(MAT 313 / PHI 323) Category Theory
Categories for the Working Mathematician, Chapter 6.

Homework: CWM p 142, #2. This problem might look more difficult than it is. To show that $G^T : X^T \longrightarrow X$ creates limits, choose a cone $(\alpha_j : \langle r, h \rangle \longrightarrow \langle x_j, h_j \rangle)$ in X^T that becomes a limiting cone when the structure is forgotten, i.e. $(\alpha_j : r \longrightarrow x_j)$ is a limiting cone in X. We just need to show that the original cone in X^T is a limit. To this end, pick another cone $(\beta j : \langle s, k \rangle \longrightarrow \langle x_j, h_j \rangle)$ in X^T, and show that there is a unique arrow $\gamma : \langle r, h \rangle \longrightarrow \langle s, k \rangle$ etc.. Since $(\alpha_j : r \longrightarrow x_j)$ is limiting in X, there is a unique arrow $\gamma : r \longrightarrow s$ etc.. The work comes in showing that γ is in fact a structure-preserving arrow.xz