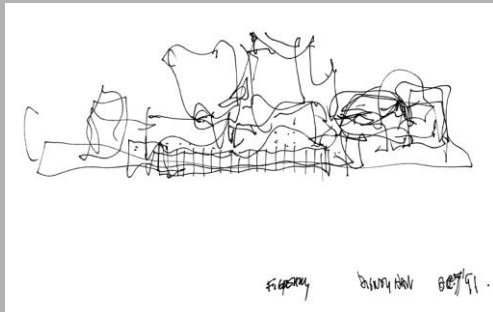


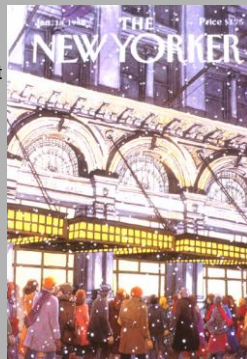
Auditoria Design



Walt Disney Concert Hall
Gehry

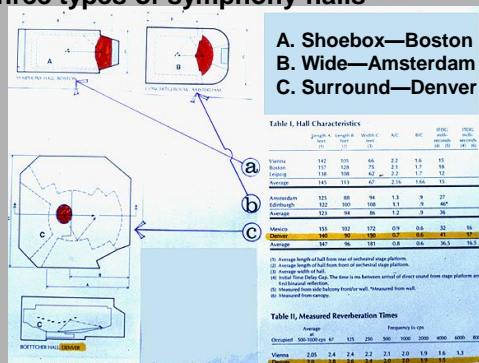
Full Range of Acoustic Issues

- Sound/Sight Lines
- Reverberation Time
- Electronic Enhancement
- Multipurpose Halls
- Noise Isolation
- Absorption
- Adaptation



Your Cultural Showcase

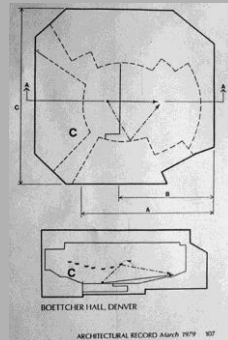
Three types of symphony halls

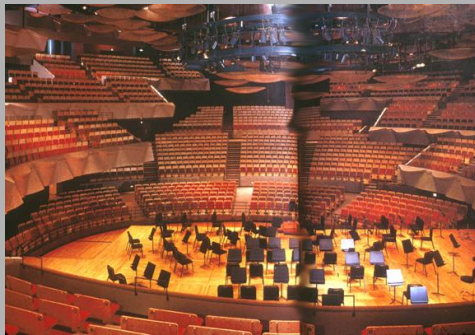


Boettcher Hall, Denver surround



Hardy Holtzman and Pfeiffer





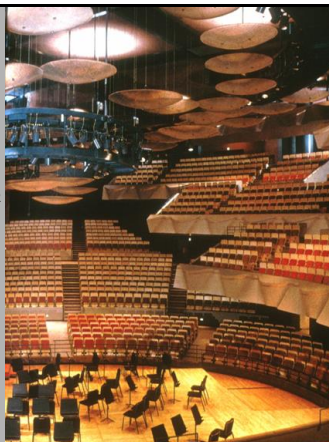
2750 seats, none more than 85 feet from stage

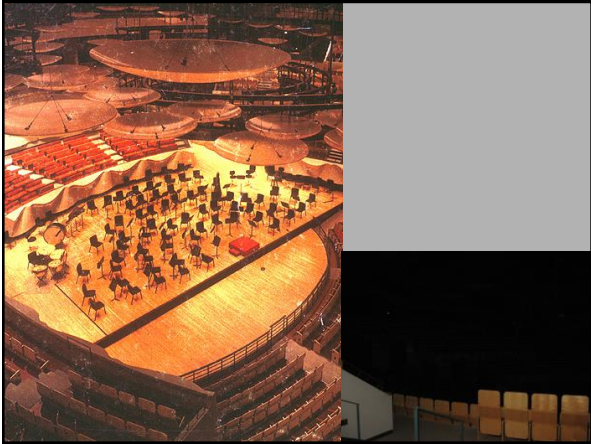
Convex "clouds"

Diffusing balconies

Reverberant chamber

Result is satisfactory T_R





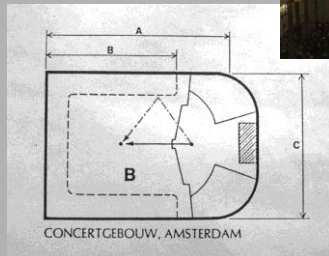




Royal Albert Hall, London



Wide Halls

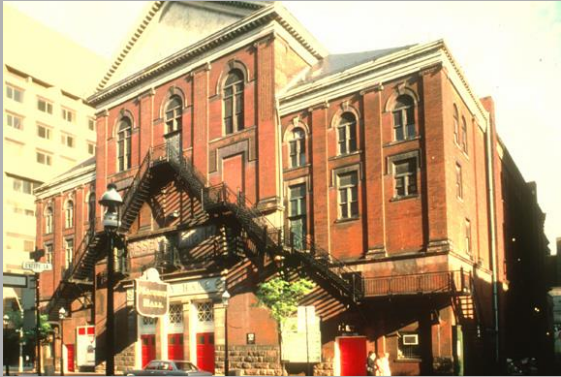


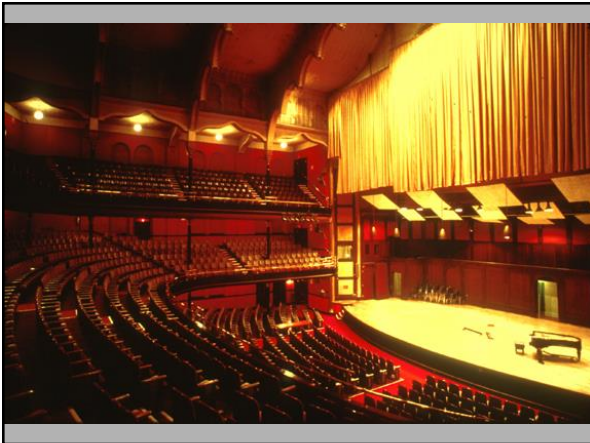
Orpheum Theatre, New Orleans



Uses electronics to enhance T_R

Massay Hall, Toronto



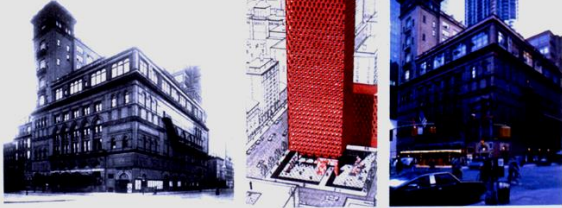


Carnegie Hall, NYC

How do you get to Carnegie Hall?



Carnegie Hall in 1919 and 1990 flanks 1959 proposal for a 44-story office tower clad in a red porcelain shading screen.



A YEAR OF TRIUMPHS
 URE LANDMARKS
 GREAT DEBATE
 IT'S CAST-IRON WIZARD
 IVAL IN
 UGUSTINE



$T_R = 2.15 \text{ sec}$

1986 remodel

1995 concrete slab
 discovered



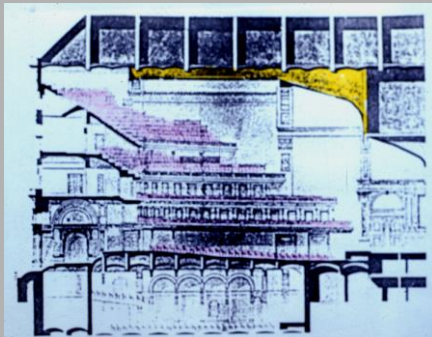
Carnegie Hall Section

Studios

Ductwork

Main Hall

Small Hall



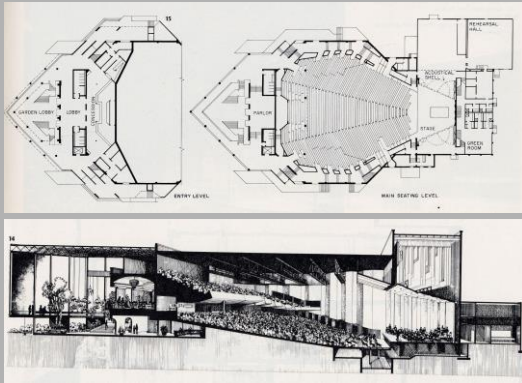




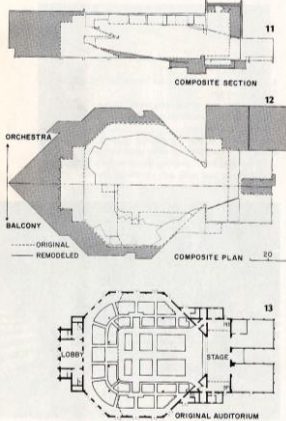
Mayor Bob Carr Auditorium, Atlanta

Original 1950s Hall
 $T_R = 1.1$ sec
 Folding Chairs on Slab!

1970s Remodeled Hall
 $T_R = 1.6 - 1.7$ sec
 Raked Seating



\$6 million remodel vs. Eugene's \$25 million new building



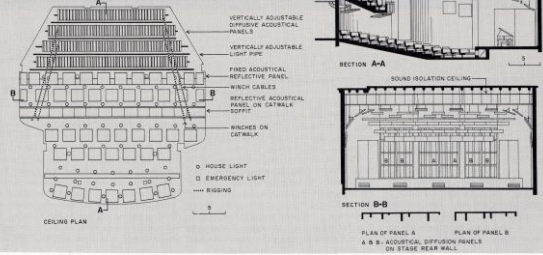
Abraham Goodman House, NYC

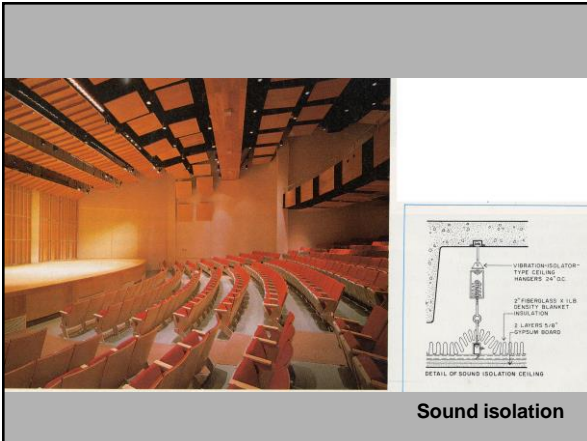


500 seats

sound reflection
adjustable "shell"

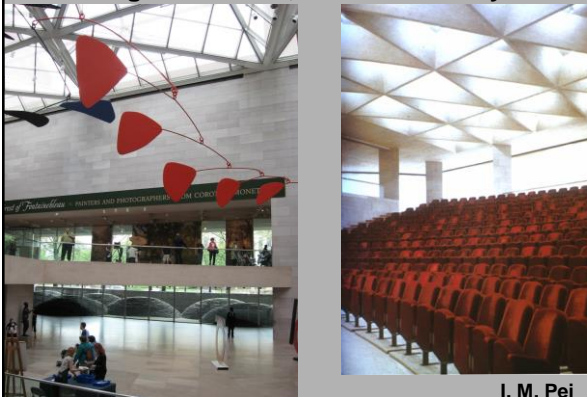
$T_R = 1.3 - 1.7 \text{ sec}$





Sound isolation

East Wing Auditorium, National Gallery of Art



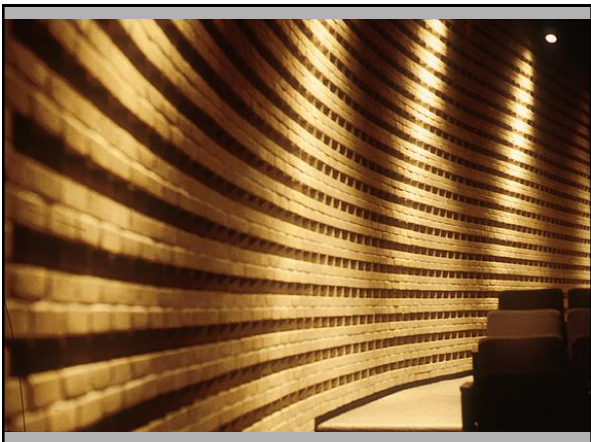
I. M. Pei



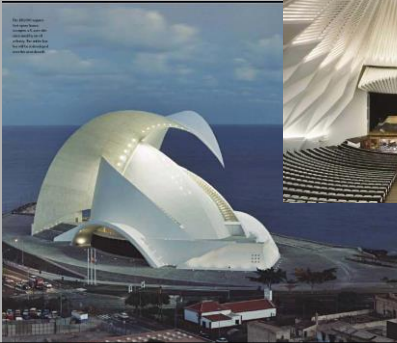
SF MOMA Auditorium, San Francisco

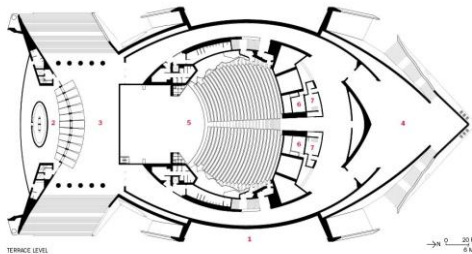


Mario Botta



Auditoriode Tenerife, Canary Islands Calatrava



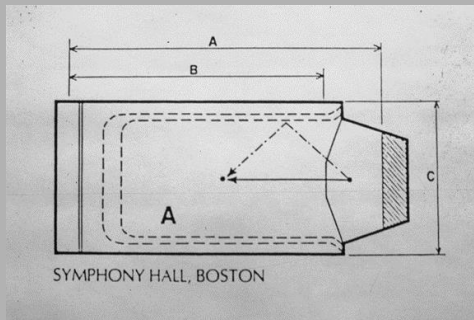


1. Plaza
2. Bar/caf 
3. South terrace
4. North terrace
5. Symphony hall
6. Control room
7. VIP room

TERMINAL LEVEL

3m 0' 20 FT
6 m

Classic Shoebox Hall

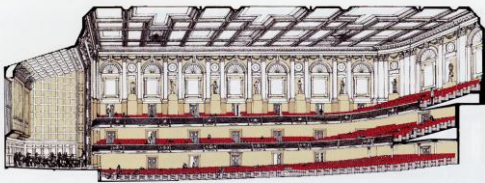


SYMPHONY HALL, BOSTON

**Boston Symphony Hall,
McKim Meade & White, 1900**



Wallace Sabine, acoustician

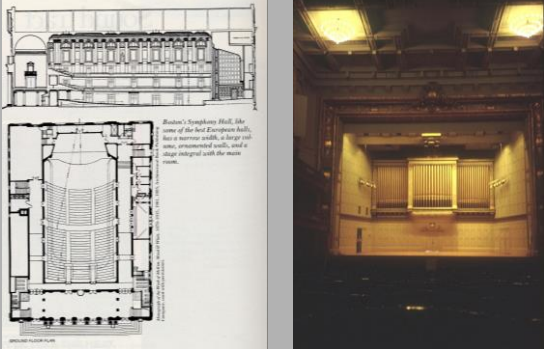


Before and after 2009 renovation...



Renovation to open clerestories
and illuminate niches



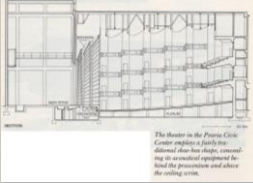




Boston's Symphony Hall, like some of the best European halls, has a narrow width, a large roll-on, ornamental walls, and a stage integral with the main walls.

$T_R = 1.7 - 2.1 \text{ sec}$

Peoria Civic Theatre

The theater in the Peoria Civic Center employs a fairly traditional floor plan, concealing its structural equipment behind the proscenium and above the ceiling area.

Uses assisted resonance to tune T_R

John F. Kennedy Center, Washington DC

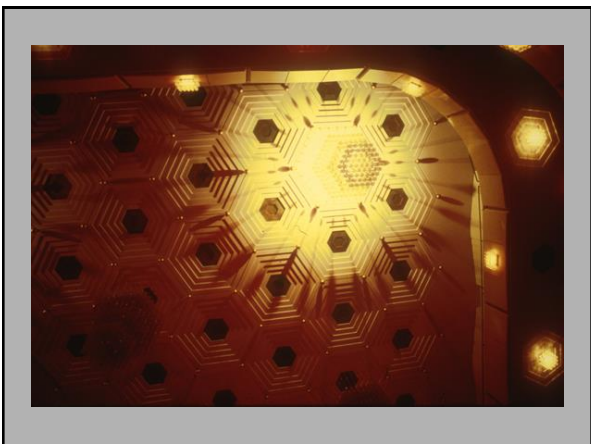


Symphony Hall – Opera House



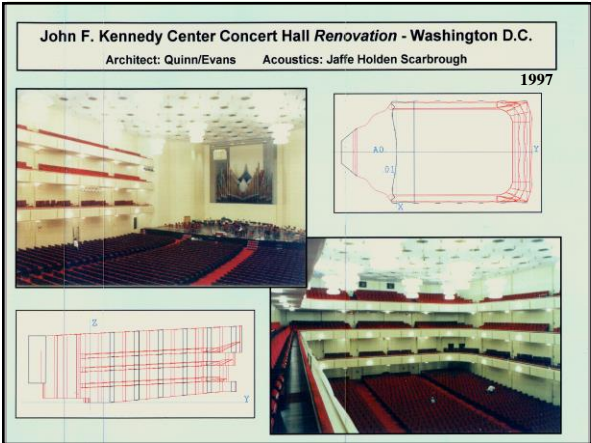
Symphony Hall

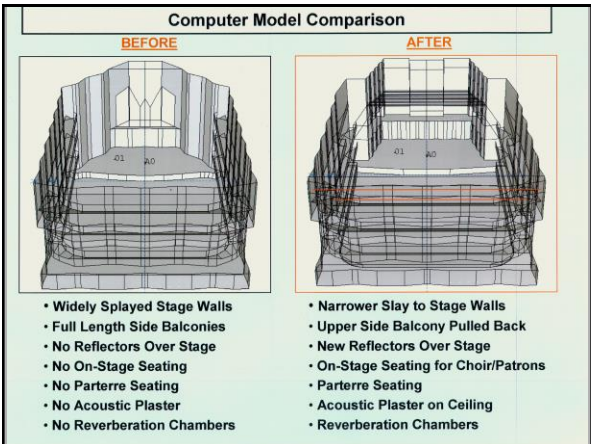


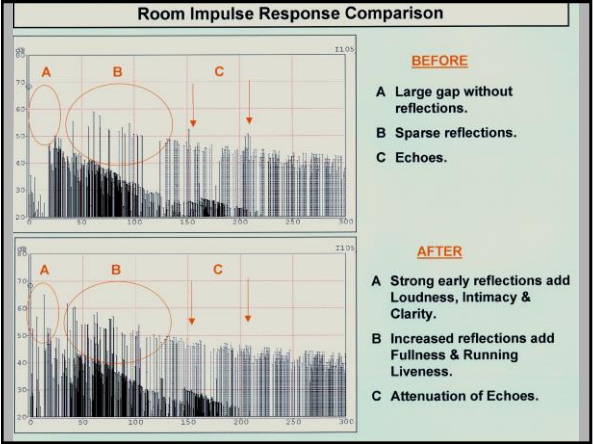




Opera House









THE NEW YORK TIMES, THURSDAY, OCTOBER 11, 1990

ARTS IN AMERICA
R. W. Apple Jr.

In a Transformed Concert Hall, Hearing Is Believing

WASHINGTON, Oct. 11 — At the Kennedy Center Concert Hall a month ago, Leonard Slatkin, the music director of the National Symphony Orchestra, was running through the repertoire it would play during its European tour.

An effie, energetic man, dressed in a red sweater vest, he bobbed around the podium, left hand on his hip, rehearsing Shostakovich's Second Symphony, then the Faure "Pavane," then Larsen Anderson's "Rainforest." The conductor's voice was masterful, full of rehearsal. "At 118, in the sixth bar, take a little more time before you get to the second note."

But when he stopped friends later, as workers applied the final touches to the hall's \$44 million face lift, there was no hiding his excitement. "It smells a little more 'breathable,'" he said. "It's a little brighter on stage. We'll work on that. And we need more comfort in the boxes. But from the first notes of the Shostakovich, it was as if the architect had been transformed in a minute. The strings could play without forcing, the winds were transparent."

From the orchestra seats halfway back, the improvement did indeed

Leonard Slatkin conducting a National Symphony rehearsal in the refurbished Kennedy Center Concert Hall.

An acoustic consultant himself, Mr. Lipnick said that Chris Jaffe, the acoustician for the renovation project, had "taken a finite space and made it infinitely better, changing it from the worst to maybe the best hall I've played in." The acoustic reflections of sound, which caused some players to hear two or three snare drums in Ravel's "Bolero" instead of one, have been tamed.

Now the dominant colors are beige and off-red (carmel and dusty rose, to use the officially sanctioned nomenclature), with bits of gold leaf and cherry wood for accents.

On the sides of the second tier, where customers used to face across the hall rather than toward the stage, the seats have been turned 90 degrees. New patterned boxes ring the

A change 'from the worst to maybe the best hall I've played in.'

Nouvel Says He Won't Attend Paris Phil Opening

By James S. Russell

January 8, 2015

Because “there were no acoustic tests in the concert hall. The schedule did not allow the architectural and technical requirements be respected.” —Jean Nouvel

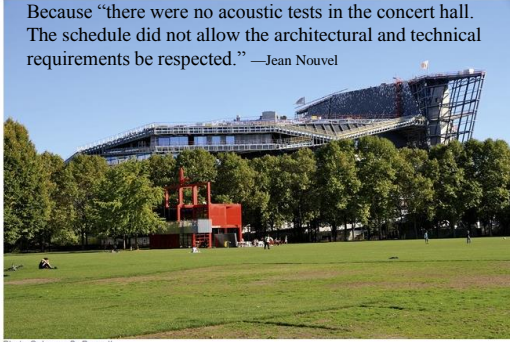
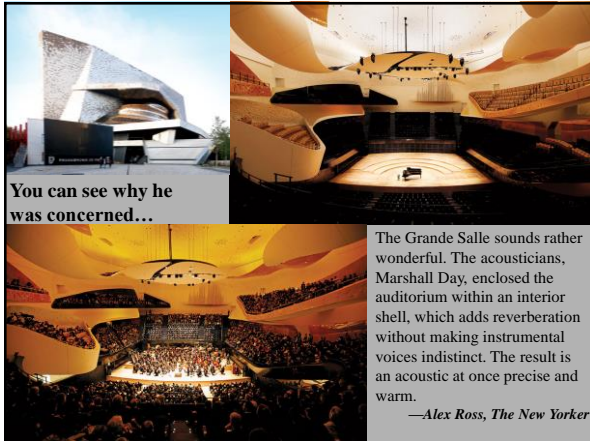


Photo © James S. Russell
The Philharmonie de Paris under construction in October 2014.



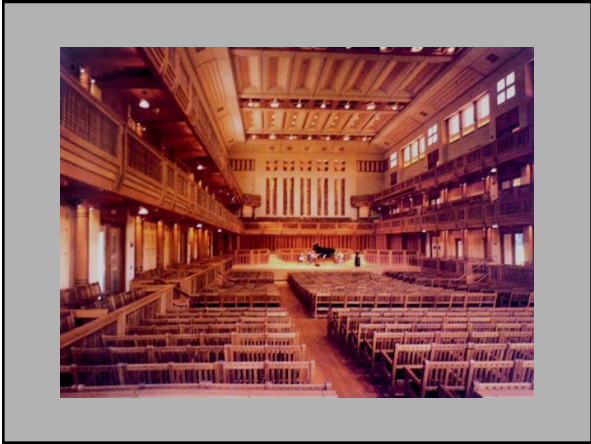
You can see why he was concerned...

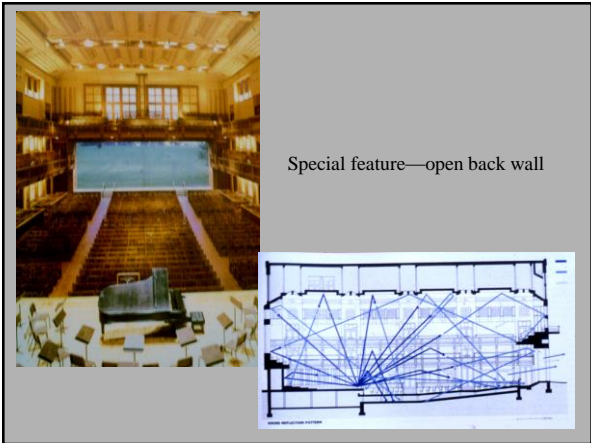
The Grande Salle sounds rather wonderful. The acousticians, Marshall Day, enclosed the auditorium within an interior shell, which adds reverberation without making instrumental voices indistinct. The result is an acoustic at once precise and warm.

—Alex Ross, *The New Yorker*

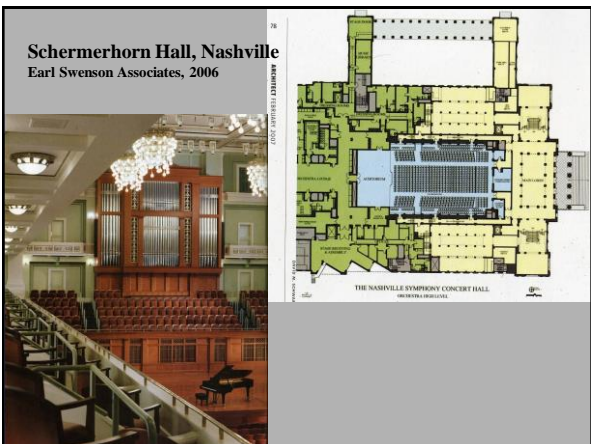
Seiji Ozawa Hall, Tanglewood, Mass.







Special feature—open back wall



Schermerhorn Hall, Nashville
Earl Swenson Associates, 2006

Special feature: Converts from concert hall to ballroom:



...uses raked seating 'wagons' to roll sections of seating in or out.

Joseph Mayerhoff Symphony Hall, Baltimore









**Kogod Cradle Theater
@ DC's Arena Stage**

Right: The spiraling path between the theater's concrete structure and its inner skin serves as a sound-and-light lock.

Below: Auralization helped demonstrate that the inner walls' poplar slats, bent to combine convex and concave radii, would effectively distribute sound.

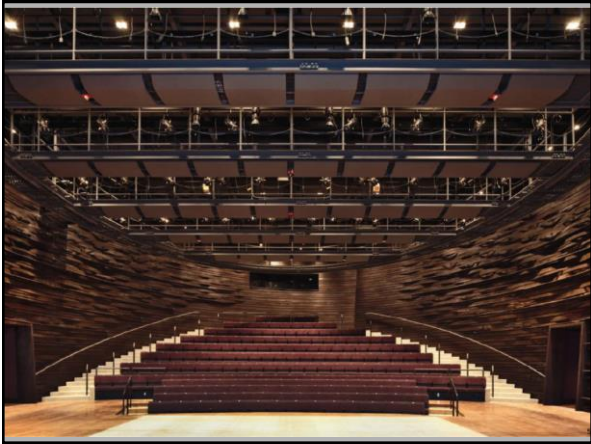
Photo © Nico Lehoucq

KOGOD CRADLE AXONOMETRIC

[dB] 1 kHz 0.00<t<00.0ms

Acoustic v8.0b 461433/100/0.13

Above: Acousticians closely examined how sound would be distributed over the Kogod's seating area, contributing to speech clarity.



Paramount Theatre, Aurora, Illinois

Former Movie/Vaudeville House

Now a Symphony Hall

