

APPENDIX 3D

CONTAINMENT TENDON ANCHORAGE HARDWARE CAPACITY TESTS

by PITTSBURGH TESTING LABORATORY

Compressive Load Tests of 90 Wire Tendon Base Plate - Test on Concrete Stand

GINNA/UFSAR

**PITTSBURGH TESTING LABORATORY**ESTABLISHED 1881
PITTSBURGH, PA.AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS
ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS, AND AUTHORIZATION
FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING
OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL.

CLIENTS No. 217114-3

March 29, 1967

LABORATORY No. 652408

ORDER No. PG-18619

REPORT

Report of: Compressive Load Tests of
90 Wire Tendon Base Plate
Test on Concrete Stand

Report to: Joseph T. Ryerson & Son, Inc.
P. O. Box 8000-A
Chicago, Illinois 60680

We were requested to fabricate a concrete base plate in accordance with Ryerson Drawing SPI-1 dated 1/20/67. A concrete mix design, reinforcing bars, base plate and trumpet were submitted for fabrication of the concrete base plate.

The following concrete properties were recorded.CONCRETE MIX DESIGN PER CU. YD.

Type III Portland Cement	611 lbs.
Dravo Corp. Siliceous Sand ASTM C-33	1240 lbs. S.S.D.
Dravo Corp. Siliceous Gravel 1" Size	1850 lbs. S.S.D.
Water	300 lbs.
Slump	4 inches

COMPRESSIVE STRENGTHS

Date of Testing	Sectional Area Sq. In.	Crushing Load Lbs.	Crushing Strength PSI	Age Days
March 8, 1967	28.27	92,000	3250	2
March 8, 1967	28.27	81,000	2870	2
			3060 Average	
March 9, 1967	28.27	115,000	4070	3
March 9, 1967	28.27	120,000	4240	3
			4150 Average	
March 10, 1967	28.27	124,000	4390	4
March 10, 1967	28.27	121,000	4280	4
			4340 Average	

3D-1

Sheet 2 of Report

GINNA/UFSAR



PITTSBURGH TESTING LABORATORY

ESTABLISHED 1881
PITTSBURGH, PA.

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS
ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS, AND AUTHORIZATION
FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING
OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL.

CLIENT'S No. 21T114-3

March 29, 1967

LABORATORY No. 652408

ORDER No. PG-18619

REPORT

When the concrete in the stand had reached the requested strength, the stand was tested by the following method.

A compressive load of 742,000 lbs. was applied in increments of 106,000 lbs., and then released in increments of 106,000 lbs. The gage readings tabulated below were obtained using a deflectometer designed as shown on Page 5 of Ryerson instructions dated 2/2/67.

Cycle One was repeated, recording the same gage readings.

On the third cycle, dial gage readings were recorded only up to 742,000 lbs. The loading continued in 106,000 lbs. increments to 1,200,000 lbs. At 954,000 lbs. hairline cracks appeared on the sides of the stand. There were no other apparent defects at 1,200,000 lbs.

The dial gage instrument was designed so that measurements, either compressive or expansive, were recorded at a specified distance from the center line of the concrete stand of metal base plate.

<u>Gage No.</u>	<u>Location</u>
1	On the concrete 3 inches from edge of base plate.
2	On the base plate 7-1/2 inches from center line of stand.
3	On the base plate 4-3/4 inches from center line of stand.
4	On the base plate 6 inches from center line of stand.
5	On the concrete 1 inch from edge of base plate.

Annendix 3D CONTAINMENT TENDON ANCHORAGE HARDWARE CAPACITY TESTS

Sheet 3 of Report

GINNA/UFSAR



PITTSBURGH TESTING LABORATORY

ESTABLISHED 1881
PITTSBURGH, PA.

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS
ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS, AND AUTHORIZATION
FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING
OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL.

March 29, 1967

LABORATORY No. 652408

CLIENT'S No. 21T114-3

ORDER No. PG-18619

REPORT

LOAD DEFORMATION MEASUREMENTS1st Loading

Load Pounds	Gage				
	#1	#2	#3	#4	#5
0	.000	.000	.000	.000	.000
106,000	-.001	.000	.002	.001	.000
212,000	-.002	.001	.006	.004	-.001
318,000	-.002	.002	.009	.005	-.004
424,000	-.003	.002	.011	.007	-.007
530,000	-.004	.003	.013	.009	-.009
636,000	-.005	.004	.016	.011	-.010
742,000	-.006	.004	.018	.013	-.012
636,000	-.006	.004	.017	.012	-.013
530,000	-.005	.004	.016	.012	-.013
424,000	-.005	.004	.015	.011	-.012
318,000	-.004	.003	.014	.010	-.012
212,000	-.004	.003	.012	.008	-.012
106,000	-.003	.002	.009	.006	-.012
0	.000	.000	.003	.002	-.002

2nd Loading

0	.000	.000	.000	.000	-.002
106,000	-.002	.001	.004	.003	-.007
212,000	-.003	.002	.004	.004	-.009
318,000	-.004	.003	.009	.006	-.011
424,000	-.005	.003	.010	.007	-.012
530,000	-.005	.003	.012	.008	-.013
636,000	-.006	.004	.013	.010	-.014
742,000	-.006	.004	.015	.011	-.015
636,000	-.006	.004	.014	.010	-.0145
530,000	-.006	.004	.013	.010	-.014
424,000	-.005	.0035	.012	.0085	-.013
318,000	-.005	.003	.011	.0075	-.0125
212,000	-.004	.003	.009	.006	-.0115
106,000	-.003	.002	.005	.004	-.010
0	.000	.000	.000	.000	-.002

3D-3

Sheet 4 of Report

GINNA/UFSAR



PITTSBURGH TESTING LABORATORY

ESTABLISHED 1881

PITTSBURGH, PA.

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS
ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS, AND AUTHORIZATION
FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING
OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL.

IM 407 REV.

CLIENT'S No. 217114-3

March 29, 1967

LABORATORY No. 652408

ORDER No. PG-18619

REPORT

LOAD DEFORMATION MEASUREMENTS3rd Loading

Load Pounds	Gage				
	#1	#2	#3	#4	#5
0	.000	.000	.000	.000	-.002
106,000	-.003	.002	.004	.003	-.009
212,000	-.004	.002	.007	.0045	-.011
318,000	-.004	.003	.009	.006	-.012
424,000	-.005	.003	.011	.007	-.013
530,000	-.006	.0035	.012	.0085	-.014
636,000	-.006	.004	.0135	.010	-.015
742,000	-.007	.004	.015	.011	-.0155
954,000	Hair line cracks visible.				

PITTSBURGH TESTING LABORATORY

Earl Gallagher
 Earl Gallagher, Manager
 Physical Testing Department

cc: 3-Ryerson Steel
 1-PTL Chicago

vs

3D-4

Compressive Load Tests of 90 Wire Tendon Base Plate - Test on Concrete Stand

GINNA/UFSAR

BASEPLATE FOR 90 WIRE TENDON		CUSTOMER	Bechtel Company
A. LOADS		POLISADES 5935-C-51	
Loads developed by the 90 wire Tendon.			
Ultimate Strength	1060 ^K		
Overstressing Force	848 ^K		
Initial Force	<u>742^K</u>	← *	
Final Force	636 ^K		
* Design Force for Baseplate			
B. SIZE		METALLOGICS	
φ o.d.	18 1/2" → 269 □"	RYERSON JOSEPH T. RYERSON & SON, INC.	
φ i.d.	6" → 29 □"		
Net Bearing Area	<u>240 □"</u>		
Plate thickness	2 1/2"	DATE	2/2/67
		MADE BY	21 PT -34-114

3D-5

Sheet 2 of Notes

GINNA/UFSAR

C) BEARING STRESSES

1) Actual

$$\text{Average } 742'000/240 = \underline{3090 \text{ psi}}$$

2) Allowable for Base-Slab

(use ACI Codes

$$f_c' = f_{ci}' = 4000 \text{ psi}$$

$$A_b' \rightarrow \phi 2'-8" = 803 \text{ sq"} \text{ (Tendon spacing)}$$

$$f_{cp} = 0.6 \cdot 4000 \sqrt[3]{803/269} = 3450 \text{ psi}$$

> actual O.K.

3) Allowable for Wall and Dome

$$f_c' = f_{ci}' = 5000 \text{ psi}$$

 A_b' (use minimum 1" clearance
around Plates

$$\rightarrow \phi 20\frac{1}{2}" = 330 \text{ sq"} \text{ }$$

$$f_{cp} = 0.6 \cdot 5000 \sqrt[3]{330/269} = 3210 \text{ psi}$$

> actual O.K.

Conclusion : The Bearing plate
size (see B.) is in accordance
with the ACI-Code requirement
as used on this Project.

3D-6

CUSTOMER Bechtel Company
Palisades 5935-C-51RYERSON
METALLOGICS
JOSEPH T. RYERSON & SON, INC.MADE BY
A W
DATE
2/2/67

Sheet 3 of Notes

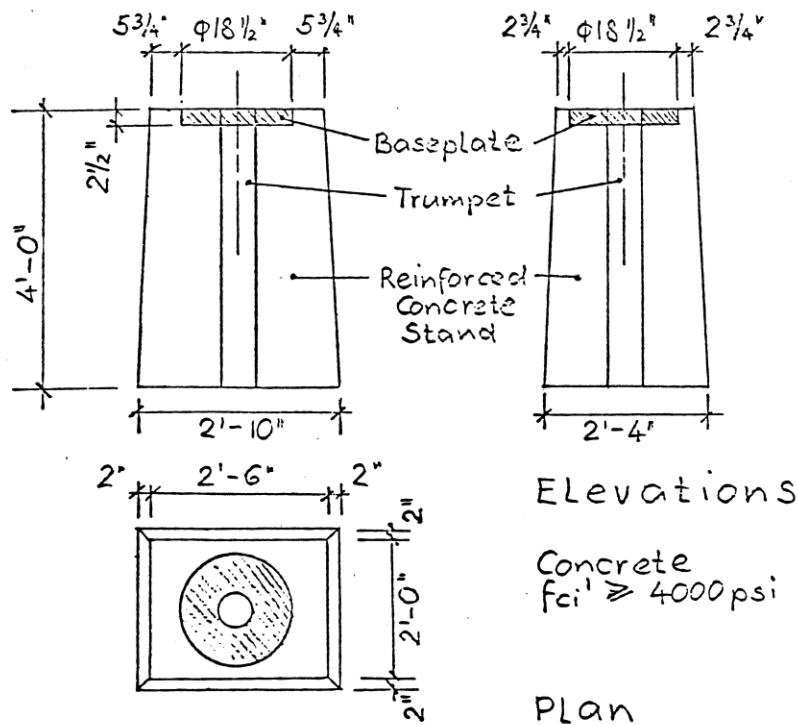
GINNA/UFSAR

D) BASEPLATE TEST

To verify the Adequacy of Plate-thickness and Plate-Material-strength the following Test is proposed.

1) Test Set up

See Ryerson drawing SPT-1 dated 1-20-67.



3D-7

CUSTOMER Bechtel Company
Palisades 5935-C-51

RYERSON
METALLOGICS
JOSEPH T. RYERSON & SON, INC.

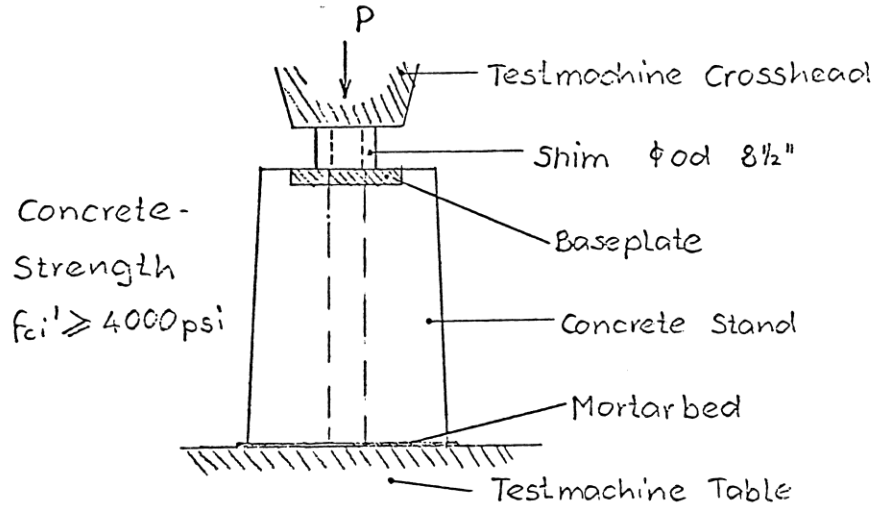
MADE BY
A. W/S

DATE
2/2/65

Sheet 4 of Notes

GINNA/UFSAR

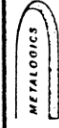
2) Application of Load



- Apply Load in increments of 106 k to 742 k max.
- Release Load in increments of 106 k to zero.
- Repeat a) and b)
- Apply Load in increments of 106 k to Failure or Testmachine Capacity
- Measure Deformations after each Load-increment of a), b) + c). (Set up see 3))
- Observe Concrete Stand (for Cracks)

3D-8

CUSTOMER Bechtel Company
Palisades 5935-C-51



RYERSON
JOSEPH T. RYERSON & SON, INC.

MADE BY
A.W.S.

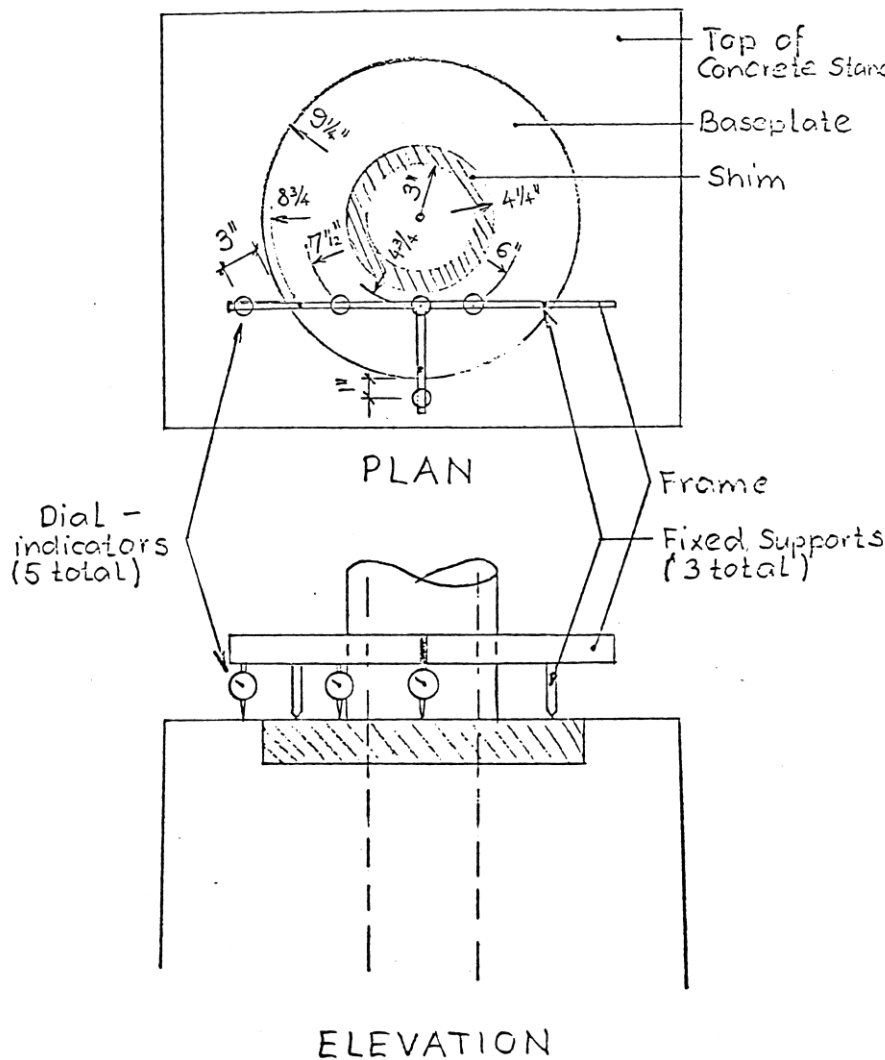
DATE
2/2/67

Sheet 5 of Notes

GINNA/UFSAR

3) Deformation - Measurements

The instrumentation is shown only to illustrate the required readings.



3D-9

CUSTOMER Bechtel Company
Palisades 5935-C-51

METALLOGICS

RYERSON
JOSEPH F. RYERSON & SON, INC.

MADE BY A.W.S. DATE 2/2/67

Sheet 6 of Notes

GINNA/UFSAR

<p>4) Anticipated Test Results</p> <p>a) Observation of Concrete Stand It is anticipated, that the Concrete Stand does not crack (other than Hairline Cracks) up to the design Load of 742 K. The Hairline cracks to close after removing of the Load. Spalling of the unreinforced (and non structural) Concrete around the Baseplate may occur and is insignificant.</p> <p>b) Observation of Baseplate It is anticipated, that the Plate-Material is not subjected to stresses greater than the Yield strength up to the design Load of 742 K. The deformation measurements should therefore vary linear with the Load and indicate complete (90%) recovery during unloading. The amount of the deformation measurements to be determined later. (max. Reading $< 1/16"$)</p>	<p>CUSTOMER Bechtel Company POLISADES 5935-C-51</p> <p>RYERSON JOSEPH T. RYERSON & SON, INC.</p> <p>DATE 2/2/67</p> <p>MADE BY A.W.S.</p>
--	---

3D-10

Sheet 7 of Notes

GINNA/UFSAR

The edge of the Baseplate should stay flush with the edge of the Concrete. Slight seating in is permissible, "curling up" indicates undesirable uneven bearing stress distribution.

5) Concrete Mix.

See attached Letter from Bechtel Corporation to Ryerson dated 1/27/67.

Because of the Specimen Size Limit the max. aggregate to 1 1/2".

Perform the Test if Concrete Test Cylinders indicate a strength greater than 4000 psi
Test Cylinders shall be broken on the same day as the bearing plate test is performed.

CUSTOMER Bechtel Company
Palisades 5935-C-51

METALLOGICS

RYERSON
JOSEPH T. RYERSON & SONS, INC.

MADE BY
A.W.

DATE
2/2/67

21 PT - 34 - 114

3D-11

Sheet 8 of Notes

GINNA/UFSAR

6) Baseplate - Material

See attached Heat Test Report regarding the chemical Composition. (which meets ASTM-A 36)
The physical Test- Report of representitiv Samples will follow.

CUSTOMER Bechtel Company
Palisades 5935-C-51

METALLOGICS

RYE RYERSON
JOSEPH T. RYERSON & SON, INC.

MADE BY A.W.S.
DATE 2/2/67

3D-12

Compression Tests of 90-Wire Anchor Head Assembly

GINNA/UFSAR



PITTSBURGH TESTING LABORATORY

ESTABLISHED 1881

PITTSBURGH, PA.

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS
ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS, AND AUTHORIZATION
FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING
OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL.

107 REV.

CLIENT'S No. 212341903-18

October 24, 1966

LABORATORY No. 646099

ORDER No. CH-9583

REPORT

Report of: Compression Tests of 90-Wire
Anchor Head Assembly

Report to: Joseph T. Ryerson & Son, Inc.
P. O. Box 8000-A
Chicago, Illinois 60680

We received two (2) 90-wire anchor head assemblies for compression tests in accordance with Drawing 90-PT-1A, 90-PT-2A and addendum dated 10/11/66.

The shims and anchor heads were assembled, loaded for two minutes and disassembled for examination in accordance with the drawings. The following observations were recorded.

ANCHOR HEAD ASSEMBLY 90-PT-1

Load	Remarks
742,000 lbs.	Button headed wires deformed anchor head. The 1/16" and 1/8" shims deformed slightly. Anchor head loosens by hand from adaptor lock nut.
848,000 lbs.	No apparent deformations except as noted above. Anchor head loosens by hand from adaptor lock nut.
954,000 lbs.	No apparent deformations except as noted above. Anchor head loosens by hand from adaptor lock nut.
1,007,000 lbs.	No apparent deformations except as noted above. Anchor head loosens by hand from adaptor lock nut.
1,060,000 lbs.	No apparent deformations except as noted above. Anchor head loosens by hand from adaptor lock nut.
1,200,000 lbs.	Deformations from the shim plates visible on adaptor. Anchor head no longer loosens by hand.

3D-13

Sheet 2 of Report

GINNA/UFSAR



PITTSBURGH TESTING LABORATORY

ESTABLISHED 1881
PITTSBURGH, PA.AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS
ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS, AND AUTHORIZATION
FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING
OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL.

CLIENT'S No. 212341903-18

October 24, 1966

LABORATORY No. 646099

ORDER No. CH-9583

REPORT

ANCHOR HEAD ASSEMBLY 90-PT-2

<u>Load</u>	<u>Remarks</u>
742,000 lbs.	Button headed wires deformed anchor head. The 1/16" and 1/8" shims deformed slightly.
848,000 lbs.	No apparent deformations except as noted above.
954,000 lbs.	No apparent deformations except as noted above.
1,007,000 lbs.	No apparent deformations except as noted above.
1,060,000 lbs.	No apparent deformations except as noted above.
1,200,000 lbs.	No apparent deformations except as noted above.

PITTSBURGH TESTING LABORATORY

Earl Gallagher, Manager
Physical Testing Departmentcc: 3-Joseph S. Ryerson & Son, Inc.
Attn: Mr. Richard E. Truesdell
1-PPL Chicago

3D-14

Compression Tests of 90-Wire Anchor Head Assembly

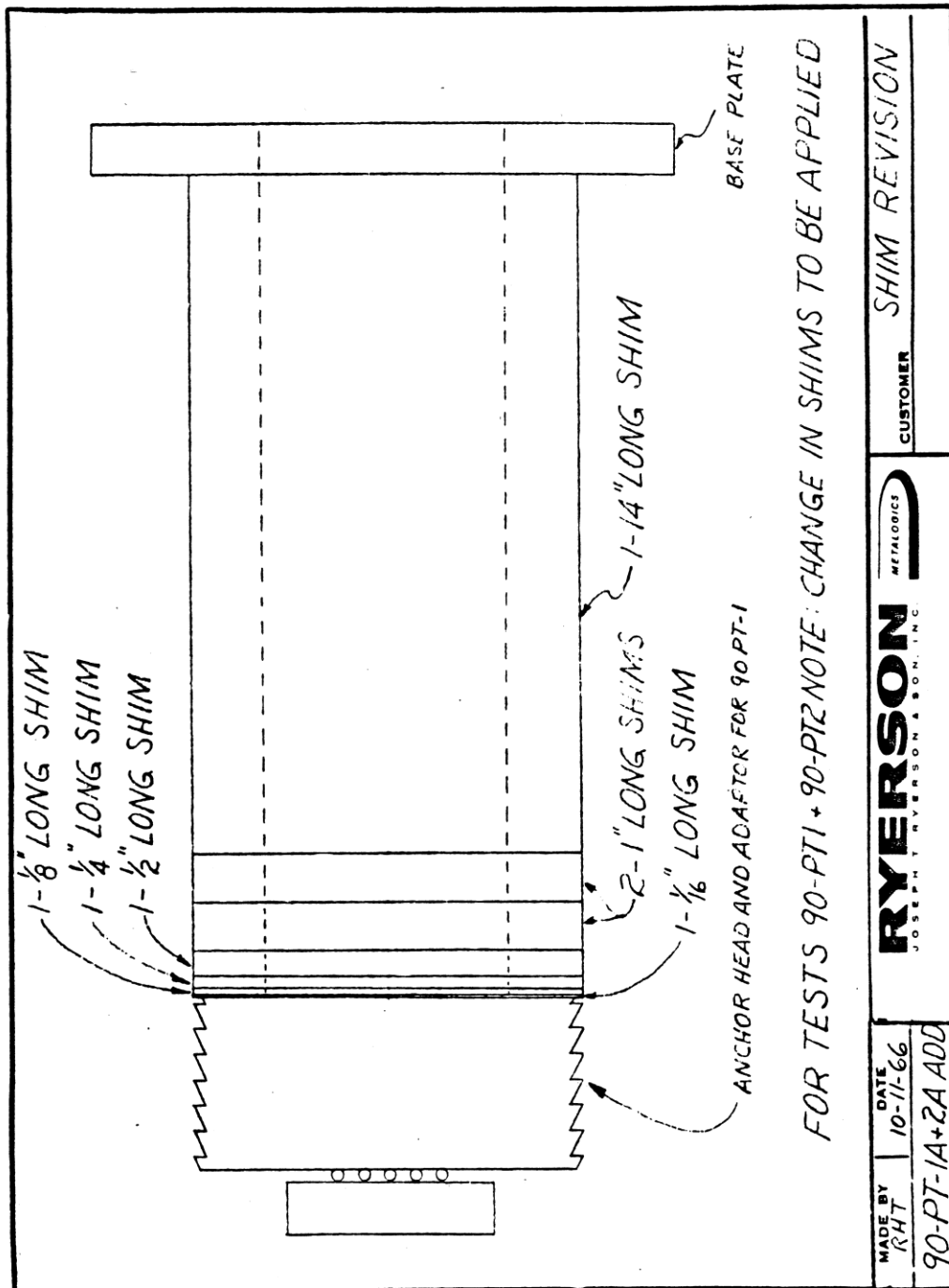
GINNA/UFSAR

<p><u>COMPRESSION TEST PROCEDURE</u></p> <p><u>TEST OF 90 WIRE ANCHOR HEAD ASSEMBLY</u></p> <p>SET UP TEST IN MACHINE PER DRAWING 90-PT-1A APPLY COMPRESSION TO DESIGNATED LOAD (SEE TABLE BELOW) (THIS IS A STATIC TEST, APPLY + RELEASE LOADS ACCORDINGLY) HOLD EACH LOAD FOR A PERIOD OF TWO MINUTES RELEASE LOAD AND DISASSEMBLE CHECK AND REPORT ON ALL DEFORMATIONS, CRACKS, OR OTHER SIGNS OF FAILURE IN THE ANCHOR HEAD, ADAPTOR LOCK NUT, AND/OR TUBE SHIMS. REASSEMBLE AND REPEAT AT NEXT HIGHER LOAD.</p>		<p>WIRE TEST</p> <p>ANCHOR HEAD</p>						
<p><u>LOAD TABLE</u></p> <table> <tr> <td>742,000 LBS.</td> <td>1,007,000 LBS.</td> </tr> <tr> <td>848,000 "</td> <td>1,060,000 "</td> </tr> <tr> <td>954,000 "</td> <td>MACHINE MAXIMUM</td> </tr> </table>		742,000 LBS.	1,007,000 LBS.	848,000 "	1,060,000 "	954,000 "	MACHINE MAXIMUM	<p>CUSTOMER</p>
742,000 LBS.	1,007,000 LBS.							
848,000 "	1,060,000 "							
954,000 "	MACHINE MAXIMUM							
<p>MADE BY RHI</p>	<p>DATE 7-23-66</p>	<p>RYERSON METALLOGICS JOSEPH T. RYERSON & SON, INC.</p>						
<p>90-PT-1</p>								

3D-15

Sheet 2 of Notes

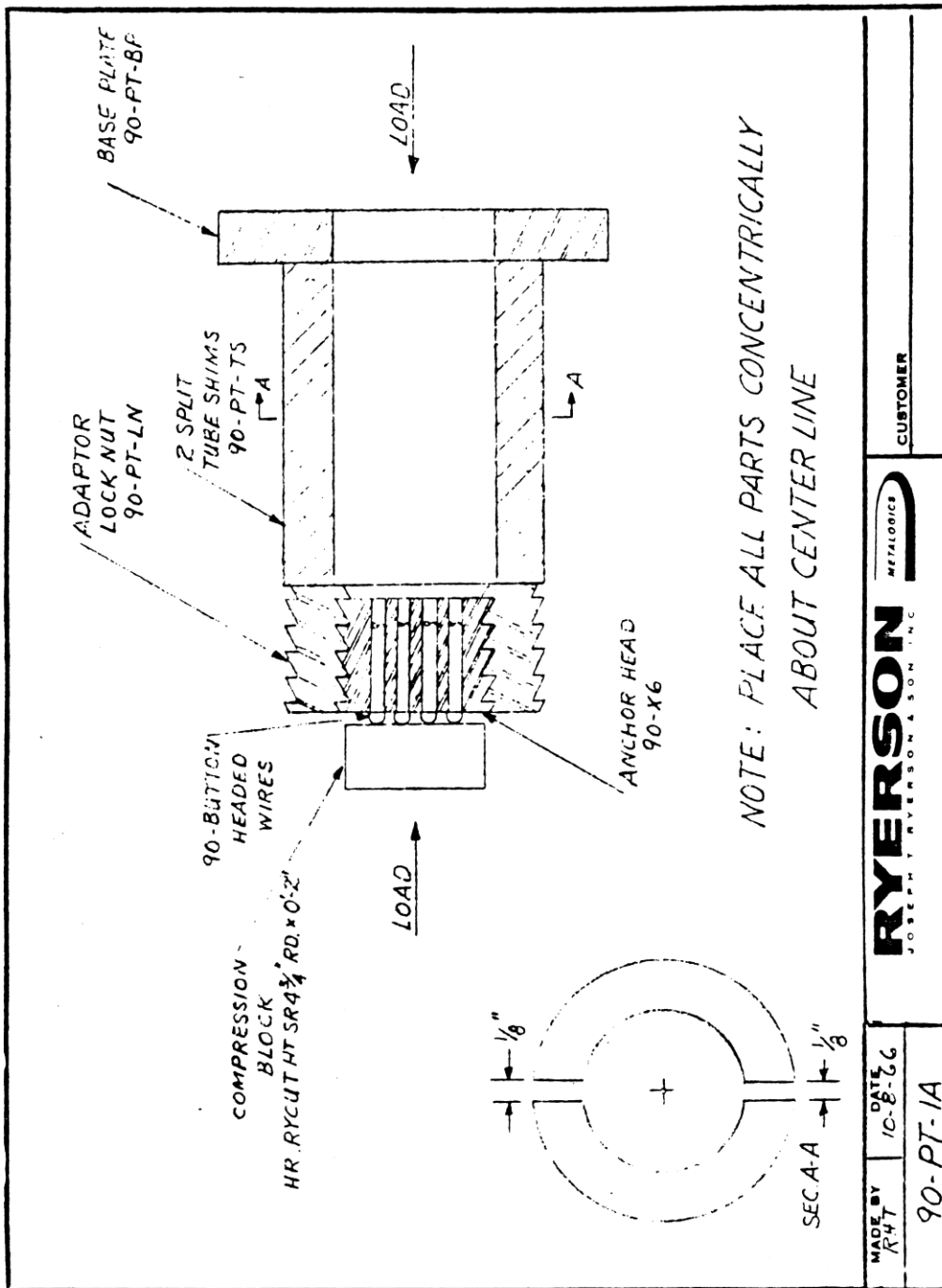
GINNA/UFSAR



3D-16

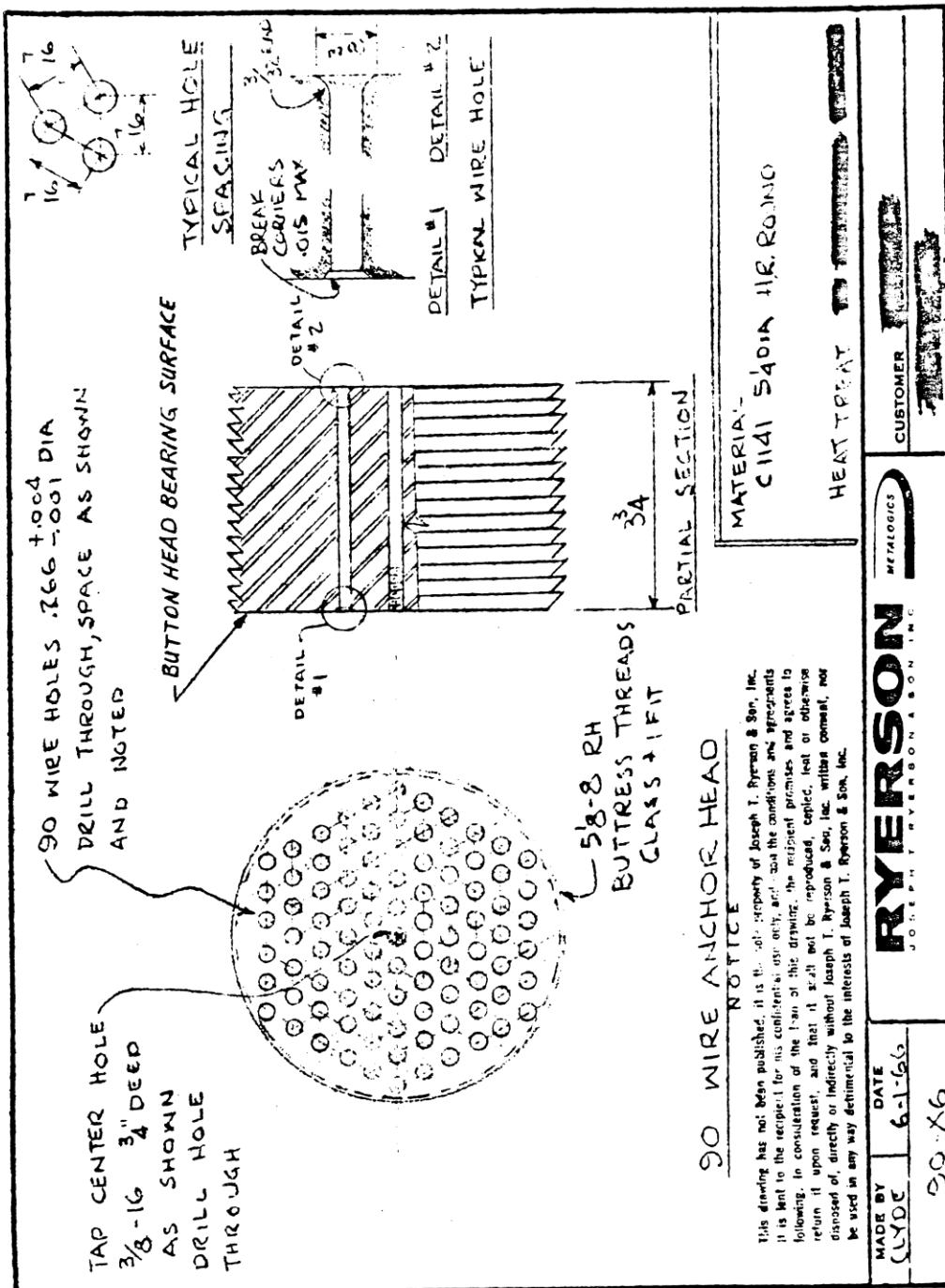
Sheet 3 of Notes

GINNA/UFSAR



3D-17

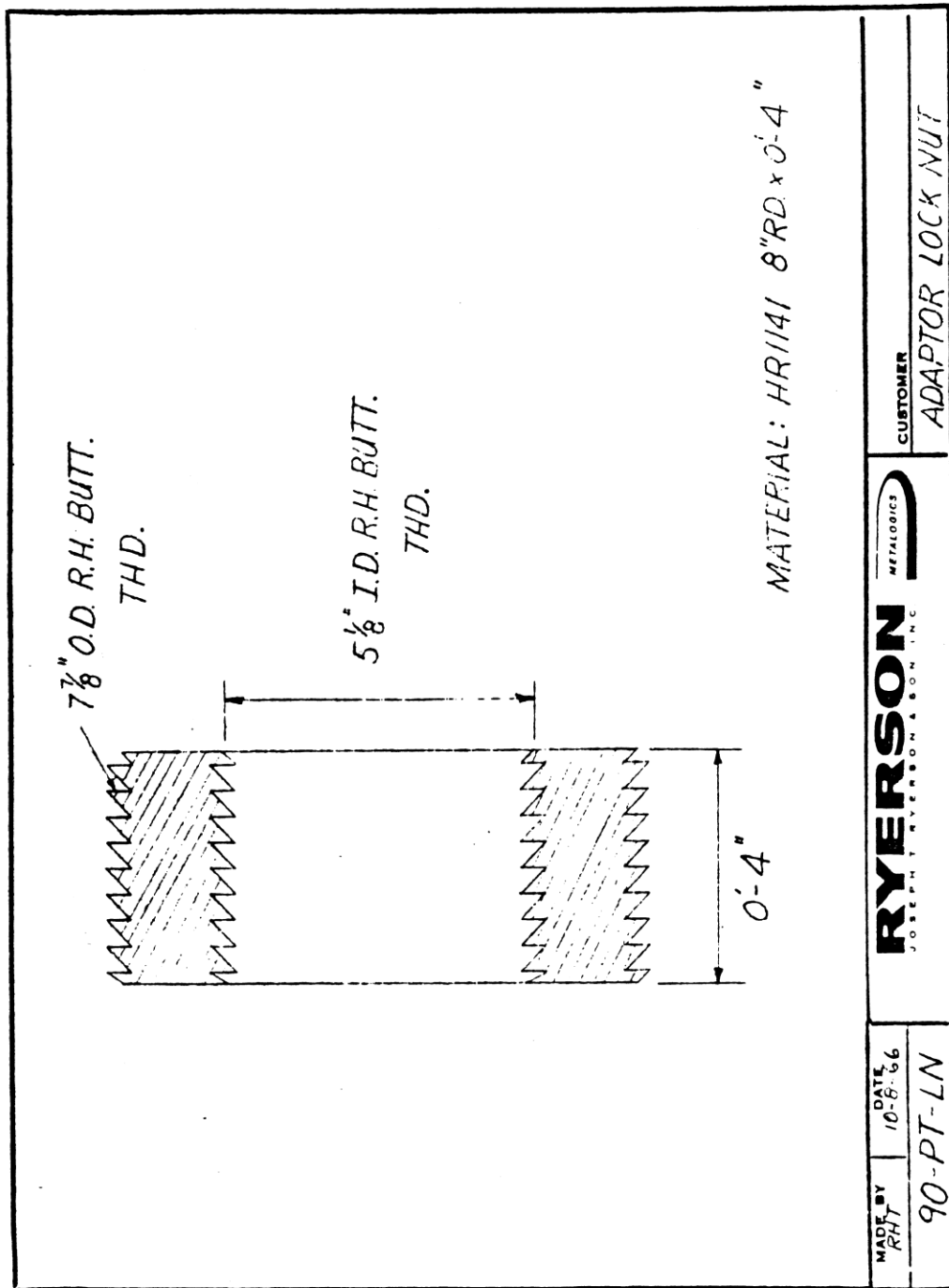
GINNA/UFSAR



3D-18

Sheet 5 of Notes

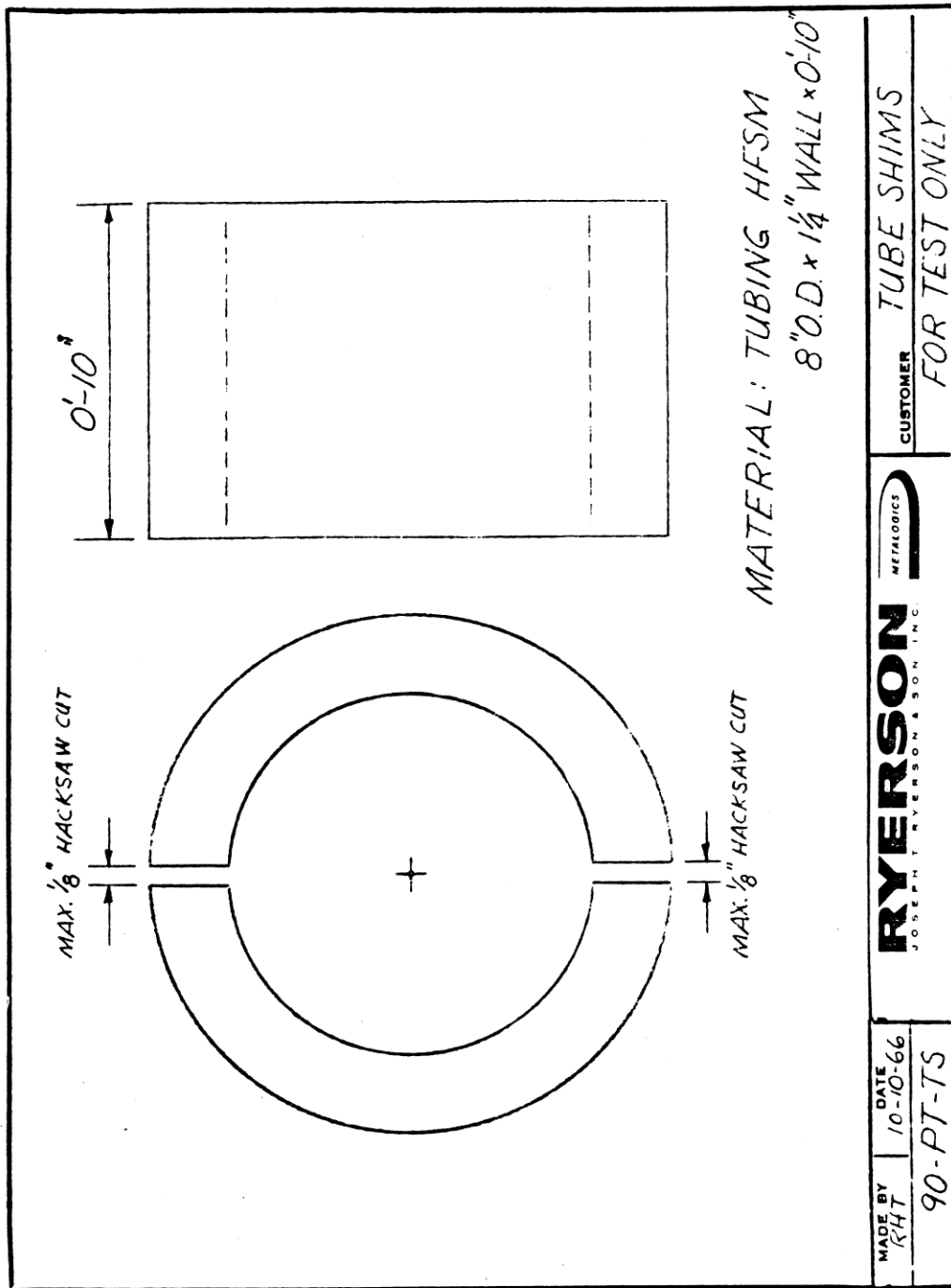
GINNA/UFSAR



3D-19

Sheet 6 of Notes

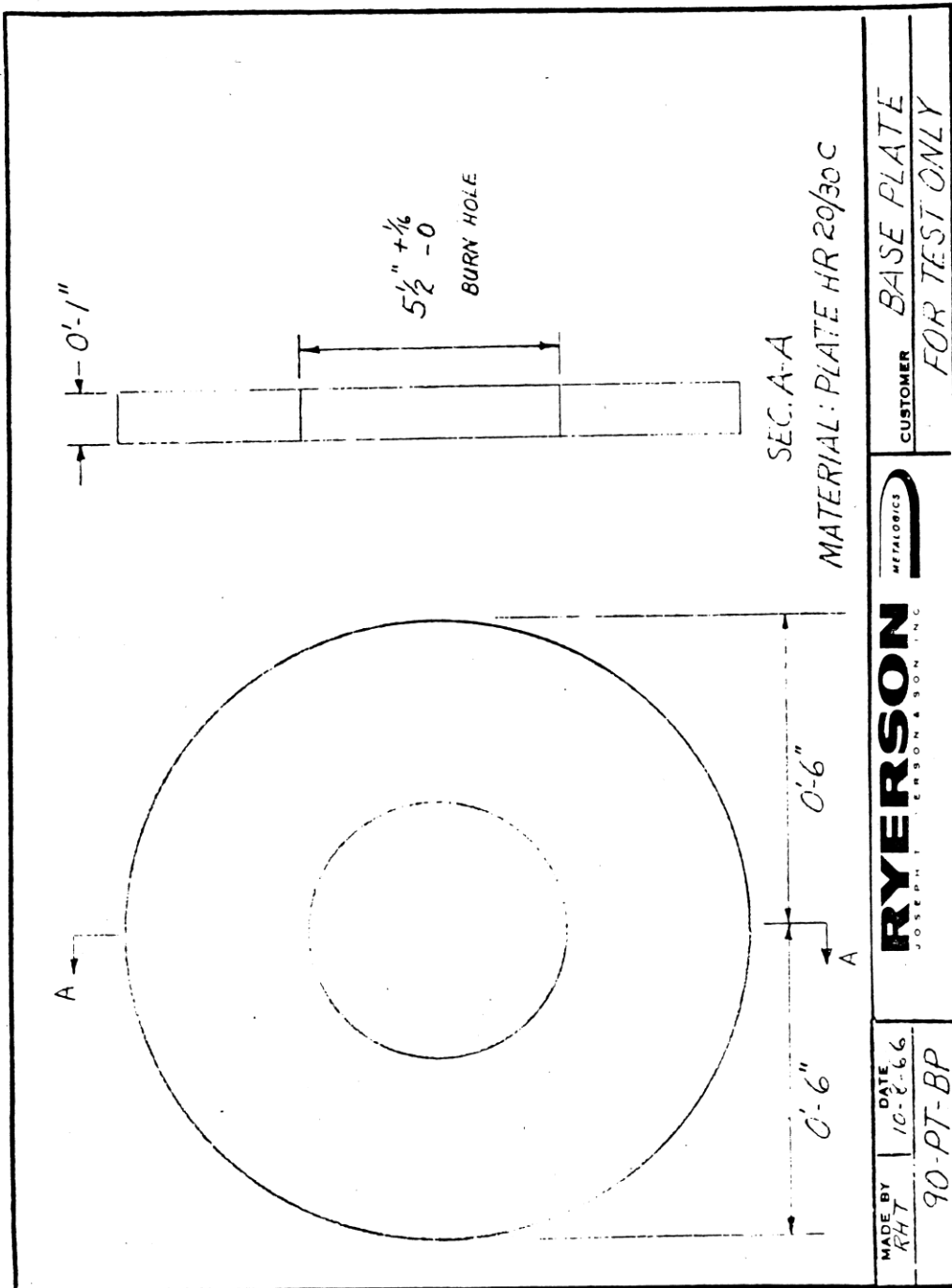
GINNA/UFSAR



3D-20

Sheet 7 of Notes

GINNA/UFSAR



3D-21

Load Tests of Coupler and Adaptor 90-11

GINNA/UFSAR

**PITTSBURGH TESTING LABORATORY**

ESTABLISHED 1881

PITTSBURGH, PA.

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS
ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS, AND AUTHORIZATION
FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING
OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL.

CLIENT'S No. 21T341891-60

August 25, 1966

LABORATORY No. 642438

ORDER No. CH-9583

REPORT

Report of: Load Tests of Coupler and Adaptor 90-11
Report to: Joseph I. Ryerson & Son, Inc.
P.O. Box 8000-A
Chicago, Illinois, 60680
Attention: Mr. W. A. Corson

We received at our laboratory one bushing measuring 11" long, 7-7/8" x 8 buttress threads on the O. D. and 5-1/8" x 8 buttress threads on the I. D., along with a pulling rod measuring 18" long with 3-3/4" of 5-1/8" x 8 buttress threads. This bushing was to be used in conjunction with the coupling identified in our Laboratory Report No. 640730. The set up was made as shown on Ryerson drawing, that is, the bushing was threaded into the 10-1/2" diameter coupling with a 5-1/4" pull rod on one end and the 8" pull rod on the other end. The assembly was then loaded and tensioned to the required loads, then released and disassembled and the threads checked both inside and outside the bushing for visible defects. It was also checked whether or not the pulling rods turned easily or with difficulty.

The results of these tests are as follows:

<u>Load Lbs.</u>		<u>Remarks</u>
742,000	Rod to adaptor	Hand turn easily.
	Adaptor to coupler	Hand turn easily.
848,000	Rod to adaptor	Hand turn easily.
	Adaptor to coupler	Hand turn easily.
954,000	Rod to adaptor	Hand turn easily.
	Adaptor to coupler	Hand turn easily.

Sheet 2 of Report

GINNA/UFSAR



PITTSBURGH TESTING LABORATORY

ESTABLISHED 1881

PITTSBURGH, PA.

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS
ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS, AND AUTHORIZATION
FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING
OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL.

LABORATORY No. 642438

August 25, 1966


ORDER No. CH-9583

CLIENT'S No. 21T341891-60

REPORT

<u>Load Lbs.</u>		<u>Remarks</u>
1,007,000	Rod to adaptor Adaptor to coupler	Hand turn easily. Hand turn easily.
1,060,000	Rod to adaptor Adaptor to coupler	Hand turn easily. Hand turn easily.
1,200,000	Rod to adaptor Adaptor to coupler	Hand turn easily. Hand turn easily.

PITTSBURGH TESTING LABORATORY


Earl Gallagher, Manger
Physical Testing Department

cc: 3-Client
Attn: W. A. Corson
1-FIL Chicago

3D-23

Load Tests of Coupler and Adaptor 90-11

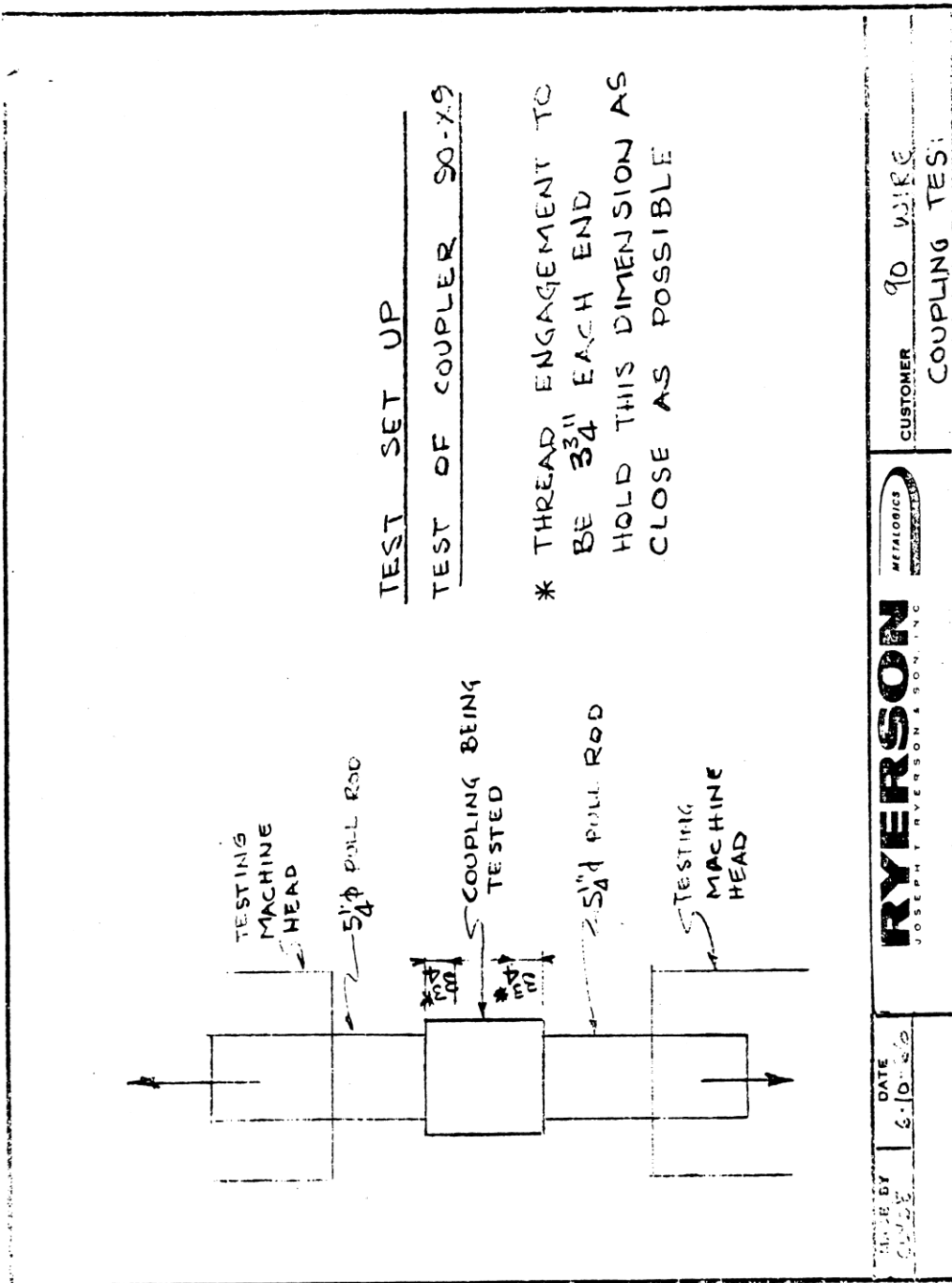
GINNA/UFSAR

<p>TEST PROCEDURE TEST OF COUPLER 90-X9</p> <p>SET UP TEST IN MACHINE PER DRAWING APPLY TENSION TO DESIGNATED LOAD (SEE TABLE BELOW) (THIS IS A STATIC TEST, APPLY & RELEASE LOADS ACCORDINGLY) RELEASE LOAD AND DISASSEMBLE CHECK THREADS AT BOTH END OF COUPLER CHECK FOR VISIBLE DEFECTS CHECK FOR TORQUE REQUIRED TO TURN RODS IN COUPLER { MEASUREMENTS ARE NOT NECESSARY, QUALITATIVE REMARKS (TURNS EASILY, DIFFICULT TO TURN, ETC) ARE SUFFICIENT</p> <p>REASSEMBLE AND REPEAT AT NEXT HIGHER LOAD</p>		<p>RYERSON JOSEPH T. RYERSON & SON, INC.</p> <p>METALLOGICS</p> <p>CUSTOMER 90 WIRE COUPLING TEST</p>										
<p>LOAD TABLE</p> <table border="1"> <tr> <td>742,000</td> <td>lbs</td> </tr> <tr> <td>842,000</td> <td>"</td> </tr> <tr> <td>954,000</td> <td>"</td> </tr> <tr> <td>1,007,000</td> <td>"</td> </tr> <tr> <td>1,060,000</td> <td>"</td> </tr> </table> <p>MACHINE MAXIMUM</p>		742,000	lbs	842,000	"	954,000	"	1,007,000	"	1,060,000	"	<p>MADE BY DATE 6-10-62</p>
742,000	lbs											
842,000	"											
954,000	"											
1,007,000	"											
1,060,000	"											

3D-24

Sheet 2 of Notes

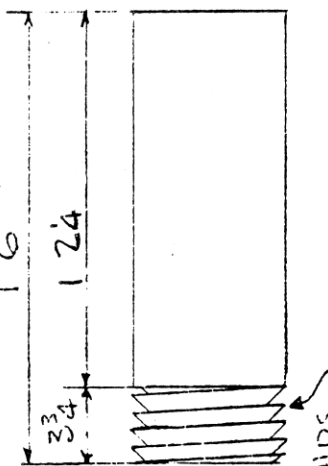
GINNA/UFSAR



3D-25

Sheet 3 of Notes

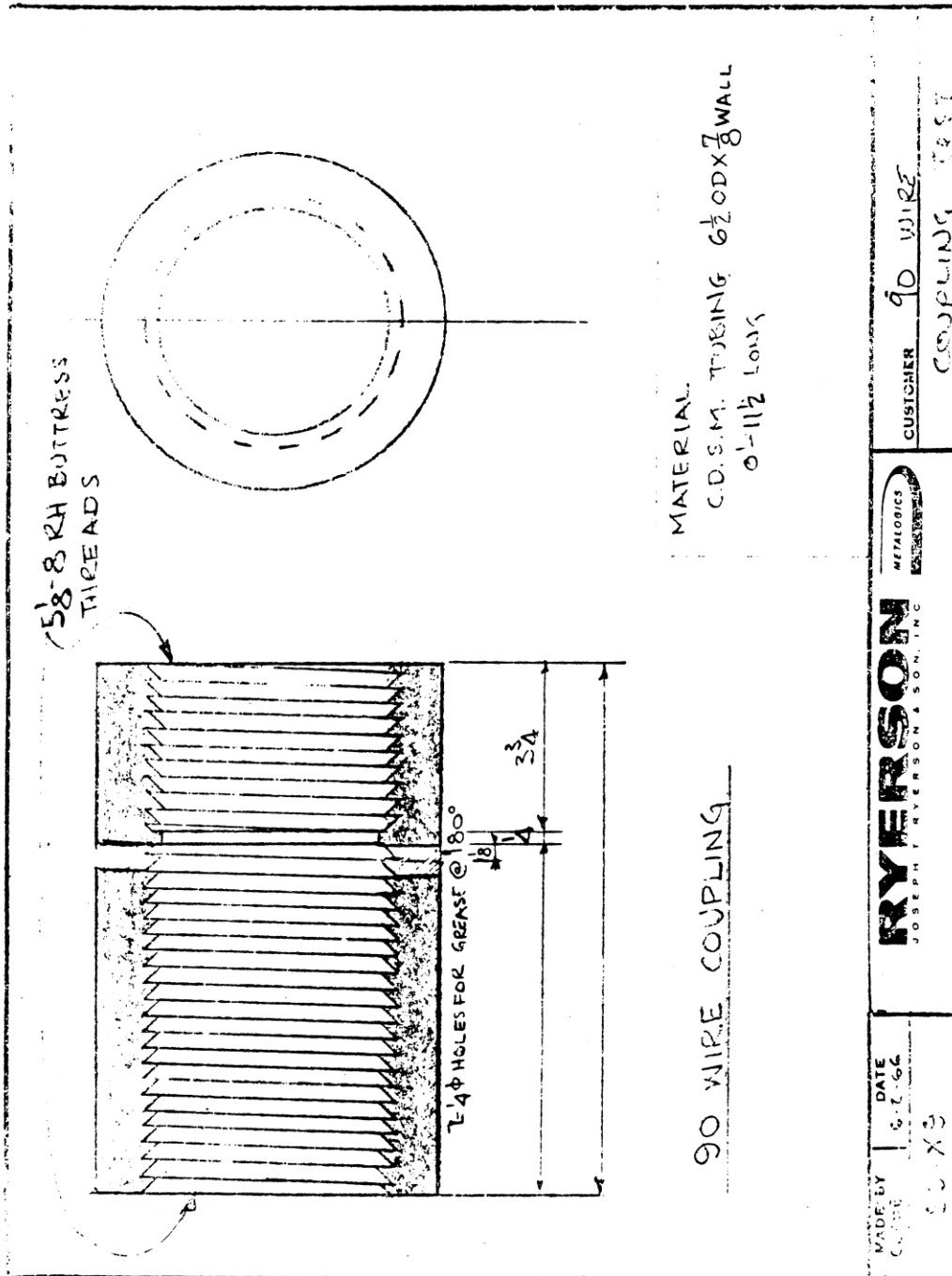
GINNA/UFSAR

 <p>58-8 RH. BUTT TILDS</p> <p>TEST PULL ROD (2 REQ'D)</p>	<table border="1"> <tr> <td data-bbox="941 323 1169 798"> <p>MATERIAL 1-5/8" ROD 10 X 1-6 HR. C1141</p> <p>HEAT TREAT TO PROPERTY C1141</p> </td> <td data-bbox="1169 323 1256 798"> <p>CUSTOMER 90 WJZE COUPLING TENDON</p> </td> </tr> <tr> <td data-bbox="941 798 1169 1386"> <p>RYERSON METALLOGICS JOSEPH T. RYERSON & SONS, INC.</p> </td> <td data-bbox="1169 798 1256 1386"> <p>MADE BY DATE 6-10-06</p> </td> </tr> </table>	<p>MATERIAL 1-5/8" ROD 10 X 1-6 HR. C1141</p> <p>HEAT TREAT TO PROPERTY C1141</p>	<p>CUSTOMER 90 WJZE COUPLING TENDON</p>	<p>RYERSON METALLOGICS JOSEPH T. RYERSON & SONS, INC.</p>	<p>MADE BY DATE 6-10-06</p>
<p>MATERIAL 1-5/8" ROD 10 X 1-6 HR. C1141</p> <p>HEAT TREAT TO PROPERTY C1141</p>	<p>CUSTOMER 90 WJZE COUPLING TENDON</p>				
<p>RYERSON METALLOGICS JOSEPH T. RYERSON & SONS, INC.</p>	<p>MADE BY DATE 6-10-06</p>				

3D-26

Sheet 4 of Notes

GINNA/UFSAR



3D-27

90 Wire Tendon Test

GINNA/UFSAR



PITTSBURGH TESTING LABORATORY

ESTABLISHED 1881

PITTSBURGH, PA.

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS
ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS, AND AUTHORIZATION
FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING
OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL.

CLIENT'S No. Ltr. 3/13/67

June 5, 1937

LABORATORY No. 655506

ORDER No. PG-18619

REPORT

Report of: 90 Wire Tendon Test


Report to: Joseph T. Ryerson & Son, Inc.
P. O. Box 8000-A
Chicago, Illinois 60680

We received a sample which was identified to us as a 90 wire tendon.
We were requested to test the sample in tension measuring elongation
over a 120" gage length.

The sample consisted of 90 wires, 1/4" in diameter, with anchor heads
on each end. The anchor heads were held on the wire by the wire
button heads. The anchor head had external threads which threaded
into a coupler. The coupler then threaded onto pull rods, 8" in
diameter, which were installed in the upper and lower cross heads of
our 1,200,000# testing machine.

An extensometer, modified to give a 120" gage length, was used to
record sufficient data to plot the attached curve.

PITTSBURGH TESTING LABORATORY


Earl Gallagher, Manager
Physical Testing Department

cc: 3-Client
1-PITL Chicago

3D-28

Annendix 3D CONTAINMENT TENDON ANCHORAGE HARDWARE CAPACITY TESTS

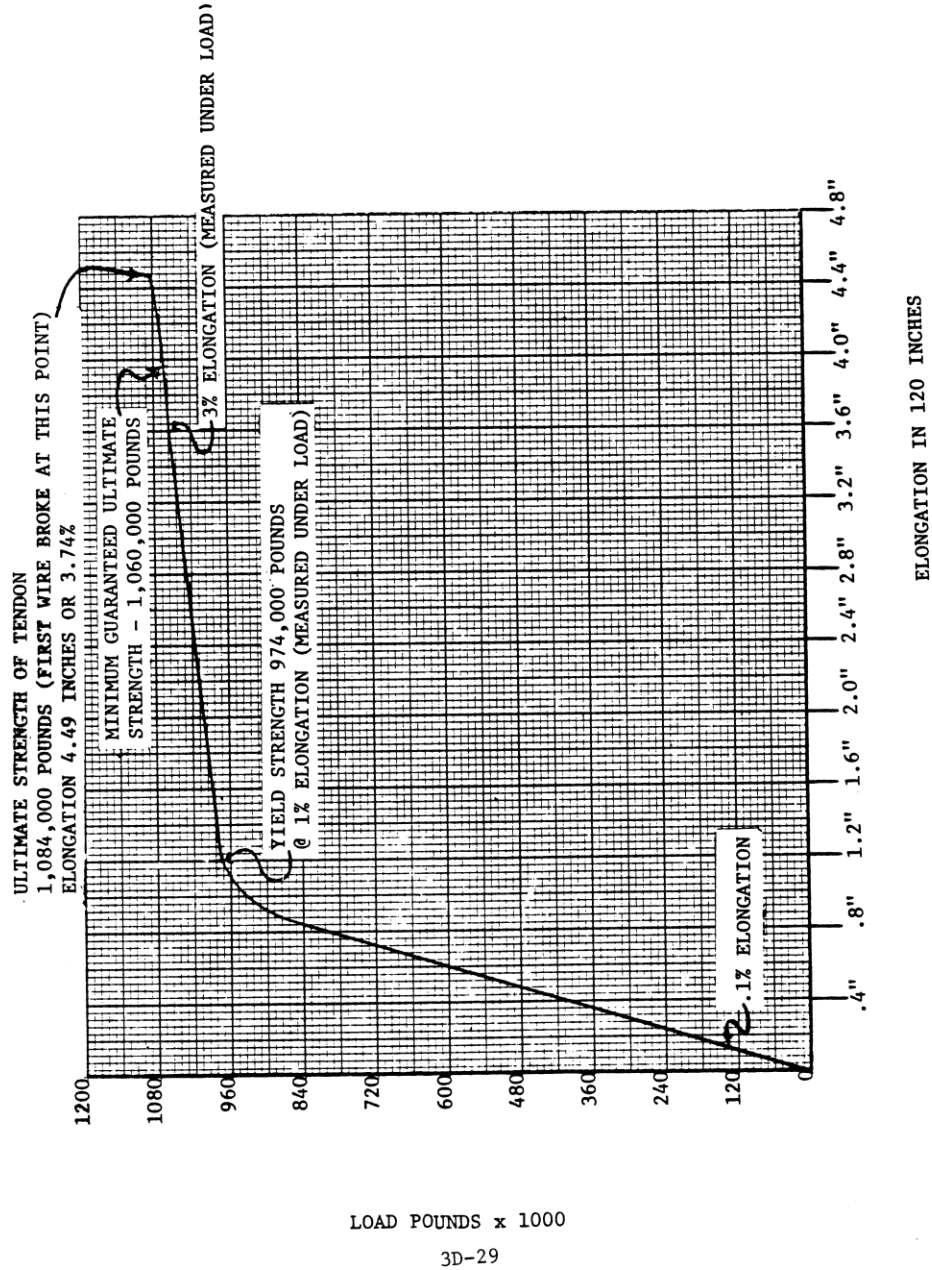
90 Wire Tendon Test

GINNA/UFSAR

TENSION TEST OF 90 WIRE TENDON

J.T. RYERSON & SONS, INC. PG-18619

5-26-67 65506



3D-29

90 Wire Tendon Test

GINNA/UFSAR

<h2 style="margin: 0;">90 WIRE TENDON TEST</h2>		CUSTOMER Bechtel Company Palisades 5935-C-51
<p>The purpose of this Test is to verify, that a Tendon, consisting of 90 wires, the wires anchored at each end in anchorheads by means of Buttonheads, is 90 times as strong as one wire. The Test further allows to measure the Tendon-elongation.</p> <p>The complete Endanchors have been previously tested beyond the ultimate strength of the Tendon. (see Ryerson 90-PT-1 dated 7/25/66 90-PT-2 7/25/66 and the corresponding Test report from PTL dated 10/24/66.)</p>		
MADE BY A.W.S	DATE 2/3/67	METALLOGICS RYERSON JOSEPH T. RYERSON & SON, INC.
21 PT - 34-114		

3D-30

Sheet 2 of Notes

GINNA/UFSAR

A. LOAD

Min. guaranteed ultimate strength
of $\phi 1/4"$ wire (see ASTM - 421)

240'000 psi

Min guaranteed ultimate strength
of 90 wire Tendon

$$90 \cdot 0.04909 \cdot 240'000 = \underline{1'060'000^*}$$

Min. Yield strength of 90 wire
Tendon, measured under Load at
1.0% extension.

$$80\% \times \text{ult. strength} = 848'000^*$$

Anticipated Test Result :
No wirebreak will occur before
the Load of 1060K is reached.

B. ELONGATION

Min. Tendon elongation 3%

measured under Load

in min. Gauge length of 10 ft
(See PCI, proposed Post-tensioning
Material Specifications)

3D-31

CUSTOMER Bechtel Company
Palisades 5935-C-51

METALLOGICS
TEST EQUIPMENT

RYERSON
JOSEPH RYERSON & SONS, INC.

MADE BY
A W/S

DATE
2/3/67

Sheet 3 of Notes

GINNA/UFSAR

The Elongation is to be measured as movement between Anchor-heads.

The Wirelength for the Test tendon is 10'-0" → 120"

The methode of measuring elongation shall be similar to the one specified in ASTM -421.

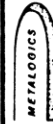
Initial elongation 0.1% → 0.12" → 1/8"

Initial Stress 29'000 psi → 128 K

Yield at 1% extension → 1.20" → 1 3/16"
min yield strength 848 K

Min. Elongation 3% → 3.60" → 3 5/8"
is to be reached before the first wire breaks.

CUSTOMER Bechtel Company
Palisades 5935-C-51



RYERSON
JOSEPH T. RYERSON & SONS, INC.

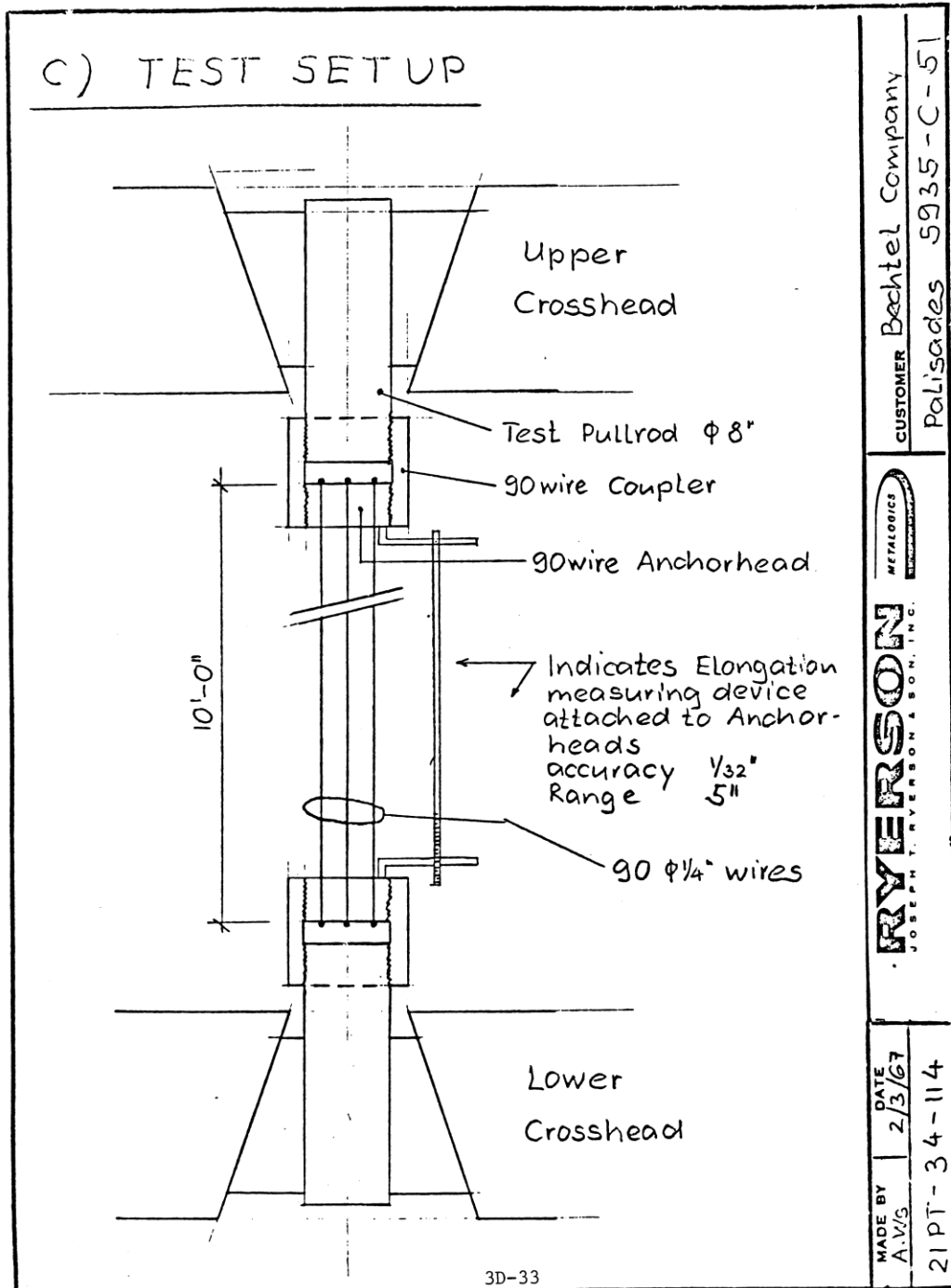
MADE BY
A.W.S.

DATE
2/3/67

3D-32

Sheet 4 of Notes

GINNA/UFSAR



Load Tests of 90-X7 Coupler

GINNA/UFSAR

**PITTSBURGH TESTING LABORATORY**ESTABLISHED 1881
PITTSBURGH, PA.

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS
ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS, AND AUTHORIZATION
FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING
OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL.

CLIENT'S NO. 21T341891-48

August 25, 1966

LABORATORY No. 640730

ORDER No. CH-9583

REPORT

Report of: Load Tests of 90-X7 Coupler

Report to: Joseph T. Ryerson & Son, Inc.
P. O. Box 8000-A
Chicago, Illinois 60680

Attention: Mr. W. A. Corson

Submitted to our laboratory for load tests was an assembly identified as 90-X7 coupler. We were instructed to set up the coupler assembly as shown on Ryerson drawing that showed the coupler that measured 10-1/2" O.D., 8" long, with a 7-7/8"-8 buttress thread and two 8" diameter pulling rods at either end threaded into the coupler. The thread engagement at each end was 3-1/2". After the assembly was complete, we were to apply designated tension loads and release the loads accordingly. After releasing the loads we were to disassemble the assembly and check threads at both ends of the coupler for visible defects and check whether or not the pulling rods would turn easily or with difficulty from the coupler.

The results of these tests are as follows:

<u>Load Lbs.</u>	<u>Remarks</u>
	Threads lubricated with oil.
142,000	Hand turn top of pulling rod. Hand turn bottom of pulling rod.
848,000	Hand turn top of pulling rod. Hand turn bottom of pulling rod.
954,000	Hand turn top of pulling rod. Hand turn bottom of pulling rod.
1,007,000	Hand turn top of pulling rod. Hand turn bottom of pulling rod. Approximately 3 turns, strap wrenches used from then on. Evidence of thread cutting on rod. Threads on bottom rod dressed with file. Threads lubricated with "Fluore Glide" dry lubricant.

3D-34

Sheet 2 of Report

GINNA/UFSAR



PITTSBURGH TESTING LABORATORY

ESTABLISHED 1961
PITTSBURGH, PA.

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS
ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS, AND AUTHORIZATION
FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING
OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL.

August 25, 1966

LABORATORY No.

640730

CLIENT'S No. 21T341891-48

ORDER No.

CH-9583

REPORT

<u>Load Lbs.</u>	<u>Remarks</u>
1,060,000	Hand turn top of pulling rod. Hand turn bottom of pulling rod.
1,200,000	Hand turn top of pulling rod. Hand turn bottom of pulling rod.

PITTSBURGH TESTING LABORATORY

Earl Gallagher

Earl Gallagher, Manager
Physical Testing Department

cc: 3-Client
Attn: Mr. W. A. Corson
1-PTL Chicago

3D-35