

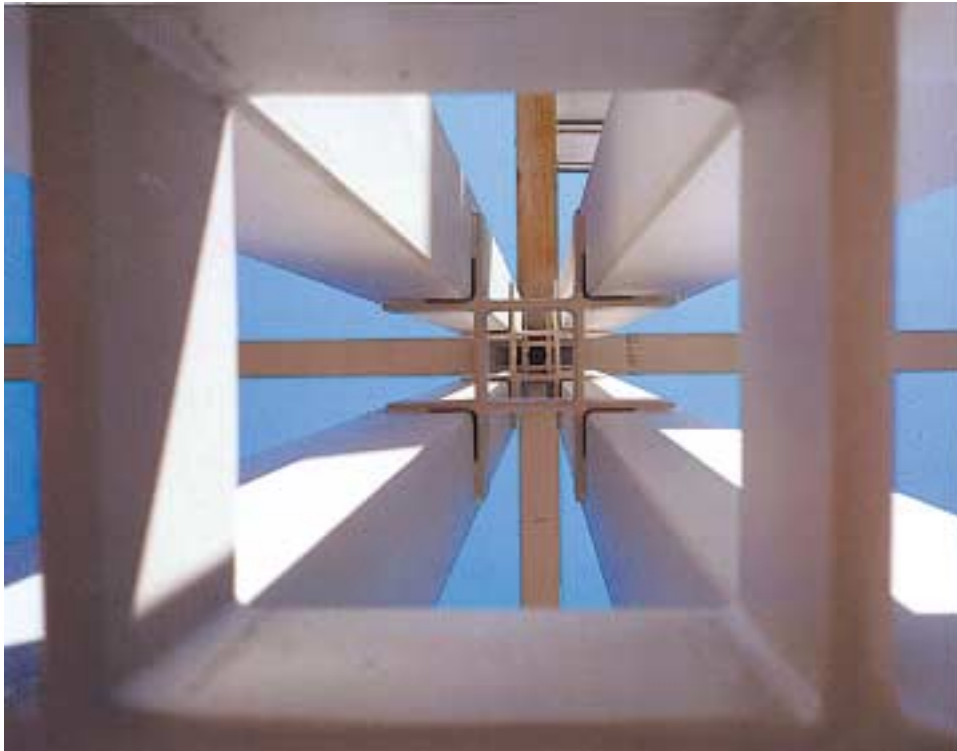


WOODSTOCK

Branch Library

Portland, Oregon

Christopher L. Thompson, P.E., S.E.



The Multnomah County Library system has branch locations spread throughout the Portland, OR, area which lies at the heart of the county. In 1996, Multnomah County's electorate approved a \$30

million bond measure to modernize and/or replace the branch libraries. Headed by Thomas Hacker and Associates Architects, the multi-disciplined design team chosen for the project evaluated 12 libraries in all. Following the evaluations, eight

branch libraries were renovated and four new branch libraries were designed.

The Woodstock branch was the first branch to be replaced, and was intended to be the model project for all of the replacement branch libraries. It is



certainly a statement of the function and form of learning spaces by the architect. The openness of the structure was designed to reflect the openness of knowledge and information of the library, a concept founded by Benjamin Franklin with the idea that education and knowledge should be available to all. The design intent also called for the library to serve as a lantern for the

community: a building that would light the area and bring the community together.

The design concept called for high volume, open space in the reading room/stack area. The column layout was driven by book stack modules. The architect also desired to showcase the structure, exhibiting a simple system

that worked in harmony with the space.

Several options for structural systems were investigated, including structural steel, reinforced concrete and heavy timber. Hybrid systems, combinations of materials, were also considered. The design intent favored columns that were "transparent" to the space. Interruptions of the space with

vertical braced frames did not serve the vision or function for the building.

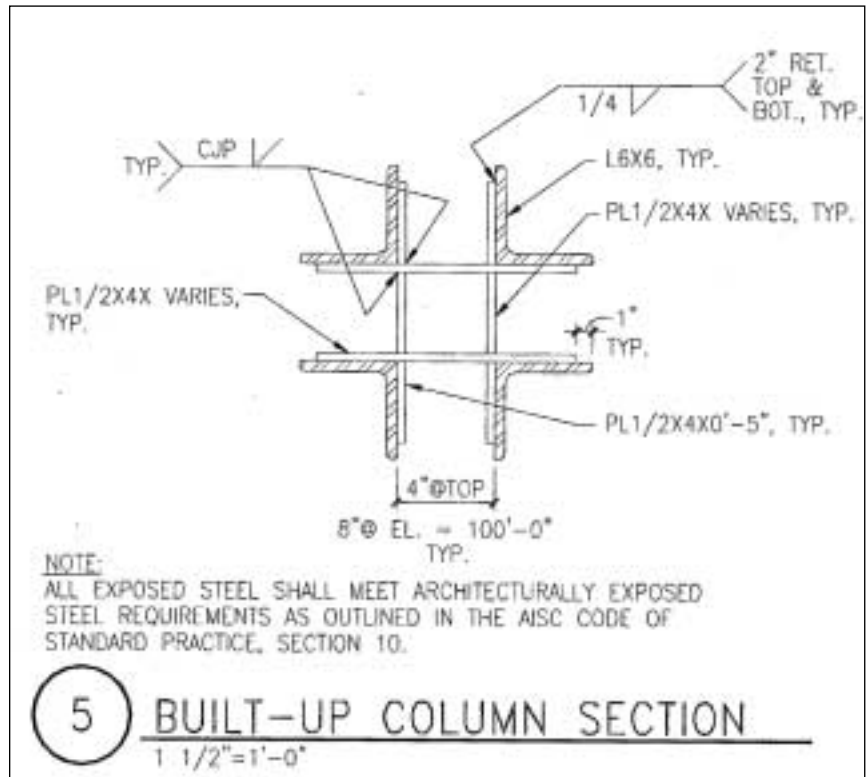
The innovative solution provided by Degenkolb Engineers was a system of cantilevered columns designed to resist lateral loads from wind and earthquakes. The use of cantilevered columns allowed for a space free of vertical bracing elements, such as braced frames. Special moment resisting frames were originally considered, but the transverse spans of 40' in the reading room rendered that solution ineffective.

The cantilever columns required innovative engineering, as the architect designed slender columns with minimum visual impact. Concrete columns were originally considered but were not chosen due to the required size for stiffness and strength. Steel wide flange columns were considered but were not chosen due to linear proportions and the desired visual effect.

The final column solution consisted of a "cruciform" column that was built from four 6x6 steel angles, laced intermittently. The spacing of the angles was varied from base to roof to provide an efficient distribution of stiffness and strength. The columns are rigidly connected to the roof girders to provide the required collector capacity and a degree of redundancy in the lateral force resisting system.

The lateral drift of the building was carefully considered in the design. The inherent flexibility of the cantilevered column system needed to be considered in connections of non-structural elements, such as the external glazing. Non-linear analysis procedures were used to more accurately estimate the actual drift of the building. Based on this analysis, and considerations of the non-structural elements, the drift of the building was limited to approximately 50% of the 1997 Uniform Building Code (governing code in Oregon) allowable.

Christopher L. Thompson, P.E., S.E., is Principal and Group Manager at Degenkolb Engineers in Portland, OR. He also served as Project Manager on the library.



OWNER:

Multnomah County Libraries,
Portland, OR

STRUCTURAL ENGINEER:

Degenkolb Engineers, Portland, OR

ARCHITECT:

Thomas Hacker and Associates
Architects, Portland, OR

GENERAL CONTRACTOR:

McCarthy, Portland, OR

FABRICATOR:

CL Fab, Inc., Portland, OR

ERECTOR:

Volk Steel Erectors, Inc., Gresham, OR

DETAILER:

Certified Technical Consultant
Services, Inc., Portland, OR