Even More Realizations ...

Yet another realization of $G(s) = \dfrac{s+1}{s^2 + 5s + 6}$ can be extracted from the partial-fractions decomposition:

$$G(s) = \frac{s+1}{(s+2)(s+3)} = \frac{2}{s+3} - \frac{1}{s+2}.$$

This is the Modal Canonical Form (MCF):

$$\begin{pmatrix} \dot{x}_1 \\ \dot{x}_2 \end{pmatrix} = \begin{pmatrix} -3 & 0 \\ 0 & -2 \end{pmatrix} \begin{pmatrix} x_1 \\ x_2 \end{pmatrix} + \begin{pmatrix} 1 \\ 1 \end{pmatrix} u, \qquad y = \begin{pmatrix} 2 & -1 \end{pmatrix} \begin{pmatrix} x_1 \\ x_2 \end{pmatrix}$$

$$\begin{aligned}
\text{Then} \quad C(Is - A)^{-1}B &= \begin{pmatrix} 2 & -1 \end{pmatrix} \begin{pmatrix} s+3 & 0 \\ 0 & s+2 \end{pmatrix}^{-1} \begin{pmatrix} 1 \\ 1 \end{pmatrix} \\
&= \begin{pmatrix} 2 & -1 \end{pmatrix} \begin{pmatrix} \frac{1}{s+3} & 0 \\ 0 & \frac{1}{s+2} \end{pmatrix} \begin{pmatrix} 1 \\ 1 \end{pmatrix} \\
&= \begin{pmatrix} 2 & -1 \end{pmatrix} \begin{pmatrix} \frac{1}{s+3} \\ \frac{1}{s+2} \end{pmatrix} = \frac{2}{s+3} - \frac{1}{s+2}
\end{aligned}$$