (SP), very dense, gray -hard clay layer, 93.9m to 94.2m		XVIII	

TOTAL DEPTH: 96.2m BACKFILLED WITH: Cement Grout



NOTE: Stratigraphy is based on Boring 98-82. Actual stratigraphy may vary at the Primary Test Location.

PROFILE OF DRIVING DATA
Pile No. 2, PDA 1
Pile Installation Demonstration Project
SFOBB East Span Seismic Safety Project

Earth Mechanics

FUGRO

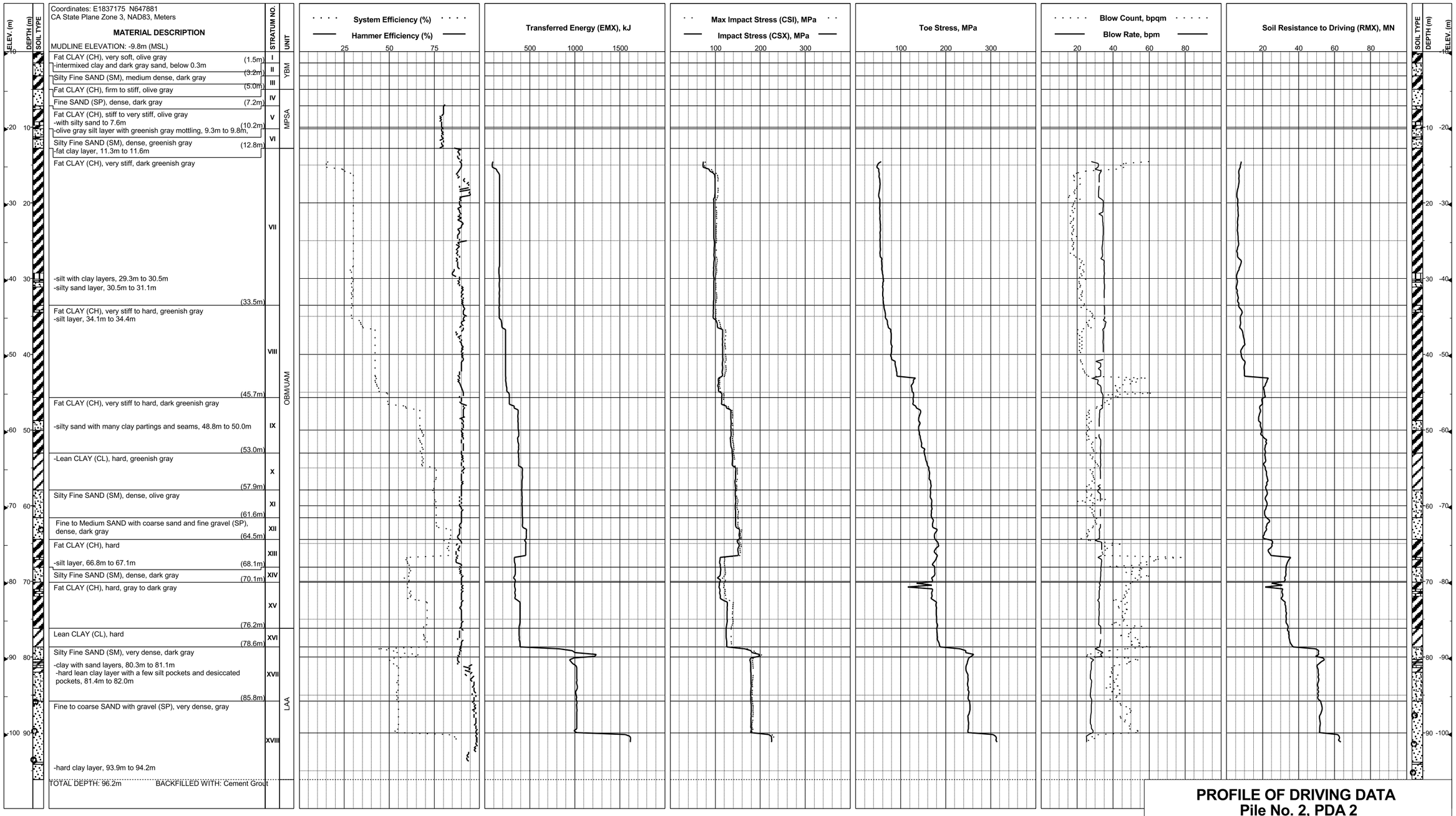
Coordinates: E1837175 N647881
CA State Plane Zone 3, NAD83, Meters

MATERIAL DESCRIPTION

MUDLINE ELEVATION: -9.8m (MSL)

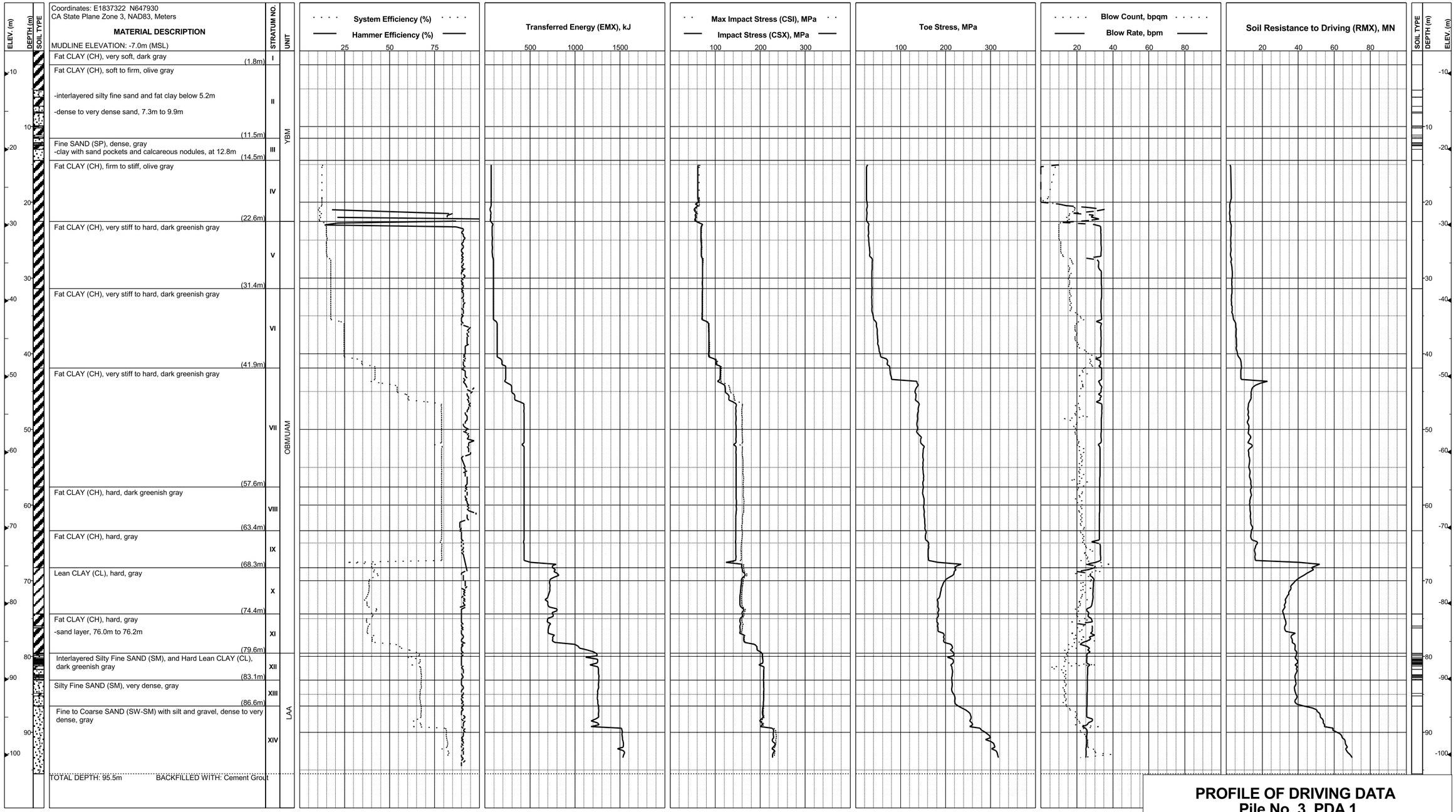
Material description	Depth (m)	Stratum no.	Unit
Fat CLAY (CH), very soft, olive gray -intermixed clay and dark gray sand, below 0.3m	(1.5m)	I	YBM
Silty Fine SAND (SM), medium dense, dark gray	(3.2m)	II	
Fat CLAY (CH), firm to stiff, olive gray	(5.0m)	III	
Fine SAND (SP), dense, dark gray	(7.2m)	IV	MPSA
Fat CLAY (CH), stiff to very stiff, olive gray -with silty sand to 7.6m -olive gray silt layer with greenish gray mottling, 9.3m to 9.8m,	(10.2m)	V	
Silty Fine SAND (SM), dense, greenish gray -fat clay layer, 11.3m to 11.6m	(12.8m)	VI	
Fat CLAY (CH), very stiff, dark greenish gray -silt with clay layers, 29.3m to 30.5m -silty sand layer, 30.5m to 31.1m	(33.5m)	VII	OBM/UAM
Fat CLAY (CH), very stiff to hard, greenish gray -silt layer, 34.1m to 34.4m	(45.7m)	VIII	
Fat CLAY (CH), very stiff to hard, dark greenish gray -silty sand with many clay partings and seams, 48.8m to 50.0m	(53.0m)	IX	
-Lean CLAY (CL), hard, greenish gray	(57.9m)	X	
Silty Fine SAND (SM), dense, olive gray	(61.6m)	XI	
Fine to Medium SAND with coarse sand and fine gravel (SP), dense, dark gray	(64.5m)	XII	
Fat CLAY (CH), hard -silt layer, 66.8m to 67.1m	(68.1m)	XIII	
Silty Fine SAND (SM), dense, dark gray	(70.1m)	XIV	
Fat CLAY (CH), hard, gray to dark gray	(76.2m)	XV	
Lean CLAY (CL), hard	(78.6m)	XVI	LAA
Silty Fine SAND (SM), very dense, dark gray -clay with sand layers, 80.3m to 81.1m -hard lean clay layer with a few silt pockets and desiccated pockets, 81.4m to 82.0m	(85.8m)	XVII	
Fine to coarse SAND with gravel (SP), very dense, gray -hard clay layer, 93.9m to 94.2m		XVIII	

TOTAL DEPTH: 96.2m BACKFILLED WITH: Cement Grout



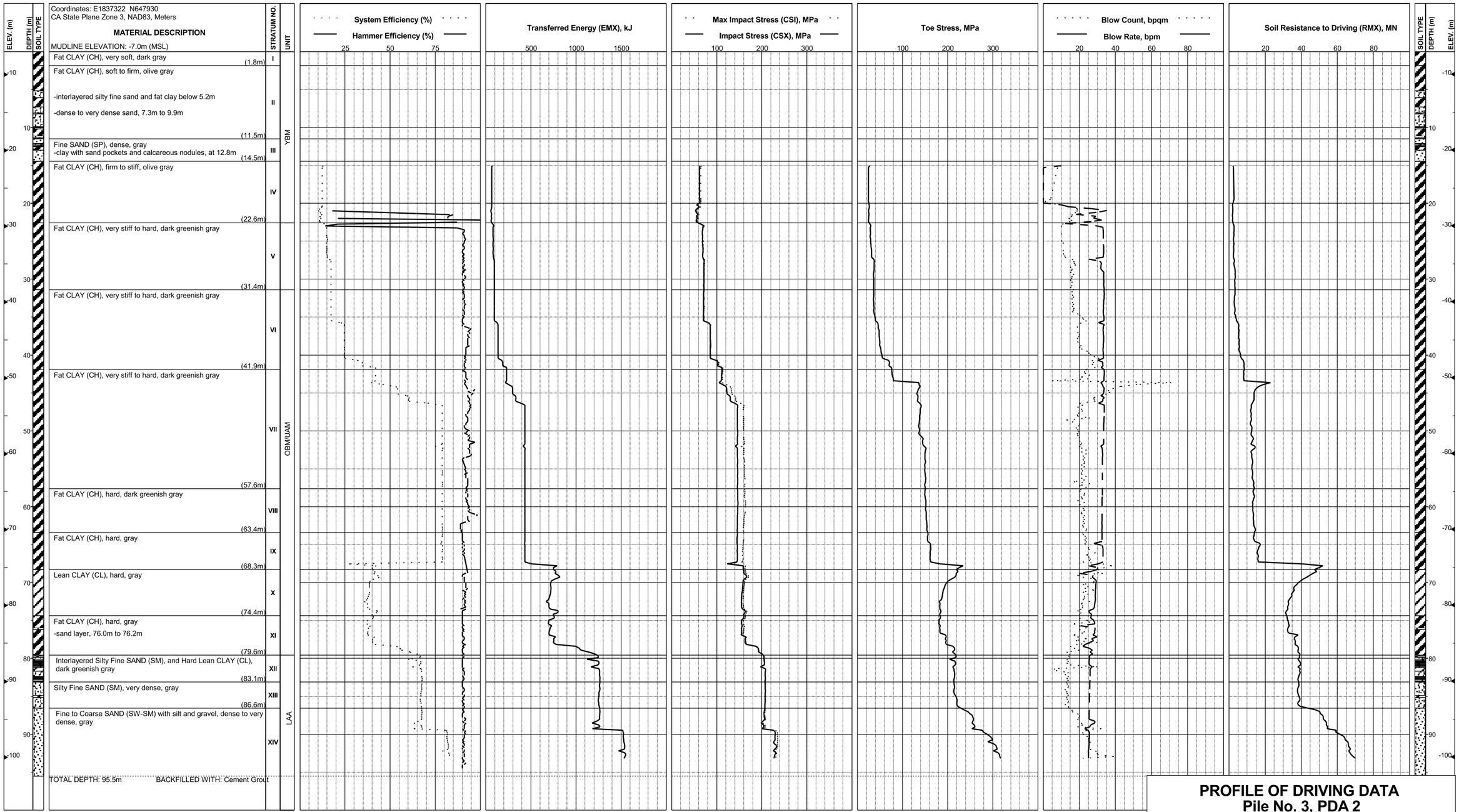
NOTE: Stratigraphy is based on Boring 98-82. Actual stratigraphy may vary at the Primary Test Location.

PROFILE OF DRIVING DATA
Pile No. 2, PDA 2
Pile Installation Demonstration Project
SFOBB East Span Seismic Safety Project



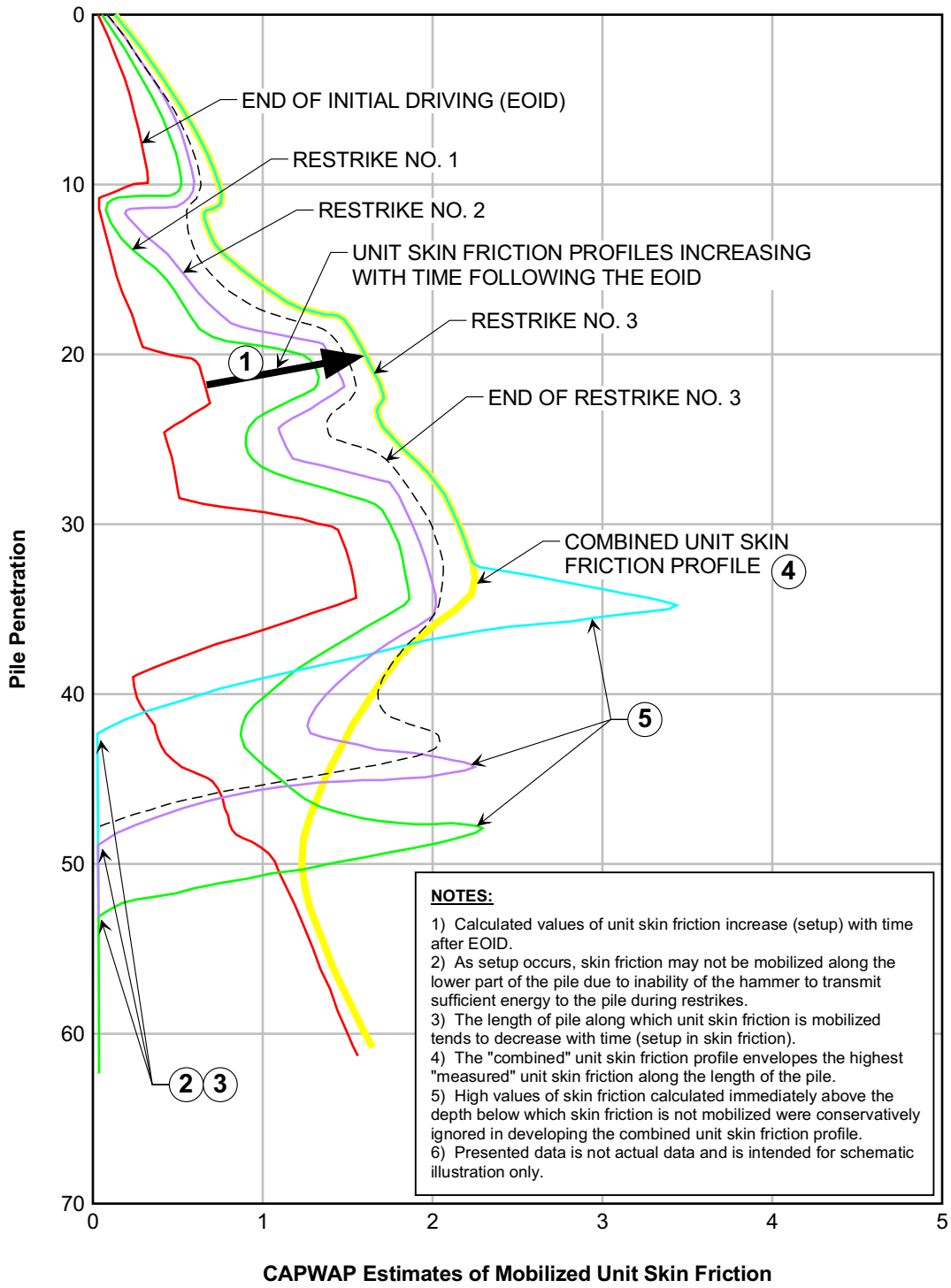
NOTE: This soil profile is based on Boring 98-49, Boring 98-30, and available geophysical data at the Pile No. 3 Test Location.
This soil profile is intended to be an estimate of actual field conditions and is likely to vary from the indicated profile.
Note that according to the geophysical mapping, the sand layer present in Boring 98-49 from approximately 31 to 42 meters does not exist at the Pile No. 3 Test Location.

PROFILE OF DRIVING DATA
Pile No. 3, PDA 1
Pile Installation Demonstration Project
SFOBB East Span Seismic Safety Project



PROFILE OF DRIVING DATA
Pile No. 3, PDA 2
Pile Installation Demonstration Project
SFOBB East Span Seismic Safety Project

NOTE: This soil profile is based on Boring 98-42, Boring 98-30, and available geophysical data at the Pile No. 3 Test Location.
This soil profile is intended to be an estimate of actual field conditions and is likely to vary from the indicated profile.
Note that according to the geophysical mapping, the sand layer present in Boring 98-49 from approximately 31 to 42 meters does not exist at the Pile No. 3 Test Location.



SCHEMATIC ILLUSTRATION OF COMBINED CAPWAP ANALYSES
Pile Installation Demonstration Project
SFOBB East Span Seismic Safety Project

PLATE 5.5

SECTION 6.0
INTERPRETATION AND EVALUATION OF DRIVING DATA AND ANALYSES

6.0 INTERPRETATION AND EVALUATION OF DRIVING DATA AND ANALYSES

6.1 HAMMER EFFICIENCY AND ENERGY TRANSFER

A pile driving hammer's performance is typically evaluated by monitoring its mechanical and system efficiency. The hammer's mechanical efficiency (hereafter referred to as hammer efficiency) is defined as the ratio of the available ram kinetic energy at impact to the theoretical ram potential energy calculated at the equivalent hammer stroke. The system efficiency is defined as the ratio of the measured energy transmitted to the pile head to the maximum rated energy of the hammer (approximately 550 kJ for the Menck MHU 500 hammer and 1,870 kJ for the Menck MHU 1700 hammer when operating above water). The system efficiency provides a measure of the overall hammer-pile system performance.

6.1.1 Hammer Efficiency

The hammer efficiency can be approximated from PDA data by evaluating the measured ram momentum (see Appendix A). However, the MHU 500 and 1700 hammers have data monitoring/acquisition systems that provide direct readings of: a) the ram kinetic energy measured immediately preceding the ram-anvil impact, and b) the theoretical energy available as computed from the measured hammer stroke and hydraulic fluid pressure. The ratio of the measured kinetic energy to the theoretical energy available at impact is taken as the hammer (mechanical) efficiency.

Profiles of hammer (mechanical) efficiency as measured by the Menck data acquisition system are provided on Plates 5.2 through 5.4. In evaluating "satisfactory hammer performance," a minimum hammer efficiency value of approximately 90 percent is typically recommended for hydraulic hammers with a steel-on-steel impact. The data show that both the MHU 500 and 1700 hammers typically operated at between 89 and 94 percent hammer efficiency. However, during the driving of the A sections for Pile Nos. 1 through 3, the measured hammer efficiencies were between 75 and 80 percent. This was likely due to the fact that the hammer (MHU 500) was being operated at the extreme low end of its operating range of energy. It is likely that the inherent system energy losses at the lowest hammer energy constitute a relatively greater portion of the available hammer energy. One other set of anomalous readings occurred during the driving of Pile 1, Section D with the MHU 1700 hammer. For this section, the hammer efficiencies were between 78 to 84 percent. These lower values are attributed to a malfunctioning hydraulic pressure sensor that resulted in the calculation of higher theoretical energy and therefore lower hammer efficiency.

6.1.2 Energy Transfer/System Efficiency

Energy Transfer. The energy transferred to the pile head (EMX) was measured by the PDA monitoring system. EMX is calculated by the numerical integration of the measured PDA force and velocity time histories for a given hammer blow (see Appendix A for further discussion). During the PIDP, recorded EMX values varied depending on the type of hammer and the percentage of the available hammer energy that was applied. Table 4.4 provides a summary of the typical EMX values at the end of driving of each section. In addition, profiles of EMX are provided for each pile on Plates 5.2 through 5.4. When running at full energy, the MHU 500 hammer typically transferred between 430 and 450 kJ of energy to the pile head, while the MHU 1700 hammer transferred between 1,400 and 1,600 kJ.

System Efficiency. The system efficiency is evaluated by comparing the measured energy transferred to the pile head (the PDA quantity EMX) to the maximum rated hammer energy. Profiles of measured system efficiencies are also provided on Plates 5.2 through 5.4. As defined, the system efficiency is really only a meaningful quantity when the hammers are operating at full energy. In evaluating "satisfactory hammer performance," a minimum system efficiency value of approximately 75 percent is typically recommended for hydraulic hammers with a steel-on-steel impact. Generally, the MHU 500 and 1700 hammers operated above this recommended minimum value. Measured system efficiencies when the hammers were operated at full energy ranged from 75 to 85 percent.

Overall, data obtained from the PDA and the hammer data acquisition system indicate that both the MHU 500 and 1700 hammer performances, as defined by the hammer and system efficiencies, were above the recommended minimum values used to define satisfactory hammer performance.

6.2 DRIVING STRESSES

6.2.1 Allowable Compressive Stress

The highest stress level in the life of the pile generally occurs during driving. For efficient utilization of both driving hammer and pile material, it is desirable to stress the pile to the practical limit during driving. The high strain rate and temporary nature of the loading allow a substantially higher allowable stress than for static loading. The PIDP specifications stated that the measured combined static and dynamic pile stress during driving should be limited to no more than 95 percent of the yield stress of steel (f_y). However, it is recommended that driving generally be terminated when the maximum driving stress is greater than 90 percent the yield stress of steel (f_y) due to:

- The ±5 percent accuracy of the measured force and velocity signals,
- Additional static stresses due to the moments induced by the self weight of the pile and the weight of the hammer on a batter pile; and
- The potential for underestimating driving stresses when battered piles are driven into horizontal rock layers, or when vertical piles are driven into sloping rock layers. Stress concentrations could result from higher end bearing on portions of the driving shoe.

Coupon tests were performed by others on the delivered pile sections to measure the yield strength of the steel pile sections. A total of 15 tests were performed with an average measured yield strength of approximately 370 MPa (as compared to the 345 MPa yield stress specified for the piles**)**. Therefore, the recommended maximum driving stress for the pile sections used for the PIDP program is approximately 333 MPa.

6.2.2 Measured Stresses

Measured Stresses. In addition to directly measuring the pile head stress during driving, the PDA data also provide estimates of the maximum tension stress and maximum compressive toe stress in the pile for each hammer blow. The pile head compressive stress (CSX) measured by the PDA system is an <u>average</u> of the maximum pile head stresses measured by the pair of strain gauges that comprise one set of PDA instruments. The <u>maximum</u> of the stresses measured by the two strain gauges is the PDA output, CSI. The maximum toe stress during driving is estimated by dividing the computed total Case resistance (dynamic plus static) by the steel area of the pile toe. The maximum tension stress (TSX) during driving is calculated by considering the magnitude of the upward and downward traveling waves (see Appendix A for further discussion). However, tension stresses are typically not an issue when driving steel pipe piles. Profiles of measured CSX, CSI, and computed toe stress are provided on Plates 5.2 through 5.4 for Pile Nos. 1 through 3. In addition, a summary table providing the CSX, CSI, and toe stress values computed from the average of the two PDA data sets is provided on Table 4.4.

Measured pile head stress (CSX) was typically well below the recommended allowable driving stress. During initial driving and restrikes using the MHU 1700 hammer, the maximum average measured compressive stress (CSX) did not exceed approximately 225 MPa (average of two PDA data sets). However, the computed value of toe stress approached the allowable stress levels during the restrikes. High levels of toe stress are expected when driving piles into soils with high end-bearing capacity (e.g., the very dense medium to coarse sand and gravel encountered near the PIDP pile tip elevations). In these conditions, when the downward traveling compression wave reaches the high-end-bearing-supported pile tip and is reflected back, the upward and downward waves superimpose, creating high compressive toe stresses. Average values of toe stress from the two PDA data sets were as high as 327 MPa (approximately 88 percent of the pile yield stress) during the second restrike on Pile No. 1. The

highest calculated average value of toe stress during initial driving was approximately 308 MPa, or approximately 83 percent of the yield stress. We recommend that toe stresses be closely monitored during production pile driving to reduce the possibility of damaging the piles during installation. This is particularly true for the piles expected to be driven into the top of the weathered Franciscan Formation bedrock (Piers E3 through E5).

Stress Eccentricities. As mentioned in Section 5.1, two sets of PDA instruments were installed on each pile to provide redundancy and better quantify pile head stress eccentricities. The presence of the four strain gauges allowed for the comparison of stresses on four sides of a pile instead of just two. This reduces the potential for "missing" high pile head stresses induced by eccentric hammer impact.

Among one set of PDA instruments, a comparison of the CSX and CSI values provides a good indication of the presence of eccentric pile head stresses that occur on opposite sides of a pile. Since CSX is the average stress of two strain gauges and CSI is the maximum stress from the two strain gauges, a minimal difference between the two values indicates uniform stress distribution between the two gauges. Profiles of CSX and CSI are provided on Plates 5.2 through 5.4. A comparison of the two values indicates that on average, CSI is greater than CSX by less than 3 to 6 percent for any one set of gauges, suggesting that pile head stresses typically were distributed uniformly.

Comparison of the two PDA data sets also shows relatively small eccentric pile head stresses during driving with differences typically ranging from 3 to 7 percent. However, relatively large differences in measured pile head stresses were noted between the two PDA sets during the initial driving of Pile 1, Section D. For that pile section, the measured CSX values typically differed by 20 percent between the two PDA sets. Eccentric stresses such as these are typically due to uneven contact between the hammer and pile. Measurements by Caltrans verified that the pile head had deviations greater than 11 mm around the circumference of the pile. This deviation is outside the tolerance specified in the 100% PS&E Design Submittal for the production piles.

In general, the PDA data indicate that the hammer-pile contact was "square," resulting in relatively uniformly distributed pile impact stresses for both the vertical and battered piles. However, it was also demonstrated that uneven pile cutoffs could lead to relatively high and eccentric pile head stresses. These high stresses can result in pile damage and/or additional stress and wear on the pile hammers. For the production pile program, we recommend that piles cut off prior to redriving be closely monitored to ensure that the cuts are even.

6.3 EVALUATION OF STATIC PILE CAPACITY, PILE SETUP, AND DRIVABILITY

6.3.1 Soil Resistance to Driving (SRD)

PDA Estimates of SRD. Estimates of SRD were computed from PDA data as the maximum Case Method capacity (RMX) using a damping coefficient (J) of 0.5 (see Appendix A for further discussion). Experience with driving long, large-diameter steel pipe piles in clay suggests that this damping value generally provides a reasonable estimate of SRD.

The calculated RMX capacities are generally considered to be rough estimates of soil resistance, and their accuracy is considered limited for pipe piles with variable wall thickness such as the piles driven for the PIDP program. Estimates of RMX capacities are generally most reliable during moderate to hard driving conditions (i.e., there is significant soil resistance). At very low resistances, the RMX method may provide poor estimates of static pile capacity. At the other extreme, during very hard driving, the RMX capacities may underestimate the available SRD because the driving hammer is not able to transfer sufficient energy to the pile to mobilize the available soil resistance. However, RMX values do provide reasonable estimates of SRD and can be used to show general trends and features in the SRD profiles. A comparison of RMX (with J = 0.5) and CAPWAP capacities shows reasonable agreement, and validates the use of RMX capacities as SRD values. At the end of initial driving of the three D sections, the CAPWAP and RMX (J = 0.5) capacities were within an average of 6 percent of each other. The total CAPWAP capacities at the end of initial driving for the three PIDP piles are plotted on Plates 6.1 and 6.2 for comparison with the RMX capacities.

Profiles of estimated SRD are provided on Plates 5.2 through 5.4 for Pile Nos. 1 through 3. In addition, Table 4.4 provides a summary of RMX values at the end of driving of each pile section and at the beginning of restrikes.

Relevant observations based on the estimated PDA-measured SRD values (RMX) include:

- The average of PDA estimates of SRD (average of the two PDA data sets) for each of the three piles at the end of initial driving of the D sections was almost the same (approximately 63 MN for each).
- The SRD typically increased significantly during initial driving at penetrations below approximately 80 meters. This increase is likely due to the very dense, fine to coarse sands within the Lower Alameda Alluvial sediments.
- The SRD profiles for Pile Nos. 1 and 2 are very similar, which indicates that pile batter did not significantly affect SRD at the Primary Test Location.

- SRD increased by a factor of 2 to 3 during the 3- to 5-day welding delays between the driving of sections. This increase is attributed to a combination of skin friction setup and the tendency of the piles to initially drive "plugged" following the delays.
- SRD values were similar (about 65 to70 MN) following the first restrike on each pile, which indicates that the MHU 1700 was not able to fully mobilize the available soil resistance during the first series of restrikes.

Predicted SRD. Predicted SRD profiles were generated for the Primary Test Location (Pile Nos. 1 and 2) and the Pile No. 3 Test Location. Two ranges of predicted SRD profiles were generated for each location. One range was based on the methodology presented by Stevens et al. (1982) and the other was calculated by reducing the American Petroleum Institute (API) (1993a,b) calculated clay skin friction pile capacity by measured clay sensitivities (the ratio of the undisturbed to remolded clay shear strengths).

For large-diameter pipe piles, Stevens et al. (1982) recommends computing lower- and upper-bound values of SRD for both coring and plugged pile conditions. The use of lower- and upper-bound soil resistance curves has been validated by experience gained from previous projects. Fugro-EM experience with driving large-diameter steel pipe piles into predominantly clay soils indicates that the soil resistance calculated for a "coring" pile generally will provide the best estimate of the field blow counts, provided the pile wall is of adequate thickness to effectively transmit the energy imparted by an adequately sized pile driving hammer.

With the exception of clay skin friction, the unit skin friction and unit end-bearing values used in the drivability analyses are the same as those used to compute static pile capacity. For piles driven into cohesive soils, the Stevens et al. (1982) method uses unit skin friction during continuous driving computed using the stress history approach presented by Semple and Gemeinhardt (1981). The unit skin friction for static loading is first computed by using the method recommended by API (1986). The SRD in clay is then calculated by incrementally reducing the API (1986) unit skin friction values by multiplying by a pile capacity factor that is a function of the overconsolidation ratio (OCR) of the cohesive soil. A detailed description of the Stevens et al. (1982) method is presented in the Axial Pile Design and Drivability Report (Fugro-EM, 2001a).

The sensitivity-based approach generally uses the same methodology as the Stevens et al. (1982) method (referred to hereafter as the Stevens Method) with the exceptions that: 1) the unit skin friction for static loading is computed using the more recent API (1993a,b) recommendations, and 2) the clay SRD is calculated by incrementally reducing the calculated API (1993a,b) clay unit skin friction values by multiplying by the inverse of the measured clay sensitivity values. The sensitivity-based reduction of unit skin friction in clay for the development of SRD is similar to a model presented by Dutt et al. (1995) that predicts SRD for large-diameter pipe piles in normally consolidated clays.

For the Primary Test Location (Pile Nos. 1 and 2), the predicted SRD profiles were developed based on stratigraphy and soil properties taken from Boring 98-82. For Pile No. 3, the SRD profiles were developed from an assumed soil profile based on soil properties from adjacent Borings 98-49 and 98-30 with stratigraphy that was modified based on available geophysical surfaces mapped at the Pile No. 3 test location.

Profiles of measured and predicted SRD are presented on Plate 6.1 for Pile Nos. 1 and 2 and on Plate 6.2 for Pile No. 3. Note that only the predicted upper- and lower-bound coring case SRD profiles are presented since the piles cored during initial driving.

Comparison of PDA-Measured and Predicted SRD. The PDA-measured SRD profiles for Pile Nos. 1 through 3 generally follow or are slightly lower than the Stevens lower-bound coring case profile below a penetration of approximately 45 meters. Above that penetration, the Stevens Method overpredicts SRD relative to the PDA measurements. This difference may be attributed to an unanticipated soil response in the upper portions of the soil profile or to an underestimation of the SRD from the Case capacity method. The maximum Case Method (RMX) is typically applicable for long piles or piles driven through moderate to high soil resistance. However, in the upper 45 meters of driving, the soil resistance is generally relatively low, which increases uncertainty in the PDA-measured SRD values.

The sensitivity-based SRD profiles match the PDA-measured SRD values in the clay portions of the soil profile reasonably well. At the start of driving of each pile section, sensitivity-based SRDs are lower than the PDA-measured values. This is attributed to the setup that occurred during the delay between the driving of sections. After about 5 meters of driving, the setup is broken down and the sensitivity-based method tends to reasonably predict the measured SRD. During the harder driving encountered in the very dense sand layers below a penetration of approximately 80 meters, PDA-measured SRD values tend toward the upper bound of the sensitivity-based SRD values. Pile driving experience has shown that plugged-condition SRD values may be more applicable when driving in significant thicknesses of dense sand.

Based on a comparison with the measured SRD values during driving of the PIDP piles, upper- and lower-bound coring case SRD profiles based on both the Stevens and sensitivity-based methods predicted the SRD at the PIDP locations reasonably well. Those predictive methodologies should therefore provide reasonable estimates of SRD at other locations along the proposed SFOBB alignment.

6.3.2 Pile Setup

Introduction. Pile setup is a complex physical phenomenon whose general mechanisms are understood, but whose specific behaviors or results are more difficult to predict. During continuous driving in clay soils, the clay near the pile tip and wall is repeatedly sheared and remolded, which generates large excess pore water pressures that in turn reduce the effective

stress and soil shear strength in the vicinity of the pile wall. Therefore, the skin friction pile capacity at the end of driving will be significantly less than the static skin friction pile capacity used for design. As the pore pressure generated during the pile installation dissipates and the effective stress in the vicinity of the pile wall increases, the pile capacity will increase. Field measurements from numerous projects and studies have shown that the time required for piles to achieve the ultimate geotechnical capacity in clay soils can be on the order of months to years. Consequently, the axial pile capacity will increase as the construction process proceeds and this should be considered during construction sequencing.

Field measurements have shown that the rate of pile setup in predominantly clay soils differs for displacement and open-ended pipe piles and varies with pile diameter, wall thickness, and horizontal coefficient of consolidation.

Observed Setup in Clay. A series of restrikes was conducted on the PIDP test piles to develop a better understanding of the setup phenomenon at the PIDP locations. Three restrikes were conducted on Pile No. 1, two restrikes were conducted on Pile No. 2, and one restrike was conducted on Pile No. 3. Each of those restrikes was monitored with the PDA, and CAPWAP analyses were performed to better understand the magnitude and distribution of soil resistance along the piles. The results of the CAPWAP analyses were used to develop estimates of pile setup.

The trend of increasing skin friction with time is illustrated on Plates 6.3 through 6.5. Profiles of total unit skin friction are presented on the "a"-suffix plates while the profiles of unit skin friction are presented on the "b"-suffix plates. As shown on those plates, the profiles of total and unit skin friction for each pile increase from the end of initial driving (EOID) and through each of the subsequent restrikes. . Note that the total and unit skin friction profiles shown in Plates 6.3 through 6.5 include both sand and clay layers. However, based on adjacent subsurface exploration data, the unit skin friction profiles include significant thicknesses of clay that clearly demonstrate the setup phenomenon in clay. Also shown for comparison on Plates 6.3 through 6.5 is the design (total and unit) skin friction profiles developed using the modified API procedure documented in Fugro-EM (2001b).

In addition to showing a trend of increasing skin friction with time, Plate 6.3b shows two pronounced peaks at penetrations of approximately 36 and 50 meters, respectively, that coincide with desiccated crusts in the Old Bay Mud/Upper Alameda Marine sequence. These crusts may have higher than predicted skin friction due to an underestimation of the shear strengths and associated alpha values used in the pile capacity calculations. In addition, it is likely that these crusts set up significantly faster due to their generally higher silt content and often desiccated and slickensided (fissured) structure that allows for faster pore pressure dissipation.

Another phenomenon associated with pile driving and setup is the reversal of setup as a pile is driven following the delay causing the setup. Generally, the increased soil resistance due to setup degrades as the pile is driven and the soil is re-sheared, and once again generates excess

pore pressures. This phenomenon is illustrated in the PDA-measured SRD profiles shown on Plates 6.1 and 6.2. Shown on those plates is the relative increase in SRD occurring at the beginning of driving a given section, and the subsequent degradation of SRD as the pile is advanced. However, the data indicate that although the soil resistance will degrade following the re-initiation of pile driving, the soil resistance generally does not fall to values as low as those at the end of driving of the previous section. This phenomenon is not well understood. One possible hypothesis may be that the lower values during initial driving are associated with the relatively greater shearing induced by the pile tip during initial driving, prior to the setup, than by the side of the pile during subsequent redrives.

To quantify the skin friction setup in clay based on the CAPWAP analyses, the CAPWAP-calculated skin friction distributions were compared between the end of initial driving (EOID) and the beginning of restrikes (BOR). For the purpose of this study, setup is defined as the ratio of the skin friction capacity in clay at the BOR to skin friction capacity in clay at the EOID. The incremental clay skin friction capacities were summed along the length of the pile to a depth at which the skin friction was either no longer mobilized or the data were no longer considered representative of the mobilized skin friction. Sand layers were screened out based on available subsurface data. Estimates of setup were obtained from the ratio of the summed skin friction values at the EOID to those for the particular restrike event being considered. Note that the CAPWAP estimates of skin friction at the EOID likely include some portion (possibly 20 to 30 percent) of the inside pile skin friction as discussed in Section 5.2.2. Since it is likely that only the outside skin friction was mobilized at the beginning of the restrikes, the actual setup ratio of the skin friction capacity in clay at the BOR to skin friction capacity in clay at the EOID (on the outside of the pile) may be larger than the CAPWAP data indicates.

Curves of calculated skin friction setup in clay (as defined above) for Pile Nos. 1 through 3 are provided on Plate 6.6 along with a range of predicted setup values. The calculated skin friction resistance in clay increased by factors of 1.4 to 1.8 after approximately 2 days, and to approximately 2.4 after about 1 month. However, as shown on Plate 6.6, there is a great deal of variability between the estimates at each of the pile locations.

Although care was taken in evaluating the setup values from the restrike CAPWAP data, the calculated values of setup are considered approximate due to the inherent limitations in the CAPWAP method. In addition, the longest setup period between a restrike and EOID was only 33 days. This time period is relatively short compared to the anticipated total setup time. Therefore, application and extrapolation of the setup behavior suggested by these evaluations should be performed with caution and appropriate factors of safety. A series of restrikes is to be conducted on the three PIDP piles prior to production pile driving. Assuming that those restrikes will mobilize soil resistance along a significant length of pile, they should provide additional insight to long-term setup behavior.

Comparison of Observed and Predicted Setup in Clay. Observed and predicted curves of skin friction setup versus time are shown on Plate 6.6. Two ranges of predicted setup are shown. One method was developed by Soderberg (1962) and the other by Bogard and Matlock (1990). The Bogard and Matlock approach was used with the understanding that in the absence of any site-specific data for large-diameter, low displacement piles, the estimated setup predictions were likely to be conservative. The Soderberg method has been incorporated to better utilize the available radial coefficient of consolidation data from this project.

Soderberg solved the radial consolidation problem with a finite difference approach. His solution is presented as a plot of percent pore pressure dissipation at the pile surface versus a dimensionless time factor (T) defined as:

$$T = (c_h\, t)/r_p^2$$

where: c_h = coefficient of radial consolidation
t = time
r_p = pile radius

The Bogard and Matlock approach is based on a large number of experiments on Gulf of Mexico clays with instrumented probes and piles having a wide variation in diameters and wall thicknesses. The resultant empirical design procedures that were developed include the effects of pile diameter, wall thickness, and plugging on the rate of consolidation and setup (Bogard and Matlock, 1990). A detailed discussion of the data and methodology behind the development of the design procedure is included in Fugro-EM (2001b). The recommended relationships describing the range of predicted increase of axial geotechnical capacity with time are:

Lower Bound: $Q(t) = Q_u[0.20 + 0.80U]$

Upper Bound: $Q(t) = Q_u[0.33 + 0.67U]$

where: $Q(t)$ = axial capacity due to side shear at time, t
Q_u = ultimate static axial capacity due to side shear
U = percent consolidation (or setup) described by:

$$U = \frac{\frac{t}{t_{50}}}{1 + \frac{t}{t_{50}}}$$

where: t_{50} = time required for dissipation of 50 percent of the excess pore pressures

The predicted ranges of setup curves for the two methods are based on an assumed range of final setup factors (the ratio of the final ultimate capacity to the capacity at the end of initial driving) of 3 to 5. A value of the horizontal coefficient of consolidation (c_h) was chosen for the Soderberg method based on available consolidation data in the Young and Old Bay Muds and a series of multiple orientation consolidation tests that were run as part of the Phase 2 site characterization. From the available consolidation data, a vertical coefficient of consolidation (c_v) from approximately the lower one-third of the available data range was assumed (approximately 8 square meters per year [m^2/year]). Based on available multi-oriented consolidation test data in the overconsolidated range of stresses, the c_v value was multiplied by the ratio of c_h to c_v (approximately 1.5) to obtain a c_h value of approximately 12 m^2/yr. The Bogard and Matlock method inherently uses a c_h value of approximately 5.4 m^2/yr based on field experiments in the Gulf of Mexico. Hence, the Soderberg method predicts a more rapid setup than is predicted by the Bogard and Matlock method.

Plate 6.6 indicates that for Pile No. 1, the predicted setup curves that were based on Soderberg broadly envelope the calculated setup values. The Bogard and Matlock approach underpredicts the rate of setup through the available range of data. Pile 2 appears to set up at a slower rate than Pile 1. This lack of agreement may be explained by the inherent uncertainty associated with the interpretation of the CAPWAP results, the interpretation of soil profiles at the Primary Test Location (i.e., the presence of sand layers), and the relatively short time for comparison relative to the anticipated long time periods to achieve the ultimate pile capacity. The limited available setup data for Pile No. 3 suggest that the pile is setting up at a rate that is faster than Pile Nos. 1 and 2 and is at the upper end of the range predicted using the Soderberg relationship.

In general, the increase of pile capacity with time appears to occur more quickly than originally anticipated. However, an important consideration of relatively fast pile setup is that a contractor may have trouble restarting a pile after significant delays (particularly with an under-sized pile driving hammer).

Setup in Sand. In comparison to clay layers, setup within sand layers generally is expected to occur relatively quickly. The setup rate in sand depends on the amount and type of fines in the sand layer, the grain size distribution, the extent and thickness of the sand layer, the amount of smearing of adjacent clay layers into the sand, and other factors. No attempt has been made to quantify the setup in sand due to: a) uncertainty in delineating the actual thicknesses of sand layers because of limited location-specific geotechnical data; and b) limitations in the CAPWAP analyses relative to accurately delineating unit skin friction values in the relatively thin sand layers shown to be present in nearby borings.

6.3.3 Estimate of Available Geotechnical Pile Capacity

Skin Friction. The MHU 1700 hammer typically was not able to mobilize all the available skin friction during the restrikes. However, combined CAPWAP analyses were used to estimate the available static axial skin friction capacity at the time of each restrike. Plate 6.7 presents a plot of total skin friction capacity (estimated from combined CAPWAP analyses) at each restrike versus time. This plot demonstrates the increase in total skin friction (sand and clay) and presents the approximate predicted total skin friction capacity developed using the modified API (1993a,b) procedure documented in Fugro-EM (2001b). After approximately 33 days of setup, the available skin friction capacity for Pile No. 1 was estimated to be approximately 70 MN. Therefore, the Pile No. 1 total skin friction capacity reached approximately 88 percent of the modified API (1993a,b) static skin friction capacity after approximately 1 month of setup time. For Pile Nos. 2 and 3, the total available skin friction capacities were approximately 67 MN and 55 MN at setup times of 22 and 1.8 days, respectively. The consistent increasing trend of total skin friction capacity shown on Plate 6.7 suggest that the piles will achieve final skin friction capacities that meet or exceed the predicted values of total skin friction.

It should be noted that these combined analyses may be conservative since they do not consider setup of the increments of skin friction in the lower portions of the pile where the skin friction was not mobilized during the later restrikes. In addition, evaluation of setup suggests that these piles will continue to gain skin friction capacity for some time, eventually reaching and likely exceeding the calculated (API, 1993a,b) ultimate skin friction pile capacities. In addition, the production piles will be larger-diameter piles than the PIDP piles (2.5-meter-diameter versus 2.43-meter-diameter for the PIDP piles), which should contribute a slight increase (about 2.5 percent) in the available skin friction capacity.

End Bearing. CAPWAP analyses indicate that approximately 22 to 26 MN of end-bearing capacity was available at the end of initial driving of the three test piles. Subsequent restrikes generally mobilized less than about half that amount, indicating that the pile-driving hammer did not have sufficient energy to mobilize the full end-bearing capacity of the pile. Based on the assumption that the pile is coring during the EOID (as indicated by soil plug measurements and PDA data), it may be assumed that the measured end-bearing resistance occurred on the annulus of the pile end area thereby giving a unit end-bearing value of at least 58 MPa. If this unit end-bearing value is applied to the entire pile end area (as in the case of a fully plugged pile), the available end-bearing resistance would be over 260 MN. However, this value of unit end bearing is <u>much</u> higher than that typically assumed during pile capacity analyses, and not nearly that much end bearing resistance is expected to be available. These apparent discrepancies between the measured and predicted unit end-bearing values may be attributed to a combination of: a) the CAPWAP model's lack of sensitivity to the end bearing of open-ended pipe piles, and b) the fact that the piles may be driving as partially plugged piles in the dense sands encountered near the pile tip elevations.

Based on conservative API-based limiting end-bearing values in sand and the assumption that the PIDP piles will behave as plugged piles under long term axial loading conditions, it is reasonable to assume that at least 40 MN of end-bearing resistance will be available for the PIDP piles.. As mentioned above, the CAPWAP analysis is typically limited in its ability to accurately model the soil-pile interaction near the end of the pile for open-ended pipe piles. The distribution of skin and end-bearing resistance near the end of the pile is often uncertain and may lead to erroneous values of either skin friction and/or end bearing resistance at and near the end of the pile.

In general, based on the available CAPWAP data and estimates of the magnitude and rate of pile setup (see Section 6.3.2), it appears that the PIDP piles will reach ultimate capacities that meet or exceed the required design capacities of the planned production piles.

6.3.4 Evaluation of Drivability (Blow Counts)

Drivability analyses have been performed as part of this program to validate the drivability methodologies used to predict blow count versus pile penetration. Drivability analyses are typically conducted to verify that a particular pile driving hammer system is capable of driving a given pile to the required penetrations into a known (or estimated) soil profile. Those analyses typically consist of computing the anticipated SRD and then conducting wave equation analyses with given (or assumed) pile driving hammer system parameters, pile parameters, and dynamic soil properties to predict blow count and driving stresses during pile driving. Drivability analyses are discussed in detail in the Axial Pile Design and Drivability Report (Fugro-EM, 2001b).

Soil resistance to driving was evaluated as discussed in Section 6.3.1 using the Stevens et al. (1982) and clay sensitivity-based methods. Wave equation analyses were conducted using the program GRLWEAP (GRL&A, 1997). Hammer parameters were obtained from the Manson/Dutra hammer submittal and pile parameters from the project plans. Recommended values of soil quake and damping parameters by Roussel (1979) were used. These parameters were selected from a comprehensive correlation study performed for large-diameter offshore piles in which the driving records of 58 piles at 15 offshore sites in the Gulf of Mexico were analyzed. The side and point quakes are assumed equal with a magnitude of 0.25 centimeter (cm) for stiff to hard clay, silt, and sand. Side damping in clay decreases with increasing shear strength, which is in agreement with the laboratory test results of Coyle and Gibson (1970) and Heerema (1979). Point damping of 0.49 second per meter is recommended for firm to hard clay, silt, and sand. A summary of wave equation parameters used in the analyses is provided on Plate 6.8.

The drivability analyses conducted for this program were intended to validate the drivability methodologies that have been adopted for this project. Wave equation analyses were run with the selected pile, hammer, and soil parameters (including SRD predicted from both the

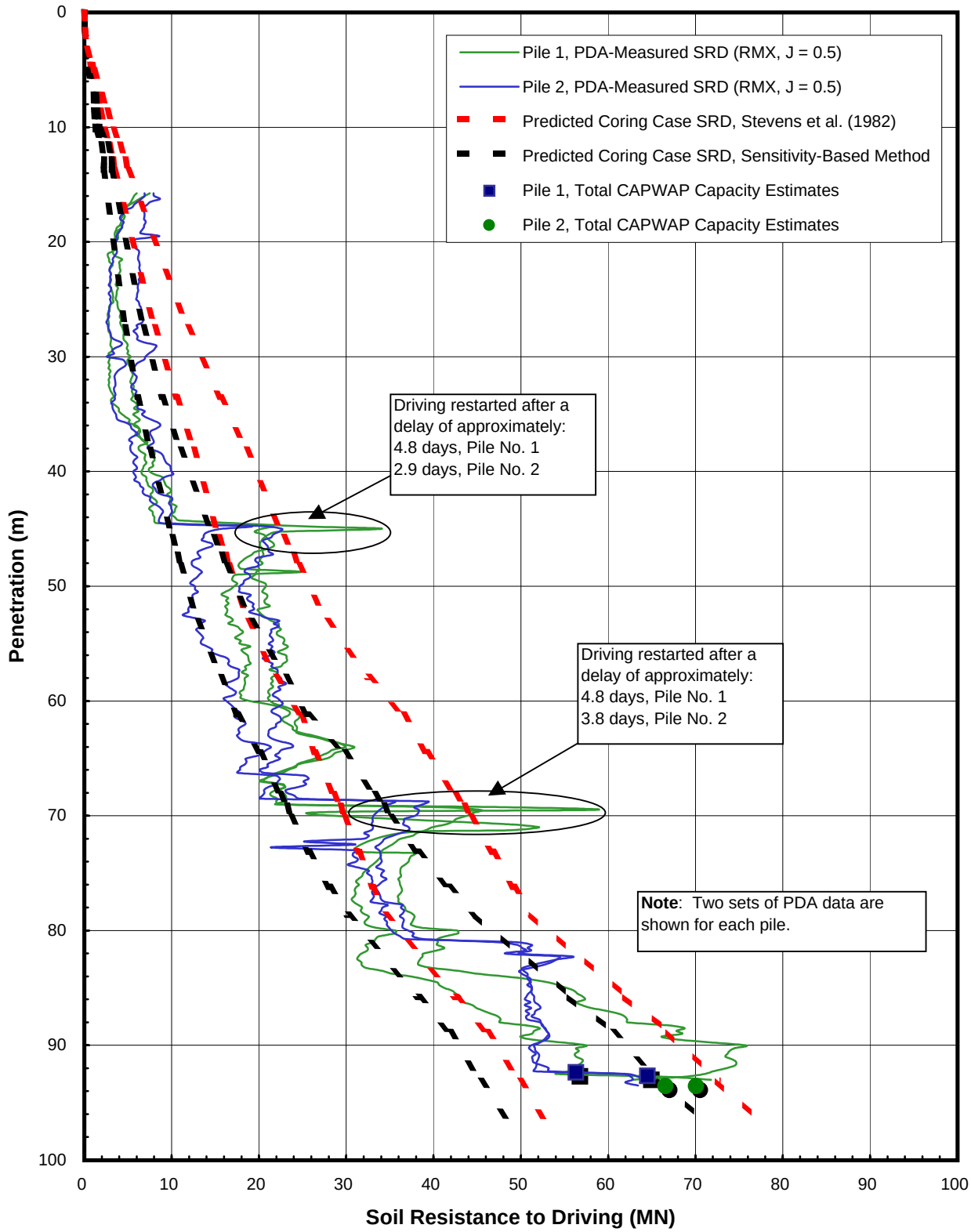
Stevens and sensitivity-based methods) at the measured hammer energies (from PDA data). These analyses have only been performed for piles installed at the Primary Test Location (Pile Nos. 1 and 2).

Results of the drivability analyses conducted for the Primary Test Location using the calculated Stevens et al. (1982) and sensitivity-based method SRD profiles are plotted in Plates 6.9a and 6.9b for Pile Nos. 1 and 2, respectively. These plates present profiles of predicted and observed blow counts for the two piles.

During continuous driving below a penetration of about 40 meters, the wave equation analyses using the two SRD estimates predict the observed blow counts reasonably well. The observed blow counts tend to follow the lower bound of the blow counts estimated using SRD from the Stevens Method and are generally bounded by the blow counts estimated using SRD from the sensitivity-based method. At penetrations above 40 meters, the predicted blow counts are typically higher than the observed blow counts. These discrepancies are likely due to the difficulties in accurately modeling pile driving behavior of large-diameter piles driven with a large pile driving hammer (operating at relatively low energy settings) into the relatively soft sediment encountered in the upper portions of the soil profile. Blow counts predicted using the sensitivity-based method SRD seem to better match the blow counts in the softer sediments in the upper 40 meters.

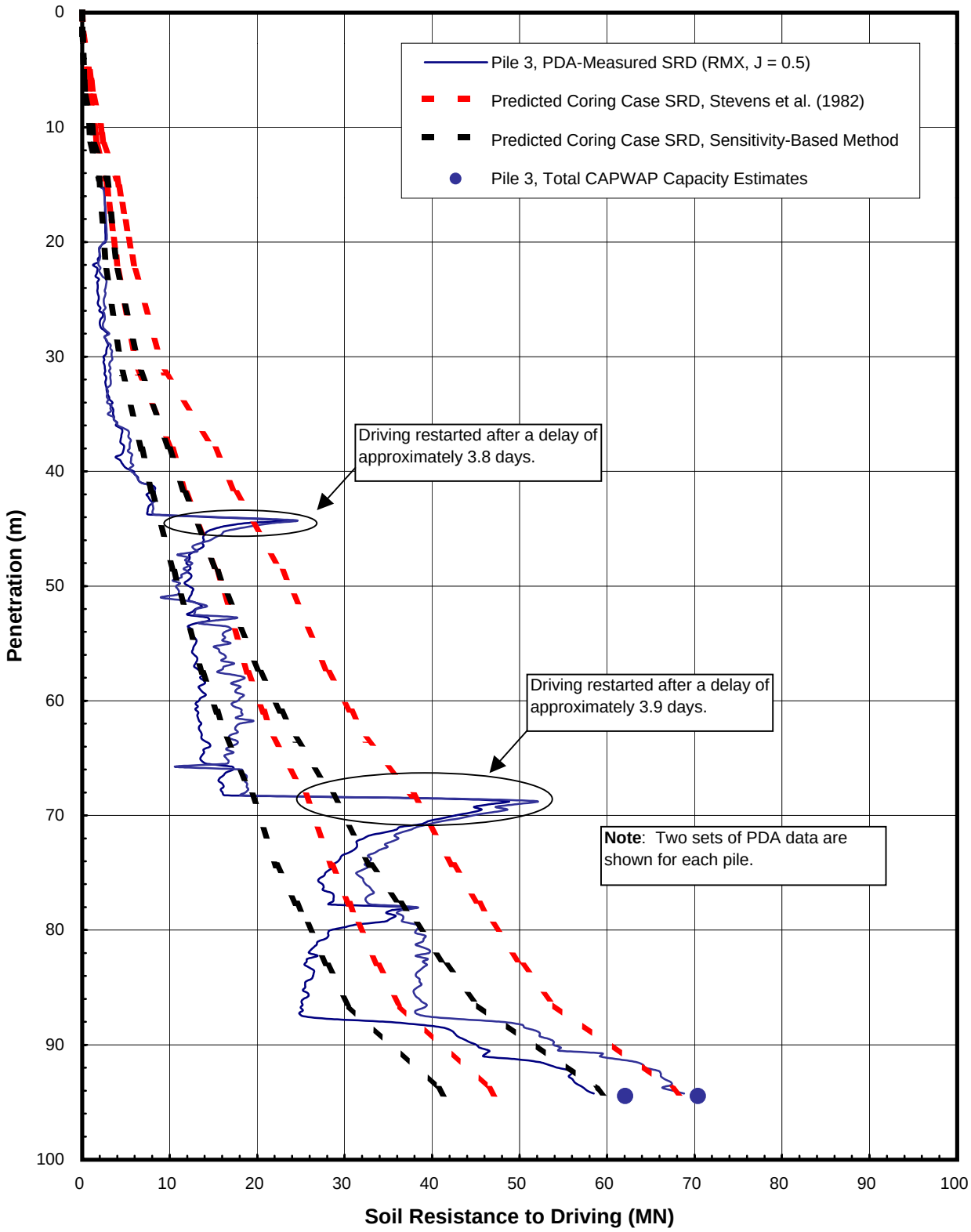
The predicted and observed blow counts also diverge at the beginning of driving of each pile section. This behavior is due to the setup that occurred between the driving of pile sections. The presented blow count predictions assume continuous driving conditions and do not account for pile setup (and associated increases in SRD) during driving delays such as those that occurred during the splicing/welding of pile sections. Typically after about 5 meters of driving, the setup is broken down and the predicted blow counts tend to reasonably approximate the observed blow counts.

As shown on Plates 6.1, 6.2, 6.9a, and 6.9b, the responses of the predicted and observed blow count profiles match the variations in the predicted and observed SRD profiles, respectively. For instance, where the predicted SRD values were larger than the measured SRD values, the predicted blow counts were higher than the observed blow counts. When the measured SRD follows the predicted lower-bound coring case SRD, the observed blow count also follows the lower-bound predicted blow count. This shows that the wave equation analyses (using appropriate SRD predictions) are able to reasonably predict blow count versus penetration during continuous driving when the correct hammer transfer energies are used in the model. Those observations serve to verify the methodologies and wave equation parameters that have been used by Fugro-EM for the SFOBB East Span Seismic Safety Project.



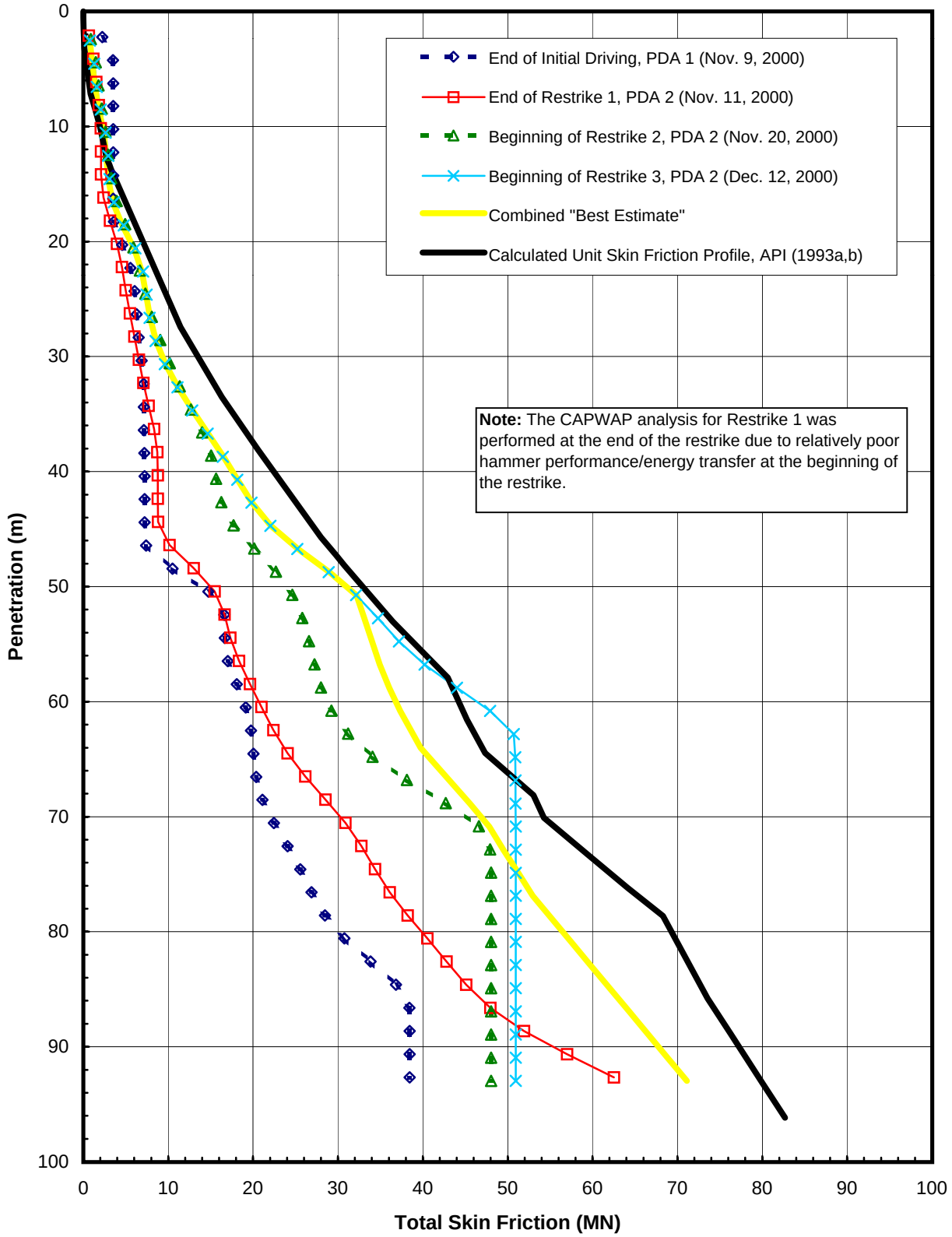
PDA-MEASURED AND PREDICTED SOIL RESISTANCE TO DRIVING
Pile Nos. 1 and 2
Pile Installation Demonstration Project
SFOBB East Span Seismic Safety Project

PLATE 6.1



PDA-MEASURED AND PREDICTED SOIL RESISTANCE TO DRIVING
Pile No. 3
Pile Installation Demonstration Project
SFOBB East Span Seismic Safety Project

PLATE 6.2

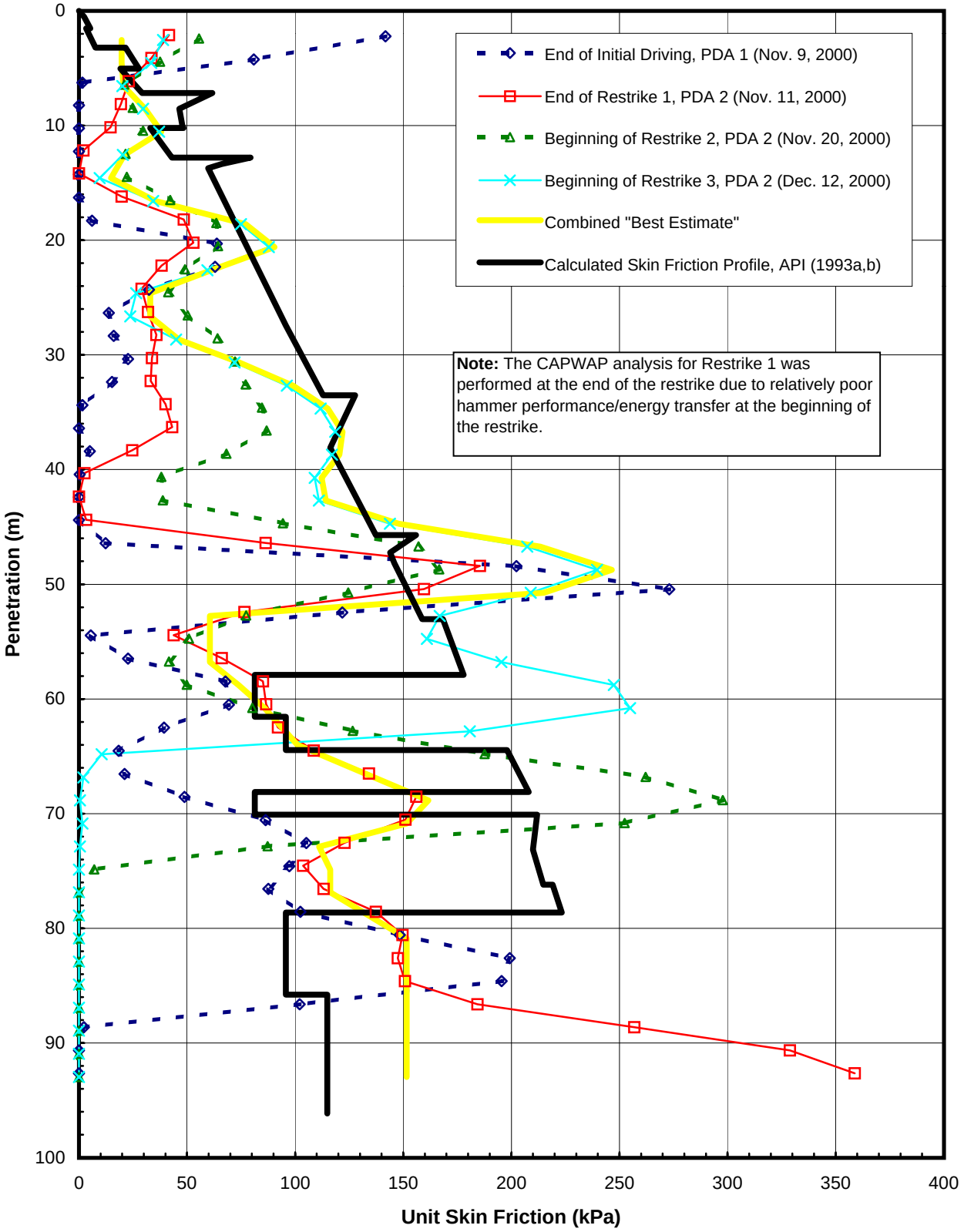


TOTAL SKIN FRICTION PROFILES FROM CAPWAP ANALYSES, PILE NO. 1

Pile Installation Demonstration Project

SFOBB East Span Seismic Safety Project

PLATE 6.3a

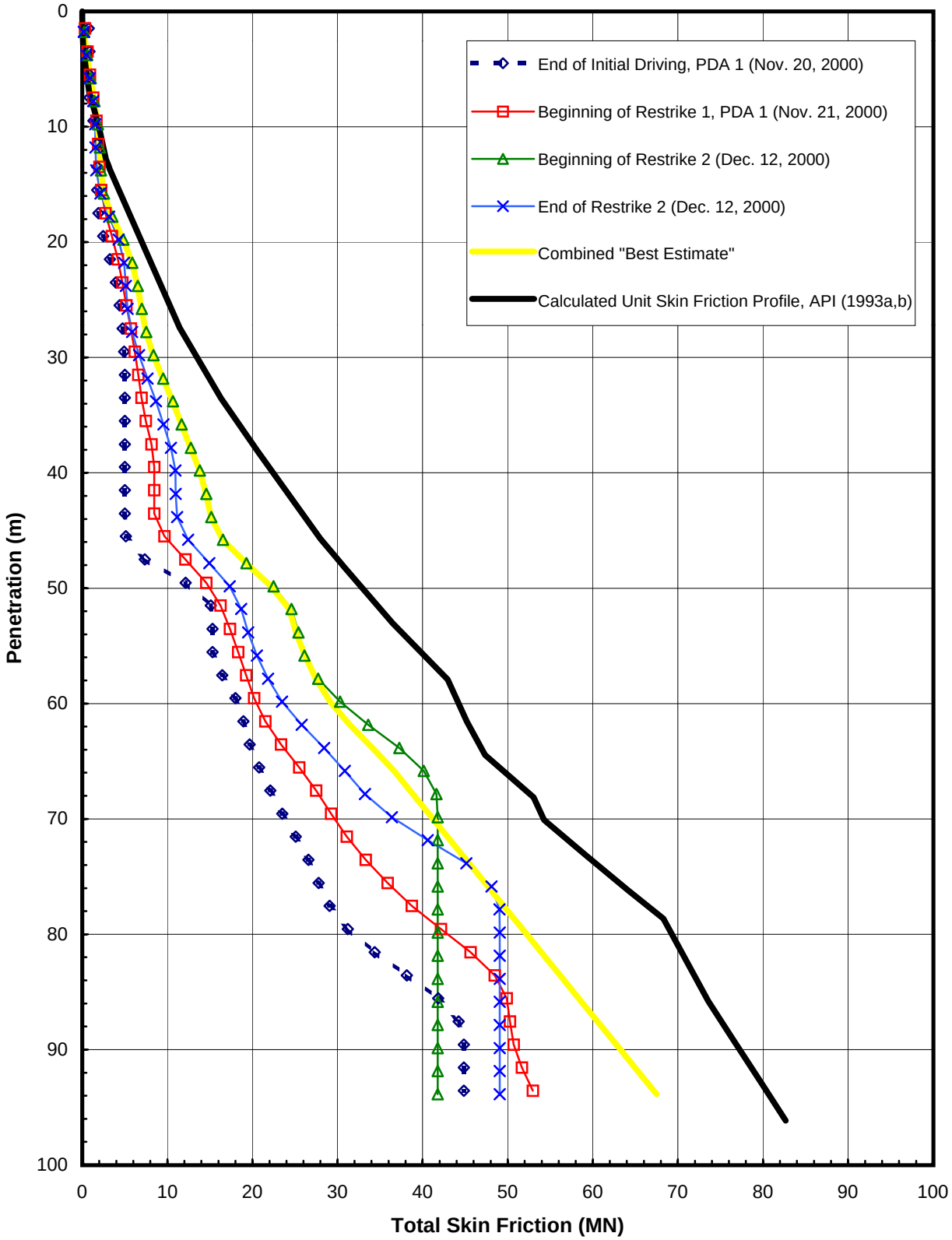


UNIT SKIN FRICTION PROFILES FROM CAPWAP ANALYSES, PILE NO. 1

Pile Installation Demonstration Project

SFOBB East Span Seismic Safety Project

PLATE 6.3b

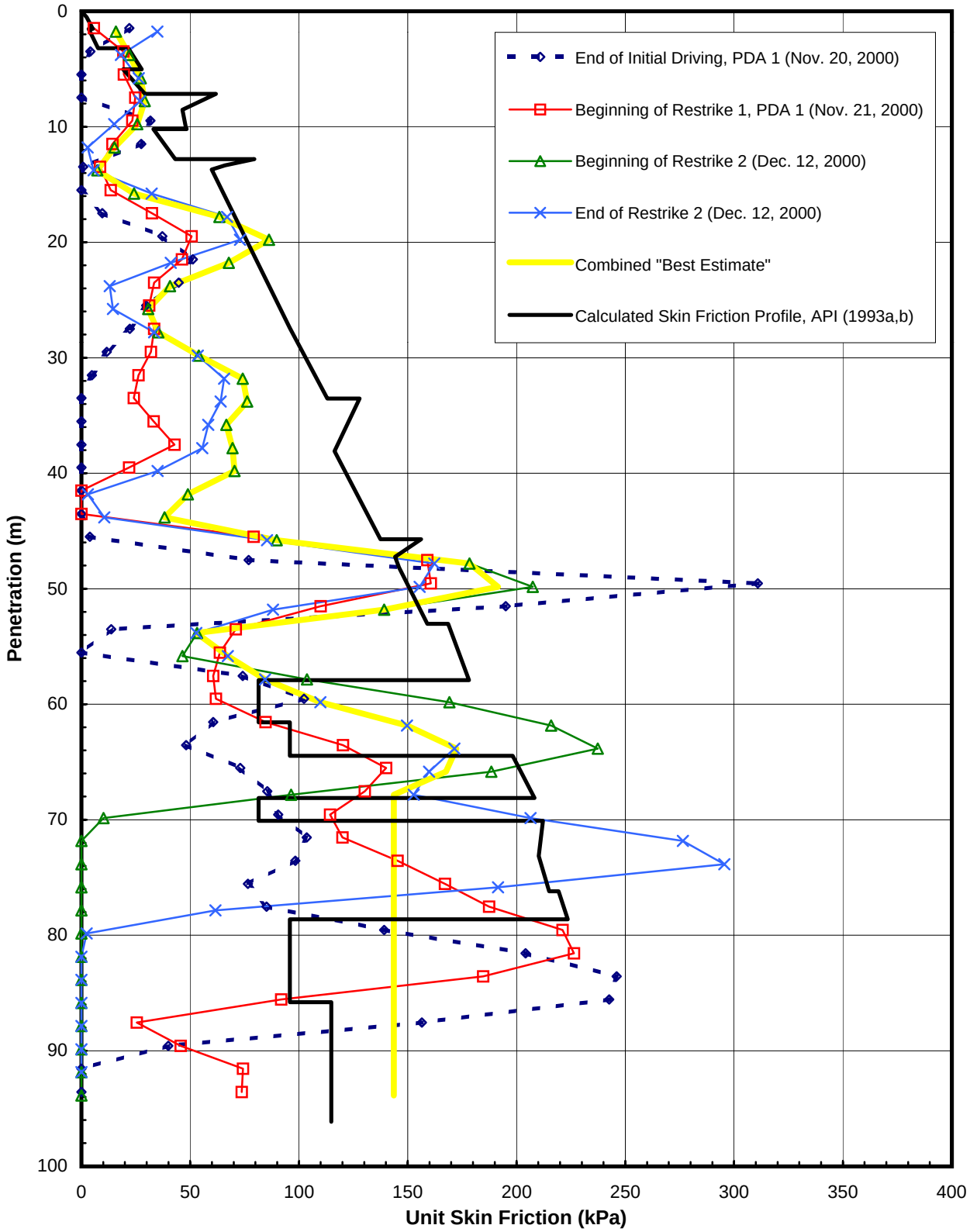


TOTAL SKIN FRICTION PROFILES FROM CAPWAP ANALYSES, PILE NO. 2

Pile Installation Demonstration Project

SFOBB East Span Seismic Safety Project

PLATE 6.4a

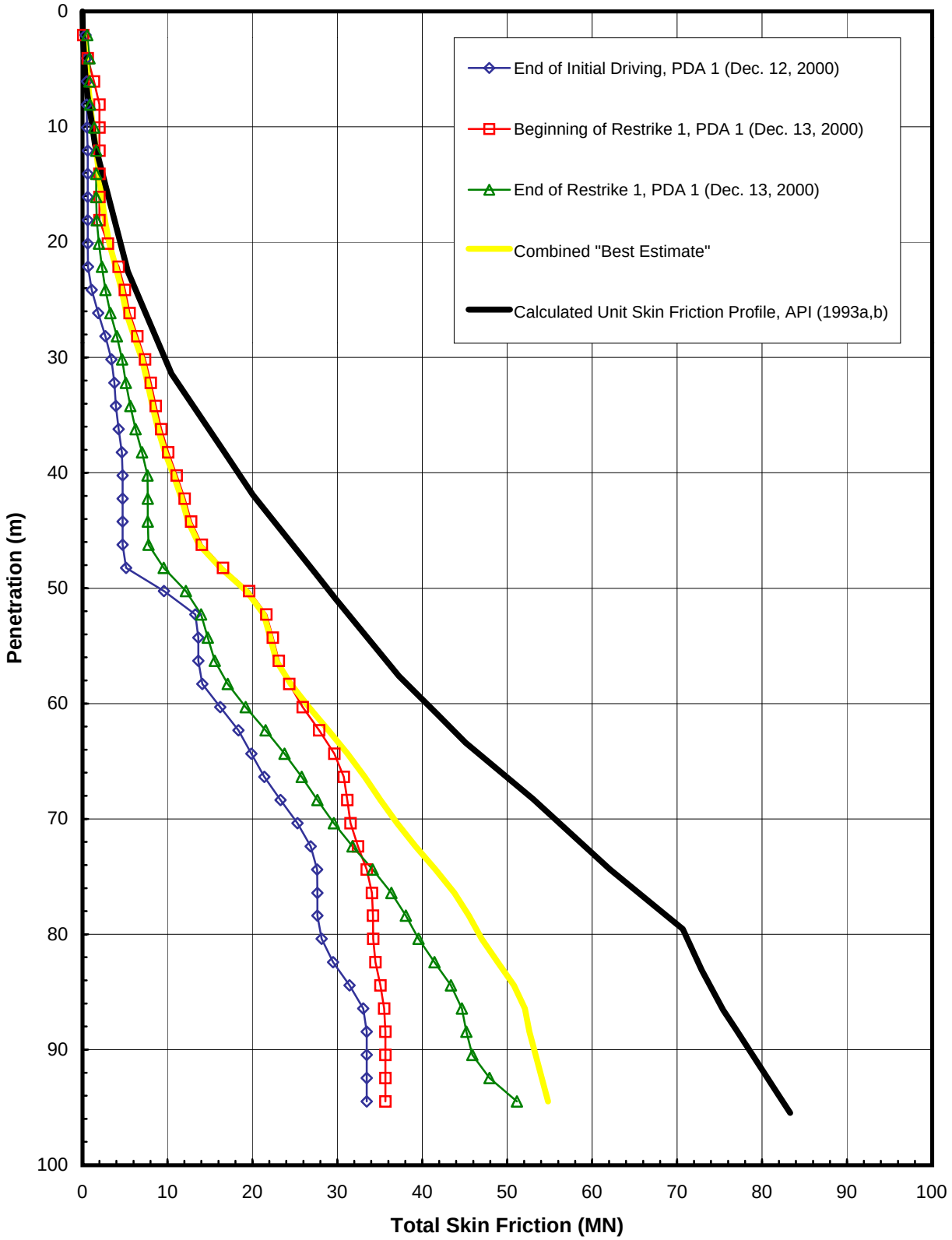


UNIT SKIN FRICTION PROFILES FROM CAPWAP ANALYSES, PILE NO. 2

Pile Installation Demonstration Project

SFOBB East Span Seismic Safety Project

PLATE 6.4b

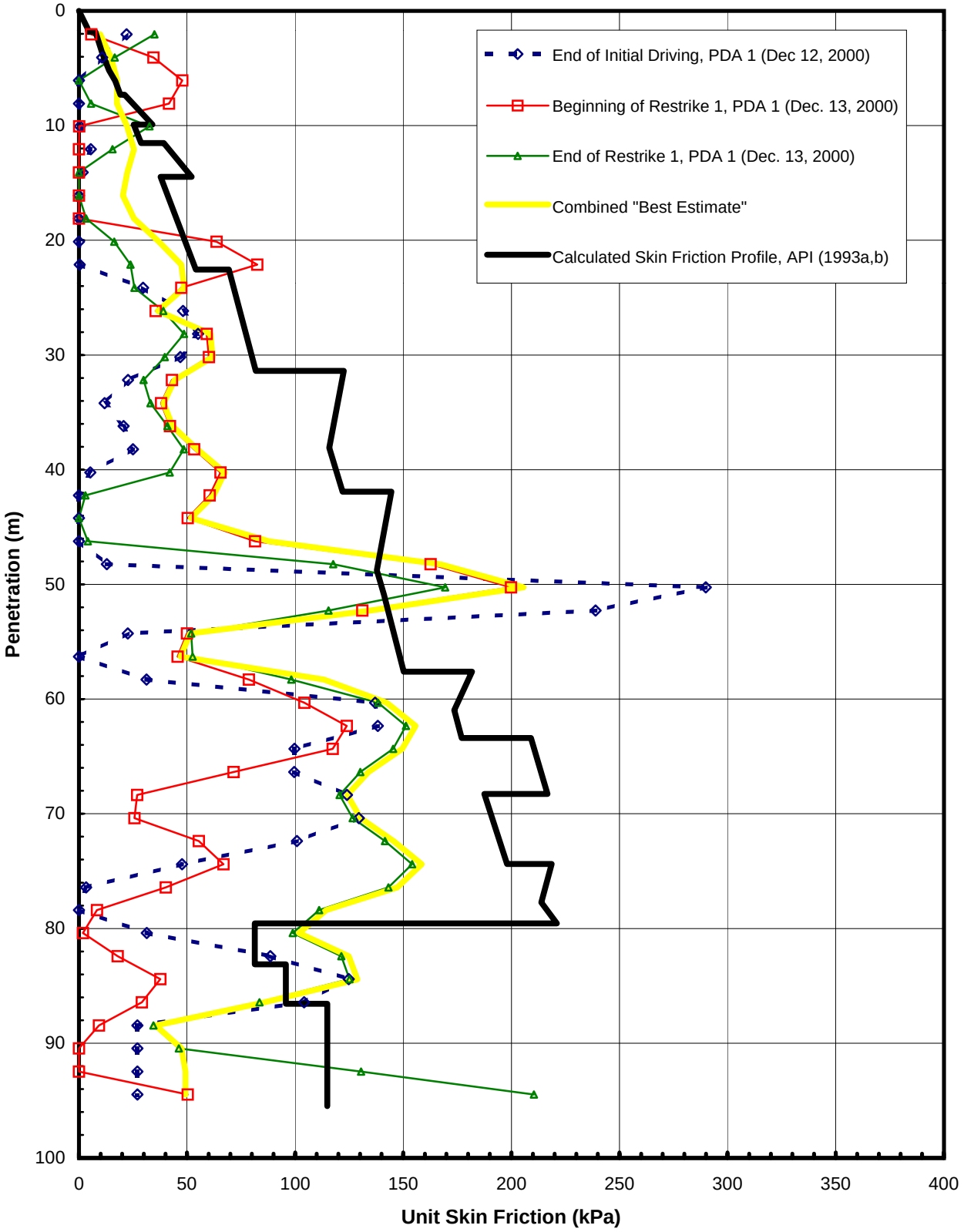


TOTAL SKIN FRICTION PROFILES FROM CAPWAP ANALYSES, PILE NO. 3

Pile Installation Demonstration Project

SFOBB East Span Seismic Safety Project

PLATE 6.5a

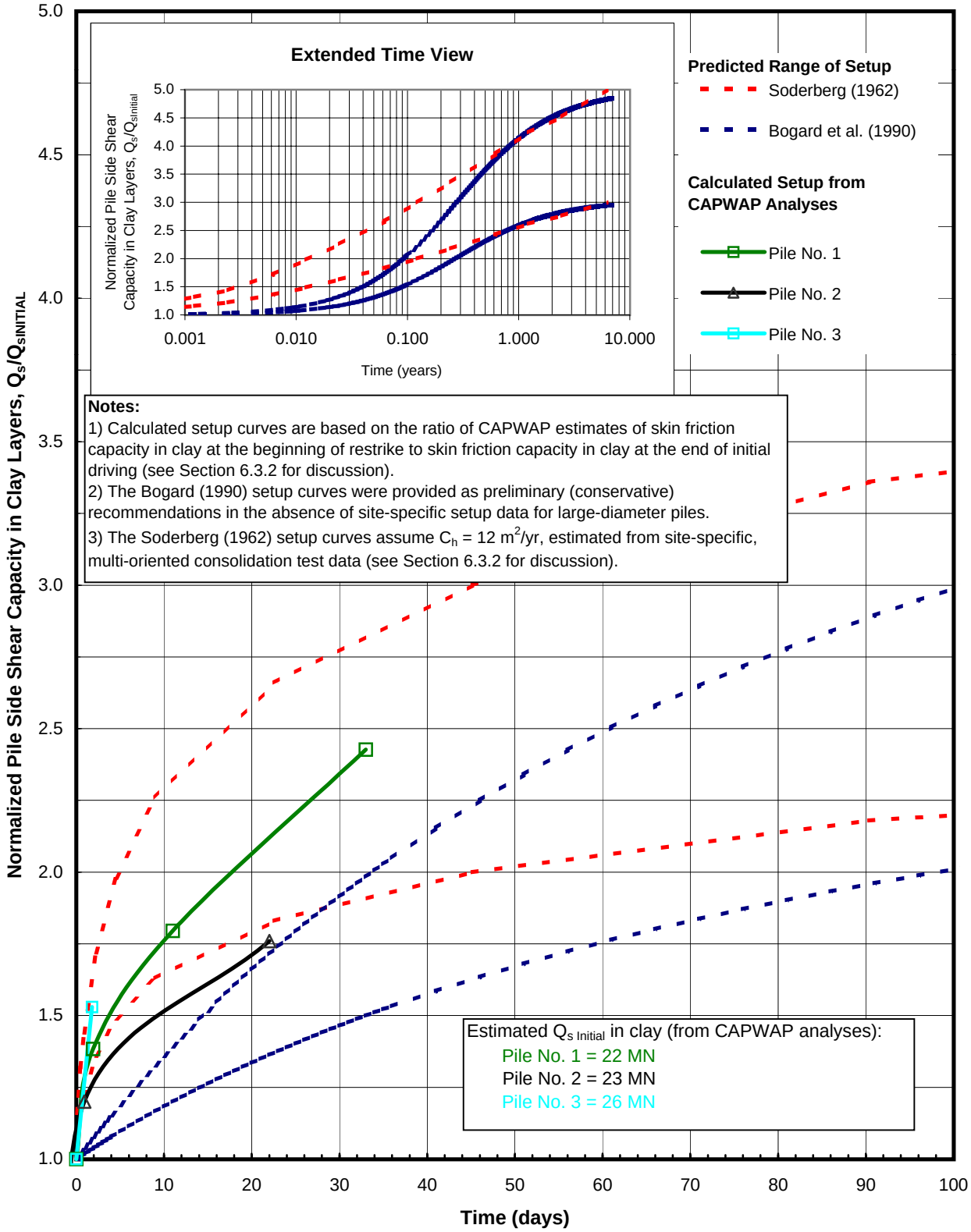


UNIT SKIN FRICTION PROFILES FROM CAPWAP ANALYSES, PILE NO. 3

Pile Installation Demonstration Project

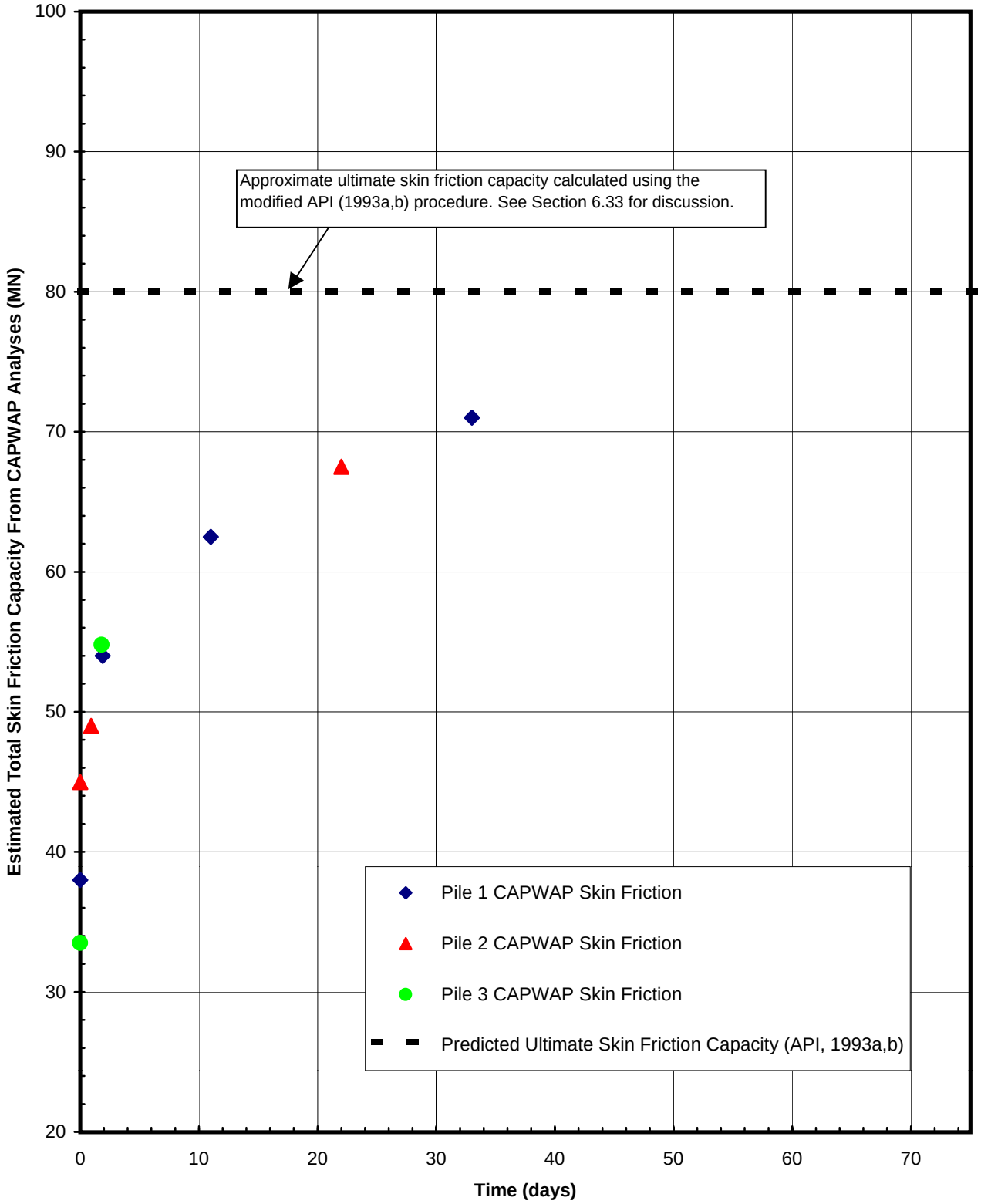
SFOBB East Span Seismic Safety Project

PLATE 6.5b



CALCULATED AND PREDICTED SETUP OF SKIN FRICTION IN CLAY LAYERS
Pile Nos. 1 through 3
Pile Installation Demonstration Project
SFOBB East Span Seismic Safety Project

PLATE 6.6



TOTAL SKIN FRICTION CAPACITY ESTIMATED FROM CAPWAP ANALYSES

Pile Installation Demonstration Project

SFOBB East Span Seismic Safety Project

PLATE 6.7

HAMMER PROPERTIES

	Menck MHU 500T	Menck MHU 1700
Rated Energy, kN-m (kJ)	550	1,670
Hammer Efficiency, %	95	95
Weight of Ram, (tonnes, metric)	30	94
Weight of Pile Cap, (tonnes, metric)	26	38
Coefficient of Restitution Ram on Pile Cap Pile Cap on Pile	 0.98 0.95	 0.98 0.95

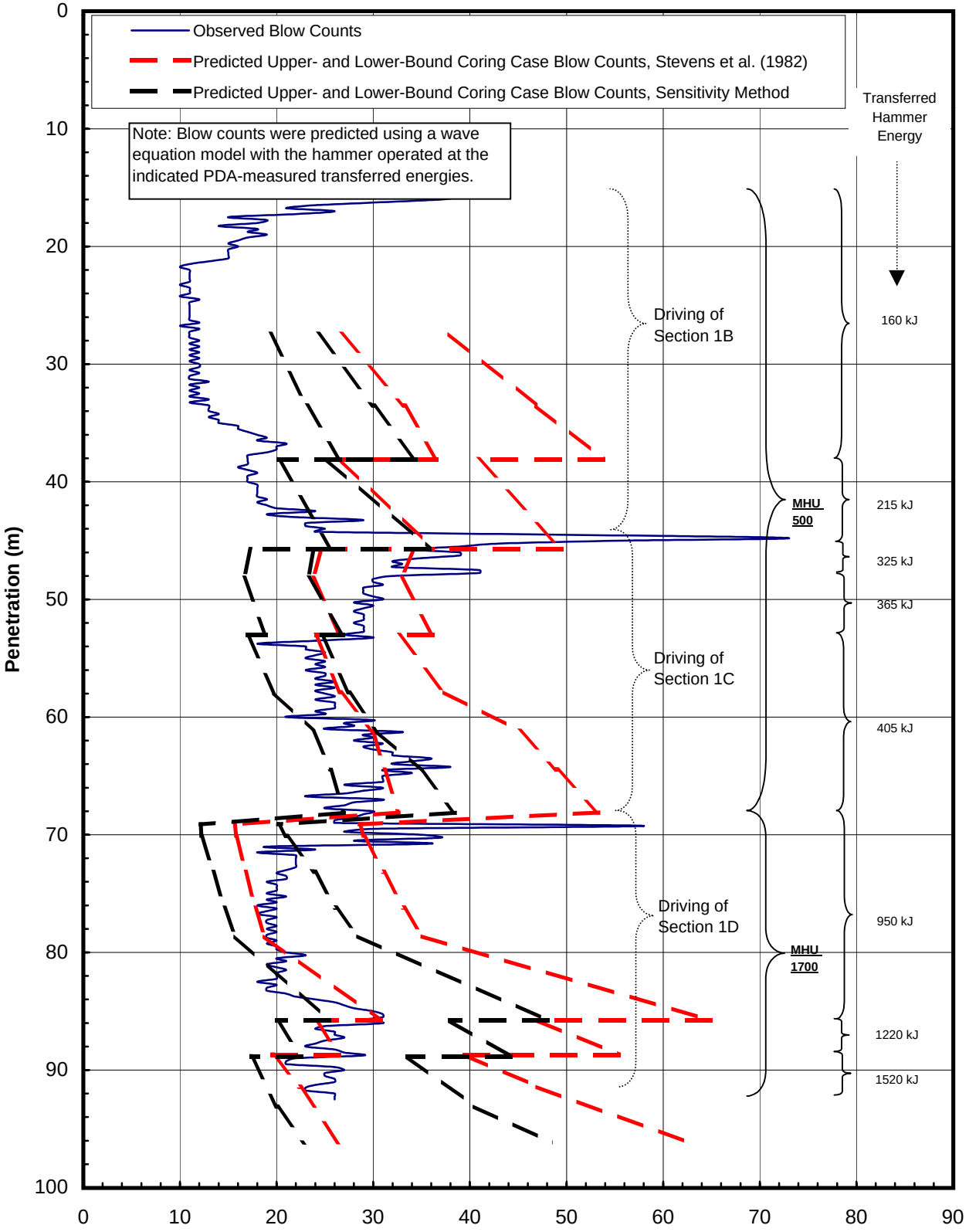
PILE PROPERTIES

Diameter, m	2.438
Length, m	See Plate 4.2
Wall Thickness, mm	See Plate 4.2
Unit Weight, kN/m^3	77
Modulus, kN/m^2	2.1×10^8

SOIL PROPERTIES

Quake, cm Side Tip	 0.254 0.254
Damping, sec/m Side Tip	 0.194 to 0.361 0.49
Tip Resistance, %	2 to 55

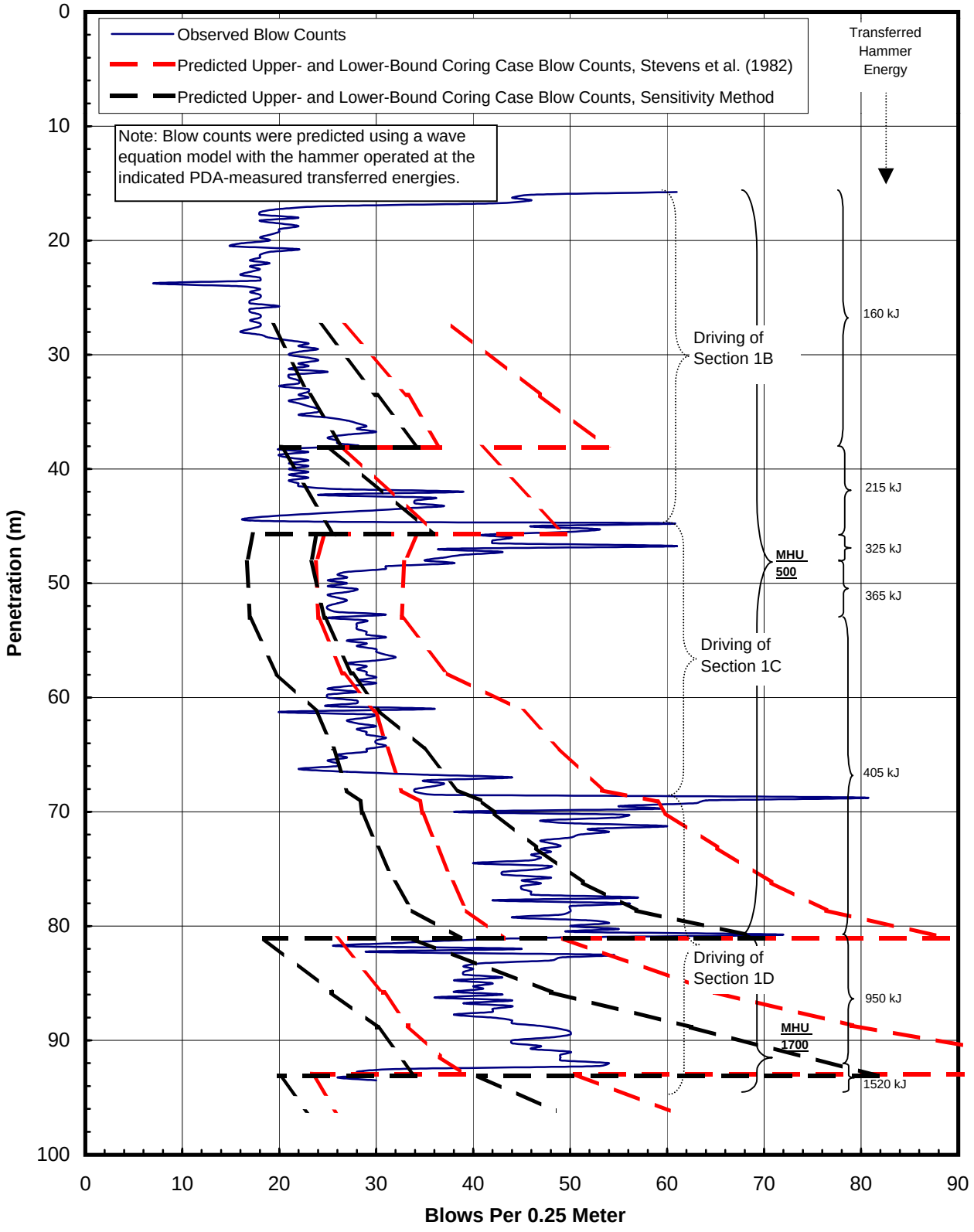
SUMMARY OF WAVE EQUATION PARAMETERS
Pile Installation Demonstration Project
SFOBB East Span Seismic Safety Project



PREDICTED AND OBSERVED BLOW COUNTS, PILE NO. 1

Pile Installation Demonstration Project

SFOBB East Span Seismic Safety Project



PREDICTED AND OBSERVED BLOW COUNTS, PILE NO. 2

Pile Installation Demonstration Project

SFOBB East Span Seismic Safety Project

PLATE 6.9b

SECTION 7.0
SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

7.0 SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

The PIDP pile driving was successfully conducted by the contractor between October 23 and December 13, 2000. All three piles were driven to their respective specified tip elevations by the large offshore hammers (Menck MHU 500T and MHU 1700) without any significant driving problems. PDA data using four sets of gauges were collected and analyzed for three sections of each pile. The analyses provided insight into pile behavior as described in the report.

Our findings, conclusions, and recommendations are summarized in the following sections.

7.1 CONSTRUCTION OPERATIONS

- The pile support template as designed and installed by the contractor provided satisfactory support for the pile installation operation.
- The contractor's derrick barge and ancillary support equipment appeared to perform satisfactorily for this project.
- The method(s) employed by the contractor to handle the piles and pile driving equipment were satisfactory.
- Control of pile batter was acceptable. The actual batter of the two batter piles was 1h:6.3v and 1h:6.1v, which is within the specified tolerance for the production piles.
- Pile head locations for Pile Nos. 1 and 2 were acceptable and on the order of 90 to 110 mm from the specified location. Those deviations are within the 150 mm tolerance specified for the production piles. Pile No. 3 was approximately 210 mm from the planned location. The deviation was likely due to the pile support template being out of position.

7.2 WELDING/SPLICING

- Field welding/splicing operations were slower than anticipated primarily due to the need to repair initial weld defects. There was a clear learning curve effect regarding welding, inspection, and weld repair.
- Delays/elapsed time for pile splicing did not cause pile drivability problems for the hammers that were used.

7.3 HAMMER PERFORMANCE

- Hammer performance for both hammers was generally satisfactory. The hammers were able to routinely develop their maximum rated energy. Energy transfer to the piles was also considered to be very good, with typical system efficiencies of above 75 percent when the hammers were operated at their maximum rated energies. There were a few periods of spotty performance that were due largely to problems with the hydraulic supply systems.

7.4 DRIVABILITY

- The three PIDP piles were each successfully driven to the specified pile tip elevation (SPTE) without excessive blow counts or pile damage.

- Pile behavior during installation agreed relatively well with the interpretation of soil stratigraphy based on the adjacent explorations and available geophysical data.

- Piles had little difficulty penetrating to the specified pile tip elevation, and sand layers/lenses located above the identified LAA-sands did not significantly impede driving.

- PDA-measured RMX values (J = 0.5) provided reasonable estimates of soil resistance to driving at the PIDP test locations.

- The SRD profiles for Pile Nos. 1 and 2 are very similar, which indicates that pile batter did not significantly affect SRD at the Primary Test Location.

- Predicted blow counts versus penetration agreed reasonably well with observed blow counts. This suggests that the method(s) used to estimate SRD and input parameters to the wave equation model were reasonable and can be used with added confidence to predict drivability of production piles.

- No discernable difference was observed in the drivability of the two batter piles as compared to the single vertical pile.

- Damage or deformation to pile section tops was minimal during the PIDP driving. Cutting off the top of each section prior to splicing was shown to be straightforward. However, the pile top cutoff procedure used on production pile sections should ensure that an even cut be made to minimize potential for uneven stresses and damage during driving.

- Maximum measured driving stresses in the piles typically occurred at the pile toe during the end of initial driving and restrikes, and were as high as approximately 330 MPa or 90 percent of the pile steel yield strength. Pile toe stresses should be closely monitored during production pile driving.

- Sand layers within the Merritt-Posey-San Antonio (MPSA) Formations were capable of stopping the piles from running under self-weight and weight of hammer. Other sand layers and lenses located below the MPSA and above the LAA-sands did not cause driving difficulties for the hammers that were used.

- The driving program did not require the hammers to operate outside of either the refusal criteria suggested by Menck or API (1993a,b).

7.5 PILE SETUP AND ESTIMATED AXIAL CAPACITY

- Restrikes clearly indicated that soil-pile setup occurred and that the rate of setup was faster than that originally (conservatively) assumed.

- Setup due to elapsed time for welding, weld repair, and inspection did cause significant increases in blow counts, but did not result in driving difficulties for the hammers used on this project.

- CAPWAP analyses during initial driving and restrikes suggest that significant soil-pile setup occurs over time. Associated geotechnical analyses suggest that this setup will continue for many more months. It is probable that production piles will achieve ultimate static axial geotechnical capacities that are greater than those used for design.

- The SRD increased significantly below about El. -80 meters and indicates that the dense sand layers of the Lower Alameda Alluvium Formation are contributing significantly to ultimate axial geotechnical pile capacity.

7.6 KEY CONCLUSIONS AND RECOMMENDATIONS FOR PRODUCTION PILES

- Installing 1h:6v batter piles along the alignment is feasible. During production pile driving, careful continuous monitoring of pile alignment and location is recommended so that the contractor can maintain/correct alignment before it becomes "uncorrectable."

- A large hammer such as the MHU 1700 or equivalent should be used/available during production pile driving. Although piles were advanced through sand layers of the Lower Alameda Alluvium with lower hammer energies, a larger hammer is recommended to: 1) restart pile driving in the event of any breakdowns during which

significant setup occurs; and 2) to reduce the potential for variability in the characteristics of the LAA-sand to result in premature refusal.

- Production pile installation should include a PDA monitoring program. This is especially critical for piers where piles are to be driven to bedrock (Skyway Piers E3 through E5) and where large toe stresses may develop relatively quickly (before refusal is observed) and result in pile damage.

- Piles can be expected to run under self-weight and weight of hammer through the Young Bay Mud into the underlying Merritt-Posey-San Antonio Formations. Appropriate control of pile running will be required for production piles.

- Production piles feasibly can be installed with fewer segments (e.g., two or three segments of longer lengths).

- Piles were driven well into the LAA-sands at these two sites, and mostly likely can be driven into similar soils across the alignment if the same or similar large hammer is used.

- Piles cored through the soil during continuous driving, and the soil cores moved up within the pipe pile during penetration. This suggests that the production piles will require a maximum amount of soil plug removal prior to placing reinforcing materials within the pile.

- The PIDP piles should be restruck prior to or during production pile driving to collect additional information on longer-term pile-soil setup.

- For the production pile program, we recommend that required pile cutoffs be closely monitored prior to redriving to ensure that the cuts are even and "square".

SECTION 8.0
LIMITATIONS

8.0 LIMITATIONS

This report is intended for use by Caltrans and the Metropolitan Transportation Commission for the San Francisco-Oakland Bay Bridge East Span Seismic Safety Project. Although information contained in this report may be of some value for other purposes, it may not contain sufficient information for other parties or uses. If any changes are made to the project as described in this report or in the referenced geotechnical study reports, the conclusions and recommendations in this report shall not be considered valid unless the changes are reviewed and the conclusions and recommendations of this report are modified or validated by Fugro-Earth Mechanics.

The conclusions and recommendations presented in this report are based on the assumption that an appropriate level of quality control and quality assurance (inspections and tests) will be provided during construction. Fugro-Earth Mechanics should be notified of any pertinent changes in the project plans or if subsurface conditions are found to vary from those described herein or in other various Fugro-Earth Mechanics' San Francisco-Oakland Bay Bridge reports. Such changes or variations may require a re-evaluation of the conclusions and recommendations contained in this report.

The Pile Installation Demonstration Project (PIDP) was a successful demonstration project, but was not intended to be a design confirmation project. The project's intent, goals, and potential benefits have been presented in Section 3.0. The PIDP data and its interpretation have added significantly to the body of knowledge regarding pile installation of large open-ended steel pipe piles with heavy marine/civil construction equipment at this site. However, it is critical to note that the PIDP program only involved three piles driven by specific types/models of pile driving hammers at two locations that are not directly on the planned new bridge alignment. The physical coverage of the project represents only a small portion of the new bridge, which will be supported by over 160 2.5-meter-diameter steel pipe piles similar to those used in the PIDP program.

In addition, although the geological, geotechnical, and topographic conditions at the site were very well characterized by a comprehensive, integrated geological/geotechnical investigation and engineering program, there are natural subsurface variations across the site that may affect pile driving at other locations along the planned alignment.

PIDP data analysis and evaluation also provided insight into and estimates of pile setup behavior and axial pile capacity. These quantitative estimates are useful, but approximate. No pile load tests were conducted to confirm the estimated capacities.

It is important to explicitly recognize that the PIDP provided valuable insight and knowledge, but also has significant limitations. Extrapolating the results of the PIDP to other

conditions (location, equipment, methods, and so forth) should be done with the appropriate amount of understanding, insight, and caution.

In performing our professional services, we have used generally accepted geologic and geotechnical engineering principles and have applied that degree of care and skill ordinarily exercised, under similar circumstances, by reputable geotechnical engineers currently practicing in this or similar locales. No other warranty, express or implied, is made as to the professional advice included in this report.

SECTION 9.0
LIST OF TERMS

9.0 LIST OF TERMS

BLC	Blow count recorded as blows per quarter meter (bpqm) as recorded by the PDA
BPM	Blows per minute from PDA data
bpqm	blows per quarter meter
CAPWAP	Case Pile Wave Analysis Program
CSX	The maximum average compressive stress measured from PDA data
EDAP	Engineering Design and Advisory Panel
EMX	The measured maximum energy transferred to the pile tops measured by the PDA
EOID	End of initial driving
LAA	Lower Alameda Alluvial Sediments
MHU	Menck Hydraulic Underwater
MLLW	mean lower low water
MPSA	Merritt-Posey-San Antonio Formations
MSL	mean sea level
MTC	Metropolitan Transportation Commission
MWO	Measured ram momentum as calculated from PDA data
NGVD	National Geodetic Vertical Datum
OBM	Old Bay Mud
OD	Outside Diameter
PDA	Pile Driving Analyzer
PIDP	Pile Installation Demonstration Project
RMX	The maximum Case Method capacities at an assumed soil damping (J) value of 0.5 as calculated from PDA data
RS	Restrike
RTL	The total static and dynamic pile resistance calculated using the maximum Case Method, calculated from PDA data
SFOBB	San Francisco-Oakland Bay Bridge
SPTE	Specified pile tip elevation
SRD	Soil resistance to driving (essentially the static pile capacity at the time of driving)
TSX	The maximum measured tensile stress in the pile as measured by the PDA
UAM	Upper Alameda Marine Sediments
VMX	The maximum pile head velocities measured by the PDA
YBM	Young Bay Mud

SECTION 10.0
REFERENCES

10.0 REFERENCES

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APPENDIX A
PDA INSTRUMENTATION AND DATA INTERPRETATION

APPENDIX A
PDA INSTRUMENTATION AND DATA INTERPRETATION

INSTRUMENTATION OF PILE SECTIONS

Strain transducers and accelerometers were bolted on opposite sides of the pile 4.88 meters below the top of the pile. Plate 5.1 illustrates the layout of the instrumentation. Strain transducers were fabricated by Pile Dynamics, Inc., and have a range of 1,000 microstrain. Accelerometers were fabricated by PCB Piezotronics, Inc., and have a range of 2,000 g.

Three 7/32-in.-diameter holes were drilled and tapped on four sides of the pile for attachment of the instrumentation. To provide strain relief in the cable connecting the instrumentation to the data acquisition system, the cable is attached to an eyebolt located midway between the sensor locations. The holes are drilled about 1/2 in. into the pile.

Data Acquisition System

The data acquisition system consisted of a Pile Dynamics Pile Driving Analyzer (PDA). Nine quantities were displayed and stored for every one to two hammer blows. Force and velocity signals were stored on floppy disc for selected hammer blows.

Calibration curves for the strain transducers and the frequency response of the accelerometers were obtained from the manufacturer. Calibration signals are generated by the analyzer. Axial strain is calibrated by a resistor shunted across the strain transducers for 30 msec. Velocity is calibrated by an internal pulse generator that provides a velocity trace of known magnitude and duration. The accuracy of recorded signals is ±0.3 percent of the calibration standard for force, and ±0.2 and ±0.5 percent of the transducer specification for acceleration and velocity, respectively.

INTERPRETATION OF MEASUREMENTS

Force and Velocity Records

The recorded strain data consists of a set of time histories of the average strain at the strain transducer location. To convert strain to force, we used an assumed Young's Modulus of 207,000 megapascal (MPa) for steel, a pile area based on nominal dimensions, and a manufacturer-supplied gage factor for strain gages.

The acceleration data are converted to velocities by electronic integration. The pile velocity records consist of a set of time histories of the average pile particle velocity at the accelerometer transducer location.

Maximum Ram Momentum

The ram momentum, MFO, is obtained by integrating the recorded pile force until the recorded pile velocity equals zero, so that:

$$MFO = \int_{0}^{V=0} F(t)\,dt.$$

The hammer efficiency is given by:

$$\eta = (MFO)^2\, g/2\,(WRAM(ENR)$$

where g = acceleration due to gravity,
$WRAM$ = weight of ram, and
ENR = rated hammer energy.

Ram Impact Velocity

The ram impact velocity, VRI, is obtained by dividing the ram momentum by the ram mass, so that:

$$VRI = (MFO)\, g/WRAM$$

The hammer efficiency is given by:

$$\eta = (VRI/V_{100})^2$$

where $V_{100} = (2gh_{max})^{1/2}$, and
h_{max} = nominal stroke.

Maximum Transmitted Energy

Energy transmitted to the pile was calculated by numerical integration of the recorded data using the formula:

$$ENTHRU = \Delta W = \Sigma FV\,\Delta t \quad \text{or} \quad \Sigma F^2\,\Delta t$$

where: $ENTHRU$ = energy transmitted to the pile,
ΔW = work done on the pile,
F = recorded pile force,
V = recorded pile velocity, and
Δt = time interval between data points.

Because of energy losses in the cushion and at the pile cap, the energy transmitted to the pile is significantly less than the kinetic energy of the ram. The ratio of the energy transmitted to the pile to the rated hammer energy for the reported stroke is defined as the system efficiency.

Estimated Soil Resistance to Driving

The soil resistance to driving is composed of two components: a dynamic resistance, D, and a static soil resistance, SRD. The measured peak stress and velocity at impact together with the stress and velocity reflected from the pile tip are used to estimate the soil resistance to driving.

First, the total driving resistance, R_t, is computed by the Case Method using the expression:

$$R_t = 1/2 \left[F(t_1) + F(t_2) + EA/c \ \{ v(t_1) - v(t_2) \} \right]$$

Where:
- A = pile cross sectional area,
- E = pile modulus of elasticity,
- c = velocity of wave propagation,
- t_1 = time at which maximum velocity occurs,
- t_2 = $t_1 + 2L^*/c$, and
- L* = distance from transducers to pile toe.

The dynamic resistance then is computed using the expression:

$$D = J \left[EA/c \ \{ v(t_1) \} + F(t_1) - R_t \right]$$

where: J = Case damping coefficient.

The static soil resistance to driving, SRD, is then computed by subtracting the dynamic resistance, D, from the total resistance, R_t.

Tension Stresses

The maximum tension stress can be computed from the pile top measurements by considering the magnitude of both upward and downward traveling waves, W_u and W_d.

$$W_u = ½[F(t) - EA/c\ v(t)]$$

$$W_d = ½[F(t) + EA/c\ v(t)]$$

If any one of these waves is negative, a tension wave exists. It must be checked whether the wave traveling in the opposite direction is sufficiently compressive to reduce the net tension to allowable levels.

Maximum Toe Stress

A good estimate of the maximum compressive toe stress is obtained by dividing the total driving resistance, R_t, by the cross-sectional area of steel above the driving shoe.

APPENDIX B
BLOW COUNT RECORDS

PILE NO. 1

Pile No. 1

Job # *98-42-0061*
Client *Caltrans*
Location *Primary PIDP Location*
Inspector *RH, NM, BS (Fugro)*
Pile Contractor *Mason / Dutra*
Pile Type *Steel Pipe Pile*
Pile No. *Pile #1*
Cushion *NA*

Project *San Francisco-Oakland Bay Bridge*
Weather *Variable*
Structure *SFOBB East Span Siesmic Safety Project*
General Contractor *Manson / Dutra*
Hammer Type *Menck 500 and Menck 1700*
Pile Diameter *8' (2.438m)*
Ground Surface Elevation *~ -29.1' (msl) (-8.86 m (msl))*

Pile 1, Section A (10/23/00)

Time	Pen. (m)	No of Blows	Notes	Time	Pen. (m)	No of Blows	Notes	Time	Pen. (m)	No of Blows	Notes	Time	Pen. (m)	No of Blows	Notes
10:20	0.25	WOP	MHU 500		7.25	18		10:40	14.25	52	stop (pull bot. yoke)				
	0.50	WOP	~ 10% Energy		7.50	21		11:09	14.50	45	start				
	0.75	WOP			7.75	23			14.75	37					
	1.00	WOP			8.00	29			15.00	39					
	1.25	WOP			8.25	34			15.25	36					
	1.50	WOP			8.50	26			15.50	39					
	1.75	WOP			8.75	21		11:16	15.75	28/.2					
	2.00	WOP			9.00	15									
	2.25	WOP			9.25	14									
	2.50	WOP			9.50	16									
	2.75	WOP			9.75	14									
	3.00	WOP			10.00	15									
	3.25	WOP			10.25	15									
	3.50	WOP			10.50	15									
	3.75	WOP			10.75	14									
	4.00	WOP			11.00	15									
	4.25	WOH			11.25	20									
	4.50	WOH			11.50	17									
	4.75	WOH			11.75	14									
	5.00	WOH			12.00	20									
	5.25	WOH			12.25	29									
	5.50	WOH			12.50	20									
	5.75	WOH			12.75	27									
	6.00	WOH			13.00	21									
	6.25	WOH			13.25	21									
10:50	6.50	9			13.50	29									
	6.75	11			13.75	30									
	7.00	14 + 9			14.00	21									

Earth Mechanics

FUGRO

Job # *98-42-0061*
Client *Caltrans*
Location *Primary PIDP Location*
Inspector *RH, NM, BS (Fugro)*
Pile Contractor *Mason / Dutra*
Pile Type *Steel Pipe Pile*
Pile No. *Pile #1*
Cushion *NA*

Project *San Francisco-Oakland Bay Bridge*
Weather *Variable*
Structure *SFOBB East Span Siesmic Safety Project*
General Contractor *Manson / Dutra*
Hammer Type *Menck 500 and Menck 1700*
Pile Diameter *8' (2.438m)*
Ground Surface Elevation *~ -29.1' (msl) (-8.86 m (msl))*

Pile 1, Section B (10/30/00)

Time	Pen. (m)	No of Blows	Notes	Time	Pen. (m)	No of Blows	Notes	Time	Pen. (m)	No of Blows	Notes	Time	Pen. (m)	No of Blows	Notes
16:58	15.75	37	MHU 500		23.75	11			31.75	11			39.75	17	
	16.00	37	20 - 30 % energy		24.00	11			32.00	12			40.00	17	
	16.25	35			24.25	10			32.25	11			40.25	18	
	16.50	24			24.50	12			32.50	12			40.50	18	
	16.75	21			24.75	11			32.75	11			40.75	18	
	17.00	26			25.00	11			33.00	13			41.00	18	
	17.25	22			25.25	11			33.25	11			41.25	18	
	17.50	16			25.50	11			33.50	13			41.50	19	
	17.75	18			25.75	11			33.75	13			41.75	18	
	18.00	18			26.00	11			34.00	13			42.00	19	
	18.25	14			26.25	11			34.25	14			42.25	20	
	18.50	18			26.50	12			34.50	13			42.50	21	
	18.75	17			26.75	10			34.75	14			42.75	22	
	19.00	16			27.00	12			35.00	14			43.00	20	
	19.25	17			27.25	11			35.25	16			43.25	20	
	19.50	16			27.50	11			35.50	16			43.50	20	
	19.75	15			27.75	11			35.75	17			43.75	20	
	20.00	16			28.00	12			36.00	18			44.00	21	
	20.25	15			28.25	11			36.25	19			44.25	21	
	20.50	15			28.50	12			36.50	18		17:53	44.50	22	
	20.75	15			28.75	11			36.75	21					
	21.00	15			29.00	12			37.00	20					
	21.25	13			29.25	11			37.25	20	50% energy				
	21.50	11			29.50	12			37.50	19					
	21.75	10	40 % energy		29.75	11			37.75	17					
	22.00	11			30.00	12			38.00	17					
	22.25	11			30.25	12			38.25	17					
	22.50	11			30.50	11			38.50	17					
	22.75	11			30.75	12			38.75	16					
	23.00	11			31.00	11			39.00	17					
	23.25	10			31.25	11			39.25	18					
	23.50	11			31.50	13			39.50	17					

Job # *98-42-0061*
Client *Caltrans*
Location *Primary PIDP Location*
Inspector *RH, NM, BS (Fugro)*
Pile Contractor *Mason / Dutra*
Pile Type *Steel Pipe Pile*
Pile No. *Pile #1*
Cushion *NA*

Project *San Francisco-Oakland Bay Bridge*
Weather *Variable*
Structure *SFOBB East Span Siesmic Safety Project*
General Contractor *Manson / Dutra*
Hammer Type *Menck 500 and Menck 1700*
Pile Diameter *8' (2.438m)*
Ground Surface Elevation *~ -29.1' (msl) (-8.86 m (msl))*

Pile 1, Section C (11/04/00)

Time	Pen. (m)	No of Blows	Notes	Time	Pen. (m)	No of Blows	Notes	Time	Pen. (m)	No of Blows	Notes	Time	Pen. (m)	No of Blows	Notes
			MHU 500		51.50	29			58.50	24			65.50	31	
14:11	44.75	68	40 to 50 % energy		51.75	29			58.75	26			65.75	27	
	45.00	56			52.00	28			59.00	26			66.00	31	
	45.25	43			52.25	29			59.25	26			66.25	30	
	45.50	39	70 % energy		52.50	29			59.50	24			66.50	26	
	45.75	34			52.75	29			59.75	25			66.75	25	
	46.00	39			53.00	27			60.00	25			67.00	30	
	46.25	39			53.25	30			60.25	27			67.25	30	
	46.50	35			53.50	24			60.50	27			67.50	26	
	46.75	32			53.75	18	100 % energy		60.75	28			67.75	25	
	47.00	33			54.00	23			61.00	28			68.00	30	
	47.25	32			54.25	23			61.25	30			68.25	29	
	47.50	41			54.50	25			61.50	29		15:35	68.50	28	stop
	47.75	41	80 % energy		54.75	24			61.75	30		15:45	68.75	26	start
	48.00	32			55.00	23			62.00	28			69.00	26	
	48.25	30			55.25	25			62.25	31		15:52	69.25	8	stop
	48.50	30			55.50	24			62.50	29					
	48.75	31			55.75	25			62.75	30					
	49.00	29			56.00	23			63.00	32					
	49.25	29			56.25	25			63.25	32					
	49.50	29			56.50	25			63.50	36					
	49.75	30			56.75	24			63.75	34					
	50.00	31			57.00	26			64.00	32					
	50.25	28			57.25	24			64.25	38					
	50.50	30			57.50	26			64.50	31					
	50.75	29			57.75	24			64.75	34					
	51.00	28			58.00	25			65.00	31					
	51.25	29			58.25	26			65.25	31					

Earth Mechanics

FUGRO

Job # *98-42-0061*
Client *Caltrans*
Location *Primary PIDP Location*
Inspector *RH, NM, BS (Fugro)*
Pile Contractor *Mason / Dutra*
Pile Type *Steel Pipe Pile*
Pile No. *Pile #1*
Cushion *NA*

Project *San Francisco-Oakland Bay Bridge*
Weather *Variable*
Structure *SFOBB East Span Siesmic Safety Project*
General Contractor *Manson / Dutra*
Hammer Type *Menck 500 and Menck 1700*
Pile Diameter *8' (2.438m)*
Ground Surface Elevation *~ -29.1' (msl) (-8.86 m (msl))*

Pile 1, Section D (11/09/00)

Time	Pen. (m)	No of Blows	Notes	Time	Pen. (m)	No of Blows	Notes	Time	Pen. (m)	No of Blows	Notes	Time	Pen. (m)	No of Blows	Notes
11:10	69.25	60	MHU 1700		76.25	20			83.25	19			90.25	25	
	69.50	30	50 to 60 % energy		76.50	19			83.50	21			90.50	25	
	69.75	27			76.75	18			83.75	22			90.75	26	
	70.00	35			77.00	20			84.00	24			91.00	26	
	70.25	37			77.25	19			84.25	26			91.25	24	
	70.50	28			77.50	19			84.50	27			91.50	23	
	70.75	36			77.75	20			84.75	28			91.75	23	
	71.00	19			78.00	19			85.00	30			92.00	26	
	71.25	24			78.25	20			85.25	31			92.25	26	
	71.50	18			78.50	19			85.50	31		12:53	92.50	25	
	71.75	22			78.75	19			85.75	29					
	72.00	22			79.00	20			86.00	31					
	72.25	22			79.25	19			86.25	25	60 to 70 % energy				
	72.50	22			79.50	20			86.50	24		**Restrikes**			
	72.75	22			79.75	20			86.75	26					
	73.00	21			80.00	21			87.00	26		Restrike No. 1 (11/12/00)			
	73.25	20			80.25	23			87.25	27		10:37	92.75	54	
	73.50	21			80.50	20			87.50	25	70 to 80 % enrgy	10:41			
	73.75	21			80.75	21			87.75	24					
	74.00	19			81.00	19			88.00	23		Restrike No. 2 (11/20/00)			
	74.25	20			81.25	20			88.25	26		13:59	93.00	144	
	74.50	20			81.50	21			88.50	27		14:05			
	74.75	20			81.75	20			88.75	29					
	75.00	19			82.00	20			89.00	22	90% energy	Restrike No. 3 (12/12/00)			
	75.25	21			82.25	20			89.25	21		13:39	93.25	333	
	75.50	19			82.50	18			89.50	21		13:51			
	75.75	20			82.75	20			89.75	26					
	76.00	18			83.00	19			90.00	27					

SFOBB Task Order No. 5
Project No. 98-42-0058

Earth Mechanics

FUGRO

PILE NO. 2

Pile No. 2

Job # *98-42-0061*
Client *Caltrans*
Location *Primary PIDP Location*
Inspector *RH, NM, BS (Fugro)*
Pile Contractor *Mason / Dutra*
Pile Type *Steel Pipe Pile*
Pile No. *Pile #2*
Cushion *NA*

Project *San Francisco-Oakland Bay Bridge*
Weather *Variable*
Structure *SFOBB East Span Siesmic Safety Project*
General Contractor *Manson / Dutra*
Hammer Type *Menck 500 and Menck 1700*
Pile Diameter *8' (2.438m)*
Ground Surface Elevation *~ -29.1' (msl) (-8.86 m (msl))*

Pile 2, Section A (11/03/00)

Time	Pen. (m)	No of Blows	Notes	Time	Pen. (m)	No of Blows	Notes	Time	Pen. (m)	No of Blows	Notes	Time	Pen. (m)	No of Blows	Notes
	0.25	WOP	MHU 500		7.25	19		10:41	14.25	30	stop (pull bot. yoke)				
	0.50	WOP			7.50	25			14.50	34					
	0.75	WOP			7.75	28			14.75	38					
	1.00	WOP			8.00	29			15.00	42					
	1.25	WOP			8.25	30			15.25	39					
	1.50	WOP			8.50	31		10:49	15.50	22					
	1.75	WOP			8.75	35									
	2.00	WOP			9.00	33									
	2.25	WOP			9.25	35									
	2.50	WOP			9.50	36									
	2.75	WOP			9.75	33									
	3.00	WOP			10.00	31									
	3.25	WOP			10.25	31									
	3.50	WOP			10.50	29									
	3.75	WOP			10.75	32									
	4.00	WOP			11.00	29									
	4.25	WOP			11.25	31									
	4.50	WOP			11.50	33									
	4.75	WOP			11.75	32									
	5.00	WOH			12.00	29									
	5.25	WOH			12.25	32									
	5.50	WOH			12.50	38									
	5.75	WOH			12.75	43									
	6.00	WOH			13.00	32									
	6.25	WOH			13.25	22	20 % energy								
	6.50	WOH			13.50	20									
9:12	6.75	13	~ 10% energy		13.75	19									
	7.00	14		9:45	14.00	28	stop (pull bot. yoke)								

Job # *98-42-0061*
Client *Caltrans*
Location *Primary PIDP Location*
Inspector *RH, NM, BS (Fugro)*
Pile Contractor *Mason / Dutra*
Pile Type *Steel Pipe Pile*
Pile No. *Pile #2*
Cushion *NA*

Project *San Francisco-Oakland Bay Bridge*
Weather *Variable*
Structure *SFOBB East Span Siesmic Safety Project*
General Contractor *Manson / Dutra*
Hammer Type *Menck 500 and Menck 1700*
Pile Diameter *8' (2.438m)*
Ground Surface Elevation *~ -29.1' (msl) (-8.86 m (msl))*

Pile 2, Section B (11/12/00)

Time	Pen. (m)	No of Blows	Notes	Time	Pen. (m)	No of Blows	Notes	Time	Pen. (m)	No of Blows	Notes	Time	Pen. (m)	No of Blows	Notes
8:49	15.75	60	MHU 500		23.75	17			31.75	21			39.75	23	
	16.00	46	20% energy		24.00	16			32.00	21			40.00	21	
	16.25	44			24.25	18			32.25	22			40.25	23	
	16.50	46	35 to 40% energy		24.50	17			32.50	22			40.50	21	
	16.75	42			24.75	18			32.75	20			40.75	23	
	17.00	25			25.00	18			33.00	23			41.00	21	
	17.25	20			25.25	17			33.25	23			41.25	22	
	17.50	18			25.50	17			33.50	22			41.50	22	
	17.75	18			25.75	20			33.75	23			41.75	21	
	18.00	22			26.00	17			34.00	21			42.00	22	
	18.25	18			26.25	17			34.25	22			42.25	22	
	18.50	20			26.50	18			34.50	23		11:06	42.50	23	stop (pull bot. yoke)
	18.75	22			26.75	18			34.75	24		11:22	42.75	22	start
	19.00	20			27.00	17			35.00	24			43.00	23	
	19.25	20			27.25	18			35.25	22			43.25	23	
	19.50	19			27.50	18			35.50	25			43.50	23	
	19.75	18			27.75	17			35.75	27		11:28	43.75	24	
	20.00	19			28.00	16			36.00	28			44.00	24	
9:08	20.25	16	stop		28.25	18			36.25	29			44.25	25	
9:17	20.50	15	start		28.50	19			36.50	28			44.50	28	
	20.75	22		9:35	28.75	21	stop (pull top yoke)		36.75	30					
	21.00	19		10:30	29.00	23	start		37.00	27					
	21.25	18			29.25	22			37.25	25					
	21.50	18			29.50	24			37.50	26					
	21.75	17			29.75	22			37.75	26					
	22.00	19			30.00	21			38.00	28					
9:23	22.25	17	start/stop		30.25	23	1433		38.25	20	50% energy				
	22.50	18			30.50	24			38.50	23					
	22.75	17			30.75	22			38.75	20					
	23.00	16			31.00	23			39.00	21					
	23.25	18			31.25	21			39.25	23					
	23.50	18			31.5	25			39.50	21					

Earth Mechanics

FUGRO

Job # *98-42-0061*
Client *Caltrans*
Location *Primary PIDP Location*
Inspector *RH, NM, BS (Fugro)*
Pile Contractor *Mason / Dutra*
Pile Type *Steel Pipe Pile*
Pile No. *Pile #2*
Cushion *NA*

Project *San Francisco-Oakland Bay Bridge*
Weather *Variable*
Structure *SFOBB East Span Siesmic Safety Project*
General Contractor *Manson / Dutra*
Hammer Type *Menck 500 and Menck 1700*
Pile Diameter *8' (2.438m)*
Ground Surface Elevation *~ -29.1' (msl) (-8.86 m (msl))*

Pile 2, Section C (11/15/00)

Time	Pen. (m)	No of Blows	Notes	Time	Pen. (m)	No of Blows	Notes	Time	Pen. (m)	No of Blows	Notes	Time	Pen. (m)	No of Blows	Notes
	44.50		MHU 500		51.50	27			58.50	29		13:39	65.50	25	start
10:50	44.75	58	50% energy		51.75	26			58.75	29			65.75	26	
	45.00	46			52.00	25			59.00	27			66.00	26	
	45.25	53			52.25	25			59.25	30			66.25	22	
	45.50	50			52.50	26			59.50	28			66.50	28	
	45.75	41		11:30	52.75	31	stop (pull top yoke)		59.75	31			66.75	35	
	46.00	44		12:14	53.00	25	start		60.00	26			67.00	44	
	46.25	42			53.25	29			60.25	28			67.25	35	
	46.50	42	75% energy		53.50	28			60.50	28			67.50	37	
	46.75	61			53.75	28			60.75	25			67.75	36	
	47.00	37			54.00	28			61.00	36			68.00	34	
	47.25	43			54.25	29			61.25	20			68.25	34	
	47.50	39			54.50	29			61.50	30		13:48	68.50	35	end of drive
	47.75	37			54.75	31			61.75	29					
	48.00	35			55.00	27			62.00	27					
	48.25	38			55.25	29			62.25	28					
	48.50	31			55.50	28			62.50	30					
	48.75	31			55.75	30			62.75	28					
	49.00	27	80 % energy		56.00	30			63.00	29					
	49.25	26			56.25	31			63.25	29					
	49.50	27			56.50	32	90% energy		63.50	31					
	49.75	25			56.75	30			63.75	30					
	50.00	27			57.00	27			64.00	30					
	50.25	25			57.25	29			64.25	31					
	50.50	28			57.50	28			64.50	29					
	50.75	27			57.75	29			64.75	29	100% energy				
	51.00	25			58.00	29			65.00	26					
	51.25	26			58.25	30		13:01	65.25	27	stop (pull bot. yoke)				

Job # *98-42-0061*
Client *Caltrans*
Location *Primary PIDP Location*
Inspector *RH, NM, BS (Fugro)*
Pile Contractor *Mason / Dutra*
Pile Type *Steel Pipe Pile*
Pile No. *Pile #2*
Cushion *NA*

Project *San Francisco-Oakland Bay Bridge*
Weather *Variable*
Structure *SFOBB East Span Siesmic Safety Project*
General Contractor *Manson / Dutra*
Hammer Type *Menck 500 and Menck 1700*
Pile Diameter *8' (2.438m)*
Ground Surface Elevation *~ -29.1' (msl) (-8.86 m (msl))*

Pile 2, Section D (11/19/00 to 11/20/00)

Time	Pen. (m)	No of Blows	Notes	Time	Pen. (m)	No of Blows	Notes	Time	Pen. (m)	No of Blows	Notes	Time	Pen. (m)	No of Blows	Notes
	68.50		MHU 500		75.50	44		0.3924	82.50	54	(11/20/00)		89.50	50	
8:56	68.75	78	100% energy		75.75	48			82.75	49	MHU 1700		89.75	48	
	69.00	64			76.00	45			83.00	48	at 1000kJ		90.00	44	
	69.25	63			76.25	47			83.25	41			90.25	44	
	69.50	56			76.50	44			83.50	39			90.50	47	
	69.75	58			76.75	46			83.75	40			90.75	46	
	70.00	39		9:56	77.00	45	stop (pull top yoke)		84.00	39			91.00	50	
	70.25	56		10:35	77.25	45	start		84.25	39			91.25	49	
	70.50	54			77.50	42			84.50	43		10:27	91.50	49	stop (pull bot. yoke)
	70.75	48			77.75	40			84.75	38		11:13	91.75	50	start
	71.00	49			78.00	55			85.00	42			92.00	54	
	71.25	60			78.25	50			85.25	40			92.25	53	
	71.50	53			78.50	50			85.50	41			92.50	32	100% energy
	71.75	54			78.75	51			85.75	38			92.75	28	
	72.00	51			79.00	48			86.00	43			93.00	30	
	72.25	51			79.25	45			86.25	36			93.25	26	
	72.50	47			79.50	51			86.50	44		11:23	93.50	29	
	72.75	50			79.75	54			86.75	39					
	73.00	49			80.00	50			87.00	44		**Restrikes**			
	73.25	47			80.25	55			87.25	42					
	73.50	47			80.50	52			87.50	42		Restrike No. 1 (11/21/00)			
	73.75	46		10:55	80.75	73	stop (11/19/00)		87.75	38		9:14	93.63	20/.125	
	74.00	48		16:41	81.00	46	start MHU 1700		88.00	42		9:16			
	74.25	48			81.25	39	at 100kJ		88.25	44					
	74.50	40			81.50	31			88.50	44		Restrike No. 2 (12/12/00)			
	74.75	48			81.75	26			88.75	47		10:27	93.88	105	
	75.00	48			82.00	26			89.00	49		10:32			
	75.25	42		16:57	82.25	28	stop (hyd. leak)		89.25	50					

PILE NO. 3

Pile No. 3

Job #	*98-42-0061*		
Client	*Caltrans*	**Project**	*San Francisco-Oakland Bay Bridge*
Location	*Pile Location No. 3*	**Weather**	*Variable*
Inspector	*RH, NM, BS (Fugro)*	**Structure**	*SFOBB East Span Seismic Safety Project*
Pile Contractor	*Mason / Dutra*	**General Contractor**	*Manson / Dutra*
Pile Type	*Steel Pipe Pile*	**Hammer Type**	*Menck 500 and Menck 1700*
Pile No.	*Pile #3*	**Pile Diameter**	*8' (2.438m)*
Cushion	*NA*	**Ground Surface Elevation**	*~ -23.2' (msl) (-7.07 m (msl))*

Pile 3, Section A (12/01/00)

Time	Pen. (m)	No of Blows	Notes	Time	Pen. (m)	No of Blows	Notes	Time	Pen. (m)	No of Blows	Notes	Time	Pen. (m)	No of Blows	Notes
10:50	0.25	WOP			7.25	WOP			14.25	WOH	stop (pull bot. yoke)				
	0.50	WOP			7.50	WOP			14.50	WOH					
	0.75	WOP			7.75	WOH	MHU 500		14.75	WOH					
	1.00	WOP			8.00	WOH		11:45	14.90	WOH					
	1.25	WOP			8.25	WOH									
	1.50	WOP			8.50	WOH									
	1.75	WOP			8.75	WOH									
	2.00	WOP			9.00	WOH									
	2.25	WOP			9.25	WOH									
	2.50	WOP			9.50	WOH									
	2.75	WOP			9.75	WOH									
	3.00	WOP			10.00	WOH									
	3.25	WOP			10.25	WOH									
	3.50	WOP			10.50	WOH									
	3.75	WOP			10.75	WOH									
	4.00	WOP			11.00	WOH									
	4.25	WOP			11.25	WOH									
	4.50	WOP			11.50	WOH									
	4.75	WOP			11.75	WOH									
	5.00	WOP			12.00	WOH									
	5.25	WOP			12.25	WOH									
	5.50	WOP			12.50	WOH									
	5.75	WOP			12.75	WOH									
	6.00	WOP			13.00	WOH									
	6.25	WOP			13.25	WOH									
	6.50	WOP			13.50	WOH									
	6.75	WOP			13.75	WOH									
	7.00	WOP			14.00	WOH									

WOH - Weight of Hammer
WOP - Weight of Pile

Job #	*98-42-0061*		
Client	*Caltrans*	**Project**	*San Francisco-Oakland Bay Bridge*
Location	*Pile Location No. 3*	**Weather**	*Variable*
Inspector	*RH, NM, BS (Fugro)*	**Structure**	*SFOBB East Span Seismic Safety Project*
Pile Contractor	*Mason / Dutra*	**General Contractor**	*Manson / Dutra*
Pile Type	*Steel Pipe Pile*	**Hammer Type**	*Menck 500 and Menck 1700*
Pile No.	*Pile #3*	**Pile Diameter**	*8' (2.438m)*
Cushion	*NA*	**Ground Surface Elevation**	*~ -23.2' (msl) (-7.07 m (msl))*

Pile 3, Section B (12/03/00)

Time	Pen. (m)	No of Blows	Notes	Time	Pen. (m)	No of Blows	Notes	Time	Pen. (m)	No of Blows	Notes	Time	Pen. (m)	No of Blows	Notes
11:21	15.25	10	MHU 500		23.00	11	15 to 20 % energy		30.75	16			38.50	19	
	15.50	8	10 % energy		23.25	10			31.00	16			38.75	19	
	15.75	WOH			23.50	10			31.25	16			39.00	20	
	16.00				23.75	10			31.50	15			39.25	21	
	16.25				24.00	10			31.75	17			39.50	20	
	16.50				24.25	10			32.00	16			39.75	21	
	16.75				24.50	10			32.25	16			40.00	24	
	17.00				24.75	10			32.50	16			40.25	25	
	17.25				25.00	10			32.75	17			40.50	26	
	17.50				25.25	10			33.00	16			40.75	28	
	17.75				25.50	11			33.25	16			41.00	31	
	18.00				25.75	11			33.50	16		12:49	41.25	27	40 to 50% energy
	18.25				26.00	11			33.75	17		13:17	41.50	28	(pull bot. yoke)
	18.50				26.25	11			34.00	16			41.75	27	
	18.75				26.50	11			34.25	17			42.00	28	
	19.00				26.75	11			34.50	17			42.25	29	
	19.25				27.00	11			34.75	16			42.50	24	
	19.50				27.25	12			35.00	19			42.75	23	
	19.75	4		11:46	27.50	12	stop (pull top yoke)		35.25	20			43.00	23	
	20.00	1		12:18	27.75	16	start		35.50	22			43.25	26	
	20.25	2			28.00	17			35.75	22			43.50	21	
	20.50	10			28.25	17			36.00	24			43.75	25	
	20.75	14			28.50	18			36.25	21	30 % energy	13:25	44.00	5	
	21.00	19			28.75	15			36.50	20					
	21.25	19			29.00	16			36.75	19					
	21.50	18			29.25	16			37.00	19					
	21.75	16			29.50	15			37.25	19					
	22.00	17			29.75	17			37.50	19					
	22.25	14			30.00	16			37.75	20					
	22.50	16			30.25	16			38.00	20					
	22.75	15			30.50	15			38.25	19					

Job #	*98-42-0061*		
Client	*Caltrans*	**Project**	*San Francisco-Oakland Bay Bridge*
Location	*Pile Location No. 3*	**Weather**	*Variable*
Inspector	*RH, NM, BS (Fugro)*	**Structure**	*SFOBB East Span Seismic Safety Project*
Pile Contractor	*Mason / Dutra*	**General Contractor**	*Manson / Dutra*
Pile Type	*Steel Pipe Pile*	**Hammer Type**	*Menck 500 and Menck 1700*
Pile No.	*Pile #3*	**Pile Diameter**	*8' (2.438m)*
Cushion	*NA*	**Ground Surface Elevation**	*~ -23.2' (msl) (-7.07 m (msl))*

Pile 3, Section C (12/07/00)

Time	Pen. (m)	No of Blows	Notes	Time	Pen. (m)	No of Blows	Notes	Time	Pen. (m)	No of Blows	Notes	Time	Pen. (m)	No of Blows	Notes
	44.00		MHU 500		51.00	19			58.00	20			65.00	24	
10:04	44.25	71	50% energy		51.25	19			58.25	24			65.25	23	
	44.50	52			51.50	20			58.50	21		11:35	65.50	24	stop (pull bot. Yoke)
	44.75	43	70% energy		51.75	20			58.75	20		11:51	65.75	39	start
	45.00	39			52.00	20			59.00	23			66.00	24	
	45.25	36			52.25	21			59.25	23			66.25	25	
	45.50	37			52.50	21			59.50	21			66.50	25	
	45.75	35		10:31	52.75	20	stop (pull top yoke)		59.75	22			66.75	27	
	46.00	33	80% energy	10:55	53.00	21	start		60.00	19			67.00	29	
	46.25	28			53.25	24			60.25	23			67.25	24	
	46.50	28			53.50	21			60.50	20			67.50	25	
	46.75	29			53.75	24			60.75	23			67.75	26	
	47.00	20	100% energy		54.00	22			61.00	22			68.00	26	
	47.25	22			54.25	23			61.25	23		12:00	68.25	22	
	47.50	19			54.50	22			61.50	21					
	47.75	21			54.75	23			61.75	21					
	48.00	22			55.00	23			62.00	23					
	48.25	20			55.25	21			62.25	22					
	48.50	19			55.50	23			62.50	23					
	48.75	19			55.75	21			62.75	22					
	49.00	26			56.00	22			63.00	23					
	49.25	13			56.25	21			63.25	22					
	49.50	16			56.50	21			63.50	22					
	49.75	20			56.75	24			63.75	24					
	50.00	20			57.00	21			64.00	24					
	50.25	18			57.25	23			64.25	22					
	50.50	19			57.50	17			64.50	22					
	50.75	20			57.75	26			64.75	23					

Earth Mechanics

FUGRO

Job #	*98-42-0061*		
Client	*Caltrans*	**Project**	*San Francisco-Oakland Bay Bridge*
Location	*Pile Location No. 3*	**Weather**	*Variable*
Inspector	*RH, NM, BS (Fugro)*	**Structure**	*SFOBB East Span Seismic Safety Project*
Pile Contractor	*Mason / Dutra*	**General Contractor**	*Manson / Dutra*
Pile Type	*Steel Pipe Pile*	**Hammer Type**	*Menck 500 and Menck 1700*
Pile No.	*Pile #3*	**Pile Diameter**	*8' (2.438m)*
Cushion	*NA*	**Ground Surface Elevation**	*~ -23.2' (msl) (-7.07 m (msl))*

Pile 3, Section D

Time	Pen. (m)	No of Blows	Notes	Time	Pen. (m)	No of Blows	Notes	Time	Pen. (m)	No of Blows	Notes	Time	Pen. (m)	No of Blows	Notes
10:48	68.50	47	MHU 1700		75.50	20			82.50	6			89.50	20	
10:53	68.75	38	stop (fix control cable)		75.75	20			82.75	7			89.75	21	
12:12	69.00	34	start		76.00	24			83.00	14			90.00	22	
	69.25	31	erratic hammer		76.25	26			83.25	12		14:46	90.25	19	stop (pull bot. Yoke)
	69.50	26	behavior, many start		76.50	17			83.50	14		15:09	90.50	33	start
	69.75	33	stop sequences		76.75	20			83.75	13			90.75	24	
	70.00	19			77.00	24			84.00	14			91.00	22	
	70.25	22			77.25	20			84.25	13			91.25	22	
	70.50	29			77.50	24			84.50	13			91.50	24	
	70.75	28		13:15	77.75	22	stop (pull top yoke)		84.75	14			91.75	25	
	71.00	28		14:03	78.00	16	start		85.00	14			92.00	25	
	71.25	22			78.25	19	erratic hammer		85.25	12			92.25	26	
	71.50	25			78.50	24	behavior, many start		85.50	13			92.50	26	
	71.75	23			78.75	18	stop sequences		85.75	13			92.75	26	
	72.00	28			79.00	30			86.00	14			93.00	26	
	72.25	22			79.25	19			86.25	13			93.25	26	
	72.50	25			79.50	15			86.50	13			93.50	29	
	72.75	23			79.75	17			86.75	14			93.75	30	
	73.00	23			80.00	20			87.00	14			94.00	30	
	73.25	22			80.25	13			87.25	12			94.25	29	
	73.50	26			80.50	15			87.50	14		15:28	94.50	32	
	73.75	21			80.75	14			87.75	14					
	74.00	22			81.00	15			88.00	16					
	74.25	22			81.25	13			88.25	16		**Restrikes**			
	74.50	21			81.50	14			88.50	19					
	74.75	19			81.75	13			88.75	20		Restrike No. 1 (12/13/00)			
	75.00	21			82.00	15			89.00	20		10:40	94.80	62/0.3	
	75.25	20			82.25	30			89.25	19		10:42			

APPENDIX C
PDA DATA

C-1, Driving System Performance Data

PILE NO. 1

PILE NO. 1

Pile 1, Section B, PDA 1

PILE 1, SECTION B, PDA 1

Penetration (m)	Blow Count (bpqm)	Blow Rate (bpm)	Transmitted Energy (KJ)	System Efficiency (%)	Resistance to Driving (MN)	Impact Stress (MPa)	Tensile Stress (MPa)	Stress at Toe (MPa)	Impact Velocity (m/sec)
15.75	37	32.8	59	11	5.2	57.9	28.1	43.9	1.4
16.00	37	33.3	81	15	5.6	70.1	0.0	42.2	1.7
16.25	35	33.5	83	15	5.5	70.1	0.0	39.7	1.7
16.50	24	32.9	126	23	5.3	80.9	0.0	39.5	2.0
16.75	21	33.8	141	26	5.0	85.5	59.3	38.5	2.1
17.00	26	33.6	138	25	4.2	85.9	59.6	37.4	2.1
17.25	22	33.3	138	25	4.0	86.2	59.6	37.8	2.1
17.50	16	33.1	136	25	4.3	85.7	59.6	38.5	2.1
17.75	18	33.2	136	25	4.4	85.7	58.8	38.9	2.1
18.00	18	33.1	140	25	4.2	86.1	58.3	40.2	2.1
18.25	14	33.1	136	25	4.3	85.9	58.3	39.1	2.1
18.50	18	33.9	130	24	4.1	84.6	58.5	38.0	2.1
18.75	17	33.9	122	22	4.3	83.0	57.5	38.2	2.0
19.00	16	33.5	122	22	3.8	82.9	57.8	36.5	2.0
19.25	17	33.0	122	22	3.8	82.8	58.0	35.7	2.0
19.50	16	33.0	122	22	3.9	82.7	58.0	35.5	2.0
19.75	15	33.1	122	22	3.8	82.6	58.0	35.1	2.0
20.00	16	33.1	122	22	3.5	82.8	57.8	34.5	2.0
20.25	15	33.2	122	22	3.5	82.7	57.6	34.3	2.0
20.50	15	33.2	122	22	3.4	82.9	57.6	34.0	2.0
20.75	15	33.1	124	23	3.2	83.4	57.6	34.6	2.0
21.00	15	33.1	129	23	3.3	83.4	57.4	34.4	2.0
21.25	13	32.3	139	25	3.4	86.4	60.5	36.4	2.1
21.50	11	32.3	175	32	4.4	97.9	70.6	41.3	2.4
21.75	10	34.6	161	29	4.0	93.6	67.2	41.0	2.3
22.00	11	33.7	163	30	4.0	93.4	67.0	40.6	2.3
22.25	11	33.2	163	30	4.0	93.3	66.7	40.9	2.3
22.50	11	33.2	163	30	4.1	93.2	66.9	41.5	2.3
22.75	11	33.2	163	30	4.0	93.4	66.8	42.0	2.3
23.00	11	33.2	163	30	3.7	93.5	67.1	41.8	2.3
23.25	10	33.2	163	30	3.9	93.8	66.6	41.9	2.3
23.50	11	33.2	163	30	3.7	93.7	65.5	41.4	2.3
23.75	11	33.2	163	30	3.6	93.5	65.4	42.0	2.3
24.00	11	33.2	163	30	3.9	93.7	65.0	42.7	2.3
24.25	10	33.2	163	30	3.7	93.3	65.0	42.4	2.3
24.50	12	33.1	161	29	3.7	93.2	65.0	43.0	2.3
24.75	11	33.1	163	30	3.6	93.1	65.0	42.9	2.3
25.00	11	33.0	161	29	3.6	92.8	64.7	42.2	2.3
25.25	11	33.0	161	29	3.7	92.9	64.8	42.3	2.3
25.50	11	33.0	163	30	3.8	92.8	64.7	42.8	2.3
25.75	11	33.5	163	30	3.9	92.5	64.3	43.3	2.3
26.00	11	33.8	161	29	4.1	92.7	64.1	42.9	2.3
26.25	11	33.9	163	30	4.2	92.7	64.2	43.3	2.3
26.50	12	33.8	163	30	4.0	92.9	64.2	43.6	2.3
26.75	10	33.9	163	30	4.2	93.0	63.8	43.3	2.3
27.00	12	33.8	163	30	4.1	92.7	64.2	43.7	2.3
27.25	11	33.9	163	30	4.3	92.5	63.5	43.6	2.3
27.50	11	33.9	163	30	4.4	93.0	63.6	44.1	2.3
27.75	11	33.9	163	30	4.5	93.0	63.3	44.2	2.3
28.00	12	33.9	163	30	4.6	92.7	62.9	44.3	2.3
28.25	11	33.9	163	30	4.5	92.7	63.4	43.6	2.3
28.50	12	33.8	163	30	4.6	92.6	63.2	42.8	2.3

DRIVING SYSTEM PERFORMANCE DATA
Pile 1B, PDA 1 Menck MHU 500
SFOBB East Span Seismic Safety Project

Penetration (m)	Blow Count (bpqm)	Blow Rate (bpm)	Transmitted Energy (KJ)	System Efficiency (%)	Resistance to Driving (MN)	Impact Stress (MPa)	Tensile Stress (MPa)	Stress at Toe (MPa)	Impact Velocity (m/sec)
28.75	11	33.9	163	30	4.8	92.7	62.8	43.7	2.3
29.00	12	33.9	161	29	5.0	92.5	63.4	43.5	2.3
29.25	11	33.8	163	30	4.8	92.5	63.5	43.5	2.3
29.50	12	33.9	163	30	5.0	92.3	63.5	43.8	2.3
29.75	11	33.8	160	29	4.9	92.3	63.6	44.2	2.3
30.00	12	33.8	163	30	5.3	92.3	63.4	46.3	2.3
30.25	12	33.8	163	30	5.0	92.3	63.3	46.5	2.3
30.50	11	33.8	163	30	5.0	92.3	63.3	46.9	2.3
30.75	12	33.7	163	30	5.1	92.8	63.1	46.4	2.3
31.00	11	33.7	163	30	5.3	92.5	63.0	45.8	2.3
31.25	11	33.7	163	30	5.4	92.3	0.0	45.8	2.3
31.50	13	33.6	163	30	5.5	92.8	0.0	46.3	2.3
31.75	11	33.4	163	30	5.5	93.1	0.0	45.8	2.3
32.00	12	33.3	163	30	5.4	93.2	0.0	45.7	2.3
32.25	11	33.3	163	30	5.2	93.2	0.0	45.5	2.3
32.50	12	33.4	163	30	5.6	93.2	0.0	46.6	2.3
32.75	11	33.4	163	30	5.6	93.3	0.0	46.8	2.3
33.00	13	33.4	163	30	5.4	93.3	0.0	45.7	2.3
33.25	11	33.4	163	30	5.6	93.2	0.0	45.4	2.3
33.50	13	33.5	163	30	5.6	93.0	0.0	45.8	2.3
33.75	13	33.5	163	30	5.3	92.6	0.0	46.2	2.3
34.00	13	33.5	163	30	5.8	93.1	0.0	45.9	2.3
34.25	14	33.5	163	30	6.0	94.1	0.0	46.0	2.3
34.50	13	33.5	163	30	5.7	94.1	0.0	46.0	2.3
34.75	14	33.5	163	30	6.2	94.0	0.0	47.1	2.3
35.00	14	33.5	163	30	5.6	94.0	0.0	47.1	2.3
35.25	16	33.6	163	30	6.0	93.4	0.0	48.1	2.3
35.50	16	33.6	163	30	6.3	92.6	0.0	50.2	2.3
35.75	17	33.6	163	30	5.9	92.5	0.0	51.2	2.3
36.00	18	33.5	163	30	5.6	93.2	0.0	51.4	2.3
36.25	19	33.5	163	30	6.3	92.7	0.0	52.7	2.3
36.50	18	33.6	163	30	6.2	92.6	0.0	52.4	2.3
36.75	21	33.9	163	30	5.9	92.7	0.0	52.6	2.3
37.00	20	33.9	163	30	6.3	92.5	0.0	52.3	2.3
37.25	20	33.9	163	30	6.8	92.5	0.0	52.3	2.3
37.50	19	32.0	192	35	7.3	100.8	0.0	57.6	2.5
37.75	17	34.4	208	38	6.4	103.8	0.0	59.1	2.6
38.00	17	34.1	214	39	6.2	103.9	0.0	59.4	2.6
38.25	17	34.1	209	38	6.4	103.8	0.0	59.2	2.6
38.50	17	34.2	209	38	7.0	104.0	0.0	58.6	2.6
38.75	16	34.1	212	39	6.9	104.6	64.7	59.1	2.6
39.00	17	34.1	214	39	6.9	105.0	64.9	60.0	2.6
39.25	18	34.0	211	38	7.1	104.7	64.3	59.9	2.6
39.50	17	34.0	214	39	6.8	104.8	64.8	60.5	2.6
39.75	17	34.1	209	38	6.7	104.7	64.1	61.4	2.6
40.00	17	34.1	214	39	6.6	104.3	63.4	60.9	2.6
40.25	18	34.1	215	39	6.6	104.1	63.6	59.3	2.6
40.50	18	34.2	215	39	7.1	103.8	63.5	59.9	2.6
40.75	18	34.2	214	39	7.1	103.8	63.4	60.3	2.6
41.00	18	34.1	214	39	7.2	103.8	63.0	60.9	2.6
41.25	18	34.1	214	39	7.4	103.8	62.4	61.1	2.6
41.50	19	34.2	215	39	7.8	103.8	62.4	62.2	2.6

DRIVING SYSTEM PERFORMANCE DATA
Pile 1B, PDA 1 Menck MHU 500
SFOBB East Span Seismic Safety Project

Penetration (m)	Blow Count (bpqm)	Blow Rate (bpm)	Transmitted Energy (KJ)	System Efficiency (%)	Resistance to Driving (MN)	Impact Stress (MPa)	Tensile Stress (MPa)	Stress at Toe (MPa)	Impact Velocity (m/sec)
41.75	18	34.1	217	39	7.9	103.8	62.4	63.1	2.6
42.00	19	34.1	217	39	7.6	104.5	60.6	62.5	2.6
42.25	20	34.2	217	39	7.7	104.1	60.3	62.9	2.6
42.50	21	34.2	217	39	8.1	104.6	60.8	63.3	2.6
42.75	22	34.3	217	39	8.4	104.7	61.5	63.9	2.6
43.00	20	35.0	217	39	7.7	104.7	60.6	65.1	2.6
43.25	20	35.7	217	39	7.4	105.5	58.8	65.4	2.6
43.50	20	35.7	215	39	7.7	105.7	58.9	66.5	2.6
43.75	20	35.7	216	39	7.9	105.3	57.5	66.8	2.6
44.00	21	35.7	214	39	7.7	104.2	57.9	65.5	2.6
44.25	21	35.7	213	39	8.3	106.5	58.0	66.9	2.6
44.50	22	35.7	213	39	8.2	107.2	57.5	69.1	2.6

DRIVING SYSTEM PERFORMANCE DATA
Pile 1B, PDA 1 Menck MHU 500
SFOBB East Span Seismic Safety Project

Pile 1, Section B, PDA 2

PILE 1, SECTION B, PDA 2

Penetration (m)	Blow Count (bpqm)	Blow Rate (bpm)	Transmitted Energy (KJ)	System Efficiency (%)	Resistance to Driving (MN)	Impact Stress (MPa)	Tensile Stress (MPa)	Stress at Toe (MPa)	Impact Velocity (m/sec)
15.75	39	33.6	66	12	7.5	59.5	28.5	44.5	1.4
16.00	37	33.4	95	17	6.9	72.6	42.7	44.0	1.6
16.25	35	33.5	95	17	6.3	72.5	44.2	41.5	1.6
16.50	24	33.0	130	24	5.8	83.7	55.0	43.6	1.9
16.75	21	33.7	149	27	5.2	89.0	60.0	44.1	2.1
17.00	26	33.6	149	27	4.8	88.8	60.7	42.7	2.1
17.25	22	33.3	149	27	4.5	88.9	60.6	41.9	2.1
17.50	16	33.1	149	27	4.4	89.2	60.5	42.0	2.1
17.75	18	33.2	149	27	4.6	89.0	59.6	42.9	2.1
18.00	18	33.1	149	27	4.5	89.2	59.6	43.4	2.1
18.25	14	33.1	149	27	4.2	89.2	59.7	43.0	2.1
18.50	18	34.0	143	26	4.1	88.4	59.4	41.7	2.1
18.75	17	33.8	136	25	3.7	86.5	59.5	39.7	2.0
19.00	16	33.5	136	25	3.6	86.3	59.6	39.5	2.0
19.25	17	33.0	136	25	3.5	86.4	59.6	39.5	2.0
19.50	16	33.0	136	25	3.5	86.1	59.6	39.2	2.0
19.75	15	33.1	137	25	3.5	86.5	59.6	38.9	2.0
20.00	16	33.1	136	25	3.4	86.4	59.6	38.2	2.0
20.25	15	33.2	136	25	3.4	86.1	59.5	38.4	2.0
20.50	15	33.2	138	25	3.4	85.9	59.6	38.4	2.0
20.75	15	33.1	138	25	3.4	85.6	59.6	38.3	2.0
21.00	15	33.1	137	25	2.7	85.8	59.6	37.9	2.0
21.25	13	32.1	154	28	2.7	89.2	62.1	38.6	2.1
21.50	11	33.0	195	35	2.8	101.1	71.3	42.3	2.3
21.75	10	34.5	176	32	2.9	96.9	67.2	41.5	2.2
22.00	11	33.6	180	33	3.2	97.2	67.2	41.8	2.2
22.25	11	33.2	180	33	3.0	96.9	67.2	41.9	2.2
22.50	11	33.2	179	33	2.9	97.1	67.2	41.6	2.2
22.75	11	33.2	179	33	3.0	97.5	67.2	42.0	2.2
23.00	11	33.2	176	32	3.0	97.4	67.2	41.9	2.2
23.25	10	33.2	178	32	3.0	97.5	67.2	41.9	2.2
23.50	11	33.2	178	32	2.9	97.4	67.2	42.0	2.2
23.75	11	33.2	176	32	2.9	97.1	67.2	42.2	2.2
24.00	11	33.2	176	32	3.0	97.1	67.1	42.9	2.2
24.25	10	33.1	176	32	3.2	96.9	66.9	43.3	2.2
24.50	12	33.1	177	32	3.2	97.0	66.4	43.1	2.2
24.75	11	33.2	176	32	3.3	96.8	66.2	43.8	2.2
25.00	11	33.1	175	32	3.2	96.7	66.1	44.0	2.2
25.25	11	33.1	175	32	3.3	96.6	65.9	44.0	2.2
25.50	11	33.2	176	32	2.9	97.0	65.4	43.7	2.2
25.75	11	33.6	175	32	2.8	96.8	65.4	43.7	2.2
26.00	11	34.0	175	32	2.9	96.8	65.9	44.1	2.2
26.25	11	33.9	174	32	2.7	97.0	66.2	43.5	2.2
26.50	12	33.8	171	31	2.7	97.0	65.9	44.2	2.2
26.75	10	33.9	172	31	2.7	97.2	65.7	44.6	2.2
27.00	12	33.8	171	31	2.8	97.2	65.6	44.2	2.2
27.25	11	33.9	168	31	2.8	97.4	65.6	44.5	2.2
27.50	11	33.9	168	31	2.8	97.7	65.8	45.2	2.2
27.75	11	33.9	168	31	2.8	97.8	65.4	45.0	2.2
28.00	12	33.9	170	31	3.0	98.0	65.3	46.0	2.2
28.25	11	33.9	172	31	3.0	97.8	65.3	45.6	2.2
28.50	12	33.8	175	32	3.1	97.6	64.6	45.6	2.2
28.75	11	33.8	172	31	3.0	97.7	63.9	46.2	2.2

DRIVING SYSTEM PERFORMANCE DATA
Pile 1B, PDA 2, Menck MHU 500
SFOBB East Span Seismic Safety Project

Penetration (m)	Blow Count (bpqm)	Blow Rate (bpm)	Transmitted Energy (KJ)	System Efficiency (%)	Resistance to Driving (MN)	Impact Stress (MPa)	Tensile Stress (MPa)	Stress at Toe (MPa)	Impact Velocity (m/sec)
29.00	12	33.8	170	31	3.0	97.4	63.5	46.1	2.2
29.25	11	33.8	176	32	3.2	97.8	63.3	46.5	2.2
29.50	12	33.9	175	32	3.2	97.6	63.2	46.8	2.2
29.75	11	33.8	172	31	2.8	97.4	62.8	46.6	2.2
30.00	12	33.8	175	32	3.0	97.6	62.5	47.3	2.2
30.25	12	33.8	174	32	2.9	97.8	62.8	46.6	2.2
30.50	11	33.8	174	32	2.8	97.2	62.9	46.5	2.2
30.75	12	33.7	176	32	2.9	97.2	63.0	46.9	2.2
31.00	11	33.7	176	32	2.8	97.2	62.6	47.5	2.2
31.25	11	33.7	176	32	3.0	97.1	62.5	48.0	2.2
31.50	13	33.6	175	32	2.9	97.5	61.7	49.0	2.2
31.75	11	33.4	176	32	2.9	97.9	62.4	49.1	2.2
32.00	12	33.3	176	32	2.8	97.9	63.0	48.8	2.2
32.25	11	33.3	176	32	2.8	97.7	62.7	48.8	2.2
32.50	12	33.4	176	32	2.8	98.0	63.0	48.5	2.2
32.75	11	33.4	176	32	2.9	97.7	62.6	48.7	2.2
33.00	13	33.4	176	32	3.0	97.4	62.5	49.2	2.2
33.25	11	33.4	176	32	3.2	97.5	61.8	49.7	2.2
33.50	13	33.5	176	32	3.4	97.0	61.2	50.4	2.2
33.75	13	33.5	176	32	3.0	97.1	60.3	50.5	2.2
34.00	13	33.5	174	32	3.2	97.1	60.1	51.2	2.2
34.25	14	33.5	173	31	3.6	97.7	59.6	52.6	2.2
34.50	13	33.5	173	31	3.9	98.0	58.9	53.3	2.2
34.75	14	33.5	173	31	4.0	98.0	58.5	53.3	2.2
35.00	14	33.5	176	32	4.3	98.0	57.6	54.1	2.2
35.25	16	33.6	176	32	4.7	97.4	56.2	56.2	2.2
35.50	16	33.6	176	32	5.2	97.0	55.5	56.7	2.2
35.75	17	33.6	175	32	5.1	97.0	54.7	57.8	2.2
36.00	18	33.5	166	30	5.9	97.0	54.0	59.9	2.2
36.25	19	33.5	163	30	6.3	96.7	53.8	61.1	2.2
36.50	18	33.7	163	30	6.4	96.4	53.2	62.1	2.2
36.75	21	33.9	163	30	6.3	97.0	52.1	61.9	2.2
37.00	20	33.9	163	30	6.4	97.0	52.4	62.1	2.2
37.25	20	33.9	163	30	6.6	97.0	52.1	62.2	2.2
37.50	19	32.0	195	35	7.0	106.3	58.6	66.4	2.4
37.75	17	34.4	203	37	7.3	110.4	61.4	68.7	2.5
38.00	17	34.1	203	37	7.5	110.5	61.8	69.3	2.5
38.25	17	34.1	204	37	8.0	110.5	61.5	70.1	2.5
38.50	17	34.2	203	37	8.0	110.5	61.6	70.8	2.5
38.75	16	34.1	203	37	7.9	110.5	61.1	71.8	2.5
39.00	17	34.1	203	37	8.0	110.6	59.8	72.8	2.5
39.25	18	34.0	203	37	7.8	110.5	59.5	72.9	2.5
39.50	17	34.0	203	37	7.9	110.5	59.6	73.1	2.5
39.75	17	34.0	203	37	7.4	110.5	59.6	72.1	2.5
40.00	17	34.1	203	37	7.5	110.5	59.6	71.8	2.5
40.25	18	34.1	203	37	8.0	110.4	59.6	72.2	2.5
40.50	18	34.2	203	37	9.0	110.5	59.5	72.7	2.5
40.75	18	34.2	203	37	9.1	110.4	59.2	72.2	2.5
41.00	18	34.1	203	37	9.2	110.0	59.4	72.3	2.5
41.25	18	34.1	203	37	9.4	109.7	58.2	72.5	2.5
41.50	19	34.2	203	37	9.8	109.6	58.0	73.1	2.5
41.75	18	34.1	203	37	9.9	109.7	57.2	74.1	2.5

DRIVING SYSTEM PERFORMANCE DATA
Pile 1B, PDA 2, Menck MHU 500
SFOBB East Span Seismic Safety Project

Penetration (m)	Blow Count (bpqm)	Blow Rate (bpm)	Transmitted Energy (KJ)	System Efficiency (%)	Resistance to Driving (MN)	Impact Stress (MPa)	Tensile Stress (MPa)	Stress at Toe (MPa)	Impact Velocity (m/sec)
42.00	19	34.1	203	37	9.5	110.3	58.2	73.5	2.5
42.25	20	34.2	203	37	9.8	109.6	59.0	73.6	2.5
42.50	21	34.2	203	37	9.8	108.8	58.8	72.6	2.5
42.75	22	34.3	203	37	9.8	108.3	59.0	72.2	2.5
43.00	20	35.1	203	37	10.6	108.3	58.3	72.5	2.5
43.25	20	35.7	203	37	10.6	109.4	57.6	73.2	2.5
43.50	20	35.7	203	37	10.2	110.5	57.6	72.8	2.5
43.75	20	35.7	203	37	10.3	110.6	57.4	72.7	2.5
44.00	21	35.7	203	37	9.9	109.1	57.6	71.9	2.5
44.25	22	35.7	203	37	10.7	107.9	57.4	72.1	2.5
44.50	22	357.3	203	37	10.8	111.4	56.0	74.8	2.5

DRIVING SYSTEM PERFORMANCE DATA
Pile 1B, PDA 2, Menck MHU 500
SFOBB East Span Seismic Safety Project

Pile 1, Section C, PDA 1

PILE 1, SECTION C PDA 1

Penetration (m)	Blow Count (bpqm)	Blow Rate (bpm)	Transmitted Energy (KJ)	System Efficiency (%)	Resistance to Driving (MN)	Impact Stress (MPa)	Tensile Stress (MPa)	Stress at Toe (MPa)	Impact Velocity (m/sec)
45.00	56	32.1	230	42	20.3	113.1	29.1	139.3	2.9
45.25	43	32.1	254	46	19.5	118.2	32.3	139.6	3.0
45.50	39	34.4	307	56	20.5	130.9	40.7	147.9	3.4
45.75	34	34.3	308	56	20.9	131.0	41.1	148.6	3.4
46.00	39	34.3	307	56	21.2	131.0	41.6	147.2	3.4
46.25	39	34.2	307	56	21.6	131.0	42.5	148.1	3.4
46.50	35	34.2	307	56	21.7	131.1	43.4	149.1	3.4
46.75	32	34.2	307	56	21.0	131.5	43.8	149.2	3.4
47.00	33	34.1	309	56	19.6	130.7	40.8	146.1	3.4
47.25	32	34.1	306	56	19.2	130.6	40.5	144.4	3.4
47.50	41	34.1	310	56	18.6	130.6	41.5	144.5	3.4
47.75	41	33.7	333	61	18.2	135.7	45.2	147.0	3.6
48.00	32	33.6	351	64	17.8	139.7	49.3	149.2	3.7
48.25	30	33.1	351	64	17.7	140.0	49.3	149.5	3.7
48.50	30	33.0	351	64	18.0	139.6	49.1	148.1	3.7
48.75	31	32.9	354	64	17.9	139.7	49.1	147.7	3.6
49.00	29	32.9	351	64	17.3	139.4	49.2	144.3	3.6
49.25	29	32.9	348	63	17.0	140.1	49.4	144.9	3.6
49.50	29	32.9	349	63	17.0	140.1	49.1	145.0	3.7
49.75	30	32.9	348	63	17.5	139.9	48.5	150.3	3.7
50.00	31	32.9	351	64	17.2	140.2	48.5	148.2	3.7
50.25	28	32.8	351	64	16.7	140.1	49.1	149.2	3.7
50.50	30	32.8	352	64	16.1	140.2	49.5	148.2	3.7
50.75	29	32.8	352	64	15.7	140.3	50.0	148.5	3.7
51.00	28	32.8	353	64	16.5	140.5	49.8	148.2	3.7
51.25	29	32.7	352	64	16.2	140.6	50.4	148.0	3.8
51.50	29	32.7	353	64	16.5	140.7	50.7	149.5	3.7
51.75	29	32.7	352	64	16.2	140.8	50.7	150.4	3.8
52.00	28	32.7	353	64	16.4	140.7	49.5	150.2	3.8
52.25	29	32.77	352.5	64	16	141	48.4	153.0	3.8
52.50	29	32.7	352	64	16.2	140.7	48.4	154.2	3.8
52.75	29	32.7	351	64	16.8	140.5	47.8	154.5	3.8
53.00	27	32.2	387	70	17.0	147.0	51.7	160.7	4.0
53.25	30	32.4	438	80	16.5	156.5	58.0	165.0	4.3
53.50	24	32.4	436	79	17.5	156.6	58.4	166.1	4.3
53.75	18	32.4	435	79	17.8	156.4	61.2	164.9	4.3
54.00	23	32.4	437	79	18.2	156.4	59.6	165.8	4.3
54.25	23	32.4	436	79	17.7	156.8	58.9	168.3	4.3
54.50	25	32.4	435	79	17.3	156.6	58.1	169.4	4.3
54.75	24	32.4	434	79	17.9	156.5	58.2	170.9	4.3
55.00	23	32.4	436	79	17.8	156.6	57.0	169.8	4.3
55.25	25	32.4	435	79	19.0	156.5	56.7	172.0	4.3
55.50	24	32.4	434	79	18.1	156.2	55.9	173.6	4.3
55.75	25	32.4	435	79	18.2	155.6	55.3	170.4	4.2
56.00	23	32.3	434	79	18.7	155.8	55.3	170.2	4.2
56.25	25	32.3	435	79	18.8	156.3	55.1	171.6	4.3
56.50	25.00	32.324	435	79	19	156.4	54.5	172.9	4.3
56.75	24	32.3	434	79	19.0	156.6	54.2	174.7	4.3

DRIVING SYSTEM PERFORMANCE DATA
Pile 1C, PDA 1, Menck MHU 500
SFOBB East Span Seismic Safety Project

Penetration (m)	Blow Count (bpqm)	Blow Rate (bpm)	Transmitted Energy (KJ)	System Efficiency (%)	Resistance to Driving (MN)	Impact Stress (MPa)	Tensile Stress (MPa)	Stress at Toe (MPa)	Impact Velocity (m/sec)
57.00	26	32.3	435	79	18.4	156.4	53.0	173.2	4.3
57.25	24	32.3	436	79	18.5	155.7	53.9	174.4	4.3
57.50	26	32.3	434	79	18.0	155.7	52.6	177.1	4.3
57.75	24	32.3	436	79	18.8	156.1	53.2	176.3	4.3
58.00	25	32.3	435	79	18.4	156.1	52.8	177.2	4.3
58.25	26	32.3	435	79	18.4	155.8	52.7	178.0	4.3
58.50	24	32.3	434	79	18.4	155.6	52.9	178.8	4.3
58.75	26	32.3	434	79	18.3	155.1	51.5	179.2	4.3
59.00	26	32.3	434	79	18.2	155.3	50.8	179.6	4.3
59.25	26	32.3	434	79	17.8	155.4	50.8	178.4	4.3
59.50	24	32.3	434	79	18.0	155.1	50.6	178.6	4.3
59.75	25	32.3	434	79	17.9	155.2	50.0	178.4	4.3
60.00	25	32.3	434	79	19.0	155.3	48.6	179.7	4.3
60.25	27	32.2	434	79	20.8	155.1	47.3	182.2	4.2
60.50	27	32.2	438	80	22.4	155.2	47.0	186.1	4.3
60.75	28	32.2	437	79	23.1	155.2	46.3	188.0	4.3
61.00	28	32.2	438	80	23.6	155.4	45.3	187.9	4.3
61.25	30	32.2	442	80	23.4	155.5	44.9	187.6	4.3
61.50	29	32.2	443	81	22.7	156.0	43.9	185.5	4.3
61.75	30	32.2	444	81	22.8	156.0	43.3	186.4	4.3
62.00	28	32.2	442	80	23.3	155.8	43.2	187.9	4.3
62.25	31	32.2	443	81	23.9	156.0	42.3	188.6	4.3
62.50	29	32.2	444	81	23.9	156.0	41.8	188.5	4.3
62.75	30	32.2	446	81	24.8	156.4	41.1	189.7	4.3
63.00	32	32.2	446	81	26.2	156.3	40.2	193.2	4.3
63.25	32	32.2	446	81	27.3	156.5	39.5	194.8	4.3
63.50	36	32.2	444	81	28.6	156.5	37.7	196.9	4.3
63.75	34	32.2	441	80	29.4	156.5	36.9	198.4	4.3
64.00	32	32.3	439	80	29.9	156.5	36.3	200.0	4.3
64.25	38	32.2	441	80	28.5	156.4	37.0	195.5	4.3
64.50	31	32.2	442	80	27.9	156.6	38.4	195.3	4.3
64.75	34	32.2	442	80	27.1	156.6	38.5	194.1	4.3
65.00	31	32.2	441	80	26.4	157.1	39.9	193.1	4.3
65.25	31	32.2	443	80	25.4	157.0	41.3	191.7	4.3
65.50	31	32.2	439	80	24.4	157.0	42.6	190.3	4.3
65.75	27	32.1	437	79	24.2	157.0	43.6	189.5	4.3
66.00	31	32.2	438	80	23.4	156.7	44.3	188.0	4.3
66.25	30	32.2	438	80	22.7	157.2	44.6	187.3	4.3
66.50	26	32.2	439	80	21.6	157.0	44.9	185.7	4.3
66.75	25	32.2	436	79	20.7	155.6	45.0	183.2	4.3
67.00	30	32.2	436	79	20.6	156.5	44.4	183.3	4.3
67.25	30	29.6	429	78	22.8	152.5	42.0	182.2	4.2
67.50	26	32.3	446	81	22.9	154.9	45.8	186.2	4.3
67.75	25	32.4	446	81	22.5	155.2	45.4	185.4	4.3
68.00	30	32.4	446	81	22.8	155.2	45.4	186.9	4.3
68.25	29	32.4	442	80	23.1	155.3	46.4	186.1	4.3
68.50	28	32.4	441	80	23.1	155.3	47.0	186.2	4.3
68.75	26	32.4	439	80	23.1	155.5	46.3	187.3	4.3
69.00	26	32.4	439	80	22.1	155.7	44.8	185.0	4.3
69.25	8	32.4	391	71	20.1	141.3	40.1	168.2	3.9

DRIVING SYSTEM PERFORMANCE DATA
Pile 1C, PDA 1, Menck MHU 500
SFOBB East Span Seismic Safety Project

Pile 1, Section C, PDA 2

PILE 1, SECTION C, PDA 2

Penetration (m)	Blow Count (bpqm)	Blow Rate (bpm)	Transmitted Energy (KJ)	System Efficiency (%)	Resistance to Driving (MN)	Impact Stress (MPa)	Tensile Stress (MPa)	Stress at Toe (MPa)	Impact Velocity (m/sec)
44.75	70	25.0	217	40	23.0	101.4	23.6	131.3	2.5
45.00	56	32.1	244	44	23.5	110.1	30.4	141.7	2.8
45.25	43	32.1	268	49	22.1	115.2	33.3	142.3	2.9
45.50	39	34.4	325	59	21.1	125.4	38.8	148.1	3.2
45.75	34	34.3	325	59	20.6	125.1	38.9	147.5	3.2
46.00	39	34.3	325	59	20.3	125.6	38.7	147.4	3.2
46.25	39	34.2	325	59	20.1	126.1	39.2	148.4	3.2
46.50	35	34.2	325	59	20.1	126.1	40.1	148.6	3.2
46.75	32	34.2	325	59	20.4	125.8	40.6	148.9	3.2
47.00	33	34.1	325	59	20.4	125.6	41.1	148.9	3.2
47.25	32	34.1	325	59	20.5	125.5	41.0	148.9	3.2
47.50	41	34.1	325	59	20.3	126.5	40.6	148.5	3.2
47.75	41	33.7	354	64	20.1	131.7	42.3	151.8	3.3
48.00	32	33.5	376	68	19.8	134.9	43.0	153.7	3.4
48.25	30	33.1	372	68	19.9	134.1	42.8	151.9	3.4
48.50	30	33.0	371	67	20.1	134.0	44.8	152.1	3.4
48.75	31	32.9	373	68	19.7	134.5	45.1	152.3	3.4
49.00	29	32.9	372	68	19.6	134.2	45.8	151.9	3.4
49.25	29	32.9	374	68	19.1	133.7	45.8	150.5	3.4
49.50	29	32.9	372	68	19.8	133.7	45.5	149.7	3.4
49.75	30	32.9	369	67	20.7	133.5	45.2	149.2	3.4
50.00	31	32.9	368	67	20.8	133.6	46.1	148.4	3.4
50.25	28	32.8	369	67	20.5	132.5	47.4	146.3	3.3
50.50	30	32.8	367	67	20.4	132.8	47.6	146.1	3.3
50.75	29	32.8	368	67	21.0	132.5	46.7	146.3	3.3
51.00	28	32.8	367	67	20.9	132.6	46.5	147.0	3.3
51.25	29	32.7	367	67	20.6	132.8	46.9	147.1	3.3
51.50	29	32.7	366	67	20.7	132.9	47.4	148.0	3.3
51.75	29	32.7	367	67	21.2	132.8	47.3	146.5	3.3
52.00	28	32.7	366	67	19.9	132.7	47.2	147.7	3.3
52.25	29	32.8	368	67	20.1	132.8	47.1	147.5	3.3
52.50	29	32.7	366	67	20.4	132.8	47.0	148.7	3.3
52.75	29	32.7	368	67	20.9	132.8	46.4	147.8	3.3
53.00	27	32.2	405	74	21.3	139.3	50.3	155.0	3.5
53.25	30	32.4	468	85	22.3	150.3	57.6	167.2	3.7
53.50	24	32.4	467	85	22.1	149.3	57.5	168.3	3.7
53.75	18	32.4	469	85	22.5	147.5	56.9	170.8	3.7
54.00	23	32.4	468	85	22.1	149.4	56.8	170.0	3.7
54.25	23	32.4	465	85	22.1	149.4	57.6	169.1	3.7
54.50	25	32.4	469	85	22.8	150.1	56.8	169.4	3.7
54.75	24	32.4	466	85	22.9	149.8	56.0	170.0	3.7
55.00	23	32.4	468	85	22.8	149.7	55.7	169.9	3.7
55.25	25	32.4	466	85	23.3	150.3	55.4	170.8	3.7
55.50	24	32.4	462	84	22.8	149.9	54.7	167.1	3.7
55.75	25	32.4	462	84	22.1	150.2	53.6	168.3	3.7
56.00	23	32.3	465	84	23.1	149.7	53.3	171.4	3.7
56.25	25	32.4	466	85	23.2	150.2	53.9	173.4	3.7
56.50	25	32.3	464	84	23.2	150.2	54.2	173.3	3.7
56.75	24	32.3	463	84	22.7	149.9	53.5	172.9	3.7
57.00	26	32.3	463	84	22.5	150.3	52.7	173.2	3.7
57.25	24	32.3	468	85	21.2	149.6	52.6	172.4	3.7
57.50	26	32.3	463	84	22.1	150.1	51.1	169.9	3.7

DRIVING SYSTEM PERFORMANCE DATA
Pile 1C, PDA 2, Menck MHU 500
SFOBB East Span Seismic Safety Project

Penetration (m)	Blow Count (bpqm)	Blow Rate (bpm)	Transmitted Energy (KJ)	System Efficiency (%)	Resistance to Driving (MN)	Impact Stress (MPa)	Tensile Stress (MPa)	Stress at Toe (MPa)	Impact Velocity (m/sec)
57.75	24	32.3	466	85	21.9	149.3	51.7	170.7	3.7
58.00	25	32.3	464	84	21.4	149.8	51.5	171.9	3.7
58.25	26	32.3	464	84	21.6	149.6	51.3	171.6	3.7
58.50	24	32.3	464	84	21.4	148.8	51.6	170.1	3.7
58.75	26	32.3	462	84	21.6	149.3	51.1	167.3	3.7
59.00	26	32.3	463	84	21.2	149.1	50.8	167.0	3.7
59.25	26	32.3	462	84	21.0	149.0	52.3	168.0	3.7
59.50	24	32.3	462	84	21.3	148.5	52.1	169.2	3.7
59.75	25	32.3	464	84	21.0	148.7	50.6	170.5	3.7
60.00	21	32.3	464	84	21.3	147.3	49.0	172.7	3.7
60.25	31	32.2	466	85	21.8	154.5	46.6	175.3	3.7
60.50	27	32.2	467	85	23.0	148.8	44.3	177.0	3.7
60.75	28	32.2	469	85	23.8	148.9	43.9	178.2	3.7
61.00	25	32.2	467	85	24.5	148.4	44.3	180.7	3.7
61.25	33	32.2	467	85	24.6	154.2	43.4	180.0	3.7
61.50	29	32.2	469	85	24.6	148.6	43.1	179.4	3.7
61.75	30	32.2	466	85	24.2	148.5	43.9	178.7	3.7
62.00	28	32.2	469	85	24.1	148.2	44.4	177.8	3.7
62.50	31	32.2	469	85	24.3	148.7	44.1	179.5	3.7
62.75	29	32.2	465	85	24.3	148.4	42.8	178.9	3.7
63.00	30	32.2	464	84	24.4	144.0	41.9	179.6	3.7
63.25	32	32.2	464	84	25.5	149.4	40.9	180.7	3.7
63.50	32	32.2	464	84	26.9	149.1	39.0	184.0	3.7
63.75	36	32.2	463	84	28.1	149.6	37.1	185.3	3.7
64.00	34	32.2	466	85	29.5	149.6	34.7	188.1	3.7
64.25	32	32.3	464	84	31.0	149.1	35.2	191.9	3.7
64.50	38	32.2	468	85	30.1	150.0	36.1	190.6	3.7
64.75	31	32.2	466	85	28.8	148.9	36.8	187.1	3.7
65.00	34	32.2	471	86	28.4	149.5	38.0	187.6	3.7
65.25	31	32.2	469	85	27.7	149.3	38.7	183.4	3.7
65.50	31	32.2	468	85	26.1	149.3	40.8	183.0	3.7
65.75	31	32.2	471	86	24.7	149.4	42.3	180.8	3.7
66.00	27	32.2	465	84	24.0	148.5	43.3	179.7	3.7
66.25	31	32.2	464	84	23.0	149.3	44.6	178.1	3.7
66.50	29	32.1	467	85	22.1	149.5	45.7	176.4	3.7
66.75	27	32.2	466	85	21.2	148.9	46.2	174.1	3.7
67.00	23	32.2	466	85	20.8	147.5	47.2	173.9	3.7
67.25	29	32.2	463	84	20.1	146.1	47.7	170.1	3.7
67.50	31	29.9	467	85	22.2	147.7	44.3	174.6	3.7
67.75	27	32.3	469	85	23.0	151.0	44.2	181.0	3.8
68.00	25	32.4	465	85	22.0	156.0	44.1	178.3	3.8
68.25	30	32.4	465	84	21.3	152.0	44.3	173.8	3.7
68.50	29	32.4	462	84	21.4	147.5	44.5	175.4	3.8
68.75	28	32.4	464	84	22.1	149.0	43.0	177.6	3.8
69.00	26	32.4	465	85	22.0	147.1	42.3	175.8	3.7
69.25	26	32.4	465	85	22.2	146.9	41.5	174.9	3.7

DRIVING SYSTEM PERFORMANCE DATA
Pile 1C, PDA 2, Menck MHU 500
SFOBB East Span Seismic Safety Project

Pile 1, Section D, PDA 1

PILE 1, SECTION D, PDA 1

Penetration (m)	Blow Count (bpqm)	Blow Rate (bpm)	Transmitted Energy (KJ)	System Efficiency (%)	Resistance to Driving (MN)	Impact Stress (MPa)	Tensile Stress (MPa)	Stress at Toe (MPa)	Impact Velocity (m/sec)
69.50	30	31.9	1138	61	58.3	191.1	1.5	268.8	4.7
69.75	27	27.2	1084	58	25.5	186.7		261.9	4.6
70.00	35	31.4	1099	59	37.1	188.5		261.1	4.6
70.25	37	32.2	1107	59	7.5	188.0	9.4	256.3	4.6
70.50	28	32.0	1112	59	13.7	188.6	19.0	254.7	4.6
70.75	36	31.5	1110	59	49.1	189.4	21.9	253.6	4.6
71.00	19	31.2	1112	59	52.1	189.3	25.0	250.2	4.6
71.25	24	31.0	1114	60	48.7	189.5	27.7	247.2	4.6
71.50	18	30.9	1118	60	36.3	189.6	29.2	244.2	4.7
71.75	22	30.8	1119	60	11.2	189.5	30.8	241.4	4.7
72.00	22	30.4	1124	60	6.6	189.3	31.9	239.6	4.7
72.25	22	30.4	1136	61		190.6	33.2	238.9	4.7
72.50	22	30.4	1138	61		190.9	35.1	238.6	4.7
72.75	22	30.2	1139	61		190.6	35.5	237.8	4.7
73.00	21	30.0	1140	61	30.9	190.5	36.3	236.5	4.7
73.25	20	29.7	1143	61	37.9	191.5	37.7	237.2	4.7
73.50	21	29.5	1148	61	37.4	192.2	37.4	237.1	4.7
73.75	21	30.1	1140	61	37.2	191.2	37.1	234.8	4.7
74.00	19	30.2	1139	61	37.1	191.5	39.0	235.6	4.7
74.25	20	30.3	1140	61	36.7	191.2	40.3	235.1	4.7
74.50	20	29.9	1139	61	36.3	191.2	40.2	235.2	4.7
74.75	20	29.8	1139	61	36.2	191.0	41.1	234.7	4.7
75.00	19	29.6	1141	61	36.2	191.1	41.9	234.0	4.7
75.25	21	29.3	1150	62	36.3	192.2	42.4	235.7	4.7
75.50	19	29.6	1148	61	36.0	191.5	42.5	234.5	4.7
75.75	20	29.6	1143	61	36.1	191.5	42.1	235.1	4.7
76.00	18	29.5	1151	62	36.2	192.1	42.6	235.7	4.7
76.25	20	29.6	1148	61	36.3	191.7	42.3	235.3	4.7
76.50	19	29.4	1151	62	36.4	192.2	42.4	236.2	4.7
76.75	18	29.1	1152	62	36.2	192.2	42.0	236.0	4.7
77.00	20	29.0	1156	62	35.9	192.0	42.0	235.6	4.7
77.25	19	28.9	1160	62	36.0	192.3	43.0	235.9	4.8
77.50	19	29.2	1155	62	36.0	192.3	42.5	235.5	4.8
77.75	20	29.2	1154	62	36.5	192.7	42.6	236.2	4.8
78.00	19	29.1	1152	62	36.7	193.7	42.2	237.9	4.8
78.25	20	29.0	1153	62	36.8	194.5	42.5	237.9	4.8
78.50	19	29.1	1153	62	37.5	194.3	42.1	239.2	4.8
78.75	19	29.1	1153	62	37.8	194.7	40.0	239.2	4.8
79.00	20	29.3	1153	62	37.7	194.9	40.5	239.6	4.8
79.25	19	29.5	1153	62	37.6	195.1	41.4	240.0	4.8
79.50	20	29.4	1152	62	37.4	194.1	42.2	237.7	4.8
79.75	20	29.2	1156	62	38.7	194.2	38.9	241.0	4.8
80.00	21	29.5	1162	62	42.7	194.6	33.0	248.7	4.8
80.25	23	29.4	1160	62	42.8	193.5	32.8	247.2	4.8
80.50	20	29.2	1158	62	41.3	193.2	35.8	244.8	4.8
80.75	21	29.3	1162	62	40.4	192.4	36.7	242.4	4.8
81.00	19	29.2	1154	62	40.5	194.0	38.5	243.0	4.8
81.25	20	29.2	1152	62	40.4	195.1	38.5	244.1	4.8
81.50	21	29.1	1154	62	41.3	195.5	37.3	245.3	4.8
81.75	20	29.2	1154	62	40.3	195.0	37.8	243.5	4.8
82.00	20	29.1	1154	62	38.8	194.1	39.0	239.9	4.8
82.25	20	29.3	1153	62	38.8	195.3	41.2	240.9	4.8

DRIVING SYSTEM PERFORMANCE DATA
Pile 1D, PDA 1, Menck MHU 1700
SFOBB East Span Seismic Safety Project

Penetration (m)	Blow Count (bpqm)	Blow Rate (bpm)	Transmitted Energy (KJ)	System Efficiency (%)	Resistance to Driving (MN)	Impact Stress (MPa)	Tensile Stress (MPa)	Stress at Toe (MPa)	Impact Velocity (m/sec)
82.50	18	29.0	1153	62	38.5	195.8	41.4	240.8	4.8
82.75	20	29.1	1156	62	38.3	195.9	41.6	240.6	4.8
83.00	19	29.0	1155	62	38.3	195.5	41.3	240.1	4.8
83.25	19	29.3	1153	62	39.8	195.1	38.8	243.0	4.8
83.50	21	28.9	1163	62	42.7	195.5	35.2	248.2	4.8
83.75	22	29.4	1161	62	45.0	194.5	31.2	251.9	4.8
84.00	24	29.3	1166	62	48.2	194.7	26.2	257.3	4.8
84.25	26	29.3	1157	62	51.0	194.0	24.1	260.8	4.8
84.50	27	29.4	1159	62	53.0	193.8	6.6	263.8	4.8
84.75	28	29.3	1160	62	54.2	193.0		265.5	4.7
85.00	30	29.3	1162	62	55.3	192.7		267.2	4.7
85.25	31	0.0	1162	62	56.1	192.3		268.2	4.8
85.50	31	29.2	1166	62	56.5	192.8		268.8	4.8
85.75	29	30.3	1206	65	57.1	197.0		274.4	4.8
86.00	31	30.3	1205	64	57.4	197.1		275.5	4.8
86.25	25	28.7	1302	70	56.4	206.2	12.2	280.9	5.0
86.50	24	30.0	1382	74	57.0	214.0	22.2	288.7	5.2
86.75	26	30.1	1382	74	58.1	213.7	6.6	290.9	5.2
87.00	26	30.0	1383	74	59.8	213.5		293.9	5.2
87.25	27	30.0	1382	74	61.3	212.4		295.5	5.1
87.50	25	28.7	1510	81	61.9	222.0	2.0	304.5	5.4
87.75	24	28.5	1578	84	62.2	224.8	8.3	310.8	5.5
88.00	23	29.2	1586	85	62.2	224.1	4.4	310.6	5.5
88.25	26	29.2	1586	85	66.9	223.8		319.1	5.5
88.50	27	29.2	1583	85	68.8	224.8		322.6	5.5
88.75	29	29.2	1585	85	67.8	226.8		320.8	5.5
89.00	22	27.0	1858	99	68.5	241.5	9.3	336.3	6.0
89.25	21	28.6	1830	98	66.1	238.8	25.2	331.5	5.9
89.50	21	28.5	1828	98	68.1	239.1	5.2	335.0	5.9
89.75	26	16.8	1690	90	71.7	233.5	0.6	333.7	5.7
90.00	27	28.5	1847	99	75.8	244.7		351.1	6.0
90.25	25	28.5	1833	98	74.5	243.7		348.5	5.9
90.50	25	28.5	1832	98	73.9	243.5		347.5	5.9
90.75	26	28.4	1833	98	73.7	243.5		345.9	5.9
91.00	26	28.5	1833	98	73.4	243.8		345.3	5.9
91.25	24	28.5	1836	98	74.3	243.8		347.5	5.9
91.50	23	28.3	1839	98	74.7	244.3		348.5	5.9
91.75	23	28.4	1833	98	74.5	244.0		348.5	5.9
92.00	26	28.3	1839	98	73.5	240.2		344.1	5.9
92.25	26	28.3	1844	99	72.0	241.9		342.7	5.9
92.50	25	28.3	1844	99	71.0	246.5		344.6	6.0

DRIVING SYSTEM PERFORMANCE DATA
Pile 1D, PDA 1, Menck MHU 1700
SFOBB East Span Seismic Safety Project

Pile 1, Section D, PDA 2

PILE 1, SECTION D, PDA 2

Penetration (m)	Blow Count (bpqm)	Blow Rate (bpm)	Transmitted Energy (KJ)	System Efficiency (%)	Resistance to Driving (MN)	Impact Stress (MPa)	Tensile Stress (MPa)	Stress at Toe (MPa)	Impact Velocity (m/sec)
69.50	30	25.5	778	42	45.4	157.0	16.6	213.5	3.7
69.75	27	28.3	737	39	44.5	152.4	16.0	206.7	3.6
70.00	35	31.4	747	40	43.8	155.3	16.6	205.0	3.6
70.25	37	32.2	753	40	42.7	155.9	18.0	200.7	3.6
70.50	28	31.9	756	40	42.3	154.5	18.9	199.2	3.6
70.75	36	31.5	755	40	41.4	156.0	20.2	198.1	3.6
71.00	19	31.2	758	41	39.9	152.2	23.3	193.8	3.6
71.25	24	31.0	758	41	39.1	154.0	26.0	189.9	3.6
71.50	18	30.9	759	41	38.1	151.6	27.5	187.8	3.6
71.75	22	30.7	759	41	37.6	153.4	27.3	186.7	3.7
72.00	22	30.4	761	41	36.2	153.4	28.4	186.5	3.7
72.25	22	30.4	760	41	35.7	153.0	28.7	184.6	3.6
72.50	22	30.4	766	41	35.3	153.6	29.0	183.7	3.7
72.75	22	30.2	772	41	34.7	154.0	28.9	183.7	3.7
73.00	21	30.0	772	41	34.1	153.8	30.6	184.3	3.7
73.25	20	29.7	773	41	34.0	153.1	29.5	183.6	3.7
73.50	21	29.6	773	41	34.0	153.7	30.0	184.1	3.7
73.75	21	30.1	771	41	33.8	153.7	29.9	182.3	3.7
74.00	19	30.2	771	41	33.4	153.0	30.1	183.1	3.7
74.25	20	30.3	770	41	33.0	153.4	30.8	182.8	3.7
74.50	20	29.9	772	41	32.6	153.6	30.9	184.1	3.7
74.75	20	29.8	769	41	32.3	153.1	31.9	182.7	3.7
75.00	19	29.6	773	41	32.0	151.9	32.6	181.1	3.7
75.25	21	29.3	773	41	31.8	153.2	33.2	181.1	3.7
75.50	19	29.6	774	41	31.4	152.0	34.0	180.4	3.7
75.75	20	29.6	774	41	31.1	152.5	33.5	181.1	3.7
76.00	18	29.5	774	41	31.5	151.7	34.0	181.2	3.7
76.25	20	29.6	774	41	31.1	152.4	33.9	181.0	3.7
76.50	19	29.3	775	41	31.0	151.5	34.2	181.0	3.7
76.75	18	29.1	776	41	31.1	151.4	33.9	180.8	3.7
77.00	20	29.0	781	42	30.9	152.9	34.4	180.4	3.7
77.25	19	28.9	779	42	30.6	152.6	35.5	179.8	3.7
77.50	19	29.2	780	42	30.9	152.5	35.4	181.1	3.8
77.75	20	29.1	775	41	31.3	152.4	34.3	182.1	3.7
78.00	19	29.1	775	41	31.8	152.0	33.9	182.9	3.7
78.25	20	29.0	774	41	31.7	152.5	34.8	182.2	3.7
78.50	19	29.1	776	41	31.9	151.8	34.5	182.7	3.8
78.75	19	29.1	771	41	32.6	151.9	33.9	183.0	3.7
79.00	20	29.4	769	41	32.4	151.9	34.2	183.1	3.7
79.25	19	29.5	774	41	32.1	152.1	34.1	183.8	3.8
79.50	20	29.4	771	41	32.3	153.4	34.0	183.2	3.8
79.75	20	29.2	775	41	33.4	153.2	32.0	186.5	3.8
80.00	21	29.5	776	41	35.7	153.1	27.3	191.2	3.8
80.25	23	29.4	772	41	35.6	153.3	27.1	191.6	3.8
80.50	20	29.2	772	41	33.8	151.8	28.3	188.9	3.8
80.75	21	29.3	766	41	33.4	152.0	29.1	187.5	3.7
81.00	19	29.2	768	41	33.1	151.2	30.2	186.6	3.7
81.25	20	29.2	771	41	32.2	151.6	31.8	185.0	3.7

DRIVING SYSTEM PERFORMANCE DATA
Pile 1D, PDA 2, Menck MHU 1700
SFOBB East Span Seismic Safety Project

Penetration (m)	Blow Count (bpqm)	Blow Rate (bpm)	Transmitted Energy (KJ)	System Efficiency (%)	Resistance to Driving (MN)	Impact Stress (MPa)	Tensile Stress (MPa)	Stress at Toe (MPa)	Impact Velocity (m/sec)
81.50	21	29.1	776	41	32.5	152.4	31.4	185.9	3.8
81.75	20	29.2	774	41	32.4	153.0	31.7	184.8	3.8
82.00	20	29.1	775	41	31.7	153.7	32.8	183.7	3.8
82.25	20	29.3	770	41	31.4	152.6	33.9	183.3	3.8
82.50	18	29.0	774	41	31.3	151.5	33.8	183.7	3.8
82.75	20	29.1	774	41	31.7	152.4	33.8	184.4	3.8
83.00	19	29.0	778	42	31.8	152.4	34.2	184.8	3.8
83.25	19	29.3	779	42	32.3	152.6	32.9	186.9	3.8
83.50	21	28.9	780	42	34.1	153.1	29.0	191.9	3.8
83.75	22	29.4	774	41	35.3	154.2	25.7	196.1	3.8
84.00	24	29.3	773	41	37.4	154.8	22.4	202.0	3.8
84.25	26	29.3	772	41	38.9	155.2	18.0	205.6	3.8
84.50	27	29.4	771	41	40.4	155.9	15.9	207.9	3.8
84.75	28	29.3	771	41	40.6	156.5	15.6	209.1	3.8
85.00	30	29.3	771	41	41.3	157.1	15.4	211.3	3.8
85.25	31	29.4	771	41	42.2	157.6	15.3	212.4	3.8
85.50	31	29.2	773	41	42.6	157.8	15.1	212.4	3.8
85.75	29	30.3	800	43	43.1	160.2	14.7	215.4	3.8
86.00	31	30.3	800	43	43.1	160.5	15.1	215.7	3.8
86.25	25	28.6	867	46	43.4	166.0	18.4	221.1	4.0
86.50	24	30.1	922	49	44.4	170.4	19.8	227.3	4.1
86.75	26	30.1	922	49	44.9	170.1	18.7	229.3	4.1
87.00	26	30.0	920	49	45.7	170.3	17.4	230.8	4.1
87.25	27	30.0	921	49	46.6	171.5	16.8	232.4	4.1
87.50	25	28.7	1006	54	47.4	177.8	18.6	239.2	4.2
87.75	24	28.6	1047	56	47.7	179.9	19.5	242.4	4.4
88.00	23	29.2	1050	56	47.6	179.9	18.7	244.3	4.4
88.25	26	29.2	1048	56	50.6	181.4	18.9	251.3	4.4
88.50	27	29.2	1044	56	52.2	180.6	19.5	254.9	4.4
88.75	29	29.2	1050	56	51.5	182.0	18.9	252.9	4.4
89.00	22	27.0	1237	66	51.2	192.6	18.1	262.7	4.7
89.25	21	28.6	1220	65	49.9	190.8	18.2	260.6	4.7
89.50	21	28.5	1220	65	51.3	191.1	18.2	263.3	4.7
89.75	26	16.3	1127	60	54.7	187.7	19.7	265.3	4.5
90.00	27	28.4	1238	66	57.6	197.6	20.5	279.6	4.8
90.25	25	28.5	1230	66	56.3	196.3	20.0	277.4	4.8
90.50	25	28.5	1224	65	56.7	196.1	19.5	277.7	4.8
90.75	26	28.4	1226	66	56.2	196.5	19.7	276.8	4.8
91.00	26	28.5	1224	65	56.3	196.6	19.9	277.4	4.8
91.25	24	28.5	1226	66	57.1	196.5	19.9	278.8	4.8
91.50	23	28.3	1228	66	57.0	195.8	19.9	278.3	4.8
91.75	23	28.4	1225	66	56.5	194.5	20.1	277.0	4.8
92.00	26	28.3	1227	66	56.1	194.9	19.7	277.2	4.8
92.25	26	28.3	1227	66	55.7	196.0	19.0	276.0	4.8
92.50	26	28.3	1222	65	54.1	190.3	17.8	270.9	4.8

DRIVING SYSTEM PERFORMANCE DATA
Pile 1D, PDA 2, Menck MHU 1700
SFOBB East Span Seismic Safety Project

PILE NO. 2

PILE NO. 2

Pile 2, Section B, PDA 1

PILE 2, SECTION B, PDA 1

Penetration (m)	Blow Count (bpqm)	Blow Rate (bpm)	Transmitted Energy (KJ)	System Efficiency (%)	Resistance to Driving (MN)	Impact Stress (MPa)	Tensile Stress (MPa)	Stress at Toe (MPa)	Impact Velocity (m/sec)
15.75	60	28.5	96	18	6.9	70.2	34.7	51.7	1.7
16.00	46	31.8	95	17	6.9	69.2	40.0	44.3	1.7
16.25	44	31.9	95	17	6.5	69.1	41.4	42.1	1.7
16.50	46	31.6	95	17	6.1	69.0	42.7	40.7	1.7
16.75	42	29.9	129	24	5.7	81.2	51.1	45.1	2.0
17.00	25	33.4	134	24	5.4	82.7	53.3	44.5	2.1
17.25	20	32.8	156	28	4.6	90.4	58.8	46.6	2.3
17.50	18	32.3	163	30	4.5	94.6	62.2	48.4	2.3
17.75	18	32.2	163	30	4.2	94.6	62.3	48.4	2.3
18.00	22	32.2	163	30	4.1	94.8	61.2	49.0	2.3
18.25	18	32.2	163	30	4.5	94.4	59.3	49.5	2.3
18.50	20	32.2	163	30	4.4	94.1	58.8	50.3	2.4
18.75	22	32.2	165	30	4.3	94.2	58.1	50.7	2.4
19.00	20	32.2	164	30	4.1	94.4	58.2	50.3	2.4
19.25	20	32.1	165	30	3.9	94.8	58.5	49.6	2.3
19.50	19	32.1	165	30	3.7	94.8	58.7	49.1	2.3
19.75	18	31.9	167	30	3.8	94.9	58.7	48.9	2.3
20.00	19	31.9	167	30	3.6	94.5	58.8	48.2	2.4
20.25	16	31.9	168	31	3.6	94.7	59.3	48.2	2.4
20.50	15	31.9	173	32	3.4	94.4	59.5	47.5	2.4
20.75	22	33.4	163	30	3.7	91.9	56.2	49.5	2.3
21.00	19	34.4	163	30	3.7	92.0	56.8	48.9	2.3
21.25	18	34.6	163	30	3.5	92.3	57.0	48.7	2.3
21.50	18	34.6	163	30	3.2	92.1	57.1	48.4	2.3
21.75	17	34.6	163	30	3.3	92.2	57.3	48.7	2.3
22.00	19	34.4	163	30	3.1	92.3	57.4	48.6	2.3
22.25	17	34.4	163	30	2.9	92.4	57.6	48.7	2.3
22.50	18	34.3	163	30	2.9	92.9	57.4	48.9	2.3
22.75	17	31.9	163	30	3.1	92.9	57.1	49.4	2.3
23.00	16	34.0	163	30	3.0	92.8	57.4	49.6	2.3
23.25	18	34.1	163	30	3.1	92.6	57.6	49.0	2.3
23.50	18	34.1	163	30	3.0	92.4	57.8	48.8	2.3
23.75	17	34.2	163	30	2.8	92.3	57.8	48.8	2.3
24.00	16	34.3	163	30	3.1	92.0	57.8	48.8	2.3
24.25	18	34.3	163	30	3.0	91.6	57.9	48.8	2.3
24.50	17	34.5	163	30	2.8	91.6	57.8	48.6	2.3
24.75	18	34.5	163	30	3.0	91.6	57.9	48.8	2.3
25.00	18	34.5	163	30	2.9	91.5	57.8	48.9	2.3
25.25	17	34.5	163	30	3.0	91.6	57.7	49.1	2.3
25.50	17	34.6	163	30	2.9	91.6	57.5	49.9	2.3
25.75	20	34.4	163	30	2.9	91.8	56.9	50.3	2.3
26.00	17	34.3	163	30	2.8	92.3	56.7	50.6	2.3
26.25	17	34.3	163	30	2.8	92.7	56.4	51.1	2.3
26.50	18	34.2	163	30	2.8	93.0	56.4	51.0	2.3
26.75	18	34.1	163	30	2.7	92.8	56.6	50.6	2.3
27.00	17	34.0	163	30	2.6	93.0	56.6	50.4	2.3
27.25	18	33.9	163	30	2.7	93.2	56.3	51.0	2.3
27.50	18	33.9	163	30	2.7	93.0	56.4	50.2	2.3
27.75	17	34.0	163	30	2.9	92.9	56.7	50.0	2.3
28.00	16	34.0	163	30	3.0	92.8	57.3	50.3	2.3
28.25	18	34.0	163	30	3.1	93.1	56.4	50.5	2.3
28.50	19	34.0	163	30	3.4	93.2	56.4	50.9	2.3

DRIVING SYSTEM PERFORMANCE DATA
Pile 2B, PDA 1, Menck MHU 500
SFOBB East Span Seismic Safety Project

Penetration (m)	Blow Count (bpqm)	Blow Rate (bpm)	Transmitted Energy (KJ)	System Efficiency (%)	Resistance to Driving (MN)	Impact Stress (MPa)	Tensile Stress (MPa)	Stress at Toe (MPa)	Impact Velocity (m/sec)
28.75	21	31.3	163	30	4.3	93.6	53.1	55.5	2.3
29.00	23	35.0	163	30	4.2	93.2	51.3	57.4	2.3
29.25	22	35.1	163	30	3.5	92.1	51.6	56.8	2.3
29.50	24	34.9	163	30	3.2	91.7	51.2	56.3	2.3
29.75	22	35.1	163	30	3.4	91.3	50.7	55.9	2.3
30.00	21	35.1	163	30	2.5	91.4	50.6	55.4	2.3
30.25	23	35.1	163	30	4.4	91.8	51.3	55.1	2.3
30.50	24	35.1	163	30	4.7	91.7	51.8	55.3	2.3
30.75	22	35.2	163	30	4.8	91.7	52.1	54.6	2.3
31.00	23	35.2	163	30	4.2	91.2	51.8	55.0	2.3
31.25	21	34.9	163	30	3.8	91.1	51.7	55.0	2.3
31.50	25	35.0	163	30	3.6	91.3	51.0	55.2	2.3
31.75	21	35.1	163	30	3.4	91.3	51.2	55.7	2.3
32.00	21	35.1	163	30	3.5	91.6	51.4	55.8	2.3
32.25	22	35.2	163	30	3.6	91.3	51.1	55.7	2.3
32.50	22	35.2	163	30	3.6	91.7	51.1	56.3	2.3
32.75	20	35.2	163	30	3.4	91.4	51.1	56.2	2.3
33.00	23	35.1	163	30	3.4	91.9	51.7	56.7	2.3
33.25	23	35.1	163	30	3.6	92.2	51.1	57.1	2.3
33.50	22	35.1	163	30	3.5	92.3	50.6	57.4	2.3
33.75	23	35.0	163	30	3.5	92.8	50.4	58.1	2.3
34.00	21	35.0	163	30	3.1	92.8	50.3	58.0	2.3
34.25	22	35.1	163	30	3.2	92.2	50.3	58.0	2.3
34.50	23	35.1	163	30	3.3	92.1	50.4	57.9	2.3
34.75	24	35.1	163	30	3.4	92.3	50.5	58.1	2.3
35.00	24	35.1	163	30	3.6	92.4	50.1	59.4	2.3
35.25	22	35.3	163	30	3.7	92.4	49.8	59.6	2.3
35.50	25	35.3	163	30	3.8	92.1	49.7	60.6	2.3
35.75	27	35.2	163	30	4.8	91.7	47.5	62.0	2.3
36.00	28	35.3	163	30	5.3	91.8	46.1	64.0	2.3
36.25	29	35.2	163	30	5.4	91.5	45.9	63.9	2.3
36.50	28	35.3	163	30	5.8	91.3	46.4	62.6	2.3
36.75	30	35.4	163	30	6.1	91.6	46.3	63.0	2.3
37.00	27	34.5	178	32	5.5	97.6	49.3	66.9	2.5
37.25	25	36.1	181	33	5.1	99.3	50.0	67.4	2.5
37.50	26	35.7	186	34	5.5	100.0	50.6	67.2	2.5
37.75	26	35.6	189	34	5.3	99.9	50.3	68.0	2.5
38.00	28	35.4	191	35	5.3	100.8	50.8	68.8	2.5
38.25	20	33.9	230	42	5.4	111.8	57.2	76.2	2.8
38.50	23	34.5	230	42	5.6	111.9	58.6	76.6	2.8
38.75	20	34.5	230	42	6.1	112.2	57.8	76.7	2.8
39.00	21	34.5	230	42	5.7	112.5	57.8	76.9	2.8
39.25	23	34.5	230	42	5.6	112.3	57.4	76.9	2.8
39.50	21	34.5	230	42	5.9	112.1	57.0	76.8	2.8
39.75	23	34.4	230	42	6.0	112.3	56.6	76.8	2.8
40.00	21	34.4	230	42	5.6	112.2	57.0	76.6	2.8
40.25	23	34.5	230	42	5.7	111.9	55.5	76.9	2.8
40.50	21	34.5	230	42	5.9	112.6	55.4	78.2	2.8
40.75	23	34.5	230	42	5.7	113.0	55.3	77.9	2.8
41.00	21	34.6	230	42	6.3	112.4	56.5	77.8	2.8
41.25	22	34.5	230	42	6.4	112.4	56.5	78.5	2.8
41.50	22	34.5	230	42	6.8	112.7	57.1	80.0	2.8

DRIVING SYSTEM PERFORMANCE DATA
Pile 2B, PDA 1, Menck MHU 500
SFOBB East Span Seismic Safety Project

Penetration (m)	Blow Count (bpqm)	Blow Rate (bpm)	Transmitted Energy (KJ)	System Efficiency (%)	Resistance to Driving (MN)	Impact Stress (MPa)	Tensile Stress (MPa)	Stress at Toe (MPa)	Impact Velocity (m/sec)
41.75	21	34.5	230	42	6.7	112.3	56.5	78.8	2.8
42.00	22	34.5	230	42	6.8	112.4	56.0	80.0	2.8
42.25	22	34.5	230	42	6.8	113.1	55.5	80.4	2.8
42.50	23	30.2	219	40	7.6	108.9	52.0	79.2	2.7
42.75	22	33.1	224	41	7.5	110.9	53.8	79.4	2.7
43.00	23	33.2	226	41	7.5	111.2	53.3	82.3	2.7
43.25	23	33.2	226	41	7.8	111.2	52.1	82.8	2.7
43.50	23	33.2	223	41	8.2	111.5	51.4	83.8	2.7
43.75	24	33.2	225	41	8.8	111.6	50.3	84.3	2.7
44.00	24	33.2	222	40	8.7	110.1	50.2	84.0	2.7
44.25	25	33.1	223	41	8.9	109.7	49.9	83.7	2.7
44.50	28	33.1	220	40	8.9	109.6	49.0	82.9	2.7

DRIVING SYSTEM PERFORMANCE DATA
Pile 2B, PDA 1, Menck MHU 500
SFOBB East Span Seismic Safety Project

Pile 2, Section B, PDA 2

PILE 2, SECTION B, PDA 2

Penetration (m)	Blow Count (bpqm)	Blow Rate (bpm)	Transmitted Energy (KJ)	System Efficiency (%)	Resistance to Driving (MN)	Impact Stress (MPa)	Tensile Stress (MPa)	Stress at Toe (MPa)	Impact Velocity (m/sec)
15.75	60	27.8	89	16	8.1	74.0	32.6	56.8	1.8
16.00	46	31.8	83	15	8.0	73.0	36.9	50.5	1.7
16.25	44	31.9	82	15	7.7	72.8	38.8	48.5	1.7
16.50	46	31.6	85	15	7.6	72.8	40.1	47.0	1.7
16.75	42	30.0	129	24	7.2	86.4	50.0	51.9	2.1
17.00	25	33.5	136	25	6.7	87.9	52.2	51.3	2.2
17.25	20	32.7	154	28	6.7	95.4	57.8	52.5	2.3
17.50	18	32.3	163	30	6.9	98.9	61.5	52.2	2.3
17.75	18	32.2	163	30	6.9	99.2	61.8	51.9	2.3
18.00	22	32.2	163	30	6.8	99.9	61.0	52.8	2.3
18.25	18	32.2	163	30	7.0	99.3	59.8	53.5	2.3
18.50	20	32.2	163	30	6.9	99.4	59.5	53.8	2.4
18.75	22	32.2	163	30	6.8	99.5	59.4	54.5	2.4
19.00	20	32.2	163	30	6.6	99.4	59.7	53.7	2.4
19.25	20	32.0	163	30	6.5	99.9	60.5	53.5	2.4
19.50	19	32.1	163	30	6.0	99.9	61.6	52.9	2.4
19.75	18	31.9	163	30	5.9	99.9	62.1	52.6	2.4
20.00	19	31.9	163	30	5.8	99.7	62.6	52.0	2.4
20.25	16	31.9	163	30	5.7	99.1	62.0	51.3	2.4
20.50	15	31.9	163	30	5.8	98.9	62.0	51.8	2.4
20.75	22	33.5	163	30	6.2	96.4	57.6	53.9	2.4
21.00	19	34.5	163	30	6.3	96.6	58.0	53.5	2.3
21.25	18	34.6	163	30	6.2	96.7	58.5	53.5	2.4
21.50	18	34.6	163	30	6.1	96.6	58.8	53.6	2.4
21.75	17	34.6	163	30	6.3	96.7	58.2	53.5	2.4
22.00	19	34.4	163	30	6.4	96.8	58.2	53.4	2.4
22.25	17	34.4	163	30	6.3	96.9	58.5	53.5	2.4
22.50	18	34.3	163	30	6.4	97.0	59.1	53.5	2.4
22.75	17	32.1	163	30	6.5	97.1	58.5	54.1	2.4
23.00	16	34.0	163	30	6.6	97.0	58.5	54.3	2.4
23.25	18	34.1	163	30	6.2	97.0	58.5	53.5	2.4
23.50	18	34.2	163	30	6.3	97.1	58.9	53.6	2.4
23.75	17	34.2	163	30	6.1	97.1	59.5	54.2	2.4
24.00	16	34.3	163	30	6.1	97.1	59.6	54.3	2.4
24.25	18	34.3	163	30	6.2	97.1	59.5	55.0	2.4
24.50	17	34.5	163	30	6.1	97.0	59.2	54.8	2.4
24.75	18	34.5	163	30	6.0	96.7	58.3	55.0	2.4
25.00	18	34.5	163	30	5.9	96.8	58.1	54.9	2.4
25.25	17	34.5	163	30	6.2	96.5	58.4	54.0	2.4
25.50	17	34.5	163	30	6.3	96.5	57.6	54.4	2.4
25.75	20	34.4	163	30	6.5	96.9	57.3	54.7	2.4
26.00	17	34.3	163	30	6.4	97.1	57.5	54.2	2.4
26.25	17	34.3	163	30	6.5	97.6	57.5	54.1	2.3
26.50	18	34.2	163	30	6.6	97.9	57.4	54.2	2.4
26.75	18	34.1	163	30	6.7	98.0	57.2	54.3	2.3
27.00	17	34.0	163	30	6.6	98.0	57.5	54.2	2.3
27.25	18	33.9	163	30	6.0	97.7	57.6	54.7	2.3
27.50	18	33.9	163	30	6.1	97.5	57.8	54.9	2.3
27.75	17	34.0	163	30	5.6	97.3	57.5	54.6	2.3
28.00	16	34.0	163	30	6.0	97.3	57.3	54.1	2.3
28.25	18	34.1	163	30	6.1	97.1	57.4	54.2	2.3
28.50	19	34.0	163	30	6.1	97.3	57.4	54.6	2.3

DRIVING SYSTEM PERFORMANCE DATA
Pile 2B, PDA 2, Menck MHU 500
SFOBB East Span Seismic Safety Project

Penetration (m)	Blow Count (bpqm)	Blow Rate (bpm)	Transmitted Energy (KJ)	System Efficiency (%)	Resistance to Driving (MN)	Impact Stress (MPa)	Tensile Stress (MPa)	Stress at Toe (MPa)	Impact Velocity (m/sec)
28.75	21	33.1	163	30	6.9	98.4	55.2	58.5	2.4
29.00	23	35.0	163	30	8.2	97.7	55.3	57.3	2.3
29.25	22	35.1	163	30	8.1	97.1	55.0	58.0	2.4
29.50	24	34.9	163	30	7.8	96.9	54.9	58.1	2.4
29.75	22	35.1	163	30	7.4	96.5	54.2	58.4	2.4
30.00	21	35.1	158	29	7.0	96.4	54.2	57.9	2.4
30.25	23	35.1	157	28	6.9	96.6	53.5	58.3	2.4
30.50	24	35.1	157	29	6.2	96.4	52.5	59.6	2.4
30.75	22	35.2	158	29	5.9	96.1	52.3	59.4	2.4
31.00	23	35.1	160	29	5.6	96.2	51.9	60.6	2.4
31.25	21	34.9	161	29	5.5	96.9	52.1	60.8	2.4
31.50	25	35.0	163	30	5.7	97.2	52.4	61.2	2.4
31.75	21	35.1	163	30	6.0	96.9	52.5	61.9	2.4
32.00	21	35.1	162	29	5.9	96.7	52.8	60.2	2.4
32.25	22	35.2	162	29	5.7	96.9	53.0	60.5	2.4
32.50	22	35.2	161	29	5.4	96.5	53.4	59.4	2.4
32.75	20	35.2	163	30	5.4	96.8	53.1	60.5	2.4
33.00	23	35.1	163	30	6.0	96.9	53.3	60.7	2.4
33.25	23	35.1	162	29	5.8	96.9	52.9	60.4	2.4
33.50	22	35.1	162	29	6.1	96.8	53.0	60.3	2.4
33.75	23	35.0	163	30	6.3	97.0	52.6	59.8	2.4
34.00	21	35.0	162	29	6.6	97.0	52.4	61.2	2.4
34.25	22	35.1	162	29	6.2	96.7	52.1	61.0	2.4
34.50	23	35.1	162	29	6.1	96.3	51.7	61.6	2.4
34.75	24	35.1	162	29	6.9	96.3	51.3	61.8	2.4
35.00	24	35.1	163	30	6.6	96.3	51.2	62.6	2.4
35.25	22	35.3	158	29	7.0	96.0	50.1	63.1	2.4
35.50	25	35.3	159	29	7.8	95.8	50.5	63.6	2.4
35.75	27	35.2	159	29	8.5	95.6	50.4	64.8	2.3
36.00	28	35.3	162	29	8.7	95.9	50.3	66.0	2.3
36.25	29	35.2	160	29	8.2	95.7	50.4	66.3	2.4
36.50	28	35.3	161	29	7.6	95.7	50.4	65.9	2.4
36.75	30	35.4	161	29	7.6	95.7	49.8	66.4	2.3
37.00	27	34.6	180	33	7.7	101.9	51.6	69.9	2.5
37.25	25	36.1	186	34	7.9	103.4	52.2	70.8	2.5
37.50	26	35.7	188	34	7.9	104.3	52.9	70.8	2.5
37.75	26	35.6	190	35	7.4	104.8	52.5	71.7	2.5
38.00	28	35.3	193	35	7.3	105.4	52.9	72.5	2.6
38.25	20	34.1	230	42	8.4	116.6	58.0	78.3	2.8
38.50	23	34.5	230	42	8.9	116.5	58.8	77.4	2.8
38.75	20	34.5	230	42	9.1	116.3	58.5	78.9	2.8
39.00	21	34.5	230	42	9.2	116.7	59.1	79.1	2.8
39.25	23	34.5	230	42	9.4	116.1	57.8	79.1	2.8
39.50	21	34.5	230	42	9.8	115.8	58.8	78.7	2.8
39.75	23	34.4	230	42	9.9	116.1	58.7	78.1	2.8
40.00	21	34.4	230	42	10.0	116.1	58.8	78.6	2.8
40.25	23	34.5	230	42	10.2	115.8	59.1	78.9	2.8
40.50	21	34.5	230	42	9.2	116.2	58.7	81.1	2.8
40.75	23	34.5	230	42	8.7	116.3	58.9	80.0	2.8
41.00	21	34.5	230	42	8.0	116.4	59.2	79.4	2.8
41.25	22	34.5	230	42	7.8	116.4	57.8	80.0	2.8
41.50	22	34.5	230	42	8.1	116.6	58.6	78.9	2.8

DRIVING SYSTEM PERFORMANCE DATA
Pile 2B, PDA 2, Menck MHU 500
SFOBB East Span Seismic Safety Project

Penetration (m)	Blow Count (bpqm)	Blow Rate (bpm)	Transmitted Energy (KJ)	System Efficiency (%)	Resistance to Driving (MN)	Impact Stress (MPa)	Tensile Stress (MPa)	Stress at Toe (MPa)	Impact Velocity (m/sec)
41.75	22	34.5	230	42	8.2	116.5	58.7	77.8	2.8
42.00	22	34.5	230	42	8.5	116.7	56.5	79.8	2.8
42.25	22	34.6	230	42	9.1	117.0	56.4	79.4	2.8
42.50	22	30.4	229	42	10.2	116.7	54.4	88.4	2.8
42.75	23	33.1	230	42	10.2	115.7	53.7	87.2	2.8
43.00	23	33.2	230	42	9.9	116.0	53.2	88.1	2.8
43.25	23	33.2	230	42	9.7	116.2	52.1	89.0	2.8
43.50	23	31.7	229	42	9.8	116.2	52.1	90.4	2.8
43.75	24	33.2	230	42	10.0	115.7	51.8	90.2	2.8
44.00	24	33.2	230	42	9.9	114.7	50.4	91.7	2.8
44.25	25	33.1	230	42	10.0	116.5	51.5	91.6	2.8
44.50	26	33.1	230	42	10.0	115.5	51.4	91.4	2.8

DRIVING SYSTEM PERFORMANCE DATA
Pile 2B, PDA 2, Menck MHU 500
SFOBB East Span Seismic Safety Project

Pile 2, Section C, PDA 1

PILE 2, SECTION C PDA 1

Penetration (m)	Blow Count (bpqm)	Blow Rate (bpm)	Transmitted Energy (KJ)	System Efficiency (%)	Resistance to Driving (MN)	Impact Stress (MPa)	Tensile Stress (MPa)	Stress at Toe (MPa)	Impact Velocity (m/sec)
44.75	58	27.5	205	37	19.0	108.2	25.8	133.6	2.8
45.00	46	31.8	204	37	15.8	108.5	29.0	128.2	2.8
45.25	53	31.5	204	37	14.2	107.6	31.0	125.5	2.8
45.50	50	31.2	208	38	13.7	107.7	32.4	123.7	2.8
45.75	41	31.2	209	38	13.7	107.0	32.6	122.9	2.8
46.00	44	33.3	217	39	13.5	109.9	34.3	124.6	2.9
46.25	42	33.3	217	39	14.5	109.7	34.2	124.8	2.9
46.50	42	33.2	217	39	14.7	109.3	34.1	125.2	2.9
46.75	61	33.9	246	45	13.8	117.6	38.1	130.7	3.1
47.00	37	34.3	253	46	13.0	118.8	38.3	130.8	3.1
47.25	43	34.3	248	45	13.1	118.7	37.9	129.5	3.1
47.50	39	34.3	248	45	13.3	119.0	38.7	130.4	3.1
47.75	37	34.3	245	45	12.4	119.4	39.2	130.2	3.1
48.00	35	34.2	245	45	12.3	119.3	39.7	130.2	3.1
48.25	38	34.2	245	45	12.5	119.3	39.0	129.2	3.1
48.50	31	34.0	299	54	13.0	128.1	45.2	135.5	3.3
48.75	31	34.2	297	54	13.5	127.6	44.6	135.0	3.3
49.00	27	32.7	337	61	13.1	135.0	48.9	142.6	3.6
49.25	26	32.6	339	62	12.8	134.7	48.9	143.2	3.6
49.50	27	32.5	339	62	12.5	134.4	49.1	143.8	3.6
49.75	25	32.5	339	62	12.1	134.1	49.6	143.8	3.6
50.00	27	32.4	339	62	12.7	134.5	48.8	144.5	3.6
50.25	25	32.3	339	62	12.6	134.6	48.0	145.2	3.6
50.50	28	32.3	339	62	13.0	135.4	46.8	144.5	3.6
50.75	27	32.3	339	62	12.4	138.0	47.8	142.7	3.6
51.00	25	32.3	339	62	12.4	140.8	48.9	142.6	3.6
51.25	26	32.2	339	62	12.4	141.7	49.6	142.3	3.6
51.50	27	32.3	339	62	12.5	141.8	49.9	142.3	3.6
51.75	26	32.2	339	62	12.1	141.7	49.9	142.5	3.6
52.00	25	32.2	339	62	11.9	141.6	50.0	141.5	3.6
52.25	25	32.2	339	62	11.9	141.6	50.3	142.3	3.6
52.50	26	32.1	339	62	11.3	141.6	51.0	143.2	3.6
52.75	31	30.3	329	60	12.4	137.7	47.3	143.4	3.5
53.00	25	33.2	339	62	13.8	141.4	44.7	150.4	3.6
53.25	29	33.1	339	62	13.2	141.4	45.6	149.5	3.6
53.50	28	33.1	340	62	13.4	141.9	45.6	150.3	3.6
53.75	28	33.1	339	62	12.8	141.8	45.4	149.3	3.6
54.00	28	33.1	339	62	13.0	141.6	45.2	149.7	3.6
54.25	29	33.0	340	62	13.4	139.2	45.0	148.7	3.6
54.50	29	33.1	339	62	13.6	135.0	44.8	147.9	3.6
54.75	31	33.1	339	62	13.4	133.3	44.5	146.9	3.6
55.00	27	33.0	339	62	13.4	134.1	44.8	146.7	3.6
55.25	29	33.0	339	62	14.0	134.2	44.1	147.9	3.6
55.50	28	33.0	339	62	14.6	135.9	43.3	149.4	3.6
55.75	30	33.1	339	62	14.6	136.3	42.3	149.4	3.6
56.00	30	33.0	339	62	15.4	136.8	41.7	150.6	3.6
56.25	31	33.1	339	62	16.3	136.8	40.8	152.1	3.6
56.50	32	33.1	339	62	16.6	135.6	41.3	151.8	3.5

DRIVING SYSTEM PERFORMANCE DATA
Pile 2C, PDA 1, Menck MHU 500
SFOBB East Span Seismic Safety Project

Penetration (m)	Blow Count (bpqm)	Blow Rate (bpm)	Transmitted Energy (KJ)	System Efficiency (%)	Resistance to Driving (MN)	Impact Stress (MPa)	Tensile Stress (MPa)	Stress at Toe (MPa)	Impact Velocity (m/sec)
56.75	30	32.8	373	68	16.5	140.3	44.2	158.6	3.7
57.00	27	32.8	380	69	16.7	141.2	44.8	160.5	3.8
57.25	29	32.9	380	69	17.7	141.2	44.9	162.3	3.8
57.50	28	32.9	380	69	17.7	141.9	43.5	161.9	3.8
57.75	29	32.9	380	69	17.7	142.7	43.0	162.0	3.8
58.00	29	32.9	380	69	17.6	142.5	42.9	162.2	3.8
58.25	30	32.9	380	69	16.9	142.0	43.1	161.3	3.8
58.50	29	32.9	380	69	16.2	139.4	44.5	160.0	3.8
58.75	29	32.9	380	69	16.5	139.1	44.8	160.6	3.8
59.00	27	33.0	380	69	17.0	139.9	43.8	161.5	3.8
59.25	30	32.9	380	69	17.4	141.2	43.9	162.1	3.8
59.50	28	32.9	380	69	17.1	141.0	43.6	162.0	3.8
59.75	31	32.9	380	69	16.0	139.6	44.0	159.5	3.8
60.00	26	32.9	380	69	16.3	139.5	45.0	160.0	3.8
60.25	28	33.0	380	69	16.7	140.0	44.5	160.8	3.8
60.50	28	33.0	378	69	17.0	139.9	43.7	161.1	3.8
60.75	25	32.9	379	69	17.4	139.8	41.5	161.5	3.7
61.00	36	32.9	379	69	17.8	139.4	42.2	162.0	3.7
61.25	20	32.9	380	69	17.1	140.2	41.3	161.1	3.7
61.50	30	33.0	378	69	17.3	140.4	41.6	161.1	3.7
61.75	29	32.9	379	69	18.2	140.3	41.5	162.3	3.7
62.00	27	32.9	376	68	18.5	140.7	42.2	162.8	3.7
62.25	28	32.9	377	68	17.9	141.2	41.4	161.5	3.7
62.50	30	32.9	374	68	17.6	140.2	41.0	160.5	3.7
62.75	28	32.9	375	68	17.8	139.9	40.9	160.6	3.7
63.00	29	32.9	375	68	17.5	140.2	40.1	160.1	3.7
63.25	29	32.9	371	67	17.7	140.0	40.7	160.4	3.7
63.50	31	32.9	373	68	18.3	140.3	40.3	161.6	3.7
63.75	30	32.9	372	68	20.5	140.3	37.5	165.2	3.7
64.00	30	32.9	369	67	21.4	140.0	37.4	166.5	3.7
64.25	31	32.9	369	67	20.9	140.9	38.3	165.9	3.7
64.50	29	33.0	369	67	20.4	141.0	38.7	165.0	3.7
64.75	29	32.9	374	68	20.0	142.3	40.0	165.4	3.7
65.00	26	32.3	420	76	18.5	150.4	44.0	170.7	3.9
65.25	27	32.5	420	76	18.6	149.4	44.2	171.0	3.9
65.50	25	32.5	419	76	18.5	148.3	43.2	170.6	3.9
65.75	26	32.5	418	76	17.9	148.4	44.0	169.7	3.9
66.00	26	32.4	420	76	17.8	148.7	43.8	170.2	3.9
66.25	22	32.4	420	76	17.6	149.5	42.6	170.4	3.9
66.50	28	27.1	381	69	21.8	140.4	34.5	168.7	3.7
66.75	35	33.6	407	74	22.4	146.6	37.2	175.8	3.9
67.00	44	33.6	409	74	22.2	147.2	38.1	175.9	3.9
67.25	35	33.7	409	74	21.8	147.2	38.3	175.2	3.9
67.50	37	33.6	407	74	21.1	146.6	39.3	173.4	3.9
67.75	36	33.6	407	74	20.6	146.8	39.6	172.8	3.9
68.00	34	33.6	407	74	20.6	146.6	40.0	173.0	3.9
68.25	34	33.6	407	74	20.4	146.6	39.9	172.7	3.9
68.50	35	33.6	407	74	20.1	147.0	40.0	171.1	3.8

DRIVING SYSTEM PERFORMANCE DATA
Pile 2C, PDA 1, Menck MHU 500
SFOBB East Span Seismic Safety Project

Pile 2, Section C, PDA 2

PILE 2, SECTION C, PDA 2

Penetration (m)	Blow Count (bpqm)	Blow Rate (bpm)	Transmitted Energy (KJ)	System Efficiency (%)	Resistance to Driving (MN)	Impact Stress (MPa)	Tensile Stress (MPa)	Stress at Toe (MPa)	Impact Velocity (m/sec)
44.75	58	28.1	234	43	23.3	107.1	28.7	132.7	2.8
45.00	46	31.8	231	42	22.6	106.5	32.3	128.0	2.8
45.25	53	31.5	233	42	22.3	107.0	31.2	128.8	2.8
45.50	50	31.2	237	43	21.6	107.1	31.6	126.4	2.8
45.75	41	33.0	236	43	21.4	105.5	32.7	123.4	2.8
46.00	44	33.3	244	44	20.4	107.4	34.5	124.2	2.9
46.25	42	33.3	244	44	20.7	107.5	35.5	125.1	2.9
46.50	42	33.3	244	44	21.0	107.4	36.2	125.3	2.9
46.75	61	33.9	270	49	21.1	114.0	41.1	128.7	3.0
47.00	37	34.3	272	49	21.1	114.8	41.8	128.7	3.0
47.25	43	34.3	271	49	21.6	114.4	42.1	128.8	3.0
47.50	39	34.3	271	49	19.8	114.5	41.6	127.3	3.0
47.75	37	34.2	271	49	19.6	114.5	40.7	127.7	3.0
48.00	35	34.2	271	49	19.9	114.3	41.2	127.9	3.0
48.25	38	34.2	271	49	19.9	113.9	41.9	126.8	3.0
48.50	31	34.0	327	59	18.5	124.7	49.1	133.7	3.2
48.75	31	34.2	325	59	18.4	124.7	48.7	134.7	3.2
49.00	27	32.6	369	67	18.9	134.5	55.5	143.6	3.5
49.25	26	32.6	369	67	18.9	134.9	55.8	144.7	3.5
49.50	27	32.5	369	67	18.3	134.8	55.2	143.1	3.5
49.75	25	32.5	366	67	18.2	134.7	55.4	142.2	3.5
50.00	27	32.4	367	67	17.8	134.8	55.7	140.3	3.5
50.25	25	32.3	369	67	17.8	134.9	55.7	140.0	3.5
50.50	28	32.3	368	67	17.8	135.0	56.2	140.2	3.5
50.75	27	32.3	370	67	19.0	135.2	57.3	143.6	3.5
51.00	25	32.3	371	67	18.7	135.1	58.0	142.3	3.4
51.25	26	32.3	370	67	18.8	134.9	57.1	139.9	3.4
51.50	27	32.3	371	67	19.4	135.0	57.8	139.8	3.4
51.75	26	32.2	373	68	19.3	134.9	57.7	139.7	3.4
52.00	25	32.2	376	68	19.4	135.2	56.8	142.0	3.5
52.25	25	32.2	378	69	18.9	135.2	56.5	141.6	3.4
52.50	26	32.1	379	69	20.1	135.2	56.2	143.2	3.4
52.75	31	32.4	363	66	20.8	133.0	52.3	143.3	3.4
53.00	25	33.2	368	67	22.3	133.6	50.0	144.8	3.4
53.25	29	33.1	368	67	21.7	133.8	51.7	145.6	3.4
53.50	28	33.1	373	68	22.3	134.8	52.7	146.7	3.4
53.75	28	33.1	376	68	21.4	134.9	52.1	146.2	3.4
54.00	28	33.0	375	68	21.4	135.2	51.6	146.2	3.4
54.25	29	33.0	378	69	21.2	137.5	50.3	154.1	3.5
54.50	29	33.1	369	67	21.5	137.4	48.6	151.8	3.5
54.75	31	33.1	371	68	21.6	137.4	47.8	152.4	3.5
55.00	27	33.0	376	68	21.1	138.1	48.8	153.2	3.5
55.25	29	33.0	374	68	21.5	138.3	48.6	154.8	3.5
55.50	28	33.0	378	69	21.4	138.6	48.8	155.3	3.5
55.75	30	33.1	376	68	21.8	138.2	49.4	156.1	3.5
56.00	30	33.0	377	69	21.4	138.0	48.8	158.2	3.5
56.25	31	33.1	376	68	20.4	137.8	48.2	159.0	3.5
56.50	32	33.1	373	68	20.9	138.4	46.7	159.3	3.5
56.75	30	32.8	411	75	21.6	144.9	49.9	162.9	3.7
57.00	27	32.8	419	76	21.4	146.0	52.6	162.4	3.7
57.25	29	32.9	416	76	22.1	145.5	52.7	163.7	3.7
57.50	28	32.9	416	76	22.2	145.3	51.8	164.1	3.7

DRIVING SYSTEM PERFORMANCE DATA
Pile 2C, PDA 2, Menck MHU 500
SFOBB East Span Seismic Safety Project

Penetration (m)	Blow Count (bpqm)	Blow Rate (bpm)	Transmitted Energy (KJ)	System Efficiency (%)	Resistance to Driving (MN)	Impact Stress (MPa)	Tensile Stress (MPa)	Stress at Toe (MPa)	Impact Velocity (m/sec)
57.75	29	32.9	417	76	22.1	145.3	51.5	163.8	3.7
58.00	29	32.9	418	76	22.5	145.2	50.7	163.8	3.7
58.25	30	32.9	417	76	22.7	145.0	50.3	163.1	3.7
58.50	28	32.9	412	75	23.1	144.0	49.2	166.2	3.7
58.75	30	32.9	411	75	22.2	144.1	48.5	166.2	3.7
59.00	27	33.0	412	75	22.5	144.4	49.0	167.4	3.7
59.25	25	31.5	412	75	21.9	144.8	49.7	167.7	3.7
59.50	28	32.9	411	75	21.6	144.9	48.1	166.7	3.7
59.75	25	31.5	410	74	22.1	144.6	46.9	165.5	3.7
60.00	25	31.6	414	75	22.5	144.6	46.4	166.6	3.7
60.25	28	33.0	413	75	22.7	144.4	46.7	166.3	3.7
60.50	28	33.0	414	75	22.2	144.6	47.2	166.0	3.7
60.75	25	32.9	415	75	21.5	145.0	46.9	166.1	3.7
61.00	36	32.9	414	75	21.5	145.5	46.4	168.3	3.7
61.25	20	32.9	417	76	22.2	145.6	47.1	169.2	3.7
61.50	30	33.0	414	75	22.5	145.2	46.6	168.7	3.7
61.75	29	32.9	414	75	22.5	144.8	44.7	168.7	3.7
62.00	27	32.9	417	76	22.0	144.5	43.8	168.7	3.7
62.25	28	32.9	416	76	21.9	144.7	43.1	170.2	3.7
62.50	30	32.9	417	76	21.2	145.5	43.6	168.0	3.7
62.75	28	32.9	417	76	21.1	145.5	44.2	168.4	3.7
63.00	29	32.9	415	76	21.1	145.2	44.4	167.9	3.7
63.25	29	32.9	415	76	21.4	145.1	42.8	168.1	3.7
63.50	31	32.9	419	76	22.3	145.3	42.7	169.0	3.7
63.75	30	32.9	419	76	23.7	145.2	41.7	172.7	3.7
64.00	30	32.9	419	76	23.9	145.2	41.9	172.3	3.7
64.25	31	32.9	418	76	22.6	145.2	42.7	170.4	3.7
64.50	29	33.0	417	76	22.3	145.3	44.2	170.6	3.7
64.75	29	32.9	423	77	21.9	146.4	45.8	171.2	3.7
65.00	26	32.3	464	84	22.4	154.5	49.5	181.1	3.9
65.25	27	32.5	463	84	21.7	154.1	49.3	179.5	3.9
65.50	25	32.5	462	84	21.0	153.3	48.7	176.5	3.9
65.75	26	32.5	461	84	21.0	152.8	47.5	175.1	3.9
66.00	26	32.4	462	84	20.1	153.7	47.2	174.9	3.9
66.25	22	32.4	463	84	20.6	154.7	46.9	175.5	3.9
66.50	27	29.9	439	80	25.2	148.4	39.9	178.3	3.8
66.75	35	33.6	458	83	25.7	149.3	42.2	182.7	3.9
67.00	44	33.6	455	83	25.1	153.1	42.6	183.4	3.9
67.25	35	33.7	456	83	25.4	153.5	42.1	184.6	3.9
67.50	37	33.6	453	82	24.5	151.0	42.5	179.1	3.9
67.75	36	33.6	454	83	23.1	150.4	42.4	176.3	3.9
68.00	34	33.6	456	83	23.2	151.1	42.4	174.5	3.9
68.25	34	33.6	455	83	24.1	151.3	42.6	177.6	3.9
68.50	35	33.6	456	83	24.6	151.5	42.6	182.1	3.9

DRIVING SYSTEM PERFORMANCE DATA
Pile 2C, PDA 2, Menck MHU 500
SFOBB East Span Seismic Safety Project

Pile 2, Section D, PDA 1

PILE 2, SECTION D, PDA 1

Penetration (m)	Blow Count (bpqm)	Blow Rate (bpm)	Transmitted Energy (KJ)	System Efficiency (%)	Resistance to Driving (MN)	Impact Stress (MPa)	Tensile Stress (MPa)	Stress at Toe (MPa)	Impact Velocity (m/sec)
68.75	78	31.4	422	77	39.4	142.2	19.6	196.6	3.5
69.00	64	33.5	422	77	38.8	143.0	18.6	195.7	3.5
69.25	63	33.6	422	77	37.8	142.6	19.0	194.0	3.5
69.50	56	33.5	421	76	38.3	142.3	20.1	195.0	3.5
69.75	58	33.4	421	77	38.2	141.8	22.0	195.0	3.5
70.00	39	33.3	421	77	37.9	141.5	20.9	194.5	3.5
70.25	56	33.2	422	77	36.7	141.3	19.9	192.4	3.5
70.50	54	33.3	423	77	36.6	141.2	19.9	192.5	3.5
70.75	48	33.2	423	77	36.5	140.9	20.1	192.3	3.5
71.00	49	33.1	423	77	37.2	140.8	18.6	193.4	3.5
71.25	60	33.1	422	77	37.2	140.6	15.8	193.3	3.5
71.50	53	33.0	423	77	36.2	140.5	18.5	191.7	3.5
71.75	54	33.0	421	77	35.3	140.9	20.7	190.4	3.5
72.00	51	33.0	422	77	34.4	141.0	20.1	188.8	3.5
72.25	51	32.9	421	77	34.2	141.0	21.7	188.6	3.5
72.50	47	32.9	421	77	33.8	141.0	22.2	187.9	3.5
72.75	50	32.9	421	77	33.3	141.1	22.6	187.1	3.5
73.00	49	32.6	427	78	33.8	141.8	23.5	188.5	3.6
73.25	47	32.3	434	79	33.9	141.9	20.4	189.0	3.6
73.50	47	32.3	433	79	34.0	141.8	22.1	189.1	3.6
73.75	46	32.2	433	79	34.0	142.2	22.1	189.5	3.6
74.00	48	32.2	434	79	34.1	142.2	23.1	189.8	3.6
74.25	48	32.2	434	79	33.8	142.3	23.5	189.3	3.6
74.50	40	32.2	433	79	33.5	142.7	20.6	188.9	3.6
74.75	48	32.2	433	79	34.3	142.6	20.5	190.3	3.6
75.00	48	32.2	433	79	34.1	142.6	20.5	189.8	3.6
75.25	42	32.2	434	79	34.0	142.8	20.5	189.9	3.6
75.50	44	32.2	433	79	34.6	143.0	21.4	190.8	3.6
75.75	48	32.1	434	79	34.1	142.9	21.8	190.0	3.6
76.00	45	32.2	433	79	33.8	142.8	21.5	189.1	3.6
76.25	47	32.2	432	79	33.3	142.9	21.2	188.6	3.6
76.50	44	32.2	434	79	33.6	142.9	21.2	188.9	3.6
76.75	46	32.1	433	79	33.7	142.8	21.6	189.2	3.6
77.00	45	32.1	432	79	33.9	143.1	21.1	189.8	3.6
77.25	45	32.1	432	79	34.0	143.3	21.5	190.0	3.6
77.50	42	32.1	433	79	34.4	143.4	21.3	190.8	3.6
77.75	40	29.3	426	77	35.6	142.4	19.9	191.8	3.5
78.00	55	33.1	422	77	36.2	142.3	19.6	192.6	3.5
78.25	50	33.2	421	77	36.6	142.2	20.0	193.0	3.5
78.50	50	33.2	420	76	36.5	142.3	19.7	192.9	3.5
78.75	51	33.2	421	77	36.1	142.3	19.2	192.4	3.5
79.00	48	33.2	421	76	36.6	142.4	19.5	193.3	3.5
79.25	45	33.2	421	77	36.5	142.6	19.4	193.3	3.5
79.50	51	33.2	421	76	36.5	142.7	19.8	193.3	3.5
79.75	54	33.2	420	76	36.5	142.7	19.0	193.2	3.5
80.00	50	32.9	426	78	37.1	143.4	18.7	195.0	3.6
80.25	55	32.7	432	79	37.8	144.4	17.8	197.1	3.6
80.50	52	32.6	433	79	37.6	144.6	17.9	197.2	3.6
80.75	73	32.6	433	79	38.9	144.4	17.2	198.8	3.6
81.00	48	30.7	762	139	47.1	149.7	15.9	217.2	3.7

DRIVING SYSTEM PERFORMANCE DATA
Pile 2D, PDA 1, Menck MHU 500
SFOBB East Span Seismic Safety Project

Penetration (m)	Blow Count (bpqm)	Blow Rate (bpm)	Transmitted Energy (KJ)	System Efficiency (%)	Resistance to Driving (MN)	Impact Stress (MPa)	Tensile Stress (MPa)	Stress at Toe (MPa)	Impact Velocity (m/sec)
81.00	46	31.4	763	41	47.1	149.8	16.0	217.0	3.7
81.25	39	32.5	892	48	49.6	164.1	17.3	234.0	4.0
81.50	31	34.3	903	48	50.1	165.8	16.9	236.1	4.0
81.75	26	32.9	1093	58	50.6	182.2	15.5	251.3	4.4
82.00	26	33.7	1069	57	48.4	179.3	16.2	244.9	4.4
82.25	28	24.9	894	48	54.5	165.1	19.6	244.4	4.1
82.50	54	29.2	867	46	54.1	163.4	17.1	241.1	4.0
82.75	49	28.1	882	47	53.5	165.3	17.7	241.6	4.0
83.00	48	27.9	886	47	52.6	165.0	17.8	240.1	4.0
83.25	41	27.9	892	48	51.1	164.7	18.2	237.7	4.0
83.50	39	27.8	909	49	49.8	164.6	19.4	236.3	4.1
83.75	40	27.8	910	49	50.1	164.8	18.4	236.7	4.1
84.00	39	27.6	905	48	50.7	164.8	18.4	237.8	4.1
84.25	39	27.5	908	49	51.1	164.8	19.0	238.6	4.1
84.50	43	27.4	908	49	51.0	164.8	18.7	238.5	4.1
84.75	38	27.3	909	49	51.2	165.0	18.0	238.8	4.1
85.00	42	27.4	912	49	51.3	164.9	17.7	239.0	4.1
85.25	40	28.0	911	49	51.2	165.0	17.5	238.8	4.1
85.50	41	28.0	896	48	51.3	165.1	17.7	238.5	4.0
85.75	38	27.9	899	48	51.5	164.8	17.7	238.7	4.1
86.00	43	27.8	902	48	51.5	164.8	18.4	239.1	4.1
86.25	36	27.7	906	48	51.6	164.6	18.0	239.3	4.1
86.50	44	27.6	900	48	52.0	164.9	17.7	239.2	4.1
86.75	39	27.5	894	48	52.3	164.8	17.9	233.6	4.0
87.00	44	27.4	896	48	51.7	164.8	18.2	232.8	4.0
87.25	42	27.4	900	48	51.6	165.6	16.2	236.3	4.0
87.50	42	27.5	903	48	51.3	165.6	16.8	236.1	4.1
87.75	38	28.0	899	48	52.1	166.3	17.3	236.0	4.0
88.00	42	28.0	903	48	52.3	165.9	15.7	238.2	4.1
88.25	44	28.1	905	48	52.5	165.6	17.2	238.9	4.1
88.50	44	27.9	900	48	52.7	165.5	15.2	239.4	4.1
88.75	47	27.9	900	48	52.9	165.6	14.8	239.6	4.1
89.00	49	27.9	899	48	53.2	165.5	14.7	239.9	4.1
89.25	50	27.9	900	48	53.3	165.8	14.4	239.7	4.1
89.50	50	27.8	898	48	52.9	165.7	14.0	239.3	4.1
89.75	48	27.7	897	48	52.1	166.0	14.0	237.7	4.1
90.00	44	27.5	897	48	51.2	167.1	14.0	236.1	4.1
90.25	44	27.5	894	48	50.9	167.1	14.2	235.8	4.1
90.50	47	27.3	891	48	51.3	167.2	14.8	236.7	4.1
90.75	46	27.3	886	47	51.7	167.3	14.3	237.3	4.1
91.00	50	27.4	886	47	51.3	167.3	16.1	237.0	4.1
91.25	49	27.9	886	47	51.4	167.7	17.2	237.5	4.1
91.50	49	27.9	883	47	51.5	167.3	18.0	238.2	4.1
91.75	50	27.3	884	47	52.5	166.9	14.6	239.3	4.1
92.00	54	29.0	876	47	53.2	167.3	13.2	238.4	4.0
92.25	53	28.6	898	48	53.1	165.8	14.6	234.8	4.0
92.50	32	26.6	1390	74	62.2	204.7	18.9	282.8	5.0
92.75	28	25.0	1435	77	63.4	212.3	20.1	289.8	5.2
93.00	30	25.3	1432	77	64.3	212.6	18.6	294.9	5.2
93.25	26	25.3	1427	76	63.6	209.1	17.9	291.1	5.1
93.50	29	25.2	1430	76	63.2	208.0	17.7	293.6	5.1

DRIVING SYSTEM PERFORMANCE DATA
Pile 2D, PDA 1, Menck MHU 1700
SFOBB East Span Seismic Safety Project

Pile 2, Section D, PDA 2

PILE 2, SECTION D, PDA 2

Penetration (m)	Blow Count (bpqm)	Blow Rate (bpm)	Transmitted Energy (KJ)	System Efficiency (%)	Resistance to Driving (MN)	Impact Stress (MPa)	Tensile Stress (MPa)	Stress at Toe (MPa)	Impact Velocity (m/sec)
68.75	78	31.5	328	60	35.6	111.1	11.8	179.5	3.7
69.00	64	33.5	327	59	34.8	110.5	16.0	178.3	3.7
69.25	63	33.6	328	60	34.3	110.2	16.8	176.4	3.7
69.50	55	33.5	331	60	33.8	109.6	17.1	172.6	3.7
69.75	59	33.4	338	61	33.4	111.5	17.3	169.7	3.7
70.00	38	33.3	337	61	33.1	110.7	17.5	175.4	3.7
70.25	56	33.2	338	61	33.0	112.1	17.8	175.9	3.7
70.50	55	33.3	339	62	33.0	112.3	17.5	175.6	3.7
70.75	47	33.2	338	61	32.9	111.8	17.6	175.9	3.7
71.00	50	33.1	338	61	33.1	111.6	17.8	176.1	3.6
71.25	60	33.1	333	61	32.9	110.1	17.9	174.3	3.6
71.50	52	33.0	318	58	32.1	104.8	18.3	168.8	3.6
71.75	54	33.0	338	61	32.6	111.4	20.2	170.9	3.6
72.00	51	33.0	338	61	32.0	111.1	19.9	170.5	3.6
72.25	50	32.3	331	60	25.2	108.5	15.5	135.7	3.6
72.50	47	32.9	331	60	31.0	109.7	19.7	169.3	3.6
72.75	48	32.3	331	60	21.4	108.1	13.1	115.9	3.7
73.00	49	32.6	338	61	31.2	110.2	18.6	170.8	3.6
73.25	47	32.3	339	62	30.8	111.1	18.9	170.8	3.7
73.50	48	32.3	333	61	30.8	109.2	19.2	168.4	3.7
73.75	46	32.2	339	62	31.3	111.1	18.5	169.3	3.6
74.00	47	32.2	339	62	31.1	111.2	18.1	170.2	3.6
74.25	46	32.2	332	60	30.2	110.8	19.2	167.4	3.6
74.50	40	31.4	363	66	31.3	117.5	19.6	173.3	3.6
74.75	48	32.2	392	71	32.6	127.2	20.5	179.5	3.6
75.00	47	32.2	392	71	32.4	127.1	20.8	178.3	3.6
75.25	43	32.2	392	71	32.9	126.9	21.1	178.2	3.6
75.50	43	32.2	391	71	32.9	126.4	20.6	179.6	3.6
75.75	48	32.1	391	71	33.0	126.6	20.4	179.4	3.6
76.00	45	32.2	393	71	32.9	126.1	19.9	179.0	3.6
76.25	47	32.2	392	71	33.3	126.3	20.0	179.0	3.6
76.50	45	32.2	393	71	33.0	126.2	20.2	179.4	3.6
76.75	45	32.1	393	71	33.0	126.3	19.8	179.5	3.6
77.00	46	32.1	393	71	33.2	126.4	20.5	179.9	3.6
77.25	46	32.1	393	71	33.0	126.6	20.7	179.6	3.6
77.50	41	32.1	393	71	33.0	126.5	19.5	179.9	3.6
77.75	39	31.9	389	71	33.8	125.4	19.5	182.2	3.6
78.00	56	33.2	382	69	34.2	125.1	18.9	181.8	3.6
78.25	50	33.2	380	69	34.0	124.1	19.2	180.0	3.6
78.50	50	33.2	380	69	33.8	123.9	18.8	180.2	3.6
78.75	50	33.2	381	69	34.6	124.0	18.6	180.7	3.6
79.00	49	33.2	381	69	34.4	124.1	18.9	181.5	3.6
79.25	44	33.2	381	69	34.7	124.1	18.7	181.2	3.6
79.50	52	33.2	383	70	34.6	124.4	18.5	181.6	3.6
79.75	54	33.2	381	69	34.9	124.6	18.2	181.5	3.6
80.00	50	32.9	388	71	35.2	125.2	18.2	183.6	3.6
80.25	55	32.7	393	71	35.5	125.7	17.5	185.2	3.6
80.50	50	32.6	393	71	36.2	125.3	17.4	185.8	3.6
80.75	61	32.6	393	71	36.8	125.8	18.0	187.2	3.6

DRIVING SYSTEM PERFORMANCE DATA
Pile 2D, PDA 2, Menck MHU 500
SFOBB East Span Seismic Safety Project

Penetration (m)	Blow Count (bpqm)	Blow Rate (bpm)	Transmitted Energy (KJ)	System Efficiency (%)	Resistance to Driving (MN)	Impact Stress (MPa)	Tensile Stress (MPa)	Stress at Toe (MPa)	Impact Velocity (m/sec)
81.00	47	29.9	826	44	49.4	165.5	17.2	231.4	3.8
81.25	38	32.5	972	52	51.2	179.5	19.4	245.0	4.2
81.50	32	34.3	1001	54	50.8	181.7	20.5	244.1	4.3
81.75	26	33.0	1240	66	51.2	198.6	24.1	262.5	4.8
82.00	25	33.8	1221	65	49.4	197.0	25.9	256.8	4.8
82.25	48	27.2	989	53	53.6	179.4	20.4	251.5	4.2
82.50	54	29.2	940	50	54.3	176.9	21.6	249.9	4.1
82.75	49	28.1	958	51	52.7	178.1	22.8	248.6	4.2
83.00	48	27.9	975	52	51.4	178.6	23.3	247.9	4.2
83.25	41	27.9	1011	54	50.2	178.5	23.9	245.8	4.4
83.50	39	27.8	1020	55	50.3	178.7	22.6	244.6	4.4
83.75	40	27.8	1022	55	50.8	178.9	23.0	244.8	4.4
84.00	39	27.6	1021	55	50.8	179.1	23.3	245.9	4.4
84.25	39	27.5	1020	55	50.8	179.4	23.4	247.9	4.4
84.50	43	27.4	1022	55	51.2	179.3	23.7	249.7	4.4
84.75	38	27.3	1021	55	50.7	179.3	21.6	248.8	4.4
85.00	42	27.4	1023	55	51.3	179.7	21.7	249.8	4.4
85.25	40	28.0	1026	55	51.2	179.6	21.3	249.9	4.4
85.50	41	28.0	1017	54	50.8	179.5	22.8	248.9	4.4
85.75	38	27.9	1021	55	50.6	179.8	22.2	248.6	4.4
86.00	43	27.8	1027	55	50.5	180.0	21.9	249.0	4.4
86.25	36	27.7	1028	55	51.1	179.6	21.5	250.3	4.4
86.50	44	27.6	1020	55	50.5	179.3	21.7	248.8	4.4
86.75	39	27.5	1006	54	51.2	178.8	21.2	251.7	4.4
87.00	44	27.3	1011	54	50.6	178.9	20.7	251.0	4.5
87.25	42	27.4	1016	54	51.0	178.8	22.0	250.8	4.5
87.50	42	27.5	1020	55	50.6	179.2	21.1	249.5	4.4
87.75	38	28.1	1016	54	50.8	179.0	22.7	250.0	4.4
88.00	42	28.0	1020	55	52.2	179.6	20.3	253.3	4.5
88.25	44	28.1	1026	55	52.4	179.5	19.7	253.1	4.5
88.50	44	27.9	1019	55	52.8	180.0	18.2	253.9	4.4
88.75	47	27.9	1020	55	52.9	180.3	18.3	254.3	4.4
89.00	49	27.9	1020	55	53.2	180.3	18.3	254.0	4.4
89.25	50	27.9	1025	55	53.0	180.1	17.3	253.7	4.4
89.50	50	27.8	1023	55	52.7	180.0	16.8	252.9	4.4
89.75	48	27.7	1022	55	52.2	179.5	16.5	251.9	4.4
90.00	44	27.5	1020	55	51.5	180.2	16.2	249.3	4.4
90.25	44	27.5	1020	55	51.6	179.6	16.5	249.8	4.4
90.50	47	27.3	1020	55	51.7	179.4	15.9	249.5	4.4
90.75	46	27.3	1023	55	52.0	179.4	16.2	250.7	4.4
91.00	50	27.4	1022	55	52.1	179.5	16.7	251.4	4.4
91.25	49	27.9	1023	55	52.0	179.5	15.9	250.6	4.4
91.50	49	27.9	1023	55	51.8	178.8	14.8	250.8	4.4
91.75	49	28.0	1022	55	51.8	181.2	17.5	250.4	4.4
92.00	54	29.0	991	53	51.7	179.8	19.4	249.1	4.4
92.25	53	28.7	1017	54	51.5	178.9	19.4	250.0	4.4
92.50	32	26.4	1560	83	61.8	219.0	20.8	305.1	5.5
92.75	28	25.1	1614	86	62.6	225.1	21.1	311.7	5.6
93.00	30	25.3	1619	87	62.8	225.3	20.6	312.8	5.6
93.25	26	25.3	1618	87	62.0	225.4	20.2	311.3	5.6
93.50	29	25.2	1618	87	63.4	225.3	20.6	313.9	5.6

DRIVING SYSTEM PERFORMANCE DATA
Pile 2D, PDA 2, Menck MHU 1700
SFOBB East Span Seismic Safety Project

PILE NO. 3

PILE NO. 3

Pile 3, Section B, PDA 1

PILE 3, SECTION B, PDA 1

Penetration (m)	Blow Count (bpqm)	Blow Rate (bpm)	Transmitted Energy (KJ)	System Efficiency (%)	Resistance to Driving (MN)	Impact Stress (MPa)	Tensile Stress (MPa)	Stress at Toe (MPa)	Impact Velocity (m/sec)
15.25	10	10.0	71	13	2.5	60.0	42.1	25.8	1.4
15.50	8	0.0	68	12	2.5	58.6	43.2	23.3	1.4
19.75	4	0.0	68	12	2.7	58.6	44.2	23.3	1.4
20.00	1	0.0	68	12	2.7	59.1	42.7	25.0	1.5
20.25	2	0.0	68	12	2.2	59.6	42.3	24.4	1.5
20.50	10	10.0	68	12	2.0	59.6	41.3	25.7	1.5
20.75	14	14.0	68	12	2.0	59.4	40.8	26.2	1.5
21.00	19	26.4	58	11	2.1	54.0	36.4	25.2	1.3
21.25	19	35.7	49	9	1.9	50.6	34.2	23.7	1.3
21.50	18	30.5	53	10	1.8	52.5	36.0	23.8	1.3
21.75	16	16.8	57	10	1.8	56.2	38.9	25.2	1.4
22.00	17	34.6	51	9	1.2	51.3	35.7	22.5	1.3
22.25	14	27.7	55	10	1.7	54.7	38.0	24.3	1.3
22.50	16	32.5	54	10	1.7	52.8	36.6	23.4	1.3
22.75	15	28.5	52	10	1.7	52.1	36.7	22.9	1.3
23.00	11	14.0	65	12	1.5	59.0	41.9	25.4	1.5
23.25	10	25.2	90	16	1.9	69.2	50.8	28.2	1.7
23.50	10	33.1	81	15	1.7	66.3	48.7	26.8	1.6
23.75	10	33.1	81	15	1.8	66.3	48.4	27.4	1.7
24.00	10	33.3	81	15	1.8	66.3	48.4	27.4	1.6
24.25	10	33.3	81	15	1.7	66.3	48.5	27.9	1.7
24.50	10	33.4	81	15	1.8	66.3	48.2	27.9	1.6
24.75	10	33.4	81	15	1.9	66.4	48.1	27.9	1.7
25.00	10	33.4	81	15	1.9	66.4	47.8	28.0	1.7
25.25	10	33.3	81	15	1.8	66.4	47.5	28.2	1.7
25.50	11	33.3	81	15	1.8	66.4	47.2	28.6	1.6
25.75	11	33.3	81	15	2.1	66.3	46.8	29.3	1.6
26.00	11	33.4	81	15	2.0	66.3	46.2	29.4	1.7
26.25	11	33.5	81	15	2.4	66.3	46.1	28.8	1.7
26.50	11	33.5	81	15	2.4	65.8	46.1	28.8	1.6
26.75	11	33.5	81	15	2.1	65.5	46.6	28.6	1.6
27.00	11	33.4	81	15	2.0	65.5	46.3	28.6	1.6
27.25	12	33.3	81	15	2.0	65.3	46.0	28.4	1.6
27.50	12	33.3	81	15	2.2	65.4	46.0	29.3	1.7
27.75	16	24.9	90	16	2.6	68.1	43.7	34.7	1.7
28.00	17	30.9	95	17	2.9	69.4	44.1	35.9	1.7
28.25	17	32.2	95	17	2.6	69.0	44.4	34.8	1.7
28.50	18	32.1	95	17	2.7	68.9	44.4	34.9	1.7
28.75	15	32.0	95	17	2.8	68.9	44.1	34.9	1.7
29.00	16	31.9	95	17	3.0	69.0	44.2	34.9	1.7
29.25	16	32.4	95	17	2.8	69.1	44.2	34.9	1.7
29.50	15	33.6	95	17	2.8	68.9	44.2	34.8	1.7
29.75	17	33.5	95	17	2.7	69.0	44.1	34.8	1.7
30.00	16	33.5	95	17	2.4	68.8	44.1	34.7	1.7
30.25	16	33.5	95	17	2.5	68.8	44.2	34.5	1.7
30.50	15	33.5	95	17	2.4	68.9	44.2	34.6	1.7
30.75	16	33.5	95	17	2.6	69.2	44.2	34.7	1.7
31.00	16	33.5	95	17	2.6	69.2	44.4	34.5	1.7
31.25	16	33.5	95	17	2.6	69.0	44.5	34.7	1.7
31.50	15	33.7	95	17	2.5	69.0	44.2	35.0	1.7
31.75	17	33.8	95	17	2.7	69.2	44.3	35.0	1.7
32.00	16	33.7	95	17	2.7	69.0	44.2	34.9	1.7

DRIVING SYSTEM PERFORMANCE DATA
Pile 3B, PDA 1, Menck MHU 500
SFOBB East Span Seismic Safety Project

Penetration (m)	Blow Count (bpqm)	Blow Rate (bpm)	Transmitted Energy (KJ)	System Efficiency (%)	Resistance to Driving (MN)	Impact Stress (MPa)	Tensile Stress (MPa)	Stress at Toe (MPa)	Impact Velocity (m/sec)
32.25	16	33.8	95	17	2.6	69.2	44.2	34.8	1.7
32.50	16	33.8	95	17	2.7	69.0	44.2	34.5	1.7
32.75	17	33.7	95	17	2.8	68.9	44.4	34.3	1.7
33.00	16	33.7	95	17	2.8	68.8	44.4	34.3	1.7
33.25	16	33.6	95	17	2.9	68.8	44.8	34.4	1.7
33.50	16	33.4	95	17	3.1	68.7	44.8	34.7	1.7
33.75	17	33.4	95	17	3.1	68.8	44.4	34.9	1.7
34.00	16	33.4	95	17	3.5	68.7	44.2	34.9	1.7
34.25	17	33.5	95	17	3.2	68.6	44.3	34.9	1.7
34.50	17	33.4	95	17	3.5	68.6	44.0	35.2	1.7
34.75	16	33.4	95	17	3.6	68.4	43.8	35.4	1.7
35.00	19	33.4	95	17	3.5	68.2	42.6	36.4	1.7
35.25	20	33.5	95	17	3.6	67.8	42.4	37.2	1.7
35.50	22	33.6	95	17	3.6	67.4	41.9	37.7	1.7
35.75	22	33.7	95	17	4.0	67.5	40.5	38.2	1.7
36.00	24	33.7	95	17	3.8	67.3	40.0	39.1	1.7
36.25	21	30.6	123	22	4.4	77.4	46.3	44.2	2.0
36.50	20	33.9	136	25	4.6	81.6	49.1	46.5	2.1
36.75	19	33.4	136	25	4.5	81.6	49.1	46.4	2.1
37.00	19	33.3	136	25	4.5	81.8	49.4	46.5	2.1
37.25	19	33.2	136	25	4.4	81.7	49.1	46.5	2.1
37.50	19	33.3	136	25	4.4	81.6	49.3	46.6	2.1
37.75	20	33.4	136	25	4.8	81.6	48.8	46.6	2.1
38.00	20	33.4	136	25	4.8	81.6	49.0	46.5	2.1
38.25	19	33.4	136	25	4.8	81.6	49.2	46.5	2.1
38.50	19	33.5	136	25	4.3	81.6	49.9	45.6	2.0
38.75	19	33.4	136	25	3.8	81.6	49.9	45.7	2.0
39.00	20	33.3	136	25	4.3	81.6	49.1	46.4	2.0
39.25	21	33.4	136	25	4.5	81.6	48.8	46.0	2.0
39.50	20	33.3	136	25	4.7	81.6	48.9	47.1	2.0
39.75	21	33.2	136	25	5.1	81.6	48.0	47.6	2.0
40.00	24	33.2	136	25	5.9	81.6	47.3	49.5	2.0
40.25	25	33.3	136	25	6.0	81.6	45.8	51.0	2.0
40.50	26	33.3	136	25	6.4	81.6	45.2	51.6	2.0
40.75	28	33.3	136	25	6.4	81.6	44.6	52.6	2.0
41.00	31	33.5	136	25	6.8	82.1	42.9	54.7	2.0
41.25	27	30.4	172	31	8.1	93.2	46.3	66.4	2.3
41.50	28	33.0	189	34	8.4	97.0	48.7	68.5	2.4
41.75	27	32.9	188	34	8.0	96.2	48.5	67.7	2.4
42.00	28	33.2	189	34	7.4	96.1	48.7	67.4	2.4
42.25	29	32.1	221	40	7.6	105.9	55.0	72.3	2.7
42.50	24	33.7	220	40	7.8	105.7	54.3	72.3	2.7
42.75	23	33.8	218	40	8.0	106.0	53.6	73.9	2.7
43.00	23	33.7	219	40	7.7	106.3	52.5	75.0	2.7
43.25	26	33.7	223	41	7.5	106.7	51.7	76.2	2.7
43.50	21	33.7	226	41	7.5	106.7	51.2	76.6	2.7
43.75	25	33.7	219	40	7.5	106.7	50.5	77.7	2.7
44.00	5	33.7	224	41	7.7	106.7	50.4	76.5	2.7

DRIVING SYSTEM PERFORMANCE DATA
Pile 3B, PDA 1, Menck MHU 500
SFOBB East Span Seismic Safety Project

Pile 3, Section B, PDA 2

PILE 3, SECTION B, PDA 2

Penetration (m)	Blow Count (bpqm)	Blow Rate (bpm)	Transmitted Energy (KJ)	System Efficiency (%)	Resistance to Driving (MN)	Impact Stress (MPa)	Tensile Stress (MPa)	Stress at Toe (MPa)	Impact Velocity (m/sec)
15.25	10	10.0	71	13	2.1	62.9	43.3	27.0	1.5
15.50	8	0.0	68	12	2.5	61.5	44.7	24.1	1.4
19.75	4	0.0	68	12	2.8	61.5	45.2	24.0	1.4
20.00	1	0.0	68	12	2.4	62.4	45.6	23.8	1.4
20.25	2	0.0	68	12	2.2	62.5	44.2	25.6	1.5
20.50	10	10.0	68	12	1.9	55.5	42.5	25.7	1.5
20.75	14	14.0	68	12	2.0	61.6	42.0	26.5	1.4
21.00	19	26.6	61	11	2.0	56.4	37.4	25.7	1.3
21.25	19	35.3	56	10	2.1	52.8	34.8	24.5	1.3
21.50	18	29.4	61	11	2.0	54.7	36.3	24.8	1.3
21.75	16	18.2	68	12	1.8	58.4	39.0	25.9	1.4
22.00	16	29.1	61	11	1.9	55.1	36.5	24.7	1.3
22.25	14	27.9	65	12	2.1	56.7	37.9	25.1	1.4
22.50	16	32.4	61	11	1.9	54.7	36.7	24.3	1.3
22.75	15	26.7	59	11	2.1	54.4	36.2	24.3	1.3
23.00	11	12.1	72	13	2.3	61.7	41.9	27.1	1.4
23.25	10	28.9	92	17	2.7	71.8	51.0	29.7	1.7
23.50	10	33.1	81	15	2.8	68.8	48.0	28.3	1.6
23.75	10	33.1	81	15	2.7	68.5	48.0	28.7	1.6
24.00	10	33.3	81	15	2.7	68.2	48.1	28.4	1.6
24.25	10	33.3	81	15	2.6	68.4	48.0	28.9	1.6
24.50	10	33.3	81	15	2.7	68.3	48.7	28.8	1.6
24.75	10	33.4	81	15	2.6	68.5	48.7	28.0	1.6
25.00	10	33.3	84	15	2.5	68.4	48.1	29.2	1.6
25.25	10	33.4	84	15	2.5	68.5	47.5	29.1	1.6
25.50	11	33.3	81	15	2.5	68.3	47.7	29.4	1.6
25.75	11	33.3	81	15	2.7	68.7	47.5	29.7	1.6
26.00	11	33.4	81	15	2.4	69.0	47.3	30.0	1.6
26.25	11	33.5	83	15	2.5	69.3	47.0	30.8	1.6
26.50	11	33.5	83	15	2.6	69.3	47.3	31.3	1.6
26.75	11	33.5	81	15	2.6	69.3	46.8	31.3	1.6
27.00	11	33.4	81	15	2.4	69.2	46.7	31.6	1.6
27.25	12	33.3	84	15	2.3	68.7	46.1	31.5	1.6
27.50	12	33.3	83	15	2.4	68.8	46.1	31.2	1.6
27.75	16	25.3	90	16	2.8	71.3	44.8	36.3	1.7
28.00	17	31.2	95	17	3.1	72.1	45.0	37.4	1.7
28.25	17	32.2	95	17	2.5	72.0	45.3	37.0	1.7
28.50	18	32.1	95	17	2.7	71.8	45.3	36.9	1.7
28.75	15	32.0	95	17	2.9	71.8	45.4	37.0	1.7
29.00	16	32.0	95	17	3.3	71.7	45.5	36.7	1.7
29.25	16	32.5	95	17	3.2	71.5	45.4	36.8	1.7
29.50	15	33.6	95	17	3.4	71.6	45.6	36.2	1.7
29.75	17	33.5	95	17	3.4	71.6	45.7	35.9	1.7
30.00	16	33.5	95	17	3.4	71.8	45.8	35.9	1.7
30.25	16	33.5	95	17	3.4	71.7	45.5	36.3	1.7
30.50	15	33.5	95	17	3.1	71.6	45.2	36.3	1.7
30.75	16	33.6	95	17	3.1	71.5	45.3	36.1	1.7
31.00	16	33.5	95	17	3.2	71.3	45.2	36.3	1.7
31.25	16	33.5	95	17	3.1	71.3	45.2	36.2	1.7
31.50	15	33.7	95	17	3.2	71.5	45.2	36.0	1.7
31.75	17	33.8	95	17	3.2	71.5	45.2	36.5	1.7
32.00	16	33.7	95	17	3.2	71.5	45.2	36.3	1.7

DRIVING SYSTEM PERFORMANCE DATA
Pile 3B, PDA 2, Menck MHU 500
SFOBB East Span Seismic Safety Project

Penetration (m)	Blow Count (bpqm)	Blow Rate (bpm)	Transmitted Energy (KJ)	System Efficiency (%)	Resistance to Driving (MN)	Impact Stress (MPa)	Tensile Stress (MPa)	Stress at Toe (MPa)	Impact Velocity (m/sec)
32.25	16	33.8	95	17	3.3	71.2	45.9	36.0	1.7
32.50	16	33.8	95	17	3.2	71.3	46.0	36.4	1.7
32.75	17	33.7	95	17	2.8	71.1	45.6	36.1	1.7
33.00	16	33.7	95	17	3.0	71.1	45.4	35.7	1.7
33.25	16	33.5	95	17	2.9	71.1	45.7	35.8	1.7
33.50	16	33.4	95	17	2.8	71.1	45.7	36.1	1.7
33.75	17	33.4	95	17	3.0	71.2	45.4	36.0	1.7
34.00	16	33.4	95	17	2.8	71.1	45.4	36.0	1.7
34.25	17	33.4	95	17	3.4	71.3	44.7	36.8	1.7
34.50	17	33.3	95	17	3.2	71.1	44.7	36.1	1.7
34.75	16	33.4	95	17	3.3	71.0	44.3	36.4	1.7
35.00	19	33.4	95	17	2.9	71.0	44.1	37.2	1.7
35.25	20	33.5	95	17	3.6	70.5	43.5	38.1	1.7
35.50	22	33.6	95	17	3.6	70.8	42.7	39.3	1.7
35.75	22	33.6	95	17	3.9	70.6	41.9	39.9	1.7
36.00	24	33.6	95	17	4.1	70.3	40.9	40.1	1.7
36.25	21	30.7	125	23	4.8	81.2	48.9	44.9	1.9
36.50	20	33.8	136	25	5.3	85.4	52.7	46.3	2.0
36.75	19	33.4	136	25	5.3	85.4	52.8	46.1	2.0
37.00	19	33.3	136	25	5.3	85.4	52.2	46.4	2.0
37.25	19	33.2	136	25	5.6	85.5	52.2	48.3	2.0
37.50	19	33.3	136	25	5.4	85.4	51.8	48.3	2.0
37.75	20	33.4	136	25	5.4	85.5	51.6	48.3	2.0
38.00	20	33.4	136	25	5.4	85.5	50.7	48.4	2.0
38.25	19	33.4	136	25	5.2	85.5	50.9	48.6	2.0
38.50	19	33.5	136	25	5.7	85.5	50.1	48.7	2.0
38.75	19	33.4	136	25	5.6	85.7	49.9	49.6	2.0
39.00	20	33.3	136	25	5.6	86.0	49.9	49.5	2.0
39.25	21	33.4	136	25	5.6	85.8	50.6	49.1	2.0
39.50	20	33.3	136	25	5.9	85.6	50.0	50.6	2.0
39.75	21	33.2	136	25	5.4	85.5	48.9	51.5	2.0
40.00	24	33.2	136	25	5.6	85.6	47.0	52.3	2.0
40.25	25	33.3	136	25	6.0	85.5	46.0	52.5	2.0
40.50	26	33.3	136	25	6.2	85.4	45.2	54.2	2.0
40.75	28	33.3	136	25	6.4	85.4	43.9	54.8	2.0
41.00	31	33.5	136	25	6.8	85.5	44.2	55.9	2.0
41.25	27	30.4	175	32	7.8	97.7	46.6	68.5	2.3
41.50	28	33.0	190	35	8.2	102.8	49.4	71.2	2.4
41.75	27	32.9	190	35	8.3	102.1	49.4	70.5	2.4
42.00	28	33.2	190	35	8.2	101.5	49.7	70.0	2.4
42.25	29	32.1	230	42	8.4	111.5	57.1	75.4	2.6
42.50	24	33.7	230	42	8.5	111.4	56.2	76.0	2.6
42.75	23	33.8	230	42	8.0	111.4	55.7	76.4	2.6
43.00	23	33.7	230	42	8.1	111.3	55.3	77.0	2.6
43.25	26	33.7	230	42	8.1	111.1	54.9	77.0	2.6
43.50	21	33.7	230	42	8.0	110.8	54.4	78.3	2.6
43.75	25	33.7	230	42	8.2	110.5	53.8	79.6	2.6
44.00	5	33.7	230	42	8.2	110.3	54.0	80.0	2.7

DRIVING SYSTEM PERFORMANCE DATA
Pile 3B, PDA 2, Menck MHU 500
SFOBB East Span Seismic Safety Project

Pile 3, Section C, PDA 1

PILE 3, SECTION C PDA 1

Penetration (m)	Blow Count (bpqm)	Blow Rate (bpm)	Transmitted Energy (KJ)	System Efficiency (%)	Resistance to Driving (MN)	Impact Stress (MPa)	Tensile Stress (MPa)	Stress at Toe (MPa)	Impact Velocity (m/sec)
44.25	71	31.3	239	43	24.3	108.6	20.1	135.0	2.5
44.50	52	32.7	274	50	21.8	116.9	27.7	135.4	2.8
44.75	43	33.1	311	57	19.5	124.9	33.1	138.7	2.9
45.00	39	33.8	314	57	17.7	125.9	36.0	136.1	3.0
45.25	36	33.6	318	58	16.2	126.5	38.4	132.1	3.0
45.50	37	33.4	320	58	15.9	126.3	39.9	130.0	3.0
45.75	35	33.3	321	58	15.2	126.4	41.2	128.1	3.0
46.00	33	31.9	353	64	14.6	132.6	45.9	130.0	3.1
46.25	28	33.7	370	67	13.6	134.6	47.7	128.9	3.2
46.50	28	32.9	365	66	12.7	134.3	48.0	126.8	3.2
46.75	29	33.0	364	66	12.8	134.0	48.8	126.7	3.2
47.00	20	30.6	422	77	13.1	144.4	55.7	133.4	3.4
47.25	22	33.8	471	86	10.9	152.1	61.8	132.9	3.6
47.50	19	33.9	462	84	12.1	152.4	61.1	135.4	3.6
47.75	21	33.9	459	83	11.8	151.8	62.0	133.1	3.6
48.00	22	33.8	460	84	12.6	152.1	62.7	133.3	3.6
48.25	20	33.8	456	83	12.1	151.8	63.9	132.9	3.6
48.50	19	33.8	457	83	11.6	152.1	64.5	132.3	3.6
48.75	19	33.8	461	84	12.1	151.9	64.9	132.5	3.6
49.00	26	33.7	460	84	11.4	152.0	65.4	132.0	3.6
49.25	13	33.6	461	84	11.3	152.2	65.2	133.2	3.6
49.50	16	33.6	462	84	10.3	152.2	65.4	131.2	3.6
49.75	20	33.5	460	84	11.2	151.9	64.7	132.1	3.6
50.00	20	33.5	466	85	10.7	152.3	64.3	133.4	3.7
50.25	18	33.5	463	84	10.9	152.1	64.5	131.4	3.6
50.50	19	33.5	461	84	11.1	152.2	63.8	132.6	3.6
50.75	20	33.5	467	85	10.9	152.6	64.3	133.3	3.7
51.00	19	33.5	462	84	9.0	152.6	65.8	129.7	3.6
51.25	19	33.4	449	82	11.7	152.4	63.7	133.6	3.6
51.50	20	33.4	456	83	13.2	152.4	59.6	139.2	3.6
51.75	20	33.4	455	83	14.3	152.2	58.3	140.5	3.6
52.00	20	33.5	455	83	13.1	152.2	59.7	138.0	3.6
52.25	21	33.5	464	84	12.9	152.8	59.2	141.1	3.6
52.50	21	33.4	462	84	12.8	152.9	59.0	141.1	3.6
52.75	20	30.6	449	82	17.7	147.1	51.2	149.1	3.5
53.00	21	32.7	468	85	15.2	153.2	54.8	146.8	3.6
53.25	24	32.8	483	88	13.3	153.2	55.9	145.8	3.7
53.50	21	32.8	462	84	16.5	152.6	56.1	146.4	3.6
53.75	24	32.9	476	87	17.0	153.0	57.1	138.4	3.7
54.00	22	32.9	469	85	16.2	152.6	56.5	145.6	3.6
54.25	23	32.8	471	86	16.1	153.3	56.1	147.0	3.7
54.50	22	32.8	464	84	16.4	153.1	56.3	147.5	3.6
54.75	23	32.8	471	86	16.0	152.5	56.8	148.3	3.6
55.00	23	32.8	463	84	16.9	152.8	57.4	149.8	3.6
55.25	21	32.8	464	84	15.1	152.6	57.3	148.1	3.6
55.50	23	32.8	476	87	15.6	153.0	57.0	148.6	3.7
55.75	21	32.8	465	85	15.7	153.2	56.6	147.8	3.6
56.00	22	32.8	464	84	16.3	153.5	57.1	147.3	3.6
56.25	21	32.8	465	85	16.4	153.5	57.4	148.6	3.6
56.50	21	32.8	467	85	15.9	153.6	57.5	148.3	3.6
56.75	24	32.8	464	84	17.4	153.0	56.2	152.4	3.6
57.00	21	32.8	467	85	16.2	152.9	55.4	151.0	3.6

DRIVING SYSTEM PERFORMANCE DATA
Pile 3C, PDA 1, Menck MHU 500
SFOBB East Span Seismic Safety Project

Penetration (m)	Blow Count (bpqm)	Blow Rate (bpm)	Transmitted Energy (KJ)	System Efficiency (%)	Resistance to Driving (MN)	Impact Stress (MPa)	Tensile Stress (MPa)	Stress at Toe (MPa)	Impact Velocity (m/sec)
57.25	23	32.7	471	86	16.1	152.5	55.3	151.3	3.7
57.50	17	32.7	476	87	15.5	152.9	55.7	150.5	3.7
57.75	26	32.7	467	85	17.4	153.2	56.4	150.2	3.6
58.00	20	32.7	461	84	18.6	152.7	56.8	151.4	3.6
58.25	24	32.7	462	84	17.9	152.8	55.8	150.5	3.6
58.50	21	32.7	458	83	17.0	152.6	56.0	149.6	3.6
58.75	20	32.7	460	84	18.1	152.6	56.0	152.0	3.6
59.00	23	32.7	464	84	17.7	152.4	56.3	152.6	3.6
59.25	23	32.7	463	84	17.6	152.7	56.8	150.9	3.6
59.50	21	32.7	460	84	18.5	152.6	56.9	151.2	3.6
59.75	22	32.7	456	83	18.0	152.5	56.9	151.3	3.6
60.00	19	32.6	452	82	17.8	152.5	56.2	151.4	3.6
60.25	23	32.6	452	82	17.1	152.7	55.6	150.8	3.6
60.50	20	32.6	455	83	17.4	152.8	57.0	151.7	3.6
60.75	23	32.6	461	84	18.2	152.8	56.6	155.0	3.6
61.00	22	32.6	460	84	18.2	152.9	56.1	154.5	3.6
61.25	23	32.6	457	83	18.3	153.5	56.2	153.4	3.6
61.50	21	32.6	457	83	17.6	154.1	56.0	152.6	3.6
61.75	21	32.6	454	82	19.6	154.0	54.8	155.6	3.6
62.00	23	32.6	463	84	18.0	154.1	54.5	154.7	3.6
62.25	22	32.5	460	84	17.6	154.2	53.8	153.4	3.6
62.50	23	32.5	463	84	17.5	154.3	53.0	153.7	3.6
62.75	22	32.5	457	83	17.8	154.3	52.9	154.7	3.6
63.00	23	32.5	467	85	16.9	154.3	53.0	155.0	3.7
63.25	22	32.5	463	84	16.8	154.0	53.1	155.1	3.6
63.50	22	32.5	461	84	17.7	154.1	53.0	155.1	3.6
63.75	24	32.5	463	84	17.7	154.0	52.2	154.2	3.6
64.00	24	32.5	463	84	16.9	154.0	52.8	154.2	3.6
64.25	22	32.5	464	84	16.5	153.9	53.3	156.2	3.6
64.50	22	32.5	461	84	17.3	153.7	52.5	157.0	3.6
64.75	23	32.5	463	84	16.3	153.8	51.8	155.9	3.6
65.00	24	32.5	461	84	16.5	153.4	52.0	155.0	3.6
65.25	23	32.5	460	84	16.7	153.6	52.0	155.1	3.6
65.50	24	32.5	463	84	16.6	153.8	51.8	154.7	3.6
65.75	39	30.2	265	48	10.6	89.5	27.8	90.4	2.1
66.00	24	32.6	461	84	18.2	156.1	49.4	147.8	3.6
66.25	25	33.0	461	84	18.2	156.1	50.7	147.3	3.6
66.50	25	33.0	461	84	18.7	156.0	49.6	148.2	3.6
66.75	27	33.1	460	84	18.8	156.1	48.7	149.1	3.6
67.00	29	33.1	461	84	18.6	156.1	47.2	151.3	3.6
67.25	24	33.1	461	84	18.9	156.0	47.4	151.5	3.6
67.50	25	33.1	461	84	18.8	155.9	47.7	150.5	3.6
67.75	26	33.1	461	84	19.0	156.0	48.5	152.1	3.7
68.00	26	33.1	461	84	18.6	156.0	47.8	154.3	3.7
68.25	22	33.1	461	84	18.1	156.2	46.7	152.9	3.7

DRIVING SYSTEM PERFORMANCE DATA
Pile 3C, PDA 1, Menck MHU 500
SFOBB East Span Seismic Safety Project

Pile 3, Section C, PDA 2

PILE 3, SECTION C, PDA 2

Penetration (m)	Blow Count (bpqm)	Blow Rate (bpm)	Transmitted Energy (KJ)	System Efficiency (%)	Resistance to Driving (MN)	Impact Stress (MPa)	Tensile Stress (MPa)	Stress at Toe (MPa)	Impact Velocity (m/sec)
44.25	71	32.0	217	40	22.9	104.9	18.4	136.1	2.6
44.50	52	32.7	251	46	19.0	113.0	25.9	136.5	2.9
44.75	43	33.1	292	53	16.4	120.8	31.7	139.4	3.1
45.00	39	33.8	298	54	15.1	121.8	34.0	136.6	3.1
45.25	36	33.6	298	54	14.3	122.2	36.4	134.1	3.1
45.50	37	33.4	298	54	14.0	122.4	38.2	132.7	3.1
45.75	35	33.3	298	54	13.8	122.6	39.1	131.6	3.2
46.00	33	31.9	325	59	13.9	128.3	43.3	134.6	3.3
46.25	28	33.8	334	61	13.7	130.6	44.9	134.3	3.3
46.50	28	32.9	331	60	13.9	130.0	45.7	133.8	3.3
46.75	29	32.9	332	60	13.5	130.1	46.1	132.7	3.3
47.00	20	30.6	389	71	12.9	139.3	52.4	138.1	3.6
47.25	22	33.8	433	79	12.2	146.6	58.5	141.3	3.8
47.50	19	33.9	433	79	12.3	146.7	58.9	141.0	3.8
47.75	21	33.9	433	79	12.2	146.0	59.2	139.5	3.8
48.00	22	33.8	433	79	11.9	146.0	59.3	138.9	3.8
48.25	20	33.8	433	79	12.3	146.1	59.7	139.3	3.8
48.50	19	33.8	434	79	12.4	145.8	60.0	138.3	3.8
48.75	19	33.8	434	79	12.0	145.7	60.7	137.6	3.8
49.00	26	33.7	434	79	12.4	146.0	61.3	137.6	3.8
49.25	13	33.6	434	79	12.5	146.0	61.9	137.8	3.8
49.50	16	33.6	434	79	12.1	146.1	61.6	137.3	3.8
49.75	20	33.5	434	79	11.7	145.9	61.2	137.0	3.8
50.00	20	33.5	434	79	12.2	145.8	61.5	136.0	3.8
50.25	18	33.5	434	79	12.7	146.0	60.7	136.7	3.8
50.50	19	33.5	434	79	12.6	146.2	60.4	138.0	3.8
50.75	20	33.5	434	79	12.5	146.4	61.6	137.7	3.8
51.00	19	33.5	434	79	12.3	146.3	62.4	135.6	3.8
51.25	19	33.4	434	79	12.2	146.3	60.3	138.2	3.8
51.50	20	33.4	434	79	13.1	146.1	56.3	142.5	3.8
51.75	20	33.4	434	79	13.7	146.1	54.9	146.4	3.8
52.00	20	33.5	434	79	13.0	145.9	56.0	144.3	3.8
52.25	21	33.5	434	79	12.5	146.1	56.0	144.6	3.8
52.50	21	33.4	434	79	12.0	146.3	55.4	144.7	3.8
52.75	20	31.8	412	75	14.3	140.9	48.8	147.9	3.7
53.00	21	32.7	437	79	14.5	146.2	51.0	152.7	3.8
53.25	24	32.8	434	79	13.0	146.1	51.8	151.1	3.8
53.50	21	32.8	434	79	12.1	146.1	52.3	150.2	3.8
53.75	24	32.9	434	79	12.5	145.8	52.4	149.8	3.8
54.00	22	32.9	434	79	12.5	146.1	53.5	149.5	3.8
54.25	23	32.8	434	79	12.6	146.1	52.9	149.4	3.8
54.50	22	32.8	434	79	12.8	146.3	52.6	149.3	3.8
54.75	23	32.8	434	79	13.1	146.5	51.6	151.0	3.8
55.00	23	32.8	434	79	13.0	146.3	50.6	150.0	3.8
55.25	21	32.8	434	79	12.8	146.1	50.7	149.1	3.8
55.50	23	32.8	434	79	12.7	146.2	50.8	149.9	3.8
55.75	21	32.8	434	79	12.5	146.3	50.5	149.6	3.8
56.00	22	32.8	434	79	12.8	146.2	51.4	149.2	3.8
56.25	21	32.8	435	79	13.1	146.5	51.3	149.9	3.8
56.50	21	32.8	434	79	13.1	146.2	51.1	150.0	3.8
56.75	24	32.8	434	79	13.0	146.1	50.5	150.7	3.8
57.00	21	32.8	434	79	12.8	146.4	49.2	151.5	3.8

DRIVING SYSTEM PERFORMANCE DATA
Pile 3C, PDA 2, Menck MHU 500
SFOBB East Span Seismic Safety Project

Penetration (m)	Blow Count (bpqm)	Blow Rate (bpm)	Transmitted Energy (KJ)	System Efficiency (%)	Resistance to Driving (MN)	Impact Stress (MPa)	Tensile Stress (MPa)	Stress at Toe (MPa)	Impact Velocity (m/sec)
57.25	23	32.7	434	79	13.2	146.5	49.7	150.9	3.8
57.50	17	32.7	434	79	13.6	146.6	49.5	151.3	3.8
57.75	26	32.7	434	79	13.8	146.3	50.0	149.4	3.8
58.00	20	32.7	434	79	13.5	146.2	51.0	149.1	3.8
58.25	24	32.7	434	79	13.9	146.1	50.8	150.2	3.8
58.50	21	32.7	434	79	14.0	146.2	50.3	150.6	3.8
58.75	20	32.7	434	79	13.3	146.3	51.0	149.7	3.8
59.00	23	32.7	434	79	13.5	146.3	50.6	149.7	3.8
59.25	23	32.7	434	79	13.8	146.3	51.8	148.8	3.8
59.50	21	32.7	434	79	14.1	146.4	51.0	150.0	3.8
59.75	22	32.7	434	79	13.5	146.4	50.6	150.7	3.8
60.00	19	32.6	434	79	13.3	146.6	50.3	151.9	3.8
60.25	23	32.6	434	79	13.0	147.0	50.4	152.1	3.8
60.50	20	32.6	434	79	13.2	147.0	49.8	152.1	3.8
60.75	23	32.6	434	79	12.9	146.8	50.5	152.0	3.8
61.00	22	32.6	434	79	13.3	146.6	49.8	151.0	3.8
61.25	23	32.6	434	79	13.2	146.8	49.8	151.4	3.8
61.50	21	32.6	434	79	13.2	146.7	49.3	152.4	3.8
61.75	21	32.6	434	79	13.4	146.6	50.3	152.7	3.8
62.00	23	32.6	434	79	13.6	146.2	50.5	152.4	3.8
62.25	22	32.5	434	79	13.4	145.9	50.3	152.5	3.8
62.50	23	32.5	434	79	13.4	145.7	49.5	152.7	3.8
62.75	22	32.5	434	79	13.6	145.7	49.1	153.5	3.8
63.00	23	32.5	434	79	13.7	145.8	48.8	153.8	3.8
63.25	22	32.5	434	79	13.6	145.6	49.0	153.9	3.8
63.50	22	32.5	434	79	14.0	145.7	48.4	154.3	3.8
63.75	24	32.5	434	79	14.5	145.5	47.6	154.1	3.8
64.00	24	32.5	434	79	14.6	145.4	47.4	153.9	3.8
64.25	22	32.5	434	79	13.9	145.5	47.8	155.6	3.8
64.50	22	32.5	435	79	13.9	145.8	47.3	156.9	3.8
64.75	23	32.5	434	79	13.7	145.6	47.6	156.0	3.8
65.00	24	32.5	434	79	13.5	145.4	47.6	155.3	3.8
65.25	23	32.5	434	79	13.7	145.3	47.0	155.1	3.8
65.50	24	32.5	434	79	14.2	145.3	47.2	156.0	3.8
65.75	23	28.0	429	78	17.2	145.0	43.8	161.6	3.8
66.00	24	32.6	434	79	17.3	145.9	45.0	162.4	3.8
66.25	25	33.0	434	79	16.4	145.9	45.2	162.4	3.8
66.50	25	33.0	434	79	16.2	145.8	44.8	162.8	3.8
66.75	27	33.1	434	79	15.7	145.4	44.6	161.4	3.8
67.00	29	33.1	434	79	15.6	145.7	44.6	161.2	3.8
67.25	24	33.1	434	79	16.0	145.6	45.0	161.3	3.8
67.50	25	33.1	434	79	16.2	145.9	45.0	161.1	3.8
67.75	26	33.1	434	79	15.8	146.0	45.4	161.1	3.8
68.00	26	33.1	434	79	16.1	145.6	44.8	161.8	3.8
68.25	22	33.1	435	79	16.2	145.4	43.7	162.0	3.8

DRIVING SYSTEM PERFORMANCE DATA
Pile 3C, PDA 2, Menck MHU 500
SFOBB East Span Seismic Safety Project

Pile 3, Section D, PDA 1

PILE 3, SECTION D, PDA 1

Penetration (m)	Blow Count (bpqm)	Blow Rate (bpm)	Transmitted Energy (KJ)	System Efficiency (%)	Resistance to Driving (MN)	Impact Stress (MPa)	Tensile Stress (MPa)	Stress at Toe (MPa)	Impact Velocity (m/sec)
68.50	47	52.5	495	26	39.4	125.4	19.9	181.3	3.1
68.75	38	24.3	782	42	48.6	163.2	22.0	229.7	3.9
69.00	34	30.3	751	40	46.7	162.6	21.3	222.6	3.8
69.25	31	29.9	748	40	44.8	162.9	20.3	217.7	3.8
69.50	26	27.6	780	42	45.7	163.9	20.3	219.5	3.9
69.75	33	20.0	768	41	44.4	164.0	19.2	215.6	3.8
70.00	19	27.8	804	43	42.7	169.2	18.4	215.6	3.9
70.25	22	27.2	822	44	41.1	170.6	21.2	213.6	4.0
70.50	29	28.6	784	42	39.6	164.8	18.3	208.1	3.9
70.75	28	29.4	748	40	38.8	161.7	18.3	203.8	3.8
71.00	28	29.3	747	40	36.3	161.6	19.7	200.8	3.8
71.25	22	29.1	748	40	35.9	161.5	21.1	199.1	3.8
71.50	25	29.1	756	40	34.4	160.9	24.4	195.9	3.8
71.75	23	29.1	760	41	32.9	160.5	23.4	196.7	3.8
72.00	28	28.9	755	40	32.2	160.3	25.2	193.7	3.8
72.25	22	29.0	763	41	31.4	159.7	26.0	192.6	3.8
72.50	25	29.0	759	41	31.4	159.4	26.0	191.1	3.8
72.75	23	28.8	752	40	31.4	158.9	27.9	188.3	3.8
73.00	23	28.9	743	40	31.1	158.8	28.7	187.5	3.7
73.25	22	28.9	737	39	30.5	158.7	27.6	188.0	3.7
73.50	26	28.8	732	39	29.7	158.4	27.7	187.8	3.7
73.75	21	28.5	734	39	29.5	158.4	26.9	188.0	3.7
74.00	22	28.4	735	39	29.3	158.4	28.7	185.0	3.7
74.25	22	28.3	734	39	28.8	157.8	29.2	183.7	3.7
74.50	21	27.9	748	40	28.8	159.7	29.4	185.7	3.7
74.75	19	25.5	826	44	28.3	166.6	32.6	192.1	3.9
75.00	21	25.5	824	44	27.8	166.4	31.5	191.7	3.9
75.25	20	26.6	780	42	27.7	162.0	30.0	188.1	3.8
75.50	20	26.5	796	43	27.1	163.5	31.1	188.6	3.8
75.75	20	26.1	793	42	27.0	163.1	32.3	187.2	3.8
76.00	24	27.9	744	40	27.5	158.0	29.5	183.8	3.7
76.25	26	28.3	745	40	27.6	158.1	30.3	183.4	3.7
76.50	17	28.6	747	40	27.5	158.2	30.9	182.7	3.7
76.75	20	18.9	774	41	28.5	159.7	31.7	185.2	3.8
77.00	24	28.5	760	41	28.8	157.9	30.4	184.7	3.8
77.25	20	28.7	759	41	28.7	157.5	29.8	185.4	3.8
77.50	24	28.4	751	40	28.7	158.5	28.4	187.1	3.8
77.75	22	28.6	750	40	28.2	158.1	28.6	186.7	3.7
78.00	16	21.3	766	41	37.5	158.4	19.0	201.8	3.8
78.25	19	29.9	824	44	35.4	167.0	24.7	202.2	3.9
78.50	24	26.8	802	43	34.7	165.6	25.0	200.6	3.9
78.75	18	26.9	813	43	35.8	165.9	24.0	201.5	3.9
79.00	30	26.4	806	43	35.2	165.9	24.1	200.8	3.9
79.25	19	28.9	847	45	34.6	168.3	26.1	204.0	4.0
79.50	15	21.6	1120	60	31.4	189.7	39.4	217.2	4.6
79.75	17	25.2	1174	63	30.0	194.3	42.1	218.7	4.7
80.00	20	27.1	1180	63	28.3	194.8	42.7	218.7	4.7
80.25	13	26.2	1168	62	28.1	194.3	44.1	217.2	4.7
80.50	15	25.6	1231	66	28.2	202.2	51.8	218.7	4.8
80.75	14	25.6	1261	67	27.8	206.5	54.6	220.0	4.9
81.00	15	25.5	1260	67	26.9	206.7	55.3	218.8	4.9
81.25	13	25.6	1260	67	26.8	205.5	53.4	219.8	4.9

DRIVING SYSTEM PERFORMANCE DATA
Pile 3D, PDA 1, Menck MHU 1700
SFOBB East Span Seismic Safety Project

Penetration (m)	Blow Count (bpqm)	Blow Rate (bpm)	Transmitted Energy (KJ)	System Efficiency (%)	Resistance to Driving (MN)	Impact Stress (MPa)	Tensile Stress (MPa)	Stress at Toe (MPa)	Impact Velocity (m/sec)
81.50	14	25.5	1259	67	26.5	206.2	56.3	217.9	4.9
81.75	13	25.5	1262	67	26.1	206.6	56.8	218.4	4.9
82.00	15	25.4	1261	67	26.0	206.4	55.6	217.6	4.9
82.25	30	26.2	1197	64	26.9	198.5	47.8	215.7	4.8
82.50	6	25.9	1274	68	25.7	209.4	56.7	218.0	4.9
82.75	7	25.9	1272	68	25.7	208.8	57.4	217.7	4.9
83.00	14	26.0	1275	68	25.4	208.8	57.6	218.4	4.9
83.25	12	25.9	1277	68	25.9	209.2	58.3	218.2	4.9
83.50	14	25.9	1282	69	26.5	209.3	58.5	217.4	4.9
83.75	13	25.9	1285	69	26.5	209.7	56.7	218.9	5.0
84.00	14	25.9	1283	69	26.4	210.1	57.7	217.9	5.0
84.25	13	25.8	1287	69	26.2	209.4	58.1	219.7	5.0
84.50	13	25.8	1283	69	25.5	210.1	59.0	217.6	5.0
84.75	14	25.8	1287	69	25.5	210.2	58.2	219.0	5.0
85.00	14	25.8	1281	68	25.5	210.0	57.1	220.6	5.0
85.25	12	25.7	1281	68	25.2	210.0	57.1	220.9	5.0
85.50	13	25.7	1276	68	25.8	209.2	58.0	219.2	5.0
85.75	13	25.7	1276	68	25.9	209.3	58.7	219.0	5.0
86.00	14	25.6	1275	68	25.3	210.1	59.7	216.2	5.0
86.25	13	25.7	1276	68	25.1	209.9	59.6	218.0	5.0
86.50	13	25.7	1276	68	25.2	210.0	59.3	219.0	5.0
86.75	14	25.6	1275	68	25.0	210.1	58.5	220.4	5.0
87.00	14	25.6	1283	69	25.2	209.8	59.1	219.5	5.0
87.25	12	25.6	1282	69	24.8	208.9	59.2	219.5	5.0
87.50	14	25.5	1278	68	25.3	208.8	57.1	222.0	5.0
87.75	14	25.6	1279	68	28.5	208.1	49.8	230.6	5.0
88.00	16	25.5	1272	68	34.7	207.1	42.3	241.5	5.0
88.25	16	25.5	1269	68	38.7	205.9	36.1	248.5	5.0
88.50	19	25.5	1264	68	41.2	205.3	33.7	251.3	4.9
88.75	20	25.5	1266	68	42.2	205.4	31.7	254.7	4.9
89.00	20	25.5	1264	68	42.6	205.1	29.8	255.7	4.9
89.25	19	25.4	1268	68	42.9	205.6	29.3	257.6	4.9
89.50	20	28.4	1243	66	43.6	202.3	25.6	256.2	4.9
89.75	21	28.7	1193	64	44.2	198.2	23.5	254.1	4.8
90.00	22	26.4	1251	67	45.1	203.9	25.8	260.0	4.9
90.25	19	25.8	1263	68	45.4	204.9	25.9	261.6	4.9
90.50	33	22.3	1208	65	46.5	197.7	23.4	256.6	4.8
90.75	24	24.5	1527	82	46.2	223.9	34.3	274.0	5.3
91.00	22	25.6	1533	82	45.9	227.6	36.5	275.8	5.3
91.25	22	25.6	1531	82	49.6	226.9	30.5	283.0	5.3
91.50	24	25.6	1528	82	52.1	226.8	25.9	289.4	5.3
91.75	25	25.5	1532	82	53.3	226.8	21.4	293.1	5.3
92.00	25	25.5	1531	82	54.3	225.7	21.9	294.4	5.3
92.25	26	25.4	1534	82	55.9	226.9	23.1	296.3	5.3
92.50	26	25.4	1535	82	56.0	227.3	22.9	297.5	5.3
92.75	26	25.4	1539	82	55.6	226.1	22.9	296.1	5.3
93.00	26	25.3	1535	82	56.0	225.9	22.8	296.9	5.3
93.25	26	25.2	1532	82	56.3	225.3	23.4	295.1	5.3
93.50	29	23.4	1471	79	56.4	220.4	23.0	291.0	5.2
93.75	30	25.1	1535	82	57.8	225.1	22.6	295.9	5.3
94.00	30	25.1	1534	82	57.7	222.6	23.7	295.6	5.3
94.25	29	25.1	1551	83	58.5	222.1	23.1	297.1	5.4
94.50	32	25.0	1554	83	59.0	222.3	22.1	297.9	5.4

DRIVING SYSTEM PERFORMANCE DATA
Pile 3D, PDA 1, Menck MHU 1700
SFOBB East Span Seismic Safety Project

Pile 3, Section D, PDA 2

PILE 3, SECTION D, PDA 2

Penetration (m)	Blow Count (bpqm)	Blow Rate (bpm)	Transmitted Energy (KJ)	System Efficiency (%)	Resistance to Driving (MN)	Impact Stress (MPa)	Tensile Stress (MPa)	Stress at Toe (MPa)	Impact Velocity (m/sec)
68.50	33	30.5	509	27	40.5	123.5	18.8	183.3	3.1
68.75	38	25.1	790	42	51.9	159.4	23.8	234.3	3.9
69.00	34	30.2	749	40	49.7	158.5	22.0	225.2	3.8
69.25	31	29.8	751	40	47.3	159.2	22.0	219.7	3.8
69.50	26	26.3	781	42	48.6	160.4	22.8	222.9	3.9
69.75	33	20.0	765	41	46.6	160.2	23.3	218.8	3.9
70.00	19	27.7	804	43	44.7	165.6	25.2	218.7	3.9
70.25	22	27.1	821	44	43.1	166.8	26.2	216.4	4.0
70.50	29	28.6	767	41	41.1	161.5	24.8	208.7	3.8
70.75	28	29.5	728	39	39.6	158.3	22.6	201.5	3.7
71.00	28	29.2	721	39	38.3	158.3	22.5	197.8	3.6
71.25	22	29.1	717	38	37.6	158.1	22.7	195.3	3.6
71.50	25	29.1	722	39	36.4	157.5	23.5	193.9	3.6
71.75	23	29.1	723	39	35.7	157.0	23.9	192.3	3.6
72.00	28	28.9	720	39	36.1	156.9	24.3	190.1	3.6
72.25	22	29.0	722	39	35.5	156.5	23.3	189.9	3.6
72.50	25	29.0	718	38	34.6	155.9	24.1	189.0	3.6
72.75	23	28.8	710	38	34.9	155.5	24.8	187.9	3.6
73.00	23	28.9	702	38	34.0	155.0	24.3	187.2	3.6
73.25	22	28.9	695	37	33.4	154.8	25.0	185.9	3.6
73.50	26	28.7	667	36	32.7	154.7	25.2	181.1	3.4
73.75	21	28.5	698	37	33.0	154.8	26.7	183.0	3.6
74.00	22	28.4	700	37	32.9	154.8	27.5	182.9	3.6
74.25	22	28.3	699	37	32.3	154.6	25.8	182.8	3.5
74.50	21	27.7	715	38	32.7	156.7	27.3	182.4	3.6
74.75	19	25.5	801	43	32.1	163.5	32.8	185.6	3.8
75.00	21	25.5	800	43	31.3	163.4	32.9	184.8	3.8
75.25	20	26.7	745	40	31.6	159.2	30.2	182.2	3.7
75.50	20	26.4	759	41	32.1	160.6	31.0	184.0	3.7
75.75	20	26.2	759	41	32.2	160.2	30.7	184.0	3.7
76.00	24	27.9	700	37	32.4	155.2	27.5	180.5	3.5
76.25	26	28.3	696	37	32.9	154.7	27.5	181.0	3.5
76.50	17	28.7	693	37	33.1	154.7	27.9	180.6	3.5
76.75	20	20.6	730	39	33.3	156.7	27.9	184.1	3.6
77.00	24	28.5	713	38	32.7	155.1	27.2	182.0	3.5
77.25	20	28.7	709	38	32.4	155.0	26.3	183.3	3.5
77.50	23	28.4	704	38	32.5	155.4	26.0	182.9	3.5
77.75	22	28.6	700	37	33.0	155.1	26.7	183.0	3.5
78.00	17	27.5	702	38	38.3	154.1	22.1	195.3	3.5
78.25	19	29.8	773	41	36.5	164.7	24.4	197.4	3.7
78.50	24	26.9	752	40	36.0	162.9	25.8	194.8	3.7
78.75	18	27.8	756	40	36.6	163.3	25.0	197.2	3.7
79.00	30	25.8	749	40	36.7	162.9	25.8	195.2	3.7
79.25	19	23.4	776	41	36.6	165.6	28.8	197.1	3.7
79.50	15	21.8	998	53	38.2	186.8	41.3	212.0	4.3
79.75	17	25.4	1037	55	38.4	192.2	43.4	215.2	4.3
80.00	20	27.1	1052	56	38.2	193.1	46.4	215.5	4.3
80.25	13	26.0	1139	61	38.1	192.5	47.7	210.4	4.4
80.50	15	27.4	1209	65	39.2	200.3	50.9	216.3	4.5
80.75	14	25.6	1244	67	39.0	204.9	53.8	218.9	4.6
81.00	15	25.5	1247	67	38.9	205.0	55.2	217.4	4.6
81.25	13	25.6	1122	60	38.1	205.0	54.5	204.4	4.1

DRIVING SYSTEM PERFORMANCE DATA
Pile 3D, PDA 2, Menck MHU 1700
SFOBB East Span Seismic Safety Project

Penetration (m)	Blow Count (bpqm)	Blow Rate (bpm)	Transmitted Energy (KJ)	System Efficiency (%)	Resistance to Driving (MN)	Impact Stress (MPa)	Tensile Stress (MPa)	Stress at Toe (MPa)	Impact Velocity (m/sec)
81.50	14	25.5	1250	67	38.9	205.3	56.3	216.2	4.6
81.75	13	25.5	1255	67	39.7	205.8	56.3	217.7	4.6
82.00	15	25.5	1246	67	39.6	205.5	55.5	216.7	4.6
82.25	30	27.1	1166	62	38.1	196.9	50.4	211.4	4.4
82.50	6	26.0	1255	67	39.5	208.0	61.6	214.2	4.6
82.75	7	25.9	1261	67	38.9	207.9	61.2	214.2	4.6
83.00	14	25.9	1262	67	39.4	207.7	59.5	215.8	4.6
83.25	12	25.9	1261	67	39.0	207.8	60.8	215.4	4.6
83.50	14	25.9	1263	68	38.6	207.7	60.1	215.2	4.6
83.75	13	25.9	1268	68	38.2	207.8	59.6	215.0	4.6
84.00	14	25.9	1264	68	38.2	207.6	61.1	213.3	4.6
84.25	13	25.8	1265	68	38.6	207.0	61.7	214.2	4.6
84.50	13	25.8	1264	68	38.6	207.5	60.4	214.0	4.6
84.75	14	25.8	1261	67	38.8	207.4	61.1	215.1	4.6
85.00	14	25.8	1263	68	38.3	207.3	61.0	215.2	4.6
85.25	12	25.8	1266	68	37.9	207.7	61.4	214.1	4.6
85.50	13	25.7	1259	67	37.9	207.9	60.9	213.7	4.7
85.75	13	25.7	1252	67	38.1	207.6	60.6	214.2	4.6
86.00	14	25.6	1255	67	38.5	207.5	60.4	216.2	4.7
86.25	13	25.7	1252	67	38.8	207.4	60.1	219.0	4.7
86.50	13	25.7	1250	67	39.4	207.5	60.3	220.3	4.6
86.75	14	25.6	1246	67	39.1	207.5	60.1	220.9	4.6
87.00	14	25.6	1254	67	38.2	207.2	59.8	220.7	4.6
87.25	12	25.6	1253	67	38.1	207.1	59.7	220.7	4.6
87.50	14	25.5	1256	67	39.3	206.7	58.3	222.0	4.6
87.75	14	25.6	1264	68	43.0	206.5	53.2	228.3	4.7
88.00	16	25.5	1263	68	47.9	205.8	44.2	236.0	4.6
88.25	16	25.5	1265	68	50.3	205.2	37.5	244.6	4.6
88.50	19	25.5	1264	68	50.5	205.0	34.8	249.0	4.6
88.75	20	25.5	1262	67	51.8	205.0	32.0	254.4	4.6
89.00	20	25.5	1260	67	52.3	205.6	30.0	255.9	4.6
89.25	19	25.4	1264	68	52.3	206.8	27.6	257.4	4.6
89.50	20	28.6	1230	66	53.4	202.6	26.7	256.0	4.6
89.75	21	28.6	1179	63	53.9	198.6	25.0	253.7	4.5
90.00	22	26.3	1252	67	53.9	204.0	27.1	258.7	4.6
90.25	19	25.8	1268	68	54.7	205.0	27.4	260.7	4.6
90.50	32	23.0	1181	63	54.5	200.4	25.3	253.6	4.4
90.75	24	24.7	1518	81	59.5	226.4	33.5	277.1	5.1
91.00	22	25.6	1522	81	59.2	230.0	35.2	279.4	5.1
91.25	22	25.6	1528	82	61.2	229.7	31.0	287.1	5.1
91.50	24	25.6	1523	81	63.3	228.9	29.9	293.1	5.1
91.75	25	25.5	1525	82	64.1	229.3	28.8	297.6	5.2
92.00	25	25.4	1528	82	64.3	229.8	27.3	300.2	5.2
92.25	26	25.4	1529	82	65.8	226.5	26.5	289.0	5.1
92.50	26	25.4	1537	82	66.2	227.1	25.7	300.7	5.1
92.75	26	25.4	1539	82	66.2	232.8	24.3	306.9	5.1
93.00	26	25.3	1538	82	66.6	232.6	23.1	308.3	5.2
93.25	26	25.2	1535	82	67.3	228.7	22.9	309.7	5.2
93.50	29	24.9	1473	79	66.3	225.7	22.5	301.8	5.1
93.75	30	25.1	1541	82	66.9	232.2	22.6	312.1	5.3
94.00	30	25.1	1554	83	67.6	229.2	22.8	315.0	5.2
94.25	39	25.0	1543	83	68.8	227.6	22.4	315.6	5.1
94.50	22	25.0	1532	82	70.1	227.2	22.4	317.9	5.1

DRIVING SYSTEM PERFORMANCE DATA
Pile 3D, PDA 2, Menck MHU 1700
SFOBB East Span Seismic Safety Project

C-2, PDA Data Profiles

Notes regarding PDA data profiles:

1) Penetration values are in meters (not feet as indicated)

2) Blow count (BLC) units are blows per meter (not blows per foot as indicated).

3) All other units are as indicated.

4) Relevant unit conversions:

1 ksi	=	6.895 megapascals
1 kip-ft	=	1.356 kilojoules
1 kip	=	0.004448 meganewtons
1 ft/sec	=	0.3048 meters/sec
1 kip-sec	=	4.448 kilonewton-sec

PILE NO. 1

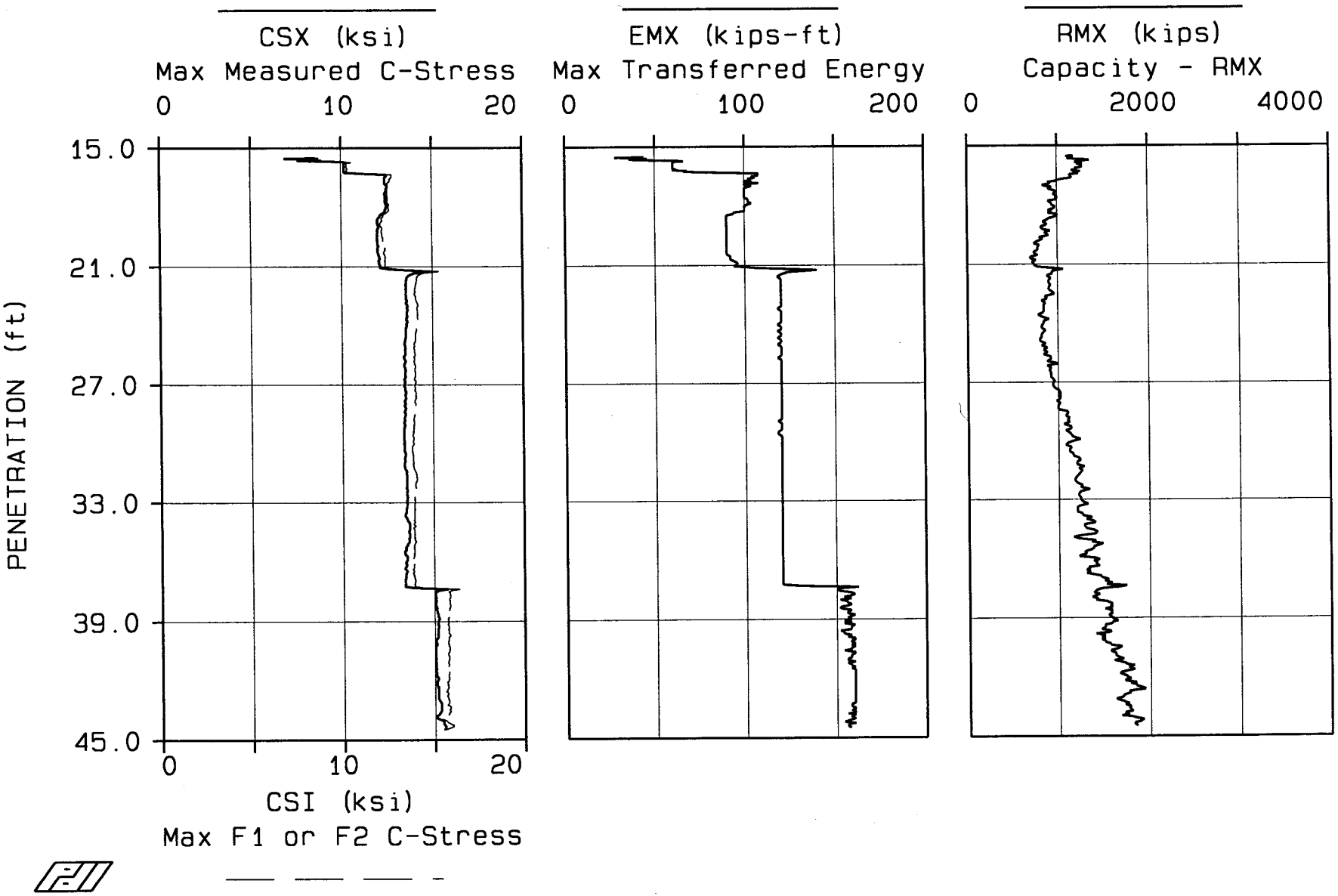
PILE NO. 1

Pile 1, Section B, PDA 1

PILE 1, SECTION B, PDA 1

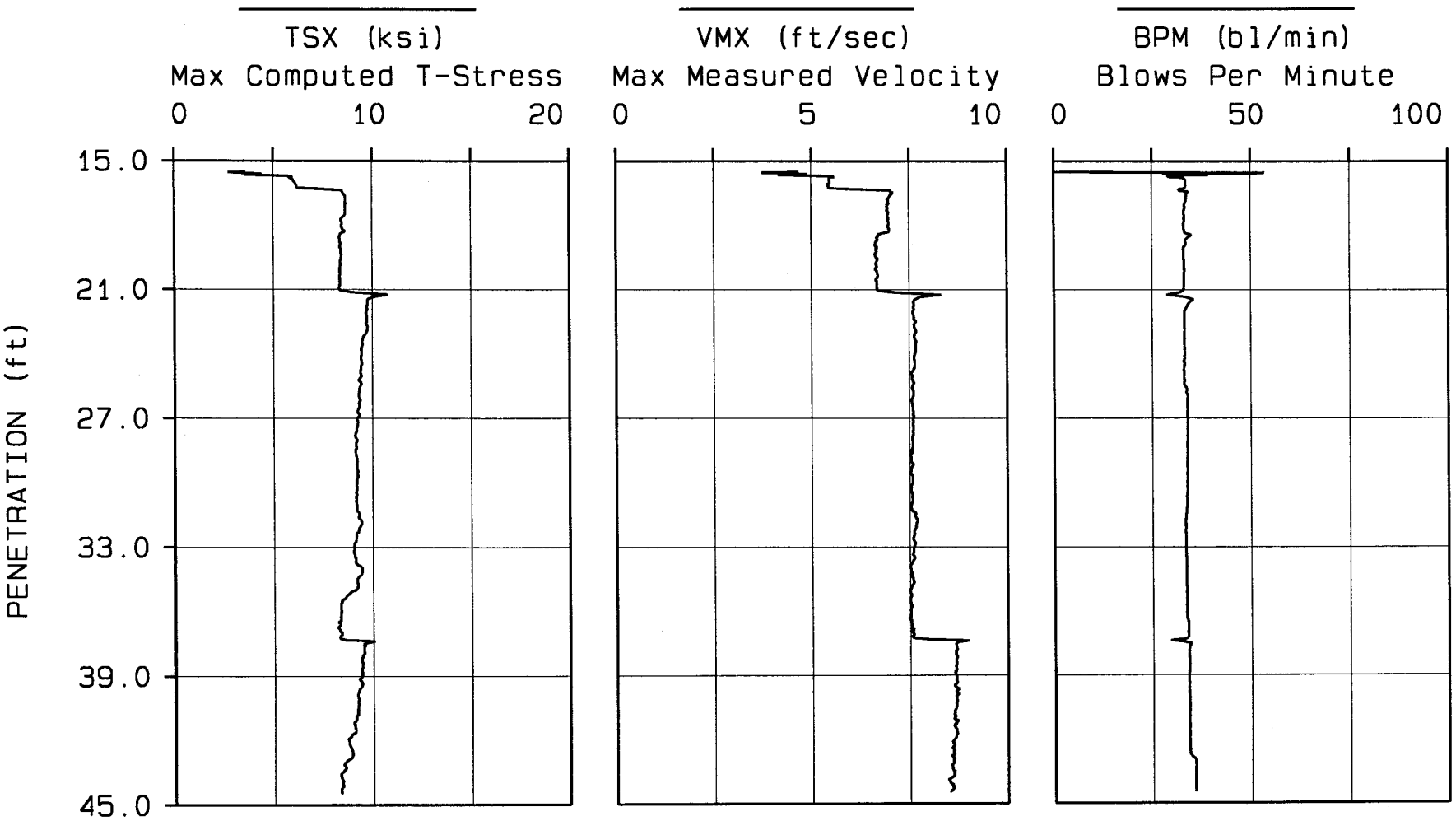
Fugro McClelland 00/10/30

SFOBB PIDP, TP1B, MHU-500T



Fugro McClelland 00/10/30

SFOBB PIDP, TP1B, MHU-500T



Fugro McClelland 00/10/30

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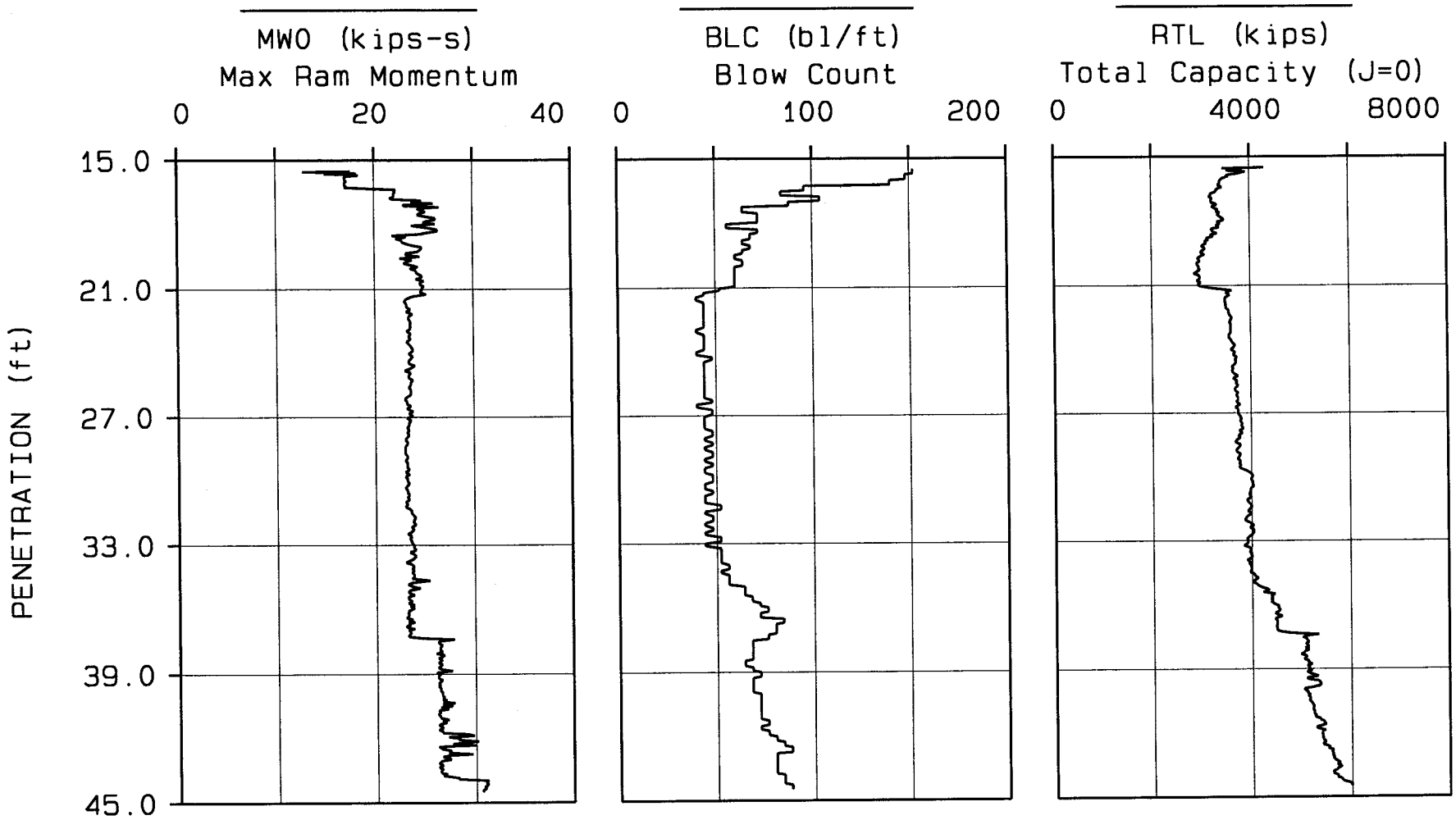
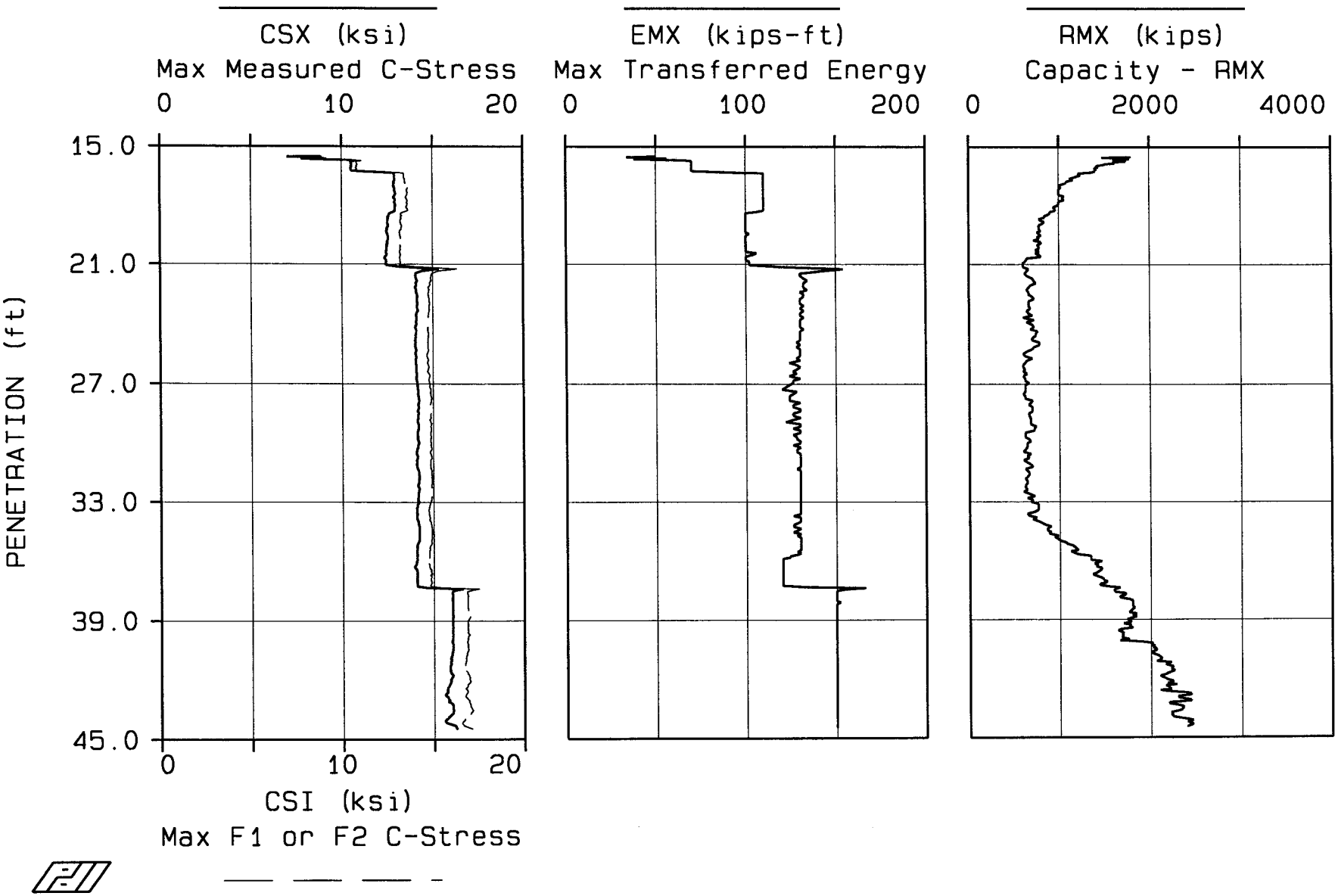


Pile 1, Section B, PDA 2

PILE 1, SECTION B, PDA 2

Fugro McClelland 00/10/30

SFOBB PIDP, TP1B, MHU-500T



Fugro McClelland 00/10/30

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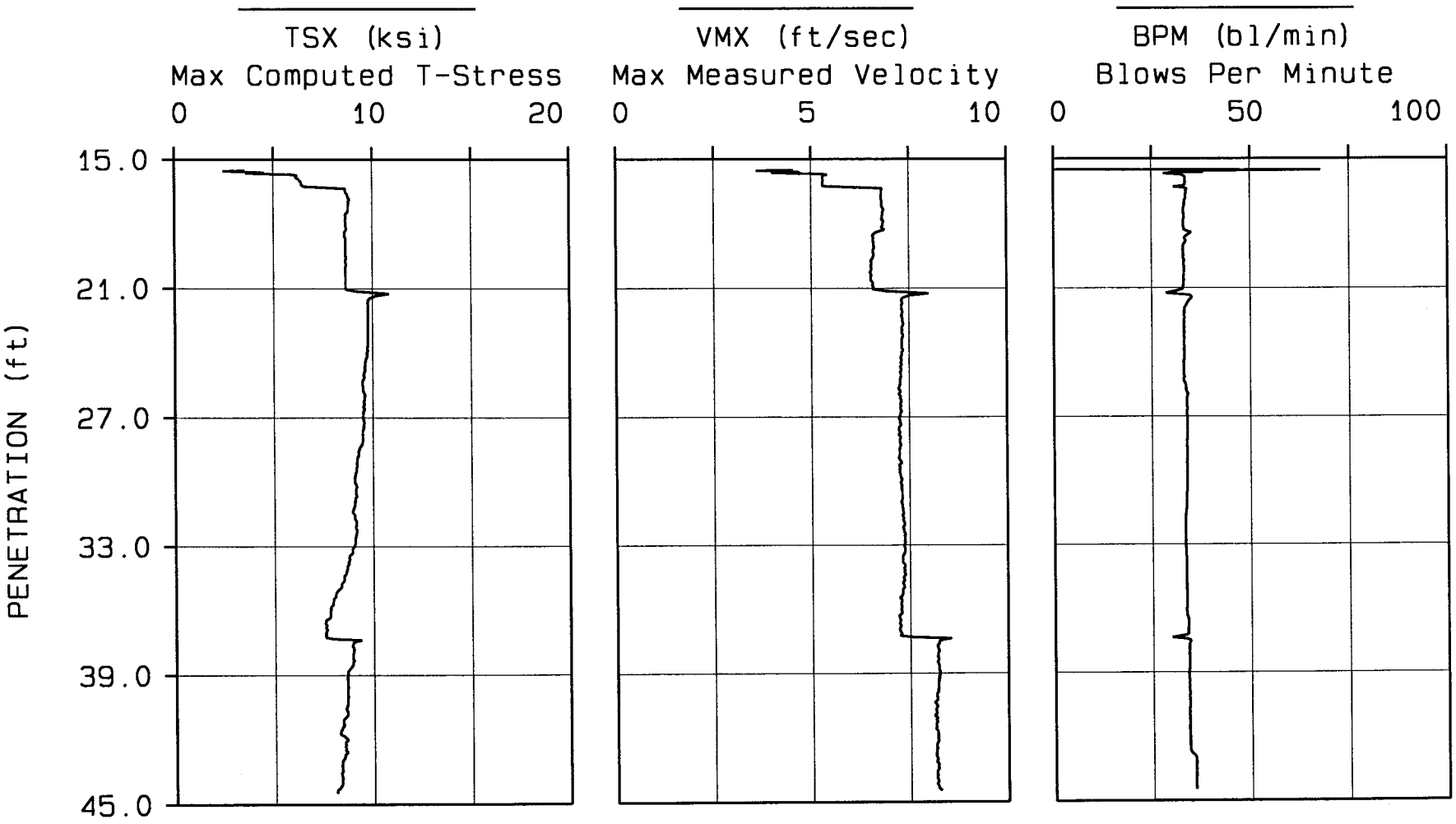

Fugro McClelland 00/10/30

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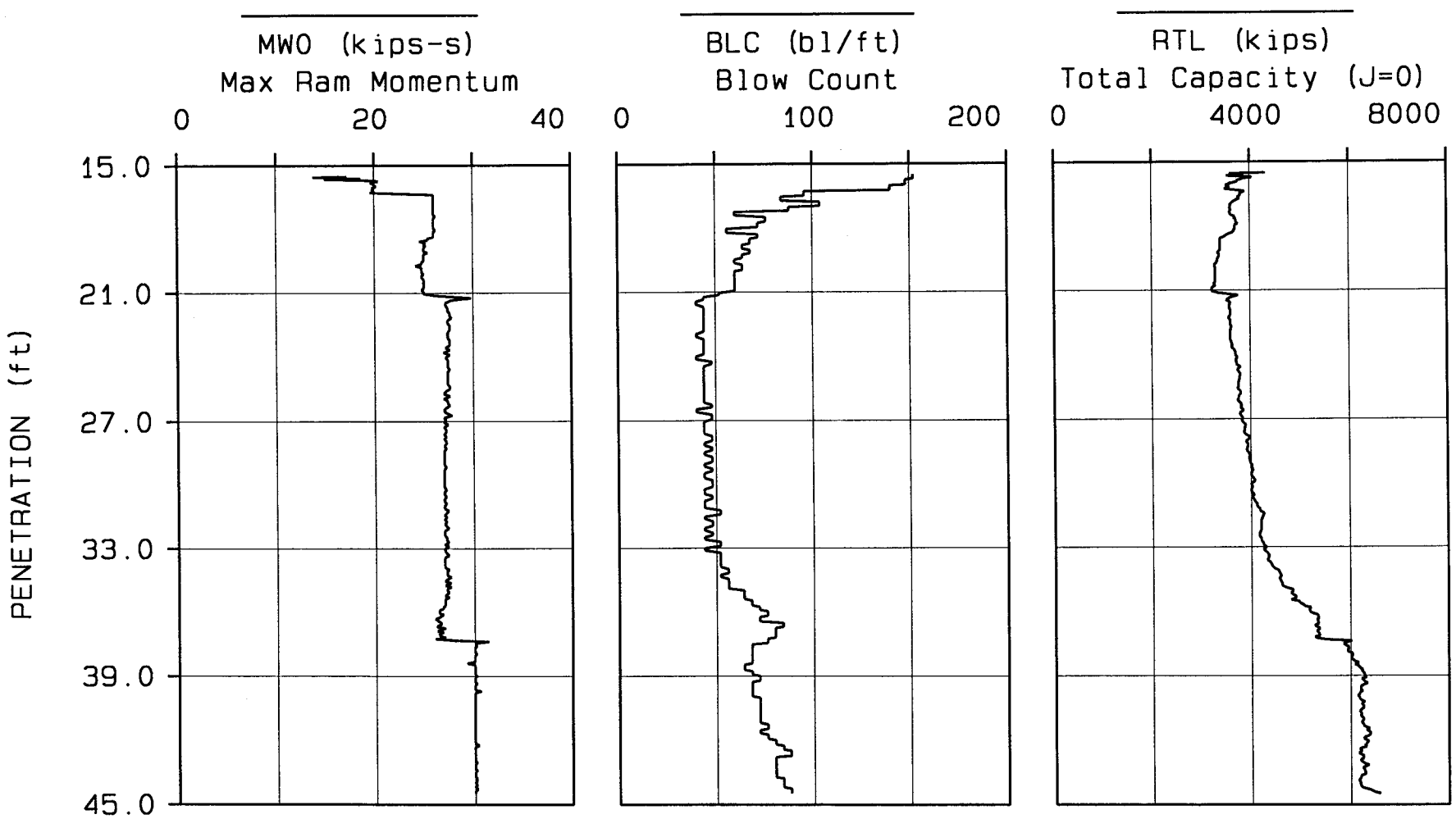
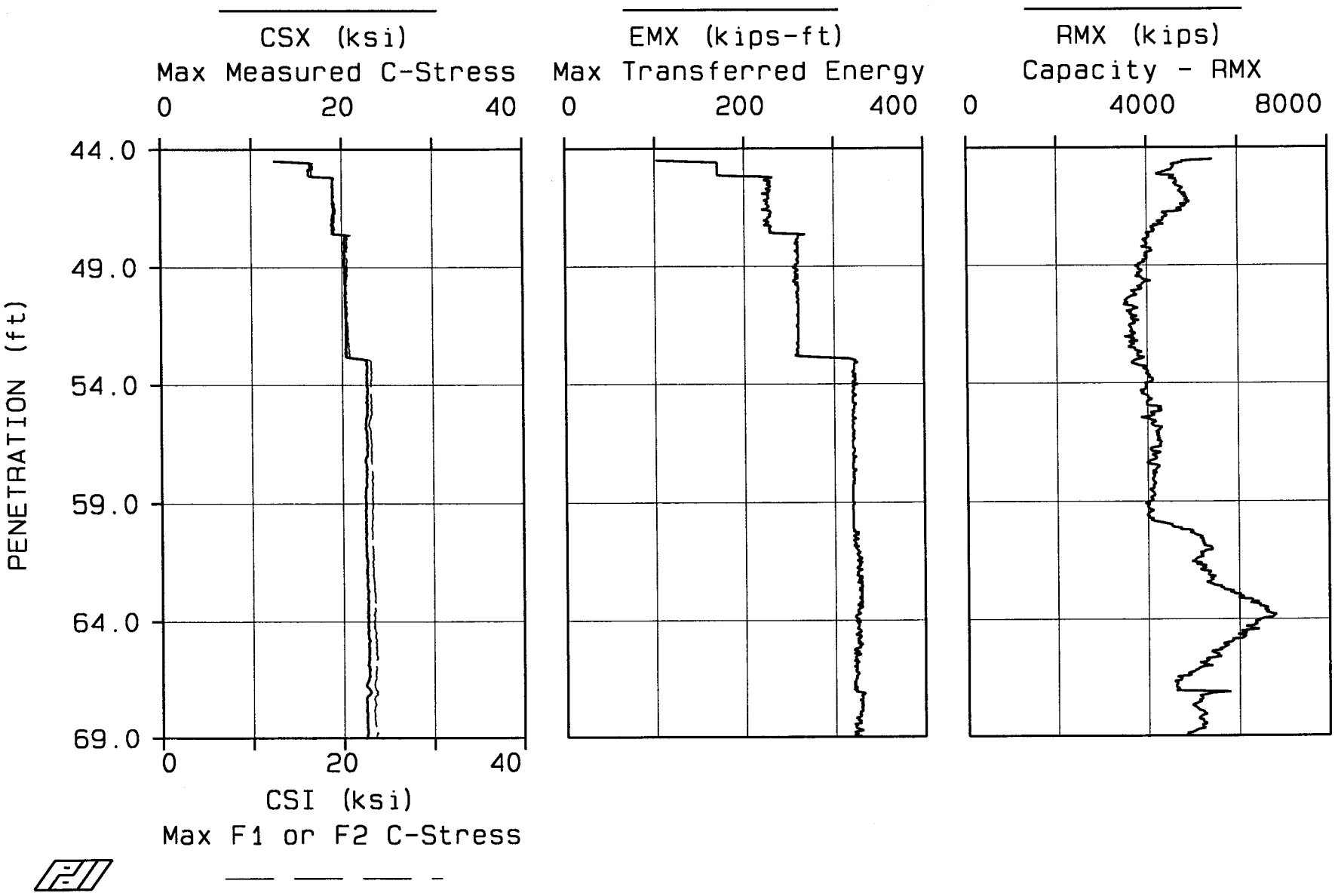


Pile 1, Section C, PDA 1

PILE 1, SECTION C, PDA 1

Fugro McClelland 00/11/4

SFOBB PIDP, TP1C, MHU-500T



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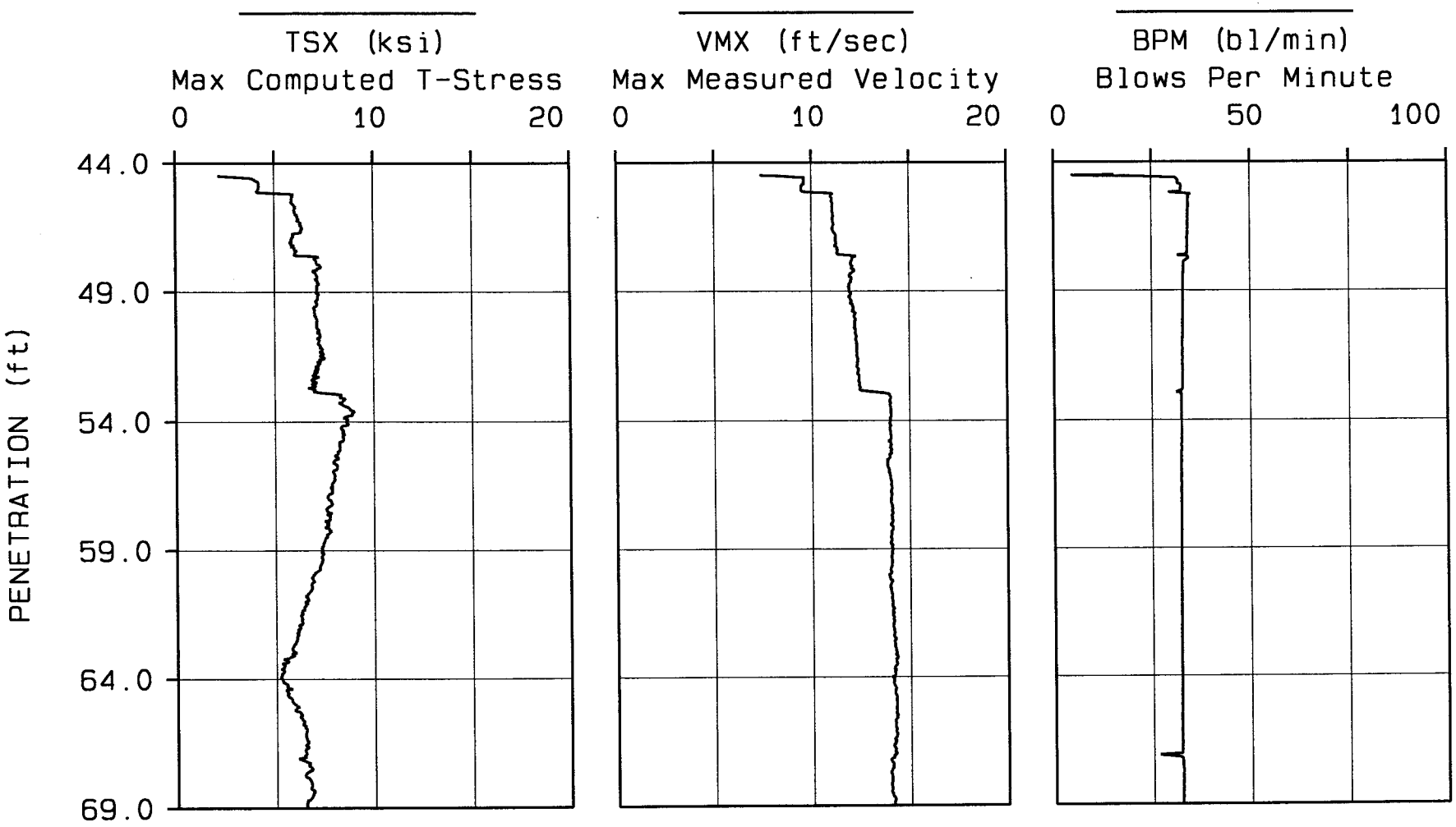

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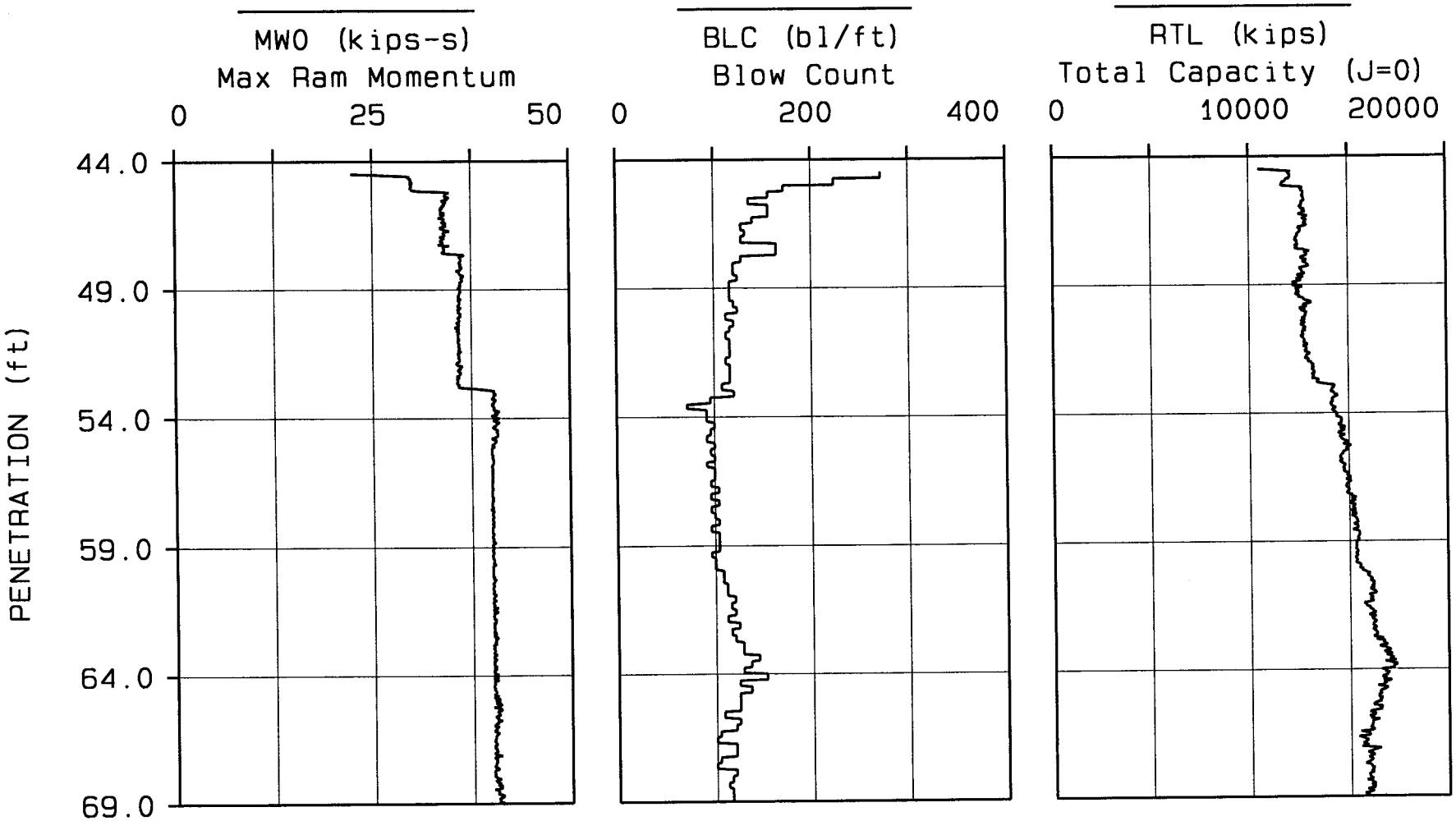
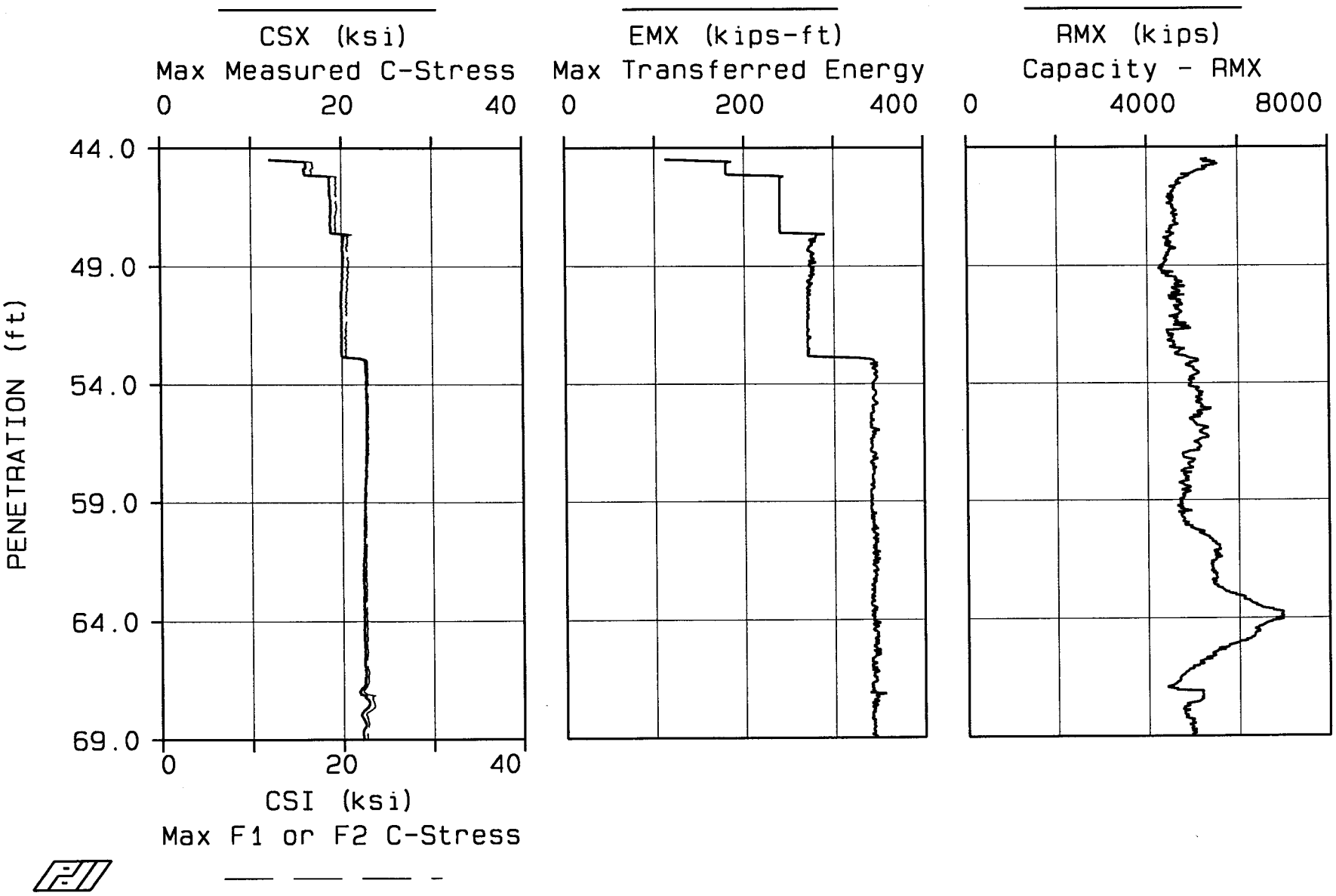


Pile 1, Section C, PDA 2

PILE 1, SECTION C, PDA 2

Fugro McClelland 00/11/4

SFOBB PIDP, TP1C, MHU-500T



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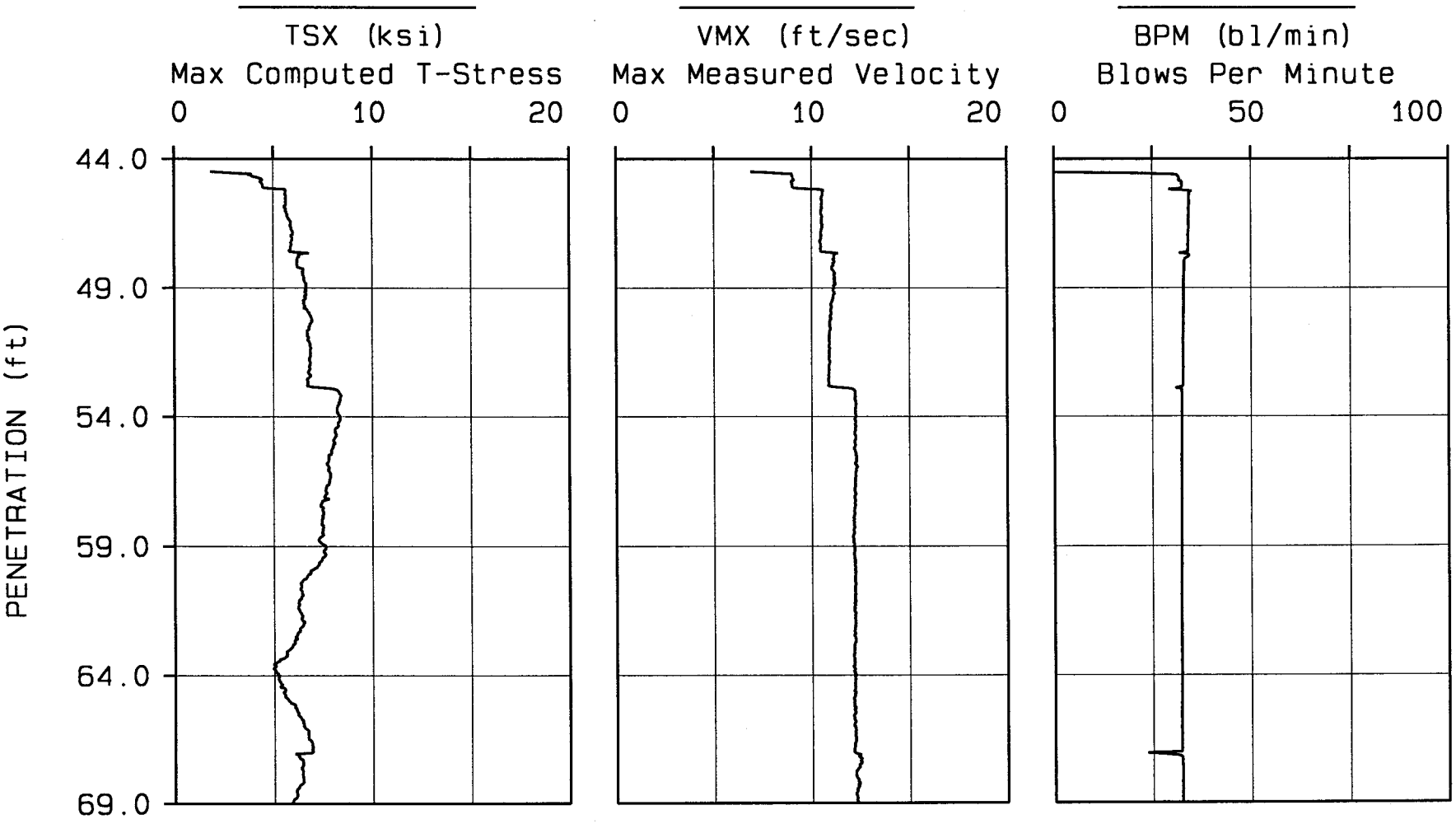
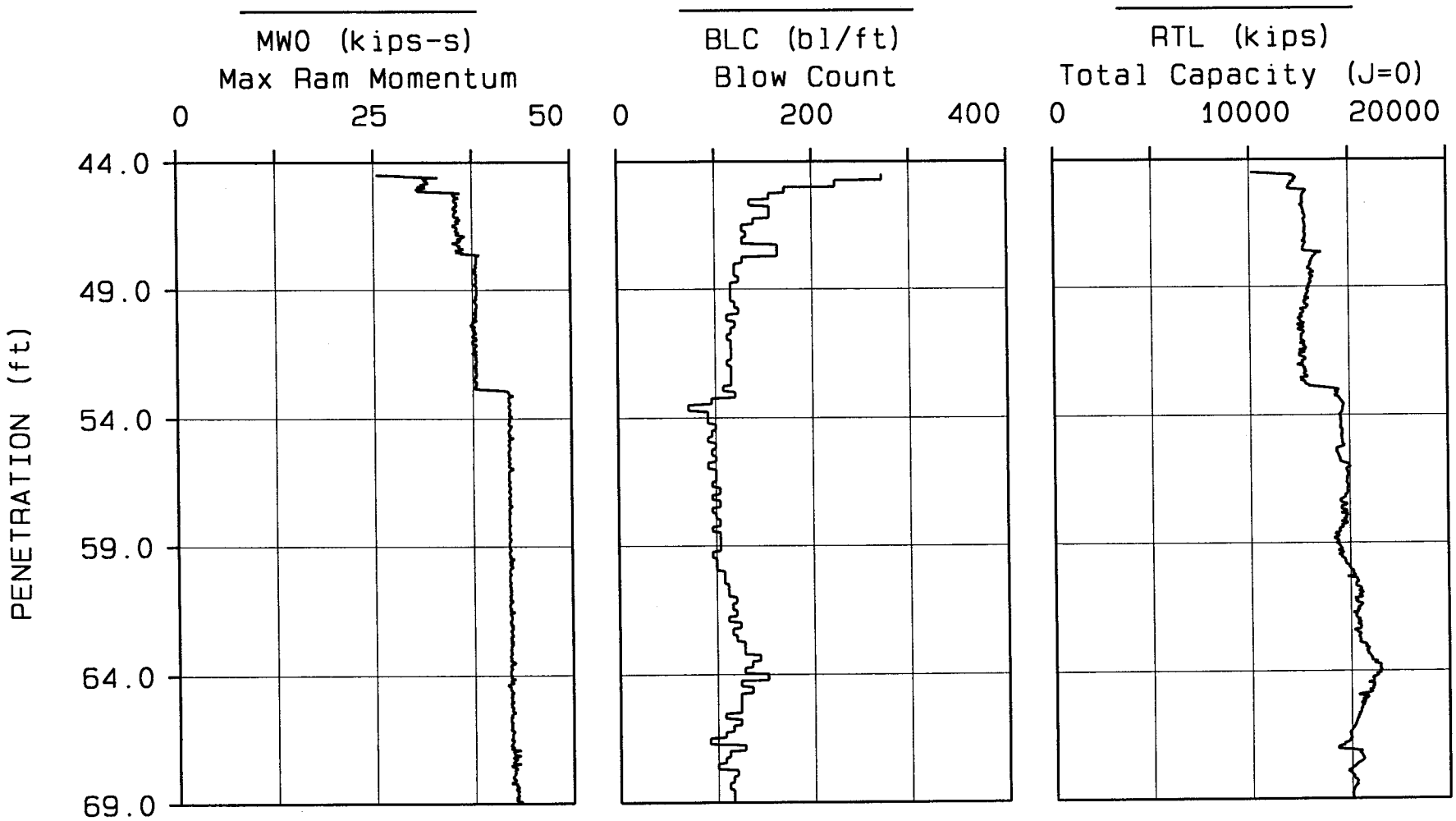
SFOBB PIDP, TP1C, MHU-500T



Fugro McClelland 00/11/4

SFOBB PIDP, TP1C, MHU-500T

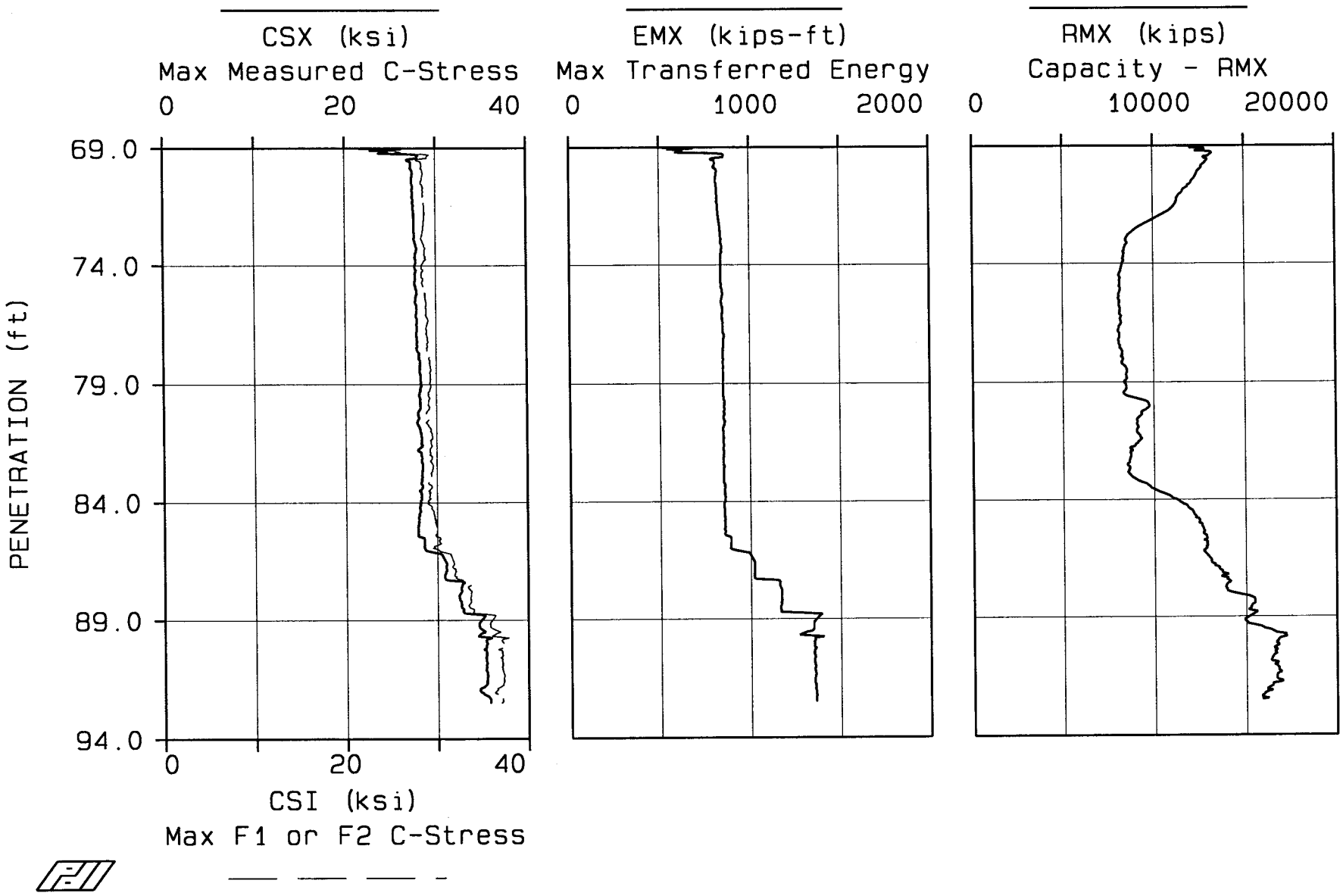


Pile 1, Section D, PDA 1

PILE 1, SECTION D, PDA 1

Fugro McClelland 00/11/9

SFOBB PIDP, TP1D, MHU 1700



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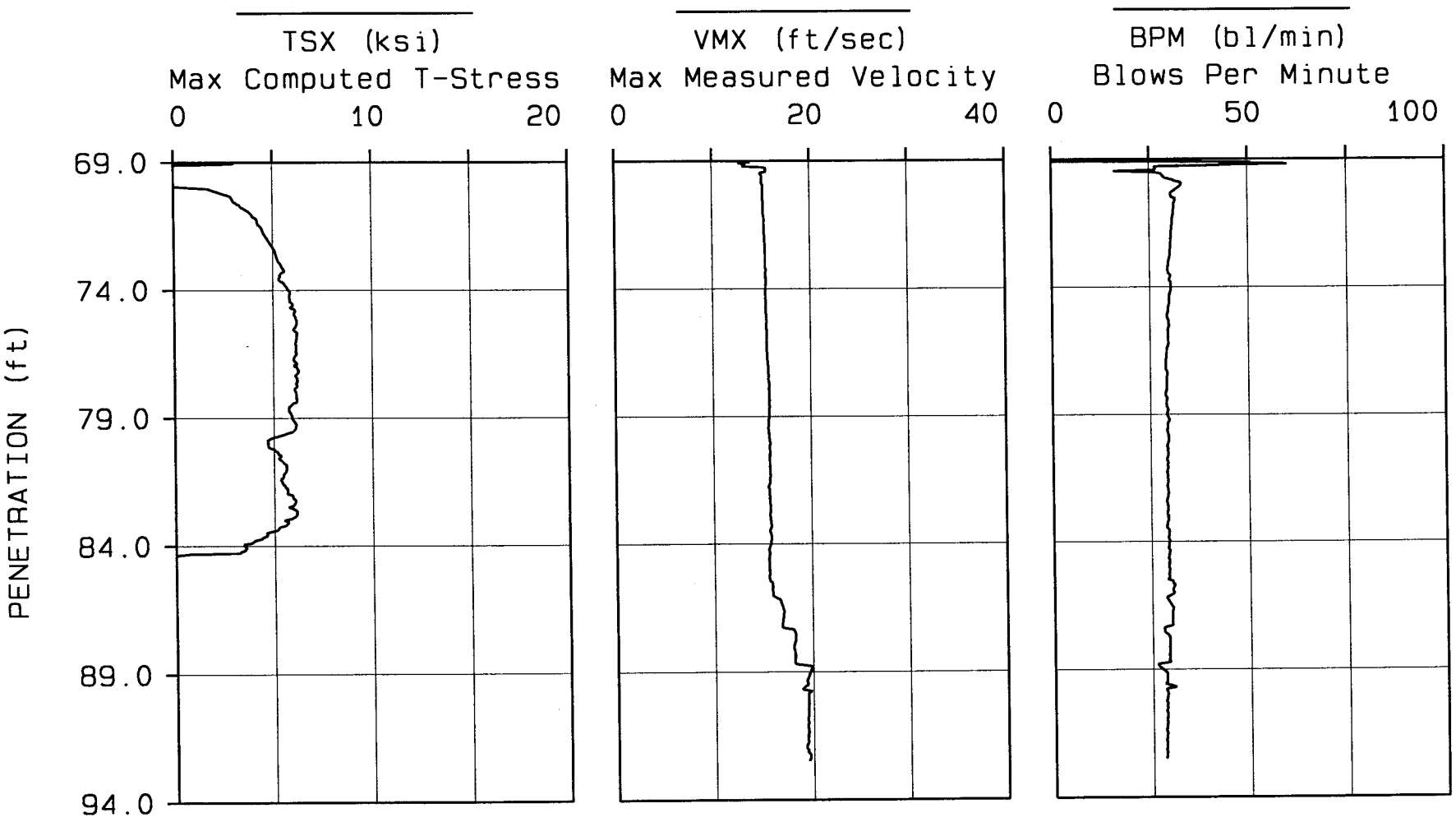
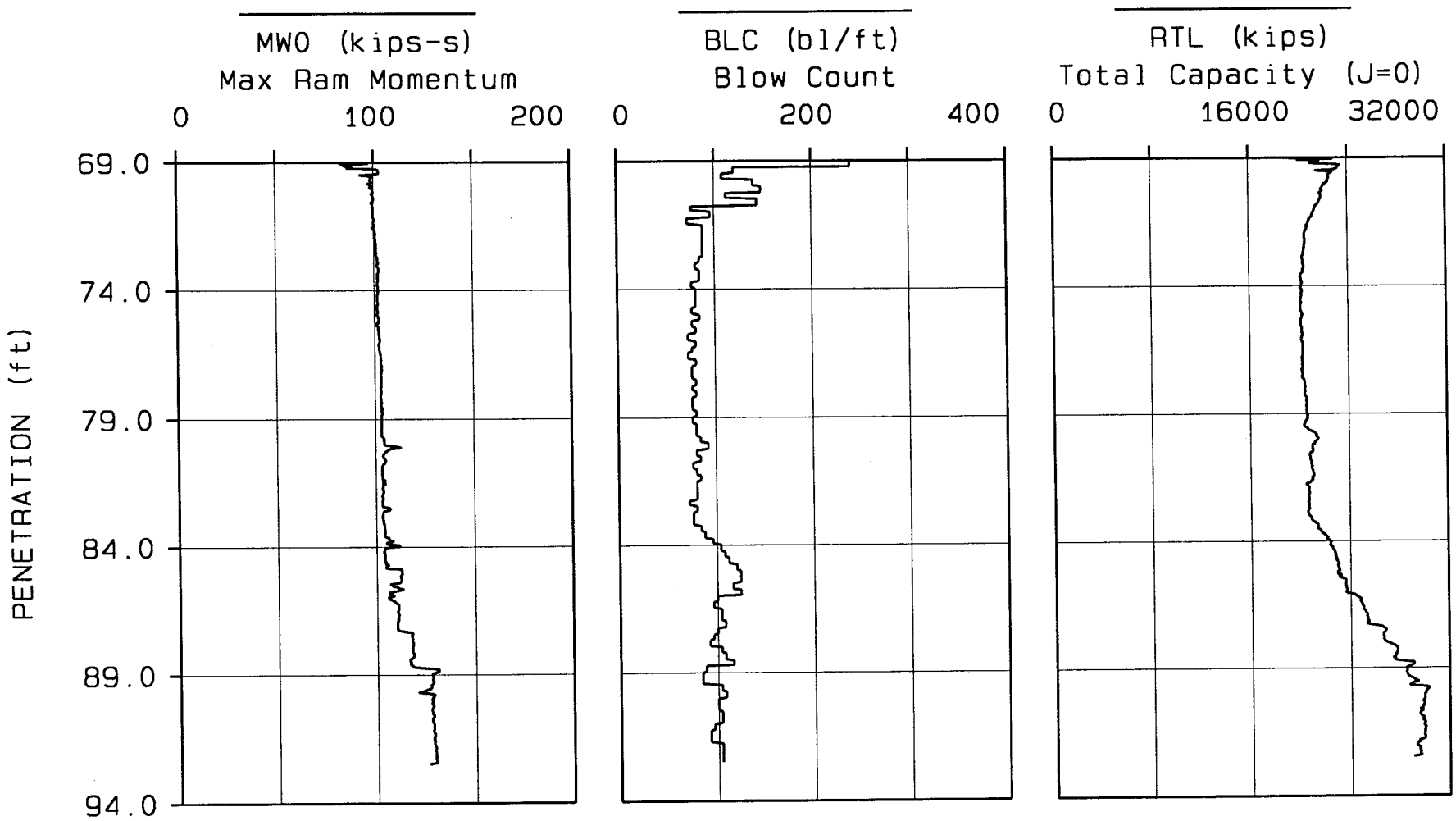
SFOBB PIDP, TP1D, MHU-1700



Fugro McClelland 00/11/9

SFOBB PIDP, TP1D, MHU 1700

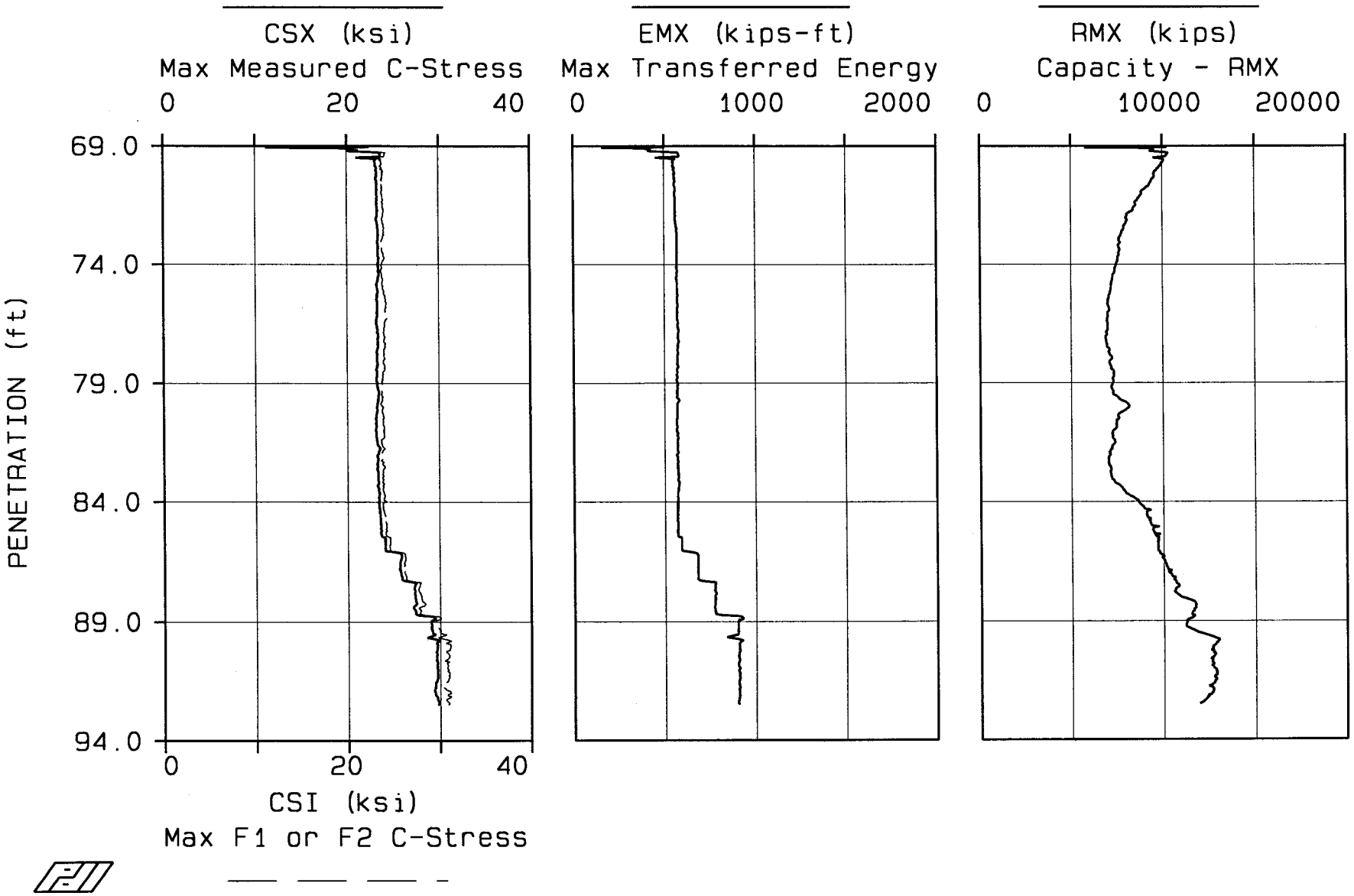


Pile 1, Section D, PDA 2

PILE 1, SECTION D, PDA 2

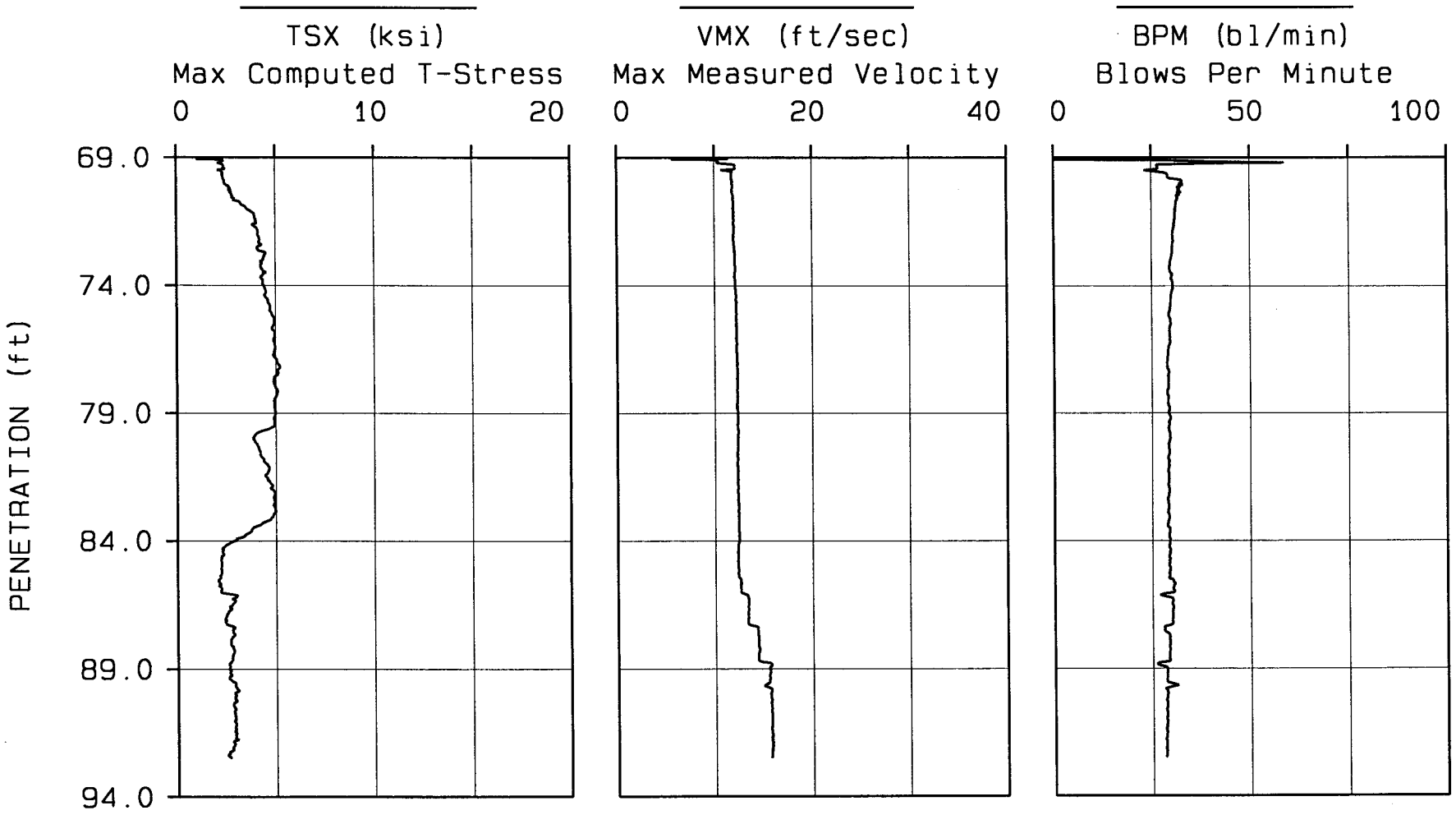
Fugro McClelland 00/11/9

SFOBB PIDP, TP1D, MHU-1700



Fugro McClelland 00/11/9

SFOBB PIDP, TP1D, MHU-1700



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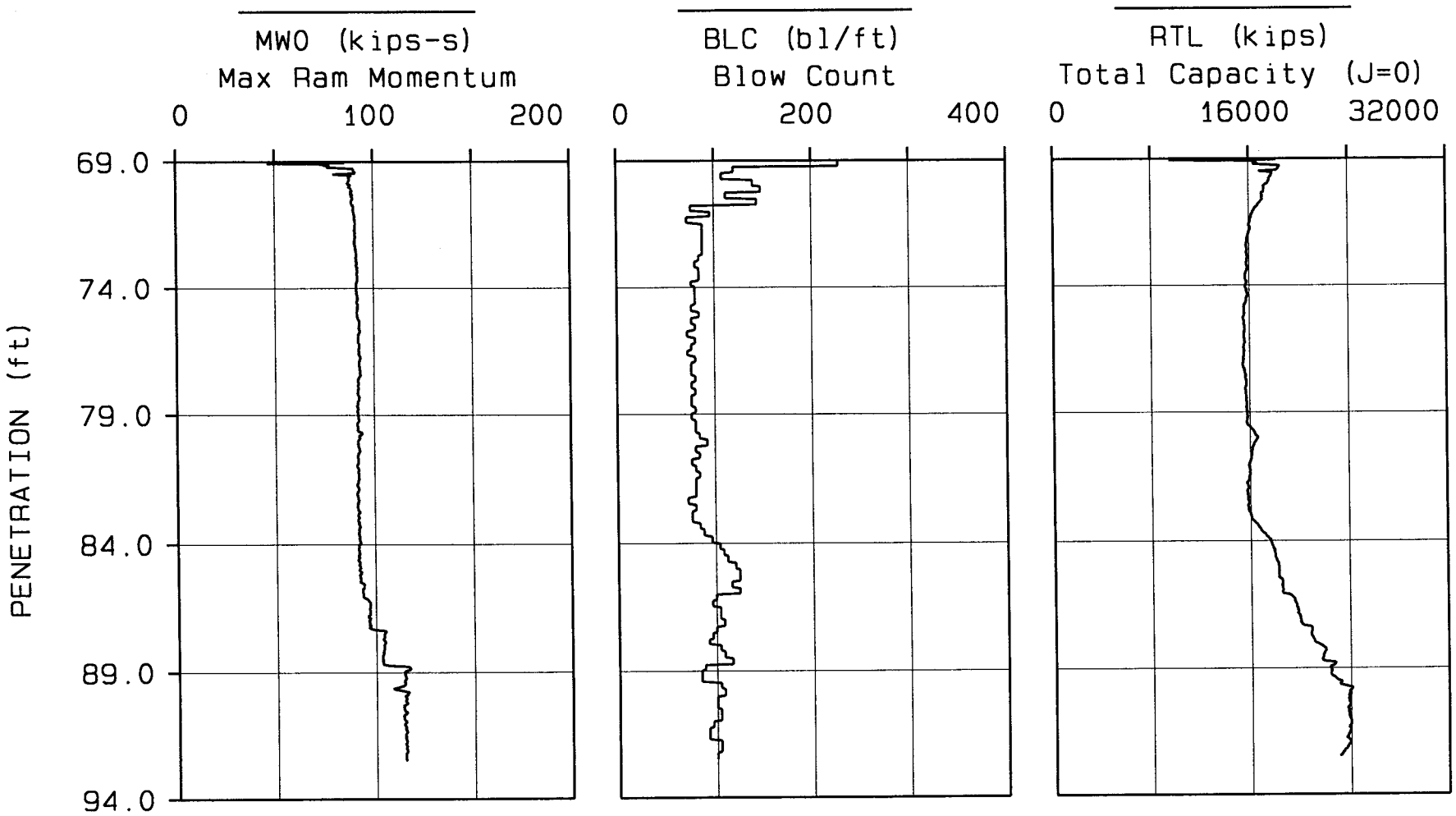
SFOBB PIDP, TP1D, MHU-1700

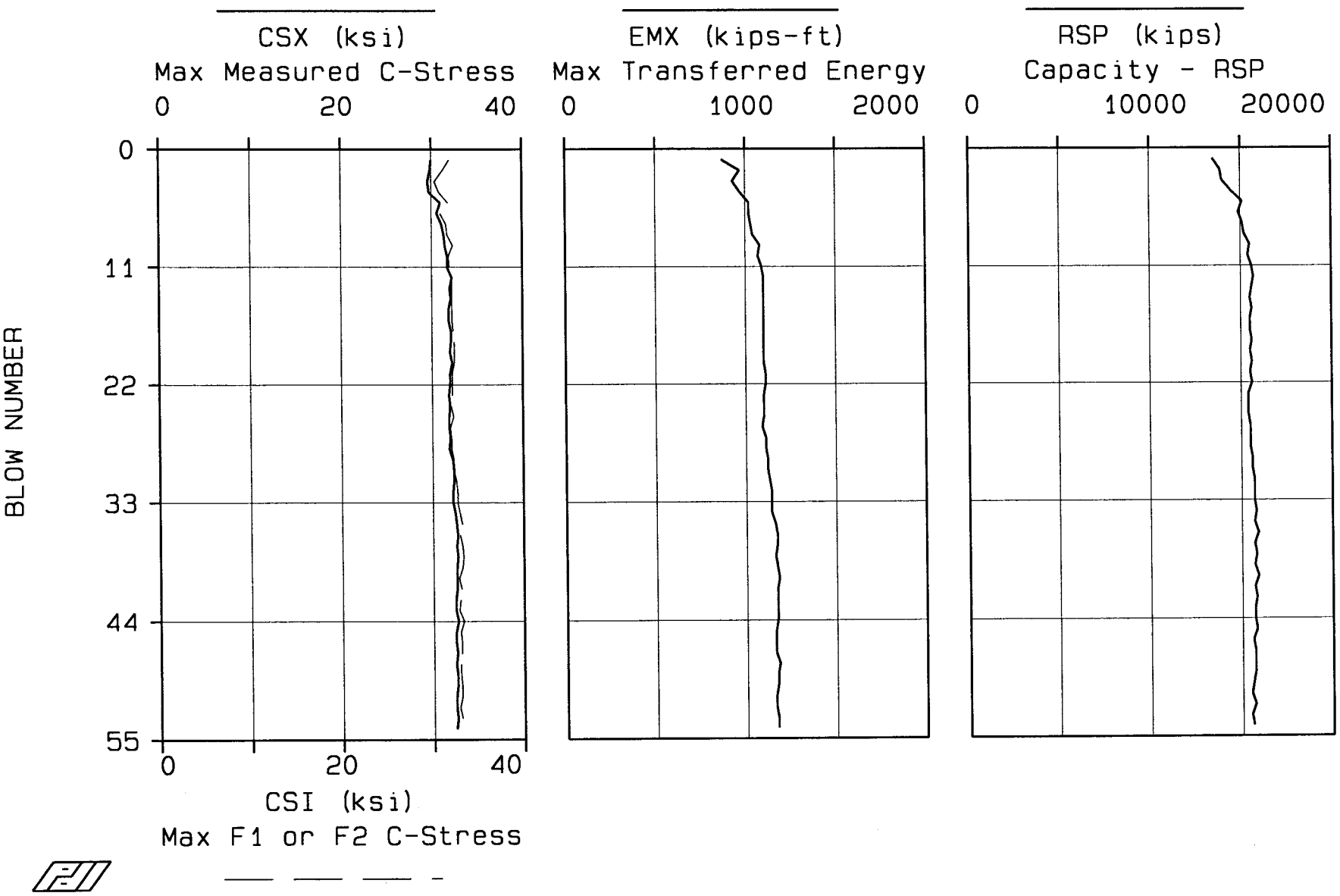


Pile 1, Restrike No. 1, PDA 1

PILE 1, RESTRIKE NO. 1, PDA 1

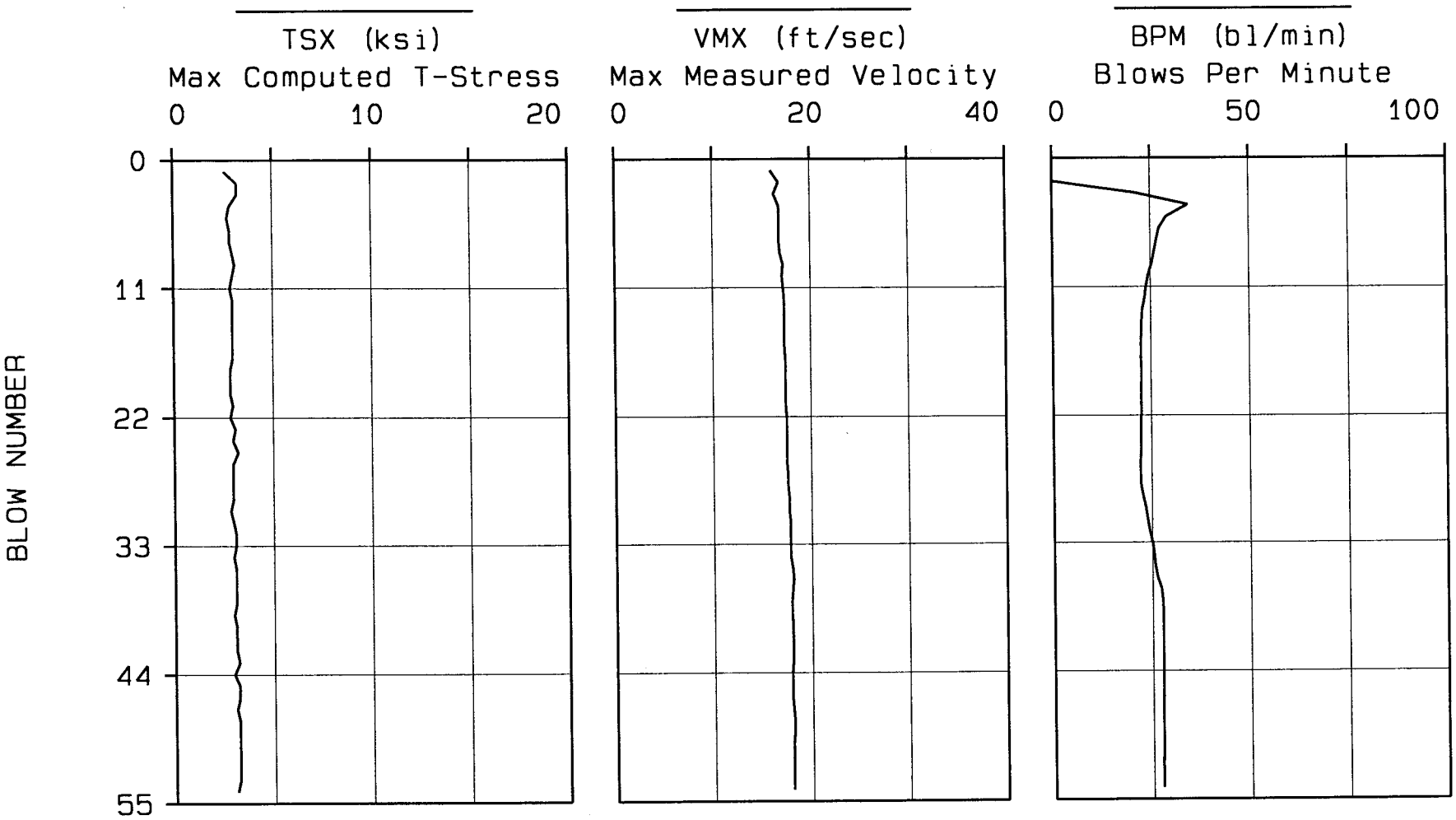
Fugro McClelland 00/11/11

SFOBB PIDP, TP1DR, MHU-1700



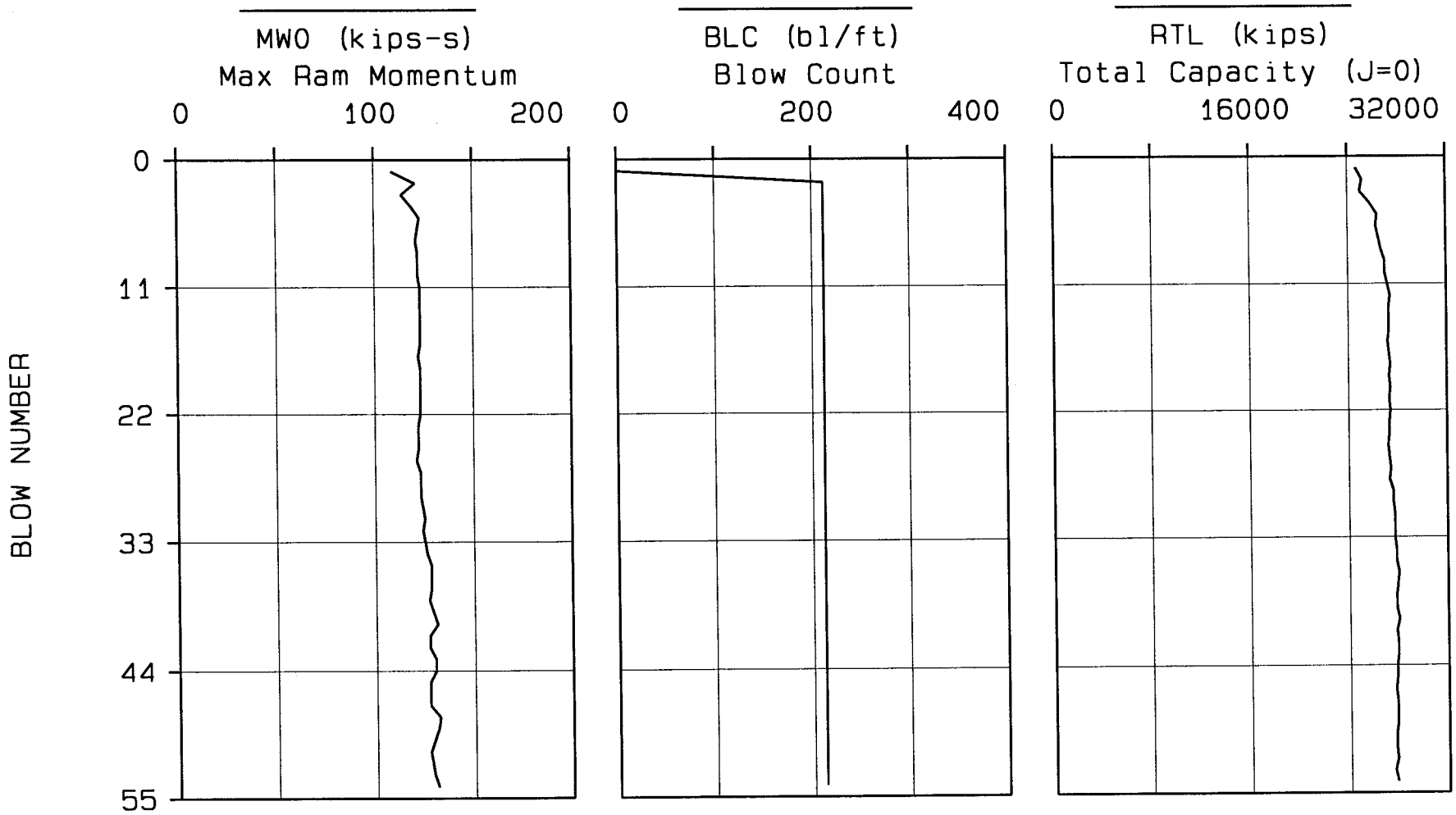
Fugro McClelland 00/11/11

SFOBB PIDP, TP1DR, MHU-1700



Fugro McClelland 00/11/11

SFOBB PIDP, TP1DR, MHU-1700

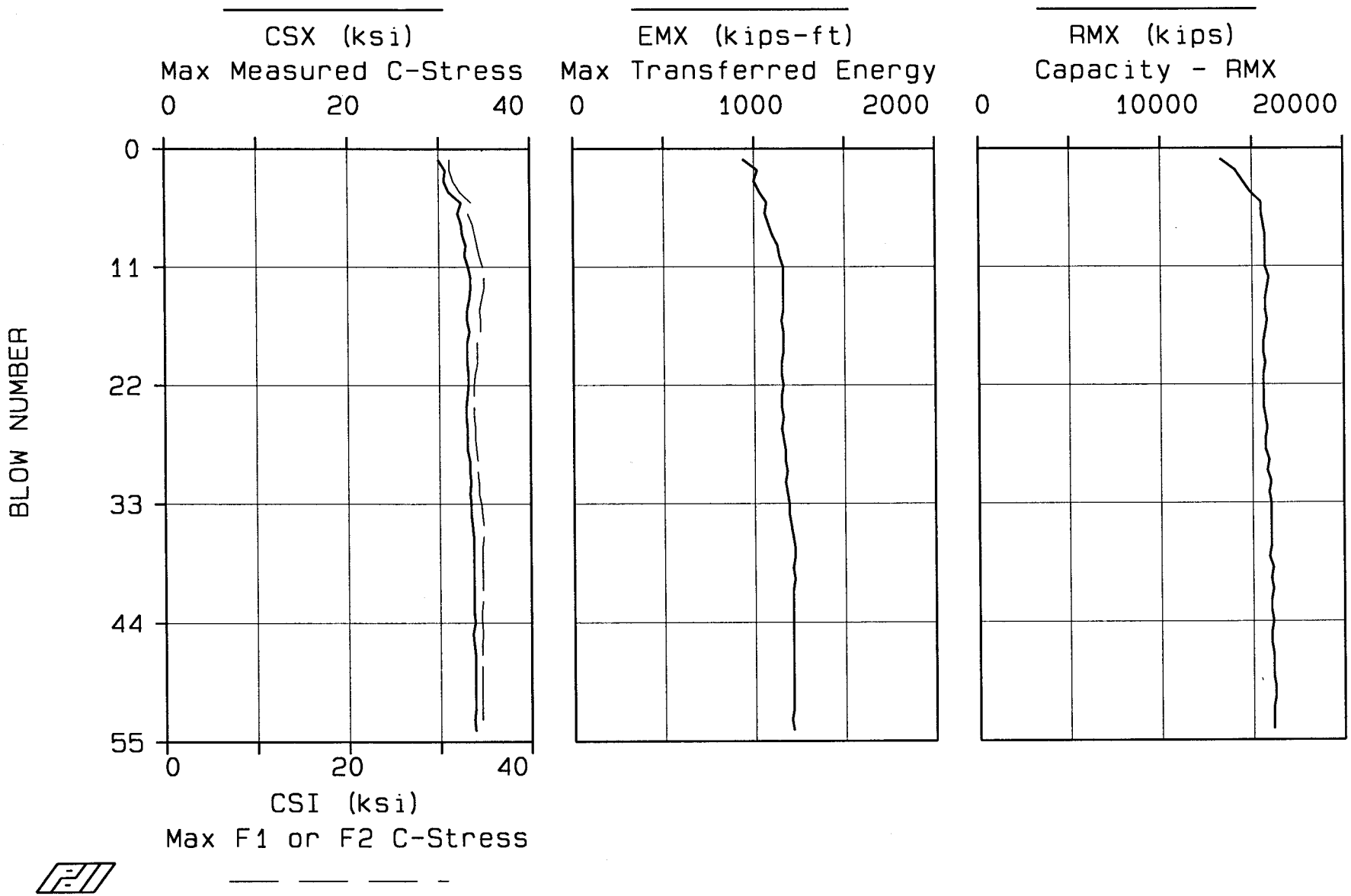


Pile 1, Restrike No. 1, PDA 2

PILE 1, RESTRIKE NO. 1
PDA 2

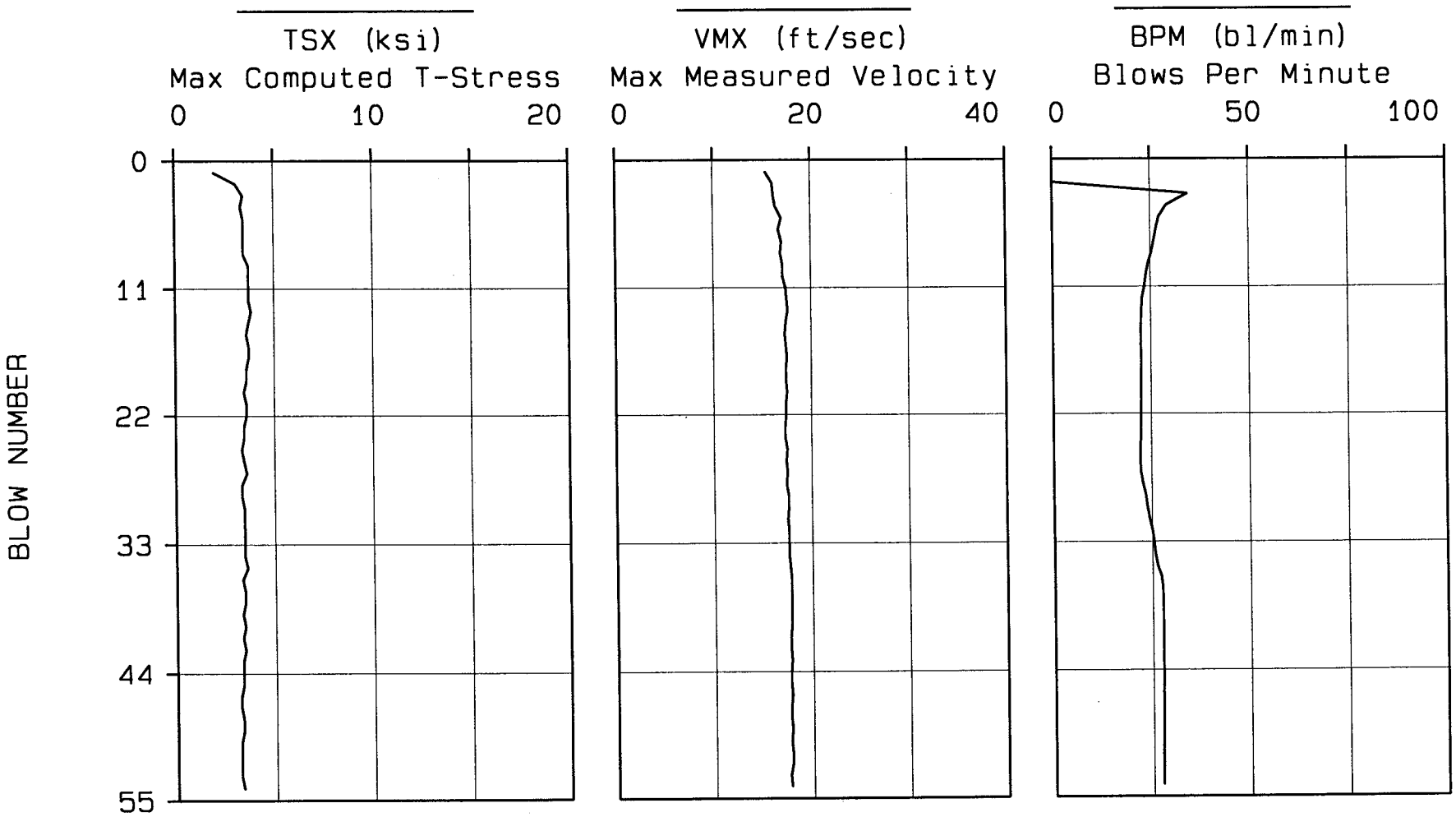
Fugro McClelland 00/11/11

SFOBB PIDP, TP1DR, MHU-1700



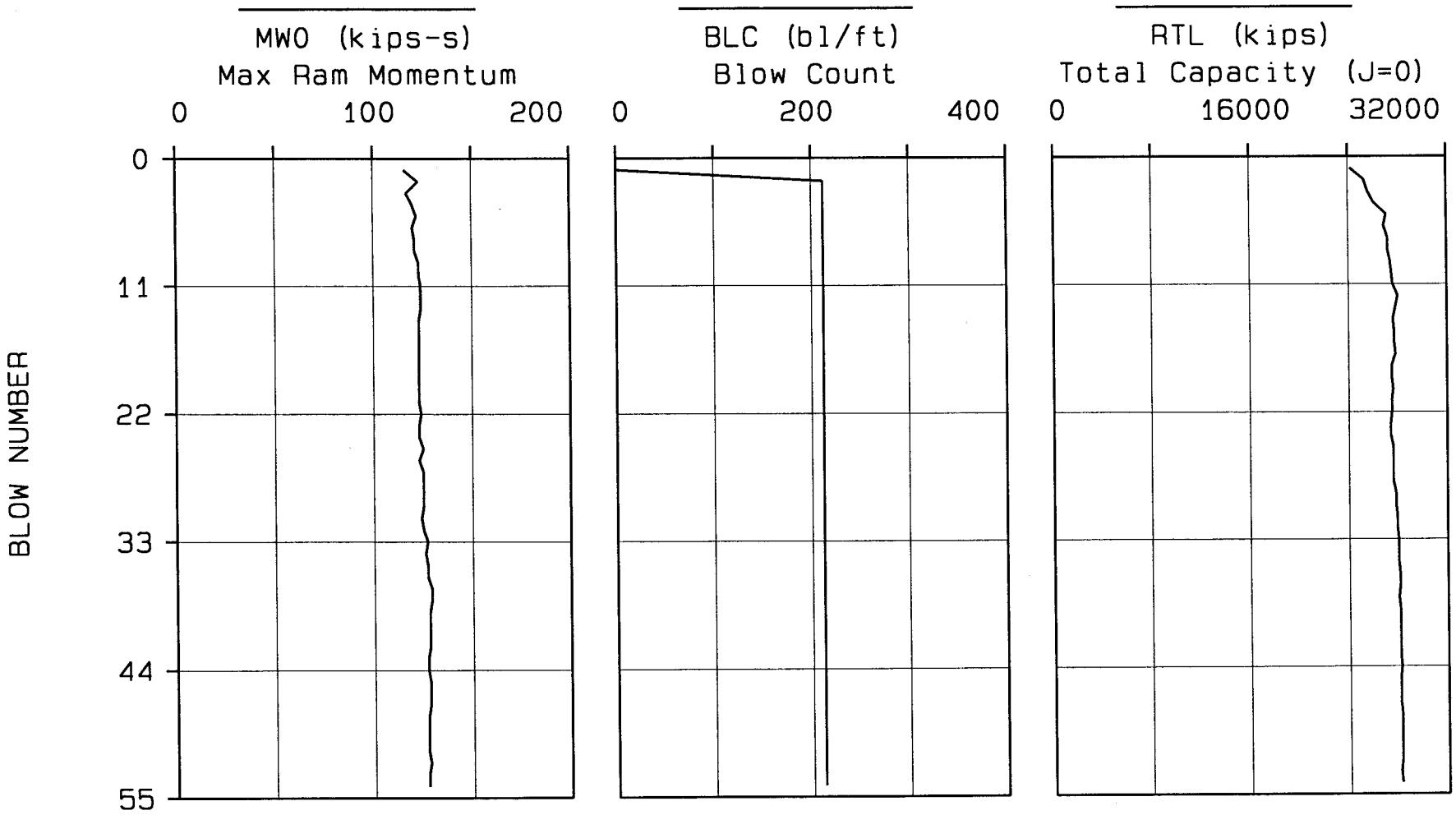
Fugro McClelland 00/11/11

SFOBB PIDP, TP1DR, MHU-1700



Fugro McClelland 00/11/11

SFOBB PIDP, TP1DR, MHU-1700

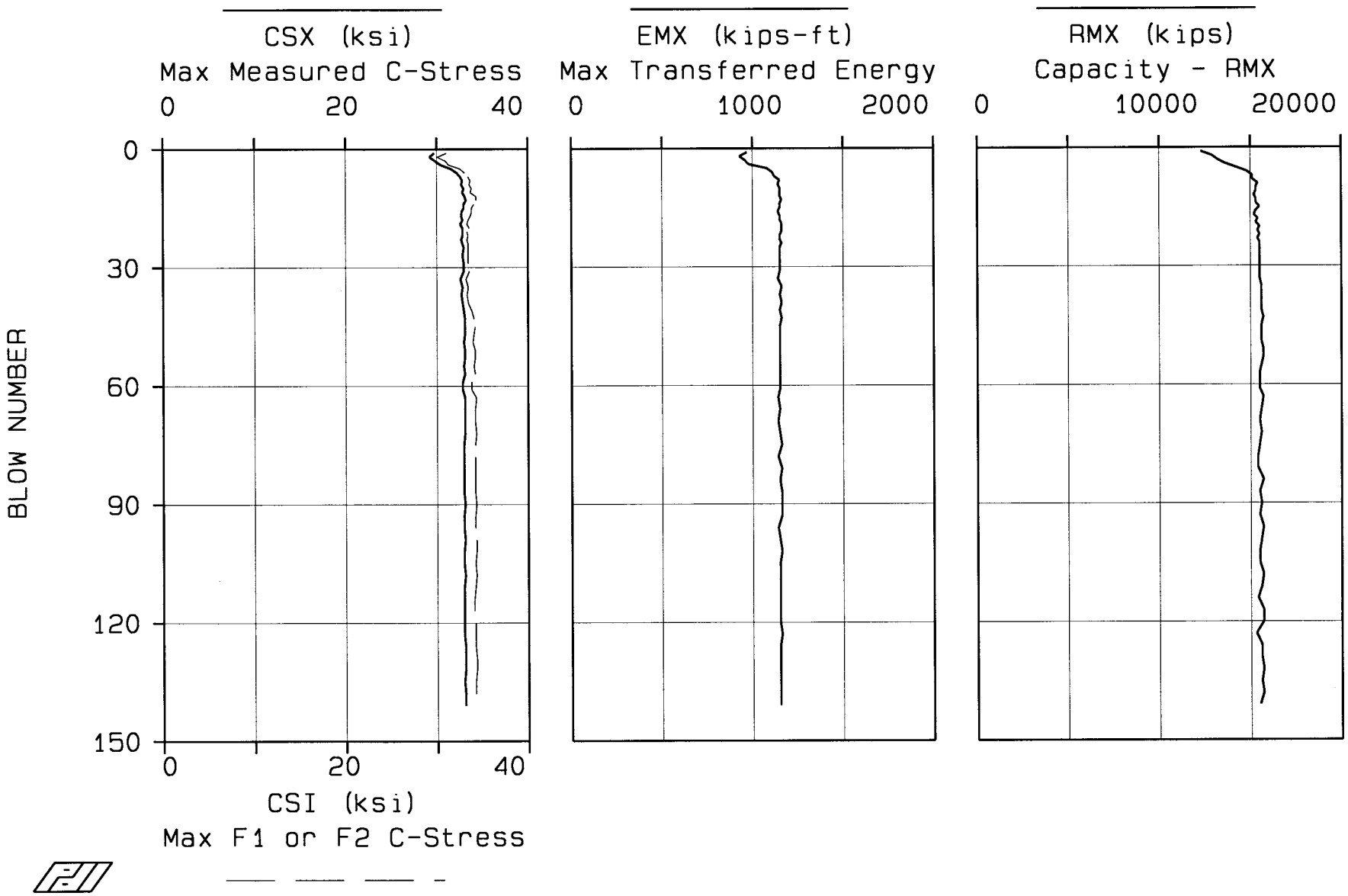


Pile 1, Restrike No. 2, PDA 1

PILE 1, RESTRIKE NO. 2
PDA 1

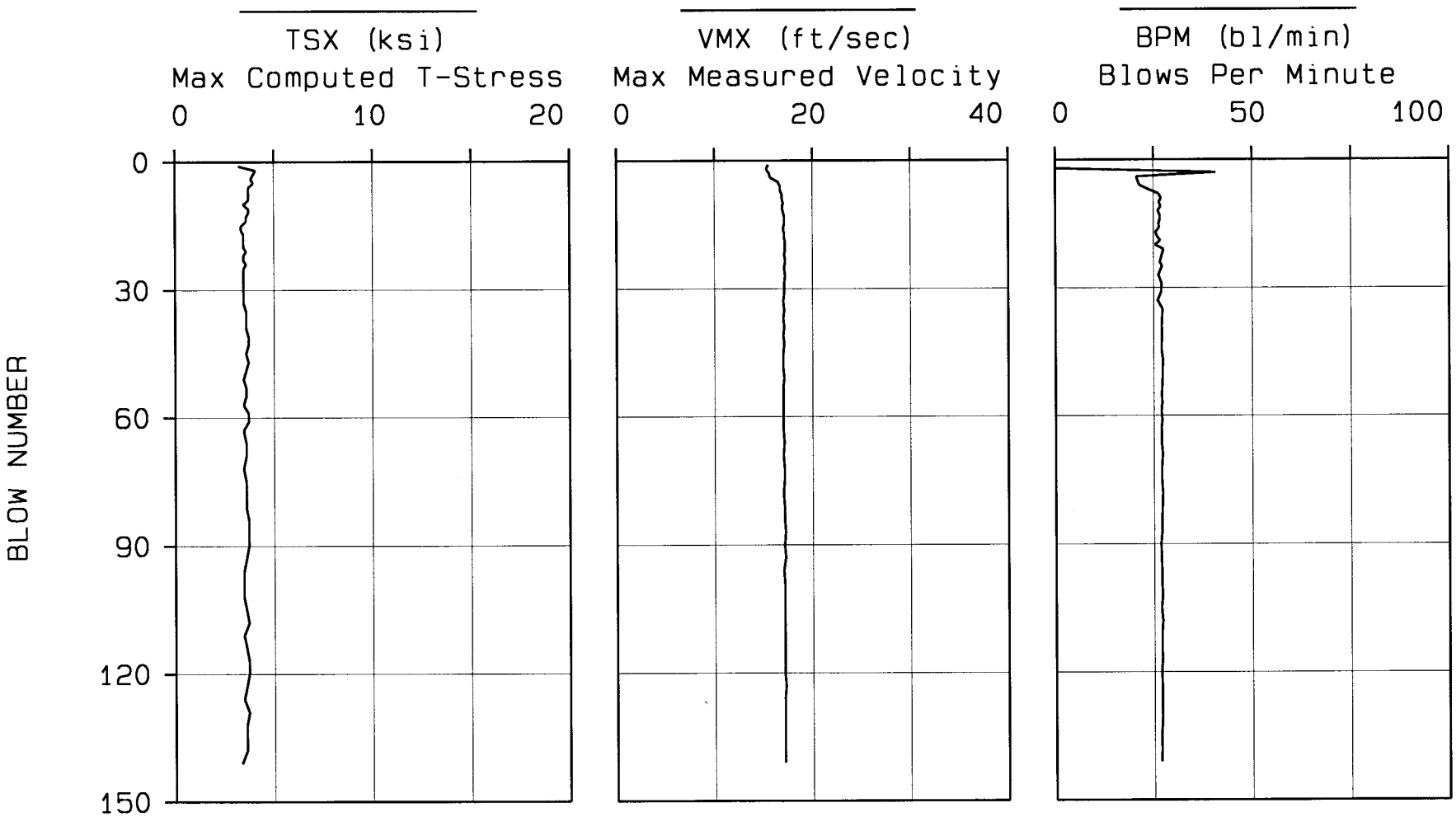
Fugro McClelland 00/11/20

SFOBB PIDP, TP1DR2, MHU-1700



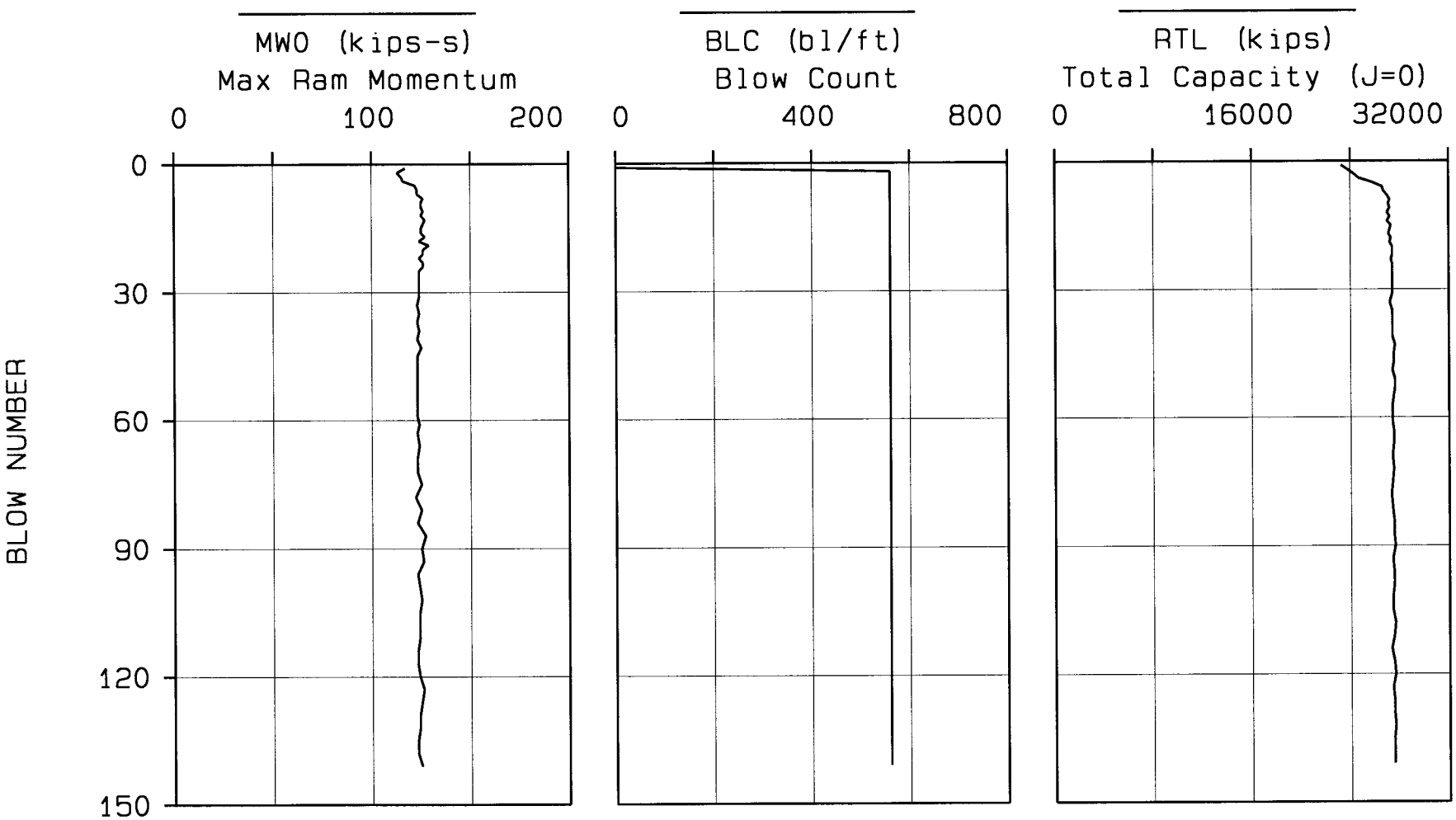
Fugro McClelland 00/11/20

SFOBB PIDP, TP1DR2, MHU-1700



Fugro McClelland 00/11/20

SFOBB PIDP, TP1DR2, MHU-1700

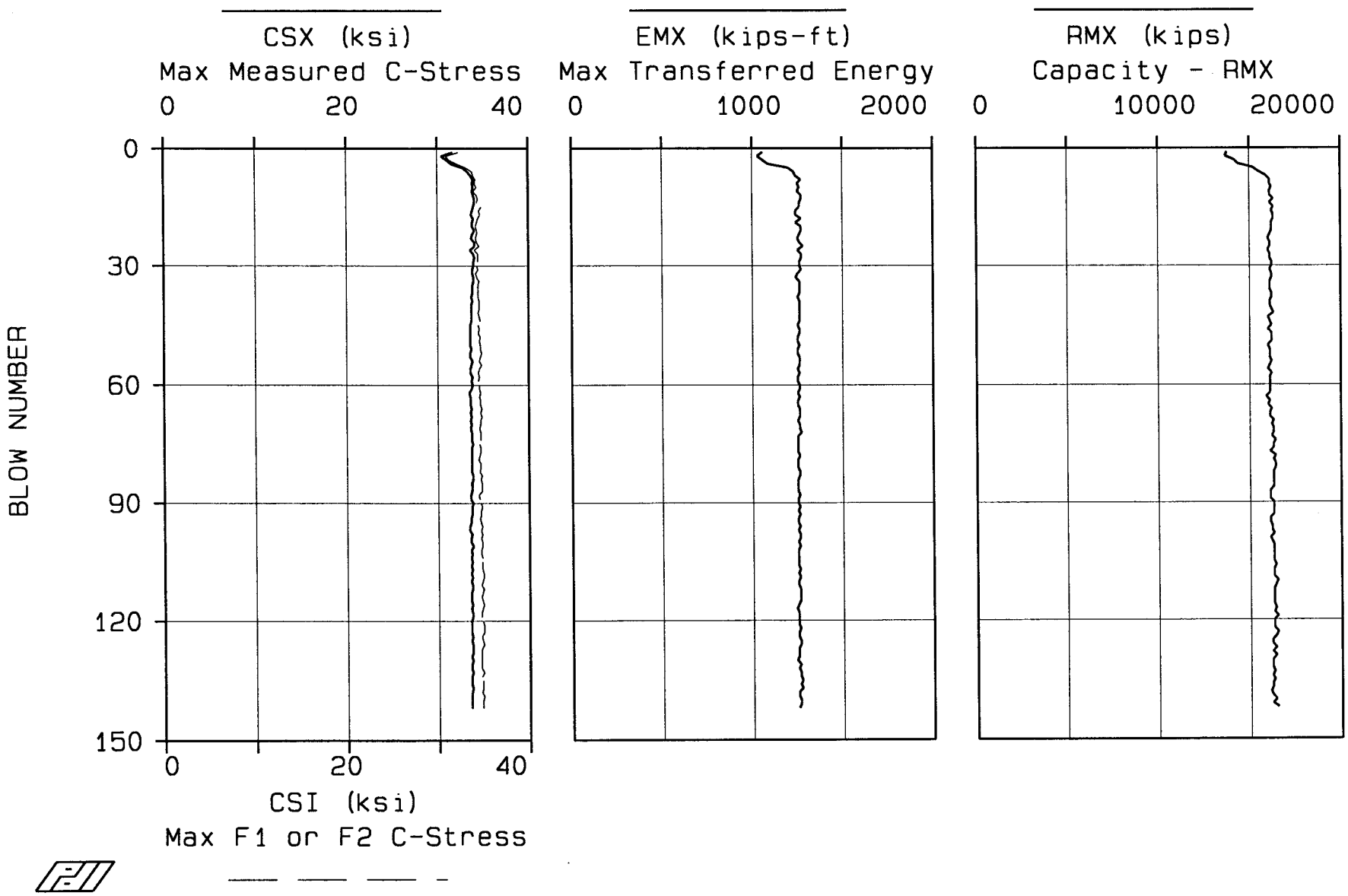


Pile 1, Restrike No. 2, PDA 2

PILE 1, RESTRIKE NO. 2,
PDA 2

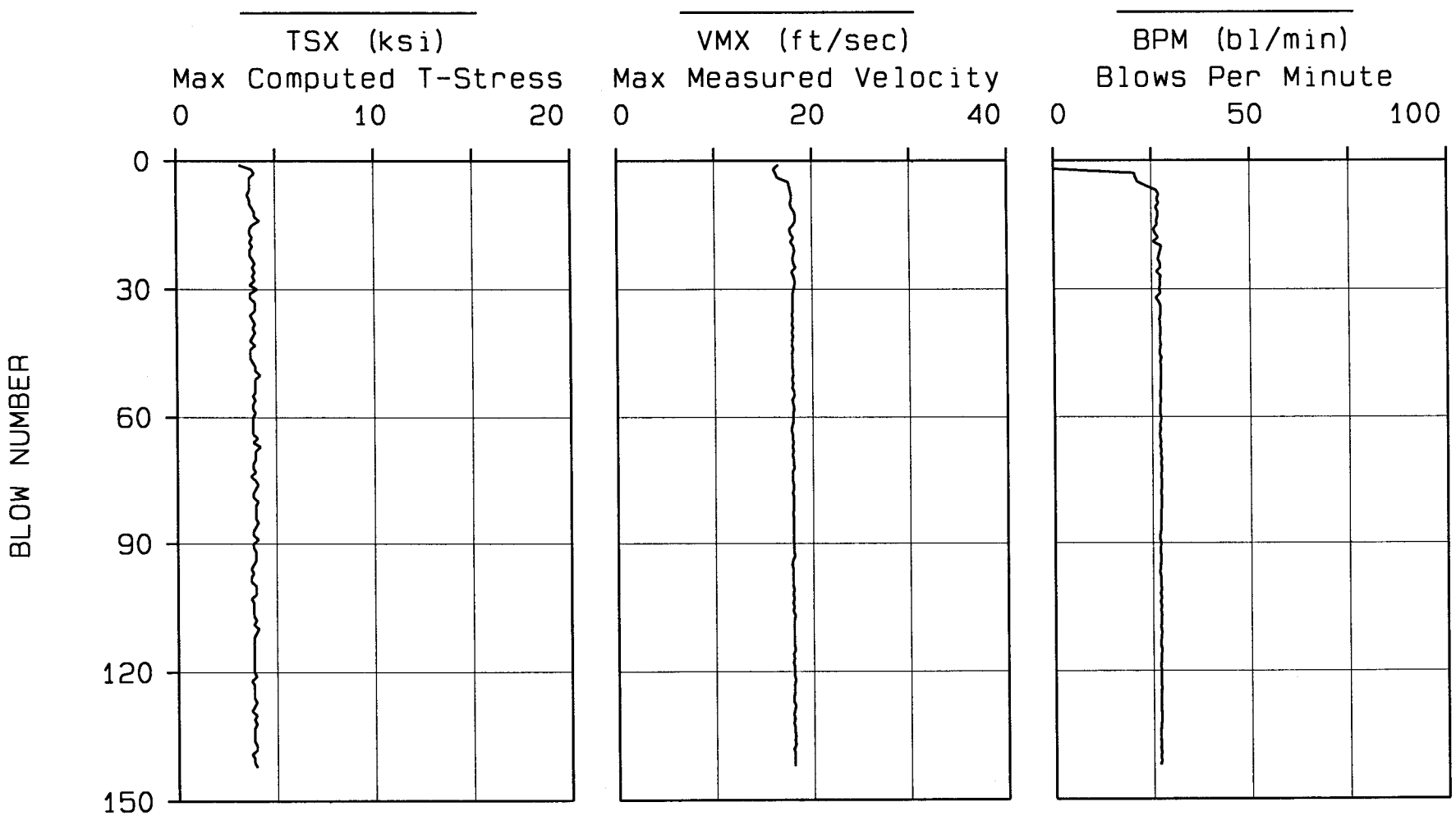
Fugro McClelland 00/11/20

SFOBB PIDP, TP1DR2, MHU-1700



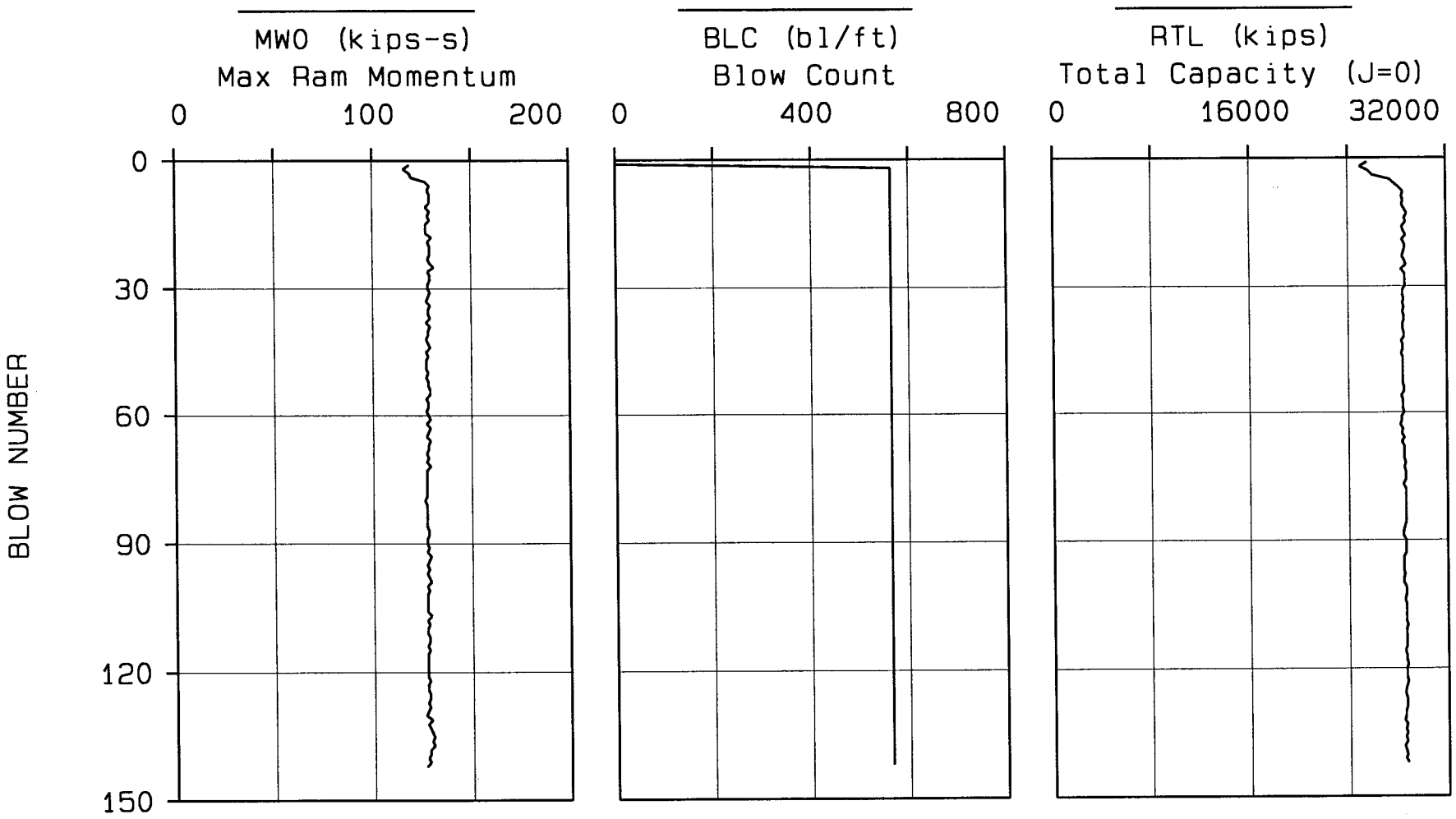
Fugro McClelland 00/11/20

SFOBB PIDP, TP1DR2, MHU-1700



Fugro McClelland 00/11/20

SFOBB PIDP, TP1DR2, MHU-1700

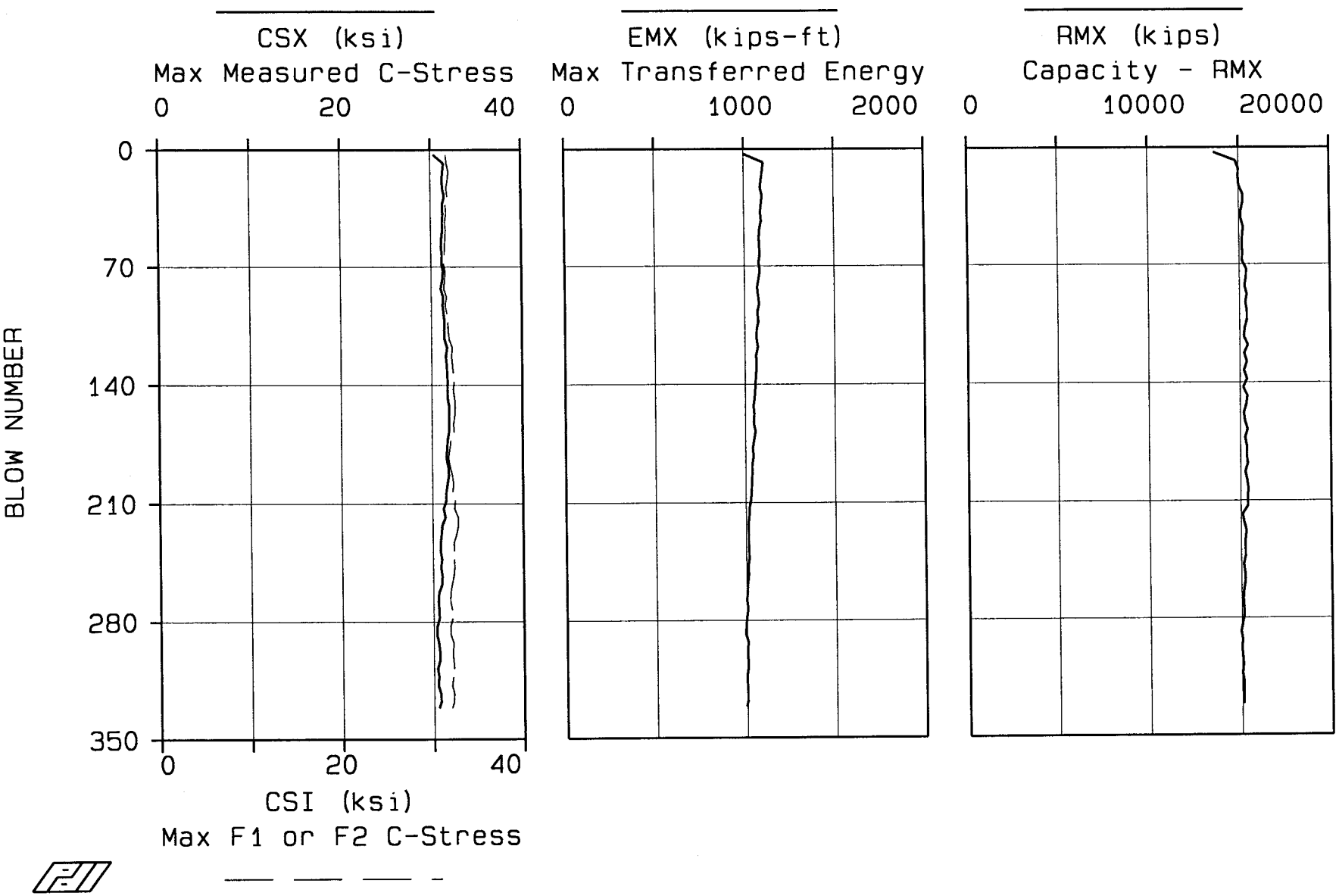


Pile 1, Restrike No. 3, PDA 1

PILE 1, RESTRIKE NO. 3, PDA 1

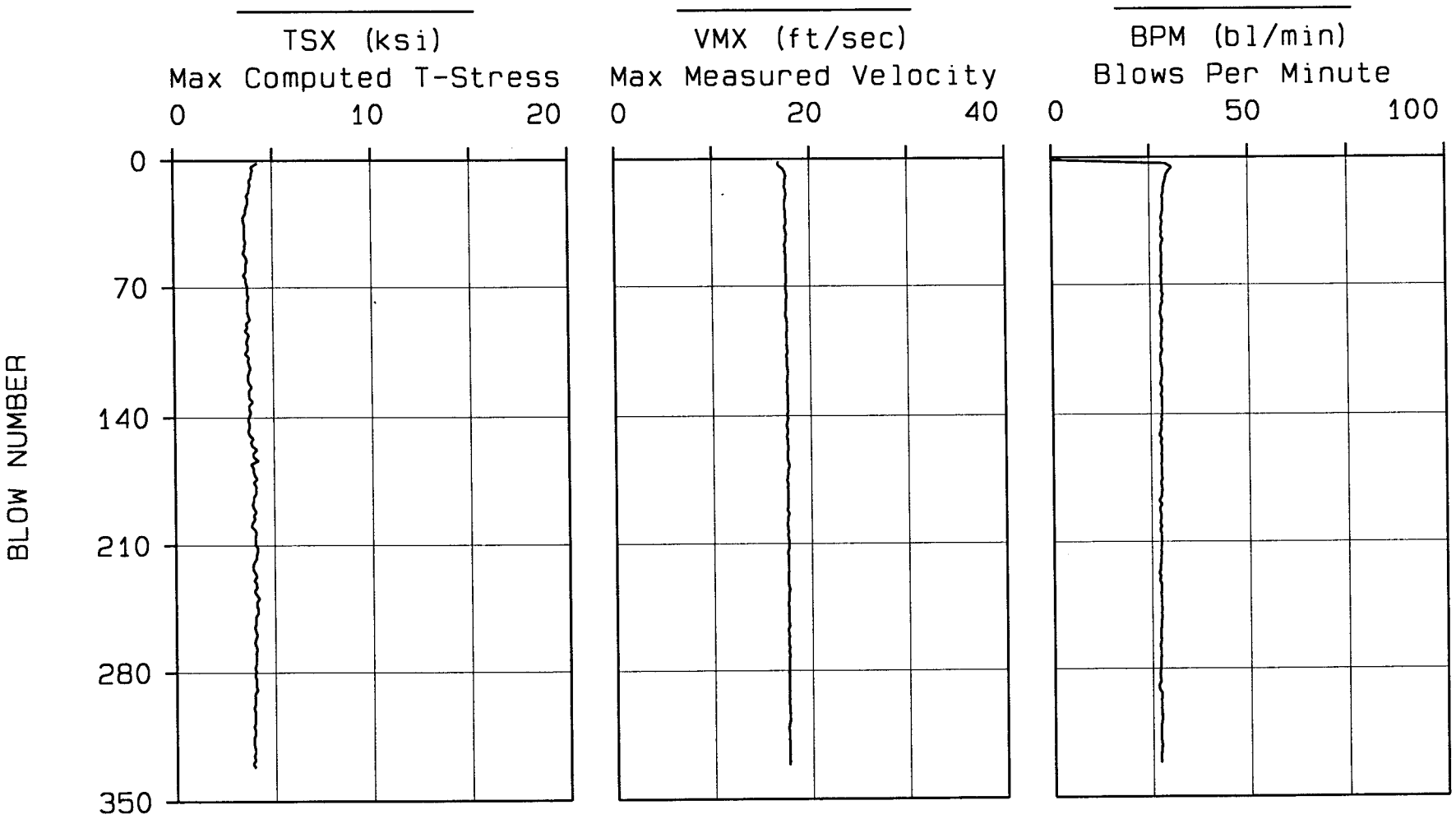
Fugro McClelland 00/12/12

SFOBB PIDP, TP1DR3, MHU-1700



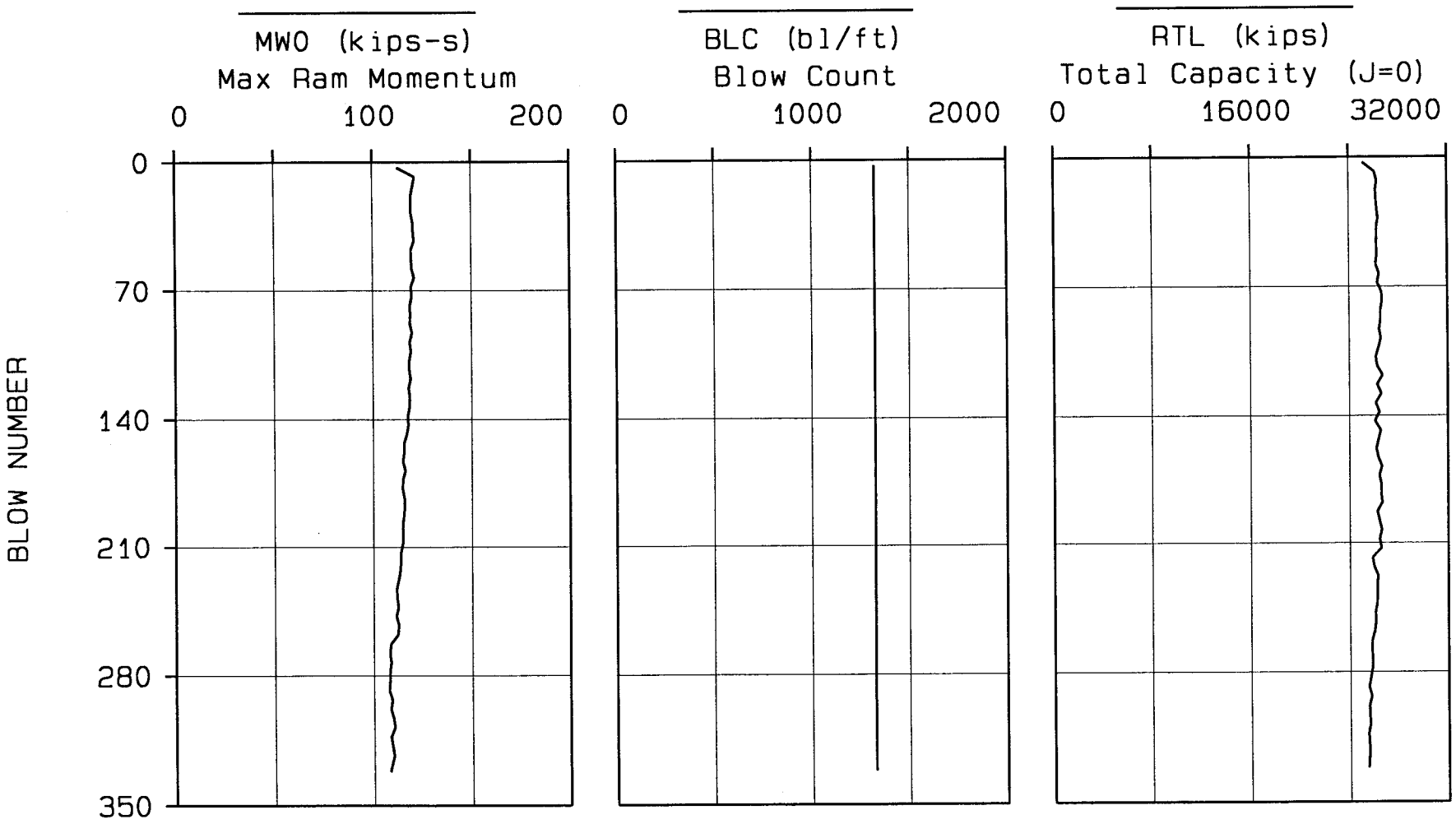
Fugro McClelland 00/12/12

SFOBB PIDP, TP1DR3, MHU-1700



Fugro McClelland 00/12/12

SFOBB PIDP, TP1DR3, MHU-1700

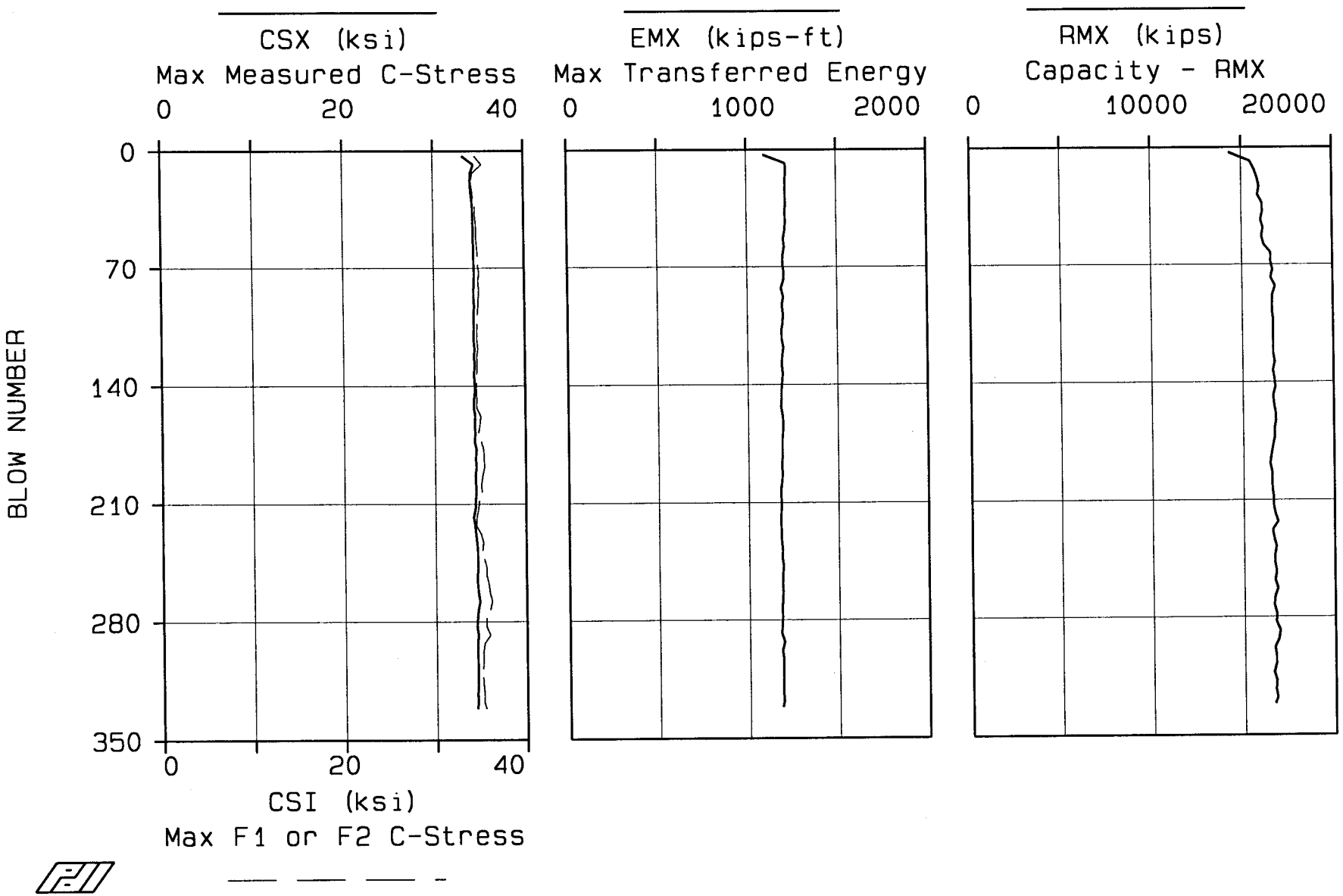


Pile 1, Restrike No. 3, PDA 2

PILE 1, RESTRIKE NO. 3,
PDA 2

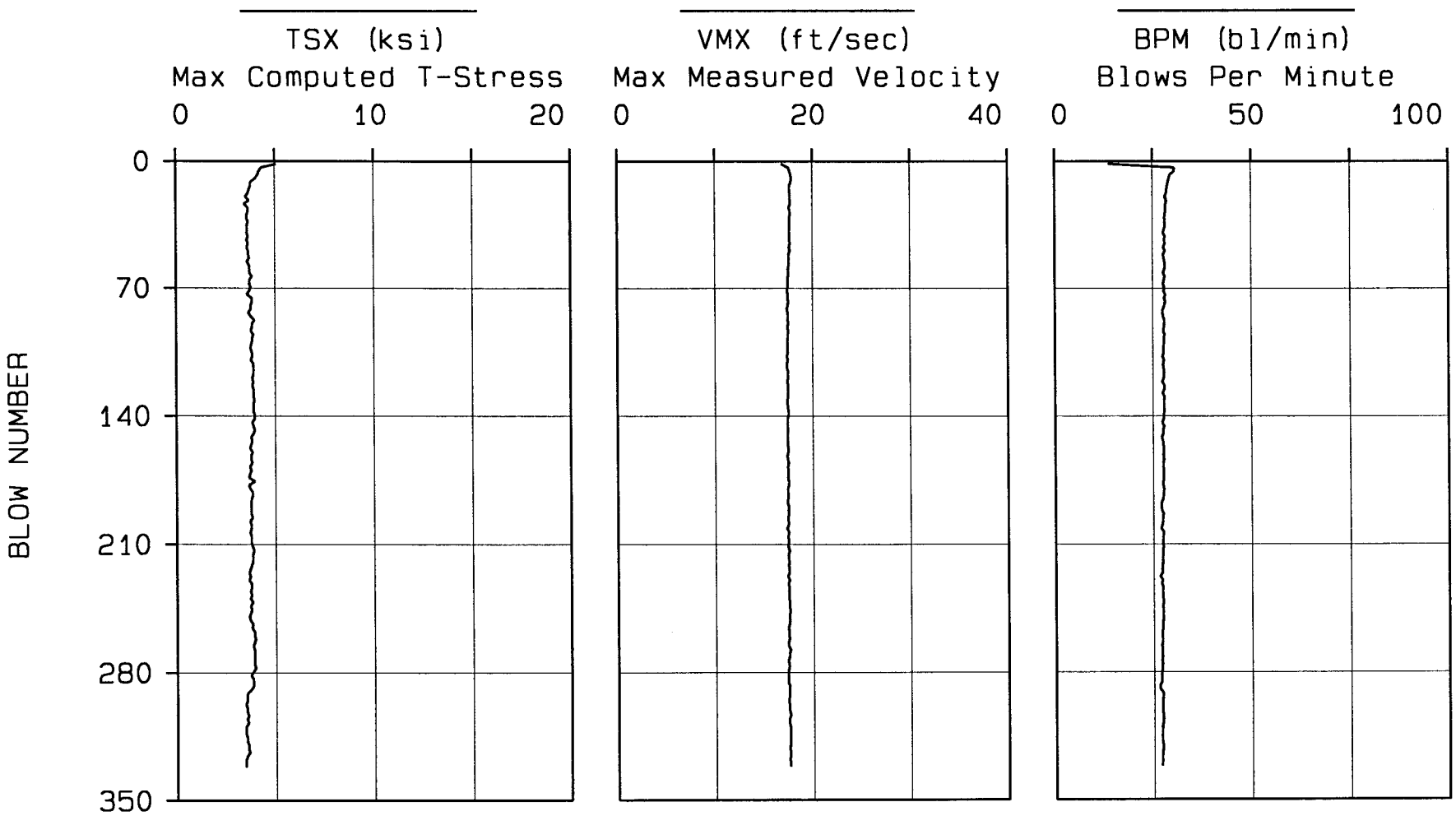
Fugro McClelland 00/12/12

SFOBB PIDP, TP1DR3, MHU-1700



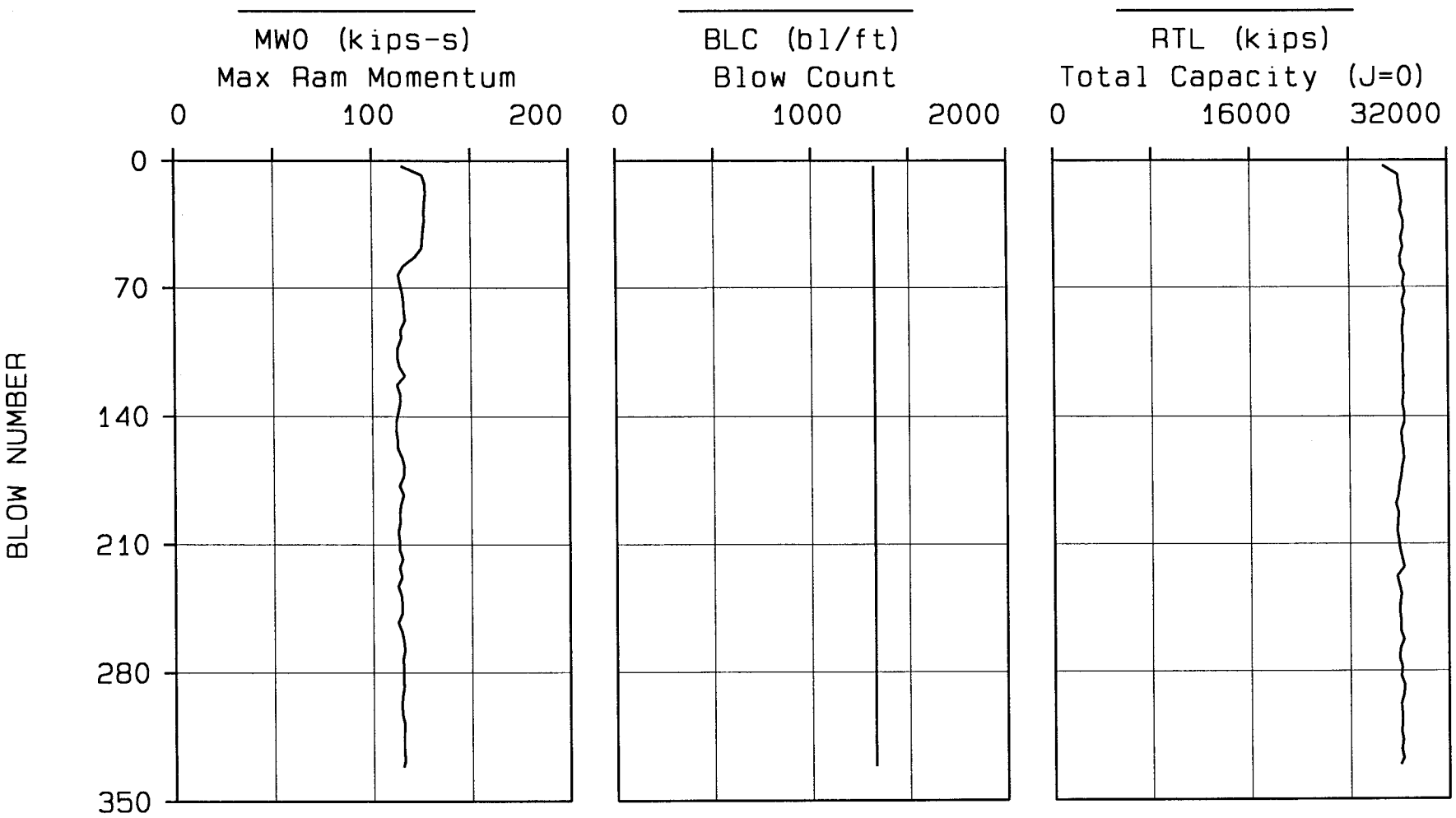
Fugro McClelland 00/12/12

SFOBB PIDP, TP1DR3, MHU-1700



Fugro McClelland 00/12/12

SFOBB PIDP, TP1DR3, MHU-1700



PILE NO. 2

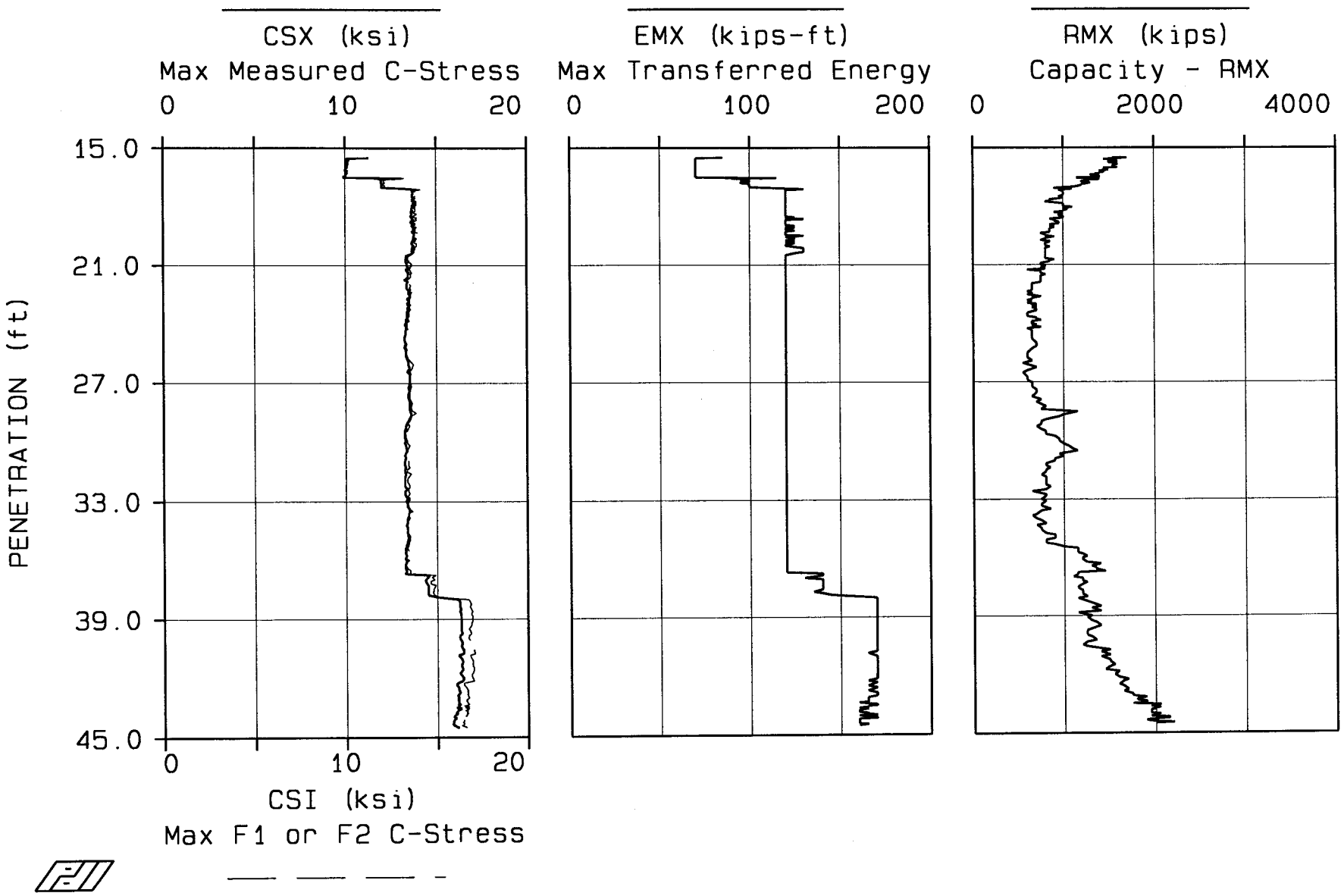
PILE NO. 2

Pile 2, Section B, PDA 1

PILE 2, SECTION B, PDA 1

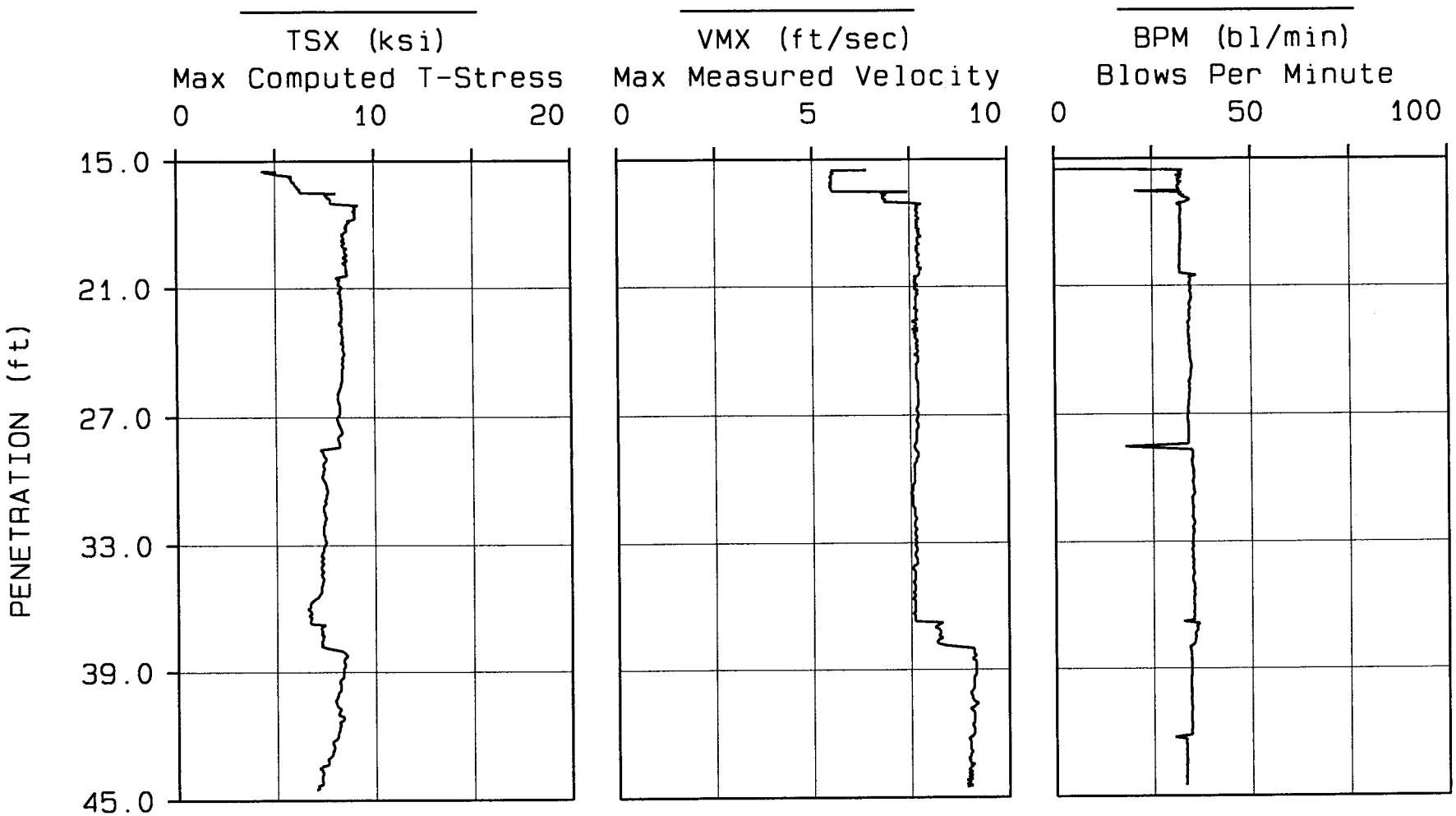
Fugro McClelland 00/11/12

SFOBB PIDP, TP2B, MHU-500T



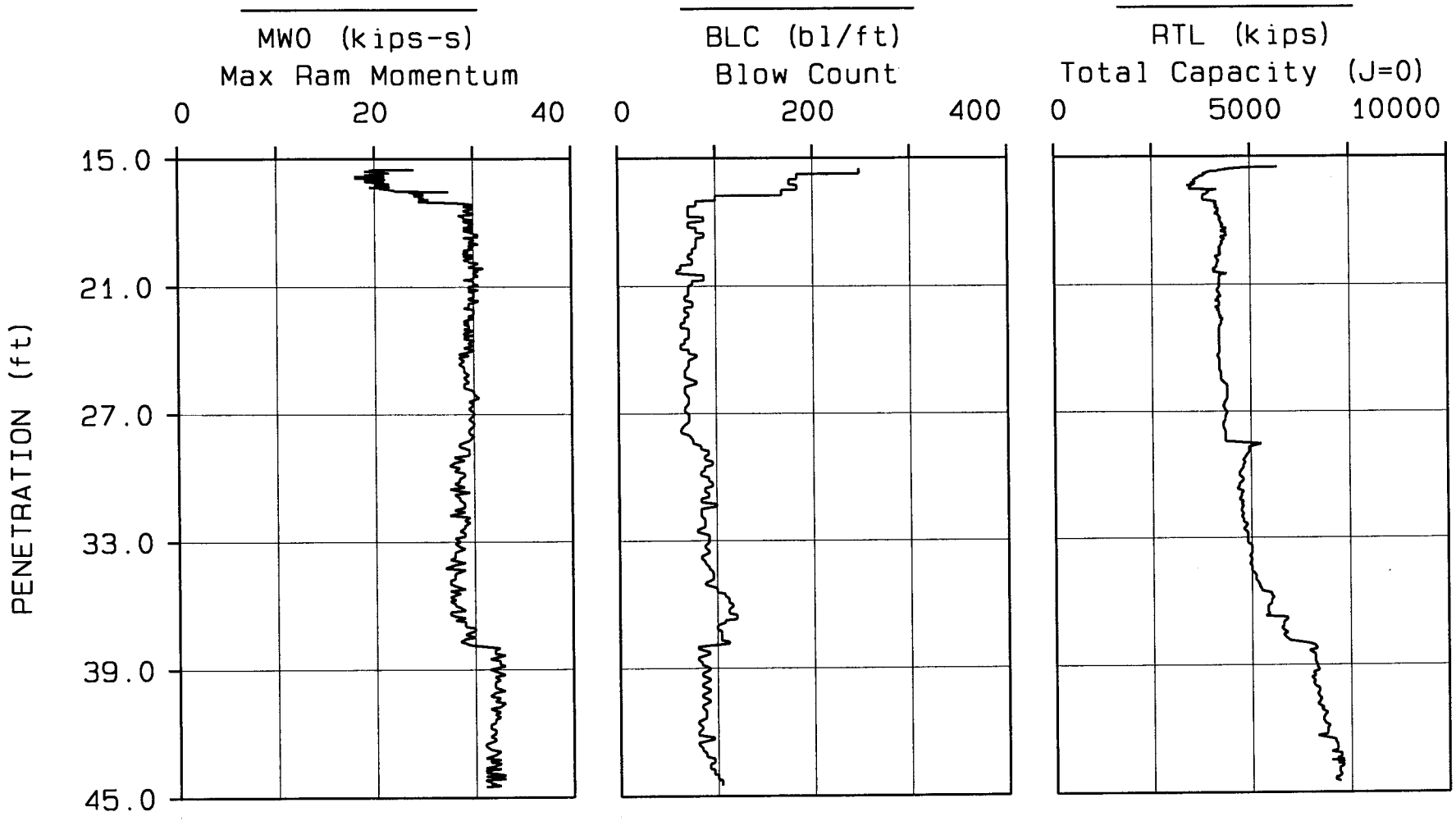
Fugro McClelland 00/11/12

SFOBB PIDP, TP2B, MHU-500T



Fugro McClelland 00/11/12

SFOBB PIDP, TP2B, MHU-500T

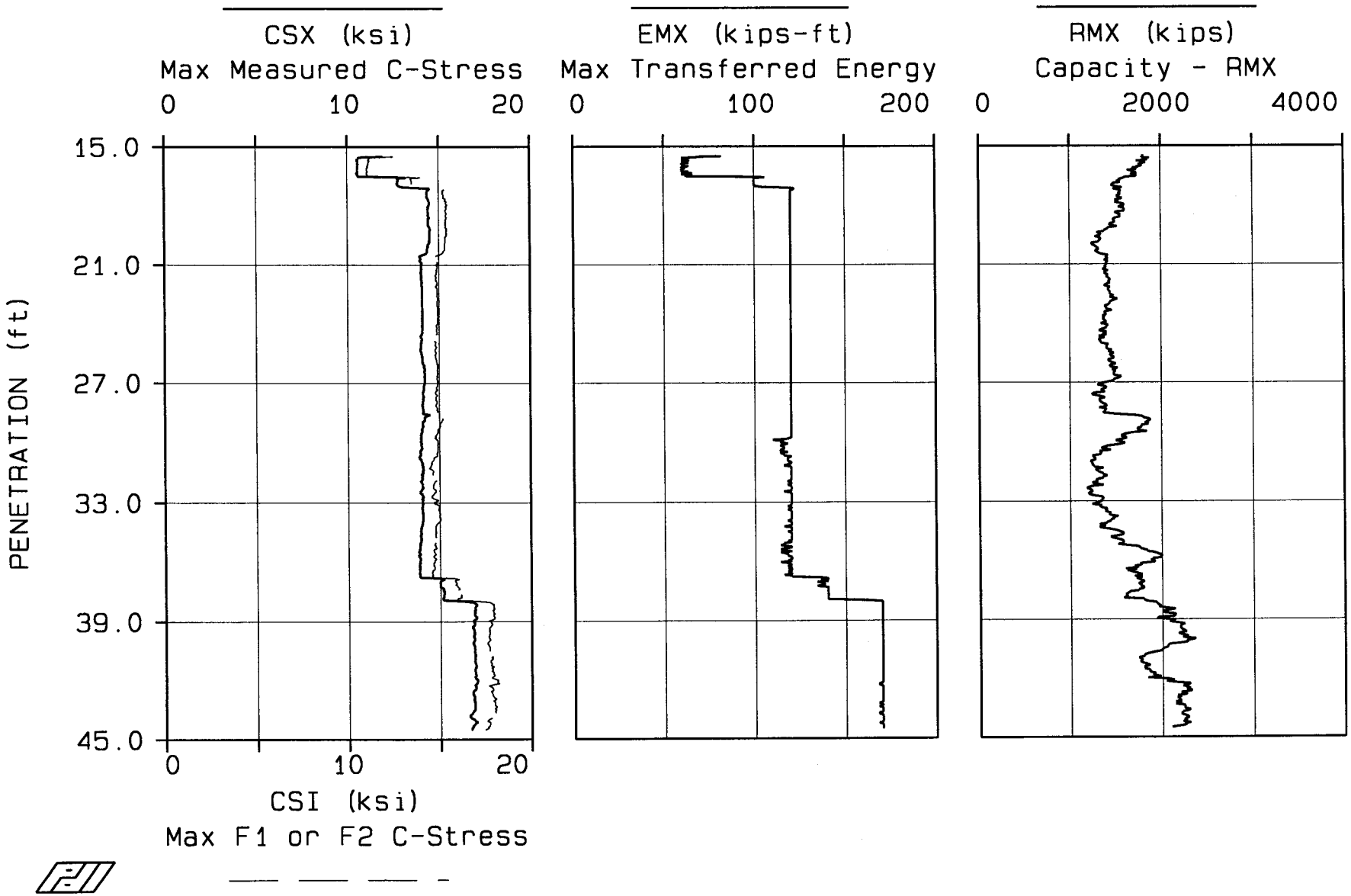


Pile 2, Section B, PDA 2

PILE 2, SECTION B, PDA 2

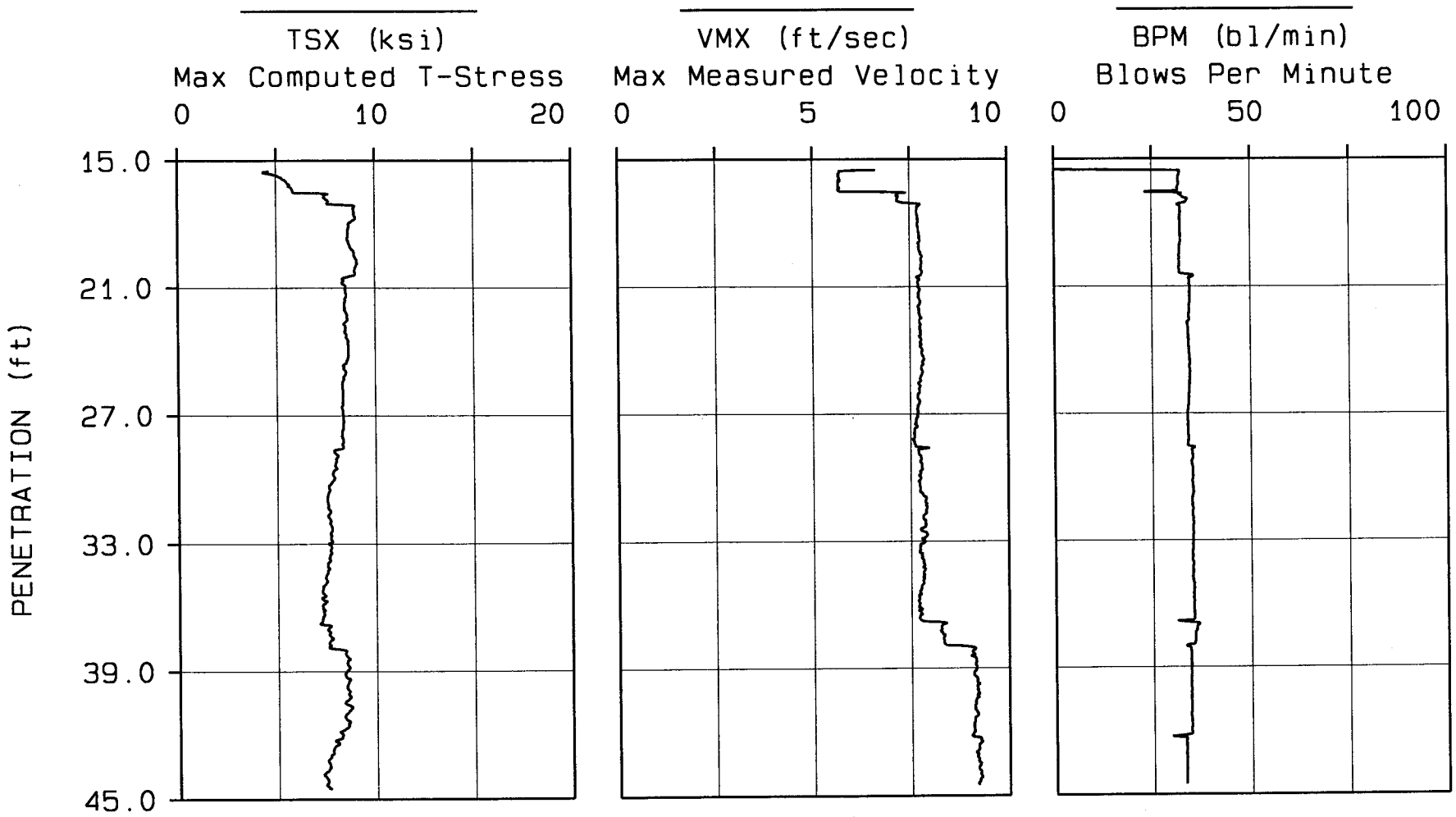
Fugro McClelland 00/11/12

SFOBB PIDP, TP2B, MHU-500T



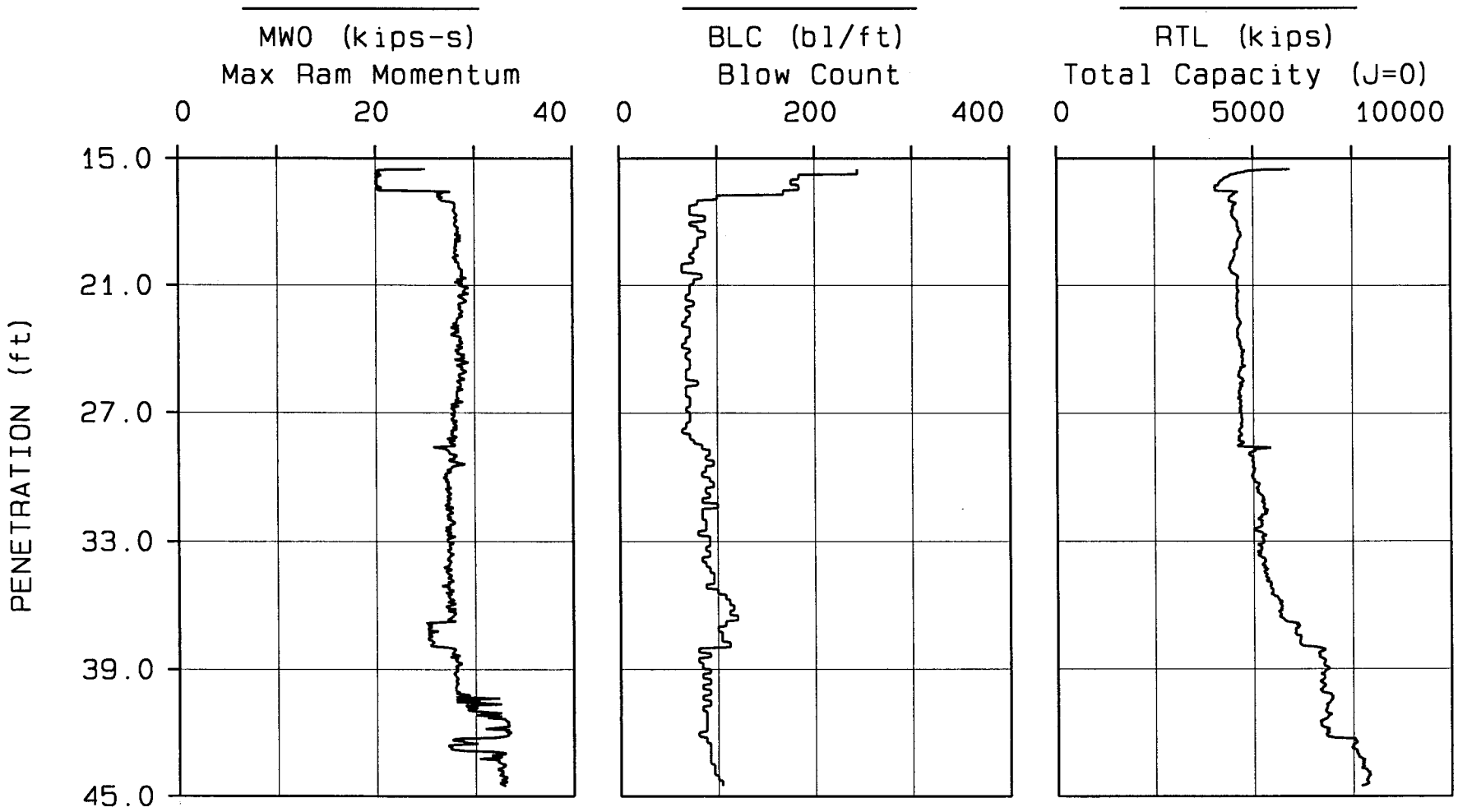
Fugro McClelland 00/11/12

SFOBB PIDP, TP2B, MHU-500T



Fugro McClelland 00/11/12

SFOBB PIDP, TP2B, MHU-500T

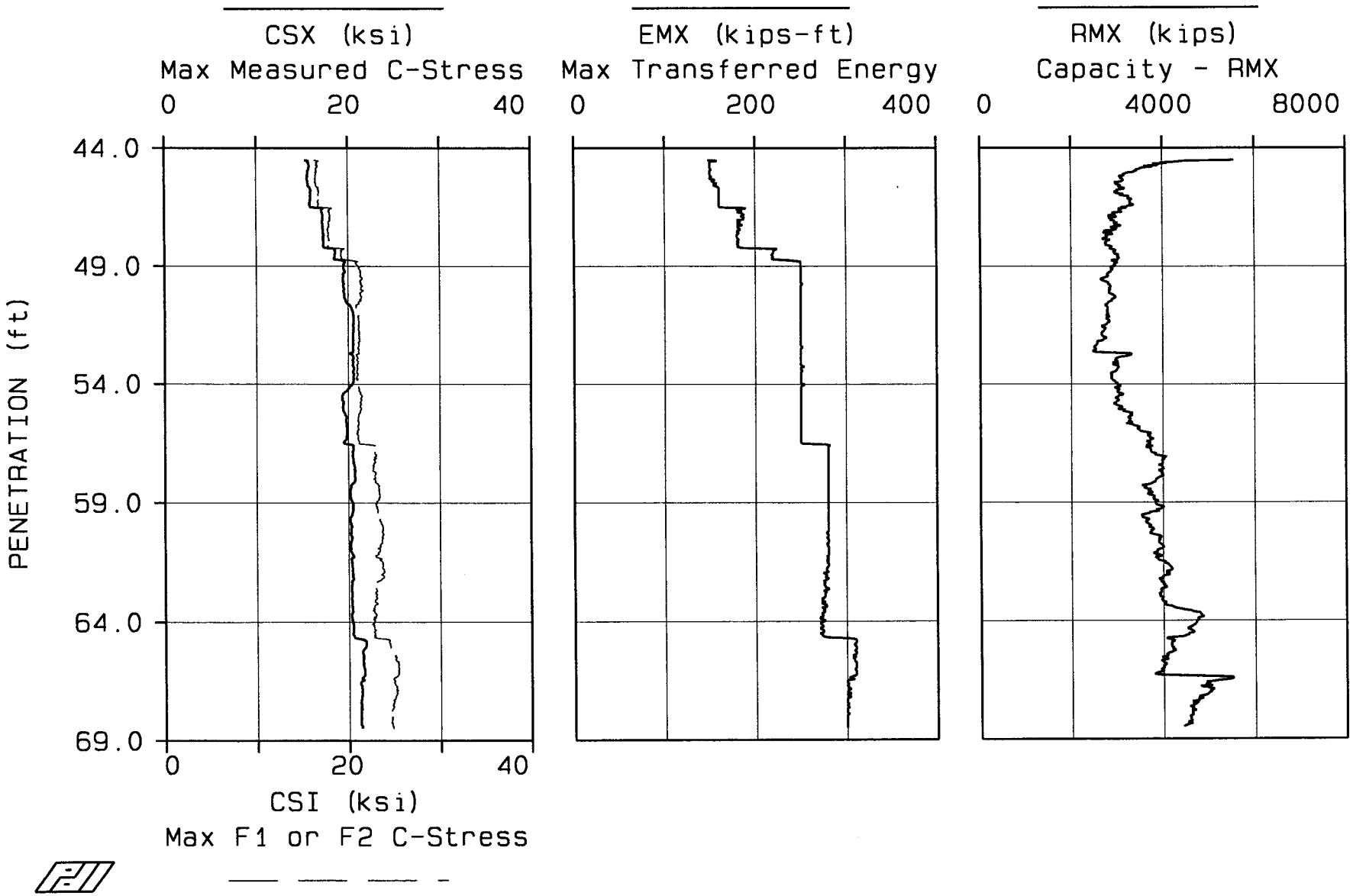


Pile 2, Section C, PDA 1

PILE 2, SECTION C, PDA 1

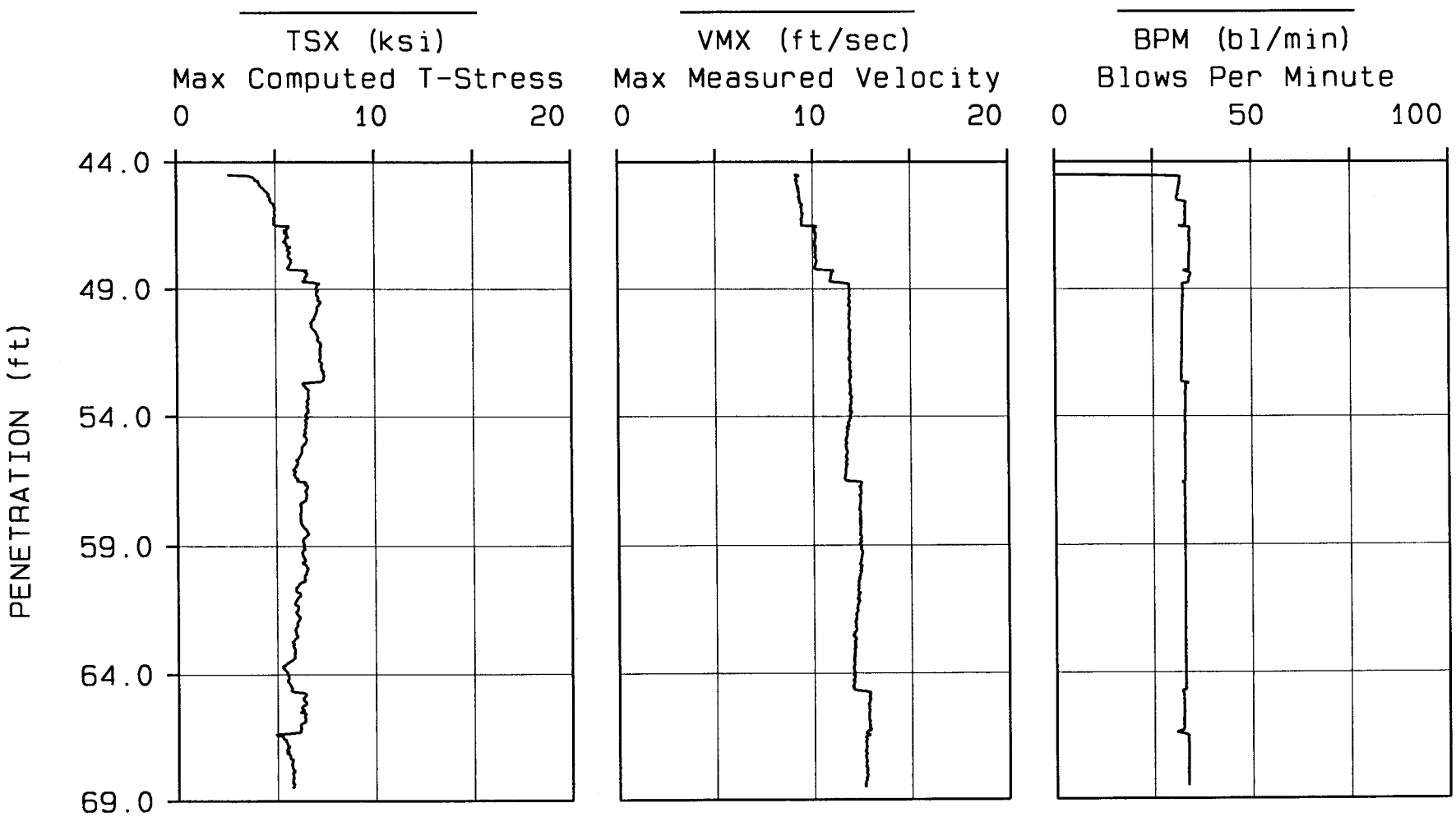
Fugro McClelland 00/11/15

SFOBB PIDP, TP2C, MHU-500T



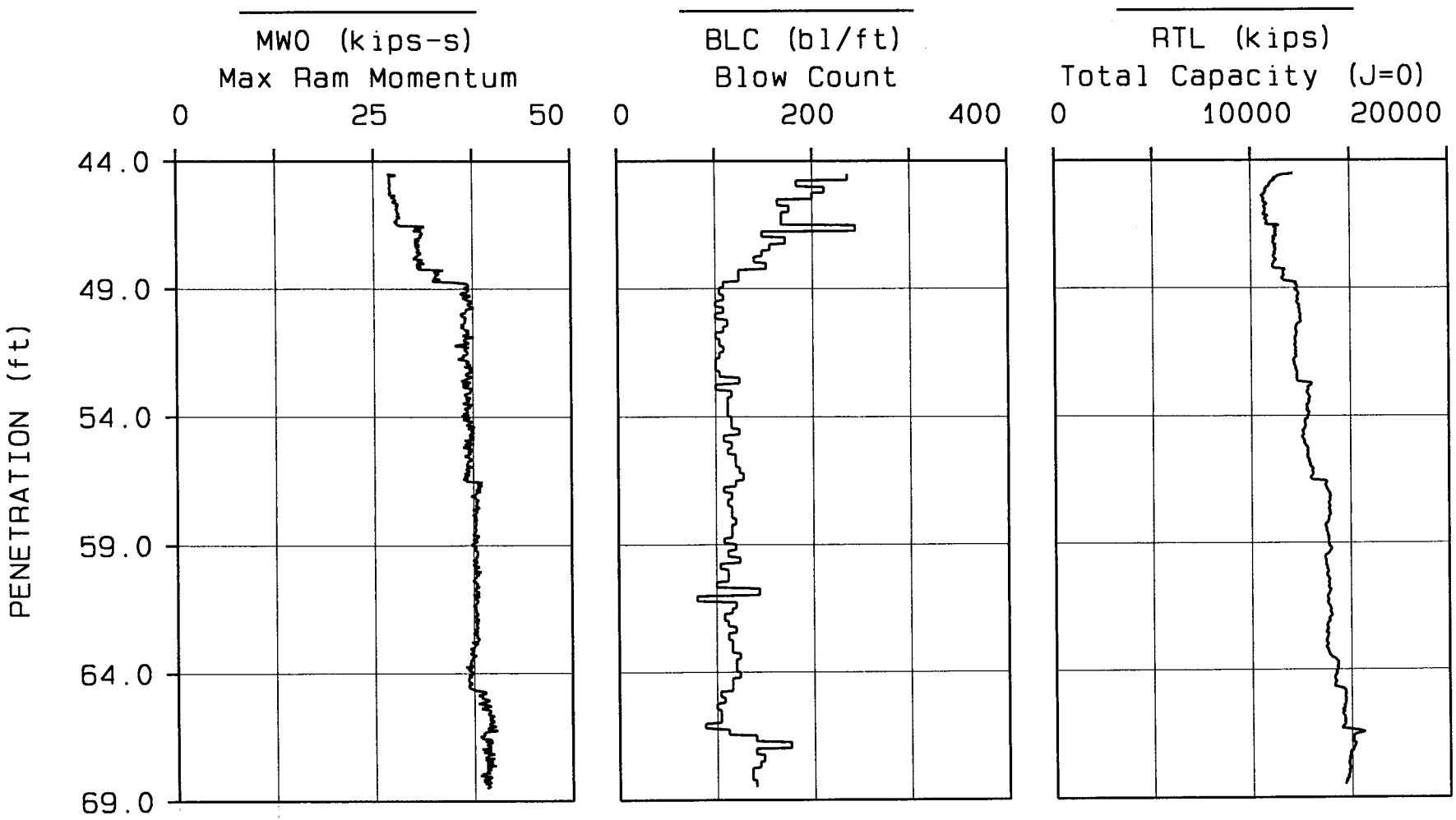
Fugro McClelland 00/11/15

SFOBB PIDP, TP2C, MHU-500T



Fugro McClelland 00/11/15

SFOBB PIDP, TP2C, MHU-500T

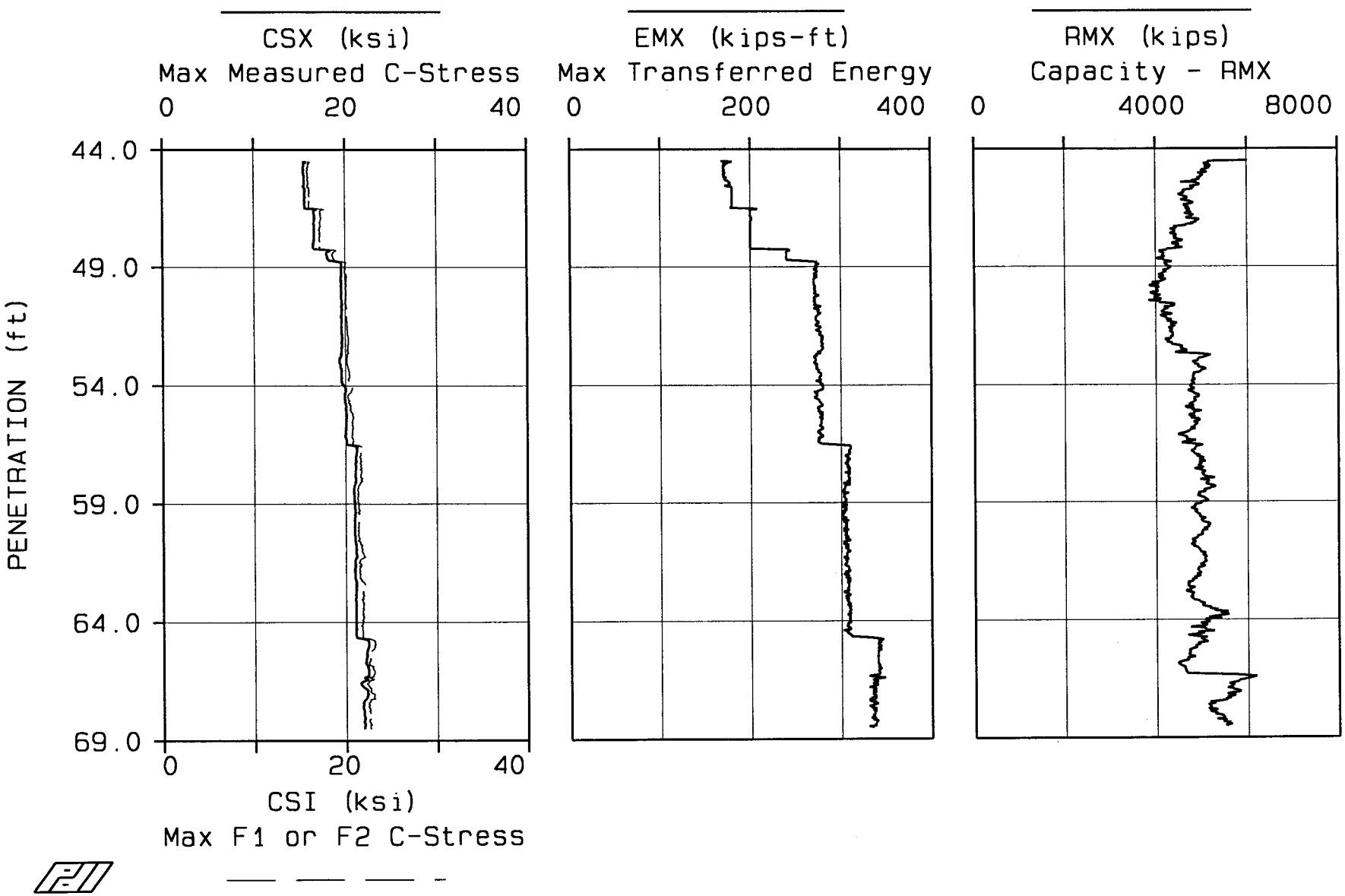


Pile 2, Section C, PDA 2

PILE 2, SECTION C, PDA 2

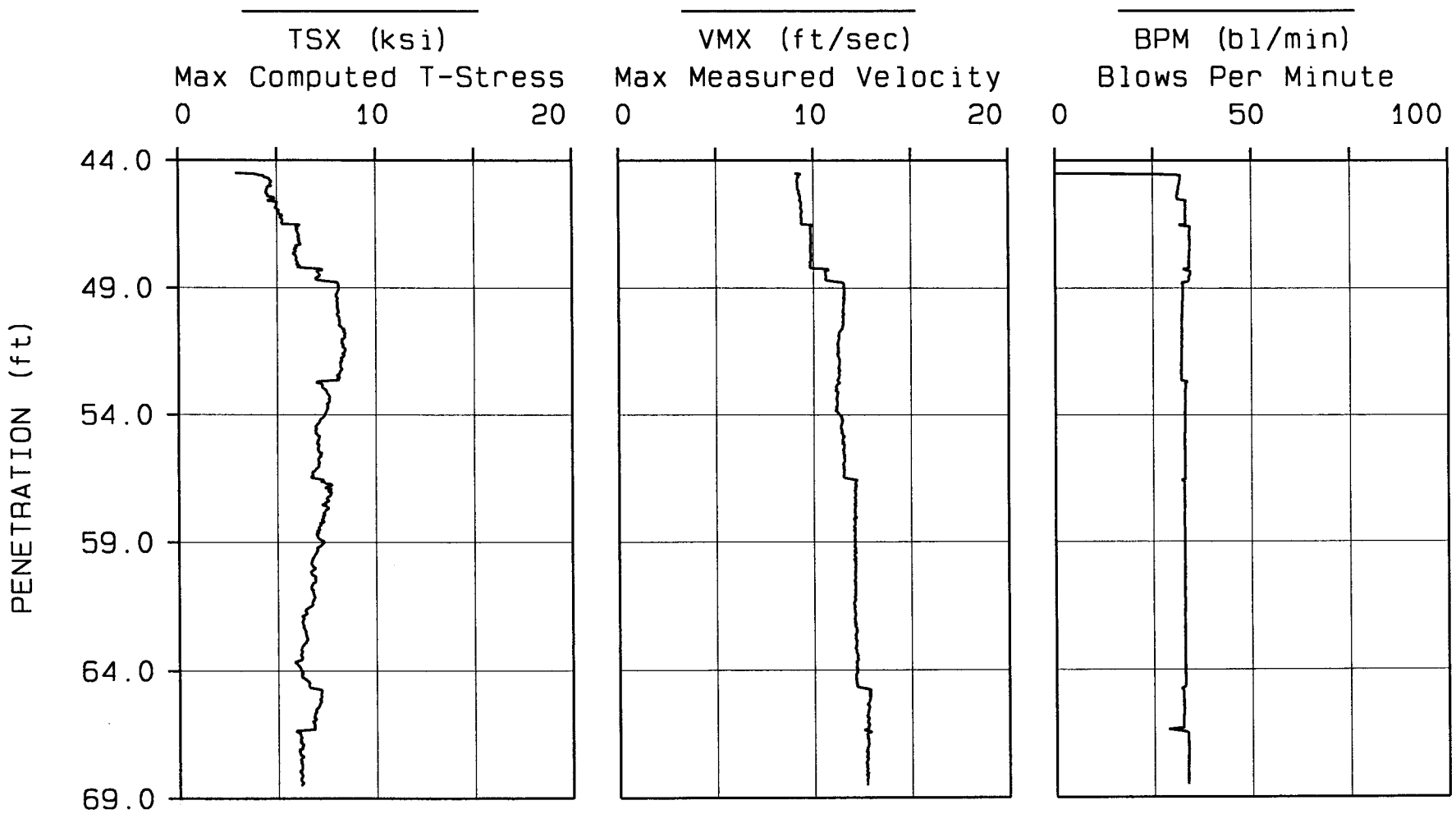
Fugro McClelland 00/11/15

SFOBB PIDP, TP2C, MHU-500T



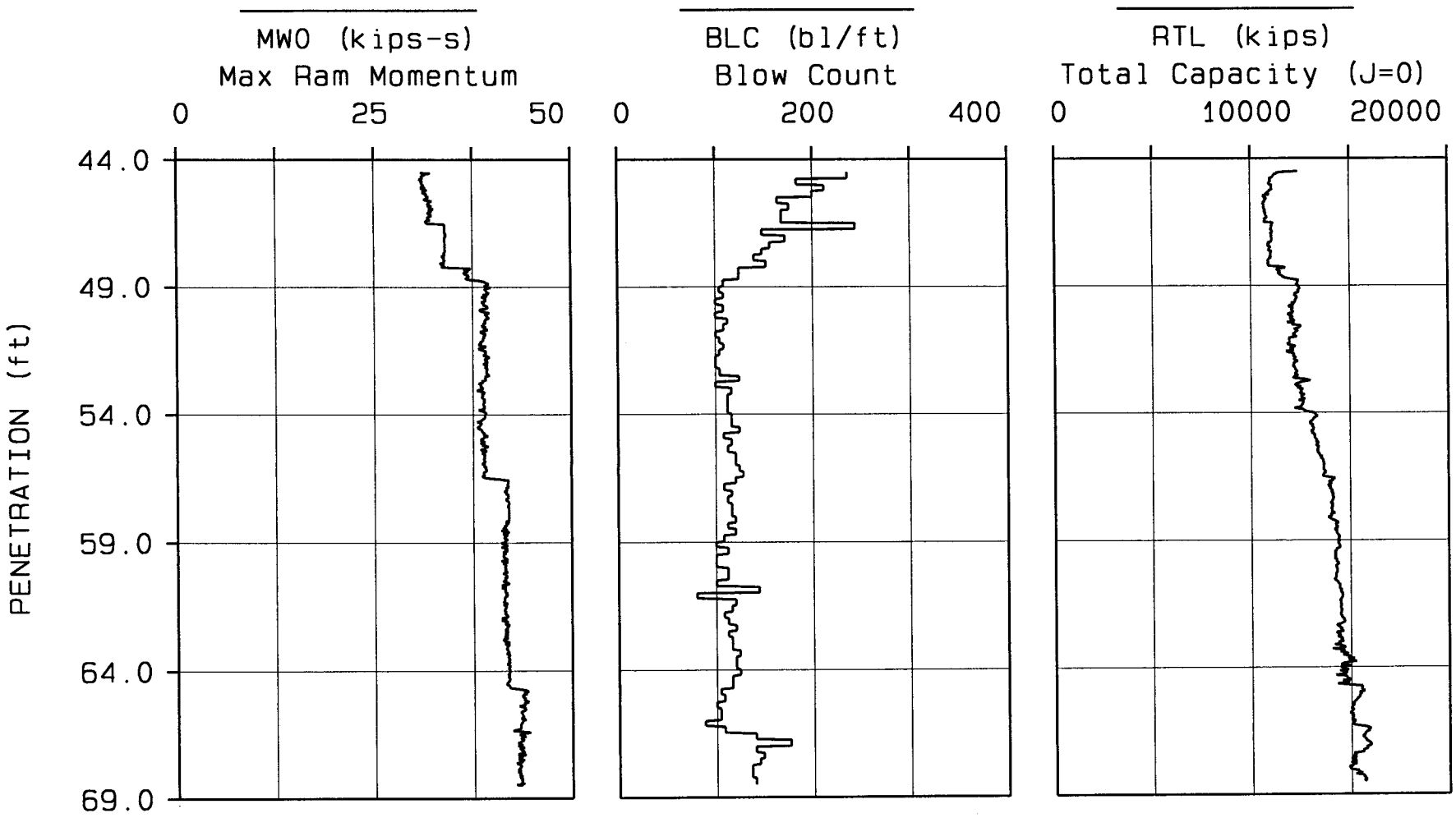
Fugro McClelland 00/11/15

SFOBB PIDP, TP2C, MHU-500T



Fugro McClelland 00/11/15

SFOBB PIDP, TP2C, MHU-500T

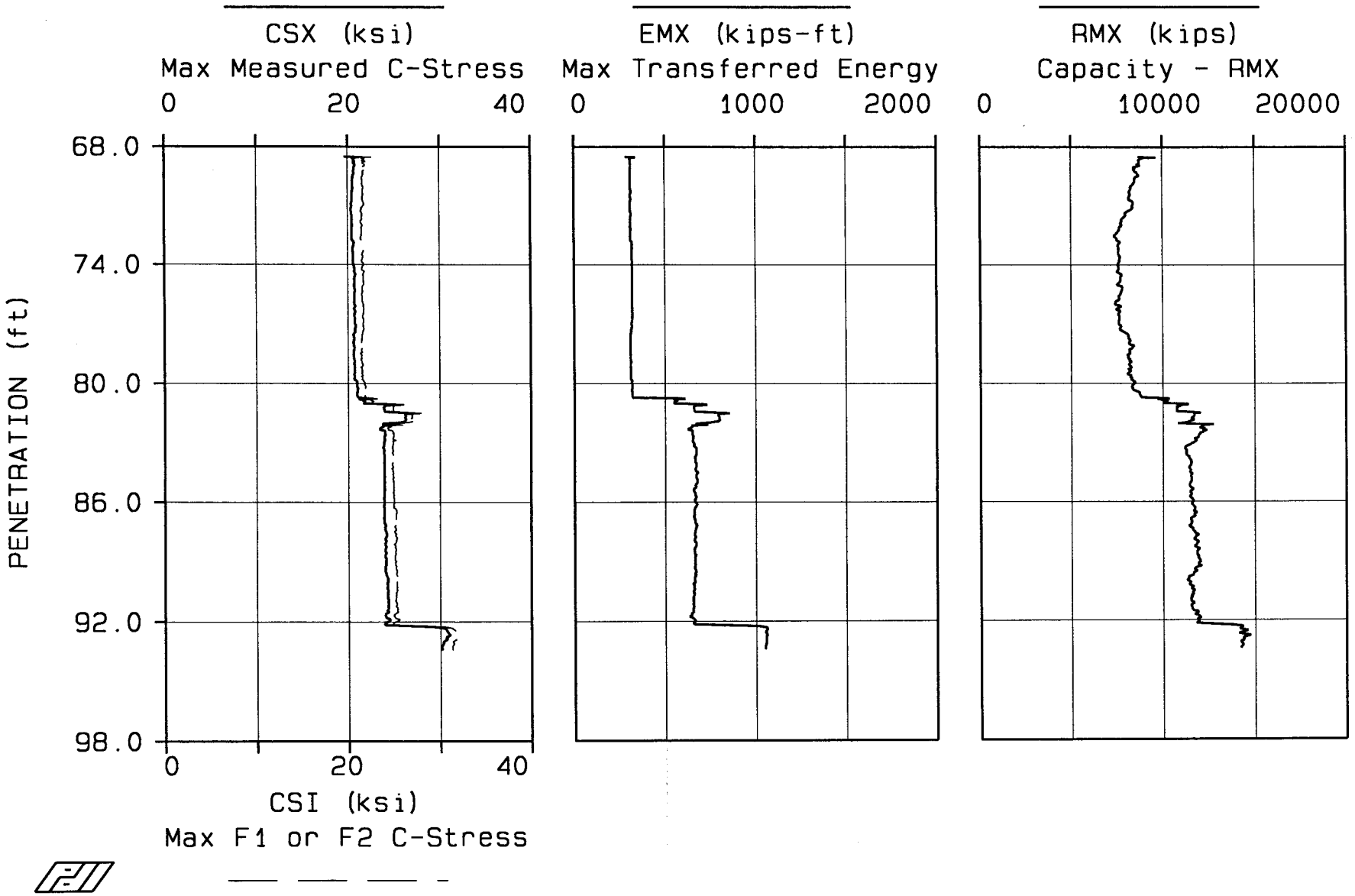


Pile 2, Section D, PDA 1

PILE 2, SECTION D, PDA 1

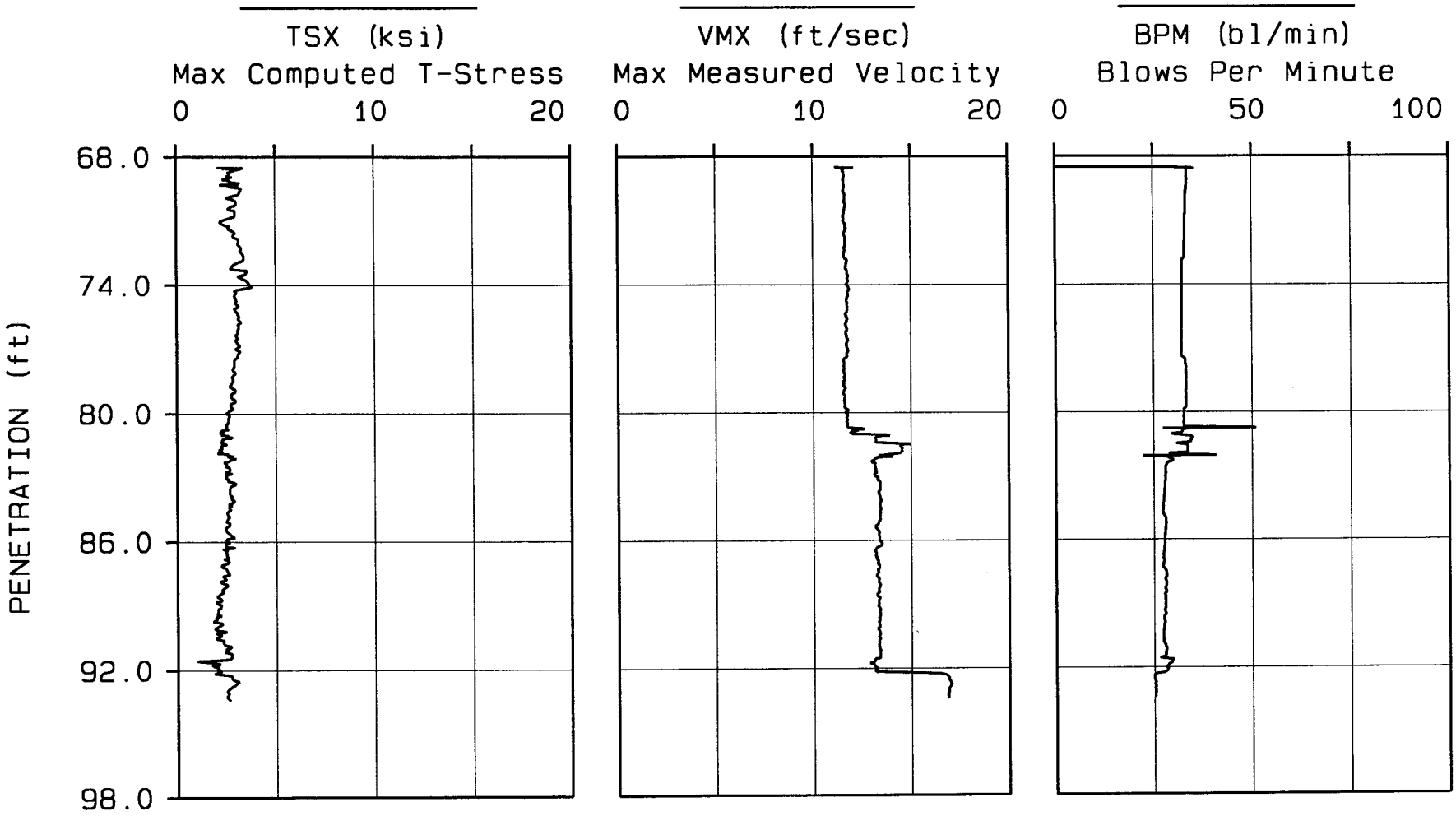
Fugro McClelland 00/11/19

SFOBB PIDP, TP2D, MHU-500T & 1700



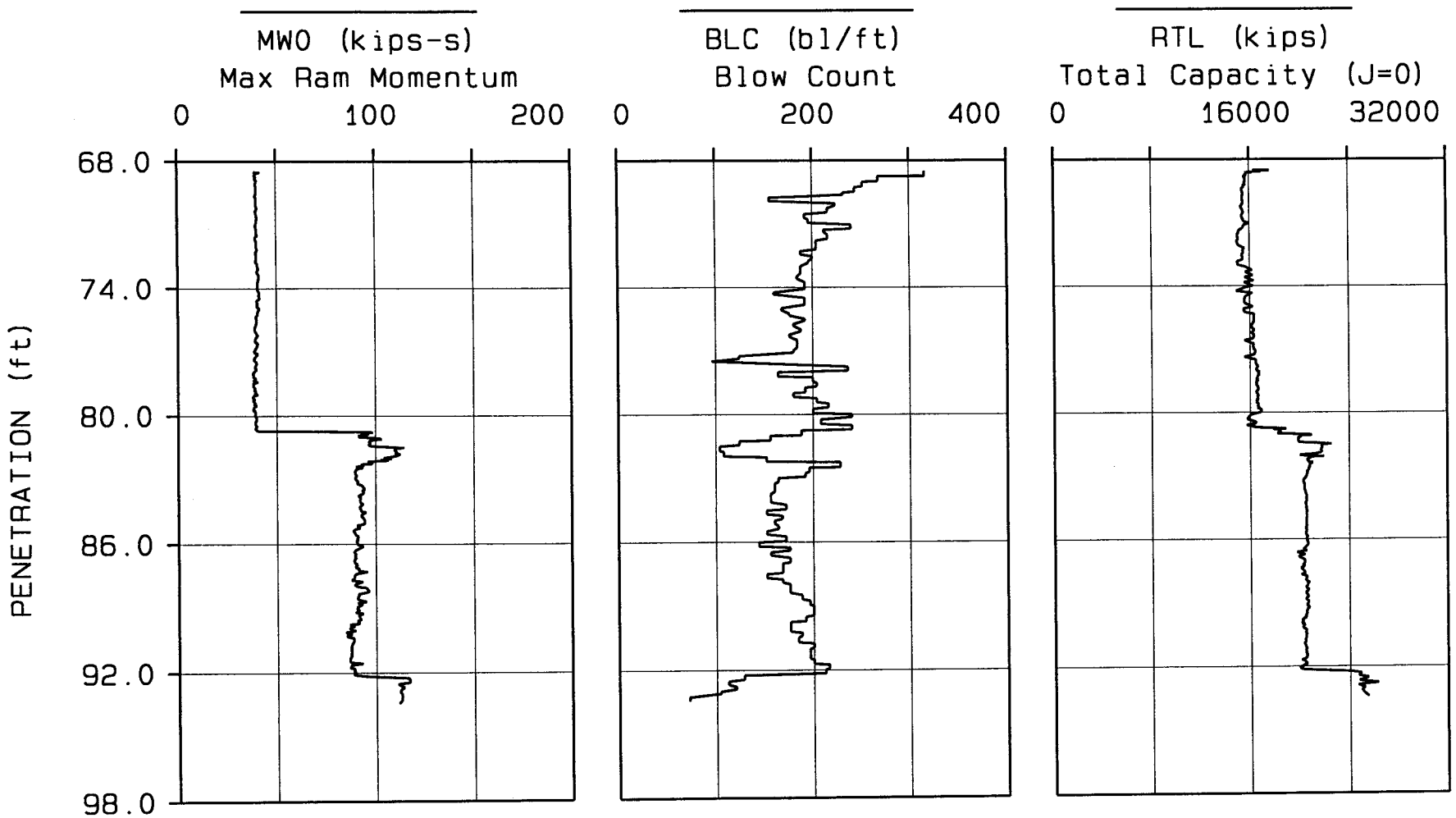
Fugro McClelland 00/11/19

SFOBB PIDP, TP2D, MHU-500T & 1700



Fugro McClelland 00/11/19

SFOBB PIDP, TP2D, MHU-500T & 1700

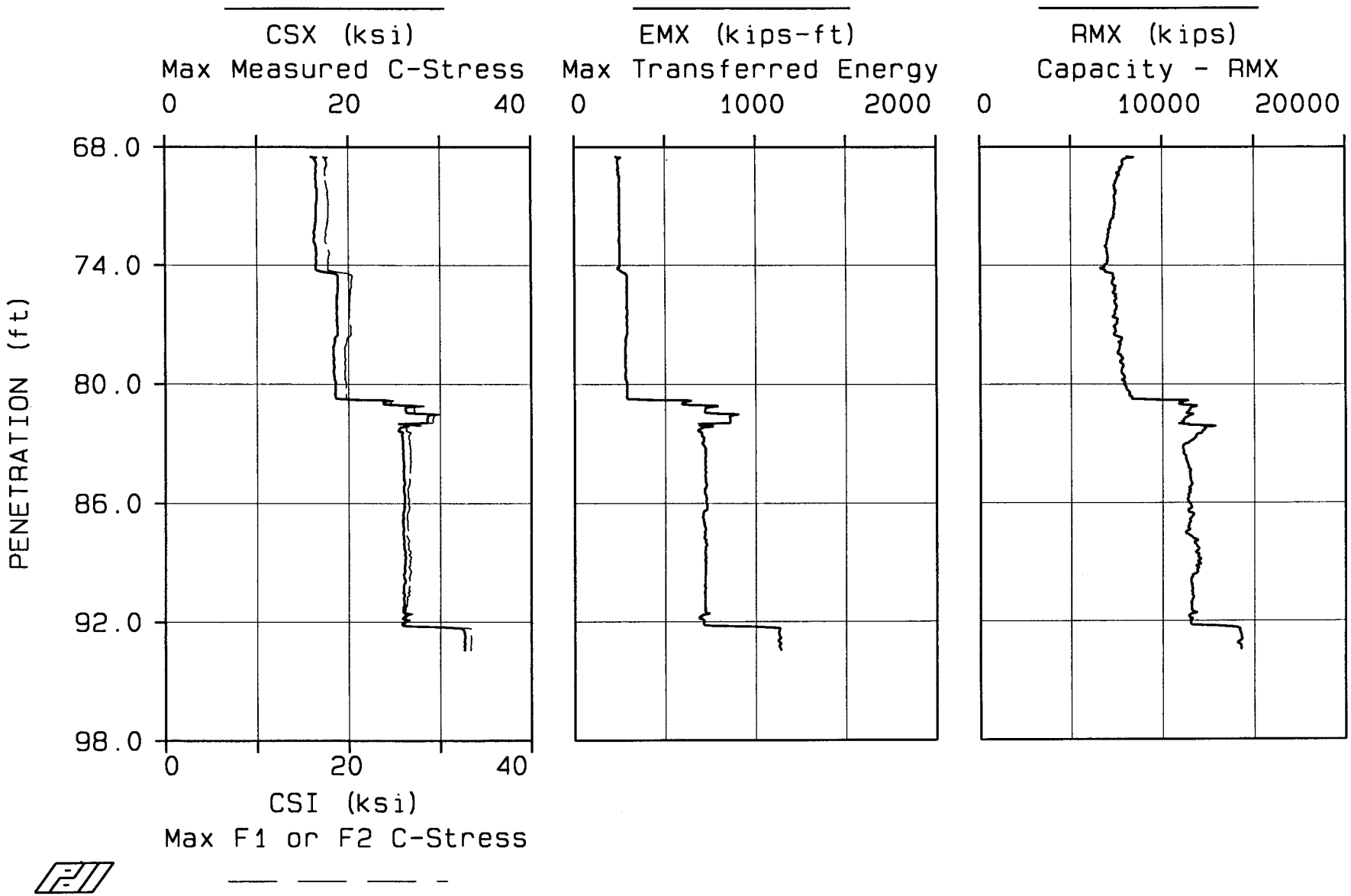


Pile 2, Section D, PDA 2

PILE 2, SECTION D, PDA 2

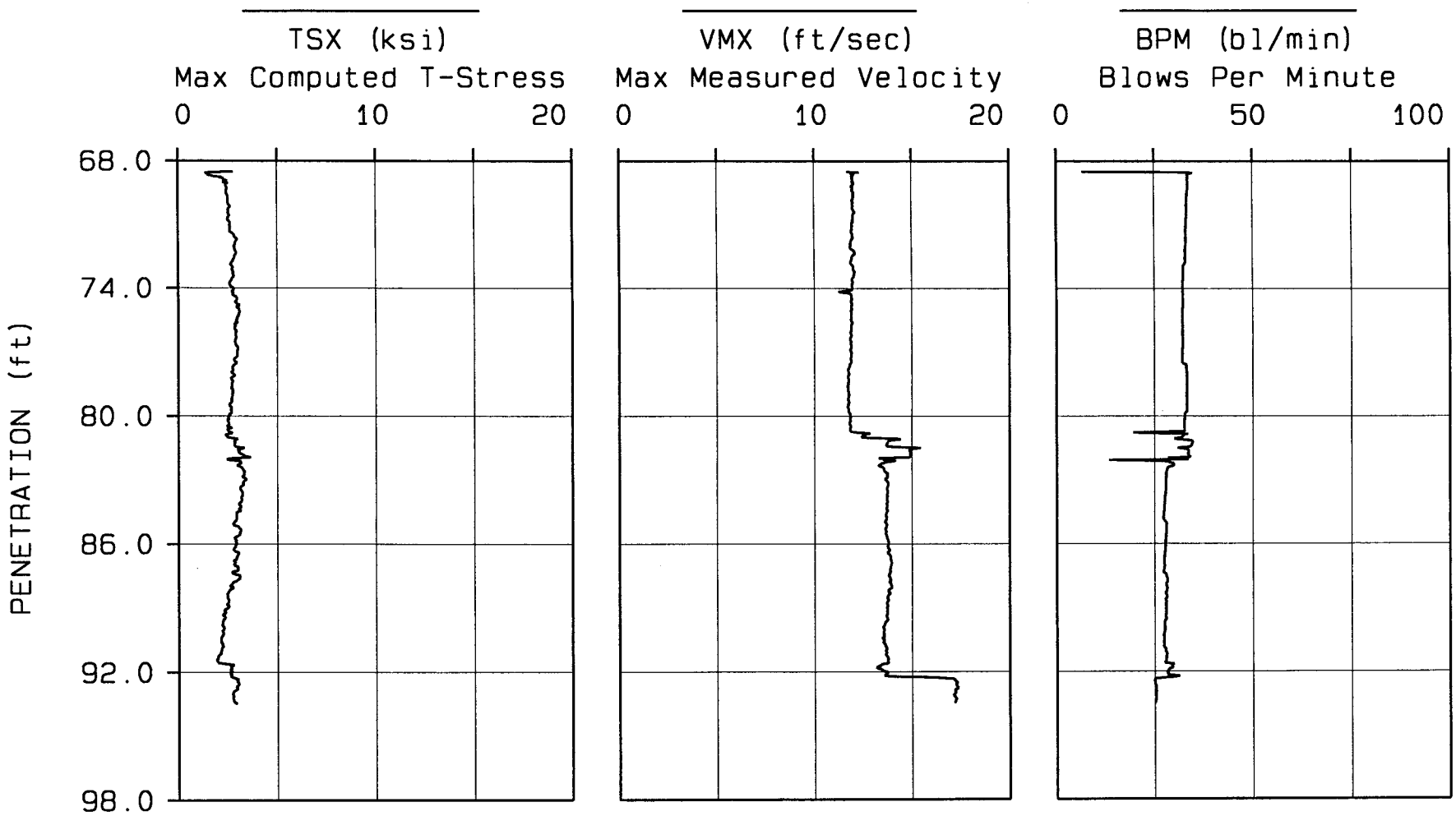
Fugro McClelland 00/11/19

SFOBB PIDP, TP2D, MHU-500T & 1700



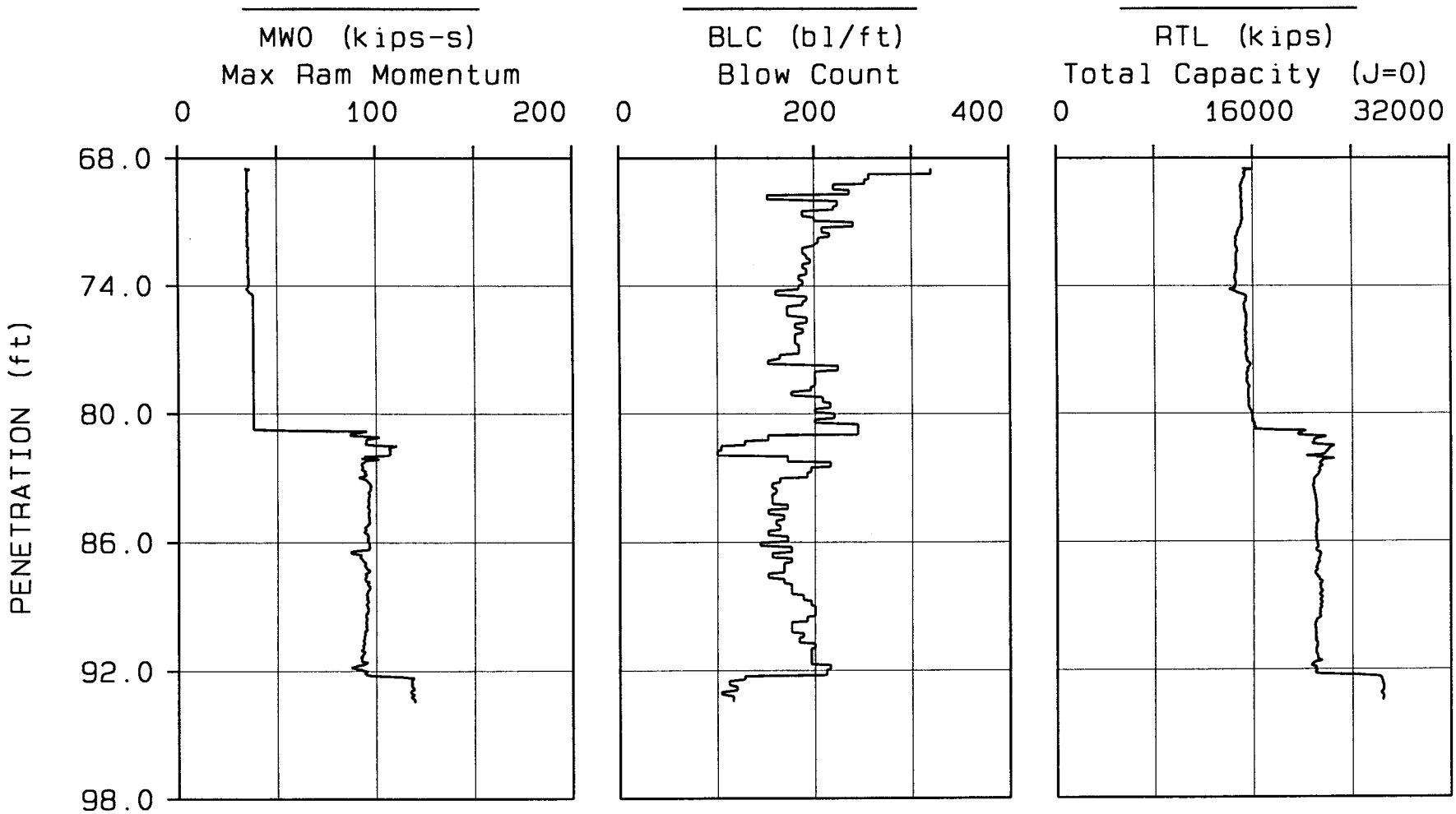
Fugro McClelland 00/11/19

SFOBB PIDP, TP2D, MHU-500T & 1700



Fugro McClelland 00/11/19

SFOBB PIDP, TP2D, MHU-500T & 1700

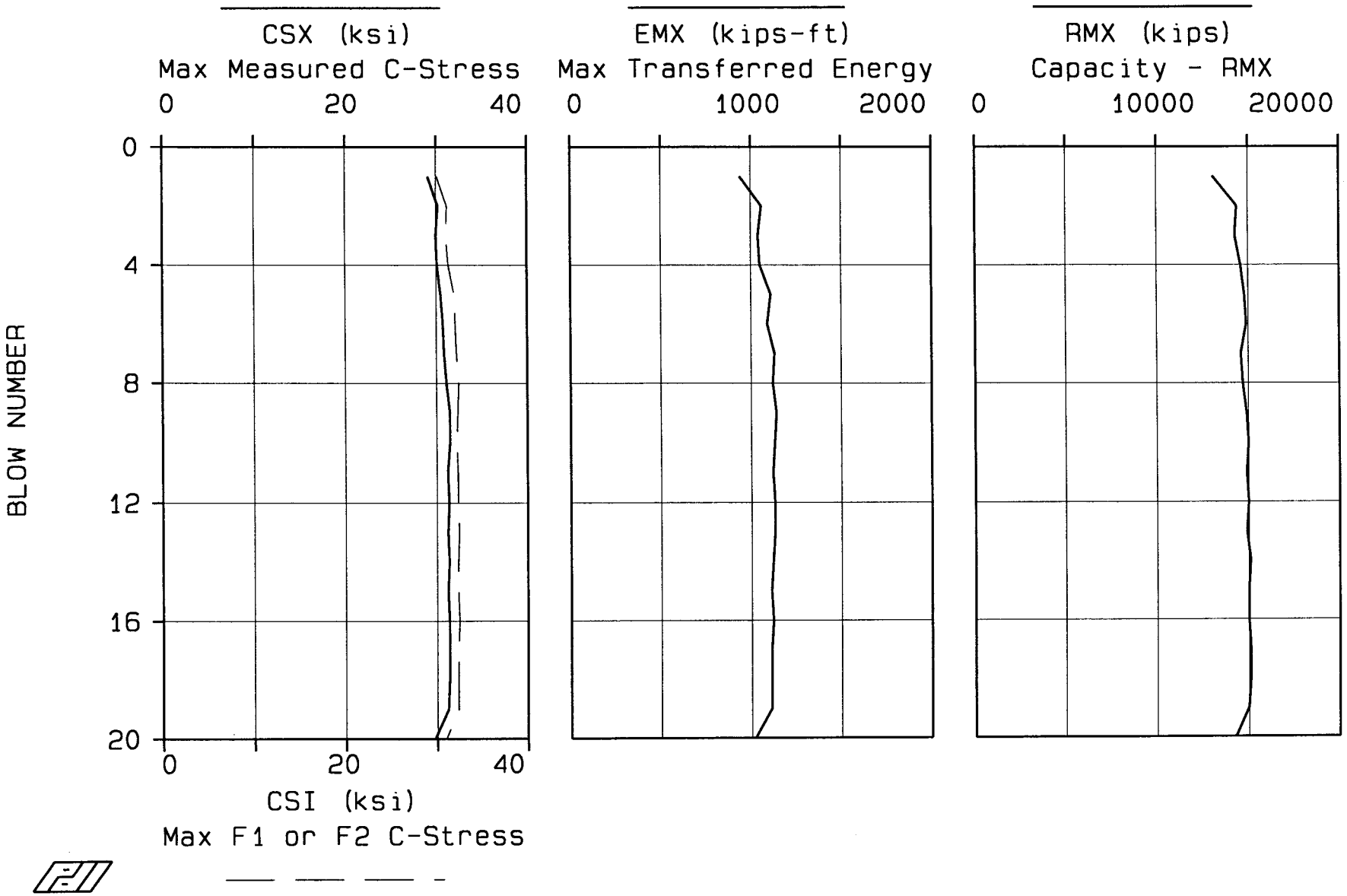


Pile 2, Restrike No. 1, PDA 1

PILE 2, RESTRIKE NO. 1, PDA 1

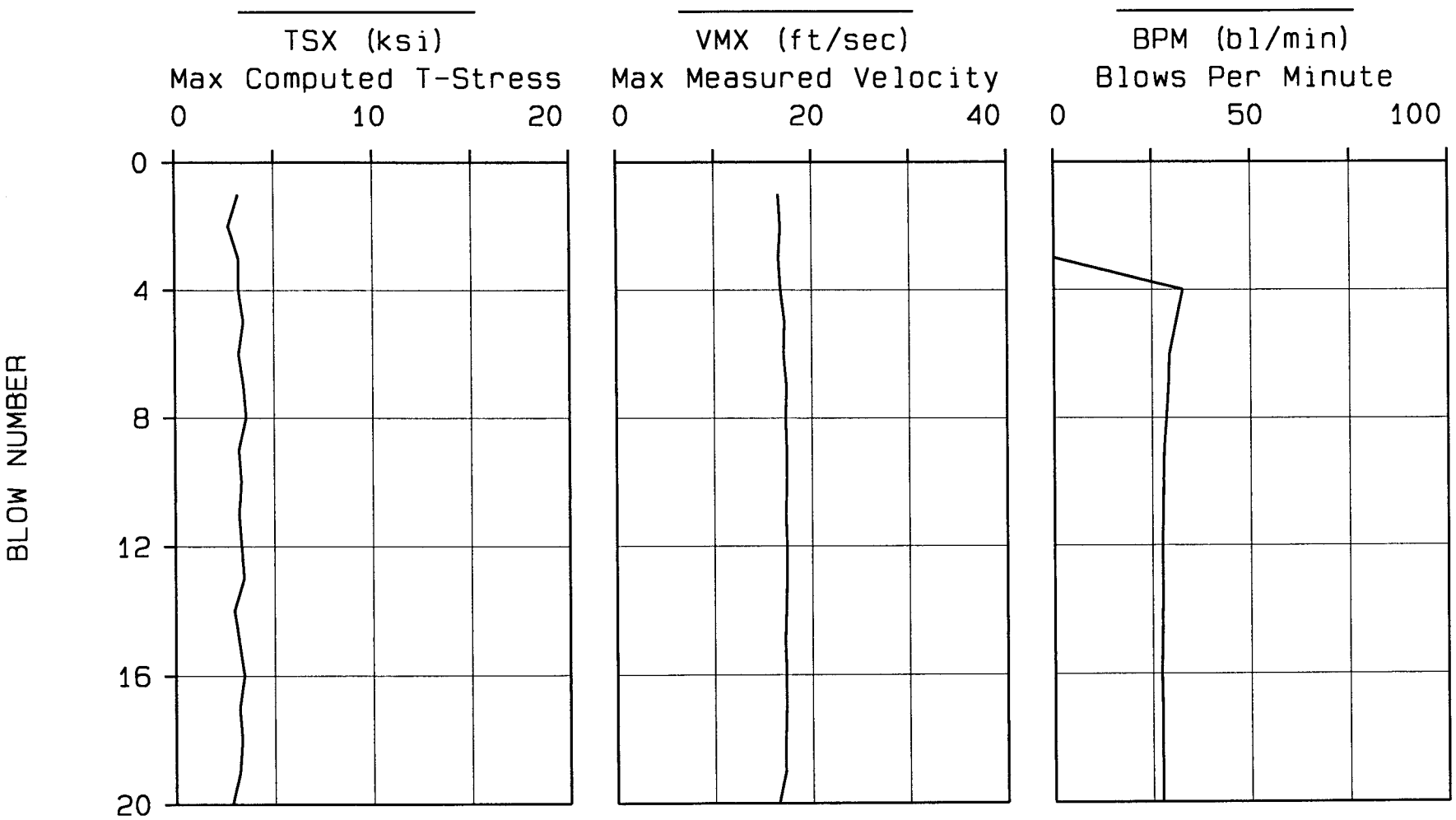
Fugro McClelland 00/11/21

SFOBB PIDP, TP2DR, MHU-1700



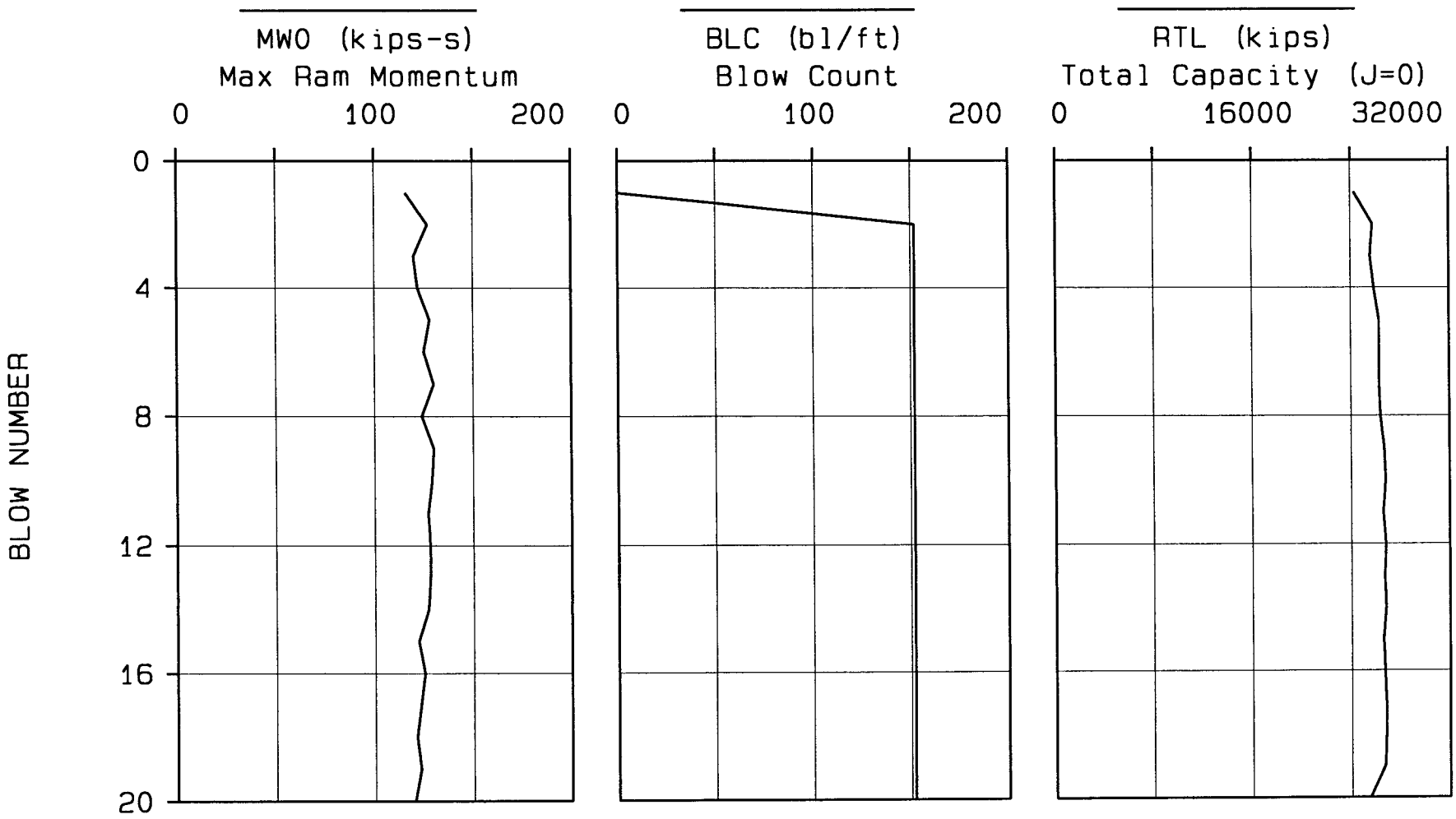
Fugro McClelland 00/11/21

SFOBB PIDP, TP2DR, MHU-1700



Fugro McClelland 00/11/21

SFOBB PIDP, TP2DR, MHU-1700

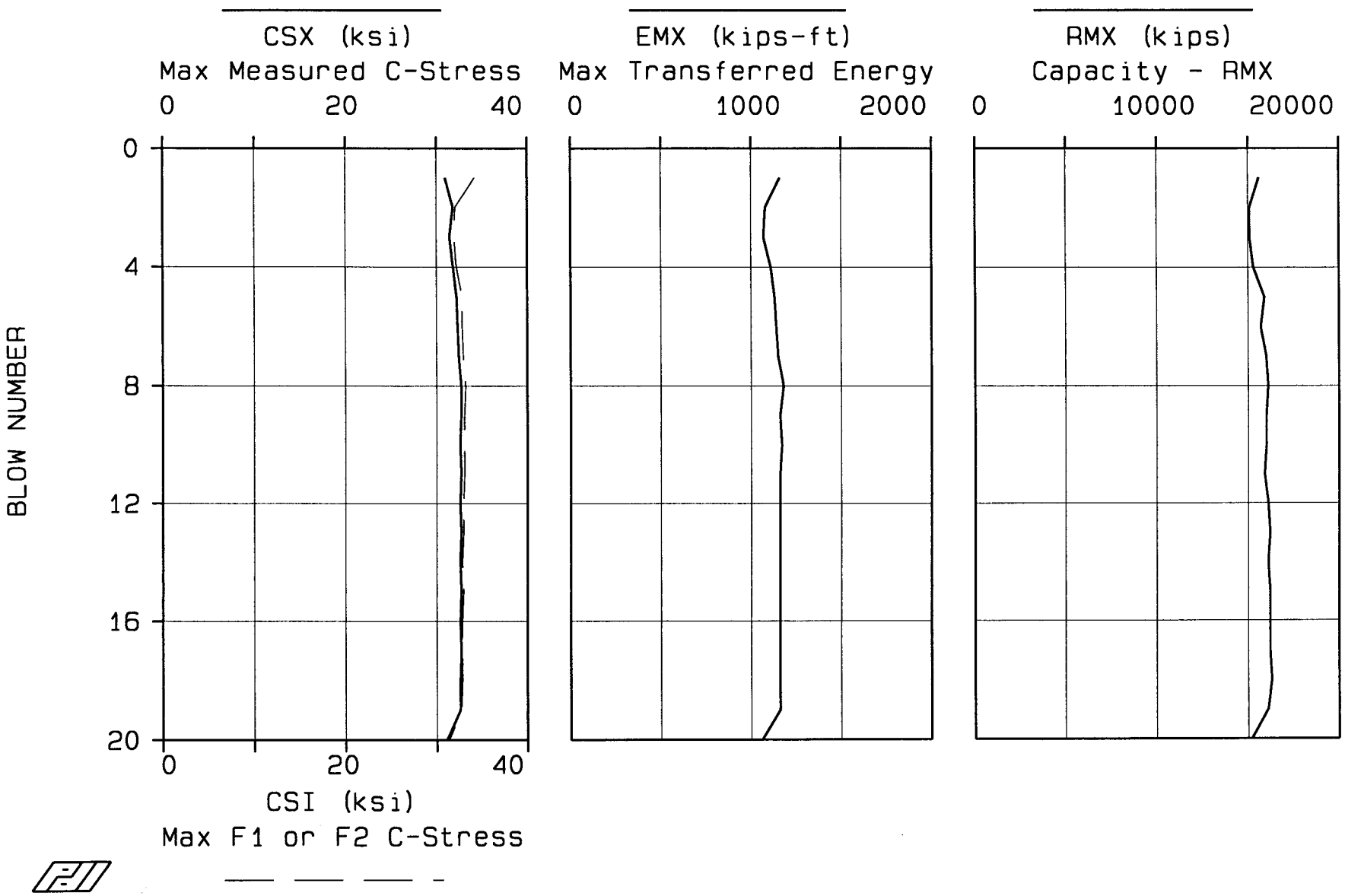


Pile 2, Restrike No. 1, PDA 2

PILE 2, RESTRIKE NO. 1
PDA 2

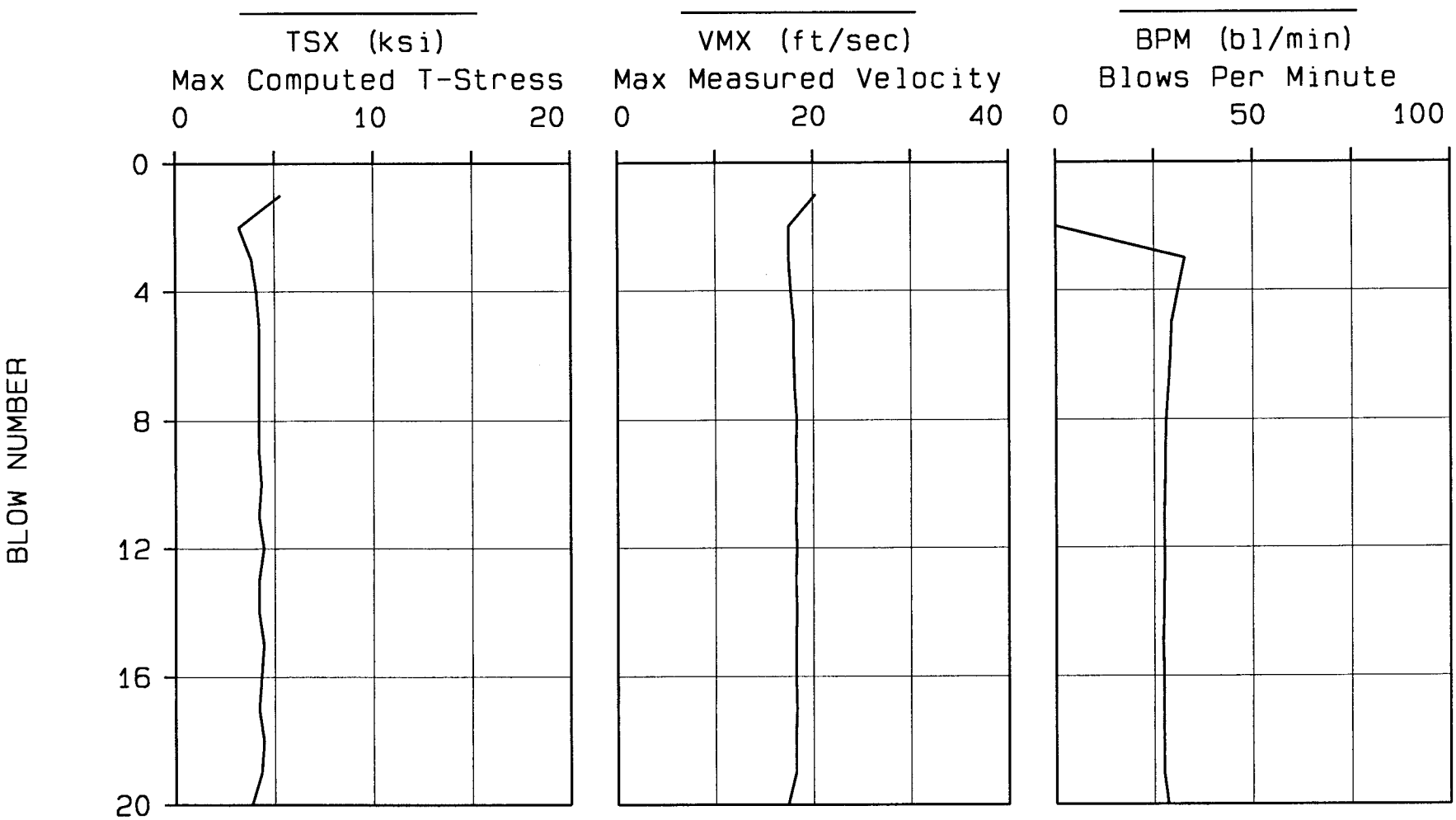
Fugro McClelland 00/11/21

SFOBB PIDP, TP2DR, MHU-1700



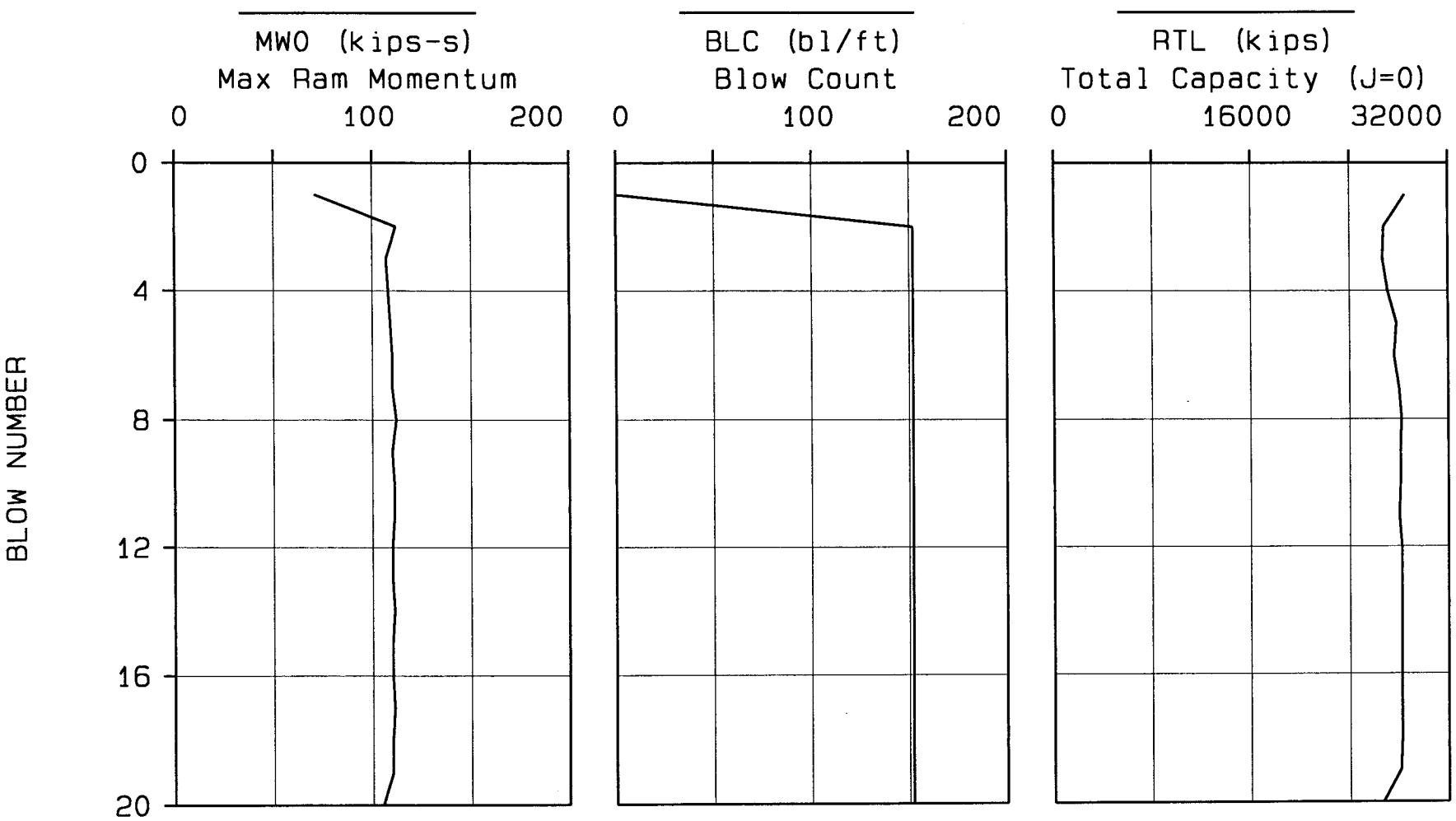
Fugro McClelland 00/11/21

SFOBB PIDP, TP2DR, MHU-1700



Fugro McClelland 00/11/21

SFOBB PIDP, TP2DR, MHU-1700

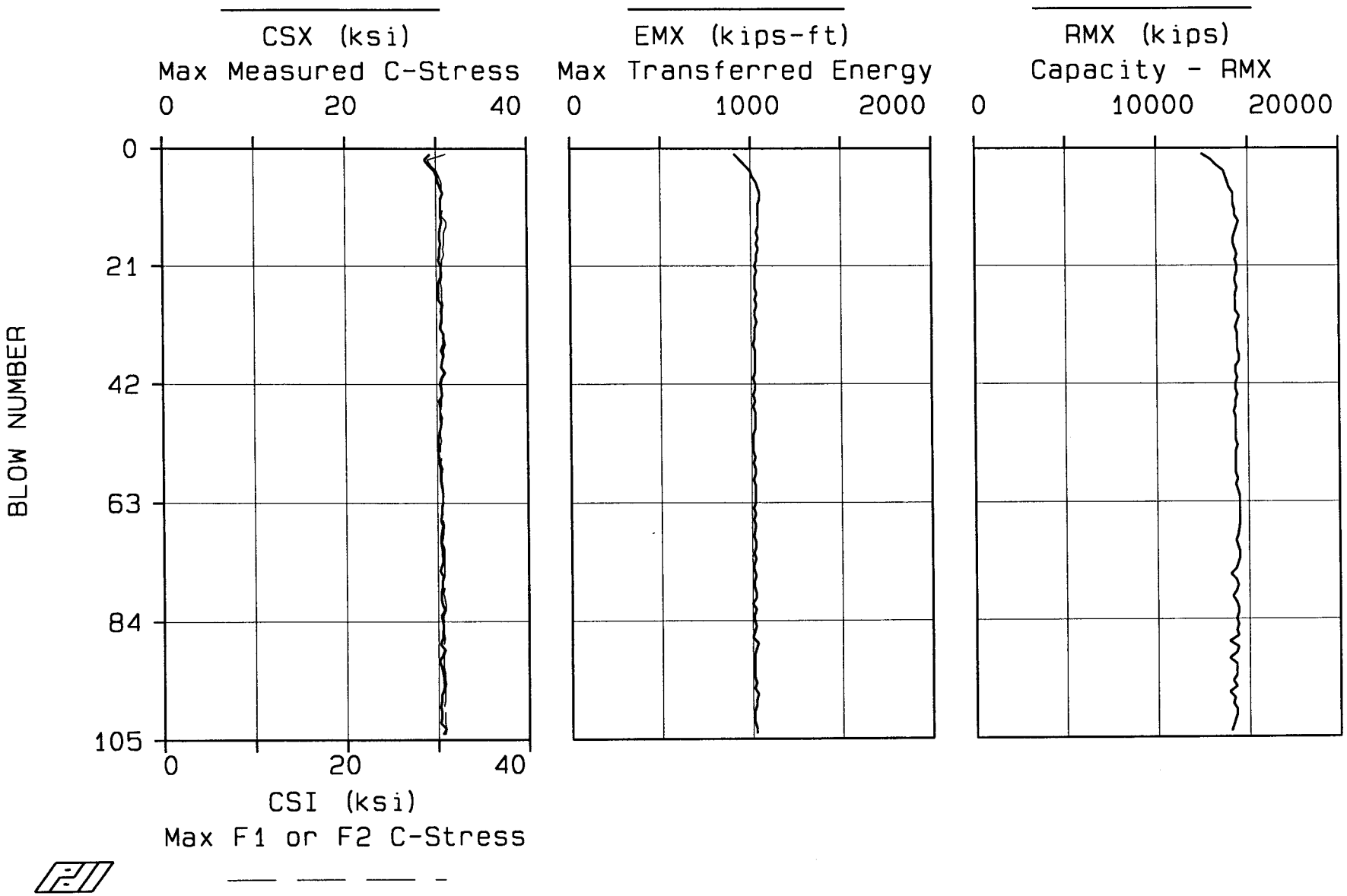


Pile 2, Restrike No. 2, PDA 1

PILE 2, RESTRIKE NO. 2
PDA 1

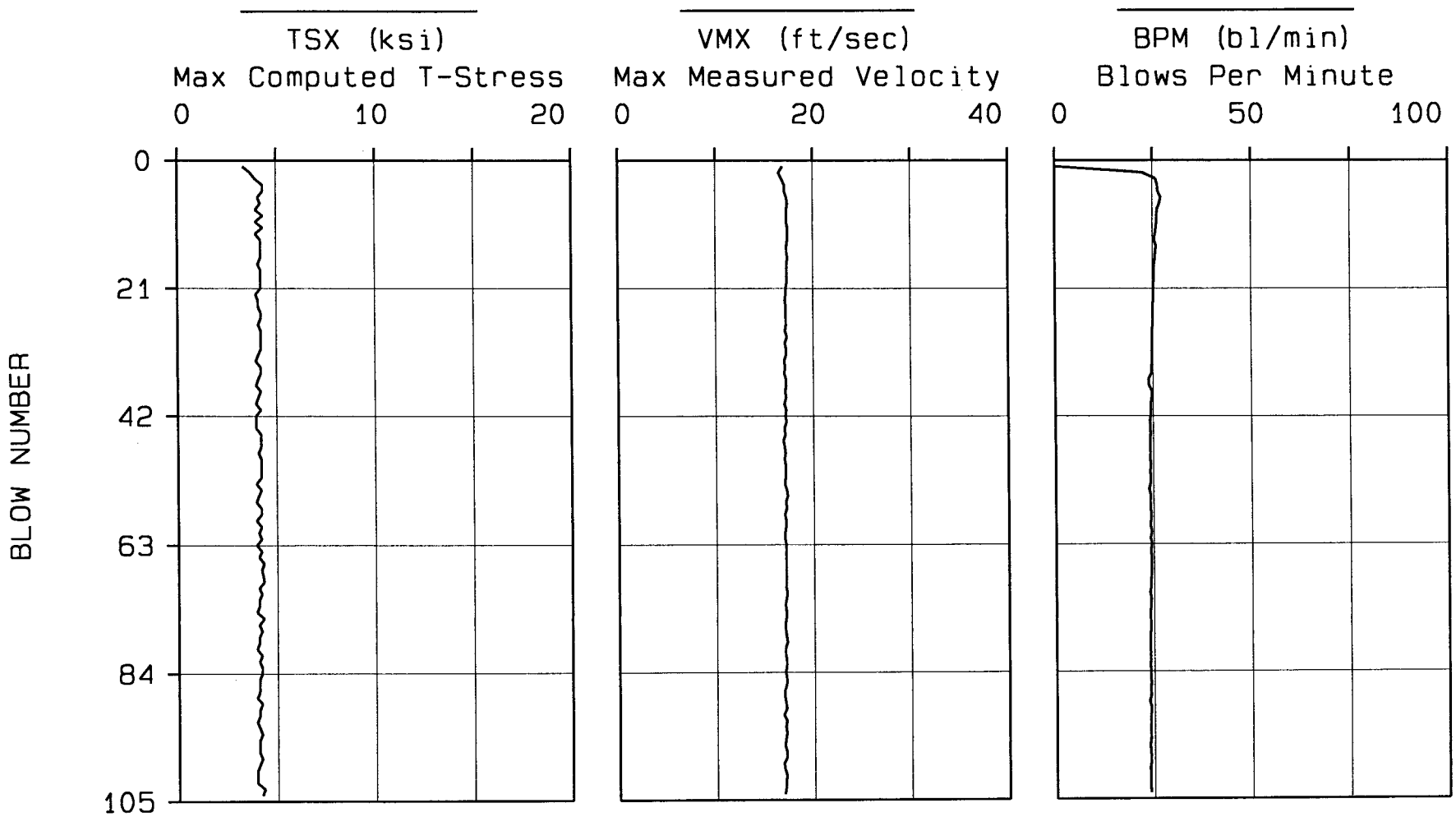
Fugro McClelland 00/12/12

SFOBB PIDP, TP2DR2, MHU-1700



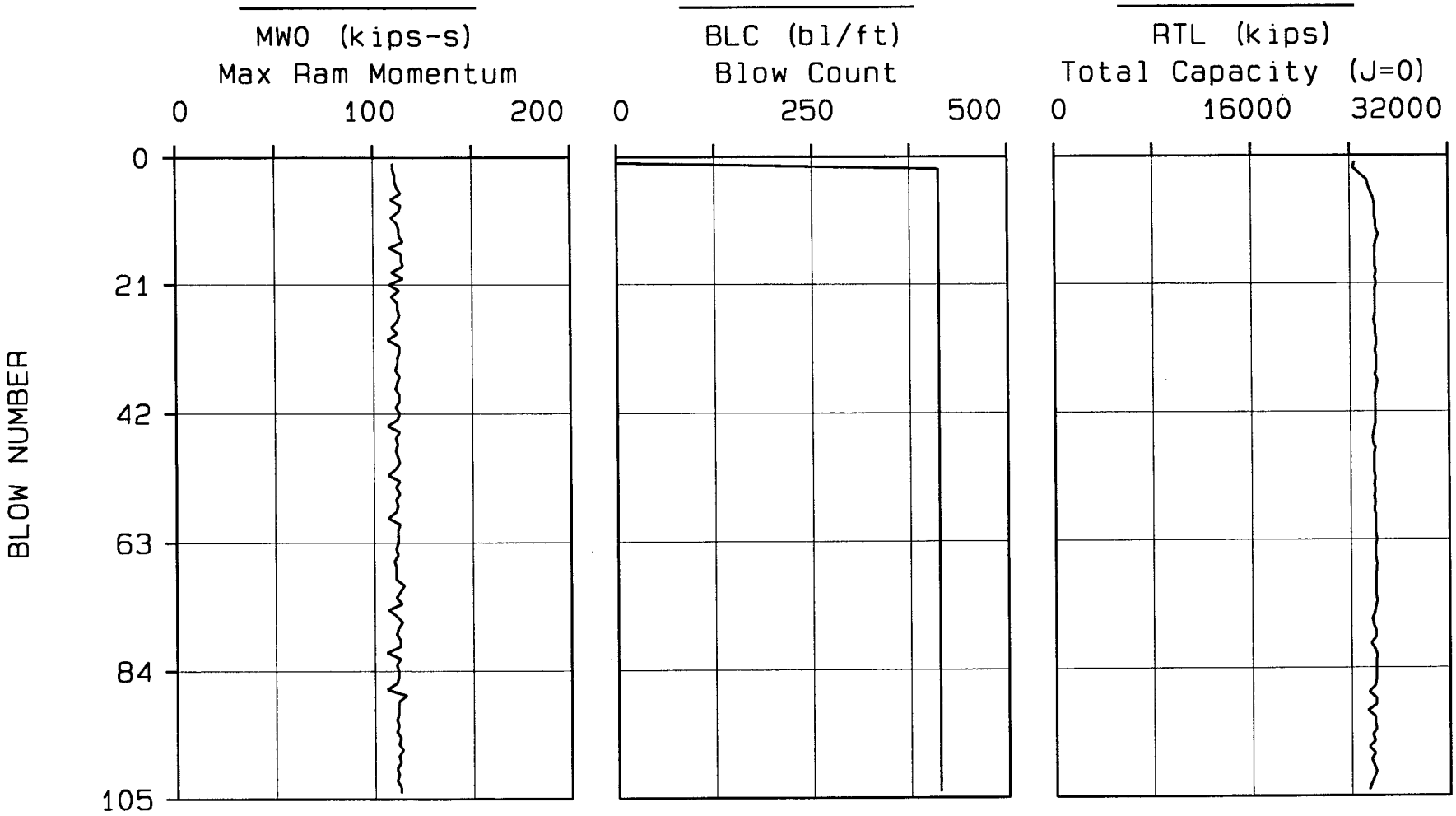
Fugro McClelland 00/12/12

SFOBB PIDP, TP2DR2, MHU-1700



Fugro McClelland 00/12/12

SFOBB PIDP, TP2DR2, MHU-1700

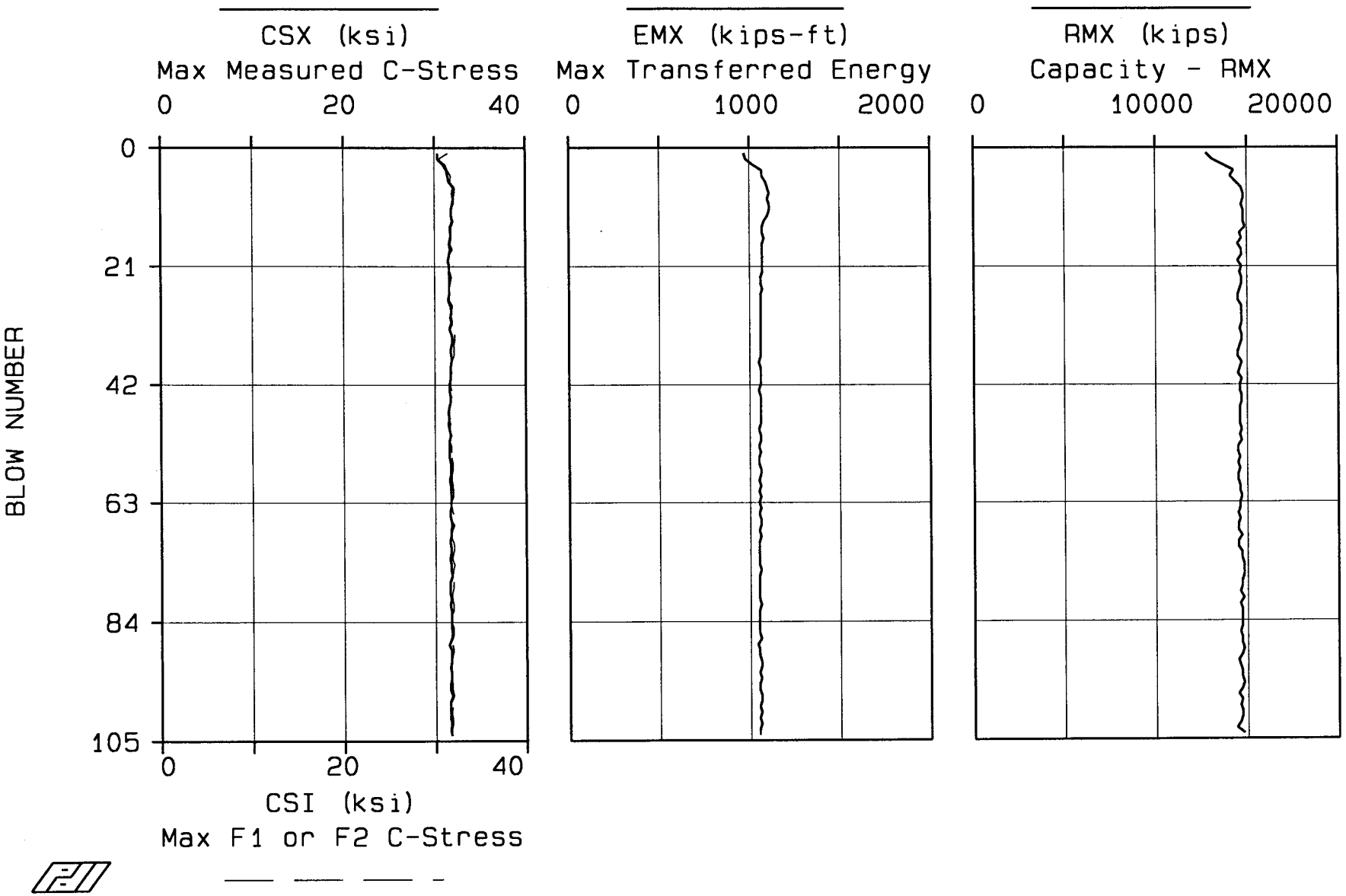


Pile 2, Restrike No. 2, PDA 2

PILE 2, RESTRIKE NO. 2,
PDA 2

Fugro McClelland 00/12/12

SFOBB PIDP, TP2DR2, MHU-1700

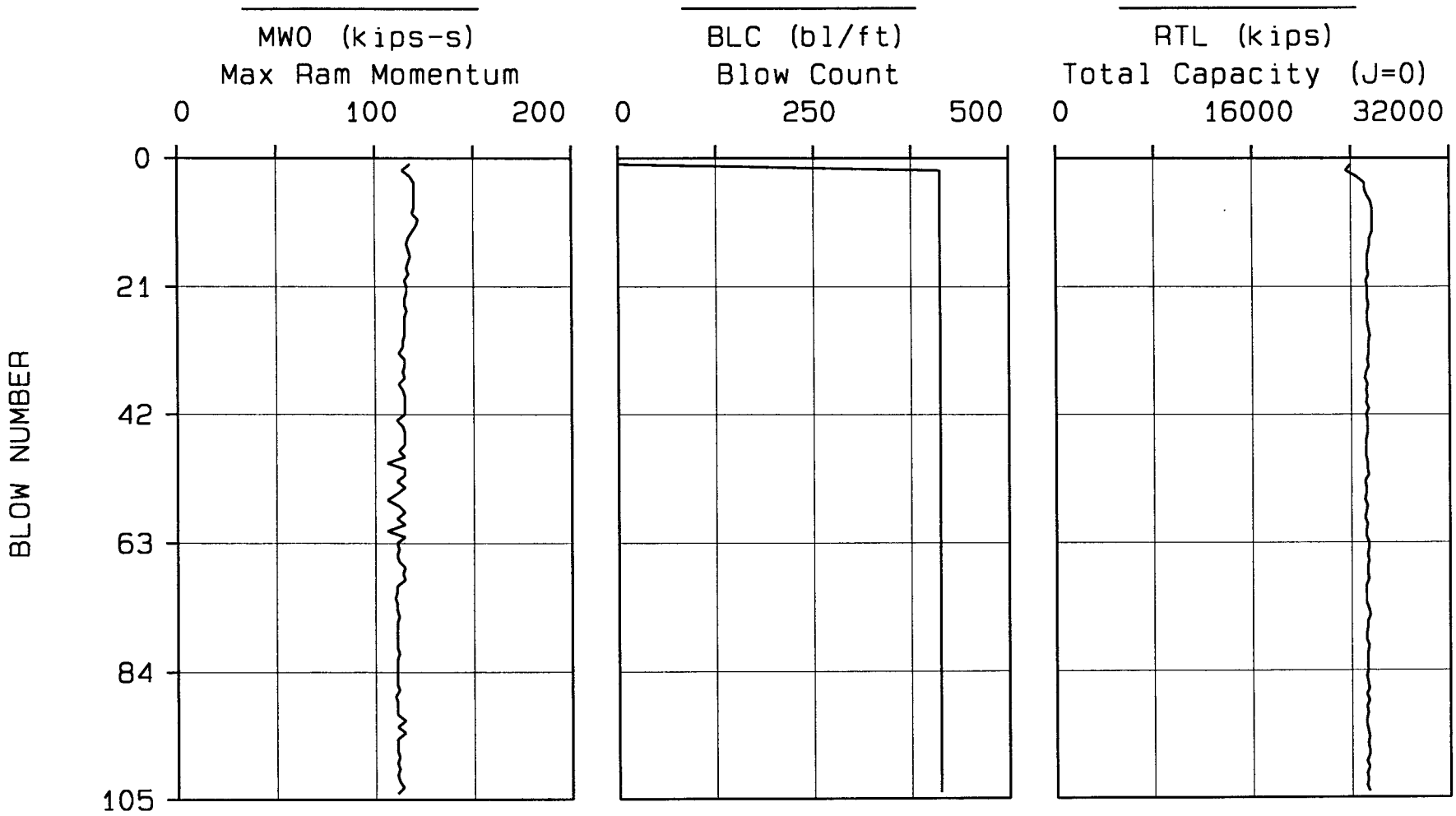


Fugro McClelland 00/12/12

SFOBB PIDP, TP2DR2, MHU-1700

Fugro McClelland 00/12/12

SFOBB PIDP, TP2DR2, MHU-1700



PILE NO. 3

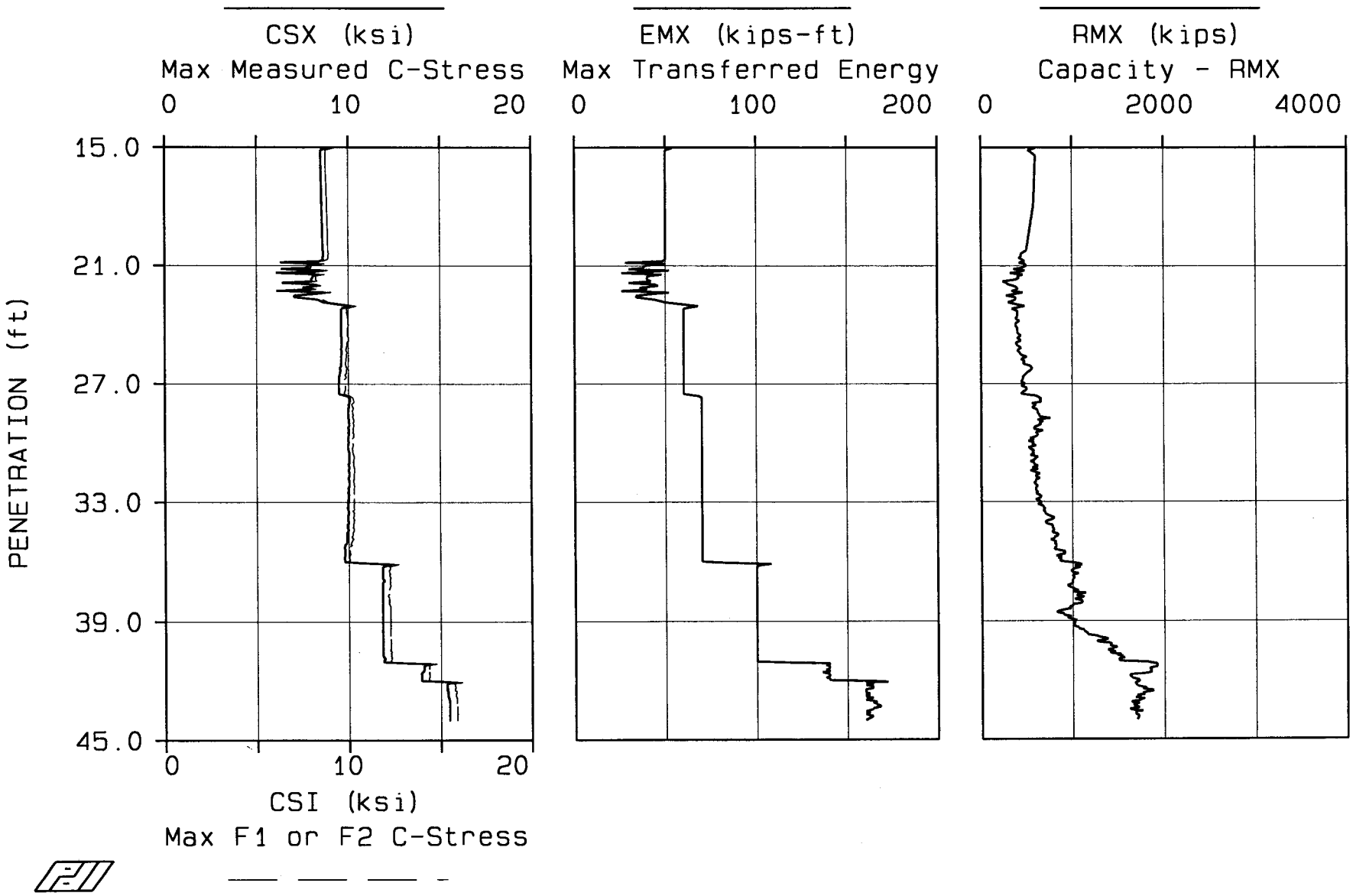
PILE NO. 3

Pile 3, Section B, PDA 1

PILE 3, SECTION B, PDA 1

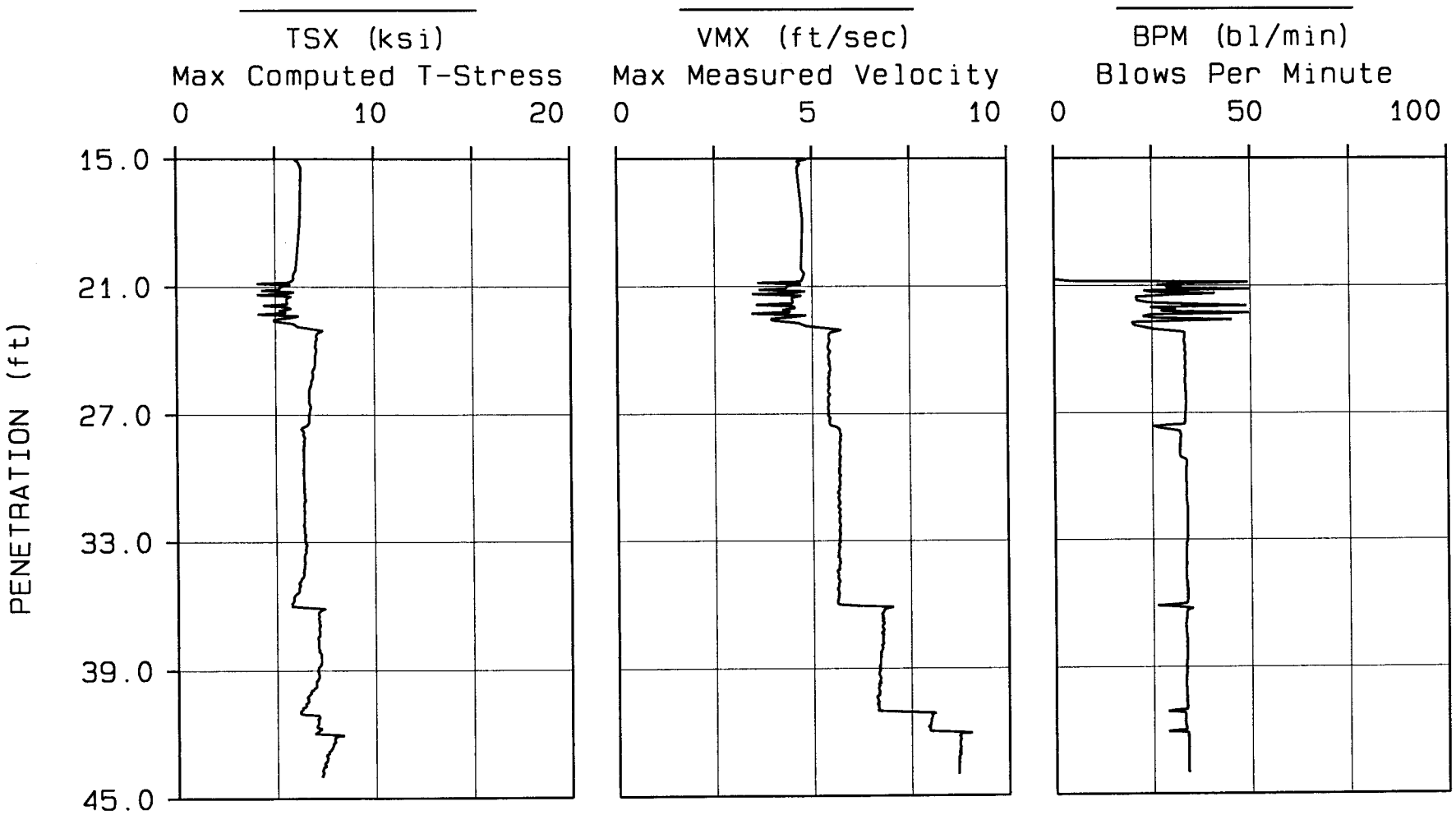
Fugro McClelland 00/12/3

SFOBB PIDP, TP3B, MHU-500T



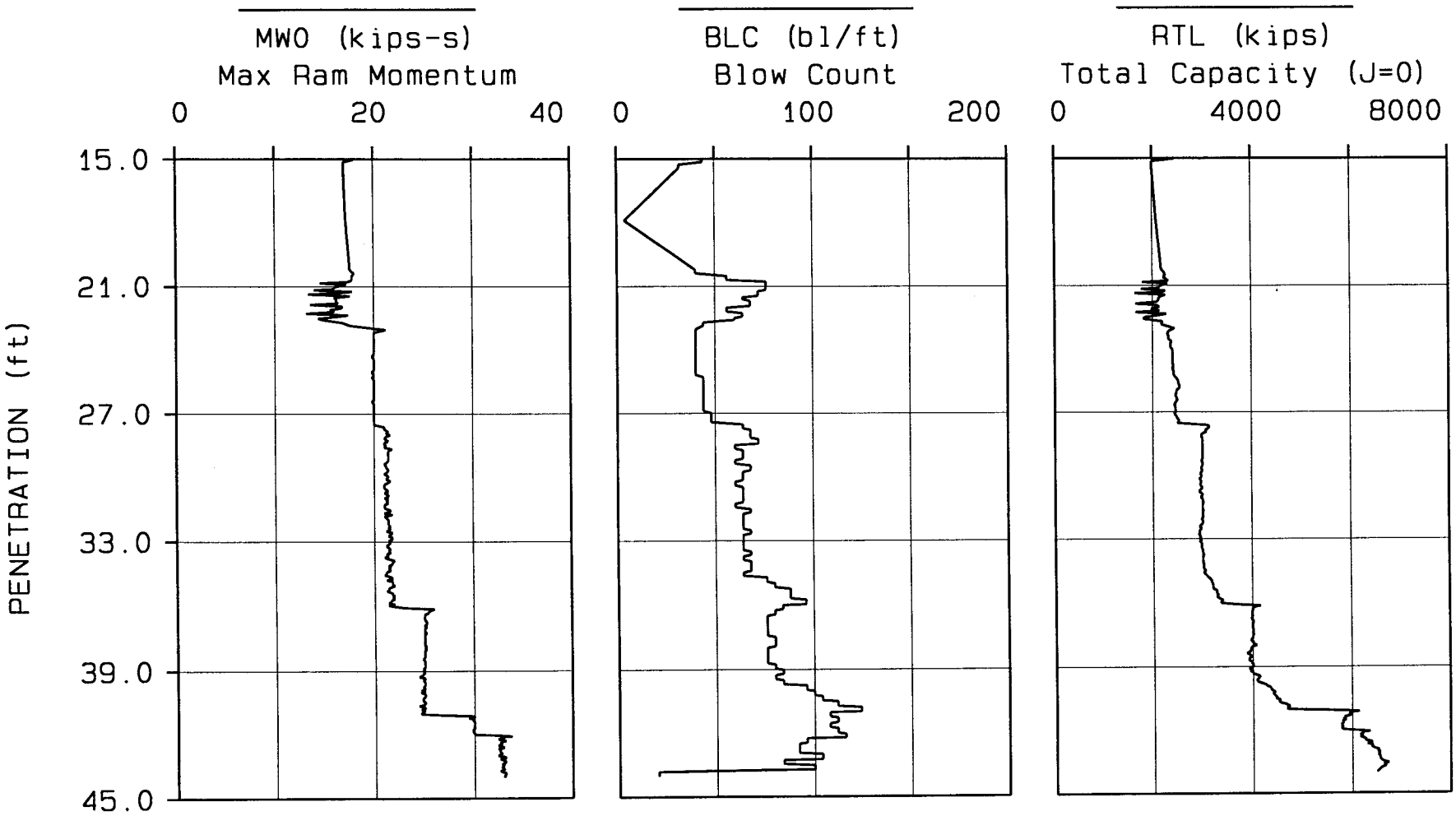
Fugro McClelland 00/12/3

SFOBB PIDP, TP3B, MHU-500T



Fugro McClelland 00/12/3

SFOBB PIDP, TP3B, MHU-500T

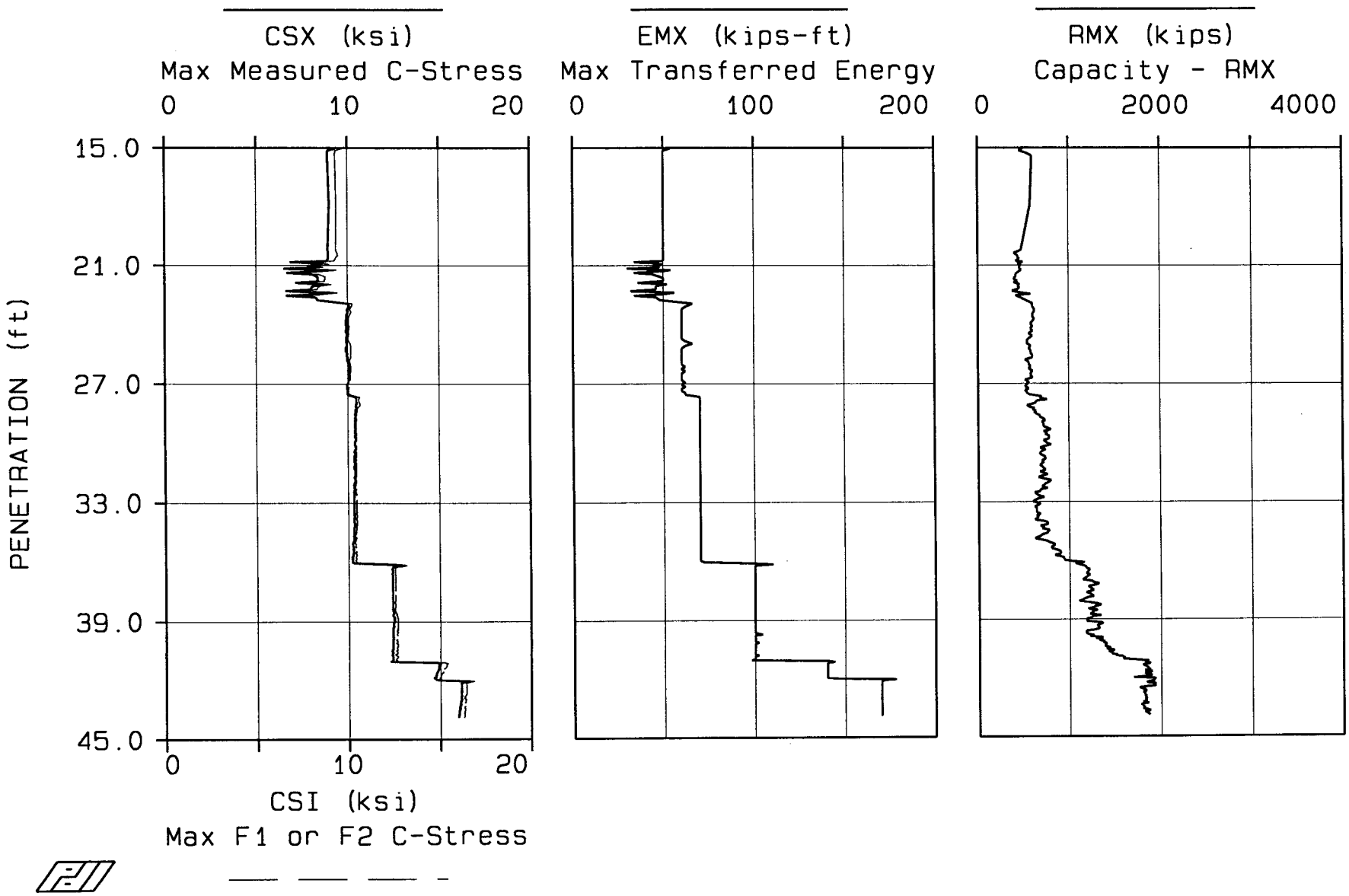


Pile 3, Section B, PDA 2

PILE 3, SECTION B, PDA 2

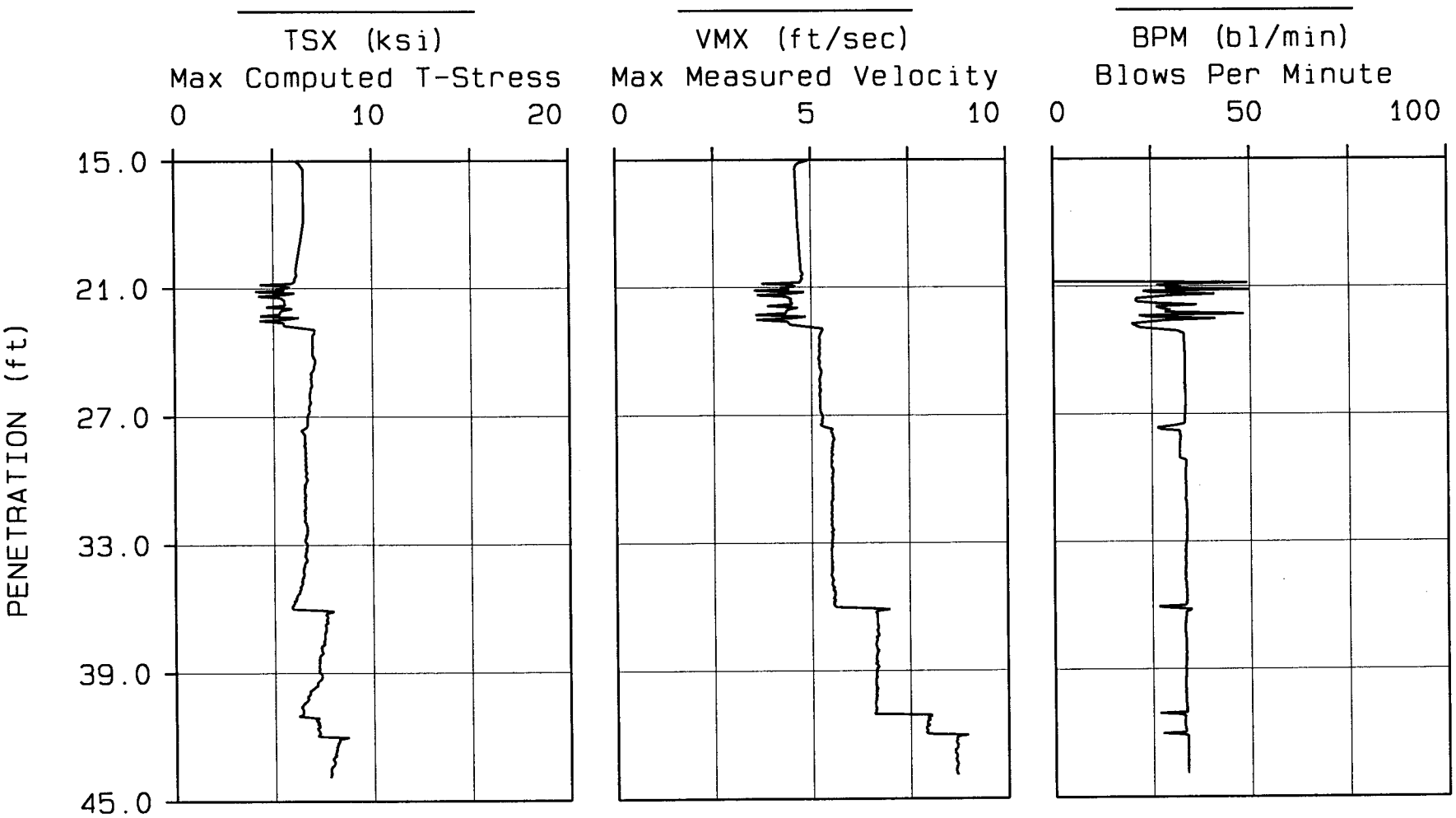
Fugro McClelland 00/12/3

SFOBB PIDP, TP3B, Menck MHU-500T



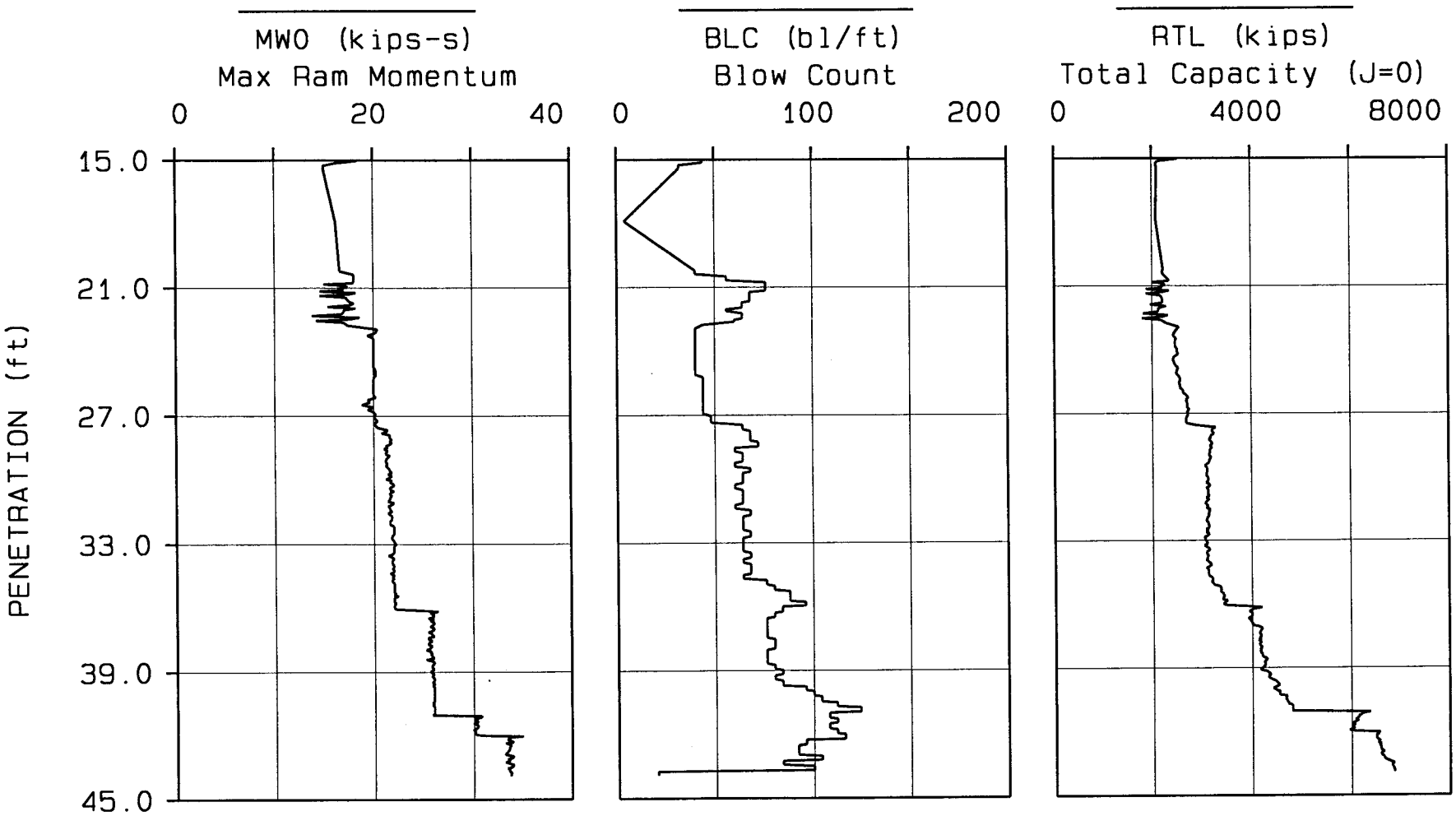
Fugro McClelland 00/12/3

SFOBB PIDP, TP3B, Menck MHU-500T



Fugro McClelland 00/12/3

SFOBB PIDP, TP3B, Menck MHU-500T



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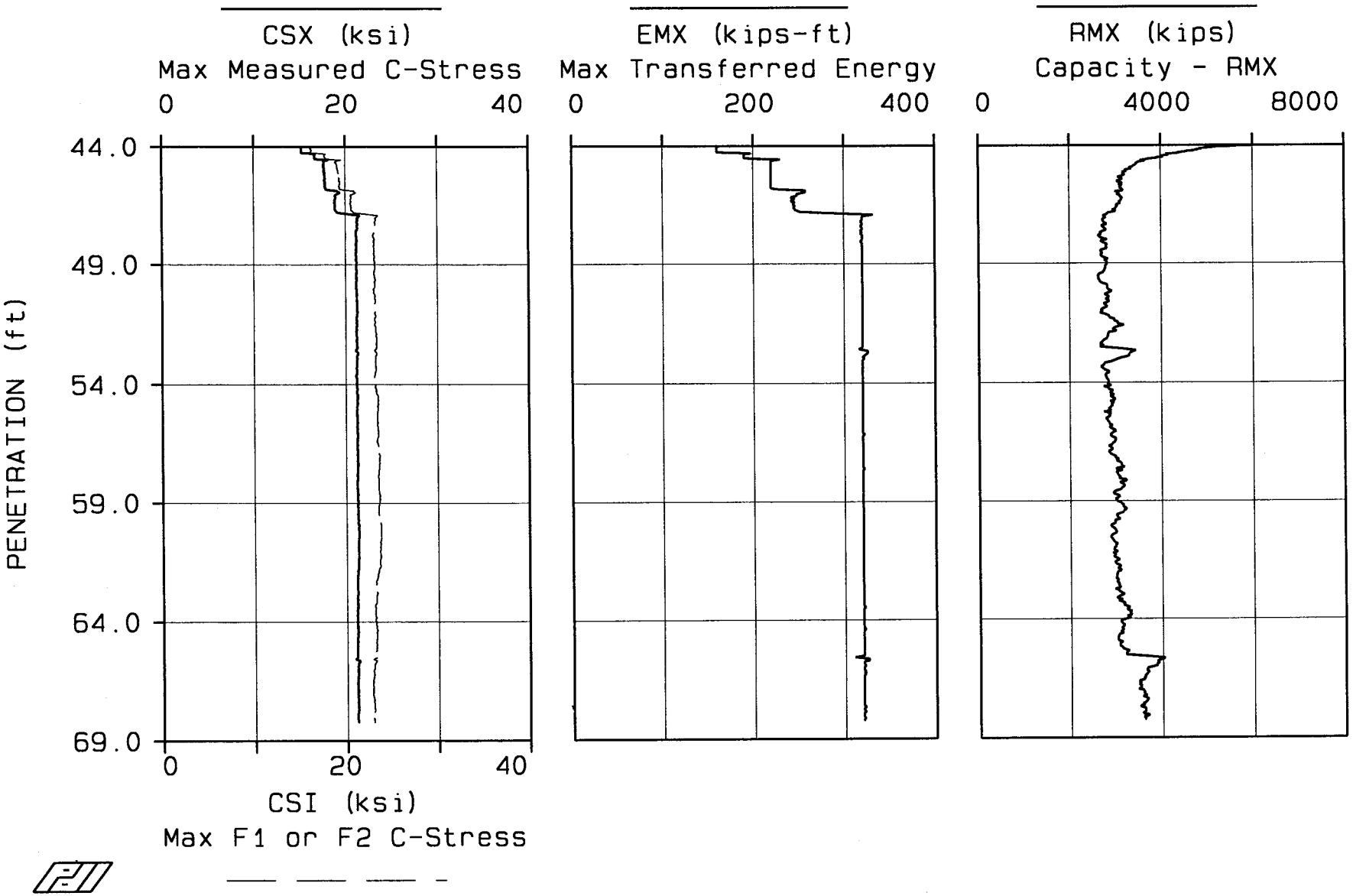
PILE 3, SECTION C, PDA 1

Fugro McClelland 00/12/7

SFOBB PIDP, TP3C, MHU-500T



Fugro McClelland 00/12/7

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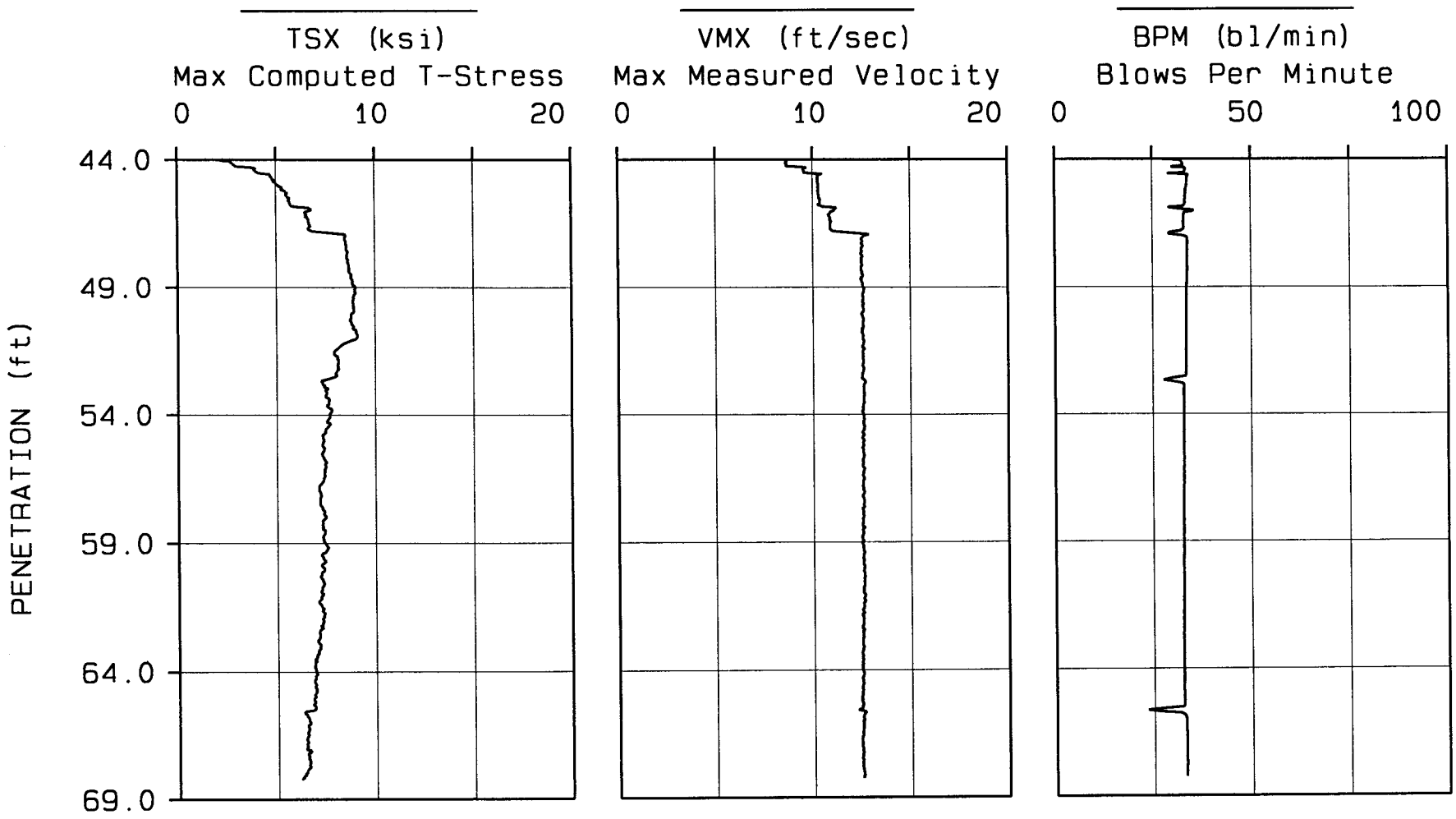

Fugro McClelland 00/12/7

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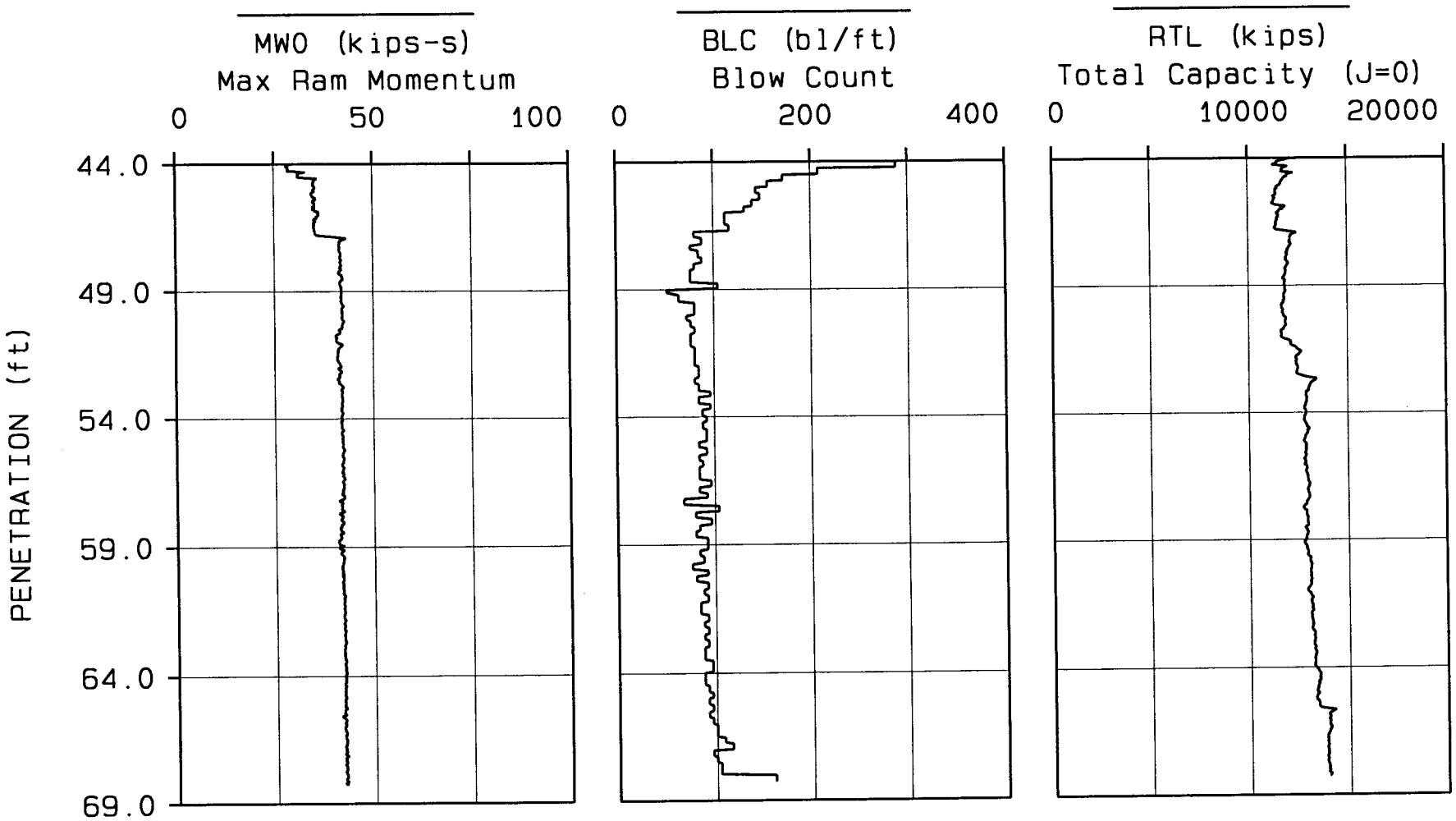

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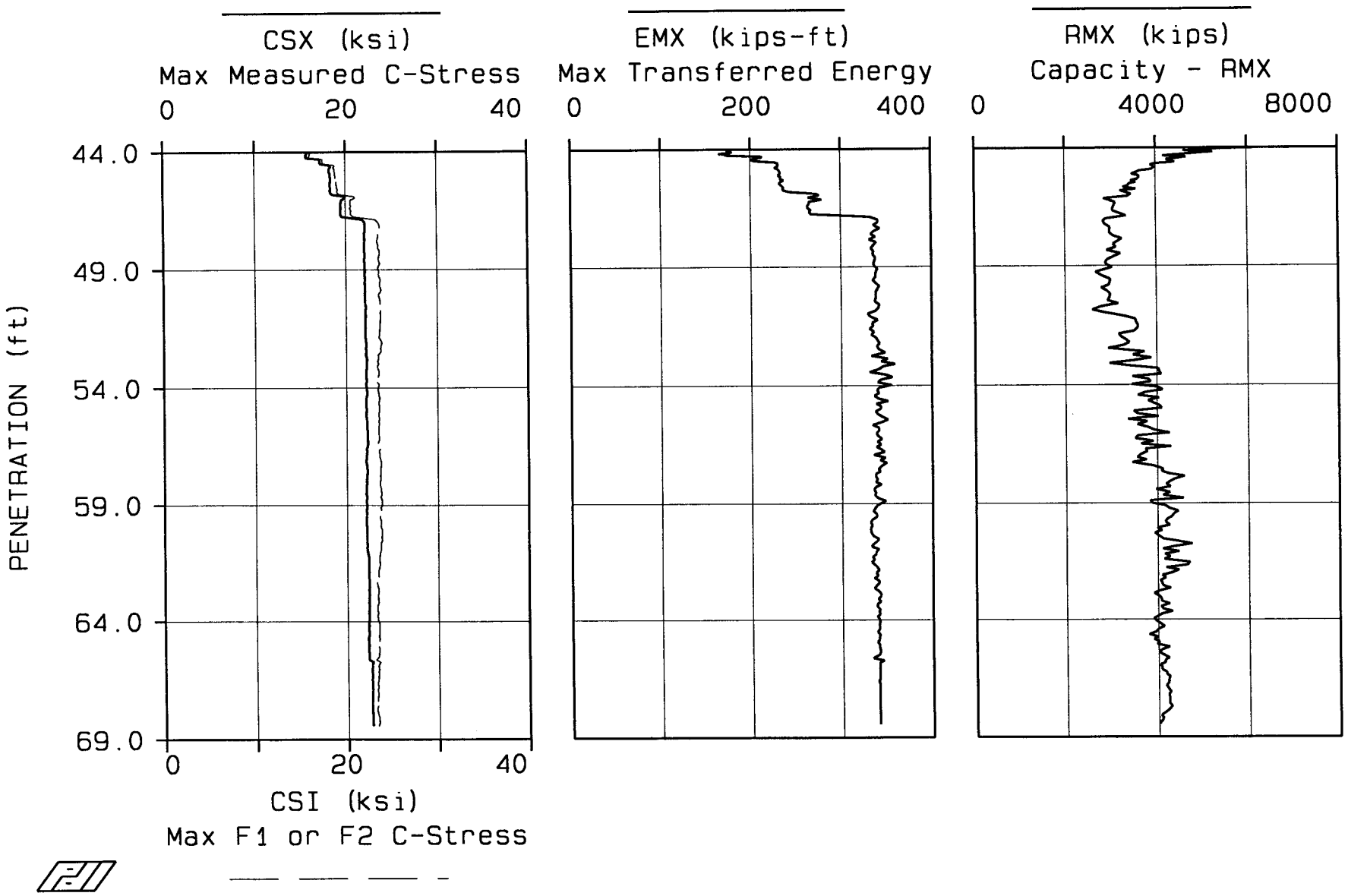
PILE 3, SECTION C, PDA 2

Fugro McClelland 00/12/7

SFOBB PIDP, TP3C, MHU-500T



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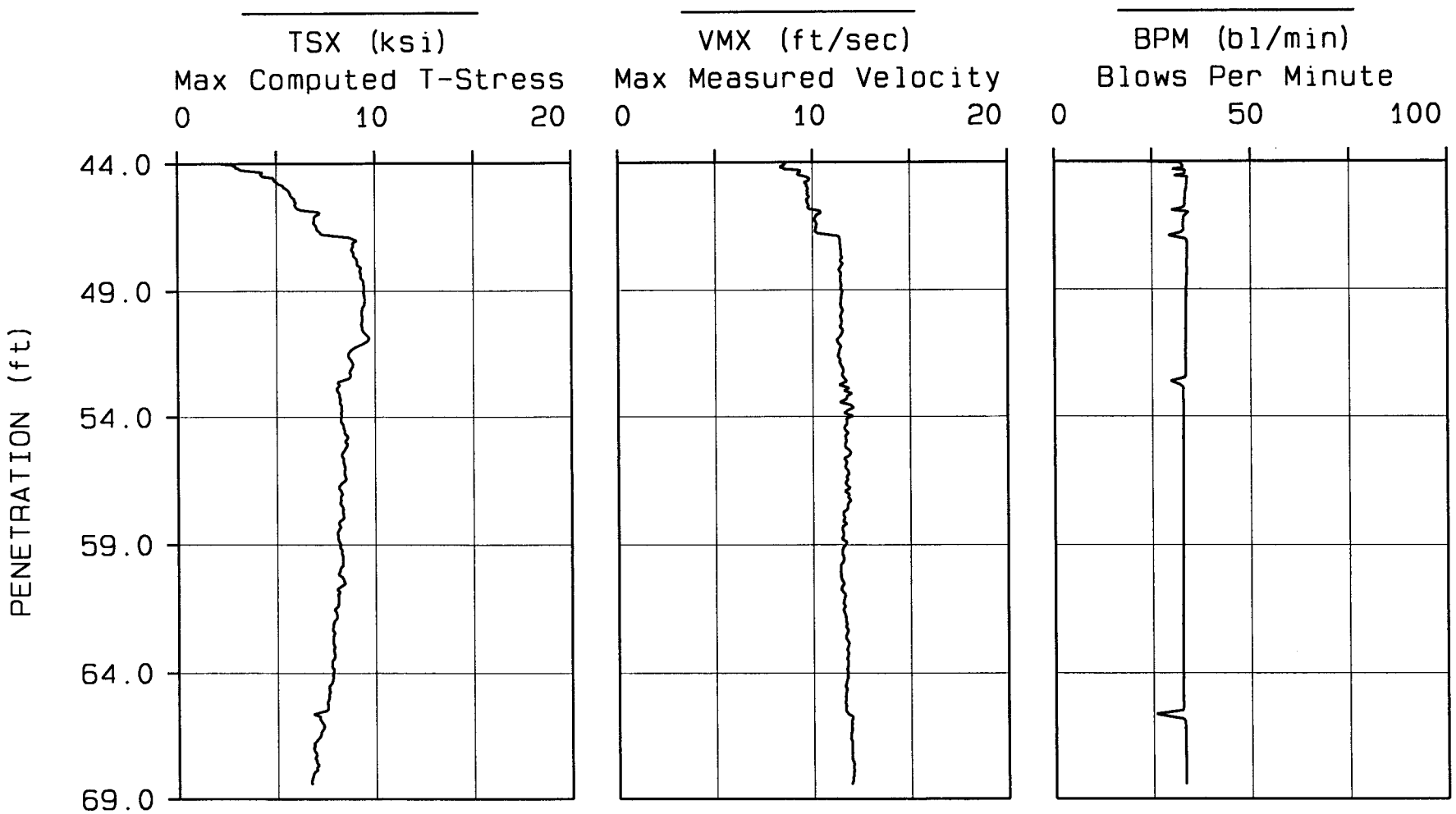

Fugro McClelland 00/12/7

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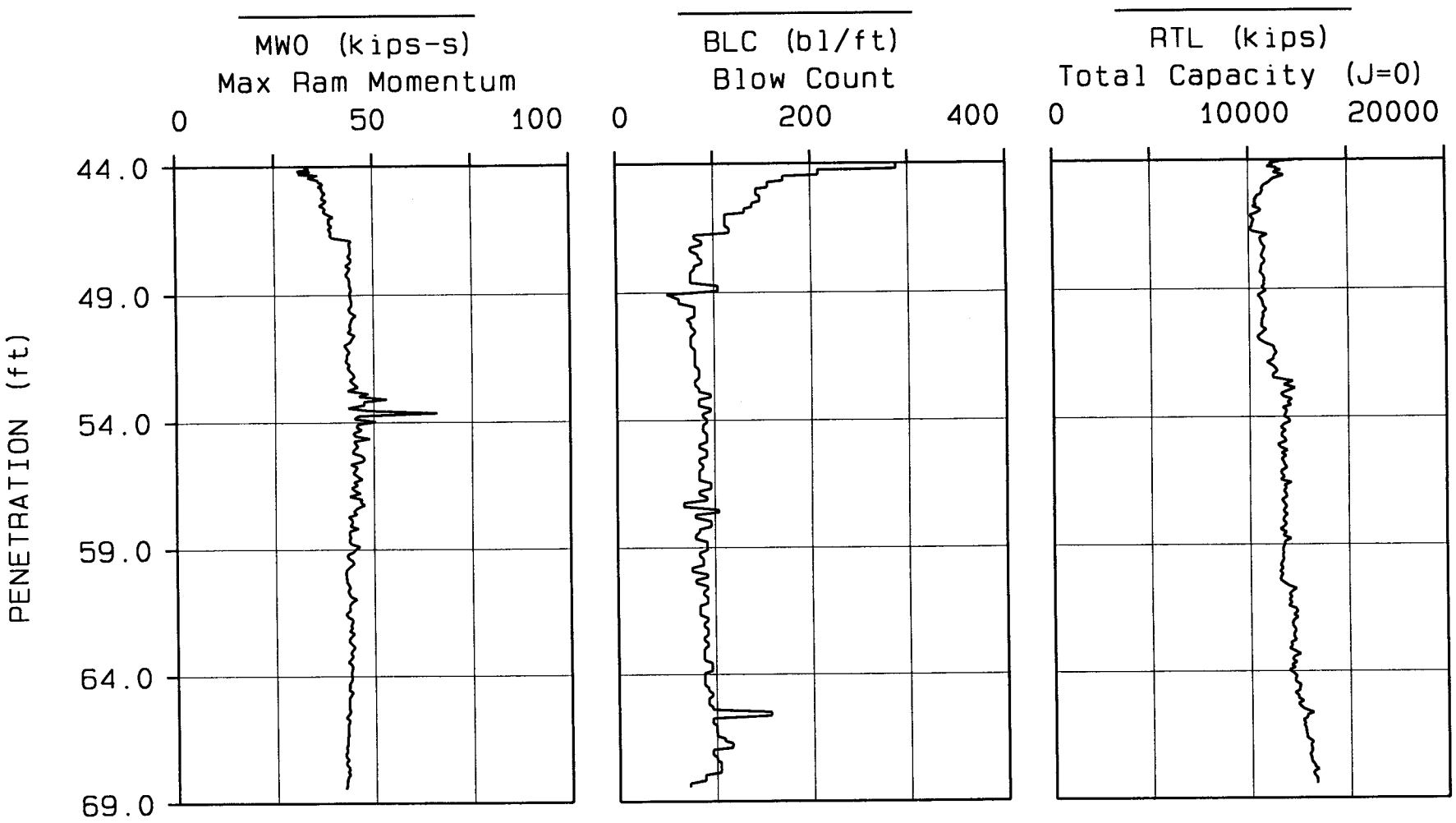
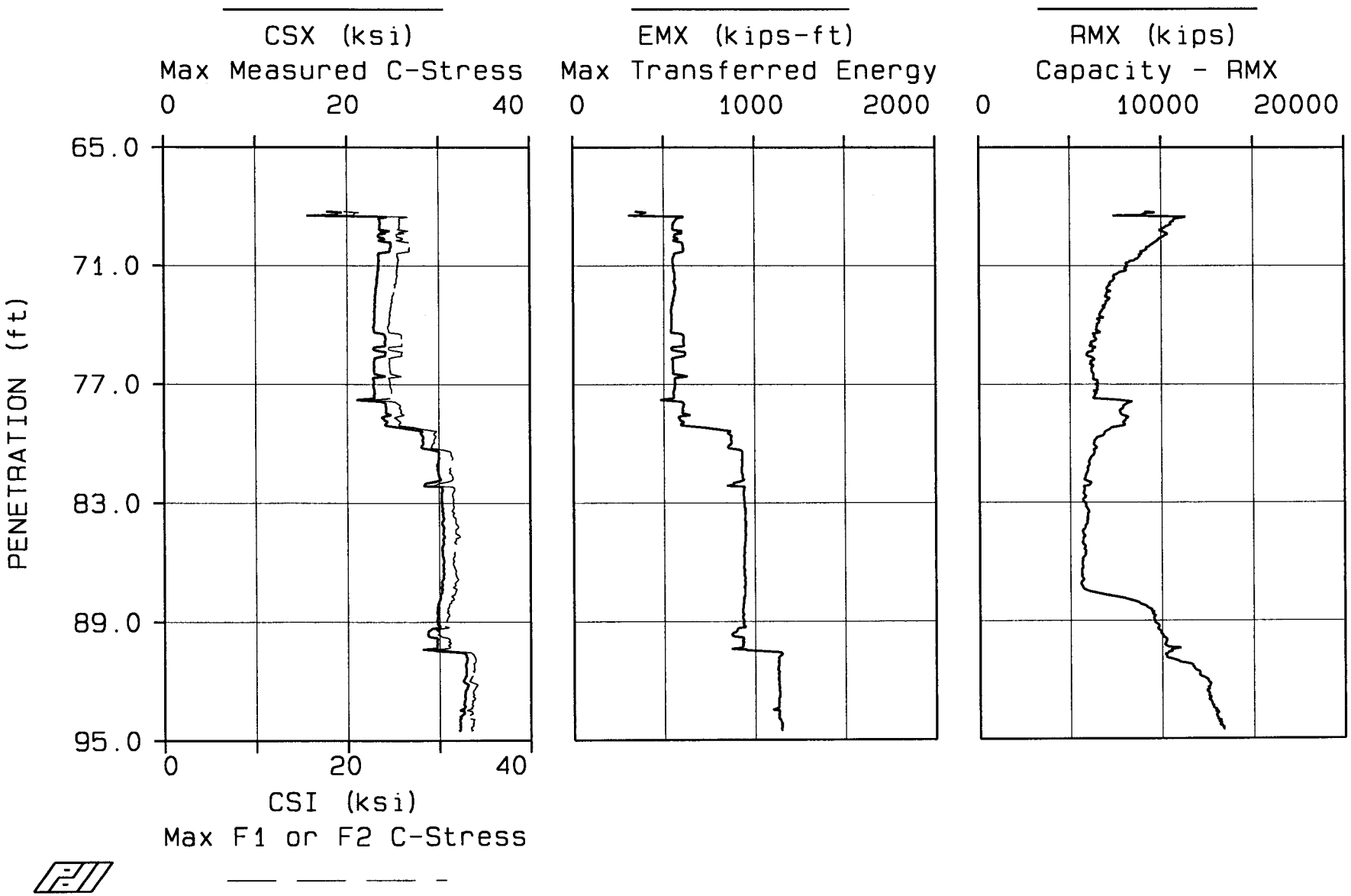


Pile 3, Section D, PDA 1

PILE 3, SECTION D, PDA 1

Fugro McClelland 00/12/11

SFOBB PIDP, TP3D, MHU-1700

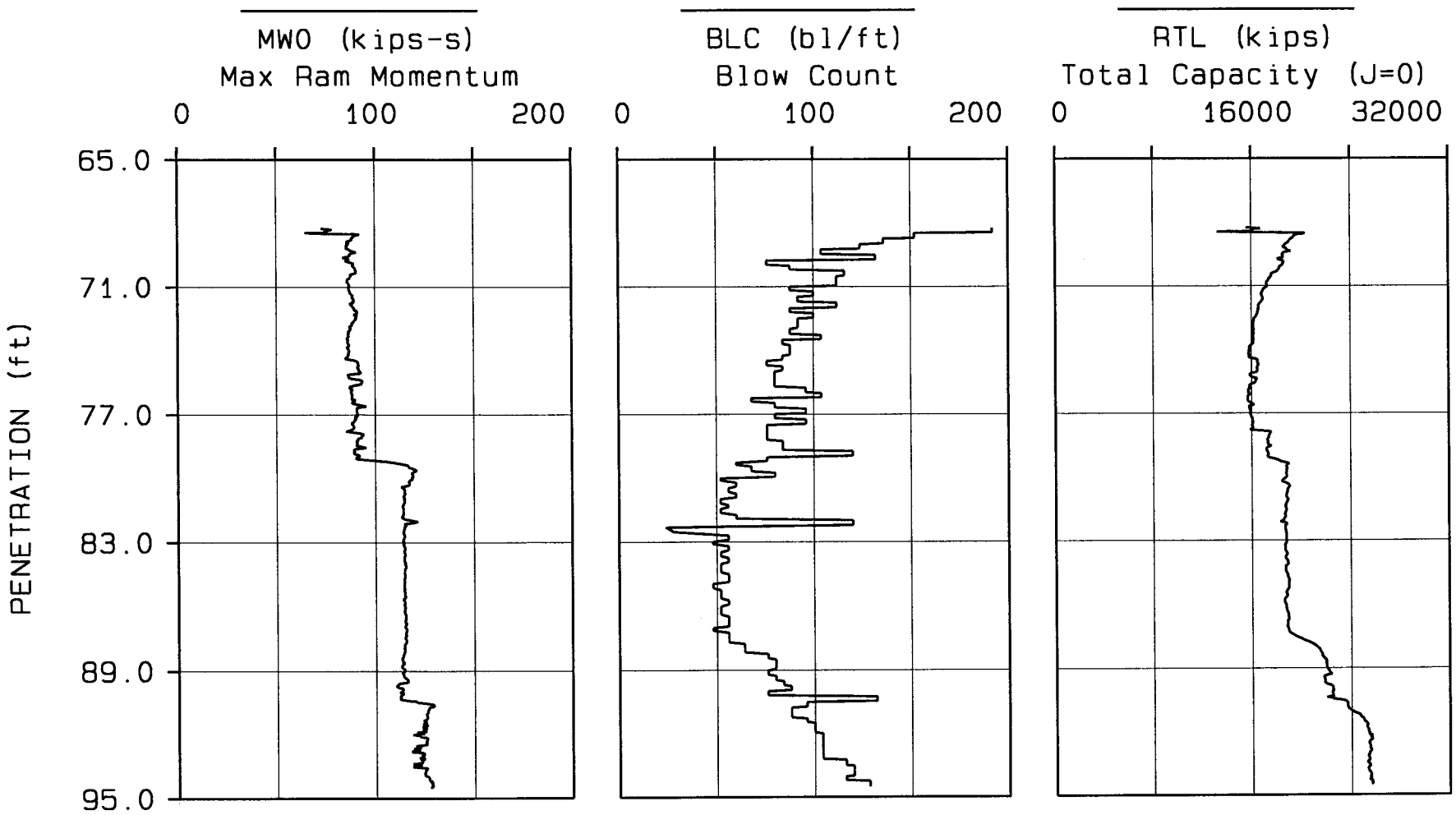


Fugro McClelland 00/12/11

SFOBB PIDP, TP3D, MHU-1700

Fugro McClelland 00/12/11

SFOBB PIDP, TP3D, MHU-1700



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PILE 3, SECTION D, PDA 2

Fugro McClelland 00/12/11

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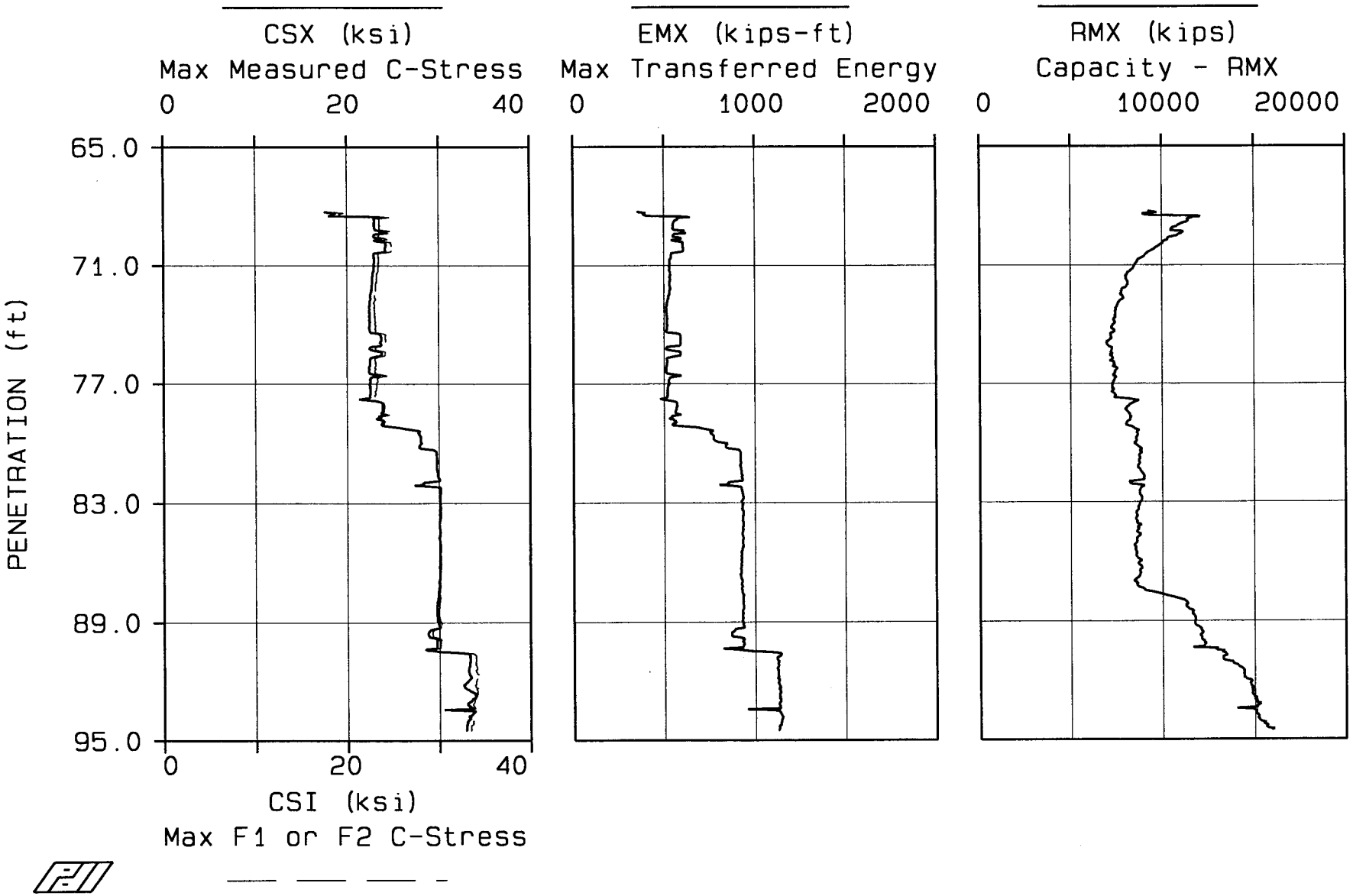
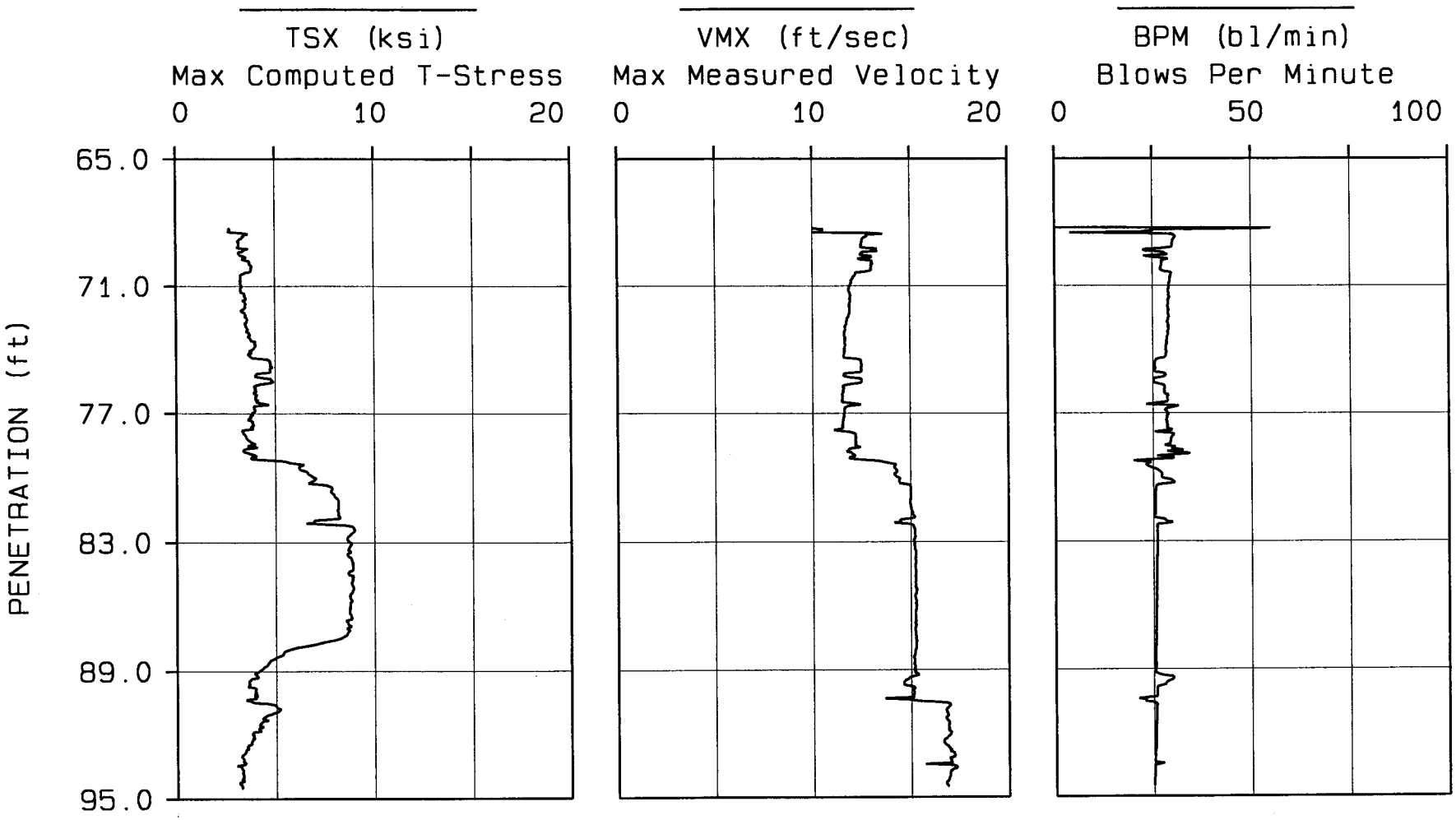


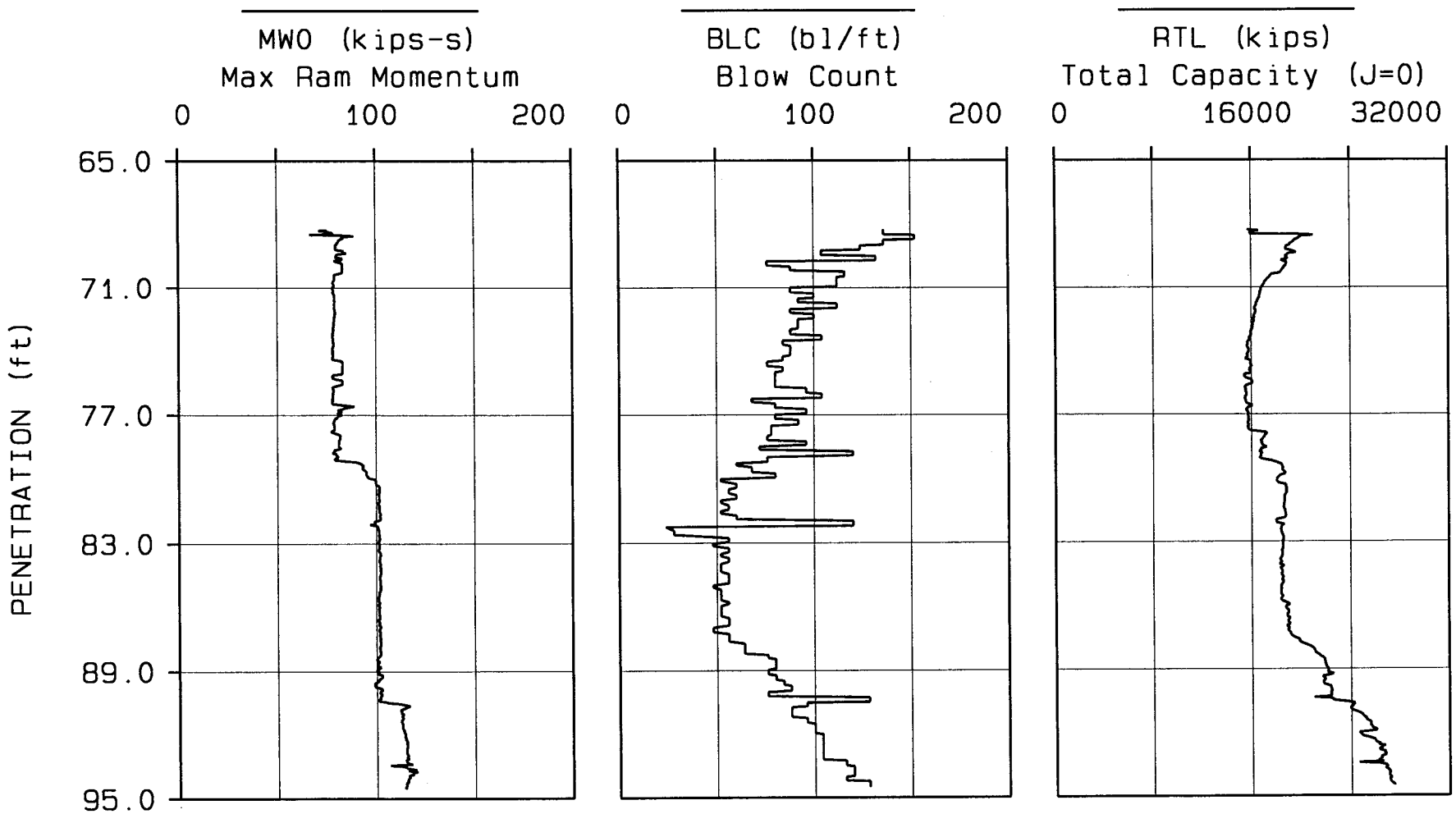
Fugro McClelland 00/12/11

SFOBB PIDP, TP3D, MHU-1700



Fugro McClelland 00/12/11

SFOBB PIDP, TP3D, MHU-1700

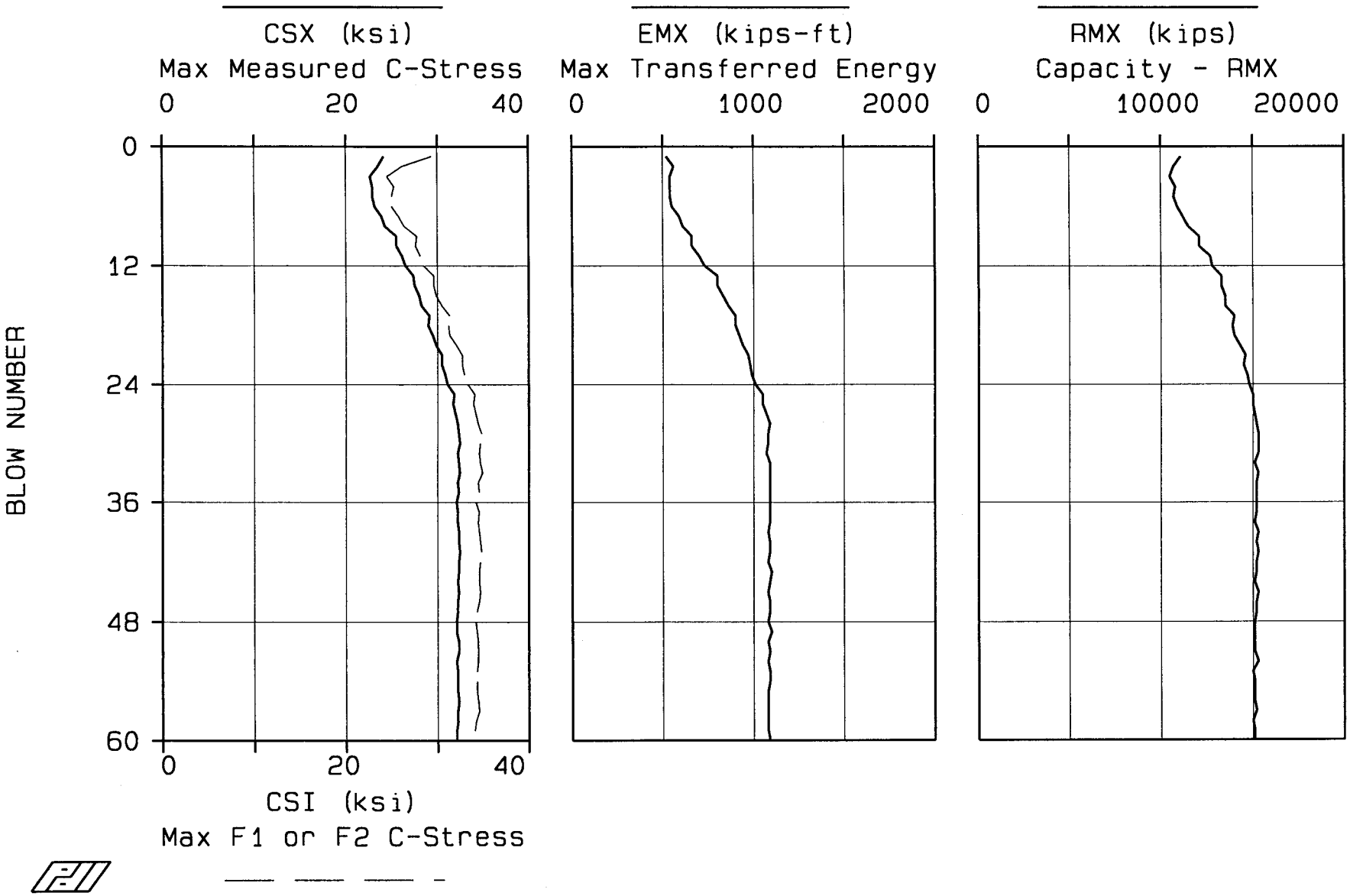


Pile 3, Restrike No. 1, PDA 1

PILE 3, RESTRIKE NO. 1, PDA 1

Fugro McClelland 00/12/13

SFOBB PIDP, TP3DR, MHU-1700



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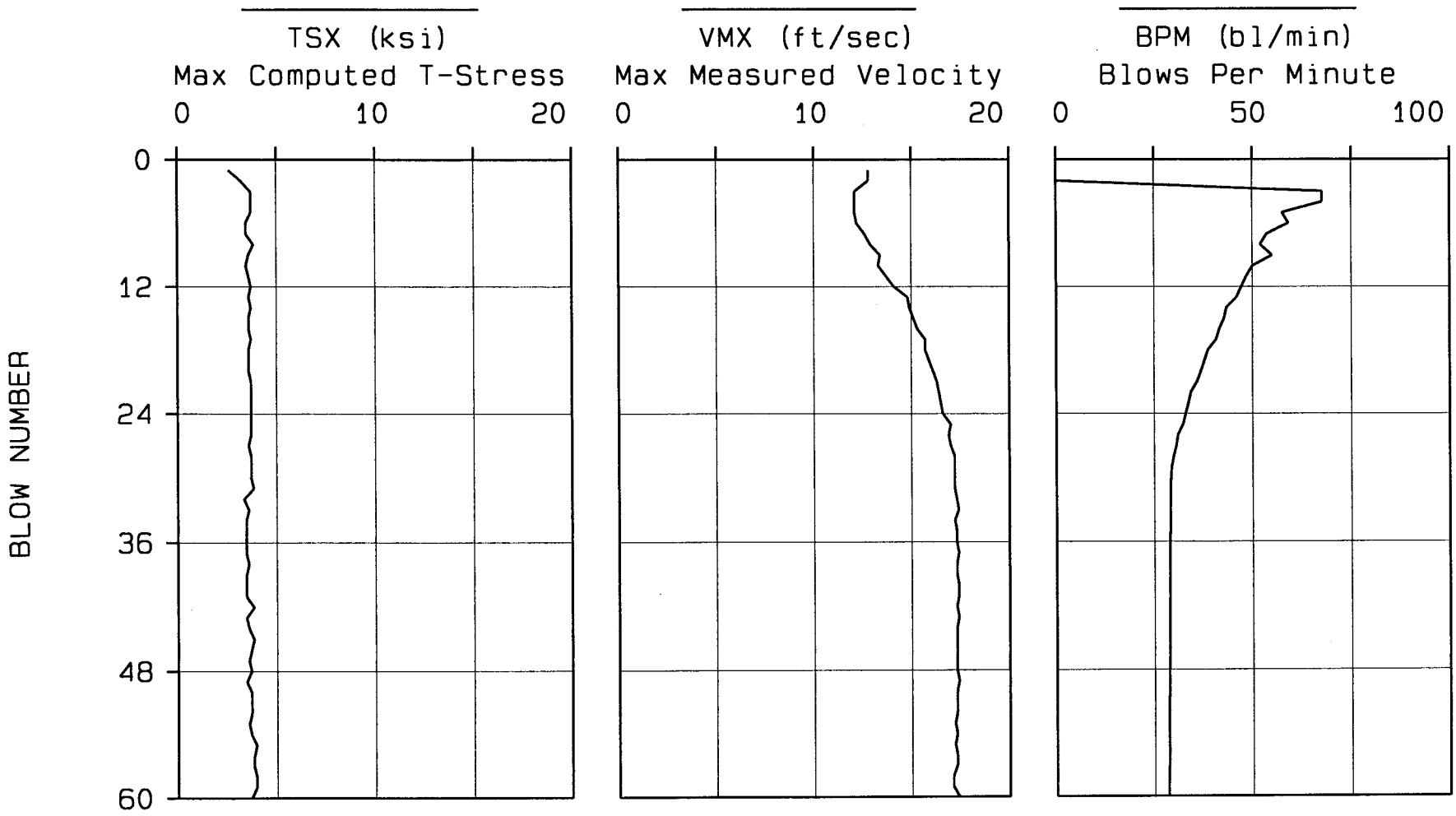

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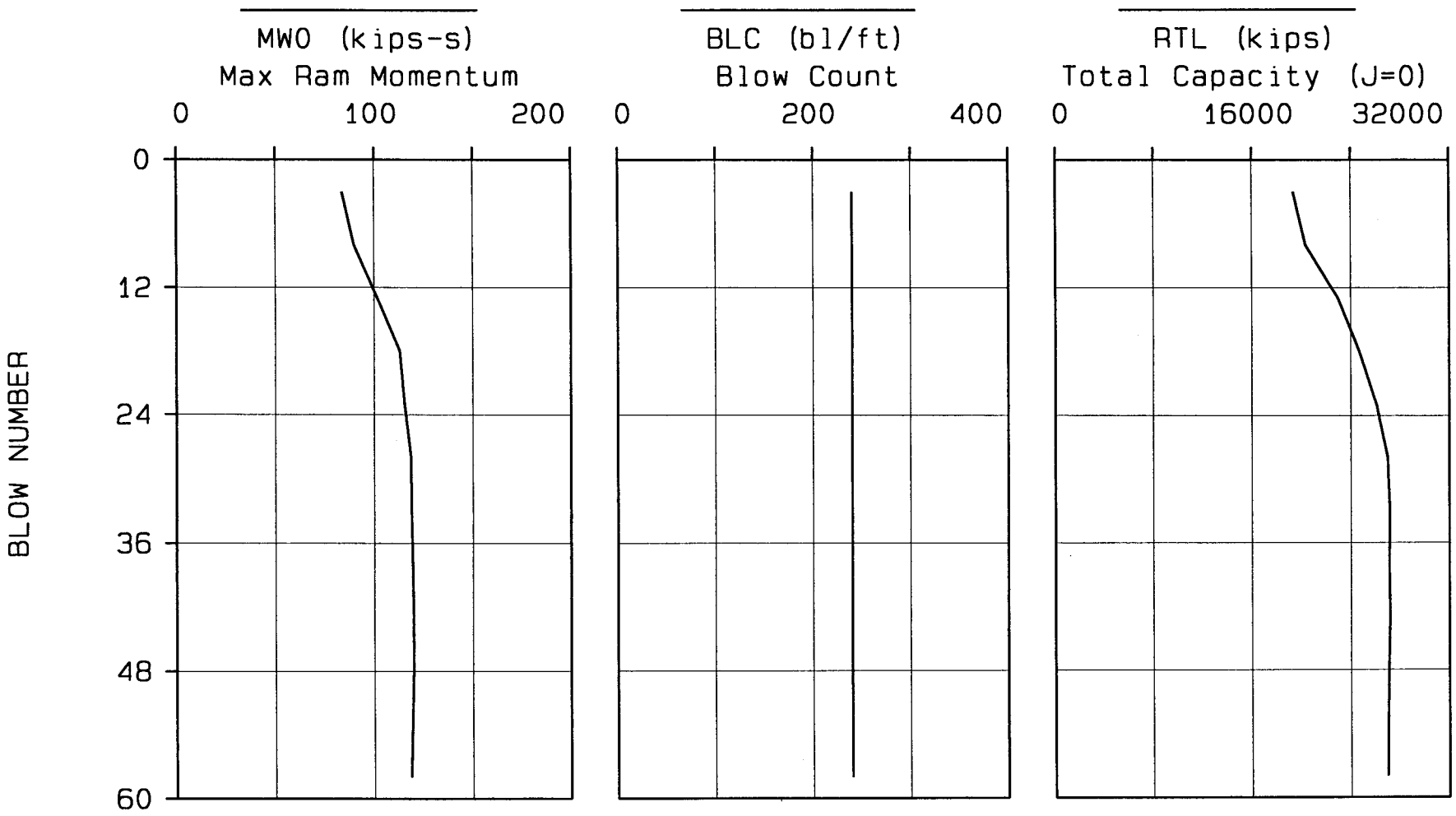

Pile 3, Restrike No. 1, PDA 2

PILE 3, RESTRIKE NO. 1,
PDA 2

Fugro McClelland 00/12/13

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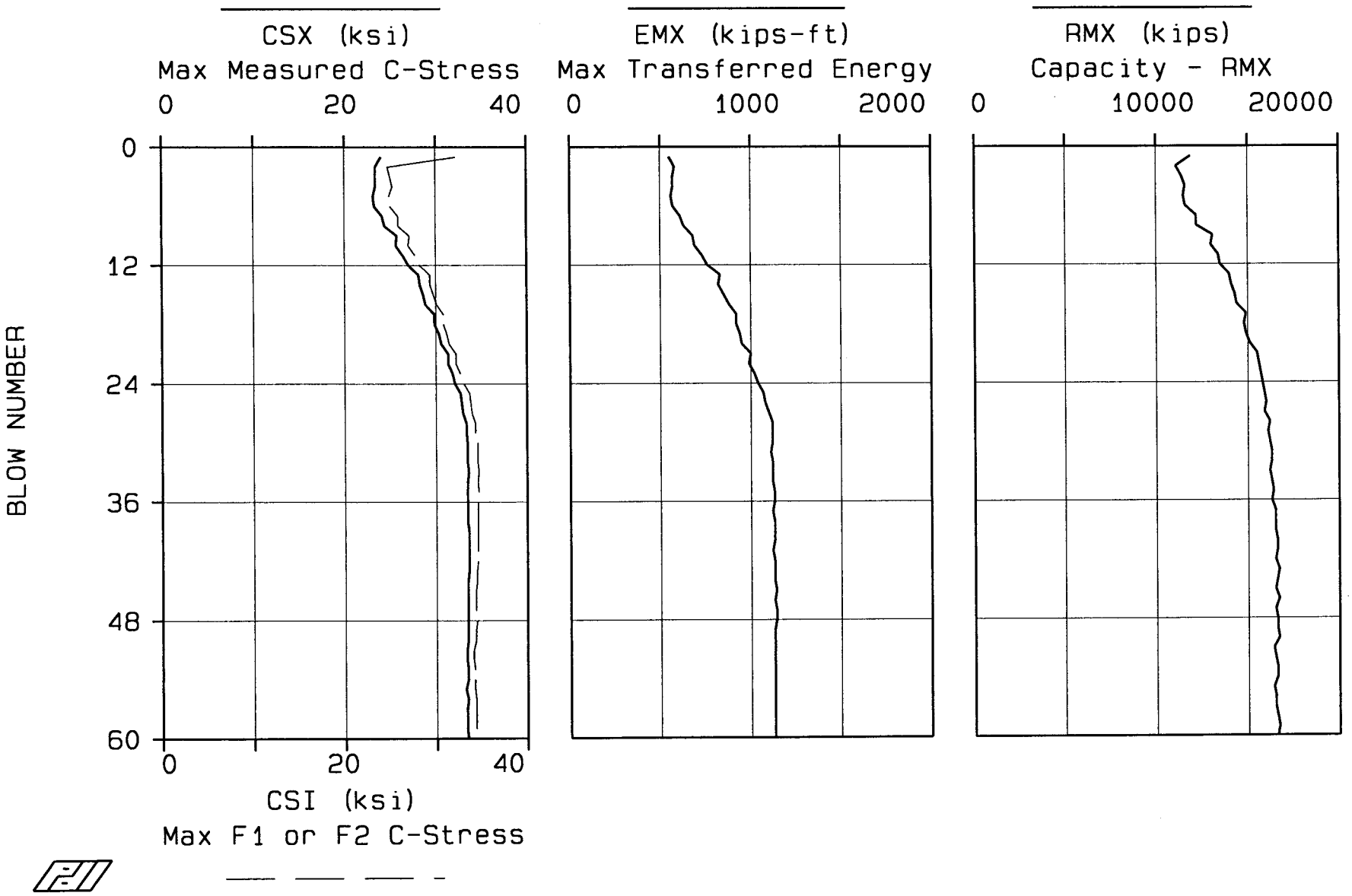

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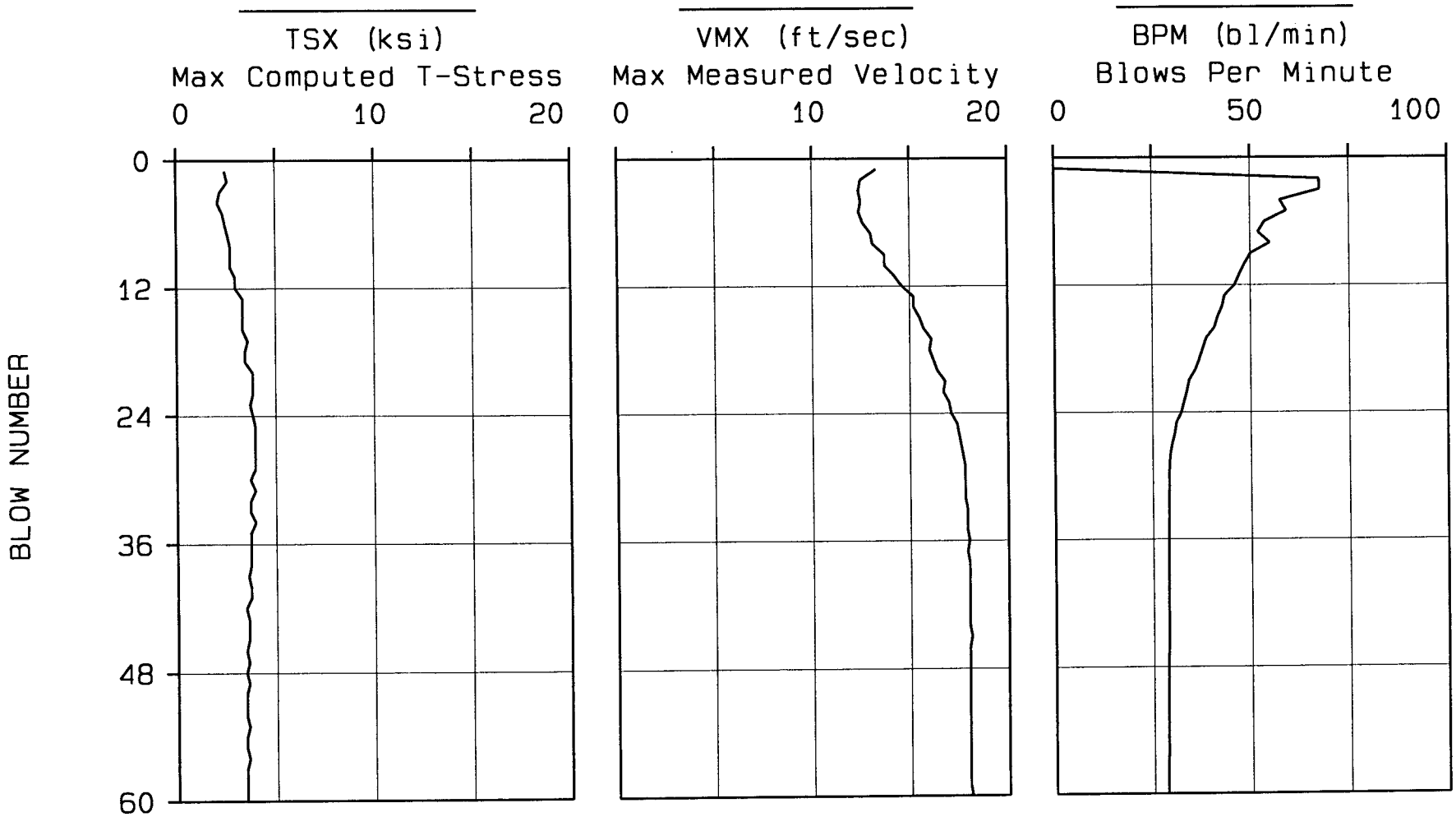

Fugro McClelland 00/12/13

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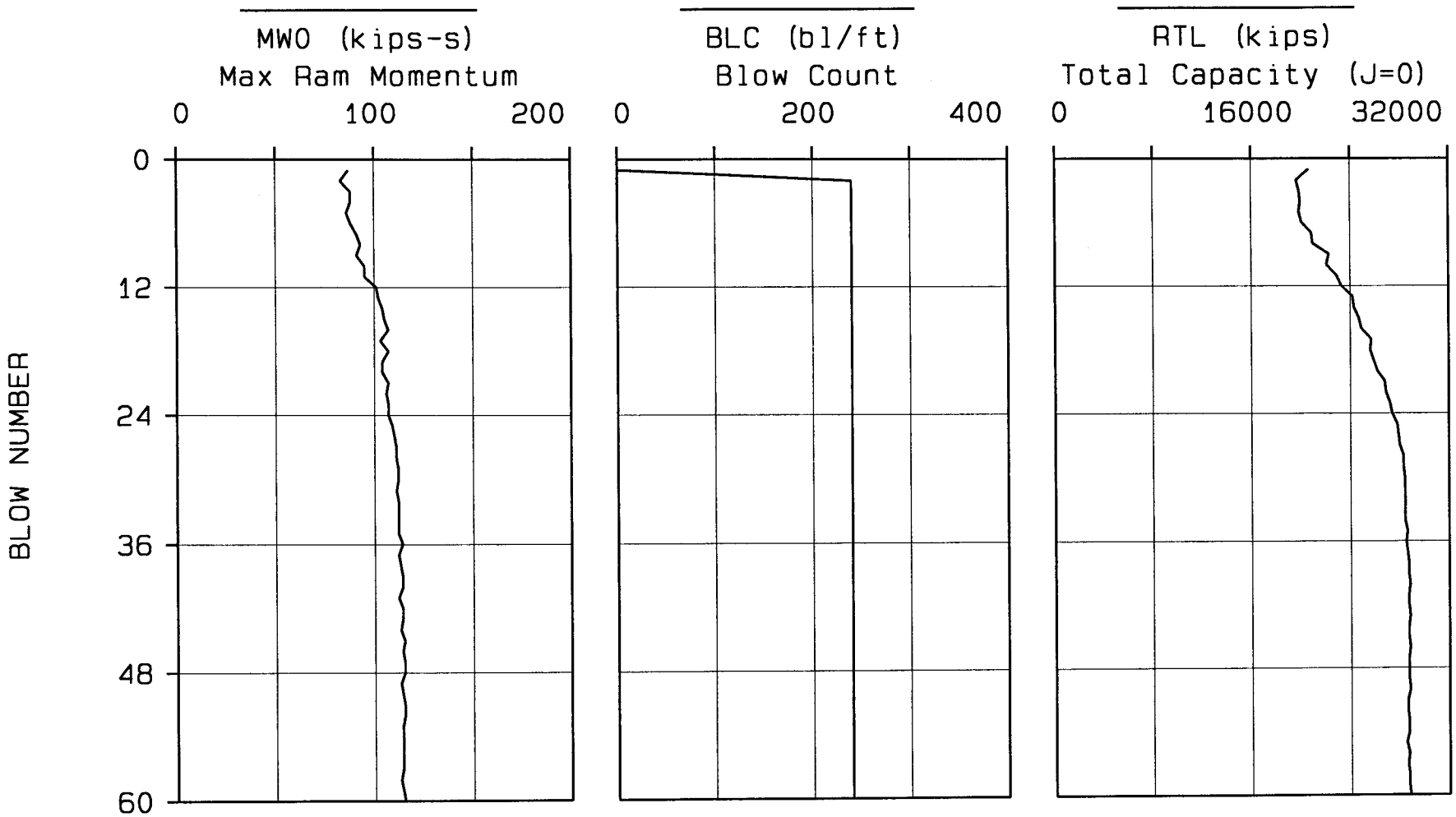


APPENDIX D
CAPWAP DATA AND ANALYSES

Pile No. 1, Section D

Summary of Included CAPWAP Analyses		
Driving Designation	**Blow No.**	**PDA Set**
BOID	5	PDA 2
EOID	2193	PDA 1
EOID	2197	PDA 2
EOR	40	PDA 1
EOR	51	PDA 2
BOR2	1	PDA 1
BOR2	1	PDA 2
EOR2	138	PDA 1
BOR3	1	PDA 2
BOR3	2	PDA 1
BOR3	45	PDA 1
EOR3	195	PDA 1

Note:

BOID = Beginning of Initial Driving
EOID = End of Initial Driving
BOR = Beginning of Restrike No.
EOR = End of Restrike No.

PILE 1
BOID, BLOW NO. 5, PDA 2

PILE 1
BOID, BLOW NO. 5, PDA 2

SFOBB PIDP, Pile TP1D, MHU-1700, BoID
Fugro-McClelland Marine Geosciences, Inc

Blow No. 5 02/12/01
CAPWAP(R) Version 1.993-1

CAPWAP FINAL RESULTS

Final CAPWAP Capacity: Ru 8159.4 Skin 6504.1 Toe 1655.3 kips

Soil Sgmnt No.	Depth Below Gages ft	Depth Below Grade ft	Ru kips	Sum of Ru Up kips	Sum of Ru Down kips	Unit Resist. w. Respect to Depth kips/ft	Unit Resist. w. Respect to Area kips/f2	Smith Damping s/ft	Quake inch
				8159.4					
1	122.0	8.4	203.1	7956.3	203.1	30.80	1.23	.227	.100
2	128.6	15.0	120.2	7836.1	323.3	18.22	.73	.227	.100
3	135.2	21.6	38.3	7797.8	361.5	5.80	.23	.227	.100
4	141.8	28.2	54.5	7743.3	416.0	8.27	.33	.227	.100
5	148.4	34.8	125.1	7618.3	541.1	18.97	.75	.227	.100
6	155.0	41.4	143.2	7475.1	684.3	21.72	.86	.227	.100
7	161.6	48.0	86.6	7388.4	770.9	13.14	.52	.227	.100
8	168.2	54.6	22.9	7365.5	793.8	3.47	.14	.227	.100
9	174.7	61.1	.0	7365.5	793.8	.00	.00	.000	.100
10	181.3	67.7	.0	7365.5	793.8	.00	.00	.000	.100
11	187.9	74.3	258.8	7106.7	1052.6	39.25	1.56	.227	.100
12	194.5	80.9	585.1	6521.7	1637.7	88.73	3.53	.227	.100
13	201.1	87.5	443.8	6077.9	2081.5	67.30	2.68	.227	.100
14	207.7	94.1	140.9	5936.9	2222.4	21.37	.85	.227	.100
15	214.3	100.7	72.9	5864.0	2295.4	11.06	.44	.227	.100
16	220.9	107.3	204.3	5659.7	2499.7	30.98	1.23	.227	.100
17	227.5	113.9	306.7	5353.0	2806.3	46.50	1.85	.227	.100
18	234.1	120.5	330.8	5022.3	3137.1	50.16	2.00	.227	.100
19	240.7	127.1	309.6	4712.7	3446.7	46.95	1.87	.227	.100
20	247.3	133.7	267.8	4444.9	3714.5	40.62	1.62	.227	.100
21	253.9	140.3	261.8	4183.1	3976.3	39.70	1.58	.227	.100
22	260.5	146.9	270.5	3912.5	4246.8	41.03	1.63	.227	.100
23	267.1	153.5	236.2	3676.3	4483.0	35.82	1.43	.227	.100
24	273.7	160.1	195.5	3480.8	4678.5	29.65	1.18	.227	.100
25	280.3	166.7	191.7	3289.1	4870.2	29.07	1.16	.227	.100
26	286.8	173.2	213.4	3075.7	5083.6	32.36	1.29	.227	.100
27	293.4	179.8	241.0	2834.7	5324.6	36.55	1.45	.227	.100
28	300.0	186.4	269.0	2565.7	5593.6	40.79	1.62	.227	.100
29	306.6	193.0	307.0	2258.8	5900.6	46.55	1.85	.227	.100

Soil Sgmnt No.	Depth Below Gages ft	Depth Below Grade ft	Ru kips	Sum of Ru Up kips	Sum of Ru Down kips	Unit w. Respect to Depth kips/ft	Resist. Area kips/f2	Smith Damping s/ft	Quake inch
30	313.2	199.6	314.4	1944.4	6215.0	47.68	1.90	.227	.100
31	319.8	206.2	221.7	1722.6	6436.7	33.63	1.34	.227	.100
32	326.4	212.8	67.3	1655.3	6504.1	10.21	.41	.227	.100
33	333.0	219.4	.0	1655.3	6504.1	.00	.00	.000	.100
34	339.6	226.0	.0	1655.3	6504.1	.00	.00	.000	.100
Average Skin Values			191.3			28.78	1.15	.227	.100
Toe			1655.3				402.06	.540	.100

Soil Model Parameters/Extensions		Skin	Toe
Case Damping		1.026	.621
Unloading Quake	(% of loading quake)	100	87
Unloading Level	(% of Ru)	54	
Soil Plug Weight	(kips)		1.64

SFOBB PIDP, Pile TP1D, MHU-1700, BoID
Fugro-McClelland Marine Geosciences, Inc

Blow No. 5 02/12/01
CAPWAP(R) Version 1.993-1

EXTREMA TABLE

Pile Sgmnt No.	Depth Below Gages ft	max. Force kips	min. Force kips	max. Comp. Stress kips/in2	max. Tension Stress kips/in2	max. Trnsfd. Energy kips-ft	max. Veloc. ft/s	max. Displ. in
1	3.3	17094.0	-525.0	21.18	-.65	473.43	10.9	.657
10	33.0	16344.5	-645.9	20.25	-.80	470.72	11.3	.660
20	65.9	16278.3	-626.1	20.17	-.78	468.21	11.3	.630
30	98.9	15253.7	-931.0	21.26	-1.30	464.73	11.9	.600
40	131.9	14711.5	-1046.0	20.51	-1.46	420.64	11.3	.550
51	168.2	13873.2	-1089.8	19.34	-1.52	359.82	10.7	.470
61	201.1	10572.3	-601.1	22.63	-1.29	264.61	10.5	.370
71	234.1	8637.8	-1.6	18.49	.00	167.16	8.5	.280
82	270.4	5955.6	.0	12.75	.00	88.30	6.6	.210
92	303.3	4942.5	.0	10.58	.00	54.83	5.3	.150
102	336.3	4335.6	.0	8.15	.00	36.66	4.3	.120
103	339.6	4411.1	.0	7.44	.00	37.07	4.2	.117
Absolute	194.5			26.07		(T=	33.1 ms)	
	194.5				-2.00	(T=	84.9 ms)	

CASE METHOD

	J=0.0	J=0.1	J=0.2	J=0.3	J=0.4	J=0.5	J=0.6	J=0.7	J=0.8	J=0.9
RS1	16212.	14899.	13585.	12272.	10959.	9646.	8332.	7019.	5706.	4392.
RMX	16212.	14899.	13585.	12272.	10959.	9646.	8332.	7019.	5706.	4392.
RSU	15230.	13818.	12407.	10995.	9584.	8172.	6761.	5349.	3938.	2526.

RA A2 W 1606. 2999. 0.
Current CAPWAP Ru= 8159.4; Corresponding J(Rs)= .61; J(Rx)= .61

VMAX	VFIN	V1*Z	F1	FMAX	DMAX	DFIN	EMAX	EFIN	R HF	R EN
10.87	-.08	1565	1.71	7094.0	17094.0	.657	.065	473.4	423.0	13751.4	21062.4

SFOBB PIDP, Pile TP1D, MHU-1700, BoID
Fugro-McClelland Marine Geosciences, Inc

Blow No. 5 02/12/01
CAPWAP(R) Version 1.993-1

PILE PROFILE AND PILE MODEL

Depth ft	Area in2	E-Modulus kips/in2	Spec. Weight kips/ft3	Circumf. ft
.00	807.20	30000.0	.492	25.130
90.25	807.20	30000.0	.492	25.130
90.25	717.40	30000.0	.492	25.130
188.60	717.40	30000.0	.492	25.130
188.60	467.10	30000.0	.492	25.130
334.60	467.10	30000.0	.492	25.130
334.60	592.80	30000.0	.492	25.130
339.60	592.80	30000.0	.492	25.130

Toe Area 4.117 ft2

Segmnt No.	Depth B.G. feet	Impedance kips/ft/s	Imp. Change %	T. Slack inch	C. Slack inch	Circumf. feet
1	3.30	1440.51	.00	.000	.000	25.130
3	9.89	1440.51	.00	.000	.000	25.130
4	13.19	1440.51	.00	.000	.000	25.130
5	16.49	1440.51	.00	.000	.000	25.130
6	19.78	1440.51	.00	.000	.000	25.130
10	32.97	1440.51	.00	.000	.000	25.130
11	36.27	1440.51	.00	.000	.000	25.130
20	65.94	1440.51	.00	.000	.000	25.130
21	69.24	1440.51	.00	.000	.000	25.130
28	92.32	1339.97	.00	.000	.000	25.130
29	95.62	1280.25	.00	.000	.000	25.130
40	131.88	1280.26	.00	.000	.000	25.130
41	135.18	1280.25	.00	.000	.000	25.130
58	191.23	923.80	.00	.000	.000	25.130
59	194.53	833.58	.00	.000	.000	25.130
80	263.77	833.58	.00	.000	.000	25.130
102	336.30	949.46	.00	.000	.000	25.130
103	339.60	1057.90	.00	.000	.000	25.130

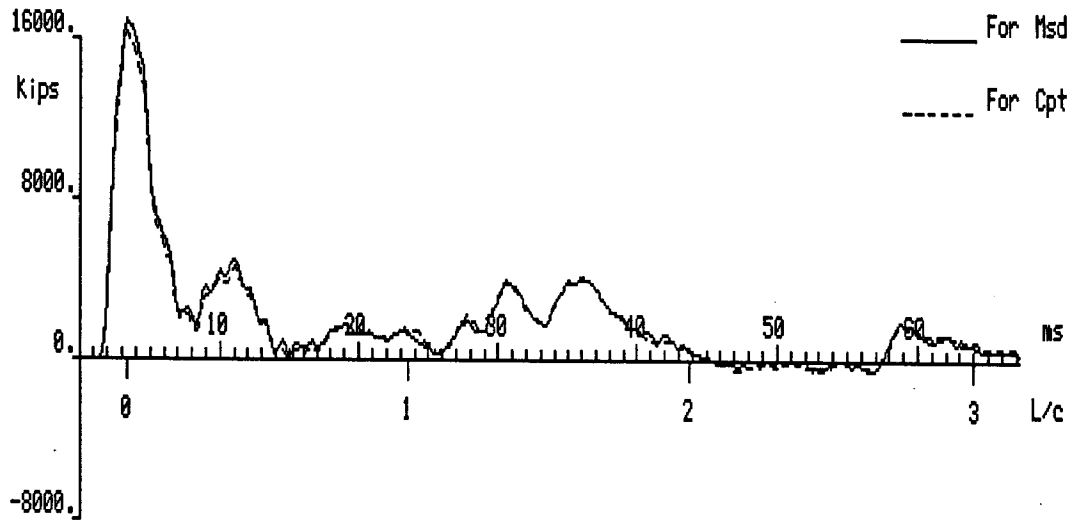
Pile Damping 1.0 %, Time Incr .196 ms, Wave Speed 16810.7 ft/s

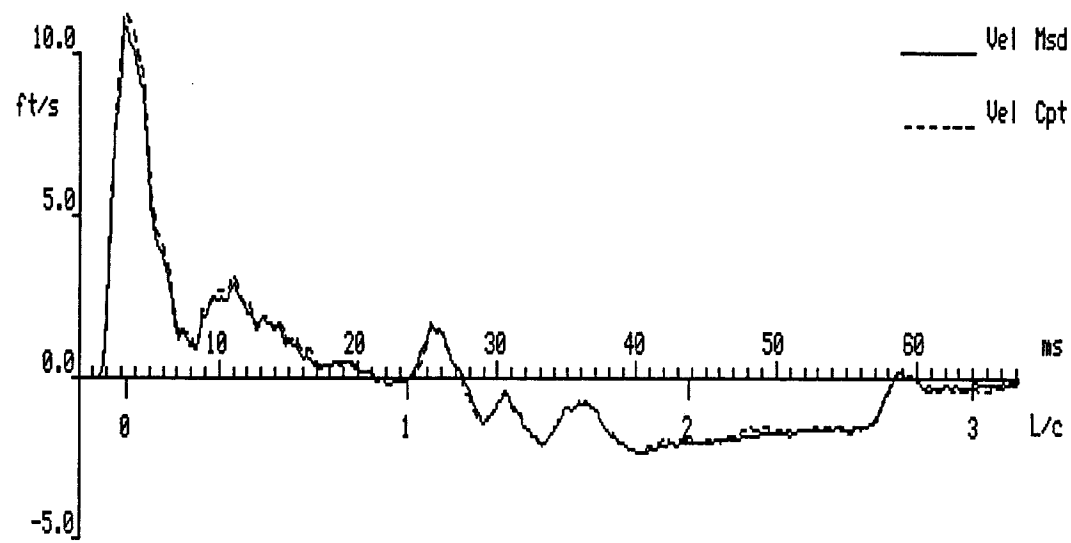
SFOBB PIDP, Pile TP1D, MHU-1700, BoID

Blow 5 02/12/01

Fugro-McClelland Marine Geosciences, Inc

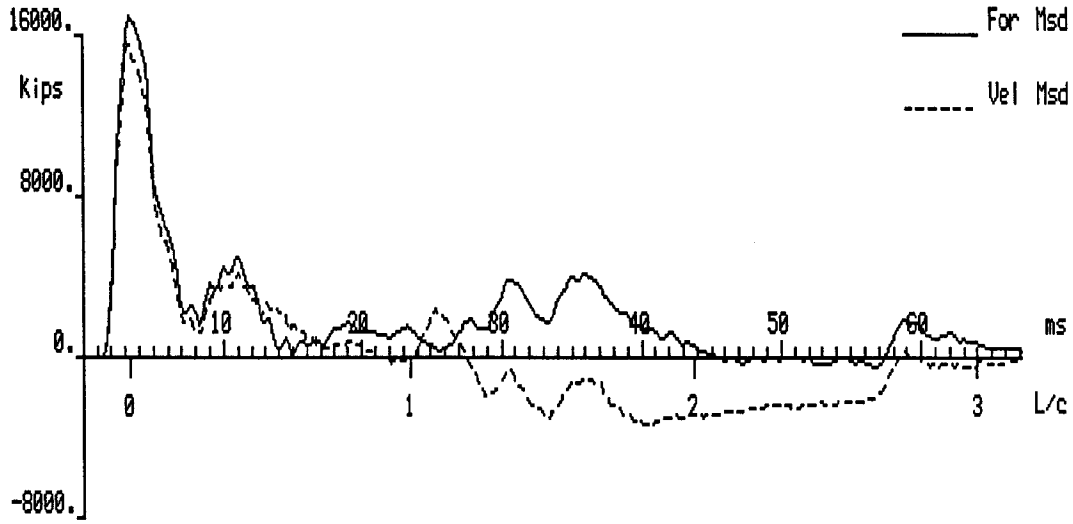
CAPWAP(R) Version 1.993-1

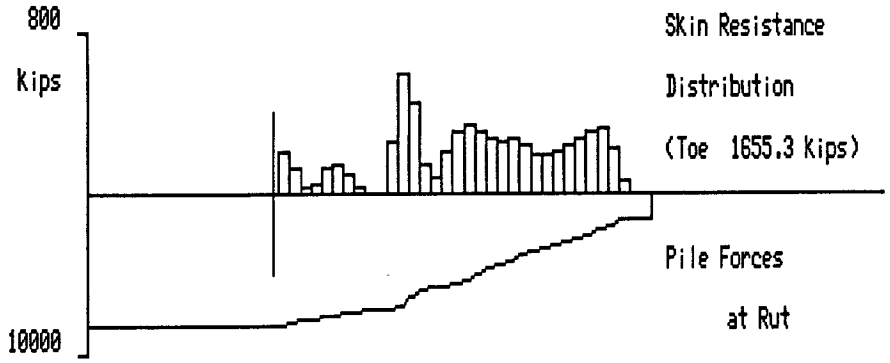




SFOBB PIDP, Pile TP1D, MHU-1700, BoID Blow 5 02/12/01

Fugro-McClelland Marine Geosciences, Inc CAPWAP(R) Version 1.993-1





SFOBB PIDP, Pile TP1D, MHU-1700, BoID

Blow 5 02/12/01

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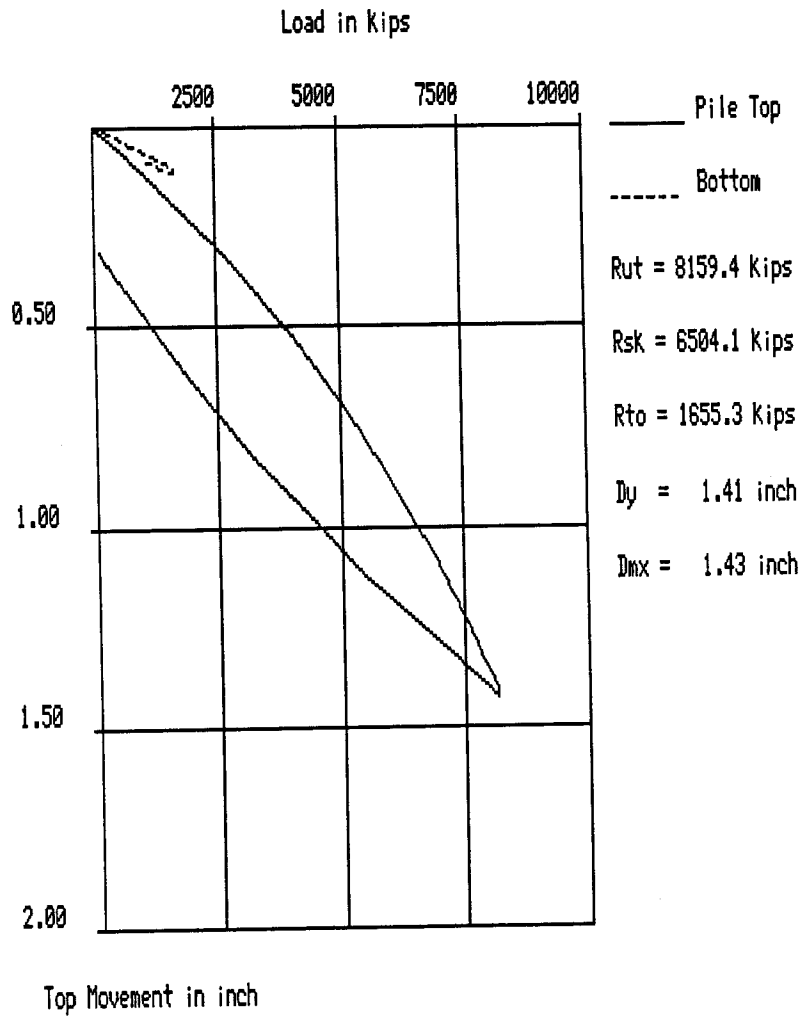
Dynamic D-Toe, E-P R-Toe



PILE 1
EOID, BLOW NO. 2193, PDA 1

PILE 1
EOID, BLOW NO. 2193, PDA 1

SFOBB PIDP, Pile TP1D, MHU-1700, EoID
Fugro-McClelland Marine Geosciences, Inc

Blow No. 2193 02/12/01
CAPWAP(R) Version 1.993-1

CAPWAP FINAL RESULTS

Final CAPWAP Capacity: Ru 14565.3 Skin 8644.1 Toe 5921.2 kips

Soil Sgmnt No.	Depth Below Gages ft	Depth Below Grade ft	Ru kips	Sum of Ru Up kips	Sum of Ru Down kips	Unit Resist. w. Respect to Depth kips/ft	Unit Resist. w. Respect to Area kips/f2	Smith Damping s/ft	Quake inch
				14565.3					
1	42.9	7.3	503.1	14062.2	503.1	76.30	3.04	.080	.060
2	49.5	13.9	280.3	13781.9	783.4	42.51	1.69	.080	.060
3	56.1	20.5	5.4	13776.5	788.8	.82	.03	.080	.060
4	62.6	27.0	.0	13776.5	788.8	.00	.00	.000	.060
5	69.2	33.6	.0	13776.5	788.8	.00	.00	.000	.060
6	75.8	40.2	.0	13776.5	788.8	.00	.00	.000	.060
7	82.4	46.8	.0	13776.5	788.8	.00	.00	.000	.060
8	89.0	53.4	.0	13776.5	788.8	.00	.00	.000	.060
9	95.6	60.0	21.1	13755.4	809.9	3.20	.13	.080	.060
10	102.2	66.6	220.6	13534.7	1030.6	33.46	1.33	.080	.060
11	108.8	73.2	218.2	13316.5	1248.8	33.08	1.32	.080	.060
12	115.4	79.8	112.3	13204.2	1361.0	17.03	.68	.080	.060
13	122.0	86.4	47.7	13156.5	1408.8	7.24	.29	.080	.060
14	128.6	93.0	55.7	13100.8	1464.5	8.44	.34	.080	.060
15	135.2	99.6	78.9	13022.0	1543.3	11.96	.48	.080	.060
16	141.8	106.2	53.0	12969.0	1596.3	8.04	.32	.080	.060
17	148.4	112.8	5.5	12963.5	1601.8	.83	.03	.080	.060
18	155.0	119.4	.0	12963.5	1601.8	.00	.00	.000	.060
19	161.6	126.0	17.3	12946.2	1619.1	2.63	.10	.080	.060
20	168.2	132.6	1.3	12944.9	1620.4	.20	.01	.080	.060
21	174.7	139.1	.0	12944.9	1620.4	.00	.00	.000	.060
22	181.3	145.7	.0	12944.9	1620.4	.00	.00	.000	.060
23	187.9	152.3	42.5	12902.3	1663.0	6.45	.26	.080	.060
24	194.5	158.9	701.0	12201.3	2364.0	106.31	4.23	.080	.060
25	201.1	165.5	945.8	11255.5	3309.8	143.44	5.71	.080	.060
26	207.7	172.1	422.0	10833.5	3731.8	63.99	2.55	.080	.060
27	214.3	178.7	19.1	10814.4	3750.9	2.90	.12	.080	.060
28	220.9	185.3	78.8	10735.6	3829.7	11.96	.48	.080	.060
29	227.5	191.9	234.8	10500.8	4064.5	35.61	1.42	.080	.060

Soil Sgmnt No.	Depth Below Gages ft	Depth Below Grade ft	Ru kips	Sum of Ru Up kips	Sum of Ru Down kips	Unit w. Depth kips/ft	Resist. Respect to Area kips/f2	Smith Damping s/ft	Quake inch
30	234.1	198.5	240.0	10260.7	4304.6	36.40	1.45	.080	.060
31	240.7	205.1	136.6	10124.2	4441.1	20.71	.82	.080	.060
32	247.3	211.7	63.6	10060.6	4504.7	9.64	.38	.080	.060
33	253.9	218.3	73.0	9987.6	4577.7	11.07	.44	.080	.060
34	260.5	224.9	168.9	9818.6	4746.7	25.62	1.02	.080	.060
35	267.1	231.5	299.0	9519.6	5045.7	45.35	1.80	.080	.060
36	273.7	238.1	364.3	9155.3	5410.0	55.25	2.20	.080	.060
37	280.3	244.7	336.8	8818.4	5746.9	51.08	2.03	.080	.060
38	286.8	251.2	299.0	8519.4	6045.9	45.35	1.80	.080	.060
39	293.4	257.8	355.0	8164.4	6400.9	53.83	2.14	.080	.060
40	300.0	264.4	514.0	7650.4	6914.9	77.95	3.10	.080	.060
41	306.6	271.0	690.4	6960.0	7605.3	104.70	4.17	.080	.060
42	313.2	277.6	677.1	6282.9	8282.4	102.68	4.09	.080	.060
43	319.8	284.2	353.9	5929.0	8636.2	53.66	2.14	.080	.060
44	326.4	290.8	7.9	5921.2	8644.1	1.20	.05	.080	.060
45	333.0	297.4	.0	5921.2	8644.1	.00	.00	.000	.060
46	339.6	304.0	.0	5921.2	8644.1	.00	.00	.000	.060
Average Skin Values			187.9			28.43	1.13	.080	.060
Toe			5921.2				1438.22	.111	.280

Soil Model Parameters/Extensions		Skin	Toe
Case Damping		.483	.454
Unloading Level	(% of Ru)	34	

SFOBB PIDP, Pile TP1D, MHU-1700, EoID
Fugro-McClelland Marine Geosciences, Inc

Blow No. 2193 02/12/01
CAPWAP(R) Version 1.993-1

EXTREMA TABLE

Pile Sgmnt No.	Depth Below Gages ft	max. Force kips	min. Force kips	max. Comp. Stress kips/in2	max. Tension Stress kips/in2	max. Trnsfd. Energy kips-ft	max. Veloc. ft/s	max. Displ. in
1	3.3	28574.6	-1332.7	35.40	-1.65	1344.55	19.1	1.106
10	33.0	28220.9	-3197.6	34.96	-3.96	1341.65	19.3	1.060
20	65.9	26862.3	-2777.0	33.28	-3.44	1220.06	18.7	1.050
30	98.9	25559.8	-1767.9	35.63	-2.46	1207.91	19.4	1.020
40	131.9	24382.6	-1282.8	33.99	-1.79	1093.92	18.9	.980
51	168.2	23974.9	-1335.4	33.42	-1.86	1061.17	18.8	.920
61	201.1	19892.7	-876.9	42.59	-1.88	935.79	19.9	.820
71	234.1	16470.8	-76.7	35.26	-.16	690.00	18.7	.690
82	270.4	15408.4	-76.5	32.99	-.16	561.55	17.1	.560
92	303.3	13700.0	-76.3	29.33	-.16	395.45	14.0	.440
102	336.3	11049.1	-76.2	20.77	-.14	279.48	12.9	.360
103	339.6	11615.8	-76.0	19.59	-.13	290.71	12.5	.353
Absolute	194.5			45.47		(T=	33.3 ms)	
	46.2				-4.26	(T=	41.2 ms)	

CASE METHOD

	J=0.0	J=0.1	J=0.2	J=0.3	J=0.4	J=0.5	J=0.6	J=0.7	J=0.8	J=0.9
RS1	25402.	22929.	20456.	17983.	15510.	13037.	10564.	8091.	5618.	3145.
RMX	25402.	22929.	20456.	17983.	15510.	13307.	11365.	9424.	7483.	5542.
RSU	26842.	24513.	22184.	19855.	17526.	15197.	12868.	10539.	8210.	5881.
RA A2 W	1195.	6191.	0.							

Current CAPWAP Ru= 14565.3; Corresponding J(Rs)= .44; J(Rx)= .44

VMAX	VFIN	V1*Z	F1	FMAX	DMAX	DFIN	EMAX	EFIN	R HF	R EN
19.12	.292	7541.9	28574.6	28574.6	1.106	.264	1344.6	1305.8	21733.7	33715.7

SFOBB PIDP, Pile TP1D, MHU-1700, EoID
Fugro-McClelland Marine Geosciences, Inc

Blow No. 2193 02/12/01
CAPWAP(R) Version 1.993-1

PILE PROFILE AND PILE MODEL

Depth ft	Area in2	E-Modulus kips/in2	Spec. Weight kips/ft3	Circumf. ft
.00	807.20	30000.0	.492	25.130
90.25	807.20	30000.0	.492	25.130
90.25	717.40	30000.0	.492	25.130
188.60	717.40	30000.0	.492	25.130
188.60	467.10	30000.0	.492	25.130
334.60	467.10	30000.0	.492	25.130
334.60	592.80	30000.0	.492	25.130
339.60	592.80	30000.0	.492	25.130

Toe Area 4.117 ft2

Segmnt No.	Depth B.G. feet	Impedance kips/ft/s	Imp. Change %	T. Slack inch	C. Slack inch	Circumf. feet
1	3.30	1440.51	.00	.000	.000	25.130
3	9.89	1440.51	.00	.000	.000	25.130
4	13.19	1440.51	.00	.000	.000	25.130
5	16.49	1440.51	.00	.000	.000	25.130
6	19.78	1440.51	.00	.000	.000	25.130
10	32.97	1440.51	.00	.000	.000	25.130
11	36.27	1440.51	.00	.000	.000	25.130
20	65.94	1440.51	.00	.000	.000	25.130
21	69.24	1440.51	.00	.000	.000	25.130
28	92.32	1339.97	.00	.000	.000	25.130
29	95.62	1280.25	.00	.000	.000	25.130
40	131.88	1280.26	.00	.000	.000	25.130
41	135.18	1280.25	.00	.000	.000	25.130
58	191.23	923.80	.00	.000	.000	25.130
59	194.53	833.58	.00	.000	.000	25.130
80	263.77	833.58	.00	.000	.000	25.130
102	336.30	949.46	.00	.000	.000	25.130
103	339.60	1057.90	.00	.000	.000	25.130

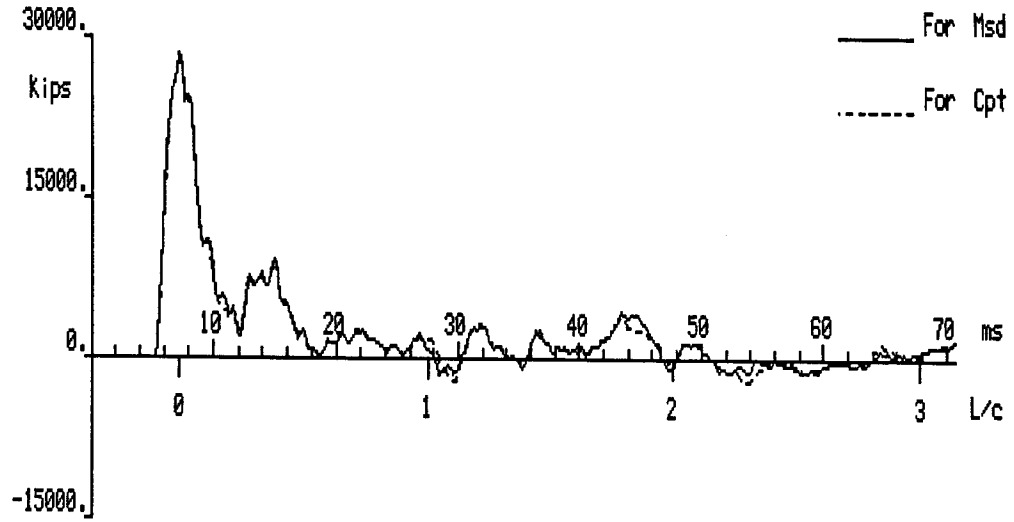
Pile Damping 1.0 %, Time Incr .196 ms, Wave Speed 16810.7 ft/s

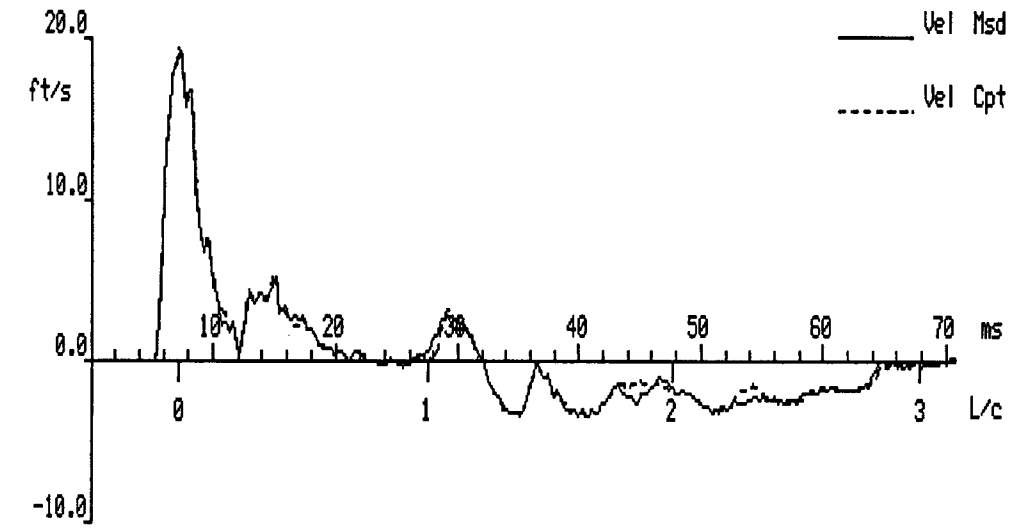
SFOBB PIDP, Pile TP1D, MHU-1700, EoID

Blow 2193 02/12/01

Fugro-McClelland Marine Geosciences, Inc

CAPWAP(R) Version 1.993-1



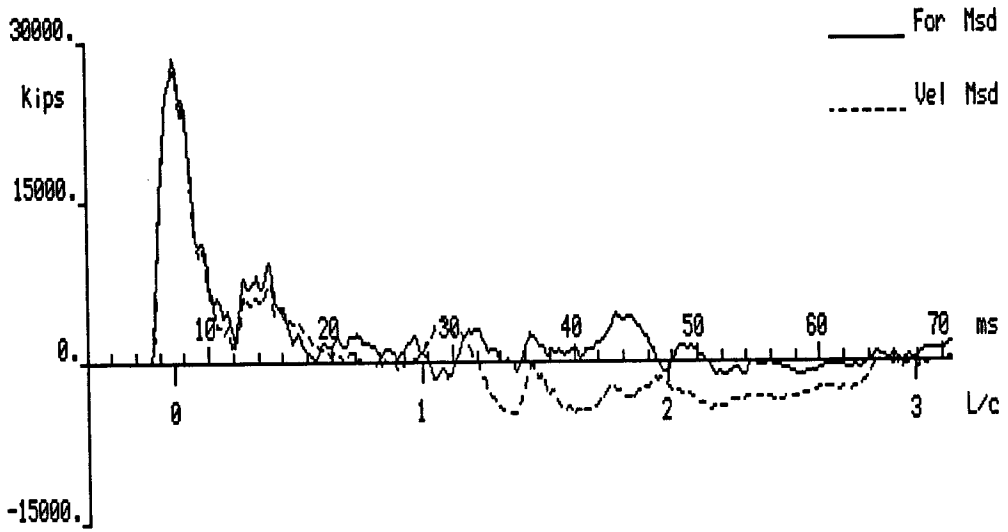


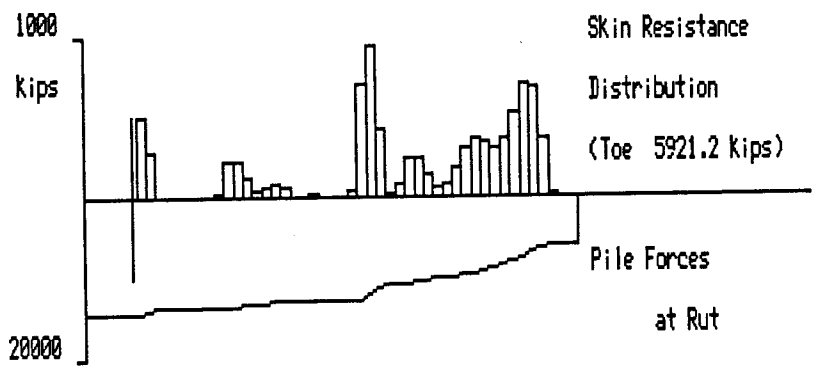
SFOBB PIDP, Pile TP1D, MHU-1700, EoID

Blow 2193 02/12/01

Fugro-McClelland Marine Geosciences, Inc

CAPWAP(R) Version 1.993-1





SFOBB PIDP, Pile TP1D, MHU-1700, EoID

Blow 2193 02/12/01

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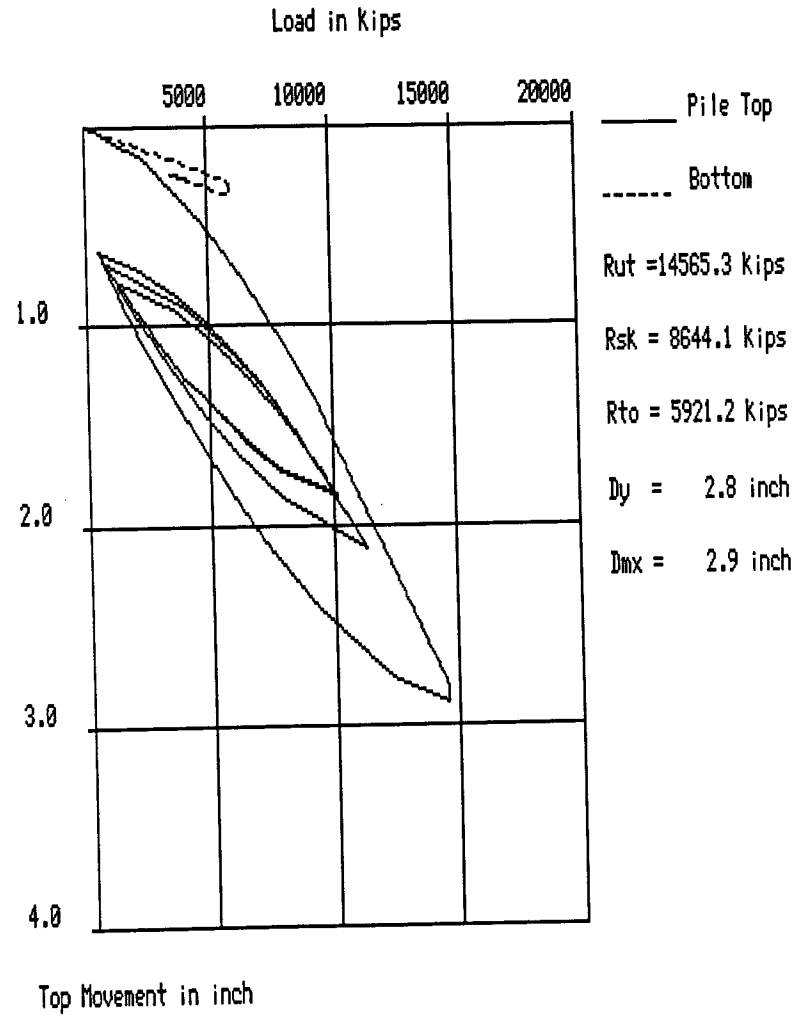
CAPWAP(R) Version 1.993-1

Dynamic D-Toe, E-P R-Toe



Rut =14565.3 Kips

Rsk = 8644.1 Kips

Rto = 5921.2 Kips

Dy = 2.8 inch

Dmx = 2.9 inch

PILE 1
EOID, BLOW NO. 2197, PDA 2

PILE 1
EOID, BLOW NO. 2197, PDA 2

SFOBB PIDP, Pile TP1D, MHU-1700, EoID
Fugro-McClelland Marine Geosciences, Inc

Blow No. 2197 02/12/01
CAPWAP(R) Version 1.993-1

CAPWAP FINAL RESULTS

Final CAPWAP Capacity: Ru 12655.0 Skin 7548.7 Toe 5106.3 kips

Soil Sgmnt No.	Depth Below Gages ft	Depth Below Grade ft	Ru kips	Sum of Ru Up kips	Sum of Ru Down kips	Unit Resist. w. Respect to Depth kips/ft	Unit Resist. w. Respect to Area kips/f2	Smith Damping s/ft	Quake inch
				12655.0					
1	42.9	7.3	211.6	12443.3	211.6	32.10	1.28	.080	.060
2	49.5	13.9	77.2	12366.1	288.8	11.71	.47	.080	.060
3	56.1	20.5	.0	12366.1	288.8	.00	.00	.080	.060
4	62.6	27.0	.0	12366.1	288.8	.00	.00	.080	.060
5	69.2	33.6	.9	12365.2	289.7	.13	.01	.080	.060
6	75.8	40.2	.0	12365.2	289.7	.00	.00	.080	.060
7	82.4	46.8	.0	12365.2	289.7	.00	.00	.080	.060
8	89.0	53.4	.0	12365.2	289.7	.00	.00	.080	.060
9	95.6	60.0	11.2	12354.1	300.9	1.69	.07	.080	.060
10	102.2	66.6	228.7	12125.3	529.6	34.69	1.38	.080	.060
11	108.8	73.2	166.2	11959.2	695.8	25.20	1.00	.080	.060
12	115.4	79.8	46.1	11913.0	741.9	7.00	.28	.080	.060
13	122.0	86.4	57.6	11855.4	799.6	8.74	.35	.080	.060
14	128.6	93.0	144.1	11711.3	943.6	21.85	.87	.080	.060
15	135.2	99.6	142.4	11568.9	1086.0	21.60	.86	.080	.060
16	141.8	106.2	35.8	11533.2	1121.8	5.42	.22	.080	.060
17	148.4	112.8	.0	11533.2	1121.8	.00	.00	.080	.060
18	155.0	119.4	.0	11533.2	1121.8	.00	.00	.080	.060
19	161.6	126.0	6.2	11527.0	1128.0	.93	.04	.080	.060
20	168.2	132.6	.0	11527.0	1128.0	.00	.00	.080	.060
21	174.7	139.1	.0	11527.0	1128.0	.00	.00	.080	.060
22	181.3	145.7	.0	11527.0	1128.0	.00	.00	.080	.060
23	187.9	152.3	28.3	11498.7	1156.3	4.29	.17	.080	.060
24	194.5	158.9	309.2	11189.5	1465.5	46.89	1.87	.080	.060
25	201.1	165.5	1011.0	10178.5	2476.5	153.31	6.10	.080	.060
26	207.7	172.1	324.0	9854.5	2800.5	49.13	1.96	.080	.060
27	214.3	178.7	.0	9854.5	2800.5	.00	.00	.080	.060
28	220.9	185.3	43.7	9810.8	2844.2	6.63	.26	.080	.060
29	227.5	191.9	208.1	9602.7	3052.2	31.55	1.26	.080	.060

Soil Sgmnt No.	Depth Below Gages ft	Depth Below Grade ft	Ru kips	Sum of Ru Up kips	Sum of Ru Down kips	Unit Resist. w. Respect to Depth kips/ft	Unit Resist. w. Respect to Area kips/f2	Smith Damping s/ft	Quake inch
30	234.1	198.5	160.4	9442.4	3212.6	24.32	.97	.080	.060
31	240.7	205.1	112.9	9329.4	3325.5	17.13	.68	.080	.060
32	247.3	211.7	165.4	9164.0	3491.0	25.09	1.00	.080	.060
33	253.9	218.3	208.7	8955.3	3699.7	31.65	1.26	.080	.060
34	260.5	224.9	214.0	8741.2	3913.8	32.46	1.29	.080	.060
35	267.1	231.5	217.9	8523.3	4131.7	33.05	1.32	.080	.060
36	273.7	238.1	219.8	8303.5	4351.5	33.33	1.33	.080	.060
37	280.3	244.7	207.3	8096.2	4558.8	31.43	1.25	.080	.060
38	286.8	251.2	199.4	7896.8	4758.1	30.23	1.20	.080	.060
39	293.4	257.8	282.1	7614.8	5040.2	42.78	1.70	.080	.060
40	300.0	264.4	478.7	7136.1	5518.9	72.59	2.89	.080	.060
41	306.6	271.0	640.8	6495.3	6159.7	97.18	3.87	.080	.060
42	313.2	277.6	604.7	5890.6	6764.4	91.70	3.65	.080	.060
43	319.8	284.2	253.3	5637.3	7017.7	38.41	1.53	.080	.060
44	326.4	290.8	253.3	5383.9	7271.0	38.42	1.53	.080	.060
45	333.0	297.4	253.3	5130.6	7524.4	38.42	1.53	.080	.060
46	339.6	304.0	24.3	5106.3	7548.7	3.69	.15	.080	.060
Average Skin Values			164.1			24.83	.99	.080	.060
Toe			5106.3				1240.29	.110	.270

Soil Model Parameters/Extensions		Skin	Toe
Case Damping		.420	.391
Unloading Quake	(% of loading quake)	51	82
Unloading Level	(% of Ru)	46	

SFOBB PIDP, Pile TP1D, MHU-1700, EoID
Fugro-McClelland Marine Geosciences, Inc

Blow No. 2197 02/12/01
CAPWAP(R) Version 1.993-1

EXTREMA TABLE

Pile Sgmnt No.	Depth Below Gages ft	max. Force kips	min. Force kips	max. Comp. Stress kips/in2	max. Tension Stress kips/in2	max. Trnsfd. Energy kips-ft	max. Veloc. ft/s	max. Displ. in
1	3.3	23815.0	-1101.9	29.50	-1.37	900.18	15.4	.957
10	33.0	22766.5	-2530.8	28.20	-3.14	898.09	15.7	.930
20	65.9	22337.4	-1799.0	27.67	-2.23	859.56	15.5	.900
30	98.9	21332.3	-1716.0	29.74	-2.39	851.23	16.2	.860
40	131.9	20433.8	-624.8	28.48	-.87	765.42	15.7	.830
51	168.2	20040.1	-694.3	27.93	-.97	737.84	15.6	.780
61	201.1	16925.9	-404.8	36.24	-.87	685.86	16.8	.690
71	234.1	13899.7	-29.6	29.76	-.06	509.00	16.0	.590
82	270.4	12662.3	-28.9	27.11	-.06	405.47	14.5	.490
92	303.3	11760.2	-28.2	25.18	-.06	303.41	12.2	.390
102	336.3	8495.6	-27.3	15.97	-.05	198.32	11.4	.320
103	339.6	9148.2	-26.4	15.43	-.04	204.99	11.2	.316
Absolute	194.5			36.70		(T=	32.9 ms)	
	145.1				-3.41	(T=	34.7 ms)	

CASE METHOD

	J=0.0	J=0.1	J=0.2	J=0.3	J=0.4	J=0.5	J=0.6	J=0.7	J=0.8	J=0.9
RS1	20505.	18478.	16452.	14426.	12400.	10373.	8347.	6321.	4294.	2268.
RMX	20505.	18478.	16452.	14426.	12400.	10373.	8347.	6679.	5172.	3729.
RSU	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
RA A2 W	1697.	2869.	0.							

Current CAPWAP Ru= 12655.0; Corresponding J(Rs)= .39; J(Rx)= .39

VMAX	VFIN	V1*Z	F1	FMAX	DMAX	DFIN	EMAX	EFIN	R HF	R EN
15.36	.602	2130.4	23445.8	23815.0	.957	.362	900.2	870.4	16171.0	22572.8

SFOBB PIDP, Pile TP1D, MHU-1700, EoID
Fugro-McClelland Marine Geosciences, Inc

Blow No. 2197 02/12/01
CAPWAP(R) Version 1.993-1

PILE PROFILE AND PILE MODEL

Depth ft	Area in2	E-Modulus kips/in2	Spec. Weight kips/ft3	Circumf. ft
.00	807.20	30000.0	.492	25.130
90.25	807.20	30000.0	.492	25.130
90.25	717.40	30000.0	.492	25.130
188.60	717.40	30000.0	.492	25.130
188.60	467.10	30000.0	.492	25.130
334.60	467.10	30000.0	.492	25.130
334.60	592.80	30000.0	.492	25.130
339.60	592.80	30000.0	.492	25.130

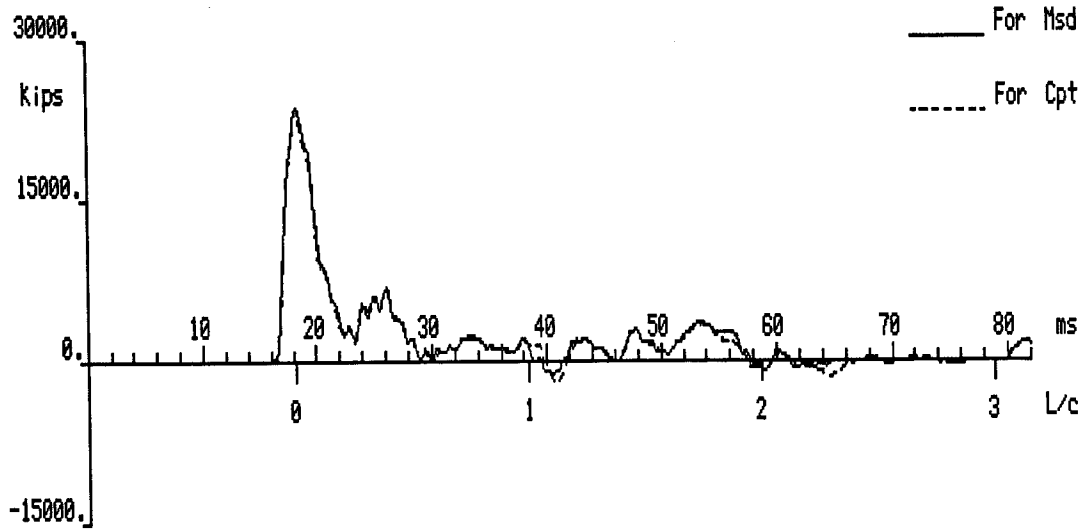
Toe Area 4.117 ft2

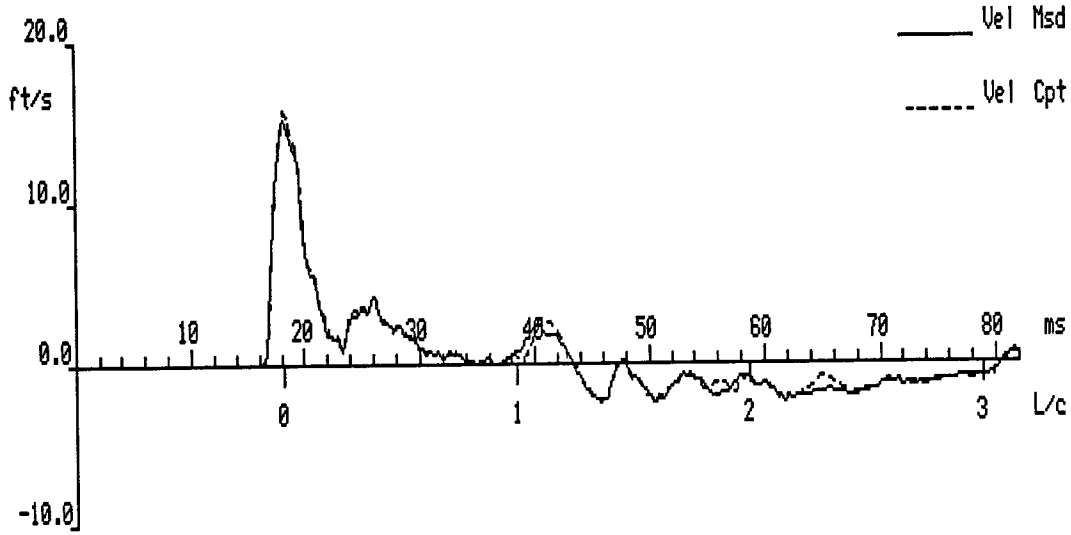
Segmnt No.	Depth B.G. feet	Impedance kips/ft/s	Imp. Change %	T. Slack inch	C. Slack inch	Circumf. feet
1	3.30	1440.51	.00	.000	.000	25.130
3	9.89	1440.51	.00	.000	.000	25.130
4	13.19	1440.51	.00	.000	.000	25.130
5	16.49	1440.51	.00	.000	.000	25.130
6	19.78	1440.51	.00	.000	.000	25.130
10	32.97	1440.51	.00	.000	.000	25.130
11	36.27	1440.51	.00	.000	.000	25.130
20	65.94	1440.51	.00	.000	.000	25.130
21	69.24	1440.51	.00	.000	.000	25.130
28	92.32	1339.97	.00	.000	.000	25.130
29	95.62	1280.25	.00	.000	.000	25.130
40	131.88	1280.26	.00	.000	.000	25.130
41	135.18	1280.25	.00	.000	.000	25.130
58	191.23	923.80	.00	.000	.000	25.130
59	194.53	833.58	.00	.000	.000	25.130
80	263.77	833.58	.00	.000	.000	25.130
102	336.30	949.46	.00	.000	.000	25.130
103	339.60	1057.90	.00	.000	.000	25.130

Pile Damping 1.0 %, Time Incr .196 ms, Wave Speed 16810.7 ft/s

SFOBB PIDP, Pile TP1D, MHU-1700, EoID Blow 2197 02/12/01

Fugro-McClelland Marine Geosciences, Inc CAPWAP(R) Version 1.993-1



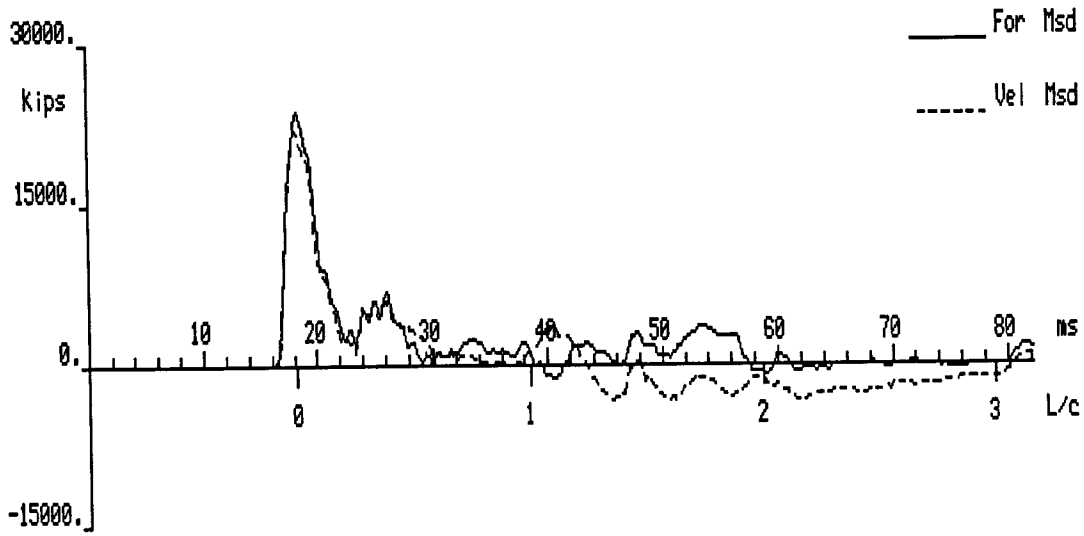


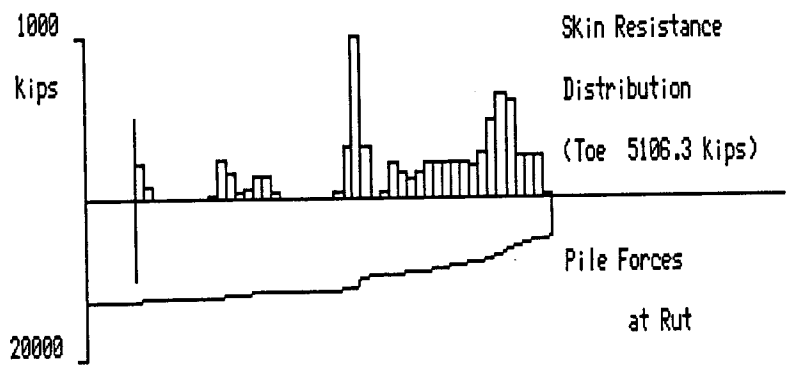
SFOBB PIDP, Pile TP1D, MHU-1700, EoID

Blow 2197 02/12/01

Fugro-McClelland Marine Geosciences, Inc

CAPWAP(R) Version 1.993-1





SFOBB PIDP, Pile TP1D, MHU-1700, EoID

Blow 2197 02/12/01

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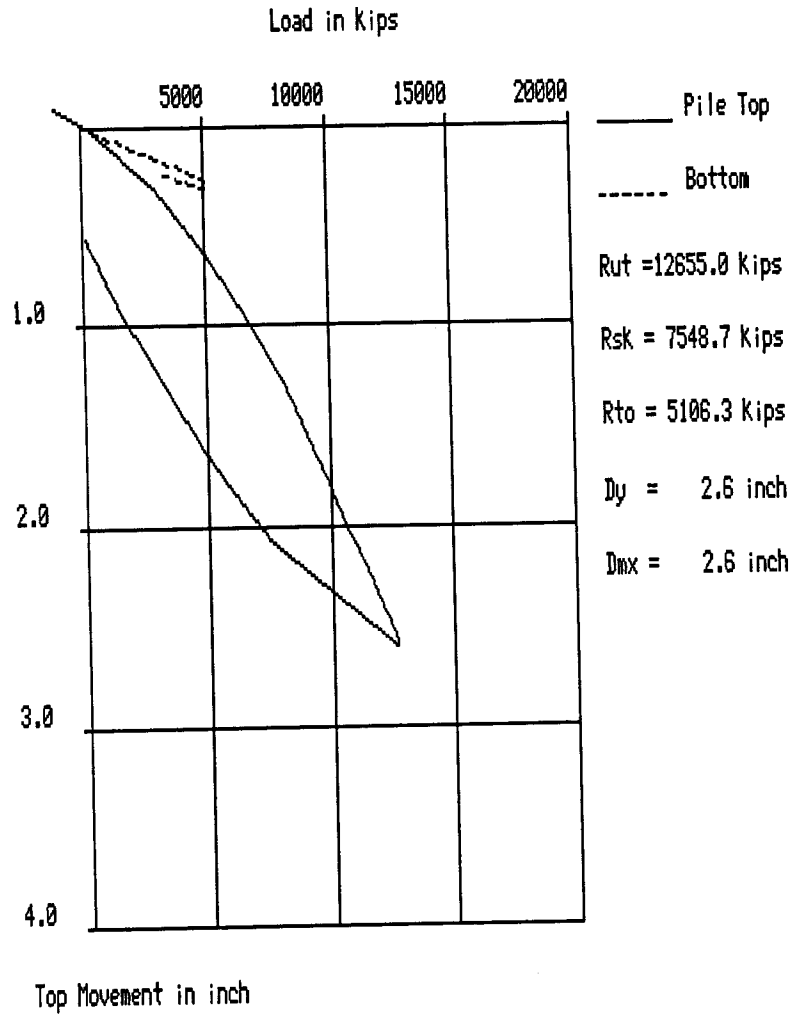
CAPWAP(R) Version 1.993-1

Dynamic D-Toe, E-P R-Toe



PILE 1
EOR, BLOW NO. 40, PDA 1

PILE 1
EOR, BLOW NO. 40, PDA 1

SFOBB PIDP, Pile TP1D, MHU-1700, EoR Blow No. 40 02/12/01
Fugro-McClelland Marine Geosciences, Inc CAPWAP(R) Version 1.993-1

CAPWAP FINAL RESULTS

Final CAPWAP Capacity: Ru 17272.0 Skin 14358.2 Toe 2913.8 kips

Soil Sgmnt No.	Depth Below Gages ft	Depth Below Grade ft	Ru kips	Sum of Ru Up kips	Sum of Ru Down kips	Unit w. Depth kips/ft	Resist. Respect to Area kips/f2	Smith Damping s/ft	Quake inch
				17272.0					
1	42.9	7.3	307.2	16964.8	307.2	46.58	1.85	.100	.125
2	49.5	13.9	225.6	16739.2	532.8	34.21	1.36	.100	.125
3	56.1	20.5	107.5	16631.7	640.3	16.31	.65	.100	.125
4	62.6	27.0	48.2	16583.6	688.5	7.30	.29	.100	.125
5	69.2	33.6	35.6	16547.9	724.1	5.40	.22	.100	.125
6	75.8	40.2	.8	16547.1	724.9	.12	.00	.100	.125
7	82.4	46.8	.0	16547.1	724.9	.00	.00	.100	.125
8	89.0	53.4	25.5	16521.6	750.4	3.87	.15	.100	.125
9	95.6	60.0	195.1	16326.5	945.5	29.58	1.18	.100	.125
10	102.2	66.6	241.5	16085.0	1187.0	36.63	1.46	.100	.125
11	108.8	73.2	172.7	15912.3	1359.7	26.19	1.04	.100	.125
12	115.4	79.8	118.7	15793.6	1478.4	18.00	.72	.100	.125
13	122.0	86.4	130.0	15663.6	1608.4	19.72	.78	.100	.125
14	128.6	93.0	162.7	15501.0	1771.0	24.67	.98	.100	.125
15	135.2	99.6	164.9	15336.1	1935.9	25.01	1.00	.100	.125
16	141.8	106.2	142.3	15193.7	2078.3	21.59	.86	.100	.125
17	148.4	112.8	114.6	15079.1	2192.9	17.38	.69	.100	.125
18	155.0	119.4	77.8	15001.3	2270.7	11.79	.47	.100	.125
19	161.6	126.0	39.5	14961.8	2310.2	5.99	.24	.100	.125
20	168.2	132.6	.0	14961.8	2310.2	.00	.00	.100	.125
21	174.7	139.1	.0	14961.8	2310.2	.00	.00	.100	.125
22	181.3	145.7	79.1	14882.7	2389.3	11.99	.48	.100	.125
23	187.9	152.3	651.4	14231.4	3040.7	98.78	3.93	.100	.125
24	194.5	158.9	953.0	13278.4	3993.6	144.52	5.75	.100	.125
25	201.1	165.5	690.4	12587.9	4684.1	104.70	4.17	.100	.125
26	207.7	172.1	256.2	12331.7	4940.3	38.85	1.55	.100	.125
27	214.3	178.7	74.2	12257.6	5014.5	11.25	.45	.100	.125
28	220.9	185.3	95.8	12161.8	5110.2	14.52	.58	.100	.125
29	227.5	191.9	91.9	12069.9	5202.2	13.94	.55	.100	.125

Soil Sgmnt No.	Depth Below Gages ft	Depth Below Grade ft	Ru kips	Sum of Ru Up kips	Sum of Ru Down kips	Unit Resist. w. Respect to Depth kips/ft	Unit Resist. w. Respect to Area kips/f2	Smith Damping s/ft	Quake inch
30	234.1	198.5	79.2	11990.7	5281.4	12.01	.48	.100	.125
31	240.7	205.1	190.1	11800.5	5471.5	28.84	1.15	.100	.125
32	247.3	211.7	361.8	11438.7	5833.3	54.87	2.18	.100	.125
33	253.9	218.3	435.8	11002.9	6269.2	66.09	2.63	.100	.125
34	260.5	224.9	411.6	10591.2	6680.8	62.43	2.48	.100	.125
35	267.1	231.5	402.7	10188.5	7083.5	61.07	2.43	.100	.125
36	273.7	238.1	427.7	9760.8	7511.2	64.86	2.58	.100	.125
37	280.3	244.7	437.0	9323.8	7948.2	66.27	2.64	.100	.125
38	286.8	251.2	457.5	8866.3	8405.7	69.37	2.76	.100	.125
39	293.4	257.8	513.2	8353.1	8918.9	77.83	3.10	.100	.125
40	300.0	264.4	571.1	7782.0	9490.0	86.61	3.45	.100	.125
41	306.6	271.0	623.6	7158.4	10113.6	94.56	3.76	.100	.125
42	313.2	277.6	655.3	6503.2	10768.9	99.37	3.95	.100	.125
43	319.8	284.2	652.6	5850.6	11421.4	98.96	3.94	.100	.125
44	326.4	290.8	721.7	5128.9	12143.1	109.45	4.36	.100	.125
45	333.0	297.4	971.3	4157.6	13114.4	147.29	5.86	.100	.125
46	339.6	304.0	1243.8	2913.8	14358.2	188.62	7.51	.100	.125
Average Skin Values			312.1			47.23	1.88	.100	.125
	Toe		2913.8				707.76	.140	.170

Soil Model Parameters/Extensions		Skin	Toe
Case Damping		.994	.283
Unloading Level	(% of Ru)	29	

SFOBB PIDP, Pile TP1D, MHU-1700, EoR
Fugro-McClelland Marine Geosciences, Inc

Blow No. 40 02/12/01
CAPWAP(R) Version 1.993-1

EXTREMA TABLE

Pile Sgmnt No.	Depth Below Gages ft	max. Force kips	min. Force kips	max. Comp. Stress kips/in2	max. Tension Stress kips/in2	max. Trnsfd. Energy kips-ft	max. Veloc. ft/s	max. Displ. in
1	3.3	26128.4	-807.7	32.37	-1.00	1163.96	17.6	.936
10	33.0	25861.4	-1617.5	32.04	-2.00	1159.80	17.7	.920
20	65.9	24728.1	-1376.0	30.63	-1.70	1057.91	17.0	.890
30	98.9	23205.6	-965.4	32.35	-1.35	1016.71	17.4	.860
40	131.9	21904.7	-597.2	30.53	-.83	897.81	16.6	.800
51	168.2	20908.4	-604.9	29.14	-.84	817.23	16.2	.730
61	201.1	15888.6	-88.6	34.02	-.19	604.67	16.2	.610
71	234.1	13511.8	-83.3	28.93	-.18	462.20	15.3	.510
82	270.4	11581.7	.0	24.79	.00	313.86	12.3	.390
92	303.3	9209.4	.0	19.72	.00	185.93	9.2	.280
102	336.3	5750.2	.0	10.81	.00	83.23	7.8	.190
103	339.6	6284.3	.0	10.60	.00	61.40	7.7	.189
Absolute	194.5			38.45		(T=	53.2 ms)	
	42.9				-2.41	(T=	85.3 ms)	

CASE METHOD

	J=0.0	J=0.1	J=0.2	J=0.3	J=0.4	J=0.5	J=0.6	J=0.7	J=0.8	J=0.9
RS1	24485.	22335.	20185.	18035.	15885.	13735.	11585.	9435.	7285.	5135.
RMX	24485.	22335.	20185.	18035.	15885.	13735.	11585.	9435.	7285.	5135.
RSU	27175.	25294.	23413.	21532.	19651.	17770.	15889.	14009.	12128.	10247.
RA A2 W	317.	4774.	0.							

Current CAPWAP Ru= 17272.0; Corresponding J(Rs)= .34; J(Rx)= .34

VMAX	VFIN	V1*Z	F1	FMAX	DMAX	DFIN	EMAX	EFIN	R HF	R EN
17.61	.922	5366.9	26128.4	26128.4	.936	.151	1164.0	1107.6	24983.2	49465.3

SFOBB PIDP, Pile TP1D, MHU-1700, EoR
Fugro-McClelland Marine Geosciences, Inc

Blow No. 40 02/12/01
CAPWAP(R) Version 1.993-1

PILE PROFILE AND PILE MODEL

Depth ft	Area in2	E-Modulus kips/in2	Spec. Weight kips/ft3	Circumf. ft
.00	807.20	30000.0	.492	25.130
90.25	807.20	30000.0	.492	25.130
90.25	717.40	30000.0	.492	25.130
188.60	717.40	30000.0	.492	25.130
188.60	467.10	30000.0	.492	25.130
334.60	467.10	30000.0	.492	25.130
334.60	592.80	30000.0	.492	25.130
339.60	592.80	30000.0	.492	25.130

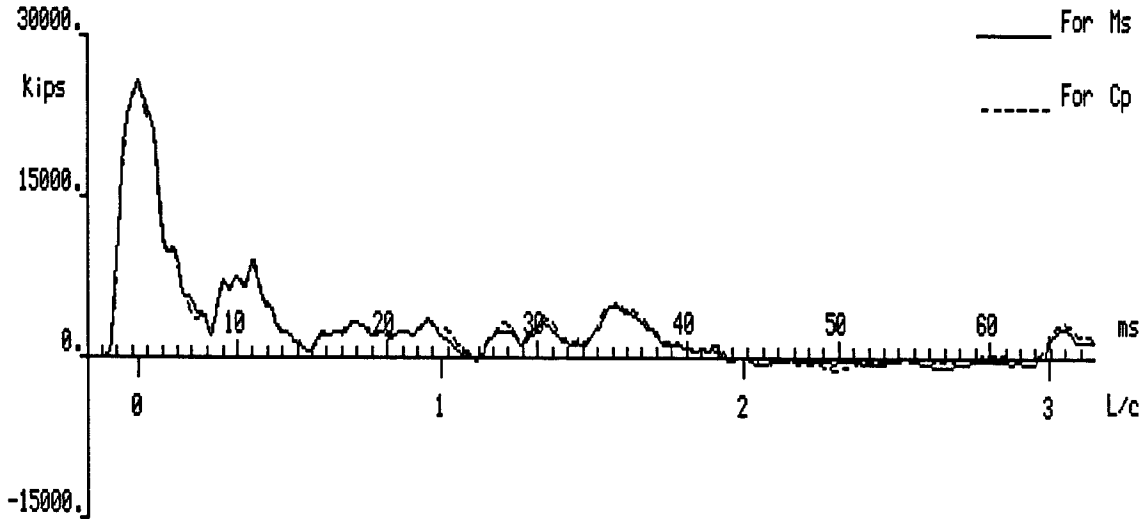
Toe Area 4.117 ft2

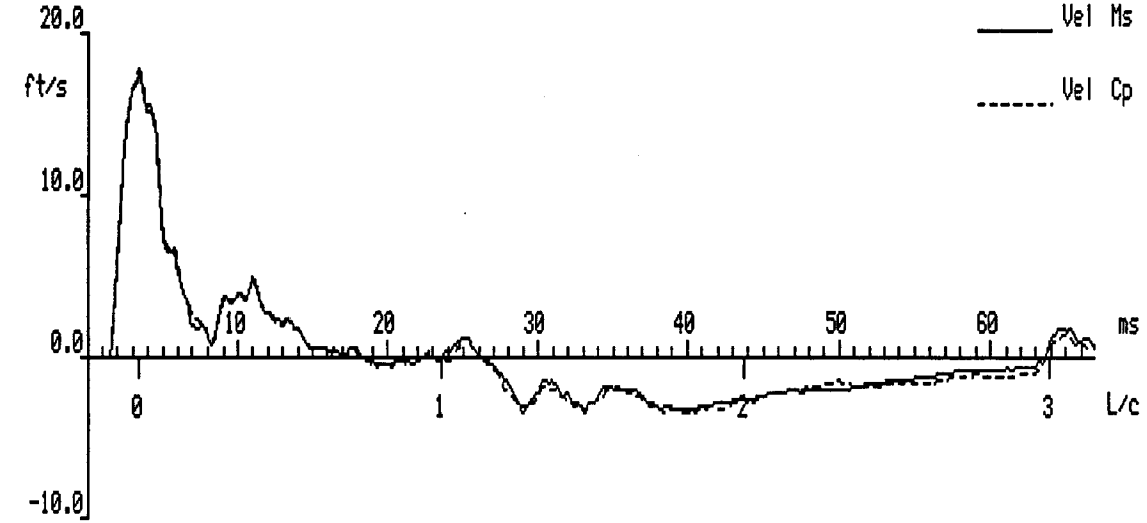
Segmnt No.	Depth B.G. feet	Impedance kips/ft/s	Imp. Change %	T. Slack inch	C. Slack inch	Circumf. feet
1	3.30	1440.51	.00	.000	.000	25.130
3	9.89	1440.51	.00	.000	.000	25.130
4	13.19	1440.51	.00	.000	.000	25.130
5	16.49	1440.51	.00	.000	.000	25.130
6	19.78	1440.51	.00	.000	.000	25.130
10	32.97	1440.51	.00	.000	.000	25.130
11	36.27	1440.51	.00	.000	.000	25.130
20	65.94	1440.51	.00	.000	.000	25.130
21	69.24	1440.51	.00	.000	.000	25.130
28	92.32	1339.97	.00	.000	.000	25.130
29	95.62	1280.25	.00	.000	.000	25.130
40	131.88	1280.26	.00	.000	.000	25.130
41	135.18	1280.25	.00	.000	.000	25.130
58	191.23	923.80	.00	.000	.000	25.130
59	194.53	833.58	.00	.000	.000	25.130
80	263.77	833.58	.00	.000	.000	25.130
102	336.30	949.46	.00	.000	.000	25.130
103	339.60	1057.90	.00	.000	.000	25.130

Pile Damping 1.0 %, Time Incr .196 ms, Wave Speed 16810.7 ft/s

SFOBB PIDP, Pile TP1D, MHU-1700, EoR Blow 40 02/12/01

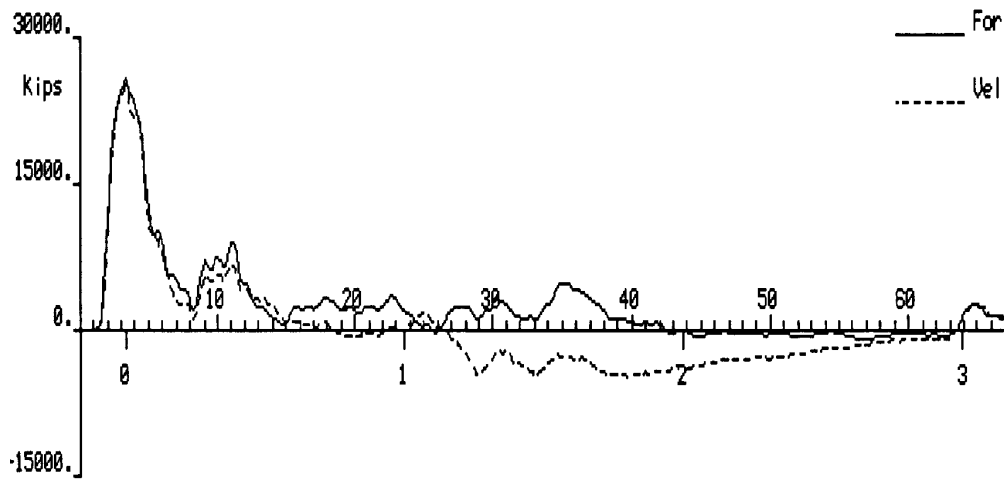
Fugro-McClelland Marine Geosciences, Inc CAPWAP(R) Version 1.993-1

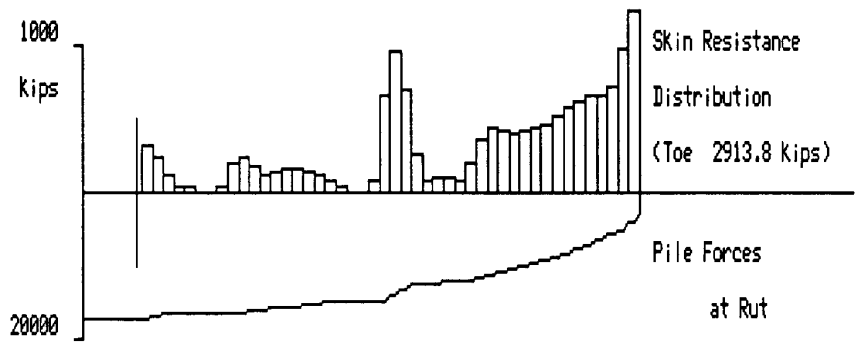




SFOBB PIDP, Pile TP1D, MHU-1700, EoR Blow 40 02/12/01

Fugro-McClelland Marine Geosciences, Inc CAPWAP(R) Version 1.993-1





SFOBB PIDP, Pile TP1D, MHU-1700, EoR

Blow 40 02/12/01

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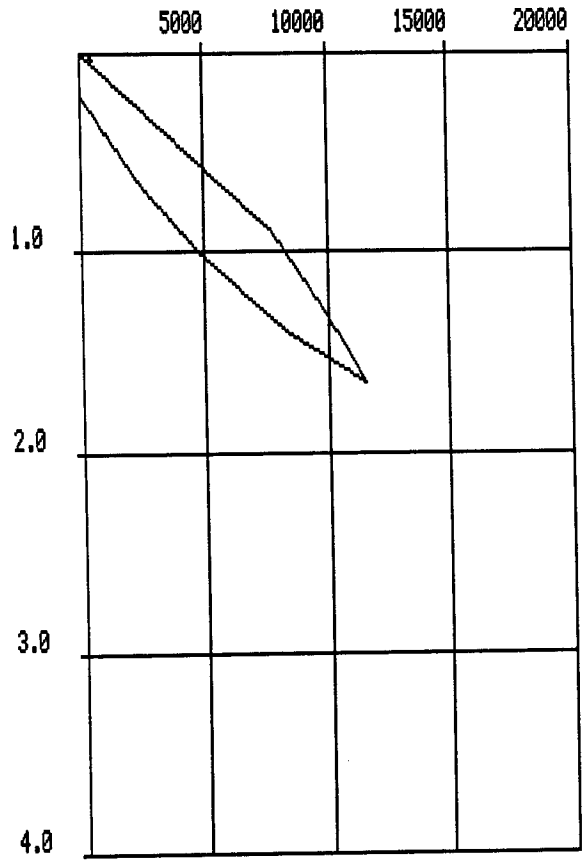
Dynamic D-Toe, E-P R-Toe

Load in Kips



Top Movement in inch

Pile Top

Bottom

Rut =17272.0 Kips

Rsk =14358.2 Kips

Rto = 2913.8 Kips

Dy = 1.7 inch

Dmx = 1.7 inch

PILE 1
EOR, BLOW NO. 51, PDA 2

PILE 1
EOR, BLOW NO. 51, PDA 2

SFOBB PIDP, Pile TP1D, MHU-1700, EoR
Fugro-McClelland Marine Geosciences, Inc

Blow No. 51 02/12/01
CAPWAP(R) Version 1.993-1

CAPWAP FINAL RESULTS

Final CAPWAP Capacity: Ru 15547.3 Skin 14054.3 Toe 1492.9 kips

Soil Sgmnt No.	Depth Below Gages ft	Depth Below Grade ft	Ru kips	Sum of Ru Up kips	Sum of Ru Down kips	Unit Resist. w. Respect to Depth kips/ft	Unit Resist. w. Respect to Area kips/f2	Smith Damping s/ft	Quake inch
				15547.3					
1	42.9	7.3	147.8	15399.5	147.8	22.41	.89	.188	.127
2	49.5	13.9	116.3	15283.2	264.1	17.64	.70	.188	.127
3	56.1	20.5	79.8	15203.4	343.9	12.09	.48	.188	.127
4	62.6	27.0	67.2	15136.2	411.1	10.19	.41	.188	.127
5	69.2	33.6	50.7	15085.5	461.8	7.69	.31	.188	.127
6	75.8	40.2	7.0	15078.5	468.8	1.06	.04	.188	.127
7	82.4	46.8	.0	15078.5	468.8	.00	.00	.188	.127
8	89.0	53.4	68.5	15010.0	537.3	10.39	.41	.188	.127
9	95.6	60.0	167.9	14842.0	705.2	25.47	1.01	.188	.127
10	102.2	66.6	183.3	14658.7	888.6	27.80	1.11	.188	.127
11	108.8	73.2	132.2	14526.5	1020.8	20.05	.80	.188	.127
12	115.4	79.8	100.3	14426.2	1121.1	15.21	.61	.188	.127
13	122.0	86.4	110.8	14315.4	1231.8	16.80	.67	.188	.127
14	128.6	93.0	124.0	14191.5	1355.8	18.80	.75	.188	.127
15	135.2	99.6	117.0	14074.4	1472.9	17.75	.71	.188	.127
16	141.8	106.2	114.9	13959.5	1587.7	17.42	.69	.188	.127
17	148.4	112.8	138.8	13820.7	1726.5	21.05	.84	.188	.127
18	155.0	119.4	149.2	13671.6	1875.7	22.62	.90	.188	.127
19	161.6	126.0	85.3	13586.3	1961.0	12.93	.51	.188	.127
20	168.2	132.6	8.7	13577.6	1969.7	1.32	.05	.188	.127
21	174.7	139.1	.0	13577.6	1969.7	.00	.00	.188	.127
22	181.3	145.7	11.3	13566.3	1981.0	1.71	.07	.188	.127
23	187.9	152.3	299.1	13267.1	2280.1	45.36	1.81	.188	.127
24	194.5	158.9	642.3	12624.8	2922.5	97.41	3.88	.188	.127
25	201.1	165.5	553.1	12071.7	3475.5	83.87	3.34	.188	.127
26	207.7	172.1	265.1	11806.7	3740.6	40.20	1.60	.188	.127
27	214.3	178.7	151.9	11654.7	3892.5	23.04	.92	.188	.127
28	220.9	185.3	228.9	11425.8	4121.4	34.71	1.38	.188	.127
29	227.5	191.9	294.8	11131.1	4416.2	44.70	1.78	.188	.127

Soil Sgmnt No.	Depth Below Gages ft	Depth Below Grade ft	Ru kips	Sum of Ru Up kips	Sum of Ru Down kips	Unit Resist. w. Respect to Depth kips/ft	Unit Resist. w. Respect to Area kips/f2	Smith Damping s/ft	Quake inch
30	234.1	198.5	300.1	10831.0	4716.3	45.51	1.81	.188	.127
31	240.7	205.1	319.0	10511.9	5035.3	48.38	1.93	.188	.127
32	247.3	211.7	376.1	10135.9	5411.4	57.03	2.27	.188	.127
33	253.9	218.3	464.7	9671.2	5876.0	70.46	2.80	.188	.127
34	260.5	224.9	540.5	9130.7	6416.5	81.97	3.26	.188	.127
35	267.1	231.5	523.1	8607.6	6939.7	79.33	3.16	.188	.127
36	273.7	238.1	425.5	8182.1	7365.2	64.53	2.57	.188	.127
37	280.3	244.7	359.0	7823.1	7724.2	54.45	2.17	.188	.127
38	286.8	251.2	391.9	7431.2	8116.1	59.43	2.36	.188	.127
39	293.4	257.8	475.6	6955.6	8591.7	72.13	2.87	.188	.127
40	300.0	264.4	518.5	6437.1	9110.2	78.63	3.13	.188	.127
41	306.6	271.0	510.9	5926.1	9621.1	77.48	3.08	.188	.127
42	313.2	277.6	522.4	5403.8	10143.5	79.22	3.15	.188	.127
43	319.8	284.2	638.6	4765.1	10782.1	96.85	3.85	.188	.127
44	326.4	290.8	889.9	3875.2	11672.0	134.95	5.37	.188	.127
45	333.0	297.4	1139.1	2736.1	12811.1	172.74	6.87	.188	.127
46	339.6	304.0	1243.2	1492.9	14054.3	188.53	7.50	.188	.119
Average Skin Values			305.5			46.23	1.84	.188	.126
Toe			1492.9				362.63	.048	.118

Soil Model Parameters/Extensions		Skin	Toe
Case Damping		1.837	.049
Unloading Quake	(% of loading quake)	100	98
Unloading Level	(% of Ru)	31	

SFOBB PIDP, Pile TP1D, MHU-1700, EoR
Fugro-McClelland Marine Geosciences, Inc

Blow No. 51 02/12/01
CAPWAP(R) Version 1.993-1

EXTREMA TABLE

Pile Sgmnt No.	Depth Below Gages ft	max. Force kips	min. Force kips	max. Comp. Stress kips/in2	max. Tension Stress kips/in2	max. Trnsfd. Energy kips-ft	max. Veloc. ft/s	max. Displ. in
1	3.3	27063.0	-657.7	33.53	-.81	1211.50	17.5	.922
10	33.0	26074.4	-1098.7	32.30	-1.36	1207.68	18.0	.920
20	65.9	25118.1	-960.6	31.12	-1.19	1114.79	17.3	.890
30	98.9	23379.8	-1014.1	32.59	-1.41	1047.09	17.5	.850
40	131.9	21843.9	-561.2	30.45	-.78	908.18	16.5	.790
51	168.2	20297.8	-606.3	28.29	-.85	777.80	15.8	.690
61	201.1	15976.7	-437.0	34.20	-.94	589.04	15.5	.540
71	234.1	12753.2	-38.8	27.30	-.08	373.86	12.8	.420
82	270.4	8734.8	.0	18.70	.00	177.04	8.9	.280
92	303.3	6289.2	.0	13.46	.00	85.92	6.5	.180
102	336.3	2642.9	.0	4.97	.00	24.32	5.3	.120
103	339.6	3124.7	.0	5.27	.00	10.21	5.2	.119
Absolute	194.5			38.55		(T=	33.1 ms)	
	49.5				-1.65	(T=	64.7 ms)	

CASE METHOD

	J=0.0	J=0.1	J=0.2	J=0.3	J=0.4	J=0.5	J=0.6	J=0.7	J=0.8	J=0.9
RS1	24415.	22243.	20071.	17899.	15727.	13556.	11384.	9212.	7040.	4868.
RMX	24415.	22243.	20071.	17899.	15727.	13556.	11384.	9212.	7040.	4868.
RSU	27196.	25302.	23408.	21514.	19621.	17727.	15833.	13939.	12045.	10151.
RA A2 W	1319.	4316.	0.							

Current CAPWAP Ru= 15547.3; Corresponding J(Rs)= .41; J(Rx)= .41

VMAX	VFIN	V1*Z	F1	FMAX	DMAX	DFIN	EMAX	EFIN	R HF	R EN
17.47	.472	4541.9	26924.6	27063.0	.922	.104	1211.5	1146.7	26316.9	51485.6

SFOBB PIDP, Pile TP1D, MHU-1700, EoR
Fugro-McClelland Marine Geosciences, Inc

Blow No. 51 02/12/01
CAPWAP(R) Version 1.993-1

PILE PROFILE AND PILE MODEL

Depth ft	Area in2	E-Modulus kips/in2	Spec. Weight kips/ft3	Circumf. ft
.00	807.20	30000.0	.492	25.130
90.25	807.20	30000.0	.492	25.130
90.25	717.40	30000.0	.492	25.130
188.60	717.40	30000.0	.492	25.130
188.60	467.10	30000.0	.492	25.130
334.60	467.10	30000.0	.492	25.130
334.60	592.80	30000.0	.492	25.130
339.60	592.80	30000.0	.492	25.130

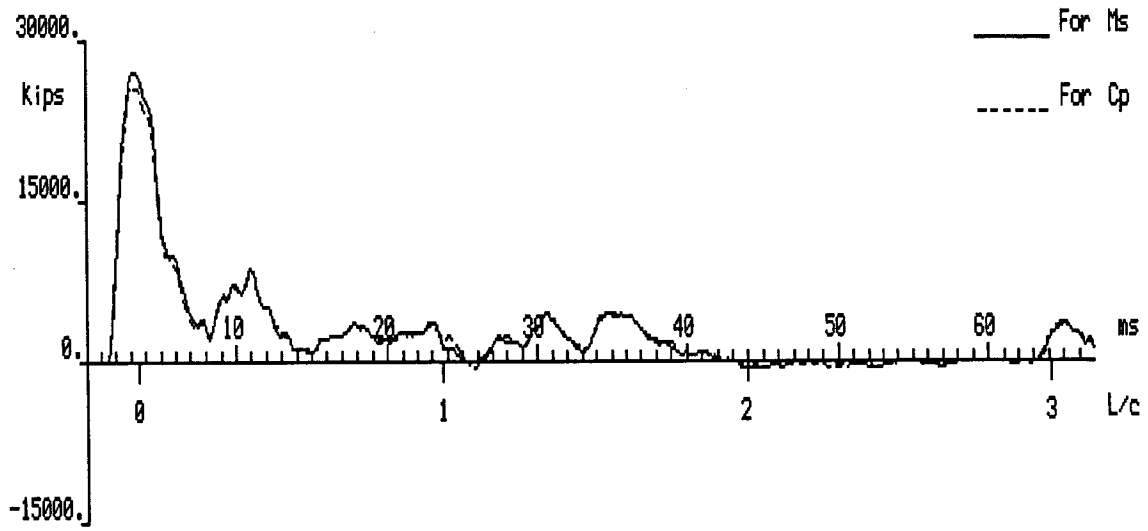
Toe Area 4.117 ft2

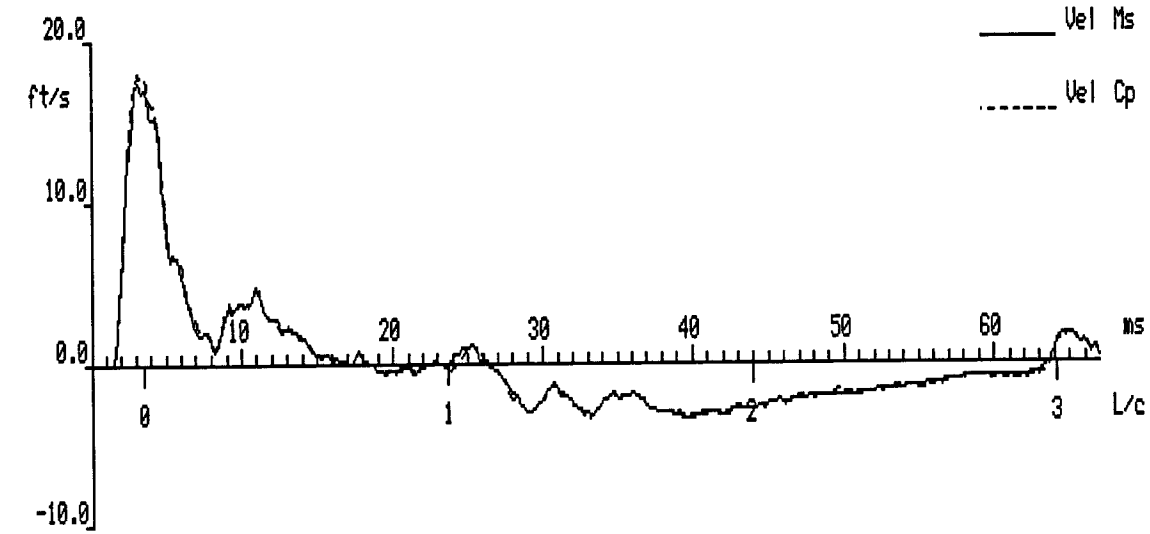
Segmnt No.	Depth B.G. feet	Impedance kips/ft/s	Imp. Change %	T. Slack inch	C. Slack inch	Circumf. feet
1	3.30	1440.51	.00	.000	.000	25.130
3	9.89	1440.51	.00	.000	.000	25.130
4	13.19	1440.51	.00	.000	.000	25.130
5	16.49	1440.51	.00	.000	.000	25.130
6	19.78	1440.51	.00	.000	.000	25.130
10	32.97	1440.51	.00	.000	.000	25.130
11	36.27	1440.51	.00	.000	.000	25.130
20	65.94	1440.51	.00	.000	.000	25.130
21	69.24	1440.51	.00	.000	.000	25.130
28	92.32	1339.97	.00	.000	.000	25.130
29	95.62	1280.25	.00	.000	.000	25.130
40	131.88	1280.26	.00	.000	.000	25.130
41	135.18	1280.25	.00	.000	.000	25.130
58	191.23	923.80	.00	.000	.000	25.130
59	194.53	833.58	.00	.000	.000	25.130
80	263.77	833.58	.00	.000	.000	25.130
102	336.30	949.46	.00	.000	.000	25.130
103	339.60	1057.90	.00	.000	.000	25.130

Pile Damping 1.0 %, Time Incr .196 ms, Wave Speed 16810.7 ft/s

SFOBB PIDP, Pile TP1DR, MHU-1700, EoR Blow 51 02/12/01

Fugro-McClelland Marine Geosciences, Inc CAPWAP(R) Version 1.993-1



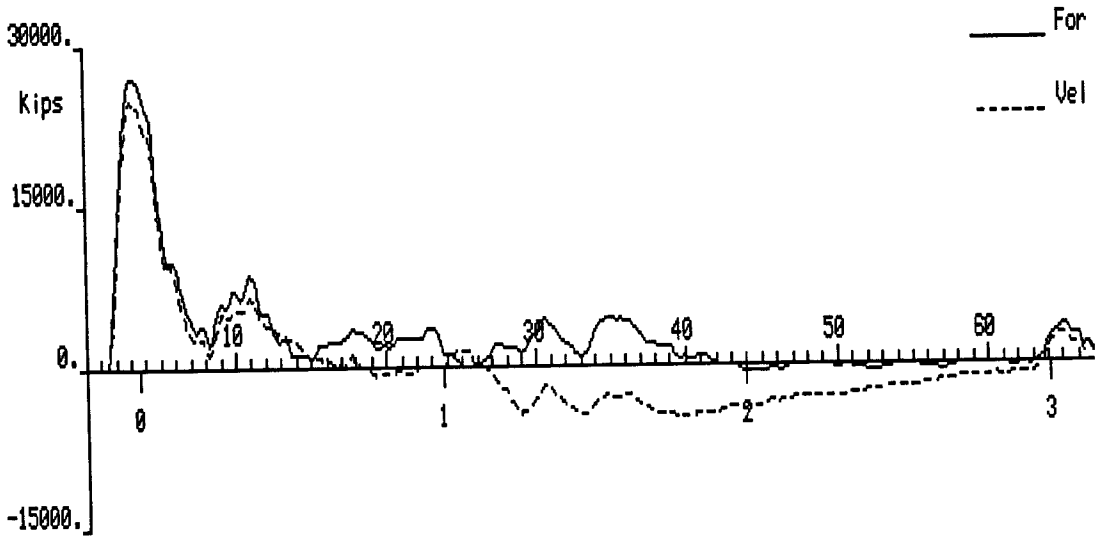


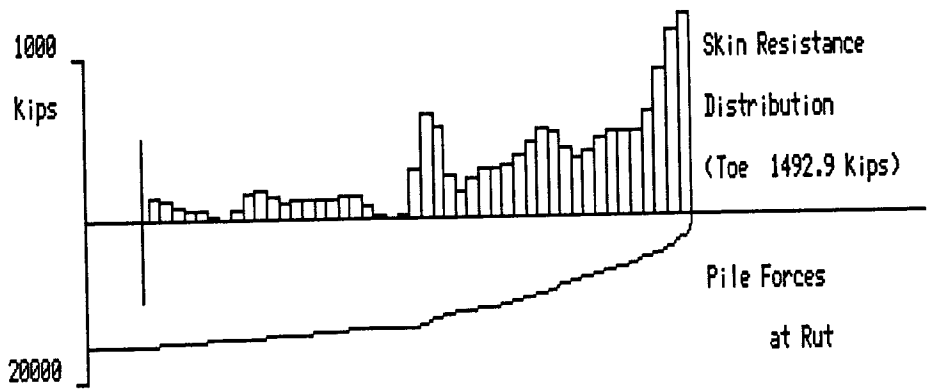
SFOBB PIDP, Pile TP1DR, MHU-1700, EoR

Fugro-McClelland Marine Geosciences, Inc

Blow 51 02/12/01

CAPWAP(R) Version 1.993-1





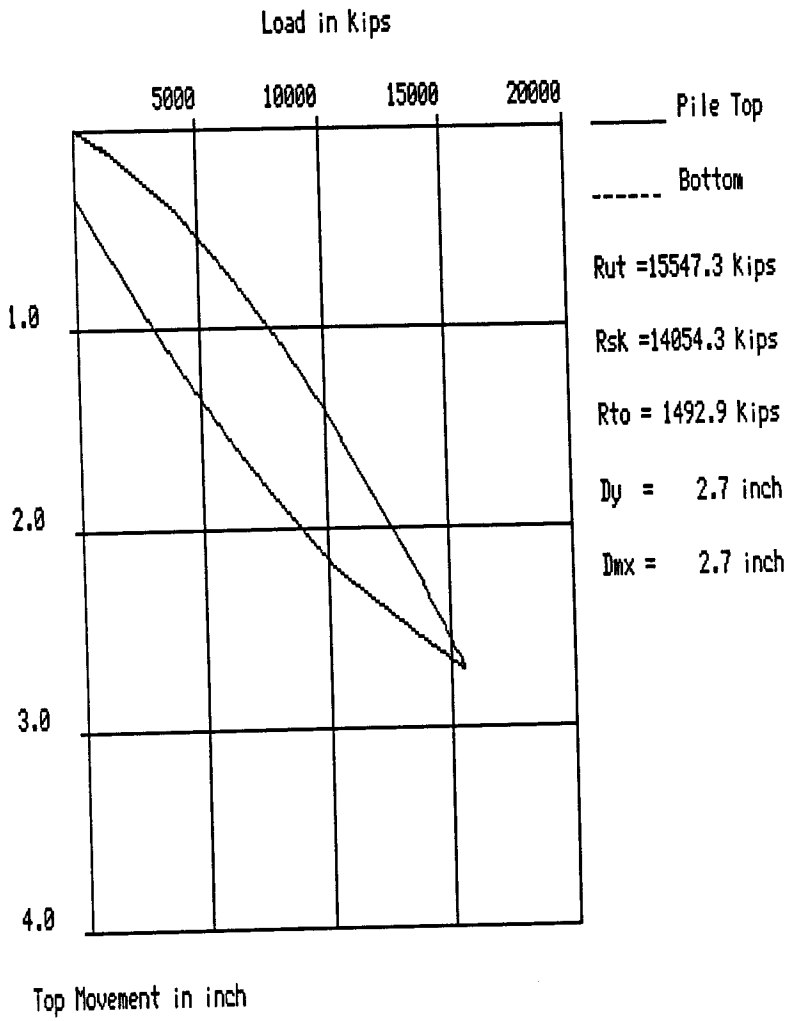
SFOBB PIDP, Pile TP1DR, MHU-1700, EoR

Blow 51 02/12/01

Fugro-McClelland Marine Geosciences, Inc

CAPWAP(R) Version 1.993-1

Dynamic D-Toe, E-P R-Toe



PILE 1
BOR2, BLOW NO. 1, PDA 1

PILE 1
BOR2, BLOW NO. 1, PDA 1

SFOBB PIDP. Pile TP1D, MHU-1700, BoR2
Fugro-McClelland Marine Geosciences, Inc

Blow No. 1 02/12/01
CAPWAP(R) Version 1.993-1

CAPWAP FINAL RESULTS

Final CAPWAP Capacity: Ru 12263.5 Skin 10436.6 Toe 1826.8 kips

Soil Sgmnt No.	Depth Below Gages ft	Depth Below Grade ft	Ru kips	Sum of Ru Up kips	Sum of Ru Down kips	Unit Resist. w. Respect to Depth kips/ft	Unit Resist. w. Respect to Area kips/f2	Smith Damping s/ft	Quake inch
				12263.5					
1	45.7	10.1	196.7	12066.8	196.7	30.11	1.20	.251	.125
2	52.2	16.6	155.1	11911.7	351.7	23.75	.94	.251	.125
3	58.8	23.2	97.5	11814.2	449.2	14.93	.59	.251	.125
4	65.3	29.7	68.5	11745.8	517.7	10.48	.42	.251	.125
5	71.8	36.2	66.0	11679.7	583.7	10.11	.40	.251	.125
6	78.4	42.8	69.2	11610.5	653.0	10.60	.42	.251	.125
7	84.9	49.3	98.2	11512.4	751.1	15.03	.60	.251	.125
8	91.4	55.8	163.9	11348.4	915.0	25.10	1.00	.251	.125
9	98.0	62.4	214.1	11134.3	1129.2	32.79	1.30	.251	.125
10	104.5	68.9	198.6	10935.7	1327.8	30.41	1.21	.251	.125
11	111.0	75.4	145.5	10790.2	1473.3	22.28	.89	.251	.125
12	117.6	82.0	112.5	10677.7	1585.8	17.22	.69	.251	.125
13	124.1	88.5	126.6	10551.1	1712.4	19.38	.77	.251	.125
14	130.6	95.0	180.1	10371.0	1892.5	27.58	1.10	.251	.125
15	137.1	101.5	229.6	10141.3	2122.1	35.16	1.40	.251	.125
16	143.7	108.1	245.2	9896.2	2367.3	37.54	1.49	.251	.125
17	150.2	114.6	249.5	9646.7	2616.7	38.20	1.52	.251	.125
18	156.7	121.1	246.4	9400.3	2863.2	37.73	1.50	.251	.125
19	163.3	127.7	204.8	9195.5	3068.0	31.36	1.25	.251	.125
20	169.8	134.2	151.7	9043.8	3219.7	23.23	.92	.251	.125
21	176.3	140.7	178.4	8865.4	3398.1	27.32	1.09	.251	.125
22	182.9	147.3	325.8	8539.6	3723.9	49.88	1.98	.251	.125
23	189.4	153.8	481.5	8058.1	4205.4	73.73	2.93	.251	.125
24	195.9	160.3	488.1	7570.0	4693.5	74.75	2.97	.251	.125
25	202.5	166.9	354.3	7215.7	5047.8	54.24	2.16	.251	.125
26	209.0	173.4	205.5	7010.2	5253.2	31.46	1.25	.251	.125
27	215.5	179.9	116.8	6893.4	5370.0	17.88	.71	.251	.125
28	222.0	186.4	100.9	6792.5	5471.0	15.46	.62	.251	.125
29	228.6	193.0	148.8	6643.7	5619.8	22.78	.91	.251	.125

Soil Sgmnt No.	Depth Below Gages ft	Depth Below Grade ft	Ru kips	Sum of Ru Up kips	Sum of Ru Down kips	Unit Resist. w. Respect to Depth kips/ft	Unit Resist. w. Respect to Area kips/f2	Smith Damping s/ft	Quake inch
30	235.1	199.5	243.9	6399.8	5863.7	37.35	1.49	.251	.125
31	241.6	206.0	363.2	6036.6	6226.9	55.62	2.21	.251	.125
32	248.2	212.6	475.3	5561.2	6702.2	72.79	2.90	.251	.125
33	254.7	219.1	563.3	4997.9	7265.6	86.25	3.43	.251	.125
34	261.2	225.6	634.9	4363.0	7900.4	97.21	3.87	.251	.125
35	267.8	232.2	697.1	3665.9	8597.6	106.75	4.25	.251	.125
36	274.3	238.7	717.1	2948.8	9314.7	109.81	4.37	.251	.123
37	280.8	245.2	631.5	2317.2	9946.2	96.70	3.85	.251	.116
38	287.4	251.8	409.4	1907.9	10355.6	62.68	2.49	.251	.114
39	293.9	258.3	79.6	1828.3	10435.2	12.19	.48	.251	.113
40	300.4	264.8	1.2	1827.1	10436.4	.19	.01	.251	.112
41	306.9	271.3	.0	1827.1	10436.4	.00	.00	.251	.112
42	313.5	277.9	.0	1827.1	10436.4	.00	.00	.251	.118
43	320.0	284.4	.0	1827.1	10436.4	.00	.00	.251	.116
44	326.5	290.9	.2	1826.8	10436.6	.03	.00	.251	.113
45	333.1	297.5	.0	1826.8	10436.6	.00	.00	.251	.095
46	339.6	304.0	.0	1826.8	10436.6	.00	.00	.000	.089
Average Skin Values			226.9			34.33	1.38	.251	.124
Toe			1826.8				443.73	.251	.050

Soil Model Parameters/Extensions		Skin	Toe
Case Damping		1.816	.318
Unloading Level	(% of Ru)	43	
Soil Plug Weight	(kips)		7.28

SFOBB PIDP. Pile TP1D, MHU-1700, BoR2 Blow No. 1 02/12/01
Fugro-McClelland Marine Geosciences, Inc CAPWAP(R) Version 1.993-1

EXTREMA TABLE

Pile Sgmnt No.	Depth Below Gages ft	max. Force kips	min. Force kips	max. Comp. Stress kips/in2	max. Tension Stress kips/in2	max. Trnsfd. Energy kips-ft	max. Veloc. ft/s	max. Displ. in
1	3.3	23861.2	-1050.0	29.56	-1.30	953.16	15.4	.797
10	32.7	23076.1	-1328.7	28.59	-1.65	946.48	15.9	.770
20	65.3	22201.3	-1214.5	27.50	-1.50	843.80	15.0	.690
30	98.0	20440.1	-1251.4	28.49	-1.74	744.88	14.6	.620
41	133.9	18045.0	-732.0	25.15	-1.02	577.88	13.0	.540
51	166.5	15396.0	-251.2	21.46	-.35	420.87	11.4	.450
62	202.5	10283.2	-37.3	22.02	-.08	243.17	10.1	.350
72	235.1	8685.1	-36.8	18.59	-.08	161.08	8.5	.260
82	267.8	6256.2	-36.3	13.39	-.08	65.55	5.2	.140
93	303.7	3318.4	-904.4	7.10	-1.94	26.90	4.0	.120
103	336.3	3402.6	-136.4	6.37	-.26	25.82	4.2	.110
104	339.6	3202.5	-294.3	5.40	-.50	26.78	4.2	.113
Absolute	3.3			29.56		(T=	41.4 ms)	
	297.1				-2.05	(T=	63.9 ms)	

CASE METHOD

	J=0.0	J=0.1	J=0.2	J=0.3	J=0.4	J=0.5	J=0.6	J=0.7	J=0.8	J=0.9
RS1	20930.	18929.	16928.	14928.	12927.	10926.	8926.	6925.	4924.	2924.
RMX	20972.	18945.	16928.	14928.	12927.	10926.	8926.	6925.	4924.	2924.
RSU	23560.	21822.	20084.	18347.	16609.	14872.	13134.	11396.	9659.	7921.
RA A2 W	817.	705.	0.							

Current CAPWAP Ru= 12297.6; Corresponding J(Rs)= .43; J(Rx)= .43

VMAX	VFIN	V1*Z	F1	FMAX	DMAX	DFIN	EMAX	EFIN	R HF	R EN
15.42	-.2222	153.5	23595.8	23861.2	.797	.176	953.2	897.8	26428.6	67694.1

SFOBB PIDP. Pile TP1D, MHU-1700, BoR2 Blow No. 1 02/12/01
Fugro-McClelland Marine Geosciences, Inc CAPWAP(R) Version 1.993-1

PILE PROFILE AND PILE MODEL

Depth ft	Area in2	E-Modulus kips/in2	Spec. Weight kips/ft3	Circumf. ft
.00	807.20	30000.0	.492	25.130
90.25	807.20	30000.0	.492	25.130
90.25	717.40	30000.0	.492	25.130
188.60	717.40	30000.0	.492	25.130
188.60	467.10	30000.0	.492	25.130
334.60	467.10	30000.0	.492	25.130
334.60	592.80	30000.0	.492	25.130
339.60	592.80	30000.0	.492	25.130

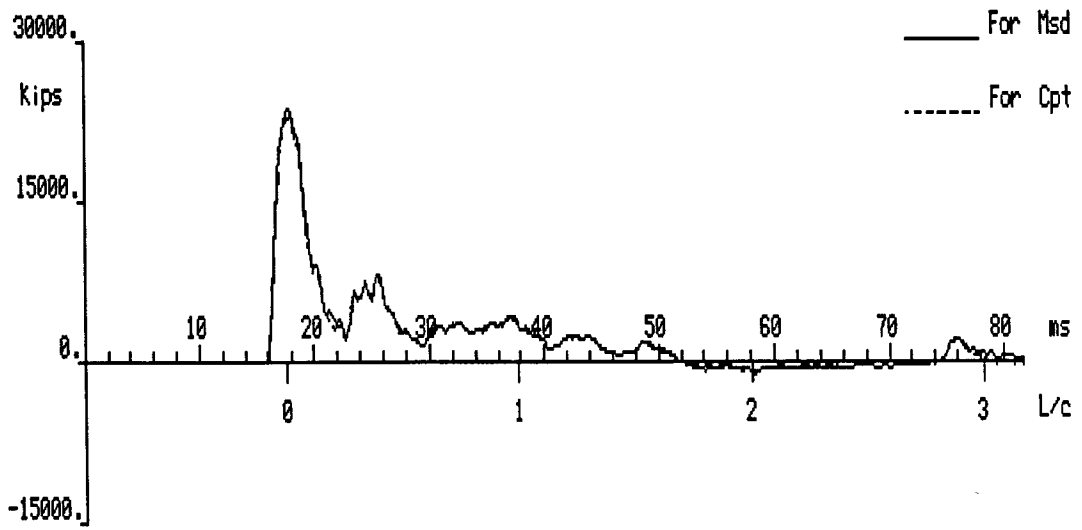
Toe Area 4.117 ft2

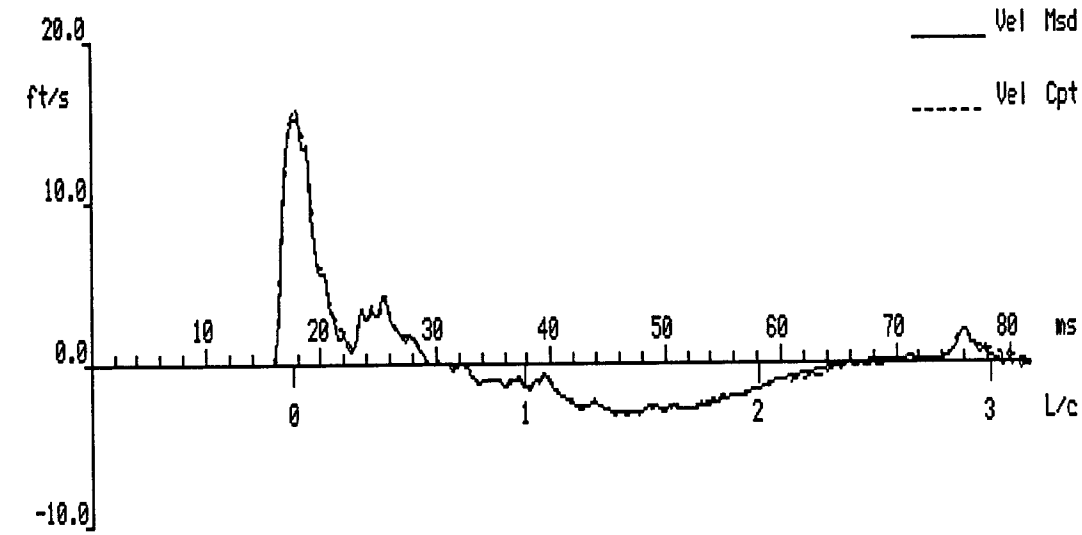
Segmnt No.	Depth B.G. feet	Impedance kips/ft/s	Imp. Change %	T. Slack inch	C. Slack inch	Circumf. feet
1	3.27	1440.51	.00	.000	.000	25.130
3	9.80	1440.51	.00	.000	.000	25.130
4	13.06	1440.51	.00	.000	.000	25.130
6	19.59	1440.51	.00	.000	.000	25.130
11	35.92	1440.51	.00	.000	.000	25.130
28	91.43	1382.56	.00	.000	.000	25.130
29	94.70	1280.25	.00	.000	.000	25.130
58	189.39	1171.88	.00	.000	.000	25.130
59	192.66	833.57	.00	.000	.000	25.130
81	264.50	833.58	.00	.000	.000	25.130
82	267.76	833.57	.00	.000	.000	25.130
103	336.33	952.73	.00	.000	.000	25.130
104	339.60	1057.90	.00	.000	.000	25.130

Pile Damping 1.0 %, Time Incr .194 ms, Wave Speed 16810.7 ft/s

SFOBB PIDP. Pile TP1D, MHU-1700, BoR2 Blow 1 02/12/01

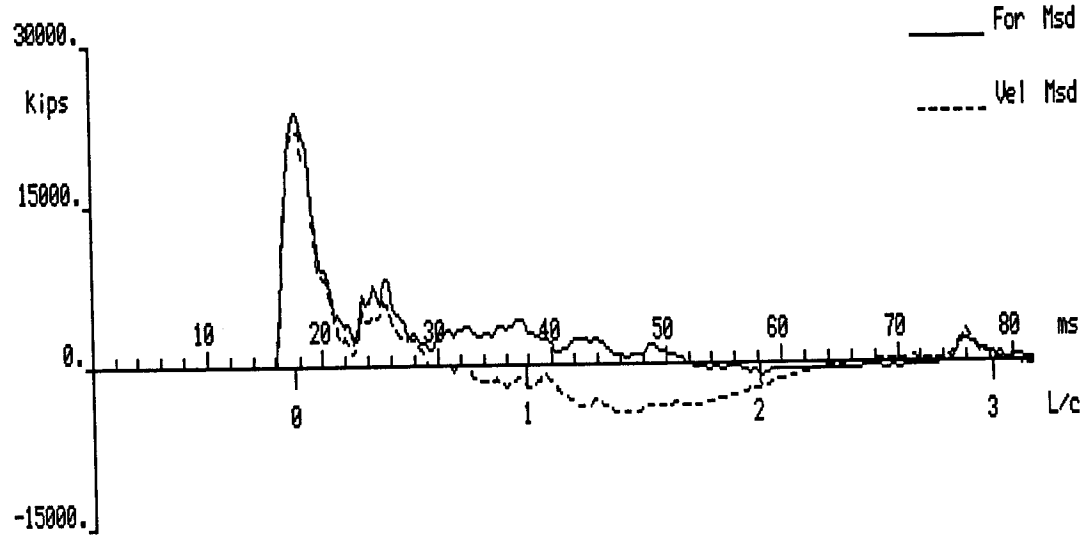
Fugro-McClelland Marine Geosciences, Inc CAPWAP(R) Version 1.993-1

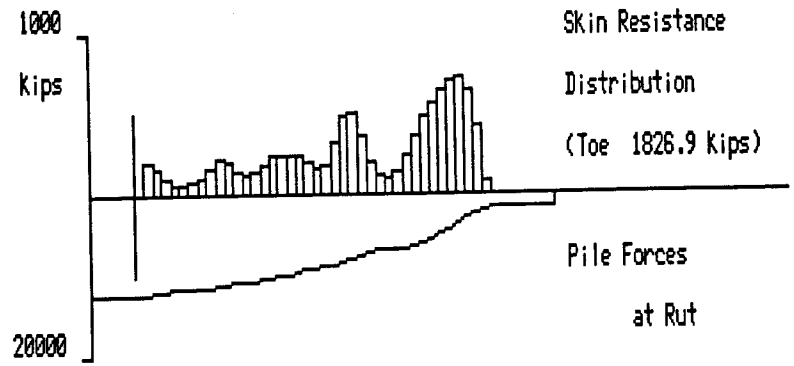




SFOBB PIDP. Pile TP1D, MHU-1700, BoR2 Blow 1 02/12/01

Fugro-McClelland Marine Geosciences, Inc CAPWAP(R) Version 1.993-1

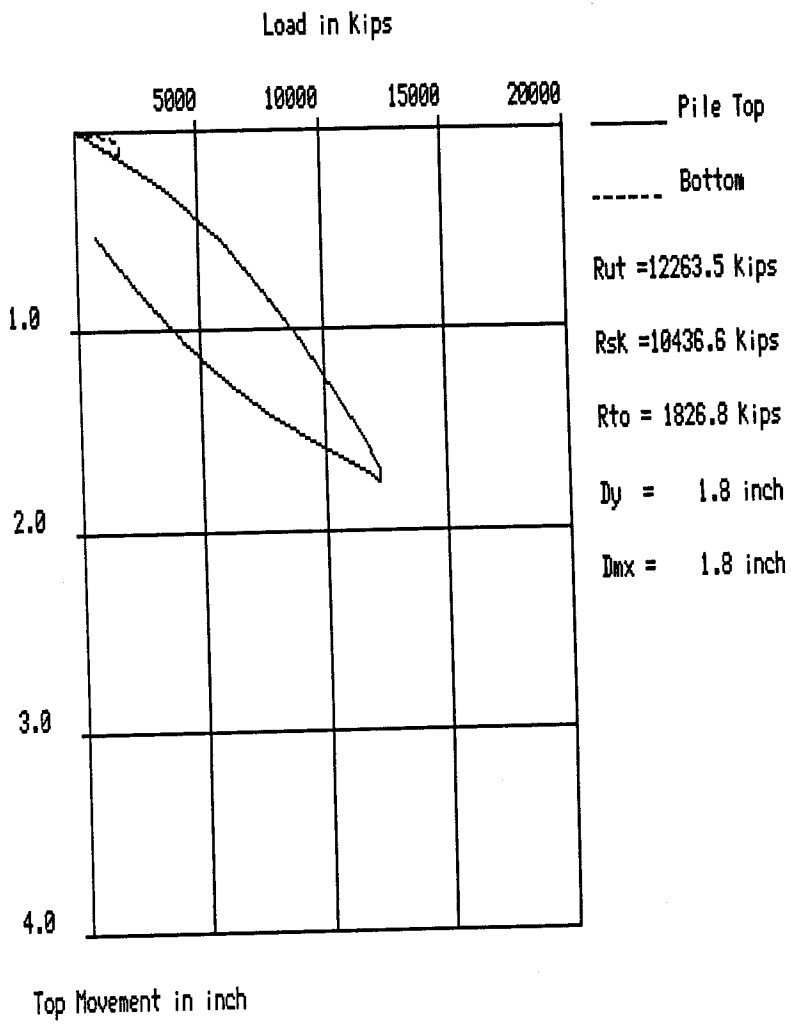




SFOBB PIDP. Pile TP1D, MHU-1700, BoR2 Blow 1 02/12/01

Fugro-McClelland Marine Geosciences, Inc CAPWAP(R) Version 1.993-1

Dynamic D-Toe, E-P R-Toe



PILE 1
BOR2, BLOW NO. 1, PDA 2

PILE 1
BOR2, BLOW NO. 1, PDA 2

SFOBB PIDP, Pile TP1DR2, MHU 1700, BoR2
Fugro-McClelland Marine Geosciences, Inc

Blow No. 1 02/12/01
CAPWAP(R) Version 1.993-1

CAPWAP FINAL RESULTS

Final CAPWAP Capacity: Ru 13368.3 Skin 10802.3 Toe 2566.0 kips

Soil Sgmnt No.	Depth Below Gages ft	Depth Below Grade ft	Ru kips	Sum of Ru Up kips	Sum of Ru Down kips	Unit Resist. w. Respect to Depth kips/ft	Unit Resist. w. Respect to Area kips/f2	Smith Damping s/ft	Quake inch
				13368.3					
1	42.9	7.3	196.7	13171.7	196.7	29.82	1.19	.240	.150
2	49.5	13.9	130.2	13041.4	326.9	19.75	.79	.240	.150
3	56.1	20.5	72.6	12968.8	399.5	11.01	.44	.240	.150
4	62.6	27.0	86.1	12882.7	485.6	13.06	.52	.240	.150
5	69.2	33.6	102.6	12780.1	588.2	15.55	.62	.240	.150
6	75.8	40.2	74.8	12705.3	663.0	11.34	.45	.240	.150
7	82.4	46.8	76.6	12628.8	739.6	11.61	.46	.240	.150
8	89.0	53.4	146.3	12482.5	885.9	22.19	.88	.240	.150
9	95.6	60.0	220.0	12262.5	1105.9	33.36	1.33	.240	.150
10	102.2	66.6	222.9	12039.5	1328.8	33.81	1.35	.240	.150
11	108.8	73.2	169.9	11869.7	1498.6	25.76	1.03	.240	.150
12	115.4	79.8	143.0	11726.7	1641.6	21.69	.86	.240	.150
13	122.0	86.4	174.1	11552.6	1815.8	26.40	1.05	.240	.150
14	128.6	93.0	222.1	11330.4	2037.9	33.69	1.34	.240	.150
15	135.2	99.6	250.3	11080.1	2288.2	37.96	1.51	.240	.150
16	141.8	106.2	267.3	10812.8	2555.5	40.53	1.61	.240	.150
17	148.4	112.8	293.3	10519.5	2848.8	44.48	1.77	.240	.150
18	155.0	119.4	301.0	10218.6	3149.7	45.64	1.82	.240	.150
19	161.6	126.0	236.3	9982.3	3386.0	35.83	1.43	.240	.150
20	168.2	132.6	132.0	9850.3	3518.0	20.02	.80	.240	.150
21	174.7	139.1	136.5	9713.8	3654.5	20.70	.82	.240	.150
22	181.3	145.7	326.6	9387.1	3981.2	49.54	1.97	.240	.150
23	187.9	152.3	544.2	8843.0	4525.4	82.52	3.28	.240	.150
24	194.5	158.9	577.2	8265.7	5102.6	87.54	3.48	.240	.150
25	201.1	165.5	431.4	7834.3	5534.0	65.42	2.60	.240	.150
26	207.7	172.1	268.0	7566.3	5802.0	40.65	1.62	.240	.150
27	214.3	178.7	176.2	7390.0	5978.3	26.73	1.06	.240	.150
28	220.9	185.3	144.1	7245.9	6122.4	21.85	.87	.240	.150
29	227.5	191.9	172.7	7073.2	6295.1	26.19	1.04	.240	.150

Soil Sgmnt No.	Depth Below Gages ft	Depth Below Grade ft	Ru kips	Sum of Ru Up kips	Sum of Ru Down kips	Unit Resist. w. Respect to Depth kips/ft	Unit Resist. w. Respect to Area kips/f2	Smith Damping s/ft	Quake inch
30	234.1	198.5	277.6	6795.6	6572.7	42.10	1.68	.240	.150
31	240.7	205.1	438.7	6356.9	7011.4	66.53	2.65	.240	.150
32	247.3	211.7	650.0	5706.9	7661.4	98.57	3.92	.240	.150
33	253.9	218.3	907.9	4799.0	8569.3	137.68	5.48	.240	.150
34	260.5	224.9	1031.9	3767.2	9601.2	156.48	6.23	.240	.140
35	267.1	231.5	874.6	2892.6	10475.7	132.62	5.28	.240	.133
36	273.7	238.1	302.1	2590.5	10777.9	45.82	1.82	.240	.131
37	280.3	244.7	24.5	2566.0	10802.3	3.71	.15	.240	.131
38	286.8	251.2	.0	2566.0	10802.3	.00	.00	.240	.142
39	293.4	257.8	.0	2566.0	10802.3	.00	.00	.240	.143
40	300.0	264.4	.0	2566.0	10802.3	.00	.00	.240	.142
41	306.6	271.0	.0	2566.0	10802.3	.00	.00	.240	.138
42	313.2	277.6	.0	2566.0	10802.3	.00	.00	.240	.131
43	319.8	284.2	.0	2566.0	10802.3	.00	.00	.240	.119
44	326.4	290.8	.0	2566.0	10802.3	.00	.00	.240	.103
45	333.0	297.4	.0	2566.0	10802.3	.00	.00	.240	.092
46	339.6	304.0	.0	2566.0	10802.3	.00	.00	.240	.078
Average Skin Values			234.8			35.53	1.42	.240	.147
Toe			2566.0				623.26	.400	.070

Soil Model Parameters/Extensions		Skin	Toe
Case Damping		1.799	.713
Unloading Level	(% of Ru)	39	
Soil Plug Weight	(kips)		5.60

SFOBB PIDP, Pile TP1DR2, MHU 1700, BoR2 Blow No. 1 02/12/01
Fugro-McClelland Marine Geosciences, Inc CAPWAP(R) Version 1.993-1

EXTREMA TABLE

Pile Sgmnt No.	Depth Below Gages ft	max. Force kips	min. Force kips	max. Comp. Stress kips/in2	max. Tension Stress kips/in2	max. Trnsfd. Energy kips-ft	max. Veloc. ft/s	max. Displ. in
1	3.3	25205.4	-790.4	31.23	-.98	1049.62	16.5	.816
10	33.0	24605.7	-1302.5	30.48	-1.61	1042.49	16.8	.790
20	65.9	23488.4	-1437.8	29.10	-1.78	924.68	15.9	.710
30	98.9	21098.3	-1318.6	29.41	-1.84	792.57	15.4	.630
40	131.9	19075.9	-1012.1	26.59	-1.41	630.62	13.7	.550
51	168.2	16126.9	-390.0	22.48	-.54	445.22	11.8	.440
61	201.1	10899.1	-14.7	23.33	-.03	263.27	10.6	.360
71	234.1	8878.2	-11.8	19.01	-.03	159.71	8.7	.250
82	270.4	4305.4	-531.7	9.22	-1.14	41.41	4.7	.140
92	303.3	3888.2	-5.7	8.32	-.01	35.37	4.7	.140
102	336.3	4630.8	-239.9	8.70	-.45	31.79	3.7	.090
103	339.6	4747.1	-401.2	8.01	-.68	32.65	3.7	.090
Absolute	3.3			31.23		(T=	21.6 ms)	
	95.6				-2.05	(T=	63.3 ms)	

CASE METHOD

	J=0.0	J=0.1	J=0.2	J=0.3	J=0.4	J=0.5	J=0.6	J=0.7	J=0.8	J=0.9
RS1	22560.	20455.	18350.	16246.	14141.	12037.	9932.	7828.	5723.	3618.
RMX	22560.	20455.	18350.	16246.	14141.	12037.	9932.	7828.	5723.	3618.
RSU	25491.	23679.	21868.	20056.	18245.	16433.	14622.	12810.	10999.	9187.
RA A2 W	9.	744.	0.							

Current CAPWAP Ru= 13368.3; Corresponding J(Rs)= .44; J(Rx)= .44

VMAX	VFIN	V1*Z	F1	FMAX	DMAX	DFIN	EMAX	EFIN	R HF	R EN
16.47	-.192	3728.5	25032.3	25205.4	.816	.166	1049.6	984.0	28456.6	74596.8

SFOBB PIDP, Pile TP1DR2, MHU 1700, BoR2 Blow No. 1 02/12/01
Fugro-McClelland Marine Geosciences, Inc CAPWAP(R) Version 1.993-1

PILE PROFILE AND PILE MODEL

Depth ft	Area in2	E-Modulus kips/in2	Spec. Weight kips/ft3	Circumf. ft
.00	807.20	30000.0	.492	25.130
90.25	807.20	30000.0	.492	25.130
90.25	717.40	30000.0	.492	25.130
188.60	717.40	30000.0	.492	25.130
188.60	467.10	30000.0	.492	25.130
334.60	467.10	30000.0	.492	25.130
334.60	592.80	30000.0	.492	25.130
339.60	592.80	30000.0	.492	25.130

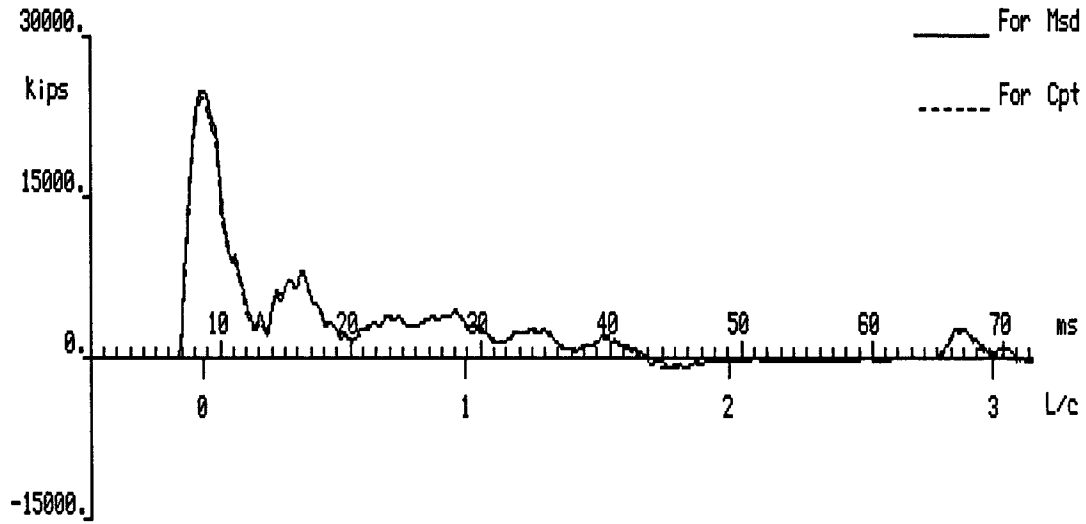
Toe Area 4.117 ft2

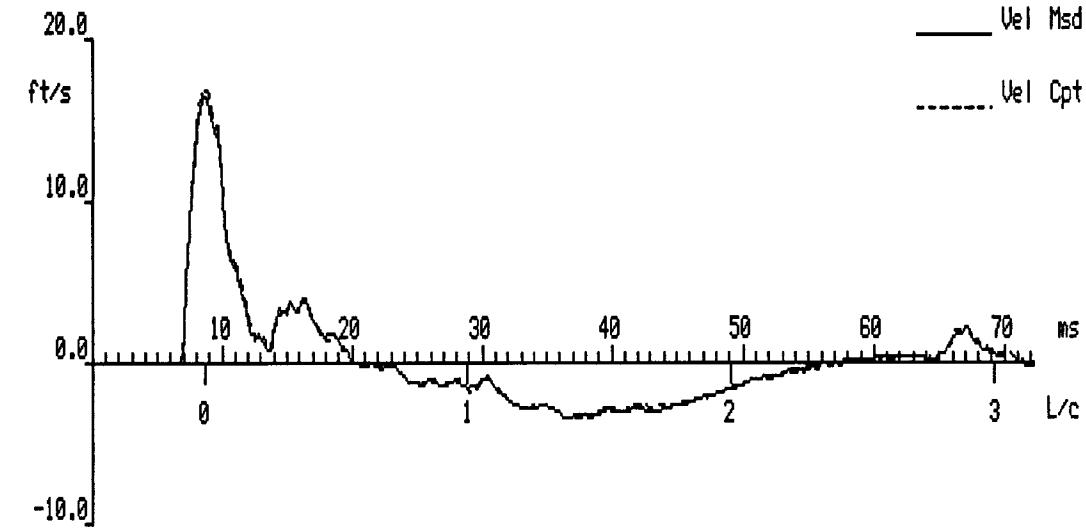
Segmnt No.	Depth B.G. feet	Impedance kips/ft/s	Imp. Change %	T. Slack inch	C. Slack inch	Circumf. feet
1	3.30	1440.51	.00	.000	.000	25.130
3	9.89	1440.51	.00	.000	.000	25.130
4	13.19	1440.51	.00	.000	.000	25.130
5	16.49	1440.51	.00	.000	.000	25.130
6	19.78	1440.51	.00	.000	.000	25.130
10	32.97	1440.51	.00	.000	.000	25.130
11	36.27	1440.51	.00	.000	.000	25.130
20	65.94	1440.51	.00	.000	.000	25.130
21	69.24	1440.51	.00	.000	.000	25.130
28	92.32	1339.97	.00	.000	.000	25.130
29	95.62	1280.25	.00	.000	.000	25.130
40	131.88	1280.26	.00	.000	.000	25.130
41	135.18	1280.25	.00	.000	.000	25.130
58	191.23	923.80	.00	.000	.000	25.130
59	194.53	833.58	.00	.000	.000	25.130
80	263.77	833.58	.00	.000	.000	25.130
102	336.30	949.46	.00	.000	.000	25.130
103	339.60	1057.90	.00	.000	.000	25.130

Pile Damping 1.0 %, Time Incr .196 ms, Wave Speed 16810.7 ft/s

SFOBB PIDP, Pile TP1DR2, MHU 1700, BoR2 Blow 1 02/12/01

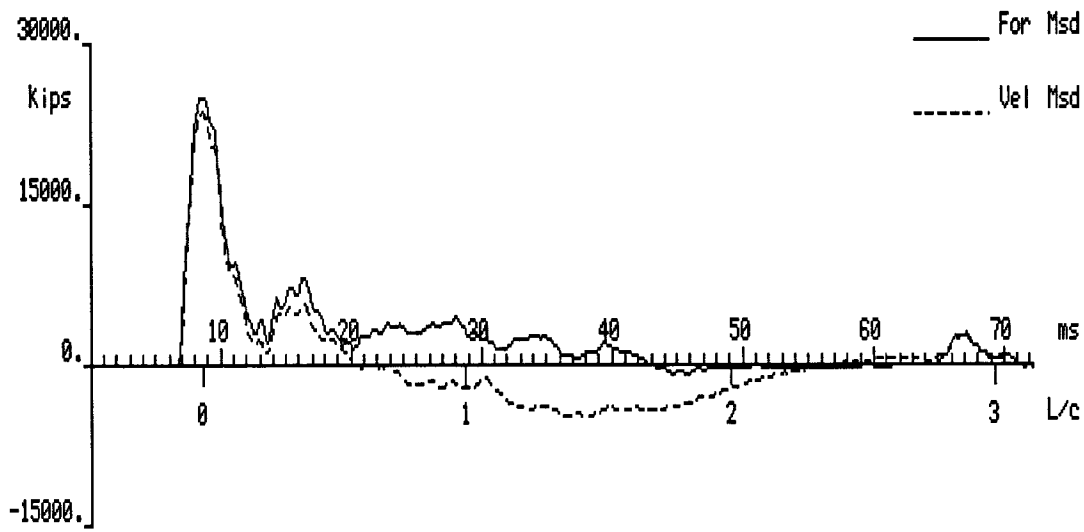
Fugro-McClelland Marine Geosciences, Inc CAPWAP(R) Version 1.993-1

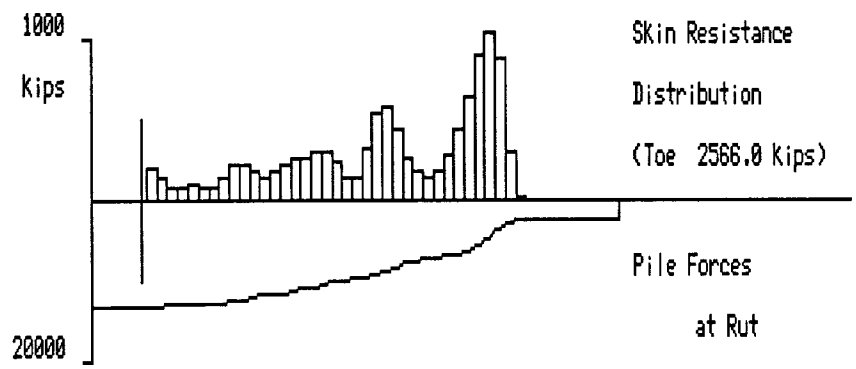




SFOBB PIDP, Pile TP1DR2, MHU 1700, BoR2 Blow 1 02/12/01

Fugro-McClelland Marine Geosciences, Inc CAPWAP(R) Version 1.993-1

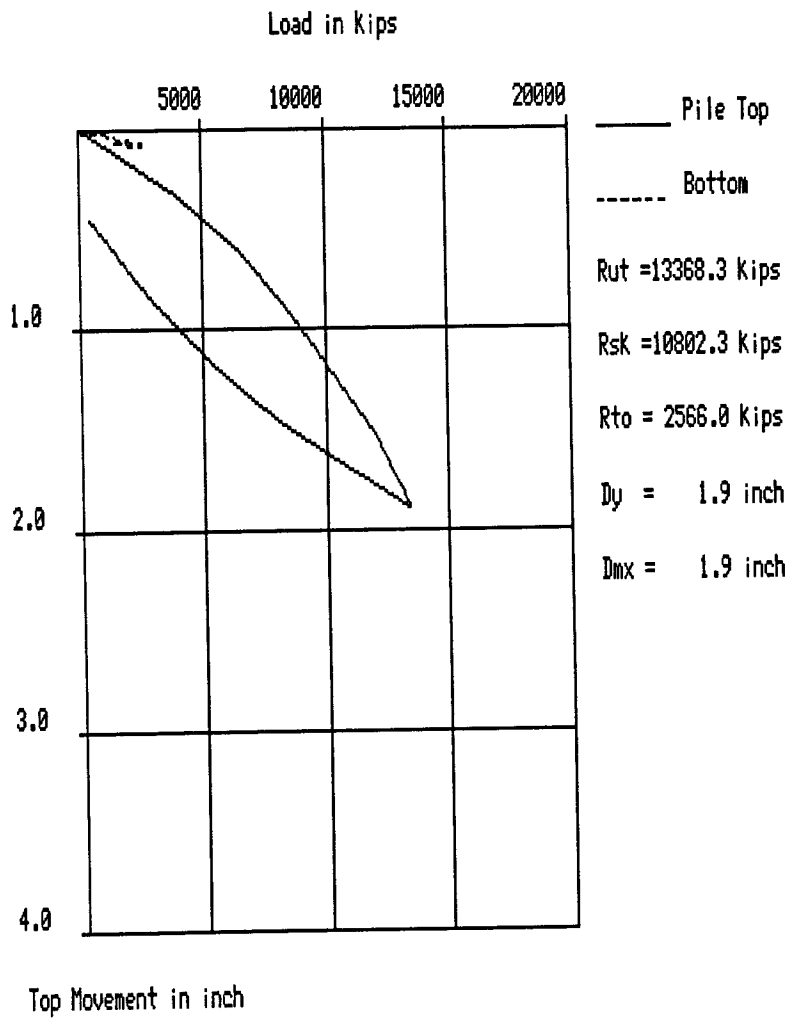




SFOBB PIDP, Pile TP1DR2, MHU 1700, BoR2 Blow 1 02/12/01

Fugro-McClelland Marine Geosciences, Inc CAPWAP(R) Version 1.993-1

Dynamic D-Toe, E-P R-Toe



PILE 1
EOR2, BLOW NO. 138, PDA 1

PILE 1
EOR2, BLOW NO. 138, PDA 1

SFOBB PIDP, Pile TP1D, MHU-1700, EoR2
Fugro-McClelland Marine Geosciences, Inc

Blow No. 138 02/12/01
CAPWAP(R) Version 1.993-1

CAPWAP FINAL RESULTS

Final CAPWAP Capacity: Ru 15713.2 Skin 10418.6 Toe 5294.6 kips

Soil Sgmnt No.	Depth Below Gages ft	Depth Below Grade ft	Ru kips	Sum of Ru Up kips	Sum of Ru Down kips	Unit Resist. w. Respect to Depth kips/ft	Unit Resist. w. Respect to Area kips/f2	Smith Damping s/ft	Quake inch
				15713.2					
1	42.9	8.3	141.1	15572.2	141.1	21.40	.85	.316	.194
2	49.5	14.9	107.3	15464.9	248.4	16.27	.65	.316	.194
3	56.1	21.5	71.3	15393.6	319.7	10.81	.43	.316	.194
4	62.6	28.0	50.9	15342.6	370.6	7.73	.31	.316	.194
5	69.2	34.6	30.8	15311.8	401.4	4.67	.19	.316	.194
6	75.8	41.2	22.2	15289.7	423.6	3.36	.13	.316	.194
7	82.4	47.8	46.7	15243.0	470.2	7.08	.28	.316	.194
8	89.0	54.4	84.8	15158.2	555.1	12.86	.51	.316	.194
9	95.6	61.0	112.5	15045.7	667.6	17.06	.68	.316	.194
10	102.2	67.6	123.9	14921.7	791.5	18.80	.75	.316	.194
11	108.8	74.2	112.8	14808.9	904.4	17.11	.68	.316	.194
12	115.4	80.8	85.1	14723.8	989.5	12.91	.51	.316	.194
13	122.0	87.4	75.6	14648.2	1065.0	11.46	.46	.316	.194
14	128.6	94.0	103.3	14544.9	1168.3	15.66	.62	.316	.194
15	135.2	100.6	133.7	14411.3	1302.0	20.27	.81	.316	.194
16	141.8	107.2	136.3	14274.9	1438.3	20.67	.82	.316	.194
17	148.4	113.8	136.5	14138.4	1574.8	20.71	.82	.316	.194
18	155.0	120.4	143.4	13995.0	1718.2	21.74	.87	.316	.194
19	161.6	127.0	103.0	13892.0	1821.2	15.62	.62	.316	.194
20	168.2	133.6	19.4	13872.6	1840.6	2.94	.12	.316	.194
21	174.7	140.1	24.4	13848.2	1865.0	3.70	.15	.316	.194
22	181.3	146.7	193.2	13655.0	2058.2	29.30	1.17	.316	.194
23	187.9	153.3	386.5	13268.5	2444.7	58.62	2.33	.316	.194
24	194.5	159.9	430.1	12838.4	2874.8	65.23	2.60	.316	.194
25	201.1	166.5	343.1	12495.3	3218.0	52.03	2.07	.316	.194
26	207.7	173.1	251.6	12243.7	3469.5	38.15	1.52	.316	.194
27	214.3	179.7	199.6	12044.2	3669.1	30.26	1.20	.316	.194
28	220.9	186.3	164.2	11879.9	3833.3	24.90	.99	.316	.194
29	227.5	192.9	162.2	11717.7	3995.5	24.60	.98	.316	.194

Soil Sgmnt No.	Depth Below Gages ft	Depth Below Grade ft	Ru kips	Sum of Ru Up kips	Sum of Ru Down kips	Unit w. Depth kips/ft	Resist. Respect to Area kips/f2	Smith Damping s/ft	Quake inch
30	234.1	199.5	225.0	11492.7	4220.5	34.13	1.36	.316	.194
31	240.7	206.1	337.5	11155.2	4558.0	51.17	2.04	.316	.194
32	247.3	212.7	470.3	10685.0	5028.3	71.31	2.84	.316	.194
33	253.9	219.3	588.2	10096.8	5616.4	89.19	3.55	.316	.192
34	260.5	225.9	662.7	9434.2	6279.1	100.49	4.00	.316	.167
35	267.1	232.5	733.8	8700.4	7012.8	111.27	4.43	.316	.144
36	273.7	239.1	843.6	7856.8	7856.5	127.93	5.09	.316	.126
37	280.3	245.7	937.2	6919.6	8793.6	142.12	5.66	.316	.115
38	286.8	252.2	893.1	6026.5	9686.8	135.44	5.39	.316	.109
39	293.4	258.8	614.3	5412.2	10301.0	93.15	3.71	.316	.107
40	300.0	265.4	117.6	5294.6	10418.6	17.84	.71	.316	.104
41	306.6	272.0	.0	5294.6	10418.6	.00	.00	.000	.104
42	313.2	278.6	.0	5294.6	10418.6	.00	.00	.000	.186
43	319.8	285.2	.0	5294.6	10418.6	.00	.00	.000	.177
44	326.4	291.8	.0	5294.6	10418.6	.00	.00	.000	.134
45	333.0	298.4	.0	5294.6	10418.6	.00	.00	.000	.039
46	339.6	305.0	.0	5294.6	10418.6	.00	.00	.000	.023
Average Skin Values			226.5			34.16	1.37	.316	.163
Toe			5294.6				1286.03	.340	.029

Soil Model Parameters/Extensions		Skin	Toe
Case Damping		2.285	1.248
Unloading Level	(% of Ru)	87	
Soil Plug Weight	(kips)		71.40

SFOBB PIDP, Pile TP1D, MHU-1700, EoR2 Blow No. 138 02/12/01
Fugro-McClelland Marine Geosciences, Inc CAPWAP(R) Version 1.993-1

EXTREMA TABLE

Pile Sgmnt No.	Depth Below Gages ft	max. Force kips	min. Force kips	max. Comp. Stress kips/in2	max. Tension Stress kips/in2	max. Trnsfd. Energy kips-ft	max. Veloc. ft/s	max. Displ. in
1	3.3	26336.1	-767.3	32.63	-.95	1166.95	17.2	.892
10	33.0	25744.4	-1499.2	31.89	-1.86	1161.05	17.5	.870
20	65.9	24424.9	-1357.6	30.26	-1.68	1046.15	16.7	.820
30	98.9	22447.3	-1266.5	31.29	-1.77	958.49	16.7	.780
40	131.9	20931.5	-893.5	29.18	-1.25	818.94	15.4	.710
51	168.2	18727.3	-443.0	26.10	-.62	656.48	14.3	.600
61	201.1	13833.4	.0	29.62	.00	425.86	13.1	.460
71	234.1	10920.2	.0	23.38	.00	252.83	10.5	.320
82	270.4	6836.4	.0	14.64	.00	72.80	5.4	.150
92	303.3	2862.0	.0	6.13	.00	19.83	3.3	.100
102	336.3	4831.5	.0	9.08	.00	10.90	1.2	.030
103	339.6	4730.0	.0	7.98	.00	10.68	1.3	.032
Absolute	194.5			33.13		(T=	53.2 ms)	
	42.9				-2.03	(T=	84.7 ms)	

CASE METHOD

	J=0.0	J=0.1	J=0.2	J=0.3	J=0.4	J=0.5	J=0.6	J=0.7	J=0.8	J=0.9
RS1	24388.	22259.	20130.	18001.	15872.	13743.	11614.	9485.	7356.	5227.
RMX	24388.	22259.	20130.	18001.	15872.	13743.	11614.	9485.	7356.	5227.
RSU	27542.	25728.	23915.	22101.	20288.	18474.	16660.	14847.	13033.	11220.
RA A2 W	71.	4304.	0.							

Current CAPWAP Ru= 15713.2; Corresponding J(Rs)= .41; J(Rx)= .41

VMAX	VFIN	V1*Z	F1	FMAX	DMAX	DFIN	EMAX	EFIN	R HF	R EN
17.15	.932	4709.2	26336.1	26336.1	.892	.118	1166.9	1088.4	29146.2	82877.1

SFOBB PIDP, Pile TP1D, MHU-1700, EoR2
Fugro-McClelland Marine Geosciences, Inc

Blow No. 138 02/12/01
CAPWAP(R) Version 1.993-1

PILE PROFILE AND PILE MODEL

Depth ft	Area in2	E-Modulus kips/in2	Spec. Weight kips/ft3	Circumf. ft
.00	807.20	30000.0	.492	25.130
90.25	807.20	30000.0	.492	25.130
90.25	717.40	30000.0	.492	25.130
188.60	717.40	30000.0	.492	25.130
188.60	467.10	30000.0	.492	25.130
334.60	467.10	30000.0	.492	25.130
334.60	592.80	30000.0	.492	25.130
339.60	592.80	30000.0	.492	25.130

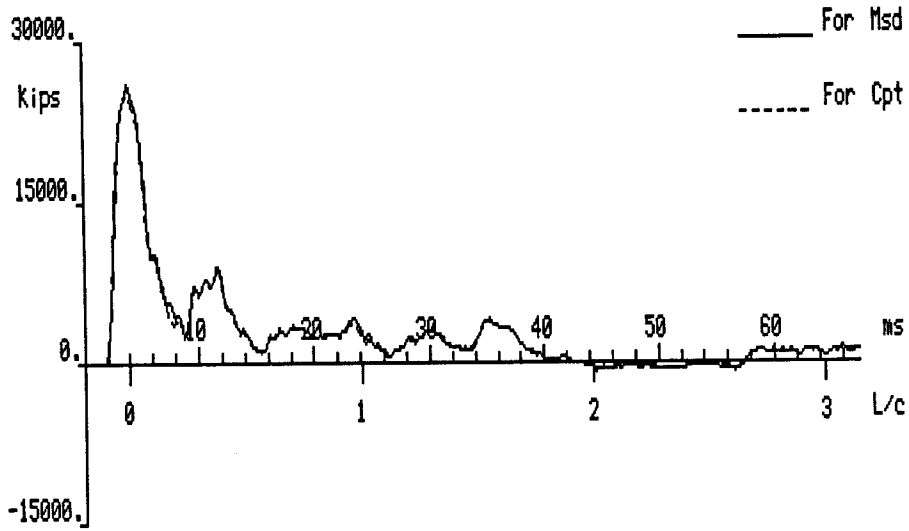
Toe Area 4.117 ft2

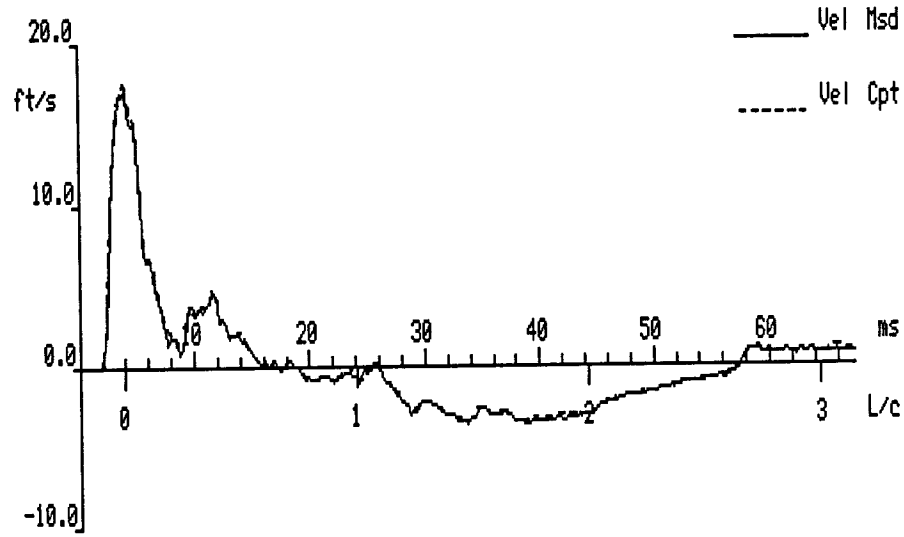
Segmnt No.	Depth B.G. feet	Impedance kips/ft/s	Imp. Change %	T. Slack inch	C. Slack inch	Circumf. feet
1	3.30	1440.51	.00	.000	.000	25.130
3	9.89	1440.51	.00	.000	.000	25.130
4	13.19	1440.51	.00	.000	.000	25.130
5	16.49	1440.51	.00	.000	.000	25.130
6	19.78	1440.51	.00	.000	.000	25.130
10	32.97	1440.51	.00	.000	.000	25.130
11	36.27	1440.51	.00	.000	.000	25.130
20	65.94	1440.51	.00	.000	.000	25.130
21	69.24	1440.51	.00	.000	.000	25.130
28	92.32	1339.97	.00	.000	.000	25.130
29	95.62	1280.25	.00	.000	.000	25.130
40	131.88	1280.26	.00	.000	.000	25.130
41	135.18	1280.25	.00	.000	.000	25.130
58	191.23	923.80	.00	.000	.000	25.130
59	194.53	833.58	.00	.000	.000	25.130
80	263.77	833.58	.00	.000	.000	25.130
102	336.30	949.46	.00	.000	.000	25.130
103	339.60	1057.90	.00	.000	.000	25.130

Pile Damping 1.0 %, Time Incr .196 ms, Wave Speed 16810.7 ft/s

SFOBB PIDP, Pile TP1D, MHU-1700, EoR2 Blow 138 02/12/01

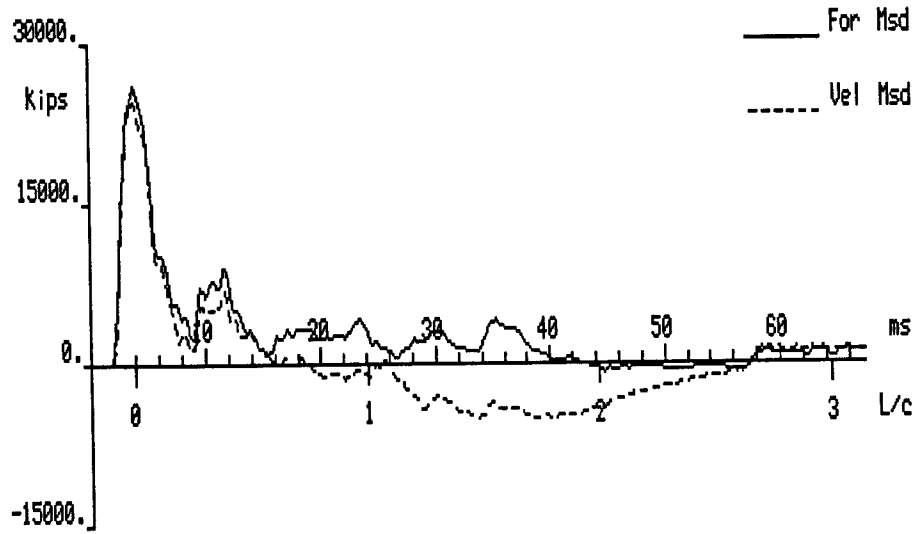
Fugro-McClelland Marine Geosciences, Inc CAPWAP(R) Version 1.993-1

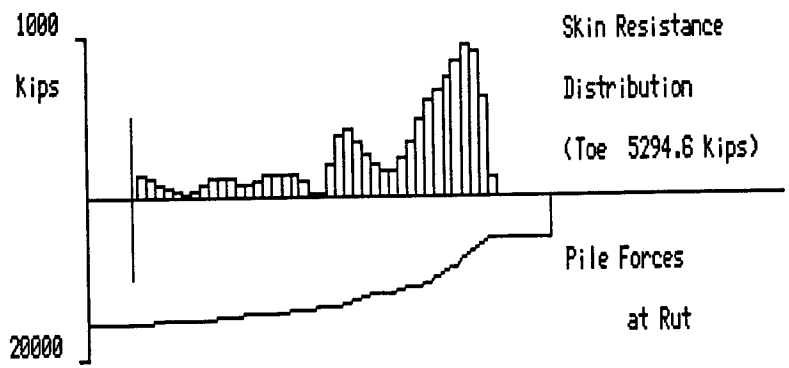




SFOBB PIDP, Pile TP1D, MHU-1700, EoR2 Blow 138 02/12/01

Fugro-McClelland Marine Geosciences, Inc CAPWAP(R) Version 1.993-1

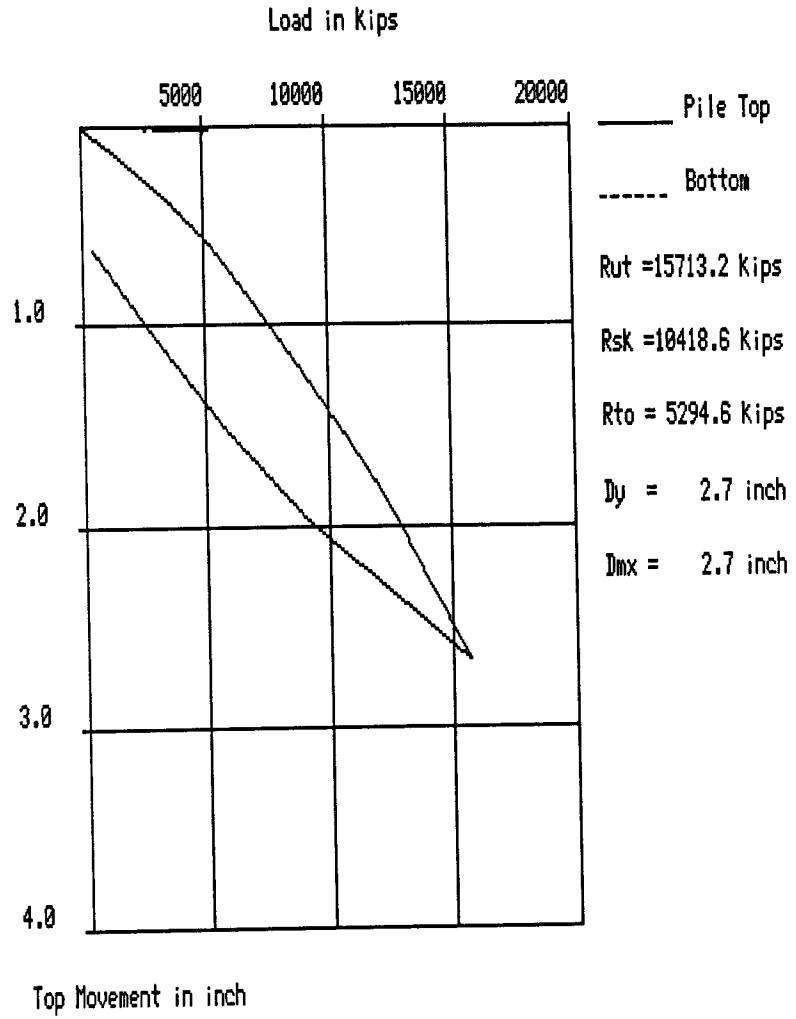




SFOBB PIDP, Pile TP1D, MHU-1700, EoR2 Blow 138 02/12/01

Fugro-McClelland Marine Geosciences, Inc CAPWAP(R) Version 1.993-1

Dynamic D-Toe, E-P R-Toe



PILE 1
BOR3, BLOW NO. 1, PDA 2

PILE 1
BOR3, BLOW NO. 1, PDA 2

SFOBB PIDP, Pile TP1D, MHU-1700, BoR3
Fugro-McClelland Marine Geosciences, Inc

Blow No. 1 02/12/01
CAPWAP(R) Version 1.993-1

CAPWAP FINAL RESULTS

Final CAPWAP Capacity: Ru 12263.0 Skin 11456.0 Toe 807.0 kips

Soil Sgmnt No.	Depth Below Gages ft	Depth Below Grade ft	Ru kips	Sum of Ru Up kips	Sum of Ru Down kips	Unit Resist. w. Respect to Depth kips/ft	Unit Resist. w. Respect to Area kips/f2	Smith Damping s/ft	Quake inch
				12263.0					
1	42.9	8.3	174.0	12089.0	174.0	26.39	1.05	.180	.040
2	49.5	14.9	115.9	11973.1	289.9	17.57	.70	.180	.040
3	56.1	21.5	69.7	11903.4	359.6	10.56	.42	.180	.040
4	62.6	28.0	101.3	11802.2	460.8	15.36	.61	.180	.040
5	69.2	34.6	128.3	11673.9	589.1	19.45	.77	.180	.040
6	75.8	41.2	70.5	11603.4	659.6	10.69	.43	.180	.040
7	82.4	47.8	33.3	11570.1	692.9	5.05	.20	.180	.040
8	89.0	54.4	119.1	11451.1	811.9	18.06	.72	.180	.040
9	95.6	61.0	259.6	11191.5	1071.5	39.37	1.57	.180	.040
10	102.2	67.6	304.4	10887.1	1375.9	46.15	1.84	.180	.040
11	108.8	74.2	205.8	10681.3	1581.7	31.21	1.24	.180	.040
12	115.4	80.8	91.7	10589.6	1673.4	13.90	.55	.180	.040
13	122.0	87.4	82.3	10507.4	1755.6	12.48	.50	.180	.040
14	128.6	94.0	155.6	10351.7	1911.3	23.60	.94	.180	.040
15	135.2	100.6	249.6	10102.2	2160.8	37.85	1.51	.180	.040
16	141.8	107.2	333.3	9768.9	2494.1	50.54	2.01	.180	.040
17	148.4	113.8	387.4	9381.5	2881.5	58.75	2.34	.180	.040
18	155.0	120.4	410.4	8971.1	3291.9	62.24	2.48	.180	.040
19	161.6	127.0	405.6	8565.5	3697.5	61.51	2.45	.180	.040
20	168.2	133.6	377.8	8187.7	4075.3	57.29	2.28	.180	.040
21	174.7	140.1	378.6	7809.1	4453.9	57.42	2.28	.180	.040
22	181.3	146.7	498.1	7310.9	4952.1	75.54	3.01	.180	.040
23	187.9	153.3	718.4	6592.5	5670.5	108.95	4.34	.180	.040
24	194.5	159.9	830.1	5762.4	6500.6	125.88	5.01	.180	.040
25	201.1	166.5	724.0	5038.4	7224.6	109.80	4.37	.180	.040
26	207.7	173.1	577.9	4460.5	7802.5	87.64	3.49	.180	.040
27	214.3	179.7	557.5	3903.0	8360.0	84.54	3.36	.180	.040
28	220.9	186.3	677.0	3226.0	9037.0	102.66	4.09	.180	.040
29	227.5	192.9	857.2	2368.8	9894.2	129.99	5.17	.180	.040

Soil Sgmnt No.	Depth Below Gages ft	Depth Below Grade ft	Ru kips	Sum of Ru Up kips	Sum of Ru Down kips	Unit Resist. w. Respect to Depth kips/ft	Unit Resist. w. Respect to Area kips/f2	Smith Damping s/ft	Quake inch
30	234.1	199.5	883.3	1485.5	10777.5	133.96	5.33	.180	.040
31	240.7	206.1	626.2	859.2	11403.8	94.97	3.78	.180	.040
32	247.3	212.7	36.4	822.8	11440.2	5.52	.22	.180	.040
33	253.9	219.3	7.3	815.6	11447.4	1.11	.04	.180	.040
34	260.5	225.9	1.6	813.9	11449.1	.25	.01	.180	.040
35	267.1	232.5	5.5	808.4	11454.6	.83	.03	.180	.040
36	273.7	239.1	1.4	807.0	11456.0	.22	.01	.180	.040
37	280.3	245.7	.0	807.0	11456.0	.00	.00	.180	.040
38	286.8	252.2	.0	807.0	11456.0	.00	.00	.180	.040
39	293.4	258.8	.0	807.0	11456.0	.00	.00	.180	.040
40	300.0	265.4	.0	807.0	11456.0	.00	.00	.180	.040
41	306.6	272.0	.0	807.0	11456.0	.00	.00	.180	.040
42	313.2	278.6	.0	807.0	11456.0	.00	.00	.180	.040
43	319.8	285.2	.0	807.0	11456.0	.00	.00	.180	.040
44	326.4	291.8	.0	807.0	11456.0	.00	.00	.180	.040
45	333.0	298.4	.0	807.0	11456.0	.00	.00	.180	.040
46	339.6	305.0	.0	807.0	11456.0	.00	.00	.180	.040
Average Skin Values			249.0			37.56	1.50	.180	.040
Toe			807.0				196.02	.260	.160

Soil Model Parameters/Extensions		Skin	Toe
Case Damping		1.431	.146
Unloading Quake	(% of loading quake)	3	59
Unloading Level	(% of Ru)	18	
Soil Plug Weight	(kips)		.05

SFOBB PIDP, Pile TP1D, MHU-1700, BoR3 Blow No. 1 02/12/01
Fugro-McClelland Marine Geosciences, Inc CAPWAP(R) Version 1.993-1

EXTREMA TABLE

Pile Sgmnt No.	Depth Below Gages ft	max. Force kips	min. Force kips	max. Comp. Stress kips/in2	max. Tension Stress kips/in2	max. Trnsfd. Energy kips-ft	max. Veloc. ft/s	max. Displ. in
1	3.3	25845.8	-2342.3	32.02	-2.90	939.40	16.4	.774
10	33.0	24733.9	-3136.9	30.64	-3.89	944.40	17.1	.740
20	65.9	23876.9	-3503.4	29.58	-4.34	852.18	16.2	.680
30	98.9	21723.9	-3275.7	30.28	-4.57	745.08	15.9	.590
40	131.9	20095.9	-3188.6	28.01	-4.44	620.79	14.7	.510
51	168.2	17519.2	-2837.8	24.42	-3.96	438.38	11.9	.390
61	201.1	11228.2	-1922.0	24.04	-4.11	234.27	9.7	.330
71	234.1	6857.2	-880.5	14.68	-1.89	87.75	5.3	.300
82	270.4	4186.1	-1927.2	8.96	-4.13	40.66	5.0	.280
92	303.3	4171.3	-1649.0	8.93	-3.53	37.50	5.0	.270
102	336.3	2365.4	-223.5	4.45	-.42	32.16	7.4	.250
103	339.6	2082.6	-217.8	3.51	-.37	33.10	7.5	.254
Absolute	3.3			32.02		(T=	21.4 ms)	
	247.3				-4.93	(T=	47.7 ms)	

CASE METHOD

	J=0.0	J=0.1	J=0.2	J=0.3	J=0.4	J=0.5	J=0.6	J=0.7	J=0.8	J=0.9
RS1	21975.	19735.	17496.	15256.	13017.	10777.	8538.	6298.	4059.	1819.
RMX	21975.	19735.	17496.	15256.	13017.	10777.	8538.	6298.	4059.	1819.
RSU	24267.	22257.	20247.	18237.	16227.	14217.	12206.	10196.	8186.	6176.

RA A2 W-1637. 133. 0.

Current CAPWAP Ru= 12263.0; Corresponding J(Rs)= .43; J(Rx)= .43

VMAX	VFIN	V1*Z	F1	FMAX	DMAX	DFIN	EMAX	EFIN	R HF	R EN
16.43	-.342	3665.0	25845.8	25845.8	.774	.049	939.4	937.3	28050.1	87010.7

SFOBB PIDP, Pile TP1D, MHU-1700, BoR3 Blow No. 1 02/12/01
Fugro-McClelland Marine Geosciences, Inc CAPWAP(R) Version 1.993-1

PILE PROFILE AND PILE MODEL

Depth ft	Area in2	E-Modulus kips/in2	Spec. Weight kips/ft3	Circumf. ft
.00	807.20	30000.0	.492	25.130
90.25	807.20	30000.0	.492	25.130
90.25	717.40	30000.0	.492	25.130
188.60	717.40	30000.0	.492	25.130
188.60	467.10	30000.0	.492	25.130
334.60	467.10	30000.0	.492	25.130
334.60	592.80	30000.0	.492	25.130
339.60	592.80	30000.0	.492	25.130

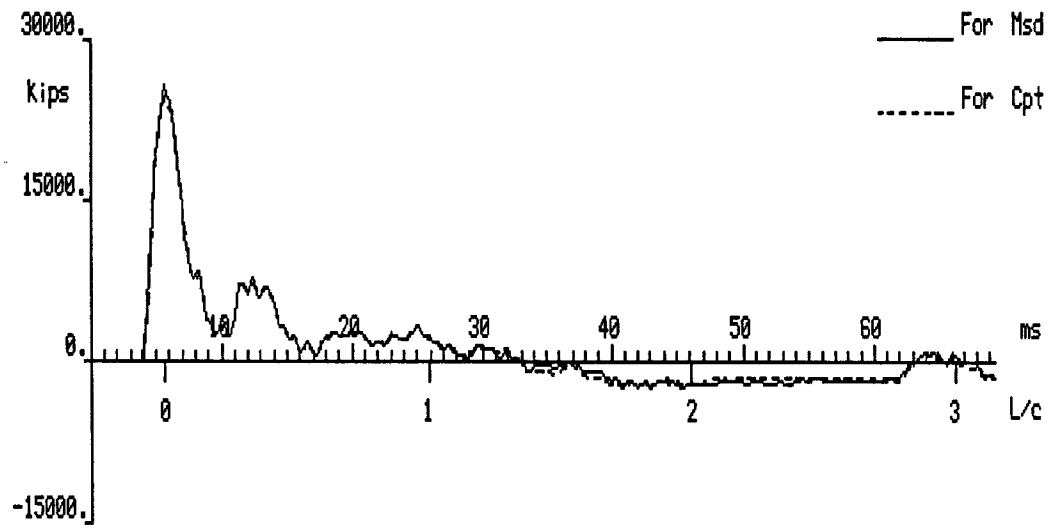
Toe Area 4.117 ft2

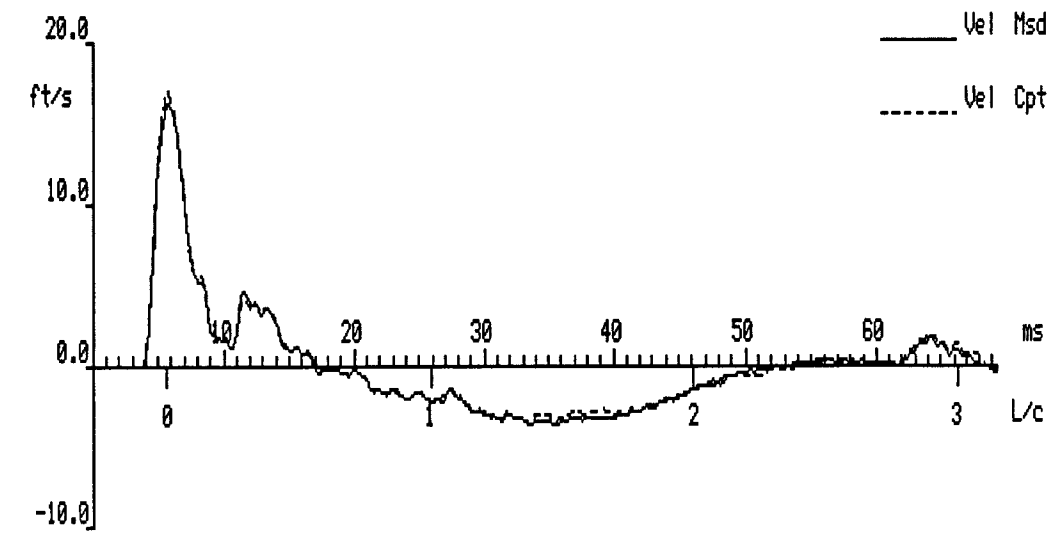
Segmnt No.	Depth B.G. feet	Impedance kips/ft/s	Imp. Change %	T. Slack inch	C. Slack inch	Circumf. feet
1	3.30	1440.51	.00	.000	.000	25.130
3	9.89	1440.51	.00	.000	.000	25.130
4	13.19	1440.51	.00	.000	.000	25.130
5	16.49	1440.51	.00	.000	.000	25.130
6	19.78	1440.51	.00	.000	.000	25.130
10	32.97	1440.51	.00	.000	.000	25.130
11	36.27	1440.51	.00	.000	.000	25.130
20	65.94	1440.51	.00	.000	.000	25.130
21	69.24	1440.51	.00	.000	.000	25.130
28	92.32	1339.97	.00	.000	.000	25.130
29	95.62	1280.25	.00	.000	.000	25.130
40	131.88	1280.26	.00	.000	.000	25.130
41	135.18	1280.25	.00	.000	.000	25.130
58	191.23	923.80	.00	.000	.000	25.130
59	194.53	833.58	.00	.000	.000	25.130
80	263.77	833.58	.00	.000	.000	25.130
102	336.30	949.46	.00	.000	.000	25.130
103	339.60	1057.90	.00	.000	.000	25.130

Pile Damping 1.0 %, Time Incr .196 ms, Wave Speed 16810.7 ft/s

SFOBB PIDP, Pile TP1D, MHU-1700, BoR3 Blow 1 02/12/01

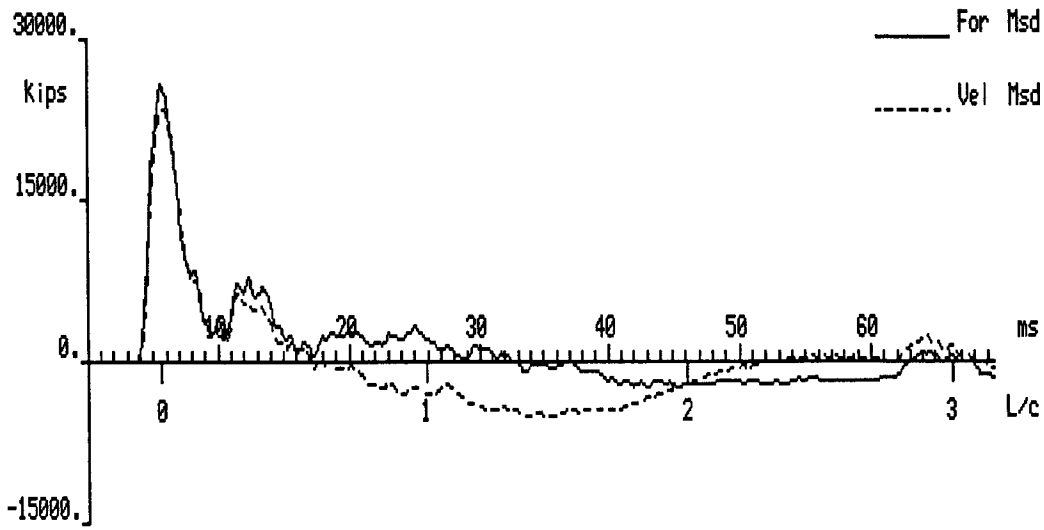
Fugro-McClelland Marine Geosciences, Inc CAPWAP(R) Version 1.993-1

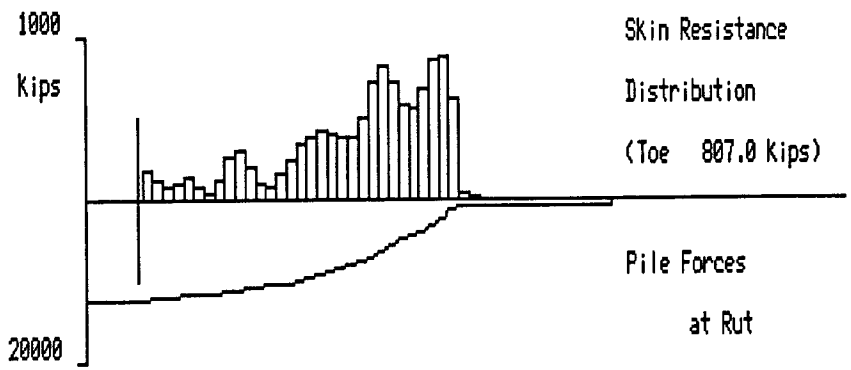




SFOBB PIDP, Pile TP1D, MHU-1700, BoR3 Blow 1 02/12/01

Fugro-McClelland Marine Geosciences, Inc CAPWAP(R) Version 1.993-1

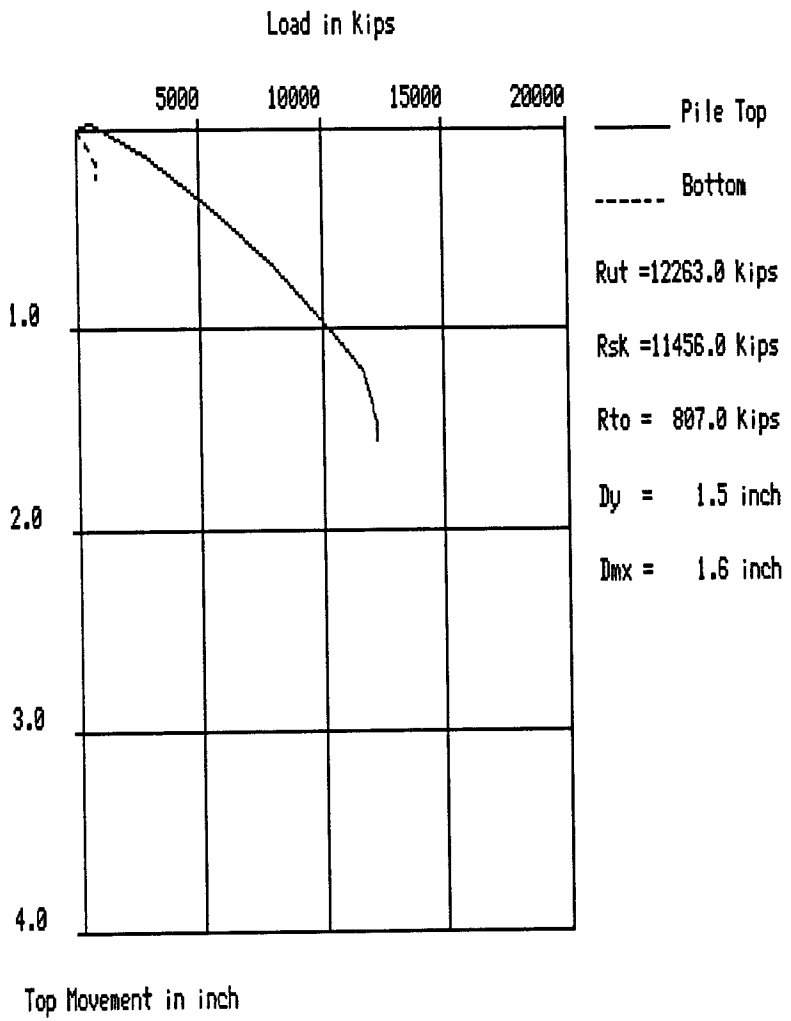




SFOBB PIDP, Pile TP1D, MHU-1700, BoR3 Blow 1 02/12/01

Fugro-McClelland Marine Geosciences, Inc CAPWAP(R) Version 1.993-1

Dynamic D-Toe, E-P R-Toe



PILE1
BOR3, BLOW NO. 2, PDA 1

PILE 1
BOR3, BLOW NO. 2, PDA 1

SFOBB PIDP, Pile TP1D, MHU-1700, BoR3 Blow No. 2 02/13/01
Fugro-McClelland Marine Geosciences, Inc CAPWAP(R) Version 1.993-1

CAPWAP FINAL RESULTS

Final CAPWAP Capacity: Ru 13239.6 Skin 11859.5 Toe 1380.0 kips

Soil Sgmnt No.	Depth Below Gages ft	Depth Below Grade ft	Ru kips	Sum of Ru Up kips	Sum of Ru Down kips	Unit Resist. w. Respect to Depth kips/ft	Unit Resist. w. Respect to Area kips/f2	Smith Damping s/ft	Quake inch
				13239.6					
1	42.9	8.3	167.9	13071.7	167.9	25.47	1.01	.187	.190
2	49.5	14.9	111.8	12959.9	279.7	16.95	.67	.187	.190
3	56.1	21.5	51.3	12908.6	331.0	7.78	.31	.187	.190
4	62.6	28.0	54.3	12854.3	385.3	8.23	.33	.187	.190
5	69.2	34.6	82.0	12772.3	467.3	12.44	.50	.187	.190
6	75.8	41.2	92.9	12679.4	560.2	14.09	.56	.187	.190
7	82.4	47.8	148.1	12531.3	708.3	22.46	.89	.187	.190
8	89.0	54.4	268.8	12262.5	977.1	40.76	1.62	.187	.190
9	95.6	61.0	356.9	11905.6	1334.0	54.12	2.15	.187	.190
10	102.2	67.6	310.6	11595.0	1644.6	47.11	1.87	.187	.190
11	108.8	74.2	175.7	11419.3	1820.3	26.64	1.06	.187	.190
12	115.4	80.8	103.3	11316.0	1923.6	15.67	.62	.187	.190
13	122.0	87.4	139.6	11176.3	2063.3	21.18	.84	.187	.190
14	128.6	94.0	215.0	10961.4	2278.2	32.60	1.30	.187	.190
15	135.2	100.6	281.4	10680.0	2559.6	42.67	1.70	.187	.190
16	141.8	107.2	331.7	10348.3	2891.3	50.30	2.00	.187	.190
17	148.4	113.8	371.3	9977.0	3262.6	56.30	2.24	.187	.190
18	155.0	120.4	355.1	9621.9	3617.7	53.86	2.14	.187	.190
19	161.6	127.0	214.5	9407.4	3832.2	32.52	1.29	.187	.190
20	168.2	133.6	61.8	9345.6	3894.0	9.37	.37	.187	.190
21	174.7	140.1	157.4	9188.2	4051.4	23.87	.95	.187	.190
22	181.3	146.7	518.5	8669.7	4569.8	78.63	3.13	.187	.190
23	187.9	153.3	789.9	7879.8	5359.8	119.79	4.77	.187	.190
24	194.5	159.9	685.3	7194.5	6045.1	103.92	4.14	.187	.190
25	201.1	166.5	294.5	6900.0	6339.6	44.67	1.78	.187	.190
26	207.7	173.1	30.7	6869.3	6370.3	4.66	.19	.187	.190
27	214.3	179.7	.0	6869.3	6370.3	.00	.00	.187	.190
28	220.9	186.3	.8	6868.5	6371.1	.12	.00	.187	.190
29	227.5	192.9	78.1	6790.4	6449.2	11.84	.47	.187	.190

Soil Sgmnt No.	Depth Below Gages ft	Depth Below Grade ft	Ru kips	Sum of Ru Up kips	Sum of Ru Down kips	Unit Resist. w. Respect to Depth kips/ft	Unit Resist. w. Respect to Area kips/f2	Smith Damping s/ft	Quake inch
30	234.1	199.5	208.8	6581.6	6658.0	31.67	1.26	.187	.190
31	240.7	206.1	321.8	6259.7	6979.9	48.81	1.94	.187	.190
32	247.3	212.7	378.0	5881.7	7357.9	57.33	2.28	.187	.190
33	253.9	219.3	389.7	5491.9	7747.6	59.10	2.35	.187	.190
34	260.5	225.9	407.2	5084.7	8154.9	61.76	2.46	.187	.190
35	267.1	232.5	469.7	4615.0	8624.6	71.23	2.83	.187	.190
36	273.7	239.1	608.8	4006.1	9233.5	92.33	3.67	.187	.190
37	280.3	245.7	765.5	3240.6	9999.0	116.09	4.62	.187	.171
38	286.8	252.2	843.4	2397.2	10842.4	127.90	5.09	.187	.158
39	293.4	258.8	694.2	1702.9	11536.7	105.28	4.19	.187	.151
40	300.0	265.4	261.2	1441.7	11797.8	39.61	1.58	.187	.149
41	306.6	272.0	61.7	1380.0	11859.5	9.36	.37	.187	.147
42	313.2	278.6	.0	1380.0	11859.5	.00	.00	.187	.142
43	319.8	285.2	.0	1380.0	11859.5	.00	.00	.187	.135
44	326.4	291.8	.0	1380.0	11859.5	.00	.00	.187	.132
45	333.0	298.4	.0	1380.0	11859.5	.00	.00	.187	.127
46	339.6	305.0	.0	1380.0	11859.5	.00	.00	.187	.121
Average Skin Values			257.8			38.88	1.56	.187	.183
Toe			1380.0				335.21	.496	.070

Soil Model Parameters/Extensions		Skin	Toe
Case Damping		1.541	.475
Unloading Level	(% of Ru)	33	
Soil Plug Weight	(kips)		10.92

SFOBB PIDP, Pile TP1D, MHU-1700, BoR3 Blow No. 2 02/13/01
Fugro-McClelland Marine Geosciences, Inc CAPWAP(R) Version 1.993-1

EXTREMA TABLE

Pile Sgmnt No.	Depth Below Gages ft	max. Force kips	min. Force kips	max. Comp. Stress kips/in2	max. Tension Stress kips/in2	max. Trnsfd. Energy kips-ft	max. Veloc. ft/s	max. Displ. in
1	3.3	23555.4	-646.1	29.18	-.80	972.10	16.2	.822
10	33.0	23561.3	-1669.3	29.19	-2.07	962.95	16.1	.760
20	65.9	22877.5	-1737.8	28.34	-2.15	883.76	15.5	.690
30	98.9	20282.4	-1639.0	28.27	-2.28	730.80	14.9	.600
40	131.9	18621.6	-1303.2	25.96	-1.82	600.73	13.6	.530
51	168.2	15914.9	-725.9	22.18	-1.01	436.35	12.0	.450
61	201.1	10308.0	.0	22.07	.00	249.61	11.2	.380
71	234.1	9844.2	.0	21.08	.00	213.48	10.5	.310
82	270.4	7642.0	.0	16.36	.00	108.63	7.6	.200
92	303.3	4695.7	-1079.6	10.05	-2.31	46.57	5.4	.150
102	336.3	5271.7	-550.8	9.91	-1.04	44.56	4.9	.130
103	339.6	4700.3	-607.3	7.93	-1.02	44.56	5.2	.139
Absolute	95.6			29.83		(T=	47.1 ms)	
	319.8				-2.73	(T=	64.3 ms)	

CASE METHOD

	J=0.0	J=0.1	J=0.2	J=0.3	J=0.4	J=0.5	J=0.6	J=0.7	J=0.8	J=0.9
RS1	21627.	19610.	17593.	15576.	13559.	11542.	9525.	7508.	5491.	3474.
RMX	21627.	19610.	17593.	15576.	13559.	11542.	9525.	7508.	5491.	3474.
RSU	24680.	22968.	21257.	19545.	17834.	16122.	14410.	12699.	10987.	9276.
RA A2 W	132.	1250.	0.							

Current CAPWAP Ru= 13239.6; Corresponding J(Rs)= .42; J(Rx)= .42

VMAX	VFIN	V1*Z	F1	FMAX	DMAX	DFIN	EMAX	EFIN	R HF	R EN
16.24	-.172	399.6	23480.4	23555.4	.822	.156	972.1	904.9	27412.0	90039.5

SFOBB PIDP, Pile TP1D, MHU-1700, BoR3 Blow No. 2 02/13/01
Fugro-McClelland Marine Geosciences, Inc CAPWAP(R) Version 1.993-1

PILE PROFILE AND PILE MODEL

Depth ft	Area in2	E-Modulus kips/in2	Spec. Weight kips/ft3	Circumf. ft
.00	807.20	30000.0	.492	25.130
90.25	807.20	30000.0	.492	25.130
90.25	717.40	30000.0	.492	25.130
188.60	717.40	30000.0	.492	25.130
188.60	467.10	30000.0	.492	25.130
334.60	467.10	30000.0	.492	25.130
334.60	592.80	30000.0	.492	25.130
339.60	592.80	30000.0	.492	25.130

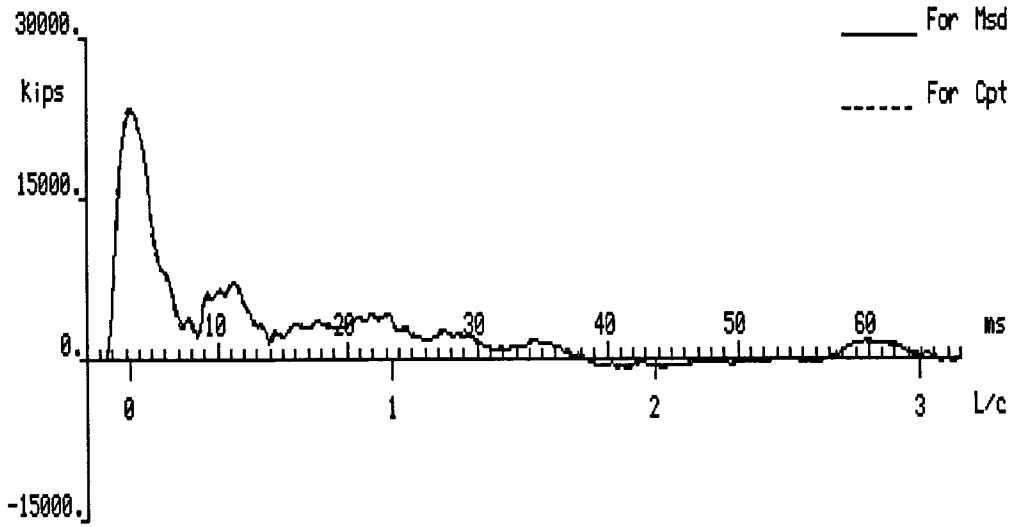
Toe Area 4.117 ft2

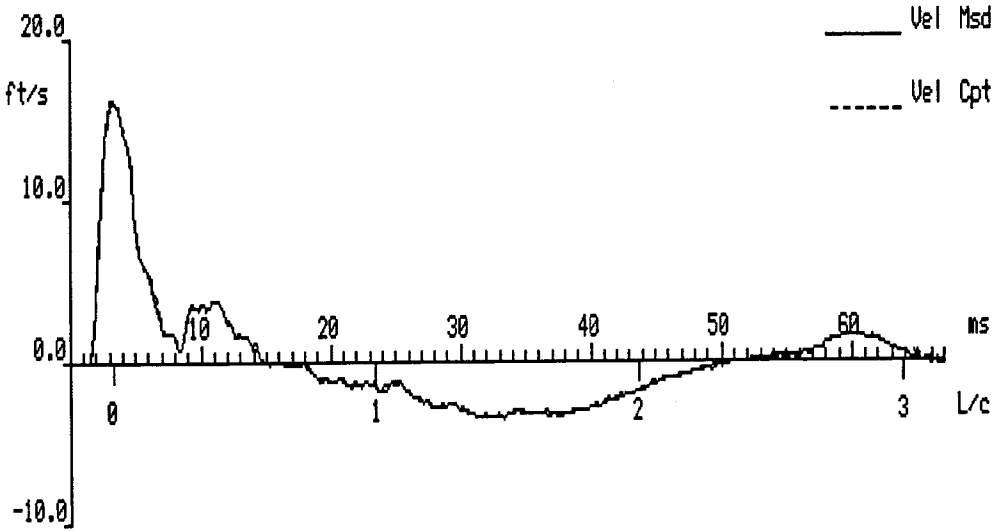
Segmnt No.	Depth B.G. feet	Impedance kips/ft/s	Imp. Change %	T. Slack inch	C. Slack inch	Circumf. feet
1	3.30	1440.51	.00	.000	.000	25.130
3	9.89	1440.51	.00	.000	.000	25.130
4	13.19	1440.51	.00	.000	.000	25.130
5	16.49	1440.51	.00	.000	.000	25.130
6	19.78	1440.51	.00	.000	.000	25.130
10	32.97	1440.51	.00	.000	.000	25.130
11	36.27	1440.51	.00	.000	.000	25.130
20	65.94	1440.51	.00	.000	.000	25.130
21	69.24	1440.51	.00	.000	.000	25.130
28	92.32	1339.97	.00	.000	.000	25.130
29	95.62	1280.25	.00	.000	.000	25.130
40	131.88	1280.26	.00	.000	.000	25.130
41	135.18	1280.25	.00	.000	.000	25.130
58	191.23	923.80	.00	.000	.000	25.130
59	194.53	833.58	.00	.000	.000	25.130
80	263.77	833.58	.00	.000	.000	25.130
102	336.30	949.46	.00	.000	.000	25.130
103	339.60	1057.90	.00	.000	.000	25.130

Pile Damping 1.0 %, Time Incr .196 ms, Wave Speed 16810.7 ft/s

SFOBB PIDP, Pile TP1D, MHU-1700, BoR3 Blow 2 02/13/01

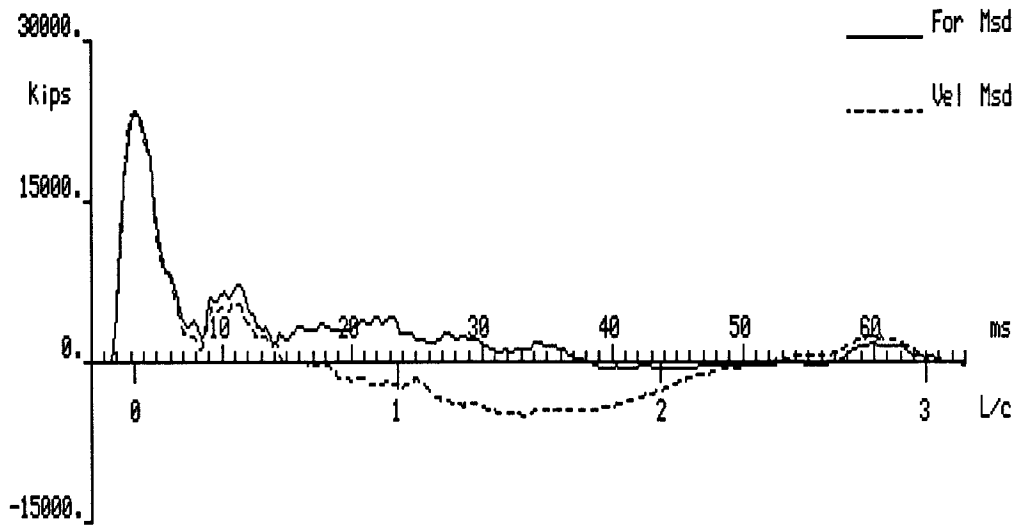
Fugro-McClelland Marine Geosciences, Inc CAPWAP(R) Version 1.993-1

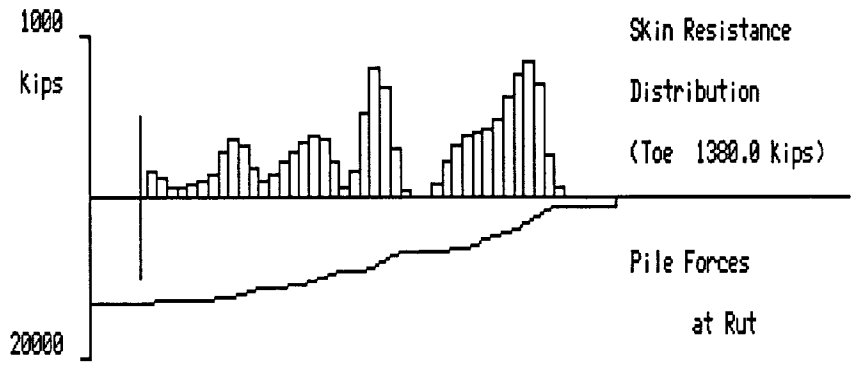




SFOBB PIDP, Pile TP1D, MHU-1700, BoR3 Blow 2 02/13/01

Fugro-McClelland Marine Geosciences, Inc CAPWAP(R) Version 1.993-1

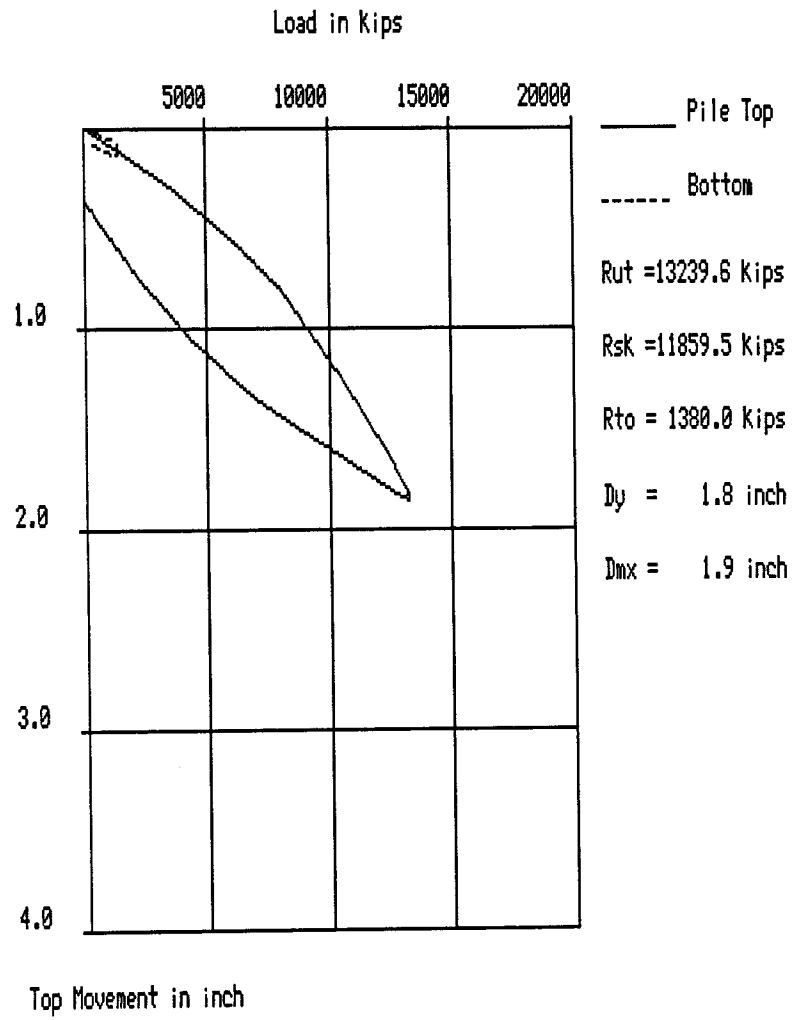




SFOBB PIDP, Pile TP1D, MHU-1700, BoR3 Blow 2 02/13/01

Fugro-McClelland Marine Geosciences, Inc CAPWAP(R) Version 1.993-1

Dynamic D-Toe, E-P R-Toe



PILE 1
BOR3, BLOW NO. 45, PDA 1

PILE 1
BOR3, BLOW NO. 45, PDA 1

SFOBB PIDP, Pile TP1D, MHU-1700, BoR3 Blow No. 45 02/13/01
Fugro-McClelland Marine Geosciences, Inc CAPWAP(R) Version 1.993-1

CAPWAP FINAL RESULTS

Final CAPWAP Capacity: Ru 14079.4 Skin 11758.4 Toe 2321.1 kips

Soil Sgmnt No.	Depth Below Gages ft	Depth Below Grade ft	Ru kips	Sum of Ru Up kips	Sum of Ru Down kips	Unit Resist. w. Respect to Depth kips/ft	Unit Resist. w. Respect to Area kips/f2	Smith Damping s/ft	Quake inch
				14079.4					
1	42.9	8.3	71.4	14008.1	71.4	10.82	.42	.255	.250
2	49.5	14.9	43.4	13964.6	114.8	6.59	.26	.255	.250
3	56.1	21.5	31.1	13933.5	145.9	4.72	.18	.255	.250
4	62.6	28.0	45.3	13888.2	191.2	6.87	.27	.255	.250
5	69.2	34.6	39.8	13848.4	231.0	6.04	.23	.255	.250
6	75.8	41.2	40.6	13807.8	271.6	6.15	.24	.255	.250
7	82.4	47.8	101.9	13705.9	373.5	15.45	.60	.255	.250
8	89.0	54.4	195.2	13510.7	568.7	29.60	1.15	.255	.250
9	95.6	61.0	242.2	13268.5	810.9	36.73	1.43	.255	.250
10	102.2	67.6	193.7	13074.8	1004.6	29.38	1.14	.255	.250
11	108.8	74.2	108.6	12966.3	1113.2	16.46	.64	.255	.250
12	115.4	80.8	82.6	12883.6	1195.8	12.53	.49	.255	.250
13	122.0	87.4	119.6	12764.1	1315.3	18.13	.70	.255	.250
14	128.6	94.0	167.5	12596.6	1482.9	25.40	.99	.255	.250
15	135.2	100.6	198.1	12398.5	1680.9	30.04	1.17	.255	.250
16	141.8	107.2	219.3	12179.2	1900.2	33.26	1.29	.255	.250
17	148.4	113.8	256.1	11923.1	2156.3	38.83	1.51	.255	.250
18	155.0	120.4	272.9	11650.3	2429.1	41.38	1.61	.255	.250
19	161.6	127.0	176.6	11473.7	2605.7	26.78	1.04	.255	.250
20	168.2	133.6	24.1	11449.6	2629.8	3.65	.14	.255	.250
21	174.7	140.1	69.3	11380.3	2699.1	10.52	.41	.255	.250
22	181.3	146.7	371.4	11008.9	3070.5	56.32	2.19	.255	.250
23	187.9	153.3	619.2	10389.7	3689.7	93.91	3.64	.255	.250
24	194.5	159.9	595.7	9794.0	4285.4	90.33	3.51	.255	.250
25	201.1	166.5	428.8	9365.2	4714.3	65.03	2.52	.255	.250
26	207.7	173.1	284.6	9080.6	4998.8	43.16	1.67	.255	.250
27	214.3	179.7	185.4	8895.2	5184.2	28.11	1.09	.255	.250
28	220.9	186.3	130.3	8765.0	5314.5	19.76	.77	.255	.250
29	227.5	192.9	155.4	8609.5	5469.9	23.57	.91	.255	.250

Soil Sgmnt No.	Depth Below Gages ft	Depth Below Grade ft	Ru kips	Sum of Ru Up kips	Sum of Ru Down kips	Unit Resist. w. Respect to Depth kips/ft	Unit Resist. w. Respect to Area kips/f2	Smith Damping s/ft	Quake inch
30	234.1	199.5	258.1	8351.4	5728.0	39.14	1.52	.255	.250
31	240.7	206.1	387.8	7963.6	6115.8	58.81	2.28	.255	.250
32	247.3	212.7	505.8	7457.8	6621.6	76.70	2.98	.255	.232
33	253.9	219.3	621.9	6836.0	7243.4	94.31	3.66	.255	.193
34	260.5	225.9	785.3	6050.7	8028.7	119.09	4.62	.255	.164
35	267.1	232.5	995.2	5055.5	9024.0	150.93	5.86	.255	.146
36	273.7	239.1	1069.2	3986.3	10093.1	162.14	6.29	.255	.127
37	280.3	245.7	948.6	3037.7	11041.7	143.85	5.58	.255	.118
38	286.8	252.2	619.8	2418.0	11661.5	93.99	3.65	.255	.113
39	293.4	258.8	96.9	2321.1	11758.4	14.69	.57	.255	.113
40	300.0	265.4	.0	2321.1	11758.4	.00	.00	.255	.112
41	306.6	272.0	.0	2321.1	11758.4	.00	.00	.255	.110
42	313.2	278.6	.0	2321.1	11758.4	.00	.00	.255	.104
43	319.8	285.2	.0	2321.1	11758.4	.00	.00	.255	.091
44	326.4	291.8	.0	2321.1	11758.4	.00	.00	.255	.084
45	333.0	298.4	.0	2321.1	11758.4	.00	.00	.255	.081
46	339.6	305.0	.0	2321.1	11758.4	.00	.00	.255	.027
Average Skin Values			255.6			38.55	1.50	.255	.201
Toe			2321.1				563.77	.354	.060

Soil Model Parameters/Extensions		Skin	Toe
Case Damping		2.084	.570
Unloading Quake	(% of loading quake)	97	100
Unloading Level	(% of Ru)	52	
Soil Plug Weight	(kips)		26.14

SFOBB PIDP, Pile TP1D, MHU-1700, BoR3 Blow No. 45 02/13/01
Fugro-McClelland Marine Geosciences, Inc CAPWAP(R) Version 1.993-1

EXTREMA TABLE

Pile Sgmnt No.	Depth Below Gages ft	max. Force kips	min. Force kips	max. Comp. Stress kips/in2	max. Tension Stress kips/in2	max. Trnsfd. Energy kips-ft	max. Veloc. ft/s	max. Displ. in
1	3.3	25084.2	-871.1	31.08	-1.08	1098.17	17.5	.904
10	33.0	24855.0	-1480.7	30.79	-1.83	1089.21	17.1	.840
20	65.9	24415.8	-1900.2	30.25	-2.35	1030.34	16.7	.770
30	98.9	21952.5	-1661.2	30.60	-2.32	886.25	16.2	.700
40	131.9	20438.9	-1404.4	28.49	-1.96	743.28	15.0	.620
51	168.2	17663.3	-913.8	24.62	-1.27	552.23	13.4	.510
61	201.1	12315.6	-35.9	26.37	-.08	328.54	12.0	.400
71	234.1	10001.2	.0	21.41	.00	205.64	9.9	.290
82	270.4	6320.9	.0	13.53	.00	60.15	5.2	.130
92	303.3	3315.2	-286.3	7.10	-.61	24.07	3.9	.110
102	336.3	4501.4	-30.2	8.46	-.06	21.61	2.8	.080
103	339.6	4116.2	-38.4	6.94	-.06	21.17	3.1	.080
Absolute	95.6			32.03		(T=	47.1 ms)	
	95.6				-2.59	(T=	87.7 ms)	

CASE METHOD

	J=0.0	J=0.1	J=0.2	J=0.3	J=0.4	J=0.5	J=0.6	J=0.7	J=0.8	J=0.9
RS1	23313.	21280.	19247.	17213.	15180.	13147.	11113.	9080.	7047.	5014.
RMX	23535.	21474.	19414.	17354.	15293.	13233.	11173.	9112.	7052.	5014.
RSU	26464.	24745.	23027.	21309.	19591.	17872.	16154.	14436.	12718.	11000.

RA A2 W -435. 3565. 0.
Current CAPWAP Ru= 14079.4; Corresponding J(Rs)= .45; J(Rx)= .46

VMAX	VFIN	V1*Z	F1	FMAX	DMAX	DFIN	EMAX	EFIN	R HF	R EN
17.54	.97	25268.8	23866.9	25084.2	.904	.106	1098.2	1014.6	28221.6	*******

SFOBB PIDP, Pile TP1D, MHU-1700, BoR3 Blow No. 45 02/13/01
Fugro-McClelland Marine Geosciences, Inc CAPWAP(R) Version 1.993-1

PILE PROFILE AND PILE MODEL

Depth ft	Area in2	E-Modulus kips/in2	Spec. Weight kips/ft3	Circumf. ft
.00	807.20	30000.0	.492	25.770
90.25	807.20	30000.0	.492	25.770
90.25	717.40	30000.0	.492	25.770
188.60	717.40	30000.0	.492	25.770
188.60	467.10	30000.0	.492	25.770
334.60	467.10	30000.0	.492	25.770
334.60	592.80	30000.0	.492	25.770
339.60	592.80	30000.0	.492	25.770

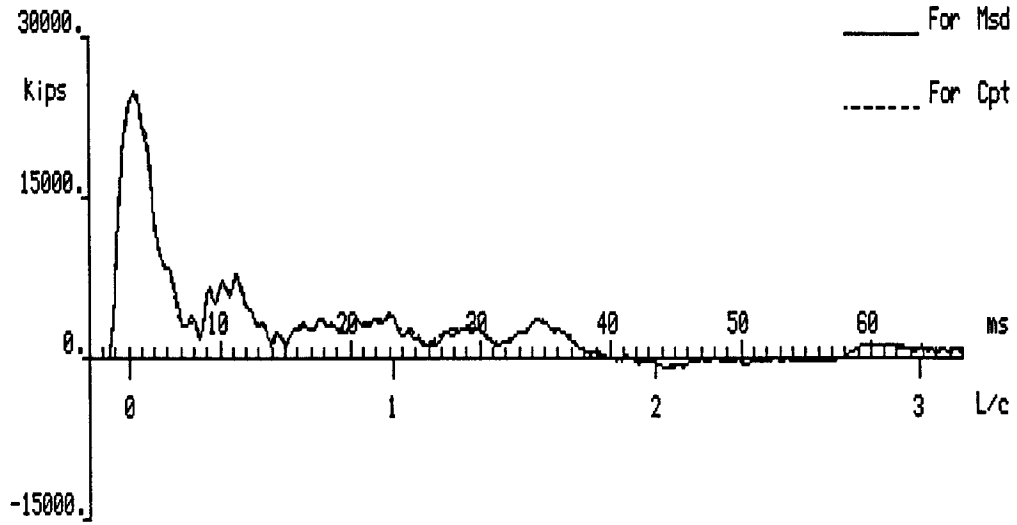
Toe Area 4.117 ft2

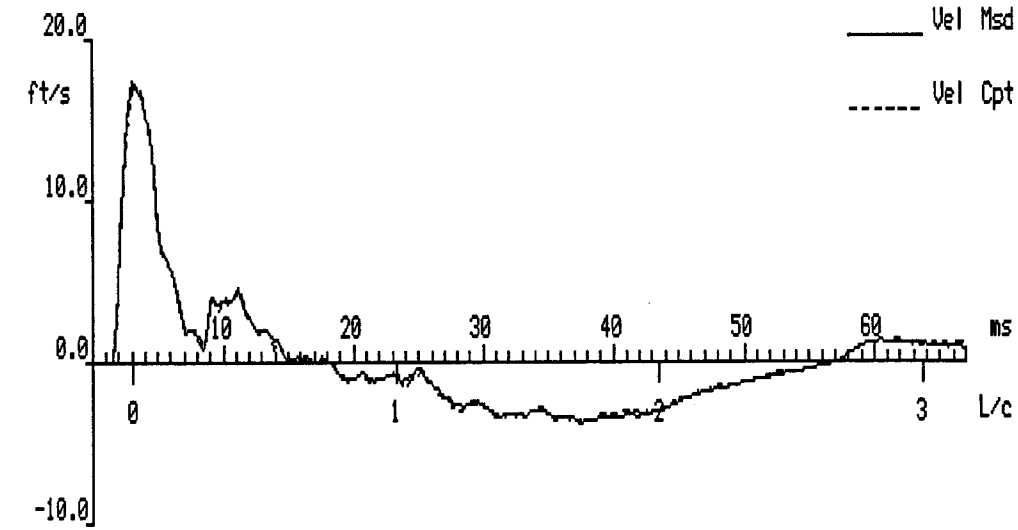
Segmnt No.	Depth B.G. feet	Impedance kips/ft/s	Imp. Change %	T. Slack inch	C. Slack inch	Circumf. feet
1	3.30	1440.51	.00	.000	.000	25.770
3	9.89	1440.51	.00	.000	.000	25.770
4	13.19	1440.51	.00	.000	.000	25.770
5	16.49	1440.51	.00	.000	.000	25.770
6	19.78	1440.51	.00	.000	.000	25.770
10	32.97	1440.51	.00	.000	.000	25.770
11	36.27	1440.51	.00	.000	.000	25.770
20	65.94	1440.51	.00	.000	.000	25.770
21	69.24	1440.51	.00	.000	.000	25.770
28	92.32	1339.97	.00	.000	.000	25.770
29	95.62	1280.25	.00	.000	.000	25.770
40	131.88	1280.26	.00	.000	.000	25.770
41	135.18	1280.25	.00	.000	.000	25.770
58	191.23	923.80	.00	.000	.000	25.770
59	194.53	833.58	.00	.000	.000	25.770
80	263.77	833.58	.00	.000	.000	25.770
102	336.30	949.46	.00	.000	.000	25.770
103	339.60	1057.90	.00	.000	.000	25.770

Pile Damping 1.0 %, Time Incr .196 ms, Wave Speed 16810.7 ft/s

SFOBB PIDP, Pile TP1D, MHU-1700, BoR3 Blow 45 02/13/01

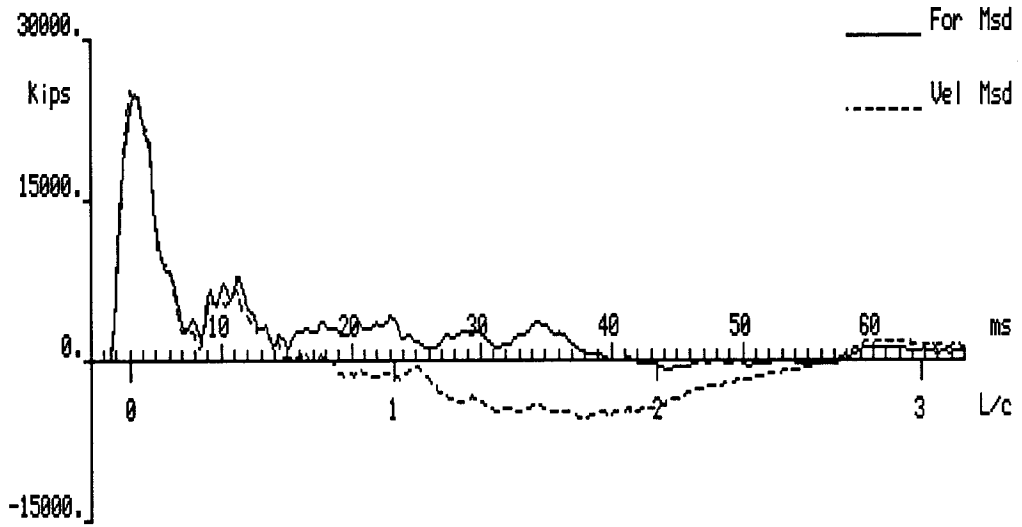
Fugro-McClelland Marine Geosciences, Inc CAPWAP(R) Version 1.993-1

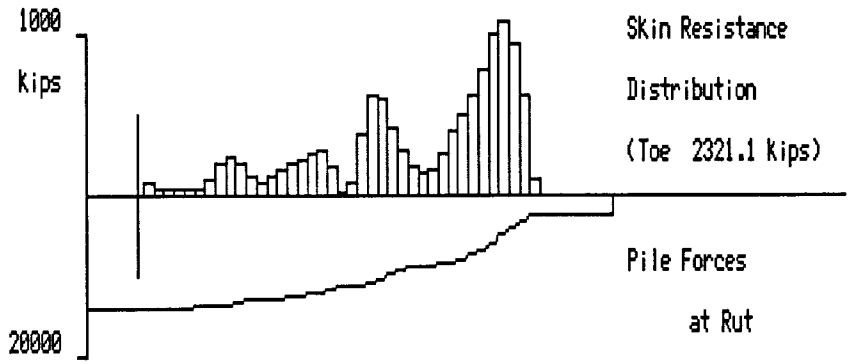




SFOBB PIDP, Pile TP1D, MHU-1700, BoR3 Blow 45 02/13/01

Fugro-McClelland Marine Geosciences, Inc CAPWAP(R) Version 1.993-1



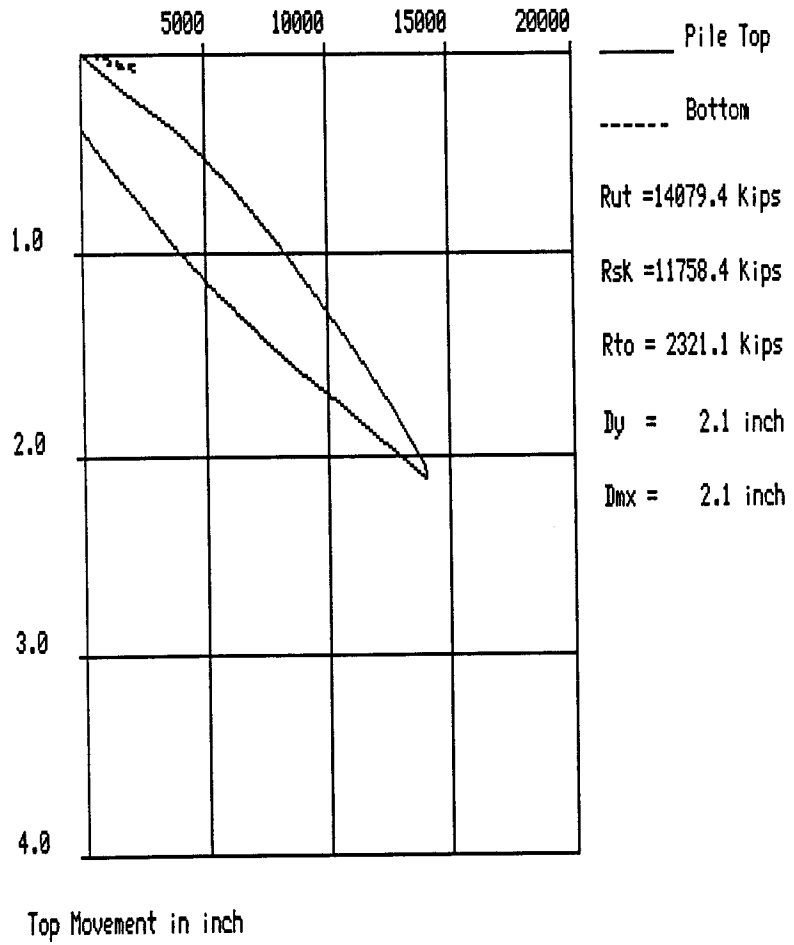


SFOBB PIDP, Pile TP1D, MHU-1700, BoR3 Blow 45 02/13/01

Fugro-McClelland Marine Geosciences, Inc CAPWAP(R) Version 1.993-1

Dynamic D-Toe, E-P R-Toe

Load in Kips



Top Movement in inch

PILE 1
EOR3, BLOW NO. 195, PDA 1

PILE 1
EOR3, BLOW NO. 195, PDA 1

SFOBB PIDP, Pile TP1D, MHU-1700, EoR3 Blow No. 195 02/13/01
Fugro-McClelland Marine Geosciences, Inc CAPWAP(R) Version 1.993-1

CAPWAP FINAL RESULTS

Final CAPWAP Capacity: Ru 13405.2 Skin 10925.6 Toe 2479.5 kips

Soil Sgmnt No.	Depth Below Gages ft	Depth Below Grade ft	Ru kips	Sum of Ru Up kips	Sum of Ru Down kips	Unit Resist. w. Respect to Depth kips/ft	Unit Resist. w. Respect to Area kips/f2	Smith Damping s/ft	Quake inch
				13405.2					
1	42.9	8.3	55.7	13349.5	55.7	8.44	.33	.222	.230
2	49.5	14.9	28.7	13320.8	84.3	4.35	.17	.222	.230
3	56.1	21.5	19.4	13301.4	103.8	2.94	.11	.222	.230
4	62.6	28.0	31.9	13269.5	135.7	4.84	.19	.222	.230
5	69.2	34.6	25.4	13244.1	161.1	3.85	.15	.222	.230
6	75.8	41.2	26.5	13217.6	187.6	4.02	.16	.222	.230
7	82.4	47.8	82.2	13135.4	269.7	12.46	.48	.222	.230
8	89.0	54.4	158.5	12976.9	428.3	24.04	.93	.222	.230
9	95.6	61.0	195.1	12781.8	623.4	29.58	1.15	.222	.230
10	102.2	67.6	164.0	12617.8	787.3	24.86	.96	.222	.230
11	108.8	74.2	94.3	12523.6	881.6	14.29	.55	.222	.230
12	115.4	80.8	63.3	12460.3	944.9	9.60	.37	.222	.230
13	122.0	87.4	102.4	12357.9	1047.2	15.52	.60	.222	.230
14	128.6	94.0	158.7	12199.2	1206.0	24.07	.93	.222	.230
15	135.2	100.6	187.9	12011.3	1393.8	28.49	1.11	.222	.230
16	141.8	107.2	201.2	11810.1	1595.0	30.51	1.18	.222	.230
17	148.4	113.8	208.4	11601.7	1803.4	31.60	1.23	.222	.230
18	155.0	120.4	181.4	11420.3	1984.8	27.51	1.07	.222	.230
19	161.6	127.0	99.8	11320.5	2084.6	15.13	.59	.222	.230
20	168.2	133.6	30.4	11290.1	2115.1	4.62	.18	.222	.230
21	174.7	140.1	112.6	11177.5	2227.7	17.08	.66	.222	.230
22	181.3	146.7	362.0	10815.5	2589.7	54.90	2.13	.222	.230
23	187.9	153.3	569.8	10245.7	3159.5	86.41	3.35	.222	.230
24	194.5	159.9	540.8	9704.8	3700.3	82.02	3.18	.222	.230
25	201.1	166.5	337.7	9367.1	4038.1	51.22	1.99	.222	.230
26	207.7	173.1	164.7	9202.4	4202.8	24.98	.97	.222	.230
27	214.3	179.7	105.9	9096.4	4308.7	16.06	.62	.222	.230
28	220.9	186.3	108.3	8988.1	4417.0	16.43	.64	.222	.230
29	227.5	192.9	134.2	8853.9	4551.2	20.35	.79	.222	.230

Soil Sgmnt No.	Depth Below Gages ft	Depth Below Grade ft	Ru kips	Sum of Ru Up kips	Sum of Ru Down kips	Unit Resist. w. Respect to Depth kips/ft	Unit Resist. w. Respect to Area kips/f2	Smith Damping s/ft	Quake inch
30	234.1	199.5	200.6	8653.3	4751.9	30.43	1.18	.222	.230
31	240.7	206.1	312.2	8341.1	5064.0	47.34	1.84	.222	.230
32	247.3	212.7	423.9	7917.3	5487.9	64.28	2.49	.222	.230
33	253.9	219.3	483.4	7433.8	5971.3	73.31	2.84	.222	.230
34	260.5	225.9	484.0	6949.8	6455.3	73.39	2.85	.222	.219
35	267.1	232.5	461.1	6488.8	6916.4	69.92	2.71	.222	.201
36	273.7	239.1	450.1	6038.7	7366.5	68.26	2.65	.222	.184
37	280.3	245.7	446.4	5592.3	7812.9	67.69	2.63	.222	.168
38	286.8	252.2	431.6	5160.7	8244.5	65.46	2.54	.222	.153
39	293.4	258.8	427.2	4733.4	8671.7	64.79	2.51	.222	.138
40	300.0	265.4	462.4	4271.1	9134.1	70.11	2.72	.222	.124
41	306.6	272.0	512.7	3758.4	9646.8	77.75	3.02	.222	.111
42	313.2	278.6	509.1	3249.3	10155.9	77.20	3.00	.222	.100
43	319.8	285.2	404.9	2844.4	10560.7	61.40	2.38	.222	.087
44	326.4	291.8	238.0	2606.4	10798.8	36.10	1.40	.222	.071
45	333.0	298.4	97.4	2509.0	10896.2	14.77	.57	.222	.052
46	339.6	305.0	29.5	2479.5	10925.6	4.47	.17	.222	.012
Average Skin Values			237.5			35.82	1.40	.222	.190
Toe			2479.5				602.27	.315	.080

Soil Model Parameters/Extensions		Skin	Toe
Case Damping		1.683	.541
Unloading Level	(% of Ru)	48	
Soil Plug Weight	(kips)		1.08

SFOBB PIDP, Pile TP1D, MHU-1700, EoR3 Blow No. 195 02/13/01
Fugro-McClelland Marine Geosciences, Inc CAPWAP(R) Version 1.993-1

EXTREMA TABLE

Pile Sgmnt No.	Depth Below Gages ft	max. Force kips	min. Force kips	max. Comp. Stress kips/in2	max. Tension Stress kips/in2	max. Trnsfd. Energy kips-ft	max. Veloc. ft/s	max. Displ. in
1	3.3	24720.8	-998.1	30.63	-1.24	1041.17	17.6	.903
10	33.0	24491.3	-1631.4	30.34	-2.02	1036.08	16.9	.840
20	65.9	24180.7	-1994.4	29.96	-2.47	997.92	16.6	.780
30	98.9	22050.7	-1903.1	30.74	-2.65	895.21	16.5	.730
40	131.9	20876.4	-1630.5	29.10	-2.27	779.12	15.4	.670
51	168.2	18836.8	-1238.5	26.26	-1.73	628.24	14.2	.570
61	201.1	12975.4	-354.0	27.78	-.76	391.40	13.5	.460
71	234.1	11373.5	-66.1	24.35	-.14	285.60	11.9	.360
82	270.4	8124.3	.0	17.39	.00	134.00	8.3	.230
92	303.3	5782.3	.0	12.38	.00	61.58	5.8	.150
102	336.3	4167.1	.0	7.83	.00	29.97	4.3	.100
103	339.6	4455.4	.0	7.52	.00	30.30	4.1	.095
Absolute	95.6			31.79		(T=	47.3 ms)	
	95.6				-2.82	(T=	87.9 ms)	

CASE METHOD

	J=0.0	J=0.1	J=0.2	J=0.3	J=0.4	J=0.5	J=0.6	J=0.7	J=0.8	J=0.9
RS1	22924.	20946.	18968.	16990.	15011.	13033.	11055.	9077.	7099.	5120.
RMX	23340.	21315.	19290.	17265.	15239.	13214.	11189.	9164.	7149.	5148.
RSU	25697.	23996.	22295.	20594.	18893.	17192.	15491.	13790.	12089.	10388.

RA A2 W -608. 3496. 0.

Current CAPWAP Ru= 13405.2; Corresponding J(Rs)= .48; J(Rx)= .49

VMAX	VFIN	V1*Z	F1	FMAX	DMAX	DFIN	EMAX	EFIN	R HF	R EN
17.65	1.122	5424.6	22805.4	24720.8	.903	.082	1041.2	962.7	26781.6	96437.3

SFOBB PIDP, Pile TP1D, MHU-1700, EoR3 Blow No. 195 02/13/01
Fugro-McClelland Marine Geosciences, Inc CAPWAP(R) Version 1.993-1

PILE PROFILE AND PILE MODEL

Depth ft	Area in2	E-Modulus kips/in2	Spec. Weight kips/ft3	Circumf. ft
.00	807.20	30000.0	.492	25.770
90.25	807.20	30000.0	.492	25.770
90.25	717.40	30000.0	.492	25.770
188.60	717.40	30000.0	.492	25.770
188.60	467.10	30000.0	.492	25.770
334.60	467.10	30000.0	.492	25.770
334.60	592.80	30000.0	.492	25.770
339.60	592.80	30000.0	.492	25.770

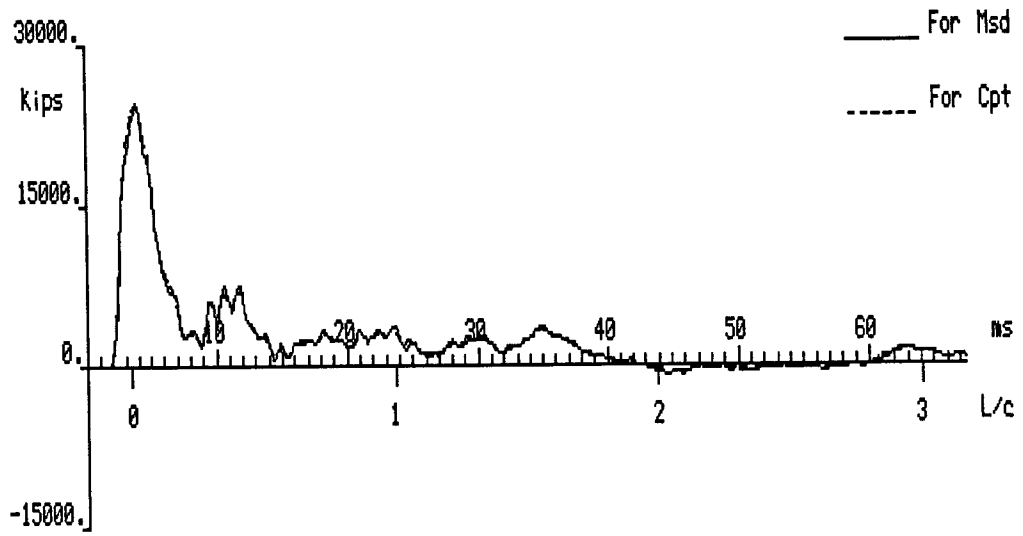
Toe Area 4.117 ft2

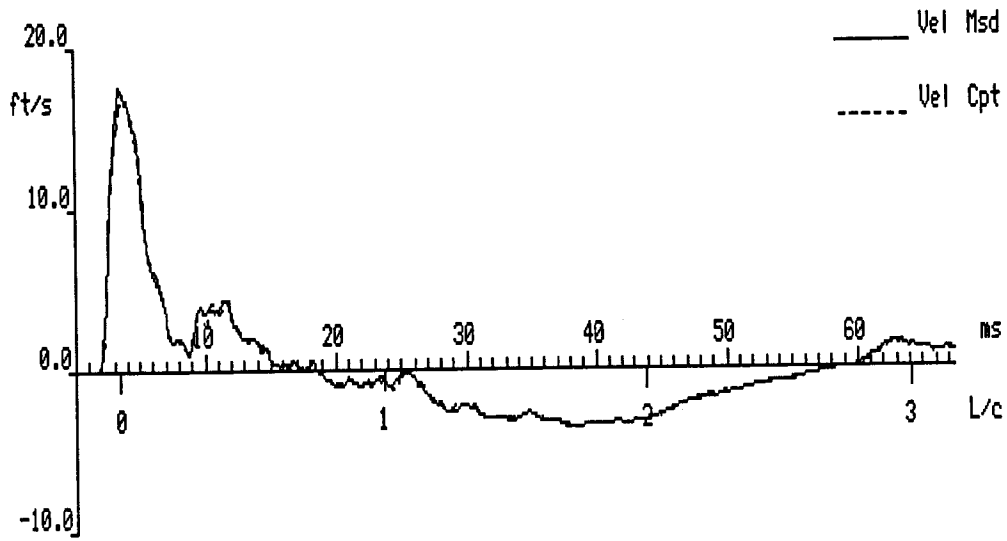
Segmnt No.	Depth B.G. feet	Impedance kips/ft/s	Imp. Change %	T. Slack inch	C. Slack inch	Circumf. feet
1	3.30	1440.51	.00	.000	.000	25.770
3	9.89	1440.51	.00	.000	.000	25.770
4	13.19	1440.51	.00	.000	.000	25.770
5	16.49	1440.51	.00	.000	.000	25.770
6	19.78	1440.51	.00	.000	.000	25.770
10	32.97	1440.51	.00	.000	.000	25.770
11	36.27	1440.51	.00	.000	.000	25.770
20	65.94	1440.51	.00	.000	.000	25.770
21	69.24	1440.51	.00	.000	.000	25.770
28	92.32	1339.97	.00	.000	.000	25.770
29	95.62	1280.25	.00	.000	.000	25.770
40	131.88	1280.26	.00	.000	.000	25.770
41	135.18	1280.25	.00	.000	.000	25.770
58	191.23	923.80	.00	.000	.000	25.770
59	194.53	833.58	.00	.000	.000	25.770
80	263.77	833.58	.00	.000	.000	25.770
102	336.30	949.46	.00	.000	.000	25.770
103	339.60	1057.90	.00	.000	.000	25.770

Pile Damping 1.0 %, Time Incr .196 ms, Wave Speed 16810.7 ft/s

SFOBB PIDP, Pile TP1D, MHU-1700, EoR3 Blow 195 02/13/01

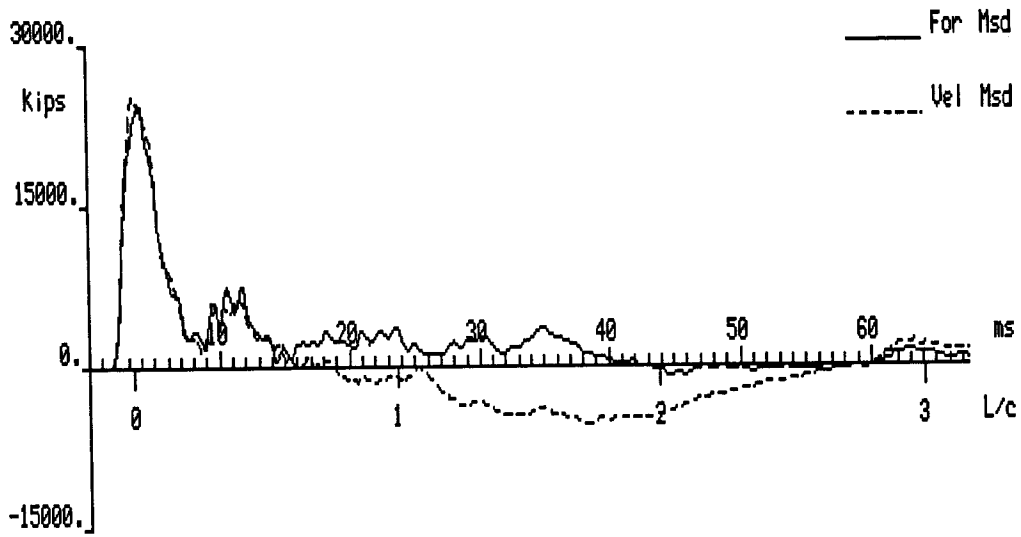
Fugro-McClelland Marine Geosciences, Inc CAPWAP(R) Version 1.993-1

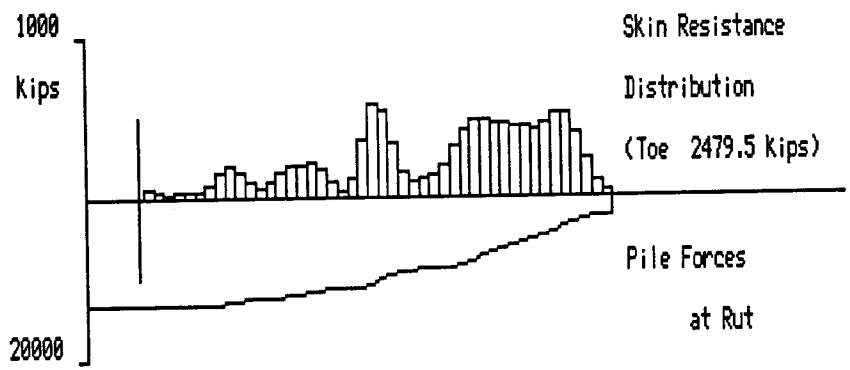




SFOBB PIDP, Pile TP1D, MHU-1700, EoR3 Blow 195 02/13/01

Fugro-McClelland Marine Geosciences, Inc CAPWAP(R) Version 1.993-1





SFOBB PIDP, Pile TP1D, MHU-1700, EoR3 Blow 195 02/13/01

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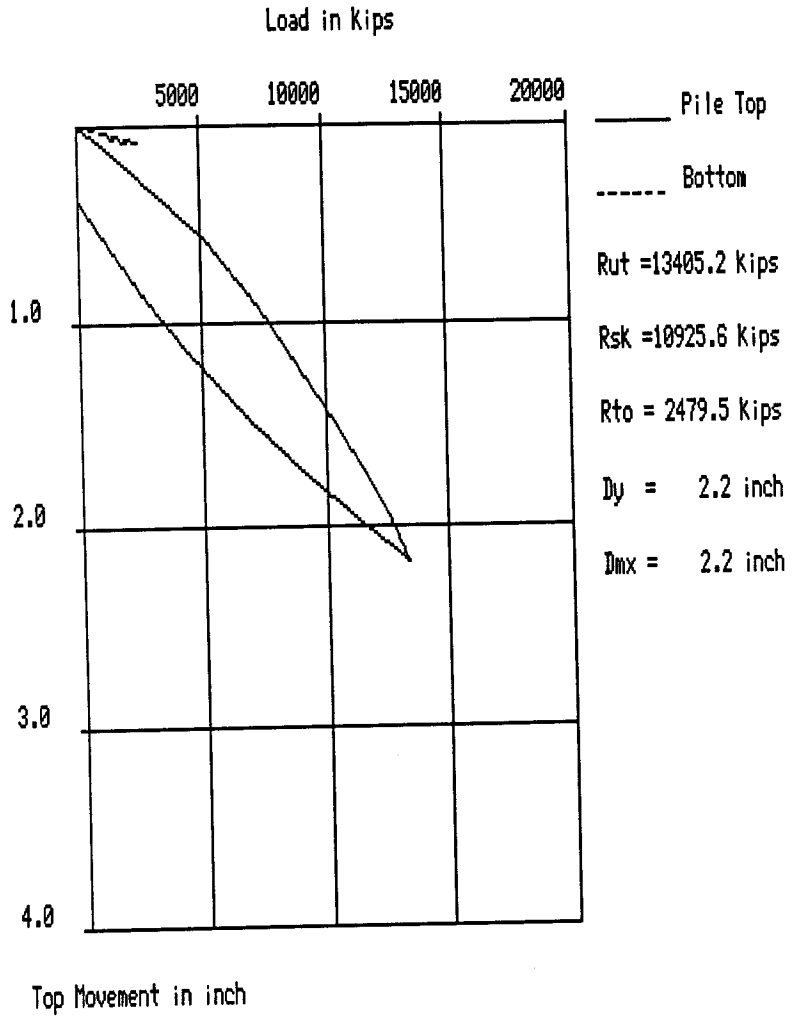
Dynamic D-Toe, E-P R-Toe



Pile No. 2, Section D

Summary of Included CAPWAP Analyses		
Driving Designation	**Blow No.**	**PDA Set**
BOID	5	PDA 1
EOID	1909	PDA 1
EOID	1945	PDA 2
BOR	3	PDA 1
BOR	12	PDA 2
BOR2	5	PDA 1
EOR2	90	PDA 1

Note:

BOID = Beginning of Initial Driving
EOID = End of Initial Driving
BOR = Beginning of Restrike No.
EOR = End of Restrike No.

PILE 2
BOID, BLOW NO. 5, PDA 1

PILE 2
BOID, BLOW NO. 5, PDA 1

SFOBB PIDP, TP2D, MHU-500T, BoID
Fugro-McClelland Marine Geosciences, Inc

Blow No. 5 02/14/01
CAPWAP(R) Version 1.993-1

CAPWAP FINAL RESULTS

Final CAPWAP Capacity: Ru 7004.0 Skin 5639.9 Toe 1364.1 kips

Soil Sgmnt No.	Depth Below Gages ft	Depth Below Grade ft	Ru kips	Sum of Ru Up kips	Sum of Ru Down kips	Unit Resist. w. Respect to Depth kips/ft	Unit Resist. w. Respect to Area kips/f2	Smith Damping s/ft	Quake inch
				7004.0					
1	124.8	8.2	50.6	6953.4	50.6	7.70	.31	.284	.099
2	131.4	14.8	47.1	6906.3	97.7	7.17	.29	.284	.099
3	138.0	21.4	52.2	6854.1	149.9	7.95	.32	.284	.099
4	144.5	27.9	65.1	6789.0	215.0	9.90	.39	.284	.099
5	151.1	34.5	62.7	6726.3	277.7	9.54	.38	.284	.099
6	157.7	41.1	31.6	6694.7	309.2	4.81	.19	.284	.099
7	164.2	47.6	9.6	6685.1	318.9	1.47	.06	.284	.099
8	170.8	54.2	.0	6685.1	318.9	.00	.00	.284	.099
9	177.4	60.8	.0	6685.1	318.9	.00	.00	.284	.099
10	183.9	67.3	23.9	6661.2	342.8	3.64	.14	.284	.099
11	190.5	73.9	325.5	6335.7	668.3	49.55	1.97	.284	.099
12	197.1	80.5	450.4	5885.3	1118.6	68.56	2.73	.284	.099
13	203.6	87.0	253.2	5632.2	1371.8	38.54	1.53	.284	.099
14	210.2	93.6	27.2	5605.0	1399.0	4.14	.16	.284	.099
15	216.8	100.2	10.1	5594.8	1409.1	1.54	.06	.284	.099
16	223.4	106.8	100.0	5494.9	1509.1	15.22	.61	.284	.099
17	229.9	113.3	146.0	5348.9	1655.1	22.22	.88	.284	.099
18	236.5	119.9	133.6	5215.3	1788.6	20.34	.81	.284	.099
19	243.1	126.5	136.0	5079.4	1924.6	20.70	.82	.284	.099
20	249.6	133.0	191.7	4887.6	2116.3	29.19	1.16	.284	.099
21	256.2	139.6	265.4	4622.2	2381.7	40.40	1.61	.284	.099
22	262.8	146.2	298.7	4323.5	2680.5	45.47	1.81	.284	.099
23	269.3	152.7	284.7	4038.8	2965.2	43.34	1.72	.284	.099
24	275.9	159.3	276.6	3762.2	3241.7	42.10	1.68	.284	.099
25	282.5	165.9	296.6	3465.6	3538.3	45.15	1.80	.284	.099
26	289.0	172.4	311.7	3153.9	3850.1	47.45	1.89	.284	.099
27	295.6	179.0	301.3	2852.6	4151.4	45.87	1.83	.284	.099
28	302.2	185.6	273.1	2579.5	4424.4	41.57	1.65	.284	.099
29	308.8	192.2	218.1	2361.5	4642.5	33.19	1.32	.284	.099

Soil Sgmnt No.	Depth Below Gages ft	Depth Below Grade ft	Ru kips	Sum of Ru Up kips	Sum of Ru Down kips	Unit w. Depth kips/ft	Resist. Respect to Area kips/f2	Smith Damping s/ft	Quake inch
30	315.3	198.7	134.6	2226.8	4777.1	20.49	.82	.284	.099
31	321.9	205.3	93.3	2133.6	4870.4	14.20	.57	.284	.099
32	328.5	211.9	157.9	1975.7	5028.3	24.03	.96	.284	.099
33	335.0	218.4	271.5	1704.2	5299.7	41.33	1.64	.284	.099
34	341.6	225.0	340.2	1364.1	5639.9	51.78	2.06	.284	.099
Average Skin Values			165.9			25.07	1.00	.284	.099
Toe			1364.1				331.32	.359	.042

Soil Model Parameters/Extensions		Skin	Toe
Case Damping		1.114	.340
Unloading Level	(% of Ru)	60	
Soil Plug Weight	(kips)		1.79

SFOBB PIDP, TP2D, MHU-500T, BoID — Blow No. 5 02/14/01
Fugro-McClelland Marine Geosciences, Inc — CAPWAP(R) Version 1.993-1

EXTREMA TABLE

Pile Sgmnt No.	Depth Below Gages ft	max. Force kips	min. Force kips	max. Comp. Stress kips/in2	max. Tension Stress kips/in2	max. Trnsfd. Energy kips-ft	max. Veloc. ft/s	max. Displ. in
1	3.3	15801.7	-1309.6	19.58	-1.62	291.37	11.0	.336
10	32.8	15807.5	-1764.4	19.58	-2.19	290.98	11.0	.340
20	65.7	15783.2	-1418.6	19.55	-1.76	289.78	11.0	.340
30	98.5	14829.4	-1828.0	20.67	-2.55	288.39	11.6	.340
41	134.7	14738.6	-1572.8	20.54	-2.19	279.22	11.3	.340
51	167.5	14095.6	-1297.3	19.65	-1.81	258.60	11.0	.340
62	203.6	10253.9	-696.0	21.95	-1.49	190.10	11.0	.300
72	236.5	9039.8	-455.4	19.35	-.97	147.74	9.8	.250
82	269.3	7556.8	-5.8	16.18	-.01	92.14	7.4	.180
93	305.5	4919.4	-223.0	10.53	-.48	42.50	5.3	.130
103	338.3	3898.1	-419.5	7.36	-.79	27.86	4.6	.100
104	341.6	4082.8	-466.9	6.89	-.79	25.31	4.4	.106
Absolute	197.1			25.46		(T=	53.0 ms)	
	151.1				-2.72	(T=	54.5 ms)	

CASE METHOD

	J=0.0	J=0.1	J=0.2	J=0.3	J=0.4	J=0.5	J=0.6	J=0.7	J=0.8	J=0.9
RS1	14235.	12866.	11496.	10127.	8757.	7388.	6019.	4649.	3280.	1910.
RMX	14518.	13146.	11775.	10403.	9032.	7661.	6289.	4918.	3546.	2190.
RSU	15186.	13912.	12637.	11363.	10088.	8814.	7539.	6265.	4991.	3716.
RA A2 W	8.	1836.	0.							

Current CAPWAP Ru= 7004.0; Corresponding J(Rs)= .53; J(Rx)= .55

VMAX	VFIN	V1*Z	F1	FMAX	DMAX	DFIN	EMAX	EFIN	R HF	R EN
11.01	.32	15645.9	15663.2	15801.7	.336	.063	291.4	286.6	15221.6	15673.4

SFOBB PIDP, TP2D, MHU-500T, BoID
Fugro-McClelland Marine Geosciences, Inc

Blow No. 5 02/14/01
CAPWAP(R) Version 1.993-1

PILE PROFILE AND PILE MODEL

Depth ft	Area in2	E-Modulus kips/in2	Spec. Weight kips/ft3	Circumf. ft
.00	807.20	30000.0	.492	25.130
92.25	807.20	30000.0	.492	25.130
92.25	717.40	30000.0	.492	25.130
190.68	717.40	30000.0	.492	25.130
190.68	467.10	30000.0	.492	25.130
336.68	467.10	30000.0	.492	25.130
336.68	592.80	30000.0	.492	25.130
341.60	592.80	30000.0	.492	25.130

Toe Area 4.117 ft2

Segmnt No.	Depth B.G. feet	Impedance kips/ft/s	Imp. Change %	T. Slack inch	C. Slack inch	Circumf. feet
1	3.28	1440.51	.00	.000	.000	25.130
3	9.85	1440.51	.00	.000	.000	25.130
4	13.14	1440.51	.00	.000	.000	25.130
5	16.42	1440.51	.00	.000	.000	25.130
6	19.71	1440.51	.00	.000	.000	25.130
10	32.85	1440.51	.00	.000	.000	25.130
29	95.25	1293.95	.00	.000	.000	25.130
30	98.54	1280.26	.00	.000	.000	25.130
41	134.67	1280.25	.00	.000	.000	25.130
59	193.79	857.01	.00	.000	.000	25.130
60	197.08	833.57	.00	.000	.000	25.130
80	262.77	833.58	.00	.000	.000	25.130
81	266.05	833.57	.00	.000	.000	25.130
103	338.31	945.24	.00	.000	.000	25.130
104	341.60	1057.89	.00	.000	.000	25.130

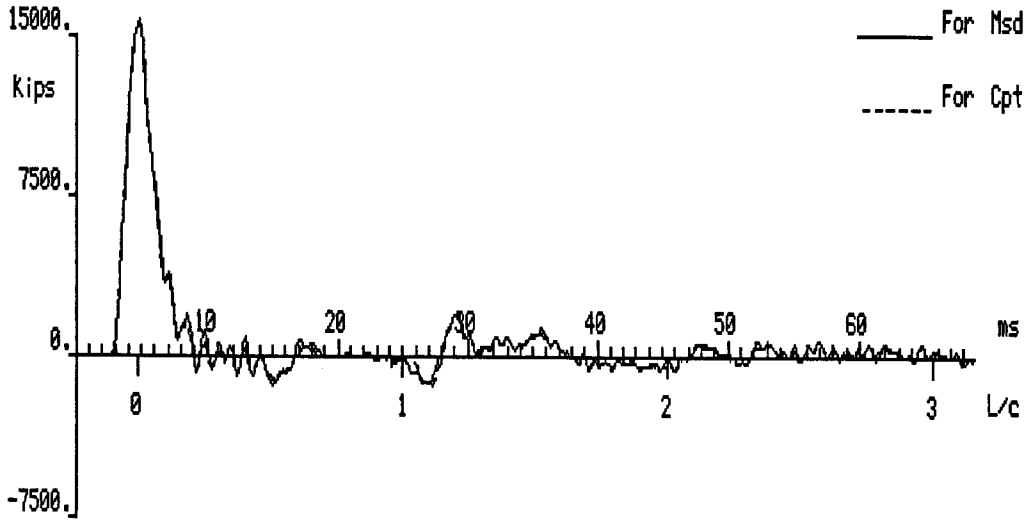
Pile Damping 1.0 %, Time Incr .195 ms, Wave Speed 16810.7 ft/s

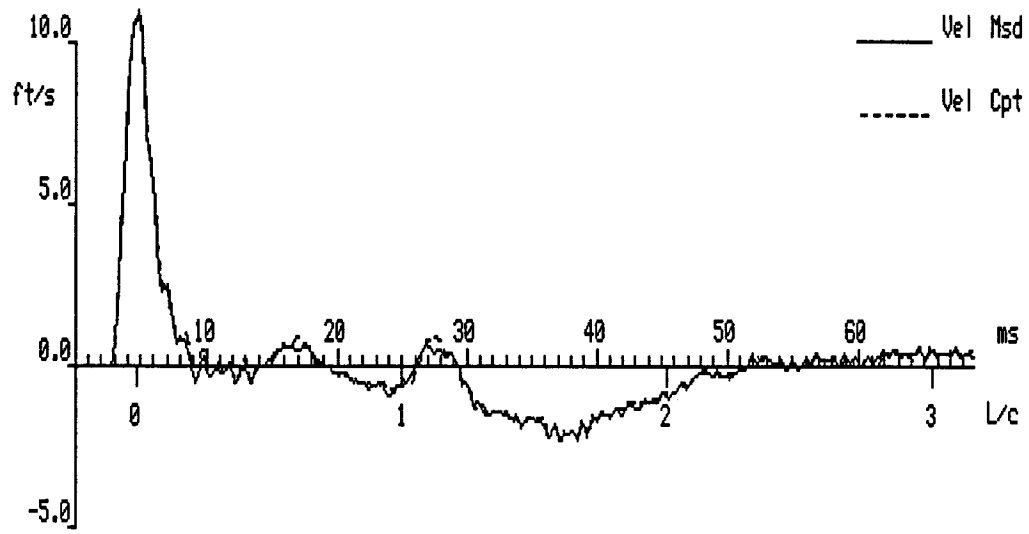
SFOB8 PIDP, TP2D, MHU-500T, BoID

Blow 5 02/14/01

Fugro-McClelland Marine Geosciences, Inc

CAPWAP(R) Version 1.993-1



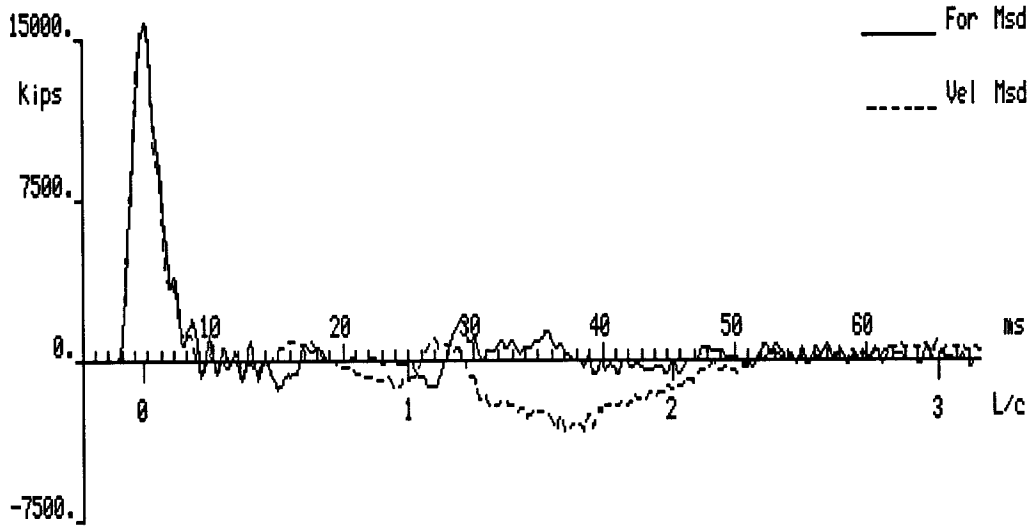


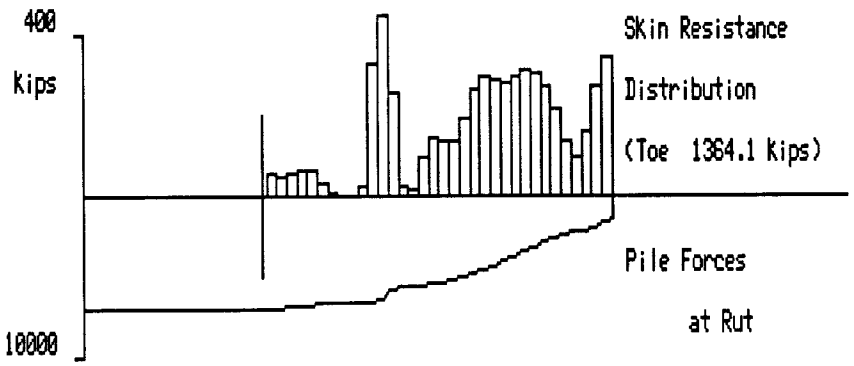
SFOBB PIDP, TP2D, MHU-500T, BoID

Blow 5 02/14/01

Fugro-McClelland Marine Geosciences, Inc

CAPWAP(R) Version 1.993-1





SFOBB PIDP, TP2D, MHU-500T, BoID | Blow 5 | 02/14/01

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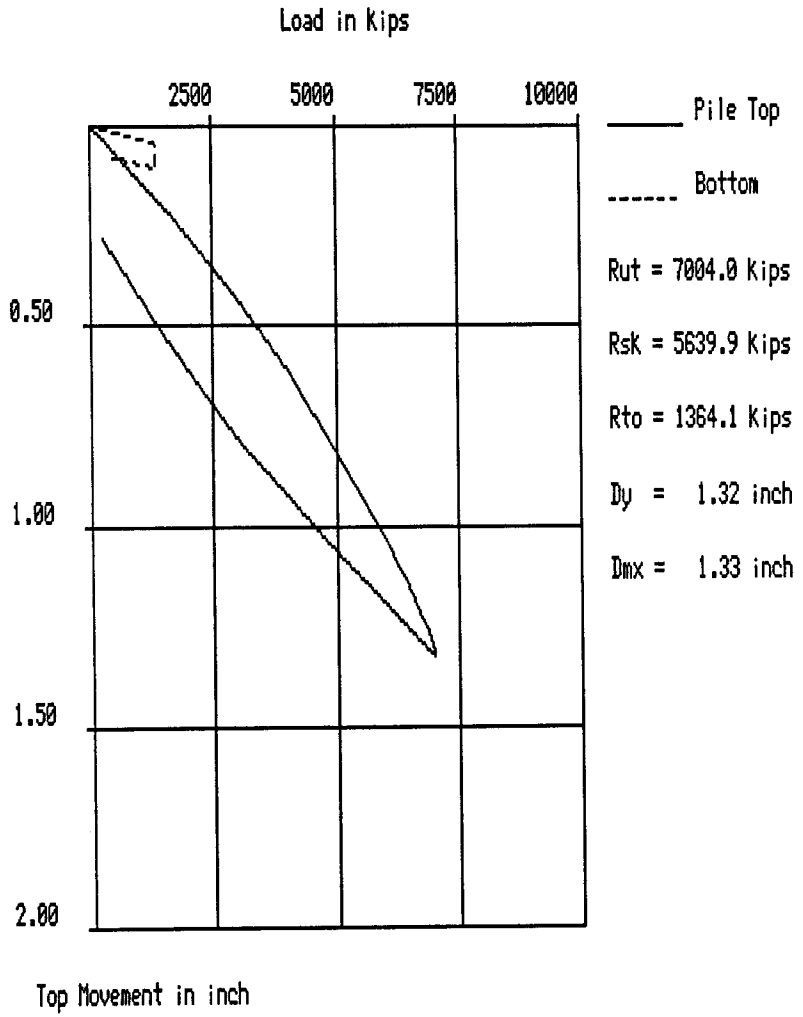
Dynamic D-Toe, E-P R-Toe



PILE 2
EOID, BLOW NO. 1909, PDA 1

PILE 2
EOID, BLOW NO. 1909, PDA 1

SFOBB PIDP, TP2D, MHU-1700, EoID
Fugro-McClelland Marine Geosciences, Inc

Blow No. 1909 02/14/01
CAPWAP(R) Version 1.993-1

CAPWAP FINAL RESULTS

Final CAPWAP Capacity: Ru 15762.7 Skin 10083.7 Toe 5679.0 kips

Soil Sgmnt No.	Depth Below Gages ft	Depth Below Grade ft	Ru kips	Sum of Ru Up kips	Sum of Ru Down kips	Unit Resist. w. Respect to Depth kips/ft	Unit Resist. w. Respect to Area kips/f2	Smith Damping s/ft	Quake inch
				15762.7					
1	39.4	4.8	173.5	15589.2	173.5	26.42	1.03	.107	.097
2	46.0	11.4	14.4	15574.8	187.9	2.19	.09	.107	.097
3	52.6	18.0	.0	15574.8	187.9	.00	.00	.000	.097
4	59.1	24.5	.0	15574.8	187.9	.00	.00	.000	.097
5	65.7	31.1	109.9	15464.9	297.8	16.72	.65	.107	.097
6	72.3	37.7	95.2	15369.7	393.0	14.49	.56	.107	.097
7	78.8	44.2	2.8	15366.9	395.8	.43	.02	.107	.097
8	85.4	50.8	.0	15366.9	395.8	.00	.00	.000	.097
9	92.0	57.4	33.2	15333.7	429.0	5.06	.20	.107	.097
10	98.5	63.9	126.7	15207.0	555.7	19.29	.75	.107	.097
11	105.1	70.5	177.5	15029.5	733.2	27.02	1.05	.107	.097
12	111.7	77.1	154.6	14874.8	887.9	23.54	.91	.107	.097
13	118.2	83.6	101.6	14773.2	989.5	15.47	.60	.107	.097
14	124.8	90.2	77.1	14696.1	1066.6	11.74	.46	.107	.097
15	131.4	96.8	40.5	14655.6	1107.1	6.17	.24	.107	.097
16	138.0	103.4	16.7	14638.9	1123.8	2.54	.10	.107	.097
17	144.5	109.9	.0	14638.9	1123.8	.00	.00	.000	.097
18	151.1	116.5	.0	14638.9	1123.8	.00	.00	.000	.097
19	157.7	123.1	.0	14638.9	1123.8	.00	.00	.000	.097
20	164.2	129.6	.0	14638.9	1123.8	.00	.00	.000	.097
21	170.8	136.2	.0	14638.9	1123.8	.00	.00	.000	.097
22	177.4	142.8	.0	14638.9	1123.8	.00	.00	.000	.097
23	183.9	149.3	26.5	14612.4	1150.3	4.03	.16	.107	.097
24	190.5	155.9	502.4	14110.0	1652.7	76.47	2.97	.107	.097
25	197.1	162.5	1077.0	13033.0	2729.7	163.94	6.36	.107	.097
26	203.6	169.0	665.6	12367.4	3395.2	101.32	3.93	.107	.097
27	210.2	175.6	47.5	12320.0	3442.7	7.23	.28	.107	.097
28	216.8	182.2	.0	12320.0	3442.7	.00	.00	.000	.097
29	223.4	188.8	256.9	12063.1	3699.6	39.10	1.52	.107	.097

Soil Sgmnt No.	Depth Below Gages ft	Depth Below Grade ft	Ru kips	Sum of Ru Up kips	Sum of Ru Down kips	Unit Resist. w. Respect to Depth kips/ft	Unit Resist. w. Respect to Area kips/f2	Smith Damping s/ft	Quake inch
30	229.9	195.3	349.1	11714.1	4048.6	53.13	2.06	.107	.097
31	236.5	201.9	209.9	11504.1	4258.5	31.95	1.24	.107	.097
32	243.1	208.5	166.9	11337.3	4425.4	25.40	.99	.107	.097
33	249.6	215.0	249.2	11088.1	4674.6	37.94	1.47	.107	.097
34	256.2	221.6	295.7	10792.3	4970.4	45.02	1.75	.107	.097
35	262.8	228.2	313.5	10478.8	5283.9	47.73	1.85	.107	.097
36	269.3	234.7	353.5	10125.3	5637.4	53.81	2.09	.107	.097
37	275.9	241.3	340.8	9784.6	5978.1	51.87	2.01	.107	.097
38	282.5	247.9	265.2	9519.3	6243.4	40.38	1.57	.107	.097
39	289.0	254.4	290.4	9228.9	6533.8	44.20	1.72	.107	.097
40	295.6	261.0	482.2	8746.7	7016.0	73.41	2.85	.107	.097
41	302.2	267.6	707.3	8039.4	7723.3	107.67	4.18	.107	.097
42	308.8	274.2	852.4	7187.0	8575.7	129.76	5.04	.107	.097
43	315.3	280.7	827.6	6359.4	9403.3	125.98	4.89	.107	.097
44	321.9	287.3	542.2	5817.1	9945.5	82.54	3.20	.107	.097
45	328.5	293.9	138.1	5679.0	10083.7	21.03	.82	.107	.097
46	335.0	300.4	.0	5679.0	10083.7	.00	.00	.000	.097
47	341.6	307.0	.0	5679.0	10083.7	.00	.00	.000	.097
Average Skin Values			214.5			32.85	1.27	.107	.097
	Toe		5679.0				1379.41	.110	.170

Soil Model Parameters/Extensions		Skin	Toe
Case Damping		.752	.435
Unloading Level	(% of Ru)	45	

SFOBB PIDP, TP2D, MHU-1700, EoID
Fugro-McClelland Marine Geosciences, Inc

Blow No. 1909 02/14/01
CAPWAP(R) Version 1.993-1

EXTREMA TABLE

Pile Sgmnt No.	Depth Below Gages ft	max. Force kips	min. Force kips	max. Comp. Stress kips/in2	max. Tension Stress kips/in2	max. Trnsfd. Energy kips-ft	max. Veloc. ft/s	max. Displ. in
1	3.3	24184.2	-1373.1	29.96	-1.70	1048.13	16.6	.930
10	32.8	24258.3	-2121.2	30.05	-2.63	1047.83	16.5	.910
20	65.7	24010.1	-1140.1	29.74	-1.41	1016.52	16.3	.910
30	98.5	22427.4	-732.2	31.26	-1.02	978.02	16.8	.880
41	134.7	21051.2	-522.3	29.34	-.73	873.79	16.4	.840
51	167.5	20963.7	-583.0	29.22	-.81	856.67	16.3	.760
62	203.6	15747.6	.0	33.71	.00	634.86	16.5	.640
72	236.5	13542.2	.0	28.99	.00	468.43	14.9	.520
82	269.3	12270.6	.0	26.27	.00	356.06	12.7	.430
93	305.5	10029.5	.0	21.47	.00	201.82	9.2	.290
103	338.3	7830.4	.0	14.78	.00	113.08	7.5	.210
104	341.6	8528.7	.0	14.39	.00	116.56	7.2	.203
Absolute	197.1			39.70		(T=	53.3 ms)	
	36.1				-2.65	(T=	61.5 ms)	

CASE METHOD

	J=0.0	J=0.1	J=0.2	J=0.3	J=0.4	J=0.5	J=0.6	J=0.7	J=0.8	J=0.9
RS1	22502.	20455.	18408.	16361.	14314.	12266.	10219.	8172.	6125.	4078.
RMX	22502.	20455.	18408.	16361.	14331.	12401.	10560.	8719.	6880.	5093.
RSU	24098.	22210.	20323.	18435.	16548.	14660.	12772.	10885.	8997.	7110.
RA A2 W	861.	4565.	0.							

Current CAPWAP Ru= 15762.7; Corresponding J(Rs)= .33; J(Rx)= .33

VMAX	VFIN	V1*Z	F1	FMAX	DMAX	DFIN	EMAX	EFIN	R HF	R EN
16.64	.592	3965.0	24184.2	24184.2	.930	.342	1048.1	977.0	19815.6	28651.7

SFOBB PIDP, TP2D, MHU-1700, EoID
Fugro-McClelland Marine Geosciences, Inc

Blow No. 1909 02/14/01
CAPWAP(R) Version 1.993-1

PILE PROFILE AND PILE MODEL

Depth ft	Area in2	E-Modulus kips/in2	Spec. Weight kips/ft3	Circumf. ft
.00	807.20	30000.0	.492	25.770
92.25	807.20	30000.0	.492	25.770
92.25	717.40	30000.0	.492	25.770
190.68	717.40	30000.0	.492	25.770
190.68	467.10	30000.0	.492	25.770
336.68	467.10	30000.0	.492	25.770
336.68	592.80	30000.0	.492	25.770
341.60	592.80	30000.0	.492	25.770

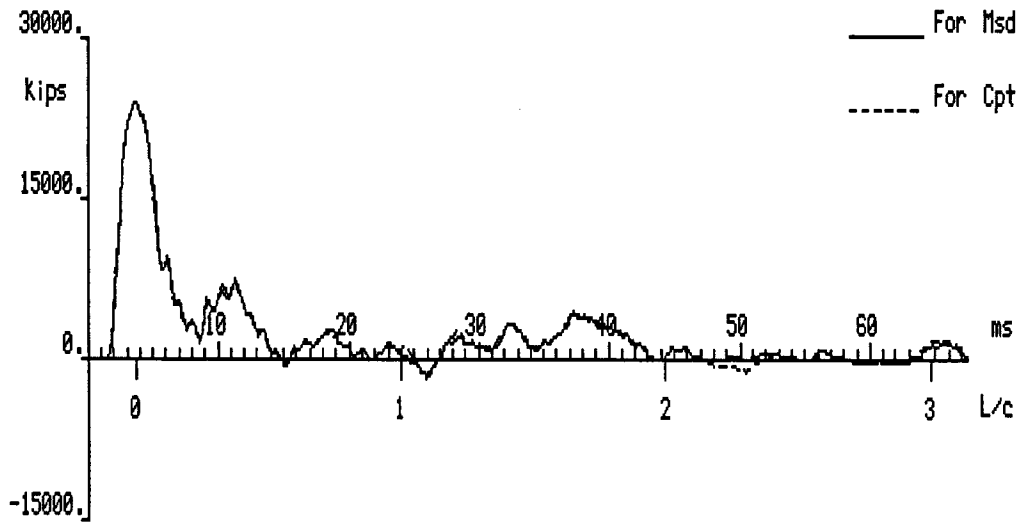
Toe Area 4.117 ft2

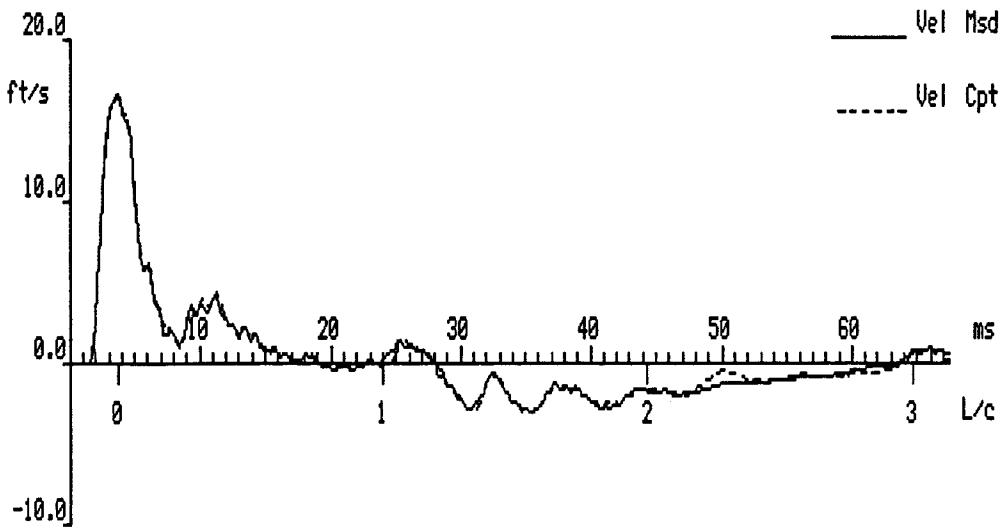
Segmnt No.	Depth B.G. feet	Impedance kips/ft/s	Imp. Change %	T. Slack inch	C. Slack inch	Circumf. feet
1	3.28	1440.51	.00	.000	.000	25.770
3	9.85	1440.51	.00	.000	.000	25.770
4	13.14	1440.51	.00	.000	.000	25.770
5	16.42	1440.51	.00	.000	.000	25.770
6	19.71	1440.51	.00	.000	.000	25.770
10	32.85	1440.51	.00	.000	.000	25.770
29	95.25	1293.95	.00	.000	.000	25.770
30	98.54	1280.26	.00	.000	.000	25.770
41	134.67	1280.25	.00	.000	.000	25.770
59	193.79	857.01	.00	.000	.000	25.770
60	197.08	833.57	.00	.000	.000	25.770
80	262.77	833.58	.00	.000	.000	25.770
81	266.05	833.57	.00	.000	.000	25.770
103	338.31	945.24	.00	.000	.000	25.770
104	341.60	1057.89	.00	.000	.000	25.770

Pile Damping 1.0 %, Time Incr .195 ms, Wave Speed 16810.7 ft/s

SFOBB PIDP, TP2D, MHU-1700, EoID Blow 1909 02/14/01

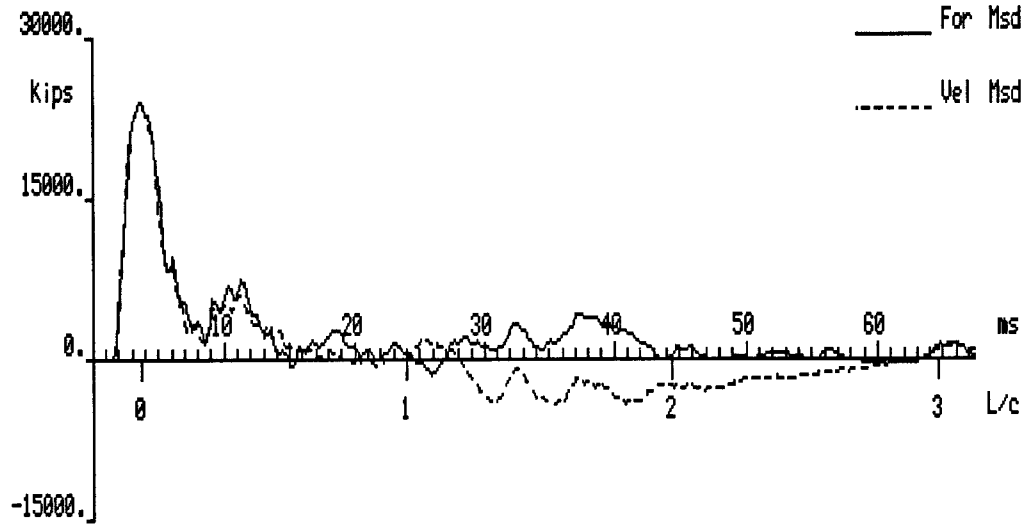
Fugro-McClelland Marine Geosciences, Inc CAPWAP(R) Version 1.993-1

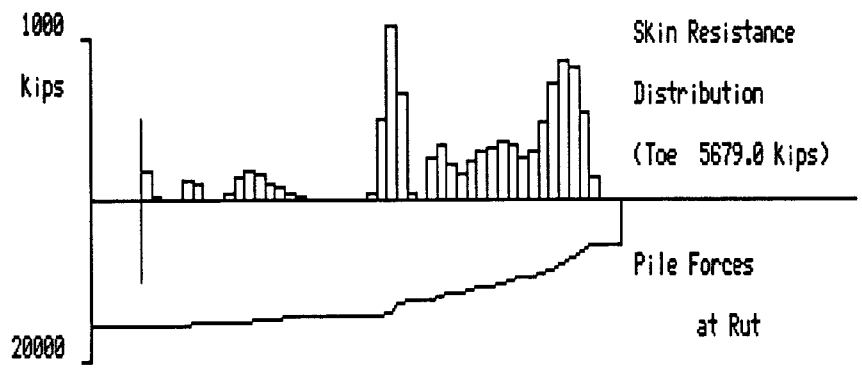




SFOBB PIDP, TP2D, MHU-1700, EoID Blow 1909 02/14/01

Fugro-McClelland Marine Geosciences, Inc CAPWAP(R) Version 1.993-1

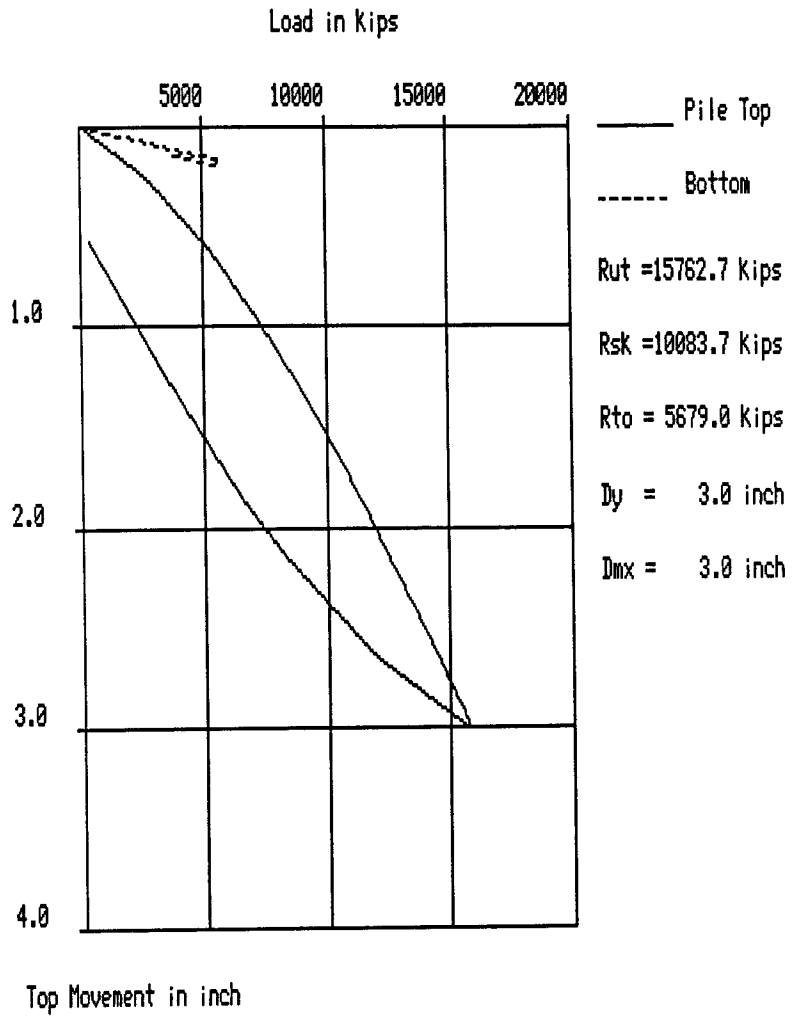




SFOBB PIDP, TP2D, MHU-1700, EoID | Blow 1909 | 02/14/01

Fugro-McClelland Marine Geosciences, Inc | CAPWAP(R) Version 1.993-1

Dynamic D-Toe, E-P R-Toe



PILE 2
EOID, BLOW NO. 1945, PDA 2

PILE 2
EOID, BLOW NO. 1945, PDA 2

SFOBB PIDP, TP2D, MHU-1700, EoID
Fugro-McClelland Marine Geosciences, Inc

Blow No. 1945 02/14/01
CAPWAP(R) Version 1.993-1

CAPWAP FINAL RESULTS

Final CAPWAP Capacity: Ru 14977.5 Skin 9507.5 Toe 5470.0 kips

Soil Sgmnt No.	Depth Below Gages ft	Depth Below Grade ft	Ru kips	Sum of Ru Up kips	Sum of Ru Down kips	Unit w. Depth kips/ft	Resist. Respect to Area kips/f2	Smith Damping s/ft	Quake inch
				14977.5					
1	39.5	4.9	179.3	14798.2	179.3	27.26	1.06	.106	.130
2	46.0	11.4	180.7	14617.5	360.0	27.48	1.07	.106	.130
3	52.6	18.0	170.9	14446.6	530.9	25.99	1.01	.106	.130
4	59.2	24.6	150.2	14296.4	681.1	22.84	.89	.106	.130
5	65.8	31.2	96.3	14200.0	777.5	14.65	.57	.106	.130
6	72.3	37.7	1.1	14199.0	778.6	.17	.01	.106	.130
7	78.9	44.3	.0	14199.0	778.6	.00	.00	.106	.130
8	85.5	50.9	2.6	14196.4	781.1	.39	.02	.106	.130
9	92.1	57.5	178.8	14017.6	959.9	27.18	1.05	.106	.130
10	98.7	64.1	254.6	13763.0	1214.5	38.71	1.50	.106	.130
11	105.2	70.6	188.6	13574.4	1403.1	28.68	1.11	.106	.130
12	111.8	77.2	96.9	13477.5	1500.1	14.74	.57	.106	.130
13	118.4	83.8	69.5	13407.9	1569.6	10.57	.41	.106	.130
14	125.0	90.4	91.9	13316.1	1661.4	13.97	.54	.106	.130
15	131.5	96.9	126.9	13189.2	1788.3	19.29	.75	.106	.130
16	138.1	103.5	170.5	13018.7	1958.8	25.93	1.01	.106	.130
17	144.7	110.1	213.2	12805.5	2172.0	32.41	1.26	.106	.130
18	151.3	116.7	212.7	12592.8	2384.7	32.33	1.25	.106	.130
19	157.8	123.2	130.0	12462.8	2514.7	19.77	.77	.106	.130
20	164.4	129.8	43.8	12419.0	2558.5	6.66	.26	.106	.130
21	171.0	136.4	.0	12419.0	2558.5	.00	.00	.106	.130
22	177.6	143.0	.0	12419.0	2558.5	.00	.00	.106	.130
23	184.2	149.6	36.1	12382.9	2594.6	5.50	.21	.106	.130
24	190.7	156.1	313.3	12069.6	2907.9	47.63	1.85	.106	.130
25	197.3	162.7	586.2	11483.4	3494.1	89.13	3.46	.106	.130
26	203.9	169.3	454.3	11029.1	3948.4	69.07	2.68	.106	.130
27	210.5	175.9	148.1	10881.1	4096.5	22.51	.87	.106	.130
28	217.0	182.4	14.9	10866.1	4111.4	2.27	.09	.106	.130
29	223.6	189.0	74.7	10791.5	4186.1	11.35	.44	.106	.130

Soil Sgmnt No.	Depth Below Gages ft	Depth Below Grade ft	Ru kips	Sum of Ru Up kips	Sum of Ru Down kips	Unit w. Respect to Depth kips/ft	Resist. Area kips/f2	Smith Damping s/ft	Quake inch
30	230.2	195.6	139.1	10652.4	4325.1	21.15	.82	.106	.130
31	236.8	202.2	166.3	10486.1	4491.4	25.28	.98	.106	.130
32	243.3	208.7	214.4	10271.7	4705.8	32.60	1.27	.106	.130
33	249.9	215.3	276.9	9994.8	4982.7	42.10	1.63	.106	.130
34	256.5	221.9	329.8	9665.0	5312.5	50.14	1.95	.106	.130
35	263.1	228.5	358.2	9306.7	5670.8	54.47	2.11	.106	.130
36	269.7	235.1	355.5	8951.2	6026.3	54.06	2.10	.106	.130
37	276.2	241.6	368.5	8582.7	6394.8	56.02	2.17	.106	.130
38	282.8	248.2	432.6	8150.1	6827.4	65.78	2.55	.106	.130
39	289.4	254.8	517.7	7632.4	7345.1	78.72	3.05	.106	.130
40	296.0	261.4	588.4	7044.0	7933.5	89.46	3.47	.106	.130
41	302.5	267.9	613.8	6430.2	8547.3	93.33	3.62	.106	.130
42	309.1	274.5	544.2	5886.0	9091.5	82.74	3.21	.106	.130
43	315.7	281.1	356.6	5529.5	9448.1	54.21	2.10	.106	.130
44	322.3	287.7	36.5	5492.9	9484.6	5.55	.22	.106	.130
45	328.8	294.2	.0	5492.9	9484.6	.00	.00	.106	.130
46	335.4	300.8	.0	5492.9	9484.6	.00	.00	.106	.130
47	342.0	307.4	22.9	5470.0	9507.5	3.48	.14	.106	.130
Average Skin Values			202.3			30.97	1.19	.106	.130
Toe			5470.0				1328.65	.095	.204

Soil Model Parameters/Extensions		Skin	Toe
Case Damping		.701	.360
Unloading Quake	(% of loading quake)	95	100
Unloading Level	(% of Ru)	44	
Soil Plug Weight	(kips)		3.01

SFOBB PIDP, TP2D, MHU-1700, EoID
Fugro-McClelland Marine Geosciences, Inc

Blow No. 1945 02/14/01
CAPWAP(R) Version 1.993-1

EXTREMA TABLE

Pile Sgmnt No.	Depth Below Gages ft	max. Force kips	min. Force kips	max. Comp. Stress kips/in2	max. Tension Stress kips/in2	max. Trnsfd. Energy kips-ft	max. Veloc. ft/s	max. Displ. in
1	3.3	26186.1	-1719.2	32.44	-2.13	1135.22	16.9	.866
10	32.9	25462.0	-2544.1	31.54	-3.15	1133.27	17.4	.880
20	65.8	24407.5	-2462.3	30.24	-3.05	1032.23	16.8	.850
30	98.7	23020.3	-1534.6	32.09	-2.14	989.53	17.1	.830
41	134.8	21599.5	-1133.9	30.11	-1.58	871.25	16.4	.800
51	167.7	20201.3	-1125.5	28.16	-1.57	766.92	15.8	.740
62	203.9	15598.1	-648.4	33.39	-1.39	633.24	16.9	.640
72	236.8	14178.4	-118.7	30.35	-.25	518.80	15.8	.540
82	269.7	12793.1	-5.2	27.39	-.01	388.34	13.4	.440
93	305.8	9419.5	-904.7	20.17	-1.94	214.20	9.8	.330
103	338.7	8233.0	-4.0	15.55	-.01	169.51	10.1	.290
104	341.6	9055.9	-3.5	15.28	-.01	174.72	9.8	.281
Absolute	197.3			36.35		(T=	33.3 ms)	
	23.0				-3.36	(T=	66.9 ms)	

CASE METHOD

	J=0.0	J=0.1	J=0.2	J=0.3	J=0.4	J=0.5	J=0.6	J=0.7	J=0.8	J=0.9
RS1	23092.	20874.	18656.	16438.	14220.	12002.	9784.	7566.	5348.	3130.
RMX	23092.	20874.	18656.	16438.	14220.	12002.	9784.	7643.	5624.	3606.
RSU	25387.	23399.	21411.	19422.	17434.	15445.	13457.	11469.	9480.	7492.

RA A2 W 140. 2169. 0.

Current CAPWAP Ru= 14977.5; Corresponding J(Rs)= .37; J(Rx)= .37

VMAX	VFIN	V1*Z	F1	FMAX	DMAX	DFIN	EMAX	EFIN	R HF	R EN
16.89	.242	4334.2	26186.1	26186.1	.866	.140	1135.2	1110.7	22615.9	31032.2

SFOBB PIDP, TP2D, MHU-1700, EoID
Fugro-McClelland Marine Geosciences, Inc

Blow No. 1945 02/14/01
CAPWAP(R) Version 1.993-1

PILE PROFILE AND PILE MODEL

Depth ft	Area in2	E-Modulus kips/in2	Spec. Weight kips/ft3	Circumf. ft
.00	807.20	30000.0	.492	25.770
92.65	807.20	30000.0	.492	25.770
92.65	717.40	30000.0	.492	25.770
191.08	717.40	30000.0	.492	25.770
191.08	467.10	30000.0	.492	25.770
337.08	467.10	30000.0	.492	25.770
337.08	592.80	30000.0	.492	25.770
342.00	592.80	30000.0	.492	25.770

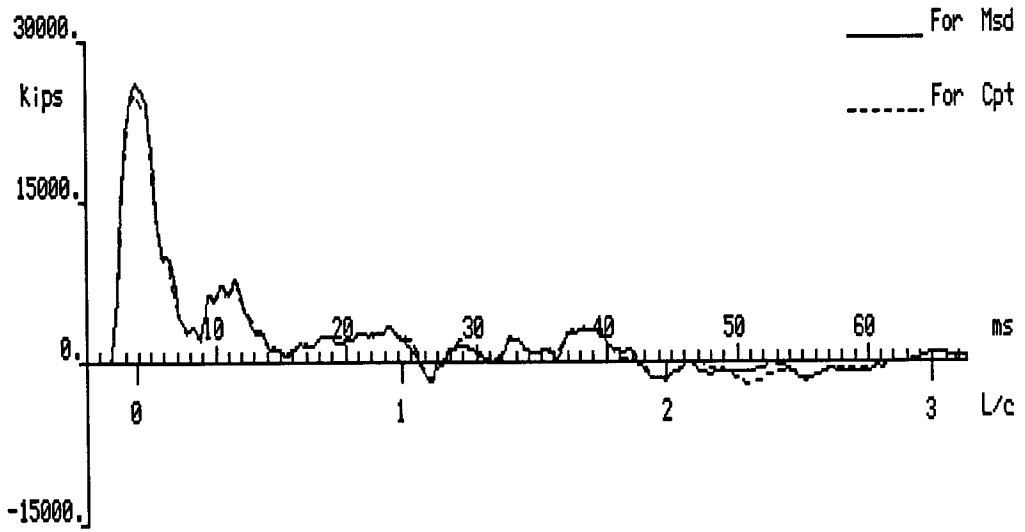
Toe Area 4.117 ft2

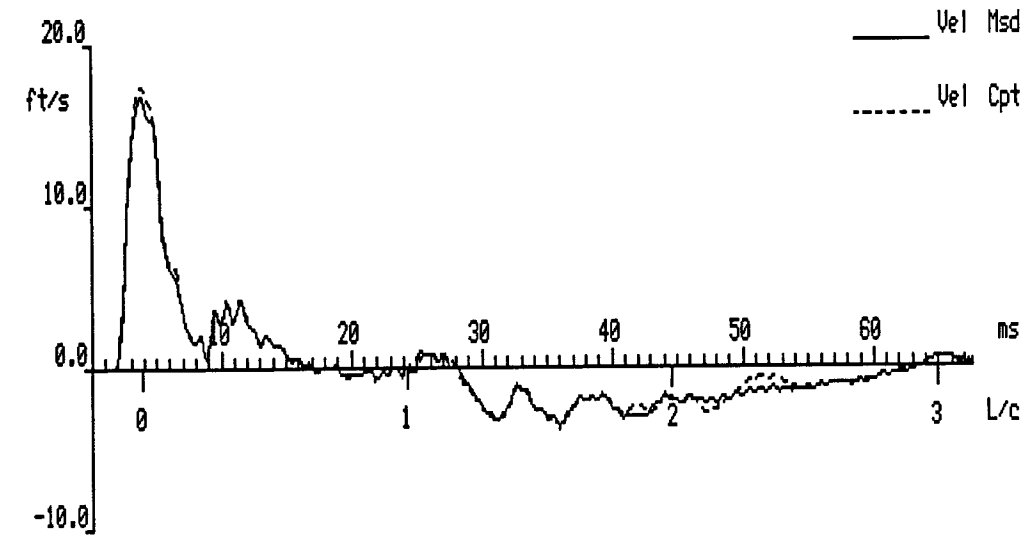
Segmnt No.	Depth B.G. feet	Impedance kips/ft/s	Imp. Change %	T. Slack inch	C. Slack inch	Circumf. feet
1	3.29	1440.51	.00	.000	.000	25.770
3	9.87	1440.51	.00	.000	.000	25.770
4	13.15	1440.51	.00	.000	.000	25.770
10	32.88	1440.51	.00	.000	.000	25.770
11	36.17	1440.51	.00	.000	.000	25.770
20	65.77	1440.51	.00	.000	.000	25.770
21	69.06	1440.51	.00	.000	.000	25.770
29	95.37	1308.18	.00	.000	.000	25.770
30	98.65	1280.25	.00	.000	.000	25.770
40	131.54	1280.26	.00	.000	.000	25.770
41	134.83	1280.25	.00	.000	.000	25.770
59	194.02	881.02	.00	.000	.000	25.770
60	197.31	833.57	.00	.000	.000	25.770
80	263.08	833.58	.00	.000	.000	25.770
81	266.37	833.57	.00	.000	.000	25.770
103	338.71	944.87	.00	.000	.000	25.770
104	342.00	1057.90	.00	.000	.000	25.770

Pile Damping 1.0 %, Time Incr .196 ms, Wave Speed 16810.7 ft/s

SF088 PIDP, TP2D, MHU-1700, EoID Blow 1945 02/14/01

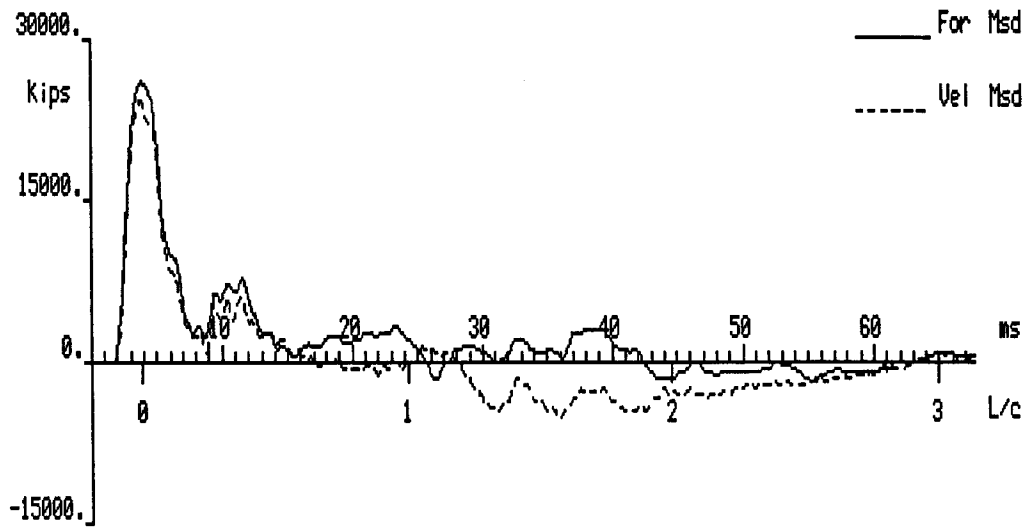
Fugro-McClelland Marine Geosciences, Inc CAPWAP(R) Version 1.993-1

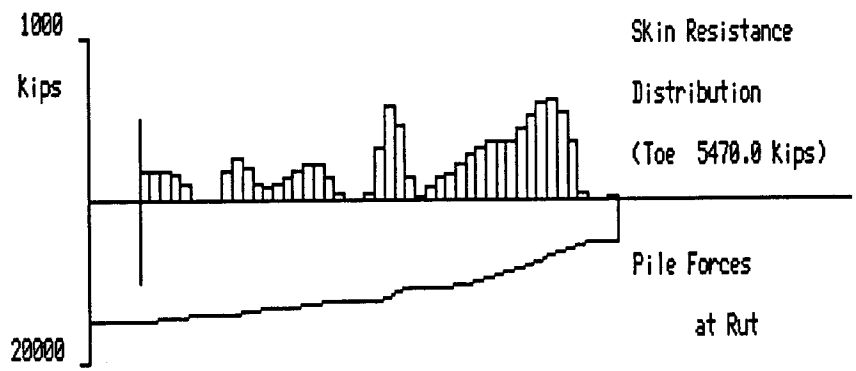




SFOBB PIDP, TP2D, MHU-1700, EoID | Blow 1945 | 02/14/01

Fugro-McClelland Marine Geosciences, Inc | CAPWAP(R) Version 1.993-1





SFOBB PIDP, TP2D, MHU-1700, EoID Blow 1945 02/14/01

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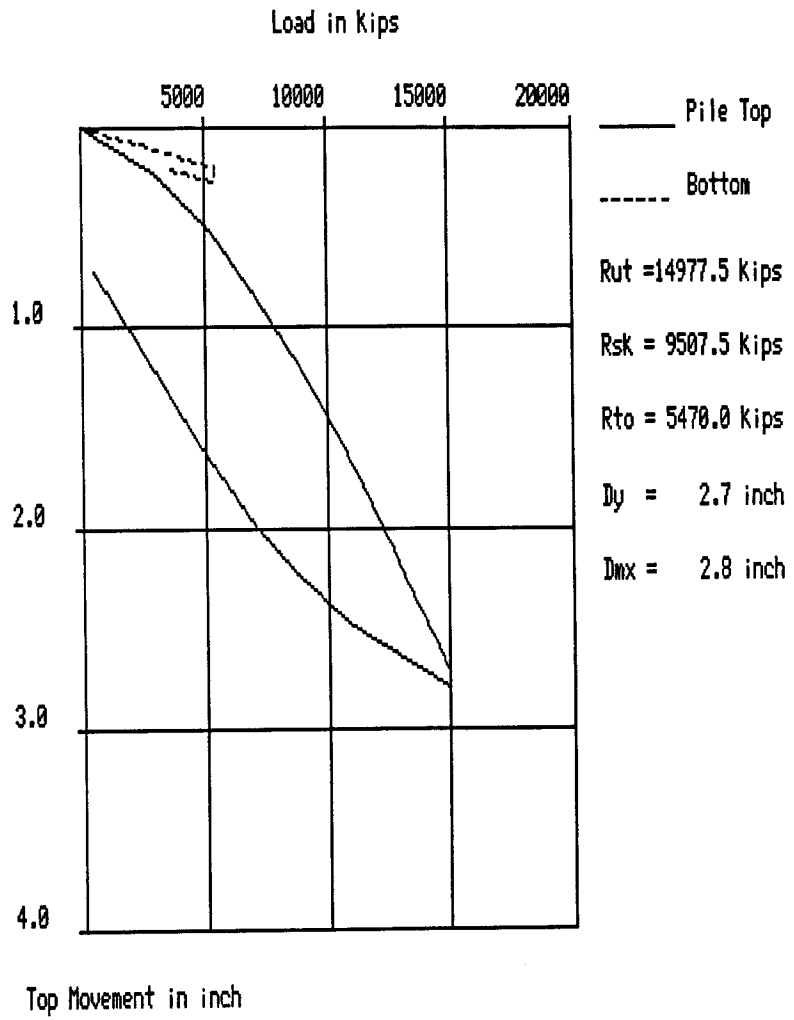
Dynamic D-Toe, E-P R-Toe



PILE 2
BOR, BLOW NO. 3, PDA 1

PILE 2
BOR, BLOW NO. 3, PDA 1

SFOBB PIDP, TP2D, MHU-1700, BoR
Fugro-McClelland Marine Geosciences, Inc

Blow No. 3 02/14/01
CAPWAP(R) Version 1.993-1

CAPWAP FINAL RESULTS

Final CAPWAP Capacity: Ru 13879.8 Skin 11907.7 Toe 1972.1 kips

Soil Sgmnt No.	Depth Below Gages ft	Depth Below Grade ft	Ru kips	Sum of Ru Up kips	Sum of Ru Down kips	Unit Resist. w. Respect to Depth kips/ft	Unit Resist. w. Respect to Area kips/f2	Smith Damping s/ft	Quake inch
				13879.8					
1	39.4	4.8	72.8	13807.0	72.8	11.09	.44	.237	.197
2	46.0	11.4	66.6	13740.4	139.4	10.13	.40	.237	.197
3	52.6	18.0	67.4	13673.0	206.9	10.27	.41	.237	.197
4	59.1	24.5	84.3	13588.6	291.2	12.84	.51	.237	.197
5	65.7	31.1	81.1	13507.5	372.3	12.35	.49	.237	.197
6	72.3	37.7	49.5	13458.0	421.8	7.54	.30	.237	.197
7	78.8	44.2	29.1	13428.9	450.9	4.43	.18	.237	.197
8	85.4	50.8	46.8	13382.1	497.7	7.13	.28	.237	.197
9	92.0	57.4	112.2	13269.8	610.0	17.09	.68	.237	.197
10	98.5	63.9	172.8	13097.0	782.8	26.31	1.05	.237	.197
11	105.1	70.5	160.1	12936.9	943.0	24.38	.97	.237	.197
12	111.7	77.1	115.9	12820.9	1058.9	17.65	.70	.237	.197
13	118.2	83.6	106.4	12714.6	1165.3	16.19	.64	.237	.197
14	124.8	90.2	115.6	12599.0	1280.9	17.60	.70	.237	.197
15	131.4	96.8	110.8	12488.1	1391.7	16.87	.67	.237	.197
16	138.0	103.4	90.7	12397.4	1482.4	13.81	.55	.237	.197
17	144.5	109.9	82.1	12315.3	1564.5	12.49	.50	.237	.197
18	151.1	116.5	114.8	12200.5	1679.3	17.48	.70	.237	.197
19	157.7	123.1	148.0	12052.5	1827.4	22.53	.90	.237	.197
20	164.2	129.6	74.9	11977.5	1902.3	11.41	.45	.237	.197
21	170.8	136.2	.0	11977.5	1902.3	.00	.00	.000	.197
22	177.4	142.8	.0	11977.5	1902.3	.00	.00	.000	.197
23	183.9	149.3	270.2	11707.3	2172.5	41.14	1.64	.237	.197
24	190.5	155.9	550.7	11156.6	2723.3	83.84	3.34	.237	.197
25	197.1	162.5	556.6	10600.0	3279.8	84.72	3.37	.237	.197
26	203.6	169.0	375.1	10224.9	3654.9	57.10	2.27	.237	.197
27	210.2	175.6	245.6	9979.2	3900.6	37.39	1.49	.237	.197
28	216.8	182.2	220.4	9758.8	4121.0	33.55	1.34	.237	.197
29	223.4	188.8	209.9	9549.0	4330.9	31.95	1.27	.237	.197

Soil Sgmnt No.	Depth Below Gages ft	Depth Below Grade ft	Ru kips	Sum of Ru Up kips	Sum of Ru Down kips	Unit w. Respect to Depth kips/ft	Resist. Area kips/f2	Smith Damping s/ft	Quake inch
30	229.9	195.3	211.0	9337.9	4541.9	32.13	1.28	.237	.197
31	236.5	201.9	293.1	9044.8	4835.0	44.61	1.78	.237	.197
32	243.1	208.5	416.5	8628.3	5251.5	63.40	2.52	.237	.197
33	249.6	215.0	477.8	8150.5	5729.3	72.74	2.89	.237	.197
34	256.2	221.6	451.2	7699.3	6180.5	68.68	2.73	.237	.197
35	262.8	228.2	395.8	7303.6	6576.3	60.25	2.40	.237	.184
36	269.3	234.7	409.3	6894.2	6985.6	62.31	2.48	.237	.166
37	275.9	241.3	503.4	6390.9	7488.9	76.63	3.05	.237	.145
38	282.5	247.9	579.0	5811.9	8067.9	88.14	3.51	.237	.133
39	289.0	254.4	639.2	5172.7	8707.1	97.29	3.87	.237	.126
40	295.6	261.0	766.3	4406.4	9473.4	116.66	4.64	.237	.123
41	302.2	267.6	784.5	3621.9	10257.9	119.42	4.75	.237	.111
42	308.8	274.2	639.7	2982.2	10897.6	97.37	3.87	.237	.102
43	315.3	280.7	313.3	2669.0	11210.9	47.69	1.90	.237	.095
44	321.9	287.3	88.1	2580.9	11299.0	13.41	.53	.237	.088
45	328.5	293.9	98.5	2482.3	11397.5	15.00	.60	.237	.083
46	335.0	300.4	215.6	2266.7	11613.1	32.82	1.31	.237	.064
47	341.6	307.0	294.6	1972.1	11907.7	44.85	1.78	.237	.030
Average Skin Values			253.4			38.79	1.53	.237	.160
Toe			1972.1				479.01	.329	.067

Soil Model Parameters/Extensions		Skin	Toe
Case Damping		1.961	.451
Unloading Quake	(% of loading quake)	98	100
Unloading Level	(% of Ru)	94	
Soil Plug Weight	(kips)		8.86

SFOBB PIDP, TP2D, MHU-1700, BoR
Fugro-McClelland Marine Geosciences, Inc

Blow No. 3 02/14/01
CAPWAP(R) Version 1.993-1

EXTREMA TABLE

Pile Sgmnt No.	Depth Below Gages ft	max. Force kips	min. Force kips	max. Comp. Stress kips/in2	max. Tension Stress kips/in2	max. Trnsfd. Energy kips-ft	max. Veloc. ft/s	max. Displ. in
1	3.3	23861.2	-553.8	29.56	-.69	1025.72	16.8	.864
10	32.8	24177.5	-1061.8	29.95	-1.32	1019.19	16.5	.820
20	65.7	23561.0	-1332.8	29.19	-1.65	953.00	15.9	.790
30	98.5	21881.9	-1083.8	30.50	-1.51	882.64	15.9	.750
41	134.7	19600.7	-339.5	27.32	-.47	725.74	14.8	.680
51	167.5	18240.6	.0	25.43	.00	622.34	14.2	.580
62	203.6	13155.8	.0	28.16	.00	400.26	13.1	.450
72	236.5	10773.8	.0	23.07	.00	252.08	10.5	.330
82	269.3	7974.0	.0	17.07	.00	123.16	7.4	.210
93	305.5	4316.3	.0	9.24	.00	34.16	4.1	.110
103	338.3	3503.4	.0	6.61	.00	18.65	3.1	.070
104	341.6	3291.6	.0	5.55	.00	16.13	3.2	.075
Absolute	197.1			31.93		(T=	53.3 ms)	
	59.1				-1.66	(T=	84.6 ms)	

CASE METHOD

	J=0.0	J=0.1	J=0.2	J=0.3	J=0.4	J=0.5	J=0.6	J=0.7	J=0.8	J=0.9
RS1	22596.	20573.	18551.	16528.	14505.	12483.	10460.	8437.	6415.	4392.
RMX	22596.	20573.	18551.	16528.	14505.	12483.	10460.	8437.	6415.	4392.
RSU	25889.	24196.	22502.	20809.	19116.	17422.	15729.	14036.	12342.	10649.
RA A2 W	0.	3005.	0.							

Current CAPWAP Ru= 13879.8; Corresponding J(Rs)= .43; J(Rx)= .43

VMAX	VFIN	V1*Z	F1	FMAX	DMAX	DFIN	EMAX	EFIN	R HF	R EN
16.79	.532	4184.2	23861.2	23861.2	.864	.114	1025.7	926.42	2184.0	3584.3

SFOBB PIDP, TP2D, MHU-1700, BoR
Fugro-McClelland Marine Geosciences, Inc

Blow No. 3 02/14/01
CAPWAP(R) Version 1.993-1

PILE PROFILE AND PILE MODEL

Depth ft	Area in2	E-Modulus kips/in2	Spec. Weight kips/ft3	Circumf. ft
.00	807.20	30000.0	.492	25.130
92.25	807.20	30000.0	.492	25.130
92.25	717.40	30000.0	.492	25.130
190.68	717.40	30000.0	.492	25.130
190.68	467.10	30000.0	.492	25.130
336.68	467.10	30000.0	.492	25.130
336.68	592.80	30000.0	.492	25.130
341.60	592.80	30000.0	.492	25.130

Toe Area 4.117 ft2

Segmnt No.	Depth B.G. feet	Impedance kips/ft/s	Imp. Change %	T. Slack inch	C. Slack inch	Circumf. feet
1	3.28	1440.51	.00	.000	.000	25.130
3	9.85	1440.51	.00	.000	.000	25.130
4	13.14	1440.51	.00	.000	.000	25.130
5	16.42	1440.51	.00	.000	.000	25.130
6	19.71	1440.51	.00	.000	.000	25.130
10	32.85	1440.51	.00	.000	.000	25.130
29	95.25	1293.95	.00	.000	.000	25.130
30	98.54	1280.26	.00	.000	.000	25.130
41	134.67	1280.25	.00	.000	.000	25.130
59	193.79	857.01	.00	.000	.000	25.130
60	197.08	833.57	.00	.000	.000	25.130
80	262.77	833.58	.00	.000	.000	25.130
81	266.05	833.57	.00	.000	.000	25.130
103	338.31	945.24	.00	.000	.000	25.130
104	341.60	1057.89	.00	.000	.000	25.130

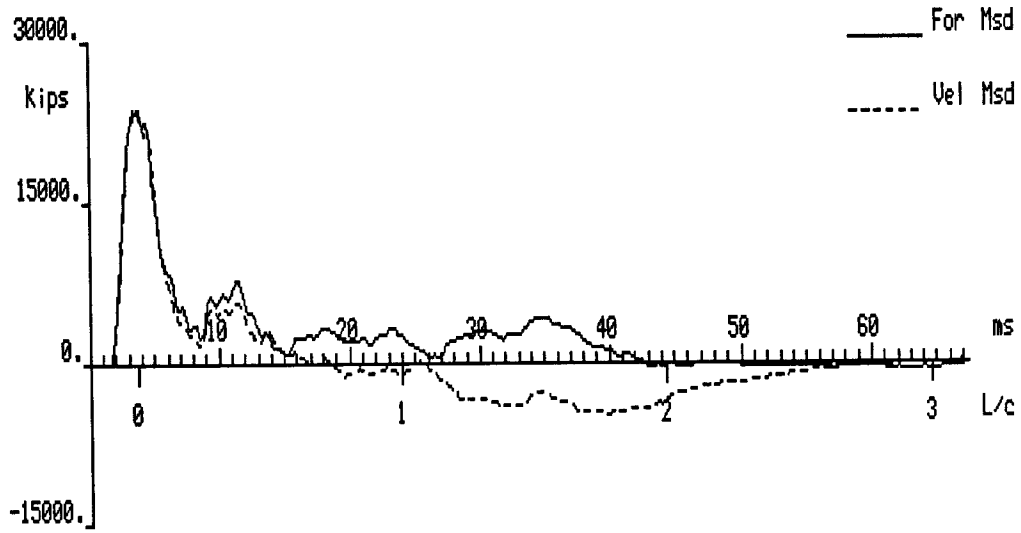
Pile Damping 1.0 %, Time Incr .195 ms, Wave Speed 16810.7 ft/s

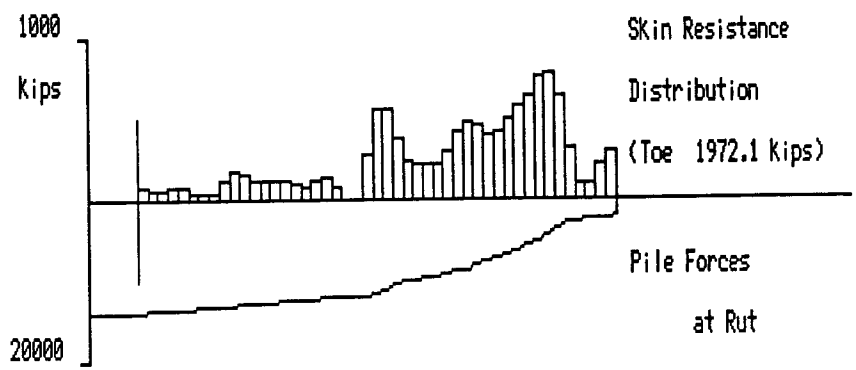
SFOBB PIDP, TP2D, MHU-1700, BoR

Blow 3 02/14/01

Fugro-McClelland Marine Geosciences, Inc

CAPWAP(R) Version 1.993-1



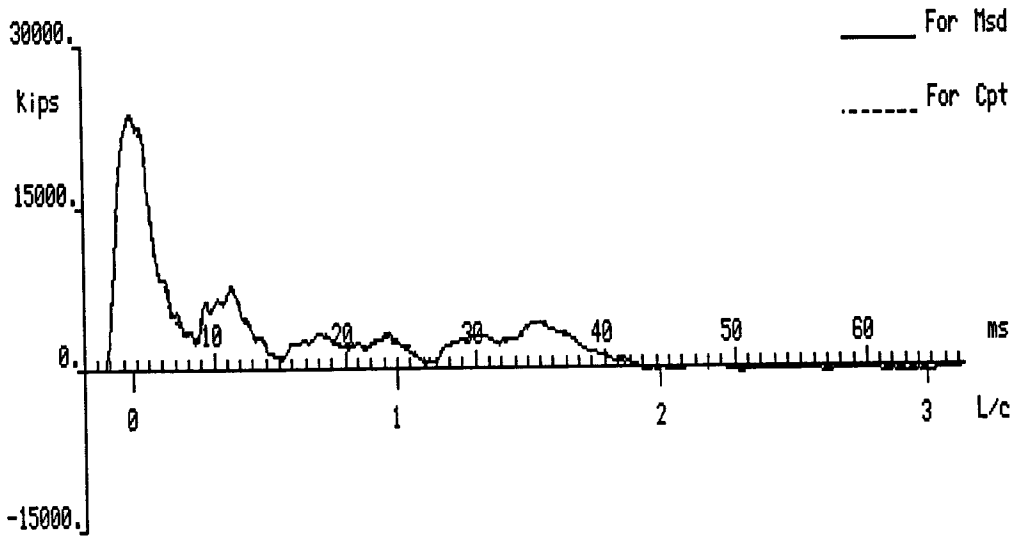


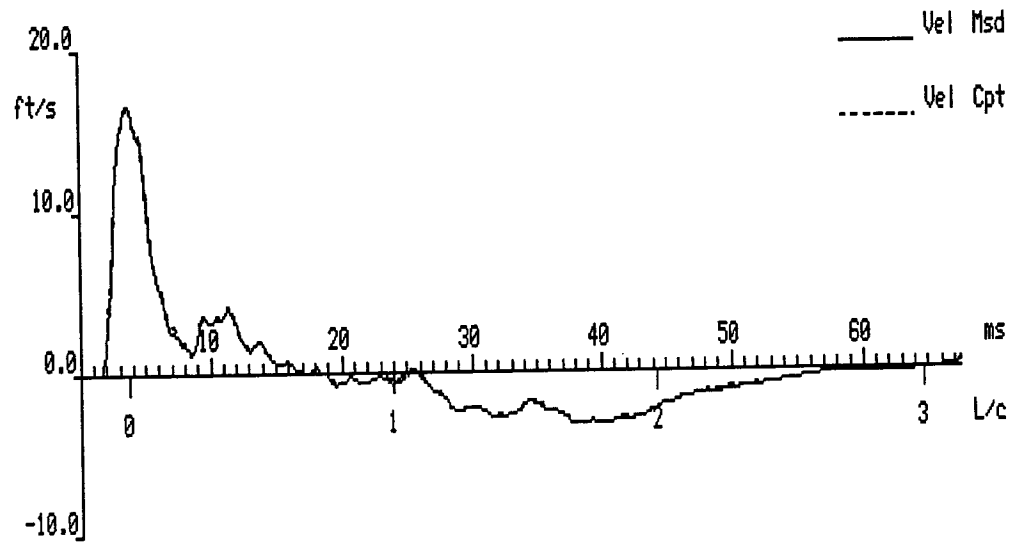
SFOBB PIDP, TP2D, MHU-1700, BoR

Blow 3 02/14/01

Fugro-McClelland Marine Geosciences, Inc

CAPWAP(R) Version 1.993-1





SFOBB PIDP, TP2D, MHU-1700, BoR Blow 3 02/14/01

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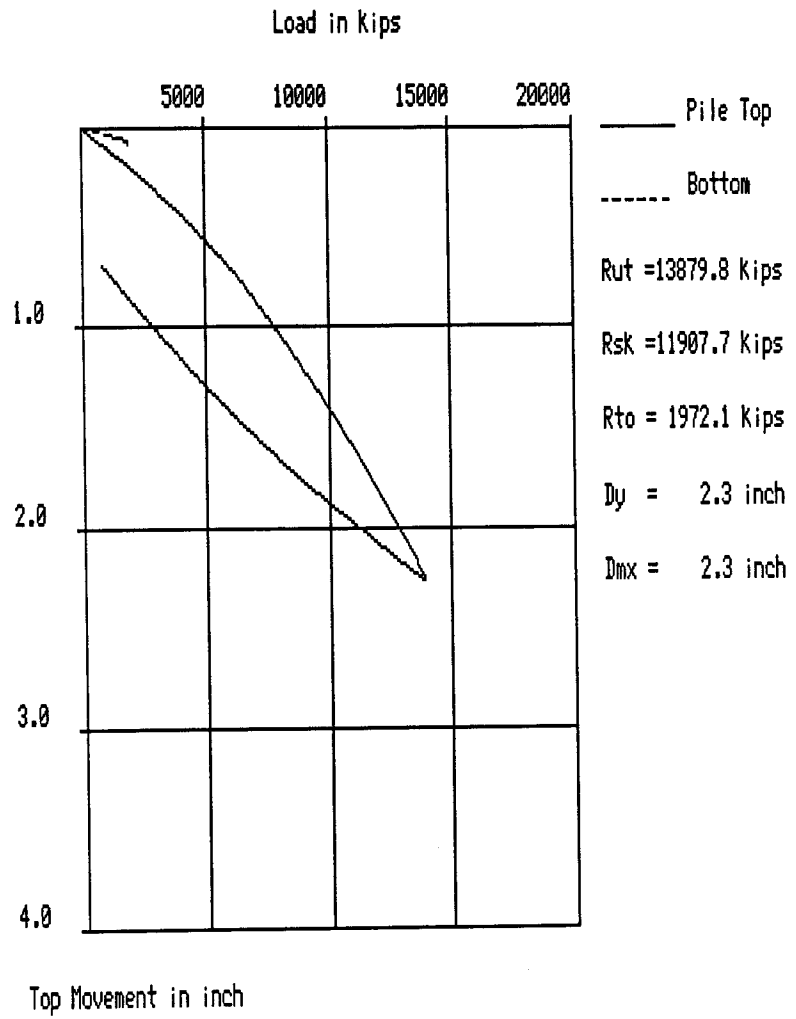
Dynamic D-Toe, E-P R-Toe



PILE 2
BOR, BLOW NO. 12, PDA 2

PILE 2
BOR, BLOW NO. 12, PDA 2

SFOBB PIDP, TP2D, MHU-1700, BoR
Fugro-McClelland Marine Geosciences, Inc

Blow No. 12 02/14/01
CAPWAP(R) Version 1.993-1

CAPWAP FINAL RESULTS

Final CAPWAP Capacity: Ru 16504.1 Skin 14353.9 Toe 2150.2 kips

Soil Sgmnt No.	Depth Below Gages ft	Depth Below Grade ft	Ru kips	Sum of Ru Up kips	Sum of Ru Down kips	Unit Resist. w. Respect to Depth kips/ft	Unit Resist. w. Respect to Area kips/f2	Smith Damping s/ft	Quake inch
				16504.1					
1	39.5	4.9	143.8	16360.2	143.8	21.87	.85	.150	.191
2	46.0	11.4	141.3	16218.9	285.2	21.49	.83	.150	.191
3	52.6	18.0	144.6	16074.3	429.8	21.99	.85	.150	.191
4	59.2	24.6	110.9	15963.4	540.7	16.86	.65	.150	.191
5	65.8	31.2	3.7	15959.7	544.4	.56	.02	.150	.191
6	72.3	37.7	.0	15959.7	544.4	.00	.00	.000	.191
7	78.9	44.3	.0	15959.7	544.4	.00	.00	.000	.191
8	85.5	50.9	87.0	15872.7	631.4	13.23	.51	.150	.191
9	92.1	57.5	251.2	15621.5	882.6	38.19	1.48	.150	.191
10	98.7	64.1	302.1	15319.4	1184.7	45.93	1.78	.150	.191
11	105.2	70.6	227.2	15092.2	1411.8	34.54	1.34	.150	.191
12	111.8	77.2	152.3	14940.0	1564.1	23.15	.90	.150	.191
13	118.4	83.8	134.9	14805.0	1699.0	20.52	.80	.150	.191
14	125.0	90.4	168.5	14636.5	1867.6	25.62	.99	.150	.191
15	131.5	96.9	211.2	14425.3	2078.7	32.11	1.25	.150	.191
16	138.1	103.5	228.2	14197.1	2307.0	34.70	1.35	.150	.191
17	144.7	110.1	246.0	13951.1	2553.0	37.40	1.45	.150	.191
18	151.3	116.7	264.8	13686.3	2817.7	40.26	1.56	.150	.191
19	157.8	123.2	214.1	13472.2	3031.9	32.56	1.26	.150	.191
20	164.4	129.8	66.1	13406.1	3098.0	10.05	.39	.150	.191
21	171.0	136.4	.0	13406.1	3098.0	.00	.00	.000	.191
22	177.6	143.0	2.7	13403.4	3100.6	.41	.02	.150	.191
23	184.2	149.6	246.2	13157.2	3346.8	37.43	1.45	.150	.191
24	190.7	156.1	540.9	12616.3	3887.8	82.25	3.19	.150	.191
25	197.3	162.7	601.6	12014.7	4489.3	91.46	3.55	.150	.191
26	203.9	169.3	432.5	11582.3	4921.8	65.76	2.55	.150	.191
27	210.5	175.9	284.0	11298.3	5205.8	43.18	1.68	.150	.191
28	217.0	182.4	280.1	11018.2	5485.9	42.59	1.65	.150	.191
29	223.6	189.0	334.6	10683.6	5820.5	50.87	1.97	.150	.191

Soil Sgmnt No.	Depth Below Gages ft	Depth Below Grade ft	Ru kips	Sum of Ru Up kips	Sum of Ru Down kips	Unit Resist. w. Respect to Depth kips/ft	Unit Resist. w. Respect to Area kips/f2	Smith Damping s/ft	Quake inch
30	230.2	195.6	388.0	10295.6	6208.5	59.00	2.29	.150	.191
31	236.8	202.2	512.8	9782.8	6721.3	77.97	3.03	.150	.191
32	243.3	208.7	724.7	9058.1	7446.0	110.19	4.28	.150	.191
33	249.9	215.3	898.7	8159.4	8344.7	136.65	5.30	.150	.191
34	256.5	221.9	930.6	7228.7	9275.3	141.50	5.49	.150	.191
35	263.1	228.5	858.4	6370.3	10133.8	130.52	5.06	.150	.191
36	269.7	235.1	810.5	5559.8	10944.3	123.24	4.78	.150	.191
37	276.2	241.6	865.7	4694.1	11810.0	131.62	5.11	.150	.176
38	282.8	248.2	966.0	3728.1	12776.0	146.88	5.70	.150	.158
39	289.4	254.8	911.6	2816.5	13687.5	138.60	5.38	.150	.149
40	296.0	261.4	507.3	2309.2	14194.9	77.14	2.99	.150	.145
41	302.5	267.9	159.0	2150.2	14353.9	24.18	.94	.150	.143
42	309.1	274.5	.0	2150.2	14353.9	.00	.00	.000	.142
43	315.7	281.1	.0	2150.2	14353.9	.00	.00	.000	.176
44	322.3	287.7	.0	2150.2	14353.9	.00	.00	.000	.191
45	328.8	294.2	.0	2150.2	14353.9	.00	.00	.000	.191
46	335.4	300.8	.0	2150.2	14353.9	.00	.00	.000	.191
47	342.0	307.4	.0	2150.2	14353.9	.00	.00	.000	.191
Average Skin Values			305.4			46.76	1.80	.150	.183
Toe			2150.2				522.27	.446	.098

Soil Model Parameters/Extensions		Skin	Toe
Case Damping		1.491	.666
Unloading Quake	(% of loading quake)	100	98
Unloading Level	(% of Ru)	6	

SFOBB PIDP, TP2D, MHU-1700, BoR
Fugro-McClelland Marine Geosciences, Inc

Blow No. 12 02/14/01
CAPWAP(R) Version 1.993-1

EXTREMA TABLE

Pile Sgmnt No.	Depth Below Gages ft	max. Force kips	min. Force kips	max. Comp. Stress kips/in2	max. Tension Stress kips/in2	max. Trnsfd. Energy kips-ft	max. Veloc. ft/s	max. Displ. in
1	3.3	26082.3	-1425.0	32.31	-1.77	1155.91	17.8	.885
10	32.9	26046.0	-2176.8	32.27	-2.70	1150.90	17.8	.850
20	65.8	24858.8	-2022.5	30.80	-2.51	1049.13	17.2	.790
30	98.7	23647.0	-2163.3	32.96	-3.02	987.00	17.1	.750
41	134.8	21201.3	-2019.3	29.55	-2.81	803.69	15.8	.700
51	167.7	19098.6	-1854.1	26.62	-2.58	651.61	14.9	.590
62	203.9	14206.1	-1744.6	30.41	-3.74	471.58	14.7	.490
72	236.8	12058.3	-1661.6	25.82	-3.56	292.73	11.6	.340
82	269.7	8097.2	-1150.4	17.34	-2.46	113.53	7.3	.190
93	305.8	4415.3	-795.7	9.45	-1.70	42.67	5.3	.140
103	338.7	4981.0	-690.0	9.41	-1.30	42.12	4.6	.110
104	341.6	5193.6	-787.3	8.76	-1.33	44.23	4.4	.109
Absolute	197.3			33.41		(T=	33.1 ms)	
	197.3				-3.99	(T=	73.6 ms)	

CASE METHOD

	J=0.0	J=0.1	J=0.2	J=0.3	J=0.4	J=0.5	J=0.6	J=0.7	J=0.8	J=0.9
RS1	24451.	22284.	20117.	17950.	15782.	13615.	11448.	9281.	7113.	4946.
RMX	24451.	22284.	20117.	17950.	15782.	13615.	11448.	9281.	7113.	4946.
RSU	28092.	26289.	24486.	22683.	20880.	19076.	17273.	15470.	13667.	11864.
RA A2 W	820.	2434.	0.							

Current CAPWAP Ru= 16504.1; Corresponding J(Rs)= .37; J(Rx)= .37

VMAX	VFIN	V1*Z	F1	FMAX	DMAX	DFIN	EMAX	EFIN	R HF	R EN
17.81	-.352	5649.6	26007.3	26082.3	.885	-.287	1155.9	1076.9	24536.5	40100.7

SFOBB PIDP, TP2D, MHU-1700, BoR
Fugro-McClelland Marine Geosciences, Inc

Blow No. 12 02/14/01
CAPWAP(R) Version 1.993-1

PILE PROFILE AND PILE MODEL

Depth ft	Area in2	E-Modulus kips/in2	Spec. Weight kips/ft3	Circumf. ft
.00	807.20	30000.0	.492	25.770
92.65	807.20	30000.0	.492	25.770
92.65	717.40	30000.0	.492	25.770
191.08	717.40	30000.0	.492	25.770
191.08	467.10	30000.0	.492	25.770
337.08	467.10	30000.0	.492	25.770
337.08	592.80	30000.0	.492	25.770
342.00	592.80	30000.0	.492	25.770

Toe Area 4.117 ft2

Segmnt No.	Depth B.G. feet	Impedance kips/ft/s	Imp. Change %	T. Slack inch	C. Slack inch	Circumf. feet
1	3.29	1440.51	.00	.000	.000	25.770
3	9.87	1440.51	.00	.000	.000	25.770
4	13.15	1440.51	.00	.000	.000	25.770
10	32.88	1440.51	.00	.000	.000	25.770
11	36.17	1440.51	.00	.000	.000	25.770
20	65.77	1440.51	.00	.000	.000	25.770
21	69.06	1440.51	.00	.000	.000	25.770
29	95.37	1308.18	.00	.000	.000	25.770
30	98.65	1280.25	.00	.000	.000	25.770
40	131.54	1280.26	.00	.000	.000	25.770
41	134.83	1280.25	.00	.000	.000	25.770
59	194.02	881.02	.00	.000	.000	25.770
60	197.31	833.57	.00	.000	.000	25.770
80	263.08	833.58	.00	.000	.000	25.770
81	266.37	833.57	.00	.000	.000	25.770
103	338.71	944.87	.00	.000	.000	25.770
104	342.00	1057.90	.00	.000	.000	25.770

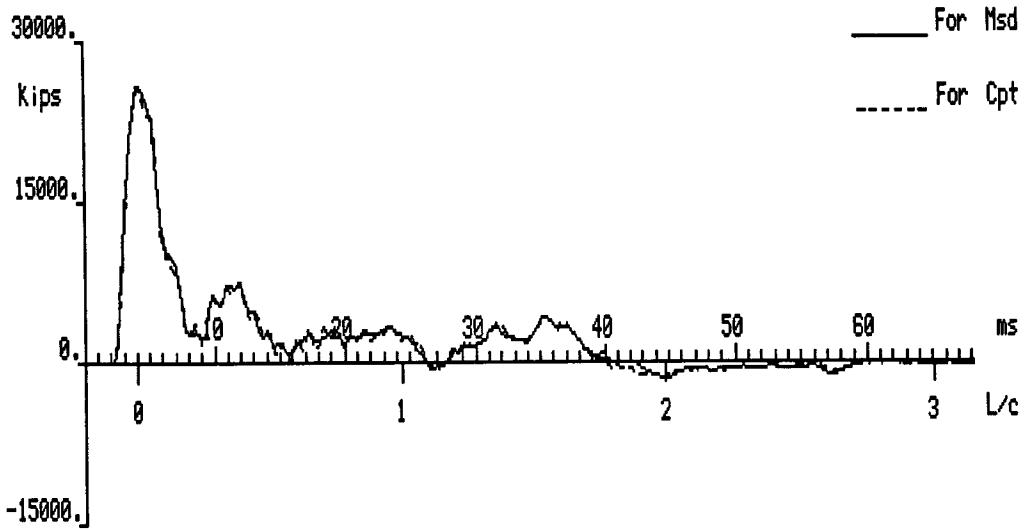
Pile Damping 1.0 %, Time Incr .196 ms, Wave Speed 16810.7 ft/s

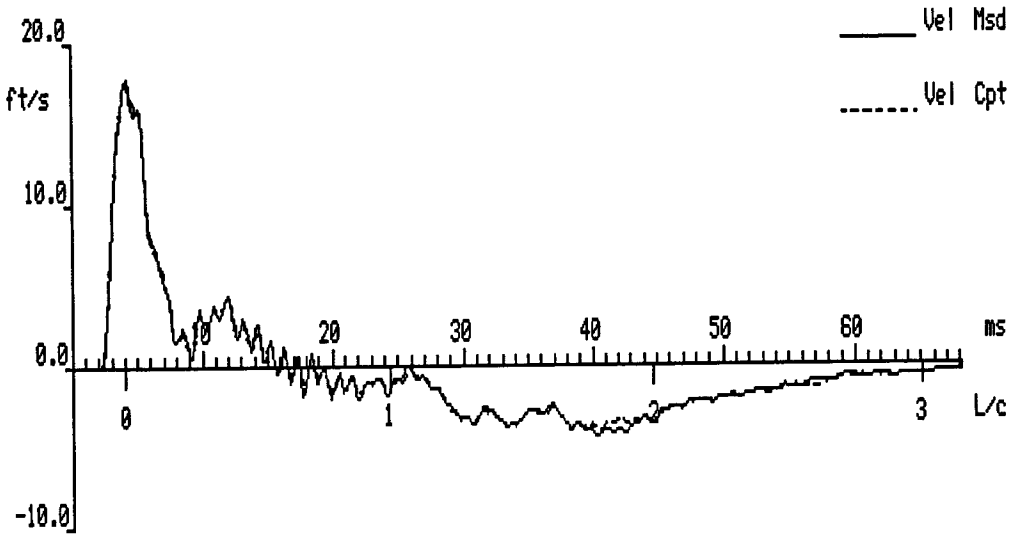
SFOB8 PIDP, TP2D, MHU-1700, BoR

Blow 12 02/14/01

Fugro-McClelland Marine Geosciences, Inc

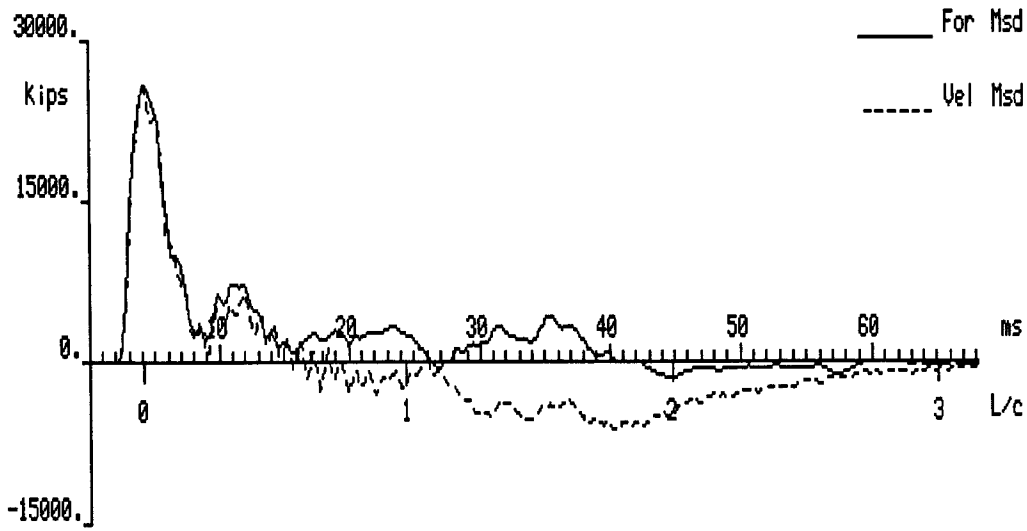
CAPWAP(R) Version 1.993-1

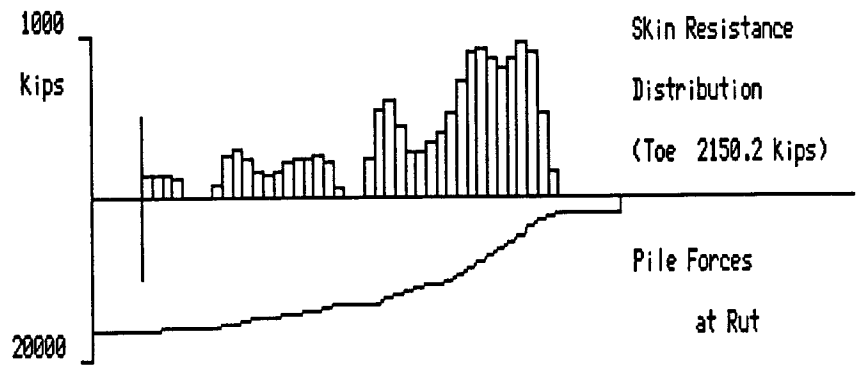




SFOBB PIDP, TP2D, MHU-1700, BoR Blow 12 02/14/01

Fugro-McClelland Marine Geosciences, Inc CAPWAP(R) Version 1.993-1





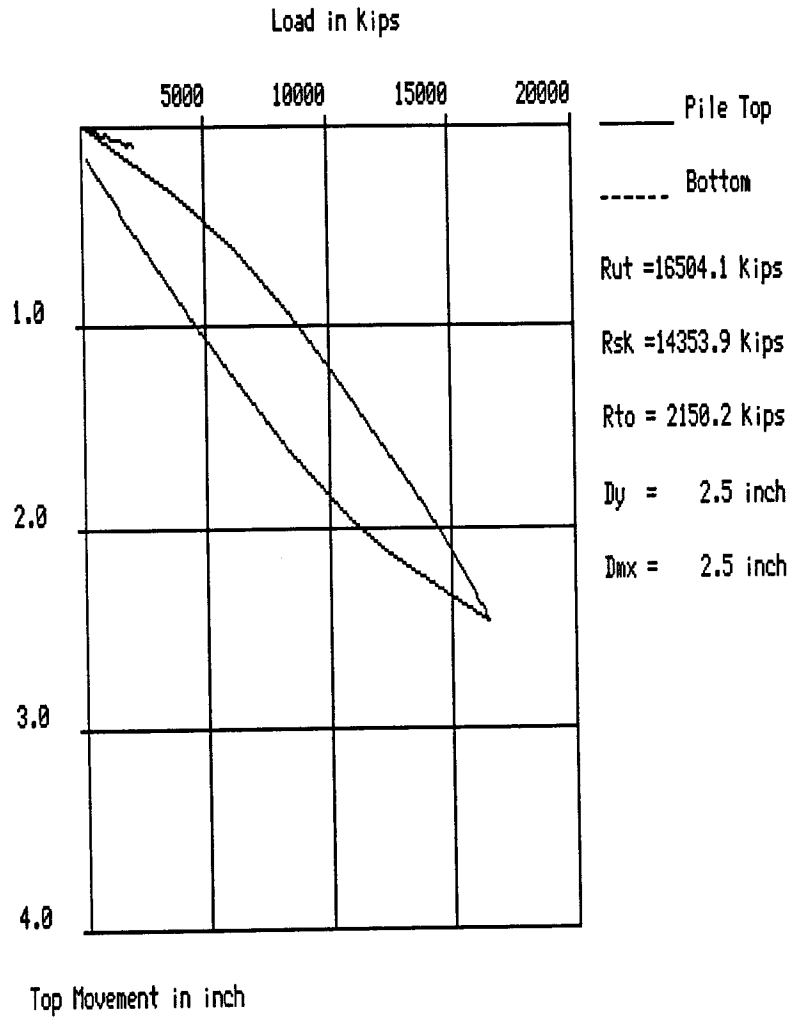
SFOBB PIDP, TP2D, MHU-1700, BoR

Blow 12 02/14/01

Fugro-McClelland Marine Geosciences, Inc

CAPWAP(R) Version 1.993-1

Dynamic D-Toe, E-P R-Toe



PILE 2
BOR2, BLOW NO. 5, PDA 1

PILE 3
BOR2, BLOW NO. 5, PDA 1

SFOBB PIDP, TP2D, MHU-1700, BoR2
Fugro-McClelland Marine Geosciences, Inc

Blow No. 5 02/14/01
CAPWAP(R) Version 1.993-1

CAPWAP FINAL RESULTS

Final CAPWAP Capacity: Ru 11997.7 Skin 9390.4 Toe 2607.3 kips

Soil Sgmnt No.	Depth Below Gages ft	Depth Below Grade ft	Ru kips	Sum of Ru Up kips	Sum of Ru Down kips	Unit Resist. w. Respect to Depth kips/ft	Unit Resist. w. Respect to Area kips/f2	Smith Damping s/ft	Quake inch
				11997.7					
1	39.4	5.8	54.1	11943.6	54.1	8.23	.33	.201	.100
2	46.0	12.4	76.3	11867.3	130.4	11.62	.46	.201	.100
3	52.6	19.0	94.7	11772.6	225.0	14.41	.57	.201	.100
4	59.1	25.5	99.3	11673.4	324.3	15.11	.60	.201	.100
5	65.7	32.1	89.1	11584.2	413.4	13.56	.54	.201	.100
6	72.3	38.7	52.6	11531.6	466.1	8.01	.32	.201	.100
7	78.8	45.2	25.0	11506.6	491.1	3.81	.15	.201	.100
8	85.4	51.8	83.9	11422.7	575.0	12.77	.51	.201	.100
9	92.0	58.4	219.6	11203.1	794.6	33.43	1.33	.201	.100
10	98.5	64.9	294.3	10908.8	1088.9	44.80	1.78	.201	.100
11	105.1	71.5	234.9	10673.9	1323.8	35.76	1.42	.201	.100
12	111.7	78.1	141.2	10532.7	1465.0	21.50	.86	.201	.100
13	118.2	84.6	104.8	10427.9	1569.8	15.95	.63	.201	.100
14	124.8	91.2	122.6	10305.3	1692.4	18.67	.74	.201	.100
15	131.4	97.8	186.9	10118.4	1879.3	28.46	1.13	.201	.100
16	138.0	104.4	256.7	9861.7	2136.0	39.08	1.55	.201	.100
17	144.5	110.9	260.0	9601.7	2396.0	39.58	1.57	.201	.100
18	151.1	117.5	230.9	9370.8	2626.9	35.14	1.40	.201	.100
19	157.7	124.1	240.6	9130.2	2867.5	36.63	1.46	.201	.100
20	164.2	130.6	240.3	8889.9	3107.8	36.58	1.46	.201	.100
21	170.8	137.2	169.8	8720.1	3277.5	25.84	1.03	.201	.100
22	177.4	143.8	132.2	8587.9	3409.7	20.12	.80	.201	.100
23	183.9	150.3	306.3	8281.7	3716.0	46.62	1.86	.201	.100
24	190.5	156.9	617.9	7663.7	4333.9	94.06	3.74	.201	.100
25	197.1	163.5	718.6	6945.2	5052.5	109.38	4.35	.201	.100
26	203.6	170.0	474.6	6470.5	5527.2	72.25	2.88	.201	.100
27	210.2	176.6	184.2	6286.3	5711.4	28.04	1.12	.201	.100
28	216.8	183.2	160.7	6125.6	5872.1	24.46	.97	.201	.100
29	223.4	189.8	359.3	5766.3	6231.4	54.69	2.18	.201	.100

Soil Sgmnt No.	Depth Below Gages ft	Depth Below Grade ft	Ru kips	Sum of Ru Up kips	Sum of Ru Down kips	Unit w. Respect to Depth kips/ft	Resist. Area kips/f2	Smith Damping s/ft	Quake inch
30	229.9	196.3	577.0	5189.3	6808.4	87.84	3.50	.201	.100
31	236.5	202.9	748.1	4441.2	7556.5	113.88	4.53	.201	.100
32	243.1	209.5	822.2	3618.9	8378.8	125.16	4.98	.201	.100
33	249.6	216.0	642.8	2976.1	9021.6	97.86	3.89	.201	.100
34	256.2	222.6	333.7	2642.4	9355.3	50.80	2.02	.201	.100
35	262.8	229.2	35.1	2607.3	9390.4	5.34	.21	.201	.100
36	269.3	235.7	.0	2607.3	9390.4	.00	.00	.000	.100
37	275.9	242.3	.0	2607.3	9390.4	.00	.00	.000	.100
38	282.5	248.9	.0	2607.3	9390.4	.00	.00	.000	.100
39	289.0	255.4	.0	2607.3	9390.4	.00	.00	.000	.100
40	295.6	262.0	.0	2607.3	9390.4	.00	.00	.000	.100
41	302.2	268.6	.0	2607.3	9390.4	.00	.00	.000	.100
42	308.8	275.2	.0	2607.3	9390.4	.00	.00	.000	.100
43	315.3	281.7	.0	2607.3	9390.4	.00	.00	.000	.100
44	321.9	288.3	.0	2607.3	9390.4	.00	.00	.000	.100
45	328.5	294.9	.0	2607.3	9390.4	.00	.00	.000	.100
46	335.0	301.4	.0	2607.3	9390.4	.00	.00	.000	.100
47	341.6	308.0	.0	2607.3	9390.4	.00	.00	.000	.100
Average Skin Values			199.8			30.49	1.21	.201	.100
Toe			2607.3				633.30	.459	.131

Soil Model Parameters/Extensions		Skin	Toe
Case Damping		1.312	.832
Unloading Level	(% of Ru)	29	
Soil Plug Weight	(kips)		1.17

SFOBB PIDP, TP2D, MHU-1700, BoR2 Blow No. 5 02/14/01
Fugro-McClelland Marine Geosciences, Inc CAPWAP(R) Version 1.993-1

EXTREMA TABLE

Pile Sgmnt No.	Depth Below Gages ft	max. Force kips	min. Force kips	max. Comp. Stress kips/in2	max. Tension Stress kips/in2	max. Trnsfd. Energy kips-ft	max. Veloc. ft/s	max. Displ. in
1	3.3	24091.9	-1332.7	29.85	-1.65	1003.38	16.8	.838
10	32.8	24220.5	-2129.3	30.01	-2.64	996.35	16.7	.790
20	65.7	23670.3	-2270.1	29.32	-2.81	924.14	16.1	.720
30	98.5	22072.7	-2152.9	30.77	-3.00	829.04	15.7	.640
41	134.7	19506.3	-1949.1	27.19	-2.72	653.53	14.3	.570
51	167.5	16905.1	-1399.7	23.56	-1.95	482.59	12.7	.460
62	203.6	11300.1	-741.3	24.19	-1.59	282.45	11.3	.360
72	236.5	9445.2	-307.0	20.22	-.66	156.19	7.5	.240
82	269.3	4956.3	-631.5	10.61	-1.35	68.93	6.0	.210
93	305.5	4950.6	-72.1	10.60	-.15	67.35	6.0	.200
103	338.3	6139.6	-72.7	11.59	-.14	61.23	4.7	.130
104	341.6	6328.6	-72.5	10.68	-.12	63.18	4.5	.133
Absolute	98.5			30.77		(T=	47.3 ms)	
	98.5				-3.00	(T=	83.4 ms)	

CASE METHOD

	J=0.0	J=0.1	J=0.2	J=0.3	J=0.4	J=0.5	J=0.6	J=0.7	J=0.8	J=0.9
RS1	22203.	20115.	18027.	15939.	13852.	11764.	9676.	7588.	5501.	3413.
RMX	22203.	20115.	18027.	15939.	13852.	11764.	9676.	7588.	5501.	3413.
RSU	25914.	24197.	22480.	20764.	19047.	17330.	15613.	13897.	12180.	10463.
RA A2 W	-524.	1300.	0.							

Current CAPWAP Ru= 11997.7; Corresponding J(Rs)= .49; J(Rx)= .49

VMAX	VFIN	V1*Z	F1	FMAX	DMAX	DFIN	EMAX	EFIN	R HF	R EN
16.81	.812	4218.9	24091.9	24091.9	.838	-.041	1003.4	944.4	25843.8	62144.6

SFOBB PIDP, TP2D, MHU-1700, BoR2 Blow No. 5 02/14/01
Fugro-McClelland Marine Geosciences, Inc CAPWAP(R) Version 1.993-1

PILE PROFILE AND PILE MODEL

Depth ft	Area in2	E-Modulus kips/in2	Spec. Weight kips/ft3	Circumf. ft
.00	807.20	30000.0	.492	25.130
92.25	807.20	30000.0	.492	25.130
92.25	717.40	30000.0	.492	25.130
190.68	717.40	30000.0	.492	25.130
190.68	467.10	30000.0	.492	25.130
336.68	467.10	30000.0	.492	25.130
336.68	592.80	30000.0	.492	25.130
341.60	592.80	30000.0	.492	25.130

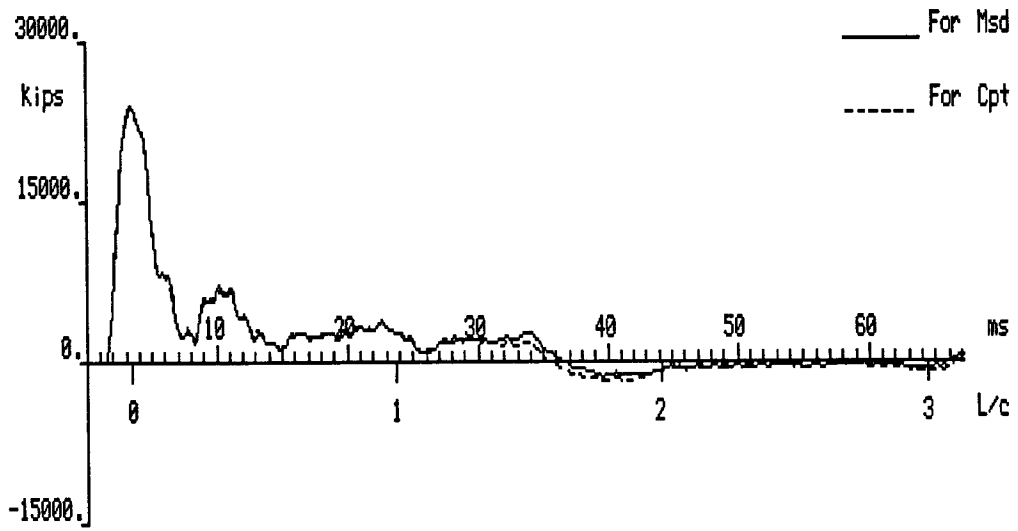
Toe Area 4.117 ft2

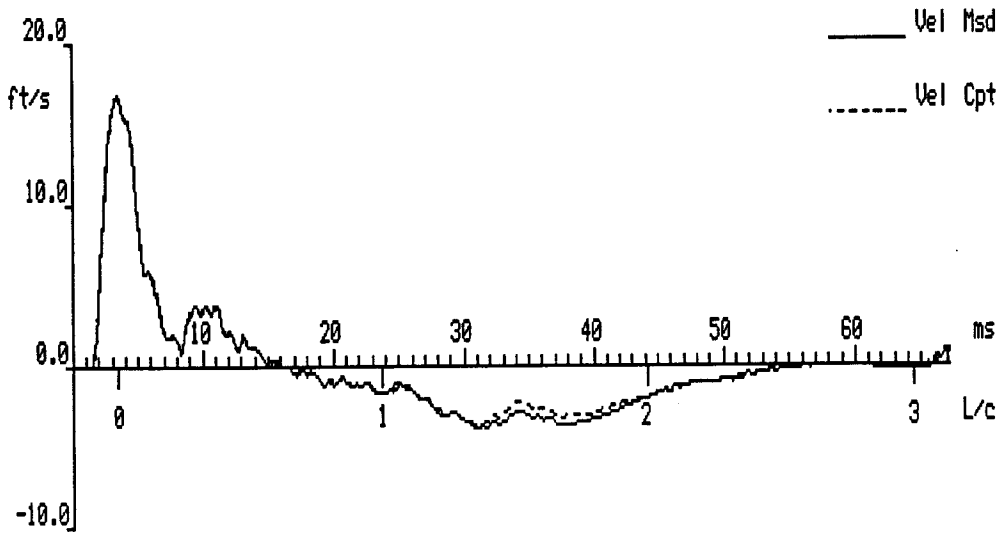
Segmnt No.	Depth B.G. feet	Impedance kips/ft/s	Imp. Change %	T. Slack inch	C. Slack inch	Circumf. feet
1	3.28	1440.51	.00	.000	.000	25.130
3	9.85	1440.51	.00	.000	.000	25.130
4	13.14	1440.51	.00	.000	.000	25.130
5	16.42	1440.51	.00	.000	.000	25.130
6	19.71	1440.51	.00	.000	.000	25.130
10	32.85	1440.51	.00	.000	.000	25.130
29	95.25	1293.95	.00	.000	.000	25.130
30	98.54	1280.26	.00	.000	.000	25.130
41	134.67	1280.25	.00	.000	.000	25.130
59	193.79	857.01	.00	.000	.000	25.130
60	197.08	833.57	.00	.000	.000	25.130
80	262.77	833.58	.00	.000	.000	25.130
81	266.05	833.57	.00	.000	.000	25.130
103	338.31	945.24	.00	.000	.000	25.130
104	341.60	1057.89	.00	.000	.000	25.130

Pile Damping 1.0 %, Time Incr .195 ms, Wave Speed 16810.7 ft/s

SFOBB PIDP, TP2D, MHU-1700, BoR2 Blow 5 02/14/01

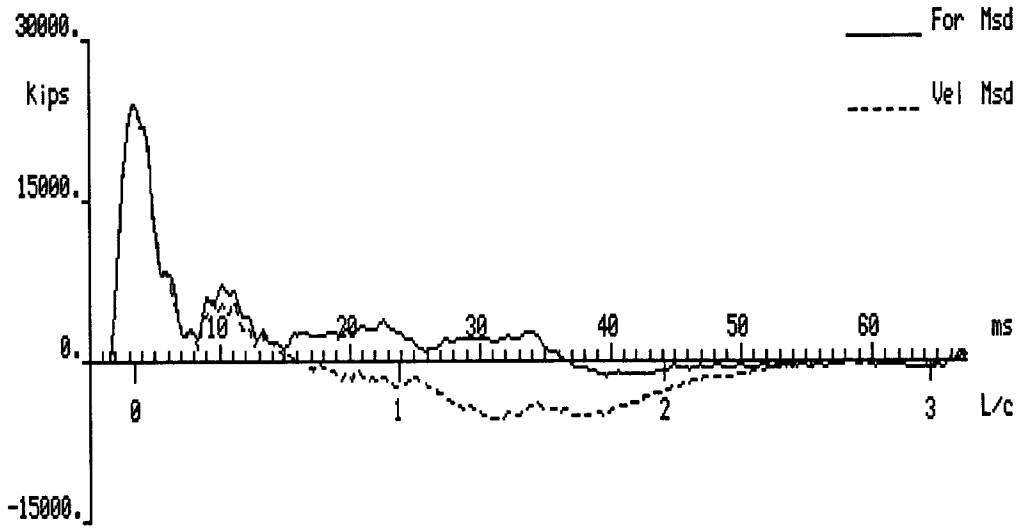
Fugro-McClelland Marine Geosciences, Inc CAPWAP(R) Version 1.993-1

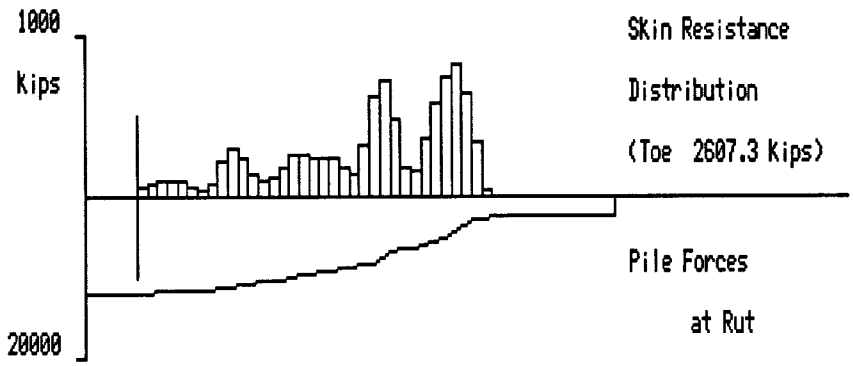




SFOBB PIDP, TP2D, MHU-1700, BoR2 Blow 5 02/14/01

Fugro-McClelland Marine Geosciences, Inc CAPWAP(R) Version 1.993-1

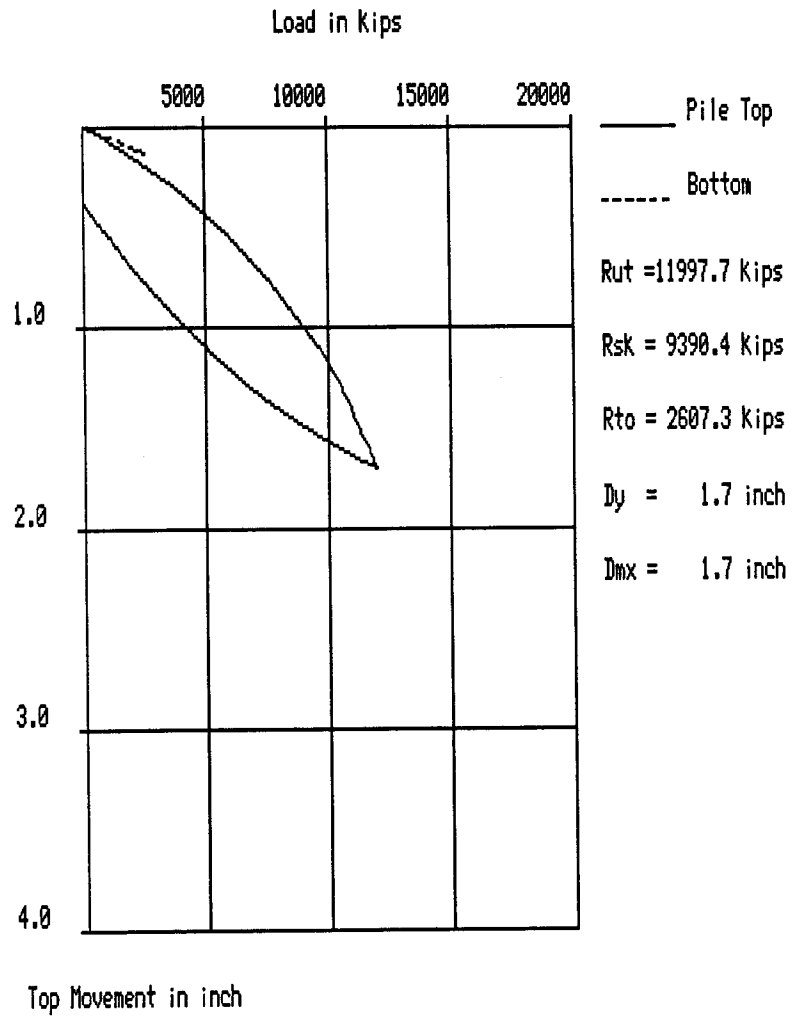




SFOBB PIDP, TP2D, MHU-1700, BoR2 Blow 5 02/14/01

Fugro-McClelland Marine Geosciences, Inc CAPWAP(R) Version 1.993-1

Dynamic D-Toe, E-P R-Toe



PILE 2
EOR2, BLOW NO. 90, PDA 1

PILE 2
EOR2, BLOW NO. 90, PDA 1

SFOBB PIDP, TP2D, MHU-1700, EoR2
Fugro-McClelland Marine Geosciences, Inc

Blow No. 90 02/14/01
CAPWAP(R) Version 1.993-1

CAPWAP FINAL RESULTS

Final CAPWAP Capacity: Ru 15203.9 Skin 11031.7 Toe 4172.2 kips

Soil Sgmnt No.	Depth Below Gages ft	Depth Below Grade ft	Ru kips	Sum of Ru Up kips	Sum of Ru Down kips	Unit w. Respect to Depth kips/ft	Resist. Area kips/f2	Smith Damping s/ft	Quake inch
				15203.9					
1	39.4	5.8	42.5	15161.4	42.5	6.47	.26	.241	.158
2	46.0	12.4	62.6	15098.7	105.2	9.53	.38	.241	.158
3	52.6	19.0	91.1	15007.6	196.3	13.87	.55	.241	.158
4	59.1	25.5	91.7	14915.9	288.0	13.96	.56	.241	.158
5	65.7	32.1	52.1	14863.9	340.0	7.92	.32	.241	.158
6	72.3	38.7	9.9	14853.9	350.0	1.51	.06	.241	.158
7	78.8	45.2	19.1	14834.8	369.1	2.91	.12	.241	.158
8	85.4	51.8	112.0	14722.8	481.1	17.05	.68	.241	.158
9	92.0	58.4	231.8	14491.0	712.9	35.28	1.40	.241	.158
10	98.5	64.9	248.7	14242.3	961.6	37.86	1.51	.241	.158
11	105.1	71.5	142.4	14100.0	1103.9	21.67	.86	.241	.158
12	111.7	78.1	45.2	14054.8	1149.1	6.87	.27	.241	.158
13	118.2	84.6	49.5	14005.3	1198.6	7.53	.30	.241	.158
14	124.8	91.2	115.8	13889.5	1314.4	17.63	.70	.241	.158
15	131.4	97.8	185.6	13704.0	1499.9	28.25	1.12	.241	.158
16	138.0	104.4	227.0	13476.9	1727.0	34.56	1.38	.241	.158
17	144.5	110.9	218.5	13258.4	1945.5	33.27	1.32	.241	.158
18	151.1	117.5	201.9	13056.4	2147.5	30.74	1.22	.241	.158
19	157.7	124.1	192.4	12864.0	2339.9	29.29	1.17	.241	.158
20	164.2	130.6	119.3	12744.7	2459.2	18.17	.72	.241	.158
21	170.8	137.2	10.1	12734.6	2469.3	1.54	.06	.241	.158
22	177.4	143.8	36.5	12698.1	2505.8	5.56	.22	.241	.158
23	183.9	150.3	291.1	12407.0	2796.9	44.31	1.76	.241	.158
24	190.5	156.9	561.6	11845.5	3358.4	85.48	3.40	.241	.158
25	197.1	163.5	538.4	11307.1	3896.8	81.95	3.26	.241	.158
26	203.6	170.0	300.6	11006.5	4197.4	45.76	1.82	.241	.158
27	210.2	176.6	182.9	10823.5	4380.3	27.85	1.11	.241	.158
28	216.8	183.2	233.1	10590.4	4613.4	35.48	1.41	.241	.158
29	223.4	189.8	292.6	10297.9	4906.0	44.54	1.77	.241	.158

Soil Sgmnt No.	Depth Below Gages ft	Depth Below Grade ft	Ru kips	Sum of Ru Up kips	Sum of Ru Down kips	Unit w. Depth kips/ft	Resist. Respect to Area kips/f2	Smith Damping s/ft	Quake inch
30	229.9	196.3	374.9	9923.0	5280.9	57.07	2.27	.241	.158
31	236.5	202.9	518.4	9404.6	5799.3	78.91	3.14	.241	.158
32	243.1	209.5	593.8	8810.8	6393.1	90.39	3.60	.241	.158
33	249.6	216.0	545.1	8265.7	6938.2	82.97	3.30	.241	.158
34	256.2	222.6	529.1	7736.6	7467.3	80.54	3.21	.241	.158
35	262.8	229.2	715.3	7021.4	8182.5	108.88	4.33	.241	.158
36	269.3	235.7	943.4	6077.9	9126.0	143.61	5.71	.241	.143
37	275.9	242.3	1023.7	5054.2	10149.7	155.84	6.20	.241	.132
38	282.5	248.9	663.4	4390.8	10813.1	100.99	4.02	.241	.127
39	289.0	255.4	210.1	4180.6	11023.3	31.99	1.27	.241	.126
40	295.6	262.0	8.5	4172.2	11031.7	1.29	.05	.241	.126
41	302.2	268.6	.0	4172.2	11031.7	.00	.00	.241	.125
42	308.8	275.2	.0	4172.2	11031.7	.00	.00	.241	.122
43	315.3	281.7	.0	4172.2	11031.7	.00	.00	.241	.114
44	321.9	288.3	.0	4172.2	11031.7	.00	.00	.241	.099
45	328.5	294.9	.0	4172.2	11031.7	.00	.00	.241	.080
46	335.0	301.4	.0	4172.2	11031.7	.00	.00	.241	.070
47	341.6	308.0	.0	4172.2	11031.7	.00	.00	.241	.063
Average Skin Values			234.7			35.82	1.42	.241	.152
Toe			4172.2				1013.40	.299	.063

Soil Model Parameters/Extensions		Skin	Toe
Case Damping		1.847	.866
Unloading Quake	(% of loading quake)	98	100
Unloading Level	(% of Ru)	39	
Soil Plug Weight	(kips)		37.71

SFOBB PIDP, TP2D, MHU-1700, EoR2 Blow No. 90 02/14/01
Fugro-McClelland Marine Geosciences, Inc CAPWAP(R) Version 1.993-1

EXTREMA TABLE

Pile Sgmnt No.	Depth Below Gages ft	max. Force kips	min. Force kips	max. Comp. Stress kips/in2	max. Tension Stress kips/in2	max. Trnsfd. Energy kips-ft	max. Veloc. ft/s	max. Displ. in
1	3.3	24443.8	-1200.0	30.28	-1.49	1016.20	16.9	.840
10	32.8	24488.1	-2180.0	30.34	-2.70	1010.16	16.8	.800
20	65.7	23799.2	-1993.3	29.48	-2.47	938.20	16.3	.730
30	98.5	22120.6	-1991.1	30.83	-2.78	846.68	15.9	.680
41	134.7	20020.9	-1635.5	27.91	-2.28	696.66	14.6	.610
51	167.5	17332.2	-1049.3	24.16	-1.46	534.57	13.4	.510
62	203.6	12069.0	-460.0	25.84	-.98	336.73	12.4	.410
72	236.5	10204.5	-45.1	21.85	-.10	195.04	9.0	.270
82	269.3	6853.9	.0	14.67	.00	69.72	5.2	.140
93	305.5	3491.8	.0	7.48	.00	28.24	4.1	.120
103	338.3	5259.8	.0	9.93	.00	21.98	2.2	.060
104	341.6	4997.7	.0	8.43	.00	22.22	2.6	.064
Absolute	98.5			30.83		(T=	47.3 ms)	
	98.5				-2.77	(T=	84.4 ms)	

CASE METHOD

	J=0.0	J=0.1	J=0.2	J=0.3	J=0.4	J=0.5	J=0.6	J=0.7	J=0.8	J=0.9
RS1	22659.	20573.	18487.	16401.	14315.	12229.	10143.	8057.	5972.	3886.
RMX	22659.	20573.	18487.	16401.	14315.	12229.	10143.	8057.	5972.	3886.
RSU	25951.	24195.	22438.	20681.	18925.	17168.	15411.	13655.	11898.	10141.

RA A2 W -287. 2093. 0.

Current CAPWAP Ru= 15203.9; Corresponding J(Rs)= .36; J(Rx)= .36

VMAX	VFIN	V1*Z	F1	FMAX	DMAX	DFIN	EMAX	EFIN	R HF	R EN
16.89	.272	4328.5	24443.8	24443.8	.840	-.012	1016.2	959.4	26115.9	62938.9

SFOBB PIDP, TP2D, MHU-1700, EoR2
Fugro-McClelland Marine Geosciences, Inc

Blow No. 90 02/14/01
CAPWAP(R) Version 1.993-1

PILE PROFILE AND PILE MODEL

Depth ft	Area in2	E-Modulus kips/in2	Spec. Weight kips/ft3	Circumf. ft
.00	807.20	30000.0	.492	25.130
92.25	807.20	30000.0	.492	25.130
92.25	717.40	30000.0	.492	25.130
190.68	717.40	30000.0	.492	25.130
190.68	467.10	30000.0	.492	25.130
336.68	467.10	30000.0	.492	25.130
336.68	592.80	30000.0	.492	25.130
341.60	592.80	30000.0	.492	25.130

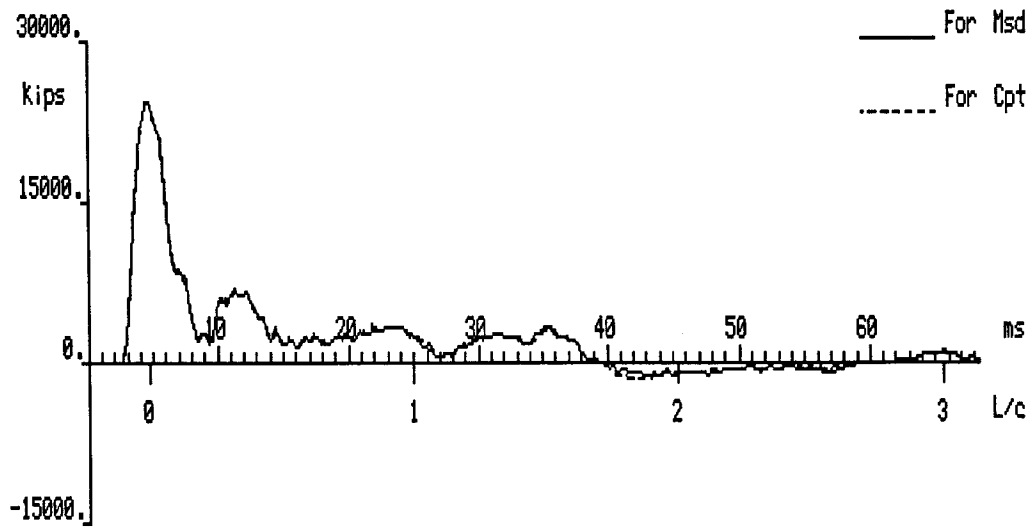
Toe Area 4.117 ft2

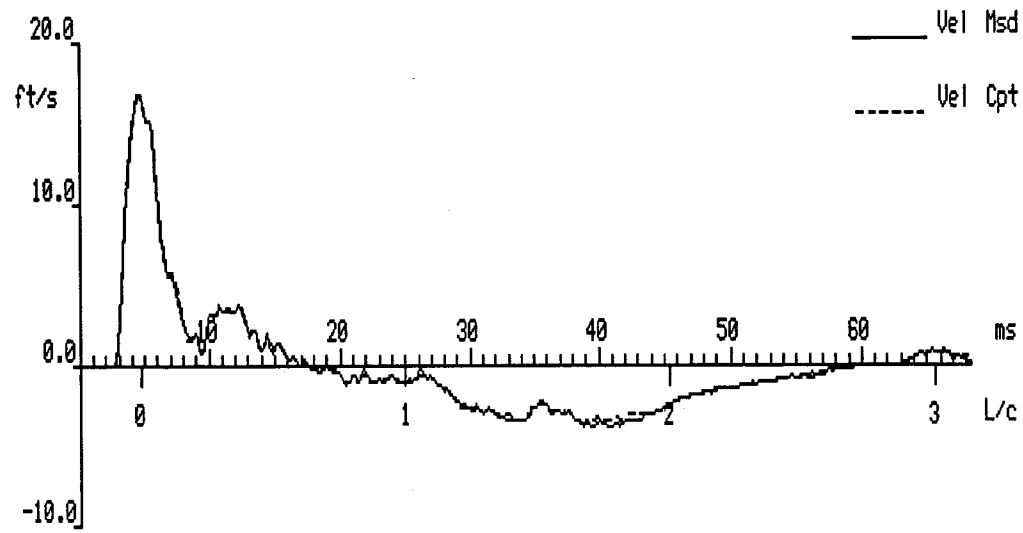
Segmnt No.	Depth B.G. feet	Impedance kips/ft/s	Imp. Change %	T. Slack inch	C. Slack inch	Circumf. feet
1	3.28	1440.51	.00	.000	.000	25.130
3	9.85	1440.51	.00	.000	.000	25.130
4	13.14	1440.51	.00	.000	.000	25.130
5	16.42	1440.51	.00	.000	.000	25.130
6	19.71	1440.51	.00	.000	.000	25.130
10	32.85	1440.51	.00	.000	.000	25.130
29	95.25	1293.95	.00	.000	.000	25.130
30	98.54	1280.26	.00	.000	.000	25.130
41	134.67	1280.25	.00	.000	.000	25.130
59	193.79	857.01	.00	.000	.000	25.130
60	197.08	833.57	.00	.000	.000	25.130
80	262.77	833.58	.00	.000	.000	25.130
81	266.05	833.57	.00	.000	.000	25.130
103	338.31	945.24	.00	.000	.000	25.130
104	341.60	1057.89	.00	.000	.000	25.130

Pile Damping 1.0 %, Time Incr .195 ms, Wave Speed 16810.7 ft/s

SFOBB PIDP, TP2D, MHU-1700, EoR2 Blow 90 02/14/01

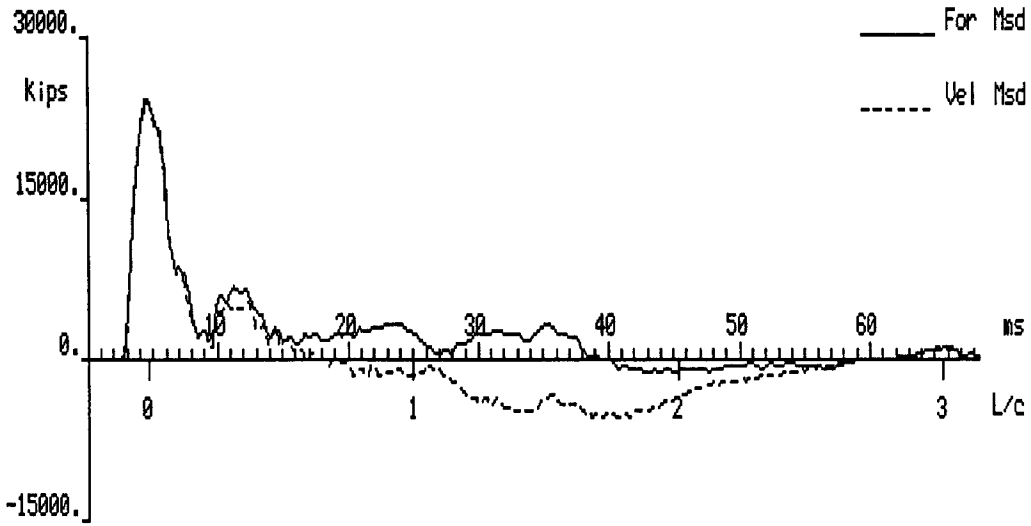
Fugro-McClelland Marine Geosciences, Inc CAPWAP(R) Version 1.993-1

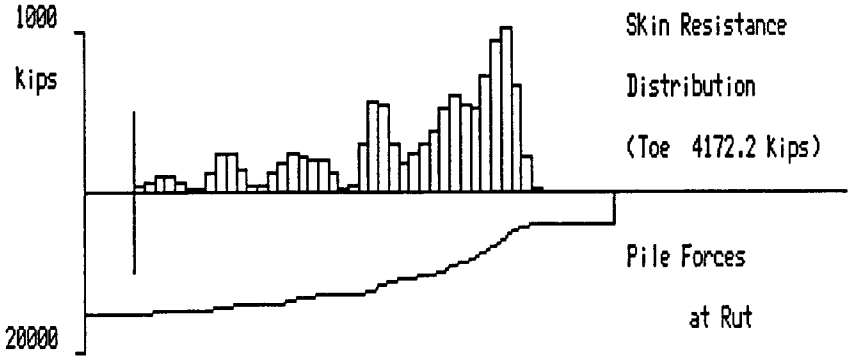




SFOBB PIDP, TP2D, MHU-1700, EoR2 Blow 90 02/14/01

Fugro-McClelland Marine Geosciences, Inc CAPWAP(R) Version 1.993-1





SFOBB PIDP, TP2D, MHU-1700, EoR2 Blow 90 02/14/01

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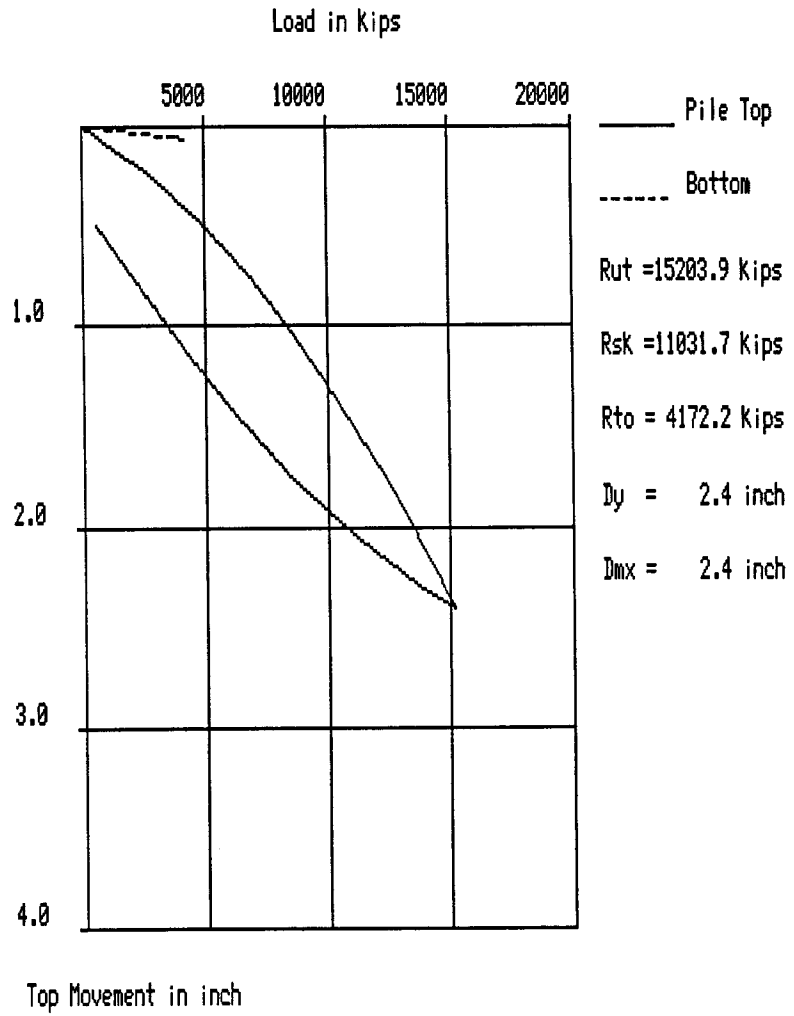
Dynamic D-Toe, E-P R-Toe



Pile No. 3, Section D

Summary of Included CAPWAP Analyses		
Driving Designation	**Blow No.**	**PDA Set**
BOID	1	PDA 1
BOID	1	PDA 2
EOID	2181	PDA 1
EOID	2169	PDA 2
BOR	1	PDA 1
BOR	2	PDA 2
EOR	26	PDA 2
EOR	52	PDA 1

Note:

BOID = Beginning of Initial Driving
EOID = End of Initial Driving
BOR = Beginning of Restrike No.
EOR = End of Restrike No.

PILE 3
BOID, BLOW NO. 1, PDA 1

PILE 3
BOID, BLOW NO. 1, PDA 1

SFOBB PIDP, TP3D, MHU-1700, BoID
Fugro-McClelland Marine Geosciences, Inc

Blow No. 1 02/13/01
CAPWAP(R) Version 1.993-1

CAPWAP FINAL RESULTS

Final CAPWAP Capacity: Ru 6279.6 Skin 4444.5 Toe 1835.0 kips

Soil Sgmnt No.	Depth Below Gages ft	Depth Below Grade ft	Ru kips	Sum of Ru Up kips	Sum of Ru Down kips	Unit Resist. w. Respect to Depth kips/ft	Unit Resist. w. Respect to Area kips/f2	Smith Damping s/ft	Quake inch
				6279.6					
1	122.0	6.4	66.6	6213.0	66.6	10.10	.40	.206	.080
2	128.6	13.0	68.4	6144.6	135.0	10.37	.41	.206	.080
3	135.2	19.6	89.8	6054.8	224.8	13.62	.54	.206	.080
4	141.8	26.2	117.3	5937.5	342.0	17.78	.71	.206	.080
5	148.4	32.8	117.5	5820.0	459.5	17.82	.71	.206	.080
6	155.0	39.4	103.3	5716.7	562.8	15.67	.62	.206	.080
7	161.6	46.0	100.6	5616.1	663.5	15.26	.61	.206	.080
8	168.2	52.6	91.0	5525.1	754.5	13.80	.55	.206	.080
9	174.7	59.1	75.8	5449.3	830.3	11.50	.46	.206	.080
10	181.3	65.7	125.6	5323.7	955.8	19.04	.76	.206	.080
11	187.9	72.3	259.4	5064.4	1215.2	39.33	1.57	.206	.080
12	194.5	78.9	348.5	4715.9	1563.7	52.85	2.10	.206	.080
13	201.1	85.5	281.2	4434.6	1844.9	42.65	1.70	.206	.080
14	207.7	92.1	144.3	4290.4	1989.2	21.88	.87	.206	.080
15	214.3	98.7	93.9	4196.5	2083.1	14.23	.57	.206	.080
16	220.9	105.3	137.5	4059.0	2220.5	20.85	.83	.206	.080
17	227.5	111.9	177.9	3881.1	2398.4	26.98	1.07	.206	.080
18	234.1	118.5	176.1	3705.0	2574.5	26.70	1.06	.206	.080
19	240.7	125.1	157.3	3547.7	2731.8	23.86	.95	.206	.080
20	247.3	131.7	145.6	3402.1	2877.5	22.08	.88	.206	.080
21	253.9	138.3	147.3	3254.8	3024.8	22.34	.89	.206	.080
22	260.5	144.9	151.1	3103.7	3175.8	22.91	.91	.206	.080
23	267.1	151.5	153.9	2949.8	3329.8	23.34	.93	.206	.080
24	273.7	158.1	156.5	2793.3	3486.2	23.73	.94	.206	.080
25	280.3	164.7	133.7	2659.6	3619.9	20.28	.81	.206	.080
26	286.8	171.2	89.7	2570.0	3709.6	13.60	.54	.206	.080
27	293.4	177.8	68.8	2501.1	3778.4	10.44	.42	.206	.080
28	300.0	184.4	79.4	2421.7	3857.8	12.04	.48	.206	.080
29	306.6	191.0	99.9	2321.8	3957.8	15.16	.60	.206	.080

Soil Sgmnt No.	Depth Below Gages ft	Depth Below Grade ft	Ru kips	Sum of Ru Up kips	Sum of Ru Down kips	Unit Resist. w. Respect to Depth kips/ft	Unit Resist. w. Respect to Area kips/f2	Smith Damping s/ft	Quake inch
30	313.2	197.6	114.4	2207.4	4072.1	17.35	.69	.206	.080
31	319.8	204.2	106.5	2100.9	4178.6	16.15	.64	.206	.080
32	326.4	210.8	85.5	2015.4	4264.1	12.96	.52	.206	.080
33	333.0	217.4	83.0	1932.5	4347.1	12.58	.50	.206	.080
34	339.6	224.0	97.5	1835.0	4444.6	14.78	.59	.206	.080
Average Skin Values			130.7			19.84	.79	.206	.080
Toe			1835.0				445.71	.423	.150

Soil Model Parameters/Extensions		Skin	Toe
Case Damping		.634	.538
Unloading Level	(% of Ru)	47	
Soil Plug Weight	(kips)		1.30

SFOBB PIDP, TP3D, MHU-1700, BoID
Fugro-McClelland Marine Geosciences, Inc

Blow No. 1 02/13/01
CAPWAP(R) Version 1.993-1

EXTREMA TABLE

Pile Sgmnt No.	Depth Below Gages ft	max. Force kips	min. Force kips	max. Comp. Stress kips/in2	max. Tension Stress kips/in2	max. Trnsfd. Energy kips-ft	max. Veloc. ft/s	max. Displ. in
1	3.3	14486.3	-617.3	17.95	-.76	327.57	9.8	.592
10	33.0	14216.5	-821.9	17.61	-1.02	324.95	10.0	.560
20	65.9	14192.1	-947.4	17.58	-1.17	323.61	10.0	.540
30	98.9	13317.9	-1159.7	18.56	-1.62	321.46	10.6	.520
40	131.9	13278.9	-922.4	18.51	-1.29	305.83	10.2	.470
51	168.2	12458.1	-845.3	17.37	-1.18	258.13	9.5	.410
61	201.1	9064.8	-451.0	19.41	-.97	187.69	9.7	.350
71	234.1	7681.5	-201.5	16.45	-.43	133.87	8.4	.290
82	270.4	6272.5	-199.8	13.43	-.43	90.02	7.1	.230
92	303.3	5538.9	-199.0	11.86	-.43	70.72	6.5	.200
102	336.3	5108.4	-199.2	9.60	-.37	56.52	5.7	.160
103	339.6	5268.6	-198.0	8.89	-.33	58.28	5.6	.163
Absolute	194.5			21.15		(T=	53.3 ms)	
	95.6				-1.63	(T=	90.2 ms)	

CASE METHOD

	J=0.0	J=0.1	J=0.2	J=0.3	J=0.4	J=0.5	J=0.6	J=0.7	J=0.8	J=0.9
RS1	13705.	12518.	11330.	10142.	8955.	7767.	6579.	5392.	4204.	3017.
RMX	13705.	12518.	11330.	10142.	8955.	7767.	6579.	5392.	4204.	3017.
RSU	13176.	11935.	10695.	9454.	8214.	6973.	5733.	4492.	3251.	2011.
RA A2 W	0.	1231.	0.							

Current CAPWAP Ru= 6279.6; Corresponding J(Rs)= .63; J(Rx)= .63

VMAX	VFIN	V1*Z	F1	FMAX	DMAX	DFIN	EMAX	EFIN	R HF	R EN
9.84	-.211	4174.8	14486.3	14486.3	.592	.077	327.6	308.3	9760.0	12522.5

SFOBB PIDP, TP3D, MHU-1700, BoID
Fugro-McClelland Marine Geosciences, Inc

Blow No. 1 02/13/01
CAPWAP(R) Version 1.993-1

PILE PROFILE AND PILE MODEL

Depth ft	Area in2	E-Modulus kips/in2	Spec. Weight kips/ft3	Circumf. ft
.00	807.20	30000.0	.492	25.130
90.25	807.20	30000.0	.492	25.130
90.25	717.40	30000.0	.492	25.130
188.60	717.40	30000.0	.492	25.130
188.60	467.10	30000.0	.492	25.130
334.60	467.10	30000.0	.492	25.130
334.60	592.80	30000.0	.492	25.130
339.60	592.80	30000.0	.492	25.130

Toe Area 4.117 ft2

Segmnt No.	Depth B.G. feet	Impedance kips/ft/s	Imp. Change %	T. Slack inch	C. Slack inch	Circumf. feet
1	3.30	1440.51	.00	.000	.000	25.130
3	9.89	1440.51	.00	.000	.000	25.130
4	13.19	1440.51	.00	.000	.000	25.130
5	16.49	1440.51	.00	.000	.000	25.130
6	19.78	1440.51	.00	.000	.000	25.130
10	32.97	1440.51	.00	.000	.000	25.130
11	36.27	1440.51	.00	.000	.000	25.130
20	65.94	1440.51	.00	.000	.000	25.130
21	69.24	1440.51	.00	.000	.000	25.130
28	92.32	1339.97	.00	.000	.000	25.130
29	95.62	1280.25	.00	.000	.000	25.130
40	131.88	1280.26	.00	.000	.000	25.130
41	135.18	1280.25	.00	.000	.000	25.130
58	191.23	923.80	.00	.000	.000	25.130
59	194.53	833.58	.00	.000	.000	25.130
80	263.77	833.58	.00	.000	.000	25.130
102	336.30	949.46	.00	.000	.000	25.130
103	339.60	1057.90	.00	.000	.000	25.130

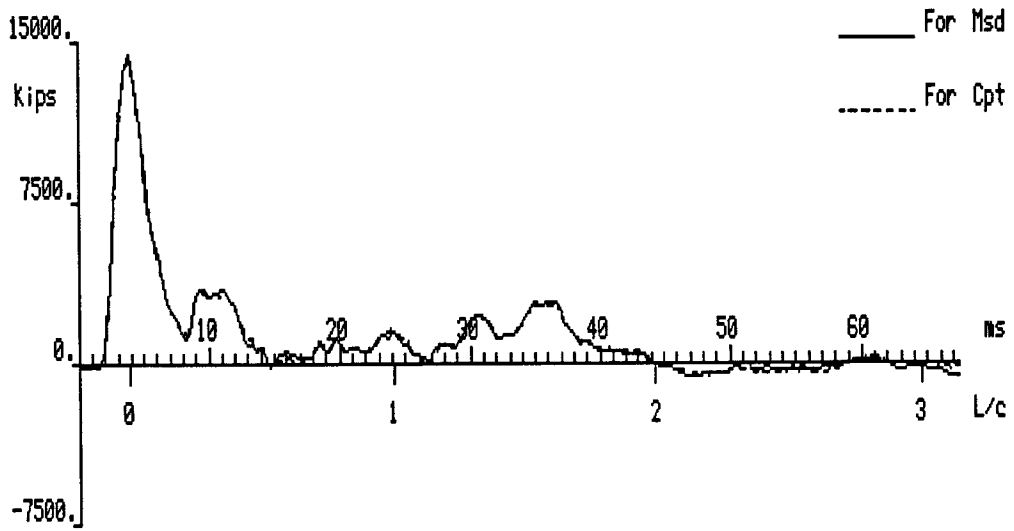
Pile Damping 1.0 %, Time Incr .196 ms, Wave Speed 16810.7 ft/s

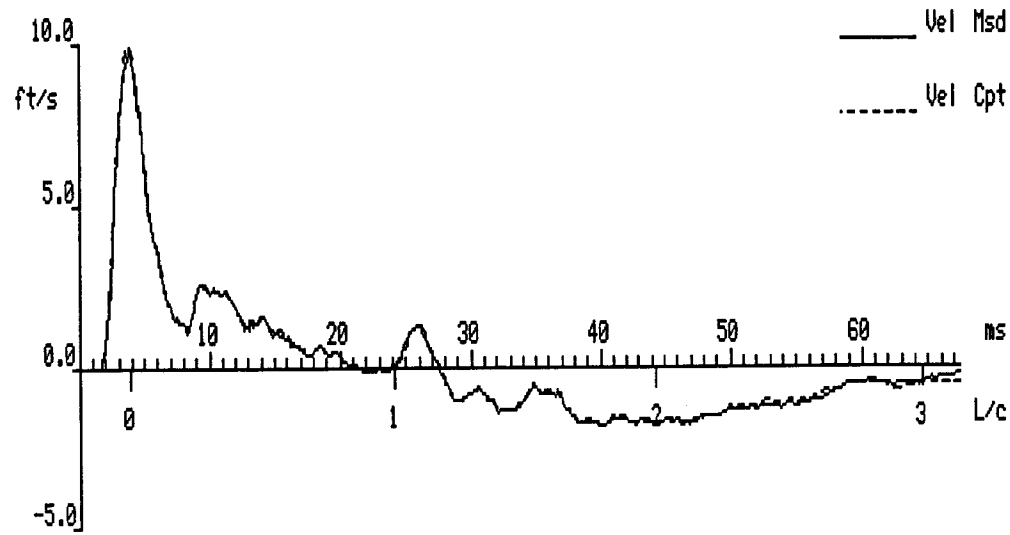
SFOBB PIDP, TP3D, MHU-1700, BoID

Blow 1 02/13/01

Fugro-McClelland Marine Geosciences, Inc

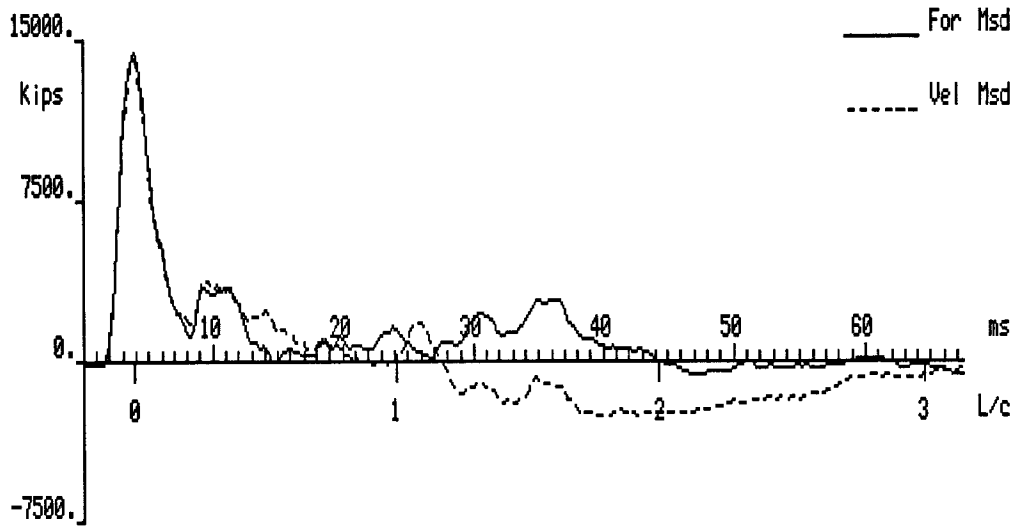
CAPWAP(R) Version 1.993-1

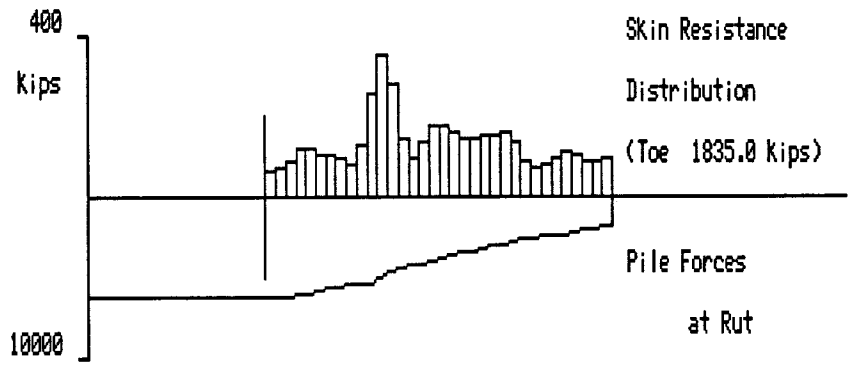




SFOBB PIDP, TP3D, MHU-1700, BoID Blow 1 02/13/01

Fugro-McClelland Marine Geosciences, Inc CAPWAP(R) Version 1.993-1





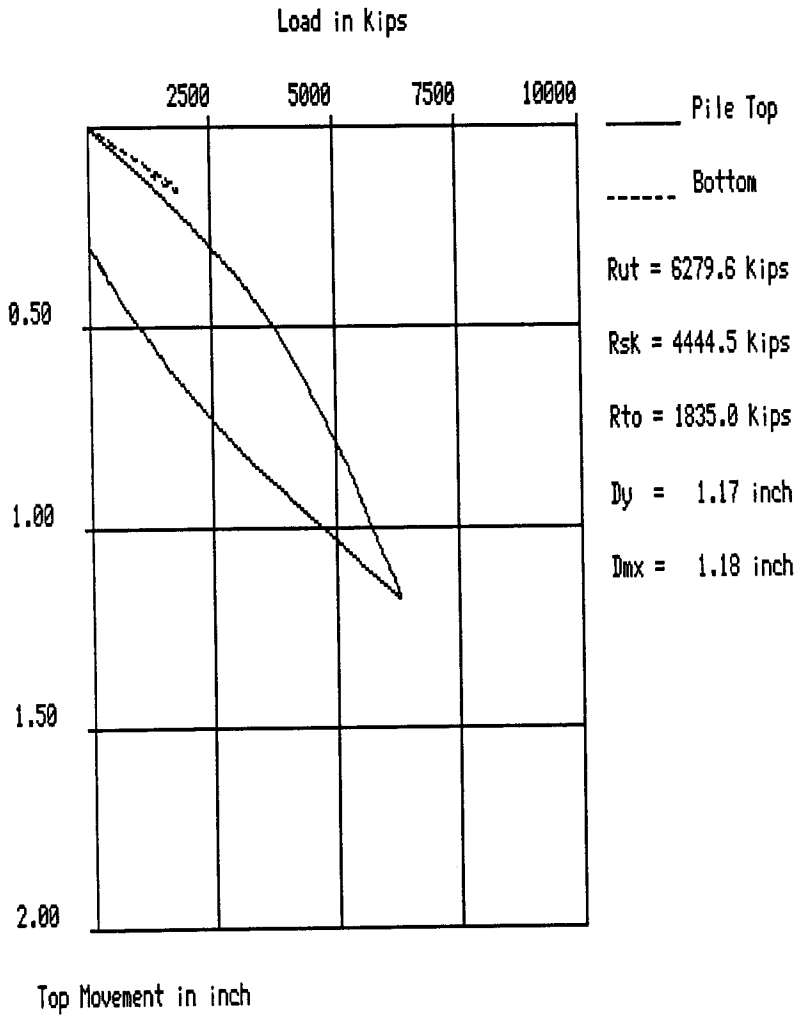
SFOBB PIDP, TP3D, MHU-1700, BoID

Blow 1 02/13/01

Fugro-McClelland Marine Geosciences, Inc

CAPWAP(R) Version 1.993-1

Dynamic D-Toe, E-P R-Toe



PILE 3
BOID, BLOW NO. 1, PDA 2

PILE 3
BOID, BLOW NO. 1, PDA 2

SFOBB PIDP, TP3D, MHU-1700, BoID
Fugro-McClelland Marine Geosciences, Inc

Blow No. 1 02/13/01
CAPWAP(R) Version 1.993-1

CAPWAP FINAL RESULTS

Final CAPWAP Capacity: Ru 6456.8 Skin 4432.2 Toe 2024.6 kips

Soil Sgmnt No.	Depth Below Gages ft	Depth Below Grade ft	Ru kips	Sum of Ru Up kips	Sum of Ru Down kips	Unit Resist. w. Respect to Depth kips/ft	Unit Resist. w. Respect to Area kips/f2	Smith Damping s/ft	Quake inch
				6456.8					
1	122.0	6.4	.0	6456.8	.0	.00	.00	.214	.100
2	128.6	13.0	4.8	6452.1	4.8	.73	.03	.214	.100
3	135.2	19.6	44.7	6407.3	49.5	6.78	.27	.214	.100
4	141.8	26.2	84.1	6323.2	133.7	12.76	.51	.214	.100
5	148.4	32.8	80.1	6243.1	213.7	12.15	.48	.214	.100
6	155.0	39.4	90.0	6153.1	303.7	13.64	.54	.214	.100
7	161.6	46.0	150.0	6003.2	453.7	22.74	.91	.214	.100
8	168.2	52.6	154.2	5848.9	607.9	23.39	.93	.214	.100
9	174.7	59.1	81.0	5768.0	688.9	12.28	.49	.214	.100
10	181.3	65.7	102.3	5665.7	791.2	15.51	.62	.214	.100
11	187.9	72.3	281.2	5384.5	1072.3	42.64	1.70	.214	.100
12	194.5	78.9	419.3	4965.2	1491.6	63.58	2.53	.214	.100
13	201.1	85.5	358.1	4607.1	1849.7	54.31	2.16	.214	.100
14	207.7	92.1	209.6	4397.5	2059.3	31.78	1.26	.214	.100
15	214.3	98.7	144.0	4253.5	2203.3	21.84	.87	.214	.100
16	220.9	105.3	143.1	4110.4	2346.5	21.70	.86	.214	.100
17	227.5	111.9	142.8	3967.6	2489.2	21.65	.86	.214	.100
18	234.1	118.5	175.0	3792.6	2664.3	26.54	1.06	.214	.100
19	240.7	125.1	220.1	3572.5	2884.4	33.38	1.33	.214	.100
20	247.3	131.7	224.4	3348.1	3108.8	34.03	1.35	.214	.100
21	253.9	138.3	211.4	3136.7	3320.2	32.06	1.28	.214	.100
22	260.5	144.9	179.3	2957.3	3499.5	27.20	1.08	.214	.100
23	267.1	151.5	121.6	2835.8	3621.1	18.43	.73	.214	.100
24	273.7	158.1	97.8	2738.0	3718.8	14.83	.59	.214	.100
25	280.3	164.7	119.2	2618.9	3838.0	18.07	.72	.214	.100
26	286.8	171.2	149.3	2469.5	3987.3	22.64	.90	.214	.100
27	293.4	177.8	181.0	2288.5	4168.3	27.45	1.09	.214	.100
28	300.0	184.4	184.1	2104.4	4352.5	27.92	1.11	.214	.100
29	306.6	191.0	57.9	2046.5	4410.3	8.78	.35	.214	.100

Soil Sgmnt No.	Depth Below Gages ft	Depth Below Grade ft	Ru kips	Sum of Ru Up kips	Sum of Ru Down kips	Unit Resist. w. Respect to Depth kips/ft	Unit Resist. w. Respect to Area kips/f2	Smith Damping s/ft	Quake inch
30	313.2	197.6	21.9	2024.6	4432.2	3.32	.13	.214	.100
31	319.8	204.2	.0	2024.6	4432.2	.00	.00	.214	.100
32	326.4	210.8	.0	2024.6	4432.2	.00	.00	.214	.100
33	333.0	217.4	.0	2024.6	4432.2	.00	.00	.214	.100
34	339.6	224.0	.0	2024.6	4432.2	.00	.00	.214	.100
Average Skin Values			130.4			19.79	.79	.214	.100
Toe			2024.6				491.77	.458	.130

Soil Model Parameters/Extensions		Skin	Toe
Case Damping		.658	.644
Unloading Quake	(% of loading quake)	77	100
Soil Plug Weight	(kips)		2.78

SFOBB PIDP, TP3D, MHU-1700, BoID
Fugro-McClelland Marine Geosciences, Inc

Blow No. 1 02/13/01
CAPWAP(R) Version 1.993-1

EXTREMA TABLE

Pile Sgmnt No.	Depth Below Gages ft	max. Force kips	min. Force kips	max. Comp. Stress kips/in2	max. Tension Stress kips/in2	max. Trnsfd. Energy kips-ft	max. Veloc. ft/s	max. Displ. in
1	3.3	14422.9	-946.1	17.87	-1.17	332.78	10.1	.588
10	33.0	14416.8	-1087.1	17.86	-1.35	331.49	10.1	.570
20	65.9	14396.9	-1139.6	17.84	-1.41	330.17	10.1	.560
30	98.9	13514.3	-1264.6	18.84	-1.76	328.62	10.6	.540
40	131.9	13574.6	-1630.0	18.92	-2.27	323.30	10.5	.500
51	168.2	13029.9	-1449.3	18.16	-2.02	278.20	9.8	.430
61	201.1	9384.8	-501.4	20.09	-1.07	194.03	9.6	.360
71	234.1	7586.9	-121.6	16.24	-.26	129.47	8.2	.280
82	270.4	5919.6	-120.5	12.67	-.26	80.37	6.9	.220
92	303.3	5082.9	-119.9	10.88	-.26	57.57	6.1	.180
102	336.3	5557.4	-120.7	10.45	-.23	53.53	5.3	.140
103	339.6	5600.7	-120.1	9.45	-.20	56.02	5.3	.143
Absolute	194.5			22.05		(T=	33.1 ms)	
	141.8				-2.32	(T=	82.8 ms)	

CASE METHOD

	J=0.0	J=0.1	J=0.2	J=0.3	J=0.4	J=0.5	J=0.6	J=0.7	J=0.8	J=0.9
RS1	14008.	12830.	11651.	10473.	9295.	8117.	6938.	5760.	4582.	3404.
RMX	14008.	12830.	11651.	10473.	9295.	8117.	6938.	5760.	4582.	3404.
RSU	13203.	11945.	10686.	9427.	8169.	6910.	5651.	4392.	3134.	1875.
RA A2 W	438.	566.	0.							

Current CAPWAP Ru= 6456.8; Corresponding J(Rs)= .64; J(Rx)= .64

VMAX	VFIN	V1*Z	F1	FMAX	DMAX	DFIN	EMAX	EFIN	R HF	R EN
10.15	-.26	14619.0	14347.9	14422.9	.588	.068	332.8	315.0	9965.3	12721.7

SFOBB PIDP, TP3D, MHU-1700, BoID
Fugro-McClelland Marine Geosciences, Inc

Blow No. 1 02/13/01
CAPWAP(R) Version 1.993-1

PILE PROFILE AND PILE MODEL

Depth ft	Area in2	E-Modulus kips/in2	Spec. Weight kips/ft3	Circumf. ft
.00	807.20	30000.0	.492	25.130
90.25	807.20	30000.0	.492	25.130
90.25	717.40	30000.0	.492	25.130
188.60	717.40	30000.0	.492	25.130
188.60	467.10	30000.0	.492	25.130
334.60	467.10	30000.0	.492	25.130
334.60	592.80	30000.0	.492	25.130
339.60	592.80	30000.0	.492	25.130

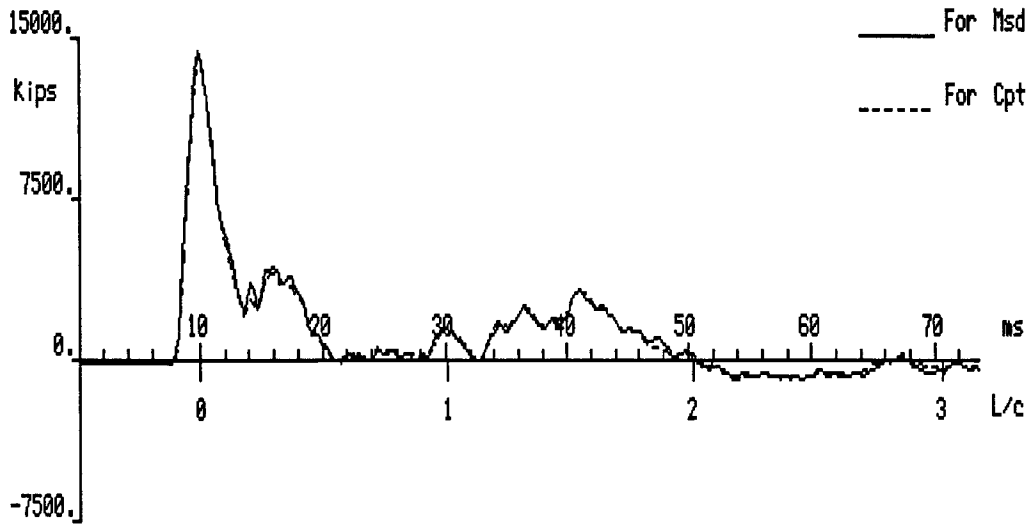
Toe Area 4.117 ft2

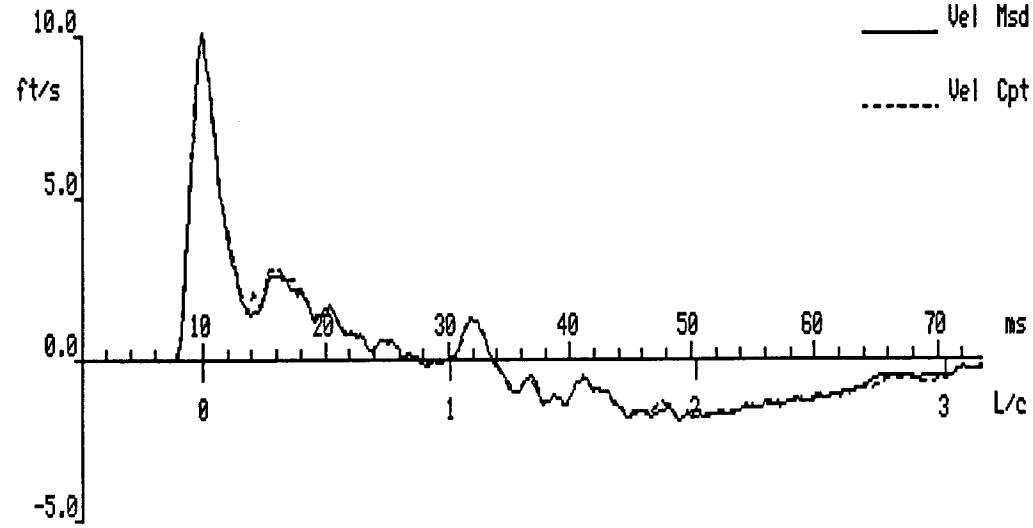
Segmnt No.	Depth B.G. feet	Impedance kips/ft/s	Imp. Change %	T. Slack inch	C. Slack inch	Circumf. feet
1	3.30	1440.51	.00	.000	.000	25.130
3	9.89	1440.51	.00	.000	.000	25.130
4	13.19	1440.51	.00	.000	.000	25.130
5	16.49	1440.51	.00	.000	.000	25.130
6	19.78	1440.51	.00	.000	.000	25.130
10	32.97	1440.51	.00	.000	.000	25.130
11	36.27	1440.51	.00	.000	.000	25.130
20	65.94	1440.51	.00	.000	.000	25.130
21	69.24	1440.51	.00	.000	.000	25.130
28	92.32	1339.97	.00	.000	.000	25.130
29	95.62	1280.25	.00	.000	.000	25.130
40	131.88	1280.26	.00	.000	.000	25.130
41	135.18	1280.25	.00	.000	.000	25.130
58	191.23	923.80	.00	.000	.000	25.130
59	194.53	833.58	.00	.000	.000	25.130
80	263.77	833.58	.00	.000	.000	25.130
102	336.30	949.46	.00	.000	.000	25.130
103	339.60	1057.90	.00	.000	.000	25.130

Pile Damping 1.0 %, Time Incr .196 ms, Wave Speed 16810.7 ft/s

SFOBB PIDP, TP3D, MHU-1700, BoID Blow 1 02/13/01

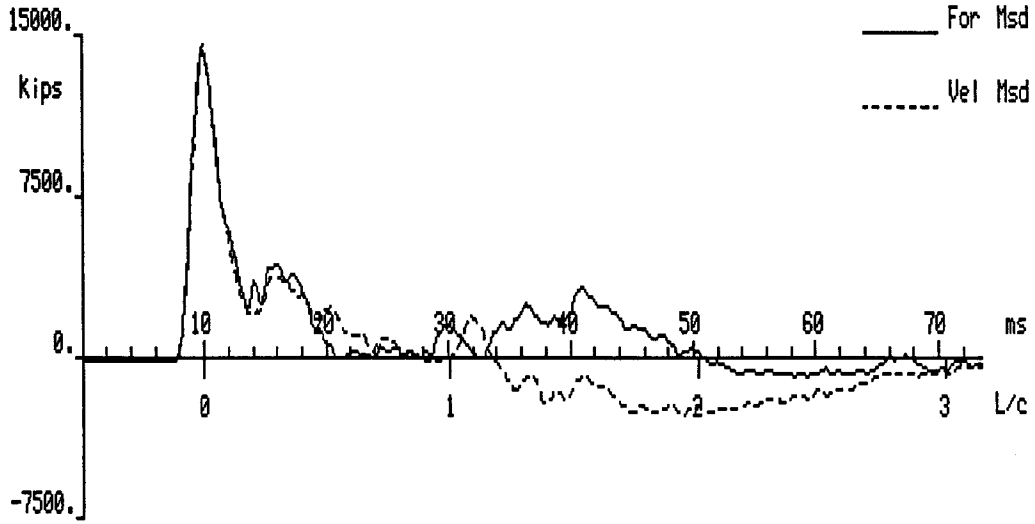
Fugro-McClelland Marine Geosciences, Inc CAPWAP(R) Version 1.993-1

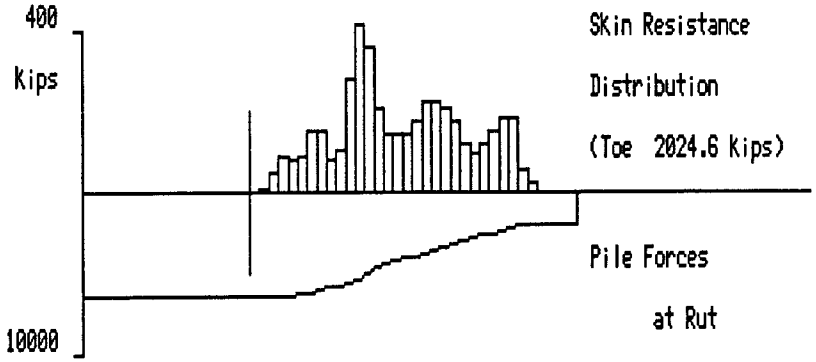




SFOBB PIDP, TP3D, MHU-1700, BoID Blow 1 02/13/01

Fugro-McClelland Marine Geosciences, Inc CAPWAP(R) Version 1.993-1





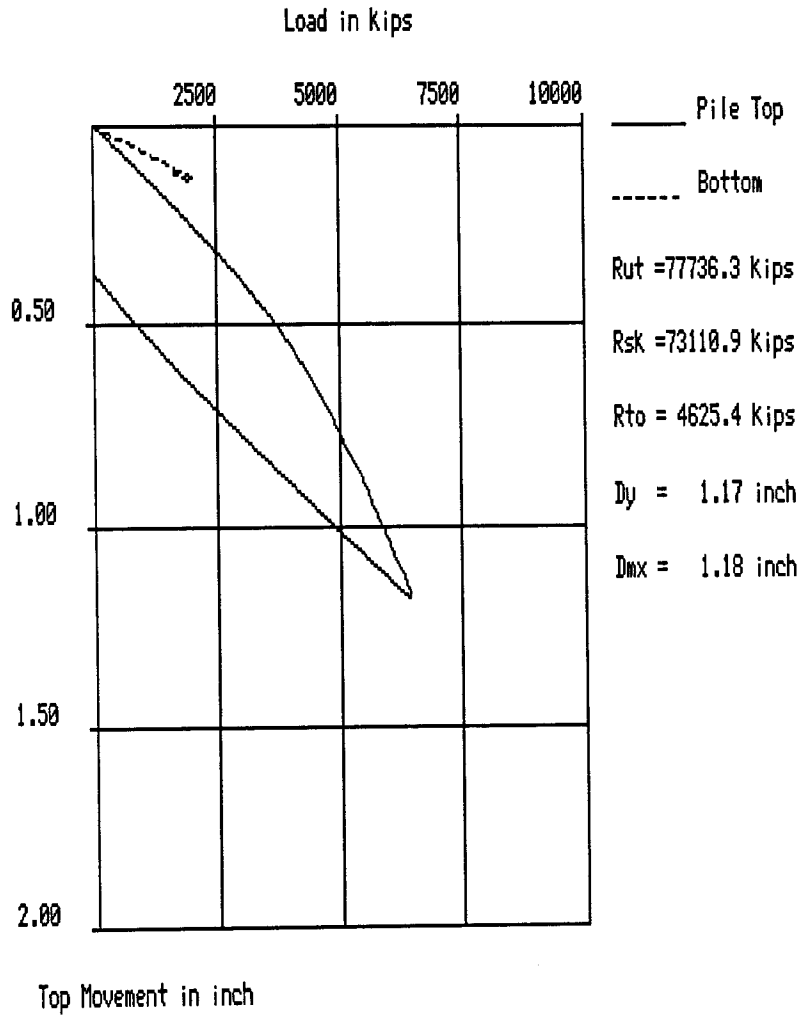
SFOBB PIDP, TP3D, MHU-1700, BoID

Blow 1 02/13/01

Fugro-McClelland Marine Geosciences, Inc

CAPWAP(R) Version 1.993-1

Dynamic D-Toe, E-P R-Toe



PILE 3
EOID, BLOW NO. 2181, PDA 1

PILE 3
EOID, BLOW NO. 2181, PDA 1

SFOBB PIDP, Pile TP3D, MHU-1700, EOID — Blow No. 2181 02/13/01
Fugro-McClelland Marine Geosciences, Inc — CAPWAP(R) Version 1.993-1

CAPWAP FINAL RESULTS

Final CAPWAP Capacity: Ru 13950.9 Skin 7520.8 Toe 6430.1 kips

Soil Sgmnt No.	Depth Below Gages ft	Depth Below Grade ft	Ru kips	Sum of Ru Up kips	Sum of Ru Down kips	Unit Resist. w. Respect to Depth kips/ft	Unit Resist. w. Respect to Area kips/f2	Smith Damping s/ft	Quake inch
				13950.9					
1	36.3	6.7	78.2	13872.8	78.2	11.85	.46	.070	.060
2	42.9	13.3	37.0	13835.8	115.2	5.61	.22	.070	.060
3	49.5	19.9	.0	13835.8	115.2	.00	.00	.000	.060
4	56.1	26.5	.0	13835.8	115.2	.00	.00	.000	.060
5	62.6	33.0	1.7	13834.0	116.9	.26	.01	.070	.060
6	69.2	39.6	18.9	13815.1	135.8	2.87	.11	.070	.060
7	75.8	46.2	5.9	13809.2	141.7	.90	.03	.070	.060
8	82.4	52.8	.0	13809.2	141.7	.00	.00	.000	.060
9	89.0	59.4	.0	13809.2	141.7	.00	.00	.000	.060
10	95.6	66.0	.0	13809.2	141.7	.00	.00	.000	.060
11	102.2	72.6	1.3	13807.9	143.0	.19	.01	.070	.060
12	108.8	79.2	102.6	13705.4	245.6	15.55	.60	.070	.060
13	115.4	85.8	167.0	13538.4	412.5	25.32	.98	.070	.060
14	122.0	92.4	191.0	13347.4	603.5	28.97	1.12	.070	.060
15	128.6	99.0	162.6	13184.8	766.1	24.66	.96	.070	.060
16	135.2	105.6	78.8	13106.0	844.9	11.95	.46	.070	.060
17	141.8	112.2	40.9	13065.1	885.9	6.21	.24	.070	.060
18	148.4	118.8	71.7	12993.3	957.6	10.88	.42	.070	.060
19	155.0	125.4	86.4	12906.9	1044.0	13.10	.51	.070	.060
20	161.6	132.0	18.2	12888.7	1062.2	2.77	.11	.070	.060
21	168.2	138.6	.0	12888.7	1062.2	.00	.00	.000	.060
22	174.7	145.1	.0	12888.7	1062.2	.00	.00	.000	.060
23	181.3	151.7	.0	12888.7	1062.2	.00	.00	.000	.060
24	187.9	158.3	89.5	12799.2	1151.7	13.57	.53	.070	.060
25	194.5	164.9	1004.4	11794.8	2156.1	152.31	5.91	.070	.060
26	201.1	171.5	828.0	10966.8	2984.1	125.57	4.87	.070	.060
27	207.7	178.1	78.4	10888.4	3062.5	11.89	.46	.070	.060
28	214.3	184.7	.0	10888.4	3062.5	.00	.00	.000	.060
29	220.9	191.3	108.1	10780.3	3170.6	16.39	.64	.070	.060

Soil Sgmnt No.	Depth Below Gages ft	Depth Below Grade ft	Ru kips	Sum of Ru Up kips	Sum of Ru Down kips	Unit Resist. w. Respect to Depth kips/ft	Unit Resist. w. Respect to Area kips/f2	Smith Damping s/ft	Quake inch
30	227.5	197.9	474.4	10305.9	3645.0	71.94	2.79	.070	.060
31	234.1	204.5	478.9	9827.0	4123.9	72.63	2.82	.070	.060
32	240.7	211.1	345.3	9481.7	4469.3	52.36	2.03	.070	.060
33	247.3	217.7	345.0	9136.6	4814.3	52.32	2.03	.070	.060
34	253.9	224.3	429.5	8707.1	5243.8	65.14	2.53	.070	.060
35	260.5	230.9	448.6	8258.5	5692.4	68.03	2.64	.070	.060
36	267.1	237.5	349.5	7909.0	6041.9	53.00	2.06	.070	.060
37	273.7	244.1	165.1	7743.9	6207.0	25.04	.97	.070	.060
38	280.3	250.7	11.3	7732.6	6218.3	1.72	.07	.070	.060
39	286.8	257.2	.0	7732.6	6218.3	.00	.00	.000	.060
40	293.4	263.8	108.8	7623.8	6327.1	16.50	.64	.070	.060
41	300.0	270.4	306.6	7317.1	6633.8	46.50	1.80	.070	.060
42	306.6	277.0	432.3	6884.8	7066.1	65.56	2.54	.070	.060
43	313.2	283.6	360.9	6523.9	7427.0	54.73	2.12	.070	.060
44	319.8	290.2	93.9	6430.1	7520.8	14.23	.55	.070	.060
45	326.4	296.8	.0	6430.1	7520.8	.00	.00	.000	.060
46	333.0	303.4	.0	6430.1	7520.8	.00	.00	.000	.060
47	339.6	310.0	.0	6430.1	7520.8	.00	.00	.000	.060
Average Skin Values			160.0			24.26	.94	.070	.060
Toe			6430.1				1561.84	.100	.337

Soil Model Parameters/Extensions		Skin	Toe
Case Damping		.366	.447
Unloading Quake	(% of loading quake)	80	89
Unloading Level	(% of Ru)	48	

SFOBB PIDP, Pile TP3D, MHU-1700, EOID
Fugro-McClelland Marine Geosciences, Inc

Blow No. 2181 02/13/01
CAPWAP(R) Version 1.993-1

EXTREMA TABLE

Pile Sgmnt No.	Depth Below Gages ft	max. Force kips	min. Force kips	max. Comp. Stress kips/in2	max. Tension Stress kips/in2	max. Trnsfd. Energy kips-ft	max. Veloc. ft/s	max. Displ. in
1	3.3	25822.7	-1892.3	31.99	-2.34	1137.15	17.4	1.084
10	33.0	25515.2	-2437.5	31.61	-3.02	1135.54	17.5	1.040
20	65.9	25269.1	-1765.5	31.30	-2.19	1114.68	17.4	1.010
30	98.9	23777.2	-1658.7	33.14	-2.31	1104.20	18.4	.970
40	131.9	23088.5	-784.8	32.18	-1.09	1010.87	17.8	.940
51	168.2	22621.5	-996.8	31.53	-1.39	956.32	17.6	.850
61	201.1	17834.4	-268.8	38.18	-.58	799.62	18.9	.730
71	234.1	15919.8	-28.8	34.08	-.06	622.78	17.1	.620
82	270.4	12678.2	-27.9	27.14	-.06	415.25	14.8	.520
92	303.3	12478.2	-27.4	26.71	-.06	365.15	13.7	.450
102	336.3	10962.2	-28.0	20.60	-.05	301.03	13.4	.380
103	339.6	11830.2	-26.2	19.96	-.04	311.79	13.1	.372
Absolute	194.5			42.63		(T=	53.0 ms)	
	46.2				-3.06	(T=	60.8 ms)	

CASE METHOD

	J=0.0	J=0.1	J=0.2	J=0.3	J=0.4	J=0.5	J=0.6	J=0.7	J=0.8	J=0.9
RS1	22682.	20404.	18126.	15848.	13570.	11292.	9014.	6736.	4458.	2180.
RMX	22801.	20559.	18316.	16073.	13830.	11693.	9685.	7741.	5823.	4046.
RSU	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
RA A2 W	2150.	1832.	0.							

Current CAPWAP Ru= 13950.9; Corresponding J(Rs)= .38; J(Rx)= .39

VMAX	VFIN	V1*Z	F1	FMAX	DMAX	DFIN	EMAX	EFIN	R HF	R EN
17.42	.272	5090.0	25822.7	25822.7	1.084	.399	1137.2	1084.7	19744.3	34242.4

SFOBB PIDP, Pile TP3D, MHU-1700, EOID
Fugro-McClelland Marine Geosciences, Inc

Blow No. 2181 02/13/01
CAPWAP(R) Version 1.993-1

PILE PROFILE AND PILE MODEL

Depth ft	Area in2	E-Modulus kips/in2	Spec. Weight kips/ft3	Circumf. ft
.00	807.20	30000.0	.492	25.770
90.25	807.20	30000.0	.492	25.770
90.25	717.40	30000.0	.492	25.770
188.60	717.40	30000.0	.492	25.770
188.60	467.10	30000.0	.492	25.770
334.60	467.10	30000.0	.492	25.770
334.60	592.80	30000.0	.492	25.770
339.60	592.80	30000.0	.492	25.770

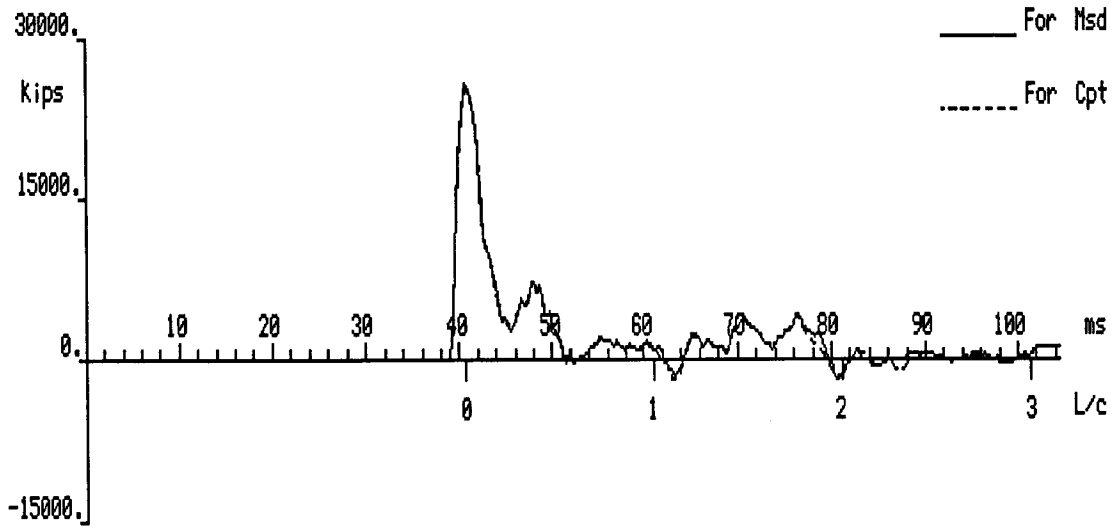
Toe Area 4.117 ft2

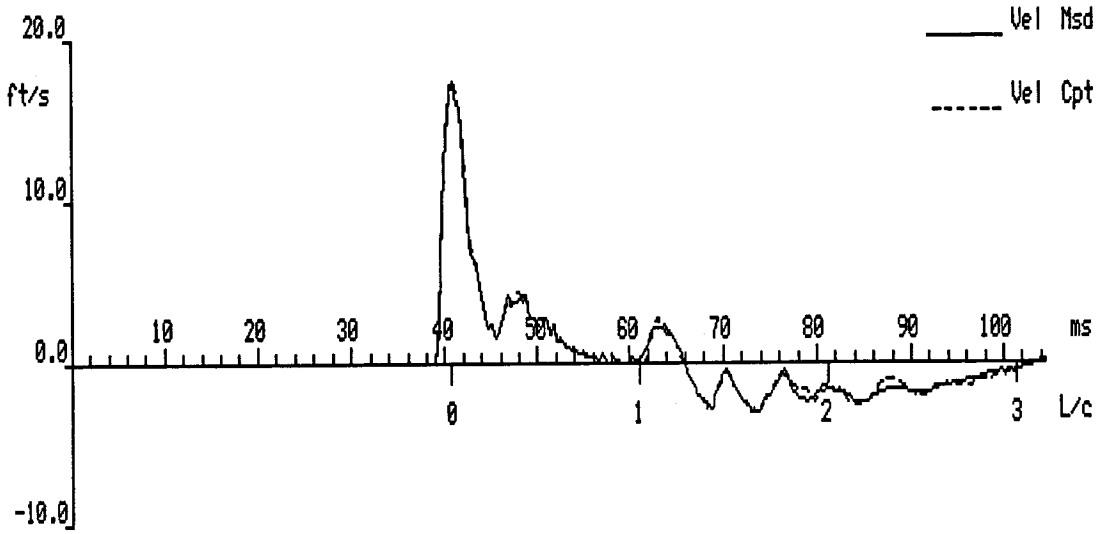
Segmnt No.	Depth B.G. feet	Impedance kips/ft/s	Imp. Change %	T. Slack inch	C. Slack inch	Circumf. feet
1	3.30	1440.51	.00	.000	.000	25.770
3	9.89	1440.51	.00	.000	.000	25.770
4	13.19	1440.51	.00	.000	.000	25.770
5	16.49	1440.51	.00	.000	.000	25.770
6	19.78	1440.51	.00	.000	.000	25.770
10	32.97	1440.51	.00	.000	.000	25.770
11	36.27	1440.51	.00	.000	.000	25.770
20	65.94	1440.51	.00	.000	.000	25.770
21	69.24	1440.51	.00	.000	.000	25.770
28	92.32	1339.97	.00	.000	.000	25.770
29	95.62	1280.25	.00	.000	.000	25.770
40	131.88	1280.26	.00	.000	.000	25.770
41	135.18	1280.25	.00	.000	.000	25.770
58	191.23	923.80	.00	.000	.000	25.770
59	194.53	833.58	.00	.000	.000	25.770
80	263.77	833.58	.00	.000	.000	25.770
102	336.30	949.46	.00	.000	.000	25.770
103	339.60	1057.90	.00	.000	.000	25.770

Pile Damping 1.0 %, Time Incr .196 ms, Wave Speed 16810.7 ft/s

SFOBB PIDP, Pile TP3D, MHU-1700, EOID Blow 2181 02/13/01

Fugro-McClelland Marine Geosciences, Inc CAPWAP(R) Version 1.993-1





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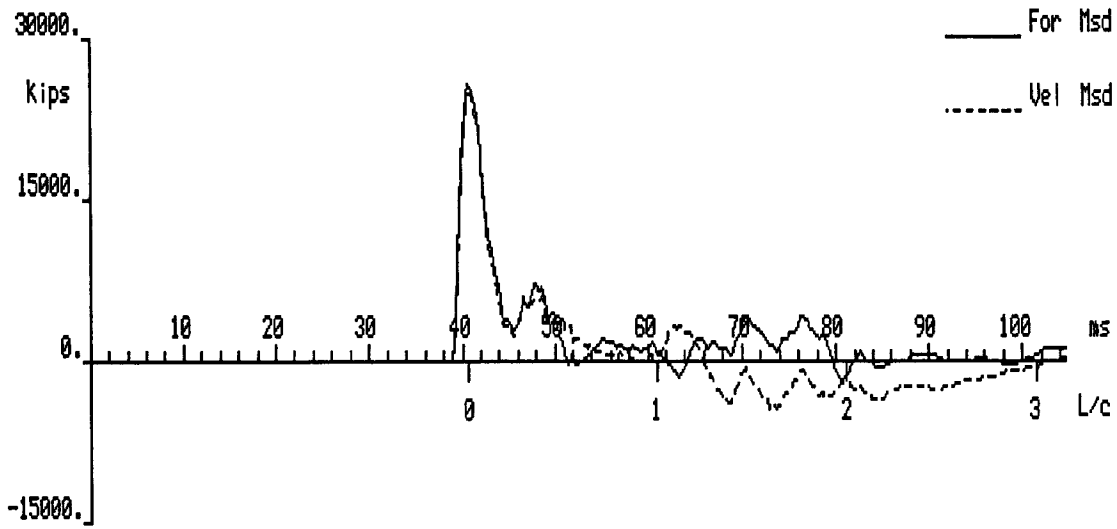

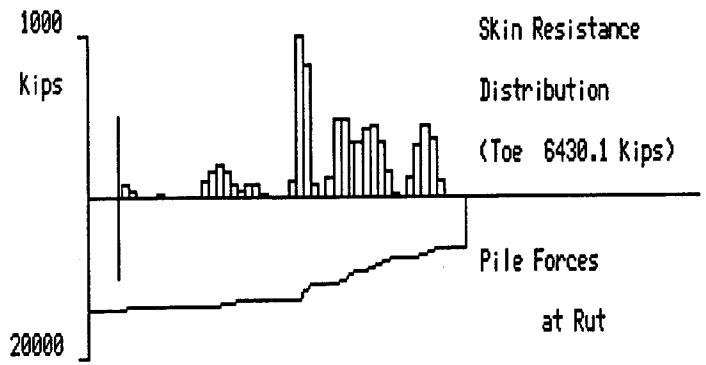

SFOBB PIDP, Pile TP3D, MHU-1700, EOID Blow 2181 02/13/01

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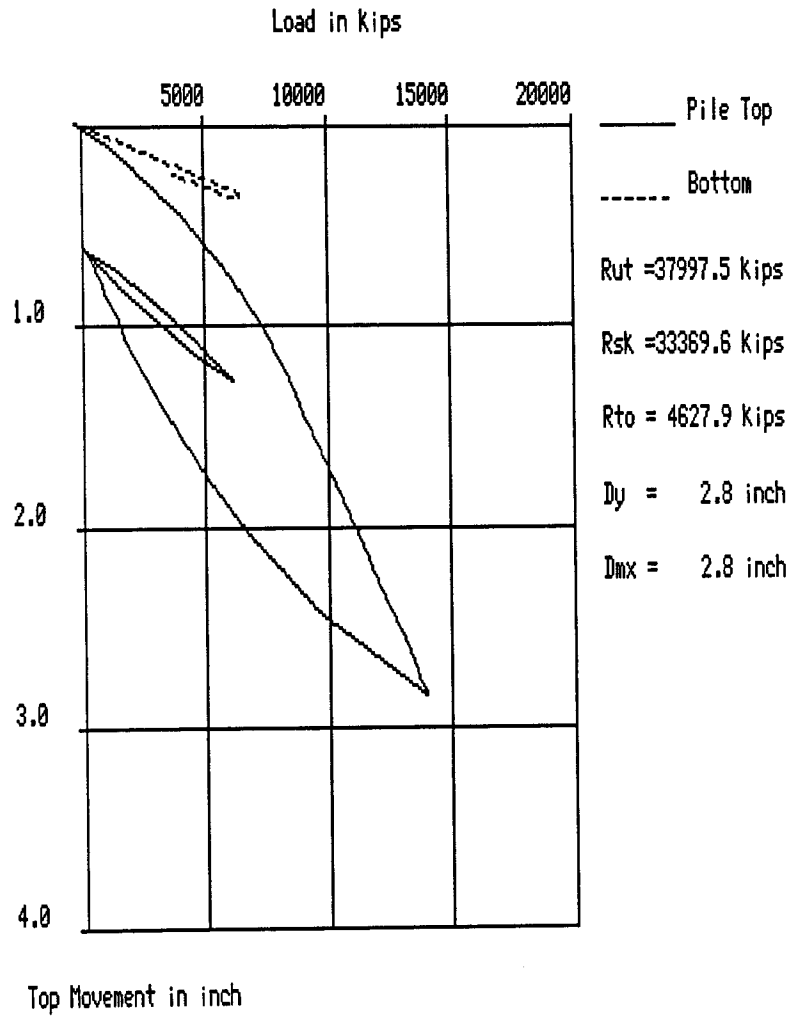
Dynamic D-Toe, E-P R-Toe



PILE 3
EOID, BLOW NO. 2169, PDA 2

PILE 3
EOID, BLOW NO. 2169, PDA 2

SFOBB PIDP, TP3D, MHU-1700, EoID
Fugro-McClelland Marine Geosciences, Inc

Blow No. 2169 02/13/01
CAPWAP(R) Version 1.993-1

CAPWAP FINAL RESULTS

Final CAPWAP Capacity: Ru 15831.8 Skin 9690.0 Toe 6141.7 kips

Soil Sgmnt No.	Depth Below Gages ft	Depth Below Grade ft	Ru kips	Sum of Ru Up kips	Sum of Ru Down kips	Unit w. Respect to Depth kips/ft	Resist. Area kips/f2	Smith Damping s/ft	Quake inch
				15831.8					
1	36.3	6.7	464.3	15367.5	464.3	70.41	2.73	.101	.080
2	42.9	13.3	344.7	15022.8	809.0	52.27	2.03	.101	.080
3	49.5	19.9	196.5	14826.3	1005.4	29.80	1.16	.101	.080
4	56.1	26.5	83.9	14742.4	1089.3	12.72	.49	.101	.080
5	62.6	33.0	14.1	14728.3	1103.4	2.14	.08	.101	.080
6	69.2	39.6	.0	14728.3	1103.4	.00	.00	.101	.080
7	75.8	46.2	14.5	14713.8	1117.9	2.20	.09	.101	.080
8	82.4	52.8	38.7	14675.1	1156.6	5.87	.23	.101	.080
9	89.0	59.4	90.0	14585.1	1246.7	13.65	.53	.101	.080
10	95.6	66.0	139.1	14446.0	1385.8	21.10	.82	.101	.080
11	102.2	72.6	113.5	14332.4	1499.3	17.22	.67	.101	.080
12	108.8	79.2	57.1	14275.3	1556.4	8.66	.34	.101	.080
13	115.4	85.8	31.3	14244.0	1587.7	4.75	.18	.101	.080
14	122.0	92.4	4.2	14239.9	1591.9	.63	.02	.101	.080
15	128.6	99.0	.0	14239.9	1591.9	.00	.00	.101	.080
16	135.2	105.6	.0	14239.9	1591.9	.00	.00	.101	.080
17	141.8	112.2	39.2	14200.7	1631.1	5.94	.23	.101	.080
18	148.4	118.8	88.8	14111.9	1719.9	13.47	.52	.101	.080
19	155.0	125.4	84.7	14027.2	1804.6	12.84	.50	.101	.080
20	161.6	132.0	36.0	13991.2	1840.6	5.46	.21	.101	.080
21	168.2	138.6	.0	13991.2	1840.6	.00	.00	.101	.080
22	174.7	145.1	.0	13991.2	1840.6	.00	.00	.101	.080
23	181.3	151.7	2.2	13989.0	1842.8	.33	.01	.101	.080
24	187.9	158.3	243.1	13745.9	2085.8	36.86	1.43	.101	.080
25	194.5	164.9	575.9	13170.0	2661.8	87.34	3.39	.101	.080
26	201.1	171.5	519.7	12650.3	3181.4	78.81	3.06	.101	.080
27	207.7	178.1	235.6	12414.7	3417.1	35.74	1.39	.101	.080
28	214.3	184.7	98.8	12315.9	3515.9	14.98	.58	.101	.080
29	220.9	191.3	181.4	12134.5	3697.3	27.51	1.07	.101	.080

Soil Sgmnt No.	Depth Below Gages ft	Depth Below Grade ft	Ru kips	Sum of Ru Up kips	Sum of Ru Down kips	Unit Resist. w. Respect to Depth kips/ft	Unit Resist. w. Respect to Area kips/f2	Smith Damping s/ft	Quake inch
30	227.5	197.9	292.6	11841.9	3989.9	44.38	1.72	.101	.080
31	234.1	204.5	323.7	11518.1	4313.6	49.09	1.91	.101	.080
32	240.7	211.1	335.5	11182.6	4649.2	50.89	1.97	.101	.080
33	247.3	217.7	356.7	10825.9	5005.9	54.10	2.10	.101	.080
34	253.9	224.3	346.6	10479.2	5352.5	52.57	2.04	.101	.080
35	260.5	230.9	338.8	10140.5	5691.3	51.37	1.99	.101	.080
36	267.1	237.5	374.6	9765.9	6065.9	56.81	2.20	.101	.080
37	273.7	244.1	408.7	9357.2	6474.6	61.97	2.40	.101	.080
38	280.3	250.7	411.2	8946.0	6885.7	62.36	2.42	.101	.080
39	286.8	257.2	416.6	8529.4	7302.3	63.17	2.45	.101	.080
40	293.4	263.8	466.3	8063.2	7768.6	70.71	2.74	.101	.080
41	300.0	270.4	558.6	7504.6	8327.2	84.71	3.29	.101	.080
42	306.6	277.0	616.0	6888.6	8943.2	93.42	3.63	.101	.080
43	313.2	283.6	517.8	6370.8	9461.0	78.53	3.05	.101	.080
44	319.8	290.2	229.0	6141.7	9690.0	34.73	1.35	.101	.080
45	326.4	296.8	.0	6141.7	9690.0	.00	.00	.101	.080
46	333.0	303.4	.0	6141.7	9690.0	.00	.00	.101	.080
47	339.6	310.0	.0	6141.7	9690.0	.00	.00	.101	.080
Average Skin Values			206.2			31.26	1.21	.101	.080
Toe			6141.7				1491.79	.111	.211

Soil Model Parameters/Extensions		Skin	Toe
Case Damping		.678	.473
Unloading Level	(% of Ru)	12	

SFOBB PIDP, TP3D, MHU-1700, EoID — Blow No. 2169 02/13/01
Fugro-McClelland Marine Geosciences, Inc — CAPWAP(R) Version 1.993-1

EXTREMA TABLE

Pile Sgmnt No.	Depth Below Gages ft	max. Force kips	min. Force kips	max. Comp. Stress kips/in2	max. Tension Stress kips/in2	max. Trnsfd. Energy kips-ft	max. Veloc. ft/s	max. Displ. in
1	3.3	26313.1	-1673.1	32.60	-2.07	1128.97	16.8	.865
10	33.0	26101.2	-2503.0	32.34	-3.10	1129.03	16.9	.890
20	65.9	23767.6	-2944.9	29.44	-3.65	976.18	16.5	.900
30	98.9	22167.9	-1959.4	30.90	-2.73	932.36	17.0	.890
40	131.9	21703.0	-1469.2	30.25	-2.05	892.36	16.9	.870
51	168.2	21309.6	-1504.6	29.70	-2.10	844.13	16.6	.790
61	201.1	16901.5	-1577.5	36.18	-3.38	709.87	17.8	.670
71	234.1	14890.1	-1069.2	31.88	-2.29	528.02	15.9	.530
82	270.4	12189.7	-675.6	26.10	-1.45	343.95	13.0	.420
92	303.3	9923.0	-391.2	21.24	-.84	210.28	9.9	.310
102	336.3	8573.7	-30.2	16.11	-.06	146.30	8.6	.240
103	339.6	9310.8	-1.5	15.71	.00	151.69	8.1	.231
Absolute	194.5			38.91		(T=	32.9 ms)	
	62.6				-3.99	(T=	39.8 ms)	

CASE METHOD

	J=0.0	J=0.1	J=0.2	J=0.3	J=0.4	J=0.5	J=0.6	J=0.7	J=0.8	J=0.9
RS1	23930.	21799.	19668.	17536.	15405.	13274.	11143.	9012.	6880.	4749.
RMX	23930.	21799.	19668.	17536.	15412.	13376.	11340.	9391.	7812.	6292.
RSU	26392.	24507.	22622.	20737.	18853.	16968.	15083.	13198.	11313.	9428.
RA A2 W	1267.	5123.	0.							

Current CAPWAP Ru= 15831.8; Corresponding J(Rs)= .38; J(Rx)= .38

VMAX	VFIN	V1*Z	F1	FMAX	DMAX	DFIN	EMAX	EFIN	R HF	R EN
16.83	-.392	4241.9	26266.9	26313.1	.865	-.170	1129.0	1073.2	23285.3	33996.0

SFOBB PIDP, TP3D, MHU-1700, EoID
Fugro-McClelland Marine Geosciences, Inc

Blow No. 2169 02/13/01
CAPWAP(R) Version 1.993-1

PILE PROFILE AND PILE MODEL

Depth ft	Area in2	E-Modulus kips/in2	Spec. Weight kips/ft3	Circumf. ft
.00	807.20	30000.0	.492	25.770
90.25	807.20	30000.0	.492	25.770
90.25	717.40	30000.0	.492	25.770
188.60	717.40	30000.0	.492	25.770
188.60	467.10	30000.0	.492	25.770
334.60	467.10	30000.0	.492	25.770
334.60	592.80	30000.0	.492	25.770
339.60	592.80	30000.0	.492	25.770

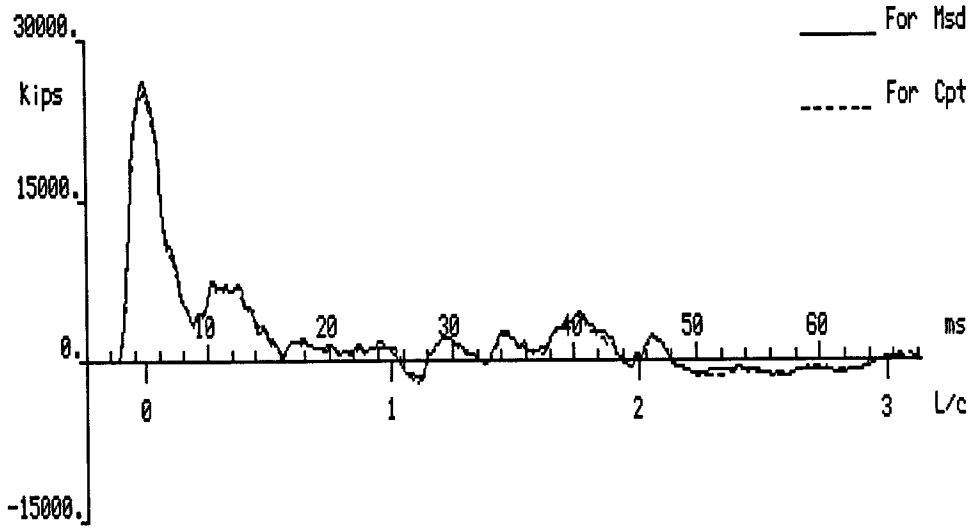
Toe Area 4.117 ft2

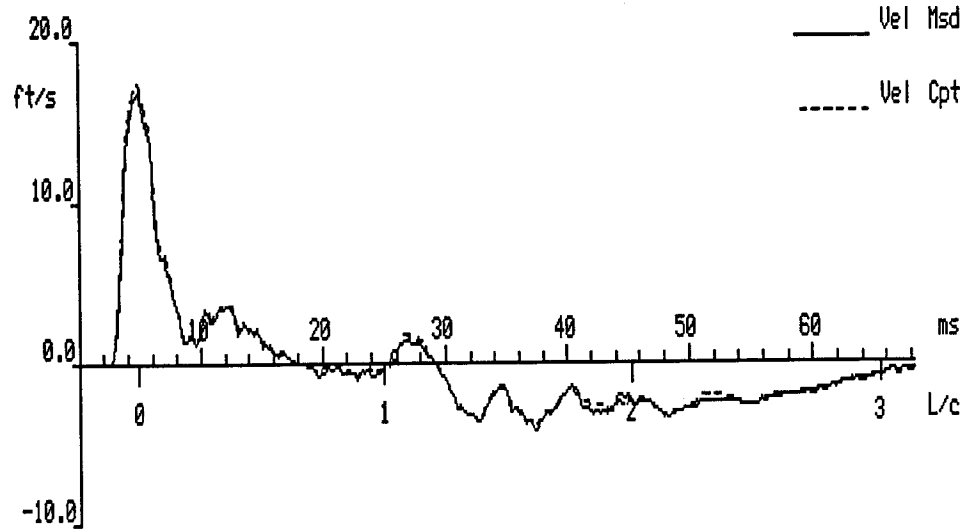
Segmnt No.	Depth B.G. feet	Impedance kips/ft/s	Imp. Change %	T. Slack inch	C. Slack inch	Circumf. feet
1	3.30	1440.51	.00	.000	.000	25.770
3	9.89	1440.51	.00	.000	.000	25.770
4	13.19	1440.51	.00	.000	.000	25.770
5	16.49	1440.51	.00	.000	.000	25.770
6	19.78	1440.51	.00	.000	.000	25.770
10	32.97	1440.51	.00	.000	.000	25.770
11	36.27	1440.51	.00	.000	.000	25.770
20	65.94	1440.51	.00	.000	.000	25.770
21	69.24	1440.51	.00	.000	.000	25.770
28	92.32	1339.97	.00	.000	.000	25.770
29	95.62	1280.25	.00	.000	.000	25.770
40	131.88	1280.26	.00	.000	.000	25.770
41	135.18	1280.25	.00	.000	.000	25.770
58	191.23	923.80	.00	.000	.000	25.770
59	194.53	833.58	.00	.000	.000	25.770
80	263.77	833.58	.00	.000	.000	25.770
102	336.30	949.46	.00	.000	.000	25.770
103	339.60	1057.90	.00	.000	.000	25.770

Pile Damping 1.0 %, Time Incr .196 ms, Wave Speed 16810.7 ft/s

SFOBB PIDP, TP3D, MHU-1700, EoID | Blow 2169 | 02/13/01

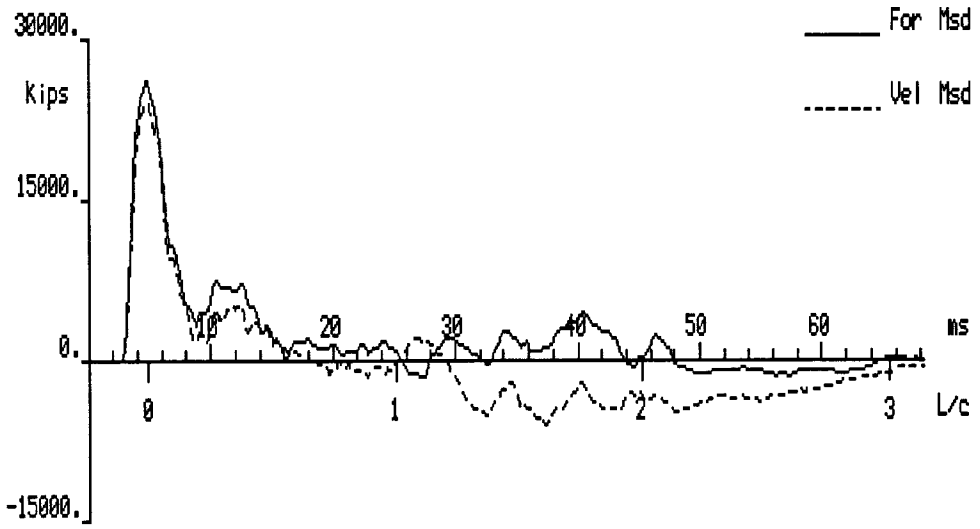
Fugro-McClelland Marine Geosciences, Inc | CAPWAP(R) Version 1.993-1

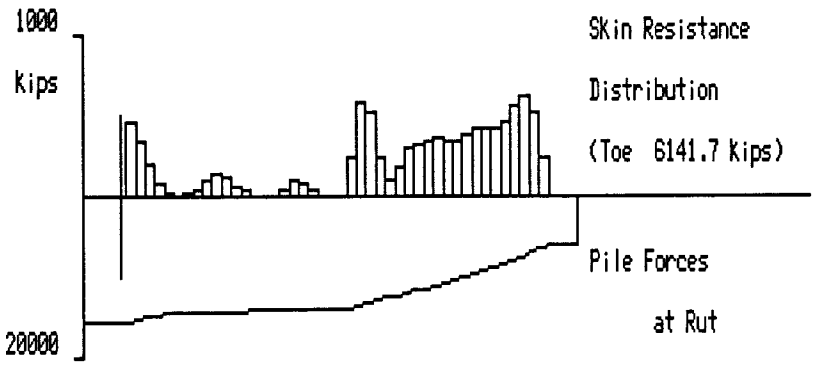




SFOBB PIDP, TP3D, MHU-1700, EoID Blow 2169 02/13/01

Fugro-McClelland Marine Geosciences, Inc CAPWAP(R) Version 1.993-1





SFOBB PIDP, TP3D, MHU-1700, EoID

Blow 2169 02/13/01

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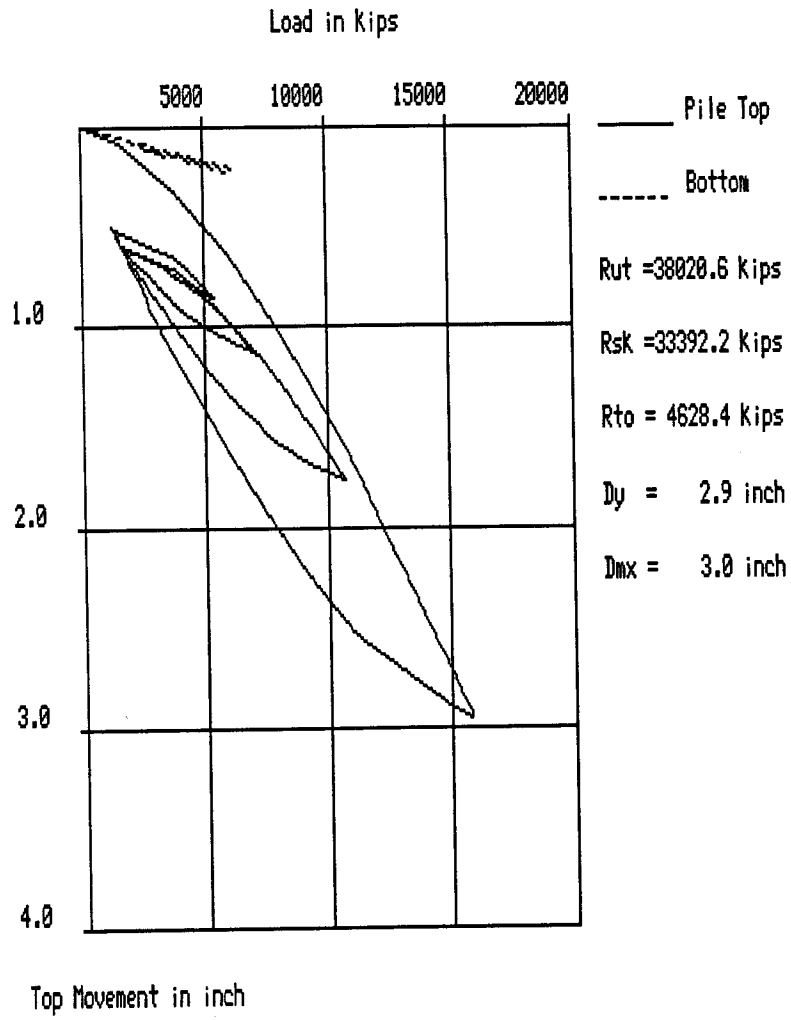
CAPWAP(R) Version 1.993-1

Dynamic D-Toe, E-P R-Toe



PILE 3
BOR, BLOW NO. 1, PDA 1

PILE 3
BOR, BLOW NO. 1, PDA 1

SFOBB PIDP, TP3D, MHU-1700, BoR
Fugro-McClelland Marine Geosciences, Inc

Blow No. 1 02/13/01
CAPWAP(R) Version 1.993-1

CAPWAP FINAL RESULTS

Final CAPWAP Capacity: Ru 10126.4 Skin 8018.2 Toe 2108.2 kips

Soil Sgmnt No.	Depth Below Gages ft	Depth Below Grade ft	Ru kips	Sum of Ru Up kips	Sum of Ru Down kips	Unit Resist. w. Respect to Depth kips/ft	Unit Resist. w. Respect to Area kips/f2	Smith Damping s/ft	Quake inch
				10126.4					
1	36.3	6.7	20.2	10106.3	20.2	3.06	.12	.129	.100
2	42.9	13.3	119.2	9987.1	139.4	18.07	.72	.129	.100
3	49.5	19.9	165.5	9821.5	304.9	25.10	1.00	.129	.100
4	56.1	26.5	144.1	9677.5	449.0	21.85	.87	.129	.100
5	62.6	33.0	.5	9677.0	449.5	.07	.00	.129	.100
6	69.2	39.6	.1	9676.9	449.6	.01	.00	.129	.100
7	75.8	46.2	.0	9676.9	449.6	.00	.00	.000	.100
8	82.4	52.8	.0	9676.9	449.6	.00	.00	.000	.100
9	89.0	59.4	.1	9676.8	449.7	.02	.00	.129	.100
10	95.6	66.0	220.5	9456.3	670.2	33.44	1.33	.129	.100
11	102.2	72.6	285.6	9170.7	955.8	43.31	1.72	.129	.100
12	108.8	79.2	164.0	9006.6	1119.8	24.88	.99	.129	.100
13	115.4	85.8	123.0	8883.7	1242.8	18.65	.74	.129	.100
14	122.0	92.4	204.7	8679.0	1447.4	31.04	1.23	.129	.100
15	128.6	99.0	208.1	8470.9	1655.5	31.56	1.26	.129	.100
16	135.2	105.6	148.8	8322.1	1804.4	22.57	.90	.129	.100
17	141.8	112.2	131.6	8190.5	1936.0	19.96	.79	.129	.100
18	148.4	118.8	145.9	8044.6	2081.8	22.12	.88	.129	.100
19	155.0	125.4	184.3	7860.3	2266.2	27.95	1.11	.129	.100
20	161.6	132.0	227.0	7633.2	2493.2	34.43	1.37	.129	.100
21	168.2	138.6	209.5	7423.7	2702.7	31.77	1.26	.129	.100
22	174.7	145.1	171.6	7252.1	2874.3	26.03	1.04	.129	.100
23	181.3	151.7	281.9	6970.2	3156.3	42.76	1.70	.129	.100
24	187.9	158.3	563.6	6406.6	3719.9	85.47	3.40	.129	.100
25	194.5	164.9	692.3	5714.3	4412.2	104.99	4.18	.129	.100
26	201.1	171.5	454.0	5260.3	4866.1	68.84	2.74	.129	.100
27	207.7	178.1	173.0	5087.3	5039.2	26.24	1.04	.129	.100
28	214.3	184.7	158.2	4929.1	5197.3	23.98	.95	.129	.100
29	220.9	191.3	272.3	4656.9	5469.6	41.29	1.64	.129	.100

Soil Sgmnt No.	Depth Below Gages ft	Depth Below Grade ft	Ru kips	Sum of Ru Up kips	Sum of Ru Down kips	Unit Resist. w. Respect to Depth kips/ft	Unit Resist. w. Respect to Area kips/f2	Smith Damping s/ft	Quake inch
30	227.5	197.9	361.0	4295.9	5830.6	54.74	2.18	.129	.100
31	234.1	204.5	429.1	3866.8	6259.6	65.07	2.59	.129	.100
32	240.7	211.1	406.5	3460.3	6666.1	61.65	2.45	.129	.100
33	247.3	217.7	247.5	3212.8	6913.7	37.54	1.49	.129	.100
34	253.9	224.3	93.2	3119.6	7006.8	14.13	.56	.129	.100
35	260.5	230.9	89.1	3030.5	7095.9	13.51	.54	.129	.100
36	267.1	237.5	192.0	2838.5	7287.9	29.11	1.16	.129	.100
37	273.7	244.1	231.7	2606.9	7519.6	35.13	1.40	.129	.100
38	280.3	250.7	138.9	2467.9	7658.5	21.07	.84	.129	.100
39	286.8	257.2	28.5	2439.5	7687.0	4.32	.17	.129	.100
40	293.4	263.8	6.4	2433.1	7693.3	.96	.04	.129	.100
41	300.0	270.4	61.9	2371.2	7755.2	9.38	.37	.129	.100
42	306.6	277.0	130.5	2240.8	7885.7	19.79	.79	.129	.100
43	313.2	283.6	100.7	2140.1	7986.3	15.27	.61	.129	.100
44	319.8	290.2	31.9	2108.2	8018.2	4.83	.19	.129	.100
45	326.4	296.8	.0	2108.2	8018.2	.00	.00	.000	.100
46	333.0	303.4	.0	2108.2	8018.2	.00	.00	.000	.100
47	339.6	310.0	.0	2108.2	8018.2	.00	.00	.000	.100
Average Skin Values			170.6			25.87	1.03	.129	.100
Toe			2108.2				512.08	.426	.130

Soil Model Parameters/Extensions		Skin	Toe
Case Damping		.717	.623
Unloading Quake	(% of loading quake)	98	100
Unloading Level	(% of Ru)	22	
Soil Plug Weight	(kips)		2.16

SFOBB PIDP, TP3D, MHU-1700, BoR
Fugro-McClelland Marine Geosciences, Inc

Blow No. 1 02/13/01
CAPWAP(R) Version 1.993-1

EXTREMA TABLE

Pile Sgmnt No.	Depth Below Gages ft	max. Force kips	min. Force kips	max. Comp. Stress kips/in2	max. Tension Stress kips/in2	max. Trnsfd. Energy kips-ft	max. Veloc. ft/s	max. Displ. in
1	3.3	19072.8	-986.5	23.63	-1.22	515.34	12.4	.628
10	33.0	18572.0	-1241.6	23.01	-1.54	511.94	12.7	.600
20	65.9	17831.5	-1427.3	22.09	-1.77	467.43	12.3	.560
30	98.9	16807.4	-1566.8	23.43	-2.18	444.01	12.5	.510
40	131.9	15300.8	-1377.8	21.33	-1.92	368.97	11.6	.480
51	168.2	14366.9	-1050.6	20.03	-1.46	301.11	10.6	.390
61	201.1	9849.5	-439.4	21.09	-.94	190.17	10.1	.310
71	234.1	8341.3	-191.1	17.86	-.41	127.92	8.2	.240
82	270.4	6414.5	-273.8	13.73	-.59	84.34	7.1	.210
92	303.3	5906.9	-57.4	12.65	-.12	71.51	6.7	.190
102	336.3	6238.9	-388.7	11.73	-.73	65.14	5.8	.150
103	339.6	6305.4	-397.8	10.64	-.67	66.33	5.7	.153
Absolute	95.6			24.04		(T=	47.1 ms)	
	95.6				-2.26	(T=	83.9 ms)	

CASE METHOD

	J=0.0	J=0.1	J=0.2	J=0.3	J=0.4	J=0.5	J=0.6	J=0.7	J=0.8	J=0.9
RS1	17293.	15712.	14130.	12549.	10967.	9386.	7804.	6223.	4641.	3060.
RMX	17293.	15712.	14130.	12549.	10967.	9386.	7804.	6223.	4641.	3060.
RSU	19859.	18534.	17209.	15884.	14559.	13234.	11909.	10585.	9260.	7935.
RA A2 W	131.	907.	0.							

Current CAPWAP Ru= 10126.4; Corresponding J(Rs)= .45; J(Rx)= .45

VMAX	VFIN	V1*Z	F1	FMAX	DMAX	DFIN	EMAX	EFIN	R HF	R EN
12.45	.691	7930.5	19072.8	19072.8	.628	.036	515.3	480.9	15715.6	23901.6

SFOBB PIDP, TP3D, MHU-1700, BoR
Fugro-McClelland Marine Geosciences, Inc

Blow No. 1 02/13/01
CAPWAP(R) Version 1.993-1

PILE PROFILE AND PILE MODEL

Depth ft	Area in2	E-Modulus kips/in2	Spec. Weight kips/ft3	Circumf. ft
.00	807.20	30000.0	.492	25.130
90.25	807.20	30000.0	.492	25.130
90.25	717.40	30000.0	.492	25.130
188.60	717.40	30000.0	.492	25.130
188.60	467.10	30000.0	.492	25.130
334.60	467.10	30000.0	.492	25.130
334.60	592.80	30000.0	.492	25.130
339.60	592.80	30000.0	.492	25.130

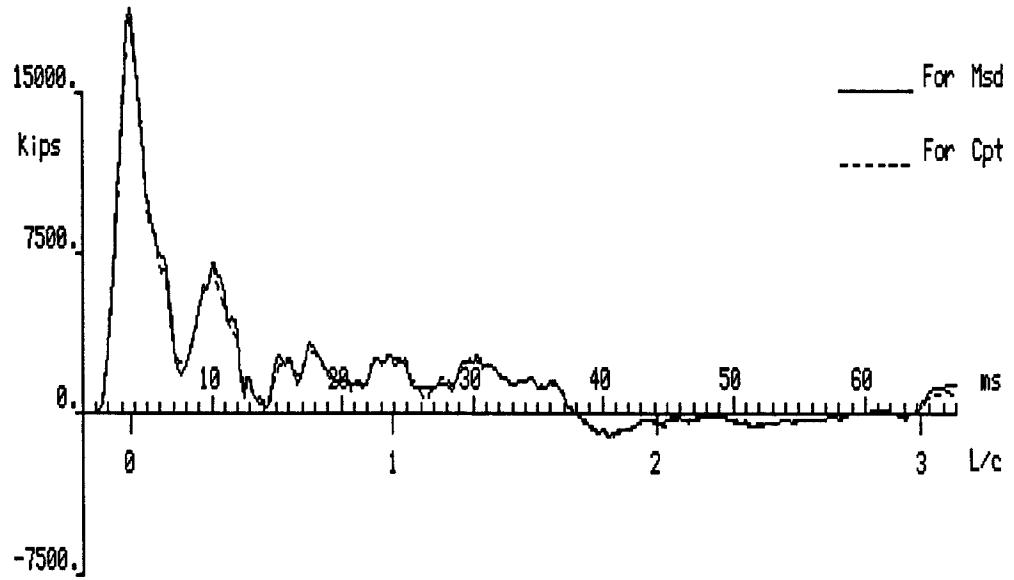
Toe Area 4.117 ft2

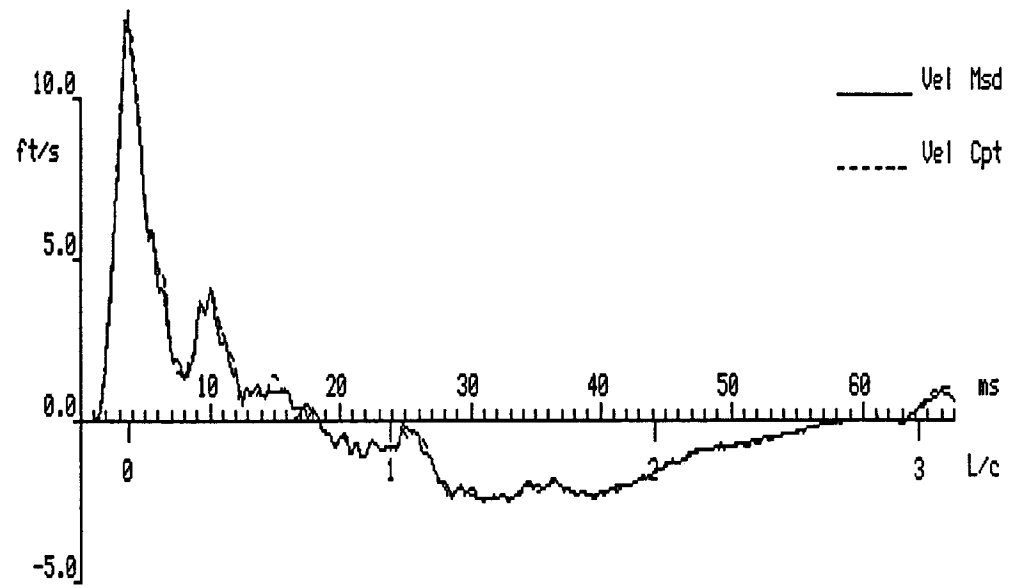
Segmnt No.	Depth B.G. feet	Impedance kips/ft/s	Imp. Change %	T. Slack inch	C. Slack inch	Circumf. feet
1	3.30	1440.51	.00	.000	.000	25.130
3	9.89	1440.51	.00	.000	.000	25.130
4	13.19	1440.51	.00	.000	.000	25.130
5	16.49	1440.51	.00	.000	.000	25.130
6	19.78	1440.51	.00	.000	.000	25.130
10	32.97	1440.51	.00	.000	.000	25.130
11	36.27	1440.51	.00	.000	.000	25.130
20	65.94	1440.51	.00	.000	.000	25.130
21	69.24	1440.51	.00	.000	.000	25.130
28	92.32	1339.97	.00	.000	.000	25.130
29	95.62	1280.25	.00	.000	.000	25.130
40	131.88	1280.26	.00	.000	.000	25.130
41	135.18	1280.25	.00	.000	.000	25.130
58	191.23	923.80	.00	.000	.000	25.130
59	194.53	833.58	.00	.000	.000	25.130
80	263.77	833.58	.00	.000	.000	25.130
102	336.30	949.46	.00	.000	.000	25.130
103	339.60	1057.90	.00	.000	.000	25.130

Pile Damping 1.0 %, Time Incr .196 ms, Wave Speed 16810.7 ft/s

SFOBB PIDP, TP3D, MHU-1700, BoR Blow 1 02/13/01

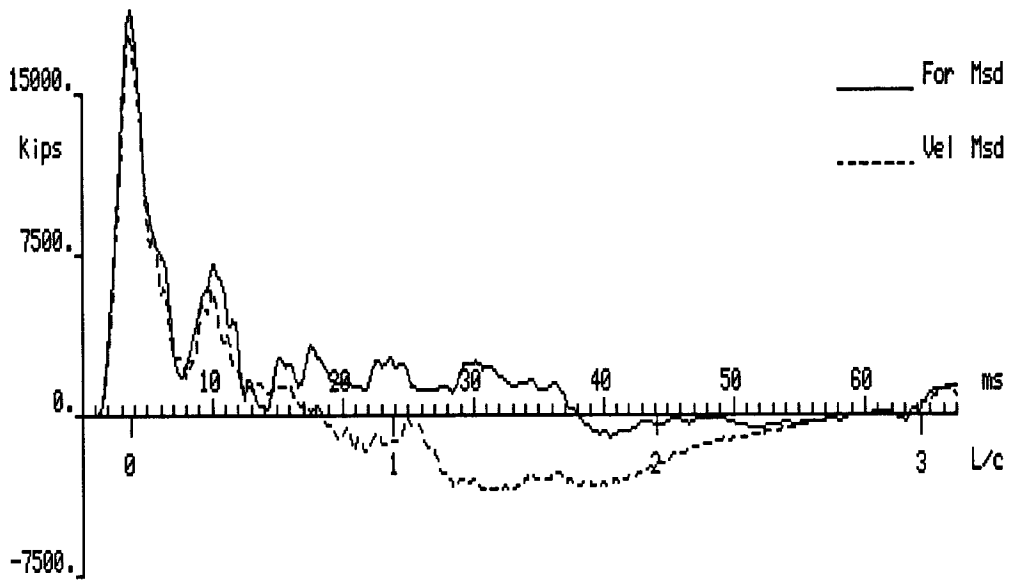
Fugro-McClelland Marine Geosciences, Inc CAPWAP(R) Version 1.993-1

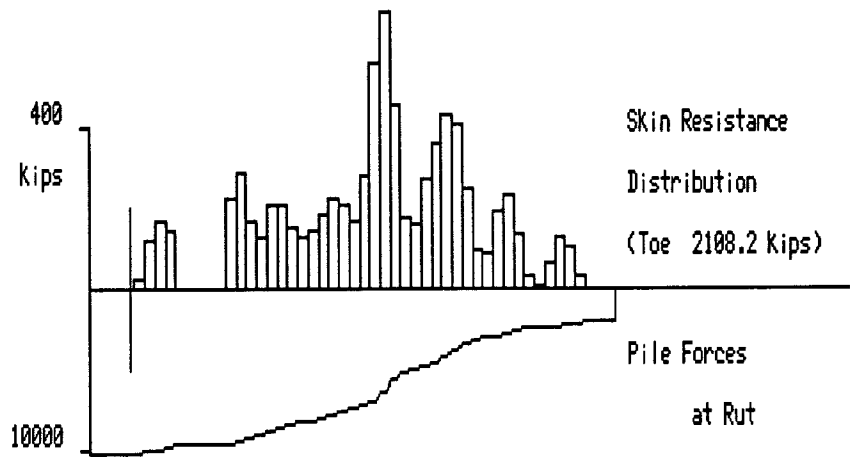




SFOBB PIDP, TP3D, MHU-1700, BoR Blow 1 02/13/01

Fugro-McClelland Marine Geosciences, Inc CAPWAP(R) Version 1.993-1





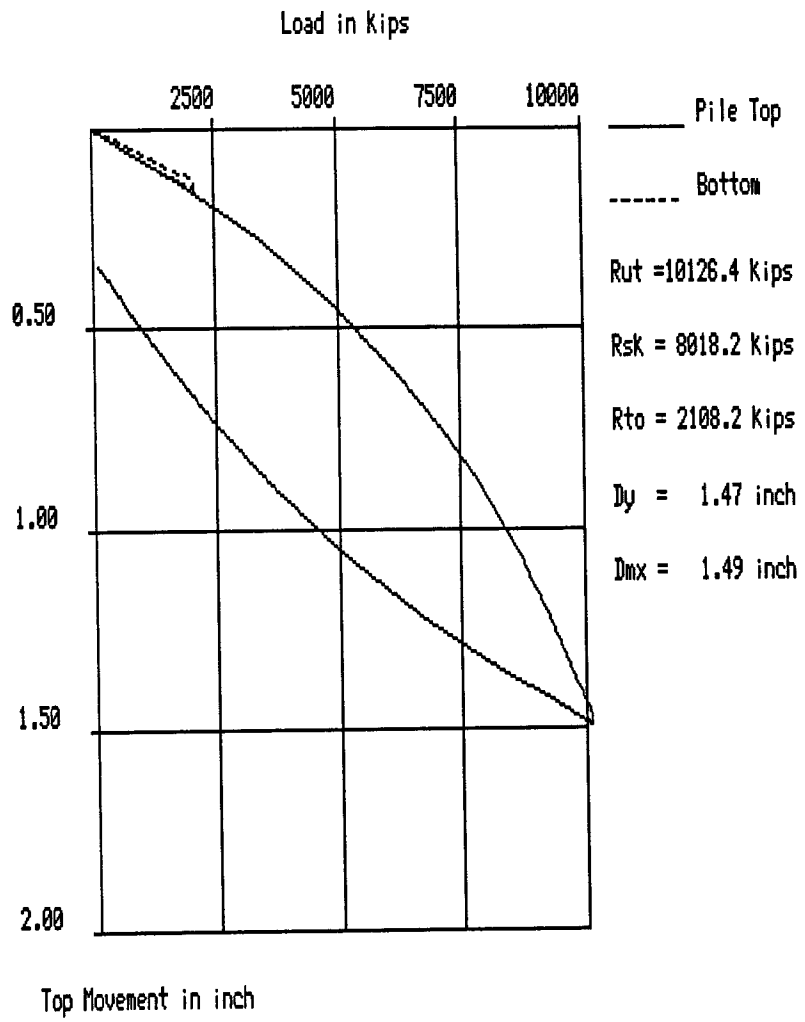
SFOBB PIDP, TP3D, MHU-1700, BoR

Blow 1 02/13/01

Fugro-McClelland Marine Geosciences, Inc

CAPWAP(R) Version 1.993-1

Dynamic D-Toe, E-P R-Toe



PILE 3
BOR, BLOW NO. 2, PDA 2

PILE 3
BOR, BLOW NO. 2, PDA 2

SFOBB PIDP, TP3D, MHU-1700, BoR
Fugro-McClelland Marine Geosciences, Inc

Blow No. 2 02/13/01
CAPWAP(R) Version 1.993-1

CAPWAP FINAL RESULTS

Final CAPWAP Capacity: Ru 12163.6 Skin 10327.8 Toe 1835.8 kips

Soil Sgmnt No.	Depth Below Gages ft	Depth Below Grade ft	Ru kips	Sum of Ru Up kips	Sum of Ru Down kips	Unit w. Depth kips/ft	Resist. Respect to Area kips/f2	Smith Damping s/ft	Quake inch
				12163.6					
1	36.3	6.7	273.3	11890.3	273.3	41.44	1.65	.262	.190
2	42.9	13.3	185.0	11705.4	458.2	28.05	1.12	.262	.190
3	49.5	19.9	92.5	11612.8	550.8	14.03	.56	.262	.190
4	56.1	26.5	59.0	11553.8	609.8	8.95	.36	.262	.190
5	62.6	33.0	73.7	11480.1	683.5	11.17	.44	.262	.190
6	69.2	39.6	85.7	11394.4	769.2	13.00	.52	.262	.190
7	75.8	46.2	75.1	11319.3	844.3	11.40	.45	.262	.190
8	82.4	52.8	68.1	11251.2	912.5	10.33	.41	.262	.190
9	89.0	59.4	85.7	11165.5	998.1	12.99	.52	.262	.190
10	95.6	66.0	123.9	11041.6	1122.1	18.79	.75	.262	.190
11	102.2	72.6	159.2	10882.4	1281.3	24.14	.96	.262	.190
12	108.8	79.2	161.4	10721.0	1442.7	24.47	.97	.262	.190
13	115.4	85.8	134.6	10586.4	1577.2	20.41	.81	.262	.190
14	122.0	92.4	111.7	10474.6	1689.0	16.95	.67	.262	.190
15	128.6	99.0	103.6	10371.1	1792.6	15.71	.63	.262	.190
16	135.2	105.6	103.8	10267.2	1896.4	15.75	.63	.262	.190
17	141.8	112.2	128.4	10138.8	2024.8	19.48	.78	.262	.190
18	148.4	118.8	184.5	9954.3	2209.3	27.98	1.11	.262	.190
19	155.0	125.4	218.7	9735.6	2428.1	33.17	1.32	.262	.190
20	161.6	132.0	175.1	9560.5	2603.1	26.55	1.06	.262	.190
21	168.2	138.6	105.7	9454.8	2708.8	16.02	.64	.262	.190
22	174.7	145.1	136.2	9318.7	2845.0	20.65	.82	.262	.190
23	181.3	151.7	295.8	9022.8	3140.8	44.86	1.79	.262	.190
24	187.9	158.3	457.7	8565.1	3598.5	69.41	2.76	.262	.190
25	194.5	164.9	489.2	8076.0	4087.7	74.18	2.95	.262	.190
26	201.1	171.5	410.7	7665.3	4498.4	62.28	2.48	.262	.190
27	207.7	178.1	342.9	7322.4	4841.2	51.99	2.07	.262	.190
28	214.3	184.7	355.3	6967.1	5196.6	53.88	2.14	.262	.190
29	220.9	191.3	449.5	6517.6	5646.1	68.17	2.71	.262	.190

Soil Sgmnt No.	Depth Below Gages ft	Depth Below Grade ft	Ru kips	Sum of Ru Up kips	Sum of Ru Down kips	Unit w. Respect to Depth kips/ft	Resist. Area kips/f2	Smith Damping s/ft	Quake inch
30	227.5	197.9	577.6	5940.0	6223.6	87.59	3.49	.262	.164
31	234.1	204.5	758.5	5181.5	6982.1	115.02	4.58	.262	.140
32	240.7	211.1	897.0	4284.5	7879.1	136.03	5.41	.262	.120
33	247.3	217.7	939.2	3345.3	8818.4	142.43	5.67	.262	.104
34	253.9	224.3	803.5	2541.8	9621.9	121.85	4.85	.262	.094
35	260.5	230.9	515.3	2026.4	10137.2	78.15	3.11	.262	.090
36	267.1	237.5	174.9	1851.5	10312.1	26.53	1.06	.262	.089
37	273.7	244.1	15.7	1835.8	10327.8	2.38	.09	.262	.089
38	280.3	250.7	.0	1835.8	10327.8	.00	.00	.262	.089
39	286.8	257.2	.0	1835.8	10327.8	.00	.00	.262	.089
40	293.4	263.8	.0	1835.8	10327.8	.00	.00	.262	.089
41	300.0	270.4	.0	1835.8	10327.8	.00	.00	.262	.089
42	306.6	277.0	.0	1835.8	10327.8	.00	.00	.262	.087
43	313.2	283.6	.0	1835.8	10327.8	.00	.00	.262	.083
44	319.8	290.2	.0	1835.8	10327.8	.00	.00	.262	.073
45	326.4	296.8	.0	1835.8	10327.8	.00	.00	.262	.063
46	333.0	303.4	.0	1835.8	10327.8	.00	.00	.262	.055
47	339.6	310.0	.0	1835.8	10327.8	.00	.00	.262	.046
Average Skin Values			219.7			33.32	1.33	.262	.157
Toe			1835.8				445.91	.503	.056

Soil Model Parameters/Extensions		Skin	Toe
Case Damping		1.876	.641
Unloading Quake	(% of loading quake)	98	100
Unloading Level	(% of Ru)	5	
Soil Plug Weight	(kips)		25.02

SFOBB PIDP, TP3D, MHU-1700, BoR
Fugro-McClelland Marine Geosciences, Inc

Blow No. 2 02/13/01
CAPWAP(R) Version 1.993-1

EXTREMA TABLE

Pile Sgmnt No.	Depth Below Gages ft	max. Force kips	min. Force kips	max. Comp. Stress kips/in2	max. Tension Stress kips/in2	max. Trnsfd. Energy kips-ft	max. Veloc. ft/s	max. Displ. in
1	3.3	18761.2	-1148.1	23.24	-1.42	582.75	12.5	.598
10	33.0	18868.7	-1678.8	23.38	-2.08	579.45	12.3	.580
20	65.9	17119.0	-1357.7	21.21	-1.68	486.74	11.7	.530
30	98.9	15479.9	-1404.3	21.58	-1.96	429.55	11.6	.480
40	131.9	14131.7	-1492.4	19.70	-2.08	354.76	10.7	.430
51	168.2	12903.0	-1495.2	17.99	-2.08	273.37	9.6	.340
61	201.1	9033.1	-1377.9	19.34	-2.95	164.12	8.7	.260
71	234.1	6875.8	-1056.8	14.72	-2.26	68.00	5.4	.140
82	270.4	2626.4	-676.9	5.62	-1.45	15.64	3.2	.090
92	303.3	2607.4	-460.2	5.58	-.99	14.75	3.2	.090
102	336.3	3612.3	-448.1	6.79	-.84	14.37	2.2	.060
103	339.6	3333.4	-447.4	5.62	-.75	14.42	2.5	.064
Absolute	36.3			23.61		(T=	23.3 ms)	
	194.5				-3.06	(T=	76.3 ms)	

CASE METHOD

	J=0.0	J=0.1	J=0.2	J=0.3	J=0.4	J=0.5	J=0.6	J=0.7	J=0.8	J=0.9
RS1	17160.	15597.	14033.	12469.	10906.	9342.	7779.	6215.	4651.	3088.
RMX	17160.	15597.	14033.	12469.	10906.	9342.	7779.	6215.	4651.	3088.
RSU	20356.	19112.	17868.	16624.	15380.	14136.	12892.	11648.	10404.	9160.
RA A2 W	0.	3053.	0.							

Current CAPWAP Ru= 12163.6; Corresponding J(Rs)= .32; J(Rx)= .32

VMAX	VFIN	V1*Z	F1	FMAX	DMAX	DFIN	EMAX	EFIN	R HF	R EN
12.46	.491	7953.6	18743.9	18761.2	.598	-.260	582.8	526.1	18486.8	27028.3

SFOBB PIDP, TP3D, MHU-1700, BoR
Fugro-McClelland Marine Geosciences, Inc

Blow No. 2 02/13/01
CAPWAP(R) Version 1.993-1

PILE PROFILE AND PILE MODEL

Depth ft	Area in2	E-Modulus kips/in2	Spec. Weight kips/ft3	Circumf. ft
.00	807.20	30000.0	.492	25.130
90.25	807.20	30000.0	.492	25.130
90.25	717.40	30000.0	.492	25.130
188.60	717.40	30000.0	.492	25.130
188.60	467.10	30000.0	.492	25.130
334.60	467.10	30000.0	.492	25.130
334.60	592.80	30000.0	.492	25.130
339.60	592.80	30000.0	.492	25.130

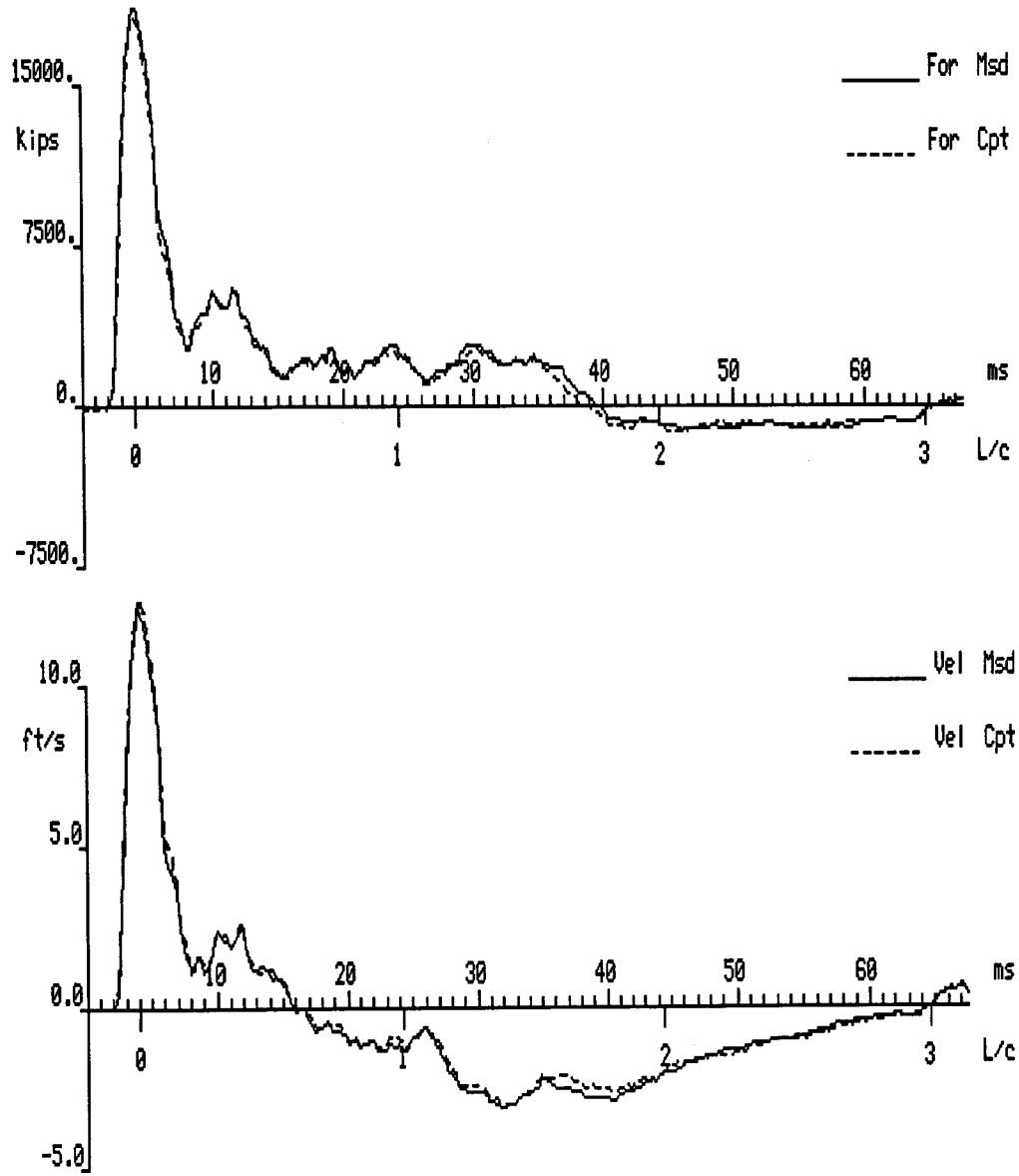
Toe Area 4.117 ft2

Segmnt No.	Depth B.G. feet	Impedance kips/ft/s	Imp. Change %	T. Slack inch	C. Slack inch	Circumf. feet
1	3.30	1440.51	.00	.000	.000	25.130
3	9.89	1440.51	.00	.000	.000	25.130
4	13.19	1440.51	.00	.000	.000	25.130
5	16.49	1440.51	.00	.000	.000	25.130
6	19.78	1440.51	.00	.000	.000	25.130
10	32.97	1440.51	.00	.000	.000	25.130
11	36.27	1440.51	.00	.000	.000	25.130
20	65.94	1440.51	.00	.000	.000	25.130
21	69.24	1440.51	.00	.000	.000	25.130
28	92.32	1339.97	.00	.000	.000	25.130
29	95.62	1280.25	.00	.000	.000	25.130
40	131.88	1280.26	.00	.000	.000	25.130
41	135.18	1280.25	.00	.000	.000	25.130
58	191.23	923.80	.00	.000	.000	25.130
59	194.53	833.58	.00	.000	.000	25.130
80	263.77	833.58	.00	.000	.000	25.130
102	336.30	949.46	.00	.000	.000	25.130
103	339.60	1057.90	.00	.000	.000	25.130

Pile Damping 1.0 %, Time Incr .196 ms, Wave Speed 16810.7 ft/s

SF088 PIDP, TP3D, MHU-1700, BoR Blow 2 02/13/01

Fugro-McClelland Marine Geosciences, Inc CAPWAP(R) Version 1.993-1

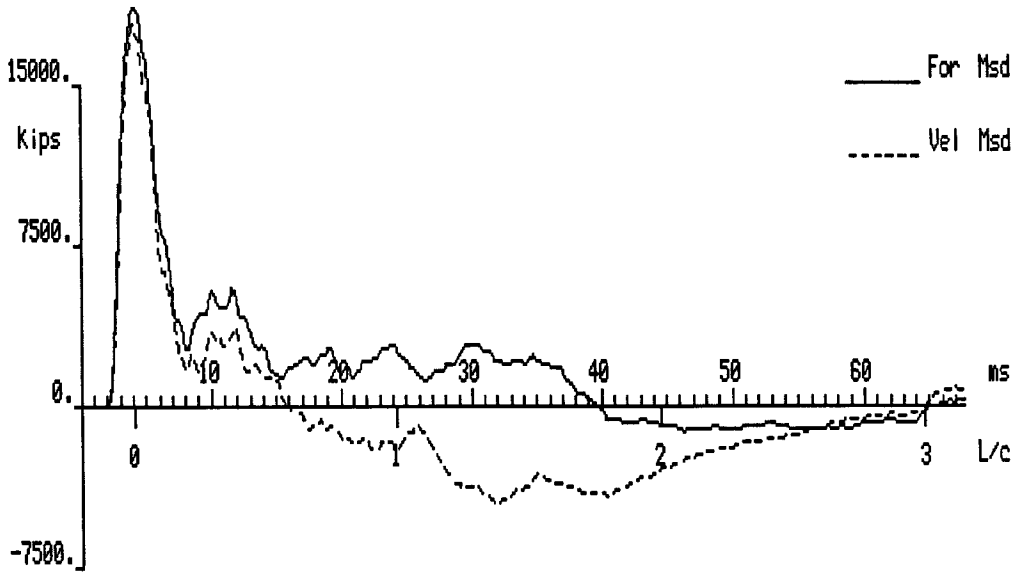


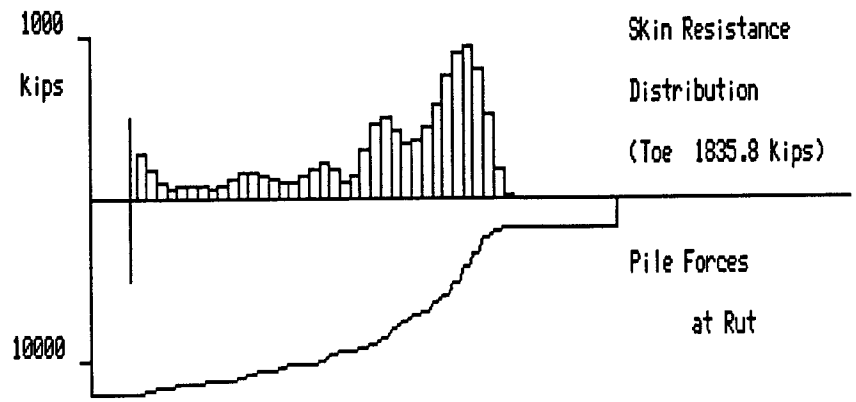
SFOBB PIDP, TP3D, MHU-1700, BoR

Blow 2 02/13/01

Fugro-McClelland Marine Geosciences, Inc

CAPWAP(R) Version 1.993-1

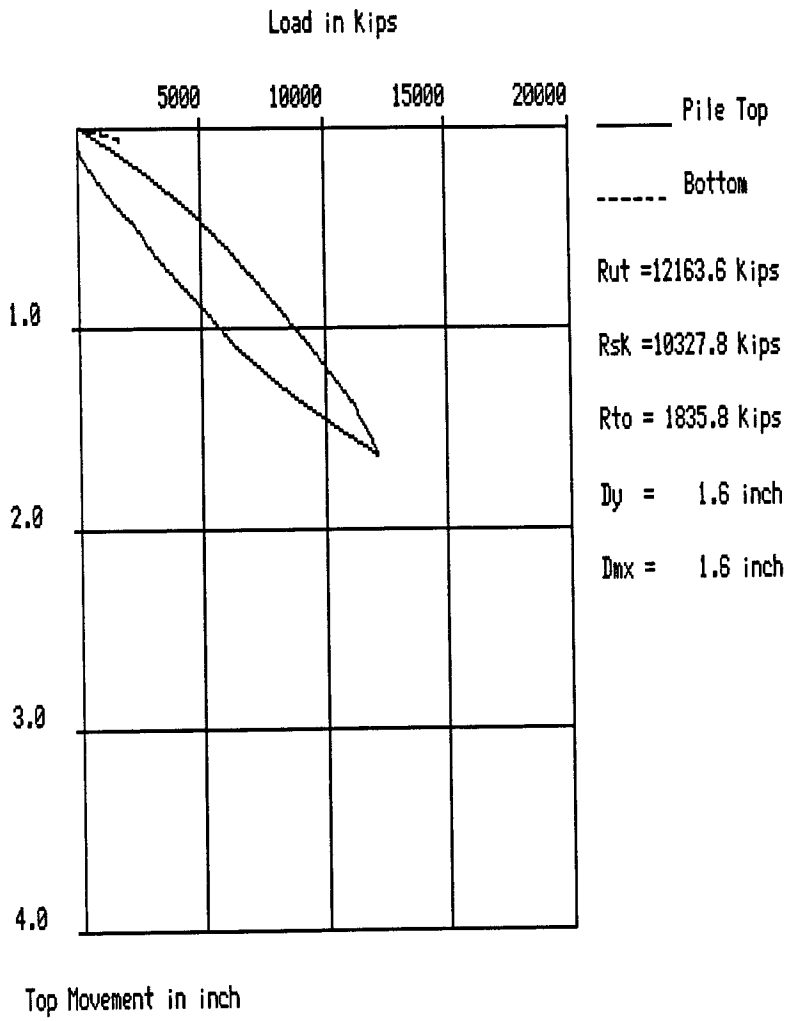




SFOBB PIDP, TP3D, MHU-1700, BoR Blow 2 02/13/01

Fugro-McClelland Marine Geosciences, Inc CAPWAP(R) Version 1.993-1

Dynamic D-Toe, E-P R-Toe



Rut =12163.6 Kips

Rsk =10327.8 Kips

Rto = 1835.8 Kips

Dy = 1.6 inch

Dmx = 1.6 inch

PILE 3
EOR, BLOW NO. 26, PDA 2

PILE 3
EOR, BLOW NO. 26, PDA 2

SFOBB PIDP, TP3D, MHU-1700, EoR
Fugro-McClelland Marine Geosciences, Inc

Blow No. 26 02/13/01
CAPWAP(R) Version 1.993-1

CAPWAP FINAL RESULTS

Final CAPWAP Capacity: Ru 14887.1 Skin 12655.1 Toe 2232.0 kips

Soil Sgmnt No.	Depth Below Gages ft	Depth Below Grade ft	Ru kips	Sum of Ru Up kips	Sum of Ru Down kips	Unit Resist. w. Respect to Depth kips/ft	Unit Resist. w. Respect to Area kips/f2	Smith Damping s/ft	Quake inch
				14887.1					
1	36.3	6.7	214.6	14672.6	214.6	32.54	1.26	.171	.194
2	42.9	13.3	230.3	14442.3	444.8	34.92	1.36	.171	.194
3	49.5	19.9	175.6	14266.7	620.5	26.64	1.03	.171	.194
4	56.1	26.5	79.3	14187.4	699.7	12.02	.47	.171	.194
5	62.6	33.0	40.7	14146.6	740.5	6.18	.24	.171	.194
6	69.2	39.6	49.8	14096.9	790.2	7.55	.29	.171	.194
7	75.8	46.2	51.5	14045.3	841.8	7.82	.30	.171	.194
8	82.4	52.8	69.6	13975.7	911.4	10.56	.41	.171	.194
9	89.0	59.4	109.0	13866.6	1020.5	16.54	.64	.171	.194
10	95.6	66.0	124.4	13742.2	1144.9	18.87	.73	.171	.194
11	102.2	72.6	129.3	13612.9	1274.2	19.61	.76	.171	.194
12	108.8	79.2	138.5	13474.4	1412.7	21.01	.82	.171	.194
13	115.4	85.8	119.7	13354.8	1532.4	18.15	.70	.171	.194
14	122.0	92.4	88.3	13266.5	1620.7	13.39	.52	.171	.194
15	128.6	99.0	86.0	13180.5	1706.6	13.04	.51	.171	.194
16	135.2	105.6	104.5	13075.9	1811.2	15.85	.62	.171	.194
17	141.8	112.2	120.7	12955.2	1931.9	18.31	.71	.171	.194
18	148.4	118.8	140.5	12814.7	2072.4	21.31	.83	.171	.194
19	155.0	125.4	158.0	12656.7	2230.4	23.96	.93	.171	.194
20	161.6	132.0	121.8	12534.9	2352.2	18.47	.72	.171	.194
21	168.2	138.6	27.5	12507.4	2379.7	4.18	.16	.171	.194
22	174.7	145.1	.0	12507.4	2379.7	.00	.00	.000	.194
23	181.3	151.7	160.5	12346.9	2540.2	24.34	.94	.171	.194
24	187.9	158.3	425.4	11921.5	2965.6	64.51	2.50	.171	.194
25	194.5	164.9	549.5	11372.0	3515.1	83.33	3.23	.171	.194
26	201.1	171.5	453.4	10918.6	3968.5	68.75	2.67	.171	.194
27	207.7	178.1	316.3	10602.3	4284.8	47.97	1.86	.171	.194
28	214.3	184.7	298.5	10303.8	4583.3	45.26	1.76	.171	.194
29	220.9	191.3	375.9	9927.9	4959.2	57.00	2.21	.171	.194

Soil Sgmnt No.	Depth Below Gages ft	Depth Below Grade ft	Ru kips	Sum of Ru Up kips	Sum of Ru Down kips	Unit Resist. w. Respect to Depth kips/ft	Unit Resist. w. Respect to Area kips/f2	Smith Damping s/ft	Quake inch
30	227.5	197.9	480.5	9447.4	5439.7	72.87	2.83	.171	.194
31	234.1	204.5	578.2	8869.2	6017.9	87.69	3.40	.171	.194
32	240.7	211.1	630.0	8239.2	6647.9	95.54	3.71	.171	.194
33	247.3	217.7	654.8	7584.4	7302.8	99.31	3.85	.171	.194
34	253.9	224.3	730.6	6853.7	8033.4	110.80	4.30	.171	.194
35	260.5	230.9	849.7	6004.0	8883.1	128.86	5.00	.171	.179
36	267.1	237.5	924.7	5079.3	9807.8	140.22	5.44	.171	.160
37	273.7	244.1	918.3	4161.0	10726.1	139.27	5.40	.171	.145
38	280.3	250.7	841.0	3320.0	11567.1	127.53	4.95	.171	.135
39	286.8	257.2	673.9	2646.1	12241.0	102.20	3.97	.171	.129
40	293.4	263.8	359.5	2286.6	12600.5	54.51	2.12	.171	.127
41	300.0	270.4	54.6	2232.0	12655.1	8.28	.32	.171	.127
42	306.6	277.0	.0	2232.0	12655.1	.00	.00	.000	.168
43	313.2	283.6	.0	2232.0	12655.1	.00	.00	.000	.194
44	319.8	290.2	.0	2232.0	12655.1	.00	.00	.000	.194
45	326.4	296.8	.0	2232.0	12655.1	.00	.00	.000	.194
46	333.0	303.4	.0	2232.0	12655.1	.00	.00	.000	.194
47	339.6	310.0	.0	2232.0	12655.1	.00	.00	.000	.104
Average Skin Values			269.3			40.82	1.58	.171	.177
Toe			2232.0				542.14	.339	.114

Soil Model Parameters/Extensions		Skin	Toe
Case Damping		1.503	.526
Unloading Level	(% of Ru)	5	
Soil Plug Weight	(kips)		1.06

SFOBB PIDP, TP3D, MHU-1700, EoR Blow No. 26 02/13/01
Fugro-McClelland Marine Geosciences, Inc CAPWAP(R) Version 1.993-1

EXTREMA TABLE

Pile Sgmnt No.	Depth Below Gages ft	max. Force kips	min. Force kips	max. Comp. Stress kips/in2	max. Tension Stress kips/in2	max. Trnsfd. Energy kips-ft	max. Veloc. ft/s	max. Displ. in
1	3.3	26284.2	-1476.9	32.56	-1.83	1076.86	17.3	.823
10	33.0	26120.6	-1685.0	32.36	-2.09	1074.52	17.3	.820
20	65.9	24195.9	-1683.3	29.98	-2.09	943.13	16.6	.780
30	98.9	22212.2	-1751.6	30.96	-2.44	872.86	16.8	.760
40	131.9	21039.7	-1993.9	29.33	-2.78	776.33	16.0	.710
51	168.2	19665.4	-2118.7	27.41	-2.95	657.20	15.2	.600
61	201.1	14922.1	-1866.0	31.95	-3.99	484.87	15.0	.480
71	234.1	12077.6	-1539.1	25.86	-3.29	281.32	11.3	.330
82	270.4	7124.1	-837.3	15.25	-1.79	89.22	6.7	.180
92	303.3	4342.9	-839.6	9.30	-1.80	41.31	5.2	.140
102	336.3	4439.9	-408.2	8.35	-.77	39.23	5.0	.120
103	339.6	4624.9	-403.0	7.80	-.68	40.48	5.0	.121
Absolute	194.5			34.92		(T=	32.9 ms)	
	194.5				-4.21	(T=	83.2 ms)	

CASE METHOD

	J=0.0	J=0.1	J=0.2	J=0.3	J=0.4	J=0.5	J=0.6	J=0.7	J=0.8	J=0.9
RS1	24193.	22038.	19884.	17729.	15574.	13419.	11264.	9109.	6954.	4799.
RMX	24193.	22038.	19884.	17729.	15574.	13419.	11264.	9109.	6954.	4799.
RSU	27864.	26077.	24289.	22501.	20713.	18925.	17137.	15350.	13562.	11774.
RA A2 W	302.	4199.	0.							

Current CAPWAP Ru= 14887.1; Corresponding J(Rs)= .43; J(Rx)= .43

VMAX	VFIN	V1*Z	F1	FMAX	DMAX	DFIN	EMAX	EFIN	R HF	R EN
17.26	-.562	4859.2	26284.2	26284.2	.823	-.355	1076.9	1010.6	26319.3	49945.2

SFOBB PIDP, TP3D, MHU-1700, EoR
Fugro-McClelland Marine Geosciences, Inc

Blow No. 26 02/13/01
CAPWAP(R) Version 1.993-1

PILE PROFILE AND PILE MODEL

Depth ft	Area in2	E-Modulus kips/in2	Spec. Weight kips/ft3	Circumf. ft
.00	807.20	30000.0	.492	25.770
90.25	807.20	30000.0	.492	25.770
90.25	717.40	30000.0	.492	25.770
188.60	717.40	30000.0	.492	25.770
188.60	467.10	30000.0	.492	25.770
334.60	467.10	30000.0	.492	25.770
334.60	592.80	30000.0	.492	25.770
339.60	592.80	30000.0	.492	25.770

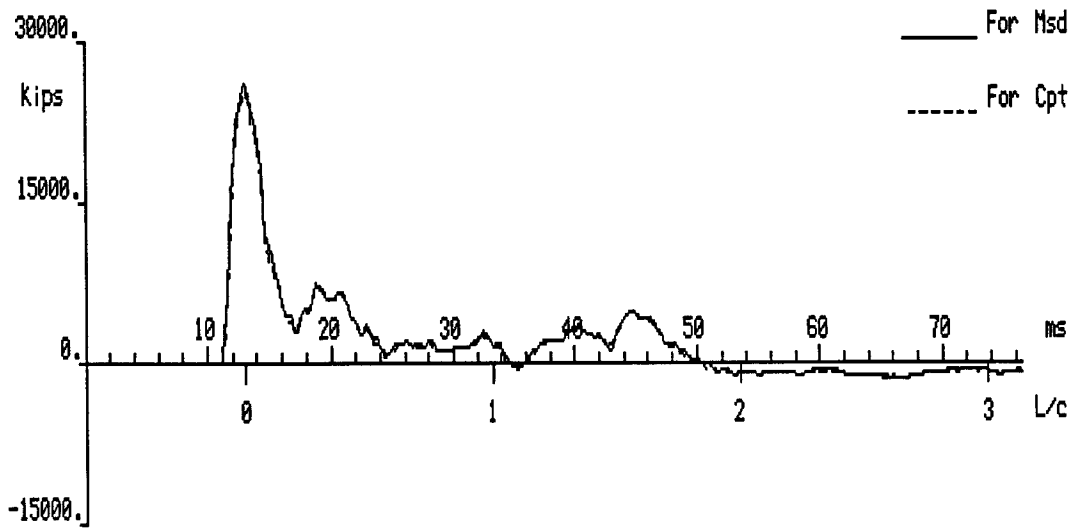
Toe Area 4.117 ft2

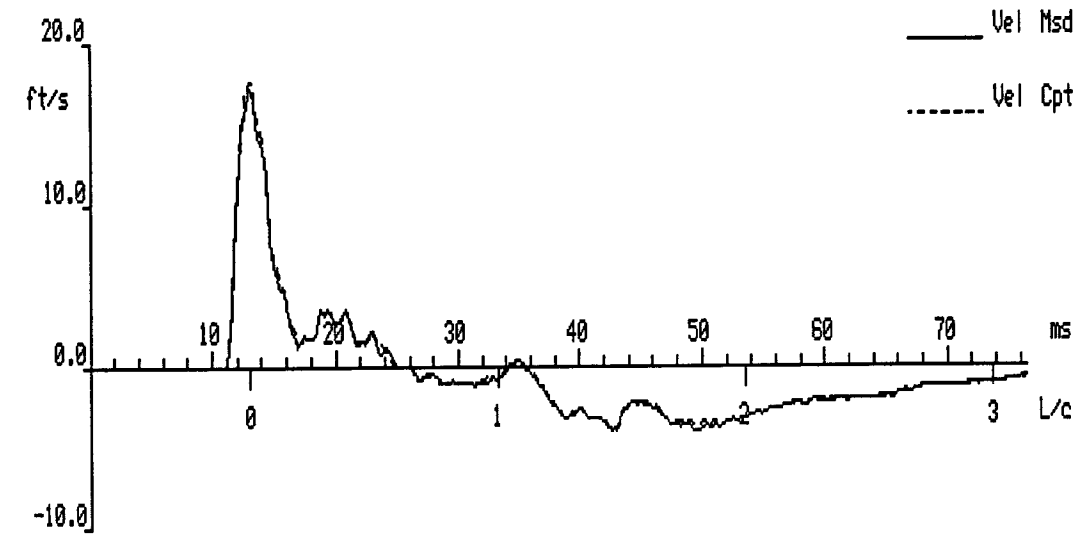
Segmnt No.	Depth B.G. feet	Impedance kips/ft/s	Imp. Change %	T. Slack inch	C. Slack inch	Circumf. feet
1	3.30	1440.51	.00	.000	.000	25.770
3	9.89	1440.51	.00	.000	.000	25.770
4	13.19	1440.51	.00	.000	.000	25.770
5	16.49	1440.51	.00	.000	.000	25.770
6	19.78	1440.51	.00	.000	.000	25.770
10	32.97	1440.51	.00	.000	.000	25.770
11	36.27	1440.51	.00	.000	.000	25.770
20	65.94	1440.51	.00	.000	.000	25.770
21	69.24	1440.51	.00	.000	.000	25.770
28	92.32	1339.97	.00	.000	.000	25.770
29	95.62	1280.25	.00	.000	.000	25.770
40	131.88	1280.26	.00	.000	.000	25.770
41	135.18	1280.25	.00	.000	.000	25.770
58	191.23	923.80	.00	.000	.000	25.770
59	194.53	833.58	.00	.000	.000	25.770
80	263.77	833.58	.00	.000	.000	25.770
102	336.30	949.46	.00	.000	.000	25.770
103	339.60	1057.90	.00	.000	.000	25.770

Pile Damping 1.0 %, Time Incr .196 ms, Wave Speed 16810.7 ft/s

SF088 PIDP, TP3D, MHU-1700, EoR Blow 26 02/13/01

Fugro-McClelland Marine Geosciences, Inc CAPWAP(R) Version 1.993-1



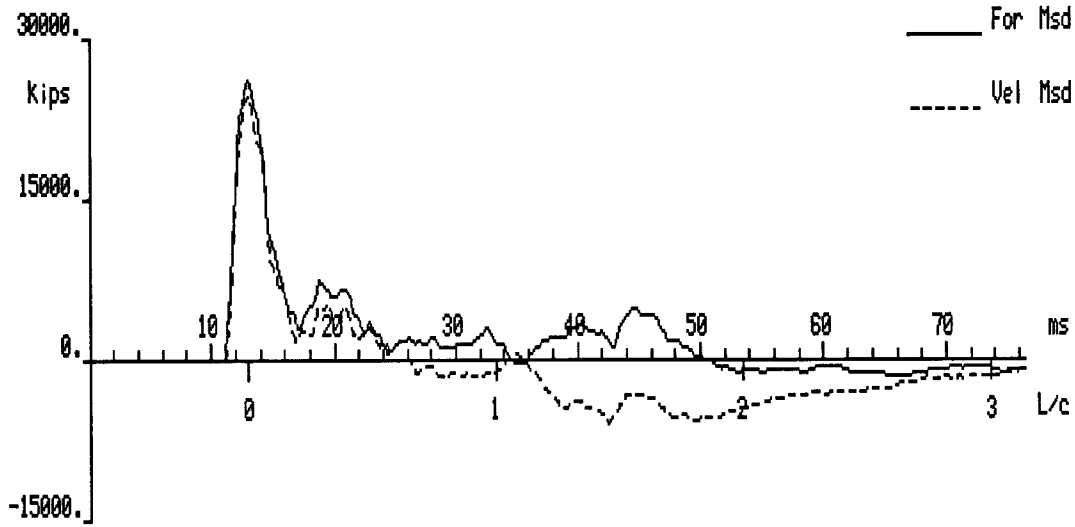


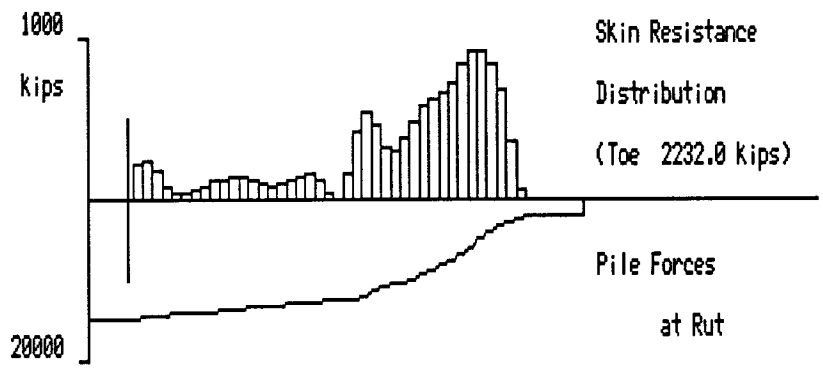
SFOBB PIDP, TP3D, MHU-1700, EoR

Blow 26 02/13/01

Fugro-McClelland Marine Geosciences, Inc

CAPWAP(R) Version 1.993-1





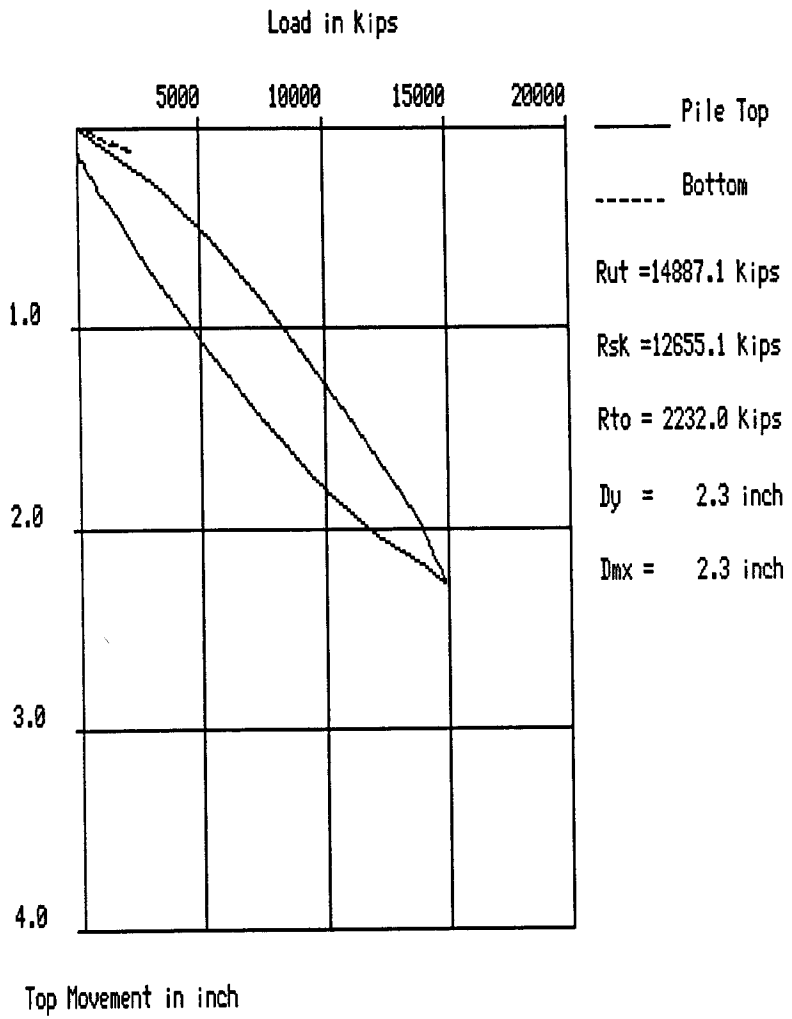
SFOBB PIDP, TP3D, MHU-1700, EoR

Blow 26 02/13/01

Fugro-McClelland Marine Geosciences, Inc

CAPWAP(R) Version 1.993-1

Dynamic D-Toe, E-P R-Toe



PILE 3
EOR, BLOW NO. 52, PDA 1

PILE 3
EOR, BLOW NO. 52, PDA 1

SFOBB PIDP, TP3D, MHU-1700, EoR
Fugro-McClelland Marine Geosciences, Inc

Blow No. 52 02/13/01
CAPWAP(R) Version 1.993-1

CAPWAP FINAL RESULTS

Final CAPWAP Capacity: Ru 13765.0 Skin 11500.0 Toe 2265.0 kips

Soil Sgmnt No.	Depth Below Gages ft	Depth Below Grade ft	Ru kips	Sum of Ru Up kips	Sum of Ru Down kips	Unit Resist. w. Respect to Depth kips/ft	Unit Resist. w. Respect to Area kips/f2	Smith Damping s/ft	Quake inch
				13765.0					
1	36.3	6.7	123.9	13641.1	123.9	18.79	.75	.200	.120
2	42.9	13.3	57.4	13583.7	181.3	8.71	.35	.200	.120
3	49.5	19.9	.0	13583.7	181.3	.00	.00	.200	.120
4	56.1	26.5	19.1	13564.5	200.5	2.90	.12	.200	.120
5	62.6	33.0	111.4	13453.1	311.9	16.90	.67	.200	.120
6	69.2	39.6	53.7	13399.4	365.6	8.14	.32	.200	.120
7	75.8	46.2	.0	13399.4	365.6	.00	.00	.200	.120
8	82.4	52.8	.0	13399.4	365.6	.00	.00	.200	.120
9	89.0	59.4	11.6	13387.8	377.2	1.76	.07	.200	.120
10	95.6	66.0	56.5	13331.3	433.7	8.57	.34	.200	.120
11	102.2	72.6	82.4	13248.9	516.1	12.49	.50	.200	.120
12	108.8	79.2	89.1	13159.8	605.2	13.52	.54	.200	.120
13	115.4	85.8	135.1	13024.6	740.3	20.49	.82	.200	.120
14	122.0	92.4	168.4	12856.3	908.7	25.53	1.02	.200	.120
15	128.6	99.0	137.6	12718.7	1046.3	20.87	.83	.200	.120
16	135.2	105.6	103.6	12615.1	1149.9	15.71	.63	.200	.120
17	141.8	112.2	114.6	12500.5	1264.5	17.39	.69	.200	.120
18	148.4	118.8	142.0	12358.5	1406.5	21.53	.86	.200	.120
19	155.0	125.4	167.9	12190.6	1574.4	25.46	1.01	.200	.120
20	161.6	132.0	145.6	12045.0	1720.0	22.07	.88	.200	.120
21	168.2	138.6	10.4	12034.6	1730.4	1.58	.06	.200	.120
22	174.7	145.1	.0	12034.6	1730.4	.00	.00	.200	.120
23	181.3	151.7	14.1	12020.5	1744.5	2.14	.09	.200	.120
24	187.9	158.3	407.3	11613.2	2151.8	61.77	2.46	.200	.120
25	194.5	164.9	586.7	11026.4	2738.6	88.98	3.54	.200	.120
26	201.1	171.5	399.9	10626.5	3138.5	60.65	2.41	.200	.120
27	207.7	178.1	179.9	10446.7	3318.3	27.28	1.09	.200	.120
28	214.3	184.7	182.1	10264.6	3500.4	27.61	1.10	.200	.120
29	220.9	191.3	340.4	9924.2	3840.8	51.62	2.05	.200	.120

Soil Sgmnt No.	Depth Below Gages ft	Depth Below Grade ft	Ru kips	Sum of Ru Up kips	Sum of Ru Down kips	Unit w. Respect to Depth kips/ft	Resist. Area kips/f2	Smith Damping s/ft	Quake inch
30	227.5	197.9	479.2	9445.0	4320.0	72.67	2.89	.200	.120
31	234.1	204.5	524.1	8920.9	4844.1	79.48	3.16	.200	.120
32	240.7	211.1	503.3	8417.6	5347.4	76.33	3.04	.200	.120
33	247.3	217.7	450.9	7966.7	5798.3	68.37	2.72	.200	.120
34	253.9	224.3	417.7	7549.0	6216.0	63.34	2.52	.200	.120
35	260.5	230.9	438.6	7110.4	6654.6	66.51	2.65	.200	.120
36	267.1	237.5	490.4	6620.0	7144.9	74.36	2.96	.200	.120
37	273.7	244.1	533.8	6086.2	7678.8	80.95	3.22	.200	.120
38	280.3	250.7	495.9	5590.4	8174.6	75.20	2.99	.200	.120
39	286.8	257.2	379.2	5211.2	8553.8	57.50	2.29	.200	.120
40	293.4	263.8	342.6	4868.6	8896.4	51.96	2.07	.200	.120
41	300.0	270.4	420.3	4448.3	9316.7	63.73	2.54	.200	.120
42	306.6	277.0	433.5	4014.8	9750.2	65.74	2.62	.200	.120
43	313.2	283.6	289.1	3725.7	10039.3	43.84	1.74	.200	.120
44	319.8	290.2	119.4	3606.3	10158.7	18.11	.72	.200	.120
45	326.4	296.8	159.8	3446.4	10318.6	24.24	.96	.200	.120
46	333.0	303.4	452.2	2994.2	10770.8	68.57	2.73	.200	.116
47	339.6	310.0	729.2	2265.0	11500.0	110.59	4.40	.200	.107
Average Skin Values			244.7			37.10	1.48	.200	.119
Toe			2265.0				550.16	.220	.110

Soil Model Parameters/Extensions		Skin	Toe
Case Damping		1.597	.346
Unloading Level	(% of Ru)	37	

SFOBB PIDP, TP3D, MHU-1700, EoR
Fugro-McClelland Marine Geosciences, Inc

Blow No. 52 02/13/01
CAPWAP(R) Version 1.993-1

EXTREMA TABLE

Pile Sgmnt No.	Depth Below Gages ft	max. Force kips	min. Force kips	max. Comp. Stress kips/in2	max. Tension Stress kips/in2	max. Trnsfd. Energy kips-ft	max. Veloc. ft/s	max. Displ. in
1	3.3	25718.8	-1200.0	31.86	-1.49	1080.83	17.1	.863
10	33.0	25378.0	-1477.6	31.44	-1.83	1078.29	17.3	.870
20	65.9	24464.6	-1508.3	30.31	-1.87	1007.89	16.9	.840
30	98.9	22845.9	-1391.3	31.85	-1.94	979.05	17.5	.820
40	131.9	21492.8	-1304.7	29.96	-1.82	851.11	16.4	.760
51	168.2	19790.6	-818.9	27.59	-1.14	705.88	15.4	.640
61	201.1	14963.5	-601.8	32.03	-1.29	517.06	15.3	.510
71	234.1	12375.7	-104.8	26.49	-.22	312.47	11.4	.360
82	270.4	7691.0	-9.9	16.47	-.02	129.55	7.6	.230
92	303.3	5296.7	-5.5	11.34	-.01	61.94	5.6	.160
102	336.3	3887.6	-4.1	7.31	-.01	35.03	4.8	.110
103	339.6	4293.6	-3.6	7.24	-.01	27.84	4.6	.114
Absolute	194.5			36.18		(T=	53.0 ms)	
	122.0				-2.19	(T=	87.9 ms)	

CASE METHOD

	J=0.0	J=0.1	J=0.2	J=0.3	J=0.4	J=0.5	J=0.6	J=0.7	J=0.8	J=0.9
RS1	23718.	21591.	19465.	17339.	15212.	13086.	10959.	8833.	6706.	4580.
RMX	23718.	21591.	19465.	17339.	15212.	13086.	10959.	8833.	6706.	4592.
RSU	26377.	24517.	22656.	20796.	18935.	17075.	15214.	13354.	11493.	9632.
RA A2 W	1643.	1408.	0.							

Current CAPWAP Ru= 13765.0; Corresponding J(Rs)= .47; J(Rx)= .47

VMAX	VFIN	V1*Z	F1	FMAX	DMAX	DFIN	EMAX	EFIN	R HF	R EN
17.09	-.302	4611.2	25718.8	25718.8	.863	-.017	1080.8	1008.3	25385.4	50129.3

SFOBB PIDP, TP3D, MHU-1700, EoR
Fugro-McClelland Marine Geosciences, Inc

Blow No. 52 02/13/01
CAPWAP(R) Version 1.993-1

PILE PROFILE AND PILE MODEL

Depth ft	Area in2	E-Modulus kips/in2	Spec. Weight kips/ft3	Circumf. ft
.00	807.20	30000.0	.492	25.130
90.25	807.20	30000.0	.492	25.130
90.25	717.40	30000.0	.492	25.130
188.60	717.40	30000.0	.492	25.130
188.60	467.10	30000.0	.492	25.130
334.60	467.10	30000.0	.492	25.130
334.60	592.80	30000.0	.492	25.130
339.60	592.80	30000.0	.492	25.130

Toe Area 4.117 ft2

Segmnt No.	Depth B.G. feet	Impedance kips/ft/s	Imp. Change %	T. Slack inch	C. Slack inch	Circumf. feet
1	3.30	1440.51	.00	.000	.000	25.130
3	9.89	1440.51	.00	.000	.000	25.130
4	13.19	1440.51	.00	.000	.000	25.130
5	16.49	1440.51	.00	.000	.000	25.130
6	19.78	1440.51	.00	.000	.000	25.130
10	32.97	1440.51	.00	.000	.000	25.130
11	36.27	1440.51	.00	.000	.000	25.130
20	65.94	1440.51	.00	.000	.000	25.130
21	69.24	1440.51	.00	.000	.000	25.130
28	92.32	1339.97	.00	.000	.000	25.130
29	95.62	1280.25	.00	.000	.000	25.130
40	131.88	1280.26	.00	.000	.000	25.130
41	135.18	1280.25	.00	.000	.000	25.130
58	191.23	923.80	.00	.000	.000	25.130
59	194.53	833.58	.00	.000	.000	25.130
80	263.77	833.58	.00	.000	.000	25.130
102	336.30	949.46	.00	.000	.000	25.130
103	339.60	1057.90	.00	.000	.000	25.130

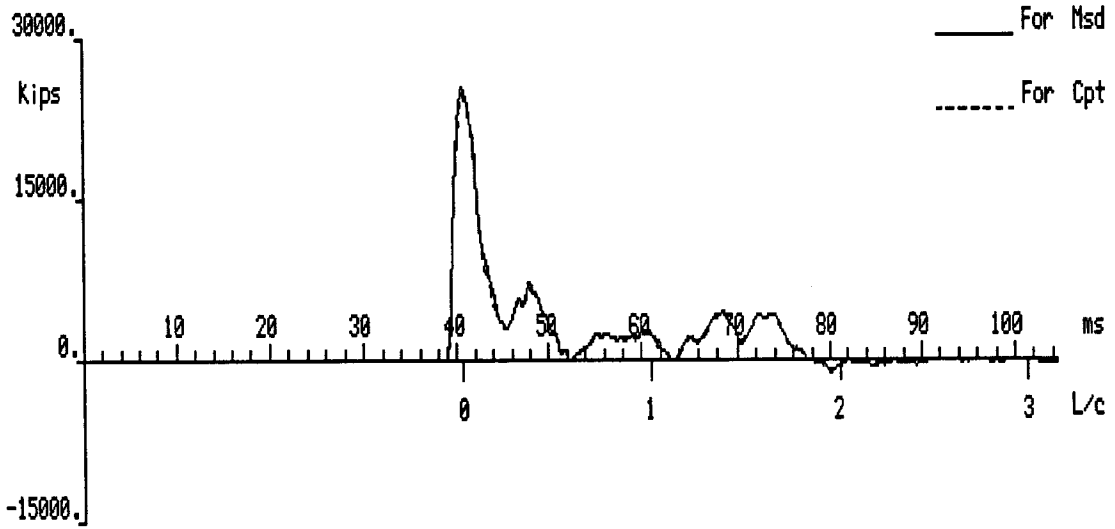
Pile Damping 1.0 %, Time Incr .196 ms, Wave Speed 16810.7 ft/s

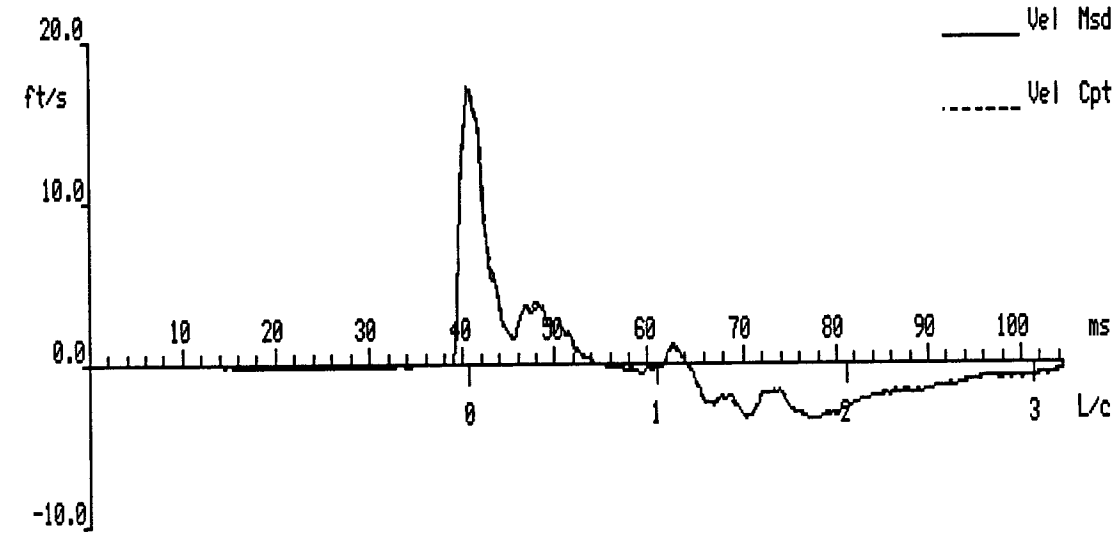
SFOBB PIDP, TP3D, MHU-1700, EoR

Fugro-McClelland Marine Geosciences, Inc

Blow 52 02/13/01

CAPWAP(R) Version 1.993-1



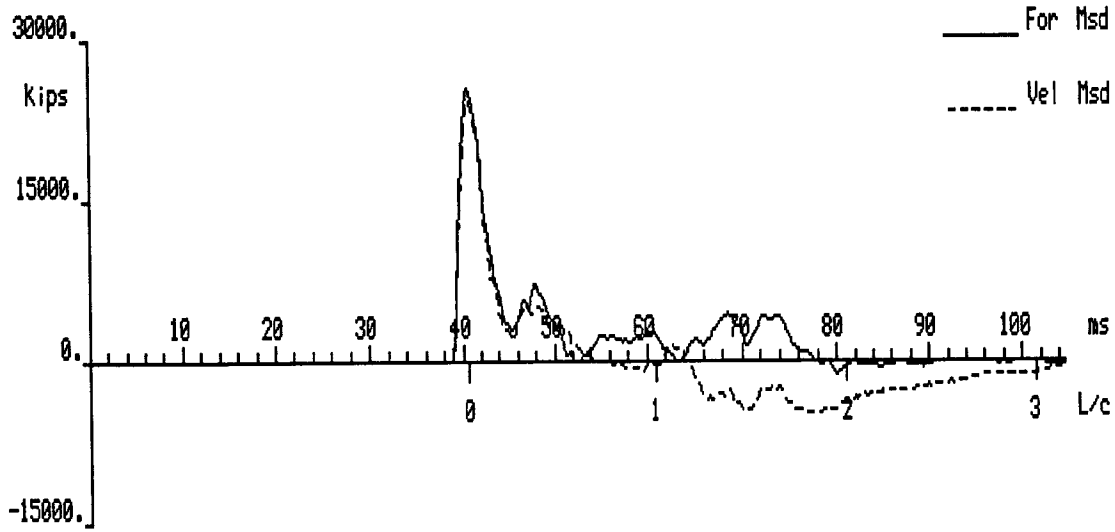


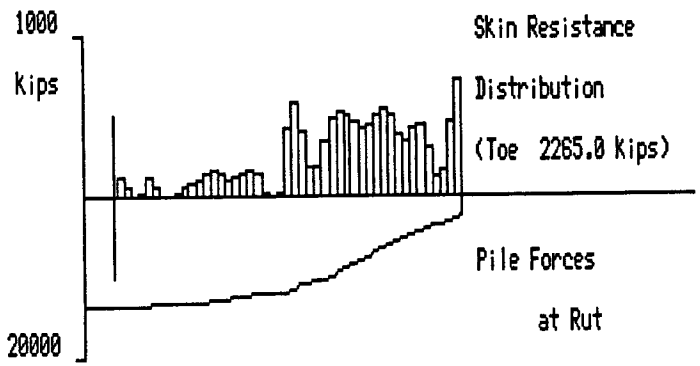
SFOBB PIDP, TP3D, MHU-1700, EoR

Blow 52 02/13/01

Fugro-McClelland Marine Geosciences, Inc

CAPWAP(R) Version 1.993-1

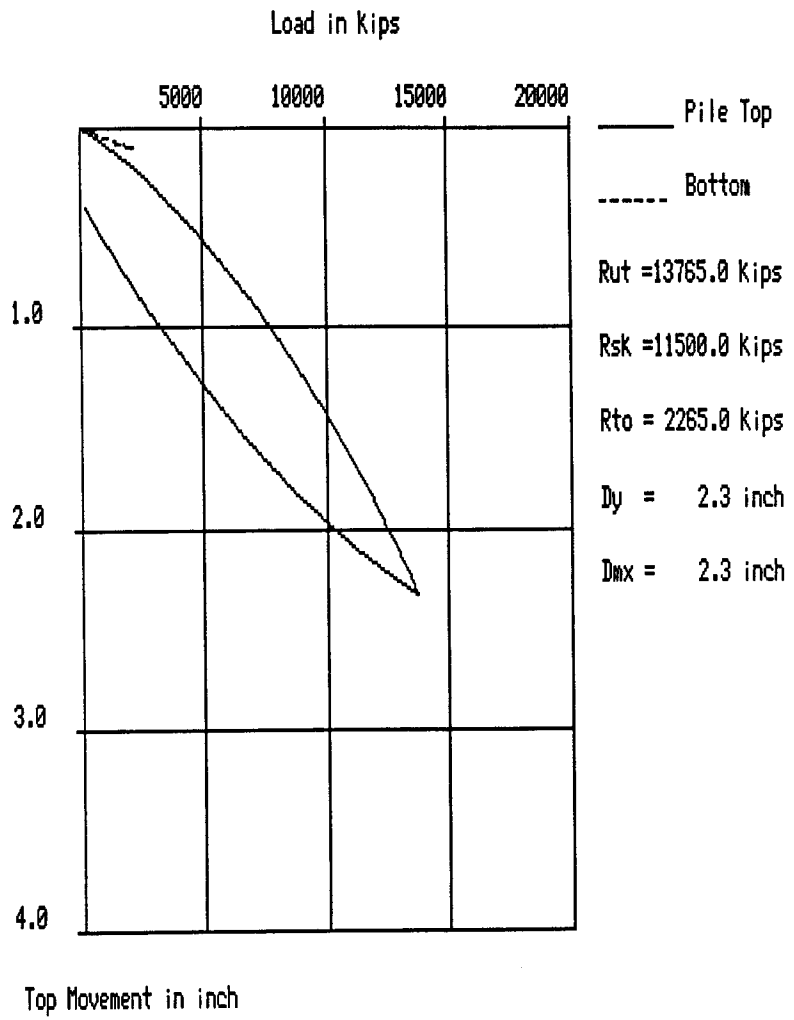




SFOBB PIDP, TP3D, MHU-1700, EoR Blow 52 02/13/01

Fugro-McClelland Marine Geosciences, Inc CAPWAP(R) Version 1.993-1

Dynamic D-Toe, E-P R-Toe



APPENDIX E
MENCK HAMMER RECORDS

PILE NO. 1

Pile No. 1

PILE 1, SECTION A

PILE 1, SECTION A

```
ALLSEAS   PILE DRIVING RECORD FROM MENCK MONITORING-SYSTEM  PAGE 01  23-10-2000

JOB INFORMATION

PILE CODE ........................... : A1
FILE NAME ........................... : MANSONA1
CLIENT .............................. : CAL.TRANS
PROJECT ............................. : BAY BRIDGE TEST
PLATFORM ............................ :
SHIPS NAME .......................... : DB 24
JOB NO .............................. : 40-00-044
CONTRACT NR ......................... :

HAMMER INFORMATION

HAMMER TYPE ......................... : MHU 500 T
SERIAL NO ........................... : 63038 (05)
POWERPACK ........................... : FISCHON 1600L
CONFIGURATION ....................... : FREE RIDING..................._
CONTROL UNIT NO ..................... : _............................_
BLOW COUNTER ON PANEL ............... : 0............................_

PARAMETER INFORMATION

PRINTER LOGGING DISTANCE ............ : 0.25........................._
LOWER REVERSAL TIME VARIABLE 0-400ms  :    relative stair

UPPER REVERSAL AUTOMATICALLY
DIFF PRESS SENSORS
START POINT AT ..............mbar  :    _............................_
STOP POINT AT ...............mbar  :    _............................_

PILE INFORMATION

OUTSIDE DIAMETER ............."     :    96
WALL THICKNESS ..............."     :    1.9/16
LENGTH ..................feet      :    100 PER PILE
SELF PENETR. PILE .......feet      :    20
SELF PENETR.W.HAMMER ....feet      :    20

REMARK :   Eph := ENERGY FROM HYDRAULIC AND FREE FALL
           Eff := IMPACT ENERGY  /  Eph
           k   := IMPACT ENERGY  /  DESIGN ENERGY

NTSv421  OLDv234  HUBv222  PICv105  TXTv517  GPAv205  GMHv006  USSv000
```

ALLSEAS PILE DRIVING RECORD MHU 500 T MONITORING-SYSTEM PAGE 2 23-10-2000

From File MANSONA1

Time hh:mm:ss	Blow No	St- Blow 1/min	Ene- roke cm	Ene- rgy kNm	Oil- flow l/min	Oil- temp. C	Oilpres. PP bar	Dif1 Hammer bar	Dif2 mbar	Water mbar	Eph Press. bar	k Usage kNm	Mech Eff

8:39:47 DATAOUTPUT ON THE FUGRO-PORT TERMINATE

8:41:38 CH1 SENSOR WAS DETECTED AS DEFECT BUT IS STILL FUNCTIONING

8:41:38 MH_22 SENSOR WAS DETECTED AS DEFECT BUT IS STILL FUNCTIONING

8:41:38 MH_21 SENSOR WAS DETECTED AS DEFECT BUT IS STILL FUNCTIONING

8:41:38 MH_12 SENSOR WAS DETECTED AS DEFECT BUT IS STILL FUNCTIONING

8:41:38 MH_11 SENSOR WAS DETECTED AS DEFECT BUT IS STILL FUNCTIONING

8:41:41 IGNORE SENSOR CH1 DEFECT

8:41:41 I lost the electric connection to the ultrasonic sensor

8:41:41 IGNORE SENSOR MH_21 DEFECT

8:41:42 IGNORE SENSOR MH_12 DEFECT

8:41:42 IGNORE SENSOR MH_11 DEFECT

8:41:42 I MUST STOP WY TO MANY STROKE SENSOR'S DEFECT

9:18:37 STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED

10:18:29 START HAMMER OPERATION IN SINGLE BLOW MODE

10:19:13 START HAMMER OPERATION IN SINGLE BLOW MODE

ALLSEAS PILE DRIVING RECORD MHU 500 T MONITORING-SYSTEM PAGE 3 23-10-2000

From File _____

Time hh:mm:ss	Blow No	Blow 1/min	St-roke cm	Ene-rgy kNm	Oil-flow l/min	Oil-temp. C	Oilpres. PP bar	Dif1 Hammer bar	Dif2 mbar	Water mbar	Eph Press. bar	k Usage kNm	Mech Eff
10:19:19	START HAMMER OPERATION IN SINGLE BLOW MODE												
10:19:26	START HAMMER OPERATION IN SINGLE BLOW MODE												
10:19:44	START HAMMER OPERATION IN SINGLE BLOW MODE												
10:19:49	START HAMMER OPERATION IN SINGLE BLOW MODE												
10:19:54	START HAMMER OPERATION IN SINGLE BLOW MODE												
10:20:00	START HAMMER OPERATION IN SINGLE BLOW MODE												
10:20:08	START HAMMER OPERATION IN SINGLE BLOW MODE												
10:20:13	START HAMMER OPERATION IN SINGLE BLOW MODE												
10:20:19	START HAMMER OPERATION IN SINGLE BLOW MODE												
10:20:25	START HAMMER OPERATION IN SINGLE BLOW MODE												
10:20:31	START HAMMER OPERATION IN SINGLE BLOW MODE												
10:20:36	START HAMMER OPERATION IN SINGLE BLOW MODE												
10:20:42	START HAMMER OPERATION IN SINGLE BLOW MODE												
10:20:47	START HAMMER OPERATION IN SINGLE BLOW MODE												
10:21:00	START HAMMER OPERATION IN SINGLE BLOW MODE												

```
ALLSEAS   PILE DRIVING RECORD   MHU 500 T MONITORING-SYSTEM  PAGE  4 23-10-2000

From File ________   St- Ene-  Oil- Oil- Oilpres. Dif1 Dif2 Water  Eph   k  Mech
Time    Blow  Blow roke rgy  flow temp. PP Hammer          Press.    Usage  Eff
hh:mm:ss  No   1/min cm  kNm  l/min  C   bar bar  mbar mbar  bar   kNm

 10:21:07  START HAMMER OPERATION IN SINGLE BLOW MODE

 10:21:15  START HAMMER OPERATION IN SINGLE BLOW MODE

 10:21:23  START HAMMER OPERATION IN SINGLE BLOW MODE

 10:21:30  START HAMMER OPERATION IN SINGLE BLOW MODE

 10:21:37  START HAMMER OPERATION IN SINGLE BLOW MODE

 10:21:44  START HAMMER OPERATION IN SINGLE BLOW MODE

 10:21:50  START HAMMER OPERATION IN SINGLE BLOW MODE

 10:21:58  START HAMMER OPERATION IN SINGLE BLOW MODE

 10:22:10  START HAMMER OPERATION IN SINGLE BLOW MODE

 10:22:19  START HAMMER OPERATION IN SINGLE BLOW MODE

 10:22:27  START HAMMER OPERATION IN SINGLE BLOW MODE

 10:22:44  START HAMMER OPERATION IN SINGLE BLOW MODE

 10:22:51  START HAMMER OPERATION IN SINGLE BLOW MODE

 10:22:59  START HAMMER OPERATION IN SINGLE BLOW MODE

 10:23:05  START HAMMER OPERATION IN SINGLE BLOW MODE
```

ALLSEAS PILE DRIVING RECORD MHU 500 T MONITORING-SYSTEM PAGE 5 23-10-2000

From File _____

Time hh:mm:ss	Blow No	Blow 1/min	St-roke cm	Ene-rgy kNm	Oil-flow l/min	Oil-temp. C	Oilpres. PP bar	Dif1 Hammer bar	Dif2 mbar	Water mbar	Press. bar	Eph kNm	k Usage	Mech Eff
10:23:15	STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED													
10:23:29	START HAMMER OPERATION IN STROKE SEQUENCE MODE													
10:24:02	42	25.8	20	83	0	21.5	176	195	0	0	0.0	95	0.17	0.88
10:24:22	52	29.5	16	59	0	22.2	178	195	0	0	0.0	75	0.12	0.79
10:24:40	62	29.6	16	59	0	22.3	177	196	0	0	0.0	77	0.12	0.76
10:24:59	72	26.2	16	58	0	22.2	179	196	0	0	0.0	75	0.12	0.77
10:25:16	82	31.8	16	59	0	22.2	177	195	0	0	0.0	75	0.12	0.79
10:25:31	92	38.2	16	59	0	22.3	175	195	0	0	0.0	76	0.12	0.78
10:25:47	102	39.4	16	59	0	22.6	177	195	0	0	0.0	76	0.12	0.78
10:26:02	112	38.6	16	60	0	22.3	181	196	0	0	0.0	75	0.12	0.79
10:26:17	122	39.1	16	60	0	22.5	179	195	0	0	0.0	75	0.12	0.80
10:26:33	132	38.8	16	60	0	22.3	176	196	0	0	0.0	76	0.12	0.80
10:26:48	142	38.7	16	60	0	22.6	180	196	0	0	0.0	76	0.12	0.79
10:27:04	152	38.9	16	60	0	22.5	179	195	0	0	0.0	75	0.12	0.80
10:27:19	162	38.5	16	60	0	22.7	182	195	0	0	0.0	74	0.12	0.81
10:27:35	172	38.9	16	60	0	22.4	177	196	0	0	0.0	76	0.12	0.80
10:27:51	182	38.2	16	60	0	22.8	178	196	0	0	0.0	75	0.12	0.80
10:28:06	192	38.2	16	60	0	22.8	176	196	0	0	0.0	76	0.12	0.80
10:28:22	202	37.8	16	60	0	22.6	177	196	0	0	0.0	75	0.12	0.80
10:28:38	212	38.3	16	61	0	22.8	183	198	0	0	0.0	76	0.12	0.81
10:28:54	222	39.5	16	61	0	22.9	180	197	0	0	0.0	75	0.12	0.81
10:29:07	CH1 SENSOR WAS DETECTED AS DEFECT BUT IS STILL FUNCTIONING													
10:29:10	232	36.1	16	60	0	22.6	181	198	0	0	0.0	76	0.12	0.80
10:29:23	IGNORE SENSOR CH1 DEFECT													
10:29:25	242	38.0	16	61	0	22.9	182	198	0	0	0.0	75	0.12	0.82
10:29:39	252	30.8	20	83	0	22.9	178	198	0	0	0.0	95	0.17	0.88
10:29:55	262	41.0	14	52	0	22.9	180	198	0	0	0.0	67	0.10	0.78
10:30:12	272	34.7	14	51	0	22.7	180	197	0	0	0.0	66	0.10	0.78
10:30:29	282	34.7	14	51	0	22.8	181	197	0	0	0.0	67	0.10	0.77
10:30:46	292	34.7	14	51	0	22.8	177	196	0	0	0.0	65	0.10	0.78
10:31:04	302	34.6	14	51	0	23.1	180	197	0	0	0.0	67	0.10	0.77
10:31:21	312	34.5	14	51	0	23.1	177	196	0	0	0.0	66	0.10	0.77
10:31:38	322	34.4	14	51	0	23.0	181	197	0	0	0.0	66	0.10	0.77
10:31:56	332	34.3	14	51	0	23.3	178	197	0	0	0.0	66	0.10	0.77
10:32:13	342	34.4	14	51	0	23.3	179	197	0	0	0.0	67	0.10	0.76
10:32:31	352	34.4	14	51	0	22.8	179	197	0	0	0.0	65	0.10	0.79
10:32:48	362	34.5	14	50	0	23.5	178	198	0	0	0.0	67	0.10	0.74

ALLSEAS PILE DRIVING RECORD MHU 500 T MONITORING-SYSTEM PAGE 6 23-10-2000

From File _____

Time hh:mm:ss	Blow No	Blow 1/min	St-roke cm	Ene-rgy kNm	Oil-flow l/min	Oil-temp. C	Oilpres. PP bar	Hammer bar	Dif1 mbar	Dif2 mbar	Water Press. bar	Eph Usage kNm	k	Mech Eff
10:33:05	372	34.5	14	51	0	23.2	181	197	0	0	0.0	66	0.10	0.77
10:33:23	382	34.7	14	51	0	23.3	180	197	0	0	0.0	66	0.10	0.77
10:33:40	392	34.6	14	51	0	23.1	177	197	0	0	0.0	66	0.10	0.77
10:33:58	402	34.4	14	51	0	23.7	183	196	0	0	0.0	66	0.10	0.77
10:34:15	412	34.6	14	51	0	23.7	179	196	0	0	0.0	66	0.10	0.77
10:34:33	422	35.1	14	49	0	24.2	178	195	0	0	0.0	67	0.10	0.74
10:34:50	432	34.7	14	49	0	24.1	181	196	0	0	0.0	67	0.10	0.74
10:35:07	442	34.9	14	49	0	24.6	176	196	0	0	0.0	65	0.10	0.74
10:35:24	452	34.5	14	49	0	23.9	181	196	0	0	0.0	65	0.10	0.76
10:35:41	462	34.8	14	49	0	24.4	178	195	0	0	0.0	65	0.10	0.75
10:35:58	472	35.0	14	50	0	24.8	181	196	0	0	0.0	67	0.10	0.74
10:36:15	482	35.0	14	50	0	24.7	179	196	0	0	0.0	65	0.10	0.78
10:36:33	492	34.6	14	50	0	24.9	180	197	0	0	0.0	66	0.10	0.76
10:36:50	502	34.3	14	51	0	25.4	179	197	0	0	0.0	66	0.10	0.77
10:37:08	512	34.1	14	51	0	25.2	178	197	0	0	0.0	65	0.10	0.78
10:37:25	522	34.7	14	50	0	25.8	181	197	0	0	0.0	67	0.10	0.75
10:37:42	532	34.1	14	49	0	25.4	179	197	0	0	0.0	66	0.10	0.74
10:38:00	542	34.8	14	50	0	25.0	179	196	0	0	0.0	66	0.10	0.75
10:38:17	552	34.7	14	49	0	25.8	181	194	0	0	0.0	65	0.10	0.76
10:38:34	562	33.6	14	48	0	25.6	176	195	0	0	0.0	66	0.10	0.73
10:38:51	572	34.1	14	49	0	25.6	176	196	0	0	0.0	66	0.10	0.75
10:39:09	582	34.5	14	49	0	25.7	180	195	0	0	0.0	66	0.10	0.74
10:39:26	592	34.1	14	49	0	25.8	178	195	0	0	0.0	65	0.10	0.75
10:39:43	602	34.0	14	49	0	25.8	178	195	0	0	0.0	65	0.10	0.75
10:40:01	612	34.5	14	49	0	25.8	180	195	0	0	0.0	66	0.10	0.75

10:40:01 STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED

10:50:23 STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED

11:09:20 START HAMMER OPERATION IN STROKE SEQUENCE MODE

11:09:51	622	35.0	14	49	0	30.4	177	195	0	0	0.0	66	0.10	0.75
11:10:09	632	35.1	14	49	0	30.8	181	196	0	0	0.0	67	0.10	0.74
11:10:25	642	35.2	14	49	0	30.9	178	196	0	0	0.0	67	0.10	0.73
11:10:42	652	35.6	14	50	0	31.0	181	197	0	0	0.0	66	0.10	0.75
11:10:58	662	37.2	14	50	0	30.7	178	198	0	0	0.0	67	0.10	0.74

11:11:13 CH1 SENSOR WAS DETECTED AS DEFECT BUT IS STILL FUNCTIONING

11:11:14	672	36.1	14	49	0	31.0	175	197	0	0	0.0	67	0.10	0.72
11:11:31	682	34.0	14	49	0	31.0	176	196	0	0	0.0	66	0.10	0.74
11:11:47	692	30.0	14	49	0	31.0	182	197	0	0	0.0	67	0.10	0.73

ALLSEAS PILE DRIVING RECORD MHU 500 T MONITORING-SYSTEM PAGE 7 23-10-2000

From File _____

Time hh:mm:ss	Blow No	Blow 1/min	St-roke cm	Ene-rgy kNm	Oil-flow l/min	Oil-temp. C	Oilpres. PP bar	Hammer bar	Dif1 mbar	Dif2 mbar	Water Press. bar	Eph Usage kNm	k	Mech Eff
11:12:01	702	39.8	14	49	0	31.1	180	196	0	0	0.0	66	0.10	0.74
11:12:16	712	37.7	14	49	0	31.3	180	196	0	0	0.0	66	0.10	0.74
11:12:31	722	39.0	14	49	0	31.2	180	196	0	0	0.0	66	0.10	0.74
11:12:46	732	39.1	14	49	0	30.7	178	197	0	0	0.0	67	0.10	0.73
11:13:01	742	38.8	14	49	0	31.4	177	195	0	0	0.0	65	0.10	0.75
11:13:16	752	39.6	14	49	0	31.1	179	195	0	0	0.0	66	0.10	0.75
11:13:32	762	39.6	14	49	0	31.4	178	195	0	0	0.0	66	0.10	0.75
11:13:47	772	39.3	14	49	0	31.3	179	195	0	0	0.0	65	0.10	0.75
11:14:02	782	39.8	14	49	0	31.0	178	195	0	0	0.0	66	0.10	0.75
11:14:17	792	39.1	14	50	0	30.8	177	197	0	0	0.0	65	0.10	0.76
11:14:33	802	38.9	14	49	0	31.0	180	197	0	0	0.0	67	0.10	0.73
11:14:48	812	38.8	14	49	0	31.2	180	197	0	0	0.0	66	0.10	0.74
11:15:03	822	39.3	14	50	0	31.0	182	196	0	0	0.0	66	0.10	0.75
11:15:19	832	39.0	14	50	0	30.6	180	196	0	0	0.0	66	0.10	0.75
11:15:34	842	38.8	14	49	0	30.6	180	196	0	0	0.0	67	0.10	0.74
11:15:49	852	39.2	14	49	0	30.9	178	196	0	0	0.0	66	0.10	0.74
11:16:05	862	38.8	14	49	0	30.4	179	197	0	0	0.0	66	0.10	0.74

11:16:14 STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED

11:17:12 C1 HAS REPORTED HAMMER NOT ON PILE

PILE 1, SECTION B

PILE 1, SECTION B

```
ALLSEAS   PILE DRIVING RECORD FROM MENCK MONITORING-SYSTEM  PAGE 01  30-10-2000

JOB INFORMATION

PILE CODE ........................... : B1
FILE NAME ........................... : MANSONB1
CLIENT .............................. : CAL.TRANS
PROJECT ............................. : BAY BRIDGE TEST
PLATFORM ............................ :
SHIPS NAME .......................... : DB 24
JOB NO .............................. : 40-00-044
CONTRACT NR ......................... :

HAMMER INFORMATION

HAMMER TYPE ......................... : MHU 500 T
SERIAL NO ........................... : 63038 (05)
POWERPACK ........................... : FISCHON 1600L
CONFIGURATION ....................... : FREE RIDING..................._
CONTROL UNIT NO ..................... : _............................_
BLOW COUNTER ON PANEL ............... : 0............................_

PARAMETER INFORMATION

PRINTER LOGGING DISTANCE ............ : 0.25........................._
LOWER REVERSAL TIME VARIABLE 0-400ms  :    relative stair

UPPER REVERSAL AUTOMATICALLY
DIFF PRESS SENSORS
START POINT AT ..............mbar  :    _............................_
STOP POINT AT ...............mbar  :    _............................_

PILE INFORMATION

OUTSIDE DIAMETER ............."     :    96
WALL THICKNESS ..............."     :    1.9/16
LENGTH ..................feet      :    100 PER PILE
SELF PENETR. PILE .......feet      :    6 Meter
SELF PENETR.W.HAMMER ....feet      :    15,5 Meter

REMARK :   Eph := ENERGY FROM HYDRAULIC AND FREE FALL
           Eff := IMPACT ENERGY  /  Eph
           k   := IMPACT ENERGY  /  DESIGN ENERGY

NTSv421  OLDv234  HUBv222  PICv105  TXTv517  GPAv205  GMHv006  USSv000
```

ALLSEAS PILE DRIVING RECORD MHU 500 T MONITORING-SYSTEM PAGE 2 30-10-2000

From File MANSONB1

Time hh:mm:ss	Blow No	St- roke 1/min	Ene- rgy cm	Oil- flow kNm	Oil- temp. l/min	Oilpres. PP C	Dif1 Hammer bar	Dif2 bar	Water mbar	mbar	Press. bar	Eph kNm	k Usage	Mech Eff
16:00:54														
16:00:54	STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED													
16:33:45	PENETRATION - 1													
16:58:20	START HAMMER OPERATION IN SINGLE BLOW MODE													
16:59:13	START HAMMER OPERATION IN SINGLE BLOW MODE													
16:59:25	START HAMMER OPERATION IN SINGLE BLOW MODE													
16:59:38	START HAMMER OPERATION IN SINGLE BLOW MODE													
16:59:47	START HAMMER OPERATION IN STROKE SEQUENCE MODE													
17:00:05	14	33.2	18	72	0	23.9	179	189	0	0	0.0	84	0.14	0.86
17:00:23	24	40.4	14	10	0	24.2	182	190	0	0	0.0	65	0.02	0.15
17:00:43	34	27.3	26	113	0	24.2	180	190	0	0	0.0	121	0.23	0.93
17:01:03	44	33.0	24	105	0	24.2	182	192	0	0	0.0	113	0.21	0.93
17:01:21	54	33.6	24	105	0	24.5	183	191	0	0	0.0	112	0.21	0.93
17:01:39	64	33.4	24	105	0	24.4	182	192	0	0	0.0	112	0.21	0.94
17:01:56	74	33.7	24	104	0	24.6	184	191	0	0	0.0	112	0.21	0.93

ALLSEAS PILE DRIVING RECORD MHU 500 T MONITORING-SYSTEM PAGE 01 3 30-10-2000

From File _____

Time hh:mm:ss	Blow No	Blow 1/min	St-roke cm	Ene-rgy kNm	Oil-flow l/min	Oil-temp. C	Oilpres. PP bar	Hammer bar	Dif1 mbar	Dif2 mbar	Water Press. bar	Eph Usage kNm	k	Mech Eff
17:02:14	84	33.6	24	107	0	24.5	184	192	0	0	0.0	111	0.21	0.96
17:02:32	94	33.3	24	105	0	24.3	181	193	0	0	0.0	113	0.21	0.93
17:02:50	104	33.4	24	104	0	24.3	180	191	0	0	0.0	113	0.21	0.93
17:03:08	114	33.3	24	104	0	24.6	183	191	0	0	0.0	111	0.21	0.93
17:03:27	124	34.7	36	160	0	24.5	185	192	0	0	0.0	168	0.32	0.95
17:03:45	134	33.9	36	159	0	24.5	186	193	0	0	0.0	169	0.32	0.94
17:04:02	144	33.9	36	159	0	24.3	185	193	0	0	0.0	170	0.32	0.94
17:04:20	154	33.7	36	159	0	24.5	184	192	0	0	0.0	168	0.32	0.94
17:04:38	164	33.6	36	159	0	24.4	186	194	0	0	0.0	169	0.32	0.94
17:04:56	174	33.7	36	159	0	24.1	185	194	0	0	0.0	170	0.32	0.94
17:05:14	184	33.5	36	159	0	24.3	187	195	0	0	0.0	169	0.32	0.94
17:05:32	194	33.3	36	160	0	24.5	186	194	0	0	0.0	169	0.32	0.95
17:05:50	204	33.1	36	161	0	24.5	189	194	0	0	0.0	169	0.32	0.95
17:06:08	214	32.9	36	161	0	24.6	187	195	0	0	0.0	170	0.32	0.95
17:06:26	224	33.1	36	161	0	24.5	186	194	0	0	0.0	169	0.32	0.96
17:06:44	234	33.2	36	160	0	24.7	185	194	0	0	0.0	169	0.32	0.95
17:07:02	244	33.1	36	161	0	24.6	187	195	0	0	0.0	169	0.32	0.95
17:07:20	254	33.0	36	161	0	24.3	187	195	0	0	0.0	169	0.32	0.95
17:07:39	264	33.0	36	161	0	24.5	186	194	0	0	0.0	169	0.32	0.95
17:07:57	274	33.3	36	161	0	24.5	188	195	0	0	0.0	169	0.32	0.95
17:08:14	284	35.4	34	150	0	24.5	186	194	0	0	0.0	160	0.30	0.94
17:08:32	294	33.9	34	150	0	24.5	185	194	0	0	0.0	160	0.30	0.94
17:08:50	304	33.3	34	151	0	24.6	186	194	0	0	0.0	159	0.30	0.95
17:09:07	314	33.5	34	150	0	24.1	184	193	0	0	0.0	160	0.30	0.94
17:09:25	324	32.8	34	150	0	24.7	186	194	0	0	0.0	160	0.30	0.94
17:09:44	334	33.2	34	150	0	24.5	186	192	0	0	0.0	158	0.30	0.95
17:10:02	344	33.1	34	149	0	24.5	184	193	0	0	0.0	159	0.30	0.94
17:10:20	354	33.2	34	149	0	24.6	185	191	0	0	0.0	159	0.30	0.94
17:10:38	364	33.4	34	149	0	23.9	182	191	0	0	0.0	159	0.30	0.94
17:10:56	374	32.9	34	151	0	24.1	184	192	0	0	0.0	159	0.30	0.95
17:11:14	384	33.2	34	148	0	24.3	182	191	0	0	0.0	158	0.30	0.94
17:11:32	394	33.3	34	148	0	24.7	183	191	0	0	0.0	160	0.30	0.93
17:11:50	404	33.3	34	149	0	24.4	186	192	0	0	0.0	160	0.30	0.93
17:12:08	414	33.3	34	149	0	24.8	185	192	0	0	0.0	159	0.30	0.93
17:12:27	424	33.1	34	149	0	24.6	183	192	0	0	0.0	160	0.30	0.93
17:12:45	434	33.2	34	149	0	24.4	184	192	0	0	0.0	159	0.30	0.94
17:13:03	444	33.0	34	149	0	24.4	184	192	0	0	0.0	160	0.30	0.93
17:13:21	454	30.6	40	179	0	24.6	187	194	0	0	0.0	187	0.36	0.96
17:13:41	464	36.8	44	195	0	24.6	193	200	0	0	0.0	208	0.39	0.94
17:13:58	474	34.2	44	192	0	24.6	189	198	0	0	0.0	207	0.38	0.93
17:14:16	484	33.5	44	191	0	24.9	190	197	0	0	0.0	208	0.38	0.92
17:14:34	494	33.2	44	191	0	24.9	191	197	0	0	0.0	207	0.38	0.92
17:14:52	504	33.2	44	190	0	24.9	191	198	0	0	0.0	207	0.38	0.92
17:15:10	514	33.2	44	190	0	24.8	190	197	0	0	0.0	207	0.38	0.92
17:15:28	524	33.2	44	190	0	24.7	189	197	0	0	0.0	207	0.38	0.92
17:15:46	534	33.2	44	191	0	25.1	188	198	0	0	0.0	207	0.38	0.92
17:16:04	544	33.2	44	190	0	24.9	189	198	0	0	0.0	207	0.38	0.92
17:16:22	554	33.3	44	191	0	24.8	192	198	0	0	0.0	206	0.38	0.92

ALLSEAS PILE DRIVING RECORD MHU 500 T MONITORING-SYSTEM PAGE 02 5 30-10-2000

From File _____

Time hh:mm:ss	Blow No	Blow 1/min	St-roke cm	Ene-rgy kNm	Oil-flow l/min	Oil-temp. C	Oilpres. PP bar	Hammer bar	Dif1 mbar	Dif2 mbar	Water Press. bar	Eph Usage kNm	k	Mech Eff
17:16:40	564	33.2	44	191	0	25.3	191	203	0	0	0.0	210	0.38	0.91
17:16:58	574	33.1	44	190	0	25.2	191	202	0	0	0.0	210	0.38	0.91
17:17:16	584	32.8	44	191	0	25.0	191	201	0	0	0.0	209	0.38	0.91
17:17:34	594	32.3	42	190	0	25.2	190	200	0	0	0.0	200	0.38	0.95
17:17:52	604	34.1	42	193	0	24.8	191	200	0	0	0.0	199	0.39	0.97
17:18:11	614	32.6	42	193	0	24.8	187	201	0	0	0.0	200	0.39	0.97
17:18:29	624	32.6	44	190	0	25.1	190	200	0	0	0.0	208	0.38	0.91
17:18:47	634	34.8	42	190	0	25.5	190	199	0	0	0.0	198	0.38	0.96
17:19:05	644	32.5	42	190	0	25.1	188	199	0	0	0.0	199	0.38	0.96
17:19:23	654	35.1	44	189	0	25.1	189	200	0	0	0.0	208	0.38	0.91
17:19:40	664	33.6	42	192	0	25.5	191	200	0	0	0.0	200	0.38	0.96
17:19:58	674	33.7	42	193	0	25.2	189	199	0	0	0.0	198	0.39	0.97
17:20:16	684	33.8	42	193	0	25.5	188	200	0	0	0.0	200	0.39	0.96
17:20:34	694	33.9	44	190	0	25.5	190	200	0	0	0.0	209	0.38	0.91
17:20:51	704	33.6	42	193	0	25.1	188	200	0	0	0.0	200	0.39	0.97
17:21:09	714	33.9	42	193	0	25.6	190	200	0	0	0.0	199	0.39	0.97
17:21:27	724	34.0	42	193	0	25.4	188	200	0	0	0.0	199	0.39	0.97
17:21:44	734	33.9	44	189	0	25.5	190	199	0	0	0.0	208	0.38	0.91
17:22:02	744	34.0	44	190	0	25.7	190	199	0	0	0.0	208	0.38	0.92
17:22:37	764	33.9	44	190	0	25.6	190	199	0	0	0.0	206	0.38	0.92
17:22:55	774	33.9	44	190	0	25.6	192	199	0	0	0.0	207	0.38	0.92
17:23:13	784	34.1	42	193	0	25.6	189	198	0	0	0.0	198	0.39	0.97
17:23:31	794	34.1	44	190	0	25.7	192	199	0	0	0.0	209	0.38	0.91
17:23:48	804	34.0	44	190	0	25.9	190	199	0	0	0.0	207	0.38	0.92
17:24:06	814	33.7	42	193	0	25.7	189	199	0	0	0.0	199	0.39	0.97
17:24:24	824	33.9	44	190	0	25.7	189	200	0	0	0.0	209	0.38	0.91
17:24:41	834	33.9	44	190	0	25.7	190	199	0	0	0.0	208	0.38	0.92
17:24:59	844	33.8	44	190	0	25.7	189	200	0	0	0.0	209	0.38	0.91
17:25:17	854	33.8	44	191	0	25.9	189	201	0	0	0.0	210	0.38	0.91
17:25:35	864	33.9	44	190	0	25.7	189	199	0	0	0.0	207	0.38	0.92
17:25:52	874	33.8	44	191	0	25.8	190	201	0	0	0.0	209	0.38	0.92
17:26:10	884	33.8	44	191	0	26.1	192	200	0	0	0.0	208	0.38	0.92
17:26:28	894	33.7	44	191	0	26.0	189	200	0	0	0.0	208	0.38	0.92
17:26:46	904	33.5	44	191	0	25.7	190	200	0	0	0.0	209	0.38	0.91
17:27:04	914	33.6	44	192	0	26.1	190	200	0	0	0.0	208	0.38	0.92
17:27:22	924	33.5	44	194	0	26.0	192	200	0	0	0.0	207	0.39	0.94
17:27:40	934	33.4	44	194	0	26.4	191	200	0	0	0.0	207	0.39	0.93
17:27:58	944	33.4	44	194	0	26.1	191	201	0	0	0.0	208	0.39	0.93
17:28:16	954	33.4	44	194	0	26.3	193	201	0	0	0.0	209	0.39	0.93
17:28:34	964	33.3	44	194	0	26.3	190	201	0	0	0.0	207	0.39	0.94
17:28:52	974	33.4	44	194	0	26.2	191	202	0	0	0.0	209	0.39	0.93
17:29:09	984	33.4	44	194	0	26.3	190	201	0	0	0.0	208	0.39	0.93
17:29:27	994	33.4	44	193	0	26.2	191	200	0	0	0.0	208	0.39	0.93
17:29:45	1004	33.5	44	192	0	26.5	191	200	0	0	0.0	207	0.38	0.93
17:30:03	1014	33.5	44	192	0	26.5	192	198	0	0	0.0	207	0.38	0.93
17:30:21	1024	33.6	44	192	0	26.8	192	198	0	0	0.0	207	0.38	0.93

ALLSEAS PILE DRIVING RECORD MHU 500 T MONITORING-SYSTEM PAGE 03 5 30-10-2000

From File _____

Time hh:mm:ss	Blow No	Blow 1/min	St-roke cm	Ene-rgy kNm	Oil-flow l/min	Oil-temp. C	Oilpres. PP bar	Hammer bar	Dif1 mbar	Dif2 mbar	Water Press. bar	Eph Usage kNm	k	Mech Eff
17:30:39	1034	33.6	44	191	0	26.5	190	198	0	0	0.0	207	0.38	0.92
17:30:57	1044	33.5	44	191	0	26.5	190	198	0	0	0.0	207	0.38	0.92
17:31:15	1054	33.5	44	191	0	26.7	189	197	0	0	0.0	207	0.38	0.92
17:31:33	1064	33.5	44	191	0	26.8	192	198	0	0	0.0	208	0.38	0.92
17:31:51	1074	33.5	44	191	0	26.8	191	197	0	0	0.0	207	0.38	0.92
17:32:09	1084	33.6	44	190	0	26.8	190	198	0	0	0.0	208	0.38	0.91
17:32:26	1094	33.5	44	190	0	26.7	189	198	0	0	0.0	208	0.38	0.91
17:32:44	1104	33.7	42	193	0	26.4	189	198	0	0	0.0	198	0.39	0.98
17:33:02	1114	33.7	42	192	0	26.8	189	200	0	0	0.0	199	0.38	0.97
17:33:20	1124	33.6	42	192	0	26.8	189	199	0	0	0.0	199	0.38	0.97
17:33:38	1134	33.6	42	192	0	26.5	189	198	0	0	0.0	199	0.38	0.97
17:33:56	1144	33.5	42	192	0	27.0	187	198	0	0	0.0	199	0.38	0.97
17:34:14	1154	33.6	42	193	0	26.7	189	198	0	0	0.0	198	0.39	0.97
17:34:31	1164	33.6	42	191	0	27.0	189	198	0	0	0.0	198	0.38	0.96
17:34:49	1174	33.5	42	192	0	27.0	189	198	0	0	0.0	200	0.38	0.96
17:35:07	1184	33.6	42	191	0	27.2	188	198	0	0	0.0	200	0.38	0.96
17:35:25	1194	34.0	42	190	0	27.1	187	198	0	0	0.0	199	0.38	0.96
17:35:43	1204	33.9	42	191	0	27.2	186	198	0	0	0.0	199	0.38	0.96
17:36:00	1214	33.9	42	190	0	27.0	187	198	0	0	0.0	199	0.38	0.96
17:36:18	1224	33.7	42	190	0	27.3	188	198	0	0	0.0	200	0.38	0.95
17:36:36	1234	33.9	42	190	0	27.2	188	197	0	0	0.0	198	0.38	0.96
17:36:53	1244	34.1	42	190	0	27.3	187	198	0	0	0.0	200	0.38	0.95
17:37:11	1254	33.9	42	191	0	27.0	188	198	0	0	0.0	199	0.38	0.96
17:37:29	1264	30.6	48	218	0	27.2	187	198	0	0	0.0	227	0.44	0.96
17:37:48	1274	35.0	54	246	0	27.3	195	206	0	0	0.0	259	0.49	0.95
17:38:06	1284	34.2	54	246	0	27.5	195	206	0	0	0.0	259	0.49	0.95
17:38:23	1294	34.1	54	246	0	27.5	195	205	0	0	0.0	258	0.49	0.95
17:38:41	1304	34.0	54	246	0	27.5	198	205	0	0	0.0	259	0.49	0.95
17:38:59	1314	34.1	54	246	0	27.5	197	204	0	0	0.0	258	0.49	0.95
17:39:16	1324	34.0	54	246	0	27.4	198	204	0	0	0.0	258	0.49	0.95
17:39:34	1334	34.2	54	247	0	27.2	197	204	0	0	0.0	258	0.49	0.96
17:39:51	1344	34.2	54	248	0	27.5	193	205	0	0	0.0	258	0.50	0.96
17:40:09	1354	34.1	54	246	0	27.5	194	204	0	0	0.0	258	0.49	0.95
17:40:26	1364	34.1	54	247	0	27.6	192	205	0	0	0.0	258	0.49	0.96
17:40:44	1374	34.0	54	246	0	27.7	194	204	0	0	0.0	258	0.49	0.96
17:41:02	1384	34.0	54	247	0	27.5	196	205	0	0	0.0	258	0.49	0.96
17:41:19	1394	34.0	54	246	0	27.9	195	205	0	0	0.0	258	0.49	0.95
17:41:37	1404	34.1	54	246	0	27.7	195	204	0	0	0.0	258	0.49	0.95
17:41:55	1414	34.0	54	246	0	27.4	194	204	0	0	0.0	256	0.49	0.96
17:42:12	1424	34.0	54	246	0	27.6	196	205	0	0	0.0	259	0.49	0.95
17:42:30	1434	34.1	54	246	0	27.9	195	204	0	0	0.0	258	0.49	0.95
17:42:47	1444	34.1	54	245	0	27.7	194	205	0	0	0.0	259	0.49	0.95
17:43:05	1454	34.0	54	245	0	27.8	194	204	0	0	0.0	257	0.49	0.95
17:43:22	1464	34.2	54	244	0	28.0	194	205	0	0	0.0	258	0.49	0.95
17:43:40	1474	34.1	54	245	0	27.8	193	204	0	0	0.0	258	0.49	0.95
17:43:58	1484	34.3	54	244	0	27.7	193	204	0	0	0.0	259	0.49	0.94
17:44:15	1494	34.2	54	244	0	28.0	193	205	0	0	0.0	259	0.49	0.94

ALLSEAS PILE DRIVING RECORD MHU 500 T MONITORING-SYSTEM PAGE 04 5 30-10-2000

From File _____

Time hh:mm:ss	Blow No	Blow 1/min	St-roke cm	Ene-rgy kNm	Oil-flow l/min	Oil-temp. C	Oilpres. PP bar	Hammer bar	Dif1 mbar	Dif2 mbar	Water Press. bar	Eph kNm	k Usage	Mech Eff
17:44:33	1504	34.2	54	243	0	27.9	194	204	0	0	0.0	258	0.49	0.94
17:44:50	1514	34.2	54	243	0	28.2	192	204	0	0	0.0	258	0.49	0.94
17:45:08	1524	34.3	54	243	0	28.0	196	205	0	0	0.0	260	0.49	0.93
17:45:25	1534	34.2	54	243	0	28.1	193	204	0	0	0.0	259	0.49	0.94
17:45:43	1544	34.2	54	243	0	28.2	193	204	0	0	0.0	259	0.49	0.94
17:46:01	1554	34.1	54	244	0	28.1	195	203	0	0	0.0	257	0.49	0.95
17:46:18	1564	34.1	54	246	0	28.1	193	203	0	0	0.0	258	0.49	0.95
17:46:36	1574	34.2	54	244	0	28.4	192	204	0	0	0.0	257	0.49	0.95
17:46:53	1584	34.1	54	243	0	28.3	193	202	0	0	0.0	257	0.49	0.95
17:47:11	1594	34.2	54	242	0	28.3	193	204	0	0	0.0	259	0.48	0.93
17:47:28	1604	34.3	54	242	0	28.5	194	203	0	0	0.0	258	0.48	0.94
17:47:46	1614	34.2	54	242	0	28.4	193	203	0	0	0.0	257	0.48	0.94
17:48:03	1624	34.2	54	243	0	28.4	194	204	0	0	0.0	260	0.49	0.93
17:48:21	1634	34.4	54	242	0	28.3	194	203	0	0	0.0	257	0.48	0.94
17:48:38	1644	34.3	54	246	0	28.3	193	203	0	0	0.0	258	0.49	0.95
17:48:56	1654	34.6	54	243	0	28.3	192	204	0	0	0.0	259	0.49	0.94
17:49:13	1664	34.8	54	243	0	28.3	195	204	0	0	0.0	259	0.49	0.94
17:49:30	1674	35.6	54	244	0	28.4	194	205	0	0	0.0	259	0.49	0.94
17:49:47	1684	35.6	54	244	0	28.7	197	204	0	0	0.0	258	0.49	0.94
17:50:04	1694	36.0	54	244	0	28.5	196	205	0	0	0.0	260	0.49	0.94
17:50:20	1704	35.8	54	244	0	28.5	194	205	0	0	0.0	260	0.49	0.94
17:50:37	1714	35.8	54	246	0	28.7	196	205	0	0	0.0	259	0.49	0.95
17:50:54	1724	35.8	54	245	0	28.5	195	205	0	0	0.0	259	0.49	0.94
17:51:11	1734	35.8	54	244	0	28.6	195	206	0	0	0.0	260	0.49	0.94
17:51:28	1744	35.8	54	244	0	28.7	196	206	0	0	0.0	260	0.49	0.94
17:51:44	1754	35.8	54	244	0	28.4	194	206	0	0	0.0	260	0.49	0.94
17:52:01	1764	35.7	54	245	0	28.5	194	205	0	0	0.0	259	0.49	0.95
17:52:18	1774	35.8	54	244	0	28.7	194	205	0	0	0.0	259	0.49	0.94
17:52:35	1784	35.8	54	244	0	28.8	195	206	0	0	0.0	260	0.49	0.94
17:52:52	1794	35.8	54	244	0	28.8	194	206	0	0	0.0	261	0.49	0.94

17:53:00 STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED

17:55:21 C1 HAS REPORTED HAMMER NOT ON PILE

PILE 1, SECTION C

PILE 1, SECTION C

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ALLSEAS   PILE DRIVING RECORD FROM MENCK MONITORING-SYSTEM  PAGE 01  04-11-2000

JOB INFORMATION

PILE CODE ........................... : C1
FILE NAME ........................... : MANSONC1
CLIENT .............................. : CAL.TRANS
PROJECT ............................. : BAY BRIDGE TEST
PLATFORM ............................ :
SHIPS NAME .......................... : DB 24
JOB NO .............................. : 40-00-044
CONTRACT NR ......................... :

HAMMER INFORMATION

HAMMER TYPE ......................... : MHU 500 T
SERIAL NO ........................... : 63038 (05)
POWERPACK ........................... : FISCHON 1600L
CONFIGURATION ....................... : FREE RIDING..................._
CONTROL UNIT NO ..................... : _............................_
BLOW COUNTER ON PANEL ............... : 0............................_

PARAMETER INFORMATION

PRINTER LOGGING DISTANCE ............ : 0.25........................._
LOWER REVERSAL TIME VARIABLE 0-400ms  :    relative stair

UPPER REVERSAL AUTOMATICALLY
DIFF PRESS SENSORS
START POINT AT ..............mbar  :    _............................_
STOP POINT AT ...............mbar  :    _............................_

PILE INFORMATION

OUTSIDE DIAMETER ............."     :    96
WALL THICKNESS ..............."     :    2.7/16
LENGTH ..................feet      :    85  PER PILE
SELF PENETR. PILE .......feet      :    6,0METER
SELF PENETR.W.HAMMER ....feet      :    44,5METER

REMARK :   Eph := ENERGY FROM HYDRAULIC AND FREE FALL
           Eff := IMPACT ENERGY  /  Eph
           k   := IMPACT ENERGY  /  DESIGN ENERGY

NTSv421  OLDv234  HUBv222  PICv105  TXTv517  GPAv205  GMHv006  USSv000
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ALLSEAS PILE DRIVING RECORD MHU 500 T MONITORING-SYSTEM PAGE 02 04-11-2000

From File MANSONC1

Time hh:mm:ss	Blow No	St- Blow 1/min	Ene- roke cm	Ene- rgy kNm	Oil- flow l/min	Oil- temp. C	Oilpres. PP bar	Dif1 Hammer bar	Dif2 mbar	Water mbar	Eph bar	k Press.	Mech Usage kNm	Eff

13:47:44 CH1 SENSOR WAS DETECTED AS DEFECT BUT IS STILL FUNCTIONING

13:47:44 CH2 SENSOR WAS DETECTED AS DEFECT BUT IS STILL FUNCTIONING

13:47:44 MH_22 SENSOR WAS DETECTED AS DEFECT BUT IS STILL FUNCTIONING

13:47:45 MH_21 SENSOR WAS DETECTED AS DEFECT BUT IS STILL FUNCTIONING

13:47:45 MH_12 SENSOR WAS DETECTED AS DEFECT BUT IS STILL FUNCTIONING

13:47:45 MH_11 SENSOR WAS DETECTED AS DEFECT BUT IS STILL FUNCTIONING

13:48:05 IGNORE SENSOR CH1 DEFECT

13:48:06 IGNORE SENSOR CH2 DEFECT

13:48:06 I lost the electric connection to the ultrasonic sensor

13:48:06 IGNORE SENSOR MH_21 DEFECT

13:48:07 IGNORE SENSOR MH_12 DEFECT

13:48:07 IGNORE SENSOR MH_11 DEFECT

13:48:07 I MUST STOP WY TO MANY STROKE SENSOR'S DEFECT

14:00:35 STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED

14:00:39 START ABORTED BECAUSE STOP-KEY HAS BEEN PUSHED

ALLSEAS PILE DRIVING RECORD MHU 500 T MONITORING-SYSTEM PAGE 03 04-11-2000

From File _____

Time hh:mm:ss	Blow No	Blow 1/min	St-roke cm	Ene-rgy kNm	Oil-flow l/min	Oil-temp. C	Oilpres. PP bar	Hammer bar	Dif1 mbar	Dif2 mbar	Water Press. bar	Eph Usage kNm	k	Mech Eff
14:11:42	START HAMMER OPERATION IN SINGLE BLOW MODE													
14:12:23	START HAMMER OPERATION IN SINGLE BLOW MODE													
14:12:29	START HAMMER OPERATION IN SINGLE BLOW MODE													
14:12:36	START HAMMER OPERATION IN SINGLE BLOW MODE													
14:12:51	START HAMMER OPERATION IN SINGLE BLOW MODE													
14:12:57	START HAMMER OPERATION IN SINGLE BLOW MODE													
14:13:07	START HAMMER OPERATION IN STROKE SEQUENCE MODE													
14:13.44	16	22.6	48	210	0	25.4	183	195	0	0	0.0	223	0.42	0.94
14:14:09	26	27.5	60	261	0	25.1	189	200	0	0	0.0	283	0.52	0.92
14:14:29	36	31.5	58	260	0	25.3	195	206	0	0	0.0	276	0.52	0.94
14:14:48	46	31.2	58	260	0	25.0	193	206	0	0	0.0	277	0.52	0.94
14:15:07	56	31.9	58	260	0	25.0	194	210	0	0	0.0	279	0.52	0.93
14:15:26	66	31.8	58	260	0	25.5	194	209	0	0	0.0	278	0.52	0.93
14:15:44	76	31.8	58	260	0	25.4	193	209	0	0	0.0	278	0.52	0.94
14:16:03	86	31.8	58	260	0	25.6	196	209	0	0	0.0	279	0.52	0.93
14:16:22	96	32.1	56	254	0	25.5	193	209	0	0	0.0	271	0.51	0.94
14:16:41	106	32.5	56	254	0	25.7	195	209	0	0	0.0	270	0.51	0.94
14:16:59	116	32.7	56	254	0	25.9	193	209	0	0	0.0	270	0.51	0.94
14:17:17	126	32.3	58	253	0	25.2	194	209	0	0	0.0	278	0.51	0.91
14:17:36	136	32.4	58	254	0	25.4	196	211	0	0	0.0	279	0.51	0.91
14:17:54	146	32.5	58	255	0	25.8	196	210	0	0	0.0	278	0.51	0.92
14:18:13	156	30.3	70	312	0	25.9	198	212	0	0	0.0	336	0.62	0.93
14:18:32	166	34.9	76	345	0	25.7	209	222	0	0	0.0	373	0.69	0.93
14:18:50	176	34.4	76	345	0	25.8	211	223	0	0	0.0	374	0.69	0.92
14:19:07	186	34.3	76	345	0	25.5	210	224	0	0	0.0	374	0.69	0.92
14:19:25	196	34.3	76	344	0	25.6	208	224	0	0	0.0	374	0.69	0.92
14:19:42	206	34.3	76	345	0	25.5	209	223	0	0	0.0	372	0.69	0.93
14:20:00	216	34.4	76	344	0	25.7	209	224	0	0	0.0	373	0.69	0.92
14:20:17	226	34.4	76	346	0	25.5	209	224	0	0	0.0	373	0.69	0.93
14:20:34	236	34.3	76	344	0	25.6	209	223	0	0	0.0	374	0.69	0.92
14:20:52	246	34.3	76	346	0	25.8	212	223	0	0	0.0	373	0.69	0.93
14:21:09	256	34.3	76	343	0	25.5	208	223	0	0	0.0	374	0.69	0.92
14:21:27	266	34.3	76	344	0	25.6	210	223	0	0	0.0	375	0.69	0.92
14:21:44	276	34.3	76	343	0	26.0	210	223	0	0	0.0	372	0.69	0.92
14:22:02	286	34.3	76	344	0	25.9	209	224	0	0	0.0	373	0.69	0.92
14:22:19	296	34.2	76	345	0	25.8	210	224	0	0	0.0	375	0.69	0.92
14:22:37	306	34.2	76	344	0	25.9	209	223	0	0	0.0	375	0.69	0.92
14:22:55	316	34.3	76	344	0	26.0	208	223	0	0	0.0	374	0.69	0.92
14:23:12	326	34.1	76	342	0	26.2	209	222	0	0	0.0	373	0.68	0.92
14:23:30	336	34.2	76	343	0	26.2	209	221	0	0	0.0	372	0.69	0.92
14:23:47	346	34.2	76	345	0	26.0	209	220	0	0	0.0	369	0.69	0.93

ALLSEAS PILE DRIVING RECORD MHU 500 T MONITORING-SYSTEM PAGE 04 04-11-2000

From File MANSONC1

Time hh:mm:ss	Blow No	Blow 1/min	St-roke cm	Ene-rgy kNm	Oil-flow l/min	Oil-temp. C	Oilpres. PP bar	Hammer bar	Dif1 mbar	Dif2 mbar	Water Press. bar	Eph Usage kNm	k	Mech Eff
14:24:05	356	34.2	76	344	0	26.5	209	221	0	0	0.0	372	0.69	0.92
14:24:22	366	34.2	76	344	0	26.2	209	220	0	0	0.0	372	0.69	0.92
14:24:40	376	34.2	76	344	0	26.3	207	222	0	0	0.0	372	0.69	0.92
14:24:57	386	34.2	76	343	0	26.6	210	220	0	0	0.0	370	0.69	0.93
14:25:15	396	34.2	76	342	0	27.0	210	222	0	0	0.0	373	0.68	0.92
14:25:32	406	34.1	76	344	0	26.8	209	222	0	0	0.0	373	0.69	0.92
14:25:50	416	34.1	76	343	0	26.6	207	220	0	0	0.0	371	0.69	0.93
14:26:08	426	34.1	76	344	0	27.0	207	221	0	0	0.0	373	0.69	0.92
14:26:25	436	34.1	76	343	0	26.7	208	219	0	0	0.0	369	0.69	0.93
14:26:43	446	34.0	76	343	0	26.9	210	220	0	0	0.0	371	0.69	0.93
14:27:00	456	34.1	76	345	0	26.9	209	220	0	0	0.0	371	0.69	0.93
14:27:18	466	34.0	76	345	0	27.1	210	222	0	0	0.0	372	0.69	0.93
14:27:36	476	34.1	76	344	0	27.1	208	222	0	0	0.0	373	0.69	0.92
14:27:53	486	34.1	76	340	0	27.1	207	221	0	0	0.0	371	0.68	0.92
14:28:11	496	34.0	76	346	0	27.1	209	221	0	0	0.0	371	0.69	0.93
14:28:28	506	34.1	76	343	0	27.2	209	221	0	0	0.0	371	0.69	0.92
14:28:46	516	31.3	92	416	0	27.5	213	221	0	0	0.0	448	0.83	0.93
14:29:04	526	34.3	86	396	0	27.5	217	226	0	0	0.0	426	0.79	0.93
14:29:22	536	34.3	86	394	0	27.3	215	226	0	0	0.0	425	0.79	0.93
14:29:40	546	33.4	86	391	0	27.4	212	224	0	0	0.0	422	0.78	0.93
14:29:58	556	33.1	86	393	0	27.8	212	223	0	0	0.0	422	0.79	0.93
14:30:16	566	33.1	86	392	0	27.7	212	224	0	0	0.0	424	0.78	0.93
14:30:34	576	33.1	86	393	0	27.7	212	223	0	0	0.0	423	0.79	0.93
14:30:52	586	33.2	86	394	0	27.7	213	222	0	0	0.0	420	0.79	0.94
14:31:10	596	33.1	86	397	0	27.4	211	223	0	0	0.0	423	0.79	0.94
14:31:28	606	33.0	86	393	0	28.0	215	223	0	0	0.0	422	0.79	0.93
14:31:47	616	33.0	86	393	0	28.1	211	222	0	0	0.0	423	0.79	0.93
14:32:05	626	33.1	86	394	0	27.7	210	224	0	0	0.0	423	0.79	0.93
14:32:23	636	33.1	86	394	0	28.2	213	222	0	0	0.0	420	0.79	0.94
14:32:41	646	32.9	86	392	0	28.1	213	222	0	0	0.0	423	0.78	0.93
14:32:59	656	32.9	86	392	0	28.3	212	223	0	0	0.0	422	0.78	0.93
14:33:18	666	32.9	86	394	0	28.2	210	222	0	0	0.0	422	0.79	0.93
14:33:36	676	32.9	86	393	0	28.6	212	222	0	0	0.0	421	0.79	0.93
14:33:54	686	32.9	86	392	0	28.6	212	222	0	0	0.0	422	0.78	0.93
14:34:12	696	32.9	86	394	0	28.6	210	223	0	0	0.0	421	0.79	0.93
14:34:30	706	32.9	86	393	0	28.6	211	222	0	0	0.0	421	0.79	0.93
14:34:49	716	32.9	86	393	0	28.8	212	221	0	0	0.0	422	0.79	0.93
14:35:07	726	32.9	86	396	0	28.9	212	222	0	0	0.0	420	0.79	0.94
14:35:25	736	32.9	86	393	0	28.8	211	221	0	0	0.0	420	0.79	0.94
14:35:43	746	32.9	86	393	0	28.8	210	221	0	0	0.0	421	0.79	0.93
14:36:02	756	32.9	86	393	0	28.6	213	219	0	0	0.0	420	0.79	0.94
14:36:20	766	32.9	86	396	0	29.0	211	219	0	0	0.0	419	0.79	0.94
14:36:38	776	32.9	86	393	0	29.3	213	219	0	0	0.0	418	0.79	0.94
14:36:56	786	32.9	86	393	0	29.2	211	220	0	0	0.0	419	0.79	0.94
14:37:15	796	32.8	86	392	0	29.1	211	220	0	0	0.0	420	0.78	0.93
14:37:33	806	32.9	86	394	0	29.1	210	221	0	0	0.0	421	0.79	0.94
14:37:51	816	32.9	86	393	0	29.2	212	220	0	0	0.0	419	0.79	0.94
14:38:09	826	32.9	86	393	0	29.3	210	219	0	0	0.0	421	0.79	0.93

ALLSEAS PILE DRIVING RECORD MHU 500 T MONITORING-SYSTEM PAGE 05 04-11-2000

From File MANSONC1

Time hh:mm:ss	Blow No	Blow 1/min	St-roke cm	Ene-rgy kNm	Oil-flow l/min	Oil-temp. C	Oilpres. PP bar	Hammer bar	Dif1 mbar	Dif2 mbar	Water Press. bar	Eph Usage kNm	k	Mech Eff
14:38:28	836	32.8	86	393	0	29.3	213	220	0	0	0.0	418	0.79	0.94
14:38:46	846	33.0	86	392	0	29.2	212	220	0	0	0.0	418	0.78	0.94
14:39:04	856	32.8	86	392	0	29.4	214	220	0	0	0.0	419	0.78	0.94
14:39:22	866	32.8	86	391	0	29.6	211	220	0	0	0.0	419	0.78	0.93
14:39:41	876	32.8	86	391	0	29.7	212	220	0	0	0.0	421	0.78	0.93
14:39:59	886	32.8	86	392	0	29.8	211	219	0	0	0.0	419	0.78	0.94
14:40:17	896	32.8	86	391	0	29.7	212	220	0	0	0.0	420	0.78	0.93
14:40:36	906	32.8	86	394	0	29.8	212	219	0	0	0.0	419	0.79	0.94
14:40:54	916	32.7	86	393	0	29.7	212	219	0	0	0.0	419	0.79	0.94
14:41:12	926	32.8	86	394	0	29.8	209	218	0	0	0.0	417	0.79	0.94
14:41:31	936	32.8	86	393	0	30.0	210	219	0	0	0.0	420	0.79	0.94
14:41:49	946	32.8	86	392	0	30.0	209	218	0	0	0.0	419	0.78	0.94
14:42:07	956	32.8	86	393	0	30.0	211	219	0	0	0.0	419	0.79	0.94
14:42:25	966	32.8	86	393	0	30.0	211	218	0	0	0.0	419	0.79	0.94
14:42:44	976	32.8	86	394	0	30.1	209	218	0	0	0.0	419	0.79	0.94
14:43:02	986	32.7	86	394	0	30.1	212	222	0	0	0.0	421	0.79	0.94
14:43:20	996	32.8	86	394	0	30.0	211	220	0	0	0.0	421	0.79	0.94
14:43:39	1006	32.7	86	393	0	30.1	209	221	0	0	0.0	421	0.79	0.94
14:43:57	1016	32.8	86	395	0	29.6	212	221	0	0	0.0	422	0.79	0.94
14:44:15	1026	32.8	86	394	0	30.2	208	221	0	0	0.0	419	0.79	0.94
14:44:34	1036	32.8	86	392	0	30.3	212	221	0	0	0.0	421	0.78	0.93
14:44:52	1046	32.8	86	394	0	30.4	210	220	0	0	0.0	420	0.79	0.94
14:45:10	1056	32.8	86	394	0	30.2	211	222	0	0	0.0	421	0.79	0.93
14:45:29	1066	32.8	86	393	0	30.4	210	221	0	0	0.0	421	0.79	0.93
14:45:47	1076	32.8	86	392	0	30.5	212	222	0	0	0.0	420	0.78	0.93
14:46:05	1086	32.8	86	393	0	30.5	211	221	0	0	0.0	420	0.79	0.93
14:46:24	1096	32 8	86	392	0	30.7	210	221	0	0	0.0	420	0 78	0.93
14:46:42	1106	32.7	86	390	0	30.8	210	220	0	0	0.0	419	0.78	0.93
14:47:00	1116	32.7	86	392	0	30.7	210	221	0	0	0.0	421	0.78	0.93
14:47:19	1126	32.7	86	393	0	30.5	213	221	0	0	0.0	421	0.79	0.93
14:47:37	1136	30.5	100	452	0	30.7	212	220	0	0	0.0	486	0.90	0.93
14:47:56	1146	32.6	108	493	0	30.7	221	229	0	0	0.0	535	0.99	0.92
14:48:15	1156	32.4	108	495	0	30.5	222	228	0	0	0.0	535	0.99	0.93
14:48:33	1166	32.4	108	497	0	30.9	219	228	0	0	0.0	535	0.99	0.93
14:48:52	1176	32.4	108	496	0	31.1	221	229	0	0	0.0	536	0.99	0.93
14:49:10	1186	32.5	108	495	0	30.9	222	228	0	0	0.0	534	0.99	0.93
14:49:29	1196	32.4	108	494	0	31.2	222	229	0	0	0.0	535	0.99	0.92
14:49:47	1206	32.5	108	495	0	30.8	221	229	0	0	0.0	535	0.99	0.92
14:50:05	1216	32.5	108	494	0	31.3	223	230	0	0	0.0	538	0.99	0.92
14:50:24	1226	32.4	108	497	0	31.1	219	229	0	0	0.0	536	0.99	0.93
14:50:43	1236	32.4	108	496	0	31.3	222	228	0	0	0.0	537	0.99	0.92
14:51:01	1246	32.4	108	494	0	31.4	221	230	0	0	0.0	537	0.99	0.92
14:51:20	1256	32.4	108	494	0	31.3	220	229	0	0	0.0	539	0.99	0.92
14:51:38	1266	32.4	108	496	0	31.4	221	228	0	0	0.0	536	0.99	0.93
14:51:57	1276	32.4	108	496	0	31.4	221	228	0	0	0.0	534	0.99	0.93
14:52:15	1286	32.4	108	496	0	31.5	221	228	0	0	0.0	537	0.99	0.92
14:52:34	1296	32.4	108	495	0	31.5	219	228	0	0	0.0	535	0.99	0.93
14:52:52	1306	32.4	108	497	0	31.5	222	228	0	0	0.0	536	0.99	0.93

ALLSEAS PILE DRIVING RECORD MHU 500 T MONITORING-SYSTEM PAGE 06 04-11-2000

From File MANSONC1

Time hh:mm:ss	Blow No	Blow 1/min	St-roke cm	Ene-rgy kNm	Oil-flow l/min	Oil-temp. C	Oilpres. PP bar	Hammer bar	Dif1 mbar	Dif2 mbar	Water Press. bar	Eph Usage kNm	k	Mech Eff
14:53:11	1316	32.4	108	495	0	31.7	221	227	0	0	0.0	533	0.99	0.93
14:53:29	1326	32.4	108	498	0	31.6	219	228	0	0	0.0	535	1.00	0.93
14:53:48	1336	32.4	108	502	0	31.7	221	225	0	0	0.0	534	1.00	0.94
14:54:06	1346	32.4	108	499	0	31.8	221	225	0	0	0.0	532	1.00	0.94
14:54:25	1356	32.4	108	494	0	31.8	222	225	0	0	0.0	532	0.99	0.93
14:54:43	1366	32.4	108	495	0	31.8	220	225	0	0	0.0	535	0.99	0.93
14:55:02	1376	32.4	108	494	0	31.9	220	225	0	0	0.0	533	0.99	0.93
14:55:20	1386	32.4	108	494	0	32.0	221	226	0	0	0.0	535	0.99	0.92
14:55:39	1396	32.4	108	493	0	32.0	220	226	0	0	0.0	534	0.99	0.92
14:55:57	1406	32.4	108	494	0	32.2	220	223	0	0	0.0	531	0.99	0.93
14:56:16	1416	32.4	108	492	0	32.1	221	224	0	0	0.0	533	0.98	0.92
14:56:34	1426	32.4	108	493	0	32.1	222	224	0	0	0.0	531	0.99	0.93
14:56:53	1436	32.4	108	493	0	32.1	220	227	0	0	0.0	535	0.99	0.92
14:57:11	1446	32.4	108	493	0	32.3	220	230	0	0	0.0	537	0.99	0.92
14:57:30	1456	32.4	108	496	0	32.3	221	229	0	0	0.0	536	0.99	0.93
14:57:48	1466	32.4	108	494	0	32.5	219	229	0	0	0.0	538	0.99	0.92
14:58:07	1476	32.4	108	492	0	32.4	220	229	0	0	0.0	537	0.98	0.92
14:58:26	1486	32.4	108	495	0	32.7	219	229	0	0	0.0	538	0.99	0.92
14:58:44	1496	32.4	108	495	0	32.7	220	230	0	0	0.0	540	0.99	0.92
14:59:03	1506	32.4	108	494	0	32.5	220	229	0	0	0.0	538	0.99	0.92
14:59:21	1516	32.4	108	495	0	32.6	221	229	0	0	0.0	536	0.99	0.92
14:59:40	1526	32.4	108	497	0	32.9	221	229	0	0	0.0	537	0.99	0.93
14:59:58	1536	32.4	108	495	0	32.8	222	230	0	0	0.0	537	0.99	0.92
15:00:17	1546	32.4	108	494	0	32.5	221	230	0	0	0.0	537	0.99	0.92
15:00:35	1556	32.4	108	494	0	32.6	220	229	0	0	0.0	536	0.99	0.92
15:00:54	1566	32.4	108	492	0	32.9	221	229	0	0	0.0	537	0.98	0.92
15:01:12	1576	32.3	108	494	0	32.9	220	229	0	0	0.0	535	0.99	0.92
15:01:31	1586	32.4	108	492	0	32.8	221	229	0	0	0.0	536	0.98	0.92
15:01:49	1596	32.3	108	494	0	32.9	220	228	0	0	0.0	536	0.99	0.92
15:02:08	1606	32.3	108	493	0	33.0	219	229	0	0	0.0	537	0.99	0.92
15:02:27	1616	32.3	108	499	0	32.9	219	230	0	0	0.0	537	1.00	0.93
15:02:45	1626	32.3	108	494	0	32.7	221	230	0	0	0.0	536	0.99	0.92
15:03:04	1636	32.3	108	494	0	33.1	219	229	0	0	0.0	536	0.99	0.92
15:03:22	1646	32.3	108	495	0	33.0	219	228	0	0	0.0	538	0.99	0.92
15:03:41	1656	32.3	108	496	0	33.3	221	228	0	0	0.0	536	0.99	0.93
15:03:59	1666	32.4	108	493	0	33.3	220	229	0	0	0.0	535	0.99	0.92
15:04:18	1676	32.4	108	494	0	33.3	220	229	0	0	0.0	535	0.99	0.92
15:04:36	1686	32.3	108	493	0	33.5	220	229	0	0	0.0	536	0.99	0.92
15:04:55	1696	32.3	108	492	0	33.5	219	228	0	0	0.0	534	0.98	0.92
15:05:14	1706	32.4	108	492	0	33.6	221	228	0	0	0.0	535	0.98	0.92
15:05:32	1716	32.3	108	493	0	33.7	218	228	0	0	0.0	536	0.99	0.92
15:05:51	1726	32.3	108	497	0	33.9	221	228	0	0	0.0	536	0.99	0.93
15:06:09	1736	32.3	108	493	0	33.4	219	228	0	0	0.0	537	0.99	0.92
15:06:28	1746	32.3	108	495	0	33.9	220	229	0	0	0.0	537	0.99	0.92
15:06:46	1756	32.3	108	491	0	33.6	219	229	0	0	0.0	537	0.98	0.91
15:07:05	1766	32.4	108	495	0	33.8	220	229	0	0	0.0	536	0.99	0.92
15:07:23	1776	32.3	108	492	0	34.3	220	228	0	0	0.0	536	0.98	0.92
15:07:42	1786	32.2	108	499	0	34.0	220	228	0	0	0.0	537	1.00	0.93

ALLSEAS PILE DRIVING RECORD MHU 500 T MONITORING-SYSTEM PAGE 07 04-11-2000

From File MANSONC1

Time hh:mm:ss	Blow No	Blow 1/min	St-roke cm	Ene-rgy kNm	Oil-flow l/min	Oil-temp. C	Oilpres. PP bar	Hammer bar	Dif1 mbar	Dif2 mbar	Water Press. bar	Eph Usage kNm	k	Mech Eff
15:08:01	1796	32.3	108	491	0	34.1	219	228	0	0	0.0	536	0.98	0.92
15:08:19	1806	32.3	108	493	0	34.1	220	228	0	0	0.0	535	0.99	0.92
15:08:38	1816	32.3	108	493	0	34.0	219	228	0	0	0.0	536	0.99	0.92
15:08:56	1826	32.3	108	493	0	33.9	219	227	0	0	0.0	535	0.99	0.92
15:09:15	1836	32.2	108	495	0	34.1	219	228	0	0	0.0	534	0.99	0.93
15:09:34	1846	32.2	108	495	0	34.0	220	228	0	0	0.0	537	0.99	0.92
15:09:52	1856	32.2	108	491	0	34.3	219	227	0	0	0.0	533	0.98	0.92
15:10:11	1866	32.2	108	493	0	34.2	220	228	0	0	0.0	536	0.99	0.92
15:10:29	1876	32.3	108	501	0	34.3	220	228	0	0	0.0	536	1.00	0.93
15:10:48	1886	32.2	108	494	0	34.6	220	229	0	0	0.0	537	0.99	0.92
15:11:07	1896	32.3	108	493	0	34.6	221	228	0	0	0.0	536	0.99	0.92
15:11:25	1906	32.3	108	493	0	34.4	221	228	0	0	0.0	534	0.99	0.92
15:11:44	1916	32.3	108	492	0	34.3	221	228	0	0	0.0	534	0.98	0.92
15:12:02	1926	32.2	108	494	0	34.5	220	228	0	0	0.0	536	0.99	0.92
15:12:21	1936	32.2	108	495	0	34.7	219	228	0	0	0.0	535	0.99	0.93
15:12:40	1946	32.2	108	495	0	34.7	221	228	0	0	0.0	535	0.99	0.93
15:12:58	1956	32.2	108	494	0	34.8	221	228	0	0	0.0	537	0.99	0.92
15:13:17	1966	32.2	108	494	0	34.5	218	228	0	0	0.0	536	0.99	0.92
15:13:36	1976	32.2	108	495	0	34.8	218	228	0	0	0.0	534	0.99	0.93
15:13:54	1986	32.2	108	496	0	34.6	218	228	0	0	0.0	537	0.99	0.92
15:14:13	1996	32.3	108	495	0	34.9	219	227	0	0	0.0	535	0.99	0.93
15:14:31	2006	32.3	108	492	0	34.9	220	228	0	0	0.0	537	0.98	0.92
15:14:50	2016	32.3	108	494	0	34.7	219	227	0	0	0.0	534	0.99	0.93
15:15:09	2026	32.3	108	494	0	34.8	218	228	0	0	0.0	538	0.99	0.92
15:15:27	2036	32.3	108	494	0	34.7	219	229	0	0	0.0	535	0.99	0.92
15:15:46	2046	32.2	108	493	0	35.1	218	229	0	0	0.0	538	0.99	0.92
15:16:04	2056	32.3	108	495	0	35.0	220	229	0	0	0.0	536	0.99	0.92
15:16:23	2066	32.2	108	495	0	35.1	219	229	0	0	0.0	538	0.99	0.92
15:16:42	2076	32.2	108	498	0	34.8	220	228	0	0	0.0	536	1.00	0.93
15:17:00	2086	32.2	108	493	0	35.0	220	228	0	0	0.0	536	0.99	0.92
15:17:19	2096	32.2	108	491	0	35.1	220	228	0	0	0.0	535	0.98	0.92
15:17:38	2106	32.2	108	497	0	34.7	219	228	0	0	0.0	536	0.99	0.93
15:17:56	2116	32.2	108	494	0	35.0	219	227	0	0	0.0	535	0.99	0.92
15:18:15	2126	32.2	108	493	0	35.1	220	229	0	0	0.0	537	0.99	0.92
15:18:34	2136	32.2	108	494	0	35.2	218	228	0	0	0.0	534	0.99	0.93
15:18:52	2146	32.2	108	496	0	34.9	220	229	0	0	0.0	535	0.99	0.93
15:19:11	2156	32.2	108	497	0	35.1	220	227	0	0	0.0	535	0.99	0.93
15:19:29	2166	32.2	108	496	0	35.3	218	230	0	0	0.0	537	0.99	0.92
15:19:48	2176	32.2	108	496	0	35.1	220	229	0	0	0.0	536	0.99	0.92
15:20:07	2186	32.2	108	496	0	35.3	219	229	0	0	0.0	537	0.99	0.92
15:20:25	2196	32.2	108	495	0	35.3	220	228	0	0	0.0	535	0.99	0.93
15:20:44	2206	32.2	108	497	0	35.5	219	228	0	0	0.0	537	0.99	0.92
15:21:03	2216	32.2	108	494	0	35.5	219	229	0	0	0.0	536	0.99	0.92
15:21:21	2226	32.3	108	494	0	35.5	220	229	0	0	0.0	536	0.99	0.92
15:21:40	2236	32.3	108	492	0	35.4	220	228	0	0	0.0	536	0.98	0.92
15:21:58	2246	32.3	108	494	0	35.2	220	229	0	0	0.0	537	0.99	0.92
15:22:17	2256	32.3	108	494	0	35.4	220	229	0	0	0.0	536	0.99	0.92

ALLSEAS PILE DRIVING RECORD MHU 500 T MONITORING-SYSTEM PAGE 08 04-11-2000

From File MANSONC1

Time hh:mm:ss	Blow No	Blow 1/min	St-roke cm	Ene-rgy kNm	Oil-flow l/min	Oil-temp. C	Oilpres. PP bar	Hammer bar	Dif1 mbar	Dif2 mbar	Water Press. bar	Eph Usage kNm	k	Mech Eff
15:22:36	2266	32.3	108	497	0	35.3	220	228	0	0	0.0	534	0.99	0.93
15:22:54	2276	32.2	108	497	0	35.1	220	229	0	0	0.0	537	0.99	0.93
15:23:13	2286	32.3	108	497	0	35.4	218	229	0	0	0.0	537	0.99	0.92
15:23:31	2296	32.3	108	493	0	35.3	220	227	0	0	0.0	535	0.99	0.92
15:23:50	2306	32.3	108	493	0	35.4	219	229	0	0	0.0	536	0.99	0.92
15:24:09	2316	32.3	108	494	0	35.4	220	228	0	0	0.0	536	0.99	0.92
15:24:27	2326	32.2	108	496	0	35.2	220	228	0	0	0.0	535	0.99	0.93
15:24:46	2336	32.3	108	494	0	35.2	219	228	0	0	0.0	537	0.99	0.92
15:25:04	2346	32.2	108	494	0	35.6	218	228	0	0	0.0	538	0.99	0.92
15:25:23	2356	32.3	108	493	0	35.4	219	228	0	0	0.0	536	0.99	0.92
15:25:42	2366	32.2	108	493	0	35.5	220	229	0	0	0.0	539	0.99	0.92
15:26:00	2376	32.3	108	492	0	35.4	219	228	0	0	0.0	534	0.98	0.92
15:26:19	2386	32.2	108	494	0	35.7	219	227	0	0	0.0	535	0.99	0.92
15:26:37	2396	32.2	108	495	0	35.2	220	228	0	0	0.0	534	0.99	0.93
15:26:56	2406	32.3	108	493	0	35.5	221	228	0	0	0.0	537	0.99	0.92
15:27:15	2416	32.2	108	493	0	35.6	218	228	0	0	0.0	536	0.99	0.92
15:27:33	2426	32.2	108	494	0	35.5	219	228	0	0	0.0	537	0.99	0.92
15:27:52	2436	32.2	108	491	0	35.7	221	227	0	0	0.0	534	0.98	0.92
15:28:11	2446	32.2	108	495	0	35.5	220	229	0	0	0.0	537	0.99	0.92
15:28:29	2456	32.2	108	496	0	35.5	220	228	0	0	0.0	536	0.99	0.93
15:28:48	2466	32.2	108	493	0	35.6	219	228	0	0	0.0	535	0.99	0.92
15:29:06	2476	32.2	108	493	0	35.4	220	229	0	0	0.0	537	0.99	0.92
15:29:25	2486	32.2	108	497	0	35.6	220	227	0	0	0.0	535	0.99	0.93
15:29:44	2496	32.2	108	494	0	35.7	219	228	0	0	0.0	534	0.99	0.93
15:30:02	2506	32.1	108	494	0	35.5	221	229	0	0	0.0	537	0.99	0.92
15:30:21	2516	32.2	108	494	0	35.7	220	229	0	0	0.0	536	0.99	0.92
15:30:40	2526	32.2	108	492	0	35.9	219	227	0	0	0.0	535	0.98	0.92
15:30:58	2536	32.2	108	494	0	35.6	219	229	0	0	0.0	537	0.99	0.92
15:31:17	2546	32.2	108	493	0	35.2	218	227	0	0	0.0	534	0.99	0.92
15:31:36	2556	32.2	108	494	0	35.6	221	228	0	0	0.0	535	0.99	0.92
15:31:54	2566	32.2	108	497	0	35.5	219	228	0	0	0.0	535	0.99	0.93
15:32:13	2576	32.1	108	493	0	35.7	219	227	0	0	0.0	535	0.99	0.92
15:32:32	2586	32.2	108	492	0	35.7	220	228	0	0	0.0	537	0.98	0.92
15:32:50	2596	32.1	108	493	0	35.8	220	227	0	0	0.0	534	0.99	0.92
15:33:09	2606	32.2	108	490	0	35.8	220	228	0	0	0.0	536	0.98	0.91
15:33:27	2616	32.1	108	492	0	35.7	221	227	0	0	0.0	535	0.98	0.92
15:33:46	2626	32.2	108	492	0	35.7	220	228	0	0	0.0	536	0.98	0.92
15:34:05	2636	32.2	108	491	0	35.8	220	228	0	0	0.0	537	0.98	0.92
15:34:23	2646	32.2	108	492	0	35.8	219	226	0	0	0.0	535	0.98	0.92
15:34:42	2656	32.2	108	492	0	35.5	219	228	0	0	0.0	537	0.98	0.92
15:35:01	2666	32.2	108	493	0	35.9	219	227	0	0	0.0	535	0.99	0.92
15:35:19	2676	32.2	108	493	0	35.9	219	227	0	0	0.0	535	0.99	0.92
15:35:38	2686	32.3	108	495	0	35.6	219	228	0	0	0.0	535	0.99	0.93

ALLSEAS PILE DRIVING RECORD MHU 500 T MONITORING-SYSTEM PAGE 09 04-11-2000

From File MANSONC1

Time hh:mm:ss	Blow No	St- roke 1/min	Ene- rgy cm	Oil- flow kNm	Oil- temp. l/min	Oilpres. PP C	Dif1 Hammer bar	Dif2 Hammer bar	Water mbar	Press. mbar	Eph bar	Usage kNm	k	Mech Eff
15:35:49	STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED													
15:37:42	C1 HAS REPORTED HAMMER NOT ON PILE													
15:45:24	START HAMMER OPERATION IN STROKE SEQUENCE MODE													
15:45:55	2702	31.0	110	498	0	35.2	216	226	0	0	0.0	545	1.00	0.91
15:46:13	2712	32.3	108	497	0	35.3	219	228	0	0	0.0	535	0.99	0.93
15:46:32	2722	32.4	108	497	0	35.5	219	229	0	0	0.0	539	0.99	0.92
15:46:50	2732	32.4	108	496	0	35.4	219	229	0	0	0.0	538	0.99	0.92
15:47:09	2742	32.4	108	497	0	35.6	220	228	0	0	0.0	535	0.99	0.93
15:47:27	2752	32.4	108	496	0	36.3	219	228	0	0	0.0	536	0.99	0.93
15:47:46	2762	32.4	108	497	0	36.8	219	227	0	0	0.0	536	0.99	0.93
15:48:04	2772	32.4	108	495	0	36.3	219	229	0	0	0.0	538	0.99	0.92
15:48:23	2782	32.4	108	497	0	35.9	219	228	0	0	0.0	535	0.99	0.93
15:48:41	2792	32.4	108	495	0	36.2	221	229	0	0	0.0	537	0.99	0.92
15:49:00	2802	32.4	108	495	0	36.1	219	228	0	0	0.0	537	0.99	0.92
15:49:18	2812	32.4	108	497	0	35.8	220	228	0	0	0.0	536	0.99	0.93
15:49:37	2822	32.4	108	496	0	35.8	218	228	0	0	0.0	538	0.99	0.92
15:49:55	2832	32.4	108	498	0	35.7	219	228	0	0	0.0	536	1.00	0.93
15:50:14	2842	32.4	108	500	0	35.7	218	227	0	0	0.0	536	1.00	0.93
15:50:32	2852	32.4	108	494	0	35.7	219	227	0	0	0.0	535	0.99	0.92
15:50:51	2862	32.4	108	496	0	35.7	220	226	0	0	0.0	535	0.99	0.93
15:51:10	2872	32.4	108	496	0	35.9	218	225	0	0	0.0	533	0.99	0.93
15:51:28	2882	32.4	108	495	0	35.7	218	227	0	0	0.0	535	0.99	0.93
15:51:47	2892	32.4	108	495	0	36.1	217	226	0	0	0.0	535	0.99	0.93
15:52:05	2902	32.4	108	495	0	35.6	217	227	0	0	0.0	536	0.99	0.92
15:52:18	STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED													
15:53:13	C1 HAS REPORTED HAMMER NOT ON PILE													
15:59:27	CH1 SENSOR WAS DETECTED AS DEFECT BUT IS STILL FUNCTIONING													

PILE 1, SECTION D

PILE 1, SECTION D

ALLSEAS PILE DRIVING RECORD FROM MENCK MONITORING-SYSTEM PAGE 01 09-11-2000

JOB INFORMATION

PILE CODE ..... : 1D
FILE NAME ..... : MANSON1D
CLIENT ..... : CAL.TRANS
PROJECT ..... : BAY BRIDGE TEST
PLATFORM ..... :
SHIPS NAME ..... : DB 24
JOB NO ..... : 40-00-044
CONTRACT NR ..... :

HAMMER INFORMATION

HAMMER TYPE ..... : MHU 1700 i
SERIAL NO ..... : 62443
POWERPACK ..... : 2 X FISCHCON 1600 l
CONFIGURATION ..... : FREE RIDING....._
CONTROL UNIT NO ..... : _....._
BLOW COUNTER ON PANEL ..... : 0....._

PARAMETER INFORMATION

PRINTER LOGGING DISTANCE ..... : 0.25....._
LOWER REVERSAL TIME VARIABLE 0-400ms : relative stair

UPPER REVERSAL AUTOMATICALLY
DIFF PRESS SENSORS
START POINT AT .....mbar : _....._
STOP POINT AT .....mbar : _....._

PILE INFORMATION

OUTSIDE DIAMETER ....." : 96
WALL THICKNESS ....." : 2.3/4
LENGTH .....feet : 85 PER PILE
SELF PENETR. PILE .....feet : 6.00 METER
SELF PENETR.W.HAMMER ....feet : 69.00 METER

REMARK : Eph := ENERGY FROM HYDRAULIC AND FREE FALL
Eff := IMPACT ENERGY / Eph
k := IMPACT ENERGY / DESIGN ENERGY

NTSv421 OLDv234 HUBv222 PICv105 TXTv517 GPAv205 GMHv006 USSv000

ALLSEAS PILE DRIVING RECORD MHU 1700i MONITORING-SYSTEM PAGE 02 09-11-2000

From File MANSON1D

Time hh:mm:ss	Blow No	St- roke 1/min	Ene- rgy cm	Oil- flow kNm	Oil- temp. l/min	Oilpres. PP C	Dif1 Hammer bar	Dif2 bar	Water mbar	Eph mbar	k bar	Mech Press. kNm	Usage	Eff

11:10:06 START HAMMER OPERATION IN SINGLE BLOW MODE

11:10:35 INCREMENTAL COUNT ERROR

11:10:37 ATTENTION THE OILPRESSURE AT HAMMER IS TO HIGH !

11:10:43 START HAMMER OPERATION IN SINGLE BLOW MODE

11:10:48 INCREMENTAL COUNT ERROR

11:10:57 START HAMMER OPERATION IN SINGLE BLOW MODE

11:11:02 INCREMENTAL COUNT ERROR

11:11:07 START HAMMER OPERATION IN SINGLE BLOW MODE

11:11:49 START HAMMER OPERATION IN SINGLE BLOW MODE

11:11:55 INCREMENTAL COUNT ERROR

11:12:00 START HAMMER OPERATION IN SINGLE BLOW MODE

11:12:06 INCREMENTAL COUNT ERROR

11:12:53 START HAMMER OPERATION IN STROKE SEQUENCE MODE

11:12:59 INCREMENTAL COUNT ERROR

11:13:07 INCREMENTAL COUNT ERROR

ALLSEAS PILE DRIVING RECORD MHU 1700i MONITORING-SYSTEM PAGE 03 09-11-2000

From File _____ Time hh:mm:ss	Blow No	St- Blow 1/min	Ene- roke cm	rgy kNm	Oil- flow l/min	Oil- temp. C	Oilpres. PP bar	Dif1 Hammer bar	Dif2 mbar	Water mbar	Press. bar	Eph kNm	k Usage	Mech Eff
11:13:10	INCREMENTAL COUNT ERROR													
11:13:13	INCREMENTAL COUNT ERROR													
11:13:17	12	14.2	30	1042	0	19.0	200	278	0	0	0.0	697	0.61	1.50
11:13:18	INCREMENTAL COUNT ERROR													
11:13:22	INCREMENTAL COUNT ERROR													
11:13:26	INCREMENTAL COUNT ERROR													
11:13:29	ATTENTION THE OILPRESSURE AT HAMMER IS TO HIGH !													
11:13:30	INCREMENTAL COUNT ERROR													
11:13:40	STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED													
11:13:44	START HAMMER OPERATION IN STROKE SEQUENCE MODE													
11:13:48	ATTENTION THE OILPRESSURE AT HAMMER IS TO HIGH !													
11:13:52	STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED													
11:18:38	START HAMMER OPERATION IN STROKE SEQUENCE MODE													
11:18:48	ATTENTION THE OILPRESSURE AT HAMMER IS TO HIGH !													
11:18:51	STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED													

ALLSEAS PILE DRIVING RECORD MHU 1700i MONITORING-SYSTEM PAGE 04 09-11-2000

From File _____

Time hh:mm:ss	Blow No	St- roke 1/min	Ene- rgy cm	Oil- flow kNm	Oil- temp. l/min	Oilpres. PP C	Dif1 Hammer bar	Dif2 bar	Water mbar	Eph mbar	k bar	Mech Press. kNm	Usage	Eff
11:20:36	START HAMMER OPERATION IN SINGLE BLOW MODE													
11:20:41	ATTENTION THE OILPRESSURE AT HAMMER IS TO HIGH !													
11:20:50	STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED													
11:21:09	START HAMMER OPERATION IN STROKE SEQUENCE MODE													
11:21:12	ATTENTION THE OILPRESSURE AT HAMMER IS TO HIGH !													
11:21:18	STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED													
11:22:33	STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED													
11:22:36	START HAMMER OPERATION IN SINGLE BLOW MODE													
11:22:39	ATTENTION THE OILPRESSURE AT HAMMER IS TO HIGH !													
11:22:40	STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED													
11:23:00	START HAMMER OPERATION IN SINGLE BLOW MODE													
11:24:48	SYSTEM STOP REQUIRED BEFOR MODE SWITCH IS ACTUATED													
11:24:59	START HAMMER OPERATION IN SINGLE BLOW MODE													
11:25:21	ATTENTION THE OILPRESSURE AT HAMMER IS TO HIGH !													
11:25:28	START HAMMER OPERATION IN STROKE SEQUENCE MODE													

ALLSEAS PILE DRIVING RECORD MHU 1700i MONITORING-SYSTEM PAGE 05 09-11-2000

From File _____

Time hh:mm:ss	Blow No	St- roke 1/min	Ene- rgy cm	Oil- flow kNm	Oil- temp. l/min	Oilpres. PP C	Dif1 Hammer bar	Dif2 bar	Water mbar	Press. mbar	Eph bar	k Usage kNm	Mech Eff
11:25:32	ATTENTION THE OILPRESSURE AT HAMMER IS TO HIGH !												
11:25:43	START HAMMER OPERATION IN STROKE SEQUENCE MODE												
11:25:50	ATTENTION THE OILPRESSURE AT HAMMER IS TO HIGH !												
11:26:12	START HAMMER OPERATION IN STROKE SEQUENCE MODE												
11:26:16	ATTENTION THE OILPRESSURE AT HAMMER IS TO HIGH !												
11:26:45	STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED												
11:26:47	START HAMMER OPERATION IN SINGLE BLOW MODE												
11:26:57	START HAMMER OPERATION IN SINGLE BLOW MODE												
11:26:59	ATTENTION THE OILPRESSURE AT HAMMER IS TO HIGH !												
11:27:02	START HAMMER OPERATION IN SINGLE BLOW MODE												
11:27:14	START HAMMER OPERATION IN SINGLE BLOW MODE												
11:27:31	START HAMMER OPERATION IN SINGLE BLOW MODE												
11:27:45	START HAMMER OPERATION IN STROKE SEQUENCE MODE												
11:28:05	31	68.1	36	627	0	21.2	0	293	0	0	0.0	829	0.37 0.76
11:28:21	41	84.2	36	656	0	21.0	0	287	0	0	0.0	830	0.39 0.79
11:28:36	51	75.3	34	622	0	21.1	0	277	0	0	0.0	765	0.37 0.81
11:28:57	61	26.5	50	953	0	21.5	0	283	0	0	0.0	1193	0.56 0.80
11:29:20	71	26.7	50	961	0	21.6	0	285	0	0	0.0	1196	0.57 0.80
11:29:42	81	26.7	50	958	0	22.2	0	283	0	0	0.0	1212	0.56 0.79

ALLSEAS PILE DRIVING RECORD MHU 1700i MONITORING-SYSTEM PAGE 06 09-11-2000

From File _____

Time hh:mm:ss	Blow No	Blow 1/min	St-roke cm	Ene-rgy kNm	Oil-flow l/min	Oil-temp. C	Oilpres. PP bar	Dif1 Hammer bar	Dif2 mbar	Water mbar	Press. bar	Eph Usage kNm	k	Mech Eff
11:29:49	STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED													
11:32:24	START HAMMER OPERATION IN STROKE SEQUENCE MODE													
11:32:28	ATTENTION THE OILPRESSURE AT HAMMER IS TO HIGH !													
11:32:38	START HAMMER OPERATION IN STROKE SEQUENCE MODE													
11:32:59	95	27.9	48	914	0	23.8	0	286	0	0	0.0	1155	0.54	0.79
11:33:20	105	29.0	48	914	0	24.2	0	291	0	0	0.0	1162	0.54	0.79
11:33:40	115	29.1	48	917	0	24.1	0	285	0	0	0.0	1142	0.54	0.80
11:34:00	125	31.1	48	913	0	24.1	0	284	0	0	0.0	1160	0.54	0.79
11:34:19	135	43.3	48	875	0	23.9	0	283	0	0	0.0	1129	0.51	0.77
11:34:38	145	32.2	48	919	0	24.1	0	301	0	0	0.0	1195	0.54	0.77
11:34:56	155	28.7	48	948	0	23.9	0	303	0	0	0.0	1171	0.56	0.81
11:35:15	165	29.6	48	940	0	23.9	0	300	0	0	0.0	1175	0.55	0.80
11:35:34	175	30.2	48	939	0	23.8	0	309	0	0	0.0	1180	0.55	0.80
11:35:53	185	29.7	48	940	0	24.6	0	311	0	0	0.0	1191	0.55	0.79
11:36:12	195	29.8	48	942	0	24.6	0	321	0	0	0.0	1198	0.55	0.79
11:36:31	205	29.3	48	950	0	25.2	0	317	0	0	0.0	1208	0.56	0.79
11:36:50	215	30.0	48	935	0	24.8	0	302	0	0	0.0	1190	0.55	0.79
11:37:09	225	31.1	48	932	0	25.0	0	293	0	0	0.0	1169	0.55	0.80
11:37:28	235	31.9	48	924	0	25.4	0	288	0	0	0.0	1181	0.54	0.78
11:37:47	245	31.4	48	930	0	25.2	0	291	0	0	0.0	1183	0.55	0.79
11:38:06	255	31.3	48	923	0	25.4	0	299	0	0	0.0	1172	0.54	0.79
11:38:25	265	31.0	48	930	0	25.9	0	298	0	0	0.0	1192	0.55	0.78
11:38:44	275	30.8	48	931	0	25.6	0	301	0	0	0.0	1150	0.55	0.81
11:39:04	285	31.4	48	926	0	25.9	0	291	0	0	0.0	1162	0.54	0.80
11:39:23	295	31.0	48	931	0	26.3	0	294	0	0	0.0	1190	0.55	0.78
11:39:42	305	31.0	48	932	0	26.6	0	295	0	0	0.0	1169	0.55	0.80
11:40:02	315	30.9	48	930	0	26.4	0	300	0	0	0.0	1189	0.55	0.78
11:40:21	325	30.8	48	933	0	26.5	0	296	0	0	0.0	1163	0.55	0.80
11:40:41	335	30.7	48	936	0	26.9	0	294	0	0	0.0	1161	0.55	0.81
11:41:01	345	30.4	48	931	0	27.1	0	300	0	0	0.0	1185	0.55	0.79
11:41:20	355	30.5	48	933	0	27.3	0	305	0	0	0.0	1183	0.55	0.79
11:41:40	365	30.4	48	935	0	27.2	0	309	0	0	0.0	1191	0.55	0.78
11:42:00	375	30.5	48	936	0	27.3	0	296	0	0	0.0	1174	0.55	0.80
11:42:20	385	30.1	48	944	0	27.5	0	294	0	0	0.0	1178	0.56	0.80
11:42:39	395	30.4	48	940	0	27.7	0	297	0	0	0.0	1174	0.55	0.80
11:42:59	405	30.1	48	943	0	27.8	0	290	0	0	0.0	1159	0.55	0.81
11:43:19	415	30.1	48	941	0	27.8	0	291	0	0	0.0	1184	0.55	0.79

ALLSEAS PILE DRIVING RECORD MHU 1700i MONITORING-SYSTEM PAGE 07 09-11-2000

From File _____

Time hh:mm:ss	Blow No	Blow 1/min	St-roke cm	Ene-rgy kNm	Oil-flow l/min	Oil-temp. C	Oilpres. PP bar	Hammer bar	Dif1 mbar	Dif2 mbar	Water Press. bar	Eph Usage kNm	k	Mech Eff
11:43:39	425	30.0	48	941	0	27.9	0	293	0	0	0.0	1176	0.55	0.80
11:43:59	435	29.9	48	943	0	28.0	0	298	0	0	0.0	1174	0.55	0.80
11:44:19	445	29.7	48	943	0	28.1	0	294	0	0	0.0	1192	0.55	0.79
11:44:39	455	29.7	48	948	0	28.6	0	292	0	0	0.0	1173	0.56	0.81
11:45:00	465	29.6	48	947	0	28.8	0	288	0	0	0.0	1175	0.56	0.81
11:45:20	475	29.7	48	947	0	28.5	0	285	0	0	0.0	1145	0.56	0.83
11:45:40	485	30.5	48	943	0	28.7	0	291	0	0	0.0	1170	0.55	0.81
11:46:00	495	30.0	48	945	0	28.7	0	285	0	0	0.0	1135	0.56	0.83
11:46:20	505	29.9	48	942	0	29.2	0	291	0	0	0.0	1160	0.55	0.81
11:46:40	515	30.3	48	941	0	29.5	0	284	0	0	0.0	1156	0.55	0.81
11:46:59	525	30.3	48	944	0	29.4	0	287	0	0	0.0	1158	0.56	0.81
11:47:19	535	30.2	48	945	0	29.7	0	287	0	0	0.0	1137	0.56	0.83
11:47:39	545	30.0	48	944	0	29.5	0	289	0	0	0.0	1151	0.56	0.82
11:47:59	555	29.9	48	945	0	29.8	0	292	0	0	0.0	1160	0.56	0.81
11:48:19	565	29.9	48	943	0	29.9	0	303	0	0	0.0	1171	0.55	0.81
11:48:39	575	29.8	48	943	0	30.2	0	299	0	0	0.0	1178	0.55	0.80
11:48:59	585	29.7	48	946	0	30.0	0	303	0	0	0.0	1191	0.56	0.79
11:49:20	595	29.6	48	949	0	30.4	0	301	0	0	0.0	1206	0.56	0.79
11:49:40	605	29.3	48	947	0	30.3	0	300	0	0	0.0	1188	0.56	0.80
11:50:01	615	29.5	48	947	0	30.2	0	309	0	0	0.0	1173	0.56	0.81
11:50:21	625	29.6	48	947	0	30.6	0	295	0	0	0.0	1184	0.56	0.80
11:50:41	635	29.8	48	948	0	30.7	0	309	0	0	0.0	1173	0.56	0.81
11:51:01	645	29.8	48	944	0	30.7	0	299	0	0	0.0	1203	0.56	0.78
11:51:22	655	29.5	48	944	0	31.1	0	296	0	0	0.0	1172	0.56	0.81
11:51:42	665	29.5	48	947	0	31.1	0	307	0	0	0.0	1205	0.56	0.79
11:52:02	675	29.7	48	942	0	31.3	0	299	0	0	0.0	1198	0.55	0.79
11:52:22	685	29.7	48	947	0	30.9	0	307	0	0	0.0	1200	0.56	0.79
11:52:43	695	29.8	48	947	0	31.2	0	303	0	0	0.0	1173	0.56	0.81
11:53:03	705	29.4	48	947	0	31.4	0	295	0	0	0.0	1181	0.56	0.80
11:53:24	715	29.3	48	947	0	31.5	0	301	0	0	0.0	1201	0.56	0.79
11:53:44	725	29.1	48	949	0	31.7	0	302	0	0	0.0	1169	0.56	0.81
11:54:05	735	29.0	48	951	0	31.7	0	297	0	0	0.0	1186	0.56	0.80
11:54:25	745	29.1	48	950	0	31.9	0	296	0	0	0.0	1183	0.56	0.80
11:54:46	755	28.8	48	949	0	32.0	0	297	0	0	0.0	1166	0.56	0.81
11:55:07	765	28.9	48	951	0	32.0	0	295	0	0	0.0	1167	0.56	0.82
11:55:28	775	28.9	48	956	0	32.3	0	300	0	0	0.0	1175	0.56	0.81
11:55:48	785	29.2	48	948	0	32.3	0	296	0	0	0.0	1182	0.56	0.80
11:56:09	795	29.2	48	946	0	32.3	0	311	0	0	0.0	1186	0.56	0.80
11:56:29	805	29.3	48	954	0	32.3	0	306	0	0	0.0	1198	0.56	0.80
11:56:50	815	29.1	48	955	0	32.5	0	308	0	0	0.0	1185	0.56	0.81
11:57:10	825	29.1	48	950	0	32.6	0	301	0	0	0.0	1183	0.56	0.80
11:57:31	835	29.2	48	955	0	32.6	0	305	0	0	0.0	1184	0.56	0.81
11:57:52	845	28.8	48	955	0	32.7	0	303	0	0	0.0	1203	0.56	0.79
11:58:12	855	28.9	48	952	0	32.8	0	300	0	0	0.0	1206	0.56	0.79
11:58:33	865	29.0	48	951	0	32.9	0	300	0	0	0.0	1183	0.56	0.80

ALLSEAS PILE DRIVING RECORD MHU 1700i MONITORING-SYSTEM PAGE 08 09-11-2000

From File _____

Time hh:mm:ss	Blow No	Blow 1/min	St-roke cm	Ene-rgy kNm	Oil-flow l/min	Oil-temp. C	Oilpres. PP bar	Hammer bar	Dif1 mbar	Dif2 mbar	Water Press. bar	Eph Usage kNm	k	Mech Eff
11:58:54	875	29.0	48	952	0	33.3	0	296	0	0	0.0	1180	0.56	0.81
11:59:14	885	29.1	48	950	0	33.2	0	295	0	0	0.0	1184	0.56	0.80
11:59:35	895	29.5	48	954	0	33.5	0	302	0	0	0.0	1188	0.56	0.80
11:59:55	905	29.3	48	956	0	33.1	0	305	0	0	0.0	1185	0.56	0.81
12:00:16	915	29.3	48	959	0	33.4	0	298	0	0	0.0	1176	0.56	0.81
12:00:36	925	29.7	48	948	0	33.6	0	304	0	0	0.0	1184	0.56	0.80
12:00:56	935	29.3	48	949	0	33.7	0	304	0	0	0.0	1174	0.56	0.81
12:01:17	945	29.5	48	959	0	33.4	0	299	0	0	0.0	1173	0.56	0.82
12:01:37	955	29.5	48	957	0	33.8	0	292	0	0	0.0	1150	0.56	0.83
12:01:58	965	29.2	48	956	0	33.8	0	297	0	0	0.0	1172	0.56	0.82
12:02:18	975	29.6	48	952	0	33.6	0	291	0	0	0.0	1153	0.56	0.83
12:02:38	985	29.4	48	953	0	34.0	0	288	0	0	0.0	1139	0.56	0.84
12:02:59	995	29.6	48	955	0	33.9	0	289	0	0	0.0	1160	0.56	0.82
12:03:19	1005	29.3	48	958	0	34.0	0	289	0	0	0.0	1131	0.56	0.85
12:03:40	1015	29.2	48	952	0	34.2	0	292	0	0	0.0	1163	0.56	0.82
12:04:00	1025	29.1	48	956	0	34.2	0	293	0	0	0.0	1179	0.56	0.81
12:04:20	1035	29.5	48	951	0	34.2	0	293	0	0	0.0	1144	0.56	0.83
12:04:41	1045	29.2	48	956	0	34.1	0	295	0	0	0.0	1151	0.56	0.83
12:05:01	1055	29.0	48	956	0	34.4	0	288	0	0	0.0	1143	0.56	0.84
12:05:22	1065	29.2	48	957	0	34.2	0	294	0	0	0.0	1159	0.56	0.83
12:05:43	1075	29.3	48	958	0	34.1	0	282	0	0	0.0	1128	0.56	0.85
12:06:03	1085	29.2	48	958	0	34.6	0	307	0	0	0.0	1191	0.56	0.80
12:06:24	1095	29.0	48	956	0	34.7	0	289	0	0	0.0	1159	0.56	0.82
12:06:44	1105	29.3	48	954	0	34.4	0	284	0	0	0.0	1150	0.56	0.83
12:07:05	1115	29.4	48	956	0	34.6	0	293	0	0	0.0	1164	0.56	0.82
12:07:25	1125	29.4	48	957	0	34.9	0	297	0	0	0.0	1161	0.56	0.82
12:07:46	1135	29.2	48	963	0	34.8	0	291	0	0	0.0	1155	0.57	0.83
12:08:06	1145	29.0	48	959	0	34.9	0	290	0	0	0.0	1151	0.56	0.83
12:08:27	1155	29.5	48	961	0	34.9	0	294	0	0	0.0	1143	0.57	0.84
12:08:47	1165	29.3	48	959	0	34.7	0	284	0	0	0.0	1140	0.56	0.84
12:09:08	1175	29.2	48	955	0	35.2	0	289	0	0	0.0	1141	0.56	0.84
12:09:29	1185	28.7	48	961	0	35.4	0	285	0	0	0.0	1159	0.57	0.83
12:09:49	1195	29.1	48	960	0	35.0	0	285	0	0	0.0	1153	0.56	0.83
12:10:10	1205	29.2	48	958	0	34.9	0	297	0	0	0.0	1161	0.56	0.83
12:10:30	1215	29.2	48	958	0	35.1	0	293	0	0	0.0	1151	0.56	0.83
12:10:51	1225	28.9	48	958	0	35.2	0	295	0	0	0.0	1141	0.56	0.84
12:11:12	1235	29.1	48	954	0	35.4	0	298	0	0	0.0	1151	0.56	0.83
12:11:32	1245	29.4	48	958	0	35.2	0	299	0	0	0.0	1162	0.56	0.82
12:11:53	1255	29.0	48	954	0	35.2	0	300	0	0	0.0	1153	0.56	0.83
12:12:13	1265	28.9	48	957	0	35.8	0	299	0	0	0.0	1160	0.56	0.83
12:12:34	1275	29.5	48	959	0	35.6	0	301	0	0	0.0	1173	0.56	0.82
12:12:55	1285	29.4	48	955	0	35.5	0	293	0	0	0.0	1164	0.56	0.82
12:13:15	1295	29.4	48	952	0	35.8	0	294	0	0	0.0	1152	0.56	0.83
12:13:35	1305	29.0	48	954	0	35.7	0	297	0	0	0.0	1177	0.56	0.81
12:13:56	1315	29.6	48	952	0	35.7	0	292	0	0	0.0	1172	0.56	0.81

ALLSEAS PILE DRIVING RECORD MHU 1700i MONITORING-SYSTEM PAGE 09 09-11-2000

From File _____

Time hh:mm:ss	Blow No	Blow 1/min	St-roke cm	Ene-rgy kNm	Oil-flow l/min	Oil-temp. C	Oilpres. PP bar	Hammer bar	Dif1 mbar	Dif2 mbar	Water Press. bar	Eph Usage kNm	k	Mech Eff
12:14:16	1325	29.4	48	949	0	35.8	0	294	0	0	0.0	1151	0.56	0.82
12:14:37	1335	29.4	48	950	0	35.8	0	296	0	0	0.0	1152	0.56	0.82
12:14:57	1345	29.2	48	949	0	36.1	0	293	0	0	0.0	1142	0.56	0.83
12:15:18	1355	29.5	48	952	0	35.9	0	288	0	0	0.0	1152	0.56	0.83
12:15:38	1365	29.4	48	953	0	36.2	0	294	0	0	0.0	1132	0.56	0.84
12:15:58	1375	29.3	48	950	0	36.0	0	299	0	0	0.0	1170	0.56	0.81
12:16:19	1385	29.2	48	955	0	36.0	0	296	0	0	0.0	1161	0.56	0.82
12:16:39	1395	29.5	48	951	0	36.0	0	296	0	0	0.0	1173	0.56	0.81
12:17:00	1405	29.3	48	957	0	36.4	0	297	0	0	0.0	1159	0.56	0.83
12:17:20	1415	29.3	48	954	0	36.4	0	295	0	0	0.0	1151	0.56	0.83
12:17:41	1425	29.1	48	956	0	36.2	0	294	0	0	0.0	1146	0.56	0.83
12:18:01	1435	29.4	48	955	0	36.3	0	290	0	0	0.0	1159	0.56	0.82
12:18:21	1445	29.4	48	954	0	36.5	0	294	0	0	0.0	1140	0.56	0.84
12:18:42	1455	29.5	48	952	0	36.6	0	296	0	0	0.0	1161	0.56	0.82
12:19:02	1465	29.2	48	954	0	36.2	0	293	0	0	0.0	1163	0.56	0.82
12:19:23	1475	29.4	48	954	0	36.6	0	296	0	0	0.0	1175	0.56	0.81
12:19:43	1485	29.3	48	953	0	36.3	0	295	0	0	0.0	1156	0.56	0.82
12:20:04	1495	30.3	50	996	0	36.3	0	292	0	0	0.0	1206	0.59	0.83
12:20:23	1505	30.1	50	1002	0	36.6	0	309	0	0	0.0	1231	0.59	0.81
12:20:43	1515	30.8	50	998	0	36.7	0	304	0	0	0.0	1226	0.59	0.81
12:21:03	1525	30.4	50	1002	0	36.6	0	307	0	0	0.0	1225	0.59	0.82
12:21:22	1535	30.3	50	999	0	36.4	0	303	0	0	0.0	1219	0.59	0.82
12:21:42	1545	30.5	50	999	0	36.5	0	301	0	0	0.0	1231	0.59	0.81
12:22:02	1555	30.3	50	998	0	36.5	0	313	0	0	0.0	1229	0.59	0.81
12:22:23	1565	26.4	60	1139	0	36.7	0	304	0	0	0.0	1461	0.67	0.78
12:22:45	1575	29.4	60	1156	0	36.8	0	303	0	0	0.0	1473	0.68	0.78
12:23:05	1585	30.2	60	1159	0	36.9	0	309	0	0	0.0	1485	0.68	0.78
12:23:25	1595	30.0	60	1158	0	36.8	0	306	0	0	0.0	1468	0.68	0.79
12:23:45	1605	30.2	60	1165	0	36.7	0	306	0	0	0.0	1477	0.69	0.79
12:24:04	1615	30.3	60	1164	0	37.2	0	306	0	0	0.0	1478	0.68	0.79
12:24:24	1625	30.1	60	1154	0	36.8	0	313	0	0	0.0	1490	0.68	0.77
12:24:44	1635	30.0	60	1165	0	37.1	0	316	0	0	0.0	1514	0.69	0.77
12:25:04	1645	30.2	60	1155	0	36.9	0	317	0	0	0.0	1508	0.68	0.77
12:25:24	1655	30.1	60	1165	0	37.0	0	312	0	0	0.0	1483	0.69	0.79
12:25:44	1665	30.1	60	1169	0	37.1	0	307	0	0	0.0	1476	0.69	0.79
12:26:04	1675	30.1	60	1167	0	37.3	0	307	0	0	0.0	1479	0.69	0.79
12:26:24	1685	30.4	60	1165	0	37.2	0	308	0	0	0.0	1496	0.69	0.78
12:26:45	1695	27.9	68	1311	0	37.7	0	311	0	0	0.0	1707	0.77	0.77
12:27:07	1705	27.9	68	1313	0	37.6	0	307	0	0	0.0	1660	0.77	0.79
12:27:28	1715	28.6	68	1311	0	37.6	0	302	0	0	0.0	1667	0.77	0.79
12:27:49	1725	29.3	68	1319	0	37.9	0	302	0	0	0.0	1658	0.78	0.80
12:28:09	1735	29.2	68	1324	0	38.0	0	298	0	0	0.0	1660	0.78	0.80
12:28:30	1745	29.4	68	1324	0	37.9	0	306	0	0	0.0	1681	0.78	0.79
12:28:50	1755	29.3	68	1317	0	37.7	0	297	0	0	0.0	1654	0.77	0.80
12:29:11	1765	29.2	68	1324	0	37.9	0	304	0	0	0.0	1680	0.78	0.79

ALLSEAS PILE DRIVING RECORD MHU 1700i MONITORING-SYSTEM PAGE 10 09-11-2000

From File _____

Time hh:mm:ss	Blow No	Blow 1/min	Stroke cm	Energy kNm	Oil-flow l/min	Oil-temp. C	Oilpres. PP bar	Hammer bar	Dif1 mbar	Dif2 mbar	Water Press. bar	Eph kNm	k Usage	Mech Eff
12:29:31	1775	29.3	68	1317	0	37.8	0	299	0	0	0.0	1686	0.77	0.78
12:29:52	1785	29.2	68	1319	0	38.0	0	306	0	0	0.0	1667	0.78	0.79
12:30:12	1795	29.1	68	1323	0	38.0	0	309	0	0	0.0	1690	0.78	0.78
12:30:33	1805	29.3	68	1320	0	37.8	0	315	0	0	0.0	1684	0.78	0.78
12:30:53	1815	29.2	68	1319	0	38.2	0	315	0	0	0.0	1696	0.78	0.78
12:31:14	1825	29.5	68	1329	0	38.2	0	312	0	0	0.0	1676	0.78	0.79
12:31:35	1835	27.3	76	1521	0	38.1	0	312	0	0	0.0	1898	0.89	0.80
12:31:58	1845	26.6	82	1583	0	38.4	0	308	0	0	0.0	2036	0.93	0.78
12:32:19	1855	28.6	76	1535	0	38.6	0	316	0	0	0.0	1897	0.90	0.81
12:32:40	1865	28.6	76	1527	0	38.5	0	315	0	0	0.0	1899	0.90	0.80
12:33:01	1875	28.6	76	1535	0	38.8	0	321	0	0	0.0	1934	0.90	0.79
12:33:22	1885	28.6	76	1532	0	38.9	0	318	0	0	0.0	1917	0.90	0.80
12:33:43	1895	28.5	76	1522	0	39.0	0	317	0	0	0.0	1897	0.90	0.80
12:34:04	1905	26.3	76	1437	0	38.8	0	312	0	0	0.0	1832	0.85	0.78
12:35:02	1915	9.6	74	1298	0	39.7	0	268	0	0	0.0	1644	0.76	0.79

12:35:10 STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED

12:42:42 START HAMMER OPERATION IN STROKE SEQUENCE MODE

12:42:57 ATTENTION THE OILPRESSURE AT HAMMER IS TO HIGH !

12:43:10 STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED

12:43:17 STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED

12:43:20 START HAMMER OPERATION IN STROKE SEQUENCE MODE

12:43:39	1925	27.4	82	1595	0	42.0	0	312	0	0	0.0	2038	0.94	0.78
12:44:01	1935	28.6	76	1541	0	41.9	0	302	0	0	0.0	1900	0.91	0.81
12:44:21	1945	28.8	76	1534	0	42.1	0	313	0	0	0.0	1890	0.90	0.81
12:44:42	1955	28.5	76	1536	0	42.0	0	323	0	0	0.0	1930	0.90	0.80
12:45:03	1965	28.5	76	1529	0	41.9	0	328	0	0	0.0	1959	0.90	0.78
12:45:25	1975	28.2	76	1541	0	41.4	0	324	0	0	0.0	1935	0.91	0.80
12:45:46	1985	28.6	76	1533	0	41.6	0	324	0	0	0.0	1938	0.90	0.79
12:46:07	1995	28.5	76	1535	0	41.5	0	327	0	0	0.0	1946	0.90	0.79
12:46:28	2005	28.5	76	1535	0	41.3	0	317	0	0	0.0	1923	0.90	0.80
12:46:49	2015	28.4	76	1538	0	41.5	0	320	0	0	0.0	1937	0.90	0.79
12:47:10	2025	28.5	76	1539	0	41.5	0	321	0	0	0.0	1949	0.91	0.79
12:47:31	2035	28.5	76	1550	0	41.7	0	323	0	0	0.0	1943	0.91	0.80

ALLSEAS PILE DRIVING RECORD MHU 1700i MONITORING-SYSTEM PAGE 11 09-11-2000

From File _____

Time hh:mm:ss	Blow No	Blow 1/min	Stroke cm	Energy kNm	Oil-flow l/min	Oil-temp. C	Oilpres. PP bar	Hammer bar	Dif1 mbar	Dif2 mbar	Water Press. bar	Eph kNm	k Usage	Mech Eff
12:47:52	2045	28.4	76	1530	0	41.7	0	326	0	0	0.0	1955	0.90	0.78
12:48:13	2055	28.6	76	1534	0	41.4	0	325	0	0	0.0	1947	0.90	0.79
12:48:34	2065	28.5	76	1537	0	41.7	0	324	0	0	0.0	1936	0.90	0.79
12:48:55	2075	28.4	76	1533	0	41.8	0	320	0	0	0.0	1917	0.90	0.80
12:49:16	2085	28.2	76	1544	0	41.3	0	316	0	0	0.0	1930	0.91	0.80
12:49:37	2095	28.5	76	1532	0	41.8	0	312	0	0	0.0	1900	0.90	0.81
12:49:59	2105	28.4	76	1549	0	41.9	0	317	0	0	0.0	1924	0.91	0.80
12:50:20	2115	28.4	76	1536	0	41.5	0	314	0	0	0.0	1903	0.90	0.81
12:50:41	2125	28.1	76	1538	0	41.7	0	313	0	0	0.0	1894	0.90	0.81
12:51:02	2135	28.4	76	1540	0	41.7	0	318	0	0	0.0	1928	0.91	0.80
12:51:23	2145	28.3	76	1539	0	42.1	0	315	0	0	0.0	1893	0.91	0.81
12:51:44	2155	28.4	76	1536	0	42.2	0	312	0	0	0.0	1889	0.90	0.81
12:52:06	2165	28.3	76	1539	0	41.8	0	314	0	0	0.0	1888	0.91	0.82
12:52:27	2175	28.4	76	1535	0	42.2	0	315	0	0	0.0	1899	0.90	0.81
12:52:48	2185	28.4	76	1542	0	41.8	0	314	0	0	0.0	1899	0.91	0.81
12:53:09	2195	28.1	76	1528	0	42.3	0	313	0	0	0.0	1901	0.90	0.80

12:53:17 STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED

12:58:58 C1 HAS REPORTED HAMMER NOT ON PILE

ALLSEAS PILE DRIVING RECORD MHU 1700i MONITORING-SYSTEM PAGE 12 11-11-2000

From File MANSON1D

Time hh:mm:ss	Blow No	St- roke 1/min	Ene- rgy cm	Oil- flow kNm	Oil- temp. l/min	Oilpres. C	Dif1 bar	Dif2 bar	Water PP mbar	Hammer mbar	Press. bar	Eph kNm	k	Usage	Mech Eff

9:13:32 APPEND REPORT FILE MANSON1D

PILE 1, RESTRIKE NO. 1

PILE 1, RESTRIKE NO. 1

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ALLSEAS   PILE DRIVING RECORD FROM MENCK MONITORING-SYSTEM  PAGE 01  11-11-2000

JOB INFORMATION

PILE CODE ........................... : 1D
FILE NAME ........................... : RMANSO1D
CLIENT .............................. : CAL.TRANS
PROJECT ............................. : BAY BRIDGE TEST
PLATFORM ............................ :
SHIPS NAME .......................... : DB 24
JOB NO .............................. : 40-00-044
CONTRACT NR ......................... :

HAMMER INFORMATION

HAMMER TYPE ......................... : MHU 1700 i
SERIAL NO ........................... : 62443
POWERPACK ........................... : 2 X FISCHCON 1600 l
CONFIGURATION ....................... : FREE RIDING..................._
CONTROL UNIT NO ..................... : _............................._
BLOW COUNTER ON PANEL ............... : 0............................._

PARAMETER INFORMATION

PRINTER LOGGING DISTANCE ............ : 0.25........................._
LOWER REVERSAL TIME VARIABLE 0-400ms  :    relative stair

UPPER REVERSAL AUTOMATICALLY
DIFF PRESS SENSORS
START POINT AT ..............mbar  :    _............................._
STOP POINT AT ...............mbar  :    _............................._

PILE INFORMATION

OUTSIDE DIAMETER ............."     :    96
WALL THICKNESS ..............."     :    2.3/4
LENGTH ..................feet      :    85  PER PILE
SELF PENETR. PILE .......feet      :    6.00 METER
SELF PENETR.W.HAMMER ....feet      :    92.00 METER

REMARK :   Eph := ENERGY FROM HYDRAULIC AND FREE FALL
           Eff := IMPACT ENERGY  /  Eph
           k   := IMPACT ENERGY  /  DESIGN ENERGY
NTSv421  OLDv234  HUBv222  PICv105  TXTv517  GPAv205  GMHv006  USSv000
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ALLSEAS PILE DRIVING RECORD MHU 1700i MONITORING-SYSTEM PAGE 2 11-11-2000

From File RMANSO1D Time hh:mm:ss	Blow No	St- Blow 1/min	Ene- roke cm	rgy kNm	Oil- flow l/min	Oil- temp. C	Oilpres. PP bar	Dif1 Hammer bar	Dif2 bar	Water mbar	mbar	Press. bar	Eph kNm	k Usage	Mech Eff
10:37:59	START HAMMER OPERATION IN SINGLE BLOW MODE														
10:38:28	STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED														
10:38:39	START ABORTED BECAUSE STOP-KEY HAS BEEN PUSHED														
10:38:47	START HAMMER OPERATION IN STROKE SEQUENCE MODE														
10:39:09	11	23.5	84	1570	0	28.9	221	0	0	0	0	0.0	1688	0.92	0.93
10:39:35	21	22.4	84	1606	0	29.3	218	0	0	0	0	0.0	1676	0.94	0.96
10:40:02	31	24.3	84	1646	0	29.1	227	0	0	0	0	0.0	1712	0.97	0.96
10:40:24	41	27.6	84	1697	0	28.6	236	0	0	0	0	0.0	1750	1.00	0.97
10:40:46	51	27.5	84	1683	0	28.0	241	0	0	0	0	0.0	1769	0.99	0.95
10:40:53	STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED														
10:41:00	ATTENTION THE OILPRESSURE AT HAMMER IS TO HIGH !														

PILE 1, RESTRIKE NO. 2

PILE 1, RESTRIKE NO. 2

ALLSEAS PILE DRIVING RECORD FROM MENCK MONITORING-SYSTEM PAGE 01 20-11-2000

JOB INFORMATION

PILE CODE ..... : 1D
FILE NAME ..... : RRMANS1D
CLIENT ..... : CAL.TRANS
PROJECT ..... : BAY BRIDGE TEST
PLATFORM ..... :
SHIPS NAME ..... : DB 24
JOB NO ..... : 40-00-044
CONTRACT NR ..... :

HAMMER INFORMATION

HAMMER TYPE ..... : MHU 1700 i
SERIAL NO ..... : 62443
POWERPACK ..... : 2 X FISCHCON 1600 l
CONFIGURATION ..... : FREE RIDING....._
CONTROL UNIT NO ..... : _....._
BLOW COUNTER ON PANEL ..... : 0....._

PARAMETER INFORMATION

PRINTER LOGGING DISTANCE ..... : 0.25....._
LOWER REVERSAL TIME VARIABLE 0-400ms : relative stair

UPPER REVERSAL AUTOMATICALLY
DIFF PRESS SENSORS
START POINT AT .....mbar : _....._
STOP POINT AT .....mbar : _....._

PILE INFORMATION

OUTSIDE DIAMETER ....." : 96
WALL THICKNESS ....." : 2.3/4
LENGTH .....feet : 85 PER PILE
SELF PENETR. PILE .....feet : 6.00 METER
SELF PENETR.W.HAMMER ....feet : 92.75 METER

REMARK : Eph := ENERGY FROM HYDRAULIC AND FREE FALL
Eff := IMPACT ENERGY / Eph
k := IMPACT ENERGY / DESIGN ENERGY

NTSv421 OLDv234 HUBv222 PICv105 TXTv517 GPAv205 GMHv006 USSv000

ALLSEAS PILE DRIVING RECORD MHU 500 T MONITORING-SYSTEM PAGE 02 20-11-2000

From File RRMANS1D

Time hh:mm:ss	Blow No	Blow 1/min	St-roke cm	Ene-rgy kNm	Oil-flow l/min	Oil-temp. C	Oilpres. PP bar	Dif1 Hammer bar	Dif2 bar	Water mbar	Eph mbar	Press. bar	k Usage kNm	Mech Eff
13:50:45	INCREMENTAL COUNT ERROR													
13:50:45	STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED													
13:50:45	STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED													
13:50:45	DATAOUTPUT ON THE FUGRO-PORT TERMINATE													
13:58:44	START HAMMER OPERATION IN SINGLE BLOW MODE													
13:59:15	START HAMMER OPERATION IN STROKE SEQUENCE MODE													
13:59:46	11	26.0	84	1658	0	37.5	241	0	0	0	0.0	1770	0.98	0.94
14:00:09	21	27.3	84	1687	0	37.5	241	0	0	0	0.0	1771	0.99	0.95
14:00:31	31	27.3	84	1708	0	37.4	242	0	0	0	0.0	1772	1.00	0.96
14:00:53	41	27.0	84	1708	0	37.4	239	0	0	0	0.0	1763	1.00	0.97
14:01:15	51	27.2	84	1698	0	37.5	242	0	0	0	0.0	1774	1.00	0.96
14:01:38	61	27.1	84	1685	0	37.5	240	0	0	0	0.0	1766	0.99	0.95
14:02:00	71	27.0	84	1677	0	37.6	240	0	0	0	0.0	1766	0.99	0.95
14:02:22	81	27.2	84	1680	0	37.7	240	0	0	0	0.0	1764	0.99	0.95
14:02:44	91	27.0	84	1687	0	37.5	241	0	0	0	0.0	1770	0.99	0.95
14:03:06	101	27.1	84	1691	0	37.3	239	-0	0	0	0.0	1761	0.99	0.96
14:03:29	111	27.1	84	1690	0	36.9	241	0	0	0	0.0	1769	0.99	0.96
14:03:51	121	26.9	84	1691	0	36.8	241	0	0	0	0.0	1770	0.99	0.96
14:04:13	131	26.9	84	1679	0	36.6	242	-0	0	0	0.0	1772	0.99	0.95
14:04:36	141	26.9	84	1694	0	36.6	240	0	0	0	0.0	1764	1.00	0.96
14:04:38	STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED													
14:06:01	C1 HAS REPORTED HAMMER NOT ON PILE													

PILE 1, RESTRIKE NO. 3

PILE 1, RESTRIKE NO. 3

ALLSEAS PILE DRIVING RECORD FROM MENCK MONITORING-SYSTEM PAGE 01 12-12-2000

JOB INFORMATION

PILE CODE ..... : 1D
FILE NAME ..... : RRRMAN1D
CLIENT ..... : CAL.TRANS
PROJECT ..... : BAY BRIDGE TEST
PLATFORM ..... :
SHIPS NAME ..... : DB 24
JOB NO ..... : 40-00-044
CONTRACT NR ..... :

HAMMER INFORMATION

HAMMER TYPE ..... : MHU 1700 i
SERIAL NO ..... : 62443
POWERPACK ..... : 2 X FISCHCON 1600 l
CONFIGURATION ..... : FREE RIDING....._
CONTROL UNIT NO ..... : _....._
BLOW COUNTER ON PANEL ..... : 0....._

PARAMETER INFORMATION

PRINTER LOGGING DISTANCE ..... : 0.25....._
LOWER REVERSAL TIME VARIABLE 0-400ms : relative stair

UPPER REVERSAL AUTOMATICALLY
DIFF PRESS SENSORS
START POINT AT .....mbar : _....._
STOP POINT AT .....mbar : _....._

PILE INFORMATION

OUTSIDE DIAMETER ....." : 96
WALL THICKNESS ....." : 2.3/4
LENGTH .....feet : 85 PER PILE
SELF PENETR. PILE .....feet : 6.00 METER
SELF PENETR.W.HAMMER ....feet : 93.00 METER

REMARK : Eph := ENERGY FROM HYDRAULIC AND FREE FALL
Eff := IMPACT ENERGY / Eph
k := IMPACT ENERGY / DESIGN ENERGY

NTSv421 OLDv234 HUBv222 PICv105 TXTv517 GPAv205 GMHv006 USSv000

ALLSEAS PILE DRIVING RECORD MHU 1700i MONITORING-SYSTEM PAGE 02 12-12-2000

From File RRRMAN1D

Time hh:mm:ss	Blow No	Blow 1/min	Stroke cm	Energy kNm	Oil-flow l/min	Oil-temp. C	Oilpres. PP bar	Dif1 Hammer bar	Dif2 Hammer mbar	Water mbar	Press. bar	Eph kNm	k Usage	Mech Eff
13:39:15	START HAMMER OPERATION IN STROKE SEQUENCE MODE													
13:39:44	10	29.2	84	1693	0	27.0	245	0	0	0	0.0	1787	1.00	0.95
13:40:05	20	27.8	84	1687	0	26.6	244	0	0	0	0.0	1781	0.99	0.95
13:40:26	30	27.9	84	1670	0	26.6	240	0	0	0	0.0	1765	0.98	0.95
13:40:47	40	27.9	84	1670	0	27.1	241	0	0	0	0.0	1770	0.98	0.94
13:41:09	50	28.1	84	1670	0	26.8	240	0	0	0	0.0	1767	0.98	0.94
13:41:30	60	28.1	84	1690	0	26.8	241	0	0	0	0.0	1768	0.99	0.96
13:41:52	70	28.1	84	1677	0	26.5	239	0	0	0	0.0	1763	0.99	0.95
13:42:13	80	27.8	84	1657	0	26.6	240	0	0	0	0.0	1767	0.97	0.94
13:42:35	90	27.9	84	1674	0	26.5	239	0	0	0	0.0	1761	0.98	0.95
13:42:56	100	28.0	84	1673	0	26.9	239	0	0	0	0.0	1762	0.98	0.95
13:43:18	110	28.1	84	1679	0	26.7	238	0	0	0	0.0	1759	0.99	0.95
13:43:40	120	27.6	84	1669	0	27.5	240	0	0	0	0.0	1764	0.98	0.95
13:44:01	130	27.8	84	1670	0	27.2	238	0	0	0	0.0	1758	0.98	0.95
13:44:23	140	27.6	84	1671	0	27.5	239	0	0	0	0.0	1761	0.98	0.95
13:44:45	150	27.7	84	1673	0	27.7	238	0	0	0	0.0	1758	0.98	0.95
13:45:06	160	27.5	84	1666	0	27.9	237	0	0	0	0.0	1754	0.98	0.95
13:45:28	170	27.6	84	1680	0	28.4	238	0	0	0	0.0	1757	0.99	0.96
13:45:50	180	27.7	84	1683	0	28.1	238	0	0	0	0.0	1756	0.99	0.96
13:46:12	190	26.3	84	1651	0	28.5	239	0	0	0	0.0	1762	0.97	0.94
13:46:34	200	27.6	84	1673	0	28.9	236	0	0	0	0.0	1750	0.98	0.96
13:46:56	210	27.1	84	1661	0	28.9	237	0	0	0	0.0	1752	0.98	0.95
13:47:18	220	27.3	84	1674	0	29.2	235	0	0	0	0.0	1745	0.98	0.96
13:47:40	230	26.9	84	1663	0	29.4	238	0	0	0	0.0	1758	0.98	0.95
13:48:02	240	27.3	84	1677	0	29.6	237	0	0	0	0.0	1752	0.99	0.96
13:48:24	250	27.4	84	1670	0	29.4	235	0	0	0	0.0	1744	0.98	0.96
13:48:46	260	27.1	84	1666	0	29.6	235	0	0	0	0.0	1745	0.98	0.95
13:49:08	270	27.1	84	1680	0	30.0	236	0	0	0	0.0	1748	0.99	0.96
13:49:30	280	27.1	84	1676	0	30.3	235	0	0	0	0.0	1746	0.99	0.96
13:49:53	290	25.9	84	1635	0	30.5	239	0	0	0	0.0	1761	0.96	0.93
13:50:15	300	27.1	84	1680	0	31.1	236	0	0	0	0.0	1749	0.99	0.96
13:50:37	310	27.1	84	1682	0	31.0	236	0	0	0	0.0	1749	0.99	0.96
13:50:59	320	27.2	84	1668	0	31.1	236	0	0	0	0.0	1749	0.98	0.95
13:51:21	330	27.0	84	1673	0	31.2	235	0	0	0	0.0	1747	0.98	0.96

13:51:26 STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED

13:54:27 STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED

PILE NO. 2

Pile No. 2

PILE 2, SECTION A

PILE 2, SECTION A

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ALLSEAS   PILE DRIVING RECORD FROM MENCK MONITORING-SYSTEM  PAGE 01  03-11-2000

JOB INFORMATION

PILE CODE ........................... : 2A
FILE NAME ........................... : MANSON2A
CLIENT .............................. : CAL.TRANS
PROJECT ............................. : BAY BRIDGE TEST
PLATFORM ............................ :
SHIPS NAME .......................... : DB 24
JOB NO .............................. : 40-00-044
CONTRACT NR ......................... :

HAMMER INFORMATION

HAMMER TYPE ......................... : MHU 500 T
SERIAL NO ........................... : 63038 (05)
POWERPACK ........................... : FISCHON 1600L
CONFIGURATION ....................... : FREE RIDING..................._
CONTROL UNIT NO ..................... : _............................._
BLOW COUNTER ON PANEL ............... : 0............................._

PARAMETER INFORMATION

PRINTER LOGGING DISTANCE ............ : 0.25........................._
LOWER REVERSAL TIME VARIABLE 0-400ms  :    relative stair

UPPER REVERSAL AUTOMATICALLY
DIFF PRESS SENSORS
START POINT AT ..............mbar  :    _............................._
STOP POINT AT ...............mbar  :    _............................._

PILE INFORMATION

OUTSIDE DIAMETER ............."     :    96
WALL THICKNESS ..............."     :    1.9/16
LENGTH ..................feet      :    100 PER PILE
SELF PENETR. PILE .......feet      :    5,0METER
SELF PENETR.W.HAMMER ....feet      :    6,4METER

REMARK :   Eph := ENERGY FROM HYDRAULIC AND FREE FALL
           Eff := IMPACT ENERGY  /  Eph
           k   := IMPACT ENERGY  /  DESIGN ENERGY

NTSv421  OLDv234  HUBv222  PICv105  TXTv517  GPAv205  GMHv006  USSv000
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ALLSEAS   PILE DRIVING RECORD   MHU 500 T MONITORING-SYSTEM  PAGE 02  03-11-2000

From File MANSON2A   St- Ene-  Oil- Oil- Oilpres. Dif1 Dif2 Water  Eph   k  Mech
Time    Blow  Blow roke rgy  flow temp. PP Hammer          Press.    Usage  Eff
hh:mm:ss  No   1/min cm  kNm  l/min  C   bar bar  mbar mbar  bar   kNm

  9:12:19  START HAMMER OPERATION IN SINGLE BLOW MODE

  9:12:26  1257  BLOW/PENETRATION            0 ENERGY/PENETRATION              0
                 AV. ENERGY/PENETRATION      0 ENERGY TOTAL                    0
                 PENETRATION             18.25 DURATION      0 HRS 00 MIN 07 SEC

  9:13:14  1257  BLOW/PENETRATION            0 ENERGY/PENETRATION              0
                 AV. ENERGY/PENETRATION      0 ENERGY TOTAL                    0
                 PENETRATION             18.50 DURATION      0 HRS 00 MIN 48 SEC

  9:14:44  START HAMMER OPERATION IN SINGLE BLOW MODE

  9:15:44  START HAMMER OPERATION IN SINGLE BLOW MODE

  9:16:12  START HAMMER OPERATION IN SINGLE BLOW MODE

  9:16:23  START HAMMER OPERATION IN SINGLE BLOW MODE

  9:16:34  START HAMMER OPERATION IN SINGLE BLOW MODE

  9:16:43  START HAMMER OPERATION IN SINGLE BLOW MODE

  9:16:52  START HAMMER OPERATION IN SINGLE BLOW MODE

  9:16:59  START HAMMER OPERATION IN SINGLE BLOW MODE

  9:17:07  START HAMMER OPERATION IN SINGLE BLOW MODE

  9:17:15  START HAMMER OPERATION IN SINGLE BLOW MODE
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ALLSEAS   PILE DRIVING RECORD   MHU 500 T MONITORING-SYSTEM  PAGE  03  03-11-2000

From File ________   St- Ene-  Oil- Oil- Oilpres. Dif1 Dif2 Water  Eph   k  Mech
Time    Blow  Blow roke rgy  flow temp. PP Hammer          Press.    Usage  Eff
hh:mm:ss  No   1/min cm  kNm  l/min  C   bar bar  mbar mbar  bar   kNm

  9:17:23  START HAMMER OPERATION IN SINGLE BLOW MODE

  9:17:34  START HAMMER OPERATION IN SINGLE BLOW MODE

  9:17:41  START HAMMER OPERATION IN SINGLE BLOW MODE

  9:17:49  START HAMMER OPERATION IN SINGLE BLOW MODE

  9:17:57  START HAMMER OPERATION IN SINGLE BLOW MODE

  9:18:05  START HAMMER OPERATION IN SINGLE BLOW MODE

  9:18:12  START HAMMER OPERATION IN SINGLE BLOW MODE

  9:18:19  START HAMMER OPERATION IN SINGLE BLOW MODE

  9:18:25  START HAMMER OPERATION IN SINGLE BLOW MODE

  9:18:31  START HAMMER OPERATION IN SINGLE BLOW MODE

  9:18:37  START HAMMER OPERATION IN SINGLE BLOW MODE

  9:18:42  START HAMMER OPERATION IN SINGLE BLOW MODE

  9:18:48  START HAMMER OPERATION IN SINGLE BLOW MODE
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ALLSEAS PILE DRIVING RECORD MHU 500 T MONITORING-SYSTEM PAGE 04 03-11-2000

From File _____

Time hh:mm:ss	Blow No	Blow 1/min	St-roke cm	Ene-rgy kNm	Oil-flow l/min	Oil-temp. C	Oilpres. PP bar	Dif1 Hammer bar	Dif2 mbar	Water mbar	Press. bar	Eph kNm	k Usage	Mech Eff
9:18:55	START HAMMER OPERATION IN SINGLE BLOW MODE													
9:19:01	START HAMMER OPERATION IN SINGLE BLOW MODE													
9:19:07	START HAMMER OPERATION IN SINGLE BLOW MODE													
9:19:14	START HAMMER OPERATION IN SINGLE BLOW MODE													
9:19:21	START HAMMER OPERATION IN SINGLE BLOW MODE													
9:19:30	START HAMMER OPERATION IN SINGLE BLOW MODE													
9:19:43	START HAMMER OPERATION IN STROKE SEQUENCE MODE													
9:20:19	1297	62.0	12	65	0	23.0	186	199	0	0	0.0	57	0.13	1.14
9:20:32	1307	38.7	16	10	0	22.8	182	194	0	0	0.0	75	0.02	0.13
9:20:48	1317	33.1	16	61	0	22.8	177	194	0	0	0.0	76	0.12	0.81
9:21:06	1327	32.7	16	61	0	23.0	180	194	0	0	0.0	76	0.12	0.80
9:21:25	1337	33.0	16	60	0	22.7	181	192	0	0	0.0	74	0.12	0.80
9:21:43	1347	32.1	16	60	0	22.9	179	192	0	0	0.0	75	0.12	0.80
9:22:01	1357	32.4	16	60	0	22.9	179	193	0	0	0.0	75	0.12	0.80

ALLSEAS PILE DRIVING RECORD MHU 500 T MONITORING-SYSTEM PAGE 05 03-11-2000

From File _____

Time hh:mm:ss	Blow No	Blow 1/min	St-roke cm	Ene-rgy kNm	Oil-flow l/min	Oil-temp. C	Oilpres. PP bar	Hammer bar	Dif1 mbar	Dif2 mbar	Water Press. bar	Eph Usage kNm	k	Mech Eff
9:22:19	1367	32.7	16	59	0	22.7	181	193	0	0	0.0	75	0.12	0.80
9:22:37	1377	32.6	16	60	0	23.3	177	192	0	0	0.0	75	0.12	0.79
9:22:55	1387	32.7	16	60	0	23.1	180	191	0	0	0.0	74	0.12	0.80
9:23:13	1397	33.1	16	60	0	23.3	178	192	0	0	0.0	75	0.12	0.80
9:23:31	1407	32.3	16	60	0	23.3	178	192	0	0	0.0	75	0.12	0.79
9:23:50	1417	31.9	16	59	0	23.5	180	192	0	0	0.0	74	0.12	0.80
9:24:08	1427	33.2	16	59	0	23.5	179	192	0	0	0.0	74	0.12	0.80
9:24:26	1437	33.2	16	59	0	23.6	179	193	0	0	0.0	76	0.12	0.79
9:24:45	1447	33.5	16	60	0	24.1	179	192	0	0	0.0	75	0.12	0.80
9:25:03	1457	32.3	16	59	0	23.7	177	193	0	0	0.0	75	0.12	0.79
9:25:21	1467	32.0	16	59	0	23.8	179	193	0	0	0.0	76	0.12	0.78
9:25:40	1477	32.4	16	59	0	24.0	181	193	0	0	0.0	76	0.12	0.78
9:25:58	1487	31.7	16	59	0	23.8	179	192	0	0	0.0	75	0.12	0.79
9:26:16	1497	32.2	16	59	0	24.1	179	192	0	0	0.0	74	0.12	0.79
9:26:35	1507	32.4	16	59	0	24.5	180	191	0	0	0.0	75	0.12	0.79
9:26:53	1517	32.1	16	59	0	24.3	176	192	0	0	0.0	75	0.12	0.78
9:27:12	1527	31.7	16	59	0	24.0	180	191	0	0	0.0	75	0.12	0.79
9:27:30	1537	32.3	16	59	0	24.4	181	192	0	0	0.0	75	0.12	0.79
9:27:49	1547	32.5	16	59	0	24.1	180	192	0	0	0.0	75	0.12	0.79
9:28:07	1557	32.3	16	59	0	24.7	177	193	0	0	0.0	76	0.12	0.78
9:28:26	1567	32.6	16	59	0	24.3	178	191	0	0	0.0	75	0.12	0.79
9:28:45	1577	32.4	16	59	0	24.2	178	191	0	0	0.0	74	0.12	0.80
9:29:03	1587	32.2	16	59	0	24.7	179	192	0	0	0.0	75	0.12	0.79
9:29:22	1597	32.5	16	59	0	24.5	180	191	0	0	0.0	75	0.12	0.79
9:29:40	1607	32.2	16	59	0	24.6	178	191	0	0	0.0	75	0.12	0.79
9:29:59	1617	32.1	16	59	0	24.5	180	191	0	0	0.0	75	0.12	0.79
9:30:17	1627	32.4	16	59	0	24.7	176	191	0	0	0.0	74	0.12	0.79
9:30:36	1637	31.9	16	59	0	24.8	177	190	0	0	0.0	74	0.12	0.80
9:30:55	1647	32.5	16	59	0	24.8	177	190	0	0	0.0	75	0.12	0.79
9:31:13	1657	32.0	16	59	0	25.1	177	190	0	0	0.0	75	0.12	0.79
9:31:32	1667	32.5	16	59	0	24.9	175	191	0	0	0.0	74	0.12	0.80
9:31:51	1677	32.3	16	59	0	24.9	179	192	0	0	0.0	75	0.12	0.78
9:32:09	1687	32.1	16	59	0	24.9	176	191	0	0	0.0	75	0.12	0.79
9:32:28	1697	31.9	16	59	0	25.3	176	190	0	0	0.0	74	0.12	0.80
9:32:47	1707	31.6	16	59	0	24.9	178	191	0	0	0.0	75	0.12	0.79
9:33:06	1717	31.6	16	59	0	25.2	179	191	0	0	0.0	75	0.12	0.79
9:33:24	1727	31.7	16	59	0	25.2	179	190	0	0	0.0	74	0.12	0.79
9:33:43	1737	32.0	16	59	0	25.5	176	190	0	0	0.0	75	0.12	0.78
9:34:02	1747	32.1	16	59	0	25.6	176	190	0	0	0.0	75	0.12	0.79
9:34:21	1757	32.4	16	59	0	25.2	178	190	0	0	0.0	74	0.12	0.80
9:34:39	1767	32.1	16	59	0	25.6	178	191	0	0	0.0	76	0.12	0.78
9:34:58	1777	32.0	16	59	0	25.6	179	190	0	0	0.0	75	0.12	0.79
9:35:17	1787	31.6	16	59	0	25.7	180	190	0	0	0.0	74	0.12	0.80
9:35:36	1797	32.0	16	59	0	25.6	176	189	0	0	0.0	75	0.12	0.79
9:35:55	1807	32.2	16	59	0	25.4	177	190	0	0	0.0	75	0.12	0.79
9:36:14	1817	32.1	16	59	0	25.8	178	191	0	0	0.0	75	0.12	0.79
9:36:33	1827	31.9	16	59	0	26.0	178	189	0	0	0.0	74	0.12	0.80
9:36:52	1837	32.0	16	59	0	25.8	177	190	0	0	0.0	75	0.12	0.79

ALLSEAS PILE DRIVING RECORD MHU 500 T MONITORING-SYSTEM PAGE 06 03-11-2000

From File _____

Time hh:mm:ss	Blow No	Blow 1/min	St-roke cm	Ene-rgy kNm	Oil-flow l/min	Oil-temp. C	Oilpres. PP bar	Hammer bar	Dif1 mbar	Dif2 mbar	Water Press. bar	Eph Usage kNm	k	Mech Eff
9:37:11	1847	32.6	16	59	0	25.7	175	189	0	0	0.0	75	0.12	0.80
9:37:30	1857	31.7	16	59	0	25.9	176	189	0	0	0.0	74	0.12	0.80
9:37:49	1867	30.7	16	59	0	25.8	178	189	0	0	0.0	74	0.12	0.80
9:38:08	1877	31.1	16	59	0	26.1	177	189	0	0	0.0	75	0.12	0.78
9:38:27	1887	31.0	16	59	0	26.4	177	190	0	0	0.0	74	0.12	0.79
9:38:46	1897	30.7	16	59	0	26.0	176	190	0	0	0.0	75	0.12	0.80
9:39:05	1907	30.1	16	59	0	26.3	176	189	0	0	0.0	74	0.12	0.80
9:39:25	1917	30.8	16	59	0	26.2	179	191	0	0	0.0	75	0.12	0.79
9:39:44	1927	29.4	16	59	0	26.6	178	191	0	0	0.0	75	0.12	0.79
9:40:03	1937	28.9	16	59	0	26.7	180	191	0	0	0.0	75	0.12	0.79
9:40:23	1947	27.8	16	59	0	26.8	178	191	0	0	0.0	74	0.12	0.79
9:40:42	1957	27.8	16	59	0	26.5	179	191	0	0	0.0	75	0.12	0.79
9:41:02	1967	29.0	16	59	0	26.4	178	190	0	0	0.0	74	0.12	0.80
9:41:21	1977	29.1	16	59	0	27.1	178	191	0	0	0.0	75	0.12	0.79
9:41:40	1987	30.5	16	59	0	26.3	182	191	0	0	0.0	75	0.12	0.80
9:41:59	1997	31.0	16	59	0	26.6	177	192	0	0	0.0	75	0.12	0.80
9:42:18	2007	31.3	16	59	0	26.8	178	192	0	0	0.0	76	0.12	0.78
9:42:36	2017	31.9	16	60	0	26.7	180	192	0	0	0.0	75	0.12	0.80
9:42:55	2027	32.0	16	60	0	27.1	179	192	0	0	0.0	75	0.12	0.79
9:43:13	2037	34.5	18	72	0	27.0	182	192	0	0	0.0	84	0.14	0.86
9:43:33	2047	31.6	26	109	0	27.2	179	193	0	0	0.0	122	0.22	0.90
9:43:52	2057	31.8	26	108	0	26.8	179	192	0	0	0.0	121	0.22	0.89
9:44:10	2067	32.1	26	107	0	27.0	181	194	0	0	0.0	122	0.21	0.88
9:44:29	2077	32.2	26	107	0	27.0	180	192	0	0	0.0	121	0.21	0.89
9:44:48	2087	31.8	26	107	0	27.0	182	192	0	0	0.0	122	0.21	0.88
9:45:07	2097	31.9	26	108	0	27.1	182	192	0	0	0.0	122	0.22	0.88
9:45:25	2107	31.8	26	107	0	27.5	179	191	0	0	0.0	121	0.21	0.89

9:45:26 STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED

9:50:15 PENETRATION - 1

9:50:16 PENETRATION - 1

9:50:31 PENETRATION - 1

10:09:45 C1 HAS REPORTED HAMMER NOT ON PILE

10:41:42 START HAMMER OPERATION IN SINGLE BLOW MODE

10:42:37 START HAMMER OPERATION IN STROKE SEQUENCE MODE

10:43:06	2118	31.6	24	100	0	36.6	181	194	0	0	0.0	113	0.20	0.89
10:43:25	2128	31.4	24	100	0	36.5	182	195	0	0	0.0	113	0.20	0.89
10:43:43	2138	32.0	24	99	0	36.7	181	194	0	0	0.0	113	0.20	0.88
10:44:02	2148	32.2	24	99	0	36.6	180	194	0	0	0.0	112	0.20	0.88
10:44:21	2158	31.8	24	100	0	36.6	182	195	0	0	0.0	113	0.20	0.88
10:44:39	2168	32.3	24	100	0	36.5	182	194	0	0	0.0	112	0.20	0.89

ALLSEAS PILE DRIVING RECORD MHU 500 T MONITORING-SYSTEM PAGE 07 03-11-2000

From File _____

Time hh:mm:ss	Blow No	Blow 1/min	St-roke cm	Ene-rgy kNm	Oil-flow l/min	Oil-temp. C	Oilpres. PP bar	Hammer bar	Dif1 mbar	Dif2 mbar	Water Press. bar	Eph Usage kNm	k	Mech Eff
10:44:58	2178	31.9	24	100	0	36.0	182	195	0	0	0.0	112	0.20	0.90
10:45:17	2188	32.0	24	100	0	35.7	182	194	0	0	0.0	112	0.20	0.90
10:45:36	2198	31.9	24	101	0	35.9	183	194	0	0	0.0	112	0.20	0.90
10:45:55	2208	31.9	24	101	0	35.6	181	194	0	0	0.0	112	0.20	0.90
10:46:14	2218	31.9	24	102	0	35.5	182	194	0	0	0.0	112	0.20	0.90
10:46:32	2228	32.0	24	101	0	35.5	181	193	0	0	0.0	113	0.20	0.89
10:46:51	2238	32.0	24	101	0	35.4	183	194	0	0	0.0	112	0.20	0.90
10:47:10	2248	32.1	24	101	0	35.3	182	194	0	0	0.0	113	0.20	0.89
10:47:29	2258	31.9	24	101	0	35.1	182	194	0	0	0.0	112	0.20	0.90
10:47:48	2268	32.1	24	101	0	35.1	182	193	0	0	0.0	112	0.20	0.90
10:48:06	2278	31.7	24	101	0	35.2	182	194	0	0	0.0	112	0.20	0.90
10:48:25	2288	31.9	24	101	0	34.9	183	193	0	0	0.0	112	0.20	0.90
10:48:44	2298	32.1	24	101	0	34.7	181	194	0	0	0.0	112	0.20	0.90
10:49:03	2308	31.7	24	101	0	34.9	181	193	0	0	0.0	112	0.20	0.90
10:49:21	2318	32.3	24	101	0	34.7	182	194	0	0	0.0	112	0.20	0.90
10:49:40	2328	31.7	24	101	0	34.8	183	194	0	0	0.0	112	0.20	0.90

10:49:52 STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED

10:50:47 C1 HAS REPORTED HAMMER NOT ON PILE

PILE 2, SECTION B

PILE 2, SECTION B

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ALLSEAS   PILE DRIVING RECORD FROM MENCK MONITORING-SYSTEM  PAGE 01  12-11-2000

JOB INFORMATION

PILE CODE ........................... : 2B
FILE NAME ........................... : MANSON2B
CLIENT .............................. : CAL.TRANS
PROJECT ............................. : BAY BRIDGE TEST
PLATFORM ............................ :
SHIPS NAME .......................... : DB 24
JOB NO .............................. : 40-00-044
CONTRACT NR ......................... :

HAMMER INFORMATION

HAMMER TYPE ......................... : MHU 500 T
SERIAL NO ........................... : 63038 (05)
POWERPACK ........................... : FISCHON 1600L
CONFIGURATION ....................... : FREE RIDING..................._
CONTROL UNIT NO ..................... : _............................_
BLOW COUNTER ON PANEL ............... : 0............................_

PARAMETER INFORMATION

PRINTER LOGGING DISTANCE ............ : 0.25........................._
LOWER REVERSAL TIME VARIABLE 0-400ms  :    relative stair

UPPER REVERSAL AUTOMATICALLY
DIFF PRESS SENSORS
START POINT AT ..............mbar  :    _............................_
STOP POINT AT ...............mbar  :    _............................_

PILE INFORMATION

OUTSIDE DIAMETER ............."     :    96
WALL THICKNESS ..............."     :    1.9/16
LENGTH ..................feet      :    100 PER PILE
SELF PENETR. PILE .......feet      :    5,0METER
SELF PENETR.W.HAMMER ....feet      :    15,5METER

REMARK :   Eph := ENERGY FROM HYDRAULIC AND FREE FALL
           Eff := IMPACT ENERGY  /  Eph
           k   := IMPACT ENERGY  /  DESIGN ENERGY

NTSv421  OLDv234  HUBv222  PICv105  TXTv517  GPAv205  GMHv006  USSv000
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ALLSEAS PILE DRIVING RECORD MHU 500 T MONITORING-SYSTEM PAGE 02 12-11-2000

From File MANSON2B

Time hh:mm:ss	Blow No	Blow 1/min	St-roke cm	Ene-rgy kNm	Oil-flow l/min	Oil-temp. C	Oilpres. PP bar	Dif1 Hammer bar	Dif2 Hammer mbar	Water mbar	Press. bar	Eph Usage kNm	k	Mech Eff
8:22:30	STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED													
8:22:30	DATAOUTPUT ON THE FUGRO-PORT TERMINATE													
8:22:30	STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED													
8:49:15	START HAMMER OPERATION IN SINGLE BLOW MODE													
8:50:21	START HAMMER OPERATION IN SINGLE BLOW MODE													
8:50:31	START HAMMER OPERATION IN SINGLE BLOW MODE													
8:50:39	START HAMMER OPERATION IN SINGLE BLOW MODE													
8:50:46	START HAMMER OPERATION IN SINGLE BLOW MODE													
8:50:52	START HAMMER OPERATION IN SINGLE BLOW MODE													
8:51:04	START HAMMER OPERATION IN STROKE SEQUENCE MODE													
8:51:35	16	32.0	24	101	0	24.2	179	192	0	0	0.0	112	0.20	0.90
8:51:53	26	31.8	24	98	0	24.3	178	192	0	0	0.0	112	0.20	0.88
8:52:12	36	32.1	24	99	0	24.3	179	192	0	0	0.0	112	0.20	0.88
8:52:31	46	32.0	24	99	0	24.0	175	191	0	0	0.0	111	0.20	0.88
8:52:50	56	31.5	24	98	0	24.5	179	192	0	0	0.0	112	0.20	0.88
8:53:08	66	31.9	24	98	0	24.5	177	192	0	0	0.0	111	0.20	0.88
8:53:27	76	31.2	24	99	0	24.5	181	193	0	0	0.0	113	0.20	0.88
8:53:46	86	32.6	24	98	0	24.0	178	192	0	0	0.0	113	0.20	0.87
8:54:05	96	32.0	24	98	0	23.8	176	192	0	0	0.0	112	0.20	0.88
8:54:24	106	31.5	24	98	0	23.3	177	193	0	0	0.0	112	0.20	0.87

ALLSEAS PILE DRIVING RECORD MHU 500 T MONITORING-SYSTEM PAGE 03 12-11-2000

From File _____

Time hh:mm:ss	Blow No	Blow 1/min	Stroke cm	Energy kNm	Oil-flow l/min	Oil-temp. C	Oilpres. PP bar	Hammer bar	Dif1 mbar	Dif2 mbar	Water Press. bar	Eph Usage kNm	k	Mech Eff
8:54:43	116	32.0	24	98	0	23.1	176	192	0	0	0.0	111	0.20	0.88
8:55:02	126	32.1	24	97	0	23.4	173	192	0	0	0.0	113	0.19	0.87
8:55:20	136	32.0	24	97	0	23.2	177	192	0	0	0.0	113	0.19	0.86
8:55:39	146	31.9	24	97	0	23.2	176	191	0	0	0.0	111	0.19	0.88
8:55:58	156	31.4	24	99	0	23.2	176	192	0	0	0.0	112	0.20	0.88
8:56:17	166	31.7	24	98	0	23.4	176	192	0	0	0.0	112	0.20	0.87
8:56:36	176	31.5	24	99	0	23.8	180	193	0	0	0.0	113	0.20	0.88
8:56:55	186	32.0	24	98	0	23.5	178	191	0	0	0.0	111	0.20	0.89
8:57:14	196	32.0	24	98	0	23.2	176	192	0	0	0.0	112	0.20	0.88
8:57:35	206	21.7	38	158	0	23.3	179	192	0	0	0.0	176	0.32	0.90
8:57:59	216	33.3	34	146	0	23.1	182	194	0	0	0.0	159	0.29	0.91
8:58:17	226	31.8	34	146	0	23.2	183	195	0	0	0.0	158	0.29	0.92
8:58:36	236	32.1	34	146	0	23.3	182	194	0	0	0.0	159	0.29	0.92
8:58:54	246	32.3	34	146	0	23.1	182	197	0	0	0.0	160	0.29	0.91
8:59:12	256	34.1	34	145	0	23.2	183	196	0	0	0.0	160	0.29	0.91
8:59:30	266	33.0	34	147	0	23.4	184	198	0	0	0.0	160	0.29	0.92
8:59:48	276	31.3	44	193	0	23.3	185	198	0	0	0.0	206	0.39	0.94
9:00:07	286	32.4	42	184	0	23.3	184	198	0	0	0.0	198	0.37	0.93
9:00:25	296	32.3	42	185	0	23.3	184	197	0	0	0.0	197	0.37	0.94
9:00:44	306	32.3	42	187	0	23.2	185	198	0	0	0.0	198	0.37	0.94
9:01:03	316	32.2	44	184	0	23.1	182	198	0	0	0.0	208	0.37	0.89
9:01:21	326	32.2	44	184	0	22.7	186	198	0	0	0.0	207	0.37	0.89
9:01:40	336	32.3	42	187	0	23.1	185	198	0	0	0.0	198	0.37	0.94
9:01:59	346	32.1	44	184	0	23.2	186	198	0	0	0.0	207	0.37	0.89
9:02:17	356	32.3	42	187	0	23.2	184	196	0	0	0.0	197	0.37	0.95
9:02:36	366	32.1	44	185	0	23.4	186	199	0	0	0.0	208	0.37	0.89
9:02:54	376	32.4	42	187	0	23.5	183	198	0	0	0.0	198	0.37	0.95
9:03:13	386	32.2	42	187	0	23.2	185	198	0	0	0.0	198	0.37	0.94
9:03:32	396	32.3	42	187	0	22.6	182	197	0	0	0.0	198	0.37	0.95
9:03:50	406	32.2	42	187	0	23.5	186	197	0	0	0.0	197	0.37	0.95
9:04:09	416	32.3	42	186	0	23.6	186	197	0	0	0.0	197	0.37	0.95
9:04:27	426	32.2	44	184	0	23.4	184	198	0	0	0.0	206	0.37	0.89
9:04:46	436	32.0	44	186	0	22.7	187	199	0	0	0.0	207	0.37	0.90
9:05:05	446	32.1	44	185	0	23.0	186	199	0	0	0.0	208	0.37	0.89
9:05:24	456	32.1	44	185	0	23.5	184	200	0	0	0.0	208	0.37	0.89
9:05:42	466	31.9	44	187	0	23.2	187	202	0	0	0.0	208	0.37	0.90
9:06:01	476	32.0	44	186	0	23.6	185	201	0	0	0.0	209	0.37	0.89
9:06:20	486	32.0	44	186	0	23.7	187	201	0	0	0.0	209	0.37	0.89
9:06:39	496	31.9	44	186	0	23.4	188	201	0	0	0.0	208	0.37	0.89
9:06:57	506	31.9	44	186	0	23.5	184	201	0	0	0.0	209	0.37	0.89
9:07:16	516	31.9	44	186	0	23.4	184	201	0	0	0.0	208	0.37	0.90
9:07:35	526	31.9	44	187	0	23.5	186	200	0	0	0.0	207	0.37	0.90

9:07:41 STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED

9:17:13 START HAMMER OPERATION IN STROKE SEQUENCE MODE

ALLSEAS PILE DRIVING RECORD MHU 500 T MONITORING-SYSTEM PAGE 04 12-11-2000

From File MANSON2B

Time hh:mm:ss	Blow No	Blow 1/min	St-roke cm	Ene-rgy kNm	Oil-flow l/min	Oil-temp. C	Oilpres. PP bar	Hammer bar	Dif1 mbar	Dif2 mbar	Water Press. bar	Eph Usage kNm	k	Mech Eff
9:17:48	539	34.0	42	175	0	23.5	183	199	0	0	0.0	197	0.35	0.88
9:18:05	549	34.4	42	176	0	23.6	186	199	0	0	0.0	199	0.35	0.88
9:18:22	559	34.3	42	177	0	23.8	186	200	0	0	0.0	199	0.35	0.89
9:18:40	569	34.6	42	177	0	23.7	186	201	0	0	0.0	198	0.35	0.89
9:18:57	579	35.1	42	178	0	23.8	189	202	0	0	0.0	199	0.36	0.89
9:19:15	589	34.1	42	180	0	23.8	186	202	0	0	0.0	199	0.36	0.90
9:19:32	599	34.6	42	176	0	23.6	185	199	0	0	0.0	199	0.35	0.89
9:19:49	609	34.7	42	177	0	23.4	184	201	0	0	0.0	200	0.35	0.89
9:20:07	619	34.8	42	176	0	24.0	185	199	0	0	0.0	199	0.35	0.88
9:20:24	629	34.2	42	180	0	24.1	186	202	0	0	0.0	200	0.36	0.90
9:20:41	639	34.3	42	180	0	24.1	186	202	0	0	0.0	199	0.36	0.90
9:20:59	649	34.6	42	177	0	24.4	187	201	0	0	0.0	200	0.35	0.88
9:21:16	659	34.6	42	179	0	24.6	186	201	0	0	0.0	199	0.36	0.90
9:21:34	669	34.4	42	180	0	24.8	186	203	0	0	0.0	200	0.36	0.90
9:21:51	679	34.4	42	180	0	24.7	189	201	0	0	0.0	199	0.36	0.91

9:22:04 C1 HAS REPORTED HAMMER NOT ON PILE

9:22:11 STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED

9:22:54 START HAMMER OPERATION IN STROKE SEQUENCE MODE

9:23:14	696	34.1	42	179	0	24.7	184	202	0	0	0.0	200	0.36	0.90
9:23:31	706	34.0	42	180	0	25.0	189	202	0	0	0.0	199	0.36	0.90
9:23:49	716	34.1	42	180	0	24.9	188	203	0	0	0.0	200	0.36	0.90
9:24:07	726	34.2	42	180	0	24.9	187	203	0	0	0.0	200	0.36	0.90
9:24:24	736	34.4	42	180	0	25.4	185	214	0	0	0.0	204	0.36	0.88
9:24:42	746	34.2	42	179	0	25.2	184	208	0	0	0.0	201	0.36	0.89
9:24:59	756	34.1	42	179	0	25.1	186	205	0	0	0.0	201	0.36	0.89
9:25:17	766	34.2	42	178	0	25.1	187	203	0	0	0.0	200	0.36	0.89
9:25:34	776	34.3	42	178	0	25.2	185	203	0	0	0.0	199	0.36	0.89
9:25:52	786	34.4	42	177	0	25.3	185	204	0	0	0.0	201	0.35	0.88
9:26:09	796	34.5	42	177	0	25.3	185	203	0	0	0.0	200	0.35	0.88
9:26:27	806	34.5	42	176	0	25.3	187	204	0	0	0.0	200	0.35	0.88
9:26:44	816	34.5	42	176	0	25.2	185	202	0	0	0.0	199	0.35	0.88
9:27:01	826	33.9	42	176	0	25.6	187	202	0	0	0.0	199	0.35	0.89
9:27:19	836	34.3	42	176	0	25.7	184	201	0	0	0.0	199	0.35	0.89
9:27:36	846	34.8	40	177	0	25.4	184	202	0	0	0.0	190	0.35	0.93
9:27:53	856	34.4	42	175	0	25.8	183	202	0	0	0.0	200	0.35	0.88
9:28:11	866	34.1	42	178	0	25.3	188	203	0	0	0.0	199	0.36	0.89
9:28:28	876	34.7	42	174	0	25.4	185	200	0	0	0.0	199	0.35	0.87
9:28:46	886	34.4	42	175	0	25.4	186	200	0	0	0.0	197	0.35	0.89
9:29:03	896	34.6	42	177	0	25.6	188	200	0	0	0.0	198	0.35	0.89
9:29:20	906	34.3	42	177	0	25.5	187	203	0	0	0.0	201	0.35	0.88
9:29:38	916	34.5	42	176	0	25.4	184	201	0	0	0.0	199	0.35	0.88
9:29:55	926	34.3	42	177	0	25.5	183	213	0	0	0.0	203	0.35	0.87
9:30:13	936	34.3	42	178	0	25.7	187	212	0	0	0.0	203	0.36	0.88
9:30:30	946	34.4	42	178	0	25.5	189	214	0	0	0.0	203	0.36	0.88

ALLSEAS PILE DRIVING RECORD MHU 500 T MONITORING-SYSTEM PAGE 05 12-11-2000

From File MANSON2B

Time hh:mm:ss	Blow No	Blow 1/min	St-roke cm	Ene-rgy kNm	Oil-flow l/min	Oil-temp. C	Oilpres. PP bar	Hammer bar	Dif1 mbar	Dif2 mbar	Water Press. bar	Eph Usage kNm	k	Mech Eff
9:31:05	966	34.2	42	178	0	25.7	187	212	0	0	0.0	202	0.36	0.88
9:31:23	976	34.1	42	178	0	25.9	184	214	0	0	0.0	203	0.36	0.88
9:31:41	986	33.9	42	180	0	25.9	186	213	0	0	0.0	203	0.36	0.89
9:31:58	996	33.9	42	180	0	25.7	188	212	0	0	0.0	202	0.36	0.89
9:32:16	1006	34.0	42	179	0	25.6	187	212	0	0	0.0	205	0.36	0.87
9:32:34	1016	33.9	42	179	0	25.5	186	213	0	0	0.0	203	0.36	0.88
9:32:51	1026	34.0	42	179	0	25.9	185	216	0	0	0.0	205	0.36	0.87
9:33:09	1036	34.0	42	179	0	26.0	189	214	0	0	0.0	204	0.36	0.88
9:33:27	1046	34.1	42	179	0	26.1	185	215	0	0	0.0	204	0.36	0.88
9:33:44	1056	34.0	42	178	0	26.2	186	214	0	0	0.0	204	0.36	0.88
9:34:02	1066	34.0	42	178	0	25.9	186	215	0	0	0.0	204	0.36	0.88
9:34:20	1076	34.1	42	180	0	26.0	184	215	0	0	0.0	205	0.36	0.88
9:34:37	1086	34.0	42	179	0	26.0	190	213	0	0	0.0	203	0.36	0.88
9:34:55	1096	33.9	42	179	0	26.4	186	209	0	0	0.0	202	0.36	0.89
9:35:12	1106	33.9	42	179	0	26.2	186	212	0	0	0.0	203	0.36	0.88

9:35:13 STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED

10:30:30 START HAMMER OPERATION IN STROKE SEQUENCE MODE

10:31:04	1116	34.8	42	179	0	34.9	188	228	0	0	0.0	207	0.36	0.86
10:31:21	1126	34.9	42	180	0	35.2	189	228	0	0	0.0	209	0.36	0.86
10:31:39	1136	34.9	42	179	0	35.3	185	226	0	0	0.0	207	0.36	0.86
10:31:56	1146	35.2	42	176	0	35.6	186	224	0	0	0.0	208	0.35	0.85
10:32:13	1156	35.3	42	176	0	35.9	186	225	0	0	0.0	207	0.35	0.85
10:32:30	1166	34.7	42	176	0	35.8	186	224	0	0	0.0	207	0.35	0.85
10:32:47	1176	34.8	42	176	0	35.7	182	222	0	0	0.0	207	0.35	0.85
10:33:04	1186	34.9	42	176	0	35.6	183	219	0	0	0.0	203	0.35	0.87
10:33:21	1196	35.2	40	176	0	35.1	180	220	0	0	0.0	196	0.35	0.90
10:33:39	1206	35.4	40	175	0	35.2	181	220	0	0	0.0	198	0.35	0.89
10:33:56	1216	35.2	40	176	0	34.7	185	223	0	0	0.0	198	0.35	0.89
10:34:13	1226	35.0	40	175	0	34.5	180	223	0	0	0.0	196	0.35	0.89
10:34:30	1236	35.1	40	175	0	34.5	182	224	0	0	0.0	198	0.35	0.89
10:34:47	1246	34.9	40	175	0	34.1	184	224	0	0	0.0	197	0.35	0.88
10:35:04	1256	35.0	40	175	0	34.0	184	224	0	0	0.0	197	0.35	0.89
10:35:21	1266	34.9	40	175	0	34.0	184	224	0	0	0.0	198	0.35	0.89
10:35:38	1276	35.0	40	175	0	33.8	179	223	0	0	0.0	198	0.35	0.88
10:35:55	1286	35.1	40	175	0	33.4	178	222	0	0	0.0	197	0.35	0.89
10:36:12	1296	35.5	40	175	0	32.9	183	222	0	0	0.0	195	0.35	0.89
10:36:29	1306	35.0	40	176	0	32.9	181	222	0	0	0.0	197	0.35	0.89
10:36:46	1316	35.2	40	177	0	33.4	180	218	0	0	0.0	197	0.35	0.90
10:37:03	1326	34.9	40	176	0	32.9	183	217	0	0	0.0	194	0.35	0.91
10:37:21	1336	34.9	40	176	0	32.8	185	218	0	0	0.0	196	0.35	0.90
10:37:38	1346	35.0	40	177	0	32.9	184	217	0	0	0.0	195	0.35	0.91
10:37:55	1356	34.7	40	178	0	32.6	184	217	0	0	0.0	195	0.36	0.91
10:38:12	1366	35.4	40	178	0	32.8	182	216	0	0	0.0	195	0.36	0.91
10:38:29	1376	35.0	40	177	0	32.4	182	214	0	0	0.0	196	0.35	0.90
10:38:46	1386	34.8	40	176	0	32.7	182	217	0	0	0.0	196	0.35	0.90

ALLSEAS PILE DRIVING RECORD MHU 500 T MONITORING-SYSTEM PAGE 06 12-11-2000

From File MANSON2B

Time hh:mm:ss	Blow No	Blow 1/min	St-roke cm	Ene-rgy kNm	Oil-flow l/min	Oil-temp. C	Oilpres. PP bar	Hammer bar	Dif1 mbar	Dif2 mbar	Water Press. bar	Eph Usage kNm	k	Mech Eff
10:39:03	1396	34.8	40	177	0	32.6	179	218	0	0	0.0	197	0.35	0.90
10:39:20	1406	35.3	40	177	0	32.5	181	217	0	0	0.0	195	0.35	0.91
10:39:37	1416	35.0	40	175	0	32.2	186	216	0	0	0.0	194	0.35	0.90
10:39:54	1426	34.9	40	176	0	32.4	181	216	0	0	0.0	196	0.35	0.90
10:40:11	1436	35.4	40	175	0	32.1	183	216	0	0	0.0	195	0.35	0.90
10:40:28	1446	35.2	40	177	0	32.2	187	212	0	0	0.0	193	0.35	0.91
10:40:46	1456	34.9	40	177	0	32.1	180	216	0	0	0.0	196	0.35	0.91
10:41:03	1466	35.7	40	176	0	32.6	181	213	0	0	0.0	195	0.35	0.90
10:41:20	1476	35.2	40	177	0	31.7	184	214	0	0	0.0	195	0.35	0.91
10:41:37	1486	35.1	40	176	0	31.7	182	213	0	0	0.0	196	0.35	0.90
10:41:54	1496	35.5	40	177	0	31.3	185	213	0	0	0.0	194	0.35	0.91
10:42:11	1506	34.9	40	175	0	31.8	183	214	0	0	0.0	196	0.35	0.89
10:42:28	1516	34.7	40	177	0	31.6	184	214	0	0	0.0	195	0.35	0.90
10:42:45	1526	34.7	40	177	0	32.0	184	213	0	0	0.0	195	0.35	0.91
10:43:02	1536	35.3	40	176	0	31.9	180	212	0	0	0.0	194	0.35	0.91
10:43:19	1546	35.1	40	177	0	31.6	185	215	0	0	0.0	195	0.35	0.91
10:43:36	1556	35.2	40	178	0	31.7	185	213	0	0	0.0	195	0.36	0.91
10:43:54	1566	34.9	40	179	0	31.6	182	212	0	0	0.0	193	0.36	0.92
10:44:11	1576	35.0	40	178	0	31.5	184	212	0	0	0.0	194	0.36	0.92
10:44:28	1586	35.1	40	178	0	31.7	183	214	0	0	0.0	195	0.36	0.91
10:44:45	1596	35.1	40	176	0	31.4	184	211	0	0	0.0	193	0.35	0.91
10:45:02	1606	35.0	40	177	0	31.8	181	210	0	0	0.0	195	0.35	0.91
10:45:19	1616	35.3	40	177	0	31.5	184	211	0	0	0.0	194	0.35	0.91
10:45:36	1626	35.2	40	178	0	31.3	185	211	0	0	0.0	194	0.36	0.91
10:45:53	1636	35.1	40	177	0	31.3	181	211	0	0	0.0	194	0.35	0.91
10:46:10	1646	35.1	40	177	0	31.0	182	211	0	0	0.0	195	0.35	0.91
10:46:27	1656	34.8	40	179	0	31.4	182	211	0	0	0.0	193	0.36	0.93
10:46:45	1666	35.0	40	179	0	31.1	182	211	0	0	0.0	194	0.36	0.92
10:47:02	1676	35.3	40	178	0	31.3	185	211	0	0	0.0	193	0.36	0.92
10:47:19	1686	35.5	40	176	0	31.3	182	210	0	0	0.0	193	0.35	0.91
10:47:36	1696	35.5	40	177	0	31.1	183	210	0	0	0.0	194	0.35	0.91
10:48:27	1726	35.3	40	175	0	31.2	185	211	0	0	0.0	195	0.35	0.90
10:48:44	1736	35.4	40	174	0	30.8	182	209	0	0	0.0	195	0.35	0.90
10:49:01	1746	35.2	40	175	0	30.8	184	208	0	0	0.0	194	0.35	0.90
10:49:18	1756	35.3	40	175	0	31.2	181	210	0	0	0.0	194	0.35	0.90
10:49:35	1766	34.9	40	176	0	31.3	179	209	0	0	0.0	194	0.35	0.91
10:49:52	1776	35.0	40	176	0	30.5	180	210	0	0	0.0	194	0.35	0.90
10:50:09	1786	35.4	40	175	0	31.3	181	209	0	0	0.0	192	0.35	0.91
10:50:26	1796	35.3	40	175	0	31.2	183	208	0	0	0.0	193	0.35	0.91
10:50:43	1806	35.4	40	175	0	31.4	179	210	0	0	0.0	195	0.35	0.90
10:51:00	1816	35.5	40	175	0	31.4	182	210	0	0	0.0	195	0.35	0.89
10:51:17	1826	35.4	40	175	0	31.1	184	209	0	0	0.0	193	0.35	0.91
10:51:34	1836	35.1	40	176	0	30.9	184	208	0	0	0.0	193	0.35	0.91
10:51:51	1846	35.4	40	176	0	30.4	183	208	0	0	0.0	193	0.35	0.91
10:52:08	1856	35.3	40	176	0	30.8	182	209	0	0	0.0	195	0.35	0.90
10:52:25	1866	35.0	40	176	0	31.1	184	209	0	0	0.0	194	0.35	0.91
10:52:42	1876	32.7	44	193	0	30.9	181	210	0	0	0.0	214	0.39	0.90
10:53:00	1886	36.0	48	203	0	31.0	185	213	0	0	0.0	235	0.41	0.87

ALLSEAS PILE DRIVING RECORD MHU 500 T MONITORING-SYSTEM PAGE 07 12-11-2000

From File MANSON2B

Time hh:mm:ss	Blow No	Blow 1/min	St-roke cm	Ene-rgy kNm	Oil-flow l/min	Oil-temp. C	Oilpres. PP bar	Hammer bar	Dif1 mbar	Dif2 mbar	Water Press. bar	Eph Usage kNm	k	Mech Eff
10:53:17	1896	36.9	48	204	0	31.1	186	214	0	0	0.0	234	0.41	0.87
10:53:33	1906	36.0	48	203	0	30.9	186	212	0	0	0.0	233	0.41	0.87
10:53:50	1916	35.8	48	204	0	30.7	189	212	0	0	0.0	233	0.41	0.88
10:54:06	1926	35.9	48	205	0	30.9	184	213	0	0	0.0	235	0.41	0.87
10:54:23	1936	35.7	48	208	0	30.9	189	213	0	0	0.0	233	0.42	0.90
10:54:40	1946	35.7	48	207	0	30.4	189	214	0	0	0.0	235	0.41	0.88
10:54:57	1956	35.6	48	207	0	31.1	187	215	0	0	0.0	235	0.41	0.88
10:55:14	1966	35.4	48	208	0	30.9	187	213	0	0	0.0	234	0.42	0.89
10:55:31	1976	35.5	48	207	0	30.8	188	213	0	0	0.0	233	0.41	0.89
10:55:48	1986	35.6	48	209	0	30.8	188	214	0	0	0.0	234	0.42	0.89
10:56:05	1996	34.7	50	219	0	31.0	189	212	0	0	0.0	243	0.44	0.90
10:56:22	2006	34.4	58	256	0	30.5	192	217	0	0	0.0	284	0.51	0.90
10:56:40	2016	34.4	58	256	0	30.6	192	217	0	0	0.0	286	0.51	0.89
10:56:57	2026	34.4	58	256	0	30.8	193	218	0	0	0.0	286	0.51	0.90
10:57:15	2036	34.5	58	256	0	30.4	192	219	0	0	0.0	286	0.51	0.90
10:57:32	2046	34.5	58	256	0	30.8	192	218	0	0	0.0	283	0.51	0.90
10:57:50	2056	34.4	58	257	0	30.3	193	218	0	0	0.0	284	0.51	0.90
10:58:07	2066	34.5	58	258	0	30.6	192	217	0	0	0.0	284	0.52	0.91
10:58:24	2076	34.6	58	259	0	30.5	189	217	0	0	0.0	284	0.52	0.91
10:58:42	2086	34.5	58	258	0	30.9	191	218	0	0	0.0	285	0.52	0.90
10:58:59	2096	34.5	58	258	0	30.9	192	218	0	0	0.0	285	0.52	0.91
10:59:16	2106	34.5	58	257	0	30.6	195	217	0	0	0.0	284	0.51	0.90
10:59:34	2116	34.5	58	257	0	30.5	193	217	0	0	0.0	285	0.51	0.90
10:59:51	2126	34.5	58	257	0	30.6	191	219	0	0	0.0	284	0.51	0.90
11:00:09	2136	34.4	58	258	0	31.2	192	219	0	0	0.0	286	0.52	0.90
11:00:26	2146	34.5	58	258	0	30.4	192	218	0	0	0.0	285	0.52	0.91
11:00:43	2156	34.5	58	256	0	30.8	189	218	0	0	0.0	284	0.51	0.90
11:01:01	2166	34.4	58	257	0	30.6	194	218	0	0	0.0	285	0.51	0.90
11:01:18	2176	34.5	58	257	0	31.0	190	218	0	0	0.0	283	0.51	0.91
11:01:36	2186	34.5	58	256	0	30.8	194	217	0	0	0.0	284	0.51	0.90
11:01:53	2196	34.4	58	257	0	30.8	190	217	0	0	0.0	284	0.51	0.91
11:02:10	2206	34.6	58	258	0	30.7	194	216	0	0	0.0	285	0.52	0.91
11:02:28	2216	34.5	58	258	0	30.9	191	218	0	0	0.0	285	0.52	0.91
11:02:45	2226	34.4	58	257	0	30.9	192	217	0	0	0.0	284	0.51	0.90
11:03:03	2236	34.5	58	257	0	30.8	191	215	0	0	0.0	283	0.51	0.91
11:03:20	2246	34.6	58	257	0	30.7	193	218	0	0	0.0	286	0.51	0.90
11:03:37	2256	34.5	58	257	0	30.9	192	217	0	0	0.0	285	0.51	0.90
11:03:55	2266	34.5	58	257	0	30.8	193	217	0	0	0.0	285	0.51	0.90
11:04:12	2276	34.4	58	256	0	31.1	193	217	0	0	0.0	284	0.51	0.90
11:04:30	2286	34.4	58	256	0	30.5	192	217	0	0	0.0	284	0.51	0.90
11:04:47	2296	34.6	58	257	0	31.1	190	217	0	0	0.0	285	0.51	0.90
11:05:04	2306	34.6	58	255	0	30.7	191	216	0	0	0.0	283	0.51	0.90
11:05:22	2316	34.5	58	256	0	30.9	193	214	0	0	0.0	283	0.51	0.91
11:05:39	2326	34.6	58	256	0	30.7	190	215	0	0	0.0	284	0.51	0.90
11:05:56	2336	34.5	58	257	0	30.8	192	215	0	0	0.0	284	0.51	0.90
11:06:14	2346	34.5	58	257	0	30.7	192	218	0	0	0.0	285	0.51	0.90
11:06:31	2356	34.6	58	255	0	30.7	193	217	0	0	0.0	284	0.51	0.90
11:06:48	2366	34.7	58	256	0	30.7	191	215	0	0	0.0	284	0.51	0.90

ALLSEAS PILE DRIVING RECORD MHU 500 T MONITORING-SYSTEM PAGE 08 12-11-2000

From File MANSON2B

Time hh:mm:ss	Blow No	Blow 1/min	St-roke cm	Ene-rgy kNm	Oil-flow l/min	Oil-temp. C	Oilpres. PP bar	Hammer bar	Dif1 mbar	Dif2 mbar	Water Press. bar	Eph Usage kNm	k	Mech Eff
11:06:54	STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED													
11:22:08	START HAMMER OPERATION IN STROKE SEQUENCE MODE													
11:22:40	2379	33.4	58	251	0	31.6	191	212	0	0	0.0	282	0.50	0.89
11:22:58	2389	33.2	58	252	0	31.7	187	213	0	0	0.0	283	0.50	0.89
11:23:16	2399	33.0	58	252	0	31.9	188	214	0	0	0.0	283	0.50	0.89
11:23:34	2409	33.2	58	251	0	32.1	190	213	0	0	0.0	281	0.50	0.89
11:23:52	2419	33.2	58	253	0	33.0	187	216	0	0	0.0	285	0.51	0.89
11:24:11	2429	33.3	58	253	0	32.9	188	215	0	0	0.0	283	0.51	0.89
11:24:29	2439	33.2	58	253	0	32.7	190	215	0	0	0.0	281	0.51	0.90
11:24:47	2449	33.2	58	254	0	33.0	189	214	0	0	0.0	284	0.51	0.90
11:25:05	2459	33.1	58	251	0	32.8	189	215	0	0	0.0	284	0.50	0.88
11:25:23	2469	33.2	58	252	0	32.7	191	213	0	0	0.0	283	0.50	0.89
11:25:41	2479	33.1	58	253	0	33.1	188	213	0	0	0.0	282	0.51	0.90
11:25:59	2489	33.2	58	252	0	32.8	189	214	0	0	0.0	283	0.50	0.89
11:26:17	2499	33.2	58	253	0	32.7	190	213	0	0	0.0	283	0.51	0.89
11:26:35	2509	33.2	58	252	0	32.5	189	213	0	0	0.0	283	0.50	0.89
11:26:53	2519	33.2	58	250	0	32.4	192	212	0	0	0.0	282	0.50	0.89
11:27:11	2529	33.2	58	251	0	32.2	191	214	0	0	0.0	284	0.50	0.88
11:27:29	2539	33.2	58	252	0	32.3	189	215	0	0	0.0	284	0.50	0.89
11:27:47	2549	33.0	58	253	0	32.5	189	214	0	0	0.0	282	0.51	0.89
11:28:06	2559	33.1	58	251	0	31.9	187	214	0	0	0.0	285	0.50	0.88
11:28:24	2569	33.1	58	252	0	32.5	188	214	0	0	0.0	284	0.50	0.89
11:28:42	2579	33.1	58	252	0	32.1	188	213	0	0	0.0	283	0.50	0.89
11:28:51	STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED													
11:30:13	MH_11 SENSOR WAS DETECTED AS DEFECT BUT IS STILL FUNCTIONING													
11:30:14	MH_22 SENSOR WAS DETECTED AS DEFECT BUT IS STILL FUNCTIONING													
11:30:14	MH_21 SENSOR WAS DETECTED AS DEFECT BUT IS STILL FUNCTIONING													
11:30:15	MH_12 SENSOR WAS DETECTED AS DEFECT BUT IS STILL FUNCTIONING													
11:30:17	I lost the electric connection to the ultrasonic sensor													
11:30:17	IGNORE SENSOR MH_21 DEFECT													
11:30:18	IGNORE SENSOR MH_11 DEFECT													
11:30:18	I MUST STOP WY TO MANY STROKE SENSOR'S DEFECT													
11:30:18	IGNORE SENSOR MH_12 DEFECT													
11:30:19	I MUST STOP WY TO MANY STROKE SENSOR'S DEFECT													

PILE 2, SECTION C

PILE 2, SECTION C

ALLSEAS PILE DRIVING RECORD FROM MENCK MONITORING-SYSTEM PAGE 01 15-11-2000

JOB INFORMATION

PILE CODE ..... : 2C
FILE NAME ..... : MANSON2C
CLIENT ..... : CAL.TRANS
PROJECT ..... : BAY BRIDGE TEST
PLATFORM ..... :
SHIPS NAME ..... : DB 24
JOB NO ..... : 40-00-044
CONTRACT NR ..... :

HAMMER INFORMATION

HAMMER TYPE ..... : MHU 500 T
SERIAL NO ..... : 63038 (05)
POWERPACK ..... : FISCHON 1600L
CONFIGURATION ..... : FREE RIDING....._
CONTROL UNIT NO ..... : _....._
BLOW COUNTER ON PANEL ..... : 0....._

PARAMETER INFORMATION

PRINTER LOGGING DISTANCE ..... : 0.25....._
LOWER REVERSAL TIME VARIABLE 0-400ms : relative stair

UPPER REVERSAL AUTOMATICALLY
DIFF PRESS SENSORS
START POINT AT .....mbar : _....._
STOP POINT AT .....mbar : _....._

PILE INFORMATION

OUTSIDE DIAMETER ....." : 96
WALL THICKNESS ....." : 2.7/16
LENGTH .....feet : 85 PER PILE
SELF PENETR. PILE .....feet : 5,0 METER
SELF PENETR.W.HAMMER ....feet : 44,5 METER

REMARK : Eph := ENERGY FROM HYDRAULIC AND FREE FALL
Eff := IMPACT ENERGY / Eph
k := IMPACT ENERGY / DESIGN ENERGY

NTSv421 OLDv234 HUBv222 PICv105 TXTv517 GPAv205 GMHv006 USSv000

ALLSEAS PILE DRIVING RECORD MHU 500 T MONITORING-SYSTEM PAGE 02 15-11-2000

From File MANSON2C

Time hh:mm:ss	Blow No	St- roke 1/min	Ene- rgy cm	Oil- flow kNm	Oil- temp. l/min	Oilpres. C	Dif1 PP bar	Dif2 Hammer bar	Water mbar	Eph mbar	k Press. bar	Usage kNm	Mech Eff
10:45:02	DATAOUTPUT ON THE FUGRO-PORT TERMINATE												
10:45:02	STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED												
10:50:29	START HAMMER OPERATION IN SINGLE BLOW MODE												
10:51:02	START HAMMER OPERATION IN SINGLE BLOW MODE												
10:51:17	START HAMMER OPERATION IN SINGLE BLOW MODE												
10:51:29	START HAMMER OPERATION IN SINGLE BLOW MODE												
10:51:45	START HAMMER OPERATION IN STROKE SEQUENCE MODE												
10:52:20	14	30.5	58	251	0	19.7	193	204	0	0	0.0	277	0.50 0.91
10:52:39	24	32.0	58	250	0	19.4	193	204	0	0	0.0	278	0.50 0.90
10:52:58	34	32.0	58	253	0	19.5	194	205	0	0	0.0	278	0.51 0.91
10:53:16	44	32.0	58	253	0	19.4	193	205	0	0	0.0	277	0.51 0.91
10:53:35	54	32.0	58	252	0	19.5	194	204	0	0	0.0	278	0.50 0.91
10:53:54	64	32.1	58	253	0	19.4	191	203	0	0	0.0	277	0.51 0.91
10:54:13	74	31.9	58	253	0	20.0	193	203	0	0	0.0	277	0.51 0.91
10:54:32	84	31.9	58	253	0	19.6	192	203	0	0	0.0	277	0.51 0.91
10:54:50	94	31.6	58	250	0	19.7	192	203	0	0	0.0	277	0.50 0.91
10:55:09	104	31.6	58	253	0	19.7	195	203	0	0	0.0	277	0.51 0.91
10:55:28	114	31.5	58	252	0	19.7	192	203	0	0	0.0	277	0.50 0.91
10:55:47	124	31.6	58	253	0	20.4	195	203	0	0	0.0	276	0.51 0.92
10:56:06	134	31.6	58	252	0	19.7	191	204	0	0	0.0	277	0.50 0.91
10:56:25	144	31.6	58	252	0	19.8	193	204	0	0	0.0	277	0.50 0.91
10:56:45	154	31.4	58	253	0	19.9	193	205	0	0	0.0	277	0.51 0.91
10:57:04	164	31.4	58	252	0	20.0	195	204	0	0	0.0	276	0.50 0.91
10:57:23	174	31.4	58	254	0	20.0	192	204	0	0	0.0	277	0.51 0.92
10:57:42	184	31.2	58	255	0	20.0	194	205	0	0	0.0	276	0.51 0.92
10:58:01	194	31.2	60	254	0	20.0	193	205	0	0	0.0	285	0.51 0.89
10:58:21	204	31.2	60	254	0	20.4	195	206	0	0	0.0	286	0.51 0.89
10:58:40	214	31.2	60	254	0	20.4	193	205	0	0	0.0	286	0.51 0.89
10:58:46	STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED												
11:01:55	START HAMMER OPERATION IN STROKE SEQUENCE MODE												
11:02:24	227	33.4	60	255	0	20.7	192	204	0	0	0.0	286	0.51 0.89
11:02:42	237	33.4	60	258	0	20.9	195	207	0	0	0.0	287	0.52 0.90
11:03:00	247	33.3	60	259	0	20.6	195	206	0	0	0.0	287	0.52 0.90
11:03:18	257	33.2	60	258	0	21.2	195	207	0	0	0.0	288	0.52 0.90
11:03:36	267	33.3	60	259	0	21.1	194	206	0	0	0.0	286	0.52 0.90
11:03:54	277	33.4	60	258	0	21.0	197	205	0	0	0.0	288	0.52 0.90
11:04:12	287	33.3	60	259	0	21.0	196	206	0	0	0.0	287	0.52 0.90
11:04:30	297	33.3	60	258	0	21.3	196	205	0	0	0.0	287	0.52 0.90
11:04:48	307	33.3	60	257	0	21.4	194	206	0	0	0.0	287	0.51 0.89
11:05:06	317	33.3	60	257	0	21.3	195	206	0	0	0.0	287	0.51 0.90

ALLSEAS PILE DRIVING RECORD MHU 500 T MONITORING-SYSTEM PAGE 03 15-11-2000

From File MANSON2C

Time hh:mm:ss	Blow No	Blow 1/min	St-roke cm	Ene-rgy kNm	Oil-flow l/min	Oil-temp. C	Oilpres. PP bar	Hammer bar	Dif1 mbar	Dif2 mbar	Water Press. bar	Eph Usage kNm	k	Mech Eff
11:05:24	327	33.2	60	257	0	21.3	196	206	0	0	0.0	288	0.51	0.89
11:05:42	337	33.3	60	256	0	21.5	195	205	0	0	0.0	286	0.51	0.90
11:06:00	347	33.2	60	256	0	21.6	195	205	0	0	0.0	285	0.51	0.90
11:06:18	357	33.4	60	256	0	21.5	194	205	0	0	0.0	287	0.51	0.89
11:06:36	367	33.2	60	257	0	21.4	197	205	0	0	0.0	286	0.51	0.90
11:06:54	377	33.3	58	257	0	21.6	196	205	0	0	0.0	277	0.51	0.93
11:07:13	387	31.2	72	313	0	21.4	199	209	0	0	0.0	346	0.63	0.90
11:07:30	397	34.3	68	297	0	21.8	200	210	0	0	0.0	327	0.59	0.91
11:07:48	407	34.4	68	298	0	21.7	199	209	0	0	0.0	327	0.60	0.91
11:08:05	417	34.6	68	297	0	22.0	202	210	0	0	0.0	328	0.59	0.91
11:08:23	427	34.3	68	299	0	22.2	199	210	0	0	0.0	327	0.60	0.91
11:08:40	437	34.4	68	299	0	22.0	198	209	0	0	0.0	327	0.60	0.91
11:08:58	447	34.2	68	301	0	22.1	201	209	0	0	0.0	326	0.60	0.92
11:09:15	457	34.3	68	299	0	22.3	198	209	0	0	0.0	327	0.60	0.91
11:09:33	467	34.2	68	301	0	22.3	200	209	0	0	0.0	325	0.60	0.92
11:09:50	477	34.3	68	299	0	22.2	201	209	0	0	0.0	327	0.60	0.91
11:10:08	487	34.3	68	299	0	22.6	199	209	0	0	0.0	328	0.60	0.91
11:10:25	497	34.2	68	299	0	22.6	199	209	0	0	0.0	326	0.60	0.92
11:10:43	507	34.3	68	298	0	22.9	200	208	0	0	0.0	326	0.60	0.91
11:11:00	517	34.4	68	297	0	23.2	202	209	0	0	0.0	327	0.59	0.91
11:11:18	527	34.4	68	299	0	22.7	202	209	0	0	0.0	327	0.60	0.91
11:11:35	537	34.3	68	299	0	22.5	202	209	0	0	0.0	327	0.60	0.92
11:11:53	547	34.3	68	299	0	23.2	199	210	0	0	0.0	327	0.60	0.91
11:12:10	557	34.3	68	297	0	23.2	200	209	0	0	0.0	328	0.59	0.91
11:12:28	567	34.2	68	299	0	23.0	203	209	0	0	0.0	327	0.60	0.91
11:12:45	577	34.3	68	298	0	23.4	199	209	0	0	0.0	327	0.60	0.91
11:13:03	587	34.2	68	299	0	23.3	199	209	0	0	0.0	327	0.60	0.91
11:13:20	597	34.2	68	299	0	23.6	200	209	0	0	0.0	327	0.60	0.91
11:13:38	607	34.2	68	298	0	23.9	199	209	0	0	0.0	327	0.60	0.91
11:13:55	617	34.2	68	298	0	23.6	201	209	0	0	0.0	327	0.60	0.91
11:14:13	627	34.1	68	298	0	24.0	200	209	0	0	0.0	327	0.60	0.91
11:14:30	637	34.2	68	299	0	24.1	198	210	0	0	0.0	328	0.60	0.91
11:14:48	647	34.1	68	299	0	23.6	202	210	0	0	0.0	327	0.60	0.91
11:15:05	657	34.2	68	300	0	24.6	202	208	0	0	0.0	326	0.60	0.92
11:15:23	667	34.1	76	328	0	24.2	203	212	0	0	0.0	367	0.66	0.89
11:15:41	677	34.7	80	349	0	24.3	204	215	0	0	0.0	390	0.70	0.89
11:15:58	687	34.6	80	351	0	24.1	207	216	0	0	0.0	390	0.70	0.90
11:16:16	697	34.4	80	352	0	24.5	206	216	0	0	0.0	388	0.70	0.91
11:16:33	707	34.2	80	350	0	24.7	207	215	0	0	0.0	388	0.70	0.90
11:16:51	717	34.1	80	351	0	25.0	208	215	0	0	0.0	389	0.70	0.90
11:17:09	727	34.6	80	356	0	24.8	209	216	0	0	0.0	389	0.71	0.91
11:17:27	737	32.5	92	406	0	24.2	210	216	0	0	0.0	447	0.81	0.91
11:17:45	747	32.6	92	405	0	24.7	208	216	0	0	0.0	448	0.81	0.90
11:18:04	757	32.6	92	406	0	25.0	210	216	0	0	0.0	447	0.81	0.91
11:18:22	767	32.6	92	406	0	24.8	209	216	0	0	0.0	449	0.81	0.91
11:18:40	777	32.6	92	406	0	25.2	209	215	0	0	0.0	447	0.81	0.91
11:18:59	787	32.6	92	406	0	24.9	207	216	0	0	0.0	448	0.81	0.91
11:19:17	797	32.5	92	406	0	24.8	210	216	0	0	0.0	448	0.81	0.91

ALLSEAS PILE DRIVING RECORD MHU 500 T MONITORING-SYSTEM PAGE 04 15-11-2000

From File MANSON2C

Time hh:mm:ss	Blow No	Blow 1/min	St-roke cm	Ene-rgy kNm	Oil-flow l/min	Oil-temp. C	Oilpres. PP bar	Hammer bar	Dif1 mbar	Dif2 mbar	Water Press. bar	Eph Usage kNm	k	Mech Eff
11:19:36	807	32.5	92	405	0	25.1	210	216	0	0	0.0	447	0.81	0.91
11:19:54	817	32.5	92	405	0	25.0	208	216	0	0	0.0	446	0.81	0.91
11:20:13	827	32.4	92	405	0	25.6	210	217	0	0	0.0	449	0.81	0.90
11:20:31	837	32.5	92	406	0	25.8	210	217	0	0	0.0	448	0.81	0.91
11:20:50	847	32.4	92	404	0	25.4	208	217	0	0	0.0	448	0.81	0.90
11:21:08	857	32.4	92	405	0	25.7	210	216	0	0	0.0	448	0.81	0.90
11:21:27	867	32.3	92	405	0	26.1	209	217	0	0	0.0	449	0.81	0.90
11:21:45	877	32.3	92	405	0	25.8	208	216	0	0	0.0	448	0.81	0.90
11:22:04	887	32.4	92	407	0	26.3	207	216	0	0	0.0	447	0.81	0.91
11:22:22	897	32.3	92	405	0	26.2	209	215	0	0	0.0	447	0.81	0.91
11:22:41	907	32.3	92	403	0	26.1	209	216	0	0	0.0	448	0.81	0.90
11:22:59	917	32.4	92	406	0	26.3	209	215	0	0	0.0	447	0.81	0.91
11:23:18	927	32.3	92	404	0	26.0	206	215	0	0	0.0	447	0.81	0.90
11:23:37	937	32.3	92	405	0	26.1	210	215	0	0	0.0	447	0.81	0.90
11:23:55	947	32.3	92	406	0	26.4	206	216	0	0	0.0	447	0.81	0.91
11:24:14	957	32.3	92	408	0	26.2	212	216	0	0	0.0	447	0.82	0.91
11:24:32	967	32.2	92	407	0	26.5	208	216	0	0	0.0	447	0.81	0.91
11:24:51	977	32.2	92	405	0	26.5	211	217	0	0	0.0	448	0.81	0.90
11:25:09	987	32.2	92	405	0	26.4	210	219	0	0	0.0	449	0.81	0.90
11:25:28	997	32.2	92	405	0	26.5	211	218	0	0	0.0	448	0.81	0.90
11:25:47	1007	32.2	92	404	0	26.6	210	217	0	0	0.0	447	0.81	0.90
11:26:05	1017	32.3	92	405	0	26.8	209	217	0	0	0.0	448	0.81	0.90
11:26:24	1027	32.3	92	404	0	27.0	210	217	0	0	0.0	447	0.81	0.90
11:26:42	1037	32.2	92	404	0	27.0	208	217	0	0	0.0	447	0.81	0.91
11:27:01	1047	32.2	92	405	0	27.1	211	217	0	0	0.0	447	0.81	0.91
11:27:20	1057	32.2	92	407	0	27.3	209	217	0	0	0.0	447	0.81	0.91
11:27:38	1067	32.2	92	405	0	27.4	209	217	0	0	0.0	447	0.81	0.91
11:27:57	1077	32.2	92	406	0	27.2	209	217	0	0	0.0	448	0.81	0.91
11:28:16	1087	32.2	92	406	0	27.2	210	217	0	0	0.0	447	0.81	0.91
11:28:34	1097	32.2	92	406	0	27.7	205	216	0	0	0.0	448	0.81	0.91
11:28:53	1107	32.2	92	409	0	27.6	208	216	0	0	0.0	446	0.82	0.92
11:29:12	1117	32.2	92	407	0	27.5	210	216	0	0	0.0	447	0.81	0.91
11:29:30	1127	32.2	92	406	0	27.5	210	216	0	0	0.0	446	0.81	0.91
11:29:49	1137	32.1	92	404	0	27.6	207	217	0	0	0.0	448	0.81	0.90

11:30:01 STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED

12:13:55 START HAMMER OPERATION IN STROKE SEQUENCE MODE

12:14:26	1153	33.1	92	405	0	33.4	210	221	0	0	0.0	453	0.81	0.90
12:14:44	1163	33.2	92	403	0	34.5	207	220	0	0	0.0	451	0.81	0.89
12:15:02	1173	33.3	92	405	0	34.4	206	220	0	0	0.0	451	0.81	0.90
12:15:20	1183	33.0	92	404	0	34.6	208	219	0	0	0.0	450	0.81	0.90
12:15:38	1193	33.1	92	406	0	34.6	208	219	0	0	0.0	451	0.81	0.90
12 12:15:56	1203	33.2	92	406	0	34.8	208	219	0	0	0.0	451	0.81	0.90
12:16:14	1213	33.1	92	408	0	34.7	209	219	0	0	0.0	450	0.82	0.91
12:16:32	1223	33.1	92	407	0	34.7	208	219	0	0	0.0	450	0.81	0.90
12:16:50	1233	33.2	92	408	0	34.4	211	219	0	0	0.0	451	0.82	0.91

ALLSEAS PILE DRIVING RECORD MHU 500 T MONITORING-SYSTEM PAGE 05 15-11-2000

From File MANSON2C

Time hh:mm:ss	Blow No	Blow 1/min	St-roke cm	Ene-rgy kNm	Oil-flow l/min	Oil-temp. C	Oilpres. PP bar	Hammer bar	Dif1 mbar	Dif2 mbar	Water Press. bar	Eph Usage kNm	k	Mech Eff
12:17:08	1243	33.1	92	408	0	33.9	211	219	0	0	0.0	450	0.82	0.91
12:17:26	1253	33.2	92	408	0	34.0	210	220	0	0	0.0	450	0.82	0.91
12:17:45	1263	33.1	92	408	0	33.9	209	220	0	0	0.0	452	0.82	0.90
12:18:03	1273	33.1	92	408	0	34.1	207	219	0	0	0.0	451	0.82	0.90
12:18:21	1283	33.0	92	409	0	33.6	208	220	0	0	0.0	450	0.82	0.91
12:18:39	1293	33.1	92	410	0	33.5	209	220	0	0	0.0	450	0.82	0.91
12:18:57	1303	33.1	92	410	0	33.0	209	220	0	0	0.0	451	0.82	0.91
12:19:15	1313	33.0	92	405	0	33.3	206	219	0	0	0.0	450	0.81	0.90
12:19:33	1323	32.9	92	406	0	33.3	209	219	0	0	0.0	450	0.81	0.90
12:19:52	1333	33.2	92	409	0	33.3	211	219	0	0	0.0	448	0.82	0.91
12:20:10	1343	33.2	92	406	0	33.3	207	219	0	0	0.0	451	0.81	0.90
12:20:28	1353	33.1	92	408	0	33.1	206	220	0	0	0.0	452	0.82	0.90
12:20:46	1363	33.3	92	407	0	33.1	210	220	0	0	0.0	452	0.81	0.90
12:21:04	1373	33.3	92	409	0	32.8	209	220	0	0	0.0	451	0.82	0.91
12:21:22	1383	32.8	92	410	0	32.7	207	220	0	0	0.0	451	0.82	0.91
12:21:40	1393	32.9	92	404	0	33.0	209	220	0	0	0.0	451	0.81	0.90
12:21:59	1403	33.2	92	412	0	32.9	210	221	0	0	0.0	450	0.82	0.92
12:22:17	1413	33.2	92	410	0	32.9	210	220	0	0	0.0	449	0.82	0.91
12:22:35	1423	33.1	92	409	0	32.8	212	225	0	0	0.0	455	0.82	0.90
12:22:53	1433	32.8	92	408	0	32.8	210	220	0	0	0.0	451	0.82	0.91
12:23:11	1443	32.9	92	407	0	33.0	209	219	0	0	0.0	451	0.81	0.90
12:23:29	1453	33.2	92	408	0	32.6	209	221	0	0	0.0	450	0.82	0.91
12:23:48	1463	33.1	92	408	0	32.7	208	220	0	0	0.0	451	0.82	0.91
12:24:06	1473	33.2	92	407	0	32.9	210	220	0	0	0.0	451	0.81	0.90
12:24:24	1483	33.0	92	404	0	32.9	210	218	0	0	0.0	451	0.81	0.90
12:24:42	1493	33.0	92	405	0	32.6	207	219	0	0	0.0	452	0.81	0.90
12:25:00	1503	33.1	92	410	0	32.9	209	220	0	0	0.0	450	0.82	0.91
12:25:18	1513	33.2	92	408	0	32.5	212	220	0	0	0.0	451	0.82	0.90
12:25:36	1523	33.3	92	408	0	32.8	209	220	0	0	0.0	452	0.82	0.90
12:25:54	1533	33.1	92	404	0	32.8	208	219	0	0	0.0	451	0.81	0.90
12:26:13	1543	33.1	92	407	0	32.8	207	220	0	0	0.0	451	0.81	0.90
12:26:31	1553	33.1	92	406	0	32.8	211	219	0	0	0.0	450	0.81	0.90
12:26:49	1563	33.1	92	405	0	32.7	210	219	0	0	0.0	450	0.81	0.90
12:27:07	1573	33.0	92	405	0	32.8	210	220	0	0	0.0	452	0.81	0.90
12:27:25	1583	33.0	92	406	0	32.4	205	219	0	0	0.0	452	0.81	0.90
12:27:43	1593	32.2	104	460	0	32.6	214	222	0	0	0.0	510	0.92	0.90
12:28:02	1603	32.9	102	453	0	32.4	216	224	0	0	0.0	505	0.91	0.90
12:28:20	1613	32.8	102	456	0	32.3	215	226	0	0	0.0	503	0.91	0.91
12:28:38	1623	32.9	102	455	0	32.4	213	225	0	0	0.0	504	0.91	0.90
12:28:56	1633	32.9	102	457	0	32.5	216	226	0	0	0.0	503	0.91	0.91
12:29:15	1643	32.7	102	455	0	32.5	215	225	0	0	0.0	505	0.91	0.90
12:29:33	1653	32.9	102	456	0	32.7	212	225	0	0	0.0	504	0.91	0.91
12:29:51	1663	32.9	102	454	0	32.5	215	225	0	0	0.0	504	0.91	0.90
12:30:09	1673	33.0	102	453	0	32.7	215	225	0	0	0.0	505	0.91	0.90
12:30:28	1683	33.0	102	454	0	32.6	211	224	0	0	0.0	506	0.91	0.90
12:30:46	1693	32.8	102	454	0	32.3	216	225	0	0	0.0	505	0.91	0.90
12:31:04	1703	32.9	102	453	0	32.4	213	225	0	0	0.0	504	0.91	0.90
12:31:22	1713	32.9	102	454	0	32.6	216	224	0	0	0.0	504	0.91	0.90

ALLSEAS PILE DRIVING RECORD MHU 500 T MONITORING-SYSTEM PAGE 06 15-11-2000

From File MANSON2C

Time hh:mm:ss	Blow No	Blow 1/min	St-roke cm	Ene-rgy kNm	Oil-flow l/min	Oil-temp. C	Oilpres. PP bar	Hammer bar	Dif1 mbar	Dif2 mbar	Water Press. bar	Eph Usage kNm	k	Mech Eff
12:31:40	1723	32.9	102	454	0	32.3	215	225	0	0	0.0	504	0.91	0.90
12:31:59	1733	32.9	102	456	0	32.5	213	225	0	0	0.0	506	0.91	0.90
12:32:17	1743	32.9	102	454	0	32.6	212	225	0	0	0.0	504	0.91	0.90
12:32:35	1753	32.9	102	454	0	33.0	214	224	0	0	0.0	504	0.91	0.90
12:32:53	1763	32.9	102	454	0	32.8	213	224	0	0	0.0	503	0.91	0.90
12:33:12	1773	32.9	102	455	0	32.5	216	225	0	0	0.0	505	0.91	0.90
12:33:30	1783	32.8	102	456	0	33.1	215	225	0	0	0.0	505	0.91	0.90
12:33:48	1793	32.9	102	453	0	32.4	214	224	0	0	0.0	504	0.91	0.90
12:34:06	1803	32.9	102	453	0	32.6	214	223	0	0	0.0	504	0.91	0.90
12:34:25	1813	33.0	102	454	0	32.5	214	224	0	0	0.0	505	0.91	0.90
12:34:43	1823	33.0	102	454	0	32.8	215	223	0	0	0.0	504	0.91	0.90
12:35:01	1833	33.0	102	455	0	32.7	214	226	0	0	0.0	507	0.91	0.90
12:35:19	1843	33.0	102	454	0	32.9	214	225	0	0	0.0	507	0.91	0.89
12:35:56	1863	33.0	102	454	0	33.0	213	225	0	0	0.0	504	0.91	0.90
12:36:14	1873	32.9	102	456	0	32.8	214	226	0	0	0.0	506	0.91	0.90
12:36:32	1883	32.9	102	452	0	33.1	214	227	0	0	0.0	508	0.90	0.89
12:36:50	1893	32.9	102	453	0	32.8	215	228	0	0	0.0	507	0.91	0.89
12:37:08	1903	32.9	102	454	0	33.0	216	228	0	0	0.0	509	0.91	0.89
12:37:27	1913	32.9	102	458	0	33.1	214	228	0	0	0.0	506	0.92	0.90
12:37:45	1923	32.9	102	454	0	33.0	214	228	0	0	0.0	507	0.91	0.90
12:38:03	1933	32.9	102	455	0	33.3	212	228	0	0	0.0	509	0.91	0.90
12:38:21	1943	32.9	102	453	0	33.2	214	227	0	0	0.0	506	0.91	0.89
12:38:39	1953	32.9	102	452	0	33.1	211	226	0	0	0.0	506	0.90	0.89
12:38:58	1963	33.0	102	455	0	33.2	212	227	0	0	0.0	507	0.91	0.90
12:39:16	1973	33.0	102	452	0	33.2	213	228	0	0	0.0	510	0.90	0.89
12:39:34	1983	33.0	102	454	0	33.1	214	223	0	0	0.0	502	0.91	0.90
12:39:52	1993	33.0	102	453	0	33.3	214	223	0	0	0.0	505	0.91	0.90
12:40:10	2003	33.0	102	453	0	33.2	215	223	0	0	0.0	503	0.91	0.90
12:40:29	2013	33.0	102	454	0	32.9	212	223	0	0	0.0	503	0.91	0.90
12:40:47	2023	33.0	102	458	0	33.3	212	223	0	0	0.0	504	0.92	0.91
12:41:05	2033	32.9	102	452	0	33.3	215	224	0	0	0.0	504	0.90	0.90
12:41:23	2043	32.9	102	454	0	33.3	213	225	0	0	0.0	505	0.91	0.90
12:41:42	2053	32.9	102	455	0	33.2	213	225	0	0	0.0	506	0.91	0.90
12:42:00	2063	33.0	102	458	0	33.1	212	225	0	0	0.0	507	0.92	0.90
12:42:18	2073	32.9	102	456	0	33.4	217	224	0	0	0.0	506	0.91	0.90
12:42:36	2083	33.0	102	453	0	33.5	214	224	0	0	0.0	505	0.91	0.90
12:42:54	2093	33.0	102	455	0	33.1	212	223	0	0	0.0	503	0.91	0.90
12:43:13	2103	32.9	102	452	0	33.4	214	222	0	0	0.0	501	0.90	0.90
12:43:31	2113	32.9	102	453	0	33.2	211	222	0	0	0.0	502	0.91	0.90
12:43:49	2123	33.0	102	453	0	32.9	212	221	0	0	0.0	503	0.91	0.90
12:44:07	2133	32.9	102	452	0	33.5	212	223	0	0	0.0	504	0.90	0.90
12:44:25	2143	33.0	102	455	0	33.6	213	222	0	0	0.0	503	0.91	0.90
12:44:44	2153	32.9	102	454	0	33.5	213	222	0	0	0.0	503	0.91	0.90
12:45:02	2163	33.0	102	454	0	33.5	212	222	0	0	0.0	504	0.91	0.90
12:45:20	2173	32.9	102	453	0	33.6	211	222	0	0	0.0	502	0.91	0.90
12:45:38	2183	32.9	102	455	0	33.8	211	222	0	0	0.0	504	0.91	0.90
12:45:56	2193	32.9	102	454	0	33.7	213	222	0	0	0.0	502	0.91	0.90
12:46:15	2203	32.9	102	454	0	33.5	211	223	0	0	0.0	504	0.91	0.90

ALLSEAS PILE DRIVING RECORD MHU 500 T MONITORING-SYSTEM PAGE 07 15-11-2000

From File MANSON2C

Time hh:mm:ss	Blow No	Blow 1/min	St-roke cm	Ene-rgy kNm	Oil-flow l/min	Oil-temp. C	Oilpres. PP bar	Hammer bar	Dif1 mbar	Dif2 mbar	Water Press. bar	Eph Usage kNm	k	Mech Eff
12:46:33	2213	32.9	102	451	0	33.6	215	225	0	0	0.0	506	0.90	0.89
12:46:51	2223	33.0	102	455	0	33.5	215	226	0	0	0.0	506	0.91	0.90
12:47:09	2233	33.0	102	454	0	33.9	216	230	0	0	0.0	511	0.91	0.89
12:47:28	2243	32.9	102	454	0	34.0	214	229	0	0	0.0	509	0.91	0.89
12:47:46	2253	33.0	102	453	0	33.7	212	229	0	0	0.0	509	0.91	0.89
12:48:04	2263	32.9	102	451	0	33.6	214	228	0	0	0.0	505	0.90	0.89
12:48:22	2273	32.8	102	451	0	33.8	213	228	0	0	0.0	508	0.90	0.89
12:48:41	2283	33.0	102	456	0	33.8	214	231	0	0	0.0	510	0.91	0.89
12:48:59	2293	33.0	102	455	0	34.0	215	228	0	0	0.0	507	0.91	0.90
12:49:17	2303	33.1	102	455	0	34.0	213	229	0	0	0.0	510	0.91	0.89
12:49:35	2313	33.0	102	453	0	34.0	212	230	0	0	0.0	509	0.91	0.89
12:49:53	2323	33.1	102	454	0	34.0	211	229	0	0	0.0	508	0.91	0.89
12:50:12	2333	33.0	102	452	0	33.9	215	230	0	0	0.0	510	0.90	0.89
12:50:30	2343	33.0	102	453	0	33.6	214	229	0	0	0.0	508	0.91	0.89
12:50:48	2353	33.0	102	452	0	34.0	215	227	0	0	0.0	508	0.90	0.89
12:51:06	2363	32.9	102	455	0	33.8	214	228	0	0	0.0	509	0.91	0.89
12:51:25	2373	32.9	102	453	0	34.3	215	227	0	0	0.0	507	0.91	0.89
12:51:43	2383	32.9	102	453	0	33.8	214	227	0	0	0.0	507	0.91	0.89
12:52:01	2393	33.0	102	454	0	34.0	213	228	0	0	0.0	508	0.91	0.89
12:52:19	2403	32.8	102	451	0	34.1	212	228	0	0	0.0	510	0.90	0.88
12:52:37	2413	32.9	102	452	0	33.9	213	233	0	0	0.0	510	0.90	0.89
12:52:56	2423	33.0	102	452	0	34.3	213	231	0	0	0.0	511	0.90	0.88
12:53:14	2433	32.9	102	453	0	33.9	211	232	0	0	0.0	512	0.91	0.88
12:53:32	2443	32.9	102	453	0	34.1	211	232	0	0	0.0	511	0.91	0.89
12:53:50	2453	32.9	102	452	0	34.3	215	232	0	0	0.0	512	0.90	0.88
12:54:09	2463	33.0	102	452	0	34.4	212	232	0	0	0.0	511	0.90	0.88
12:54:27	2473	32.9	102	453	0	34.2	213	232	0	0	0.0	511	0.91	0.89
12:54:45	2483	32.9	100	450	0	34.1	214	233	0	0	0.0	504	0.90	0.89
12:55:03	2493	33.0	100	453	0	34.2	212	232	0	0	0.0	504	0.91	0.90
12:55:21	2503	33.0	100	452	0	34.2	213	233	0	0	0.0	502	0.90	0.90
12:55:40	2513	32.9	100	452	0	34.3	212	232	0	0	0.0	504	0.90	0.90
12:55:58	2523	32.9	100	452	0	34.4	214	232	0	0	0.0	503	0.90	0.90
12:56:16	2533	31.6	112	506	0	34.5	217	236	0	0	0.0	564	1.01	0.90
12:56:35	2543	32.5	114	508	0	34.1	221	240	0	0	0.0	578	1.02	0.88
12:56:53	2553	32.4	114	508	0	34.3	220	243	0	0	0.0	584	1.02	0.87
12:57:12	2563	32.3	112	507	0	34.5	219	241	0	0	0.0	569	1.01	0.89
12:57:30	2573	32.4	112	507	0	34.5	220	242	0	0	0.0	570	1.01	0.89
12:57:49	2583	32.6	112	509	0	34.3	223	242	0	0	0.0	570	1.02	0.89
12:58:07	2593	32.5	112	508	0	34.5	221	243	0	0	0.0	572	1.02	0.89
12:58:26	2603	32.6	112	507	0	34.3	219	242	0	0	0.0	574	1.01	0.88
12:58:44	2613	32.5	112	506	0	34.7	218	241	0	0	0.0	574	1.01	0.88
12:59:02	2623	32.3	112	506	0	34.6	216	241	0	0	0.0	575	1.01	0.88
12:59:21	2633	32.4	112	508	0	34.7	219	243	0	0	0.0	573	1.02	0.89
12:59:39	2643	32.5	114	508	0	34.5	220	245	0	0	0.0	583	1.02	0.87
12:59:58	2653	32.4	114	508	0	34.5	221	243	0	0	0.0	580	1.02	0.87
13:00:16	2663	32.4	114	508	0	34.4	221	245	0	0	0.0	585	1.02	0.87
13:00:35	2673	32.4	114	509	0	34.7	221	244	0	0	0.0	582	1.02	0.87
13:00:53	2683	32.5	114	510	0	34.6	221	245	0	0	0.0	583	1.02	0.87

ALLSEAS PILE DRIVING RECORD MHU 500 T MONITORING-SYSTEM PAGE 08 15-11-2000

From File MANSON2C

Time hh:mm:ss	Blow No	Blow 1/min	St-roke cm	Ene-rgy kNm	Oil-flow l/min	Oil-temp. C	Oilpres. PP bar	Hammer bar	Dif1 mbar	Dif2 mbar	Water Press. bar	Eph Usage kNm	k	Mech Eff
13:01:12	2693	32.4	112	509	0	34.6	222	246	0	0	0.0	576	1.02	0.88

13:01:14 STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED

13:30:43 START HAMMER OPERATION IN SINGLE BLOW MODE

13:31:16 START HAMMER OPERATION IN STROKE SEQUENCE MODE

13:31:26 STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED

13:39:17 START HAMMER OPERATION IN STROKE SEQUENCE MODE

13:39:46	2708	33.5	110	499	0	38.3	219	244	0	0	0.0	569	1.00	0.88
13:40:04	2718	33.6	110	498	0	38.2	217	244	0	0	0.0	568	1.00	0.88
13:40:21	2728	33.6	110	497	0	38.7	220	246	0	0	0.0	570	0.99	0.87
13:40:39	2738	33.6	110	501	0	38.6	218	246	0	0	0.0	570	1.00	0.88
13:40:57	2748	33.6	110	498	0	39.0	220	247	0	0	0.0	571	1.00	0.87
13:41:15	2758	33.7	110	496	0	39.2	220	247	0	0	0.0	570	0.99	0.87
13:41:33	2768	33.7	110	499	0	38.7	218	245	0	0	0.0	566	1.00	0.88
13:41:51	2778	33.7	110	497	0	38.6	221	247	0	0	0.0	569	0.99	0.87
13:42:08	2788	33.6	110	496	0	38.5	218	247	0	0	0.0	570	0.99	0.87
13:42:26	2798	33.7	110	497	0	38.5	218	248	0	0	0.0	571	0.99	0.87
13:42:44	2808	33.8	110	498	0	38.8	220	247	0	0	0.0	571	1.00	0.87
13:43:02	2818	33.7	110	497	0	38.8	217	247	0	0	0.0	571	0.99	0.87
13:43:20	2828	33.7	110	498	0	38.6	220	247	0	0	0.0	568	1.00	0.88
13:43:37	2838	33.6	110	498	0	38.4	219	244	0	0	0.0	565	1.00	0.88
13:43:55	2848	33.5	110	493	0	37.9	219	242	0	0	0.0	566	0.99	0.87
13:44:13	2858	33.7	110	498	0	38.1	218	232	0	0	0.0	552	1.00	0.90
13:44:31	2868	33.7	110	496	0	37.6	220	232	0	0	0.0	554	0.99	0.90
13:44:49	2878	33.6	110	497	0	37.3	220	234	0	0	0.0	555	0.99	0.90
13:45:07	2888	33.7	110	498	0	37.2	220	235	0	0	0.0	556	1.00	0.90
13:45:24	2898	33.6	110	496	0	37.4	219	234	0	0	0.0	554	0.99	0.89
13:45:42	2908	33.8	110	498	0	37.2	221	232	0	0	0.0	553	1.00	0.90
13:46:00	2918	33.6	110	498	0	36.8	220	237	0	0	0.0	558	1.00	0.89
13:46:18	2928	33.6	110	498	0	36.9	218	235	0	0	0.0	556	1.00	0.90
13:46:36	2938	33.6	110	498	0	36.8	219	236	0	0	0.0	558	1.00	0.89
13:46:54	2948	33.6	110	499	0	36.8	218	237	0	0	0.0	559	1.00	0.89
13:47:12	2958	33.6	110	497	0	36.8	218	239	0	0	0.0	560	0.99	0.89
13:47:29	2968	33.6	110	499	0	36.7	221	239	0	0	0.0	561	1.00	0.89
13:47:47	2978	33.6	110	504	0	36.6	221	239	0	0	0.0	560	1.01	0.90
13:48:05	2988	33.5	110	500	0	36.7	219	237	0	0	0.0	560	1.00	0.89
13:48:23	2998	33.5	110	501	0	36.7	220	238	0	0	0.0	557	1.00	0.90

13:48:30 STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED

PILE 2, SECTION D

PILE 2, SECTION D

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ALLSEAS   PILE DRIVING RECORD FROM MENCK MONITORING-SYSTEM  PAGE 01  18-11-2000

JOB INFORMATION

PILE CODE ........................... : 2D
FILE NAME ........................... : MANSON2D
CLIENT .............................. : CAL.TRANS
PROJECT ............................. : BAY BRIDGE TEST
PLATFORM ............................ :
SHIPS NAME .......................... : DB 24
JOB NO .............................. : 40-00-044
CONTRACT NR ......................... :

HAMMER INFORMATION

HAMMER TYPE ......................... : MHU 500 T
SERIAL NO ........................... : 63038 (05)
POWERPACK ........................... : FISCHON 1600L
CONFIGURATION ....................... : FREE RIDING..................._
CONTROL UNIT NO ..................... : _............................._
BLOW COUNTER ON PANEL ............... : 0............................._

PARAMETER INFORMATION

PRINTER LOGGING DISTANCE ............ : 0.25........................._
LOWER REVERSAL TIME VARIABLE 0-400ms  :    relative stair

UPPER REVERSAL AUTOMATICALLY
DIFF PRESS SENSORS
START POINT AT ..............mbar  :    _............................._
STOP POINT AT ...............mbar  :    _............................._

PILE INFORMATION

OUTSIDE DIAMETER ............."     :    96
WALL THICKNESS ..............."     :    2.7/16
LENGTH ..................feet      :    85  PER PILE
SELF PENETR. PILE .......feet      :    5,0 METER
SELF PENETR.W.HAMMER ....feet      :    68,5 METER

REMARK :   Eph := ENERGY FROM HYDRAULIC AND FREE FALL
           Eff := IMPACT ENERGY  /  Eph
           k   := IMPACT ENERGY  /  DESIGN ENERGY

NTSv421  OLDv234  HUBv222  PICv105  TXTv517  GPAv205  GMHv006  USSv000
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ALLSEAS PILE DRIVING RECORD MHU 500 T MONITORING-SYSTEM PAGE 02 18-11-2000

From File MANSON2D

Time hh:mm:ss	Blow No	Blow 1/min	St-roke cm	Ene-rgy kNm	Oil-flow l/min	Oil-temp. C	Oilpres. PP bar	Dif1 Hammer bar	Dif2 mbar	Water mbar	Press. bar	Eph Usage kNm	k	Mech Eff
8:49:46	STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED													
8:49:46	DATAOUTPUT ON THE FUGRO-PORT TERMINATE													
8:49:46	STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED													
8:57:26	START HAMMER OPERATION IN SINGLE BLOW MODE													
8:58:03	START HAMMER OPERATION IN SINGLE BLOW MODE													
8:58:21	START HAMMER OPERATION IN SINGLE BLOW MODE													
8:58:43	START HAMMER OPERATION IN STROKE SEQUENCE MODE													
8:59:05	13	33.4	114	514	0	19.7	228	231	0	0	0.0	573	1.03	0.90
8:59:22	23	35.7	108	494	0	20.6	235	236	0	0	0.0	543	0.99	0.91
8:59:40	33	33.6	110	494	0	20.4	227	231	0	0	0.0	549	0.99	0.90
8:59:58	43	33.4	110	497	0	20.5	228	231	0	0	0.0	550	0.99	0.90
9:00:16	53	33.5	110	491	0	20.5	227	231	0	0	0.0	549	0.98	0.89
9:00:34	63	33.5	110	493	0	20.7	224	229	0	0	0.0	548	0.99	0.90
9:00:52	73	33.5	110	493	0	20.9	225	230	0	0	0.0	549	0.99	0.90
9:01:09	83	33.5	110	490	0	21.3	226	229	0	0	0.0	548	0.98	0.89
9:01:27	93	33.6	110	492	0	21.1	226	229	0	0	0.0	546	0.98	0.90
9:01:45	103	33.6	110	492	0	20.8	226	229	0	0	0.0	547	0.98	0.90
9:02:03	113	33.6	110	491	0	21.3	224	229	0	0	0.0	549	0.98	0.89
9:02:21	123	33.5	110	493	0	21.1	222	229	0	0	0.0	548	0.99	0.90
9:02:39	133	33.5	110	494	0	21.1	223	229	0	0	0.0	547	0.99	0.90
9:02:57	143	33.7	110	493	0	21.1	225	229	0	0	0.0	546	0.99	0.90
9:03:15	153	33.6	110	492	0	21.1	222	228	0	0	0.0	546	0.98	0.90
9:03:33	163	33.5	110	495	0	21.2	224	228	0	0	0.0	548	0.99	0.90
9:03:50	173	33.6	110	492	0	21.6	224	228	0	0	0.0	546	0.98	0.90
9:04:08	183	33.6	110	493	0	21.5	222	228	0	0	0.0	547	0.99	0.90
9:04:26	193	33.6	110	493	0	21.4	222	227	0	0	0.0	547	0.99	0.90
9:04:44	203	33.6	110	496	0	21.3	222	227	0	0	0.0	547	0.99	0.91
9:05:02	213	33.6	110	492	0	21.6	222	227	0	0	0.0	546	0.98	0.90
9:05:20	223	33.6	110	491	0	21.6	225	226	0	0	0.0	545	0.98	0.90
9:05:38	233	33.6	110	488	0	21.5	221	227	0	0	0.0	547	0.98	0.89
9:05:55	243	33.4	110	492	0	21.9	222	227	0	0	0.0	545	0.98	0.90
9:06:13	253	33.5	110	491	0	22.0	220	226	0	0	0.0	547	0.98	0.90
9:06:31	263	33.6	110	492	0	22.1	221	228	0	0	0.0	546	0.98	0.90
9:06:49	273	33.4	110	492	0	22.0	222	228	0	0	0.0	546	0.98	0.90
9:07:07	283	33.5	110	491	0	22.2	222	227	0	0	0.0	545	0.98	0.90
9:07:25	293	33.5	110	491	0	22.4	223	227	0	0	0.0	546	0.98	0.90
9:07:43	303	33.4	110	491	0	22.5	223	227	0	0	0.0	545	0.98	0.90
9:08:01	313	33.4	110	492	0	22.7	222	227	0	0	0.0	547	0.98	0.90
9:08:19	323	33.3	110	489	0	22.7	223	227	0	0	0.0	545	0.98	0.90
9:08:37	333	33.3	110	490	0	22.6	222	226	0	0	0.0	546	0.98	0.90
9:08:55	343	33.3	110	493	0	23.0	220	227	0	0	0.0	546	0.99	0.90
9:09:13	353	33.3	110	491	0	23.1	221	226	0	0	0.0	546	0.98	0.90

ALLSEAS PILE DRIVING RECORD MHU 500 T MONITORING-SYSTEM PAGE 03 18-11-2000

From File MANSON2D

Time hh:mm:ss	Blow No	Blow 1/min	St-roke cm	Ene-rgy kNm	Oil-flow l/min	Oil-temp. C	Oilpres. PP bar	Hammer bar	Dif1 mbar	Dif2 mbar	Water Press. bar	Eph Usage kNm	k	Mech Eff
9:09:31	363	33.3	110	493	0	23.3	220	226	0	0	0.0	546	0.99	0.90
9:09:49	373	33.2	110	493	0	23.1	222	227	0	0	0.0	546	0.99	0.90
9:10:07	383	33.3	110	492	0	23.6	221	226	0	0	0.0	546	0.98	0.90
9:10:25	393	33.2	110	493	0	23.5	222	226	0	0	0.0	545	0.99	0.90
9:10:43	403	33.3	110	490	0	24.0	222	226	0	0	0.0	547	0.98	0.90
9:11:01	413	33.3	110	492	0	23.6	218	226	0	0	0.0	545	0.98	0.90
9:11:19	423	33.2	110	493	0	23.9	221	226	0	0	0.0	546	0.99	0.90
9:11:37	433	33.3	110	491	0	24.4	219	226	0	0	0.0	546	0.98	0.90
9:11:55	443	33.3	110	494	0	24.1	222	225	0	0	0.0	545	0.99	0.91
9:12:13	453	33.2	110	494	0	24.3	220	226	0	0	0.0	546	0.99	0.90
9:12:31	463	33.1	110	494	0	24.4	221	226	0	0	0.0	545	0.99	0.91
9:12:50	473	33.2	110	492	0	24.2	220	226	0	0	0.0	544	0.98	0.90
9:13:08	483	33.2	110	492	0	24.8	220	226	0	0	0.0	545	0.98	0.90
9:13:26	493	33.3	110	494	0	24.8	221	226	0	0	0.0	546	0.99	0.90
9:13:44	503	33.2	110	492	0	25.0	221	226	0	0	0.0	546	0.98	0.90
9:14:02	513	33.1	110	492	0	25.0	222	225	0	0	0.0	544	0.98	0.90
9:14:20	523	33.1	110	494	0	25.2	217	226	0	0	0.0	544	0.99	0.91
9:14:38	533	33.1	110	493	0	25.6	219	226	0	0	0.0	546	0.99	0.90
9:14:56	543	33.1	110	491	0	25.0	218	226	0	0	0.0	544	0.98	0.90
9:15:14	553	33.1	110	492	0	25.4	221	226	0	0	0.0	545	0.98	0.90
9:15:32	563	33.1	110	493	0	25.6	218	226	0	0	0.0	546	0.99	0.90
9:15:50	573	33.1	110	491	0	26.0	218	226	0	0	0.0	544	0.98	0.90
9:16:09	583	33.1	110	492	0	25.7	220	224	0	0	0.0	543	0.98	0.91
9:16:27	593	33.1	110	492	0	25.7	219	226	0	0	0.0	546	0.98	0.90
9:16:45	603	33.1	110	493	0	25.8	220	226	0	0	0.0	546	0.99	0.90
9:17:03	613	33.1	110	492	0	26.0	220	226	0	0	0.0	545	0.98	0.90
9:17:18	CH1 SENSOR WAS DETECTED AS DEFECT BUT IS STILL FUNCTIONING													
9:17:21	623	33.1	110	492	0	26.0	219	225	0	0	0.0	543	0.98	0.91
9:17:39	633	33.0	110	491	0	26.4	218	225	0	0	0.0	545	0.98	0.90
9:17:57	643	33.1	110	492	0	26.2	218	225	0	0	0.0	545	0.98	0.90
9:18:16	653	33.0	110	492	0	26.4	220	225	0	0	0.0	544	0.98	0.90
9:18:34	663	33.1	110	490	0	26.7	220	225	0	0	0.0	543	0.98	0.90
9:18:52	673	33.1	110	490	0	26.9	218	225	0	0	0.0	546	0.98	0.90
9:19:10	683	33.1	110	490	0	26.4	222	225	0	0	0.0	545	0.98	0.90
9:19:28	693	33.1	110	492	0	26.7	216	224	0	0	0.0	544	0.98	0.90
9:19:46	703	33.1	110	489	0	27.0	218	225	0	0	0.0	544	0.98	0.90
9:20:04	713	33.1	110	491	0	27.0	220	224	0	0	0.0	543	0.98	0.91
9:20:23	723	33.0	110	489	0	27.0	219	225	0	0	0.0	543	0.98	0.90
9:20:41	733	33.0	110	490	0	27.1	217	224	0	0	0.0	546	0.98	0.90
9:20:59	743	33.0	110	491	0	27.0	217	224	0	0	0.0	543	0.98	0.90
9:21:17	753	33.0	110	491	0	27.0	219	225	0	0	0.0	545	0.98	0.90
9:21:35	763	32.9	110	488	0	27.2	217	224	0	0	0.0	544	0.98	0.90
9:21:53	773	33.0	110	490	0	27.0	220	224	0	0	0.0	544	0.98	0.90
9:22:12	783	32.9	110	490	0	27.3	216	224	0	0	0.0	545	0.98	0.90
9:22:30	793	32.9	110	490	0	28.0	215	225	0	0	0.0	544	0.98	0.90
9:22:48	803	32.9	110	489	0	27.7	217	224	0	0	0.0	543	0.98	0.90

ALLSEAS PILE DRIVING RECORD MHU 500 T MONITORING-SYSTEM PAGE 04 18-11-2000

From File MANSON2D

Time hh:mm:ss	Blow No	Blow 1/min	St-roke cm	Ene-rgy kNm	Oil-flow l/min	Oil-temp. C	Oilpres. PP bar	Hammer bar	Dif1 mbar	Dif2 mbar	Water Press. bar	Eph Usage kNm	k	Mech Eff
9:23:06	813	33.0	110	491	0	27.8	215	223	0	0	0.0	542	0.98	0.90
9:23:24	823	32.9	110	488	0	27.7	219	225	0	0	0.0	543	0.98	0.90
9:23:43	833	32.9	110	490	0	28.2	218	223	0	0	0.0	543	0.98	0.90
9:24:01	843	33.0	110	490	0	28.2	216	224	0	0	0.0	545	0.98	0.90
9:24:19	853	32.9	110	491	0	28.0	218	222	0	0	0.0	543	0.98	0.90
9:24:37	863	32.9	110	490	0	28.0	219	224	0	0	0.0	544	0.98	0.90
9:24:56	873	32.9	110	494	0	28.6	218	223	0	0	0.0	541	0.99	0.91
9:25:14	883	32.9	110	490	0	29.0	217	223	0	0	0.0	542	0.98	0.90
9:25:32	893	32.9	110	491	0	28.6	216	223	0	0	0.0	542	0.98	0.91
9:25:50	903	33.0	110	489	0	28.8	216	223	0	0	0.0	543	0.98	0.90
9:26:08	913	32.9	110	490	0	28.7	218	223	0	0	0.0	543	0.98	0.90
9:26:27	923	32.9	110	489	0	29.0	220	223	0	0	0.0	543	0.98	0.90
9:26:45	933	32.9	110	488	0	29.4	216	224	0	0	0.0	544	0.98	0.90
9:27:03	943	32.9	110	490	0	29.6	217	224	0	0	0.0	545	0.98	0.90
9:27:21	953	33.0	110	488	0	29.6	218	224	0	0	0.0	544	0.98	0.90
9:27:40	963	32.4	112	493	0	29.3	218	224	0	0	0.0	553	0.99	0.89
9:27:58	973	32.4	112	497	0	29.3	220	224	0	0	0.0	553	0.99	0.90
9:28:17	983	32.3	112	497	0	29.5	216	225	0	0	0.0	554	0.99	0.90
9:28:35	993	32.3	112	498	0	29.3	219	224	0	0	0.0	554	1.00	0.90
9:28:54	1003	32.3	112	495	0	29.9	215	224	0	0	0.0	554	0.99	0.89
9:29:13	1013	32.3	112	498	0	29.5	218	224	0	0	0.0	553	1.00	0.90
9:29:31	1023	32.3	112	497	0	29.9	217	224	0	0	0.0	555	0.99	0.89
9:29:50	1033	32.3	112	495	0	29.9	216	224	0	0	0.0	554	0.99	0.89
9:30:08	1043	32.3	112	494	0	29.9	217	224	0	0	0.0	555	0.99	0.89
9:30:27	1053	32.3	112	498	0	29.9	219	225	0	0	0.0	553	1.00	0.90
9:30:45	1063	32.2	112	495	0	30.3	216	224	0	0	0.0	554	0.99	0.89
9:31:04	1073	32.3	112	497	0	30.3	219	224	0	0	0.0	553	0.99	0.90
9:31:23	1083	32.2	112	496	0	30.0	217	224	0	0	0.0	554	0.99	0.90
9:31:41	1093	32.3	112	498	0	30.5	218	224	0	0	0.0	553	1.00	0.90
9:32:00	1103	32.2	112	496	0	30.5	217	224	0	0	0.0	552	0.99	0.90
9:32:18	1113	32.2	112	499	0	30.5	220	223	0	0	0.0	552	1.00	0.90
9:32:37	1123	32.2	112	498	0	30.8	216	223	0	0	0.0	551	1.00	0.90
9:32:56	1133	32.2	112	499	0	30.9	219	224	0	0	0.0	554	1.00	0.90
9:33:14	1143	32.2	112	499	0	31.0	215	224	0	0	0.0	554	1.00	0.90
9:33:33	1153	32.2	112	498	0	30.6	215	224	0	0	0.0	552	1.00	0.90
9:33:52	1163	32.2	112	498	0	31.0	218	223	0	0	0.0	552	1.00	0.90
9:34:10	1173	32.2	112	499	0	31.0	216	224	0	0	0.0	554	1.00	0.90
9:34:29	1183	32.3	112	498	0	30.9	215	223	0	0	0.0	552	1.00	0.90
9:34:47	1193	32.2	112	498	0	30.8	219	223	0	0	0.0	551	1.00	0.90
9:35:06	1203	32.2	112	498	0	31.4	215	222	0	0	0.0	551	1.00	0.90
9:35:25	1213	32.2	112	500	0	31.6	214	223	0	0	0.0	553	1.00	0.90
9:35:43	1223	32.3	112	504	0	31.0	216	223	0	0	0.0	551	1.01	0.91
9:36:02	1233	32.2	112	498	0	31.2	216	223	0	0	0.0	554	1.00	0.90
9:36:21	1243	32.2	112	497	0	31.0	219	225	0	0	0.0	553	0.99	0.90
9:36:39	1253	32.2	112	497	0	31.6	215	222	0	0	0.0	550	0.99	0.90
9:36:58	1263	32.2	112	499	0	31.4	216	221	0	0	0.0	550	1.00	0.91
9:37:16	1273	32.2	112	501	0	30.9	216	223	0	0	0.0	553	1.00	0.91
9:37:35	1283	32.2	112	498	0	31.6	214	223	0	0	0.0	552	1.00	0.90

ALLSEAS PILE DRIVING RECORD MHU 500 T MONITORING-SYSTEM PAGE 05 18-11-2000

From File MANSON2D

Time hh:mm:ss	Blow No	Blow 1/min	St-roke cm	Ene-rgy kNm	Oil-flow l/min	Oil-temp. C	Oilpres. PP bar	Hammer bar	Dif1 mbar	Dif2 mbar	Water Press. bar	Eph Usage kNm	k	Mech Eff
9:37:54	1293	32.2	112	499	0	31.6	216	222	0	0	0.0	552	1.00	0.90
9:38:12	1303	32.2	112	498	0	31.9	219	222	0	0	0.0	551	1.00	0.90
9:38:31	1313	32.2	112	499	0	31.9	215	222	0	0	0.0	552	1.00	0.90
9:38:50	1323	32.3	112	505	0	31.2	219	222	0	0	0.0	550	1.01	0.92
9:39:08	1333	32.2	112	499	0	31.3	216	222	0	0	0.0	553	1.00	0.90
9:39:27	1343	32.2	112	498	0	31.6	215	222	0	0	0.0	553	1.00	0.90
9:39:45	1353	32.2	112	498	0	31.4	216	223	0	0	0.0	553	1.00	0.90
9:40:04	1363	32.2	112	496	0	32.0	215	221	0	0	0.0	552	0.99	0.90
9:40:23	1373	32.2	112	497	0	32.1	216	223	0	0	0.0	553	0.99	0.90
9:40:41	1383	32.2	112	497	0	31.8	214	222	0	0	0.0	549	0.99	0.91
9:41:00	1393	32.2	112	496	0	32.1	217	222	0	0	0.0	552	0.99	0.90
9:41:19	1403	32.2	112	496	0	32.0	217	221	0	0	0.0	550	0.99	0.90
9:41:37	1413	32.2	112	496	0	32.0	213	222	0	0	0.0	551	0.99	0.90
9:41:56	1423	32.2	112	496	0	32.3	215	222	0	0	0.0	553	0.99	0.90
9:42:15	1433	32.2	112	496	0	31.9	217	222	0	0	0.0	549	0.99	0.90
9:42:33	1443	32.2	112	497	0	32.1	217	222	0	0	0.0	553	0.99	0.90
9:42:52	1453	32.2	112	496	0	31.7	216	221	0	0	0.0	549	0.99	0.90
9:43:11	1463	32.1	112	496	0	32.6	216	222	0	0	0.0	549	0.99	0.90
9:43:29	1473	32.2	112	496	0	32.2	216	221	0	0	0.0	548	0.99	0.90
9:43:48	1483	32.2	112	497	0	32.5	216	221	0	0	0.0	549	0.99	0.90
9:44:07	1493	32.2	112	496	0	32.7	213	222	0	0	0.0	552	0.99	0.90
9:44:25	1503	32.2	112	498	0	32.7	215	221	0	0	0.0	551	1.00	0.90
9:44:44	1513	32.2	112	497	0	32.7	214	225	0	0	0.0	556	0.99	0.89
9:45:02	1523	32.2	112	498	0	32.4	216	225	0	0	0.0	556	1.00	0.90
9:45:21	1533	32.2	112	497	0	32.9	216	224	0	0	0.0	555	0.99	0.89
9:45:40	1543	32.1	112	496	0	32.6	218	225	0	0	0.0	553	0.99	0.90
9:45:58	1553	32.2	112	498	0	32.6	217	224	0	0	0.0	556	1.00	0.89
9:46:17	1563	32.2	112	496	0	32.4	216	224	0	0	0.0	550	0.99	0.90
9:46:36	1573	32.2	112	505	0	32.7	215	225	0	0	0.0	555	1.01	0.91
9:46:54	1583	32.2	112	498	0	32.5	216	224	0	0	0.0	553	1.00	0.90
9:47:13	1593	32.2	112	502	0	32.9	218	225	0	0	0.0	554	1.00	0.91
9:47:32	1603	32.2	112	495	0	32.5	215	225	0	0	0.0	554	0.99	0.89
9:47:50	1613	32.2	112	497	0	32.6	215	225	0	0	0.0	556	0.99	0.89
9:48:09	1623	32.2	112	495	0	32.9	212	229	0	0	0.0	559	0.99	0.89
9:48:28	1633	32.2	112	496	0	33.0	214	226	0	0	0.0	555	0.99	0.89
9:48:46	1643	32.2	112	495	0	32.9	216	229	0	0	0.0	559	0.99	0.89
9:49:05	1653	32.2	112	497	0	33.0	217	226	0	0	0.0	556	0.99	0.89
9:49:23	1663	32.1	112	497	0	32.6	215	227	0	0	0.0	556	0.99	0.89
9:49:42	1673	32.1	112	496	0	32.8	218	226	0	0	0.0	554	0.99	0.90
9:50:01	1683	32.2	112	497	0	33.1	213	227	0	0	0.0	556	0.99	0.89
9:50:19	1693	32.1	112	496	0	32.7	217	227	0	0	0.0	556	0.99	0.89
9:50:38	1703	32.1	112	496	0	32.8	217	226	0	0	0.0	557	0.99	0.89
9:50:57	1713	32.1	112	497	0	33.1	213	226	0	0	0.0	556	0.99	0.89
9:51:15	1723	32.1	112	497	0	33.3	214	227	0	0	0.0	559	0.99	0.89
9:51:34	1733	32.1	112	496	0	33.0	217	227	0	0	0.0	558	0.99	0.89
9:51:53	1743	32.1	112	497	0	33.1	214	226	0	0	0.0	556	0.99	0.89
9:52:11	1753	32.1	112	494	0	33.5	217	228	0	0	0.0	557	0.99	0.89
9:52:30	1763	32.2	112	497	0	33.3	215	229	0	0	0.0	558	0.99	0.89

ALLSEAS PILE DRIVING RECORD MHU 500 T MONITORING-SYSTEM PAGE 06 18-11-2000

From File MANSON2D

Time hh:mm:ss	Blow No	Blow 1/min	St-roke cm	Ene-rgy kNm	Oil-flow l/min	Oil-temp. C	Oilpres. PP bar	Hammer bar	Dif1 mbar	Dif2 mbar	Water Press. bar	Eph Usage kNm	k	Mech Eff
9:52:49	1773	32.1	112	496	0	33.1	216	233	0	0	0.0	563	0.99	0.88
9:53:07	1783	32.1	112	495	0	33.5	215	234	0	0	0.0	562	0.99	0.88
9:53:26	1793	32.2	112	497	0	33.2	211	232	0	0	0.0	564	0.99	0.88
9:53:45	1803	32.2	112	496	0	32.8	217	233	0	0	0.0	564	0.99	0.88
9:54:03	1813	32.2	112	496	0	33.4	217	233	0	0	0.0	564	0.99	0.88
9:54:11	STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED													
9:55:20	C1 HAS REPORTED HAMMER NOT ON PILE													
10:35:25	START HAMMER OPERATION IN STROKE SEQUENCE MODE													
10:35:45	SYSTEM STOP REQUIRED BEFOR MODE SWITCH IS ACTUATED													
10:35:55	START HAMMER OPERATION IN STROKE SEQUENCE MODE													
10:36:14	1830	33.1	110	493	0	38.4	216	225	0	0	0.0	544	0.99	0.91
10:36:32	1840	33.1	110	491	0	38.4	218	225	0	0	0.0	545	0.98	0.90
10:36:50	1850	33.1	110	491	0	38.8	213	224	0	0	0.0	543	0.98	0.90
10:37:08	1860	33.1	110	490	0	38.7	214	224	0	0	0.0	543	0.98	0.90
10:37:26	1870	33.2	110	490	0	39.0	214	224	0	0	0.0	545	0.98	0.90
10:37:45	1880	33.2	110	491	0	39.0	220	225	0	0	0.0	546	0.98	0.90
10:38:03	1890	33.2	110	491	0	38.8	216	225	0	0	0.0	544	0.98	0.90
10:38:21	1900	33.3	110	490	0	38.4	216	225	0	0	0.0	547	0.98	0.90
10:38:39	1910	33.3	110	492	0	37.7	215	226	0	0	0.0	546	0.98	0.90
10:38:57	1920	33.2	110	490	0	37.5	218	224	0	0	0.0	543	0.98	0.90
10:39:15	1930	33.3	110	489	0	37.3	217	226	0	0	0.0	546	0.98	0.90
10:39:33	1940	33.3	110	489	0	37.0	219	225	0	0	0.0	546	0.98	0.90
10:39:51	1950	33.3	110	491	0	36.7	217	225	0	0	0.0	544	0.98	0.90
10:40:09	1960	33.3	110	489	0	36.9	216	227	0	0	0.0	547	0.98	0.89
10:40:27	1970	33.3	110	491	0	36.4	218	231	0	0	0.0	551	0.98	0.89
10:40:45	1980	33.2	110	493	0	36.3	216	228	0	0	0.0	546	0.99	0.90
10:41:03	1990	33.2	110	491	0	36.4	216	229	0	0	0.0	550	0.98	0.89
10:41:21	2000	33.3	110	492	0	35.9	221	229	0	0	0.0	551	0.98	0.89
10:41:39	2010	33.2	110	489	0	36.1	217	229	0	0	0.0	547	0.98	0.90
10:41:57	2020	33.2	110	490	0	36.2	217	229	0	0	0.0	549	0.98	0.89
10:42:15	2030	33.3	110	491	0	35.9	216	229	0	0	0.0	549	0.98	0.90
10:42:33	2040	33.3	110	490	0	35.6	216	230	0	0	0.0	551	0.98	0.89
10:42:51	2050	33.2	110	492	0	35.8	217	230	0	0	0.0	549	0.98	0.90
10:43:09	2060	33.2	110	492	0	35.7	219	230	0	0	0.0	549	0.98	0.90
10:43:27	2070	33.2	110	488	0	35.9	216	231	0	0	0.0	552	0.98	0.89
10:43:45	2080	33.2	110	491	0	35.9	216	231	0	0	0.0	551	0.98	0.89
10:44:04	2090	33.2	110	494	0	35.9	217	231	0	0	0.0	550	0.99	0.90
10:44:22	2100	33.3	110	491	0	36.1	216	231	0	0	0.0	550	0.98	0.89
10:44:40	2110	33.3	110	490	0	35.6	218	231	0	0	0.0	552	0.98	0.89
10:44:58	2120	33.2	110	492	0	35.8	216	231	0	0	0.0	551	0.98	0.89
10:45:16	2130	33.3	110	491	0	35.4	215	230	0	0	0.0	553	0.98	0.89
10:45:34	2140	33.2	110	492	0	35.8	218	231	0	0	0.0	551	0.98	0.89
10:45:52	2150	33.2	110	490	0	35.7	216	231	0	0	0.0	551	0.98	0.89

ALLSEAS PILE DRIVING RECORD MHU 500 T MONITORING-SYSTEM PAGE 07 18-11-2000

From File MANSON2D

Time hh:mm:ss	Blow No	Blow 1/min	St-roke cm	Ene-rgy kNm	Oil-flow l/min	Oil-temp. C	Oilpres. PP bar	Hammer bar	Dif1 mbar	Dif2 mbar	Water Press. bar	Eph kNm	k Usage	Mech Eff
10:46:10	2160	33.3	110	495	0	35.6	216	231	0	0	0.0	552	0.99	0.90
10:46:28	2170	33.2	110	492	0	35.5	216	232	0	0	0.0	552	0.98	0.89
10:46:46	2180	33.2	110	490	0	35.8	220	232	0	0	0.0	553	0.98	0.89
10:47:04	2190	33.2	110	490	0	35.3	220	231	0	0	0.0	550	0.98	0.89
10:47:22	2200	33.3	110	490	0	35.0	216	232	0	0	0.0	553	0.98	0.89
10:47:40	2210	33.2	110	491	0	35.2	216	231	0	0	0.0	552	0.98	0.89
10:47:58	2220	33.3	110	492	0	35.4	216	231	0	0	0.0	552	0.98	0.89
10:48:16	2230	33.3	110	489	0	34.6	216	232	0	0	0.0	554	0.98	0.88
10:48:34	2240	33.2	110	491	0	35.2	217	231	0	0	0.0	550	0.98	0.89
10:48:52	2250	33.3	110	489	0	35.3	218	232	0	0	0.0	555	0.98	0.88
10:49:10	2260	33.3	110	491	0	35.1	218	233	0	0	0.0	553	0.98	0.89
10:49:28	2270	32.9	112	495	0	35.2	218	233	0	0	0.0	562	0.99	0.88
10:49:47	2280	32.7	112	497	0	35.1	215	231	0	0	0.0	562	0.99	0.88
10:50:05	2290	32.7	112	496	0	35.3	216	232	0	0	0.0	562	0.99	0.88
10:50:23	2300	32.7	112	497	0	34.9	216	235	0	0	0.0	562	0.99	0.89
10:50:42	2310	32.7	112	498	0	35.3	215	233	0	0	0.0	563	1.00	0.89
10:51:00	2320	32.7	112	497	0	35.2	218	232	0	0	0.0	562	0.99	0.88
10:51:19	2330	32.7	112	496	0	35.1	217	233	0	0	0.0	563	0.99	0.88
10:51:37	2340	32.7	112	496	0	35.2	215	233	0	0	0.0	563	0.99	0.88
10:51:55	2350	32.7	112	498	0	35.1	220	235	0	0	0.0	565	1.00	0.88
10:52:14	2360	32.6	112	498	0	35.0	217	234	0	0	0.0	564	1.00	0.88
10:52:32	2370	32.7	112	497	0	35.3	215	233	0	0	0.0	561	0.99	0.89
10:52:50	2380	32.6	112	498	0	35.0	215	234	0	0	0.0	564	1.00	0.88
10:53:09	2390	32.6	112	497	0	35.0	217	235	0	0	0.0	565	0.99	0.88
10:53:27	2400	32.6	112	500	0	34.8	217	235	0	0	0.0	563	1.00	0.89
10:53:46	2410	32.7	112	497	0	35.3	218	234	0	0	0.0	564	0.99	0.88
10:54:04	2420	32.6	112	497	0	35.2	217	235	0	0	0.0	566	0.99	0.88
10:54:22	2430	32.6	112	499	0	34.6	216	235	0	0	0.0	565	1.00	0.88
10:54:41	2440	32.6	112	498	0	34.9	215	237	0	0	0.0	565	1.00	0.88
10:54:59	2450	32.6	112	497	0	35.1	215	234	0	0	0.0	565	0.99	0.88
10:55:17	2460	32.7	112	496	0	35.2	213	234	0	0	0.0	564	0.99	0.88
10:55:36	2470	32.6	112	496	0	35.2	217	236	0	0	0.0	567	0.99	0.88

10:55:51 STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED

10:56:51 C1 HAS REPORTED HAMMER NOT ON PILE

PILE 2, RESTRIKE NO. 1

PILE 2, RESTRIKE NO. 1

Pile 2, Restrike No. 1

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ALLSEAS   PILE DRIVING RECORD FROM MENCK MONITORING-SYSTEM  PAGE 01  21-11-2000

JOB INFORMATION

PILE CODE ........................... : 2D
FILE NAME ........................... : RMANSO2D
CLIENT .............................. : CAL.TRANS
PROJECT ............................. : BAY BRIDGE TEST
PLATFORM ............................ :
SHIPS NAME .......................... : DB 24
JOB NO .............................. : 40-00-044
CONTRACT NR ......................... :

HAMMER INFORMATION

HAMMER TYPE ......................... : MHU 1700 i
SERIAL NO ........................... : 62443
POWERPACK ........................... : 2 X FISCHCON 1600 l
CONFIGURATION ....................... : FREE RIDING..................._
CONTROL UNIT NO ..................... : _............................._
BLOW COUNTER ON PANEL ............... : 0............................._

PARAMETER INFORMATION

PRINTER LOGGING DISTANCE ............ : 0.25........................._
LOWER REVERSAL TIME VARIABLE 0-400ms  :    relative stair

UPPER REVERSAL AUTOMATICALLY
DIFF PRESS SENSORS
START POINT AT ..............mbar  :    _............................._
STOP POINT AT ...............mbar  :    _............................._

PILE INFORMATION

OUTSIDE DIAMETER ............."     :    96
WALL THICKNESS ..............."     :    2.3/4
LENGTH ..................feet      :    85  PER PILE
SELF PENETR. PILE .......feet      :    5.00 METER
SELF PENETR.W.HAMMER ....feet      :    93.50 METER

REMARK :   Eph := ENERGY FROM HYDRAULIC AND FREE FALL
           Eff := IMPACT ENERGY  /  Eph
           k   := IMPACT ENERGY  /  DESIGN ENERGY

NTSv421  OLDv234  HUBv222  PICv105  TXTv517  GPAv205  GMHv006  USSv000
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ALLSEAS PILE DRIVING RECORD MHU 1700i MONITORING-SYSTEM PAGE 02 21-11-2000

From File RMANSO2D Time hh:mm:ss	Blow No	St- Blow 1/min	Ene- roke cm	Ene- rgy kNm	Oil- flow l/min	Oil- temp. C	Oilpres. PP bar	Dif1 Hammer bar	Dif2 bar	Water mbar	Eph mbar	Press. bar	k Usage kNm	Mech Eff
9:16:36	START HAMMER OPERATION IN SINGLE BLOW MODE													
9:16:54	STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED													
9:16:58	ATTENTION THE OILPRESSURE AT HAMMER IS TO HIGH !													
9:17:01	START ABORTED BECAUSE STOP-KEY HAS BEEN PUSHED													
9:17:04	START HAMMER OPERATION IN STROKE SEQUENCE MODE													
9:17:24		11	27.5	84	1645	0	26.5	276	0	0	0	0.0	1913	0.97 0.86
9:17:43	STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED													
9:21:16	I lost the electric connection to the ultrasonic sensor													
9:21:16	I MUST STOP WY TO MANY STROKE SENSOR'S DEFECT													
9:21:17	IGNORE SENSOR CH1 DEFECT													
9:21:17	IGNORE SENSOR MH_11 DEFECT													
9:21:17	I MUST STOP WY TO MANY STROKE SENSOR'S DEFECT													
9:21:18	IGNORE SENSOR MH_21 DEFECT													
9:21:18	I MUST STOP WY TO MANY STROKE SENSOR'S DEFECT													

PILE 2, RESTRIKE NO. 2

PILE 2, RESTRIKE NO. 2

ALLSEAS PILE DRIVING RECORD FROM MENCK MONITORING-SYSTEM PAGE 01 12-12-2000

JOB INFORMATION

PILE CODE ..... : 2D
FILE NAME ..... : RRMANS2D
CLIENT ..... : CAL.TRANS
PROJECT ..... : BAY BRIDGE TEST
PLATFORM ..... :
SHIPS NAME ..... : DB 24
JOB NO ..... : 40-00-044
CONTRACT NR ..... :

HAMMER INFORMATION

HAMMER TYPE ..... : MHU 1700 i
SERIAL NO ..... : 62443
POWERPACK ..... : 2 X FISCHCON 1600 l
CONFIGURATION ..... : FREE RIDING....._
CONTROL UNIT NO ..... : _....._
BLOW COUNTER ON PANEL ..... : 0....._

PARAMETER INFORMATION

PRINTER LOGGING DISTANCE ..... : 0.25....._
LOWER REVERSAL TIME VARIABLE 0-400ms : relative stair

UPPER REVERSAL AUTOMATICALLY
DIFF PRESS SENSORS
START POINT AT .....mbar : _....._
STOP POINT AT .....mbar : _....._

PILE INFORMATION

OUTSIDE DIAMETER ....." : 96
WALL THICKNESS ....." : 2.3/4
LENGTH .....feet : 85 PER PILE
SELF PENETR. PILE .....feet : 5.00 METER
SELF PENETR.W.HAMMER ....feet : 93.40 METER

REMARK : Eph := ENERGY FROM HYDRAULIC AND FREE FALL
Eff := IMPACT ENERGY / Eph
k := IMPACT ENERGY / DESIGN ENERGY

NTSv421 OLDv234 HUBv222 PICv105 TXTv517 GPAv205 GMHv006 USSv000

ALLSEAS PILE DRIVING RECORD MHU 1700i MONITORING-SYSTEM PAGE 2 12-12-2000

From File RRMANS2D

Time hh:mm:ss	Blow No	St- roke 1/min	Ene- rgy cm	Oil- flow kNm	Oil- temp. l/min	Oilpres. PP C	Dif1 Hammer bar	Dif2 bar	Water mbar	mbar	Press. bar	Eph kNm	k Usage	Mech Eff
10:18:07	STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED													
10:18:07	DATAOUTPUT ON THE FUGRO-PORT TERMINATE													
10:18:07	STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED													
10:27:15	START HAMMER OPERATION IN STROKE SEQUENCE MODE													
10:27:52	10	25.9	84	1620	0	26.9	244	0	0	0	0.0	1784	0.95	0.91
10:28:15	20	25.2	84	1583	0	27.4	234	0	0	0	0.0	1739	0.93	0.91
10:28:39	30	24.8	84	1579	0	27.5	235	0	0	0	0.0	1744	0.93	0.91
10:29:04	40	24.4	84	1585	0	28.3	231	0	0	0	0.0	1728	0.93	0.92
10:29:29	50	24.1	84	1573	0	28.0	231	0	0	0	0.0	1727	0.93	0.91
10:29:54	60	24.4	84	1595	0	27.3	230	0	0	0	0.0	1724	0.94	0.92
10:30:18	70	23.8	84	1575	0	26.6	232	-413	0	0	0.0	1732	0.93	0.91
10:30:43	80	24.1	84	1586	0	26.0	233	0	0	0	0.0	1736	0.93	0.91
10:31:08	90	24.0	84	1572	0	26.0	232	0	0	0	0.0	1733	0.92	0.91
10:31:33	100	24.0	84	1588	0	26.0	229	-413	0	0	0.0	1719	0.93	0.92
10:31:45	STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED													

Pile No. 3

PILE NO. 3

PILE 3, SECTION A

PILE 3, SECTION A

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ALLSEAS   PILE DRIVING RECORD FROM MENCK MONITORING-SYSTEM  PAGE 01  01-12-2000

JOB INFORMATION

PILE CODE ........................... : 3A
FILE NAME ........................... : MANSON3A
CLIENT .............................. : CAL.TRANS
PROJECT ............................. : BAY BRIDGE TEST
PLATFORM ............................ :
SHIPS NAME .......................... : DB 24
JOB NO .............................. : 40-00-044
CONTRACT NR ......................... :

HAMMER INFORMATION

HAMMER TYPE ......................... : MHU 500 T
SERIAL NO ........................... : 63038 (05)
POWERPACK ........................... : FISCHON 1600L
CONFIGURATION ....................... : FREE RIDING..................._
CONTROL UNIT NO ..................... : _............................_
BLOW COUNTER ON PANEL ............... : 0............................_

PARAMETER INFORMATION

PRINTER LOGGING DISTANCE ............ : 0.25........................._
LOWER REVERSAL TIME VARIABLE 0-400ms  :    relative stair

UPPER REVERSAL AUTOMATICALLY
DIFF PRESS SENSORS
START POINT AT ..............mbar  :    _............................_
STOP POINT AT ...............mbar  :    _............................_

PILE INFORMATION

OUTSIDE DIAMETER ............."     :    96
WALL THICKNESS ..............."     :    1.9/16
LENGTH ..................feet      :    100 PER PILE
SELF PENETR. PILE .......feet      :    7,5 METER
SELF PENETR.W.HAMMER ....feet      :    15,0MMETER

REMARK :   Eph := ENERGY FROM HYDRAULIC AND FREE FALL
           Eff := IMPACT ENERGY  /  Eph
           k   := IMPACT ENERGY  /  DESIGN ENERGY

NTSv421  OLDv234  HUBv222  PICv105  TXTv517  GPAv205  GMHv006  USSv000
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PILE 3, SECTION B

PILE 3, SECTION B

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ALLSEAS   PILE DRIVING RECORD FROM MENCK MONITORING-SYSTEM  PAGE 01  03-12-2000

JOB INFORMATION

PILE CODE ........................... : B3
FILE NAME ........................... : MANSON3B
CLIENT .............................. : COASTAL
PROJECT ............................. : 9494
PLATFORM ............................ : 247 A MAIN PASS
SHIPS NAME .......................... : DB 1
JOB NO .............................. : 529-00
CONTRACT NR ......................... :

HAMMER INFORMATION

HAMMER TYPE ......................... : MHU 500 T
SERIAL NO ........................... : 62895 (03)
POWERPACK ........................... : FISCHON 1600L
CONFIGURATION ....................... : FREE RIDING..................._
CONTROL UNIT NO ..................... : _............................._
BLOW COUNTER ON PANEL ............... : 0............................._

PARAMETER INFORMATION

PRINTER LOGGING DISTANCE ............ : 0.25........................._
LOWER REVERSAL TIME VARIABLE 0-400ms  :    relative stair

UPPER REVERSAL AUTOMATICALLY
DIFF PRESS SENSORS
START POINT AT ..............mbar  :    _............................._
STOP POINT AT ...............mbar  :    _............................._

PILE INFORMATION

OUTSIDE DIAMETER ............."     :    42
WALL THICKNESS ..............."     :    1.75
LENGTH ..................feet      :    218 PER PILE
SELF PENETR. PILE .......feet      :    73
SELF PENETR.W.HAMMER ....feet      :    73

REMARK :   Eph := ENERGY FROM HYDRAULIC AND FREE FALL
           Eff := IMPACT ENERGY  /  Eph
           k   := IMPACT ENERGY  /  DESIGN ENERGY

NTSv421  OLDv234  HUBv222  PICv105  TXTv517  GPAv205  GMHv006  USSv000
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ALLSEAS PILE DRIVING RECORD MHU 500 T MONITORING-SYSTEM PAGE 02 03-12-2000

From File MANSON3B

Time hh:mm:ss	Blow No	St- roke 1/min	Ene- rgy cm	Oil- flow kNm	Oil- temp. l/min	Oilpres. PP C	Dif1 Hammer bar	Dif2 Press. bar	Water mbar	Eph mbar	k bar	Mech Usage kNm	Eff
11:05:57	DATAOUTPUT ON THE FUGRO-PORT TERMINATE												
11:21:44	START HAMMER OPERATION IN SINGLE BLOW MODE												
11:22:53	START HAMMER OPERATION IN SINGLE BLOW MODE												
11:23:02	START HAMMER OPERATION IN SINGLE BLOW MODE												
11:23:14	START HAMMER OPERATION IN SINGLE BLOW MODE												
11:23:29	START HAMMER OPERATION IN SINGLE BLOW MODE												
11:23:46	START HAMMER OPERATION IN SINGLE BLOW MODE												
11:23:56	START HAMMER OPERATION IN SINGLE BLOW MODE												
11:24:06	START HAMMER OPERATION IN SINGLE BLOW MODE												
11:24:15	START HAMMER OPERATION IN SINGLE BLOW MODE												
11:24:24	START HAMMER OPERATION IN SINGLE BLOW MODE												
11:24:35	START HAMMER OPERATION IN SINGLE BLOW MODE												
11:24:44	START HAMMER OPERATION IN SINGLE BLOW MODE												
11:24:56	START HAMMER OPERATION IN SINGLE BLOW MODE												
11:25:05	START HAMMER OPERATION IN SINGLE BLOW MODE												
11:25:16	START HAMMER OPERATION IN SINGLE BLOW MODE												
11:25:25	START HAMMER OPERATION IN SINGLE BLOW MODE												
11:25:32	START HAMMER OPERATION IN SINGLE BLOW MODE												
11:25:39	START HAMMER OPERATION IN SINGLE BLOW MODE												
11:25:46	START HAMMER OPERATION IN SINGLE BLOW MODE												
11:25:54	START HAMMER OPERATION IN SINGLE BLOW MODE												
11:26:03	STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED												
11:26:06	START HAMMER OPERATION IN SINGLE BLOW MODE												
11:26:13	START HAMMER OPERATION IN SINGLE BLOW MODE												

ALLSEAS PILE DRIVING RECORD MHU 500 T MONITORING-SYSTEM PAGE 03 03-12-2000

From File _____ St- Ene- Oil- Oil- Oilpres. Dif1 Dif2 Water Eph k Mech
Time Blow Blow roke rgy flow temp. PP Hammer Press. Usage Eff
hh:mm:ss No 1/min cm kNm l/min C bar bar mbar mbar bar kNm

11:26:21 START HAMMER OPERATION IN SINGLE BLOW MODE

11:29:40 START HAMMER OPERATION IN SINGLE BLOW MODE

11:30:44 START HAMMER OPERATION IN SINGLE BLOW MODE

11:30:54 START HAMMER OPERATION IN SINGLE BLOW MODE

11:31:05 START HAMMER OPERATION IN SINGLE BLOW MODE

11:31:17 START HAMMER OPERATION IN SINGLE BLOW MODE

11:31:30 START HAMMER OPERATION IN SINGLE BLOW MODE

11:31:39 START HAMMER OPERATION IN SINGLE BLOW MODE

11:31:46 START HAMMER OPERATION IN SINGLE BLOW MODE

11:31:54 START HAMMER OPERATION IN SINGLE BLOW MODE

11:32:01 START HAMMER OPERATION IN SINGLE BLOW MODE

11:32:07 START HAMMER OPERATION IN SINGLE BLOW MODE

11:32:12 START HAMMER OPERATION IN SINGLE BLOW MODE

11:32:19 START HAMMER OPERATION IN SINGLE BLOW MODE

11:32:25 START HAMMER OPERATION IN SINGLE BLOW MODE

11:32:30 START HAMMER OPERATION IN SINGLE BLOW MODE

11:32:35 START HAMMER OPERATION IN SINGLE BLOW MODE

11:32:41 START HAMMER OPERATION IN SINGLE BLOW MODE

11:32:46 START HAMMER OPERATION IN SINGLE BLOW MODE

11:32:51 START HAMMER OPERATION IN SINGLE BLOW MODE

11:32:56 START HAMMER OPERATION IN SINGLE BLOW MODE

11:33:01 START HAMMER OPERATION IN SINGLE BLOW MODE

11:33:05 START HAMMER OPERATION IN SINGLE BLOW MODE

11:33:10 START HAMMER OPERATION IN SINGLE BLOW MODE

ALLSEAS PILE DRIVING RECORD MHU 500 T MONITORING-SYSTEM PAGE 04 03-12-2000

From File _____

Time hh:mm:ss	Blow No	Blow 1/min	St-roke cm	Ene-rgy kNm	Oil-flow l/min	Oil-temp. C	Oilpres. PP bar	Dif1 Hammer bar	Dif2 mbar	Water mbar	Press. bar	Eph kNm	k Usage	Mech Eff
11:33:15	START HAMMER OPERATION IN SINGLE BLOW MODE													
11:33:20	START HAMMER OPERATION IN SINGLE BLOW MODE													
11:33:24	START HAMMER OPERATION IN SINGLE BLOW MODE													
11:33:30	START HAMMER OPERATION IN SINGLE BLOW MODE													
11:33:35	START HAMMER OPERATION IN SINGLE BLOW MODE													
11:33:41	START HAMMER OPERATION IN SINGLE BLOW MODE													
11:33:46	START HAMMER OPERATION IN SINGLE BLOW MODE													
11:33:52	START HAMMER OPERATION IN SINGLE BLOW MODE													
11:34:34	START HAMMER OPERATION IN STROKE SEQUENCE MODE													
11:35:18	64	26.8	18	72	0	20.6	181	188	0	0	0.0	83	0.14	0.87
11:35:40	74	29.8	16	44	0	20.8	179	187	0	0	0.0	74	0.09	0.59
11:35:57	84	59.5	12	10	0	20.8	176	185	0	0	0.0	55	0.02	0.18
11:36:22	94	26.0	16	62	0	20.6	177	189	0	0	0.0	75	0.12	0.83
11:36:42	104	20.9	18	70	0	20.6	180	187	0	0	0.0	82	0.14	0.85
11:37:13	114	21.5	16	60	0	21.1	177	187	0	0	0.0	74	0.12	0.82
11:37:41	124	21.1	16	60	0	20.8	179	187	0	0	0.0	74	0.12	0.82
11:38:01	134	93.3	10	10	0	21.0	179	189	0	0	0.0	47	0.02	0.21
11:38:22	144	28.3	14	72	0	20.9	182	188	0	0	0.0	65	0.14	1.12
11:38:43	154	28.5	14	72	0	21.3	181	189	0	0	0.0	64	0.14	1.12
11:39:04	164	19.3	20	81	0	20.6	176	187	0	0	0.0	93	0.16	0.87
11:39:27	174	34.5	10	10	0	21.0	183	189	0	0	0.0	47	0.02	0.21
11:39:53	184	19.1	16	10	0	20.9	178	186	0	0	0.0	74	0.02	0.14
11:40:26	194	14.2	26	104	0	21.2	176	184	0	0	0.0	119	0.21	0.87
11:40:49	204	33.4	22	93	0	21.4	180	189	0	0	0.0	102	0.19	0.91
11:41:07	214	33.0	22	93	0	22.1	178	190	0	0	0.0	103	0.19	0.91
11:41:25	224	33.2	22	93	0	21.4	181	189	0	0	0.0	103	0.19	0.90
11:41:43	234	33.3	22	93	0	21.5	182	189	0	0	0.0	101	0.19	0.91
11:42:01	244	33.2	22	93	0	21.5	180	189	0	0	0.0	102	0.19	0.91
11:42:19	254	33.2	22	93	0	21.2	182	188	0	0	0.0	101	0.19	0.92
11:42:37	264	33.1	22	93	0	21.8	181	188	0	0	0.0	102	0.19	0.91
11:42:55	274	33.4	22	92	0	21.5	179	188	0	0	0.0	101	0.18	0.91
11:43:13	284	33.2	22	92	0	21.6	180	188	0	0	0.0	102	0.18	0.90
11:43:31	294	33.3	22	92	0	21.6	181	188	0	0	0.0	102	0.18	0.90
11:43:49	304	33.8	22	92	0	21.6	179	187	0	0	0.0	101	0.18	0.91
11:44:07	314	33.3	22	92	0	22.1	179	188	0	0	0.0	102	0.18	0.91
11:44:25	324	33.5	22	92	0	21.9	183	188	0	0	0.0	102	0.18	0.90
11:44:43	334	33.4	22	92	0	22.3	180	188	0	0	0.0	102	0.18	0.90
11:45:01	344	33.5	22	92	0	22.1	182	188	0	0	0.0	101	0.18	0.91
11:45:19	354	33.3	22	92	0	22.6	181	188	0	0	0.0	102	0.18	0.90

ALLSEAS PILE DRIVING RECORD MHU 500 T MONITORING-SYSTEM PAGE 05 03-12-2000

From File _____

Time hh:mm:ss	Blow No	Blow 1/min	St-roke cm	Ene-rgy kNm	Oil-flow l/min	Oil-temp. C	Oilpres. PP bar	Hammer bar	Dif1 mbar	Dif2 mbar	Water Press. bar	Eph Usage kNm	k	Mech Eff
11:45:37	364	33.1	22	92	0	22.1	183	189	0	0	0.0	102	0.18	0.91
11:45:55	374	33.4	22	92	0	21.8	182	189	0	0	0.0	102	0.18	0.90
11:46:13	384	33.3	22	92	0	22.4	181	188	0	0	0.0	102	0.18	0.91

11:46:27 STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED

11:47:20 C1 HAS REPORTED HAMMER NOT ON PILE

12:17:58 START HAMMER OPERATION IN SINGLE BLOW MODE

12:18:34 START HAMMER OPERATION IN STROKE SEQUENCE MODE

12:19:07	403	27.4	24	101	0	26.3	179	191	0	0	0.0	111	0.20	0.90
12:19:27	413	32.2	24	101	0	26.6	184	192	0	0	0.0	111	0.20	0.91
12:19:45	423	32.2	24	101	0	26.9	182	193	0	0	0.0	112	0.20	0.91
12:20:04	433	32.1	24	102	0	27.1	183	193	0	0	0.0	112	0.20	0.91
12:20:23	443	32.0	24	101	0	26.5	179	193	0	0	0.0	112	0.20	0.90
12:20:41	453	32.0	24	101	0	26.9	180	192	0	0	0.0	111	0.20	0.91
12:21:00	463	32.0	24	101	0	27.1	182	192	0	0	0.0	110	0.20	0.92
12:21:19	473	31.7	24	101	0	26.9	183	193	0	0	0.0	113	0.20	0.90
12:21:38	483	31.9	24	101	0	26.4	182	193	0	0	0.0	111	0.20	0.91
12:21:56	493	32.1	24	102	0	26.7	180	193	0	0	0.0	113	0.20	0.90
12:22:14	503	33.6	24	101	0	26.3	182	193	0	0	0.0	112	0.20	0.90
12:22:32	513	33.5	24	102	0	25.8	182	193	0	0	0.0	111	0.20	0.91
12:22:50	523	33.3	24	102	0	26.3	179	193	0	0	0.0	111	0.20	0.92
12:23:08	533	33.4	24	102	0	25.9	184	194	0	0	0.0	112	0.20	0.91
12:23:26	543	33.6	24	102	0	26.1	181	194	0	0	0.0	113	0.20	0.90
12:23:44	553	33.2	24	102	0	26.1	177	193	0	0	0.0	112	0.20	0.91
12:24:02	563	33.6	24	102	0	26.0	181	193	0	0	0.0	112	0.20	0.90
12:24:20	573	33.4	24	101	0	26.0	181	194	0	0	0.0	113	0.20	0.90
12:24:38	583	33.5	24	102	0	26.3	183	191	0	0	0.0	111	0.20	0.91
12:24:55	593	33.3	24	101	0	25.7	178	193	0	0	0.0	112	0.20	0.90
12:25:13	603	33.4	24	101	0	26.3	179	192	0	0	0.0	112	0.20	0.91
12:25:31	613	33.4	24	101	0	26.1	179	192	0	0	0.0	112	0.20	0.91
12:25:49	623	33.5	24	102	0	26.1	182	192	0	0	0.0	111	0.20	0.91
12:26:07	633	33.5	24	101	0	26.2	183	193	0	0	0.0	113	0.20	0.90
12:26:25	643	33.7	24	102	0	25.9	182	193	0	0	0.0	112	0.20	0.91
12:26:43	653	33.8	24	101	0	25.6	185	193	0	0	0.0	113	0.20	0.90
12:27:00	663	33.9	24	102	0	25.9	180	192	0	0	0.0	112	0.20	0.91
12:27:18	673	33.8	24	102	0	26.0	180	192	0	0	0.0	111	0.20	0.91
12:27:36	683	33.9	24	101	0	25.9	182	192	0	0	0.0	111	0.20	0.91
12:27:54	693	33.9	24	101	0	25.7	179	193	0	0	0.0	112	0.20	0.91
12:28:11	703	33.8	24	101	0	26.2	180	193	0	0	0.0	112	0.20	0.91
12:28:29	713	33.7	24	101	0	25.7	180	192	0	0	0.0	112	0.20	0.90
12:28:47	723	33.8	24	101	0	26.0	182	192	0	0	0.0	111	0.20	0.91
12:29:05	733	33.7	24	102	0	25.9	179	192	0	0	0.0	112	0.20	0.91
12:29:22	743	33.7	24	102	0	26.0	180	193	0	0	0.0	112	0.20	0.91
12:29:40	753	33.5	24	102	0	25.9	180	192	0	0	0.0	111	0.20	0.92

ALLSEAS PILE DRIVING RECORD MHU 500 T MONITORING-SYSTEM PAGE 06 03-12-2000

From File _____

Time hh:mm:ss	Blow No	Blow 1/min	St-roke cm	Ene-rgy kNm	Oil-flow l/min	Oil-temp. C	Oilpres. PP bar	Hammer bar	Dif1 mbar	Dif2 mbar	Water Press. bar	Eph Usage kNm	k	Mech Eff
12:29:58	763	33.5	24	102	0	26.2	181	192	0	0	0.0	112	0.20	0.91
12:30:16	773	33.4	24	102	0	25.9	183	192	0	0	0.0	112	0.20	0.91
12:30:34	783	33.4	24	102	0	25.4	182	193	0	0	0.0	112	0.20	0.91
12:30:52	793	33.5	24	102	0	25.7	178	192	0	0	0.0	112	0.20	0.91
12:31:10	803	33.5	24	102	0	25.9	182	193	0	0	0.0	113	0.20	0.90
12:31:28	813	33.6	24	102	0	26.0	179	192	0	0	0.0	111	0.20	0.91
12:31:46	823	33.5	24	102	0	25.7	182	192	0	0	0.0	111	0.20	0.91
12:32:04	833	33.4	24	102	0	25.9	179	192	0	0	0.0	112	0.20	0.91
12:32:22	843	33.3	24	102	0	25.9	181	193	0	0	0.0	112	0.20	0.91
12:32:40	853	33.6	24	102	0	25.9	181	193	0	0	0.0	112	0.20	0.90
12:32:58	863	33.2	24	102	0	25.6	178	193	0	0	0.0	112	0.20	0.91
12:33:16	873	33.4	24	101	0	25.9	180	192	0	0	0.0	111	0.20	0.91
12:33:34	883	33.8	24	101	0	25.8	182	192	0	0	0.0	113	0.20	0.90
12:33:52	893	33.4	24	101	0	26.1	179	192	0	0	0.0	112	0.20	0.90
12:34:09	903	34.0	24	101	0	25.6	180	192	0	0	0.0	112	0.20	0.90
12:34:27	913	34.0	24	101	0	25.9	180	191	0	0	0.0	112	0.20	0.90
12:34:45	923	33.3	24	101	0	25.7	182	192	0	0	0.0	112	0.20	0.90
12:35:03	933	33.4	24	101	0	26.4	183	192	0	0	0.0	112	0.20	0.90
12:35:21	943	33.7	24	101	0	25.8	181	192	0	0	0.0	111	0.20	0.91
12:35:38	953	33.5	24	101	0	26.2	180	192	0	0	0.0	111	0.20	0.90
12:35:56	963	33.5	24	101	0	26.3	180	193	0	0	0.0	112	0.20	0.90
12:36:16	973	25.1	34	144	0	26.0	180	192	0	0	0.0	158	0.29	0.91
12:36:36	983	35.6	34	151	0	26.2	183	197	0	0	0.0	160	0.30	0.94
12:36:53	993	33.4	34	150	0	26.1	182	195	0	0	0.0	158	0.30	0.95
12:37:11	1003	33.4	34	150	0	25.8	182	196	0	0	0.0	160	0.30	0.94
12:37:29	1013	33.4	34	150	0	25.9	185	196	0	0	0.0	160	0.30	0.94
12:37:47	1023	33.4	34	150	0	26.2	186	197	0	0	0.0	161	0.30	0.93
12:38:05	1033	33.4	34	150	0	26.4	181	197	0	0	0.0	159	0.30	0.94
12:38:41	1053	33.1	34	149	0	26.1	181	197	0	0	0.0	160	0.30	0.93
12:38:59	1063	33.3	34	149	0	26.5	183	198	0	0	0.0	160	0.30	0.93
12:39:18	1073	33.3	34	149	0	26.3	183	197	0	0	0.0	160	0.30	0.93
12:39:36	1083	33.4	34	149	0	26.2	182	197	0	0	0.0	160	0.30	0.94
12:39:54	1093	33.4	34	149	0	26.2	182	197	0	0	0.0	160	0.30	0.93
12:40:11	1103	33.4	34	148	0	26.6	183	197	0	0	0.0	160	0.30	0.93
12:40:29	1113	33.4	34	149	0	26.3	183	198	0	0	0.0	160	0.30	0.93
12:40:47	1123	33.4	34	149	0	26.1	181	197	0	0	0.0	160	0.30	0.93
12:41:05	1133	33.5	34	149	0	26.0	185	198	0	0	0.0	161	0.30	0.92
12:41:23	1143	33.4	34	149	0	26.2	181	198	0	0	0.0	161	0.30	0.93
12:41:41	1153	33.4	34	149	0	26.4	182	197	0	0	0.0	160	0.30	0.93
12:41:59	1163	33.4	34	149	0	26.3	181	197	0	0	0.0	160	0.30	0.93
12:42:17	1173	33.3	34	149	0	26.4	181	197	0	0	0.0	159	0.30	0.94
12:42:35	1183	33.4	34	149	0	26.2	182	198	0	0	0.0	161	0.30	0.92
12:42:53	1193	33.0	34	149	0	26.5	182	198	0	0	0.0	161	0.30	0.92
12:43:11	1203	33.4	34	148	0	26.2	184	197	0	0	0.0	161	0.30	0.92
12:43:29	1213	33.3	34	148	0	26.4	181	197	0	0	0.0	160	0.30	0.92
12:43:47	1223	33.4	34	147	0	26.4	182	197	0	0	0.0	161	0.29	0.92
12:44:05	1233	33.4	34	147	0	26.3	182	197	0	0	0.0	161	0.29	0.92
12:44:23	1243	33.4	34	148	0	26.7	183	197	0	0	0.0	161	0.30	0.92

ALLSEAS PILE DRIVING RECORD MHU 500 T MONITORING-SYSTEM PAGE 07 03-12-2000

From File _____

Time hh:mm:ss	Blow No	Blow 1/min	St-roke cm	Ene-rgy kNm	Oil-flow l/min	Oil-temp. C	Oilpres. PP bar	Hammer bar	Dif1 mbar	Dif2 mbar	Water Press. bar	Eph Usage kNm	k	Mech Eff
12:44:41	1253	33.3	34	147	0	26.7	186	197	0	0	0.0	160	0.29	0.92
12:44:59	1263	34.0	34	148	0	26.8	182	198	0	0	0.0	161	0.30	0.92
12:45:17	1273	32.9	34	148	0	26.5	184	198	0	0	0.0	161	0.30	0.92
12:45:35	1283	33.4	34	147	0	26.9	181	198	0	0	0.0	161	0.29	0.91
12:45:53	1293	33.5	34	147	0	26.8	184	197	0	0	0.0	160	0.29	0.92
12:46:11	1303	33.1	34	147	0	26.5	182	197	0	0	0.0	161	0.29	0.92
12:46:29	1313	33.4	34	147	0	27.0	185	198	0	0	0.0	161	0.29	0.91
12:46:47	1323	33.5	34	147	0	27.0	184	197	0	0	0.0	160	0.29	0.92
12:47:05	1333	33.7	34	148	0	27.2	182	197	0	0	0.0	161	0.30	0.92
12:47:23	1343	33.1	34	147	0	26.7	181	196	0	0	0.0	160	0.29	0.92
12:47:41	1353	33.7	34	147	0	26.8	183	198	0	0	0.0	161	0.29	0.91
12:47:59	1363	33.4	34	147	0	26.7	183	197	0	0	0.0	161	0.29	0.92
12:48:17	1373	33.5	34	147	0	27.0	184	196	0	0	0.0	161	0.29	0.91
12:48:35	1383	33.0	34	148	0	27.0	181	196	0	0	0.0	161	0.30	0.91
12:48:53	1393	34.1	34	147	0	26.7	181	196	0	0	0.0	161	0.29	0.91

12:49:05 STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED

12:49:57 C1 HAS REPORTED HAMMER NOT ON PILE

13:16:23 START HAMMER OPERATION IN STROKE SEQUENCE MODE

13:16:59	1409	32.4	48	207	0	31.5	186	200	0	0	0.0	227	0.41	0.91
13:17:17	1419	32.8	48	208	0	31.6	189	202	0	0	0.0	229	0.42	0.91
13:17:35	1429	33.0	48	209	0	31.6	186	202	0	0	0.0	228	0.42	0.92
13:17:53	1439	33.0	48	207	0	31.4	186	202	0	0	0.0	228	0.41	0.91
13:18:11	1449	32.9	48	208	0	31.4	187	201	0	0	0.0	227	0.42	0.92
13:18:30	1459	33.0	48	207	0	31.5	190	200	0	0	0.0	227	0.41	0.91
13:18:48	1469	32.9	48	206	0	31.3	188	200	0	0	0.0	227	0.41	0.91
13:19:06	1479	33.1	48	206	0	31.4	187	199	0	0	0.0	226	0.41	0.91
13:19:24	1489	33.2	48	205	0	31.2	187	200	0	0	0.0	228	0.41	0.90
13:19:42	1499	33.3	48	205	0	31.1	186	201	0	0	0.0	228	0.41	0.90
13:20:02	1509	27.0	62	269	0	30.8	188	202	0	0	0.0	292	0.54	0.92
13:20:21	1519	33.7	56	248	0	30.8	192	206	0	0	0.0	268	0.50	0.93
13:20:38	1529	33.7	56	248	0	30.4	195	207	0	0	0.0	269	0.50	0.92
13:20:56	1539	33.7	56	248	0	30.5	195	207	0	0	0.0	269	0.50	0.92
13:21:14	1549	33.8	56	247	0	30.6	191	207	0	0	0.0	269	0.49	0.92
13:21:32	1559	33.7	56	247	0	30.3	193	205	0	0	0.0	268	0.49	0.92
13:21:50	1569	33.8	56	248	0	30.3	191	205	0	0	0.0	268	0.50	0.92
13:22:07	1579	33.7	56	247	0	30.2	193	206	0	0	0.0	268	0.49	0.92
13:22:25	1589	33.7	56	247	0	30.3	193	205	0	0	0.0	269	0.49	0.92
13:22:43	1599	33.7	56	246	0	30.1	192	205	0	0	0.0	268	0.49	0.92
13:23:01	1609	33.7	56	248	0	30.0	191	205	0	0	0.0	267	0.50	0.93
13:23:18	1619	33.8	56	247	0	30.0	192	206	0	0	0.0	269	0.49	0.91
13:23:36	1629	33.7	56	247	0	29.7	194	206	0	0	0.0	269	0.49	0.92
13:23:54	1639	33.6	56	247	0	30.0	192	206	0	0	0.0	268	0.49	0.92
13:24:12	1649	33.8	56	247	0	30.1	191	206	0	0	0.0	270	0.49	0.91
13:24:30	1659	33.8	56	246	0	29.8	192	206	0	0	0.0	269	0.49	0.91

ALLSEAS PILE DRIVING RECORD MHU 500 T MONITORING-SYSTEM PAGE 08 03-12-2000

From File _____

Time hh:mm:ss	Blow No	St- Blow 1/min	Ene- roke cm	rgy kNm	Oil- flow l/min	Oil- temp. C	Oilpres. PP bar	Hammer bar	Dif1 mbar	Dif2 mbar	Water Press. bar	Eph Usage kNm	k	Mech Eff
13:24:47	1669	33.7	56	246	0	29.7	191	206	0	0	0.0	270	0.49	0.91
13:25:05	1679	33.7	56	246	0	30.0	188	202	0	0	0.0	268	0.49	0.92

13:25:05 STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED

13:26:10 C1 HAS REPORTED HAMMER NOT ON PILE

PILE 3, SECTION C

PILE 3, SECTION C

ALLSEAS PILE DRIVING RECORD FROM MENCK MONITORING-SYSTEM PAGE 01 07-12-2000

JOB INFORMATION

PILE CODE ..... : 3D
FILE NAME ..... : MANSON3D
CLIENT ..... : CAL.TRANS
PROJECT ..... : BAY BRIDGE TEST
PLATFORM ..... :
SHIPS NAME ..... : DB 24
JOB NO ..... : 40-00-044
CONTRACT NR ..... :

HAMMER INFORMATION

HAMMER TYPE ..... : MHU 500 T
SERIAL NO ..... : 63038 (05)
POWERPACK ..... : FISCHON 1600L
CONFIGURATION ..... : FREE RIDING....._
CONTROL UNIT NO ..... : _....._
BLOW COUNTER ON PANEL ..... : 0....._

PARAMETER INFORMATION

PRINTER LOGGING DISTANCE ..... : 0.25....._
LOWER REVERSAL TIME VARIABLE 0-400ms : relative stair

UPPER REVERSAL AUTOMATICALLY
DIFF PRESS SENSORS
START POINT AT .....mbar : _....._
STOP POINT AT .....mbar : _....._

PILE INFORMATION

OUTSIDE DIAMETER ....." : 96
WALL THICKNESS ....." : 2.7/16
LENGTH .....feet : 85 PER PILE
SELF PENETR. PILE .....feet : 7,5 METER
SELF PENETR.W.HAMMER ....feet : 44,0 METER

REMARK : Eph := ENERGY FROM HYDRAULIC AND FREE FALL
Eff := IMPACT ENERGY / Eph
k := IMPACT ENERGY / DESIGN ENERGY

NTSv421 OLDv234 HUBv222 PICv105 TXTv517 GPAv205 GMHv006 USSv000

ALLSEAS PILE DRIVING RECORD MHU 500 T MONITORING-SYSTEM PAGE 02 07-12-2000

From File MANSON3D

Time hh:mm:ss	Blow No	Blow 1/min	St-roke cm	Ene-rgy kNm	Oil-flow l/min	Oil-temp. C	Oilpres. PP bar	Hammer bar	Dif1 mbar	Dif2 mbar	Water Press. bar	Eph Usage kNm	k	Mech Eff
10:03:47	INCREMENTAL COUNT ERROR													
10:03:48	DATAOUTPUT ON THE FUGRO-PORT TERMINATE													
10:04:07	START HAMMER OPERATION IN SINGLE BLOW MODE													
10:04:36	START HAMMER OPERATION IN STROKE SEQUENCE MODE													
10:04:58	11	31.7	60	256	0	16.1	197	202	0	0	0.0	284	0.51	0.90
10:05:17	21	32.3	58	257	0	16.1	198	202	0	0	0.0	275	0.51	0.94
10:05:35	31	32.5	58	253	0	16.3	196	200	0	0	0.0	275	0.51	0.92
10:05:54	41	32.5	58	253	0	16.5	196	200	0	0	0.0	276	0.51	0.92
10:06:12	51	32.8	58	255	0	16.5	195	201	0	0	0.0	275	0.51	0.93
10:06:30	61	32.8	58	254	0	16.1	196	201	0	0	0.0	275	0.51	0.92
10:06:49	71	32.8	58	253	0	16.3	194	201	0	0	0.0	275	0.51	0.92
10:07:07	81	32.2	60	261	0	15.8	199	200	0	0	0.0	284	0.52	0.92
10:07:27	91	33.6	70	301	0	16.3	205	205	0	0	0.0	335	0.60	0.90
10:07:45	101	33.4	70	301	0	16.2	202	206	0	0	0.0	336	0.60	0.89
10:08:03	111	33.4	70	302	0	16.3	203	205	0	0	0.0	335	0.60	0.90
10:08:20	121	33.4	70	303	0	16.3	203	206	0	0	0.0	335	0.61	0.90
10:08:38	131	33.5	70	301	0	16.6	201	205	0	0	0.0	336	0.60	0.90
10:08:58	141	32.8	82	363	0	16.5	209	209	0	0	0.0	397	0.73	0.91
10:09:16	151	33.9	78	341	0	16.8	210	209	0	0	0.0	377	0.68	0.91
10:09:33	161	33.9	78	342	0	16.8	208	209	0	0	0.0	376	0.68	0.91
10:09:51	171	33.8	78	341	0	16.8	206	209	0	0	0.0	377	0.68	0.91
10:10:09	181	33.9	78	343	0	16.7	205	210	0	0	0.0	377	0.69	0.91
10:10:26	191	33.8	78	343	0	17.1	207	210	0	0	0.0	378	0.69	0.91
10:10:44	201	33.7	78	344	0	17.2	206	209	0	0	0.0	377	0.69	0.91
10:11:02	211	33.8	78	343	0	16.9	209	209	0	0	0.0	376	0.69	0.91
10:11:20	221	33.7	78	345	0	17.4	208	210	0	0	0.0	377	0.69	0.92
10:11:38	231	33.5	78	345	0	17.4	209	210	0	0	0.0	377	0.69	0.92
10:11:56	241	33.6	78	345	0	17.8	208	210	0	0	0.0	375	0.69	0.92
10:12:13	251	33.4	78	347	0	17.2	210	210	0	0	0.0	375	0.69	0.92
10:12:31	261	33.4	78	343	0	17.7	210	210	0	0	0.0	376	0.69	0.91
10:12:49	271	33.3	78	347	0	18.0	207	211	0	0	0.0	377	0.69	0.92
10:13:07	281	33.5	78	344	0	18.0	205	210	0	0	0.0	375	0.69	0.92
10:13:25	291	33.2	78	346	0	18.5	205	209	0	0	0.0	377	0.69	0.92
10:13:43	301	33.4	78	348	0	18.2	208	210	0	0	0.0	376	0.70	0.93
10:14:01	311	33.3	78	347	0	18.4	207	210	0	0	0.0	376	0.69	0.92
10:14:19	321	33.2	80	348	0	18.6	211	210	0	0	0.0	385	0.70	0.91
10:14:38	331	29.2	92	395	0	19.1	206	209	0	0	0.0	439	0.79	0.90
10:14:58	341	32.0	92	408	0	19.0	213	216	0	0	0.0	445	0.82	0.92
10:15:15	351	35.8	88	397	0	19.1	222	223	0	0	0.0	432	0.79	0.92
10:15:33	361	33.1	88	390	0	18.7	216	216	0	0	0.0	426	0.78	0.91
10:15:51	371	32.9	88	391	0	18.5	217	216	0	0	0.0	426	0.78	0.92

ALLSEAS PILE DRIVING RECORD MHU 500 T MONITORING-SYSTEM PAGE 03 07-12-2000

From File MANSON3D

Time hh:mm:ss	Blow No	Blow 1/min	St-roke cm	Ene-rgy kNm	Oil-flow l/min	Oil-temp. C	Oilpres. PP bar	Hammer bar	Dif1 mbar	Dif2 mbar	Water Press. bar	Eph Usage kNm	k	Mech Eff
10:16:10	381	33.0	88	389	0	18.9	214	217	0	0	0.0	424	0.78	0.92
10:16:28	391	33.1	88	387	0	19.3	212	216	0	0	0.0	427	0.77	0.91
10:16:46	401	32.9	88	389	0	19.8	216	217	0	0	0.0	426	0.78	0.91
10:17:04	411	32.9	88	391	0	19.7	215	216	0	0	0.0	425	0.78	0.92
10:17:22	421	33.1	88	390	0	19.6	217	216	0	0	0.0	427	0.78	0.91
10:17:41	431	33.0	88	388	0	19.7	212	216	0	0	0.0	425	0.78	0.91
10:17:59	441	30.4	98	424	0	20.0	211	213	0	0	0.0	472	0.85	0.90
10:18:20	451	32.2	114	514	0	20.1	229	225	0	0	0.0	564	1.03	0.91
10:18:38	461	34.0	110	502	0	20.6	227	227	0	0	0.0	547	1.00	0.92
10:18:55	471	34.0	110	498	0	20.4	230	228	0	0	0.0	547	1.00	0.91
10:19:13	481	33.9	110	499	0	20.6	223	226	0	0	0.0	545	1.00	0.92
10:19:31	491	33.9	110	500	0	20.9	229	227	0	0	0.0	545	1.00	0.92
10:19:48	501	33.9	110	499	0	21.0	225	227	0	0	0.0	546	1.00	0.91
10:20:06	511	34.0	110	499	0	21.0	227	227	0	0	0.0	545	1.00	0.91
10:20:24	521	33.9	110	499	0	21.5	227	228	0	0	0.0	547	1.00	0.91
10:20:41	531	33.9	110	501	0	21.3	228	226	0	0	0.0	545	1.00	0.92
10:20:59	541	33.8	110	503	0	21.4	228	227	0	0	0.0	544	1.01	0.92
10:21:17	551	33.9	112	499	0	21.8	225	227	0	0	0.0	558	1.00	0.89

10:21:17 CH1 SENSOR WAS DETECTED AS DEFECT BUT IS STILL FUNCTIONING

10:21:35	561	33.9	110	499	0	21.6	229	228	0	0	0.0	547	1.00	0.91
10:21:52	571	33.8	110	501	0	22.0	225	228	0	0	0.0	547	1.00	0.92
10:22:10	581	33.8	112	498	0	22.3	230	227	0	0	0.0	554	1.00	0.90
10:22:28	591	33.8	112	500	0	22.2	225	226	0	0	0.0	554	1.00	0.90
10:22:46	601	33.7	112	499	0	22.5	228	227	0	0	0.0	554	1.00	0.90
10:23:04	611	33.8	112	500	0	22.3	227	227	0	0	0.0	556	1.00	0.90
10:23:21	621	33.7	112	498	0	22.6	226	226	0	0	0.0	554	1.00	0.90
10:23:39	631	33.7	112	501	0	23.0	227	226	0	0	0.0	554	1.00	0.90
10:23:57	641	33.5	112	500	0	22.6	227	226	0	0	0.0	555	1.00	0.90
10:24:15	651	33.6	112	499	0	23.0	226	226	0	0	0.0	556	1.00	0.90
10:24:33	661	33.7	112	500	0	23.1	226	226	0	0	0.0	554	1.00	0.90
10:24:51	671	33.5	112	499	0	23.8	229	227	0	0	0.0	557	1.00	0.90
10:25:09	681	33.5	112	499	0	23.8	224	225	0	0	0.0	554	1.00	0.90
10:25:26	691	33.6	112	500	0	23.2	228	225	0	0	0.0	554	1.00	0.90
10:25:44	701	33.5	112	499	0	23.8	227	226	0	0	0.0	556	1.00	0.90
10:26:02	711	33.5	112	498	0	24.0	227	226	0	0	0.0	554	1.00	0.90
10:26:20	721	33.5	112	499	0	24.1	226	226	0	0	0.0	557	1.00	0.90
10:26:38	731	33.5	112	500	0	24.4	227	225	0	0	0.0	555	1.00	0.90
10:26:56	741	33.5	112	505	0	24.8	226	226	0	0	0.0	554	1.01	0.91
10:27:14	751	33.5	112	501	0	24.5	226	226	0	0	0.0	557	1.00	0.90
10:27:32	761	33.5	112	500	0	25.0	226	225	0	0	0.0	553	1.00	0.90
10:27:50	771	33.5	112	500	0	24.9	222	225	0	0	0.0	555	1.00	0.90
10:28:08	781	33.5	112	501	0	25.6	222	225	0	0	0.0	554	1.00	0.90
10:28:26	791	33.4	112	502	0	25.4	226	225	0	0	0.0	553	1.00	0.91
10:28:44	801	33.4	112	501	0	25.9	227	226	0	0	0.0	556	1.00	0.90
10:29:01	811	33.5	112	502	0	25.5	224	225	0	0	0.0	554	1.00	0.91
10:29:37	831	33.5	112	500	0	26.1	224	226	0	0	0.0	554	1.00	0.90

ALLSEAS PILE DRIVING RECORD MHU 500 T MONITORING-SYSTEM PAGE 04 07-12-2000

From File MANSON3D

Time hh:mm:ss	Blow No	Blow 1/min	St-roke cm	Ene-rgy kNm	Oil-flow l/min	Oil-temp. C	Oilpres. PP bar	Hammer bar	Dif1 mbar	Dif2 mbar	Water Press. bar	Eph Usage kNm	k	Mech Eff
10:29:55	841	33.5	112	501	0	26.1	226	225	0	0	0.0	554	1.00	0.90
10:30:13	851	33.5	112	500	0	26.0	225	225	0	0	0.0	553	1.00	0.90
10:30:31	861	33.4	112	500	0	26.4	224	225	0	0	0.0	554	1.00	0.90
10:30:49	871	33.5	112	502	0	26.3	227	226	0	0	0.0	554	1.00	0.91
10:31:07	881	33.4	112	502	0	26.2	225	225	0	0	0.0	554	1.00	0.91
10:31:25	891	33.5	112	502	0	26.5	224	226	0	0	0.0	555	1.00	0.91

10:31:29 STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED

10:32:23 C1 HAS REPORTED HAMMER NOT ON PILE

10:59:18 START HAMMER OPERATION IN SINGLE BLOW MODE

10:59:47 START HAMMER OPERATION IN STROKE SEQUENCE MODE

11:00:09	904	30.8	114	510	0	31.7	219	225	0	0	0.0	561	1.02	0.91
11:00:28	914	32.8	112	505	0	31.5	220	228	0	0	0.0	557	1.01	0.91
11:00:46	924	32.9	112	502	0	31.8	222	227	0	0	0.0	556	1.00	0.90
11:01:04	934	32.9	112	500	0	31.7	220	228	0	0	0.0	554	1.00	0.90

11:01:19 CH1 SENSOR WAS DETECTED AS DEFECT BUT IS STILL FUNCTIONING

11:01:22	944	32.8	112	502	0	31.4	223	226	0	0	0.0	557	1.00	0.90
11:01:41	954	32.9	112	511	0	31.3	221	227	0	0	0.0	554	1.02	0.92
11:01:59	964	32.9	112	503	0	31.9	224	227	0	0	0.0	555	1.01	0.91
11:02:17	974	32.9	112	501	0	31.6	223	228	0	0	0.0	556	1.00	0.90
11:02:35	984	32.9	112	500	0	31.4	223	228	0	0	0.0	556	1.00	0.90
11:02:54	994	32.9	112	506	0	31.0	225	227	0	0	0.0	556	1.01	0.91
11:03:12	1004	32.9	112	503	0	30.9	224	227	0	0	0.0	556	1.01	0.90
11:03:30	1014	32.9	112	500	0	31.1	223	227	0	0	0.0	556	1.00	0.90
11:03:48	1024	32.9	112	501	0	30.7	223	227	0	0	0.0	555	1.00	0.90
11:04:07	1034	32.9	112	501	0	30.7	222	226	0	0	0.0	554	1.00	0.90
11:04:25	1044	32.9	112	501	0	30.9	225	227	0	0	0.0	556	1.00	0.90
11:04:43	1054	32.9	112	502	0	30.7	221	227	0	0	0.0	555	1.00	0.90
11:05:01	1064	32.9	112	503	0	30.8	223	226	0	0	0.0	554	1.01	0.91
11:05:20	1074	32.8	112	501	0	30.9	222	227	0	0	0.0	556	1.00	0.90
11:05:38	1084	32.9	112	502	0	30.8	221	228	0	0	0.0	557	1.00	0.90
11:05:56	1094	32.9	112	501	0	30.8	224	227	0	0	0.0	554	1.00	0.91
11:06:14	1104	32.9	112	501	0	30.8	221	227	0	0	0.0	556	1.00	0.90
11:06:33	1114	32.8	112	503	0	30.6	222	227	0	0	0.0	556	1.01	0.90
11:06:51	1124	32.9	112	500	0	30.9	224	227	0	0	0.0	555	1.00	0.90
11:07:09	1134	32.8	112	502	0	30.8	220	227	0	0	0.0	556	1.00	0.90
11:07:27	1144	32.8	112	502	0	30.5	220	227	0	0	0.0	556	1.00	0.90
11:07:46	1154	32.8	112	501	0	31.0	222	228	0	0	0.0	556	1.00	0.90
11:08:04	1164	32.8	112	501	0	30.9	219	226	0	0	0.0	555	1.00	0.90
11:08:22	1174	32.8	112	502	0	30.9	221	226	0	0	0.0	556	1.00	0.90
11:08:41	1184	32.8	112	502	0	30.7	223	226	0	0	0.0	554	1.00	0.91
11:08:59	1194	32.8	112	501	0	31.1	223	227	0	0	0.0	555	1.00	0.90
11:09:17	1204	32.8	112	503	0	31.0	223	227	0	0	0.0	554	1.01	0.91

ALLSEAS PILE DRIVING RECORD MHU 500 T MONITORING-SYSTEM PAGE 05 07-12-2000

From File MANSON3D

Time hh:mm:ss	Blow No	Blow 1/min	St-roke cm	Ene-rgy kNm	Oil-flow l/min	Oil-temp. C	Oilpres. PP bar	Hammer bar	Dif1 mbar	Dif2 mbar	Water Press. bar	Eph Usage kNm	k	Mech Eff
11:09:35	1214	32.8	112	507	0	31.1	223	226	0	0	0.0	556	1.01	0.91
11:09:54	1224	32.8	112	504	0	31.3	221	224	0	0	0.0	553	1.01	0.91
11:10:12	1234	32.8	112	501	0	31.2	220	226	0	0	0.0	553	1.00	0.91
11:10:30	1244	32.8	112	502	0	31.2	220	225	0	0	0.0	555	1.00	0.90
11:10:49	1254	32.8	112	501	0	31.3	223	225	0	0	0.0	555	1.00	0.90
11:11:07	1264	32.8	112	501	0	31.1	224	226	0	0	0.0	553	1.00	0.91
11:11:25	1274	32.8	112	499	0	31.2	222	226	0	0	0.0	554	1.00	0.90
11:11:43	1284	32.8	112	500	0	31.3	223	225	0	0	0.0	553	1.00	0.90
11:12:02	1294	32.8	112	500	0	31.0	222	225	0	0	0.0	554	1.00	0.90
11:12:20	1304	32.8	112	500	0	31.2	222	226	0	0	0.0	555	1.00	0.90
11:12:38	1314	32.7	112	501	0	31.4	220	224	0	0	0.0	554	1.00	0.90
11:12:57	1324	32.8	112	503	0	31.2	222	226	0	0	0.0	555	1.01	0.91
11:13:15	1334	32.8	112	501	0	31.4	220	225	0	0	0.0	554	1.00	0.91
11:13:33	1344	32.7	112	503	0	31.3	221	224	0	0	0.0	553	1.01	0.91
11:13:52	1354	32.8	112	500	0	31.7	222	225	0	0	0.0	553	1.00	0.90
11:14:10	1364	32.8	112	499	0	31.8	223	225	0	0	0.0	555	1.00	0.90
11:14:28	1374	32.8	112	503	0	31.6	220	225	0	0	0.0	552	1.01	0.91
11:14:47	1384	32.7	112	501	0	31.9	223	224	0	0	0.0	553	1.00	0.91
11:15:05	1394	32.7	112	500	0	31.8	219	225	0	0	0.0	554	1.00	0.90
11:15:23	1404	32.8	112	503	0	31.5	222	224	0	0	0.0	552	1.01	0.91
11:15:42	1414	32.7	112	500	0	32.1	221	224	0	0	0.0	552	1.00	0.90
11:16:00	1424	32.7	112	500	0	31.7	222	225	0	0	0.0	554	1.00	0.90
11:16:18	1434	32.7	112	502	0	31.7	223	224	0	0	0.0	553	1.00	0.91
11:16:37	1444	32.7	112	501	0	31.8	221	224	0	0	0.0	554	1.00	0.90
11:16:55	1454	32.7	112	501	0	32.0	222	224	0	0	0.0	554	1.00	0.91
11:17:13	1464	32.7	112	501	0	32.0	222	224	0	0	0.0	554	1.00	0.91
11:17:32	1474	32.7	112	498	0	32.0	220	224	0	0	0.0	552	1.00	0.90
11:17:50	1484	32.7	112	501	0	31.8	221	224	0	0	0.0	553	1.00	0.91
11:18:08	1494	32.7	112	502	0	32.2	221	225	0	0	0.0	553	1.00	0.91
11:18:27	1504	32.7	112	500	0	32.2	222	225	0	0	0.0	553	1.00	0.90
11:18:45	1514	32.7	112	500	0	32.1	221	226	0	0	0.0	553	1.00	0.90
11:19:03	1524	32.7	112	500	0	32.3	222	225	0	0	0.0	554	1.00	0.90
11:19:22	1534	32.7	112	503	0	31.8	221	225	0	0	0.0	555	1.01	0.91
11:19:40	1544	32.6	112	507	0	32.0	221	225	0	0	0.0	551	1.01	0.92
11:19:59	1554	32.6	112	501	0	32.6	221	225	0	0	0.0	554	1.00	0.91
11:20:17	1564	32.6	112	501	0	32.3	221	225	0	0	0.0	554	1.00	0.90
11:20:35	1574	32.6	112	504	0	32.6	221	225	0	0	0.0	553	1.01	0.91
11:20:54	1584	32.6	112	505	0	32.4	221	224	0	0	0.0	551	1.01	0.92
11:21:12	1594	32.7	112	503	0	32.5	219	224	0	0	0.0	552	1.01	0.91
11:21:31	1604	32.6	112	502	0	32.5	220	224	0	0	0.0	554	1.00	0.91
11:21:49	1614	32.6	112	499	0	32.3	221	225	0	0	0.0	555	1.00	0.90
11:22:07	1624	32.6	112	501	0	32.6	222	225	0	0	0.0	553	1.00	0.91
11:22:26	1634	32.7	112	500	0	32.5	221	223	0	0	0.0	551	1.00	0.91
11:22:44	1644	32.6	112	498	0	32.7	219	224	0	0	0.0	552	1.00	0.90
11:23:03	1654	32.6	112	502	0	32.8	220	224	0	0	0.0	553	1.00	0.91
11:23:21	1664	32.6	112	504	0	32.6	219	223	0	0	0.0	550	1.01	0.92
11:23:39	1674	32.6	112	500	0	32.8	217	223	0	0	0.0	552	1.00	0.91
11:23:58	1684	32.6	112	500	0	32.9	218	222	0	0	0.0	550	1.00	0.91

ALLSEAS PILE DRIVING RECORD MHU 500 T MONITORING-SYSTEM PAGE 06 07-12-2000

From File MANSON3D

Time hh:mm:ss	Blow No	Blow 1/min	St-roke cm	Ene-rgy kNm	Oil-flow l/min	Oil-temp. C	Oilpres. PP bar	Hammer bar	Dif1 mbar	Dif2 mbar	Water Press. bar	Eph Usage kNm	k	Mech Eff
11:24:16	1694	32.6	112	506	0	33.0	219	223	0	0	0.0	551	1.01	0.92
11:24:19	IGNORE SENSOR CH1 DEFECT													
11:24:35	1704	32.6	112	502	0	32.9	220	224	0	0	0.0	551	1.00	0.91
11:24:53	1714	32.6	112	502	0	33.1	219	223	0	0	0.0	550	1.00	0.91
11:25:11	1724	32.6	112	502	0	33.1	217	223	0	0	0.0	552	1.00	0.91
11:25:30	1734	32.6	112	500	0	33.2	220	224	0	0	0.0	551	1.00	0.91
11:25:48	1744	32.6	112	500	0	33.1	221	224	0	0	0.0	553	1.00	0.90
11:26:07	1754	32.5	112	501	0	33.0	221	224	0	0	0.0	552	1.00	0.91
11:26:25	1764	32.6	112	500	0	33.3	218	224	0	0	0.0	554	1.00	0.90
11:26:44	1774	32.6	112	499	0	33.2	221	223	0	0	0.0	551	1.00	0.91
11:27:02	1784	32.6	112	500	0	33.0	217	224	0	0	0.0	553	1.00	0.90
11:27:20	1794	32.6	112	500	0	33.0	220	223	0	0	0.0	551	1.00	0.91
11:27:39	1804	32.6	112	500	0	33.0	222	224	0	0	0.0	553	1.00	0.90
11:27:57	1814	32.6	112	501	0	33.0	220	223	0	0	0.0	552	1.00	0.91
11:28:16	1824	32.5	112	503	0	33.2	220	224	0	0	0.0	552	1.01	0.91
11:28:34	1834	32.6	112	500	0	33.4	220	224	0	0	0.0	551	1.00	0.91
11:28:53	1844	32.6	112	500	0	33.2	218	224	0	0	0.0	553	1.00	0.90
11:29:11	1854	32.6	112	499	0	33.5	220	223	0	0	0.0	552	1.00	0.91
11:29:29	1864	32.6	112	498	0	33.0	223	223	0	0	0.0	551	1.00	0.90
11:29:48	1874	32.5	112	499	0	33.4	219	224	0	0	0.0	552	1.00	0.90
11:30:06	1884	32.5	112	499	0	33.5	221	223	0	0	0.0	553	1.00	0.90
11:30:25	1894	32.6	112	499	0	33.1	221	223	0	0	0.0	551	1.00	0.91
11:30:43	1904	32.5	112	500	0	33.6	220	223	0	0	0.0	551	1.00	0.91
11:31:02	1914	32.5	112	500	0	33.5	221	224	0	0	0.0	552	1.00	0.90
11:31:20	1924	32.5	112	500	0	33.5	220	223	0	0	0.0	552	1.00	0.91
11:31:38	1934	32.6	112	499	0	33.6	216	223	0	0	0.0	552	1.00	0.90
11:31:57	1944	32.6	112	500	0	33.5	219	223	0	0	0.0	552	1.00	0.91
11:32:15	1954	32.5	112	503	0	33.8	221	224	0	0	0.0	553	1.01	0.91
11:32:34	1964	32.6	112	501	0	33.4	219	224	0	0	0.0	553	1.00	0.91
11:32:52	1974	32.5	112	500	0	33.6	220	223	0	0	0.0	551	1.00	0.91
11:33:11	1984	32.6	112	500	0	33.7	219	223	0	0	0.0	553	1.00	0.91
11:33:29	1994	32.5	112	501	0	33.6	219	223	0	0	0.0	553	1.00	0.91
11:33:48	2004	32.5	112	499	0	34.0	219	224	0	0	0.0	553	1.00	0.90
11:34:06	2014	32.6	112	498	0	33.8	219	223	0	0	0.0	553	1.00	0.90
11:34:24	2024	32.5	112	498	0	33.7	220	224	0	0	0.0	554	1.00	0.90
11:34:43	2034	32.5	112	501	0	33.8	222	223	0	0	0.0	551	1.00	0.91
11:35:01	2044	32.6	112	501	0	33.7	221	223	0	0	0.0	550	1.00	0.91
11:35:03	STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED													
11:51:00	START HAMMER OPERATION IN STROKE SEQUENCE MODE													
11:51:38	2055	25.1	120	517	0	34.5	202	211	0	0	0.0	571	1.03	0.90
11:51:58	2065	32.4	112	503	0	34.6	221	226	0	0	0.0	555	1.01	0.91
11:52:16	2075	33.0	112	504	0	34.6	225	226	0	0	0.0	556	1.01	0.91

ALLSEAS PILE DRIVING RECORD MHU 500 T MONITORING-SYSTEM PAGE 07 07-12-2000

From File MANSON3D

Time hh:mm:ss	Blow No	Blow 1/min	St-roke cm	Ene-rgy kNm	Oil-flow l/min	Oil-temp. C	Oilpres. PP bar	Hammer bar	Dif1 mbar	Dif2 mbar	Water Press. bar	Eph Usage kNm	k	Mech Eff
11:52:34	2085	33.0	112	509	0	34.6	223	225	0	0	0.0	554	1.02	0.92
11:52:52	2095	33.0	112	505	0	34.5	222	226	0	0	0.0	556	1.01	0.91
11:53:10	2105	33.0	112	503	0	34.8	226	226	0	0	0.0	556	1.01	0.90
11:53:29	2115	33.1	112	502	0	34.6	221	227	0	0	0.0	557	1.00	0.90
11:53:47	2125	33.1	112	502	0	34.4	222	226	0	0	0.0	555	1.00	0.90
11:54:05	2135	33.1	112	502	0	34.3	220	226	0	0	0.0	556	1.00	0.90
11:54:23	2145	33.1	112	502	0	34.1	224	226	0	0	0.0	557	1.00	0.90
11:54:41	2155	33.1	112	501	0	34.0	223	227	0	0	0.0	556	1.00	0.90
11:54:59	2165	33.1	112	501	0	34.0	224	226	0	0	0.0	555	1.00	0.90
11:55:17	2175	33.1	112	503	0	34.1	223	226	0	0	0.0	553	1.01	0.91
11:55:35	2185	33.1	112	501	0	34.1	223	226	0	0	0.0	554	1.00	0.90
11:55:54	2195	33.1	112	498	0	34.2	223	227	0	0	0.0	555	1.00	0.90
11:56:12	2205	33.1	112	498	0	34.2	223	226	0	0	0.0	555	1.00	0.90
11:56:30	2215	33.1	112	502	0	33.9	224	226	0	0	0.0	555	1.00	0.90
11:56:48	2225	33.1	112	502	0	33.9	220	226	0	0	0.0	556	1.00	0.90
11:57:06	2235	33.1	112	502	0	34.0	223	226	0	0	0.0	553	1.00	0.91
11:57:24	2245	33.1	112	501	0	34.2	223	227	0	0	0.0	555	1.00	0.90
11:57:42	2255	33.2	112	503	0	33.9	220	226	0	0	0.0	554	1.01	0.91
11:58:00	2265	33.2	112	502	0	34.0	223	225	0	0	0.0	555	1.00	0.90
11:58:18	2275	33.1	112	501	0	33.9	221	226	0	0	0.0	553	1.00	0.91
11:58:37	2285	33.1	112	501	0	33.9	223	227	0	0	0.0	557	1.00	0.90
11:58:55	2295	33.2	112	501	0	34.1	223	227	0	0	0.0	554	1.00	0.90
11:59:13	2305	33.2	112	499	0	34.3	223	227	0	0	0.0	556	1.00	0.90
11:59:31	2315	33.1	112	502	0	34.2	224	227	0	0	0.0	558	1.00	0.90
11:59:49	2325	33.1	112	501	0	34.5	223	227	0	0	0.0	556	1.00	0.90

12:00:03 STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED

12:02:18 MH_11 SENSOR WAS DETECTED AS DEFECT BUT IS STILL FUNCTIONING

12:02:18 INCREMENTAL COUNT ERROR

12:02:18 INCREMENTAL COUNT ERROR

12:02:19 MH_22 SENSOR WAS DETECTED AS DEFECT BUT IS STILL FUNCTIONING

12:02:19 MH_21 SENSOR WAS DETECTED AS DEFECT BUT IS STILL FUNCTIONING

12:02:20 INCREMENTAL COUNT ERROR

12:02:20 INCREMENTAL COUNT ERROR

12:02:20 MH_12 SENSOR WAS DETECTED AS DEFECT BUT IS STILL FUNCTIONING

12:02:21 INCREMENTAL COUNT ERROR

12:02:21 INCREMENTAL COUNT ERROR

ALLSEAS PILE DRIVING RECORD MHU 500 T MONITORING-SYSTEM PAGE 08 07-12-2000

From File MANSON3D Time hh:mm:ss	Blow No	St- Blow 1/min	Ene- roke cm	Ene- rgy kNm	Oil- flow l/min	Oil- temp. C	Oilpres. PP bar	Dif1 Hammer bar	Dif2 bar	Water mbar	Eph mbar	k bar	Mech Press. kNm	Usage	Eff
12:02:23	I lost the electric connection to the ultrasonic sensor														
12:02:24	IGNORE SENSOR MH_11 DEFECT														
12:02:24	IGNORE SENSOR MH_12 DEFECT														
12:02:24	I MUST STOP WY TO MANY STROKE SENSOR'S DEFECT														
12:02:25	IGNORE SENSOR MH_21 DEFECT														
12:02:25	I MUST STOP WY TO MANY STROKE SENSOR'S DEFECT														

PILE 3, SECTION D

PILE 3, SECTION D

ALLSEAS PILE DRIVING RECORD FROM MENCK MONITORING-SYSTEM PAGE 01 11-12-2000

JOB INFORMATION

PILE CODE ..... : 3D
FILE NAME ..... : MANSON3C
CLIENT ..... : CAL.TRANS
PROJECT ..... : BAY BRIDGE TEST
PLATFORM ..... :
SHIPS NAME ..... : DB 24
JOB NO ..... : 40-00-044
CONTRACT NR ..... :

HAMMER INFORMATION

HAMMER TYPE ..... : MHU 1700 i
SERIAL NO ..... : 62443
POWERPACK ..... : 2 X FISCHCON 1600 l
CONFIGURATION ..... : FREE RIDING....._
CONTROL UNIT NO ..... : _....._
BLOW COUNTER ON PANEL ..... : 0....._

PARAMETER INFORMATION

PRINTER LOGGING DISTANCE ..... : 0.25....._
LOWER REVERSAL TIME VARIABLE 0-400ms : relative stair

UPPER REVERSAL AUTOMATICALLY
DIFF PRESS SENSORS
START POINT AT .....mbar : _....._
STOP POINT AT .....mbar : _....._

PILE INFORMATION

OUTSIDE DIAMETER ....." : 96
WALL THICKNESS ....." : 2.3/4
LENGTH .....feet : 85 PER PILE
SELF PENETR. PILE .....feet : 7.50 METER
SELF PENETR.W.HAMMER ....feet : 68.25 METER

REMARK : Eph := ENERGY FROM HYDRAULIC AND FREE FALL
Eff := IMPACT ENERGY / Eph
k := IMPACT ENERGY / DESIGN ENERGY

NTSv421 OLDv234 HUBv222 PICv105 TXTv517 GPAv205 GMHv006 USSv000

ALLSEAS PILE DRIVING RECORD MHU 1700i MONITORING-SYSTEM PAGE 02 11-12-2000

From File MANSON3C

Time hh:mm:ss	Blow No	Blow 1/min	St-roke cm	Ene-rgy kNm	Oil-flow l/min	Oil-temp. C	Oilpres. PP bar	Dif1 Hammer bar	Dif2 mbar	Water mbar	Press. bar	Eph kNm	k Usage	Mech Eff
12:14:09	DATAOUTPUT ON THE FUGRO-PORT TERMINATE													
12:15:45	START HAMMER OPERATION IN SINGLE BLOW MODE													
12:16:09	START HAMMER OPERATION IN SINGLE BLOW MODE													
12:16:16	START HAMMER OPERATION IN SINGLE BLOW MODE													
12:16:23	STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED													
12:22:32	START HAMMER OPERATION IN STROKE SEQUENCE MODE													
12:23:17	13	27.8	44	825	0	23.1	215	0	0	0	0.0	871	0.49	0.95
12:23:37	23	30.7	44	816	0	23.4	215	0	0	0	0.0	871	0.48	0.94
12:23:57	33	30.5	44	809	0	23.7	213	0	0	0	0.0	866	0.48	0.93
12:24:16	43	30.7	44	805	0	24.2	212	0	0	0	0.0	864	0.47	0.93
12:24:36	53	30.1	44	807	0	24.6	211	0	0	0	0.0	862	0.47	0.94
12:24:56	63	30.4	44	799	0	24.8	211	0	0	0	0.0	861	0.47	0.93
12:25:16	73	30.3	44	798	0	25.2	210	0	0	0	0.0	861	0.47	0.93
12:25:36	83	30.2	44	798	0	24.7	211	0	0	0	0.0	863	0.47	0.93
12:25:56	93	30.0	44	797	0	25.0	212	0	0	0	0.0	865	0.47	0.92
12:26:16	103	27.8	48	889	0	24.9	212	0	0	0	0.0	944	0.52	0.94
12:26:30	STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED													
12:44:37	START HAMMER OPERATION IN STROKE SEQUENCE MODE													
12:45:23	119	25.0	44	833	0	25.6	208	0	0	0	0.0	855	0.49	0.97
12:45:45	129	28.2	44	818	0	25.3	207	0	0	0	0.0	853	0.48	0.96
12:46:06	139	28.9	44	802	0	25.5	208	0	0	0	0.0	856	0.47	0.94
12:46:39	149	15.8	48	845	0	26.1	193	0	0	0	0.0	899	0.50	0.94
12:47:05	159	28.1	44	796	0	26.4	207	0	0	0	0.0	853	0.47	0.93
12:47:26	169	27.1	48	895	0	26.4	211	0	0	0	0.0	941	0.53	0.95
12:47:48	179	27.2	48	896	0	26.8	211	0	0	0	0.0	940	0.53	0.95
12:48:10	189	27.4	48	901	0	26.9	211	0	0	0	0.0	941	0.53	0.96
12:48:32	199	27.3	48	901	0	27.0	211	0	0	0	0.0	941	0.53	0.96
12:48:54	209	27.1	48	902	0	27.2	213	0	0	0	0.0	946	0.53	0.95
12:49:15	219	29.8	44	804	0	26.7	209	0	0	0	0.0	857	0.47	0.94
12:49:36	229	29.8	44	801	0	26.7	210	0	0	0	0.0	860	0.47	0.93
12:49:56	239	29.6	44	800	0	26.9	209	0	0	0	0.0	857	0.47	0.93
12:50:16	249	29.6	44	800	0	26.8	211	-0	0	0	0.0	861	0.47	0.93
12:50:37	259	29.3	44	796	0	26.7	208	0	0	0	0.0	856	0.47	0.93
12:50:57	269	29.9	44	800	0	26.9	208	0	0	0	0.0	857	0.47	0.93
12:51:17	279	29.2	44	806	0	26.8	210	0	0	0	0.0	861	0.47	0.94
12:51:38	289	29.4	44	802	0	27.1	2103395		0	0	0.0	861	0.47	0.93
12:51:59	299	29.0	44	805	0	26.8	209	-0	0	0	0.0	858	0.47	0.94
12:52:19	309	28.9	44	808	0	27.3	212	0	0	0	0.0	864	0.48	0.94

ALLSEAS PILE DRIVING RECORD MHU 1700i MONITORING-SYSTEM PAGE 03 11-12-2000

From File MANSON3C

Time hh:mm:ss	Blow No	Blow 1/min	St-roke cm	Ene-rgy kNm	Oil-flow l/min	Oil-temp. C	Oilpres. PP bar	Hammer bar	Dif1 mbar	Dif2 mbar	Water Press. bar	Eph Usage kNm	k	Mech Eff
12:52:40	319	28.6	44	811	0	27.5	211	0	0	0	0.0	863	0.48	0.94
12:53:01	329	29.2	44	811	0	27.5	209	0	0	0	0.0	858	0.48	0.95
12:53:21	339	29.2	44	805	0	27.8	212	0	0	0	0.0	864	0.47	0.93
12:53:42	349	28.6	44	812	0	27.9	212	0	0	0	0.0	864	0.48	0.94
12:54:02	359	28.5	44	810	0	27.8	212	0	0	0	0.0	865	0.48	0.94
12:54:23	369	29.1	44	809	0	28.0	211	0	0	0	0.0	863	0.48	0.94
12:54:44	379	28.7	44	811	0	28.1	213	0	0	0	0.0	867	0.48	0.94
12:55:05	389	28.7	44	817	0	28.1	211	0	0	0	0.0	861	0.48	0.95
12:55:25	399	28.8	44	820	0	28.2	210	0	0	0	0.0	861	0.48	0.95
12:55:46	409	29.1	44	814	0	28.3	212	6	0	0	0.0	864	0.48	0.94
12:56:07	419	29.0	44	813	0	28.3	212	0	0	0	0.0	863	0.48	0.94
12:56:28	429	29.3	44	807	0	28.5	211	0	0	0	0.0	863	0.47	0.94
12:56:48	439	28.5	44	813	0	28.4	209	620	0	0	0.0	859	0.48	0.95
12:57:09	449	29.4	44	806	0	28.5	210	0	0	0	0.0	861	0.47	0.94
12:57:30	459	28.6	44	810	0	28.8	210	0	0	0	0.0	861	0.48	0.94
12:57:51	469	28.8	44	808	0	28.6	210	0	0	0	0.0	860	0.48	0.94
12:58:11	479	28.7	44	803	0	29.0	211	0	0	0	0.0	861	0.47	0.93
12:58:32	489	29.0	44	802	0	29.3	211	0	0	0	0.0	863	0.47	0.93
12:58:53	499	28.5	44	802	0	29.4	211	0	0	0	0.0	862	0.47	0.93
12:59:14	509	28.8	44	798	0	29.6	212	0	0	0	0.0	864	0.47	0.92
12:59:34	519	29.0	44	796	0	29.4	211	0	0	0	0.0	861	0.47	0.92
12:59:55	529	28.4	44	796	0	29.4	212	6	0	0	0.0	864	0.47	0.92
13:00:16	539	28.5	44	798	0	29.4	2103395		0	0	0.0	861	0.47	0.93
13:00:37	549	28.9	44	802	0	29.4	212	0	0	0	0.0	863	0.47	0.93
13:00:58	559	28.3	44	801	0	30.0	213	0	0	0	0.0	866	0.47	0.93
13:01:20	569	28.3	44	799	0	29.7	210	0	0	0	0.0	859	0.47	0.93
13:01:41	579	28.3	44	798	0	29.8	211	0	0	0	0.0	863	0.47	0.93
13:02:02	589	28.6	44	801	0	29.9	212	0	0	0	0.0	864	0.47	0.93
13:02:23	599	28.3	44	797	0	30.1	211	0	0	0	0.0	862	0.47	0.92
13:02:44	609	28.1	44	797	0	30.0	211	0	0	0	0.0	863	0.47	0.92
13:03:08	619	25.7	50	899	0	29.9	211	0	0	0	0.0	979	0.53	0.92
13:03:31	629	25.4	50	895	0	30.4	213	0	0	0	0.0	985	0.53	0.91
13:03:55	639	25.4	50	889	0	30.1	212	0	0	0	0.0	982	0.52	0.91
13:04:18	649	25.6	50	898	0	30.5	211	0	0	0	0.0	979	0.53	0.92
13:04:42	659	25.5	50	908	0	30.9	213	0	0	0	0.0	985	0.53	0.92
13:05:04	669	27.9	44	807	0	30.8	211	0	0	0	0.0	861	0.47	0.94
13:05:26	679	28.3	44	796	0	30.7	210	0	0	0	0.0	860	0.47	0.93
13:05:49	689	25.4	50	900	0	30.8	212	0	0	0	0.0	982	0.53	0.92
13:06:13	699	25.4	50	897	0	30.9	212	0	0	0	0.0	982	0.53	0.91
13:06:36	709	27.7	44	804	0	31.1	212	6	0	0	0.0	864	0.47	0.93
13:06:57	719	27.8	44	808	0	31.3	211	0	0	0	0.0	861	0.48	0.94
13:07:18	729	28.0	44	804	0	31.3	210	0	0	0	0.0	860	0.47	0.93
13:07:40	739	28.3	44	809	0	31.2	210	0	0	0	0.0	860	0.48	0.94
13:08:01	749	27.9	44	811	0	31.3	210	0	0	0	0.0	860	0.48	0.94

13:08:02 CH1 SENSOR WAS DETECTED AS DEFECT BUT IS STILL FUNCTIONING

ALLSEAS PILE DRIVING RECORD MHU 1700i MONITORING-SYSTEM PAGE 04 11-12-2000

From File MANSON3C

Time hh:mm:ss	Blow No	Blow 1/min	St-roke cm	Ene-rgy kNm	Oil-flow l/min	Oil-temp. C	Oilpres. PP bar	Hammer bar	Dif1 mbar	Dif2 mbar	Water Press. bar	Eph Usage kNm	k	Mech Eff
13:08:22	759	29.1	44	810	0	31.1	211	0	0	0	0.0	863	0.48	0.94
13:08:43	769	29.1	44	805	0	32.0	212	0	0	0	0.0	864	0.47	0.93
13:09:04	779	28.8	44	804	0	31.6	210	0	0	0	0.0	861	0.47	0.93
13:09:15	STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED													
13:10:47	START HAMMER OPERATION IN STROKE SEQUENCE MODE													
13:11:44	794	26.7	48	915	0	32.0	214	-0	0	0	0.0	946	0.54	0.97
13:12:04	804	29.5	44	812	0	31.7	211	0	0	0	0.0	862	0.48	0.94
13:12:25	814	28.0	44	812	0	32.2	211	0	0	0	0.0	861	0.48	0.94
13:12:46	824	29.1	44	809	0	32.2	211	0	0	0	0.0	862	0.48	0.94
13:13:07	834	28.5	44	808	0	32.5	211	0	0	0	0.0	861	0.48	0.94
13:13:28	844	28.3	44	809	0	32.4	211	0	0	0	0.0	863	0.48	0.94
13:13:49	854	28.2	44	805	0	32.6	211	0	0	0	0.0	862	0.47	0.93
13:14:10	864	28.6	44	806	0	32.3	209	0	0	0	0.0	858	0.47	0.94
13:14:31	874	28.8	44	808	0	32.4	210	0	0	0	0.0	860	0.48	0.94
13:14:52	884	28.4	44	808	0	32.2	210	0	0	0	0.0	860	0.48	0.94
13:15:05	STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED													
13:16:26	C1 HAS REPORTED HAMMER NOT ON PILE													
13:56:11	START HAMMER OPERATION IN STROKE SEQUENCE MODE													
13:56:42	STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED													
14:03:51	START HAMMER OPERATION IN STROKE SEQUENCE MODE													
14:04:31	903	30.7	48	888	0	33.1	212	0	0	0	0.0	943	0.52	0.94
14:04:51	913	29.6	48	893	0	33.6	214	0	0	0	0.0	947	0.53	0.94
14:05:11	923	29.6	48	896	0	33.8	212	0	0	0	0.0	943	0.53	0.95
14:05:31	933	29.7	48	901	0	34.1	213	0	0	0	0.0	944	0.53	0.95
14:05:52	943	30.2	48	894	0	34.6	212	0	0	0	0.0	942	0.53	0.95
14:05:57	MAX PROCESSTIME FOR LOWERING HAS BEEN EXCEEDED,PLEASE CHECK SENSORS AND VALVE'S													
14:05:59	STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED													
14:10:10	START HAMMER OPERATION IN STROKE SEQUENCE MODE													
14:10:54	955	33.0	48	867	0	32.1	213	0	0	0	0.0	946	0.51	0.92
14:11:05	MAX PROCESSTIME FOR LOWERING HAS BEEN EXCEEDED,PLEASE CHECK SENSORS AND VALVE'S													

ALLSEAS PILE DRIVING RECORD MHU 1700i MONITORING-SYSTEM PAGE 05 11-12-2000

From File MANSON3C

Time hh:mm:ss	Blow No	St- roke 1/min	Ene- rgy cm	Oil- flow kNm	Oil- temp. l/min	Oilpres. PP C	Dif1 Hammer bar	Dif2 bar	Water mbar	Press. mbar	Eph bar	k Usage kNm	Mech Eff
14:11:11	STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED												
14:11:20	STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED												
14:11:21	STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED												
14:11:23	STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED												
14:12:41	START HAMMER OPERATION IN STROKE SEQUENCE MODE												
14:13:12	CH1 SENSOR WAS DETECTED AS DEFECT BUT IS STILL FUNCTIONING												
14:13:14	970	36.6	48	854	0	33.7	211	0	0	0	0.0	941	0.50 0.91
14:13:18	STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED												
14:13:51	START HAMMER OPERATION IN STROKE SEQUENCE MODE												
14:14:23	981	36.4	48	857	0	33.4	215	0	0	0	0.0	949	0.50 0.90
14:14:37	MAX PROCESSTIME FOR LOWERING HAS BEEN EXCEEDED,PLEASE CHECK SENSORS AND VALVE'S												
14:14:41	STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED												
14:14:51	START HAMMER OPERATION IN STROKE SEQUENCE MODE												
14:15:34	999	30.5	56	0	0	34.3	213	0	0	0	0.0	1102	0.00 0.00
14:15:43	MH_22 SENSOR WAS DETECTED AS DEFECT BUT IS STILL FUNCTIONING												
14:15:52	MAX PROCESSTIME FOR LOWERING HAS BEEN EXCEEDED,PLEASE CHECK SENSORS AND VALVE'S												
14:15:58	STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED												
14:18:32	START HAMMER OPERATION IN STROKE SEQUENCE MODE												
14:19:16	MAX PROCESSTIME FOR LOWERING HAS BEEN EXCEEDED,PLEASE CHECK SENSORS AND VALVE'S												
14:19:18	STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED												
14:19:20	START HAMMER OPERATION IN STROKE SEQUENCE MODE												
14:19:46	1028	23.5	66	0	0	34.4	220	0	0	0	0.0	1321	0.00 0.00
14:20:10	1038	25.8	66	0	0	34.3	223	0	0	0	0.0	1333	0.00 0.00
14:20:33	1048	26.7	66	0	0	34.6	225****	0	0	0	0.0	1337	0.00 0.00
14:20:55	1058	27.2	66	0	0	34.6	226	0	0	0	0.0	1341	0.00 0.00
14:21:17	1068	27.2	66	0	0	35.1	226	0	0	0	0.0	1342	0.00 0.00

ALLSEAS PILE DRIVING RECORD MHU 1700i MONITORING-SYSTEM PAGE 06 11-12-2000

From File MANSON3C

Time hh:mm:ss	Blow No	Blow 1/min	St-roke cm	Ene-rgy kNm	Oil-flow l/min	Oil-temp. C	Oilpres. bar	Dif1 bar	Dif2 mbar	Water mbar	Eph bar	k kNm	Mech Eff
14:21:32	MAX PROCESSTIME FOR LOWERING HAS BEEN EXCEEDED,PLEASE CHECK SENSORS AND VALVE'S												
14:21:34	STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED												
14:21:38	START HAMMER OPERATION IN STROKE SEQUENCE MODE												
14:21:47	MAX PROCESS TIME FOR LOWERING HAS BEEN EXCEEDED,PLEASE CHECK SENSORS AND VALVE'S												
14:21:48	STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED												
14:21:50	START HAMMER OPERATION IN STROKE SEQUENCE MODE												
14:22:10	1088	25.6	74	1388	0	34.9	226	0	0	0	0.0	1504	0.82 0.92
14:22:34	1098	25.6	74	1374	0	35.0	227	0	0	0	0.0	1509	0.81 0.91
14:22:57	1108	25.6	74	1388	0	35.0	227	0	0	0	0.0	1507	0.82 0.92
14:23:21	1118	25.5	74	1380	0	35.4	226	0	0	0	0.0	1506	0.81 0.92
14:23:44	1128	25.6	74	1384	0	35.5	225	0	0	0	0.0	1502	0.81 0.92
14:24:08	1138	25.5	74	1387	0	35.7	227	0	0	0	0.0	1508	0.82 0.92
14:24:31	1148	25.5	74	1394	0	35.6	225	0	0	0	0.0	1502	0.82 0.93
14:24:55	1158	25.5	74	1380	0	35.8	227	0	0	0	0.0	1509	0.81 0.91
14:25:18	1168	25.5	74	1380	0	35.9	225	0	0	0	0.0	1500	0.81 0.92
14:25:43	1179	28.2	74	0	0	35.9	227	0	0	0	0.0	1509	0.00 0.00
14:26:05	1189	28.2	74	0	0	36.0	226	0	0	0	0.0	1504	0.00 0.00
14:26:11	MAX PROCESSTIME FOR LOWERING HAS BEEN EXCEEDED,PLEASE CHECK SENSORS AND VALVE'S												
14:26:13	STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED												
14:27:03	START HAMMER OPERATION IN STROKE SEQUENCE MODE												
14:27:33	1201	26.5	74	1392	0	36.2	227	0	0	0	0.0	1507	0.82 0.92
14:27:56	1211	26.1	74	1397	0	35.8	226	0	0	0	0.0	1504	0.82 0.93
14:28:19	1221	25.9	74	1401	0	36.0	226****	0	0	0	0.0	1506	0.82 0.93
14:28:42	1231	26.0	74	1405	0	36.3	226	0	0	0	0.0	1504	0.83 0.93
14:29:05	1241	26.0	74	1401	0	36.4	227	0	0	0	0.0	1509	0.82 0.93
14:29:28	1251	25.9	74	1398	0	36.5	226	0	0	0	0.0	1504	0.82 0.93
14:29:51	1261	26.0	74	1398	0	36.8	226	0	0	0	0.0	1504	0.82 0.93
14:30:15	1271	25.9	74	1400	0	36.6	227	0	0	0	0.0	1506	0.82 0.93
14:30:38	1281	25.9	74	1399	0	36.8	225	0	0	0	0.0	1501	0.82 0.93
14:31:01	1291	25.9	74	1395	0	36.9	225	0	0	0	0.0	1501	0.82 0.93
14:31:24	1301	25.8	74	1390	0	36.9	225****	0	0	0	0.0	1502	0.82 0.93
14:31:47	1311	25.9	74	1387	0	36.8	227	0	0	0	0.0	1507	0.82 0.92
14:32:11	1321	25.8	74	1387	0	37.0	226	0	0	0	0.0	1504	0.82 0.92
14:32:34	1331	25.8	74	1394	0	37.2	225	0	0	0	0.0	1502	0.82 0.93

ALLSEAS PILE DRIVING RECORD MHU 1700i MONITORING-SYSTEM PAGE 07 11-12-2000

From File MANSON3C

Time hh:mm:ss	Blow No	Blow 1/min	St-roke cm	Ene-rgy kNm	Oil-flow l/min	Oil-temp. C	Oilpres. PP bar	Hammer bar	Dif1 mbar	Dif2 mbar	Water Press. bar	Eph Usage kNm	k	Mech Eff
14:32:57	1341	25.8	74	1387	0	37.1	225	0	0	0	0.0	1500	0.82	0.92
14:33:20	1351	25.7	74	1391	0	37.1	224	0	0	0	0.0	1499	0.82	0.93
14:33:44	1361	25.7	74	1382	0	37.4	225	0	0	0	0.0	1500	0.81	0.92
14:34:07	1371	25.8	74	1387	0	37.3	226	0	0	0	0.0	1504	0.82	0.92
14:34:30	1381	25.7	74	1387	0	37.3	225	0	0	0	0.0	1500	0.82	0.92
14:34:54	1391	25.7	74	1388	0	37.4	225	0	0	0	0.0	1499	0.82	0.93
14:35:17	1401	25.8	74	1387	0	37.5	224	0	0	0	0.0	1498	0.82	0.93
14:35:40	1411	25.7	74	1389	0	37.4	225	0	0	0	0.0	1500	0.82	0.93
14:36:04	1421	25.7	74	1388	0	37.3	224	0	0	0	0.0	1498	0.82	0.93
14:36:27	1431	25.5	74	1379	0	37.6	225	0	0	0	0.0	1502	0.81	0.92
14:36:51	1441	25.6	74	1383	0	37.7	225	0	0	0	0.0	1501	0.81	0.92
14:37:14	1451	25.6	74	1383	0	37.7	225	0	0	0	0.0	1501	0.81	0.92
14:37:37	1461	25.7	74	1392	0	37.7	224	0	0	0	0.0	1497	0.82	0.93
14:38:01	1471	25.6	74	1383	0	37.9	225	0	0	0	0.0	1500	0.81	0.92
14:38:24	1481	25.6	74	1386	0	37.9	224	6	0	0	0.0	1498	0.82	0.93
14:38:48	1491	25.6	74	1384	0	38.1	223	0	0	0	0.0	1494	0.81	0.93
14:39:11	1501	25.6	74	1392	0	38.3	224	****	0	0	0.0	1497	0.82	0.93
14:39:35	1511	25.5	74	1387	0	38.3	225	0	0	0	0.0	1502	0.82	0.92
14:39:58	1521	25.5	74	1393	0	38.4	224	0	0	0	0.0	1498	0.82	0.93
14:40:22	1531	25.5	74	1400	0	38.2	222	0	0	0	0.0	1492	0.82	0.94
14:40:45	1541	25.5	74	1385	0	38.4	224	0	0	0	0.0	1496	0.81	0.93
14:41:09	1551	25.5	74	1393	0	38.2	223	0	0	0	0.0	1494	0.82	0.93
14:41:32	1561	25.5	74	1398	0	38.7	224	0	0	0	0.0	1495	0.82	0.94
14:41:56	1571	25.5	74	1401	0	38.6	223	0	0	0	0.0	1494	0.82	0.94
14:42:19	1581	25.5	74	1394	0	38.6	225	0	0	0	0.0	1500	0.82	0.93
14:42:43	1591	25.5	74	1405	0	38.9	224	0	0	0	0.0	1498	0.83	0.94
14:43:06	1601	26.6	74	1418	0	39.1	227	0	0	0	0.0	1507	0.83	0.94
14:43:27	1611	29.9	66	1313	0	39.1	229	0	0	0	0.0	1353	0.77	0.97
14:43:47	1621	29.9	66	1318	0	38.8	228	0	0	0	0.0	1349	0.78	0.98
14:44:08	1631	28.2	66	1313	0	39.0	227	0	0	0	0.0	1345	0.77	0.98
14:44:30	1641	28.1	66	1310	0	39.1	226	0	0	0	0.0	1341	0.77	0.98
14:44:52	1651	25.9	74	1392	0	39.0	224	0	0	0	0.0	1498	0.82	0.93
14:45:16	1661	25.8	74	1392	0	39.3	224	0	0	0	0.0	1497	0.82	0.93
14:45:39	1671	25.8	74	1391	0	39.4	225	0	0	0	0.0	1499	0.82	0.93
14:46:02	1681	25.8	74	1394	0	39.1	223	0	0	0	0.0	1494	0.82	0.93
14:46:25	1691	25.8	74	1387	0	39.3	224	0	0	0	0.0	1496	0.82	0.93

14:46:33 STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED

15:09:12 START HAMMER OPERATION IN STROKE SEQUENCE MODE

15:10:02	1704	22.1	74	1383	0	39.5	216	0	0	0	0.0	1468	0.81	0.94
15:10:28	1714	21.6	82	1499	0	39.9	217	0	0	0	0.0	1630	0.88	0.92
15:10:53	1724	25.4	90	1662	0	39.8	234	0	0	0	0.0	1867	0.98	0.89
15:11:16	1734	25.8	90	1660	0	39.9	234	0	0	0	0.0	1864	0.98	0.89
15:11:40	1744	25.6	90	1672	0	40.3	235	0	0	0	0.0	1868	0.98	0.89
15:12:03	1754	25.6	90	1666	0	40.2	235	0	0	0	0.0	1868	0.98	0.89
15:12:26	1764	25.7	90	1666	0	39.8	234	0	0	0	0.0	1866	0.98	0.89
15:12:50	1774	25.7	90	1668	0	39.7	235	0	0	0	0.0	1869	0.98	0.89

ALLSEAS PILE DRIVING RECORD MHU 1700i MONITORING-SYSTEM PAGE 08 11-12-2000

From File MANSON3C

Time hh:mm:ss	Blow No	Blow 1/min	St-roke cm	Ene-rgy kNm	Oil-flow l/min	Oil-temp. C	Oilpres. PP bar	Hammer bar	Dif1 mbar	Dif2 mbar	Water Press. bar	Eph Usage kNm	k	Mech Eff
15:13:13	1784	25.6	90	1659	0	39.6	235	0	0	0	0.0	1867	0.98	0.89
15:13:37	1794	25.6	90	1669	0	39.1	234	0	0	0	0.0	1866	0.98	0.89
15:14:00	1804	25.6	90	1674	0	39.5	234	0	0	0	0.0	1864	0.98	0.90
15:14:24	1814	25.6	90	1668	0	39.5	234	0	0	0	0.0	1865	0.98	0.89
15:14:47	1824	25.5	90	1676	0	39.2	233	0	0	0	0.0	1859	0.99	0.90
15:15:10	1834	25.5	90	1666	0	39.3	234	0	0	0	0.0	1863	0.98	0.89
15:15:34	1844	25.5	90	1679	0	39.3	233	0	0	0	0.0	1862	0.99	0.90
15:15:58	1854	25.4	90	1672	0	39.6	232	0	0	0	0.0	1858	0.98	0.90
15:16:21	1864	25.5	90	1666	0	39.4	233	0	0	0	0.0	1862	0.98	0.89
15:16:45	1874	25.5	90	1676	0	39.4	232	0	0	0	0.0	1857	0.99	0.90
15:17:08	1884	25.5	90	1672	0	39.5	232	0	0	0	0.0	1857	0.98	0.90
15:17:32	1894	25.5	90	1673	0	39.8	233	0	0	0	0.0	1859	0.98	0.90
15:17:55	1904	25.4	90	1674	0	40.0	232	0	0	0	0.0	1858	0.98	0.90
15:18:19	1914	25.4	90	1675	0	39.8	233	0	0	0	0.0	1862	0.99	0.90
15:18:43	1924	25.4	90	1673	0	39.9	232	0	0	0	0.0	1857	0.98	0.90
15:19:06	1934	25.3	90	1672	0	39.8	232	0	0	0	0.0	1855	0.98	0.90
15:19:30	1944	25.3	90	1690	0	39.8	232	0	0	0	0.0	1856	0.99	0.91
15:19:54	1954	25.2	90	1673	0	40.0	233	0	0	0	0.0	1859	0.98	0.90
15:20:17	1964	25.2	90	1670	0	40.4	233	0	0	0	0.0	1859	0.98	0.90
15:20:41	1974	25.2	90	1679	0	40.2	234	0	0	0	0.0	1863	0.99	0.90
15:21:05	1984	25.2	90	1685	0	40.3	232	0	0	0	0.0	1856	0.99	0.91
15:21:29	1994	25.2	90	1686	0	40.6	232	0	0	0	0.0	1855	0.99	0.91
15:21:52	2004	25.2	90	1673	0	40.7	234	0	0	0	0.0	1864	0.98	0.90

15:21:56 STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED

15:22:37 START HAMMER OPERATION IN STROKE SEQUENCE MODE

15:23:07	2015	25.1	90	1676	0	40.9	234	0	0	0	0.0	1864	0.99	0.90
15:23:31	2025	25.1	90	1685	0	40.9	232	0	0	0	0.0	1858	0.99	0.91
15:23:55	2035	25.1	90	1684	0	40.7	232	****	0	0	0.0	1856	0.99	0.91
15:24:19	2045	25.1	90	1697	0	40.9	232	0	0	0	0.0	1858	1.00	0.91
15:24:43	2055	25.1	90	1689	0	41.0	233	0	0	0	0.0	1859	0.99	0.91
15:25:07	2065	25.1	90	1680	0	41.5	233	8	0	0	0.0	1862	0.99	0.90
15:25:31	2075	25.1	90	1684	0	41.6	232	0	0	0	0.0	1858	0.99	0.91
15:25:55	2085	25.1	90	1678	0	41.4	231	0	0	0	0.0	1852	0.99	0.91
15:26:19	2095	25.1	90	1683	0	41.6	232	0	0	0	0.0	1856	0.99	0.91
15:26:42	2105	25.1	90	1678	0	41.8	232	****	0	0	0.0	1858	0.99	0.90
15:27:06	2115	25.0	90	1681	0	41.7	232	0	0	0	0.0	1855	0.99	0.91
15:27:30	2125	25.1	90	1689	0	41.9	232	0	0	0	0.0	1855	0.99	0.91

15:27:52 STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED

15:28:15 STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED

15:28:17 STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED

15:28:18 STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED

ALLSEAS PILE DRIVING RECORD MHU 1700i MONITORING-SYSTEM PAGE 09 11-12-2000

From File MANSON3C Time hh:mm:ss	Blow No	St- Blow 1/min	Ene- roke cm	rgy kNm	Oil- flow l/min	Oil- temp. C	Oilpres. PP bar	Dif1 Hammer bar	Dif2 mbar	Water mbar	Eph Press. bar	k Usage kNm	Mech Eff

15:28:21 START HAMMER OPERATION IN STROKE SEQUENCE MODE

15:28:24 STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED

15:28:26 START ABORTED BECAUSE STOP-KEY HAS BEEN PUSHED

15:28:27 START ABORTED BECAUSE STOP-KEY HAS BEEN PUSHED

15:28:30 STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED

15:28:33 START HAMMER OPERATION IN STROKE SEQUENCE MODE

15:28:38 STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED

PILE 3, RESTRIKE NO. 1

PILE 3, RESTRIKE NO. 1

ALLSEAS PILE DRIVING RECORD FROM MENCK MONITORING-SYSTEM PAGE 01 13-12-2000

JOB INFORMATION

PILE CODE ..... : 3D
FILE NAME ..... : RMANSO3D
CLIENT ..... : CAL.TRANS
PROJECT ..... : BAY BRIDGE TEST
PLATFORM ..... :
SHIPS NAME ..... : DB 24
JOB NO ..... : 40-00-044
CONTRACT NR ..... :

HAMMER INFORMATION

HAMMER TYPE ..... : MHU 1700 i
SERIAL NO ..... : 62443
POWERPACK ..... : 2 X FISCHCON 1600 l
CONFIGURATION ..... : FREE RIDING....._
CONTROL UNIT NO ..... : _....._
BLOW COUNTER ON PANEL ..... : 0....._

PARAMETER INFORMATION

PRINTER LOGGING DISTANCE ..... : 0.25....._
LOWER REVERSAL TIME VARIABLE 0-400ms : relative stair

UPPER REVERSAL AUTOMATICALLY
DIFF PRESS SENSORS
START POINT AT .....mbar : _....._
STOP POINT AT .....mbar : _....._

PILE INFORMATION

OUTSIDE DIAMETER ....." : 96
WALL THICKNESS ....." : 2.3/4
LENGTH .....feet : 85 PER PILE
SELF PENETR. PILE .....feet : 7.50 METER
SELF PENETR.W.HAMMER ....feet : 94.50 METER

REMARK : Eph := ENERGY FROM HYDRAULIC AND FREE FALL
Eff := IMPACT ENERGY / Eph
k := IMPACT ENERGY / DESIGN ENERGY

NTSv421 OLDv234 HUBv222 PICv105 TXTv517 GPAv205 GMHv006 USSv000

ALLSEAS PILE DRIVING RECORD MHU 500 T MONITORING-SYSTEM PAGE 02 13-12-2000

From File RMANSO3D Time hh:mm:ss	Blow No	St- Blow 1/min	Ene- roke cm	Ene- rgy kNm	Oil- flow l/min	Oil- temp. C	Oilpres. PP bar	Dif1 Hammer bar	Dif2 bar	Water mbar	Eph mbar	k bar	Mech Press. kNm	Usage	Eff
10:36:09	DATAOUTPUT ON THE FUGRO-PORT TERMINATE														
10:36:09	CH1 SENSOR WAS DETECTED AS DEFECT BUT IS STILL FUNCTIONING														
10:36:09	CH2 SENSOR WAS DETECTED AS DEFECT BUT IS STILL FUNCTIONING														
10:36:09	STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED														
10:36:09	MH_12 SENSOR WAS DETECTED AS DEFECT BUT IS STILL FUNCTIONING														
10:36:11	IGNORE SENSOR CH1 DEFECT														
10:36:12	IGNORE SENSOR CH2 DEFECT														
10:36:12	IGNORE SENSOR MH_12 DEFECT														
10:40:25	START HAMMER OPERATION IN STROKE SEQUENCE MODE														
10:40:46		10	48.6	48	971	0	22.3	257	0	0	0	0.0	1049	0.57	0.93
10:41:00		20	36.0	68	1407	0	22.9	250	0	0	0	0.0	1462	0.83	0.96
10:41:20		30	29.1	84	1656	0	22.6	242	0	0	0	0.0	1774	0.97	0.93
10:41:40		40	28.9	84	1647	0	22.4	240	0	0	0	0.0	1765	0.97	0.93
10:42:01		50	28.6	84	1648	0	23.1	237	0	0	0	0.0	1753	0.97	0.94
10:42:22		60	28.6	84	1649	0	22.4	241	0	0	0	0.0	1768	0.97	0.93
10:42:25	STOP KEY IN OPERATOR CABIN HAS BEEN PUSHED														

APPENDIX F
LOG OF TEST BORINGS

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	Ala	80	0.0/0.5		

Anthony R. Dover 6/21/99
REGISTERED CIVIL ENGINEER

Joan F. Carpio 7/15/99
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
ANTHONY R. DOVER
No. 51445
Exp. 6/30/02
CIVIL
STATE OF CALIFORNIA

A JOINT VENTURE OF
FUGRO / EARTH MECHANICS
7700 EDGEWATER DRIVE, SUITE 848
OAKLAND, CALIFORNIA 94621

CH2M HILL
1111 BROADWAY, SUITE 1200
OAKLAND, CALIFORNIA 94607

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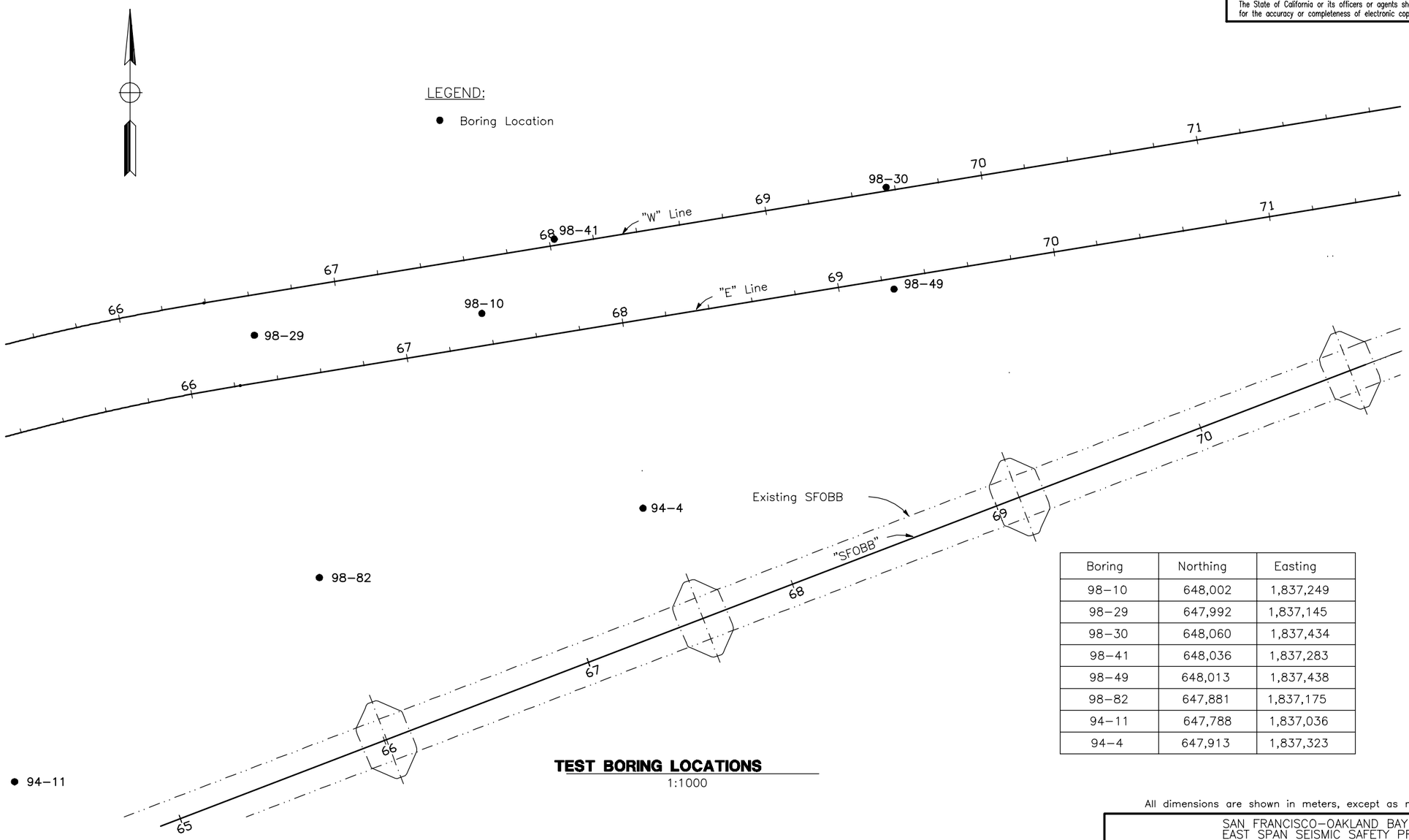


Boring	Northing	Easting
98–10	648,002	1,837,249
98–29	647,992	1,837,145
98–30	648,060	1,837,434
98–41	648,036	1,837,283
98–49	648,013	1,837,438
98–82	647,881	1,837,175
94–11	647,788	1,837,036
94–4	647,913	1,837,323

TEST BORING LOCATIONS
1:1000

All dimensions are shown in meters, except as noted.

SAN FRANCISCO–OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT

PILE INSTALLATIION DEMONSTRATION PROJECT

LOG OF TEST BORINGS 1 OF 7

JUAN F. CARPIO
CALTRANS DESIGN OVERSIGHT

DRAWN BY R. VILLEGAS II
CHECKED BY J. ALDRICH

J. CHACKO/M. ZUEGER
FIELD INVESTIGATOR
DATE 3/24/99

PREPARED FOR THE
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ANTHONY R. DOVER
PROJECT ENGINEER

BRIDGE NO. 33–25
POST km 0.0/0.5
POST MILE 0.0/0.3

CU 04251
EA 012081

FOR REDUCED PLANS
ORIGINAL SCALE IN MILLIMETERS
0 10 20 30 40 50

DISREGARD PRINTS BEARING
EARLIER REVISION DATES → 6/21/99

REVISION DATES (PRELIMINARY STAGE ONLY)

SHEET 4 OF 12

alltb01.dgn 06–JUL–1999

ZFA0:[24,1] STANDARD.2CL LOGSHT (REV. 5/90)

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	Ala	80	0.0/0.5		

GEOTECHNICAL PROFESSIONAL 06/24/99

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER T.W. McNeilan No. 0583 Exp. 12/31/00 Geotechnical STATE OF CALIFORNIA

FUGRO-EARTH MECHANICS,
A JOINT VENTURE,
7700, Edgewater Dr., Ste. 848,
Oakland, CA 94621
(510) 633-5100

The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

SOIL AND ROCK TYPES

Well graded GRAVEL (GW)
Poorly graded GRAVEL (GP)
GRAVEL with sand (GP or GW)
GRAVEL with clay (GP or GW)
Clayey GRAVEL (GC)
GRAVEL with silt (GP or GW)
Silty GRAVEL (GM)
Well graded SAND (SW)
Poorly graded SAND (SP)
SAND with gravel (SP or SW)
SAND with clay (SP-SC)
Clayey SAND (SC)
Silty SAND (SM)
SAND with silt (SP-SM)
Fat CLAY (CH)
Sandy fat CLAY (CH)
Lean CLAY (CL)
Sandy lean CLAY (CL)
Silty CLAY (CL-ML)
Elastic SILT (MH)
SILT (ML)
Sandy SILT (ML)
Clayey silt (ML/CL)
Highly plastic ORGANICS (OH)
Low plasticity ORGANICS (OL)
SANDSTONE (Rx)
SILTSTONE (Rx)
CLAYSTONE (Rx)
Interbedded Rock Strata (Rx)
CONGLOMERATE (Rx)

SAMPLERS

76mm-OD, 72mm-ID Thin Walled Tube
57mm-OD, 54mm-ID* Thin Walled Driven Tube
63.5mm-OD, 54mm-ID Offshore Liner
76mm-OD, 60mm-ID Modified California Liner
51mm-OD, 35mm-ID SPT Split Spoon Sampler
Rock Core (Inset symbol represents recovery (%)

* A variable-OD, 54-mm-ID tapered driven tube was used to sample coarse sand, gravel and rock

TUBE AND OFFSHORE LINER SAMPLERS

WOH	Offshore Liner sample advanced with the weight of an 80 kg hammer.
PUSH or SAVE	Pushed thin-walled 76mm-OD-tube.
15/60cm	Number of blows required to produce the indicated penetration using a 54mm-ID-tube sampler. The sampler was driven with an 80 kg downhole hammer dropped approximately 1.5 m.

STANDARD PENETRATION TEST AND MODIFIED CALIFORNIA LINER SAMPLERS

Samplers were driven with a 63.5 kg above deck hammer dropped approximately 760 mm.

20	Number of blows to produce 30 cm of penetration after the initial 15 cm of seating.
86/28cm	Number of blows required to produce the indicated penetration after an initial 15 cm seating.
Ref/8cm	50 blows produced the indicated penetration during the initial 15 cm interval.

Note: In rock coring interval recovery(%)-RQD are shown in the Blow Count column.

CLASSIFICATION TESTS BLOW COUNTS AND ROCK QUALITY

- ■ PERCENT PASSING #200 SIEVE
- ● WATER CONTENT (%)
- □ SUBMERGED UNIT WEIGHT
- ○ THEORETICAL SUBMERGED UNIT WEIGHT
- PLASTIC LIMIT LIQUID LIMIT
- EQUIVALENT SPT BLOW COUNT
- ROCK QUALITY DESIGNATION (RQD)
- ROCK RECOVERY PERCENT
- ROCK CORING RATE

STRENGTH TESTS

- POCKET PENETROMETER
- TORVANE
- REMOTE VANE
- MINIATURE VANE (RESIDUAL VANE)
- UNCONSOLIDATED UNDRAINED TRIAXIAL
- SWEDISH FALL CONE
- UNCONFINED COMPRESSION (SOIL)
- (Open symbols indicate remolded tests)
- Soil: Strength Exceeds Capacity of Measuring Device
- Rock: Sample broke along discontinuity; Intact sample would have greater strength
- Shear Strength Interpreted from CPT Tip Resistance
- POINT LOAD TEST (ROCK-INTACT SPECIMEN)
- POINT LOAD TEST (ROCK-ALONG WEAK PLANE)
- UNCONFINED COMPRESSION (ROCK)
- FRACTURE DENSITY (ROCK)

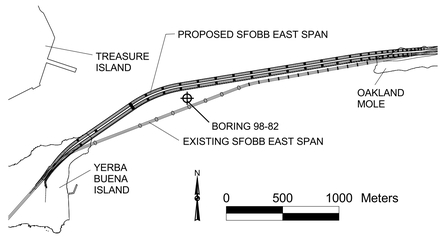
STRENGTH OF COHESIVE SOILS

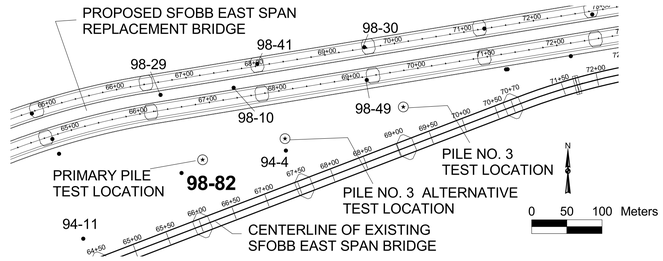
Consistency	Undrained Shear Strength kPa
Very Soft	less than 12
Soft	12 to 25
Firm	25 to 50
Stiff	50 to 100
Very Stiff	100 to 200
Hard	greater than 200

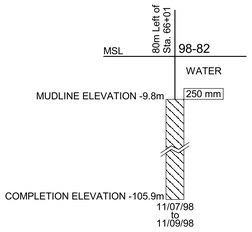
DENSITY OF GRANULAR SOILS

Descriptive Term	Relative Density (%)*
Very Loose	less than 15
Loose	15 to 35
Medium Dense	35 to 65
Dense	65 to 85
Very Dense	greater than 85

*Estimated from sampler driving record and CPT tip resistance.







BORING 98-82

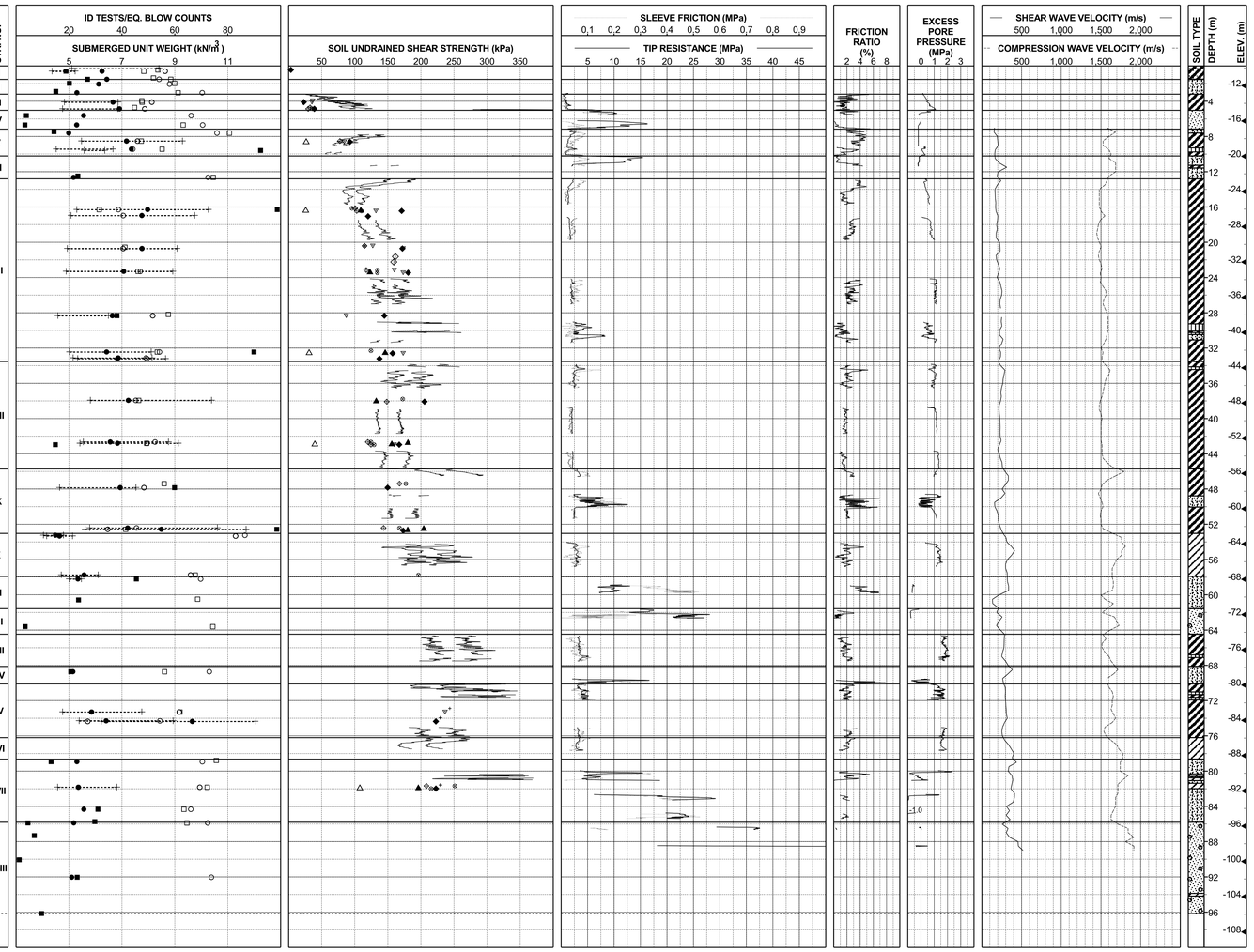
Coordinates: E1837175 N647881
CA State Plane Zone 3, NAD83, Meters

MUDLINE ELEVATION: -9.8m (MSL)

BLOW COUNT	MATERIAL DESCRIPTION	STR. NO.
WOH	Fat CLAY (CH), very soft, olive gray (1.5m)	I
WOH	Silty Fine SAND (SM), medium dense, dark gray (3.2m)	II
WOH	Fat CLAY (CH), firm to stiff, olive gray (5.0m)	III
WOH	Fine SAND (SP), dense, dark gray (7.2m)	IV
30/25cm, 30/45cm, 30/40cm, 30/45cm	Fat CLAY (CH), stiff to very stiff, olive gray -with silty sand to 7.6m (10.2m)	V
30/45cm	Silty Fine SAND (SM), dense, greenish gray -fat clay layer, 11.3m to 11.6m (12.8m)	VI
PUSH, SAVE, PUSH, PUSH, PUSH, PUSH, PUSH, SAVE	Fat CLAY (CH), very stiff, dark greenish gray -with silt seams, 24.1m to 27.1m -interlayered sand and clay, at 28.0m -silt with clay layers, 29.3m to 30.5m -silty sand layer, 30.5m to 31.1m (33.5m)	VII
PUSH, PUSH, PUSH	Fat CLAY (CH), very stiff to hard, greenish gray -silt layer, 34.1m to 34.4m -with gas blisters, slickensides, and a few dark gray pockets, at 37.8m -with slickensides, and a few organic pockets, at 42.7m (45.7m)	VIII
PUSH, PUSH, SAVE	Fat CLAY (CH), very stiff to hard, dark greenish gray -with many silty fine sand partings, and seams, at 47.5m -silty sand with many clay partings and seams, 48.8m to 50.0m -with many organic pockets and partings, below 52.1m (53.0m)	IX
PUSH	-Lean CLAY (CL), hard, greenish gray -sandy clay at 53.0m (57.9m)	X
30/25cm	Silty Fine SAND (SM), dense, olive gray -with clay layers (61.6m)	XI
30/20cm	Fine to Medium SAND with coarse sand and fine gravel (SP), dense, dark gray (64.5m)	XII
PUSH	Fat CLAY (CH), hard -silt layer, 66.8m to 67.1m (68.1m)	XIII
	Silty Fine SAND (SM), dense, dark gray -with clay pockets and seams, at 68.3m (70.1m)	XIV
PUSH, SAVE	Fat CLAY (CH), hard, gray to dark gray -interlayered with silt to 73.5m -with many dark brown organic pockets, 73.2m to 74.4m (76.2m)	XV
	Lean CLAY (CL), hard (78.6m)	XVI
PUSH, PUSH, 30/20cm, 30/25cm	Silty Fine SAND (SM), very dense, dark gray -with many silt pockets and seams, at 78.6m -clay with sand layers, 80.3m to 81.1m -hard lean clay layer with a few silt pockets and desiccated pockets, 81.4m to 82.0m (85.8m)	XVII
30/15cm, 30/15cm, 30/15cm	Fine to coarse SAND with gravel (SP), very dense, gray -with silt at 87.3m -fine gravel at 90.1m -silty fine sand with fine gravel, at 92.0m -hard clay layer, 93.9m to 94.2m -fine gravel with silt and sand, at 96.0m	XVIII

TOTAL DEPTH: 96.2m BACKFILLED WITH: Cement Grout

Note: Refer to multi-page logs presented in Volume 2 of the Final Marine Site Characterization Report for detailed soil descriptions.



JUAN F. CARPIO, DESIGN OVERSIGHT	DRAWN BY	SACHIN DESHPANDE	C.LOVATO/M.ZUEGER, FIELD INVESTIGATOR	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	ANTHONY R. DOVER, PROJECT ENGINEER	BRIDGE NO. 33-25	SAN FRANCISCO OAKLAND BAY BRIDGE EAST SPAN PILE TEST PROGRAM
	CHECKED BY	J.CHACKO	DATE 06/24/99			km POST 0.0/0.5	LOG OF TEST BORINGS 2 OF 7

ORIGINAL SCALE IN CENTIMETERS FOR REDUCED PLANS 0 1 2 3 4 5 6 7 8 9 10

CU 04251
EA 012081

POST MILE 0.0/0.3

DISREGARD PRINTS BEARING EARLIER REVISION DATES → 05/14/99

REVISION DATES (PRELIMINARY STAGE ONLY) | SHEET 5 | OF 12

d:\data\robs\pdot\newpath98-82pdot.odb

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	Ala	80	0.0/0.5		

GEOTECHNICAL PROFESSIONAL 06/24/99

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER T.W. McNeilan No. 0583 Exp. 12/31/00 Geotechnical STATE OF CALIFORNIA

FUGRO-EARTH MECHANICS,
A JOINT VENTURE.
7700, Edgewater Dr., Ste. 848,
Oakland, CA 94621
(510) 633-5100

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Metric

SOIL AND ROCK TYPES

Well graded GRAVEL (GW)
Poorly graded GRAVEL (GP)
GRAVEL with sand (GP or GW)
GRAVEL with clay (GP or GW)
Clayey GRAVEL (GC)
GRAVEL with silt (GP or GW)
Silty GRAVEL (GM)
Well graded SAND (SW)
Poorly graded SAND (SP)
SAND with gravel (SP or SW)
SAND with clay (SP-SC)
Clayey SAND (SC)
Silty SAND (SM)
SAND with silt (SP-SM)
Fat CLAY (CH)
Sandy fat CLAY (CH)
Lean CLAY (CL)
Sandy lean CLAY (CL)
Silty CLAY (CL-ML)
Elastic SILT (MH)
SILT (ML)
Sandy SILT (ML)
Clayey silt (ML/CL)
Highly plastic ORGANICS (OH)
Low plasticity ORGANICS (OL)
SANDSTONE (Rx)
SILTSTONE (Rx)
CLAYSTONE (Rx)
Interbedded Rock Strata (Rx)
CONGLOMERATE (Rx)

SAMPLERS

76mm-OD, 72mm-ID Thin Walled Tube
57mm-OD, 54mm-ID* Thin Walled Driven Tube
63.5mm-OD, 54mm-ID Offshore Liner
76mm-OD, 60mm-ID Modified California Liner
51mm-OD, 35mm-ID SPT Split Spoon Sampler
Rock Core (Inset symbol represents recovery (%)

* A variable-OD, 54-mm-ID tapered driven tube was used to sample coarse sand, gravel and rock

TUBE AND OFFSHORE LINER SAMPLERS

WOH	Offshore Liner sample advanced with the weight of an 80 kg hammer.
PUSH or SAVE	Pushed thin-walled 76mm-OD-tube.
15/60cm	Number of blows required to produce the indicated penetration using a 54mm-ID-tube sampler. The sampler was driven with an 80 kg downhole hammer dropped approximately 1.5 m.

STANDARD PENETRATION TEST AND MODIFIED CALIFORNIA LINER SAMPLERS

Samplers were driven with a 63.5 kg above deck hammer dropped approximately 760 mm.

20	Number of blows to produce 30 cm of penetration after the initial 15 cm of seating.
86/28cm	Number of blows required to produce the indicated penetration after an initial 15 cm seating.
Ref/8cm	50 blows produced the indicated penetration during the initial 15 cm interval.

Note: In rock coring interval recovery(%)-RQD are shown in the Blow Count column.

CLASSIFICATION TESTS BLOW COUNTS AND ROCK QUALITY

- ■ PERCENT PASSING #200 SIEVE
- ● WATER CONTENT (%)
- □ SUBMERGED UNIT WEIGHT
- ○ THEORETICAL SUBMERGED UNIT WEIGHT
- PLASTIC LIMIT + — LIQUID LIMIT +
- ⊙ EQUIVALENT SPT BLOW COUNT
- ROCK QUALITY DESIGNATION (RQD)
- ROCK RECOVERY PERCENT
- ROCK CORING RATE

STRENGTH TESTS

- ⊗ POCKET PENETROMETER
- ⊕ TORVANE
- ◇ REMOTE VANE
- ◆ MINIATURE VANE (⊗ RESIDUAL VANE)
- ▲ UNCONSOLIDATED UNDRAINED TRIAXIAL
- ▽ SWEDISH FALL CONE
- ⊡ UNCONFINED COMPRESSION (SOIL)
- ◇△ (Open symbols indicate remolded tests)
- \+ Soil: Strength Exceeds Capacity of Measuring Device; Rock: Sample broke along discontinuity; Intact sample would have greater strength
- Shear Strength Interpreted from CPT Tip Resistance
- ◎ POINT LOAD TEST (ROCK-INTACT SPECIMEN)
- ⊙ POINT LOAD TEST (ROCK-ALONG WEAK PLANE)
- ■ UNCONFINED COMPRESSION (ROCK)
- FRACTURE DENSITY (ROCK)

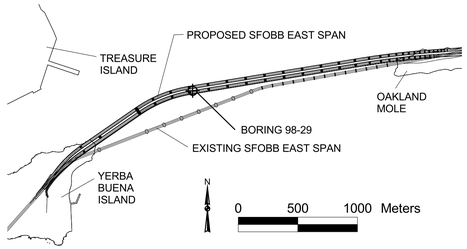
STRENGTH OF COHESIVE SOILS

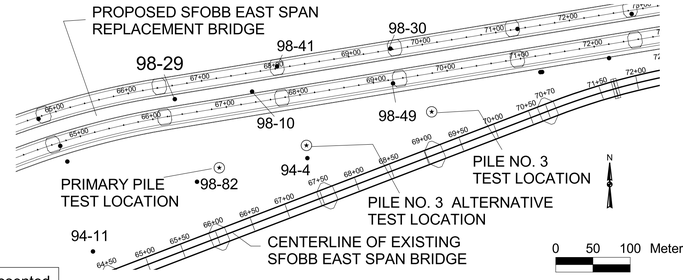
Consistency	Undrained Shear Strength kPa
Very Soft	less than 12
Soft	12 to 25
Firm	25 to 50
Stiff	50 to 100
Very Stiff	100 to 200
Hard	greater than 200

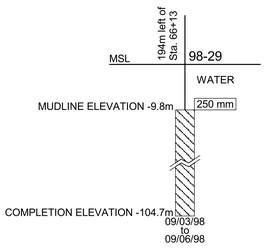
DENSITY OF GRANULAR SOILS

Descriptive Term	Relative Density (%)*
Very Loose	less than 15
Loose	15 to 35
Medium Dense	35 to 65
Dense	65 to 85
Very Dense	greater than 85

*Estimated from sampler driving record and CPT tip resistance.







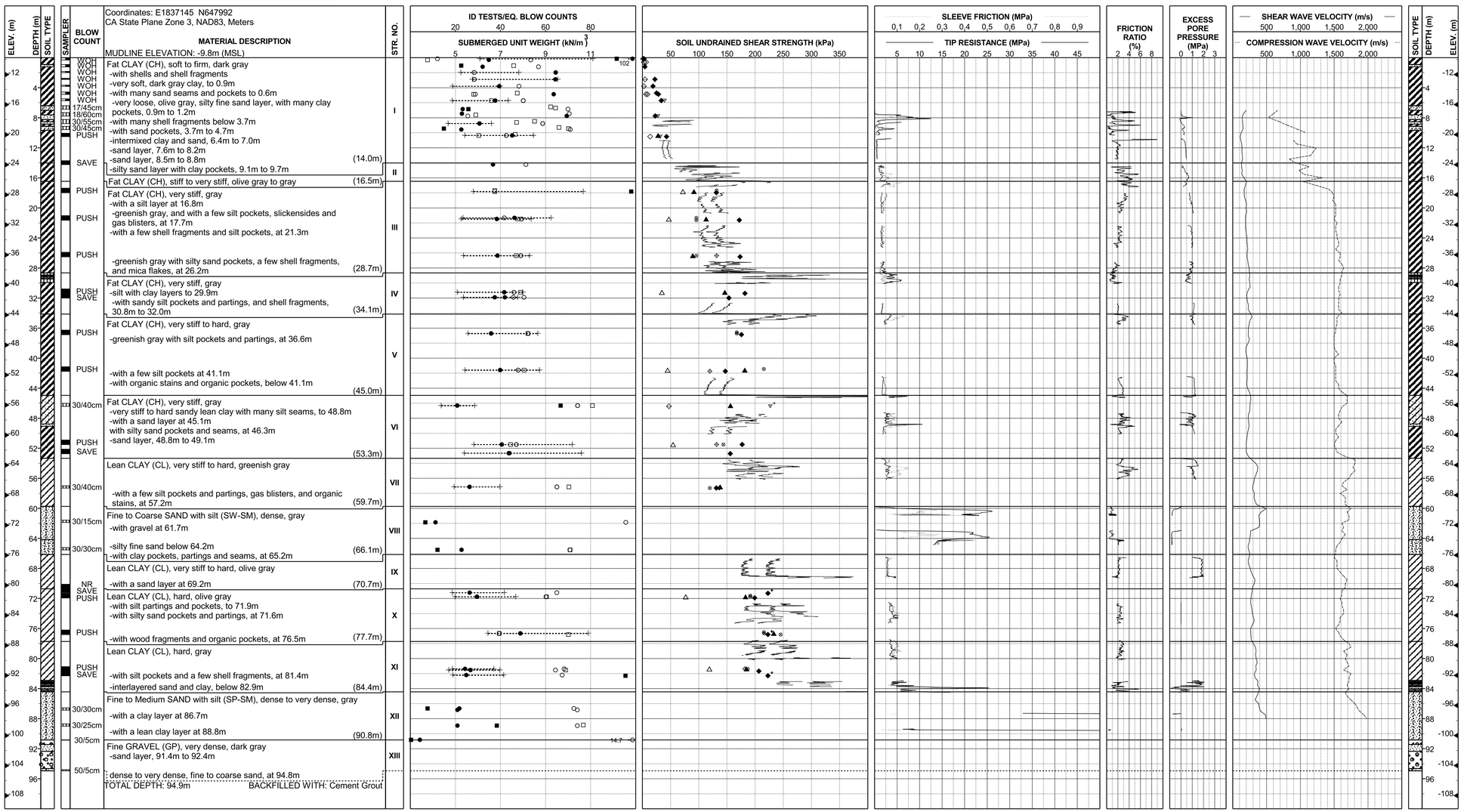
Note: Refer to multi-page logs presented in Volume 2 of the Final Marine Site Characterization Report for detailed soil descriptions.

BORING 98-29

Coordinates: E1837145 N647992
CA State Plane Zone 3, NAD83, Meters

MUDLINE ELEVATION: -9.8m (MSL)

BLOW COUNT	MATERIAL DESCRIPTION	STR. NO.
WOH, WOH, WOH, WOH, WOH, WOH, 17/45cm, 18/60cm, 30/55cm, 30/45cm, PUSH	Fat CLAY (CH), soft to firm, dark gray -with shells and shell fragments -very soft, dark gray clay, to 0.9m -with many sand seams and pockets to 0.6m -very loose, olive gray, silty fine sand layer, with many clay pockets, 0.9m to 1.2m -with many shell fragments below 3.7m -with sand pockets, 3.7m to 4.7m -intermixed clay and sand, 6.4m to 7.0m -sand layer, 7.6m to 8.2m -sand layer, 8.5m to 8.8m	I
SAVE	-silty sand layer with clay pockets, 9.1m to 9.7m (14.0m)	
	Fat CLAY (CH), stiff to very stiff, olive gray to gray (16.5m)	II
PUSH	Fat CLAY (CH), very stiff, gray -with a silt layer at 16.8m -greenish gray, and with a few silt pockets, slickensides and gas blisters, at 17.7m	III
PUSH	-with a few shell fragments and silt pockets, at 21.3m	
PUSH	-greenish gray with silty sand pockets, a few shell fragments, and mica flakes, at 26.2m (28.7m)	
PUSH, SAVE	Fat CLAY (CH), very stiff, gray -silt with clay layers to 29.9m -with sandy silt pockets and partings, and shell fragments, 30.8m to 32.0m (34.1m)	IV
PUSH	Fat CLAY (CH), very stiff to hard, gray -greenish gray with silt pockets and partings, at 36.6m	V
PUSH	-with a few silt pockets at 41.1m -with organic stains and organic pockets, below 41.1m (45.0m)	
30/40cm	Fat CLAY (CH), very stiff, gray -very stiff to hard sandy lean clay with many silt seams, to 48.8m -with a sand layer at 45.1m with silty sand pockets and seams, at 46.3m	VI
PUSH, SAVE	-sand layer, 48.8m to 49.1m (53.3m)	
30/40cm	Lean CLAY (CL), very stiff to hard, greenish gray -with a few silt pockets and partings, gas blisters, and organic stains, at 57.2m (59.7m)	VII
30/15cm	Fine to Coarse SAND with silt (SW-SM), dense, gray -with gravel at 61.7m	VIII
30/30cm	-silty fine sand below 64.2m -with clay pockets, partings and seams, at 65.2m (66.1m)	
	Lean CLAY (CL), very stiff to hard, olive gray -with a sand layer at 69.2m (70.7m)	IX
NR, SAVE, PUSH	Lean CLAY (CL), hard, olive gray -with silt partings and pockets, to 71.9m -with silty sand pockets and partings, at 71.6m	X
PUSH	-with wood fragments and organic pockets, at 76.5m (77.7m)	
PUSH, SAVE	Lean CLAY (CL), hard, gray -with silt pockets and a few shell fragments, at 81.4m -interlayered sand and clay, below 82.9m (84.4m)	XI
30/30cm, 30/25cm	Fine to Medium SAND with silt (SP-SM), dense to very dense, gray -with a clay layer at 86.7m -with a lean clay layer at 88.8m (90.8m)	XII
30/5cm	Fine GRAVEL (GP), very dense, dark gray -sand layer, 91.4m to 92.4m	XIII
50/5cm	dense to very dense, fine to coarse sand, at 94.8m TOTAL DEPTH: 94.9m BACKFILLED WITH: Cement Grout	



JUAN F. CARPIO, DESIGN OVERSIGHT	DRAWN BY SACHIN DESHPANDE	J.CHACKO/M.ZUEGER/P.ROBBINS, FIELD INVESTIGATOR	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	ANTHONY R. DOVER, PROJECT ENGINEER	BRIDGE NO. 33-25
	CHECKED BY J.CHACKO	DATE 06/24/99			km POST 0.0/0.5

SAN FRANCISCO OAKLAND BAY BRIDGE
EAST SPAN PILE TEST PROGRAM

LOG OF TEST BORINGS 3 OF 7

ORIGINAL SCALE IN CENTIMETERS FOR REDUCED PLANS 0 1 2 3 4 5 6 7 8 9 10

CU 04251
EA 012081

POST MILE 0.0/0.3

DISREGARD PRINTS BEARING EARLIER REVISION DATES → 05/14/99

REVISION DATES (PRELIMINARY STAGE ONLY)

SHEET 6 OF 12

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	Ala	80	0.0/0.5		

GEOTECHNICAL PROFESSIONAL 06/24/99

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER T.W. McNeilan No. 0583 Exp. 12/31/00 Geotechnical STATE OF CALIFORNIA

FUGRO-EARTH MECHANICS,
A JOINT VENTURE.
7700, Edgewater Dr., Ste. 848,
Oakland, CA 94621
(510) 633-5100

The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

Metric

SOIL AND ROCK TYPES

Well graded GRAVEL (GW)
Poorly graded GRAVEL (GP)
GRAVEL with sand (GP or GW)
GRAVEL with clay (GP or GW)
Clayey GRAVEL (GC)
GRAVEL with silt (GP or GW)
Silty GRAVEL (GM)
Well graded SAND (SW)
Poorly graded SAND (SP)
SAND with gravel (SP or SW)
SAND with clay (SP-SC)
Clayey SAND (SC)
Silty SAND (SM)
SAND with silt (SP-SM)
Fat CLAY (CH)
Sandy fat CLAY (CH)
Lean CLAY (CL)
Sandy lean CLAY (CL)
Silty CLAY (CL-ML)
Elastic SILT (MH)
SILT (ML)
Sandy SILT (ML)
Clayey silt (ML/CL)
Highly plastic ORGANICS (OH)
Low plasticity ORGANICS (OL)
SANDSTONE (Rx)
SILTSTONE (Rx)
CLAYSTONE (Rx)
Interbedded Rock Strata (Rx)
CONGLOMERATE (Rx)

SAMPLERS

76mm-OD, 72mm-ID Thin Walled Tube
57mm-OD, 54mm-ID* Thin Walled Driven Tube
63.5mm-OD, 54mm-ID Offshore Liner
76mm-OD, 60mm-ID Modified California Liner
51mm-OD, 35mm-ID SPT Split Spoon Sampler
Rock Core (Inset symbol represents recovery (%)

* A variable-OD, 54-mm-ID tapered driven tube was used to sample coarse sand, gravel and rock

TUBE AND OFFSHORE LINER SAMPLERS

WOH — Offshore Liner sample advanced with the weight of an 80 kg hammer.

PUSH or SAVE — Pushed thin-walled 76mm-OD-tube.

15/60cm — Number of blows required to produce the indicated penetration using a 54mm-ID-tube sampler. The sampler was driven with an 80 kg downhole hammer dropped approximately 1.5 m.

STANDARD PENETRATION TEST AND MODIFIED CALIFORNIA LINER SAMPLERS

Samplers were driven with a 63.5 kg above deck hammer dropped approximately 760 mm.

20 — Number of blows to produce 30 cm of penetration after the initial 15 cm of seating.

86/28cm — Number of blows required to produce the indicated penetration after an initial 15 cm seating.

Ref/8cm — 50 blows produced the indicated penetration during the initial 15 cm interval.

Note: In rock coring interval recovery(%)-RQD are shown in the Blow Count column.

CLASSIFICATION TESTS BLOW COUNTS AND ROCK QUALITY

- PERCENT PASSING #200 SIEVE
- WATER CONTENT (%)
- SUBMERGED UNIT WEIGHT
- THEORETICAL SUBMERGED UNIT WEIGHT
- PLASTIC LIMIT LIQUID LIMIT
- EQUIVALENT SPT BLOW COUNT
- ROCK QUALITY DESIGNATION (RQD)
- ROCK RECOVERY PERCENT
- ROCK CORING RATE

STRENGTH TESTS

- POCKET PENETROMETER
- TORVANE
- REMOTE VANE
- MINIATURE VANE (RESIDUAL VANE)
- UNCONSOLIDATED UNDRAINED TRIAXIAL
- SWEDISH FALL CONE
- UNCONFINED COMPRESSION (SOIL)
- (Open symbols indicate remolded tests)
- Soil: Strength Exceeds Capacity of Measuring Device
  Rock: Sample broke along discontinuity; Intact sample would have greater strength
- Shear Strength Interpreted from CPT Tip Resistance
- POINT LOAD TEST (ROCK-INTACT SPECIMEN)
- POINT LOAD TEST (ROCK-ALONG WEAK PLANE)
- UNCONFINED COMPRESSION (ROCK)
- FRACTURE DENSITY (ROCK)

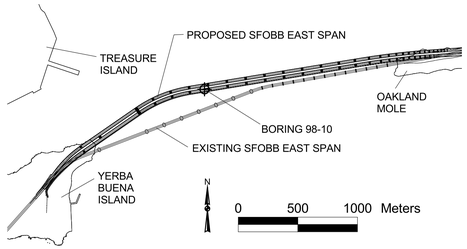
STRENGTH OF COHESIVE SOILS

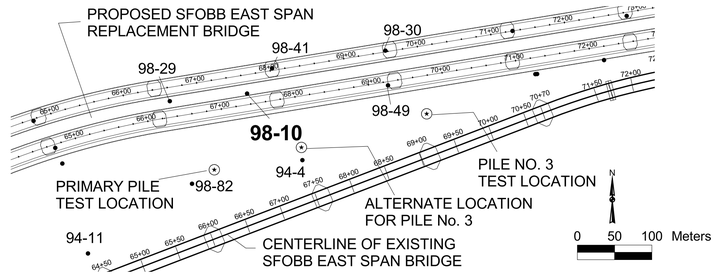
Consistency	Undrained Shear Strength kPa
Very Soft	less than 12
Soft	12 to 25
Firm	25 to 50
Stiff	50 to 100
Very Stiff	100 to 200
Hard	greater than 200

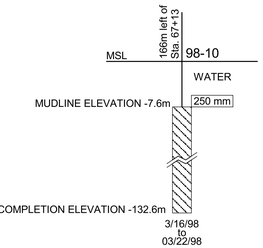
DENSITY OF GRANULAR SOILS

Descriptive Term	Relative Density (%)*
Very Loose	less than 15
Loose	15 to 35
Medium Dense	35 to 65
Dense	65 to 85
Very Dense	greater than 85

*Estimated from sampler driving record and CPT tip resistance.







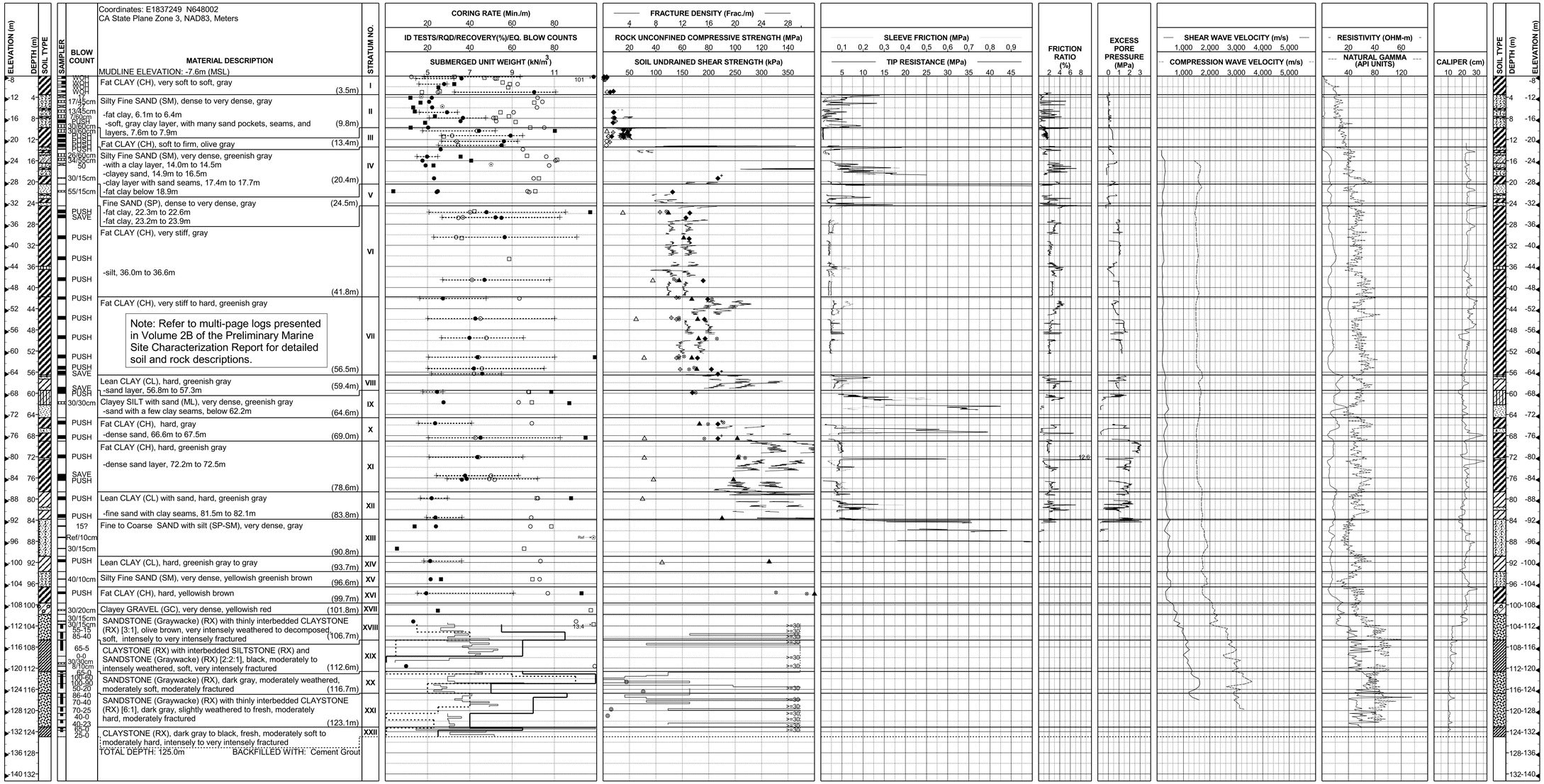
BORING 98-10

Coordinates: E1837249 N648002
CA State Plane Zone 3, NAD83, Meters

MUDLINE ELEVATION: -7.6m (MSL)

Material Description	Stratum No.
Fat CLAY (CH), very soft to soft, gray (3.5m)	I
Silty Fine SAND (SM), dense to very dense, gray -fat clay, 6.1m to 6.4m -soft, gray clay layer, with many sand pockets, seams, and layers, 7.6m to 7.9m (9.8m)	II
Fat CLAY (CH), soft to firm, olive gray (13.4m)	III
Silty Fine SAND (SM), very dense, greenish gray -with a clay layer, 14.0m to 14.5m -clayey sand, 14.9m to 16.5m -clay layer with sand seams, 17.4m to 17.7m -fat clay below 18.9m (20.4m)	IV
Fine SAND (SP), dense to very dense, gray (24.5m) -fat clay, 22.3m to 22.6m -fat clay, 23.2m to 23.9m	V
Fat CLAY (CH), very stiff, gray -silt, 36.0m to 36.6m (41.8m)	VI
Fat CLAY (CH), very stiff to hard, greenish gray (56.5m)	VII
Lean CLAY (CL), hard, greenish gray -sand layer, 56.8m to 57.3m (59.4m)	VIII
Clayey SILT with sand (ML), very dense, greenish gray -sand with a few clay seams, below 62.2m (64.6m)	IX
Fat CLAY (CH), hard, gray -dense sand, 66.6m to 67.5m (69.0m)	X
Fat CLAY (CH), hard, greenish gray -dense sand layer, 72.2m to 72.5m (78.6m)	XI
Lean CLAY (CL) with sand, hard, greenish gray -fine sand with clay seams, 81.5m to 82.1m (83.8m)	XII
Fine to Coarse SAND with silt (SP-SM), very dense, gray (90.8m)	XIII
Lean CLAY (CL), hard, greenish gray to gray (93.7m)	XIV
Silty Fine SAND (SM), very dense, yellowish greenish brown (96.6m)	XV
Fat CLAY (CH), hard, yellowish brown (99.7m)	XVI
Clayey GRAVEL (GC), very dense, yellowish red (101.8m)	XVII
SANDSTONE (Graywacke) (RX) with thinly interbedded CLAYSTONE (RX) [3:1], olive brown, very intensely weathered to decomposed, soft, intensely to very intensely fractured (106.7m)	XVIII
CLAYSTONE (RX) with interbedded SILTSTONE (RX) and SANDSTONE (Graywacke) (RX) [2:2:1], black, moderately to intensely weathered, soft, very intensely fractured (112.6m)	XIX
SANDSTONE (Graywacke) (RX), dark gray, moderately weathered, moderately soft, moderately fractured (116.7m)	XX
SANDSTONE (Graywacke) (RX) with thinly interbedded CLAYSTONE (RX) [6:1], dark gray, slightly weathered to fresh, moderately hard, moderately fractured (123.1m)	XXI
CLAYSTONE (RX), dark gray to black, fresh, moderately soft to moderately hard, intensely to very intensely fractured	XXII

TOTAL DEPTH: 125.0m BACKFILLED WITH: Cement Grout



Note: Refer to multi-page logs presented in Volume 2B of the Preliminary Marine Site Characterization Report for detailed soil and rock descriptions.

JUAN F. CARPIO DESIGN OVERSIGHT	DRAWN BY SACHIN DESHPANDE CHECKED BY J.CHACKO	J.CHACKO/M.ZUEGER M. SEBESTA/C. LOVATO FIELD INVESTIGATOR DATE 06/24/99	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	ANTHONY R. DOVER PROJECT ENGINEER	BRIDGE NO. 33-25 km POST 0.0/0.5 POST MILE 0.0/0.3

SAN FRANCISCO OAKLAND BAY BRIDGE
EAST SPAN PILE TEST PROGRAM

LOG OF TEST BORINGS 4 OF 7

ORIGINAL SCALE IN CENTIMETERS FOR REDUCED PLANS 0 1 2 3 4 5 6 7 8 9 10

CU 04251
EA 012081

DISREGARD PRINTS BEARING EARLIER REVISION DATES → 05/14/99

REVISION DATES (PRELIMINARY STAGE ONLY) | SHEET 7 | OF 12

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	Ala	80	0.0/0.5		

GEOTECHNICAL PROFESSIONAL 06/24/99

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER T.W. McNeilan No. 0583 Exp. 12/31/00 Geotechnical STATE OF CALIFORNIA

FUGRO-EARTH MECHANICS,
A JOINT VENTURE,
7700, Edgewater Dr., Ste. 848,
Oakland, CA 94621
(510) 633-5100

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SOIL AND ROCK TYPES

Well graded GRAVEL (GW)
Poorly graded GRAVEL (GP)
GRAVEL with sand (GP or GW)
GRAVEL with clay (GP or GW)
Clayey GRAVEL (GC)
GRAVEL with silt (GP or GW)
Silty GRAVEL (GM)
Well graded SAND (SW)
Poorly graded SAND (SP)
SAND with gravel (SP or SW)
SAND with clay (SP-SC)
Clayey SAND (SC)
Silty SAND (SM)
SAND with silt (SP-SM)
Fat CLAY (CH)
Sandy fat CLAY (CH)
Lean CLAY (CL)
Sandy lean CLAY (CL)
Silty CLAY (CL-ML)
Elastic SILT (MH)
SILT (ML)
Sandy SILT (ML)
Clayey silt (ML/CL)
Highly plastic ORGANICS (OH)
Low plasticity ORGANICS (OL)
SANDSTONE (Rx)
SILTSTONE (Rx)
CLAYSTONE (Rx)
Interbedded Rock Strata (Rx)
CONGLOMERATE (Rx)

SAMPLERS

76mm-OD, 72mm-ID Thin Walled Tube
57mm-OD, 54mm-ID* Thin Walled Driven Tube
63.5mm-OD, 54mm-ID Offshore Liner
76mm-OD, 60mm-ID Modified California Liner
51mm-OD, 35mm-ID SPT Split Spoon Sampler
Rock Core (Inset symbol represents recovery (%)

* A variable-OD, 54-mm-ID tapered driven tube was used to sample coarse sand, gravel and rock

TUBE AND OFFSHORE LINER SAMPLERS

WOH	Offshore Liner sample advanced with the weight of an 80 kg hammer.
PUSH or SAVE	Pushed thin-walled 76mm-OD-tube.
15/60cm	Number of blows required to produce the indicated penetration using a 54mm-ID-tube sampler. The sampler was driven with an 80 kg downhole hammer dropped approximately 1.5 m.

STANDARD PENETRATION TEST AND MODIFIED CALIFORNIA LINER SAMPLERS

Samplers were driven with a 63.5 kg above deck hammer dropped approximately 760 mm.

20	Number of blows to produce 30 cm of penetration after the initial 15 cm of seating.
86/28cm	Number of blows required to produce the indicated penetration after an initial 15 cm seating.
Ref/8cm	50 blows produced the indicated penetration during the initial 15 cm interval.

Note: In rock coring interval recovery(%)-RQD are shown in the Blow Count column.

CLASSIFICATION TESTS BLOW COUNTS AND ROCK QUALITY

■ PERCENT PASSING #200 SIEVE
● WATER CONTENT (%)
□ SUBMERGED UNIT WEIGHT
○ THEORETICAL SUBMERGED UNIT WEIGHT
PLASTIC LIMIT LIQUID LIMIT
⊙ EQUIVALENT SPT BLOW COUNT
ROCK QUALITY DESIGNATION (RQD)
ROCK RECOVERY PERCENT
ROCK CORING RATE

STRENGTH TESTS

POCKET PENETROMETER
TORVANE
REMOTE VANE
MINIATURE VANE (RESIDUAL VANE)
▲ UNCONSOLIDATED UNDRAINED TRIAXIAL
SWEDISH FALL CONE
UNCONFINED COMPRESSION (SOIL)
◇△ (Open symbols indicate remolded tests)
Soil: Strength Exceeds Capacity of Measuring Device
Rock: Sample broke along discontinuity; Intact sample would have greater strength
Shear Strength Interpreted from CPT Tip Resistance
POINT LOAD TEST (ROCK-INTACT SPECIMEN)
POINT LOAD TEST (ROCK-ALONG WEAK PLANE)
■ UNCONFINED COMPRESSION (ROCK)
FRACTURE DENSITY (ROCK)

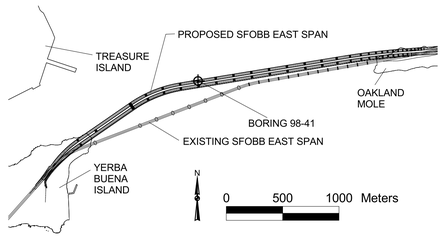
STRENGTH OF COHESIVE SOILS

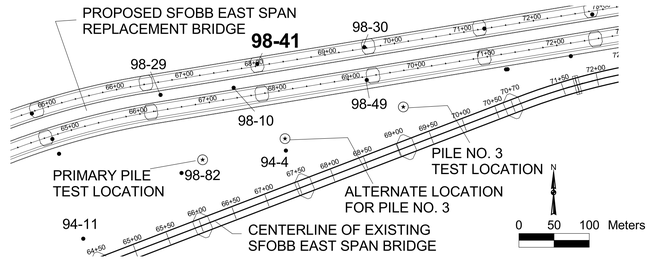
Consistency	Undrained Shear Strength kPa
Very Soft	less than 12
Soft	12 to 25
Firm	25 to 50
Stiff	50 to 100
Very Stiff	100 to 200
Hard	greater than 200

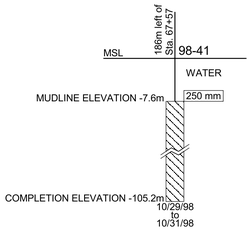
DENSITY OF GRANULAR SOILS

Descriptive Term	Relative Density (%)*
Very Loose	less than 15
Loose	15 to 35
Medium Dense	35 to 65
Dense	65 to 85
Very Dense	greater than 85

*Estimated from sampler driving record and CPT tip resistance.







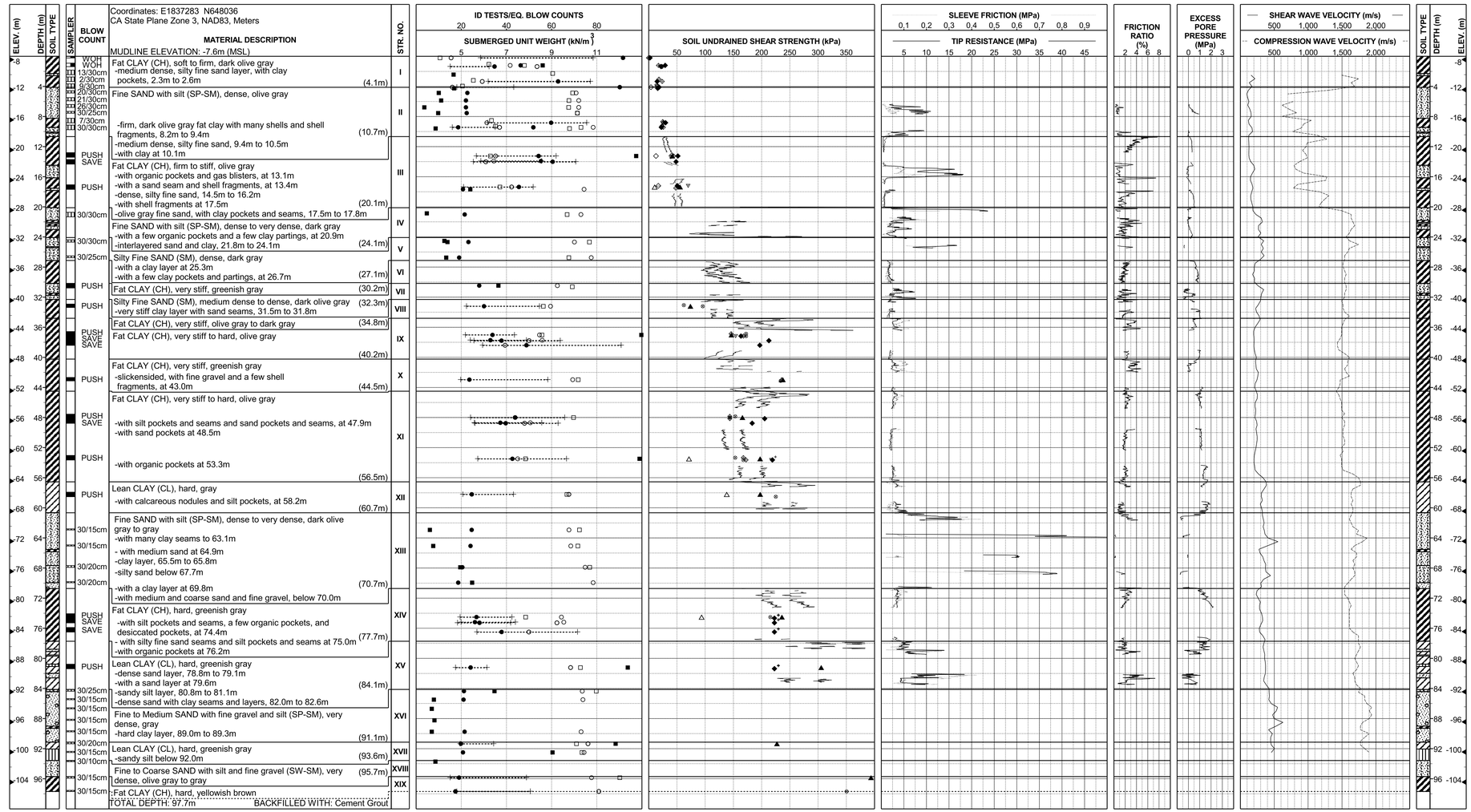
BORING 98-41

Coordinates: E1837283 N648036
CA State Plane Zone 3, NAD83, Meters

MUDLINE ELEVATION: -7.6m (MSL)

BLOW COUNT	MATERIAL DESCRIPTION	STR. NO.
WOH, WOH, 13/30cm, 2/30cm, 9/30cm	Fat CLAY (CH), soft to firm, dark olive gray -medium dense, silty fine sand layer, with clay pockets, 2.3m to 2.6m (4.1m)	I
20/30cm, 21/30cm, 26/30cm, 30/25cm, 7/30cm, 30/30cm	Fine SAND with silt (SP-SM), dense, olive gray -firm, dark olive gray fat clay with many shells and shell fragments, 8.2m to 9.4m -medium dense, silty fine sand, 9.4m to 10.5m -with clay at 10.1m (10.7m)	II
PUSH, SAVE, PUSH	Fat CLAY (CH), firm to stiff, olive gray -with organic pockets and gas blisters, at 13.1m -with a sand seam and shell fragments, at 13.4m -dense, silty fine sand, 14.5m to 16.2m -with shell fragments at 17.5m (20.1m)	III
30/30cm	-olive gray fine sand, with clay pockets and seams, 17.5m to 17.8m	IV
30/30cm	Fine SAND with silt (SP-SM), dense to very dense, dark gray -with a few organic pockets and a few clay partings, at 20.9m -interlayered sand and clay, 21.8m to 24.1m (24.1m)	V
30/25cm	Silty Fine SAND (SM), dense, dark gray -with a clay layer at 25.3m -with a few clay pockets and partings, at 26.7m (27.1m)	VI
PUSH	Fat CLAY (CH), very stiff, greenish gray (30.2m)	VII
PUSH	Silty Fine SAND (SM), medium dense to dense, dark olive gray -very stiff clay layer with sand seams, 31.5m to 31.8m (32.3m)	VIII
	Fat CLAY (CH), very stiff, olive gray to dark gray (34.8m)	
PUSH, SAVE, SAVE	Fat CLAY (CH), very stiff to hard, olive gray (40.2m)	IX
PUSH	Fat CLAY (CH), very stiff, greenish gray -slickensided, with fine gravel and a few shell fragments, at 43.0m (44.5m)	X
PUSH, SAVE	Fat CLAY (CH), very stiff to hard, olive gray -with silt pockets and seams and sand pockets and seams, at 47.9m -with sand pockets at 48.5m	XI
PUSH	-with organic pockets at 53.3m (56.5m)	
PUSH	Lean CLAY (CL), hard, gray -with calcareous nodules and silt pockets, at 58.2m (60.7m)	XII
30/15cm, 30/15cm, 30/20cm, 30/20cm	Fine SAND with silt (SP-SM), dense to very dense, dark olive gray to gray -with many clay seams to 63.1m - with medium sand at 64.9m -clay layer, 65.5m to 65.8m -silty sand below 67.7m -with a clay layer at 69.8m (70.7m) -with medium and coarse sand and fine gravel, below 70.0m	XIII
PUSH, SAVE, SAVE	Fat CLAY (CH), hard, greenish gray -with silt pockets and seams, a few organic pockets, and desiccated pockets, at 74.4m - with silty fine sand seams and silt pockets and seams at 75.0m -with organic pockets at 76.2m (77.7m)	XIV
PUSH	Lean CLAY (CL), hard, greenish gray -dense sand layer, 78.8m to 79.1m -with a sand layer at 79.6m -sandy silt layer, 80.8m to 81.1m -dense sand with clay seams and layers, 82.0m to 82.6m (84.1m)	XV
30/25cm, 30/15cm, 30/15cm, 30/15cm, 30/15cm, 30/15cm	Fine to Medium SAND with fine gravel and silt (SP-SM), very dense, gray -hard clay layer, 89.0m to 89.3m (91.1m)	XVI
30/20cm, 30/15cm, 30/10cm	Lean CLAY (CL), hard, greenish gray -sandy silt below 92.0m (93.6m)	XVII
30/15cm	Fine to Coarse SAND with silt and fine gravel (SW-SM), very dense, olive gray to gray (95.7m)	XVIII
30/15cm	Fat CLAY (CH), hard, yellowish brown	XIX

TOTAL DEPTH: 97.7m BACKFILLED WITH: Cement Grout



JUAN F. CARPIO, DESIGN OVERSIGHT	DRAWN BY SACHIN DESHPANDE	R.HOWARD/ C.LOVATO M.ZUEGER, FIELD INVESTIGATOR	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	ANTHONY R. DOVER, PROJECT ENGINEER	BRIDGE NO. 33-25
	CHECKED BY J.CHACKO	DATE 06/24/99			km POST 0.0/0.5

ORIGINAL SCALE IN CENTIMETERS FOR REDUCED PLANS 0 1 2 3 4 5 6 7 8 9 10

CU 04251
EA 012081

POST MILE 0.0/0.3

SAN FRANCISCO OAKLAND BAY BRIDGE
EAST SPAN PILE TEST PROGRAM

LOG OF TEST BORINGS 5 OF 7

DISREGARD PRINTS BEARING EARLIER REVISION DATES → 05/14/99

REVISION DATES (PRELIMINARY STAGE ONLY)

SHEET 8 OF 12

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DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	Ala	80	0.0/0.5		

GEOTECHNICAL PROFESSIONAL 06/24/99

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — T.W. McNeilan — No. 0583 — Exp. 12/31/00 — Geotechnical — STATE OF CALIFORNIA

FUGRO-EARTH MECHANICS,
A JOINT VENTURE.
7700, Edgewater Dr., Ste. 848,
Oakland, CA 94621
(510) 633-5100

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Metric

SOIL AND ROCK TYPES

- Well graded GRAVEL (GW)
- Poorly graded GRAVEL (GP)
- GRAVEL with sand (GP or GW)
- GRAVEL with clay (GP or GW)
- Clayey GRAVEL (GC)
- GRAVEL with silt (GP or GW)
- Silty GRAVEL (GM)
- Well graded SAND (SW)
- Poorly graded SAND (SP)
- SAND with gravel (SP or SW)
- SAND with clay (SP-SC)
- Clayey SAND (SC)
- Silty SAND (SM)
- SAND with silt (SP-SM)
- Fat CLAY (CH)
- Sandy fat CLAY (CH)
- Lean CLAY (CL)
- Sandy lean CLAY (CL)
- Silty CLAY (CL-ML)
- Elastic SILT (MH)
- SILT (ML)
- Sandy SILT (ML)
- Clayey silt (ML/CL)
- Highly plastic ORGANICS (OH)
- Low plasticity ORGANICS (OL)
- SANDSTONE (Rx)
- SILTSTONE (Rx)
- CLAYSTONE (Rx)
- Interbedded Rock Strata (Rx)
- CONGLOMERATE (Rx)

SAMPLERS

- 76mm-OD, 72mm-ID Thin Walled Tube
- 57mm-OD, 54mm-ID* Thin Walled Driven Tube
- 63.5mm-OD, 54mm-ID Offshore Liner
- 76mm-OD, 60mm-ID Modified California Liner
- 51mm-OD, 35mm-ID SPT Split Spoon Sampler
- Rock Core (Inset symbol represents recovery (%)

* A variable-OD, 54-mm-ID tapered driven tube was used to sample coarse sand, gravel and rock

TUBE AND OFFSHORE LINER SAMPLERS

WOH	Offshore Liner sample advanced with the weight of an 80 kg hammer.
PUSH or SAVE	Pushed thin-walled 76mm-OD-tube.
15/60cm	Number of blows required to produce the indicated penetration using a 54mm-ID-tube sampler. The sampler was driven with an 80 kg downhole hammer dropped approximately 1.5 m.

STANDARD PENETRATION TEST AND MODIFIED CALIFORNIA LINER SAMPLERS

Samplers were driven with a 63.5 kg above deck hammer dropped approximately 760 mm.

20	Number of blows to produce 30 cm of penetration after the initial 15 cm of seating.
86/28cm	Number of blows required to produce the indicated penetration after an initial 15 cm seating.
Ref/8cm	50 blows produced the indicated penetration during the initial 15 cm interval.

Note: In rock coring interval recovery(%)-RQD are shown in the Blow Count column.

CLASSIFICATION TESTS BLOW COUNTS AND ROCK QUALITY

- ■ PERCENT PASSING #200 SIEVE
- ● WATER CONTENT (%)
- □ SUBMERGED UNIT WEIGHT
- ○ THEORETICAL SUBMERGED UNIT WEIGHT
- PLASTIC LIMIT + — LIQUID LIMIT +
- ⊙ EQUIVALENT SPT BLOW COUNT
- ROCK QUALITY DESIGNATION (RQD)
- ROCK RECOVERY PERCENT
- ROCK CORING RATE

STRENGTH TESTS

- POCKET PENETROMETER
- TORVANE
- REMOTE VANE
- MINIATURE VANE (⊗ RESIDUAL VANE)
- ▲ UNCONSOLIDATED UNDRAINED TRIAXIAL
- SWEDISH FALL CONE
- UNCONFINED COMPRESSION (SOIL)
- ◇△ (Open symbols indicate remolded tests)
- \+ Soil: Strength Exceeds Capacity of Measuring Device; Rock: Sample broke along discontinuity; Intact sample would have greater strength
- Shear Strength Interpreted from CPT Tip Resistance
- POINT LOAD TEST (ROCK-INTACT SPECIMEN)
- POINT LOAD TEST (ROCK-ALONG WEAK PLANE)
- ■ UNCONFINED COMPRESSION (ROCK)
- FRACTURE DENSITY (ROCK)

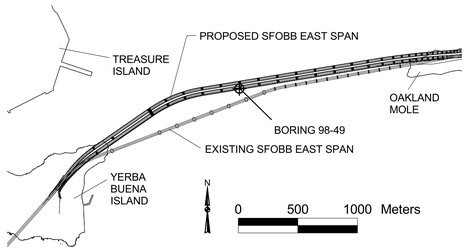
STRENGTH OF COHESIVE SOILS

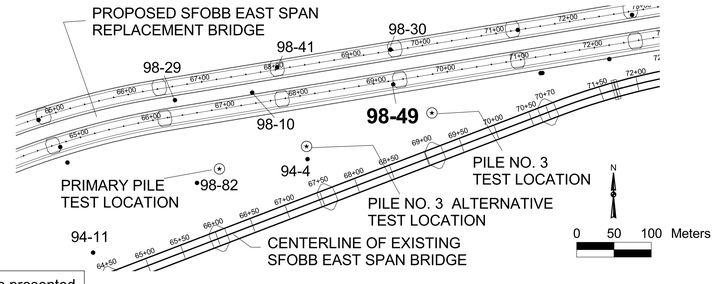
Consistency	Undrained Shear Strength kPa
Very Soft	less than 12
Soft	12 to 25
Firm	25 to 50
Stiff	50 to 100
Very Stiff	100 to 200
Hard	greater than 200

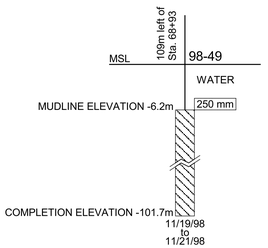
DENSITY OF GRANULAR SOILS

Descriptive Term	Relative Density (%)*
Very Loose	less than 15
Loose	15 to 35
Medium Dense	35 to 65
Dense	65 to 85
Very Dense	greater than 85

*Estimated from sampler driving record and CPT tip resistance.







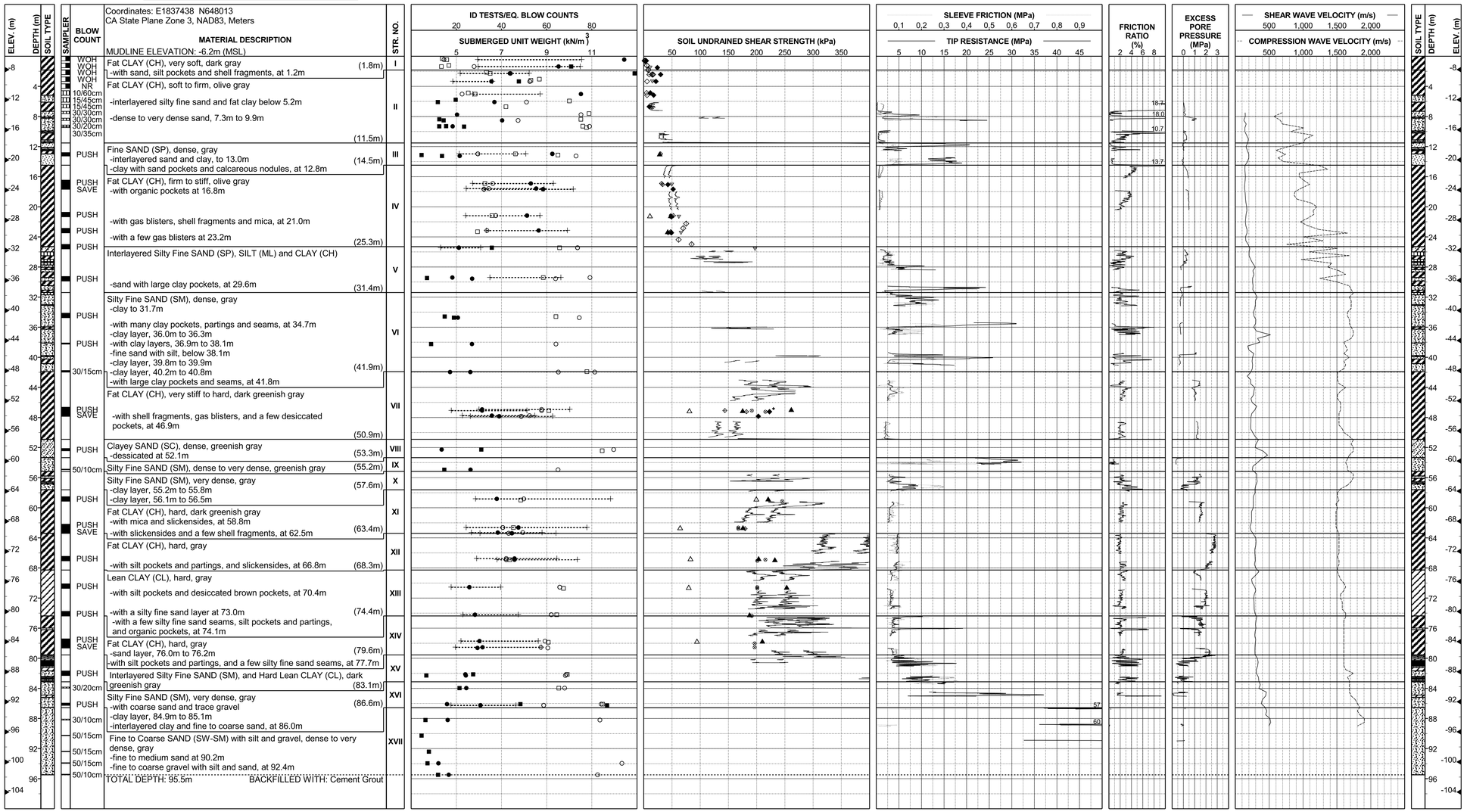
Note: Refer to multi-page logs presented in Volume 2 of the Final Marine Site Characterization Report for detailed soil descriptions.

BORING 98-49

Coordinates: E1837438 N648013
CA State Plane Zone 3, NAD83, Meters

MUDLINE ELEVATION: -6.2m (MSL)

STR. NO.	MATERIAL DESCRIPTION	BLOW COUNT	SAMPLER
I	Fat CLAY (CH), very soft, dark gray (1.8m) -with sand, silt pockets and shell fragments, at 1.2m	WOH WOH WOH WOH	
II	Fat CLAY (CH), soft to firm, olive gray -interlayered silty fine sand and fat clay below 5.2m -dense to very dense sand, 7.3m to 9.9m (11.5m)	NR 10/60cm 15/45cm 15/45cm 30/30cm 30/30cm 30/20cm 30/35cm	
III	Fine SAND (SP), dense, gray (14.5m) -interlayered sand and clay, to 13.0m -clay with sand pockets and calcareous nodules, at 12.8m	PUSH	
IV	Fat CLAY (CH), firm to stiff, olive gray -with organic pockets at 16.8m -with gas blisters, shell fragments and mica, at 21.0m -with a few gas blisters at 23.2m (25.3m)	PUSH SAVE PUSH PUSH PUSH	
V	Interlayered Silty Fine SAND (SP), SILT (ML) and CLAY (CH) -sand with large clay pockets, at 29.6m (31.4m)	PUSH	
VI	Silty Fine SAND (SM), dense, gray -clay to 31.7m -with many clay pockets, partings and seams, at 34.7m -clay layer, 36.0m to 36.3m -with clay layers, 36.9m to 38.1m -fine sand with silt, below 38.1m -clay layer, 39.8m to 39.9m -clay layer, 40.2m to 40.8m -with large clay pockets and seams, at 41.8m (41.9m)	PUSH PUSH 30/15cm	
VII	Fat CLAY (CH), very stiff to hard, dark greenish gray -with shell fragments, gas blisters, and a few desiccated pockets, at 46.9m (50.9m)	PUSH SAVE	
VIII	Clayey SAND (SC), dense, greenish gray -dessicated at 52.1m (53.3m)	PUSH	
IX	Silty Fine SAND (SM), dense to very dense, greenish gray (55.2m)	50/10cm	
X	Silty Fine SAND (SM), very dense, gray (57.6m) -clay layer, 55.2m to 55.8m -clay layer, 56.1m to 56.5m	PUSH	
XI	Fat CLAY (CH), hard, dark greenish gray -with mica and slickensides, at 58.8m -with slickensides and a few shell fragments, at 62.5m (63.4m)	PUSH SAVE	
XII	Fat CLAY (CH), hard, gray -with silt pockets and partings, and slickensides, at 66.8m (68.3m)	PUSH	
XIII	Lean CLAY (CL), hard, gray -with silt pockets and desiccated brown pockets, at 70.4m -with a silty fine sand layer at 73.0m (74.4m) -with a few silty fine sand seams, silt pockets and partings, and organic pockets, at 74.1m	PUSH PUSH	
XIV	Fat CLAY (CH), hard, gray (79.6m) -sand layer, 76.0m to 76.2m -with silt pockets and partings, and a few silty fine sand seams, at 77.7m	PUSH SAVE	
XV	Interlayered Silty Fine SAND (SM), and Hard Lean CLAY (CL), dark greenish gray (83.1m)	PUSH	
XVI	Silty Fine SAND (SM), very dense, gray (86.6m) -with coarse sand and trace gravel -clay layer, 84.9m to 85.1m -interlayered clay and fine to coarse sand, at 86.0m	30/20cm PUSH 30/10cm	
XVII	Fine to Coarse SAND (SW-SM) with silt and gravel, dense to very dense, gray -fine to medium sand at 90.2m -fine to coarse gravel with silt and sand, at 92.4m TOTAL DEPTH: 95.5m BACKFILLED WITH: Cement Grout	50/15cm 50/15cm 50/15cm 50/10cm	



JUAN F. CARPIO DESIGN OVERSIGHT	DRAWN BY SACHIN DESHPANDE CHECKED BY J.CHACKO	R.HOWARD/P.ROBBINS FIELD INVESTIGATOR DATE 06/24/99	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	ANTHONY R. DOVER PROJECT ENGINEER	BRIDGE NO. 33-25 km POST 0.0/0.5

SAN FRANCISCO OAKLAND BAY BRIDGE
EAST SPAN PILE TEST PROGRAM

LOG OF TEST BORINGS 6 OF 7

ORIGINAL SCALE IN CENTIMETERS FOR REDUCED PLANS 0 1 2 3 4 5 6 7 8 9 10

CU 04251
EA 012081

POST MILE 0.0/0.3

DISREGARD PRINTS BEARING EARLIER REVISION DATES → 05/14/99

REVISION DATES (PRELIMINARY STAGE ONLY)

SHEET 9 OF 12

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	Ala	80	0.0/0.5		

GEOTECHNICAL PROFESSIONAL 06/24/99

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER T.W. McNeilan No. 0583 Exp. 12/31/00 Geotechnical STATE OF CALIFORNIA

FUGRO-EARTH MECHANICS,
A JOINT VENTURE,
7700, Edgewater Dr., Ste. 848,
Oakland, CA 94621
(510) 633-5100

The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

SOIL AND ROCK TYPES

Well graded GRAVEL (GW); Poorly graded GRAVEL (GP); GRAVEL with sand (GP or GW); GRAVEL with clay (GP or GW); Clayey GRAVEL (GC); GRAVEL with silt (GP or GW); Silty GRAVEL (GM); Well graded SAND (SW); Poorly graded SAND (SP); SAND with gravel (SP or SW); SAND with clay (SP-SC); Clayey SAND (SC); Silty SAND (SM); SAND with silt (SP-SM); Fat CLAY (CH); Sandy fat CLAY (CH); Lean CLAY (CL); Sandy lean CLAY (CL); Silty CLAY (CL-ML); Elastic SILT (MH); SILT (ML); Sandy SILT (ML); Clayey silt (ML/CL); Highly plastic ORGANICS (OH); Low plasticity ORGANICS (OL); SANDSTONE (Rx); SILTSTONE (Rx); CLAYSTONE (Rx); Interbedded Rock Strata (Rx); CONGLOMERATE (Rx)

SAMPLERS

76mm-OD, 72mm-ID Thin Walled Tube; 76mm-OD, 60mm-ID Modified California Liner; 57mm-OD, 54mm-ID* Thin Walled Driven Tube; 51mm-OD, 35mm-ID SPT Split Spoon Sampler; 63.5mm-OD, 54mm-ID Offshore Liner; Rock Core (Inset symbol represents recovery (%)

* A variable-OD, 54-mm-ID tapered driven tube was used to sample coarse sand, gravel and rock

TUBE AND OFFSHORE LINER SAMPLERS

WOH	Offshore Liner sample advanced with the weight of an 80 kg hammer.
PUSH or SAVE	Pushed thin-walled 76mm-OD-tube.
15/60cm	Number of blows required to produce the indicated penetration using a 54mm-ID-tube sampler. The sampler was driven with an 80 kg downhole hammer dropped approximately 1.5 m.

STANDARD PENETRATION TEST AND MODIFIED CALIFORNIA LINER SAMPLERS

Samplers were driven with a 63.5 kg above deck hammer dropped approximately 760 mm.

20	Number of blows to produce 30 cm of penetration after the initial 15 cm of seating.
86/28cm	Number of blows required to produce the indicated penetration after an initial 15 cm seating.
Ref/8cm	50 blows produced the indicated penetration during the initial 15 cm interval.

Note: In rock coring interval recovery(%)-RQD are shown in the Blow Count column.

CLASSIFICATION TESTS BLOW COUNTS AND ROCK QUALITY

- ■ PERCENT PASSING #200 SIEVE
- ● WATER CONTENT (%)
- □ SUBMERGED UNIT WEIGHT
- ○ THEORETICAL SUBMERGED UNIT WEIGHT
- PLASTIC LIMIT LIQUID LIMIT
- EQUIVALENT SPT BLOW COUNT
- ROCK QUALITY DESIGNATION (RQD)
- ROCK RECOVERY PERCENT
- ROCK CORING RATE

STRENGTH TESTS

- POCKET PENETROMETER
- TORVANE
- REMOTE VANE
- MINIATURE VANE (RESIDUAL VANE)
- ▲ UNCONSOLIDATED UNDRAINED TRIAXIAL
- SWEDISH FALL CONE
- UNCONFINED COMPRESSION (SOIL)
- (Open symbols indicate remolded tests)
- Soil: Strength Exceeds Capacity of Measuring Device
- Rock: Sample broke along discontinuity; Intact sample would have greater strength
- Shear Strength Interpreted from CPT Tip Resistance
- POINT LOAD TEST (ROCK-INTACT SPECIMEN)
- POINT LOAD TEST (ROCK-ALONG WEAK PLANE)
- ■ UNCONFINED COMPRESSION (ROCK)
- FRACTURE DENSITY (ROCK)

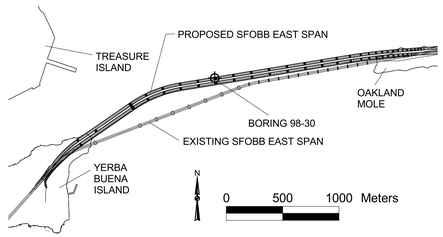
STRENGTH OF COHESIVE SOILS

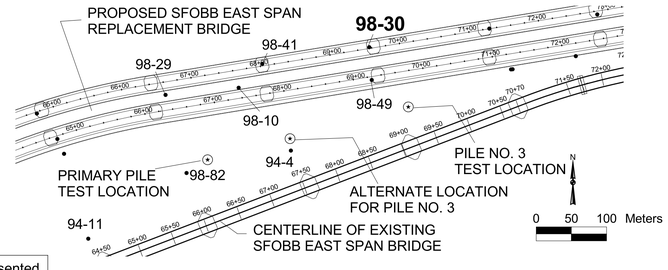
Consistency	Undrained Shear Strength kPa
Very Soft	less than 12
Soft	12 to 25
Firm	25 to 50
Stiff	50 to 100
Very Stiff	100 to 200
Hard	greater than 200

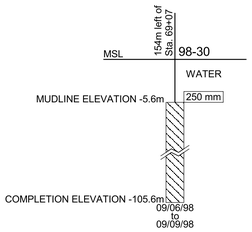
DENSITY OF GRANULAR SOILS

Descriptive Term	Relative Density (%)*
Very Loose	less than 15
Loose	15 to 35
Medium Dense	35 to 65
Dense	65 to 85
Very Dense	greater than 85

*Estimated from sampler driving record and CPT tip resistance.







Note: Refer to multi-page logs presented in Volume 2 of the Final Marine Site Characterization Report for detailed soil descriptions.

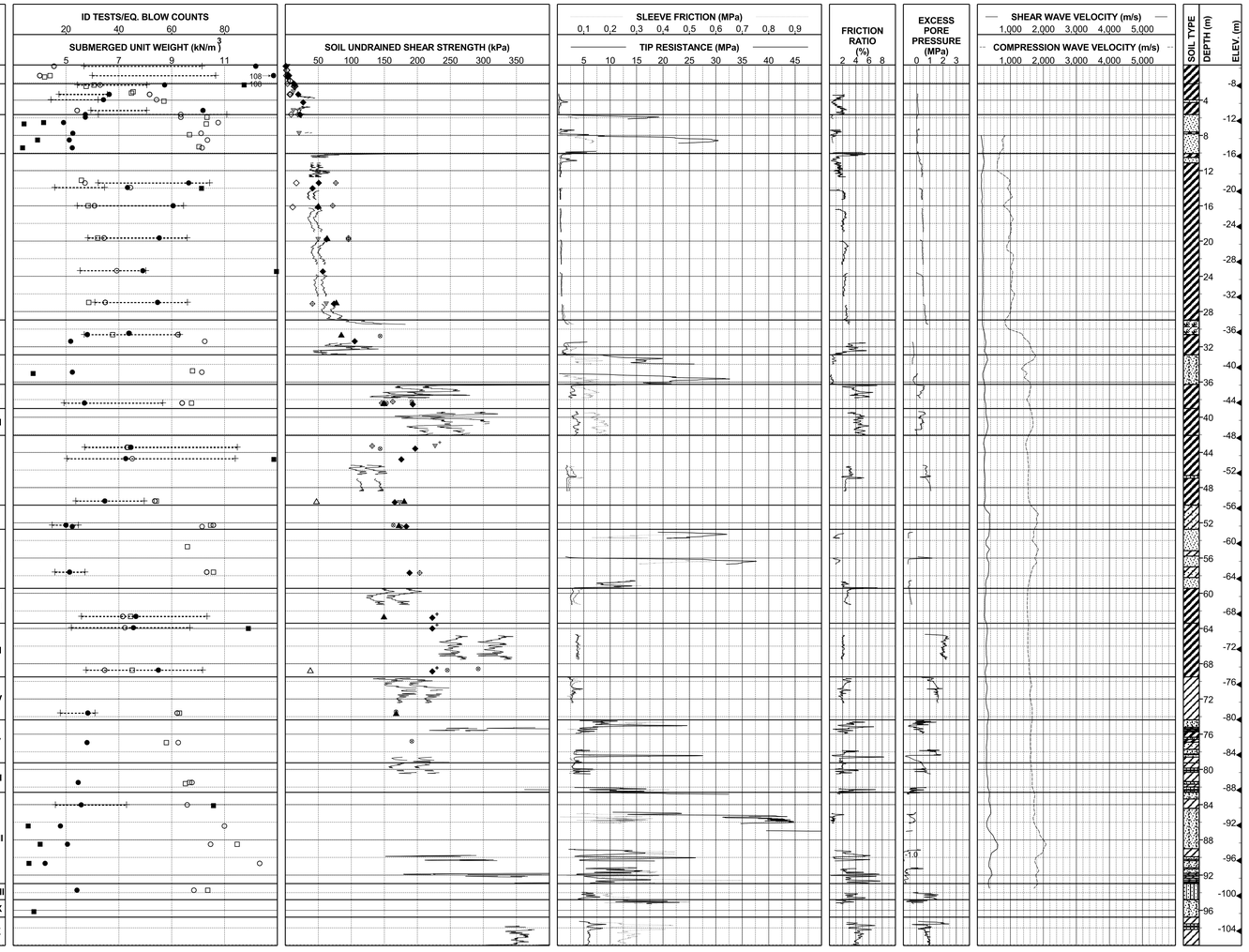
BORING 98-30

Coordinates: E1837434 N648060
CA State Plane Zone 3, NAD83, Meters

MUDLINE ELEVATION: -5.6m (MSL)

BLOW COUNT	MATERIAL DESCRIPTION	STR. NO.
WOH, WOH, WOH	Fat CLAY (CH), very soft, olive gray (2.1m)	I
WOH, 15/60cm, 9/60cm	Fat CLAY (CH), soft, olive gray -clay with fine sand, 4.3m to 5.0m (5.6m)	II
30/45cm, 30/30cm, 30/60cm, 30/30cm, 30/25cm, PUSH, SAVE, PUSH	Fine SAND (SP), very dense, gray -with medium sand -with shell fragments, 5.9m to 6.7m -with clay pockets and seams, 7.3m to 7.8m -with a clay layer, at 7.7m -with silt and shells, at 8.5m (10.1m)	III
PUSH, SAVE, PUSH, SAVE, PUSH	Fat CLAY (CH), firm to stiff, olive gray -with shell fragments -sand layer, 10.5m to 11.1m -with many shells, at 13.1m -with many silt and sand pockets, at 13.7m -with silt pockets and gas blisters, at 15.8m -with gas blisters, at 26.8m (29.0m)	IV
PUSH, SAVE	Fat CLAY (CH), stiff to very stiff, greenish gray -desiccated and with organic pockets -organic clay to 30.6m (32.9m)	V
30/60cm	Fine SAND with silt (SP-SM), very dense, olive gray -with medium sand -with shell fragments and fine gravel, at 34.7m (36.3m)	VI
PUSH	Fat CLAY (CH), very stiff to hard, greenish gray -with calcareous nodules at 38.4m (39.0m)	VII
	Fat CLAY (CH), hard, greenish gray -with sand partings, and seams, 39.6m to 42.1m (42.1m)	VIII
PUSH, SAVE, PUSH	Fat CLAY (CH), very stiff to hard, greenish gray -with slickensides, at 43.3m -with a silt layer at 46.8m -with a few silt pockets, at 49.4m (50.0m)	IX
PUSH	Sandy Lean CLAY (CL), very stiff, greenish gray -with silty sand pockets and a few roots, below 51.5m (52.7m)	X
30/15cm, 51/40cm	Fine SAND (SP), dense to very dense, greenish gray -clay layer, 55.2m to 55.8m -sandy clay layer, 57.0m to 58.2m (59.4m)	XI
PUSH, SAVE	Fat CLAY (CH), hard, greenish gray (63.4m)	XII
PUSH	Fat CLAY (CH), hard, greenish gray -with silt pockets and partings -with sandy silt pockets and partings, at 68.6m (69.5m)	XIII
PUSH	Lean CLAY (CL), hard, greenish gray -with a silt seam, at 70.9m -with organic pockets, silt pockets and partings, at 73.5m (74.4m)	XIV
PUSH	Interlayered Silty Fine SAND (SM), dense, and Fat CLAY (CH), hard, dark greenish gray (79.2m)	XV
30/25cm	Lean CLAY (CL), hard, greenish gray -with silt seams, 79.9m to 80.5m -silty sand with clay layers, below 81.4m (82.6m)	XVI
SAVE, 30/20cm, 30/20cm, 30/15cm	Fine to Medium SAND (SP-SM) with silt, very dense, gray -greenish gray, lean clay with sand, 83.4m to 84.4m -with a trace of coarse sand, below 86.3m -with gravel below 88.4m -with clay seams and layers, below 89.0m -fine to coarse gravel with silt and sand, at 90.5m (93.0m)	XVII
PUSH	Sandy SILT (ML), hard, brownish yellow -with clay pockets and seams (94.8m)	XVIII
30/15cm	Medium SAND (SP-SM) with silt, very dense, dark brown (96.8m)	XIX
	Lean CLAY (CL), hard, brown	XX

TOTAL DEPTH: 100.0m BACKFILLED WITH: Cement Grout



JUAN F. CARPIO, DESIGN OVERSIGHT	DRAWN BY: SACHIN DESHPANDE	J.CHACKO/M.ZUEGER, FIELD INVESTIGATOR	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION
	CHECKED BY: J.CHACKO	DATE 06/24/99	

ANTHONY R. DOVER, PROJECT ENGINEER

BRIDGE NO.	km POST	POST MILE
33-25	0.0/0.5	0.0/0.3

CU 04251
EA 012081

SAN FRANCISCO OAKLAND BAY BRIDGE
EAST SPAN PILE TEST PROGRAM

LOG OF TEST BORINGS 7 OF 7

ORIGINAL SCALE IN CENTIMETERS FOR REDUCED PLANS 0 1 2 3 4 5 6 7 8 9 10

DISREGARD PRINTS BEARING EARLIER REVISION DATES → 05/14/99

REVISION DATES (PRELIMINARY STAGE ONLY) | SHEET 10 | OF 12

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	Ala	80	0.0/0.5		

NOTE: Data presented on this sheet was digitized from the plan size Log of Test Boring sheets provided by Caltrans. Data were converted to Metric units. As per Caltrans direction, field descriptions on original LOTBs have not been modified to reflect subsequent laboratory test results.

The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

Metric

SOIL AND ROCK TYPES

- Well graded GRAVEL (GW)
- Poorly graded GRAVEL (GP)
- GRAVEL with sand (GP or GW)
- GRAVEL with clay (GP or GW)
- Clayey GRAVEL (GC)
- GRAVEL with silt (GP or GW)
- Silty GRAVEL (GM)
- Well graded SAND (SW)
- Poorly graded SAND (SP)
- SAND with gravel (SP or SW)
- SAND with clay (SP-SC)
- Clayey SAND (SC)
- Silty SAND (SM)
- SAND with silt (SP-SM)
- Fat CLAY (CH)
- Sandy fat CLAY (CH)
- Lean CLAY (CL)
- Sandy lean CLAY (CL)
- Silty CLAY (CL-ML)
- Elastic SILT (MH)
- SILT (ML)
- Sandy SILT (ML)
- Clayey silt (ML/CL)
- Highly plastic ORGANICS (OH)
- Low plasticity ORGANICS (OL)
- SANDSTONE (Rx)
- SILTSTONE (Rx)
- CLAYSTONE (Rx)
- Interbedded Rock Strata (Rx)
- CONGLOMERATE (Rx)

SAMPLERS

- 76mm-OD, 72mm-ID Thin Walled Tube
- 57mm-OD, 54mm-ID* Thin Walled Driven Tube
- 63.5mm-OD, 54mm-ID Offshore Liner
- 76mm-OD, 60mm-ID Modified California Liner
- 51mm-OD, 35mm-ID SPT Split Spoon Sampler
- Rock Core (Inset symbol represents recovery (%))

* A variable-OD, 54-mm-ID tapered driven tube was used to sample coarse sand, gravel and rock

TUBE AND OFFSHORE LINER SAMPLERS

WOH	Offshore Liner sample advanced with the weight of an 80 kg hammer.
PUSH or SAVE	Pushed thin-walled 76mm-OD-tube.
15/60cm	Number of blows required to produce the indicated penetration using a 54mm-ID-tube sampler. The sampler was driven with an 80 kg downhole hammer dropped approximately 1.5 m.

STANDARD PENETRATION TEST AND MODIFIED CALIFORNIA LINER SAMPLERS

Samplers were driven with a 63.5 kg above deck hammer dropped approximately 760 mm.

20	Number of blows to produce 30 cm of penetration after the initial 15 cm of seating.
86/28cm	Number of blows required to produce the indicated penetration after an initial 15 cm seating.
Ref/8cm	50 blows produced the indicated penetration during the initial 15 cm interval.

Note: In rock coring interval recovery(%)-RQD are shown in the Blow Count column.

CLASSIFICATION TESTS BLOW COUNTS AND ROCK QUALITY

- ■ PERCENT PASSING #200 SIEVE
- ● WATER CONTENT (%)
- □ SUBMERGED UNIT WEIGHT
- ○ THEORETICAL SUBMERGED UNIT WEIGHT

PLASTIC LIMIT LIQUID LIMIT

- ⊗ EQUIVALENT SPT BLOW COUNT

STRENGTH TESTS

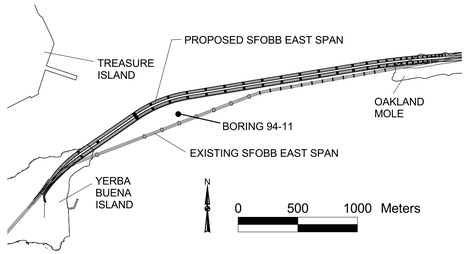
- ⊗ POCKET PENETROMETER
- ⊕ TORVANE
- ◇ REMOTE VANE
- ◆ MINIATURE VANE (⊕ RESIDUAL VANE)
- ▲ UNCONSOLIDATED UNDRAINED TRIAXIAL
- ▽ SWEDISH FALL CONE
- ⊡ UNCONFINED COMPRESSION (SOIL)
- ◇△ (Open symbols indicate remolded tests)
- ┼ Soil: Strength Exceeds Capacity of Measuring Device
  Rock: Sample broke along discontinuity; Intact sample would have greater strength

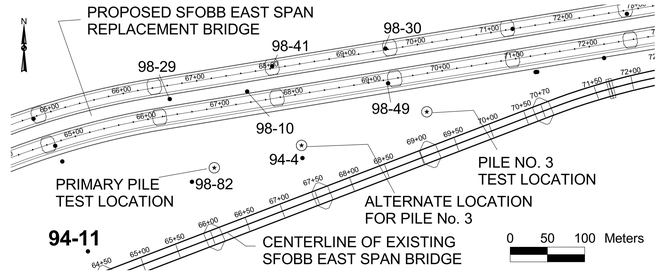
CONSISTENCY CLASSIFICATION FOR SOILS

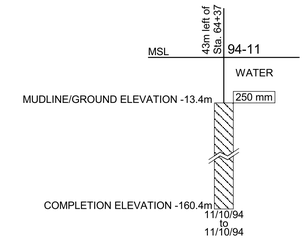
Penetration Index (Blows / 0.3m)	Granular	Cohesive
0-4	Very Loose	Very Soft
5-9	Loose	Soft
10-19	Slightly Compact	Stiff
20-34	Compact	Very Stiff
35-69	Dense	Hard
>70	Very Dense	Very Hard

Notes:

1. Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis







BORING 94-11

Coordinates: E1838455 N647138
CA State Plane Zone 3, NAD83, Meters

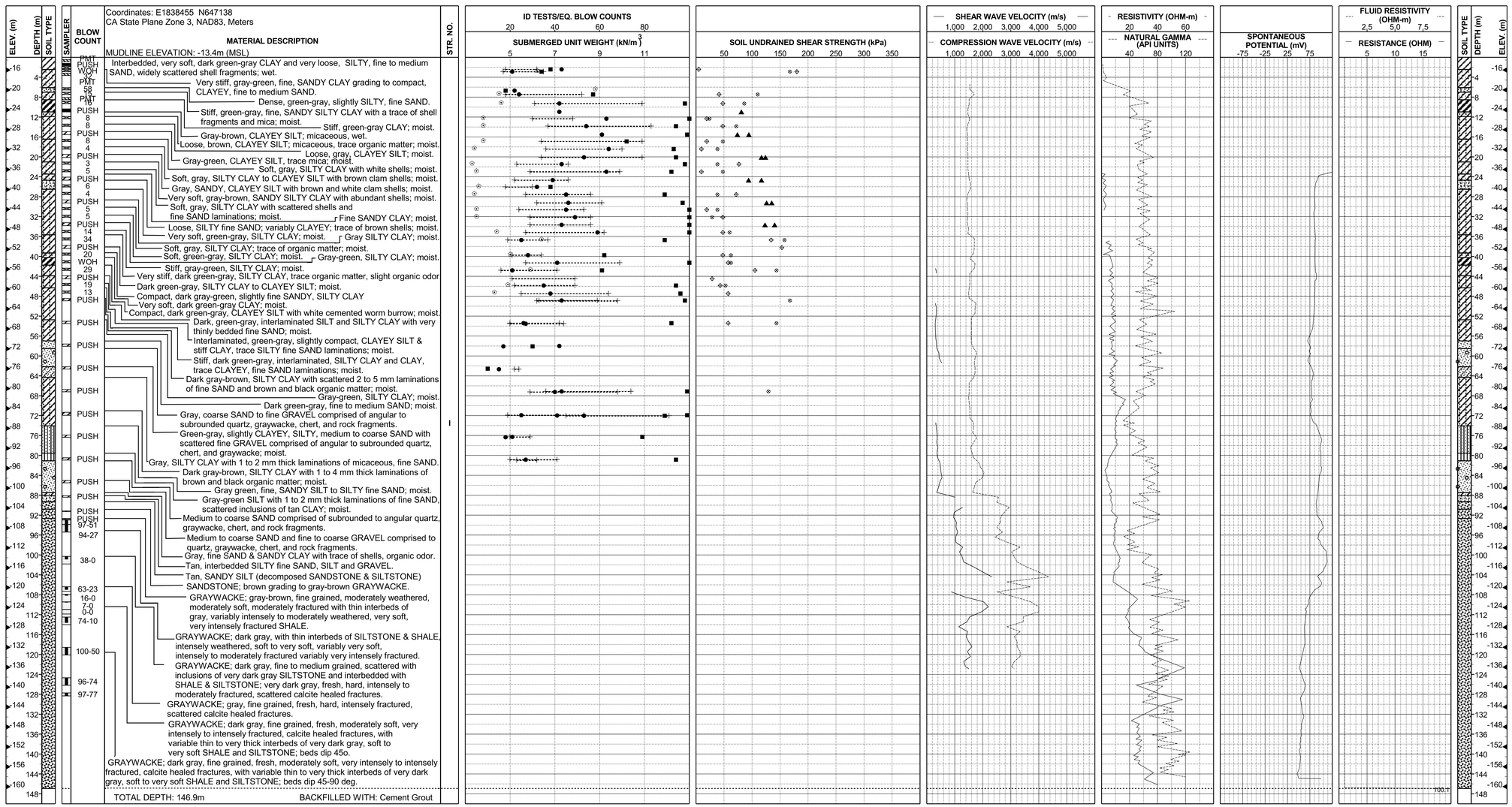
MUDLINE ELEVATION: -13.4m (MSL)

MATERIAL DESCRIPTION

Interbedded, very soft, dark green-gray CLAY and very loose, SILTY, fine to medium SAND, widely scattered shell fragments; wet.
Very stiff, gray-green, fine, SANDY CLAY grading to compact, CLAYEY, fine to medium SAND.
Dense, green-gray, slightly SILTY, fine SAND.
Stiff, green-gray, fine, SANDY SILTY CLAY with a trace of shell fragments and mica; moist.
Stiff, green-gray CLAY; moist.
Gray-brown, CLAYEY SILT; micaceous, wet.
Loose, brown, CLAYEY SILT; micaceous, trace organic matter; moist.
Loose, gray, CLAYEY SILT; moist.
Gray-green, CLAYEY SILT, trace mica; moist.
Soft, gray, SILTY CLAY with white shells; moist.
Soft, gray, SILTY CLAY to CLAYEY SILT with brown clam shells; moist.
Gray, SANDY, CLAYEY SILT with brown and white clam shells; moist.
Very soft, gray-brown, SANDY SILTY CLAY with abundant shells; moist.
Soft, gray, SILTY CLAY with scattered shells and fine SAND laminations; moist.
Fine SANDY CLAY; moist.
Loose, SILTY fine SAND; variably CLAYEY; trace of brown shells; moist.
Very soft, green-gray, SILTY CLAY; moist.
Gray SILTY CLAY; moist.
Soft, gray, SILTY CLAY; trace of organic matter; moist.
Soft, green-gray, SILTY CLAY; moist.
Gray-green, SILTY CLAY; moist.
Stiff, gray-green, SILTY CLAY; moist.
Very stiff, dark green-gray, SILTY CLAY, trace organic matter, slight organic odor
Dark green-gray, SILTY CLAY to CLAYEY SILT; moist.
Compact, dark gray-green, slightly fine SANDY, SILTY CLAY
Very soft, dark green-gray CLAY; moist.
Compact, dark green-gray, CLAYEY SILT with white cemented worm burrow; moist.
Dark, green-gray, interlaminated SILT and SILTY CLAY with very thinly bedded fine SAND; moist.
Interlaminated, green-gray, slightly compact, CLAYEY SILT & stiff CLAY, trace SILTY fine SAND laminations; moist.
Stiff, dark green-gray, interlaminated, SILTY CLAY and CLAY, trace CLAYEY, fine SAND laminations; moist.
Dark gray-brown, SILTY CLAY with scattered 2 to 5 mm laminations of fine SAND and brown and black organic matter; moist.
Gray-green, SILTY CLAY; moist.
Dark green-gray, fine to medium SAND; moist.
Gray, coarse SAND to fine GRAVEL comprised of angular to subrounded quartz, graywacke, chert, and rock fragments.
Green-gray, slightly CLAYEY, SILTY, medium to coarse SAND with scattered fine GRAVEL comprised of angular to subrounded quartz, chert, and graywacke; moist.
Gray, SILTY CLAY with 1 to 2 mm thick laminations of micaceous, fine SAND.
Dark gray-brown, SILTY CLAY with 1 to 4 mm thick laminations of brown and black organic matter; moist.
Gray green, fine, SANDY SILT to SILTY fine SAND; moist.
Gray-green SILT with 1 to 2 mm thick laminations of fine SAND, scattered inclusions of tan CLAY; moist.
Medium to coarse SAND comprised of subrounded to angular quartz, graywacke, chert, and rock fragments.
Medium to coarse SAND and fine to coarse GRAVEL comprised to quartz, graywacke, chert, and rock fragments.
Gray, fine SAND & SANDY CLAY with trace of shells, organic odor.
Tan, interbedded SILTY fine SAND, SILT and GRAVEL.
Tan, SANDY SILT (decomposed SANDSTONE & SILTSTONE)
SANDSTONE; brown grading to gray-brown GRAYWACKE.
GRAYWACKE; gray-brown, fine grained, moderately weathered, moderately soft, moderately fractured with thin interbeds of gray, variably intensely to moderately weathered, very soft, very intensely fractured SHALE.
GRAYWACKE; dark gray, with thin interbeds of SILTSTONE & SHALE, intensely weathered, soft to very soft, variably very soft, intensely to moderately fractured variably very intensely fractured.
GRAYWACKE; dark gray, fine to medium grained, scattered with inclusions of very dark gray SILTSTONE and interbedded with SHALE & SILTSTONE; very dark gray, fresh, hard, intensely to moderately fractured, scattered calcite healed fractures.
GRAYWACKE; gray, fine grained, fresh, hard, intensely fractured, scattered calcite healed fractures.
GRAYWACKE; dark gray, fine grained, fresh, moderately soft, very intensely to intensely fractured, calcite healed fractures, with variable thin to very thick interbeds of very dark gray, soft to very soft SHALE and SILTSTONE; beds dip 45o.
GRAYWACKE; dark gray, fine grained, fresh, moderately soft, very intensely to intensely fractured, calcite healed fractures, with variable thin to very thick interbeds of very dark gray, soft to very soft SHALE and SILTSTONE; beds dip 45-90 deg.

TOTAL DEPTH: 146.9m

BACKFILLED WITH: Cement Grout



JUAN F. CARPIO, DESIGN OVERSIGHT	DRAWN BY: SACHIN DESHPANDE	K. AMARU, J. BOWMAN, L. JENSEN, H. VALENCIA, G. WILCOX, FIELD INVESTIGATOR	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	ANTHONY R. DOVER, PROJECT ENGINEER	BRIDGE NO. 33-25
	CHECKED BY: J. THORNE	DATE 06/24/99			KM POST 0.0/0.5
				CU 04251 EA 012081	POST MILE 0.0/0.3

SAN FRANCISCO OAKLAND BAY BRIDGE
EAST SPAN PILE TEST PROGRAM

GEOLOGIC INFORMATION 1 of 2

ORIGINAL SCALE IN CENTIMETERS FOR REDUCED PLANS 0 1 2 3 4 5 6 7 8 9 10

DISREGARD PRINTS BEARING EARLIER REVISION DATES → 05/14/99

REVISION DATES (PRELIMINARY STAGE ONLY) | SHEET 11 | OF 12

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	Ala	80	0.0/0.5		

NOTE: Data presented on this sheet was digitized from the plan size Log of Test Boring sheets provided by Caltrans. Data were converted to Metric units. As per Caltrans direction, field descriptions on original LOTBs have not been modified to reflect subsequent laboratory test results.

The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

Metric

SOIL AND ROCK TYPES

- Well graded GRAVEL (GW)
- Poorly graded GRAVEL (GP)
- GRAVEL with sand (GP or GW)
- GRAVEL with clay (GP or GW)
- Clayey GRAVEL (GC)
- GRAVEL with silt (GP or GW)
- Silty GRAVEL (GM)
- Well graded SAND (SW)
- Poorly graded SAND (SP)
- SAND with gravel (SP or SW)
- SAND with clay (SP-SC)
- Clayey SAND (SC)
- Silty SAND (SM)
- SAND with silt (SP-SM)
- Fat CLAY (CH)
- Sandy fat CLAY (CH)
- Lean CLAY (CL)
- Sandy lean CLAY (CL)
- Silty CLAY (CL-ML)
- Elastic SILT (MH)
- SILT (ML)
- Sandy SILT (ML)
- Clayey silt (ML/CL)
- Highly plastic ORGANICS (OH)
- Low plasticity ORGANICS (OL)
- SANDSTONE (Rx)
- SILTSTONE (Rx)
- CLAYSTONE (Rx)
- Interbedded Rock Strata (Rx)
- CONGLOMERATE (Rx)

SAMPLERS

- 76mm-OD, 72mm-ID Thin Walled Tube
- 57mm-OD, 54mm-ID* Thin Walled Driven Tube
- Christensen Sampler
- 76mm-OD, 60mm-ID Modified California Liner
- 51mm-OD, 35mm-ID SPT Split Spoon Sampler
- Rock Core (Inset symbol represents recovery (%))

* A variable-OD, 54-mm-ID tapered driven tube was used to sample coarse sand, gravel and rock

TUBE AND OFFSHORE LINER SAMPLERS

WOH	Offshore Liner sample advanced with the weight of an 80 kg hammer.
PUSH or SAVE	Pushed thin-walled 76mm-OD-tube.
15/60cm	Number of blows required to produce the indicated penetration using a 54mm-ID-tube sampler. The sampler was driven with an 80 kg downhole hammer dropped approximately 1.5 m.

STANDARD PENETRATION TEST AND MODIFIED CALIFORNIA LINER SAMPLERS

Samplers were driven with a 63.5 kg above deck hammer dropped approximately 760 mm.

20	Number of blows to produce 30 cm of penetration after the initial 15 cm of seating.
86/28cm	Number of blows required to produce the indicated penetration after an initial 15 cm seating.
Ref/8cm	50 blows produced the indicated penetration during the initial 15 cm interval.

Note: In rock coring interval recovery(%)-RQD are shown in the Blow Count column.

CLASSIFICATION TESTS BLOW COUNTS AND ROCK QUALITY

- ■ PERCENT PASSING #200 SIEVE
- ● WATER CONTENT (%)
- □ SUBMERGED UNIT WEIGHT
- ○ THEORETICAL SUBMERGED UNIT WEIGHT

PLASTIC LIMIT +----------+ LIQUID LIMIT

- ⊙ EQUIVALENT SPT BLOW COUNT

STRENGTH TESTS

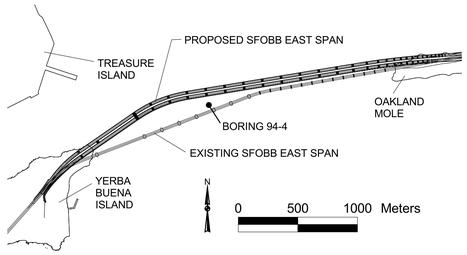
- ⊗ POCKET PENETROMETER
- ⊕ TORVANE
- ◇ REMOTE VANE
- ◆ MINIATURE VANE (⊗ RESIDUAL VANE)
- ▲ UNCONSOLIDATED UNDRAINED TRIAXIAL
- ▽ SWEDISH FALL CONE
- ⊡ UNCONFINED COMPRESSION (SOIL)
- ◇△ (Open symbols indicate remolded tests)
- ┼ Soil: Strength Exceeds Capacity of Measuring Device
  Rock: Sample broke along discontinuity; Intact sample would have greater strength

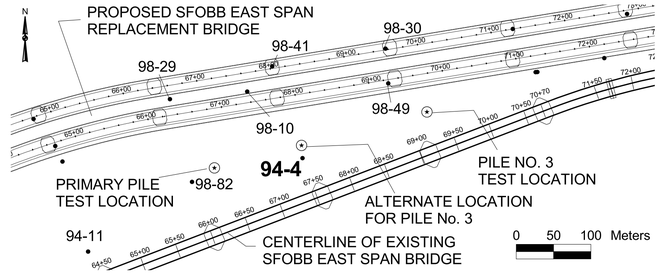
CONSISTENCY CLASSIFICATION FOR SOILS

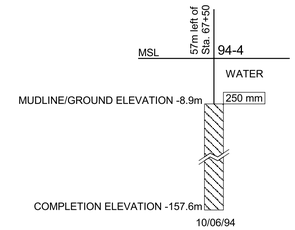
Penetration Index (Blows / 0.3m)	Granular	Cohesive
0-4	Very Loose	Very Soft
5-9	Loose	Soft
10-19	Slightly Compact	Stiff
20-34	Compact	Very Stiff
35-69	Dense	Hard
>70	Very Dense	Very Hard

Notes:

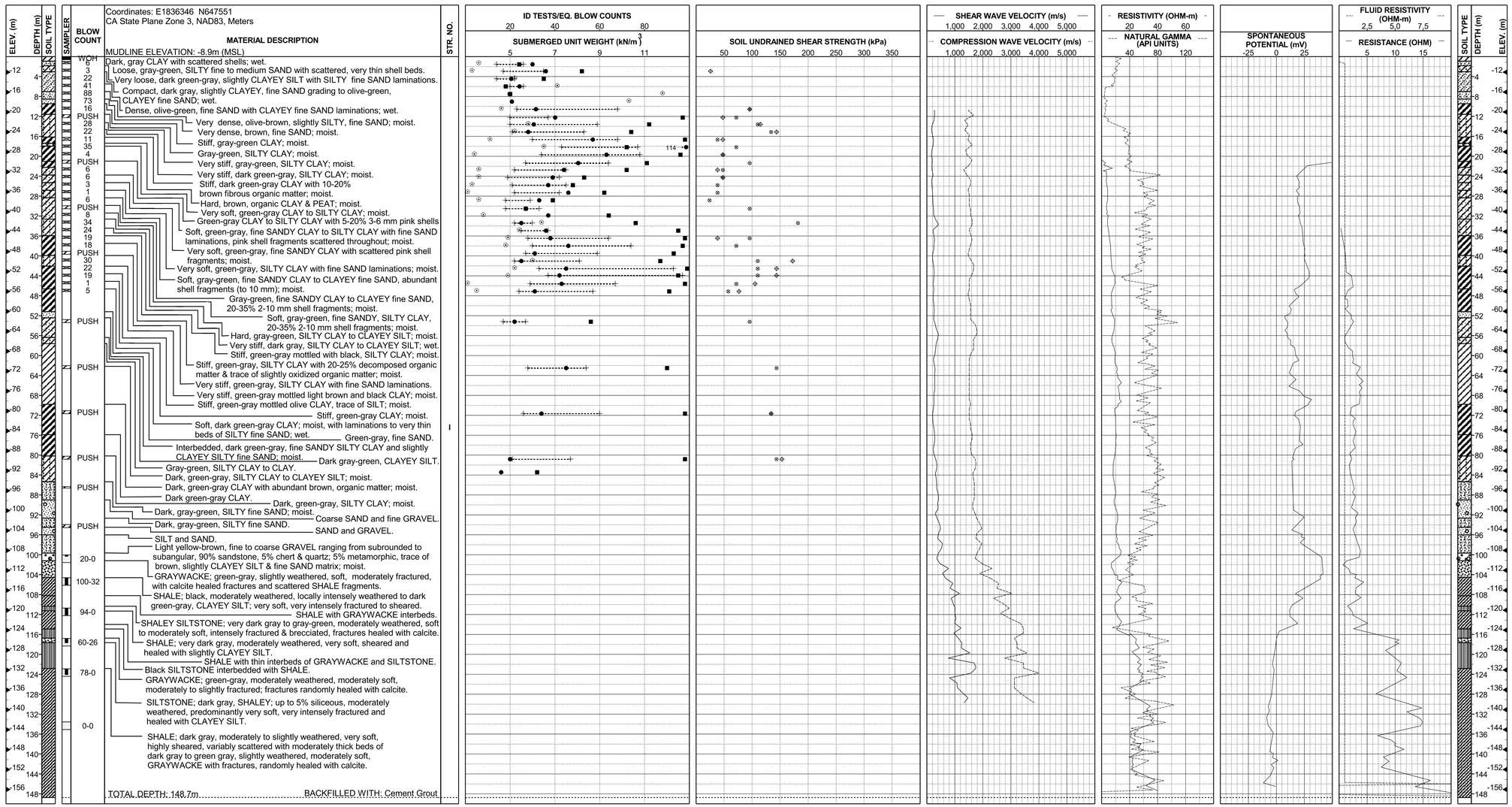
1. Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis
2. A strong motion accelerometer was installed at bottom of hole. This device is being monitored by the Earth Sciences Division of Lawrence Livermore National Laboratory, University of California, Livermore, P.O.Box 808, L-208, Livermore, CA 94551.







BORING 94-4



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SAN FRANCISCO OAKLAND BAY BRIDGE
EAST SPAN PILE TEST PROGRAM

GEOLOGIC INFORMATION 2 of 2

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SHEET 12 OF 12