AREAS OF INTEREST
W9132T26SC001

1. MATERIALS AND STRUCTURES AREAS

A. TITLE: Sustainable Engineered Wood / Mass Timber / Bio-Structural Building Solutions

TBD

B. TITLE: Bio-Based Building Insulating / Finishing Solutions

TBD.

2. INSTALLATION ENERGY AREAS

A. TITLE: Energy and Water Efficiency and Security

Products/methods/techniques that will improve overall energy efficiency are of interest. These include but are not limited to: combined heat and power generation, fuel cells, reformers, low Nox boilers/burners, natural gas and adsorption cooling, compressed air systems, distributed generation (wind, solar, hydropower), waste to energy, geothermal, and other high efficiency heating/ventilating/and air-conditioning systems. Further, novel processes that improve product development and deployment. Similarly, products/methods/techniques that address water efficiency and security are of interest. This may include but not limited to: potable water treatment and delivery systems, potable water storage, potable water metering and monitoring, gray water reuse, water recycling, rainwater harvesting, advanced wastewater treatment, anaerobic digestion, digital twins, and wastewater to energy.

Solutions are sought which address the need for improved energy and water efficiency and improved energy and water security. ERDC desires solutions that will improve the robustness of energy and water production and delivery systems whereby the risk of loss of energy and water services due to economic dislocations, depletion of natural resources, natural or man-made disasters is reduced. Further, solutions are encouraged that address products/ methods/techniques which will facilitate cost effective, reliable, and sustainable utility support to deployed forces in underdeveloped regions of the world. In addition to specific technologies, ERDC is interested in novel processes that improve product development and deployment.

3. WARFIGHTER AREAS

A. TITLE: Advanced Methods and Designs for Additive Construction

Technology Area(s): additive construction, deployable 3D printers, 3D printing, autonomous material processing and delivery, autonomous construction accessory equipment, materials (polymers, concrete/composites, metals, etc), indigenous materials, design methods, software, infrastructure.

ERDC seeks to develop, improve, and deliver additive construction capabilities in support of both military and civilian mission sets of the U.S. Army Corps of Engineers. ERDC is conducting research in the broad area of additive construction including but not limited to deployed force infrastructure and use on installations. The primary focus is to advance construction, materials, design, and technology development to minimize logistics, materials, labor, cost, manpower, and time for construction. The

solution may address a wide breadth of areas under Additive Construction including software, user interface, simulation, integration, equipment (printers and accessory pieces of equipment including pumps, mixers, or extruders), materials, testing, training & documentation, and design. The solution could include stationary builds, repair, and/or modular structures for operating environments. The solution should be able to operate in environments that are challenging and to print on unprepared or minimally prepared surfaces. Deployable and ruggedized solutions are preferred.

The solution may address one or multiple aspects of this research area including, but not limited to, containerized large/construction-scale polymer/composite printing systems capable of producing full-scale components, combination additive/subtractive manufacturing systems (including for concrete), composite materials incorporating green/recycled/indigenous materials to create structures capable of withstanding realistic structural and environmental loads, upgraded concrete mixers/pumps/extruders designed specifically for field operations & additive construction, autonomous reinforcement creation/placement, and innovative digital designs of additively constructed infrastructure for adding to a government repository. Applicants are encouraged to submit evidence of their innovations performing a demonstration at full scale.

B. TITLE: Robotics for Engineering Operations

Technology Area(s): autonomous controls, autonomous terrain shaping operations, robotic repair, field robotics, non-destructive testing/inspection, infrastructure, near real-time mapping (Engineer reconnaissance)

Description: ERDC seeks to develop and deliver unmanned/robotic capabilities in support of both military and civilian mission sets of the U.S. Army Corps of Engineers. ERDC is conducting research in the broad area of robotic engineering support in challenging and highly dynamic operating environments. In the military domain, solutions should enable Army Engineers to autonomously perform terrain shaping missions by integrating solutions into existing/standard, commercial off-the-shelf platforms, and equipment. The primary focus is to expand the Engineer's capabilities and capacity using unmanned systems. The solution should be able to operate in environments with challenging, unprepared terrain. In the civilian mission set, solutions should enable remote or autonomous non-destructive testing and inspection of large infrastructure in dangerous and challenging environments. Solutions should be suited for both land and water environments and have the ability to operate in confined spaces. New technologies and capabilities will allow for inspections and repairs to be conducted rapidly, minimize project outages, reduce labor burden, and increase safety for personnel.

ERDC prefers autonomous ground vehicle solutions that allow for real-time teleoperation as a fallback/safety method of control, allow for operations in a non-assured radio communication state (confined space, radio signal obstruction/attenuation), operate in Global Navigation Satellite System (GNSS)-denied environments, and interface with the robot operating system (ROS). The solution may address one or multiple aspects of this research area to include near real-time mapping for Engineer reconnaissance and autonomous task planning, novel localization techniques, autonomous control of equipment and implements, nondestructive evaluation and sensing systems through autonomous manipulation, algorithms for evaluation and interpretation of inspections to support decision-makers, and mission planning and control tools for coordinating mission tasks among multiple pieces of equipment.

4. OPERATIONAL ENERGY AREAS

A. TITLE: Operational Energy

Technology Area(s): hybrid power, metering and monitoring, invertors, energy storage, energy management systems, cloud infrastructure, coating technologies for power systems, power generation, design methods, software

ERDC seeks to develop, improve, and deliver operational energy capabilities in support of both military and civilian mission sets of the U.S. Army Corps of Engineers and the Engineer Regiment. ERDC is conducting research in the broad area of operational energy in challenging and highly dynamic operating environments. This research would identify new opportunities for contingency base camp operational energy reduction (demand-side management) achieved through new and innovative technologies, improved system or operational modifications. This research would also identify new and innovative opportunities for improved power generation, to include renewables and energy storage (supply-side management). In addition, technologies considered should be able to withstand the harsh, demanding, and austere conditions of an operational environment. The solution should be compatible with US power requirements as well as NATO standards. The research would provide results on the latest base camp operational energy technologies or operational changes and quantify the associated cost/benefits for any proposed change. Deployable, mobile, and ruggedized solutions are preferred.

The solution may address one or multiple aspects of this research area with a focus on reducing reliance on vulnerable resupply operations (both fuel and water) — this enables greater operational freedom of action and reduces the Soldier and system burden at the tactical edge; reducing the Warfighter's individual carry load; conserving resources.

5. TRAINING LANDS AND HERITAGE BRANCH AREAS

A. TITLE: Natural Infrastructure Condition Assessment and Lifecycle Management Optimization

Technology Area(s): Natural Lands Assessment and Management, Advanced/Remote Plant Community Identification, Structure and Dynamics Assessment. Rapid Soil Property Assessment and Characterization. Sensor Analytics, Ecological and Anthropogenic change detection, forecasting, and projection. Decision support for both military training/testing lands and potential theaters of operation.

Overview: Methods/techniques/tools are needed to rapidly and accurately characterize the configuration, structure, and condition of Natural Infrastructure required for military operations and sustainment of those operations. Better data and knowledge of the current and future projected state of these assets will inform improved decision-making regarding utilization, sustainment, and/or restoration. As more data are being collected, it is important to consider how these data can be collected, stored, processed, aggregated, analyzed, and connected with other data, systems, and processes to deliver accurate representations of military training/testing lands and terrain within operational theatres of operation.

Solutions are sought which address the need for efficient and targeted data collection, condition assessment, and the interpretation of plant and soils data. Also of interest are methods that seek to quantitatively measure and track condition, functionality, and other key indicators of the environment that impact military objectives. Solutions may also consider how these metrics are forecasted to change over time due to age, use, management, degradation, climate, other environmental impacts, and policy-related drivers. Finally, of particular interest are overarching processes and novel approaches for identifying, prioritizing, and allocating resources to inspect, maintain, and/or repair natural infrastructure assets to optimally achieve desired condition and quality standards, performance targets, and acceptable risk profiles across the Federal government's portfolio of real property assets.

6. SUSTAINMENT MANAGEMENT SYSTEM AREAS

A. TITLE: Facility and Infrastructure Lifecycle Investment Optimization

Technology Area(s): Asset management, condition assessment, performance measurement, Building Information Models, digital planning, Building Sensor Analytics, degradation forecasting, risk-based decision making, facility investment optimization, process engineering.

Overview: Methods/techniques/tools are needed to digitally characterize the configuration, condition, and performance of facilities and supporting infrastructure. Better data and knowledge of the current and future projected state of these assets will inform improved investment decision-making regarding sustainment, restoration and modernization and eventual recapitalization. As more data are being collected for our facilities, it is important to consider how these data can be stored, processed, aggregated, analyzed, and connected with other data, systems, and processes to deliver a real property portfolio that maximizes overall performance to achieve mission with optimal cost effectiveness.

Solutions are sought which address the need for efficient and targeted data collection, condition assessment, and the interpretation of real-time sensor data. Also of interest are methods that seek to quantitatively measure and track condition, functionality, service life, and other key indicators of performance, as well as approaches for expressing the relative importance of facilities, systems, and components. Solutions may also consider how these metrics are forecasted to change over time due to age, use, degradation, climate and environmental impacts, and even policy-related drivers. Finally, of particular interest are overarching processes for identifying, prioritizing, and allocating resources to inspection, maintain, repair, replace, and modernize these real property assets to optimally achieve desired condition and quality standards, performance targets, and acceptable risk profiles across the federal government's portfolio of facilities.