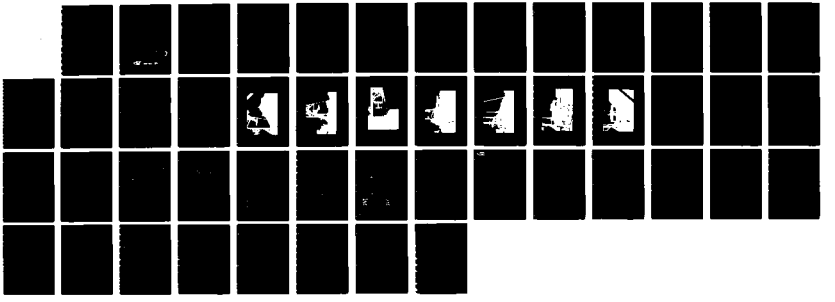
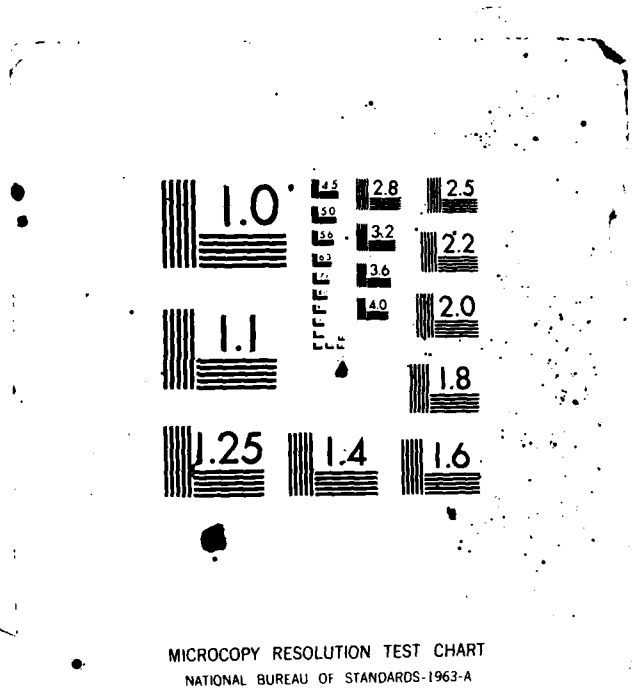
AD-A171 824 TEST AND DEMONSTRATION REPORT FOR THE PROTOTYPE DESIGN 1/1
ROTATOR ADAPTER(U) VSE CORP ALEXANDRIA VA R A LACHANCE
AUG 86 DAAK70-81-D-0109

UNCLASSIFIED F/G 13/13 NL





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AD-A171 824

FINAL

TEST AND DEMONSTRATION REPORT

FOR THE

PROTOTYPE DESIGN ROTATOR ADAPTER

Prepared For:

Logistics Support Laboratory
U.S. Army Belvoir RD&E Center
Fort Belvoir, Virginia 22060-5606

Contract No. DAAK70-81-D-0103
Task Order No. 0199

UNCLASSIFIED

Submitttted By:

VSE Corporation
2550 Huntington Avenue
Alexandria, Virginia 22303

August 1986

VSE CORPORATION

2550 HUNTINGTON AVENUE
ALEXANDRIA, VIRGINIA 22303

12

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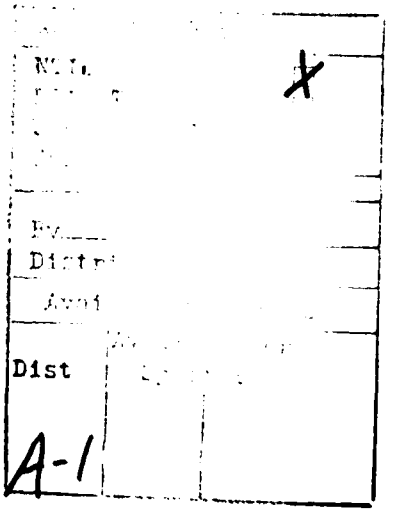


APPROVAL SHEET

TEST REPORT
FOR THE
PROTOTYPE DESIGN ROTATOR ADAPTER

CONTRACT NO. DAAK70-81-D-0109
TASK ORDER NO. 0199

PREPARED BY: Robert W. LaChance (Sr. Project Engineer) DATE: 28 Aug, 86

CHECKED BY: William S. Axsell (Project Manager) DATE: 29 August 1986

CHECKED BY: R. McMillan (Quality Control) DATE: 29 AUG 86

APPROVED BY: Robert R. Aldwell (Group Manager) DATE: 29 August 1986

PREFACE

BACKGROUND

The U.S. Army has identified a requirement to rotate 20 foot and 40 foot ISO containers during loading and unloading operations using the Army 250 ton crane P&H Model 6250 and 20 foot and 40 foot Line Fast Corp. Model 7127 spreader bars. To accomplish the mission a Bromma Model EH3 Rotator was installed. The rotator is suspended by the double hook blocks of the 250 ton crane. In its present operating configuration, the spreader bar is attached to the rotator by slings. The sling attachments permit torsional oscillations which are unacceptable.

DESIGN DESCRIPTION

The rotator adapter is a device that will dampen or eliminate the torsional oscillation present in the container spreader sling arrangement. The rotator adapter would connect the Bromma Model Number EH3 Rotator to the Line Fast Corp. Model Number 7127, 20 foot and 40 foot spreader bars.

The Rotator Adapter consists of an I-beam spreader bar with a cross beam at each end. A clevis is centrally located on top of the center I-beam to connect to the rotator The 20 foot spreader is connected using shackles between the lifteye of the spreader and a lifteye at the bottom of each end of the cross beams.

The 40 foot spreader mode set up would be as follows. Connect one end of sling legs to inner lifteyes marked "40 Ft lifteye" with bolt type anchor shackles. Connect opposite end of sling legs to spreader bar lifteyes with bolt type anchor shackles.

The 20 foot spreader mode setup would be as follows. Run free end of sling leg over top of adaptor and to diagonally opposite leg and secure with bolt type anchor shackle through thimble eye. Interlock two bolt type spring shackles. Install one end in outer lifteye marked "20 ft lifteye". Install opposite end in 20 foot spreader bar lifteye. Repeat assembly at remaining three corners.

TABLE OF CONTENTS

FIGURES

1. TEST AND DEMONSTRATION PURPOSE:

The purpose of the test and demonstration will be to verify the design strength for the rotator adapter and demonstrate that the rotator adapter does eliminate or reduce the torsional oscillation of 20 foot and 40 foot containers.

2. SYSTEM DESCRIPTION:

A Bromma Rotator, model number EH3, is suspended from the dual hookblock of the Army's 250 ton container crane P&H Model 6250. The prototype rotator adapter is connected to the rotator by à clevis and pin connection through the rotator padeye. The rotator adapter is then connected to the Army's 20 foot ISO spreader. This connection is accomplished by linking a shackle at each lifting eye of the rotator adapter with the shackle at each lifting eye of the spreader.

A 40 foot spreader may be connected to the rotator adapter by using four rotator adapter slings attached to the inner lifting eyes marked "40 ft. lifteye" on the rotator adapter. The slings are then connected to the corresponding lifteyes on the 40 foot spreader.

3. TEST PARAMETERS:

3.1 The Maximum Shipping Weight (MSW) of the Army twenty (20) foot ISO container is 20 long tons (44,800 pounds). The proof test load will be 1.5 times (MSW). The operational demonstration load will be the MSW = 44,800 lbs.

1.5 (MSW) = Proof Test Load.
1.5 (44,800) = 67,200 lbs vertical.

3.2 The Maximum Shipping Weight (MSW) of a forty (40) foot ISO container is 30 long tons (67,200 pounds). The proof test load will be 1.5 times (MSW). The operational demonstration load will be the MSW = 67,200 lbs.

1.5 (MSW) = Proof Test Load.
1.5 (67,200) = 100,800 lbs vertical.

4. TEST IDENTIFICATION:

4.1 Tests to be performed - Four tests are to be performed. Two tests with a 20 foot spreader and two tests with a 40 foot spreader.

4.1.1 Proof Test with 20 Foot Spreader - To determine the capability of the rotator adapter to lift a 20 foot spreader and ISO container loaded to 1.5 times the Maximum Shipping Weight, (67,200 lbs), for a period of not less than five minutes.

4.1.2 Operational Demonstration with 20 foot Spreader - To determine the capability of the rotator adapter to eliminate or reduce torsional oscillation of a 20 foot spreader with a 20 foot ISO container loaded to its Maximum Shipping Weight of 44,800 lbs.

4.1.3 Proof Test with 40 foot Spreader - To determine the capability of the rotator adapter to lift a 40 foot spreader and ISO container loaded to 1.5 times the Maximum Shipping Weight, (100,800 lbs), for a period of not less than 5 minutes.

4.1.4 Operational Demonstration with 40 foot Spreader - To determine the capability of the rotator adapter to eliminate or reduce torsional oscillation of a 40 foot spreader with a 40 foot ISO container loaded to its Maximum Shipping Weight of 67,200 lbs.

5. TEST PROCEDURES:

5.1 Proof Test with 20 Foot Spreader

5.1.1 Assemble the Prototype Rotator Adapter as shown in Figure 5.1 using a 20 foot ISO spreader.

5.1.2 Lift a load equal to 1.5 times the Maximum Shipping Weight of a 20 foot ISO container, (67,200 lbs). The load is to be evenly distributed over the spreader pickup points. The load is to be lifted to a height of two feet.

5.1.3 Hold the load suspended for a minimum of five minutes.

5.1.4 Lower load and disconnect spreader and rotator adapter.

5.1.5 Examine rotator adapter and spreader for cracks, damage, and permanent deformation.

5.1.6 Any evidence of malfunction, damage, permanent deformation, inability to engage, lift, or disengage the rotator adapter or spreader shall constitute failure of the test.

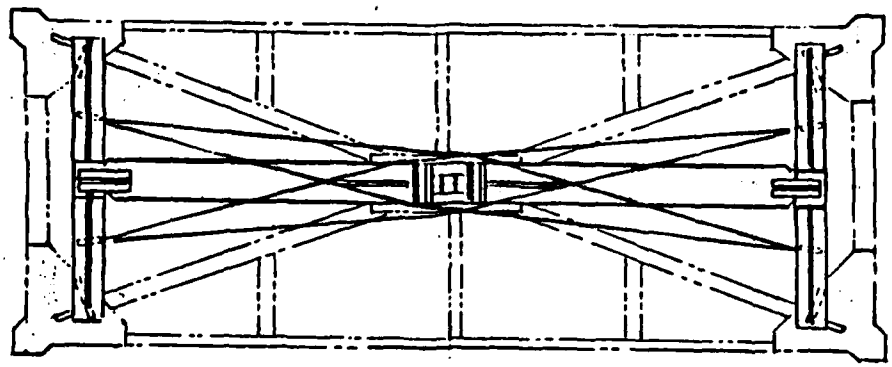
5.1.7 A test fixture may be used to apply load.

5.2 Operational Demonstration with 20 Foot Spreader

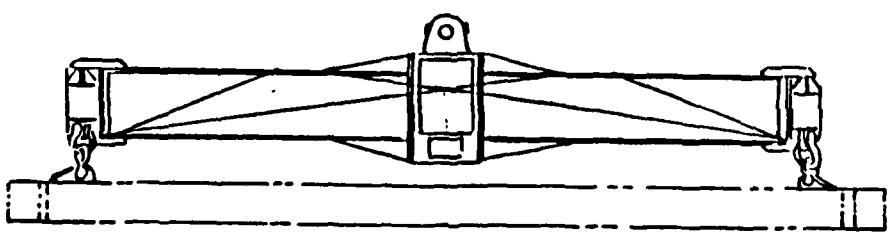
5.2.1 Assemble the Prototype Rotator Adapter as shown in Figure 5.1 using a 20 foot ISO spreader.

5.2.2 Lift a load equal to the maximum shipping weight of a 20 foot ISO container, (44,800 lbs). The load is to be evenly distributed over the spreader pickup points. The load is to be lifted to a height of two feet.

CAUTION: CONNECT SHACKLES ONLY TO THE OUTSIDE LIFTEYES MARKED "20 FT. LIFTEYE" ON THE ROTATOR ADAPTER



BROMMA EH3
ROTATOR



PROTOTYPE ROTATOR ADAPTER SYSTEM WITH 20 FOOT ISO SPREADER
FIGURE 5.1

5.2.3 Using the rotator controls, rotate the load clockwise 360°, stopping rotation every 90°, and measuring oscillation of the load. Record data on test data sheet (example Appendix A).

5.2.4 Using the rotator controls, rotate the load counter-clockwise 360°, stopping rotation every 90°, and measuring oscillation of load. Record data on test data sheet (example Appendix A).

5.2.5 Lower load and disassemble components after completion of tests.

5.3 Proof Test with 40 Foot Spreader

5.3.1 Assemble the Prototype Rotator Adapter as shown in Figure 5.2 using a 40 foot ISO spreader.

5.3.2 Lift a load equal to 1.5 times the maximum shipping weight of a 40 foot ISO container (100,800 lbs). The load is to be evenly distributed over the spreader pickup points. The load is to be lifted to a height of two feet.

5.3.3 Hold the load suspended for a minimum of five minutes.

5.3.4 Lower load and disconnect spreader and rotator adaptor.

5.3.5 Examine rotator adapter and spreader for cracks, damage, and permanent deformation.

5.3.6 Any evidence of malfunction, damage, permanent deformation, inability to engage, lift, or disengage the rotator adapter or spreader shall constitute failure of the test.

5.3.7 A test fixture may be used to apply load.

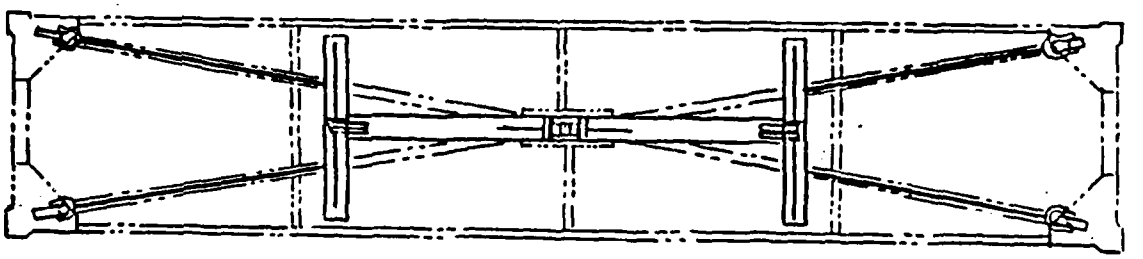
5.4 Operational Demonstration with 40 Foot Spreader

5.4.1 Assemble the Prototype Rotator Adapter as shown in Figure 5.2 using a 40 foot ISO spreader.

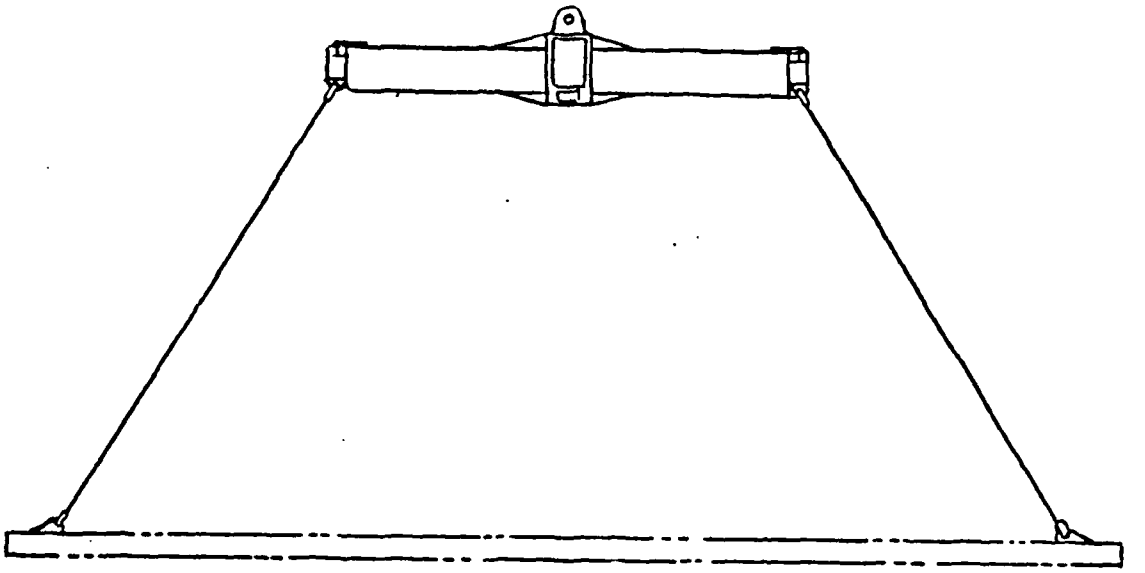
5.4.2 Lift a load equal to the maximum shipping weight of a 40 foot ISO container (67,200 lbs). The load is to be evenly distributed over the spreader pickup points. The load is to be lifted to a height of two feet.

5.4.3 Using the rotator controls, rotate the load clockwise 360°, stopping rotation every 90°, and measuring oscillation of the load. Record data on test data sheet (example Appendix A).

CAUTION: CONNECT SLINGS ONLY TO THE INSIDE LIFTEYES MARKED "40 FT. LIFTEYE" ON THE ROTATOR ADAPTER



BROMMA EH3
ROTATOR



PROTOTYPE ROTATOR ADAPTER SYSTEM WITH 40 FOOT ISO SPREADER
FIGURE 5.2

5.4.4 Using the rotator controls, rotate the load counterclockwise 360°, stopping rotation every 90°, and measuring oscillation of the load. Record data on test data sheet (example Appendix A).

5.4.5 Lower load and disassemble components after completion of tests.

6. TEST RESULTS:

6.1 Proof Test with 20 foot Spreader - This test was conducted using the ROPCO, RPC Corporation test stand. The test stand was specifically designed to test ISO container lifting spreaders and associated material handling equipment. The testing was accomplished in accordance with test procedure Paragraph 5.1. See Appendix A, Test Data Sheet 1, for test data and Appendix D for ILO Form 4 Certification.

6.2 Operational Demonstration with 20 foot Spreader - The operational tests were not conducted by VSE. The Bromma EH3 Rotator was not available until the U.S. Army TRADOC demonstrations were conducted at Fort Eustis, VA. The operational demonstration of the Rotator Adapter with a 20 foot spreader was performed by the U.S. Army 7th Transportation Group on 18 June 1986. VSE personnel were not present due to funding limitations. It was reported that the demonstration was successful and that the osciallation during operations were reduced to acceptable levels.

6.3 Proof Test with 40 foot Spreader - This test was conducted using the ROPCO, RPC Corporation test stand. Due to the structural design of the test stand the slings used on the Rotator Adapter when connected to the 40 foot spreader created an interference with a structural support beam on the test stand. The adapter slings were tested separately. A tensile load of 77,104 lbs vertile was applied at a sling angle of 40.8°. See Appendix D for ILO Form 4 Certification and RPC calculations for 40 foot sling assembly. The rotator adapter and 40 foot sprader combination was tested using shorter slings. This condition increases the compressive load on the spreader and the tensile load on the rotator adapter, creating worst case conditions. The testing was accomplished in accordance with test procedures Paragraph 5.1. See Appendix A, Test Data Sheet 1, for test data and Appendix D for ILO Form 4 Certification.

6.4 Operational Demonsration with 40 foot Spreader - The operational tests were not conducted by VSE. The Bromma EH3 Rotator was not available until the U.S. Army TRADOC demonstrations were conducted at Fort Eustis, VA. The operational demonstration of the Rotator Adapter with a 40 foot spreader was performed by the U.S. Army 7th Transportation Group on 18 June 1986. VSE personnel were not present due to funding limitations. It was reported that the demonstration

was successful and that the osciallation during operations were reduced to acceptable levels. The operation with the slings in the 40 foot mode was not as successful as in the 20 foot direct linkage mode. The oscillation was sufficiently greater in the 40 foot mode with slings. It was suggested that a 40 foot model of the rotator adapter may be a solution.

7. CONCLUSIONS:

The Rotator Adapter was inspected in accordance with VSE Quality Control End Item Final Inspection Requirements, see Appendix D, and accepted. The test and demonstration has proven the design is sufficiently strong enough and has achieved the design goal. The Rotator Adapter does effectively reduce the rotational oscillation of the Bromma Rotator when connected with 20 foot or 40 foot ISO spreaders. The 40 foot spreader mode utilizing slings does not reduce the rotational oscillation as effectively as the 20 foot spreader mode direct linkage.

8. RECOMMENDATIONS:

It is recommended that the Rotator Adapter in the 40 foot mode be redesigned. A possible consideration would be to use a large adapter capable of direct linkage to the 40 foot spreader such as used in the 20 foot spreader mode. The Rotator Adapter should be considered a short term solution to the problem. A long term solution may be to incorporate the rotator as part of the spreader frame itself. This would also eliminate excess weight and clear lift height usage.

APPENDIX A

TEST DATA SHEETS

APPENDIX A

TEST DATA SHEET 1

DATE: 29 May 1986

TITLE: Rotator Adapter Proof Test with 20 Foot Spreader

TEST NO.: 5.1

TIME: 4:00 P.M.

TEMPERATURE: 86°F

LOAD MASS (LBS): 67,200 lbs

TEST TEAM: Terry Gryder, RPC
Jim Sturgill, RPC
Clint Mooney, RPJ

TEST OBSERVERS: Paul Shively, BRDEC
Robert LaChance, VSE

OSCILLATION	(INCHES) CLOCKWISE	COUNTER-CLOCKWISE
90°	N/A	N/A
180°	N/A	N/A
270°	N/A	N/A
360°	N/A	N/A

NOTES: The test was conducted in accordance with test procedure 5.1 (Proof Test with 20 Foot Spreader). The test was performed using the ROPCO test stand. See Exhibit 1 & 2, Appendix B. A 1/4" deflection at the center of the Rotator Adapter was recorded under full load. No permanent deformation or abnormality which would render the adapter unsuitable for use was detected.

Jim Sturgill
TEST ENGINEER, RPC — DATE

Robert W. LaChance
QUALITY CONTROL, VSE — 16 Aug 86 DATE

APPENDIX A

TEST DATA SHEET 2

DATE: 29 May 1986

TITLE: Rotator Adapter Proof Test with 40 Foot Spreader

TEST NO.: 5.3

TIME: 1:30 P.M.

TEMPERATURE: 86°F

LOAD MASS (LBS): 100,800 lbs

TEST TEAM: Terry Gryder, RPC
Jim Sturgill, RPC
Clint Mooney, RPJ

TEST OBSERVERS: Paul Shively, BRDEC
Robert LaChance, VSE

OSCILLATION	(INCHES) CLOCKWISE	COUNTER-CLOCKWISE
90°	N/A	N/A
180°	N/A	N/A
270°	N/A	N/A
360°	N/A	N/A

NOTES: The test was conducted in accordance with test procedure 5.3 (Proof Test with 40 Foot Spreader). The test was performed using the ROPCO test stand. See Exhibit 3 & 4, Appendix B. A 1/4" deflection at the center of the Rotator Adapter was recorded under full load. No permanent deformation or abnormality which would render the adapter unsuitable for use was detected.

Jim Sturgill
TEST ENGINEER, RPC

DATE

Robert W. LaChance
QUALITY CONTROL, VSE

16 Aug 86
DATE

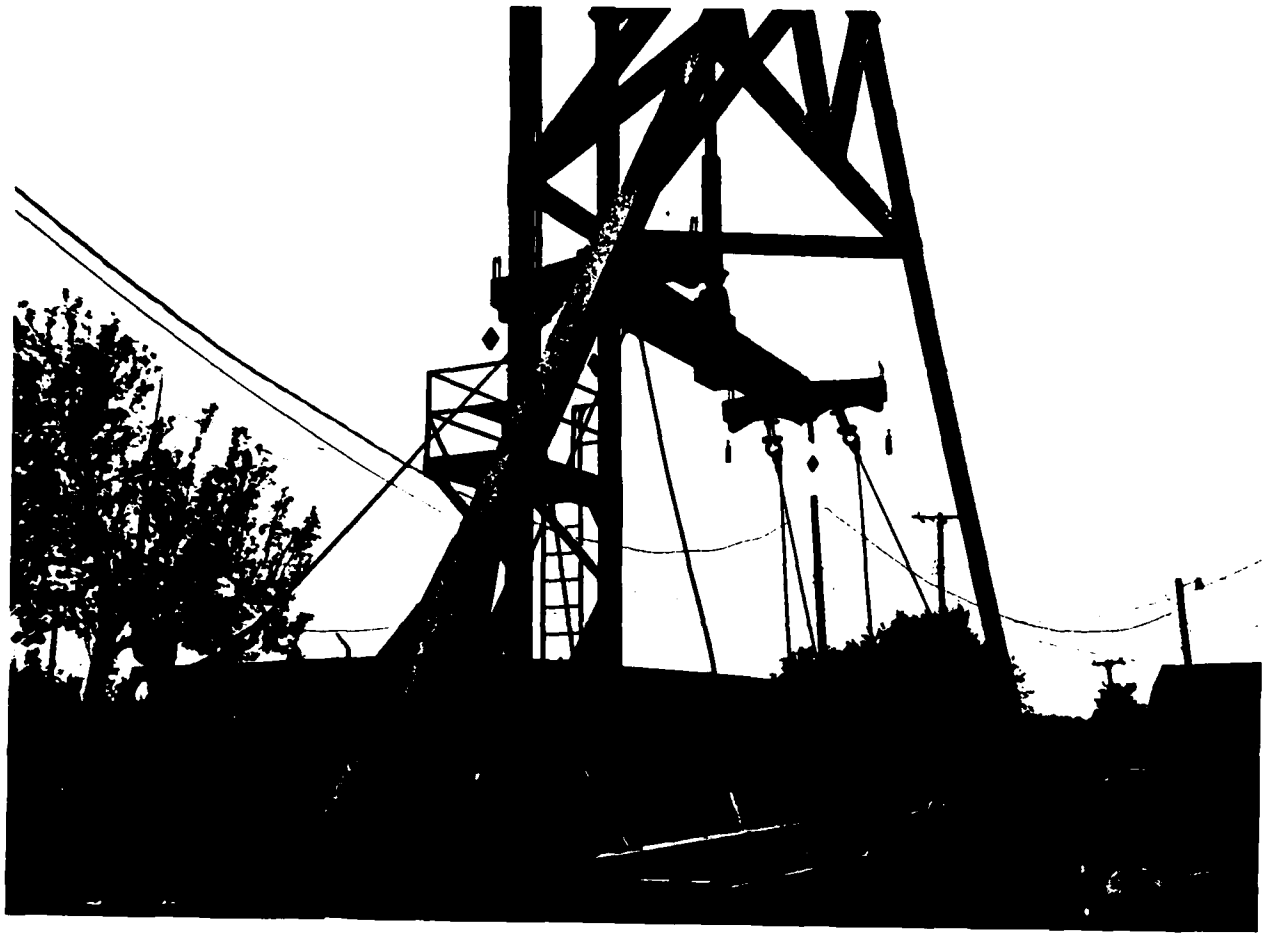
APPENDIX B

EXHIBITS 1-7

ROTATOR ADAPTER W/40 FOOT SPREADER

EXHIBIT 1

APPENDIX B



ROTATOR ADAPTER W/40 FOOT SPREADER

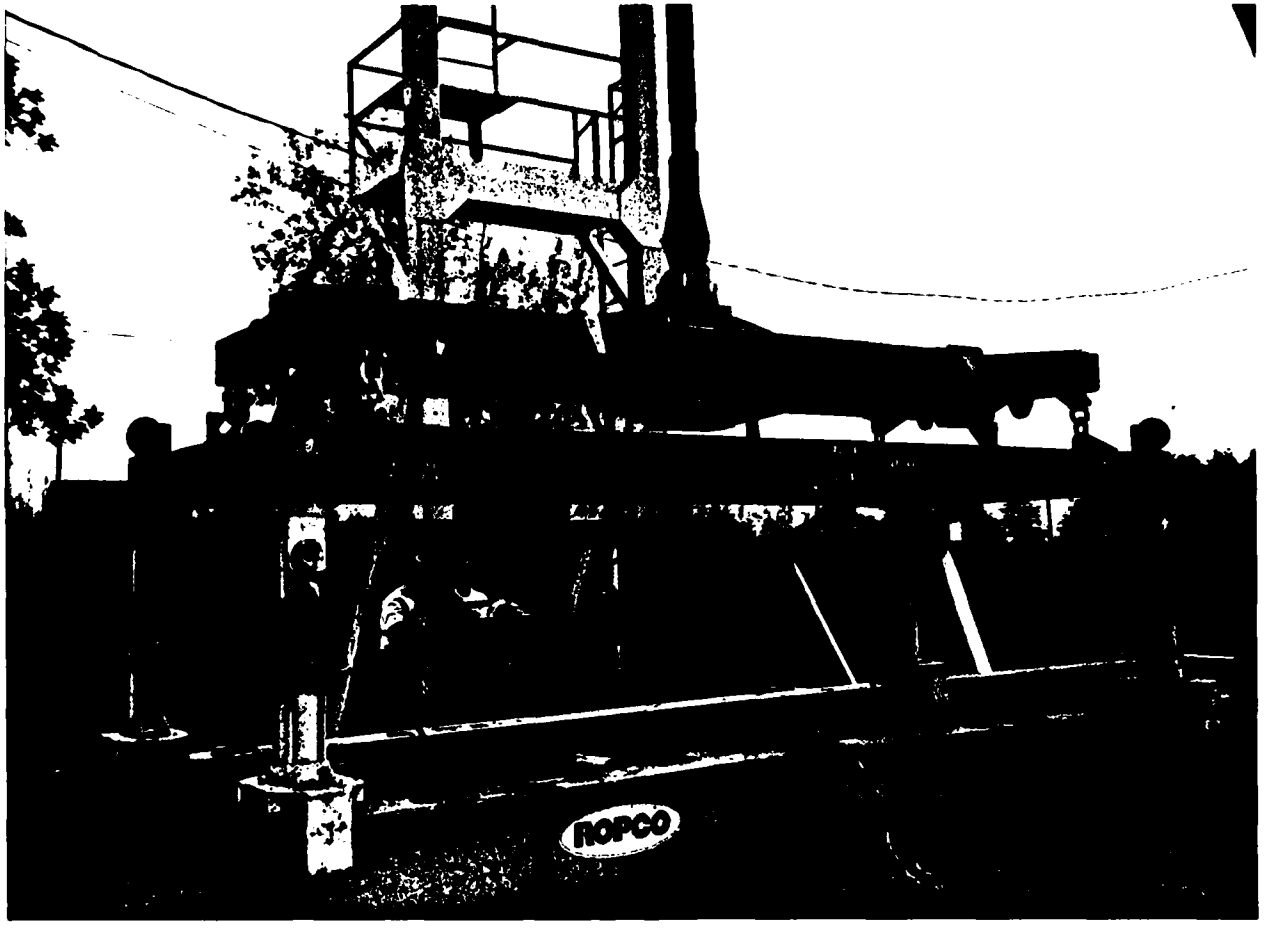
EXHIBIT 2

APPENDIX B

ROTATOR ADAPTER W/40 FOOT SPREADER

EXHIBIT 3

APPENDIX B



ROTATOR ADAPTER W/20 FOOT SPREADER

EXHIBIT 4

APPENDIX B

ROTATOR ADAPTER W/20 FOOT SPREADER

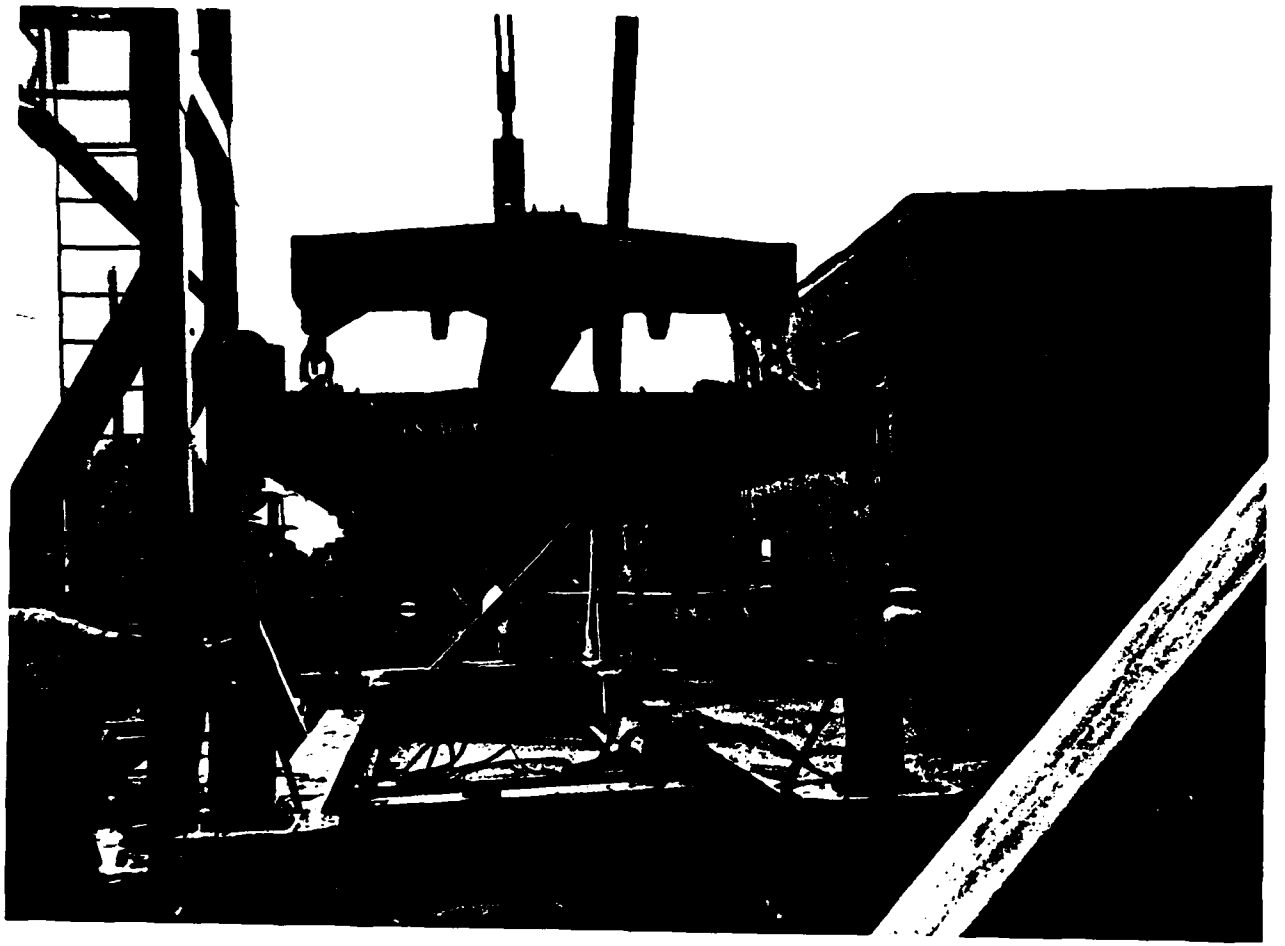
EXHIBIT 5

APPENDIX B

ROTATOR ADAPTER W/20 FOOT SPREADER

EXHIBIT 6

APPENDIX B



ROTATOR ADAPTER W/20 FOOT SPREADER

EXHIBIT 7

APPENDIX B

APPENDIX C

ROTATOR ADAPTOR DRAWINGS

VSE CORPORATION

PJO NO. 0300.0199

CLIENT

SHEET 1 OF 1

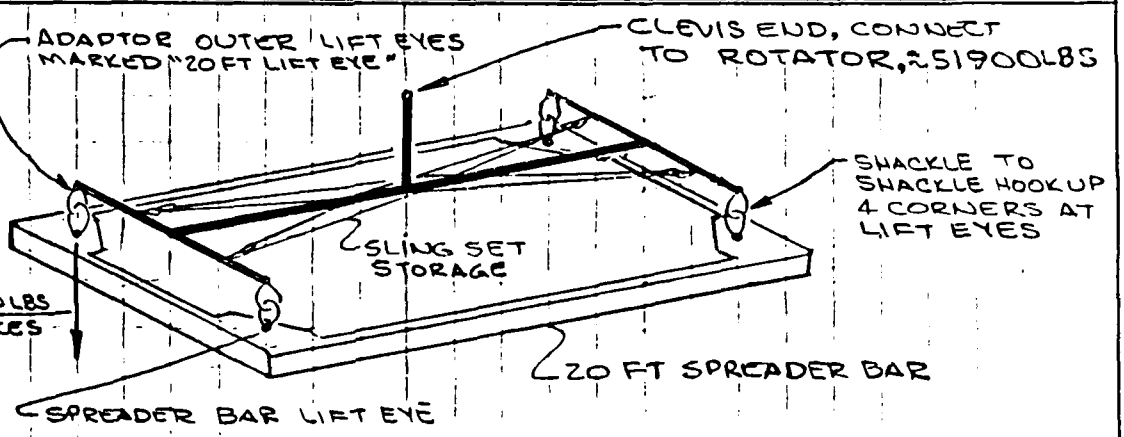
DWG Nº APPENDIX C

PROJECT TITLE CRANE / ROTATOR ADAPTOR

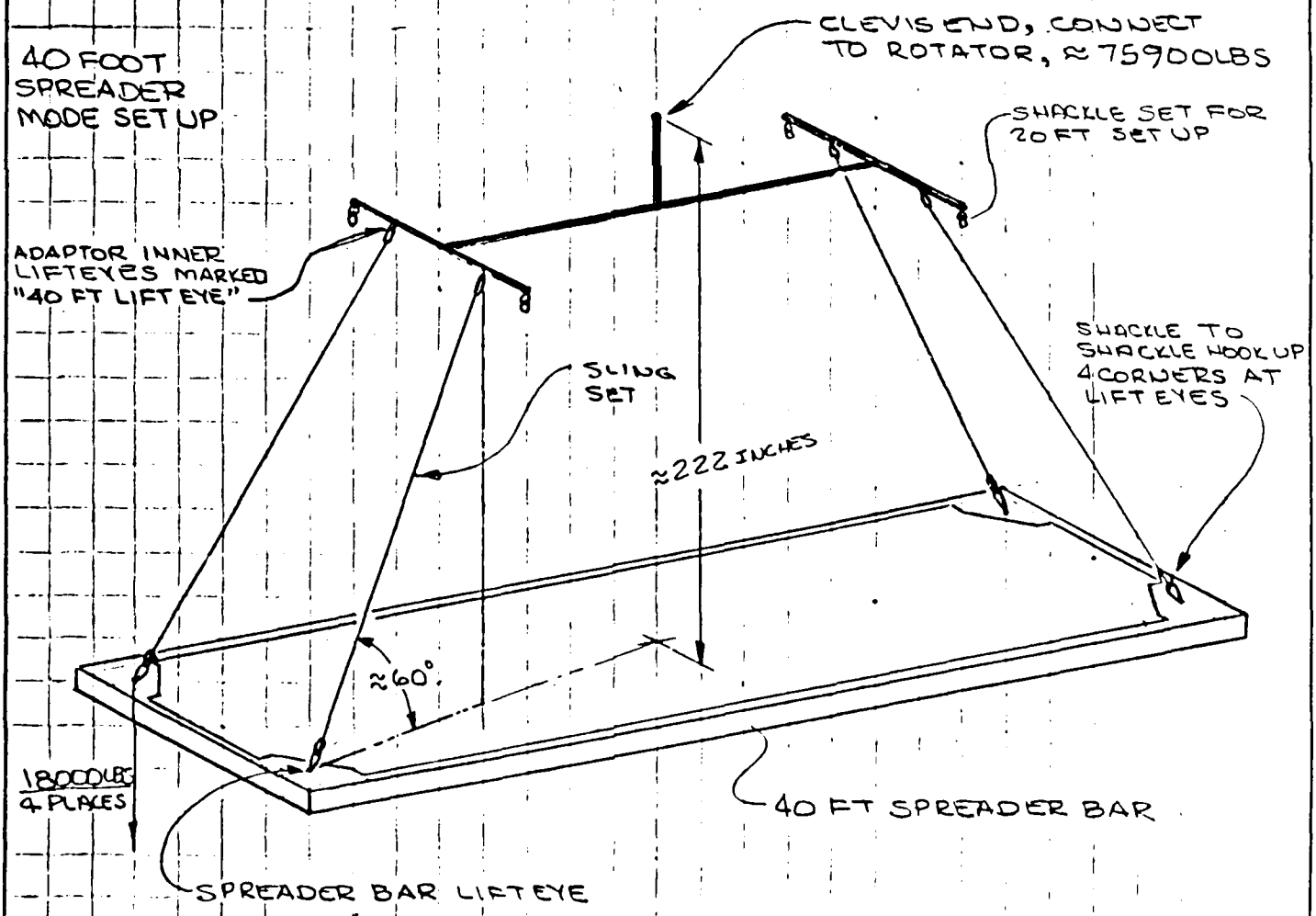
SUBJECT PROPOSAL Nº 3: I TYPE STRONG BACK

PREPARED BY J. Weller DATE 02/20/86 CHECKED BY _____ DATE _____

20 FOOT SPREADER MODE SETUP



40 FOOT SPREADER MODE SETUP



VSE CORPORATION

PJO NO. 0300.0199

CLIENT

SHEET 1 OF 8

DWG NO. 9386

PROJECT TITLE CRANE/ROTATOR ADAPTOR

SUBJECT CRANE/ROTATOR ADAPTOR ASSEMBLY

PREPARED BY J. Deller DATE 03/27/86 CHECKED BY DC/R. McMillan DATE 7 APR 86

NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   DIMENSIONS ARE IN INCHES.
   TOLERANCE, ANGLES ±1°
   3 PLACE DECIMALS ± .
   2 PLACE DECIMALS ± .06

2. ALL WELDS TO BE IN ACCORDANCE WITH DRAWING 13214E9223, TYPE I, CLASS 1

3. USING FIND NO'S 5 & 12 AS TEMPLATES LOCACATE DRILL .124-.132 DIA HOLES AS REQUIRED FOR FIND NO. 6

4. INSTALL FIND NO. 9 FINGER TIGHT, ALIGN HEADS WITH WRENCH TO POSITION SHOWN. INSTALL FIND NO. 10 AS SHOWN.

5. REMOVE FIND NO'S 7 & 11 BEFORE PAINTING.

6. INSTALL FIND NO'S 5 & 12 AFTER PAINTING.

7. TREATMENT AND PAINTING TO BE IN ACCORDANCE WITH MIL-T-704, TYPE F.
   a. PRETREATMENT, DOD-P-15328
   b. PRIMER , MIL-P-52192
   c. FINISH , MIL-C-22750
   d. COLOR NO. , 34087 OLIVE DRAB

8. ESTIMATED GROSS SHIPPING WEIGT APPROX 3896 LBS

LIST OF MATERIAL

FIND NO.	FSCM	DWG SIZE	PART OR IDENTIFYING NO.	QTY REQD	NOMENCLATURE OR DESCRIPTION	SPECIFICATION	MATERIAL
13		A	9390	4	SLING LEG		
12		A	9392	1	VSE I.D. PLATE		
11			STYLE G-2130	8	BOLT TYPE ANCHOR & CHAIN SHACKLE 1¼ SIZE, JAMES WALKER CO.	RR-C-271-B TYPE IV, CLASS 6	STEEL
10			MCMASTER-CARR 88640K65	A.R.	.051 DIA SAFETY LOCK WIRE	MIL-W-6713	STAINLESS STEEL
9			MCMASTER-CARR 90124A716	8	1/2-13 x 1 1/2 HEX HD CAP SCREW WITH DRILLED HEAD FOR SAFTEY WIRE	GRADE 5	STEEL
8		A	9315	4	RETAINER BLOCK		
7		A	9314	1	CLEVIS PIN		
6			MCMASTER-CARR 97525A016	16	DOMED HEAD BLIND RIVET 1/8 DIA x 3/8 GRIP		STAINLESS STEEL
5		A	9391	2	CAUTION LABEL PLATE		
4				2	.250 PLATE x 17.00 x 28.50	10.21 LB/FT²	ASTM A36
3				8	ANGLE BAR SIZE 2.00 x 2.00 x .375 x 15.00	4.70 LB/FT	ASTM A36
2		A	9387	2	SHORT BOOM ASSEMBLY		
1		A	9307	1	LONG BOOM ASSEMBLY		

VSE CORPORATION

PJO NO. 0300.0199

CLIENT

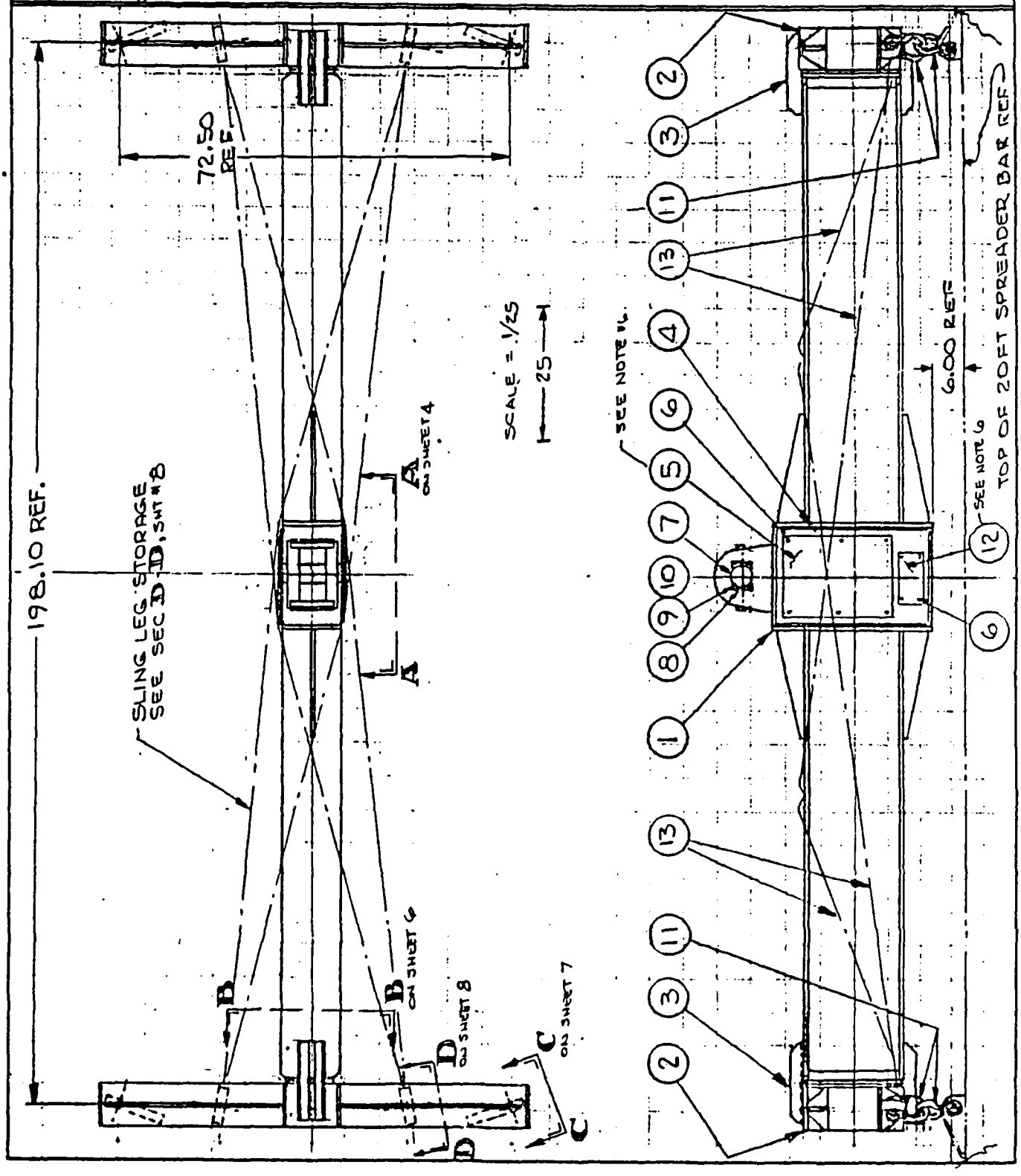
SHEET 2 OF 8

DWG NO. 9386

PROJECT TITLE CRANE/ROTATOR ADAPTOR

SUBJECT CRANE/ROTATOR ADAPTOR ASSEMBLY

PREPARED BY J. Weller DATE 03/27/86 CHECKED BY QC/R. McMillan DATE 7 APR 86



VSE CORPORATION

PJO NO. 0300.0199

CLIENT

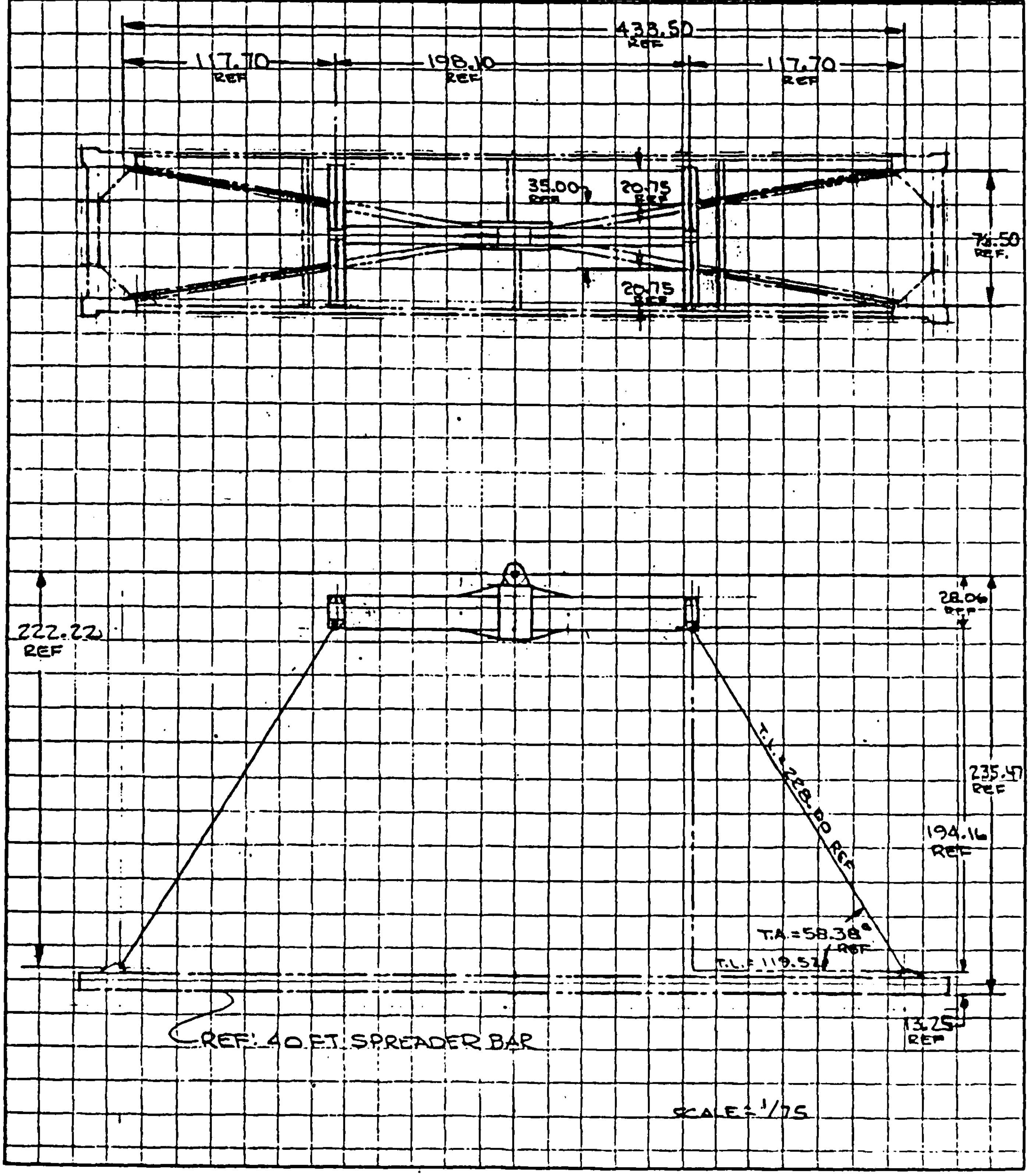
SHEET 3 OF 8

DWG NO. 9386

PROJECT TITLE Crane / Rotator Adaptor

SUBJECT Crane / Rotator Adaptor Assembly, Set up for 40 FT Spreader Bar

PREPARED BY J. Weller DATE 03/27/86 CHECKED BY R. McMillan DATE 7 ... 86



VSE CORPORATION

PJO NO. 0300.0199

CLIENT

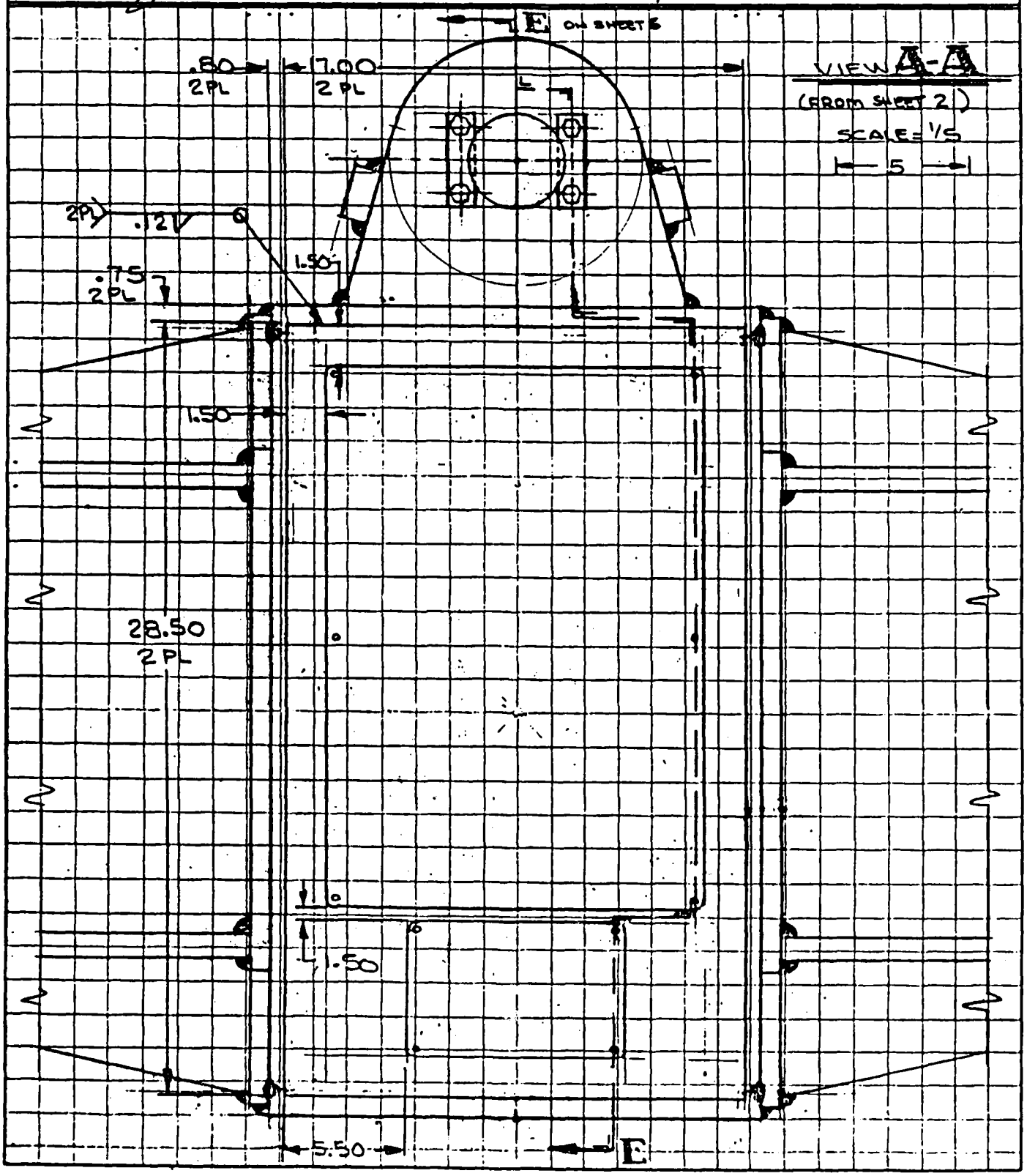
SHEET 4 OF 8

DWG NO 9386

PROJECT TITLE CRANE/ROTATOR ADAPTOR

SUBJECT CRANE/ROTATOR ADAPTOR ASSEMBLY

PREPARED BY A Weller DATE 03/27/86 CHECKED BY QC/R. McMillan DATE 7 APR 86



VSE CORPORATION

PJO NO. 0300.0199

CLIENT

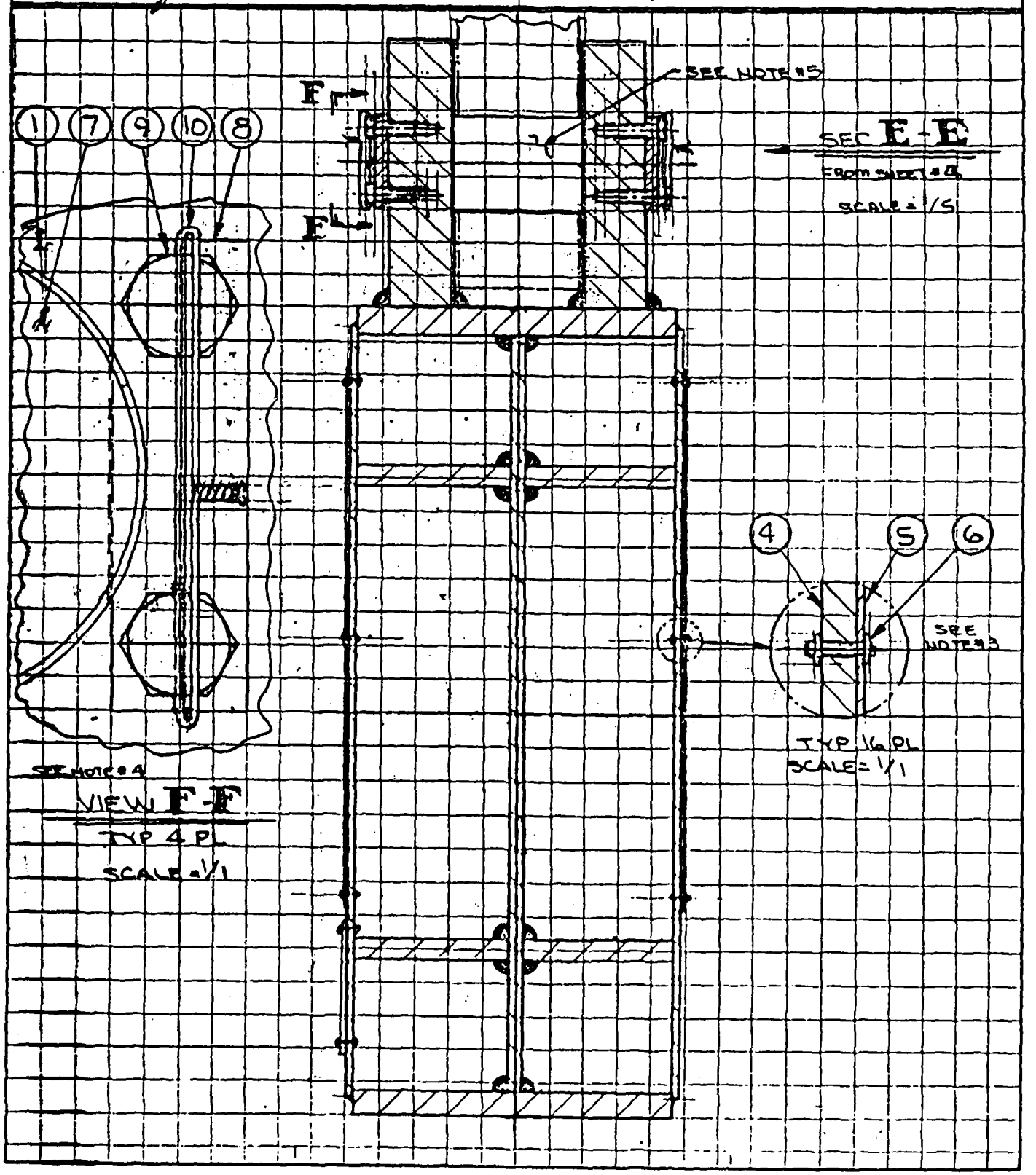
SHEET 5 OF 8

DWG NO. 9386

PROJECT TITLE CRANE/ROTATOR ADAPTOR

SUBJECT CRANE/ROTATOR ADAPTOR ASSEMBLY

PREPARED BY J. Weller DATE 03/21/86 CHECKED BY R.R. McMillan DATE 7 APR 86



VSE CORPORATION

PJO NO. 0300.0199

CLIENT

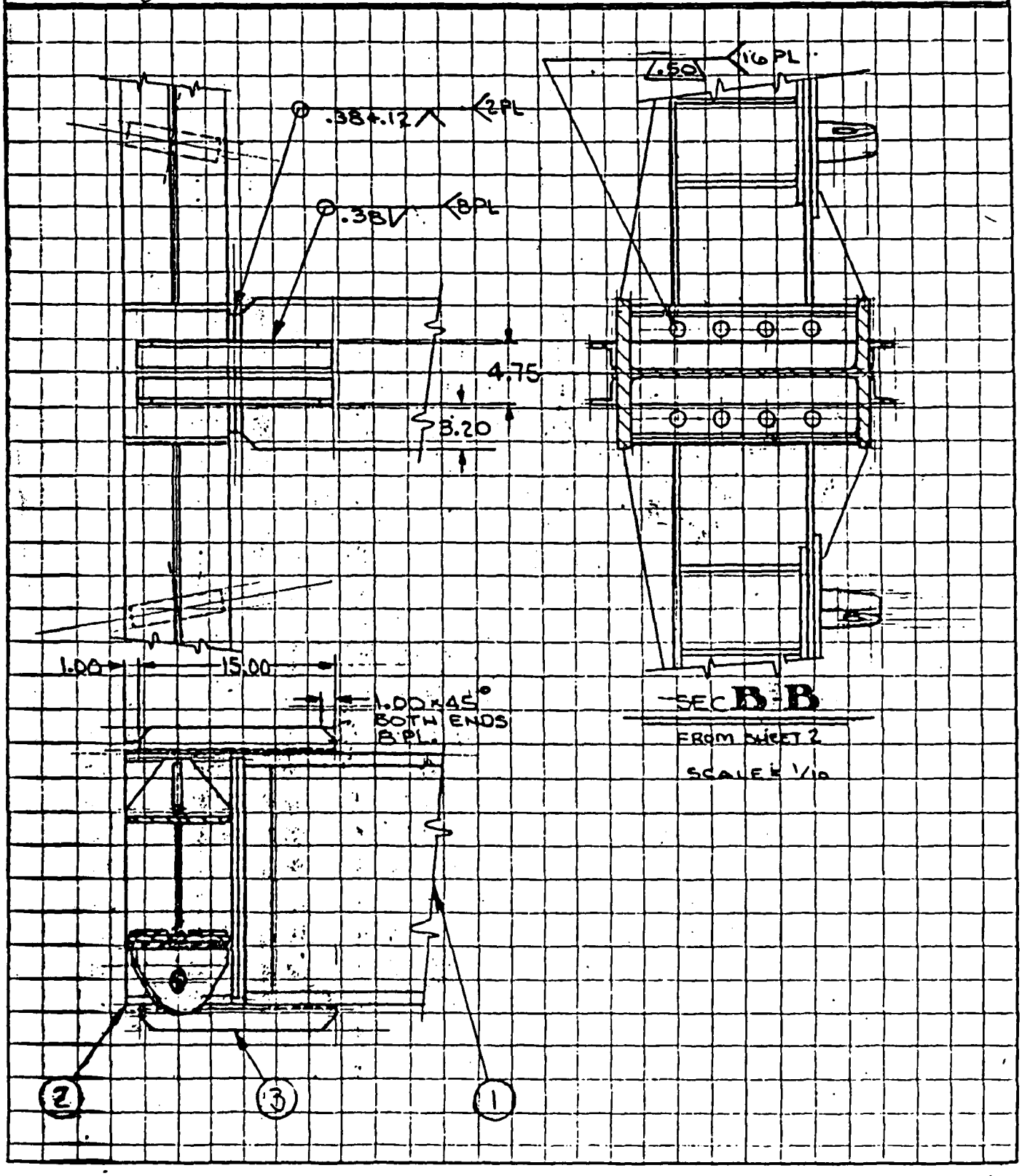
SHEET 6 OF 18

DWG NO 9386

PROJECT TITLE CRANE/ROTATOR ADAPTOR

SUBJECT CRANE/ROTATOR ADAPTOR ASSEMBLY

PREPARED BY J. Weller DATE 03/27/86 CHECKED BY QC/R. McMillan DATE 7 MAR 86



VSE CORPORATION

PJO NO. 0300.0199

CLIENT

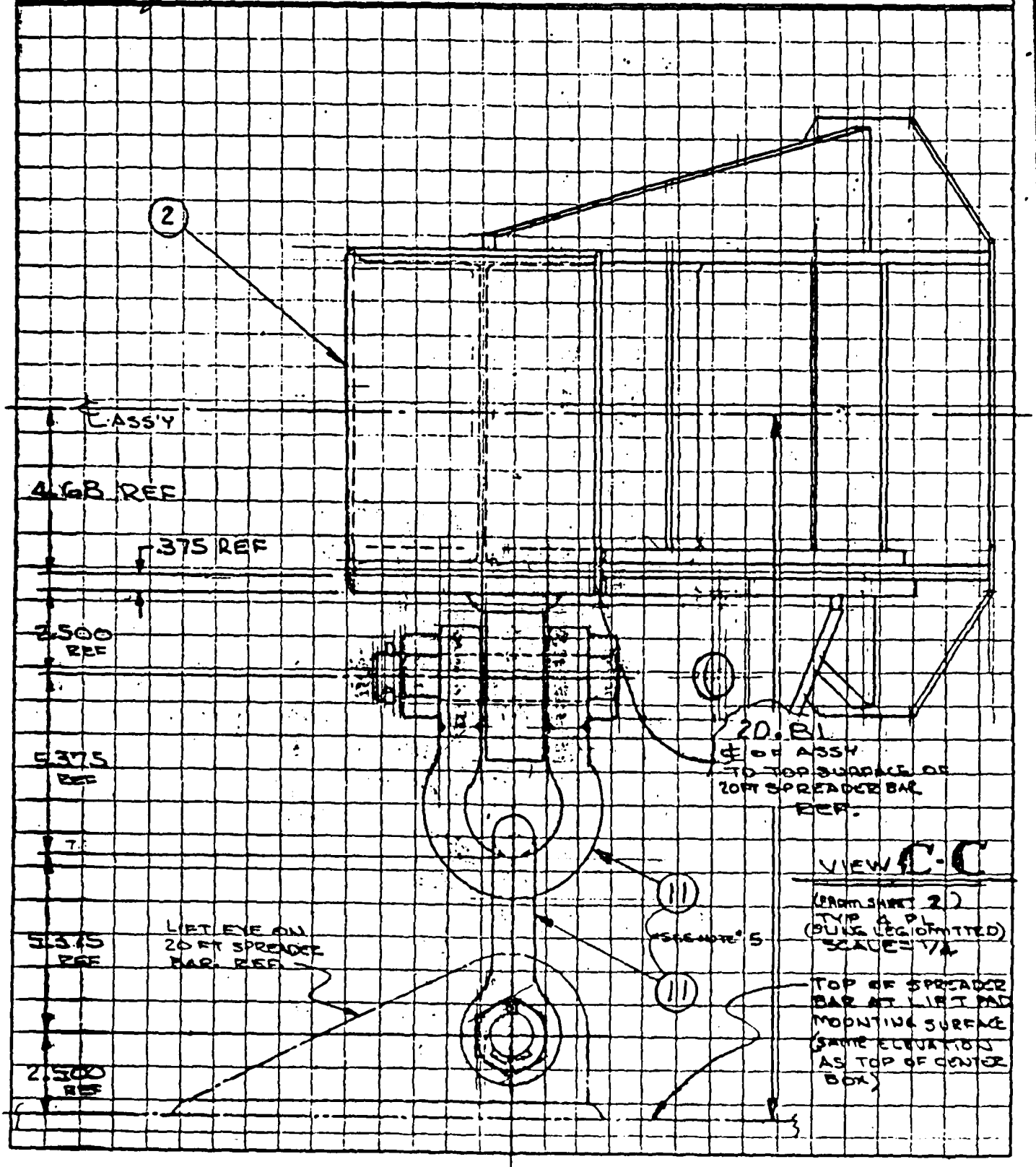
SHEET 7 OF 8

DWG NO. 9386

PROJECT TITLE CRANE ROTATOR ADAPTOR

SUBJECT CRANE/ROTATOR ADAPTOR ASSEMBLY

PREPARED BY J. Weller DATE 03/27/86 CHECKED BY DC/R. McMillan DATE 7 MAR 86



VSE CORPORATION

PJO NO. 0300.0199

CLIENT

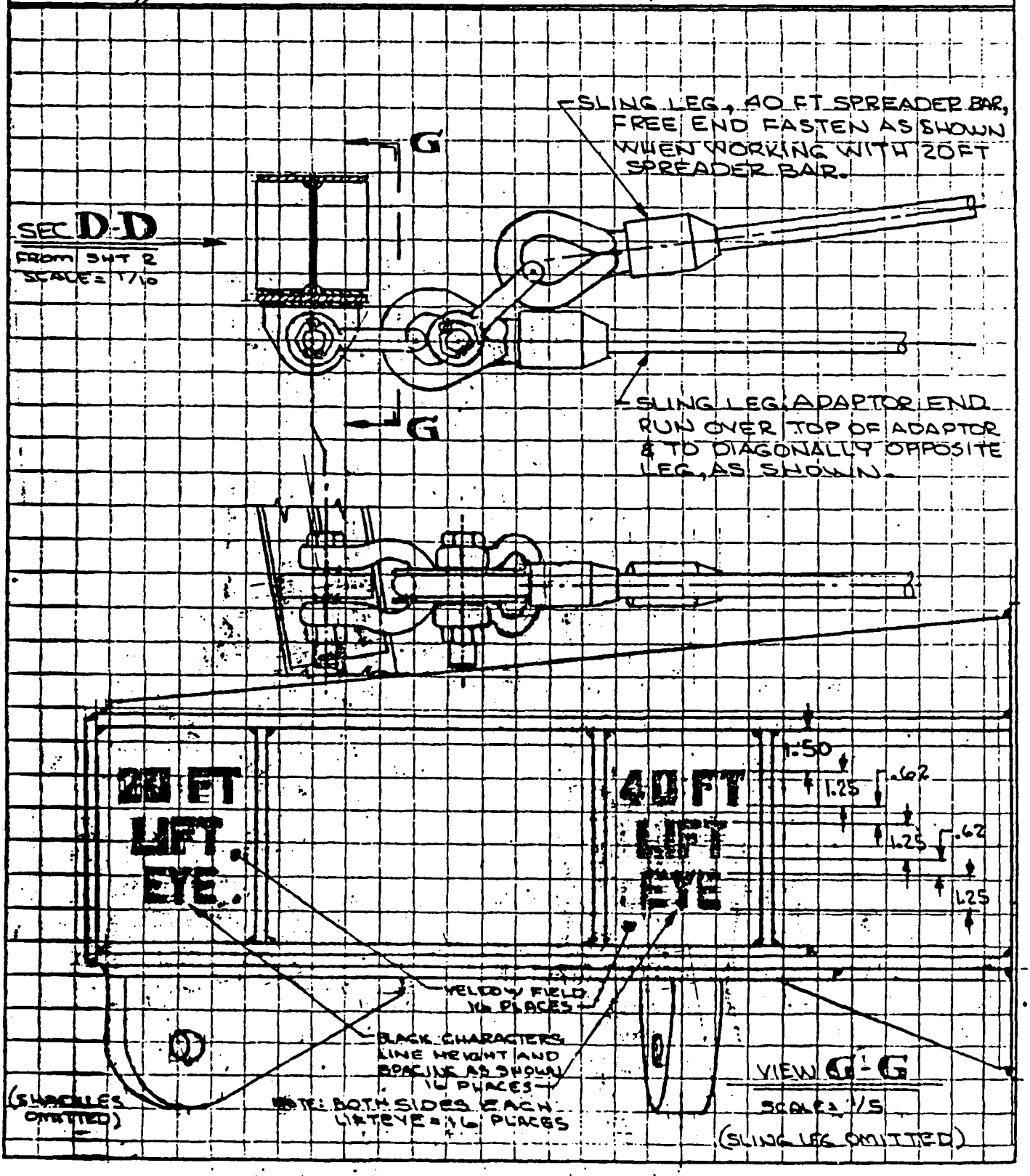
SHEET 8 OF 8

DWG NO. 9386

PROJECT TITLE CRANE/ROTATOR ADAPTOR

SUBJECT CRANE/ROTATOR ADAPTOR ASSEMBLY

PREPARED BY J. Willis DATE 03/27/86 CHECKED BY R.C./R. McMillan DATE 7 APR 86



APPENDIX D

CERTIFICATIONS

RPC Corporation
Hwy. 501 South, P.O. Box 451
Roxboro, N.C. 27573
(919) 599-3141

Test Certificate No. 682093 Form No. 135

CERTIFICATE OF TEST EXAMINATION OF CHAIN, RINGS, HOOKS, SHACKLES, SWIVELS, PULLEY BLOCKS, LATCHES AND SPREADER FRAMES

This certificate is issued to comply with existing regulations of the United States of America and of the American Bureau of Shipping.

(1) Distinguishing Number or Marks	(2) Description of Gear	(3) Number Tested	(4) Date of Test	(5) Proof Load Applied (lbs)	(6) Safe Working Load (lbs)
None	Sling Leg, 40 Ft. Spreader bar Lift per Dwg. 9390	Set of Four (4) Slings	5/29/86	77,104 # vert. applied to complete set with a 40.8° sling angle	67,200 # vertical with 58.38° applied to complete sling set
S/N 682093	Crane/Rotator Adapter Assy. with 40' Spdr. per 9386 Sht. 3 of 8	1	5/29/86	100,800 # vert. with 45° sling angle	67,200 #
S/N 682093	Crane/Rotator Adapter Assy. with 20' Spdr. per 9386 Sht. 2 of 8	1	5/29/86	67,200 # vert. with a 90° sling angle	44,800 #

(7) Name and address of makers or suppliers RPC Corporation, Post Office Box 451, Roxboro, NC 27573

(8) Name and address of company making the test and examination RPC Corporation, Post Office Box 451, Roxboro, NC 27573

(9) Position of Signatory in company Chief Engineer

I certify that on the 29 day of May 19 86 the above gear was tested and examined by a competent person in the manner set forth on the reverse side of this certificate; that the examination showed that the said gear withstood the proof load without injury of deformation; and that the safe working load of said gear is as shown in Column 6.

(Signature) James D Stuzell

(Date) May 29, 1986

In substantial agreement with I.L.O. Form No. 4

INSTRUCTIONS

Chains, rings, shackles and other loose gear (whether accessory to a machine or not) shall be tested with a proof load equal to that shown against the article in the following table:

Article of Gear	Proof Load
Chain, ring, hook, shackle, swivel latch or spreader frame.	100 percent in excess of the safe working load.
Pulley blocks:	
Single-sheave block	300 percent in excess of the safe working load.
Multiple-sheave block with safe working load up to and including 20 tons.	100 percent in excess of the safe working load.
Multiple-sheave block with safe working load over 20 tons up to and including 40 tons.	20 tons in excess of the safe working load.
Multiple-sheave block with safe working load over 40 tons.	50 percent in excess of the safe working load.
Pitched chains used with hand-operated pulley blocks and rings, hooks shackles or swivels permanently attached thereto.	50 percent in excess of the safe working load.
Hand-operated pulley blocks used with pitched chains and rings, hooks, shackles or swivels permanently attached thereto.	50 percent in excess of the safe working load.

After being tested, all the gear shall be examined, the sheaves and the pins of the pulley blocks being removed for the purpose, to see whether any part has been damaged or permanently deformed by the test.

NOTE: The expression "ton" means a ton of 1,000 kg. or 2,200 lb.

VSE QUALITY CONTROL
END ITEM FINAL INSPECTION REQUIREMENTS
(EIFIR)
ROTATOR ADAPTER VSE DRAWING 9386
PJO 0300.0199

PURPOSE

This EIFIR provides a checklist for the minimum inspection requirements to be performed on the rotator adapter, produced by RPC Corporation. It shall serve as an inspection record including a Certification of Conformance on the rotator adapter. The inspection requirements herein do not relieve VSE of any other contract requirements nor do they waive the Government's right to require additional inspection for determining conformance to other requirements. Acceptance by the VSE inspector does not constitute final acceptance by the Government.

Rotator Adapter ~~Serial~~ Part No. 9386

Quality Control Inspector [signature] Date 29 May, 86

Symbols: (✓) Acceptable (X) Unacceptable

INSTRUCTIONS TO INSPECTOR

1. Final inspection shall be accomplished in accordance with the requirements of applicable specifications and drawings.
2. For unacceptable items, see DEFICIENCY SHEET (Appendix A).
3. One copy of the EIFIR, including appendix A, shall be retained in the QC file.
4. The order of examination, inspections, and testing may be varied to be compatible with plant facilities and inspection and testing procedures.

Item No.	Characteristics					Inspector Comments
1.	DRAWING 9307	1				
	Dimensions as specified	✓				
	Welds as specified	✓				
2.	DRAWING 9308	1				
	Dimensions as specified	✓				
	Welds as specified	✓				
3.	DRAWING 9309	1	2			
	Dimensions as specified	✓	✓			
	Welds as specified	✓	✓			
4.	DRAWING 9311	1	2			
	Dimensions as specified	✓	✓			
	Welds as specified	✓	✓			
5.	DRAWING 9313	1	2	3	4	
	Dimensions as specified	✓	✓	✓	✓	
	Marking as specified	✗ ✓	✗ ✓	✗ ✓	✗ ✓	
6.	DRAWING 9314	1				
	Dimensions as specified	✓				
	Hardness Certificate	✓				
	Finish as specified	✓				
	Marking as specified	✓				
7.	DRAWING 9315	1	2	3	4	
	Dimensions as specified	✓	✓	✓	✓	
	Finish as specified	✓	✓	✓	✓	
	Marking as specified	✓	✓	✓	✓	

8.	DRAWING 9386	1			
	Dimensions as specified	✓			
	Welds as specified	✓			
	Assembled as specified	✓			
	Hardware, F/N 6, 9, 10, 11 as specified	✓			
	Painting as specified	✓			
	Marking as specified	X ✓			
9.	DRAWING 9387	1	2		
	Dimensions as specified	✓	✓		
	Welds as specified	✓	✓		
10.	DRAWING 9388	1	2	3	4
	Dimensions as specified	✓	✓	✓	✓
	Welding as specified	✓	✓	✓	✓
11.	DRAWING 9389	1	2	3	4
	Dimensions as specified	✓	✓	✓	✓
	Marking as specified	X ✓	X ✓	X ✓	X ✓
12.	DRAWING 9390	1	2	3	4
	Dimensions as shown	✓	✓	✓	✓
	Assembled as specified	✓	✓	✓	✓
	Hardware as specified	✓	✓	✓	✓
	Certification of proof load test	✓	✓	✓	✓
13.	Certification Certificate of welders	✓			
14.	Certification of material for:				
	ASTM A36	✓			
	AISI ~~1137~~ C1141 CR	✓			
15.	Copy of Purchase orders for:				
	Drawing 9386 -Find No. 6, 9, 10, 11	✓			
	Drawing 9390 -Find No. 1, 2, 3, 4,	✓			

APPENDIX A

DEFICIENCY SHEET

Rotator Adapter, Serial No. _____

Contract No. DAAK70-81-D-0109 TASK ORDER 0199 Date _____

All unacceptable items shall be listed on this DEFICIENCY SHEET along with a brief description of the deficiency and corrective action taken. The inspector shall initial this sheet opposite each item upon completion of approved corrective action.

Item No.	Description of Deficiency	Corrective Action	Inspector Initials
5	STAMPING MISSING	STAMPING COMPLETED	RWL 29 MAY, 86
11	STAMPING MISSING	STAMPING COMPLETED	RWL 29 MAY, 86
8	STENCILING NOT COMPLETED	STENCILING COMPLETED	RWL 2 JUNE, 86

Reviewed by _____ Approved by _____

(Quality Control Inspector)

Lugmayer Associates, Inc.

WELDING AND MATERIALS CONSULTANTS
8500 WEIMAR CT., CLINTON, MD. 20735
301-868-7242

TEST RESULTS

Date Test Conducted:	5/29/1986 Report No. LA8675
Conducted for:	RPC Corporation
Location:	Roxboro, N.C.
Identification:	DAAK70-81-D-0109
Type of Test:	MT-MIL-1-6868
Material Tested:	Steel Weldment
Unit:	Prototype Rotator Adapter

At the request of Mr. J. D. STURGILL, P.E., this laboratory conducted a magnetic partical inspection on the subject ROTATOR ADAPTER.

The inspection was conducted in accordance with MIL-1-6868 dry powder method.

No recordable indications were detected during the inspection.

Test conducted by

William W. Lugmayer
Lugmayer Associates, Inc.

PRATT & LAMBERT, INC.
WICHITA DIVISION

RECEIVED
MAY 28 1986

T. M. GRYDER

TO: PRC CORPORATION
P. O. BOX 451
ROXBORO, NC 27537

RE: Purchase Order No. 14363

AFFIDAVIT

I hereby certify that the following material shipped MAY 27, 1986 was made or tested under my supervision.

GALLONS	MATERIAL	SPECIFICATION	BATCH
4	COATING COMPOUND METAL PRETREATMENT MFG. DATE 10/85	DOD-P-15328D AM 1	P-94927
1	ACID COMPONENT COMP. II MFG. DATE 10/85	W/DOD-P-15328D AM 1	T-16710
4	PRIMER COATING, EPOXY PART A MFG. DATE 5/86	MIL-P-52192B AM 1 COMP L	P-96808
1	PRIMER COATING EPOXY PART B MFG. DATE 5/86	MIL-P-52192B AM 1 COMP L	P-96809

I also certify that the above material meets the requirements of the specification referred to. Test results are on file and subject to examination.

798

S. M. Reddout

S. M. Reddout, Quality Control Dept.
PRATT & LAMBERT, INC.
Wichita Division
P. O. Box 2153
16116 E. Thirteenth Street
Wichita, Kansas 67201
(316) 733-1361

AMERICAN METAL TREATING, INC.
505 GARRISON STREET • HIGH POINT, NORTH CAROLINA 27260 • PHONE (919) 889-3277

Certification

DATE May 27, 1986

THIS IS TO CERTIFY THAT PARTS NUMBER 9314 Pin

FOR RPC CORPORATION WERE

METALLURGICALLY PROCESSED IN STRICT ACCORDANCE

WITH APPLICABLE SPECIFICATIONS.

Carlton Rann

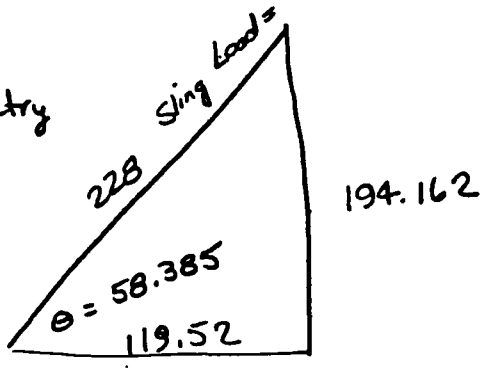
AUTHORIZED SIGNATURE

VSE Test Calculations
For 40' Sling Assembly P

5/28/85
JDS

Given:

① Geometry



② Test load factor = 1.5 $(67.2 \times 1.5) = 100.8$ K

What is cable test load? where $P = \frac{TL(1.5\ SWL)}{4(\sin 58.385)}$

$$P = \frac{67.2\text{K} \times 1.5}{4 \times \sin 58.385^\circ} = 29.592\text{ K}$$

What is spreader compression load?

$$P_c = \frac{119.52}{228}(29.592) = 15.512$$

Check $P_c = 29.592(\cos 58.385) = 15.512$K ✓

Given:

① Test Sling Loading $\phi = 36.5^\circ$
② Required cable pull on test = 29.592K
③ Spreader is good for 45° ϕ. Proof Tested for 78.2K

What is the required test load?

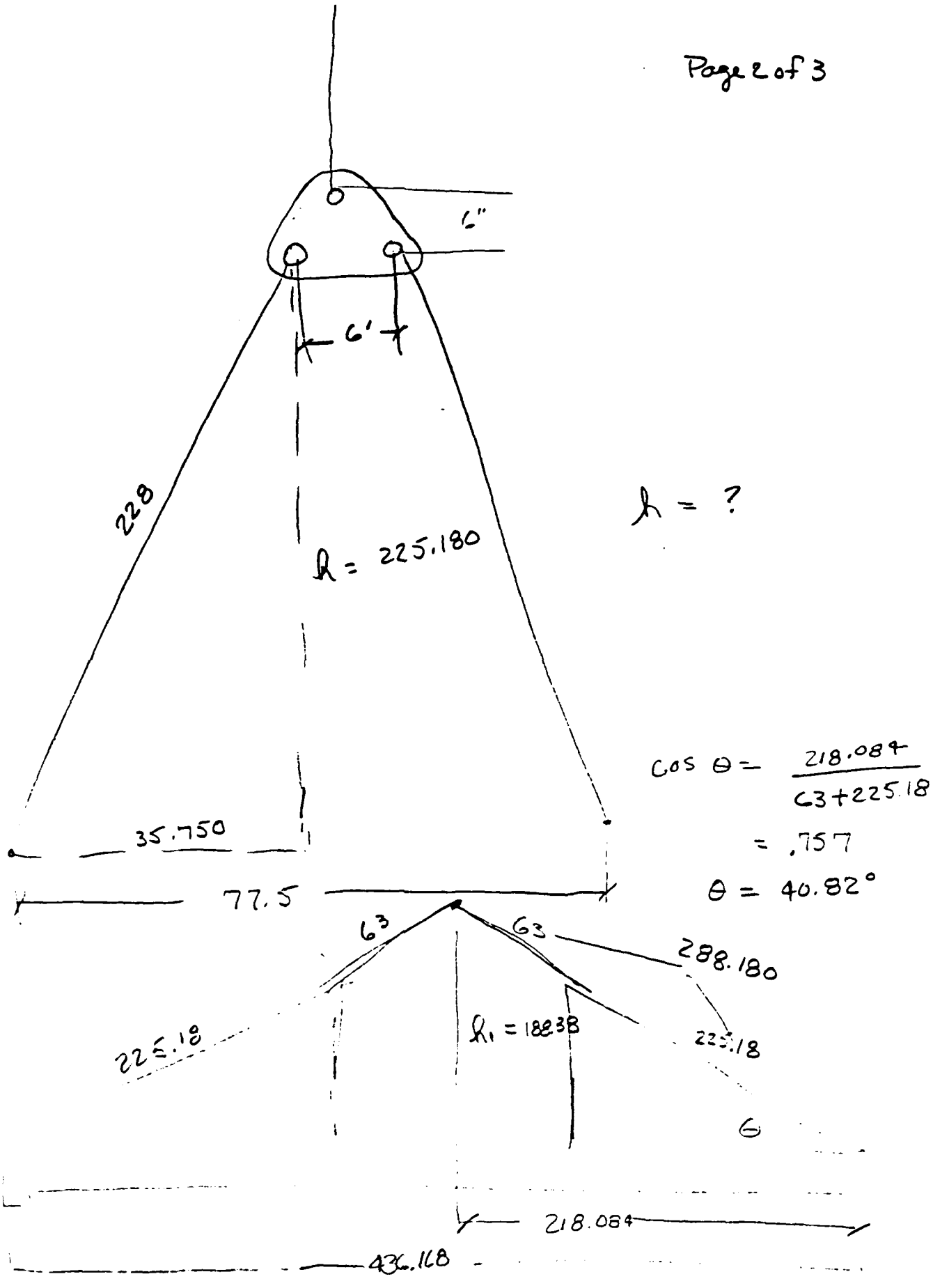
$$29.592 = \frac{TL \times 1.5}{4 \times \sin 36.5^\circ}$$

$$TL = \frac{29.592(4 \times \sin 36.5^\circ)}{} = 70.408$$

What is spreader compression load at the equivalent test load TL?

$P_c = 29.592(\cos 36.5^\circ) = 23.788 > 15.592$ (+ 50%) ✓
Compressive Load may be high - check 45°

① 45° Vertical Proof test = 78.2K → $P_v = \frac{78.2}{4} = 19.550$K
② 45° $P_c = P_v = 19.550$K.



$$\cos\theta = \frac{218.084}{63 + 225.18}$$

$$= .757$$

$$\theta = 40.82°$$

(C) Given

① Test sling Loading ∠ = 40.82
② P = 29.592 K
③ Spreader is good for 45° ∠ & proof tested for 78.2.

What is the required load?

$$TL = \frac{29.592 \ (4 \times \sin 40.82)}{} = 77.375 \text{ K}$$

What is spreader compression load at the equivalent test load of 77.375 K
Area test cylinders = 93.46 in² ⇒ PSI = 828 psi
Say 825psi

$$P_C = 29.592 (\cos 40.82) = 22.394 \text{ K} > 19,550 \text{ K}$$

OK per discussion with Bob LaClaire 5/29/82

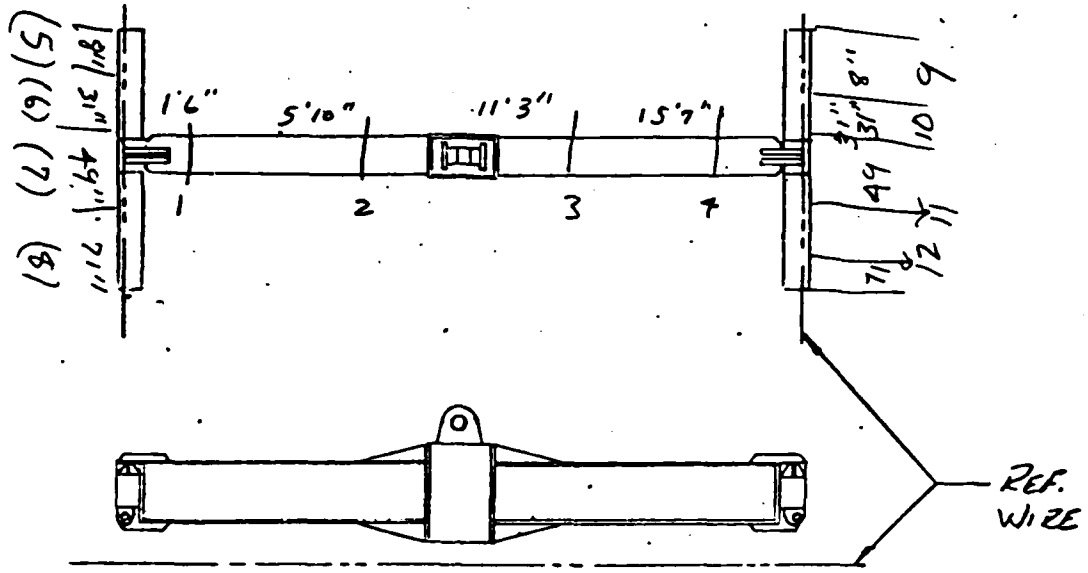
Conclusion use 40.82° ∠
Use following equipment
① ④ VSE purchased sling attached as a spreader (ROPCO or VSE?)
② ② triangle plates attached to each end pair of slings
③ ② Short ROPCO 53 test sling attached to triangle plate & force collar.
④ Pull test assembly at 77.375 K test setting.

CRANE/ROTATOR ADAPTOR

USE

SERIAL No. 682093 M. ASSY. DWG No 8386

SHOP ORDER No 57-06-051 DATE: 5-29-86



DATA POINT	DIMENSIONAL DATA								
	BASELINE	*LOAD A	UNLOAD A	*LOAD B	UNLOAD B	*LOAD C	UNLOAD C	*LOAD D	UNLOAD D
1			8 3/4		8 5/8				
2			8 3/8	8 5/8	8 3/4				
3			8 5/16	8 1/2	8 5/16				
4			8 3/32		8 1/8				
5			7 31/32		7 9/16				
6			7 7/8		7 5/8				
7			7 7/16		7 7/16				
8			7 3/32		7 [illegible]				
9			7 1/16		7 3/32				
10			7 [illegible]		7 9/32				
11			7 1/16		7 9/32				
12			7 1/32		7 1/2				

TWISTLOCK	SERIAL NO
N.A.	

TEST LOAD(S)	
	100,000

TESTED BY: [illegible]

TITLE: [illegible]

FRM 173

END

10-86

DTIC