17 March 1959

By Calculations of 29 Dec 1936 on a parabola of revolution having focal length "a" and radius "r".

The surface "s" is

$$s = \frac{\pi}{3a}\left[\left(r^2+4a^2\right)^{3/2} - 8a^3\right]$$

The centroid of this surface "s" is "d" above bottom of dish

$$d = \frac{3}{4a}\,\frac{\left[\left(\frac{1}{5}r^2 - \frac{8}{15}a^2\right)\left(r^2+4a^2\right)^{3/2} + \frac{64}{15}a^5\right]}{\left(r^2+4a^2\right)^{3/2} - 8a^3}$$

The length "r_s" along an element of the surface out from the center is

$$r_s = \frac{r}{4a}\left[r^2+4a^2\right]^{1/2} + a\log_e\left[\frac{r+\left(r^2+4a^2\right)^{1/2}}{2a}\right]$$

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Area of Dish

focal length, $a = 300$ feet
radius $r = 500$ feet

$$\text{Area } s = \frac{\pi}{3a}\left[\left(r^2 + 4a^2\right)^{3/2} - 8a^3\right]$$

$$s = \frac{3.14}{3.300}\left[\left(500^2 + 4 \cdot 300^2\right)^{3/2} - 8 \cdot 300^3\right]$$

$s = 908{,}000$ square feet.

Make skin of #12 U.S. guage black iron.
0.1046" thick, 4.375 lbs/sq ft, 0.030382 lbs/sq in.

Weight of skin

$$\frac{908{,}000}{2000} 4.375 = 1986 \text{ tons}$$