Client
CM&M Industries, Inc. (CM&M) is a manufacturer of cementitious veneers, landscaping products, and engineered stone. CM&M is currently expanding their business to include the recovery and reuse of natural stone waste to be used in the production of 100% recycled pavers, veneers, mosaics, etc. These products are consumer trademarked as BELLA-TERRA® Recycled Earth Products. CM&M’s new Phase III manufacturing process utilizes 100% waste material, is 100% Bio-Origin bound and is controlled by a zero discharge water recycling system.

Opportunity Areas
Natural stone products, including granite, are commonly used in many applications such as countertops. However, up to 30% of the original granite slab is considered to be scrap after cutting for install and is disposed in landfills. CM&M has realized an opportunity to salvage these scrap pieces of granite to be used for the manufacturing of new products, thus diverting the scrap from landfill.

Objectives
CM&M requested NYSP2I to evaluate their new Phase 3 concrete product by testing to ASTM standards for comparison to concrete products currently available on the market. This work is requested as a next step toward expanding CM&M’s Phase 3 manufacturing process to production. A further goal of the project was to document the Phase 3 manufacturing process and mixing instructions for CM&M’s new concrete material.

Work Performed
Under the GTAC program, NYSP2I and Clarkson University tested and evaluated CM&M’s Phase 3 level concrete product as a viable alternative to other commercially available concrete products. NYSP2I documented the procedure for the mixing and forming of the product being tested through this project. NYSP2I also worked with CM&M to document the Phase 3 manufacturing process.

Results
- CM&M’s concrete material exhibited the following strength characteristics as tested to ASTM standards:
  - Compressive strength in 24 hours: <4 MPa (580 psi)
  - After 28 days moist curing, compressive and tensile strengths were 16 MPa (2300 psi) and 3 MPa (435 psi), respectively.
  - After 56 days moist curing, the compressive and tensile strengths were 18 MPa (2700 psi) and 3 MPa (435 psi), respectively.
- The hydraulic reaction of CM&M’s concrete was relatively slow resulting in a setting time of 15.5 hours, approximately three times greater than typical Portland cement mortars.
- The drying shrinkage strain observed after 56 days was 0.1% (1000 µε); this is within the typical range for ordinary Portland cement (OPC) concrete (0.06—0.12%, 600—1200 µε).
- CM&M anticipates the addition of 260 jobs to support the expansion of their Phase 3 product manufacturing in NY State.