Timmins Library &
Judy A. Shank Integrated Services Building

Canadian Wood Council / Conseil canadien du bois

WOODWORKS! Project of the Canadian Wood Council

Table of contents

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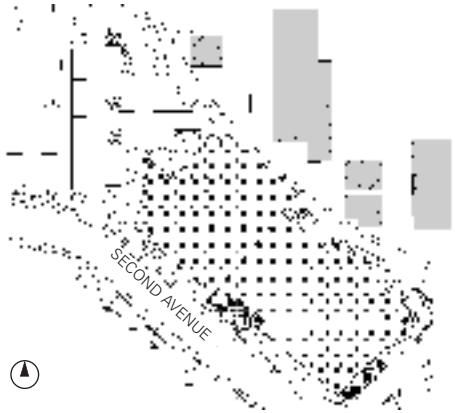

FIGURE 1 Site plan

The City of Timmins has a population of 45,000 but due to its location in northeastern Ontario, is a regional service centre for 100,000 people. It had become obvious that two major community services were in drastic need of improvement. The existing library, built in 1921, had served long and well but needed more space to provide a stimulating learning environment and more room for new technology so vital for engaging young people. The Canadian Mental Health Coalition, providing a range of social services for the community, needed more space to adequately provide assistance in the region.

The forest products sector is a vital part of the heritage, culture and economy of Timmins. For this reason, the City of Timmins wished, wherever economically justifiable, to incorporate wood products into the structure and appearance of the Library. In addition, there were obvious benefits to combining the library with the needs of the Coalition Centre offices of the Canadian Mental Health Coalition, funded by the Province of Ontario, and agreement was reached on combining these two buildings. The Coalition Centre has been named the Judy A. Shanks Integrated Services Building. The resulting landmark facility (**Figure 1**) is centrally located in Timmins, and with ample parking and barrier-free access, welcomes all the city's and region's residents.

Building Descriptions

The Library and Coalition Centre provide 8,200 m^2 (88,000 sq. ft.) of space in two buildings separated by a firewall (**Figure 2**). Both buildings share a common entrance that offers a cheery welcome provided by generous sunlighting from windows and skylights and the use of light wood finishes.

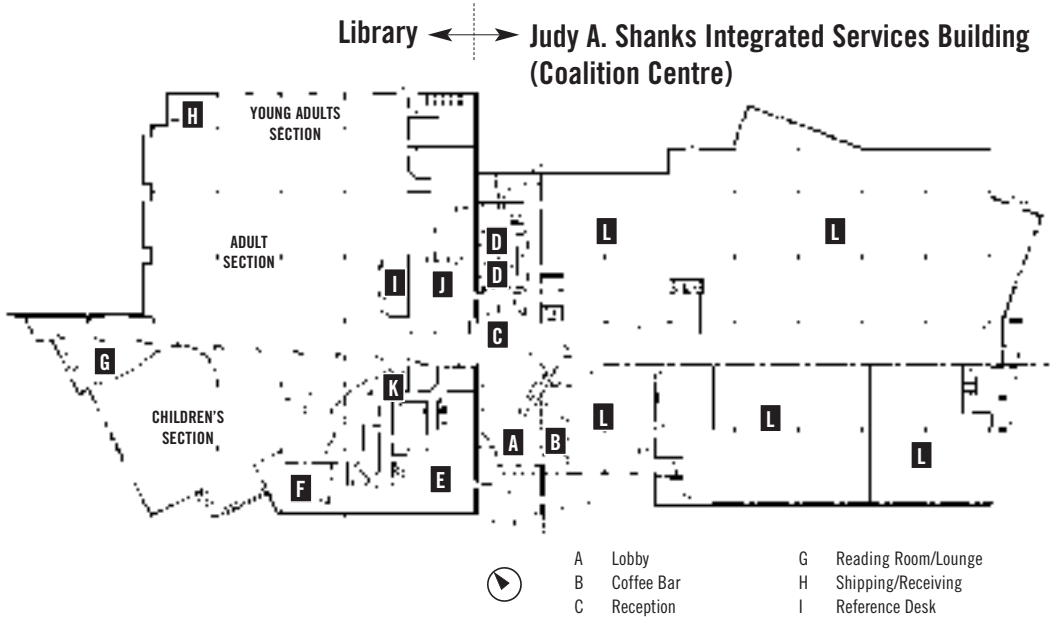

FIGURE 2 Main Floor Plan

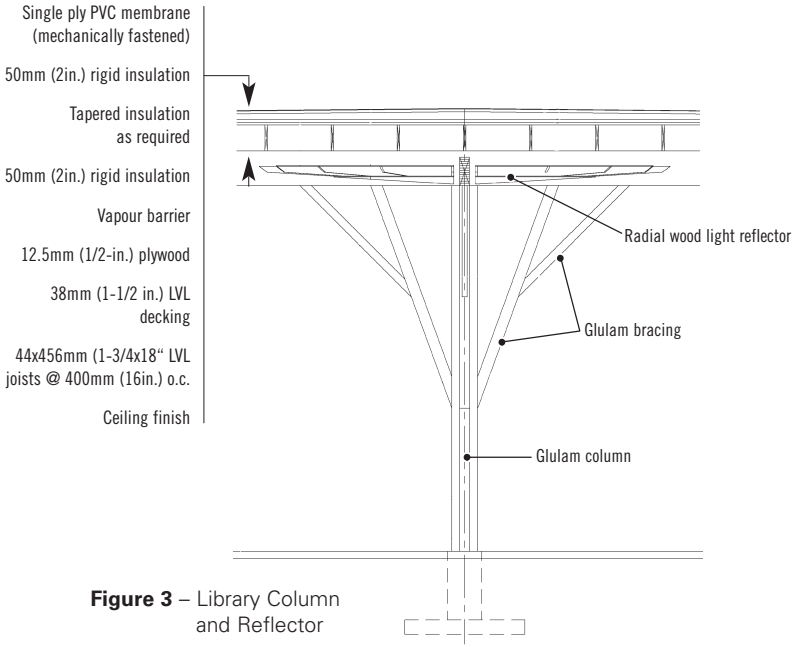

Figure 3 – Library Column and Reflector

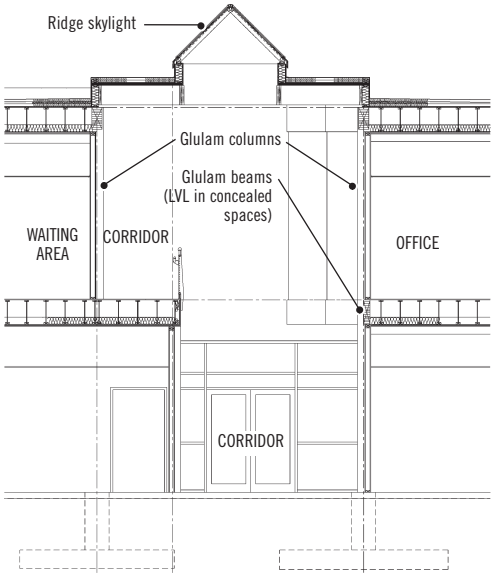

Figure 4 – Cross-section through Coalition Centre Galleria

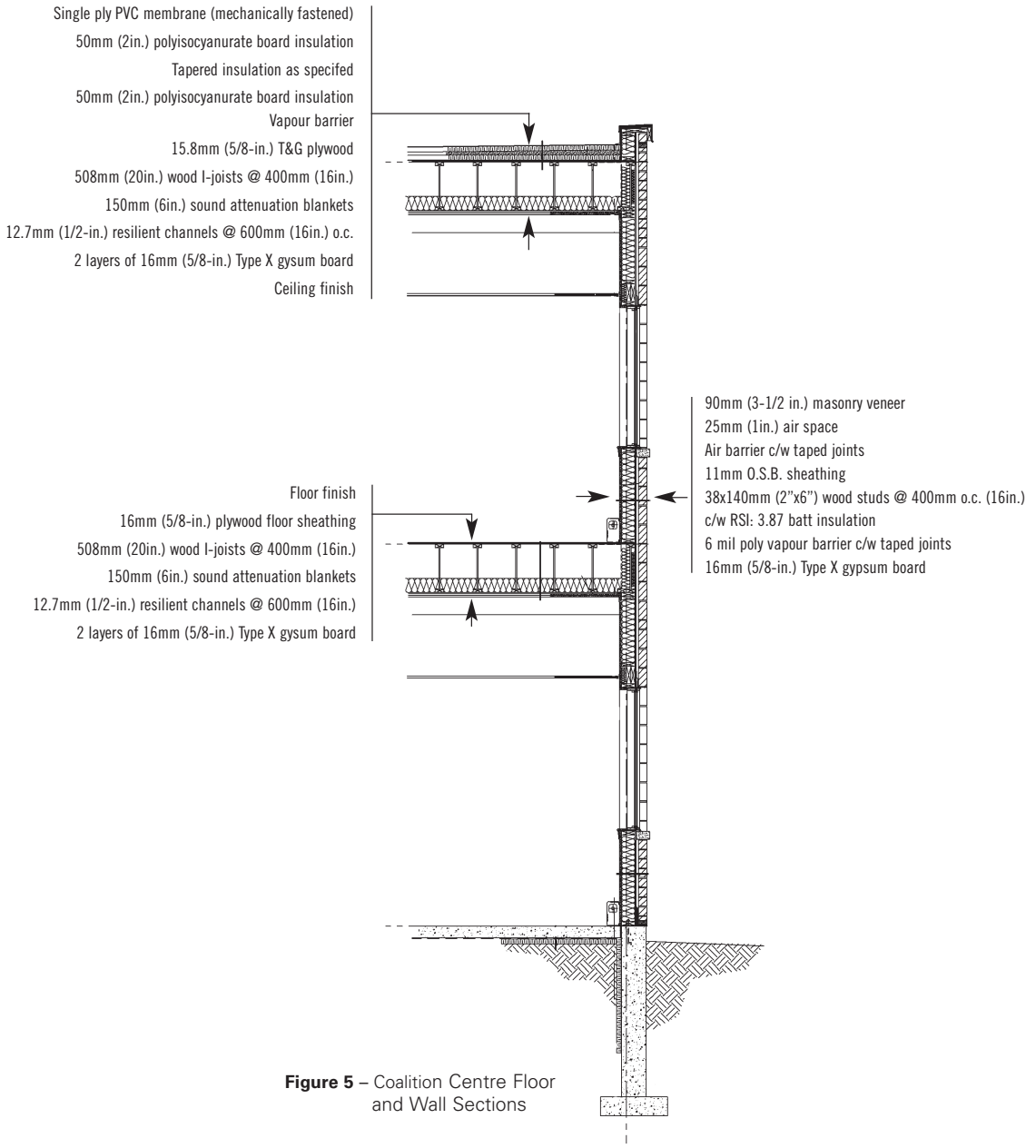

Figure 5 – Coalition Centre Floor and Wall Sections

The new library provides an expanded reference library, larger periodical space, improved areas for computers and Internet access, meeting rooms and an improved childrens' library. Visitors to the Library first notice and remark on the feeling of spaciousness and warmth emanating from exposed wood beams, columns and radial wood deflectors. High ceilings, views to the exterior, a minimal use of walls and low furniture heights assure an unobstructed view across the entire space and invite visitors to stay longer. Library use has increased 33% since the new library was commissioned.

Both buildings use wood as the main structural material. In addition, wood is used as a finish material in several areas. The warmth of the exposed wood in the Library is complemented by the careful selection of colours and finishes. Wood features include exposed wood panels on feature walls, wood grid ceilings over the Reference Desk, Computer Training Alcove and Genealogy Alcove, and natural wood finishes on all millwork elements at the Circulation and Reference Desks. A colourful play of wood ribs extends over the Main Circulation Desk to highlight the prominence of this control point for the Library. The Children's section of the Library is adorned with a medium density fibreboard (MDF) lighting feature in the form of a flying dragon.

The Coalition Centre combines post and beam and wood-frame construction to provide the degree of sound privacy and floor performance expected and required for offices. The structure was designed for the possible addition of a third storey and elevator in the future. The corridors have a roomy atmosphere due to the use of catwalks at the upper level to access tenant suites.

Stained hardwood veneer paneling is used on feature walls and bulkheads. Some hardwood flooring is used in some feature office locations. The millwork is hardwood veneer with solid wood edging and trim, with various plastic laminates used for counter surfaces. Solid wood handrails are used in public spaces.

Structure

Glulam columns and beams provide the main structural support for the Library (**Figure 3**). The columns are arranged to resemble trees and there are 26 such columns that spread out to a reflective surface at the ceiling. The lighting fixture is located in the column struts and directed to the ceiling. Light is reflected from the ceiling to the circulation and working surfaces. The Library exterior walls are wood-frame construction and owing to their 6.4 m (21 ft.) height, laminated veneer lumber (LVL) studs were used, ranging in size from 184 to 286 mm (7 -1/4 to 11-1/4 in.) depending on location.

The Coalition Centre is also post and beam construction (**Figure 4**). Glulam was used for all the columns and for the exposed beams. LVL was used for concealed beams. On the exterior walls, wood stud walls were used to fill the spaces between the columns (**Figure 5**). The partition walls are wood-framed and constructed to provide a high level of acoustical privacy.

The floors and roof are framed with wood I-joists and are provided with sound attenuation blankets, resilient channels and a double layer of gypsum board to improve the sound transmission class (**Figure 5**). The walls are similar to those for the Library except wood studs are used in the single-storey-height walls.

TABLE 1 STEEL / WOOD-FRAME COST COMPARISON (per bay)

Steel Option	Cost	Wood Option	Cost
HSS columns: supply and install	$1,822	Glulam columns and connectors: supply	$1,136
WF Beams 21WF55: supply and install	$3,362	LVL support beams: supply	$2,160
Joists: supply and install	$4,464	Wood I floor joists, hangers, web stiffeners: supply	$1,609
Bridging; supply and install	$176	OSB 15.9 mm (5/8") sub-flooring: supply	$569
Steel floor decking: supply and install	$706	Insulation: supply and install	$275
Wire mesh reinforcement: supply and install	$318	2 layers type X gypsum w resilient channels: supply	$769
Concrete: purchase	$900	Wood I floor joists, sub-flooring ,columns and beams: install	$4,215
Concrete: place and finish	$847	Gypsum board and channels: install, tape and fill	$846
Concrete: hoisting	$175		
Insulation: supply and install	$275		
Gypsum board: supply, install, tape and fill	$724		
TOTAL Steel Option	**$13,769**	**TOTAL Wood Option**	**$11,579**
Cost per m^2 ($ft.^2$)	$209.80 ($19.50)	Cost per m^2 ($ft.^2$)	$176.43 ($16.40)
Notes:			
STC	54	STC	55
IIC	47	IIC	49
Fire rating not required - gypsum ceiling installed for acoustics.		45 min fire rating required	

Cost Efficiency

Given the importance of the wood industry to Timmins, the City was open to using wood for the Library to demonstrate the capability of locally-made building materials to meet all building science and code challenges, and at the same time, add flair and warmth. However, the use of wood for structural applications was deeply scrutinized and needed to provide equal or better value than comparable concrete / steel construction systems.

In the case of the Coalition Centre office building, the Province of Ontario needed to be convinced that wood-frame construction would meet or exceed all code requirements (see Sound Transmission) and still be cost effective. At the preliminary design stage, a detailed cost comparison was made (**Table 1**) based on conceptual designs of comparable wood and steel structures for a typical 8.1 x 8.1m (26.6 x 26.6 ft.) bay of the second floor assembly.

The cost comparison showed that the wood option was 19% more economical than the steel option, while providing slightly higher acoustical performance. This analysis is consistent with price trends over the past few years whereby price increases and fluctuations have been less for wood products compared to steel (**Figure 6**).

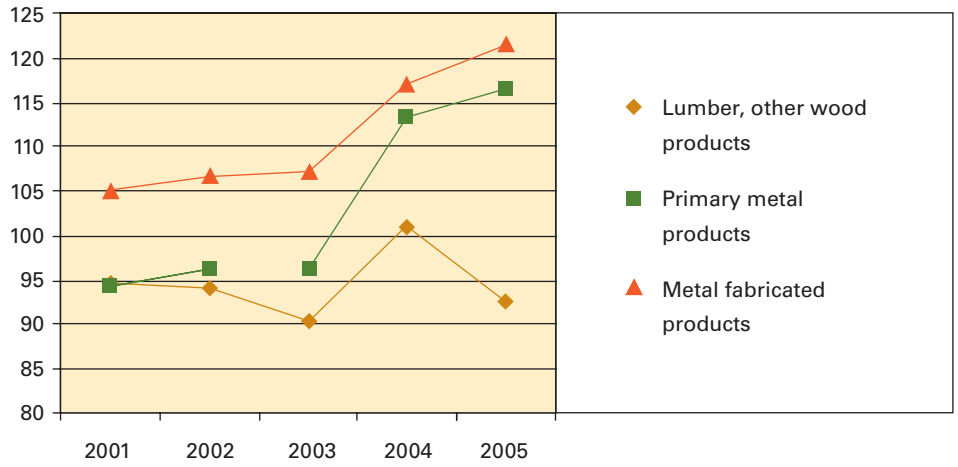

Figure 6 – Industrial product price indexes *(Source: Stats Can)*

Sound Transmission

Superior acoustical performance was a critical user requirement for the Coalition Centre. A sound transmission class (STC) of 55 was targeted for floor and critical walls and it needed to be demonstrated to the funding agency (Province of Ontario) that wood-frame floor and wall systems could provide the required level of sound privacy.

The wood floor assembly (NBCC Assembly F9d) provides an STC rating of 55, an Impact Insulation Class of 49 and a 1-hour Fire Resistance Rating (**Figure 5**). This is achieved with OSB subflooring, wood I-joists, 150 mm of absorptive material in the joist cavity, resilient channels and two layers of 15.9 mm (5/8") Type X gypsum board. The roof was constructed to provide the same level of sound protection so that, in the event of the future addition of a third floor, it would not be necessary to upgrade the second floor ceilings in the existing offices.

Interior walls between offices were constructed to STC 55 using a proprietary sound attenuating stud wall system.

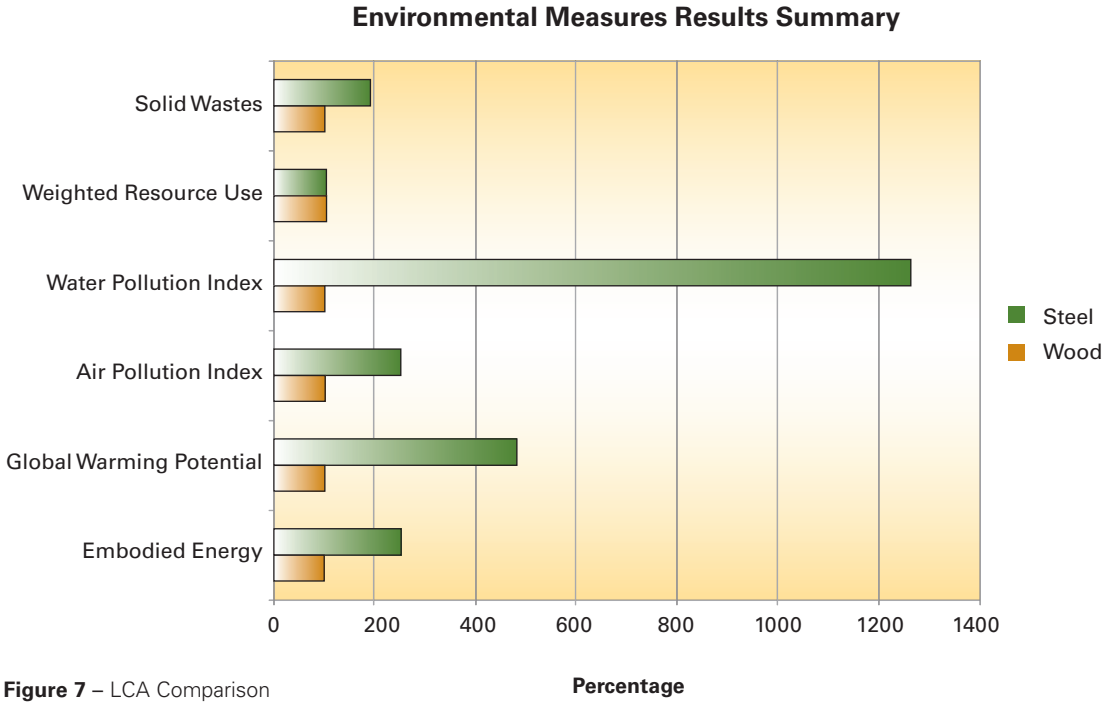

Figure 7 – LCA Comparison

TABLE 2 ENVIRONMENTAL MEASURES RESULTS SUMMARY

Design by / Assembly Components	Embodied Energy Gj	Global Warming Potential Eq. CO_2 kg	Air Pollution Index	Water Pollution Index	Weighted Resource Use kg	Solid Wastes kg
Wood Design						
Walls	424	15,008	4,377	2	120,626	9,458
Floors and Roof	1,014	27,726	6,011	97	397,723	8,120
Columns & Beams	1,114	25,602	7,665	31	359,722	20,349
Total	2,552	68,336	18,053	130	878,071	37,927
Steel Design						
Walls	645	35,362	7,061	125	75,998	7,399
Floors and Roof	3,059	143,467	16,618	738	403,429	21,158
Columns & Beams	2,728	151,912	21,584	773	436,386	44,861
Total	6,432	330,741	45,263	1,636	915,813	73,418
Ratio Steel / Wood	2.5	4.8	2.5	12.6	1.04	1.9

Fire Safety Requirements

The Library is a one-storey structure and includes an electrical / mechanical mezzanine. The Coalition Centre portion of the complex is a two-storey structure with a partial basement below for electrical / mechanical.

The complex faces one street. It is provided with a fire alarm and detection system, and is sprinklered throughout. The Library is classified as a Group A, Division 2 assembly occupancy. The Coalition Centre is classified as a Group D business occupancy.

A 2-hour firewall separates the complex into two separate buildings in terms of the Ontario Building Code. The Library has a floor area of 2,375 m^2 (25,500 $ft.^2$) and the Coalition Centre a footprint area of 2,925 m^2 (31,500 $ft.^2$). Wood-frame fire separations with 1-hour and 45-minute fire resistance ratings are used to meet fire safety requirements.

Environmental Advantage of the Building Systems

Life Cycle Assessment for the Coalition Centre Life Cycle Assessment (LCA) is a systematic method for assessing and comparing the effect that building design choices have on the environment. Of the two buildings in the Library / Coalition Centre complex, the Coalition Centre office building was selected for life cycle assessment because the design is repetitive and a closer fit with the LCA software modules and databases. A building sciences consultant was engaged to conduct a life cycle analysis using the ATHENA™ model (**http://www.athenasmi.ca**) for both wood and steel options.

Compared to the wood design as constructed, a similar building using steel would result in 2.5 times the embodied energy, 4.8 times the global warming potential, 2.5 times the air pollution index, 12.6 times the water pollution index, and 1.9 times the solid wastes (**Figure 7 and Table 2**).

The findings of the life cycle assessment for the Coalition Centre office building are consistent with the frequent conclusion that buildings that use wood products tend to have a low environmental impact. This is due mainly to the low energy input required to manufacture wood products and the fact that wood is a material that can be recycled or reused and is ultimately biodegradable.

Green Globes Assessment of the Library

Green Globes is an emerging methodology for assessing the environmental compatibility of buildings. It gives a more comprehensive assessment than other systems because it provides a mechanism for adjustments throughout the project delivery process. In addition, it considers the life cycle impact of materials used.

The assessment occurs in two stages. The first is a preliminary assessment, which is done at the Concept Design Stage. The final assessment is done at the Construction Document Stage, which corresponds with the Building Permit Approval. Green Globes is designed to ensure implementation of integrated design processes. In contrast, other systems provide credits with no perceptible order, and there is only one assessment, which takes place following the completion of the building.

The Timmins Library achieved the **3 Green Globes** rating, which "indicates excellent progress in achieving eco-efficiency results through current best energy and environmental design practices," and is roughly equivalent to **LEED Silver**. For more information about Green Globes, consult **http://thegbi.org/gbi/**.

Conclusion

The Timmins Library and the Judy A. Shanks Integrated Services Building (Coalition Centre offices) have become sources of community pride. Both buildings provide an enormous improvement in facilities, both for library services and for the essential community services housed in the adjacent building. Library usage has increased 33%.

The use of wood products reflects the heritage and economy of Timmins, meets all code requirements, provides functional, positive indoor environments, and as shown by the Life Cycle and Green Globes assessments, provides library and office facilities that have a low environmental impact. All these benefits were only possible because, based on cost comparison, the wood construction systems used provided better value and lower cost.

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