APPROVED
4/30/2014
WBC

WELLINGTON SCHOOL BUILDING COMMITTEE
MINUTES
December 11, 2013
School Administration Building Conference Room
7:30 AM

Meeting #172

Committee Members Attending: John Bowe, Patricia Brusch, Laurie Graham, Mark Haley, Bill Lovallo, Heidi Sawyer, Eric Smith

Liaisons Attending: Gerry Boyle, Floyd Carman, Frank Martin

Architect: Jonathan Levi, JLA

Acentech - Bob Behrens, Alicia Larsen

Clerk: Chris Kochem

Mark Haley, Chair, called the meeting to order at 7:35 a.m.

MSBA Budget Discussion
John Bowe and Floyd Carman, Town Treasurer, led a discussion about the MSBA budget. The MSBA total budget for the Wellington is $39,301,521. Town Meeting approved $39.7 million for this project and the town of Belmont expected to receive $12.4 million (40% of eligible costs) from the MSBA.

The project has spent $38.289 million, which includes costs for relocation. The MSBA has implemented a new process for reimbursement and now says that the MSBA maximum is the amount minus contingencies. Thus, the new MSBA rules could reduce the $12.4 million that was originally anticipated to be paid by MSBA to $11.395 million.

Floyd Carman said that Belmont has received a total of $10.425 million and that the town is waiting for an additional approved $839,637 in reimbursement. MSBA withholds 5% of the required reimbursement until the project has been closed out and audited. Mr. Carman would like MSBA to release at least $130,000 of the remaining approved reimbursement amount in order to pay outstanding invoices and balance the town's books.

Mr. Carman and Mr. Martin left the meeting at 7:50 a.m.

Acoustics
Mr. Lovallo thanked Mr. Levi of JLA Architects and Mr. Behrens and Ms. Larsen of Acentech for attending the meeting to discuss the interior acoustics of the building.

Mr. Levi summarized the five areas that were noted to be of concern in the draft of the Acentech acoustics report dated November 11, 2013:

1) classroom –airborne noise transmission through the doorways of the classrooms

2) classroom - inconsistencies between the walls and the joints of the ceilings (between the partition and the fluted deck)
3) impact noise transmission between first floor and second floor classrooms
4) reverberation in the cafetorium
5) resonant noise in the lobby area, which affects the adjacent program spaces

Heidi Sawyer arrived at 7:55 a.m.

Mr. Levi then discussed a step by step process of the options for resolving the issues noted above:

1) Doors – begin with gasketing all of the doors – there was agreement that it would be best to do a block of doors, and then test to see if there is improvement before doing all of the doors
2) Joints between the walls and the ceiling – once the doors are gasketed, go through and re-measure airborne noise transmission to determine which ceilings need to be plugged with a proprietary plug.
3) Impact noise between the floors – options from lowest to highest cost: 1) use tennis balls on the furniture (there was discussion that tennis balls might not be able to be used for desk legs); 2) install carpeting in the second floor rooms (however, it was noted that the school department will not use carpet); 3) install a second ceiling to the first floor classrooms
4) Cafetorium is actually louder than the gymnasium. The recommendation is to bring the cafetorium to the same standard of acoustics as the gym. The issue is both the quantity and type of tectum (fibrous wood material, one inch thick) that is currently on the walls. A duct liner and additional tectum can be added to the walls. Tectum panels can be pre-painted white or can be painted to match the current color in the room. The committee members agreed that this project would be worth considering and asked that Mr. Levi supply a cost estimate.
5) Lobby – noise in the community room and the administrative area is noticeable but can be lived with. The most bothersome is the noise that travels to the upward classrooms, particularly the art room and special education classrooms. If the doors are closed, the noise is ok in the library and music room. It was noted that it is difficult for people to gather in the lobby because they cannot hear each other. The recommendation is to do the gasketing of the doors to the art room and special education classroom as a first step.

Steps to take regarding acoustics:

- There was agreement that Gerry Boyle, Director of Facilities, will work with the school department to do the gasketing of approximately 12 doors as a test.
- A timeline will be set to do measurements once the pilot gaskets have been installed.
- Mr. Levi will provide the specifications and approximate cost for installing additional tectum to the cafetorium.
- Amy Spangler will talk with the staff about the use of tennis balls; the school department will investigate other products that may work better than tennis balls.
- Other than the gaskets on the doors, the lobby space will be deferred for now.

Building Evaluation

Gerry Boyle reported on a Wellington building evaluation. There are 20 items that have been identified. There were issues were regarding mechanical systems including the discovery that some valves that were still completely closed, that insulation was placed on the wrong duct system (on the return and not the supply). Mr. Boyle has ordered a re-inspection of the entire system, both during winter and summer operations.

Mr. Haley, Mr. Levi, Mr. Behrens, and Ms. Larsen left the meeting at 8:48 a.m.

Patricia Brusch chaired the remainder of the meeting.

Minutes – October 16, 2013 and November 13, 2013
Eric Smith made a motion to approve the minutes of the October 16, 2013 and November 13, 2013 meetings. The motion was seconded by Bill Lovallo and unanimously approved.

The next WBC meeting is scheduled for January 8, 2014.

Laurie Graham made a motion to adjourn the meeting at 8:50 a.m. The motion was seconded by Eric Smith and unanimously approved.

Respectfully submitted,

Mark Haley
Chair

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E-mail: postbox@acentech.com

Acentech

November 11, 2013

Mr. William Lovallo
Wellington Building Committee
Town of Belmont
121 Orchard Street
Belmont, MA 02478

DRAFT

Subject: Wellington School Acoustics Assessment - DRAFT
Wellington School
Belmont, Massachusetts
Acentech Project No.: 623729

Dear Bill:

We understand that occupants of Belmont's newly-constructed Wellington School have voiced concern over excessive noise and sound isolation issues within their new building. In response, you requested that Acentech perform a structured assessment of the school's acoustics in order to identify practical methods of eliminating or reducing these problems. Robert Berens and I visited the school on August 13, and August 21, 2013, to measure the reverberation and sound isolation in various spaces throughout the building. This letter contains the results of this assessment.

Sound Isolation

To evaluate the sound isolation at the Wellington School, we conducted field acoustical measurements to assess both airborne (Noise Insulation Class – NIC) and structure-borne (Impact Sound Reduction – ISR) sound isolation between several pairs of adjacent classrooms. These tests allow us to quantify the sound isolation: a greater NIC or ISR value indicates a greater level of sound isolation between the spaces measured. These tests also allow us to compare the results to school design guidelines that came into effect after the Wellington was built. Current design guidelines call for laboratory sound isolation values between classrooms of at least 50 for airborne sound, and at least 45 for structure-borne sound. Field measurements that show somewhat lower isolation (by 5 points or less) are typically deemed acceptable (an NIC of 45 and an ISR of 40).

Horizontal Sound Isolation

The airborne isolation provided by the classroom demising partitions appears to be substantially degraded by "leaks" in the partition, such as the communicating doors and the partition heads. Table 1, below, shows the results of horizontal sound isolation tests measured at the door ("at door") and at the center of the partition (overall). The data show that the measurements at the door are 4 to 10 points lower than those measured at the center of the partition, indicating that the door is the primary source of airborne sound transmission.

Table 1: Airborne Sound Isolation Measurement Results between Horizontally Adjacent Classrooms.

Partition Tested	Airborne Sound Isolation (NIC) at Door	Airborne Sound Isolation (NIC) Overall
Classroom 214 to 215	24	34
Classroom 172 to 174	25	29

The data in Table 1 also reports better "overall" sound isolation between Classroom 214/215 in comparison to Classroom 172/174. This difference could be attributed to a number of possible causes, including:

1. the size of the overall partition is smaller in 172/174 due to the adjoining bathroom and so we were closer to door when making the overall measurement,
2. some sound may transmit through the adjoining bathroom, as it contains a door to each classroom,
3. the sound could transmit through the flutes of the ceiling deck if the flutes are not completely sealed.

It is likely that all three of these aspects degrade the perceived sound isolation at this partition; however, we observed that the adjoining bathroom did not appear to be a dominant sound transmission path. Moreover, we localized the transmitting sound to the top of the partition, at the flutes, which we did not notice between Classroom 214/215. This suggests that some partitions may still require better seals at the flutes.

Vertical Sound Isolation

The airborne vertical sound isolation tested at approximately NIC 50 at both measurement locations. This is an appropriate level of airborne sound isolation between adjacent classrooms.

The impact sound isolation testing produced a wide range of ISR results, reported in Table 2. Although the impact sound isolation at the exposed deck is low, the sound isolation improves by more than 10 points in portions of the lower classroom beneath the ACT ceiling, and improves by more than 30 points when the upper classroom has carpet.

Table 2: Structure-Borne Sound Isolation Measurement Results between Vertically Adjacent Classrooms.

Partition Tested	Structure-Borne Sound Isolation (ISR) at Exposed Deck	Structure-Borne Sound Isolation (ISR) over Carpet or ACT Portion
Classroom 214 to 129	27	64 (carpet in 214)
Classroom 241 to 174	28	41 (ACT Ceiling in 174)

In addition to the ISR measurements, we also measured the sound levels while moving two chairs: one with tennis balls on its feet, and one without tennis balls. We measured the following sound levels in the classroom below:

- A background noise level of 24 dBA (no moving chair in the classroom above).
- A sound level of 29 dBA when moving the chair with tennis-ball feet.

- A sound level of 57 dBA when moving the chair without tennis-ball feet.

Moving chairs with and without tennis-ball feet were both audible in the bottom classroom, as is indicated by comparing the background sound level to the sound levels measured while the chairs were being moved around. However, although still audible, moving a chair with tennis-ball feet produces noise levels in the classroom below that are much more compatible with the existing background sound levels typical of the classrooms.

Circulation Spaces to Classrooms and Offices

In general, the airborne sound isolation between the Atrium/Gymnasium and sound sensitive spaces are consistent with our expectations for these types of adjacencies. Our measurement results are given in Table 3, below. The sound isolation between the Gymnasium and Atrium (NIC 25) and between the Atrium and Main Office (NIC 27) is limited by the doors at these adjacencies. Cumulatively, these partitions (which include doors) give an NIC of 56 between the Gymnasium and the Main Office. This result is consistent with current standards.

Table 3: Airborne Sound Isolation Measurement Results between the Atrium/Gymnasium and Sound Sensitive Spaces.

Partition Tested	Airborne Sound Isolation (NIC)
Gymnasium to Atrium	25
Gymnasium to Main Office	56
Atrium to Main Office	27
Atrium to Classroom 215	69
Atrium to Corridor outside Media Center	13

The airborne sound isolation between the Atrium and the classrooms is also consistent with our expectations, yielding a value of NIC 69 between the Atrium and Classroom 215, for example: a value that is consistent with current industry guidelines for these types of adjacencies. However, we understand that school occupants are experiencing high levels of sound transmission between the circulation areas and the classrooms or other sound sensitive areas. This may be due to high sound generation within the circulation spaces, rather than poor sound isolation.

Reverberation Time

Reverberation time is a measure of how quickly sound decays within a room: longer reverberation times indicate that the space preserves sound better, whereas shorter reverberation times show that the room allows sound to dissipate faster. Reverberation time is related to the room's volume and the acoustical absorption within the room. Current industry guidelines call for a maximum reverberation time of 0.6 seconds in classrooms that are 10,000 cu. ft. or less, and a maximum reverberation time of 0.7 seconds in classrooms that are between 10,000 cu. ft. and 20,000 cu. ft.

Classrooms

We measured the reverberation time in four classrooms. Our measurements range between 0.5 and 0.6 seconds. This is appropriate for learning environments of this size, and is consistent with current industry standards. Our measurement results are reported in Table 4.

Table 4: Classroom Reverberation Times.

Room Measured	Reverberation Time (seconds)
Classroom 215	0.5
Classroom 240	0.5
Classroom 174	0.5
Classroom 129	0.6

Large Spaces

We also measured the reverberation time in some of the larger spaces throughout the building, including the Gymnasium, Atrium, and Cafetorium. The reverberation times measured in these larger spaces ranged between 1.0 seconds to 1.3 seconds. These values, reported in Table 5, are acceptable for spaces of this volume. However, upon closer inspection of the acoustic response in each room, we noticed strong, early reflections. These early reflections can interfere with intelligibility and speech communication. Degradation in speech communication can cause occupants to speak louder in order to communicate, in turn, raising the overall sound level and encouraging occupants to speak even louder.

Table 5: Large Spaces Reverberation Times.

Room Measured	Reverberation Time (seconds)
Atrium	1.2
Gymnasium	1.3
Cafetorium	1.0

Recommendations

To improve the acoustical conditions discussed above, we offer the following recommendations.

Horizontal Sound Isolation

To improve horizontal sound isolation between classrooms, full perimeter, adjustable neoprene gaskets should be installed at the communicating doors. These gaskets should include a bottom seal and seals on both jamb and head. Best results will be obtained if the gaskets shown for "Type 2" or "Type 3" doors on the attached detail sheet are employed.

Once the communicating doors have been gasketed, sound isolation should be noticeably better than under current conditions. However, sound transmission may continue to be more noticeable at some partitions in comparison to others. In these cases, it is likely that another transmission path exists, most likely where the flutes of the deck meet the head of the partition. We understand that efforts have been made to seal the top of the walls to the deck above, but the work should be inspected if sound isolation continues to be an issue after the doors have been adequately gasketed.

Vertical Sound Isolation

The vertical airborne sound isolation is sufficient as is and does not require improvement. However, the structure-borne, or impact sound isolation could well be improved. The most cost-effective way to enhance vertical structure-borne sound isolation would be to install large area rugs or wall-to-wall carpeting in the second-floor classrooms. This would provide cushioning against the scraping of un-treated furniture feet, as well as hard-soled shoes, that is so audible in the first-floor spaces.

Circulation Spaces to Classrooms and Offices

The existing sound isolation between circulation spaces and classrooms/offices appear to be typical of these types of adjacencies. It is likely that the character of the sound produced in the circulation spaces can be reduced using sound absorptive finishes. See the "Reverberation" section below for more information.

Reverberation Reduction for Atrium, Gymnasium, and Cafetorium

The acoustical properties of the surface finishes in the large Atrium, Gymnasium, and Cafétorium spaces allow the reverberation times in these rooms to be acceptable, and in keeping with the volumes of these rooms. However, reducing early reflections of sound in these spaces will help enhance speech intelligibility, which, in turn, will help obviate the need for raised voices, and should help reduce the general reverberant build-up of sound within these rooms. Increasing the existing areas of sound-absorptive wall treatments with an NRC of 0.80 or greater in each of these spaces will help reduce reverberation times and will help make these spaces less noisy. We will work with you and the architect to determine appropriate locations and materials that could be installed to address the reverberation issues.

* * * * *

We trust that this report provides you with the information you need at this time. If you have any questions, please feel free to contact me at 617-499-8025.

Sincerely,

ACENTECH INCORPORATED

Alicia J. Larsen
Consultant

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Cc: Robert Berens, *Acentech, Inc.*

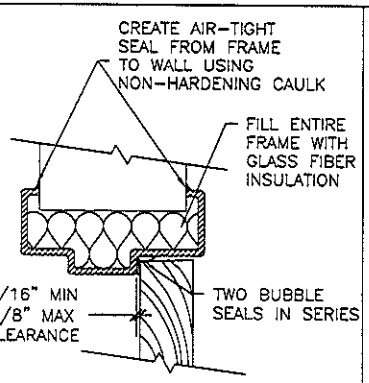
Encl: Acentech Door Types

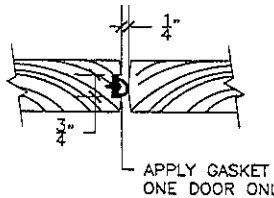
HEAD AND JAMB

ASTRAGAL

THRESHOLD

TYPE 1





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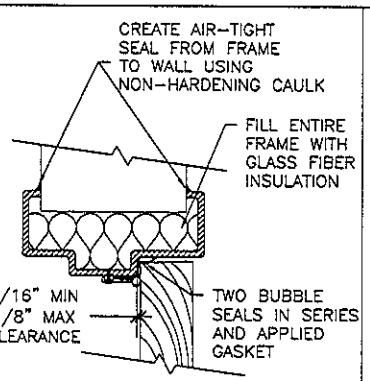

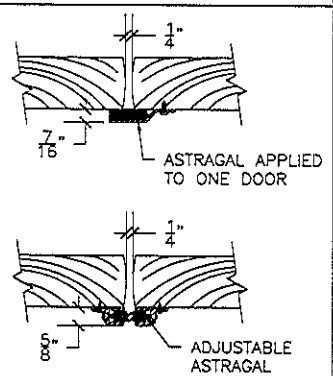

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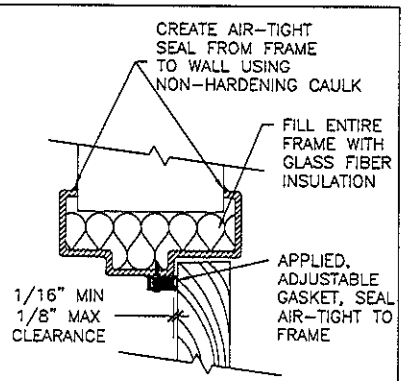
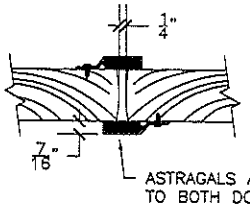
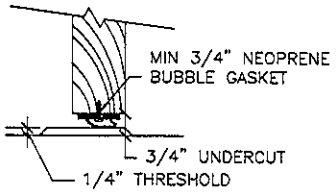




THRESHOLD NOTES:

1. FOR TYPE 1 AND 2 DOORS, WHERE A THRESHOLD IS NOT PERMITTED, USE AN AUTOMATIC DROP BOTTOM SEAL.
2. TYPE 3 DOORS, WHERE A THRESHOLD IS NOT PERMITTED, USE CAM LIFT HINGES.



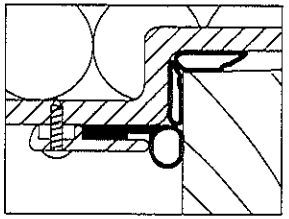
RECOMMENDED PRODUCTS

HEAD AND JAMB GASKETS			
	PEMKO	ZERO	NATIONAL GUARD
TYPE 1	S88	188	5050
TYPE 2	S88+319N	188+328	5050+137N
TYPE 3	379PK	870	141NB

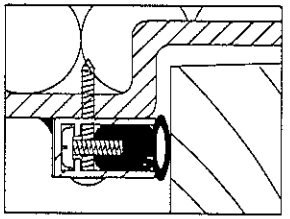
ASTRAGAL GASKETS			
	PEMKO	ZERO	NATIONAL GUARD
TYPE 1	313N	53-M	116N
TYPE 2 & 3	351PK	555	140S
TYPE 2 & 3 OVERLAPPING	375	140-M	109N

BOTTOM GASKETS			
	PEMKO	ZERO	NATIONAL GUARD
TYPE 1	314AN	52	112N
TYPE 2	314AN	52	112N
TYPE 3	314AN	52	112N
USE CAM LIFT HINGES AND OMIT BOTTOM GASKETS AND THRESHOLDS AT INNER SOUND LOCK DOORS.			

THRESHOLDS			
	PEMKO	ZERO	NATIONAL GUARD
TYPE 1	151 / 270	540	410 / 411
TYPE 2	151 / 270	540	410 / 411
TYPE 3	151 / 270	540	410 / 411
USE CAM LIFT HINGES AND OMIT BOTTOM GASKETS AND THRESHOLDS AT INNER SOUND LOCK DOORS.			



CROSS SECTION OF BUBBLE SEAL AND APPLIED GASKET



CROSS SECTION OF ADJUSTABLE GASKET

NOTES:

1. DOORS SHOULD BE SOLID CORE WOOD OR STEEL STIFFENED WITH FIBERGLASS FILL WITH 16GA. FACE SHEETS.
2. FILL FRAMES WITH GLASS FIBER AT GYPSUM BOARD OPENINGS AND GROUT-FILL FRAMES AT MASONRY OPENINGS.

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PROJECT NO: 623729
DWG DATE: AUG2013
SCALE: NTS
FILE NAME: --
DRAWN: ERW

WELLINGTON BUILDING COMMITTEE

ROGER WELLINGTON SCHOOL

BELMONT, MA

Standard Doors With Gaskets

Doors.3