We study the geometry of curves and surfaces in the three-dimensional Lie group $E(1, 1)$ equipped with left invariant Lorentzian metric by utilizing the Fels-Olver moving frame method. In doing so, we present complete sets of differential invariants for curves and surfaces in $E(1, 1)$ when the dimension of the isometry group is four. We provide a geometric interpretation of the invariants for certain classes of curves and surfaces and provide a brief comparison with differential invariants generated by alternative methods. (Received September 26, 2017)