



Geotechnical and Geoenvironmental Engineering



For more than 30 years, our geotechnical and geoenvironmental engineers have been applying engineering fundamentals to solve client issues on the following types of projects:

- Earth dams and levees
- Tailings dams and mine waste impoundments
- Dredging
- Land reclamation
- Artificial islands
- Environmental site remediation
- Foundations for major industrial and transportation facilities
- Pipelines
- Shallow and deep foundations
- Braced excavations
- Stabilization of natural and manmade slopes
- Landslide prediction and control
- Surface water reservoirs
- Oil storage tanks and reservoirs
- Solution mined salt caverns
- Retaining walls
- Municipal solid waste landfills
- Industrial landfills
- Secure hazardous waste storage facilities
- Seepage barriers
- Drainage systems
- Groundwater control
- Rock characterization
- Offshore structures

Whether for civil engineering works or engineering support on environmental projects, ICF International's Geotechnical and Geoenvironmental Engineering team provides the perfect blend of hands-on engineering expertise, environmental knowledge, and appreciation for management concerns. Our engineers have the analytical skills and construction know-how to help our clients manage risk on complex engineering projects, as well as the necessary multidisciplinary team experience to design and build solutions for environmental and security problems. ICF's perspective on policy and regulatory drivers helps our clients optimize their project strategies to achieve their core business objectives. We serve clients in the chemical, construction, mining, petrochemical, petroleum, power, transportation, water resources, and waste management industries, as well as government agencies worldwide.

Our Approach

ICF's Geotechnical and Geoenvironmental Safety Program offers a structured, performance-based approach to engineering design, construction, and performance evaluation. Our value engineering methodology engineers a facility for its design life by imposing an objective-prediction-measurement feedback loop. This process creates a buildable design, ensures construction in accordance with the design, and confirms that the as-built project meets its intended objectives. For more than 30 years, we have successfully used this approach on new projects and to extend the service life of existing facilities.

Our Services

Engineering Analysis and Design

Engineering analysis and design require application of fundamental principles of physics to the materials and processes used in construction in order to determine a project's feasibility and safety. Our engineers, by education and experience, have the knowledge and tools to apply these principles to real world problems, such as:

- Static and seismic slope stability
- Stability of deep excavations
- Shallow and deep foundation capacity
- Evaluation of liquefaction potential
- Groundwater and aquifer modeling
- Safety of salt caverns
- Finite element simulations

Earth Structure Design

ICF's geotechnical engineers have experience in all aspects of the design of earth structures, including earth dams, slopes, embankments, landfills, and excavations. Our services include definition of project objectives, site investigation, conceptual and detailed designs, alternative design selection, material property evaluation, design analyses, cost estimates, production of construction drawings, specification writing, and bid evaluation.

Value Engineering

More often than not, proposed designs for complex engineering projects benefit from an independent peer review. Our structured, value engineering approach systematically compares specific project objectives to the expected performance of the proposed design. Capital, construction, and operational cost savings realized from our past reviews have equaled 2 to 30 times the cost of our value engineering services.

Our Services (continued)

Forensic Engineering

Forensic engineering seeks to determine the causes of engineering failures or accidents. ICF's Geotechnical Engineering team has extensive experience in investigating, determining, and explaining failure causes for project owners, insurance companies, and law firms. We pride ourselves on giving our clients verifiable, objective analyses and balanced, straightforward appraisals. In litigation, we provide the expertise that wins cases. Our services include:

- Review and interpretation of geological and geotechnical data to identify key material properties
- Analysis of design documents, construction records, and monitoring data to clarify the sequence of events leading to and the conditions at failure
- Design and supervision of site investigation, field instrumentation, field sampling, and laboratory testing programs to gather additional data and evidence
- Engineering analyses and reports to explain the failure cause
- Cost analyses to quantify monetary damages
- Litigation support and expert witness testimony

Geotechnical Safety and Risk

Due to the variability of the natural materials with which they build, geotechnical engineers and project owners constantly deal with uncertainty and must constantly balance the economic costs of overly conservative designs against the potential economic, human, and environmental risks of project failure. From conceptual design, during construction, and throughout the project's service life, ICF's Geotechnical and Geoenvironmental Safety Program provides a proven methodology for evaluating, minimizing, and monitoring the risks inherent in geotechnical structures.

The Geotechnical and Geoenvironmental Safety Program has the following components:

- Establishment of performance criteria
- Design assessment
- Field measurement system

- Construction assessment
- Performance monitoring
- Performance evaluation
- Safety assessment
- Contingency planning
- Remedial measures

Construction Support

Geotechnical construction often encounters subsurface conditions and involves construction details that require field decisions to keep a project moving on track. Our veteran "dirty boots" engineers know heavy construction. We speak the language, know the heavy equipment, recognize contractors' time and budget constraints, know the construction methods and materials, and understand site safety. We apply our valuable construction experience to streamline project progress from start to finish, with design stage constructability reviews and construction quality assurance and quality control (QA/QC) programs. We often act as an owner's representative to monitor construction progress, ensure specification compliance, and make field design modifications. Our engineers have OSHA HAZWOPER health and safety certification for projects at potential hazardous waste sites.

Environmental Engineering

Environmental projects often require the same engineering disciplines as other civil works. From groundwater flow, vadose zone multiphase mass migration, contaminant transport to earthmoving, site supervision, and project management, ICF's engineers have the experience to design and implement environmentally sound solutions to challenging client concerns. We design systems for groundwater contaminant monitoring, product recovery, hydraulic containment, contaminant extraction, in situ treatment, ex situ treatment, and enhanced biological degradation of pollutants. We design impoundments, seepage barriers, dikes, ponds, and wetlands to protect and restore fragile habitats. Our combined knowledge of groundwater flow, chemistry, and advanced treatment technologies produces results tailored to the individual circumstances of each project.

About ICF International

ICF International (NASDAQ: ICFI) partners with government and commercial clients to deliver consulting services and technology solutions in the energy, environment, transportation, social programs, defense, and homeland security markets. The firm combines passion for its work with industry expertise and innovative analytics to produce compelling results throughout the entire program life cycle, from analysis and design through implementation and improvement. Since 1969, ICF has been serving government at all levels, major corporations, and multilateral institutions. More than 2,000 employees serve these clients worldwide. ICF's Web site is <http://www.icfi.com>.

For more information, please visit www.icfi.com or contact:

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