$$\mathit{invLhs} = \begin{bmatrix} \mathit{TTT} & \mathit{C}^T \\ \mathit{C} & 0 \end{bmatrix}^{-1}$$

where

$$TTT \in \mathbb{R}^{n \times n}$$
$$C \in \mathbb{R}^{m \times n}$$