For many years, wood-frame construction has been providing high-quality, affordable housing. This applies to town houses, multi-storey apartment buildings, and from single-family bungalows to large luxury homes. The secret to this success lies with many factors, and speed of erection is definitely one of them, not to mention the fact that occupants can move into the building almost as soon as it is completed. Wood’s high strength-to-weight ratio facilitates the creation of structurally efficient buildings. In addition, wood-frame construction uses a renewable resource. Its design flexibility allows for efficient building concepts in terms of energy conservation, as well as safety and reliability under extreme conditions such as earthquakes.
Minimiztion of sound transmission in multi-family residential buildings is an important factor to ensure occupant comfort. The intent of this article is to demonstrate how wood-frame buildings meet code requirements by providing examples of wood-based lightframe building systems designed to minimize sound transmission.

Wood-frame construction is particularly efficient in residential dwellings where sound insulation is required. Attaching gypsum board to walls and ceilings using resilient metal channels significantly reduces sound transmission (see Figures 1 and 2). In addition, placing glass-fiber or rock-fiber insulation within wood-frame floor and wall assemblies also reduces sound transmission. Wood-frame construction does not present the impact noise transmission problems commonly noted with concrete construction.

In Canada, airborne-sound transmission measurements are made in accordance with ASTM E 90 Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements or ASTM E336 Measurement of Airborne Sound Attenuation between Rooms in Buildings. Sound transmission class (STC) is determined in accordance with ASTM E 413 Classification for Rating Sound Insulation.

In the United States, Section 1207 of the International Building Code addresses sound transmission and references ASTM E90. Transmission of impact sound through floors is measured in accordance with ASTM E 492 Laboratory Measurement of Impact Sound Transmission through Floor-ceiling Assemblies Using the Tapping Machine. Impact insulation class (IIC) is calculated according to ASTM E989 Standard Classification for Determination of Impact Insulation Class or ASTM E1007 Field Measurement of Tapping Machine Impact Sound Transmission Through Floor-Ceiling Assemblies and Associated Support Structures.

The National Building Code of Canada currently specifies STC 50 for “party walls” in multi-family dwellings. However, individual sensitivities to noise differ, in terms of both volume and frequency ranges.

Researchers at the National Research Council of Canada suggest that music
or sounds from a television set could be transmitted through a wall with STC 45, but that only a bit of the bass beating might be heard if the STC of the wall was 50.

Following a number of homeowner acoustic-comfort surveys, Canada Mortgage and Housing Corporation identified the following sound-insulation objectives for multi-family buildings: STC > 55 for inter-unit walls and floors, IIC > 55 for interunit “hard” floors and IIC > 65 for inter-unit carpeted floors.

As demonstrated, when properly designed and constructed, wood-frame construction provides a superior level of comfort with respect to the minimization of sound transmission, and it can be designed to accommodate the broadest range of climatic, cultural, regulatory and economic conditions.

This article was excerpted from Fire Resistance and Sound Transmission in Wood-Frame Residential Buildings. To read the complete article, go to www.cwc.ca/documents/IBS/IBS3_Fire_SMC_v2.pdf