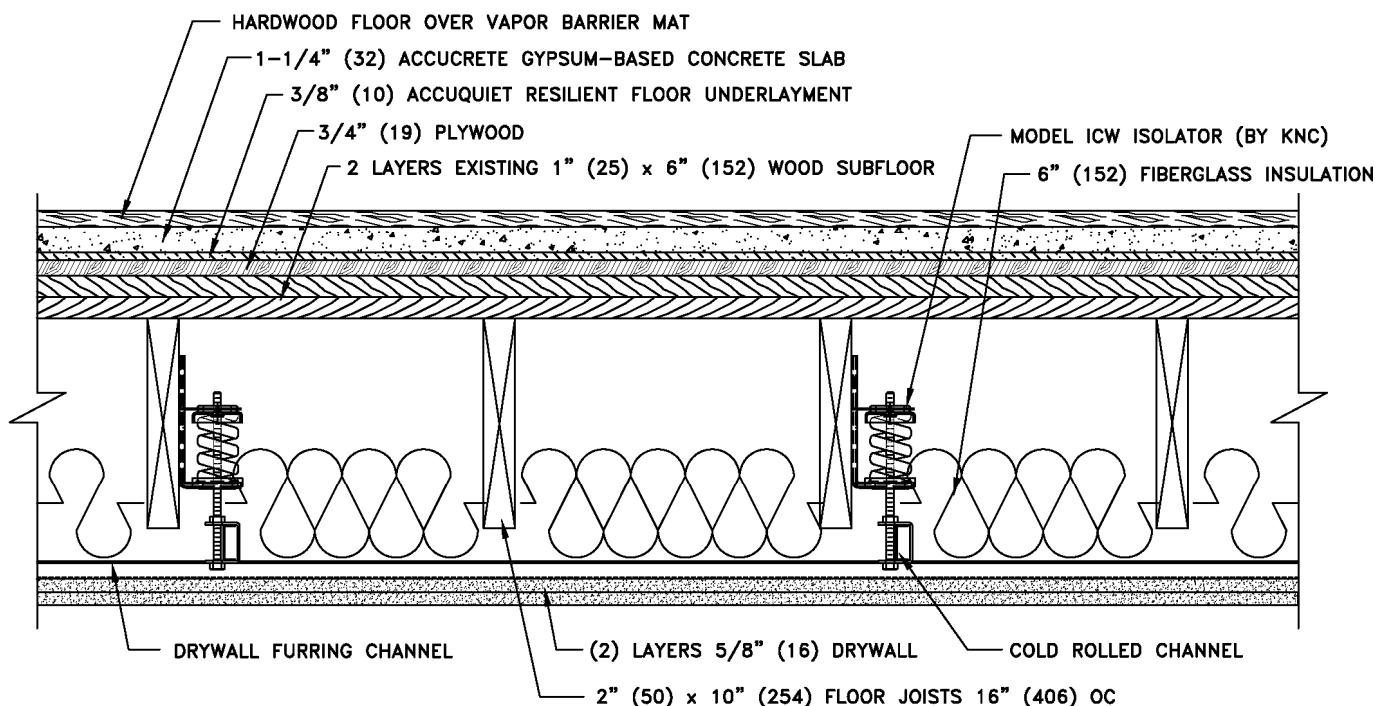


KINETICS NOISE CONTROL TEST REPORT #AT001087

- **KINETICS NOISE CONTROL PRODUCTS:**
 - ICW
- **ACOUSTICAL RATINGS:**
 - FSTC 57
 - FIIC 62
- **TESTING AGENCY & REPORT NUMBER:**
 - ACOUSTICAL DESIGN GROUP, INC.



KINETICS DRAWING NUMBER: AT001087



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April 20, 2011

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Re: Dunsany Flats, Omaha NE
Post Construction Acoustical Testing

Gentlemen:

Following is a summary of acoustical testing accomplished at Dunsany Flats in Omaha, Nebraska for your use and records.

1.0 INTRODUCTION

On April 7, 2011, ADG visited Dunsany Flats condominium complex in Omaha, Nebraska to conduct airborne noise reduction testing and impact isolation testing on the floor-ceiling construction between the first and second floors. The floor/ceiling assembly consists of products manufactured by your respective companies, Kinetics ICW spring isolation hangers, and Allied Custom Gypsum AccuQuiet resilient floor underlayment and AccuCrete gypsum-based concrete. Results are indicated in Item 3.4 and are compared to previously obtained results of the floor-ceiling construction that existed before your products were installed. Charts and data tabulations are included in the Appendix.

2.0 DESCRIPTIONS

2.1 *Project History*

Dunsany Flats is a 110 year old wood structure, built in 1901 originally as an apartment complex. The building was renovated and converted into an 18 unit condominium complex with an “old-world” charm. The first of three phases was completed in 2009, with the new owners moving in soon after completion.

ADG was retained to investigate sound transmission issues between vertically stacked units in late 2009. The floor-ceiling assembly consisted of:

- New hardwood flooring over vapor barrier mat
- 2 layers 1x6 wood subfloor (existing)
- 2x10 joists (existing) with 6" batt insulation (new) in cavity
- New 1/2" gypsum board installed to bottom of joists

Field tests on this floor-ceiling construction were conducted on November 9, 2009.

Original tests yielded **FSTC-31** and **FHIC-27**.

2.2 *Current Conditions*

A new floor-ceiling assembly was designed to incorporate gypsum-based concrete, resilient floor underlayment, and a decoupled ceiling assembly. The new construction for the first phase, as well as the second, was completed by mid-2010. As of this writing, construction of the third phase has not been commenced.

The new floor-ceiling assembly consists of:

- New hardwood flooring over vapor barrier mat
- 1-1/4" AccuCrete gypsum-based concrete slab
- 3/8" AccuQuiet resilient floor underlayment
- 3/4" plywood pouring form
- 2 layers existing 1x6 wood subfloor
- Existing 2x10 joists with 6" batt insulation in cavity
- Kinetics ICW spring hangers
- 2 layers 5/8" GWB on cross framing

Both the floor and the ceiling isolation systems were installed with perimeter isolation considerations. For the floor, vertical strips of AccuQuiet were placed at the perimeter of

the floor at the floor-wall intersecions. The AccuCrete was poured to cover the complete floor with the exception of the portion of the Kitchen where floor cabinets existed, per the Owner's direction. However, isolation strips were placed at the floor-cabinet intersection to minimize the sound flanking path this was anticipated to cause.

The ceiling system was suspended so that the ceiling drywall edges were approximately 1/4" away from the walls. The gaps were then filled with foam backer rod and continuous beads of acoustical sealant. All ductwork and lighting is suspended from the noise control ceiling grid, with penetrations through the drywall sealed airtight.

3.0 ACOUSTICAL TESTING

Acoustical testing was conducted to obtain the Field Impact Insulation Class (FIIC) rating and Field Sound Transmission Class (FSTC) rating of the floor/ceiling construction between the 1st - 2nd floors units.

3.1 *Instrumentation* – Sound level measurements obtained with Ivie IE-45 real time analyzer with 1/2" Ivie condenser microphone. Apparatus calibrated to an accuracy of +/- 0.3 dB sound pressure level of 94.0 dB, re 2×10^{-5} Pa at 1 kHz throughout measurements.

3.2 *Noise producing equipment*

Tapping tests conducted with Norsonic 211A tapping machine ; Noise reduction tests conducted with a custom mobile sound system consisting of EV DH1A high-frequency driver and JBL 2206H low-frequency driver powered by QSC PL236A, 3600 Watt amplifier and QSC DSP-3 digital signal processing module.

3.3 *Procedure*

FIIC testing – Conducted in conformance with *ASTM E1007* and FIIC ratings obtained by *ASTM E989*. Tapping machine placed in second floor unit living room area with sound pressure levels obtained directly below in first floor unit living area. All measurements were averaged to steady-state conditions over approximately 60 second time intervals with negligible transient sounds during recording times with meter set to fast. The four testing positions per ASTM standard are shown below:

Placement 1: Tapping machine arranged so that line of hammers was parallel with and aligned with the joist.

Placement 2: Same as Placement 1, except tapping machine rotated 90 degrees around the axis of the middle hammer.

Placement 3: Tapping machine displaced laterally with respect to position in Placement 1, so that the longitudinal axis of the machine was centered midway between and parallel to the central joist in Placement 1.

Placement 4: Tapping machine positioned so that the longitudinal axis of the machine formed a 45 degree angle with respect to the position in Placement 1.

FSTC testing – Conducted in general conformance with *ASTM E336*. FSTC results obtained by *ASTM E413*. Pink noise served as the noise source in second floor unit living area. Sound pressure levels were obtained in first floor unit living spaces with the meter set to fast response. All measurements were averaged to steady state conditions over approximately 30 to 60 second time intervals with negligible transient sounds during recording times.

Normalization – Normalization was conducted with .22 caliber revolver impulse. Three blanks were fired and third-octave decay times were obtained and averaged.

3.4 Results

<u>Location</u>	<u>FIIC</u>	<u>FSTC</u>
2 nd Floor Unit → 1 st Floor Unit	62	57

4.0 ANALYSIS

The dual floor and ceiling isolation system dramatically improved the acoustical conditions of the space, as expected. Refer to appendices for normalized one-third octave band tabulations, low-frequency (below 125 Hz) third-octave band tabulation, FSTC, and FIIC charts, and floor-ceiling assembly details for before and after conditions.

5.0 CONCLUSION

The installation of both the Kinetics ICW spring hanger ceiling system and Allied Custom System floor assembly substantially improved the sound and impact isolation at Dunsany Flats. The overall ratings increased by 26 FSTC points and 35 FIIC points. More importantly, from a subjective standpoint, the Owner and tenants have indicated that they are very satisfied with the overall improvement.

Please contact us if you have any questions or comments pertaining to this report.

Best regards,

Acoustical Design Group, Inc.

A handwritten signature in black ink, appearing to read "JTeel".

Jeff Teel
Senior Associate
JeffT@adgkc.com

APPENDIX

Figure 1A – (4/07/2011 Testing) FIIC-62

Figure 1B – (11/09/2009 Testing) FIIC-27

Figure 2A – (4/07/2011 Testing) FSTC-57

Figure 2B – (11/09/2011 Testing) FSTC-33

Table 1 – FIIC: One-Third Sound Pressure Levels, SPL (Normalized)

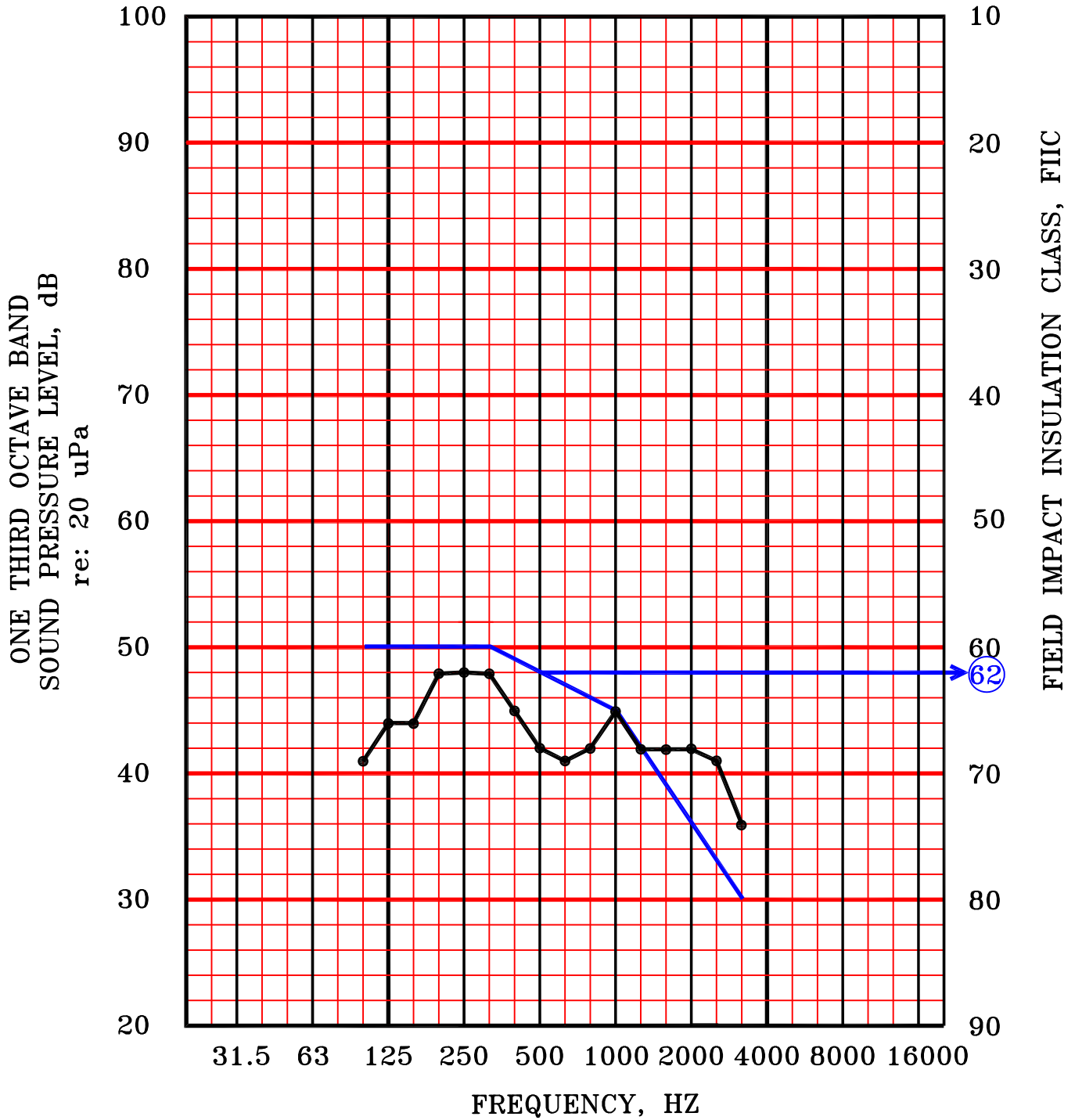
Table 2 – FSTC: One-Third Octave Band Field Transmission Loss, FTL (Normalized)

Table 3 – Low-Frequency (Below 125 Hz) Third-Octave Band Tabulations, FTL & SPL

Detail 1 – Floor-Ceiling Assembly, Before

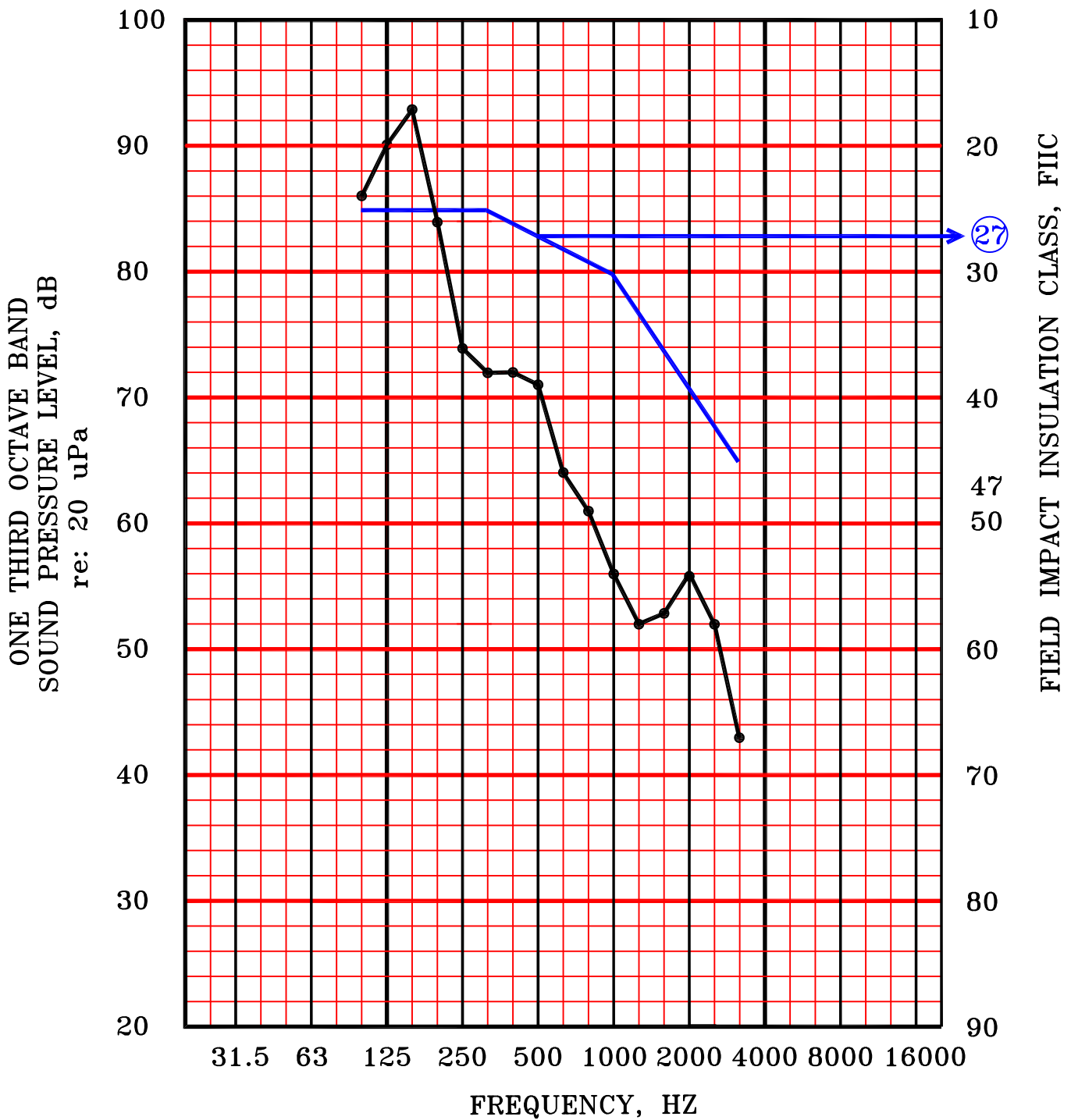
Detail 2 – Floor-Ceiling Assembly, After

Dunsany Flats
 FIGURE 1A (4/07/2011 TESTING)
 FIIC-62



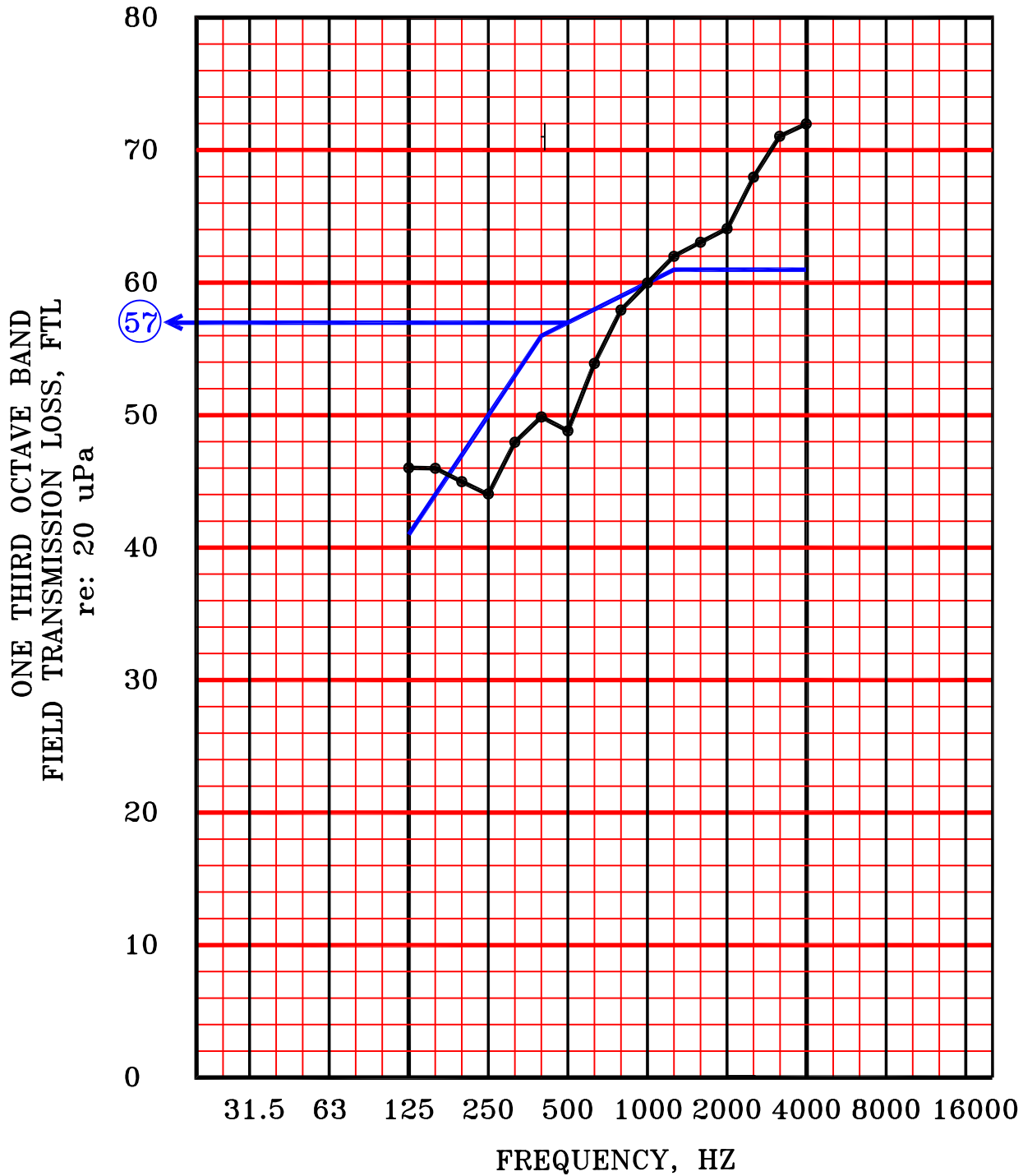
(SPLs obtained with Ivie IE45)

Dunsany Flats
 FIGURE 1B (11/09/2009 TESTING)
 FIIC-27



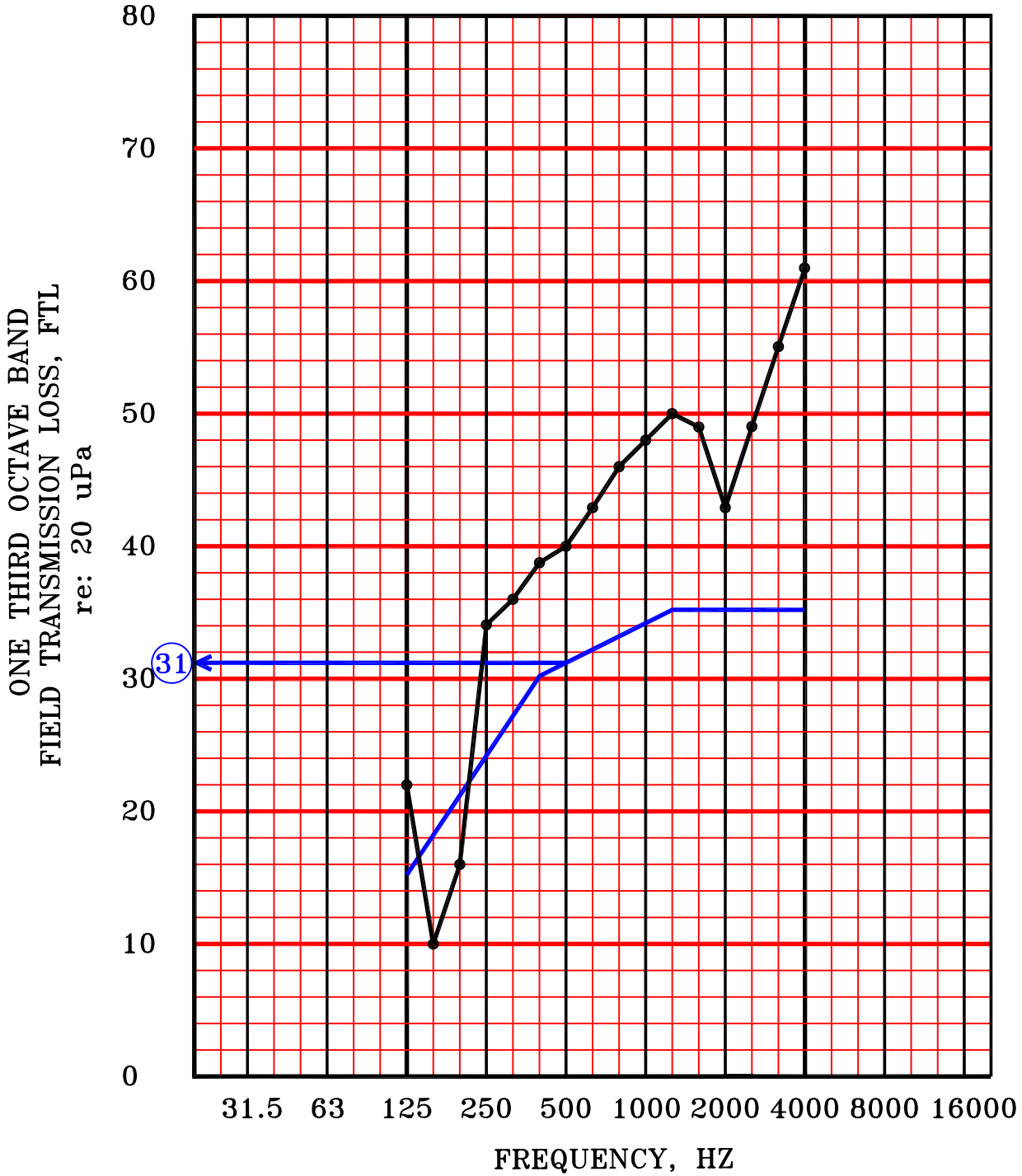
(SPLs obtained with Ivie IE45)

Dunsany Flats
FIGURE 2A (4/07/2011 TESTING)
FSTC-57



(SPLs obtained with Ivie IE45)

Dunsany Flats
FIGURE 2B (11/09/2009 TESTING)
FSTC-31



(SPLs obtained with Ivie IE45)

TABLE 1 – FIIC: One-Third Octave Band Sound Pressure Levels, SPL (Normalized)

Before – FIIC-27

After – FIIC-62

($\Delta = 35$)

<u>Frequency</u>	<u>Before</u>	<u>After</u>	<u>Δ</u>
100	86	41	-45
125	90	44	-46
160	93	44	-49
200	84	48	-36
250	74	48	-26
315	72	48	-24
400	72	45	-27
500	71	42	-29
630	64	41	-23
800	61	42	-19
1000	56	45	-11
1250	52	42	-10
1600	53	42	-11
2000	56	42	-14
2500	52	41	-11
3150	43	36	-7

TABLE 2 – FSTC: One-Third Octave Band Transmission Loss, FTL (Normalized)

Before – FSTC-31

After – FSTC-57

($\Delta = 26$)

<u>Frequency</u>	<u>Before</u>	<u>After</u>	<u>Δ</u>
125	22	46	+24
160	10	46	+36
200	16	45	+29
250	34	44	+10
315	36	48	+12
400	39	50	+11
500	40	49	+9
630	43	54	+11
800	46	58	+12
1000	48	60	+12
1250	50	62	+12
1600	49	63	+14
2000	43	64	+21
2500	49	68	+19
3150	55	71	+16
4000	61	72	+11

TABLE 3 – Low-Frequency (Below 125 Hz) One-Third Octave Band Tabulations

The following chart lists one-third octave band data that is not included in the FSTC and FIIC rating charts.

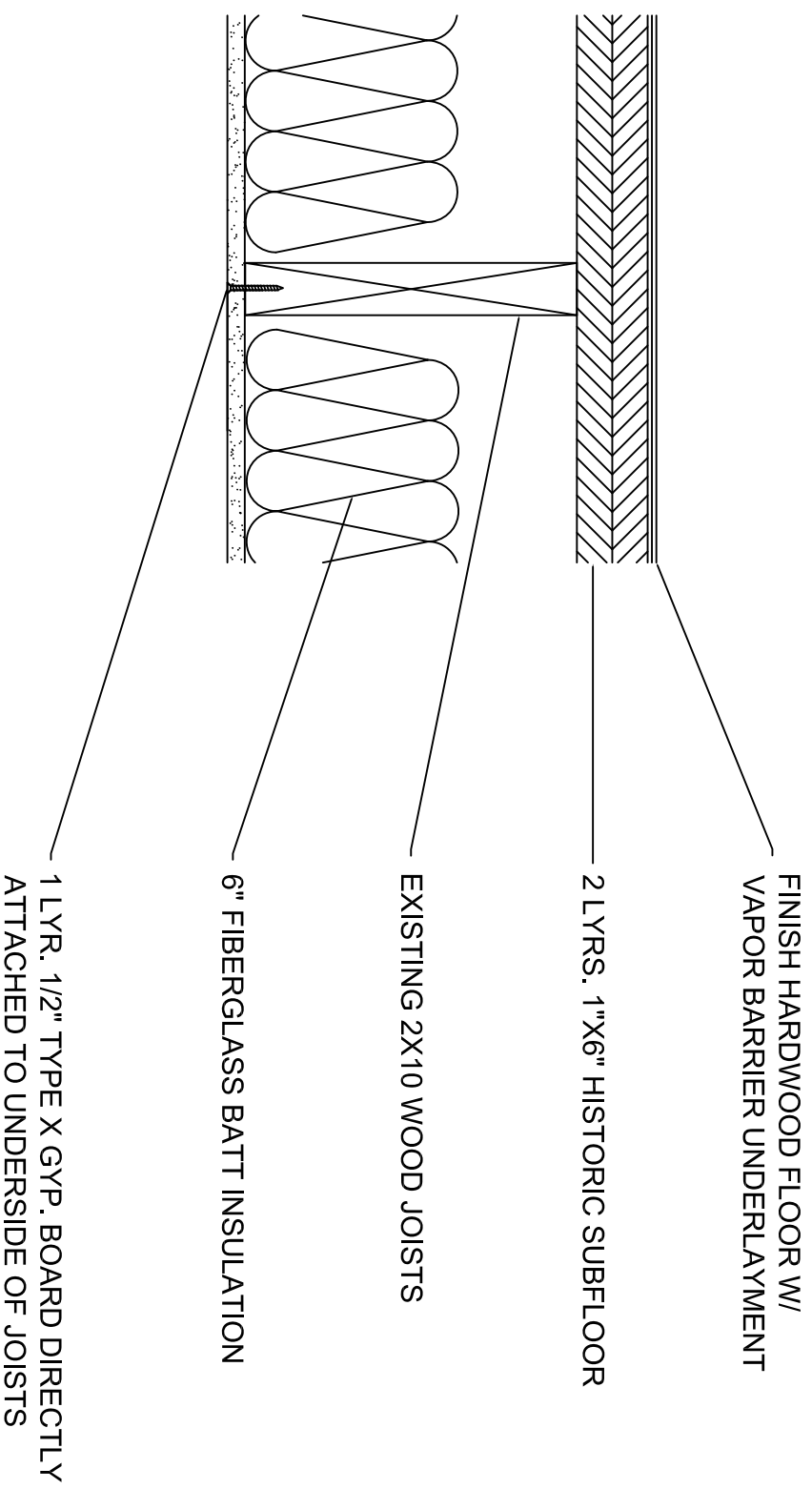
Field Transmission Loss, FTL (normalized)
Impact Sound Pressure Level, SPL (normalized)

<u>Frequency</u>	<u>FTL (FSTC)</u>	<u>SPL (FIIC)</u>
20	12	54
25	17	49
31	19	47
40	23	46
50	29	44
63	31	44
80	37	43
100	39	41
125	46	44



DETAIL 1

FLOOR-CEILING ASSEMBLY, BEFORE





DETAIL 2

FLOOR-CEILING ASSEMBLY, AFTER

