GEOTECHNICAL PROBLEMS WITH RECULTIVATION
OF DOMESTIC-WASTE LANDFILLS

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A solution is examined for one of the problems of large cities – closure and recultivation of landfills containing solid domestic wastes. Landfills are situated in unfavorable areas frequently in slide-prone sections. Modern geotechnologies in combination with use of different materials for the final coverings are cited for a recultivation example of a landfill in the Adlersk district of Sochi.

Introduction. Storage and processing of solid domestic wastes (SDW) in large cities is a problem that is difficult to resolve. Storage sites throughout the world are filled with millions of tons of debris every year. The volume of wastes per capita is increasing with increasing population and industrialization. The sites that have been closed to storage have limited dimensions, and the problem of their long-term safe operation and final recultivation is extremely critical.

Waste-storage sites are frequently located far from the city in areas unsuitable for construction of buildings and structures. The growth rate and expansion of city limits are increasing, and the urban boundary is advancing toward the "dumping places." To control the space around landfills, it is necessary to maintain sanitary and hygienic standards. Reliable construction solutions capable of withstanding seismic effects are required in regions with a seismicity of seven points and greater. Recultivation of the layer should protect the land from risk of chemical and biological contamination, and in addition, impart an aesthetic appearance to the landfill. The city of Sochi has been impacted with similar situations in its Adler district.

Initial Data. The Adler SDW landfill is located on the right bank of the Malaya Kherota mountain river within the bounds of a ravine that cuts through the right slope of the river valley. Prior to its filling with solid domestic wastes, the gorge carried a creek along its bottom – a right tributary of the Malaya Kherota River. In its central section, the southern slope of the ravine is complicated by an old slide approximately 150 m wide and 250 m long.

Closed shallow filtrate basins were formed on the surface of the landfill prior to recultivation. Filling of a large stratum of wastes altered the stress state of the mass of slide-prone rocks and the hydrogeologic situation, resulting in activation of sliding processes, which were manifested in the formation of a slide tongue along the eastern periphery of the landfill. The dynamics of exogenous geologic processes carried out at the landfill since 2001 has enabled us to trace their development successfully on the basis of their observation.
Pronounced activation of sliding occurred in April 2008 as a result of which the channel of the Malaya Kherota River channel was buried at its intersection with the ravine, and residential buildings were destroyed on the southeastern periphery of the landfill (Fig. 1). The displacement was approximately 160 m from the 2004 boundary. The sliding mass was 650 m long and 35 m wide, and the average height was 20 m.

To terrace the SDW landfill, it was necessary to install engineering protection to maintain a depression with a depth of 15 m, and in turn, prepare the site for construction of a water-passing collector.

**Computational Section and Procedure.** The Malaya Kherota River channel is subject to seasonal filling. Water from snow melt and rains washes away all obstacles in its path (tons of refuse, tree trunks, stones, etc.). The design and construction of an inlet portal and the basic section of the collector under these conditions represented a complex problem requiring detailed numerical analysis and interaction between specialists in the field of geotechnics and hydraulic engineering (Fig. 2).