



Ph.D. DISSERTATION DEFENSE

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Title: Understanding Wave Attenuation of Constructed Oyster Reefs:
Field Observations, Trends, and Design Approach

Chairperson: Prof. Jon Miller, CEOE, Stevens Institute of Technology

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ABSTRACT

This dissertation focuses on expanding the understanding of the wave attenuation of constructed oyster reefs. As nature based solutions, such as constructed oyster reefs, become the preferred method for coastal protection, quantitative guidance and information is needed to ensure appropriate application. This dissertation seeks to address this research need through (1) a systematic review, (2) field observations, and (3) a novel design approach. First, through a systematic review, quantitative values are able to be placed on many qualitative assumptions that have been part of decision making and engineering design. Second, novel field observations of wave height amplification on the inside of the structure lead to questioning many assumptions associated with constructed oyster reefs. Finally, after additional field monitoring and some modeling, the success metric of the wave height transmission coefficient (K_t) is questioned and an alternative, the energy flux transmission coefficient (P_t) is proposed. Through this new metric, the entire transformation of a wave is able to be considered, providing simple evaluation metric that will help nature based solutions be engineered with nature at the forefront of design.