Wenger
Your Performance Partner
ENSURING YOUR SCHOOL MAKES SWEET MUSIC:
HOW TO STRIKE THE RIGHT NOTE IN SCHOOL ACOUSTICS

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The Fundamental Requirements of a Music Suite
Project Sequence

- School Board Referendum
- Pre-Planning
- Programming
- Schematic Design
- Design/Development
- Construction Documents
- Bidding
- Construction
- Equipment Purchase
- School Opening
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What makes the Music Suite so unique?

• Learn by listening
• Large spaces/groups
• Expensive equipment
• Supporting multiple spaces for activities
• Dynamics of sound
Critical Factors

1. Acoustics
2. Floor plan
3. Storage
4. Equipment
Four Elements of Acoustics

1. **Cubic VOLUME**
2. **Sound ISOLATION**
3. **Acoustical TREATMENT**
4. **Mechanical SYSTEMS**
Element of Acoustics

Cubic VOLUME
Acoustics

Why is Cubic Volume so important?

TOO SMALL

• Primary reflections return too quickly
• No intelligible feedback for musician
• Short reverberation time
• Loudness
Why is Cubic Volume so important?

**BETTER**

- Slight delay of primary reflections
- Sound energy dissipated – loudness is reduced
- Provides envelopment – “presence”
- Reverberation time
Calculating Cubic Volume

• Ceiling Height – Impact on cubic volume
• Early Reflections – 30 to 50 msec
• Sound travels at approx. 1000’ per sec. – or 1’ per msec
• Performer in sitting position 4’ off the floor: 20’ ceiling = 16’ up, 
  16’ back is 32 feet or 32 msec
Interior equipment can reduce cubic volume
Consider: portable risers
Acoustics

Room Shape

Untreated Parallel Walls Cause Flutter Echo
Room Shape

Curved walls or domed ceilings focus sound creating a hot spot.
So what is the recommended Room Shape?

- Rectangular or Trapezoidal
- Avoid cubes, domes and curves
Element of Acoustics

Sound ISOLATION
Room Configuration

Be critical of adjoining walls between rooms

--allow for at least 4.8 – 10.2 cm “air space” between adjoining walls
The Complexity of Sound Isolating Wall Construction

- Normal Construction
- Proper Sound-Isolating Construction
- Staggered Studs
- Thermafiber Insulation
- Double Layer 2 cm Gypsum
- Continuous Sealant
- Cavity Creates Sound Isolation

Acoustics
Acoustics

The Complexity of Sound Isolating Wall Construction

Wall must seal at Roof Deck and Floor
The Complexity of Sound Isolating Wall Construction
The Complexity of Sound
Isolating Wall Construction

Wall must extend to permanent roof deck and seal at floor
Buffer Zones

1 Acoustics
Non-adjacent rooms can often be designed with pathways for sound.
Acoustics

Buffer Zones

Don’t forget the sound-isolating doors!
Acoustics

Sound Isolation Summary

• Walls sealed at base and ceiling
• Use of buffer zones is important
• Wall construction factors
Elements of Acoustics

Acoustical TREATMENT
Absorption and Reflection
Sound Diffusion

Without treatment, sound can be distorted
Sound Diffusion

Diffusion is the scattering and blending of sound -- the right mix of absorption & reflection
Acoustical Treatment Summary

- 2.54 cm (1") thick ceiling tile
- Minimum wall absorption thickness = 7.62 cm thick (3”)
- Consider room design – white board, windows; what else will be on the walls?
- Use hard surface floor covering -- no carpet!
Element of Acoustics

Mechanical SYSTEMS
1 Acoustics

**Airborne Noise**

**PROBLEM**
Airborne noise from restrictive air vents & noisy ventilation.

**SOLUTION**
Replace restrictive air vents with open grille and increase duct size.

Larger is quieter
Acoustics

**Lighting Buzz**

**PROBLEM**
Some fluorescent and tungsten light bulbs cause an audible “buzz”.

**SOLUTION**
Replace with incandescent or other lighting.
Critical factor number 2:

Floor Plan
How should the space be arranged?
CONSIDERATIONS
Floor Plan

LINE OF SIGHT

Diagram showing the layout of various rooms and areas, including Choral Rehearsal Room, Lab, Ensemble Practice Room, Parking, Auditorium, Orchestra Rehearsal Room, Band Rehearsal Room, Storage, and Office.
Critical factor number 3: Storage
Storage

Instrument storage areas are among the toughest

CAUTION:
Sufficient storage is the most overlooked element in schools! There is never enough!
3 Storage

Protect your school’s investment with proper storage

A typical international school can spend between US$50,000 up to US$500,000 on instruments alone!

Examples:
One Cello = US$2,500 to $4,000+
One Tuba = US$3,500 to $5,000+
One Violin = US$800 to over $2,000
Types of Storage

- Small Instruments
- Large Instruments
- Percussion
- Orchestra
- Marching Band
- Robes
- Uniforms
- Costumes
- Flags & Props
- Audio / Cables
- Sheet Music
- DVD & Video Storage
Storage Location

can improve traffic flow, reduce congestion and save space
Storage

Typical set of cabinets for 100 Band Instruments

Typical set of cabinets for 50 Orchestra Instruments
Critical factor number 4:

4 Equipment
What kinds of other equipment may be needed?!

- Music library cabinets (sheet music storage)
- Mobile cabinets (room to room)
- Storage and carry carts for chairs and stands
- Portable choral risers
- Portable acoustical shells
- Conductor’s stand and podium
- Staging, side and back rails, skirting, curtains
- Marching band accessories
- Music stand lights
- Large instrument storage, including pianos
Durable, High Quality Equipment is Less Expensive in the Long Run
Final Thoughts

• Early collaboration is important: solicit input from the school’s music educators & principal, BOD’s and other stakeholders

• Ask about future plans for music suite expansion & flexibility for new programs (choral, drama, jazz ensembles, etc)

• Check with other schools for their suggestions and “wish list” (“if only we had known....” or “if only we had thought to do this....now it’s too late...”); no regrets!

• A proper music suite can lead to productive teaching and engaged, enthusiastic students

• Acoustics, acoustics, acoustics!
THANK YOU - GRAZIE - GRACIAS - MERCI - DANKE

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