A proper definition of the Geodetic Boundary Value Problem (GBVP) in a fixed form is presented. It is compatible with the technologies emerging from GNSS such as GPS. The solution is based on Brovar's approach, originally applied to solve Molodenskii's boundary value problem by using the oblique derivative with suitable correction terms. The solution is compatible with current techniques for smoothing the external gravity field employing the remove-restore technique and residual terrain modeling. Also supplied is a simple and practical method for direct transformation of normal-orthometric heights, currently employed in Brazil, to a holonomic height system. A study area was established in the Parana State, southern Brazil. The obtained results showed that the main problem in determining a height reference surface is the omission error in gravity data. Accuracy analysis shows that the typical gravity data coverage in Brazil is the main problem in determining the (quasi-)geoid by conventional techniques. Assuming that the commission error in the gravity values is random, an absolute error expected in the quasigeoid model due to the omission error is about -0.3 m and could be improved by terrain data integration. In the relative sense, the evaluation of this error is 0.2 ppm for distances beyond the resolution of the model. Thus, we conclude that the fixed GBVP is a suitable tool for linking the Brazilian Vertical Datum to a WHS, like that offered by the EGM2008.