



AN ART MUSEUM FOR MANILA IN THE PHILIPPINES

A Thesis Submitted in Partial Fulfillment  
of the Requirements for the Degree of  
Master of Architecture  
at the  
Massachusetts Institute of Technology  
August 11, 1958

.....  
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# An Art Museum for Manila in the Philippines

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Submitted for the degree of Master of Architecture  
in the Department of Architecture on August 11, 1958.

This thesis is concerned with the design of a large art museum for Manila in the Philippine Islands. The need for such a museum actually exists and the hope is that this design may stimulate the actual planning. A study therefore was made of the unique problems of a museum in Manila. Growth of the museum, climate and site conditions, lighting and special space requirements are among the topics considered.

This project is also meant to serve as a statement of the author's views on museum design in general. The goal of providing an environment which would best help the visitor understand and enjoy art works was established. Problems which were considered in connection with this goal include museum fatigue, ease of finding one's way around, and the architectural expression itself.

Finally the attempt was made to design a building which is as fine a piece of architecture as its contents are art works.

1601 Massachusetts Avenue  
Cambridge, Massachusetts  
August 11, 1958

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Dear Dean Belluschi:

I hereby respectfully submit this thesis entitled "An Art Museum for Manila in the Philippines" in partial fulfillment of the requirements for the degree of Master of Architecture at the Massachusetts Institute of Technology.

Sincerely yours,

Bruce Gemmill

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To: Mister Tedoro Abuava, for whom this museum was  
designed in the hopes that it may help him in  
the future.

## THE PEOPLE

The people of modern Manila make up a group with many diverse influences. The three main cultural sources are the native, the Spanish and the American. Many Filipinos can speak all three languages - Spanish, English and Tagalog. The early native and Spanish influence has made the average Filipino easy going, hospitable and generous. These characteristics have remained dominant into the present period which is greatly influenced by the culture of the United States. The American element is something of a new toy for the Filipino. The glamour of Westernization has replaced the traditional ways of life.

As a result, the Filipino culture is in a state of flux, and the Filipino intellectuals are calling for a new national dignity and maturity that will eliminate the contradictions of the present situation. An indigenous Filipino art movement can be one of the powerful tools of this drive. By underlining the common human thread in the diverse aspects of modern life and by relating the new changes to the more familiar traditions the artist can fulfill his unique responsibilities.

## THE ARCHITECTURAL TRADITION

The architectural tradition of the Philippines is both native and Spanish. While under Spanish influence the Filipinos built many churches and fortresses of heavy masonry construction. These buildings were in the European style although many innovations of Oriental origin were introduced by the workmen. There is a great variety of style among the building. Greek and Roman are combined with Maya, Zapotec and Chinese and every building has unique characteristics. There is some question as to the functional value of heavy masonry and small windows in a climate in which constant daily temperature and high humidity call for free air flow.

The native Philippine architecture is very well suited to the tropical climate. Most native buildings consist of three well-defined horizontal layers; the great sheltering roof, the open walls, and the post supports which elevate the building one story off the ground to take advantage of the winds and avoid flooding.

These same conditions have generated a similar form in the projected museum. The overhang roof shades the walls and keeps the rain away, and spaces are left in the walls so that air may circulate through the inner gardens. Along with the functional value of this form, its similarity to the traditional forms may be a source of pleasure for Filipinos.



THE MUSEUM SITUATION

The only public museum in Manila at the present time is the National Museum. This museum was founded in 1905 and its career has been interrupted and altered many times since then. Much of the museum was destroyed in World War II and after the war, the museum was given quarters in the Bureau of Science. The museum opened an art gallery in 1949 and in 1950 4,800 visitors attended. Since the population of Manila is 1,000,000 it can be seen that only a limited program is in existence.

On various occasions the museum has held exhibitions under the auspices of the Art Association of the Phillipines, a private organization with an interest in establishing a new museum. If this organization can raise the funds, they are fairly sure that the government will give the land. Since the money will be slow in coming, a program that can be built in stages is mandatory.

One of the steps that has been taken to start the new museum is the training of Mr. Tedoro Abuava at the Fogg School of Harvard University. He plans to return home this fall and begin working towards the new museum. The program for this thesis was established with his cooperation.

## THE SITE

The choice of a site for this thesis was difficult to make. The city of Manila, like many other cities, was largely destroyed during the war. The rapid reconstruction after the war was uncontrolled and as a result there is little land left today that could be used for a museum.

The original Manila was located in the intramuros, or walled city, a fortress on a hill which dominates the city. After being totally destroyed during the war, the city passed an ordinance limiting reconstruction to buildings of the Spanish style. As a result the only buildings which have been built in this area are warehouses with applied Spanish colonial ornament.

To the south of the intramuros lies the institutional center of Manila with the government building and educational institutions. Most of these buildings are in white modern or neo-classic style. This area is the logical choice for the new museum since it lies between the business district to the north and the residential district to the south. There is no free land here large enough for a museum of the projected size, but filling in a portion of Manila Bay nearby would provide a suitable museum site. Immediately to the north of the projected site is located the American embassy, also built on filled ground. Gardner Daily is building a new residence building for the embassy on this site. A heavy growth of trees will obscure his building, however.

Dewey Boulevard is the main road along the bay and is the path of parades in Manila. It is 100 feet wide and is flanked to the bay side by a green strip also 100 feet wide. Before the war there were palm trees along the shore, but they were cut down by the Japanese. This



INTRAMUROS

PORT DISTRICT

Manila Hotel

LEGISLATIVE BUILDING

POLICE STATION

PRESIDENTS LANDING

SUBMERGED BREAKWATER

OFLAG

ERMITA

Paco Cemetery

CHURCH

SCHOOL

HOSPITAL

HIGH COMMISSIONER'S RESIDENCE

OBSERVATORY

BUREAU OF SCIENCE

COLLEGE

MILITARY PLAZA  
FLAG POLE

MALATE

BOULEVARD

YACHT CLUB BASIN

Fort San Antonio Abad

SEAPLANE BASIN

C. VITO

T H  
B O R

green strip is useful now as a park for Manila. In this way the people may escape from the noise of the road into an area which has enough depth for ball playing and picnicing.

The prominent position of the site also allows the museum to be seen from boats entering the harbor and in this way forms a recognizable element and a link between the sea and the land.

The site itself has beautiful views. To the north is the extension of the shore line of Manila Bay terminating with the port district and the intramuros. To the east is tree-lined Dewey Boulevard with high apartment houses beyond. Opposite the entrance to the site lies a small public park. The south affords a view of the shore line of Manila Bay as it comes seaward on the filled land of the airport.

The main view, however, is to the west with a view of Bataan and Corregidor, far across the bay. It is from the west that the prevailing breezes come and since the humidity in Manila is generally 70 or 80 per cent, this breeze is essential for comfort.

The temperature in Manila varies from 77° in January to 82° in May. The presence of the sea keeps the temperature of Manila on an even level with about 80° being the mean.

Much more variable than the temperature is the rainfall. The typhoon season, characterize by "horizontal rain", lasts from June to October. During this period only 37% of the daylight hours have sunshine. The remaining months have the characteristic tropical sunshine together with a dry temperate climate.

An additional hazard is present in the possibility of earthquakes rated as severe on the damage scale. Manila is about 15° north of the equator, so that the sun is never far from the zenith at midday. In such

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latitudes horizontal projections on buildings cast stronger shadows than vertical projections. One analyst sites this fact as a governing factor in the development of Gothic in the north and classical architecture in the southern latitudes.

Since the museum will be used mostly in the afternoon, the building will be seen with the sun behind it. The street elevation will be seen in shadow and the shadow of the building in the later afternoon will project well out into the approach from Dewey Boulevard.

Of interest in the design is the nature of Manila Bay itself. Manila Bay has about a four foot tide. There is a rough rock sea wall eight feet high along the shore. Since there is a thick layer of mud beneath the bay, the bearing conditions on the site are very poor. Piles or a mat foundation therefore become the foundation possibilities.

The way to keep cool in a humid climate is to have a large roof which shades the walls and which allows the air to circulate through the building.

In this solution the building was oriented parallel to the shore so that the prevailing breeze might circulate between the building and under the roof. The twenty four foot roof projection aids in shading the walls and thus further reducing the air conditioning load. The openings between buildings also allow an appreciation of the view on a large scale in each direction and thus relate the buildings to the site. The building was placed back from Dewey Boulevard so that it would relate directly with the bay and be easily seen in its entirety from the Boulevard. Since the building will be seen in shadow from the street most of the time, the patch of sunlight that is seen when looking between the buildings into the interior court plays an important part in the elevation. It seems to draw the visitor on.

The effect of temperature and rainfall also makes itself felt in the design. The temperate climate makes the outdoor circulation feasible and allows the outdoor amphitheatre and restaurant. But because of the heavy and gusty rainfall, an alternate means of getting between buildings must be provided. This is done on the lower level which is enclosed. a protected entry is also provided for those entering by car,

The earthquake danger points to a low building built of reinforced concrete, and the choice of a mat foundation further provides against damage since the building will act as a whole under any forces.

The mat foundation was dictated mainly by the poor bearing conditions. Because a spread out plan with frequent columns was desirable for other reasons a mat foundation proves more economical than a foundation of isolated piles.

The flooding problem was solved by raising the building on a platform and placing only the car storage below flood level. The platform also serves as a wall to keep people out of the gardens during hours when the museum is not open.

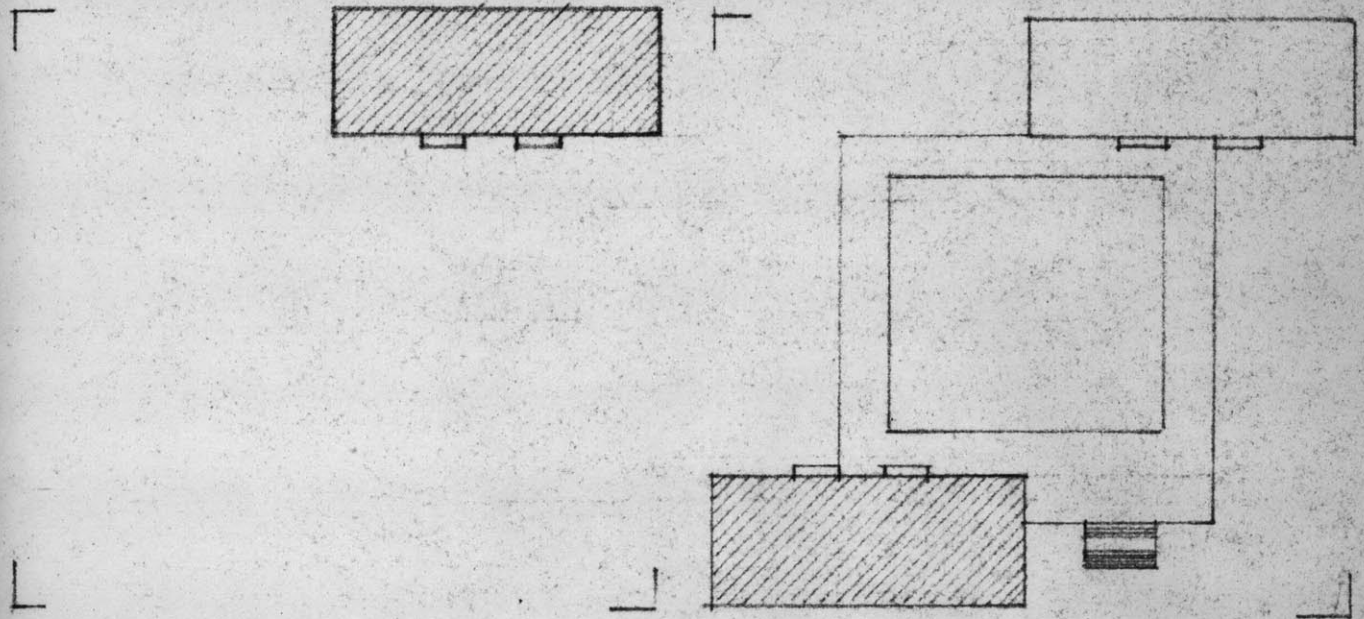
## THE PROGRAM

Expansion: One strong factor governing the form of the museum is the need for expansion. The money will come from the public, over a long period of time. The decision was therefore made to build the museum in four stages, one every five years. (See building sequence diagram.)

The first stage would be the construction of what would finally become the Spanish museum. Stage two would be the construction of the museum diagonally opposite stage one. At this time the land would be filled in in the center of the final scheme to provide for circulation between the two buildings. The palm trees would be planted at this time. Stage three would be the completion of the roof and platform and the building of the temporary exhibit museum. At this stage the museum would jump a big step ahead since the final form would be set and only a hole left for the final museum in stage four.

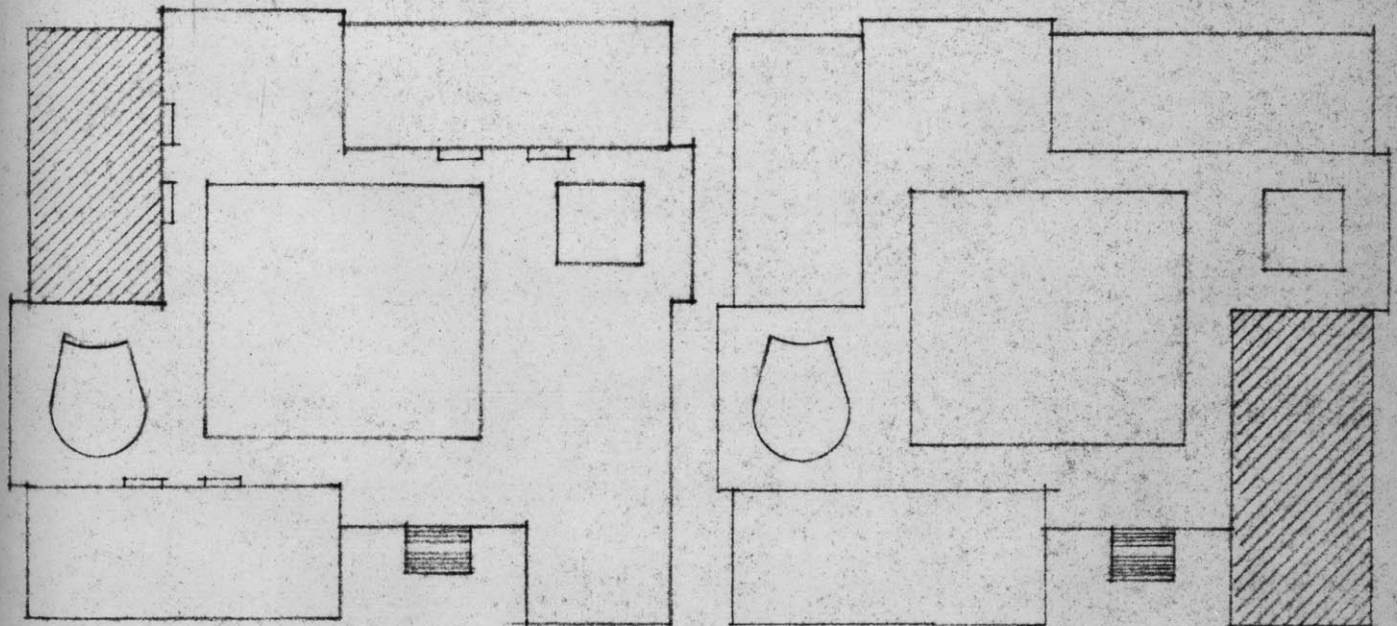
Orientation: In considering the general layout of the buildings, a great deal of consideration was given to the need for the visitor to always know where he is in relation to the whole. The feeling of being lost in a labyrinth prevents an untroubled study of the art works.

For this reason the solution was organized within a square, a figure which is easily conceptualized in plan. (See circulation diagram.) The four buildings of the square are related by the central garden. The danger of mistaking one building for another is avoided by placing minor design elements asymmetrically so that they have a different relation to each of the buildings and thus allow the visitor to orient himself when he comes out of one building. One study of movement has shown that 70% of people turn to their right on entering a building. For this reason the sequence has been planned chronologically, beginning



STAGE 1

STAGE 2



STAGE 3

STAGE 4



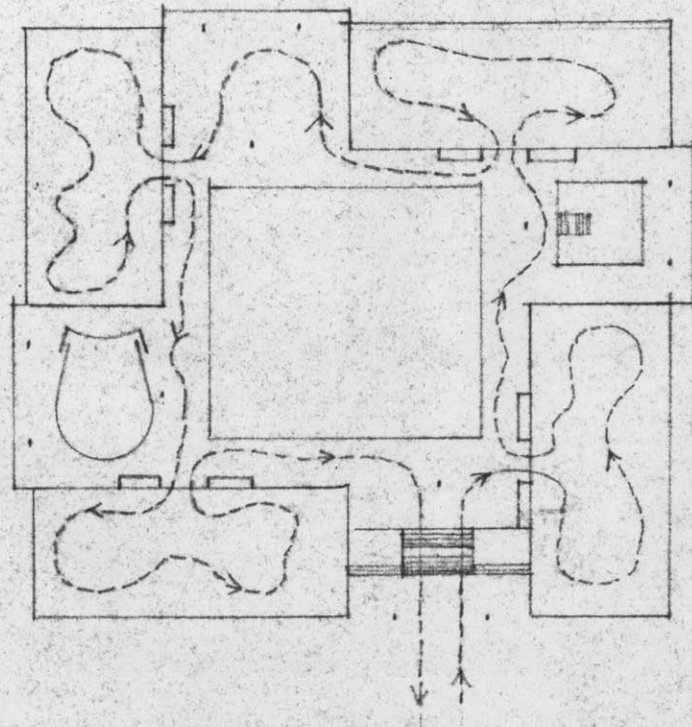


DIAGRAM SHOWING CIRCULATION

with the right hand building and progressing counterclockwise.

The circulation within the buildings themselves is also counterclockwise. A feeling of one major space is retained by the use of the central skylight and partitions which end short of the ceiling. Vertical circulation can often destroy a carefully built-up orientation pattern. In this scheme windows are provided on the stairs and in the elevators so that the visitor may relate himself to the central space as he travels. On the lower level the problem of orientation is much greater because of the greater diversity of function. The public corridor has the same relation to the garden as above and the same elements of vertical circulation and building shapes are recognizable on the opposite wall.

Museum fatigue: Museum fatigue is one of the main obstacles in the path of the large museum. One authority has concluded that the amount of time spent viewing exhibits is independent of the number of exhibits and generally runs about two hours. Given these conditions the problem becomes one of sustaining and renewing the visitor's interest.

One of the **most** direct ways of renewing a flagging interest is to provide a temporary diversion. In the scheme adopted these diversions are of two kinds. Each museum is provided with windows from which to view the grounds. In addition the walk from one gallery to another is a diversion enlivened with gardens and views of the Bay.

Much can also be done to sustain the viewer's interest as he circulates through the exhibits. The exhibit is considered as a sequence in which each painting has a meaningful place in relation to the whole. The meaning is brought out by variation in light and space which concentrate attention and provide variety. A painting is hung by itself, and the light controlled to its best advantage. Consideration is given to the

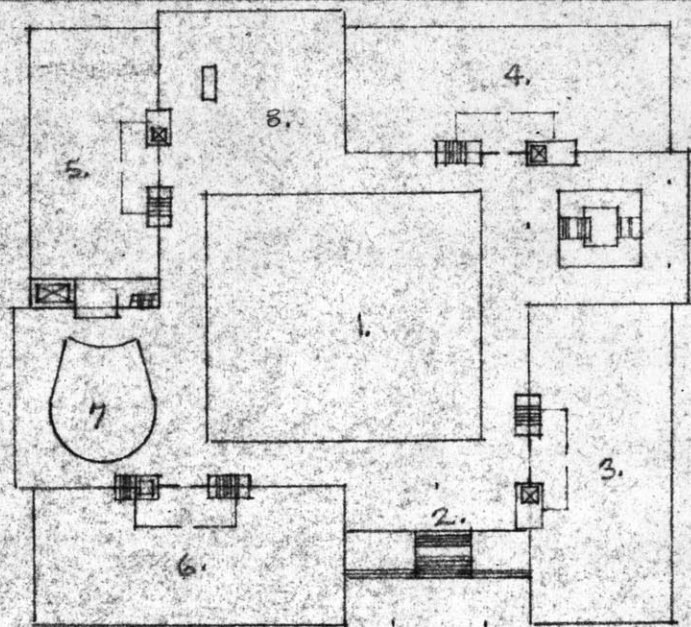
distance from which the visitor first sees it and what painting he has seen before it and will see after it.

The solution used achieves these aims by the use of moveable partitions and by the use of the mechanically variable light from the skylight. As the viewer moves around the building he moves from artificially lit areas to areas of natural illumination and back again. He moves from constricted spaces to larger spaces in a sequence that has the continuity of a system and a variety within that system.

Aesthetic considerations: The effort has been made in this thesis to determine what architectural expression would be the most conducive to the appreciation of art. The conclusion was reached that art works are most meaningful in an atmosphere of dignity, repose and serenity. The museum was looked upon as an escape from the hectic world outside to a place where undisturbed contemplation would be possible. The attempt was made to echo the immortality of the paintings with an architecture of a timeless aspect. In line with this desire the expression of shelter was given a dominant place in the design and the building was set off the ground to accent a detachment from the world. Throughout the design process every decision was made with this goal in mind in the hope that a consistent expression might result.

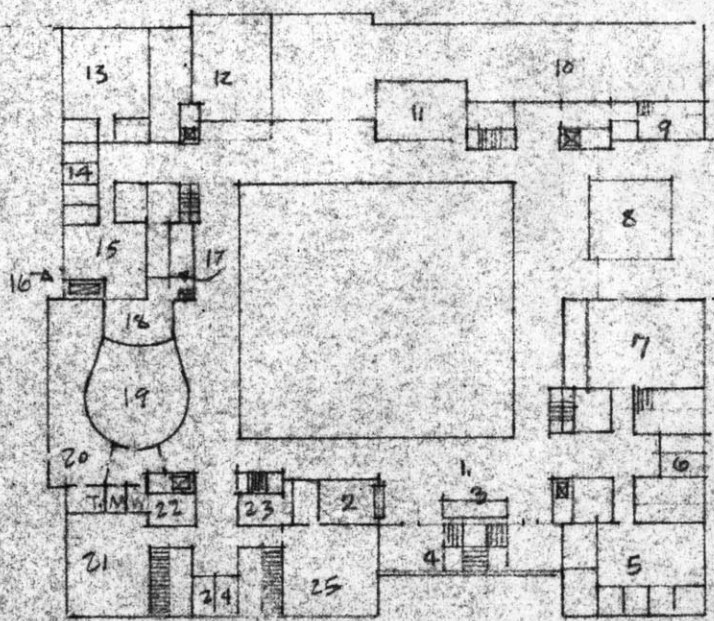
Approaches to the building: In designing the approaches to the building consideration should be given to the proper definition of pedestrian and automobile entry. In this case the majority of the visitors will be arriving by foot. Of the few that drive most will have chauffeurs.

The solution provides for automobile entry from Dewey Boulevard, which goes under a platform. The visitor is dropped off and has his choice of either stairs or elevator to the upper floors. If it is



- 1 GARDEN
- 2 ENTRY
- 3 PRESPANISH & DECORATIVE
- 4 SPANISH
- 5 TEMPORARY
- 6 MODERN
- 7 AMPHITHEATRE
- 8 RESTAURANT

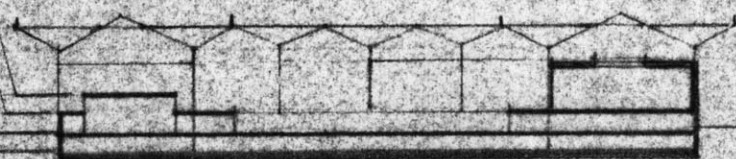
EXHIBIT LEVEL



- 1 LOBBY
- 2 COATS
- 3 BOOKS
- 4 STAIRS TO PARKING (DN)
- 5 ADMINISTRATIVE OFFICES
- 6 PRESPANISH TUTORIAL
- 7 RECEPTION
- 8 POOL
- 9 SPANISH TUTORIAL
- 10 STORAGE
- 11 AIRCONDITIONING
- 12 KITCHEN
- 13 SHOPS
- 14 REGISTRAR & SUPER.
- 15 RECEIVING ROOM
- 16 FREIGHT ELEVATOR
- 17 LOCKER ROOMS
- 18 STAGE
- 19 THEATRE
- 20 THEATRE LOBBY
- 21 STUDIO
- 22 FAN ROOM
- 23 TOILETS
- 24 MODERN TUTORIAL
- 25 LIBRARY
- 26 CAR UNLOADING UNDER

LOWER LEVEL

AMPHITHEATRE  
EXHIBITS  
LOWER LEVEL  
PARKING  
SEA LEVEL



SECTION

necessary for the visitor for the visitor to park his own car, access to the floors above is provided at three other points in the parking garage.

Pedestrians enter through gates in the front of the platform and from there to the main entry where they are given the choice of going down to the lobby or up to the exhibits directly.

The lobby: The lobby serves as a focal point in museums. It should stand in an easily recognizable relation with the exhibit spaces, the administration offices and various public spaces. The main function of the lobby is to serve as information, coat check and post card buying center, as well as rallying point for large groups of people.

In this solution the lobby is given an unconventional treatment. It no longer serves the usual function of a check point for guarding the museum. That function is left to the individual galleries themselves. Part of the lobby is actually out of doors, protected only by a roof. (See plan diagram.) It is here that a guard is stationed to direct the new visitor to the exhibits upstairs or to the coat check service and bookstore beneath. The indoor portion of the lobby, at the lower level, also serves as a central point around which the secondary functions of the museum operate. Access to the museums is also provided directly from the lobby by stairs and elevator.

Exhibit spaces: There are four categories of art which are to go in this museum:

- 1. Pre-Spanish - exhibits of early Phillipine art
- 2. Spanish Period art - religious art done at the time of the Spanish colonization
- 3. Modern art - recent art, an outgrowth of contemporary movements
- 4. Temporary exhibits

In the solution each branch is given a separate building. The temporary exhibit building also houses modern art from the museum's permanent collection which is rotated frequently. The freight elevator is located in this building and the building is located at a distance from the entry so that the visitor will walk through the garden to get to it.

The control of exhibit spaces is important in museum design. There should be only one entrance and that should be easily guarded. There can be no open balconies from which art works can be thrown. In addition, the exhibits should be laid out so that a minimum number of guards can oversee them.

In this scheme each of the four galleries operates autonomously from the standpoint of control. There is a guard stationed at the checkpoint on the far side of each lobby. Beyond this point there is basically a room with no exits and no places from which to throw objects. Before the check point, in the lobby, is located the vertical circulation. At the lower level there are guards only at the entrances to the offices. This system protects all the valuables that can be moved and at the same time allows people to circulate freely through the gardens. In some museums, such as the Gardner and the Museum of Modern Art, the garden is placed within the area that is guarded. In these cases it is possible to pass art works through the bars to friends outside.

The control within the exhibit spaces is facilitated by the free arrangement of partitions which allows the guards vantage points from which to view the crowds. There exists some exhibition space on the lower level which cannot be easily controlled. Only photographs and objects of little value could be exhibited here.

The circulation through the exhibits must be carefully considered.

Best results are achieved when the exhibit is arranged in a cycle with short cut routes available for those who want to study only one painting. The cycle should be arranged so as to minimize the number of painting missed by some one who is following the sequence.

The free arrangement of partitions allows the sequence to be performed with short cuts while at the same time strongly suggesting a direction which will encompass all the paintings.

The space concept of the exhibit area also hinges on the use of free-standing partitions which only partially enclose space. In the past a painting was a window in an enclosed room; a vanishing perspective which led outward. Today painters no longer seek to create space by destroying the two dimensional aspect of the canvas. The new art then is more at home in an architecture which provides the release.

The theatre:

The theatre: The function of an auditorium in most museums is limited to movies, small musical groups and lectures. Coleman recommends a capacity of 300 or 400 and a circulation pattern which allows the auditorium to be used when the museum is not open.

Here the auditorium is treated in conjunction with an amphitheatre above, built in one of the spaces between building. The auditorium is entered from the lower level. The increased ceiling height needed at this point is provided by punching up into the floor above. The projection this creates on the exhibition level has a sloping top and is used as seating for the amphitheatre. A projection booth is located in the rear of the hump and serves the amphitheatre by means of a periscope-type optical device, as well as the auditorium below. Access to both seating areas can be made while the museum is closed. The stage of the auditorium and amphitheatre

are equipped with lighting and wings to handle small productions that do not require a fly gallery. The museum freight elevator is located here to serve as transportation for sets, pianos, etc. On the level of the auditorium and close at hand are located the locker rooms for the museum which serve as dressing rooms and which can be closed off from the rest of the museum when it is not open. Toilets are also located in the lobby of the auditorium. A nearby stair allows access to these toilets from the amphitheatre while the museum is closed. The auditorium lobby and amphitheatre balcony are designed to accommodate the intermission crowds. The problem of ticket selling is resolved formally in the auditorium with a ticket booth and informally in the amphitheatre with a demountable table.

Because of the somewhat ambitious program adopted for the theatre facilities the construction would come late in the expansion program, although a gift by some theatre-loving patron would enable the theatres to be built as early as the second stage.

The restaurant: Together with the amphitheatre the restaurant provides the second major outdoor function in the museum. A restaurant was chosen rather than a cafeteria because of the inexpensive labor in the Phillipines.

Located between two galleries, the restaurant is positioned midway in the sequence of the four buildings, and has a view of the bay. The kitchen is located beneath the restaurant and communicates to the butler's pantry by means of dumbwaiters and a nearby private stair. Adjacent to the kitchen and in an alcove off the main corridor are located more tables and chairs for use during a storm. Service to the kitchen is provided directly below on the garage level. A large



dumbwaiter in the elevator block provides the connection.

The restaurant would also be built at a later stage in the design.

The library and studio: These two spaces along with the auditorium form the educational area of the museum. They would be located together near the entrance to the museum so that they may be found easily by the public. The library in addition should be handy to the curatorial offices since it is used by scholars.

The four elements in a museum library are the desk, the adjacent work room, the stacks and the reading area. The desk should control the only entrance easily, and the reading area should be placed in a pleasant place. The studio needs to be a well-lit flexible room with adequate storage nearby. Most large museums have extensive classroom facilities also. Education is already amply handled in Manila, however, and as a result Mr. Abuava has recommended that the facilities be minimized. The one large room which remains would be used for children's art classes and adult education, both on an informal level.

The reception room: The reception room in a museum can be said to pay its way without question. It is used for teas and gatherings in connection with fund raising as well as for the openings of new shows. A kitchenette facilitates these functions and adequate storage should be present for folding chairs. At other times the room is used for a member's lounge with easy chairs and magazines available.

In this solution the reception room is located near the main entrance and adjacent to the lily pond. This latter location establishes the reception room in a unique position.

Curatorial space: The curatorial suites of a museum form the centers of scholarship. In a large museum there is a curator for each major branch of the museum; in this case, Spanish, pre-Spanish and modern. The general opinion is that the curatorial suites should

be placed near their own exhibits. Since each curator is independent of the rest, the suites need not be near each other nor need they be near the administrative offices. The main function of the suites is to serve as study space in which scholars may view the reserve art works. The offices of the curator and his secretary are also there, as well as the workroom.

In this scheme the curatorial suites are located beneath their exhibit spaces in places easily found by the inquiring public. The largest suite is devoted to the modern art. The pre-Spanish and decorative arts combine to occupy the second suite, and a somewhat smaller suite is provided for the Spanish exhibits.

The study rooms are arranged with closely spaced screens on which paintings are hung and which pull out into the study room. In this way the maximum number of paintings may be stored in a given area.

Administrative offices: The administrative offices of a museum should be located so that they may easily be found by a visitor. The program calls for a boardroom, a director's office and a general office space as well as offices for the assistant director, finance officer, membership secretary and public relations head.

The service entrance: The problem of the service entrance is complicated in this case by the need to avoid flooding. The actual receiving room is located on the floor above, and a freight elevator connects the two areas. Protection is provided for an unloading truck by having the truck drive into a room which is then locked while the truck is unloaded. The only exit from the loading room is through the receiving room which can easily be supervised by the superintendent.

The receiving room: There are several essential elements in a museum receiving room. The freight elevator of course is adjacent to it, as is a room for the storage of crates. The superintendent must have an office which looks out over the room so that he can supervise the use of the freight elevator. Near the receiving room is located the Registrar's office where the museum records are kept and a temporary storage room and vault for art works that are being transferred. The Registrar is actively engaged in setting up temporary exhibitions so that it is necessary for his office to be near the temporary exhibition space. Adjacent to the Registrar's office is a viewing room for art works which have just arrived.

The layout of these rooms in the current design scheme is standard. The whole area revolves about the freight elevator which connects above with the temporary exhibit area, on the one side, and the outdoors, on the other. This latter connection is used for occasional changes in the permanent collections. As was mentioned before, the freight elevator also connects with both the amphitheatre and auditorium.

Shops: The shops in an art museum are used for setting up temporary exhibits and for maintaining the building itself. They must therefore be equipped to do carpentry, sheet metal work and all of the maintenance trades. The shops should be located near the receiving room and handy to the temporary exhibit area. Also in the vicinity are located the photography and restoration rooms. The photography room is used to photograph all incoming exhibits and should therefore be near the receiving room. In the solution, all of these areas are under the control of a secretary outside the Registrar's office.

In this way a visitor can gain admission only by permission.

Locker rooms: In this scheme locker rooms have been provided handy to the Registrar's office and time clock. Every employee has a locker here and since many employees have uniforms or work clothes the locker rooms form an important part of the service area. The locker rooms connect with rest rooms and showers. As was stated before the locker rooms also serve the auditorium and amphitheatre.

Storage: It is almost traditional for museums to underestimate their storage needs. In the average museum about eight per cent of the area is devoted to storage. The present scheme raises the figure to thirteen per cent and effectively the figure is greater since all of the storage is easily accessible. Most of the storage will be devoted to reserve storage of art works and lighting facilities will be provided to enable study.

Parking: This museum is in a unique position with regard to parking. Since the building is built on filled land, an underground parking garage may be obtained with the cost of excavation. This has been done and connection with the museum above has been provided at four points. The bay spacing of twenty four feet allows two cars to be parked easily in one bay and the ring plan of the building easily adopts itself to the circular circulation of a parking garage. Fewer Filipinos than Americans have cars so that the parking problem is not as great as it is here. In addition the building is within walking distance of many parking spaces.

## LIGHTING

One of the most delicate problems in museum design is the proper control of lighting. Among the variables that must be taken into account are color, intensity, brightness, brightness contrast, and position of the light source.

Color: The color of what we think of as white light varies from 2100° K. of an incandescent bulb to 12,000° K. of north light. Depending on the time of day, and the presence or absence of clouds, the color of daylight is quite variable. Daylight is therefore rich in color nuances which enhance the enjoyment of art by refreshing the eye. When daylight is used in galleries it generally provides an overall room illumination of about 4500°. Current practice calls for object illumination from incandescent spots at about 2100°.

Intensity brightness and contrast: Light that reaches the eye by reflecting from an object is dependant on the original intensity of the source and the brightness of the object. Perception of the object is also dependant on the brightness contrast of the object with its background since a contrast of over ten to one causes eye fatigue. In general a work of art should be provided with brighter illumination than its background. Human experience dictates that object illumination be of a warmer color than the background illumination.

Position: For exhibiting paintings a vertical angle of between 15° and 45° is the best for avoiding reflections in the eyes of the viewer. The answer for sculpture is more complicated and usually requires light from two directions placed so as to

bring out the modulations in the surface.

In this scheme, both skylights and artificial light are used. From some of the spaces natural light is excluded and in other spaces the natural light plays the dominant role.

The roof design of the museum is a double roof. Both elements are provided with skylights. Between skylights, the air circulates to reduce the heat gain of the room.

The skylights are constructed so that the amount of sunlight reaching the room can be controlled by a set of variable louvers, under the uppermost skylight. These louvers are necessary for two reasons; first, the sweep of the sun in the sky would place the lower skylight in shade most of the day if the rays were not rerouted by louvers. Second, the climate of Manila is such that during the rainy season, light is at a premium but during the dry season there is plenty of light. At such times, when there is too little natural light the general illumination can be strengthened by artificial light of about 4800<sup>0</sup> to an intensity of 10 foot candles.

The individual art works in this case will be illuminated by spots of 2800<sup>0</sup> K. so that the brightness of the art work will be about 30 foot lamberts. The background of these exhibit spaces will be in a fireproofed woven hemp mat, the reflection factor of which will keep the brightness contrast below ten to one.

For the spaces which depend completely on artificial light the illumination will be about the same except that the general illumination will be kept lower to provide variety. In some cases, this lighting method will be supplanted by light designed for special dramatic effects.

Additional natural illumination is provided by small windows in

the exterior wall which are spaced every twenty four feet.. These windows are one foot six inches wide and run from floor to ceiling. They may be closed off with a door flush with the inside wall. The intention is to have only a few of these windows open at a time to provide side lighting for sculpture and to give a view out.

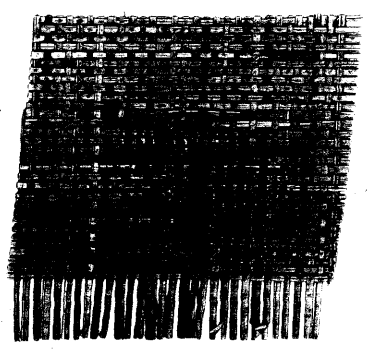
MATERIALS

The Philippines present a rich palette of materials for the architect. Sandstone and clay products are used often and the abundant tropical woods are quite handsome. Recently reinforced concrete has come into favor and its use is quite widespread in Manila. The labor situation and the scarcity of steel both point to reinforced concrete as economical.

In this design reinforced concrete was used extensively. One way of unifying a building is to use a small number of materials and since concrete is able to do many jobs efficiently it lends itself to this concept.

Tropical wood flooring was used for the exhibition spaces because the resilience of wood eases foot fatigue. For the walls in the exhibit spaces concrete is unsatisfactory since it makes hanging difficult. A furred wall was therefore employed and pandanas cloth (See attached sample.) was used. This local product has the correct reflectance value to ease brightness contrast and it hides nail holes well.

In general the choice of materials in this design was made so that the building would not command more attention than the art works.





HEATING AND AIR CONDITIONING

The galleries of all museums are air-conditioned these days since dust and humidity changes can destroy paintings. Close control on temperature also helps reduce expansion cracks. In the Philippines air-conditioned galleries will also reduce museum fatigue.

Since the new museum is very spread out in plan, the cooling job was organized in two stages. A central refrigerating plant was provided in the stage one building and the refrigerant was then piped to a fan room in each of the four buildings where the refrigerant was used to cool air that was circulated and returned. This method reduces the amount of duct work and also diminishes the fire hazard.

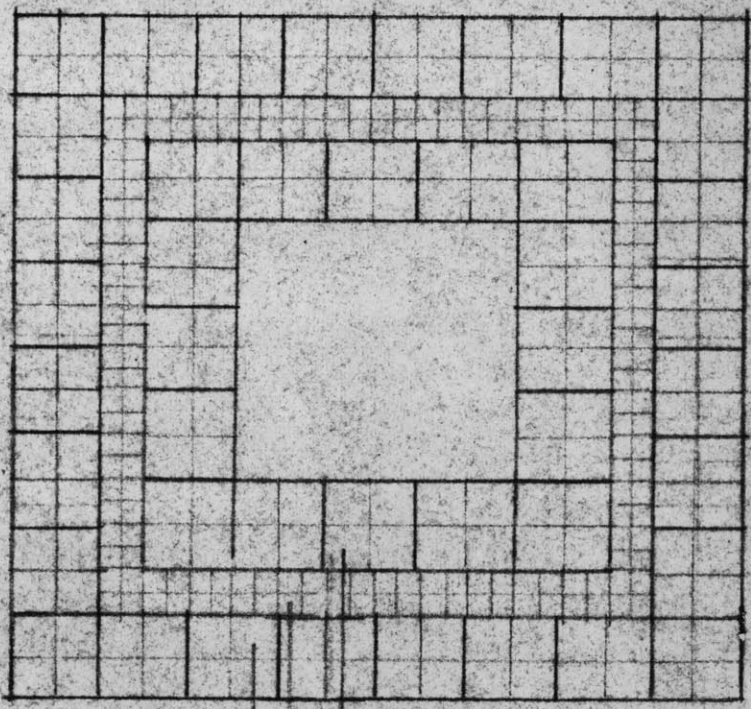
Heating is necessary only a small part of the year. Space heaters in the fan rooms will distribute warm<sup>m</sup> air through the ductwork.

## STRUCTURE

The foundation: This project presented a somewhat unusual problem. The building is built on fill, ~~Beneath~~ which is the unstable mud of the floor of Manila Bay. Either piles or a mat foundation are necessary under such circumstances. The program dictated a low spread-out building and the use of concrete established a bay spacing of twenty four feet. There are then quite a few closely spaced columns. To build this foundation with piles would be uneconomical since there would not be enough load on each pile cluster to make the system efficient. A mat foundation was therefore used with the weight of the building being compensated for by the removal of an equal weight of soil. Such a foundation also has advantages during an earthquake.

Floor framing: In the design of the floor framing a system was sought which would use concrete in a flexible and economical way. The many holes that must be cut in the floor for stairwells and elevator shafts made a system of one-way metal pans running between girders seem the logical choice. By prestressing the girders of the underroof the seventy two foot span may be accommodated with the same metal pan forms spanning the twenty four feet between girders.

Roof framing: The roof framing system used is a series of hyperbolic paraboloids. Four paraboloids are placed together so that they form a square in plan forty eight feet on a side. This group of four paraboloids is the basic unit of the structure. The directrices of the paraboloids reach down to a central column ten feet below the horizontal plane. This roof structure is made of cast in place reinforced concrete. There are two rows of forty eight foot paraboloids units, separated by a twenty four foot space over which plastic skylights are placed, also in the form of hyperbolic paraboloids. The



INNER ROW OF PARABOLOIDS  
ROW ON SKYLIGHTS  
OUTER ROW OF PARABOLOIDS

ROOF PLAN

design of the plastic skylights would be experimental and might have to be replaced with standard glass skylight. This structural system was used because a large cantilevered roof was desired. The elegance of the hyperbolic paraboloid was also a major determinant.

The actual design of the structure has not been attempted in this thesis. The precaution was taken, however, to study the problem and to consult with the faculty to make sure that the column spacing, beam depth, and hyperbolic paraboloid size were within the efficient limits of the material. Thus, although the structure has not been designed, the statement can be made that if the calculations were made, the resulting solution would not change the form noticeably.

TABULATION OF BUILDING SPACES

Exhibition space

supervised	35,700
unsupervised	<u>9,800</u>
Total	43,500
% of whole - 44%	

Educational space

lecture	9,200
library	1,700
studio	1,300
reception	<u>2,000</u>
Total	14,000
% of whole - 11%	

Offices

administrative	2,160
curatorial	2,900
supervisory	<u>575</u>
Total	5,635
% of whole - 4.3%	

Storage

Curatorial	1,700
Dead storage	12,100
Miscellaneous	<u>2,300</u>
Total	15,000
% of whole - 13.0%	

Lobby, corridors 11,000

% of whole - 8.5%

Miscellaneous 9,000

% of total - 7.0%

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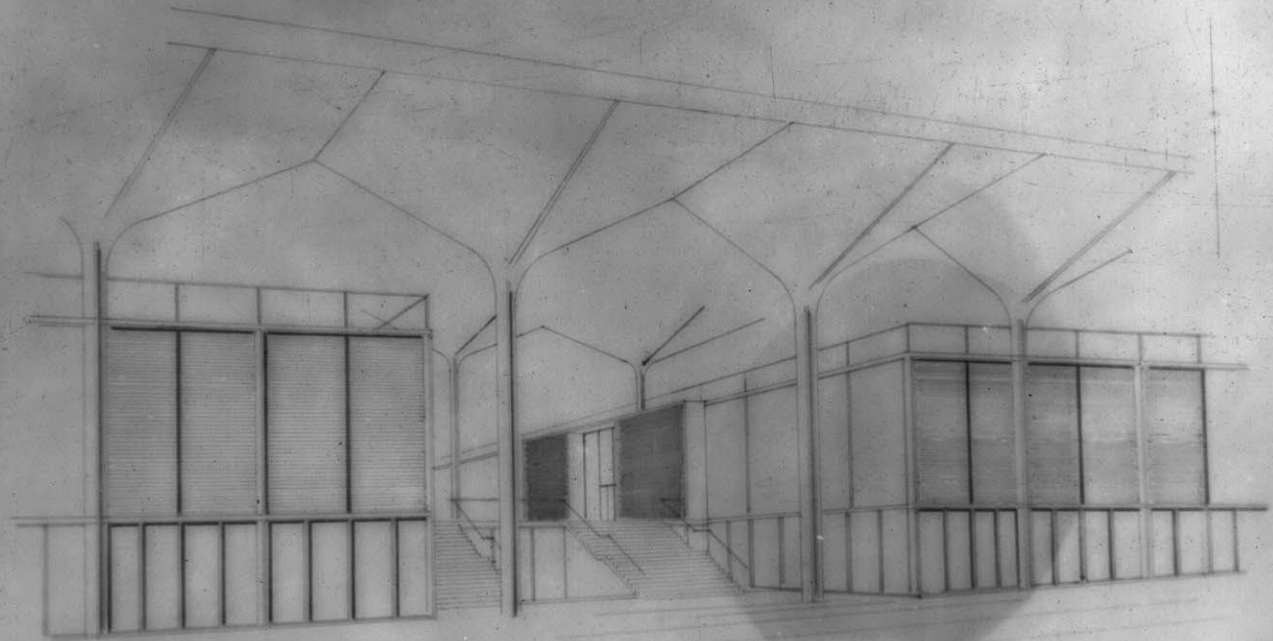
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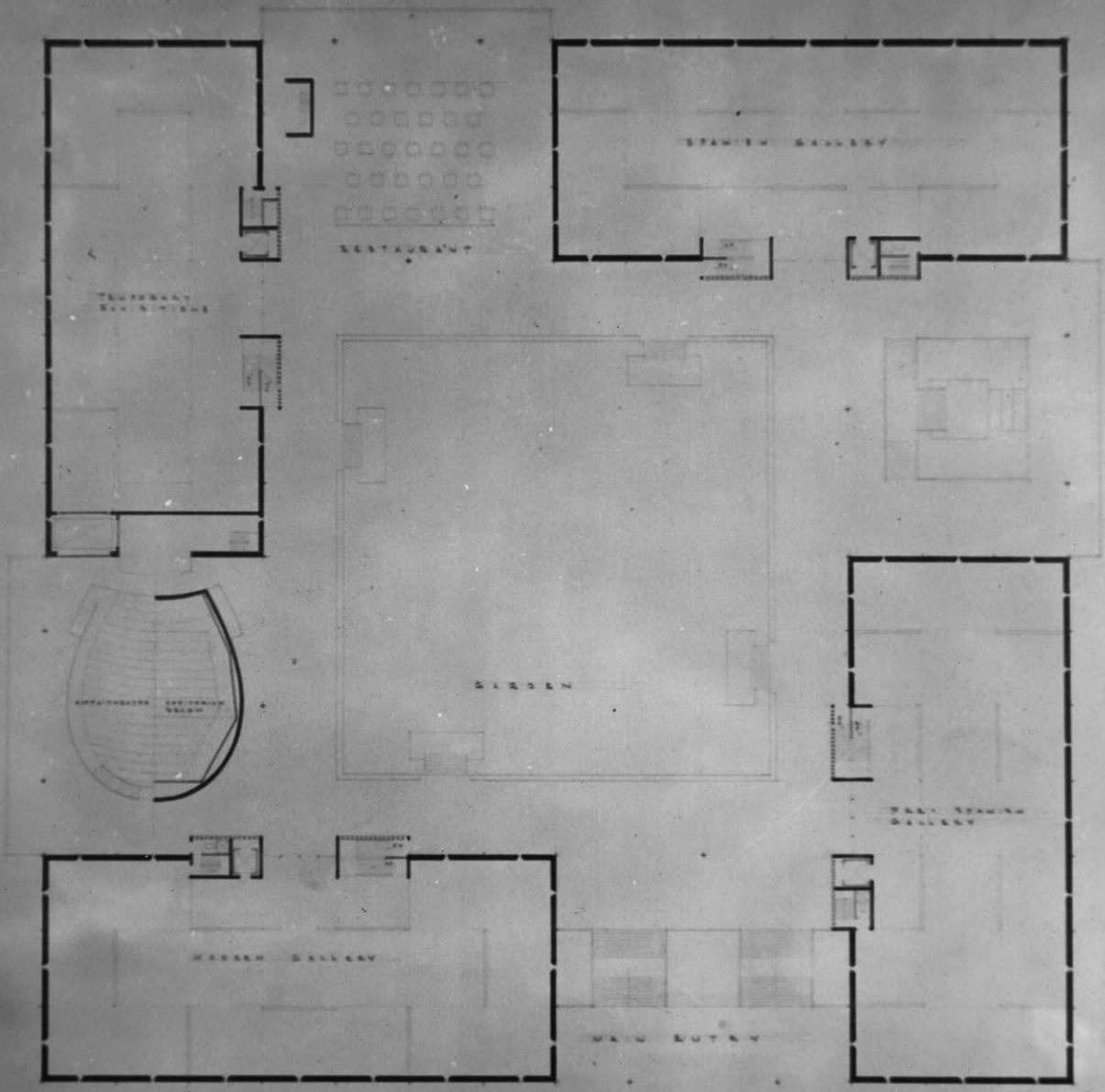
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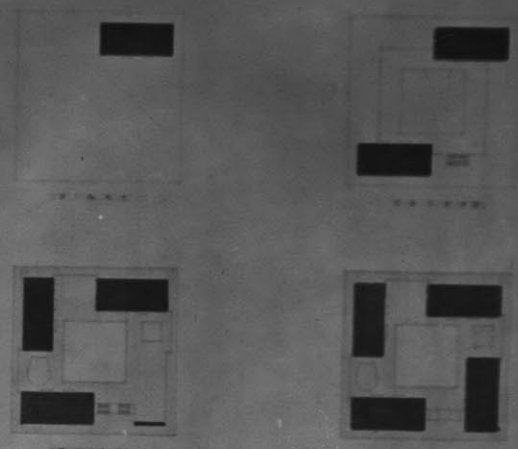
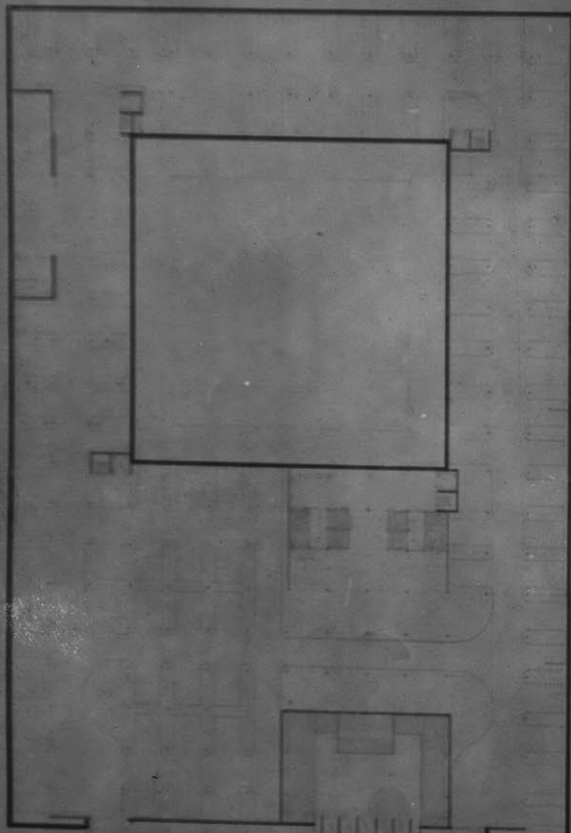


**AN ART MUSEUM FOR MANILA**

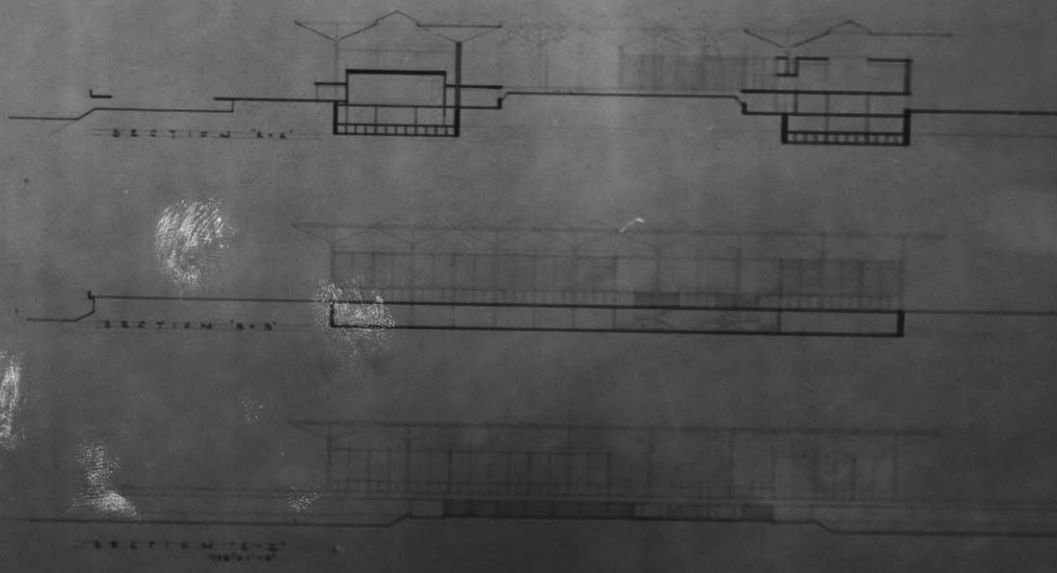




UPPER LEVEL PLAN

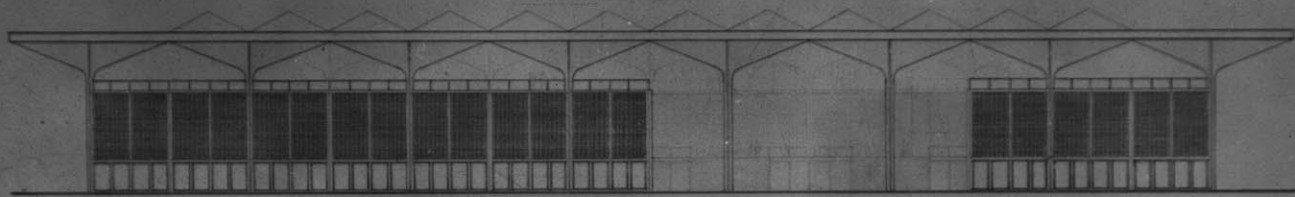


STAGES OF CONSTRUCTION  
CRAS DE BARRÉ

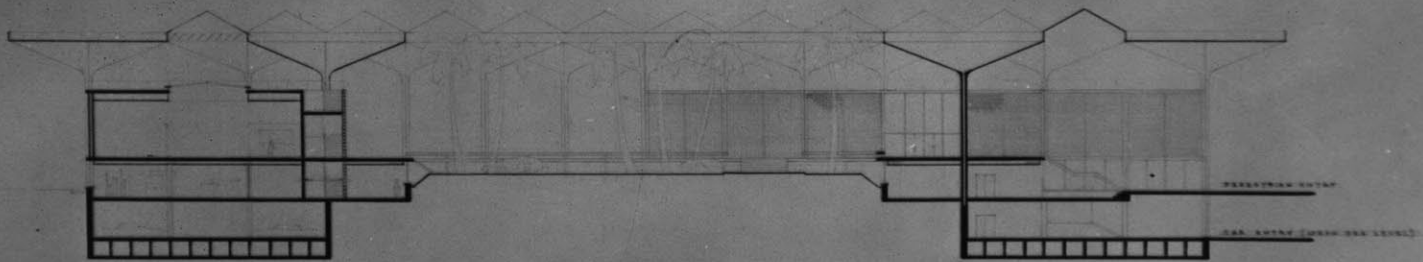


PLANNING LEVEL 1964

SECTION C-C  
1964-65



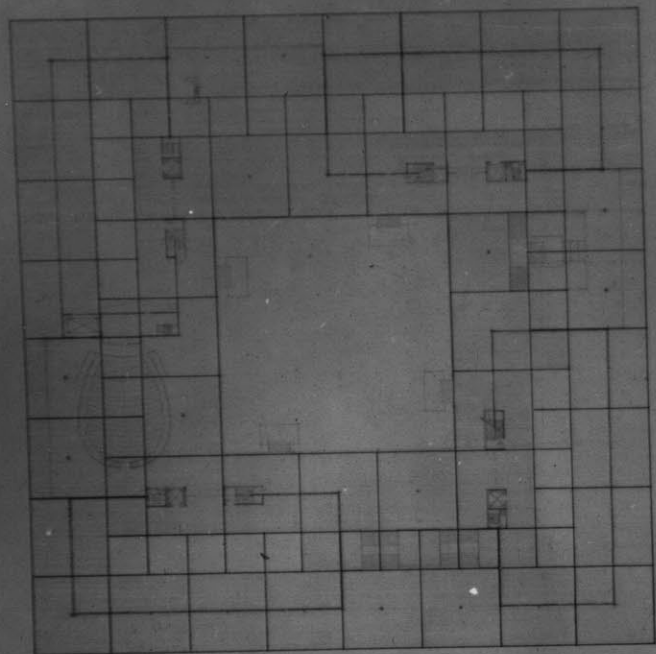
EAST ELEVATION



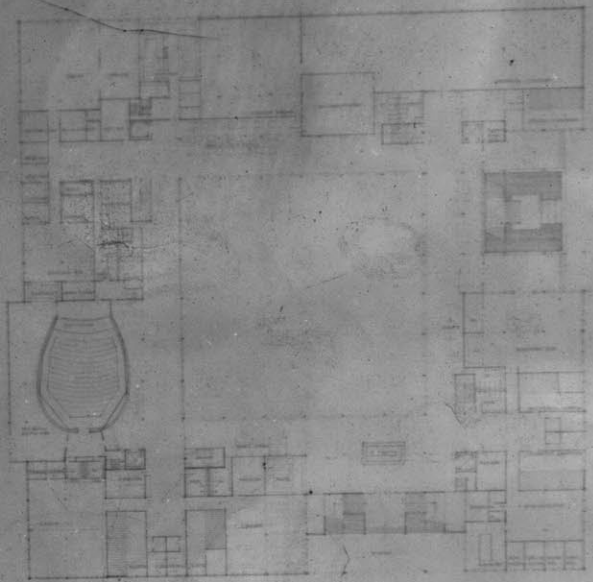
SECTION D-D'

REGISTERED OFFICE

SEA LEVEL (FROM SEA LEVEL)



QUANTUM ROOM PLAN

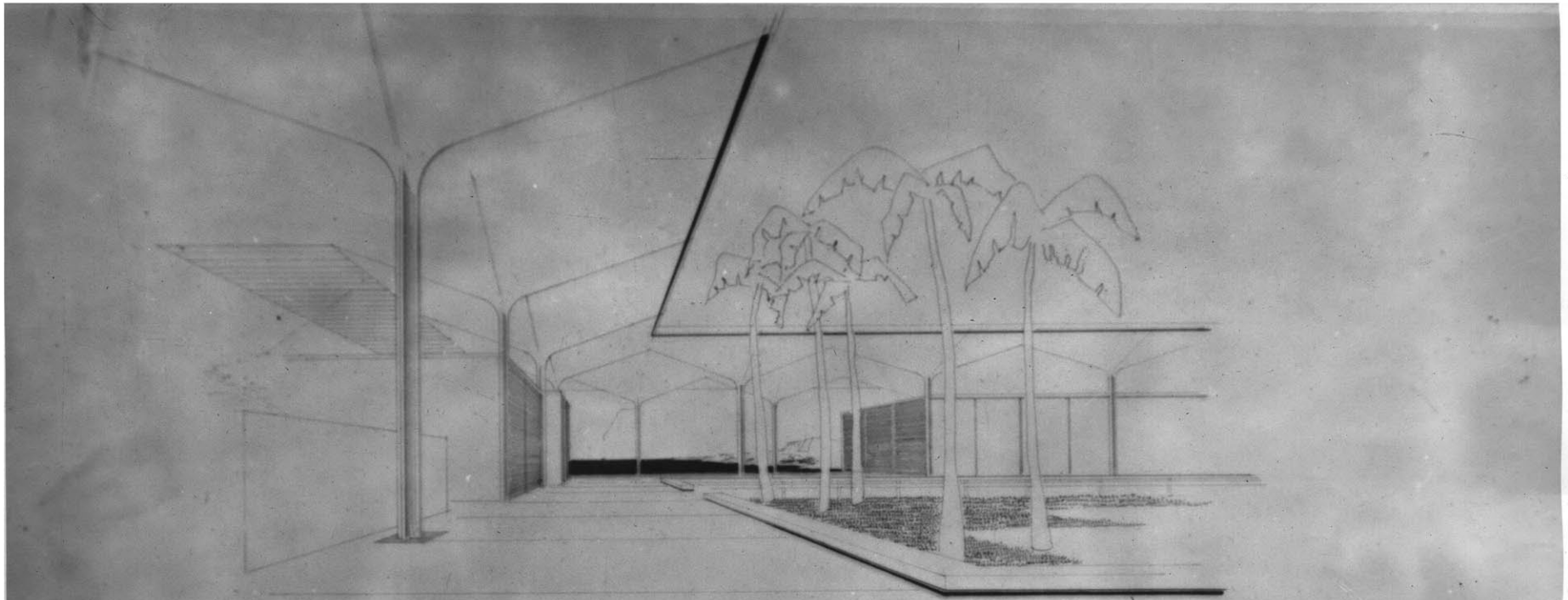


GROUND FLOOR PLAN

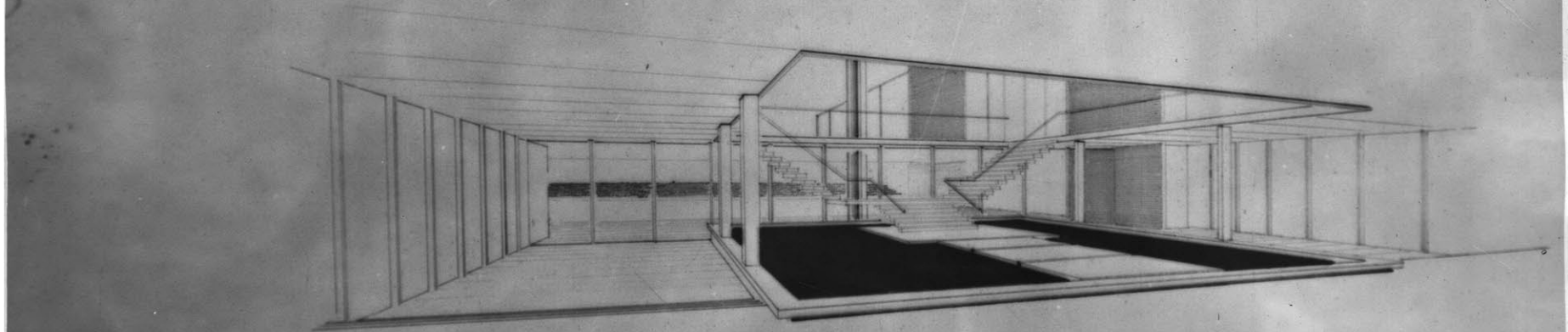
PLAN OF ISLAND



SITE PLAN



VIEW OF GARDEN



VIEW OF POOL



