Lecture Hall Design - Main Issues

Design Brief

- Function: Lectures, presentations + multipurpose auditorium
- Audience Capacity: 200 persons
- Area: 3300 SF + 200SF Storage
- Stage function: Lectures, Presentations, Projection Area

Issues to avoid

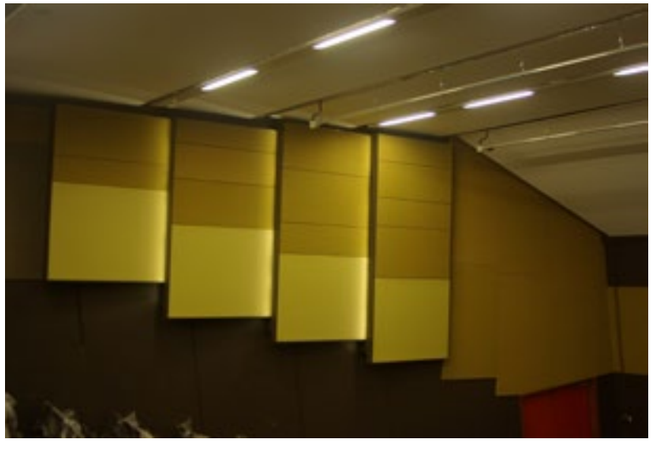
- Visual inconsistancy
- Echo, Fluttering Echo
- Unwanted sound reflections
- Excessive acoustic damping
- Cramped seating

Design Parameters

- Shape of the Lecture Hall
- Acoustic Comfort
- Optimum Reverberation time
- Visual Comfort
- Structural System
- Floor Pitch
- Interior Materials
- Acccessibility
- Ceiling Heights
- Seat Widths and Spacing
- Asile Widths
- Fire escape
- Easy access from all site buildings

Codes to refer

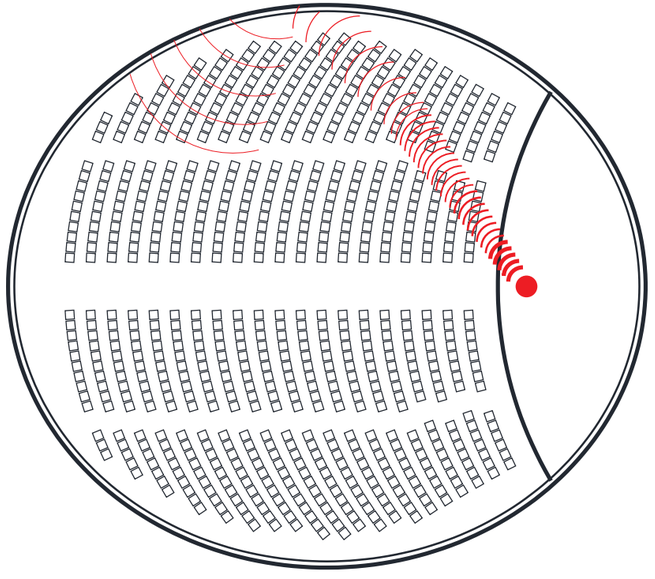
- Fire protectition codes (NFPA)
- International Buidling Codes
- American Disability Act

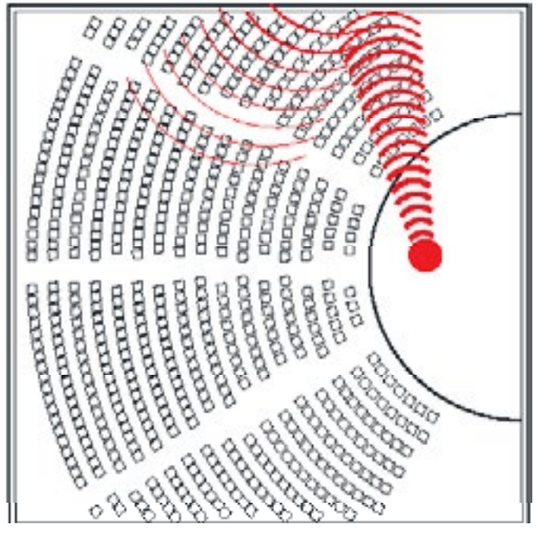


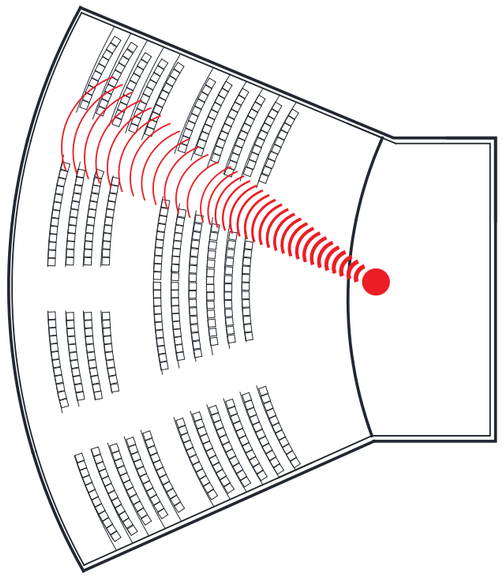
Spatial Typologies for Lecture Halls

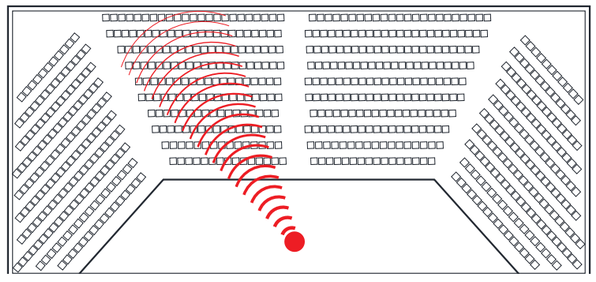
Criteria

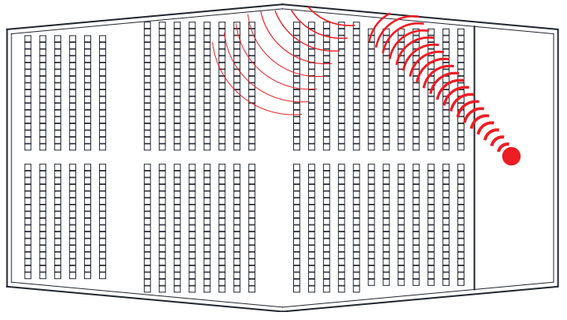
- Optimum sound propogation
- Visual Consistency for speaker and audience
- Non-parallel side walls to avoid flutter echo
- Typical chair width: 23”
- Typical chair longitudinal width: 38” including leg-room space
- Minimum asile width: 48”
- Typical Seating Slope: 8 to 15 dregrees







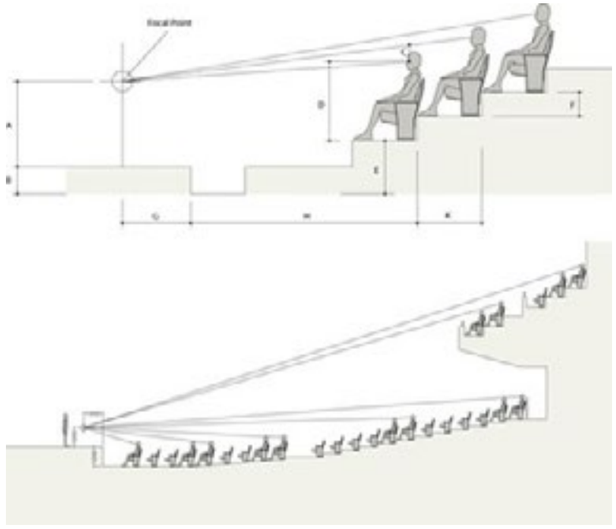




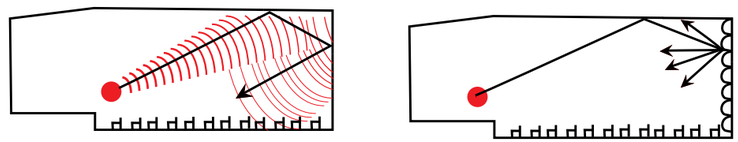
Acoustics

Acoustic Design Criteria

- Required Reverberation time = 0.16 V/A where V = Volume of the room, A = Total acoustic abrorption
- Avoid unnecessary sound reflections from the back wall
- Direct sound and vision from speaker to receiver always preferred



Floor Pitched 8 to 15 degrees to achieve direct views between audience and the stage

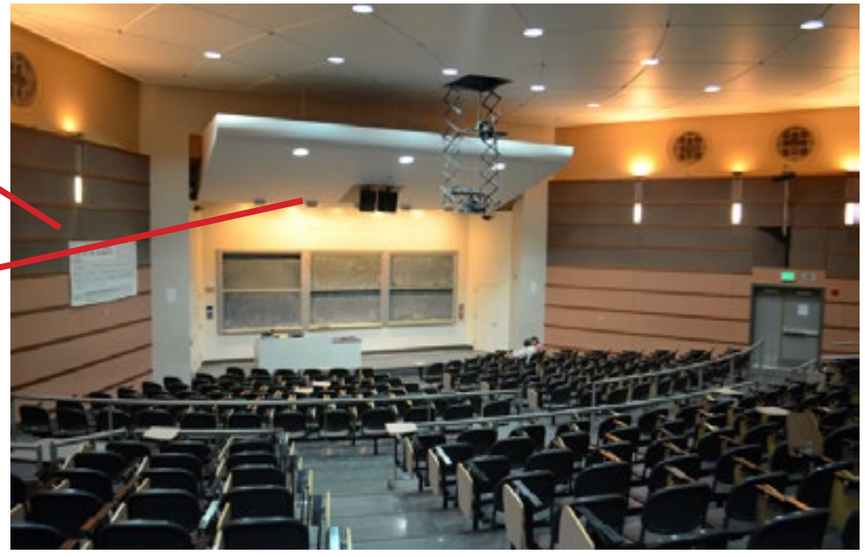


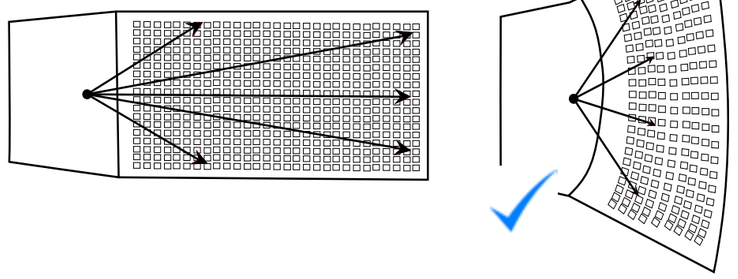
- Reflective back wall causes the sounds to bounce back causing unwanted reflections
- Acoustic treatment on back wall helps prevent unwanted noise by diffusion of sound in multiple directions

Acoustic panels on side walls

Reflective surfaces in front and ceiling for useful sound reflections

Non-parallel side walls to prevent flutter echo



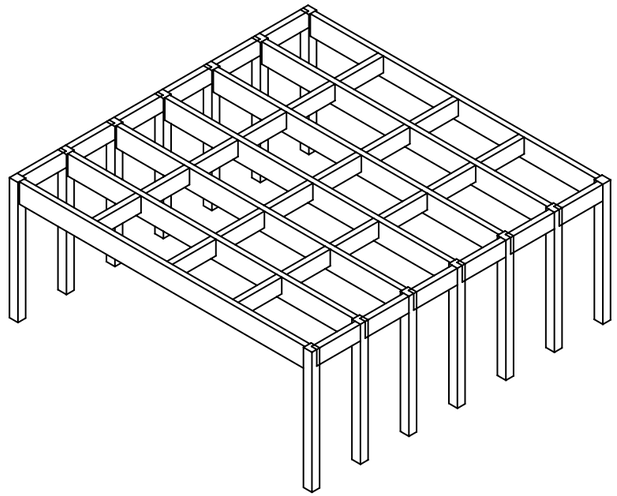


- Long auditoriams create echo and causes visual and audio inconsistency of sounds from speaker to receiver due to major differences in distances
- Narrower and wider auditoriums create consistency of sound and vision.

Structural System

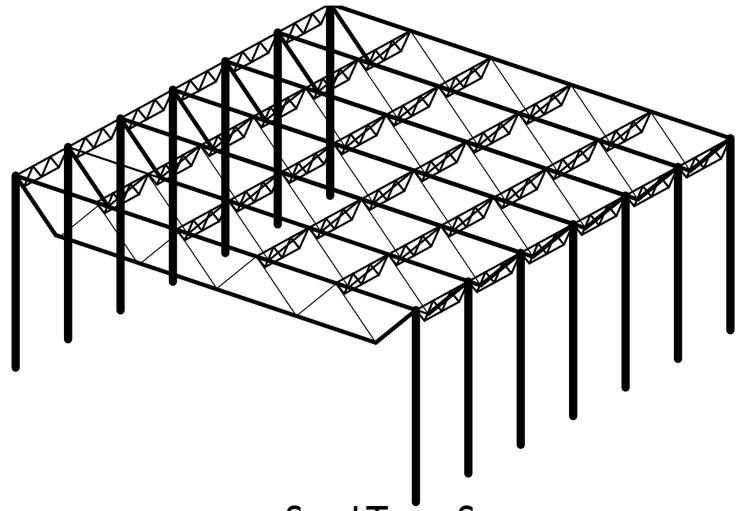
Structural Requirements

- Choice of structural system depends on floor layout, availability of materials, type of material transportation and design aesthetics
- L = Long span of the beam / truss
- d = depth of the beam / truss



Reinforced Concrete Frame System

- Casted on site
- Precast concrete is also a possibility
- Typical L / d = 15 - 20



Steel Truss System

- Transported and Assembled on site
- Typical L / d = 10-15

Wood Truss System

- Depth and spans depend on type of wood
- Wooden roof provides an aesthetics appeal
- Contributes to sustainable construction

Concrete Shell System

- Casted on site
- Thin depths possible as compared to concrete frame construction
- Light in weight
- Typical 100 ft span give 5-8” shell thickness

Steel Space Frame System

- Assembled on site
- Thin depths possible as compared to concrete and steel trusses
- Light in weight