

FORMULA FOR STRENGTHS AT 190<sup>th</sup> WORKING PRESSURE

	LLOYDS REGISTER	CANADIAN GOVT.
SHELL PLATE	PRESS. = $\frac{155 \times 14.5^2}{100} = 321.8^2$	PRESS. = $\frac{155 \times 14.5^2}{100} = 321.8^2$
HEADS IN STEAM SPACE	$\frac{155 \times 14.5^2}{100} = 321.8^2$	$\frac{155 \times 14.5^2}{100} = 321.8^2$
GIRDERS	$\frac{155 \times 14.5^2}{100} = 321.8^2$	$\frac{155 \times 14.5^2}{100} = 321.8^2$
TUBE PLATE (COMPRESSION)	$\frac{155 \times 14.5^2}{100} = 321.8^2$	$\frac{155 \times 14.5^2}{100} = 321.8^2$
" BENDING	$\frac{155 \times 14.5^2}{100} = 321.8^2$	$\frac{155 \times 14.5^2}{100} = 321.8^2$
FRONT HEAD IN WATER WAY	$\frac{155 \times 14.5^2}{100} = 321.8^2$	$\frac{155 \times 14.5^2}{100} = 321.8^2$
REAR HEAD BETW. COMB. CHRS.	$\frac{155 \times 14.5^2}{100} = 321.8^2$	$\frac{155 \times 14.5^2}{100} = 321.8^2$
TOP OF COMB. CHRS.	$\frac{155 \times 14.5^2}{100} = 321.8^2$	$\frac{155 \times 14.5^2}{100} = 321.8^2$
SIDES AND BACK OF COMB. CHRS.	$\frac{155 \times 14.5^2}{100} = 321.8^2$	$\frac{155 \times 14.5^2}{100} = 321.8^2$
FURNACES	$\frac{155 \times 14.5^2}{100} = 321.8^2$	$\frac{155 \times 14.5^2}{100} = 321.8^2$
MAIN STAYS	$\frac{155 \times 14.5^2}{100} = 321.8^2$	$\frac{155 \times 14.5^2}{100} = 321.8^2$
18" THICK. SCREW STAYS IN SIDES & BACK OF COMB. CHRS.	$\frac{155 \times 14.5^2}{100} = 321.8^2$	$\frac{155 \times 14.5^2}{100} = 321.8^2$
18" THICK. IN TOP OF COMB. CHRS.	$\frac{155 \times 14.5^2}{100} = 321.8^2$	$\frac{155 \times 14.5^2}{100} = 321.8^2$
18" THICK. SCREW STAYS AT REAR, EDGE OF COMB. CHRS.	$\frac{155 \times 14.5^2}{100} = 321.8^2$	$\frac{155 \times 14.5^2}{100} = 321.8^2$
18" THICK. SCREW STAYS AT REAR, EDGE OF COMB. CHRS.	$\frac{155 \times 14.5^2}{100} = 321.8^2$	$\frac{155 \times 14.5^2}{100} = 321.8^2$
18" THICK. SCREW STAYS IN CORNERS OF COMB. CHRS.	$\frac{155 \times 14.5^2}{100} = 321.8^2$	$\frac{155 \times 14.5^2}{100} = 321.8^2$
THICKNESS OF BUTT STRAPS	$\frac{155 \times 14.5^2}{100} = 321.8^2$	$\frac{155 \times 14.5^2}{100} = 321.8^2$
STRESS IN STAY TUBES	$\frac{155 \times 14.5^2}{100} = 321.8^2$	$\frac{155 \times 14.5^2}{100} = 321.8^2$

DATA FOR ONE BOILER

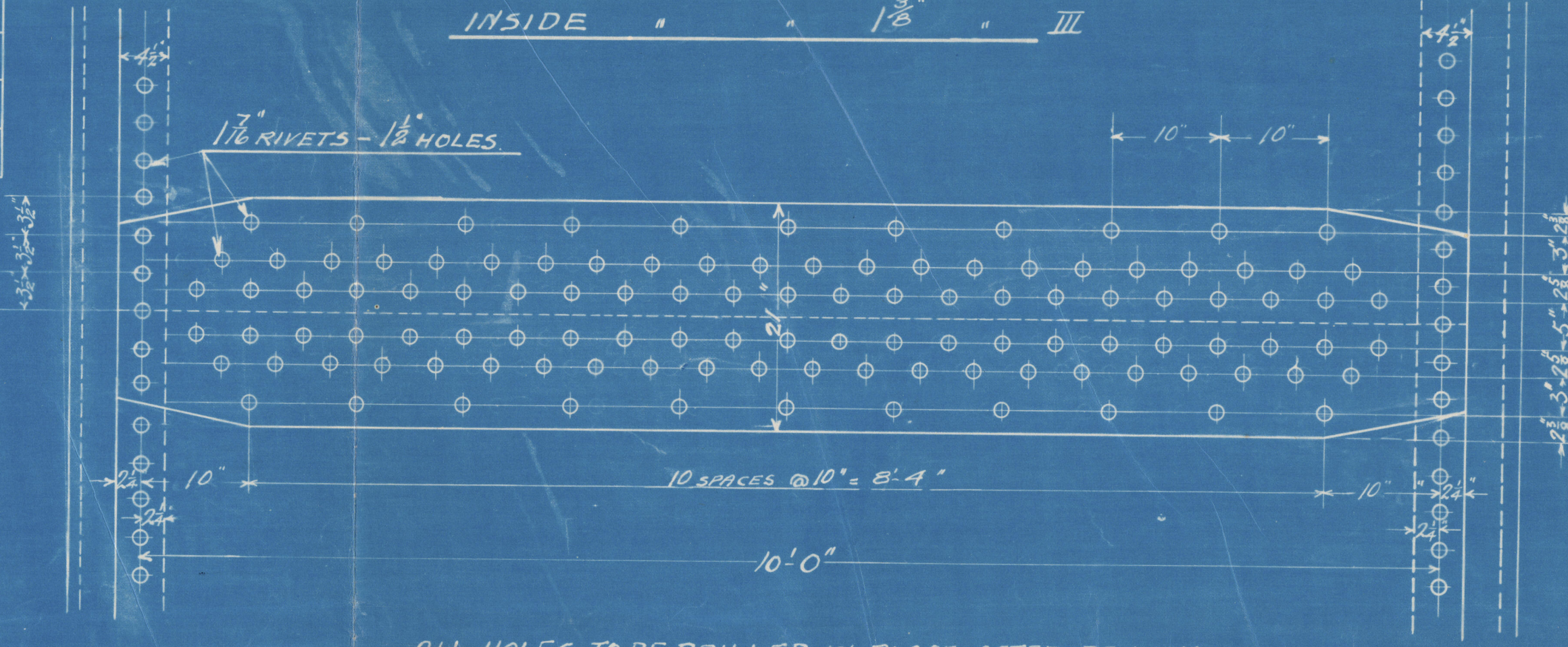
HEATING SURFACE OF TUBES	1946 SQ. FT.
" " COMB. CHAMBERS	245 " "
" " FURNACES	149 " "
TOTAL	2355 " "
GRATE SURFACE - 6'-0" GRATE BARS	67.5 " "
RATIO HEATING SURFACE GRATE SURFACE	34.6
STEAM SPACE WATER 6" ABOVE COMB. CHAMBERS	
ESTIMATED WEIGHT OF BOILER	
" " WATER	
AREA OF SAFETY VALVES REQD. (NATURAL DRAFT)	192 x 675 = 1285 SQ. IN.
TWO 3" SAFETY VALVES REQD. AREA = 141 SQ. IN.	

*Raymond P. Poirer*

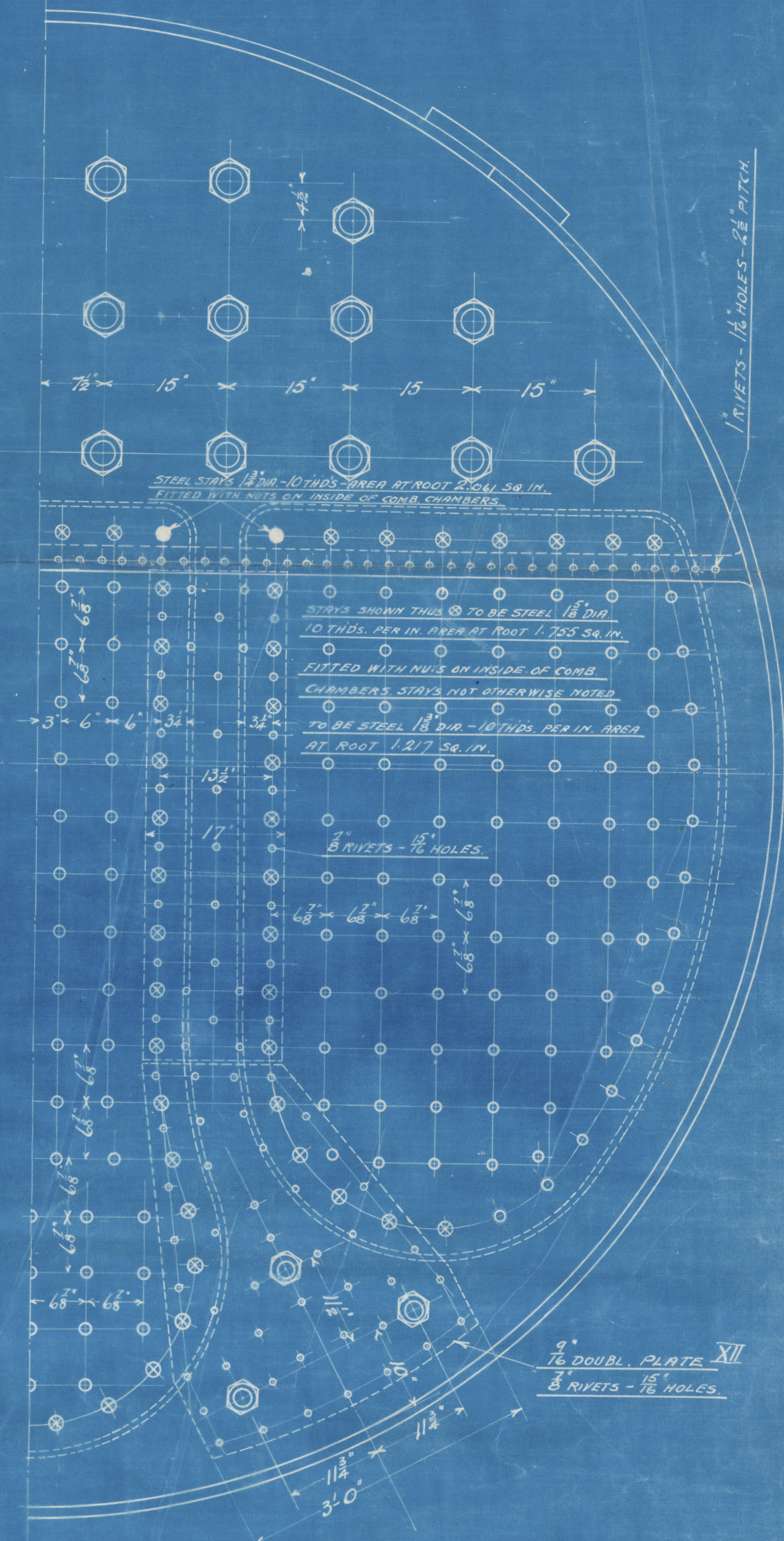
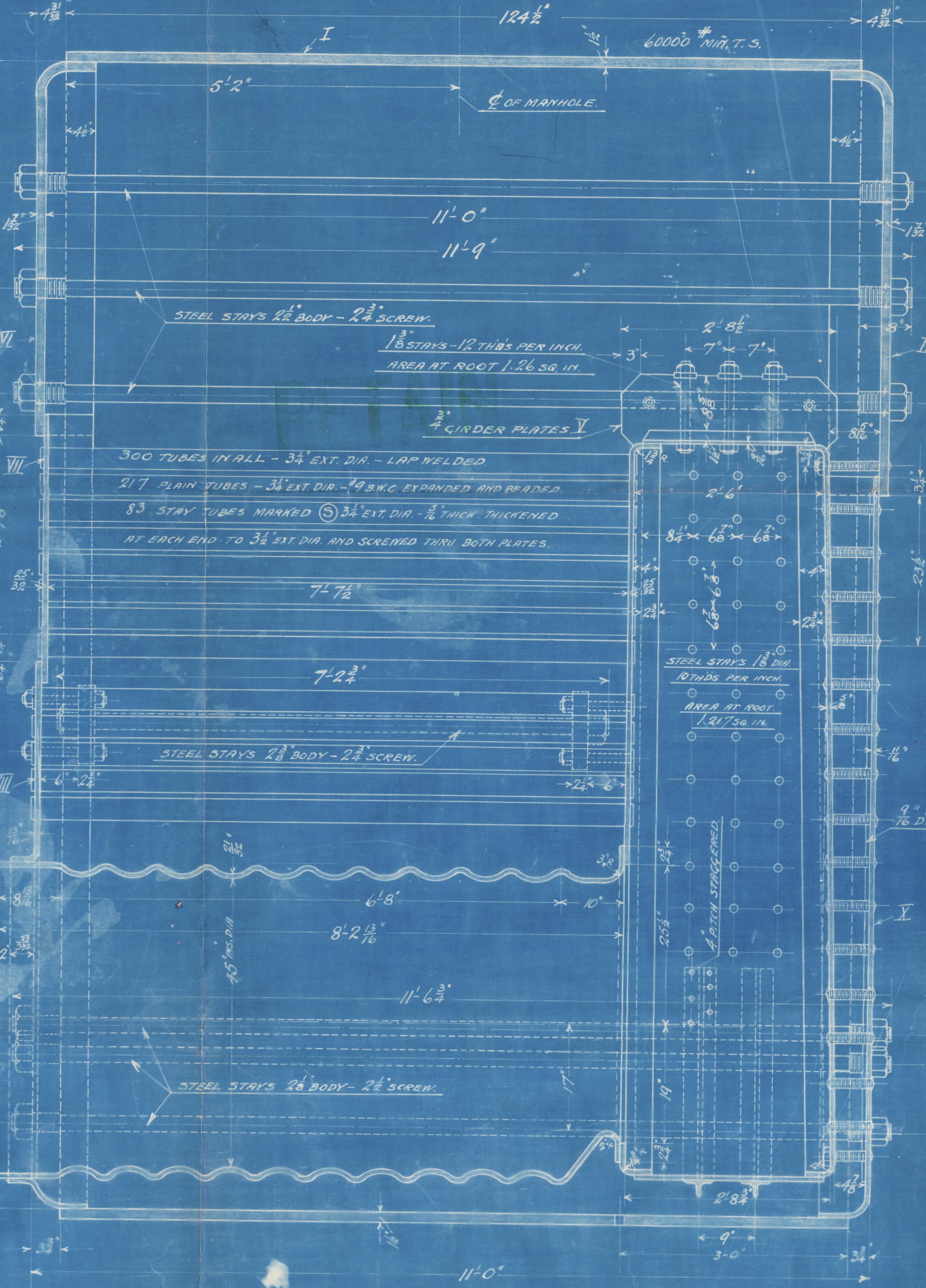
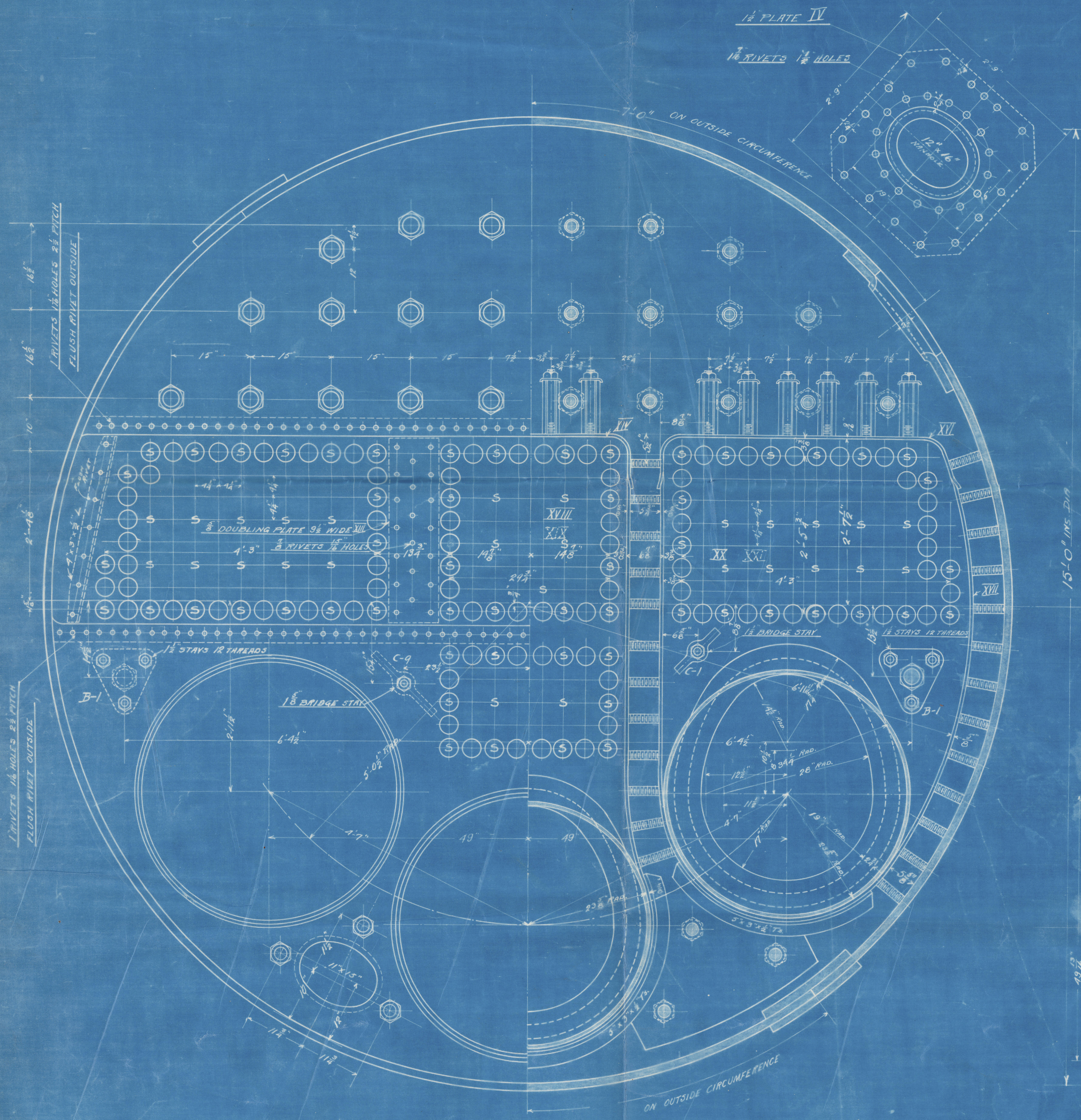
EFFICIENCY OF LONGITUDINAL JOINT

	LLOYDS REGISTER	CANADIAN GOVT.
PLATE	$\frac{100 - 1.5}{100} = 98.5\%$	$\frac{100 - 1.5}{100} = 98.5\%$
RIVETS	$\frac{5 \times 1.75 \times 1.767 \times 85}{10 \times 1.5} = 81.586\%$	$\frac{23 \times 5 \times 1.75 \times 1.767 \times 4.45 \times 100}{26 \times 8 \times 10 \times 1.5 \times 4.25} = 98.49\%$
PLATE & RIVETS COMBINED	$\frac{100 - 2 \times 1.5}{100} = 97.0\%$	$\frac{100 - 2 \times 1.5}{100} = 97.0\%$

OUTSIDE BUTT STRAPS  $\frac{1}{8}$ " THICK II  
INSIDE "  $\frac{1}{8}$ " THICK III



ALL HOLES TO BE DRILLED IN PLACE AFTER BENDING



INSIDE RIVETING AND RIVETING IN FURNACES  
AT FRONT HEAD TO BE  $\frac{1}{8}$ " DIA. -  $\frac{1}{8}$ " HOLES  $\frac{1}{8}$ " PITCH  
COUNTERSUNK ONE HALF THE THICKNESS OF EACH PLATE

APPROVED



NOTE:  
ALL STAYS AND RIVETS TO BE STEEL TESTED TO COMPLY WITH REQUIREMENTS OF LLOYDS REGISTER AND CANADIAN GOVT.  
ALL RIVET HOLES TO BE DRILLED

TO PASS INSPECTION OF LLOYDS REGISTER AND CANADIAN GOVT. PART I.  
FOR A WORKING PRESSURE OF 190 LBS. PER SQ. INCH.

TWO BOILERS REQD. { ONE AS SHOWN  
ONE TO OPP. HAND

ALTERATIONS	PRINTS
Rev. Alteration Date	Drawn by Date
	Checked by Date

ORDER NO. 131  
CONTRACT NO. 2930

**BOILER**  
15'-0" DIA. x 11'-0" HEADS - 190"  
PORT ARTHUR SHIPBUILDING CO.  
PORT ARTHUR, ONT.  
SCALE: 1" = 1' FOOT. DATE: MAY 4, 1917

ISSUED TO: \_\_\_\_\_  
DATE ISSUED: \_\_\_\_\_



M1120-0160

*London*



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Lloyd's Register  
Foundation