$$
H_{96} \quad = \quad
\begin{bmatrix}
-6\,\mu + 2\,U & \frac{-3\,t}{2} - \frac{\mathbf{i}}{2}\,\sqrt{3}\,t & 0 & 0 & 0 & \frac{3\,\sqrt{\frac{3}{2}}\,t}{2} + \frac{\frac{3}{2}\,\mathbf{i}\,t}{\sqrt{2}} & 0 & \frac{\sqrt{\frac{3}{2}}\,t}{2} - \frac{\frac{3}{2}\,\mathbf{i}\,t}{\sqrt{2}} & 0 & \frac{3}{2}\,\mathbf{i}\,t + \frac{\sqrt{3}\,t}{2} & 0 & 0 & 0 & 0 & 0 & 0 \\
\frac{-3\,t}{2} + \frac{\mathbf{i}}{2}\,\sqrt{3}\,t & -6\,\mu + 2\,U & -\mathbf{i}\,\sqrt{\frac{3}{2}}\,t & 0 & 0 & 0 & \sqrt{\frac{3}{2}}\,t & 0 & \frac{3\,\sqrt{\frac{3}{2}}\,t}{2} - \frac{\frac{3}{2}\,\mathbf{i}\,t}{\sqrt{2}} & 0 & 0 & \frac{-\left(\sqrt{\frac{3}{2}}\,t\right)}{2} + \frac{\frac{3}{2}\,\mathbf{i}\,t}{\sqrt{2}} & 0 & 0 & 0 & \frac{-3\,\mathbf{i}\,t}{\sqrt{2}} \\
0 & \mathbf{i}\,\sqrt{\frac{3}{2}}\,t & -6\,\mu + 2\,U & 0 & 0 & 0 & 0 & -\left(\sqrt{3}\,t\right) & 0 & 0 & \sqrt{3}\,t & 0 & 0 & 0 & -\left(\sqrt{\frac{3}{2}}\,t\right) & 0 \\
0 & 0 & 0 & -6\,\mu & 0 & 0 & 0 & 0 & 0 & 0 & 2\,t & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & -6\,\mu & -\mathbf{i}\,\sqrt{\frac{3}{2}}\,t + \frac{3\,t}{\sqrt{2}} & 0 & -\mathbf{i}\,\sqrt{\frac{3}{2}}\,t - \frac{t}{\sqrt{2}} & 0 & 0 & \mathbf{i}\,\sqrt{\frac{3}{2}}\,t + \frac{t}{\sqrt{2}} & 0 & 0 & 0 & 0 & 0 \\
\frac{3\,\sqrt{\frac{3}{2}}\,t}{2} - \frac{\frac{3}{2}\,\mathbf{i}\,t}{\sqrt{2}} & 0 & 0 & 0 & \mathbf{i}\,\sqrt{\frac{3}{2}}\,t + \frac{3\,t}{\sqrt{2}} & -6\,\mu + U & -t & 0 & 0 & 0 & 0 & \frac{t}{2} - \frac{\mathbf{i}}{2}\,\sqrt{3}\,t & 0 & \frac{-\mathbf{i}}{2}\,\sqrt{\frac{3}{2}}\,t + \frac{3\,t}{2\,\sqrt{2}} & 0 & 0 \\
0 & \sqrt{\frac{3}{2}}\,t & 0 & 0 & 0 & -t & -6\,\mu + U & 0 & 0 & -\left(\sqrt{2}\,t\right) & \frac{-t}{2} - \frac{\mathbf{i}}{2}\,\sqrt{3}\,t & 0 & -\mathbf{i}\,\sqrt{\frac{3}{2}}\,t + \frac{t}{\sqrt{2}} & 0 & \frac{t}{\sqrt{2}} & 0 \\
\frac{\sqrt{\frac{3}{2}}\,t}{2} + \frac{\frac{3}{2}\,\mathbf{i}\,t}{\sqrt{2}} & 0 & -\left(\sqrt{3}\,t\right) & 0 & \mathbf{i}\,\sqrt{\frac{3}{2}}\,t - \frac{t}{\sqrt{2}} & 0 & 0 & -6\,\mu + U & \frac{-t}{2} - \frac{\mathbf{i}}{2}\,\sqrt{3}\,t & 0 & 0 & 0 & 0 & \frac{\mathbf{i}}{2}\,\sqrt{\frac{3}{2}}\,t + \frac{t}{2\,\sqrt{2}} & 0 & -t \\
0 & \frac{3\,\sqrt{\frac{3}{2}}\,t}{2} + \frac{\frac{3}{2}\,\mathbf{i}\,t}{\sqrt{2}} & 0 & 0 & 0 & 0 & 0 & \frac{-t}{2} + \frac{\mathbf{i}}{2}\,\sqrt{3}\,t & -6\,\mu + U & 0 & 0 & 0 & 0 & 0 & \frac{-\mathbf{i}}{2}\,\sqrt{\frac{3}{2}}\,t + \frac{t}{2\,\sqrt{2}} & 0 \\
\frac{-3}{2}\,\mathbf{i}\,t + \frac{\sqrt{3}\,t}{2} & 0 & 0 & 0 & 0 & 0 & -\left(\sqrt{2}\,t\right) & 0 & 0 & -6\,\mu + U & 0 & -\mathbf{i}\,\sqrt{\frac{3}{2}}\,t - \frac{t}{\sqrt{2}} & 0 & \frac{-t}{2} + \frac{\mathbf{i}}{2}\,\sqrt{3}\,t & 0 & 0 \\
0 & 0 & \sqrt{3}\,t & 2\,t & -\mathbf{i}\,\sqrt{\frac{3}{2}}\,t + \frac{t}{\sqrt{2}} & 0 & \frac{-t}{2} + \frac{\mathbf{i}}{2}\,\sqrt{3}\,t & 0 & 0 & 0 & -6\,\mu + U & -t & 0 & 0 & 0 & t \\
0 & \frac{-\left(\sqrt{\frac{3}{2}}\,t\right)}{2} - \frac{\frac{3}{2}\,\mathbf{i}\,t}{\sqrt{2}} & 0 & 0 & 0 & \frac{t}{2} + \frac{\mathbf{i}}{2}\,\sqrt{3}\,t & 0 & 0 & 0 & \mathbf{i}\,\sqrt{\frac{3}{2}}\,t - \frac{t}{\sqrt{2}} & -t & -6\,\mu + U & -\left(\sqrt{2}\,t\right) & 0 & \frac{\mathbf{i}}{2}\,\sqrt{\frac{3}{2}}\,t + \frac{t}{2\,\sqrt{2}} & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & \mathbf{i}\,\sqrt{\frac{3}{2}}\,t + \frac{t}{\sqrt{2}} & 0 & 0 & 0 & 0 & -\left(\sqrt{2}\,t\right) & -6\,\mu + U & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & \frac{\mathbf{i}}{2}\,\sqrt{\frac{3}{2}}\,t + \frac{3\,t}{2\,\sqrt{2}} & 0 & \frac{-\mathbf{i}}{2}\,\sqrt{\frac{3}{2}}\,t + \frac{t}{2\,\sqrt{2}} & 0 & \frac{-t}{2} - \frac{\mathbf{i}}{2}\,\sqrt{3}\,t & 0 & 0 & 0 & -6\,\mu + 2\,U & \frac{-t}{2} + \frac{\mathbf{i}}{2}\,\sqrt{3}\,t & 0 \\
0 & 0 & -\left(\sqrt{\frac{3}{2}}\,t\right) & 0 & 0 & 0 & \frac{t}{\sqrt{2}} & 0 & \frac{\mathbf{i}}{2}\,\sqrt{\frac{3}{2}}\,t + \frac{t}{2\,\sqrt{2}} & 0 & 0 & \frac{-\mathbf{i}}{2}\,\sqrt{\frac{3}{2}}\,t + \frac{t}{2\,\sqrt{2}} & 0 & \frac{-t}{2} - \frac{\mathbf{i}}{2}\,\sqrt{3}\,t & -6\,\mu + 2\,U & \frac{t}{\sqrt{2}} \\
0 & \frac{3\,\mathbf{i}\,t}{\sqrt{2}} & 0 & 0 & 0 & 0 & 0 & -t & 0 & 0 & t & 0 & 0 & 0 & \frac{t}{\sqrt{2}} & -6\,\mu + 2\,U
\end{bmatrix}
$$