

# **Wood Design Manual**

2010

The complete  
reference  
for wood design  
in Canada

Canadian  
Wood  
Council

Conseil  
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 non-residential Canadian 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 being introduced in Canadian Mid-Rise 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 sixth 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.

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

March 2011

The information in the *Wood Design Manual* is based on the latest information available from the *National Building Code of Canada (2010)* and from *CSA Standard O86-09 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.

\*For information on CWC's other design tools, visit the CWC web site at [www.cwc.ca](http://www.cwc.ca)



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## Sustainable Building Materials – Wood is the Natural Choice

Sustainable Buildings and Green Buildings are gaining interest of designers looking to conserve energy and minimize the environmental impact of buildings using four generally accepted objectives to reduce the global impact of a particular product or system:

- Reduced energy and resource use in extraction and processing
- Reduced energy consumption in processing and end use
- Minimized external pollution and environmental damage throughout the life cycle
- Minimized internal pollution in the built environment.

Wood is the best environmental choice to meet these four principles based on the following:

- Wood is the only renewable major construction material
- Wood is energy efficient in manufacture and use
- Wood is easily recycled or re-used
- Wood minimizes environmental impact
- Canadian wood products are produced from well managed forests that are regulated by sustainable forestry policy.

### **Life-Cycle Assessment**

Life Cycle Assessment 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.

When considering environmental impact using Life Cycle Assessment, wood outperforms other major building materials in the following ways:

- Requires less embodied energy in production
- Reduces 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. 93% 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 has the largest area of legally protected forests in the world
- Canada has the largest area of original forest cover in the world (90%)
- Only one-quarter of Canada's forests are managed for commercial use
- Annually, Canada harvests less than one-half of 1% of its forest
- Canada has the largest area of independently certified forests in the world

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, 3<sup>rd</sup> 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 140 million hectares (250 million acres) of forests, the largest area of certified forests in the world.

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