THE POWER OF ERDC

CERL CONSTRUCTION ENGINEERING RESEARCH LABORATORY | CHL COASTAL & HYDRAULICS LABORATORY | CRREL COLD REGIONS RESEARCH AND ENGINEERING LABORATORY | EL ENVIRONMENTAL LABORATORY | GRL GEOSPATIAL RESEARCH LABORATORY | GSL GEOTECHNICAL & STRUCTURES LABORATORY | ITL INFORMATION TECHNOLOGY LABORATORY

51 Capabilities Available to Help Our Stakeholders Complete Quality Projects on Time and Within Budget

1. **Airfields and Pavements:** Delivers new and improved methods for the design, construction, evaluation, rehabilitation, and maintenance of structural systems for pavements and other transportation facilities.
2. **Aquatic Ecology and Invasive Species:** Laboratory and field studies on ecological processes and dynamics, impact analysis, habitat evaluation, restoration, inventory and monitoring on freshwater ecosystems.
3. **Biogeochemical Processes in Earth Materials:** Enhances battlespace awareness and force protection, and sustain training through microbial forensics and use of new plant materials.
4. **CAD/BIM Center:** Coordinates the capabilities, requirements, and deployment for Computer-Aided Design (CAD), Building Information Modeling (BIM), and Computer-Aided Facilities Management (CAFM) technologies throughout the tri-services.
5. **Climate Change:** Experts across diverse disciplines translate climate science into actionable, decision-relevant information to predict, forecast, model, and track climate stressors; next-generation infrastructure designs and innovative technologies are leveraged to achieve climate change resilient objectives.
6. **Coastal Engineering:** Plans and executes general coastal engineering studies and investigations for project planning and design, performance monitoring and evaluation, geologic and geomorphic analyses, sedimentation engineering, and dredging and dredged problems, as well as shore protection measures.
7. **Coastal Observation and Analysis:** Advance coastal science and engineering through observational research; provides engineering support for harbor monitoring, dredging, beach nourishment, inlet channel maintenance, land and hydrographic surveying and wave measurements.
8. **Coastal Processes:** Investigates fundamental near shore processes such as waves, wind, currents, sediment transport, and morphology change on site-specific and regional scales, research dredged material fate and stability, inlet navigation channel evolution/maintenance, beach fill performance/maintenance, impacts of inlets on adjacent beaches, and regional sediment management, and conducts regional wave information studies hindcasting, forecasting, and "nowcasting" of coastal waters.
9. **Computational Analysis:** Researches, develops, refines, validates, compares, and applies advanced computational methods to model physical, biological, and sociological systems.
10. **Concrete and Materials:** Serves as the single point of expertise for the U.S. Army Corps of Engineers (USACE) in concrete and materials-related research, materials testing, and in-depth materials analysis.
11. **Cybersecurity Engineering and Analysis:** Proactively protects computer systems within the DoD while promoting a productive environment for the research development test and evaluation (RDT&E) community.
12. **Data Representation and Analysis:** Concentrates on the exploitation, analysis and display of geospatial information.
13. **Data Signature and Analysis:** Applies remote sensor derived geospatial and environmental data collection, processing and display.
14. **Ecological Processes:** Highly integrated, multi-disciplined tools, procedures and methodologies in the areas of characterization of biotic and a biotic ecosystem components and processes; ecological carrying capacity; data acquisition technologies; Geographic Information System and remote sensing applications; ecosystem impact analysis; ecosystem and landscape modeling and analysis; and threatened and endangered species and bio-diversity conservation.
15. **Ecological Resources:** Provides technical support and technology transfer in support of ecological assessment, management, and restoration of habitats, communities, and landscapes for the Department of Defense, including USACE and other Federal agencies.
16. **Energy:** Holistic integrations of power delivery & distribution, energy storage, and demand-side energy efficiencies and conservation measures.
17. **Energy Resilience:** Deliver holistic energy solutions to drive emission reduction; provide expertise in energy generation, transmission/distribution, demand-side drivers with modeling and simulation capabilities to address the full energy cycle.
18. **Engineering Processes:** Processes and tools for life-cycle management of engineering processes, including design, construction, operations, maintenance, and disposal.
19. **Engineering Resources:** Delivers engineering solutions to our Warfighters and the Nation involving systems design and development, pavements and materials research development testing and evaluation (RDTE), and the use of environmentally controlled facilities to test, evaluate, and improve infrastructure and equipment for use in cold regions.
20. **Environmental Chemistry:** R&D in environmental analytical chemistry methodology and molecular biology to support the Army Civil Works and Military Environmental Quality programs.
21. **Environmental Engineering:** R&D of technologies to better understand, predict, treat and control contamination associated with all types of environmental media (air, water, soils, sediment, etc.) and structures.
22. **Environmental Processes (Civil Works):** Investigates the physical, chemical, biological, and ecological processes that are critical to the assessment, modeling, management, and remediation of aquatic and terrestrial ecosystems.
23. **Environmental Processes (Army):** Basic and applied research to address CONUS and OCONUS Army environmental needs including potable water supply systems, wastewater and storm water collection, treatment, reuse, and disposal systems, solid and hazardous waste management systems and industrial waste treatment.
24. **Environmental Risk Assessment:** R&D on the bioavailability and effects of chemical contaminants on endpoint organisms in the environment.
25. **Environmental Sustainability:** Provide expertise in infrastructure and environmental sciences and engineering to deliver innovative tools that will address sustainability and resilience challenges at home and abroad.
26. **Environmental Systems:** Basic and applied research to develop environmental sensing, characterization and monitoring capabilities necessary to quantify environmental site conditions and trends at local and regional scales.
27. **Field Data Collection and Analysis:** Develops, tests, deploy, maintain and operate water resource, environmental and sediment instrumentation systems.
28. **Force Projection and Sustainment:** Provides solutions toward sustaining operations at remote installations by understanding the impacts of extreme and austere environmental conditions on maneuver support, materiel, tactics, and military procedures in polar regions.
29. **Geospatial Applications:** Tests and evaluates the collection and processing methods of emerging geospatial systems, platforms and technologies.
30. **Geotechnical Engineering and Geosciences:** Executes research and development efforts to include testing, evaluation, and investigation in the areas of water resource infrastructure, geotechnical engineering, seismic engineering, geology, geophysics, and soil and rock mechanics.
31. **Harbors, Entrances, and Structures:** Investigated a wide range of inland and coastal facilities, navigation channels, and/or structures to assess performance, verify and/or optimize designs, and develop more effective and economical new designs. Conduct investigations and general research studies of a wide variety of hydraulic structures such as spillways, channels, and pump stations.
32. **Hydrologic Systems:** Develops and applies modeling capabilities for providing cutting-edge solutions to military and civil works issues in surface water, groundwater, and watersheds.
33. **Impact and Explosion Effects:** Develops and demonstrates physically rational, application-oriented, analytical engineering and numerical models to predict airblast, fragmentation, projectile penetration, cratering and ejecta, ground shock, and water shock environments produced by weapon impacts and detonations and the explosively-induced loads transmitted to structures by these events.
34. **Information Generation and Management:** Encompasses research and development technologies for collection and processing of geospatial data, geographic information systems, remote sensing, geospatial intelligence, and human terrain data collection and management in support of military or national objectives.
35. **Information Science and Knowledge Management:** Provides services and supports ERDC research and development projects through categorization, archiving, management, optimization and retrieval of information and knowledge to include library and information systems science services.
36. **Institute for Systems Engineering Research:** Improves engineering, design, and process systems by developing next-generation computational tools for new systems and products that will assist decision makers in selecting the most appropriate courses of action to resolve issues.
37. **Land and Heritage Conservation:** Tools to help the Army obtain and analyze geo-cultural information in theatre operations and preserve cultural resources on fixed facilities and in zones of operations.
38. **Materials and Structures:** Research and technologies to improve the durability and resilience of military and civil works facilities and infrastructure.
39. **Mobility Systems:** Focuses on research, experiments, and evaluations to ensure that U.S. military forces maintain ground mobility superiority in any environment.
40. **Navigation**: General research regarding the planning, design, operation, management, and maintenance of navigation channels, locks, ports, and waterway systems to provide safe and efficient marine transport, cost effective systems, and environmentally acceptable conditions including research on fish passage and avoidance relative to hydraulic structures.
41. **River Engineering:** Research related to geomorphic, hydraulic, and sedimentation engineering in rivers, streams, and reservoirs including alluvial channel and floodplain development, wetland and river system hydraulics, integrated river basin management for stabilization and restoration.
42. **Scientific Software:** Investigates a wide range of high-end data systems solutions in response to technical requirements. It researches and develops capabilities that address data display, data analysis, data visualization, data archiving, and mass storage.
43. **Sensor Integration:** Researches, develops, refines, validates, and applies advanced nano-scale and macro-scale transduction and communication methods to observe, measure, and document the physical world, and as components of servo-feedback systems to control structures and systems constructed to influence and leverage elements of the physical world.
44. **Signature Physics:** To conduct research and develop decision-making and prediction products focused on the sensor-target interaction and influence of terrain and weather environment on signal propagation.
45. **Software Engineering and Evaluation:** Investigates software engineering methodologies; conducts research, development, and studies of Information Systems and applications; and develops, tests, operates, and maintains automated Information Systems for the ERDC, USACE, DoD, and other federal agencies.
46. **Structural Engineering:** Develops design and analysis procedures to help structures, above and below ground, resist static and dynamic loading and to determine effects from explosives, conventional and nuclear weapons, earthquakes, and other sources.
47. **Structural Mechanics:** Conducts basic and applied research, technology demonstrations, and facilities assessments for the development and transition of technologies to protect the Warfighter and the Nation's critical military and civil works infrastructure.
48. **Survivability Engineering:** Provides force protection engineering expertise for deployed forces, from foxholes to fixed facilities, against an array of threats ranging from sabotage, small arms, and terrorist attacks to advanced weapons equipped with multispectral targeting systems.
49. **Terrestrial and Cryospheric Sciences:** Investigates fundamental processes and properties of terrain and terrestrial materials as affected by weather and climate to solve problems for the military and the Nation.
50. **Water Quality and Contaminant Modeling:** Conducts research, development, and special studies to predict environmental quality.
51. **Wetlands and Coastal Ecology:** Conducts field and laboratory investigations on biotic and abiotic resources in wetlands and coastal systems and develops product/systems supporting assessment restoration, and management of wetlands and coastal ecosystems.