Announcing the Final Examination of Michael Toth for the degree of Master of Science

Time & Location: March 30, 2012 at 8:00 AM in Engineering II 211, Conference Room
Title: Construction and Demolition Debris Recovery and Recycling in Orange County, FL

With the State of Florida's 75 percent by the year 2020 recycling goal in place, Orange County (OC) has made the development and implementation of an efficient strategy for landfill diversion of its solid waste a top priority. In response to the Florida Department of Environmental Protection (FDEP) estimation (2009) that 23 percent of municipal solid waste was generated by construction and demolition (C&D) activities with only 30 percent of C&D debris being recycled, OC decided to create a solid waste integrated resource plan (SWIRP) initially focused on the recovery and recycling of C&D materials (2010). For SWIRP development, OC decision makers need the best available data regarding C&D debris generation and composition and an understanding of the potential markets available for recycled materials.

In this investigation a debris generation model was created for the largest single governing body within OC, unincorporated OC (UOC) representing 65 percent of county population on average from 2001-2009, and was assumed to apply to the entire county. The debris generation model was constructed for 2001-2010 using area values for C&D activities in six sectors as obtained from building permits and debris generation multipliers obtained from literature values. The benefit of the model is that as building permit information is updated, debris generation estimations can also be updated expediently when debris generation multipliers are assumed to continue to apply.

Material composition fractions obtained from waste characterization studies of landfills in the Central Florida area were applied to the debris generation model using a weighted average resulting in a material composition for all sectors from 2001-2010. The material composition of the debris stream was found to be concrete (53%) followed by drywall (20%), wood (12%), a miscellaneous fraction (8%), asphalt roofing material (4%), metal (2%), cardboard (1%) and carpet and padding (1%).

A market analysis was performed for concrete, drywall, wood, asphalt roofing shingles and residual screened materials (RSM), a component of the miscellaneous fraction, which estimated potential demand for recycling C&D debris materials by examining markets that could use recycled materials but generally use natural resources. The analysis assumed that natural resources or other waste sources could be replaced with recycled C&D debris. In some instances the entire state of Florida was considered as the control boundary for the potential recycling of OC's C&D materials; however the Central Florida area was used where local data were available. It was found that 100 percent of the materials discussed in the market analysis could be recycled through the use of currently available end markets when statewide outlets were considered but that the introduction of more local markets was vital to the success of OC's high diversion goal because of the cost to transport recyclables. Asphalt shingles were found to have a particularly high potential for use in a locally created end market as an alternative ingredient material in hot mix asphalt (HMA) because roadwork involving the need for HMA is pervasive throughout OC.

Major: Environmental Engineering

Educational Career:
Bachelor's of Environmental Engineering, BS, 2010, Florida Gulf Coast University

Committee in Charge:
Dr. Debra Reinhart, Chair, Civil, Environmental and Construction
Dr. Amir Behzadan, Co-Chair, Civil, Environmental and Construction
Dr. Andrew Randall, Civil, Environmental and Construction

Approved for distribution by Dr. Debra Reinhart, Committee Chair, on March 1, 2012.
The public is welcome to attend.