$$
H_{22} = \begin{bmatrix}
-2\,h-6\,\mu+U & 0 & 0 & 0 & 0 & \sqrt{2}\,t & -2\,t & 0 \\
0 & -2\,h-6\,\mu+U & -\left(\sqrt{2}\,t\right) & 0 & 0 & -\left(\sqrt{2}\,t\right) & 0 & 0 \\
0 & -\left(\sqrt{2}\,t\right) & -2\,h-6\,\mu+2\,U & \sqrt{2}\,t & 0 & 0 & 0 & 0 \\
0 & 0 & \sqrt{2}\,t & -2\,h-6\,\mu+2\,U & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & -2\,h-6\,\mu+2\,U & -2\,t & 2\,\sqrt{2}\,t & 0 \\
\sqrt{2}\,t & -\left(\sqrt{2}\,t\right) & 0 & 0 & -2\,t & -2\,h-6\,\mu+2\,U & 0 & \sqrt{2}\,t \\
-2\,t & 0 & 0 & 0 & 2\,\sqrt{2}\,t & 0 & -2\,h-6\,\mu+2\,U & 0 \\
0 & 0 & 0 & 0 & 0 & \sqrt{2}\,t & 0 & -2\,h-6\,\mu+U
\end{bmatrix}
$$

$$
\begin{bmatrix}
\frac{\sqrt{\frac{4-4\,\sqrt{\frac{2}{11}}}{52-8\,\sqrt{22}}}\,t}{2}+\frac{7\,\sqrt{\frac{121-11\,\sqrt{22}}{52-8\,\sqrt{22}}}\,t}{11}-\sqrt{\frac{22-2\,\sqrt{22}}{52-8\,\sqrt{22}}}\,t & \frac{-6\,t}{\sqrt{11-\sqrt{22}}} & 0 & \frac{\sqrt{\frac{4-4\,\sqrt{\frac{2}{11}}}{52-8\,\sqrt{22}}}\,t}{2}+\frac{7\,\sqrt{\frac{121-11\,\sqrt{22}}{52-8\,\sqrt{22}}}\,t}{11}-\sqrt{\frac{22-2\,\sqrt{22}}{52-8\,\sqrt{22}}}\,t & -3\,\sqrt{\frac{2-2\,\sqrt{\frac{2}{11}}}{52-8\,\sqrt{22}}}\,t-\frac{5\,\sqrt{\frac{242-22\,\sqrt{22}}{52-8\,\sqrt{22}}}\,t}{11}+2\,\sqrt{\frac{11-\sqrt{22}}{52-8\,\sqrt{22}}}\,t & 0 & 0 & \frac{\sqrt{\frac{4-4\,\sqrt{\frac{2}{11}}}{52-8\,\sqrt{22}}}\,t}{2}+\frac{\sqrt{\frac{484-44\,\sqrt{22}}{52-8\,\sqrt{22}}}\,t}{264}+\frac{35\,\sqrt{\frac{121-11\,\sqrt{22}}{52-8\,\sqrt{22}}}\,t}{132}+\sqrt{\frac{22-2\,\sqrt{22}}{52-8\,\sqrt{22}}}\,t & \frac{26\,h}{-13+2\,\sqrt{22}}-\frac{4\,\sqrt{22}\,h}{-13+2\,\sqrt{22}}+\frac{78\,\mu}{-13+2\,\sqrt{22}}-\frac{12\,\sqrt{22}\,\mu}{-13+2\,\sqrt{22}}-\frac{13\,U}{-13+2\,\sqrt{22}}+\frac{2\,\sqrt{22}\,U}{-13+2\,\sqrt{22}} & 0 \\
\frac{91\,\sqrt{\frac{2+2\,\sqrt{\frac{2}{11}}}{26+4\,\sqrt{22}}}\,t}{24}+\frac{5\,\sqrt{\frac{11+\sqrt{22}}{22\,(26+4\,\sqrt{22})}}\,t}{12}+\sqrt{\frac{11+\sqrt{22}}{26+4\,\sqrt{22}}}\,t & \frac{-6\,t}{\sqrt{11+\sqrt{22}}} & 0 & \frac{91\,\sqrt{\frac{2+2\,\sqrt{\frac{2}{11}}}{26+4\,\sqrt{22}}}\,t}{24}+\frac{5\,\sqrt{\frac{11+\sqrt{22}}{22\,(26+4\,\sqrt{22})}}\,t}{12}+\sqrt{\frac{11+\sqrt{22}}{26+4\,\sqrt{22}}}\,t & -\frac{91\,\sqrt{\frac{4+4\,\sqrt{\frac{2}{11}}}{26+4\,\sqrt{22}}}\,t}{24}-\frac{5\,\sqrt{\frac{11+\sqrt{22}}{11\,(26+4\,\sqrt{22})}}\,t}{12}-\frac{\sqrt{\frac{2\,(11+\sqrt{22})}{26+4\,\sqrt{22}}}\,t}{2} & 0 & 0 & \frac{47\,\sqrt{\frac{2+2\,\sqrt{\frac{2}{11}}}{26+4\,\sqrt{22}}}\,t}{24}+\frac{\sqrt{\frac{11+\sqrt{22}}{22\,(26+4\,\sqrt{22})}}\,t}{12}-\sqrt{\frac{11+\sqrt{22}}{26+4\,\sqrt{22}}}\,t & 0 & -2\,h-6\,\mu+U
\end{bmatrix}
$$