ACOUSTICAL DESIGN GROUP INC

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Sean Slattery AIA, LEED AP+
El Dorado Inc.
510 Avenida Cesar E Chavez
Kansas City, MO 64108
sslattery@eldoradoarchitects.com

Re: Union Carbide Building - Sound and Impact Isolation Testing

Dear Sean:

We have reviewed the acoustical data resulting from our visit to the Union Carbide Building condominiums to conduct sound and impact isolation tests between recently completed units on the 6th, 7th, and 8th floors.

Tests were conducted between Units 703/603 and 703/803 on successive floors and between 703/702 and 703/704 on the 7th Floor. Results are presented below.

UNIT-TO-UNIT AIRBORNE SOUND ISOLATION

Airborne sound isolation describes how well sounds such as voices or music emanating from a loudspeaker are reduced in level by the construction elements separating the adjacent spaces. Sound isolation is objectively measured with a standardized method rated by a descriptor known as Noise Isolation Class (NIC), which is a single number rating that describes the degree of airborne sound isolation. The higher the rating number, the better the sound isolation.

Building codes require NIC ratings of 45 or higher between adjacent living units on the same floor or on successive floors. The test results were limited by the presence of ambient noise from the HVAC units, the lack of sound gaskets on the unit entry doors, the absence of carpet in the Corridor, and noise intrusion from outside the building (primarily road traffic noise transmitted through the windows). Despite these limitations, sound isolation ratings were in excess of NIC-45 between 703/702 and 703/704, and NIC-55 between 703/603 and 703/803. Once the Corridor carpet is installed and if sound gaskets can be installed on the Condo entry doors, these ratings will likely exceed NIC-50 and NIC-60 respectively.

In practical terms, airborne sound from human speech will be unintelligible between adjacent units. Music or home theater sound will be inaudible in adjacent living units unless played at extreme sound levels.

FLOOR-TO-FLOOR IMPACT ISOLATION

Structure-borne sound isolation, also termed "impact isolation," describes the degree of isolation from direct-impact activities on the floor above an occupied space. Footfalls, dragging furniture, etc. are the types of structure-borne impacts that are considered in multi-tenant structures such as this. Good impact isolation is a function of the degree of structural separation provided in the floor-ceiling construction separating the vertically adjacent spaces. We measured impact sound levels in the lower floor unit with various floor impacts occurring in the space above and compared them to the ambient noise levels in the space.

In order to establish a baseline for comparison of impact sound levels, we measured sound levels resulting from direct impacts of steel hammers repeatedly striking the floor – to simulate the levels which would result if an ASTM-certified tapping machine were employed for a code-compliance test. The rating system applicable to this method is Impact Insulation Class (IIC) and the single number rating resulting from this test should meet or exceed IIC-45 to meet code. While our simulation test cannot definitively declare an IIC rating resulting from the test we conducted, we can estimate that the impact isolation resulting from such a rated test would likely exceed IIC-65, which is significant. To the best of our knowledge of condominium and apartment construction in the region, very few (if any) meet this degree of impact isolation.

To practically rate the degree of impact isolation between these condominiums, we measured the sound levels resulting from ordinary floor impacts and compared them to typical residential ambient noise levels. Noise Criteria (NC) ratings are single-number descriptors of the loudness of ambient noise levels. Generally, the lower the NC rating number, the quieter the space. For reference, a quiet residential ambient noise environment will typically rate NC-30 to 35 or less.

In a typical wood-framed multi-tenant building, normal-gait walking will produce noise levels exceeding NC-50. Concrete construction with an un-isolated finish floor or suspended ceiling will produce noise levels in the range of NC-40. The noise levels in Unit 703 resulting from normal-gait walking in Unit 803 were less than NC-30 and were inaudible, as was the noise from dragging a chair across the floor. The only floor impacts which were audible were those associated with the reference test of striking the floor with steel hammers and the extreme impact of a person jumping heavily upon the floor.

As a graphic illustration of the degree of impact isolation at the Union Carbide condominiums, the attached chart of impact sound levels versus frequency compares the noise levels of footfall noise transmitted through a typical wood-framed floor-ceiling construction with the impact sound levels measured at Union Carbide. As seen in the chart, the Union Carbide condominiums are significantly quieter and better equipped to isolate impact sound.

SUMMARY

The degree of sound and impact isolation resulting from the construction employed at Union Carbide is of a higher acoustical quality than that occurring in any wood-framed multi-tenant building and, because of the wall, floor, and ceiling isolation employed, it also exceeds that achieved by all of the concrete-based condominium projects we have evaluated in the Midwest region.

Please contact us if you have any questions.

Sincerely,

Acoustical Design Group, Inc.

Brian F. Kubicki

cc: Rick Powell, rpowell@baltimoreplace.net

Impact Sound Levels - footfall noise