Since $\hat{\mathbf{n}} = -\hat{\mathbf{i}}$ at the face at $x = 0$, the surface charge density at $x = 0$ is given by

$$\sigma_b\big|_{x=0} = \vec{\mathbf{P}}.\hat{\mathbf{n}}\big|_{x=0} = -\vec{\mathbf{P}}.\hat{\mathbf{i}} = -(ax^2 + b)\Big|_{x=0} = -b \quad \text{(ii)}$$

Since $\hat{\mathbf{n}} = \hat{\mathbf{i}}$ at the face $x = L$, the surface charge density at $x = L$ is

$$\sigma_b\big|_{x=L} = \vec{\mathbf{P}}.\hat{\mathbf{n}}\big|_{x=L} = \vec{\mathbf{P}}.\hat{\mathbf{i}} = (ax^2 + b)\Big|_{x=L} = (aL^2 + b) \quad \text{(iii)}$$

Since $dV = A\,dx$, using Eq. (i), we get the total bound volume charge as

$$Q_b^V = \int_V \rho_b\, dV = \int_0^L (-2a\,x)\, A\,dx = -a\,A\,L^2$$

Using Eq. (ii), we get the bound surface charge on the surface S_1 at $x = 0$ as