TO FRIENDS AND FAMILY
I COULD NOT HAVE DONE IT WITHOUT YOU
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*Marine Research Center & Aquarium | Professor Gast | Spring 2014*
PROJECT DESCRIPTION
LOCATION: BARCELONA, CATALONIA, SPAIN
BUILDING TYPE: RESEARCH CENTER & AQUARIUM

THE CLIENT

The client for the project will be the City of Barcelona. The chosen site was initially going to be used for an aquarium, but the 2008 economic crisis brought the project down. Nevertheless, the project will remain similar to the one planned by the City of Barcelona, with some additional aspects. Such a large and costly project needs the full support of the city where it is being conceived and for this reason the best client for the Marine Research Center and Aquarium is the City of Barcelona itself.

SITE LOCATION

The chosen site is located in the Parc del Forum district in the north end of Barcelona. It is a prime spot for development with almost endless possibilities for design. It is also extremely well connected to other features of the area such as the beach system, the Forum Building, the Diagonal Mar Park and the Expo Park. It is well connected by public transit and is a perfect spot for a catalyst project.

PROPOSED PROJECT & PROGRAM

The proposed project is a Marine Research Center & Aquarium for the City of Barcelona, Spain. The program of the project holds both an educational/recreational component in the aquarium section and a research and investigation component in the research center section. These two sections are to be designed in a cohesive overall project. Moreover, the proposed project as a whole is intended to aid the urban redevelopment of El Parc del Forum District, in which will be located.

The research component of the project is intended to act as a job generator as well as an educational center for individuals interested in pursuing a job in a marine-based career. It is meant to be a space designated for professionals in marine-based careers, utilizing Barcelona’s geographical position in the Mediterranean Sea. As a city, Barcelona seems to lack a facility of these characteristics. Moreover, it will also host the educational component to train individuals interested in pursuing these careers. Given the location of the selected site, its proximity with the 22@ District, Barcelona’s Innovation and Research district, poses a great opportunity for the center to expand and connect with other research-based facilities in the greater Barcelona area. Moreover, it is also located nearby to the newly built Forum Building, which holds the National Museum of Natural Sciences of Catalonia. Again, this poses an opportunity for collaboration between other research agencies in the city.
The aquarium component of the project is intended to be both an educational tool for residents and tourist of the City of Barcelona and a catalyst project and economic generator. In general terms, sites such as The Ramblas, the Park Guell, Montjuic or the Gothic District attract most of the tourism in the city. Even with the redevelopment of the Park del Forum in 2004, most tourist and commerce still thrives in other areas of the city. The need for a catalyst project and economic generator in the area is quite clear. As for the project itself, the aquarium will serve as an educational and recreational site for residents and tourists. It will hold several different general exhibit areas, each with its own thematic experience. The aquarium will also hold several other spaces intended for the public such as a cafe, a gift shop, classrooms and interactive learning spaces. Finally, the aquarium and exhibits themselves will be closely related to the research component of the project, acting as a living laboratory for investigation and education.

**DESIGN CONCEPT**

The BCN Aquarium & Research center attempt to integrate itself with the ecological regenerative approach proposed for the site. It intends to read as part of the overall design instead of a building floating in space. To achieve this intention, the building is placed underneath the ground level, opening the accessible roof as part of the landscape. Moreover, the placement of the building attempts to move the users in a subtle and interesting way from the city, into the building, and finally into the waterfront. The plaza located as an intermediary space between the city and the project slopes down smoothly until reaching the Plaza Level Floor Plan. This floor plan is intended to be as light and open as possible even though it is located beneath the ground level. This is achieved by the placement of large clerestories providing abundant natural lighting. Moreover, the whole first floor plan is unconditioned, allowing for natural ventilation to access through the entire building. Two large staircases and an open ramp move users into the Waterfront Level Floor Plan. These staircases are also meant to be used as amphitheater-style seating for users to interact with them. All the exhibits located in the project can be seen from multiple angles and perspectives. The roof, arguably the most notorious part of the project, attempts to represent the structure of a boat, alluding to the vessels historically built in Barcelona.

**SITE**

There is an imperative need to create a strong connection between the city to the waterfront. Also, Barcelona is in need of an urban forest / restoration of the natural Mediterranean waterfront, elements that the city does not possess. For this reasons, the site proposal will replace the current state of the Parc del Forum with a large restoration of the natural waterfront, placing the building as a connection between the city to the restoration to the waterfront. A large public plaza will act as a prelude to the building, creating a vibrant transitional space between the city and the building.
PROJECT DESCRIPTION

LOCATION: BARCELONA, CATALONIA, SPAIN
BUILDING TYPE: RESEARCH CENTER & AQUARIUM

BUILDING SPATIAL ORGANIZATION

The project is organized in two main levels, the Plaza Level and the Waterfront Level. Both levels are intended to be as open as possible and to provide a variety of different experiences. The Plaza Level holds the entrance, the administrative offices, the ticket offices, restrooms, a library, a gift shop, part of the restaurant and part of the research component and service component. The Waterfront Level holds restroom, the kitchen restaurant, storage and the second part of the research and services components. This level also allows for direct interaction with the waterfront. Exhibits are located in both levels and provide several different viewpoint and perspectives. The main exhibit tank is located in the central area of the project and extends from the Waterfront Level up to the Plaza Level.

STRUCTURE AND MATERIALS

The main structure used in the project is a series of large cross-laminated timber beams extending from one side to the other of the entire project. These support the large spans of the roof above. These beams sit in a series of concrete retaining walls at both sides of the project. A secondary wood structure provides lateral stability for the roof. The sheeting material is also wood, in the form of planks, organized on top of the secondary structure. The Plaza Level is held by a structural system of smaller concrete beams and columns. To both sides of the project, large concrete retaining walls are places to control the lateral forces produced by the soil surrounding the building. Moreover, the foundation of the projects needs to be large and deep, as the building is located next to the waterfront and needs to be able to withstand buoyant forces caused by the rising water table.

SUSTAINABILITY STRATEGY

Most of the building is unconditioned, a quality that is possible due to the mild climate in Barcelona. Clerestories provide abundant natural light, reducing the need for artificial lighting. The open quality of the building provides natural ventilation across the entire project. The previously mentioned clerestories also act as exhaust systems to let warm air out from inside the project. Moreover, all the water utilized in the exhibits is taken directly from the sea, and it is later recycled and utilized for landscaping. Finally, all the timber used in the project is sustainably harvested.
One of the major urban design moves in Barcelona since the Eixample was the redevelopment of the Sant Marti District for three different events: the 1992 Olympic Games, the 2000 22@ District Plan and the 2004 Forum of Cultures Event.
The Poblenou is located in the south-western portion of the Sant Martí District. This former municipality was annexed to Barcelona in 1897. With the Industrial Revolution, steam-powered textile factories, chemical, pharmaceutical, metallurgic and other industries moved to the area. In the middle of the 19th century, before being annexed to the municipality of Barcelona, the Sant Martí District was separated from the sea by the first railway line in Spain, which connected Barcelona with France. The poor living conditions and harsh working environment gave The Poblenou the identity of a decaying working-class district. After the 1973 economic crisis, many factories abandoned the area, turning the district into a forgotten industrial wasteland.

After the selection of Barcelona as site for the 1992 Olympic Games, a part of the Sant Martí District called Nova Icaria was selected as site for the Olympic Villa. This was the first new district created by the waterfront in the historical industrial area of Sant Martí and The Poblenou. The railway was placed underground and the new highway Ronda del Litoral was constructed, separated from the sea by a linear park system. 4.2 km of beach was reclaimed and restored. This initial urban regeneration of an industrial waterfront turned Barcelona into a model of urban design and an example to follow.
EL POBLENOU & VILLA OLIMPICA
Urban interventions during the 90s redesigned most of the waterfront west of the Olympic Villa. The linear park system strategy continued to be applied as well as the creation of several artificial beaches. After these moves, the city felt the need to continue with urban interventions and create other models for its status as an successful urban design city would be maintained. In the year 2000, a large redevelopment plan for the eastern part of the Poblenou was approved: the Pla 22@bcn. The plan intended to regenerate the industrial area into a cluster of Information and Communications Technologies (TIC). It included the regeneration of 1.2 million sqm, 4600 renovated housing units, 114,000 sqm of parks and 145,000 sqm of new facilities. This urban plan was closely related to another urban masterplan to be done to hold the 2004 Forum of Cultures: the Parc del Forum.

The site chosen for the 2004 Forum of Cultures is located in the eastern waterfront of the Poblenou. It was an complex site, given the presence of factories and adjacent socially problematic districts. Also, the vicinity of the polluted Besos river provided a challenge in the waterfront. The plan was drawn in 2003 by TD & Associates and Robert A.M. Stern. Five high rise complexes were completed, with a total number of apartments of 1400. The plan also includes a large concrete area used for events, a gigantic PV structure that acts as a icon of the project, a large footbridge, a new park called Parc Litoral Nord, a new low-pollution incinerator, the Forum Building (Herzog & de Meuron), a different park called Parc Litoral Sud, a bathing zone, a new water-sports harbor, and the International Convention Center. There are still projects that haven’t been completed or even started.
22@ District & 2004 Forum of Cultures
22@ DISTRICT & 2004 FORUM OF CULTURES

2004 Forum of Cultures Site
The chosen site is located in the Parc del Forum district in the north end of Barcelona. It is a prime spot for development with almost endless possibilities for design. It is also extremely well connected to other features of the area such as the beach system, the Forum Building, the Diagonal Mar Park and the Expo Park. It is well connected by public transit and is a perfect spot for a catalyst project.
The Marine Research Center and Aquarium will also intend to aid the urban redevelopment of the Parc del Forum District. This district was recently redeveloped as the site for the 2004 International Forum of Cultures. After the event was concluded, it was soon forgotten and fell into a sort of urban wasteland. Even if this statement might seem harsh, it is validated by the clear contrast between this district and the rest of the city of Barcelona. The urban fabric and scale of the district is ill conceived, it is not walkable, and there are not enough commerce or attractions for people to use the area. There are numerous solutions to these problems.
First, the placement of a catalyst project in this area is intended to act as the first step into bringing commercial life, housing and services to the district. An iconic, landmark project that attracts attention of both tourists and inhabitants of Barcelona would prove itself as an economic generator, a featured destination, and a way to attract international attention of architects and urban designers. Moreover, the catalyst project would also act as the public face of the newly regenerated Parc del Forum District.
NEW URBAN FABRIC

Secondly, in the urban design scale of the project, the intention is to generate a more compact and complex urban fabric, by infilling large unused open areas. The infill should be done carefully, combining several different types of mix-used projects in order to achieve an urban fabric comparable to the rest of the city. A new street grid needs to be proposed, or even a continuation of the existing street grid of the adjacent districts: the Eixample Block. The newly developed neighborhoods need to be identifiable and unique, both for the residents as for visitors. Neighborhoods will be compiled of a 3-block by 3-block area, therefore encompassing 9 full blocks. Each and everyone one of these neighborhoods will have a system of small plazas or "placetas" with pedestrian primary and secondary paths connecting them. Also, each neighborhood must have at least one green area or park, of at least 60,000sqft of area and a minimum of 150ft across. The new street system must be vehicle accessible but not act as main traffic streets, what would take away from the pedestrian environment desired. Also, the creation of a ‘rambla’ that would connect the district with the selected site could prove useful for spatial reference and location.
Thirdly, a high degree of connectivity is necessary to join this area with close attractions. Pedestrian and bike circulation must be addressed in a bottom-up approach. Nevertheless, and as mentioned before the vehicular transit system in the area must also be rethought of in order to provide sufficient access to the newly developed infill strategy. Even though both the metro and the streetcar system have stops close to the district, an extension of these systems would benefit the accessibility of the area. As the district is located in an enviable position in the city, it could certainly thrive as a vibrant and dynamic neighborhood.
MULTIPLE USES

Finally, the uses itself of the new infill must be thought of and executed to perfection. Enough housing must me provided in the upper levels of the buildings, leaving the street floor open to commerce and retail spaces. This mix-use approach would ensure that the district could support itself. Other basic services such as grocery stores, pharmacies, education centers, cultural centers, recreation centers and sport venues should also be included in the master plan. The district’s adjacency with the Saint Marti district, which encompasses the 22@ innovation district, also provides the possibility of providing work spaces and business incubators, to position the district in a high level at that end as well.
The following site analysis was done in conjunction with the Human Context and Design: Programming Class taught by Yosa Huggins on Fall 2013. Christopher Alexander’s book “A Pattern Language” was utilized as base for the analysis.
The City of Barcelona has a history of planned subdivision of urban neighborhoods, or Citadellas. In its early history, Barcelona was a cluster of walled medieval separated towns such as El Raval, Passeig de Gracia and El Problenou. With the large urban design move of The Eixample in 1859 intended to unify these separated neighborhoods, all with its own subculture. Since then, the City of Barcelona has been indeed a mosaic of subcultures, all creating the large dynamic and rich urban fabric of the city. Every spatial territory of a subculture is large enough to hold cultural and social activities but small enough to give the overall city ever-changing urban environments. The Parc del Poblenou district in the northwest portion of the city contradicts with every single positive element of the previously discussed subculture environment. An area large enough to be its own town, The Parc del Forum is an homogeneous and dull neighborhood that adds nothing to the richness and charm of the whole city.

Therefore:

Attempt to treat the redevelopment of the Parc del Forum district as one of that of an individual town or city, aiming to achieve a new redesigned and dynamic urban fabric. Attempt to enrich the dormant subcultures of the district; break the vast homogeneous urban fabric into subcultures, each one with its own spatial territory.

Solutions:
1. A new proposed street grid will allow to break the large homogeneous grounds that stand at the moment.
2. A higher density of buildings is necessary to achieve a more human scale.
3. A reinterpretation of the necessary services is required to encourage different groups of people, or subcultures, to move to the district.
4. A extension of the transit system of the city is necessary.
5. Provide different levels of housing and mix use development.
6. Aim to set up cultural and social gathering spaces and buildings to attract different types of users.
7. Open space such as parks and plazas.
IDENTIFIABLE NEIGHBORHOOD

The Mosaic of Subcultures (8) provides an overall pattern to attempt and break up the homogeneous fabric of the Parc del Forum District into a series of subcultures. These subcultures then shall be called neighborhoods, Identifiable Neighborhoods (14). Given the proposed regeneration of the whole district, focus needs to be changed into each new neighborhood within the overall master-plan. Each neighborhood needs to be distinct and has its own identity, both to the inhabitants as to the visitors. Inhabitants need to be able to feel part of a cohesive spatial territory and be able to identify with it. Populations in these identifiable neighborhoods need to be small enough to be self coordinated and unique (around 400-500 inhabitants). Also the neighborhood must not be larger than 300 yards across, informing the solutions in the Mosaic of Cultures (8) pattern. Finally, the neighborhoods must be kept away from major traffic roads.

Therefore:
Utilizing the major solutions given in the previous pattern, attempt to create a cluster of independent, identifiable neighborhoods, no larger than 300 yards across, and with a population no larger than 400-500 inhabitants. Attempt to keep major roads away from the neighborhoods.

Solutions:
1. The new street grid must comply with the 300 yard across rule of thumb (size of current Eixample blocks in Barcelona is 113 m, or 127 yards; neighborhoods would be made out of 3 blocks by 3 blocks, or 9 blocks total).
2. Housing must be placed strategically.
3. Services must be placed strategically.
4. Architecture within the district must remain somewhat cohesive, but each neighborhood must attempt to have a landmark or distinct building.
5. Utilize the Avinguda Diagonal (Barcelona’s major traffic artery; ends in the corner of the district) as the major road to the district, allowing roads within neighborhoods to be of a secondary importance.
ACCESS TO WATER

After identifying major strategies for both the Mosaic of Subcultures (8) and the Identifiable Neighborhood (14) patterns, the major strategies specific to the selected site follow. The site is located in a prime spot in the Barcelona Waterfront, next to the artificial beach system completed in 2004. Only by understanding the importance of this site as an activity node and a gateway to the beach system are we to comprehend the importance of the site patterns. Land next to the water must be treated as precious and great respect. Roads must be kept away from the waterfront or reach it in right angles and perpendicular to the waterfront line. Land next to the water must also be preserved for public use.

Therefore:
The site must be treated with respect and as a precious node. A belt of public land must be kept next to the waterfront. Roads must only reach the waterfront in a perpendicular manner. Construction must only reach the waterfront at infrequent intervals.

Solutions:
1. Maintain a strip of public park of beach system in the waterfront.
2. Provide access to the water mainly by pedestrian and bike paths.
3. Setback the building to allow for the public belt.
4. Allow one road to reach the water in a perpendicular manner for service needs.
5. Allow part of the building to touch the water in a specific and powerful manner.
6. Provide variety of programs and activities to encourage a large number of different users to utilize the site in many ways, making it a precious and important space.
7. Provide easy access for the newly developed neighborhoods to the waterfront through the selected site.
This pattern aims to aid in the creation of a Mosaic of Subcultures (8) and Identifiable Neighborhoods (14). Its especially important to the success of Identifiable Neighborhoods (14). Small plazas and gathering spaces should be common and close together. A major flaw of the Parc del Forum current condition is the large amount of ambiguous and out of scale open space. With the redevelopment of the neighborhood, there is the opportunity to create smaller scale gathering places. Major and minor paths that connect these spaces and provide different perspectives and views are of great importance. These activity nodes should be spread apart around 300 yards from each other. The major site selected for the project will be a part of the overall activity nodes system.

Therefore:
Attempt to design and strategically place small scale plazas and gathering places separated around 300 yards from each other. Major and minor paths of connection between these spaces must be plenty full and distinct.

Solutions:
1. Provide small scale plazas and gathering spaces, one in every Identifiable Neighborhood (14).
2. Provide several and distinct major and minor paths connecting these activity nodes.
3. Utilize selected site as part of this network.
4. Given the scale of the site, attempt to create small scale gathering places within the site.
ACCESSIBLE GREEN

This pattern, again, is relevant to the previous patterns of a Mosaic of Subcultures (8) and Identifiable Neighborhoods (14). As important as people’s need of a green area and a place of relaxation such as a park, studies show that only people who live in a 3 minute walking radius of one really use them everyday. In the new redevelopment of the urban fabric of the Parc del Forum district, parks need to be common and diverse. Green areas suitable for relaxation must also be at least 60,000 sqft and a minimum 150 ft wide.

Therefore:
Provide several green spaces distributed evenly across the masterplan at 1500 ft intervals. Green spaces need to be at least 6000 sqft in area. Parks need to be reachable within a 3 minute walk, or 750 ft, from every home and workplace.

Solutions:
1. Design green spaces and parks as part of the main masterplan.
2. Locate parks as well as housing and services strategically to allow a close interaction between them.
3. Utilize land in selected site to create green spaces
Within the chosen site, select the area that is in the worst condition, and place the building there. Many people make the mistake of choosing the best area within the site as the area for the footprint of the building. This leaves the rest of the not-so-nice areas of the site to be neglected. Build always in the worst of areas to leave the nicer ones to be enjoyed. Within the selected site in the Barcelona waterfront, an analytic process should be followed to rank the areas of the site from good to bad.

Therefore:
Never place buildings in the places within the site that are the most beautiful. In fact, place buildings in the worst area within the site to preserve nicer areas to be enjoyed.

Solutions:
1. Consider the whole site and select the area that seems to be in the worst condition.
2. Consider also other external drivers such as accessibility, southern sun exposure, proximity to waterfront, etc.
3. Attempt to preserve areas of the site that seem to be ecologically healthy.
RELATIONSHIP BETWEEN BUILDINGS

As the chosen project is separated between the Research Center Building and the Aquarium, the spatial relationship between the two building must create positive space that can be part of the overall site design. The buildings need to be positioning in such a way that both complement each other. Views from each building must not be covered by the other structure. Accessibility to both buildings must not create problems and it should be organized in a way that both constructions are benefited. The formal language of the buildings must be cohesive. Positioning of the buildings related to the Site Repair (104) pattern strategies.

Therefore:
Attempt to design formally cohesive buildings that support each other. Intend to create positive outdoor spaces using the form of the buildings. Try to position buildings to emphasize the other. Accessibility should be of major importance to both buildings.

Solutions:
1. Formally design buildings to complement each other.
2. Utilize the overall masterplan design of the site to chose ideal position for buildings.
3. Attempt to maximize southern exposure on buildings and daylighting in the public spaces.
4. Position buildings in a place that aids with positive accessibility.
The prime position of the site as a major element in the Barcelona waterfront provides the possibility of designing an iconic piece of architecture that makes it a landmark and a destination. As the site is visible from the whole public Barcelona waterfront, the design of a building that attracts attention of the public is needed. Moreover, as the urban redevelopment of the whole district will make it a new thriving area, the placement of an iconic building will attract more attention to the urban masterplan. Waterfront buildings in many different cases have been designed as landmarks and icons of the regeneration of the area.

Therefore:
Attempt to design an formally iconic building that can be viewed from the whole Barcelona waterfront and beach system. Intend that the form also is cohesive with the masterplan of the site. Attempt to be regional and contextual but also iconic and innovative.

Solutions:
1. Formal design of the building must be memorable and make it a landmark piece.
2. Aim to attract the attention of the users of the whole waterfront system.
3. Connect to the site in such a way that the iconic building does not seem out of place or misplaced.
4. Intend to relate formally to cultural, social or environmental elements.
5. Utilize the iconic nature of the design as a statement for the regeneration of the waterfront and the whole district.
6. Connect the building formally to other large moves in the city.
TRANSITIONAL SPACES

The need of transitional is key when designing public buildings such as an Aquarium and Research Center. Levels of public and private realms must aim to achieve a smooth transition from the exterior to the interior of the building. Transitional spaces may also be used to provide gathering areas for the public, in a semi-public manner. Beware of utilizing transitional spaces only as circulation, as this may cause the space to lose memorability. Utilize scale and light as major elements in the spaces. There must be a clear path of entrance, yet a smooth transition between realms.

Therefore:
Attempt to design spaces such as foyers, exterior seating, covered exterior spaces as transitional spaces to move the public in a smooth manner from the exterior to the interior. Utilize scale, light, color and formal gestures to suggest these spaces. Provide a clear but subtle access and entrance.

Solutions:
1. The use of exterior covered spaces create changes of scale that act as transitional gestures.
2. Use cantilevers, overhangs or Loggias as formal elements.
3. Lobbies and foyers and transitional spaces.
4. Natural elements such as trees and planters can suggest paths and entrances in a subtle manner.
5. Use of abrupt changes of scale for intended purposes might prove useful.
6. When next to a busy street, transitional spaces are also useful for walking pedestrians, as a way to escape traffic.
Especially important in the Aquarium, circulation radiating from a central location is quite useful to lower the number of visitors following one specific path. Users can choose their own path, personalizing the visit. Generally, a central gathering area provides a vibrant and dynamic space, with a large number of different users utilizing the space to reach their particular locations. Radial circulation also provides an alternative to large longitudinal corridors. The central gathering space might be an exterior area or courtyard.

Therefore:
Attempt to organize the major circulation elements of the design to radiate from a dynamic central space. The central area could be an exterior courtyard or plaza. Attempt to reduce the amount of long corridors.

Solutions:
1. Design a large scale and memorable central space for it to be utilized by several users.
2. Avoid long corridors.
3. Natural light should be plenty full both in the central area as in the circulation system.
4. If possible, semi-exterior courtyards can prove as a very effective central gathering space.
BCN WATERFRONT

SOFT EDGES

HARD EDGES
The project at the urban scale attempts to connect the city with a restoration effort in the waterfront. The building then attempts to be part of this initiative, merging architecture and landscape.
PROPOSED MASTERPLAN
BUILDING PROPOSAL

The Nou Aquari de Barcelona attempts to be part of the landscape, both in form and in program, to create a smooth and thrilling transition between city and waterfront.
PROCESS WORK - INITIAL SKETCHES
PROCESS WORK-STUDY MODELS
PROCESS WORK—PROGRAMMATIC STUDIES

DEEP SEA  SHALLOW WATERS  COASTLINE

NATURE  CITY
FINAL FORM DIAGRAMS

SITE RESTORATION & BELOW GROUND
ARCHITECTURE AS LANDSCAPE
PLAZA LEVEL FLOOR PLAN

A- ENTRANCE & TICKETS
B- GIFT SHOP
C- ADMINISTRATION
D- LIBRARY
E- SERVICE AREAS
F- MAIN EXHIBIT
G- LABS
H- CLASSROOM
I- MULTIPURPOSE HALL
J- VERTICAL CIRCULATION
K- RESTROOMS
L- CAFE
WATERFRONT LEVEL FLOOR PLAN

A- SERVICE AREAS
B- VERTICAL CIRCULATION
C- TEMPORARY EXHIBIT 1
D- TEMPORARY EXHIBIT 2
E- WATERFRONT STAGE
F- RESTROOMS
G- MECHANICAL
SPATIAL DIAGRAMS

CONDITIONED VS. UNCONDITIONED

PUBLIC VS. PRIVATE

PERMANENT EXHIBITS

GATHERING SPACES

TEMPORARY EXHIBITS
SECTION B-B
TECTONIC STUDIES-STRUCTURE DIAGRAMS

RADIAL FRAMING PLAN

BEAM DEPTH PER AREA

NURB GEOMETRY
TECTONIC STUDIES—WALL DETAIL

Wood Planks

Cross Laminated Timber

Concrete Retaining Walls

Concrete Retaining Walls
TECTONIC STUDIES-AXO & WALL SECTION

EXPLODED AXONOMETRIC

- ROOF SHEATHING
  - WOOD PLANKS

- CLERESTORY STRUCTURE
  - WOOD TRUSS STRUCTURE

- SECONDARY STRUCTURE
  - CROSS-LAMINATED TIMBER

- PRIMARY STRUCTURE
  - CROSS-LAMINATED TIMBER

- SPATIAL PARTITIONS
  - CONCRETE STRUCTURE

- RETAINING WALLS
  - CONCRETE STRUCTURE

- SPATIAL PARTITIONS
  - CONCRETE STRUCTURE

- WOOD-PLANK DECKING
- CROSS-LAMINATED TIMBER JOISTS
- CROSS-LAMINATED TIMBER BEAMS
- TIMBER PIN CONNECTOR
- WOOD-PLANK DECKING
- CONCRETE RETAINING WALLS
- CONCRETE SLAB
- CONCRETE BEAM
- CONCRETE SLAB
TECTONIC STUDIES-ROOF STRUCTURE ELEVATIONS
TECTONIC STUDIES-ROOF PERSPECTIVE
TECTONIC STUDIES - TECTONIC MODEL
TECTONIC STUDIES—TECTONIC MODEL
The unconditioned space provides a great opportunity for natural ventilation. Wind coming from the sea is open to circulate through the building freely.
The numerous clerestories in the project provide a great opportunity to daylight the interior. The angle of the clerestories also avoid direct sunlight and glare.
The placement of the clerestories also provide opportunity convection currents to move hot air up to the clerestories and out through them.
Water in the tanks is taken directly from the sea and then used for landscaping when too contaminated for animals to live in.
The use of environmentally-friendly wood is extremely necessary to the overall sustainable effort of the project.
INTERIOR PERSPECTIVE-GRAND STAIRCASE
INTERIOR PERSPECTIVE - MAIN EXHIBIT
BUILDING MODEL PHOTOGRAPHS
BUILDING MODEL PHOTOGRAPHS
BUILDING MODEL PHOTOGRAPHS
BUILDING MODEL PHOTOGRAPHS
PRECEDENT STUDIES

DEN BLÅ PLANET: DANISH NATIONAL AQUARIUM
CALIFORNIA ACADEMY OF SCIENCES
MONTEREY BAY AQUARIUM
THE DEEP
DEN BLÅ PLANET: DANISH NATIONAL AQUARIUM

ARCHITECTS: 3XN
LOCATION: KASTRUP, DK
GROSS AREA: ~ 105,000 SQFT
COMPLETION: MARCH 2013

The newly completed Danish National Aquarium became Europe’s largest aquarium when it was completed in March 2013. It contains around 7 million liters of water, 53 aquariums and displays, and houses over 450 species of fish and animals. The concept for the design of the building is the shapes created by swirling water. The exhibits are divided up between several different wings and there is no fixed route. The facade is composed of diamond-shaped aluminum plates, almost reminiscent of fish scales. It also holds a restaurant and a auditorium.
PRECEDE NT STUDIES
DEN BLÅ PLANET: DANISH NATIONAL AQUARIUM
PRECEDENT STUDIES
DEN BLÅ PLANET: DANISH NATIONAL AQUARIUM
PRECEDENT STUDIES
DEN BLÅ PLANET: DANISH NATIONAL AQUARIUM
PRECEDENT STUDIES

DEN BLÅ PLANET: DANISH NATIONAL AQUARIUM
PRECEDE NT STUDIES
DEN BLÅ PLANET: DANISH NATIONAL AQUARIUM
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DEN BLÅ PLANET: DANISH NATIONAL AQUARIUM
PRECEDENT STUDIES

CALIFORNIA ACADEMY OF SCIENCES

ARCHITECTS: RENZO PIANO BUILDING WORKSHOP
LOCATION: SAN FRANCISCO, CA
GROSS AREA: 441,000 SQFT
COMPLETION: 2008

Renzo Piano was commissioned to design the new California Academy of Sciences in the year 2000. The new academy sits in the site of the previous building. The intention of the new building was to be part of the park, having a enormous 40,000 sqft of green roof. It houses a planetarium, several exhibition spaces, a rain forest habitat, an aquarium, and a vast number of research spaces. Salt water for the aquarium is piped directly for the Pacific Ocean. This water is cleaned and recycled for further use. The building was also awarded LEED Platinum status.
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MONTEREY BAY AQUARIUM

ARCHITECTS: EHDD
LOCATION: MONTEREY, CA
GROSS AREA: 130,000 SQFT
COMPLETION: 1984

The Monterey Aquarium in California is still one of the most highly regarded aquariums in the world, almost 30 years after its completion. The structure cantilevers over the Pacific Ocean, creating an interactive experience for visitors and researchers. The main concept of the aquarium was not to be a ‘display,’ but to evoke feelings in the public. As with the previous project, water utilized in the tanks is pumped from the ocean. The building also uses the ocean for cooling.
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MONTEREY BAY AQUARIUM
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MONTEREY BAY AQUARIUM

PRECEDENT STUDIES
MONTEREY BAY AQUARIUM
PRECEDENT STUDIES

THE DEEP

ARCHITECTS: SIR TERRY FARRELS
LOCATION: HULL, UK
COMPLETION: 2002

This aquarium is located in a former brown field site, at the convergence of the Hull River and the Humber estuary. Once of the important aspects of this project was the intention to make this a catalyst project, aiding with the economic regeneration of the area. It attempts to be an iconic, memorable building. The concept behind the formal qualities of the building is that of a wave or a glacier. It is also a center for marine research, utilizing the animals in the exhibits for research and education.
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THE DEEP
PRECEDENT STUDIES

THE DEEP
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THE DEEP
CONFLICT—WHICH IS THE MORE IMPORTANT?

NOT TWO ELEMENTS BUT RATHER...

ONE FORM WITH TWO INCIDENTS.

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