The main aim of this work was to obtain an approximate solution of the seismic traveltime tomography problems with the help of splines based on reproducing kernel Sobolev spaces. In order to be able to apply the spline approximation concept to surface wave as well as to body wave tomography problems, the spherical spline approximation concept was extended for the case where the domain of the function to be approximated is an arbitrary compact set in $\mathbb{R}^n$ and a finite number of discontinuity points is allowed. We present applications of such spline method to seismic surface wave as well as body wave tomography, and discuss the theoretical and numerical aspects of such applications. Moreover, we run numerous numerical tests that justify the theoretical considerations.