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Ash Kotwal is currently pursuing a PhD in Materials Science, Engineering & Commercialization at Texas State University and serves as a Doctoral Instructional Assistant for the Department of Engineering Technology. He is also a member of the American Society for Mechanical Engineers, American Concrete Institute and Precast/Prestressed Concrete Institute. Ash received a BS in Engineering Technology from the University of West Florida in 2008. During his undergraduate program, he was employed as a project manager and estimator in the field of commercial electrical construction. After graduation, he continued to obtain extensive professional experience estimating and managing projects, specializing in new building construction, sports field lighting and backup power generation. In 2011, Ash entered the Graduate College at Texas State University and received a MST in Industrial Technology. During his graduate program, he has been actively involved in many research initiatives related to the sustainable use of materials in the construction industry. His research interests include the development of alternative cements, the use of recycled materials and the characterization of geopolymer binders.

Concrete Based on Portland Limestone Cement with Limestone Content Greater Than 15%

The production of portland cement is one of the largest sources of energy consumption and carbon dioxide emissions in the world. Although cement is critical to the construction of most infrastructure, the regulations and permitting for new plants is extremely cumbersome in the United States. Its cost is also substantially higher than the other constituent materials in concrete. Consequently, the investigation of cement replacement in concrete mixtures is considered to be a worthwhile challenge in the concrete industry. Portland limestone cement conforming to ASTM C595 and AASHTO M240 is manufactured by blending or intergrinding limestone at levels currently limited to 15% by mass. To produce a more innovative and sustainable material, European standard EN 197-1 allows up to 35% limestone. Therefore, a need exists to determine the feasibility of using portland limestone cement with limestone content greater than 15% for applications in the United States.

Ultra High Performance Concrete

Ultra high performance concrete has enhanced strength and durability compared to conventional and high performance concretes. Compressive strengths of over 22 ksi (150 MPa) are obtained by dense particle packing in the concrete matrix, thereby improving blast and impact resistance. Adversaries could potentially use the improved material for protecting their installations. As a result, it is necessary to evaluate formulations and methods that can be readily implemented at Air Force test centers for construction of ultra high performance concrete targets.