The 'third' rail of a subway track is made from an iron bar measuring 10x15 cm. This rail carries current that runs the motors on the subway train. (a) What is the resistance of a 15 km piece of rail if the resistivity of iron is $9.68 \times 10^{-8} \Omega \cdot m$? (b) How much voltage is lost in the rails 15 km from the source if the motors use 1000 amps?

\[
R = \frac{\rho L}{A} = 9.68 \times 10^{-8} \frac{15 \times 10^3}{(0.10)(0.15)} = 0.97 \Omega
\]

\[
V = IR = (1000)(0.97) = 970 \text{ Volts}
\]