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Predicted Acoustic Performance for the Grant Park Village Phase II Mixed-Use Building's Proposed Floor-Ceiling & Roof-Ceiling Assemblies

Dear Mr. Turville,

This letter presents our results from our acoustic analysis of the proposed roof-ceiling assembly separating the rooftop deck space from the upper level apartment residences to meet the International Building Code (IBC) STC 50 and IIC 50 performance for the Grant Park Village Phase II Building. The airborne sound and footfall transmission performance have been calculated using existing laboratory test data, computer modeling software, and based on our previous experiences with similar paver pedestal style roof deck assemblies.

I. Predictive Methods

This performance prediction is based on laboratory test results from the *California Catalog of STC and IIC Ratings for Wall and Floor/Ceiling Assemblies*, the *Gypsum Association Fire Resistance Design Manual Sound Control*, and *National Research Council of Canada*; predictions of each piece of the total assembly with the Marshall Day Acoustics INSUL sound insulation prediction tool for floor/ceilings; field test results from similar assemblies. The laboratory test results used for this prediction were completed per ASTM E 90 *Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements* and E 492 *Standard Test Method for Laboratory Measurement of Impact Sound Transmission Through Floor Ceiling Assemblies Using the Tapping Machine*. Sound Transmission Class (STC) and Impact Insulation Class (IIC) ratings are not directly equivalent to decibel values, but the ratings are based on the exponential decibel scale.

II. Performance Standards

International Building Code (IBC)

Section 1207 – Sound Transmission

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.

1207.2 Air-borne sound. Walls, partitions and floor/ceiling assemblies separating dwelling units from each other or from public or service areas shall have a sound transmission class (STC) of not less than 50 (45 if field tested) for air-borne noise when tested in accordance with ASTM E 90. Penetrations or openings in construction assemblies for piping; electrical devices; recessed cabinets; bathtubs; soffits; or heating, ventilating or exhaust ducts shall be sealed, lined, insulated or otherwise treated to maintain the required ratings. This requirement shall not apply to dwelling unit entrance doors; however, such doors shall be tight fitting to the frame and sill.

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 (IIC) rating of not less than 50 (45 if field tested) when tested in accordance with ASTM E 492.

These ASTM standards are the laboratory equivalent of the field tests conducted for finished assemblies.

III. Assembly Description

The following proposed roof-ceiling assembly was evaluated with respect to air-borne sound and footfall noise impact performance to the STC 50 and IIC 50 performance requirements.

R3: Proposed Roof-Ceiling Assembly

Cement paver (13 - 20 psf)

AWS Pedestal System (ABS & PVC Plastic)

3/8" rubber pads below pedestals (maximum 50 durometer)

Bituminous Roofing – Malarkey 625 Paragon CAP & 603 Modified SuperBase (1.75 psf)

1/4" Gypsum cover board (0.9 psf)

2 layers of R-24 Rigid Insulation (<0.5 psf)

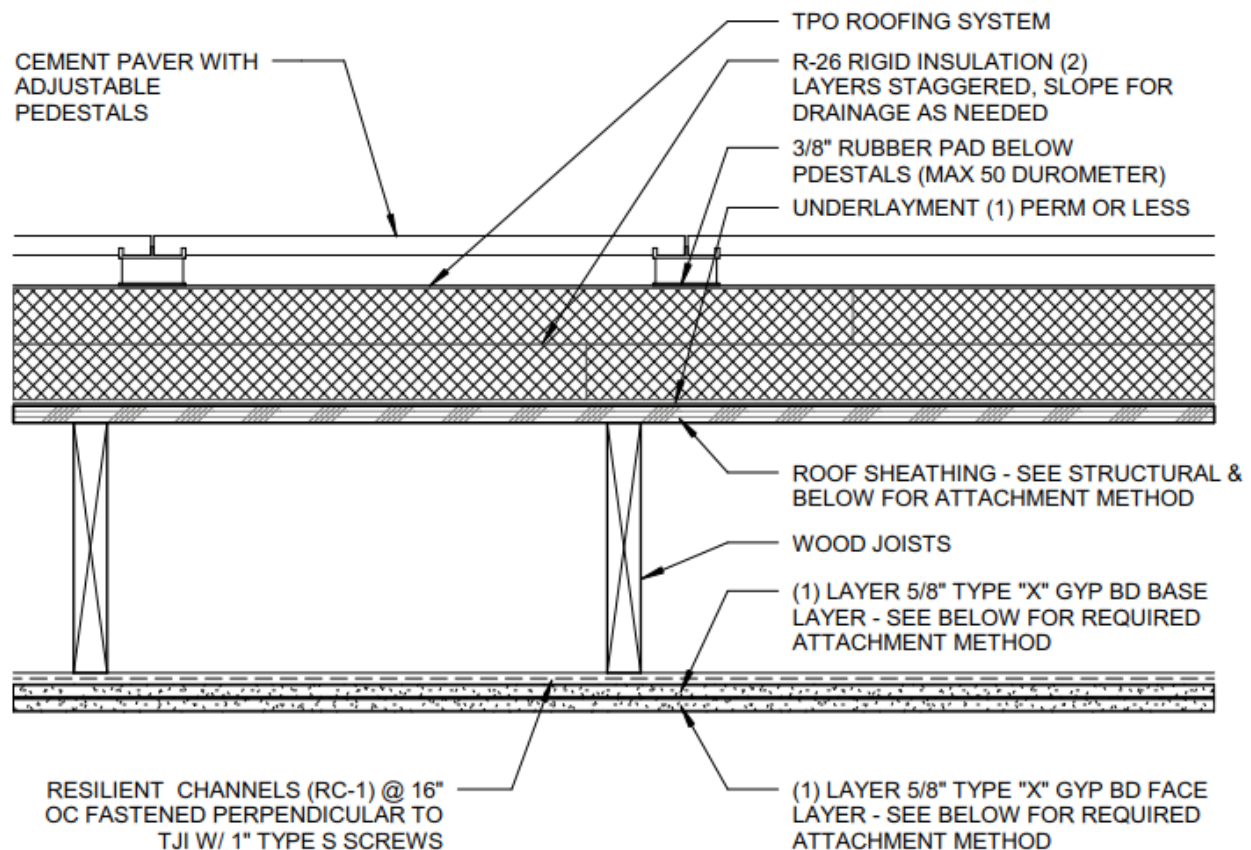
5/8" Plywood Sheathing (1.8 psf)

11-7/8" TJI wood joists

No batt or fiberglass insulation

Resilient Channel

2 Layers of 5/8" Type X gypsum board (5.0 psf)



R3

1 HR RATED ROOF-CEILING ASSEMBLY

BASED ON GA FILE NO. RC 2601.

A³ Acoustics, LLP

Consultants in Architectural, Mechanical, Environmental Acoustics, and Vibration

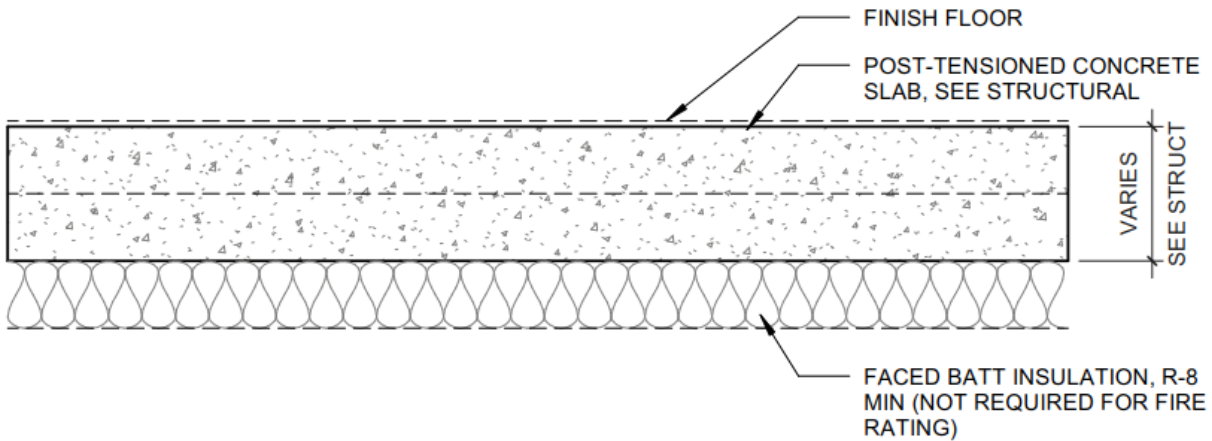
F5: Proposed Floor-Ceiling Assembly

Vinyl flooring (LVT in living areas, sheet vinyl in bathrooms)

2-mm Pliteq GenieMat RST-02 or 3-mm Regupol Sonus LV270 acoustic flooring underlayment

- Both options with laboratory test data and calculations noted below

12-inch thick Post-Tensioned Concrete (150 psf)



F5

3 HR RATED FLOOR-CEILING ASSEMBLY

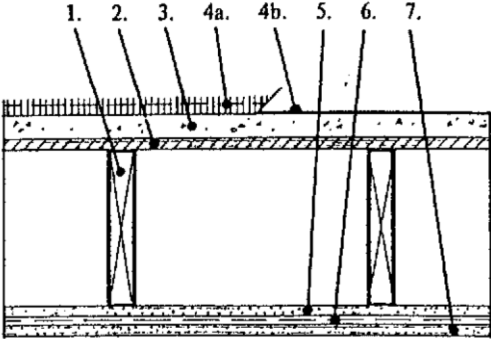
BASE ON OSSC 2014 TABLE 721.1(3), ITEM NO. 4-1.1

IV. Predicted Performance

The predicted performance for the floor-ceiling assembly (F5) and roof-ceiling assembly (R3) is noted below for the pieces evaluated from laboratory test results, independent research by NRC Canada, and computer modeling software.

F5 - Assembly Evaluated	Performance
<u>Prediction for assembly:</u> Laboratory Test Results: NRCC (Client Report: B3498.16), November 2012 (attached to this report) Tested Assembly 3-mm Vinyl flooring, FAS urethane adhesive 2-mm Pliteq GenieMat RST-02, FAS urethane adhesive - Alternative: 3-mm Regupol Sonus LV270 (IIC 52 with 6-inch concrete); Intertek/Architectural Testing D8974.04-113-11-R1, June 2014 200-mm (8-inch) concrete slab	STC 58 IIC 52
<u>Predicted improvement from:</u> 12" total concrete thickness compared to 8-inch thick concrete from laboratory testing	+ STC 2 to 3 + IIC 1 to 3
<i>Predicted Measured Performance</i> <i>(includes corrections for installed conditions based on field tests completed for similar conditions and buildings)</i>	STC 59 – 61 IIC 52 – 55

Due to limited laboratory performance data for rigid insulation roof/ceiling assemblies with respect to sound transmission (STC) and footfall impact noise (IIC), the assembly has been split into parts to evaluate the impact of these materials and installations on the overall predicted performance.

R3 - Assembly Evaluated	Performance
<u>Prediction for overall assembly (rigid insulation):</u> Laboratory Test Results: Geiger and Hamme Lab, test # CCA-8MT, CCA-9MT 1972  1. 2x10 joists, 16"o.c. 2. 5/8" plywood subfloor nailed with 8d nails 6"o.c. along edges and 10"o.c. in field. 3. 1 1/2" thick lightweight concrete over 15 lb. asphalt felt. 4a. 20 oz. carpet on 40 oz. hair pad. 4b. 1/16" vinyl-asbestos tile. 5. 5/8" type X gypsum board nailed with 6d nails 7"o.c. 6. resilient channels, 24"o.c. 7. 5/8" type X gypsum board screwed 12"o.c. <i>This lab tested assembly will have an STC performance similar to the paver system and the ceiling assembly because the concrete pavers will behave similarly to light weight concrete. The IIC performance with the asbestos tile will be similar to the impact transfer of the proposed roof assembly without additional mitigation measures noted below.</i>	STC 55 IIC 43
<u>Predicted improvement from:</u> 3/8" thick rubber pads under pedestals Using impact insulation class results provided by Mason Industries for similar neoprene isolated floor installation, impact insulation class results completed for floating assembly on neoprene waffle pads at Harbour Island Condominiums in Oxnard, California, and test results from Alfred C.C. Warnock's paper "Impact Sound Measurements on Floors Covered with Small Patches of Resilient Material or Floating Assemblies" (IRC-IR-802).	No significant impact on STC + IIC 7 to 12
<i>Predicted Measured Performance (includes corrections for installed conditions based on field tests completed for similar conditions and buildings)</i>	STC 53 – 56 IIC 50 – 54

V. Conclusion

The proposed flooring-ceiling and roof-ceiling systems will satisfy the International Building Code (IBC) sound transmission requirements of STC 50 and IIC 50. The predicted performance is the sound transmission performance that should be met with measurements at the conclusion of construction.

Please contact us if you have any questions or for additional information.

Sincerely,



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