



BAMBOO ARCHITECTURE

by Rebecca M. Buntrock, LEED AP

Simón Vélez, an architect who has pioneered the use of bamboo as a structural building material, presented and discussed his work at a lecture at the Cooper Union moderated by Nat Oppenheimer. Vélez, a native of Bogota, Columbia, first began working with this locally available material nearly 40 years ago and today is regarded as one of the foremost experts on bamboo architecture. His completed works encompass a wide range of typologies, from low-cost housing to long-span bridges to temporary structures. Signature projects include a bamboo pavilion for the Expo Hanover 2000, the Zocalo Nomadic Museum in Mexico City, and the Crosswaters Ecolodge in the Guangdong Province of China. The Crosswaters Ecolodge was notably the first bamboo structure in China, a country known for using bamboo for everything *but* buildings.

Vélez opened his lecture by implicitly stating that he does not consider himself to be a bamboo architect; very simply, he is an architect that happens to occasionally work with bamboo, amongst other materials. Despite this claim, it was clear that Vélez is dedicated to making bamboo a fashionable and viable building material, due in part to its critical importance as part of a sustainable future. As a building material, bamboo is uniquely strong in both tension and compression, up to eleven times the strength of steel. Bamboo is also rapidly renewable, with some species growing up to one meter per day. Interestingly, the strength of bamboo varies considerably based on location; Vélez commented that the bamboo in Columbia is significantly stronger than that in China.

Simon Vélez 's success with using bamboo as a structural material began as collaborations with engineers and builders, and was largely a result of trial and error over the course of his career. Since there are no standards for the structural performance of bamboo, load testing is typically necessary to confirm structural capacity and obtain building permits. Nat posed the question, is bamboo as a structural material being researched from a purely analytical perspective anywhere? No, according to Vélez, which is a hindrance for newer engineers and architects, as this necessitates years of practical experience rather than gaining an educational foundation early on in one's career.

Vélez 's philosophy is to consider "aesthetics, statics, and ethics" as the driving force behind any and all designs. As such, the form of his design typically reflects its structural function, keeping most of the members efficiently in tension or compression with minimal zero-force members. He has developed a mortar-filled joinery system, where bolted joints are filled with mortar to keep the bolts from crushing the walls of the bamboo. Vélez keeps his drawings simple, typically freehand and color-coated on letter-sized graph paper, which his experienced team of builders can easily interpret. Drafters and computer renderings are only engaged when absolutely necessary for building permits.

His works have brought bamboo into the public eye and have inspired a new generation of architects and engineers; it will be interesting to see how bamboo as a structural material continues to progress.

Rebecca is a structural engineer at Robert Silman Associates, where she is this year's National Trust for Historic Preservation's Robert Silman Fellow for Preservation Engineering. She holds a Bachelor of Science in Civil Engineering from McGill University and a Master of Engineering in Structural Engineering from the Massachusetts Institute of Technology.