$$\begin{bmatrix} y_1 \\ y_2 \\ y_3 \\ \vdots \\ y_n \end{bmatrix} = \begin{bmatrix} a_{11} a_{12} a_{13} \cdots a_{1m} \\ a_{21} a_{22} a_{23} \cdots a_{2m} \\ a_{31} a_{32} a_{33} \cdots a_{3m} \\ \vdots \quad \vdots \quad \vdots \quad \vdots \quad \vdots \\ a_{n1} a_{n2} a_{n3} \cdots a_{nm} \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ \vdots \\ x_m \end{bmatrix}$$

Y = Ax + e

$$\hat{X} = (A^T P A)^{-1} A^T P Y$$

$$\tilde{e} = A\hat{X} - Y$$

$$\hat{\sigma}_0^2 = \frac{\tilde{e}^T P \tilde{e}}{n-m}$$

$$\sum_{XX} = \hat{\sigma}_0^2 \, (A^T P A)^{-1}$$