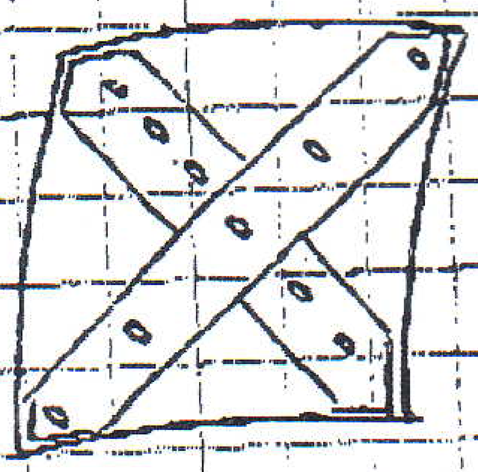
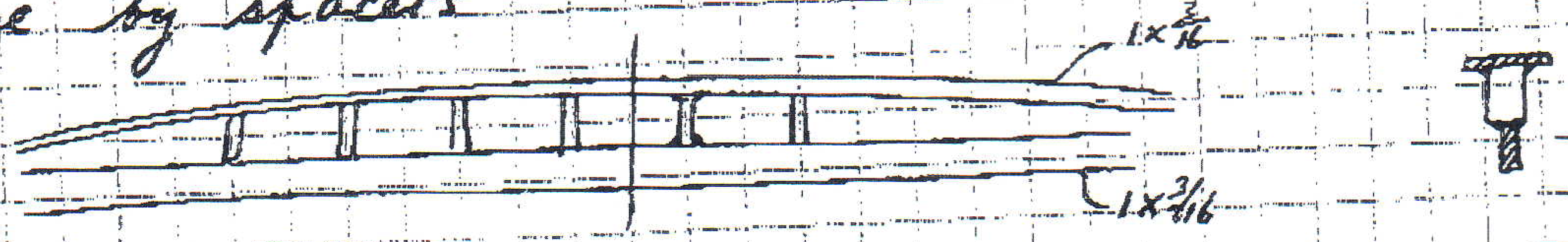
Aluminum Panel 31 Jan 1965

Attempts to make panels. A small panel about 2'x2' was bent to shape and two diagonal straps were screwed to it. It maintained its shape quite well, but was stiffer in one plane than the other.



A larger panel about 4'x4' was made on the same principle, but had no stiffness worth mentioning.

A steel frame of $1 \times 3/16$ strap showed some promise. Then a steel frame 7'6" x 2' x 4' was made, and curved to shape by spacers.



The amount of humping was taken from p. 25 (inner panel). The long upper straps have to be correctly tilted away from the horizontal to cause the panel to bulge properly.

It appeared that more steel than provided for in this frame would be needed, but already we had about 30 lb of steel compared with 20 lb or so of aluminum. Therefore CC was instructed to self-flange the sheet by hammering.

Aluminum panel (contd)

5 Jan 1965

During the week flanges were formed as follows: cross members were added to the frame, the sheet of .063" aluminum (14# B&S) was pressed down to the cross members and then clamped to the frame, working outwards. The sheet was trimmed to shape by saw, and the flanges were hammered down (about 1½"). At the 4' end, material was made up by attaching scrap.

When inspected on 5 Jan this attempt looked very good, but possessed some flexibility about the diagonals. Instructed CC to support it firmly at 4 corners for testing.

8 Jan 1965

Panel clamped to four legs welded to steel baseplate 12' long. 50 lb load at center depressed center about ¼". distributed 200 lb load (10 lb/ft²) withstood easily. I stood in the middle (150 lb, or total 350 lb) (17 lb/ft²) and it felt good. Standing at the edge on one foot did not appear to damage panel (concave upwards).

Calculate deflection assuming all the strength is in the two long flanges.

Uniform load of 100 lb on 90" beam, $b = .063$, $d = 1.5$, assuming neutral axis in surface and ends built in.

$\delta = \frac{Wl^3}{384\,EI}$ $W = 100$ $l = 90$ $I = \frac{1}{3}bd^3 = .07$ in^4 $E = 10^7$

$\delta = 1/4$ inch. This is the right order

[redacted]

of magnitude but undoubtedly much of the stiffness comes from the skin that is attributed to the built in ends. Even so, it seems that deeper flanges should be tried, also thicker flanges, and flanges turned over or back at their edges. Make deflection measurements with flanges thickened by screwing on extra thicknesses to see to what extent strengthening the flanges reduces the deflection.