



**US Army Corps
of Engineers®**

Engineer Research and
Development Center

Rapid Geotechnical-Based Assessment of Ground Failures

Description

Research engineers at the ERDC-Geotechnical and Structures Laboratory have worldwide expertise in providing geotechnical engineering-based assessment of ground failures such as landslides in natural ground, excessive embankment movements, earth dam distress, lateral spreading, and liquefaction damage. GSL team members have provided rapid field-based assessments that include identifying the cause and mode of failure and developing procedures for effort-conservative emergency repairs. These emergency assessments provide near-real-time field information and graphics that can rapidly be summarized and transmitted to decision-makers as secure Web pages.

Capabilities

The ability to make the best assessment in the field (during emergencies with limited information) derives from the high caliber and unique abilities of the ERDC researchers. Collectively, their experience represents decades of experience focused in the areas outlined below.

- Real-time field assessment of earthquake and static-based ground failures on an emergency basis. Examples include landslides in natural ground, distressed earth dams, liquefaction spreads, levee failure assessments, and complex ground movement/settlement.
- Project-based studies to evaluate failure potential in the United States and around the world. These studies include earthquake assessment of major earth and concrete dams, earthquake and static assessment of natural landslides and embankment failures (from complex to massive), and post-event evaluations of major earthquake failures.
- Focused ongoing research to address geotechnical failure mechanisms. These investigations review past failure evaluations to better understand failure modes and to further enhance geotechnical site characterization and identification/evaluation of remediation methods.
- Application of extensive computer capability, including field computer systems, data acquisition, Finite Element Method analysis, Geographic Information System, custom software development, pocket-based computer integration, Global Positioning System integration, Web page authoring/publishing, and diversified data communications (telephone, field networks, WiFi (802.11b) wireless networking, socket-based software development communications, and low- and high-bandwidth satellite communications). An important element of the rapid assessment capability is ERDC's ability to summarize large volumes of data into useful information and to generate daily graphic reports, electronic presentations, and near-real-time Web pages. All field observations, evaluations, and recommendations are summarized daily, based on project-specific needs and requirements.

Benefits

During emergencies, accurate and timely assessment of the cause and mode of ground failure is critical in order to establish repairs that are both cost effective and time critical. Many examples can be cited of poor assessments by others that hindered recovery efforts. Assessing the geotechnical failure mode, based only on observation, is difficult but critical for emergency planning and subsequent action.

Success Stories

ERDC researchers have had unique exposure to complex technical problems, large project sizes, and major geotechnical failures that others only read about. These experiences have involved dealing with U.S. Federal and State agencies, the U.S. Military, foreign governments, and U.S. Embassies in order to successfully execute a wide range of tasks. Examples include handling emergency conditions, working effectively in foreign countries with minimal resources, and properly handling highly sensitive and secure situations.

Successful recent applications of this research include

- Landslide assessments, 2001 San Salvador earthquake, for U.S. Army Southern Command and U.S. Embassy in San Salvador.
- Howard Hanson Dam assessment, 2001 Seattle Earthquake, for the U.S. Army Engineer Division, Northwestern (Portland, OR).
- Landslide assessments: in Bolivia along El Sillar Highway, 2001, for USAID (U.S. Agency for International Development); in Haiti, 2000, for U.S. Army Engineer District, Jacksonville; in Venezuela after heavy rain, 2000, for U.S. Army Southern Command; and in Columbia, 1999, for USAID.
- El Berrinche landslide study in Honduras, 1998-2001 Hurricane Mitch recovery, for World Bank and SERNA agency of the Honduran government).

Point of Contact

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