

ENTRY FORM



DVASE 2019 Excellence in Structural Engineering Awards Program

PROJECT CATEGORY (check one):

Buildings under \$5M		Buildings Over \$100M	
Buildings \$5M - \$15M		Other Structures Under \$1M	
Buildings \$15M - \$40M		Other Structures Over \$1M	X
Buildings \$40M - \$100M		Single Family Home	

Approximate construction cost of facility submitted:	\$7 Million
Name of Project:	Dow Gardens/Whiting Forest Canopy Walk
Location of Project:	Midland, MI
Date construction was completed (M/Y):	October 2018
Structural Design Firm:	CVM Professional
Affiliation:	All entries must be submitted by DVASE member firms or members.
Architect:	Metcalfe Architecture and Design
General Contractor:	Three Rivers Corporation

Company Logo (insert .jpg in box below)



Important Notes:

- Please .pdf your completed entry form and email to bsagusti@barrhorstman.com.
- Please also email separately 2-3 of the best .jpg images of your project, for the slide presentation at the May dinner and for the DVASE website. Include a brief (approx. 4 sentences) summary of the project for the DVASE Awards Presentation with this separate email.

- Provide a concise project description in the following box (one page maximum). Include the significant aspects of the project and their relationship to the judging criteria.

The Canopy Walk at Whiting Forest of Dow Gardens soars through a 54 acre forest in Midland, Michigan, reaching heights up to 40' above the ground. Visitors are provided a variety of unique experiences while traversing the meandering walkway. At over 1,400 feet long, the canopy walk is the longest of its kind in the country while also being fully accessible.

Among the unique experiences are a glass floor and frameless glass guardrails at the highest point of the walkway which cantilevers over an orchard below, a multi-faceted truss wall that extends upwards and supports the roof of the central gathering area, two pod structures with over 100 pieces of curved, glu-laminated timbers each that create the exterior shell and an area with suspended cargo netting where visitors are suspended 30' above the ground below.

Over 2,700 tons of structural steel were used to create the canopy walk. The typical walkway structure is composed of a HSS 16x12 "spine" beam and HSS 8x6 edge beams, all of which were rolled to create the winding path through the forest. The edge beams are supported by tapered HSS cross beams to maintain a slender cross section. Round pipe columns support the main spine beam, some of which are sloped to mimic the surrounding forest. Mixed in with the pipe columns are tripod columns which provide lateral stability for the entire structure. The tripods are made up of three pipe columns, scribed and fully welded together. The columns are supported by pile caps on helical piles. CVM worked closely with the garden's arborist and the architect to lay out the pile caps on site, adjusting the orientation as needed to minimize the impact of the foundations on adjacent tree roots.

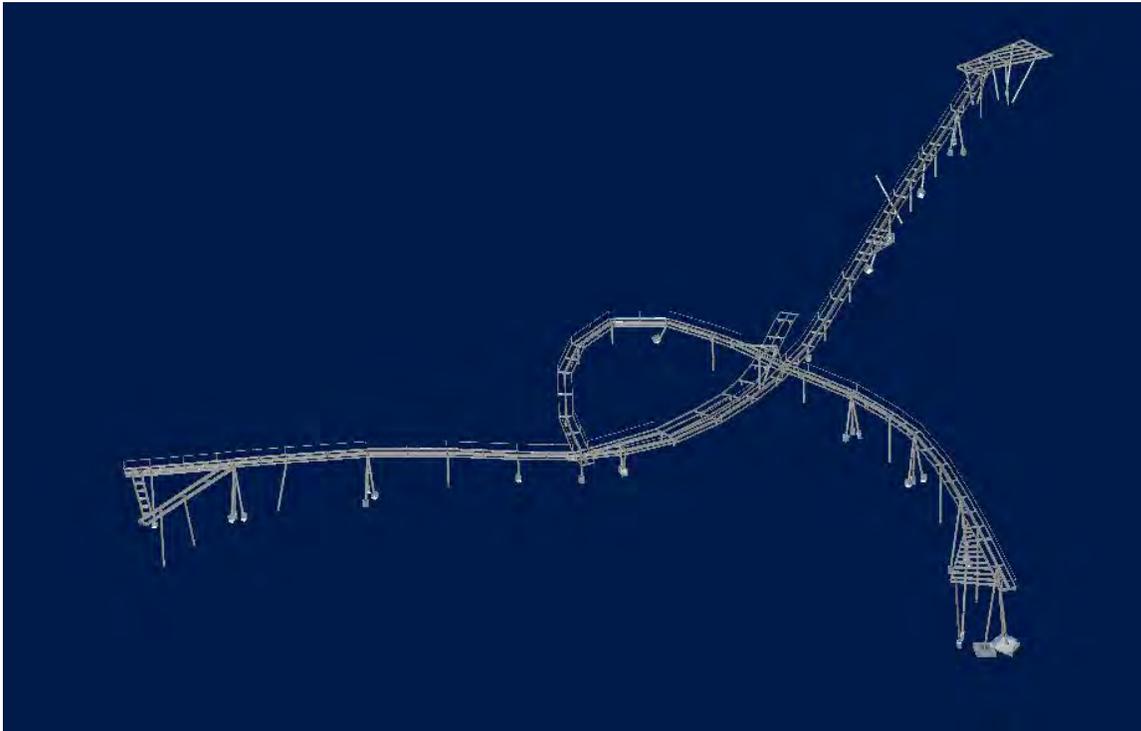
Not a single tree was removed from the property to accommodate the path of the canopy walk or to accommodate the delivery and erection of the steel. A detailed survey of the forest was completed along the proposed path of the walkway. The walkway structure was modified as necessary to respect the trees. In many cases, this meant developing a "cut-out" detail along the edge of the walkway where the structure, including the guardrail, curved around the tree. CVM and the architect worked with the garden's arborist to determine the maximum sway each tree would experience in order to detail the walkway cut-out such that it allowed for the trees anticipated movement and was not a threat to harm the tree.

The walkway structure was shop fabricated and erected in large segments to minimize the amount of field welding to respect the forest. CVM worked closely with the steel contractor to determine how to segment the walkway in such a way that the large pieces could be shipped to the site and be maneuvered through the trees into place. CVM also collaborated with the steel contractor on how to be connect the segments in the field, such that field welding was again minimized.

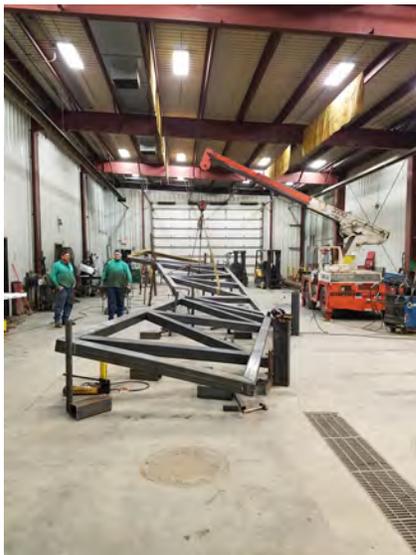
Over 800 individual sheets of structural steel shop drawings were required to completely detail the entire walkway. CVM received regular updates of the steel detailer's 3D model of the walkway, which was used to assist in reviewing the 2D drawings. Many complex connections and framing configurations could only be fully understood and reviewed in 3D.

CVM also worked directly with the steel contractor to devise the erection plan for the "Pond Arm" piece of the walkway. The "Pond Arm" includes four main columns, that slope out and over a pond, and two rear columns that slope away from the pond. The walkway structure laces up the columns and creates moment frames that stabilize the entire "Pond Arm." CVM worked closely with the steel contractor to determine an optimal erection sequence for the unbraced, sloped columns which included temporary rigging and bracing.

- The following 5 pages (maximum) can be used to portray your project to the awards committee through photos, renderings, sketches, plans, etc...



Elements snapshot



Steel fabrication



CVM worked with Dow Gardens arborists to ensure that touchdown points did not alter tree roots



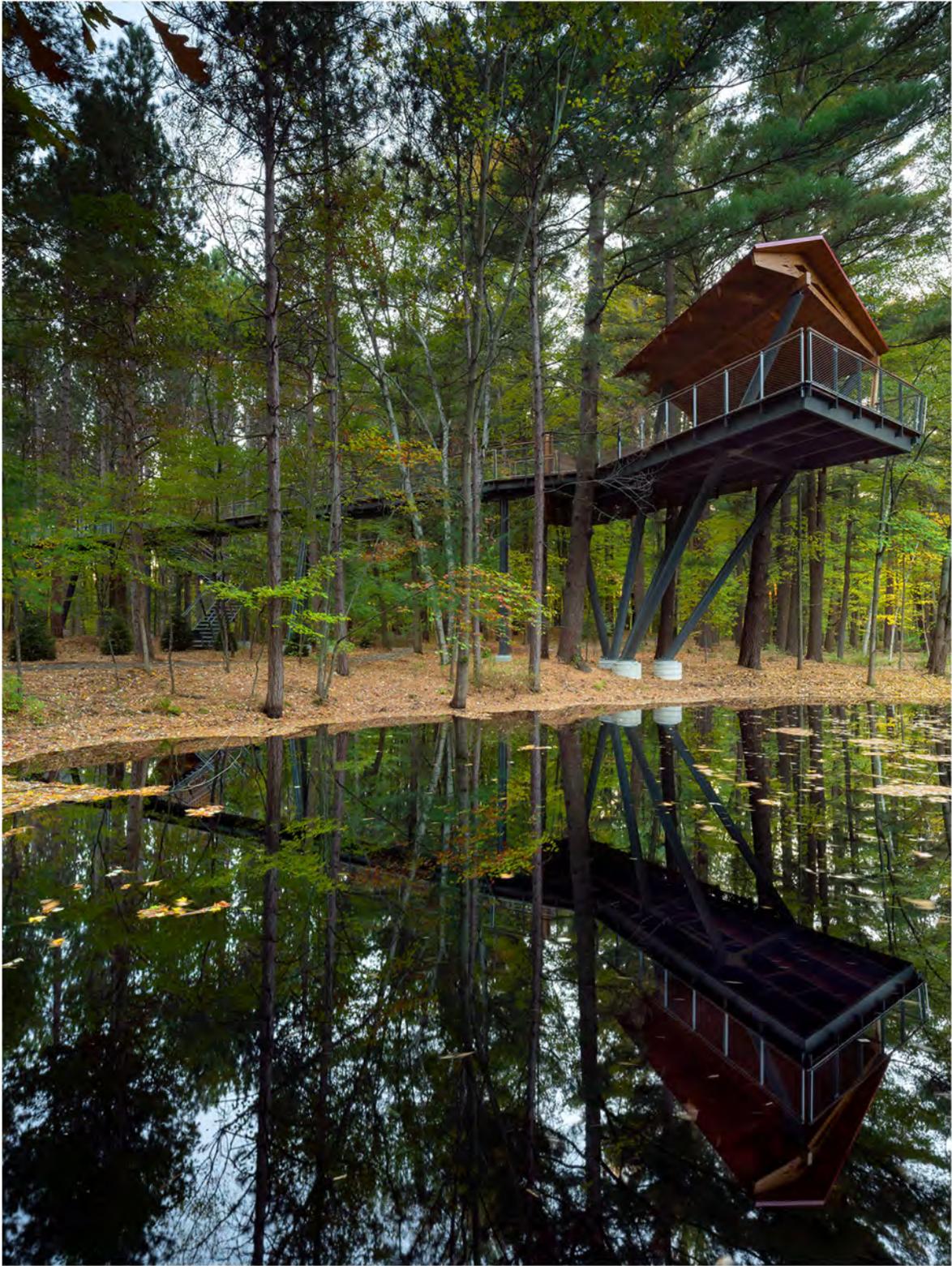
Construction of the Canopy Walk



**Frameless
glass
guardrails**



**Construction
did not disturb
a single tree in
the forest.**



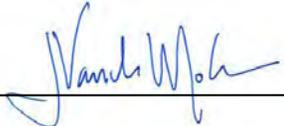


By signing, signatory agrees to the following and represents that he or she is authorized to sign for the structural design firm of record.

All entries become the property of DVASE and will not be returned. By entering, the entrant grants a royalty-free license to DVASE to use any copyrighted material submitted.

If selected as an award winner, you may be offered the opportunity to present your project at a DVASE breakfast seminar. Would you be willing to present to your colleagues? YES NO

Submitted by:

Print name: Jeff VanderMolen, SE	Signature: 	Date: 3.29.19
Submitting Firm:	CVM Professional	
Mailing address:	1002 W. 9th Avenue	
Telephone: 610-989-3800	Fax: 610-989-3677	Email: jvandermolen@cvmprofessional.com