Request for Proposals:
Pilot Projects for the Coalition for Smart Construction at Virginia Tech

The Coalition for Smart Construction (CSC) is a university, industry, and government collaboration established to serve as a catalyst for change in the built environment, including how humans interact with the built environment in all aspects of life: work, play, and learning. The CSC will bring partners from industry together with research and development experts at Virginia Tech to modernize the construction industry. By leveraging and integrating transdisciplinary strengths of Virginia Tech in key fields with private sector support, the CSC will develop a world-class integration and prototyping facility poised to tackle the construction industry's biggest challenges.

Research Areas
To address these transformation opportunities, we are mobilizing around five main research themes developed from faculty and industry input. These themes will help solve near- and long-term challenges facing the construction industry and society's use of the built environment. These areas are: (1) Advanced Materials and Manufacturing, (2) Construction Operations, (3) Energy, (4) Sustainability, and (5) Digital and Human Interfaces. More information on the research themes can be found in the attached document.

CSC Pilot Projects
To foster collaboration and kickstart, the Office of Research & Innovation (ORI) and the Institute for Critical Technology and Applied Science (ICTAS) are sponsoring pilot projects to advance research in the theme areas that will demonstrate the value of the CSC, help grow the coalition and set the stage for larger scale investments. These efforts should strengthen the argument for the CSC and the integration and prototyping facility.

We invite proposals for projects that are creative, innovative, and show strong potential to advance the goals of a coalition for smart construction and its partners, while also focusing on challenges facing the construction industry.

All faculty members at Virginia Tech are invited to apply, but cross-disciplinary teams are encouraged, particularly those that include PI's from two or more colleges. Projects that have the potential to transition to integration, prototyping, or demonstration upon completion of the pilot phase are highly desired.

Project Funding Available
Three awards are anticipated with project budgets up to **$75k** over an **18-month duration** (Spring 2025 - Summer 2026). Each team will be required to submit a research progress report at 6-month intervals. A **Research Showcase** will be held, and all teams will be required to present their research to highlight progress and aid transition of results.

Proposal Requirements

Please address each section of your proposal using Times New Roman 12-point font, 1-inch margins. Proposals should be limited to five pages maximum, plus appendices.

1. **Shorthand Title**

2. **Project Summary:**
   - Provide a high-level summary of your project, including identifying alignment with CSC research themes, the transdisciplinary research challenge, the proposed solution, and potential impact the project may have on the construction industry.

3. **Research Team:**
   - Interdisciplinary team of faculty and (optional) external partners
   - Potential path for transition to include industry partners

4. **Research Area Description:**
   - What is the problem you are trying to solve? How is it done today?
   - If you are ultimately successful, how will it change the industry?
   - Who cares? Who are the stakeholders? Will they support or resist your efforts and changes to practice?
   - How will the industry implement your results?

5. **Transition Plan:**
   - Discuss critical elements of the transition plan for the results.
   - Describe criteria that will be used to measure progress

6. **Requested funds:**
   - Requested funds may not exceed $75,000 total.
   - Describe how the funds will be used.

Submission Process

Please email a PDF copy of your submission to ICTAS by **5pm on October 28, 2024** at ictasseedgrants@vt.edu. Awards will be announced during fall semester with anticipated project start dates of January 2025. If any specific questions, please contact Jon Porter at jon.porter@vt.edu.

Milestone	Timeline
RFP Proposals Due	10/28/24
Selected Proposals Announced	12/1/24
Research Begins	Spring 2025 Semester
Showcase	Spring 2026

Evaluation Criteria

- Research Alignment
  - Does the proposal support the CSC vision and objectives?
  - Does it support one or more of the key research themes?
  - Does it integrate cross-disciplinary components and appropriate teaming across VT?
- Industry Relevance
  - Does the proposal articulate a compelling and clear market/industry need?
  - Will the proposed project change the current state of practice?
  - What is the potential for transition to practice?
- Technical Approach
  - Are the overall strategy, methodology, and analysis well-reasoned and appropriate to accomplish the specific aims of the project?
  - Are the technical risks reasonable?
  - What is the likelihood of success?
- Impact
  - Does the proposal clearly articulate an outcome for the pilot project?
  - Will the pilot project potentially lead to additional CSC work to be accomplished in the new integration and prototyping facility?
  - If successful, how will the proposal (eventually) change the state of practice?
- Feasibility
  - Is the Project feasible within the budget and schedule?

The Coalition for **Smart Construction** at Virginia Tech

OVERVIEW

We envision the Coalition will organize its efforts around **five main research themes**. These themes will help solve near and long-term challenges facing the construction industry and society's use of the built environment. The proposed themes are:

- ADVANCED MATERIALS & MANUFACTURING
- CONSTRUCTION OPERATIONS
- ENERGY
- SUSTAINABILITY
- DIGITAL AND HUMAN INTERFACES

Mobilizing around and demonstrating a diversity of research themes within the Coalition offers the potential to create convergence among ideas and exciting new opportunities for innovation and problem-solving for the construction industry. A human-centered approach will enable the Coalition to model the use, interaction, and adoption of technologies by people within the future built environments.

ADVANCED MATERIALS & MANUFACTURING

Materials performance, durability and manufacturing are becoming increasingly important in construction industry practices. When life-cycle cost is fully considered, legacy commodity materials may no longer be the best choice. Adoption of higher performance material systems that were previously cost-prohibitive at scale have the potential for more widespread use when all parameters are evaluated. Life cycle approaches and assessment, multifunctional materials, additive manufacturing and assembly, and reuse of materials are key research topics.

CONSTRUCTION OPERATIONS

Understanding the entire process—from design, to construction, through to operations—is critical to delivering on the promise of smart construction. This research theme explores the process and how the people within that process are engaged with each other and with technological resources. Research topics include systems management, team dynamics, and industrialized construction processes.

ENERGY

Energy consumption by the U.S. residential and commercial sector represented about 28% of the total U.S. end-use energy consumption in 2021. The purpose of this research area is to help the industry reduce carbon emissions during construction and operation and maintenance phases of the life cycle. Research topics may include energy production, storage and recapture as well as energy monitoring and management strategies.

SUSTAINABILITY

Construction contributes significantly to global industrial carbon emissions and materials from construction/demolition contribute significantly to landfill waste. Development of more sustainable materials and practices will move the industry toward meaningful reduction of carbon emissions and waste resulting from the construction, maintenance, operation and decommissioning of constructed facilities. Relevant research includes sustainable construction practices, sustainable materials, and infrastructure resilience.

DIGITAL AND HUMAN INTERFACES

Robotics and automation will help meet construction demand in the coming decades as the industry wrestles with massive gaps in a skilled labor force and increasing international competition for domestic projects. The effectiveness and potential efficiencies of robotics and advanced automation will transform the job site to deliver projects on time while reducing costs and risk. Relevant research includes AI/ML, AR/VR, digital twins, and human-machine interfaces.