THE GUTHRIE THEATER

ARCH 5563: ADVANCED BUILDING TECHNOLOGY

FALL 2014

SAM CLAUSEN + ELLIOT SPRONK


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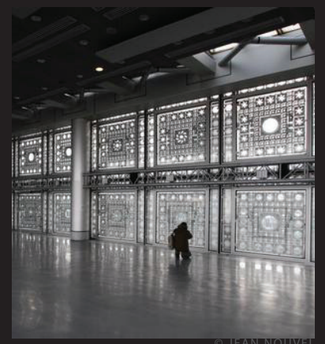
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ARCHITECT

Jean Nouvel is a French architect born in 1945. He studied at the École nationale supérieure des Beaux-Arts in Paris. During his time there, he worked for many well known architects, artists, designers and urban thinkers . He was involved in the Mars 1976 Movement and other think-tank type projects early in his career. Before even receiving his diploma, he was an associate with François Seigneur, a French designer.

Nouvel's variety of experience and collaborative attitude is apparent in his work: often structurally technical, visually unique and constructed intelligently.

His first major commission was the Arab World Institute in Paris, which he won by competition in 1981. Soon after, in 1984, he began his own practice with three other architects called *Jean Nouvel and Associates*.

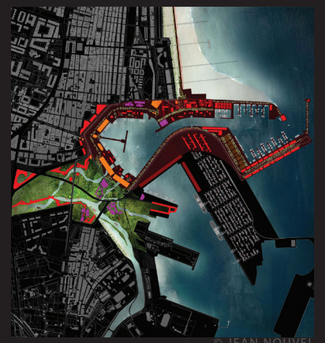
Both his experience and his confident attitude make him a leader in his office and in the field of archtiecture.

Ten years later, his current practice *Jean Nouvel Architects* was founded. Based in Paris, his practice grew immensely - now the one of the largest in France and with offices throughout Europe. This practice has had many large commissions worldwide: architecture, urban planning and exhibitions.

Jean Nouvel was awarded the Pritzker Prize in 2008, cited by the jury for a "courageous pursuit of new ideas and his challenge of accepted norms in order to stretch the boundaries of the field."[1]

Major built works include the Arab World Institute (Paris, 1987), Torre Agbar (Barcelona, 2003), Guthrie Theater (Minneapolis, 2006) and Copenhagen Concert Hall (Copenhagen, 2009). He has won many other awards throughout his career.

Many of Nouvel's large projects come out of competitions; proposed projects include towers in Los Angeles and New York and the National Museum of Art in China.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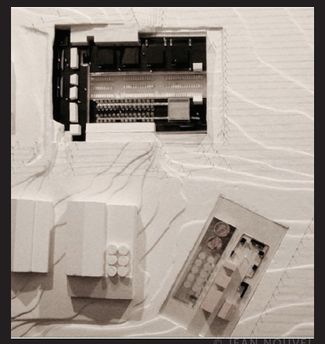
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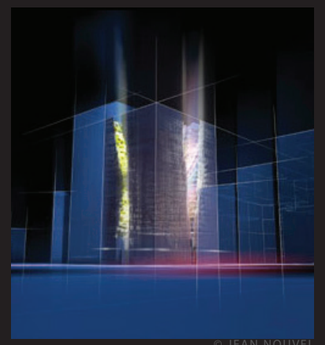
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PROJECTS

Nouvel's work was influenced by his mentors and peers from the beginning of his career. He was an assistant to Claude Parent and Paul Virilio, both of whom were deeply interested in theory and philosophy within architecture.

This background gives his work substantial cultural significance and also it puts the work into a dialogue with current architectural theory and discussions.

The office seems to produce work almost entirely digital. Projects dating back to the early 1990's include renderings and digitally produced models. Images of hand-crafted physical models or hand drawings are difficult to come by. The workflow is highly digital, but the models and drawings are not necessarily typical or traditional. The use of color and materials is evident in the models as well as in the built architecture.

Jean Nouvel's website features a detailed description of software and other production equipment. Their (outdated) list of software includes AutoCAD, Rhino and Revit and highlights their ability to work and communicate around the world.

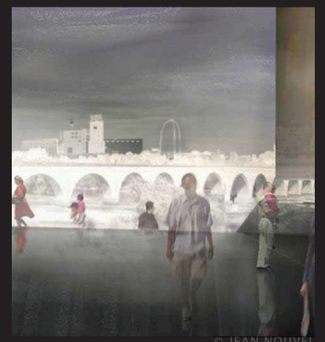
Jean Nouvel works with many other architects on projects, citing associates in Barcelona, Geneva, Madrid, Paris and Rome.

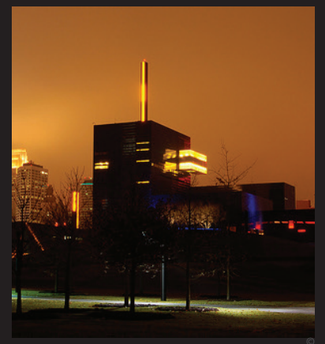
In his own words, Nouvel says, "Critics have defined me as a conceptual architect, that is, one who works more with words than with drawings. I mistrust drawings as fixing things too early in the creative process, while words liberate. I believe the architect is a man who says something." [1]

Nouvel positions himself more in a traditional *master builder* role in terms of his leadership in the firm. At almost 70 years old, he is still the sole leader of his office with no signs of partners or additional leadership. His role as an architect is a noble one in his mind.

Critics take issue with the digital representation used by Nouvel. While this representation conveys a certain ephemeral and seductive quality, it ignores the reality and grit of the site conditions and the materiality of the building.

Counter to this critique stands Nouvel's buildings themselves. The Guthrie embodies many of these qualities of light and atmosphere that are found in the renders.





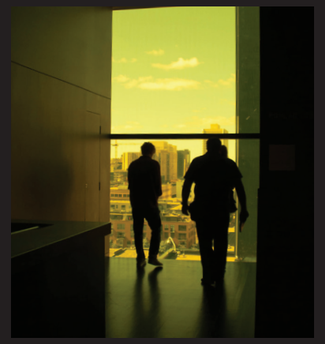
THE GUTHRIE THEATER

The Guthrie is an architecture that makes theater relevant to the 21st century. As digital media gains a stronghold and impacts social constructs of our society, the Guthrie Theater questions how perception and visualization can play a role within the tradition of theater.

The three theaters (proscenium, thrust, black box) at the Guthrie are inherently tied to a philosophy, history and social stance. The way systems are treated in each theater represents an acknowledgemnt of this typological precedent. The prosenium is the most formal and traditional. Thrust theater requries a high level of intimacy and smallness. The black box has less technical requirements because productions don't rely on a precise technical production (i.e. the black box does not have acoustic isolation).

Many theaters are not offered the luxury of having all production and administration functions within the same building; this gives the Guthrie internal clarity and coherence. The way that these functions are organized within the building reflect Nouvel's technical competence as well as his attitude towards theater as heavily reliant on a successful amalgamation of talent.

The Guthrie process involved heavy site explorations. The site is rich with history of the city and of the milling that took place there. Looking at the process work for the Guthrie, it is apparent that this history played a large role - many historic structures serve as background for renders of the project.



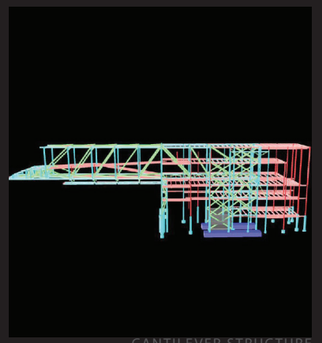
By lifting the two main theaters to the 3rd floor, the first two floors are freed up to house rehearsal rooms, administration, costume, prop shop, and a backstage connection to the main scene shop (located on the parking structure across the street) via the 3rd floor production link skyway. Each function is individually given adequate space while at the same time being thoroughly linked.

Nouvel's commitment to theater is evident in the technical care taken to make the performances successful: acoustic separation is provided for the proscenium and thrust theaters.

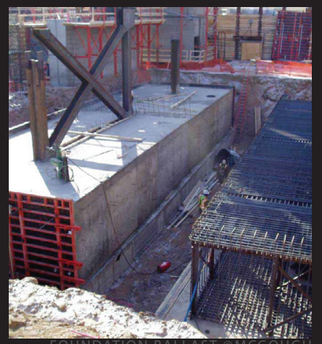
Theater by its nature requries many technical integrations: structural support for large open stages and auditoriums. Mechanical systems for large amounts of people in a space. Acoustic and lighting design that is flexible for many various performances.

In the Guthrie, integration makes these systems work together to make a sucessful theater experience - the systems are hidden to provide service but not distract.

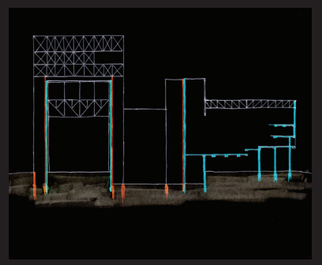
STRUCTURAL SYSTEM



CANTILEVER STRUCTURE

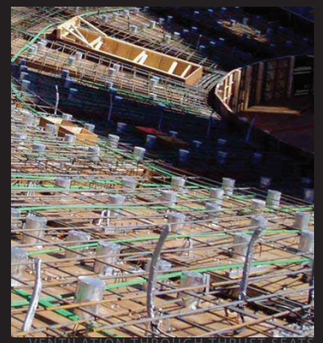


FOUNDATION BALLAST ©MCGOUGH



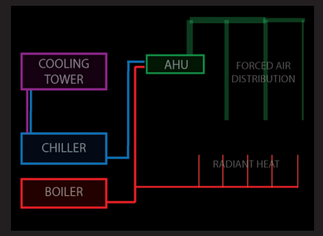
STRUCTURAL SYSTEMS

CANTILEVER CONSTRUCTION ©MCGOUGH



VENTILATION THROUGH THRUST SEATS
©MCGOUGH

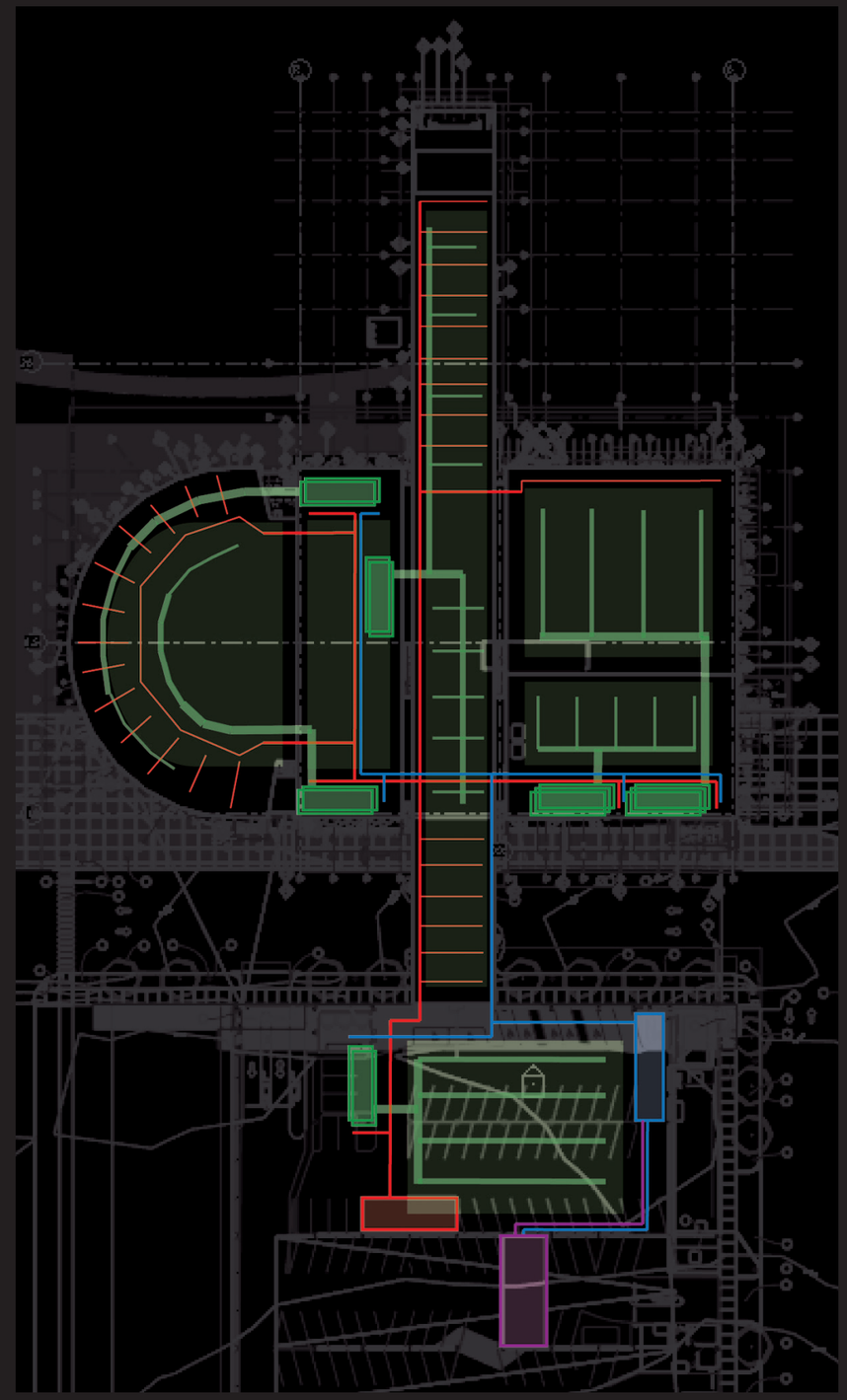
Basic elements of the HVAC system and their distribution throughout the building. Large equipment located in the parking ramp delivers hot and cold water to 12 AHUs located in the theater building. Zones are served by nearby AHUs. Radiant heat supplements forced air in areas such as bridges and overhangs: areas of significant heat loss.



MECHANICAL SYSTEM

DIFFUSER OPENINGS BENEATH EACH SEAT
©MCGOUGH

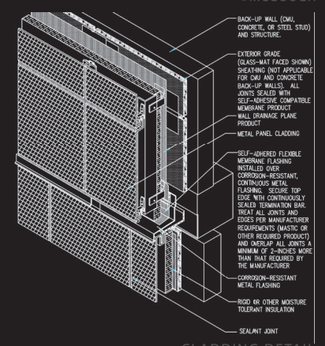
MECHANICAL SYSTEM



CONCRETE CORES AND STRUCTURAL STEEL
©MCGOUGH

DOUBLE CONCRETE WALL CONSTRUCTION
©MCGOUGH

STEEL TRUSS TO SPAN OVER PROSCENIUM ROOF
©MCGOUGH



CLADDING DETAIL
©WBDG

BUILDING SYSTEMS

Building systems in the Guthrie are first separated before they can be integrated. Acoustics become a building system in the Guthrie.

To isolate stages from backstage, production and lobby spaces, each is separated by means of two 10-inch concrete walls separated by a 3-inch air gap. These walls travel the full height of each stage (including fly space above). The construction involved proprietary steel tube formwork paired with 1" thick steel plates with a slip-form technique to pour the walls 8 feet at a time to heights of 100+ feet.

Acoustically, the Guthrie is separated into three zones:

1. Scene shop, backstage and bridge
2. Thrust seating and lobby
3. Proscenium seating and lobby

Structurally, each of these are independent, with the bridge being highly structurally independent from the backstage , thus making six structural masses:

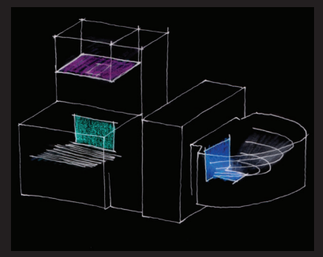
1. Scene shop
2. Backstage proscenium + black box theater
3. Proscenium seating and lobby
4. Bridge
5. Thrust backstage
6. Thrust seating and lobby.

The structural separation of the two large theaters from their backstage areas is primarily for acoustic isolation. The bridge, on the other hand, is separate to identify it as a singular feature, situated between the two large theaters but suspended above structural glass entries on either end.

Mechanical systems are similarly broken down by acoustic zones. Each stage has dedicated air handling units (AHUs). The AHUs are located in the backstage acoustic zone. Larger mechanical equipment (boiler, chiller & cooling tower) is located across the street in the parking ramp.

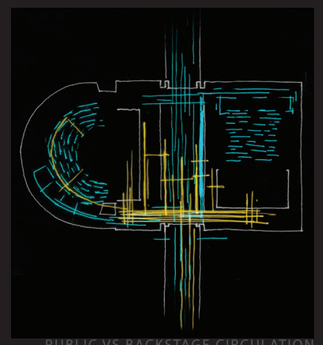
There are multiple circulation systems in the building involving public circulation as well as the actors, production, and administration. These multiple modes of circulation are necessarily separated but Nouvel brings them in contact with each other at small moments.

Envelope is treated uniformly on the entire building. Apart from glass openings, the structure is clad in a blue metal panel system. The panel grid is visible on the exterior. The panels are fastened to a secondary light gauge steel backup which is in turn connected to the primary steel structure.

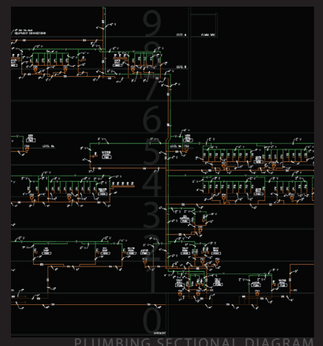


THEATER LOCATIONS

BLACK BOX SUSPENDED OVER PROSCENIUM



PUBLIC VS BACKSTAGE CIRCULATION



PLUMBING SECTIONAL DIAGRAM

INTEGRATION STRATEGIES

The acoustic separation is the first fundamental division. From here, structure is organized to create necessary volumes of space that are structurally indepenant. Mechanical systems are distributed in acoordance with the acoustic divison as well. Circulation obeys the acoustical logic by distancing major lobby space from the theaters.

Program division is linked to the mechanical systems: the boiler, chiller, and cooling tower are located in the parking structure across the street where the production shop is. Just as the production is the most disruptive and requries alot of space, these large and noisy mechanical units are alos isolated from the theater building; the plumbing runs through the production link to the main building, where it is distributed to AHUs throughout the building.

Radiant heat is necessarily coupled with aspects of the envelope where major heat loss is an issue: at the large amont of glass in the resteraunt, in the soffit below the thrust theater, and underneath both the production link and the cantilever.

The envelope is generally integrated tightly with the structure, emphasizing the simple pure forms that the steel and concrete framing logic creates. Envelope emphasizes the form of the bridge projecting: under and around the point of projection, the typical cladding is replaced by structural glass.

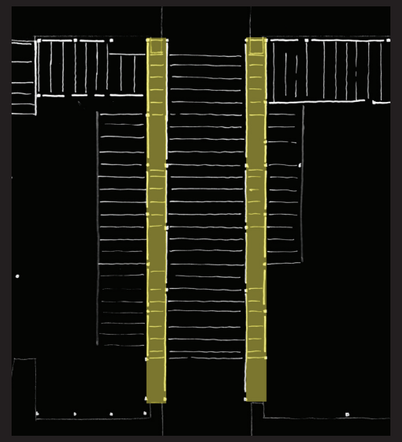
Public circulation for all theaters through a shared central lobby simplifies the plumbing system. With the bathrooms centrally located, plumbing is concentrated to the core of the building and the majority on the fourth, fifth, and seventh floors. This includes both the public bathrooms as well as bathrooms for actors, production staff and administration.

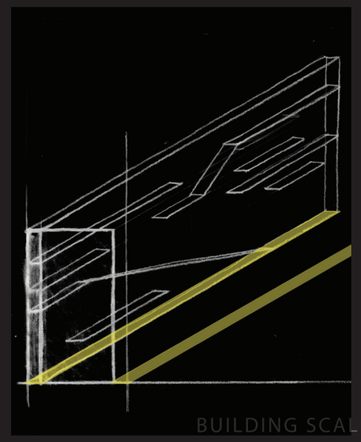
The theaters require thousands of adjustable lights for the vaious productions. In both large theaters, the roof structure integrates necessary catwalks and framework for the lighting sytem. Forced air mechanical systems are also located in this framework.

The thrust theater includes a large plenum space below the tiered seating floor. This space allows for the distribution of air to vents under most of the seats in the thrust theater. This design delivers fresh air directly to the audience and the distribution via the plenum reduces the amount of noise this air flow creates.

INTEGRATION STRATEGIES

Between the central bridge (lobby) and the theaters on either side, there is a narrow structural bay eight feet wide. This space is used for circulation including the main escalators to the fourth floor lobby and many backstage passages and stairways. This gap lends itself to discontinuous floor plates and connection between them.





BUILDING SCALE

Structure

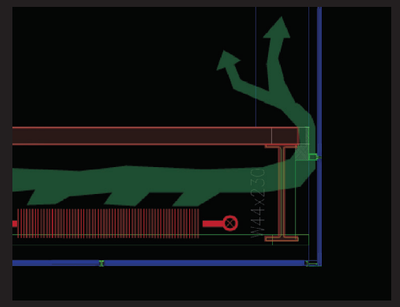
Sheathing

Plenum

The thrust theater structural system for the seating contains a large air plenum beneath the seating. Construction photos show ducts being blocked out during the pour, allowing air to be distributed beneath each seat.

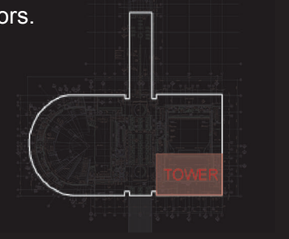
ROOM SCALE

Detailing in the cantilevered yellow box includes a critical grille at the floor and ceiling. The grill is inserted between the structure and envelope. Under the floor, forced air passes over a radiator to provide heat to the glass envelope. The flow of air moves upward through the room and returns in a similar way at the ceiling level.



DETAIL SCALE

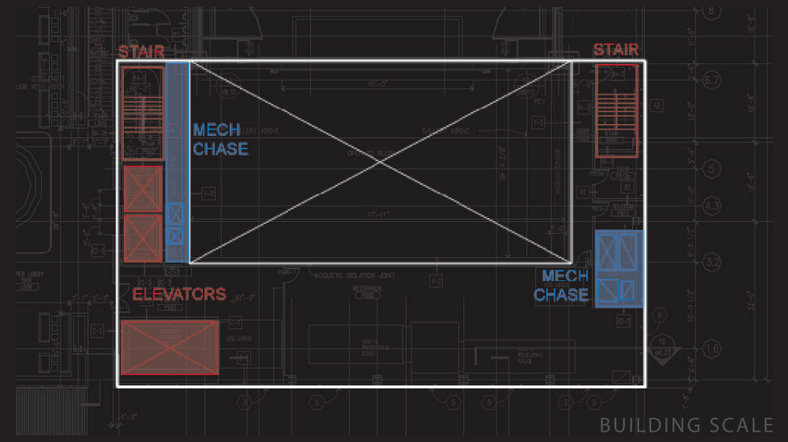
Vertical circulation and mechanical chases are paired in the black box tower. Circulation runs from floors 1 to 9. AHUs are on floors 5,6 & 7 and distribute air to all floors.



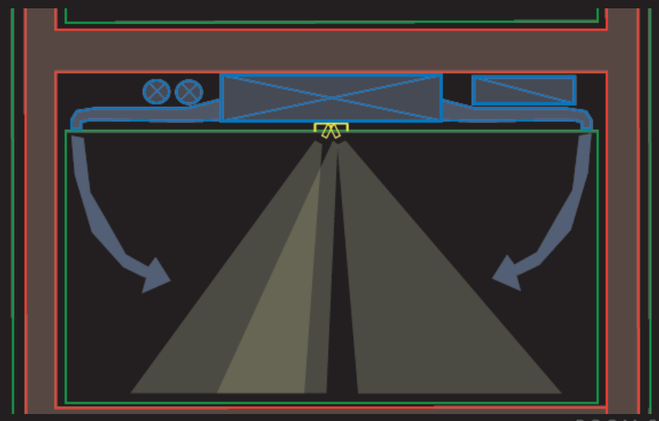
The lobbies are constructed as long continuous tubes. The section shows the structure supporting bundled services hidden above the finished ceiling: plumbing lines, duct work and electrical. The forced air system uses continuous narrow diffusers along each wall. A continuous track down the middle contains lighting fixtures.

Systems are layered in the upper regions of theaters to hide the equipment from view. Large structural members support ducts, catwalks, lighting and acoustic panels. The acoustic panels hide the equipment but allow light and ventilation through. Ambient lighting is reflected off the back of the panels to give the auditorium a glow.

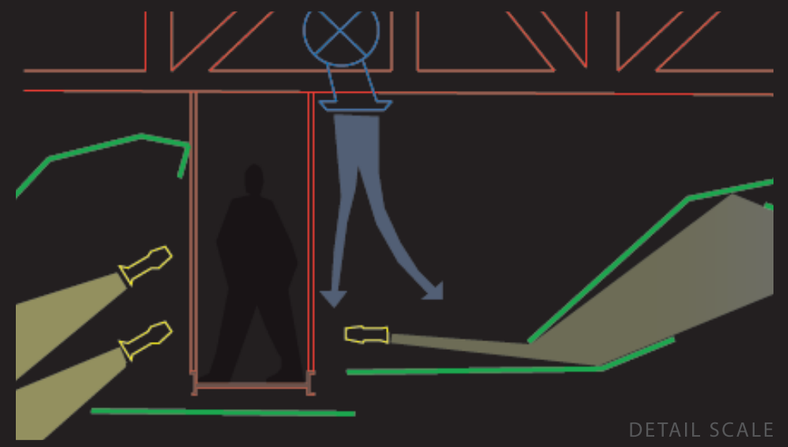
INTEGRATION STRATEGIES



BUILDING SCALE



ROOM SCALE



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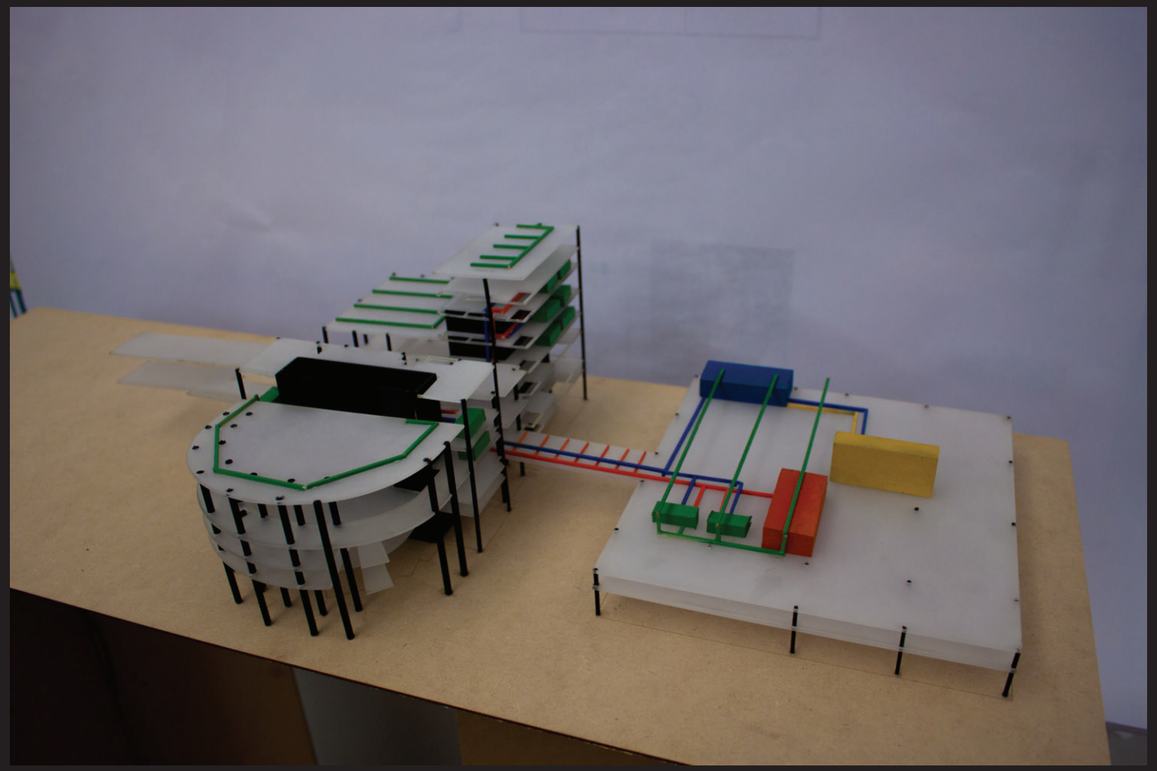

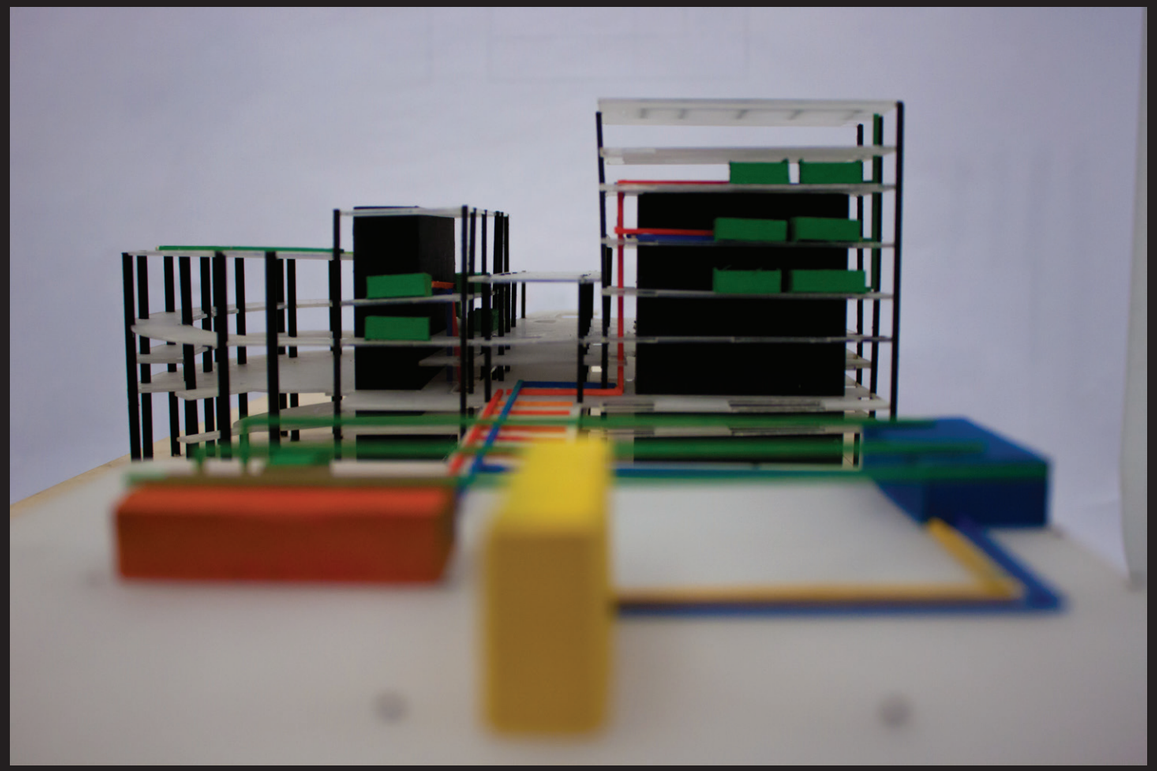

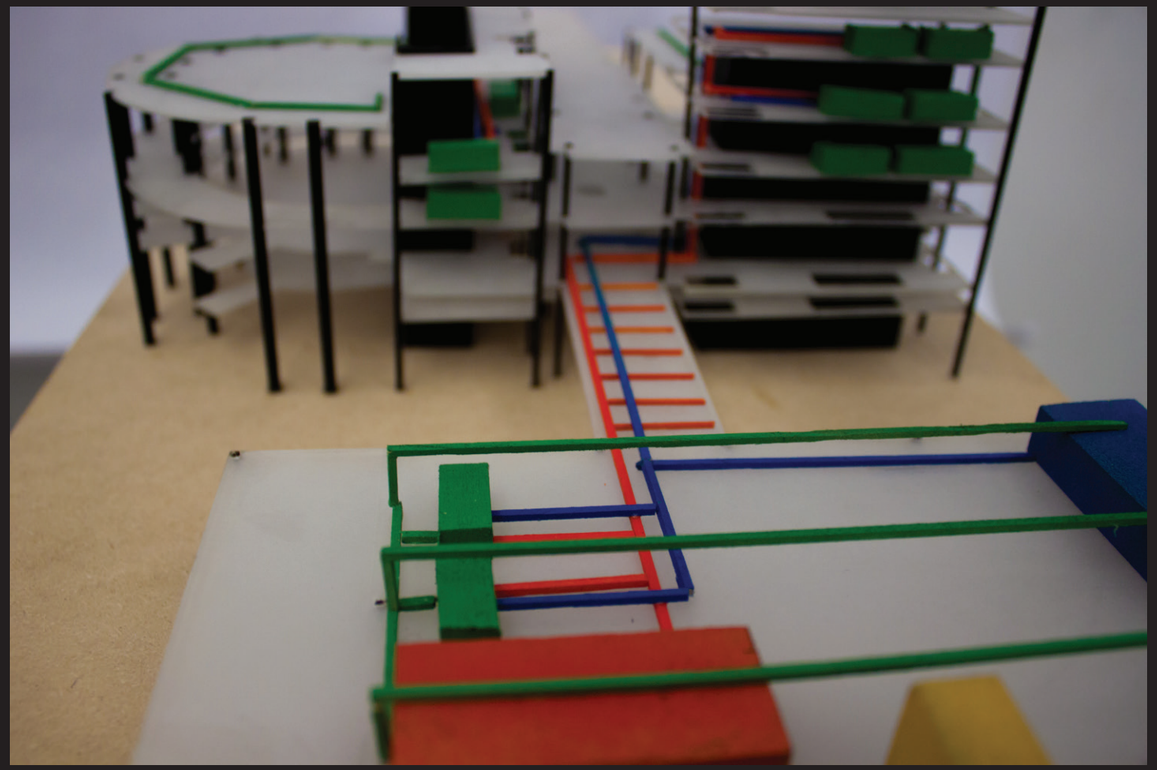

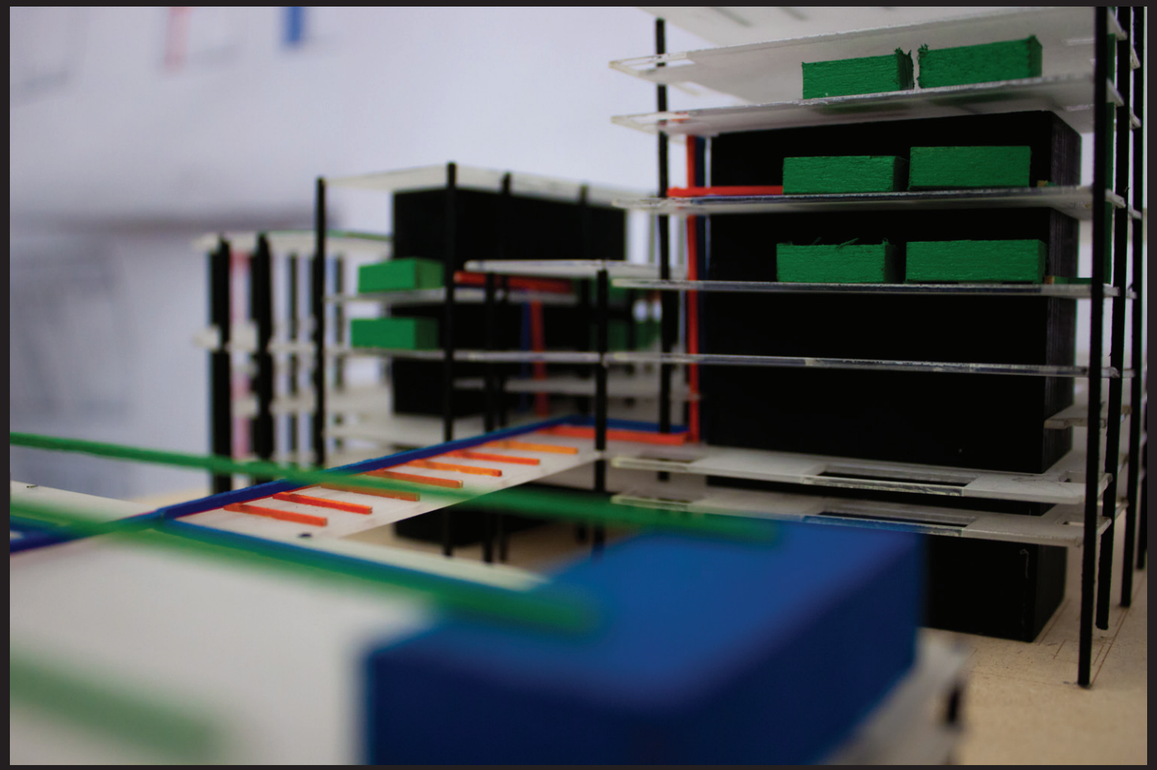

PROJECT DETAILS FROM JEANNOUVEL.COM:

- Status : Built
- Location : Minneapolis, Minnesota
- Dates :
Start of study : May 2001
Completion : June 2006
- Usable floor area : 198.000 square feet / 18.414 m2
- Groos floor area : 275.000 square feet / 25.500 m2
- Program : Three theaters (1 100, 700, and 250 seats), with administration, education and production program spaces
- Client : Guthrie Theater, Keewaydin (Owner representative)
- Program : Construction of a theatre, composed of three rooms, restaurants
- Budget : 125 Million US dollars
- Cost m2 usable area : 4 716 $

Architectural Team
- Project Managers :
Schematic Design : Brigitte Métra
Design Development and Construction : Bertram Beissel
- Architects :
APS : Vincent Laplante, Nathalie Sasso, Eric Stéphany, Anna Ugolini
APD, DCE : Damien Faraut, Michel Calzada, Athina Lazaridou-Faraut, Edwin Herkens, Julie Fernandez, Yann Salmon
- Local Architect : Architectural Alliance - Minneapolis
- Graphic designers : Marie Maillard (concept), Natalie Saccu de Franchi (Production)
- Model : Jean Louis Courtois
- Synthesized images : Artefactory, Andrew Hartness

Consultant Team
- Consultants :
Scenery Concept : Jacques Le Marquet
Office of scenery study : Ducks et Fisher Dachs
Acousticiens : The Talaske Group
Lighting : L'Observatoire International
Landscape : Tom Oslund
- Engineers : Structure : Ericksen & Roed, Fluid : Michaud & Cooley

BIBLIOGRAPHY OF SOURCE MATERIALS

1. "Media Kit Announcing the 2008 Pritzker Architecture Prize Laureate." March 31, 2008. Accessed October 12, 2014.

2. http://www.jeannouvel.com/

3. http://www.3dymaqueta.com/blog/home/2004/02/01/jean-nouvel-aix-2004/
(photos of physical models)

4. http://web.archive.org/web/20080409133706/http://www.pritzkerprize.com/full_new_site/nouvel/mediareleases/08_media_kit.pdf
(media release 2008 Pritzker)

5. http://www.peri-usa.com/