Submarine canyon formation and deepening are typically attributed to erosional processes. We present data from an industry-grade seismic volume located offshore Brunei Darussalam illustrating how topography typically associated with erosional processes can be produced under conditions of net sediment deposition. This data was generated via subsurface mapping in the vicinity of a shale-cored anticline on the Quaternary continental-slope. Three canyons traverse the structure at right-angles to the crest line with maximum canyon relief of 165 m. Subsurface mapping reveals that the structure is a site of net sediment deposition and defines a background sedimentation pattern that decreases gradually with distance from the shelf-edge. Profiles down canyon axes reveal local minima in deposit thickness over the anticline hinge that are associated with high downstream gradients. Deposition on ridges adjacent to canyons also displays local minima at the anticline hinge, but these minima are not correlated with gradient. A comparison of canyon axis and ridge deposition shows that somewhat higher rates of sedimentation on the ridges resulted in the preservation and growth of the submarine canyons with time. Laterally persistent seismic reflectors and depositional packages suggest that the canyon forming currents were sheet-like flows, extending for many kilometers in the strike direction. The currents drained into canyons as they approached the anticline hinge, leaving only a small supra-canyon fraction available to deposit sediment on the non-channelized zones.