Abstract: Design and construction markets are increasing requirements for the constructed product and how the project team delivers it. These market demands for improved infrastructure and a more sustainable built environment are increasing the importance and scope of construction engineering throughout the project development process. Concurrently, many construction degree programs face pressures to increase coverage of construction management topics, leaving less time for construction engineering. Construction research, especially related to modeling and integration, has produced new technologies and capabilities to assist with construction engineering activities. These drivers lead to the central question addressed by this paper: What are the essential core elements of construction engineering knowledge to foster successful projects and careers? The purpose of the paper is to identify these elements of knowledge and their implications, including background and support for many related topics discussed at the Construction Engineering Conference held at Virginia Tech in September 2010.

After defining construction engineering based on the main activities it includes, the paper identifies and describes four elements of knowledge that it requires: technical fundamentals, materials of construction, construction-applied resources, and field construction operations. The description for each type of knowledge includes examples of activities that require it.

The paper also includes implications and recommendations for educators to increase coverage of construction engineering, for industry to assist in advocating and offering relevant courses, and for researchers to further develop construction process models and other tools with potential benefits for construction engineering practice and education.