



ALMA

Hotel Residence in Atacama - Chile

LAN Architecture
January 2012





CITY

ALMA RESIDENCE

OBSERVATORY

4

Site -

Extreme

Extreme is the word that keeps coming back on the table at the time of the study.

Extreme but necessary is the choice to implement life and activity in the region.

Extreme is the site, the climate, the drought, the light, the horizontal dimension of the territory.

Extreme is also the way the place will be used: without schedule, without rules, without connection to the site, lost in the middle of the desert.

Extreme is the fact that once there, there is no alternative but to live in this very hotel.

Extreme is also the time given to draw a project that embraces all the factors.

Facing the extreme.

This is the drive that leads us, from the desert, through civilizations, techniques and architectures to an idea.

In this process, we quickly understood that for a form of life to develop, a certain number of conditions are essential, and the more favorable the conditions more the life form will evolve and civilize and head towards urbanity and culture.

How to transcribe these conditions in a site where for thousands of years the phenomenon hasn't been generated by itself? How to import urbanity in an area where nature overwhelms man?

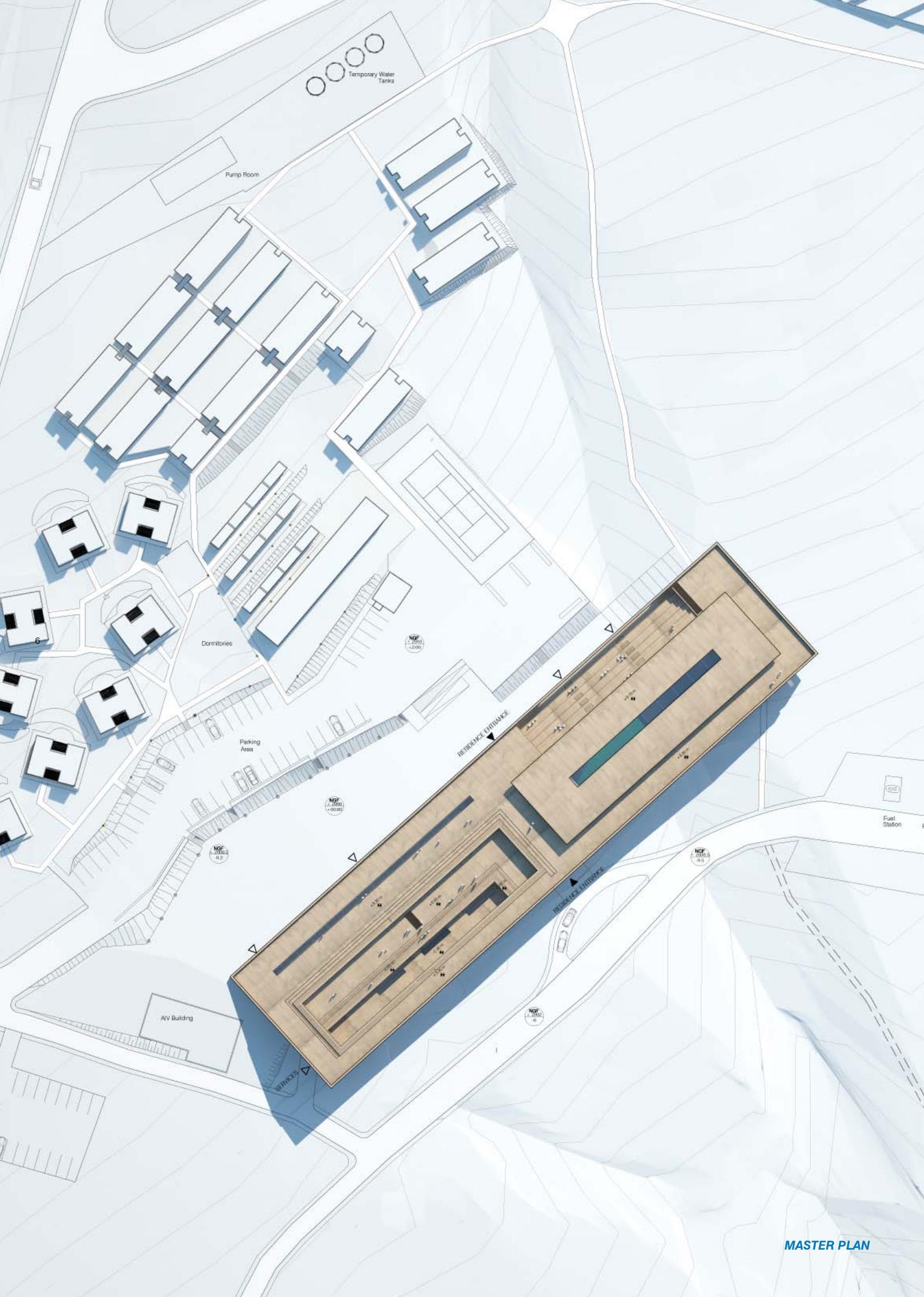
Our hotel project rapidly became a small city project, a human settlement in which is combined habitat, commerce, education, politics, culture. A city inhabited, thanks to ESO by Man from different origins where ethnic and cultural diversity meets.

Amazing isn't it?

How to define a city but a gathering of individual, collective and public interconnected within a limit?

Our proposition has the ambition of unifying in a single gesture the conditions that will structure an ecosystem and allow human activity in a human hostile environment.





Strategy -

To achieve the announced objective we set a strategy where each component of the project plays an essential role in the definition of the whole:

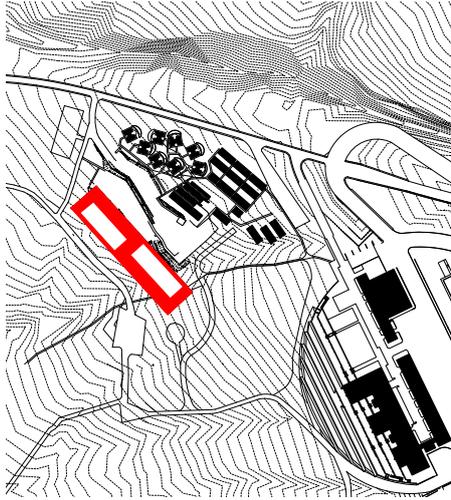
Rooms becomes roof, roof is a plaza, the plaza a window, the window a façade, the façade a landscape, etc...

The hotel is clearly defined and identified easily, alike a city; it can be apprehended, to become a landmark.

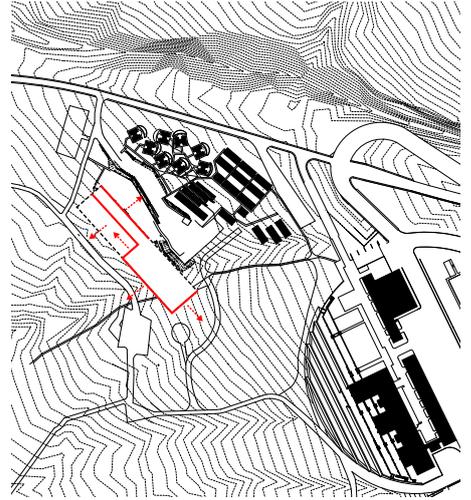
Simultaneously, each part presents its own identity, and shows its complementarity to the other.



Concept - Step 1
The Volume



Concept - Step 2
The Voids



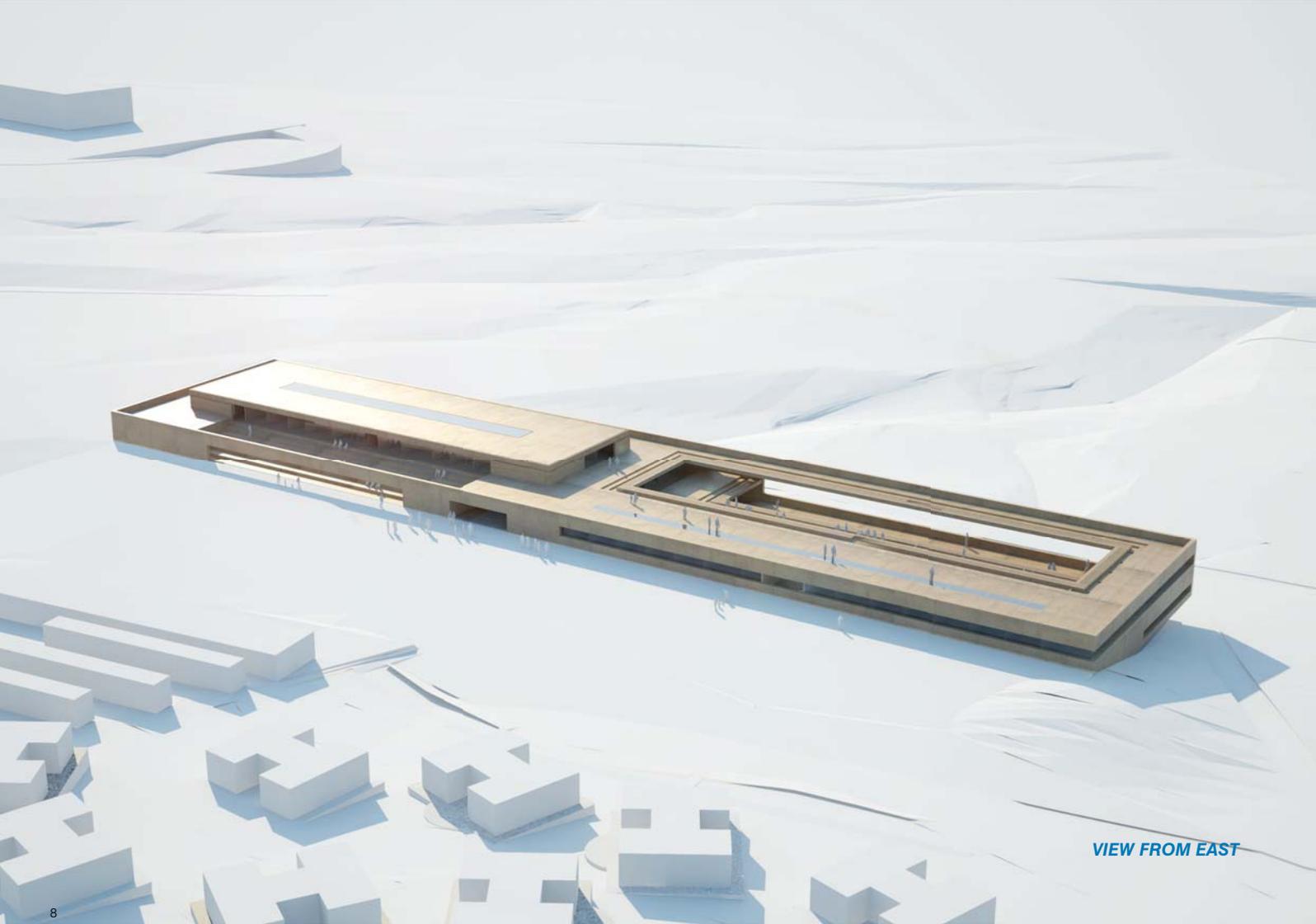
Concept - Step 3
The Views



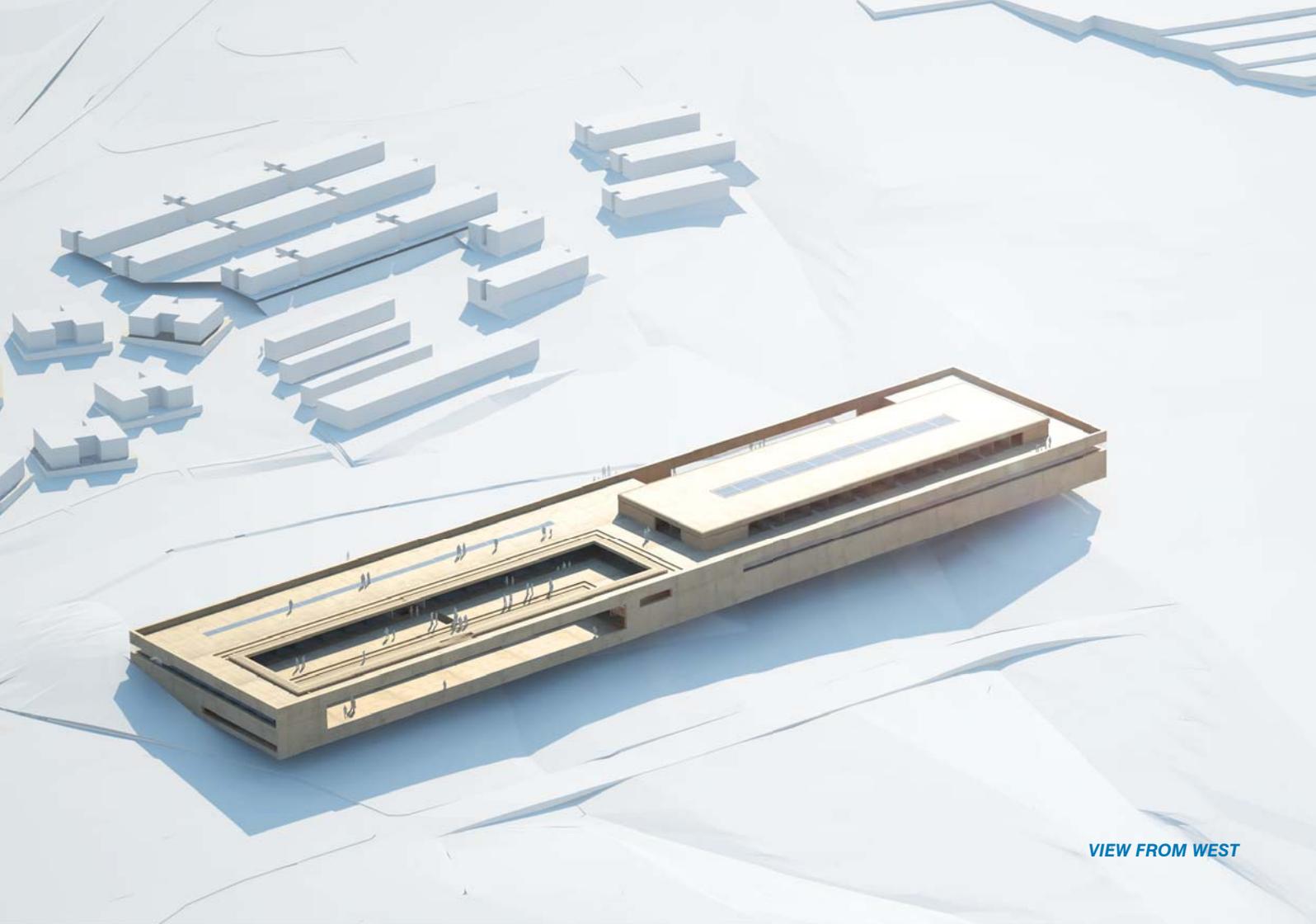
Site Section



VIEW OF WEST ELEVATION



VIEW FROM EAST



VIEW FROM WEST

Strategy -

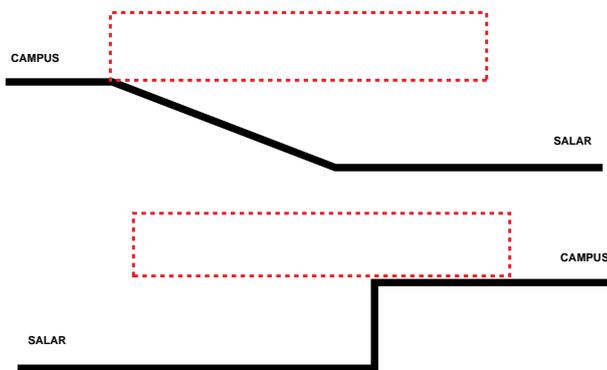
The following diagrams show the genesis of the composition, a system of relationships:

1- THE SITE



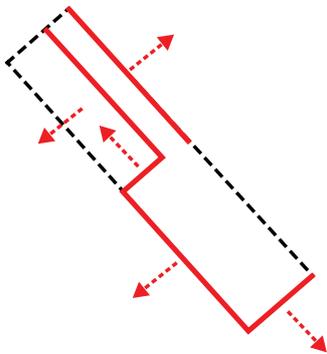
2- ALTIMETRIC INTEGRATION SYSTEM: COMMON SPACE - ROOM

In order to limit the impact of the operation on the site, the room system takes place on the higher plateau, taking advantage of the different levels on the site, protects and defines therefore spaces located on the lower level.



3- PLAN LAYOUT PRINCIPLE- VISUAL INTEGRATION ON SITE

Orientation and views were the principle factor that guided the layout of the room. 49% of the rooms are oriented towards west, 24% towards east, 17% towards north and 10% towards south. This layout generates two spaces "piazza" East and West that can be used at different time in the day depending on the sun.



4- THE ROOMS- INTERIOR- EXTERIOR PRIVATE AND COLLECTIVE

Around the piazzas, two principles define the project functionality.

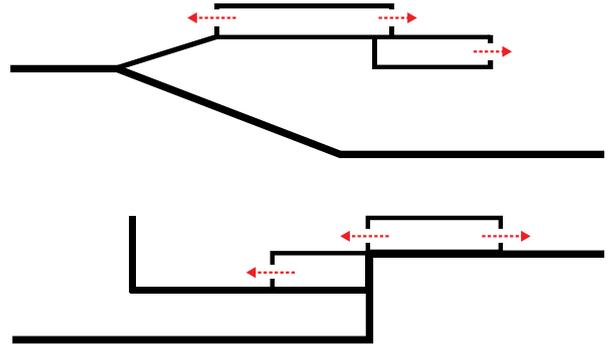
System 1:

The rooms are built in and juxtaposed on the terrace, to define different kind of exterior spaces.

A private sunken and protected terrace is accessible from the room that opens up on a wide belvedere, a place of conviviality to meet and watch the sunset.

System 2:

The rooms form an elevated platform that offers the best views on the surroundings while increasing the head height of the subjacent spaces.



5- THE COMMON SPACES

The layout and the organization of the upper part of the project define the common spaces.

System 1:

The restaurant etc...with its 5m high ceiling ending with an open roof slit, the space is visually connected with the West piazza and the horizon becomes the protagonist of its identity, the latter participates by its light and colors to the identity of the space.

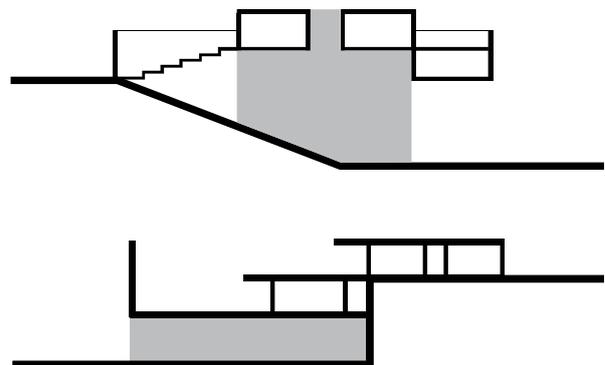
The space will be used around the clock and should be able to accommodate simultaneously big gatherings, small groups and individuals.

Therefore, leveled spaces following the natural slope of the site generate more intimate spaces, small lounges and larger spaces.

System 2

The swimming pool part etc. ...with its 12m high ceiling is a kind of programmed winter garden, an interior landscaped area that offers a very different microclimate from the exterior environment.

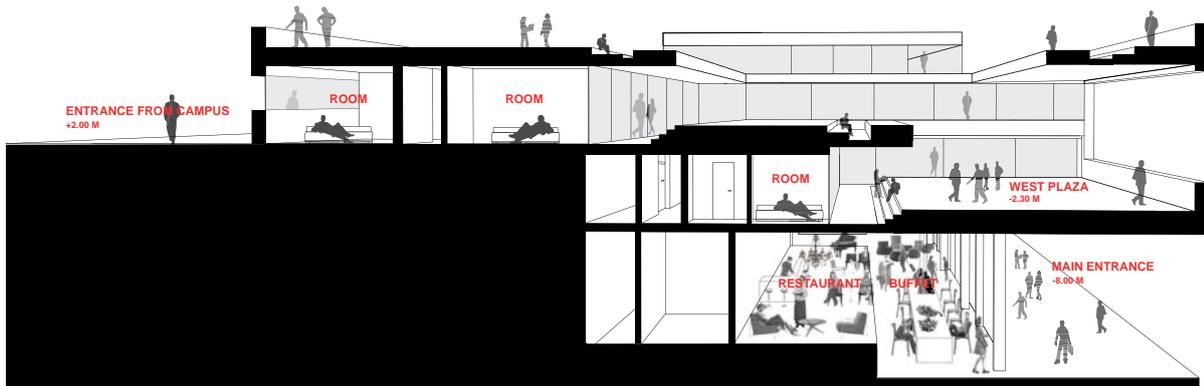
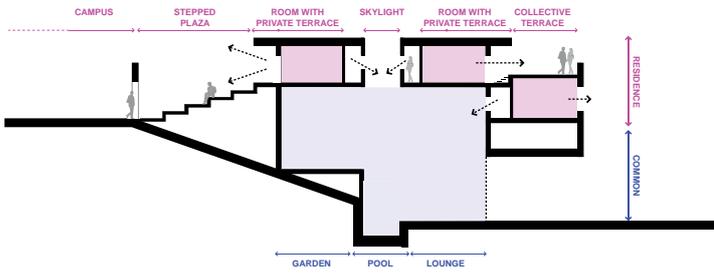
The desert is still present but not in a hostile way anymore, it is softened and promotes a friendly atmosphere. The zenithal light, changeable, allows different atmosphere.



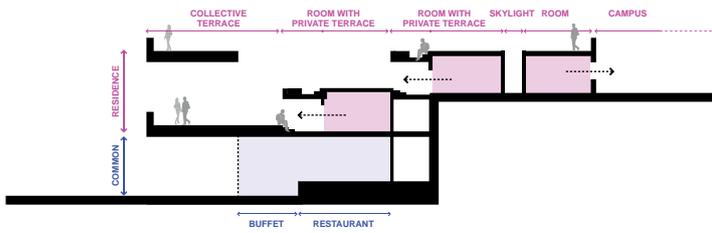
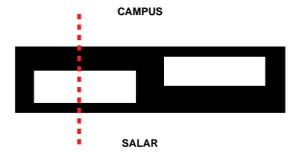


VIEW OF RESTAURANT LOUNGES

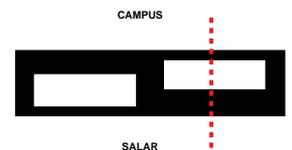
6- RELATIONSHIP OF DIFFERENT FUNCTIONS:



Section Diagram through the West Plaza



Section Diagram through the East Plaza



Climate -

The climate of the Atacama Desert is very particular, and although it is experienced as extreme and inhospitable, the temperatures are not that extreme, at least, not at the altitude of the site at 2900m. It is not the dry bulb temperatures measured in normal conditions - in the shade and sheltered from the wind - that make the climate inhospitable, but rather other elements such as solar radiation and wind.

Here solar radiation is all the more important as it is paired with practically non cloud cover.

As a result, people and buildings are exposed to a high degree of insolation and during the day, almost all the year round, and at night, a «negative radiation» or heat loss through the sky that increases when there is no cloud cover.

So if one is protected from the sun and the wind whilst enjoying the outside heat, we can experience one of the most enjoyable climates. Once we know how install protection and create openings, direct needs are relatively low.

This could be the principle theme of the project: to generate transitional spaces between outside and inside that reduce energy needs and offer a variety of different situations.

Insertion

The insertion of the project in the site is dictated primarily by the plot and the desire to limit excavation work, and to offer interesting views to all rooms and living areas.

The project appears to float above the contour lines and is orientated to the west, parallel to the slope with views towards the Salar of Atacama.

All rooms, whatever their orientation, have unobstructed and interesting views. The play of levels means that no room has a vis-à-vis effect (as indicated in the below diagram).

The climate is, as we have seen, in terms of dry temperature, relatively pleasant. The bioclimatic design is based on the solar protection and limiting heat loss at night.

Thus, the strategy is based on a structure of staggered floors offering sun protection and allows the creation of buffer zones that limit convection. These spaces are also an exterior extension of the dwelling. This morphology is backed against the ground to take advantage of its inertia.

The aim is to limit the buildings gross requirements in terms of heating, cooling and lighting. The effect is to smooth out the outside temperature curve while limiting the effects of wind and radiation.

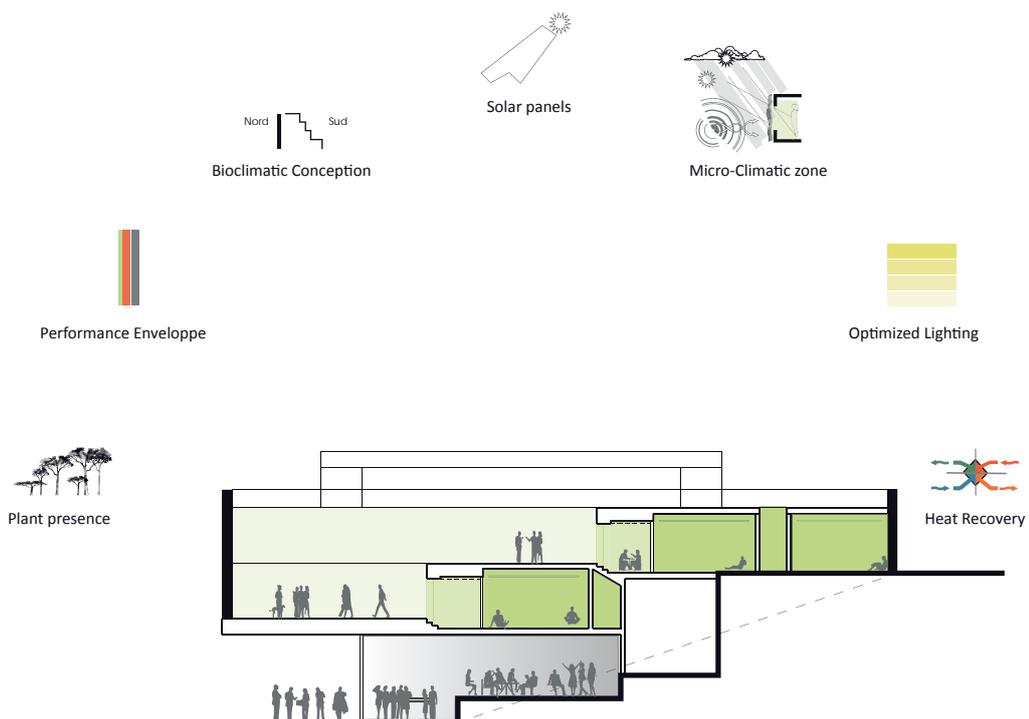
To reduce thermal loss, all the walls are insulated. In subsequent design phases, studies will allow us to refine the performance of the insulation to avoid the risk of increasing needs for cooling by an overheating phenomenon.

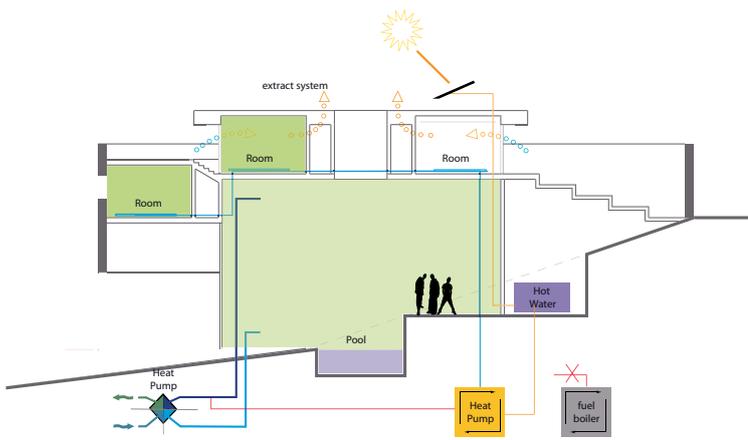
The systems we anticipate incorporating at this stage of the project, combine performance and realistic goals and can be classified under four themes: environment, design, economics and technology.

The project's context – an isolated site in Chile and unconnected to the usual networks – orientates working towards a balance of the four themes.

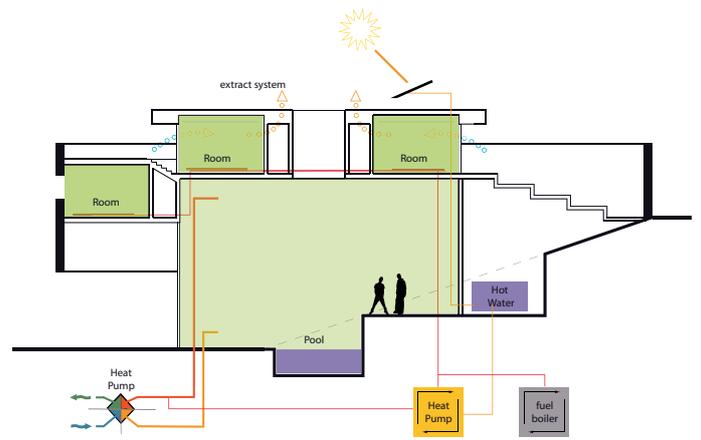
The goal is to combine the highest environmental efficiency (energy, raw materials, transportation, etc...) with the less complex technology (low maintenance, easy implementation, etc..) and the lowest cost possible. These three themes go towards of detailed and responsive design.

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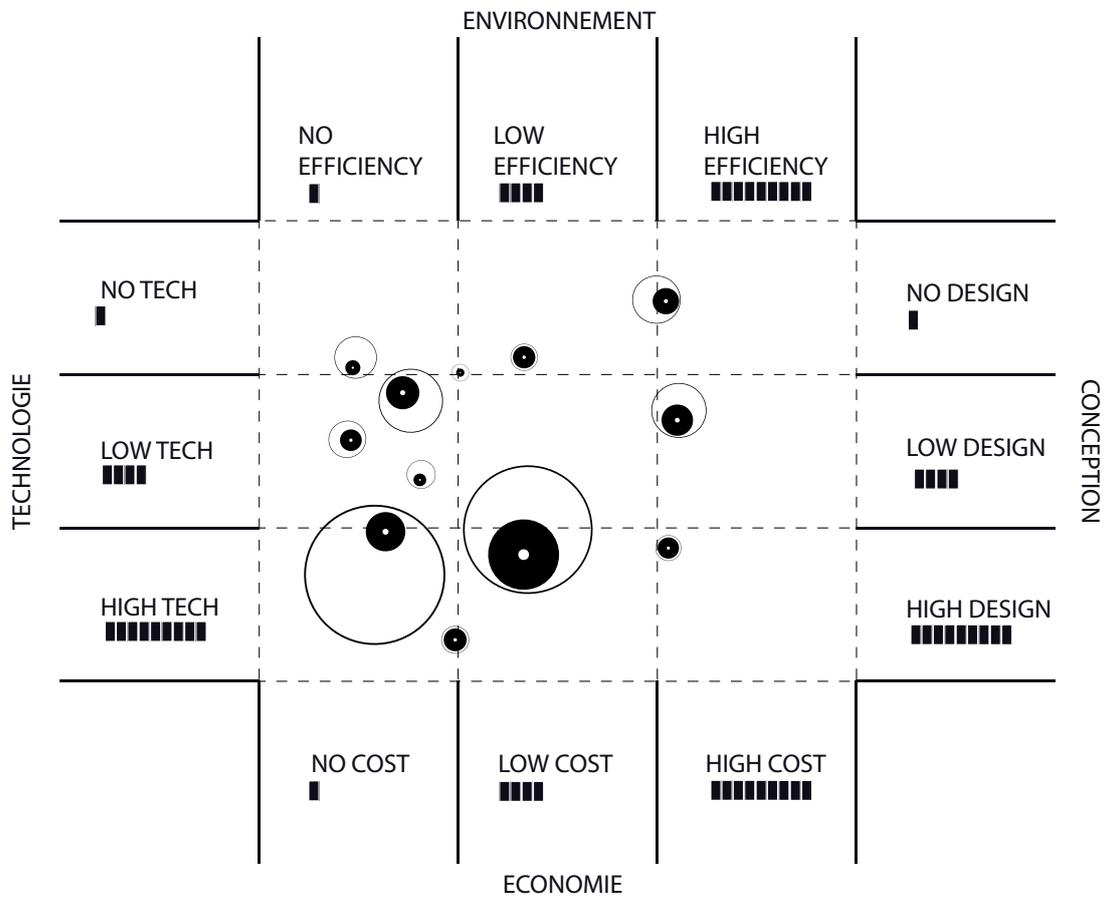




Functional Scheme - Summer



Functional Scheme - Winter



Program Distribution -

The strong directional design drives the initial decision to split the residence program in two distinctive horizontal sections: the upper zone dedicated to the guest's rooms and the below zone which address the common areas.

The main entrance to the residence is at the ground floor, at level -8.00 m, where all the reception services are gathered.

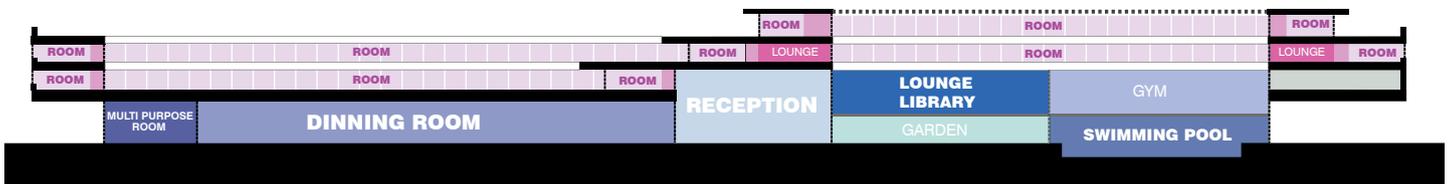
At this floor, the overall organization of the program divides the space in a wet area, where to find all the sport activities as well as the gardens, versus the dry zone, where to find the restaurants lounges and the multipurpose room. The two zone have been customized and accurately designed in order to fit the specificity of the building's section: Where the water reflects the slot of light coming from the last level, the restaurant expands towards the above west plaza.

The entrance area is centered between the dining lounges to the north and the recreational rooms to the south. Split levels and double height sections animate the floor, which benefits of extraordinary panoramic exposure on three sides. As thematic sequence, the program has been structured in order to provide adequate alternation of more intimate and private domain, such as reading lounges, and more open and dynamic areas, i.e. buffet zone or game rooms.

The Residence's rooms define the content of the concrete box, and are distributed on three levels: the majority of the suites are allocated at level 2, with direct access and security-control entrances from and to the campus. This floor is internally connected to the lower common areas as well as to the other two floors of rooms. Each of the three floors offer to the guests unique rooms condition: within a rational and modular design in fact, the scheme achieves diversity of interiors through the multiplicity of hybrid spaces which surrounds the rooms. All the rooms benefit of exterior views as well as connections towards the east and west plaza, whose geometry generates semi-private terraces and more open collective zone where to socialize.

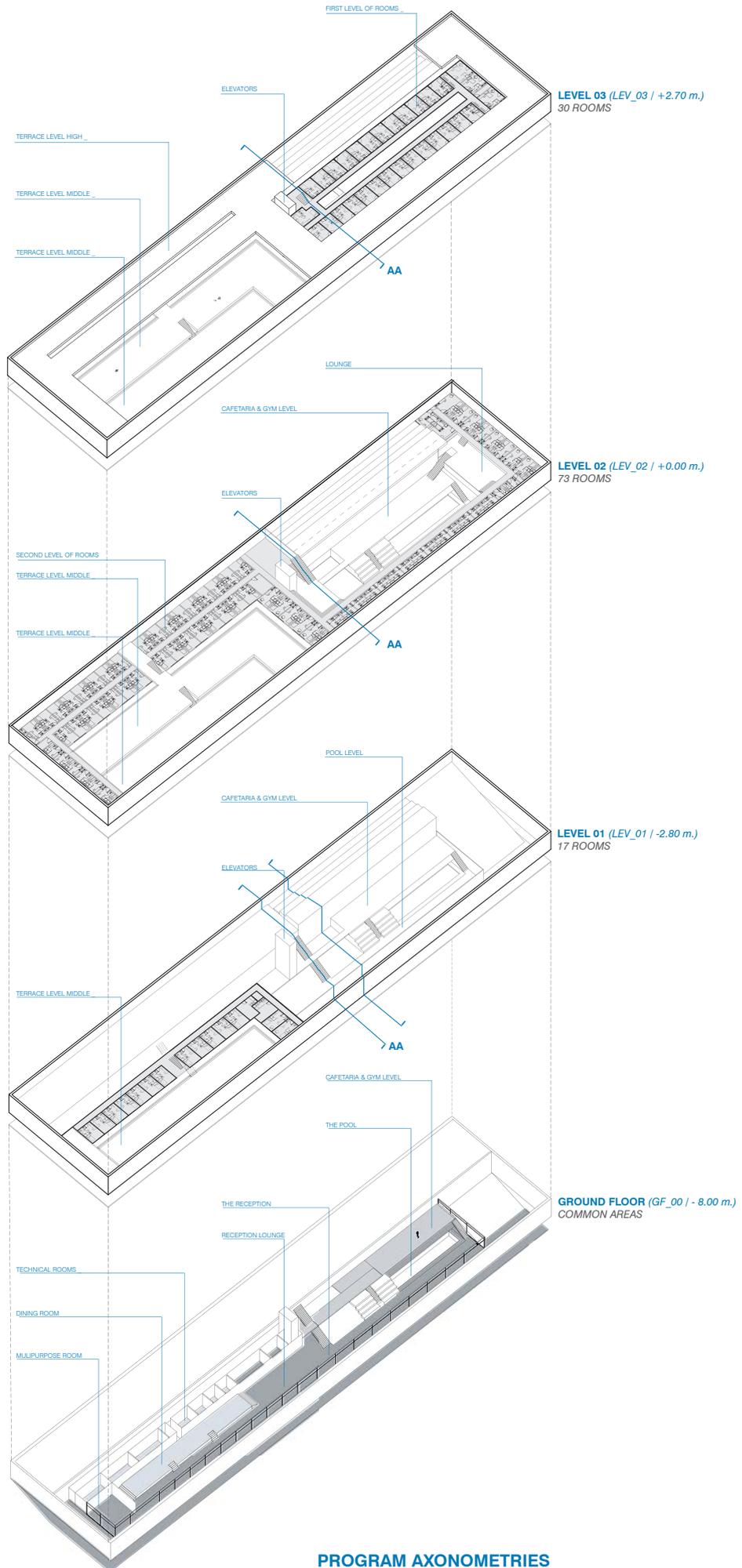
The efficient use of the floor plate creates intelligent distribution of rooms served by minimum circulation. Nevertheless surprising and pleasant moment of social gatherings are offered and evenly disposed along the rings. The strong relationship with the exterior and the special topographical plates that the design features provide many degrees of interactions between the users. Due to the scale and variety of lounge's sizes the common space at the rooms floors in fact range from small and intimate spaces to the extreme of the plaza's openness.

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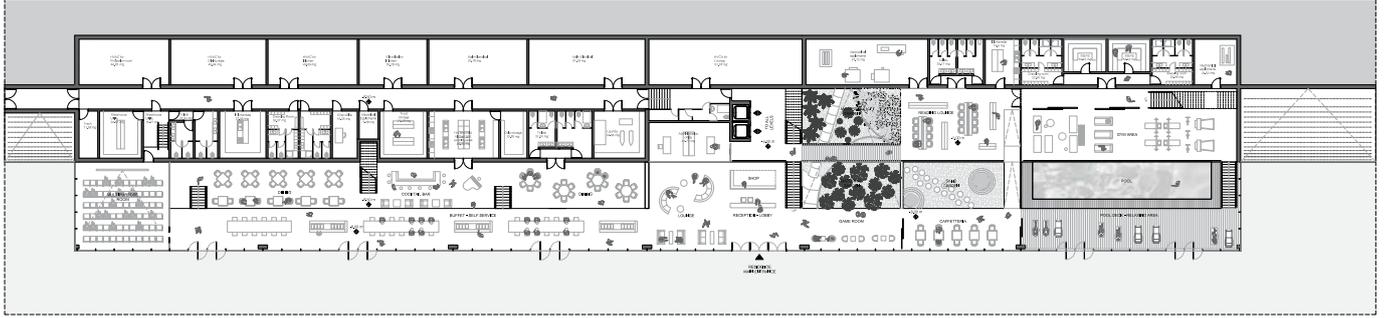


Program Section

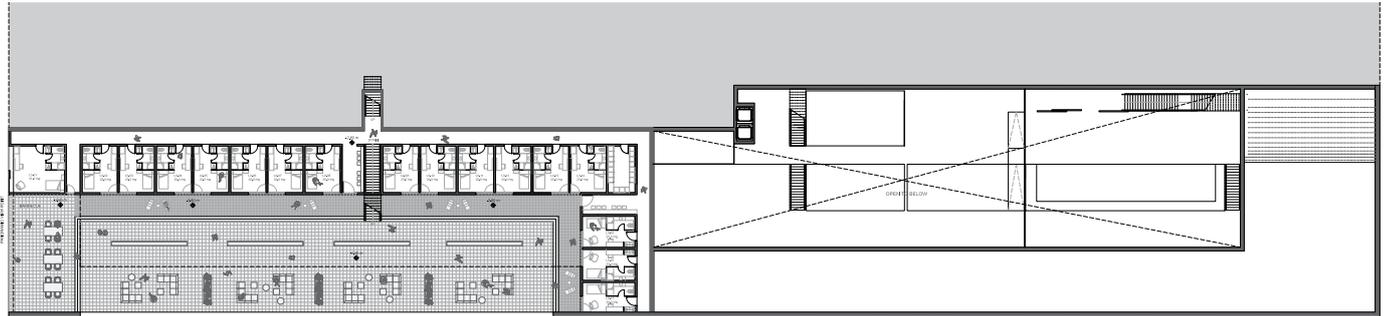
- ROOM
- CORRIDOR
- LOUNGE
- DINING ROOM
- MULTI PROPOSE ROOM
- RECEPTION
- LOUNGE LIBRARY
- SWIMMING POOL
- GYM
- GARDEN



Plans -



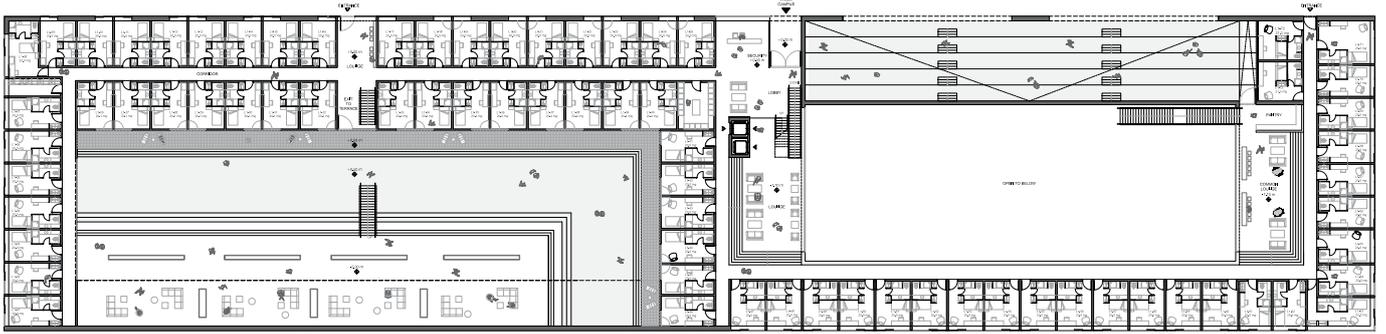
GROUND FLOOR (GF_00) (-6.50 m. and -8.00 m.)
COMMON AREAS



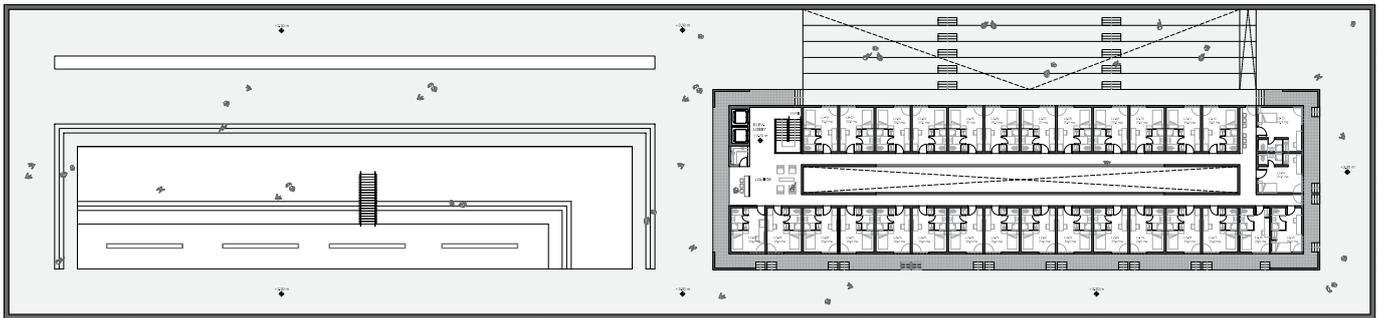
FIRST FLOOR (LEV_01) (-2.80 m.)
17 ROOMS



VIEW OF CAMPUS ENTRANCE



SECOND FLOOR (LEV_02 / +0.00 m.)
73 ROOMS



THIRD FLOOR (LEV_03 / +2.70 m.)
30 ROOMS



VIEW OF POOL AREA AND GARDEN



Sections and Elevations -



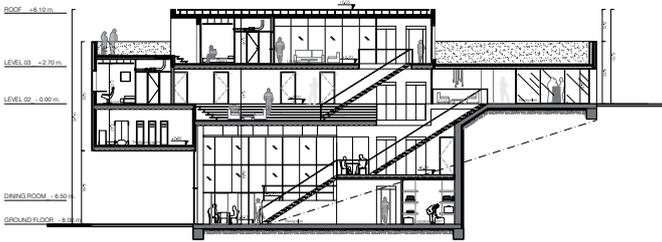
SOUTH ELEVATION



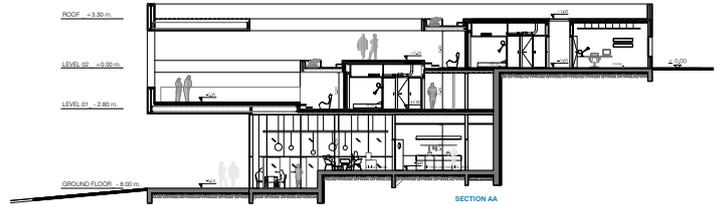
EAST ELEVATION



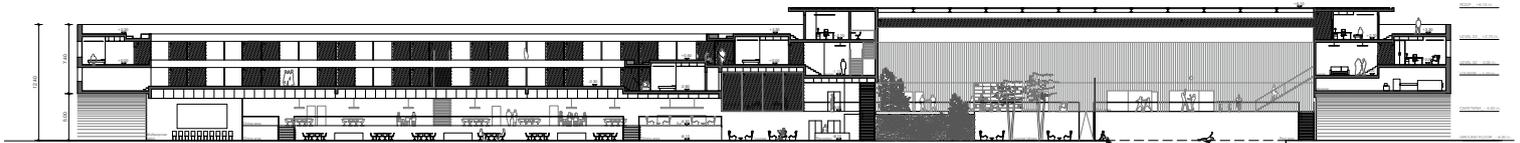
WEST ELEVATION



SECTION BB



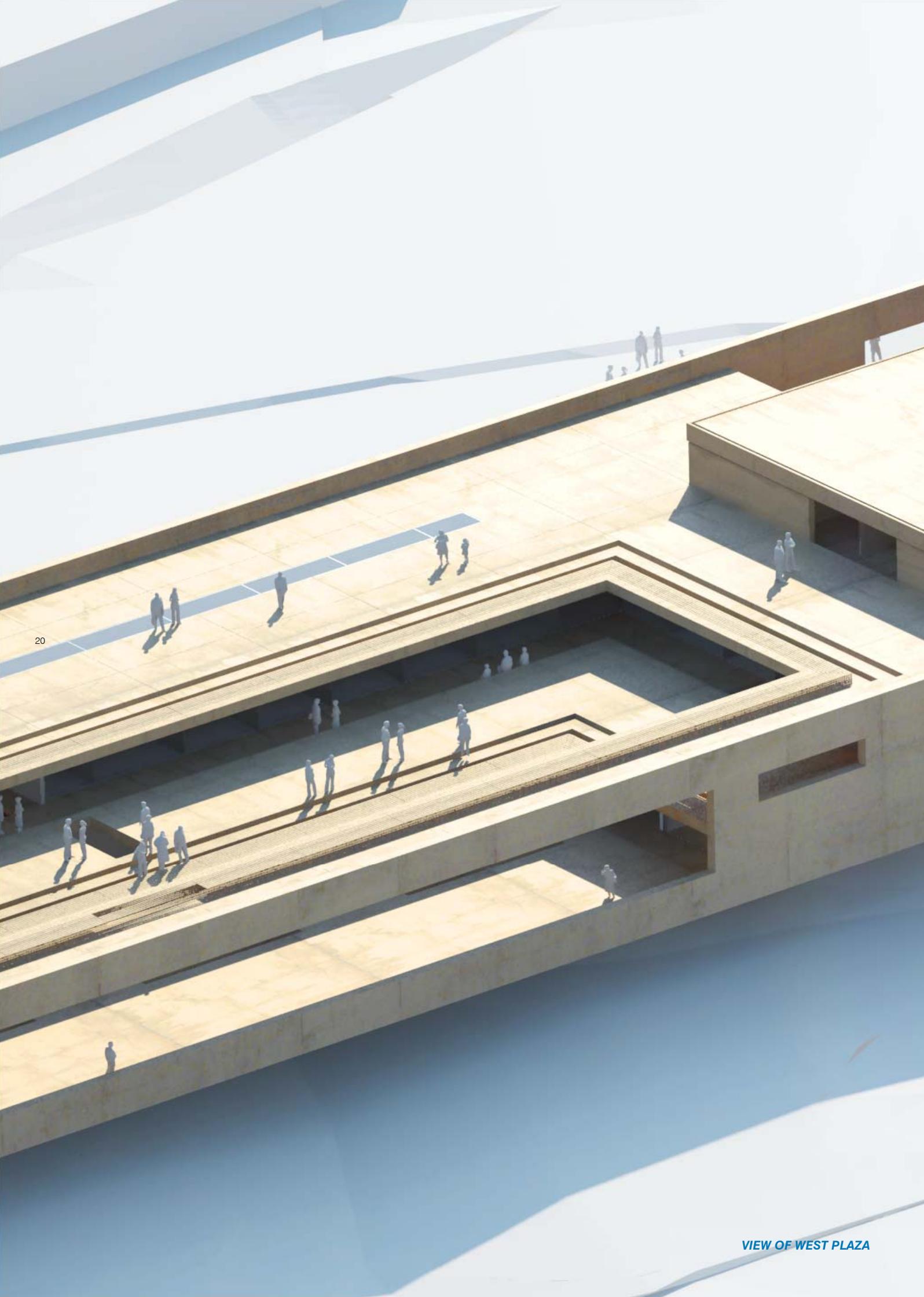
SECTION AA



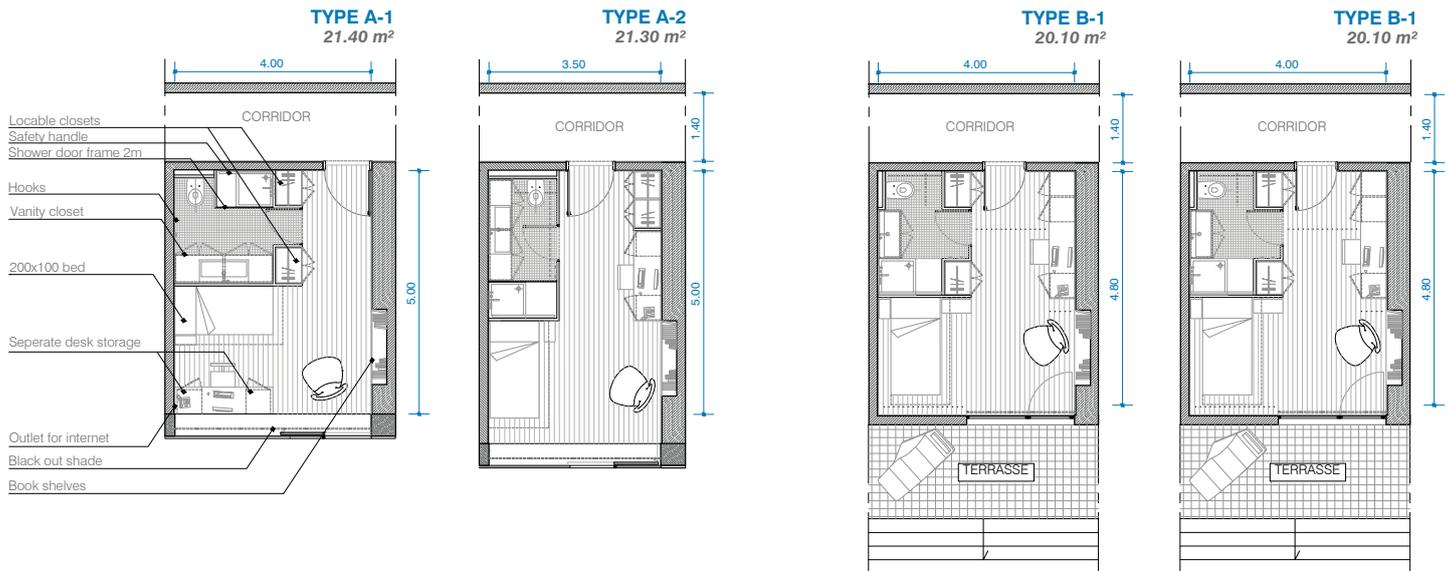
SECTION DD



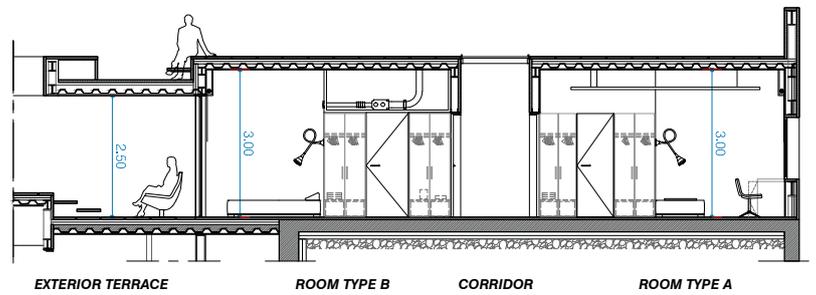
VIEW OF SOUTH WEST CORNER



Residence: Rooms Catalogue



Detailed plan



Detailed Section



VIEW OF WEST PLAZA





The structure Design -

1. GENERAL

The structural design process considered the general architectural building layout, volumes and shapes. The preliminary calculations take into account the local boundary conditions, standards and specifications according to Eurocode and the seismic assessment document SYSE-80.10.00.00-002-B-REP. All structural concepts have been developed with regard to buildability of the structures, economical constraints, health and safety and architectural requirements. Structural detailing and in-depth analysis is not part of this first design phase.

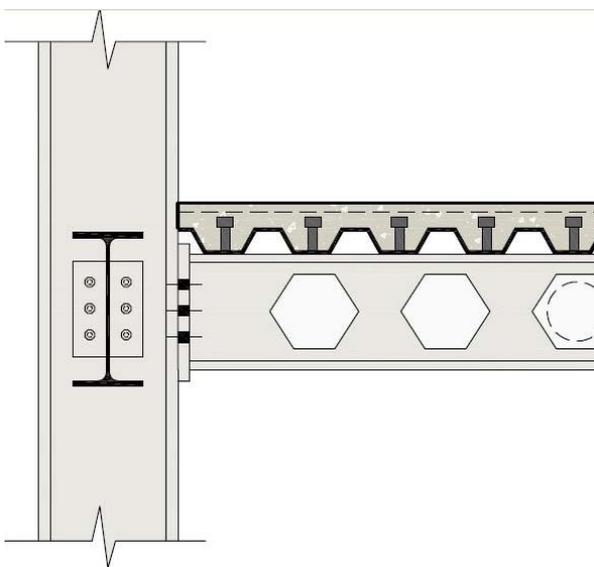
The building consists of a low rise hotel and recreational complex. The building measures 32,7m x 144,8m. Spread over three levels and dug partially into the slope, its plan form responds to the context and the orientation. Entering from the higher long end of the building, the building opens up to the visitor with grand stairs offering the visitor the chance to walk up to the centre of the building.

2.LOAD ASSUMPTIONS

Wind/snow loads

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At this moment of competition no snow loads are considered. Wind loads are considered according to Eurocode calculations and assumptions.



Thermal loads

No thermal loads have been applied so far. In a next phase, temperature loads according to local constraints should be applied. The main steel structure of the facade will be interior and as such within a tempered environment. All concrete loadbearing elements are covered and protected with thermal insulation. Any differential movement due to temperature changes will have to be considered for the design of the outer cladding.

Seismic loads

The seismic loads will be calculated according to the Eurocode 8 - earthquake codes. The new code adds the criterium of a performance related analysis and it should be decided together with the user and client to which standard the building should respond.

For the moment we consider a return period of 475 years. For the calculations we take into account the findings as stated in the report by Prof. Dr.-Ing. E. Fehling from 2003;

$$a_{g,MLE} = 0,28g$$

and $a_{g,OBE} = 0,17g$

We further note that we find ourselves in the elastic response spectrum Type 1, Soil A.

Dead Loads

The dead loads will be applied according to the considered structure. In general the density of concrete is assumed to be $\gamma = 25 \text{ kN/m}^3$ and for steel $\gamma = 78.5 \text{ kN/m}^3$.

The superimposed dead load is distinguished according to the occupancy of the building. It should be noted that the superimposed dead loads have to be verified during the construction design when the final build-up of the various buildings have been finally agreed and fixed.

Live Loads

The live loads are distinguished according to the occupancy of the building:

- Hotel rooms and foyers; $q = 2.0 \text{ kN/m}^2$;

- Gathering spaces; $q = 3.0 \text{ kN/m}^2$;

Materials

In situ concrete grades and use are as follows:

28 days cylinder compressive strength of concrete ($f_{c'}$)

For columns (except pre-cast or composite) 25-

35 MPa

For bearing walls

20-45 MPa

For beams and slabs (other than pre-cast)

30-35 MPa

For Foundations

30-35 MPa

The documentation (Geotechnical Report – Doc. No.: Site-20.00.00.00-A-REP) demands a minimum filling concrete material with min cement content of 170kg/m³. Concrete in contact with soil shall be resistant against sulphate, chloride and Chemical attack classification XD3, XA2, min cement content 320 kg/m³, w/c – ratio < 0,45 for Retaining walls foundations, ground beams, ground bearing slabs and all other structural reinforced concrete elements in contact with soil or water (tank).

Concrete Properties: to be established on site, we consider that some of the excavated soil can be used as a replacement of sand in the concrete. Especially underneath the large staircase at the entrance, the excavated soil can serve as a filling material.

SOIL

According to the soil report from 2004 the soil consists of an ignimbrite rock with medium to low hardness and is not sensitive to water contact

3. STRUCTURAL DESCRIPTION

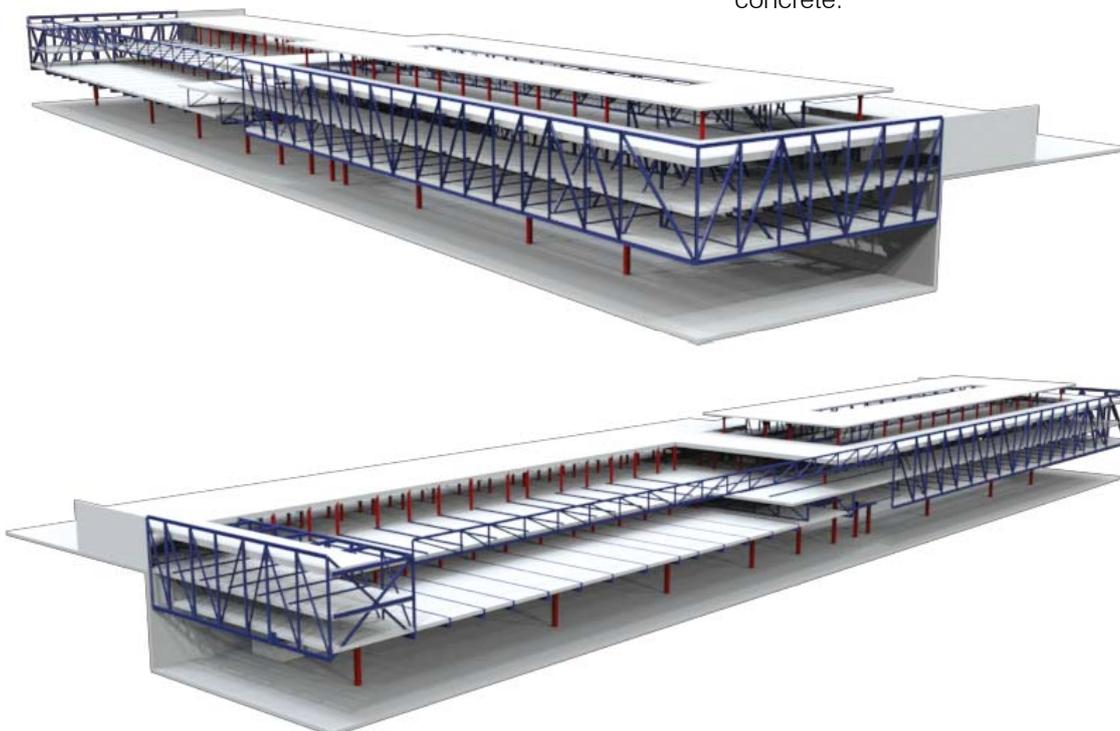
The building is conceived as a steel skeleton building with columns, steel trusses, lightweight infill and composite steel floors. The steel construction allows for a high degree of prefabrication and thus limitation of labour time on site, an optimized weight for the building and a highly ductile structure which can respond well to the high seismic loads and which allows for a high flexibility in the use of the building.

The construction of the floor decks needs to respond to several challenges; as we are in a highly seismic zone the weight of the floor decks should be reduced to the maximum, the floorplanes should also form a stiff horizontal plane in order to respond to H-loads from earthquake and wind loads, the floor system should reduce the labour on site to a minimum in order to control labour costs (desert situation) this means that prefabricated solutions are favoured, the floor system should respond well to seismic influence, the floor system should fulfil all necessary comfort criteria (acoustic, support for floor finishing, thermal, etc) , the floor system needs to respond to fire regulations and the floor deck system should be designed to span maximum 8m in one direction to obtain sufficient flexibility in the ground plan.

As a further boundary condition, the design proposes a drop ceiling for the whole complex.

The proposed solution consists of a composite steel structure whereas the regularly placed steel beams would span the 4-8m and be adapted in height accordingly and then be covered with a trapezoid steel plate and concrete. The steel sheeting and steel beams are connected rigidly to a concrete covering of 14cm through shear stud connectors to form a rigid complex (composite structure).

In a further attempt to decrease the weight of all elements, non-accessible roof tops will be executed with trapezoidal sheeting only without the supplementary concrete.







VIEW OF MAIN ENTRANCE FACADE