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Memorandum

To: **Mr. Rob Brown**
American Village Homes

From: Pablo A. Daroux

Date: 8 September 2006

Subject: 200 2nd St. Impact Testing on 24 and 30 August 2006

Dear Rob:
On Thursday, 24 August and Wednesday, 30 August we conducted impact isolation tests at the living room+kitchen areas of unit pairs #207/#107 and #201/#101 respectively. These tests were made to determine the degree of impact isolation of the floor ceiling assembly with no floor cover and with 6' by 6' patches of a variety of potential floor finishes, which were set by the center of the room for each test.

Test Procedure and Background Information

The Field Impact Isolation Class (FIIC) metric provides a measure of the ability of a floor/ceiling assembly to attenuate structure-borne sounds produced by direct impact on the floor above, such as those due to footfalls, moving furniture, etc. The procedure consists of "tapping" on the floor surface with a calibrated device which possesses five small steel hammers driven by a motorized mechanism which have a prescribed weight and are allowed to free fall off a similarly prescribed height. This device produces 10 "taps" per second of a precisely known force which allows for direct comparison of the response of each assembly tested to the same excitation by measuring the level of noise established in the unit directly below the floor under test. The higher the level of noise measured, the lower the impact isolation performance of the assembly.

ASTM Standard E 1007, titled Field Measurement of Tapping Machine Impact Sound Transmission Through Floor-Ceiling Assemblies and Associated Support Structures is the method prescribed by the current legislation regulating minimum isolation standards for multi-family dwellings and condominiums in the State of California, Title 24 of the California Code of Regulations (CCR), to measure FIIC ratings under "as built" conditions in existing dwelling units. Title 24 CCR requires that new structures have a field tested impact isolation rating (FIIC) of 45 or more. At the time of the tests, both of the downstairs units in the pairs were completed and furnished.

Test Results

The tests performed consisted of 21 Field Impact Isolation Class (FIIC) measurements of floor/ceiling assemblies at two pairs of vertically-stacked units between living rooms and Kitchens and one Noise Isolation Class (NIC) test between unit pairs #201 & #101. It is our understanding that the floor/ceiling assembly consists of:

- 1-1/2" thick gypsum concrete topping slab resiliently supported by
- 3/8" thick *Enkasonic* acoustic mat laid over
- 23/32" structural plywood subfloor screwed on

- 10" deep metal joists 16" o.c. with R-30 fiberglass batts between them onto which
- ½" thick Resilient Channels are screwed 24" o.c. and
- 2 layers of 5/8" GWB for the ceiling surface

The results of the FIIC testing are presented in summary form in Table 1, below, while the NIC result is summarized in Table 2:

TABLE 1: Field Impact Isolation Class (FIIC) Measurement Results

Units tested	Rooms	Floor cover	FIIC Rating		Conclusion
			Measured	Code Required	
#207 to #107	Living Room to LR/Kitchen below	Bare 1-1/2" gypsum concrete on 3/8" Enkasonic mat	55	45	Complies w/code
		Mannington ½" Eng. Wood Glued w/ Stauf adhesive	59	45	Complies w/code
		Columbia 8mm wood laminate over/Tuplex	64	45	Complies w/code
		Columbia 8mm wood laminate over/ "Floor Muffler"	63	45	Complies w/code
		Kahrs 9/16" Eng. Wood over "Floor Muffler"	62	45	Complies w/code
		Kahrs 9/16" Eng. Wood over Tuplex	63	45	Complies w/code
		Kahrs 9/16" Eng. Wood over Tuplex & ¼" Cork	63	45	Complies w/code
		Kahrs 9/16" Eng. Wood over Tuplex & 5mm Regupol	63	45	Complies w/code
		Mohawk Royale II 25 oz nylon carpet over 24oz fiber pad	79	45	Complies w/code
	Kitchen to Kitchen/LR below	Armstrong Initiator sheet vinyl glued w/ Mapei adhesive	55	45	Complies w/code
#201 to #101	Living Room to LR/Kitchen below	Bare 1-1/2" gypsum concrete on 3/8" Enkasonic mat	55	45	Complies w/code
		Columbia 8mm wood laminate over/Tuplex	62	45	Complies w/code
		Columbia 8mm wood laminate over/ "Floor Muffler"	62	45	Complies w/code
		Kahrs 9/16" Eng. Wood over "Floor Muffler"	62	45	Complies w/code
		Kahrs 9/16" Eng. Wood over Tuplex	63	45	Complies w/code
		Kahrs 9/16" Eng. Wood over 5mm Regupol	62	45	Complies w/code
		Kahrs 9/16" Eng. Wood over Quiet Walk	62	45	Complies w/code
		Kahrs 9/16" Eng. Wood Over ¼" Cork	61	45	Complies w/code
		Mohawk Royale II 25 oz nylon carpet over 24oz fiber pad	76	45	Complies w/code
	Kitchen to Kitchen/LR below	Armstrong Initiator sheet vinyl NOT GLUED	56	45	Complies w/code
		Armstrong Initiator sheet vinyl NOT GLUED o/5mm Regupol	60	45	Complies w/code

As can be seen in the table above, all surfaces and resilient mats tested comply with minimum code requirements. However, it should be noted that only relatively small patches (6' x 6' in size) of each material were used for these tests. Therefore the test results do not fully comply with the requirements of ASTM Standard E1007 in terms of sample size. Should the entire floor be fitted with each of the floor covers tested, then the resulting FIIC is likely to be slightly lower, perhaps by 2 or 3 points. Similarly, should the same tests take place in much smaller rooms like bedrooms or bathrooms, for example, then the expected FIIC is likely to be lower yet than those numbers indicated here.

An interesting result is that of the sheet vinyl product which, when glued directly on the gypsum concrete slab yielded an identical result as that of the bare gypsum concrete slab. However, when a layer of 5mm Regupol was introduced below it, the UFIIC increased by about 4-5 points. Therefore, should vinyl become an option for a floor topping, then the use of a resilient underlayment product such as Regupol onto which vinyl can be glued on is recommended.

Another interesting observation is the similar result obtained with virtually all combinations of resilient products tested: Tuplex, 5mm Regupol, Floor Muffler, Cork and Quiet Walk which indicates that the main isolation is provided by the floor/ceiling assembly itself, in particular the layer of Enkasonic under the gypsum concrete, as well as the thickness of the gypsum concrete slab.

TABLE 2: Noise Isolation Class (NIC) Measurement Results

Rooms	NIC Rating		Conclusion
	Measured	Required	
Kitchen/LR to Kitchen/LR below	53	45	Complies w/code

The airborne sound isolation also complies with the minimum code requirements and is generally unrelated to the type of floor cover in the case of floor/ceiling assemblies such as that at 200 2nd St..

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Please do not hesitate to contact me if you have any questions regarding these tests.

WILSON, IHRIG & ASSOCIATES, INC.

Pablo A. Daroux
Principal
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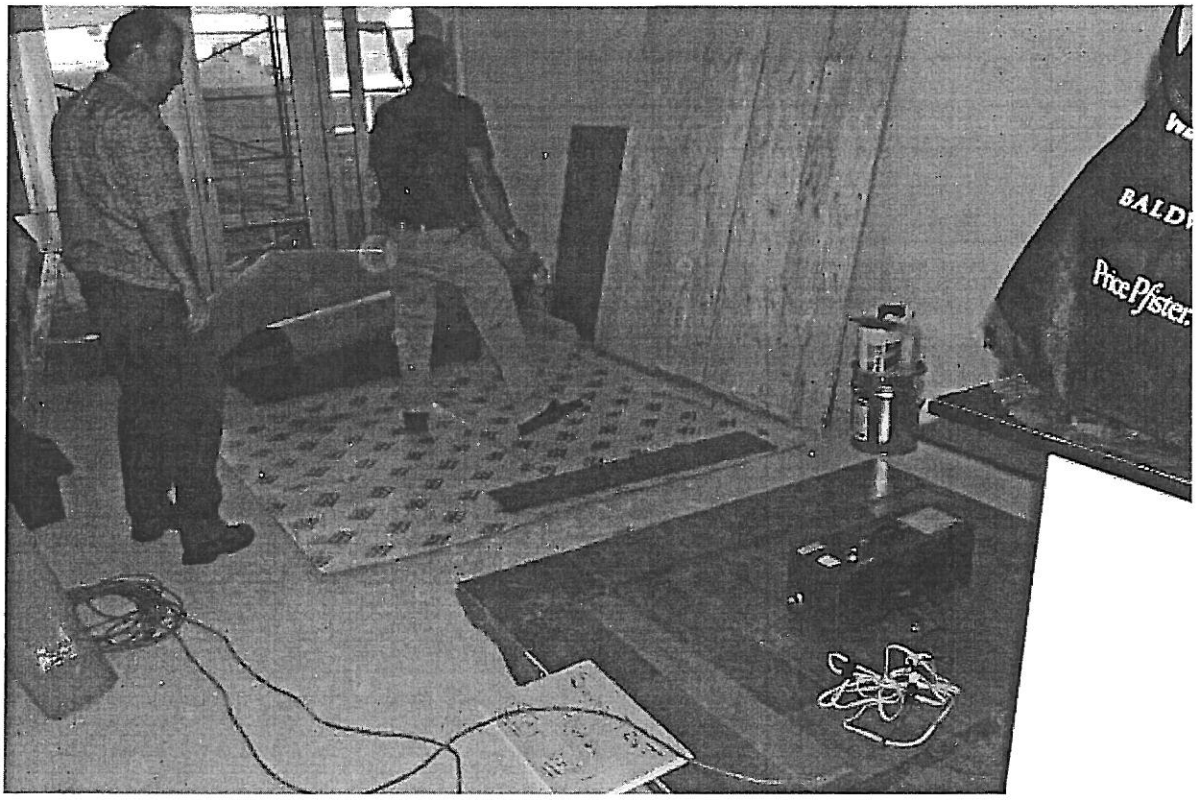

FIGURE 1: UNIT #107. TAPPING MACHINE ON GLUED-ON ENGINEERED WOOD

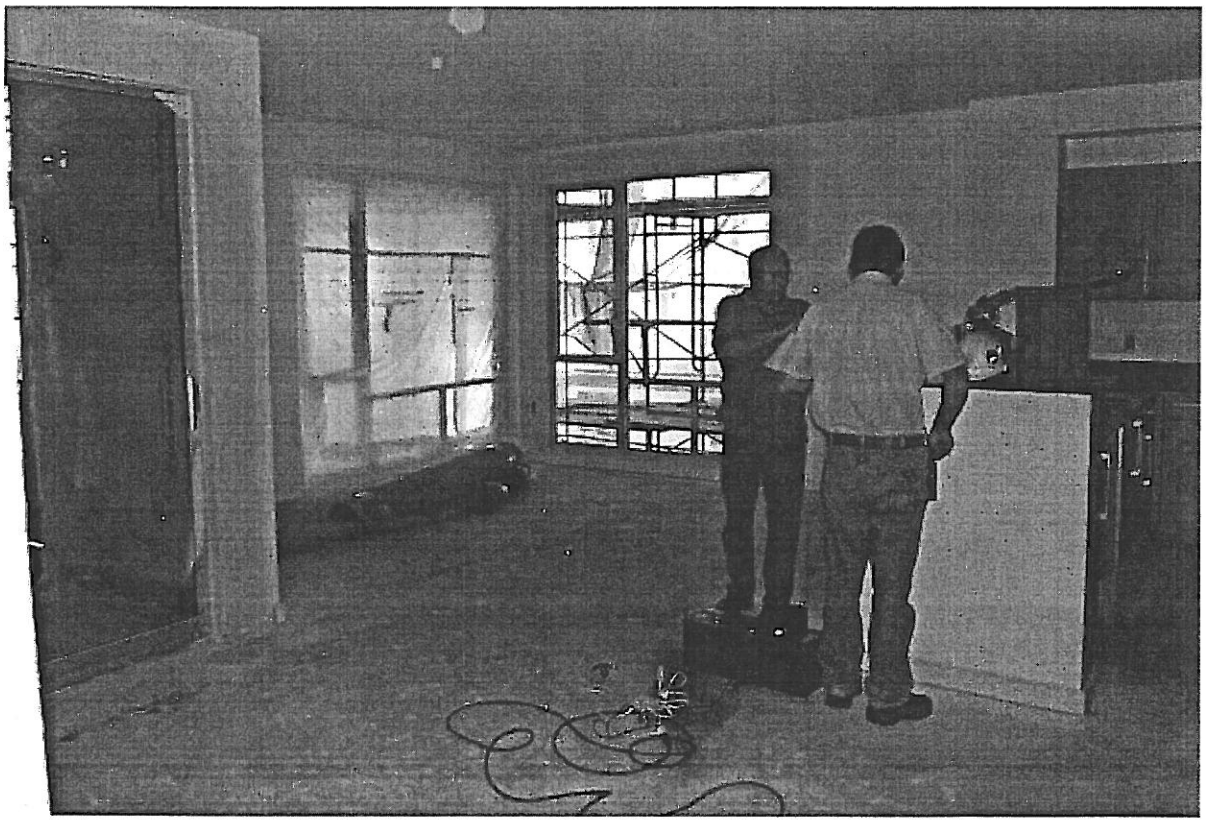

FIGURE 2: UNIT #101 LIVING ROOM/KITCHEN. PREPARATION FOR TEST