7. The condition for a minimum of intensity in a single-slit diffraction pattern is $a \sin\theta = m\lambda$, where a is the slit width, λ is the wavelength, and m is an integer. To find the angular position of the first minimum to one side of the central maximum, we set $m = 1$:

$$\theta_1 = \sin^{-1}\left(\frac{\lambda}{a}\right) = \sin^{-1}\left(\frac{589 \times 10^{-9}\,\mathrm{m}}{1.00 \times 10^{-3}\,\mathrm{m}}\right) = 5.89 \times 10^{-4}\ \mathrm{rad}\ .$$

If D is the distance from the slit to the screen, the distance on the screen from the center of the pattern to the minimum is

$$y_1 = D \tan\theta_1 = (3.00\,\mathrm{m}) \tan(5.89 \times 10^{-4}\,\mathrm{rad}) = 1.767 \times 10^{-3}\ \mathrm{m}\ .$$

To find the second minimum, we set $m = 2$:

$$\theta_2 = \sin^{-1}\left(\frac{2(589 \times 10^{-9}\,\mathrm{m})}{1.00 \times 10^{-3}\,\mathrm{m}}\right) = 1.178 \times 10^{-3}\ \mathrm{rad}\ .$$

The distance from the center of the pattern to this second minimum is $y_2 = D \tan\theta_2 = (3.00\,\mathrm{m}) \tan(1.178 \times 10^{-3}\,\mathrm{rad}) = 3.534 \times 10^{-3}\,\mathrm{m}$. The separation of the two minima is $\Delta y = y_2 - y_1 = 3.534\,\mathrm{mm} - 1.767\,\mathrm{mm} = 1.77\,\mathrm{mm}$.