

11 July 1991

Deployment of Ionospheric Sounder at Ny Alesund

Deploy a four antenna receive array in the flat area to the east of the bath house and erect two crossed transmit antennas across the road to the west of the bath house. A sketch of the approximate locations is provided as Attachment 1. Use all the tower sections from the four 22m tall triangular antenna masts and three new sections (to be provided) for the erection of the new transmit antennas. We are also to be providing the guy wires for the central mast and all the guy anchors. A draft design package of the transmit antennas is included. Note that these drawings are provided for the purpose of estimating the cost of this project. Drawings of the exact antenna dimensions will be provided, referenced to a 'zero-level' at the base of the central tower. The exact locations of the tower will be determined on-site with the help of an engineer from the University of Tromso since the relative position, orientation and height of the towers will vary.

Attachment 2 is a list of all items shipped to Ny Alesund as of 08 July 91. Attachment 3 is a list of additional items which will be provided.

The effort consists of the following items:

1. Take down the four antenna masts in the flat area to the north of the observatory, preserving all 16 of the 5m long tower sections, guy wires, turnbuckles, pulleys and cables for use in the new construction.
2. Cut off (welding torch) the four 2 m tower sections which are imbedded in the concrete foundations, for use as foundations for the four corner masts of the new antenna.
3. Move all elements, guy wires and hardware to the bath house site.
4. Determine the locations for the foundations of the 30 m center mast and the four 15 m corner masts, the 15 guy anchors, the centers for the four receive antennas and the location of all 16 receive antenna anchors. This will be done in cooperation with the engineer from the University of Tromso.
5. Excavate holes approximately 1m into the permafrost for the five tower foundations and 15 guy anchors, at the locations provided in figure nos. 1 and 2. Foundation holes should be approximately 2 m square and anchor holes should be approximately 3m x 1m as indicated in figure no. 3.
6. Assuming that the permafrost starts 1m below the surface, the excavations are estimated to be 2m deep. Tower foundations and guy anchors should be placed a minimum of 1m into the permafrost.

7. Freeze the four cut-off 2 m and a new 2 m tower sections into the permafrost for use as foundations for the 5 towers. Each of these foundations must be perfectly level to ensure exactly vertical masts. All foundations should be at the same altitude and in the specified locations to within 5 cm. To achieve this on uneven terrain, two additional tower sections of 3m length will be provided for those towers lower than the central mast. The uphill towers may have to be shortened. The exact locations and orientations of the foundations and guy wire anchors has yet to be determined.

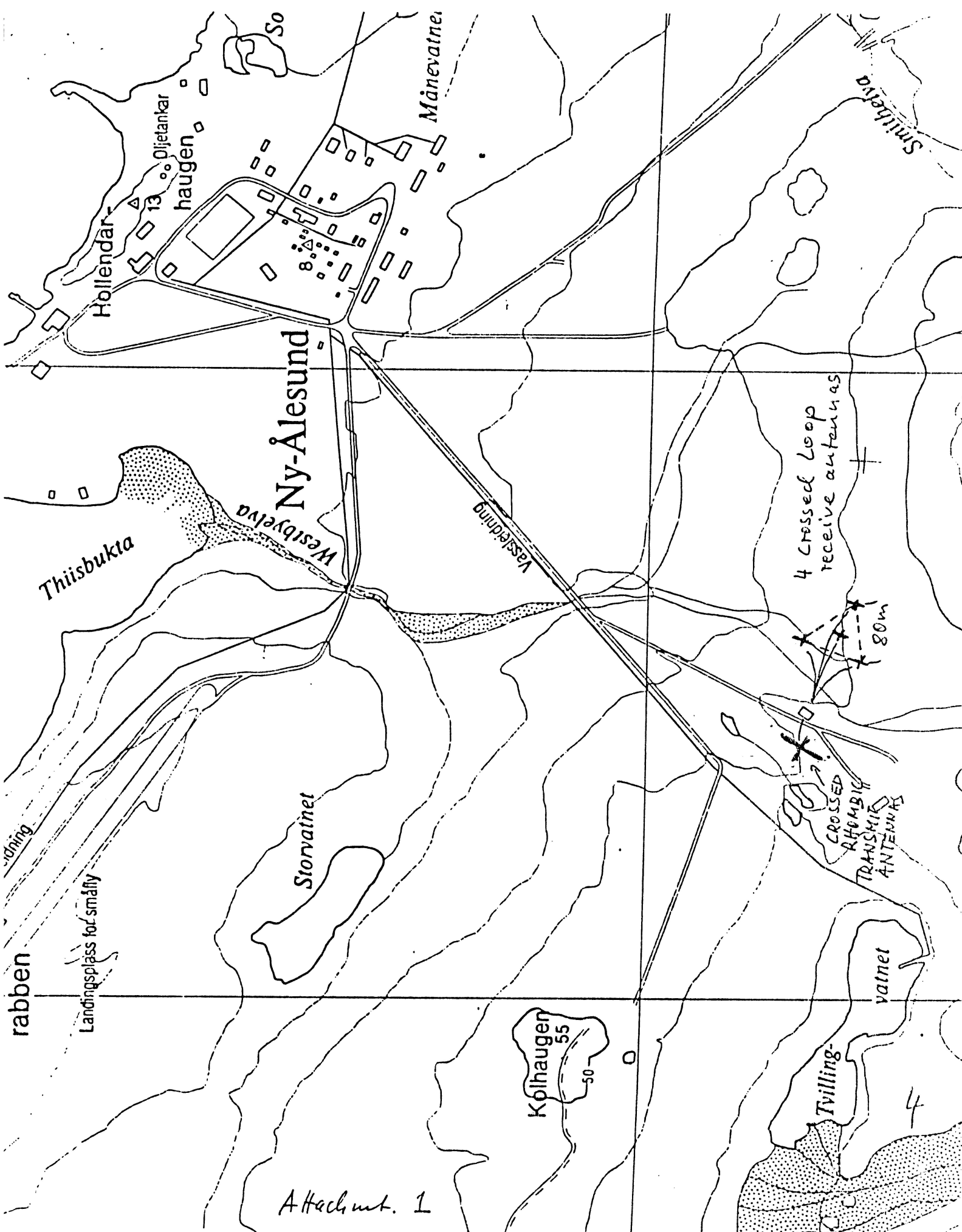
8. Provide and place insulation mats over all tower foundations and guy anchors as shown in drawing no. 3 and backfill all holes to ground level.

9. Survey the receive antenna site and install the 16 provided receive antenna anchors as shown in drawing no. 4. The anchors can be installed by driving the antenna stakes into the ground until approximately 50cm to 75cm remains above ground. The required accuracy for the relative position and orientation of the receive antennas is within 5 cm for distances and 2 degrees for angles. The position of the entire array should be such that the antennas are as close to the same altitude as possible, with no more than 1m height difference between the highest and lowest antennas. The maximum distance between the bath house and the furthest antenna is 140m. The antenna array should be aligned to magnetic north as closely as is practical, probably to within 10 degrees.

10. The transmit cables need to be buried in conduit only where they cross the road. Dig a trench (50 cm wide, 75 cm deep) across the road at the point where the cables will cross. Supply and bury a conduit (5-10cm diameter) for the transmit signal cables, and backfill the trench. The ends of the pipe on either side of the road have to remain accessible, so that the transmit cable can be fed through.

11. After the foundations have completely frozen (approximately four days), erect all five transmit antenna towers. Mount the top plate, terminating resistors and baluns on the center mast. All antenna and guying material and mounting hardware (bolts, shackles, insulators, etc.) will be provided.

12. Cut, assemble and string the two crossed rhombic radiating elements and their supporting hardware. Connect elements to the terminating resistors near the top of the center mast and to the baluns at the bottom of the center mast. Engineering guidance will be provided for items 11 and 12 by the University of Tromsø engineer.



Attachment 1

COMMERCIAL INVOICE

No. 302831003

UNIVERSITY OF LOWELL
 RESEARCH FOUNDATION
 450 Aiken Street
 Lowell, Massachusetts 01854

Ultimate Consignee:
 Kingsbay Coal Company
 Ny Alesund, Svalbard

Date: June 29, 1991
 Export License: G-DEST
 Classification: 6599G/EE
 Page 1 of 1

Intermediate:
 Vessel "Lanse"
 Tromsø, Norway
 c/o Norwegian Polar Institute

ITEM NO.	DESCRIPTION	QTY	PRICE (US DOLLARS)	AMOUNT (US DOLLARS)
1	RG-213 cable, 500 ft spools	6	\$185.00	\$1,110.00
2	Guy struts	6	24.00	144.00
3	Top plate	1	76.00	76.00
4	PVC crossed loop receive antenna	4	18.00	72.00
5	Coax loop elements	8	7.50	60.00
6	Antenna stakes	16	3.00	48.00
7	50-600 ohm transformer	2	45.00	90.00
8	600 ohm load resistor	2	45.00	90.00
9	End point spreader, PVC	4	15.00	60.00
10	Mid point spreader, G-10	8	5.00	40.00
11	U-bolts	40	1.00	40.00
12	Shackles	17	1.00	17.00
	TOTAL			\$1,847.00
	Remarks: I certify that the above information is true.			
	Steven H. Myers Program Manager			

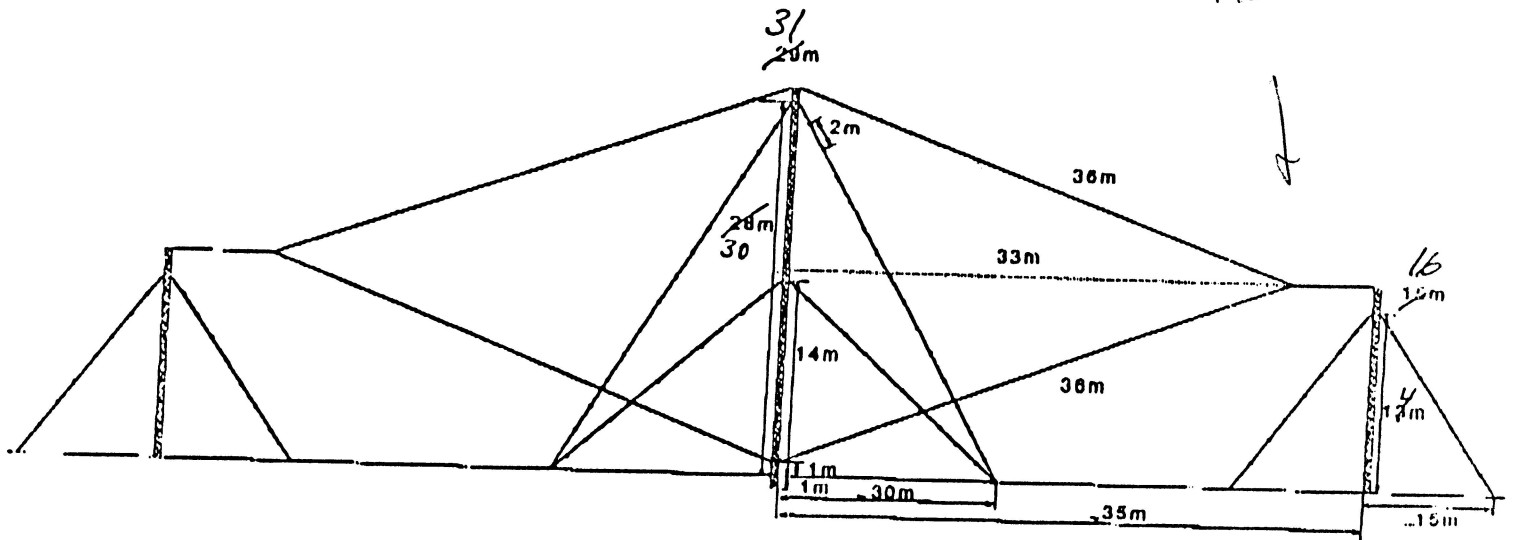
For weight listing aboard the vessel Lanse contact
 Norwegian Polar Institute
 (Oslo) 123650

Ny Alesund Ionospheric Sounder

Additional Items to be Provided

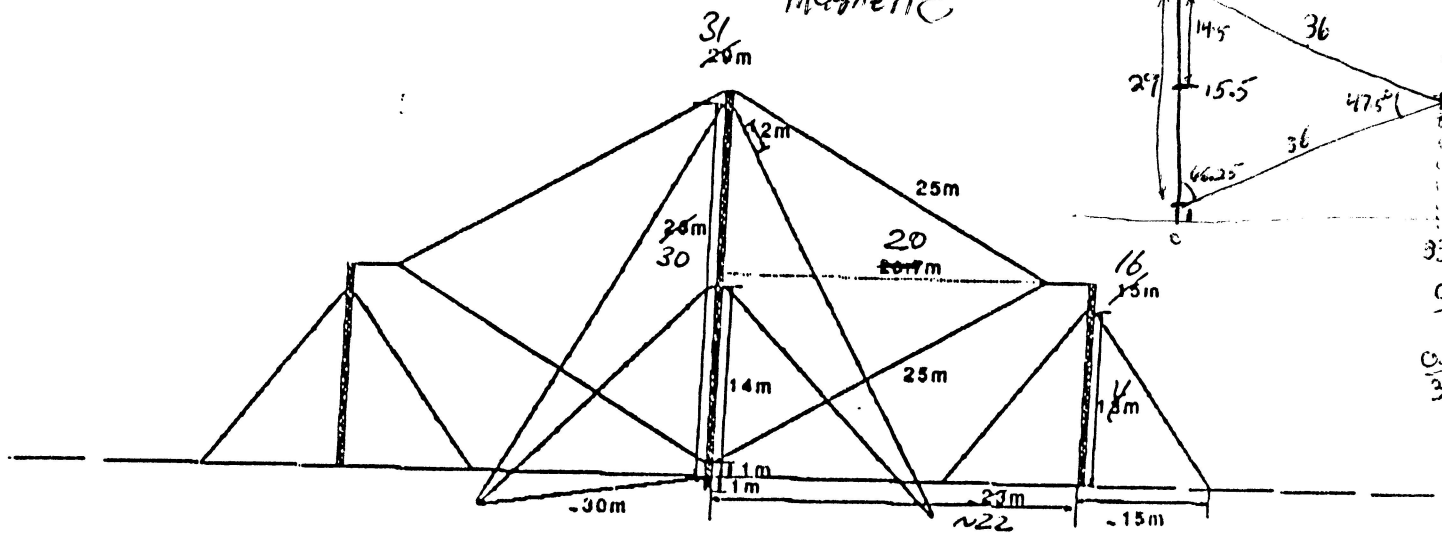
- Wire for antenna radiating elements, 14 gauge copperweld.
- 15 insulators for supporting radiating elements.
- Complete guywire assembly for center tower, including shackles, turnbuckles and mounting hardware.
- 15 guywire anchor assemblies.
- 1 tower section, 5m long
- 2 tower sections, 3m long
- 15 shackles for the element spreaders

NOT TO SCALE



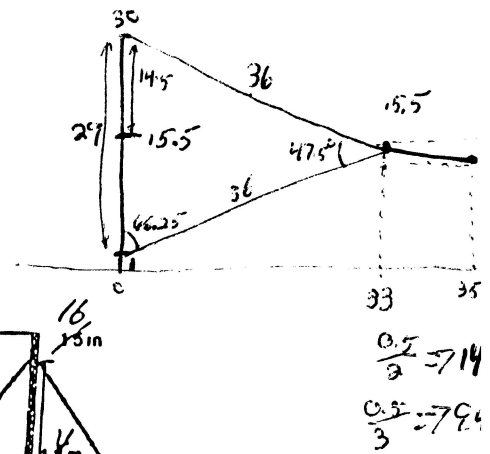
Side View (East-West)

Magnetic



Side View (North-South)

Magnetic



$$\frac{0.5}{3} = 7.14$$

$$\frac{0.5}{3} = 7.94$$

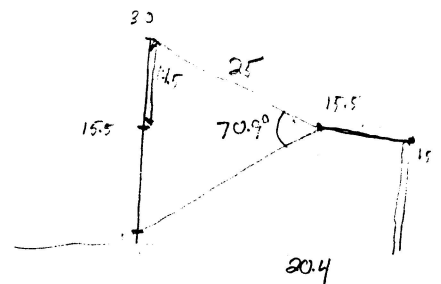


Fig 1

Top View

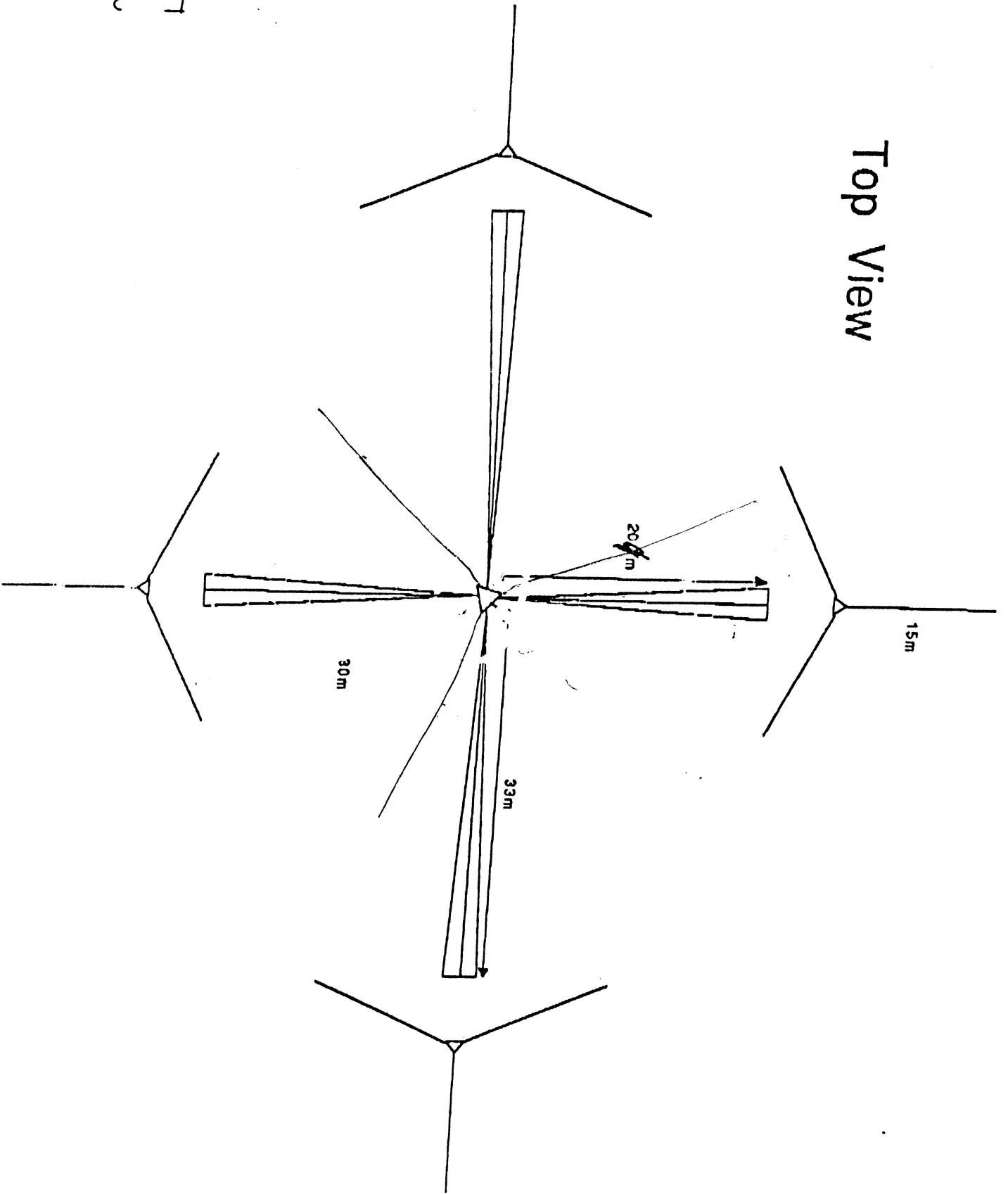
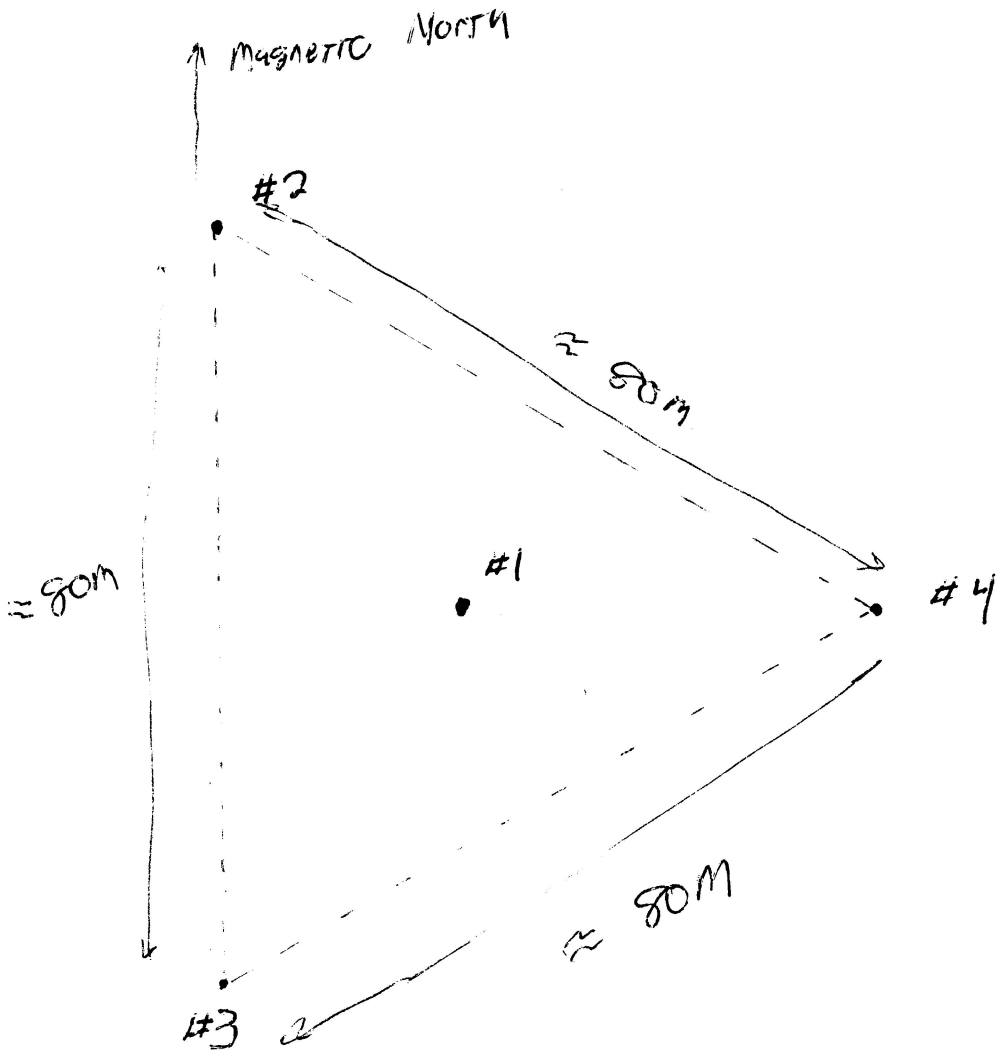


Fig 2

2

Receive Antenna Array.

4 ANTENNAS



RECEIVE ANTENNA GEOMETRIES
4 POSTS / ANTENNAS.

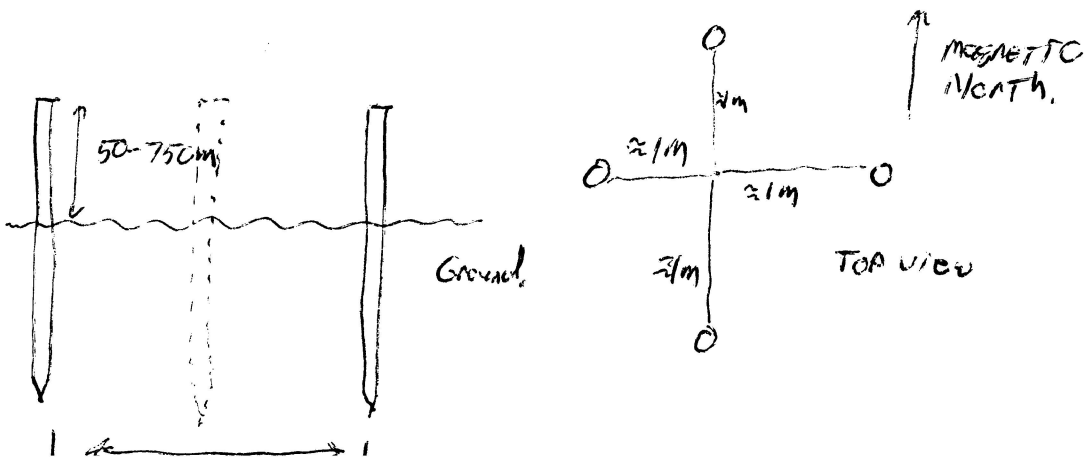
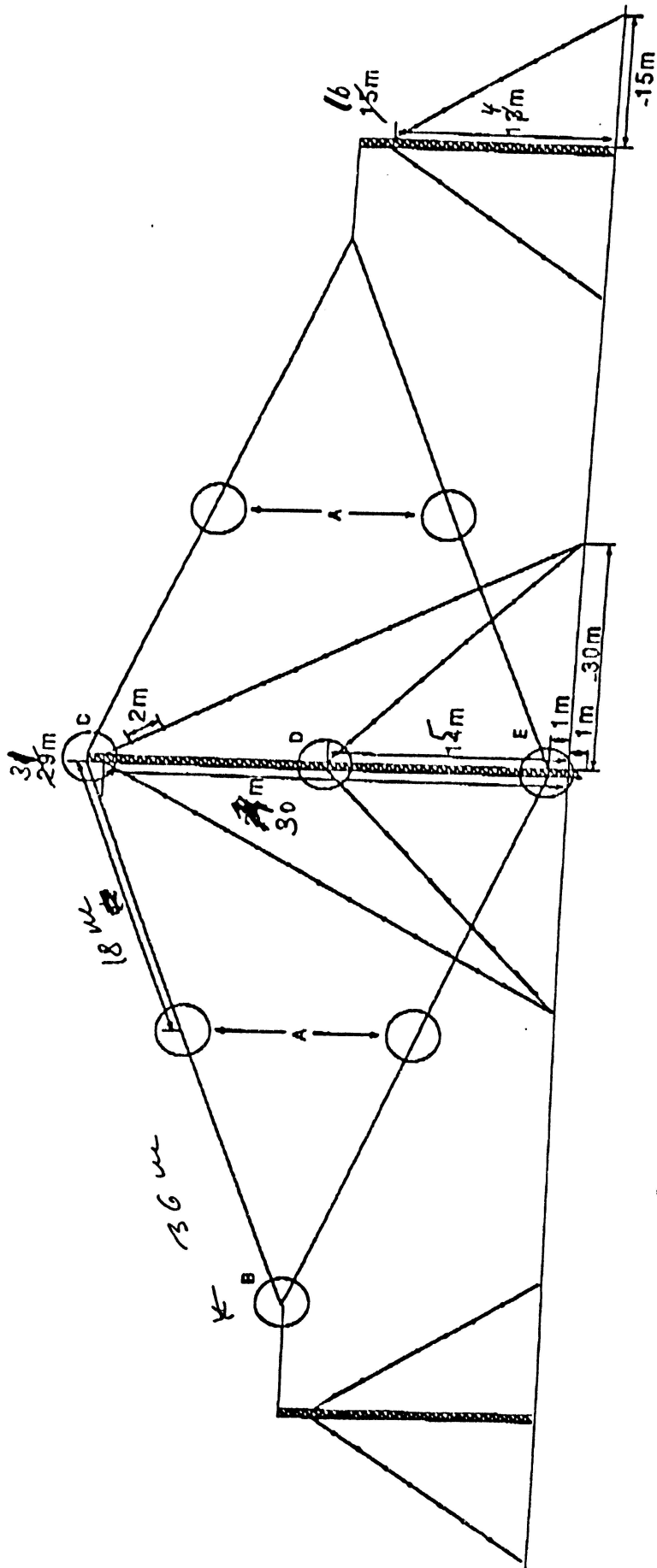


Fig 4



36m element: L=18m
25m element: L=12.5m

Fig 5 10

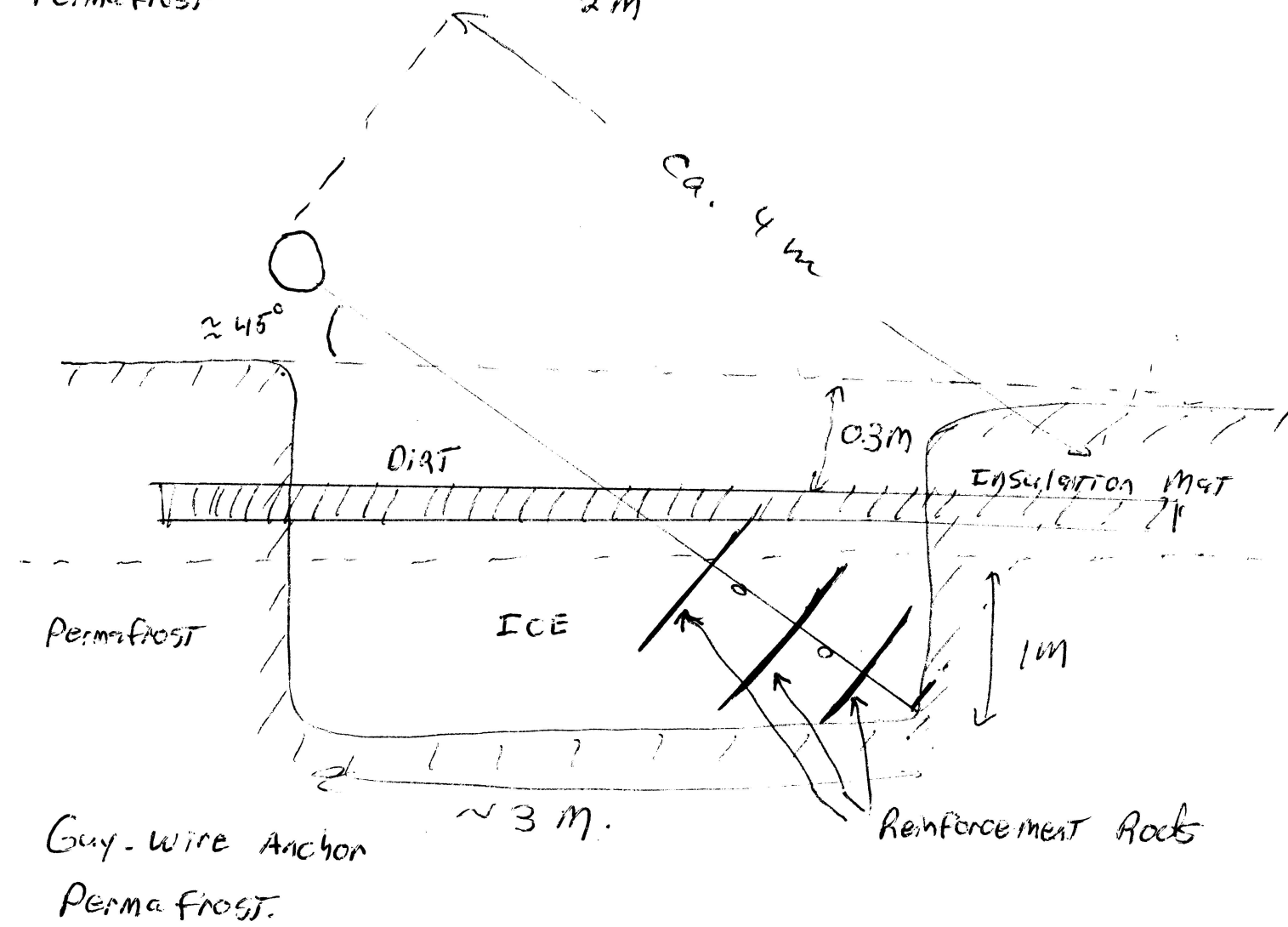
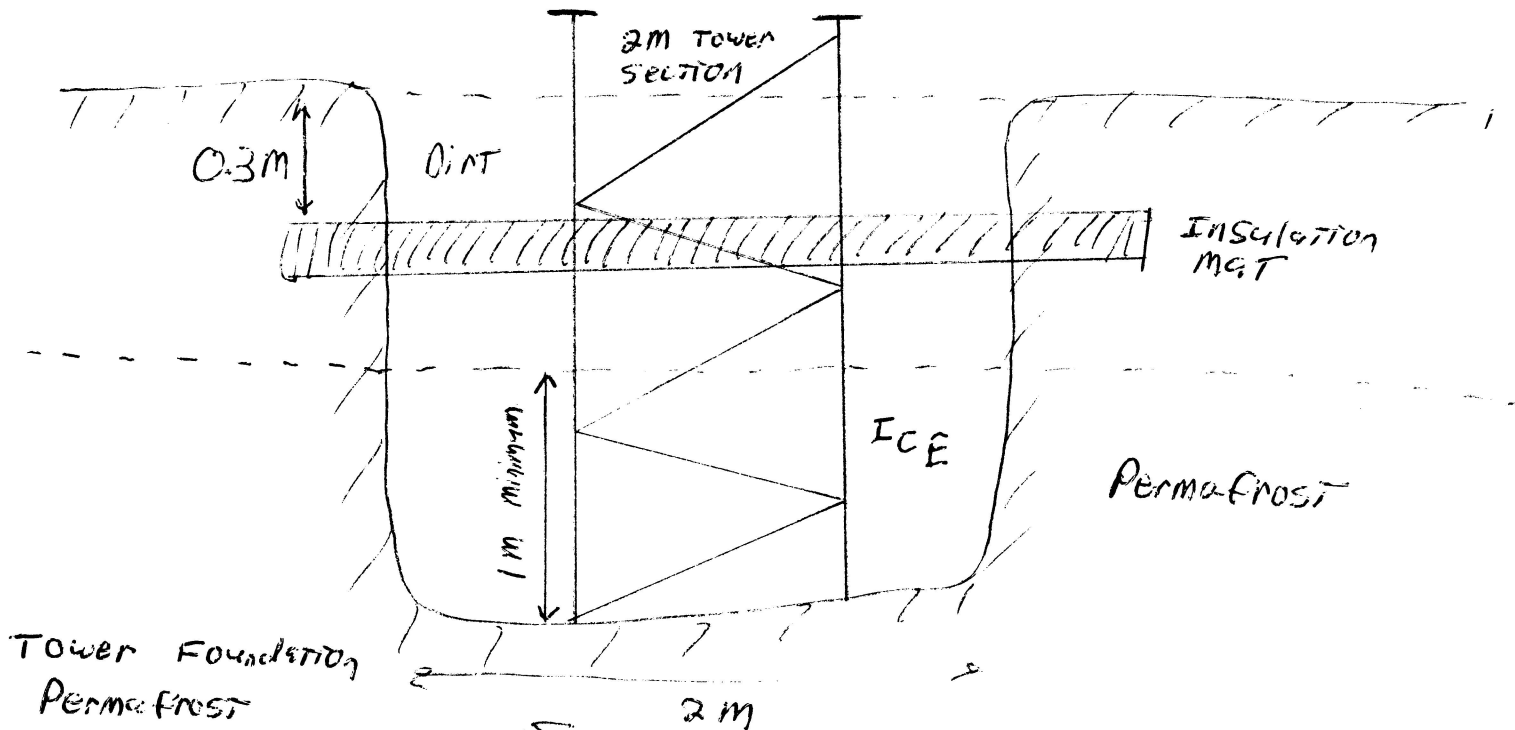
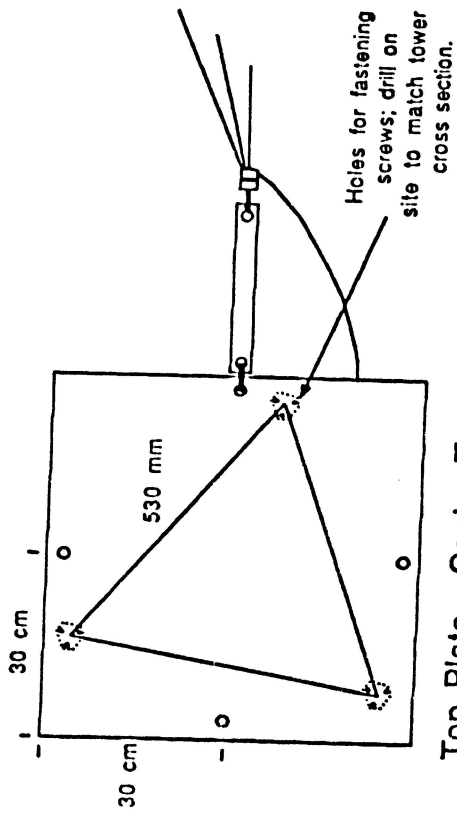


Fig. 3



Top Plate - Center Tower

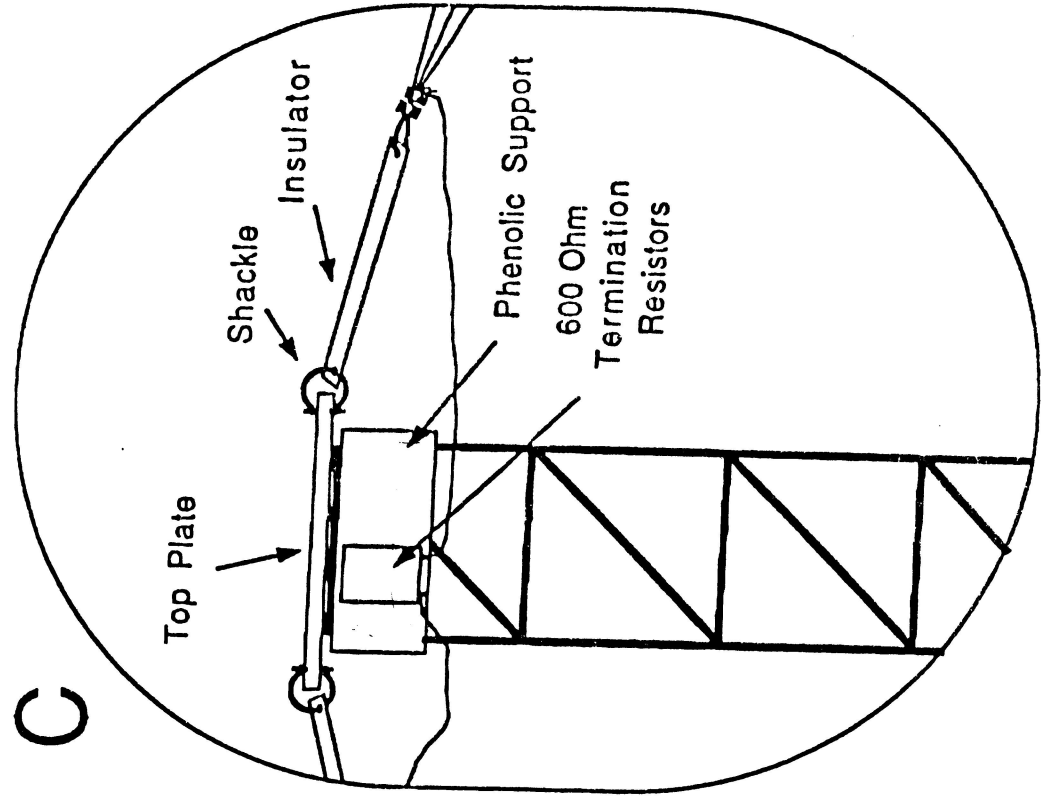
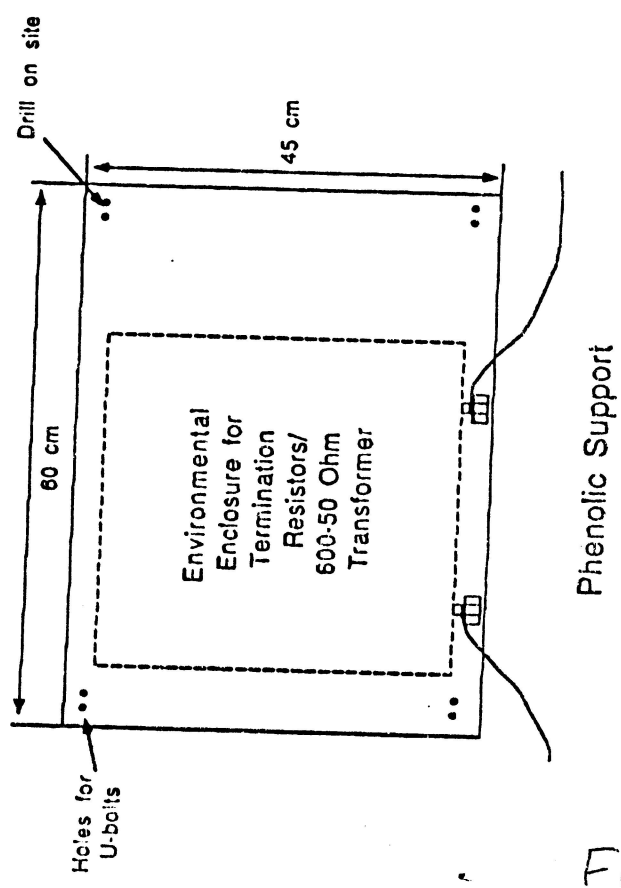
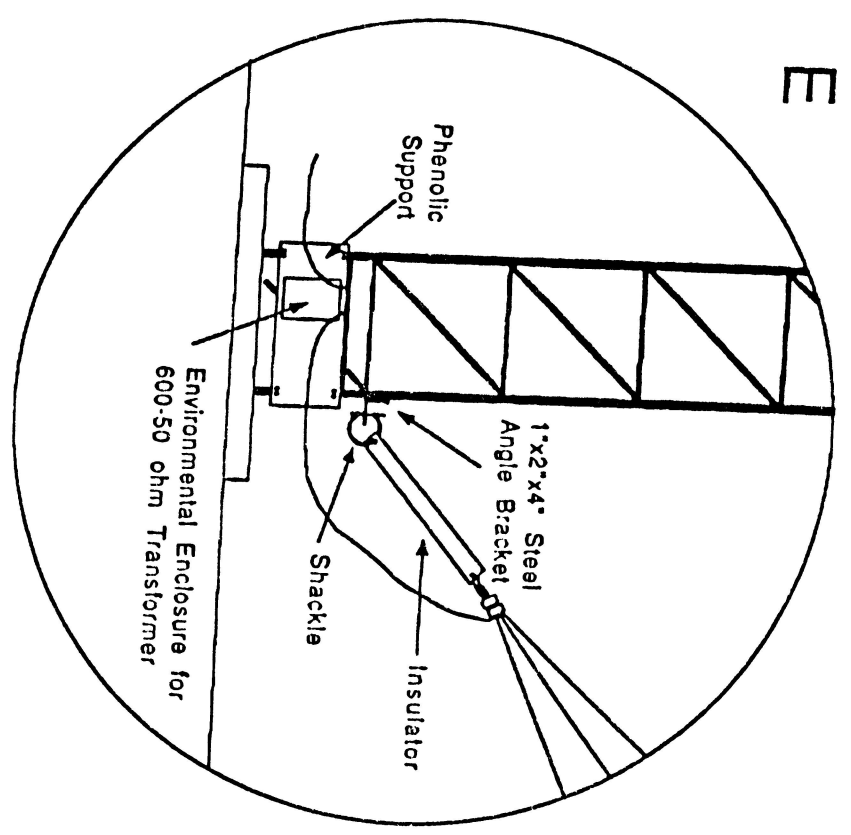
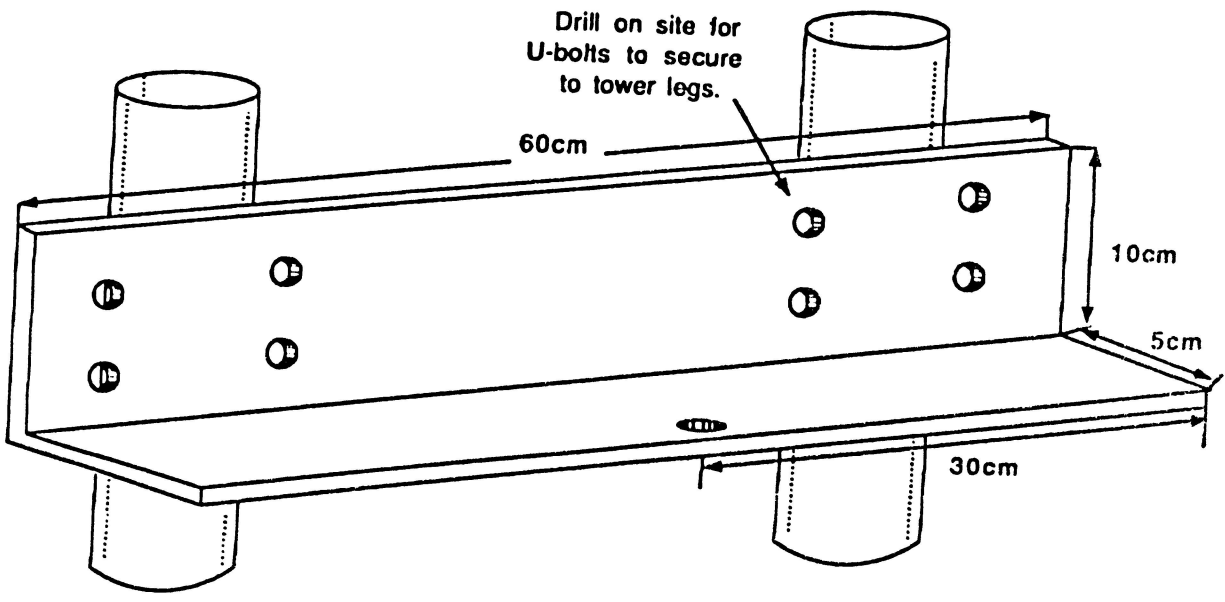


Fig 6 11



why?

Center Tower Guy Wire Strut



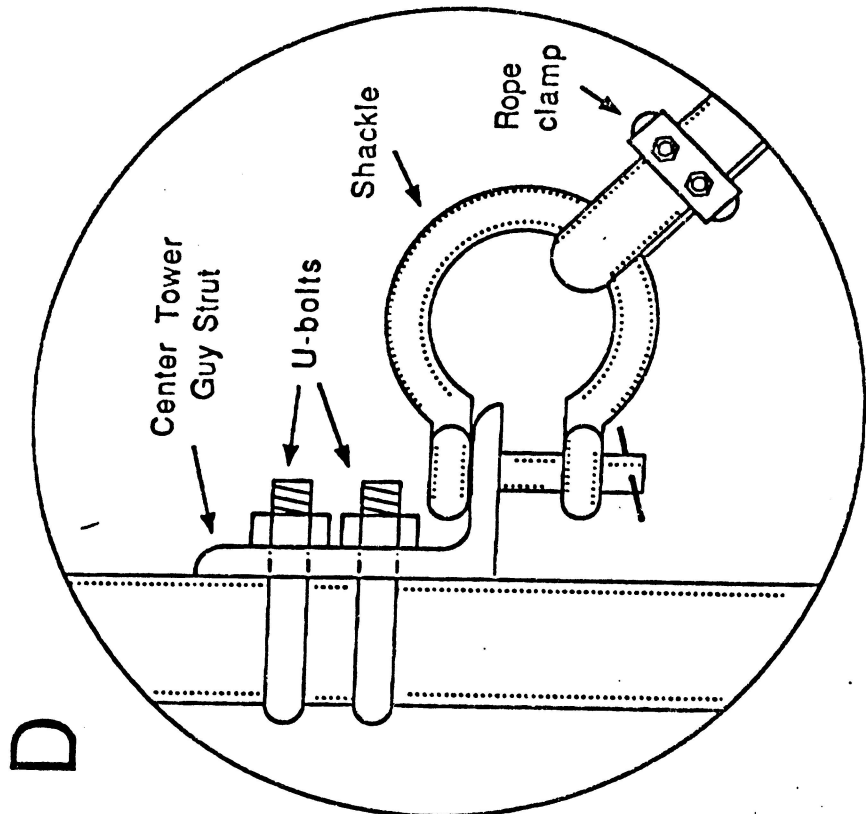
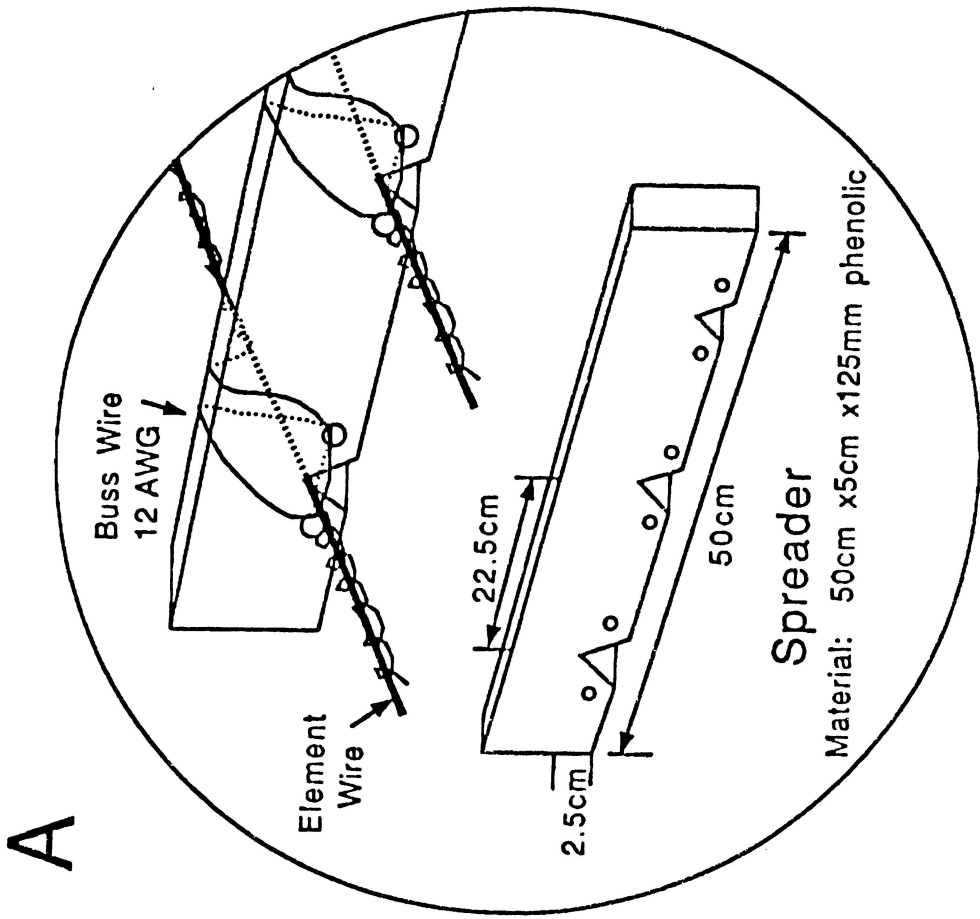


Fig 8 13

B

To maintain backside tension, wrap using nylon line and secure with a square knot.

Phenolic
1 cm x 5 cm I.D.

U-bolt

1'

U-bolt

Wire Clamp

Phenolic Tube
1m x 5 cm O.D.

Back
View

Top
view

Existing pulley on top
of tower. Secure end
of wire rope to existing
turnbuckle and bracket
on side of each tower.

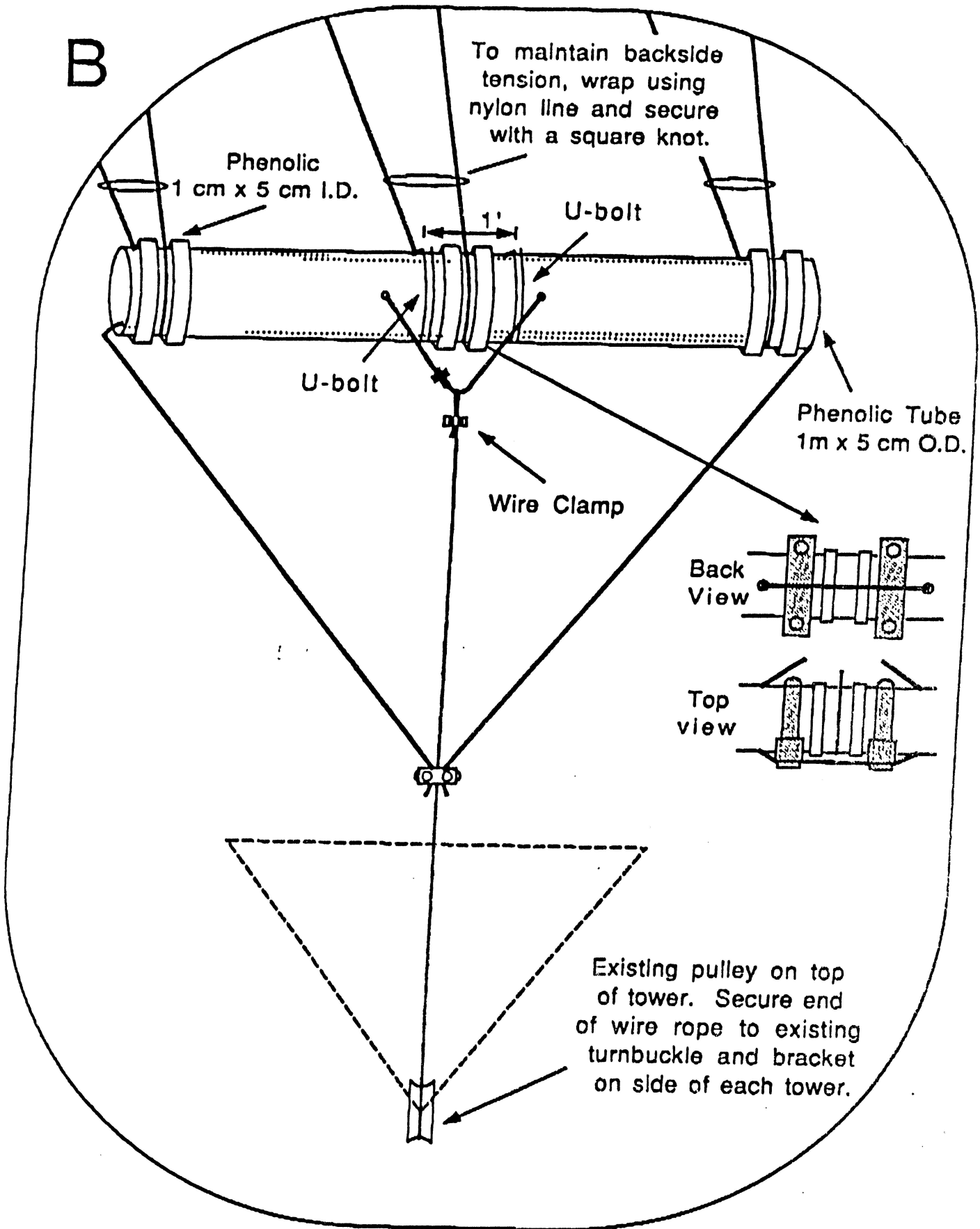


Fig 9. 14