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Acentech

June 13, 2007

Deborah Fairbanks
Fairbanks Development, LLC
Via email: deborafair@rcn.com

CC: Brian Atwood, Vibra-Conn
Via email: battwood@vibra-conn.com

Jeff Austin, SVA, Inc.
Via email: sva1@rcn.com

Subject: Acoustics test reports
Renaissance Lofts
Marlborough, MA
Acentech Project No. 619383

Dear Deborah:

We visited the Renaissance Lofts in Marlborough, MA on two occasions in order to measure the impact sound isolation between vertically stacked residences *before* and *after* you installed two mock-ups of competing resilient concrete floor constructions. This letter summarizes our measurement results and observations from the field.

Measured Constructions

For our first tests, on April 30, 2007, we measured impact sound isolation between the second floor of the Renaissance Lofts and each of two Model Units on the first floor. The demising construction comprised only the original timber decking, on wood and steel support beams and columns.

Our second tests, on June 6, 2007, repeated these initial measurements following the installation of resilient concrete floors on the second floor. Above Model Unit 1, you told us that you placed a ¾-inch thick dimpled Dodge Regupol resilient underlayment, and then poured a thickness of concrete over the Dodge Regupol resilient underlayment. Above Model Unit 2, you told us that you installed a 1-inch thick version of SR Board by Kinetics, and again poured an equal thickness of concrete over the SR Board. In each case, you used perimeter board supplied by the manufacturer for the concrete pour.

There were no suspended ceilings in place for any of our measurements.

Measurements

We placed a standard tapping machine onto the surface of the floor above Model Rooms 1 and 2, and measured the resultant sound pressure level in each of the Model Rooms, in accordance with ASTM Standard E1007-04, "Standard Test Method for Field Measurement of Tapping Machine Impact Sound Transmission Through Floor-Ceiling Assemblies and Associated Floor Structures." We performed these measurements before and after you installed the resilient

concrete floors. We normalized these sound pressure levels based on the measured reverberation times of the Model Rooms, in accordance with the standard. Using the data we collected, we calculated the Field Impact Insulation Class (FIIC) of the floor/ceiling assembly in accordance with ASTM Standard E989. The measured data for each room, before and after the installation of the resilient floor installation, are presented in the attached field reports. The FIIC results for the floor/ceiling constructions we tested are summarized in the table below:

	Before installation: existing wood deck only	After installation of concrete over resilient underlayment
Model Unit 1 – Dodge Regupol Test	FIIC 28	FIIC 39
Model Unit 2 – Kinetics SR Board Test	FIIC 27	FIIC 44

Control Room – Concrete over Wood Deck without Resilient Construction

In addition to the Model Units, we also measured impact noise in another space before and after concrete was installed directly over the existing timber decking. In this case, a large opening adjacent to the measurement rooms created a significant airborne flanking path that severely limited the accuracy of acoustical measurements between these spaces. That said, we measured no improvement in impact sound isolation after the concrete was installed.

Concrete Curing Time

Note that we measured the impact isolation of these constructions only one week following the installation of the resilient concrete floors. The standard stipulates that concrete be allowed 28 days to cure before accurate tests can performed. You should note that the impact isolation may change slightly as the concrete continues to cure.

Airborne Sound Isolation and Flanking Paths

In addition to the impact machine tests, we also placed a loudspeaker in the Model Rooms, and took measurements of the airborne noise in the Model Units and in the spaces above. The purpose of this test was twofold: to characterize the improvement that the resilient concrete floor has on airborne sound isolation, and to check for airborne flanking paths that might limit the airborne or impact isolation performance.

We noted that the noise from the loudspeaker was noticeably louder at the edge of the room, where the installed concrete met the exterior brick wall. We did not notice this discrepancy before the installation of resilient concrete floors. This implies that the concrete does not extend to and fully seal with the exterior brick construction. Visual inspection verified this concern.

Because the spaces above the Model Units are not enclosed, it is not possible to measure airborne sound isolation strictly according to standard methods. However, we did take informal measurements of the airborne sound isolation in each room, and have calculated the Noise Isolation Class (NIC) for each case. Note that NIC values are not normalized to a standard room

absorption, and cannot be readily compared to airborne sound isolation measurements of other constructions or measurements in other locations. For both Model Units, we measured an improvement in the airborne sound isolation of approximately 14 decibels, from approximately NIC 32 to NIC 46, between the initial condition (with the wood deck only) and the installation of the resilient concrete floors.

Massachusetts State Building Code

Massachusetts State Building Code (780 CMR 1214) calls for an STC rating of at least 45 and an IIC rating of at least 45 for constructions "between adjacent dwelling units…."

The code specifically refers to ASTM standard E90 for STC ratings and ASTM E492 for IIC ratings; these standards specifically apply to laboratory tests, which are not repeatable in a field application. For field evaluations, ASTC and FIIC are analogous to the STC and IIC ratings listed in the code.

We are not aware of any published laboratory sound test for the constructions installed at the Renaissance Lofts.

Interpreting the Measurement Results

It is typical for field measurements to perform at a level that is not as high as the laboratory tests. In the case of Model Unit 2, which achieved an FIIC of 44 in the field after the installation of concrete poured over a 1-inch thick SR Board from Kinetics, we expect that a laboratory measurement of this construction would yield an IIC of 45 or greater. However, we are concerned that Model Unit 1, which achieved an FIIC of 39, would not yield a laboratory IIC rating consistent with the State Building Code requirements in the absence of a suspended ceiling.

Our test results are consistent with our observations in the field: footfall noise was easily audible and highly intrusive prior to the installation of the resilient concrete floors. Following the installation, footfall noise remained clearly audible, but was significantly reduced and not nearly as bothersome. Furthermore, impact sounds above Model Unit 1 were louder and more distinct than those above Model Unit 2 following the installation of the resilient concrete floors.

* * * * *

I trust this report meets your needs at this time in connection with the subject project. If you have any questions about the information presented in this report, please do not hesitate to contact me directly.

Sincerely,

ACENTECH INCORPORATED

Benjamin. E. Markham
Consultant

Enclosed: FIIC test reports (4)

Impact Insulation Measurement Report

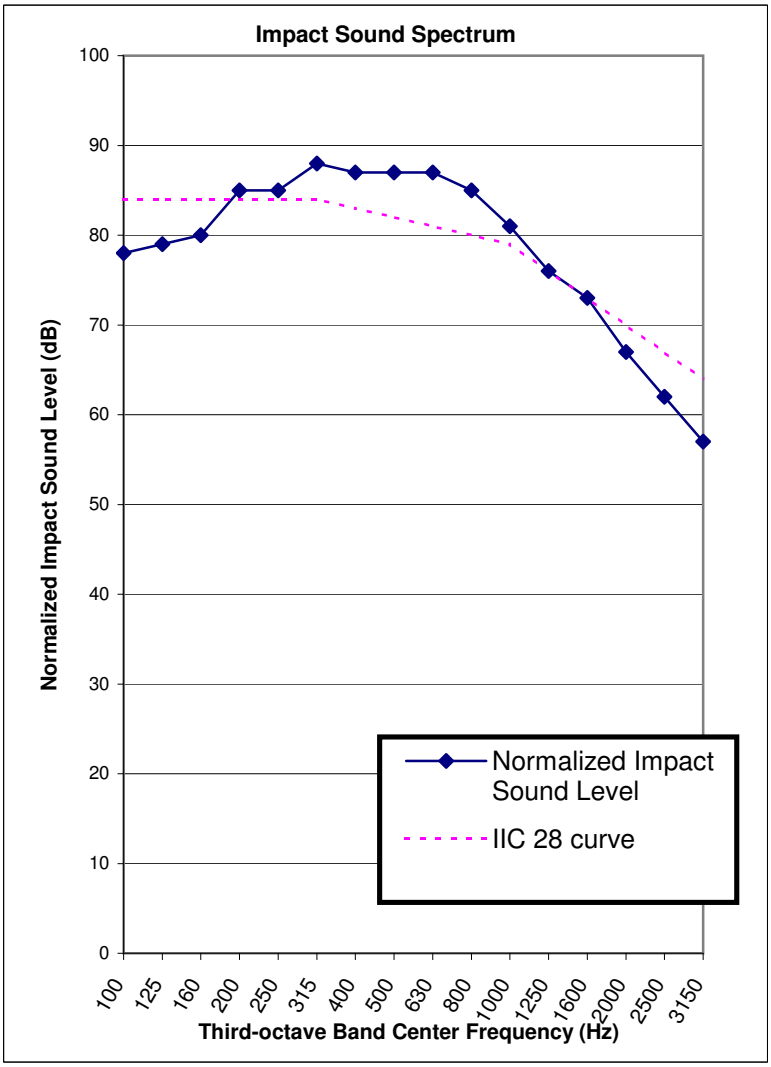
Renaissance Lofts

Date of measurement: 30-Apr-07
Consultant: BEM
Acentech Project: 619383

Description of construction:
Room 1 - Existing timber deck only. No ceiling.

Third-Octave Band Center Frequency (Hz)	**100**	**125**	**160**	**200**	**250**	**315**	**400**	**500**	**630**	**800**	**1000**	**1250**	**1600**	**2000**	**2500**	**3150**
Average Impact Sound Levels	70.9	71.5	75	78.7	77.9	81.2	80.1	80.6	81.4	79.3	75.2	70.1	67.3	61.4	56.2	50.9
Ambient Sound Levels	41	40	38	37	39	38	37	34	31	29	27	25	23	21	19	19
Absorption Effects	6.77	7.03	4.93	6.29	7.03	6.77	6.77	6.07	5.65	6.07	6.07	6.07	6.07	6.07	5.65	5.65
Normalized Impact Sound Levels	**78**	**79**	**80**	**85**	**85**	**88**	**87**	**87**	**87**	**85**	**81**	**76**	**73**	**67**	**62**	**57**

Field Impact Insulation Class (FIIC):	**28**



This test procedure was based on ASTM Standard E1007-97.

Impact Insulation Measurement Report

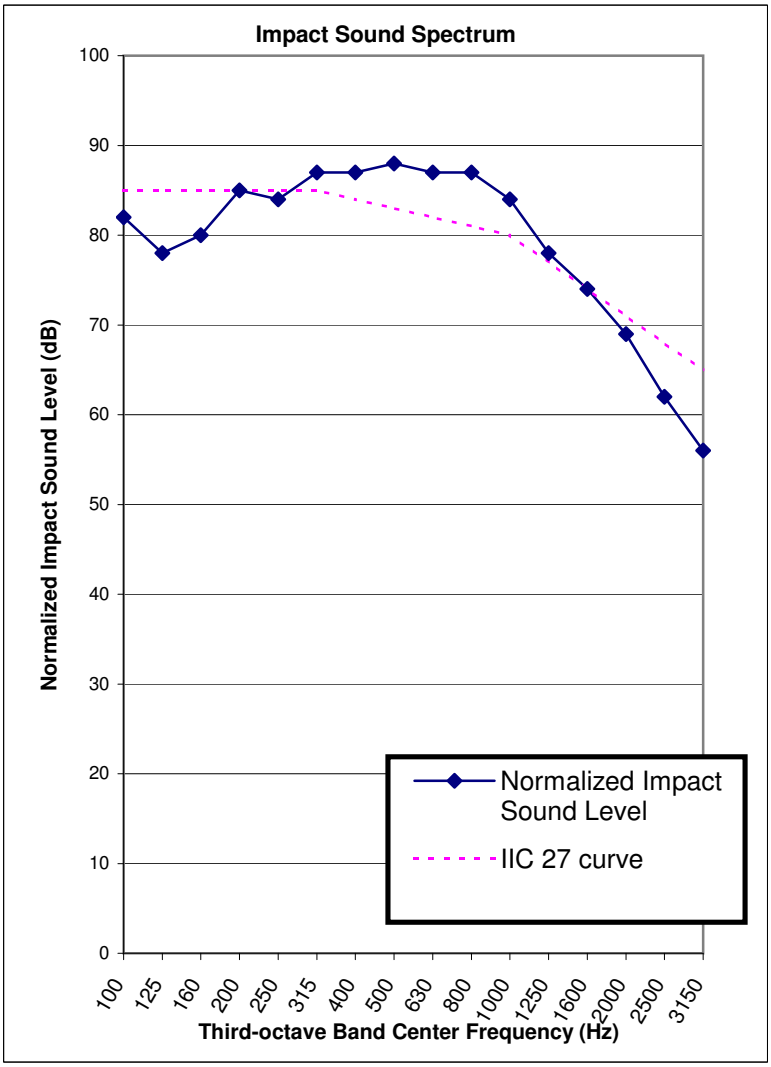
Renaissance Lofts

Date of measurement: 30-Apr-07
Consultant: BEM
Acentech Project: 619383

Description of construction:
Room 2 - Existing timber deck only. No ceiling.

Third-Octave Band Center Frequency (Hz)	**100**	**125**	**160**	**200**	**250**	**315**	**400**	**500**	**630**	**800**	**1000**	**1250**	**1600**	**2000**	**2500**	**3150**
Average Impact Sound Levels	77.3	73.2	75.8	78.9	78.7	81.1	81.2	82.3	82.2	81.7	78.7	72.6	68.2	62.7	55.9	50.6
Ambient Sound Levels	47	47	47	44	40	39	37	34	36	38	34	30	27	27	24	24
Absorption Effects	4.93	5.1	4.6	6.52	5.65	5.65	5.65	5.65	5.27	5.27	5.27	5.65	5.65	6.07	5.65	5.65
Normalized Impact Sound Levels	**82**	**78**	**80**	**85**	**84**	**87**	**87**	**88**	**87**	**87**	**84**	**78**	**74**	**69**	**62**	**56**

Field Impact Insulation Class (FIIC):	**27**



This test procedure was based on ASTM Standard E1007-97.

Impact Insulation Measurement Report

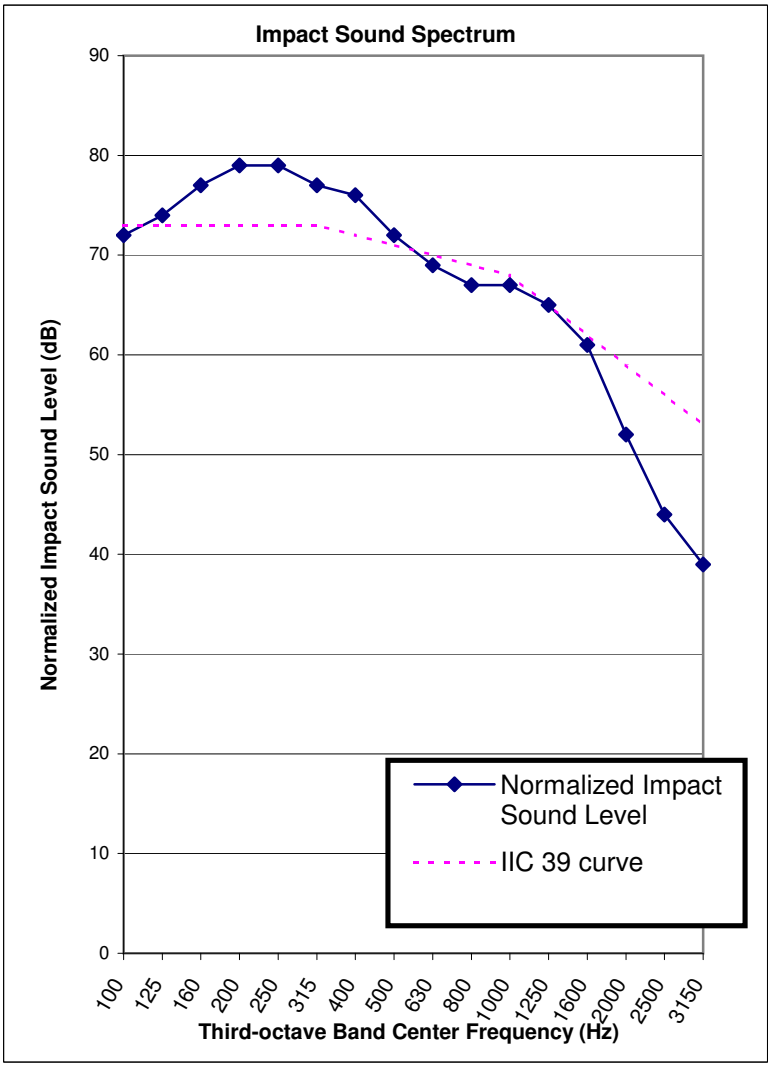
Renaissance Lofts

Date of measurement: 06-Jun-07
Consultant: BEM
Acentech Project: 619383

Description of construction:
Room 1 - concrete poured on Dodge Regupol underlayment, on existing timber deck. No ceiling.

Third-Octave Band Center Frequency (Hz)	**100**	**125**	**160**	**200**	**250**	**315**	**400**	**500**	**630**	**800**	**1000**	**1250**	**1600**	**2000**	**2500**	**3150**
Average Impact Sound Levels	65.6	67.4	72.1	73.1	71.5	70	69.5	66.2	63.8	60.9	60.9	59.3	54.9	46.3	38.1	33.6
Ambient Sound Levels	41	41	42	41	40	40	38	34	32	33	31	29	26	23	20	17
Absorption Effects	6.77	7.03	4.93	6.29	7.03	6.77	6.77	6.07	5.65	6.07	6.07	6.07	6.07	6.07	5.65	5.65
Normalized Impact Sound Levels	**72**	**74**	**77**	**79**	**79**	**77**	**76**	**72**	**69**	**67**	**67**	**65**	**61**	**52**	**44**	**39**

Field Impact Insulation Class (FIIC):	**39**



This test procedure was based on ASTM Standard E1007-97.

Impact Insulation Measurement Report

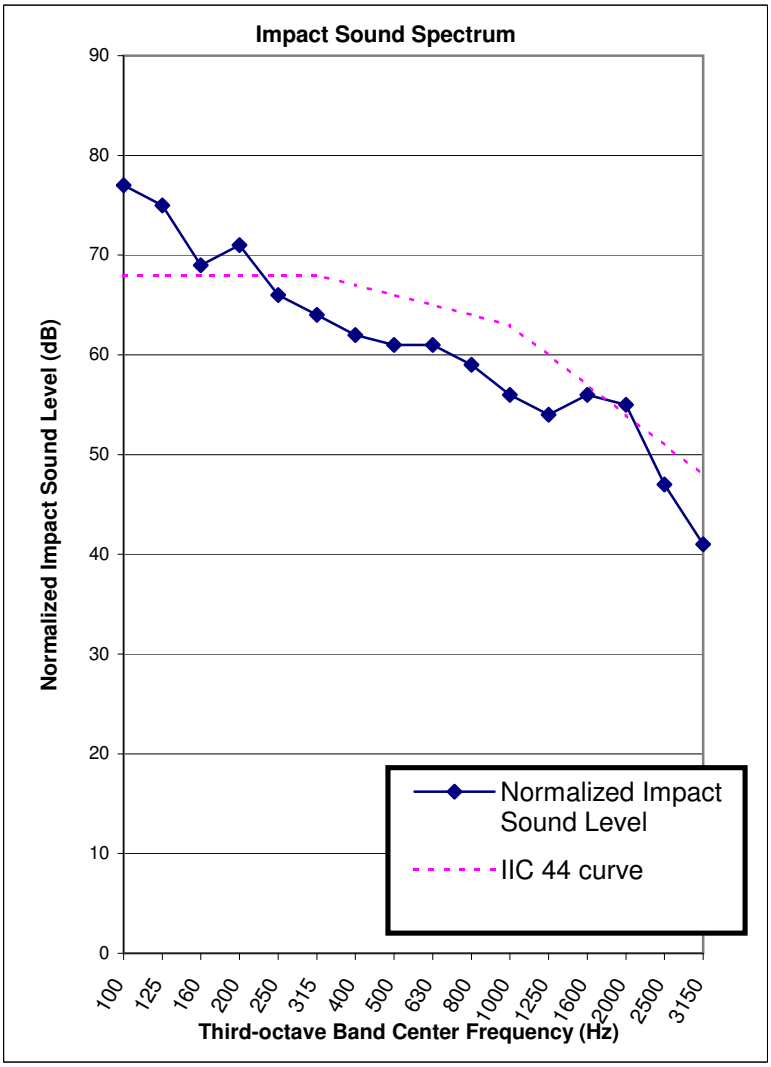
Renaissance Lofts

Date of measurement: 06-Jun-07
Consultant: BEM
Acentech Project: 619383

Description of construction:
Room 2 - concrete poured on 1-inch SR Board underlayment, on existing timber deck. No ceiling.

Third-Octave Band Center Frequency (Hz)	**100**	**125**	**160**	**200**	**250**	**315**	**400**	**500**	**630**	**800**	**1000**	**1250**	**1600**	**2000**	**2500**	**3150**
Average Impact Sound Levels	71.6	69.9	63.9	64.3	60.7	58.2	56.3	55.6	55.5	53.6	50.6	48.4	50.4	48.5	41.4	35.5
Ambient Sound Levels	40	38	40	41	42	39	35	33	28	27	26	25	23	21	18	16
Absorption Effects	4.93	5.1	4.6	6.52	5.65	5.65	5.65	5.65	5.27	5.27	5.27	5.65	5.65	6.07	5.65	5.65
Normalized Impact Sound Levels	**77**	**75**	**69**	**71**	**66**	**64**	**62**	**61**	**61**	**59**	**56**	**54**	**56**	**55**	**47**	**41**

Field Impact Insulation Class (FIIC):	**44**



This test procedure was based on ASTM Standard E1007-97.