

Canadian
Wood
Council

Conseil
canadien
du bois



Wood Design Manual 2017



Wood Design Manual

2017

Volume 1

The complete
reference
for wood design
in Canada

Canadian
Wood
Council

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canadien
du bois

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Preface

The Canadian Wood Council (CWC) is the Canadian association responsible for the development and dissemination of technical information on the use of wood products in construction. Ensuring that this information is in tune with technical change and users' needs is an ongoing process.

There has been a surge in the use of wood in both mid-rise residential and non-residential buildings. Many of these projects push the boundaries of conventional wood building practices and highlight the special qualities, versatility and sheer beauty of wood as a building material. The potential for wood use in Canada is expanding. Wood is now being introduced in taller building construction and the use of proprietary engineered wood products and cross-laminated timber make wood a viable alternative in many applications.

The purpose of this eighth edition of the *Wood Design Manual* is to help the Canadian design community – architects, engineers, specification writers, teachers and students of these disciplines – to design wood structures with efficiency, economy and safety. It brings together, in a comprehensive but concise format, the essential information a designer needs for a wide range of wood structural elements and systems. This is the first edition of the *Wood Design Manual* to provide guidance on the design of cross-laminated timber.

The CWC would like to thank the individuals who were instrumental in the original development of this manual: Stephen J. Boyd, Quaile Engineering Ltd., and Gary C. Williams, Timber Systems Ltd.

Michael Giroux
President

December 2017

The information in the *Wood Design Manual* is based on the latest information available from the *National Building Code of Canada (2015)* and from *CSA Standard O86-14 (Update 2) Engineering Design in Wood*. Every effort has been made to ensure that the data and information in the Manual are accurate and complete. The CWC does not, however, assume any responsibility for errors or omissions in the Manual nor for engineering designs or plans prepared from it.

Errata available at:
www.cwc.ca/publications/manuals/erratas

Environmental Benefits of Building with Wood

Environmental awareness coupled with sustainable design and construction practices are increasingly becoming a requirement for many projects throughout North America and around the world. Sustainable design aspires to use less energy and material resources in conjunction with lowering the environmental impacts over the life cycle of a building. Wood products have the ability to reduce the overall environmental impact of a building by contributing to sustainability goals in all life cycle stages (raw materials acquisition, processing/manufacturing, installation, use and end-of-life).

Wood products are a superior environmental choice to meet sustainable building objectives based on the following:

- Wood is the only renewable major construction material
- Wood is energy efficient in manufacture and use
- Wood can be recycled, reused or converted to useful energy at the end-of-life
- Wood products contribute to climate change mitigation by storing carbon throughout their life cycle
- Canadian wood products are produced from well managed forests that are regulated by sustainable forestry policy.

Life-Cycle Assessment

Life Cycle Assessment (LCA) is a performance based approach to assessing the impacts that building products or systems have on the environment over their lifetime.

This includes all activities from material extraction or harvesting through manufacturing, transportation, installation, use, maintenance, and final disposal or re-use. LCA is the best available tool to compare sustainability of building materials.

Wood outperforms other major building materials when LCA is used to compare environmental impacts:

- Requires less embodied energy in production
- Reduced greenhouse gas emissions
- Releases fewer pollutants into the air
- Discharges less water pollutants
- Generates fewer solid wastes.

Sustainable Forest Management

Canada is a world leader in forest conservation, protection and sustainable use. Sustainable forest management represents a careful balancing act to maintain the many environmental, social and economic benefits of forests so they are available today and for future generations. 94% of Canada's forests are on crown land and provincial governments enforce strict guidelines on harvesting, regenerating and sustaining these publicly owned forests.






For example:


- Canada retains nearly 90% of its original forest cover
- Canada's rate of deforestation is less than 0.02% and is mostly due to agriculture, urban development, transportation, recreation and hydroelectricity
- Annually, Canada harvests less than one-half of 1% of its forest
- By law, all harvested areas are regenerated
- Canada has the largest area of independently certified forests in the world
- When managed with stewardship, forests are a renewable resource that will be available for future generations

Canada's history of caring for our resource base and our desire to continually improve has made these facts a reality. Canadian law, as it now stands, has some of the most progressive legislation for forest management in the world. Public concerns focus on the highly visible effects of wood resource extraction. To address these concerns, Canadian wood product manufacturers are using certification by qualified, third-party, independent bodies to attest that they meet the requirements of a rigorous and independent forest management standard. Canadian companies have achieved third-party certification on over 150 million hectares (370 million acres) of forests, the largest area of certified forests in the world.

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