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Mr. Eliot W. Goldstein, AIA
The Goldstein Partnership
The Map Building
515 Valley Street, Suite 110
Maplewood, NJ 07040-1391

Re: Acoustical Findings and Recommendations
Fair Haven Community Center and Police Building
Revised 15 May 2023
OAA File 4677A

Dear Eli,

As agreed, we have investigated the following potential acoustical concerns pertaining to the design of the new Fair Haven Community Center and Police Building.

- Community Center: Room acoustics and sound-absorbing finishes within the partitionable community room.
- Community Center: Sound isolation details associated with the community room operable partition, partition track, and bulkhead.
- Community Center: Sound isolation between the community rooms and adjacent restrooms.
- Police Building: noise emitted from the rooftop condensing units to nearby residential properties.
- Police Building: Sound isolation between adjacent occupied spaces, comprising partition and ceiling sound isolation.
- Both buildings: any general acoustical concerns.

Specific recommendations in this letter are numbered.

CRITERIA

ROOM ACOUSTICS

Reverberation time is defined as the time it takes interrupted sound to decay by 60 dB. The Community Room will have a volume of approximately 19,000 ft³. To support events comprising speech and social gatherings, as well as provide acoustically comfortable conditions, the Community Room's reverberation time should be about 0.8 second in the 250 Hz octave band and higher.

SOUND ISOLATION

The Community Room's operable partition is specified for STC-52 performance. It is important that the bulkhead construction surrounding the track, as well as glazing above the track, achieves similar performance of at least STC-47.

To maintain privacy in restrooms and avoid intrusive plumbing noise in the Community Rooms, partitions separating the restrooms from the Community Rooms should achieve at least STC-50.

To maintain sufficient speech privacy in the Police Building, sound isolation between adjacent offices should be at least STC-45. Since the specified partition construction is not full-height, ceiling sound-isolating performance needs to be considered as well. Separation from Office 3 to the Conference Room should be at least STC-50.

SOUND EMISSIONS AT OFF-SITE RECEPTORS

Sound emissions from each municipal building are required to comply with New Jersey and Fair Haven regulatory limits for noise. The State limit, found at N.J.A.C. 7:29, requires that sound emissions from mechanical equipment be no higher than 65 dB(A) at receiving residential and commercial property lines during daytime hours of 0700 to 2200. During nighttime hours of 2200 to 0700, this limit is lowered to 50 dB(A) at residential property lines. We were unable to identify any applicable noise ordinance for Fair Haven. We expect that mechanical equipment will operate during nighttime hours; sound emissions from new equipment associated with each municipal building should be limited to 50 dB(A) at surrounding residential property lines.

Due to the proximity of residences to the Police Building, we calculated off-site sound emissions from rooftop mechanical equipment. This process is not warranted for the Community Center because noise-sensitive receptors are not near the Community Center.

FINDINGS AND RECOMMENDATIONS

COMMUNITY CENTER ROOM ACOUSTICS

We predicted the reverberation time spectrum within the Community Rooms. The calculations were based on LVT flooring, gypsum board walls, glass windows, occupancy of 10 people, and 6-inch-thick Tectum III wood fiber sound-absorbing roof deck. These calculations yielded a reverberation time spectrum that exceeds the optimum range at low frequencies; acoustical characteristics for such conditions are often described as “boomy” or “muddy”.

To address the excessive reverberation, we recommend sound-absorbing wall panels be added to the Community Room design. Figure 1 below shows the predicted reverberation time spectra compared to the optimum range, with options for two wall panel thicknesses.

1. Show fabric-wrapped glass fiber wall panels on Community Room wall elevations. Either approximately 500 ft² of 2-inch-thick panels or 350 ft² of 3-inch-thick panels. Arrange the panels symmetrically so that an equal area is present on each side of the operable partition. Specify the panels for a minimum NRC of 1.0 when tested in accordance with ASTM C423 using a Type A mounting. Acoustically acceptable products include MBI Products [Colorsonix](#) and Kinetics Noise Control [HardSide](#).

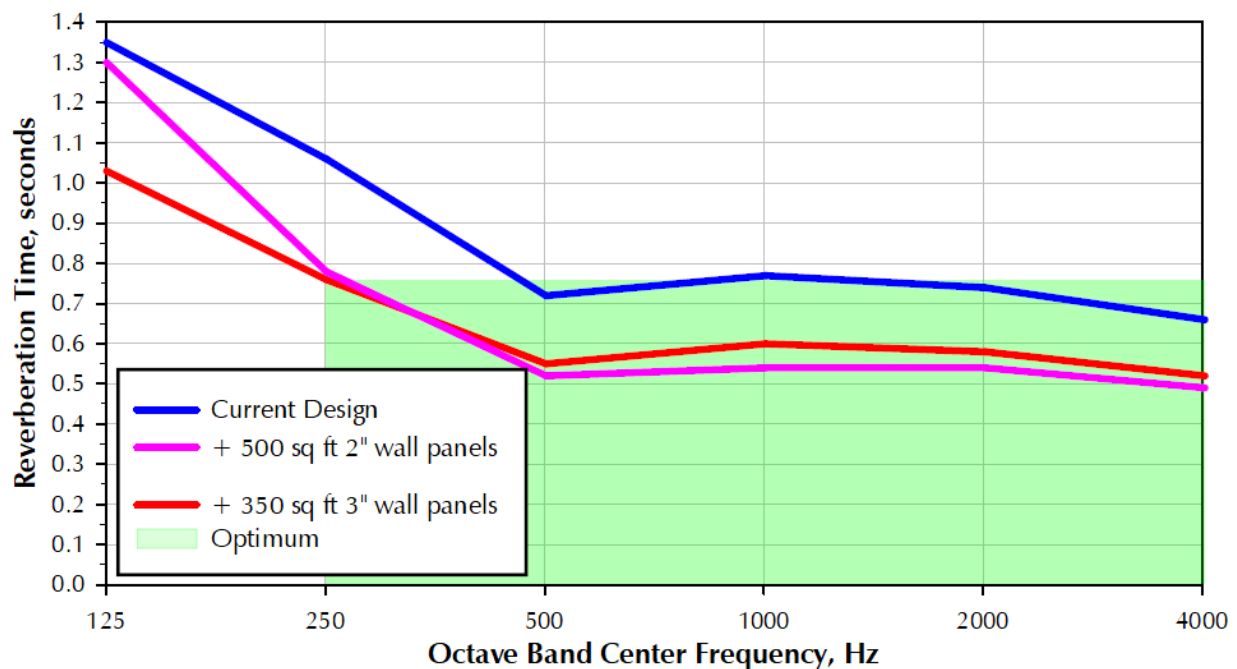


Figure 1 – Fair Haven Community Room reverberation time spectra compared to optimum values.

COMMUNITY CENTER SOUND ISOLATION

The basis-of-design operable partition is a Modernfold device with a specified minimum sound isolation rating of STC-52. To ensure that a similar amount of sound transmits over the partition as transmits through it, we recommend the following:

2. Bulkhead construction should be framed around the operable partition track. This construction should comprise two layers of $\frac{5}{8}$ -inch gypsum board and minimum 2-inch-thick glass fiber in the cavity. The gypsum board should be sealed to the track with non-hardening sealant. It is not necessary to enclose steel framing members.
3. We understand that there will be glazing above the operable partition track. This glazing should comprise a pane of $\frac{1}{2}$ " laminated glass, a 2-inch-deep air gap, and a pane of $\frac{1}{4}$ -inch laminated glass. Each pane of glass should be set in neoprene glazing channel. Alternatively, specify a framed glazing assembly with minimum performance of STC-47 when tested in accordance with ASTM E90.

STC-50 construction should separate the restrooms from the Community Rooms. Partition Type D is specified in these locations. This partition comprises one layer of $\frac{5}{8}$ -inch gypsum board on each side of $3\frac{5}{8}$ -inch steel studs 16 inches o.c., with fibrous insulation in the cavity. While Drawing A-1 lists the STC rating of this partition as STC-51, this is a significant overstatement of realistic performance. With 18-gauge studs, such partition construction can be expected to achieve about STC-43, while performance of STC-46 is possible with 25-gauge studs.

4. To reliably achieve STC-50 performance for Partition Type D, partitions separating restrooms from the Community Rooms should have two layers of $\frac{5}{8}$ -inch gypsum board on each side of studs.

POLICE BUILDING SOUND ISOLATION

STC-45 construction should separate Police Building offices.

5. Partitions separating adjacent offices should comprise two layers of $\frac{5}{8}$ -inch gypsum board on one side of studs, and one layer of $\frac{5}{8}$ -inch gypsum board on the other side.
6. Since partitions will not be full-height in the Police Building, lay-in ceilings should attenuate a similar amount of noise to the partitions. Where feasible, specify Armstrong [Calla PrivAssure](#) with a minimum CAC rating of 50.

7. Note that CAC rating is a 2-pass sound isolation rating, and thus the CAC 50 performance that is roughly equivalent to STC-50 will only be realized if there is a CAC 50 ceiling on both sides of a partition. Where it is feasible to specify the special CAC 50 ceiling on only one side of a partition, expect less sound isolation: about CAC 42 (about half of the difference between CAC 50 and CAC 35, typical for CAC 35 mineral board products).
8. Between Office 3 and the Conference Room, specify the partition construction discussed in Item #4.

POLICE BUILDING EXTERIOR NOISE

We calculated the sound levels of two rooftop condensing units and two specified rooftop exhaust fans. Emissions at the nearest residences west, north, and east of the Police Building were calculated. These calculations are shown in Tables I through III below. All calculation results comply with regulatory limits for off-site noise; no further noise control measures are necessary.

Table I – Calculation of exterior sound at nearest residence west of Police Building, dB re 20 μ Pa.

	Octave Band Center Frequency (Hz)								A*
	63	125	250	500	1000	2000	4000	8000	
CU-1, 3	77	76	78	75	70	66	61	55	76
CAC-CU-1, 3 feet	73	58	64	60	58	55	50	41	63
GEF-1, 3 feet	61	62	61	54	48	47	39	32	57
GEF-2, 3 feet	61	62	61	54	48	47	39	32	57
Total of all equipment, 3 feet	78	76	78	75	70	66	61	55	76
Attenuation from 3 feet to 67 feet	-27	-27	-27	-27	-27	-27	-27	-27	-27
Additional attenuation of equipment screen	-6	-7	-8	-8	-9	-10	-12	-14	
At residence	45	42	43	39	33	29	22	14	40
N.J.A.C. 7:29 limits	71	61	53	48	45	42	40	38	50

* A denotes the A-weighted sound level

Table II – Calculation of exterior sound at nearest residence north of Police Building, dB re 20 μ Pa.

	Octave Band Center Frequency (Hz)								A*
	63	125	250	500	1000	2000	4000	8000	
CU-1, 3	77	76	78	75	70	66	61	55	76
CAC-CU-1, 3 feet	73	58	64	60	58	55	50	41	63
GEF-1, 3 feet	61	62	61	54	48	47	39	32	57
GEF-2, 3 feet	61	62	61	54	48	47	39	32	57
Total of all equipment, 3 feet	78	76	78	75	70	66	61	55	76
Attenuation from 3 feet to 150 feet	-34	-34	-34	-34	-34	-34	-34	-34	
Additional attenuation of equipment screen	-6	-7	-7	-8	-9	-10	-11	-13	
At residence	38	36	37	33	27	22	16	8	34
N.J.A.C. 7:29 limits	71	61	53	48	45	42	40	38	50

Table III – Calculation of exterior sound at nearest residence east of Police Building, dB re 20 μ Pa.

	Octave Band Center Frequency (Hz)								A*
	63	125	250	500	1000	2000	4000	8000	
CU-1, 3	77	76	78	75	70	66	61	55	76
CAC-CU-1, 3 feet	73	58	64	60	58	55	50	41	63
GEF-1, 3 feet	61	62	61	54	48	47	39	32	57
GEF-2, 3 feet	61	62	61	54	48	47	39	32	57
Total of all equipment, 3 feet	78	76	78	75	70	66	61	55	76
Attenuation from 3 feet to 113 feet	-33	-33	-33	-33	-33	-33	-33	-33	
Additional attenuation of equipment screen	-7	-8	-9	-10	-12	-14	-19	-19	
At residence	38	35	36	32	25	20	12	3	33
N.J.A.C. 7:29 limits	71	61	53	48	45	42	40	38	50

* A denotes the A-weighted sound level

GENERAL ACOUSTICAL CONCERNS: BOTH BUILDINGS

Analyses and predictions of HVAC system noise are beyond the scope of this consultation. We caution that no noise control recommendations have been developed in order to control interior background sound levels in either building.

Typical offices constructed with effective partition sound isolation, as recommended in this letter, result in speech that can be overheard but not necessarily understood. This means that for typical vocal efforts and background sound levels, speech will likely be audible but not intelligible between two adjacent office spaces.

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I trust the above is helpful and look forward to any questions you may have.

Sincerely yours,

OSTERGAARD ACOUSTICAL ASSOCIATES



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