Define a map from $N \oplus E_0$ to $N \oplus E_0$ by

$$n \oplus e_0 \longmapsto (n - h(e_0)) \oplus e_0.$$

$\Rightarrow$

$$\begin{tikzcd} E_1/\partial E_2 \arrow[r, "\mu"] \arrow[d] & N \oplus E_0 \\ E_1/\partial E_2 \arrow[r, "\tilde{\mu}"] & N \oplus E_0 \end{tikzcd}$$

$$\begin{tikzcd} e_1 + \partial E_2 \arrow[r, mapsto] \arrow[d, mapsto] & (f(e_1), \partial(e_1)) \arrow[d, mapsto] \\ e_1 + \partial E_2 \arrow[r, mapsto] & (g(e_1), \partial(e_1)) \end{tikzcd}$$

Commutes

since $(f(e_1) - h(\partial(e_1)), \ \partial(e_1)) = ((f - \delta h)(e_1), \ \partial(e_1))$
$= (g(e_1), \partial(e_1))$.

$\Rightarrow$

$$\begin{tikzcd} 0 \arrow[r] & N \arrow[r] \arrow[d, equal] & \dfrac{N \oplus E_0}{\mu(E_1/\partial E_2)} \arrow[r] \arrow[d] & M \arrow[r] \arrow[d, equal] & 0 \\ 0 \arrow[r] & N \arrow[r] & \dfrac{N \oplus E_0}{\tilde{\mu}(E_1/\partial E_2)} \arrow[r] & M \arrow[r] & 0 \end{tikzcd}$$

$\ni (n \oplus e_0) + \operatorname{Im}\mu \longmapsto ((n - h(e_0)) \oplus e_0) + \operatorname{Im}\tilde{\mu}$

clear

Thus we can conclude that the map ψ from $\operatorname{Ext}^1_{\mathcal{O}}(M, N)$ to $\left\{ \begin{array}{l} \text{equivalent classes} \\ \text{of extensions} \end{array} \right\}$ is well-defined.