TENSION PILE STUDY
CNRD 13-3
VOLUME I

DESIGN DRAWINGS AND SPECIFICATIONS FOR THE PHYSICAL TEST SYSTEM

Interim Technical Report No. 82-200-01

Report
to
Conoco Norway, Inc.

Through
Det Norske Veritas
Oslo, Norway

By
The Earth Technology Corporation
Houston, Texas

August, 1983

The Earth Technology Corporation

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Telephone: (713) 974-1555 • Telex: 4993065

March 12, 1984

A.S VERITEC
Veritasveien 1
P. O. Box 300
N-1322 Høvik, Norway

Attention: Mr. Kjell Hauge

Gentlemen:

In accordance with the contract between The Earth Technology Corporation and Det Norske Veritas, submitted herein is the initial report for Conoco Norway's Subproject CNRD 13-3.

The report contains the drawings and specifications for the 30-in. diameter test pile installed at the West Delta 58A platform in December 1983.

The submittal of this report constitutes the end of Task 1 of The Earth Technology Corporation's work under the contract.

Sincerely,

J. Dewaine Bogard
Senior Engineer

Jean M. E. Audibert, P.E.
General Manager
Gulf States Division

JDB/JMEA:sac
Enclosure
Distribution:
(4) Det Norske Veritas
(6) Conoco, Inc. (PES)
Attention: Mr. J. H. C. Chan
(2) Conoco, Inc. (PRD)
Attention: Mr. J. L. Mueller

PREFACE

This report is the first of a series of reports to be issued under Conoco Norway's Subproject CNRD 13-3. The major portion of the project is directed toward the fabrication, installation and testing of the large-diameter test pile and is a portion of the overall project developed to better understand the pile-soil interaction associated with foundation piles for a tension leg platform.

The results of this report for the large-scale field test program have been prepared through the joint efforts of several Earth Technology Corporation's engineers with the cooperation and assistance of personnel from the Houston and New Orleans offices of Conoco, Inc. and Delta Marine Structures, also located in New Orleans.

Overall project scheduling and management was conducted by J. Dewaine Bogard. Thomas K. Hamilton was responsible for the administrative matters and G. Leon Holloway was responsible for the design of the test pile and operational instructions.

Hudson Matlock and Jean M. E. Audibert provided technical guidance in the preparation of this report.

Conoco, Inc., Houston, supported the Earth Technology Corporation staff with Jack H. C. Chan and Harold V. Phenix providing pertinent technical data. George Santos of Conoco, New Orleans Division, assisted in providing invaluable operational considerations for the platform modification and the installation scheme for the test pile.

Augustin Chin of Delta Marine Structures, New Orleans, prepared the modifications to the existing platform and the design of the load frame and testing system.

TABLE OF CONTENTS

ILLUSTRATIONS

DESIGN DRAWINGS AND SPECIFICATIONS FOR THE PHYSICAL TEST SYSTEM

1.0 INTRODUCTION

This report presents information concerning the design of a large-diameter instrumented pile and its installation at a decommissioned CAGC platform in Block 58 of the West Delta Area, Gulf of Mexico. The large-diameter instrumented pile test discussed herein is considered the main portion of the three-phase project with the overall objective of improving the understanding of the pile-soil interaction during cyclic tensile loading, such as the loading expected to be produced by a deep-water Tension Leg Platform (TLP).

The information contained in this report is intended to provide documentation of the design of the test pile, test system, platform modifications, and instructions for the fabrication of test pile and the installation procedures at the offshore test location. Further detailed documentation of the instrument design and data acquisition system will be presented in a subsequent report.

This report is the first of a series of reports to be issued for CNRD 13-3. Previous reports, presented in three volumes, for work authorized under CNRD 13-2 were as follows:

Tension Pile Study, Volume I, Site Investigation and Soil Characterization Study at Block 58 West Delta Area, Gulf of Mexico, April, 1982.

Tension Pile Study, Volume II, Plan for Performing Offshore Small-Diameter Pile Segment Tests, August, 1982.

Tension Pile Study, Volume III, Final Report on Small-Diameter Pile Segment Tests, August, 1983.

2.0 DESIGN OF THE INSTRUMENTED TEST PILE

2.1 General

The design of the instrumented test pile will be discussed in the following paragraphs of this section with each specific type of instrument and accompanying hardware being addressed. The detailed design drawings for the fabrication of the instrumented test pile are presented in Appendix A. The drawings are grouped into six major areas as follows:

1. Test pile layout
2. Strain modules and pressure transducers
3. Extensometer access tubes
4. Tell-tale access tubes
5. Bundle rods and cover plates
6. Calibration

The group arrangement above does not necessarily follow the fabrication sequence of the test pile. The actual sequence of fabrication for the test pile is presented in Appendix C in a critical path format.

Accompanying the design drawings are a set of instructions for the fabrication of the test pile. These instructions give a step-by-step procedure with highlights covering the major areas required in the fabrication process. These instructions are presented in Appendix B.

2.2 Test Pile Layout

The test pile will consist of three segments, the first being a 55-m (180-ft) instrumented segment, while the two add-on segments are 27.5 m (90 ft) long each. The second add-on segment incorporates a loading head, located 2.1 m (7 ft) below the top of the pile. Each segment will be fabricated from shorter lengths designated as "cans".

For the instrumented segment, each can will be 9.2 m (30 ft) in length, with the location of the instruments in each can being identical except for Can 1, which deviates slightly from this scheme inasmuch as the pressure transducers are positioned differently. Reasons for dividing the instrumented segment into 9.2 m (30 ft) cans were as follows:

- To allow individual calibration of each can
- To reduce handling requirements
- To increase efficiency
- To allow better ventilation and lighting
- To facilitate repetitive operations.

The first add-on segment will be assembled from 3.05-m (10-ft) lengths into a 12.2-m (40-ft) and a 15.2-m (50-ft) can. The internal hardware for these cans will be installed while they are still in these lengths. The second add-on segment will be fabricated in the same manner as the first add-on, with the only difference being that the 12.2-m (40-ft) can is made up from two 6.1-m (20-ft) lengths with a load head attached to one of the segments. Details of the assembly process and test pile layout are presented in Appendix B.

2.3 Strain Modules

The strain modules to be used in the test pile were designed by The Earth Technology Corporation to avoid several problems which commonly occur in instrumented test piles. These instruments were designed to average the wall strain in the pile over a length slightly greater than one pile diameter, thus avoiding problems associated with local strain variation near irregularities or discontinuities in the wall thickness of the pile. The units are also totally self-contained and protected from damage by scouring from the internal soil plug. In addition, the strain gage units are hermetically sealed to avoid the loss of the instruments due to moisture intrusion. A schematic illustration of the strain module is given in Plate 1.

Strain modules will be located in the instrumented segment and the second add-on segment. The strain modules in the second add-on, near the pile load head, will be used for determining the pile head load, whereas the strain modules in the instrumented segment are used to determine load "take-out" over the embedded length of the test pile.

2.4 Pressure Transducers

In the instrumented segment of the test pile, a pore pressure transducer and a total pressure transducer will be located on each side of the pile, 0.6 m (2 ft) between centers. The pressure transducers locations are reversed from one side to the other, so that comparable pore pressure and total pressure measurements are made at the same elevation.

Each transducer will be bolted into a mounting ring pre-welded to the pile wall. The position of the pressure transducers and instructions for installation are given in Group B drawings of Appendices A and Appendix B, respectively. A schematic of the two types of pressure transducers are shown on Plates 2 and 3.

2.5 Extensometer Access Tubes

The extensometers are electro-mechanical devices which measure the change in length of a section of the pile during application of load. These devices are located in Cans 2, 4, and 6 and serve as a redundant measurement for the permanently attached strain modules. A schematic diagram of an extensometer is shown in Plate 4.

Extensometers will be lowered from the top of the pile to its seating location within the gage section through access tubes welded to the inside wall of the pile. These access tubes are water-tight and are to be kept free of foreign matter. A special stab-type connector has been developed to ensure the water-tight integrity of the access tubes at the splice joints. This stab-type connector utilizes a double 0-ring seal, as shown on Plate 5.

Extensometer gage sections are located at three elevations in the instrumented segment, with diametrically opposed gage sections at each level. The three tubes on either side of the pile are connected to each other as an additional backup for flushing the seats of the gage sections should this be required. The installation procedure for attaching the extensometer gage sections and associated hardware to the pile wall is given in Group C drawings of Appendix A. Detailed instructions as to the installation of the extensometer tubes as the pile is being assembled are given in Appendix B.

2.6 Tell-Tale Access Tubes

Tell-tales use a constant-tension steel wire to measure the movement at a particular location on the pile. Two levels of tell-tales are to be installed in the instrumented segment.

The tell-tale access tubes serve the same purpose as the extensometer tubes, that is to allow a passageway for the instrument. In this case, the "instrument" is a cylindrical anchor weight. Since no electrical instruments are housed in the tube, the restrictions for water-tightness and cleanliness can be relaxed. Detailed drawings and instructions for the tell-tale access tube installation are given in Appendices A and B, respectively.

2.7 Bundle Rods and Cover Plates

Cables will run from the instruments to the top of the pile and into the data acquisition building (Plate 6). These cables pass from the inside of the pile to the outside at a location just below the top of the instrumented segment. Once the cables have exited the pile, they run the rest of the distance along the outside wall of the two add-on segments. To prevent damage to the cables, support must be provided during the pile driving and handling operations. A deformed rod (rebar), comparable in diameter to that of the cable and located approximately one cable diameter off the pile wall, accomplishes this purpose. The cables are to be securely fixed to the deformed rod with ty wraps. Spacings of the bundle rods and supports are given in Appendix A.

2.8 Calibration

Each test can will be calibrated under load so that the cross-sectional area can be accurately measured. The calibration is accomplished by loading the pile in compression with known loads so that the pile stiffness, AE, may be determined. This number is then utilized in the field to convert strains to loads. Instructions and drawings of the calibration frame are presented in Appendices A and B.

3.0 INSTALLATION OF THE TEST PILE

3.1 General

The installation of the test pile is the most critical step in the chain of events leading up to the successful testing of the instrumented pile. Throughout the fabrication and installation process, numerous contractors will be involved. This will require careful planning and scheduling to accomplish the necessary work in a timely and orderly fashion.

An organizational chart and critical path diagram outlining the installation process at the West Delta Block 58A platform site is presented in Appendix D.

The topics discussed in this section will cover a general outline of the events required for preparing the test site, mobilization, and test pile installation. Details with step-by-step guidelines are presented in the instructions for the installation of the test system in Appendix D.

3.2 Platform Modifications

Some structural modifications to the platform are required to accommodate the load frame and deck-mounted crawler crane, both of which are to be assembled on the deck of the existing structure. The major modifications, however, center around the platform itself and the bay in which the load frame will be installed.

A complete set of platform modifications and load frame drawings is given in Appendix E. The bay in which to install the load frame is the center bay on the south side of the platform.

Numerous diagonal braces will be removed from beneath the deck of the structure at elevations extending from below the wooden floor beams to just above the water level. Additional structural members which do not interfere with the test pile location will then be installed. In addition to "beefing up" the structure, pile guides will be centered in this bay to insure that the test pile will be driven vertically.

These modifications, along with preparing the work area for additional 76.2-mm (3-in.) diameter pile segment tests and a general upgrade of the platform, are scheduled to be accomplished mid to late summer of this year. The load frame will be installed after these modifications have been accomplished. The platform modifications should be completed prior to the test pile installation.

3.3 Mobilization

The timely mobilization of all the equipment, hardware and personnel to the test site is a critical link in accomplishing the desired objectives of this research project. Close coordination and cooperation among the fabricator, contractors and other associated parties is required so that each group of contractors knows the responsibilities of the other.

Since there is limited space available in which to work, the necessary items will be positioned on the platform to allow the other contractors to continue working while the crawler crane is being assembled. The next major event in the mobilization process will be the assembly of the deck-mounted crane. A 100-ton jack-up barge crane will assist in assembling the deck-mounted crawler crane and also serve as living accommodations while the test pile is being installed.

Once the crawler crane is assembled and in working order, three segments of the test pile and the secondary equipment will be loaded onto the platform from the materials barge. Preparations of the test pile and other necessary items will continue until the instrumented segment is ready for installation.

3.4 Test Pile Installation

Once all the systems have been checked out and the instrumented segment readied, the pile will be carefully picked up and lowered into the stab guide. This operation must proceed slowly to ensure that the cables hanging from the top of the pile are not damaged. Once the pile is supported vertically, it will be lowered to the appropriate level to allow instruments to be read before allowing the pile to sink under its own weight. The pile will then be driven to a convenient working height above the load frame.

The first add-on will then be lifted with a two-point pick-up so as not to damage the extensometer connections protruding from the end of the segment. It will then be mated to the instrumented section. The instrument cables will be bundled up the side of the pile and cover plates installed. The pile hammer will then be placed on top of the pile and the pile driven to a convenient working height above the load frame.

The second add-on segment will be installed in a similar manner, with the exception that it must be driven to a precise elevation so that the hydraulic rams can be positioned and the initial load test performed. Upon completion of the initial test, the pile will be redriven a very short distance to restore the residual stresses in the pile.

This description gives only the major steps in accomplishing the installation of the test pile. A detailed step-by-step procedure with accompanying illustrations is presented in Appendix D.

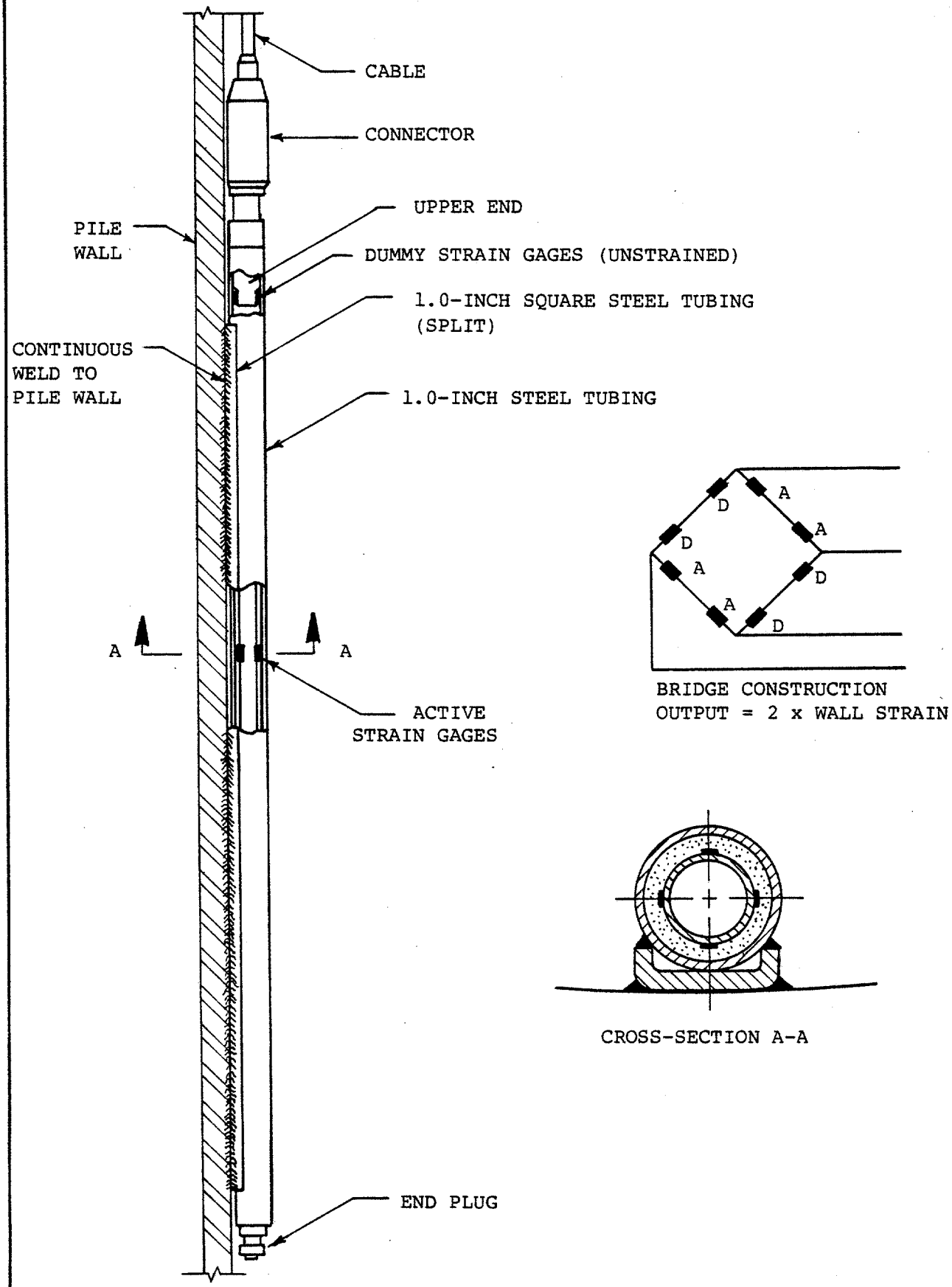
3.5 Preparation for the Long-Term Test

The major pile load test is scheduled after a period of approximately three months has elapsed so as to allow excess pore pressure dissipation. During this time, the platform will be abandoned except for weekly or biweekly visits to monitor pore pressure dissipation and to take readings of all other instruments.

Some construction activities are scheduled after the initial installation of the pile is completed. These include installing the upper load frame and the reference beam system. In addition, the hydraulic system will be dismantled and brought back on shore to ensure that it will be operable when testing begins after the three-month waiting period.

The remainder of the equipment will be either dismantled and shipped back onshore or securely protected from the harsh marine environment during the winter months.

ILLUSTRATIONS



RESISTANCE STRAIN GAGE MODULE

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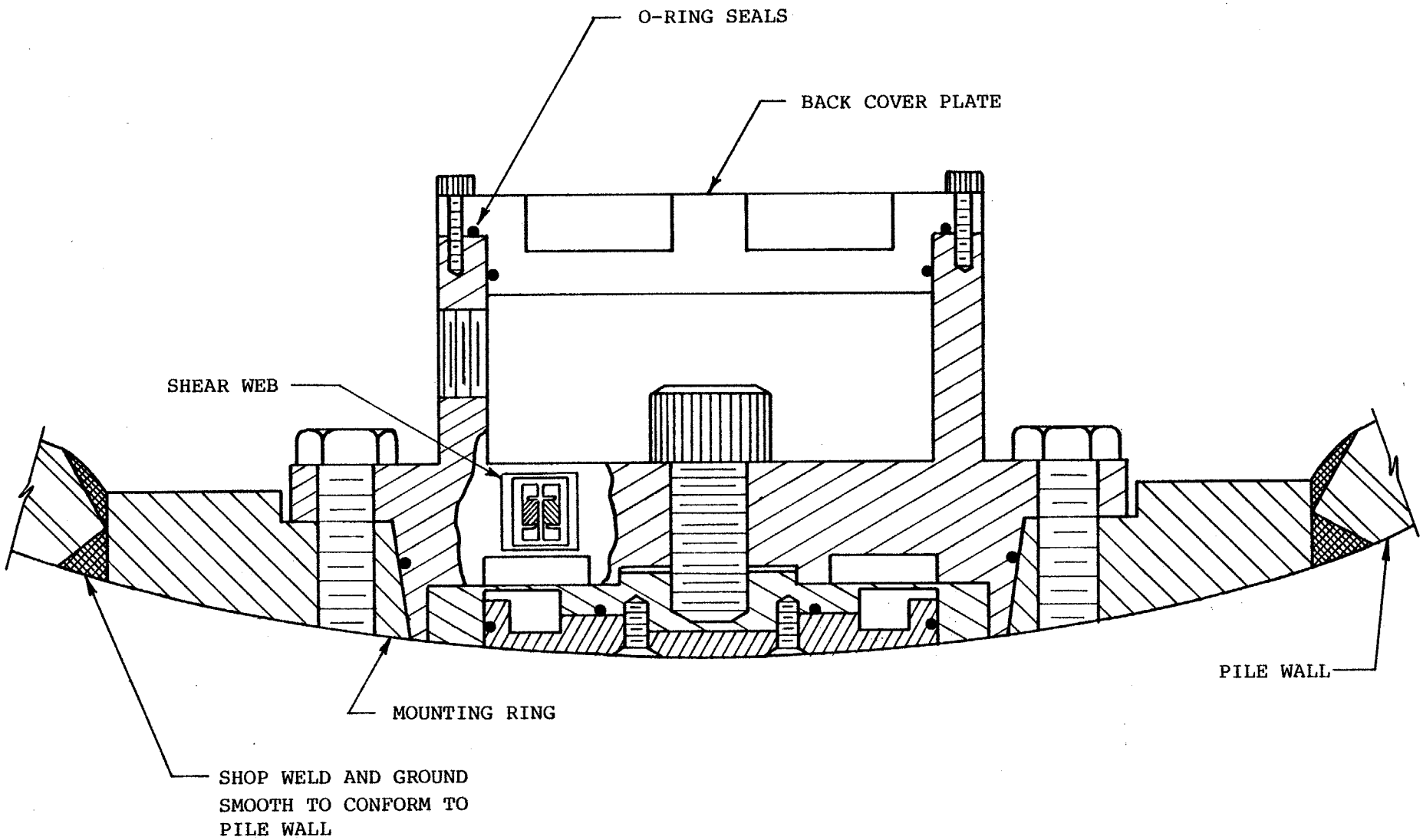
PLATE 1



TOTAL PRESSURE TRANSDUCER

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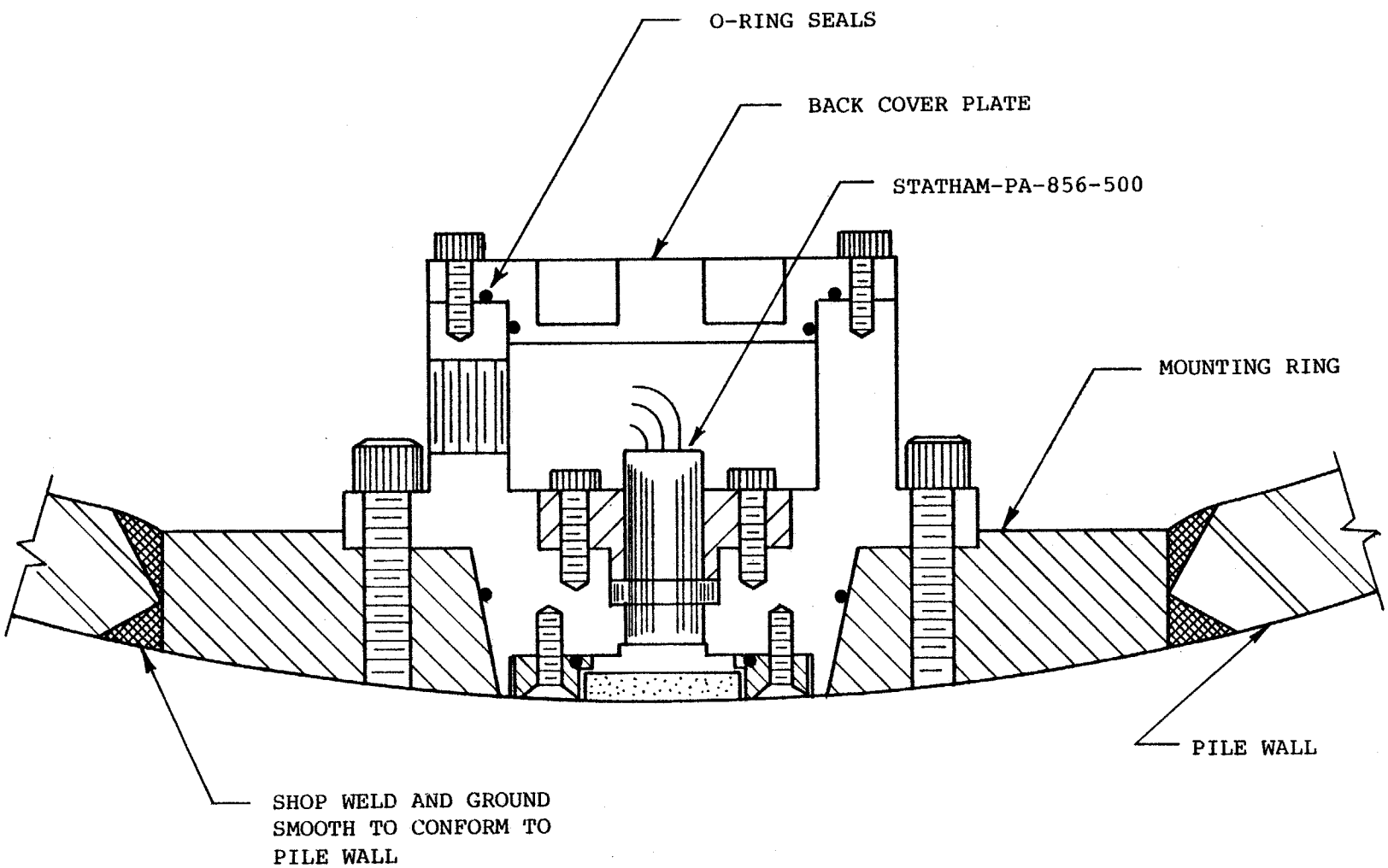
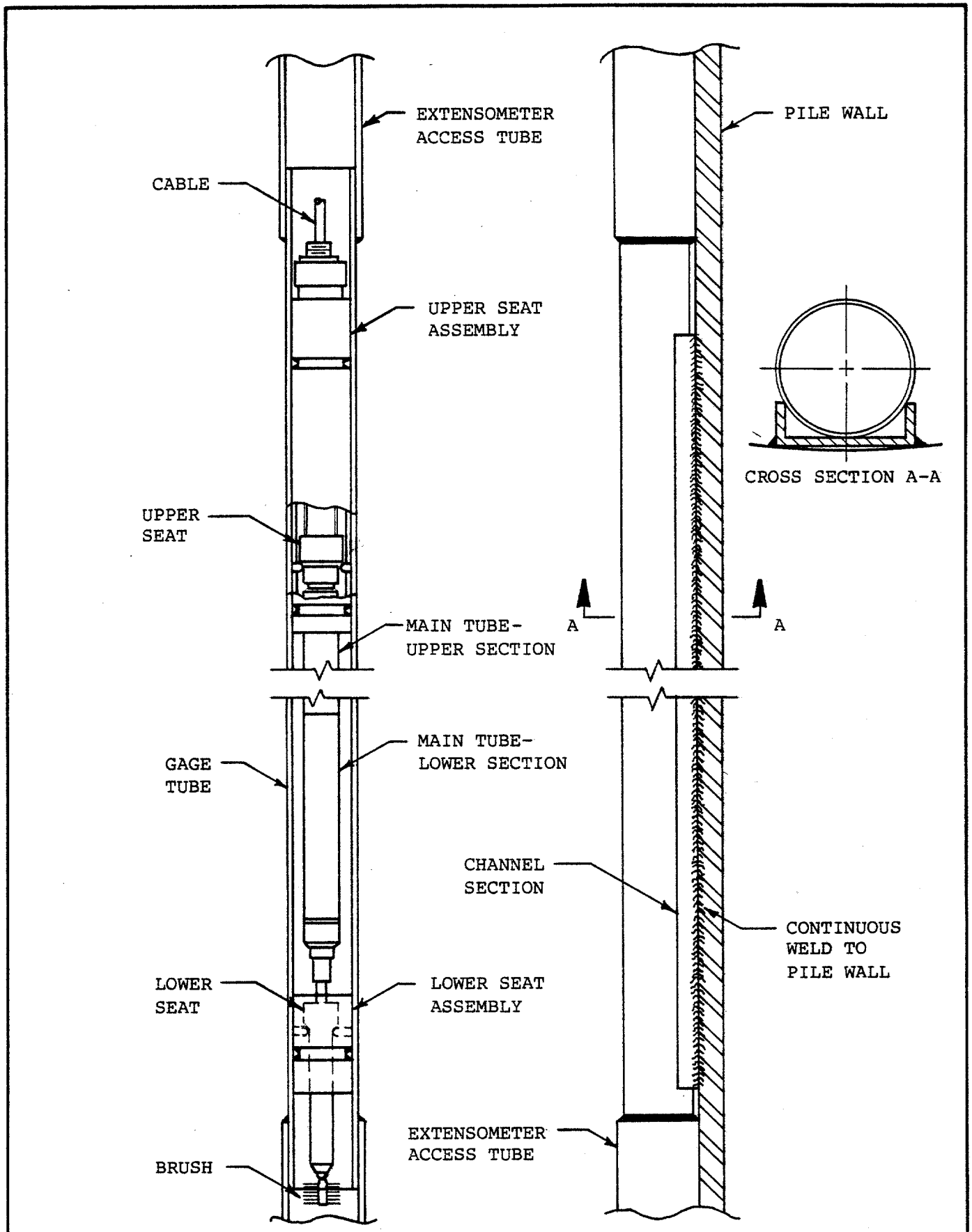
PLATE 2



PORE PRESSURE TRANSDUCER

PLATE 3



EXTENSOMETER UNIT

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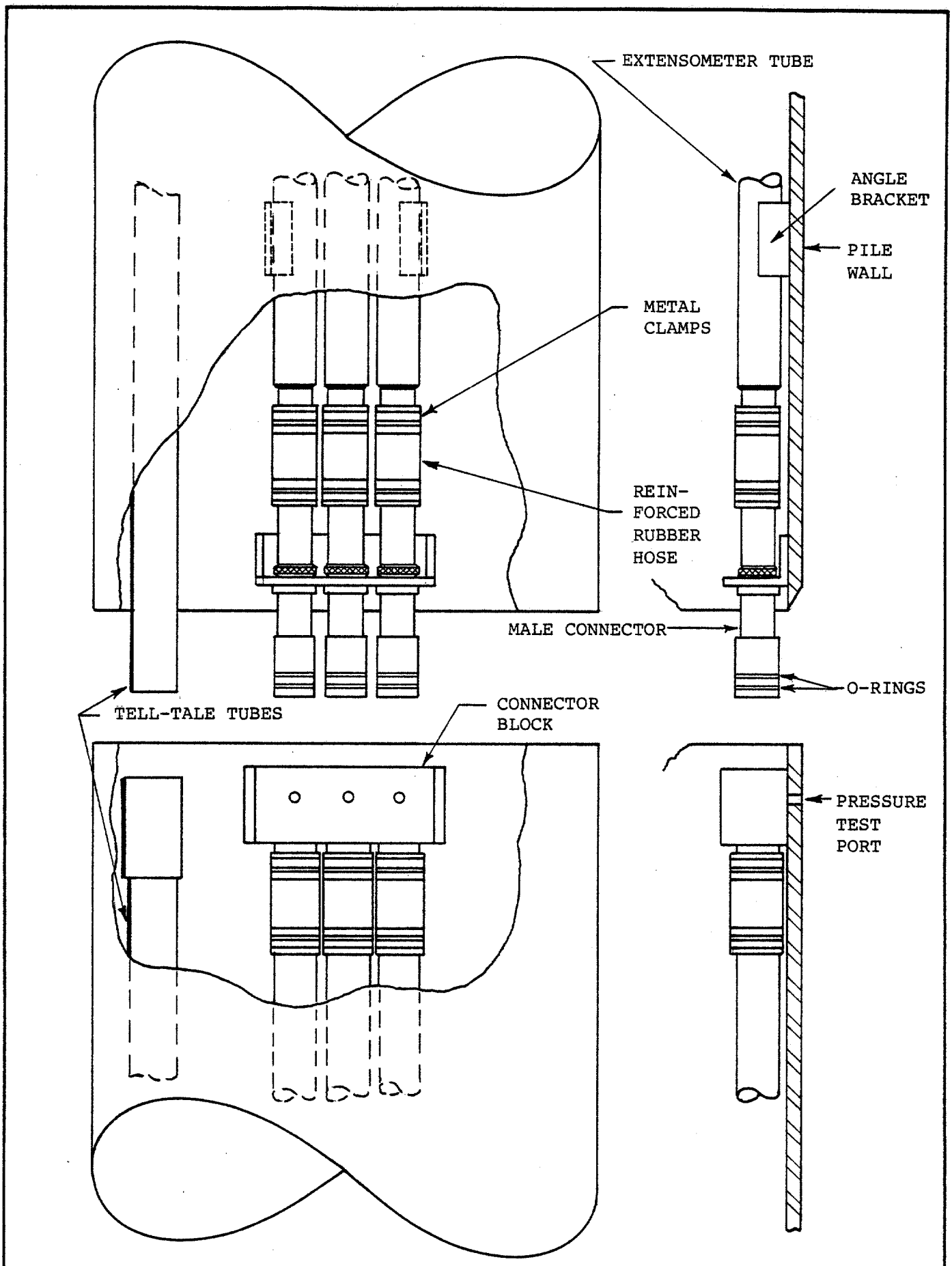
The Earth Technology Corporation

PLATE 4



EXTENSOMETER STAB JOINT CONNECTION

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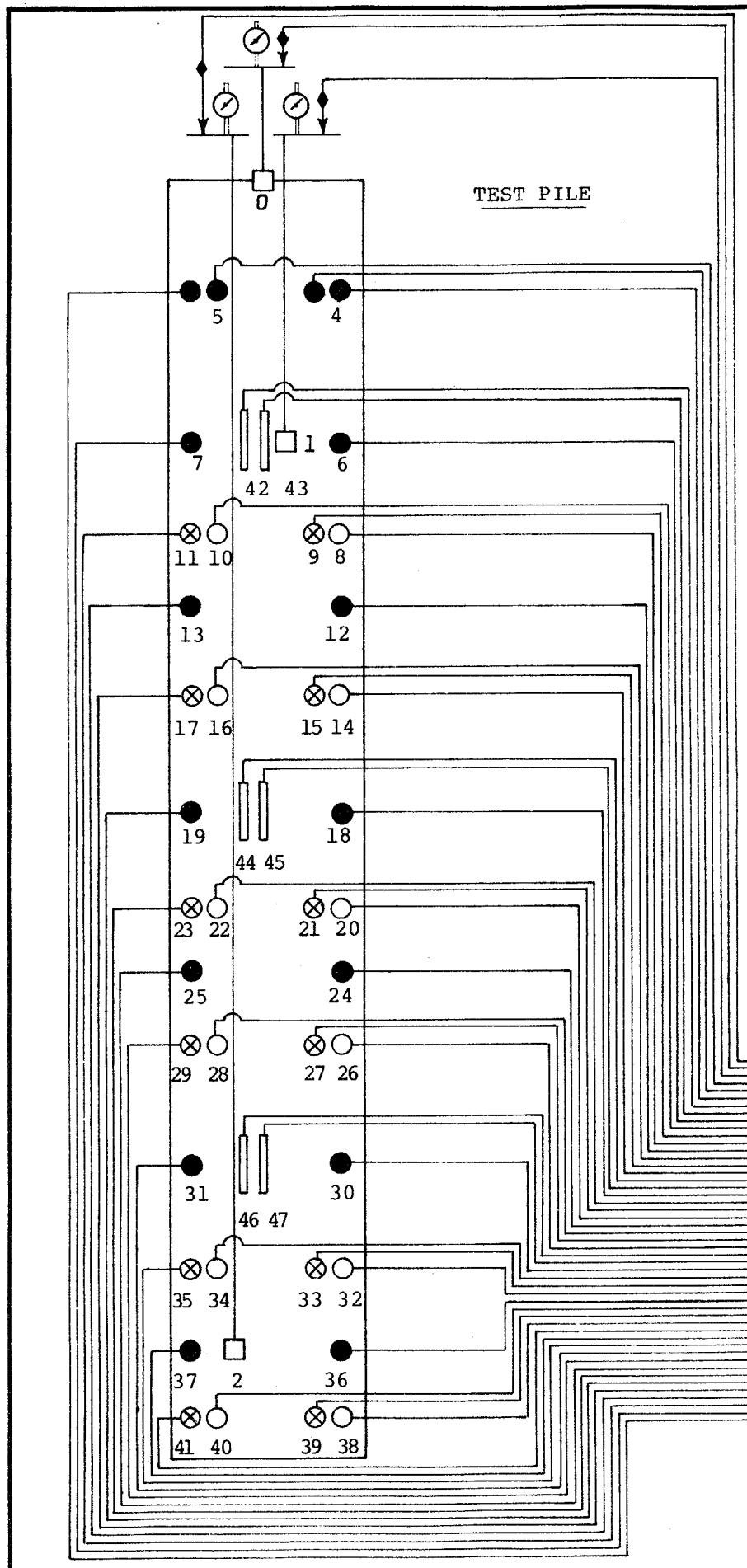
PLATE 5

JOB NO.



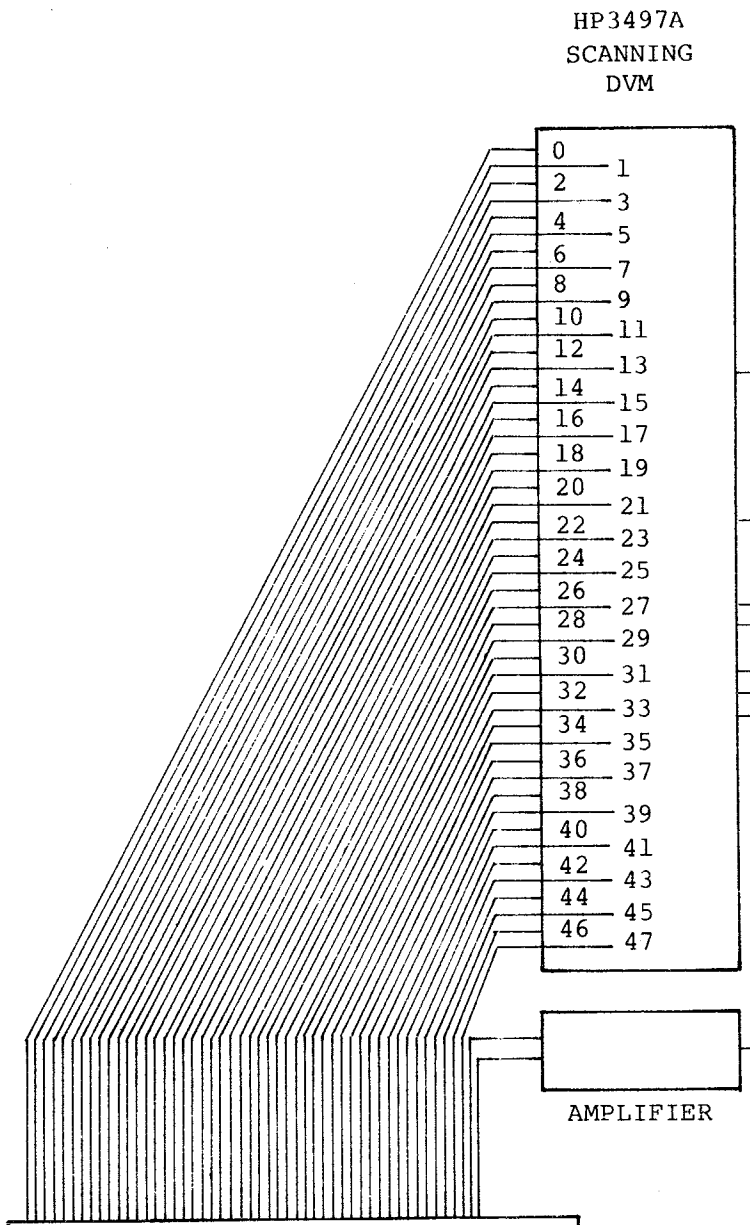


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PLATE 6

APPENDIX A

Design Drawings for Instrumented Test Pile

ITEM	QTY	PART NUMBER	DESCRIPTION
1		A-100	SUGGESTED DECK LAYOUT FOR WEST DELTA,
			BLOCK 58 A PLATFORM
2		A-101	TEST PILE CONFIGURATION
3		A-102	COMPOSITE OF INSTRUMENTED SEGMENT
4		A-103	TEST PILE SEGMENT DETAIL
5		A-104	SUGGESTED SUPPORTS FOR FABRICATION
6		A-105	SUGGESTED SUPPORTS FOR ALIGNMENT OF TEST SECTION
7		A-106	STABBING GUIDE AND COVER GUIDE BAR DETAIL
8		B-103	PRESSURE TRANSDUCER AND INSTRUMENT
			CABLE INSTALLATION DETAIL
9		B-100	PRESSURE TRANSDUCER INSTALLATION DETAIL
10		B-101	PRESSURE TRANSDUCER INSTALLATION
11		B-102	STRAIN MODULE INSTALLATION DETAIL IN
			INSTRUMENTED AND 2ND ADD-ON SECTIONS
12		C-100	CHANNEL BRACKET INSTALLATION IN
			INSTRUMENTED SECTION
13		C-101	CHANNEL BRACKET INSTALLATION IN
			INSTRUMENTED SECTION
14		C-102	CHANNEL BRACKET INSTALLATION IN
			ADD-ON SECTIONS
15		C-103	EXTENSOMETER AND ACCESS TUBE INSTALLATION
			DETAIL FOR INSTRUMENTED SECTION
16		C-104	EXTENSOMETER AND TEST CAN ASSEMBLY PROCEDURE
17		C-105	EXTENSOMETER AND TEST CAN ASSEMBY PROCEDURE
18		C-106	GAGE LENGTH AND TUBE ASSEMBLY DETAIL

LIST OF MATERIAL

TEST PILE FABRICATION DRAWINGS

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SCALE:	DRAWN BY: G.R. COFFEY
APVD BY:	DATE: 4-7-83
DRAWING NUMBER	REV. NO.

ITEM	QTY	PART NUMBER	DESCRIPTION
19		C-107	EXTENSOMETER GAGE SECTION AND
			SLEEVE TUBE DETAIL
20		C-108	SOIL PLOW AND COVER PLATE DETAIL
21		C-109	EXTENSOIMETER ACCESS TUBE INSTALLATION
			DETAIL IN ADD-ON SECTIONS
22		C-110	EXTENSOMETER ACCESS TUBE PROTECTOR
			FOR DRIVING VIBRATION
23		C-111	EXTENSOMETER ACCESS TUBE JOINT
			SECTION DETAIL
24		C-112	TEST DETAIL FOR EXTENSOMETER
			ACCESS TUBES
25		C-113	YOKE PLATE DETAIL FOR PRESSURE TEST
26		C-114	COVER PLATE DETAIL FOR PRESSURE TEST
27		C-115	PRESSURE TEST TOOL DETAILS
28		C-116	FIELD PRESSURE TEST DETAIL FOR O-RING SEAL
29		D-100	TELL-TALE INSTALLATION DETAIL IN
			INSTRUMENTED SECTION
30		D-101	TELL-TALE ACCESS TUBE DETAIL FOR
			ADD-ON SECTIONS
31		D-102	TELL-TALE COVER PLATE AND MEASUREMENT
			WEIGHT DETAIL
32		E-100	INTERNAL SPACER DETAIL FOR INSTRUMENTED SECTION
33		E-101	INTERNAL SPACER DETAIL FOR INSTRUMENTED SECTION
34		E-102	INTERNAL BUNDLE ROD DETAIL FOR
			INSTRUMENTED SECTION

LIST OF MATERIAL

TEST PILE FABRICATION DRAWINGS

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The Earth Technology Corporation

SCALE:	DRAWN BY: G.R. COFFEY
APVD BY:	DATE: 4-7-83
DRAWING NUMBER	REV. NO.

ITEM	QTY	PART NUMBER	DESCRIPTION
35		E-103	CABLE EXIT FOR INSTRUMENTED SECTION
36		E-104	CABLE EXIT DETAIL FOR INSTRUMENTED SECTION
37		E-105	INSTRUMENT CABLE EXIT DETAIL
38		E-106	INSTRUMENT CABLE EXIT
39		E-107	INTERNAL COVER PLATE AND WELD DETAIL
40		E-108	EXTERNAL SPACER DETAIL FOR TEST SECTION
41		E-109	EXTERNAL BUNDLE ROD DETAIL FOR TEST SECTION
42		E-110	EXTERNAL INSTRUMENT CABLE BUNDLE AND SPACER INSTALLATION DETAIL
43		E-111	INSTRUMENT CABLE PROTECTION COVER AND INSTALLATION DETAIL
44		F-100	TEST CAN CALIBRATION

LIST OF MATERIAL

TEST PILE FABRICATION DRAWINGS

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The Earth Technology Corporation

SCALE:	DRAWN BY: G.R. COFFEY
APVD BY:	DATE: 4-8-83
DRAWING NUMBER	REV. NO.

ITEM	QTY	PART NUMBER	DESCRIPTION
1	24		PRESSURE TRANSDUCER MOUNTING RINGS
2	12		TOTAL PRESSURE TRANSDUCERS/WITH CABLE
3	12		PORE PRESSURE TRANSDUCERS/WITH CABLE
4	16		STRAIN MODULES/WITH CABLE
5	2		TELL-TALE MEASUREMENT WEIGHT
6	6		EXTENSOMETER GAGE SECTION
7	12		ADAPTER CONNECTOR
8	4		CONNECTOR BLOCK
9	12		MALE CONNECTOR
10	4		CONNECTOR BRACKET
11	12		NUT CONNECTOR
13	12		ADAPTER TUBE
14	1		YOKE PLATE
15	1		COVER PLATE
16	12		REINFORCED RUBBER HOSE #1 (1.915 I.D.)
17	18		REINFORCED RUBBER HOSE #2 (2.390 I.D.)
18	24		O-RINGS FOR HOSE #1
19	36		O-RINGS FOR HOSE #2
20	24		O-RINGS FOR MALE CONNECTOR
21	106		METAL CLAMPS
22	6		SLIP JOINT
23			SLIP JOINT CONNECTIONS
24	2		DUMMY PRESSURE CELL (FOR MOUNTING RING INSTAL)
25	12		O-RINGS (FOR SLIP JOINT)

LIST OF MATERIAL

MATERIAL FURNISHED BY ERTEC

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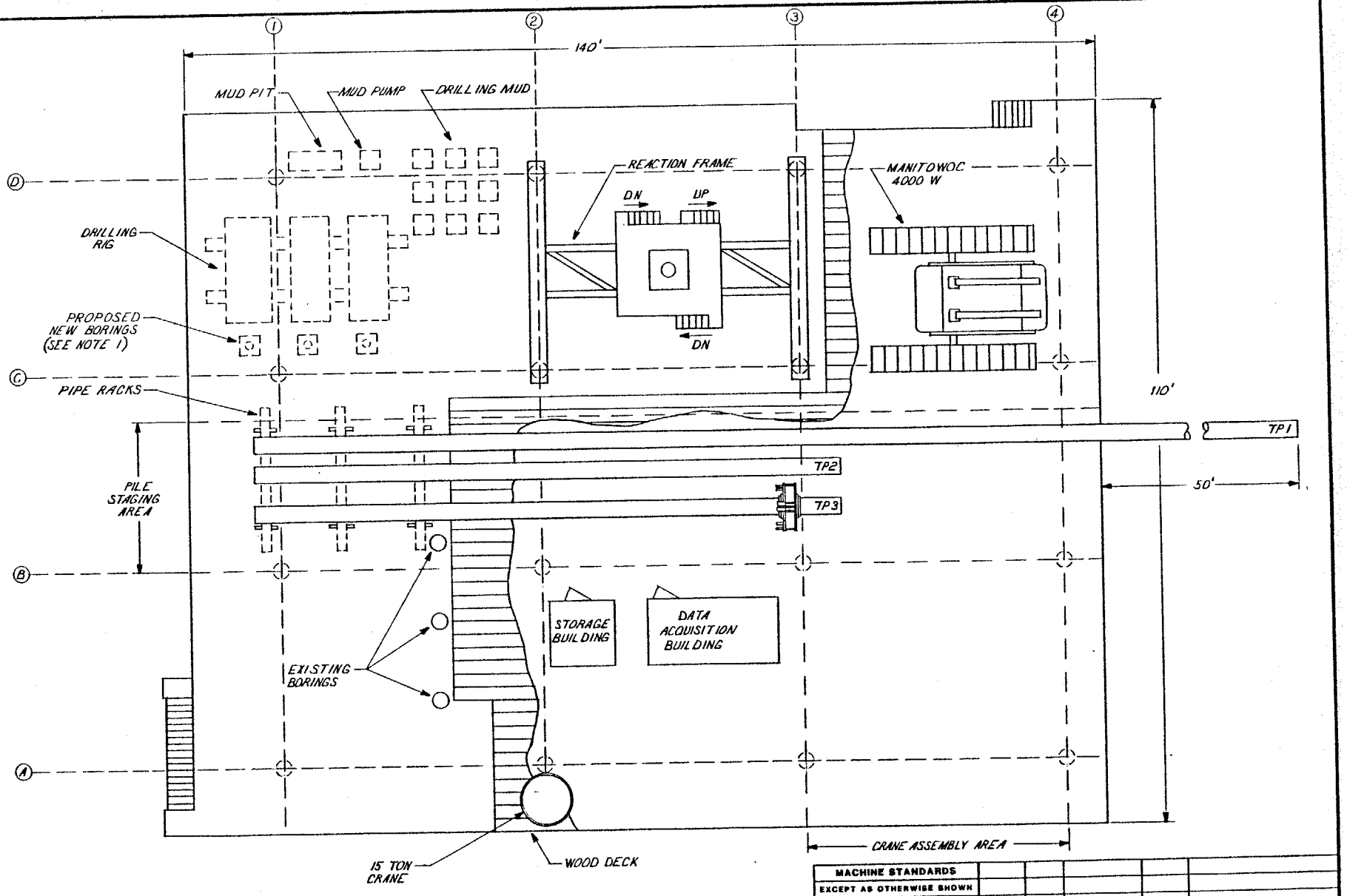
The Earth Technology Corporation

SCALE:	DRAWN BY: G.R. COFFEY
APVD BY:	DATE: 4-22-83
DRAWING NUMBER	REV. NO.



NOTE:
1) SMALL DIAMETER TESTING IN PROPOSED NEW BORINGS WILL BE CONDUCTED AFTER LARGE DIAMETER PILE IS INSTALLED.

MACHINE STANDARDS
EXCEPT AS OTHERWISE SHOWN
MACHINE FINISH TO BE 63 .0005

DIMENSIONAL TOLERANCE	ANGLE TOLERANCE
0.000 ±.002	XX° ±1°
0.00 ±.01	XX° XX' ±1'
FRACT ±1/64	XX° XX' XX" ±1"
CORNER RADIUS .010 TO .020	
LATHE CUT THREADS CLASS 2	
REMOVE ALL BURRS AND BREAK ALL SHARP CORNERS	
PROJECTION	

Pc MK	QTY	MATERIAL	SPEC	DESCRIPTION

LIST OF MATERIAL

SUGGESTED DECK LAYOUT FOR WEST DELTA, BLOCK 58A PLATFORM

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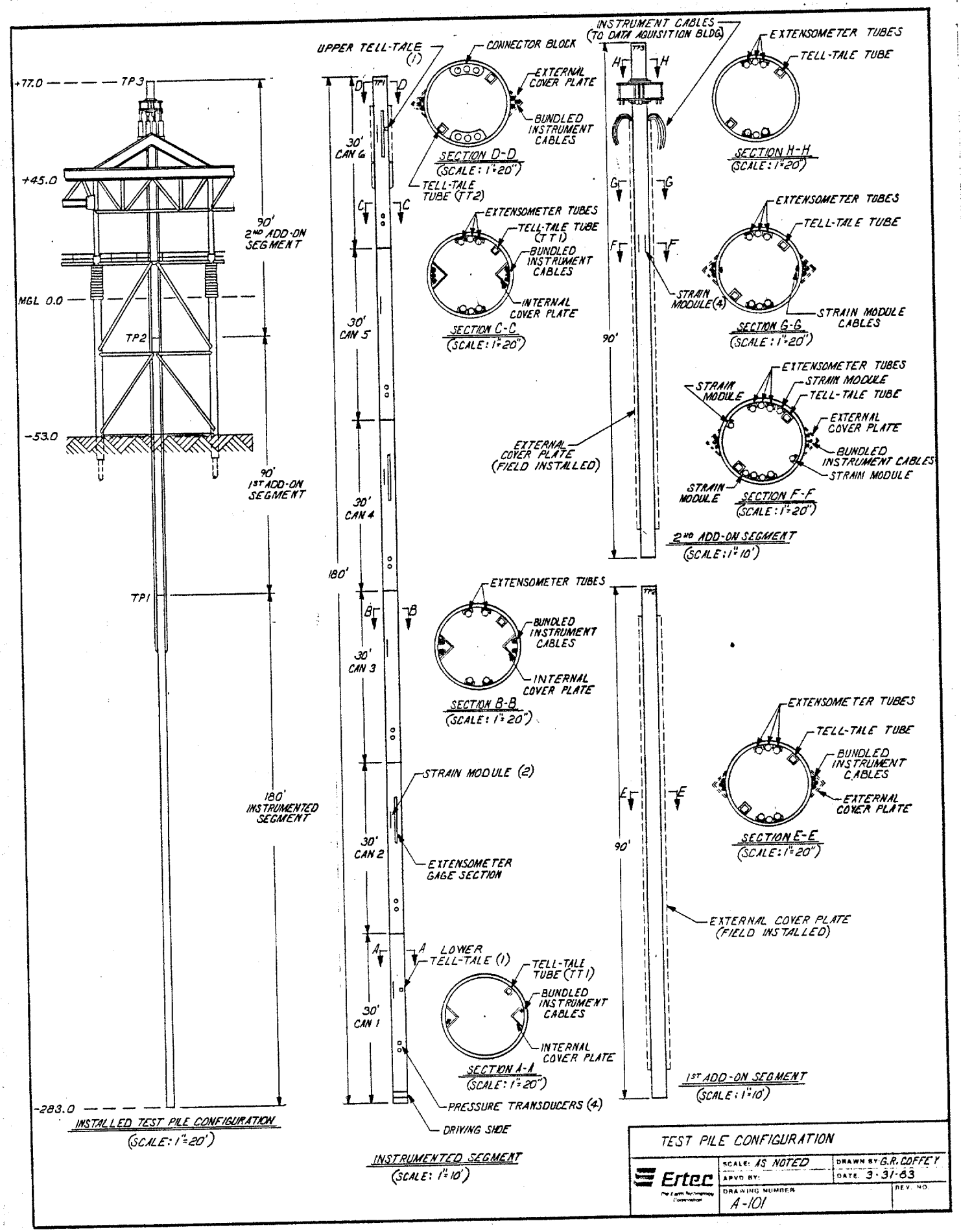
The Earth Technology Corporation

SCALE: 1" = 1'-0"
APVD BY:
DRAWN BY: G.R. COFFEY
DATE: 3-15-83
DRAWING NUMBER C-A-100
REV. NO.



TEST PILE CONFIGURATION

Ertec	SCALE: AS NOTED	DRAWN BY: G.R. COFFEY
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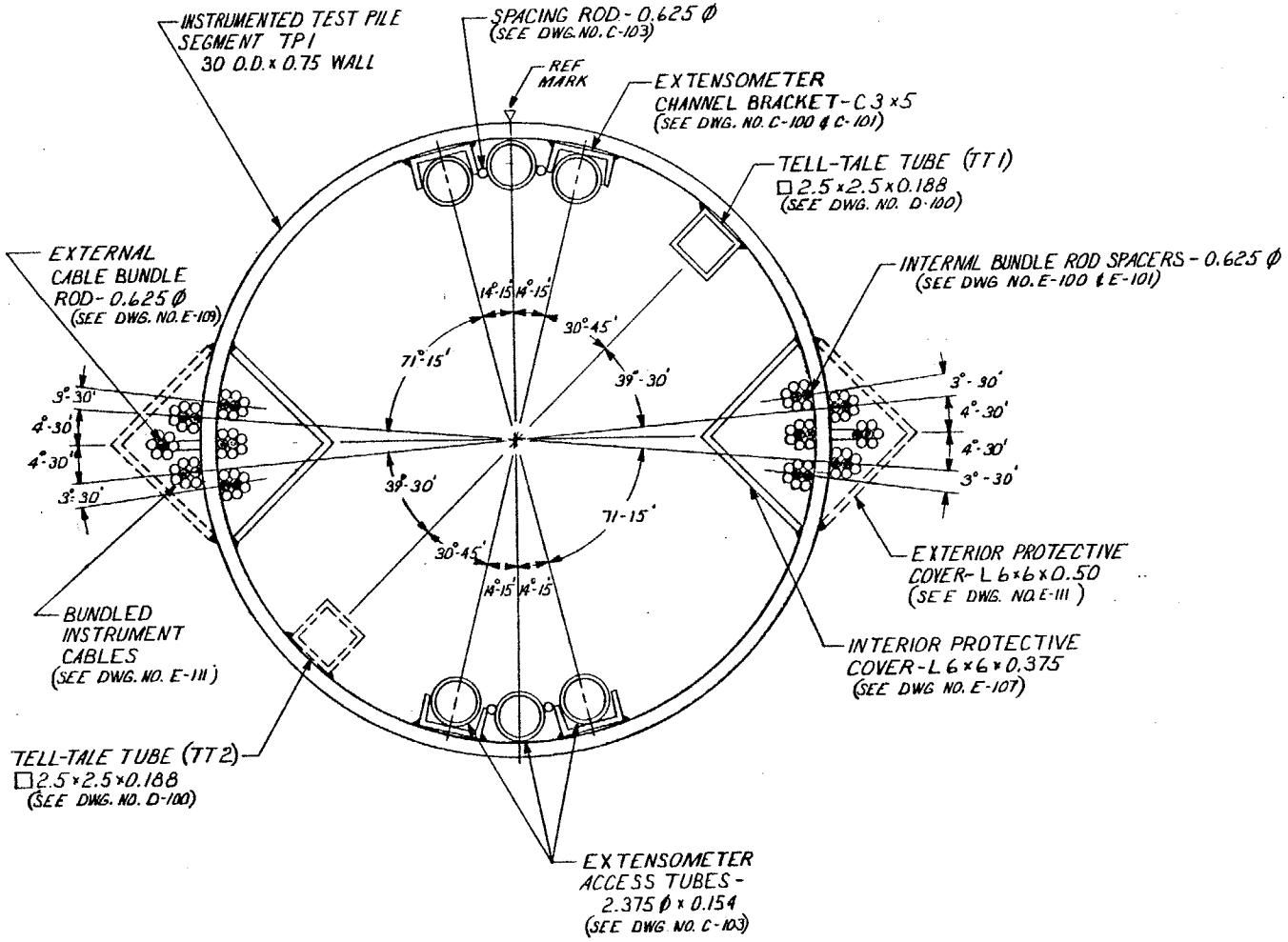


NOTE:

1) ALL NOTED DIMENSIONS ARE IN INCHES
2) REFER TO DWG. NOS. C-100, C-101, C-103, D-100, E-100, E-101, E-107, E-109, AND E-111
3) FABRICATOR TO MARK ON OUTSIDE OF PILES WITH WELD BEAD LOCATION OF TT1 & TT2 AT TOP OF TP1 AND AT TOP AND BOTTOM OF TP2 & TP3

MACHINE STANDARDS	
EXCEPT AS OTHERWISE SHOWN	
MACHINE FINISH TO BE 63 .0005	
DIMENSIONAL TOLERANCE	ANGLE TOLERANCE
0.000 ±.002	XX° ±1°
0.00 ±.01	XX° XX' ±1'
FRACT ±1/64	XX° XX' XX" ±1"
CORNER RADIUS .010 TO .020	
LATHE CUT THREADS CLASS 2	
REMOVE ALL BURRS AND BREAK ALL SHARP CORNERS	
PROJECTION	

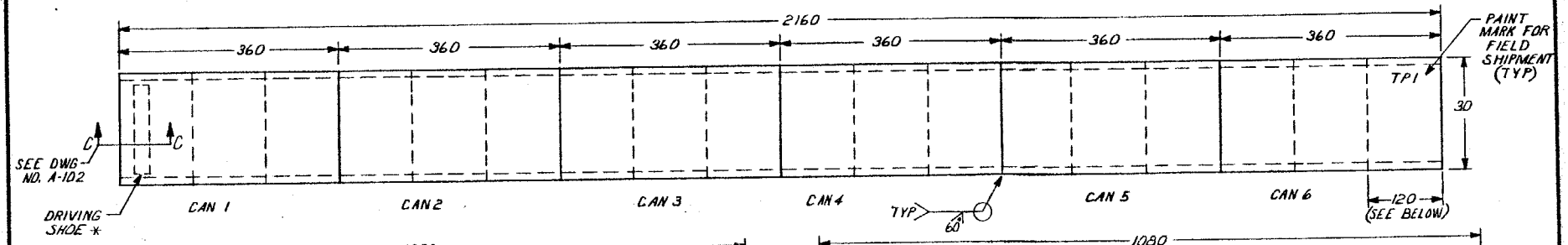
Pc MK	QTY	MATERIAL	SPEC	DESCRIPTION
LIST OF MATERIAL				

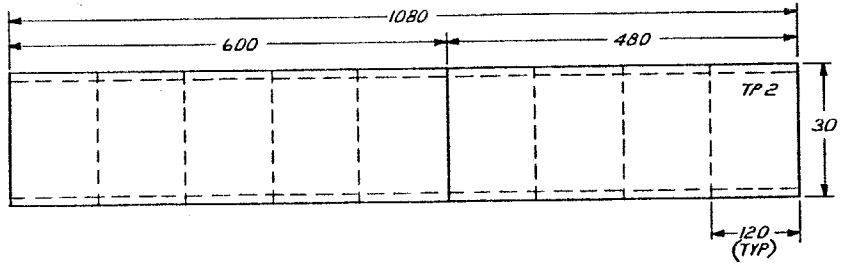
COMPOSITE OF INSTRUMENTED SEGMENT

SCALE: 1/4	DRAWN BY: G.R.COFFEY
APVD BY:	DATE:
DRAWING NUMBER C- A-102	REV. NO.

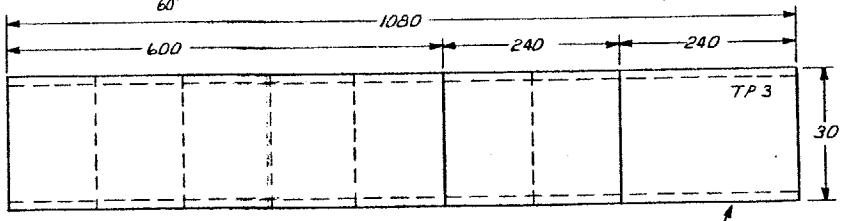
Ertec The Earth Technology Corporation

INSTRUMENTED SECTION (NO SCALE)



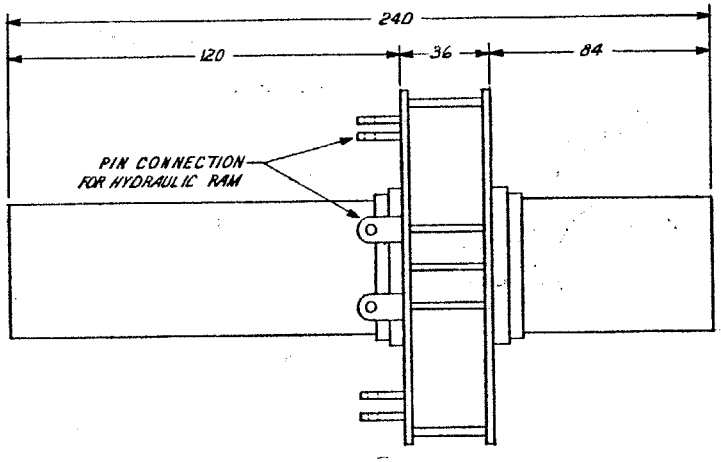


1ST ADD-ON SECTION



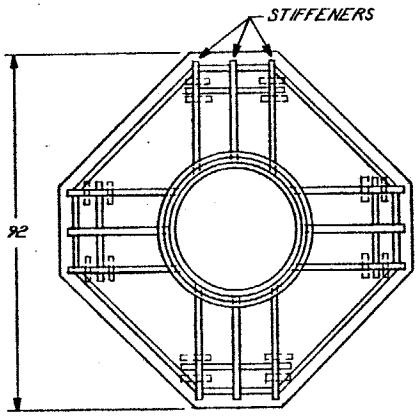
2ND ADD-ON SECTION

LOCATION OF LOAD HEAD ATTACHMENT (SEE BELOW)

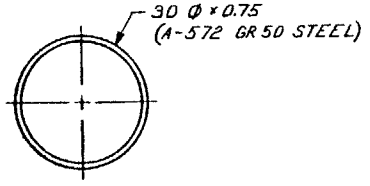


SIDE VIEW

LOAD HEAD



TOP VIEW



TYPICAL CROSS SECTION

NOTE:

1) * REFER TO DRAWING NO A-105 FOR DRIVING SHOE DETAIL
2) ALL NOTED DIMENSIONS ARE IN INCHES
3) REFER TO DMS DRAWINGS NO. A-140-04 FOR LOAD HEAD CONFIGURATION (NOT IN THE SCOPE OF THESE DRAWINGS)
4) LOAD HEAD SEGMENT FURNISHED BY CONOCO AND INSTALLED BY FABRICATOR
5) 120 INCH SECTIONS ARE ROLLED LENGTHS

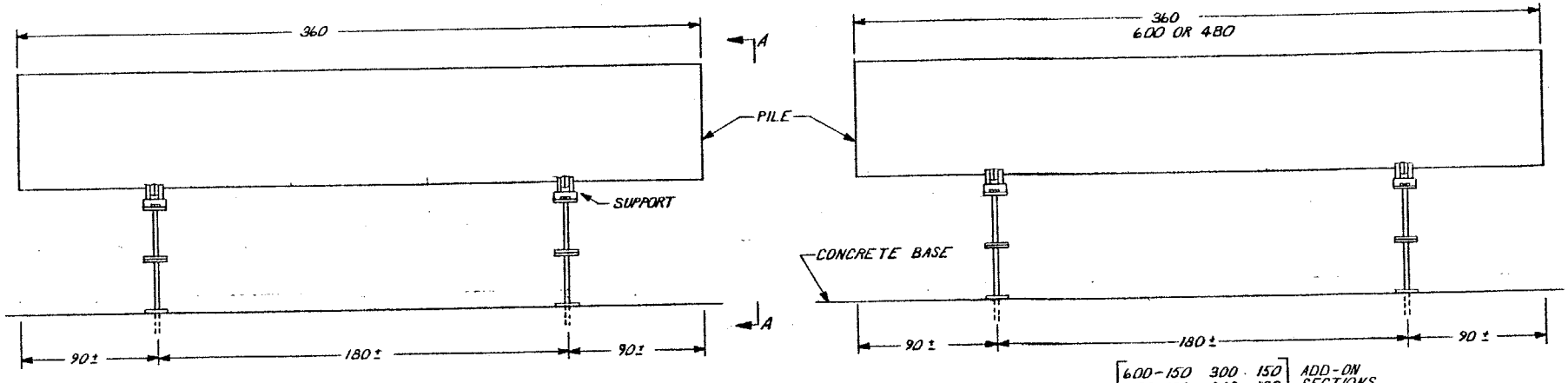
MACHINE STANDARDS	
EXCEPT AS OTHERWISE SHOWN	
MACHINE FINISH TO BE 63 $\sqrt{}$ .0005	
DIMENSIONAL TOLERANCE	ANGLE TOLERANCE
.0.000 ±.002	XX° ±1°
.0.00 ±.01	XX° XX' ±1'
FRACT ±1/64	XX° XX' XX" ±1"
CORNER RADIUS .010 TO .020	
LATHE CUT THREADS CLASS 2	
REMOVE ALL BURRS AND BREAK ALL SHARP CORNERS	
PROJECTION	

Pc MK	QTY	MATERIAL	SPEC	DESCRIPTION
LIST OF MATERIAL				

TEST PILE SEGMENT DETAIL

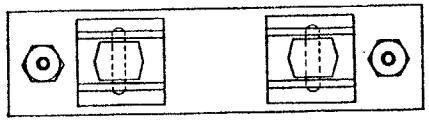
Ertec Rio Earth Technology Corporation

SCALE: NONE	DRAWN BY: G.R.COFFEY
APVD BY:	DATE: 2-21-82
DRAWING NUMBER C- A-103	REV. NO.

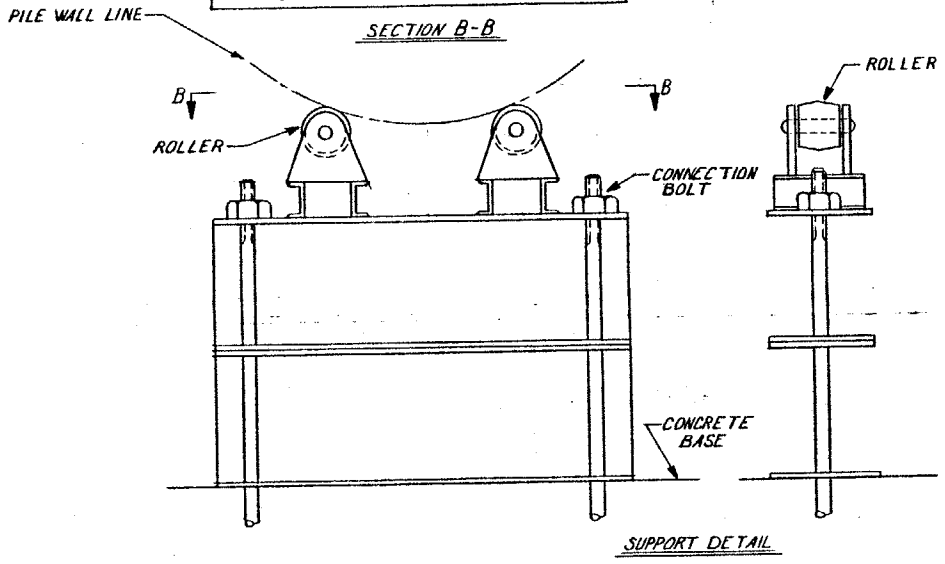


[600-150 300 150 / 480-120 240 120] ADD-ON SECTIONS

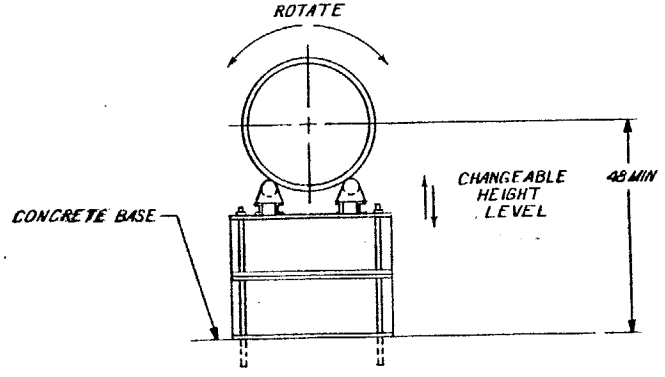
MOVE SUPPORTS AS REQUIRED TO CLEAR LOAD HEAD



SECTION B-B



SUPPORT DETAIL



SECTION A-A

NOTE:
1) ALL NOTED DIMENSIONS ARE IN INCHES
2) 48 INCH HEIGHT CLEARANCE REQUIRED FOR LOAD HEAD

MACHINE STANDARDS	
EXCEPT AS OTHERWISE SHOWN	
MACHINE FINISH TO BE 63 √ .0005	
DIMENSIONAL TOLERANCE	ANGLE TOLERANCE
.0.000 ± .002	XX° ±1°
0.00 ± .03	XX° XX' ±1'
FRACT ±1/64	XX° XX' XX" ±1"
CORNER RADIUS .010 TO .020	
LATHE CUT THREADS CLASS 2	
REMOVE ALL BURRS AND BREAK ALL SHARP CORNERS	
PROJECTION	

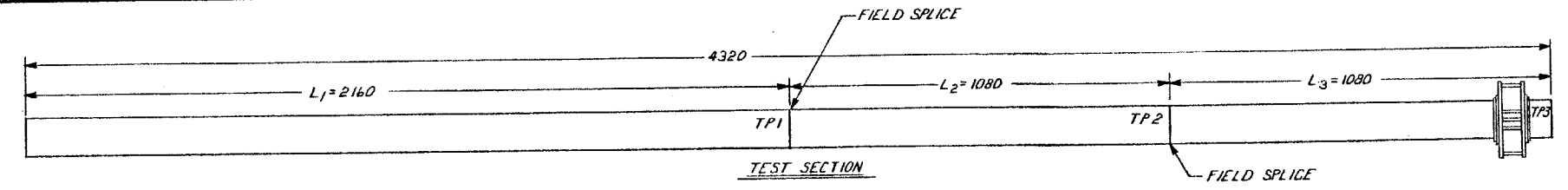
Pc MK	QTY	MATERIAL	SPEC	DESCRIPTION

LIST OF MATERIAL

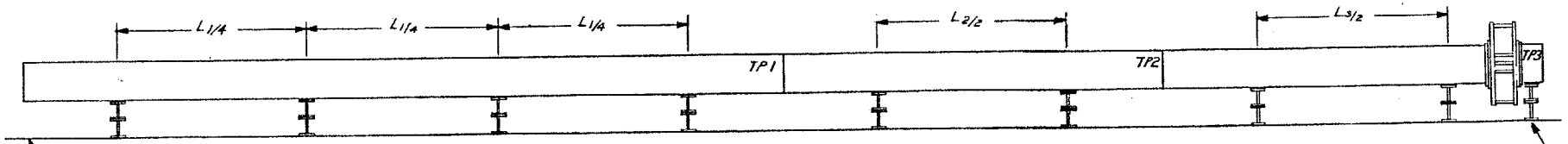
SUGGESTED SUPPORTS FOR FABRICATION

Ertec The Earth Technology Corporation

SCALE: NONE
DRAWN BY: G.R. COFFEY
APVD BY:
DATE: 2-24-83
DRAWING NUMBER C-A-104
REV. NO.

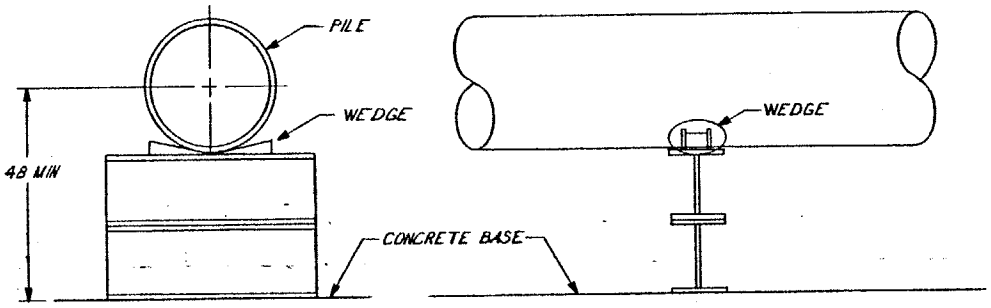


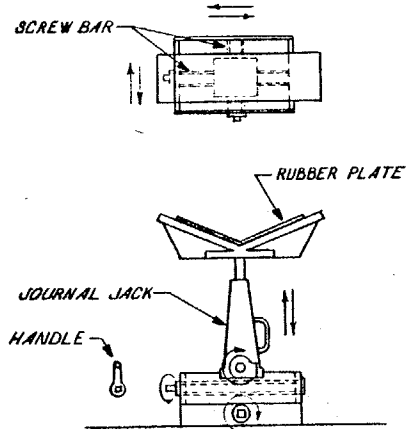
TEST SECTION



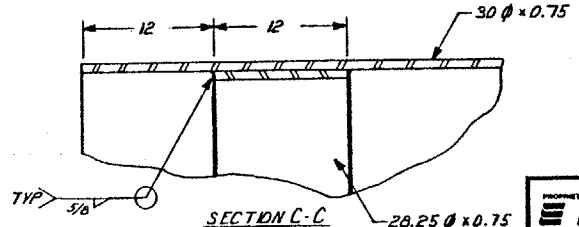
SIDE VIEW OF TEST SECTION FOR ALIGNMENT

FABRICATOR TO TEST IN YARD BEFORE FIELD SHIPMENT





SUPPORT FOR SETTING



SECTION C-C

DRIVING SHOE

(SEE DWG. NO. A-100)

(SEE NOTE 2)

NOTE:

1) ALL NOTED DIMENSIONS ARE IN INCHES

2) MULTIPLE PIECES OF DRIVING SHOE ARE ACCEPTABLE.

MACHINE STANDARDS	
EXCEPT AS OTHERWISE SHOWN	
MACHINE FINISH TO BE $63\frac{.0005}{\sqrt{}}$	
DIMENSIONAL TOLERANCE	ANGLE TOLERANCE
0.000 ±.002	XX° ±1°
0.00 ±.01	XX° XX' ±1'
FRACT ±1/64	XX° XX' XX" ±1"
CORNER RADIUS .010 TO .020	
LATHE CUT THREADS CLASS 2	
REMOVE ALL BURRS AND BREAK ALL SHARP CORNERS	
PROJECTION	

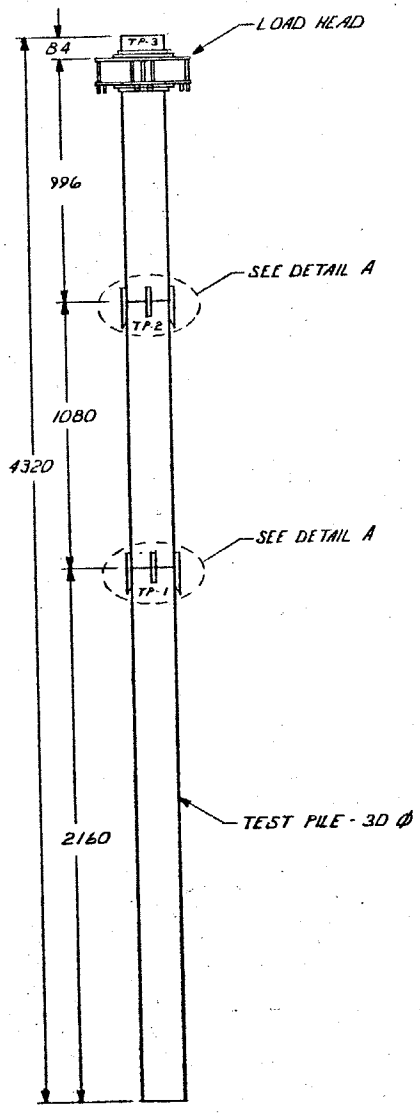
Pc MK	QTY	MATERIAL	SPEC	DESCRIPTION

LIST OF MATERIAL

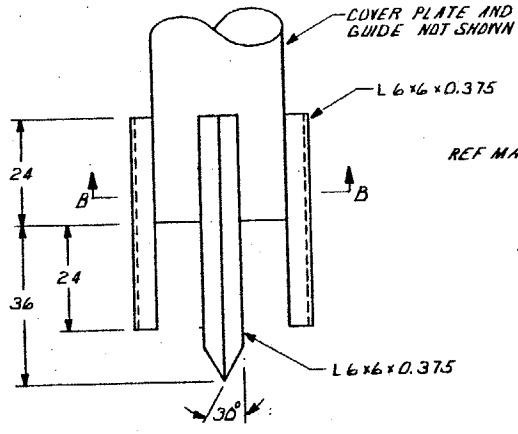
SUGGESTED SUPPORTS FOR ALIGNMENT OF TEST SECTION

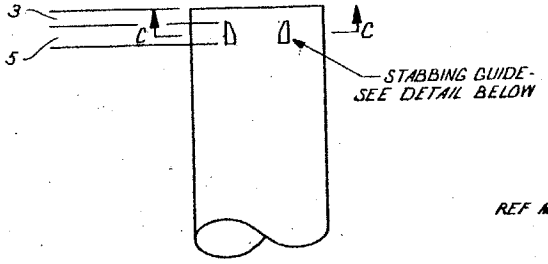
Ertec
The Earth Technology Corporation

SCALE: NONE
DRAWN BY: G.R. COFFEY
APVD BY:
DATE: 2-24-83
DRAWING NUMBER C- A-105
REV. NO.

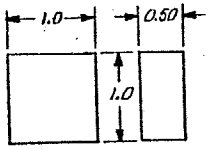


(NO SCALE)

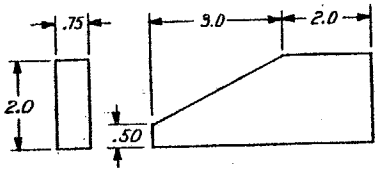




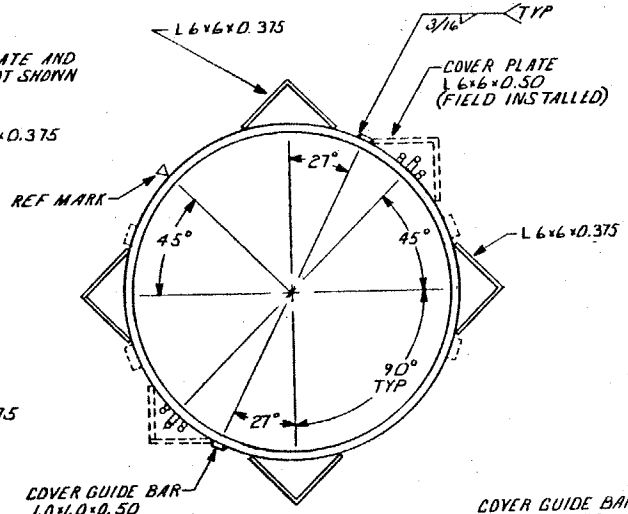
DETAIL A
SCALE: 1"=20"



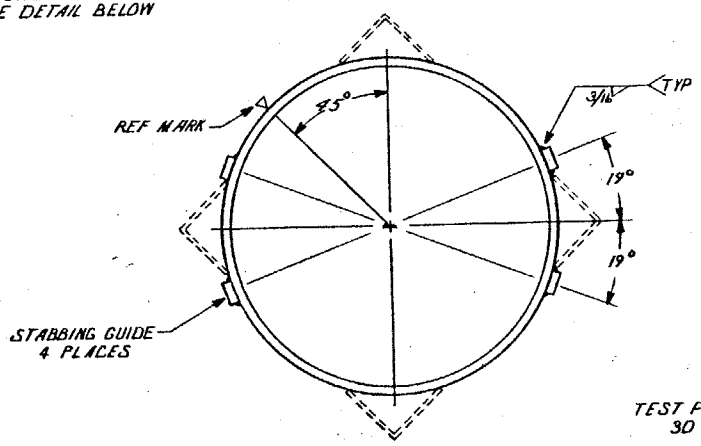
COVER GUIDE BAR
(SCALE: 1"=1")



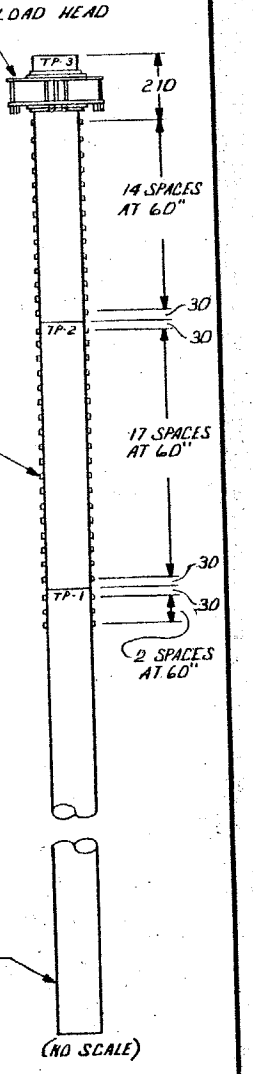
STABBING GUIDE DETAIL
SCALE: ½"=1"



SECTION B-B
SCALE: ⅛



SECTION C-C
SCALE: ⅛



(NO SCALE)

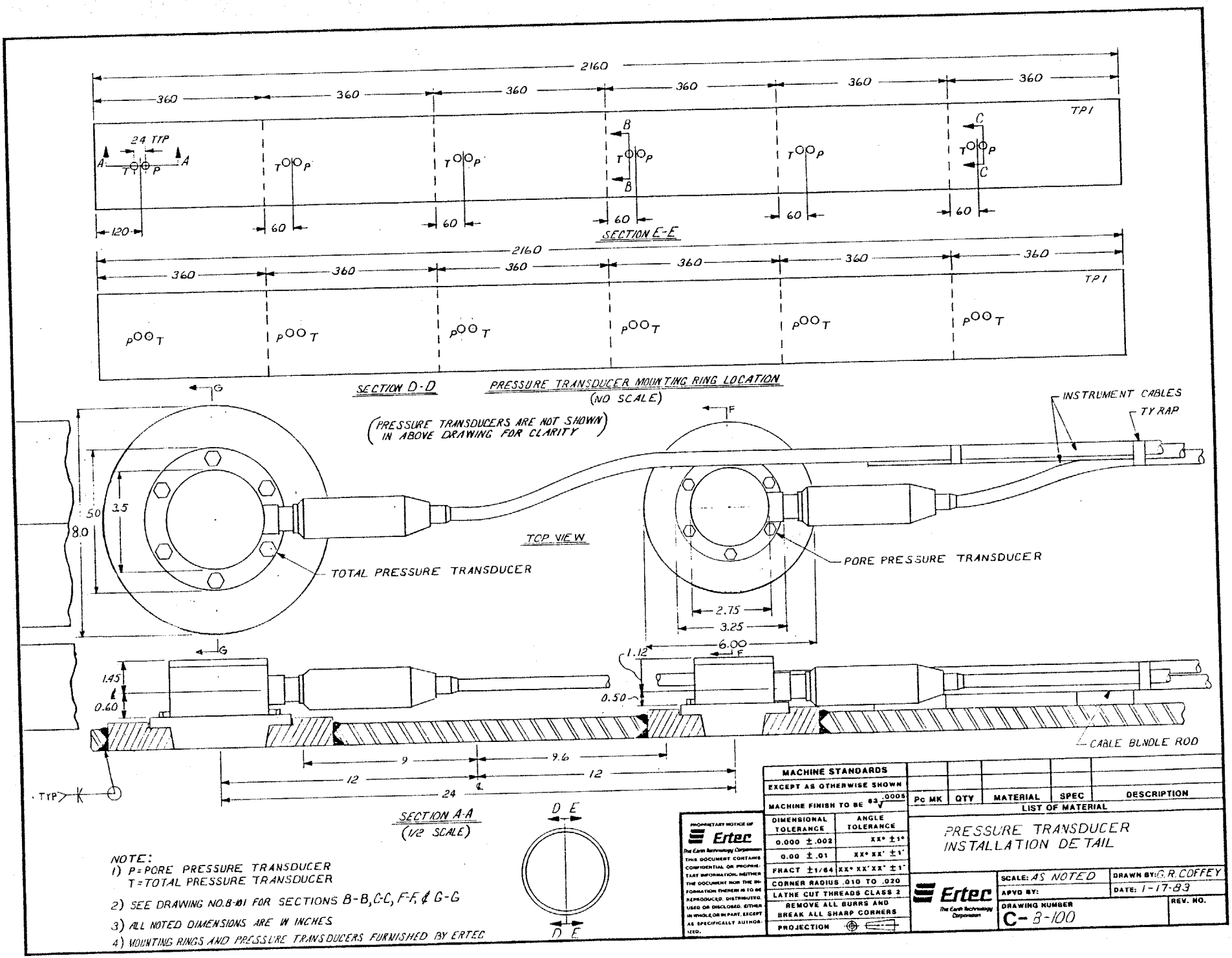
NOTE:
1) ALL NOTED DIMENSIONS ARE IN INCHES

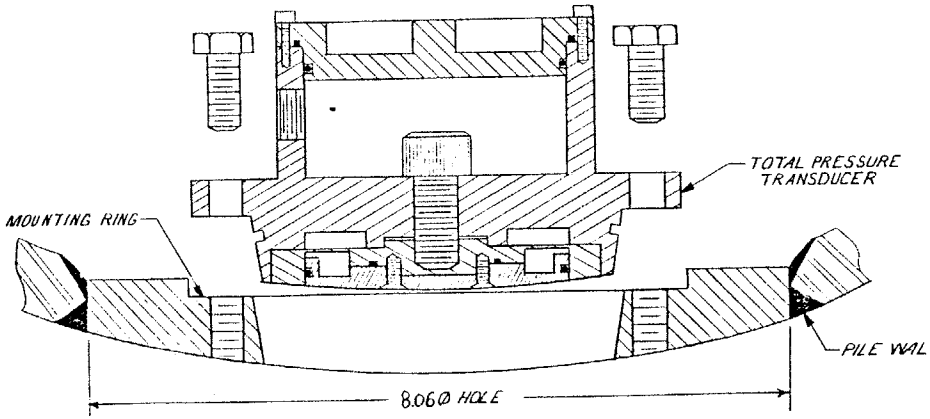
MACHINE STANDARDS						
EXCEPT AS OTHERWISE SHOWN						
MACHINE FINISH TO BE $63\sqrt{}^{.0005}$	Pc MK	QTY	MATERIAL	SPEC	DESCRIPTION	
DIMENSIONAL TOLERANCE / ANGLE TOLERANCE	LIST OF MATERIAL					
0.000 ±.002 / XX° ±1°						
0.00 ±.01 / XX° XX' ±1'						
FRACT ±1/64 / XX° XX' XX" ±1"						
CORNER RADIUS .010 TO .020						
LATHE CUT THREADS CLASS 2						
REMOVE ALL BURRS AND BREAK ALL SHARP CORNERS						
PROJECTION						

STABBING GUIDE AND COVER GUIDE BAR DETAIL

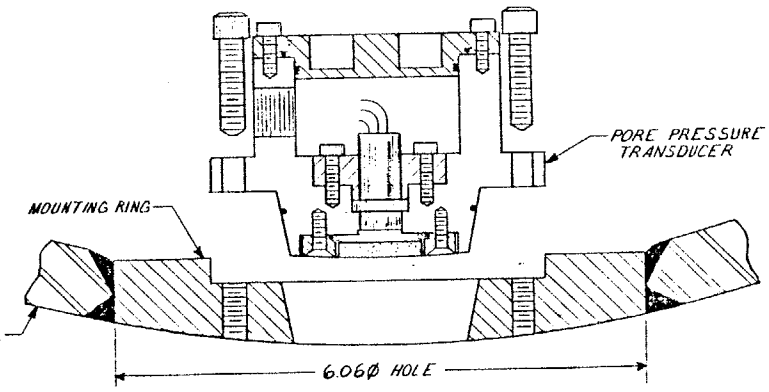
Ertec
The Earth Technology Corporation

SCALE: AS NOTED	DRAWN BY: G. R. COFFEY
APVD BY:	DATE: 4-26-83
DRAWING NUMBER: C-A-106	REV. NO.

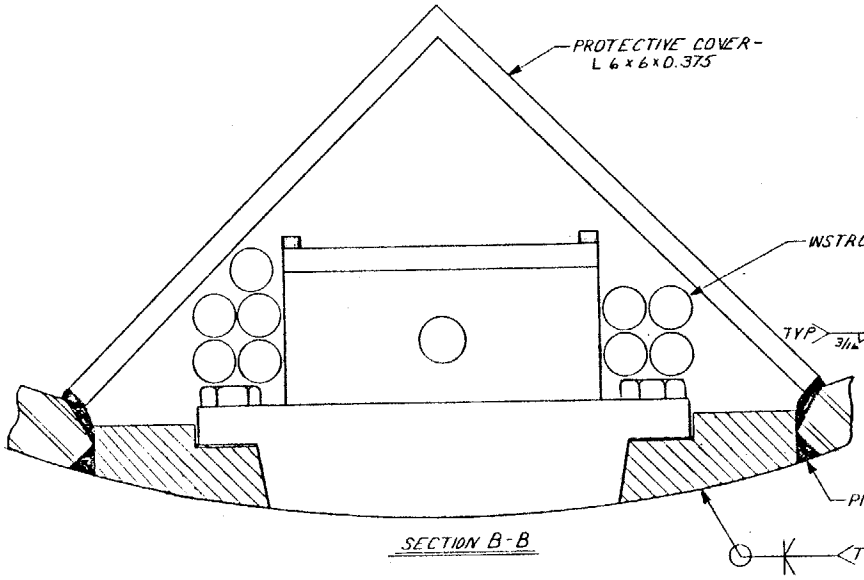

2160
360
360
360
360
360
360
TP1
24 TYP
A
A
T
P
120
60
60
60
60
60
B
B
C
C
SECTION E-E
2160
360
360
360
360
360
360
TP1
P
O
O
T
SECTION D-D
PRESSURE TRANSDUCER MOUNTING RING LOCATION
(NO SCALE)
(PRESSURE TRANSDUCERS ARE NOT SHOWN IN ABOVE DRAWING FOR CLARITY)
INSTRUMENT CABLES
TY RAP
G
F
8.0
5.0
3.5
TOP VIEW
TOTAL PRESSURE TRANSDUCER
PORE PRESSURE TRANSDUCER
2.75
3.25
6.00
1.12
1.45
0.40
0.50
CABLE BUNDLE ROD
9
9.6
12
12
24
TYP
SECTION A-A
(1/2 SCALE)
D E
D E
NOTE:
1) P=PORE PRESSURE TRANSDUCER
T=TOTAL PRESSURE TRANSDUCER
2) SEE DRAWING NO.8-101 FOR SECTIONS B-B, C-C, F-F, & G-G
3) ALL NOTED DIMENSIONS ARE IN INCHES
4) MOUNTING RINGS AND PRESSURE TRANSDUCERS FURNISHED BY ERTEC
MACHINE STANDARDS
EXCEPT AS OTHERWISE SHOWN
MACHINE FINISH TO BE 63 .0005
DIMENSIONAL TOLERANCE
ANGLE TOLERANCE
0.000 ±.002
XX° ±1°
0.00 ±.01
XX° XX' ±1'
FRACT ±1/64
XX° XX' XX" ±1"
CORNER RADIUS .010 TO .020
LATHE CUT THREADS CLASS 2
REMOVE ALL BURRS AND BREAK ALL SHARP CORNERS
PROJECTION
PROPRIETARY NOTICE OF
Ertec
The Earth Technology Corporation
THIS DOCUMENT CONTAINS CONFIDENTIAL OR PROPRIETARY INFORMATION. NEITHER THE DOCUMENT NOR THE INFORMATION THEREIN IS TO BE REPRODUCED, DISTRIBUTED, USED OR DISCLOSED, EITHER IN WHOLE OR IN PART, EXCEPT AS SPECIFICALLY AUTHORIZED.
Pc MK
QTY
MATERIAL
SPEC
DESCRIPTION
LIST OF MATERIAL
PRESSURE TRANSDUCER INSTALLATION DETAIL
Ertec
The Earth Technology Corporation
SCALE: AS NOTED
DRAWN BY: G. R. COFFEY
APVD BY:
DATE: 1-17-83
DRAWING NUMBER
C-8-100
REV. NO.



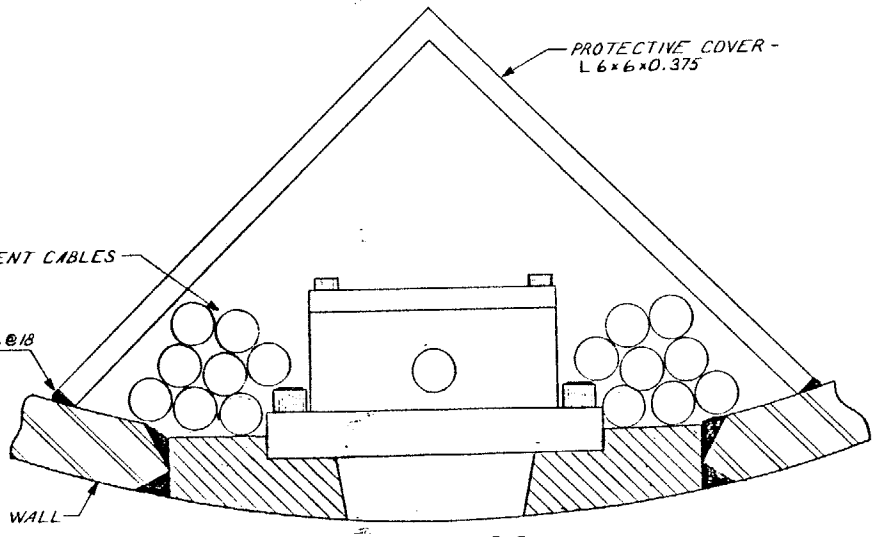
SECTION F-F



SECTION G-G



SECTION B-B



SECTION C-C

NOTE:
1) SEE DRAWING NO. B-100
2) ALL NOTED DIMENSIONS ARE IN INCHES
3) MOUNTING RINGS AND PRESSURE TRANSDUCERS WILL BE FURNISHED BY ERTEC

MACHINE STANDARDS
EXCEPT AS OTHERWISE SHOWN
MACHINE FINISH TO BE 63 +.0005 -.0005

DIMENSIONAL TOLERANCE	ANGLE TOLERANCE
0.000 ± .002	XX° ±1°
0.00 ± .01	XX° XX' ±1'
FRACT ±1/64	XX° XX' XX" ±1"
CORNER RADIUS .010 TO .020	
LATHE CUT THREADS CLASS 2	
REMOVE ALL BURRS AND BREAK ALL SHARP CORNERS	
PROJECTION	

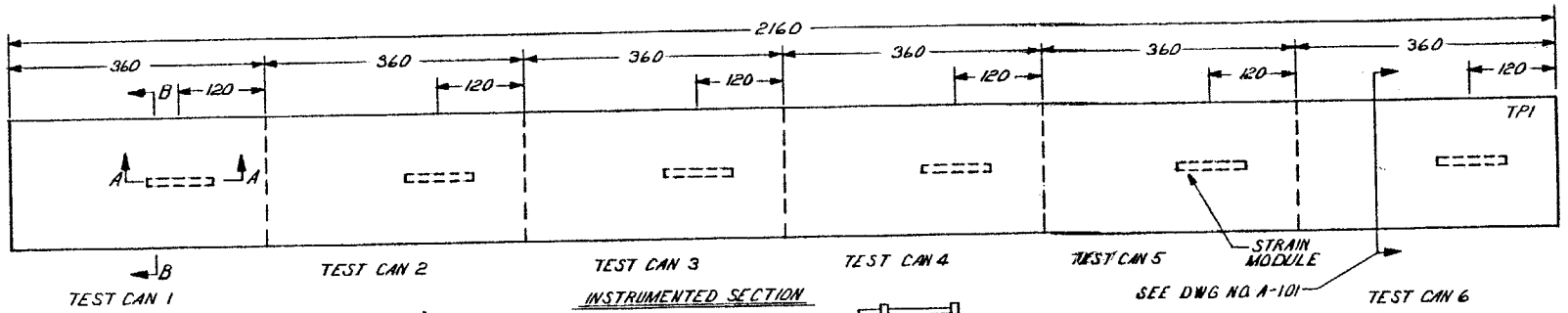
Pc MK	QTY	MATERIAL	SPEC	DESCRIPTION

LIST OF MATERIAL

PRESSURE TRANSDUCER INSTALLATION

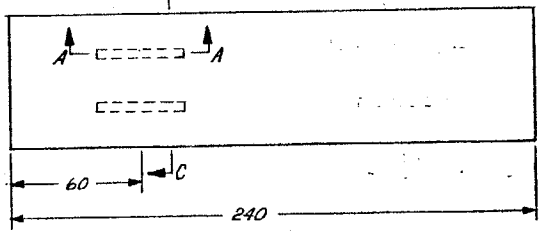
Ertec
The Earth Technology Corporation

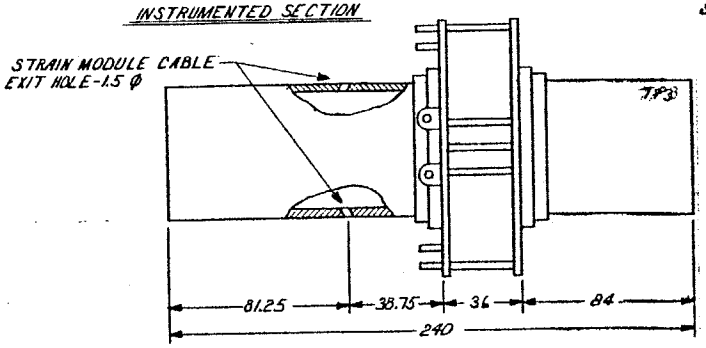
SCALE: FULL
APVD BY:
DRAWN BY: G.R.COFFEY
DATE: 2-17-83
DRAWING NUMBER C-B-101
REV. NO.

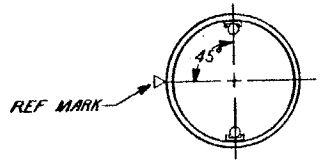


(LOCATION OF STRAIN MODULE ONLY IS SHOWN IN ABOVE DRAWING)

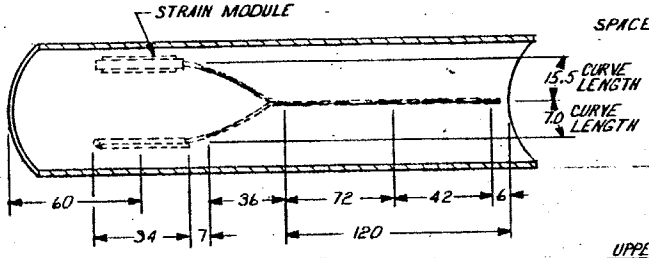
INSTRUMENTED SECTION



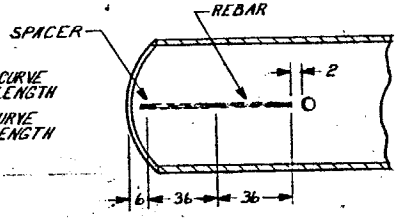




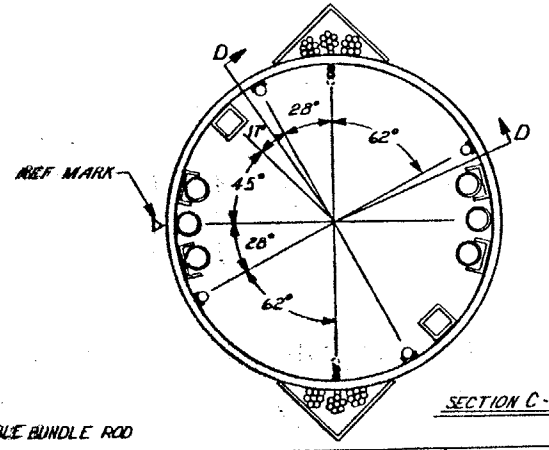
SECTION B-B



SECTION D-D
(SEE NOTE)

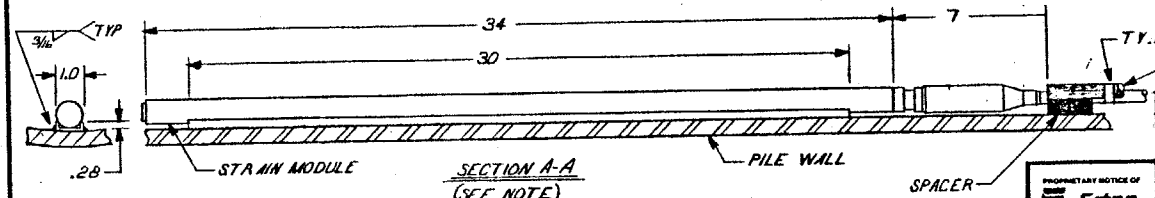


UPPER PORTION OF 2ND ADD-ON SECTION



SECTION C-C

BUNDLE RODS AND SPACERS SHALL BE PLACED ON THE MOST DIRECT HELICAL SPIRAL TO THE CENTER LINE.



SECTION A-A
(SEE NOTE)

NOTE:
1) REFER TO INSTRUCTIONS MANUAL FOR SPECIAL INSTALLATION PROCEDURES FOR STRAIN MODULES
2) ALL NOTED DIMENSIONS ARE IN INCHES
3) STRAIN MODULES WILL BE FURNISHED BY ERTEC

MACHINE STANDARDS
EXCEPT AS OTHERWISE SHOWN
MACHINE: FINISH TO BE 63 .0005

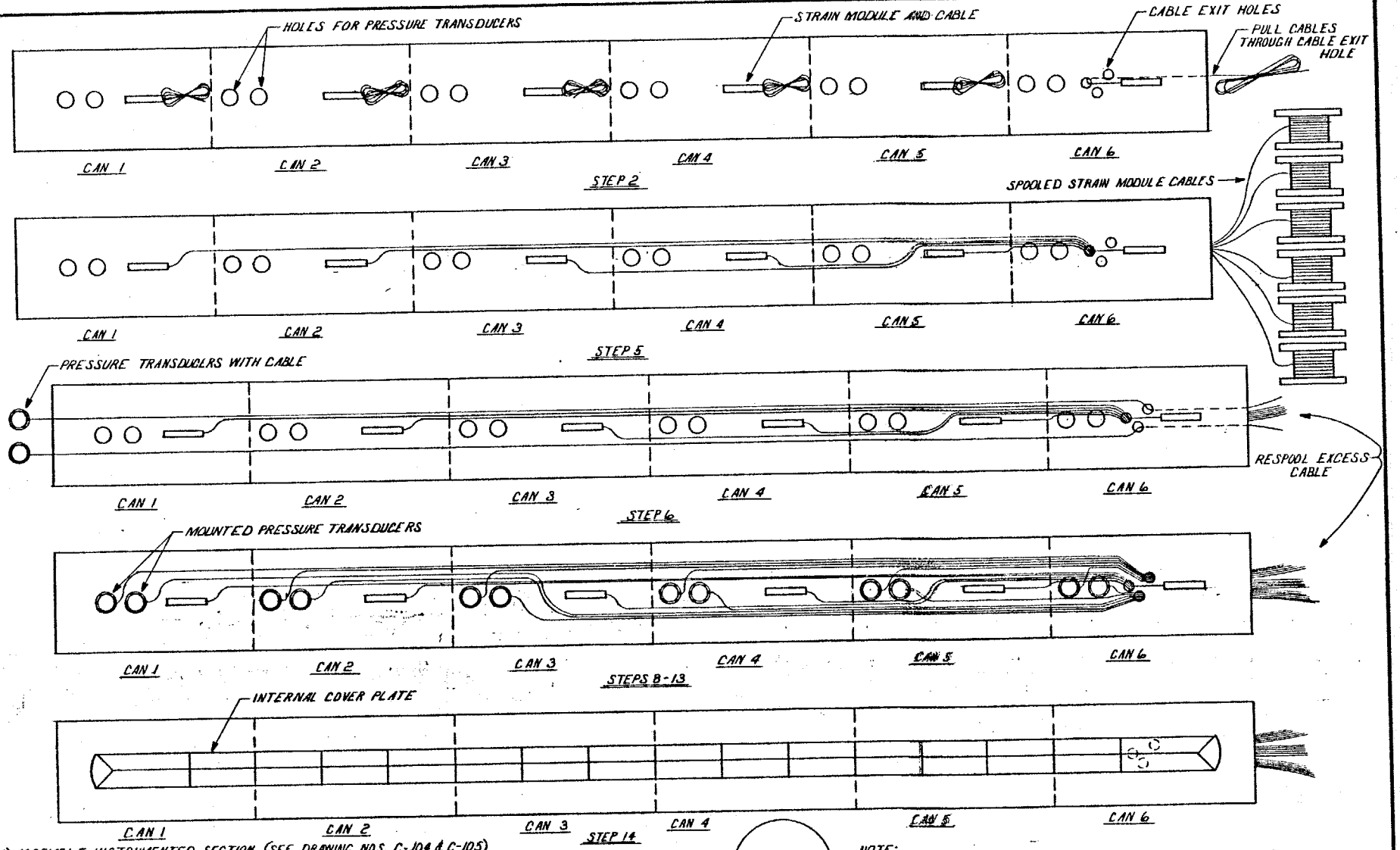
DIMENSIONAL TOLERANCE	ANGLE TOLERANCE
0.000 ± .005	XX° ±1°
.0.00 ± .01	XX° XX' ±1'
FRACT ± 1/64	XX° XX' XX" ±1"
CORNER RADII .010 TO .020	
LATHE CUT THREADS CLASS 2	
REMOVE ALL BURRS AND BREAK ALL SHARP CORNERS	
PROJECTION	

Pc MK	QTY	MATERIAL	SPEC	DESCRIPTION
LIST OF MATERIAL				

STRAIN MODULE INSTALLATION DETAIL IN INSTRUMENTED AND 2ND ADD-ON SECTIONS

Ertec
The Earth Technology Corporation

SCALE: NONE	DRAWN BY: G.R. COFFEY
APVD BY:	DATE: 3-15-83
DRAWING NUMBER C-B-102	REV. NO.



1) ASSEMBLE INSTRUMENTED SECTION. (SEE DRAWING NOS. C-104 & C-105)
2) REMOVE STORED STRAIN MODULE CABLE IN CAN 6 AND PASS THROUGH CENTER CABLE EXIT HOLE.
3) ROTATE PILE AND PASS DIAMETRICALLY OPPOSED STRAIN MODULE CABLE THROUGH CABLE EXIT HOLE.
4) CONTINUE THE STRAIN MODULE CABLE LAYOUT OPERATION UNTIL ALL CAN SECTIONS HAVE BEEN COMPLETED. (CABLES MAY BE TEMPORARILY ATTACHED TO BUNDLE RODS DURING THE ROTATION OF THE PILE.)
5) REMOVE SLACK FROM ALL CABLES AND SLIP A PROTECTIVE COVER OVER CABLES PASSING THROUGH THE EXIT HOLE. (RESPOOL)
6) UNSPOOL PRESSURE TRANSDUCER CABLES AND PASS THROUGH THE INSTRUMENTED SEGMENT & OUT THE APPROPRIATE HOLE.
7) CONTINUE PULLING CABLE THROUGH THE EXIT HOLE UNTIL TRANSDUCER REST IN MOUNTING RING.
8) INSTALL PRESSURE TRANSDUCER INTO MOUNTING RING FOR CAN 1.
9) REPEAT PROCEDURE FOR ADJACENT PRESSURE TRANSDUCER.
10) BUNDLE PRESSURE TRANSDUCERS AND STRAIN MODULE CABLES TO BUNDLE ROD PROVIDED IN FIRST CAN.
11) REPEAT INSTALLATION PROCEDURE FOR REMAINING PRESSURE TRANSDUCERS IN CANS 2 THRU 6.
12) WRAP THE PROTECTIVE COVER OVER THE INSTRUMENT CABLES PASSING THROUGH THE CABLE EXIT.
13) INSTALL A BLANKET OF INSULATION TO PROTECT THE CABLES DURING THE INSTALLATION OF THE INTERNAL COVER PLATE.
14) INSTALL INTERNAL COVER PLATE WORKING FROM THE END OF THE INSTRUMENTED SEGMENT TO THE TOP.
15) ROTATE PILE AND REPEAT STEPS 5-14 FOR THE DIAMETRICALLY OPPOSSED INSTRUMENTS.

NOTE:
ALL VIEWS ARE SHOWING INTERIOR OF PILE. (HALF SECTION)

MACHINE STANDARDS	
EXCEPT AS OTHERWISE SHOWN	
MACHINE FINISH TO BE $\sqrt{63}$ .0005	
DIMENSIONAL TOLERANCES	ANGLE TOLERANCE
0.000 ± .002	XX° ±1°
0.00 ± .01	XX° XX' ±1'
FRACT ±1/64	XX° XX' XX" ±1"
CORNER RADIUS .010 TO .020	
LATHE CUT THREADS CLASS 2	
REMOVE ALL BURRS AND BREAK ALL SHARP CORNERS	
PROJECTION	

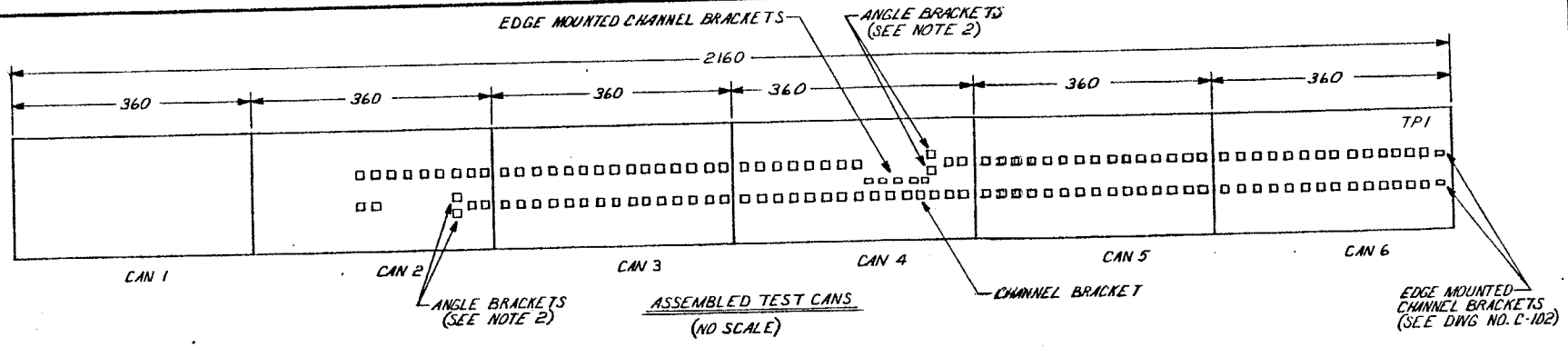
Pc MK	QTY	MATERIAL	SPEC	DESCRIPTION

LIST OF MATERIAL

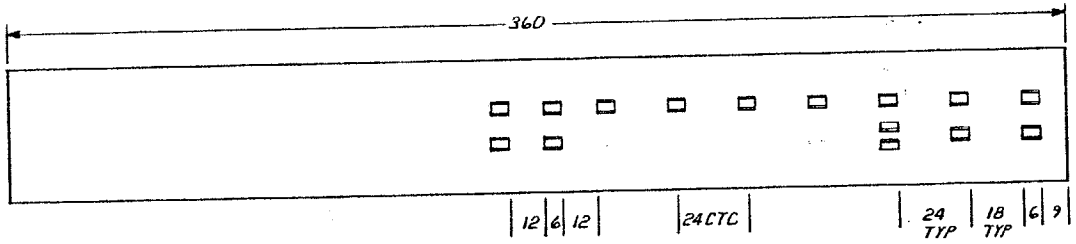
PRESSURE TRANSDUCER AND INSTRUMENT CABLE INSTALLATION DETAIL

Ertec
The Earth Technology Corporation

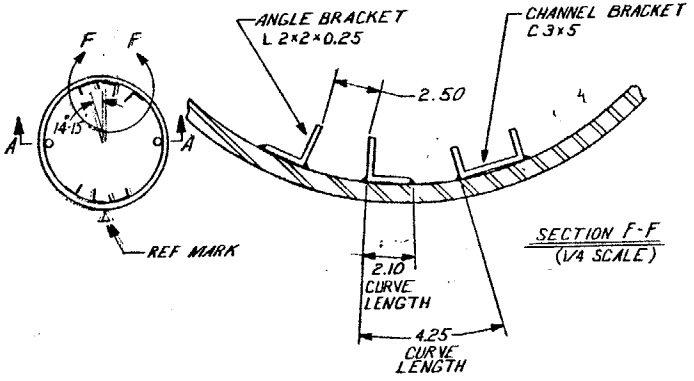
SCALE: NONE	DRAWN BY: G.R. COFFEY
APVD BY:	DATE: 5-6-83
DRAWING NUMBER C-B-103	REV. NO.



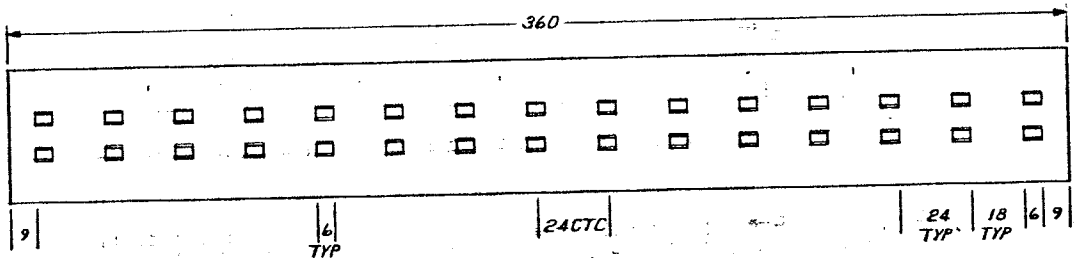
ASSEMBLED TEST CANS
(NO SCALE)



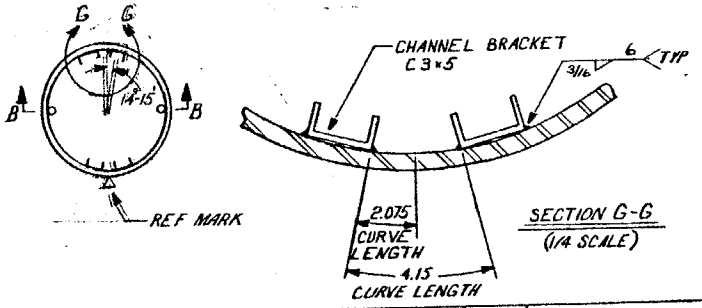
SECTION A-A (CAN 2 - DETAIL)
(NO SCALE)



SECTION F-F
(1/4 SCALE)



SECTION B-B (CAN 3 - DETAIL)
(NO SCALE)



SECTION G-G
(1/4 SCALE)

NOTE:
1) SEE DRAWING NO. C-101 FOR DETAILS ON TEST CANS 4, 5, & 6.
2) ANGLE BRACKETS ARE WELDED IN AFTER EXTENSOMETER GAGE SECTION IS INSTALLED
3) ALL NOTED DIMENSIONS ARE IN INCHES

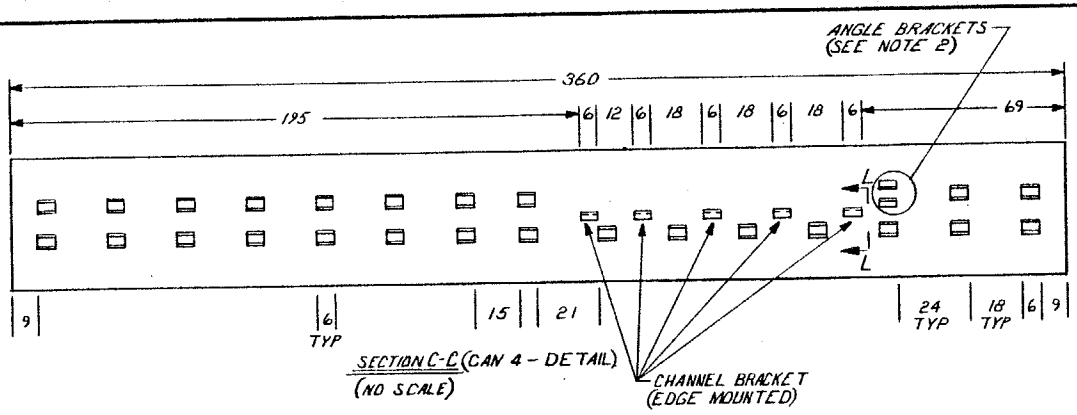
MACHINE STANDARDS	
EXCEPT AS OTHERWISE SHOWN	
MACHINE FINISH TO BE 63 .0005	
DIMENSIONAL TOLERANCE	ANGLE TOLERANCE
.0.000 ±.005	XX° ±1°
.0.00 ±.01	XX° XX' ±1'
FRACT ±1/64	XX° XX' XX" ±1"
CORNER RADIUS .010 TO .020	
LATHE CUT THREADS CLASS 2	
REMOVE ALL BURRS AND BREAK ALL SHARP CORNERS	
PROJECTION	

Pc MK	QTY	MATERIAL	SPEC	DESCRIPTION
LIST OF MATERIAL				

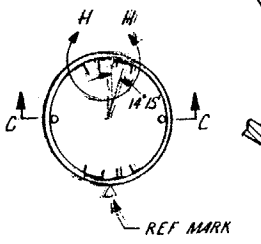
CHANNEL BRACKET INSTALLATION IN INSTRUMENTED SECTION

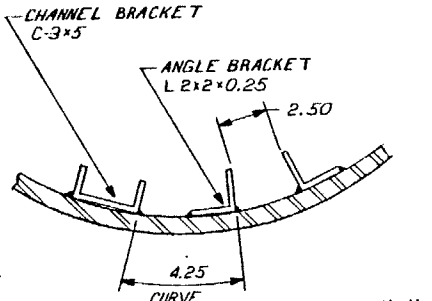
Ertec The Earth Technology Corporation

SCALE: AS NOTED | DRAWN BY: G.R. COFFEY
APVD BY: | DATE: 1-28-83
DRAWING NUMBER C- C-100 | REV. NO.

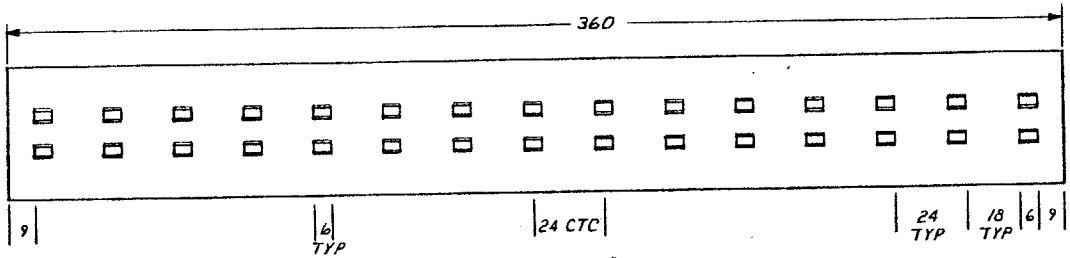


SECTION C-C (CAN 4 - DETAIL)
(NO SCALE)

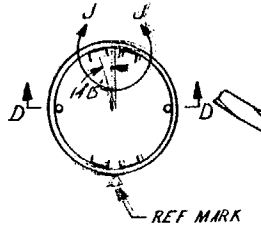


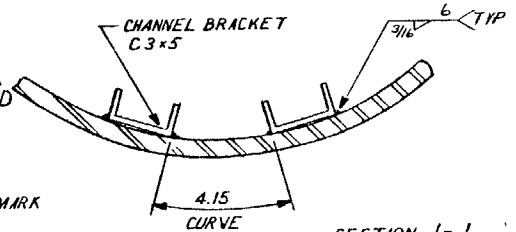


SECTION H-H
(1/4 SCALE)

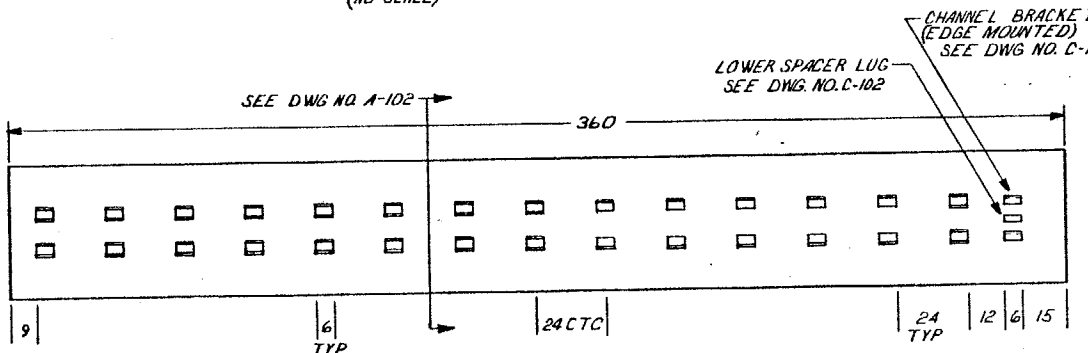


SECTION D-D (CAN 5 - DETAIL)
(NO SCALE)

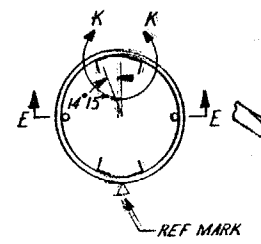


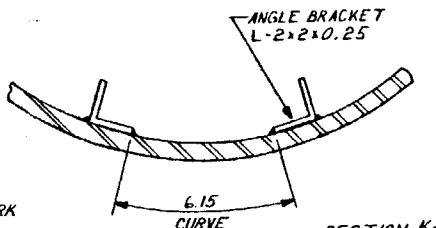


SECTION J-J
(1/4 SCALE)

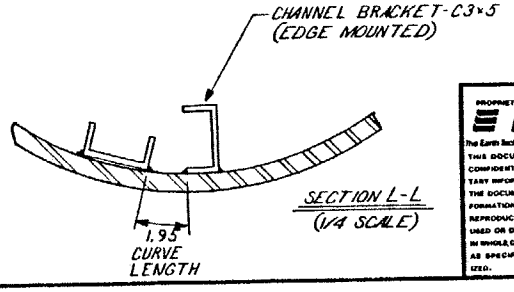


SECTION E-E (CAN 6 - DETAIL)
(NO SCALE)





SECTION K-K
(1/4 SCALE)



SECTION L-L
(1/4 SCALE)

NOTE:
1) SEE DRAWING NO. C-100 FOR DETAILS ON TEST CANS 1 & 2.
2) ANGLE BRACKETS ARE WELDED IN AFTER EXTENSOMETER GAGE SECTION IS INSTALLED
3) ALL NOTED DIMENSIONS ARE IN INCHES

MACHINE STANDARDS	
EXCEPT AS OTHERWISE SHOWN	
MACHINE FINISH TO BE 63	.0005
DIMENSIONAL TOLERANCE	ANGLE TOLERANCE
.0,000 ± .005	XX° ±1°
.0.00 ± .01	XX° XX' ±1'
FRACT ±1/64	XX° XX' XX" ±1"
CORNER RADIUS .010 TO .020	
LATHE CUT THREADS CLASS 2	
REMOVE ALL BURRS AND BREAK ALL SHARP CORNERS	
PROJECTION	

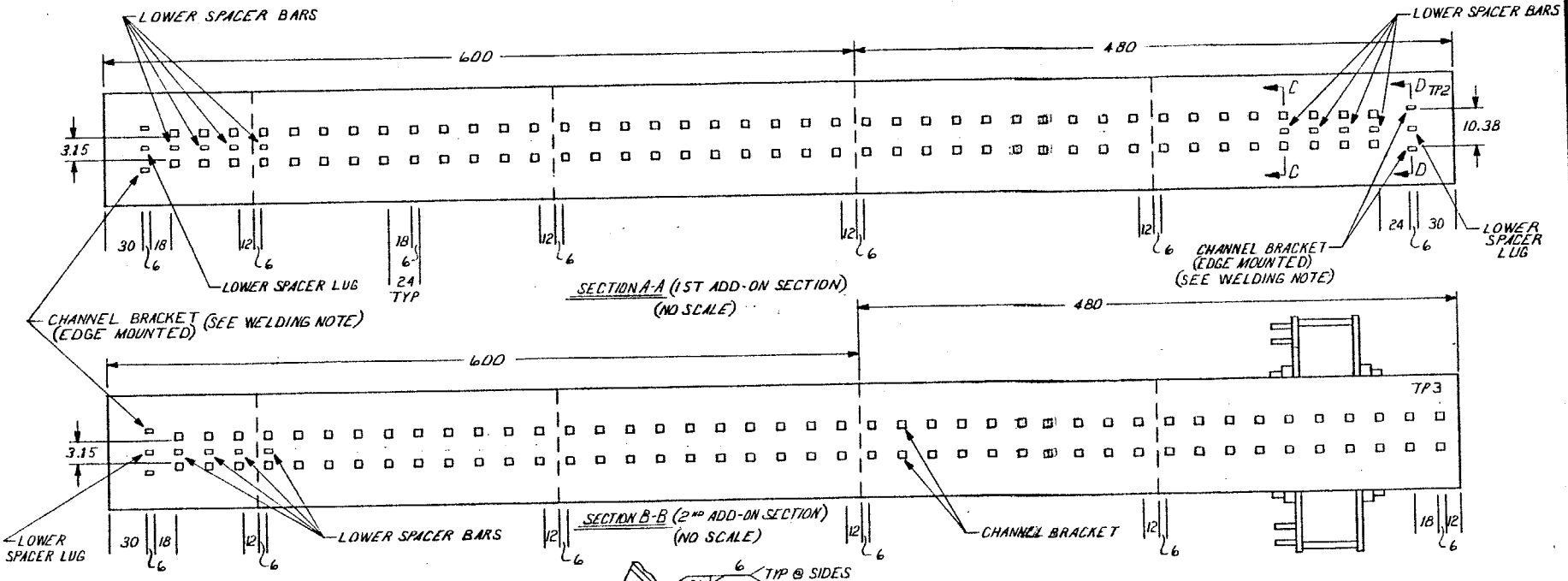
Pc MK	QTY	MATERIAL	SPEC	DESCRIPTION

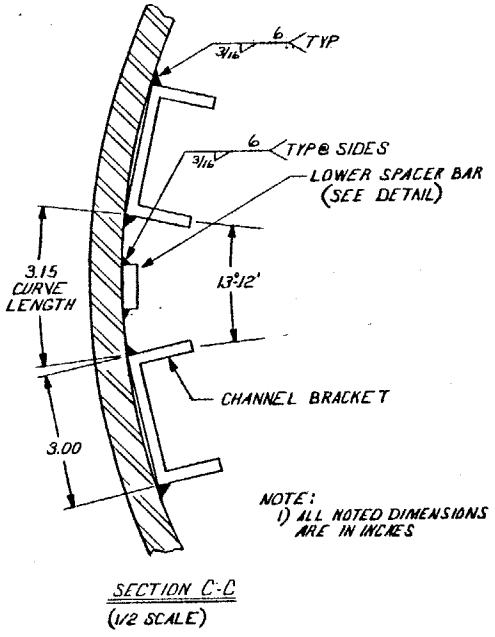
LIST OF MATERIAL

CHANNEL BRACKET INSTALLATION IN INSTRUMENTED SECTION

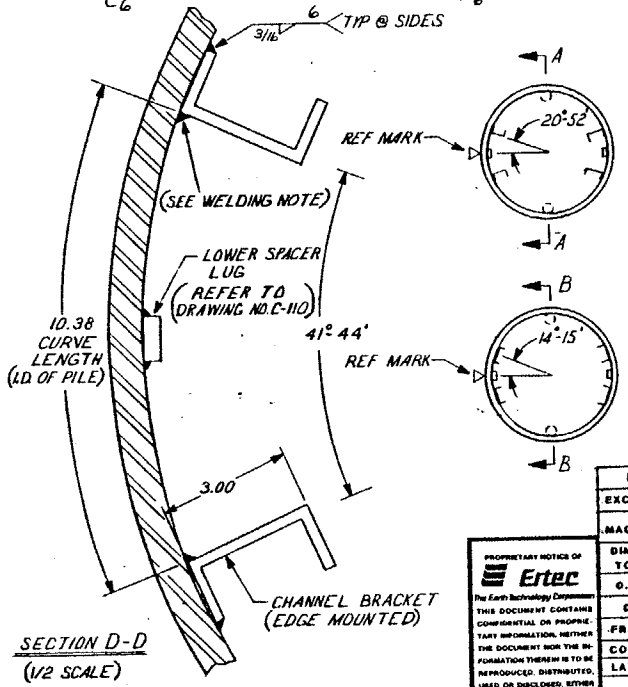
Ertec
The Earth Technology Corporation

SCALE: AS NOTED	DRAWN BY: G.R. COFFEY
APVD BY:	DATE: 1-31-83
DRAWING NUMBER C- C-101	REV. NO.



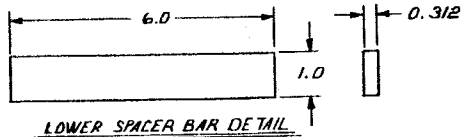


SECTION C-C
(1/2 SCALE)



SECTION D-D
(1/2 SCALE)

WELDING NOTE:
EDGE MOUNTED CHANNEL BRACKETS ARE WELDED IN AFTER EXTENSOMETER TUBES ARE INSTALLED AND PRESSURE TEST SUCCESSFUL



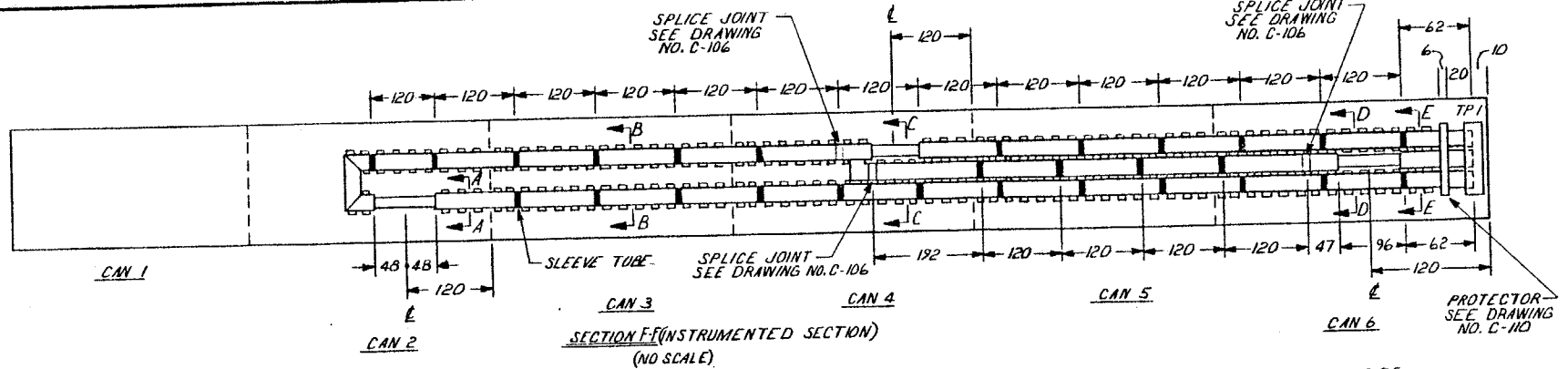
LOWER SPACER BAR DETAIL
(W ADD-ON SECTIONS)
(1/2 SCALE)

MACHINE STANDARDS		Pc MK	QTY	MATERIAL	SPEC	DESCRIPTION
EXCEPT AS OTHERWISE SHOWN						
MACHINE FINISH TO BE 63 .0005		LIST OF MATERIAL				
DIMENSIONAL TOLERANCE	ANGLE TOLERANCE					
0.000 ± .010	XX° ± 1°					
0.00 ± .04	XX° XX' ± 1'					
FRACT ± 1/64	XX° XX' XX" ± 1"					
CORNER RADIUS .010 TO .020						
LATHE CUT THREADS CLASS 2						
REMOVE ALL BURRS AND BREAK ALL SHARP CORNERS						
PROJECTION						

CHANNEL BRACKET INSTALLATION IN ADD-ON SECTIONS

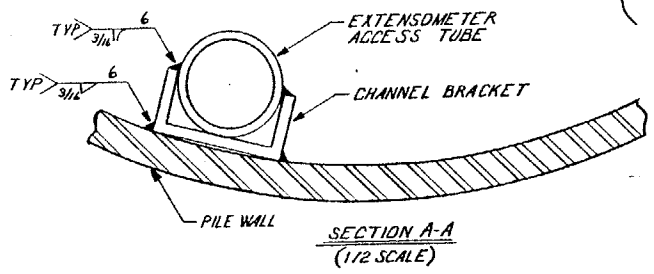
Ertec
The Earth Technology Corporation

SCALE: AS NOTED
DRAWN BY: G.R. COFFEY
APVD BY:
DATE: 1-14-83
DRAWING NUMBER C-C-102
REV. NO.

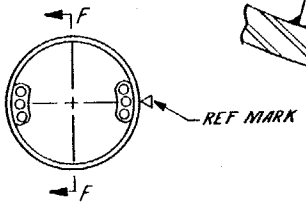


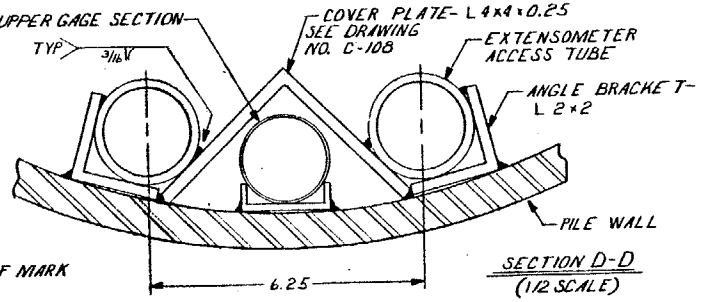
SECTION F-F (INSTRUMENTED SECTION)
(NO SCALE)

(COVER PLATES ARE NOT SHOWN IN ABOVE DRAWING FOR CLARITY. SEE SECTIONS C-C & D-D)

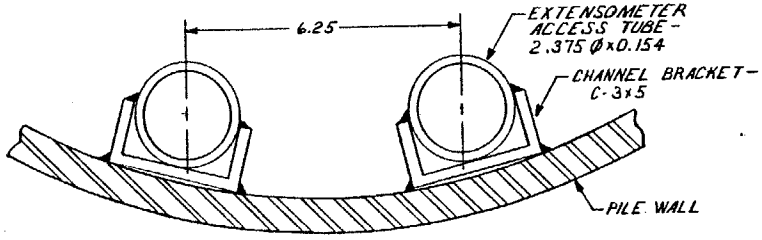


SECTION A-A
(1/2 SCALE)

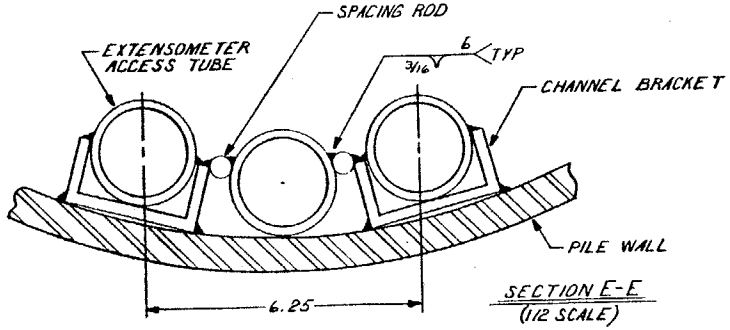




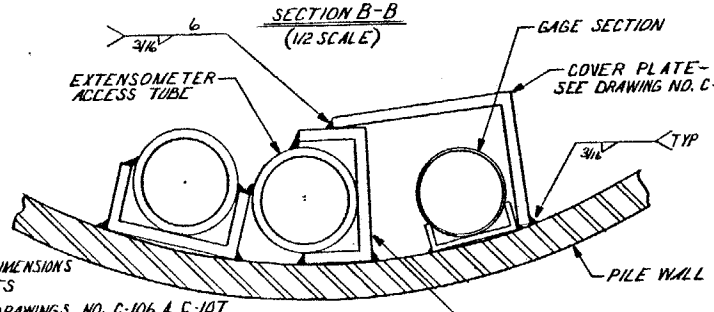
SECTION D-D
(1/2 SCALE)



SECTION B-B
(1/2 SCALE)



SECTION E-E
(1/2 SCALE)



SECTION C-C
(1/2 SCALE)

NOTE:
1.) ALL NOTED DIMENSIONS ARE IN INCHES
2.) REFER TO DRAWINGS NO. C-106 & C-107 FOR DETAILS OF SPLICE JOINT CONNECTION AND EXTENSOMETER GAGE DETAILS
3) EXTENSOMETER GAGE SECTION WILL BE FURNISHED BY ERTEC

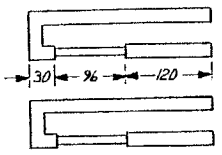
MACHINE STANDARDS	
EXCEPT AS OTHERWISE SHOWN	
MACHINE FINISH TO BE 63 .0005	
DIMENSIONAL TOLERANCE	ANGLE TOLERANCE
0.000 ±.002	XX° ±1°
0.00 ±.01	XX° XX' ±1'
FRACT ±1/64	XX° XX' XX" ±1"
CORNER RADIUS .010 TO .020	
LATHE CUT THREADS CLASS 2	
REMOVE ALL BURRS AND BREAK ALL SHARP CORNERS	
PROJECTION	

Pc MK	QTY	MATERIAL	SPEC	DESCRIPTION
LIST OF MATERIAL				

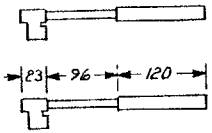
EXTENSOMETER AND ACCESS TUBE INSTALLATION DETAIL FOR INSTRUMENTED SECTION

Ertec
The Earth Technology Corporation

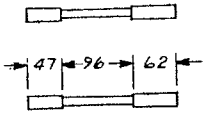
SCALE: AS NOTED	DRAWN BY: G.R.COFFEY
APVD BY:	DATE: 3-21-83
DRAWING NUMBER C-C-103	REV. NO.



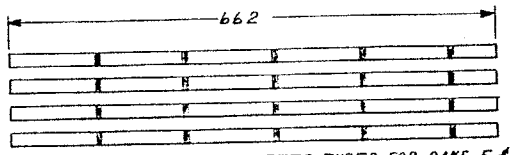
GAGE SECTIONS FOR CAN 2



GAGE SECTIONS FOR CAN 4

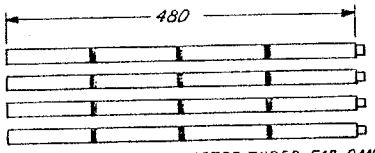


GAGE SECTIONS FOR CAN 6

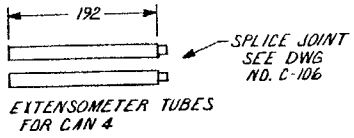


PREASSEMBLED EXTENSOMETER TUBES FOR CANS 5 & 6

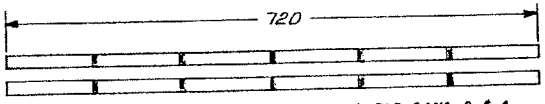
(STEP 1)



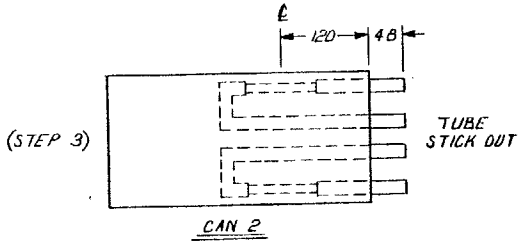
PREASSEMBLED EXTENSOMETER TUBES FOR CANS 3 & 4 AND CANS 5 & 6

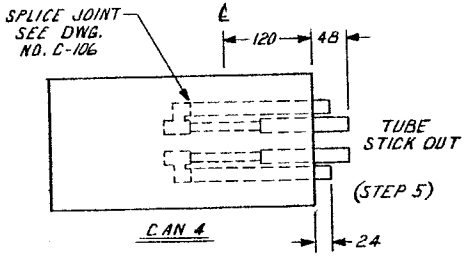


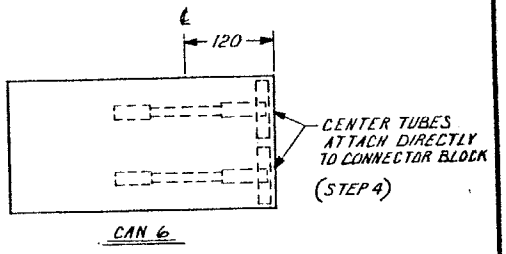
EXTENSOMETER TUBES FOR CAN 4

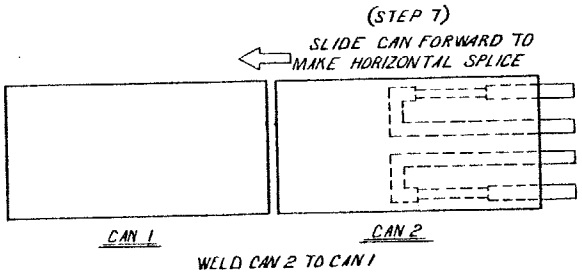


PREASSEMBLED EXTENSOMETER TUBES FOR CANS 3 & 4

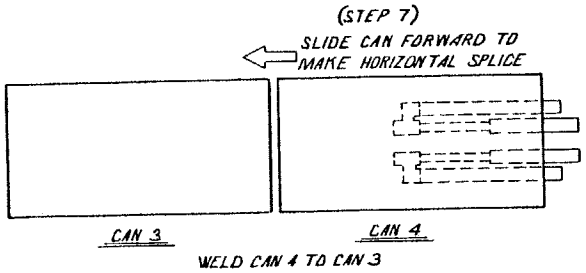




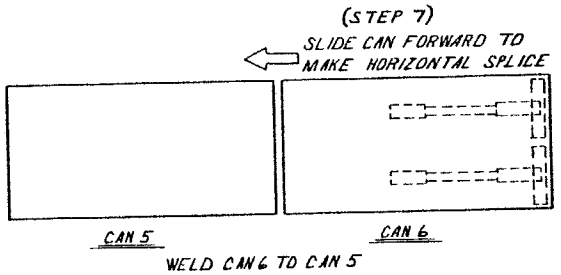




WELD CAN 2 TO CAN 1



WELD CAN 4 TO CAN 3



WELD CAN 6 TO CAN 5

STEP 1 - PREASSEMBLE EXTENSOMETER TUBE LENGTHS AND GAGE SECTIONS INTO DESCRIBED CONFIGURATION ABOVE.

STEP 2 - ATTACH SPLICE JOINT NIPPLE WHERE INDICATED AND PRESSURE TEST ALL TUBES AND GAGE SECTIONS.

STEP 3 - INSTALL GAGE SECTIONS IN CAN SECTIONS 2, 4, AND 6.

STEP 4 - ATTACH EXTENSOMETER TUBES IN CAN 6 TO CONNECTOR BLOCK PRESSURE TEST AND INSTALL COVER PLATE.

STEP 5 - ATTACH UPPER EXTENSOMETER TUBES WITH SPLICE JOINTS IN CAN 4.

STEP 6 - CALIBRATE INDIVIDUAL CAN SECTIONS UPON INSTALLATION OF STRAIN MODULES.

STEP 7 - ASSEMBLE CAN SECTIONS 1 AND 2, CAN SECTIONS 3 AND 4, AND CAN SECTIONS 5 AND 6 BY SLIDING CANS FORWARD.

NOTE: 1) REFER TO DWG. NO. C-105 FOR CONTINUATION OF ASSEMBLY PROCEDURE.

MACHINE STANDARDS	
EXCEPT AS OTHERWISE SHOWN	
MACHINE FINISH TO BE 63 +.0005 -.0003	
DIMENSIONAL TOLERANCE	ANGLE TOLERANCE
0.000 ±.002	XX° ±1°
0.00 ±.01	XX° XX' ±1'
FRACT ±1/64	XX° XX' XX" ±1"
CORNER RADIUS .010 TO .020	
LATHE CUT THREADS CLASS 2	
REMOVE ALL BURRS AND BREAK ALL SHARP CORNERS	
PROJECTION	

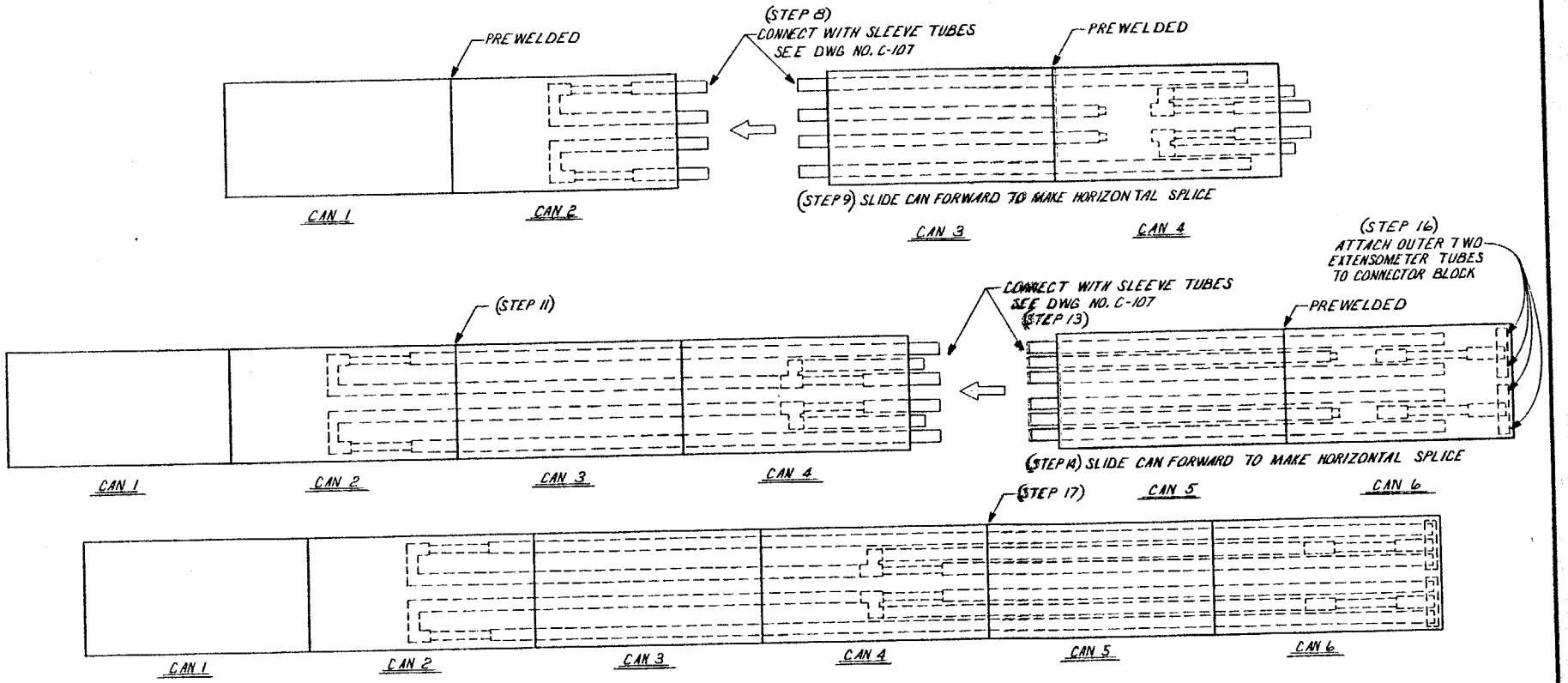
Pc MK	QTY	MATERIAL	SPEC	DESCRIPTION

LIST OF MATERIAL

EXTENSOMETER AND TEST CAN ASSEMBLY PROCEDURE

Ertec
The Earth Technology Corporation

SCALE: NONE
APVD BY:
DRAWN BY: G.R. COFFEY
DATE: 4-1-83
DRAWING NUMBER C- C-104
REV. NO.



STEP 8 – PLACE APPROPRIATE PREASSEMBLED TUBE LENGTHS INSIDE CANS 3 AND 4 AND CONNECT WITH SLEEVE TUBES TO STICK OUT FROM CAN 2. (PRESSURE TEST)

STEP 9 – ASSEMBLE CAN SECTIONS 1 AND 2 TO CAN SECTIONS 3 AND 4 BY SLIDING CAN FORWARD.

STEP 10 – GUIDE EXTENSOMETER TUBES INTO SPLICE JOINT AT BASE OF CAN 4 AND CONNECT.

STEP 11 – PERFORM HORIZONTAL GIRTH WELD.

STEP 12 – WELD EXTENSOMETER TUBES IN CAN SECTIONS 3 AND 4 TO CHANNEL BRACKETS PROVIDED AND PRESSURE TEST.

STEP 13 – PLACE THE REMAINING SIX PREASSEMBLED EXTENSOMETER TUBES INTO CAN SECTIONS 5 AND 6 AND CONNECT WITH SLEEVE TUBES TO THE STICK OUT FROM CAN 4. (PRESSURE TEST)

STEP 14 – ASSEMBLE CAN SECTIONS 1,2,3,AND 4 TO CAN SECTIONS 5 AND 6 BY SLIDING SECTIONS FORWARD.

STEP 15 – GUIDE CENTER EXTENSOMETER TUBES INTO SPLICE JOINT IN CAN 6.

STEP 16 – CONNECT EXTENSOMETER TUBES TO CONNECTOR BLOCK.

STEP 17 – PERFORM HORIZONTAL GIRTH WELD.

STEP 18 – WELD EXTENSOMETER TUBES IN CAN SECTIONS 5 AND 6 TO CHANNEL BRACKETS PROVIDED. PRESSURE TEST ENTIRE INSTRUMENTED SECTION AS OUTLINED IN DRAWING NO.

NOTE:
1) REFER TO DWG. NO. C-104 FOR CONTINUATION OF ASSEMBLY PROCEDURE.

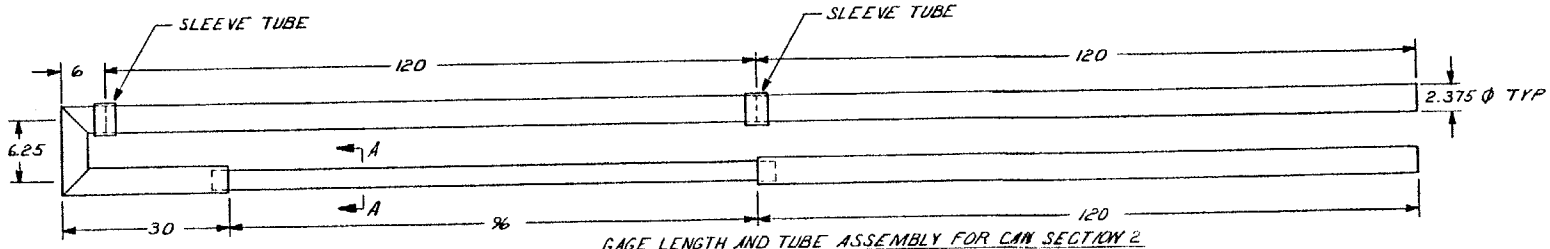
MACHINE STANDARDS	
EXCEPT AS OTHERWISE SHOWN	
MACHINE FINISH TO BE 63 $\sqrt{}$ .0005	
DIMENSIONAL TOLERANCE	ANGLE TOLERANCE
0.000 ± .002	XX° ±1°
0.00 ± .01	XX° XX' ±1'
FRACT ±1/64	XX° XX' XX" ±1"
CORNER RADIUS .010 TO .020	
LATHE CUT THREADS CLASS 2	
REMOVE ALL BURRS AND BREAK ALL SHARP CORNERS	
PROJECTION	

Pc MK	QTY	MATERIAL	SPEC	DESCRIPTION
LIST OF MATERIAL				

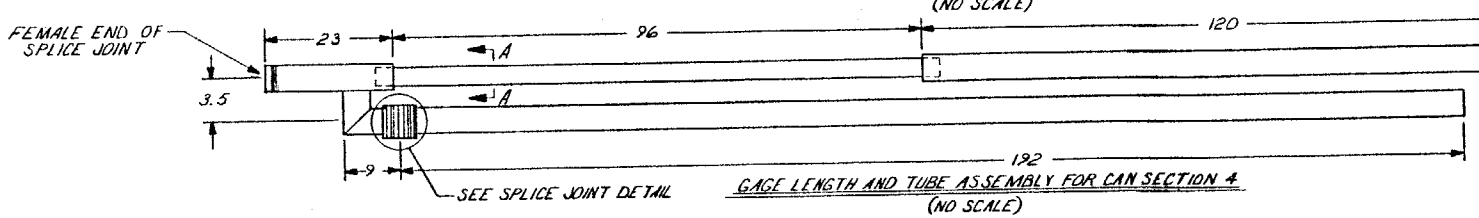
EXTENSOMETER AND TEST CAN ASSEMBLY PROCEDURE

Ertec
The Earth Technology Corporation

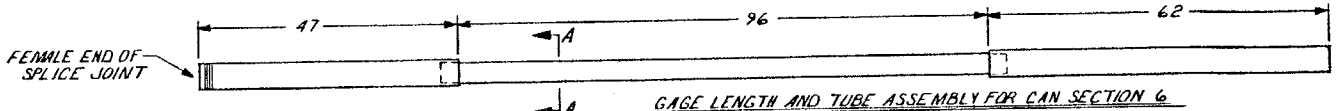
SCALE: NONE
APVD BY:
DRAWN BY: G.R. COFFEY
DATE: 4-1-83
DRAWING NUMBER C-C-105
REV. NO.



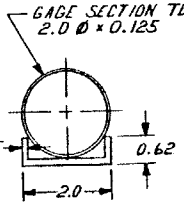
GAGE LENGTH AND TUBE ASSEMBLY FOR CAN SECTION 2
(NO SCALE)



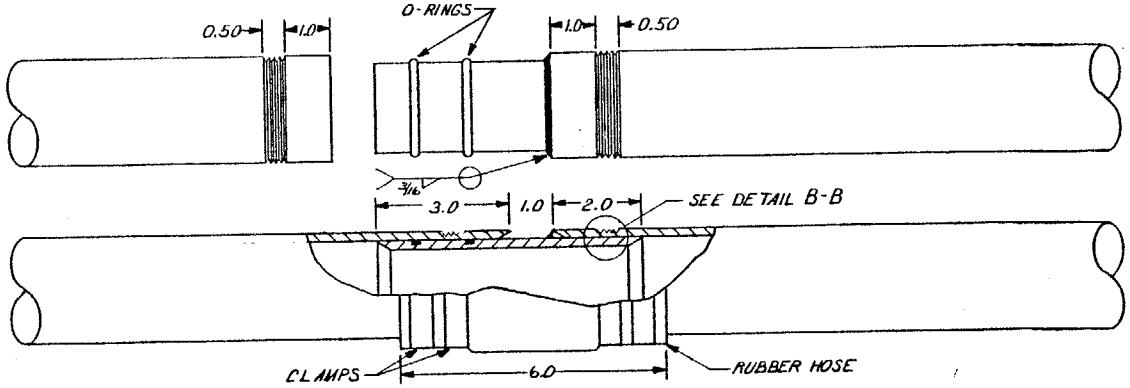
GAGE LENGTH AND TUBE ASSEMBLY FOR CAN SECTION 4
(NO SCALE)



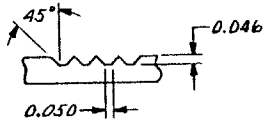
GAGE LENGTH AND TUBE ASSEMBLY FOR CAN SECTION 6
(NO SCALE)



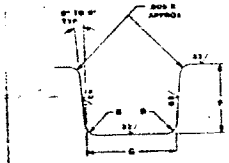
SECTION A-A
(1/2 SCALE)



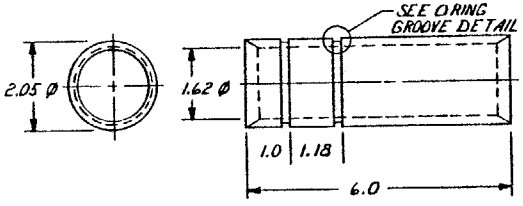
SPLICE JOINT DETAIL
(1/2 SCALE)



DETAIL B-B
(FULL SCALE)



O'RING GROOVE		
DEPTH	WIDTH	RADIUS
F	G	R
104	.187	.02



SLIP JOINT

NOTE:
1) ALL NOTED DIMENSIONS ARE IN INCHES
2) EXTENSOMETER GAGE SECTION, SLIP JOINT, AND ASSORTED HARDWARE WILL BE FURNISHED BY ERTEC.

MACHINE STANDARDS	
EXCEPT AS OTHERWISE SHOWN	
MACHINE FINISH TO BE 63 .0005	
DIMENSIONAL TOLERANCE	ANGLE TOLERANCE
0.000 ±.002	XX° ±1°
0.00 ±.01	XX° XX' ±1'
FRACT ±1/64	XX° XX' XX" ±1"
CORNER RADIUS .010 TO .020	
LATHE CUT THREADS CLASS 2	
REMOVE ALL BURRS AND BREAK ALL SHARP CORNERS	
PROJECTION	

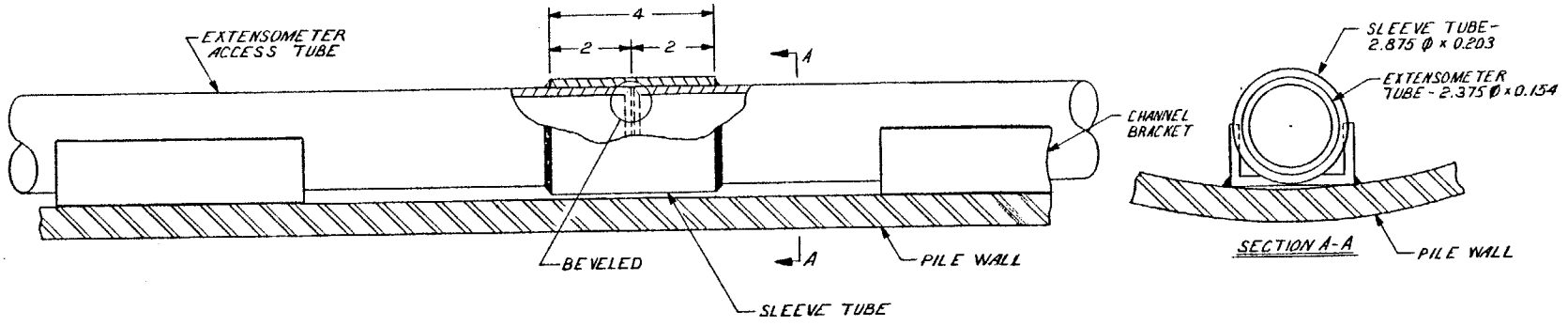
Pc MK	QTY	MATERIAL	SPEC	DESCRIPTION

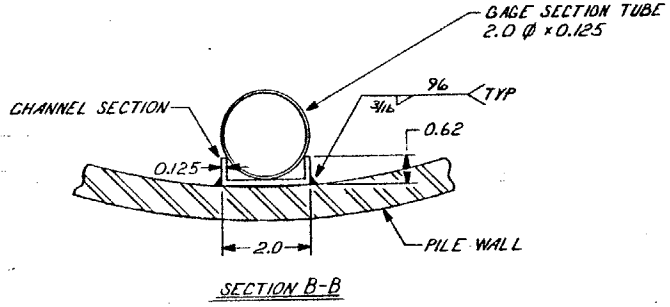
LIST OF MATERIAL

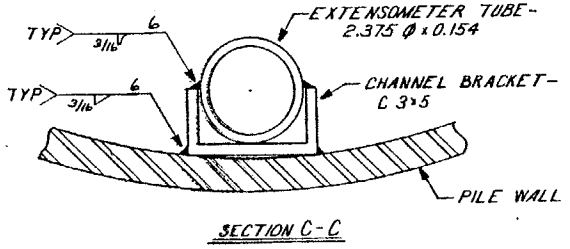
GAGE LENGTH AND TUBE ASSEMBLY DETAIL

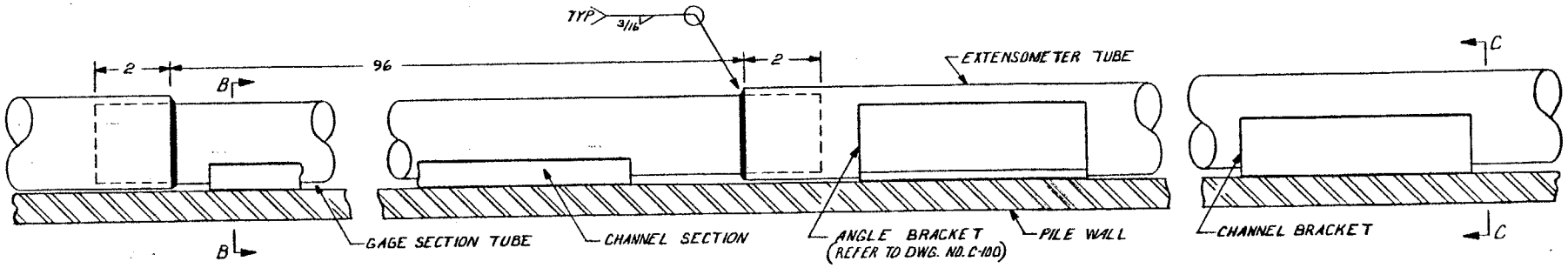
Ertec
The Earth Technology Corporation

SCALE: AS NOTED	DRAWN BY: G.R. COFFEY
APVD BY:	DATE: 3-21-83
DRAWING NUMBER C-C-106	REV. NO.









NOTE:
1) ALL NOTED DIMENSIONS ARE IN INCHES
2) EXTENSOMETER GAGE SECTION WILL BE FURNISHED BY ERTEC

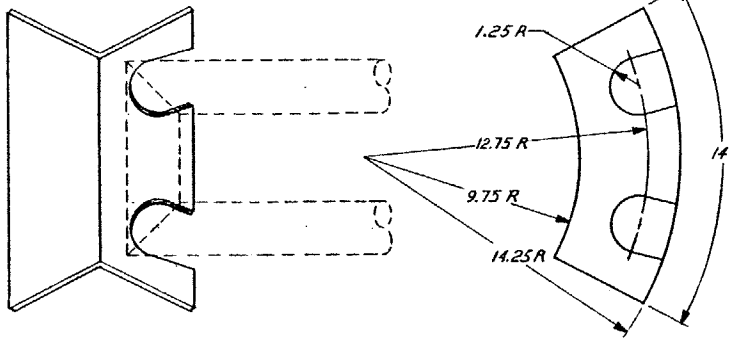
MACHINE STANDARDS	
EXCEPT AS OTHERWISE SHOWN	
MACHINE FINISH TO BE 63 √ .0005	
DIMENSIONAL TOLERANCE	ANGLE TOLERANCE
0.000 ± .002	XX° ± 1°
0.00 ± .01	XX° XX' ± 1'
FRACT ± 1/64	XX° XX' XX" ± 1"
CORNER RADIUS .010 TO .020	
LATHE CUT THREADS CLASS 2	
REMOVE ALL BURRS AND BREAK ALL SHARP CORNERS	
PROJECTION	

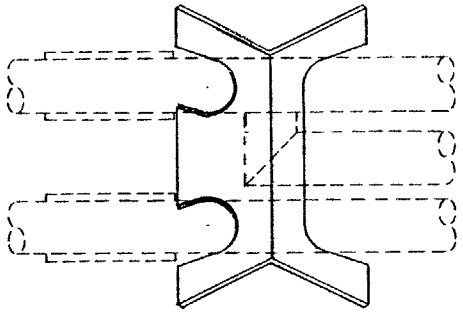
Pc MK	QTY	MATERIAL	SPEC	DESCRIPTION
LIST OF MATERIAL				

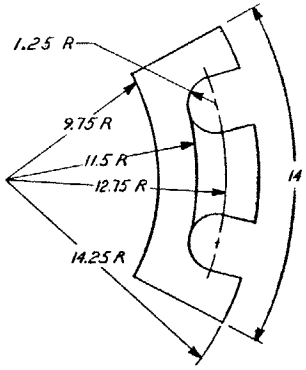
EXTENSOMETER GAGE SECTION AND SLEEVE TUBE DETAIL

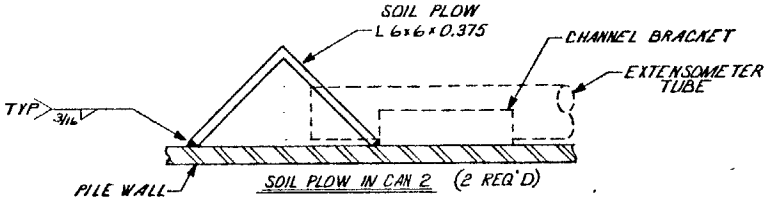
Ertec The Earth Technology Corporation

SCALE: 1/2	DRAWN BY: G.R. COFFEY
APVD BY:	DATE: 2-16-63
DRAWING NUMBER C-C-107	REV. NO.

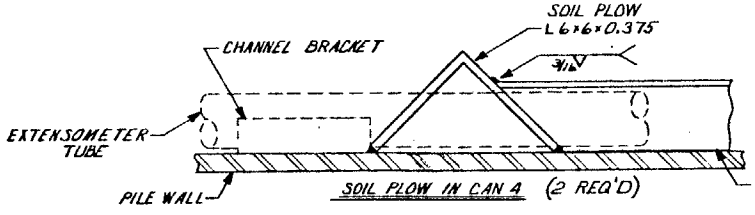




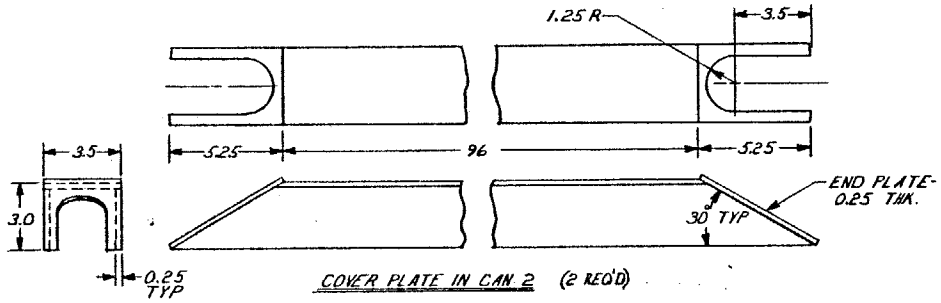




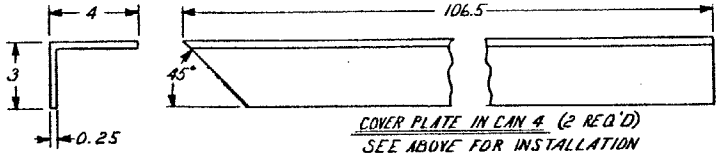
SOIL PLOW IN CAN 2 (2 REQ'D)



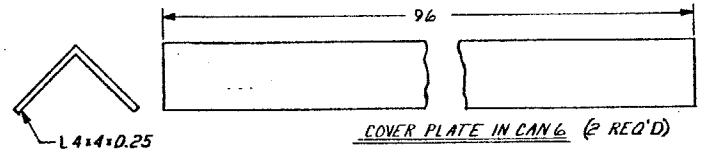
SOIL PLOW IN CAN 4 (2 REQ'D)



COVER PLATE IN CAN 2 (2 REQ'D)

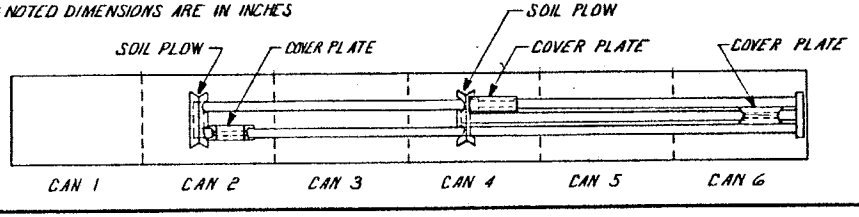


COVER PLATE IN CAN 4 (2 REQ'D)
SEE ABOVE FOR INSTALLATION



COVER PLATE IN CAN 6 (2 REQ'D)

NOTE:
1) ALL NOTED DIMENSIONS ARE IN INCHES



MACHINE STANDARDS	
EXCEPT AS OTHERWISE SHOWN	
MACHINE FINISH TO BE 63 +.000 -.005	
DIMENSIONAL TOLERANCE	ANGLE TOLERANCE
0.000 ±.002	XX° ±1°
0.00 ±.01	XX° XX' ±1°
FRACT ±1/64	XX° XX' XX" ±1°
CORNER RADIUS .010 TO .020	
LATHE CUT THREADS CLASS 2	
REMOVE ALL BURRS AND BREAK ALL SHARP CORNERS	
PROJECTION	

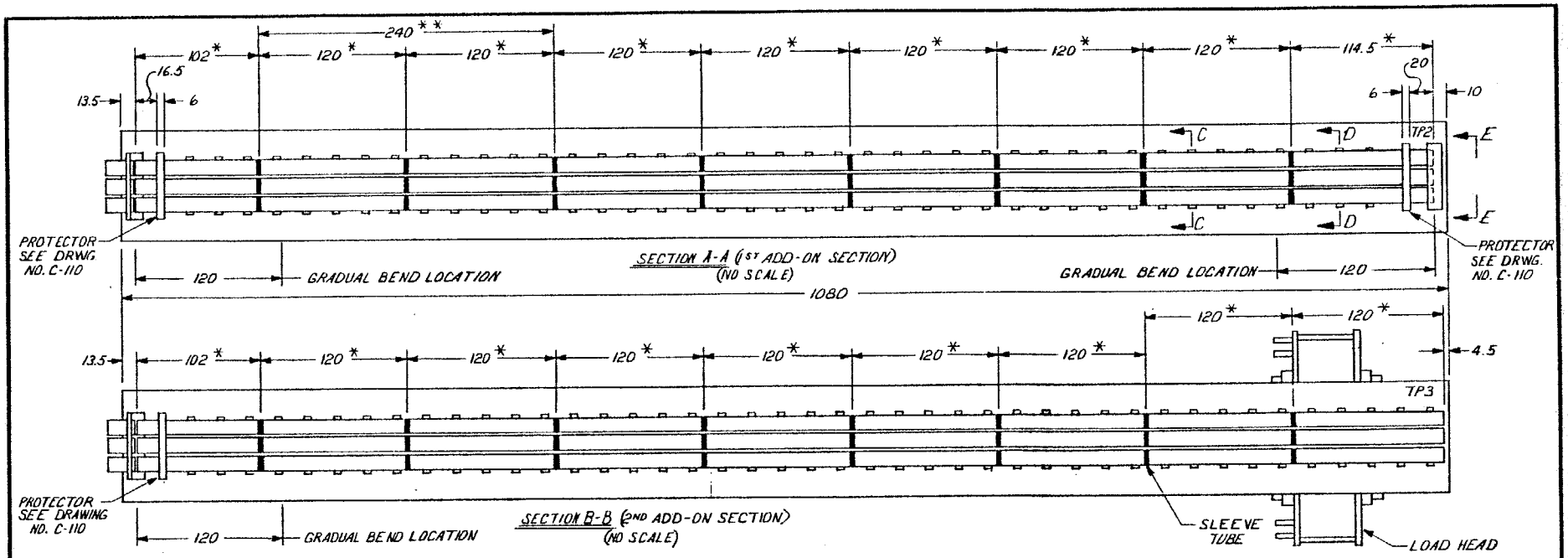
Pc MK	QTY	MATERIAL	SPEC	DESCRIPTION

LIST OF MATERIAL

SOIL PLOW AND COVER PLATE DETAIL

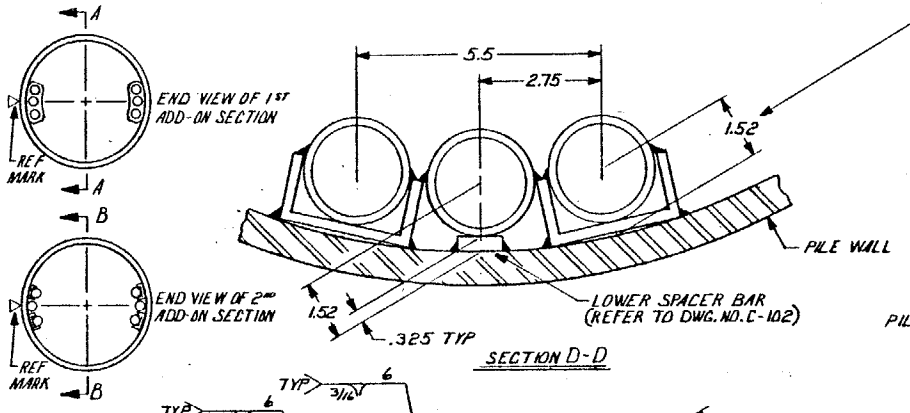
Ertec
The Earth Technology Corporation

SCALE: 1/4	DRAWN BY: G. R. COFFEY
APVD BY:	DATE: 3-23-83
DRAWING NUMBER C-C-108	REV. NO.

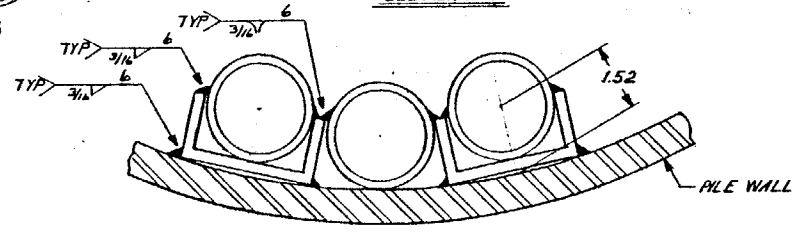


SECTION A-A (1ST ADD-ON SECTION)
(NO SCALE)

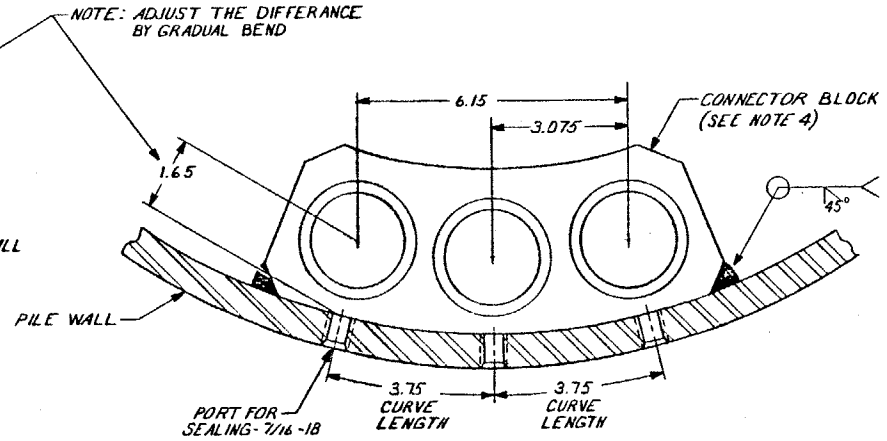
SECTION B-B (2ND ADD-ON SECTION)
(NO SCALE)



SECTION D-D



SECTION C-C



SECTION E-E
(1/2 SCALE)

NOTES:
1) DIMENSIONS DESIGNATED WITH * ARE EXTENSOMETER TUBE LENGTHS
2) * *-SOME 240 INCH EXTENSOMETER TUBES MAY BE SUBSTITUTED FOR 120 INCH LENGTH TUBES
3) ALL NOTED DIMENSIONS ARE IN INCHES
4) CONNECTOR BLOCK AND ASSORTED HARDWARE FURNISHED BY ERTEC

MACHINE STANDARDS
EXCEPT AS OTHERWISE SHOWN
MACHINE FINISH TO BE 63 .0008

DIMENSIONAL TOLERANCE	ANGLE TOLERANCE
0.000 ±.002	XX° ±1°
0.00 ±.01	XX° XX' ±1'
FRACT ±1/64	XX° XX' XX" ±1"
CORNER RADIUS .010 TO .020	
LATHE CUT THREADS CLASS 2	
REMOVE ALL BURRS AND BREAK ALL SHARP CORNERS	
PROJECTION	

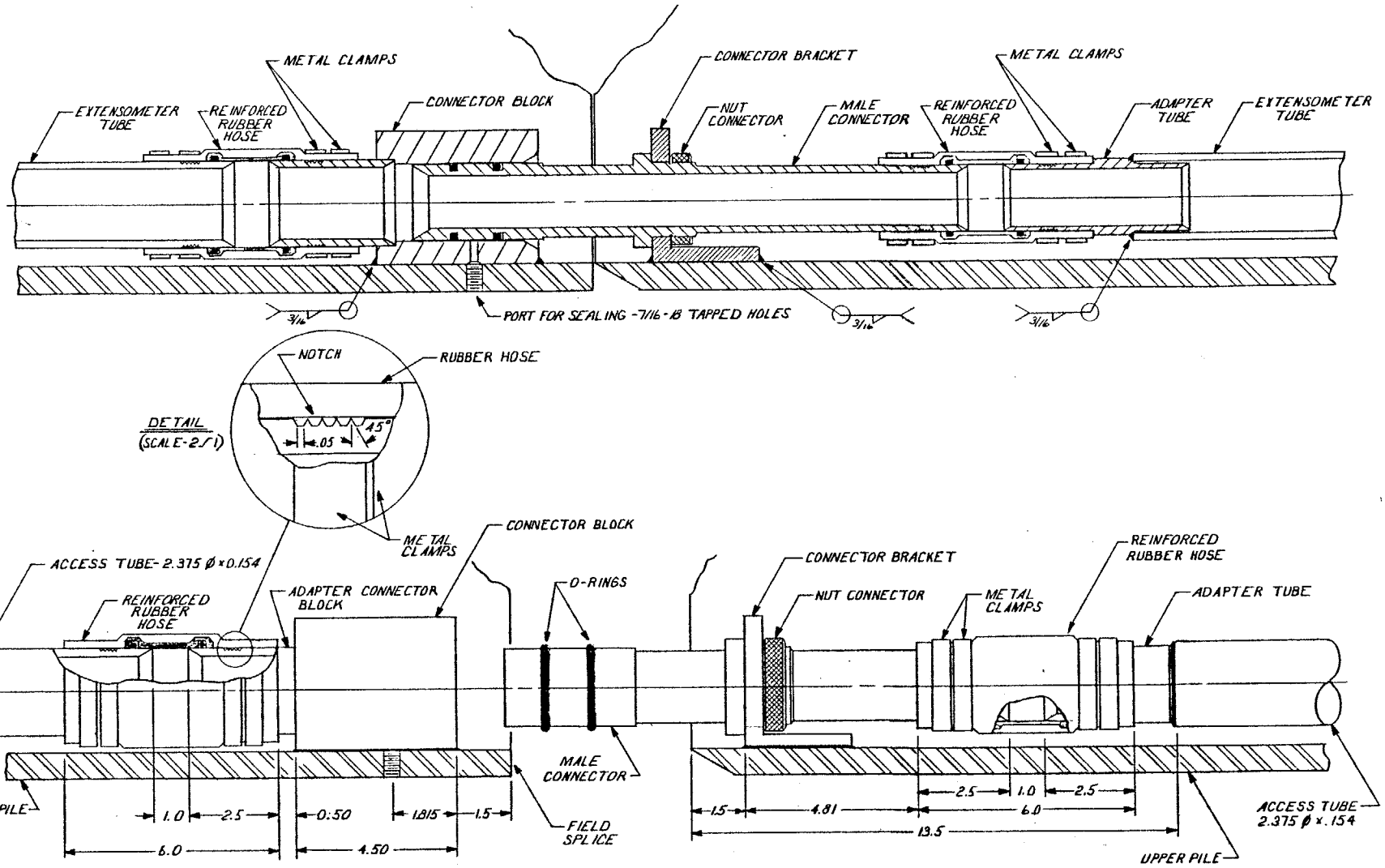
Pc MK	QTY	MATERIAL	SPEC	DESCRIPTION

LIST OF MATERIAL

EXTENSOMETER ACCESS TUBES INSTALLATION DETAIL IN ADD-ON SECTIONS

Ertec
The Earth Technology Corporation

SCALE: AS NOTED	DRAWN BY: G.R. COFFEY
APVD BY:	DATE: 2-1-83
DRAWING NUMBER C-C-109	REV. NO.



NOTE:
1) ALL NOTED DIMENSIONS ARE IN INCHES
2) ERTEC WILL FURNISH ALL HARDWARE FOR EXTENSOMETER JOINT SECTION

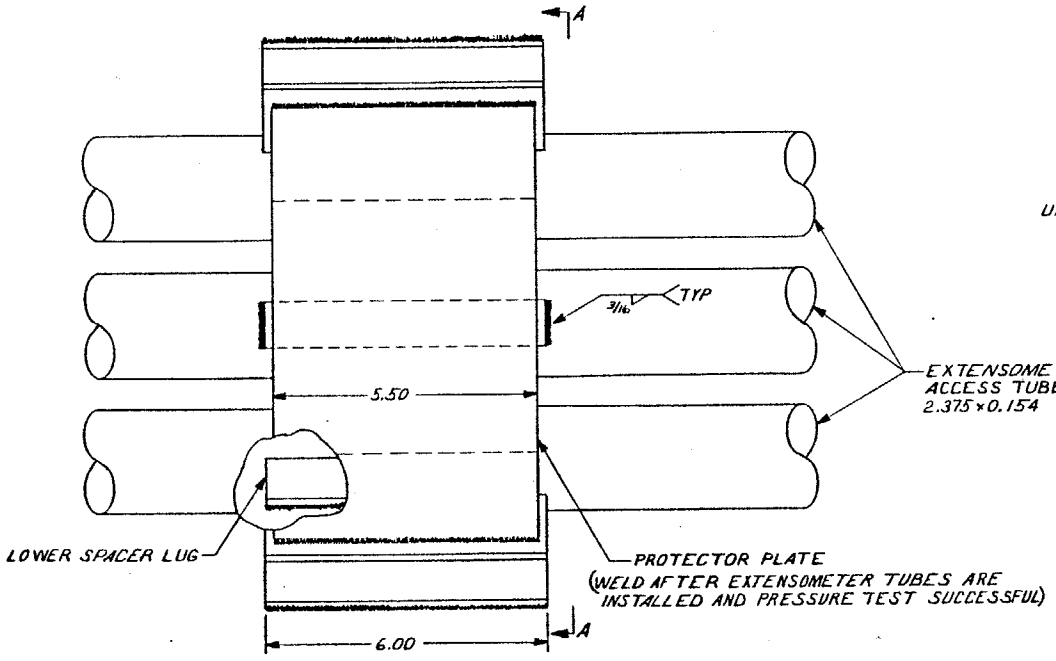
MACHINE STANDARDS						
EXCEPT AS OTHERWISE SHOWN						
MACHINE FINISH TO BE 63 $\sqrt{}^{.0005}$	Pc MK	QTY	MATERIAL	SPEC	DESCRIPTION	
LIST OF MATERIAL						

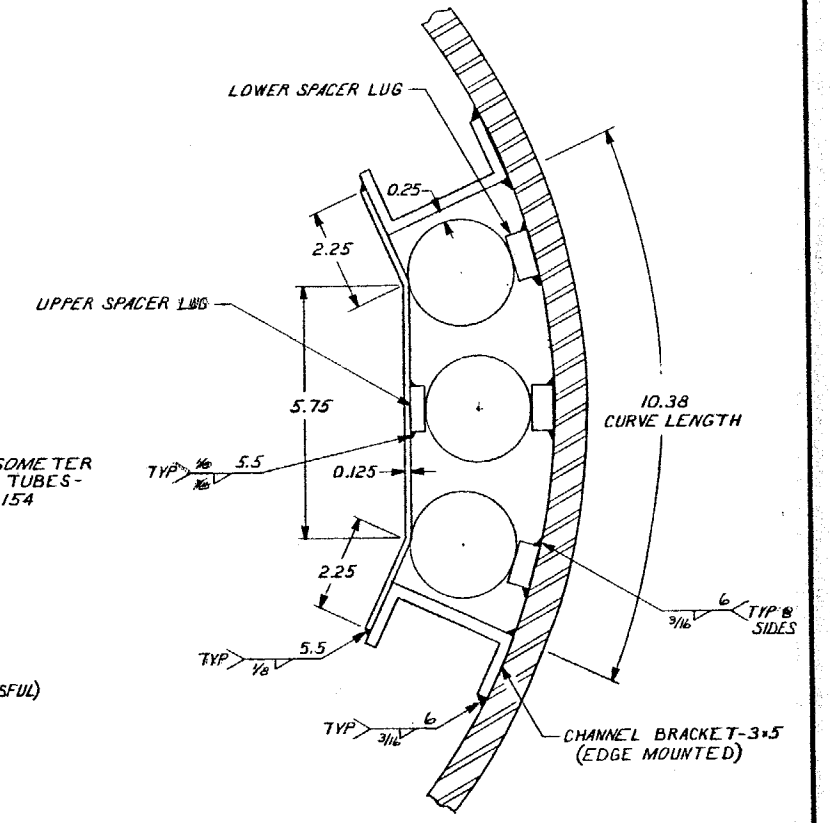
DIMENSIONAL TOLERANCE	ANGLE TOLERANCE
0.000 ±.002	XX° ±1°
0.00 ±.01	XX° XX' ±1'
FRACT ±1/64	XX° XX' XX" ±1"
CORNER RADIUS .010 TO .020	
LATHE CUT THREADS CLASS 2	
REMOVE ALL BURRS AND BREAK ALL SHARP CORNERS	
PROJECTION	

EXTENSOMETER ACCESS TUBE JOINT SECTION DETAIL

Ertec The Earth Technology Corporation

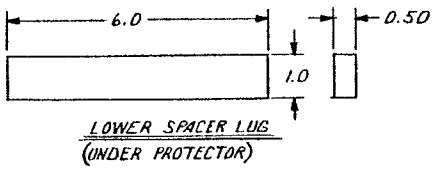
SCALE: 1/2	DRAWN BY: G.R. COFFEY
APVD BY:	DATE: 2-1-83
DRAWING NUMBER C-C-111	REV. NO.



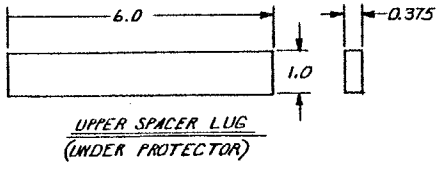


SECTION A-A

NOTE:
1) REFER TO DRAWINGS NO. C-103 & C-109 FOR LOCATION OF PROTECTOR
2) ALL NOTED DIMENSIONS ARE IN INCHES



LOWER SPACER LUG
(UNDER PROTECTOR)



UPPER SPACER LUG
(UNDER PROTECTOR)

MACHINE STANDARDS
EXCEPT AS OTHERWISE SHOWN
MACHINE FINISH TO BE 63 $\sqrt{}$ .0005

DIMENSIONAL TOLERANCE	ANGLE TOLERANCE
0.000 ±.0005	XX° ±1°
0.00 ±.01	XX° XX' ±1'
FRACT ±1/64	XX° XX' XX" ±1"

CORNER RADIUS .010 TO .020
LATHE CUT THREADS CLASS 2
REMOVE ALL BURRS AND BREAK ALL SHARP CORNERS
PROJECTION

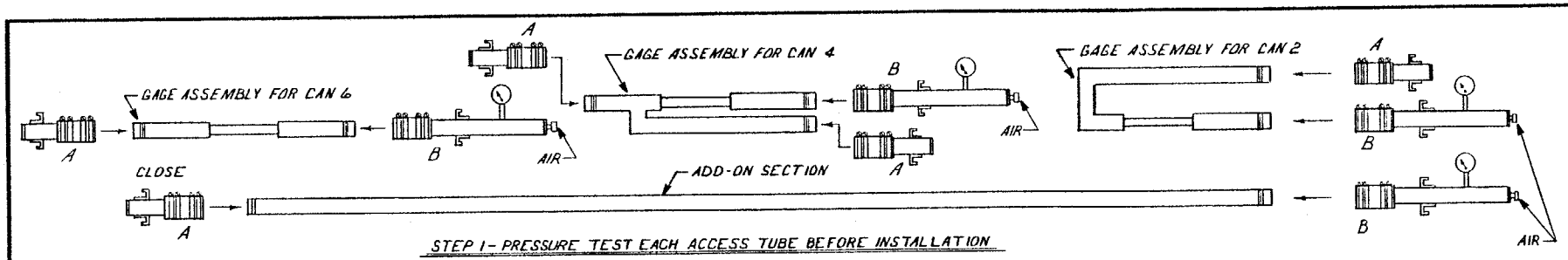
Pc MK	QTY	MATERIAL	SPEC	DESCRIPTION

LIST OF MATERIAL

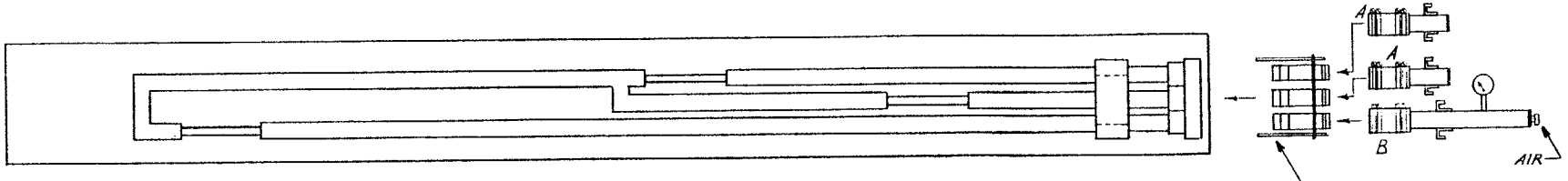
EXTENSOMETER ACCESS TUBE PROTECTOR FOR DRIVING VIBRATION

Ertec
The Earth Technology Corporation

SCALE: 1/2
DRAWN BY: G.R. COFFEY
APVD BY:
DATE: 1-26-82
DRAWING NUMBER C-C-110
REV. NO.

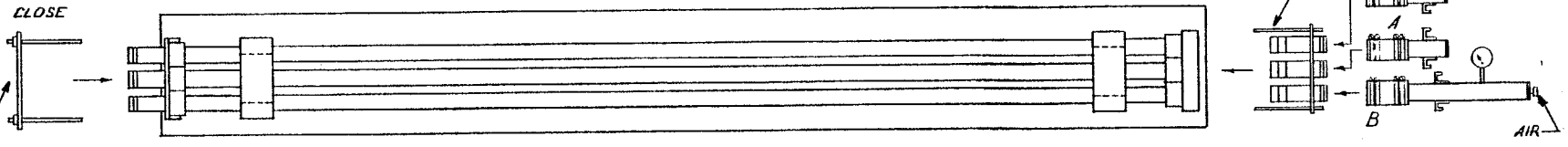


STEP 1 - PRESSURE TEST EACH ACCESS TUBE BEFORE INSTALLATION



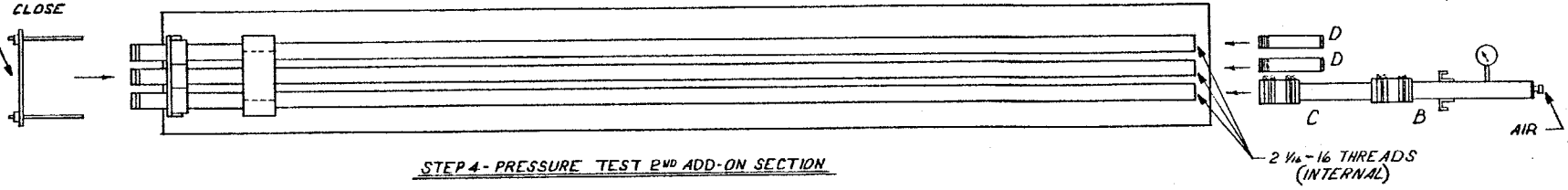
STEP 2 - PRESSURE TEST INSTRUMENTED SECTION

SEE DRAWING NO. C-113



STEP 3 - PRESSURE TEST 1ST ADD-ON SECTION

SEE DRAWING NO. C-114



STEP 4 - PRESSURE TEST 2ND ADD-ON SECTION

NOTE:
REFER TO DRAWING NO. C-115 FOR DETAILS ON PRESSURE TESTING TOOLS

MACHINE STANDARDS	
EXCEPT AS OTHERWISE SHOWN	
MACHINE FINISH TO BE $63\sqrt{}^{.0005}$	
DIMENSIONAL TOLERANCE	ANGLE TOLERANCE
0.000 ±.005	XX° ±1°
0.00 ±.01	XX° XX' ±1'
FRACT ±1/64	XX° XX' XX" ±1"
CORNER RADIUS .010 TO .020	
LATHE CUT THREADS CLASS 2	
REMOVE ALL BURRS AND BREAK ALL SHARP CORNERS	
PROJECTION	

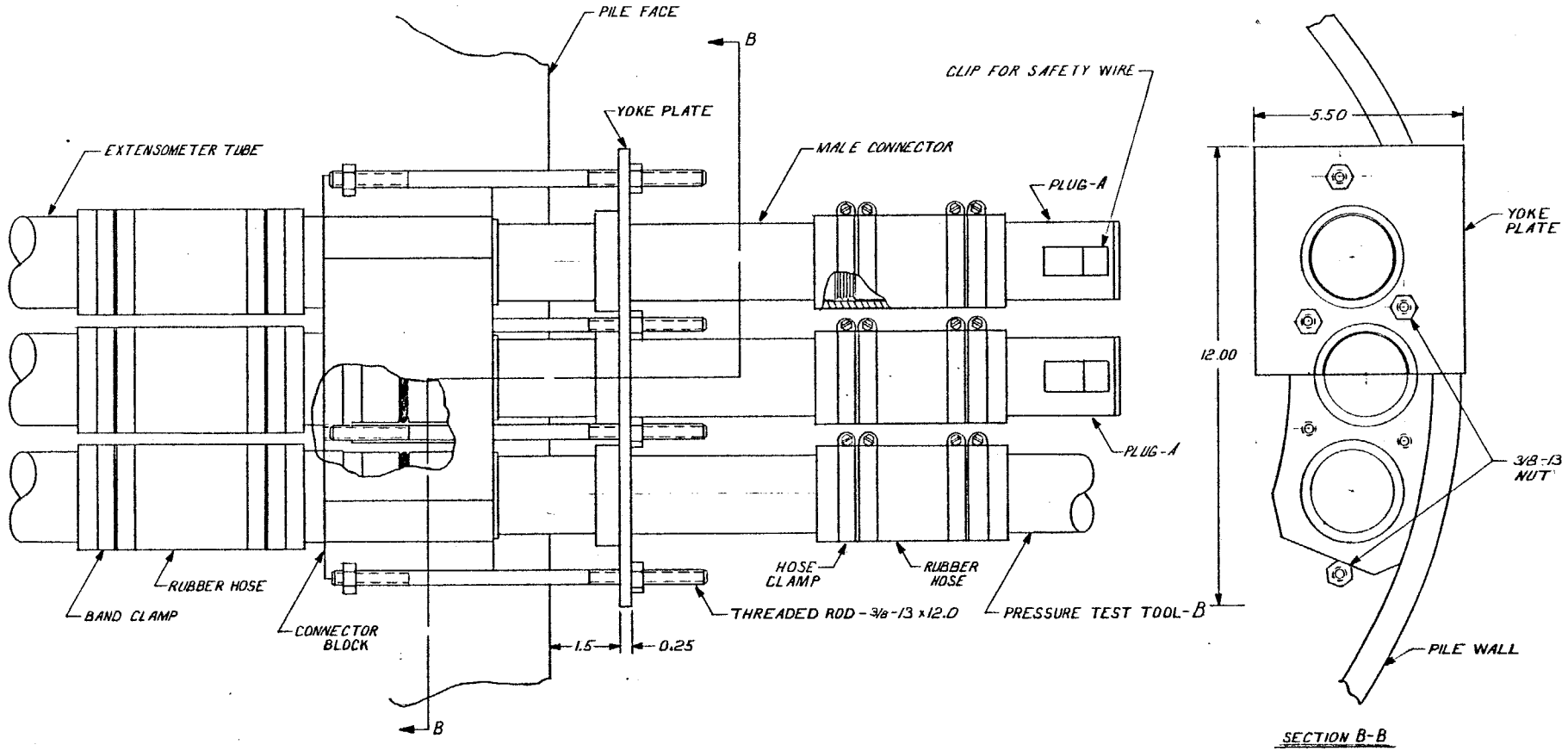
Pc MK	QTY	MATERIAL	SPEC	DESCRIPTION

LIST OF MATERIAL

TEST DETAIL FOR EXTENSOMETER ACCESS TUBES

Ertec
The Earth Technology Corporation

SCALE: NONE	DRAWN BY: G.R. COFFEY
APVD BY:	DATE: 1-27-83
DRAWING NUMBER C-C-112	REV. NO.



NOTE:
1) ALL NOTED DIMENSIONS ARE IN INCHES
2) REFER TO DWG. NO. C-112
3) YOKE PLATE WILL BE FURNISHED BY ERTEC

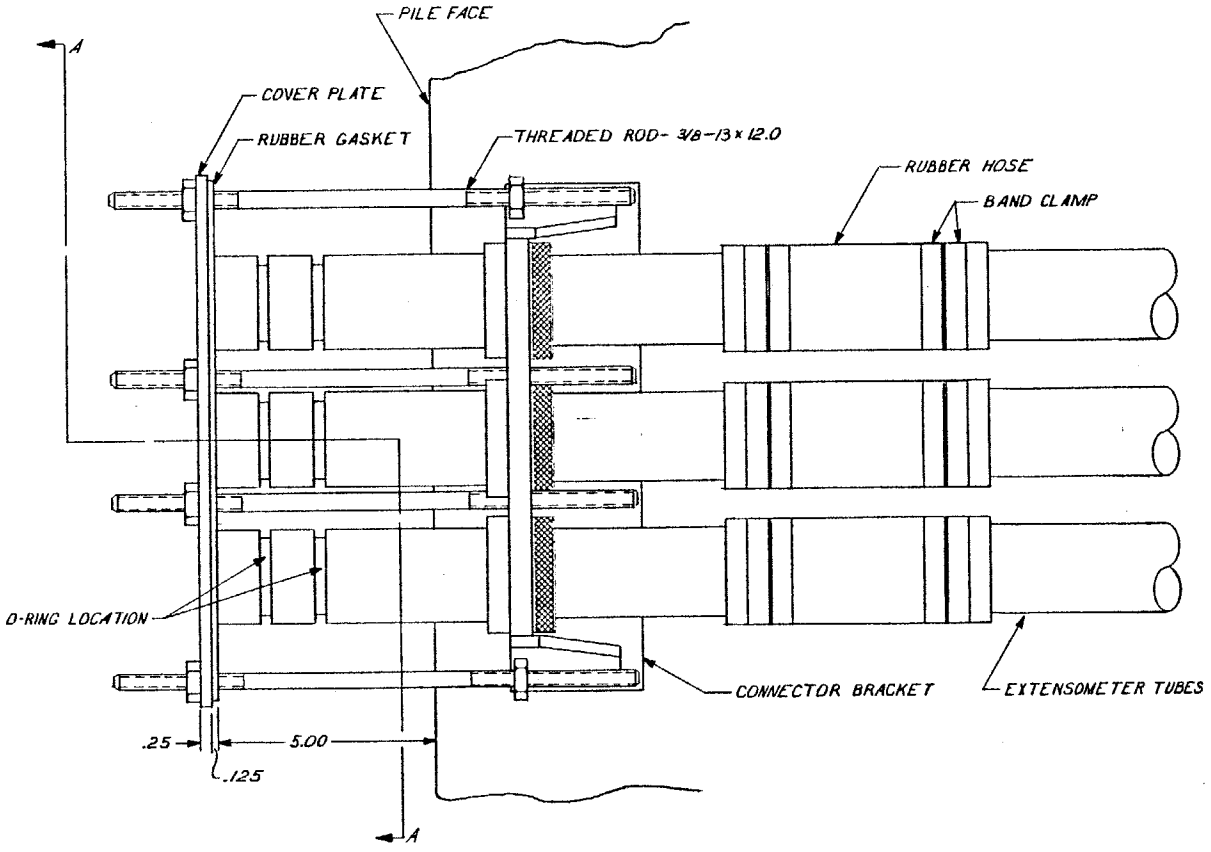
MACHINE STANDARDS	
EXCEPT AS OTHERWISE SHOWN	
MACHINE FINISH TO BE 63 $\sqrt{}$ .0005	
DIMENSIONAL TOLERANCE	ANGLE TOLERANCE
0.000 ±.002	XX° ±1°
0.00 ±.01	XX° XX' ±1'
FRACT ±1/64	XX° XX' XX" ±1"
CORNER RADIUS .010 TO .020	
LATHE CUT THREADS CLASS 2	
REMOVE ALL BURRS AND BREAK ALL SHARP CORNERS	
PROJECTION	

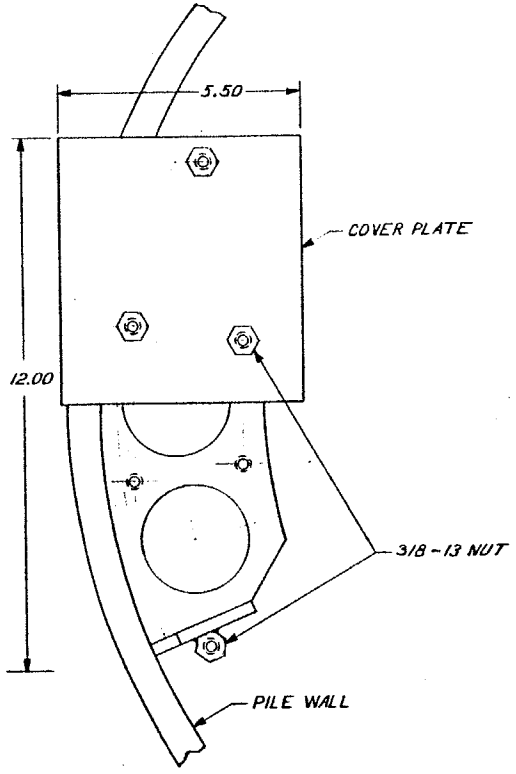
Pc MK	QTY	MATERIAL	SPEC	DESCRIPTION
LIST OF MATERIAL				

YOKE PLATE DETAIL
FOR PRESSURE TEST

Ertec
The Earth Technology Corporation

SCALE: 1/2	DRAWN BY: G.R.COFFEY
APVD BY:	DATE: 1-28-82
DRAWING NUMBER C-C-113	REV. NO.





SECTION A-A

NOTE:
1) ALL NOTED DIMENSIONS ARE IN INCHES
2) REFER TO DWG. NO. C-112
3) COVER PLATE WILL BE FURNISHED BY ERTEC

MACHINE STANDARDS	
EXCEPT AS OTHERWISE SHOWN	
MACHINE FINISH TO BE $\sqrt{}$ .0005	
DIMENSIONAL TOLERANCE	ANGLE TOLERANCE
0.000 ±.002	XX° ±1°
0.00 ±.01	XX° XX' ±1'
FRACT ±1/64	XX° XX' XX" ±1"
CORNER RADIUS .010 TO .020	
LATHE CUT THREADS CLASS 2	
REMOVE ALL BURRS AND BREAK ALL SHARP CORNERS	
PROJECTION	

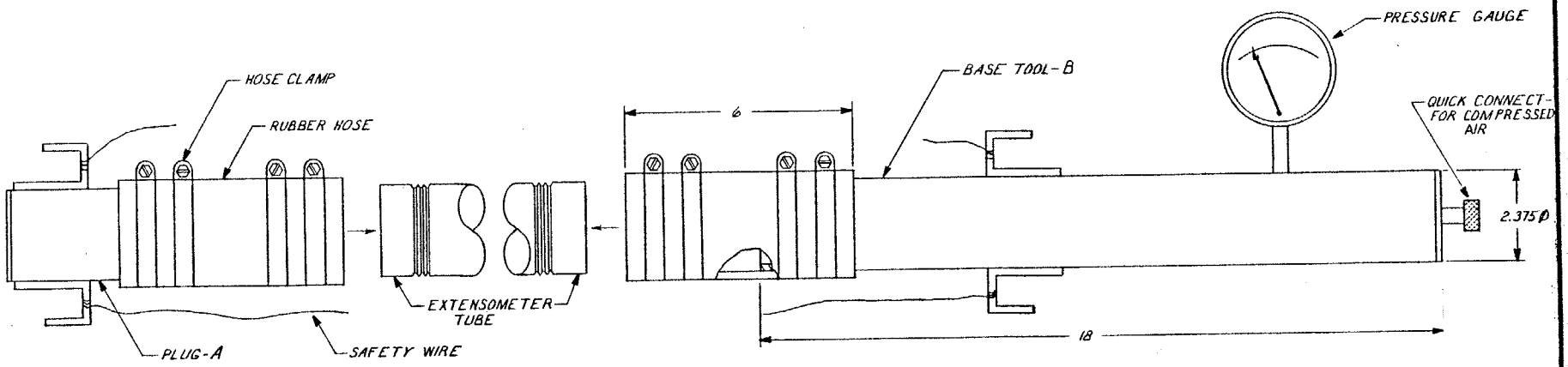
LIST OF MATERIAL

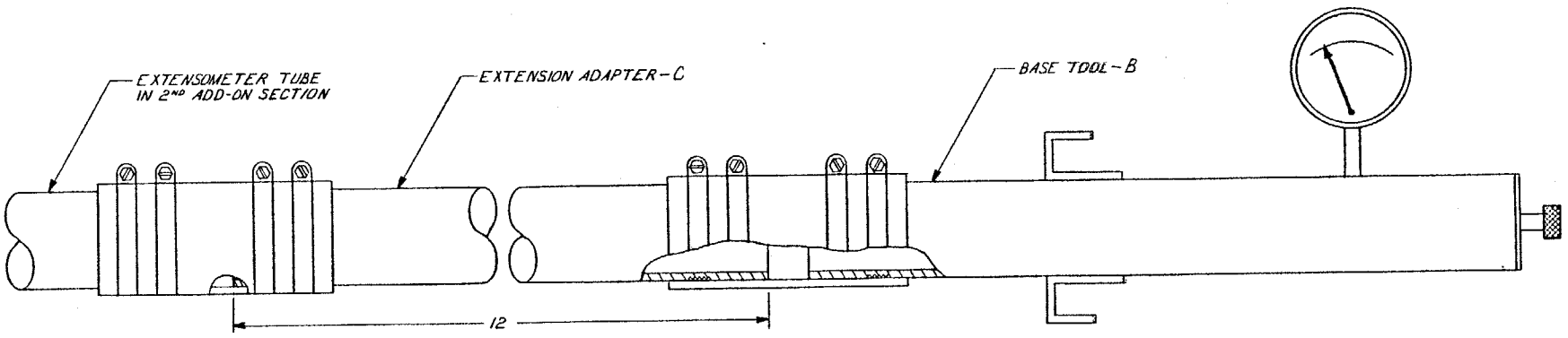
Pc MK	QTY	MATERIAL	SPEC	DESCRIPTION

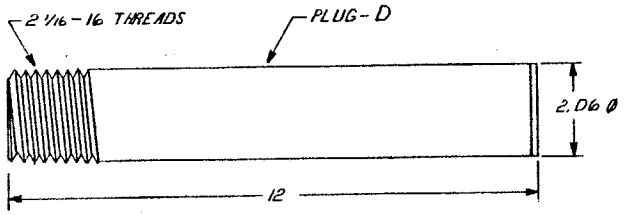
COVER PLATE DETAIL FOR PRESSURE TEST

Ertec The Earth Technology Corporation

SCALE: 1/2 | DRAWN BY: G.R.COFFEY
APVD BY: | DATE: 1-27-83
DRAWING NUMBER C- C-114 | REV. NO.







NOTE:
1) ALL NOTED DIMENSIONS ARE IN INCHES
2) REFER TO DWG. NO. C-112

PRESSURE TEST		
PRESSURE	DURATION	RESULTS
100 PSI	30 MIN	NO LEAKS

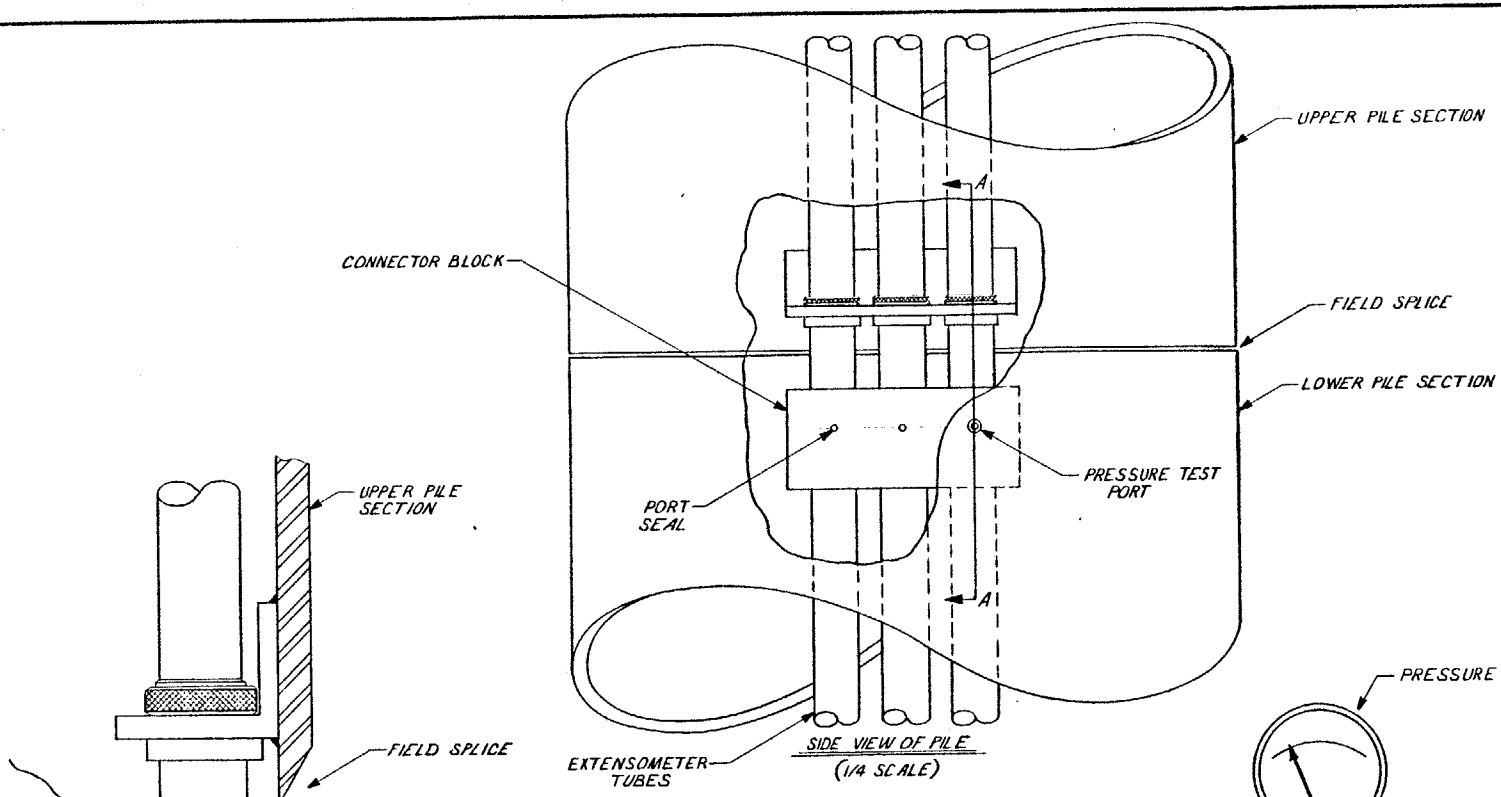
MACHINE STANDARDS	
EXCEPT AS OTHERWISE SHOWN	
MACHINE FINISH TO BE 63 √ .0005	
DIMENSIONAL TOLERANCE	ANGLE TOLERANCE
0.000 ± .005	XX° ±1°
0.00 ± .01	XX° XX' ±1'
FRACT ± 1/64	XX° XX' XX" ±1"
CORNER RADIUS .010 TO .020	
LATHE CUT THREADS CLASS 2	
REMOVE ALL BURRS AND BREAK ALL SHARP CORNERS	
PROJECTION	

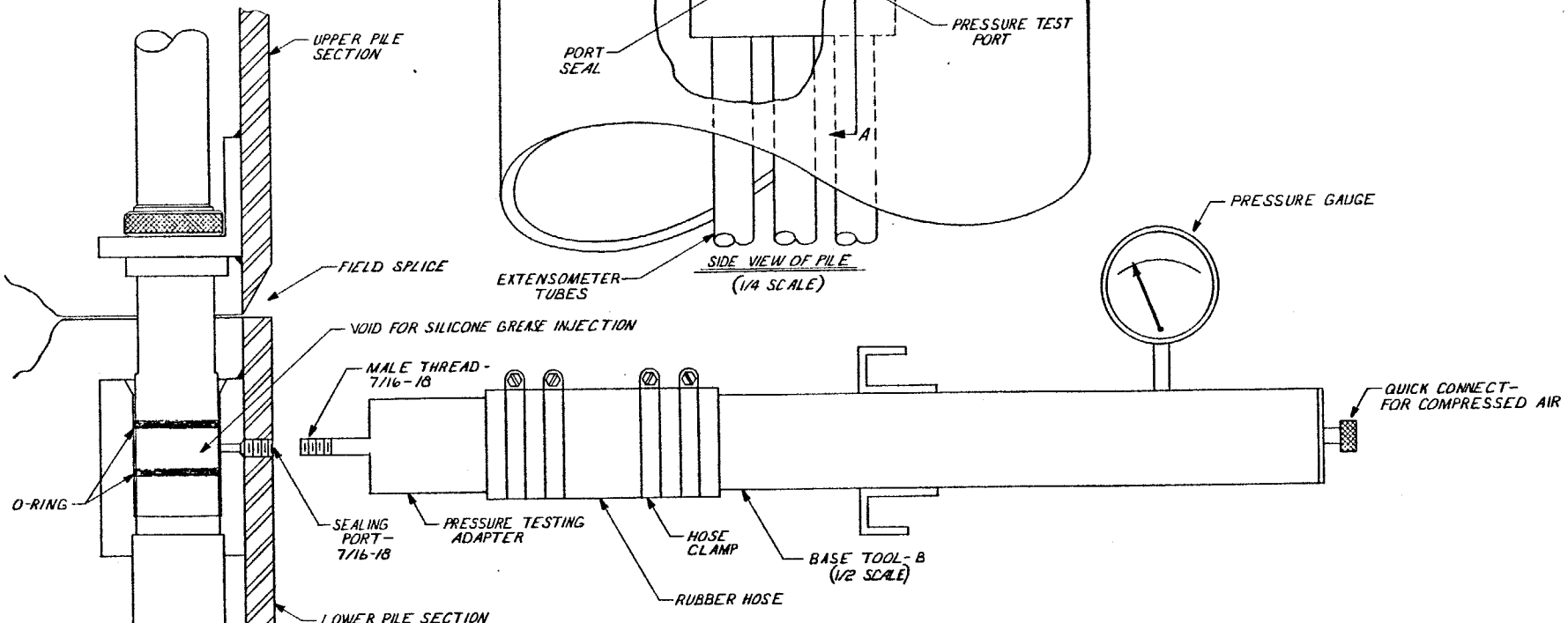
Pc MK	QTY	MATERIAL	SPEC	DESCRIPTION
LIST OF MATERIAL				

PRESSURE TEST TOOL DETAILS

Ertec The Earth Technology Corporation

SCALE: 1/2	DRAWN BY: G.R.COFFEY
APVD BY:	DATE: 2-18-82
DRAWING NUMBER C-C-115	REV. NO.





SECTION A-A
(1/2 SCALE)

FIELD TEST

NOTE:
1) ALL NOTED DIMENSIONS ARE IN INCHES

MACHINE STANDARDS	
EXCEPT AS OTHERWISE SHOWN	
MACHINE FINISH TO BE 63 $\sqrt{}$ .0005	
DIMENSIONAL TOLERANCE	ANGLE TOLERANCE
0.000 ±.002	XX° ±1°
0.00 ±.01	XX° XX' ±1'
FRACT ±1/64	XX° XX' XX" ±1"
CORNER RADIUS .010 TO .020	
LATHE CUT THREADS CLASS 2	
REMOVE ALL BURRS AND BREAK ALL SHARP CORNERS	
PROJECTION	

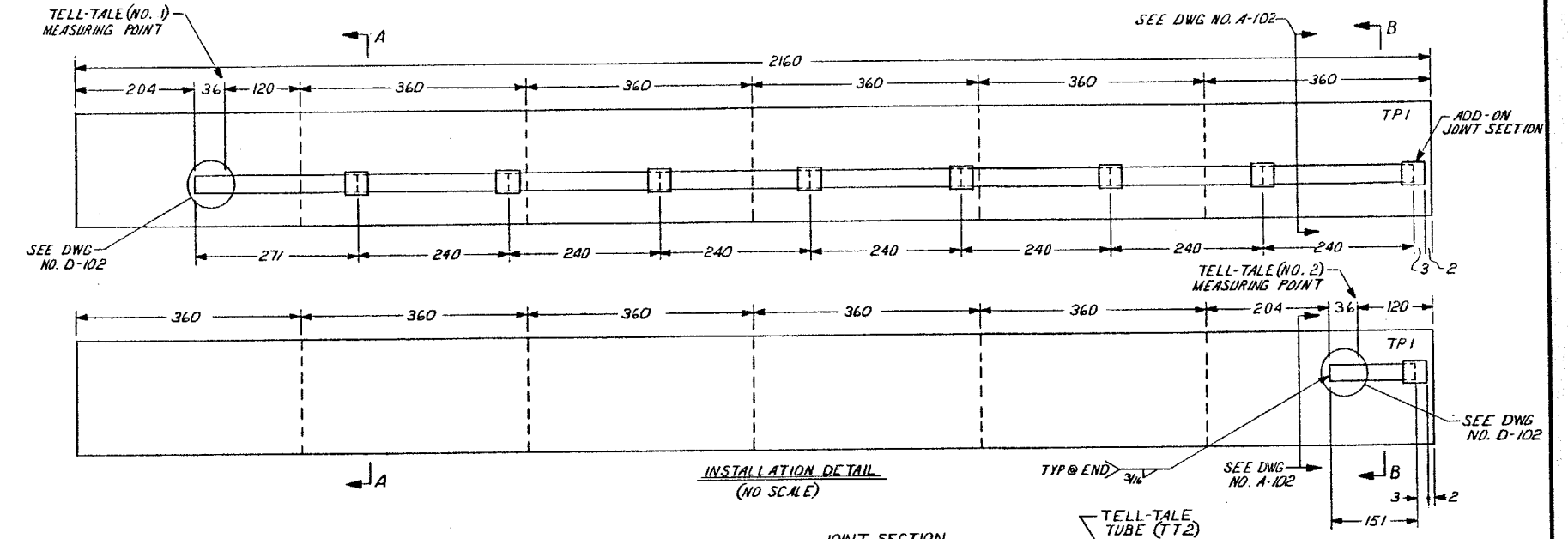
Pc MK	QTY	MATERIAL	SPEC	DESCRIPTION

LIST OF MATERIAL

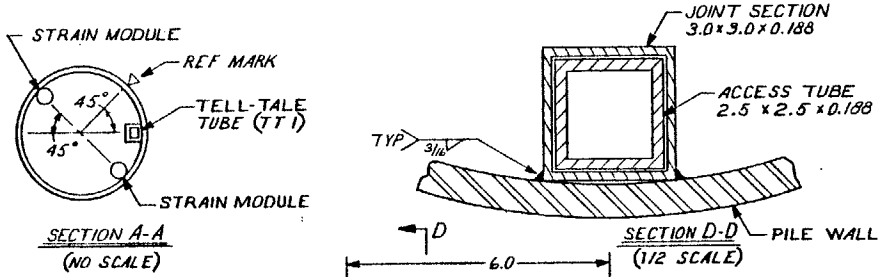
FIELD PRESSURE TEST DETAIL FOR O-RING SEAL

Ertec
The Earth Technology Corporation

SCALE: AS NOTED	DRAWN BY: G.R. COFFEY
APVD BY:	DATE: 2-18-83
DRAWING NUMBER C-C-116	REV. NO.

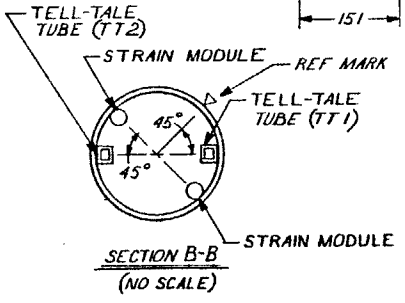


INSTALLATION DETAIL
(NO SCALE)

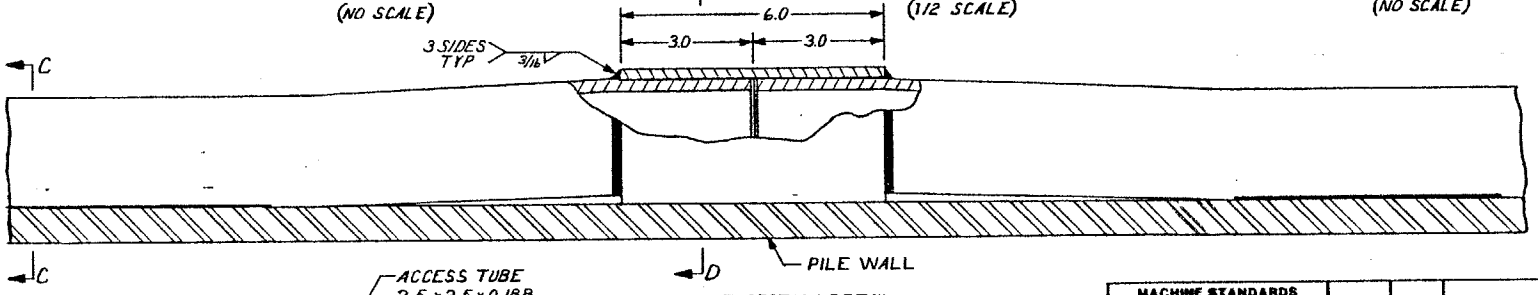


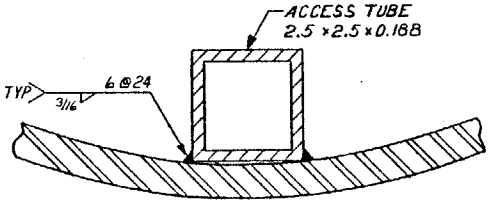
SECTION A-A
(NO SCALE)

SECTION D-D
(1/2 SCALE)



SECTION B-B
(NO SCALE)





SECTION C-C
(1/2 SCALE)

JOINT SECTION DETAIL
(1/2 SCALE)

NOTE:
1) ALL NOTED DIMENSIONS ARE IN INCHES
2) REFER TO DWG. A-102 FOR CROSS SECTION POSITION

MACHINE STANDARDS	
EXCEPT AS OTHERWISE SHOWN	
MACHINE FINISH TO BE 63 .0005 V	
DIMENSIONAL TOLERANCE	ANGLE TOLERANCE
0.000 ± .002	XX° ±1°
0.00 ± .01	XX° XX' ±1'
FRACT ±1/64	XX° XX' XX" ±1"
CORNER RADIUS .010 TO .020	
LATHE CUT THREADS CLASS 2	
REMOVE ALL BURRS AND BREAK ALL SHARP CORNERS	
PROJECTION	

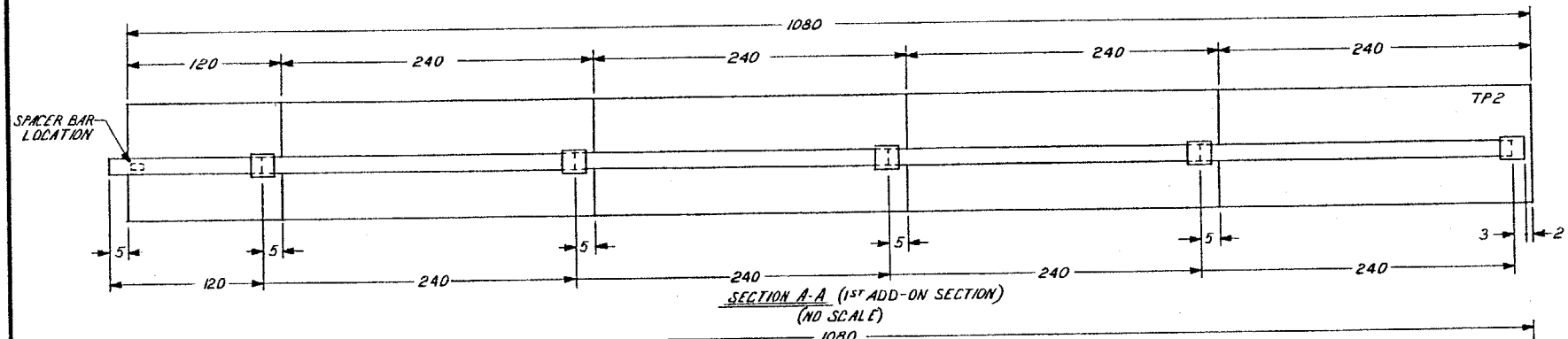
Pc MK	QTY	MATERIAL	SPEC	DESCRIPTION

LIST OF MATERIAL

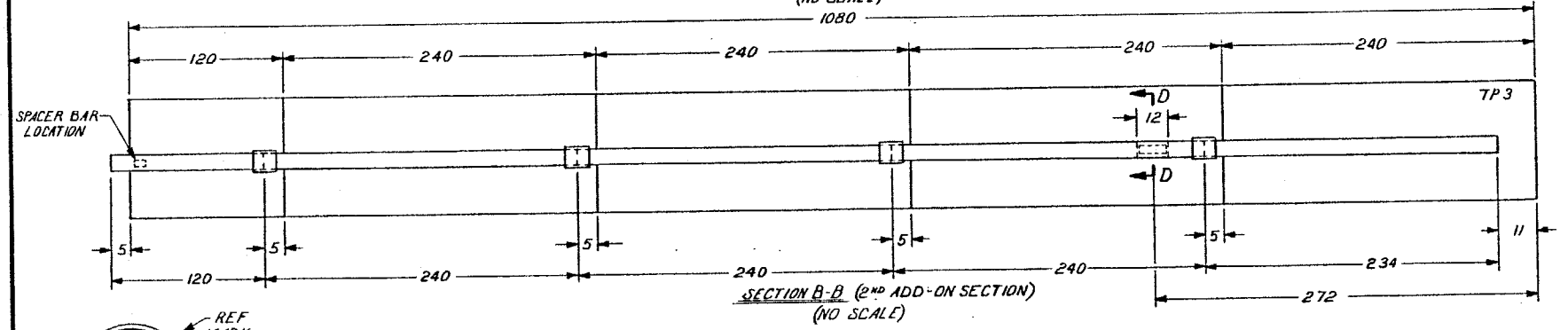
TELL TALE INSTALLATION DETAIL IN INSTRUMENTED SECTION

Ertec
The Earth Technology Corporation

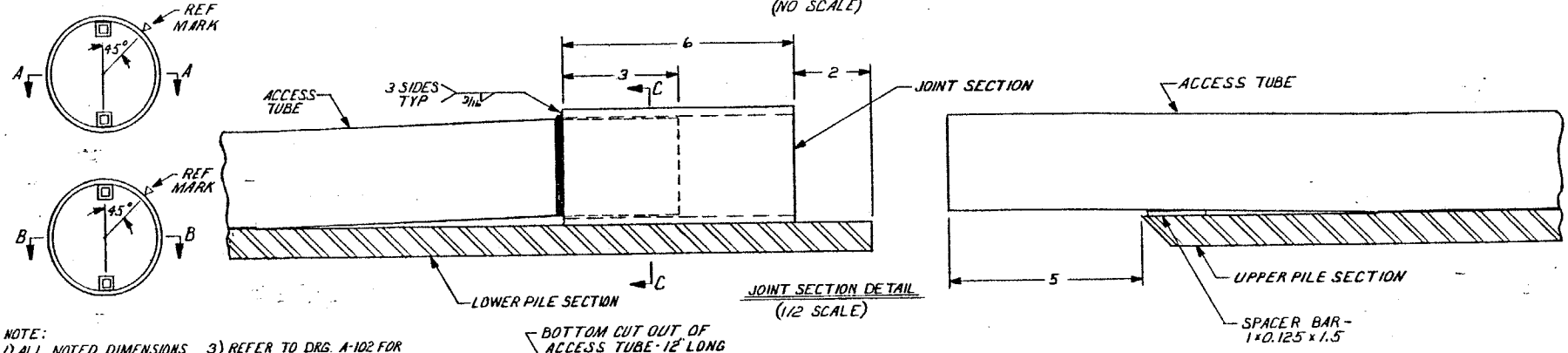
SCALE: AS NOTED	DRAWN BY: G.R. COFFEY
APVD BY:	DATE: 2-15-83
DRAWING NUMBER C- D-100	REV. NO.



SECTION A-A (1ST ADD-ON SECTION)
(NO SCALE)

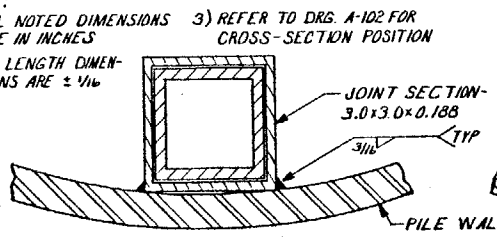


SECTION B-B (2ND ADD-ON SECTION)
(NO SCALE)

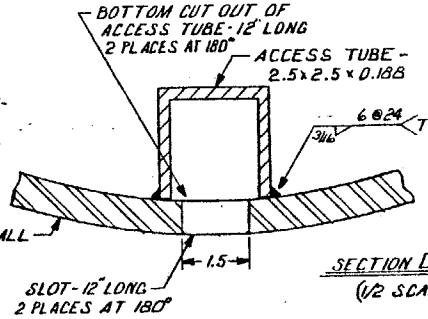


JOINT SECTION DETAIL
(1/2 SCALE)

NOTE:
1) ALL NOTED DIMENSIONS ARE IN INCHES
2) ALL LENGTH DIMENSIONS ARE ± 1/16
3) REFER TO DRG. A-102 FOR CROSS-SECTION POSITION



SECTION C-C
(1/2 SCALE)



SECTION D-D
(1/2 SCALE)

MACHINE STANDARDS	
EXCEPT AS OTHERWISE SHOWN	
MACHINE FINISH TO BE 63 +.000 -.005	
DIMENSIONAL TOLERANCE	ANGLE TOLERANCE
0.000 ± .002	XX° ±1°
0.00 ± .01	XX° XX' ±1'
FRACT ±1/64	XX° XX' XX" ±1"
CORNER RADIUS .010 TO .020	
LATHE CUT THREADS CLASS 2	
REMOVE ALL BURRS AND BREAK ALL SHARP CORNERS	
PROJECTION	

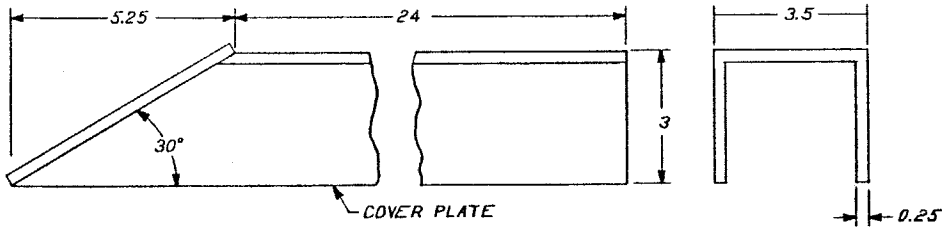
Pc MK	QTY	MATERIAL	SPEC	DESCRIPTION

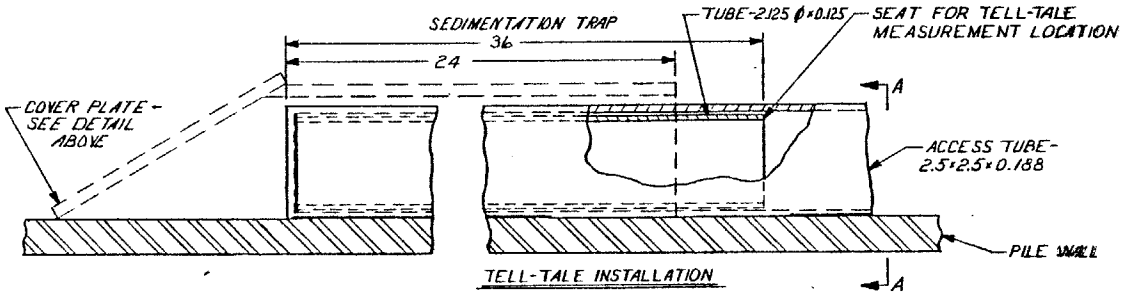
LIST OF MATERIAL

TELL-TALE ACCESS TUBE DETAIL FOR ADD-ON SECTIONS

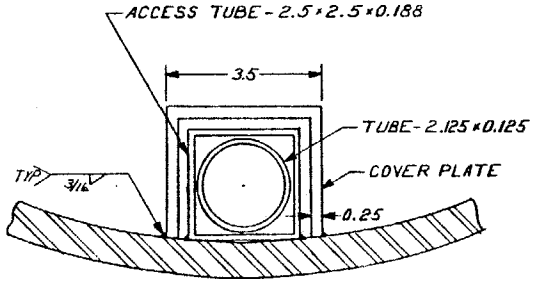
Ertec
The Earth Technology Corporation

SCALE: AS NOTED
DRAWN BY: G.R.COFFEY
APVD BY:
DATE: 2-14-89
DRAWING NUMBER
C-D-101
REV. NO.

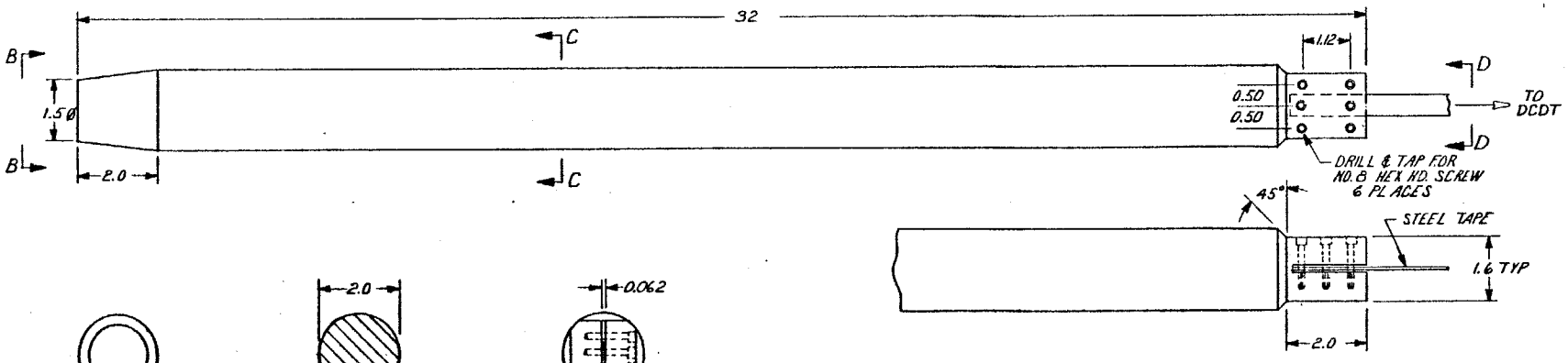




TELL-TALE INSTALLATION



SECTION A-A



SECTION B-B

SECTION C-C

SECTION D-D

TELL-TALE MEASUREMENT WEIGHT (2 REQ'D)
(FURNISHED AND FABRICATED BY ERTEC)

NOTE:
1) ALL NOTED DIMENSIONS ARE IN INCHES

MACHINE STANDARDS	
EXCEPT AS OTHERWISE SHOWN	
MACHINE FINISH TO BE	$\sqrt{63}$ .0005
DIMENSIONAL TOLERANCE	ANGLE TOLERANCE
0.000 ± .0005	XX° ±1°
0.00 ± .02	XX° XX' ±1'
FRACT ± 1/64	XX° XX' XX" ±1"
CORNER RADIUS .010 TO .020	
LATHE CUT THREADS CLASS 2	
REMOVE MILL BURRS AND BREAK ALL SHARP CORNERS	
PROJECTION	

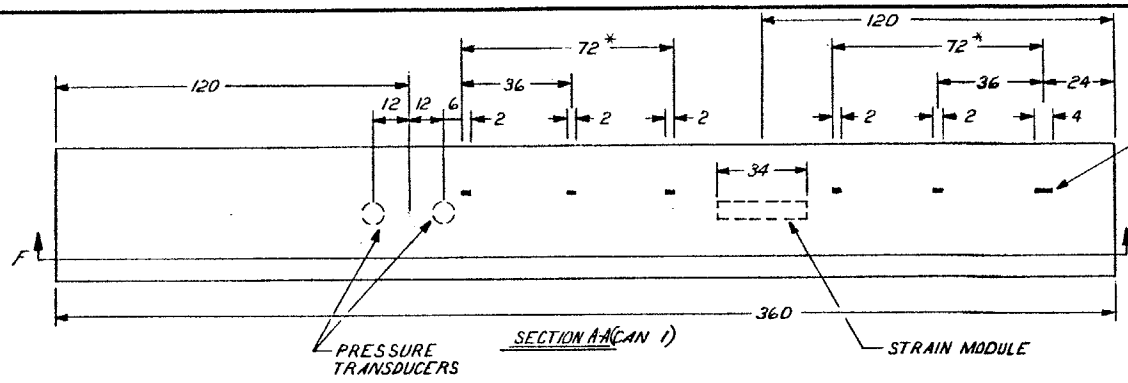
LIST OF MATERIAL

Pc MK	QTY	MATERIAL	SPEC	DESCRIPTION

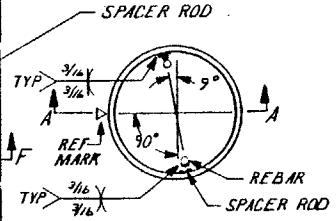
TELL-TALE COVER PLATE AND MEASUREMENT WEIGHT DETAIL

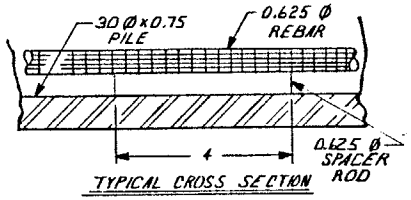
Ertec
The Earth Technology Corporation

SCALE: 1/2	DRAWN BY: G.R. COFFEY
APVD BY:	DATE: 1-20-83
DRAWING NUMBER: C-D-102	REV. NO.

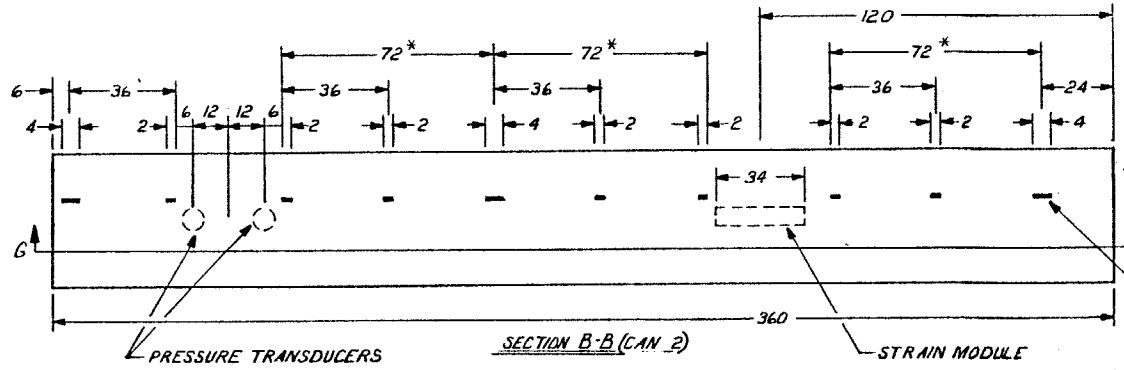


SECTION A-A (CAN 1)

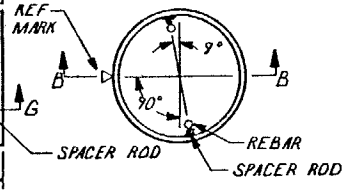


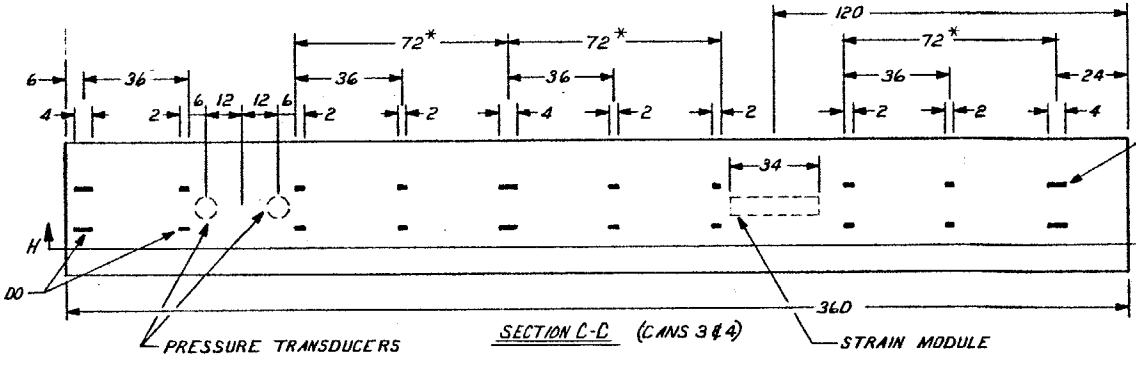


TYPICAL CROSS SECTION

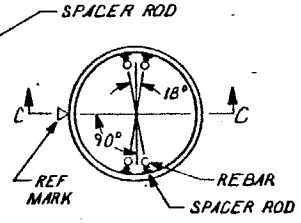


SECTION B-B (CAN 2)

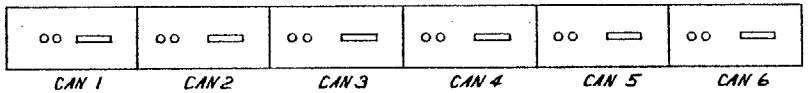




SECTION C-C (CANS 3 & 4)



NOTE:
1) DIMENSIONS DESIGNATED WITH * ARE BUNDLE ROD LENGTHS
2) ALL NOTED DIMENSIONS ARE IN INCHES
3)



CAN LAYOUT

4) SEE DWG. NO. E-102 FOR SECTIONS F-F, G-G, & H-H

MACHINE STANDARDS
EXCEPT AS OTHERWISE SHOWN
MACHINE FINISH TO BE 63 .0005 V

DIMENSIONAL TOLERANCE	ANGLE TOLERANCE
0.000 ± .005	XX° ±1°
0.00 ± .01	XX° XX' ±1'
FRACT ±1/64	XX° XX' XX" ±1"

CORNER RADIUS .010 TO .020
LATHE CUT THREADS CLASS 2
REMOVE ALL BURRS AND BREAK ALL SHARP CORNERS
PROJECTION

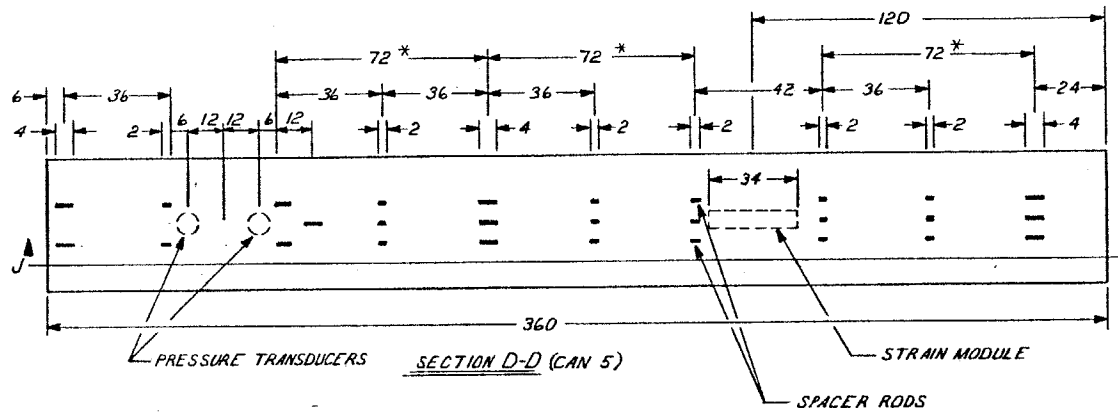
Pc MK	QTY	MATERIAL	SPEC	DESCRIPTION

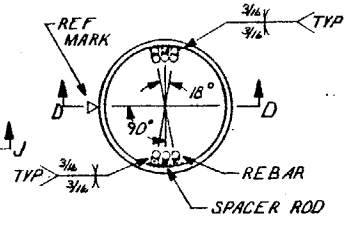
LIST OF MATERIAL

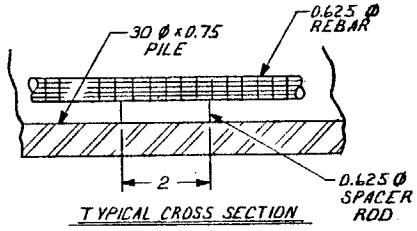
INTERNAL SPACER DETAIL FOR INSTRUMENTED SECTION

Ertec
The Earth Technology Corporation

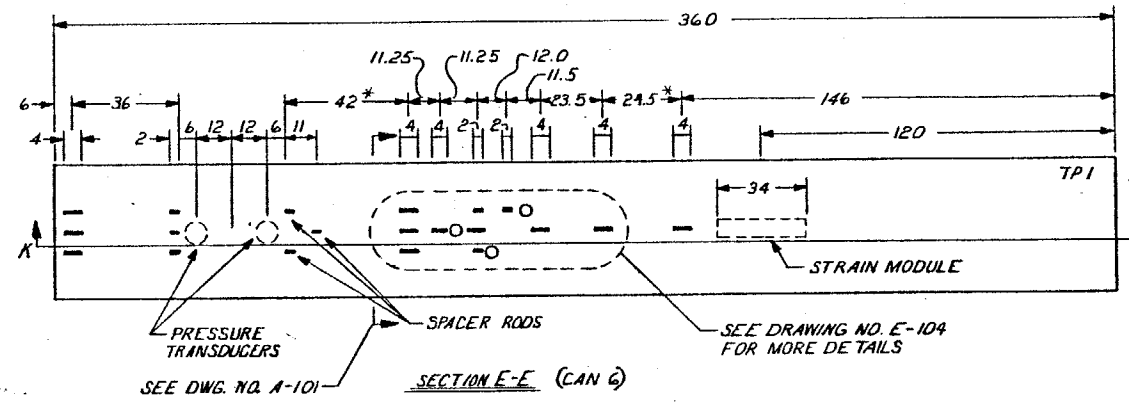
SCALE: NONE
DRAWN BY: G.R. COFFEY
APVD BY:
DATE: 2-4-83
DRAWING NUMBER C-E-100
REV. NO.

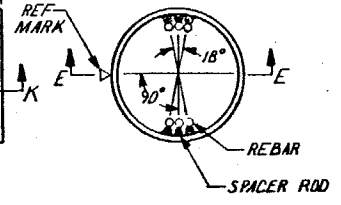




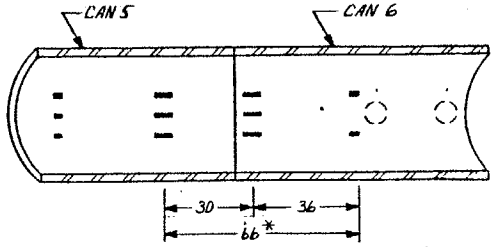


TYPICAL CROSS SECTION





NOTE:
1) DIMENSIONS DESIGNATED WITH * ARE BUNDLE ROD LENGTHS
2) ALL NOTED DIMENSIONS ARE IN INCHES
3) SEE DWG NO. E-102 FOR SECTIONS J-J & K-K



HORIZONTAL SPICE JOINT FOR TEST CANS 5 & 6

MACHINE STANDARDS	
EXCEPT AS OTHERWISE SHOWN	
MACHINE FINISH TO BE 63 .0005	
DIMENSIONAL TOLERANCE	ANGLE TOLERANCE
0.000 ±.002	XX° ±1°
0.00 ±.01	XX° XX' ±1'
FRACT ±1/64	XX° XX' XX" ±1"
CORNER RADIUS .010 TO .020	
LATHE CUT THREADS CLASS 2	
REMOVE ALL BURRS AND BREAK ALL SHARP CORNERS	
PROJECTION	

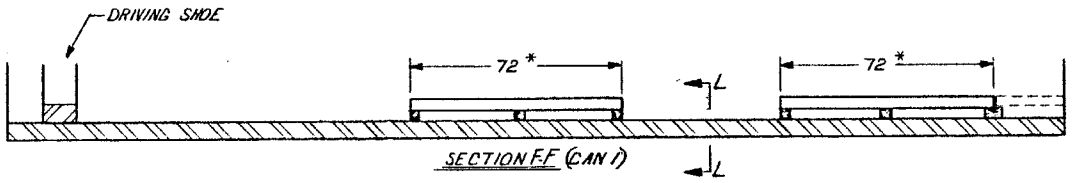
Pc MK	QTY	MATERIAL	SPEC	DESCRIPTION

LIST OF MATERIAL

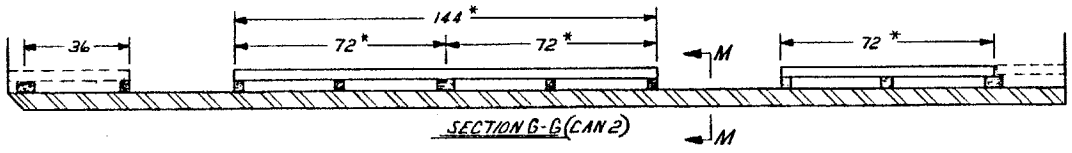
INTERNAL SPACER DETAIL FOR INSTRUMENTED SECTION

Ertec
The Earth Technology Corporation

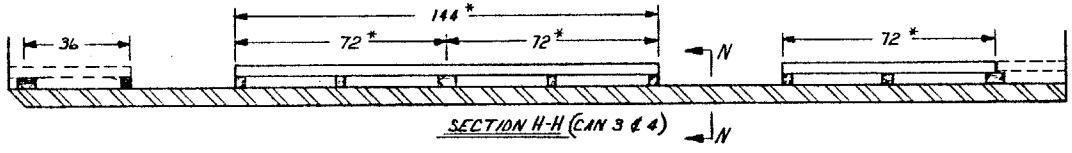
SCALE: NONE	DRAWN BY: G.R. COFFEY
APVD BY:	DATE: 2-4-83
DRAWING NUMBER C-E-101	REV. NO.



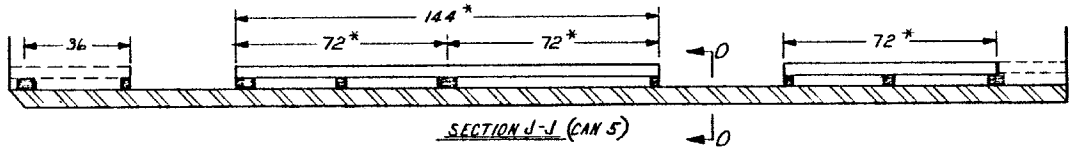
SECTION F-F (CAN 1)



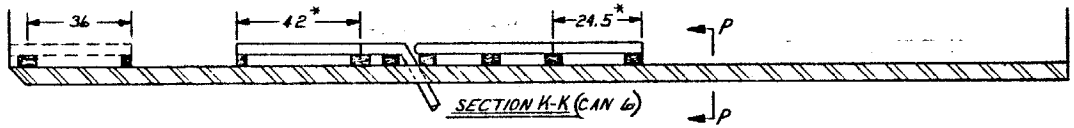
SECTION G-G (CAN 2)



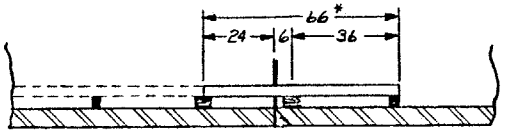
SECTION H-H (CAN 3 & 4)



SECTION J-J (CAN 5)

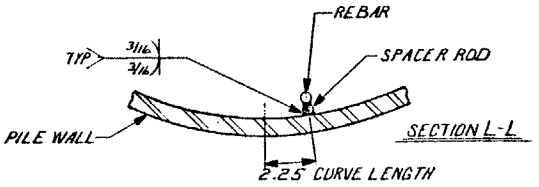


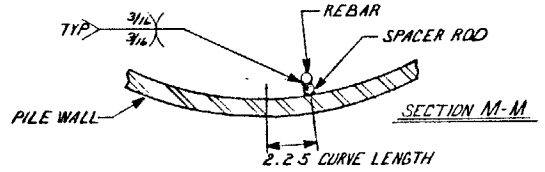
SECTION K-K (CAN 6)

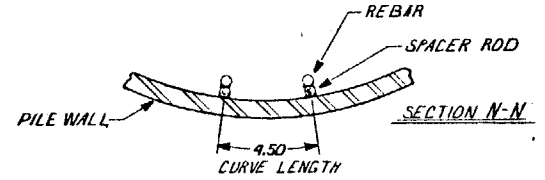


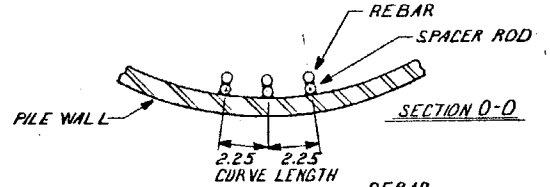
TYPICAL INTERNAL BUNDLE ROD SPLICE DETAIL

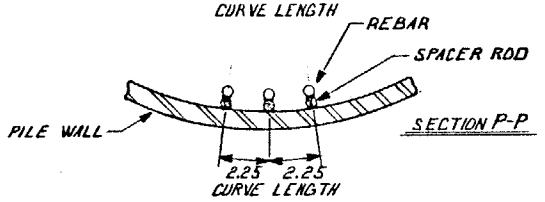
(CAN 1 TO CAN 2)











NOTE:

1) ALL NOTED DIMENSIONS ARE IN INCHES
2) SEE DWG. NO. E-100 & E-101 FOR LOCATION OF SECTIONS F-F, G-G, H-H, J-J, & K-K
3) DIMENSIONS DESIGNATED WITH * ARE BUNDLE ROD LENGTHS
4) 144 INCH RODS MAY BE SUBSTITUTED FOR SOME 72 INCH LENGTHS.

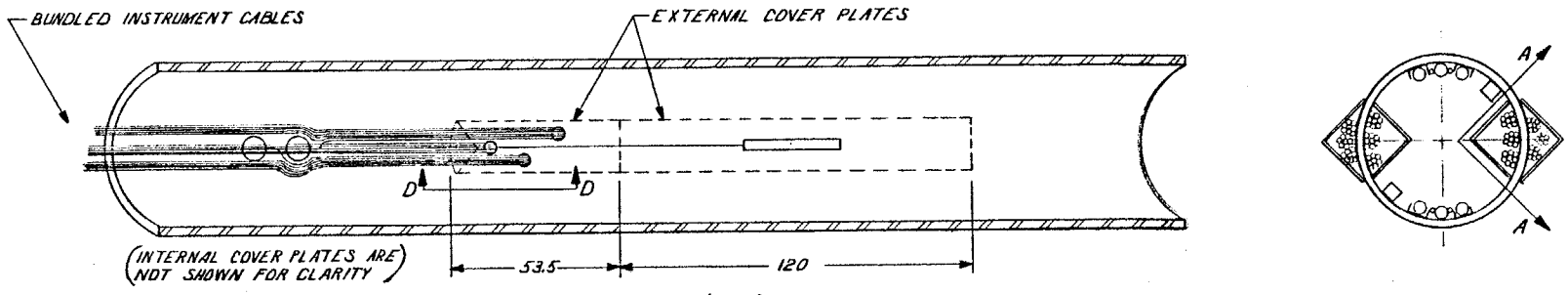
MACHINE STANDARDS	
EXCEPT AS OTHERWISE SHOWN	
MACHINE FINISH TO BE $\sqrt{}^{63}$	
DIMENSIONAL TOLERANCE	ANGLE TOLERANCE
0.000 ± .002	XX° ±1°
0.00 ± .01	XX° XX' ±1'
FRACT ±1/64	XX° XX' XX" ±1"
CORNER RADIUS .010 TO .020	
LATHE CUT THREADS CLASS 2	
REMOVE ALL BURRS AND BREAK ALL SHARP CORNERS	
PROJECTION	

Pc MK	QTY	MATERIAL	SPEC	DESCRIPTION
LIST OF MATERIAL				

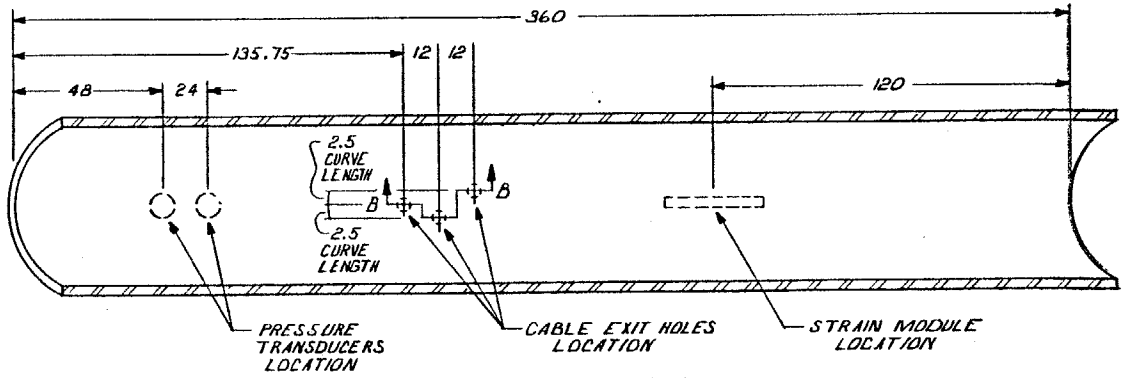
INTERNAL BUNDLE ROD DETAIL FOR INSTRUMENTED SECTION

Ertec The Earth Technology Corporation

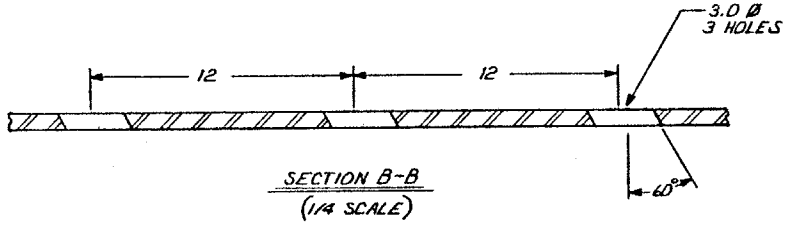
SCALE: NONE	DRAWN BY: G.R. COFFEY
APVD BY:	DATE: 3-25-83
DRAWING NUMBER C-E-102	REV. NO.



SECTION A-A (CAN 6)
(NO SCALE)



CAN 6 DETAIL
(NO SCALE)



SECTION B-B
(1/4 SCALE)

NOTE:
1) REFER TO DRAWING NO. E-106 FOR SECTION D-D
2) ALL NOTED DIMENSIONS ARE IN INCHES
3) REFER TO DRAWING NO. E-104 FOR MORE DETAILS

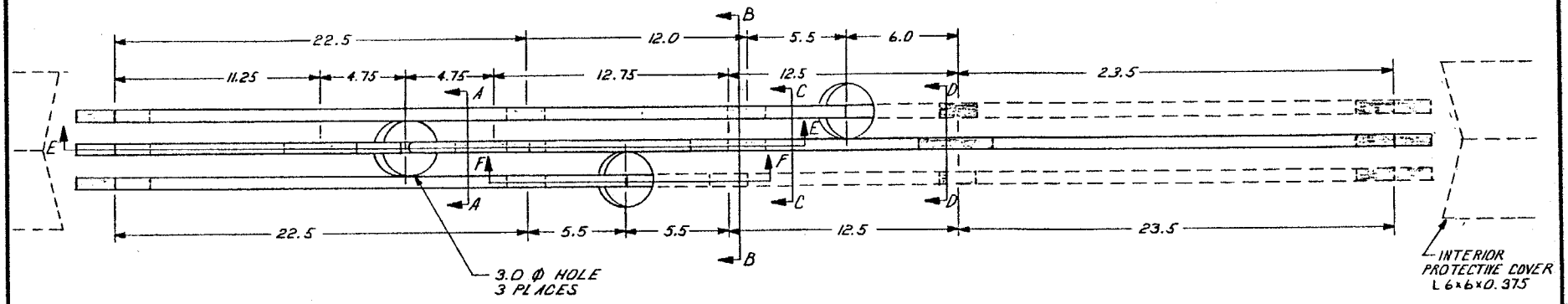
MACHINE STANDARDS	
EXCEPT AS OTHERWISE SHOWN	
MACHINE FINISH TO BE 63 $\sqrt{}$ .0005	
DIMENSIONAL TOLERANCE	ANGLE TOLERANCE
0.000 ± .002	XX° ±1°
0.00 ± .01	XX° XX' ±1'
FRACT ±1/64	XX° XX' XX" ±1"
CORNER RADIUS .010 TO .020	
LATHE CUT THREADS CLASS 2	
REMOVE ALL BURRS AND BREAK ALL SHARP CORNERS	
PROJECTION	

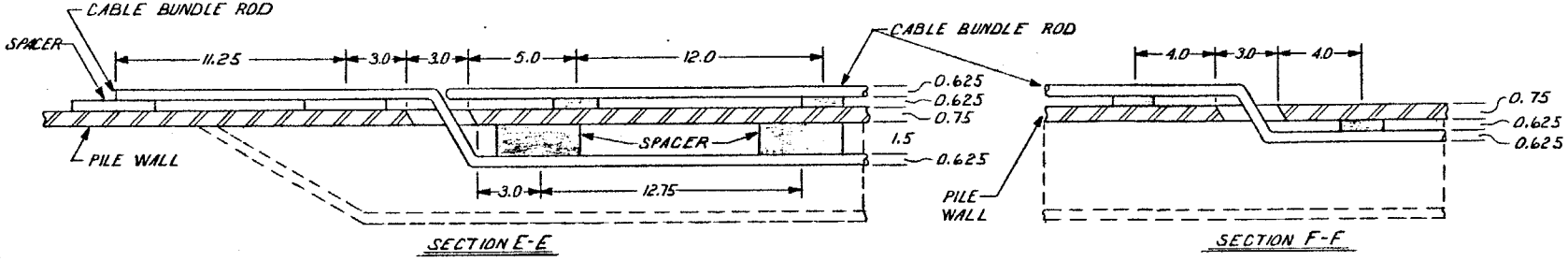
Pc MK	QTY	MATERIAL	SPEC	DESCRIPTION
LIST OF MATERIAL				

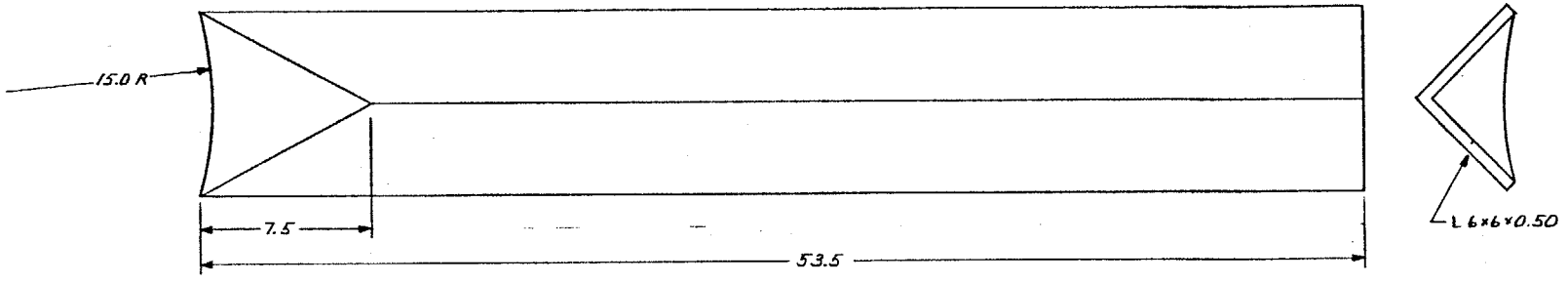
CABLE EXIT FOR INSTRUMENTED SECTION

Ertec
The Earth Technology Corporation

SCALE: AS NOTED	DRAWN BY: G.R. COFFEY
APVD BY:	DATE: 3-28-83
DRAWING NUMBER C-E-103	REV. NO.







EXTERNAL COVER PLATE

NOTE:
1) SEE DRAWING NO. E-105 FOR SECTIONS A-A, B-B, C-C, & D-D
2) EXTERIOR PROTECTIVE COVER SHALL NOT BE INSTALLED UNTIL ALL CABLE HAVE BEEN INSERTED AND BUNDLED
3) ALL NOTED DIMENSIONS ARE IN INCHES

MACHINE STANDARDS
EXCEPT AS OTHERWISE SHOWN
MACHINE FINISH TO BE $\sqrt{}^{.0005}$

DIMENSIONAL TOLERANCE	ANGLE TOLERANCE
0.000 ±.002	XX° ±1°
0.00 ±.01	XX° XX' ±1'
FRACT ±1/64	XX° XX' XX" ±1"
CORNER RADIUS .010 TO .020	
LATHE CUT THREADS CLASS 2	
REMOVE ALL BURRS AND BREAK ALL SHARP CORNERS	
PROJECTION	

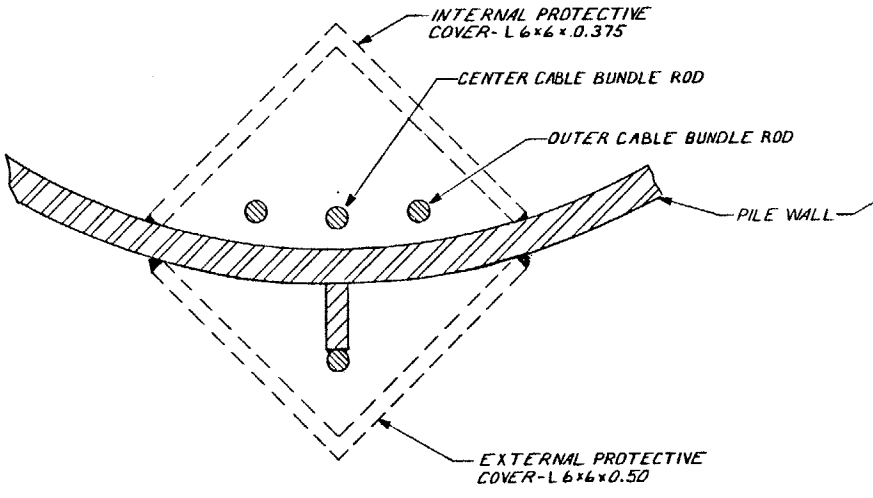
Pc MK	QTY	MATERIAL	SPEC	DESCRIPTION

LIST OF MATERIAL

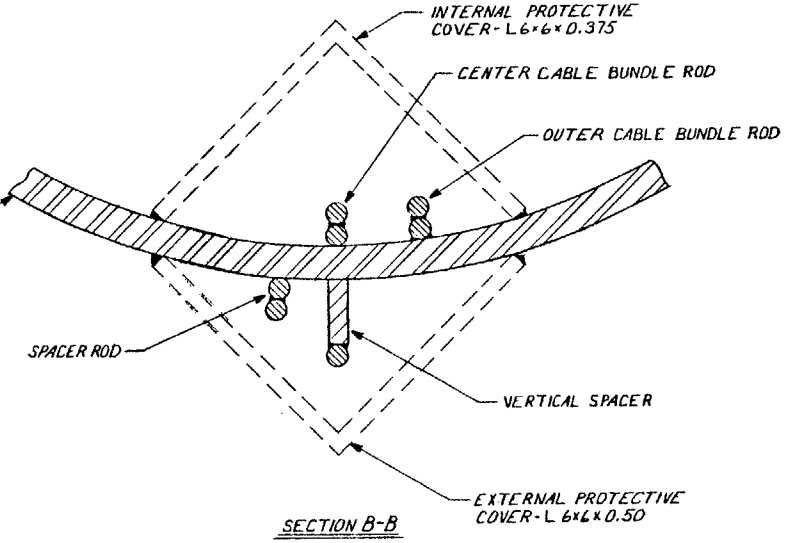
CABLE EXIT DETAIL FOR INSTRUMENTED SECTION

Ertec
The Earth Technology Corporation

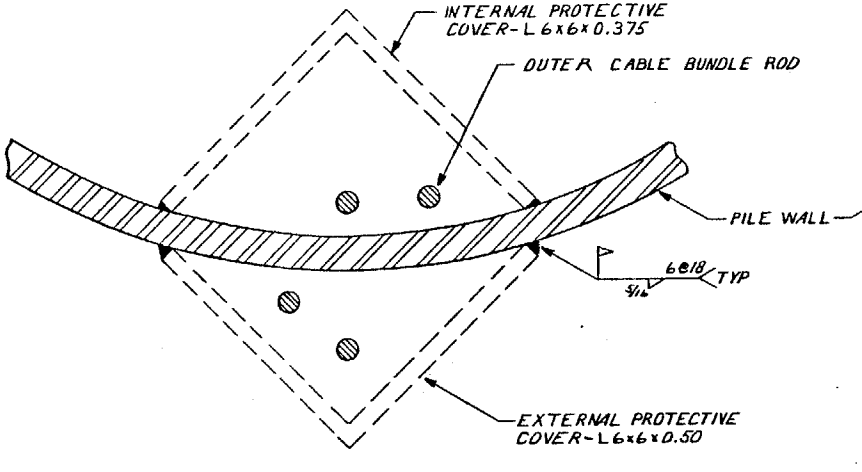
SCALE: 1/4	DRAWN BY: G. R. COFFEY
APVD BY:	DATE: 3-28-83
DRAWING NUMBER C-E-104	REV. NO.



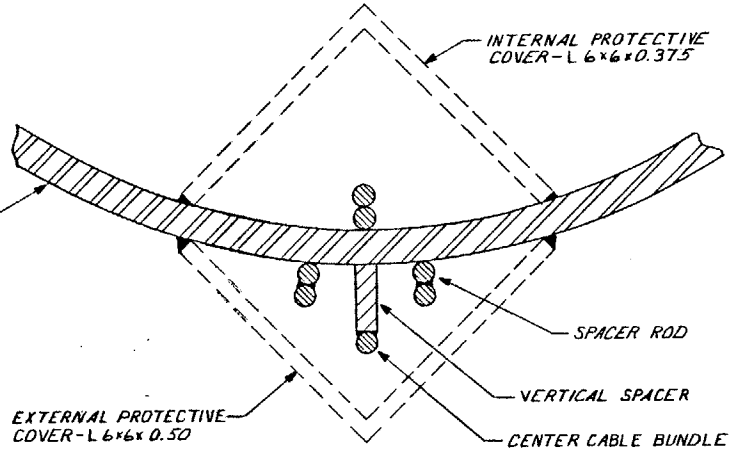
SECTION A-A



SECTION B-B



SECTION C-C



SECTION D-D

NOTE:
1) SEE DRAWING NO. E-104
2) ALL NOTED DIMENSIONS ARE IN INCHES

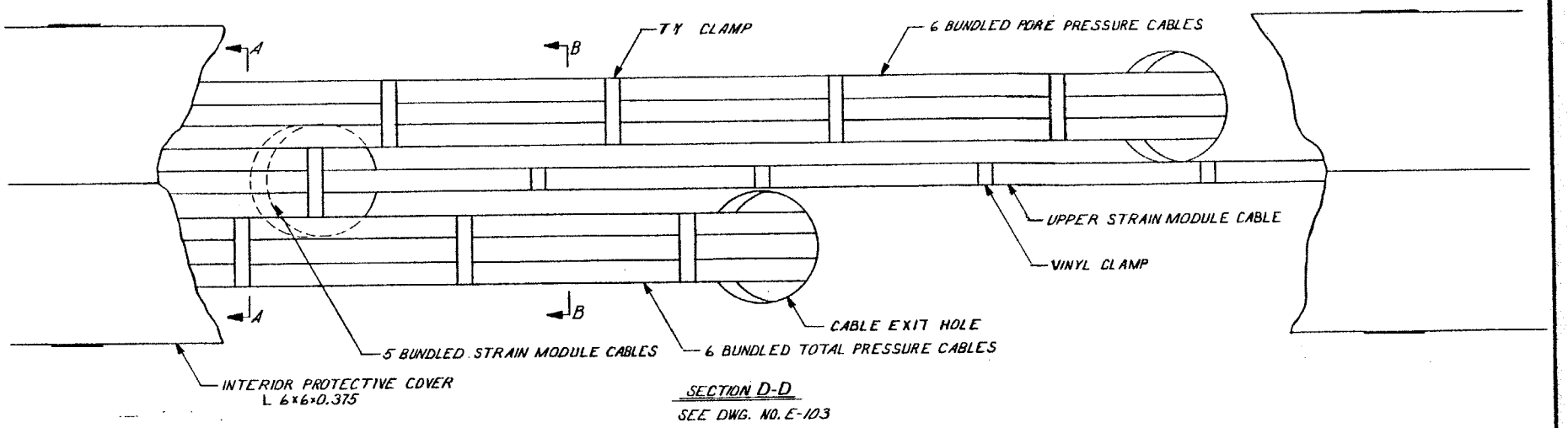
MACHINE STANDARDS	
EXCEPT AS OTHERWISE SHOWN	
MACHINE FINISH TO BE 63 .0005	
DIMENSIONAL TOLERANCE	ANGLE TOLERANCE
0.000 ±.002	XX° ±1°
0.00 ±.01	XX° XX' ±1'
FRACT ±1/64	XX° XX' XX" ±1"
CORNER RADIUS .010 TO .020	
LATHE CUT THREADS CLASS 2	
REMOVE ALL BURRS AND BREAK ALL SHARP CORNERS	
PROJECTION	

Pc MK	QTY	MATERIAL	SPEC	DESCRIPTION
LIST OF MATERIAL				

INSTRUMENT CABLE EXIT DETAIL

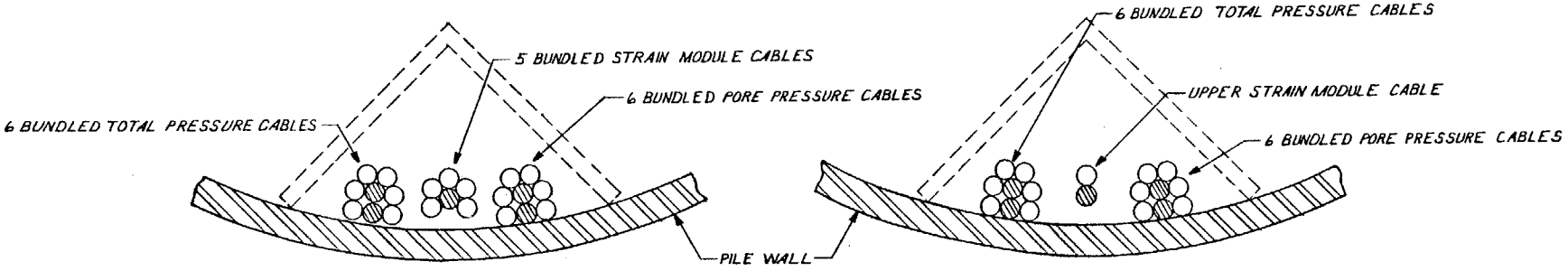
Ertec
The Earth Technology Corporation

SCALE: 1/2	DRAWN BY: G.R. COFFEY
APVD BY:	DATE: 2-2-83
DRAWING NUMBER C-E-105	REV. NO.



SECTION D-D

SEE DWG. NO. E-103



SECTION A-A

SECTION B-B

NOTE:
1) ALL NOTED DIMENSIONS ARE IN INCHES
2) REFER TO DRAWING NO. E-103 FOR CABLE EXIT HOLE LOCATION

MACHINE STANDARDS	
EXCEPT AS OTHERWISE SHOWN	
MACHINE FINISH TO BE 63 $\sqrt{}^{.0005}$	
DIMENSIONAL TOLERANCE	ANGLE TOLERANCE
0.000 ± .005	XX° ±1°
0.00 ± .01	XX° XX' ±1'
FRACT ±1/64	XX° XX' XX" ±1"
CORNER RADIUS .010 TO .020	
LATHE CUT THREADS CLASS 2	
REMOVE ALL BURRS AND BREAK ALL SHARP CORNERS	
PROJECTION	

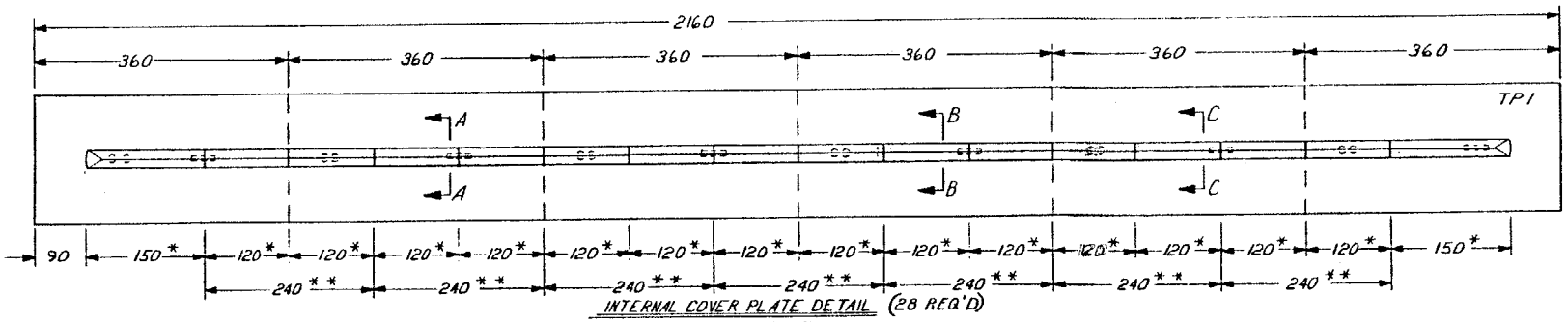
Pc MK	QTY	MATERIAL	SPEC	DESCRIPTION

LIST OF MATERIAL

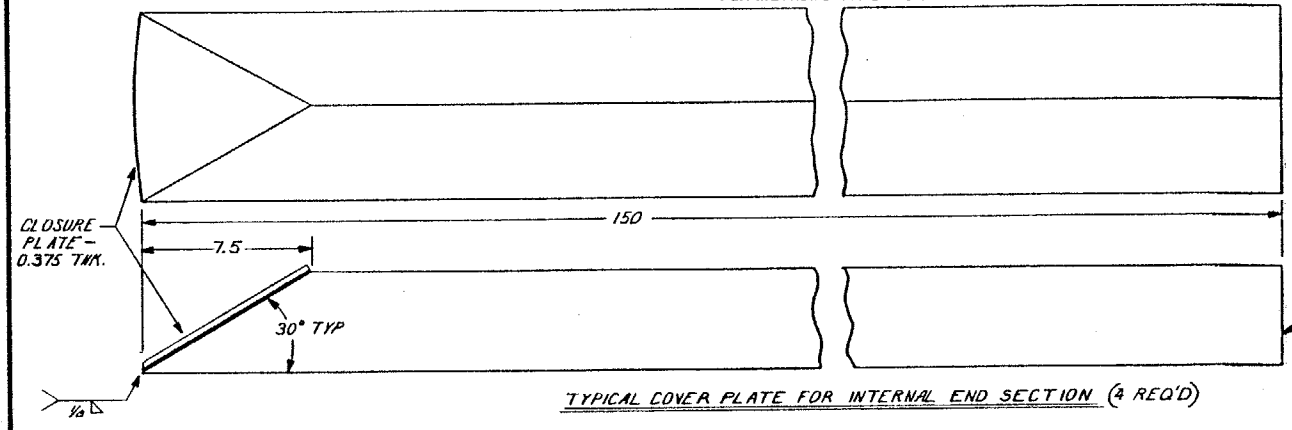
INSTRUMENT CABLE EXIT

Ertec
The Earth Technology Corporation

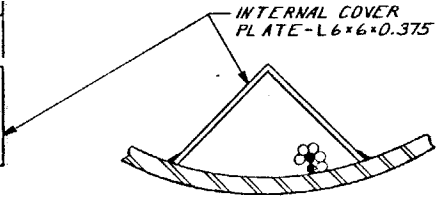
SCALE: NONE	DRAWN BY: G.R. COFFEY
APVD BY:	DATE: 2-3-83
DRAWING NUMBER C- E-106	REV. NO.



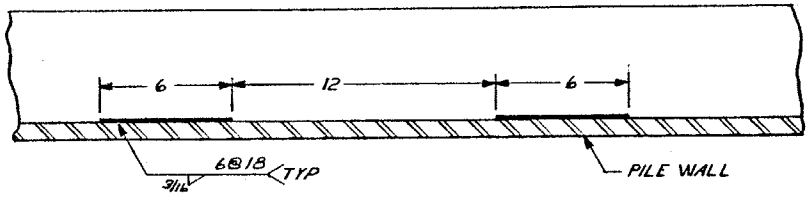
INTERNAL COVER PLATE DETAIL (28 REQ'D)
FOR INSTRUMENTED SECTION



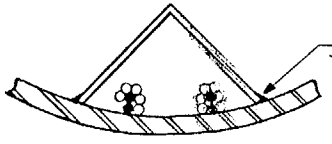
TYPICAL COVER PLATE FOR INTERNAL END SECTION (4 REQ'D)



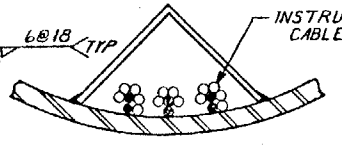
SECTION A-A



TYPICAL WELD DETAIL



SECTION B-B



SECTION C-C

NOTE:
1) ALL NOTED DIMENSIONS ARE IN INCHES
2) DIMENSIONS DESIGNATED WITH * ARE INTERNAL COVER PLATE LENGTHS
3) ** SOME 240 INCH COVER PLATES MAY BE SUBSTITUTED FOR 120 INCH LENGTHS

MACHINE STANDARDS
EXCEPT AS OTHERWISE SHOWN
MACHINE FINISH TO BE 63 .0005

DIMENSIONAL TOLERANCE	ANGLE TOLERANCE
0.000 ±.000	XX° ±1°
0.00 ±.01	XX° XX' ±1'
FRACT ±1/64	XX° XX' XX" ±1"
CORNER RADIUS .010 TO .020	
LATHE CUT THREADS CLASS 2	
REMOVE ALL BURRS AND BREAK ALL SHARP CORNERS	
PROJECTION	

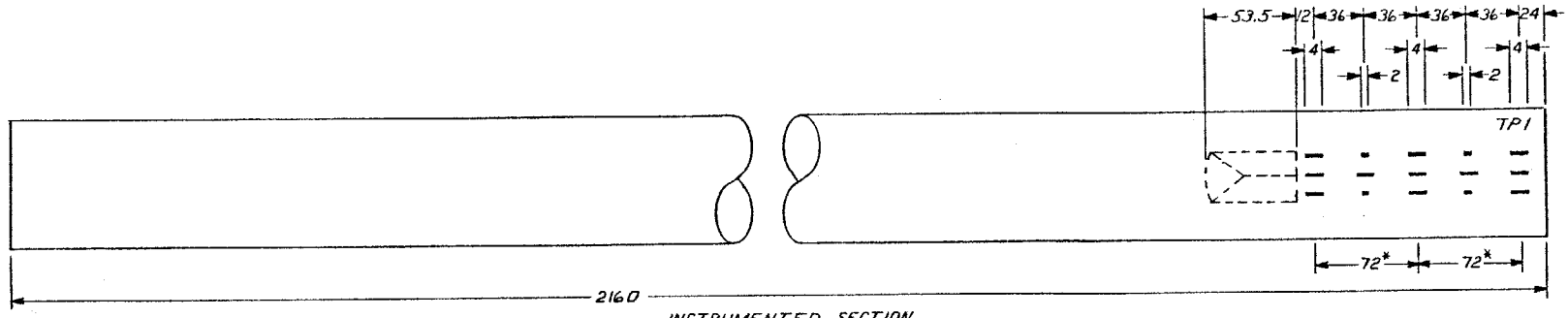
Pc MK	QTY	MATERIAL	SPEC	DESCRIPTION

LIST OF MATERIAL

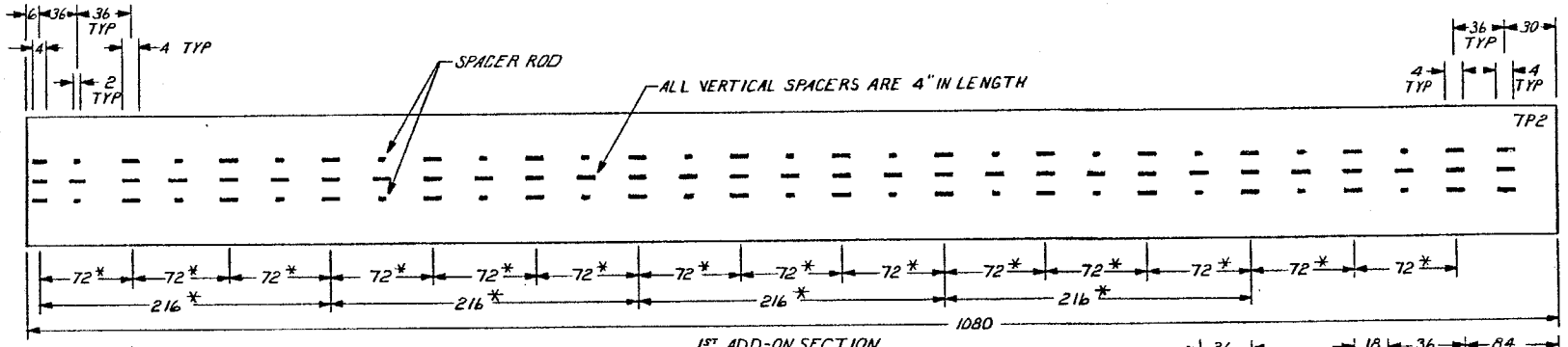
INTERNAL COVER PLATE & WELD DETAIL

Ertec Rocky Earth Technology Corporation

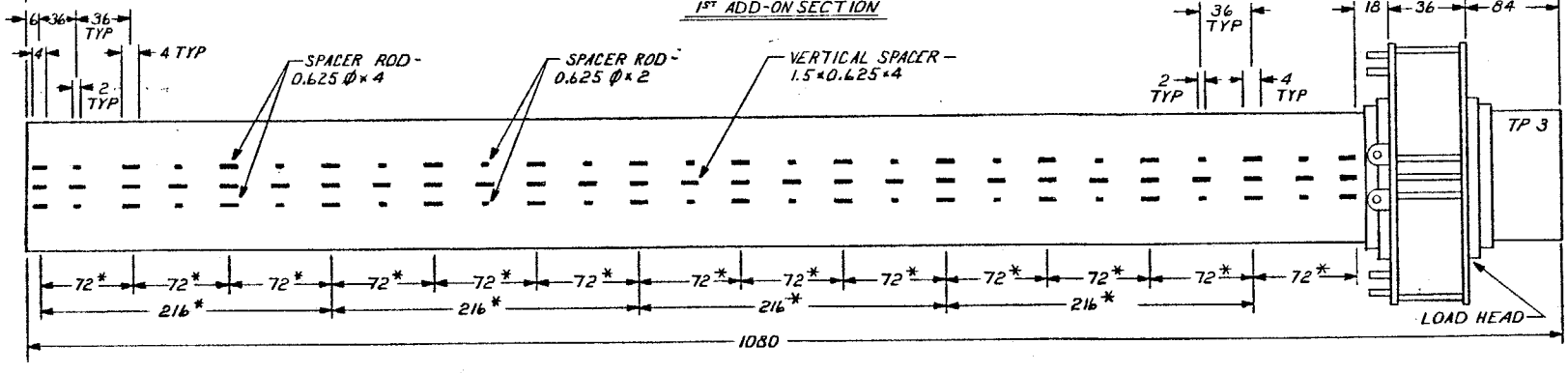
SCALE: NONE | DRAWN BY: G. R. COFFEY
APVD BY: | DATE: 2-7-83
DRAWING NUMBER C-E-107 | REV. NO.



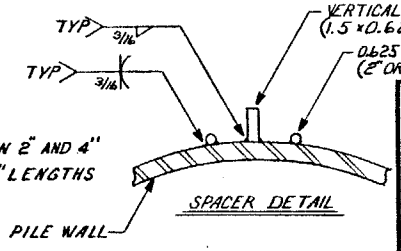
INSTRUMENTED SECTION



1ST ADD-ON SECTION



2ND ADD-ON SECTION



NOTE:
1) DIMENSIONS DESIGNATED WITH * ARE BUNDLE ROD LENGTHS
2) ALL VERTICAL SPACERS ARE 4" IN LENGTH
3) HORIZONTAL SPACERS ALTERNATE IN LENGTH BETWEEN 2" AND 4"
4) 216" BUNDLE RODS MAY BE SUBSTITUTED FOR 72" LENGTHS
5) ALL NOTED DIMENSIONS ARE IN INCHES

MACHINE STANDARDS	
EXCEPT AS OTHERWISE SHOWN	
MACHINE FINISH TO BE 63 $\sqrt{}$ -.0005	
DIMENSIONAL TOLERANCE	ANGLE TOLERANCE
0.000 ±.005	XX° ±1°
0.00 ±.01	XX° XX' ±1'
FRACT ±1/64	XX° XX' XX" ±1"
CORNER RADIUS .010 TO .020	
LATHE CUT THREADS CLASS 2	
REMOVE ALL BURRS AND BREAK ALL SHARP CORNERS	
PROJECTION	

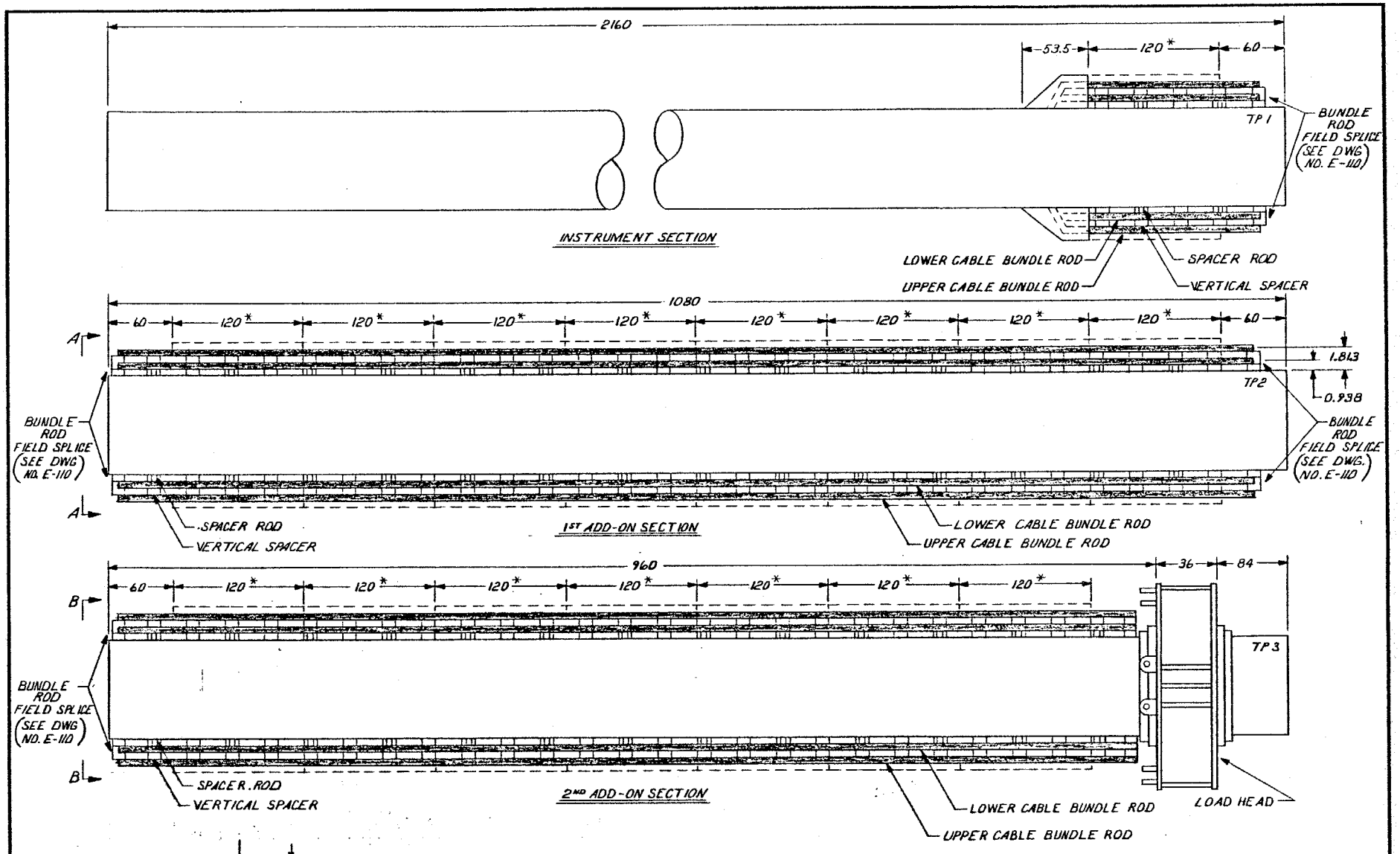
Pc MK	QTY	MATERIAL	SPEC	DESCRIPTION

LIST OF MATERIAL

EXTERNAL SPACER DETAIL FOR TEST SECTION

Ertec
The Earth Technology Corporation

SCALE: NONE	DRAWN BY: G.R.COFFEY
APVD BY:	DATE: 2-8-83
DRAWING NUMBER C-E-108	REV. NO.



NOTES:
1) DIMENSIONS DESIGNATED WITH * ARE COVER PLATE LENGTHS
2) 120" FIELD INSTALLED COVER PLATES SPAN THE VERTICAL SPLICE JOINT
3 ALL NOTED DIMENSIONS ARE IN INCHES

MACHINE STANDARDS	
EXCEPT AS OTHERWISE SHOWN	
MACHINE FINISH TO BE 63 .0005	
DIMENSIONAL TOLERANCE	ANGLE TOLERANCE
0.000 ±.002	XX° ±1°
0.00 ±.01	XX° XX' ±1'
FRACT ±1/64	XX° XX' XX" ±1"
CORNER RADIUS .010 TO .020	
LATHE CUT THREADS CLASS 2	
REMOVE ALL BURRS AND BREAK ALL SHARP CORNERS	
PROJECTION	

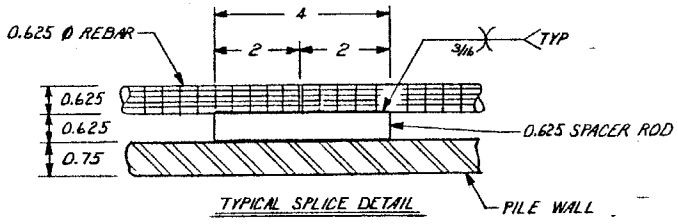
Pc MK	QTY	MATERIAL	SPEC	DESCRIPTION

LIST OF MATERIAL

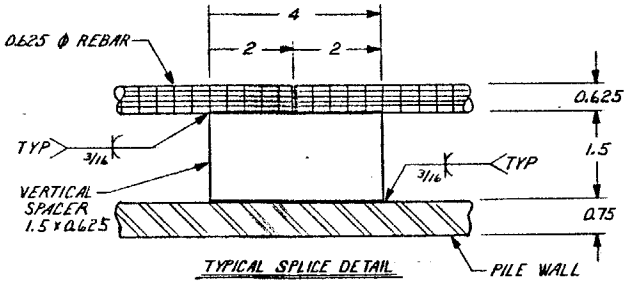
EXTERNAL BUNDLE ROD DETAIL FOR TEST SECTION

Ertec
The Earth Technology Corporation

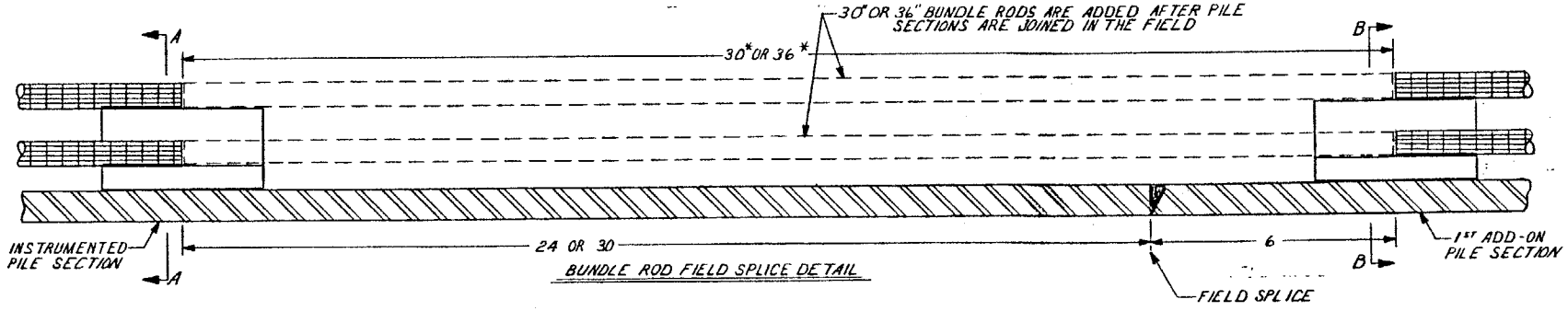
SCALE: NONE	DRAWN BY: G.R. COFFEY
APVD BY:	DATE: 2-8-83
DRAWING NUMBER C-E-109	REV. NO.



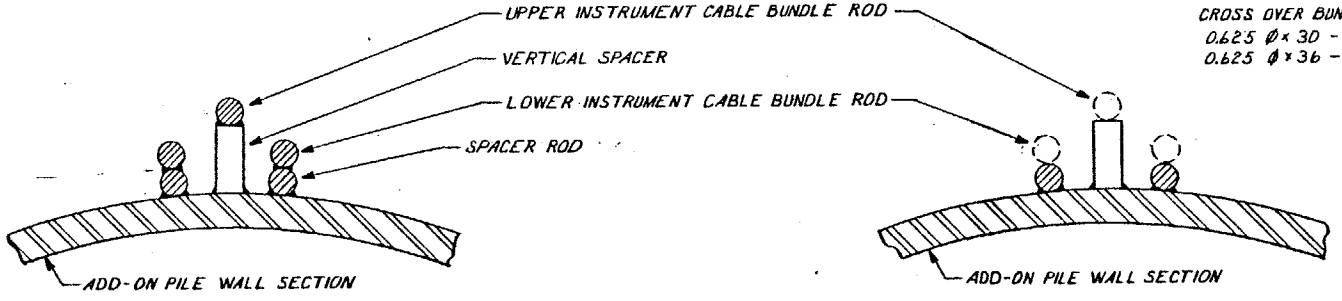
TYPICAL SPLICE DETAIL



TYPICAL SPLICE DETAIL



BUNDLE ROD FIELD SPLICE DETAIL



SECTION A-A

SECTION B-B

CROSS OVER BUNDLE RODS (SHIP LOOSE)
0.625 Ø x 30 - 6 REQ'D
0.625 Ø x 36 - 6 REQ'D

NOTE:
1) DIMENSIONS DESIGNATED WITH * ARE BUNDLE ROD LENGTHS
2) ALL NOTED DIMENSIONS ARE IN INCHES

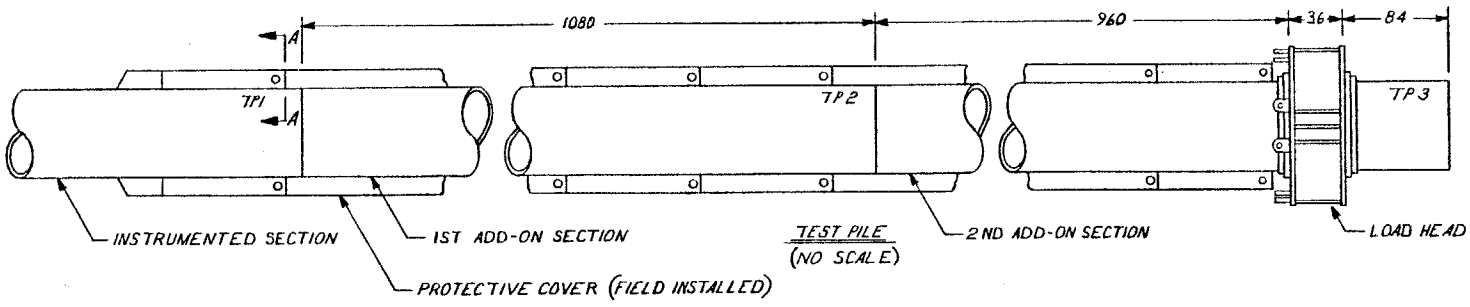
MACHINE STANDARDS	
EXCEPT AS OTHERWISE SHOWN	
MACHINE FINISH TO BE $\sqrt{}^{.0005}_{.0003}$	
DIMENSIONAL TOLERANCE	ANGLE TOLERANCE
0.000 ±.003	XX° ±1°
0.00 ±.01	XX° XX' ±1'
FRACT ±1/64	XX° XX' XX" ±1"
CORNER RADIUS .010 TO .020	
LATHE CUT THREADS CLASS 2	
REMOVE ALL BURRS AND BREAK ALL SHARP CORNERS	
PROJECTION	

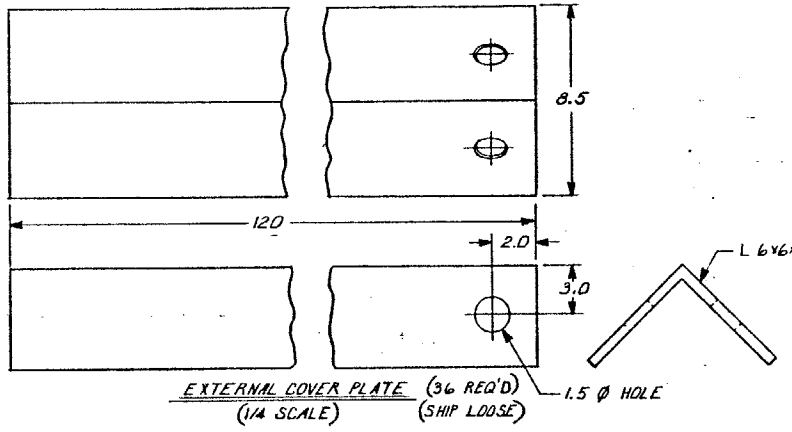
Pc MK	QTY	MATERIAL	SPEC	DESCRIPTION
LIST OF MATERIAL				

EXTERNAL INSTRUMENT CABLE BUNDLE AND SPACER INSTALLATION DETAIL

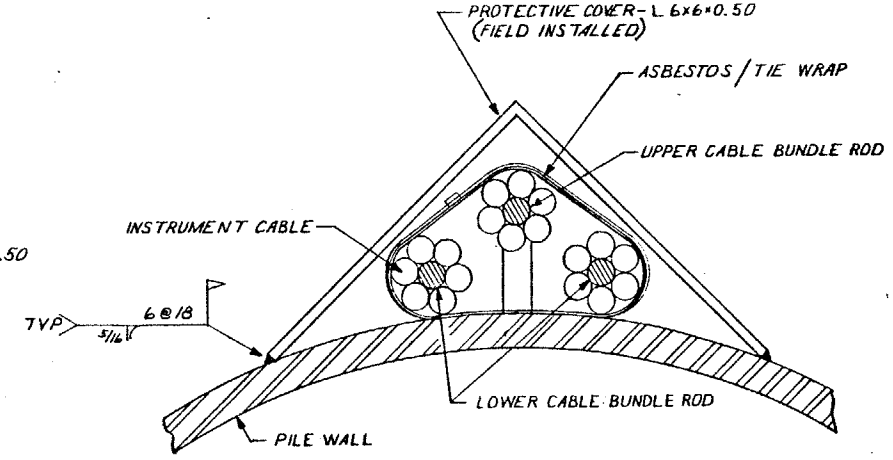
Ertec The Earth Technology Corporation

SCALE: NONE	DRAWN BY: G.R. COFFEY
APVD BY:	DATE: 2-24-83
DRAWING NUMBER: C-E-110	REV. NO.

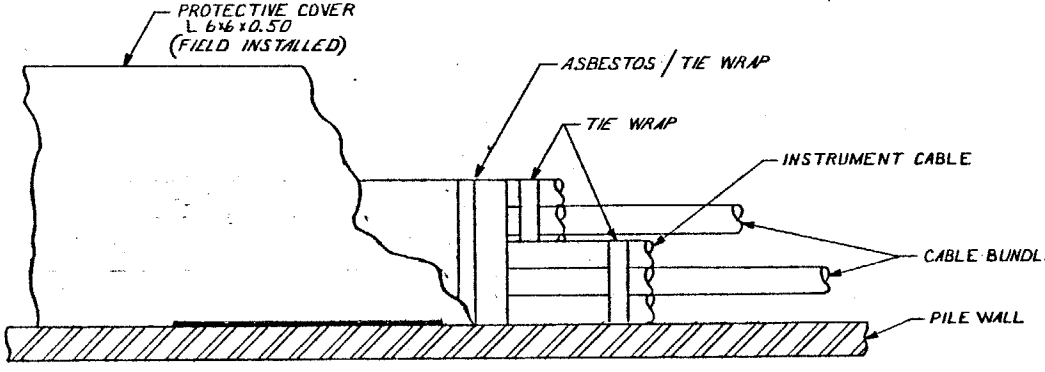




EXTERNAL COVER PLATE (36 REQ'D) (SHIP LOOSE)
(1/4 SCALE)



SECTION A-A
(NO SCALE)



(1/2 SCALE)

NOTE:
1) ALL NOTED DIMENSIONS ARE IN INCHES

MACHINE STANDARDS	
EXCEPT AS OTHERWISE SHOWN	
MACHINE FINISH TO BE $\sqrt{}^{63}_{.0005}$	
DIMENSIONAL TOLERANCE	ANGLE TOLERANCE
0.000 ± .002	XX° ±1°
0.00 ± .01	XX° XX' ±1'
FRACT ±1/64	XX° XX' XX" ±1"
CORNER RADIUS .010 TO .020	
LATHE CUT THREADS CLASS 2	
REMOVE ALL BURRS AND BREAK ALL SHARP CORNERS	
PROJECTION	

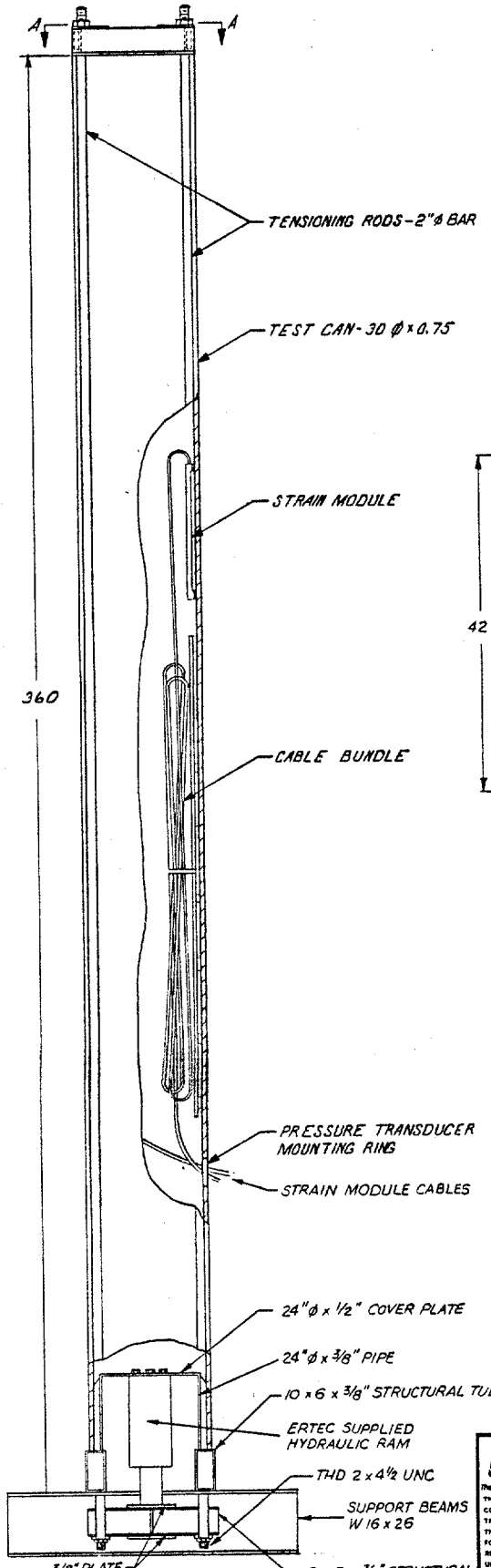
Pc MK	QTY	MATERIAL	SPEC	DESCRIPTION

LIST OF MATERIAL

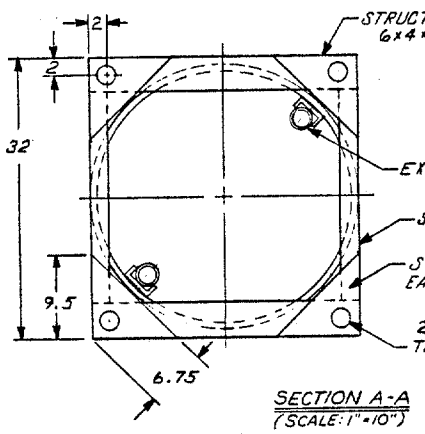
INSTRUMENT CABLE PROTECTION COVER AND INSTALLATION DETAIL

Ertec
The Earth Technology Corporation

SCALE: AS NOTED | DRAWN BY: G.R. COFFEY
APVD BY: | DATE: 1-12-83
DRAWING NUMBER: C-E-111 | REV. NO.



SECTION B-B (SCALE: 1" = 20")



SECTION A-A
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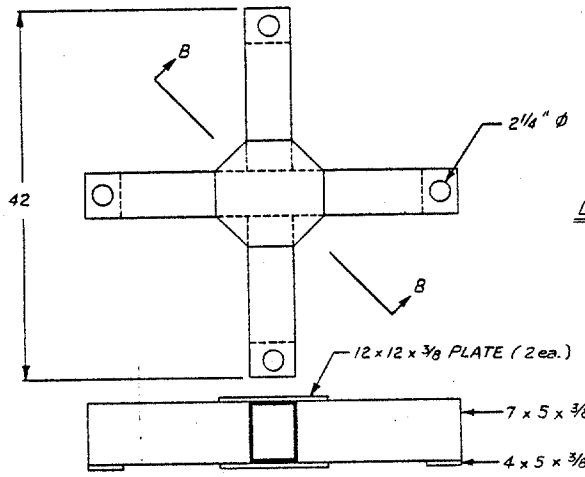
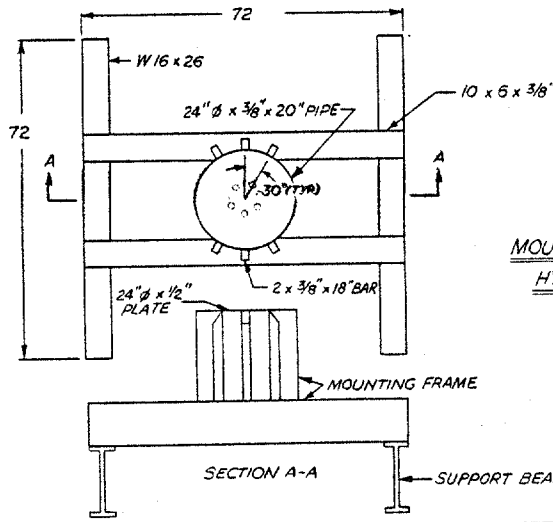


LOADING CROSSHEAD
(SCALE: 1" = 10")



MOUNTING FRAME FOR HYDRAULIC RAM
(SCALE: 1" = 20")

Notes: 1. Fabricator to supply material and assistance for calibration.

MACHINE STANDARDS	
EXCEPT AS OTHERWISE SHOWN	
MACHINE FINISH TO BE $\sqrt{}$ .0005	
DIMENSIONAL TOLERANCE	ANGLE TOLERANCE
0.000 ±.002	XX° ±1°
0.00 ±.01	XX° XX' ±1'
FRACT ±1/64	XX° XX' XX" ±1"
CORNER RADIUS .010 TO .020	
LATHE CUT THREADS CLASS 2	
REMOVE ALL BURRS AND BREAK ALL SHARP CORNERS	
PROJECTION	

LIST OF MATERIAL

Pc MK	QTY	MATERIAL	SPEC	DESCRIPTION

TEST CAN CALIBRATION

Ertec
The Earth Technology Corporation

SCALE: AS NOTED	DRAWN BY: G.R. COFFEY
APVD BY:	DATE: 5-13-93
DRAWING NUMBER C- F-100	REV. NO.

APPENDIX B

Instructions for Fabricating and Calibrating the Test Pile

INSTRUCTIONS FOR FABRICATING AND CALIBRATING THE TEST PILE

INTRODUCTION

DRAWINGS GROUP A
- 1.0 General
- 2.0 Requirements of Fabrication Shop Facility
- 3.0 Instrument Components

DRAWINGS GROUP B
- 4.0 Electrical Strain Modules
- 5.0 Pore Pressure and Total Pressure Cells
- 6.0 Additional Pile Instruments

DRAWINGS GROUP C
- 7.0 Extensometer Channel Brackets
- 8.0 Extensometer Connector Assembly
- 9.0 Extensometer Access Tubes (Instrumented Segment)
- 10.0 Extensometer Access Tubes (Add-On Segments)

DRAWINGS GROUP D
- 11.0 Tell-Tale Access Tubes
  - 11.1 Tell-Tale Tubes (Instrumented Segment)
  - 11.2 Tell-Tale Tubes (Add-On Segments)

DRAWINGS GROUP E
- 12.0 Cable Bundle Rods
  - 12.1 Internal Bundle Rods (Instrumented Segment)
  - 12.2 Instrument Cable Exit (Instrumented Segment)
  - 12.3 External Bundle Rods (Add-On Segments)
  - 12.4 Transmission Cables
- 13.0 Protective Cover Plates
  - 13.1 Internal Cover Plates
  - 13.2 External Cover Plates

DRAWINGS GROUP F
- 14.0 Pile Calibration of Instrumented Section

INSTRUCTIONS FOR FABRICATING AND CALIBRATING THE TEST PILE

INTRODUCTION

Accompanying the set of detailed drawings depicting the test pile are a set of instructions for fabricating, assembling, and calibration of the instrumented segment and the two add-on segments. The instructions are grouped in the same manner as the drawings themselves. These groups are divided into the type of instruments, components, and procedures, and do not necessarily follow a sequential installation scheme. The installation scheme is given in a critical path chart supplied at the end of this document. It is not directly stated in the CPM, but there are numerous items which can be paralleled and activities overlaped to meet the tight scheduling requirements. One such example is that of the strain module installation, calibration and test can assembly process. Since each can must go through the first two processes independent of the other, the final assembly may proceed as each group of cans complete the calibration process. A general overview of the test pile fabrication is given in the following steps:

1. Prepare hardware and can segments
2. Assemble cans in specified lengths and mark instrument locations
3. Perform all torch cutting operations on cans
4. Perform all hardware welding in cans
5. Install strain modules
6. Calibration
7. Assembly/alignment of segments
8. Prepare for shipment
9. Ship

This outline is given only to serve as a general guideline into the sequence of operations for assistance in bidding this work. A detailed bar chart shall be worked out with the successful fabricator upon award of contract. The Group A drawings give general guide lines and requirements for the fabrication shop and facilities requested. Most of these requirements are necessary due to the complexity and sensitive nature of the operation. Also mentioned in this section are the types and numbers of instruments to be installed in the test pile. These are further discussed in more detail with step-by-step procedures for their installation in Groups B-D. Group B discusses the instruments and the installation procedures for those instruments which require a transmission cable. Electrical strain modules, total pressure and pore pressure transducers are those instruments which fall into this class. The installation of mounting rings for the pressure transducers are the first step in the fabrication process. The mounting ring serves as the template in which the pressure transducers rest. The actual installation of the pressure transducer is then one of the last steps after the test pile has been assembled.

The strain modules are the first instruments to be installed in the individual cans prior to the calibration and assembly process. The strain modules must be installed with great care due to their susceptibility to damage by heat. A welding scheme is given in this section outlining this installation plan.

The extensometers and associated hardware are discussed in Group C. These are drop-in instruments which serve as a back up to the electrical strain modules. These instruments require a water-tight tube to run internally the length of the test pile. A mechanical-type O-ring connector will provide the water-tight integrity between the tubes in adjacent pile segments. To aid in the assembly process, a large portion of the extensometer tubes will be preassembled outside the pile and pressure tested to insure the water tight integrity of the system. A scheme has been devised for this assembly process.

Group D discusses the installation of the tell-tale tubes. These tubes are similar to those of the extensometers except that these do not require water tightness. The tell-tale is a device which uses a constant tension cable with a weight attached to measure the movement at a location on the pile.

The bundle rods and cover plates for both internal and external application are presented in Group E. The bundle rods are simply a deformed rod (rebar) attached to the pile wall with a stand off so that the transmission cables can be attached with ty-wraps. The cover plates for these bundled cables serve as a protective cover so that the passing soil, inside or outside the pile, will not damage the instruments or cables.

General guideline for the calibration procedure of the individual test cans are presented in Group F. The six test cans of the instrumented pile and one segment of the 2nd add-on segment are to be calibrated. A frame is to be provided so that the 30-ft cans can be calibrated in a vertical mode. Access to the top of these cans are required so that the drop-in extensometer units may be installed and checked against the strain modules.

INSTRUCTIONS FOR INSTRUMENTING AND CALIBRATING THE TEST PILE

1.0 General

1.1 The purpose of this set of instructions is to provide a set of detailed procedures for the instrumenting and calibration of the test pile.

1.2 The test pile will consist of one instrumented section 180 ft in length and two add-on sections, each 90 ft in length. The diameter of the test pile shall be 30-in with a wall thickness of 0.75 in. The pile material shall conform to Conoco General Specifications GS-15.0, Section 1.2.3. A schematic diagram of the test pile is given on Plate A-101, with a composite cross section given on Plate A-102.

1.3 The instrumented section, denoted as TP-1, will be constructed from 6 segments, each 30-ft in length: Individual 30 ft segment lengths will herein be called "cans".

1.4 Each add-on section will be assembled from two pre-fabricated lengths of 40 and 50 ft.

1.5 The second add-on section, TP-3, will have a load head attached 7 ft from one end. (Plate A-103). The 20-ft length of pipe containing the load head will be furnished by Conoco.

1.6 The 2nd add-on section and load head shall be painted per Conoco's painting and sandblasting specifications. Stripes shall also be painted on the test pile at 1-ft intervals.

1.7 Vertical stab guides for field installation of the three segments shall be provided as shown on Drawing A-106. The stab guides shall be installed after the internal stab connections are installed and successfully tested.

1.8 The instrumented segment shall be placed into a lifting cradle prior to ship out. This cradle shall also carry the spooled transmission cables.

1.9 The lifting cradle is designed to reduce bending stresses in the 180-ft instrumented segment during handling in the fabrication shop and at the offshore test site.

2.0 Requirements of Fabrication Shop Facility

2.1 The site for calibration and alignment of the test pile shall be located indoors such that it will be protected from weather and shaded from sunlight.

2.2 The site shall provide sufficient space to permit adjacent segments of the test pile to rest end-to-end on supports during the alignment process. Test cans may be placed in parallel working space at other times of the construction process.

2.3 Proper support and alignment capabilities should be provided as follows:

2.3.1 The pile supports shall be located at approximately the 1/4 points of each pile can section (30 ft) and founded on a concrete base.

2.3.2 The pile supports shall be such that the pile rests on rollers which permit the section to be easily rotated (Plate A-104).

2.3.3 The pile supports shall also provide for axial translation. These supports shall also be such that longitudinal alignment of adjacent segments can be accomplished (Plate A-105).

2.3.4 A surveyor's transit shall be available for use in the alignment of the test pile sections.

2.4 Contractor shall be prepared for welding of the instruments and access tubes on the inside of the test pile sections.

2.5 Overhead cranes or crane access within the facilities should be available to assist in handling the pile during the alignment process and during load out.

2.6 Fabrication shop shall have access to barge and shipping facilities.

2.7 All necessary support equipment for fabrication shall be supplied by contractor.

2.8 Contractor shall provide office space for 2 people with appropriate working facilities.

2.9 Fabrication shop and test pile shall be kept clean of any unnecessary materials, dirt or welding trash.

2.10 Lighting and air circulation shall be supplied while workers are working inside the pile.

3.0 Instrument Components

The instrumentation components for the instrumented section consist of the following:

3.1 Twelve total pressure cells
3.2 Twelve pore pressure cells
3.3 Twelve resistance strain modules
3.4 Six extensometers
3.5 Two tell-tales

Note: Items 3.1 thru 3.3 require transmission cables to run internally to the top of segment TP1. The cables then exit and run externally the remaining distance to the top of the add-on sections. Items 3.1.4 and 3.1.5 require access tubes to run internally the entire length of the test pile for installation of the instruments after the pile is installed by driving. The general orientation of these access tubes within the test pile is shown on Plate A-102.

Caution shall be exercised during the fabrication process with the test pile being treated and handled as one large instrument. Due to the special sequencing of instrument installation, a detailed construction sequence is shown at the beginning of this document.

4.0 Electrical Strain Modules

4.1 The electrical strain modules shall have a transmission cable permanently attached.

4.2 The electrical strain units shall be monitored by Ertec during their installation to the pile wall. Due to the potential for damage to the strain module, the temperature along the outer tube of the strain unit shall not exceed 200 degrees Fahrenheit.

4.3 The strain units in the instrumented segment shall be centered and positioned as shown on Plate B-102. Small hydraulic jacks may be required to hold the units in place while welding.

4.4 The ends of the strain units shall first be secured with fillet welds 1.0-in long on both sides of the instrument unit. Special precaution shall be taken to ensure that the instrument cables are not damaged during welding.

4.5 The final attachment shall be completed with 1.0-in long filet welds staggered and crisscrossed along both sides of the unit. Sufficient time between welds shall be allowed so that the strain units may dissipate any heat absorbed during welding.

4.6 Transmission cables shall be then rolled into a figure-eight configuration and strapped to the bundle rods in each can segment after they have been correctly installed and indications given of proper working order. Approximately 40 ft of cable shall be left free to exit through the pressure transducer mounting ring for calibration.

4.7 Two 1.50-in. holes shall be cut in the pile wall for cable exits near the ends of the external bundle rods (38.75-in. below the load head) as shown in Plate B-102.

4.8 The strain units in the upper portion of the 2nd add-on section shall be positioned as shown on Plate B-102.

4.9 The strain units shall be installed in the same manner as outlined in 4.3 through 4.5 above.

4.10 Transmission cables shall then be rolled into a figure-eight configuration and strapped to the bundle rods in the can segment after they have been installed and indications given of proper working order. Approximately 40 ft of cable shall be left free to exit the can section during the calibration.

5.0 Total Pressure and Pore Pressure Cells

5.1 The total and pore pressure cells will be bolted onto mounting rings which are prewelded into the pile wall as shown on Plate B-101. Two different sizes of mounting rings shall be installed for the total and pore pressure cells. A 6.0-in and 4.8-in diameter holes shall be cut in the pile wall at the location of each total or pore pressure cell.

The locations of the mounting rings are given on Plate B-100. The edge of these holes shall be beveled for welding as shown.

5.2 The total pressure and pore pressure cell mounting rings shall then be welded in place. Dummy pressure cells shall be used during the mounting ring installation process to reduce distortion of the mounting ring. These dummy cells shall be provided by Ertec.

5.3 Excess weld on the pile exterior shall then be ground smooth and flush to conform to the pile wall surface.

Note: Total pressure and pore pressure cells shall be the last set of instruments installed in the pile.

5.4 The total pressure and pore pressure cells shall be installed from inside the test pile. The transmission cables shall be placed on the appropriate bundle rods as these units are bolted into the mounting rings (Plate B-102). The cables are then secured to the bundle rods using nylon ty wraps.

5.5 After installation of the pressure transducers, the exposed bolts on the exterior pile wall shall be welded and ground smooth to conform to the pile surface.

6.0 Additional Pile Instrumentation

6.1 Additional instrumentation for the pile test shall include:

A. Strain gages at the pile head
B. Displacement modules at the pile head
C. Dial gages at the pile head
D. Accelerometers and dynamic strain gages at pile head
E. Hydraulic pump pressure gages

6.2 Pile verticality shall be determined using a downhole inclinometer. The access tube for the tale-tell shall serve as the guide tube for the inclinometer. Measurements shall be taken at 10-ft intervals in each tell-tale access tube.

6.3 Upon completion of the vertically measurements, one tell-tale shall be installed in each of the tell-tale access tubes. The counterweight seats for the tell-tale lines are shown on Plate D-102. Movement of the tell-tale lines shall be monitored by DCDT's mounted on the reference beam.

7.0 Extensometer Channel Brackets (Instrumented Segment)

7.1 Channel brackets consist of 6.0-in lengths of C3 x 5 structural channel sections. Additional support brackets shall be prepared from 2 x 2 x 1/4 angle sections for use in certain areas of the 180-ft instrumented segment.

7.2 Unless otherwise specified, the channel brackets shall be spaced 24-in center to center along the internal pile wall (Plate C-100 and C-101.)

7.3 At the location of the extensometer gage section in can 6, support brackets from angle sections shall be substituted for channel brackets to permit space for welding the gage section (Plate C-100 and C-101).

7.4 Each channel bracket shall be attached to the pile wall with a continuous weld along both sides (see Plate C-103).

7.5 Additional brackets shall be used to secure the extensometer tubes after the tubes have been attached to the connector blocks and brackets. Side mounted brackets are installed to reduce vibration during driving (Plate C-110).

7.6 At vertical stab joint locations, the access tubes shall be routed such that a 0.325-in separation between the tubes is achieved to permit space for installation into the connector block and connector bracket (Plates C-103 and C-109).

7.7 Spacer bars and lugs as shown on Plates C-102 and C-110 are provided to help guide the middle extensometer tube into the connector block and bracket.

8.0 Extensometer Connector Assembly

8.1 Installation and alignment of the extensometer connector block.

8.1.1 The exact position of the connector blocks shall first be marked at the top of pile segments TP1 and TP2 (Plate C-111).

8.1.2 Sealing ports shall be drilled and tapped through the pile wall as shown on Plates C-111 and C-116 to accommodate screw plugs. This shall be performed using an alignment template provided by Ertec.

8.1.3 The connector blocks shall be tack-welded into position with final welding completed after the exact position is checked during the alignment process.

8.1.4 Adjacent pile segments (TP1 and TP2 or TP2 and TP3) shall be set up for alignment with axial translation as well as rotation to be provided.

8.1.5 The pile segments will be butted together to position the connector bracket with the male connectors attached. This alignment procedure is necessary so that the O-rings on the male connector will penetrate the connector block the specified distance.

8.1.6 Tack weld the connector bracket to the pile wall and rotate the pile 180 degrees to align the other connector bracket.

8.1.7 The pile sections shall be separated and then rejoined to insure proper mating of the connecting joints. Final welding of the connector bracket and connector block shall then be completed.

8.1.8 After final welding is completed, a final demonstration shall be performed on all the extensometer stab joint connections to demonstrate proper functioning of the connectors.

8.2 Connection of the extensometer tubes to the connector block and connector bracket.

8.2.1 Refer to Sections 9.0 and 10.0 for the installation of the extensometer tubes.

8.2.2 A rubber hose sleeve shall be slipped onto the extensometer tube at the connector location.

8.2.3 Apply a thin coat of DC-4 silicon grease on both the extensometer tube and receiving connector.

8.2.4 Slip four steel banding rings over the hose connector.

8.2.5 Slide the hose forward until it meets the connector block.

8.2.6 Clamp the two banding rings over the hose to form a water-tight connection (Plate C-111).

8.2.7 Repeat steps 8.2.2 through 8.2.6 for the two outer tubes.

8.2.8 Pressure test the extensometer tubes and connector block at 100 psi until it is proven that no leaks occur in the system (Plates C-112 through C-116). Refer to sections 9.0 and 10.0 for pressure test details.

9.0 Extensometer Access Tube

9.1 The access tubes for the extensometers shall be made from standard 2-in pipe, schedule 40 (Plate C-107).

9.2 During all phases of construction, these tubes shall be kept clean and dry with adequate protection from internal rust to be maintained at all times.

9.3 Prior to installation, both ends of each typical 120-in section of access tube shall be internally beveled as shown in Plate C-107.

9.4 Pre-assembled extensometer gage sections and tubes shall be installed in cans 2, 4 and 6 (Plate C-106). A gage section is shown on Plate C-107.

9.5 The gage section shall be attached to the pile wall with a continuous weld. The extensometer tubes shall also be securely welded to each channel bracket.

9.6 Pre-assemble the remaining extensometer tubes for each section with a sleeve tube as shown on Plates C-104 and C-107.

9.7 The splices between the individual tube segments shall be accomplished using 4.0-in lengths of 2-1/2-in schedule 40 standard pipe, as illustrated on Plate C-107.

9.8 Individual pressure tests of the joined tubes and gage sections with appropriate tube lengths attached will be performed at 100 psi for 30 minutes with no leaks observed.

9.9 The center extensometer tubes (upper gage section) shall be attached to the connector block prior to assembling the six cans (Plates C-103 and C-104). The center tube shall rest between the two channel brackets.

9.10 Pressure test the six installed gage lengths and extensometer tubes to 100 psi for 30 minutes.

9.11 Attach extensometer cover plates and plow sections over all the gage sections, splice joints, and fully-exposed areas, (Plate C-108) once the pressure tests have been cleared.

Note: The calibration of each can section will be performed prior to completing the installation of the extensometer tubes in the remaining cans.

9.12 The assembly of the extensometer tubes is best illustrated on Plates C-104 and C-105, and consists of the following steps:

9.12.1 Align and assemble can sections 1 and 2, 3 and 4, 5 and 6 into 720-in sections (Plate C-104).

9.12.2 Lay the appropriate extensometer tube lengths (pre-welded and pressure tested) in the respective can sections.

9.12.3 Align the remaining pile cans in a single line to be assembled into the instrumented test section length of 2,160 in (180 ft).

9.12.4 The extensometer tubes shall be placed into the channel brackets and held in place by small jacks along the length of the 720-in pile cans.

9.12.5 Couple the two 720-in joints of extensometer tubes (pre-assembled) to the tube stick-out on the second can section.

9.12.6 Rotate the pile 180 degrees and couple the other extensometer tubes to the stick-out in the second can section.

9.12.7 The horizontal mating (alignment and welding) of the second can to the 3rd and 4th can sections shall be accomplished prior to the extensometer tubes being securely welded to the channel brackets (Plate C-105).

Note: The extensometer tubes must be pulled forward as the cans are brought together and gapped for welding. This process of attaching a tube length to each preassembled can section can best be described as a "leap frog" operation between tubes and sections.

9.12.8 Pressure test the two extensometer tubes to 100 psi for 30 minutes after the first 4 cans are assembled and the extensometer tubes are welded into their brackets.

9.12.9 Place the four remaining extensometer tubes into the preassembled can sections 5 and 6.

9.12.10 The two bottom extensometer tubes shall be placed into their respective channel bracket and held secure by jacks placed internally along the length of the 720-in(60-ft) pile section.

9.12.11 Mate the extensometer tubes to the appropriate tube stick-out in the previously assembled sections 1 thru 4 (Plate C-105).

9.12.12 Rotate the pile 180 degrees and couple the other two extensometer tubes to their respective mates.

9.12.13 Align and weld the two preassembled sections (1-2-3-4 and cans 5-6).

Note: The extensometer tubes shall be moved forward as the can sections are brought together and gapped for welding.

9.12.14 The two outer tubes shall be connected to the connector block on both sides of the pile in the 6th can section prior to final welding of the tubes into the channel brackets. This will allow any positioning of the rubber hose connectors or their replacement to be accomplished before the tubes are welded securely into the channel brackets (Plate C-103).

9.12.15 Weld the remaining 4 tubes into the channel brackets in can sections 5 and 6.

9.12.16 Pressure test the extensometer tubes to 100 psi for 30 minutes as shown on Plate C-112).

Note: All sections of rubber hose to be connection shall be placed on the extensometer tube prior to attachment of the tubes.

9.12.17 Upon successful completion of the pressure test, the protector for driving vibration shall be installed over the extensometer tubes (Plate C-110).

10.0 Extensometer Access Tubes (add-on segments)

10.1 The extensometer tubes for the add-on segments (TP2 and TP3) shall be pre-assembled (6 @ 1,062 in and 6 @ 1,056.5 in) and pressure tested outside the pile as shown on Plate C-112.

10.2 The tubes for 1st add-on section (1,056.5 in) shall be attached to the connector block and connector bracket prior to welding into the channel brackets.

10.3 Beginning with the center tube, each set of 3 tubes shall be welded into place and pressure tested to 100 psi for 30 minutes as shown on Plate C-112.

10.4 Repeat the procedure for the tubes diametrically opposed (180 degrees apart).

10.5 Install the extensometer tubes in the 2nd add-on section (1,062 in) in the same manner as outlined above.

10.6 Pressure test the tubes to 100 psi for 30 minutes as shown on Plate C-105.

10.7 Install driving vibration protector after successful completion of pressure test.

11.0 Tell-Tale Access Tubes

11.1 Tell-tale tube (instrumented segment).

11.1.1 The tell-tale access tubes consist of 10-ft lengths of 2 1/2 x 2 1/2 x 0.188 square structural tubing. The positions of the tell-tale tubes are shown on Plate D-100.

11.1.2 The tell-tale tubes shall be installed by welding directly to the pile wall. Minimum welds should be 6.0 in in length spaced at 24-in centers on both sides of the tubes (see Plate D-100).

11.1.3 At the vertical stab connections between pile segments and at splices between individual tube lengths, the access tube shall be joined as shown on Plate D-100 and D-101. The joint consists of a 6-in length of 3 x 3 x 0.188 square structural tubing which overlaps and is welded to both adjoining lengths of 2 1/2 x 2 1/2 x 0.188 tubing.

11.1.4 At the termination point of the tell-tale tubes in the instrumented section, a tell-tale seat plug shall be welded to the inside of the tubes as shown in Plate D-102.

11.1.5 Water tight connections are not required in these tubes. They may be therefore pre-installed in each 30-ft can of the instrumented segment, with joints being made once the cans are assembled.

Note: It is advisable not to have stick-out beyond the end of a can scheduled for calibration.

11.1.6 Protective cover plates for the tell-tale tubes shall be installed as shown on Plate D-102. The lower end of the cover plate shall be cut on a 30 degree angle and sealed with a cap plate.

11.1.7 The cover plate shall be welded to the pile wall with a continuous fillet weld.

11.2 Tell-tale tubes (add-on segments).

11.2.1 The position of tell-tale tubes in the add-on segments shall be marked prior to their installation. (Plate D-101)

11.2.2 The tell-tale tubes shall be preassembled with the joint section attached to the upper end of the tubes. These lengths shall consist of 600-in and 480-in lengths for the first add-on segment and 600-in and 474-in lengths for the second add-on segment.

11.2.3 One side of the square tell-tale tube facing the pile wall shall be removed for a distance of 16.0 in. This section shall be placed over a slot through the pile wall centered at 272.0 in. from the end of the second add-on segment. (Plate D-101)

11.2.4 The tell-tale tubes are slipped into the joint sections on the adjoining section of pile, and are attached internally as these pile sections (600 in and 480 in) are brought together for welding.

Note: Final welding at the vertical splice joint locations should be accomplished after alignment has fixed the location of these tubes. It is recommended that a 120-in length be unattached prior to alignment.

12.0 Cable Bundle Rods

12.1 Internal Bundle Rods (instrumented segment)

12.1.1 Cable bundle rods shall be installed in all segment of the test pile. Transmission cables shall be bundled internally along the instrumented segment and externally along the top portion of the instrumented segment.

12.1.2 A single bundle rod shall be installed in test cans 1 and 2. Two bundle rods shall be positioned in test cans 3 and 4 with three bundle rods installed in test can 5 and 6. This is on Plates E-100 through E-102.

12.1.3 The bundle rods shall consist of No. 5 (5/8-in diameter) deformed rod. Internal spacers are 5/8-in diameter rods in lengths of either 2 in or 4 in.

12.1.4 First, the spacers shall be welded to the interior of the pile wall. Their purpose is to space the bundle rods away from the wall at intervals shown on Plate E-100 and E-101.

12.1.5 The lengths of the bundle rod shall then be placed over the spacers and welded. (Plates E-100 through E-102).

12.1.6 Final attachment of the transmission cables are covered in Section 12.4.

12.2 Instrument Cable Exit

12.2.1 Three holes, of diameter shown on Plate E-103, are to be cut through the pile wall at the designated cable exit locations (Plates E-101 and E-103).

12.2.2 Details of the cable exit are shown on Plates E-104 thru E-106.

12.2.3 Bent deformed rods are to be installed through the holes cut in the pile wall (Plate E-104).

12.2.4 These rods shall be placed on the spacers and welded.

12.2.5 The ends of each bundle rod shall be centered over the spacers so that only half the splice spacer is covered (E-102).

12.3 External Bundle Rods (Add-on segments)

12.3.1 Bundle rods similar to those placed internally along the pile will also be required for the transmission cable attachment on the add-on segments.

12.3.2 Spacers shall be placed on the exterior of the add-on segments as shown on Plate E-108. The outer spacers are 5/8-in diameter rods in lengths of either 2.0 or 4.0 in. The center spacers shall consist of 5/8-in plate, 4.0 in long, and a height of 1.50 in.

12.3.3 Bundle rods of deformed bar shall then be placed on the spacers and welded. (E-109 and E-110).

Note: The spacers and bundle rods shall be placed on the exterior surface of the add-on segment only after all internal access tubes have been attached and alignment processes finished.

12.4 Transmission Cables

12.4.1 Transmission cables are permanently attached to all instruments. There are 18 cables on each side of the test pile. The cables run internally along the length of the instrumented segment and exit just before the first add-on segment (Plates A-101 and A-102).

12.4.2 Extreme care must be taken to preserve the integrity of these cables since they are the life-line of the instruments. The cables shall always be protected when welding or torch cutting is performed near their location and caution shall be exercised while handling the cables.

12.4.3 The diameter of the cable is 0.534-in and shall be bundled around a similar size rod so that a smooth transmission network can be attained. Plates E-106, E-107 and E-111 show the cable networks bundled to the three bundle rods.

12.4.4 The instrument cables shall be bundled to the appropriate rods after assembly of the 2,160-in instrumented segment. (Plate B-103).

12.4.5 Transmission cables attached to the strain modules previously stored in each can section shall be removed from the storage configuration and stretched out passing through the appropriate exit hole.

12.4.6 Transmission cable for the total and pore pressure transducers shall be carefully pulled from the end of the instrumented segment through the test pile and out the appropriate cable exit hole. The instruments will then be bolted to their respective mounting rings progressively installed until all transducers are attached. (Plate B-103)

12.4.7 All excess slack shall be removed from the cables as the bundling operation proceeds forward to the cable exit. Bundling to the bundle rods is achieved by placing nylon tie-wraps every 12.0-in. around the cables (E-111).

12.4.8 A fire retardant material shall also be placed around the bundled cables prior to the internal cover plate being installed.

12.4.9 A piece of flexible rubber hose 12.0-in in length and large enough to accept the six bundled cables (network) shall be placed around the instrument cables at the point where the bundle rod passes through the pile wall.

Note: Extreme care shall be exercised while stringing the instruments cables through the cable exit holes and welding cover plates.

12.4.10 Cables are bundled to the exterior rods after passing through the cable exit holes for a distance of 12.0 in past the location of the external cover plate (Plate E-103 thru E-106).

12.4.11 A short piece of external cover plate is welded over the cable exit (Plates E-104 , E-108 and E-109) to serve as protection.

12.4.12 Steps 12.4.5 through 12.4.11 are then repeated for the instruments diametrically opposed.

12.4.13 The lengths of transmission cables are then respooled and placed on cable racks for transportation to the test site. These racks are located on lifting and handling cradles.

13.0 Protective Cover Plates

13.1 Internal Coverplates

13.1.1 The protective cover plates for the electrical strain modules, cable network, total pressure, and pore pressure cells shall consist of lengths of 6x6x3/8 structural angle sections.

13.1.2 Both ends of the internal cover plate shall be cut on a 30-degree angle and sealed with a 3/8-in thick steel plate. A typical cover plate for an end section is shown on Plate E-107.

13.1.3 Extreme care shall be exercised during the installation of the cover plates so as not to damage the instruments or cable network attached to the bundle rods.

13.1.4 Each cover plate shall be positioned individually over the instruments and cable network before being welded. The required weld lengths are 6.0-in. on 12.0-in. centers along both sides of the cover plate. A protective insulation blanket shall be installed either side of the outer cable network prior to welding the cover plates. (Plate B-103)

13.2 External Cover Plates (field installed)

13.2.1 The external cover plates covering the bundled instrument cable network shall be installed at the test site once the test pile has been made vertical.

13.2.2 The protective cover plates for the add-on sections shall consist of lengths of 6x6x1/2 steel angle section. A typical length of this cover plate is 120.0-in (Plate E-111).

13.2.3 The instrument cables shall be tied to the cable bundle rods in three groups of six cables and wrapped with a fire-retardant cloth prior to welding cover plates (see Plate E-111).

13.2.4 The cables shall first be attached to the pile by workers stationed on both levels and sides of a work cage being hoisted up the add-on segments.

13.2.5 A kelems clamp shall also be threaded over each individual groups of six cables and attached at predetermined point below the top of the test segment to support the cable networks during pile driving.

13.2.6 The protective covers shall have holes cut which will serve as lifting eyes.

13.2.7 The protective cover plates shall be welded to the pile with staggered welds of 6.0-in spaced 12.0-in apart on both sides of the pile (Plate E-110).

13.2.8 Bars to position the external cover plates shall be installed in the shop during installation of the external bundle spacers and rods (Plate A-106).

14.0 Calibration of Instrumented Section

14.1 Each test can of the instrumented section shall be independently calibrated prior to assembly of the full instrumented segment.

14.2 Six test cans 30 ft in length and one 20 ft in length shall be tested vertically in a calibration frame provided by the contractor. Plate F-100 shows the suggested set-up for pile calibration.

14.3 The test cans shall be loaded in axial compression during calibration. A minimum of 200 kips of load shall be required. Ertec will provide the hydraulic system to calibrate the test cans.

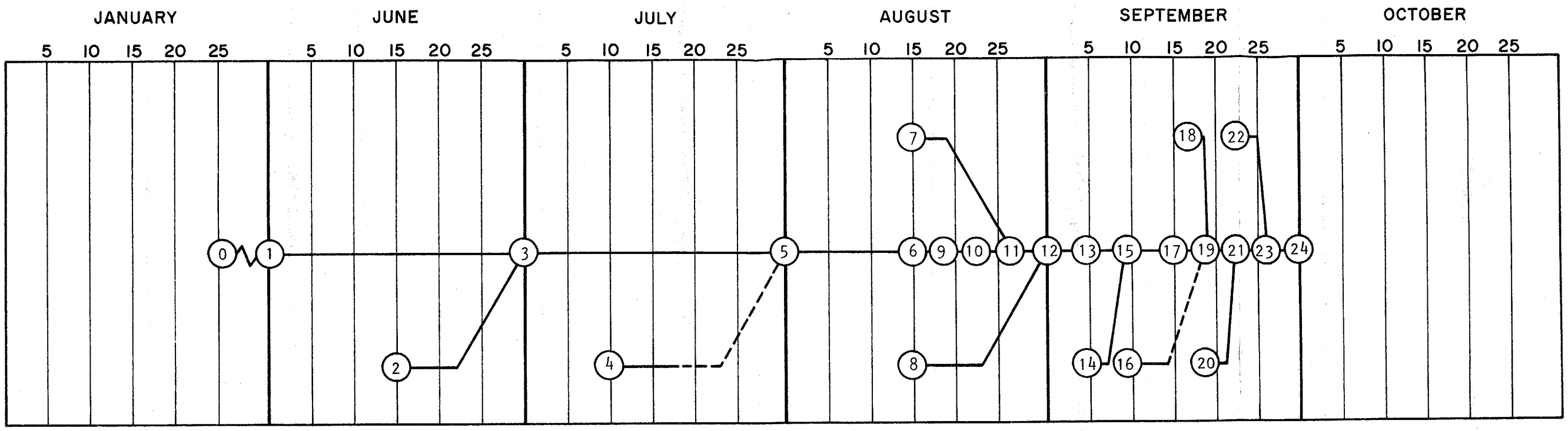
14.4 Ertec personnel will perform the test pile calibration. Contractor shall be responsible only for set-up of the calibration frame.

14.5 The test cans shall be protected from sun light or other factors influencing large temperature variation during calibration. It may be necessary to perform the calibration process in the late evening or early morning hours to ensure the ambient temperature variation does not affect the calibration process.

14.6 Access to the top of the pile along with a safe working area shall be provided by the contractor. This work area is required so that the drop-in extensometers can be read during the calibration process. A scaffolding system incorporated around three sides of the test can and may best serve this purpose.

APPENDIX C

Critical Path Sequence for Test Pile Fabrication



INSTRUMENTED SEGMENT

0-1 Screen and Select Contractor/Award Contract

1-3 Finalize Construction Plans

2-3 Order/Receive Material and Weight

3-5 Roll Plate into 10-ft Length

4-6 Prepare Hardware
- a. Extensometer Tubes/Sleeves/ Cover Plates (8.0, 9.0)
- b. Tell-Tale Tubes/Cover Plates (11.1)
- c. Extensometer Brackets/Angles/Spacers (7.0)
- d. Spacer Bars and Bundle Rods (Internal and External) (12.2, 12.2)
- e. Cover Plate (Internal) (13.1, 13.2)

5-6 Assemble Lengths into 30 ft Cans (1.0)
- a. Mark Instrument Locations
- b. Match Mark Pile

6-9 Cut Holes for Pressure Transducers/ Install Driving Shoe (5.0, 1.0)

7-11 Install Extensometer Brackets, Angles, Spacers (7.0)

8-12 Pre-Assemble Extensometer Tubes/Pressure Test (9.0)

9-10 Install Pressure Transducer Mounting Rings (5.0)

10-11 Install Internal Bundle Rods and Spacers (12.1)

11-12 Install Connector Blocks (8.0)

12-13 Install Extensometer Gage Sections in Cans 2,4 and 6/Pressure Test/Cover Plate (9.0)

13-15 Install Strain Modules/Store Cables (4.0)

14-15 Assemble Calibration Frame (14.0)

15-17 Calibrate Can Sections (14.0)

16-19 Set Up Alignment Scheme (2.0)

17-19 Assemble Test Pile
- a. Extensometer Tubes (9.0)
- b. Tell-Tales (11.1)
- c. Pressure Transducers (5.0)
- d. Bundle Cable (12.4)
- e. Internal Cover Plate (13.1)
- f. Pressure Test Extensometer Tubes (9.0)
- g. Bundle Rods and Spacers and Cover Plate (External at Cable Exit)

18-19 Disassemble Calibration Frame (14.0)

19-21 Align Test Segments
- a. Vertical Stab Guides (1.0)
- b. Lifting Eyes/Stops (1.0)
- c. Vibration Protector (9.0)
- d. External Bundle Rods and Spacers (12.2)
- e. Extensometer Bracket

20-21 Set Up Prepare Lifting Cradle (1.0)

21-23 Install Pile into Lifting Cradle (1.0)

22-23 Disassemble Alignment Scheme (1.0)

23-24 Prepare Pile for Shipment/Ship (1.0)
- a. Paint Ft Markers
- b. Attach Cable Spools to Lifting Cradle
- c. Load Out Pile onto Barge

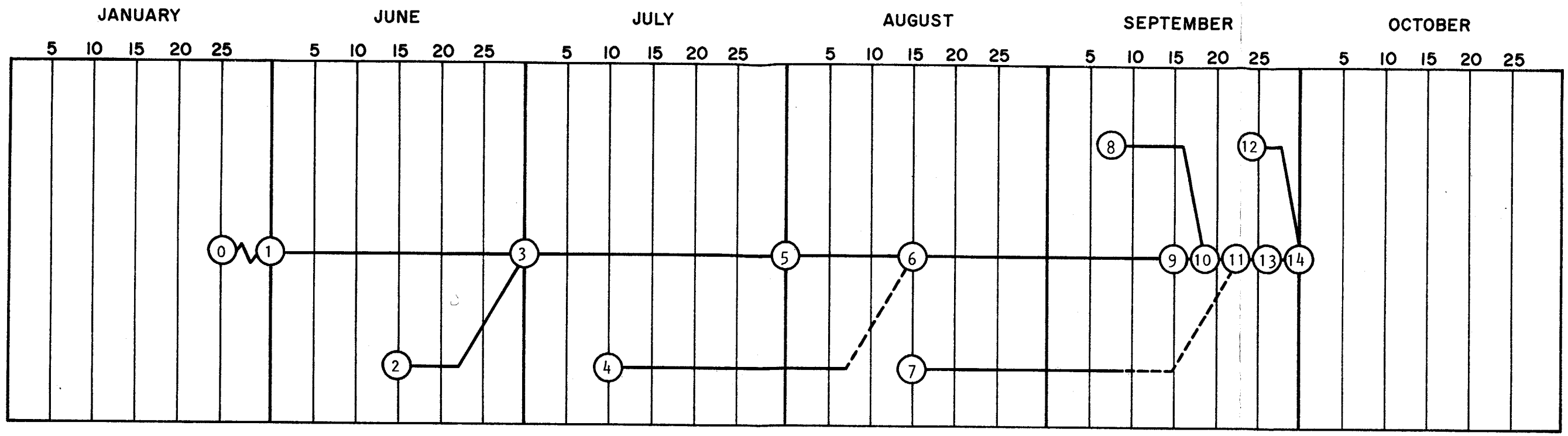
TEST PILE FABRICATION

JOB NO.

Ertec

PLATE

JOB NO.



1ST ADD-ON SEGMENT

0-1 Screen and Select Contractor/Award Contract

1-3 Finalize Construction Plans

2-3 Order/Receive Material/Weight

3-5 Roll Plate into 10 ft Lengths

4-6 Prepare Hardware
- a. Extensometer Tubes/Sleeves (8.0, 9.0, 10.0)
- b. Tell-Tale Tubes/Cover Plates/ Joint Section (11.2)
- c. Extensometer Brackets/Angles/Spacers/ Cover Plates (7.0)
- d. Spacer Bars and Bundle Rods (External) (12.3)
- e. Cover Plate (External and Internal) (13.1, 13.2)

5-6 Assemble Lengths into 40 and 50 ft Cans (1.0)
- a. Pre-Align Lengths
- b. Match Mark Pile

6-9 Install Hardware

7-11 Pre-Assemble Extensometer Tubes/Pressure Test (9.0)

8-11 Set Up Alignment Scheme (2.0)

9-10 Assemble
- a. Tell-Tale Tubes (11.2)

10-11 Align Test Segments
- a. Connector Block and Bracket (8.0)
- b. Lifting Eyes (1.0)
- c. Final Position/Weld Connector Bracket (8.0)
- d. Final Welding Tell-Tale Tubes (11.0)
- e. Vertical Stab Guides (1.0)
- f. Cover Plate Lugs (1.0)
- g. External Bundle Rods/Spacers (12.3)

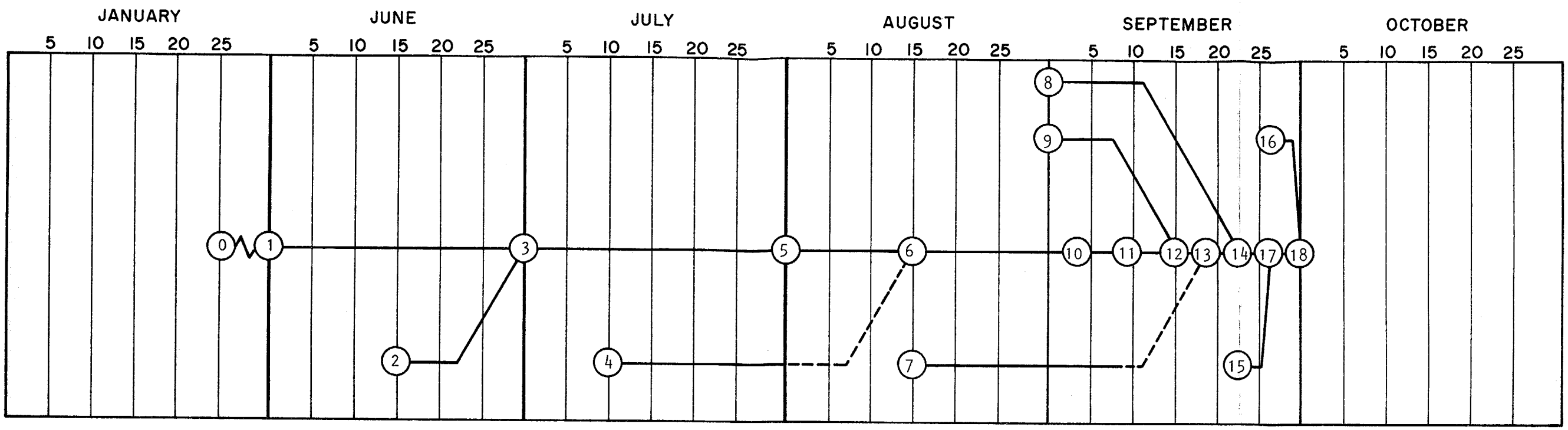
11-13 Install Extensometer Tubes (10.0)
- a. Pressure Test (10.0)
- b. Vibration Protector (10.0)

12-14 Disassemble Alignment Scheme (1.0)

13-14 Prepare Pile for Shipment and Ship (1.0)
- a. Paint Ft Marks
- b. Load Out Pile onto Barge

TEST PILE FABRICATION

JOB NO.



2ND ADD-ON SEGMENT

0-1 Screen and Select Contractor/Award Contract

1-3 Finalize Construction Plans

2-3 Order/Receive Material/Weight

3-5 Roll Plate into 10-ft Lengths

4-6 Prepare Hardware
- a. Extensometer Tubes/Sleeves (8.0, 9.0, 10.0)
- b. Tell-Tale Tubes/Cover Plates (11.2)
- c. Extensometer Brackets/Angles/Spacers Cover Plates (7.0)
- d. Cover Plate (External) (13.2)
- e. Spacers Bars and Bundle Rods (Internal and External) (12.3)

5-6 Assemble Lengths (1.0)
- a. 20,20, and 50 ft
- b. Cut Holes for Cable Exit
- c. Match Mark Pile

6-10 Install Hardware

7-13 Pre-Assemble Extensometer Tubes/ Pressure Test (9.0)

8-15 Prepare Material for Load Head (1.0)

9-12 Set Up Alignment Frame (2.0)

10-11 Install Strain Modules/Store Cables (4.0)

11-12 Calibrate 20-ft Can (14.0)

12-13 Assemble Test Section
- a. Tell-Tale Tubes (11.2)

13-14 Align Test Segments
- a. Connector Block and Bracket (8.0)
- b. Final Position/Weld Connector Bracket (8.0)
- c. Final Weld Tell-Tale Tubes (11.2)
- d. Vertical Stab Guides (1.0)

14-17 Install Load Head/External Bundle Rods/Spacers/Lifting Eyes (1.0)

15-17 Install Extensometer Tubes (10.0)
- a. Pressure Test (10.0)
- b. Vibration Protector (10.0)

16-18 Disassemble Alignment Frame (1.0)

17-18 Prepare Pile for Shipment/Ship (1.0)
- a. Sand and Paint Entire Section w/Load Head
- b. Paint Ft Markers
- c. Load Out Pile onto Barge

TEST PILE FABRICATION

APPENDIX D

Instructions for the Installation of the Test System

INSTRUCTIONS FOR INSTALLATION OF THE TEST SYSTEM

1.0 General

2.0 Preparation of Existing Platform (By COMPANY)
- 2.1 Test Platform
- 2.2 Installation of Load Frame

3.0 Mobilization of Equipment (By CONTRACTOR)
- 3.1 Equipment and Hardware
- 3.2 Test Site

4.0 Installation of the Test Pile (By CONTRACTOR)
- 4.1 Instrument Test Section
- 4.2 1st Add-On Section
- 4.3 2nd Add-On Section

5.0 Installation of the Upper Work Platform and Reference Frame (By CONTRACTOR)
- 5.1 Upper Work Platform
- 5.2 eference Frame

6.0 Demobilization (By CONTRACTOR)
- 6.1 Deck Crane
- 6.2 Test Site

1.0 GENERAL

1.1 These instructions define the requirements for the general sequence of offshore construction activities for the installation of the load frame (by COMPANY) and test pile (by CONTRACTOR). Responsibilities of the CONTRACTOR during the installation of the test pile are defined in Section 3.2 of Bid Tender 4397.2.

1.2 The procedures, instructions and associated drawings are considered to be complementary to Conoco's specifications.

1.3 The organization for the work execution is shown in Plate 1.

1.4 The proposed work schedule is shown in Appendix B. This schedule is based on the following conditions.

1.4.1 The operations carried out at the offshore test site shall be normally 24 hours a day and 7 days a week.

1.4.2 The overall work schedule is based on normal weather conditions during mobilization and installation of the test pile.

1.4.3 Upon completion of the installation of the test pile and associated hardware, the normal work schedule shall be reduced to 12 hours a day and 7 days a week.

2.0 PREPARATION OF EXISTING TEST PLATFORM (BY COMPANY)

2.1 Test Platform

2.1.1 The existing production facilities remaining on the platform deck shall be cleared or re-positioned so as not to interfere with operations or present safety hazards during the installation or testing phase of the project.

2.1.2 All necessary equipment and facilities (walkways, grating, stairways, boat landings, etc.) shall be upgraded to ensure adequate servicability for the duration of the project.

2.1.3 Where necessary, flanges of the two central floor beams shall be removed over the test bay area to cut a 42" Ø hole through the existing deck plate (see AFC Drawing A-140-D8).

2.1.4 Central portion of the diagonal braces at elevation +10 feet and +31 feet shall be removed and pile guides shall be installed in accordance with the AFC Drawings A-140-D11 and D-12.

2.1.5 Main deck plate adjacent to the jacket legs in each corner of the test bay shall be strengthened for acceptance of the load frame (see AFC Drawings A-140-D9 and D-10).

2.1.6 Generators and a lighting system shall be provided on the platform so that operations may proceed around the clock.

2.1.7 A single side band or marine band communications system shall be available on the platform or construction barge during all construction and testing activities.

2.1.8 Skid beams for the portable drilling rig shall be moved to the new position. Three 12-in conductor pipes shall be placed at the designated locations and installed to a depth of 30 ft below the seafloor. The loading frame plates shall also be installed at this time. (See Drawing A-100.)

2.1.9 Concentric pipes used for supporting the reference beam shall be installed to a depth of at least 40-ft below the seafloor (see AFC Drawings A-140-D1, -D11, and -D12).

2.2 Installation of the Load Frame

2.2.1 All preliminary preparations and modifications to the existing test platform shall be performed by COMPANY prior to the installation of the load frame.

2.2.2 The load frame should be complete in one piece upon arrival to the test site.

2.2.3 Installation of the loading frame shall be carried out with the following general procedure:

2.2.3.1 Make edge and surface preparations on the test platform and load frame for welding.

2.2.3.2 Attach lifting lines and hoist the load frame into position with a crane capable of lifting the 75-ton load frame in one piece.

2.2.3.3 Lower the load frame into position and connect the load frame to the test platform. Conduct necessary test to ensure that all welds meet the required welding specifications.

2.2.3.4 Install inner reference piles to a penetration of approximately 40 ft. below the seafloor to serve as the support for the reference beam network. Drawings A-140-D0, -D5 and -D6 illustrate the correct location of these members with respect to the load frame and existing platform.

3.0 MOBILIZATION (BY CONTRACTOR)

3.1 Equipment and Hardware

3.1.1 Port of mobilization for the test pile shall be the Fabrication yard at which the pile is assembled and built.

3.1.2 All equipment required for operations shall be mobilized to the test site on either a materials barge or a 100-ton jack-up barge.

3.1.3 The port of mobilization for the jack-up barge is not specified presently but is expected to be from along the Louisiana Coastline.

3.1.4 The test pile shall be transported to the test site in 3 pieces. The instrumented segment shall be 180 ft. in length with the 2 add-on sections, each being 90 ft. in length.

3.1.5 In addition to the test pile, COMPANY will supply a portable laboratory, prestrung cable racks, data acquisition building, generators, and other necessary equipment to be mobilized offshore.

3.1.6 Delmag diesel hammers as requested by COMPANY shall be provided by CONTRACTOR.

3.2 Test Site

3.2.1 Upon arrival at the test site, the jack-up barge shall position itself on the south side of the platform.

3.2.2 The materials barge shall then be stationed on the west side of the platform. This will allow easy access for the crane on the jack-up barge to the 150-ton crawler crane (Manitowoc 4000W or equivalent) and boom sections.

3.2.3 Generators and support equipment shall be unloaded and placed in service while the 150-ton crawler crane and boom sections are being readied for transfer.

3.2.4 The 150-ton crawler crane shall be assembled expeditiously allowing the instrumented segment and add-on segments of the test pile to be transferred to the platform pile staging area as soon as possible (Plates 2 and 3).

3.2.5 Other equipment shall be transferred to platform and set up while instrumented segment is being readied and cables are being hooked up to the Data Acquisition System.

4.0 INSTALLATION OF THE TEST PILE (BY CONTRACTOR)

4.1 Instrumented Test Segment (TP1)

4.1.1 The sequence of field construction activities for the installation of the test pile shall be as follows:

4.1.2 The instrumented pile segment resting in the lifting cradle (by CONTRACTOR) and add-on segments shall be made ready for lifting onto the platform deck. This will consist of the following events:

4.1.2.1 Lift instrumented and add-on segments of the test pile from the materials barge onto deck of platform into the pile staging area.

4.1.2.2 Remove cable spools from lifting cradle and unspool cables onto the deck of the platform. The cables shall be unrolled in an orderly fashion and placed on the platform deck in groups of six. A Kelems clamp shall be placed over each group of six cables.

4.1.2.3 The cables shall be connected to the data acquisition system inside the instrument building so that all instruments may be monitored during installation.

4.1.2.4 Ertec personnel will install the saturated porous stones into the pore pressure cells. Cells will be covered with plastic sheets so that they remain saturated during uprighting procedure.

4.1.3 Attach lifting lines and air tugger lines to the instrumented segment and upright the pile. Instrument cables shall be carefully handled so that they will not be damaged by the crane lines (Plate 4).

4.1.4 Position the instrumented pile segment over the load frame and lower pile into the stabbing guide. Lower pile until it rests on stops. (extreme caution shall be exercised during the uprighting procedure to protect the free cables).

4.1.5 Remove strong back/lifting cradle from the instrumented pile segment.

4.1.6 Attach lifting lines to the upper pad eyes and lift the pile segment off stops at platform deck.

4.1.7 Remove stops and grind the pile segment smooth.

4.1.8 Lower the pile segment to the next set of stops, and the pile tip is just off the seafloor. At elev. +10, remove any plastic sheets covering the pore pressure cells as they are immersed in the seawater.

4.1.9 A full set of pile instrument readings shall be taken to record the initial zero readings of the instruments while the pile segment is hanging vertically. These readings shall also include the drop-in extensometer units. The extensometers shall be zeroed in the following manner:

4.1.9.1 Hoist the working cage with workers and instruments to the top of the instrumented segment.

4.1.9.2 Install the dummy/cleaner into each tube to remove any dirt which may have gathered on the seats in the gage section.

4.1.9.3 Lower each instrument into its respective tube and wait for temperature stabilization.

4.1.9.4 Make readings of each instrument and check for repeatability.

4.1.9.5 Retrieve each instrument and repackage extensometer prior to lowering work cage.

4.1.9.6 Lower work cage to platform deck and remove.

4.1.10 Raise the instrumented pile segment off stops upon completion of zero readings on the instruments.

4.1.11 Remove stops and remove all weld metal by grinding.

4.1.12 Lower the instrumented pile segment until the pile supports its own weight. At elev. +10, remove plastic sheets as pore pressure cells pass into the seawater.

4.1.13 Mount the pile hammer and drive the instrumented segment until the external cover plate enters the anti-rotation guide.

4.1.14 The pile hammer will be then removed and the work cage positioned around the pile so that the surface of the instrumented segment may be prepared for welding.

4.2 First Add-On Segment (TP2)

4.2.1 The first 90-ft add-on segment shall be made ready for lifting prior to making the first vertical stab between segments TP1 and TP2.

4.2.2 Attach lifting lines to the add-on segment and lift with a two point pick-up until pile is vertical, Extreme care shall be taken during the process so as not to damage stab-joint connectors.

4.2.3 Prepare the internal access tube connectors and the surface of the add-on segment for welding.

4.2.4 Lower the add-on segment onto the instrumented segment until the four alignment guides are in contact and the access tubes mate properly.

4.2.5 Pressure test the water tight extensometer connectors prior to welding the two pile segments together. After the connectors have been proven water-tight, the splice joint may be welded. Caution should be exercised to protect the instrument cables from welding and cutting operations around the splice joint.

4.2.6 Add additional silicon grease to the extensometer connector block and weld the scew plugs into the pile. Remove the external pile stabbing guides and grind any excess material from the splice joint. Ultrasonic testing of the pile weld is required before additional penetration is permitted.

4.2.7 Attach the cross over bundle rod bars over the splice joint.

4.2.8 Remove any welding protection surrounding the instrument cables and prepare for attachment to the first add-on segment.

4.2.9 The work cage shall then be hoisted to permit access to the entire length of the add-on segment for the attachment of the instrument cables and protective covers.

4.2.10 Progressively hoist work cage while clamping instruments cables using nylon ty wraps to the bundle rods (Plate 5).

4.2.11 Bundle cables to 12 ft below the top of the first add-on segment and attach the Kelems clamps to support the cables during pile diving operations.

4.2.12 Lower work cage to the platform deck to install protective insulation around the cable network and to change out workers, if required.

4.2.13 Install angle segments in 10-ft lengths to 15 ft below the top of the add-on around the bundled cable network.

4.2.14 Lower work cage for final welding of angles and prepare pile hammer for driving the first add-on segment.

4.2.15 Mount pile driving hammer on top of first add-on segment and drive without interruption to a convenient working height above the load frame.

4.3 Second Add-On Segment (TP3)

4.3.1 Remove bundled instrument cables from inside the top of second add-on segment and route through the exit hole provided below load head. Install dynamic instrumentation below the load head.

4.3.2 Repeat step 4.2.2 through 4.2.10 for the second add-on segment.

4.3.3 Bundle cables to 5 ft below the bottom of the load head and attach the Kelems clamp to support the cables during pile driving. The cables existing below the load head should also be threaded through additional Kelems clamp.

4.3.4 Install cable insulation as the work cage is lowered to the load frame deck to change out workers.

4.3.5 Install angle segment in 10 ft length to 5 ft below the load head of the second add-on segment (TP3).

4.3.6 Complete welds on angle segment as the work cage is lowered to deck. Prepare pile hammer for driving the second add-on segment.

4.3.7 Position the hydraulic rams on the load frame and check out all loading and data acquisition equipment. Once this has been demonstrated to be in good working order, the contractor shall be advised that the pile is ready to be driven.

4.3.8 Monitor dynamic instrumentation while continually driving the second add-on segment to grade (Plate 6).

4.3.9 Attach hydraulic rams to the load head.

4.3.10 Perform immediate load test in tension and compression (Plate 7).

4.3.11 Remove hydraulic rams and redrive the test pile 1.0 ft.

5.0 INSTALLATION OF THE UPPER WORK PLATFORM AND REFERENCE FRAME (BY CONTRACTOR)

5.1 Upper Work Platform

5.1.1 The upper work platform supplied by COMPANY shall be installed upon the completion of the initial tension and compression tests.

5.1.2 The upper work platform shall be complete in one piece upon arrival to the test site (Dwg. No. A-140-D6)

5.1.3 Surface and edge preparations shall be made on the upper work platform and test pile prior to attachment.

5.1.4 Attach lifting lines to the upper work platform and lower over the top of the test pile. Lifting slings shall be sufficient to handle the anticipated ___ tons. These slings shall be attached to the lifting eyes on the work platform as shown in Dwg. No. A-140-D6.

5.1.5 Conduct necessary inspections and tests to ensure that all welds meet the required welding specifications.

5.2 Reference Frame (by COMPANY)

5.2.1 The wooden cross members and bracing of the reference frame (supplied by COMPANY) shall be preassembled prior to arrival at the test site.

5.2.2 The two vertical stands that the reference network rest upon shall be installed by COMPANY at the time the platform is modified and the load frame is installed.

5.2.3 The vertical stands consist of a 6-in. diameter pipe pile inside a larger pipe of 12 3/4-in. diameter with wall thickness of at least 0.25 in. These vertical members shall be placed approximately 15 ft apart and shall be installed to a depth of at least 30 ft below the seafloor. Refer to Dwg. Nos. A-140-D0, -D5, and -D6 for details of the reference network.

5.2.4 Conduct necessary inspections and tests after the test pile is driven to ensure that all reference frame network members are true and level and that they meet the required specifications.

5.2.5 Install the measurement modules and mounting brackets to the cross members of the reference frame.

6.0 DEMOBILIZATION

6.1 Demobilization of the 150-ton Crawler Crane

6.1.1 Demobilization of the crawler crane shall begin immediately upon completion of installing of the upper work platform and removal of the hydraulic rams. It shall follow the same sequence of disassembly as those outline in Section 3.2 for the initial assembly of the crane.

6.1.2 The 100-ton crane located on the jack-up barge shall assist in derigging the deck mounted crawler crane. Upon the crane's disassembly and placement onto supply barge, the offshore CONTRACTOR shall be demobilized.

6.1.3 Upon the disembarkment of the supply barge, the 100-ton jack-up barge used as the living quarters and in the assembly process of the deck mounted crawler crane shall also be demobilized.

6.1.4 This jack-up barge shall be replaced with a smaller jack-up barge prior to the departure of the larger vessel. It will carry the drilling rig and necessary support equipment to perform the installation of the small diameter tool. Drilling crew and equipment will be subcontracted to McClelland Engineers.

6.1.5 This smaller jack-up vessel shall be positioned on the south side of the platform so that the drill rig may be unloaded directly onto its working skids.

6.1.6 Other equipment shall be unloaded as required.

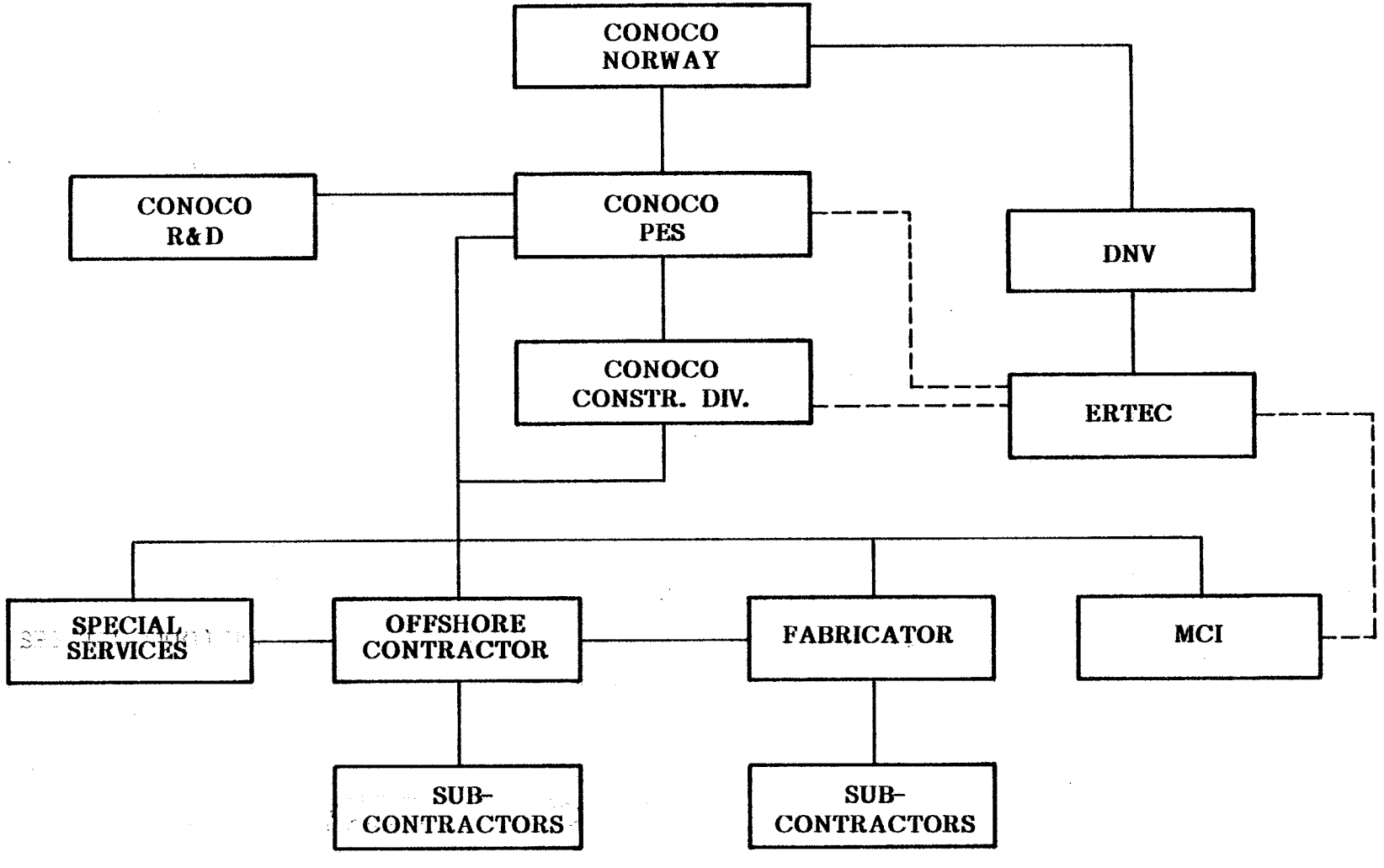
6.2 Demobilization of the Test Site

6.2.1 The test site shall be completely demobilized upon the final implantation and testing of the small diameter tools.

6.2.2 All of the drilling equipment supplied by the drilling contractor shall first be broken down and placed upon the jack-up barge or supply vessel.

6.2.3 Ertec equipment and that supplied by Conoco shall next be removed from the platform and placed on the jack-up barge.

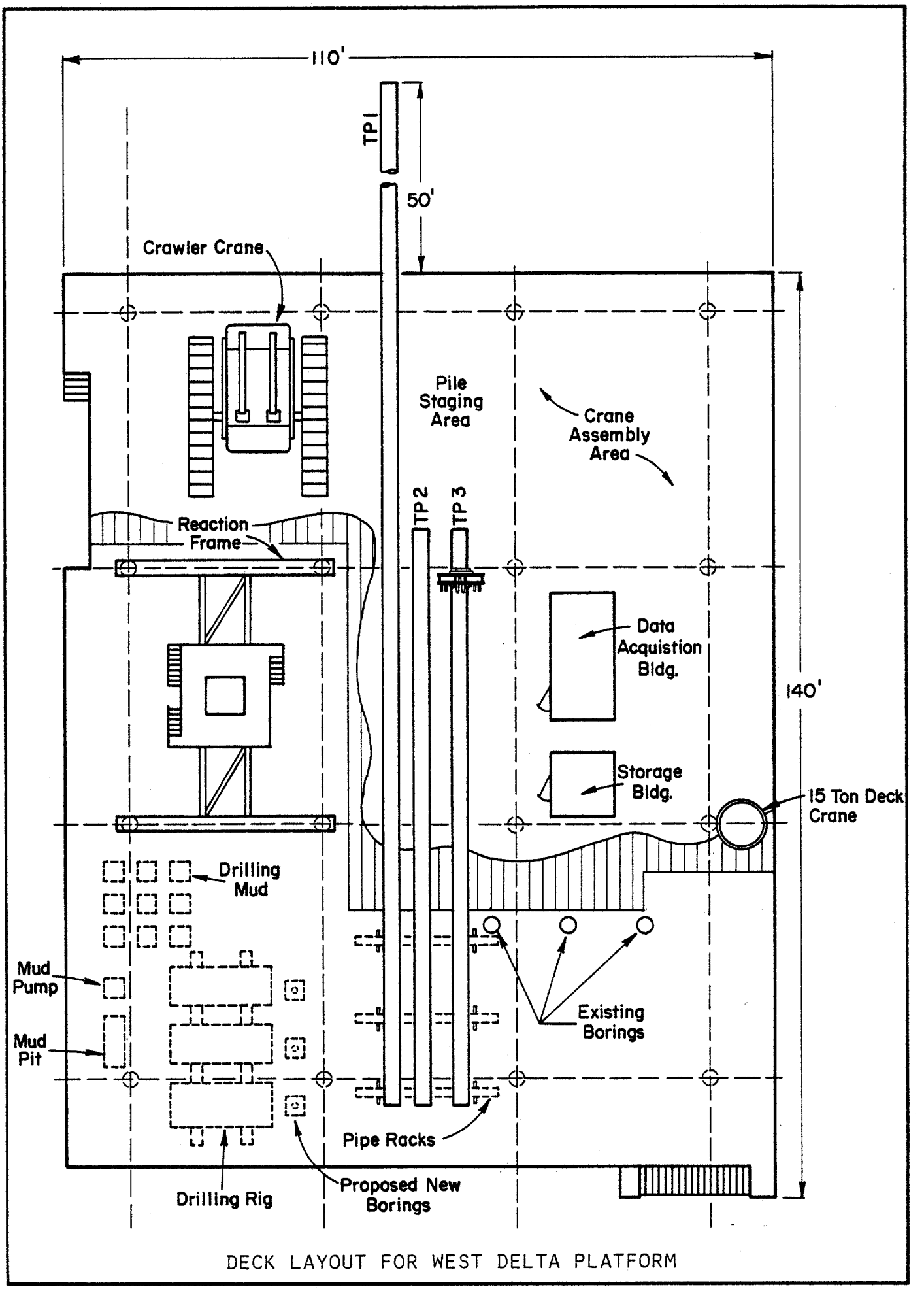
6.2.4 Final preparations to the platform to secure items that are remaining shall take place prior to the jack-up leaving the test site.



INSTRUMENTED PILE LOAD TEST PROJECT

ORGANIZATION CHART

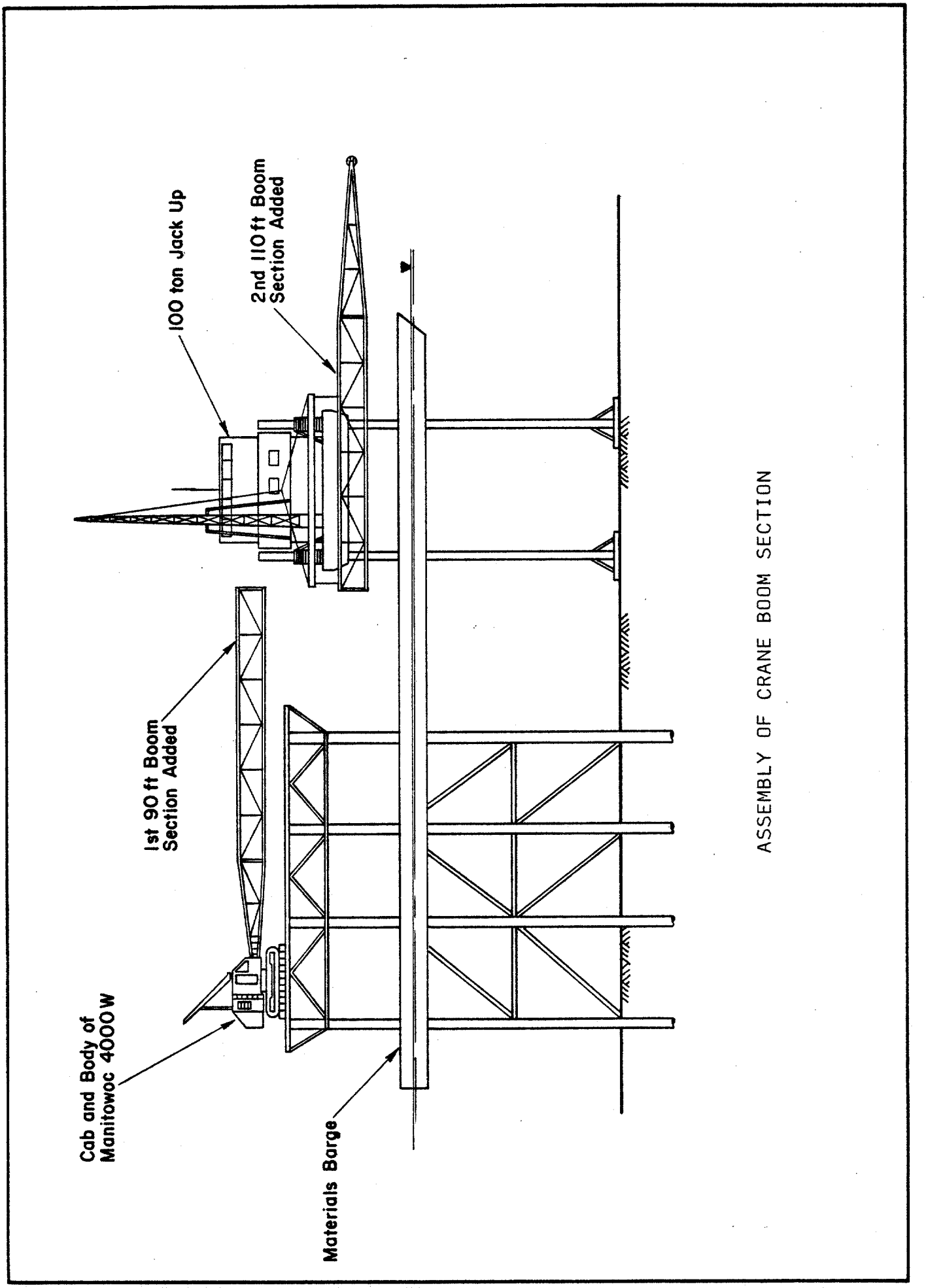
PLATE 1



DECK LAYOUT FOR WEST DELTA PLATFORM

Ertec
The Earth Technology Corporation

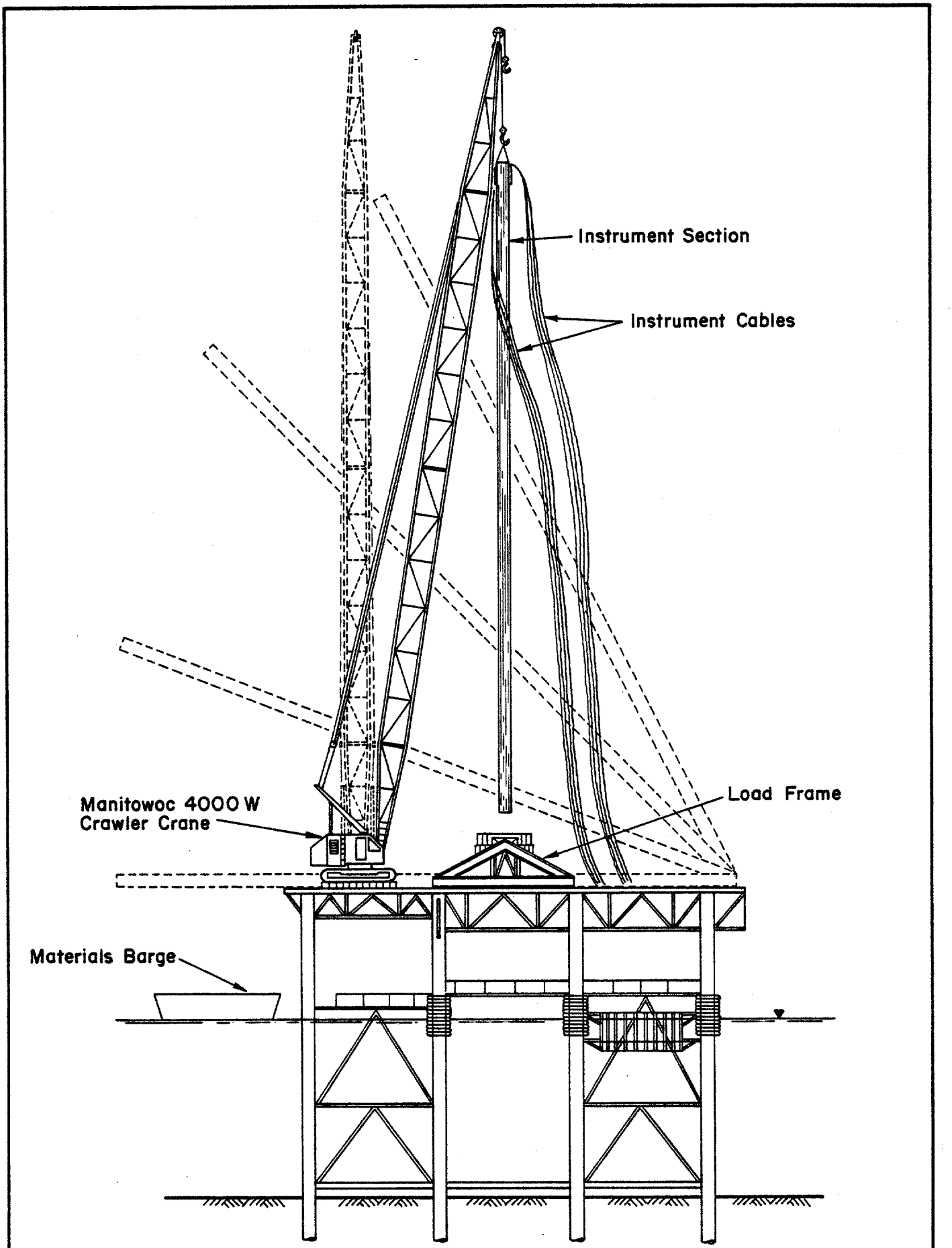
PLATE 2



ASSEMBLY OF CRANE BOOM SECTION

Ertec
The Earth Technology Corporation

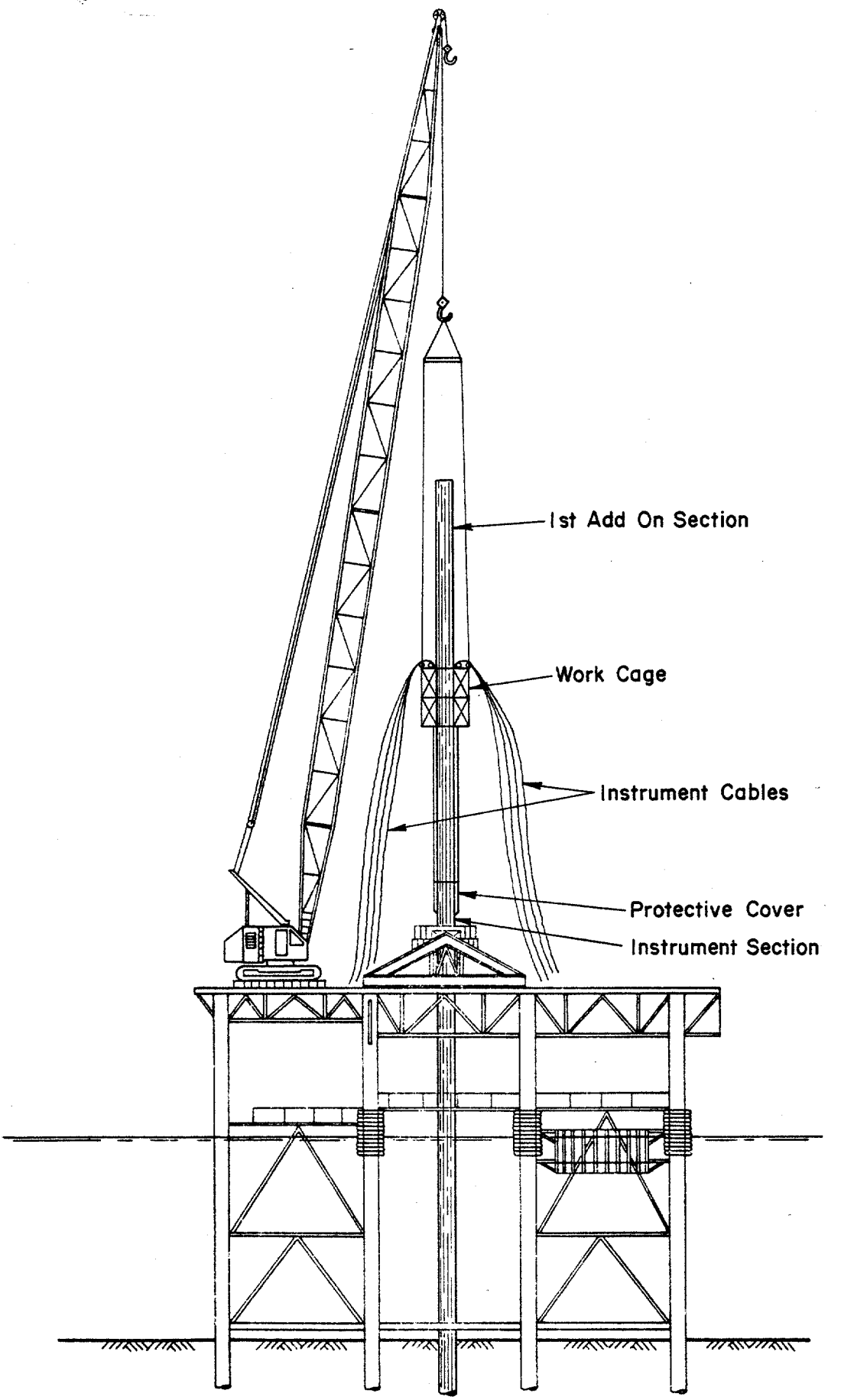
PLATE 3



INSTALLATION OF INSTRUMENTED SECTION

Ertec
The Earth Technology Corporation

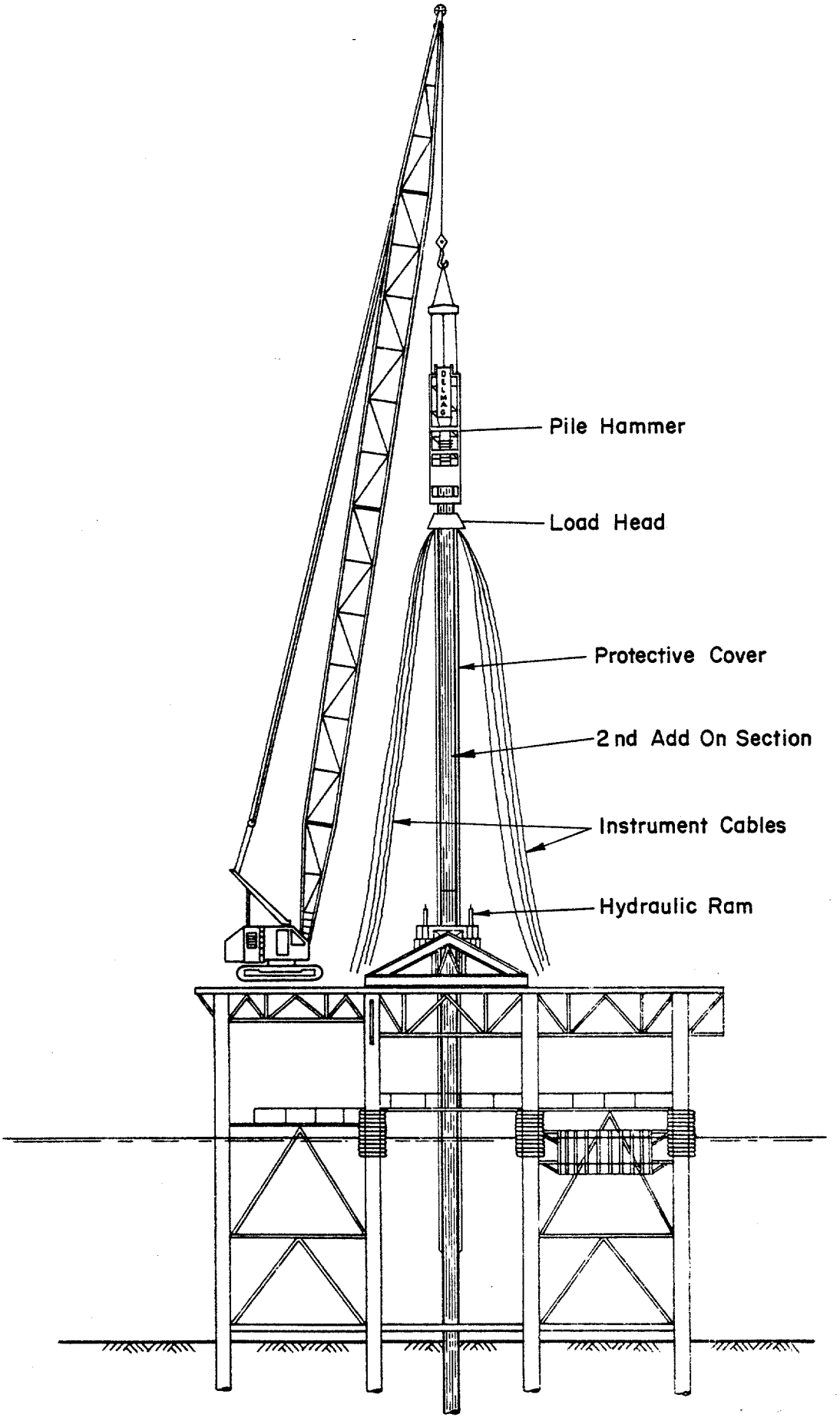
PLATE 4



CABLE BUNDLING OPERATION

Ertec
The Earth Technology Corporation

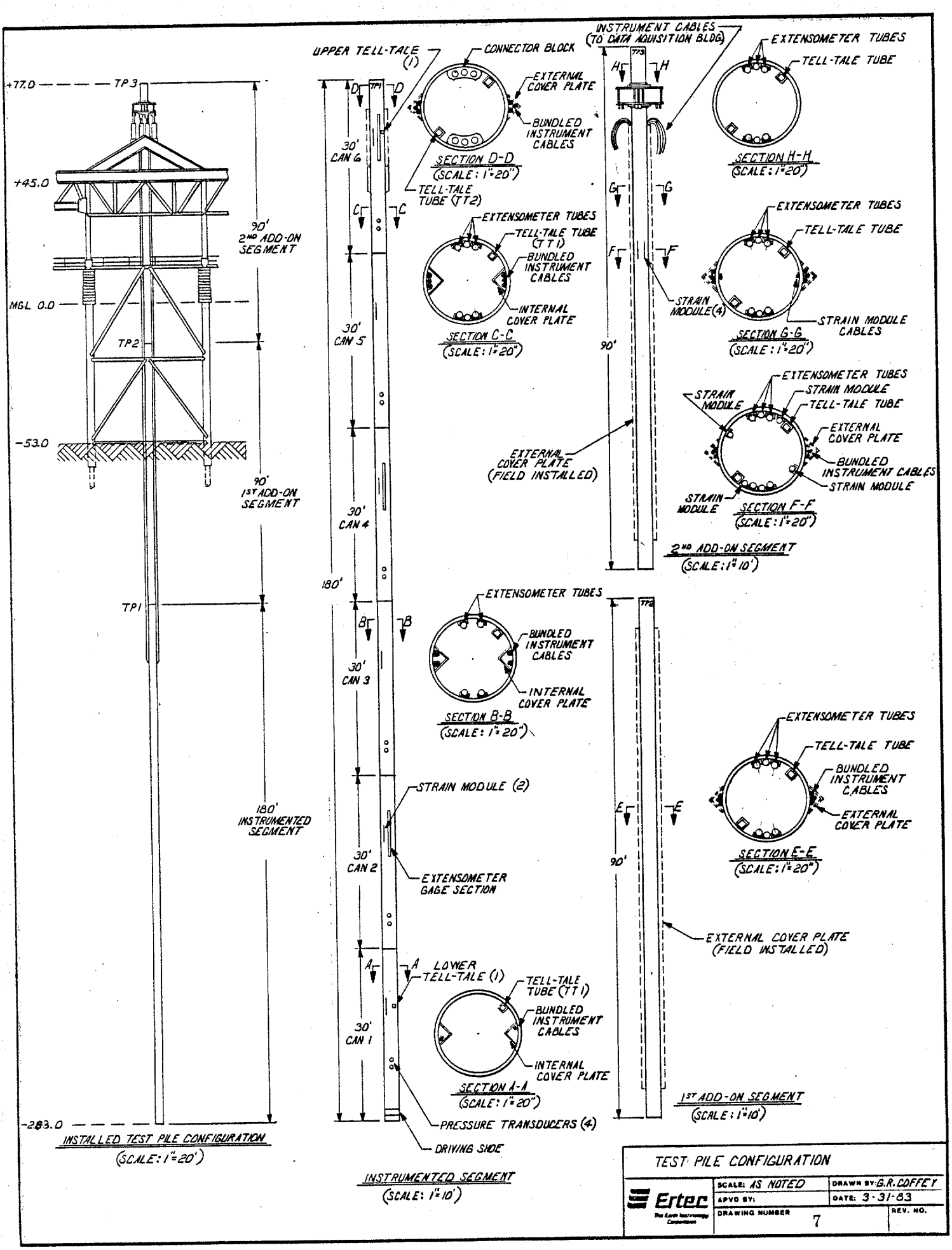
PLATE 5



PILE DRIVING OPERATION

Ertec

PLATE 6

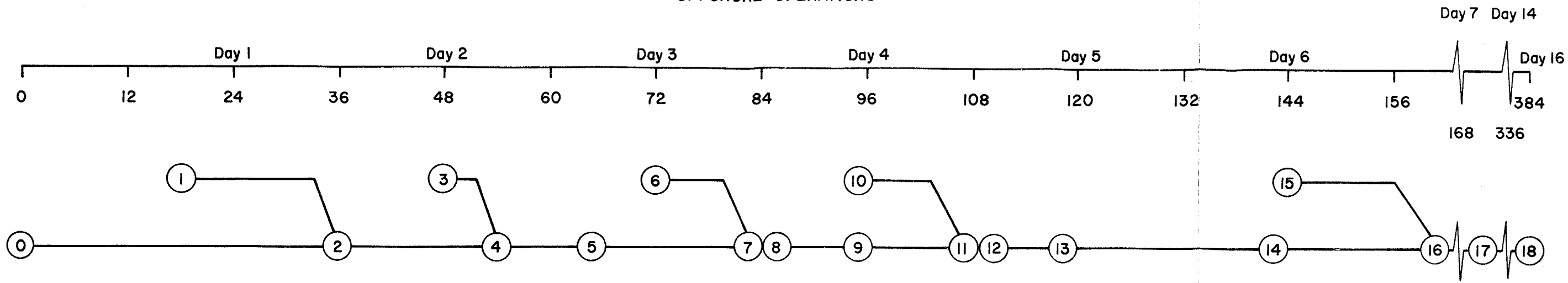


TEST PILE CONFIGURATION

Erlec	SCALE: AS NOTED	DRAWN BY: G.R. COFFEY
	APVD BY:	DATE: 3-31-83
	DRAWING NUMBER 7	REV. NO.

JOB NO.

OFFSHORE OPERATIONS



OPERATIONAL ACTIVITIES

0-2 Mobilization
- a. assemble crane
- b. unload test pile segments
- c. position equipment
- d. set up data acquisition building

1-2 Prepare Instrumented Segment for Installation
- a. unspool cables/hook-up/kelems clamp
- b. check out instruments/system
- c. saturate porous stones

2-4 Install Instrumented Segment
- a. two point lift into stab guide
- b. remove strongback/lower to above seafloor
- c. insert extensometers/zero instruments
- d. lower segment
- e. drive segment/align

3-4 Prepare First Add-On Segment

4-5 Install First Add-On Segment
- a. two point pick up/upright
- b. lower/stab pile segment
- c. pressure test extensometer tube connector
- d. weld/UT splice joint
- e. remove alignment guides
- f. final prep to extensometer connector/cross over bundle rods

5-7 Secure Instrument Cables
- a. bundle cables
- b. attach fire retardant cloth
- c. weld cover plates

6-7 Prepare Second Add-On Segment

7-8 Drive First Add-On Segment

8-9 Install Second Add-On Segment
- a. two point pick up/upright
- b. lower/stab pile segment
- c. pressure test extensometer tube connector
- d. weld/UT splice joint
- e. remove alignment guides
- f. final prep to extensometer connector/cross over bundle rods

9-11 Secure Instrument Cables
- a. bundle cables
- b. attach fire retardant cloth
- c. weld cover plate

10-11 Set Up Hydraulic System

11-12 Drive/Monitor Second Add-On Segment

12-13 Perform Initial Test
- a. connect hydraulic rams to load head
- b. tension test
- c. compression test
- d. redrive/remove hammer

13-14 Install Upper Work Platform/Reference Frame

14-16 Demobilization of 150 Ton Crane/100-ton Jack-Up Barge

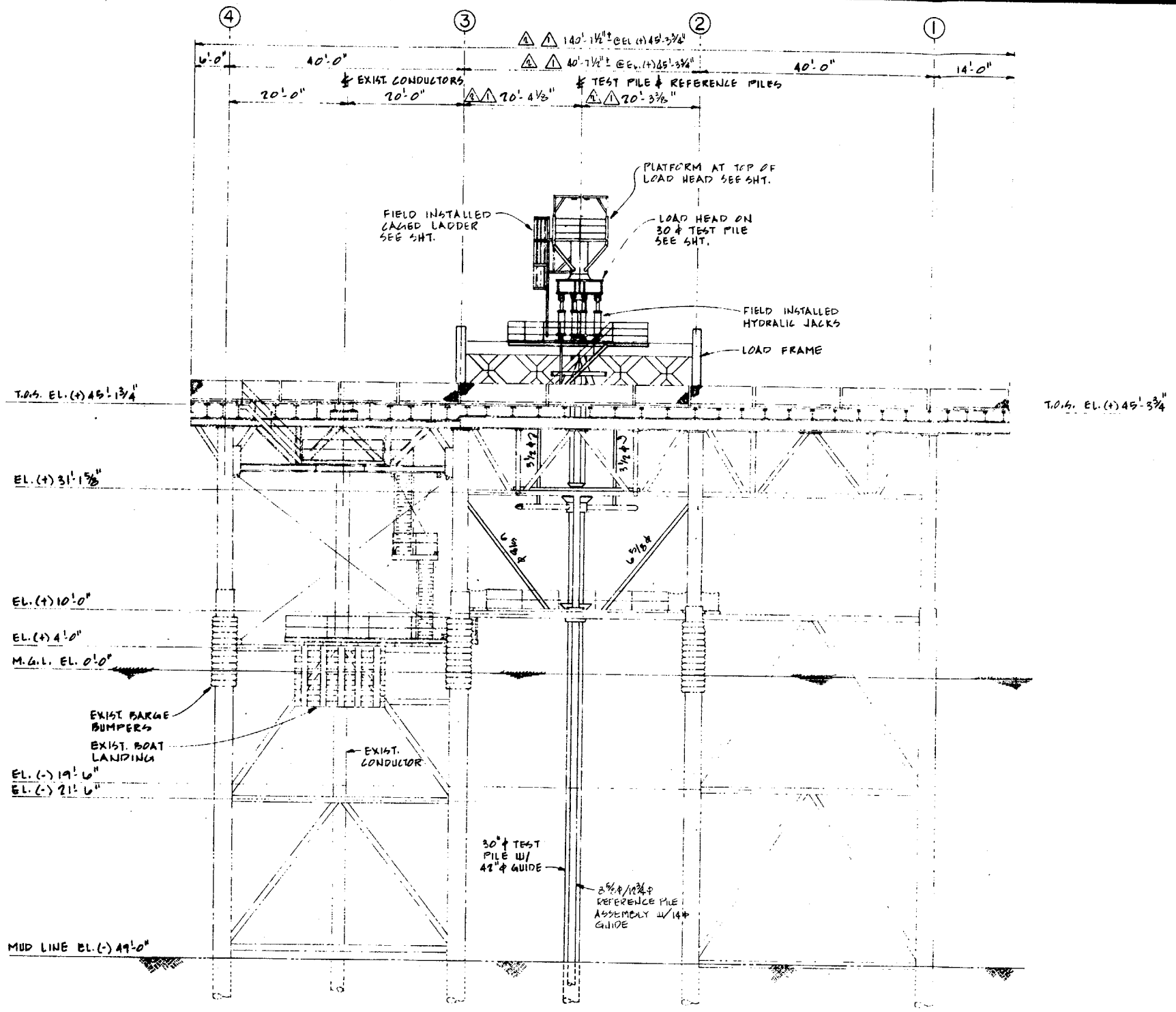
15-16 Mobilization of Small Jack-Up/Drill Crew and Rig

16-17 Perform Small Diameter Test

17-18 Demobilization of Platform
- a. pack and store equipment
- b. transfer to supply vessel/jack-up

APPENDIX E

Platform Modification and Load Frame Drawings



SOUTH ELEVATION

SCALE: 3/32" = 1'-0"

DRAWING INDEX

REV.	DATE	BY	DESCRIPTION
2	6-10-83	D.L.	REVISED DIMENSIONS
1	6-1-83	R.H.	REVISE DIMENSIONS

ELEVATION

DELTA MARINE STRUCTURES, INC.

NEW ORLEANS dms LOUISIANA

STATE OF LOUISIANA
AGUSTIN CHIN
REG. NO. 7744
REGISTERED PROFESSIONAL ENGINEER IN CIVIL ENGINEERING

CONOCO

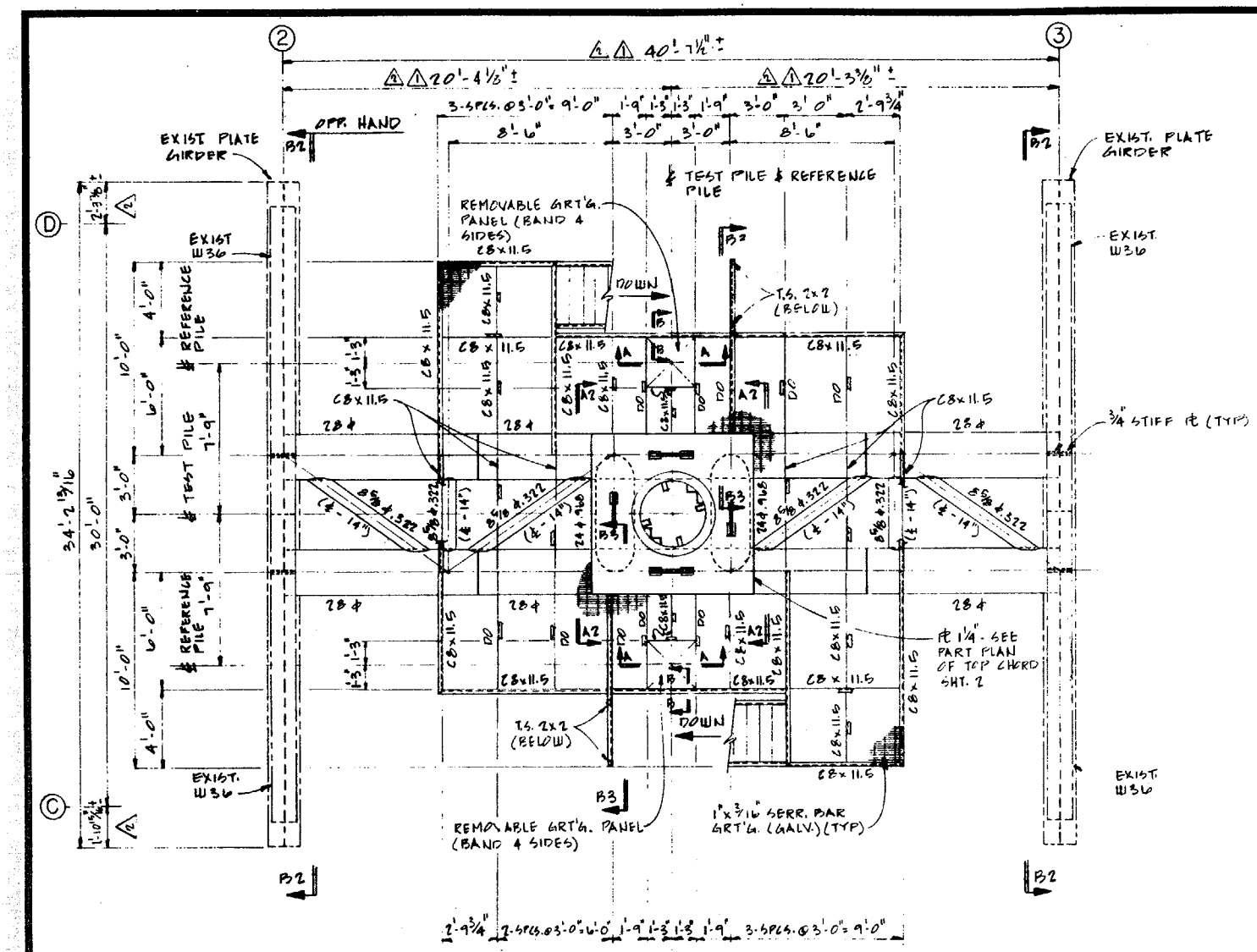
LOAD FRAME
FOR
WEST DELTA 58A

APPROVED

DRAWN R.H.
CHECKED A. CHIN

DATE 5-26-83

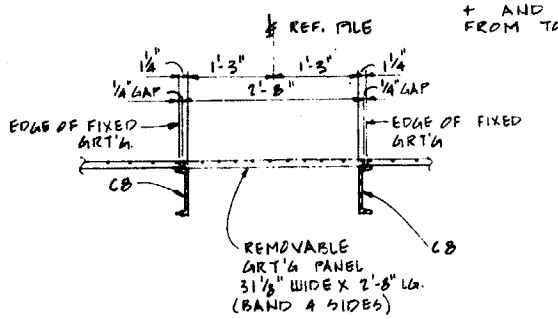
DWG. NO. [illegible]



PLAN VIEW OF TOP CHORD

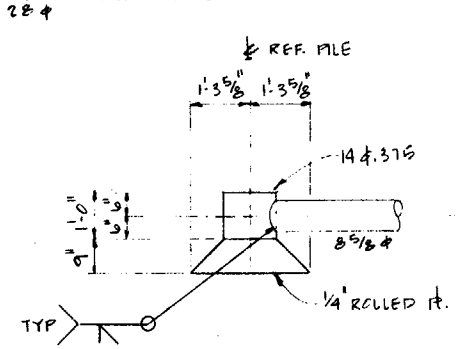
SCALE: 1/4" = 1'-0"

+ AND - DIMENSIONS ARE REFERENCE FROM TOP OF 28#



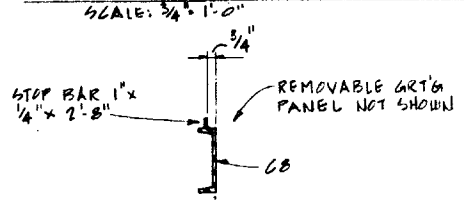
SECTION A -A

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



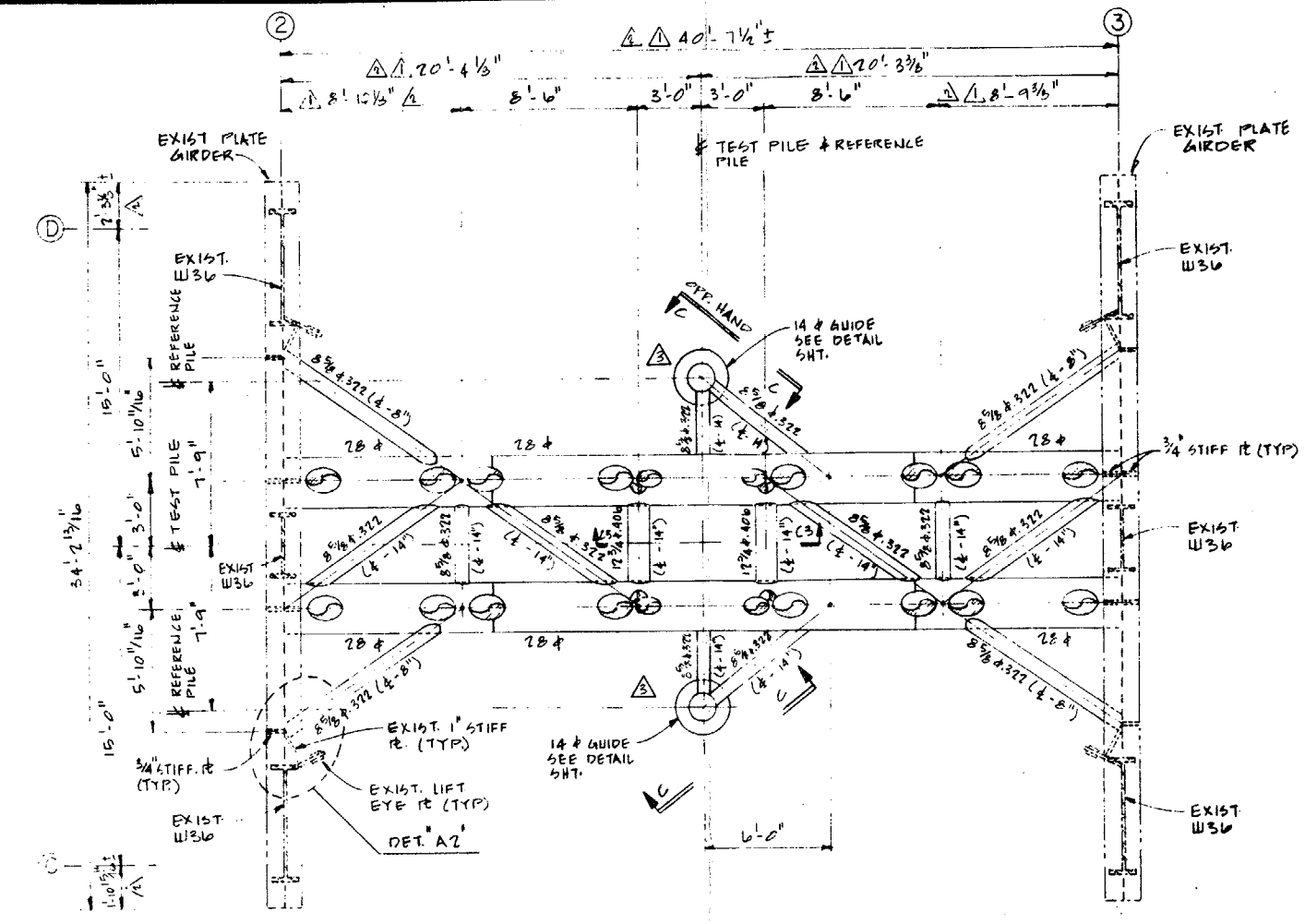
3 SECTION C -C

SCALE: 1/2" = 1'-0"



SECTION B -B

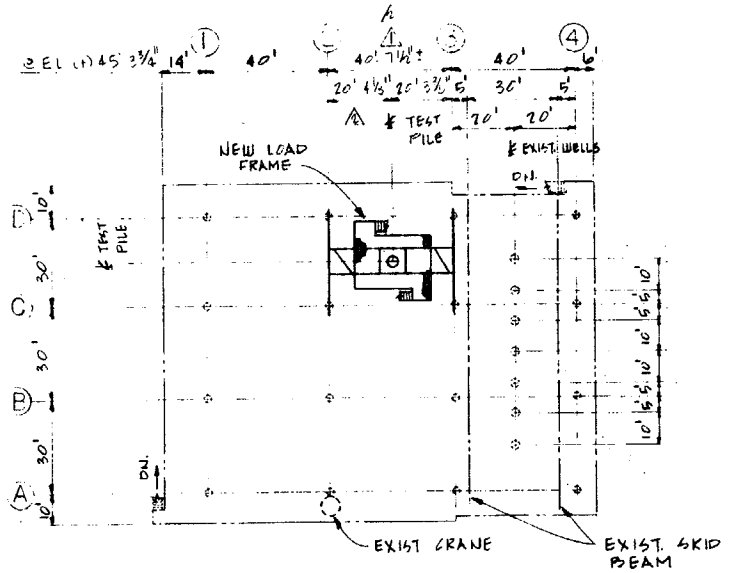
SCALE: 1" = 1'-0"



PLAN VIEW OF BOTTOM CHORD

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

+ AND - DIMENSIONS ARE REFERENCE FROM TOP OF 28#



KEY PLAN AT MAIN DECK

SCALE: 1" = 30'-0"

REV.	DATE	BY	DESCRIPTION
3	7-8-83	RS	REVISE 14 ø GUIDE & BOTTOM CHORD & SECTION "C"
2	6-10-83	DL	REVISED DIMENSIONS
1	6-1-83	RS	REVISE DIMENSIONS

LOAD FRAME - PLANS

DELTA MARINE STRUCTURES, INC.

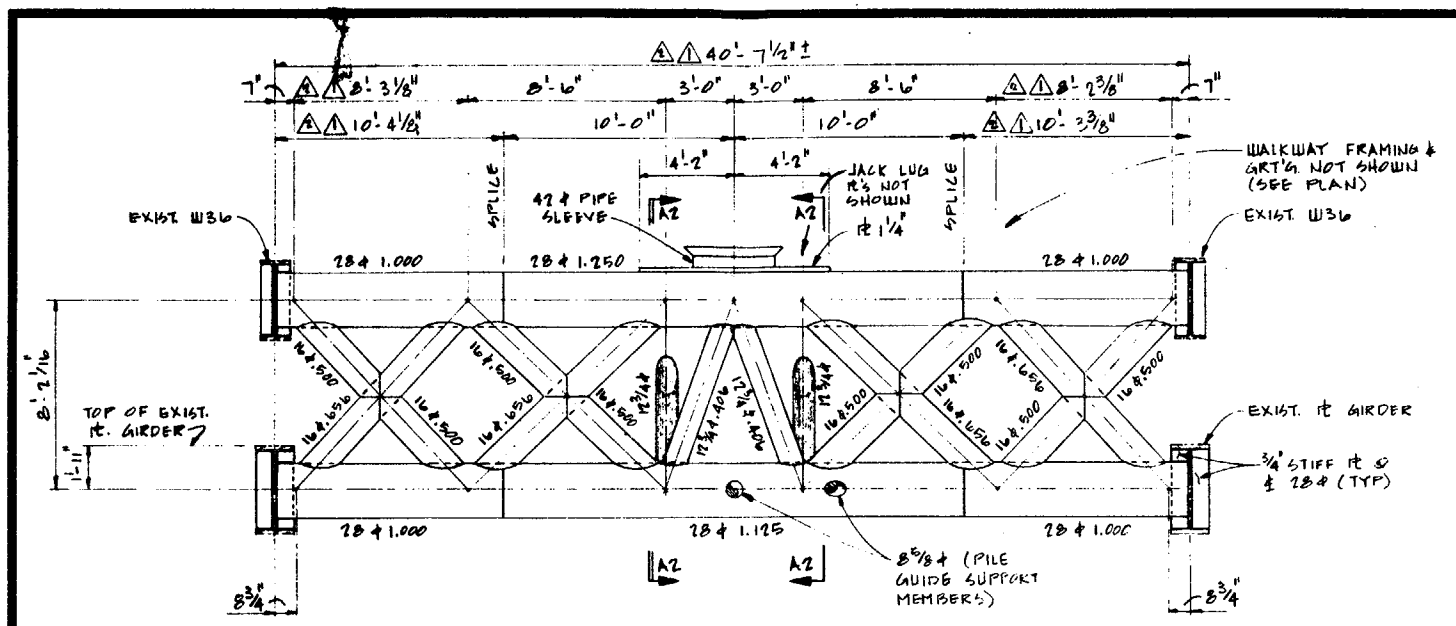
NEW ORLEANS dms LOUISIANA

STATE OF LOUISIANA — AGUSTIN CHIN REG. NO. 7744 REGISTERED PROFESSIONAL ENGINEER IN CIVIL ENGINEERING

CONOCO

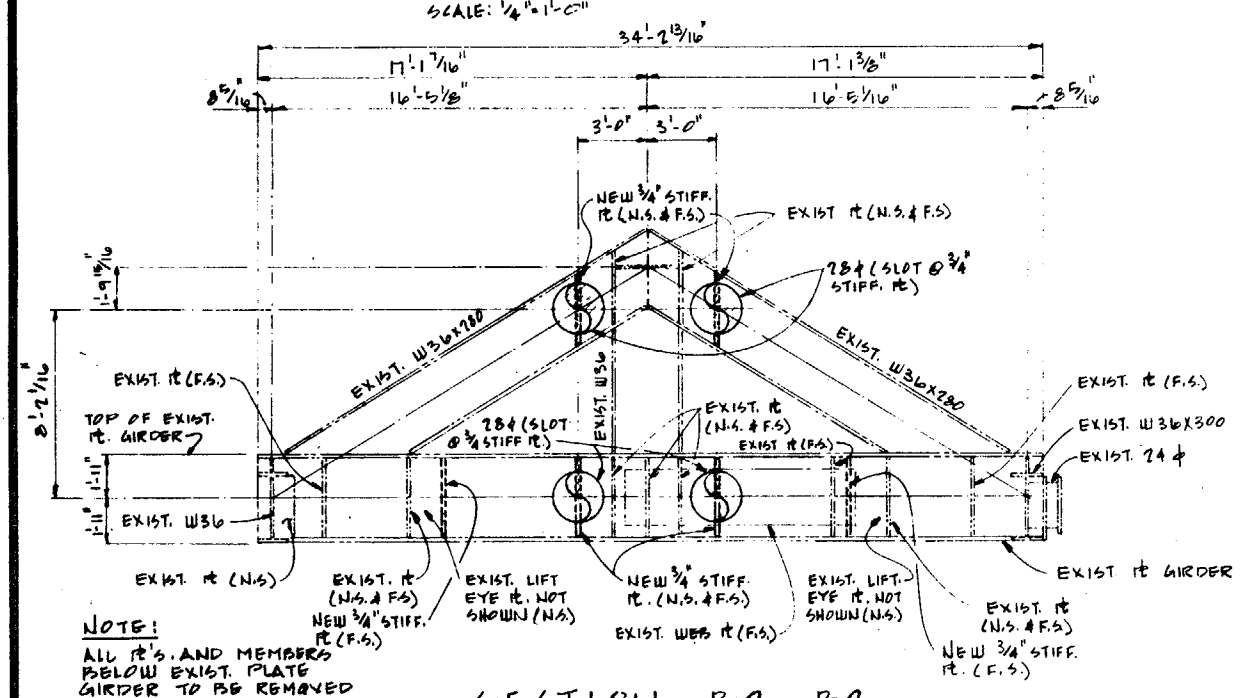
LOAD FRAME FOR WEST DELTA 58A

APPROVED | DRAWN R.S. CHECKED A. CHIN | DATE 5-26-83 | DWG. NO. A-140-[illegible] | 3



TYPICAL SIDE ELEVATION

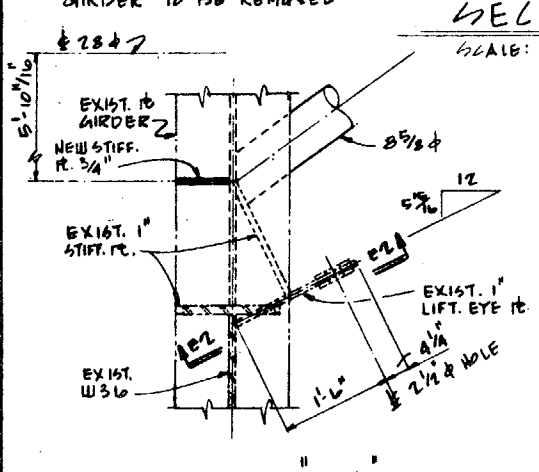
SCALE: ¼"=1'-0"



NOTE:
ALL PL's. AND MEMBERS BELOW EXIST. PLATE GIRDER TO BE REMOVED

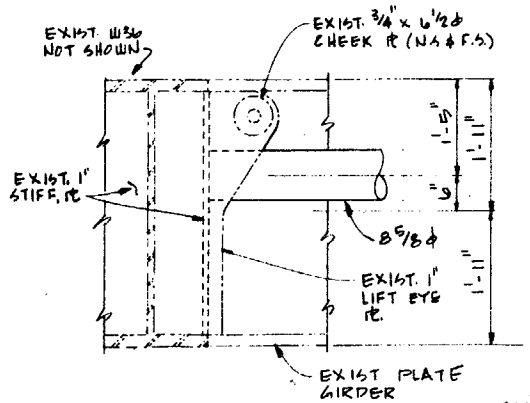
SECTION B2-B2

SCALE: ¼"=1'-0"



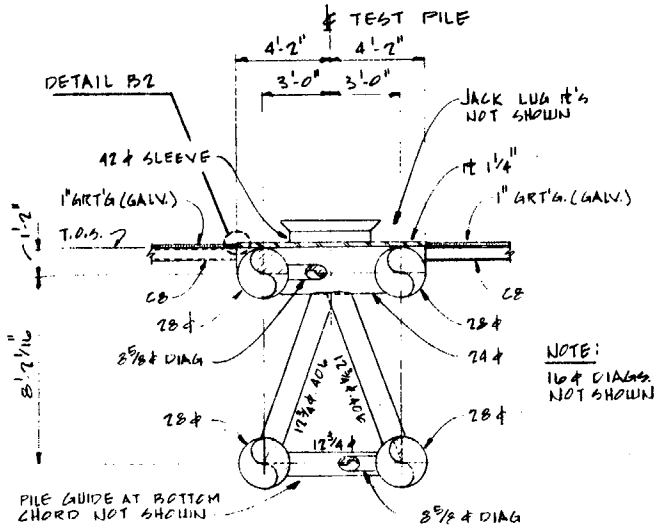
DETAIL "A2"

SCALE: ¾"=1'-0"



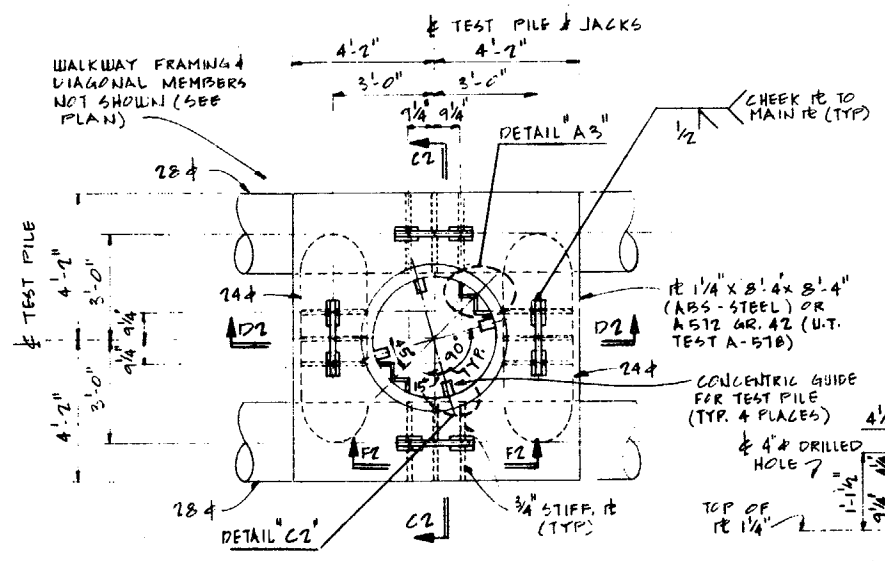
SECTION E2-E2

SCALE: ¾"=1'-0"



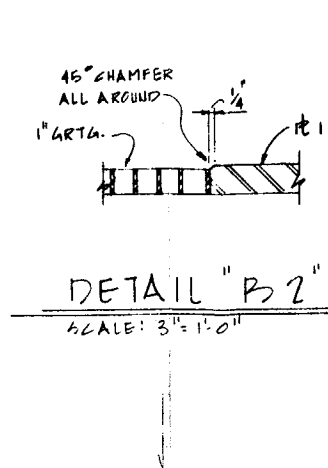
SECTION A2-A2

SCALE: ¼"=1'-0"



PART PLAN OF TOP CHORD

SCALE: ⅜"=1'-0"

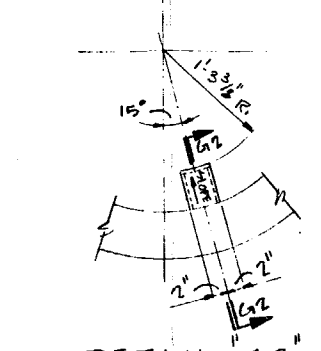


DETAIL "B2"

SCALE: 3"=1'-0"

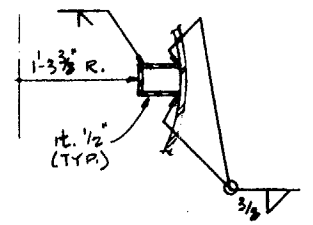
⚠2 SECTION G2-G2

SCALE: 1"=1'-0"



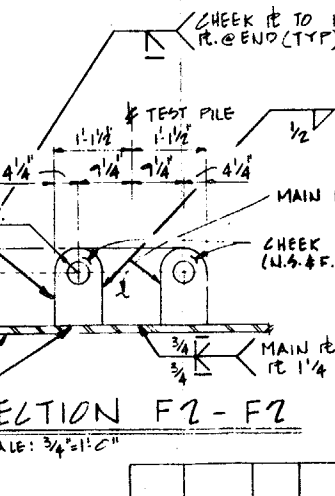
DETAIL "C2"

SCALE: 1"=1'-0"



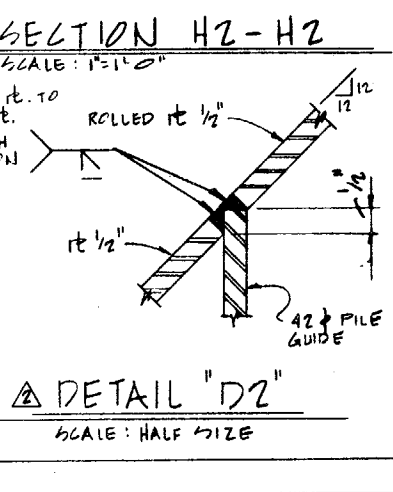
SECTION H2-H2

SCALE: 1"=1'-0"



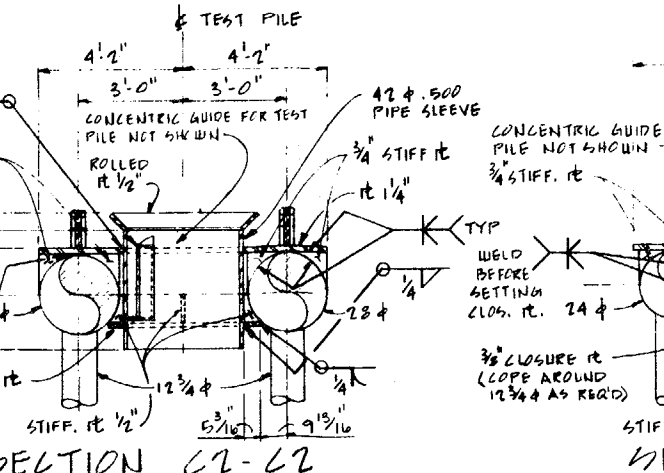
SECTION F2-F2

SCALE: ¾"=1'-0"



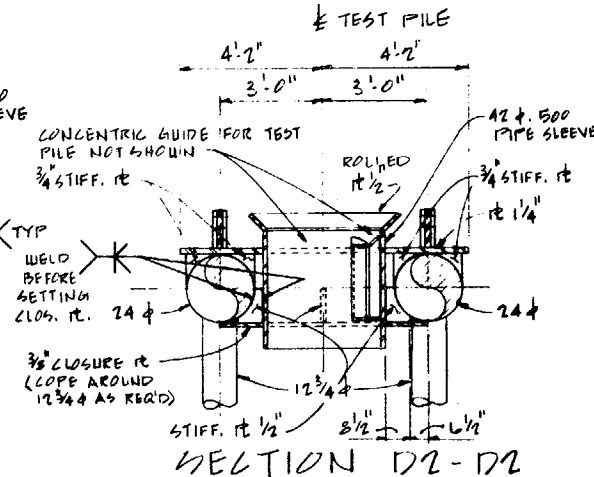
⚠2 DETAIL "D2"

SCALE: HALF SIZE



SECTION C2-C2

SCALE: ⅜"=1'-0"



SECTION D2-D2

SCALE: ⅜"=1'-0"

REV.	DATE	BY	DESCRIPTION
⚠2	6-10-83	RS.	REVISE SECTION "G2" & ADDED DETAIL "D2" & REV. DIM
⚠1	6-1-83	RS	REVISE DIMENSIONS

LOAD FRAME - ELEVATION & SECTIONS

DELTA MARINE STRUCTURES, INC.

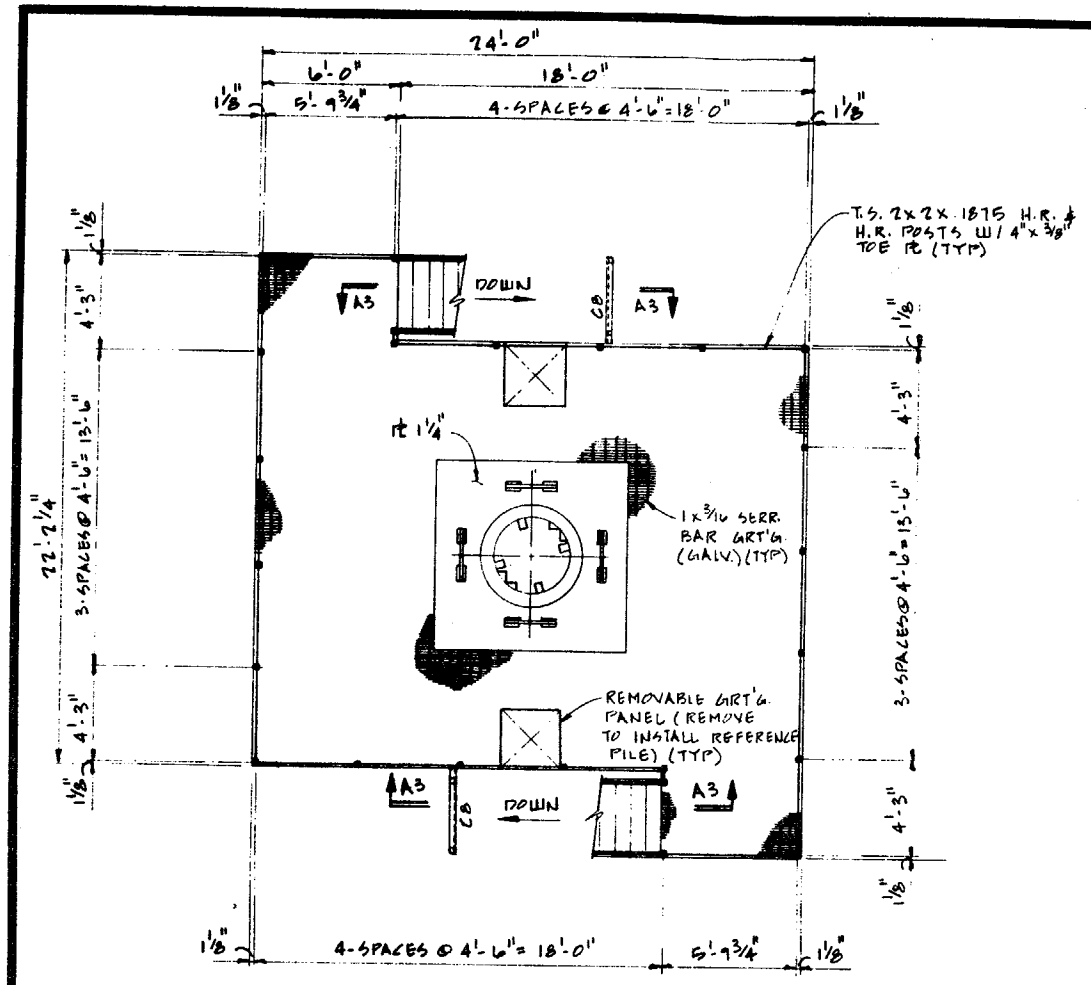
NEW ORLEANS dms LOUISIANA

STATE OF LOUISIANA — AGUSTIN CHIN — REG. NO. 7744 — REGISTERED PROFESSIONAL ENGINEER IN CIVIL ENGINEERING

CONOCO

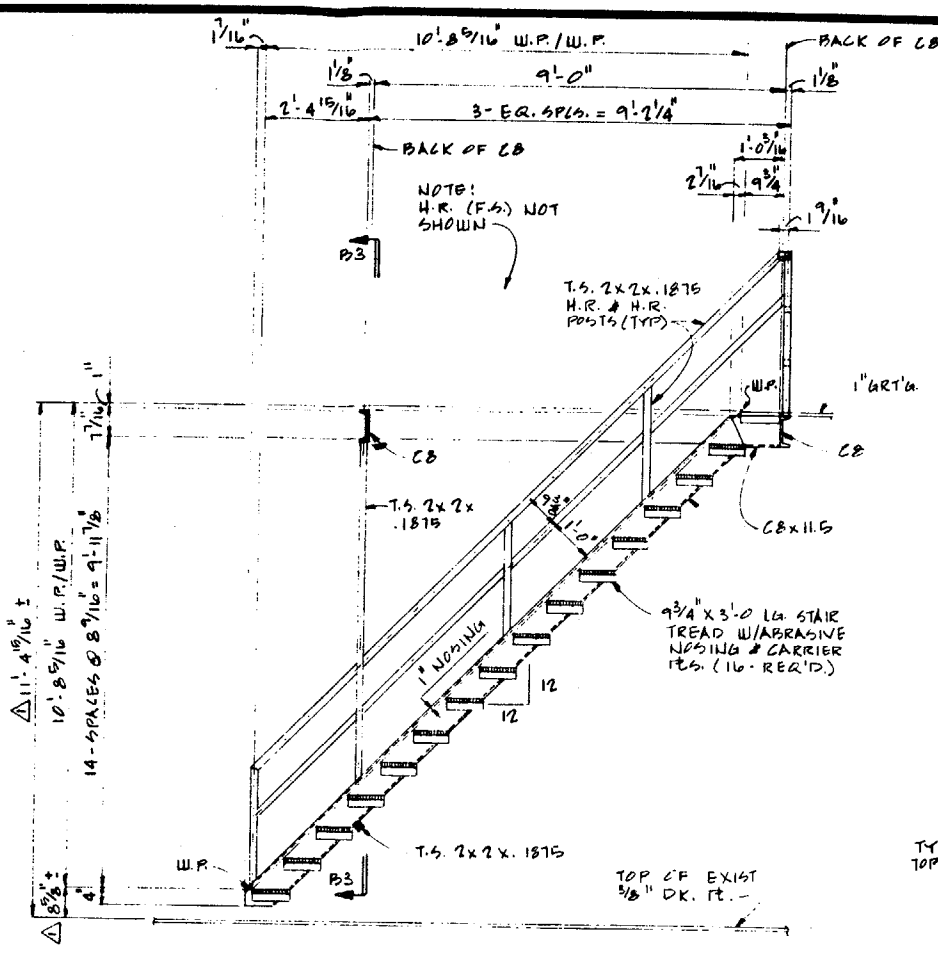
LOAD FRAME FOR: WEST DELTA 88A

APPROVED | DRAWN RG | CHECKED AC HIN | DATE 5-26-83 | DWG. NO. A-1660-D2 | ⚠2



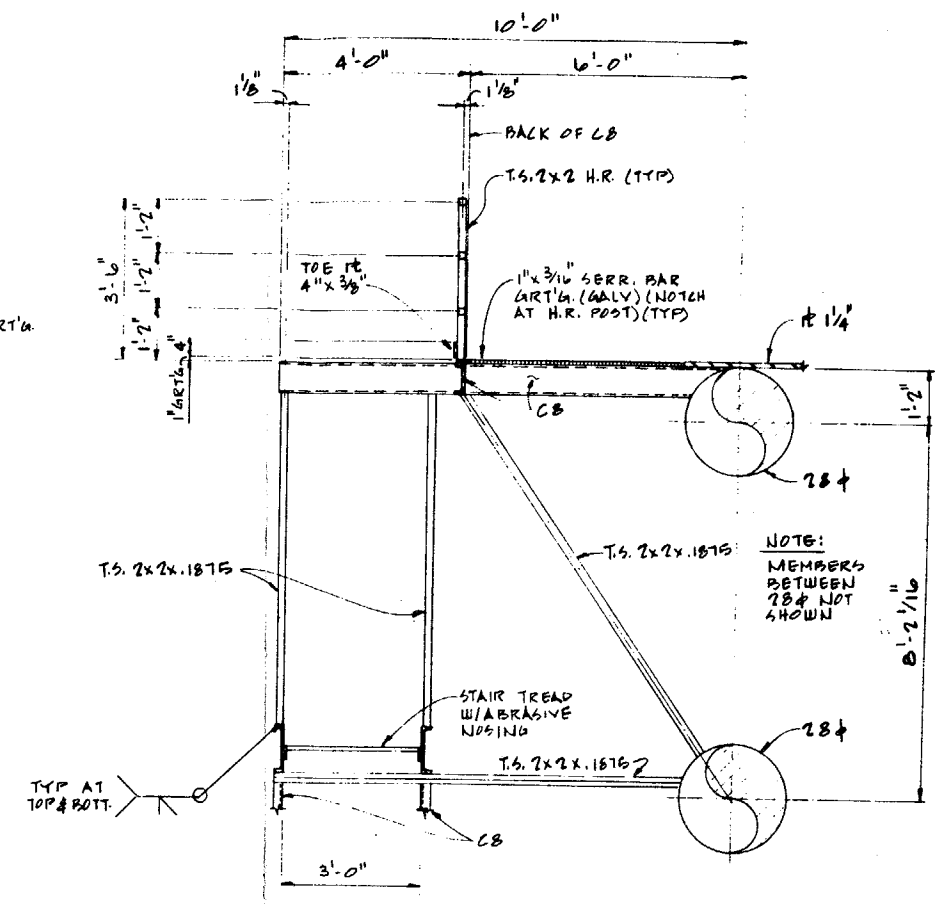
HANDRAIL AND GRATING PLAN

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



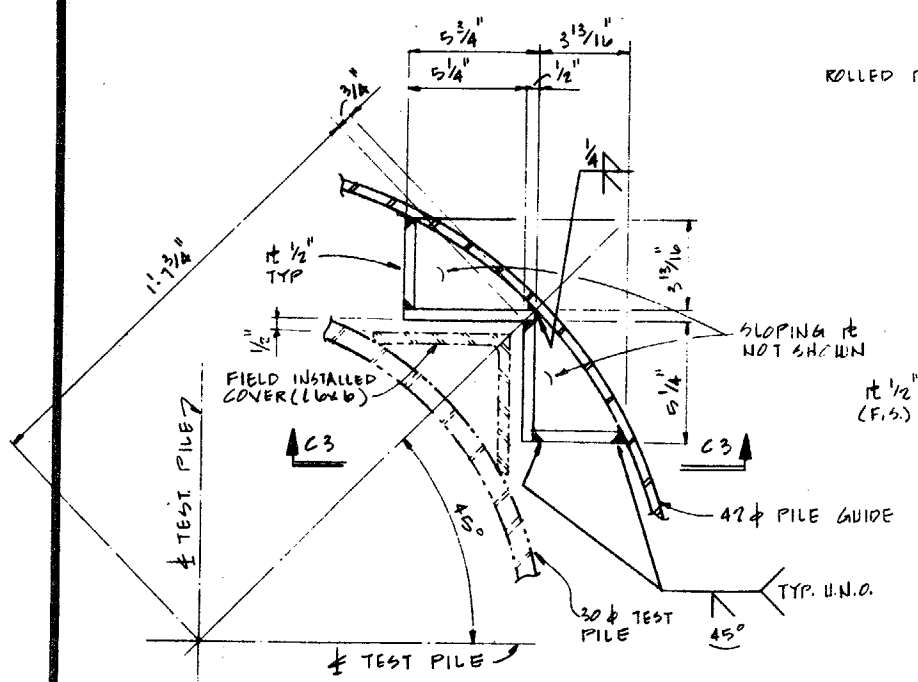
SECTION A3 - A3

SCALE: 1/2" = 1'-0"



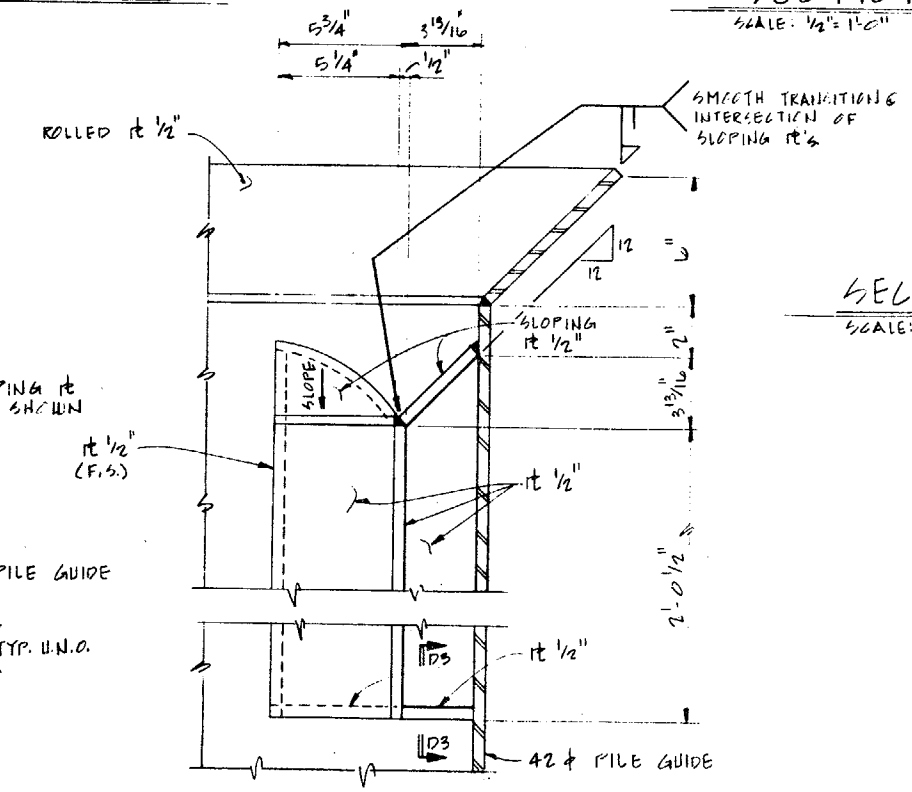
SECTION B3 - B3

SCALE: 1/2" = 1'-0"



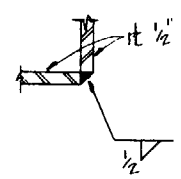
DETAIL "A3"

SCALE: 3" = 1'-0"



SECTION C3 - C3

SCALE: 3" = 1'-0"



SECTION D3 - D3

SCALE: 3" = 1'-0"

REV.	DATE	BY	DESCRIPTION
1	6-1-83	RS	REVISED STAIR DIMENSIONS

LOAD FRAME - H.R. & GRT'G. PLAN AND STAIR DETAILS

DELTA MARINE STRUCTURES, INC.

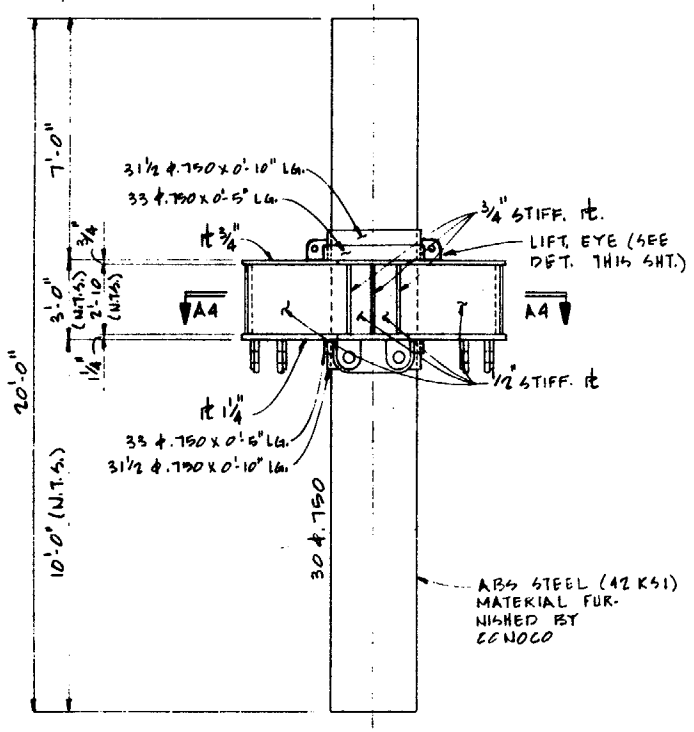
NEW ORLEANS — dms — LOUISIANA

STATE OF LOUISIANA
AGUSTIN CHIN
REG. NO. 7744
REGISTERED PROFESSIONAL ENGINEER IN CIVIL ENGINEERING

conoco

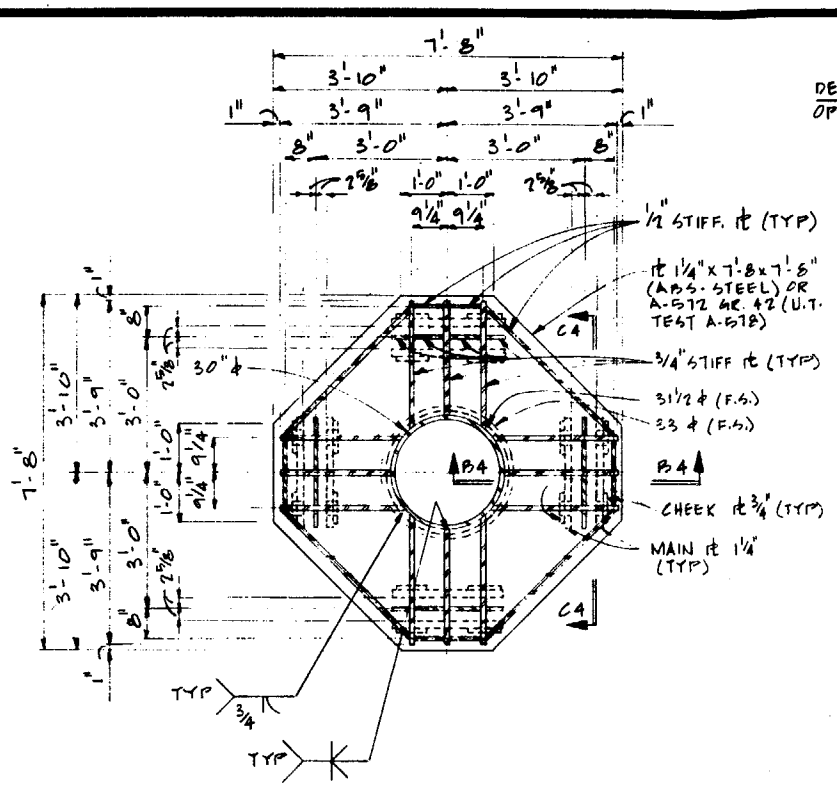
LOAD FRAME FOR WEST DELTA 58A

APPROVED	DRAWN	CHECKED	DATE	DWG. NO.	REV.
	RS	A. CHIN	5-30-83	A-140-58	1



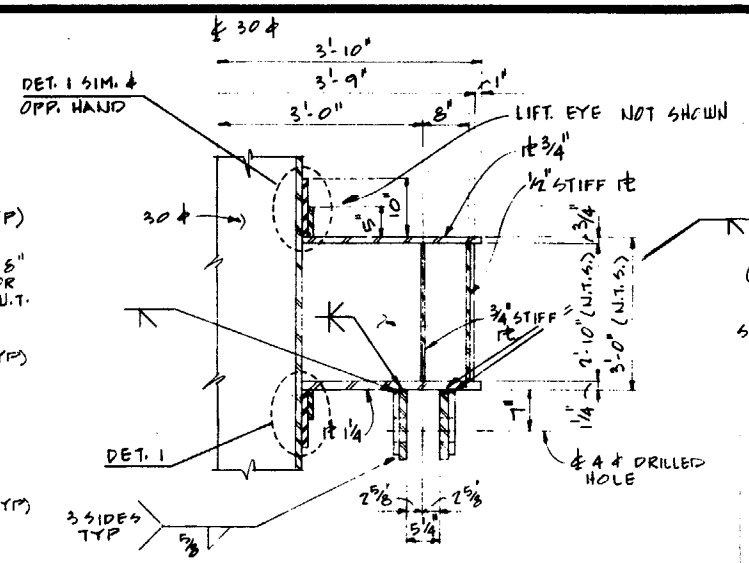
ELEVATION

SCALE: 3/8" = 1'-0"



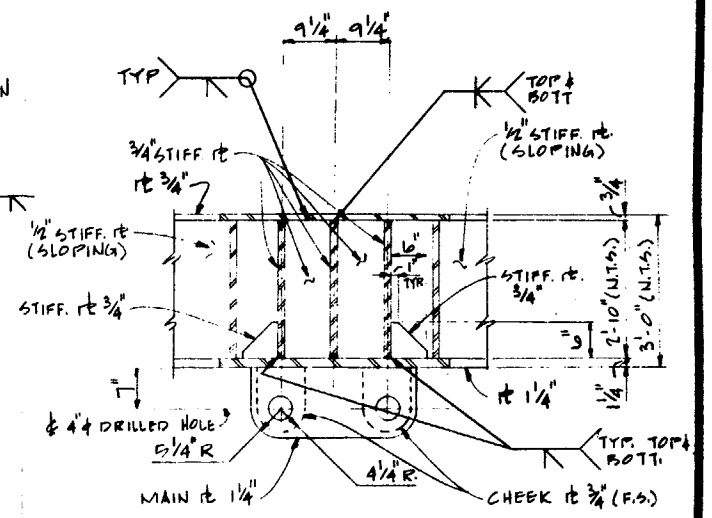
SECTION A4 – A4

SCALE: 1/2" = 1'-0"



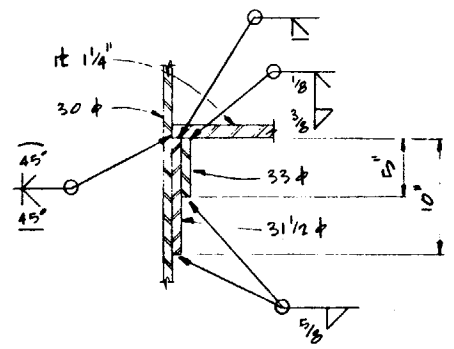
SECTION B4 – B4

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



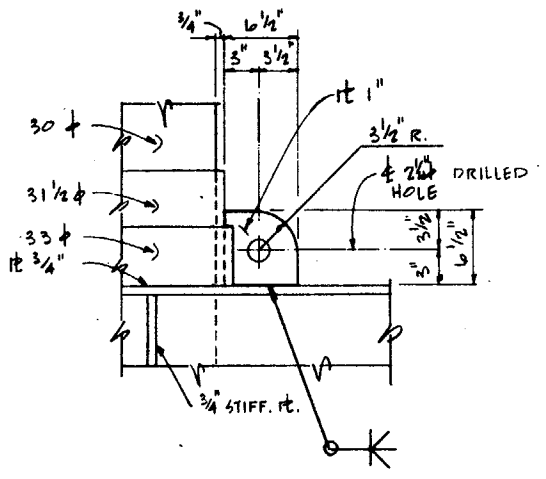
SECTION C4 – C4

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



DETAIL 1

SCALE: 1 1/2" = 1'-0"



LIFTING EYE DETAIL

SCALE: 1 1/2" = 1'-0"

1- REQ'D. (AS SHOWN)
1- REQ'D. (OPP. HAND)

REV.	DATE	BY	DESCRIPTION

LOAD FRAME - LOAD HEAD ON 30 ϕ TEST PILE

DELTA MARINE STRUCTURES, INC.

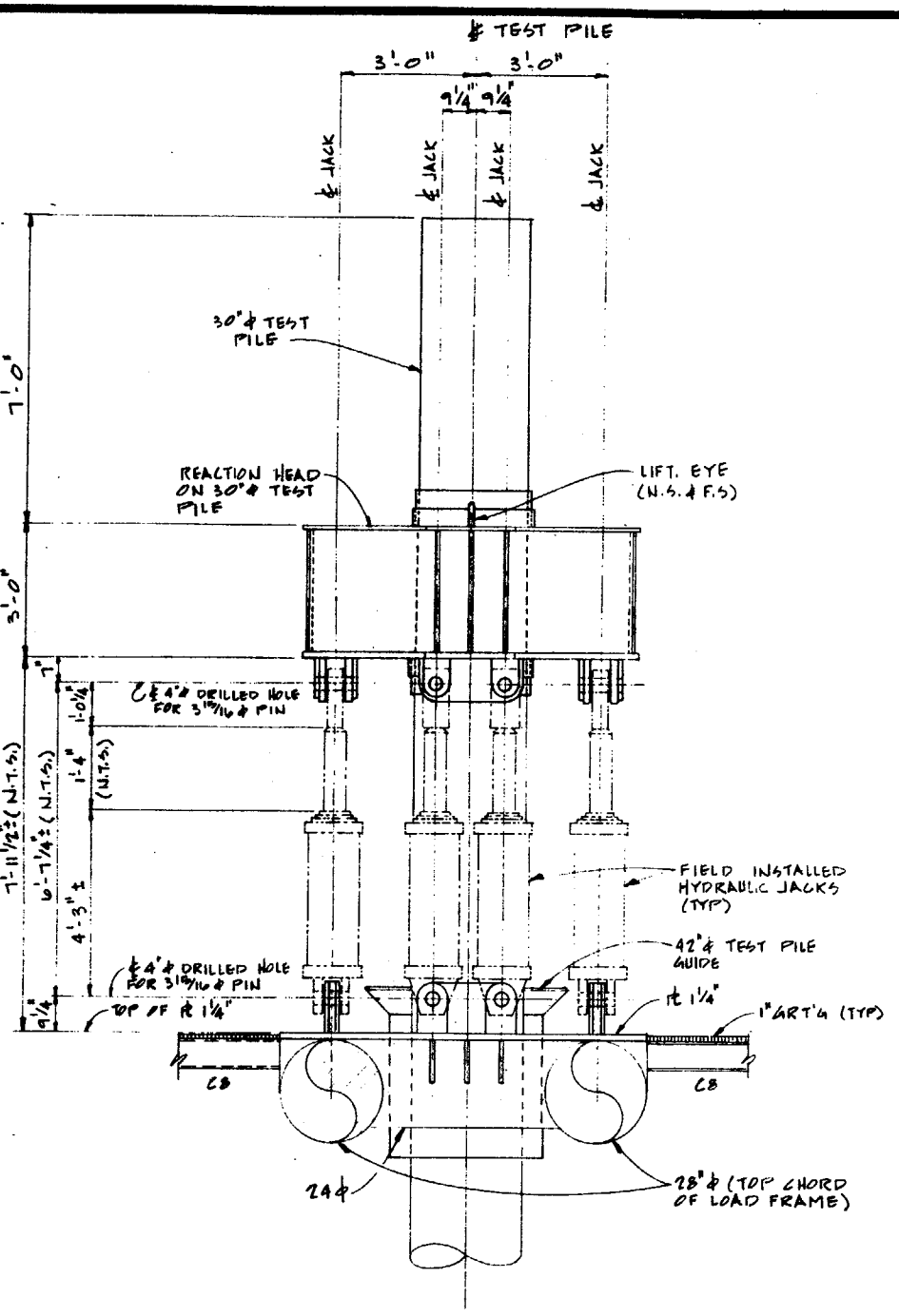
NEW ORLEANS dms LOUISIANA

STATE OF LOUISIANA
AGUSTIN CHIN
REG. NO. 7744
REGISTERED PROFESSIONAL ENGINEER IN CIVIL ENGINEERING

conoco

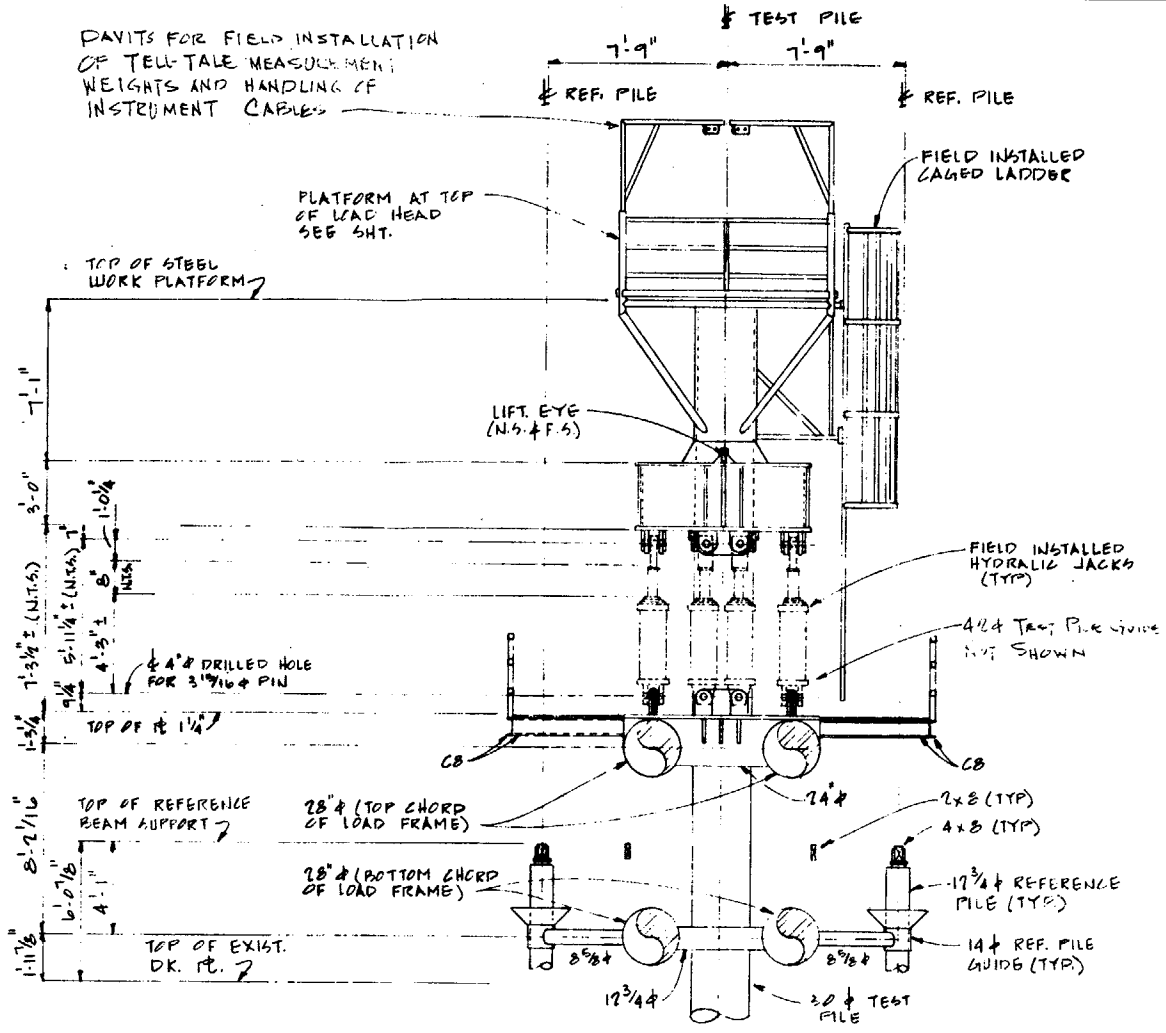
LOAD FRAME
FOR
WEST DELTA 58A

APPROVED	DRAWN R.S. / CHECKED A.CHIN	DATE 6-26-83	DWG. NO. A-140-84	0



ELEVATION OF TEST PILE POSITION FOR QUICK TEST

SCALE: ½"= 1'-0"



ELEVATION OF TEST PILE POSITION FOR LONG TERM TEST

SCALE: ¼"= 1'-0"

REV.	DATE	BY	DESCRIPTION

LOAD FRAME - TEST PILE ELEVATIONS

DELTA MARINE STRUCTURES, INC.

NEW ORLEANS dms LOUISIANA

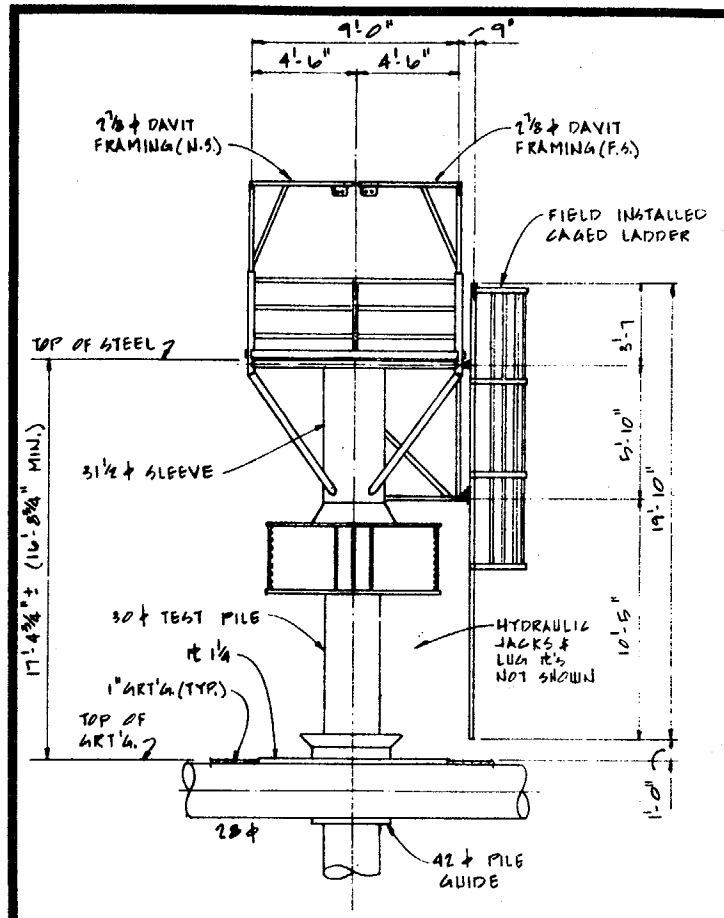
STATE OF LOUISIANA
AGUSTIN CHIN
REG. NO. 7744
REGISTERED PROFESSIONAL ENGINEER IN CIVIL ENGINEERING

conoco

LOAD FRAME FOR WEST DELTA [illegible]

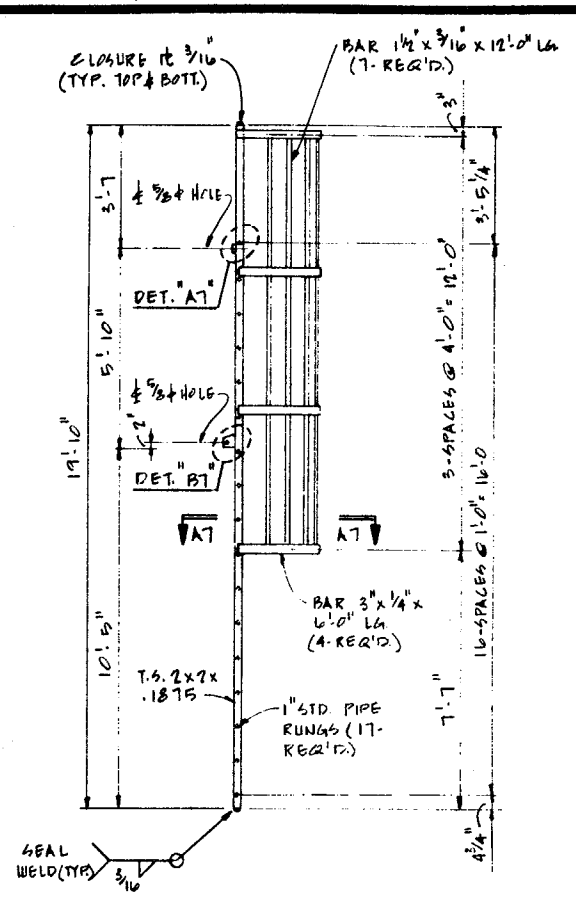
APPROVED

DRAWN RS CHECKED A. CHIN | DATE 5-26-83 | DWG. NO. [illegible] | 0



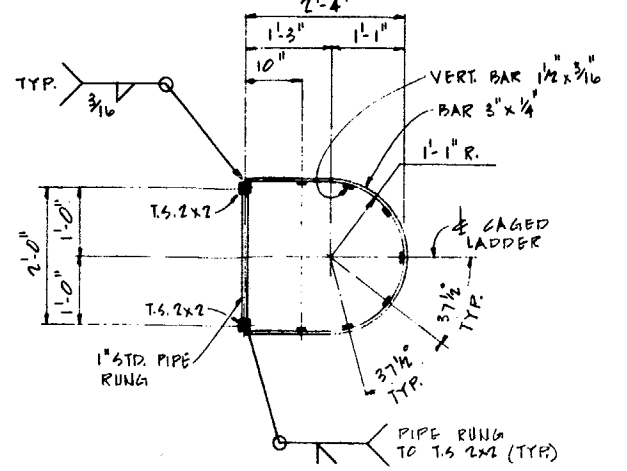
ASSEMBLY DRAWING

SCALE: ¼"=1'-0"



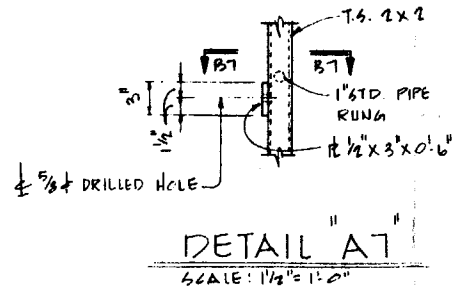
ELEVATION

SCALE: ⅜"=1'-0"



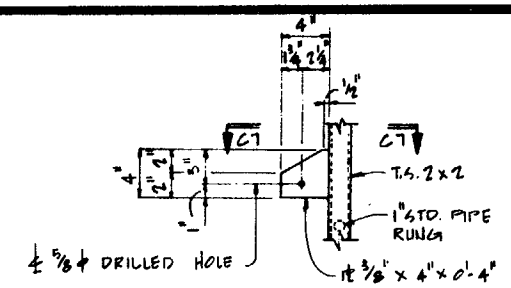
SECTION A7 - A7

SCALE: ¼"=1'-0"



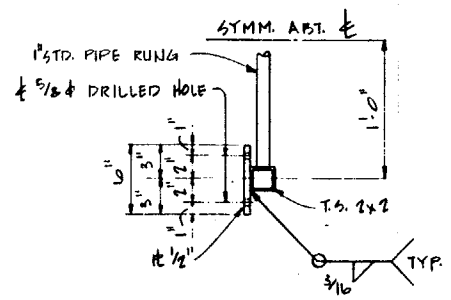
DETAIL "A7"

SCALE: 1½"=1'-0"



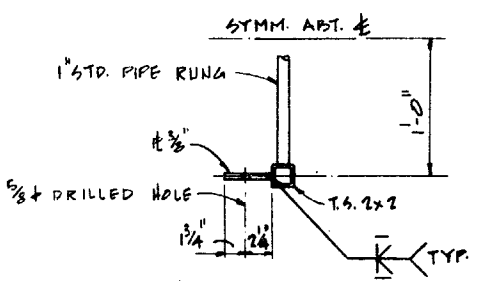
DETAIL "B7"

SCALE: 1½"=1'-0"



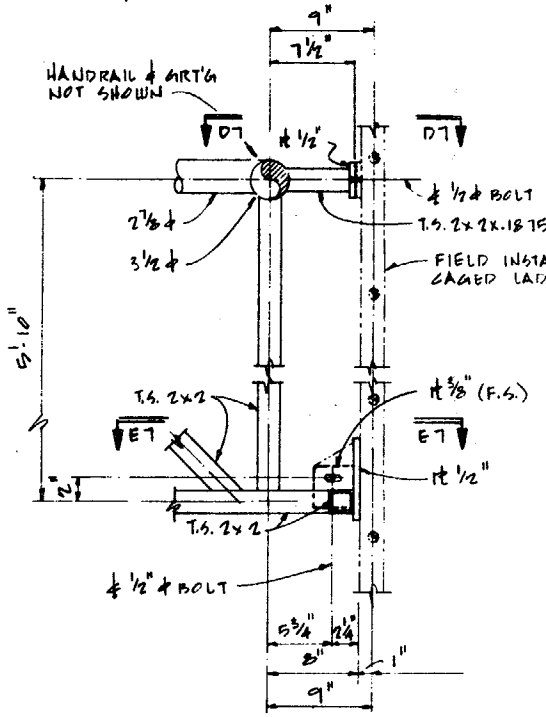
SECTION B7 - B7

SCALE: 1½"=1'-0"



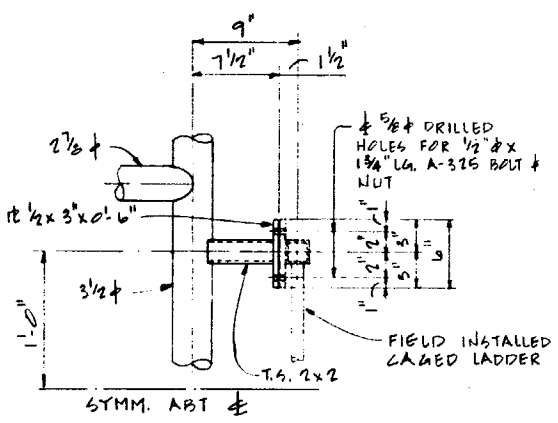
SECTION C7-C7

SCALE: 1½"=1'-0"



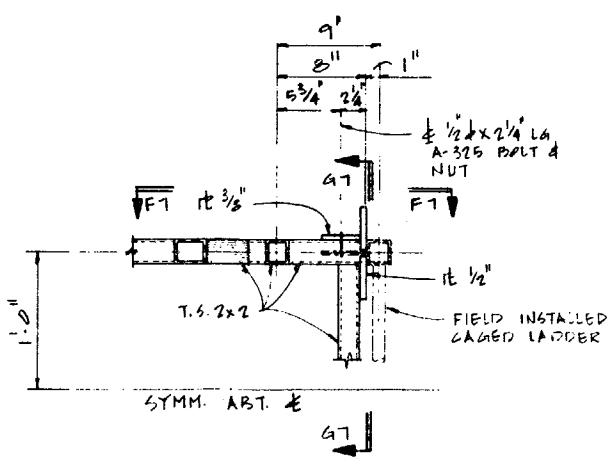
DETAIL "C7"

SCALE: 1½"=1'-0"



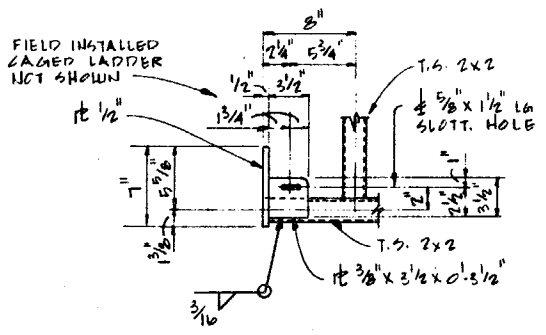
SECTION D7-D7

SCALE: 1½"=1'-0"



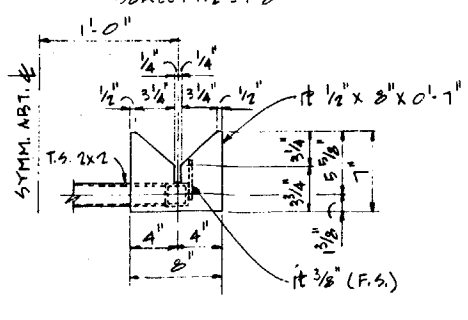
SECTION E7-E7

SCALE: 1½"=1'-0"



SECTION F7-F7

SCALE: 1½"=1'-0"



SECTION G7-G7

SCALE: 1½"=1'-0"

REV.	DATE	BY	DESCRIPTION

FIELD INSTALLED CAGED LADDER DETAILS

DELTA MARINE STRUCTURES, INC.

NEW ORLEANS — dms — LOUISIANA

STATE OF LOUISIANA
AGUSTIN CHIN
REG. NO. 7744
REGISTERED PROFESSIONAL ENGINEER IN CIVIL ENGINEERING

CONOCO

LOAD FRAME FOR WEST DELTA 56A

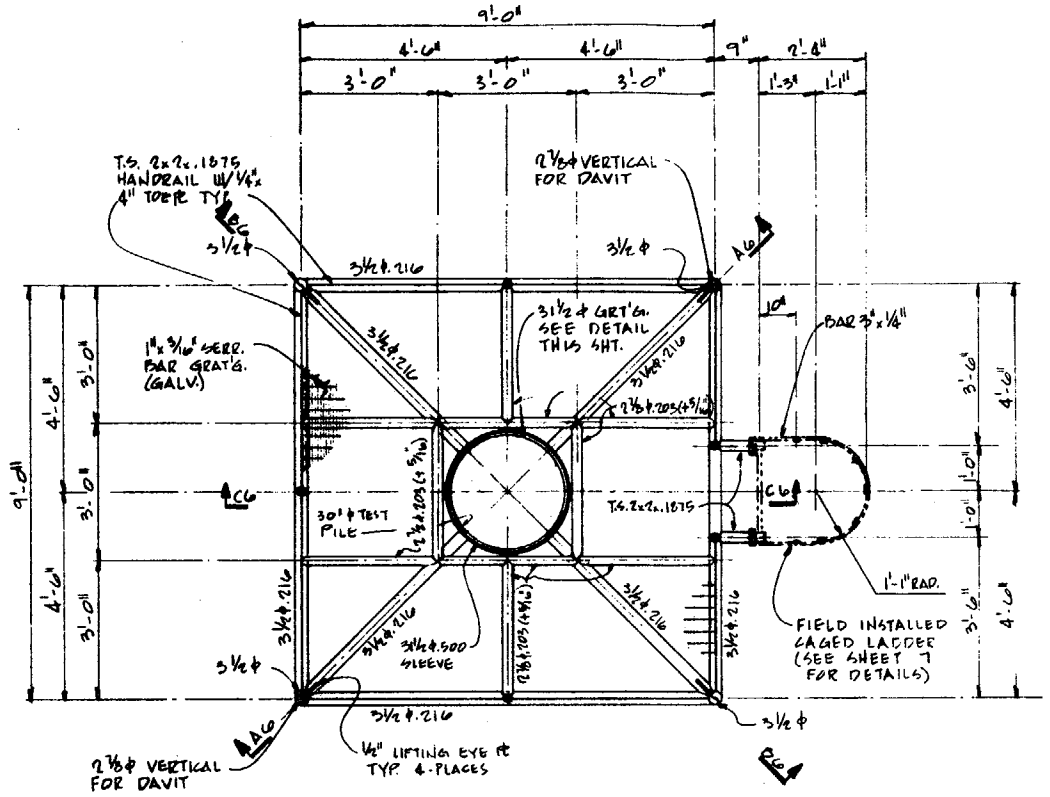
APPROVED

DRAWN KB. CHECKED A.CHIN

DATE 5-26-83

DWG. NO. A-140-[illegible]

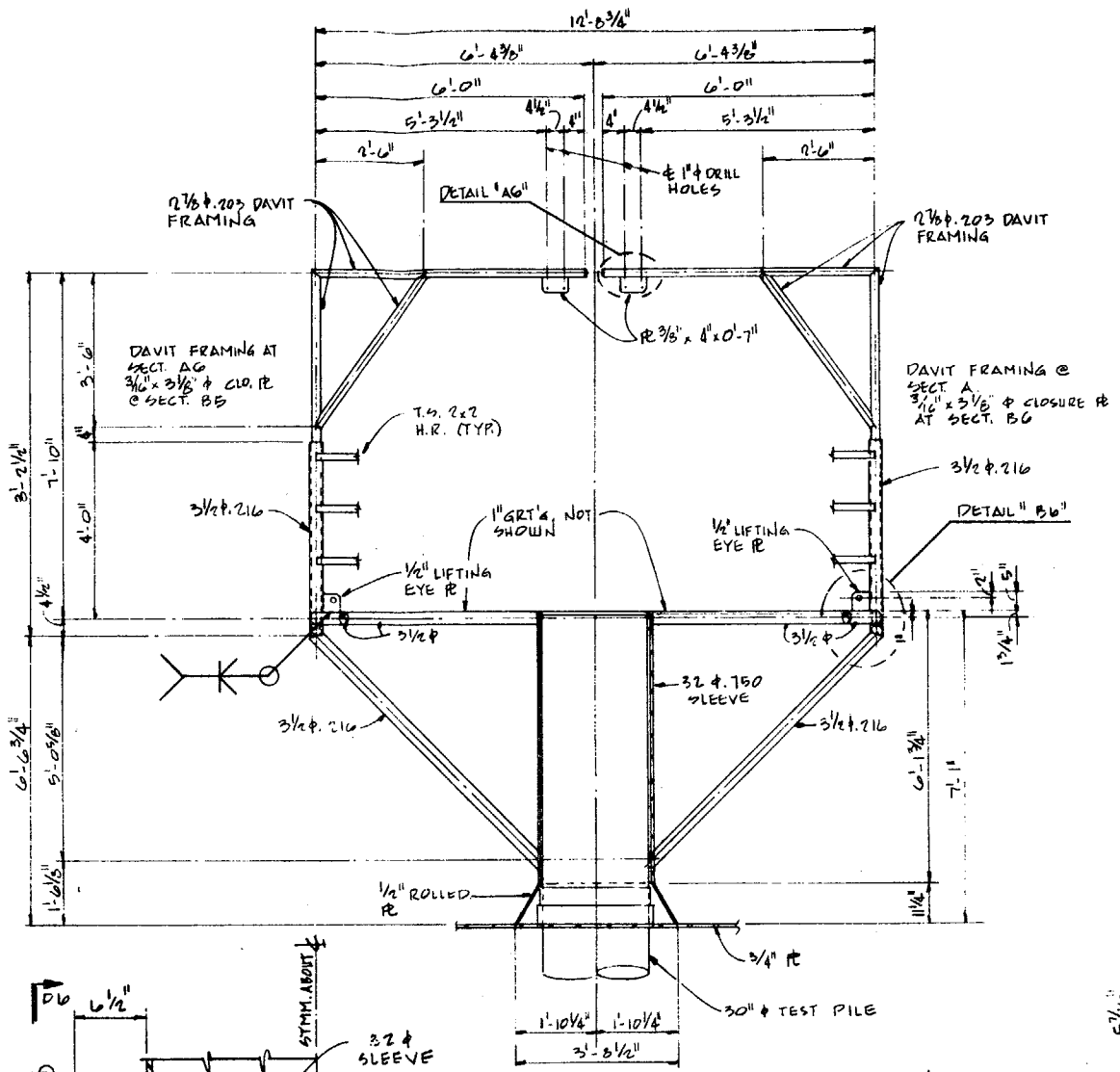
0



PLAN OF PLATFORM @ TOP OF LOAD HEAD

SCALE ½" 1'-0"

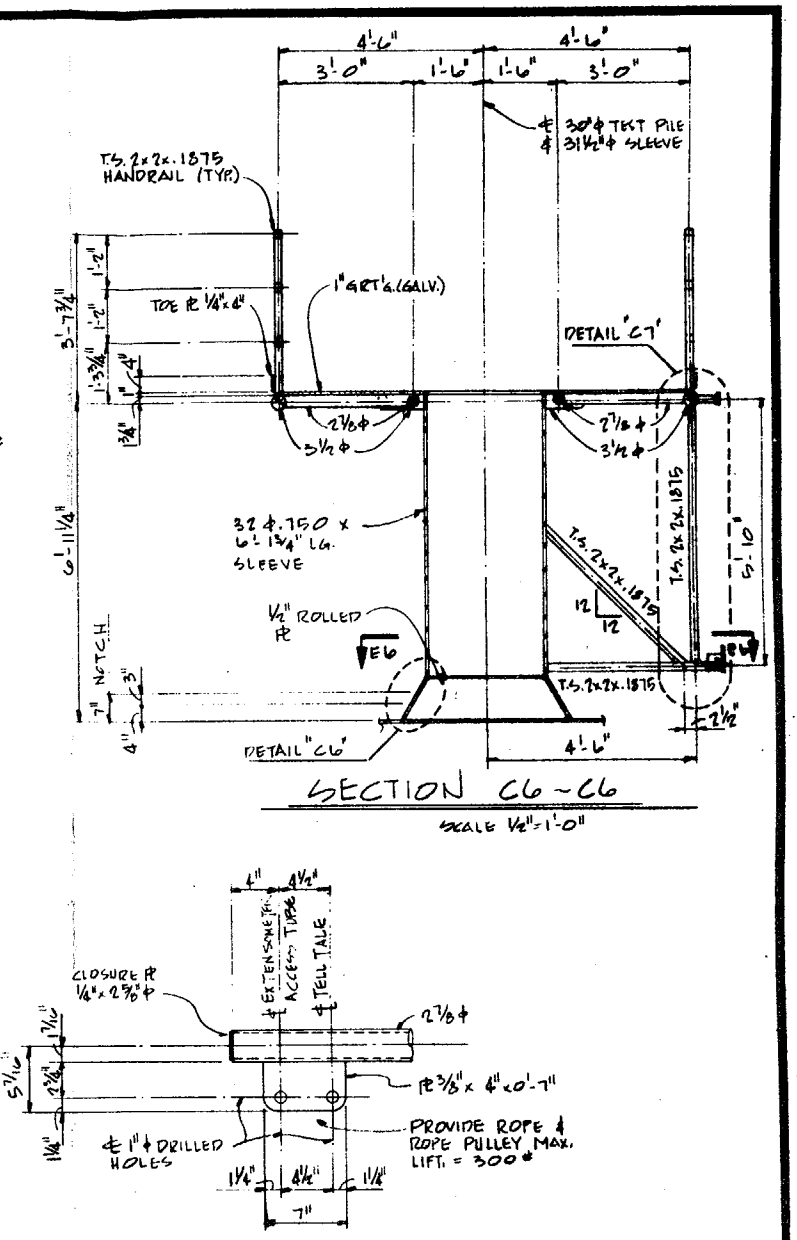
NOTE: PLUS AND MINUS DIMENSIONS ARE REFERENCE FROM ℄ OF 3½ ϕ



SECTION A6 - A6 (SHOWN & NOTED)

SECTION B6 - B6 (SIM. & NOTED)

SCALE ½" - 1'-0"

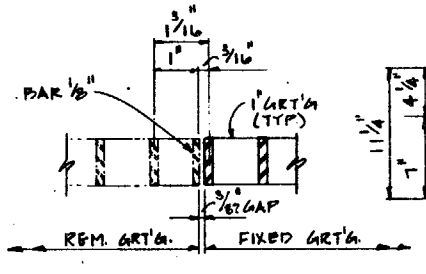


SECTION C6 - C6

SCALE ½"=1'-0"

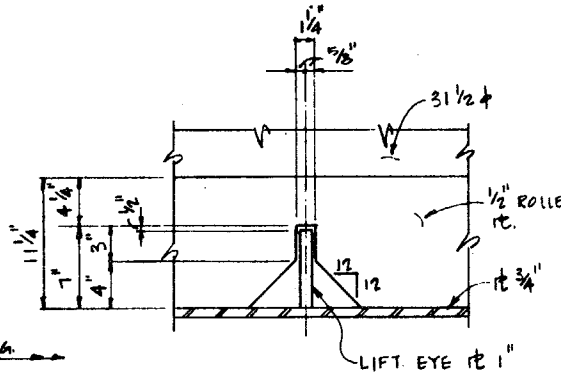
DETAIL "A6"

SCALE 1½"=1'-0"



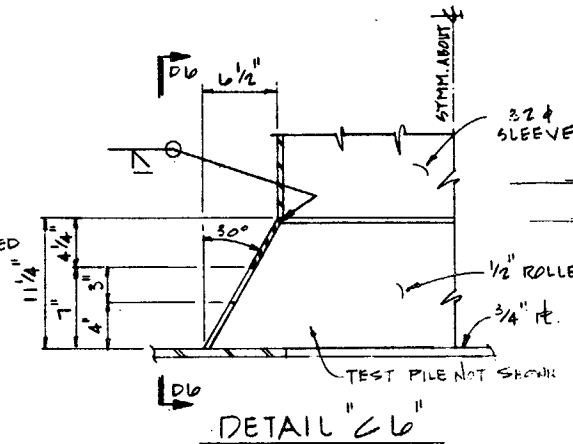
SECTION F6 - F6

SCALE: HALF SIZE



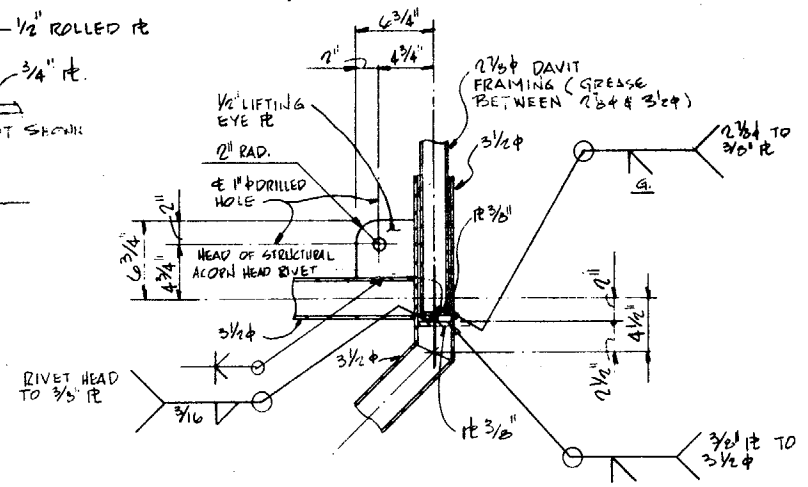
SECTION D6 - D6

SCALE: 1½"= 1'-0"



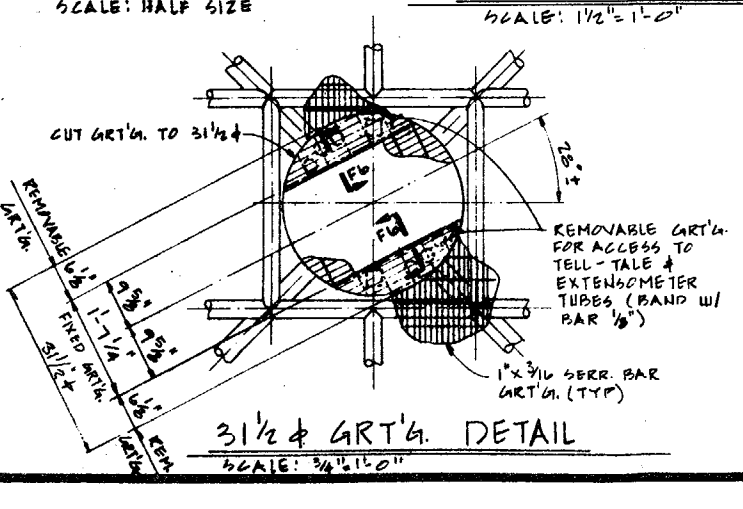
DETAIL "C6"

SCALE: 1½"= 1'-0"



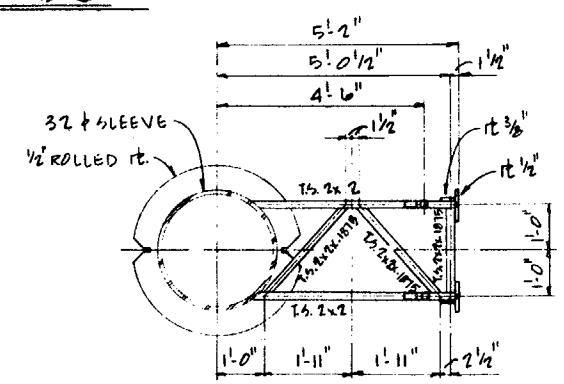
DETAIL "B6"

SCALE 1½"=1'-0"



31½ ϕ GRT'G. DETAIL

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



SECTION E6 - E6

SCALE: ½"= 1'-0"

REV.	DATE	BY	DESCRIPTION

PLAN OF PLATFORM AT TOP OF LOAD HEAD

DELTA MARINE STRUCTURES, INC.

NEW ORLEANS — dms — LOUISIANA

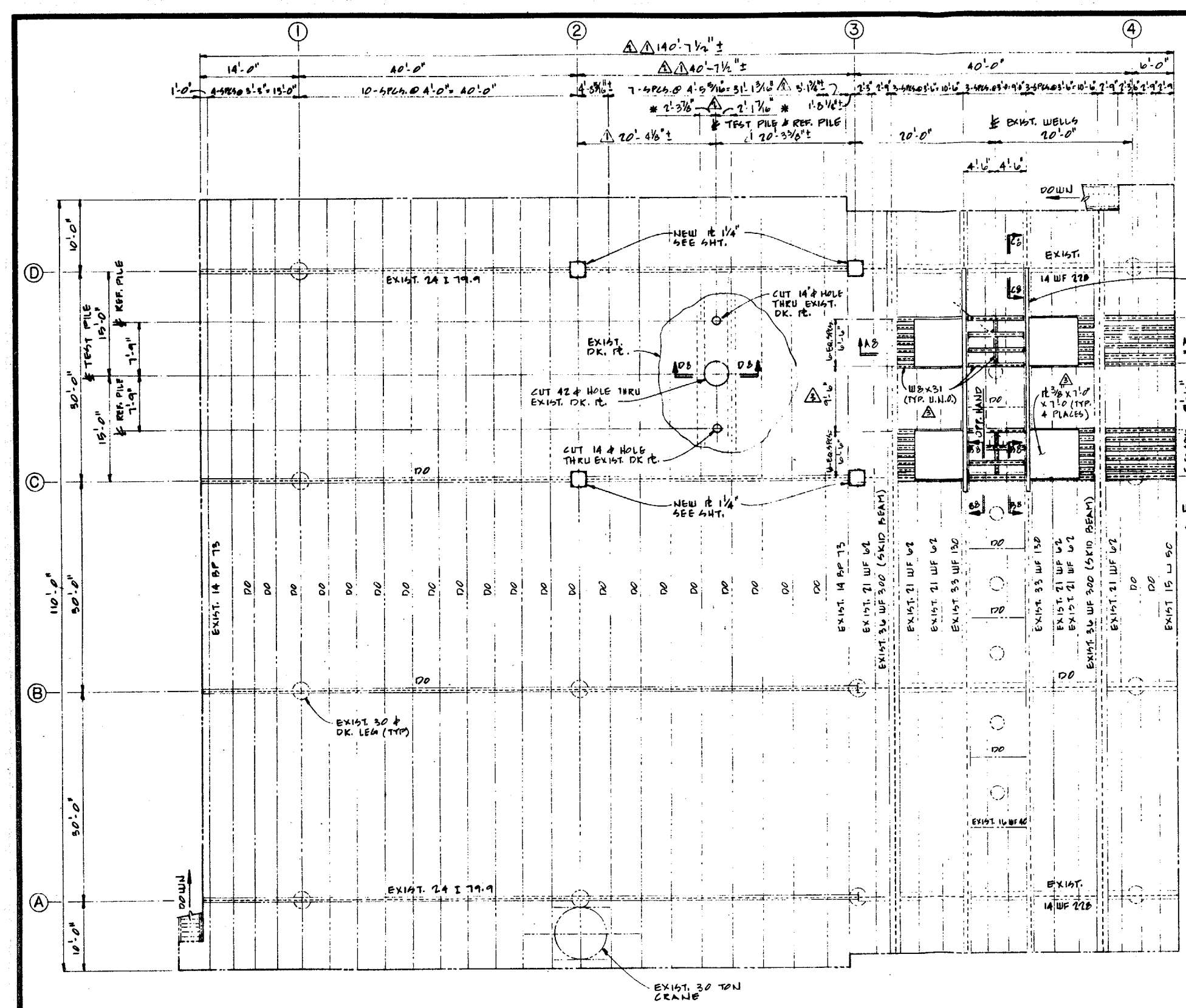
STATE OF LOUISIANA — AGUSTIN CHIN — REG. NO. 7744 — REGISTERED PROFESSIONAL ENGINEER IN CIVIL ENGINEERING

CONOCO

LOAD FRAME FOR WEST DELTA 58A

APPROVED

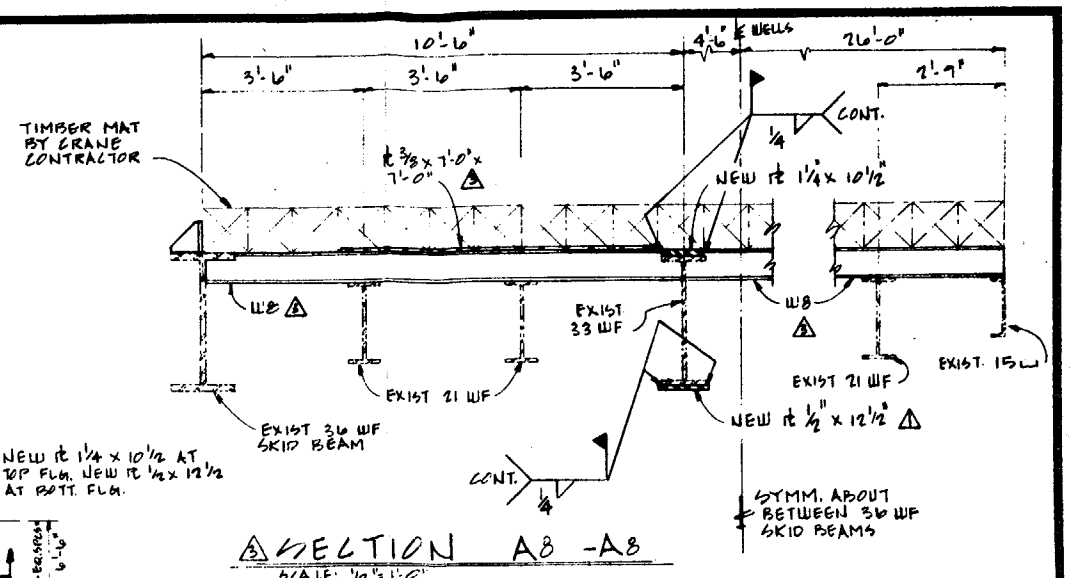
DRAWN — CHECKED — A. CHIN — DATE 5-24-83 — DWG. NO. A-148-S2



PLAN OF EXISTING MAIN DECK

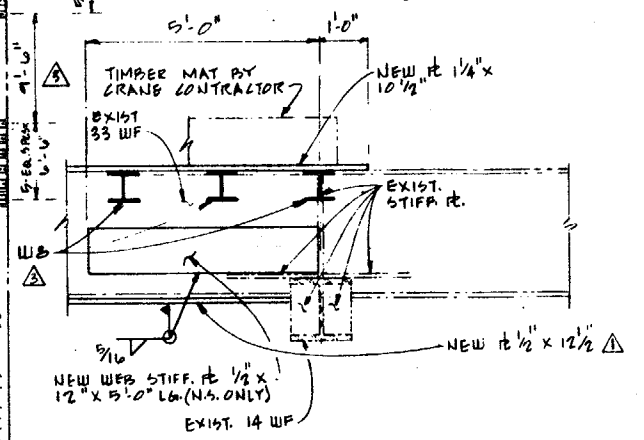
SCALE: 1/8" = 1'-0"

* INDICATES DIMENSIONS TO BE FIELD VERIFIED



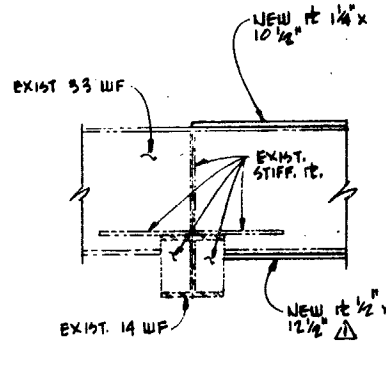
SECTION A8 - A8

SCALE: ½" = 1'-0"



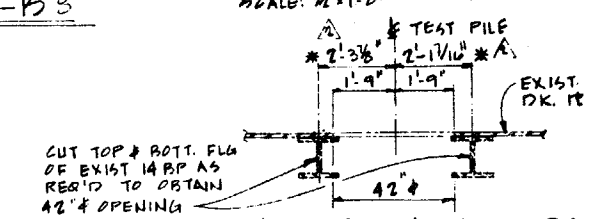
SECTION B8 - B8

SCALE: ½" = 1'-0"



SECTION C8 - C8

SCALE: ½" = 1'-0"



SECTION D8 - D8

SCALE: ⅜" = 1'-0"

REV.	DATE	BY	DESCRIPTION
5	7-19-83	RS	ADDED W8 FRAMING & REVISE SECT. A8, B8
4	6-10-83	DL	REVISED DIMENSIONS
3	6-1-83	RS	REVISE DIMENSIONS, SECTIONS "A" "B" & "C"

EXISTING MAIN DECK - PLAN & SECTIONS

DELTA MARINE STRUCTURES, INC.

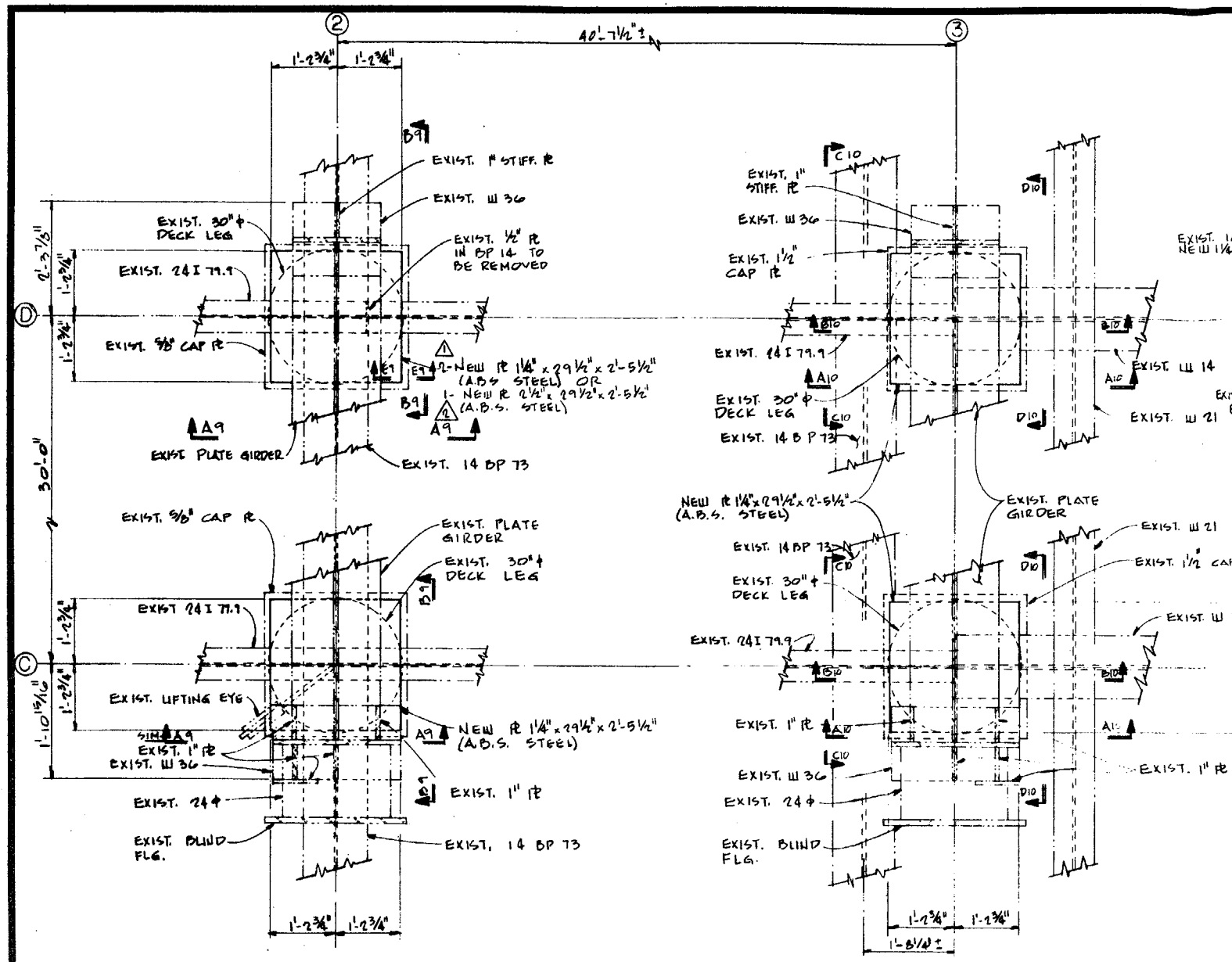
NEW ORLEANS dms LOUISIANA

STATE OF LOUISIANA — AGUSTIN CHIN, REG. NO. 7744, REGISTERED PROFESSIONAL ENGINEER IN CIVIL ENGINEERING

conoco

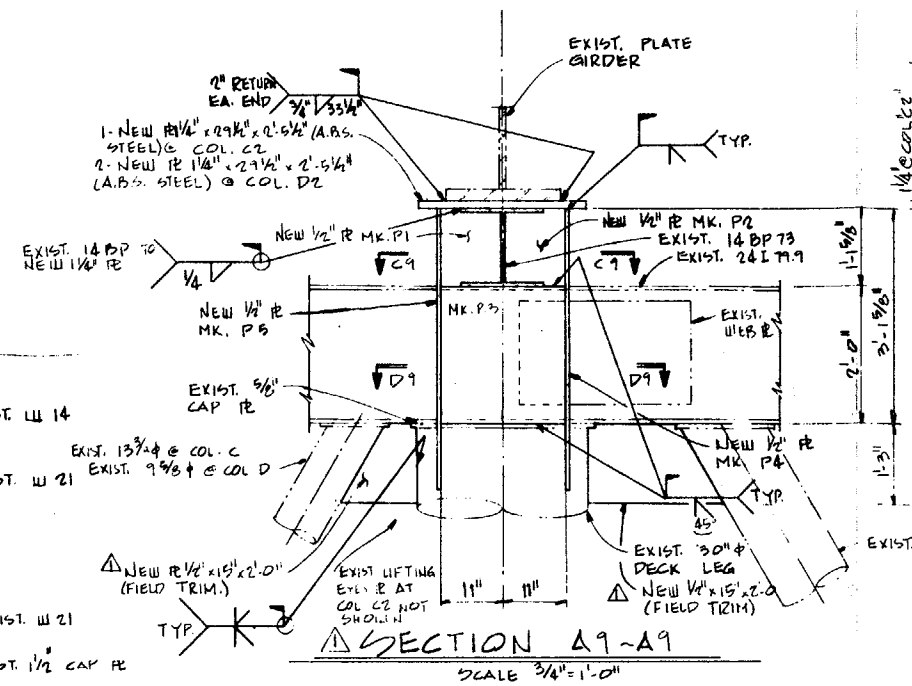
LOAD FRAME FOR WEST DELTA 53A

APPROVED | DRAWN R.S. CHECKED A. CHIN | DATE 6-24-83 | DWG. NO. A-140-M[illegible] | 3



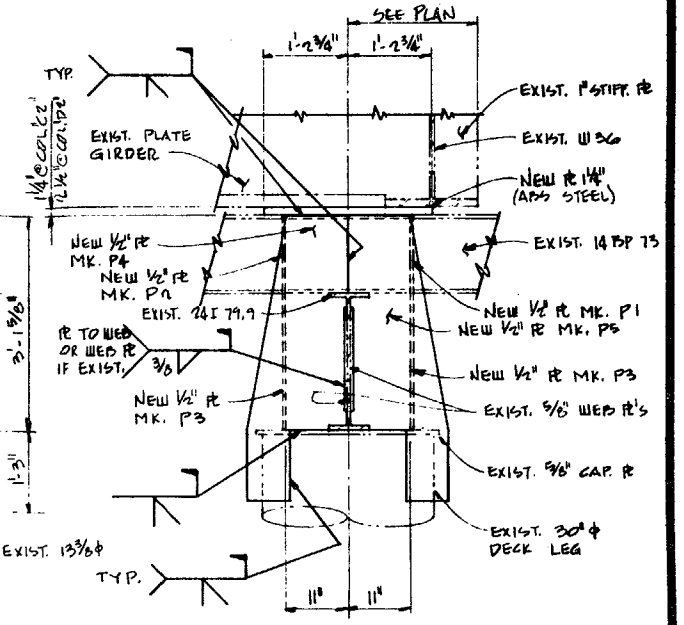
PART PLAN OF MAIN DECK PLATE CONNECTIONS

SCALE ¾" = 1'-0"



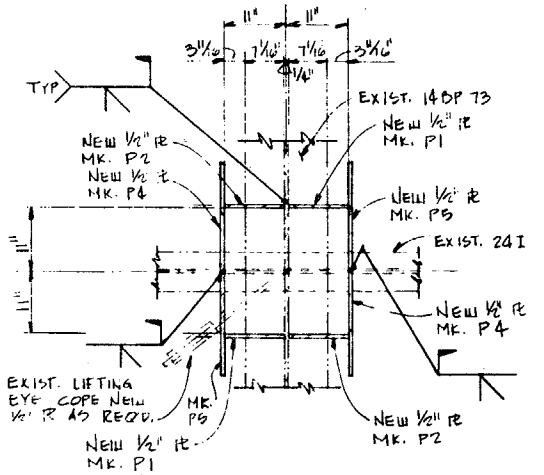
⚠ SECTION A9-A9

SCALE ¾" = 1'-0"



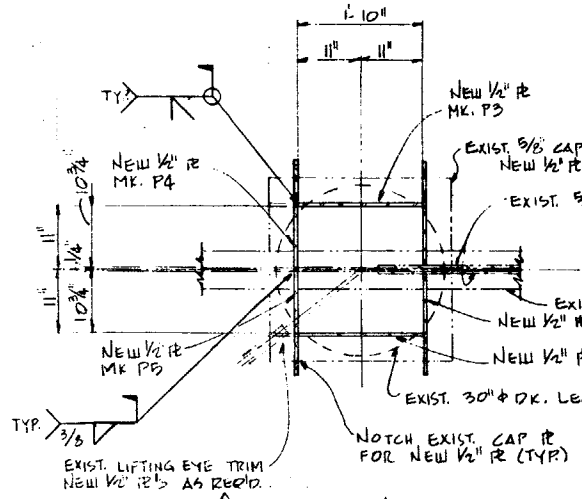
⚠ SECTION B9-B9

SCALE ¾" = 1'-0"



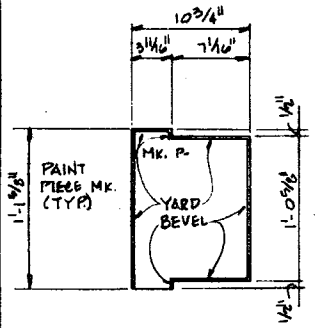
⚠ SECTION C9-C9

SCALE ¾" = 1'-0"



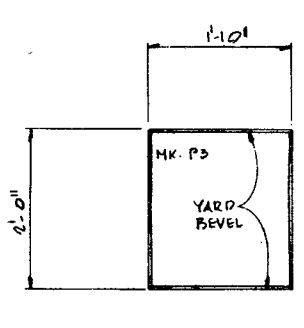
⚠ SECTION D9-D9

SCALE ¾" = 1'-0"

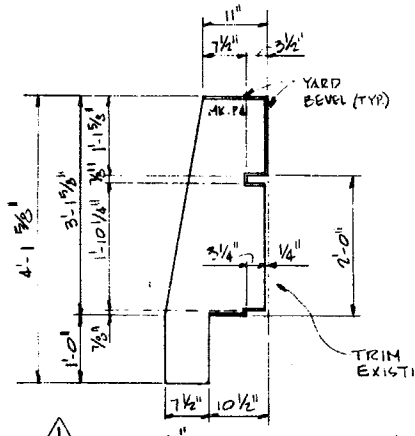


⚠ PLATE ½"-MK. P1 (4-REQ'D. AS SHOWN.)

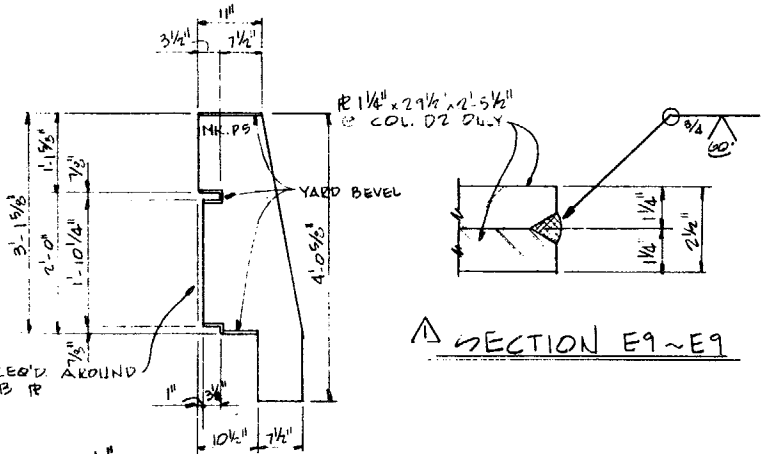
⚠ PLATE ½"-MK. P2 (4 REQ'D. OPP. HAND)



⚠ PLATE ½"-MK. P3 (4-REQ'D.)



⚠ PLATE ½"-MK. P4 (4-REQ'D.)



⚠ SECTION E9-E9

⚠ PLATE ½"-MK. P5 (4-REQ'D.)

NOTE:
ALL FIELD WELDS TO BE FULL PENETRATION UNLESS SHOWN OTHERWISE

REV.	DATE	BY	DESCRIPTION
⚠	6-20-83	D.L.	REVISED NOTATION OF NEW PL
⚠	6-10-83	D.L.	REVISED SECTIONS A9, B9, C9 AND D9 ADDED SECTION E9 AND REVISED PLATES MK. P1, P2, P3, P4, AND P5

MAIN DK. PLAN & PLATE CONN. SECTIONS & DET.

DELTA MARINE STRUCTURES, INC.

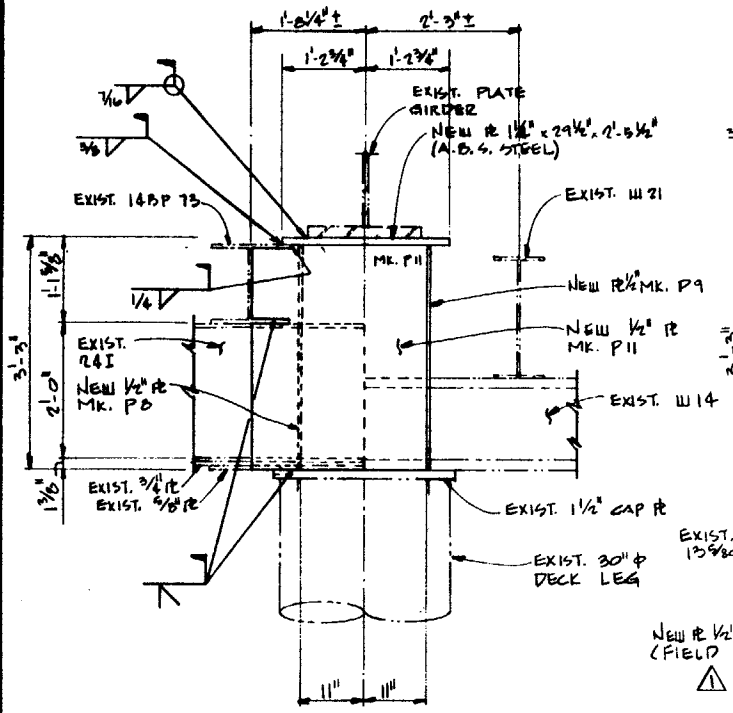
NEW ORLEANS dms LOUISIANA

STATE OF LOUISIANA
AGUSTIN CHIN
REG. NO. 7744
REGISTERED PROFESSIONAL ENGINEER IN CIVIL ENGINEERING

conoco

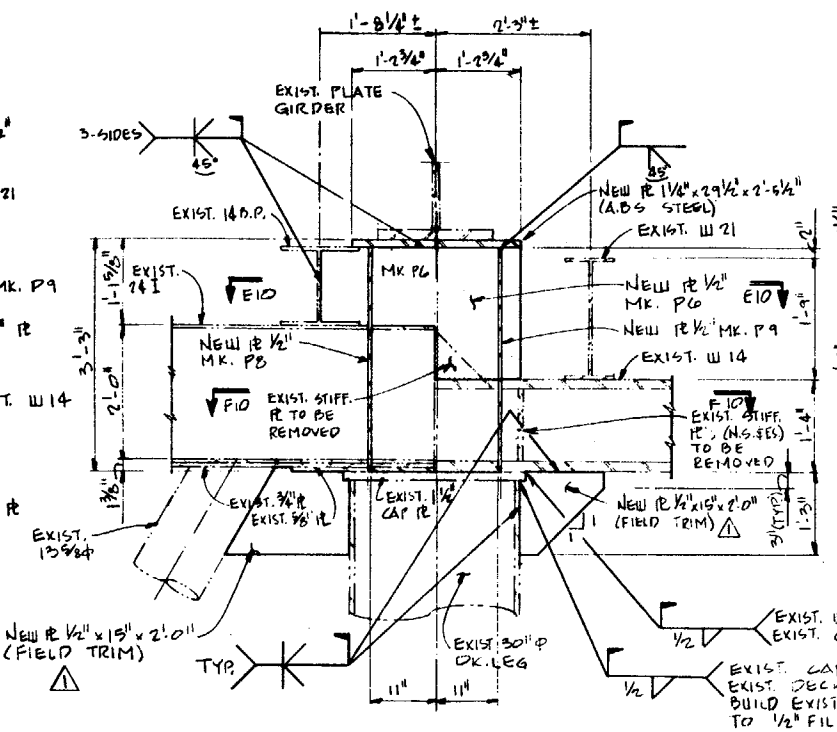
LOAD FRAME FOR WEST DELTA 58A

APPROVED	DRAWN D. LEWIS	DATE 3-30-83	DWG. NO. A-140-B8	2
	CHECKED A. CHIN			



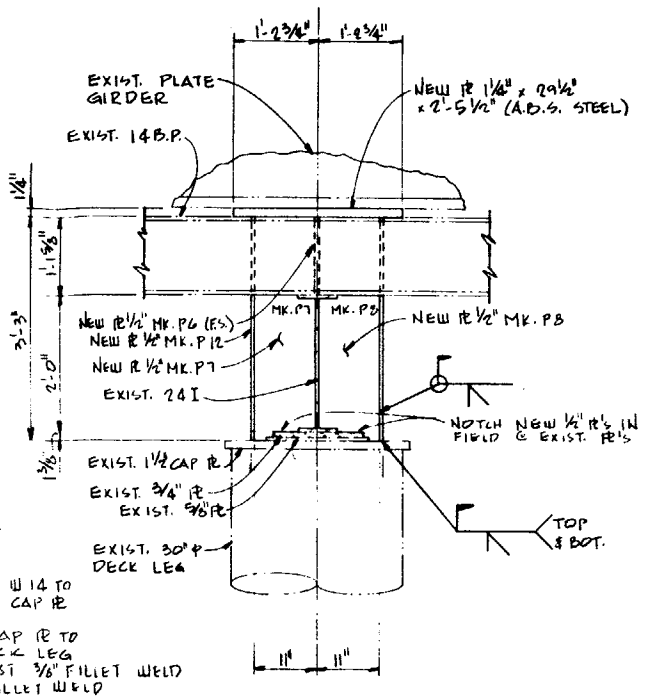
⚠ SECTION A10-A10

SCALE 3/4" = 1'-0"



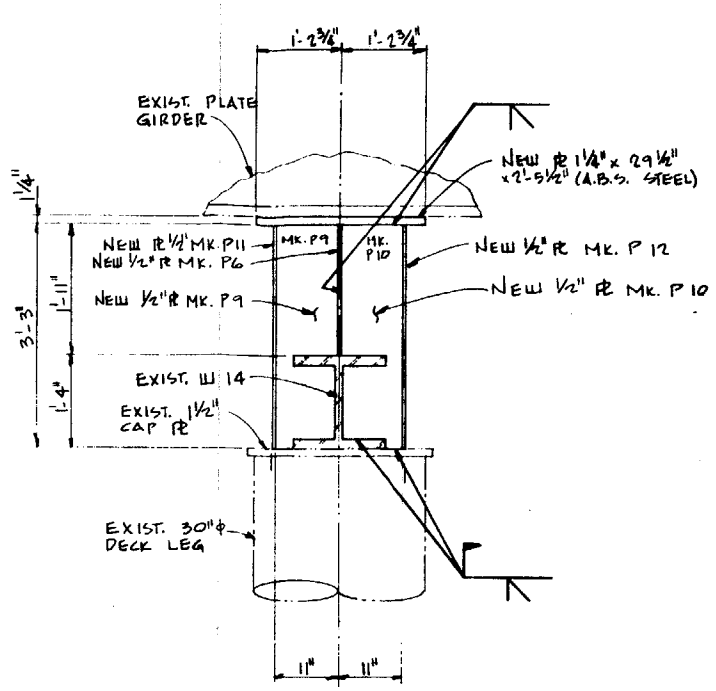
⚠ SECTION B10-B10

SCALE 3/4" = 1'-0"



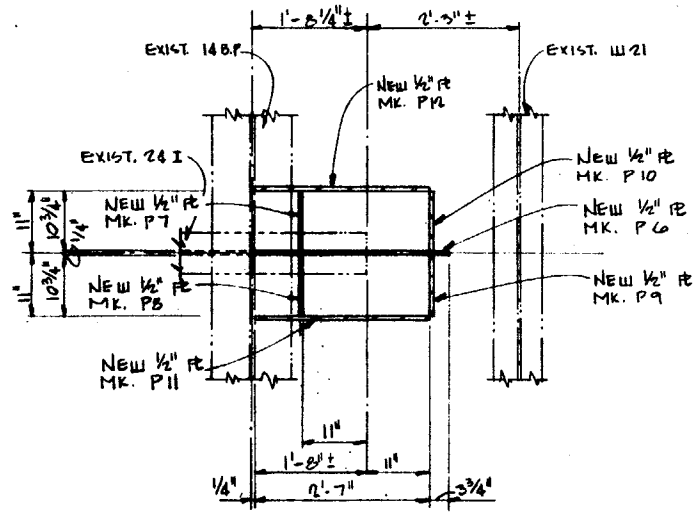
SECTION C10-C10

SCALE 3/4" = 1'-0"



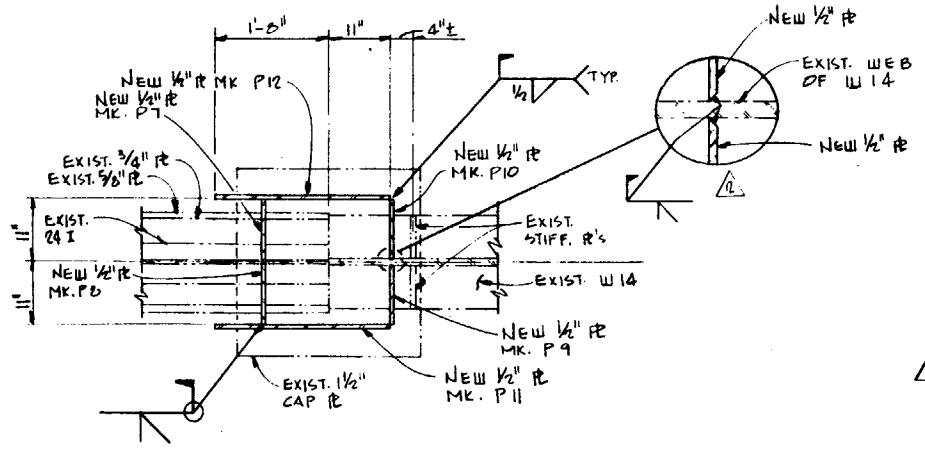
SECTION D10-D10

SCALE 3/4" = 1'-0"



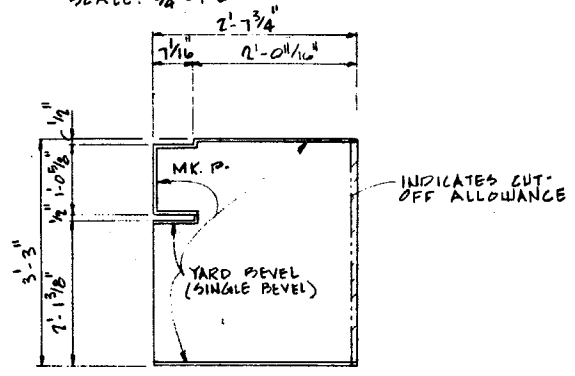
⚠ SECTION E10-E10

SCALE 3/4" = 1'-0"



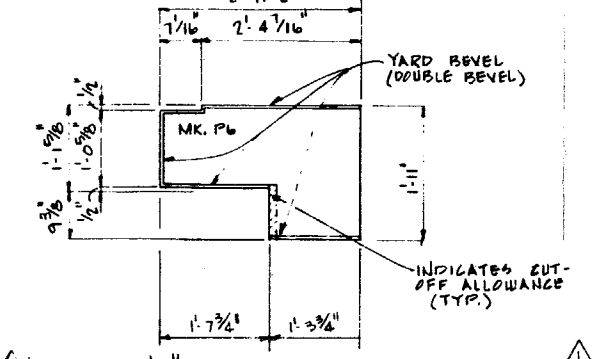
⚠ SECTION F10-F10

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

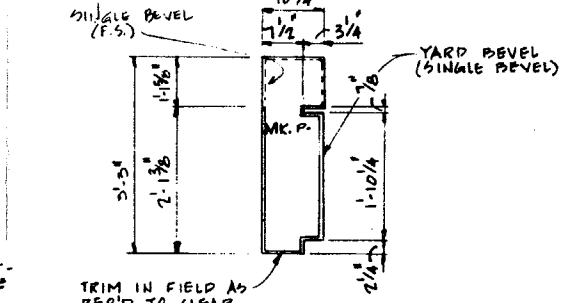


⚠ PLATE 1/2"-MK. P11 (2-REQ'D. AS SHOWN)

⚠ PLATE 1/2"-MK. P12 (2-REQ'D. OPP. HAND)



⚠ PLATE 1/2"-MK. P6 (2-REQ'D.)



⚠ PLATE 1/2"-MK. P7 (2-REQ'D. AS SHOWN)

⚠ PLATE 1/2"-MK. P8 (2-REQ'D. OPP. HAND)

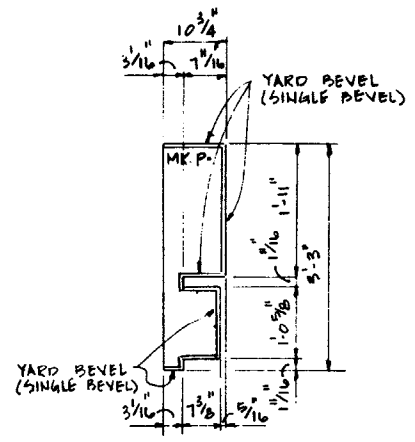


PLATE 1/2"-MK. P9 (2-REQ'D AS SHOWN)

PLATE 1/2"-MK P10 (2-REQ'D OPP. HAND)

REV.	DATE	BY	DESCRIPTION
⚠2	6-20-83	D.L.	REVISED WELD DETAIL
⚠1	6-10-83	D.L.	REVISED SECTIONS A10, B10, E10 & F10 AND REVISED PLATES MK. P6, P7, P8, P11 & P12

PLATE CONNECTION SECTIONS & DETAILS

DELTA MARINE STRUCTURES, INC.

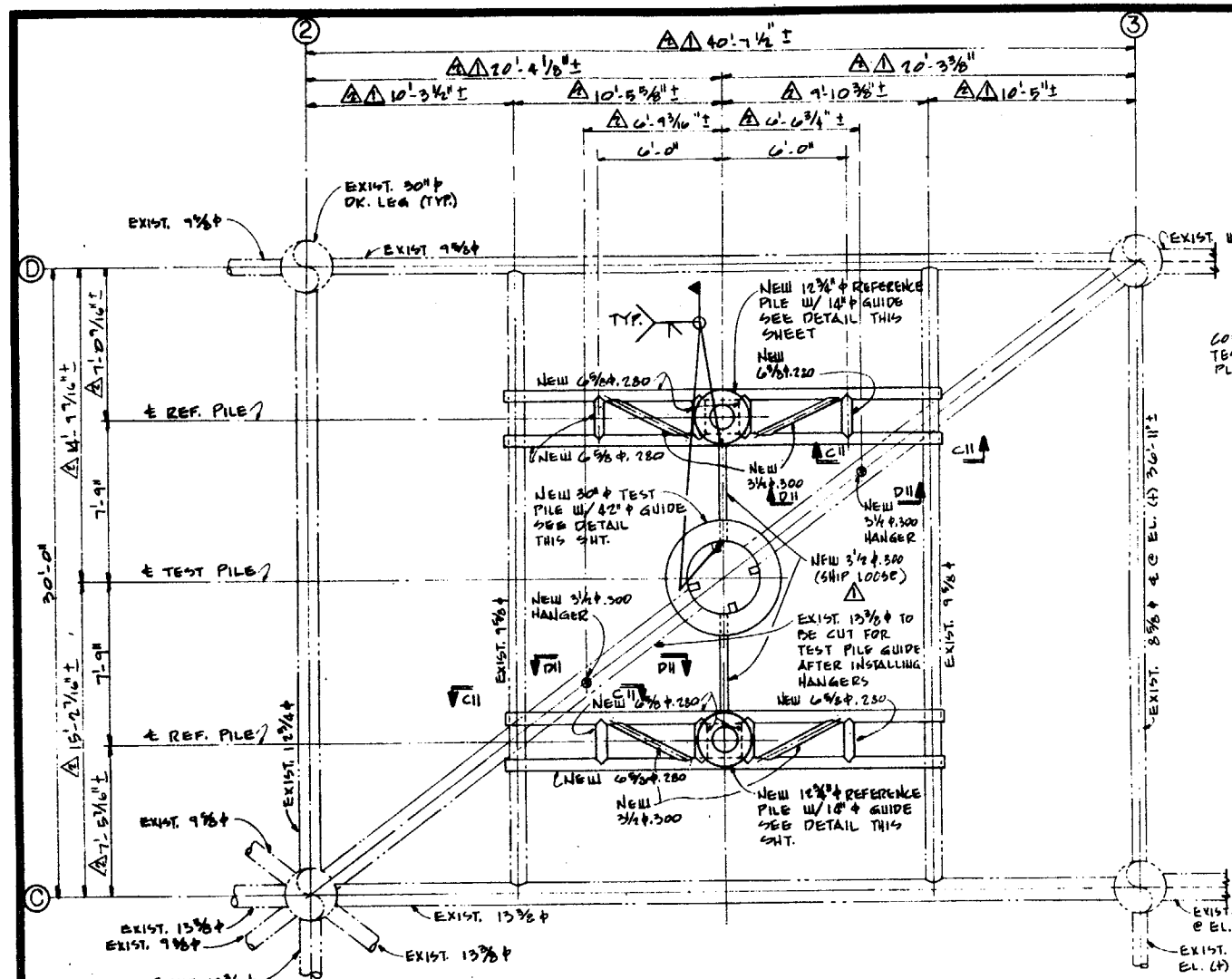
NEW ORLEANS — dms — LOUISIANA

STATE OF LOUISIANA
AGUSTIN CHIN
REG. NO. 7744
REGISTERED PROFESSIONAL ENGINEER IN CIVIL ENGINEERING

conoco

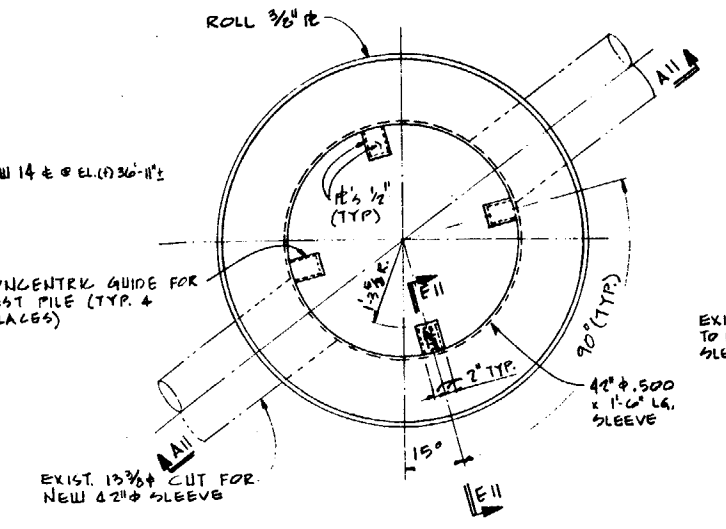
LOAD FRAME FOR WEST DELTA 56A

APPROVED	DRAWN D. LEWIS	CHECKED A. CHIN	DATE 3-30-83	DWG. NO. A-140-D10	1

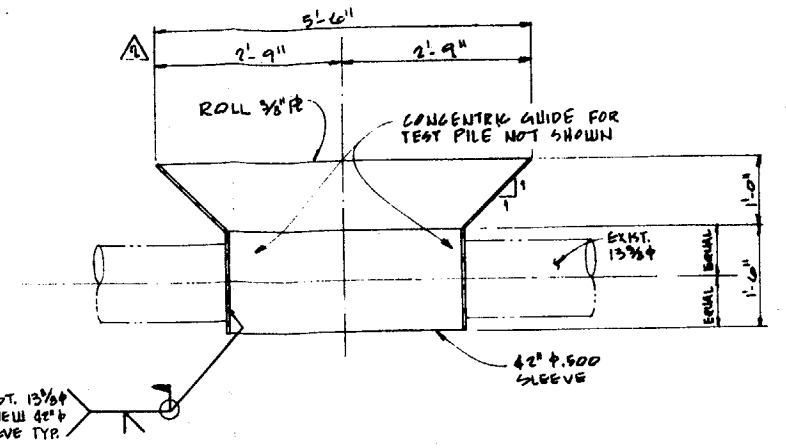


PART PLAN AT EL. (+) 31'-1⅝"

SCALE 1/8" = 1'-0"



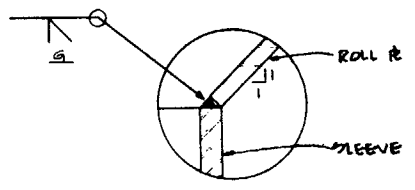
PLAN



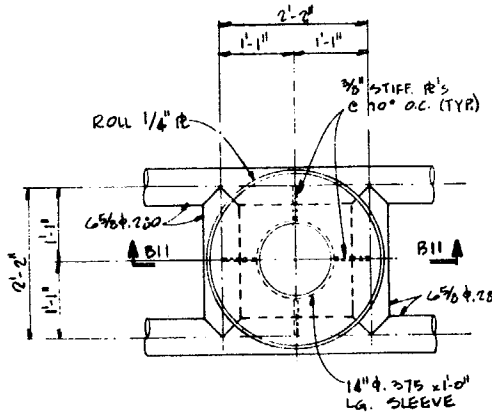
SECTION A11 ~A11

DETAIL OF 42" ϕ .500 GUIDE

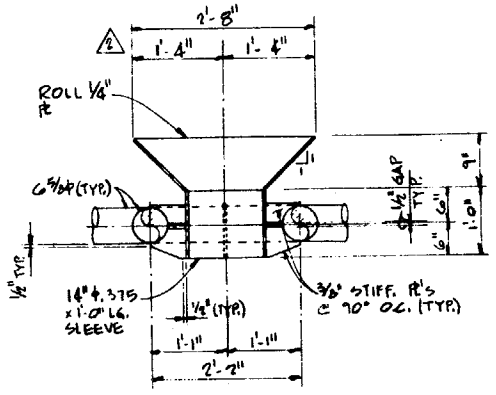
SCALE 3/4" = 1'-0"



TYPICAL WELDING FOR GUIDES



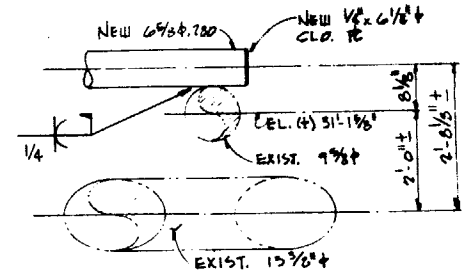
PLAN



SECTION B11 ~B11

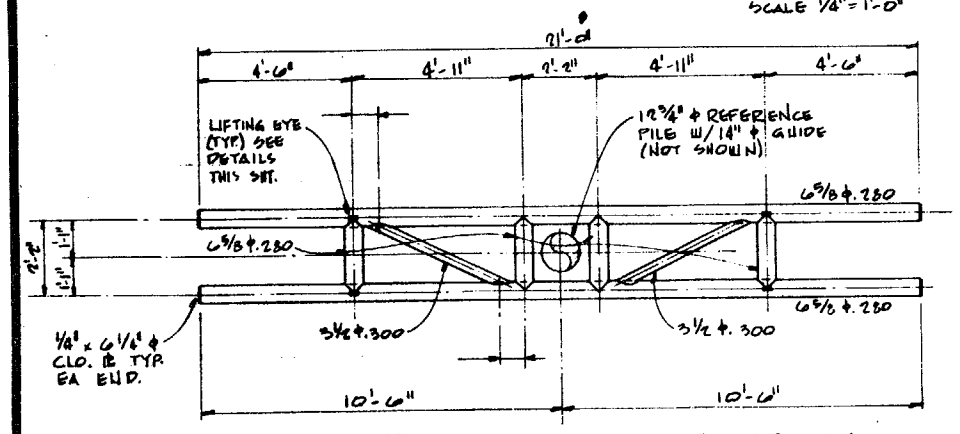
DETAIL OF 14" ϕ .375 GUIDE

SCALE 3/4" = 1'-0"



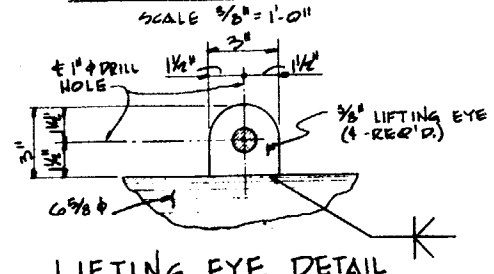
SECTION C11 ~C11

SCALE 3/4" = 1'-0"



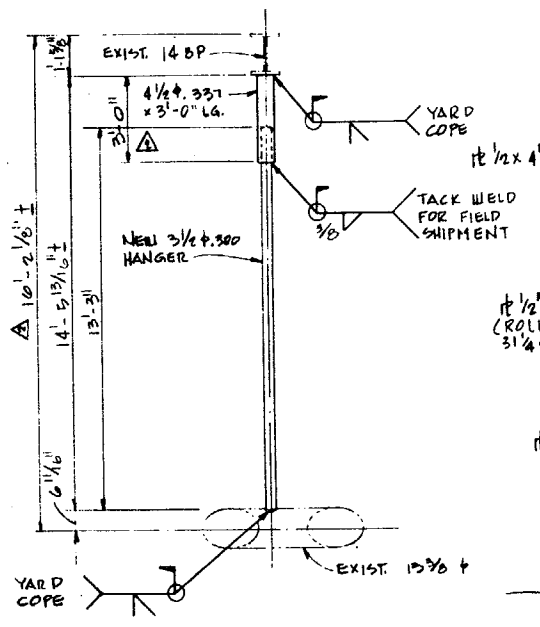
DETAIL OF 14" ϕ GUIDE SUPPORT FRAME

SCALE 3/8" = 1'-0" 2 - REQ'D.



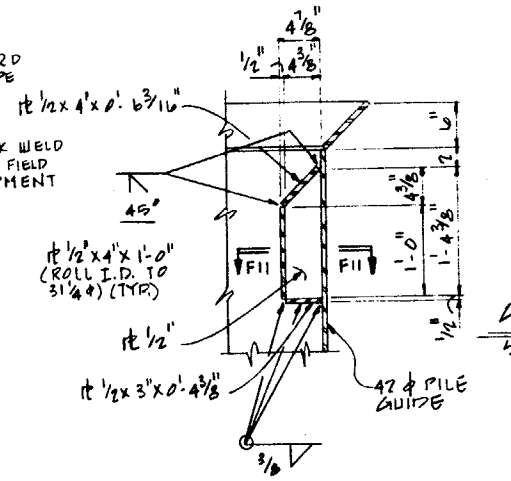
LIFTING EYE DETAIL

SCALE 3" = 1'-0"



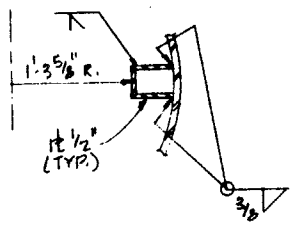
SECTION D11 ~D11

SCALE 3/8" = 1'-0"



SECTION E11 - E11

SCALE: 1" = 1'-0"



SECTION F11 - F11

SCALE: 1" = 1'-0"

REV.	DATE	BY	DESCRIPTION
2	6-10-83	D.L.	REVISED DIMENSIONS
1	6-1-83	R.S.	REVISE DIMENSIONS, ADD 3½ ϕ

PLAN, SECTIONS & DETAILS AT EL. (+) 31'-1 5/8"

DELTA MARINE STRUCTURES, INC.

NEW ORLEANS dms LOUISIANA

STATE OF LOUISIANA
AGUSTIN CHIN
REG. NO. 7744
REGISTERED PROFESSIONAL ENGINEER IN CIVIL ENGINEERING

CONCEPT

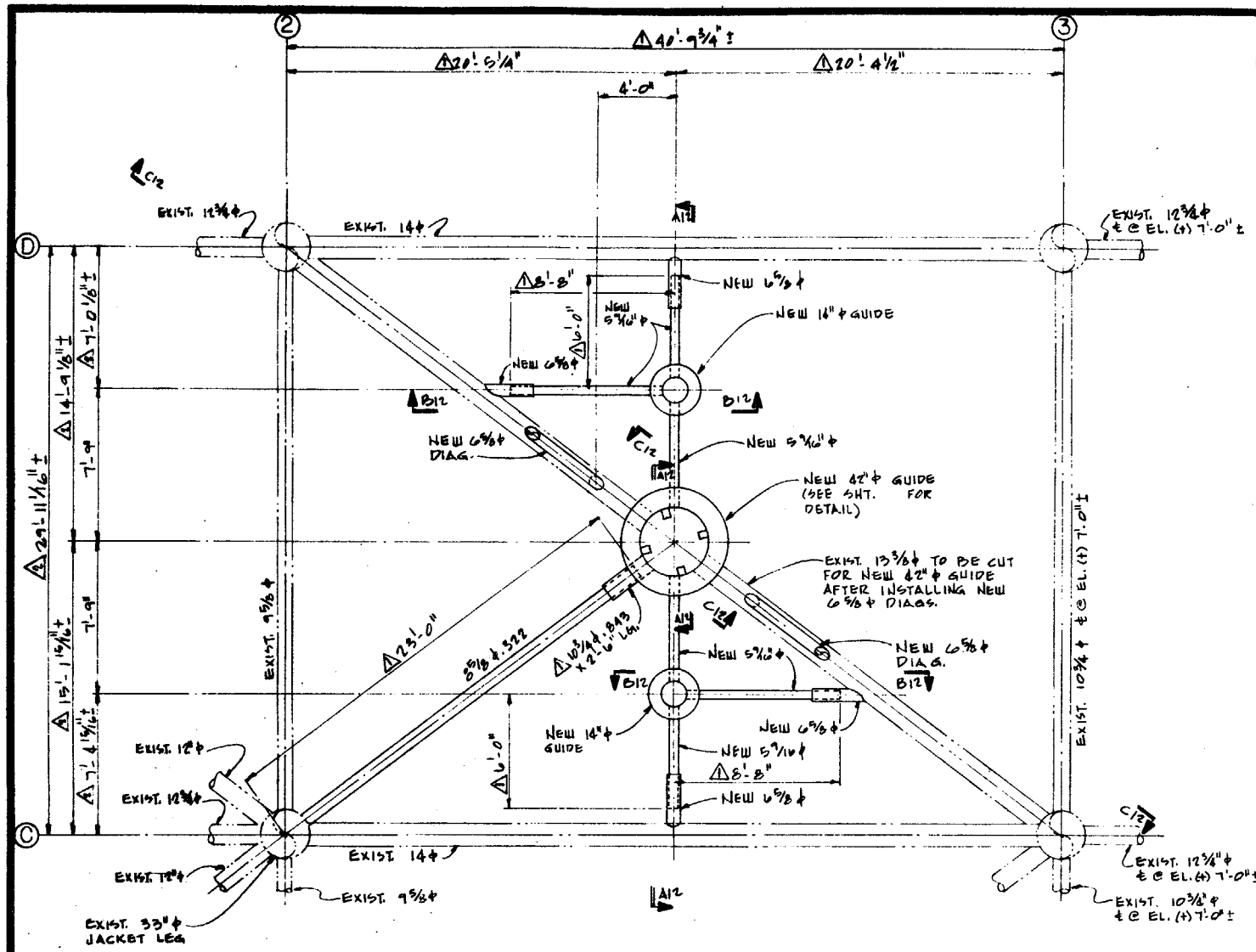
LOAD FRAME FOR WEST DELTA 86A

APPROVED

DRAWN D.LEWIS
CHECKED A.CHIN

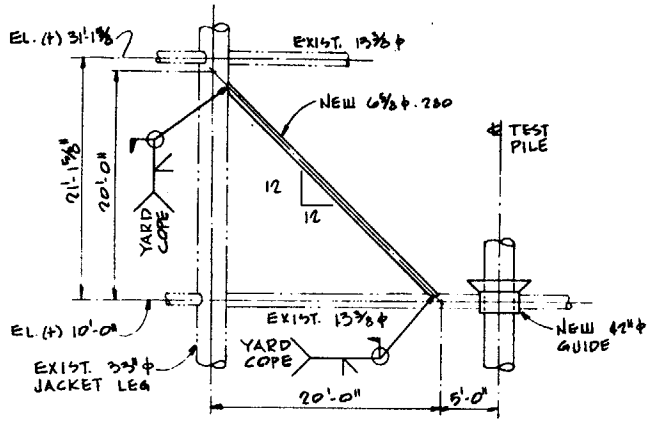
DATE 5-26-83

DWG. NO.



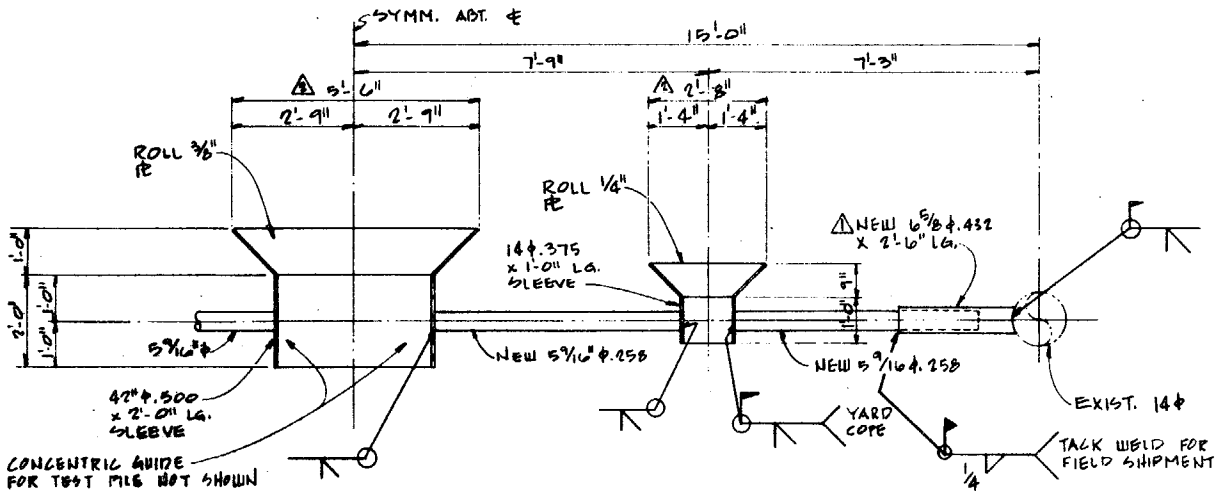
PART PLAN AT EL. (+) 10'-0"

SCALE 1/4" = 1'-0"



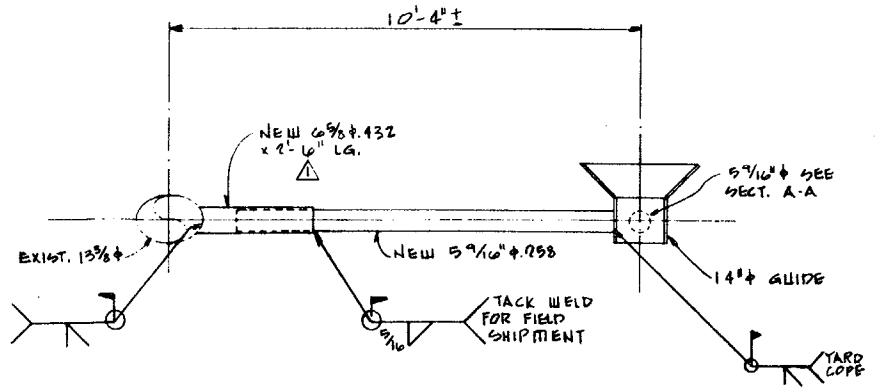
SECTION C12-C12

SCALE 1/8" = 1'-0"



⚠ SECTION A12-A12

SCALE 1/2" = 1'-0"



⚠ SECTION B12-B12

SCALE 1/2" = 1'-0"

REV.	DATE	BY	DESCRIPTION
⚠2	6-10-83	D.L.	REVISED DIMENSIONS
⚠1	6-1-83	R.S	REVISE DIMENSIONS, SECTIONS "A" & "B", ADD SLEEVES

PLAN AND SECTIONS AT EL. (+) 10'-0"

DELTA MARINE STRUCTURES, INC.

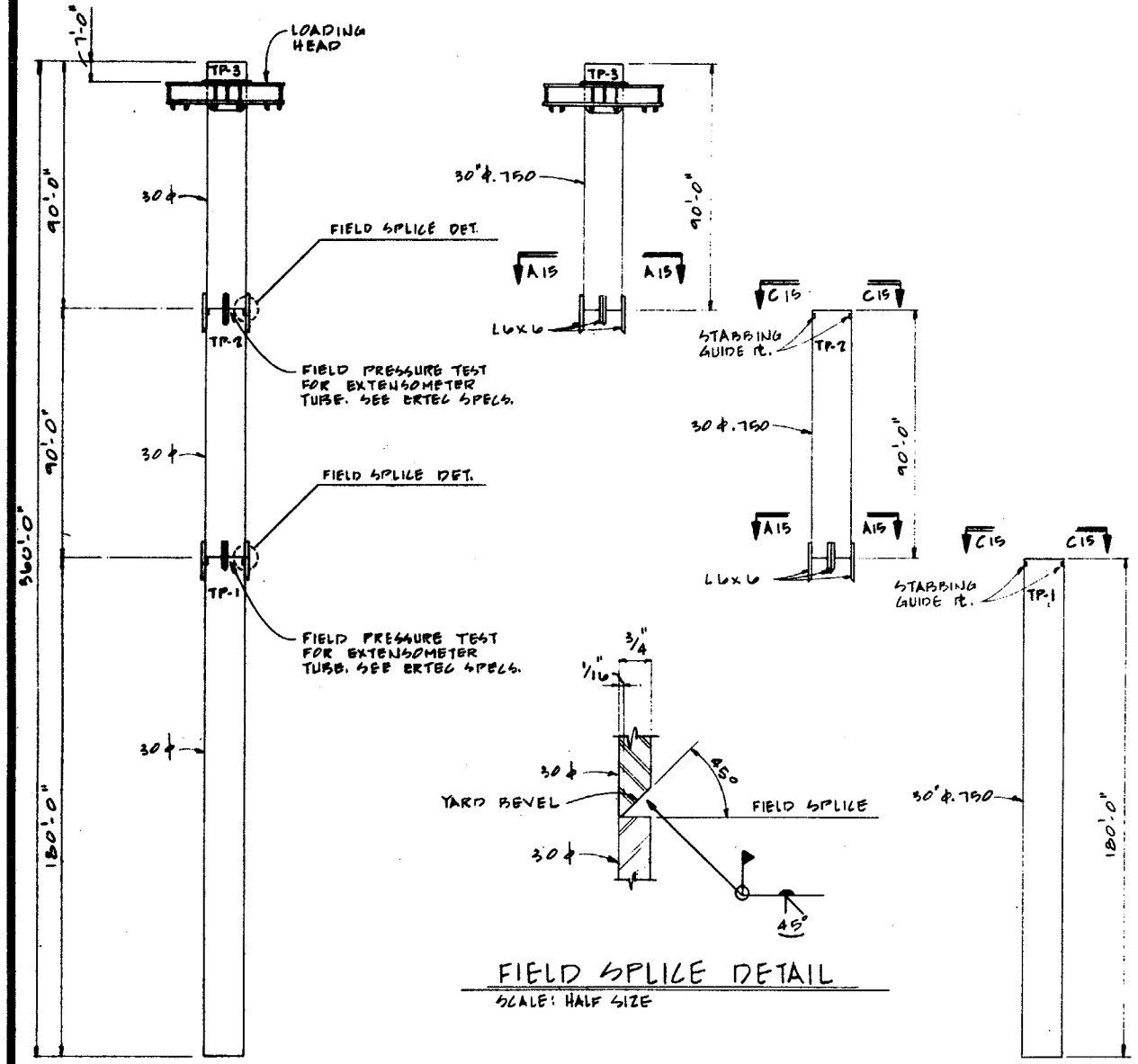
NEW ORLEANS — dms — LOUISIANA

STATE OF LOUISIANA — AGUSTIN CHIN — REG. NO. 7744 — REGISTERED PROFESSIONAL ENGINEER IN CIVIL ENGINEERING

CONOCO

LOAD PHASE FOR WEST DELTA 52L

DRAWN D. LEWIS — CHECKED A. CHIN — DATE 5-24-83 — DWG. NO. [illegible] — 1



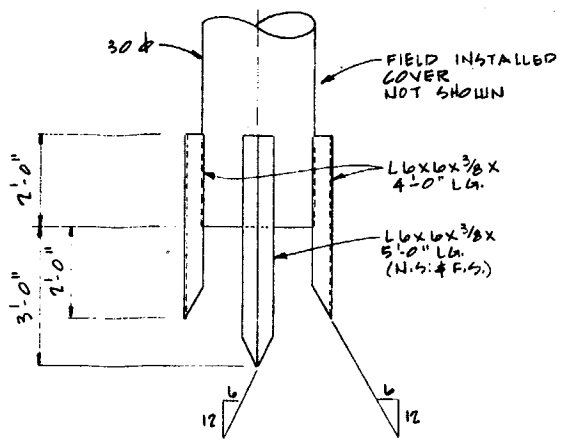
FIELD SPLICE DETAIL

SCALE: HALF SIZE

ASSEMBLY DETAILS OF TEST PILE

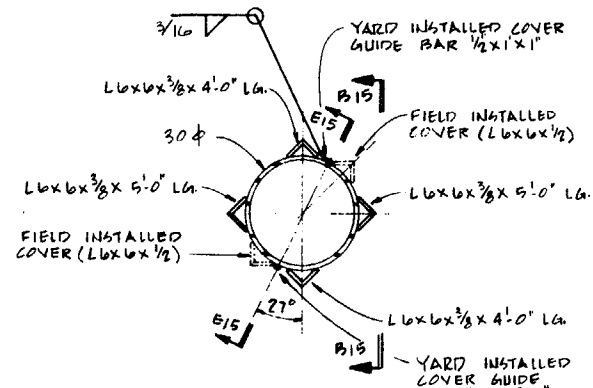
SCALE: HORIZ. 3/16" = 1'-0"
VERT. 1" = 30'-0"

NOTE: AFTER WELDING PILE IN PLACE, REMOVE STABBING GUIDE Pt's., ANGLES AND LIFTING EYES.



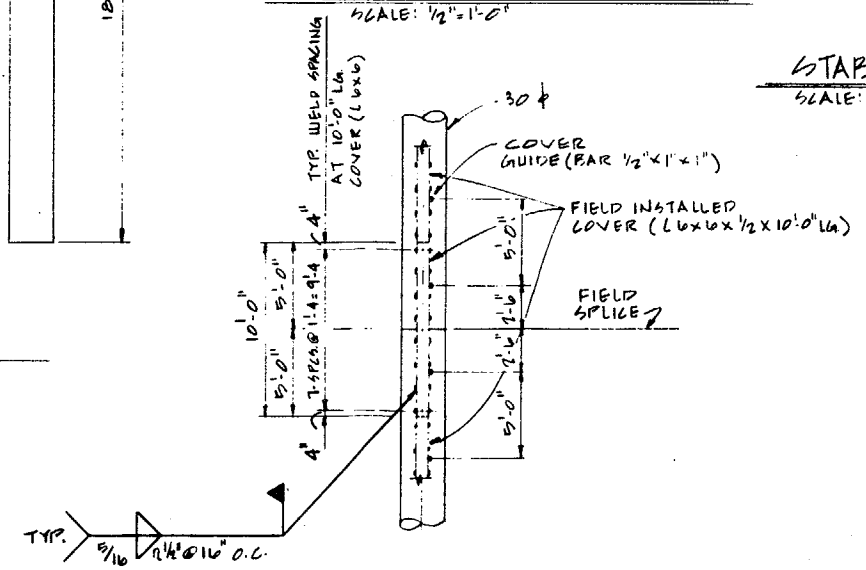
VIEW B15 -B15

SCALE: 1/2" = 1'-0"



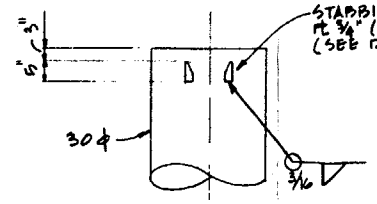
SECTION A15 -A15

SCALE: 1/2" = 1'-0"



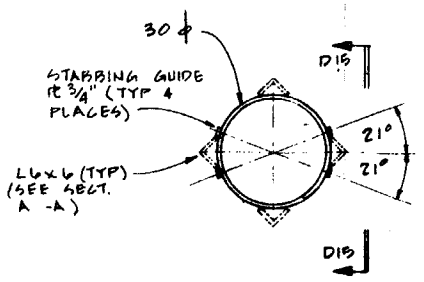
VIEW F15 -F15

SCALE: 3/16" = 1'-0"



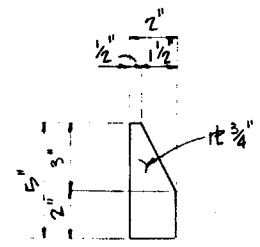
VIEW D -D

SCALE: 1/2" = 1'-0"



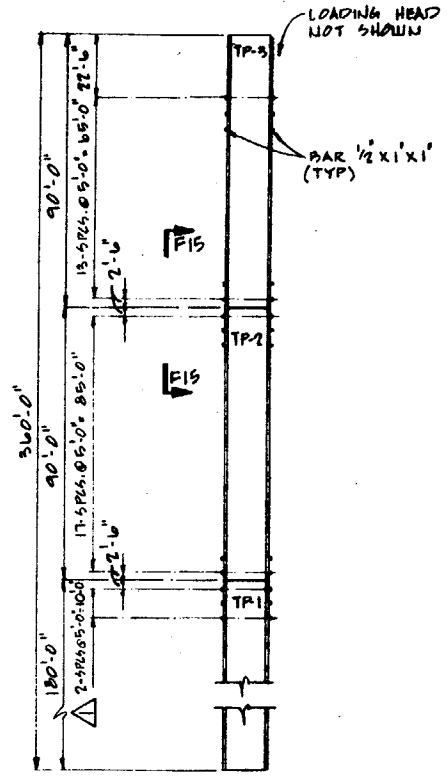
SECTION C15-C15

SCALE: 1/2" = 1'-0"



STABBING GUIDE Pt. DET.

SCALE: 3" = 1'-0" (8 - REQ'D.)



SECTION E15-E15

SCALE: HORIZ. 3/16" = 1'-0"
VERT. 1" = 30'-0"

REV.	DATE	BY	DESCRIPTION
1	6-10-85	R.S.	REVISE SECTION "E"

TEST PILE - ASSEMBLY & DETAILS

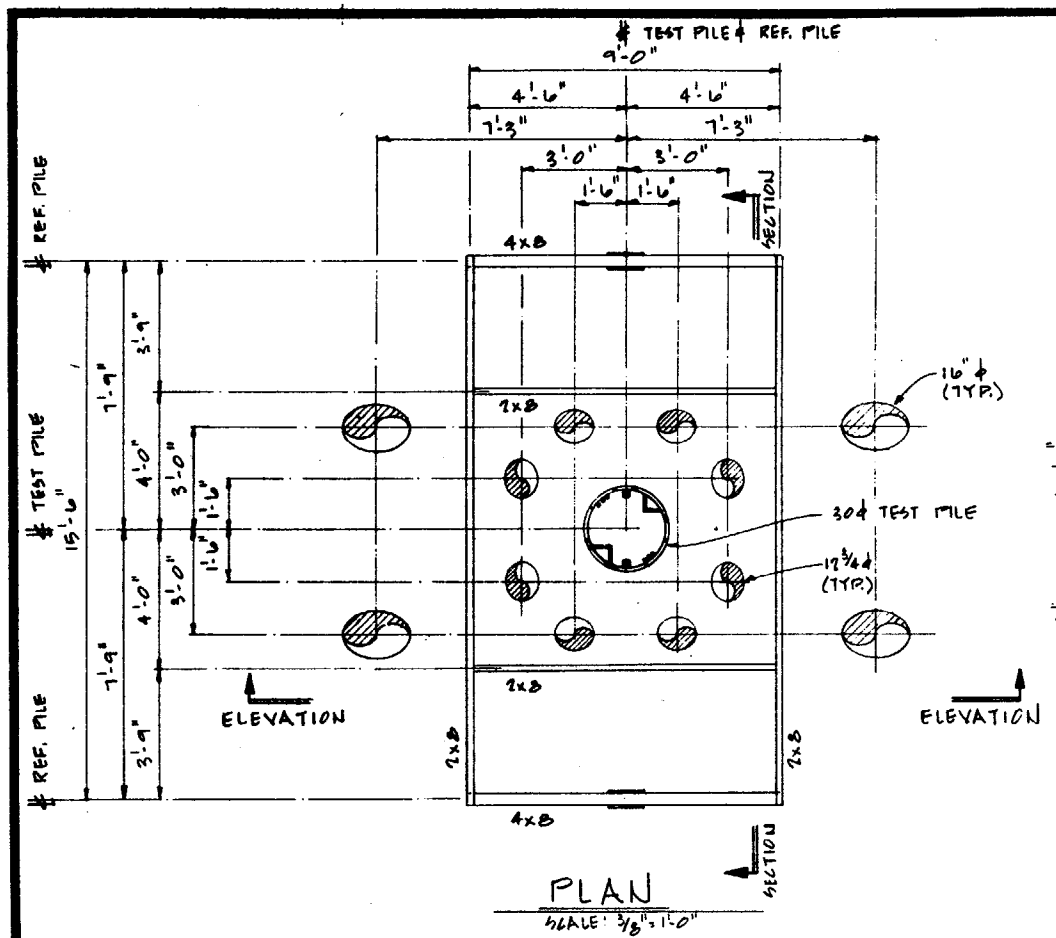
DELTA MARINE STRUCTURES, INC.

NEW ORLEANS dms LOUISIANA

STATE OF LOUISIANA
AGUSTIN CHIN
REG. NO. 7744
REGISTERED PROFESSIONAL ENGINEER IN CIVIL ENGINEERING

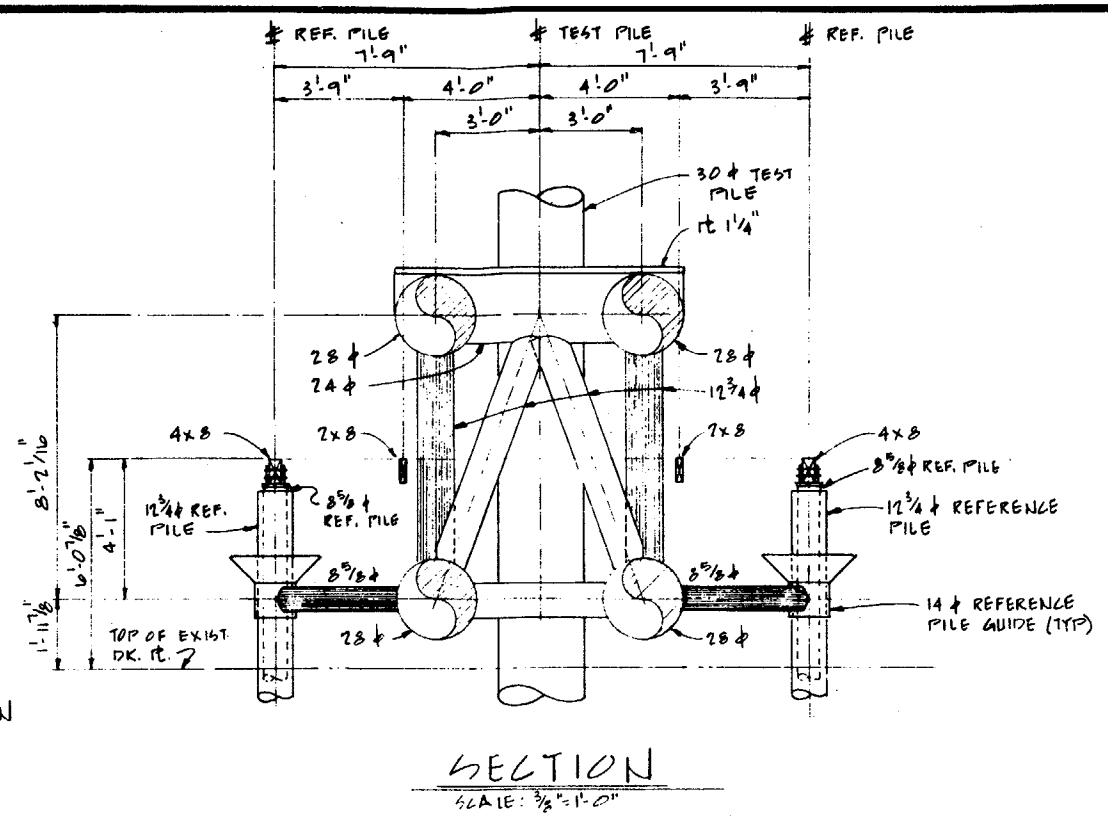
LOAD FRAME FOR WEST DELTA 300

APPROVED | DRAWN K.S. | CHECKED A. CHIN | DATE 5-16-85 | DWG. NO.



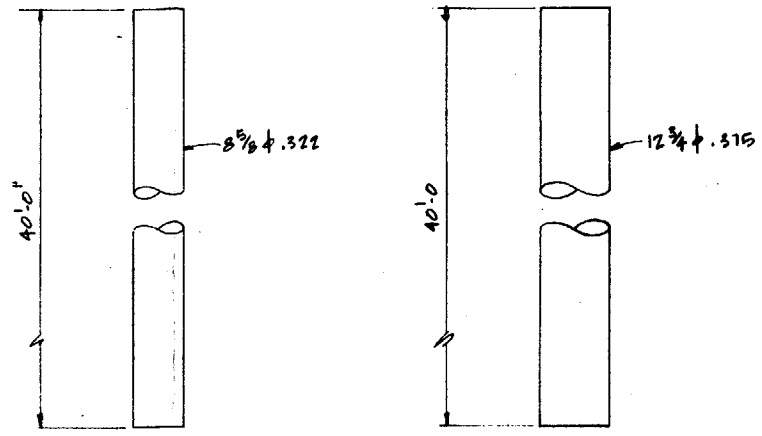
PLAN

SCALE: 3/8" = 1'-0"



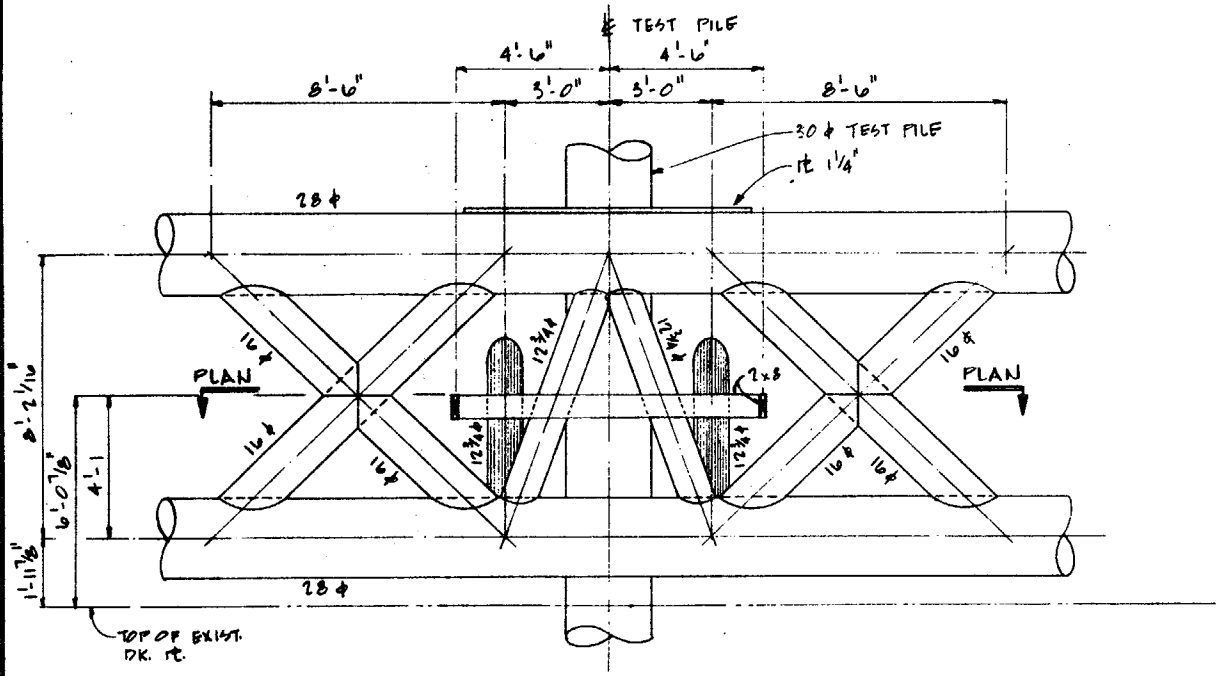
SECTION

SCALE: 3/8" = 1'-0"



⚠ REFERENCE PILES

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



ELEVATION

SCALE: 3/8" = 1'-0"

REV.	DATE	BY	DESCRIPTION
⚠1	6-1-83	RS.	ADDED REFERENCE PILE DET.

REFERENCE BEAM SUPPORT DETAILS

DELTA MARINE STRUCTURES, INC.

NEW ORLEANS dms LOUISIANA

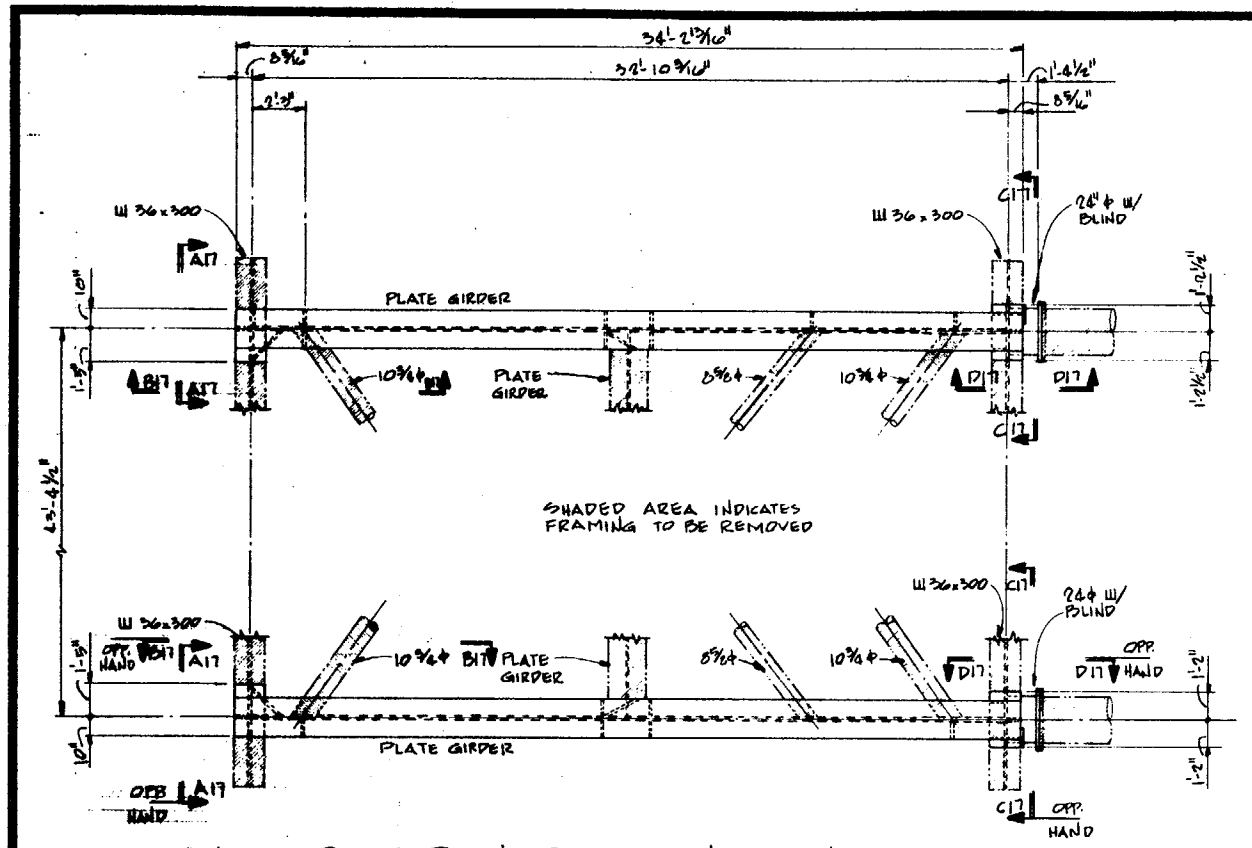
LOAD FRAME
FOR
WEST DELTA [redacted]

APPROVED

DRAWN RS. CHECKED

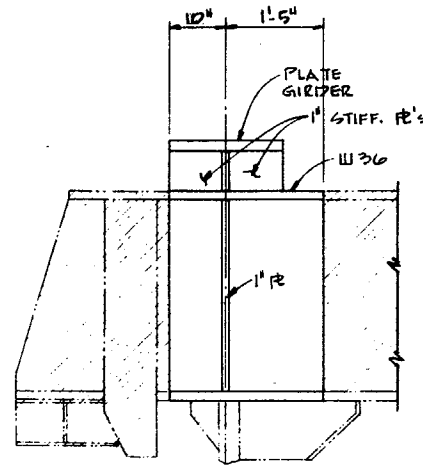
DATE 4-25-83

WDL NO. [redacted] ⚠



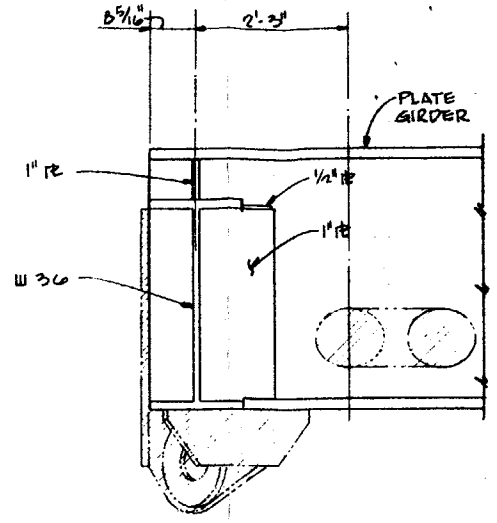
PART PLAN OF EXISTING LIFTING FRAME

SCALE 1/8"=1'-0"



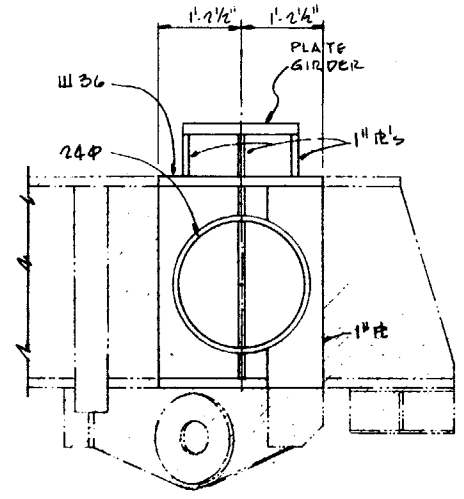
SECTION A17-A17

SCALE 3/4"=1'-0"



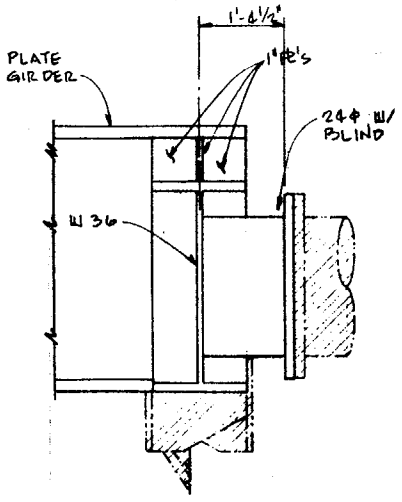
SECTION B17-B17

SCALE 3/4"=1'-0"



SECTION C17-C17

SCALE 3/4"=1'-0"



SECTION D17-D17

SCALE 3/4"=1'-0"

REV.	DATE	BY	DESCRIPTION

EXISTING LIFTING FRAME - PLAN & [illegible]

DELTA MARINE STRUCTURES, INC.

NEW ORLEANS dms LOUISIANA

[redacted]

LIFT FRAME FOR [redacted]

APPROVED

DESIGNED D. LEWIS CHECKED A. CHIN

DATE 5-30-85

DWG. NO. [redacted]