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RESEARCH PROJECT ON THE NOISE ISOLATION PROVIDED BY FLOOR/CEILING ASSEMBLIES IN WOOD CONSTRUCTIONS

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Executive Summary

MJM ACOUSTICAL CONSULTANTS INC. has been selected by the Canada Mortgage & Housing Corporation to conduct the first phase of a research project on the sound isolation provided by floor/ceiling assemblies in wood constructions. This report contains the results of our findings. The main objective of this first phase was to investigate the acoustical performance of different materials to be incorporated from the underside of the floor/ceiling assemblies. These include the sound absorptive materials in the floor cavity along with ceiling finishes and installation methods. All the airborne and impact sound insulation tests have been conducted at the laboratories of the National Research Council of Canada under the direction of Dr. A.C.C. Warnock and the supervision of Mr. Michel Morin.

In résumé, the conclusions reached during the first phase of the study are outlined in the paragraphs below.

- The spacing of the joists at 16 in. c.c. seems to generate a sub panel resonance in the plywood subfloor, at 160 Hz.

In many of the floor tested the STC rating was governed by the low transmission loss at this frequency.

- The four different types of resilient furrings tested provided an almost identical sound isolation performance.
- Resilient furrings are highly recommended in the construction of floor/ceiling assemblies separating dwellings. The use of wood furrings is not advisable since the mechanical coupling it provides between the floor and the ceiling greatly reduced the performance of the assemblies tested.

- Doubling the mass of a drywall ceiling installed on resilient furrings led to an improvement of roughly 5 dB in the STC rating and in the transmission loss at all frequencies. Doubling the mass of a drywall ceiling on wood furrings led to no improvement in the STC rating, and in the transmission loss at low frequencies for which the mechanical coupling was important; it also led to an improvement of 3 points in the IIC rating.
- Filling the joists cavity with different types of materials provides approximately the same performance in terms of STC. Benocoustics, the "acoustical" blown-in material manufactured by Benolec, did not provide a significantly better performance than a standard cellulose blown-in attic insulation. It is not recommended to pay a premium for this material.
- The insertion of a wood fibre board between the joists and resilient furrings is often encountered on site, this practice did not provide any improvements in terms of STC.
- The most efficient way of improving the performance of an existing floor/ceiling assembly, is to build and additional ceiling under it. In the present study, a ceiling consisting in in. drywall, fastened to 2 in. standard metal studs, with batt insulation between the studs, provided the best results: an improvement of 15 STC points.
- The independently joisted floor/ceiling measured in this study tested STC 40, whereas the more conventional floor/ceiling assembly built with resilient furrings tested around STC 45. The use of independently joisted ceilings is not recommended.
- Many of the assemblies tested with compositions which conform to that specified in table 9.10.3.B of the NBC, 1985 edition, (floors no 7A to 7F of this study) did not comply with the STC 45 minimum requirement referred to in section 9.11 of the code.