$$
\boldsymbol{A}_\rho = \begin{bmatrix}
\overbrace{\begin{bmatrix} \boldsymbol{A}_{\rho,11}^{J_1\times J_1} \end{bmatrix}}^{\pi(i)=1} & \overbrace{\begin{bmatrix} \boldsymbol{A}_{\rho,12}^{J_1\times J_2} \end{bmatrix}}^{\pi(i)=2} & \cdots & \overbrace{\begin{bmatrix} \boldsymbol{A}_{\rho,1N}^{J_1\times J_N} \end{bmatrix}}^{\pi(i)=J} & \boldsymbol{0} & \\
\begin{bmatrix} \boldsymbol{A}_{\rho,21}^{J_2\times J_1} \end{bmatrix} & \begin{bmatrix} \boldsymbol{A}_{\rho,22}^{J_2\times J_2} \end{bmatrix} & \cdots & \vdots & \boldsymbol{0} & \\
\vdots & \vdots & \ddots & \vdots & \boldsymbol{0} & \\
\begin{bmatrix} \boldsymbol{A}_{\rho,N1}^{J_N\times J_1} \end{bmatrix} & \cdots & \cdots & \begin{bmatrix} \boldsymbol{A}_{\rho,NN}^{J_N\times J_N} \end{bmatrix} & \boldsymbol{0} & \\
\boldsymbol{0} & \boldsymbol{0} & \boldsymbol{0} & \boldsymbol{0} & \underbrace{\begin{bmatrix} \varphi_{\rho_i,\rho_i} & \cdots & \boldsymbol{0} \\ \vdots & \ddots & \vdots \\ \boldsymbol{0} & \cdots & \varphi_{\rho_J,\rho_J} \end{bmatrix}}_{\pi(i)=\emptyset} &
\end{bmatrix}
$$