

## Description of Additional Supplementary Files

**Supplementary Movies 1-4.** Dynamics of HaloTag-Sec16a (Supplementary Movie 1), HaloTag-Sec23a (Supplementary Movie 2), HaloTag-Sec31a (Supplementary Movie 3), and HaloTag-TFG (Supplementary Movie 4) as determined using lattice light-sheet imaging (n=10 cells each; 3 biological replicates each). Bar, 10  $\mu\text{m}$ . Playback rate, 180x.

**Supplementary Movies 5-7.** Accumulation of ss-DsRed in the perinuclear region of control cells following its release in the presence (Supplementary Movie 5) and absence of nutrients for 2 hours (Supplementary Movie 6) or 24 hours (Supplementary Movie 7). n=20 cells each; 3 biological replicates each. Bar, 10  $\mu\text{m}$ . Playback rate, 180x.

**Supplementary Movie 8.** Accumulation of ss-DsRed in the perinuclear region of control cells following its release in the acute absence of nutrients following overexpression of GFP-Sec23b. n=20 cells; 3 biological replicates. Bar, 10  $\mu\text{m}$ . Playback rate, 180x.