APPENDIX: LAYOUTS OF $\tilde{\mathbf{V}}$ AND $\mathbf{V}^0$

This appendix shows the construction of the matrices $\tilde{\mathbf{V}}$ and $\mathbf{V}^0$ in Eq.10

$$\tilde{\mathbf{V}} = \begin{pmatrix} \underbrace{\begin{bmatrix} -[\mathbf{T}_1^r\mathbf{V}_{b_1,1}]^* & \mathbf{I}_3 \\ -[\mathbf{T}_1^r\mathbf{V}_{b_1,2}]^* & \mathbf{I}_3 \\ \vdots & \\ -[\mathbf{T}_1^r\mathbf{V}_{b_1,n_{b_1}}]^* & \mathbf{I}_3 \end{bmatrix}}_{3n_{b_1}\times 6} & & & \\ & \underbrace{\begin{bmatrix} -[\mathbf{T}_2^r\mathbf{V}_{b_2,1}]^* & \mathbf{I}_3 \\ -[\mathbf{T}_2^r\mathbf{V}_{b_2,2}]^* & \mathbf{I}_3 \\ \vdots & \\ -[\mathbf{T}_2^r\mathbf{V}_{b_2,n_{b_2}}]^* & \mathbf{I}_3 \end{bmatrix}}_{3n_{b_2}\times 6} & & \\ & & \ddots & \\ & & & \underbrace{\begin{bmatrix} -[\mathbf{T}_m^r\mathbf{V}_{b_m,1}]^* & \mathbf{I}_3 \\ -[\mathbf{T}_m^r\mathbf{V}_{b_m,2}]^* & \mathbf{I}_3 \\ \vdots & \\ -[\mathbf{T}_m^r\mathbf{V}_{b_m,n_{b_m}}]^* & \mathbf{I}_3 \end{bmatrix}}_{3n_{b_m}\times 6} \end{pmatrix}$$

$\mathbf{V}^0 \in \mathbb{R}^{3n\times 1}$ is a column matrix whose first $3\mathbf{n}_f$ entries are zero, corresponding to the degrees of freedom of the deformable vertices. The bottom $3\mathbf{n}_b$ rows, corresponding to the bone vertices, are stacked as follows:

$$\mathbf{V}^0 = \begin{pmatrix} \begin{bmatrix} 0 \\ 0 \\ \vdots \\ 0 \end{bmatrix} \\ \begin{bmatrix} \mathbf{T}_1^r\mathbf{V}_{b_1,1} \\ \mathbf{T}_1^r\mathbf{V}_{b_1,2} \\ \vdots \\ \mathbf{T}_1^r\mathbf{V}_{b_1,n_{b_1}} \end{bmatrix} \\ \begin{bmatrix} \mathbf{T}_2^r\mathbf{V}_{b_2,1} \\ \mathbf{T}_2^r\mathbf{V}_{b_2,2} \\ \vdots \\ \mathbf{T}_2^r\mathbf{V}_{b_2,n_{b_2}} \end{bmatrix} \\ \vdots \\ \begin{bmatrix} \mathbf{T}_m^r\mathbf{V}_{b_m,1} \\ \mathbf{T}_m^r\mathbf{V}_{b_m,2} \\ \vdots \\ \mathbf{T}_m^r\mathbf{V}_{b_m,n_{b_m}} \end{bmatrix} \end{pmatrix}$$