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The result addresses a class of optimal control problems governed by a perturbed sweeping (Moreau) process with the moving convex polyhedral set, where the controls are used to determine the best shape of the moving set and select the best perturbation in order to optimize the given Bolza-type problem which depends on controls and state variables as well as their velocities. Using the method of discrete approximations, we approximate the optimal control problem under consideration by a sequence of well-posed finite-dimensional problems whose optimal solutions strongly converge to that of the original controlled sweeping problem under less restrictive assumptions on the controls and state variables. This approach together with the advanced tools of variational analysis and generalized differentiation allows us to efficiently derive the necessary optimality conditions for the discretized control problems. The obtained results can be considered as necessary sub-optimality conditions and hence propose a numerical scheme for searching optimal solutions to the original controlled perturbed sweeping process. One numerical example is presented to illustrate such established necessary sub-optimality conditions. (Received September 01, 2019)