

FOR INFORMATION ONLY



Veneklasen Associates

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June 3, 2019

July 23, 2019

August 15, 2019

September 3, 2019

The Village Green Condominiums HOA

5300 Obama Boulevard

Los Angeles, California 90016

Attention: Karen Bragg

Subject: **The Village Green Condominiums HOA, Los Angeles, CA
Acoustical Test Summary
VA Project No. 7225-002**

Dear Karen:

At your request and authorization, Veneklasen Associates, Inc. (VA) contracted Western Electro-Acoustic Laboratory (WEAL) to perform Normalized Noise Isolation Class (NNIC) and Normalized Impact Sound Rating (NISR) tests to evaluate the floor-ceiling construction within The Village Green Condominium Complex. The building is located in Los Angeles, CA. This report documents the results of the testing.

INTRODUCTION

Testing

WEAL performed four (4) Normalized Noise Isolation Class (NNIC) and eleven (11) Normalized Impact Sound Rating (NISR), Low Frequency Impact Rating (LIR) and High Frequency Impact Rating (NHIR) tests to evaluate the airborne and impact sound isolation of the finished floor-ceiling assemblies between several occupied units within the Village Green Condominium Complex located in Los Angeles, California. Testing was performed on May 7, 2019. WEAL tested in strict accordance with ASTM standard E336-16a, "*Standard Test Method for Measurement of Airborne Sound Attenuation between Rooms in Buildings*" and ASTM standard E1007-16, "*Standard Test Method for Field Measurement of Tapping Machine Impact Sound Transmission Through Floor-Ceiling Assemblies and Associated Support Structures*". WEAL is accredited by the United States Department of Commerce, National Institute of Standards and Technology (NIST) under the National Voluntary Laboratory Accreditation Program (NVLAP) for these test procedures. WEAL's test results are shown in Table 1.

Note the following:

- The NNIC is an airborne metric where the higher the rating the better the isolation meaning that higher is better acoustically. In general, this follows the pattern of human perception. This metric is related to the sound isolation from voice, radio, phone rings, etc.
- The NISR is an impact isolation metric (like IIC) where the higher the rating is normally considered to be better acoustical performance. However, this has not historically been known to transmit to human responses. Hence the development of LIR and NHIR.
- The LIR is the Low Frequency Impact Rating and is meant to assess the low frequency impact noise (thudding) on a floor ceiling. The higher the value the better the floor meaning less noise from thudding in the space below.
- The NHIR is the Normalized High Frequency Impact Rating and is meant to assess the high frequency impact noise (heel clicks, furniture, dog's nails, items dropped on the floor) on a floor ceiling. The higher the value the better the floor meaning less noise from the high frequency impacts in the space below.

TEST RESULTS
Table 1 – Floor Ceiling Acoustical Field Testing Results

Test Number	Test Specimen	NNIC	NISR	*LIR	NHIR*
F19-1031 F19-1035	Unit 5331-1/2 and Unit 5331 Living Room (Hardwood Floor with ceiling recessed lights)	41	41	40	49
F19-1032	Unit 5331-1/2 and Unit 5331 Living Room (27 oz. Carpet Pad and Area Rug w/ ceiling recessed lights)		51	39	79
F19-1033	Unit 5331-1/2 and Unit 5331 Living Room (40 oz. Carpet Pad and Area Rug w/ ceiling recessed lights)		53	44	82
F19-1034	Unit 5331-1/2 and Unit 5331 Living Room (Interface Carpet Tile w/ ceiling recessed lights)		45	38	64
F19-1036 F19-1037	Unit 5329-1/2 and Unit 5329 Bedroom (Carpet with Pad original ceiling)	44	73	66	84
F19-1038 F19-1041	Unit 5327-1/2 and Unit 5327 Living Room (Hardwood Floor w/ original ceiling)	40	43	38	50
F19-1039	Unit 5327-1/2 and Unit 5327 Living Room (27 oz. Carpet Pad and Area Rug w/original ceiling)		51	45	78
F19-1040	Unit 5327-1/2 and Unit 5327 Living Room (40 oz. Carpet Pad and Area Rug w/ original ceiling)		54	45	78
F19-1042 F19-1045	Unit 5169-1/2 and Unit 5169 Living Room (Hardwood Floor with Pac International Ceiling)	48	59	59	72
F19-1043	Unit 5169-1/2 and Unit 5169 Living Room (27 oz. Carpet Pad and Area Rug w/ Pac International Ceiling)		67	63	85
F19-1044	Unit 5169-1/2 and Unit 5169 Living Room (40 oz. Carpet Pad and Area Rug w/ Pac International Ceiling)		73	61	85

** LIR and NHIR - John Loverde and Wayland Dong, A dual-rating method for evaluating impact noise isolation of floor-ceiling assemblies. J. Acoust. Soc. Am., 141, 428-440 (2017). <http://dx.doi.org/10.1121/1.4973868>

The test report from WEAL is on file.

Codes and Standards

The State of California Building Code requires that within habitable residential spaces the Normalized Noise Isolation Class (NNIC) value be a minimum of 45 if field tested for buildings constructed after 1976.

The State of California Building Code requires that within residential spaces the Normalized Impact Sound Rating (NISR) values be a minimum of 45 if field tested for buildings constructed after 1976.

The International Code Council Guideline for Acoustics and the work performed by LoVerde/Dong define higher classification indexes that tie to higher grades of acoustical performance where desired. Table 2 defines this information.

Table 2 Classification Indexes for Airborne and Impact Noise (2018)

Description	NNIC	NISR	LIR	NHIR
Code Minimum	45	45	50	45
Acceptable	52	52	60	52
Preferred	57	57	70	65

EVALUATION

Since the Building Code for acoustical isolation was not adopted until 1973, the Building Code does not apply to the construction at Village Green since it was constructed before the adoption of a Building Code; the information in Table 2 only helps to frame the conversation associated with the testing at Village Green and current human levels associated with human perception.

All tested floor-ceiling assemblies met the State of California Building Code requirements for NNIC and NISR except for Tests F19-1031, F19-1038, F19-1035, F19-1037, and F19-1041, which are below code because of the age, nature of the building construction and the fact the no acoustical requirements were part of the Building Code.

The following can be concluded from the data taken at the property:

1. The NNIC (airborne sound isolation) can be ranked as a function of ceiling attachment and these are exactly as one would expect for these ceiling attachments. Note that the effect of the recessed lights installed into the ceiling was not significant. From *best to worst*:
 - a. **Pac International RSIC-1 sound clip**
 - b. **ClarkDietrich RCSD (although not tested anticipated to be just below the Pac RSIC-1).**
 - c. Direct attachment (original condition)
2. The NISR, LIR and NHIR (impact isolation) can all be used to rank the ceiling attachment methods in terms of acoustical performance. Once again no surprise as the order determined for the NNIC remains and the acoustical effect from the recessed lights is not major. From *best to worst*:
 - a. **Pac International RSIC-1 sound clip**
 - b. **ClarkDietrich RCSD (although not tested anticipated to be just below the Pac RSIC-1).**
 - c. Direct attachment
3. **When evaluating floor finishes, carpet and pad affect both LIR and NHIR, while hard surface flooring affects only NHIR.** Based on our analysis, the rank ordering of the flooring finish would be *from best to worst*:
 - a. Area rug with 40 oz carpet pad
 - b. Area rug with 27 oz carpet pad
 - c. Interface Carpet Tile
 - d. Original wood floor

Ownership Options for Improving Acoustical performance

Upper Level Options to Reduce Impact Noise to the Unit below

1. The addition of area rugs with minimum 27 oz. carpet pad will significantly reduce the impact sound to the unit below when the impact activity is on the area rug.
2. Any flooring modifications shall have the goal of retaining a High Frequency Impact Rating (NHIR) of 75 when tested in accordance with ASTM E1007, subject to the frequency modifications and calculation modifications set forth in the NHIR definition.
3. Any furniture, like a chair, that will be moved across a hard-surface floor shall have resilient material (e.g. felt or rubber) on its feet such that it can glide over the hard-surface floor.
4. The floor coverings applied to the Units are required to satisfy the goal for impact isolation standards for this Project.
5. If a replacement or addition of new hard-surface flooring is proposed, an Owner must submit a written application to the Architectural Committee consistent with all of the requirements contained in this document, and specifically, containing the methodology that will be used to satisfy the goals of the HOA.

Lower Level Options to Reduce Impact Noise from the Unit above, while improving Airborne Sound Isolation

Floor Ceiling Assemblies

Modification to ceiling – these remove the existing ceiling (Options – resilient channel – 50% approximate reduction in impact level; Keene Cylent or Pac International RSIC-1 Clip approximate reduction of sound level 75%)

1. Prepare the working area. We anticipate that this repair will require that the unit Owners (if present) are relocated from the unit while the work is completed, that the items within the unit are properly protected (or moved also), etc.
2. Remove the layers of gypsum board (or materials used in the original construction) from the bottom of the floor ceiling assembly. Note that Veneklasen can be contracted to assist in witnessing install if needed.
3. Shop drawings should be prepared by Contractor. These drawings should be approved by Veneklasen.
4. Install a minimum of 3-1/2 inches of batt insulation; 6 inches preferred if possible.
5. Assess the installation of the recessed light fixtures or other items. Verify that with the new ceiling installation, they will not interfere or compromise the acoustical performance. Given that the ceiling location (height) will be lowered by a few inches, the installation of these elements may need to be replaced. Input from contractor required.
6. Move items penetrating the ceiling to a location where the finish or trim will be acceptable. Details of these connections will need to be reviewed in the context of the isolated ceiling and determine if special detailing required to isolate the penetrations. Plan on moving the connections to the isolated grid.
7. **Option 1.** Install ClarkDietrich RCSD (RC Deluxe) in a manner consistent with high quality installation (like no free flange in contact with joists, no perimeter in contact with structure, using pre-drilled holes, with no screws connecting gypsum board below joists, etc.).
8. **Option 2.** Install Keene Building Cylent hanger with ClarkDietrich RCSD resilient channel.
<http://www.keenebuilding.com/products/noise-control/multi-family-residential-products/cylent-assurance-clip>



9. **Option 3** Install Pac International RSIC-1 (<https://www.pac-intl.com/rsic.htm>), or equal.
10. Spacing to be determined by the manufacturer. Manufacturer should provide a letter stating that they have provided the design and the design meets the intent set forth above. Design to be reviewed by the acoustical consultant.
11. Install hat channel with gauge and model as recommended by the manufacturer (Option 3) or resilient channel (Option 1 and 2) as prescribed by the manufacturer. There must be a space at the edge so there is no contact with the perimeter of the room.
12. Install 2 layers of 5/8 inch type 'c' gypsum board to the hat channel (Option 3) OR resilient channel (Option 1 and 2). Attach with screw spacing and length required within the UL fire test. The gypsum

- board should be installed in a manner of good practice (overlapping joints, etc.). Gypsum board should be held from the wall by a distance of approximately 1/4 inch.
13. Fill the gap at the edge of the gypsum board with a non-hardening sealant like USG Fire Rated Acoustical Sealant. The local jurisdiction should provide information whether this joint is required to be filled with a fire rated sealant. If so, submit to acoustical consultant and architect for approval.
 14. Paint and match the gypsum board to the condition at the time of removal.
 15. Acoustically test the condition and determine if acceptable. Subjectively assess.

Modification to ceiling – Option 4 retention of existing ceiling – performance unknown

1. Prepare the working area.
2. Cut the edge of the existing ceiling so there is a gap at the perimeter of 1/4 inch. At any ceiling penetrations, cut 1/4 inch gap around the penetration.
3. Fill the gap with permanently non-hardening fire rated acoustical sealant equal to USG Fire Rated Acoustical Sealant in tube form.
4. Punch holes into the existing ceiling cavity and fill with blow-in insulation (this can be fiberglass or cellulose or mineral wool).
5. Add a wire hung Armstrong ceiling grid capable of supporting additional layers of material. (anticipate approximately 3 psf). Extend services down into the lowered ceiling (duct work, electrical, etc.).
6. Locate the ceiling as low as possible in the space. The preferable dimension between the existing floor ceiling and the finish secondary system should be a minimum of 4 inches.
7. Fill the cavity with insulation.
8. Install one layer of Quiet Rock ES directly to the grid.
9. Hold the edge of the ceiling and any penetrations 1/4 inch from the edge and fill the gap with permanently non-hardening acoustical sealant equal to USG Fire Rated Acoustical Sealant in tube form.

Recommended Language for Standards and Submission Review Process

All flooring or ceiling substitutions are required to be reviewed by the HOA. Any flooring modifications shall have the goal of retaining a High Frequency Impact Rating (NHIR) of 75 when tested in accordance with ASTM E1007, subject to the frequency modifications and calculation modifications set forth in the NHIR definition. Any ceiling modifications will have the goal of improving the sound isolation between floors to meet current Building Code requirements of NNIC 45.

If a replacement or addition of new flooring or ceiling substitution is proposed, an Owner must submit a written application to the Architectural Committee consistent with all of the requirements contained in this document, and specifically containing the methodology that will be used to satisfy the goals of the HOA.

Flooring Substitutions

1. Describe the area rug and carpet pad to be installed over the hard-surface flooring. The following shall be used as a general guide:
 - Ceramic tile, travertine or other stones or slates: Only allowed in bathrooms and kitchens.
 - Engineered hardwood: Not allowed unless ceiling in lower unit is modified.
 - Laminated wood: Not allowed unless ceiling in lower unit is modified.
 - Luxury vinyl plank or tile: Not allowed unless ceiling in lower unit is modified.
 - All other flooring: Not allowed unless ceiling in lower unit is modified.
 - Carpet and pad: Area rug with a minimum 27 oz pad installed below the area rug.
 - All installation methods shall be per manufacturer.
2. Submit the type of flooring to be installed and the padding to be provided.

Hard Surface Flooring Submission Requirements

3. A plan view drawing of the flooring area and the method of isolating the hard-surface flooring along the entire perimeter. An air space at these perimeter conditions will not be approved as an appropriate method of isolating the hard-surface flooring.
4. A copy of the installation instructions for the materials.
5. The name, qualifications and experience of the contractor who will install the flooring must be included in the Owner's application.

No construction shall be permitted without the prior written approval of the Architectural Committee, pursuant to this document and all other applicable provisions of this document, the Association's Architectural Guidelines, and all other applicable provisions of the Association's governing documents. In the event that construction has commenced prior to such approval, in addition to all other enforcement options available to the Association, the Architectural Committee may require that the unapproved construction materials be removed at the Owner's expense, and the Unit be restored to its pre-construction condition.

Product substitutions

Alternative products can be used than those described above. Products that are reviewed must include all of the information provided above. Products must be reviewed by the acoustical consultant of Village Green. Typically, products will require both lab and field acoustical testing to be considered. If products are accepted, testing is required at the end of installation to show compliance with Building goals.

Observations

In any installation, the Owner must allow the HOA's Acoustical Consultant or a representative of the HOA to observe the installation of the submitted materials. Costs for this will be borne by the Owner.

Complaints

Where a complaint as to noncompliance with the Impact Isolation Requirements cited above occurs, the Association may require that a Field High Frequency Impact Rating acoustical test (NHIR) and/or Normalized Impact Sound Reduction (NISR) acoustical test be performed by a National Voluntary Laboratory Accreditation Program (NVLAP)-accredited independent acoustical laboratory approved by the Architectural Committee. Tests shall be conducted according to ASTM E1007, except the reporting shall include NHIR values as defined in the referenced paper. The testing agency shall test in the room directly below, adjacent to or above the Unit containing the system in question. The standards described herein shall apply, and must be met or exceeded, in all directions.

Description of Testing: The Architectural Committee shall have the sole discretion to select an appropriate acoustical consultant.

Ceiling Modifications

1. Submit a plan view drawing showing the areas of the ceiling that is proposed to be modified.
2. Submit a section detail showing the proposed construction and materials to be utilized. Specifically indicated which Option will be used for installation. If alternate products are proposed, provide clear indication of the products that will be used.
3. Submit installation instructions for each of the materials proposed.
4. The name, qualifications and experience of the contractor who will install the ceiling must be included in the Owner's application. The submission must include a letter from the contractor indicating his experience in installing the proposed materials

For all ceiling installations, the Owner shall pay for a review of the systems by the HOA Acoustical Consultant. A fee of \$175 will be charged for this review.

No construction shall be permitted without the prior written approval of the Architectural Committee, pursuant to this document and all other applicable provisions of this document, the Association's Architectural Guidelines, and all other applicable provisions of the Association's governing documents. In the event that construction has commenced prior to such approval, in addition to all other enforcement options available to the Association, the Architectural Committee may require that the unapproved construction materials be removed at the Owner's expense, and the Unit be restored to its pre-construction condition.

Product substitutions

Alternative products can be used than those described within this document. Products that are reviewed must include all of the information provided above, but also include both independent lab acoustical test reports and a minimum of 5 field acoustical tests at buildings with wood structures. Products must be reviewed by the acoustical consultant of Village Green. Typically, products will require both lab and field acoustical testing to be considered. If products are accepted, testing is required at the end of installation to show compliance with Building goals.

Observations

In any installation, the Owner must allow the HOA's Acoustical Consultant or a representative of the HOA to observe the installation of the submitted materials. Costs for this will be borne by the Owner.

Complaints

Where a complaint as to noncompliance with the Isolation Requirements cited above occurs, the Association may require that a Field Normalized Noise Isolation Class acoustical test (NNIC) be performed by a National Voluntary Laboratory Accreditation Program (NVLAP)-accredited independent acoustical laboratory approved by the Architectural Committee. Tests shall be conducted according to ASTM E336, with the test being performed from the lower unit to the upper unit. The testing agency shall test in the room directly above the Unit containing the system in question. The standards described herein shall apply, and must be met or exceeded, in all directions.

Description of Testing: The Architectural Committee shall have the sole discretion to select an appropriate acoustical consultant.

If you have any questions or comments, please do not hesitate to contact the undersigned.

Sincerely,
Veneklasen Associates, Inc.



John LoVerde, FASA
Principal