c)

$$W = - \int_{\vec{r}_1 = c}^{\vec{r}_2 = c/2} \vec{F} d\vec{s} \tag{25}$$

$$= - \int_{\vec{r}_1 = c}^{\vec{r}_2 = c/2} Q_1 \vec{E} d\vec{s} \tag{26}$$

$$= Q_1 \cdot \left( - \int_{\vec{r}_1 = c}^{\vec{r}_2 = c/2} \vec{E} d\vec{s} \right) \tag{27}$$

$$= Q_1 \cdot \left( \Phi \left( \frac{c}{2} \right) - \Phi \left( c \right) \right) \tag{28}$$

$$= Q_1 \cdot \frac{k \rho_0 a + \sigma_1 b^2}{\varepsilon} \left( \frac{2}{c} - \frac{1}{c} \right) \tag{29}$$

$$= Q_1 \cdot \frac{k \rho_0 a + \sigma_1 b^2}{\varepsilon c} \tag{30}$$