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Forensic Engineering: Professional Liability Risks of Engineering Sustainable Materials and Systems, Designing for Durability, and Pushing Materials to Their Limits

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Abstract

Professional engineers in the US may be found negligent and therefore liable for damages arising from failure to exercise a level of care, diligence, and skill exercised by other reputable practitioners in similar circumstances in an effort to accomplish the purpose for which the professional engineer was hired. If the professional engineer has accepted the obligation to design for sustainability or durability, or where materials, elements, or assemblies are intended by design to be "pushed to their limits" in normal service, the professional engineer may be accepting an extreme or uninsurable risk.

The subject of this paper is the standard of care and the relationship between the standard of care and design for sustainability or durability, or design where the engineered features are expected to be "pushed to their limits" in normal service. The paper's contents include 1) an explanation of the concept of the standard of care, and 2) the professional liability pitfalls inherent in a design effort intended to result in sustainability or durability, or intended to achieve limit-state behavior in normal service. The subject is relevant for practitioners wishing to understand professional responsibilities for such designs.

Keywords: Professional negligence; standard of care; sustainability, resilience.

1. Introduction

Sustainability and resilience of the built environment are currently seen as desirable design goals [1]. Achieving sustainability may reduce the deleterious effects on the social, economic, and natural environment of building, using, maintaining, repairing, and decommissioning features of the built environment. One might be tempted to achieve sustainability by reducing the amount of construction material to the extent that material or elements of the facility are pushed to their limits during the maximum event anticipated by the design standards or Codes.

Imparting resilience in features of the built environment may allow those features to be easily returned to service after being exposed to infrequent, extreme, or unanticipated demands.

An engineer who designs a feature or facility with the intent of satisfying a design goal of sustainability or resilience may be thought of as failing to do so if the feature or facility is perceived to have not achieved those intended goals. Such a failure may result in significant liability on the part of the engineer if the engineer is found to be professionally negligent in committing that error, and that error is shown to have caused injury.

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