

# تصميم المسارح الاعتبارات الخاصة بالتصميم

## الاعتبارات الواجبة مراعتها عن تصميم المسارح :-

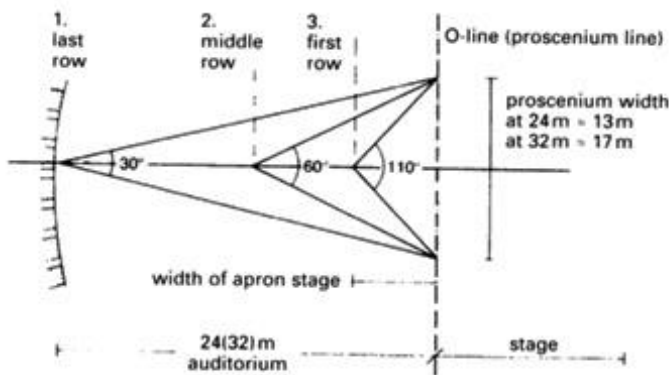
- يتوقف تصميم المسارح على السعة المطلوبة للجمهور، ونوعية العروض، وبالتالي حجم خشبة المسرح، والعلاقة المطلوبة بين الممثل والمتفرج.
- اختيار النظام الانشائي المناسب لصالة المسرح مع مراعاة تشكيل الاسطح الداخليه للمعالجات الصوتيه.
- شكل القاعه وعدد الكراسي وطريقة وضعها داخل القاعه.
- خطوط وزوايا مخروط الرؤية .
- الارتفاعات داخل القاعه .
- مواد النهو والتشطيب (اسقف – ارضيات – حوائط – الفرش الداخلي للقاعه ) .
- الانظمة التقنية الموجوده في المسارح (كهرباءواضاءة – صوتيات – تكيف – انذار واطفاء حريق – توصيلات ميكانيكيه ) .

## نظريات هامة يجب مراعاتها عند التصميم

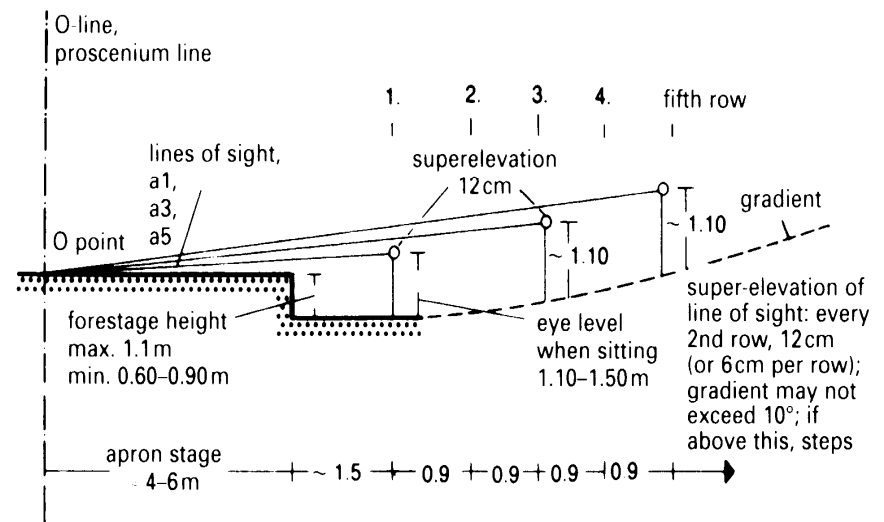
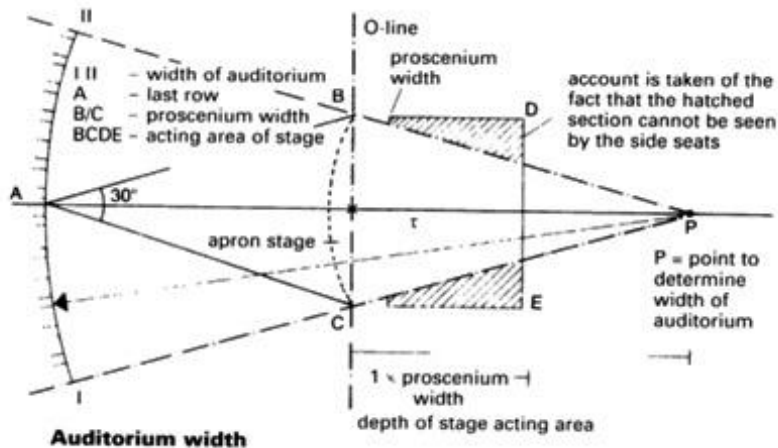
- ارتفاع فتحة المسرح: يكون عرض الفتحة من 9-12م للدراما، ومن 12-15م للموسيقى. أما ارتفاعها فيكون من 4.5-6م للدراما، ومن 6-9م للموسيقى.
- السقف: يجب أن يقع السقف في المحور الطولي للمسرح، وفوق خط مستقيم يتجه من نقطة واقعة على ارتفاع 3م فوق أرضية أعلى مكان في الصالة، إلى نقطة على جدار المسرح بعدها عن الأرضية  $\leq$  عرض فتحة خشبة المسرح.
- السلالم الداخليه للمسرح: توضع في كل جانب من جوانب المسرح، ويكون عرضها  $\leq 1.5$ م، أما في المسارح التي لا يتجاوز الحضور فيها عن 800 شخص وبمساحة لا تتجاوز 250م<sup>2</sup> فيمكن أن ينخفض عرض الممرات إلى  $\leq 1.1$ م، ويخصص 1م عرض لكل 100 شخص.
- الأبواب: يكون عرض الأبواب بمقدار 1م لكل 100م<sup>2</sup> من مساحة المسرح بحد أدنى، وعند مستوى المسرح يوضع بابان  $\leq 1.25$ م عرض، ولكن  $\geq 1.5$ م.
- ممرات صالة المسرح: يكون أكبر عدد ممكن من الكراسي في الصف الواحد 14 كرسي، لغرض رؤية خشبة المسرح بطريقة وضع الممرات الإشعاعية حيث تفضل هذه الطريقة، كما ويفضل الممر الإشعاعي المستقيم عن الممر الإشعاعي المقوس، والممرات العمودية على خشبة المسرح .
- الجدران: تكون جدران المسرح مصممة تماما، ومحشوة بمواد عازلة للصوت ومكسوة بمواد مشتتة أو ماصة للصوت حتى لا ينعكس الصوت ويشكل مصدر جديد ويحدث صدى وتشويش للصوت المصدر.
- الارضيات : عند تصميم المسارح يجب الانتباه إلى تغطية الأرضية بالسجاد، حيث يعتبر من أفضل المواد الماصة للصوت، كذلك يؤدي إلى التخلص من ضجيج الحضور عند حركتهم داخل المسرح.

## خطوط وزوايا الرؤية:

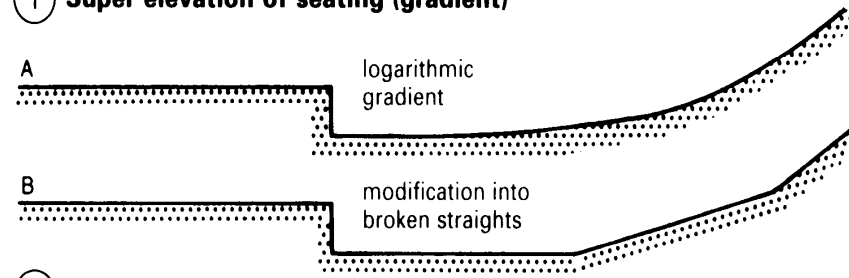
خطوط الرؤية: تكون أكبر زاوية أفقية في خطوط الرؤية بمقدار 06° وإلا يحدث تشويه في الصورة، كما وتعتبر زاوية 33° أكبر زاوية رأسية مساعدة على قدرة تمييز الممثل على خشبة المسرح.



Proportions of the traditional auditorium (view)

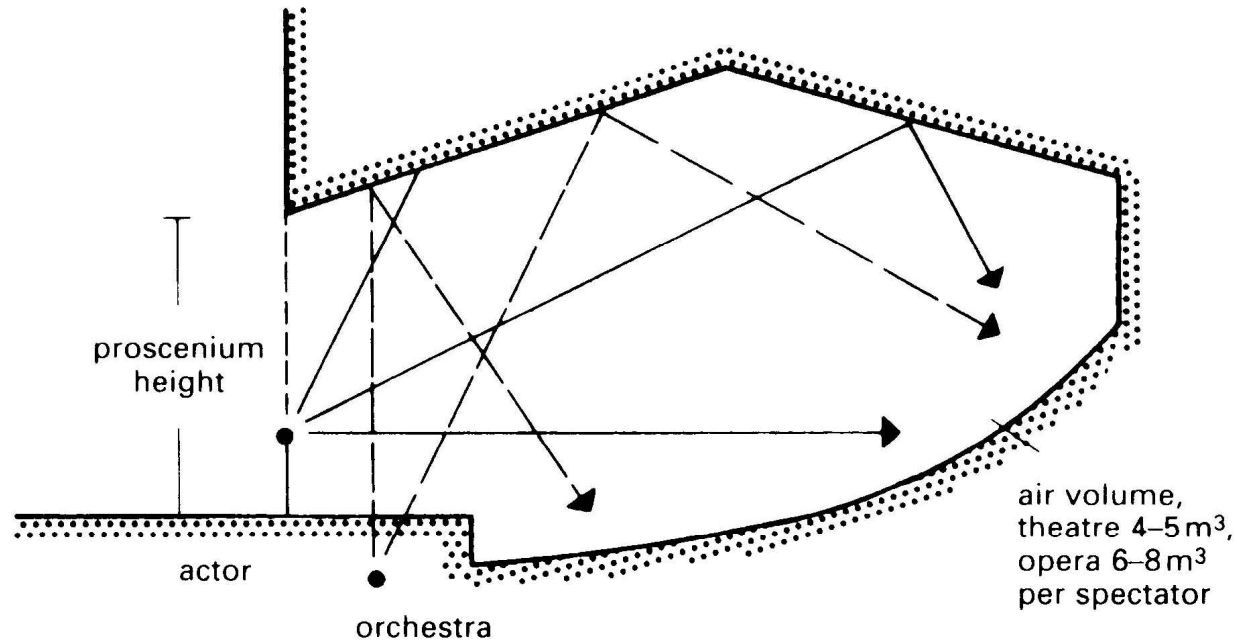


### ① Super elevation of seating (gradient)



## معالجة الصوت :

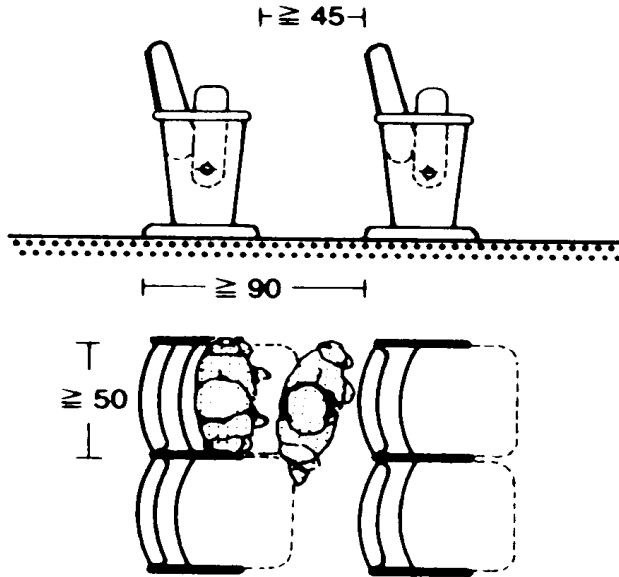
الصوت من العوامل المؤثرة داخل المسرح حيث انعكاسات الصوت ومداه فيجب اولا مراعاة التصميم الداخلي للكسرات وايضا علاقة الفراغ وحجمه بأرتفاعه وكمية الهواء الموجود في الفراغ لان الهواء هو العامل الناشر للصوت واختيار جميع مواد النهو والتشطيب لخدمة ذلك .



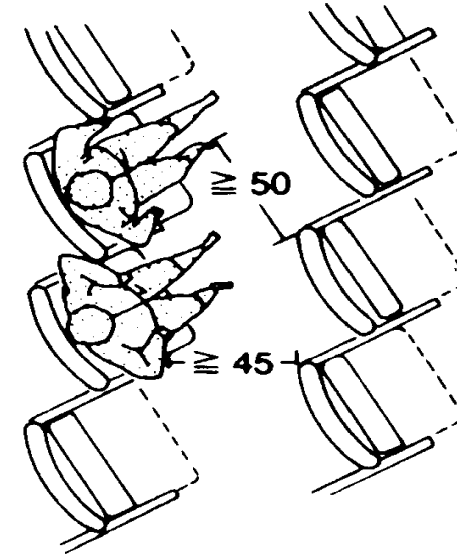
**Ceiling shape and sound reflection**

## كراسي المسرح:

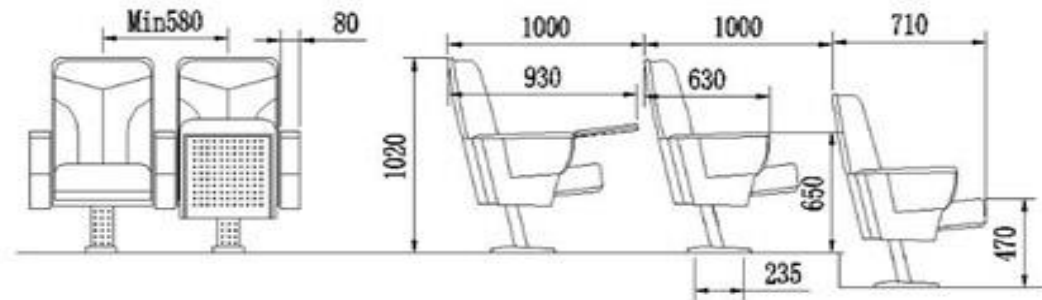
يجب أن تكون المسافة بين خلف الكرسي لخلف الكرسي من 90 سم إلى 144 سم، حيث تكون المسافة الأخيرة مناسبة للمتفرج بحيث لا يقف لتمرير متفرج آخر في نفس صف مقاعد المسرح و ممكن من وضعها مائله علي زاوية 30.



- 1 All seats apart from boxes must have fixed, self-operating folding seats with the above minimum dimensions



- 2 Offset folding seats provide elbow space





## مواد النهو والتشطيب الداخلي للمسرح :

- يجب ان تكون ملائمة لوظيفة المسرح (مسرح تمثيل – مسرح غنائي – مسرح استعراضى – مسرح متعدد الاستخدام).
- يجب ان تكون ممتصه للصوت . يجب ان تكون كاتمه للصوت في بعض الاحيان . يجب ان تكون قابلة للتشكيل .



KT MOON, FIDAMO





*Interior of the Auditorium Theatre (1889), Chicago, designed by Dankmar Adler and Louis Sullivan*



*A theatre in Belfast with a faceted timber interior is another of the six buildings shortlisted for the 2012 Stirling Prize and was designed by Irish architect O'Donnell*

## MASRAH AL QASBA THEATER

Location :Sharjah, united arab emirates

Architect : Magma Archtute.

Mechanical & Electrical

Engineering: Sarraj SMEP Engineering  
Consultants.

Project Year: **2012**

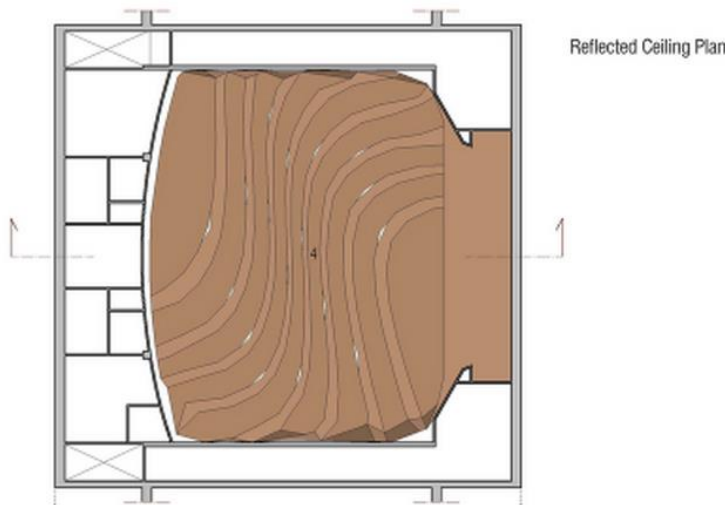
Project Area: **820.0 sqm**





# MASRAH AL QASBA THEATER Design

**DESIGN :** Undulating surfaces with light strips on fold lines scatter across the ceiling evoking images of evening sun streaking sand dunes.

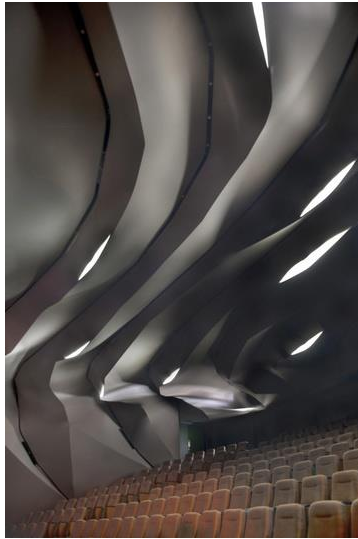


- Lights on fold lines gently accentuate the double curvature shapes.
- The design enables illuminating the space without blinding the visitors with lights.
- Placed on the inclined ceiling surfaces facing the stage the auditorium lights remain invisible from the spectator seats

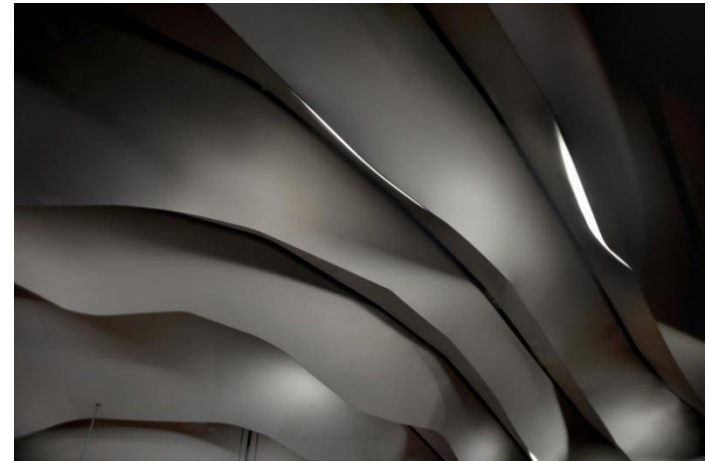
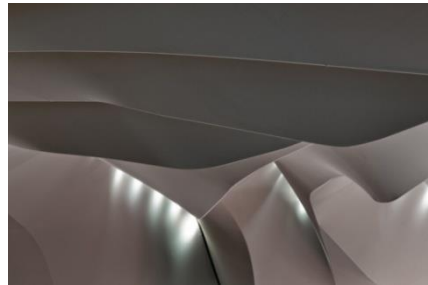


# MASRAH AL QASBA THEATER

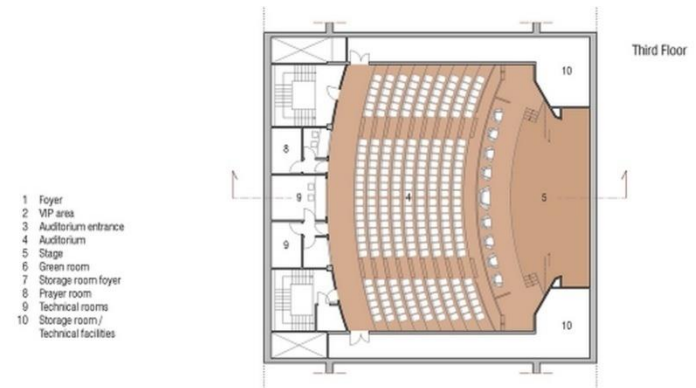
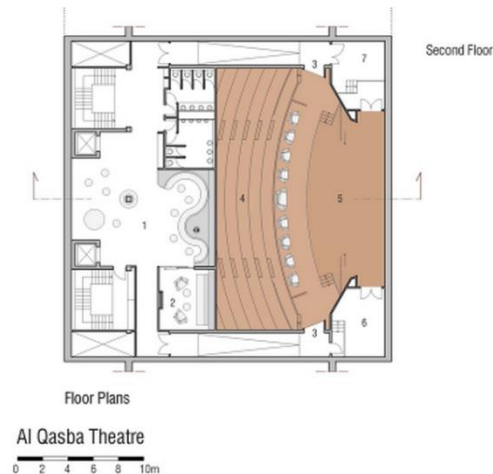
## Design



- The interior skin is created out of textile, a traditional building material in the region,



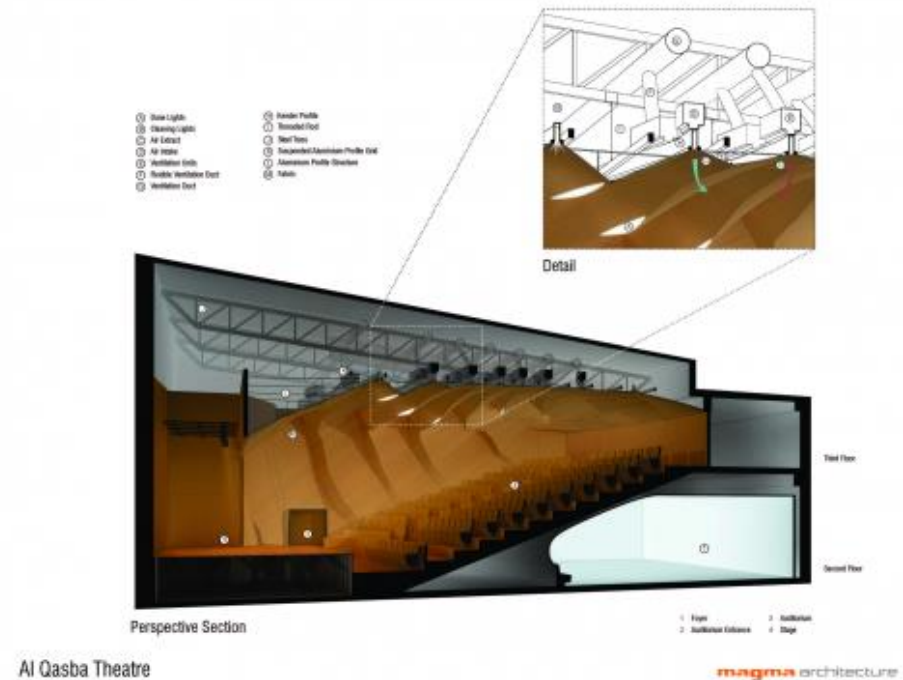
The textile wraps the walls and ceiling of the 300 seat auditorium space in a continuous smooth surface.



# MASRAH AL QASBA THEATER

## Technical Details

Ceiling and walls of the auditorium are covered with a polyamide and spandex textile stretched over an aluminium substructure. Telescopic rods push out the expandable fabric to form the hills and valleys of the enclosure. The fire rated fabric is fixed with Keeder clips into a framework of aluminium profiles. Technical installations such as air conditioning, sound equipment, light fittings, electrical wiring and acoustic insulation are concealed behind the porous fabric surface. Maintenance spot lights and ventilation outlets and intakes are recessed in ceiling joints..





# OPERA HOUSES & PERFORMING ARTS SPACES



# Introduction:

Performing arts spaces fall broadly into two categories :

- The first includes spaces that are intended primarily to house one type of performance activity (Drama theatres, Opera houses, Concert halls, Ballet and other dance theatres, film theatres , musical theatres)
- The second includes those designed to accommodate two or more such activities within a single space.....these are referred to as multipurpose or multiple-use performing arts theatres.

### *Opera and theatre:*

*There are two different expressions of theatre building: the **opera** and the **theatre**.*

*The **opera** is in the tradition of the Italian opera buildings of the 18th and 19th centuries. It is characterised by a clear spatial-architectural separation between the audience area and the stage by the orchestra pit, and through large seat numbers (1000 to almost 4000 seats), as well as the corresponding box system and the circles necessary for large numbers of spectators, e.g. Teatro allo Scala (Milan) with 3600 seats, Deutsche Oper (Berlin) with 1986 seats, Metropolitan Opera (New York) with 3788 seats, Opera Bastille (Paris), 2700 seats.*

*The **theatre** is structurally in the tradition of the German reform theatres of the 19th century. It is characterized by the stalls arrangement (i.e. the audience sit in a large ascending curved area) and by a distinctive, front acting stage (an acting area in front of the proscenium in the auditorium).*



**There are different architectural Forms for the performing art space of the theatre depending on:**

- Type of performance
- Seating capacity
- Historical precedents

These types are :

- **Proscenium Theatres.** (total separation of performers from audience)

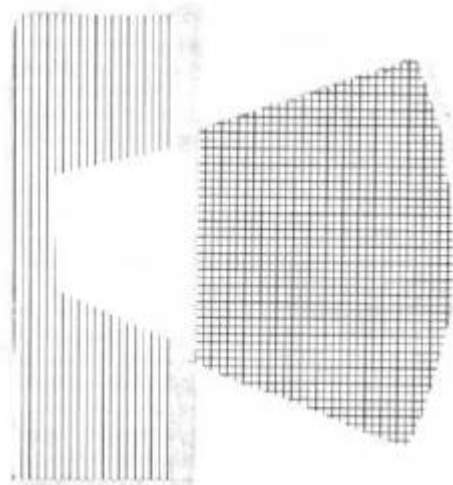


Fig. 1 The proscenium shape.

- **Arena Theatre.** (audience surrounding performers from four directions).

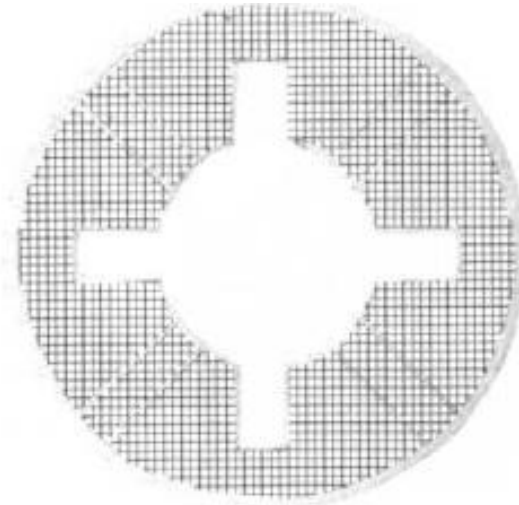


Fig. 3 The arena shape.

- **Open thrust theatre** (performers and audience share some common space)

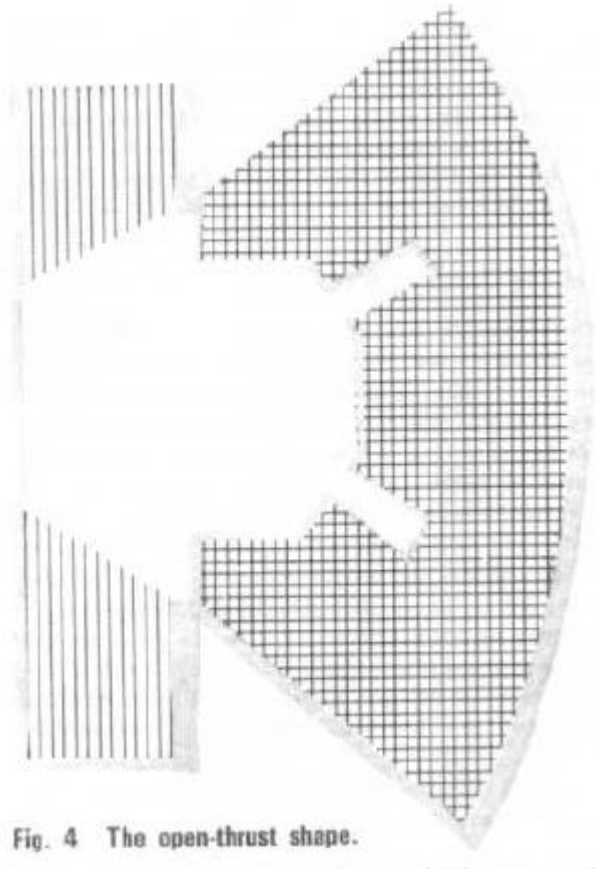


Fig. 4 The open-thrust shape.



Relationship between form and performance type:

Performance type	Common form
Drama	Proscenium, Arena, Thrust stage
Opera	Proscenium
Music concerts	Single volume music room(traditional), arena.
Ballet and other dance	Proscenium
Musical theatre	Proscenium
Film	Own archetype

Usually an Opera theatre has the same common characteristics of other types of theatres except for slight differences:

A good stage width for a play is not much more than 10.8 m while opera stages may open to as much as 18.3 m.

**Seat count:**

Optimum area needed per seat : 0.75-0.85 m<sup>2</sup>  
for movable seating: 1.2-1.4 m<sup>2</sup>

**Plan arrangement:**

Distances:

Performers expressions are difficult to see beyond 12.2 m

Gestures past 20 m

Large body movements between 20-34 m

The normal cone of optimum vision covers 30 degrees vertically and 40 degrees horizontally.

- Broad gestures by single individuals are important in grand Opera presentation, musical comedy and dance.

### مدى الرؤية فى بعض المسارح:

مدى الرؤيا م	المسرح
21	مسرح في Magdeburg
26	المسرح الرئيسي في Gelsenkirchen
27	المسرح الرئيسي في Bochum
28	مسرح Prinzregent في نيونخ ، أوبرا Hambourg
29	مسرح Schiller في برلين
30	المسرح الوطني في Mannheim ، ونجم المسرح في Dessau
31	المسرح الوطني في ميونيخ
32	Burgtheater في فيينا ، والمسرح الرئيسي في Malano
33	دار الاوبرا في برلين ، وصلات الاحتفالات في Bayreuth
35	مكالا ميلانو ، واوبرا Colegne
36	دار الاوبرا في Dresde ، المسرح الشعبي في برلين

5 - مدى الرؤيا في بعض المسارح

## Proscenium widths for kinds of theatrical productions, in metres

	<b>Minimum</b>	<b>Usual</b>	<b>Reasonable maximum</b>
Drama	8	10.8	12.2
Vaudeville, revue	9.2	10.8	13.8
Musical comedy, Opretta	9.2	12.2	15.2
Presentation, Opera	12.2	15.2-16.8	20

## Acoustical requirements for different performance

Performance type	Acoustical environment	Architectural impact
Symphonic and choral music	Very live and resonant with good definition, brilliance and warmth.	House encloses a very large cubic volume of some 10-12.8 m <sup>3</sup> per audience seat, hall width is narrow 24.4-27.6 m, materials of construction are heavy, dense and acoustically reflective.
Opera and Ballet	Moderately live with some resonance, good definition, brilliance and warmth.	Houses encloses about 20 to 40% less cubic volume than spaces for symphonic music. materials of construction tend to be heavy, dense and acoustically reflective.
Drama	Dry and articulate to foster good speech intelligibility.	House encloses the smallest cubic volume consistent with seating requirements and architectural aesthetics. A mixture of acoustically reflective and acoustically absorptive materials is used.

## Orchestra pit:

Grand opera from the late 19<sup>th</sup> century is frequently scored for an orchestra of 100 or more musicians.

The area for an orchestra pit will fall between 1.7m<sup>2</sup> – 1.9m<sup>2</sup> per musician.

The pit should be deep enough so that the orchestra is completely out of sight of the audience.

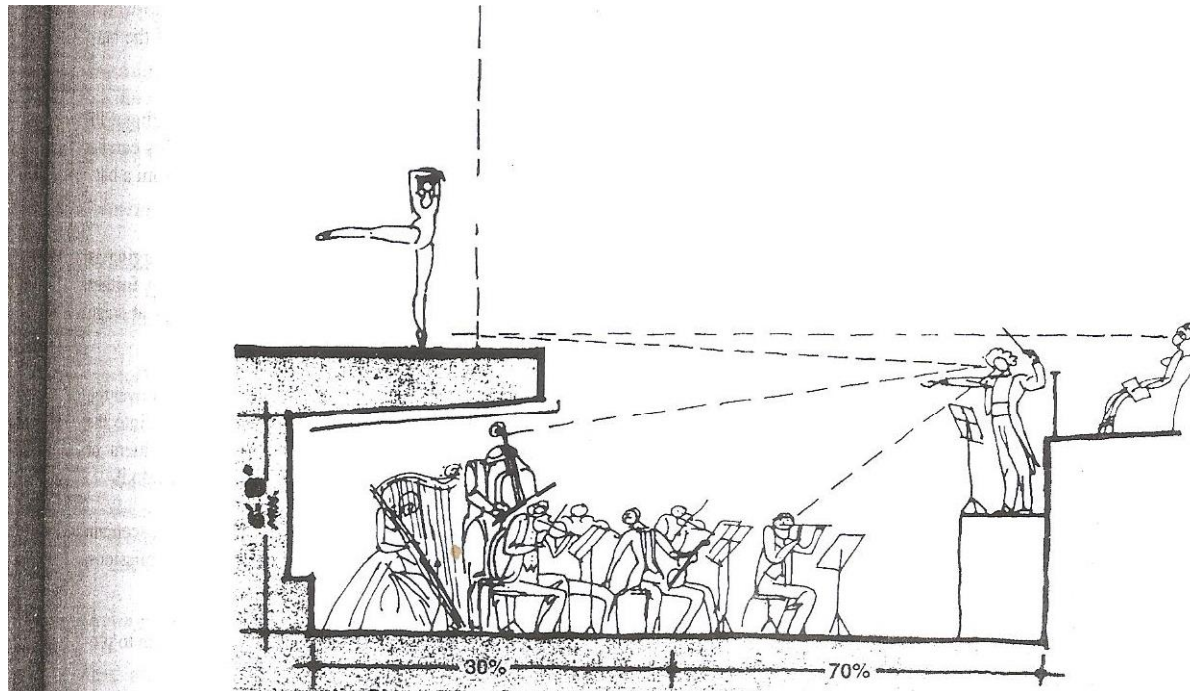


Fig. 39. Section through a typical orchestra pit. The conductor must be able to see every member of the orchestra and all of the performers on stage without interfering with audience sight-lines. When the pit extends under the stage, no more than 30 percent of its total area should be under the overhang. The thickness of the stage lip must be minimized to avoid exaggerating the depth of the pit.



## Functional requirements:

### *Performance space:*

*It is typically 18.2 \* 15.2 m deep*

### *Enclosure:*

*The opera proscenium is typically 15.2 to 18.2 m wide and 10.8 to 15.2 m high.*

### *Scene and working space:*

*Grand Opera requires substantial scene space and offstage working space on all sides.*

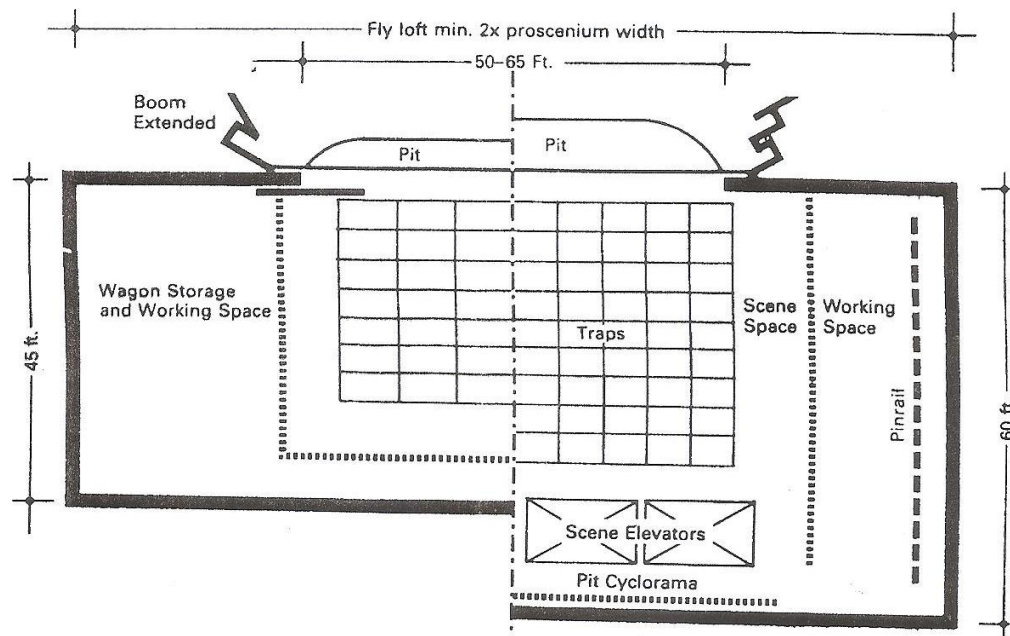


Fig. 45. Typical stage for opera or music-drama

# SYDNEY OPERA HOUSE

- Location : Sydney, New South Wales, Australia.
- Architect : Jorn Utzon.
- Construction : Concrete frame & precast concrete ribbed roof with ceramic tiles and reconstituted granite cladding to the base.

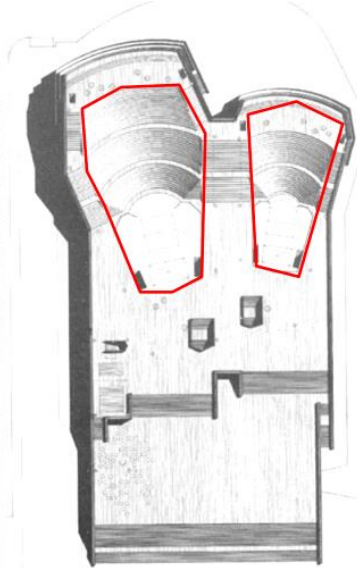
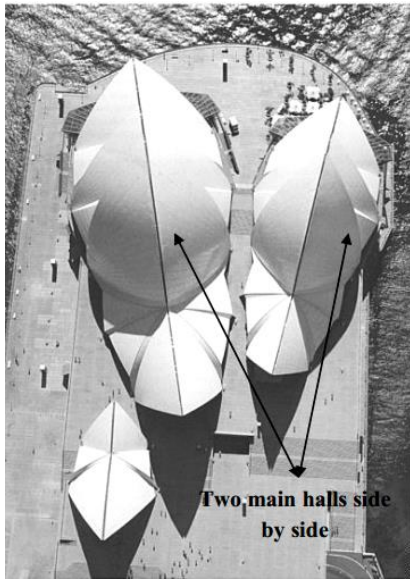


# SYDNEY OPERA HOUSE

## Design and Construction

### DESIGN :

- The Sydney Opera House has two main performance halls, the Concert Hall and the Opera Theatre..

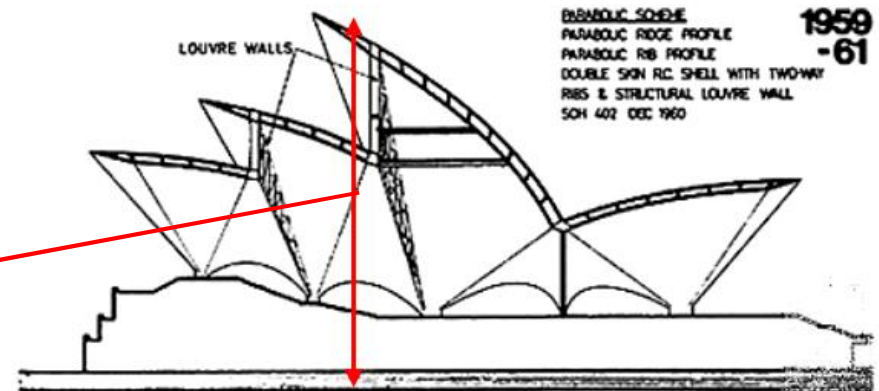


- The tallest shell reaches the height of a 20-storey building above the water.

### CONSTRUCTION :

The project was built in three stages.

- Stage 1 - (1959-1963) Building Podium.
- Stage 2 - (1963-1967) Construction of Roof shells.
- Stage 3 - (1967-1973) Interior design.



# SYDNEY OPERA HOUSE

## Construction - The Podium

- This stage is known as the "podium stage" in which the foundation and the columns to support the roof were laid

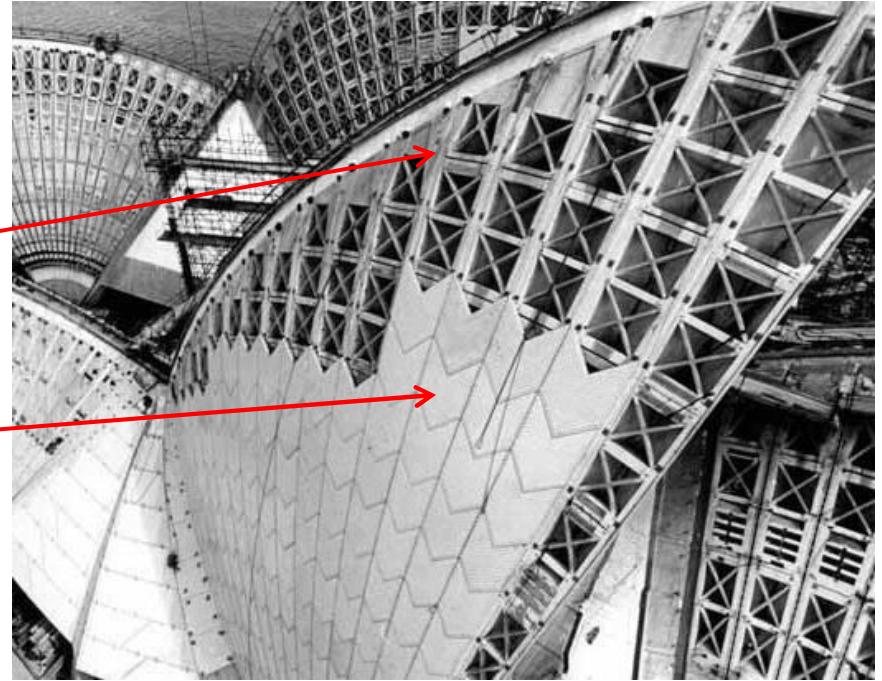




# SYDNEY OPERA HOUSE

## Construction - Roof Shells

- The roof is a Shell Structure made from concrete panels reinforced by internal ribs.
- These shells are formed from concrete members with a triangular section, The Concrete pieces are made from pre-cast concrete
- The ribs fan out from a point on the ground and join at a ridge beam to form the shell.

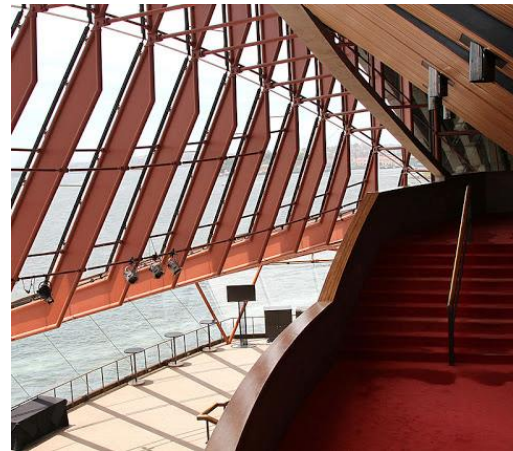


# SYDNEY OPERA HOUSE

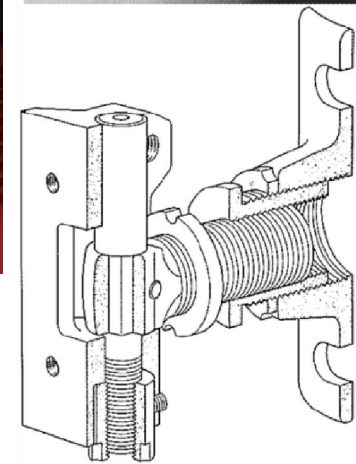
## Construction

### The Glass wall :

- Design of planar glazing with minimal external mullions and internal steel structure set back from the glass.



- Glass support system : " T-section ".

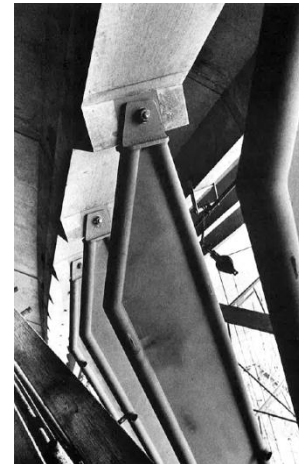
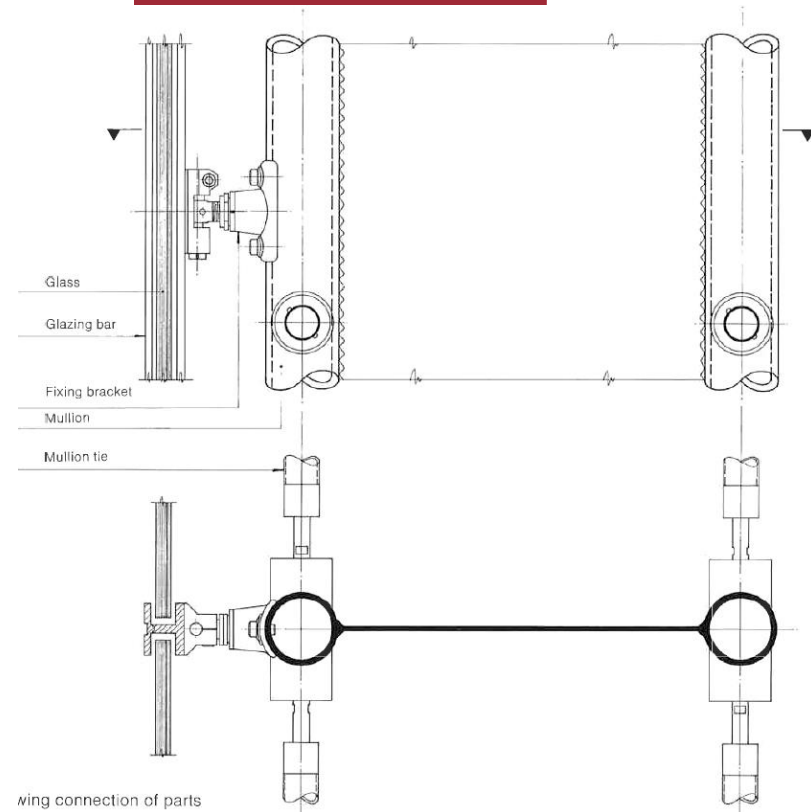




# SYDNEY OPERA HOUSE

## Construction

The mullion structure :

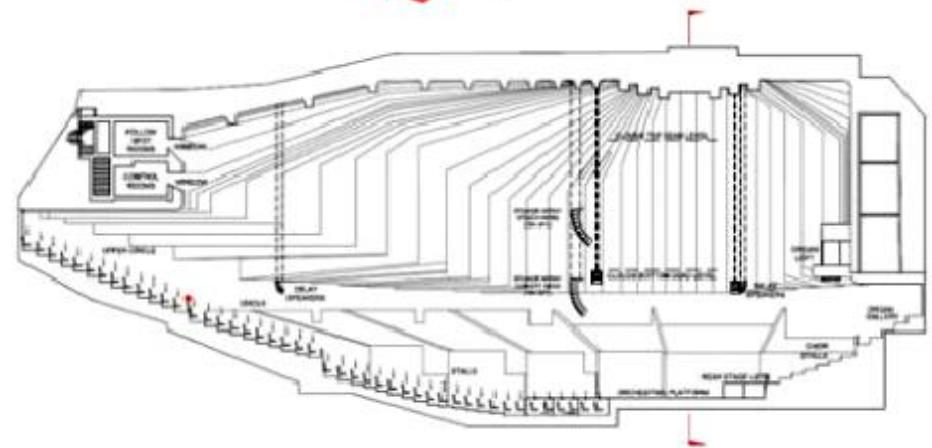
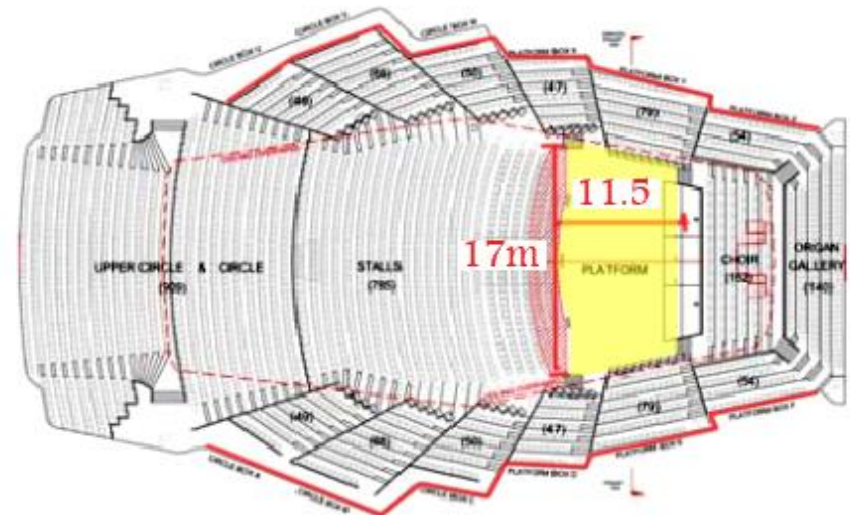
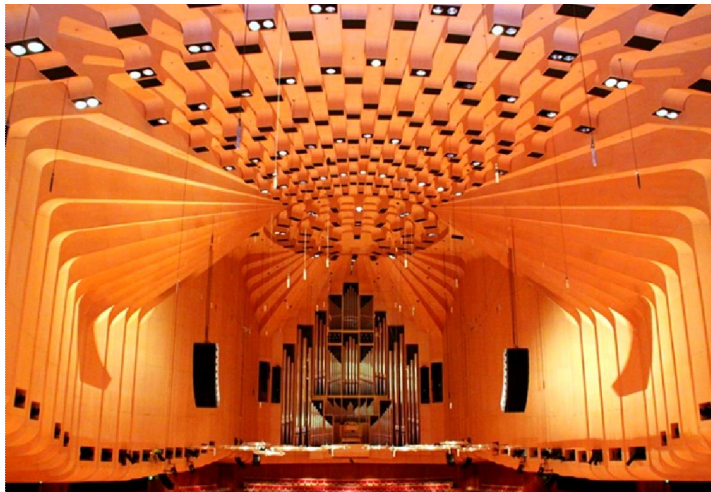


# SYDNEY OPERA HOUSE

## Construction - Interiors

### Acoustics - Concert Hall

- The Concert Hall seats up to 2,679 in-the-round.
- The walls and floor are made of timber : Timber is well suited to the control of excessive echo or reverberation off surfaces in performance and public spaces.
- The ceiling crown sits 25m above the stage platform, which creates a massive chamber above the platform.

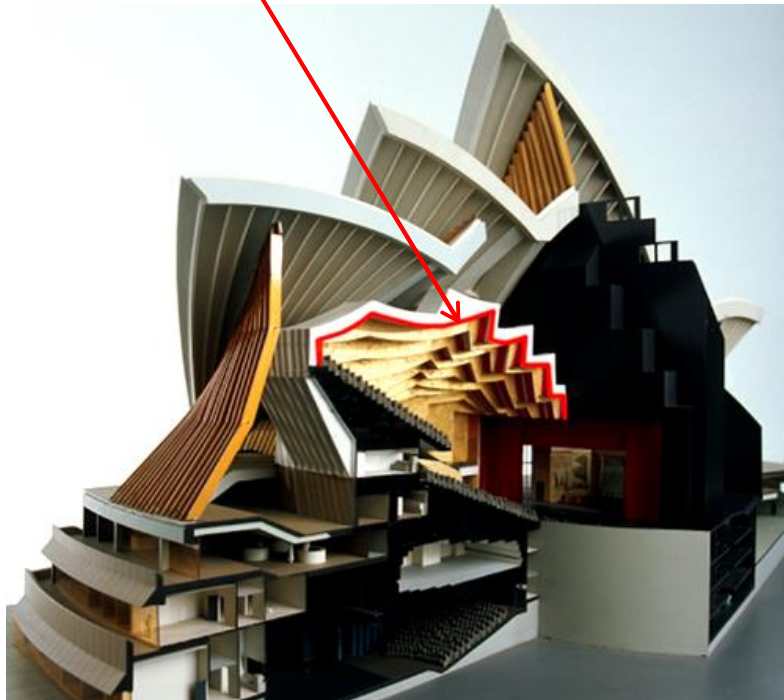


# SYDNEY OPERA HOUSE

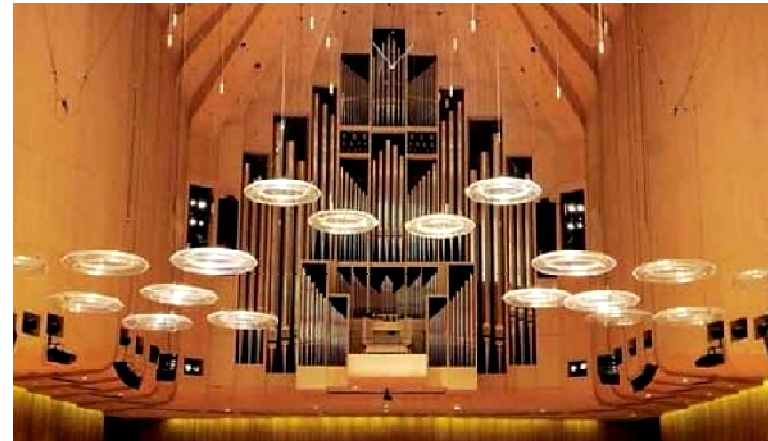
## Construction - Interiors

- **Dispersion :**

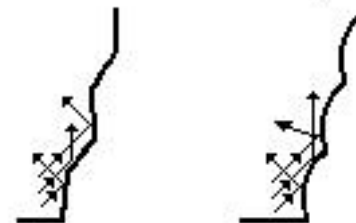
This even dispersion is usually achieved by avoiding any focusing surfaces and avoiding large flat areas which reflect sound into the listening area. Sometimes it is desirable to add some anti-focusing surfaces.



- A set of 18 acrylic rings, or 'clouds' provides a height-adjustable canopy intended to reflect sound back to the stage.



Sometimes the side walls are broken into angled segments or anti-focusing surfaces are used for dispersion.



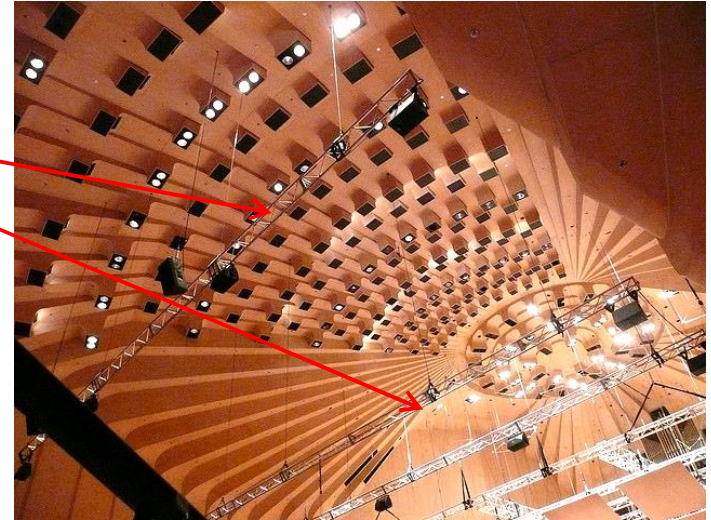
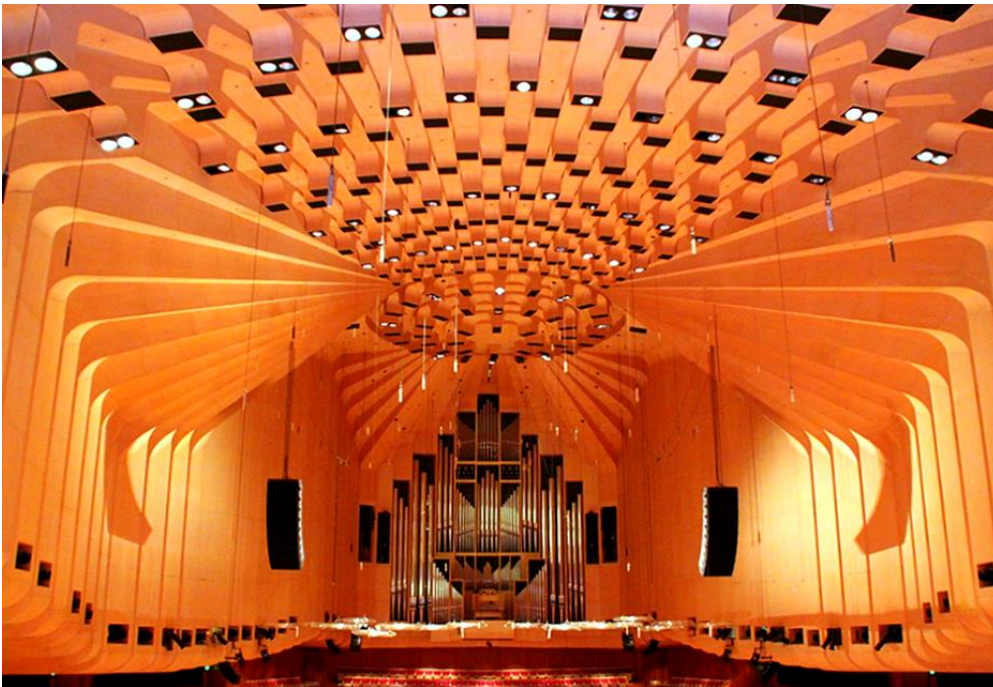


# SYDNEY OPERA HOUSE

## Construction - Interiors

### Lighting - Concert Hall

- Steel structure supporting ceiling.
- Microphones and counterweights suspended from ceiling on cables.
- Nest of speakers suspended above stage.
- Lighting battens and banks of lights.





**THANK YOU**