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Subject: Hilton Grand Vacations Club – Las Vegas, NV
Acoustical Consulting Services
CSA Project No. 07-0281

Dear Tim:

We have completed the analysis of our 30 May 2007 on-site acoustical testing at the subject project. The purpose of the testing was to quantify the impact sound insulation performance of various underlayments that could potentially be used with Amtico vinyl flooring. This letter contains a summary of the project's acoustical criteria and measurement results.

Acoustical Criteria

State of Nevada – 2006 International Building Code (IBC)

The State of Nevada has adopted the 2006 IBC, which contains Section 1207 entitled *Sound Transmission* stating the following acoustical requirements:

1207.1 Scope: This section shall apply to common interior walls, partitions and floor/ceiling assemblies between adjacent dwelling units or between dwelling units and adjacent public areas such as halls, corridors, stairs or service areas.

1207.3 Structure-borne sound: Floor/ceiling assemblies between dwelling units or between a dwelling unit and a public or service area within the structure shall have an impact insulation class (IIC¹) rating or not less than 50 (45 if field tested) when tested in accordance with ASTM E 492.

¹ Impact Insulation Class (IIC) – The Impact Insulation Class is a single figure rating similar to STC rating, but applied to impact noise on a floor through a ceiling, such as that produced by foot-falls. A standardized device generates the impact sound by dropping 5 hammers which impart a known energy into the floor/ceiling construction. The resulting sound pressure level is measured in the receiving room below in frequency bandwidths comparable to those used in sound transmission loss measurements. The procedure and curve fitting are defined in ASTM Standard E 492. Greater IIC ratings indicate better resistance to impact generated sound, that is, better sound attenuation.

Measurements and Results

As stated in the IBC, structure-borne sound measurements are to be conducted in accordance with ASTM E 492. This standard refers to measurements that must be performed in acoustic laboratories. Therefore, we performed our measurements with the corresponding field-based standard (E 1007). Sound ratings were calculated using the methodology presented in ASTM E 989, as required by the associated testing standards. In addition, ASTM E 1007 requires the determination of receiving room sound absorption to be measured in accordance with ASTM E 2235.

Our 30 May 2007 on-site acoustical measurements were performed in accordance with the mentioned standards with the following exception: ASTM E 2235 states that the number of stationary microphone positions should be at least three with 15 measurements at each position, or the number of single moving microphone measurements to be at least 10. We performed measurements with one stationary microphone at five locations. However, decay slopes exceed a correlation coefficient of 0.95. Therefore, the smaller than typical sample should not significantly affect the results.

Each testing sample was sized 3-feet by 3-feet, set back approximately 3-feet from adjacent wall surfaces. Adhesive used to bond the rubber (“Sound Shark” underlayment) to the slab was installed acceptably (i.e. not “short-circuiting” the resilient underlayment). Based on our acoustical testing, we have prepared the following table summarizing the results of our measurements:

Tested Assembly	FIIC
Bare concrete slab	34
Amtico 2.5mm vinyl flooring glued to concrete slab	44
Amtico 2.5mm vinyl flooring on 2mm Sound Shark rubber underlayment glued to concrete slab	54
Amtico 2.5mm vinyl flooring on 6.4mm Sound Shark rubber underlayment glued to concrete slab	57
Amtico 2.5mm vinyl flooring on 12mm Sound Shark rubber underlayment glued to concrete slab	59
Amtico 2.5mm vinyl flooring on Jumpax underlayment floating on concrete slab	61

As shown above, impact insulation tests without underlayments (i.e. bare concrete and Amtico vinyl flooring directly on slab) do not meet minimum code requirements.

Since the tested samples were observed to be free from the potential for sound flanking the resilient underlayments, achieving similar FIIC results for a full "wall-to-wall" installation will require scrupulous care in installation of the selected underlayment so that the probability for sound flanking is reduced. Achieving the same FIIC results may not be possible.

Degradation in FIIC (i.e. lower rating) can be attributable to sound flanking. Some examples of sound flanking are: adhesives bonding the vinyl flooring to the concrete slab between underlayment seams and at floor perimeter/wall intersections, contact between flooring and perimeter walls, imperfections or debris on slab compromising underlayment, etc. This reduction in FIIC is reflected by the IBC's lower allowable rating for field tested assemblies. Therefore, it should be considered that the as-built condition for the Jumpax and 2mm, 6.4mm, and 12mm Sound Shark underlayments will achieve a minimum FIIC of 56, 49, 52, and 54, respectively, but also noted that these FIIC values still meet IBC acoustical standards for impact noise transfer. Product information for Jumpax and Sound Shark is enclosed as noted below.

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This concludes our current comments. If you have any questions or comments, please do not hesitate to call us.

Sincerely,

Charles M Salter Associates Inc



Timothy G. Brown
Principal Consultant



Robert P. Alvarado
Vice President

Enclosures (2)

Cc: Tom Gigliotti **Amtico International** thomas.gigliotti@amtico.com

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