

EXECUTIVE SUMMARY

The structural partners of AEI Team 4 have addressed the various design challenges involved in developing the Growing Power headquarters and prototype for future expansion. This submittal contains a project overview, project goals, narrative of the design process, discussion of design decisions and justification, summaries of related analyses and modeling. In addition, the submittal includes supporting documentation and drawings presenting references, calculations, plans, elevations, sections, and modeling information.

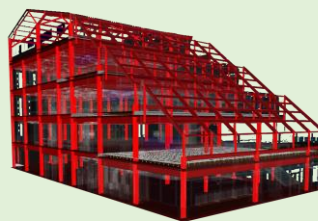
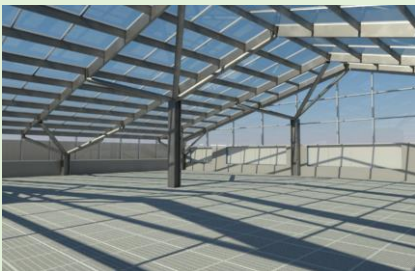
Throughout the design process, the structural team utilized BIM technology and interdisciplinary **collaboration** to develop a structural scheme for Growing Power. Structural concepts were formed by the structural partners, presented to and discussed with the entire design team, and then fully detailed by the structural partners. Input and support was also provided by the structural discipline to assist the other design disciplines in the progress of the overall building design.

The **gravity system** was designed utilizing composite steel beams and girders in order to minimize member sizes, providing more plenum space for MEP system coordination, and minimize the self-weight of the system, which was critical given the foundation bearing capacity concerns. In order to provide a **column-free** gathering space, the structural partners developed custom transfer girders utilizing W36x361 members with cover plates to **clear-span** the building in the necessary locations. To address the low allowable soil bearing capacity issues in Milwaukee, the structural partners elected to use **Geopier® soil reinforcement** to improve the effective soil bearing capacity.

The greenhouse structures were custom-designed to reduce the conditioned volume and improve systems coordination in the growing spaces. The greenhouses feature **renewable wood framing** for the greenhouse cascading up the façade of the building and **steel tree-columns** for the top greenhouse. All greenhouses contain a **grate system** to facilitate MEP flexibility and proper water drainage.

The structural partners worked diligently with the other team members to develop a striking, integrated façade system that meets the various discipline design requirements for Milwaukee, while also considering the other requirements for future Growing Power locations. The resulting **rain screen** system utilizes clips to attach the customizable façade components to the cold-formed steel backup studs.

Top Greenhouse Tree-Columns and Structural Model Overview



HIGHLIGHTS

High Strength, Low Weight Structural Steel System:

Composite steel members minimized sizes and subsequently weight.

Transfer Element:

In order to clear span over the gathering space, custom steel transfer girders were designed.

Geopiers®:

Geopier® soil reinforcement was utilized to as a cost-effective, efficient solution to improve the soil bearing capacity.

Wood Greenhouse Structure:

The cascading greenhouses utilize glulam framing as a renewable resource and architectural accent

Top Greenhouse Tree-Columns:

Smaller member sizes and an open floor plan were achieved through the design of tree-columns comprised of galvanized HSS shapes.

Flexible Prototype

Façade:

Light-weight rain screen façade system developed through integration.