Variance with V_{ij} as random variable:

$$\sigma_G^2 = \mathrm{Var}[V] = (V_{11} - \mu)^2 \cdot f(G_1G_1) + (V_{12} - \mu)^2 \cdot f(G_1G_2) + (V_{22} - \mu)^2 \cdot f(G_2G_2)$$

μ: population mean

$$= (a - [(p-q)a + 2pqd])^2 \cdot p^2 + (d - [(p-q)a + 2pqd])^2 \cdot 2pq + ((-a) - [(p-q)a + 2pqd])^2 \cdot q^2$$

Use: $V_{ij} - \mu = BV_{ij} + D_{ij}$

$$\Rightarrow \mathrm{Var}[V] = (BV_{11} + D_{11})^2 \cdot p^2 + (BV_{12} + D_{12})^2 \cdot 2pq + (BV_{22} + D_{22})^2 \cdot q^2$$

$$\dots \quad \sigma_G^2 = \mathrm{Var}[V] = 2pq\alpha^2 + (2pqd)^2$$