Since 2001, Kleinfelder has participated in the design of the Chemical and Metallurgy Research Replacement (CMRR) program. The project includes two major buildings – a Radiological Laboratory Utility Office Building (RLUOB) and a CMRR Nuclear Facility – to be constructed at the Los Alamos National Laboratory (LANL). This new facility will be the centerpiece of LANL’s ongoing mission to support the nation’s nuclear stockpile stewardship program for the National Nuclear Security Administration (NNSA) of the U.S. Department of Energy.

THE CHALLENGE
Following site selection, it was necessary to demonstrate its suitability for the building and operation of these complex, highly-secure laboratory facilities. Several design features of the nuclear facility created geotechnical challenges. For security reasons, most of the building will be constructed into the hillside, requiring a fully supported excavation up to 75 feet. Second, the excavation depth placed the foundation over a 50-foot thick soft volcanic layer presenting poor foundation characteristics. The project was conducted under the highest nuclear quality standards (NQA-1) and reviewed by the Defense Nuclear Facilities Safety Board (DNFSB).

KLEINFELDER’S SOLUTION
Kleinfelder provided various services for this high-profile project, including geologic investigations for both facilities, construction materials testing for the RLUOB, foundation and subgrades analyses, slope stability analyses, and concrete mix design for the nuclear facility. To address concerns with site conditions, Kleinfelder designed a rigid excavation support system to mitigate any potential adverse movements of excavation walls that could impact adjacent critical laboratory facilities. In addition, an extensive geomechanical instrumentation system was designed to monitor any ground deformation and potential impacts to these facilities. Kleinfelder identified that an excavate-and-replace ground treatment alternative would be needed to mitigate the geotechnical and seismic shaking concerns associated with the soft volcanic layer under the building footprint. As a result, the client agreed to raise the facility sufficiently to eliminate the need for the expensive ground treatment alternative.

PROJECT RESULTS
Personnel from several Kleinfelder offices worked with LANL’s integrated design team to develop design recommendations to mitigate the site specific characteristics that could impact the success of this project. These efforts facilitated the forward movement of the NNSAs initiative to replace its outdated nuclear laboratory facility and demonstrated to the DNFSB that the project and site were viable.

Kleinfelder is an employee-owned architecture, engineering, and science consulting firm providing solutions to meet our world’s complex infrastructure and natural resource challenges. Working as a team, our bright people will deliver the right solutions.