4.

4. There are 3 sides to fence, two sides with length b and one side with length a:

$a + b + b = 1954 \implies a = 1954 - 2b$

Now find the area:

$\text{area} = a \times b = (l - 2b)b = 1954\,b - 2\,b^2$

Notice the Parabolic equation, find the vertex:

$\text{vertex} = (\frac{977}{2}$ yards $, \frac{954\,529}{2}$ yards^2)

Square the unit for vertex's vertical coordinate since it is a quadratic.