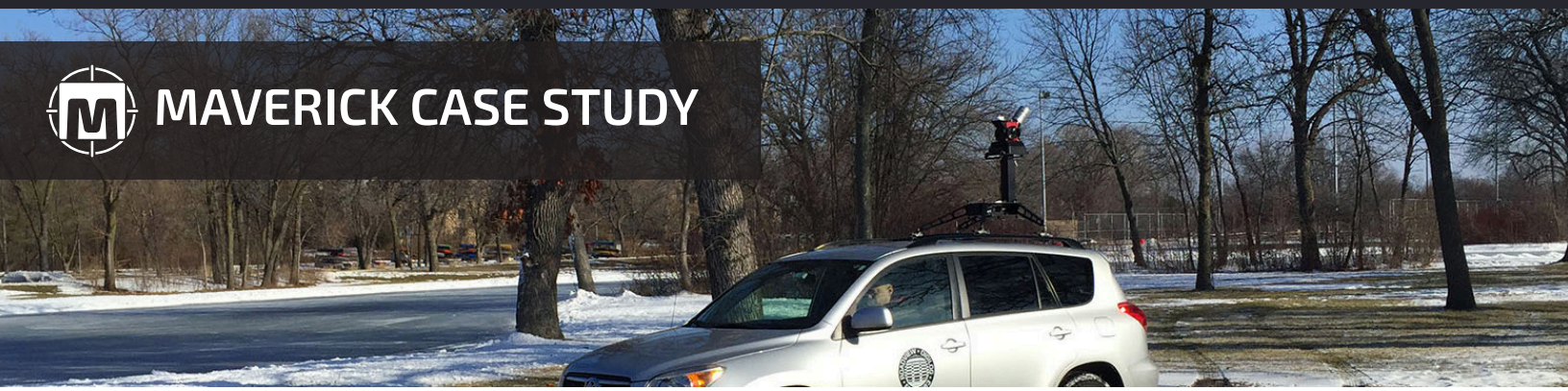
MANDLI COMMUNICATIONS
4801 Tradewinds Parkway
Madison WI 53718
(P) 608-835-3500 (F) 888-545-2214 (E) info@mandli.com



WholeTrees

CLIENT	WholeTrees	INDUSTRY	Construction
LOCATION	Madison, Wisconsin	YEAR	2015

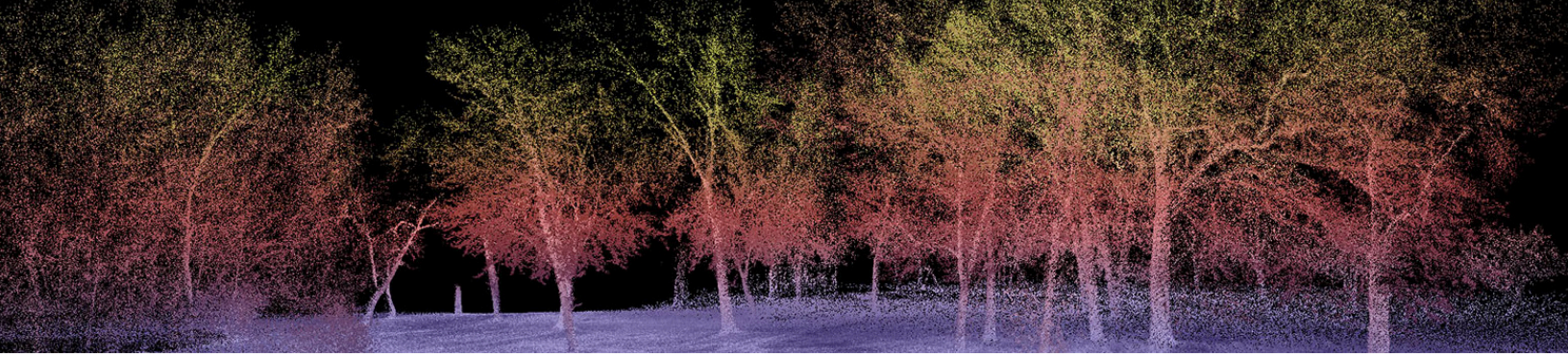
INTRODUCTION

IN MARCH OF 2015, Mandli was approached by WholeTrees, a local Wisconsin company that engineers cost-efficient, sustainable structural systems for commercial and residential buildings using whole trees, which are low or no-value cullings of sustainably managed forests.

WholeTrees approached Mandli about using LiDAR technology to scan trees in Tenney Park for use in the construction of Festival Foods on East Washington Avenue. The target trees in Tenney Park were urban ash trees that needed to be removed due to the Emerald Ash Borer.

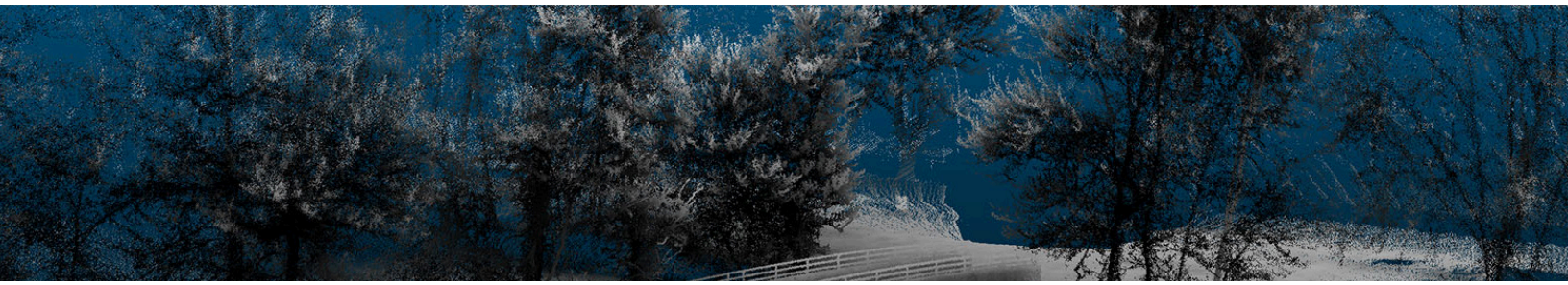
The Emerald Ash Borer is an exotic and destructive beetle from Asia that feeds on the spongy layer of tissue just beneath the bark of ash trees. Their feeding destroys the tree's tissue and the ability to move nutrients back and forth from the roots to the rest of the tree. Once infected by the Emerald Ash Borer, the tree starves and eventually dies.

The City of Madison targeted the trees needing to be cut down due to the Emerald Ash Borer infestation. Instead of destroying the infected trees, WholeTrees provided a solution: use them in the construction of a new building. Using the entire tree (rather than it being chopped up or mulched) retains the tree's natural strength, leaving it 50% stronger than a comparably sized milled timber. WholeTrees, Mandli Communications, and Festival Foods teamed up to make this vision a reality.



CHALLENGE

In the past, WholeTrees has had to cut down each tree they were interested in, bring them to their warehouse, and then individually scan each tree. This was a very complicated, inefficient, and time-consuming process. However, WholeTrees required highly-accurate measurements of the trees to ensure they would fit into the construction blueprints of a new building. WholeTrees needed a solution that would save time and resources without sacrificing accuracy.



MAVERICK SOLUTION

Mandli proposed the use of Maverick, a highly portable mobile mapping system that combines high-resolution 360 degree imaging, high-definition LiDAR, and an integrated position and orientation system to provide a robust and multi-functional dataset that WholeTrees could then use to identify which trees would suit their purposes.

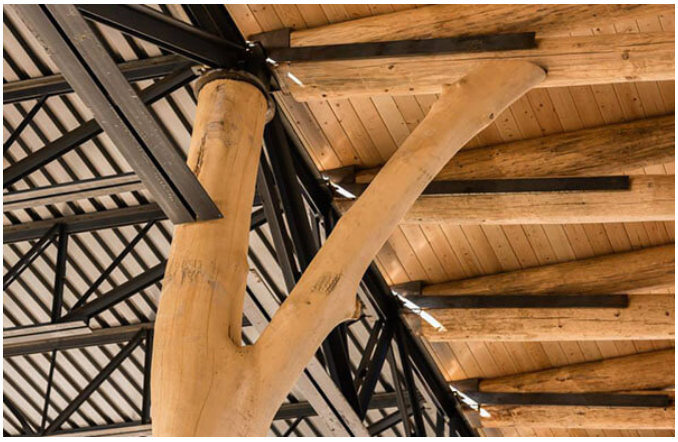
Mandli drove a vehicle equipped with Maverick through Tenney Park, and collected data for each tree of interest. The data emerging from Maverick was run through the Maverick's Distillery software to prepare the data to be used with a variety of third party viewing, post-processing, or reduction softwares. Within Mandli's internal reduction software, the trees were identified, the leaves removed, and the tree

measured. Mandli provided WholeTrees with an interactive 3D point cloud, allowing them to easily view and identify which trees fit their specific measurements.

We're developing an online catalogue of trees, from urban and rural forests, which can be pre-engineered, and made available to foresters for posting trees for sale, and building professionals as a new structural design medium.

RESULTS

Using Maverick proved to be much more time efficient and cost effective than the previous method of cutting down trees of interest and scanning them each individually. Eventually, WholeTrees and Mandli hope to create an inventory of trees that can be harvested as needed. According to WholeTrees co-founder, Roald Gundersen, "We're developing an online catalogue of trees, from urban and rural forests, which can be pre-engineered, and made available to foresters for posting trees for sale, and building professionals as a new structural



design medium."

Festival Foods will be the first grocer to use round-timber columns, beams, and trusses as an engineered structural system. The 57,000 square foot structure will use 30 to 40 tons of urban ash trees saved from the City of Madison.

> “ Mandli's staff used the Maverick system to digitize diseased ash trees, for the first time, which WholeTrees targeted for removal and reuse as columns in constructing Festival Foods in Madison, Wisconsin. The collection of canopy scans took all of twenty minutes, which demonstrated the initial feasibility for use of the Maverick as a digital forest inventory tool in future projects. ”
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> **Roald Gundersen, Co-founder & Owner at Whole Trees**