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RESTRICTED

24 Nov 92.

TO BE NOTIFIED IN A.T.M. No. 34

SECRET

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APPENDIX PART 1

AUSTRALIAN MILITARY FORCES

ENGINEER-IN-CHIEF'S
CONSOLIDATED
INTELLIGENCE SUMMARY

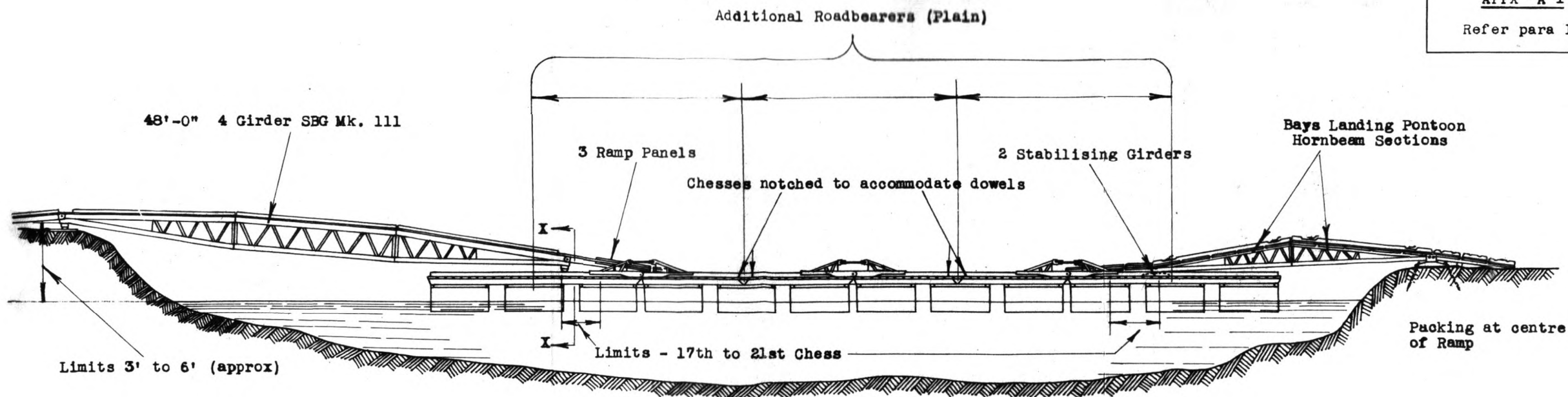
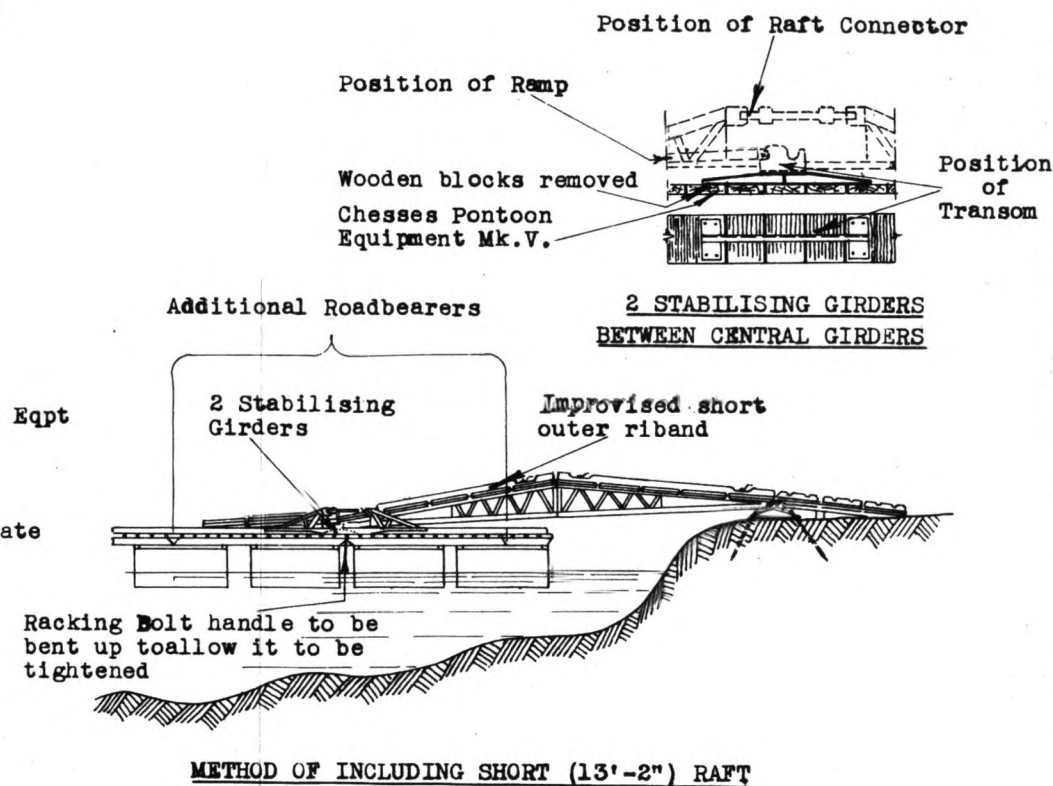
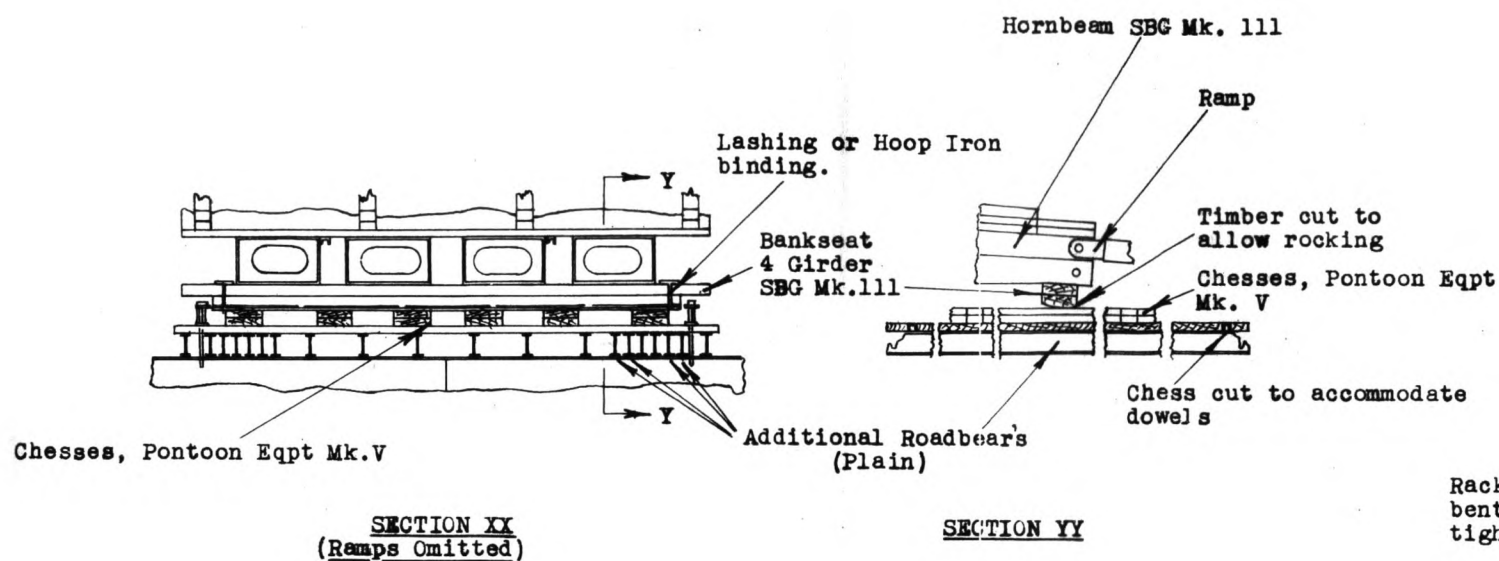
Nos. 1-17

30 May 44

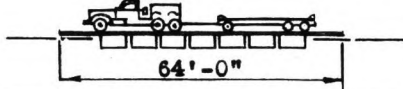
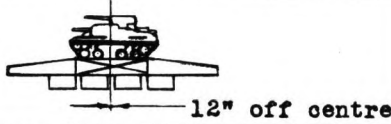
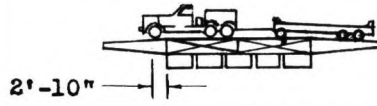
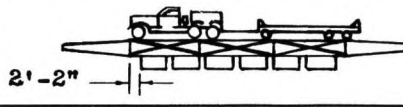
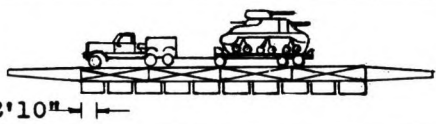
Headquarters,
Australian Military Forces

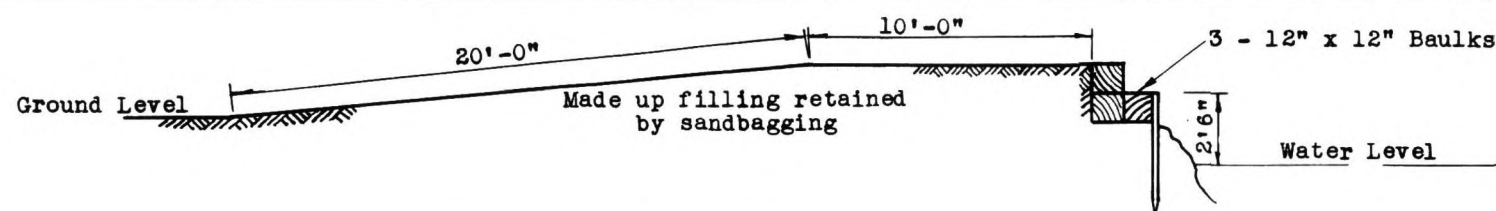
*Prepared by the General Staff and issued under the direction of
the Commander-in-Chief.*

RESTRICTED

GENERAL ARRANGEMENT

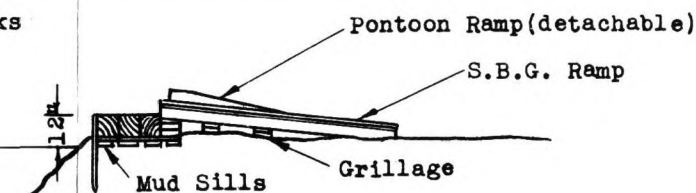
PONTOON EQUIPMENT MK.V IMPROVISED CLASS 30 BRIDGE

DESCRIPTION OF RAFT	PIERS	GIRDERS		LOAD					DIAGRAM	TOWING PERFORMANCE			LIMITATIONS
		NO	LG TH FEET	DESCRIPTION	TONS	LENGTH OF LOAD	MAX	MIN		SPEED KNOTS	FREEBOARD		
											BOW	STERN	
1. MK V PONTOON EQPT BATWING OR 7 PIER LIMITED ARTICULATION	7			TANK OR TRACTOR & TRAILER	27.5	18'6"	27	12		3	INCHES		NOT TO BE CONSIDERED NORMALLY AS VERY WASTEFUL OF EQUIPMENT NOTE : Low Freeboard on Centre Pier: Raft Tows very badly.
	7				22	52'7"	15	11			3	3		12
2. PONTOON EQUIPMENT AND PONTOON LANDING BAY	4	4	42	TANK	27.5	18'6"	10½	10½		4	2	9	A POSSIBLE VERY SLOW SPEED CALM WATER TOW. TANK MUST BE RUN ON VERY SLOWLY TO AVOID IMPACT ON HORNBEAM SECTION
										5	-12	6	
3. PONTOON EQUIPMENT AND SMALL BOX GIRDER	5	4	64	TANK	27.5	18'6"	8½	8½		3	2	9	A POSSIBLE VERY SLOW SPEED CALM WATER TOW
4. PONTOON EQUIPMENT AND SMALL BOX GIRDER	5	2	64	TRACTOR & TRAILER	22	52'7"	15	15		5	7	10	THE MINIMUM BUOYANCY FOR A TOW IN A SLOP, IE. WITH A FRESH WIND AGAINST THE STREAM ON A BROAD RIVER
										6½	-1	10	
5. PONTOON EQUIPMENT AND SMALL BOX GIRDER	6	4	80	TANK	27.5	18'6"	9½	9½		3½	2	9	ADVANTAGE OVER 3 LIES IN GREATER OVERHANG OF HORNBEAM WHICH MAY SIMPLIFY BANKSEAT CONSTRUCTION ON SHELVEING BANK
6. PONTOON EQUIPMENT AND SMALL BOX GIRDER	6	2	80	TRACTOR & TRAILER	22	52'7"	20½	20½		6½	7	12	TO BE CONSIDERED IN PLACE OF 4 IF EQUIPMENT PERMITS AS LESS ACCURATE LOADING PERMISSIBLE.
7. PONTOON EQUIPMENT AND SMALL BOX GIRDER	7	4	80	TANK	27.5	18'6"	13½	13½		3	7	10	THE MINIMUM BUOYANCY FOR A TOW IN A SLOP
										5	1	10	
8. PONTOON EQUIPMENT AND SMALL BOX GIRDER	10	4	96	TANK TRACTOR & TRAILER	49.5	52'7"	12½	12½		3	7	10	ONLY TO BE CONSIDERED IN VERY FAVOURABLE CIRCUMSTANCES, I.E. AMPLE TOWING POWER OR SLACK WATER; IN EVERY CASE WITH NEGLEGIBLE WIND.



BUILT-UP BANKSEAT

To show Height of Bankseat with 3 to 8.



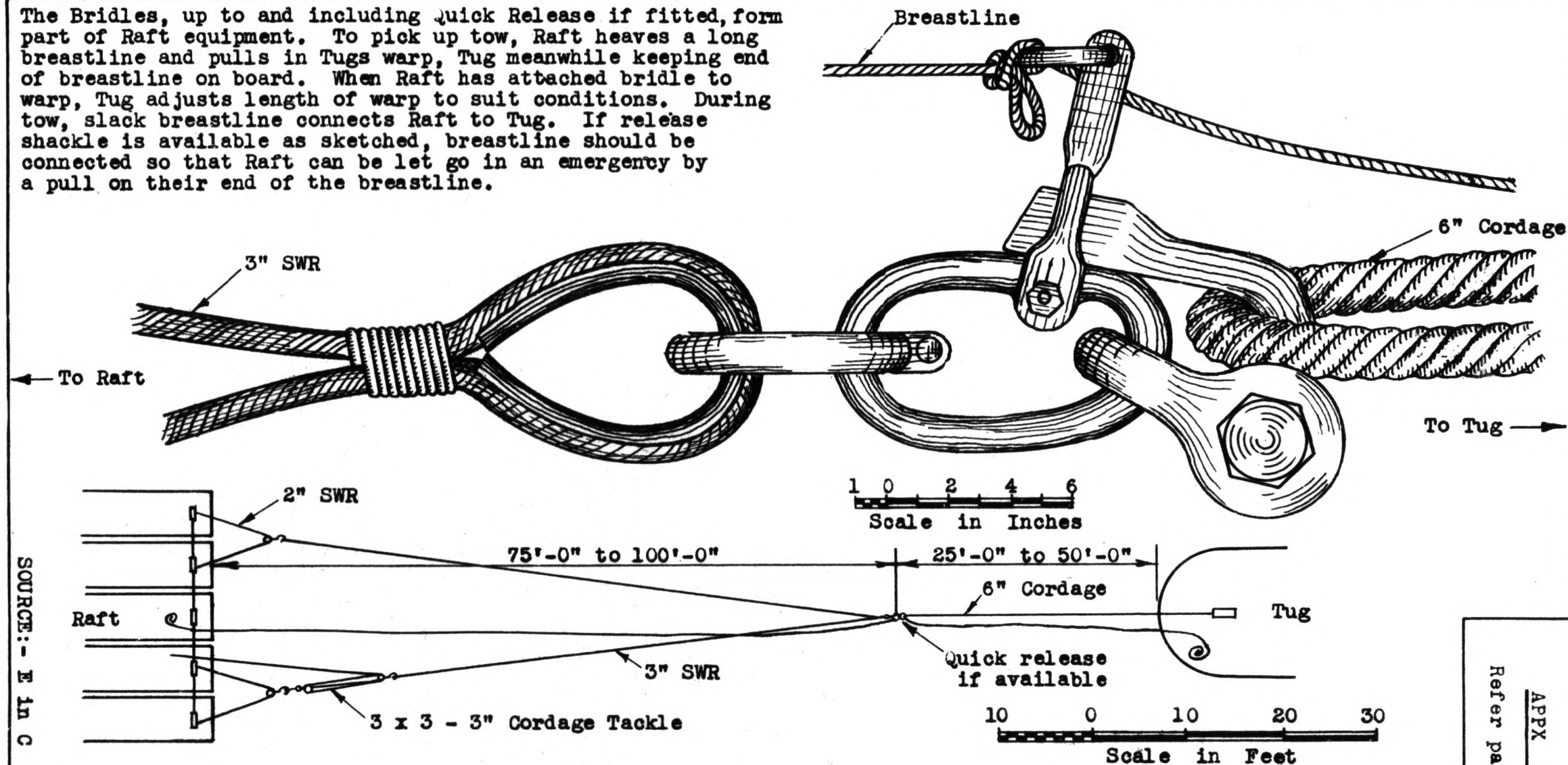
SIMPLE BANKSEAT

To show Height of Bankseat with 1 and 2.

HEAVY TANK FERRIES - PERFORMANCE FIGURES

BASED ON AMERICAN GENERAL GRANT WITH DIAMOND "T" TRACTOR & TRAILER

The Bridles, up to and including Quick Release if fitted, form part of Raft equipment. To pick up tow, Raft heaves a long breastline and pulls in Tugs warp, Tug meanwhile keeping end of breastline on board. When Raft has attached bridle to warp, Tug adjusts length of warp to suit conditions. During tow, slack breastline connects Raft to Tug. If release shackle is available as sketched, breastline should be connected so that Raft can be let go in an emergency by a pull on their end of the breastline.

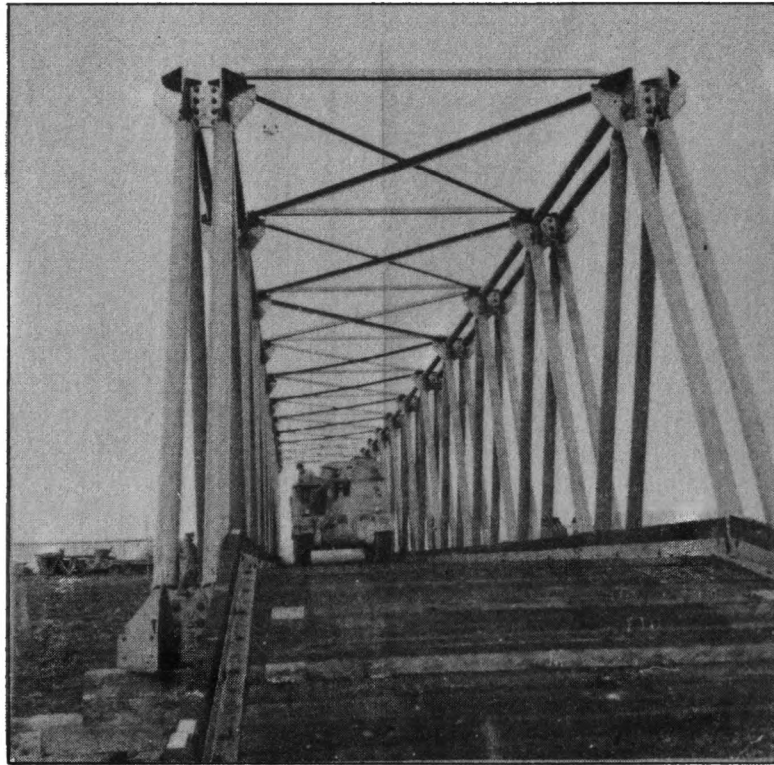


SKETCH SHOWING GENERAL ARRANGEMENT OF QUICK RELEASE SHACKLE

SOURCE:- E in C M.F.F.

Refer para 11

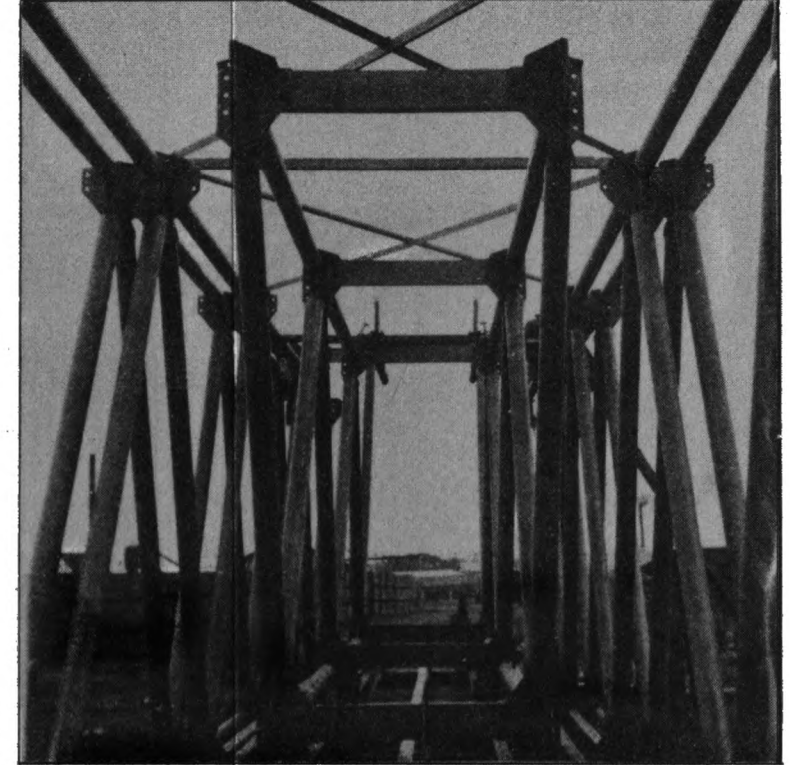
APPX A 4



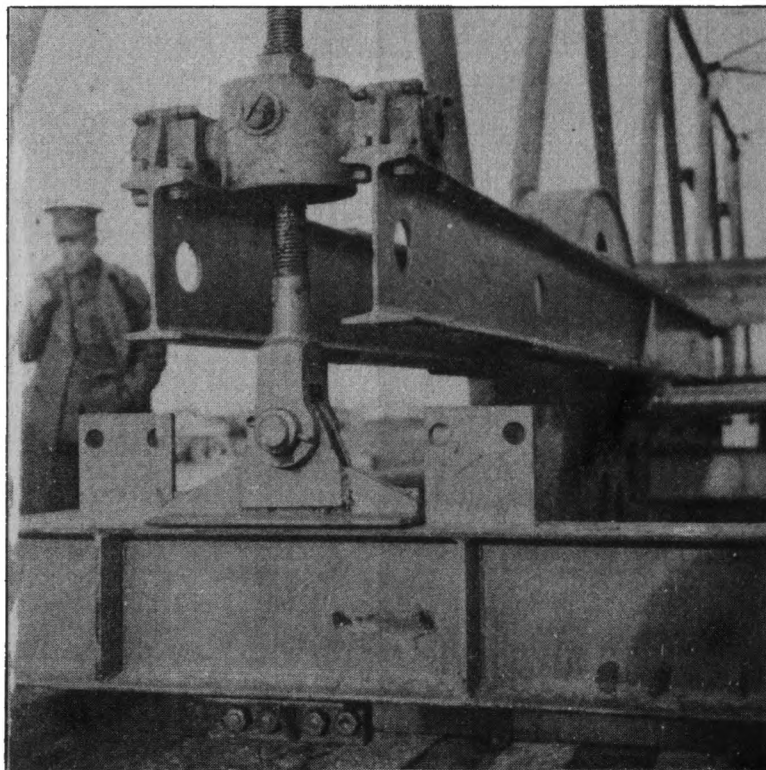
No. 1
DOUBLE TUBE "STEELE" BRIDGE 168' SPAN



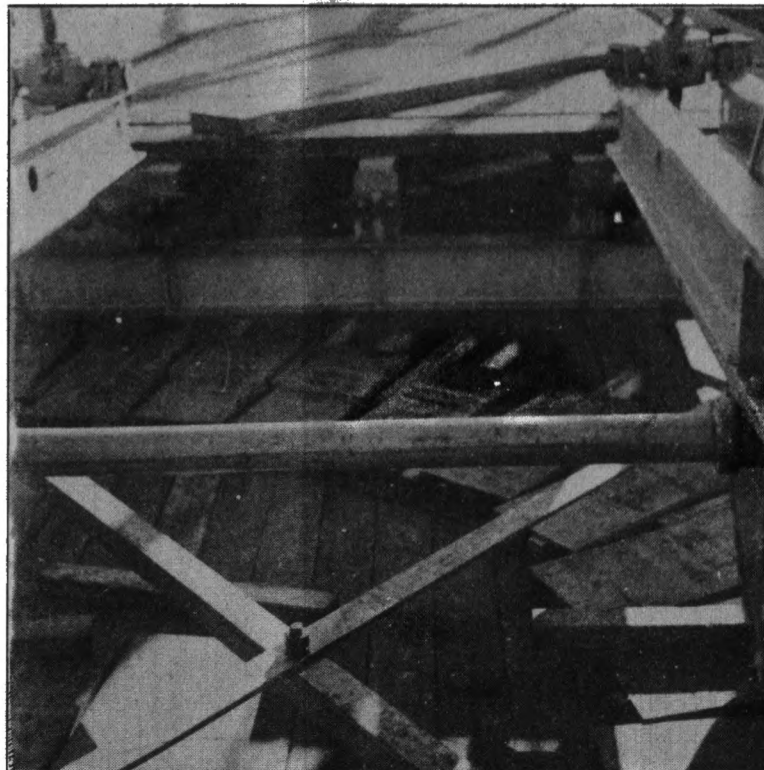
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ERECTION TROLLEY - EXT.



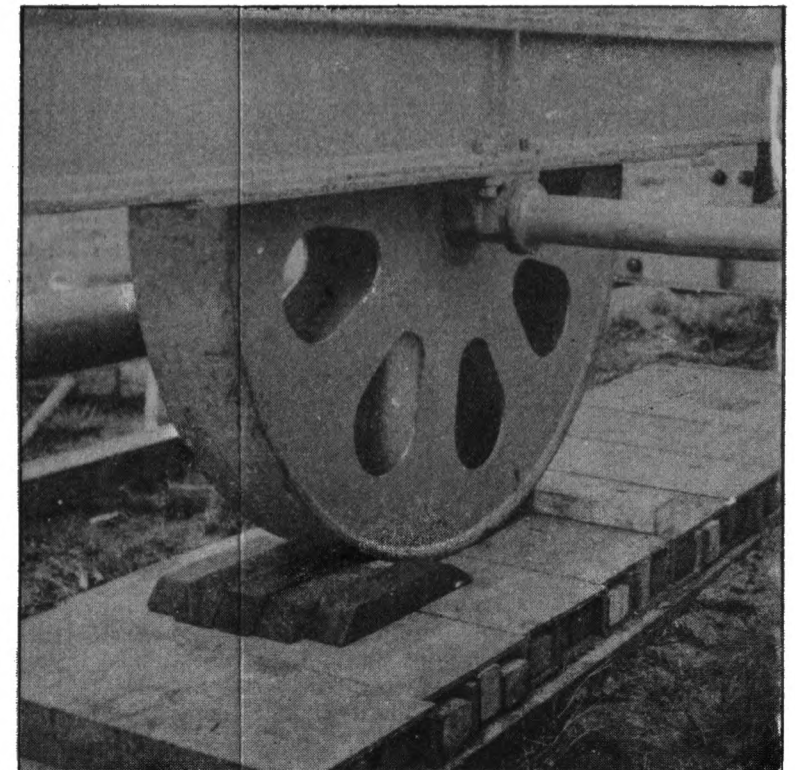
No. 3
ERECTION TROLLEY - INT.



No. 4
TROLLEY BAY CONSTRUCTION



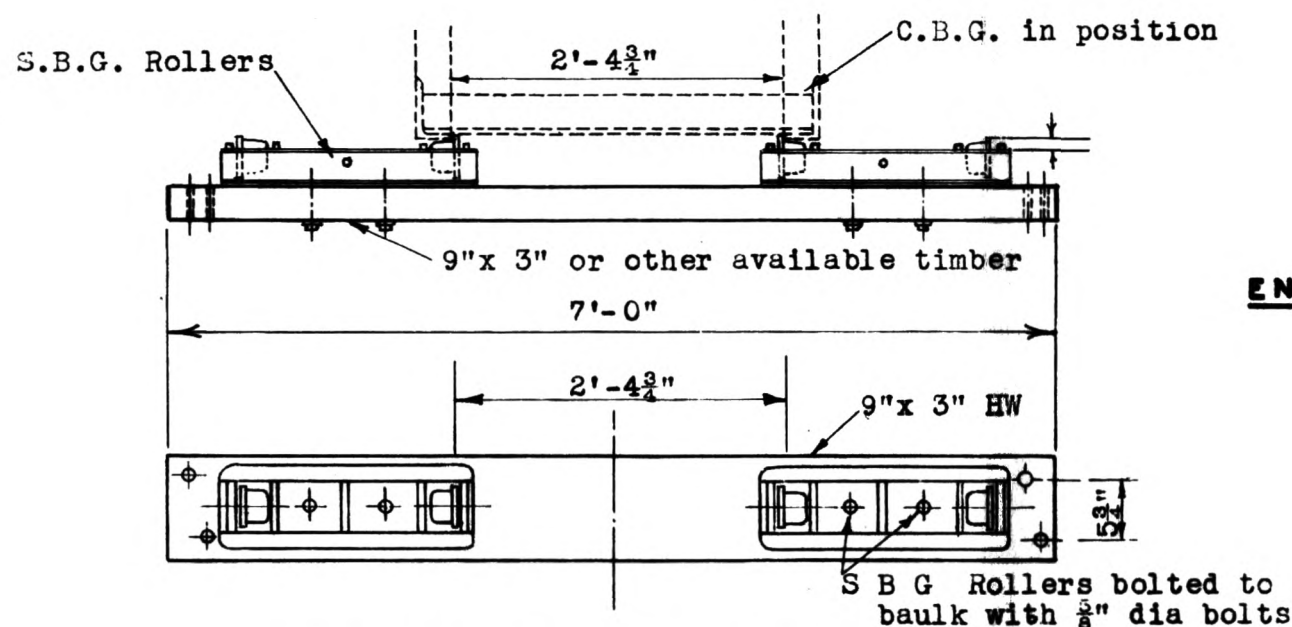
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CIRCULAR LAUNCHING TRACK



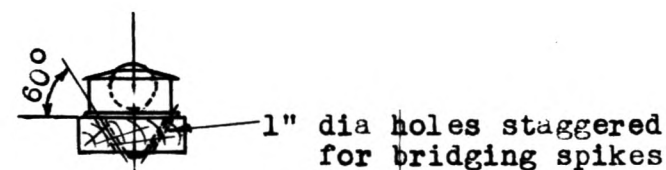
No. 6
STRAIGHT LAUNCHING TRACK

STEELE BRIDGE DOUBLE TUBE

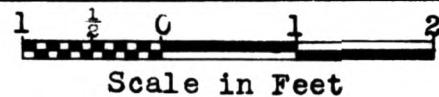
For further information on STEELE TUBULAR BRIDGE MK II
Refer to AUST Pam, 3 of M.E. Vol III Pt II 1944



END ELEV. OF ROLLER



S.B.G. ROLLERS FOR USE WITH C.B.G



1" dia Steel Studs projecting 2 $\frac{3}{4}$ " above log

Tubular Scaffolding as Rollers

1" dia Hole to take bridging spike

1 $\frac{3}{8}$ " holes (2)

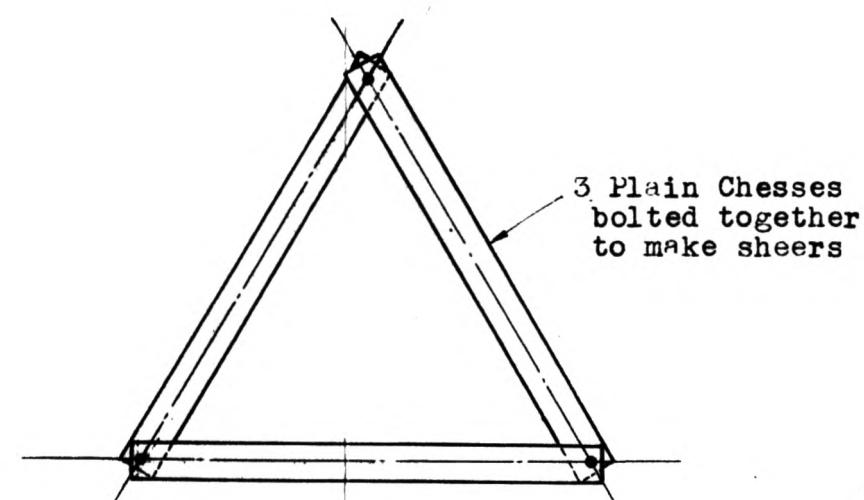
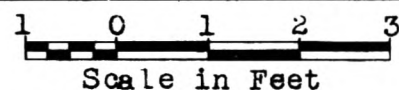
$\frac{1}{2}$ " Cup Hd Bolts, csk $\frac{1}{4}$ " below surface

Direction of Launching ►

9"x 3" H W

Log 6'-0" x 10" Dia

ROCKING CRADLE FOR LAUNCHING C.B.G



DELAUNCHING C.B.G

SHEERS TO USE UNDER PREVENTER
Diagrammatic Only

Sheers erected under Preventer to raise tail of Girder

Pickets to prevent sheers slipping

Position of Roller

DIAGRAMMATIC LAYOUT

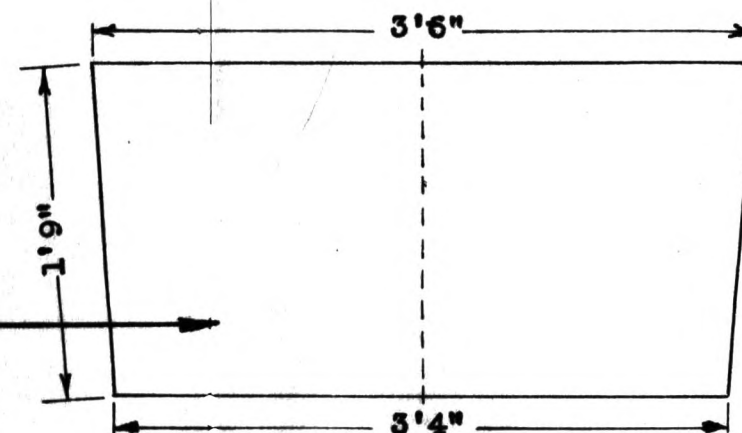
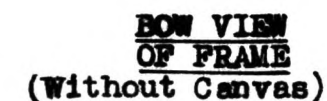
C.B.G. BRIDGE

LAUNCHING AND DE-LAUNCHING BY DERRICK PREVENTER TACKLE

Sewn here



Side and bottom canvas inserted here before screwing on under side battens. All under side battens are $1\frac{1}{2}$ " wide by $\frac{1}{2}$ " thick.

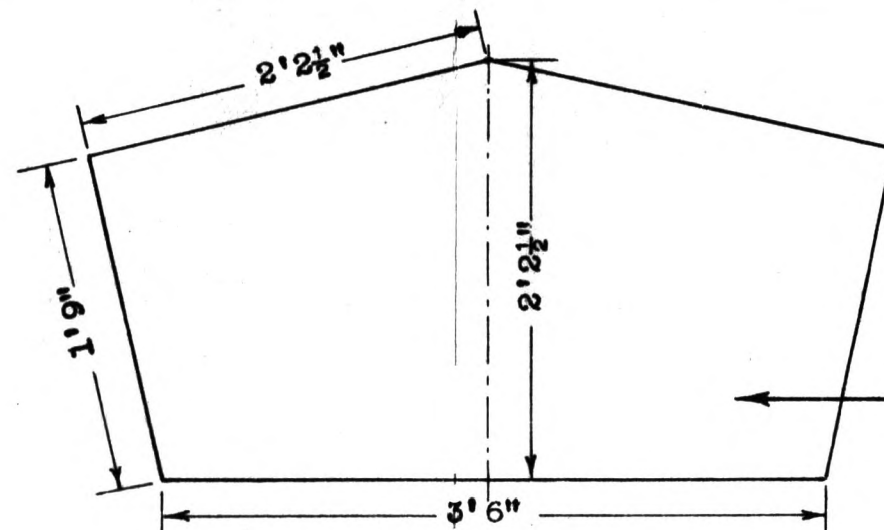


REAR CANVAS
1-off per boat.

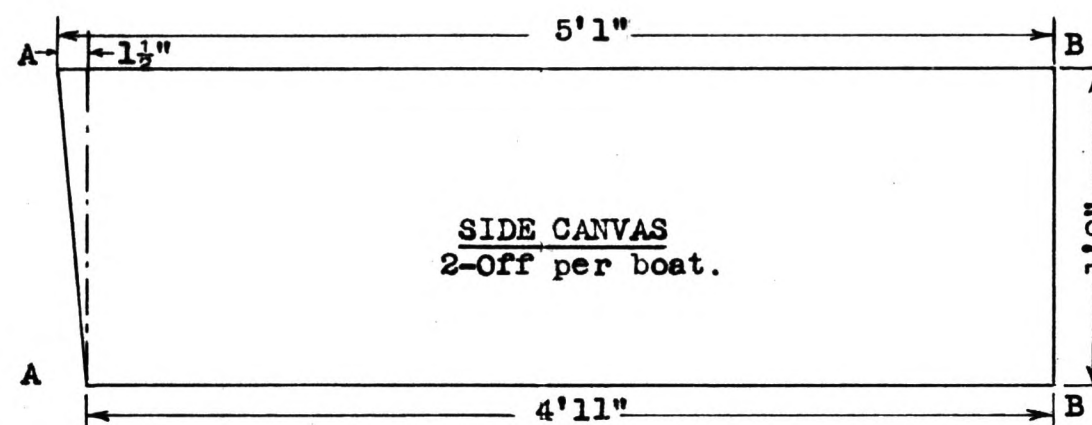


ALL CANVASES ARE 3-PLY SHEETS AND ARE FOLDED AT ENDS BEFORE SEWN., NAILED OR SCREWED.

The ends A-A of two side canvases are sewn with both ends of the front canvas, the two open ends B-B are sewn with two ends of rear canvas. The shorter length of canvas thus formed is inserted in between lower frame and under side battens along with bottom canvas 4'3" x 2'10" (not shown here) and battens are screwed to frame. Top of canvas is nailed at the back of gunwale.

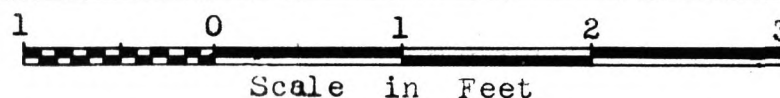


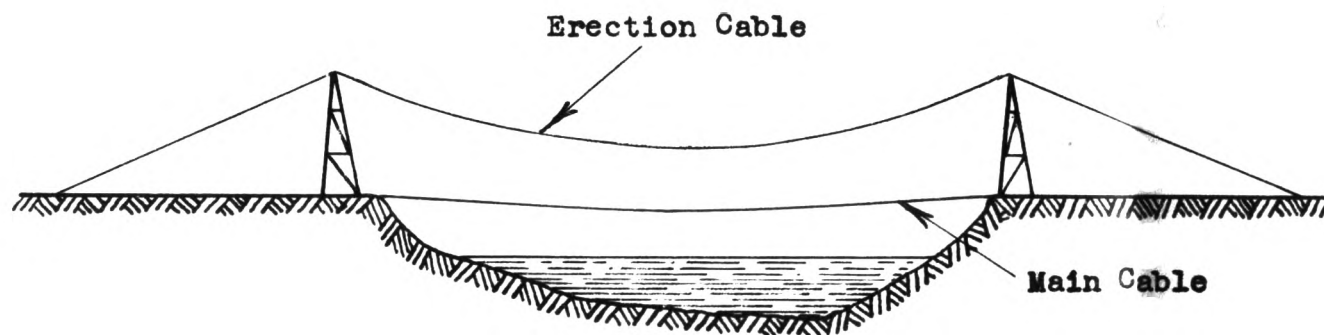
BOW CANVAS
1-Off per
boat.



SIDE CANVAS
2-Off per boat.

CANVAS RECONNAISSANCE BOAT

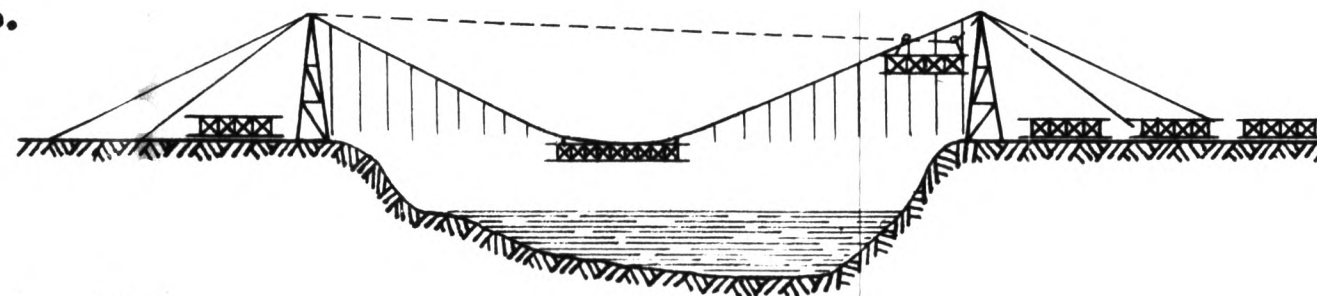




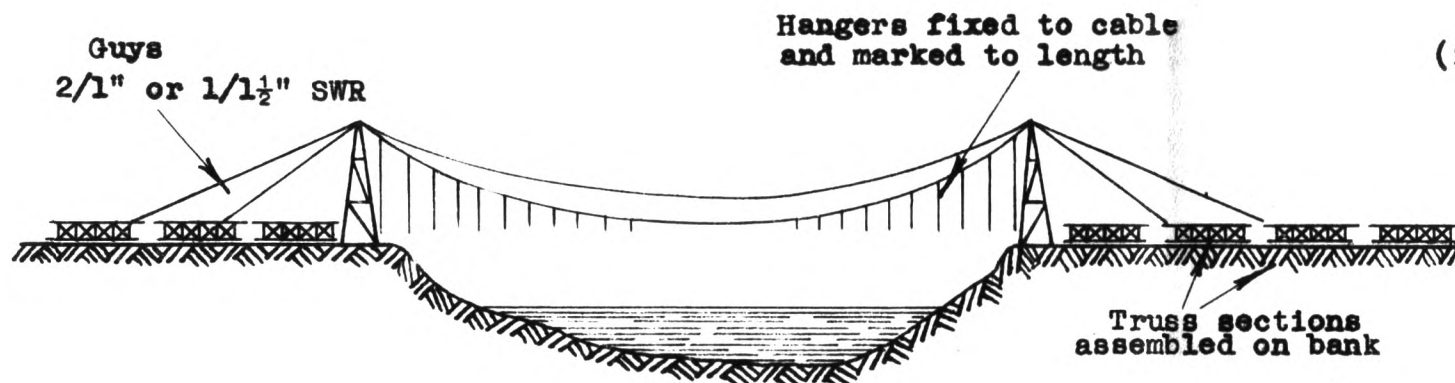
- (i) Erection cables in place on towers. Cables have been used to carry main cables across gap.

NOTE:

To allow for cable stretch & taking up of slack at anchorages, main cable when first slung should have dip of 21 feet (128' span) and one joint at centre should be left unconnected. After complete truss is in position slacken off cables at anchorage until correct dip is obtained and then close centre joint. Further adjustment should be made after placing decking.

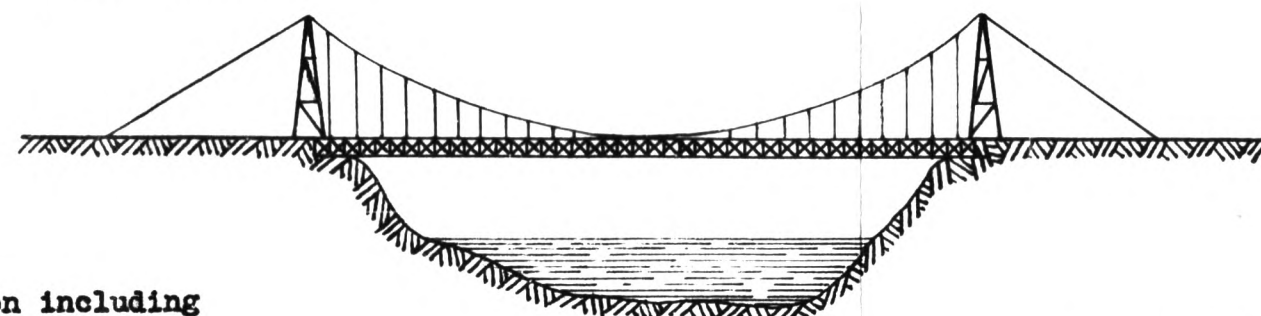


- (iv) Procedure (iii) repeated for alternate sections from each side. Chord splices, truss diagonals at splices and lateral bracing completed as each section is placed. (But see note above).



- (ii) Main cables raised on towers, with hangers in position and marked to length. Stiffening trusses and bracing assembled in sections on banks without decking or road joists. Holes drilled for drifts at truss splices and bracing connections.

Weight of 20' section including working party is 25 cwt. Max tension in erection cable is 48 cwt.

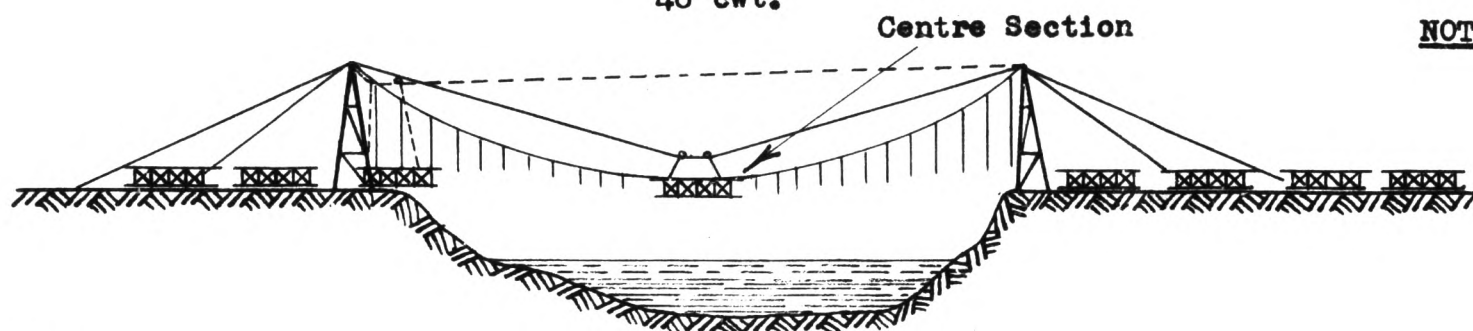


- (v) Trusses completed; roadbearers & decking placed. Erection cableway dismantled.

NOTE:

For a 224' span bridge, the above method of erection requires approx 480' of 2 1/2" SWR for cableway together with traveller. Max lift = 4000 lbs. Tension in cable = 7600 lbs. Anchorages must be constructed to carry this tension.

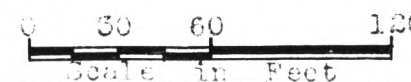
In order to reduce the loads on the erection cables, it would be possible to erect the stiffening trusses piecemeal, commencing with the lower chords. The max lift for a 224' span bridge, is then 1,700 lb, and max cable tension is 3,300 lb, 1 1/2" SWR would be sufficient. However the time for erection would be considerably increased.



- (iii) Centre section run out on erection cable to mid span, hangers attached and weight transferred to main cables.

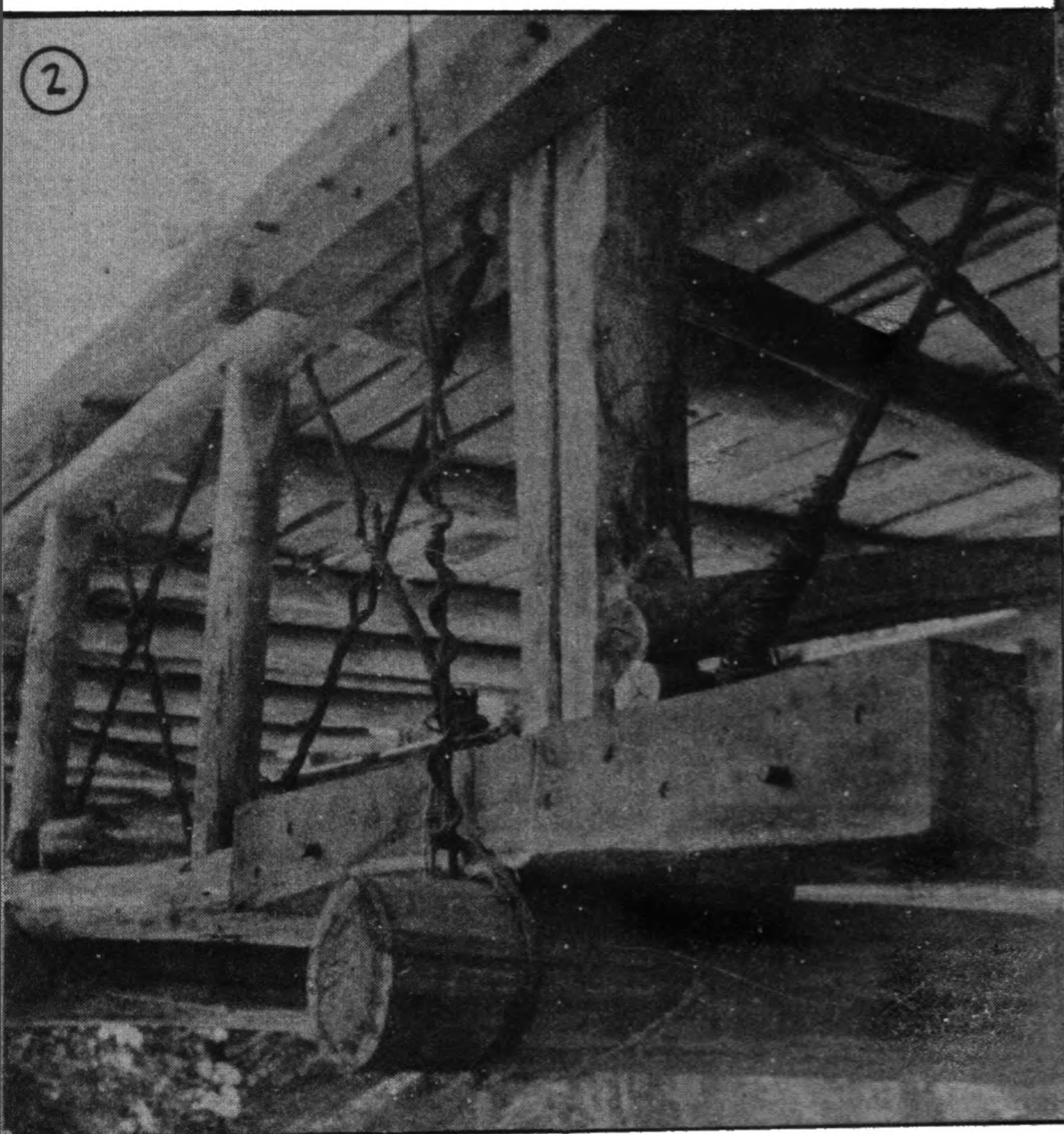
SUSPENSION BRIDGE WITH TIMBER STIFFENING TRUSS

ORDER OF ERECTION





View of Bridge



Detail of Hanger and Truss Connection



View showing
Construction of Stiffening Truss

STIFFENED
SUSPENSION BRIDGE
148' SPAN

PHOTO 1

Bridge prior to test

PHOTO 2

Truss detail showing
best method of connecting
diagonals to chord.

NOTE: No bolts used in
joints between
trusses.

PHOTO 3

Deflection in truss
due to test load of
20.4 tons at approx
 $\frac{1}{4}$ span.

PHOTO 4

Bridge after failure
of hangers between
 $\frac{1}{8}$ and $\frac{1}{4}$ span under
load of 23.4 tons.

STIFFENED SUSPENSION BRIDGE 128' SPAN
(DESTRUCTION TEST)

SOURCE: CRE 6 Aust Div

STRENGTH IN TONS OF S W R

APPX A 16

Refer para 37

Ser. No	WAR CODE NO.	Wt per 100' (lbs)	DESCRIPTION	Ultimate Strength, Supplied by AUST WIRE ROPE WORKS PTY LTD.	9 C ² FORMULA		R E POCKET BK DATA				
					Safe Strength (tons)	F of S	Diam (ins)	Safe Strength (lbs)	Equiv Circum (ins)	Strength (tons)	F of S
			<u>GALV HEMP CORE - (Ordinary Lay)</u>								
1	54	7	$\frac{3}{4}$ " circum 6/12	1.1	.28	3.9	-	-	-	-	-
2	23	18	1" " 6/19	2.9	.45	6.4	$\frac{3}{8}$	1,500	$1\frac{1}{8}$	.67	4.3
3	34	33	$1\frac{1}{2}$ " " 6/24	6.1	1.01	6.0	$\frac{1}{2}$	2,400	$1\frac{5}{8}$	1.07	5.7
4	36	60	2" " 6/24	11.2	1.8	6.2	$\frac{5}{8}$	4,000	$1\frac{7}{8}$	1.8	6.2
5	40	134	3" " 6/24	25.7	4.05	6.4	1	10,000	$3\frac{1}{8}$	4.5	5.7
			<u>BRIGHT OR BLACK, STEEL CORE</u> (Warrington Lay) (Specially made for Mech Eqpt)								
6	126	45	1-5/8" 6/19	11.61	1.2	8.7	$\frac{1}{2}$	2,400	$1\frac{5}{8}$	1.07	9.8
7	128	100	2-3/8" 6/19	21.0	2.4	8.8	$\frac{3}{4}$	6,000	$2\frac{3}{8}$	2.7	7.8
8	130	182	3-1/8" 6/19	37.0	4.4	8.4	1	10,000	$3\frac{1}{8}$	4.5	8.2

NOTE:- In Warrington Lay, each strand consists of 6 large and 6 small wires laid around centre core of 7 wires.

The working strengths for plain and barbed standard fencing wire after making deductions for twitching and allowing a factor of safety of 3 are given below.

Refer para 41

TYPE OF WIRE	Safe load per strand in lbs		
	8G	10G	12G
Black wire bright as for nails	485	350	260
Black wire soft drawn	395	250	165
Galvanised	560	390	285
Galvanised soft drawn	395	250	165
Barbed wire 12½ G	310 lbs		

¢

		TABLE OF POSITION AND LENGTH OF HANGERS																			
Span	H L D	10'0"	20'0"	30'0"	40'0"	50'0"	Length 'D' is the distance from bottom of cable to top of transome. Allow 4' to 5' for connection.														
		10'7"	21'0"	31'3"	41'4"	51'4"															
		10'11"	9'2"	8'1"	7'3"	7'0"															
100'	H L D	10'0"	20'0"	30'0"	40'0"	50'0"	60'0"	70'0"	75'0"	Length of Cables between towers equals twice 'L' at											
	10'8"	21'2"	31'6"	41'10"	51'11"	62'0"	72'0"	77'0"													
	15'4"	12'10"	11'0"	9'4"	8'3"	7'5"	7'0"	-													
150'	H L D	10'0"	20'0"	30'0"	40'0"	50'0"	60'0"	70'0"	80'0"	90'0"	100'0"	Diagram of Measurements									
	10'9"	21'4"	31'9"	42'1"	52'4"	62'6"	72'7"	82'8"	92'8"	102'8"											
	19'11"	17'3"	14'11"	12'9"	11'0"	9'9"	8'5"	7'8"	7'2"	7'0"											
200'	H L D	10'0"	20'0"	30'0"	40'0"	50'0"	60'0"	70'0"	80'0"	90'0"	100'0"	110'0"	120'0"	125'0"	Ordinates of measurements along cable are calculated from formula:-						
	10'9"	21'4"	31'10"	42'3"	52'8"	62'11"	73'1"	83'2"	93'3"	103'4"	113'4"	123'4"	128'4"								
	24'9"	21'10"	19'4"	16'9"	14'7"	12'8"	11'1"	9'9"	8'8"	7'10"	7'4"	7'0"	-								
250'	H L D	10'0"	20'0"	30'0"	40'0"	50'0"	60'0"	70'0"	80'0"	90'0"	100'0"	110'0"	120'0"	130'0"	140'0"	150'0"	Formula: $y = \frac{4fx^2}{l^2}$ & $s = x + \frac{2y^2}{3x}$				
	10'9"	21'5"	31'11"	42'6"	52'10"	63'2"	73'5"	83'7"	93'9"	103'10"	113'11"	124'0"	134'0"	144'0"	154'0"						
	29'7"	26'6"	23'8"	21'0"	18'6"	17'8"	14'5"	12'8"	11'2"	9'11"	8'11"	8'1"	7'6"	7'2"	7'0"						
300'	H L D	10'0"	20'0"	30'0"	40'0"	50'0"	60'0"	70'0"	80'0"	90'0"	100'0"	110'0"	120'0"	130'0"	140'0"	150'0"	160'0"	170'0"	175'0"	Diagram of Measurements	
	10'9"	21'6"	32'1"	42'7"	53'0"	63'5"	73'9"	84'0"	94'3"	104'4"	114'6"	124'7"	134'8"	144'9"	154'9"	164'9"	174'9"	180'9"			
	34'6"	31'4"	28'3"	25'5"	22'10"	20'4"	18'2"	16'2"	14'4"	12'9"	11'4"	10'1"	9'1"	8'3"	7'8"	7'3"	7'0"	-			
350'	H L D	10'0"	20'0"	30'0"	40'0"	50'0"	60'0"	70'0"	80'0"	90'0"	100'0"	110'0"	120'0"	130'0"	140'0"	150'0"	160'0"	170'0"	180'0"	190'0"	200'0"
	10'9"	21'6"	32'1"	42'8"	53'1"	63'6"	73'11"	84'2"	94'6"	104'8"	114'10"	125'0"	135'1"	145'2"	155'3"	165'3"	175'4"	185'4"	195'4"	205'4"	
	39'6"	36'2"	33'0"	30'1"	27'3"	24'8"	22'3"	20'0"	17'11"	16'0"	14'3"	12'10"	11'5"	10'3"	9'3"	8'5"	7'10"	7'5"	7'1"	7'0"	

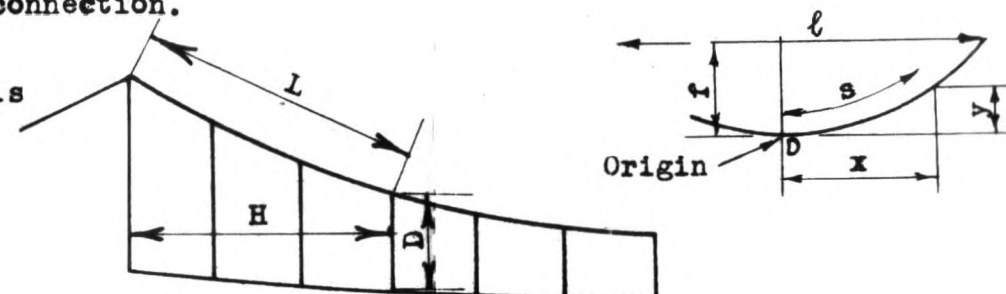


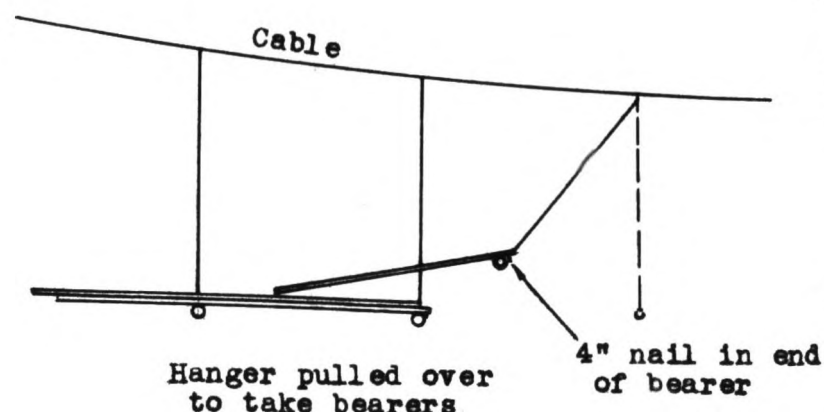
DIAGRAM OF MEASUREMENTS

Ordinates of measurements
along cable are calculated
from formula:-

$$y = \frac{4x^2}{f^2} \quad \& \quad s = x + \frac{2y^2}{3x}$$

CONSTRUCTION PROCEDURE

11. Erect towers, prepare anchorages and deck matting, drill bearers and transomes and attach transomes to hangers and hangers to cables.
2. Pass cables across gap, raise on to towers and secure to anchors.
3. Pull hanger transome as far as possible towards bank and hook bearers over transome using 4" nails in end of bearers. Allow hangers to swing back into position and secure near end of bearers to transome by $\frac{1}{2}$ " dowels (or wire lashing). Roll out deck matting, dowel (or lash) far end of bearer to transome and secure deck matting to each bearer by four light wire lashings.
4. Place handrails and connect cables to top of tower as shown on drawings.



If desired, before erection the bearers may be made up into a frame work, to the dimensions shown, by lashing or spiking, to cross pieces at either end & in the centre.

SUSPENSION FOOTBRIDGE
TWIN CABLE
FOR SPANS UP TO 400'

SOURCE:- CRE 6 Aust Div

TABLE SHOWING POSITION AND LENGTH OF HANGERS
(FEET)

Diagram illustrating the cross-section of a ship's hull, showing a parabolic curve. The diagram includes labels for length (L), height (H), draft (D), and a coordinate system with origin at the bottom center. The parabola is defined by the equation $y = \frac{4d}{a^2} \cdot x^2$.

Φ	
150.0	
154.0	
5	3.00

Φ

$Z = x + \frac{2y^2}{3r}$

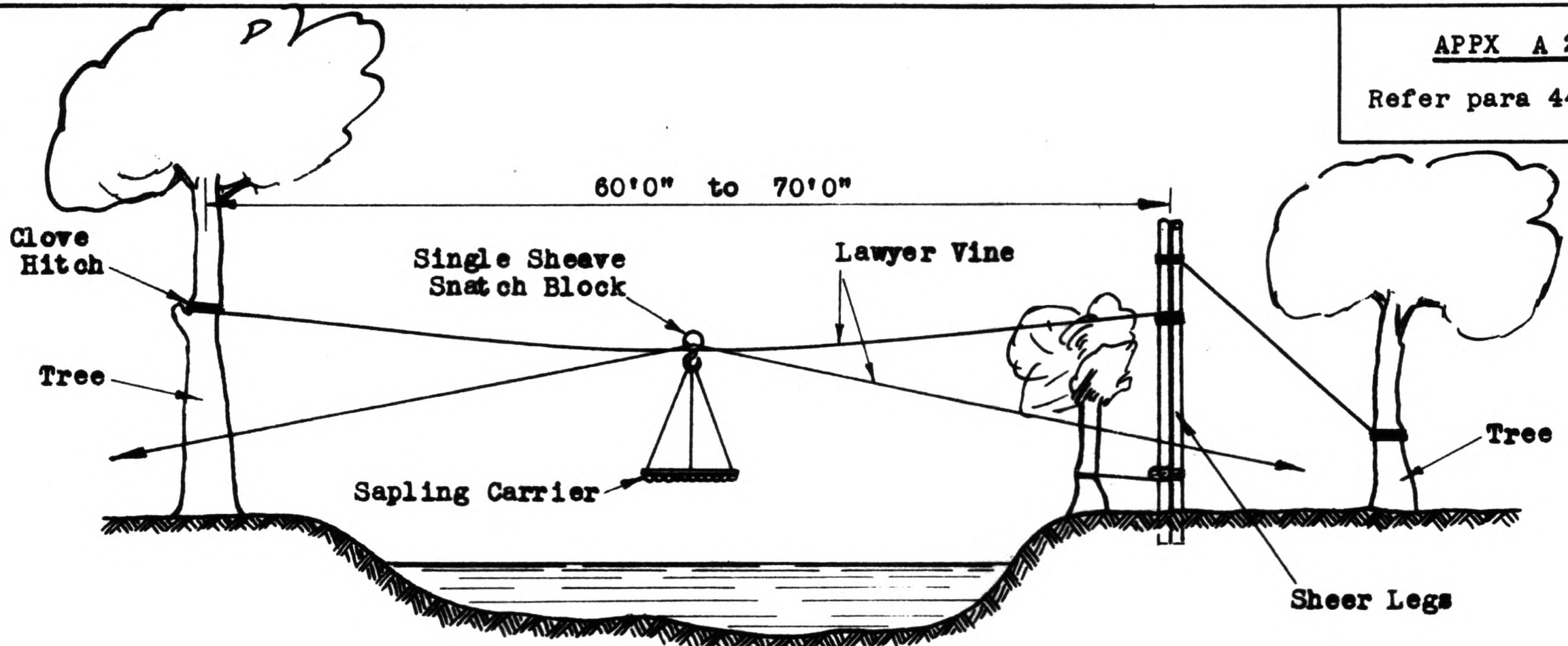
TABLE SHOWING CABLE SIZES AND SPANS

$$p = \frac{1}{3} \rho \left[\frac{70 - \frac{L}{D}}{10 + \frac{L}{D}} \right] \times \frac{3}{4}$$

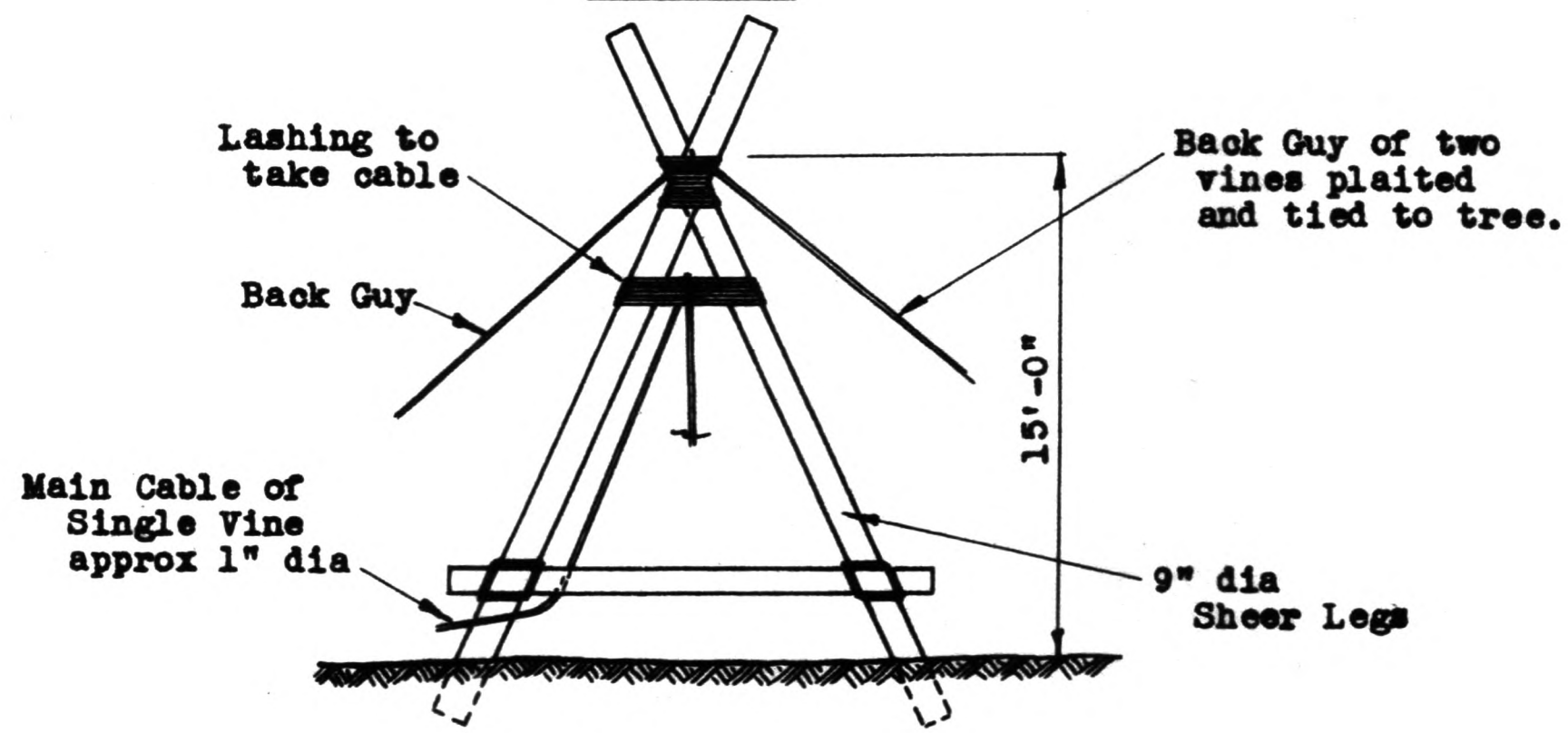
A factor of $\frac{3}{4}$ is taken to cover a condition between trestle leg and derrick pole

TABLE SHOWING CABLE SIZES AND SPANS							
Circumference of SWR in ins = C	Maximum Spans in Feet						
	Infantry at 1 Pace Intervals				Infantry at 3 Pace Intervals		
	1 SWR	2 SWR	3 SWR	4 SWR	1 SWR	2 SWR	3 SWR
1"	12	25	37	50	25	51	76
1½"	28	57	85	114	57	115	173
2"	50	101	152	202	102	204	306
2½"	79	158	238	317	160	320	480
3"	114	228	342	456	230	460	690
3½"	155	310	465	620	314	628	942

SUSPENSION FOOT BRIDGE SINGLE CABLE (FOR SPANS UP TO 400')

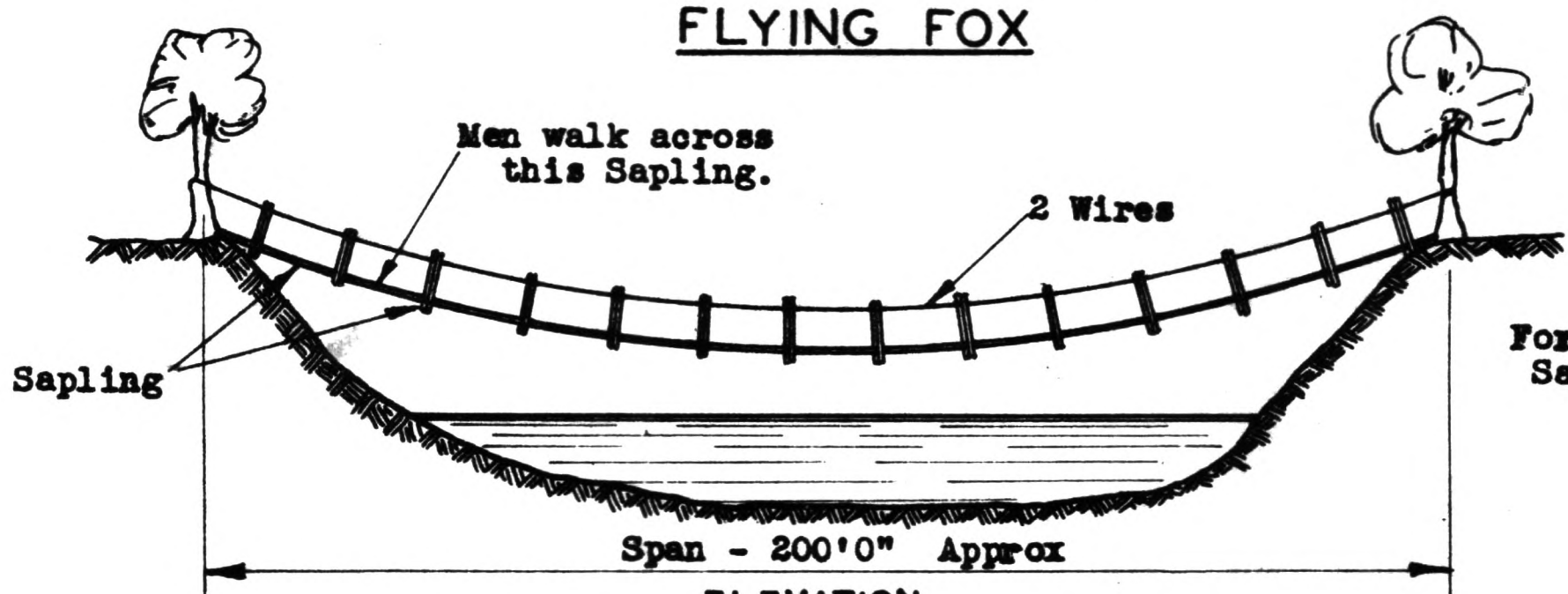


ELEVATION

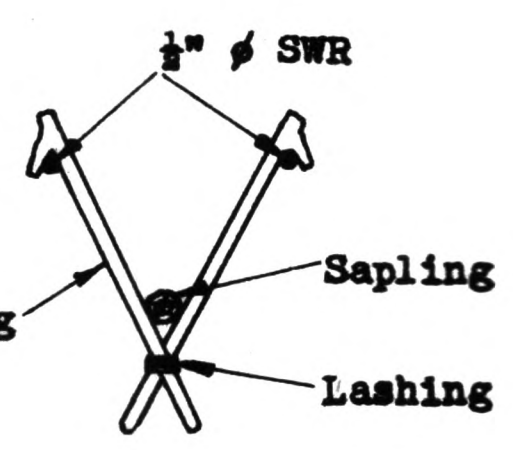


DETAIL OF SHEER LEGS

FLYING FOX



ELEVATION

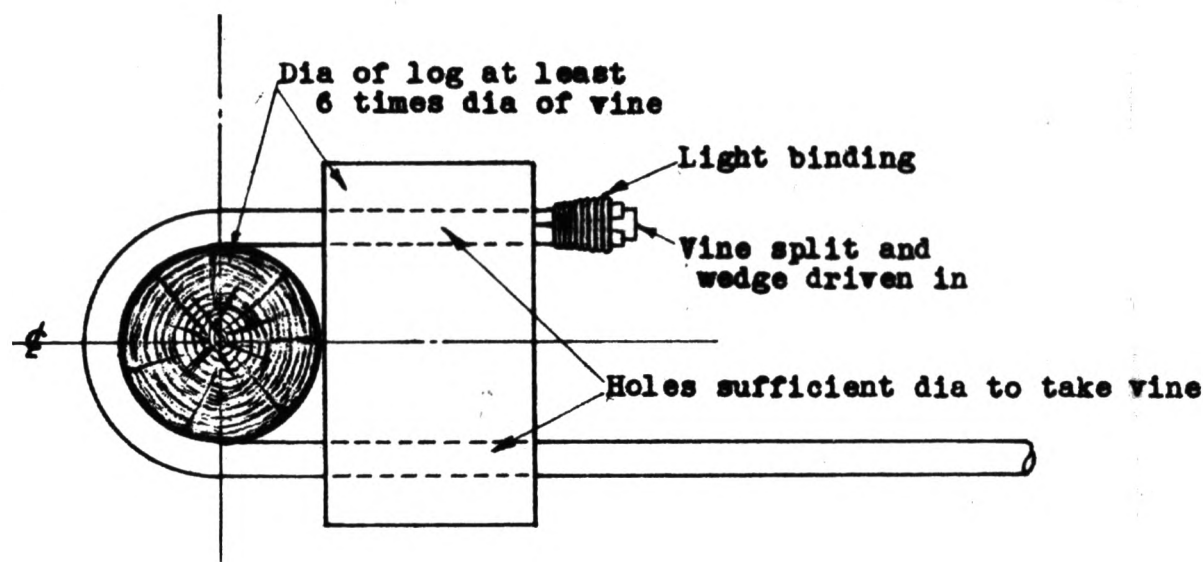
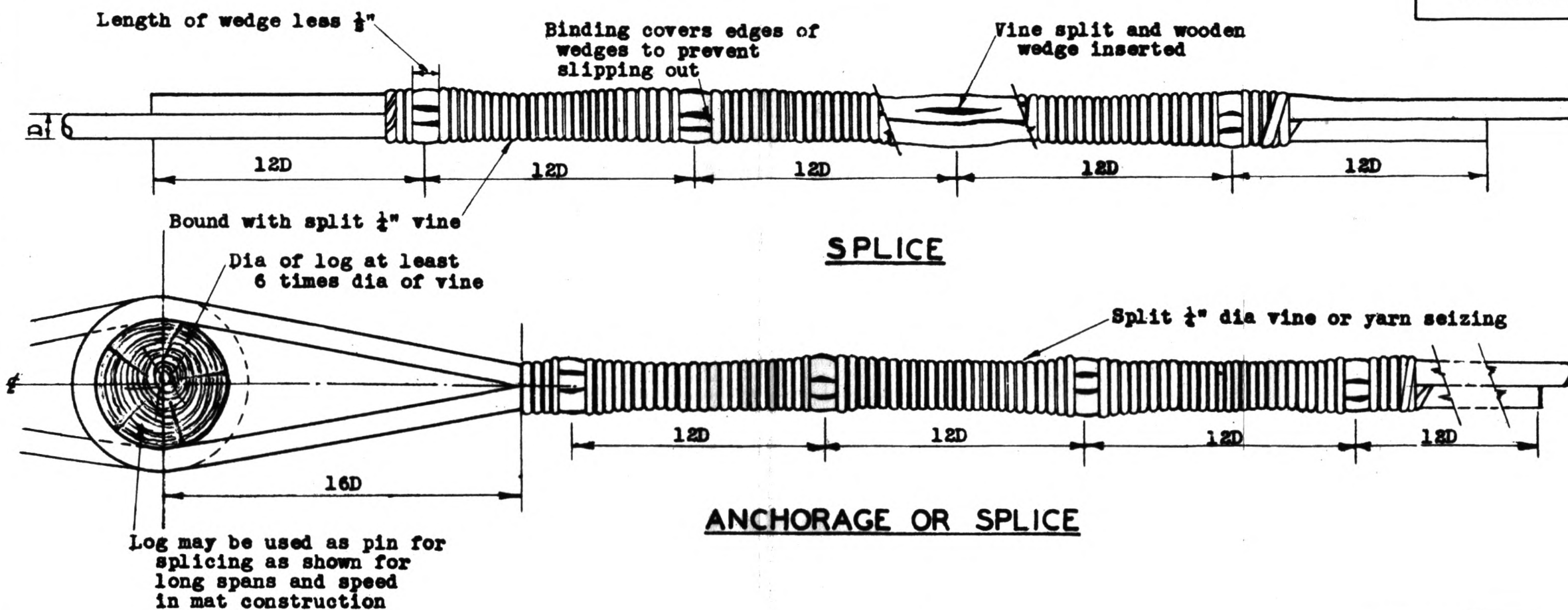


CROSS SECTION

SUSPENSION BRIDGE

IMPROVISED BRIDGING

D - Dia of Vine

**ANCHORAGE**

Splice has been tested and found at least as strong as the vine



METHODS OF JOINING LAWYER VINE

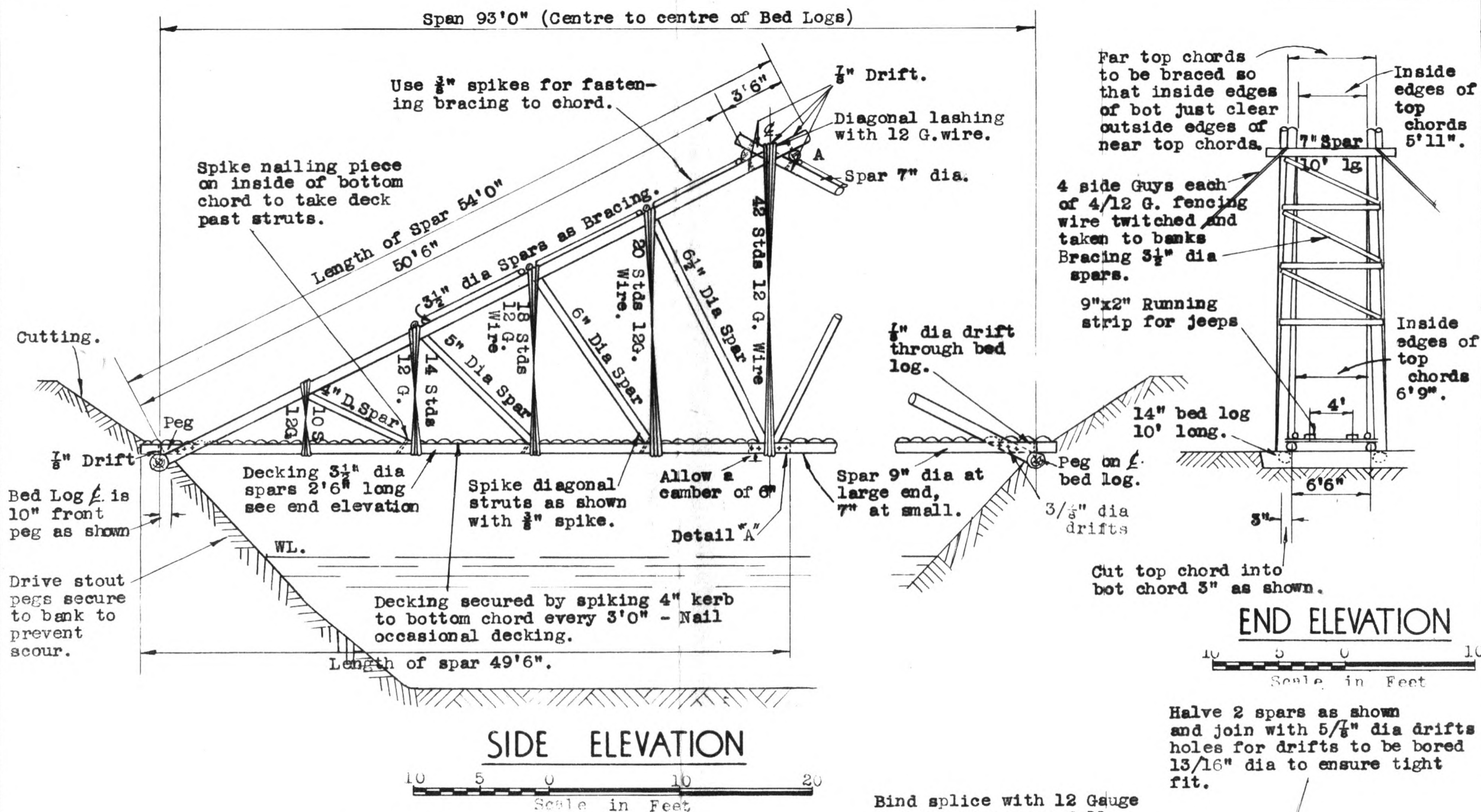
12 Gauge fencing wire standard black looped over top and bottom chords and then twitched until diagonal struts are drawn up tight - barb wire could be used in lieu.

Notc:-

Transom at A to be secured to top chord by $\frac{1}{8}$ " drifts and then lashed to top chord with a square lashing

APPX A 28

Refer para 48



METHOD OF ERECTION.

- Both top chords on each side of river are to be erected together. Care is to be taken with the clearances when bracing up each pair of top chords so that when the two pairs are lowered so as to come together the top chords of one pair rest on the transom of the other pair each pair of top chords resting on the transom of the other pair will give a stable structure and enable first the lashing to be made and secondly the drifts to be driven without difficulty.
- After top chords have been erected the joint made as above hangers dropped from points marked X on the top chord will be used for supporting bottom chords whilst the latter are pulled out and the bottom connection made.
- Next cut and fix diagonal struts in position and connect top 4 bottom chords with wire hangers, twitch hangers until sag is taken out of top and bottom chords and struts are tight at joints.
- Finally place decking etc and tighten guys. Guys should be roughly placed in position after stage 1.

This design is suitable for infantry in file, or jeeps, using timber spars, $\frac{1}{8}$ " Dia Round bars (no bolts) 12 Gauge Fencing wire (or barbed wire)

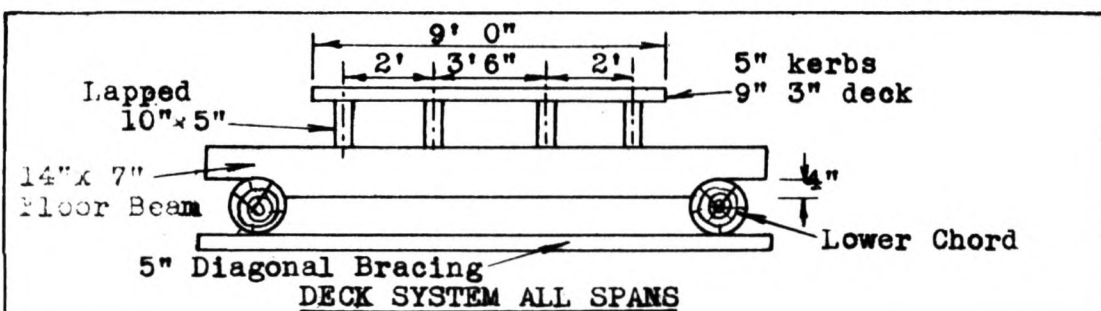
Source:-CE NG Force,
(Designed by Major CE. BAIRD)

Member	120'Span		100'Span		80'Span		60'Span	
	Load	Size	Load	Size	Load	Size	Load	Size
Upper chord	76,000 to 41,000	2/13" tapered to 8"	66,000 to 36,000	2/12" tapered to 8"	43,000 to 24,000	12" tapered to 8"	36,000 to 21,000	11" tapered to 7"
Lower chord	70,000 to 44,000	13" tapered to 9"	61,000 to 41,000	12" tapered to 9"	39,000 to 27,000	12" tapered to 9"	32,000 to 23,000	12" tapered to 9"
1.	11,000	see	11,500	see	11,500	see	11,500	see
2.	14,000	table	14,000	table	14,000	table	14,000	table
3.	17,000	for safe	17,000	for safe	17,000	for safe	18,000	for safe
4.	19,000	loads	19,000	loads	21,000	loads		loads
5.	21,000	for	27,000	for		for		for
6.	30,000	wires		wires		wires		wires
a.	15,000	6"	15,000	6"	15,000	6"	15,000	6"
b.	15,500	6"	15,500	6"	15,500	6"	15,500	6"
c.	16,500	7"	16,500	7"	16,500	7"		
d.	18,000	8"	18,000	8"				
e.	19,500	9"						

Note:- Loads include 3,000lbs. per panel point Dead Load and 25% Impact

Timbers with Values shown hereunder have been adopted.

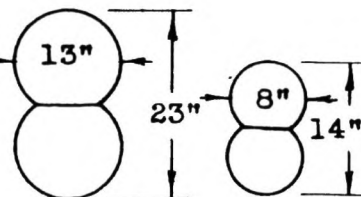
Average weight green lbs. per cub. ft.	Bending and tension parallel to grain.	Shear	Bending to grain Parallel	Bending to grain Perpendicular
65	1600	120	1200	500



UPPER CHORD

(a) 120' & 100' spans; double round timber as shown, together with $\frac{3}{4}$ " drifts and wound with No 8 gauge wire at 5' centres. Additional spikes and binding over staggered joint.

(b) 80' spans and less, single span no joints.

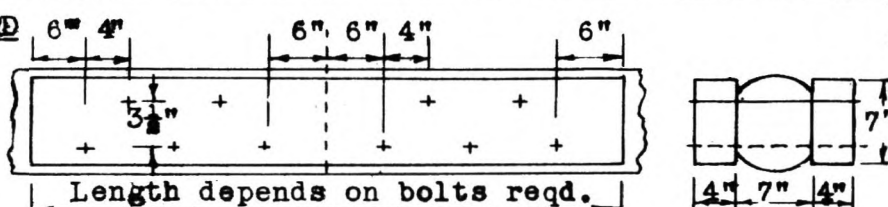


UPPER CHORD 120'

LOWER CHORD

(a) Minimum 9" dia, if butt joint as shown used.

(b) If lap joint used chord must be larger for 120' & 100' spans.



$\frac{3}{4}$ " Bolts safe load 2600lb/bolt
 $\frac{1}{2}$ " Bolts safe load 3300lb/bolt

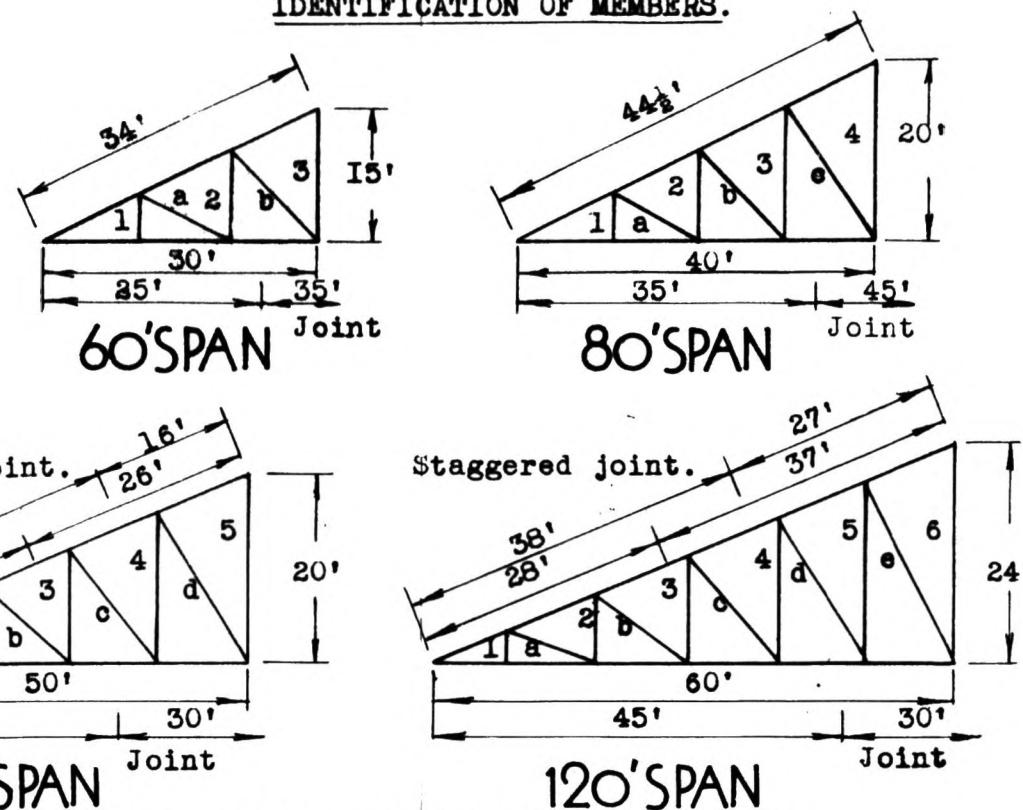
BRACING: Lower chord braced diagonally between panel points with points with 5" diameter timbers. Upper chord likewise as far down as is consistent with provision of headroom.

SAFE LOADS FOR SINGLE WIRE AS ROPES OR TWITCHED.

Type of Wire .	Safe load per strand in lbs.		
	8G.	10G.	12G.
Black Wire bright as for nails	485	350	260
Black Wire soft drawn	395	250	165
Galvanised	560	390	285
Galvanised soft drawn	395	250	165

Note:- No appreciable advantage in spinning wire into rope. Factor of safety 4.

IDENTIFICATION OF MEMBERS.

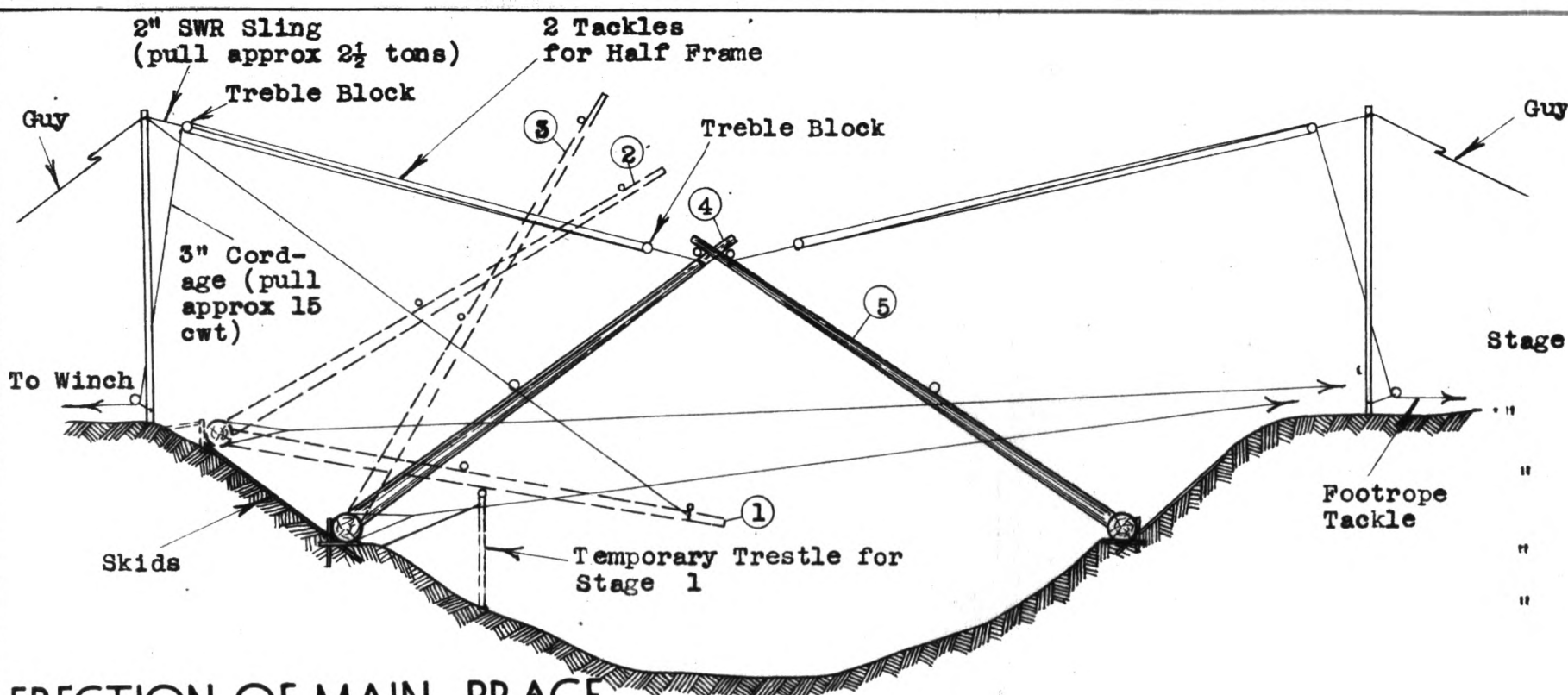


Note:- (a) 120' and 100' spans jointed upper chord as indicated height/span ratio 1/5.
 (b) 80' and 60' spans upper chords not jointed height/span ratio 1/4.
 (c) Member numbered from bankseat.

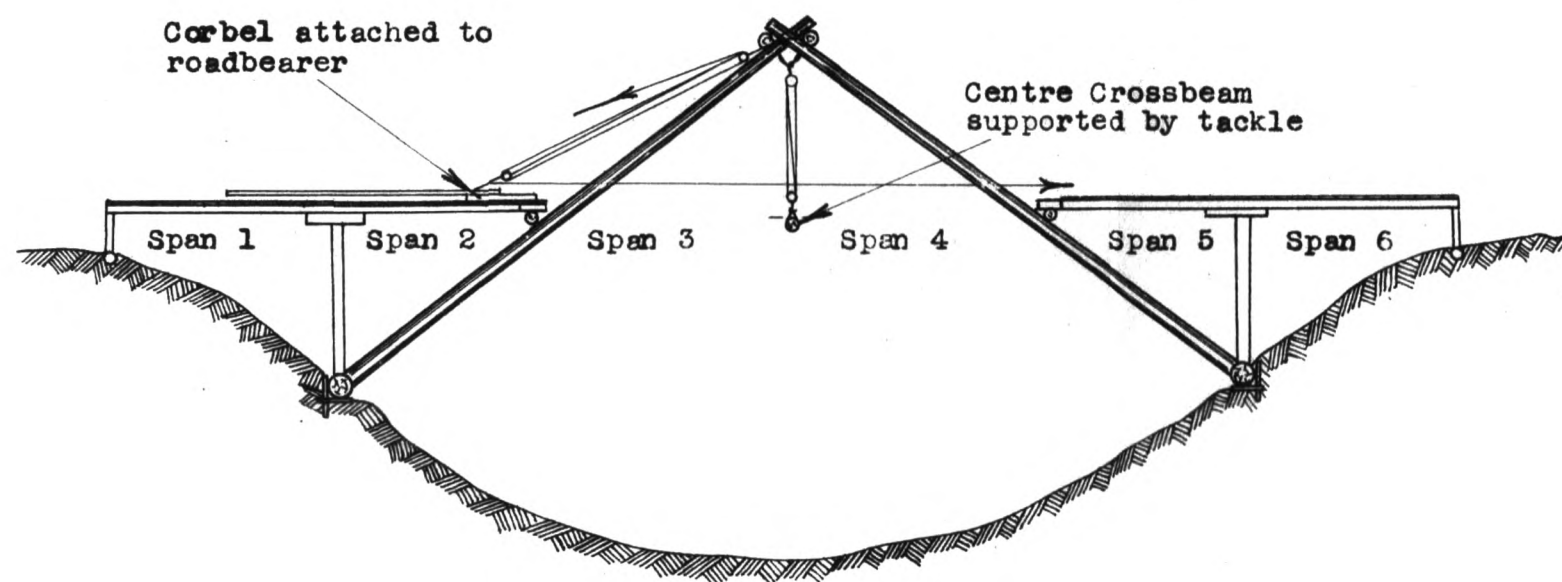
IMPROVISED TRUSS BRIDGE

CLASS 9

DETAILS FOR 60' 80' 100' & 120' SPANS.

ERECTION OF MAIN BRACE

- Stage 1 Half Frame assembled, braced & pulled into position.
 2 Frame raised.
 3 Foot of Frame pulled into position.
 4 Frame lowered into final position.
 5 Opposite half frame similarly raised and two locked together.

ERECTION OF MAIN BRACEERECTION OF DECK SYSTEM ETC.

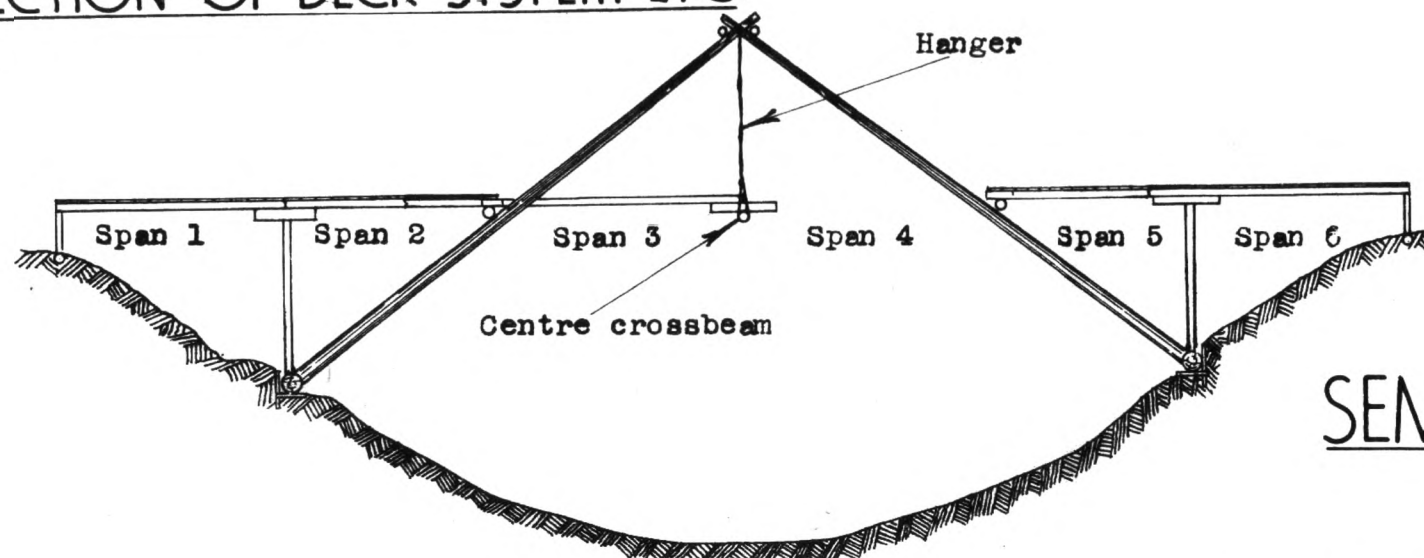
Erect Piers and complete spans 1, 2, 5 & 6.

Drill corbels for drifts to connect centre crossbeam and attach to roadbearers.

Drill centre crossbeam for connection of roadbearers and place in position supported by tackle from main frame.

Lay roadbearers in position for span 3, place centre hanger and twitch taut until correct girder level is attained.

Lay roadbearers for span 4 and complete decking.

ERECTION OF DECK SYSTEM ETC.

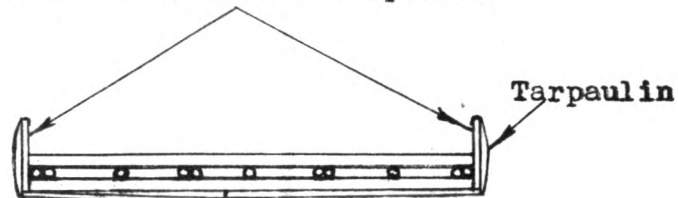
ERECTION PROCEDURE SEMI-TRUSS BRIDGE (CLASS 9)

Diagrammatic only - Not to Scale

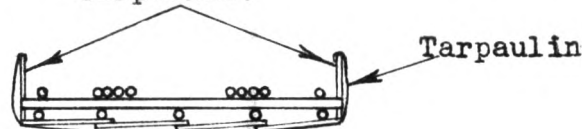
Source:- CE NG Force (From design by Major. N. B Waits 2/8 Aust Fd Coy)

Bamboo mats are laid with 6" overlap in width & 2' in length. Tarpaulins 14' x 21' with 1'0" overlap. 3'6" margin forms gunwhale. All joints are firmly lashed.

Bamboo mats inside Tarpaulin

LONGITUDINAL SECTION

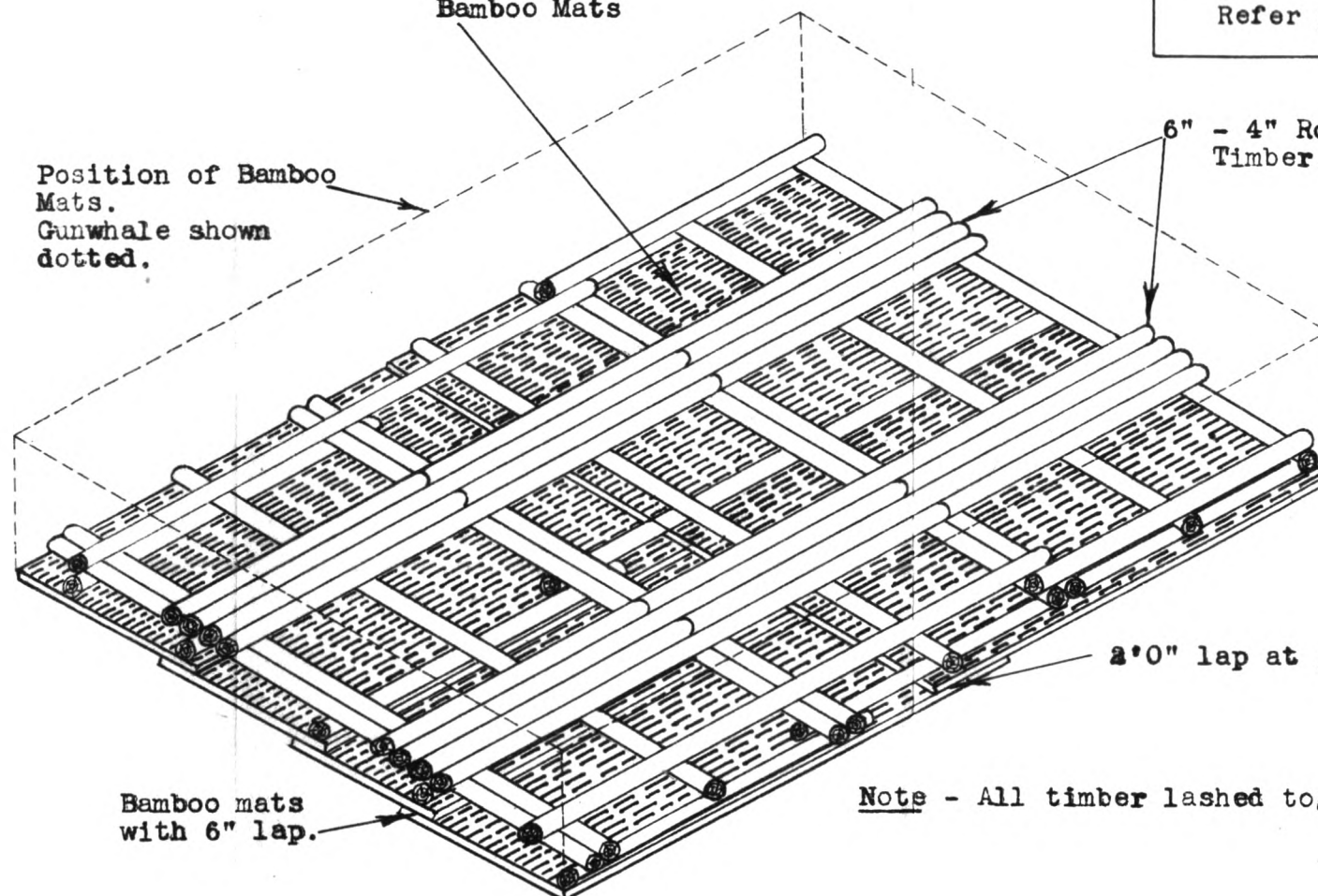
Bamboo mats inside Tarpaulin.

CROSS SECTION

Bamboo Mats

Position of Bamboo Mats.
Gunwhale shown dotted.

6" - 4" Round Timber.

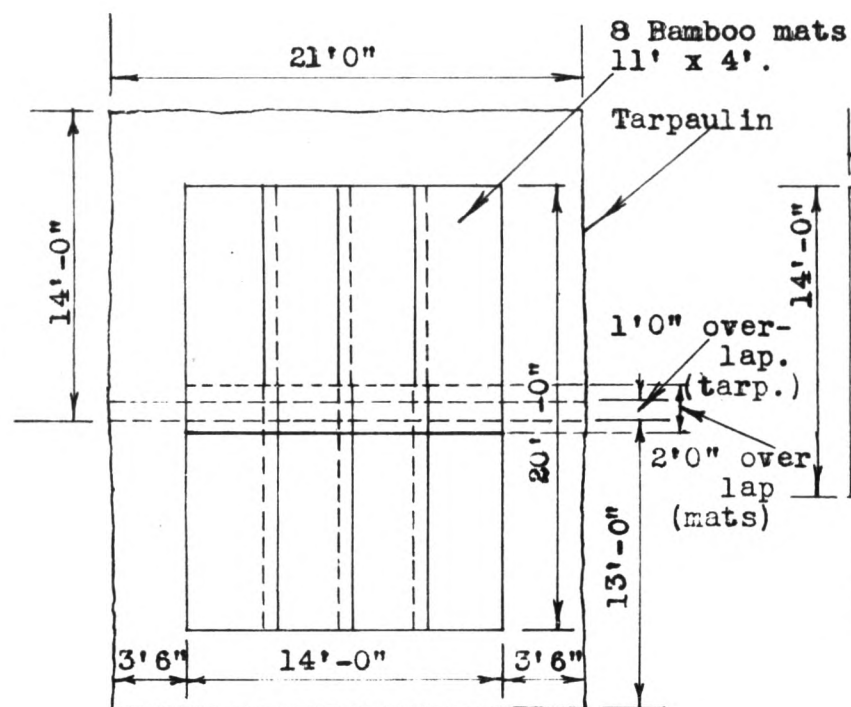
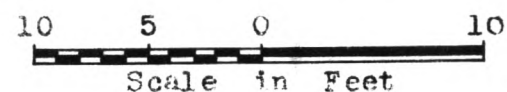


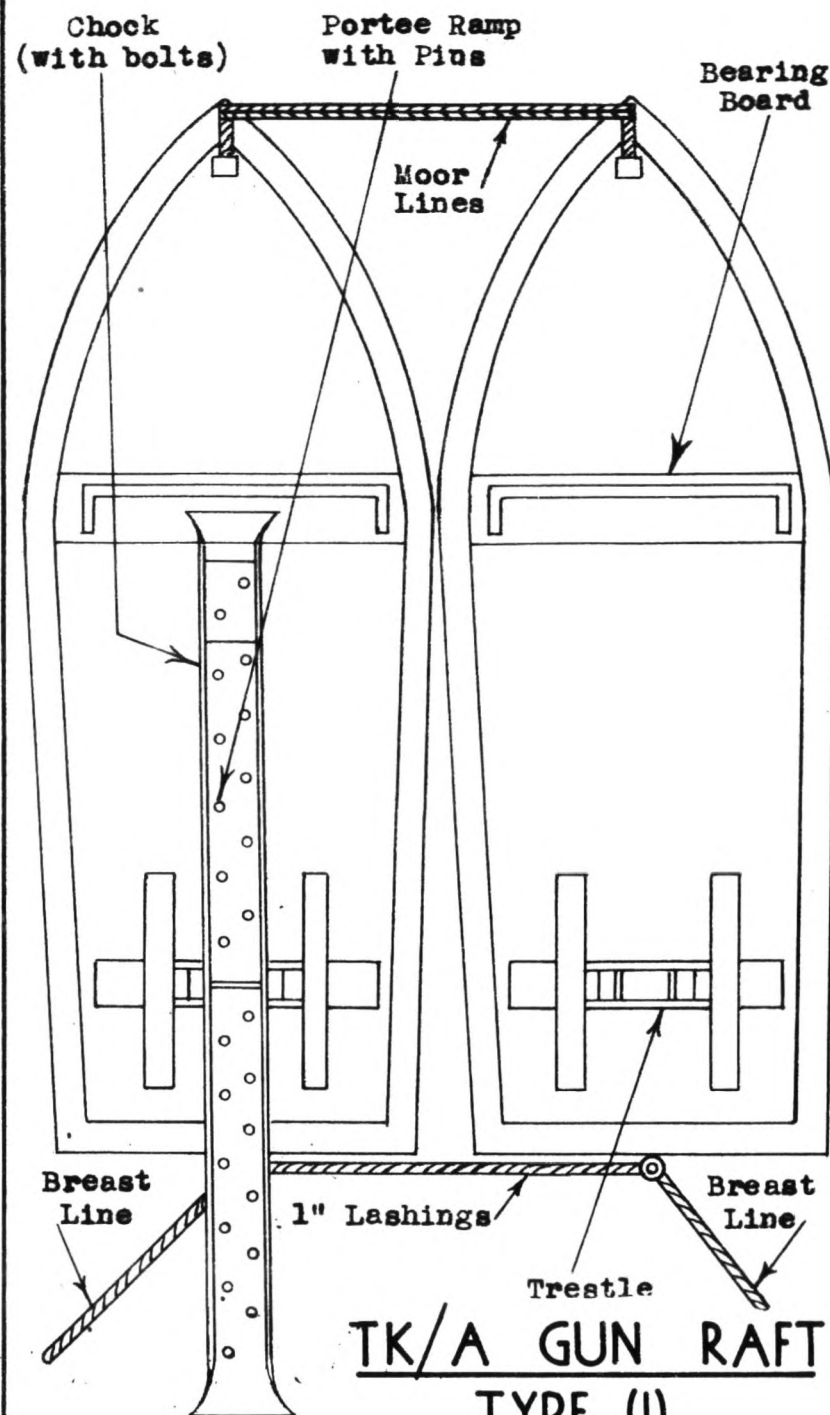
2'0" lap at joint.

Note - All timber lashed together.

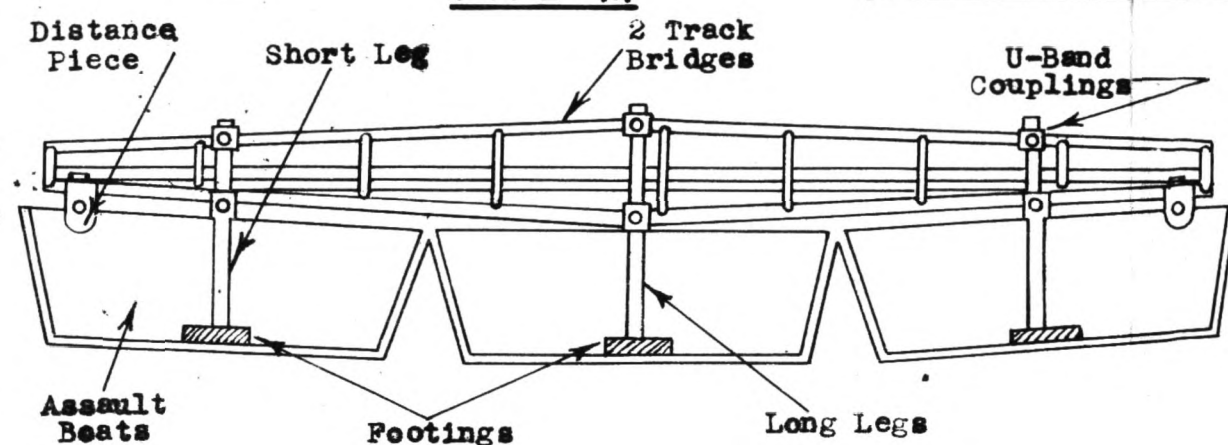
ISOMETRIC VIEW

Scale - DIAGRAMMATIC

TARPAULINS & BAMBOO MATSFIRST LAYERSECOND LAYERTHIRD LAYER
(ROADWAY)CONSTRUCTIONAL DETAILS FOR CLASS 5 LOADSIMPROVISED RAFT



**TK/A GUN RAFT
TYPE (I)**

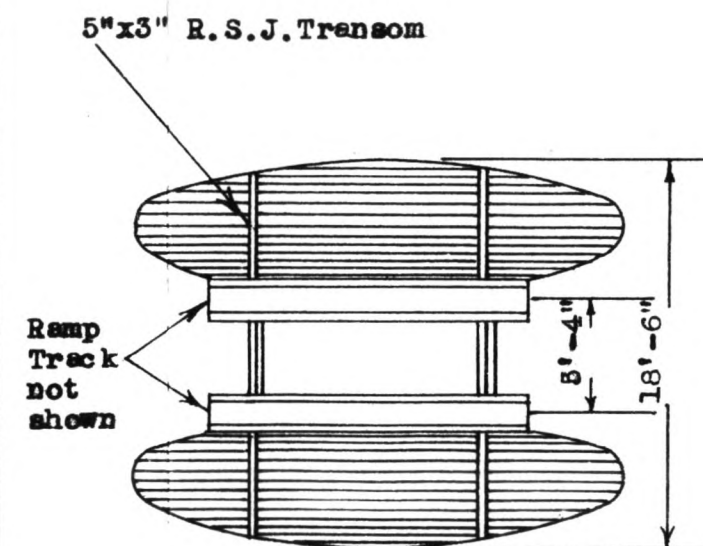


TK/A GUN RAFT TYPE (II)

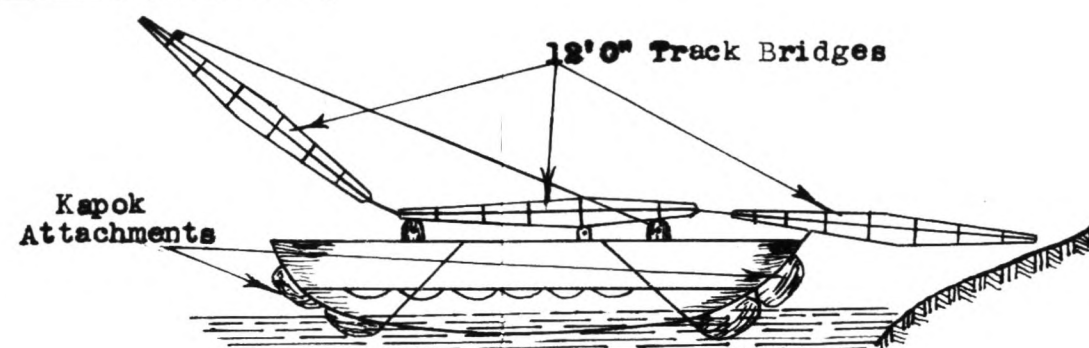
R. E. STORES			
1	2/3'-2"	6'-4"	FR 6"x2" Timber
2	2/2/1'-5"	5'-8"	" 4"x3" "
3	2/1'-6"	3'-0"	" 4"x2" "
4	2/4/1'-5"	26'4"	" 3"x2" "
5	2/2/1'-5"		
6	2/2/2'-6"		
7	2/2/0'-4"	1'-4"	FR 3'-3"x1 1/4" L
8	2/2/2	8	No 3"x1 1/2" Bolts & Nuts
9	2/2/1	4	No 1 3/4"x 16 Screws
10			Nails
11	2/1'-0"	2'-0"	FR 6"x4" Timber
12	2/2	4	No 5"x1 1/2" Bolts & Nuts
13	2/3'-6"	7'-0"	FR 9"x1" Timber
14	2/4'-0"	8'-0"	FR 1"x1" Fillets
15	2/8	16	No 1 3/4"x10 Screws
16		8'-0"	FR 1" Lashings
17		2	No Breast Lines
18		2	No Assault Boats
19		10	No Paddles

TK A R. A. STORES			
1	2/2	4	No Portee Ramps
2	2/2	4	No Portee Ramp Pins

S T O R E S	
2	Folding Boats
6	Bridges 12'-0" Wheeled Vehicles Mk I
2	5" x 3" R.S.J. Special Transoms
8	Kapok Floats
SPECIAL PARTS FOR TRACK COUPLINGS	

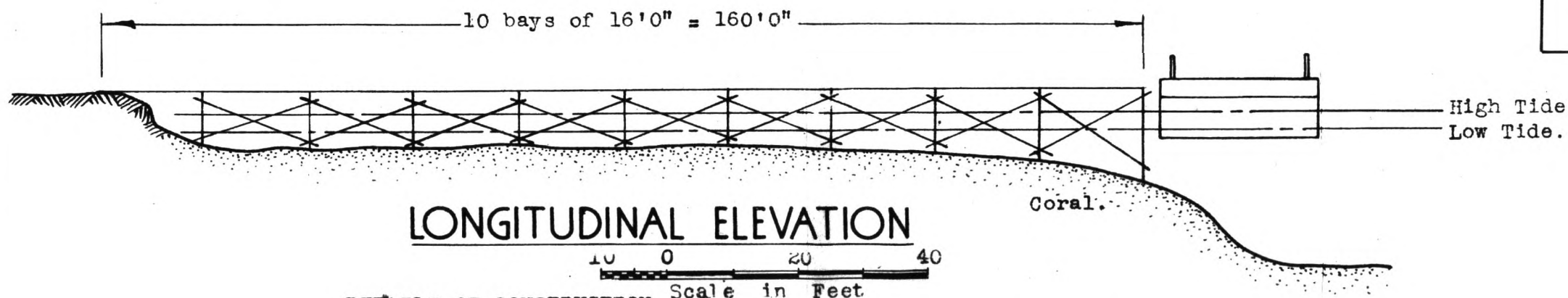


PLAN

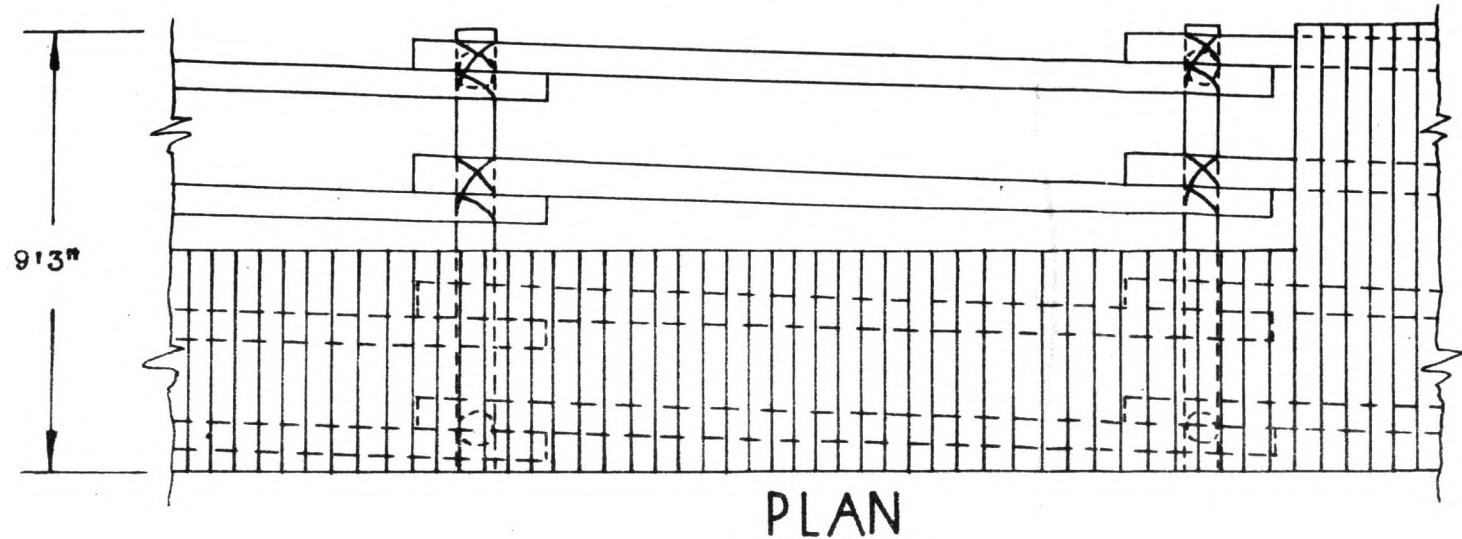
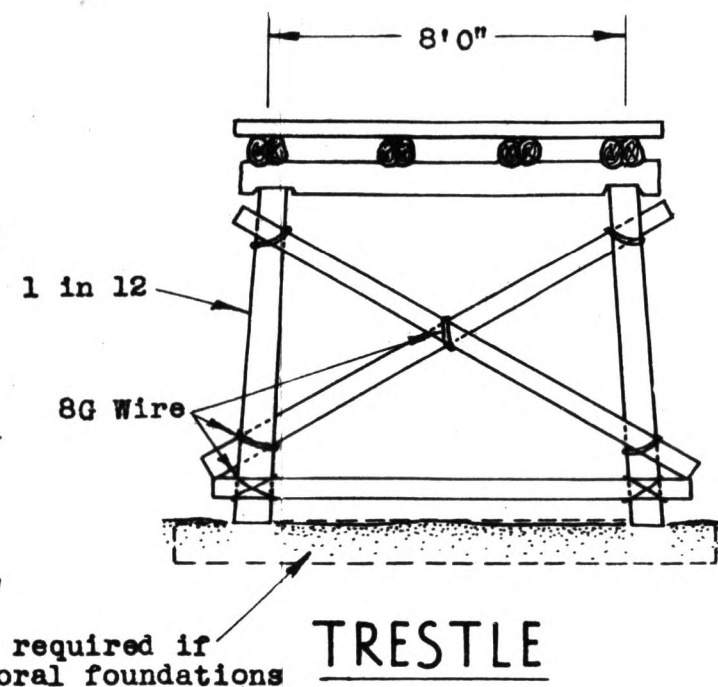
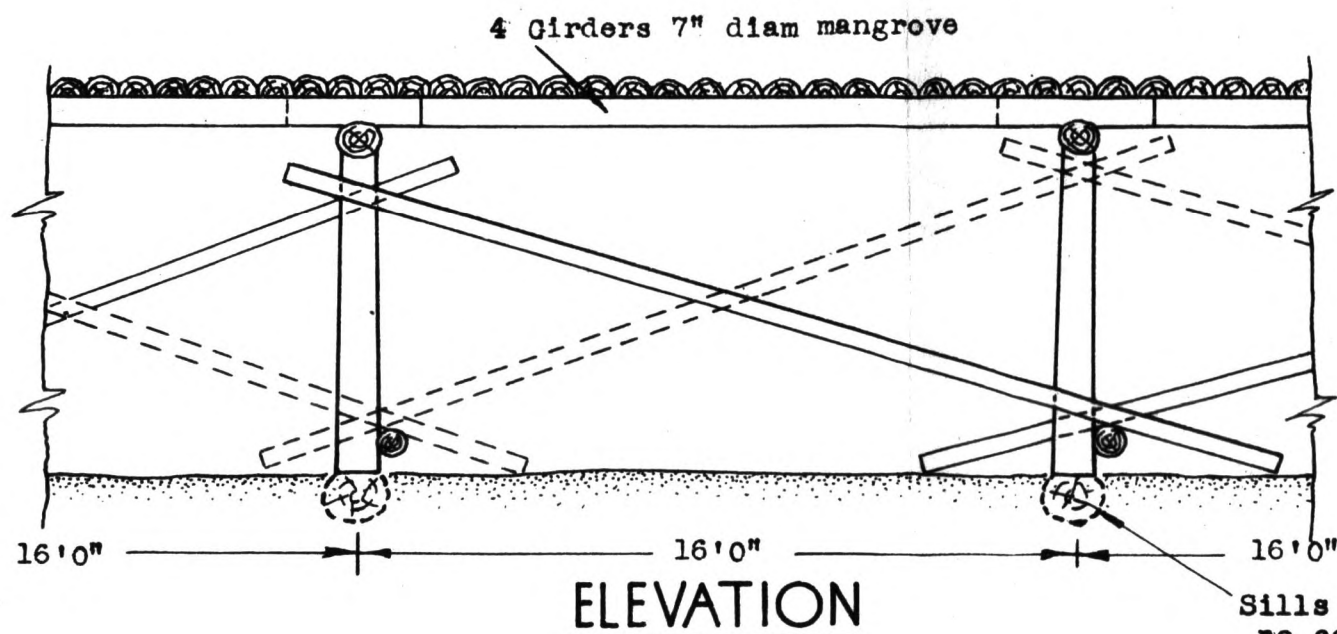
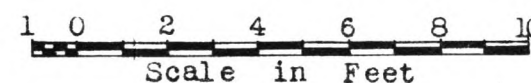


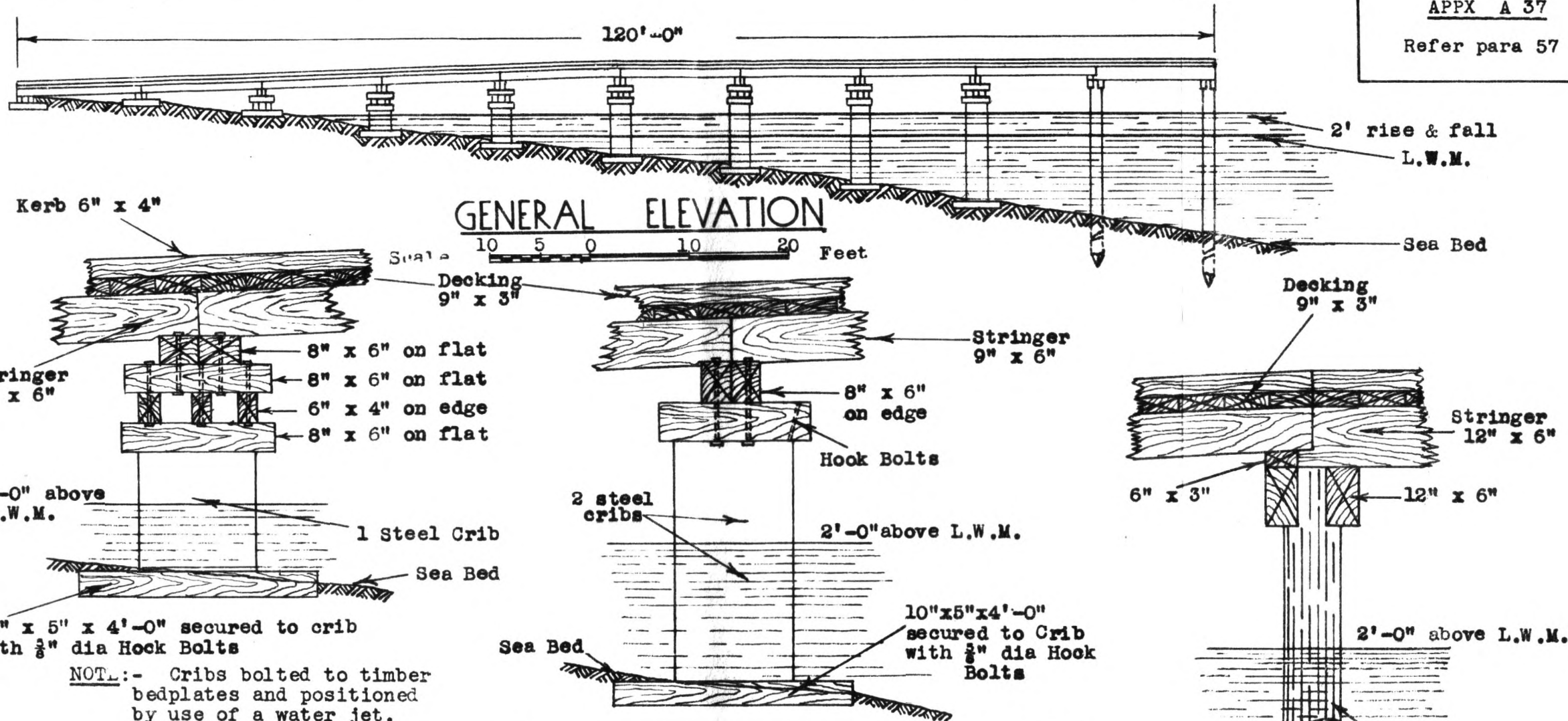
ELEVATION

CLASS 5 TRACKED RAFT

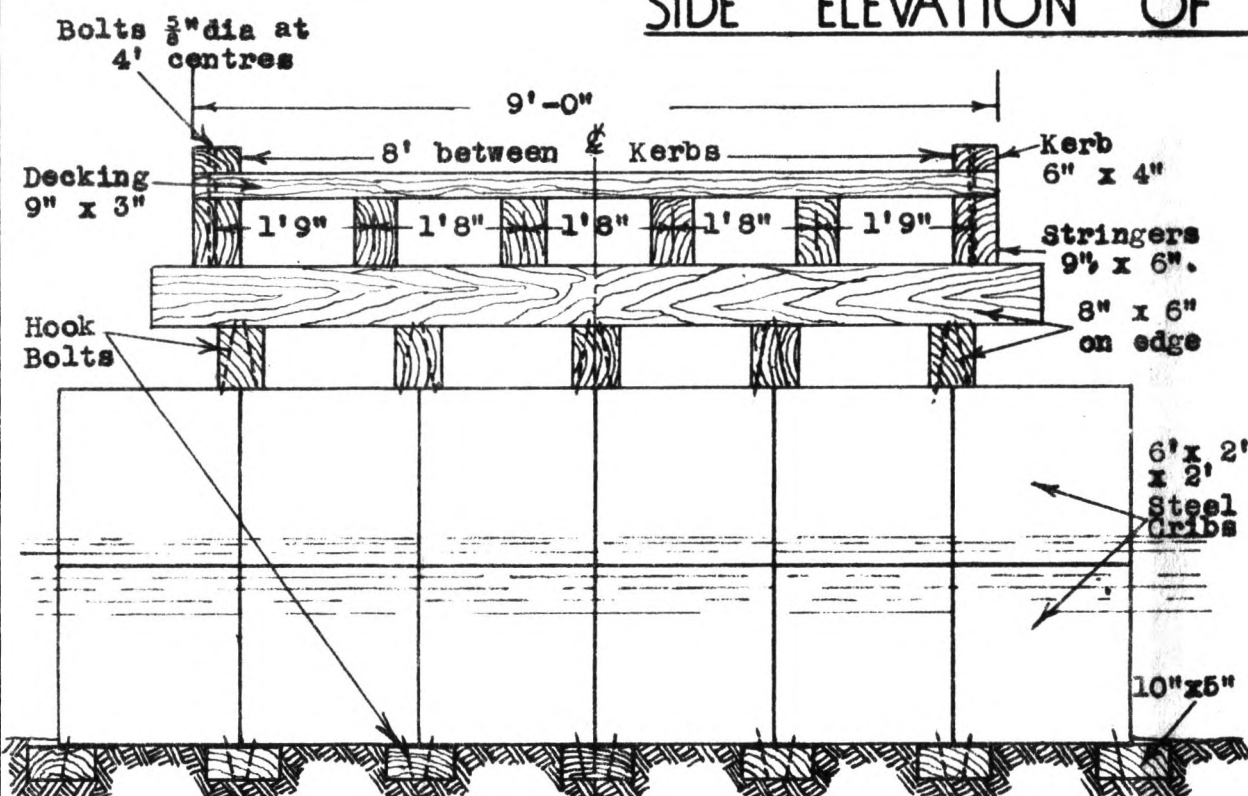
DETAILS OF CONSTRUCTION.

1. Materials available:- Mangrove timber, No 8 gauge wire and nails.
2. Foundation:- Coral
3. Work:- Timber felling, splitting for decking, construction of trestles placing girders, decking and bracing.
4. Labour:- Average parties - 10 sappers, 17 natives.
5. Time:- 9 days.
6. With 40' x 25' barge moored at end of Jetty, small ships may come alongside.
7. Depth of water - 20 feet.
8. Transshipping of personnel on Corvettes was handled in this manner: in absence of barge, two small ships were moored at end of Jetty, and Corvettes, brought alongside.

LIGHT JETTY

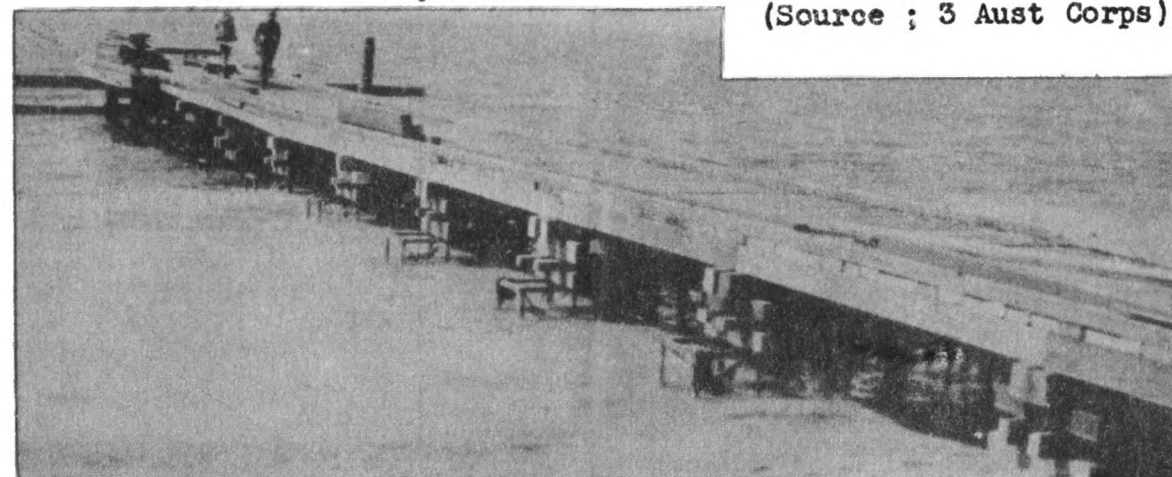


SIDE ELEVATION OF TYPICAL PIERS



A jetty constructed to this design proved stable and satisfactory over a period of 5 months, being used by fully loaded 3-ton trucks. The following observations were made:

- (i) No subsidence
- (ii) Cribs only slightly rusted and easily cleaned
- (iii) Bolts badly rusted and had to be cut for dismantling (Source ; 3 Aust Corps)



FRONT ELEVATION OF TYPICAL PIER

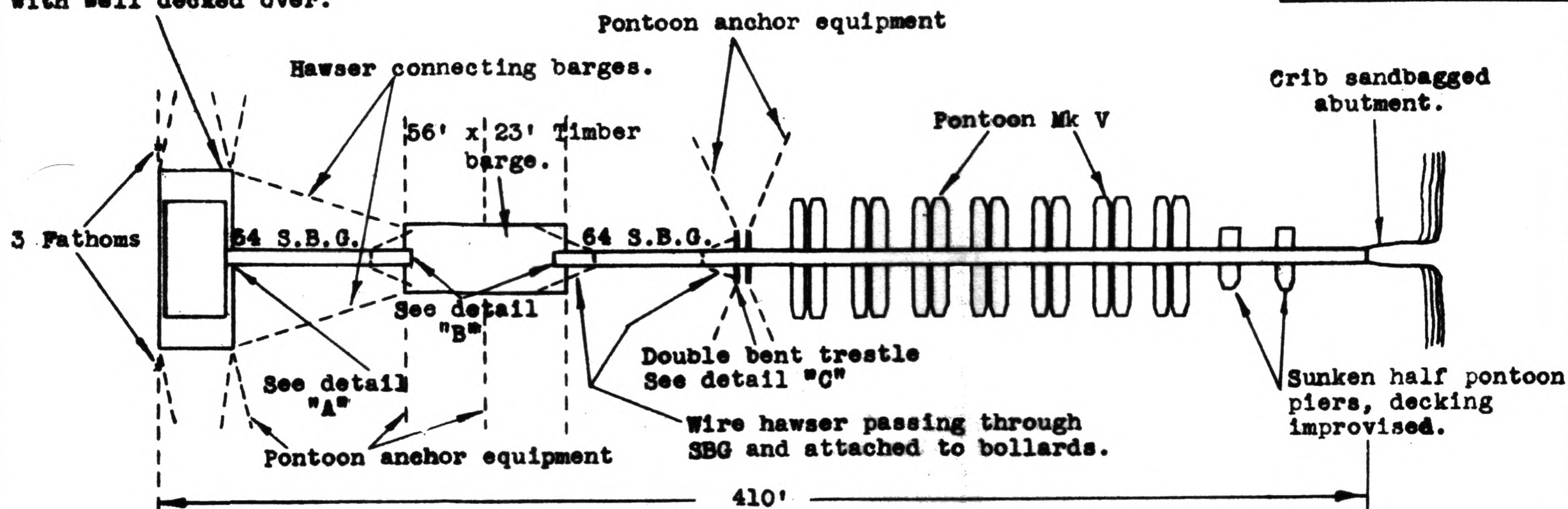
1 0 1 2 3 4
Scale in Feet

TEMPORARY JETTY 120'

USING STEEL CRIBS

SOURCE: C.E.3 AUST CORPS
CONSTRUCTED BY 62 CORPS FD PK COY

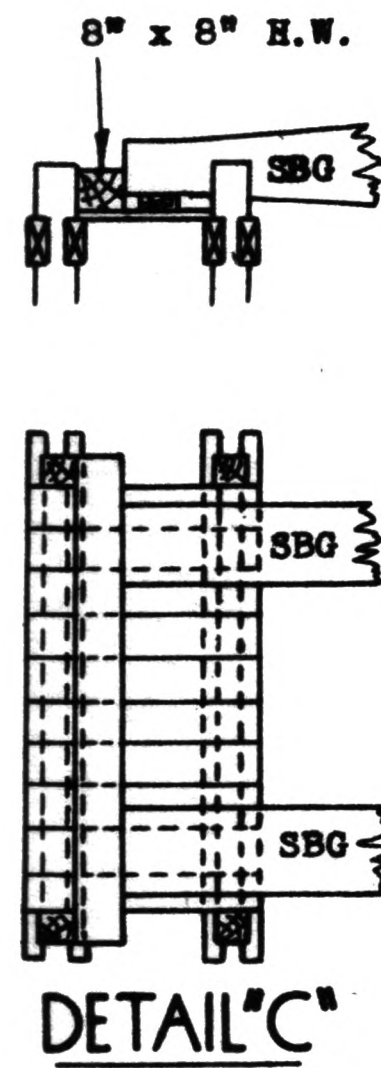
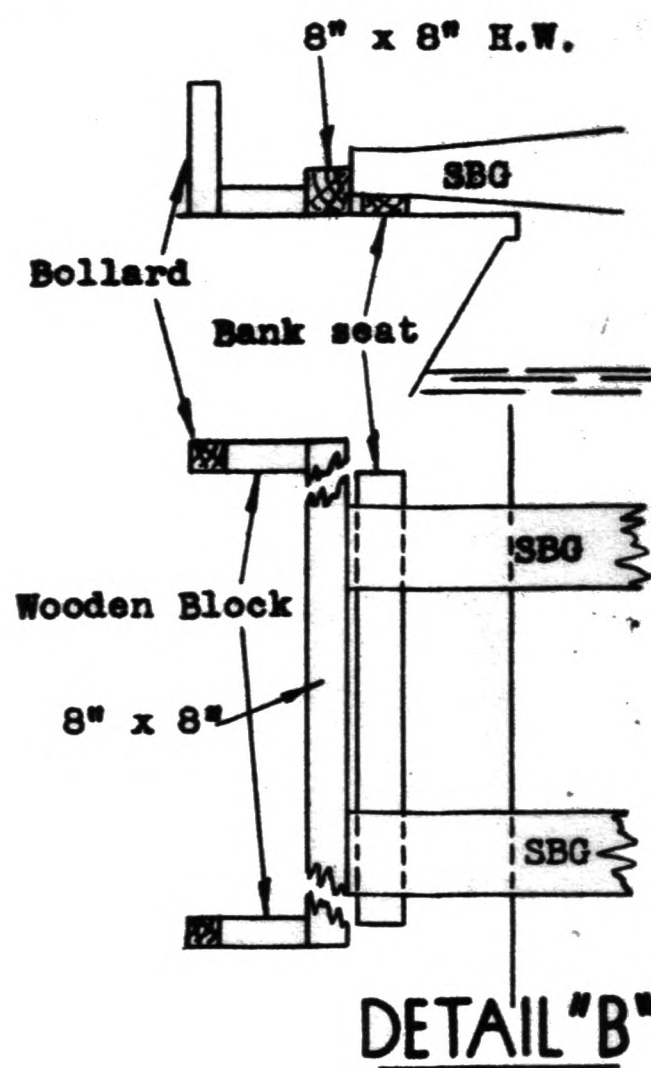
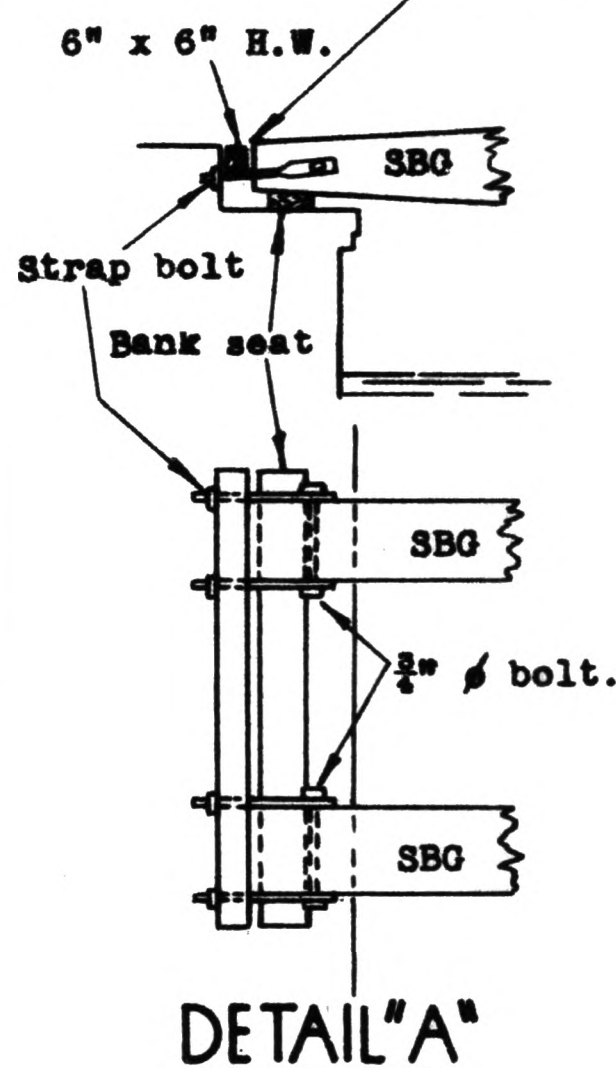
60' x 25' Steel Barge
with well decked over.



DIAGRAMMATIC PLAN

Not to Scale.

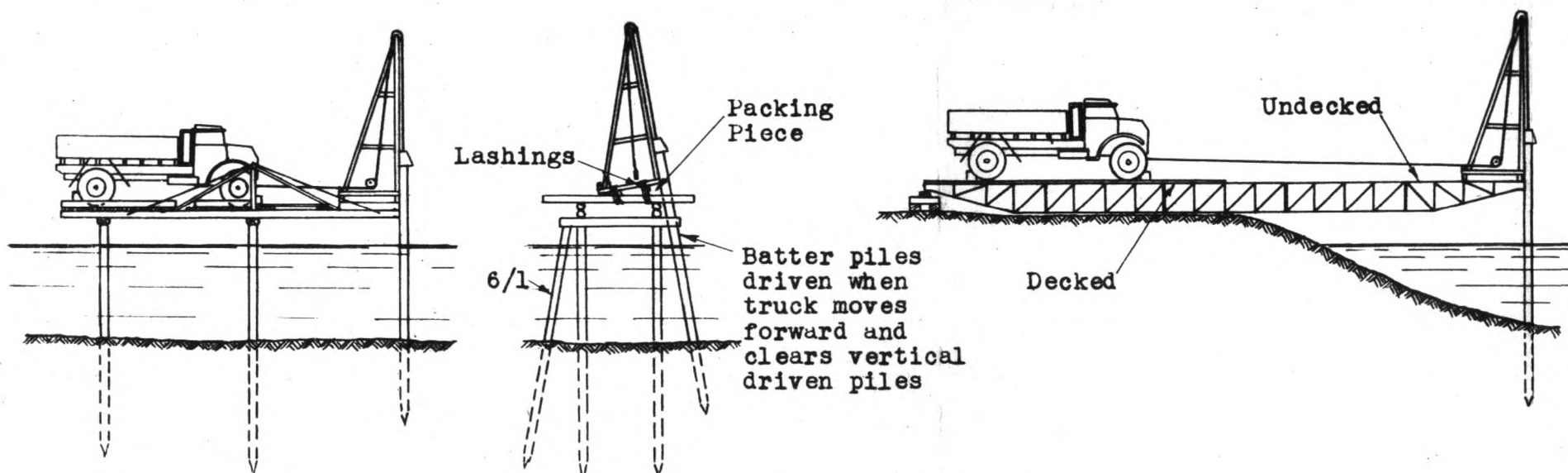
2" play allowed for articulation.



TEMPORARY PIER OF MOBILE BRIDGING EQUIPMENT

Scale 1 0 2 4 6 8 10 Feet

SOURCE: C.E.N.G.FORCE



TIMBER TRAVELLER

DRIVING
BATTER PILES

COMMERCIAL BUILT-UP GIRDER

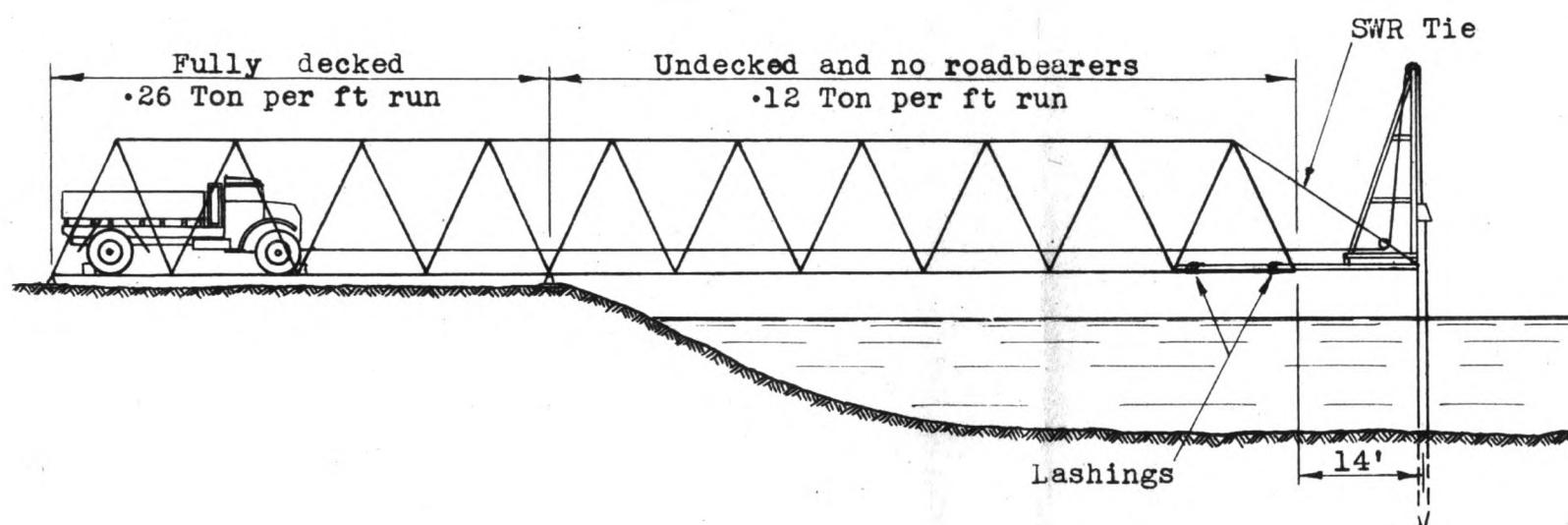
NOTES:-

1. Suggested methods of cantilever end on pile driving using improvised and equipment bridging.

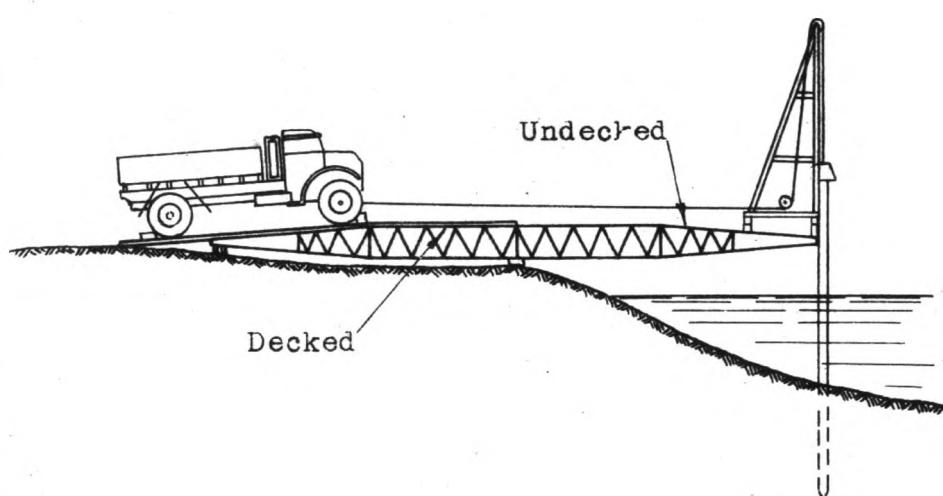
Detail calculations will be required for each case, depending on:-

- (a) Weight of Monkey, Pile-frame, etc.,
- (b) Max. length of Cantilever,
- (c) Weight of Counterweight.

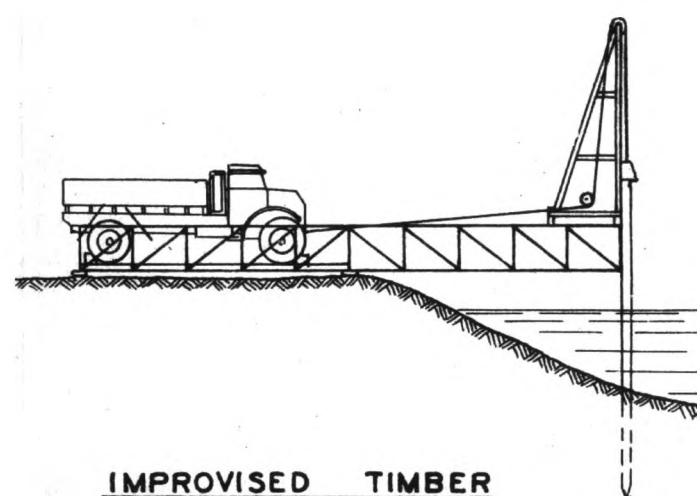
2. The diagrams show the use of a 3-ton winch truck. A native power driven pile driving winch would be preferable for speedy construction.



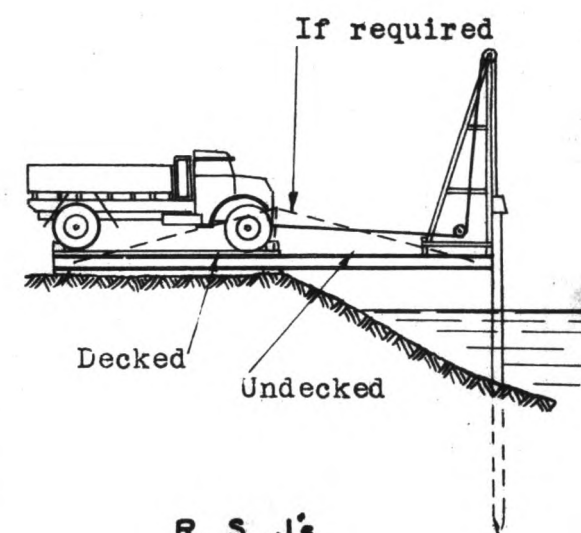
STEEL BRIDGE



SMALL BOX GIRDER

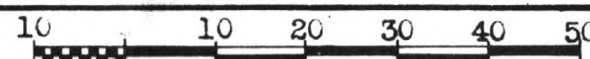


IMPROVISED TIMBER
RING CONNECTOR TRUSS



R. S. J's

CANTILEVER METHODS OF PILE DRIVING

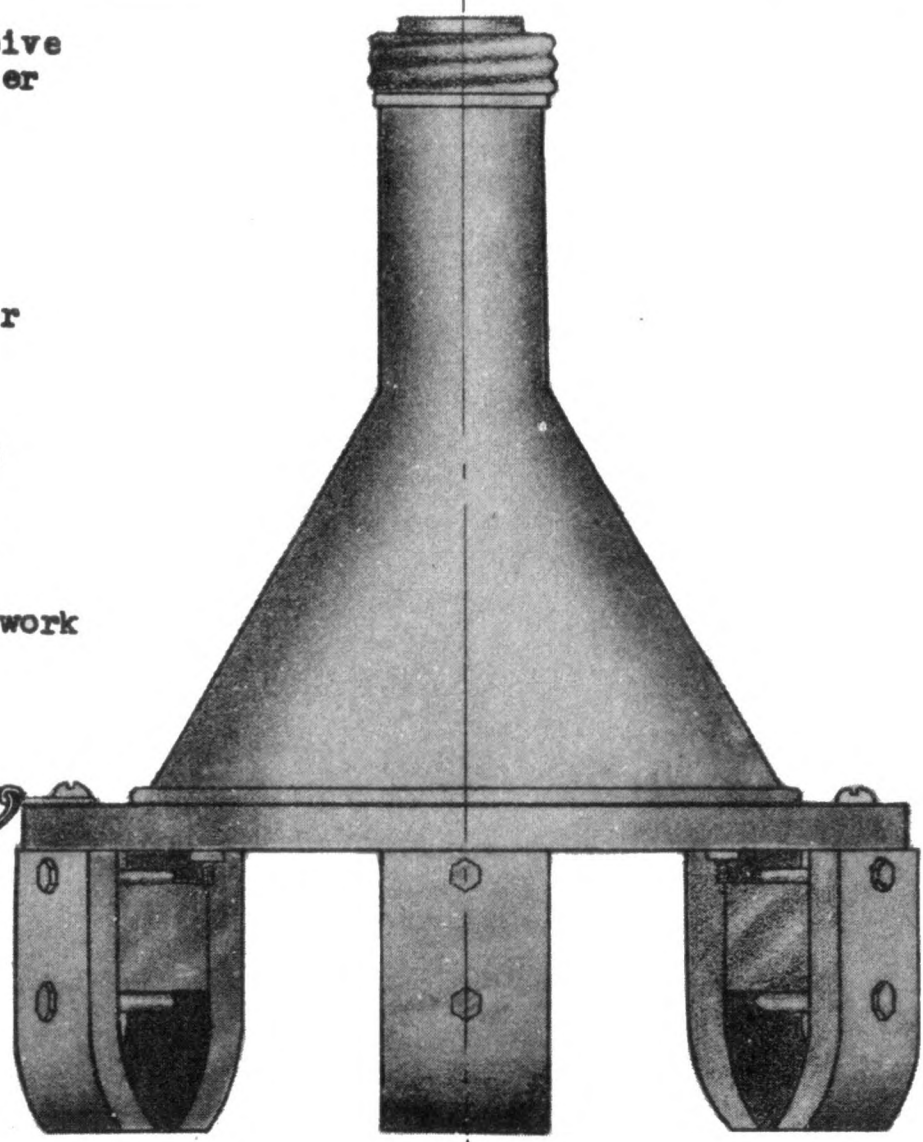
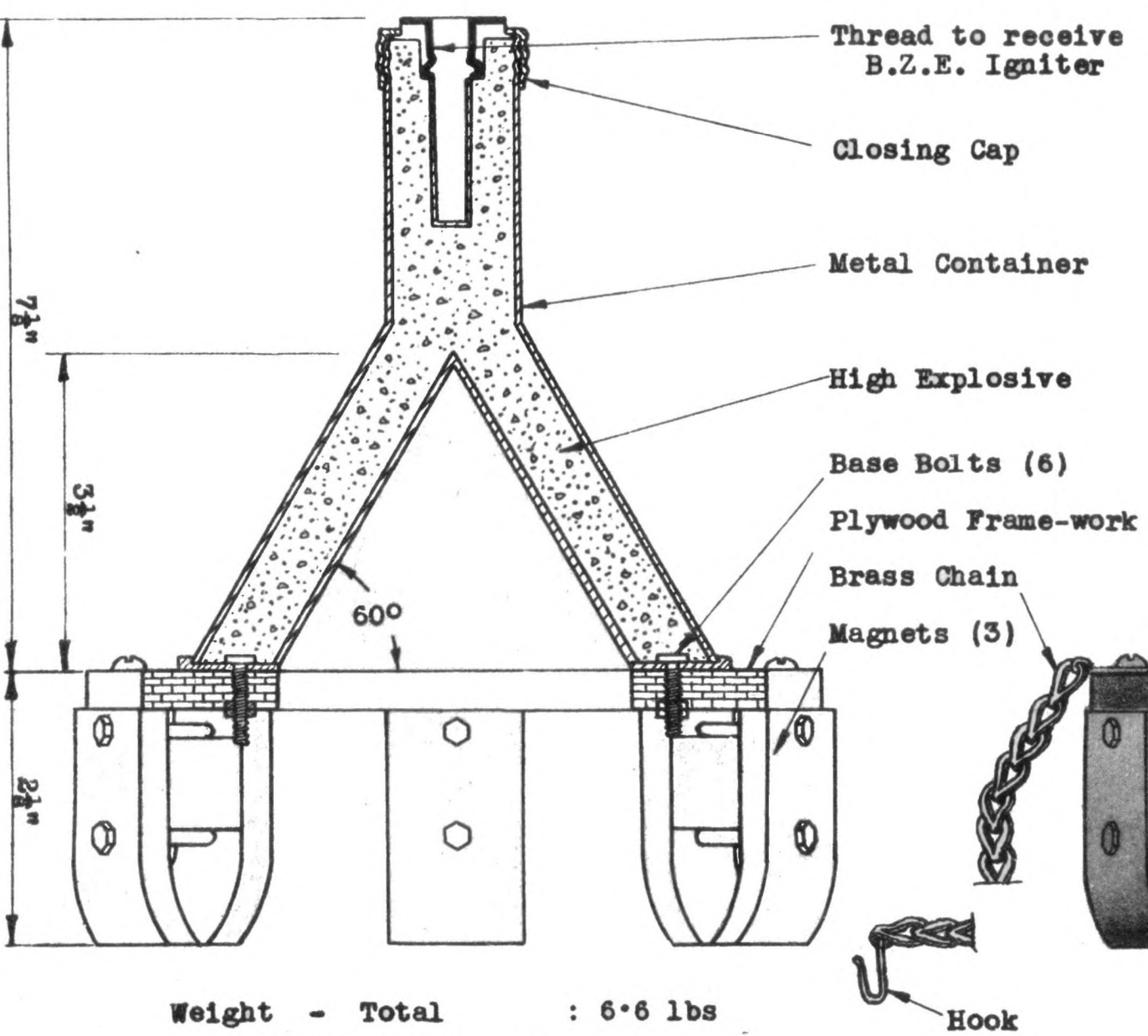


Scale in feet

SOURCE:- CRE C Aust Div (2/15 Aust Fd Coy.)

Diagrammatic Only

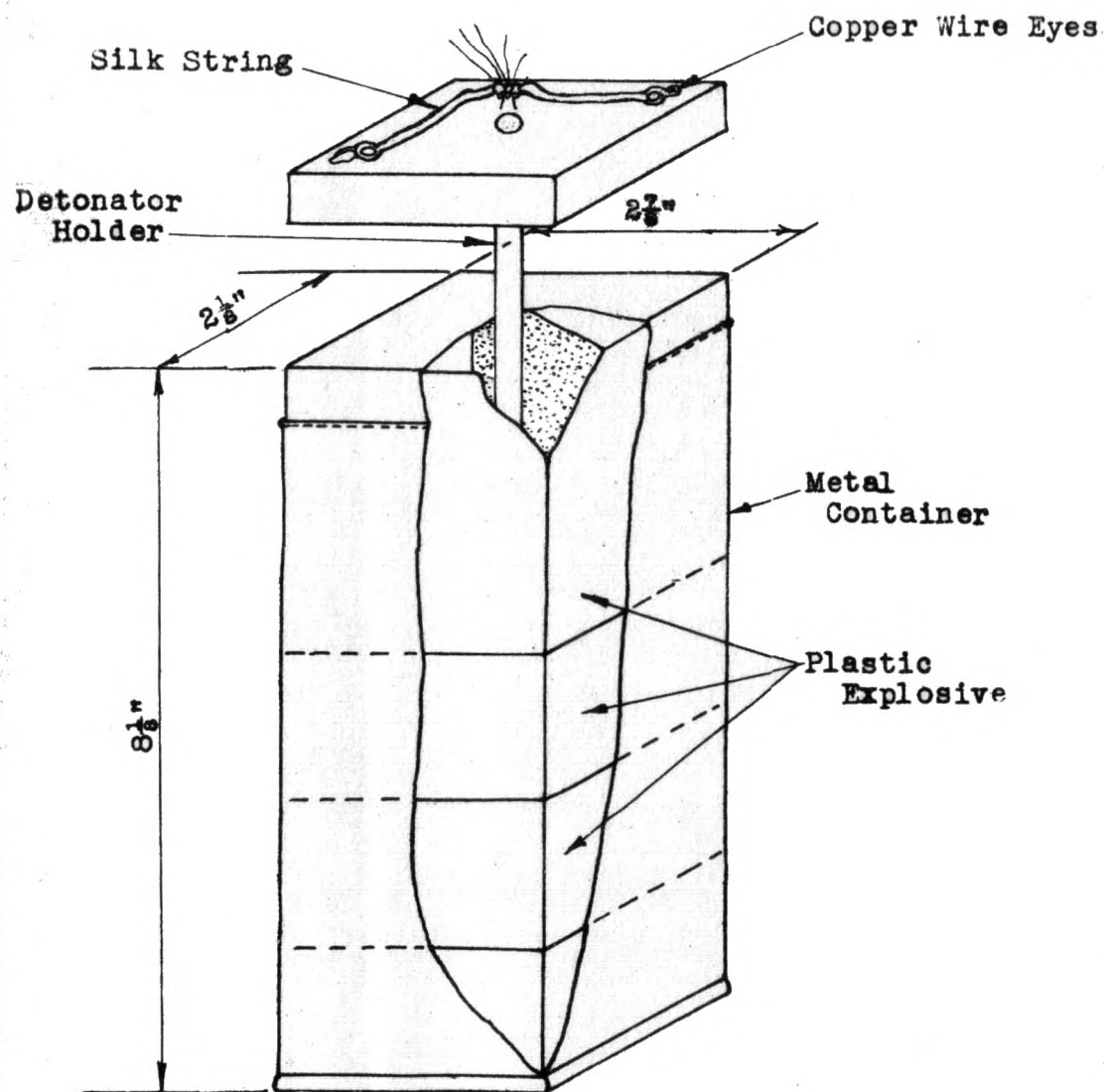
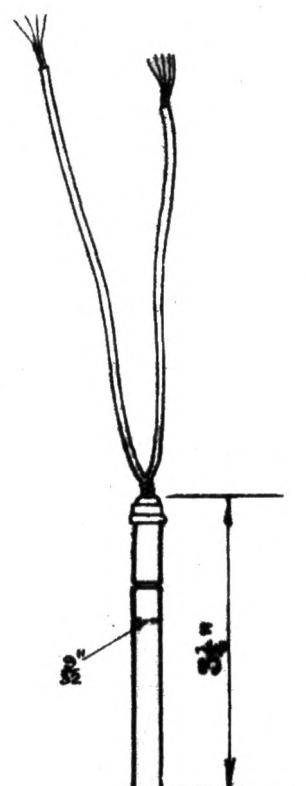
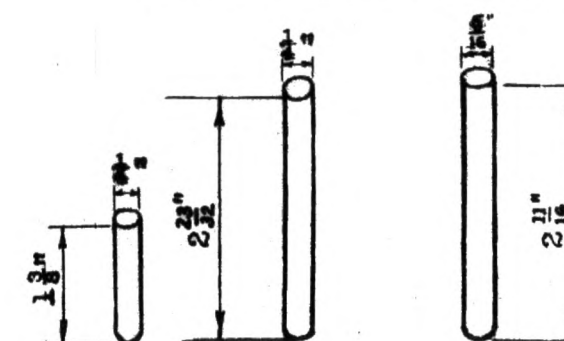
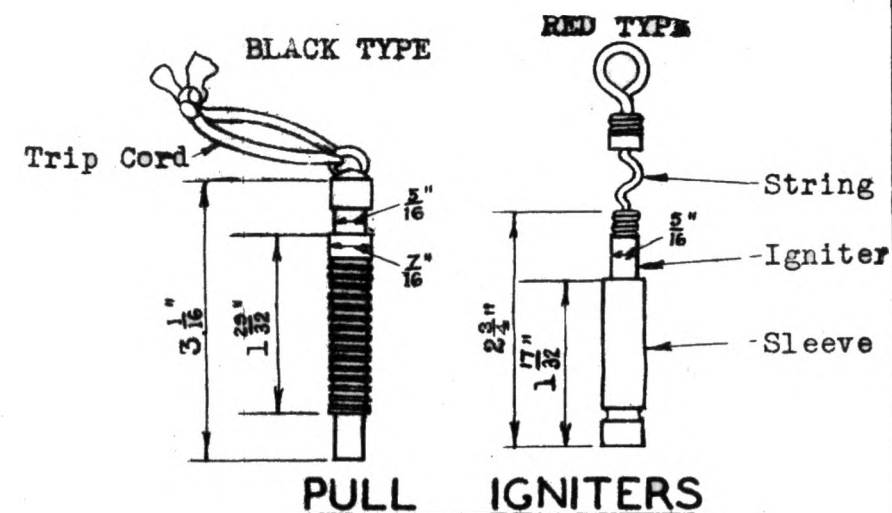
SOURCE:- M.F.F.Tech I.S. No 62



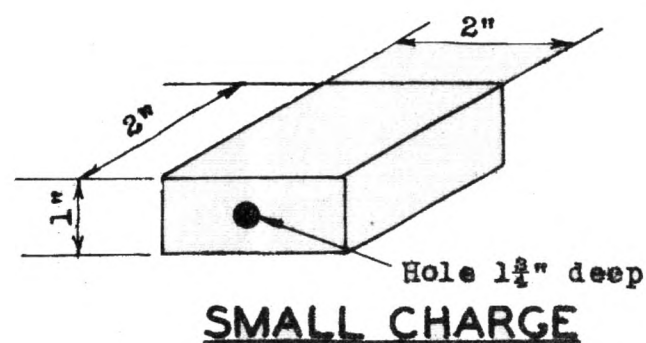
Weight - Total : 6.6 lbs
Weight without Magnets : 3.3 lbs

A-TK MAGNETIC HOLLOW DEMOLITION CHARGE - GERMAN

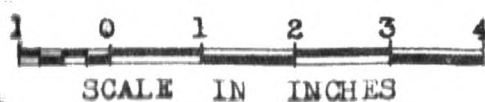
APPX B 1
Refer para 70

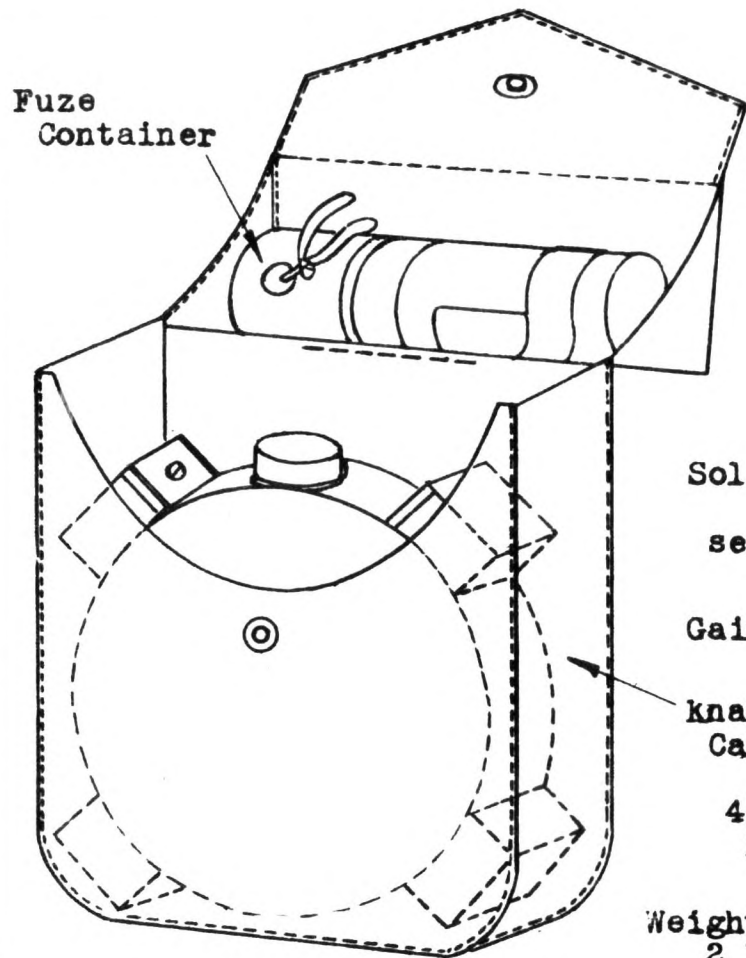
**LARGE CHARGE****ELECTRIC
DETONATOR****TYPE 97****NON ELECTRIC
DETONATORS**

Container	.. ..	2 1/8" x 2 7/8" x 8 1/8"
Small Block	.. ..	2 1/8" x 2 7/8" x 1 1/4"
Large Block	.. ..	2 1/8" x 2 7/8" x 3 1/8"
Total Weight	.. ..	2 lbs. 14 oz.
Weight of Small Block	.. ..	7 oz.
Weight of Large Block	.. ..	14 oz.



Ser	Length	Dia	Total Weight	Explosive Content			
				Fulminate of Mercury	Tetryl	Petn	Material of Construction
1	1 3/8"	1/4"	2.34 grams	1.00 grams	0.17 grams		Copper
2.	2 23/32"	1/4"	4.24 grams	0.40 grams	0.85 grams		Brass
3	2 11/16"	5/16"	7.12 grams	0.88 grams		3.93 grams	Brass
TYPE 97	3 1/4"	3/32"	11.74	4.71 grams including deadening agent		1.98 grams	

**DEMOLITION EQUIPMENT JAPANESE**



Fuze Container

Wooden Plug $3\frac{3}{4}$ " long

Threaded Boss to take Lock Nut

Magnet $1\frac{1}{2}$ " x $1\frac{1}{4}$ " x $\frac{3}{4}$ "

Top of Fuze Container

Fuze Cap

Safety Pin with String attached

Lock Nut

Gaine Body and Det.

Brass Body

Solid Explosive in 8 separate sections

Gaine Cavity

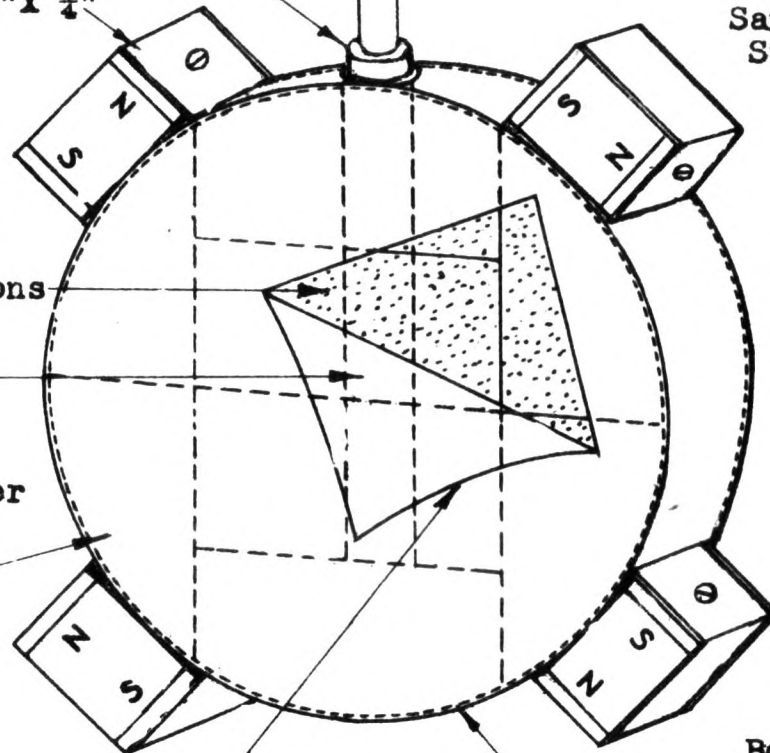
knaki Canvas Container

$4\frac{3}{8}$ " Dia
 $1\frac{1}{2}$ " thick

Weight with Fuze
2 lb 11 oz

Fuze Weight 4 oz

Charges in Canvas Container



Label

Bottom of Fuze Container

Filling Pocket with 3 Press-studs

HAVERSACK

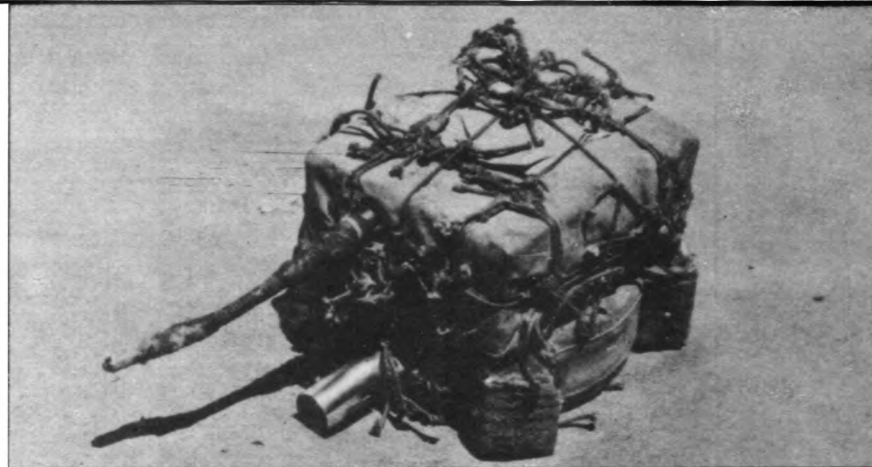
CONTAINING FUZE AND BOMB

MAGNETISED ARMOUR PIERCING BOMB - JAPANESE

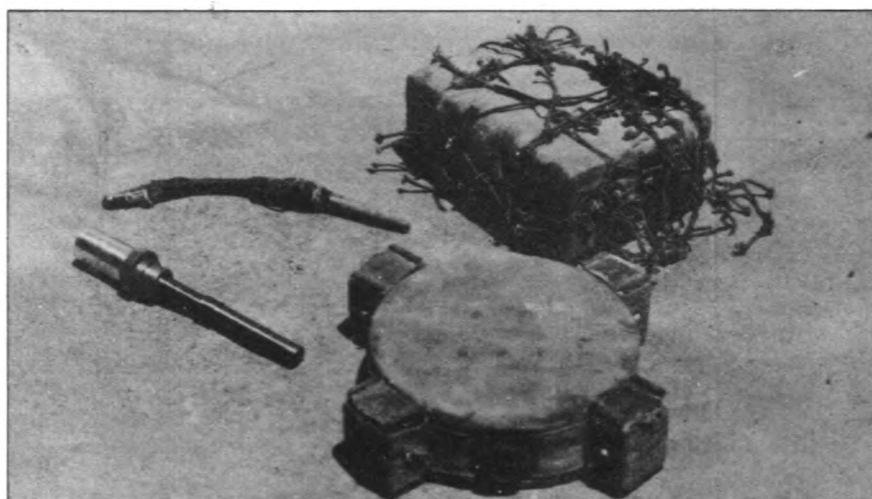
FUZE & CONTAINER

Refer para 75

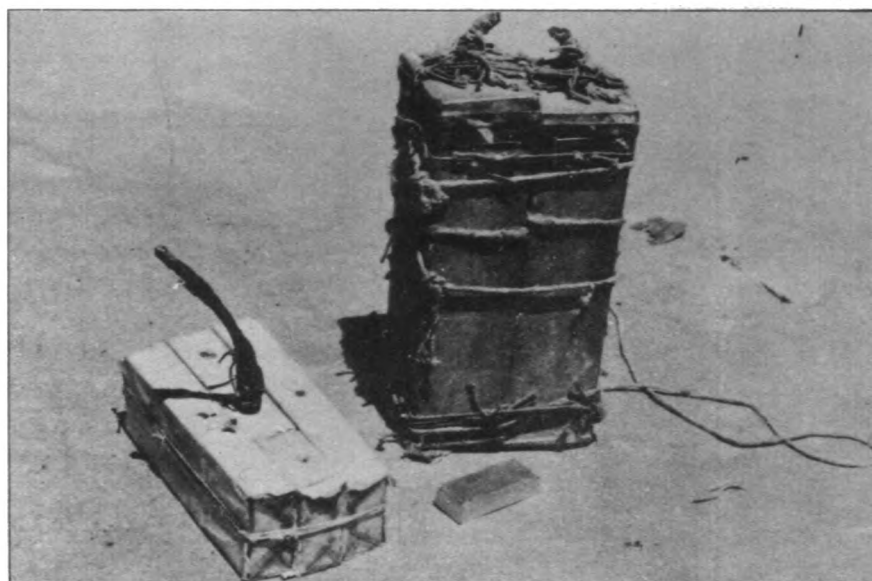
APPX B 4
(sheet 1)



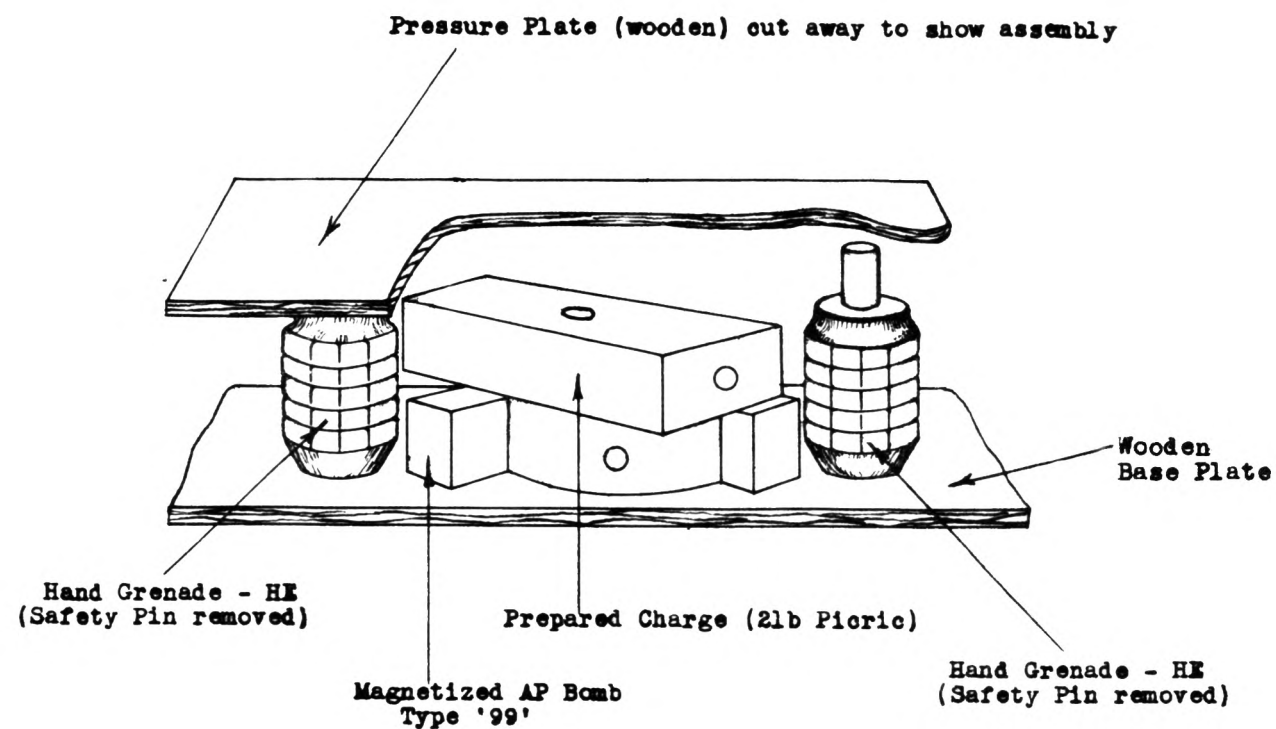
1. IMPROVISED MINE FROM 4 1/2 lb PICRIC SLABS AND TYPE 99 AP BOMB



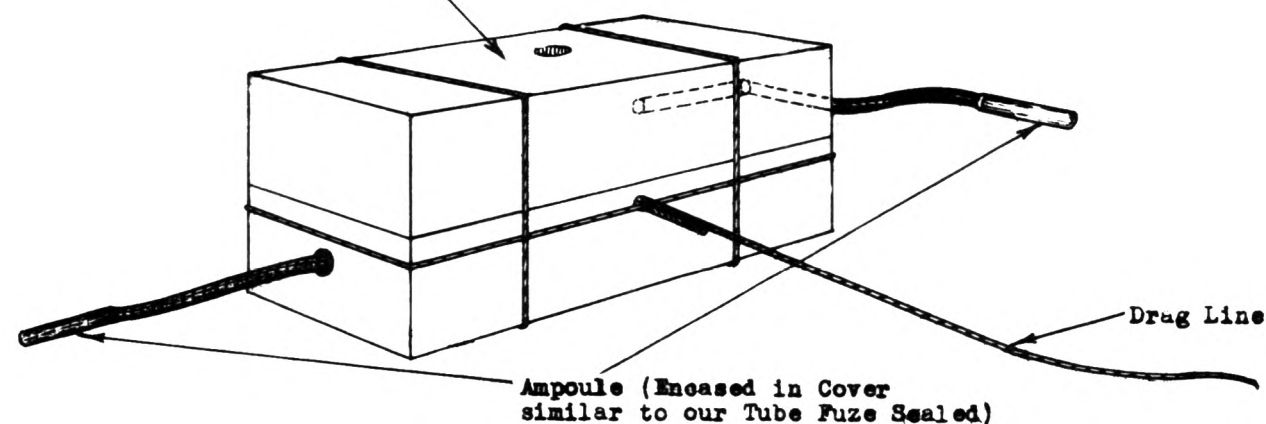
2. DETAILS OF COMPONENTS



3. IMPROVISED MINES FROM PICRIC SLABS & PREPARED CHARGES

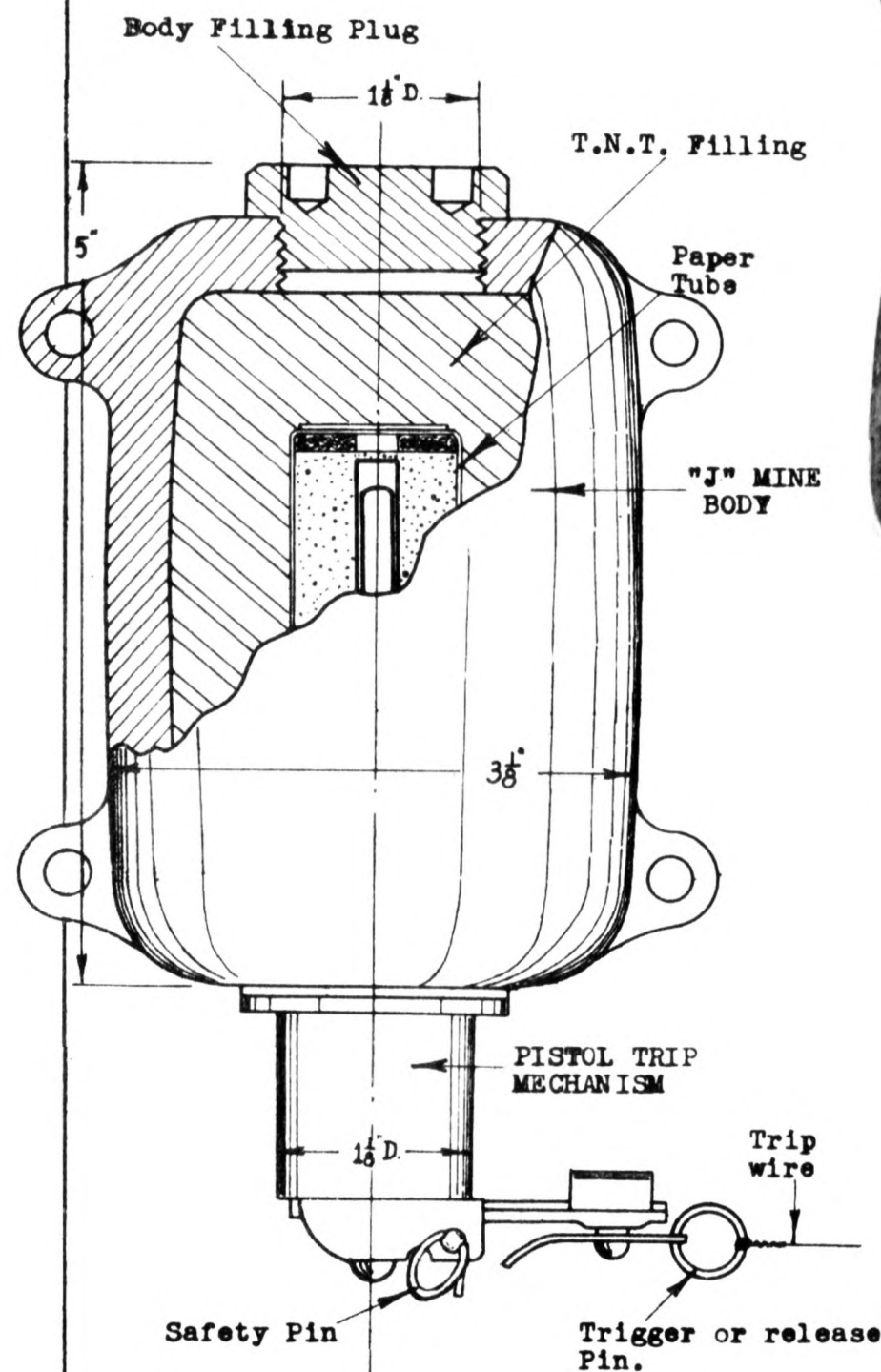


2 Prepared Charges in Tin Containers

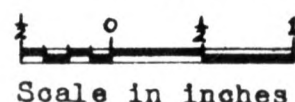


MINEFIELDS JAPANESE - IMPROVISED MINES

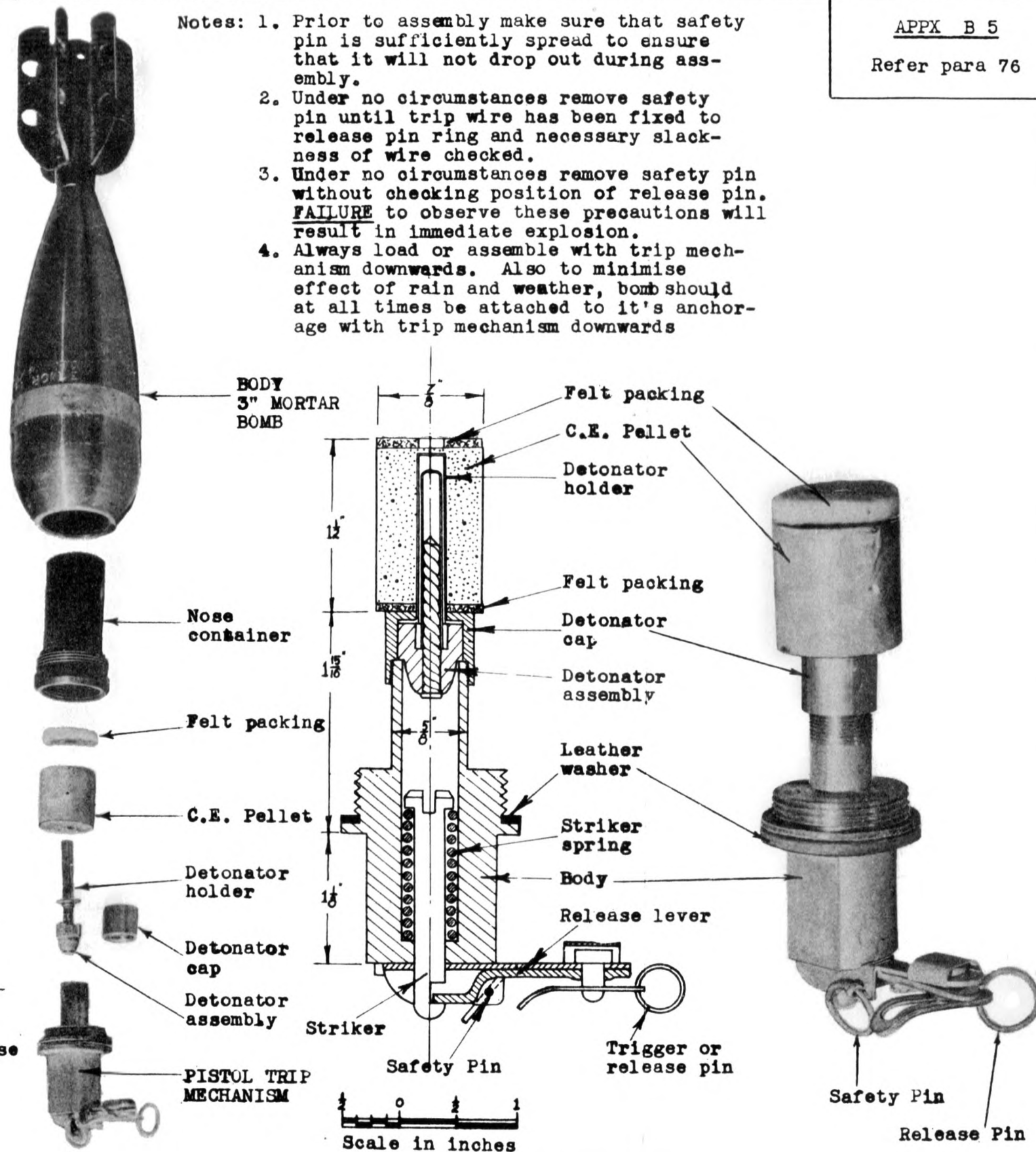
- Notes: 1. Prior to assembly make sure that safety pin is sufficiently spread to ensure that it will not drop out during assembly.
2. Under no circumstances remove safety pin until trip wire has been fixed to release pin ring and necessary slackness of wire checked.
3. Under no circumstances remove safety pin without checking position of release pin. **FAILURE** to observe these precautions will result in immediate explosion.
4. Always load or assemble with trip mechanism downwards. Also to minimise effect of rain and weather, bomb should at all times be attached to it's anchorage with trip mechanism downwards



APPLICATION TO J MINE
MK.1 AUST



APPLICATION TO 3" MORTAR BOMB

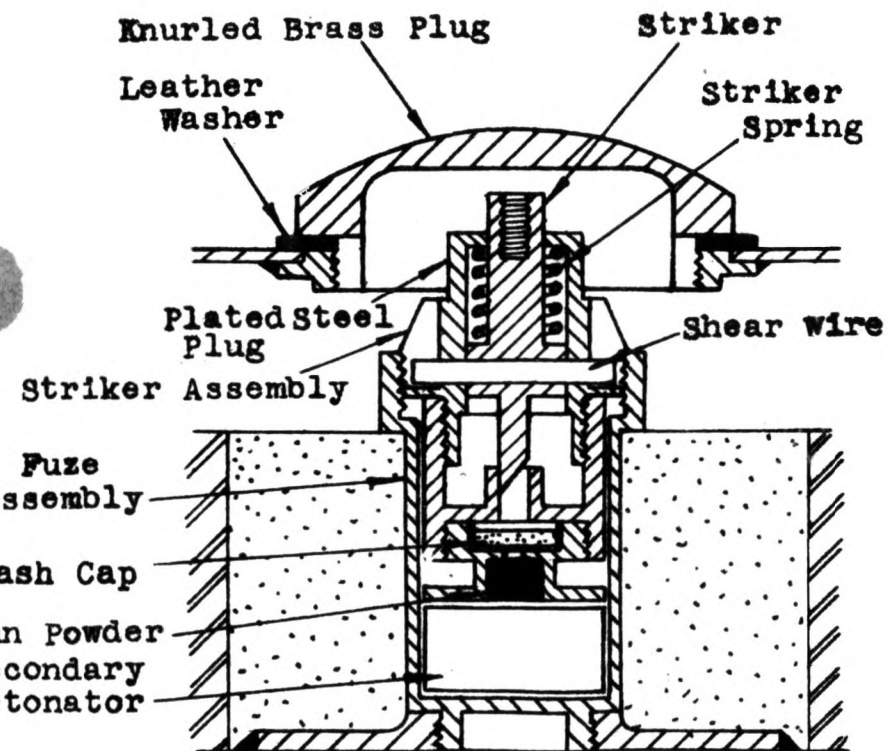


PISTOL TRIP MECHANISM

PISTOL TRIP MECHANISM & APPLICATIONS

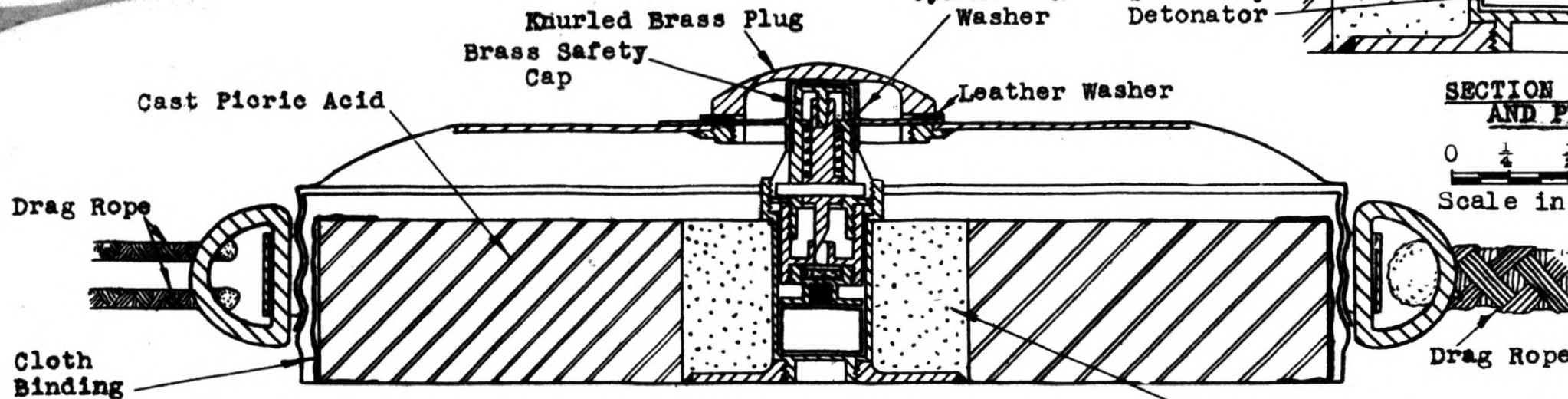
JAPANESE LAND MINE - TYPE 93

Diameter .. $6\frac{3}{4}$ "
 Height .. $1\frac{1}{4}$ "
 Total Weight 3 lb



SECTION OF FUZE ARMED AND PRIMER

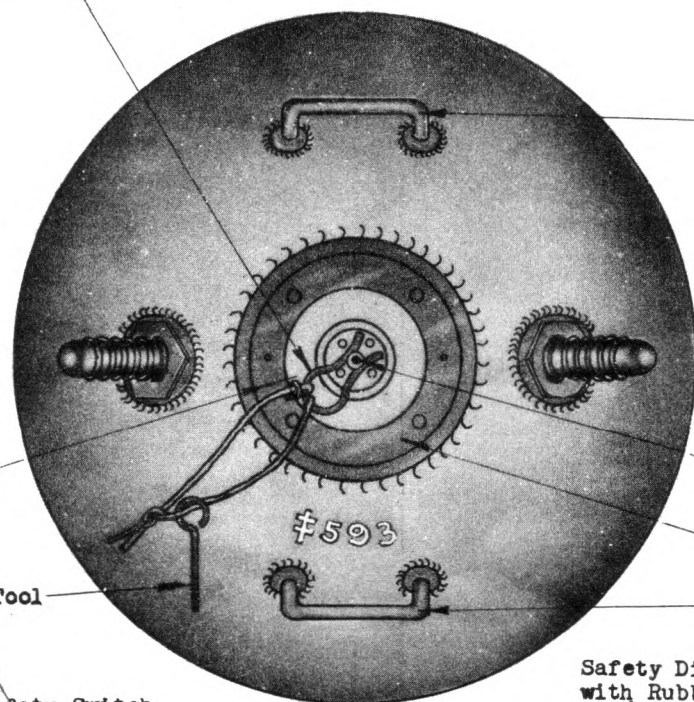
0 $\frac{1}{4}$ $\frac{1}{2}$ $\frac{3}{4}$ 1
 Scale in Inches



SECTION OF COMPLETE FUZED MINE WITH SAFETY DEVICES IN POSITION

Scale 1 $\frac{1}{2}$ 0 1 2 Inches

Safety Fork
(Switch in safe position)



Handle

Central Opening
for Booster &
Safety Switch

Threaded
Hole

Safety Switch
Plunger Lifting Tool

Keep Ring

Handle

Safety Diaphragm
with Rubber Gasket

PLAN

Safety Switch
(Armed position)

Chemical Horn

Horn Opening fitted
with Rubber Gaskets

Chamber containing
Booster, Wiring,
Safety Switch & Horn
Electrodes

5 1/2" Dia.

Outer Case

Charge
Container

Explosive
Charge

Detonator

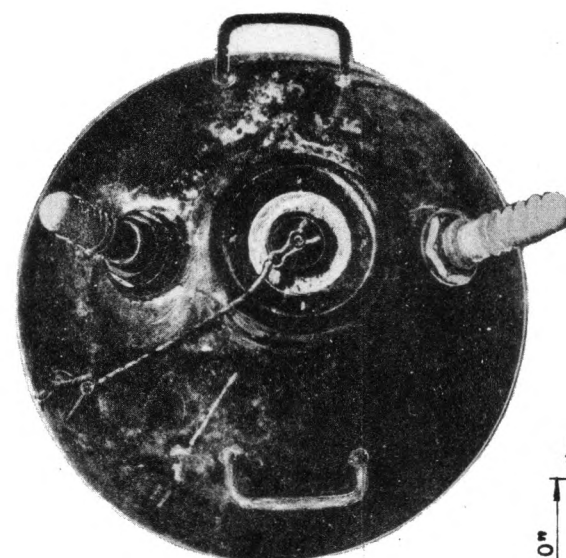
Booster

Welded
Joint

Filling Plug
20 1/2" Dia.

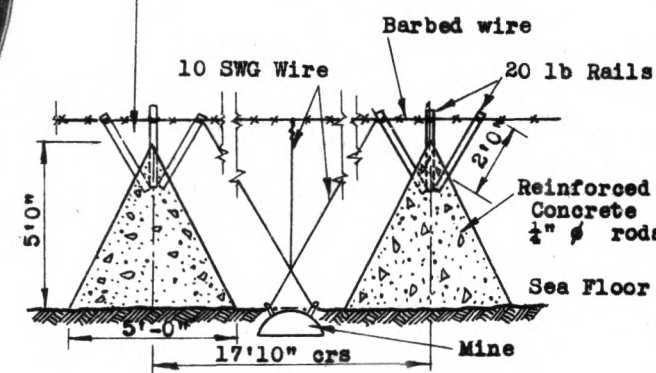
SECTION OF COMPLETELY ASSEMBLED MINE
WITH SAFETY SWITCH IN ARMED POSITION

1 0 2 4 6 8 10
Scale in Inches

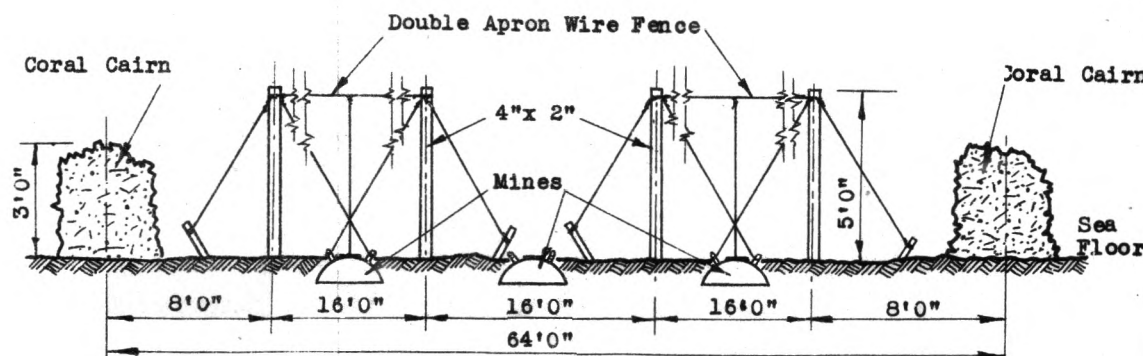


PHOTOGRAPH OF
ASSEMBLED MINE
WITH SAFETY FORK
IN POSITION

Exposed or partly submerged
according to tide



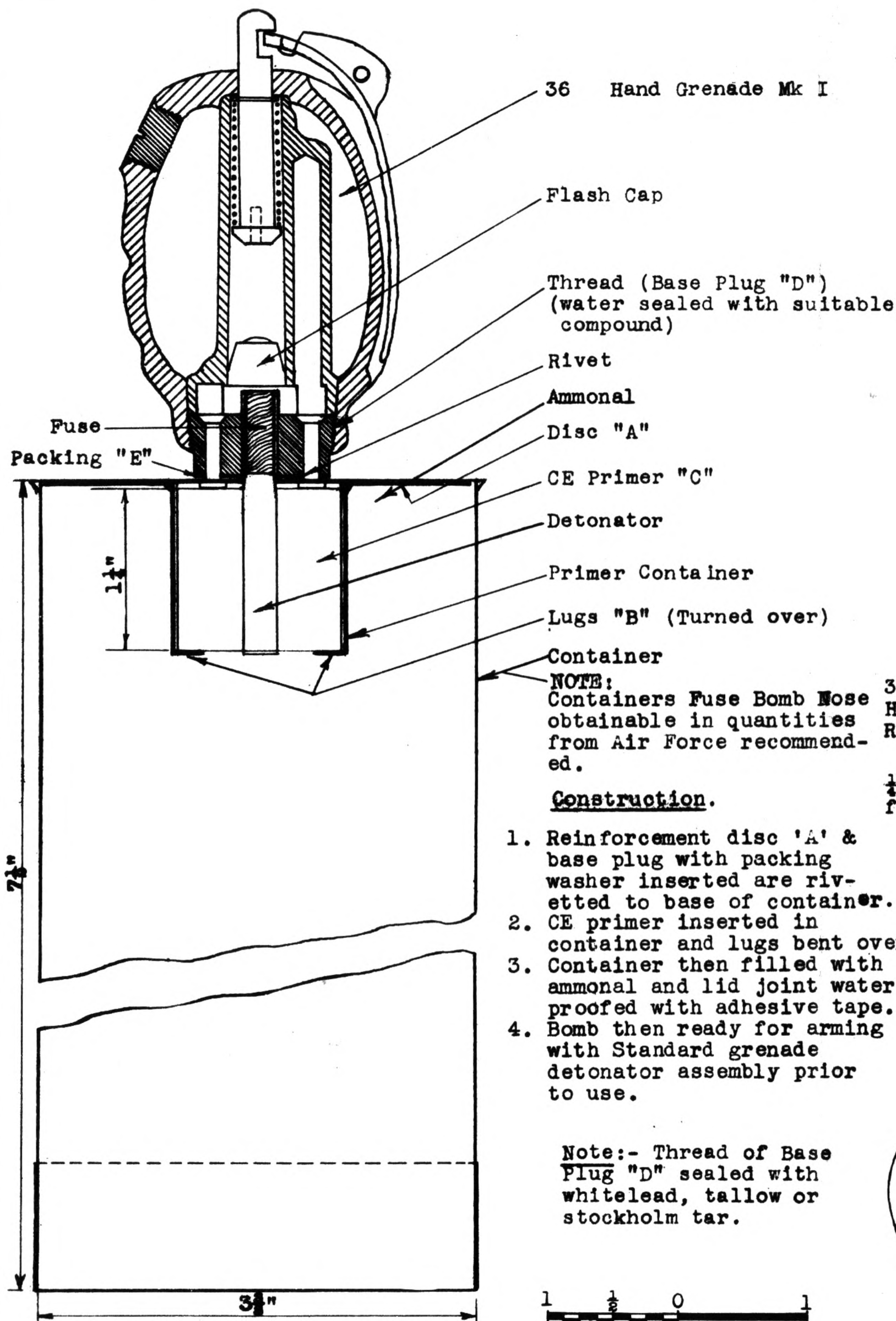
MINE WITH HORNS
ATTACHED TO REINFORCED HORNED TETRAHEDRONS
SITED AS BEACH OR SHALLOW WATER OBSTACLE
(AS USED TARAWA ATOLL - GILBERT ISLANDS)



MINES WITH HORNS ATTACHED TO DOUBLE APRON WIRE FENCE
SITED BETWEEN CORAL CAIRNS AS BEACH OR SHALLOW WATER OBSTACLE
(AS USED TARAWA ATOLL - GILBERT ISLANDS)

1 0 2 4 6 8 10
Scale in Feet

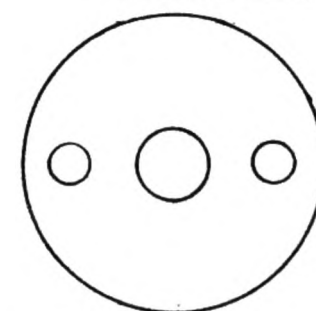
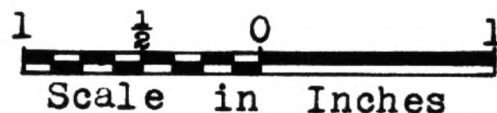
MINE, ANTI-INVASION, JAPANESE



Construction.

1. Reinforcement disc 'A' & base plug with packing washer inserted are rivetted to base of container.
2. CE primer inserted in container and lugs bent over.
3. Container then filled with ammonal and lid joint water-proofed with adhesive tape.
4. Bomb then ready for arming with Standard grenade detonator assembly prior to use.

Note:- Thread of Base Plug "D" sealed with whitelead, tallow or stockholm tar.

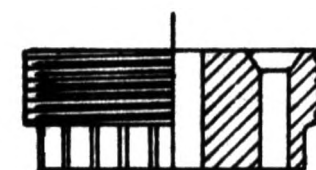


PACKING WASHER "E"

Preferably copper or Aluminium.

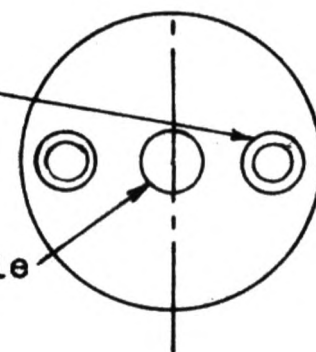


RIVET



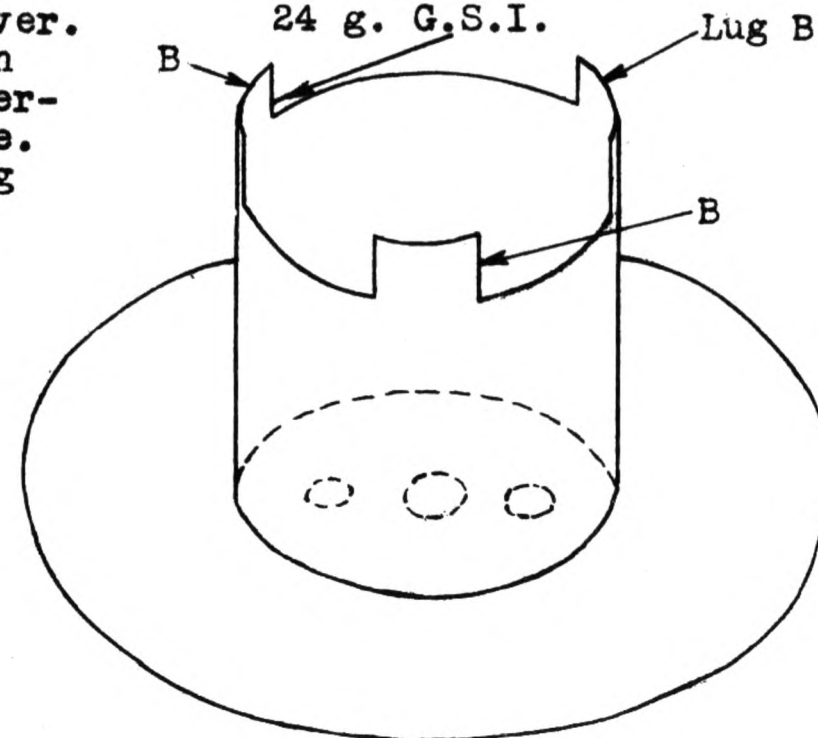
3/16" diam Hole for Rivets.

1/4" diam Hole for fuse.



BASE PLUG "D"

Made from 20 or 24 g. G.S.I.

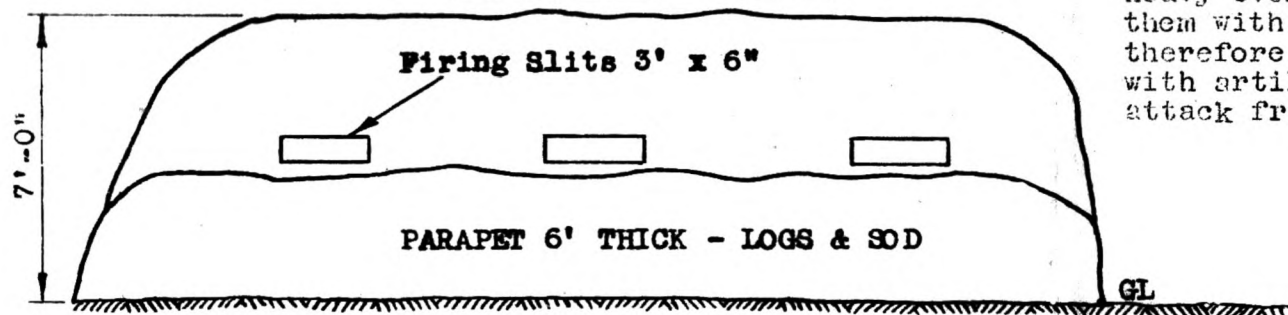


REINFORCEMENT DISC "A"

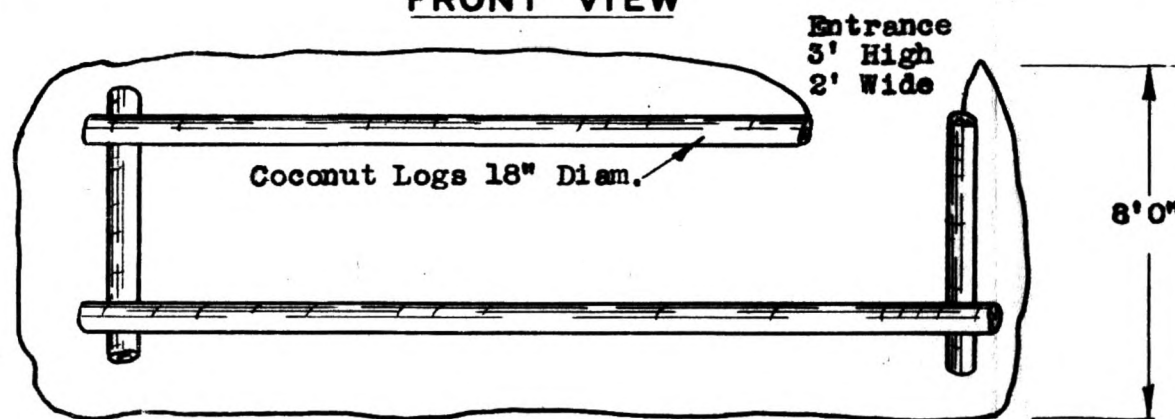
BLAST BOMB MK II

GRENADE INITIATED AMMONAL CHARGE

BUNKER TYPE I.

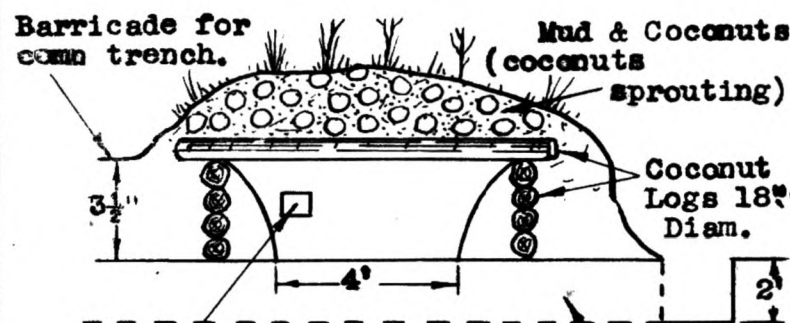


FRONT VIEW



PLAN VIEW

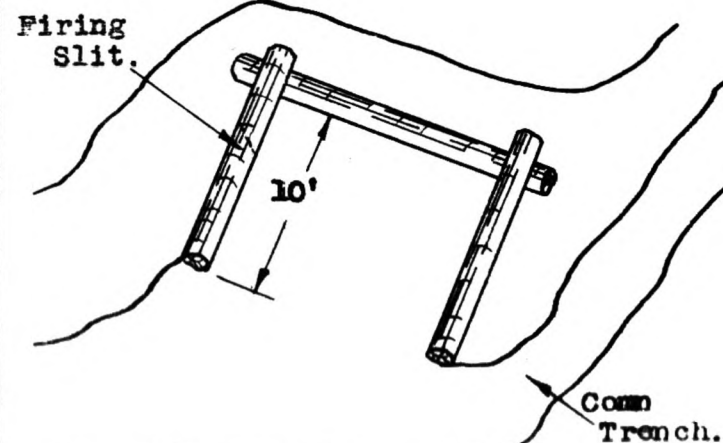
EMPLACEMENT



SIDE VIEW

Comm Trench

Firing Slit 1'0" square.



PLAN VIEW

NOTE:-

All Dugouts and Bunkers have had firing slits so small as to be invisible from the front, and with heavy overhead cover made it impossible to reduce them with a frontal assault with Infantry. It is therefore necessary either to secure a direct hit with artillery, or to overrun or envelop them and attack from the rear.

APPX C 1

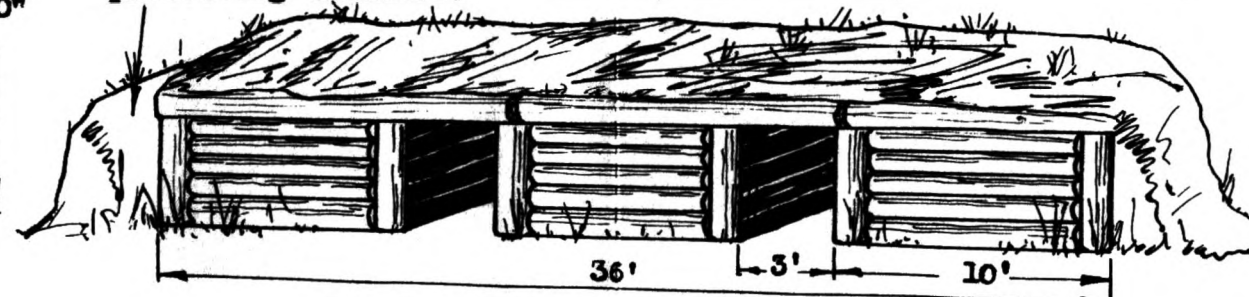
Refer para 117



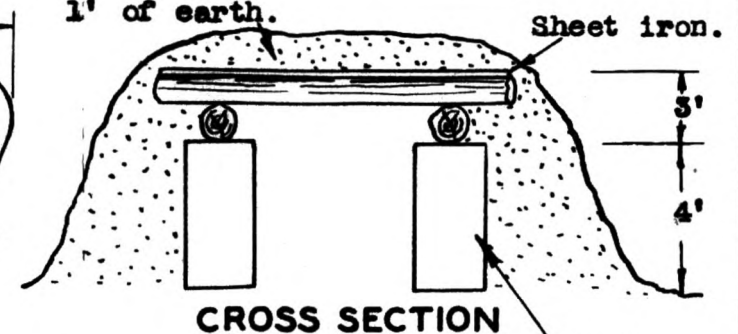
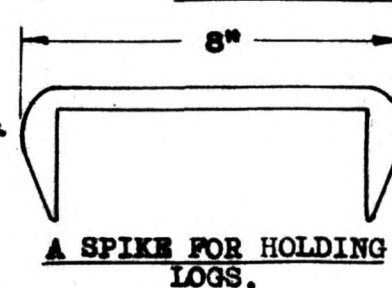
FRONT VIEW

BUNKER TYPE 2

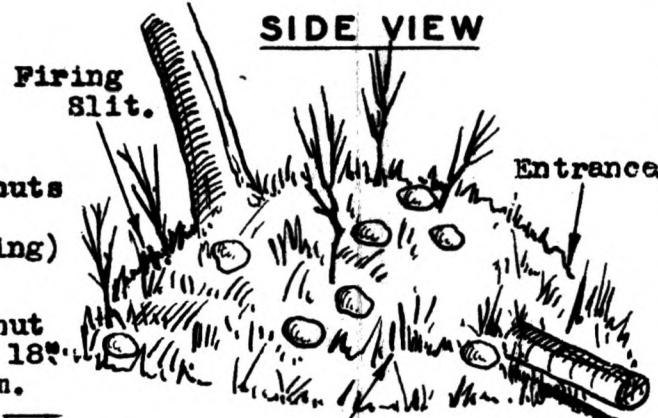
Grass and mud mound protecting entrance.



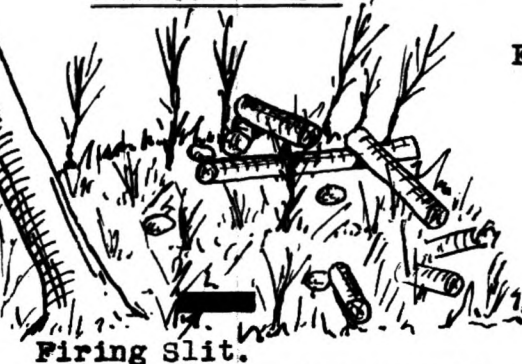
REAR VIEW SHOWING CONSTRUCTION



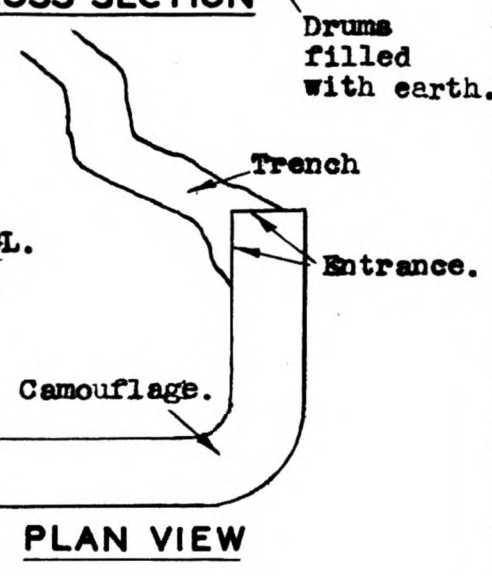
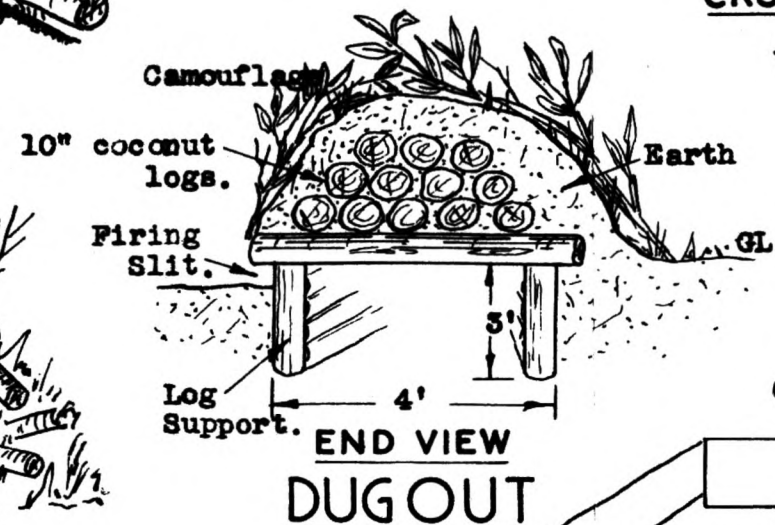
SIDE VIEW



FRONT VIEW



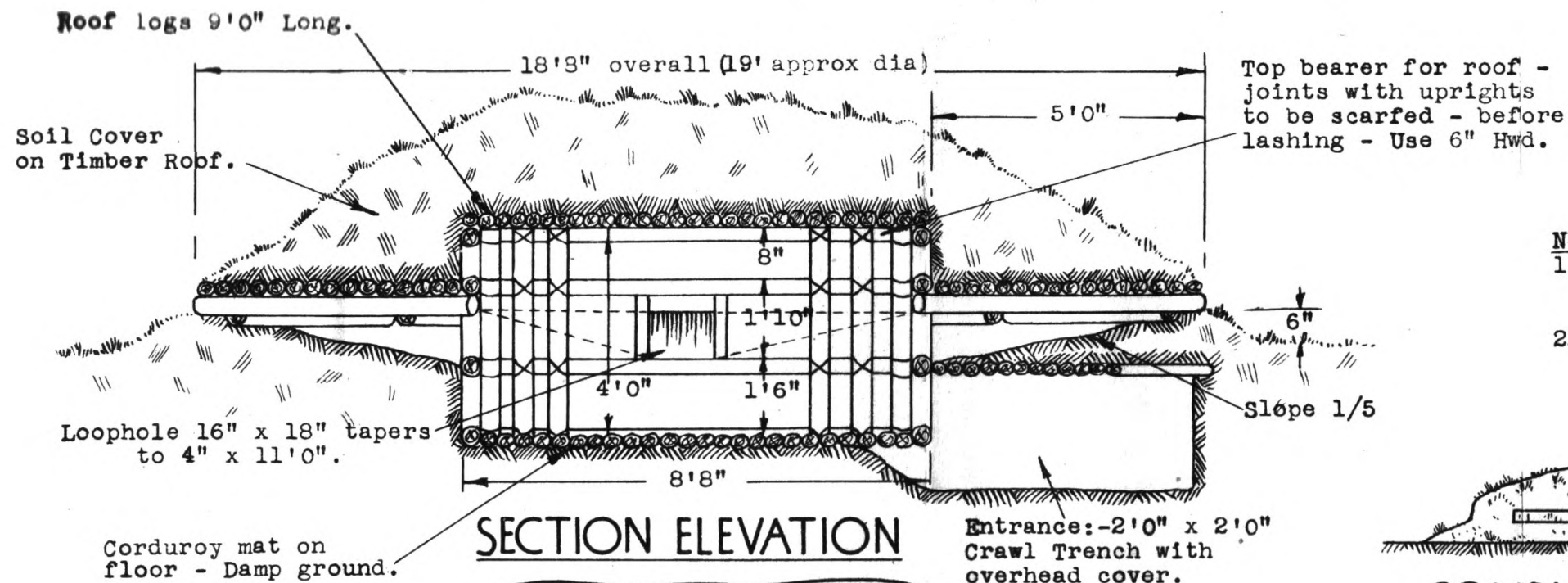
ONE MAN PIT WITH FIRING SLIT



DIAGRAMMATIC ONLY.

JAPANESE DEFENCES & STRONGPOSTS

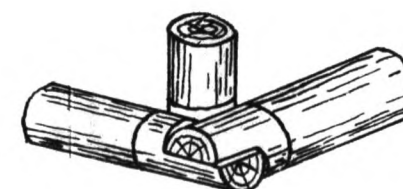
NEW GUINEA

**Notes**

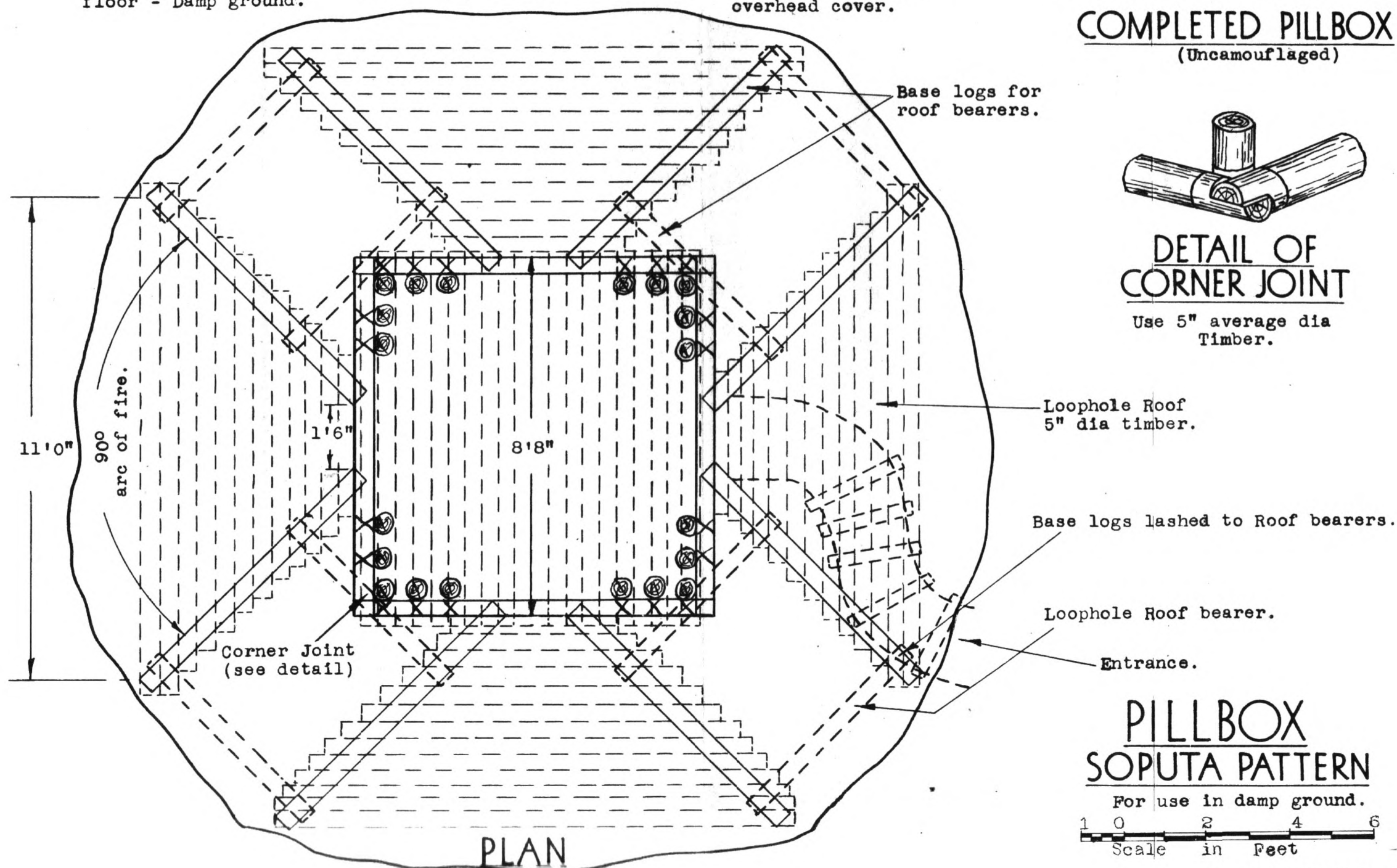
1. Roof bearers 6" Hwd. All other timber 5" average dia.
2. Joints to be wired.

**COMPLETED PILLBOX**

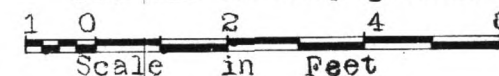
(Uncamouflaged)

**DETAIL OF CORNER JOINT**

Use 5" average dia Timber.

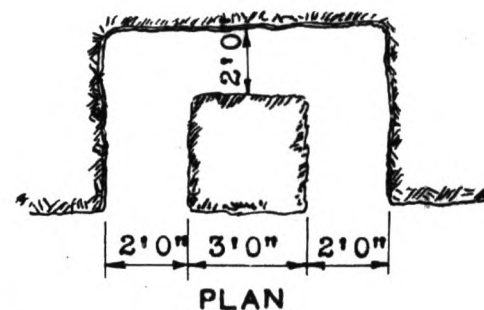
**PILLBOX
SOPUTA PATTERN**

For use in damp ground.



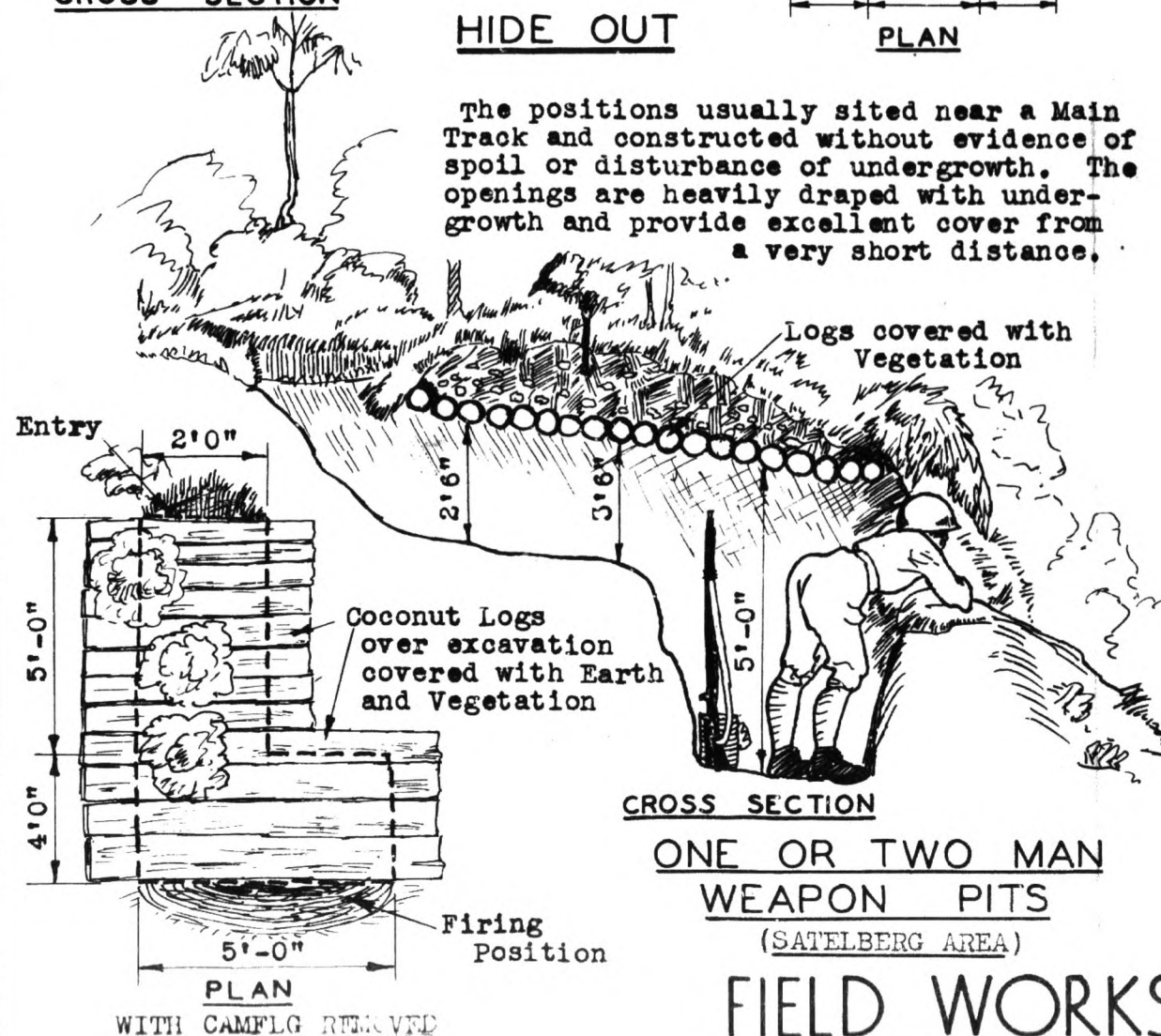


CROSS SECTION



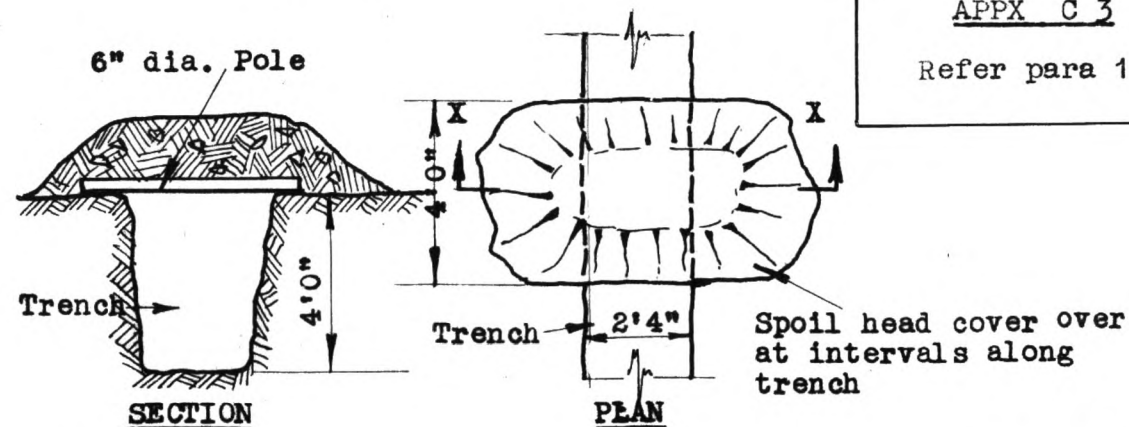
HIDE OUT

The positions usually sited near a Main Track and constructed without evidence of spoil or disturbance of undergrowth. The openings are heavily draped with undergrowth and provide excellent cover from a very short distance.



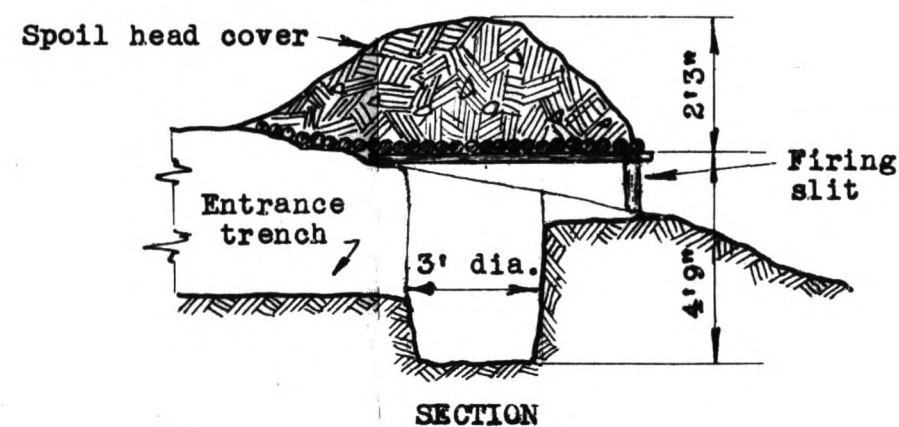
CROSS SECTION

ONE OR TWO MAN
WEAPON PITS
(SATELBERG AREA)



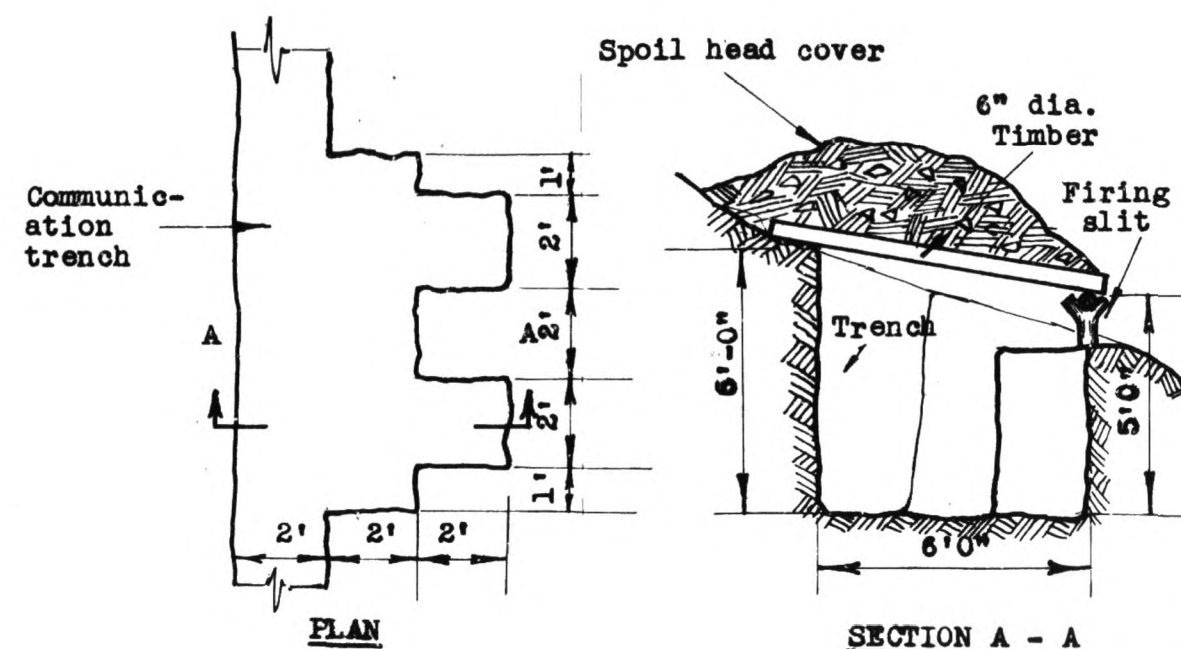
COMMUNICATION TRENCH WITH HEAD COVER

DUMPU AREA



FOX HOLE WITH HEAD COVER

DUMPU AREA



TWO MAN RIFLE PIT

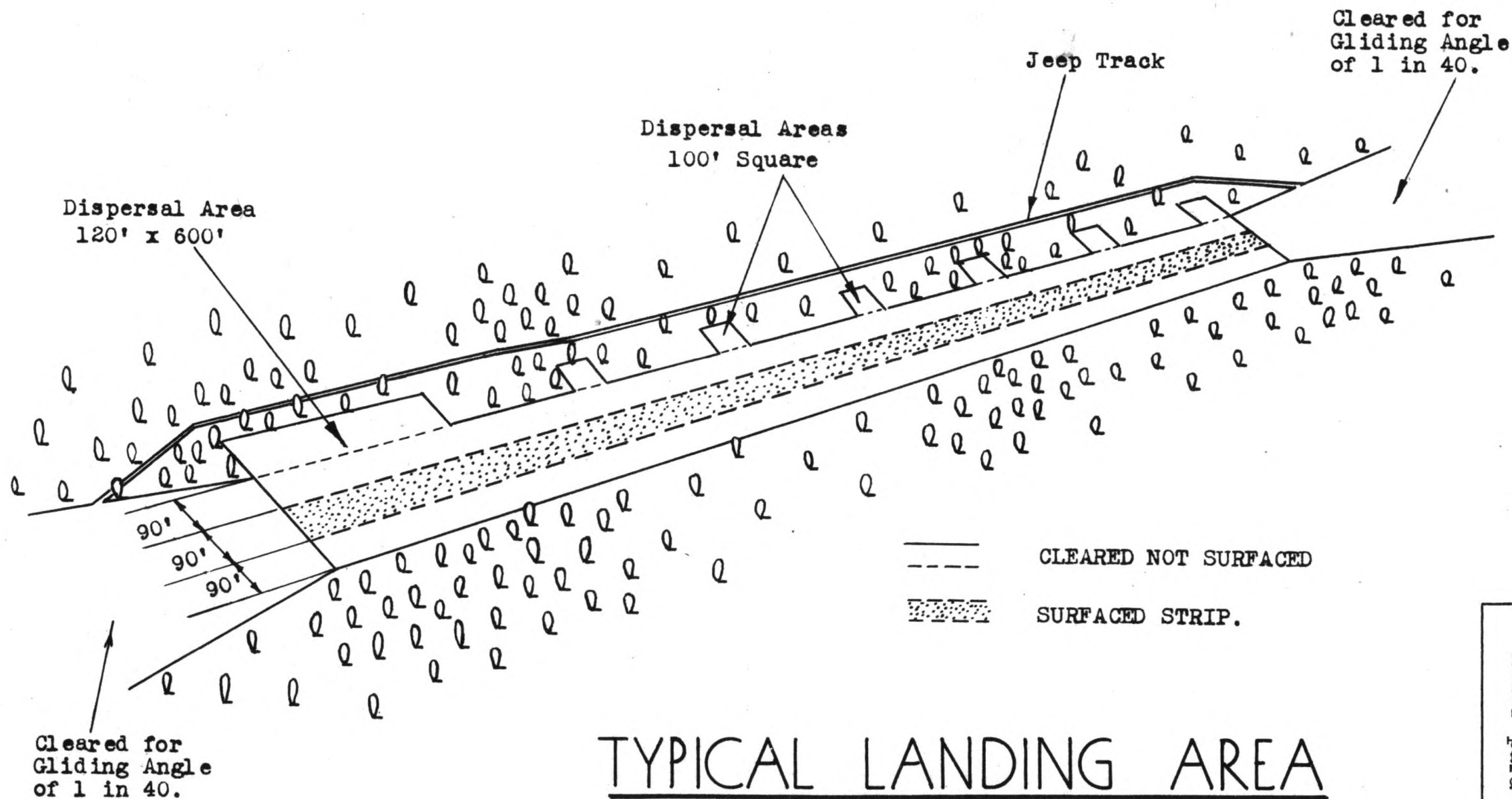
DUMPU AREA

FIELD WORKS - NEW GUINEA - JAPANESE

ROADS AND TRACKS - MINIMUM REQUIREMENTS - NEW GUINEA

APPX D 4
Refer para 128

ROADS - ASSUMED TRAFFICABLE SURFACE				MOUNTAIN TRACKS			
Vehicle	Target figures for good performance of MT Tptrs		Loaded JEEPS	JEEP towing A/Tk gun or ½ ton trailer	CARRIERS	QUAD towing 25-pdr gun with limber	Loaded 3-ton Lorry FWD
Max grade for short slope (say 10 yds)	1 in 9	1 in 20	1 in 3	1 in 5	1 in 4	1 in 5	1 in 7
Max ruling gradient for long climb (say 2000 yds)	1 in 20	1 in 30	1 in 5	1 in 10	1 in 10	1 in 7	1 in 15
Max cross grade for safety from overturning or slipping	1 in 20	1 in 20	1 in 6	1 in 6	1 in 4	1 in 5	1 in 8
Min outside radius of turning circle	35'	45'	17½'	12'	10'	28'	
Width of track on this curve	-	-	5'6"	6'	-	12'	
Normal width of track	-	-	4'7"	5'	6'	9'	
Total weight	-	-	27 cwt	55 cwt (42 cwt jeep & Tlr	3½ tons	8 tons	6½ tons
Bridge classification	-	-	2	3	3	9	9
Length overall	-	-	11'	20'	12'	39'	
Width overall	-	-	5'4"	5'4"	6'9"		
Max outside width of tyres	-	-	4'6"	4'4"	6'0" 6'9"		
Overall height	-	-	6'0" with cover 4'4"	6'0"	5'2"		



TYPICAL LANDING AREA NEW GUINEA

AIR COMPRESSORS - PORTERAGE BY CARRIERS

PROCEDURE OF STRIPPING

APPX. E-1

Refer para 136

No	Stripping Operation	Method	Arrangement of Load	Approx Wt (Lbs)	No of Carriers
1	Compressor covers incl. top cover		3 lgths hose placed in top cover	80	2
2	Small parts : Carburettor exhaust manf. Magneto, Fuel and Pressure Lines, Pressure Gauge		Wrap and pack in separate bag: Carburettor Fuel Pump Assembly, Magneto, Spark Plugs, Pressure Gauges.	40	1
3	Engine Radiator and Water Pump	Remove fan and all other small parts other than listed above.	Wrap Radiator in packing.	80	2
			Place small parts in dished side cover plate with flat cover plate acting as top.	100	2
4	Petrol Tank	Fill with 4 gals pet. for starting and cleaning.	Protect protruding parts with sacking.	100	2
		Engine oil also to be carried.	Carry in can.	50	1
5	Pressure Receiver		Safety Valve must be protected.	100	2
6	Intercooler and Fan		Fan placed in second side tray. Sacking must be wrapped around core of Cooler.	100	2
7	Air Intake Ducts		Carried as stripped.	80	2
8	Compressor Block	Remove sump and release big end bearing	Cylinder and piston con rod assembly placed in bag.	80	2
		RH LP cylinder	" "	80	2
		Remove cylinder.	" "	80	2
		Remove LH cylinder.	" "	80	2
		Remove HP cylinder.			
		Remove crank case from engine block and replace sump plate.	Carry as it stands.	180	8
9	Engine Block	Using bars, roll engine over so as to rest upside down between wheel and chassis frame.	Pistons wrapped in bag and placed in second side tray.	80	2
		Remove sump, release big end bearings and remove pistons.			
		Timing			
		Remove starting handle, dog etc. and timing gear housing. All turning gears must now be clearly marked.			
		Release magneto drive shaft.	Carried in second dished cover.		
		Release main bearings and remove fly-wheel and crankshaft.	Wrap with packing.	120	3
		Replace sump cover.	Engine Block ready for carrying.	200	8
10	Chassis	Remove spring hanger bolts and lift Chassis off trailer.	Carried as stripped.	180	8
TOTAL Weight and Carriers				1730	51

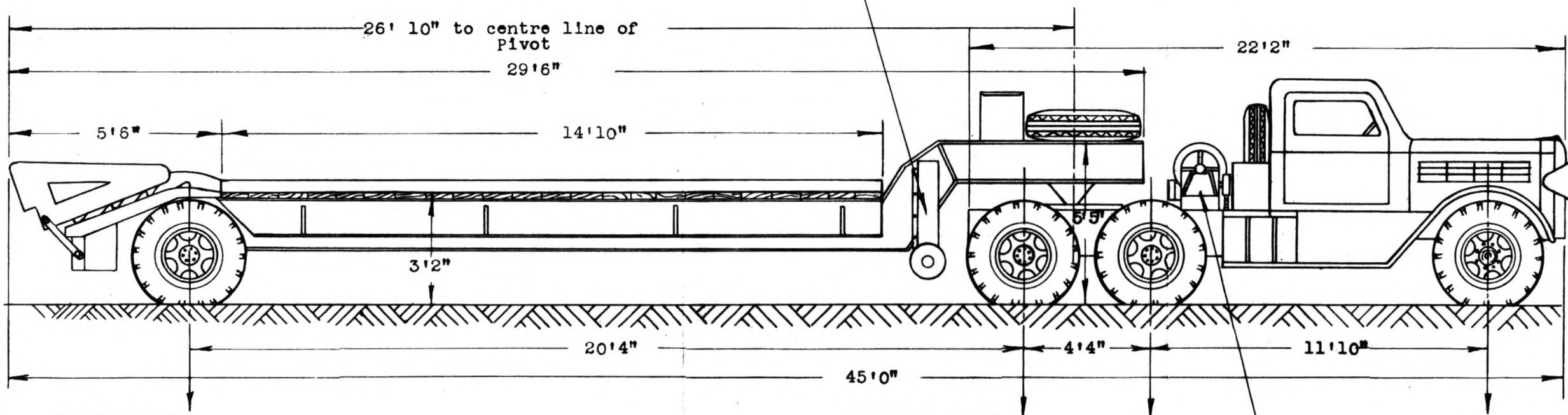
Note

Tyre size for tractor
and trailer 10.00 x 20

Jack is used for purpose of supporting load
so as to allow disconnection of tractor.

APPX E 2

Refer para 139



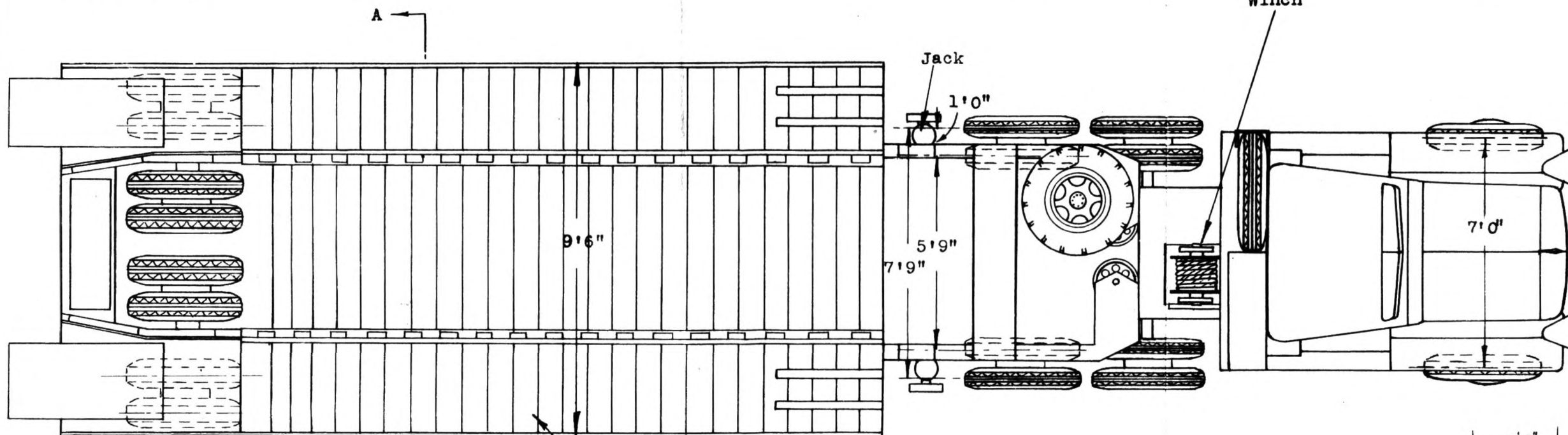
TRAILER AXLE

Unloaded 3.9T
Loaded 16.6T

TRACTOR AXLES.

Unloaded	3.8T	3.9T	3.9T
Loaded	7.45T	7.55T	3.9T

Winch



TOTAL WEIGHT OF TRACTOR

Unloaded : : : 11.6T
Loaded : : : 18.9T

TOTAL WEIGHT OF TRAILER

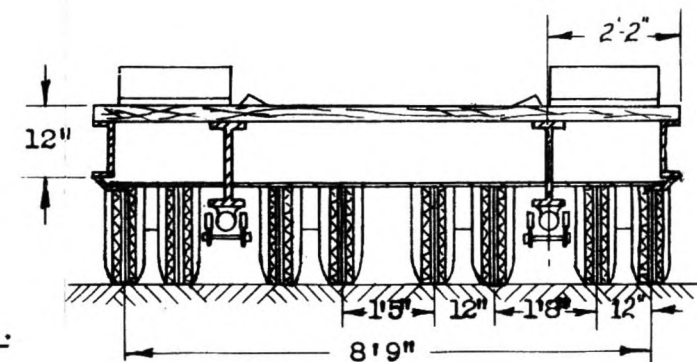
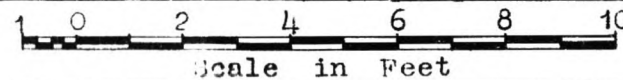
Unloaded : : : 3.9T
Loaded : : : 16.9T

TOTAL WEIGHT OF TRAIN

Unloaded : : : 15.5T
Loaded : : : 35.5T

20 TON CAPACITY.

FEDERAL TANK TRANSPORTER DIESEL MODEL 604 AND SEMI - TRAILER.



SECTION AT AA

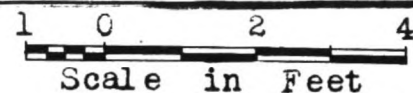
Scale in Feet



1 0 2 4
Scale in Inches

In practice D2 tractor had difficulty in turning and in later rollers, centre 2' section was omitted, making the roller 8' wide.

Cored with 4" pipe sleeve
to allow turning on shaft.



Technical drawing of a structure, likely a small building or shed, showing dimensions and components. The structure has a gabled roof and a base divided into three sections. Dimensions are given in feet and inches.

Labels and dimensions include:

- 4" x 4" x $\frac{3}{8}$ " L's.
- 2-6" x 1" dia bolts.
- 2- $\frac{3}{4}$ " dia bolts
- 8" x $\frac{1}{2}$ " Scraper.
- 4" x 4" x $\frac{3}{8}$ " L's.
- 4'0" (width of each side section)
- 2'0" (width of the central section)
- 10'0" (total width)
- 4'0" (total width)

Refer para 14

APPX E 2

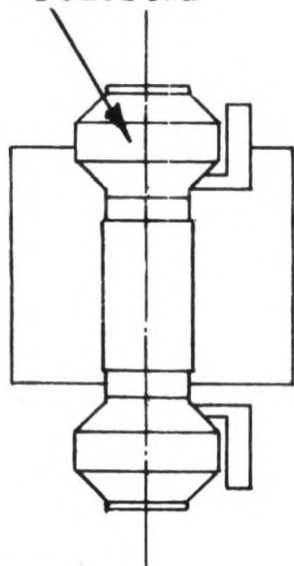
SOURCE: C.E. ^{N.G.}FORCE

APPX E 3
Refer para 1411

Front of Vehicle
6' 10"

5 K.V.A. P.E.
Generating Set

Grinder Picks
Pedestal

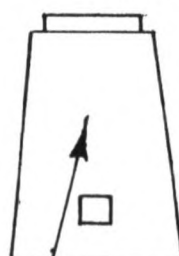


Anvil
1½-Cwt



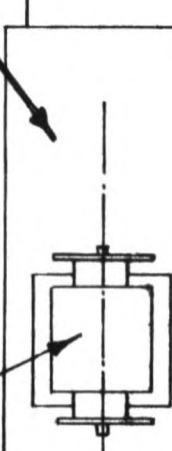
Tyre Box
&
Cupboard

Bench &
Cupboard

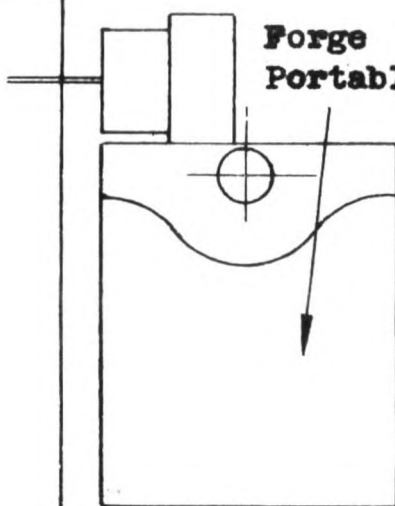


Anvil
Block

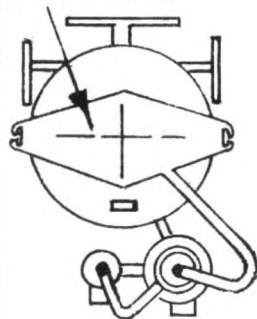
Machine
Grinding &
Polishing
8" x 1"



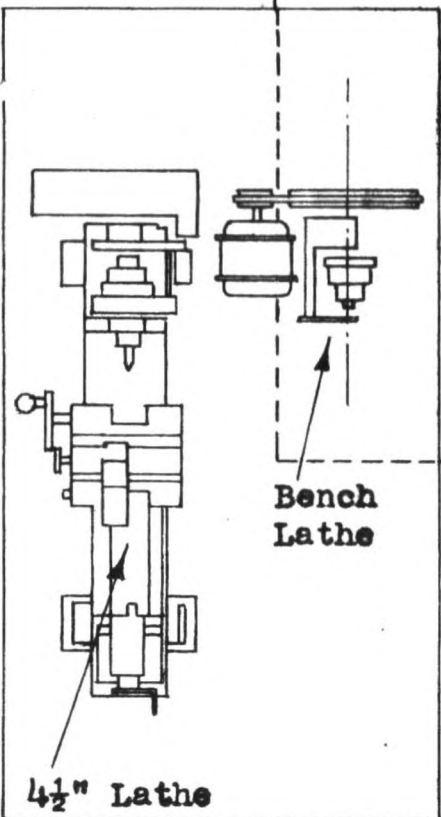
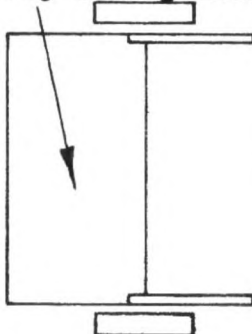
Forge
Portable



Generator
Acet Gas

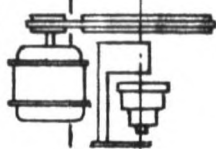


Trolley &
Cylinder
Oxy-Acetylene



4½" Lathe

Bench
Lathe



LORRY 3 TON G.S. 4 X 4 MACHINERY

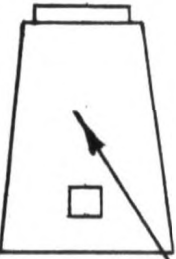
"R" LOADING

Front of Vehicle
6' 10"

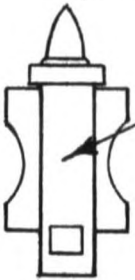
5 K.V.A. P.E. Generator
Set

Generator
Guard and
Bench H

Tyre Box & Cupboard



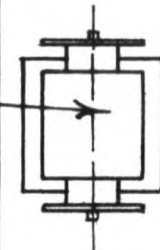
Anvil Block
1½ Cwt



Anvil
1½ Cwt

Bench
&
Cupboard

Machine
Grinding &
Polishing
8" x 1"

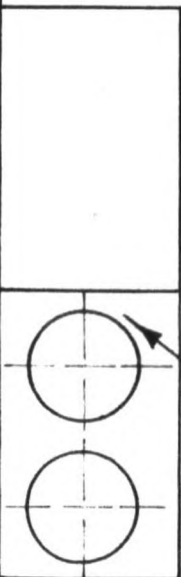


Frame
housing Oxy
& Acetylene
Bottles



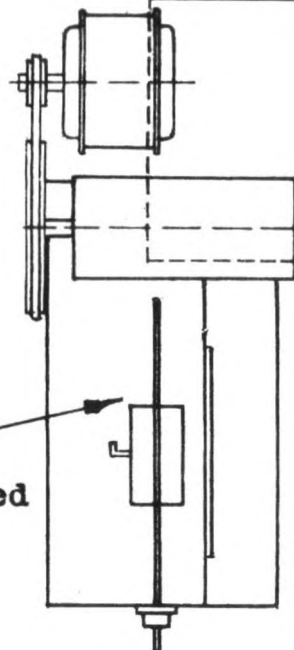
Lathe
8"
Visby

Frame
housing
Oxy &
Acetylene
Bottles



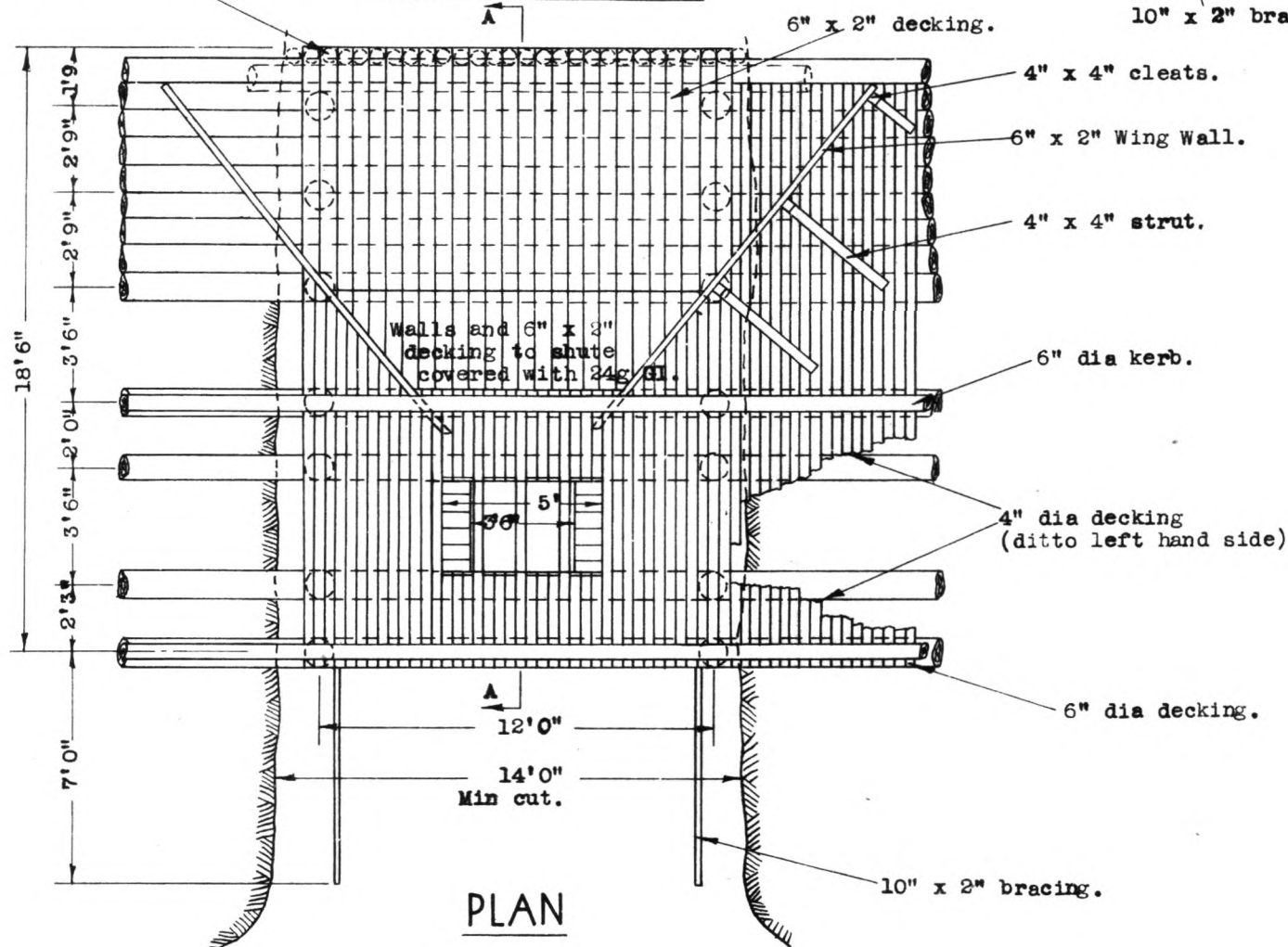
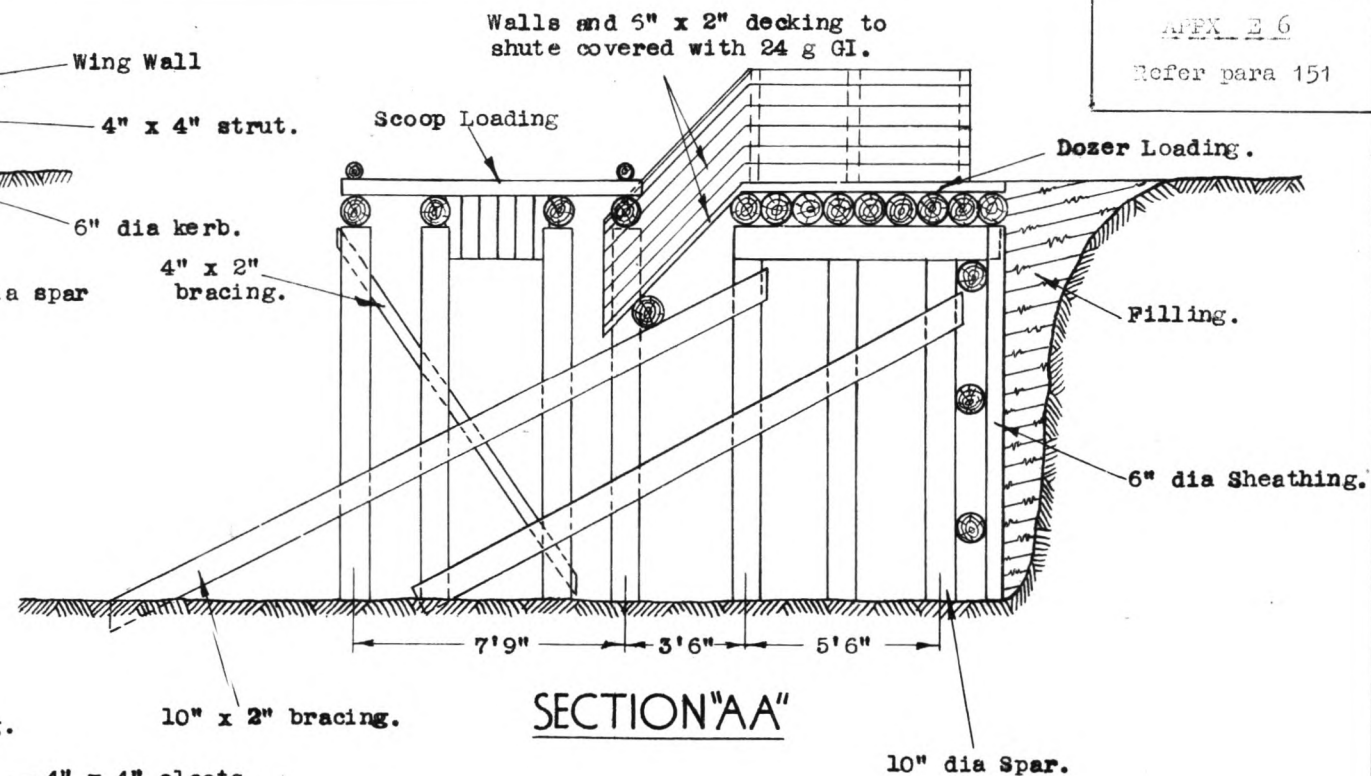
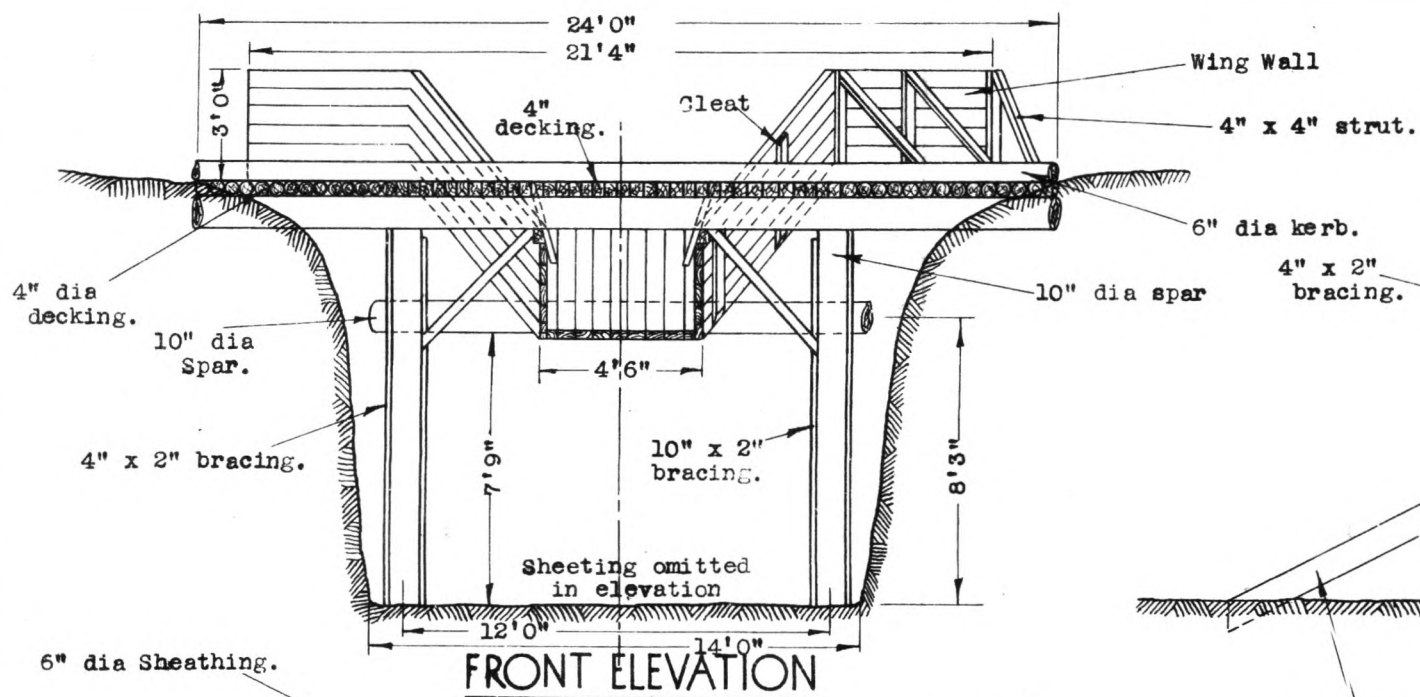
Machine
Hacksaw
6"
Motorised

Forge
Portable



LORRY 3 TON G.S. 4 X 4 MACHINERY

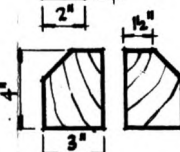
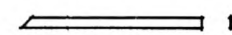
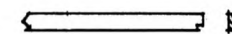
"S" LOADING



TYPE OF CHINAMAN LOADING CHUTE

1 0 2 4 6 8 10
Scale in Feet

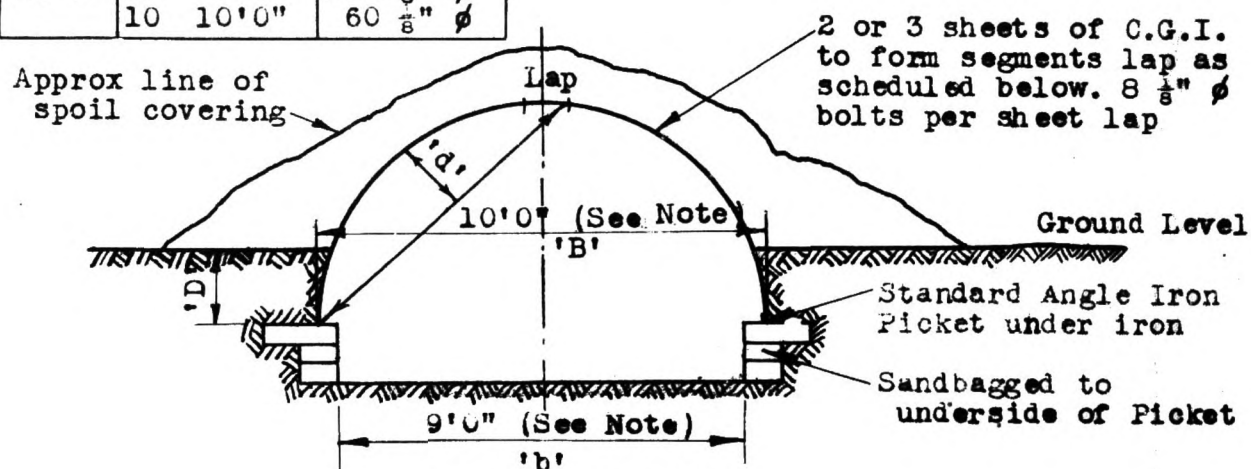
QUANTITIES OF MATERIAL REQUIRED FOR ONE TIMBER, G.I. LINED 95,000 GALLON TANK.

ITEM NO	ITEM	QUANTITY	ITEM NO	ITEM	DETAIL	QUANTITY
1	CEMENT	18 tons	14	BITUMEN		20 gals
2	AGGREGATE, $\frac{3}{4}$ " METAL	65 c.yds	15	OAKUM		1 lb
3	SAND	33 c.yds	16	TIE WIRE, 18 g.		$\frac{1}{2}$ coil
4	REINFT, $\frac{1}{2}$ " ϕ , for slab	9,000 lin.ft	17	TIMBER		
5	BOLTS		(i)	3" Splay		16/ 10' 6" 168 lin ft
	(i) 1" ϕ hooked eyebolts	16 off (230 lin.ft)	(ii)	4" x 1" T & G		570/ 8' 3" 4720 lin ft
	(ii) 1" ϕ hooked bolts	32 off	(iii)	3" x 2" splay (for apron clouts)		32/ 1' 6" 50 lin ft
	(iii) $\frac{3}{4}$ " ϕ tie rods	32 off (528 lin.ft)	(iv)	4" x 3" plates (bolted to angle uprights)		16/ 8' 0" 128 lin ft
	(iv) $\frac{1}{2}$ " ϕ hooked bolts	32 off (150 lin.ft)				
	(v) $\frac{1}{2}$ " ϕ bolts	80 off	(v)	4" x 3" plates (bolted to intermed up-rights)		16/ 8' 0" 128 lin ft
6	NUTS		(vi)	4" x 3" wall joists		96/ 10' 960 lin ft
	(i) 1" ϕ Hex Whit.	32	(vii)	4" x 4" stakes		32/ 3' 0" 96 lin ft
	(ii) $\frac{1}{2}$ " ϕ " "	32	(viii)	6" x 4" bottom plates		16/ 10' 0" 160 lin ft
	(iii) $\frac{1}{2}$ " ϕ " "	192	(ix)	8" x 3" top plates		16/ 10' 6" 168 lin ft
7	KEEPER RINGS, $\frac{1}{2}$ " ϕ , for tie rods	32	(x)	8" x 3" angle up-rights		16/ 8' 0" 128 lin ft
8	WASHERS, $\frac{1}{2}$ " ϕ	160	(xi)	8" x 3" intermed uprights		16/ 8' 0" 128 lin ft
9	WASHER PLATES		(xii)	8" x 4" centre up-rights to each section		16/ 8' 0" 128 lin ft
	(i) 6" x 2" x $\frac{1}{4}$ " with 1" ϕ hole)	16	(xiii)	8" x 1" formwork to base		8/ 20' 0" 160 lin ft
	(ii) 6" x 2" x $\frac{1}{4}$ " with $\frac{3}{4}$ " ϕ hole)	16				
	(iii) 4" x 2" x $\frac{1}{4}$ " with 1" ϕ hole) (40 lin ft.	16				
	(iv) 4" x 2" x $\frac{1}{4}$ " with $\frac{3}{4}$ " ϕ hole) 2" x $\frac{1}{4}$ " M.S.	16				
	(v) 4" x 2" x $\frac{1}{4}$ " with $\frac{1}{2}$ " ϕ hole) flat)	32				
10	GALV. IRON, 6' x 3' x 24 g., flat	95 sheets				
11	SPIRITS OF SALTS	1/3 gal.				
12	SOLDER	56 lbs.				
13	NAILS					
	(i) 2" x 10 g., diamond head	80 lbs.				
	(ii) 4" x 8 g., diamond head	30 lbs.				
	(iii) $\frac{3}{4}$ " flathead clouts	56 lbs.				
	(iv) 6" x 6 g., diamond head	35 lbs.				

MATERIAL REQUIREMENTS

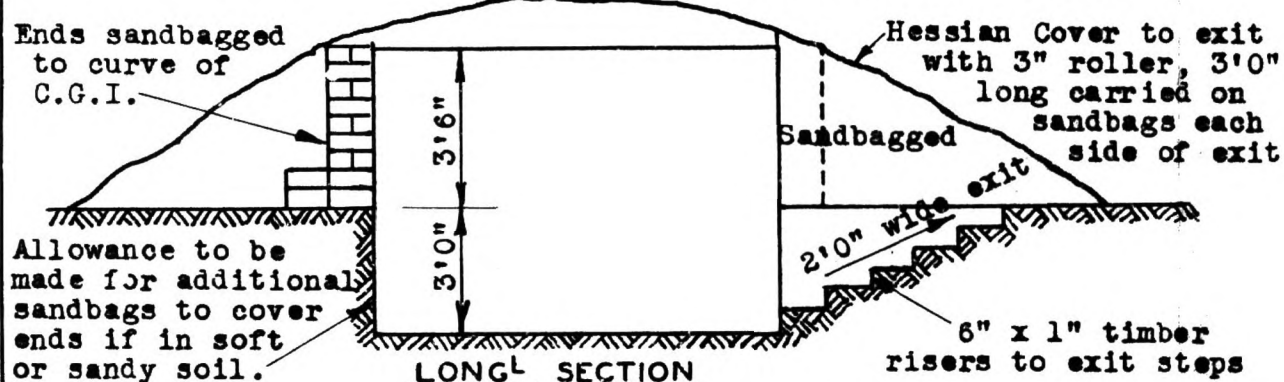
'B' diam segt	Total No & size shts in unit	Total No bolts in unit
10'0"	15 6'0"	100 $\frac{1}{8}$ " ϕ
	10 8'0"	60 $\frac{1}{8}$ " ϕ
11'0"	15 7'0"	100 $\frac{1}{8}$ " ϕ
	10 9'0"	60 $\frac{1}{8}$ " ϕ
12'0"	15 7'0"	100 $\frac{1}{8}$ " ϕ
	10 10'0"	60 $\frac{1}{8}$ " ϕ

G.C.I. & bolts according to size and number of sheets per segt - see opp.
 20 dozen Sandbags
 6 pieces of 6" x 1" timber x 2'0" long
 2 dozen small pegs
 9 ft of 3' wide hessian
 1 3" ϕ roller 3'0" long for exit cover



CROSS SECTION

Cross Section for plan area 9' x 9'. For variations in sizes and numbers of sheets, also variations in dimensions 'b', 'B', 'd' & 'D' see Schedule below.



Long section similar for 10', 11' & 12' C.G.I.

'B' diam segt	No shts per segt	Length of shts	Length of lap	'D'	'd'	'b'
10'0"	3	6'0"	1'3"	1'4 1/2"	10 1/2"	9'0"
	2	8'0"	1'6"	11"	1'6 1/2"	9'0"
11'0"	3	7'0"	1'10"	2'0"	1'1"	10'0"
	2	9'0"	1'9"	1'6"	1'9 1/2"	10'0"
12'0"	3	7'0"	1'7"	2'0"	11 1/2"	11'0"
	2	10'0"	2'2"	2'0"	1'10 1/2"	11'0"

Refer dimensions in above schedule to cross section

NOTES ON SMALL H.Q.

24g G.C.I. to be used throughout. Sheets curved to diam of dimension 'B', see schedule this sheet. Sheet laps as in schedule - bolted with 8 1/8" ϕ bolts per lap. Segts to side lap one corr. 4 1/8" ϕ bolts per side lap. Curving of alternate segts to be reversed so as to avoid lapping over and under. Sandbags to be packed firmly against end segts of G.C.I. to avoid leakage of covering soil. The amount of spoil from excavation approx equals volume of spoil in covering. This allows for one-third bulking of soil on excavation.

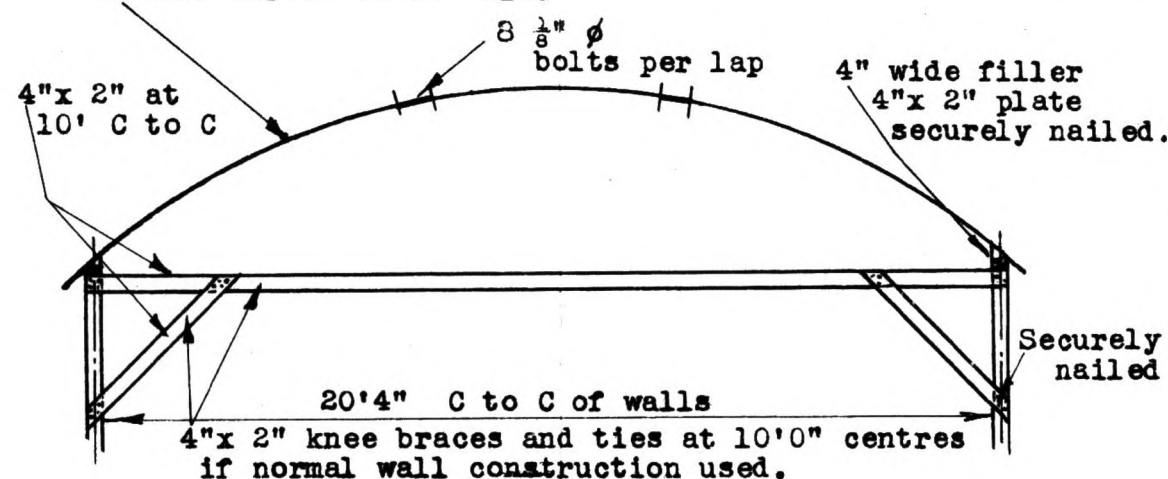
Time of Erection - 50 man hrs.

SMALL HEADQUARTERS

APPX F 5

Refer para 157

Section shows
 2/10' and 1/6' sheets of
 G.C.I. per segt lapped 16 1/2".
 G.C.I. curved to 32' dia.

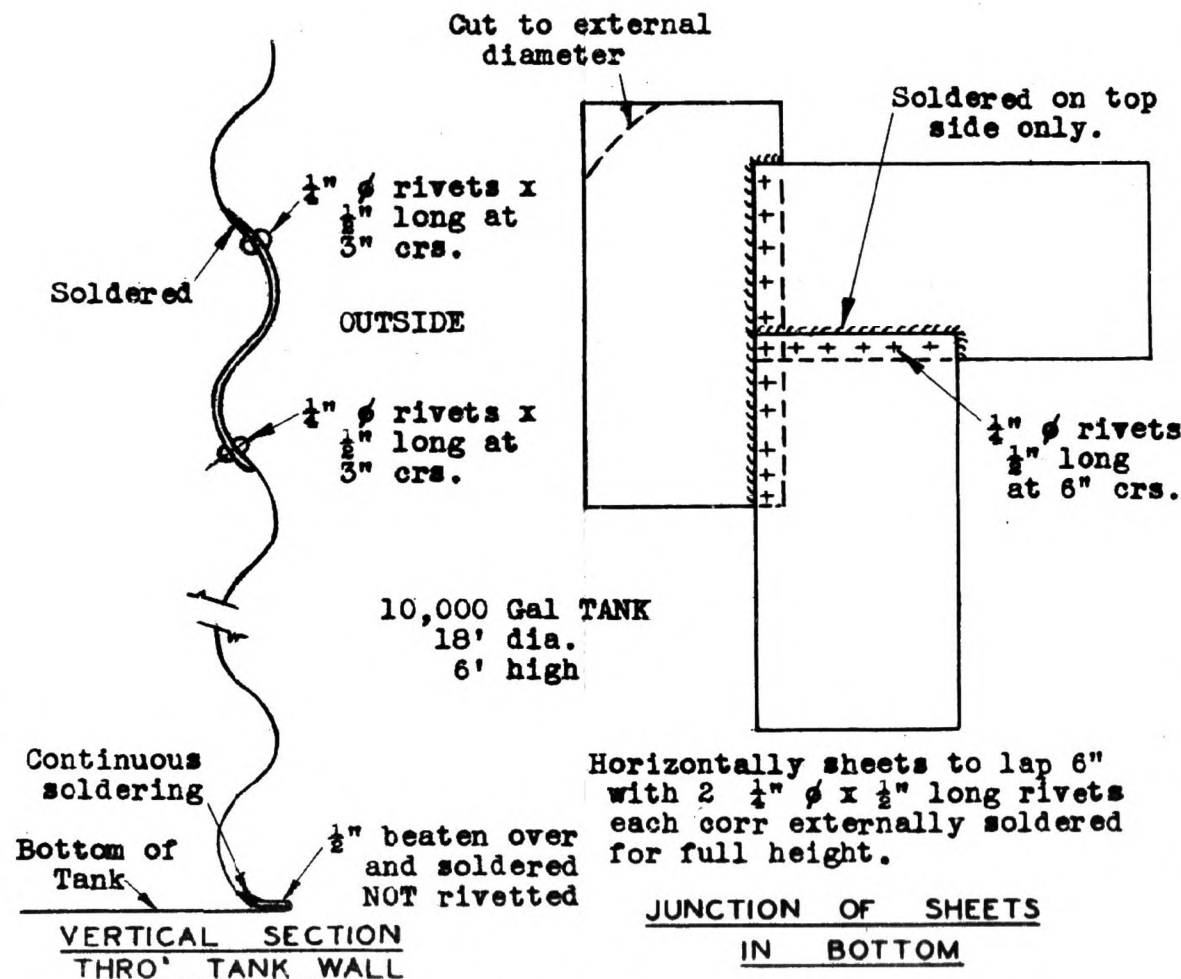


CROSS SECTION

NOTES ON HUT CONSTRUCTION.

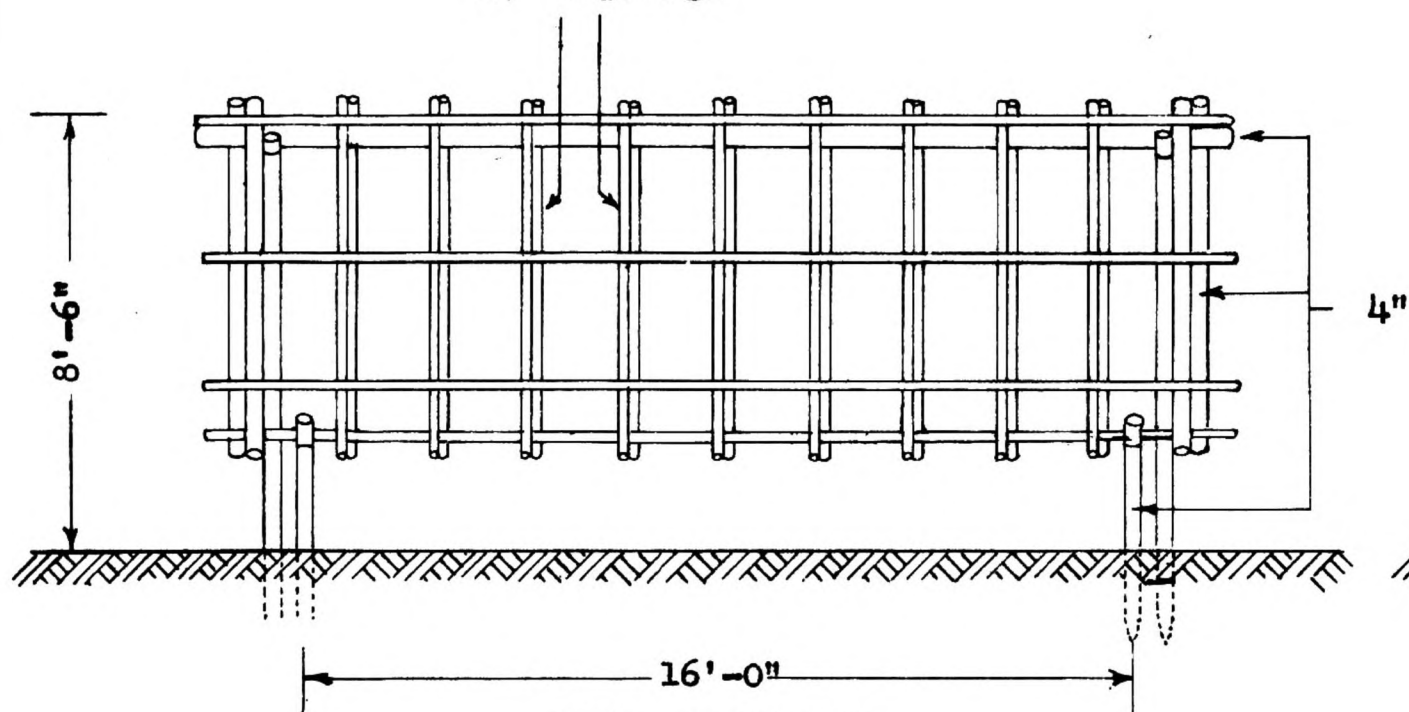
G.C.I. Iron curved to dia of 32'0". 24g or 26g may be used, preferably 24g. Sheet laps in segment bolted with 8 1/8" ϕ bolts. Curving of segments to be reversed, (alternate) as shown in note for Small H.Q.'s. Segts to side lap two corrugations 5 1/8" ϕ bolts per side lap. G.C.I. to be nailed every corr at wall plate. If different sized sheets are used to form segment from sizes shown in detail, min sheet lap should be in vicinity of 1'6".

HUT CONSTRUCTION

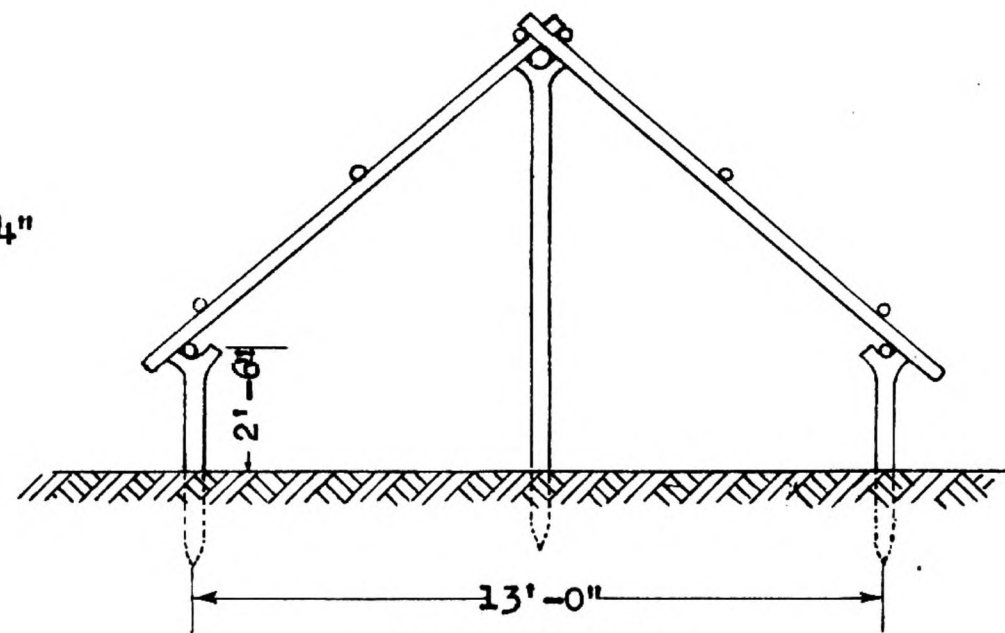


G.I. WATER TANK CONSTRUCTION

1 1/2" Saplings



SIDE ELEVATION



END ELEVATION

CONSTRUCTION : 4" - 2" Saplings lashed with Lawyer or Equivalent

ORGANISATION OF WORK (Native Labour)

Task	R.A.E.	Natives	Tools Required
Frame		5	Machettes 1
Thatch		4	" 2
TOTAL		9	3

NATIVE HUT CONSTRUCTION

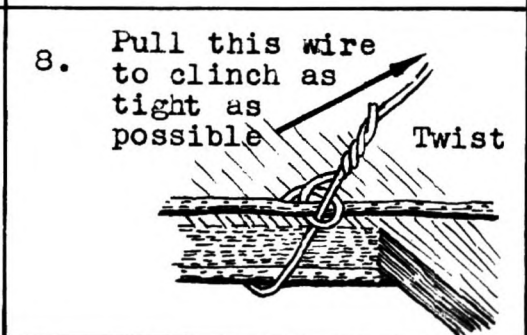
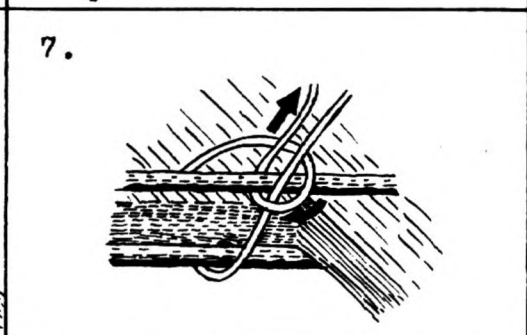
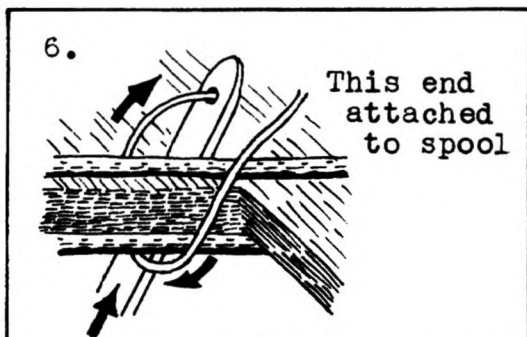
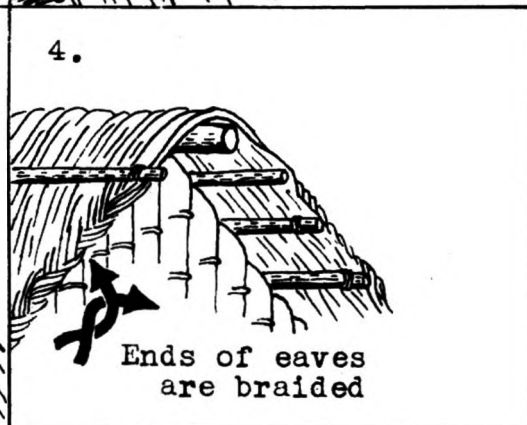
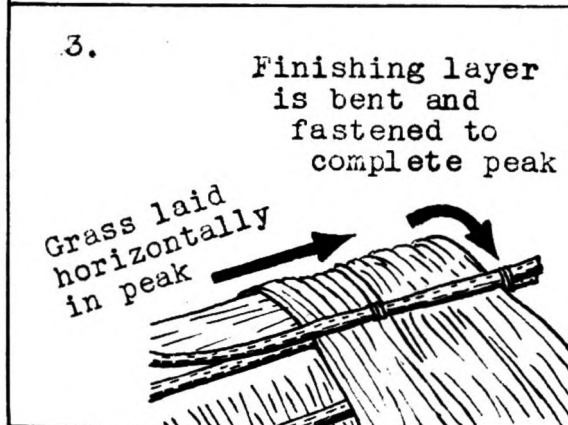
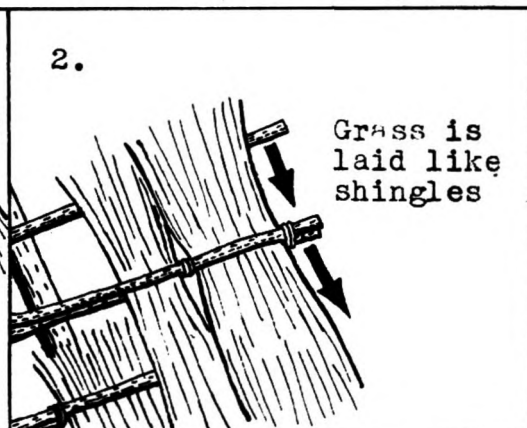
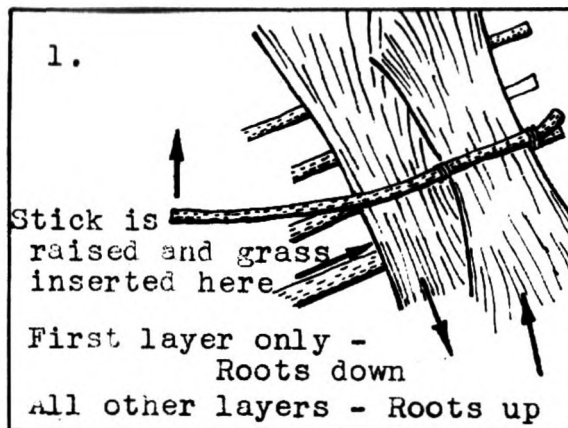
NORMAL OUTPUT

One Hut per 9
Natives in
4 - 6 hours.

1 0 2 4 6
Scale in Feet

Refer para 166

APPX G 1



(a) Materials

- (i) Best material to use is 3' long swamp grass tied into convenient bundles.
- (ii) Grass should NOT be laid wet.

(b) Method

- (i) Natives, if possible should be hired to do the first job and their technique observed.
- (ii) Roof is prepared for thatching by nailing small pliable sticks or purlins parallel to ridge pole at 6" to 8" centres over whole roof area.
- (iii) Thatching is started from lower corner of roof - the first layer of grass being put on with roots downwards.
- (iv) Next layer is laid directly over the first with grass reversed, i.e. tops down, roots up.
- (v) Successive courses are laid overlapping similarly.
- (vi) As each section or course of thatch progresses, branches are laid as shown on diagrams.
- (vii) Courses are clinched with wire at 18" intervals, the wire 'sewing' being done by man standing beneath the roof using a long pole flattened at one end with an eye in it, as a needle.
- (viii) Stick is pushed up through thatch, where man on top threads eye with wire. Pole is then withdrawn and poked through on other side of rafter and knot tied.
- (ix) Apex of roof is completed with thatch laid horizontally, and finished with grass bent over as ridging and clinched both sides as before.

(c) Durability

If properly executed grass thatching is durable and waterproof for years.

THATCHING

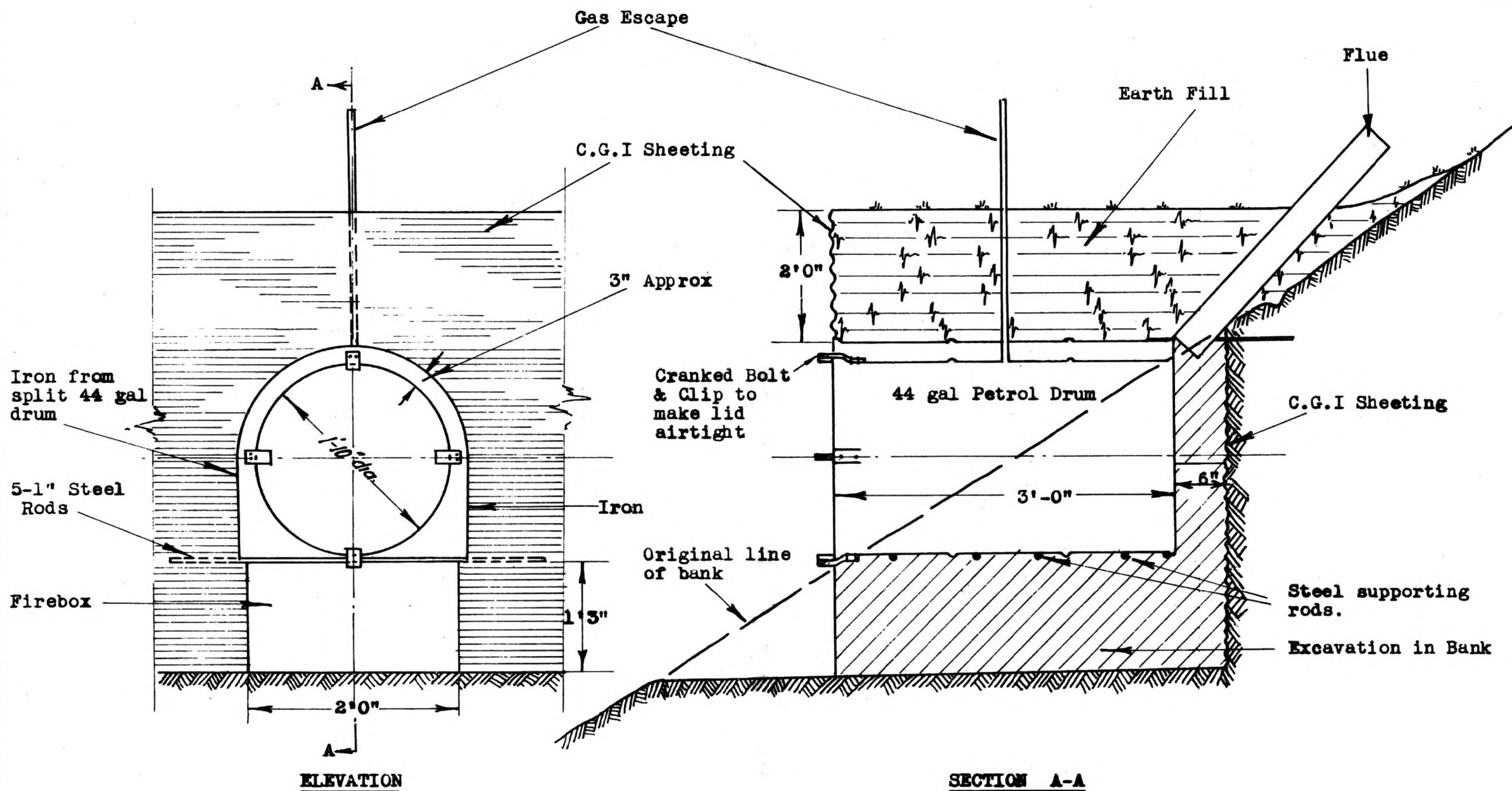


A removable basket framed in $\frac{3}{8}$ " dia M.S. rod with 10g x $1\frac{1}{2}$ " mesh crimped wire. The lid is $\frac{1}{8}$ " thick M.S. with handle.



No exact tests have been made but an average figure would be 8 c.ft of wet and dry refuse per 4 hrs. One incinerator will handle refuse of an Infantry Coy.

SOURCE:- CE 3 Aust Corps



BURNING DATA

1. Weight of wood per charge.....	1 cwt.	6. Labour, burning, procuring wood--2 men continuously	
2. Weight of wood for burning each charge	3 cwt.	7. Time of burning.....	5 hrs.
3. Weight of charcoal produced	1 ½ cwt.	8. Time of calling.....	2 hrs.
4. Weight of charcoal recovered from fire	½ cwt.	9. Time of procuring	2 hrs.
5. Total charcoal recovered	¾ cwt.	10. Two burnings/day (0800-1700 hrs). Total output/day	1 ½ cwt.

CHARCOAL BURNER

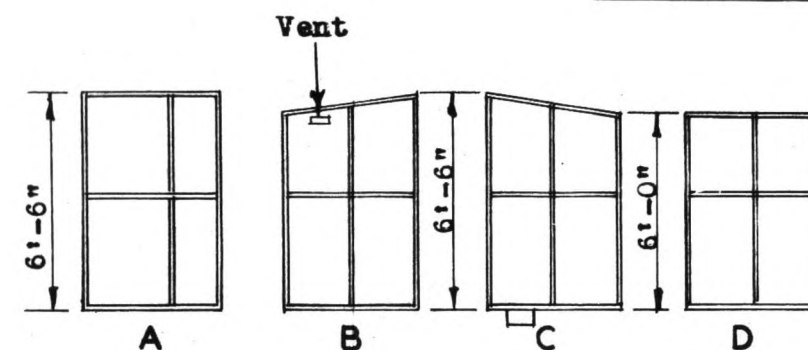
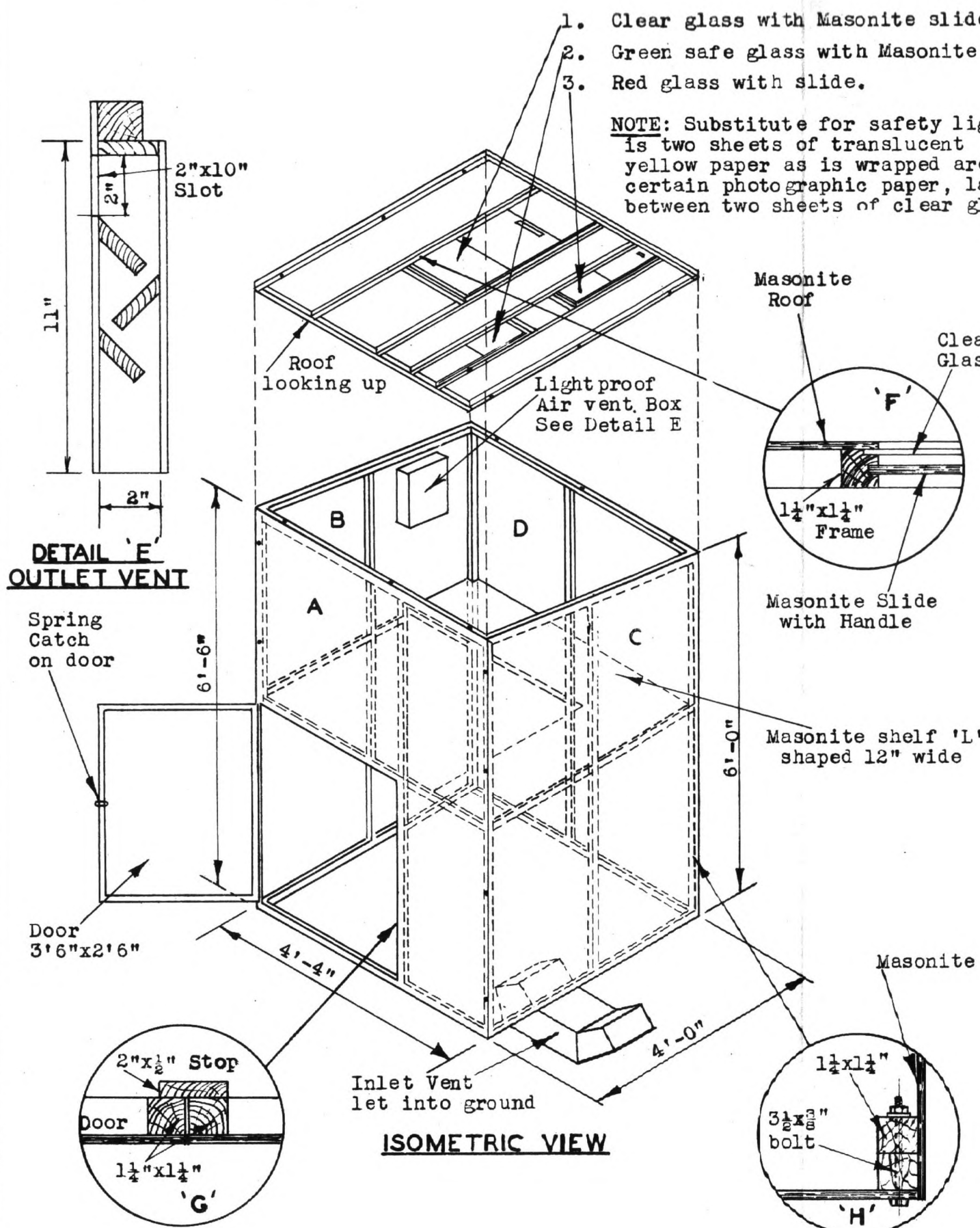


DIAGRAM OF WALLS

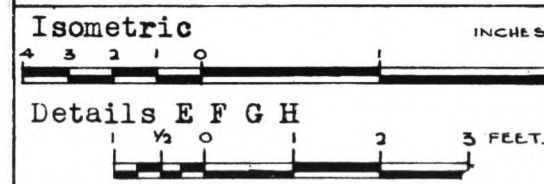
CONSTRUCTION

1. 1 1/2" x 1 1/2" timber framed panels as indicated, sheeted with Masonite and bolted together.
2. Glue or putty should be used between Masonite and timber to ensure light proof joint.
3. Ventilation. Outlet vent to be as indicated. Inlet ventilation obtained by setting metal vent at an angle of 45° beneath opposite wall.
4. Shelf is 'L' shaped, 12" wide laid on wall framing.

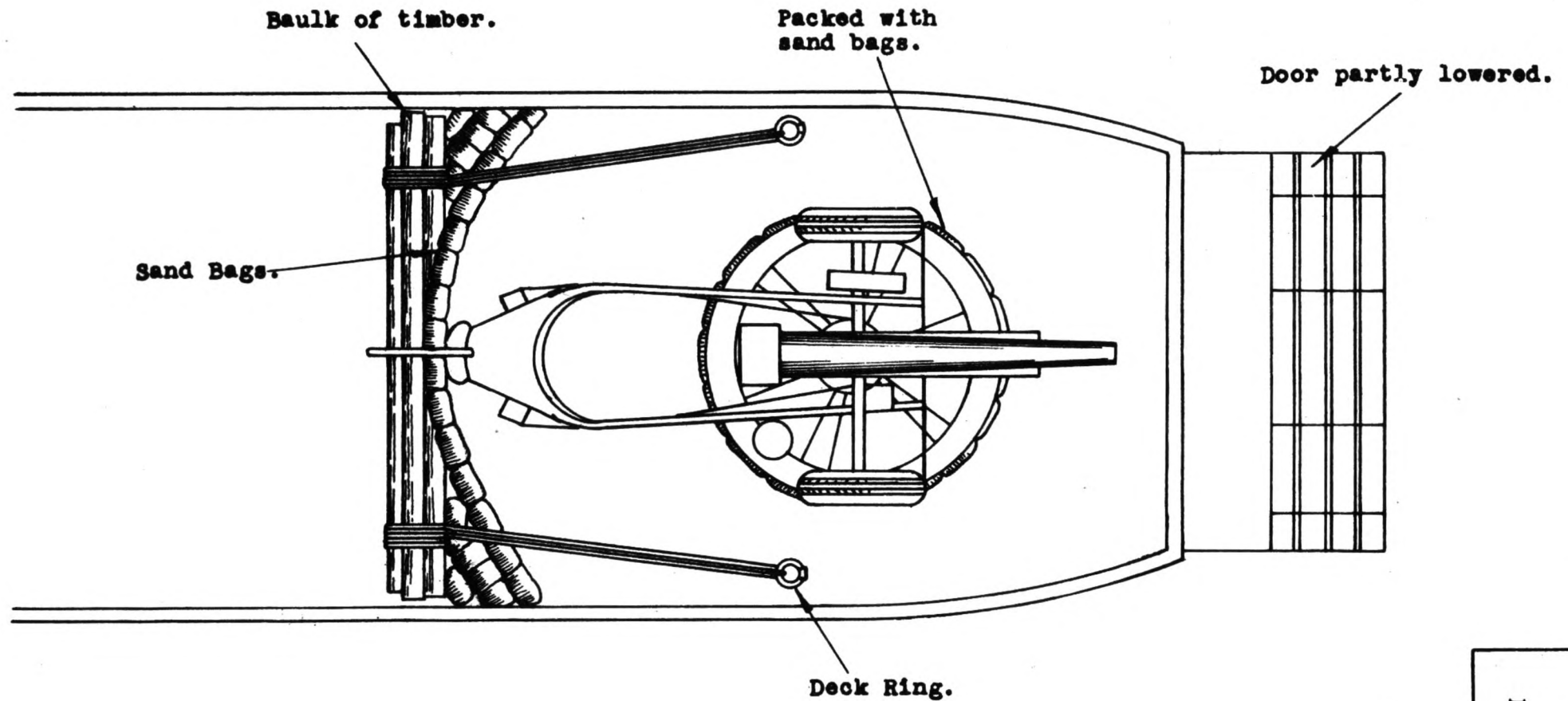
SCHEDULE OF MATERIALS

I T E M	PARTICULARS	No REQD
Timber	1 1/2"x1 1/2"x6'6" lengths	12
	1 1/2"x1 1/2"x4'6" lengths	18
	2" x 2" x 16'0"	1
Masonite	6'6" x 4'0" sheets	5
Bolts	3/8" x 3/8"	28
Nuts & Washers	3/8"	28
Nails	1 1/2"	1-lb
	1"	1/2-lb
Glass	21-oz clear	12" x 12"
	red	6" x 6"
	safety	4" x 4"
	2"	1-pr
Hinges		1
Catch	Spring	1

SCALES



COLLAPSIBLE FIELD PHOTOGRAPHIC DARK ROOM



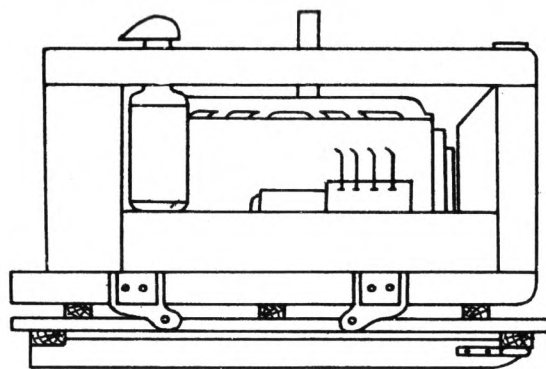
AUSTRALIAN LANDING CRAFT MOTOR 44 FT.

With 25 Pdr MK II Loaded for firing
Allowing 50° Traverse.

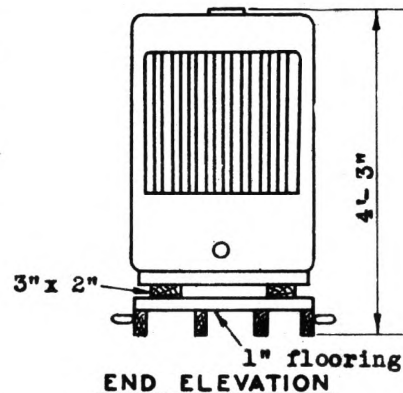
Diagrammatic Sketch only.

Source: 4 Aust Pd Bty RAA.

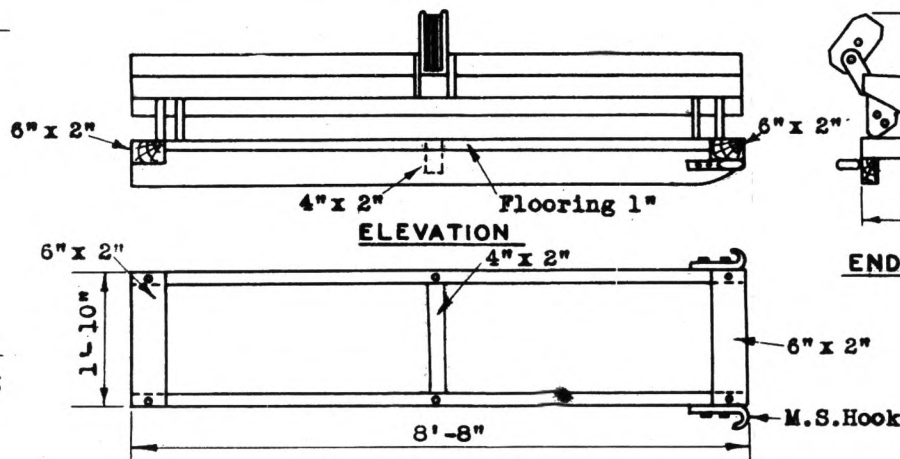
APPX I 2
Refer para 165



ELEVATION

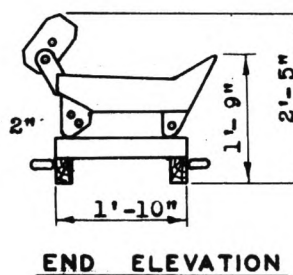


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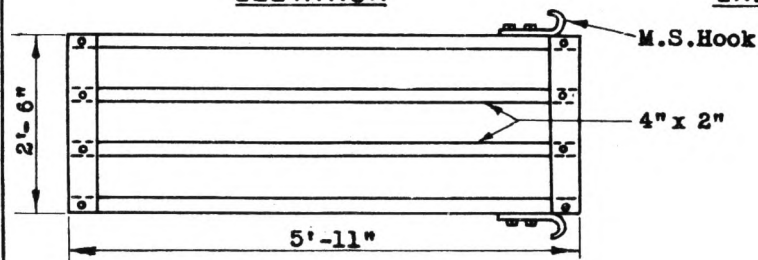


PLAN OF SLEDGE

BLADE SECTION

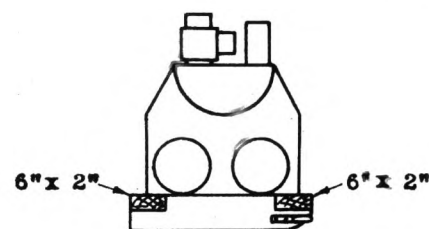


END ELEVATION



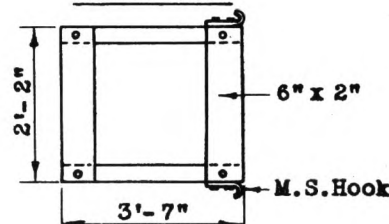
PLAN OF SLEDGE

ENGINE SECTION



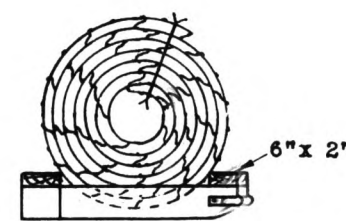
ELEVATION

END ELEVATION

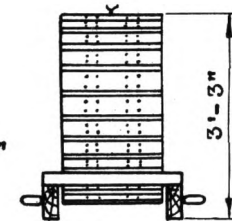


PLAN OF SLEDGE

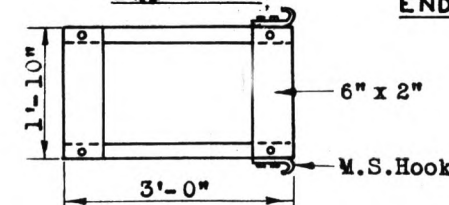
POWER TAKE-OFF SECTION



ELEVATION

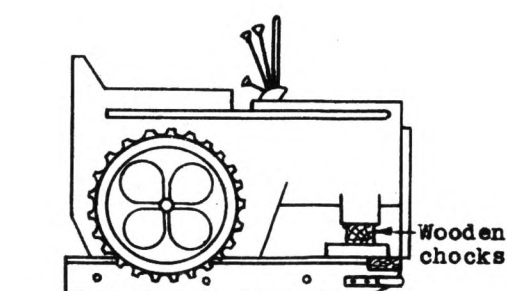


END ELEVATION

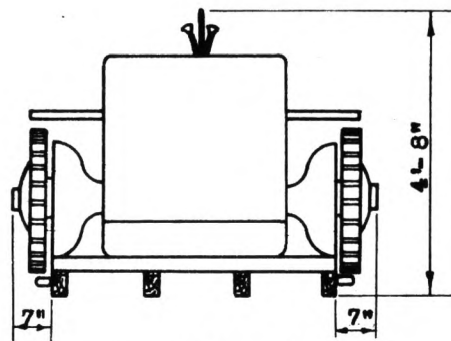


PLAN OF SLEDGE

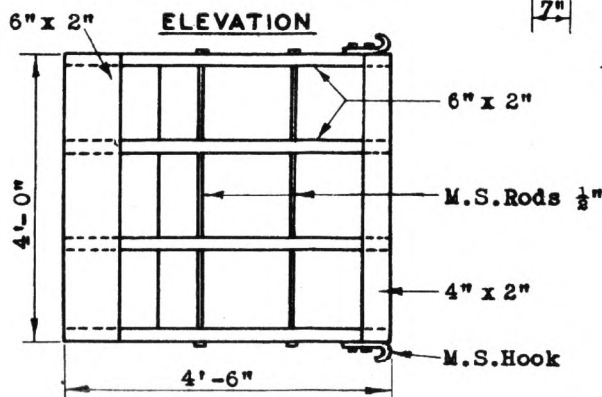
TRACKS SECTION



ELEVATION



END ELEVATION

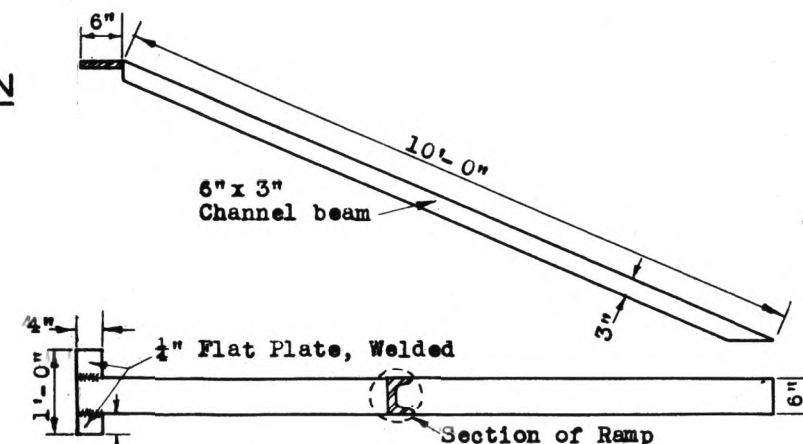


PLAN OF SLEDGE

GEARS ETC. SECTION

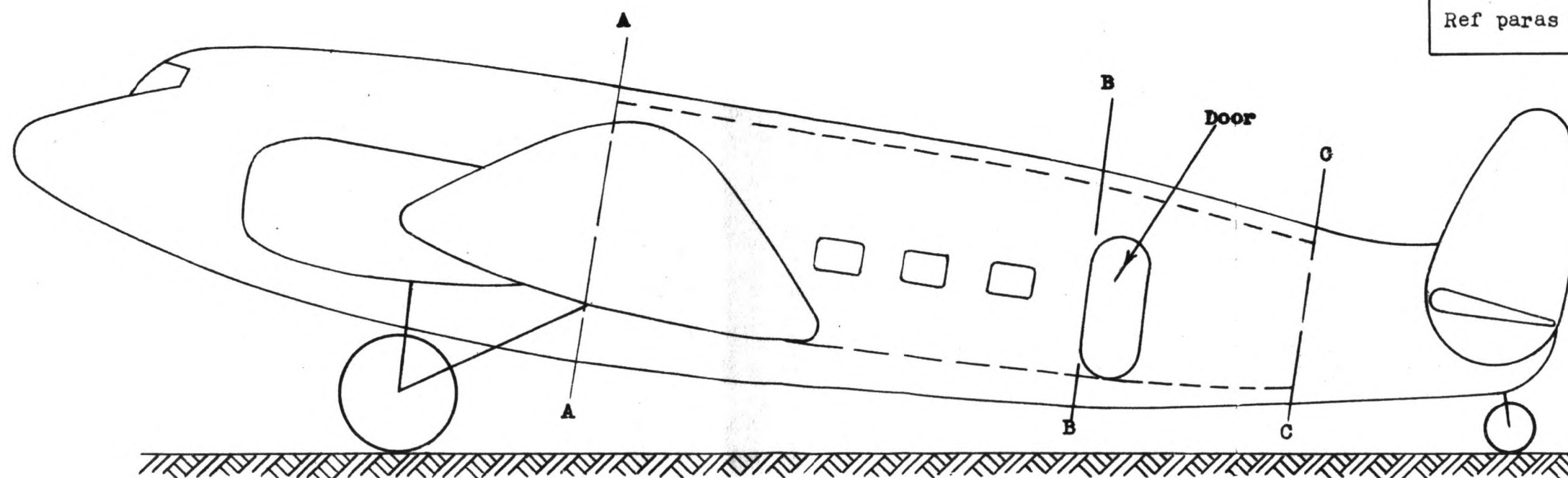
DISTRIBUTION OF PARTS OF BULLDOZER FOR

PLANE TRANSPORT (D2, D4 & CLETRAC to 35 H.P.)



STEEL RAMP

FOR USE WITH ALL PARTS ON THIS SHEET



Serial No	TYPE	Army Classification (American)	Load Capacity Lbs	CARGO SPACE - APPROX DIMENSIONS								
				Length	Section A-A		Section B-B		Section C-C		Door	
					Height	Width	Height	Width	Height	Width	Height	Width
1	DOUGLAS DC3	C47	5000	30'0"	6'6"	6'8"	6'5"	6'7"	5'3"	6'0"	5'0"	7'0"
2	DOUGLAS DC3	C49 C50 C53	4500 5000 5000	27'10"	6'6"	6'8"	6'5"	6'7"	5'3"	6'0"	4'5"	2'2"
3	DOUGLAS DC2	C33 C39	3000	27'6"	6'4"	5'4"	6'3"	4'9"	5'9"	4'9"	5'0"	2'3"
4	LOCKHEED	C56 C60	3500	25'0"	6'4"	5'3"	6'0"	4'6"	4'4"	3'0"	4'4"	1'11"
5	HUDSON	-	3000	15'6"	5'11"	5'3"	5'10"	4'2"	Bomber Type Planes. No Cargo space aft of door.		3'10"	2'0"
6	ANSON	-	800	6'10"	5'5"	4'3"	3'10"	3'8"			2'9"	2'6"Top 1'6"Bot.

TYPES OF TRANSPORT PLANES IN USE IN N.G.

Ⓐ CATERPILLAR D4 BULLDOZER

® D 2 TRACTORS

① H A N D O P E R A T E D G R A D E R

	Qty	Total Wt in lbs	Dimensions			Item	Qty	Total Wt in lbs	Item	Qty	Total Wt in lbs
			Length	Breadth	Depth						
Plane No 1											
Engine	1	3500	5'6"	3'3"	4'6"	Engine & Sump	1	3500	Main Frame	1	2000
Overhead frame	1	250	9'0"	7'0"	1'6"	Fuel Tank	1	100	Blade & Frame	1	400
Overhead frame	1	300	8'0"	6'3"	2'0"	Box, parts containing	1	400	Scarifier Frame	1	200
Overhead frame bar	1	50	9'6"	4"	4"	1 Air cleaner			A - Frame & Turntable	1	500
Fuel Tank	1	60	3'3"	1'8"	1'6"	2 Guards over foot brace			Front Wheels & Axle	1	300
Diesolene in 4 gal drums	14	560		1'	1'3"	1 Jockey spring and brackets			Rear Wheels	2	400
S A E 30 "	3	120		1'	1'3"	1 Instrument Board			Wheel Handle and spindle	1	50
S A E 140 "	3	120		1'	1'3"	2 Steering Levers			Wheel Handle	2	60
Petrol	1	40		1'	1'3"	1 Spring					
Grease	1	5				1 Exhaust Pipe					
		5005				1 Air breather cover					
						1 Throttle lever					
Plane No 2											
Blade	1	1600	10'	3'	1'6"	2 Brake springs					
Engine Tray	1	100	6'	2'6"	1'3"	1 Oil breather tube					
Blade Arm	1	80	5'	2'6"	6"	1 Fuel pipe					
Blade Arm	1	80	5'	2'6"	6"	2 Spring shackles					
Gear Box Diff etc	1	3000	5'6"	5'6"	4'3"	2 Rubber packings					
Seat Frame	1	40	1'9"	2'8"	2'0"	1 Tin bolts					
Side Frame	1	30	5'6"	1'8"	1'0"	Diesolene in 4 gal drums	22	880			
Side Frame	1	30	5'6"	1'2"	1'0"			4880			
Instrument Board	1	20	2'6"	2'6"	6"						
		4980				Plane No 2					
						Track Frame	2	1000	Plane No 1		
Plane No 3											
A Frame	1	500	8'	6'6"	3"	Tracks	2	1200	Tractor Engine	1	3500
Track	1	600	4'	4'	1'3"	Gear Box & Diff	1	2200	Personnel (1 fitter)		
Track	1	600	4'	4'	1'3"	Tins Oil & Petrol	5	200	(1 operator)	2	400
Track Carriers	1	900	7'6"	3'	2'3"	Fitters with tools for assembly					3900
Track Carrier	1	900	7'6"	3'	2'3"		2	400	Plane No 2		
Power Unit	1	900	5'	3'	3'			5000	Differential and Gear Box	1	2200
Draw Bar	1	50	4'9"	9"	6"	Plane No 1					
1 Box (Miscellaneous)	1	350	3'	2'4"	1'10"	Plane No 2					
1 Box (Grease gun & volume gun)	1	40	2'3"	1'6"	1'	Plane No 3					
Diesolene in 4 gal drums	4	160		1'	1'3"	Plane No 1					
		5000				Plane No 2					
						Plane No 3					
						Plane No 1					
						Plane No 2					
						Plane No 3					
						Plane No 1					
						Plane No 2					
						Plane No 3					
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						Plane No 3					
						Plane No 1					

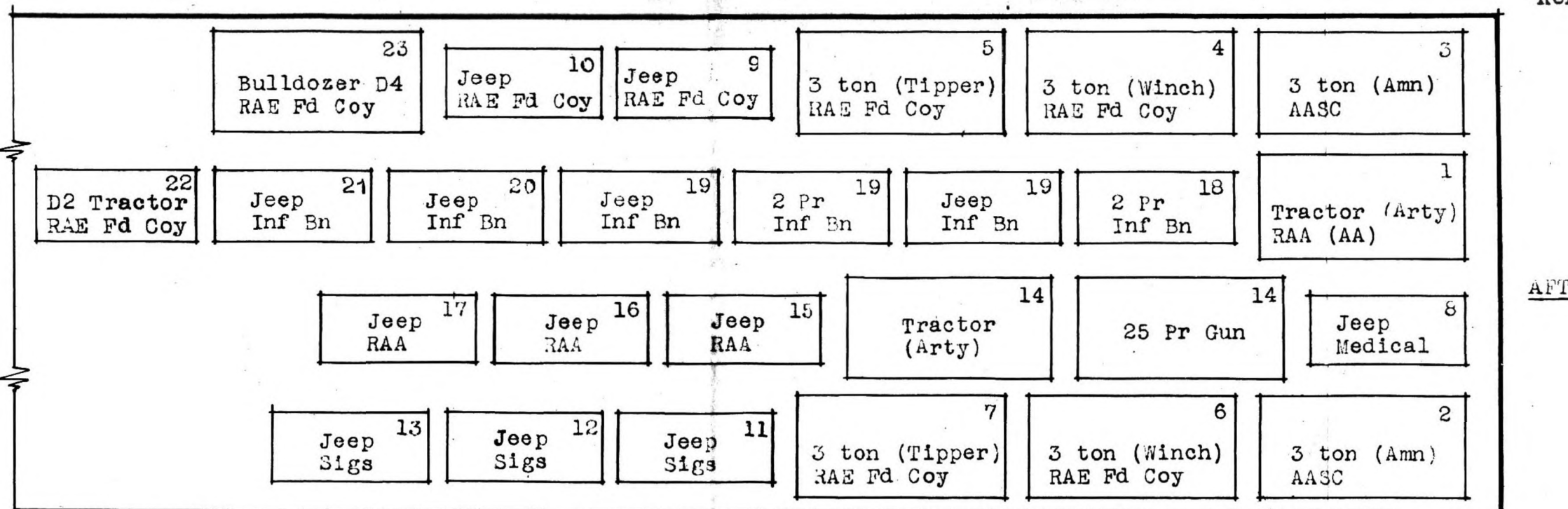


Fig 1 : TYPICAL LST LOADING

NOTE:- 1. One Bofors on top deck loads first.
2. Numbers show order of loading.

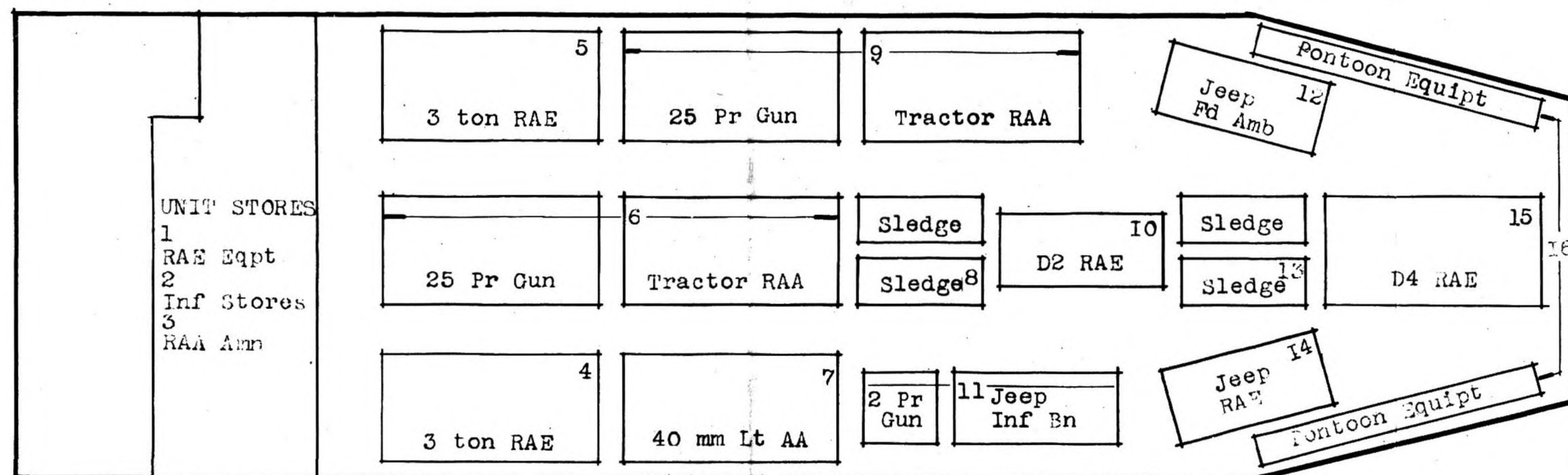


Fig 2 : TYPICAL LCT LOADING

NOTE:- Numbers show order of loading

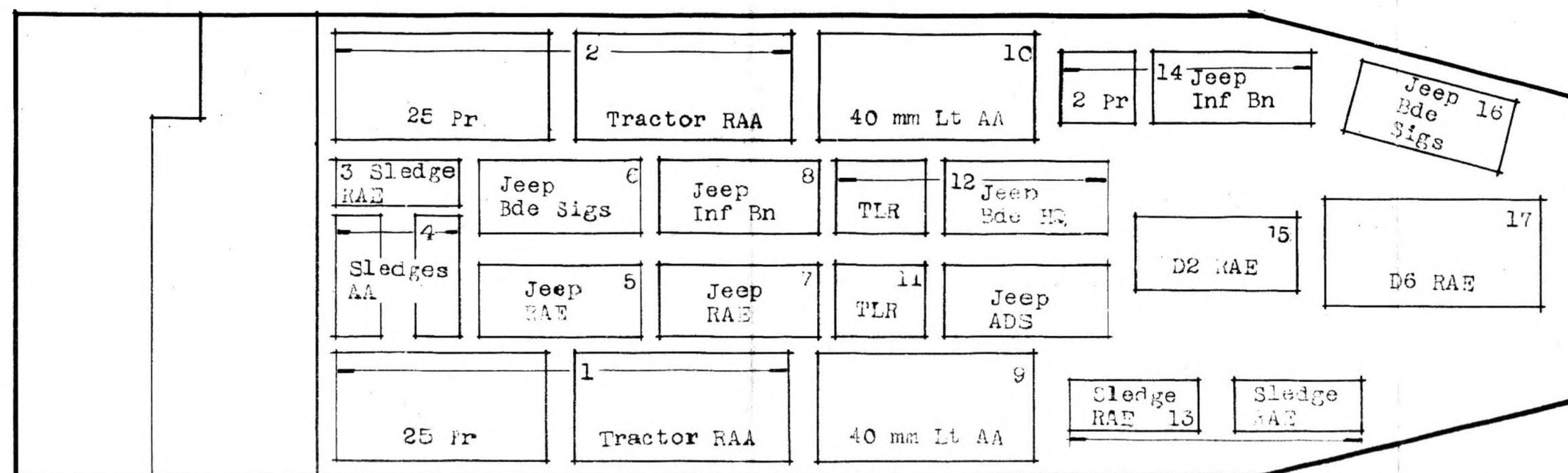
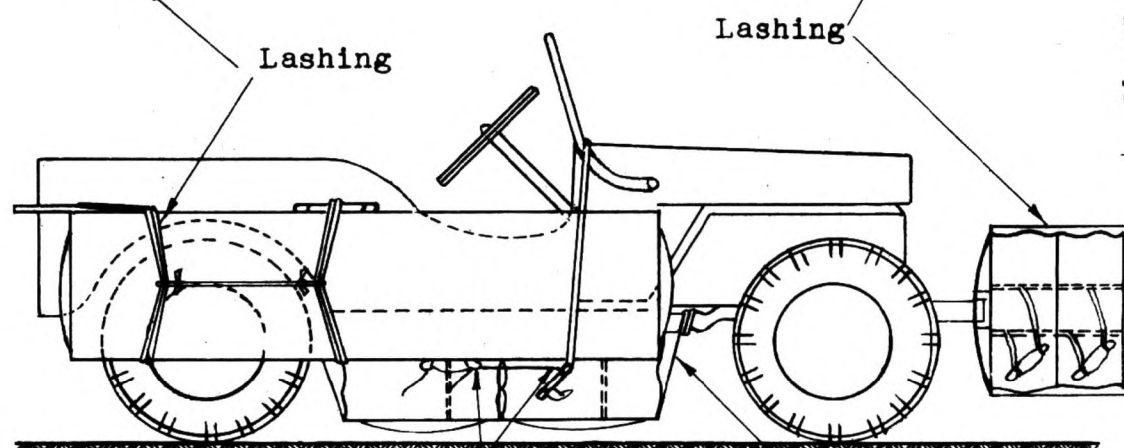
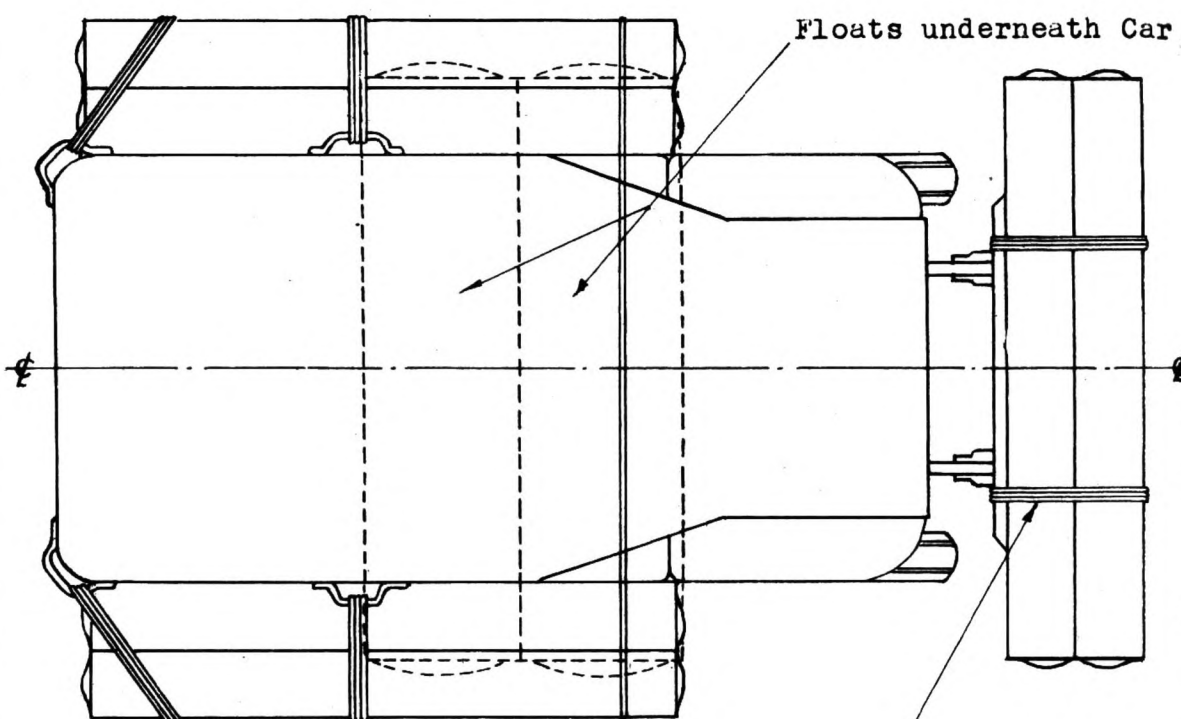


Fig 3 : TYPICAL LCT LOADING

NOTE:- Numbers show order of loading.

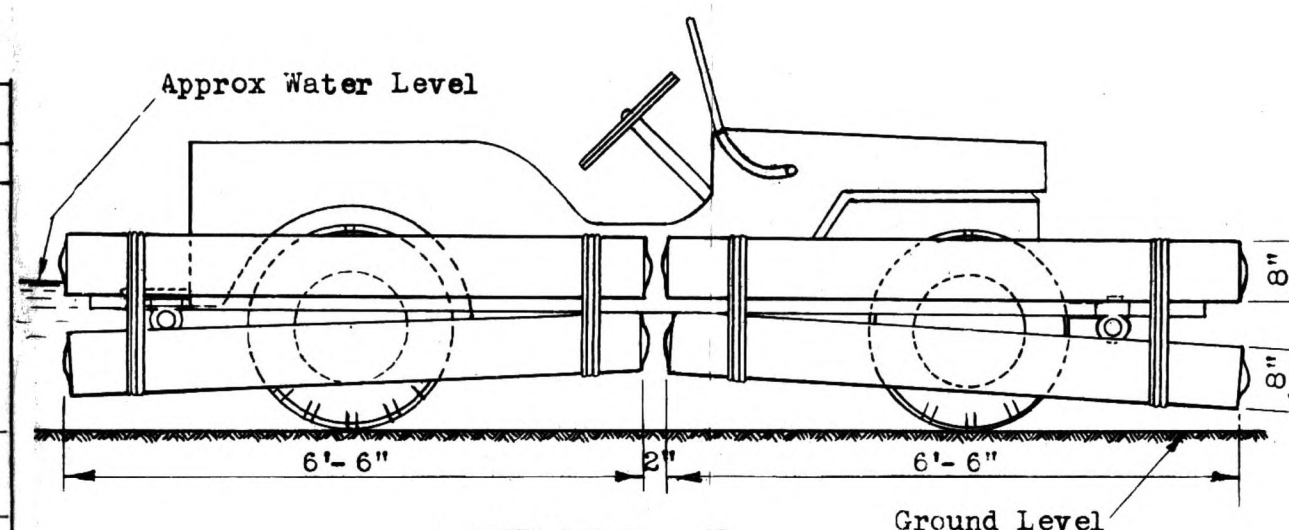
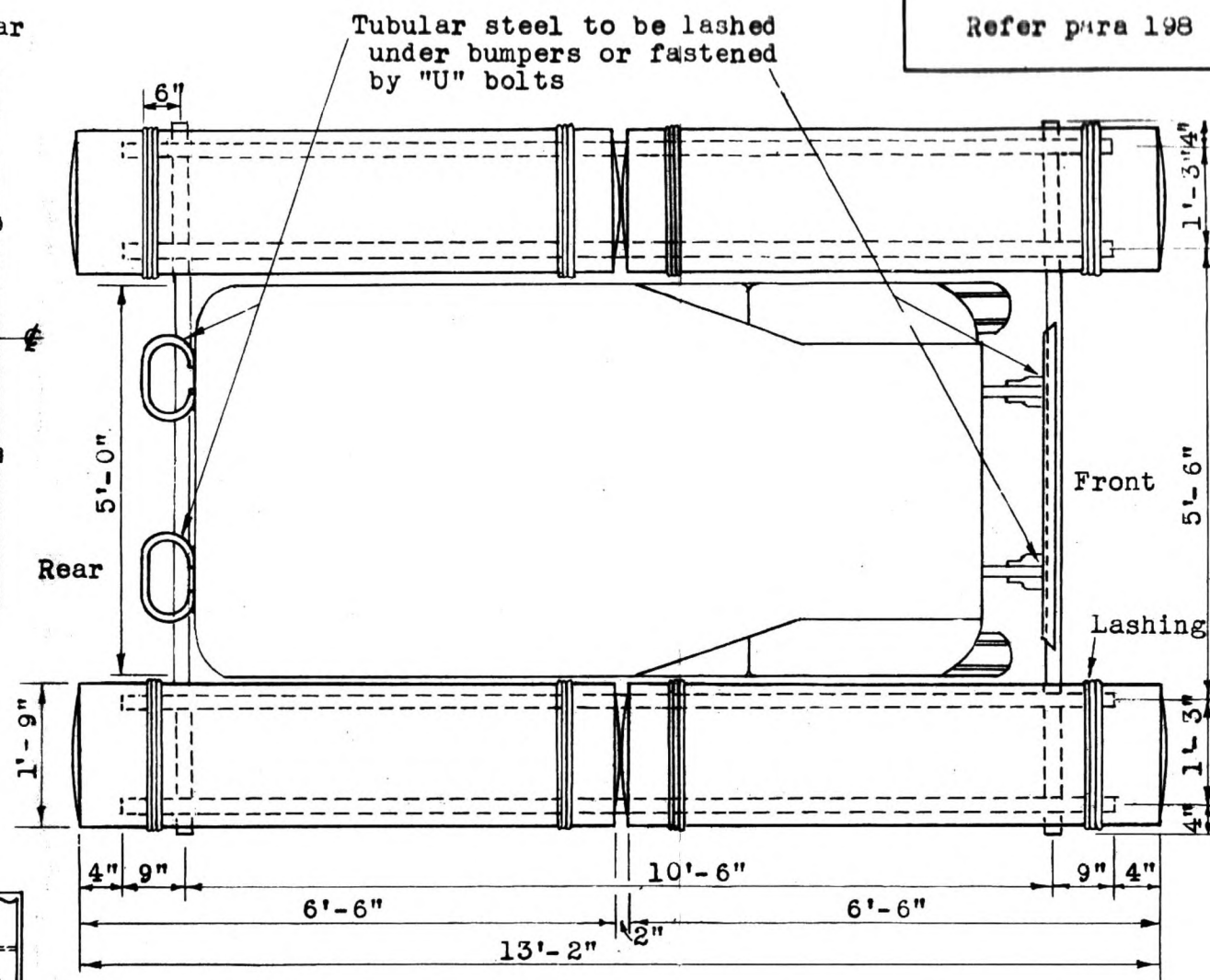
LOADS - LST's AND LCT's

(Diagrammatic Sketches Only)

**METHOD 1**Lashing through
Handles

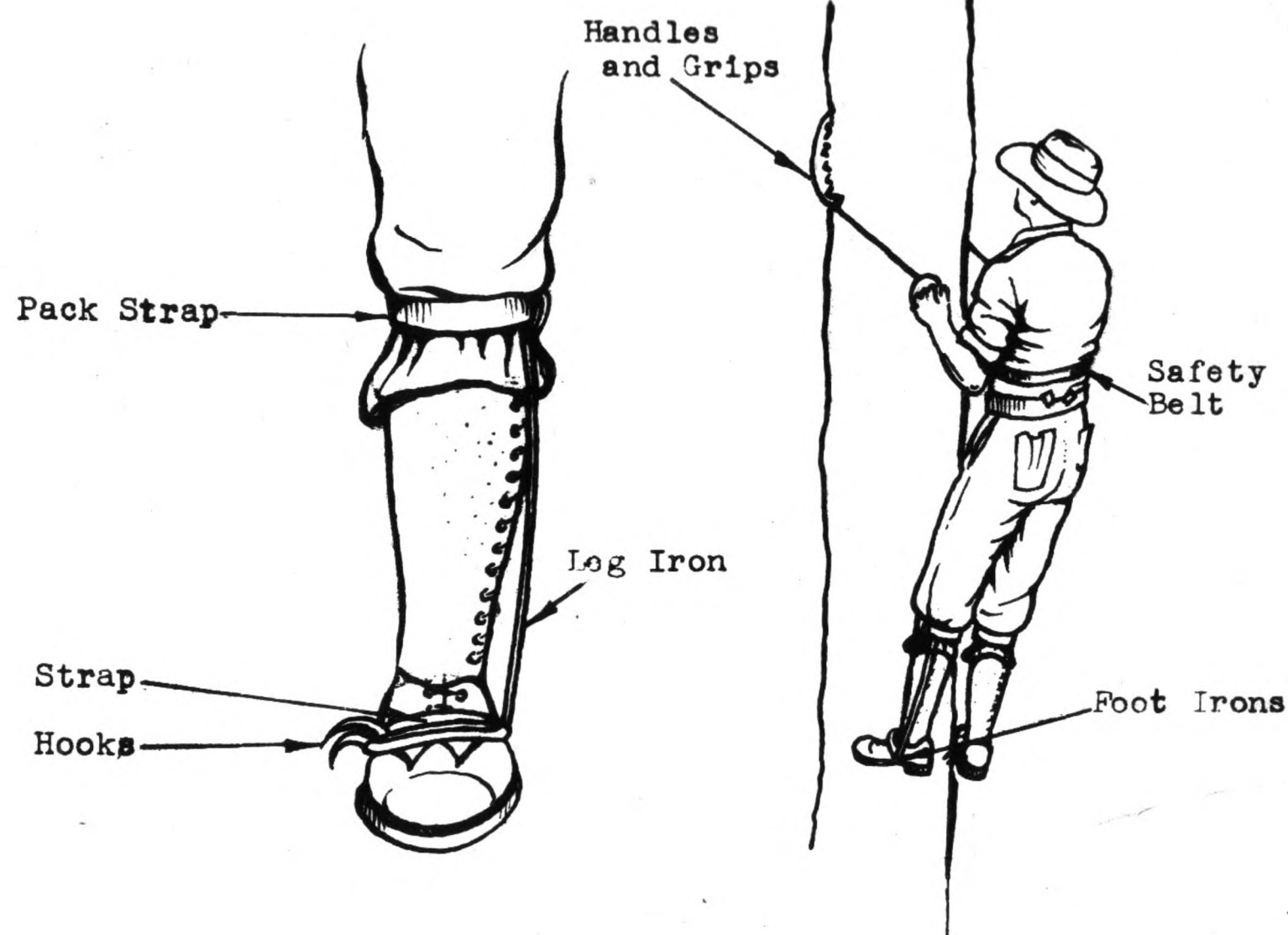
Lashed to Chassis

SCHEDULE				
Item	Method 1		Method 2	
Materials	Kapok Floats	8	Kapok Floats	8
	Lashings 1½"	10	Tubular Steel 2"	4/12'
			" " 2"	2/9'
			Couplings Sq. 2"	8
			Lashings 1½"	8
			Cordage 3" for towing	
Tools	Nil		Spanner for Couplings	1
Labour	Four Sappers		Four Sappers	
Transport	One Vehicle		One Vehicle	
Time	¾ Hour		1½ Hours	

**METHOD 2**

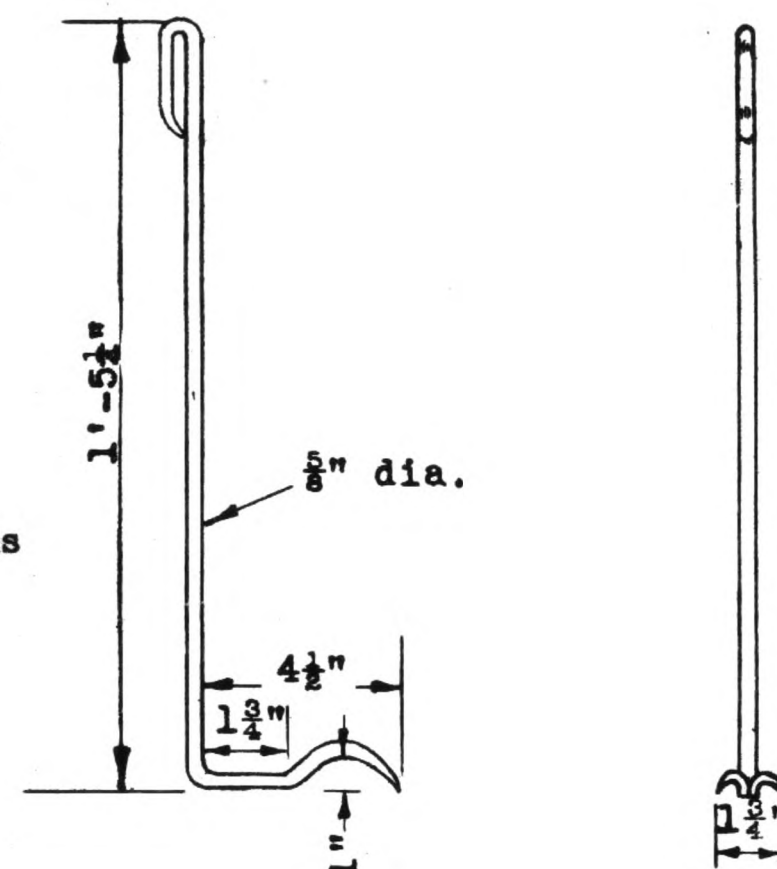
1 0 1 2 3 4
Scale in feet

FLOTATION OF JEEP BY KAPOK ASSAULT FLOATS

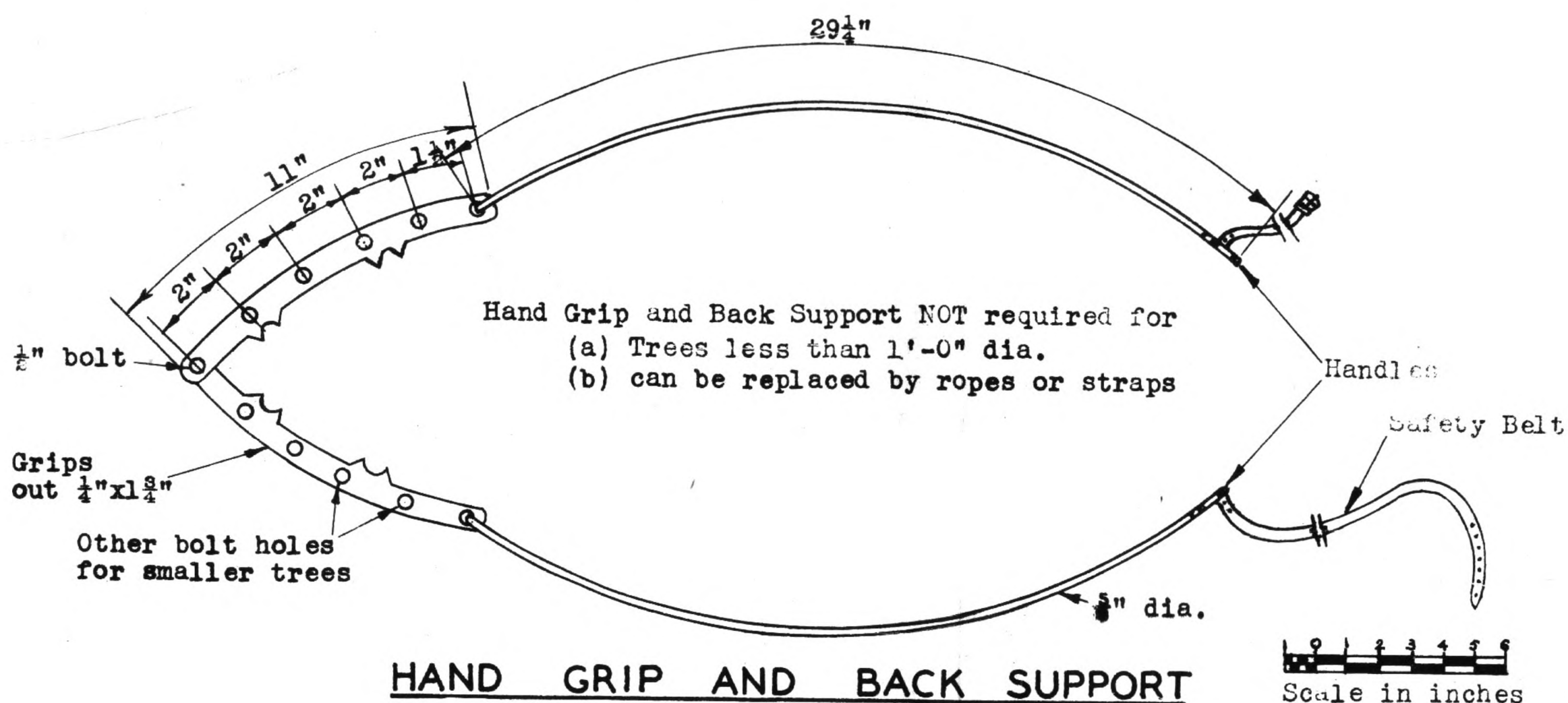


METHOD OF ATTACHING
FOOT IRONS

METHOD
OF CLIMBING



FOOT IRONS



HAND GRIP AND BACK SUPPORT

TREE CLIMBING APPLIANCE

TIMBER WORKING STRESSES

NOTES		TIMBER CLASSIFICATION								
		GROUP 'A'		GROUP 'B'		GROUP 'C'		GROUP 'D'		
(i)	These are average values for timbers grouped according to flexural strength. Values shown for shear have been kept low owing to the tendency of some timbers within a group to split.	AUSTRALIA	BOX (Grey) GUM (Grey & Spotted) IRONBARK (Grey) TALLOW WOOD	BLACK BUTT BLOODWOOD (Red) BOX (Brush, Red & Yellow) GUM (Blue, Forest Red, Spotted & Yellow) KARRI MAHOGONY (Red & White) STRINGY BARK (ex Messmate) TURPENTINE	JARRAH MOUNTAIN ASH STRINGY BARK (Messmate)	CYPRESS PINE GUM (River Red) HOOP PINE				
(ii)	For superior timbers, especially iron bark, tallow wood and grey box, shear stresses up to 450 lbs per sq in are permissible.									
(iii)	In general, standard grades of timber should be assumed unless special care is taken in selection and felling. In individual cases, allowance must be made for apparent or likely defects in the timber.	NEW GUINEA	*KASI KASI (Bot. <i>Metrosideros</i> Sp)	*GARO GARO (Gardgas) *ULABO (Kwila Melila) * (Bot. <i>Afzelia</i> Bijuga) *HAITAN (Bot. <i>Wormia Quercifolia</i>) *MANGROVE (Komo Totoa) (Bot. <i>Phizophora Mucronata</i>) *MALAI (Kohu-pilo-pilo) (Bot. <i>Hopea</i> Papuana) *TUAN NEKAKARO (Maita Maita) (Bot. <i>Eugenia</i> Sp) BIO-BIO (Bot. <i>Garcinia</i> Sp) KUNA (Bot. <i>Quercus</i> Sp)	MODAC (Marava, Saore) (Bot. <i>Pterocarpus Indicus</i>) ALAGA (Bot. <i>Calophyllum</i> Sp) MADAWO (Bot. <i>Calophyllum</i> Sp) DAMONI (Bot. <i>Dracontomelum Magniferum</i>) KAMARERE (New Britain) (Bot. <i>Eucalyptus Deglupta</i>) TOUIN (Tun) (Bot. <i>Pometia Pinnata</i>) TATO-O (Bot. <i>Vitex Confassus</i>)	LAGUNA (Bou-ura) (Bot. <i>Vatica</i> Papuana) TAMANAN (Bot. <i>Palaquim Hexandrum</i>) KLINKI PINE (Bot. <i>Arancaria Klinkii</i>) RED CEDAR (Bot. <i>Cedrela Toonavar. Australis</i>) LEICHARDT PINE (Sabi) (Bot. <i>Sarcocephalus Cordatus</i>) KOKOLAKA (Bot. <i>Vatica</i> Papuana) *TIMBERS BELOW GROUP 'D' STRENGTH (See below)				
(iv)	Values shown are for standard grade green timber; 25% may be added for select grade timber.									
(v)	Best general purpose NEW GUINEA timbers are marked with an asterisk. Timbers are listed in order of density.									
PROPERTY			Lbs Sq In	Tons Sq In	Lbs Sq In	Tons Sq In	Lbs Sq In	Tons Sq In		
BENDING AND TENSION PARALLEL TO GRAIN			2,400	1.08	2,000	0.90	1,600	0.71	1,200	0.54
SHEAR PARALLEL TO GRAIN			200		160		120		70	
BEARING PARALLEL TO GRAIN			1,800	0.80	1,500	0.67	1,200	0.54	900	0.40
BEARING PERPENDICULAR TO GRAIN			900	0.40	700	0.31	500	0.22	300	0.14
MODULUS OF ELASTICITY			2,400,000		2,100,000		1,700,000		1,500,000	
WEIGHT CU FT - GREEN (AUST)			80 lbs		75 lbs		70 lbs		50 lbs	
AIR DRY (NG)			77 lbs		60 - 50 lbs		45 - 41 lbs		40 - 35 lbs	

NOTE: Further information may be obtained from:

- (i) C S I R "Handbook of Structural Timber Design" and Supplement No 1.
- (ii) G H Q S W P A "Timber Design Data", Australian and Tropical Hardwoods.

*Below Group 'D' Strength
ILIMO (Erms, Usu, Benumba)
(Bot. *Octomeles Sumatrana*)
PUTO (Devoru, Didima)
(Bot. *Alstonia Scholaris*)

648

RESTRICTED

24 Nov 92.

TO BE NOTIFIED IN A.T.M. No. 34

SECRET

The information given in this document is not to be communicated, either directly or indirectly, to the press or to any person not holding an official position in His Majesty's Forces.

**THIS DOCUMENT MUST NOT
FALL INTO ENEMY HANDS.**

APPENDIX PART 2

AUSTRALIAN MILITARY FORCES

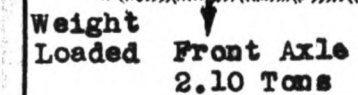
ENGINEER-IN-CHIEF'S
CONSOLIDATED
INTELLIGENCE SUMMARY
Nos. 1-17

30 May 44

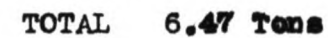
Headquarters,
Australian Military Forces

*Prepared by the General Staff and issued under the direction of
the Commander-in-Chief.*

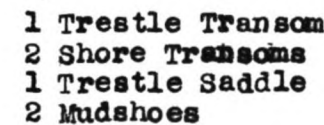
RESTRICTED



Rear Axle
4.37 Tons



7 Shore Baulks Inner
2 " " Outer

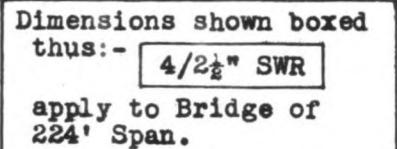


	Back Axle	Front Axle	Total
F.W.D. Tare	1.89 Tons	2.14 Tons	4.03 Tons
F.W.D. 3 Ton Load	4.59 Tons	2.44 Tons	7.03 Tons
F.W.D. Converted & loaded with F.B.E.	4.37 Tons	2.10 Tons	6.47 Tons
F.W.D. Loaded with Trestle & 1½" Bays Superstructure & Spares	4.36 Tons	2.16 Tons	6.52 Tons

F.B.E. Truck	Trestle Truck
2 Folding Boats	1 Trestle Transom
20 Chesses	56 Chesses
3 Roadbearers Btn	3 Roadbearers Btn
9 Roadbearers Plain	18 " Plain
2 Ribands	3 Ribands
2 Boat Transoms	1 Transom Saddle
2 Raft Connectors	2 Trestle Legs
4 Racking Chains	8 Racking Chains
2 Anchors	2 Tubular Struts
2 Falls	2 8" Falls
2 Buoys	2 Mud Shoes
2 Lashings	7 Baulks Inner
5 Oars	2 Baulks Outer
2 Boathooks	3 Lashings
2 Bailers	1 Maul
	4 Pickets R.E. Short
	2 " " Long
	1 Case Trestle F.B.E.
	2 Shore Transoms

F.B.E - ADAPTION OF F.W.D. FOR CARRIAGE



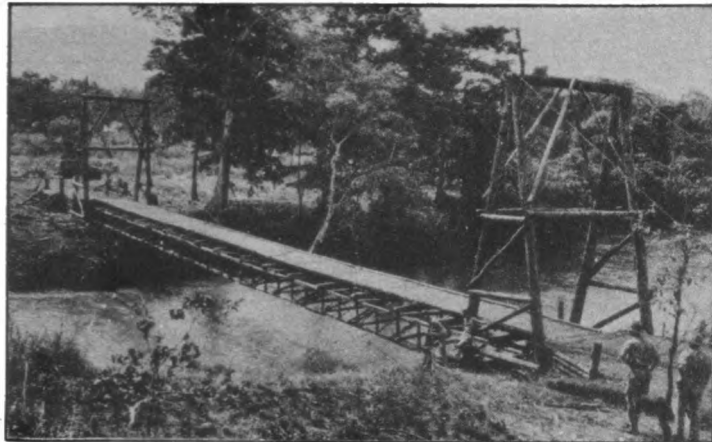


NOTES:

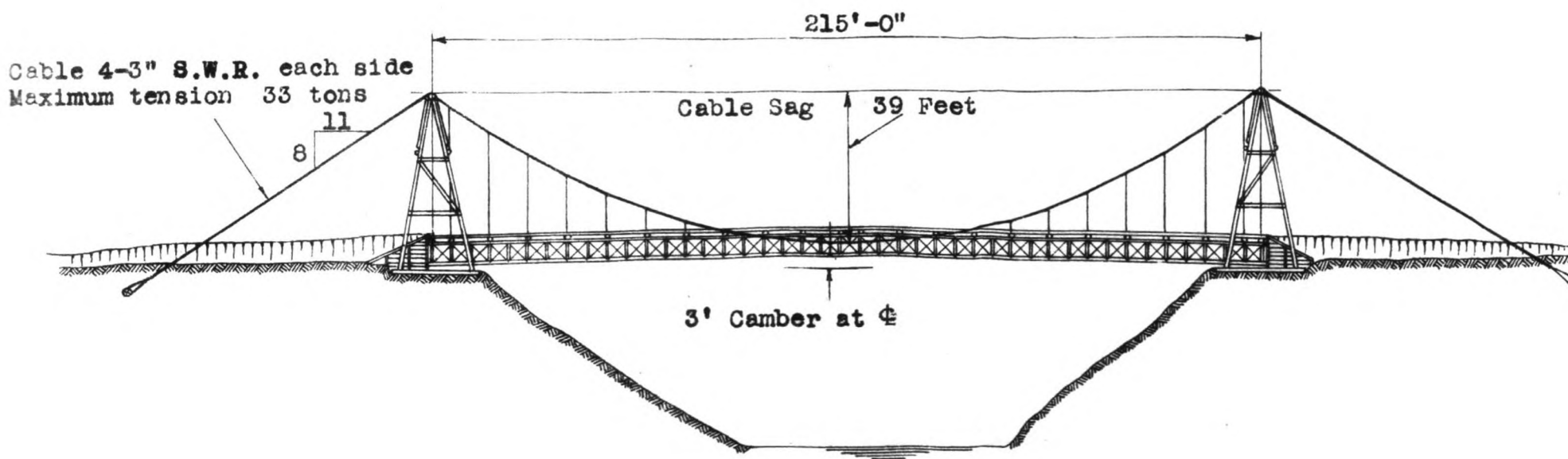
TENSION IN CABLE is 9
14.7 tons. Cable
strength was assumed
at 120 Cwt as field
approximation. More
exact values of strength
of various types of
SWR are given in
Engineer in Chief's
Technical Instruction
No. 37 and in B.H.P
Handbook.

DIAGONAL BRACING in first 6 10 panels at each end consists of 14 wires (i.e., 14 returns) of No. 8 SWG. In all others 8 wires (i.e., 8 returns) of No. 8 SWG. Alternatively use $\frac{3}{8}$ " & $\frac{1}{4}$ " dia. bolts with suitable washers. Ends of wires to be taken two turns around spars and twisted around standing wires.

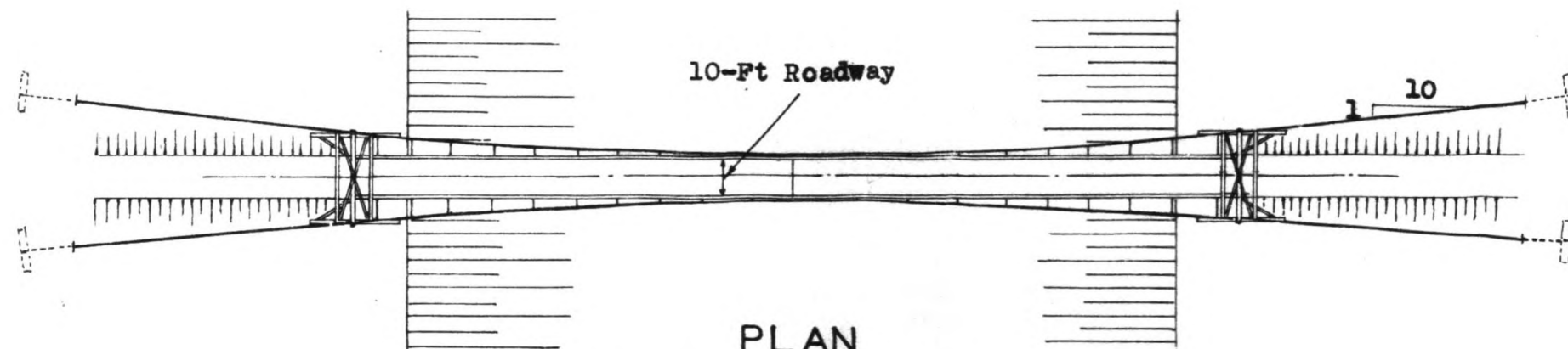
LIVE LOAD: Equivalent to 50 men over 25" length or two Jeeps 5 yds apart or tractor of 8000 lbs gross weight. Impact allowance: Tractor-Nil Jeeps-25%.



SUSPENSION BRIDGE (CLASS 4) WITH TIMBER STIFFENING TRUSS
SPANS 128' & 224'

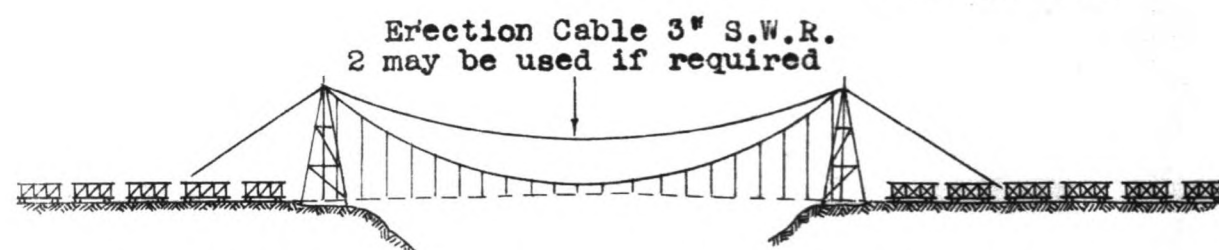


ELEVATION



PLAN

10 0 20 40 60 80 100
Scale in Feet



Erection Cable 3" S.W.R.
2 may be used if required

Erect Towers, prepare Anchorages, attach hangers to cables, assemble trusses. Place Erection Cable.

Pass cables across gap, raise onto Towers, and secure to anchors (NOTE - Check sag by sighting between marks on towers 39' from top).

Truss sections are assembled without decking. Roadbearers, Cross Girders and top chord lateral bracing. (Approx wt of 20 foot section 1½ tons)

Centre section raised onto cable-way. Run out into position. Hangers attached and section lowered till supported by Hangers and main cables.

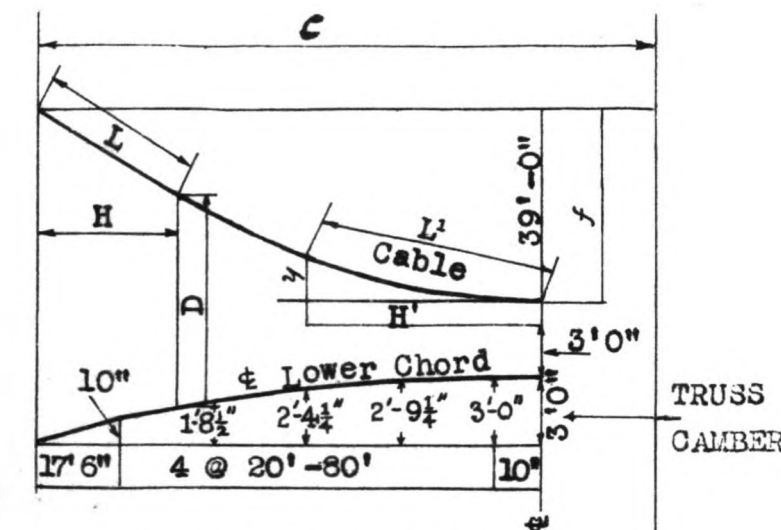
Adjacent sections on each side then placed in similar fashion. When all sections are placed splices are completed and diagonal bracing in splice panels placed.

With trusses completed, deck system is placed and cable-way dismantled.

HANGER TABLE

H	L	D
Tower 0	0	-
5	6'-1"	41'-4½"
15	18'-0"	34'-2½"
25	29'-8"	27'-10½"
35	40'-10½"	22'-1½"
45	51'-10"	17'-3"
55	62'-7½"	13'-0¾"
65	73'-1½"	9'-7¼"
75	83'-5¼"	6'-10¼"
85	93'-7½"	4'-10¾"
95	103'-8½"	3'-7"
105	113'-8½"	3'-0¼"
107½	116'-2½"	-

LENGTH OF CABLE
BETWEEN TOWERS 232'-5"



SKETCH OF DIMENSIONS

NOTES:

"D" is length of Hanger from cable to lower chord of truss. When cutting off Hangers sufficient extra length should be allowed for making attachments.

After attaching Hangers length "D" should be clearly and accurately marked, preferably with white paint. On trusses of lower chord should be clearly marked at points where Hangers are attached.

The dimensions shown on Table and ordinates to Parabola, are calculated from the following formulae.

Origin at Centre :-

$$L^1 = H^1 \left(1 + 0.35 \frac{H^1{}^2}{L^2} - 0.112 \frac{H^1{}^4}{L^4} \right)$$

H¹ = Horizontal Distance from c

C = Span

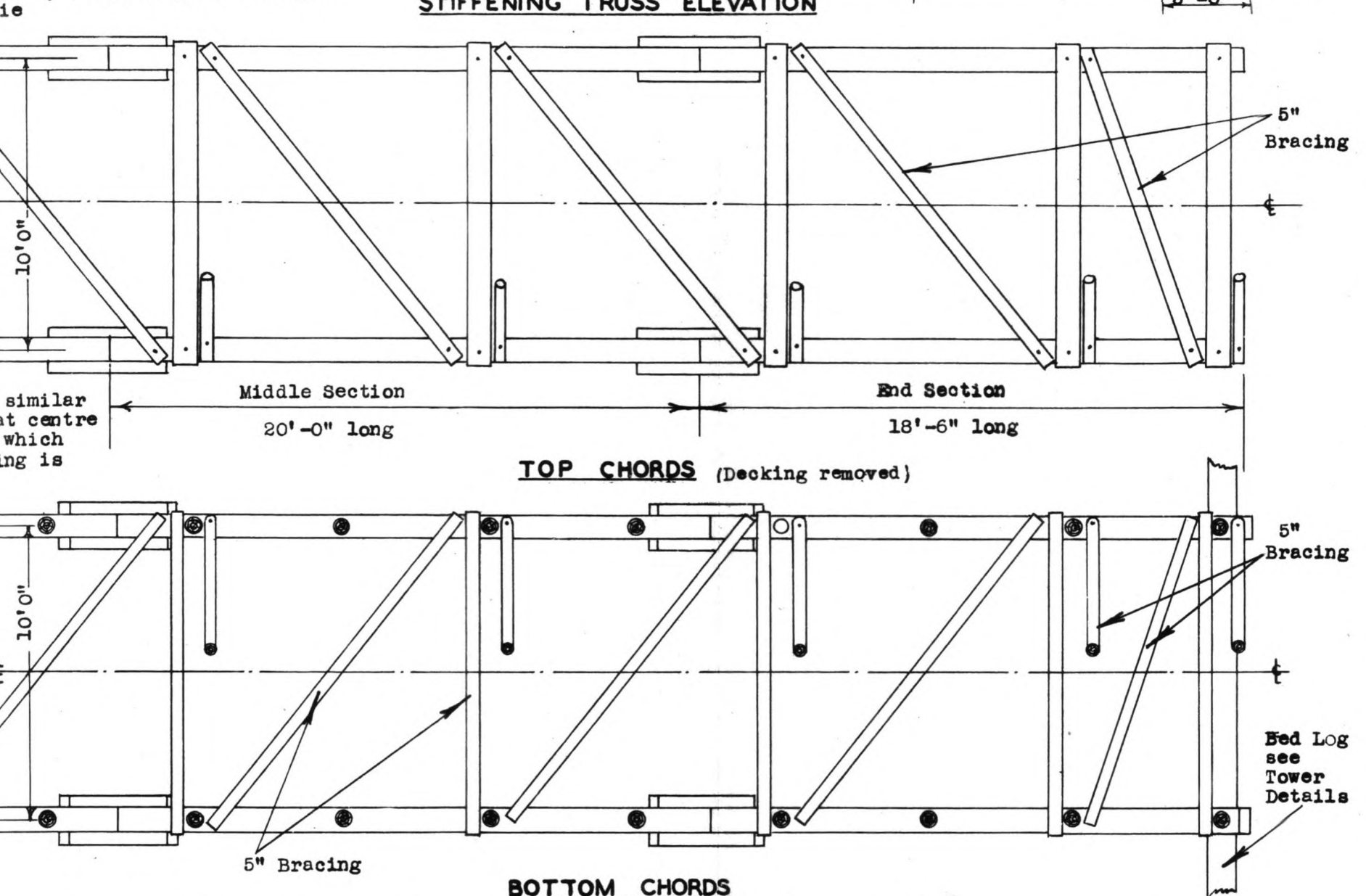
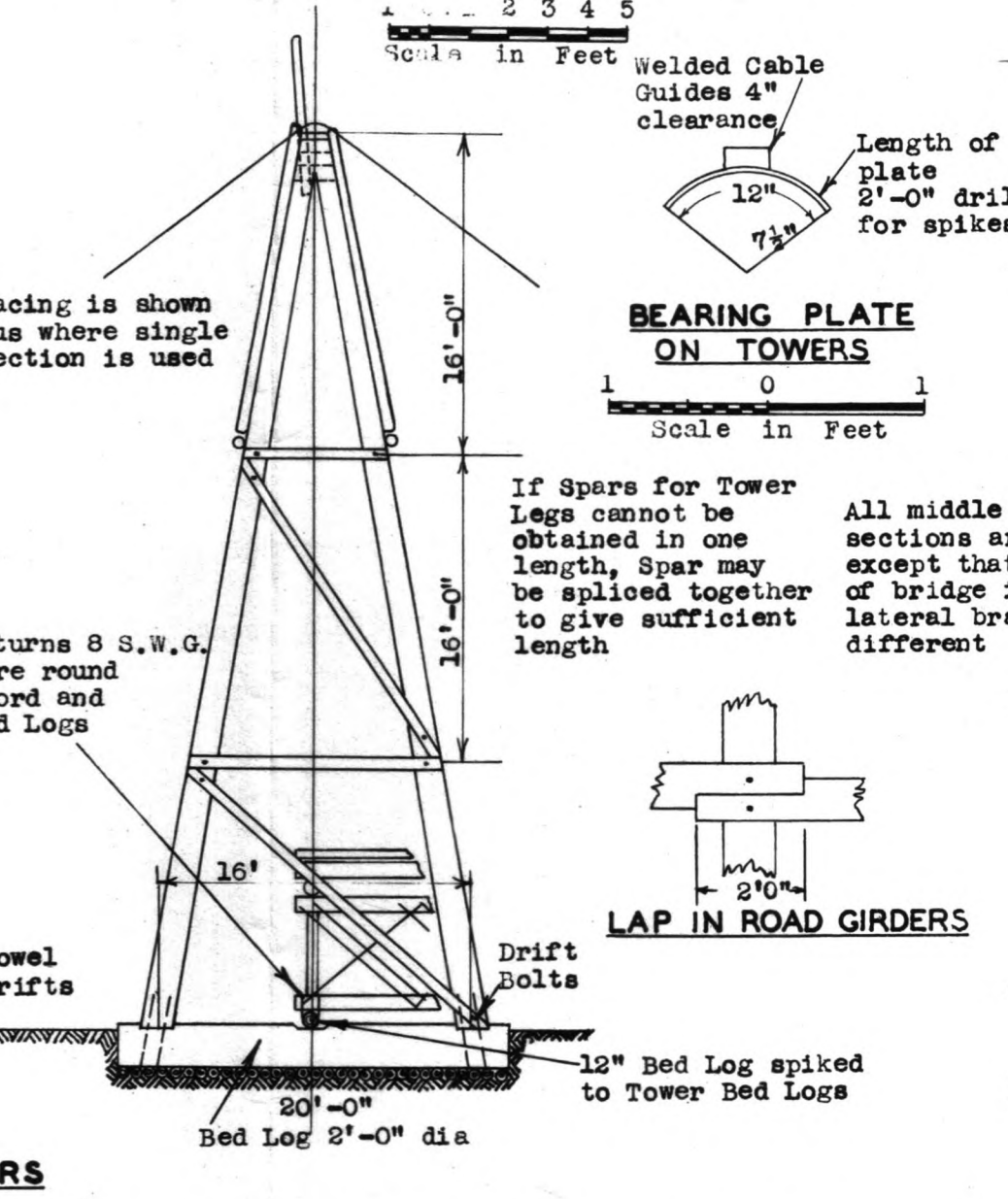
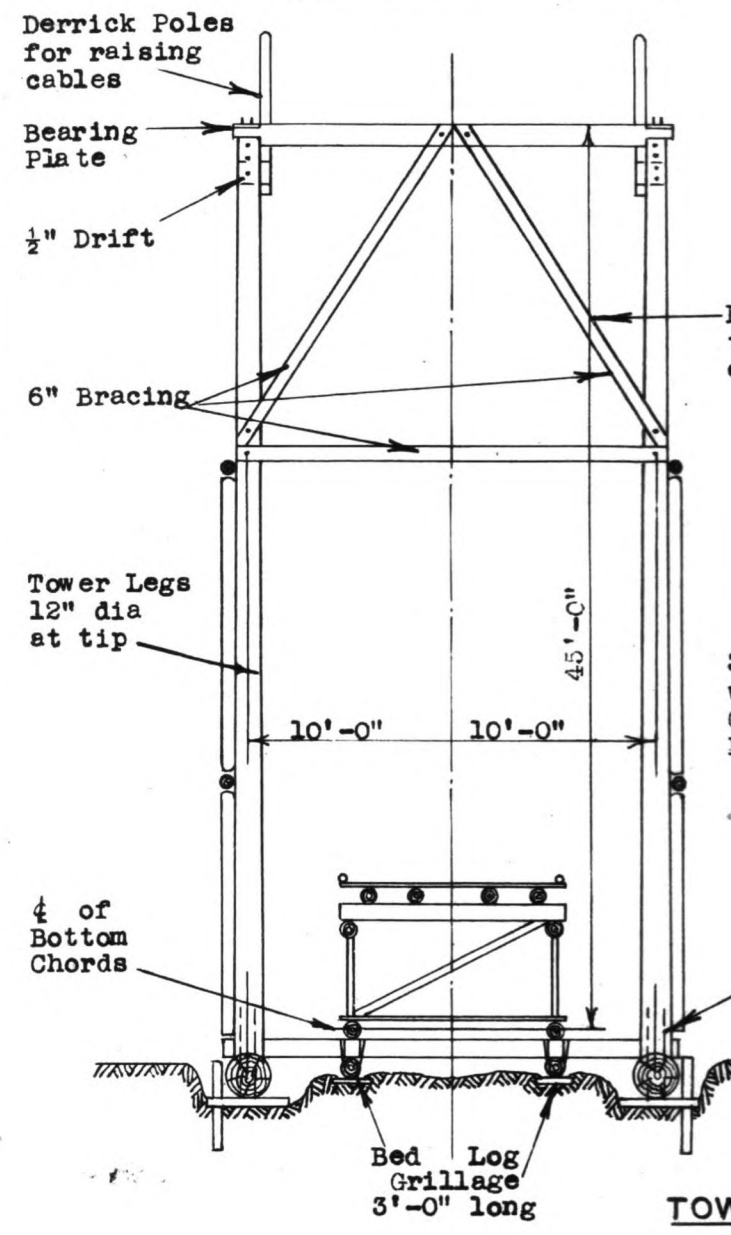
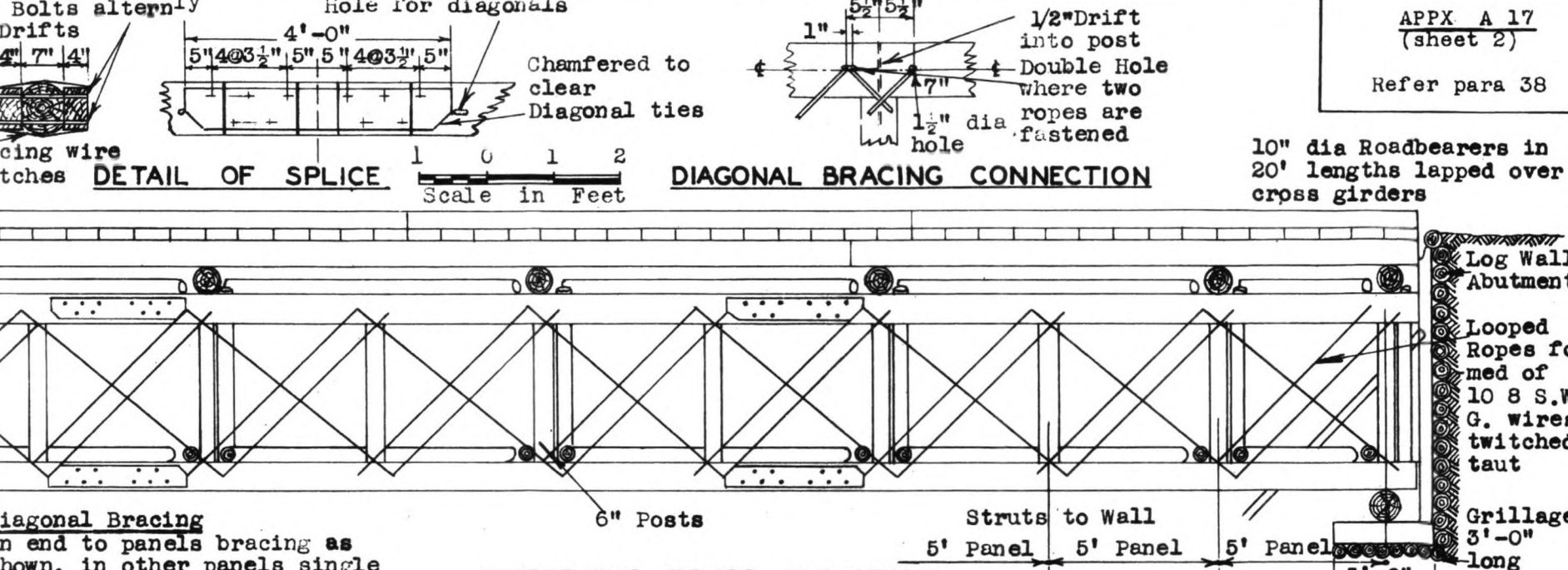
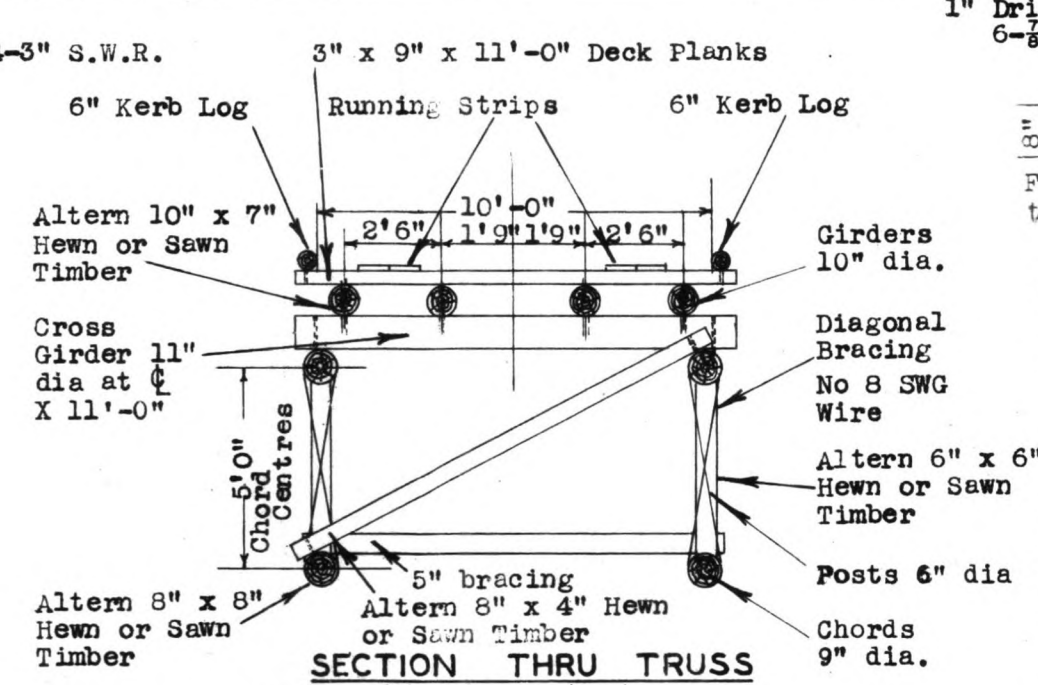
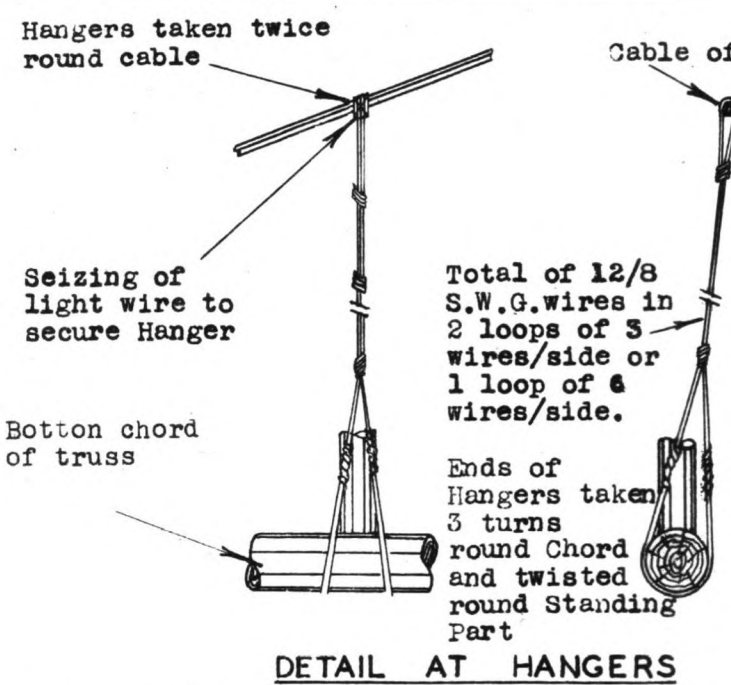
L¹ = Measure't from c of span along cable

$$y = \frac{4fH^1{}^2}{C^2}$$

f = Sag at c

200' SUSPENSION BRIDGE

FOR CLASS 9 LOADS

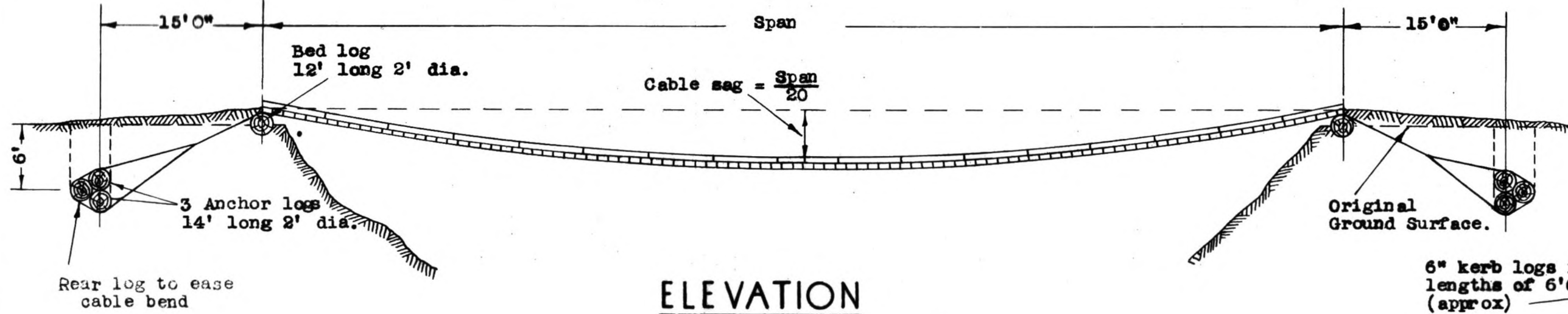


Scale in Feet

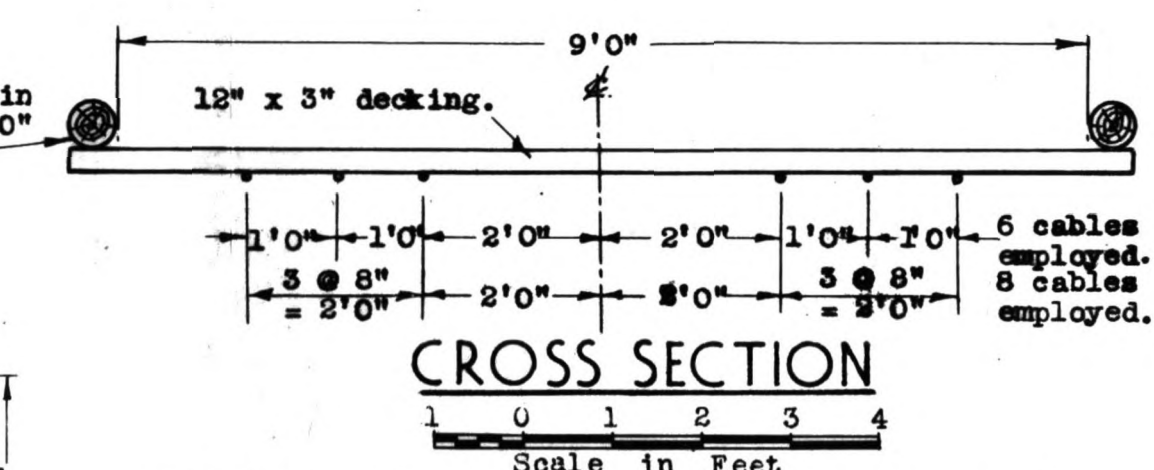
200' SUSPENSION BRIDGE

FOR CLASS 9 LOADS

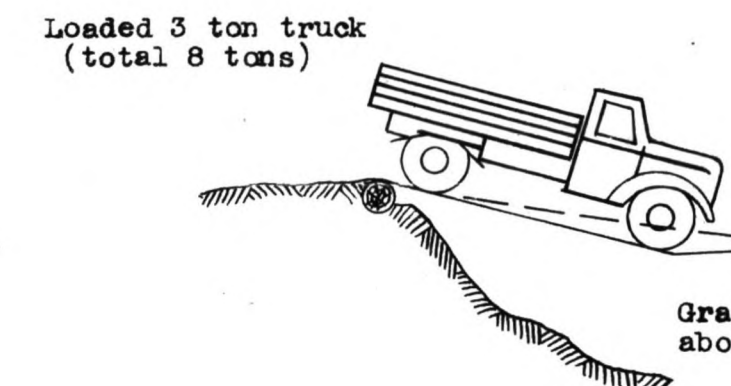
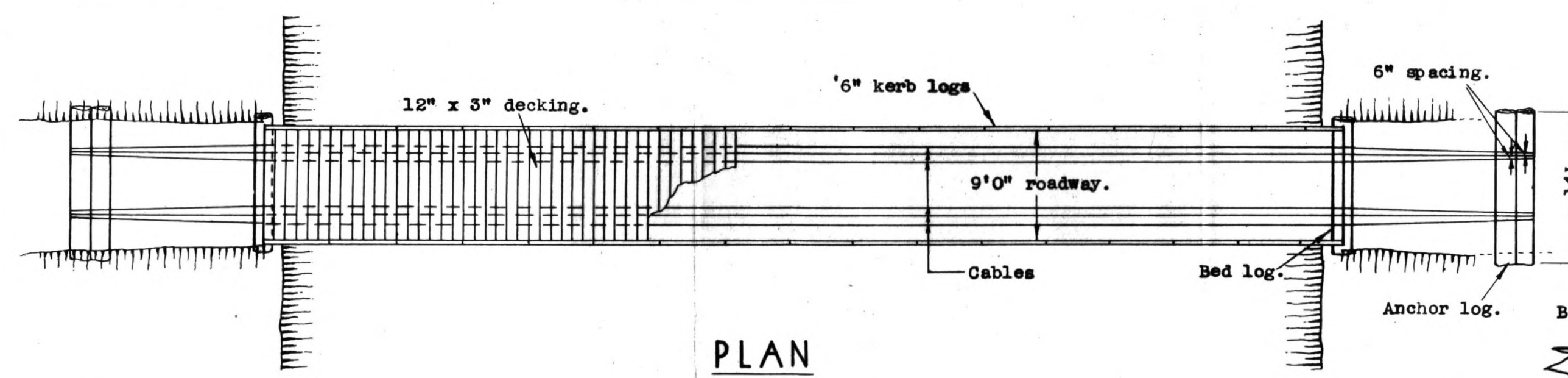
Scale in Feet



Note:-
If decking is of hewn timber, or if there is time, use running strips in lengths of 6'0" approx. Both running strips and kerbs are to be placed on bridge so as not to interfere with change of shape of cables under live load.



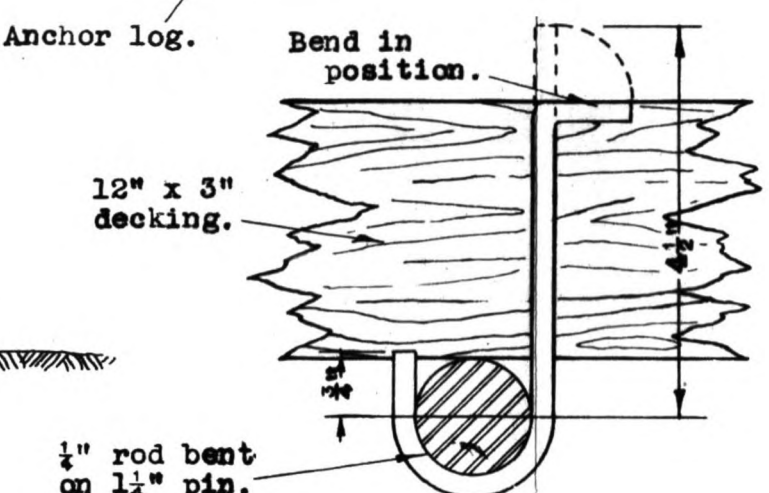
Cable taken 3 turns around anchor logs and secured by bulldog clips. If available, metal bearing plates are to be placed between cables and bed and anchor logs.



Grade of cables with above load is 1 in 4:5.

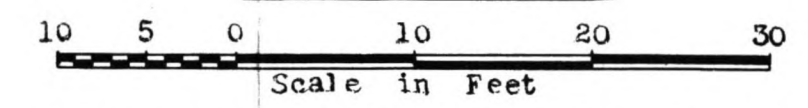
Loaded Cables.

Cables under dead load only.



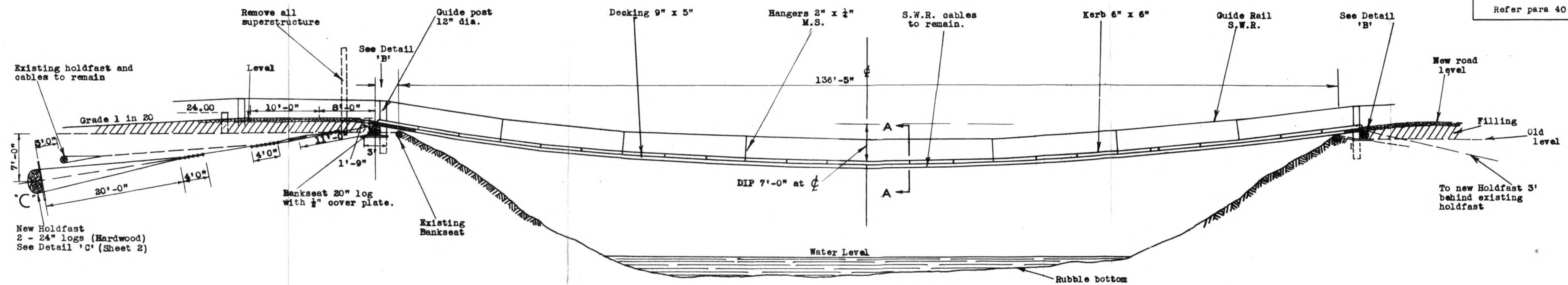
TWO CABLES CONNECTED TO EACH GANG PLANK

DISTORTION OF CABLES UNDER LOAD **UNSTIFFENED SUSPENSION BRIDGE CLASS 9** **WITH DECKING CARRIED DIRECTLY BY CABLES.**



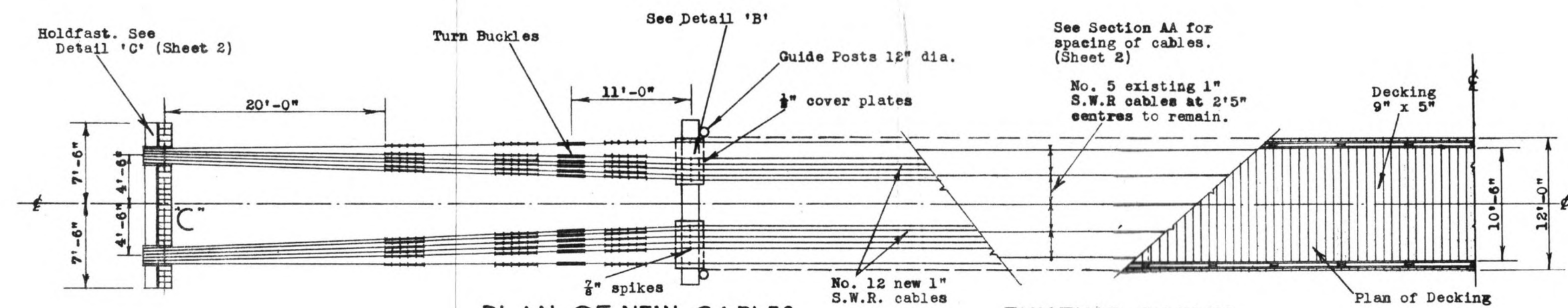
GENERAL NOTE:-
It should be noted that this type of bridge is very uneconomical in its cable requirements, however in forward areas, if S.W.R. is plentiful the type is very useful for its simplicity and rapidity of erection, particularly where a bridge with intermediate piers is inadvisable.

CABLE SCHEDULE		
Span	No of Cables	Maximum Cable Stress
100'	6 x 3 $\frac{1}{2}$ "	6 cables 14 tons/cable
	8 x 3 $\frac{1}{4}$ "	8 cables 11 tons/cable
Maximum cable loads are based on live load of loaded 3 ton truck 8 tons total strength of cables taken as 20 C² cwt where "C" is circumference. This allows a factor of safety of 3 for cables in good condition.		
ANCHORAGE SCHEDULE		
Alternative to anchorage as shown above, following sizes may be used		
Depth of $\angle$ of anchorage	Size of cable.	
6 ft	14' x 4' dia (2-2')	
	18' x 3' dia.	
7 ft	14' x 3' dia.	
8 ft	12' x 3' dia.	
If soil is poor increase length of anchor by 25%. If in rock, depth of anchor need be sufficient only to give cover.		



LONGITUDINAL SECTION

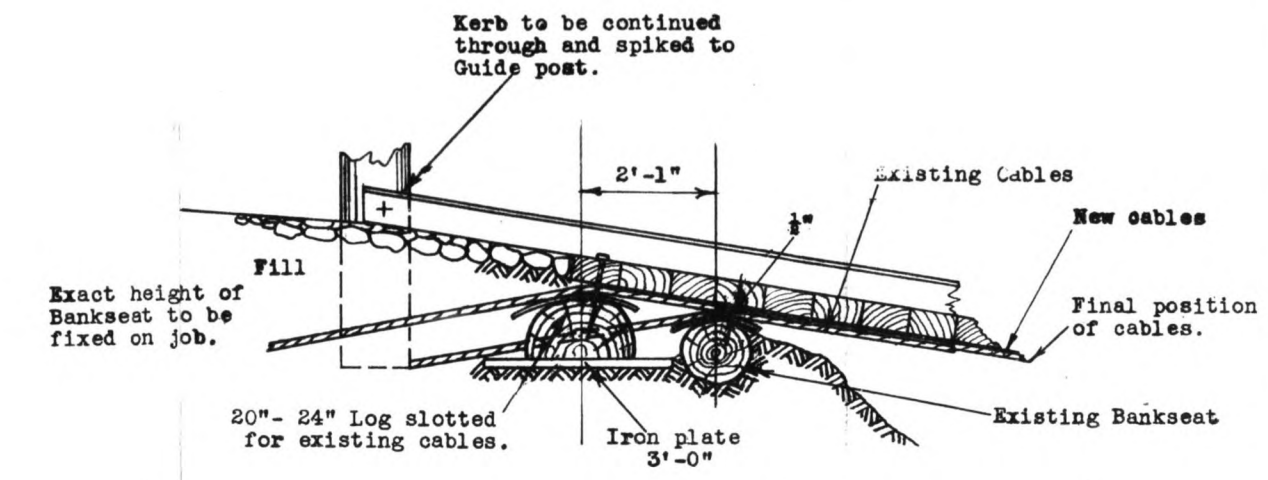
Scale A



PLAN OF NEW CABLES

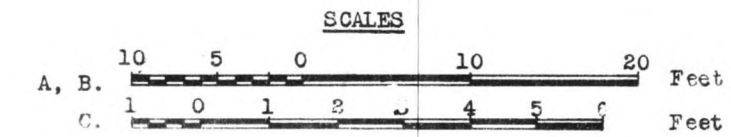
EXISTING CABLES

Scale 'B'
NO. 5 AT 2'-5" CENTRES

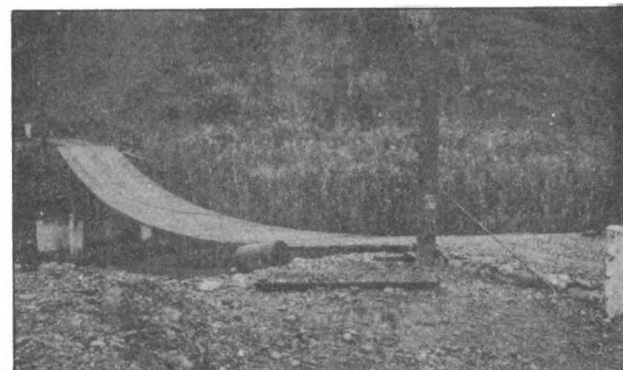
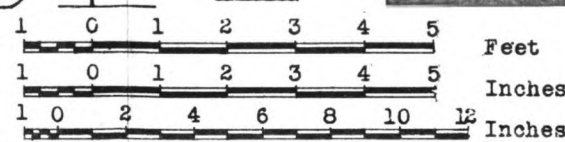
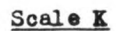
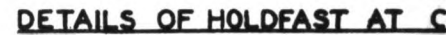
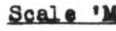
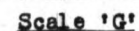
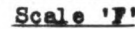
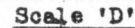


SECTION THRO BANKSEAT 'B'

Scale 'C'



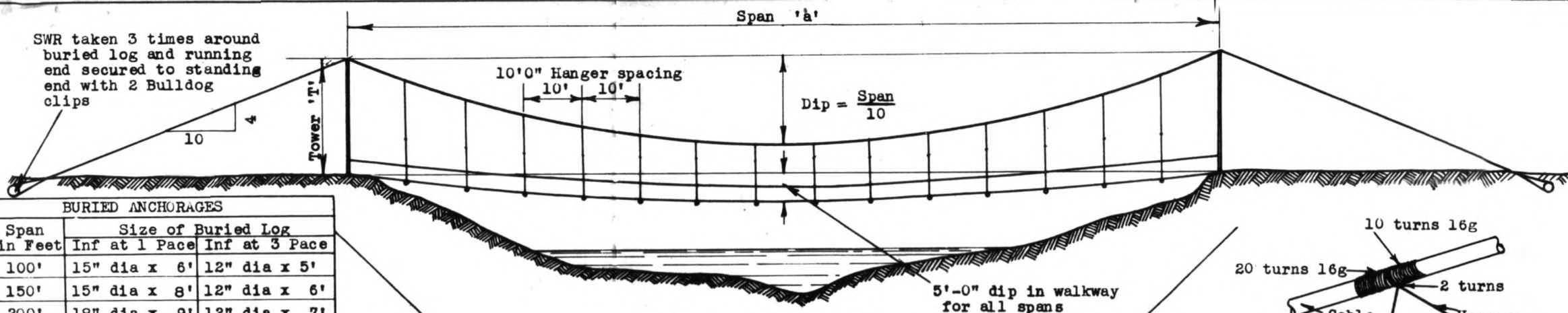
SUSPENSION BRIDGE UNSTIFFENED CLASS 12



SUSPENSION BRIDGE UNSTIFFENED CLASS 12

SOURCE:- CE. NGF.
Designed by 2/14 Aust A Fd Coy

1" Dia HOOK BOLTS
For connecting
arers to Transome

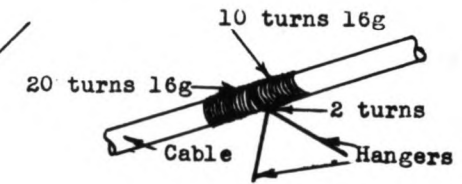


BURIED ANCHORAGES

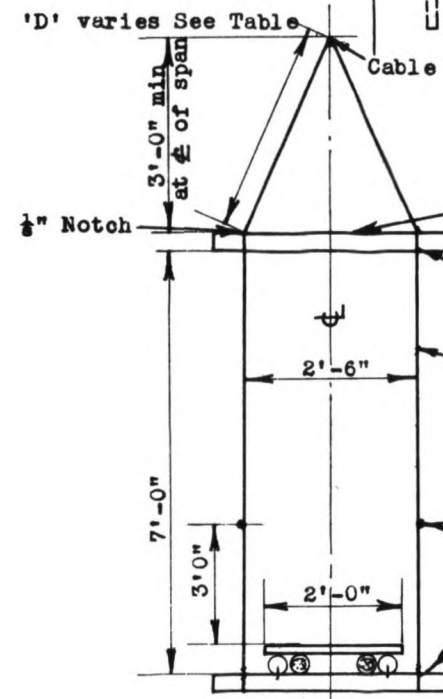
Span in Feet	Size of Buried Log	Inf at 1 Pace	Inf at 3 Pace
100'	15" dia x 6'	12" dia x 5'	
150'	15" dia x 8'	12" dia x 6'	
200'	18" dia x 9'	12" dia x 7'	
250'	18" dia x 11'	12" dia x 8'	
300'	18" dia x 13'	15" dia x 8'	
350'	24" dia x 12'	15" dia x 9'	
400'	24" dia x 15'	15" dia x 10'	

Depth to ϕ of Log 4'-0"

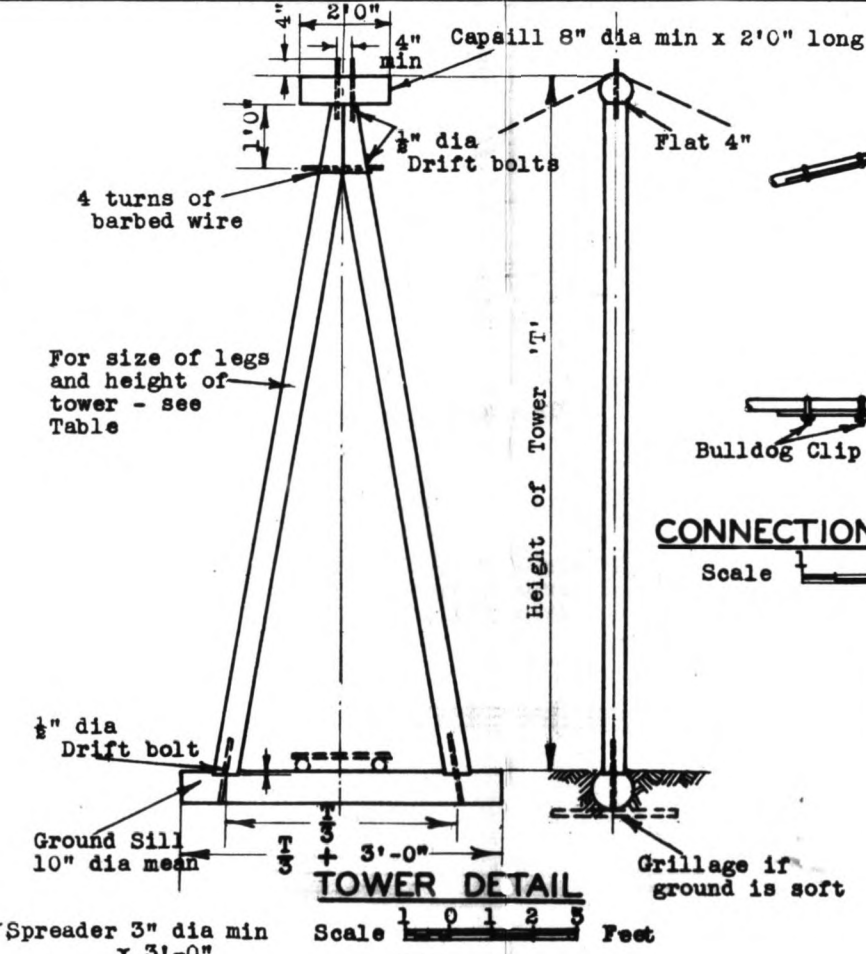
Above table based on Formulae
 $p = \frac{1}{2}wd^3h \sin 2\phi (1.5 - \sin \alpha)$
 $w = 100 \text{ lb/c ft}$
 $\phi = 35^\circ$
 $h = 4'-0"$
 $d = 4'-0"$
 Then $p = 1.0 \text{ tons/sq ft}$



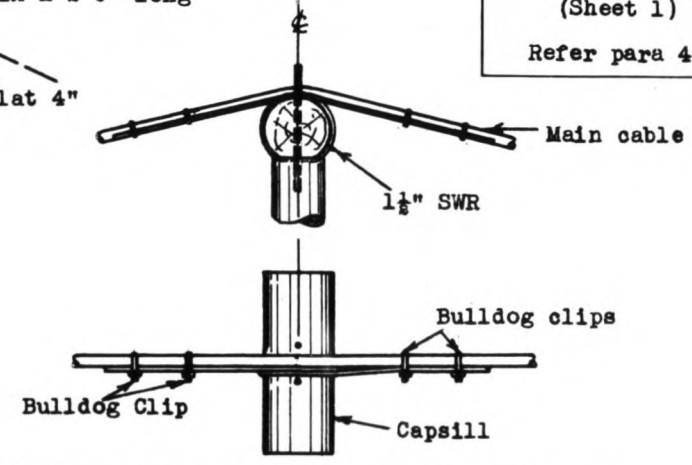
CONNECTION OF HANGER TO CABLE
 Alternative Method of preventing Hanger from slipping is one double strand barbed wire along cable and twitched to each hanger



**SUSPENSION FOOTBRIDGE
SINGLE CABLE
(FOR SPANS UP TO 400')**

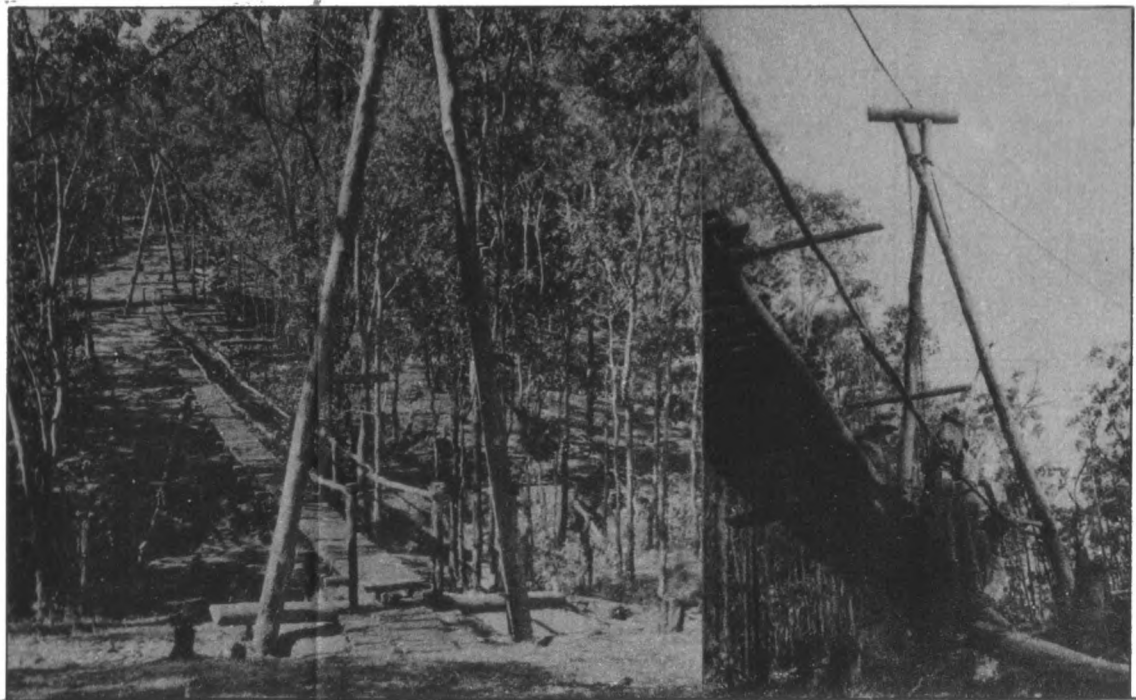
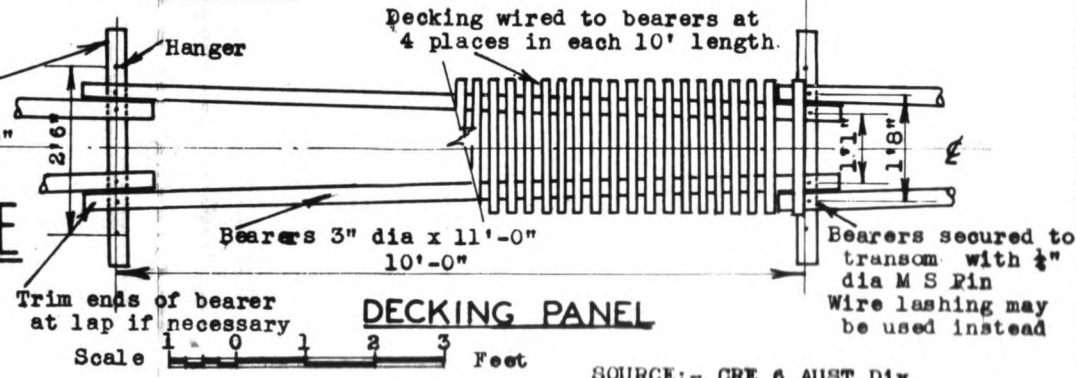
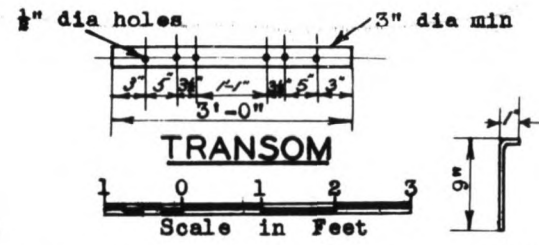
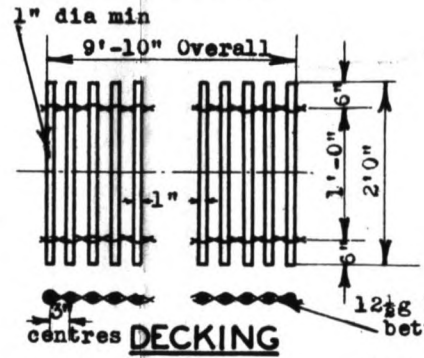


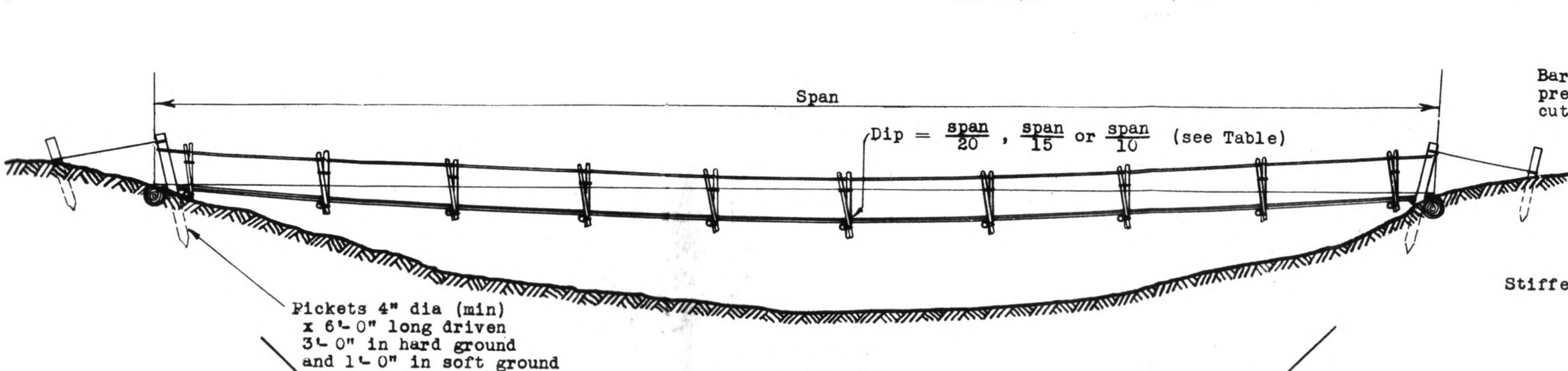
CONNECTION OF CABLE TO TOWER



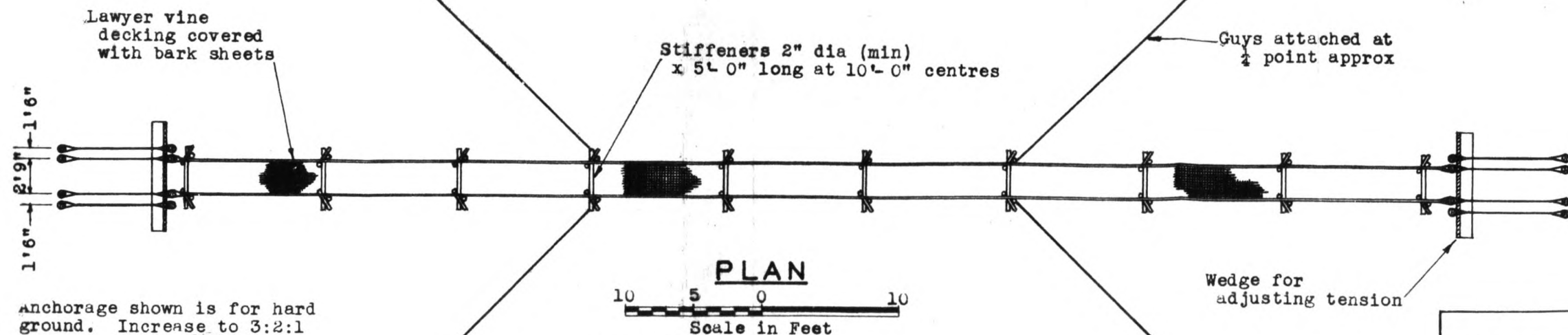
TOWER DETAILS

Span in Feet	Tower Height	Tower Legs	
		1 Pace Av dia	3 Paces Av dia
100	15'-3"	6"	5"
150	20'-3"	7"	6"
200	25'-3"	8"	7"
250	30'-3"	9"	8"
300	35'-3"	10"	9"
350	40'-3"	11"	10"
400	45'-3"	12"	11"

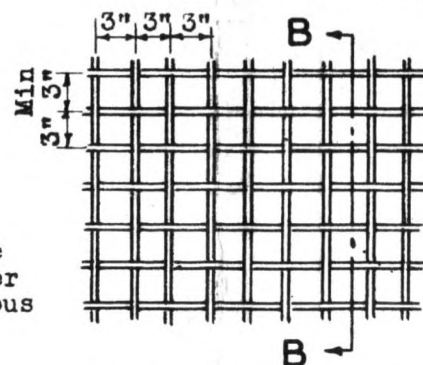




ELEVATION



PLAN

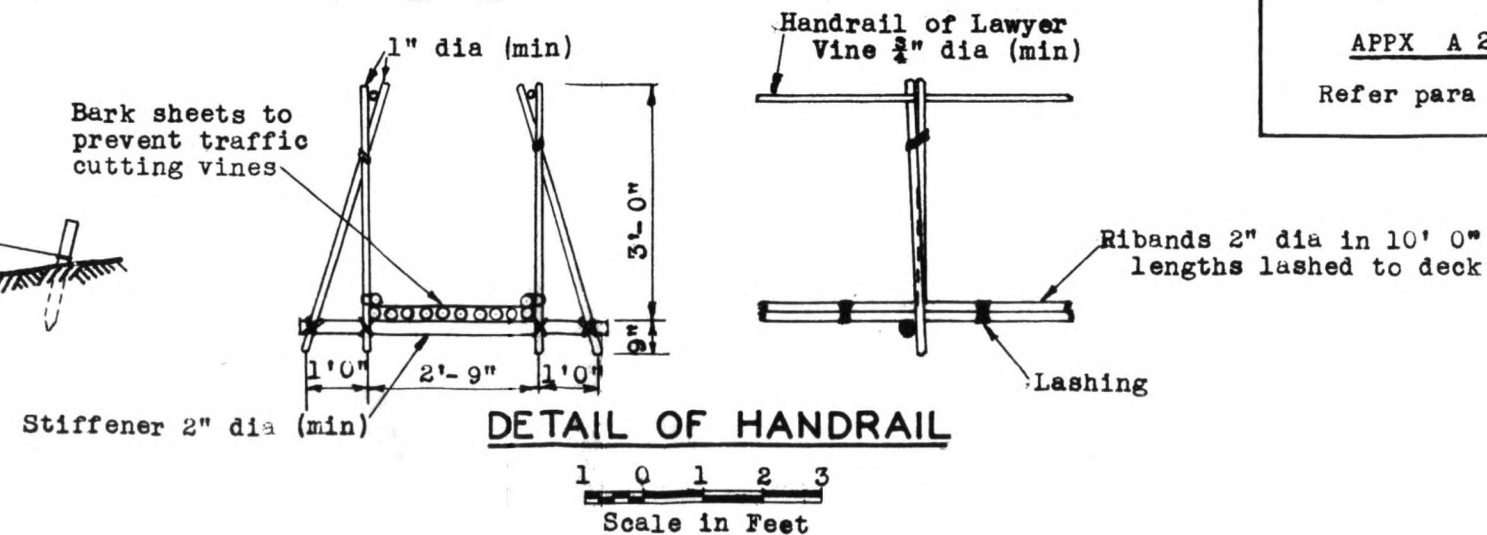


SECTION B.B.

WEAVING OF MAT DECKING

Scale 1 0 1 2 Feet

LAWYER VINE - FLAT SUSPENSION FOOTBRIDGE



NUMBER OF VINES - INFANTRY AT 3 PACES															
Size of Vine (dia) inches	Dip = $\frac{\text{Span}}{10}$					Dip = $\frac{\text{Span}}{15}$					Dip = $\frac{\text{Span}}{20}$				
	SPAN					SPAN					SPAN				
	50	75	100	150	200	50	75	100	150	200	50	75	100	150	200
$\frac{1}{2}$	8	11	15	22	30	10	15	19	29	39	13	19	25	38	50
$\frac{3}{4}$	5	7	9	13	18	6	10	12	19	25	8	12	16	24	32
$\frac{1}{2}$	3	5	6	9	12	5	7	9	13	18	6	9	12	17	23

NUMBER OF VINES - INFANTRY AT 1 PACE															
Size of Vine (dia) inches	Dip = $\frac{\text{Span}}{10}$					Dip = $\frac{\text{Span}}{15}$					Dip = $\frac{\text{Span}}{20}$				
	SPAN					SPAN					SPAN				
	50	75	100	150	200	50	75	100	150	200	50	75	100	150	200
$\frac{1}{2}$	18	27	35			26					33				
$\frac{3}{4}$	12	17	23	34		16	24	32			21	32			
$\frac{1}{2}$	8	12	16	24	32	12	17	23	34		15	23	30		

NOTE:-
To determine tension when designing holdfast according to load conditions multiply No of Vines shown in Table by value given for vine

DESIGN DATA	
LIVE LOAD	
1 Infantry man	200 lb
Inf at 3 pace interval	= 27 lb/ft
" " 1 " "	= 80 lb/ft
VINE LOAD	
Safe tension	= $1\frac{1}{2}$ C ² cwt
Allow 3.1 cwt on $\frac{1}{2}$ " dia vine	
" 4.9 " " $\frac{3}{4}$ " " "	
" 6.9 " " $\frac{1}{2}$ " " "	
HOLDFASTS	
6" dia post in hard ground	1 ton
6" " " " soft " "	$\frac{1}{2}$ "

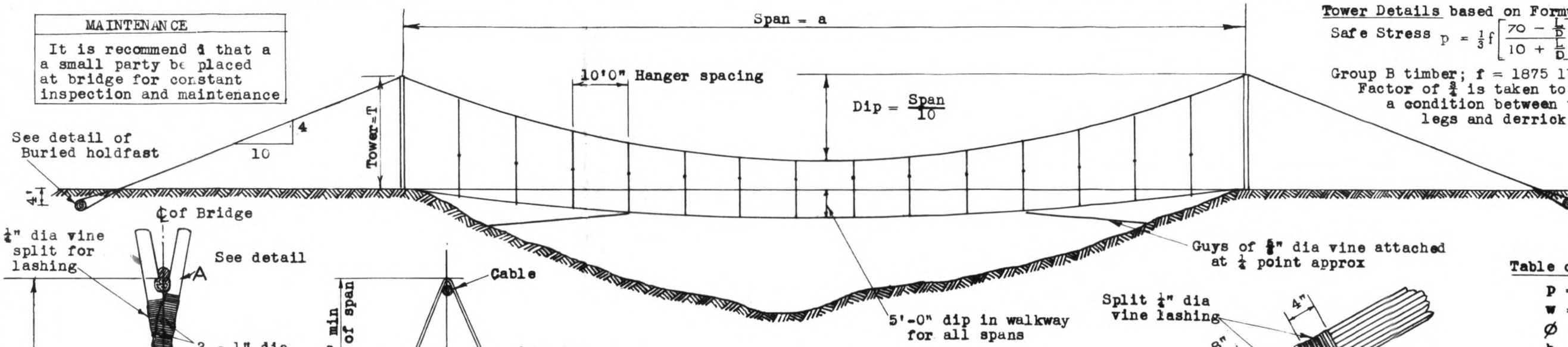
Note:-
For splicing and joining of Mats see details APPA A 24

MAINTENANCE
It is recommended that a small party be placed at bridge for constant inspection and maintenance

Tower Details based on Formula:-
Safe Stress $p = \frac{1}{3} f \left[\frac{70 - \frac{L}{D}}{10 + \frac{L}{D}} \right] \times \frac{1}{2}$
Group B timber; $f = 1875 \text{ lb/sq in}$
Factor of $\frac{1}{2}$ is taken to cover a condition between trestle legs and derrick pole.

BURIED ANCHORAGES		
Span in Feet	Size of Buried Log	
	Inf at 1 Pace	Inf at 3 Paces
100	15" dia x 6'	12" dia x 5'
150	15" dia x 8'	12" dia x 6'
200	18" dia x 9'	12" dia x 7'
250	18" dia x 11'	12" dia x 8'
300	18" dia x 13'	15" dia x 8'

TOWER DETAILS			
SPAN in FEET	HEIGHT	TOWER LEGS	
		AV Dia in INS	
		1 Pace	3 Paces
100	15'3"	6"	5"
150	20'3"	7"	6"
200	25'3"	8"	7"
250	30'3"	9"	8"
300	35'3"	10"	9"



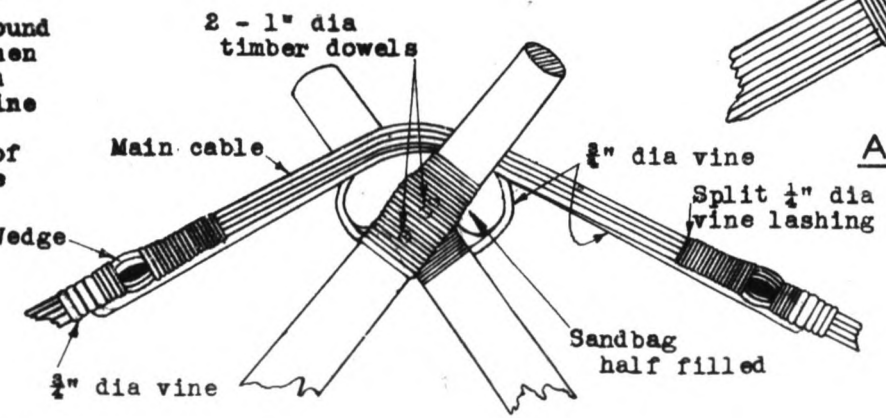
ELEVATION

Table of Anchorages based on formula:-
 $p = \frac{1}{3} w d^2 h \sin 2\phi (1.5 - \sin\phi)$
 $w = 100 \text{ lb/c ft}$
 $\phi = 35^\circ$
 $h = 4'-0"$
 $d = 4'-0"$
Then $p = 1.0 \text{ tons/sq ft}$

SIZES OF CABLE					
INFANTRY AT 1 PACE INTERVAL					
Span in Feet	100	150	200	250	300
Tension in lbs	14800	22200	29600	37000	44400
1/2" dia vine	19	29	36	48	57
INFANTRY AT 3 PACE INTERVALS					
Span	100	150	200	250	300
Tension in lbs	7660	11500	15300	19200	23000
1/2" dia vine	10	15	20	25	30
3/8" dia vine	15	22	29	36	43

DESIGN DATA
LIVE LOAD
Infantrymen weighs 200 lb
Inf at 3 pace interval = 27 lb/ft
" " 1 pace " = 80 lb/ft
VINE
Safe load = $1\frac{1}{2} C^2 \text{ cwt}$
DIP
 $\frac{\text{Span}}{10}$
CABLE
Max Tension = 1.346 wa

METHOD OF ATTACHING HANGER TO CABLE



DETAIL AT 'A'

POSITION AND LENGTH OF HANGERS																
Span	H	Length of cable between Towers = 2 x "L" at ϕ														
		10-00	20-00	30-00	40-0	50-0										
		L	D	H	L	D	H	L	D	H	L	D	H	L		
100	H	10-00	20-00	30-00	40-0	50-0										
	L	10-65	21-04	31-24	41-32	51-33										
	D	6-35	4-96	4-00	3-43	3-25										
150	H	10-0	20-0	30-0	40-0	50-0	60-0	70-0	75-0							
	L	10-71	21-21	31-67	41-80	51-93	61-98	71-99	77-00							
	D	10-58	8-46	6-71	5-33	4-29	3-59	3-29	-							
200	H	10-0	20-0	30-0	40-0	50-0	60-0	70-0	80-0	90-0	100-0					
	L	10-73	21-30	31-75	42-09	52-33	62-50	72-60	82-65	92-67	102-67					
	D	15-20	12-66	10-40	8-46	6-86	5-54	4-52	3-80	3-38	3-25					
250	H	10-0	20-0	30-0	40-0	50-0	60-0	70-0	80-0	90-0	100-0	110-0	120-0	125-0		
	L	10-73	21-36	31-87	42-28	52-61	62-86	73-05	83-17	93-26	103-30	113-33	123-33	128-33		
	D	20-05	17-18	14-6	12-4	10-3	8-52	6-97	5-74	4-72	4-00	3-51	3-27	-		
300	H	10-0	20-0	30-0	40-0	50-0	60-0	70-0	80-0	90-0	100-0	110-0	120-0	130-0	140-0	150-0
	L	10-76	21-39	31-94	42-42	52-81	63-14	73-39	83-59	93-74	103-85	113-92	123-97	133-99	144-0	154-0
	D	24-8	21-81	19-05	16-49	14-2	12-1	10-18	8-53	7-12	5-91	4-93	4-20	3-65	3-35	3-25

ϕ

Length of cable between Towers = 2 x "L" at ϕ

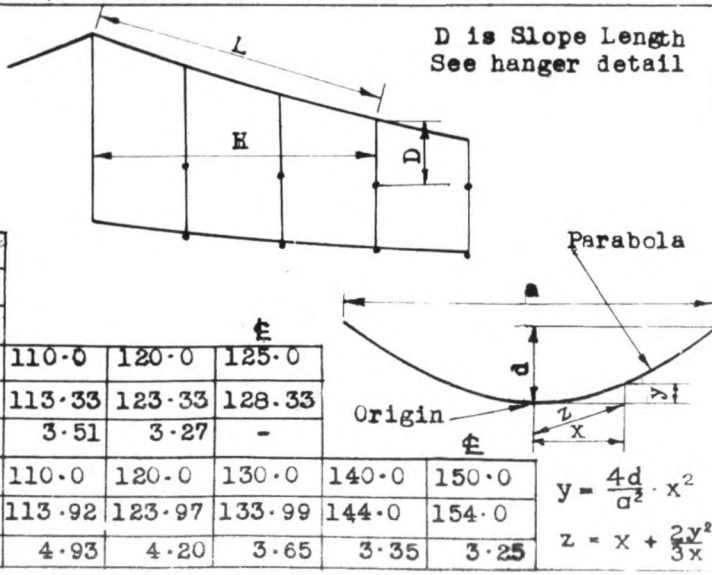
D is Slope Length
See hanger detail

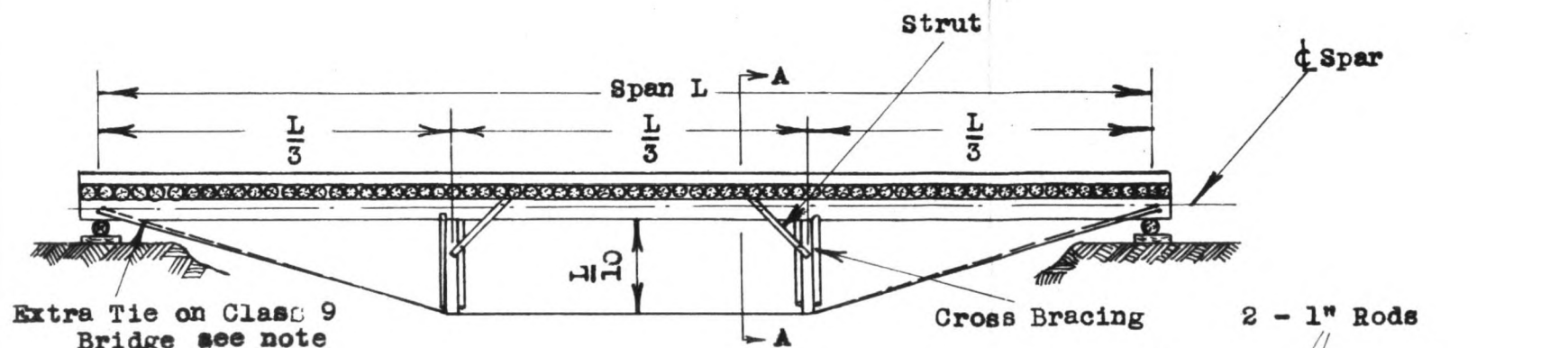
Parabola

Origin

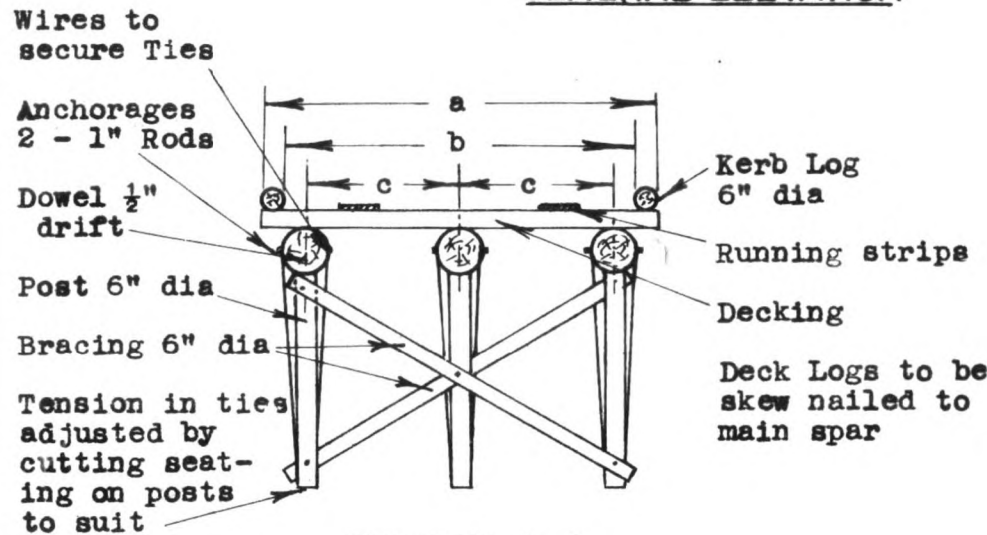
$y = \frac{4d}{a^2} \cdot x^2$

$z = x + \frac{2x^2}{3x}$

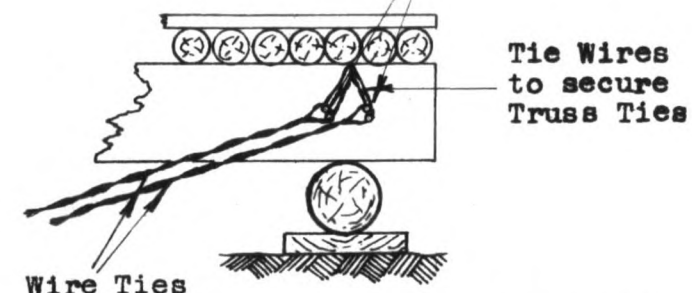




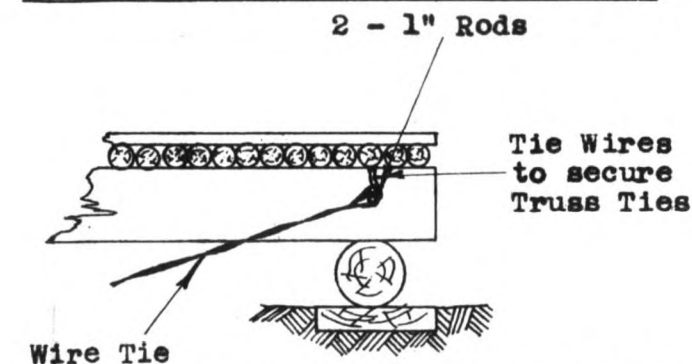
GENERAL ELEVATION



SECTION A-A



DETAIL OF TIE ANCHOR FOR CLASS 9



DETAIL OF TIE ANCHOR FOR JEEPS & D2 TRACTORS

TABLE OF SIZES FOR LOADED 3 TON TRUCKS CLASS 9

For Class 9 Bridge wires to be formed into four ropes (2 on each side of truss) each one quarter of total number shown in table. Each rope to have eye formed at each end. Length of wire rope between centres of eyes equals span + 3%

Span Ft	Spar Diam Ins	Total No 8 SWG Wire	a	b	c	Decking
30	12	44	10'0"	9'0"	3'6"	6" dia min
40	13 1/2	52				
50	15	58				
60	16	64				

TABLE OF SIZES FOR "JEEPS" & D2 TRACTORS

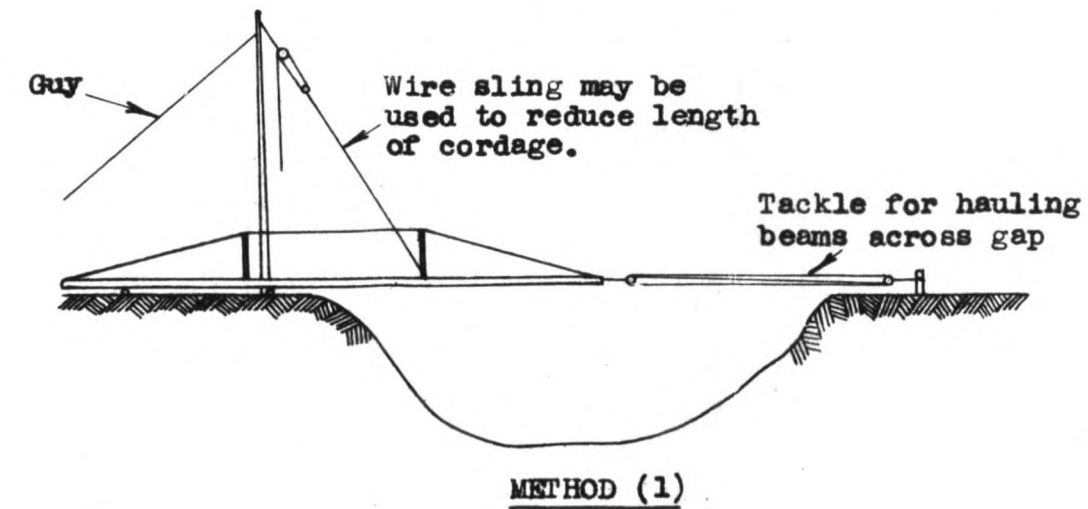
For 'Jeeps' Bridge wires to be formed into two ropes (1 on each side of truss) each one half of total number shown in table. Eye to be formed at each end.

Span Ft	Spar Diam Ins	Total No 8 SWG Wire	a	b	c	Decking
20	9	22	8'6"	7'6"	3'0"	3 1/2" dia min
40	10 1/2	24				
50	11 1/2	26				
60	12	28				

Spar diam is min tip size, slightly larger spars may be used without alteration to design.

METHODS OF LAUNCHING BY MEANS OF DERRICK & PREVENTER TACKLE

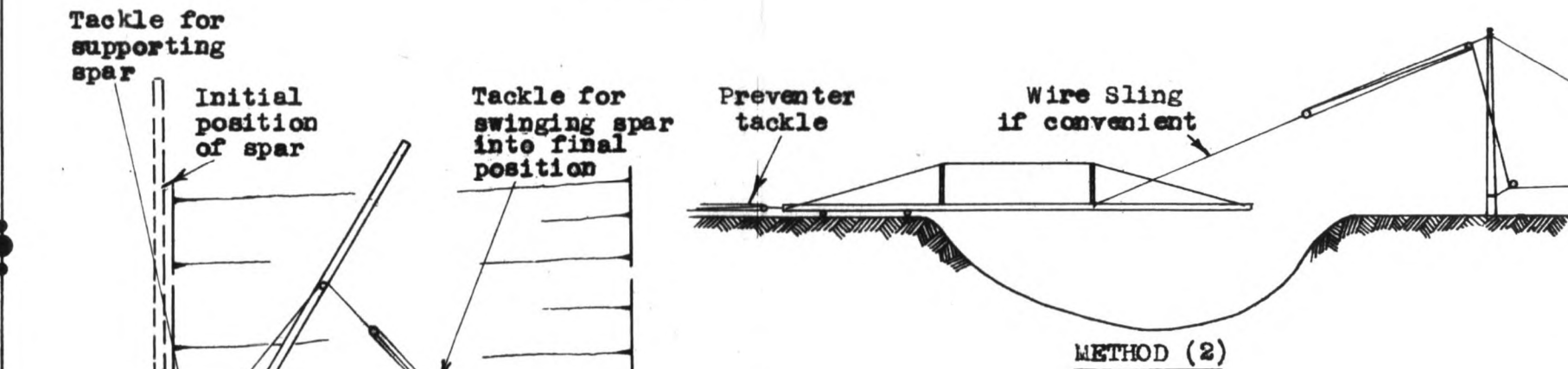
NOT TO SCALE: - Diagrammatic Only



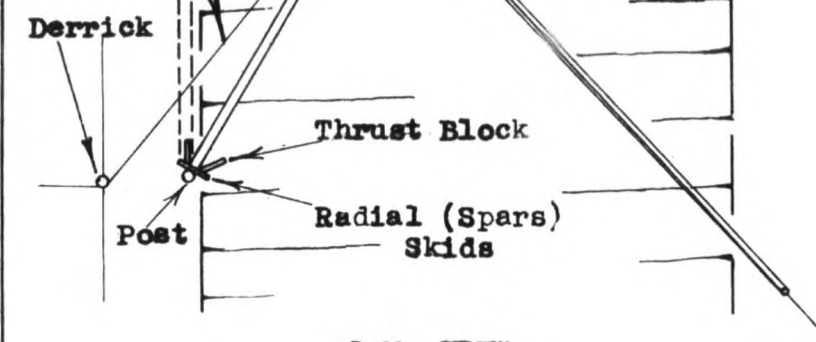
METHOD (1)

ERECTION OF BEAMS

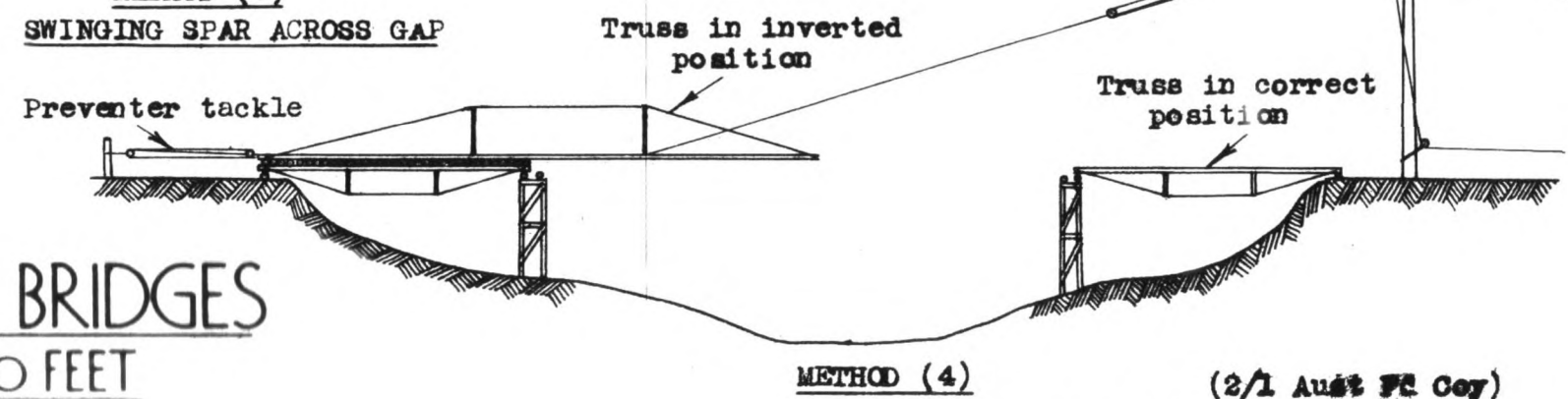
To avoid damage to Tie system; spars are launched inverted and when in position are rolled over to bring tie into correct position.



METHOD (2)



PLAN VIEW
METHOD (3)
SWINGING SPAR ACROSS GAP



METHOD (4)

For multiple spans erect end spars as below and place decking on end; centre spar is hauled into place with Derrick & Preventer Tackle.

TRUSSED BEAM BRIDGES FOR SPANS UP TO 60 FEET

MEMBERS.

APPX A 29

Refer para 48

8 Gauge Fencing wire

1. 36 returns
2. 38 "
3. 44 "
4. 50 "
5. 54 "
6. 60 "

Spars

7. 7" x 9'0" L.
8. 7" x 11'2" "
9. 8" x 14'2" "
10. 9" x 17'6" "
11. 10" x 20'9" "



Top Bracing
5" Dia Spar

No 5 - 7/8" or 1" drifts
also cover drift
with a few
turns of
wire.

2 - 7/8" drifts. also
lash transome to
top chord with
wire.

10' inside top
chords.
Guy 8 returns
8 Ga. wire
twisted.

No 6 - 7/8" drifts.

9'5 1/2" Panel

No 5 - 7/8" or 1" drifts

Secure top chords to
Bed Log with mortise and
tenon joint and fencing
wire so that Bed Log
acts as a hinge for
erection.

1'10"

4 1/2" drifts.

Fencing Wire.

14" x 7" Cross Beams.

Spar - 15" at Butt 12" Small End 49'0" long.

121'-4" C to C of Bearing Logs

W.L.

ELEVATION - HALF BRIDGE

10 5 0 10
Scale in Feet

Joint - Halve 12" Spars and lap
over distance of 4'0" Join members
with 9/16" drifts & bind joint with wire

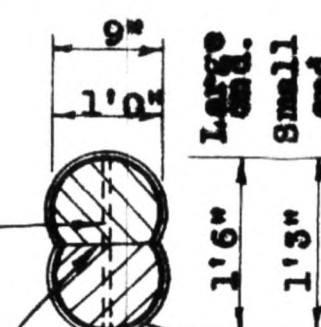
Small end

Large end

1/2" or 1/4" drift burred
over at ends after
driving.

Square on one face only.

SECTION OF TOP CHORD.



Roughly square
these faces.

Twist together
with 8 turns of
12 Ga. wire.

SECTION SHOWING CONNECTION BETWEEN TOP & BOTTOM CHORD.

10 5 0 10
Scale in Feet

METHOD OF ERECTION.

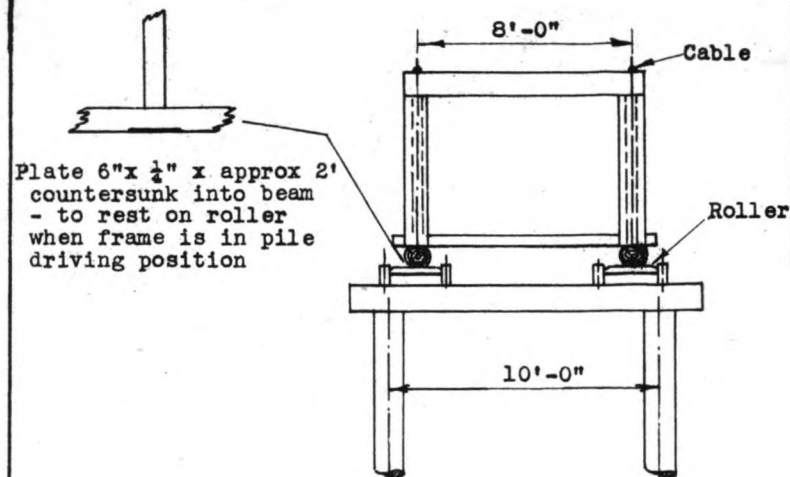
1. Brace top chords together as per drawing in pairs on each side of river.
2. Pull pair of top chords out towards centre of river ready for erection.
3. Lift right hand top chords up into position above designed height.
4. Lift left hand pair of top chords to designed height and lower right hand top chords so that the spar ends of each pair rest on the transome of the other pair.
5. Make the connection between the top chords - using drifts arranged as shown in elevation.
6. Connect the lifting tackles to the centre of the splices in the top chords and pull out any downward deflection that may have occurred - leave tackles in position while web members are being inserted.
7. Pull bottom chords out by means of tackle suspended from top chord - the centre section of the bottom chords will be rolled out on rollers supported on end sections of the bottom chord and then supported by tackle from top chord.
8. Make bottom chord connections and support bottom chord from top chord while web members are being inserted.
9. Cut and fix diagonal struts in position place hangers in position and twitch up tight until as much sag as possible is out of chords and struts are tight.
10. Place floor system, bracing and guys.

120' SPAN BRIDGE.

DESIGNED TO CARRY LOADED 3 TON TRUCKS (6 TON TOTAL LOAD)
USING 3RD GRADE TIMBER SPARS 1/2" ROUND BARS STANDARD NO. 8
GAUGE FENCING WIRE SPIKES AND NAILS ONLY.
ALLOWANCE FOR IMPACT - 25%

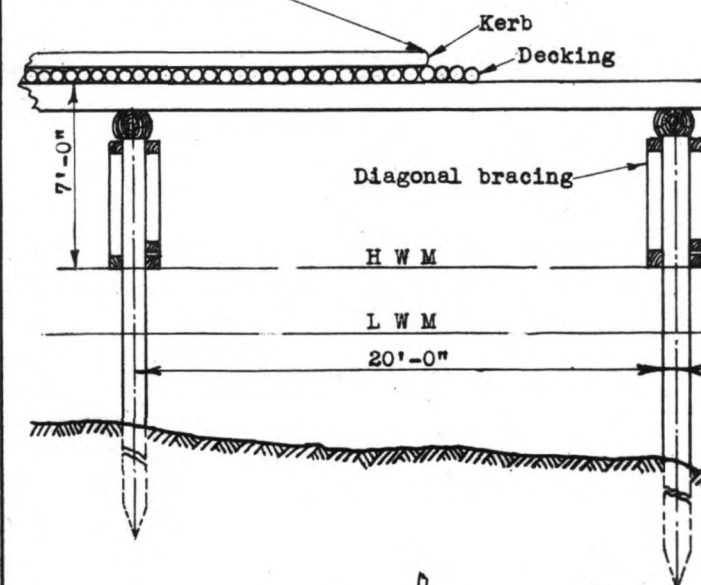


Source:- CE NG Force (From design by Major. N. B. Watts 2/8 Aust Fd Coy)

**SECTION B.B.**

This view shows rollers as Alternative method for moving frame forward. Rollers not shown on Main Elevation.

Jetty completed to this point behind traveller frame



Engine driven winch, 3 ton truck (4 x 4 winch) or team of men can operate pile driver from here. Truck moves forward before traveller is moved.

Lashing used when pile driver is in operation

9" dia kerb

4" dia decking

Underside of beam well greased

Temporary strut. Removed when frame moves forward

Bolt through beam

12" av dia x 45'

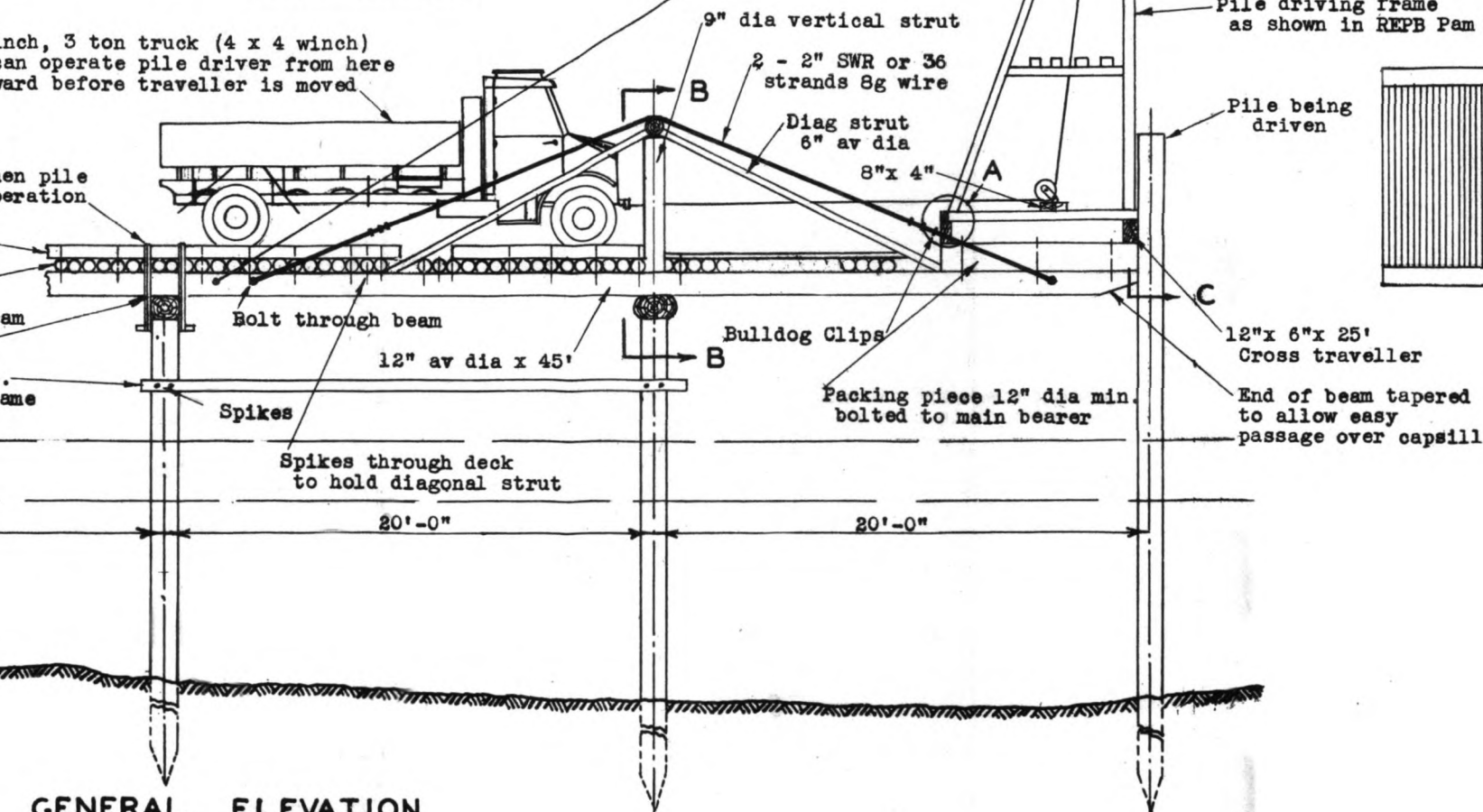
Spikes

Spikes through deck to hold diagonal strut

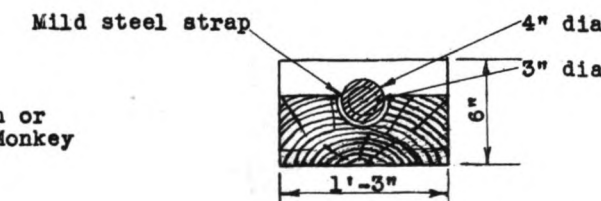
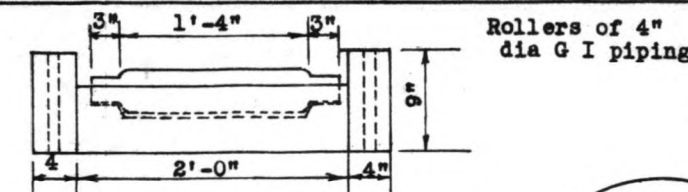
GENERAL ELEVATION

10 5 0 10

Scale in Feet

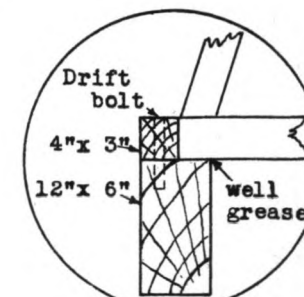
TRAVELLER FOR END-ON PILE-DRIVER**METHOD OF MOVING TRAVELLER****FRAME FORWARD**

(Diagrammatic Only)

**DETAIL OF ROLLERS**

1 0 1

Scale in Feet

**DETAIL AT A.**

8"x 4" securely lashed to pile frame

PLAN OF TRAVELLER FRAME

SHOWING METHOD OF MOVING PILE DRIVING FRAME

1 0 5 10

Scale in Feet

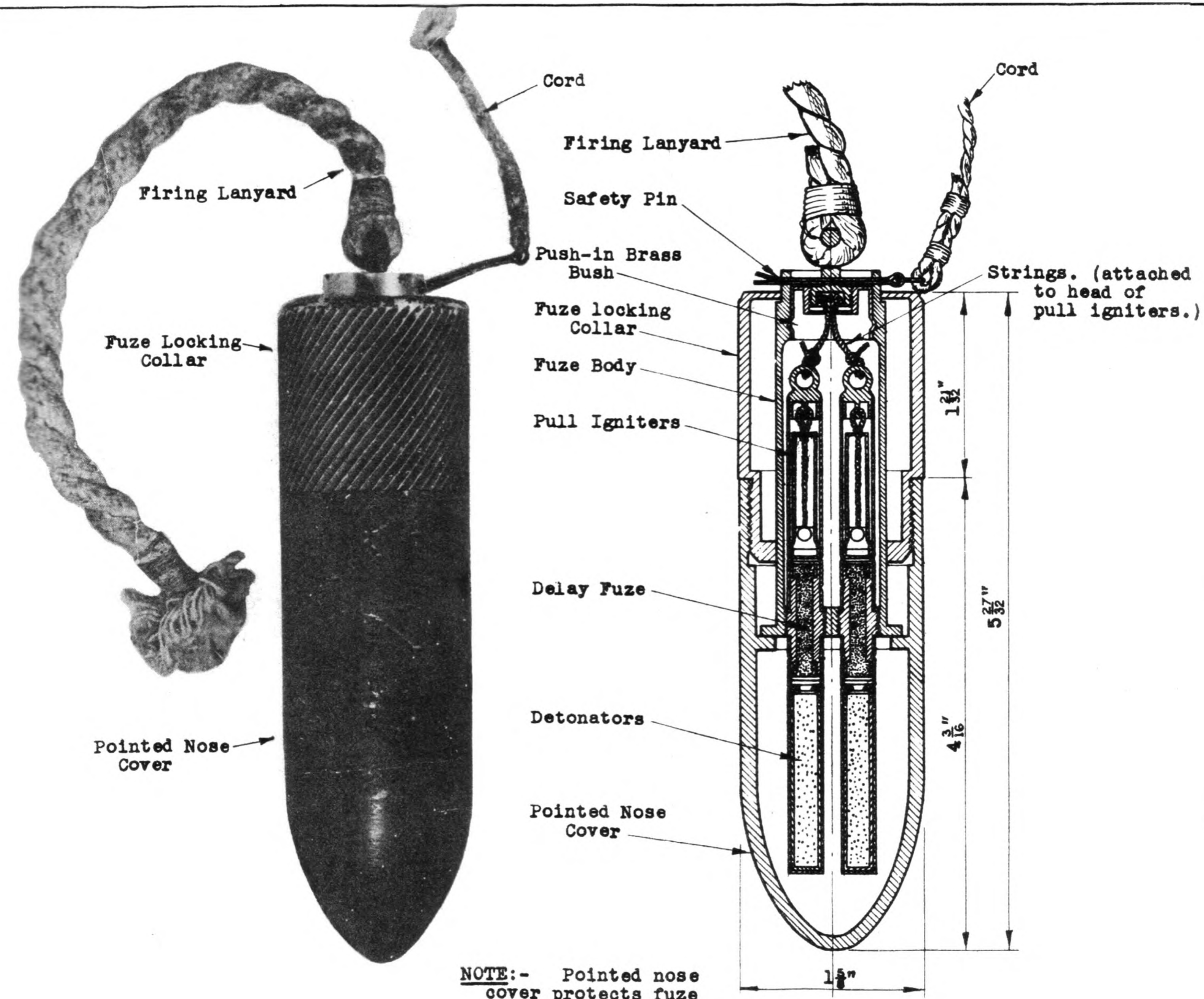
DESIGN DATA**WEIGHTS:-**

- a. 3 ton truck (4 x 4 winch) = 4 ton 10 cwt
- b. Cast Iron Monkey = 10 cwt
- c. Pile Frame = 10 cwt
- d. Pile 30' x 12" dia = 25 cwt

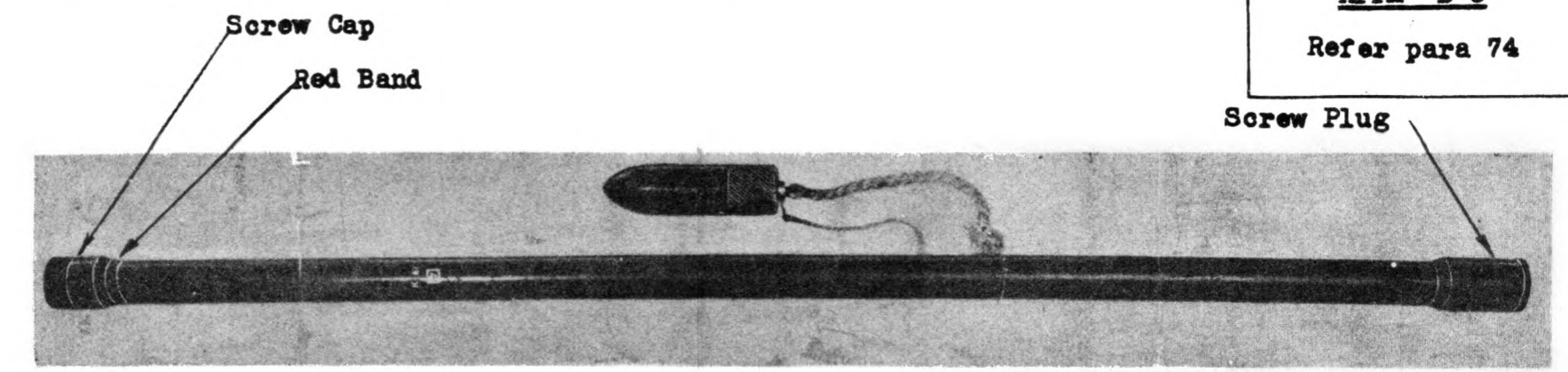
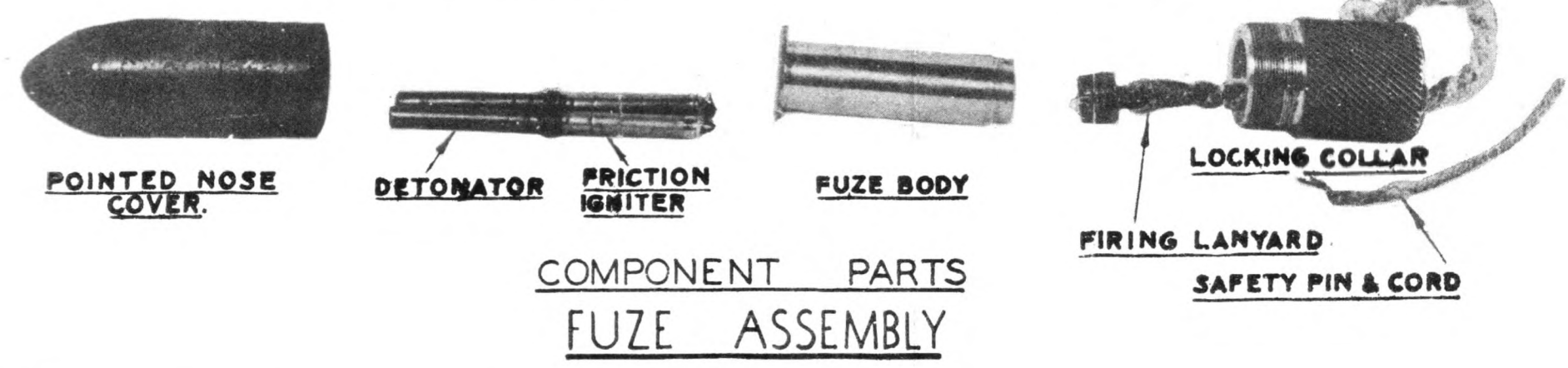
Timber Group 'B'

SWR or plain wire Safe load = 1/2 normal safe load = 8C²

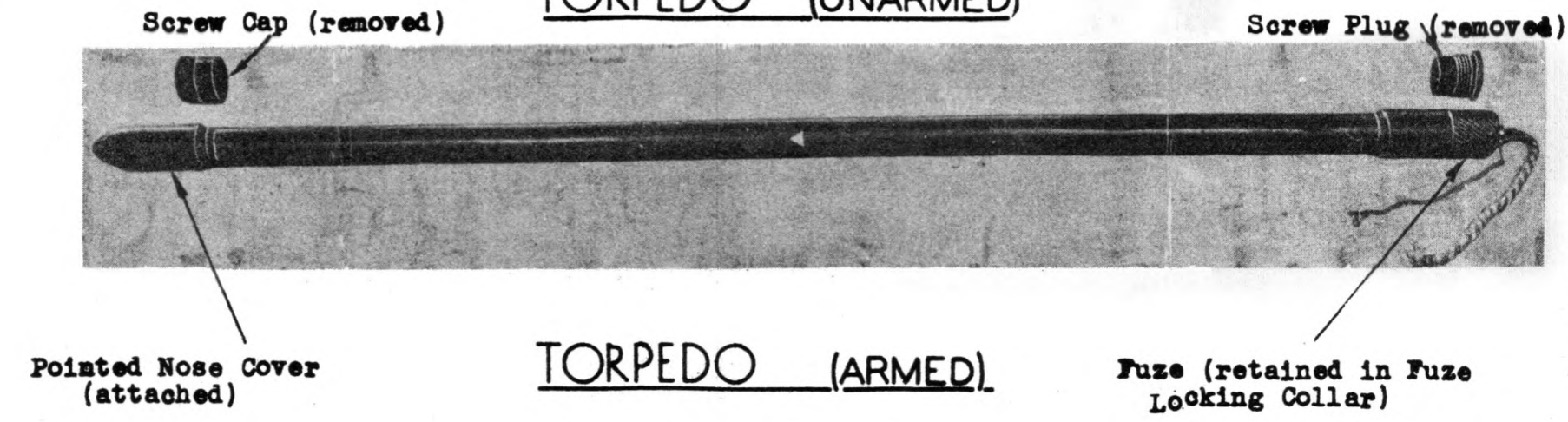
Traveller Frame	SPAN				
	10'	15'	20'	25'	30'
Tip diameter (min) inches			10		
Vert Strut dia - inches			9		
Diag Tension Member - SWR			3		
Remarks					



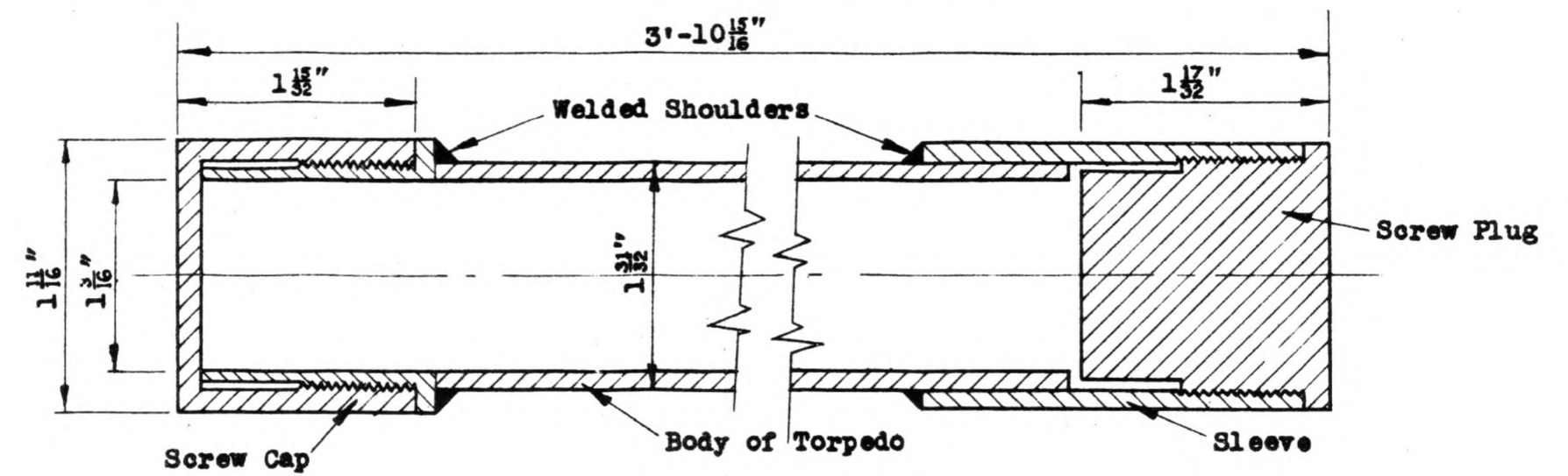
NOTE:- Pointed nose cover protects fuze assembly during transit.



TORPEDO (UNARMED)



TORPEDO (ARMED)



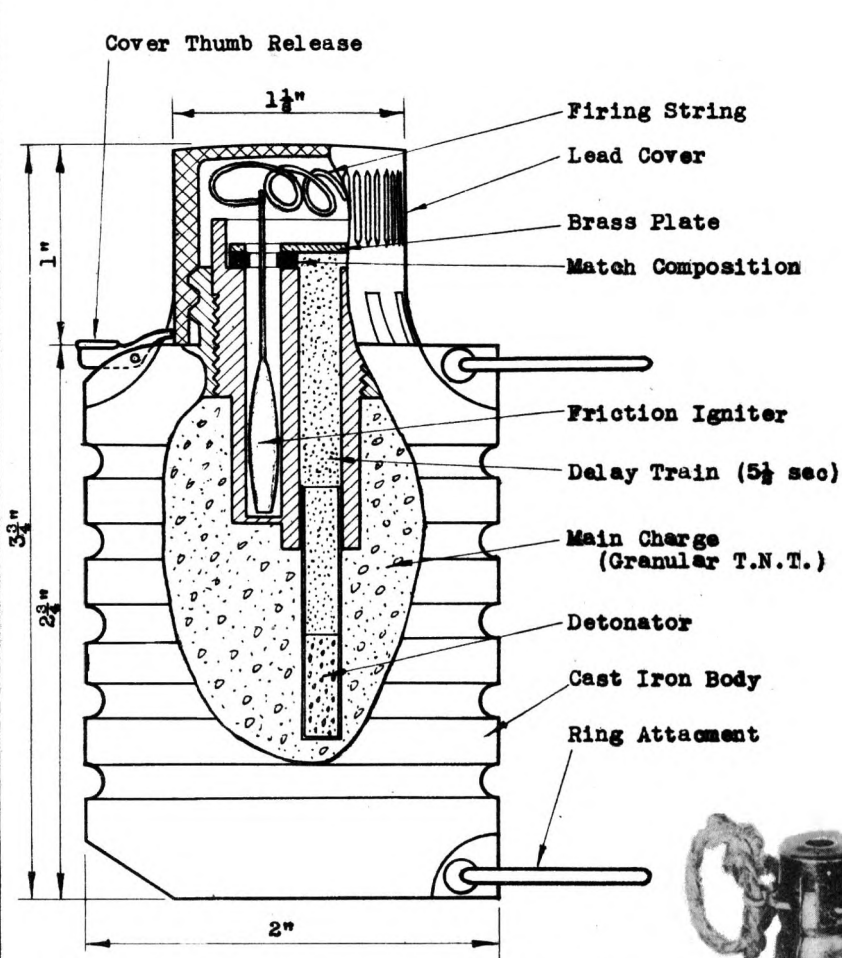
TO ASSEMBLE:-

The pointed nose cover is unscrewed from the fuze locking collar and replaces the screw cap on the male end of the torpedo body. The screw plug is then removed from the female end of the torpedo body and the fuze locking collar, with the fuze body, is screwed in to replace it.

LONG SECTION TORPEDO BODY (UNARMED)

CHARACTERISTICS		
Length of Torpedo (Unarmed)	.. ..	3'-10 15/16"
Length of Torpedo (Armed)	.. ..	4'-3"
Diameter of Body	.. ..	1 1/2"
Thickness of Wall	.. ..	7/64"
Type of Main Charge	{ TNT	36.4%
	{ Cyclonite	63.6%
Weight of Filling	.. ..	3 lb
Weight of Fuze (complete)	.. ..	12 1/2 oz
Fuze Delay	.. ..	8 sec

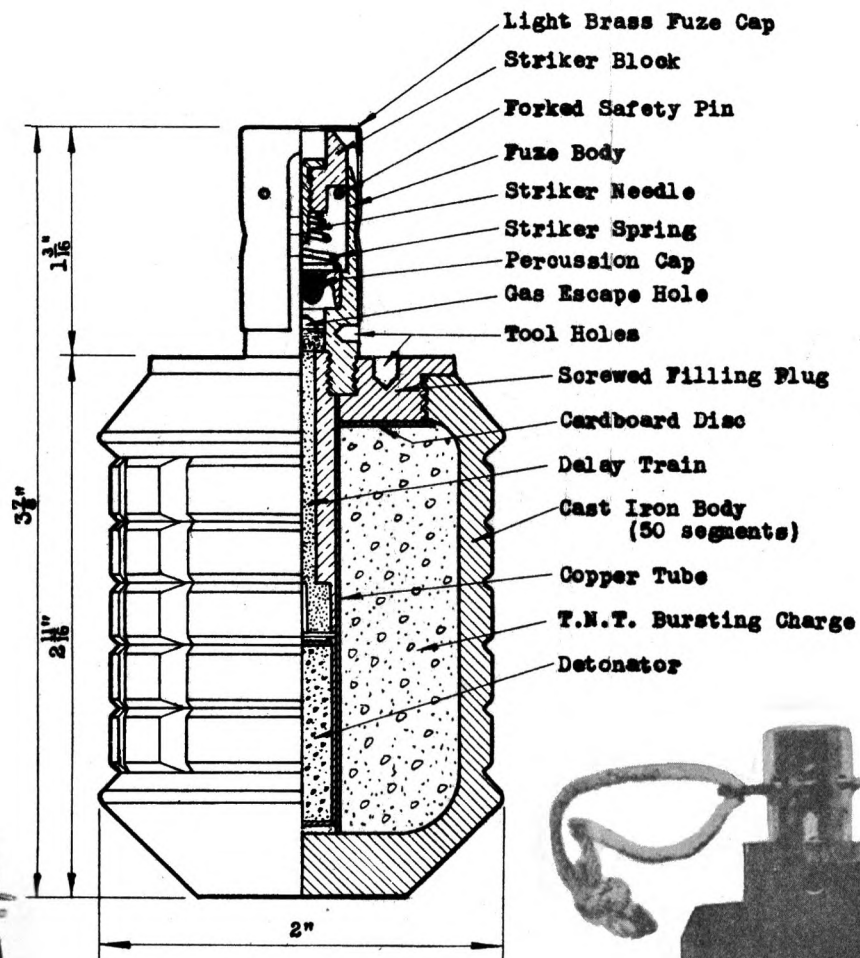
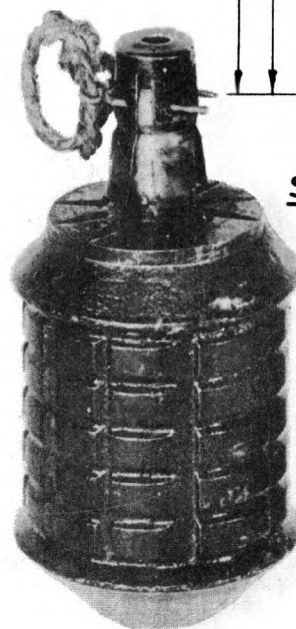
JAPANESE BANGALORE TORPEDO



ELEVATION - PART IN SECTION

Weight - Total	: 15.8 oz
Weight of Body	: 14.4 oz
Weight of Filler	: 1.4 oz

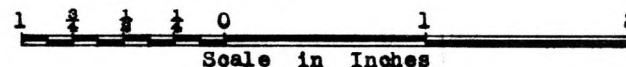
PULL TYPE



SECTIONAL ELEVATION

DELAY:- Captured Jap Document states that delay for -
 . TYPE 97 - 4-5 secs
 TYPE 91 - 6-7 secs
 however these times have been found erratic.

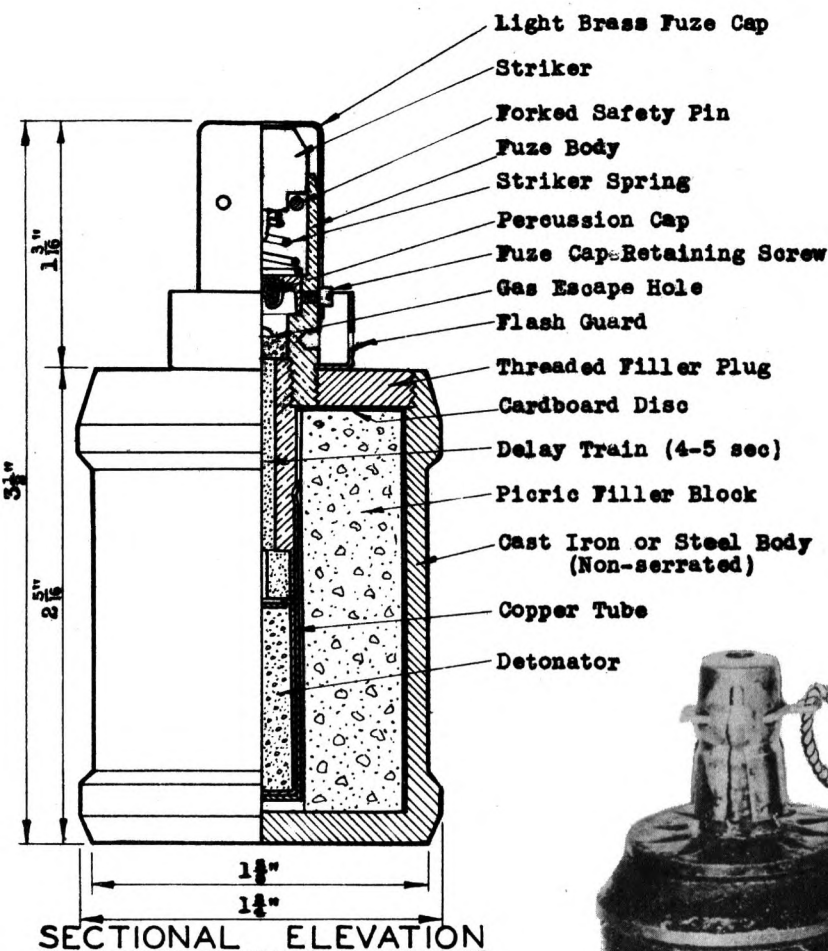
TYPE 97



JAPANESE
HAND GRENADES

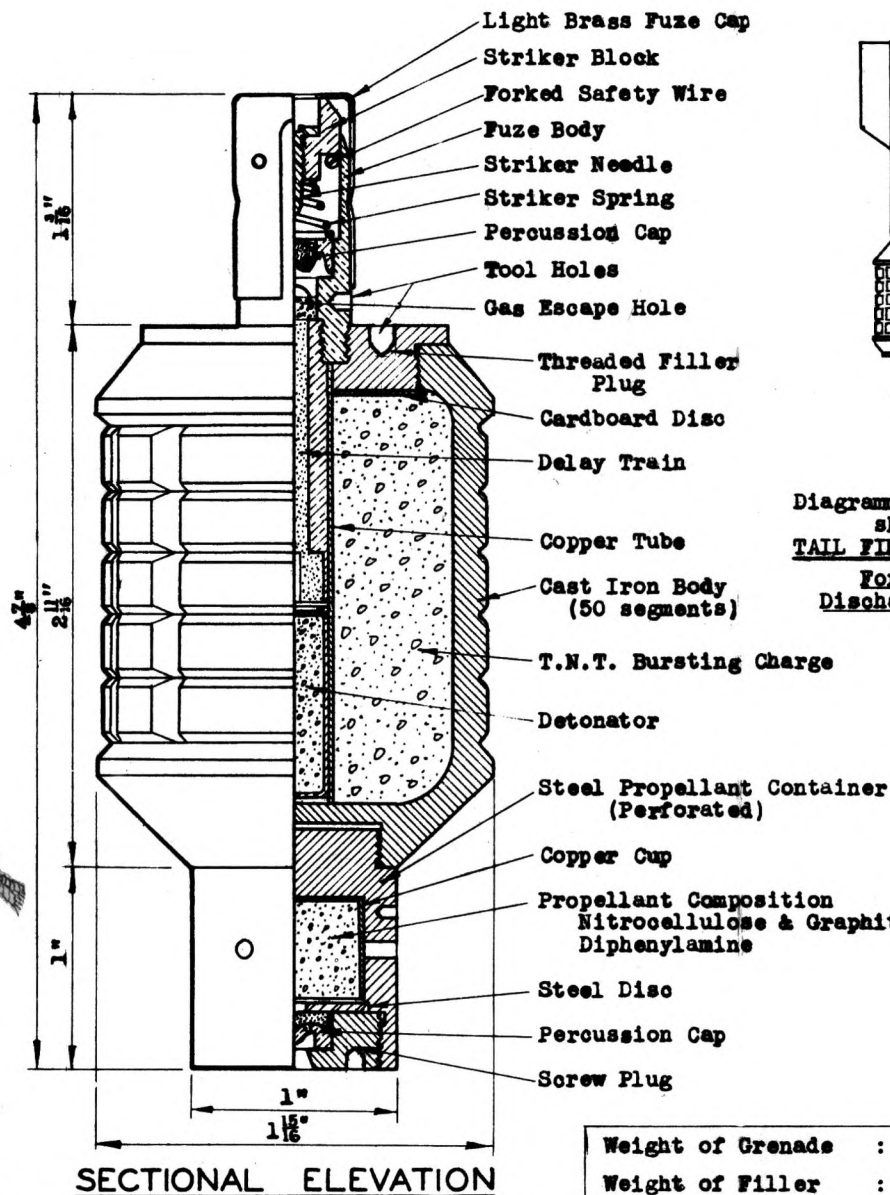


Refer paras:-
102, 103, 104.



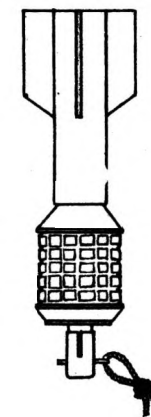
Weight of Grenade	: 10.6 oz
Weight of Filler	: 1.9 oz

IMPROVED TYPE
TYPE 99 (A)



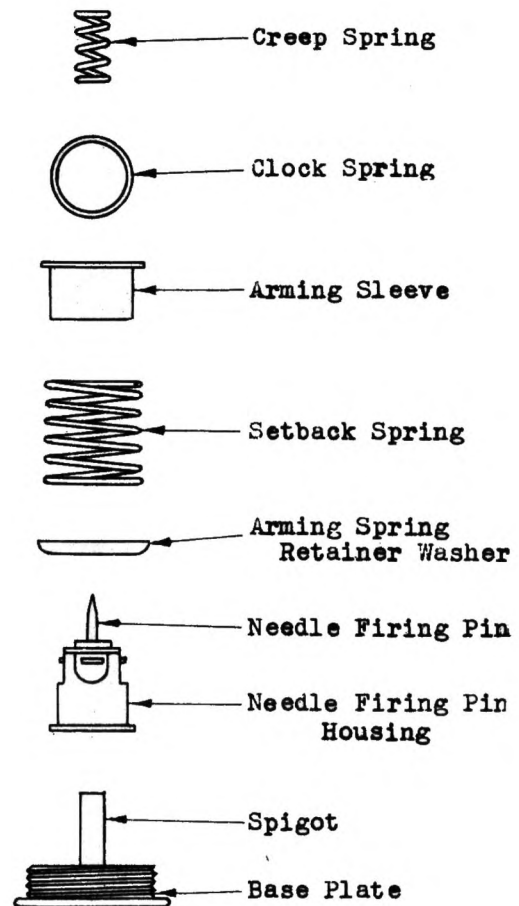
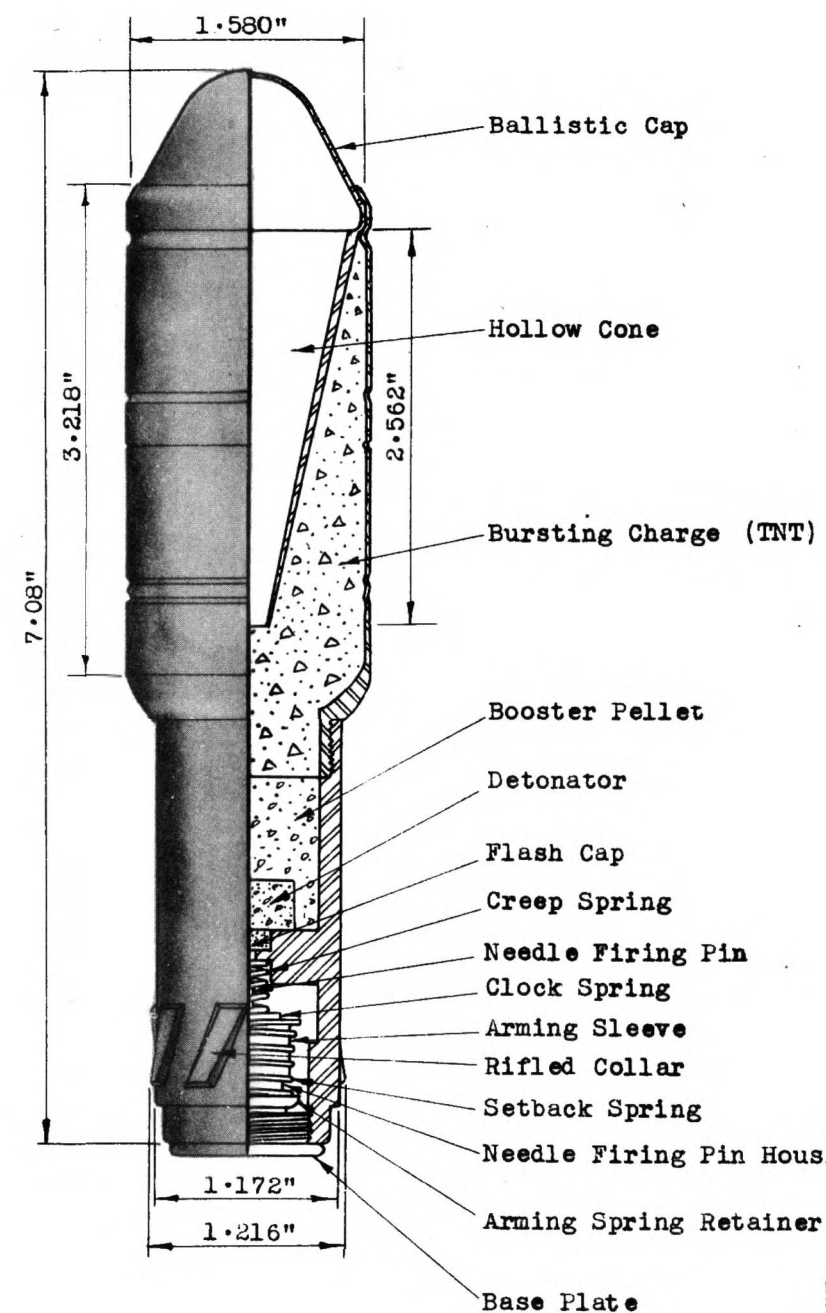
Weight of Grenade	: 18.9 oz
Weight of Filler	: 2.3 oz

TYPE 91
JAPANESE
MORTAR GRENADE



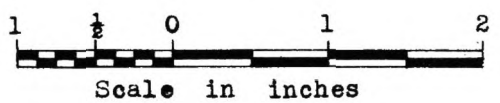
Diagrammatic Sketch
showing
TAIL FIN ATTACHMENT
For Rifle
Discharger Only

A modification of this Grenade, known as "10th Year Type", has no Threaded Filler Plug on top of body and has a threaded opening in base into which Propellant Container screws.

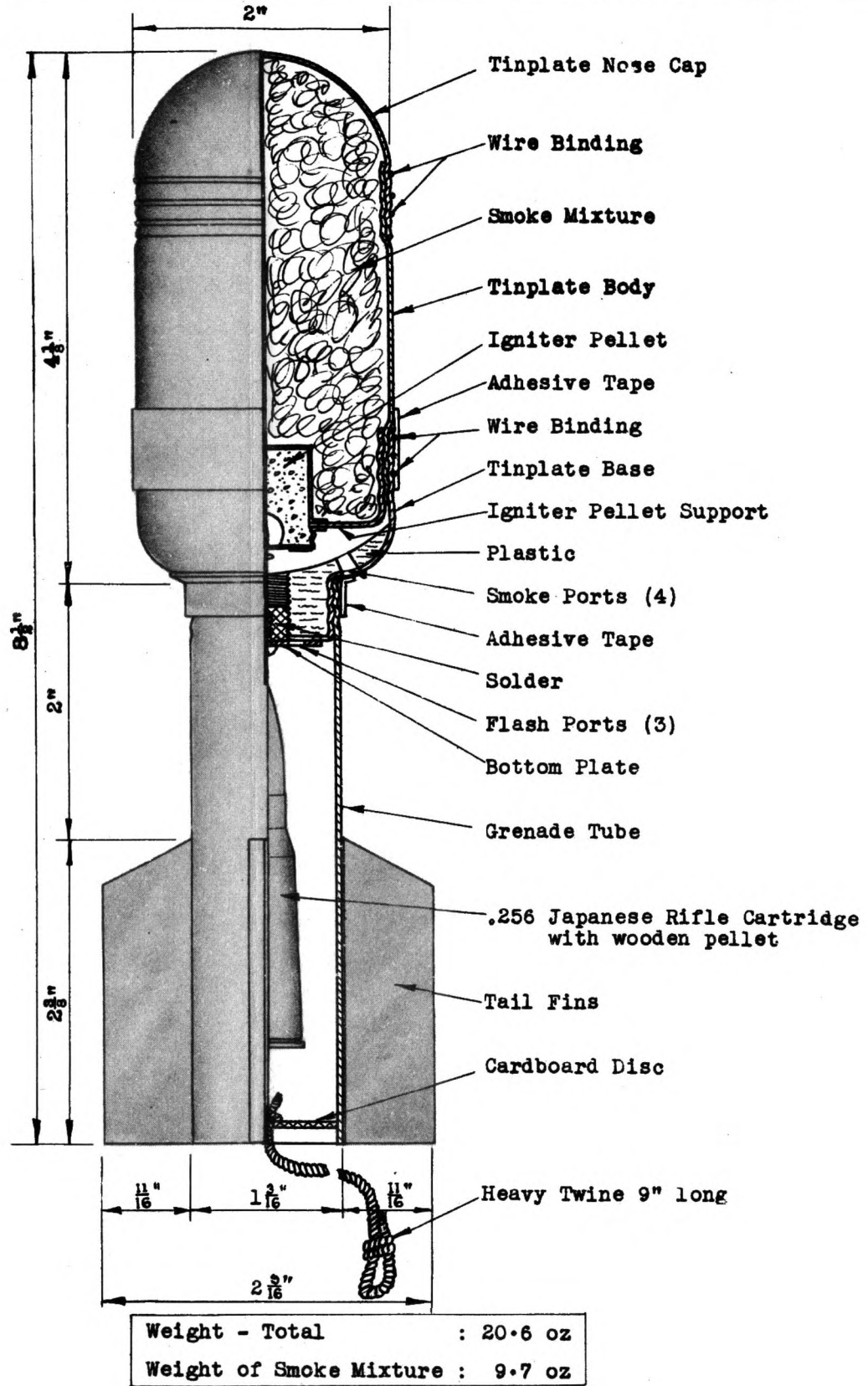


FUZE PARTS

CHARACTERISTICS	
Weight of complete Grenade	12.45 oz
Weight of explosive charge	3.81 oz
Weight of body	4.61 oz
Weight of fuze, detonator and primer	4.03 oz

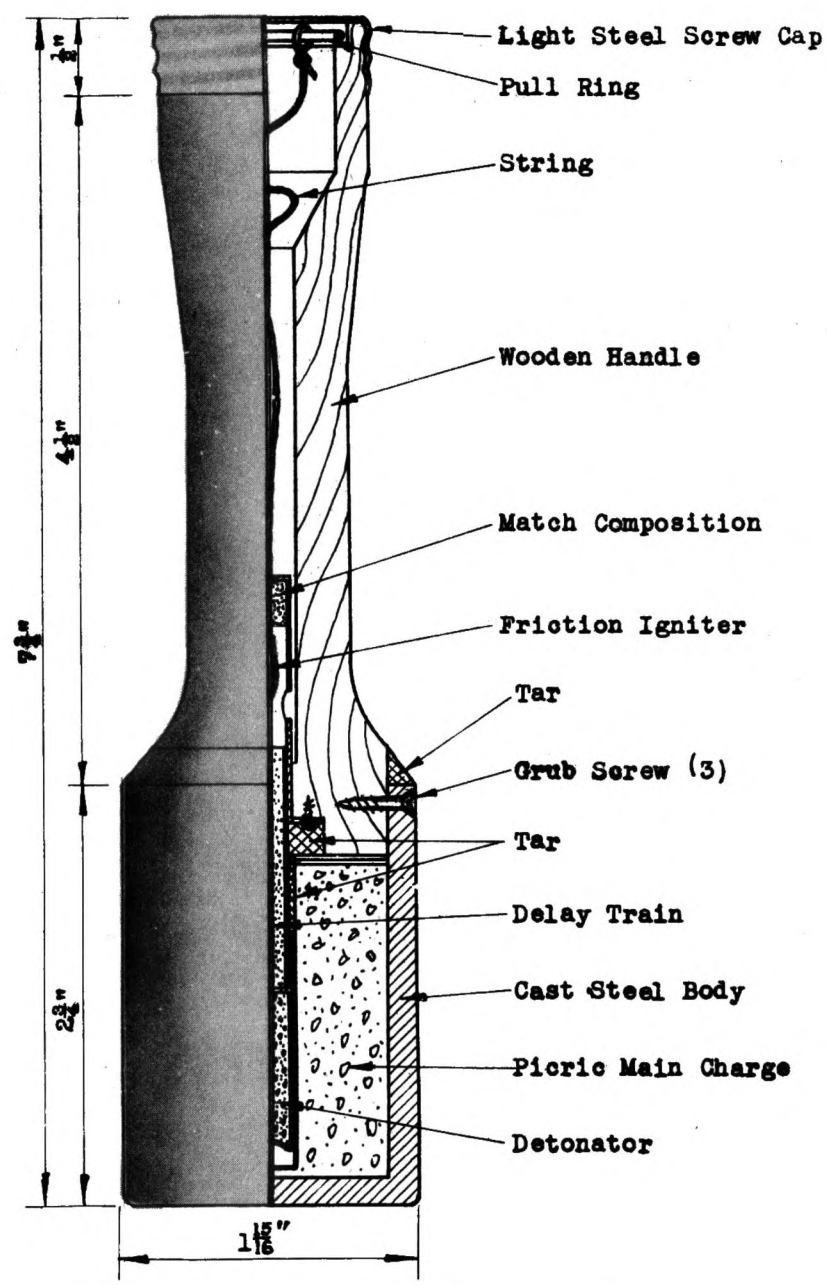


**JAPANESE
RIFLE GRENADE - HOLLOW CHARGE**



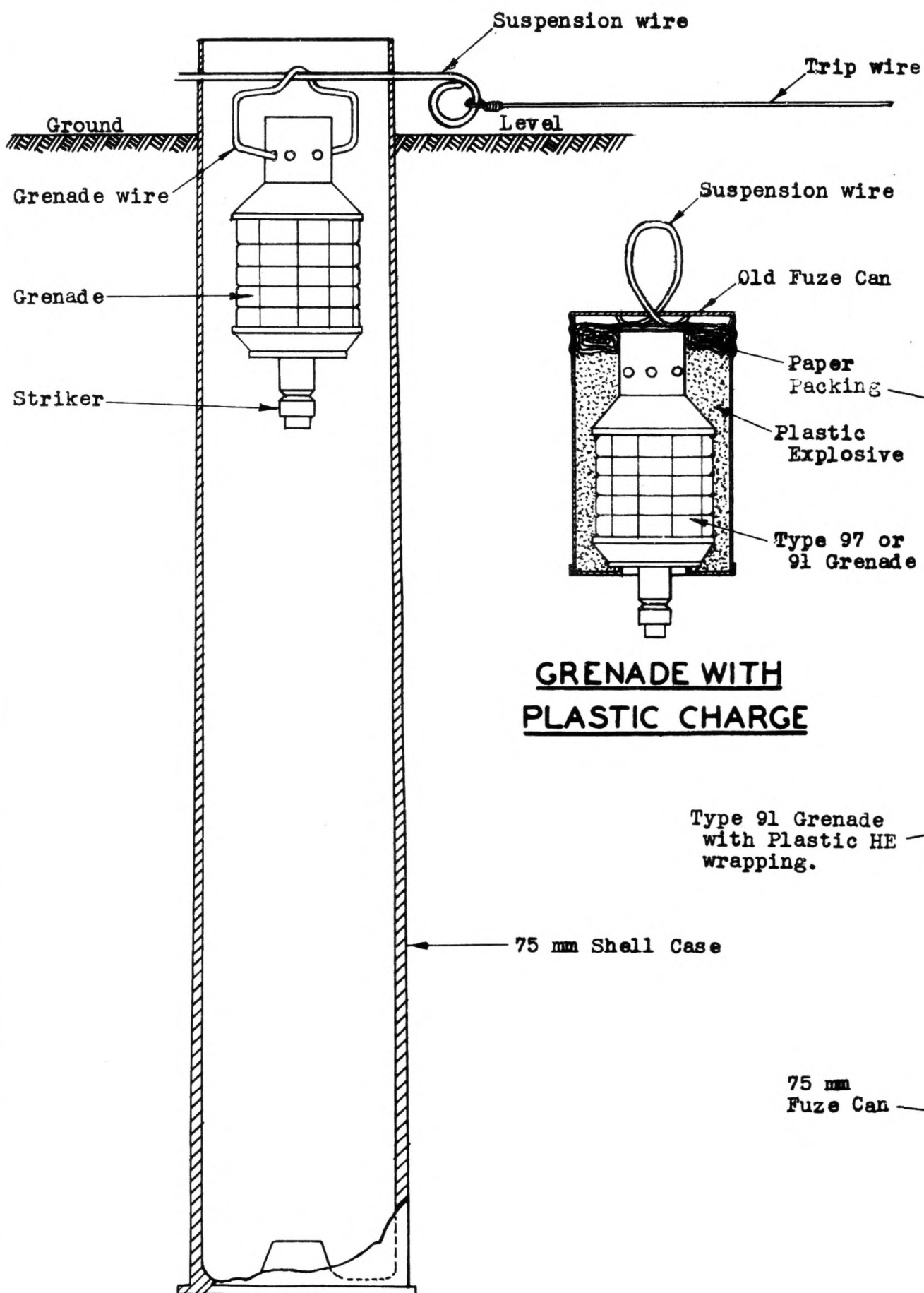
Weight - Total	: 20.6 oz
Weight of Smoke Mixture	: 9.7 oz

**JAPANESE
RIFLE GRENADE - SMOKE**



Total Weight	: 1 lb 3 oz
Weight of Body	: 14 oz
Weight of Explosive	: 3 oz

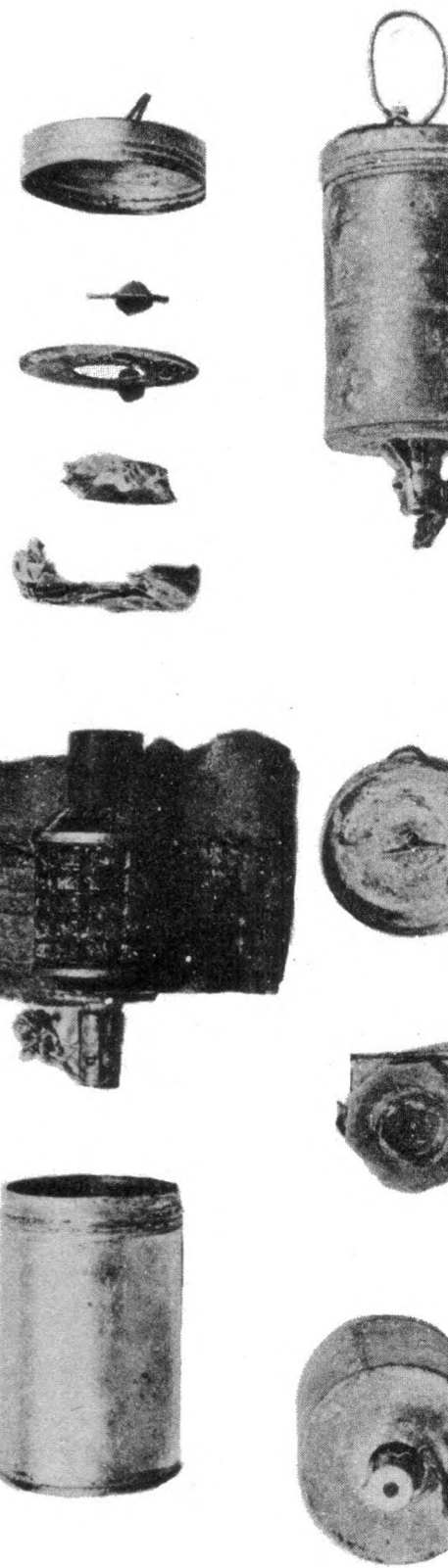
**JAPANESE
STICK GRENADE**



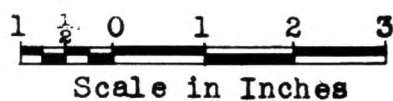
GRENAD WITH PLASTIC CHARGE

Type 91 Grenade
with Plastic HE
wrapping.

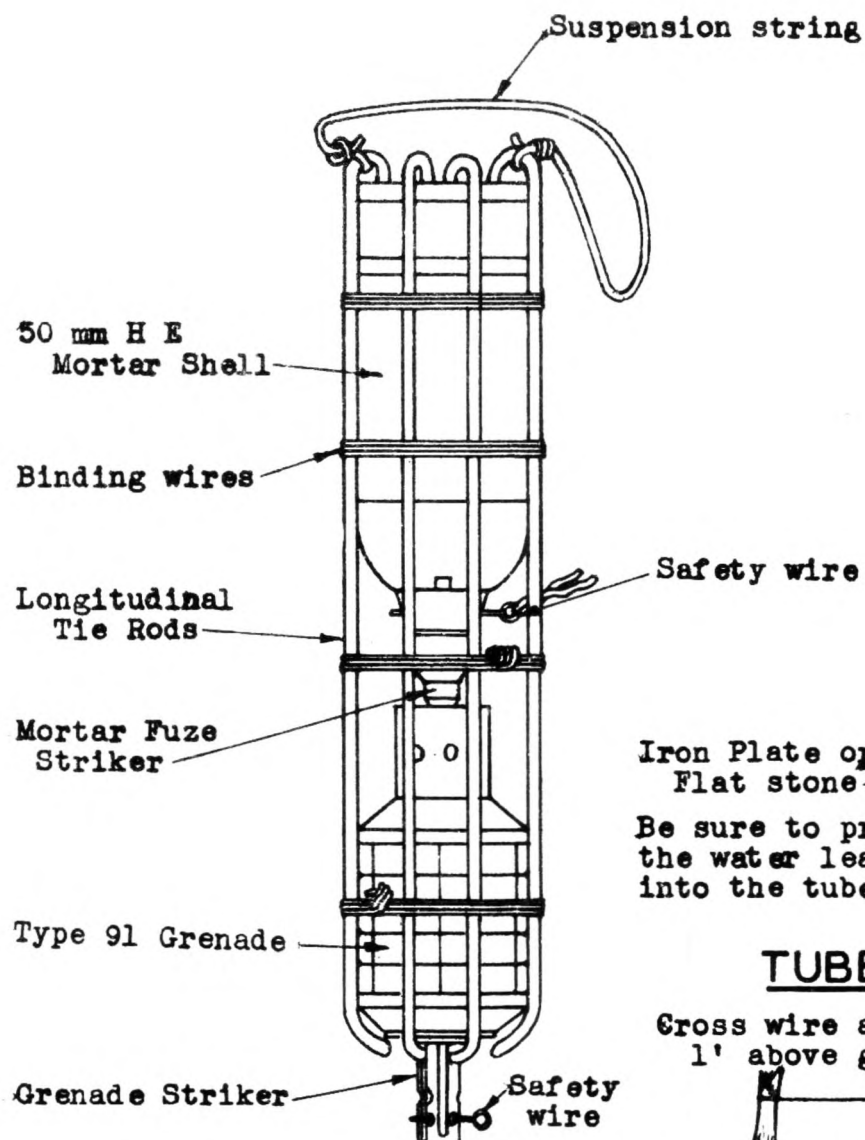
75 mm
Fuze Can



TUBE TRAP USING 75 MM SHELL CASE

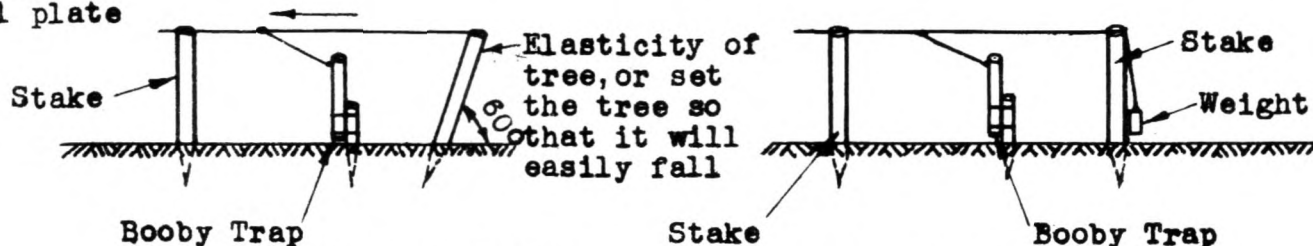
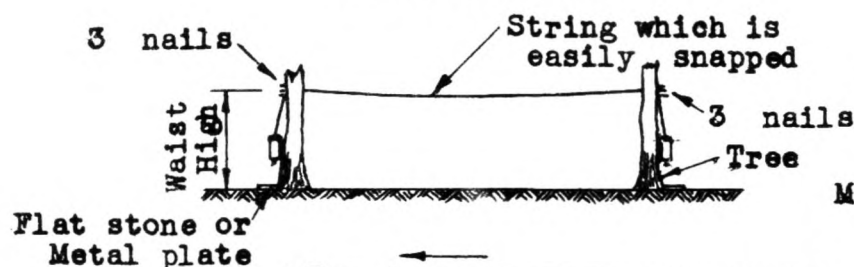


BOOBY TRAPS

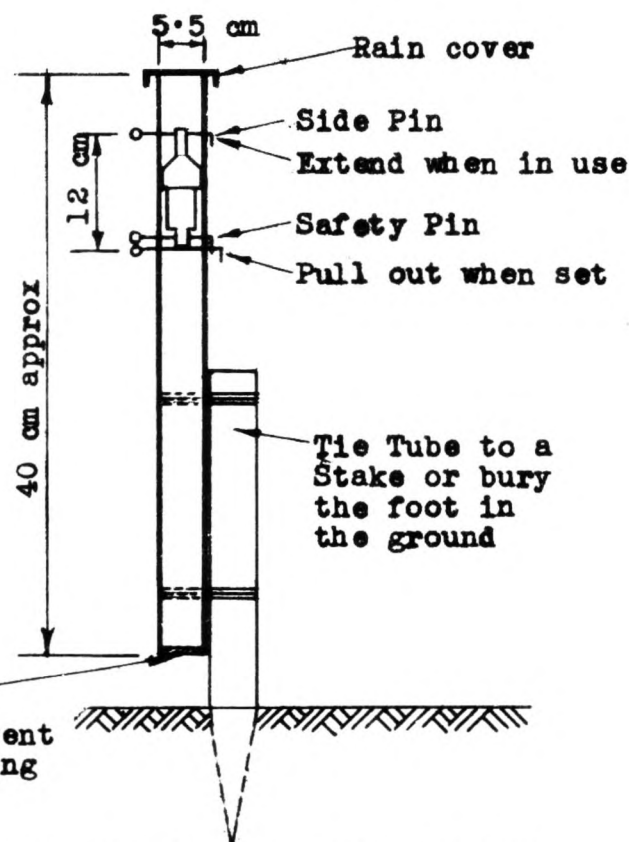


COMBINED GRENADE AND MORTAR SHELL

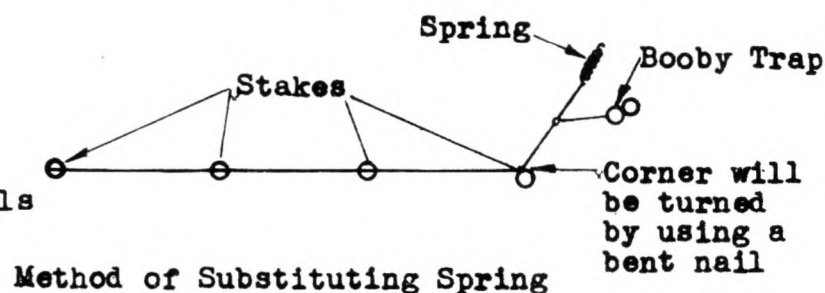
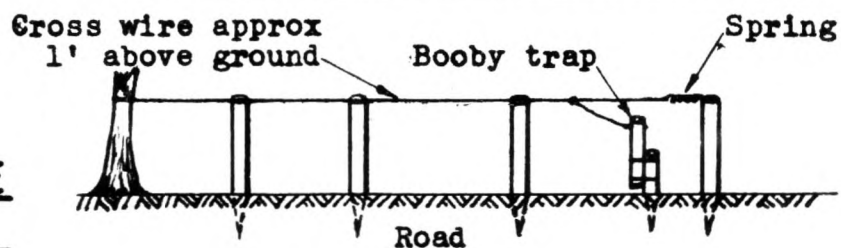
1 1/2 0 1 2 3
Scale in Inches



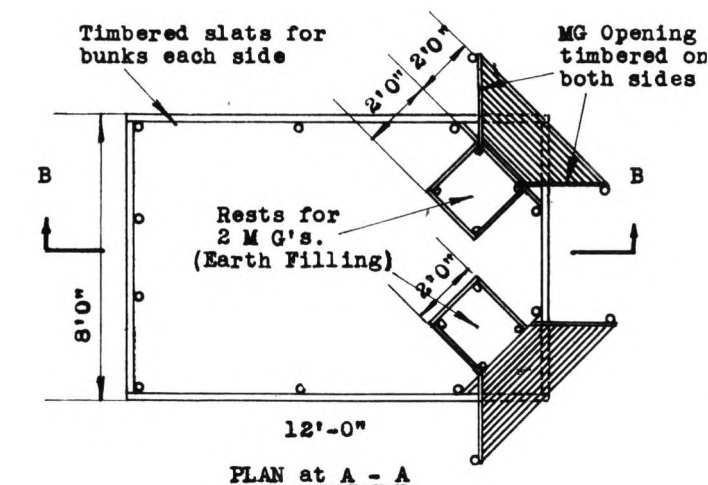
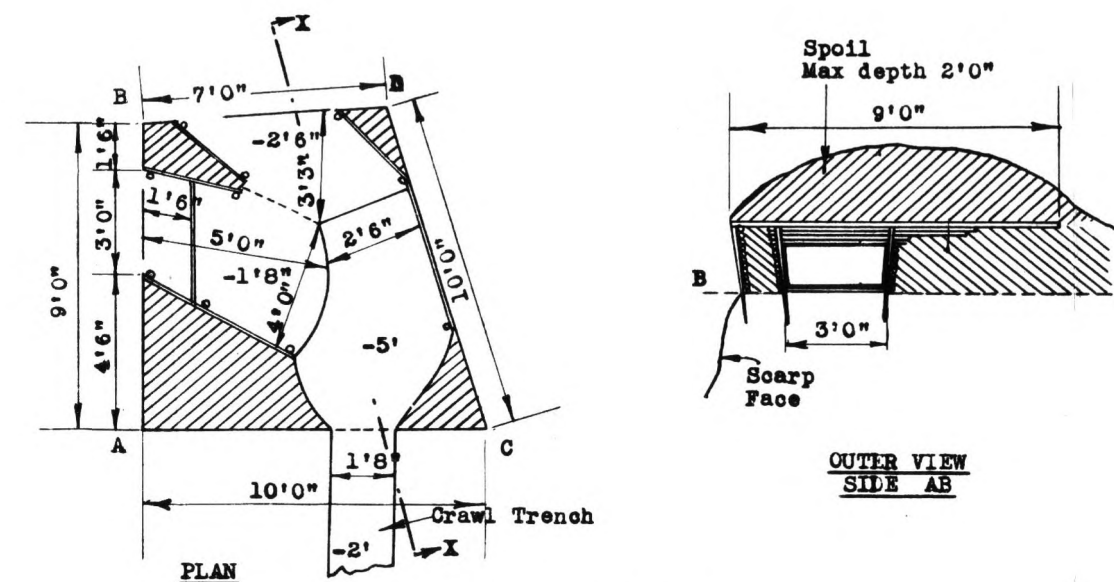
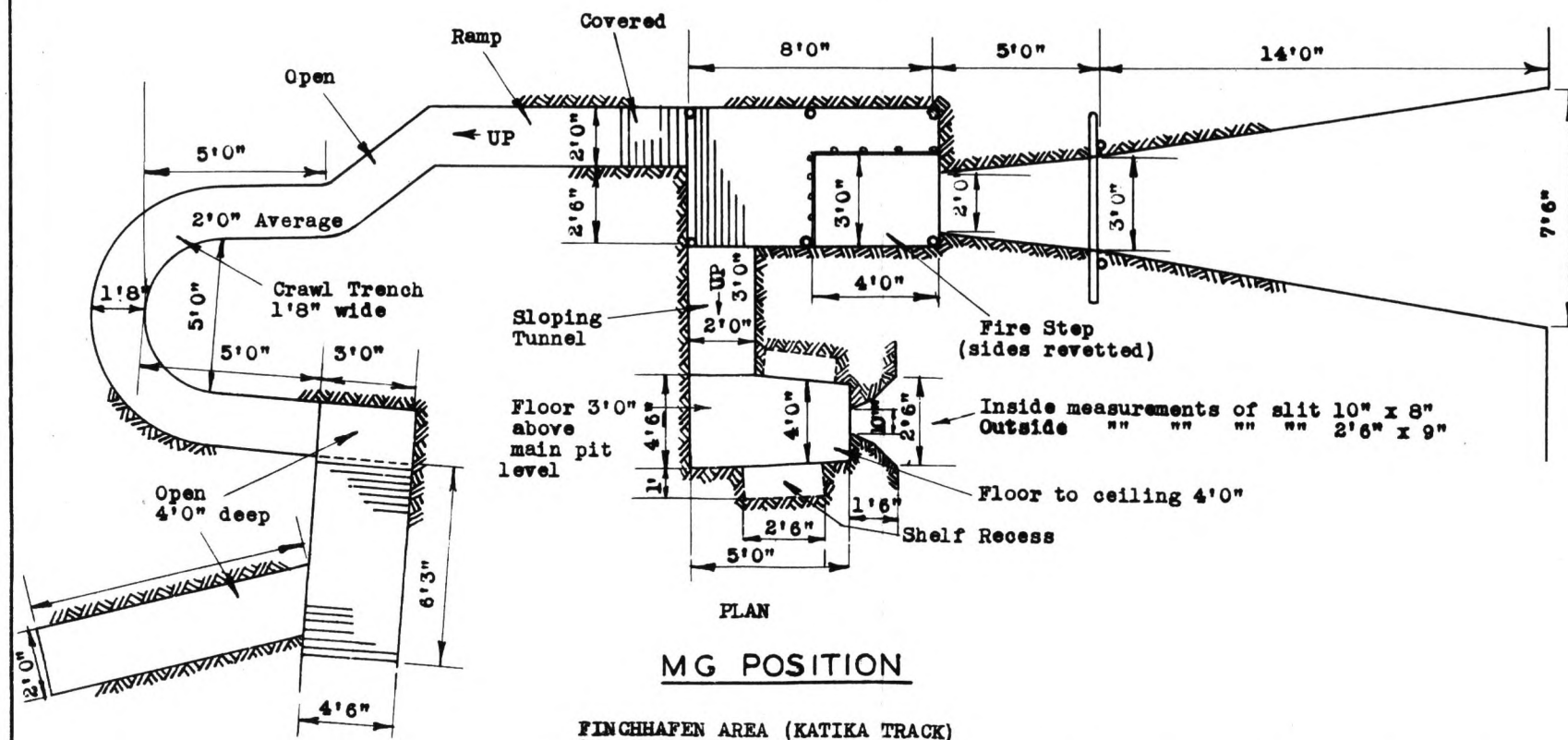
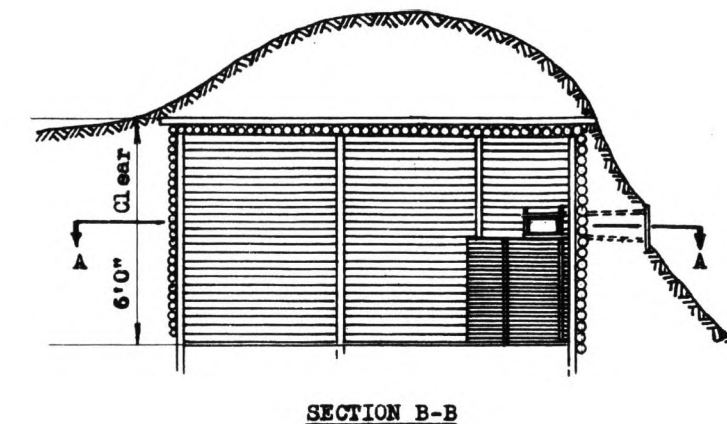
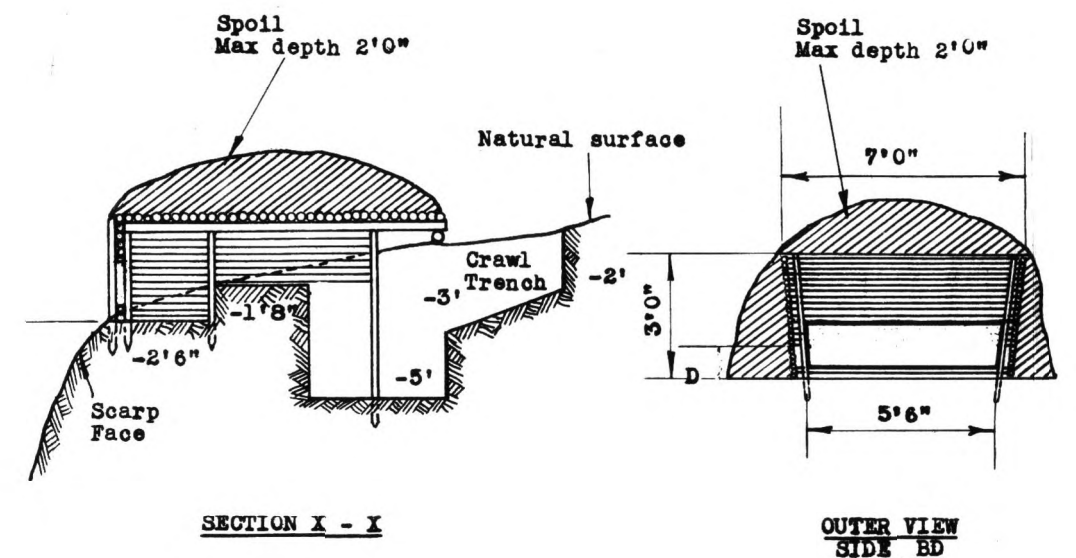
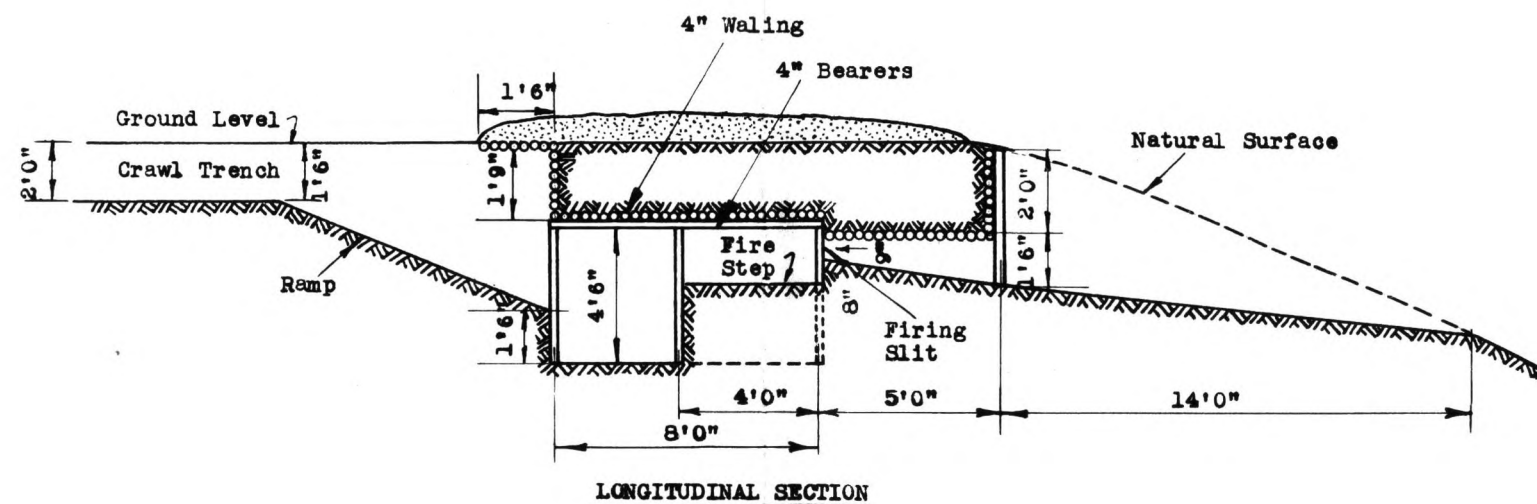
INITIATION BY TRIP WIRE



TUBE TRAP USING IRON PIPE



(JAPANESE)



TIMBER: All timber has sawn ends.
Wall uprights and bearers 4" to 6" dia.
MG Rests and openings 2'3" dia.
All timberwork spiked or nailed where
necessary.

EARTHWORK: Generally 3'0" to 4'0" depth on roof.

SINGLE MG
PILLBOX : 8' x 6' x 5'6" high without wall timbering
Uprights and roof similar in all cases.

MG POSITION
DUMPU AREA

FIELD WORKS - NEW GUINEA - JAPANESE
M G POSITIONS

Scale: ~~DIAGRAMMATIC~~ ONLY.

Source:- CRE 7 Aust Div & 2/13 Aust Fd Coy.

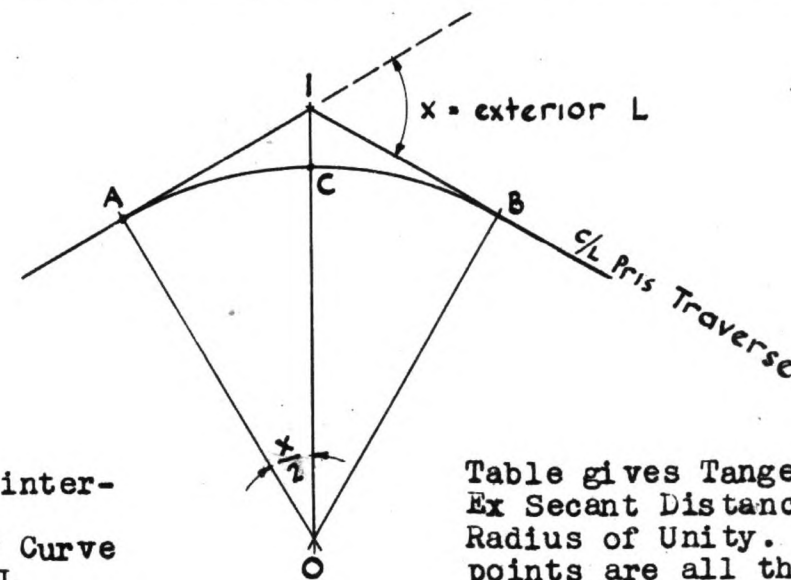
SETTING OUT. CIRCULAR CURVES

TABLE OF TANGENT AND EX-SECANT DISTANCES FOR CIRCULAR CURVES

APPX D 3

Refer para 126

TABLE FOR USE IN PRELIMINARY LOCATION OF PIONEER ROADS



I = Point of inter-section
O = Centre of Curve
X = Exterior L
AI = BI = Tangent Distance
IC = Ex Sec = $\text{Sec } \frac{X}{2} - 1$
AO = CO = BO = Radius

Table gives Tangent and Ex Secant Distance for Radius of Unity. These points are all that require pegging as other points on curve can easily be fixed by eye and later corrected by more accurate methods if required.

USE OF TABLE

(1) For any required Radius

$$AI = \text{Tangent Distance} = \text{Rad} \times \tan \frac{X}{2}$$

$$IC = \text{Ex-Secant} = \text{Rad} \times \text{Ex Sec } \frac{X}{2}$$

(2) Where Ex-Secant IC is fixed or limited

$$\text{Corresponding Fixed Radius} = \frac{IC}{\text{Ex Sec } \frac{X}{2}}$$

$$\text{Then Tangent Distance} = \text{Rad} \times \tan \frac{X}{2}$$

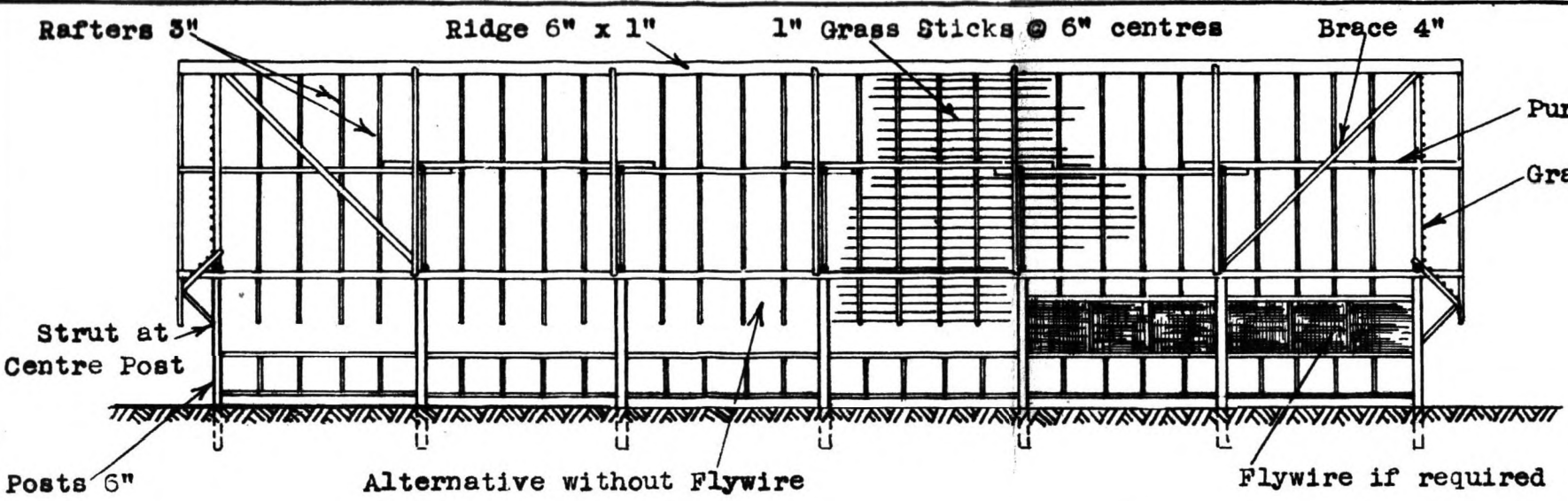
(3) Where Tangent Distance is fixed or limited

$$\text{Corresponding Fixed Radius} = \frac{AI}{\tan \frac{X}{2}}$$

$$\text{Then Ex-Secant Distance} = \text{Rad} \times \text{Ex Sec } \frac{X}{2}$$

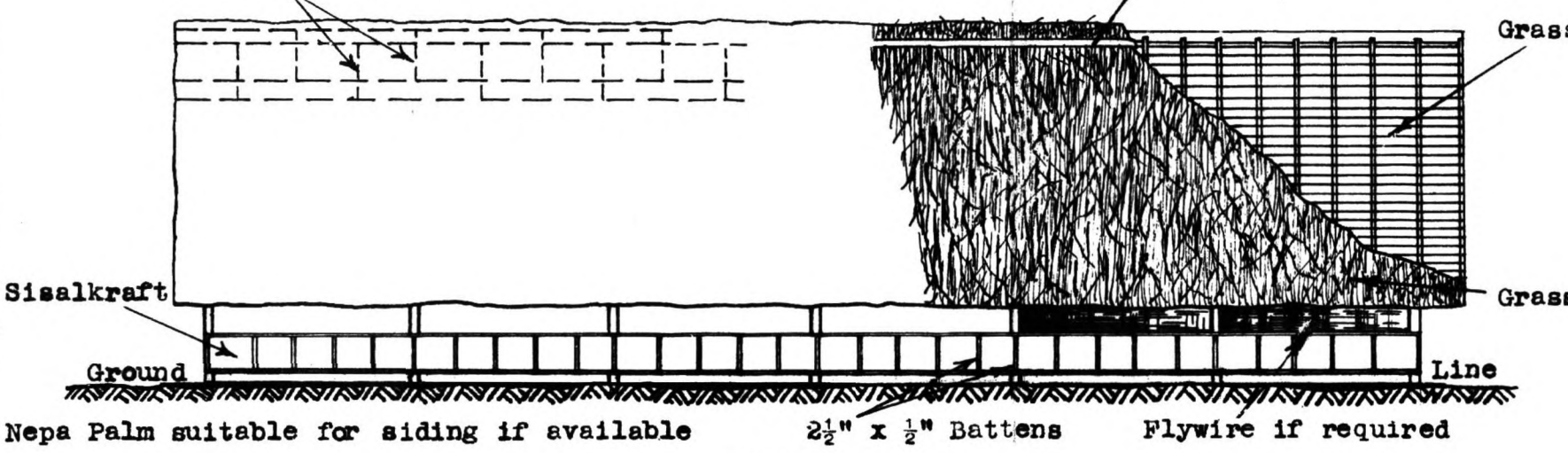
(Source CE 3 Aust Corps)

K 2				K 2				K 2				K 2				K 2				K 2			
Deg	Min	Tan	Ex Sec	Deg	Min	Tan	Ex Sec	Deg	Min	Tan	Ex Sec	Deg	Min	Tan	Ex Sec	Deg	Min	Tan	Ex Sec	Deg	Min	Tan	Ex Sec
0	0	.000	.000	26	0	.488	.113	39	0	.810	.287	52	0	1.280	.624	65	0	2.145	1.366	78	0	4.705	3.810
15	.004	.000		15	.493	.115		15	.817	.291		15	1.292	.633		15	2.169	1.389		15	4.808	3.911	
30	.009	.000		30	.499	.117		30	.824	.296		30	1.303	.643		30	2.194	1.411		30	4.915	4.016	
45	.013	.000		45	.504	.120		45	.832	.301		45	1.315	.652		45	2.220	1.435		45	5.027	4.126	
1	0	.017	.000	27	0	.510	.122	40	0	.839	.305	53	0	1.327	.662	66	0	2.246	1.459	79	0	5.145	4.241
15	.022	.000		15	.515	.125		15	.847	.310		15	1.339	.671		15	2.273	1.483		15	5.267	4.361	
30	.026	.000		30	.521	.127		30	.854	.315		30	1.351	.681		30	2.300	1.508		30	5.396	4.487	
45	.031	.000		45	.526	.130		45	.862	.320		45	1.364	.691		45	2.328	1.533		45	5.530	4.620	
2	0	.035	.001	28	0	.532	.133	41	0	.869	.325	54	0	1.376	.701	67	0	2.356	1.559	80	0	5.671	4.759
15	.039	.001		15	.537	.135		15	.877	.330		15	1.389	.712		15	2.385	1.586		15	5.820	4.905	
30	.044	.001		30	.543	.138		30	.885	.335		30	1.402	.722		30	2.414	1.613		30	5.976	5.059	
45	.048	.001		45	.549	.141		45	.893	.340		45	1.415	.733		45	2.444	1.641		45	6.140	5.221	
3	0	.052	.001	29	0	.554	.143	42	0	.900	.346	55	0	1.428	.743	68	0	2.475	1.669	81	0	6.314	5.392
15	.057	.002		15	.560	.146		15	.908	.351		15	1.441	.754		15	2.507	1.698		15	6.497	5.574	
30	.061	.002		30	.566	.149		30	.916	.356		30	1.455	.766		30	2.539	1.728		30	6.691	5.765	
45	.066	.002		45	.572	.152		45	.924	.362		45	1.469	.777		45	2.571	1.759		45	6.897	5.969	
4	0	.070	.002	30	0	.577	.155	43	0	.933	.367	56	0	1.483	.788	69	0	2.605	1.790	82	0	7.115	6.185
15	.074	.003		15	.583	.158		15	.941	.373		15	1.497	.800		15	2.639	1.823		15	7.348	6.416	
30	.079	.003		30	.589	.161		30	.949	.379		30	1.511	.812		30	2.675	1.855		30	7.596	6.661	
45	.083	.003		45	.595	.164		45	.957	.384		45	1.525	.824		45	2.711	1.889		45	7.861	6.924	
5	0	.087	.004	31	0	.601	.167	44	0	.966	.390	57	0	1.540	.836	70	0	2.747	1.924	83	0	8.144	7.206
15	.092	.004		15	.607	.170		15	.974	.396		15	1.555	.849		15	2.785	1.959		15	8.449	7.508	
30	.096	.005		30	.613	.173		30	.983	.402		30	1.570	.861		30	2.824	1.996		30	8.777	7.834	
45	.101	.005		45	.619	.176		45	.991	.408		45	1.585	.874		45	2.864	2.033		45	9.131	8.186	
6	0	.105	.006	32	0	.625	.179	45	0	1.000	.414	58	0	1.600	.887	71	0	2.904	2.072	84	0	9.514	8.567
15	.110	.006		15	.631	.182		15	1.009	.420		15	1.616	.900		15	2.946	2.111		15	9.931	8.981	
30	.114	.006		30	.637	.186		30	1.018	.427		30	1.632	.914		30	2.989	2.152		30	10.385	9.433	
45	.118	.007		45	.643	.189		45	1.027	.433		45	1.648	.928		45	3.033	2.193		45	10.883	9.929	
7	0	.123	.008	33	0	.649	.192	46	0	1.036	.440	59	0	1.664	.942	72	0	3.078	2.236	85	0	11.430	10.474
15	.127	.008		15	.656	.196		15	1.045	.446		15	1.681	.956		15	3.124	2.280		15	12.035	11.076	
30	.132	.009		30	.662	.199		30	1.054	.453		30	1.698	.970		30	3.172	2.326		30	12.706	11.745	
45	.136	.009		45	.668	.203		45	1.063	.459		45	1.715	.985		45	3.221	2.372		45	13.457	12.494	
8	0	.141	.010	34	0	.675	.206	47	0	1.072	.466	60	0	1.732	1.000	73	0	3.271	2.420	86	0	14.301	13.336
15	.145	.010		15	.681	.210		15	1.082	.473		15	1.750	1.015		15	3.323	2.470		15	15.257	14.290	
30	.149	.011		30	.687	.213		30	1.091	.480		30	1.767	1.031		30	3.376	2.521		30	16.350	15.380	
45	.154	.012		45	.694	.217		45	1.101	.487		45	1.786	1.047		45	3.431	2.574		45	17.611	16.639	
9	0	.158	.012	35	0	.700	.221	48	0	1.111	.494	61	0	1.804	1.063	74	0	3.487	2.628	87	0	19.081	17.107
15	.163	.013		15	.707	.225		15	1.120	.502		15	1.823	1.079		15	3.546	2.684		15	20.819	19.843	
30	.167	.014		30	.713	.228		30	1.130	.509		30	1.842	1.096		30	3.606	2.742		30	22.904	21.926	
45	.172	.015		45	.720	.232		45	1.140	.517		45	1.861	1.113		45	3.668	2.802		45	25.452	24.471	
10	0	.176	.015	36	0	.727	.236	49	0	1.150	.524	62	0	1.881	1.130	75	0	3.732	2.864	88	0	28.636	27.654
15	.181	.016		15	.733	.240		15	1.161	.532		15	1.901	1.148		15	3.798	2.928		15	32.730	31.746	
30	.185	.017		30	.740	.244		30	1.171	.540		30	1.921	1.166		30	3.867	2.994		30	38.188	37.202	
45	.190	.018		45	.747	.248		45	1.181	.548		45	1.942	1.184		45	3.938	3.063		45	45.829	44.840	
11	0	.194	.019	37	0	.754	.252	50	0	1.192	.556	63	0	1.963	1.203	76	0	4.011	3.134	89	0	57.290	56.299
15	.199	.020		15	.760	.256		15	1.202	.564		15	1.984	1.222		15	4.087	3.207		15	76.390	75.397	
30	.203	.020		30	.767	.260		30	1.213	.572		30	2.006	1.241		30	4.165	3.284		30	114.589	113.593	
45	.208	.021		45	.774	.265		45	1.224	.581		45	2.028	1.261		45	4.247	3.363		45	229.182	228.184	
12	0	.213	.022	38	0	.781	.269	51	0	1.235	.589	64	0	2.050	1.281	77	0	4.331	3.445				
15	.217	.023		15	.788	.273		15	1.246	.598		15	2.073	1.302		15	4.419	3.531					
30	.222	.024		30	.795	.278		30	1.257	.606		30	2.097	1.323		30	4.511	3.620					
45	.226	.025		45	.803	.282		45	1.268	.615		45	2.120	1.344		45	4.606	3.713					

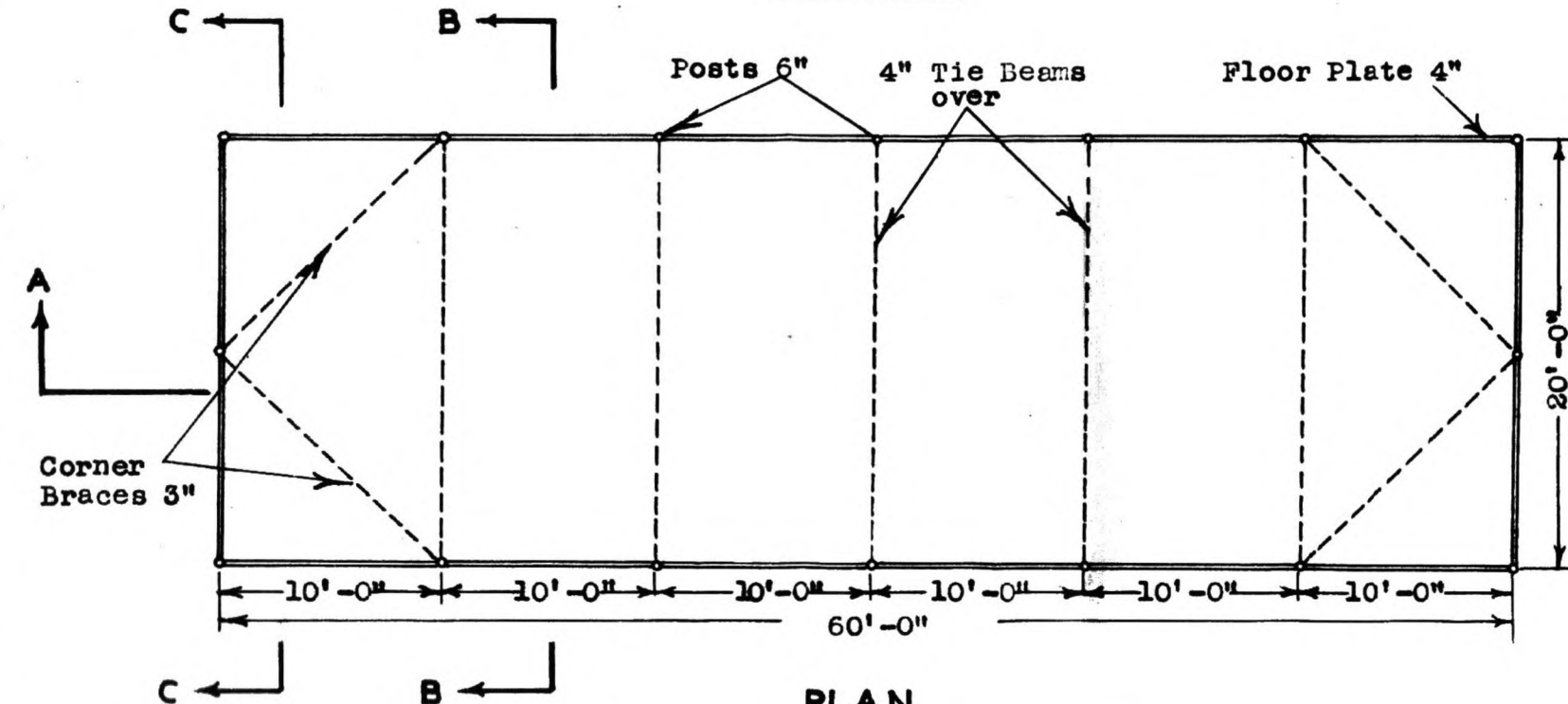


SECTION A.A.

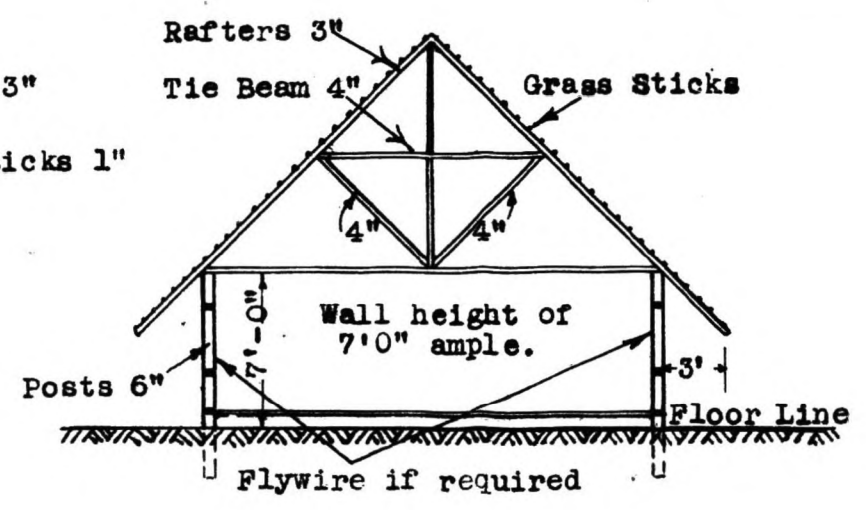
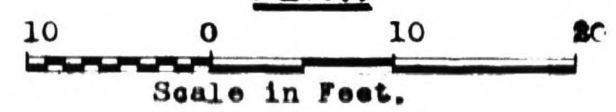
Two alternative rows of Nepa Palms showing staggered joints



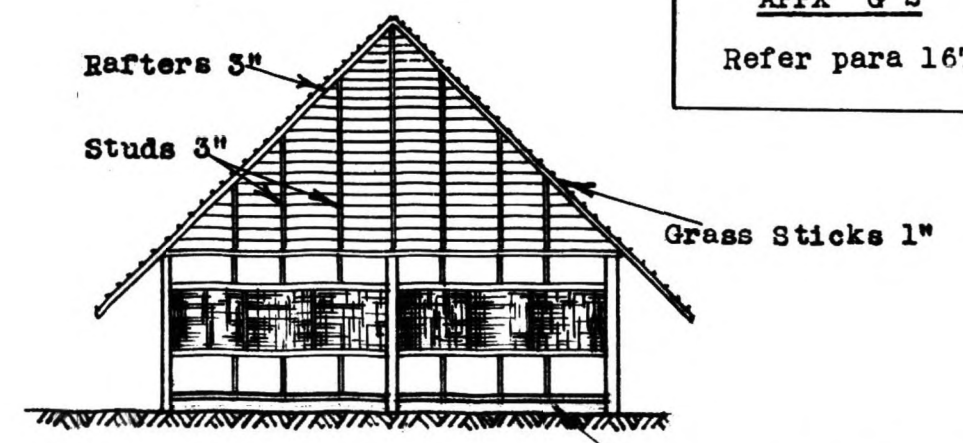
ELEVATION



PLAN

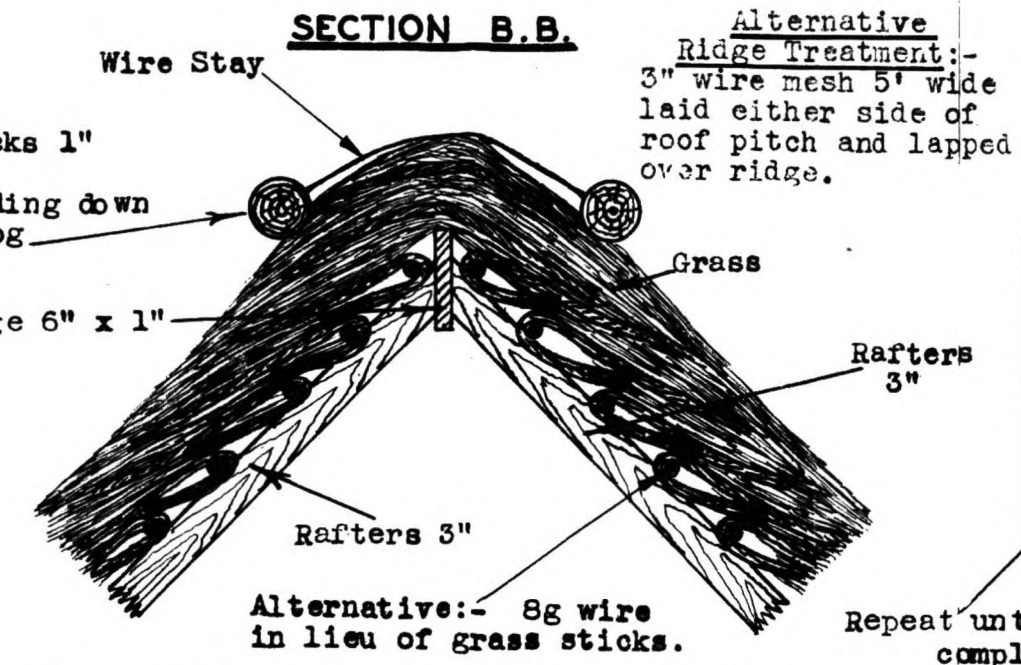


SECTION B.B.



SECTION C.C.

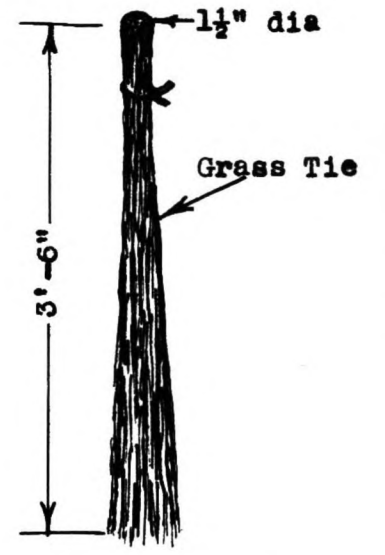
NOTE:- Raise side covering 6" above floor level for ventilation.



DETAIL AT RIDGE FOR GRASS ROOF
LIFE : 18 mnths to 2 yrs



METHOD OF PLACING GRASS BUNDLE



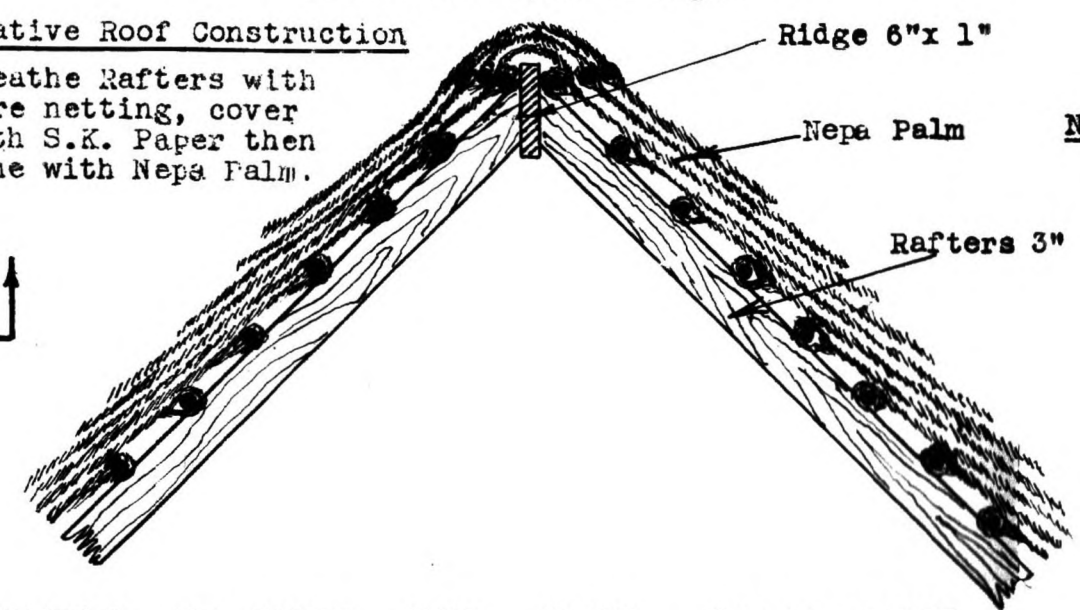
GRASS BUNDLE

SCALE : Diagrammatic only

NOTE: Nepa Palms are tied to sticks about 6'-0" long with palm hanging down about 2'-6", the sticks are then fixed at 4" to 6" centres with joints staggered.

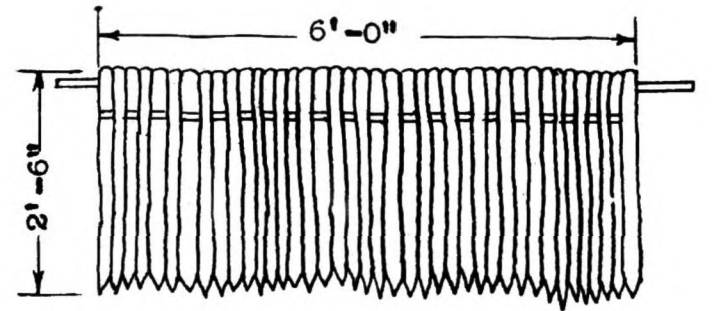
Alternative Roof Construction

Sheathe Rafters with wire netting, cover with S.K. Paper then line with Nepa Palm.



DETAIL AT RIDGE FOR NEPA PALM ROOF

Scale in Feet 1 0 1 2

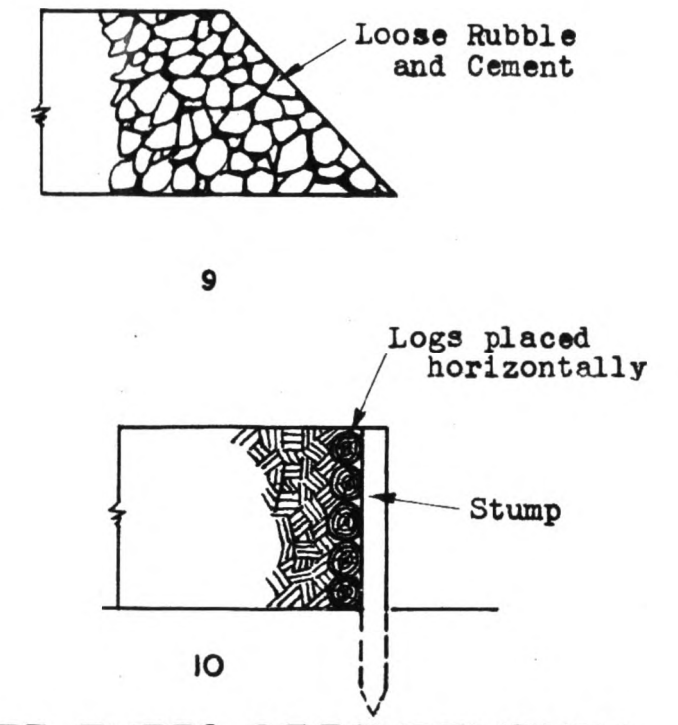
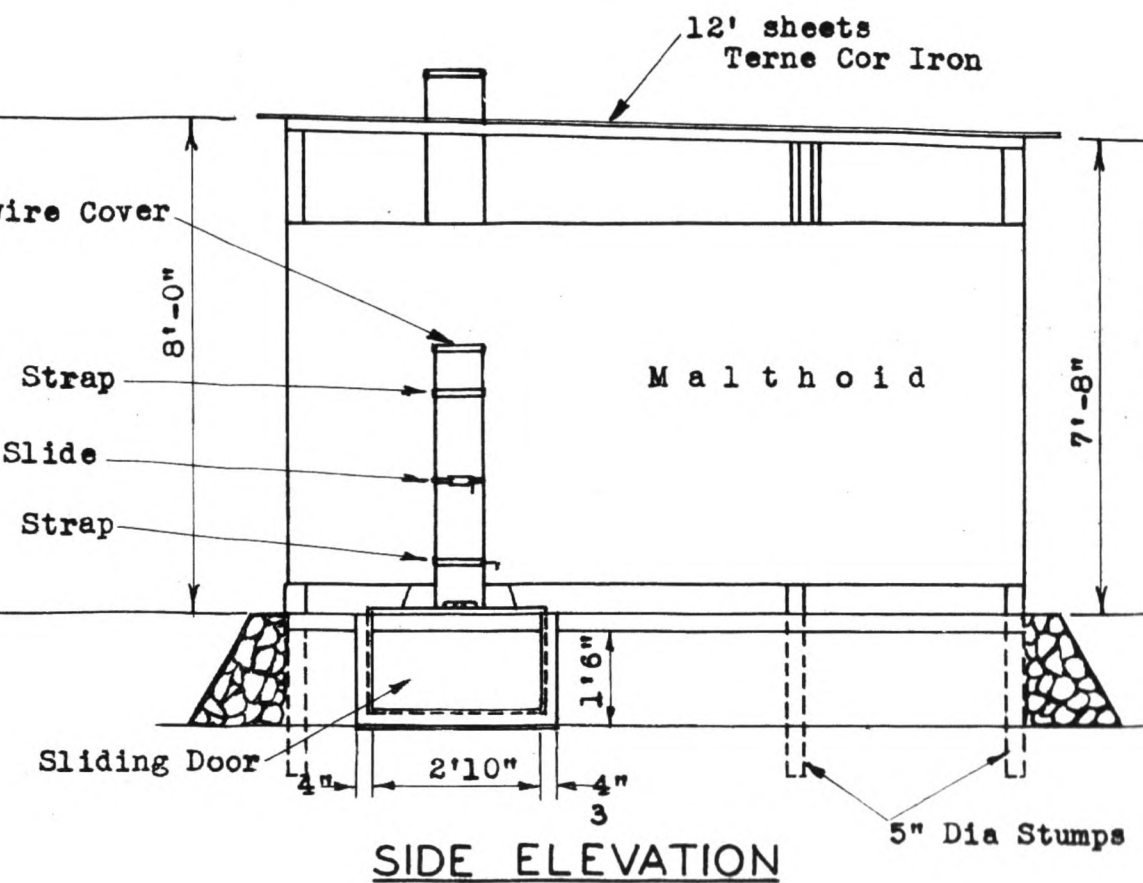
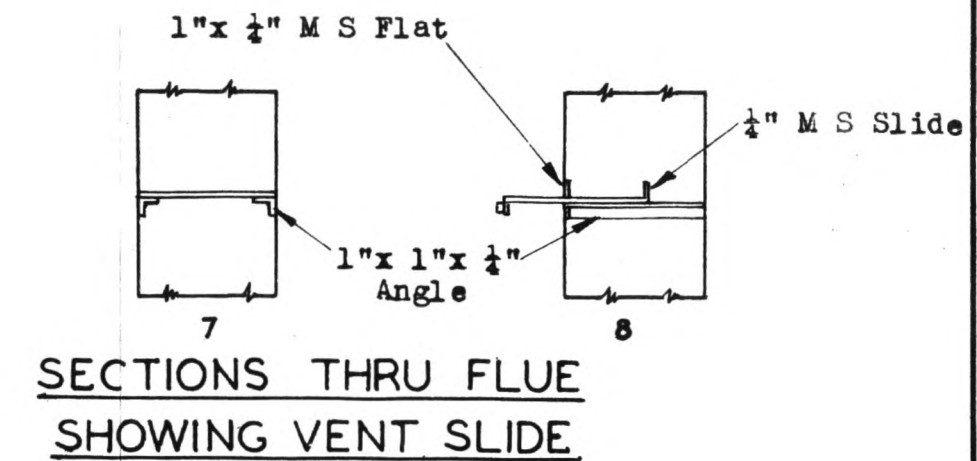
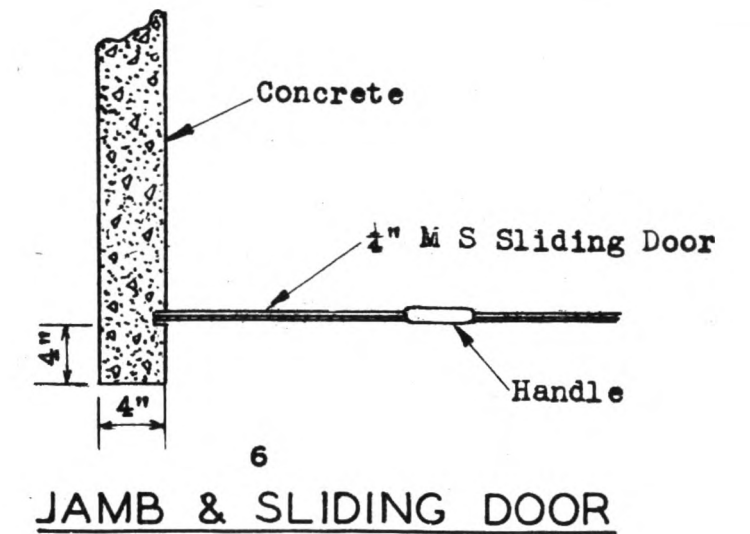
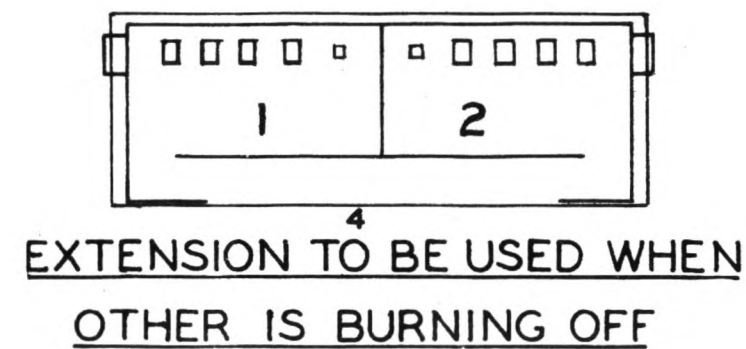
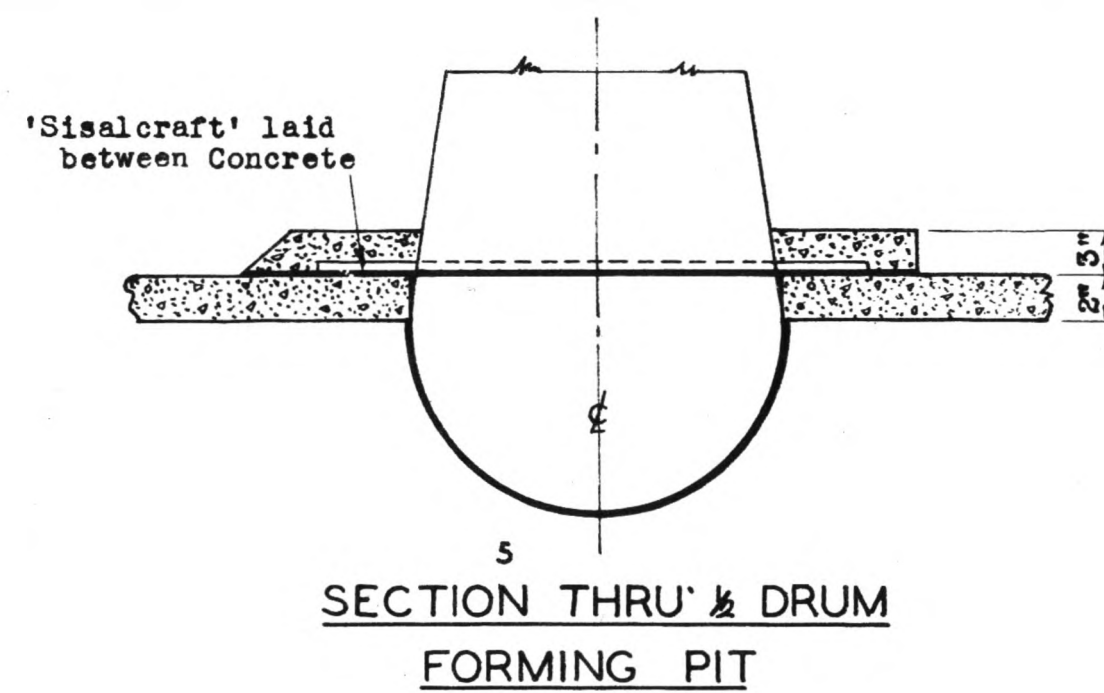
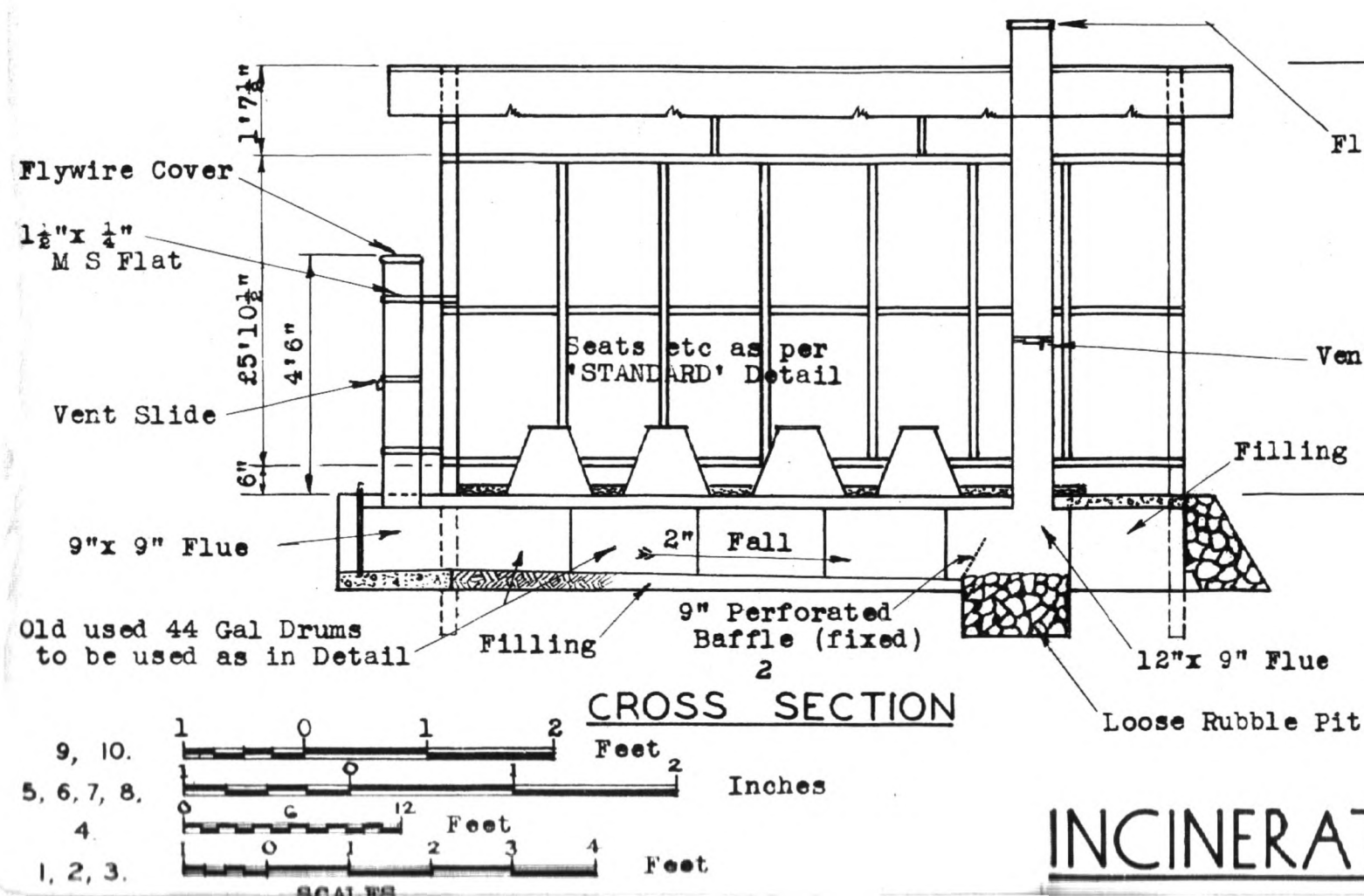


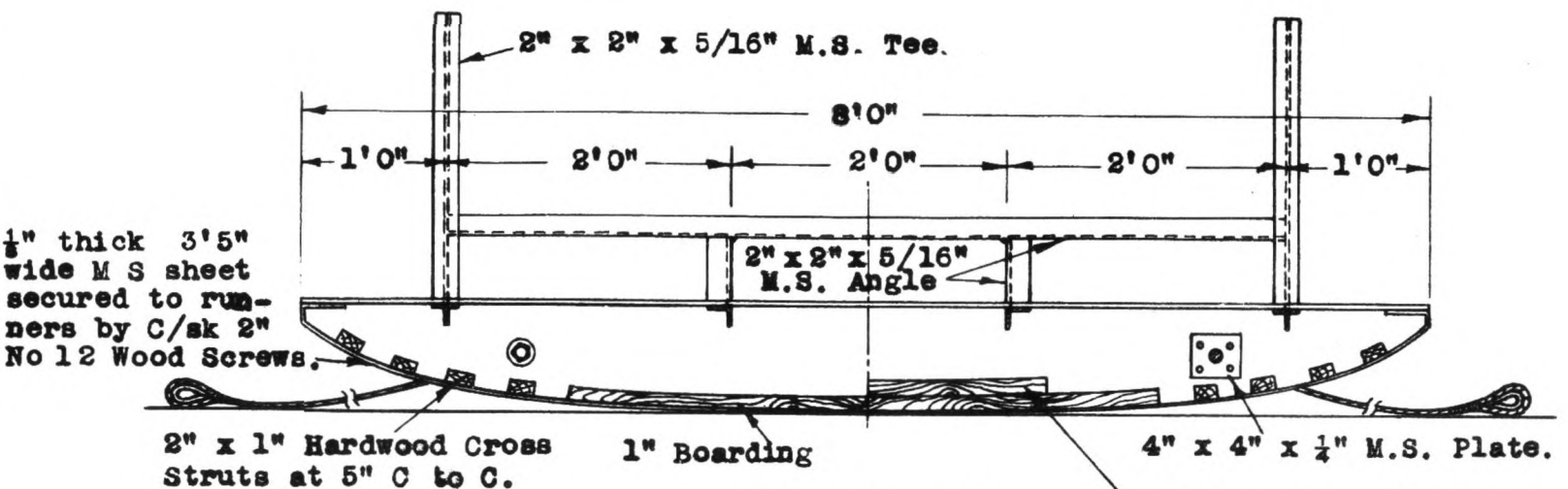
NEPA PALM

SCALE: Diagrammatic only

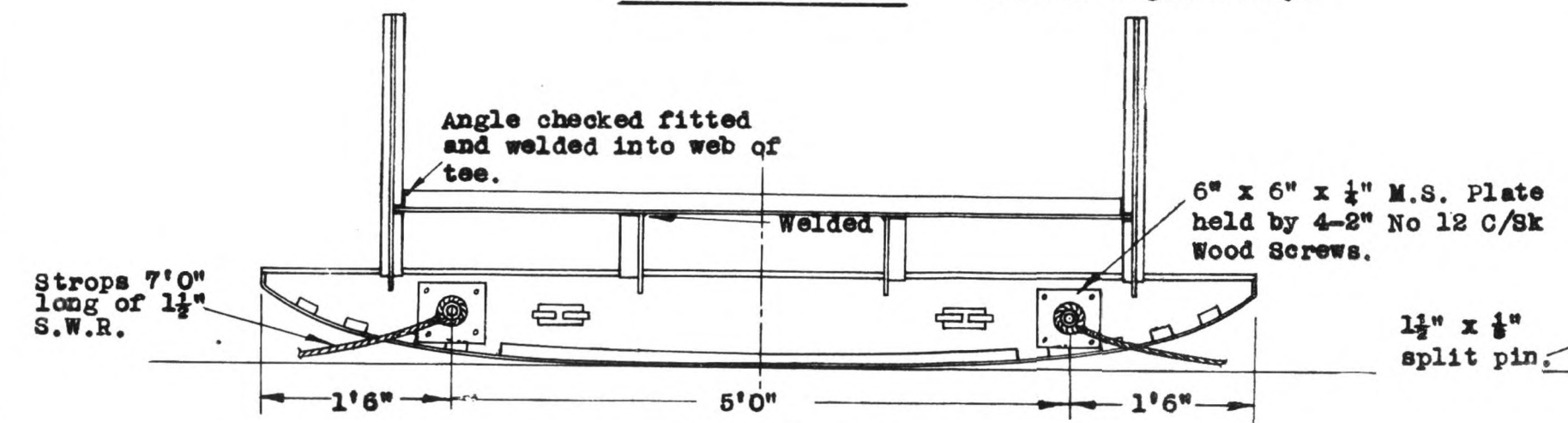
SOURCE: C E N.G.FORCE
(3 Aust Army Tps CoyRA0)

GRASS HUT CONSTRUCTION

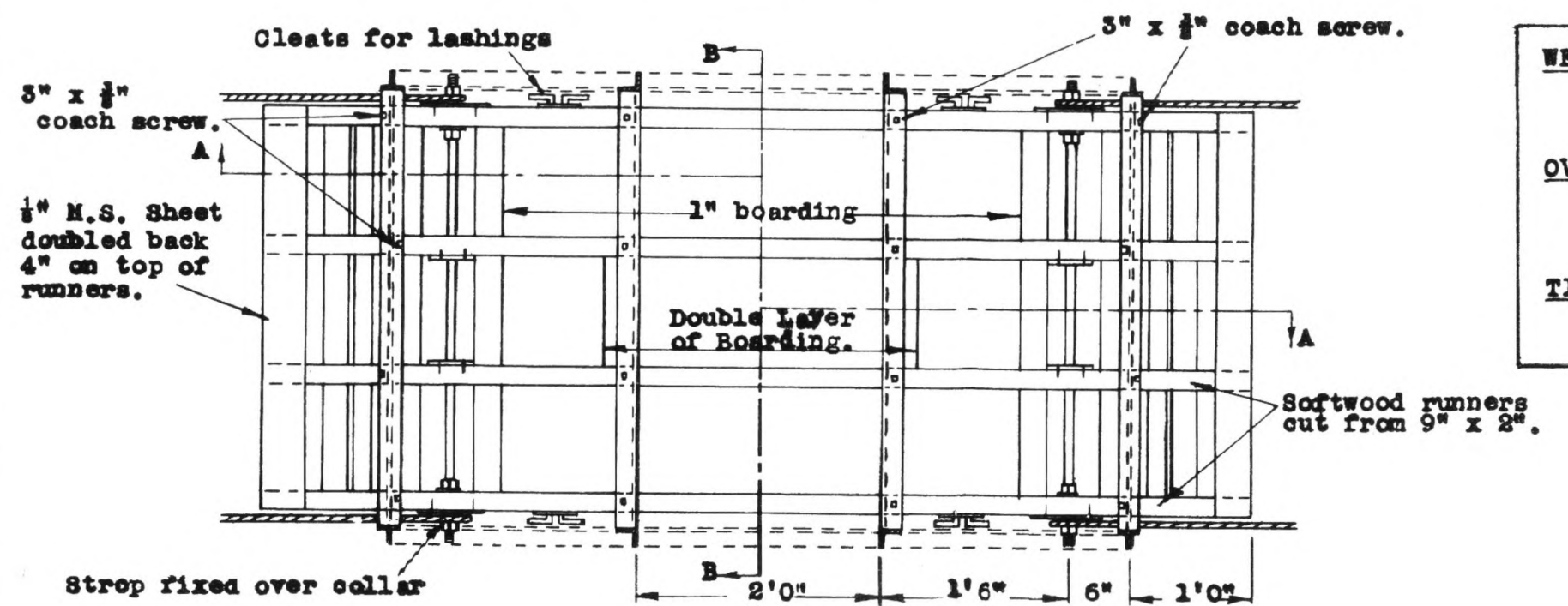




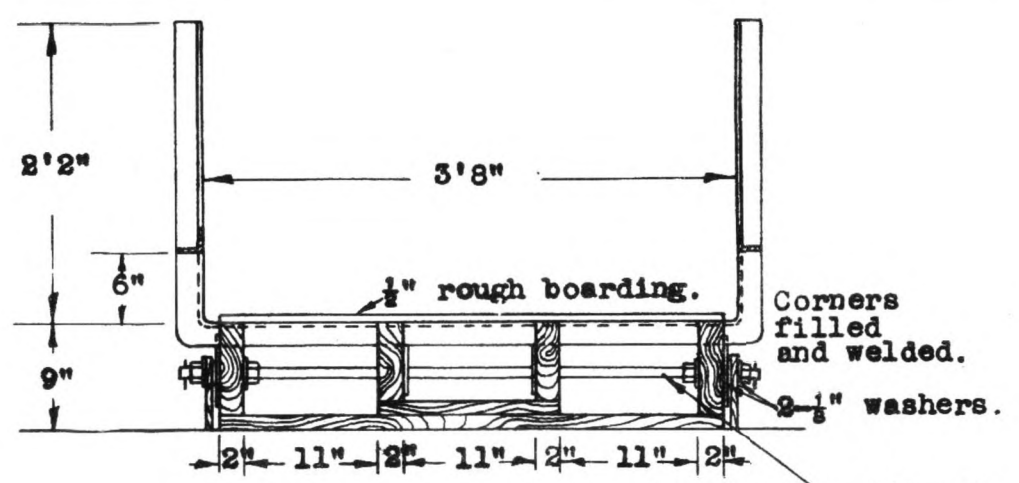
SECTION AA



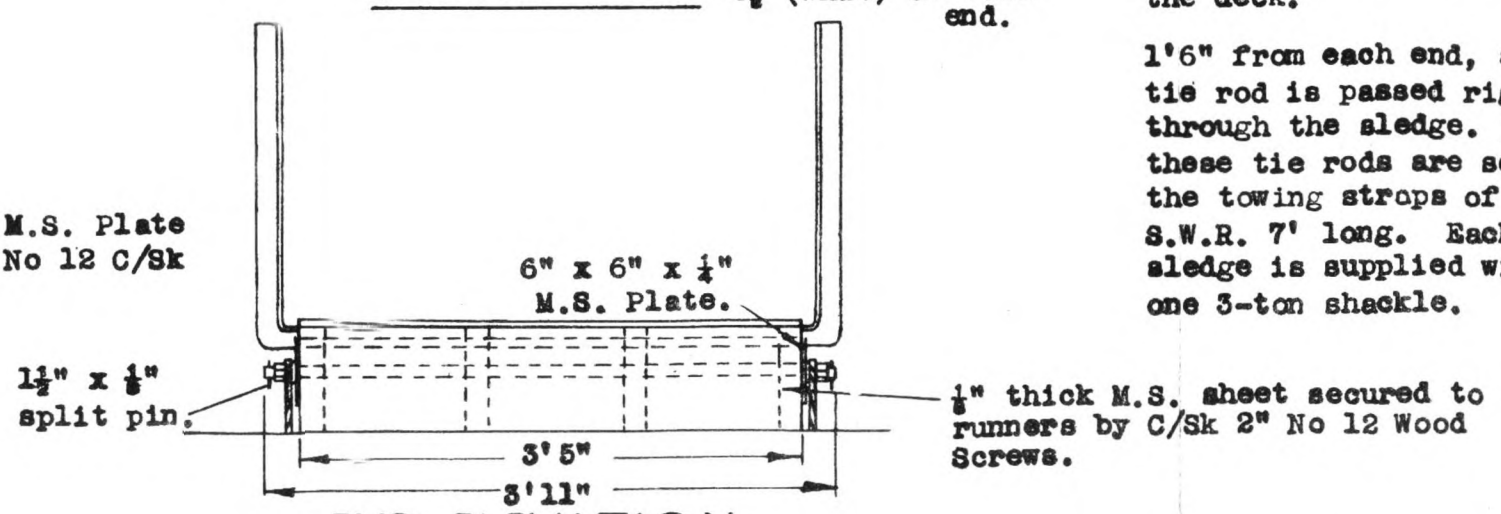
ELEVATION



PLAN
(SHOWING BOARDING REMOVED)



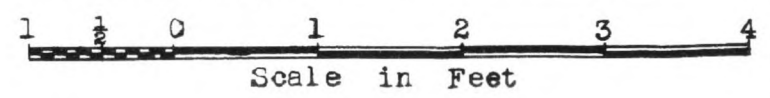
SECTION BB



END ELEVATION

WEIGHT			
Unloaded	...	...	660 lbs
Loaded (Approx)	...	...	2 tons
			or 40 cubic ft max
OVERALL DIMENSIONS			
Width	...	...	3'5"
Length	...	...	8'0"
Height to Deck	...	...	9 1/2"
TIMBER			
Decking	...	...	HW-T&G
Other timbers in Oregon.	...	...	

"INVERKIP" (2 TON) SLEDGE

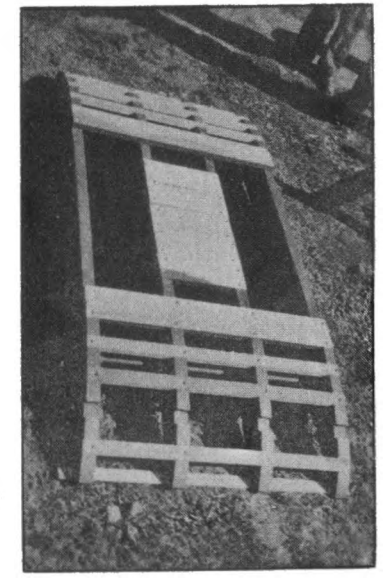


GENERAL

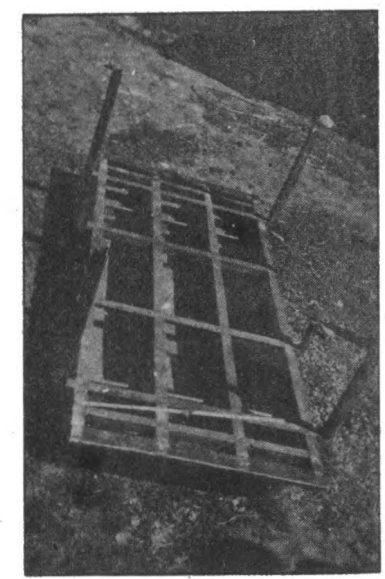
The sledge consists basically of four 9" x 2" Oregon runners decked with 1" T & G boarding, and a complete bottom sheathing of 1/2" M.S. Sheet.

Stores may be secured by a skeleton superstructure of four 2" x 2" x 5/16" Tee section uprights and two side members 6" above the deck.

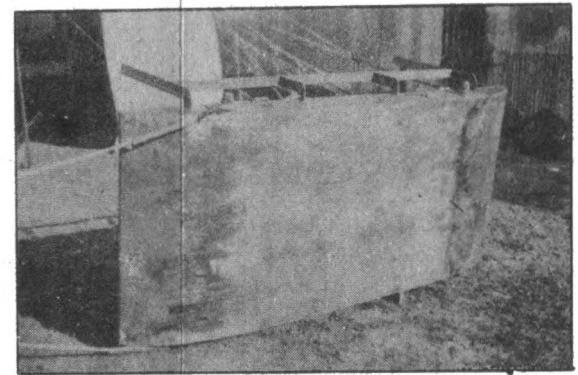
1'6" from each end, a 1" tie rod is passed right through the sledge. To these tie rods are secured the towing straps of 1 1/2" S.W.R. 7' long. Each sledge is supplied with one 3-ton shackle.



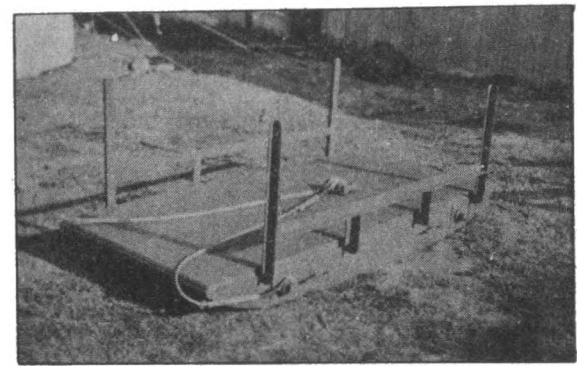
underside construction.



Decking removed.



Bottom of sledge 1/2" M.S. Sheathing.



Completed sledge.

STRENGTH OF MILD STEEL TUBES AS COLUMNS

NOTE:- (i) Pipes to be of seamless or welded seam mild steel.

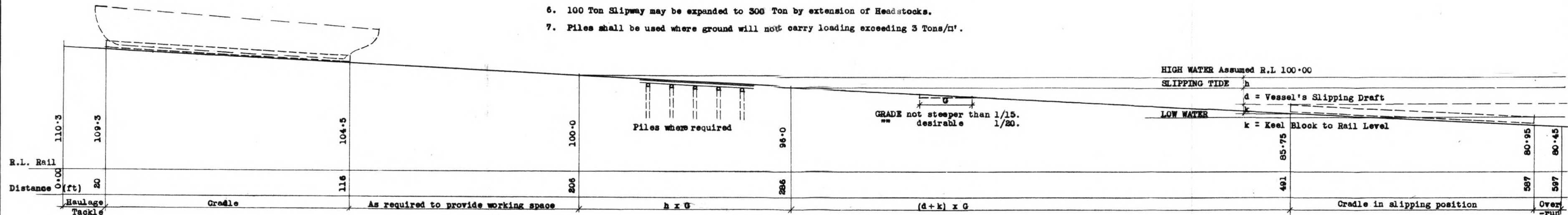
(ii) Safe loads based on Column formula of SAA Code CAI-1939. Max $l/r = 150$.

Nominal Bore Ins.	External dia.Ins.	Type of Tube	Wall thick- ness Ins.	Area of Section Sq.Ins.	Radius of Gyration Ins.	SAFE LOAD IN TONS ON TUBES FOR COLUMN LENGTHS IN FEET OF:-																	
						3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
6"	6.50"	Water Steam	0.192 0.212	3.81 4.19	2.22 2.22	27.2 30.0	27.1 29.8	26.7 29.5	26.2 28.8	25.5 28.1	25.0 27.3	24.2 26.6	23.3 25.6	22.5 24.7	21.6 23.8	20.4 22.7	19.4 21.3	18.4 20.2	17.2 18.7	16.0 17.8	15.0 16.5	14.0 15.3	12.9 14.4
5"	5.50"	Water Steam	0.192 0.212	3.21 3.52	1.88 1.87	22.9 25.1	22.6 24.8	22.1 24.2	21.5 23.4	20.8 22.8	20.1 22.0	19.2 20.9	18.4 20.0	17.2 18.9	16.3 17.8	15.1 16.5	13.9 15.2	12.9 14.1	11.9 13.0	10.9 11.9	10.0 11.0	9.3 10.1	8.3 9.1
4½"	5.00"	Water Steam	0.192 0.212	2.89 3.21	1.70 1.69	20.5 22.8	20.1 22.4	19.6 21.8	19.0 20.9	18.3 20.2	17.4 19.3	16.4 18.2	15.5 17.2	14.5 15.9	13.3 14.8	12.3 13.6	11.1 12.2	10.2 11.3	9.3 10.2	8.5 9.3	7.7 8.3	7.1 7.7	6.6 7.2
4"	4.50"	Water Steam	0.192 0.212	2.60 2.86	1.52 1.52	18.3 20.2	17.9 19.7	17.3 19.0	16.6 18.4	15.8 17.4	14.9 16.3	13.8 15.3	12.8 14.0	11.7 12.8	10.6 11.6	9.6 10.5	8.6 9.5	7.3 8.6	7.0 7.8	6.3 7.0	5.8 6.4	5.2 5.7	
3½"	4.00"	Water Steam	0.192 0.212	2.29 2.53	1.35 1.34	16.1 17.8	15.5 17.2	14.8 16.4	14.1 15.5	13.3 14.5	12.2 13.4	11.1 12.2	9.9 11.0	8.9 9.7	8.0 8.8	7.2 7.8	6.3 7.0	5.7 6.2	5.1 5.4				
3"	3.50"	Water Steam	0.192 0.212	1.98 2.20	1.17 1.16	13.7 15.2	13.1 14.5	12.4 13.7	11.6 12.8	10.5 11.7	9.5 10.3	8.3 9.0	7.3 8.0	6.3 7.3	5.5 6.1	5.0 5.3	4.2 4.7						
2½"	3.00"	Water Steam	0.192 0.212	1.69 1.87	0.997 0.986	11.5 12.5	10.7 11.8	10.0 10.9	8.9 9.7	7.8 8.6	6.7 7.3	5.7 6.3	5.0 5.3	4.2 4.6	3.6 4.0								
2"	2.375"	Water Steam	0.176 0.192	1.22 1.32	0.776 0.774	7.8 8.4	7.1 7.7	6.1 6.5	5.1 5.4	4.2 4.5	3.4 3.6	2.8 3.0											
1½"	1.906"	Water Steam	0.176 0.192	0.95 1.03	0.615 0.611	5.6 6.1	4.7 5.1	3.7 4.0	2.9 3.0	2.2 2.4													
1¼"	1.688"	Water Steam	0.160 0.176	0.77 0.83	0.543 0.540	4.3 4.6	3.3 3.6	2.6 2.7	1.9 2.0														
1"	1.344"	Water Steam	0.144 0.160	0.54 0.60	0.429 0.421	2.5 2.7	1.8 1.9	1.2 1.3															

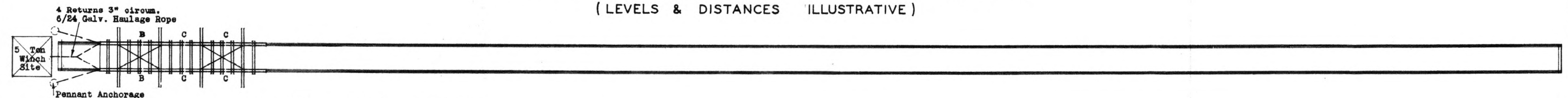
NOTE:- Thick line gives limit of condition that max $l/r = 150$.

NOTES

- Length of Slipway will be determined as shown in Illustrative Section. After ascertaining Slipping Tide Level, which depends on local conditions, "h" must be sufficient to give time to slip the vessel.
- Slipping Tide approx. half tide.
- "d" = approx. Slipping Draft (depends on draft of vessel). (i) 300 Ton - 8' to 10'. (ii) 100 Ton - 5' to 8'.
- For piled piers, alternative Headstock (Half caps) is preferable above Low Water.
- Girders in lengths not less than 18'0".
- 100 Ton Slipway may be expanded to 300 Ton by extension of Headstocks.
- Piles shall be used where ground will not carry loading exceeding 3 Tons/sq. ft.



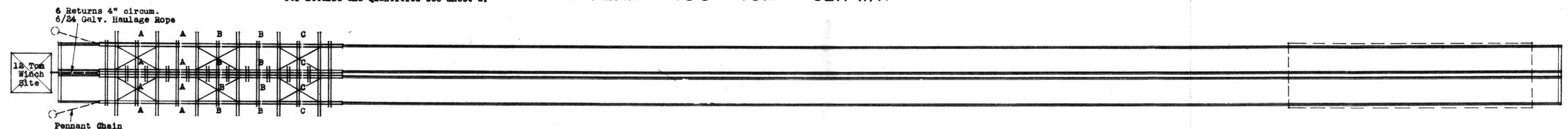
LONGITUDINAL SECTION 300 TON SLIPWAY
(LEVELS & DISTANCES ILLUSTRATIVE)



Winch geared to haul loaded cradle at approx 10' per min.

Note: Cradle framing is shown in single line only, with types of splice plates indicated. For Details and Quantities see Sheet 2.

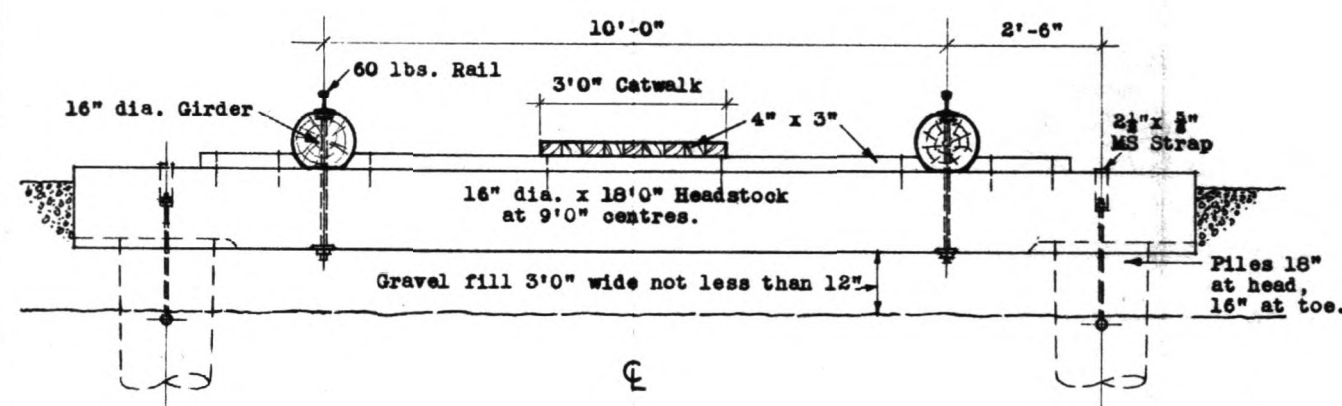
PLAN 100 TON SLIPWAY



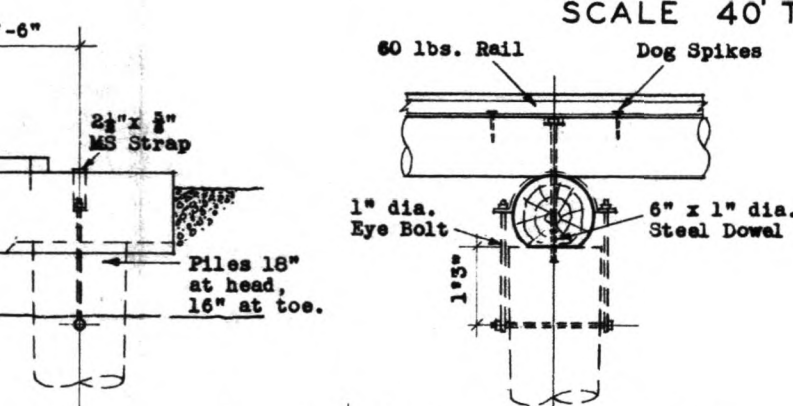
Winch geared to haul loaded cradle at approx. 5' per min.

PLAN 300 TON SLIPWAY

SCALE 40' TO 1"



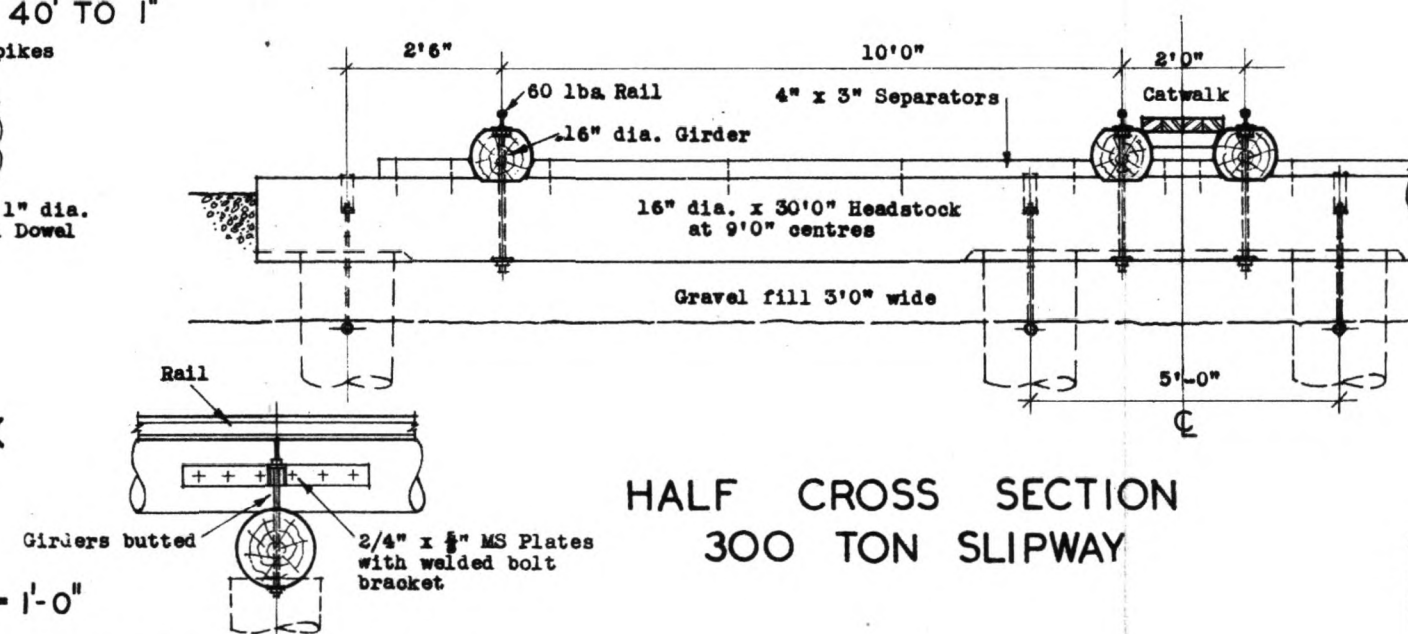
CROSS SECTION
100 TON SLIPWAY



HEADSTOCK
FIXING

ALTERNATIVE HEADSTOCK

SCALE 1/4" = 1'-0"

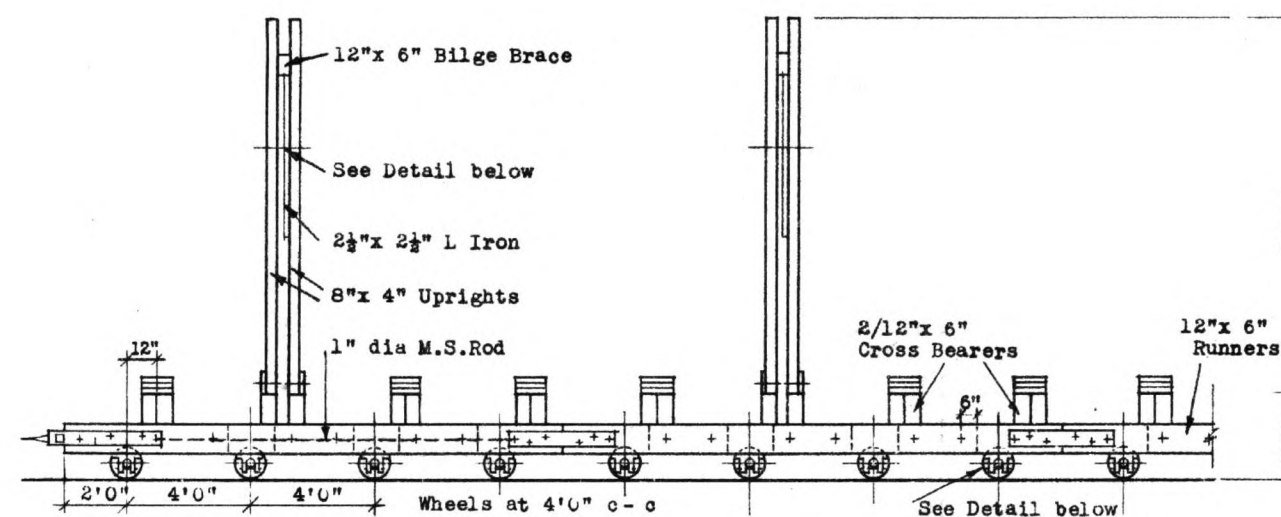


HALF CROSS SECTION
300 TON SLIPWAY

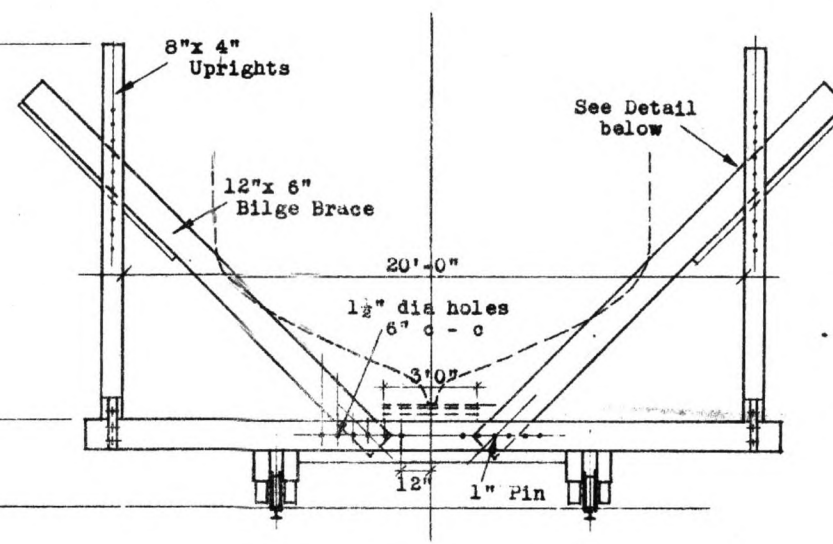
QUANTITIES PER 9'0" RUN OF SLIPWAYS		
ITEM	300 TON	100 TON
Girders 16" dia.	4/9'0"	2/9'0"
Headstocks 16" dia.	1/30'0"	1/18'0"
Separators and Catwalks 4" x 3"	60 ft sup.	94 ft sup.
Rails 60 lbs., with standard connections	36'0"	18'0"
Dog Spikes	36 No.	18 No.
Plates to Girder Joints 4" x 3/4" x 3'0" with welded bolt bkt.	4 No.	2 No.
Bolts 1" dia. with nuts & 2/3" x 3" x 3/4" washers	4/30" 4/26" 12/18"	2/30" 2/26" 6/18"
Deck Spikes 8" x 3/4"	20 No.	22 No.

Piles etc., are not included. See Note re same.

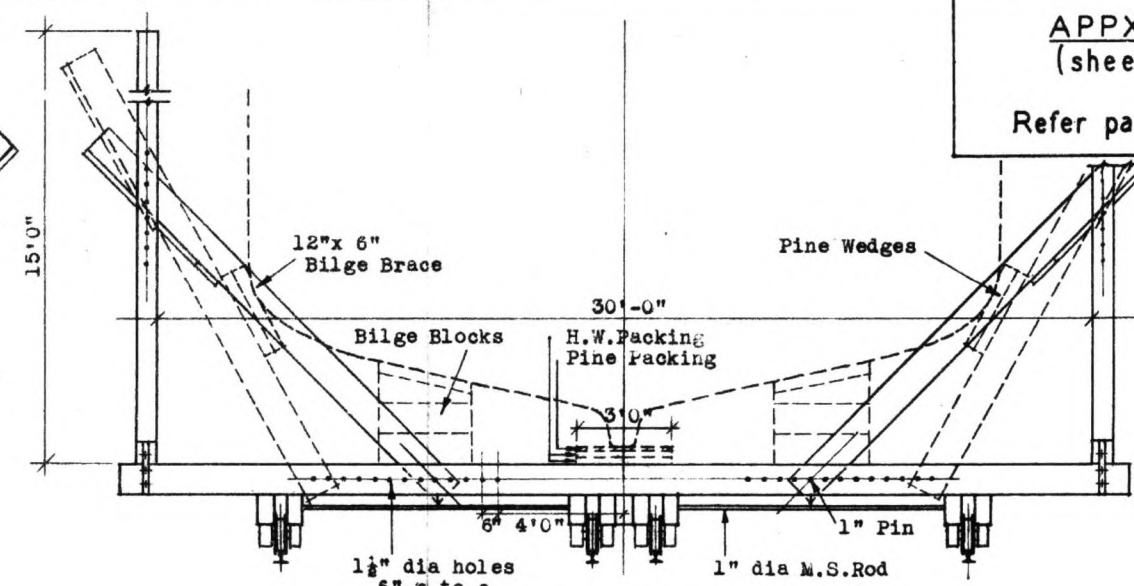
E IN C LHQ		SCALES: 40' & 1/4" TO 1'-0"
SLIPWAYS FOR SMALL CRAFT		DRAWN: D.N.T. PASSED:
		ECD 11282
		APPROVED: <i>[Signature]</i> 10 APR. 44 FOR ENGR. IN CH.



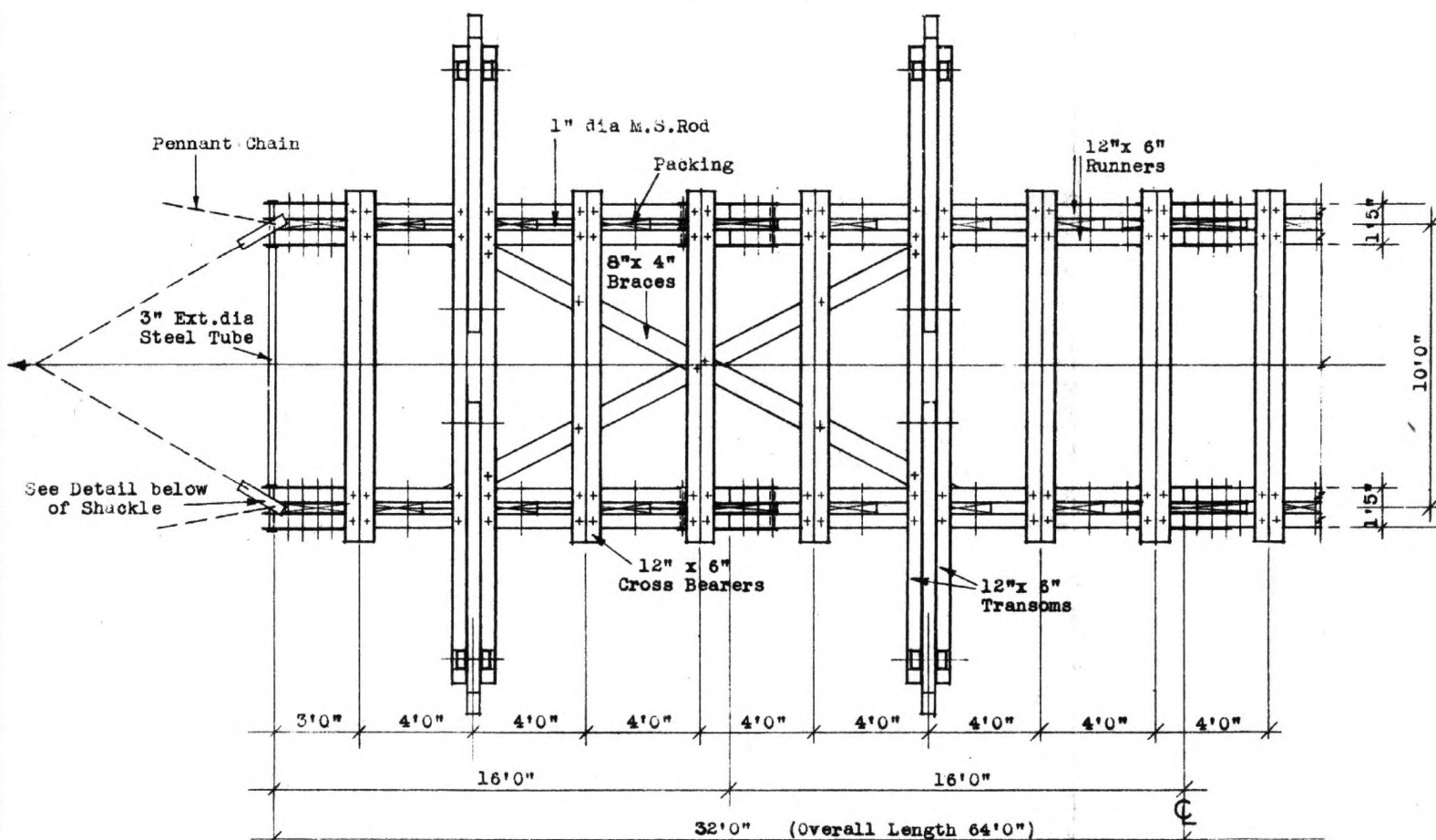
ELEVATION



END ELEVATION



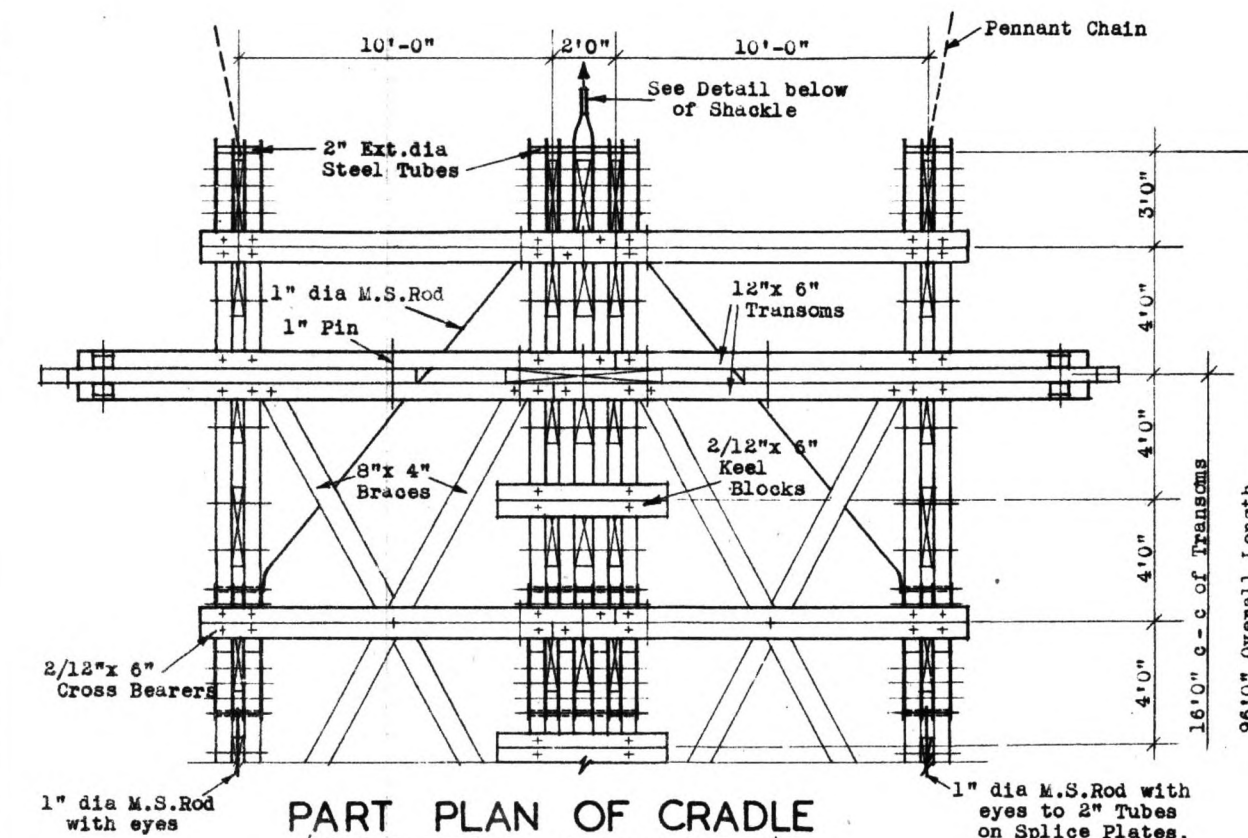
END ELEVATION (300 T)



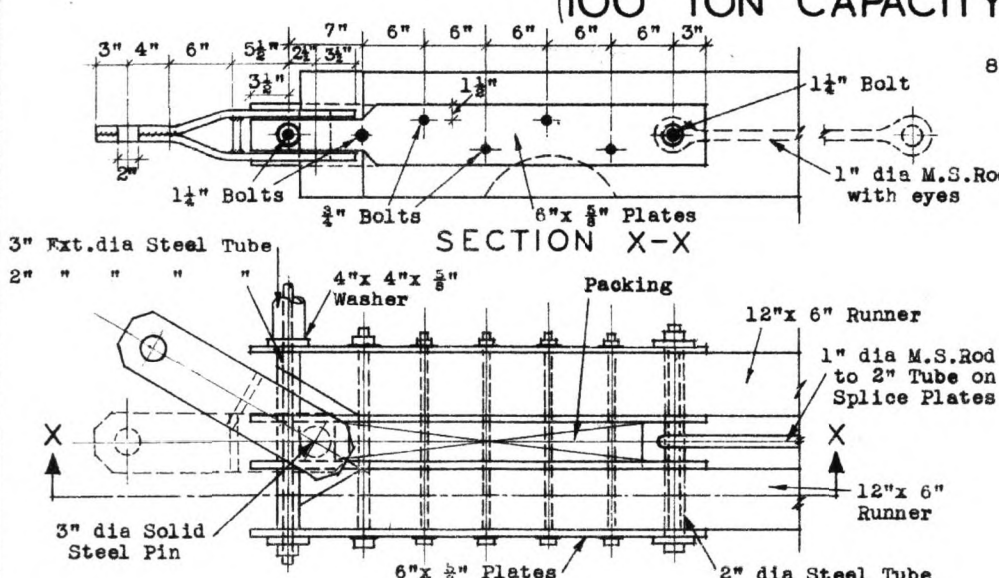
PART PLAN OF CRADLE
(100 TON CAPACITY)

QUANTITIES FOR CRADLES			
ITEM	SIZE	No. REQUIRED	
		100 TON	300 TON
Timber HW	Inches		
Runners	12 x 6	16/16'	48/16'
Transoms	"	8/22'6"	12/17'3"
			12/16'3"
			14/13'6"
			14/11'6"
			22/5'6"
Cross Bearers	"	8/16'	12/16'
Keel Blocks	"	16/12'	24/15'
Bilge Braces	"	4/20'	12/20'
Uprights	8 x 4	10/2'6"	26/2'6"
Braces	12 x 4	24/2'6"	85/2'6"
Packing	12 x 5		18/2'6"
	12 x 7		
Bilge Blocks	12 x 12	72	108
Pine Packing	(a)	16	24
" Wedges	(a)	8	12
Steel Work			
End Plates Sets(b) of 4 Pls	With shackle	2	2
	W/out "	-	2
Splice Plates 6"x 3/4"			
(See plans Sheet 2)			
(A) 52" for 6/16" bolts	Sets(b) of	-	8
and 2/2" tubes	4 plates		
(B) 40" for 4/16" bolts	"	2	8
and 2/2" tubes	"	4	4
(C) 40" for 6/16" bolts	"	8/7'	12/7'
Bilge Brace Ratchet	Sets(b) 2 pls	16	24
Plates to Uprights	1" dia.	196	404
Bolts	1" "	8	12
Pennant Chain w/shackles	20"	2/1"	2/1 1/2"
Wheels, axles, bearings	Sets	32	96
Tail shoes	Sets	2	4
MS Rods for Eye Rods	1" dia.	2/12'	8/14'

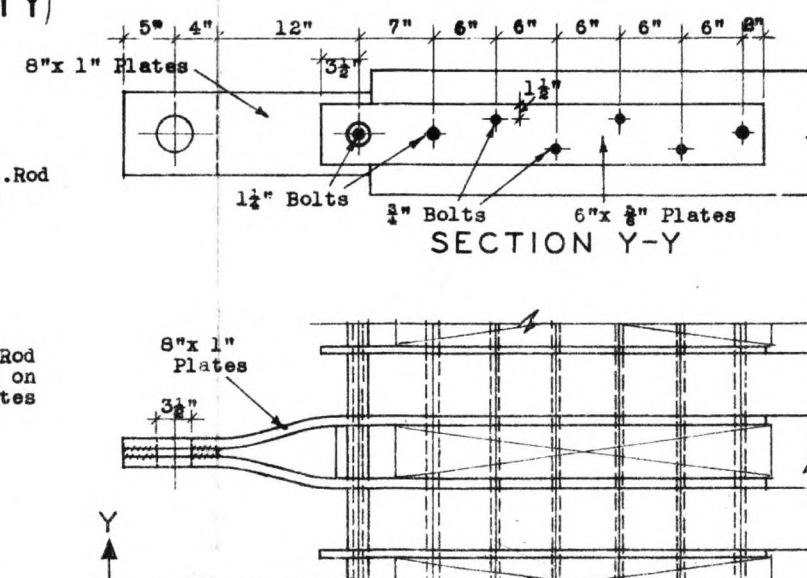
(a) As required to suit vessels.
(b) "Set" includes necessary fittings and bolts.



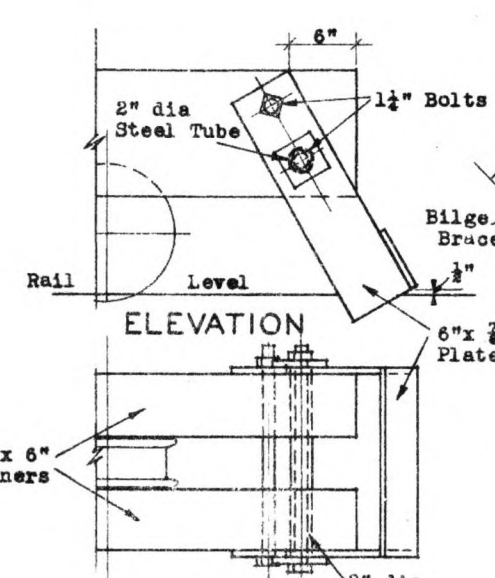
PART PLAN OF CRADLE
(300 TON CAPACITY)



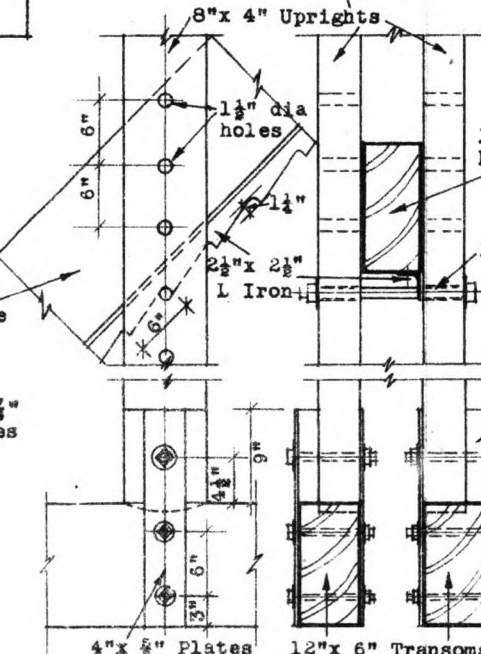
SHACKLE & END PLATES (100 T)



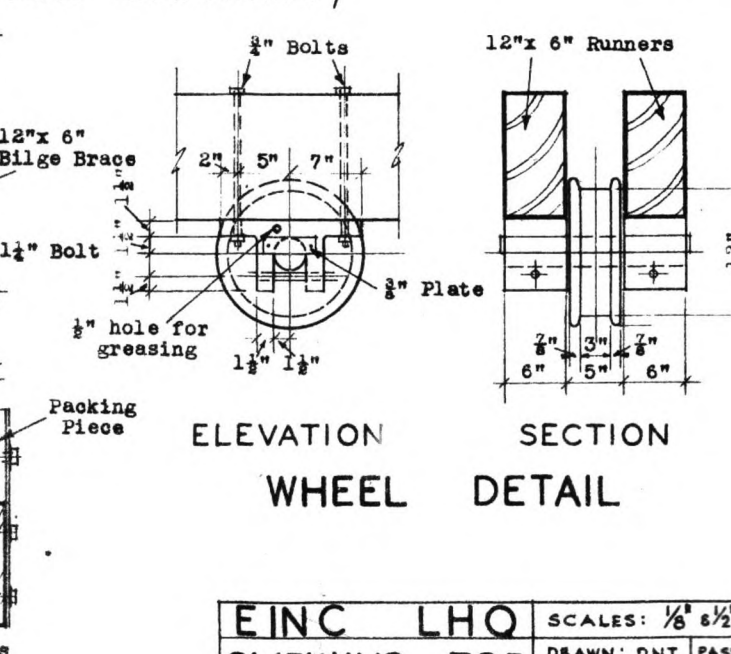
SHACKLE & END PLATES (300 T)

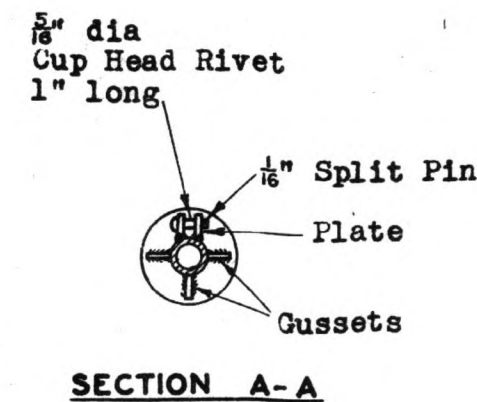
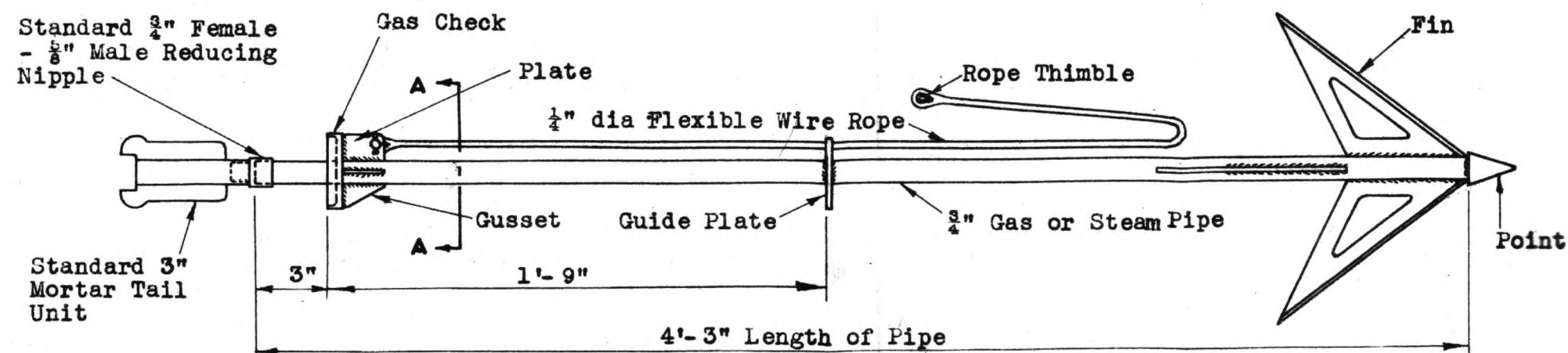
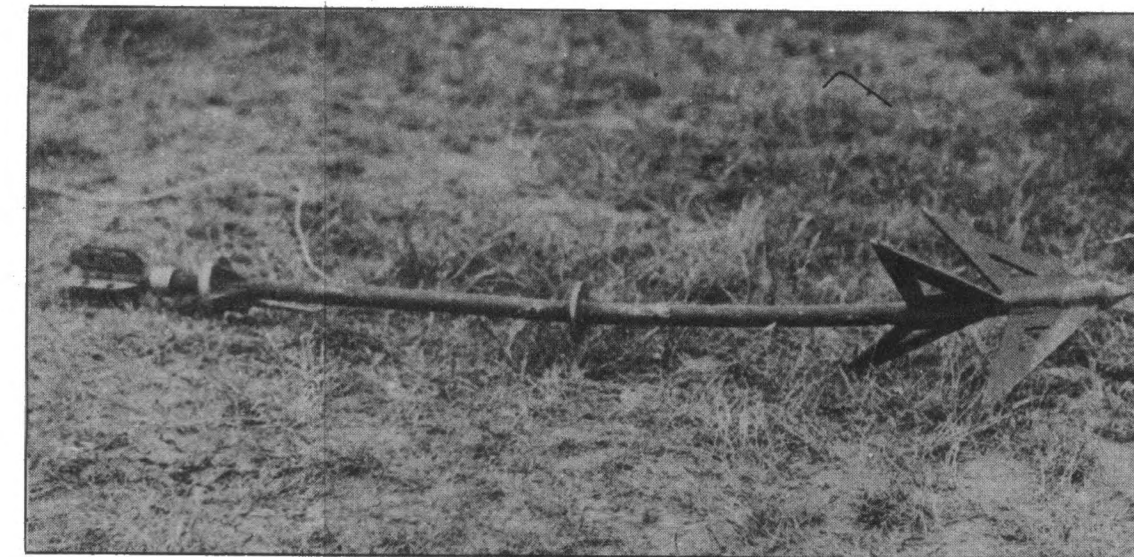
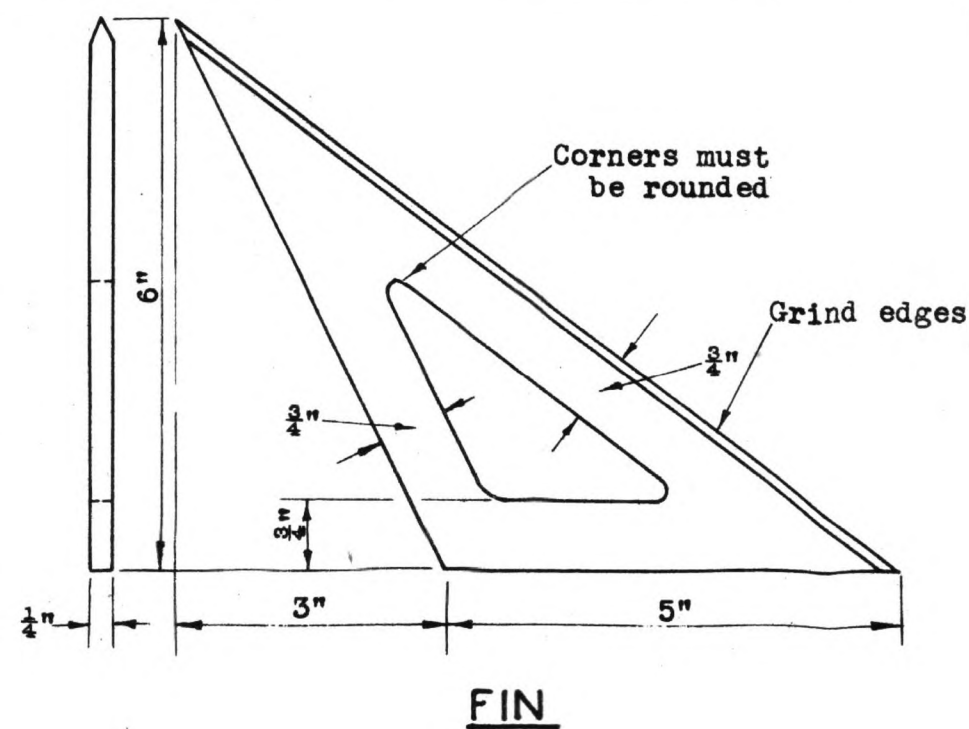
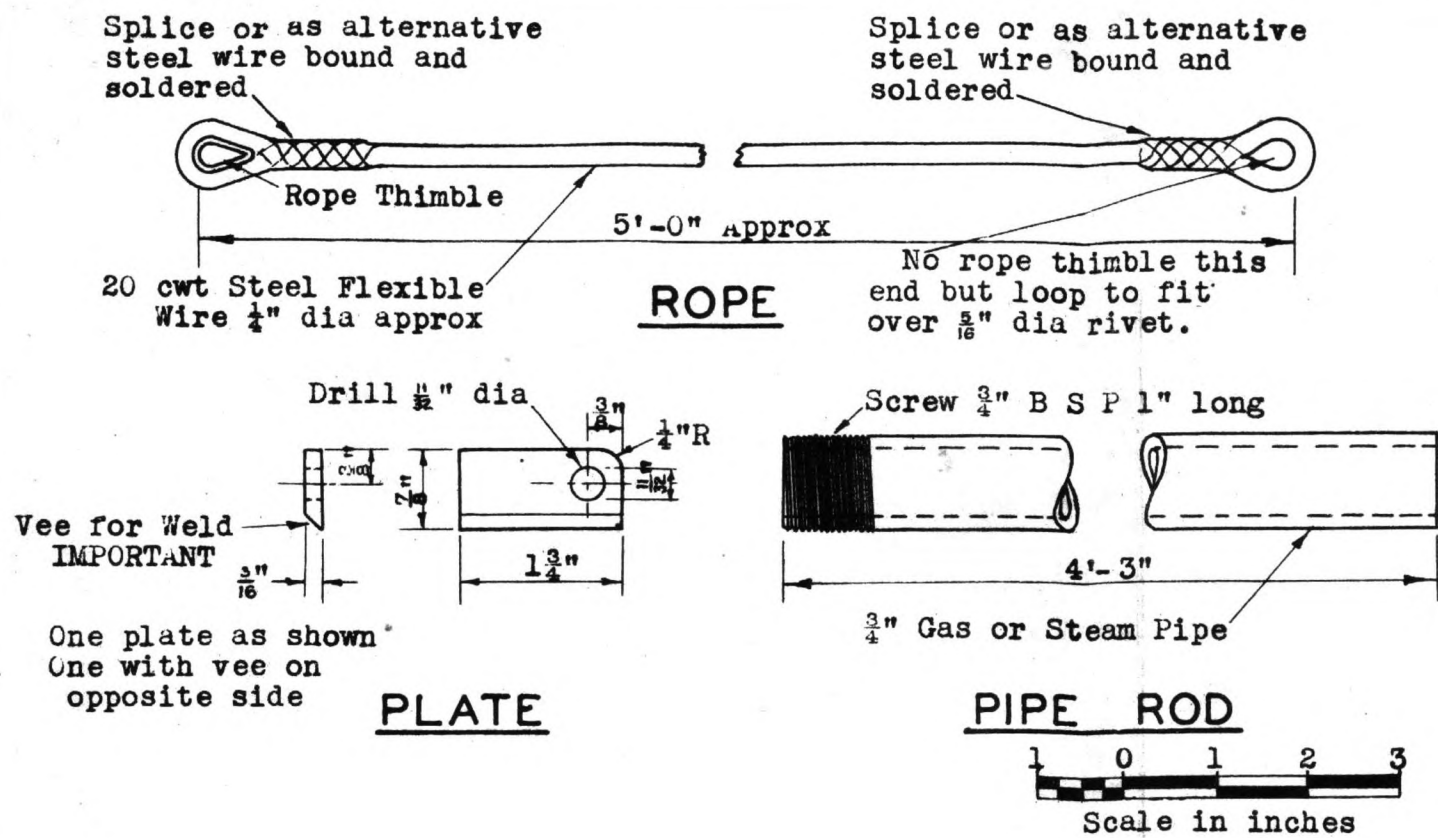


PLAN
TAIL SHOE



ELEVATION
UPRIGHTS & BRACES

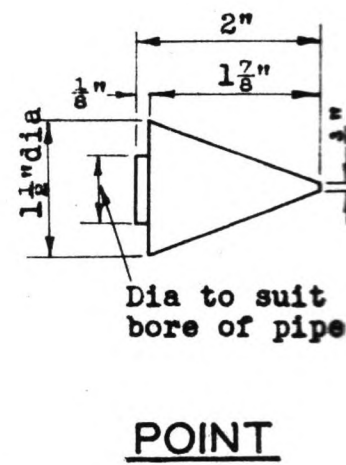
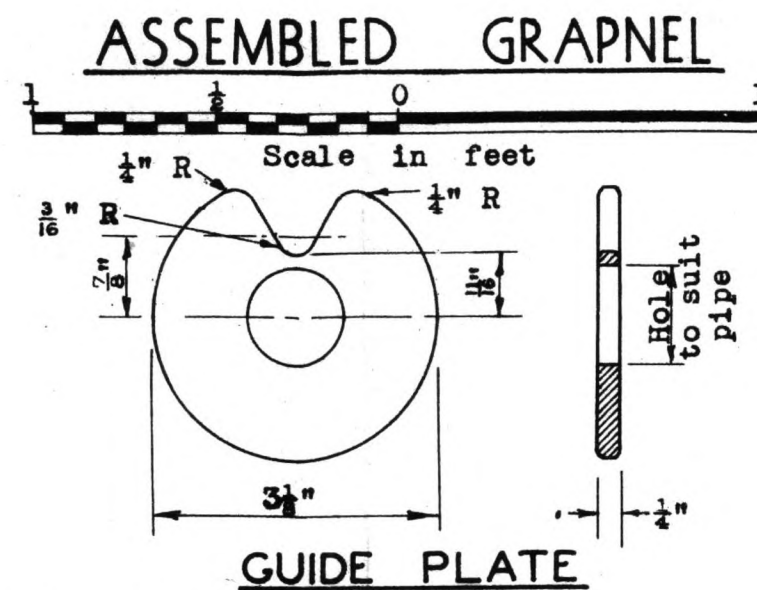




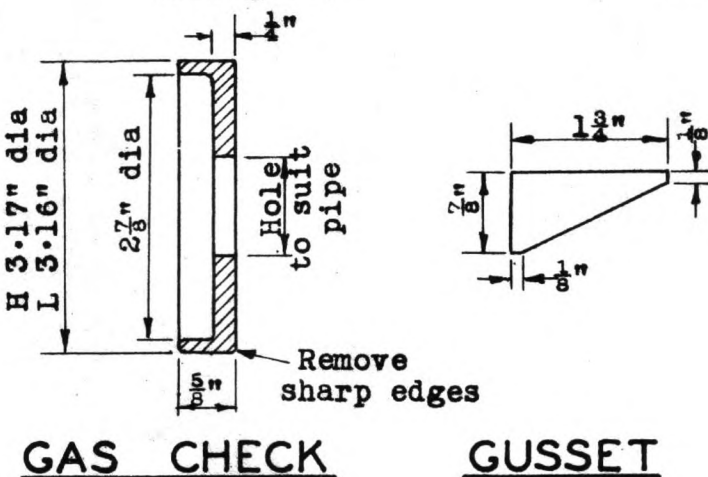
AFTER FIRING



NOTE:- To be Bronze welded throughout



SCHEDULE OF MATERIALS		
Part	Material	No required per Grapnel
Rope	Steel Flexible Wire	1
Plate	M.S.	1 L.H. 1 R.H.
Pipe Rod	$\frac{3}{4}$ " Gas or Steam Pipe	1
Fin	M S	4
Gas Check	M S	1
Gusset	M S	3
Guide Plate	M S	1
Point	M S	1



GRAPNEL 3" MORTAR