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by Yıldırım Yavuz

Yanbu Cement Company New Village

Yanbu, Saudi Arabia

Architect
Francesco Audrito and Athena Sampaniotu

Client
Yanbu Cement Company

Design
1995

Completed
2000

Yanbu Cement Company New Village
Yanbu, Saudi Arabia

I. Introduction

Yanbu Cement Company (YCC) New Village was built in 1999 at Ra's Baridi, 80 kilometres north of Yanbu, as an extension to the Yanbu Cement Factory near the Red Sea shore. Situated on a sandy slope that rises to a height of about 10 metres, the village consists of various types of houses; social, educational and recreational facilities for the factory employees; a production control tower for the factory; an office tower for the company administration; and a gateway to control entry to the whole complex.

II. Contextual Information

A. Historical background

YCC was established as a joint stock company in 1980, to produce ordinary Portland and other special kinds of cement in order to help develop the kingdom's industrial sector and to supply this much-needed building material locally. Owing to its proximity to raw material sources, Ra's Baridi on the Red Sea coast, 80 kilometres north of the new industrial port of Yanbu, was chosen as the site of the factory and a small residential settlement for employees. In 1994, the company board and its chairman, HRH Prince Mishaal Bin Abdulaziz, decided to increase the output of cement and the German firm KHD Humboldt Wedag AG was invited to install a new production line. Simultaneously, a competition was held among a limited number of architects who were working in the kingdom at the time to obtain the best possible scheme for a central production control tower, a high-rise technical building and a main gate to control entry to the plant. Studio 65 of Turin and Jeddah, run by architects Francesco Audrito and Athena Sampaniotou, won first prize in the competition and construction of these three buildings was started immediately. A short while later, in 1995, when construction of the first phase was under way, a new competition was held for the design of a new residential colony. This competition was also won by Studio 65.

B. Local architectural character

Throughout history, the Saudi Arabian Peninsula has been scarcely populated because of the harsh climatic conditions and lack of water. Larger settlements have generally been located on historical caravan routes near the eastern and western coastlines. Of these Medina, Mecca, Jeddah and Ta'if on the western seaboard are still among the most important urban centres of the kingdom today, teeming with local and foreign workers as well as pilgrims from throughout the Muslim world. These ancient settlements feature both traditional buildings, with typological and architectural features developed over centuries, and more recent ones of a contemporary international character.

The traditional buildings in these settlements are two to six storeys high and are usually built in courses of coral stone from the Red Sea, the courses being marked by tie beams made from

mangrove branches from the East African coast. Their window openings and projecting windows with seating (*rowshan*) are veiled from the exterior by timber lattice-work screens with intricate designs (*mashrabiyya*). The timber used was usually imported from central Africa, India or Indonesia.

In contrast, the contemporary architecture of these cities reflects a very international character, with reinforced concrete, steel, glass and other industrial building materials used abundantly by local and foreign architects. Jeddah in the south, the kingdom's largest port town, is truly a showcase for modern international architecture. With its predominantly white buildings and long corniche road lined with palm trees, it is reminiscent of a rapidly developing Mediterranean town.

The nearby port town of Yanbu is one of two new industrial settlements in Saudi Arabia that have been developed in a planned manner. Hence, the architecture of Yanbu is mostly international in style, as in Jeddah. In smaller settlements along the Red Sea coast, it is also difficult to find any trace of the traditional architecture, if such a thing ever existed. Most of these smaller settlements are today filled with cheap, carelessly built reinforced-concrete buildings with lavish façades, which are usually an eyesore.

D. *Climatic conditions*

The western coast of Saudi Arabia, facing the Red Sea, has a subtropical climate. In the coastal Tihamah Desert summers are very warm, with a high percentage of humidity, while winters are more moderate with relatively low humidity. The peninsula of Ra's Baridi, the area where the YCC is situated, is located at 24º17' N and 37º31' E. The area receives light but sudden rains from November through February. The main wind from the north-west is cool and fresh, but the *khamsin* (a harsh wind that brings heat and sand from North Africa) from the south-east is hot and dusty and creates sandstorms occasionally, particularly during the winter months. Heavy rainstorms which cause flash floods come from this direction too. The mean temperature in the summer averages 45ºC, while in the winter it is 10ºC. Annual rainfall rarely reaches above 45 millimetres.

D. *Topography*

The wide peninsula of Ra's Baridi is reached by a good-quality asphalt coastal road that runs north from Yanbu, through the seaside settlements of Hanak, Al Wajh and Al Muwaylih, to Al Aqabah, Jordan's sole sea port. The area is a very flat, sandy stretch of the Arabian Peninsula, almost devoid of any natural undulations. Although the Harrat Al Unayyir volcanic mountains, with their highest peak, Jabal Radwa, rising to 1,814 metres, lie further inland to the east, they are too far away to be seen from Ra's Baridi. The beautiful volcanic formations of the Hijaz Mountains to the south, which separate the coastal plains from the interior while forming a breathtaking backdrop to the desert, are also not visible from Ra's Baridi. As a result, both the eastern and western horizons on land and sea are rather boring, uninterrupted, straight horizontal lines. Nevertheless, the sunrise over the desert and particularly the sunset over the Red Sea can be dramatic, with a multitude of colour changes reflecting on the sand and the sea. In contrast to the more southerly parts of the Tihamah Desert, the area is also devoid of any particularly prominent flora and fauna.

III. Programme

A. *What conditions gave rise to the formulation of the programme?*

The Yanbu Cement Company is considered to be one of the top fifty industrial companies in Saudi Arabia and the most advanced and productive of the three major cement factories in the country. Because of its success in quality and production, in 1994 a decision was taken to enlarge the factory by adding a new production line and also to build a centre to train engineering students and technicians in order to increase the number of trained Saudi workers in accordance with a programme initiated by the royal government.

B. *Objectives*

The aim of the architectural competition held in 1994 was to obtain a scheme that would create a comfortable environment with facilities that would attract people to work and train in a village in the wilderness. The intention was that the project should avoid the typical workers' compound, where people live in barracks and create instead a Mediterranean-style village at the edge of the sea on the gently sloping site.

C. *Functional requirements*

A central production control tower was required to house the offices, laboratories and a large electronic control centre for the production engineers and technical staff of the plant. The initial phase of the programme also required the construction of a main gate for the whole complex and an office building for the administration, which soon became known as the 'technical building'; it also houses the educational areas for the programme to train engineers and technicians. The following buildings were required to make up the rest of the YCC New Village: 150 single villas, 165 apartments for bachelors, a guesthouse, and two separate recreation areas for men and women, including swimming pools, a gymnasium, tennis and squash courts, and clubhouses with restaurants, libraries, television rooms and so on. All these were to be achieved with a minimal budget through the use of the ferrocement technique, which eliminates the use of expensive formwork. This technique uses a variety of reinforced concrete, and cheap and flexible chicken wire that is stretched over and under a simple iron reinforcement frame. The cement mortar is then applied over the chicken wire, either by hand or by spray gun, to achieve a sandwich panel, which can be insulated against heat and sound by adding insulating material in between. The light iron framing and the flexible chicken wire allow the panel to be bent into curvilinear forms if desired.

IV. Description

A. *Project data*

The site of the YCC New Village measures 375,000 square metres in area. The total ground floor area of the village is 34,616 square metres and the combined floor area totals 50,545 square metres. The first building that was designed and completed was the six-storey CPC (central production control tower), built on a site close to the factory building. The public

functions are all built in the centre of the housing complex. They are mostly single storey and with their similar, playful facades, they are well integrated into the residential environment. The recreation complex for men is built closer to the cluster of bachelors, while the one for women and children has been built closer to the family residences. In between the two, at the centre, is a guesthouse for visitors.

Total area for the Technical Building		7,000 square metres
Total area for the Production Control Tower		4,000 square metres
Total area for the Main Gate	approximately	300 square metres

The specifications of the residential accommodation is as follows:

150 villas for families, each with three bedrooms with bathroom, living room, family room, dining room, kitchen, laundry, maid's room and garden:

90 units at 175 square metres	15,750 square metres
40 units at 185 square metres	7,400 square metres
14 units at 200 square metres	2,800 square metres
6 units at 220 square metres	1,320 square metres
Total area	27,270 square metres

165 apartments for bachelors, each with a bedroom, bathroom, kitchenette and living room. The apartments are combined to form single or double-storey villas:

60 apartments at 25 square metres	1,500 square metres
45 apartments at 30 square metres	1,350 square metres
35 apartments at 40 square metres	1,400 square metres
25 apartments at 60 square metres	1,500 square metres
Total area	5,750 square metres

The specifications for the guesthouse are as follows:

Reception	
Lobby / WC	
Sitting Area (TV, Reading Area, Table Tennis and Billiards)	
3 Restaurants for guests, families and bachelors	
6 Managerial suites	
10 Guest suites	
Total area	1,500 square metres

The guesthouse follows a U-shaped plan, and opens into a central court, surrounded by timber pergolas executed in the form of tunnel vaults. This seems to be the only symmetrically designed façade in the whole compound. Certain spaces in this building, such as the TV and video room, sitting room and the reading room receive light through the roof, where certain sections of the concrete roof slab is built as though it had been torn and folded back.

Specifications for the men's recreation area are as follows:

Gymnasium,
Swimming pool,
Multi-purpose hall (for volleyball, basketball, handball)

Two tennis courts
Two squash courts
Clubhouse for TV, Video, Billiards, Table tennis, Library
Restaurant
Community services (laundry, barber and shops)
Total area 5,000 square metres

The swimming pool in the mens' recreation area was originally designed as an open-air pool, but has since been covered by canvas to hide the swimmers from view. The multi-purpose hall and the swimming pool are the most prominent mens' buildings due to their height and size. They both have rectangular plans and the multi-purpose hall is lit through variously formed windows close to the roofline.

Specifications for the recreation area for women and children are as follows:
Covered, indoor swimming pool
Clubhouse with TV, Video, Library and table tennis
Total area 1,000 square metres

The women's closed swimming pool building is circular and it is lit through the roof.

Total floor area of the new residential area	40,760 square metres
Total floor area of the YCC New Village	50,545 square metres

B. Evolution of design concepts

The centrally organized production control tower has a roughly square plan, with rounded towers for the stairs and the control room. The glass façades are loosely clad with concave or convex concrete surfaces that create a highly expressive appearance. These surfaces were designed as pre-cast panels to be constructed out of ferrocement, but because the construction workers were not experienced in this technique, they were cast *in situ* in reinforced concrete instead. The laboratories were planned as a single-storey attachment, again in reinforced concrete, adding to the deconstructive appearance of the building.

The main gate has a tall, conical glass tower on one side, which is used as a circular reception room, and a roughly rectangular control room with a toilet–kitchenette on the other side. It is a freely designed small building with flowing, curvilinear walls and roof, all structured of ferrocement panels. The tower looks as if it has been trapped at the centre of a whirlwind and is wrapped in a ferrocement panel that rises to form the entrance arch and then falls in waves to form the roof of the control room. The whole composition suggests a long piece of cloth, fluttering freely in the wind.

The seven-storey technical building is, like the CPC tower, centrally planned but it has at its centre a circular atrium that visually connects all seven floors. A panoramic glass elevator rises through the atrium and a glass roof draws in daylight down to ground level. The interior spaces on each floor are divided by glass and ferrocement partition walls; these partition walls do not rise as high as the ceiling, thus allowing maximum physical and visual continuity of

light, space and air. At every floor these partitions are planned very differently, protruding into circulation areas in a multitude of sharply geometric or flowing curvilinear forms.

On the upper levels of the technical building, narrow interior gardens are created at the outer fringes of the offices. These narrow gardens, planted with real plants, are continuous in front of the glass wall, connecting several offices. Hence, one can see the next office from this garden, or one can even walk to the next office through the garden. In the executive restrooms at roof level, small exterior gardens are located beyond the transparent glass walls of the toilet cabinets, creating a green, natural environment for these service areas. All the interior surfaces, including the ceilings, are painted in white, while the floors are covered with a plain wall-to-wall carpet in light grey, creating an extremely light atmosphere.

The first two levels above the entrance hall, reserved for classrooms, seminar rooms, and language laboratories, are designed more freely. The concrete floors glide in different directions above each other, creating a deliberately complex spatial organization. The entrance hall is planted with trees and shrubs around a shallow pool that creates rippling reflections on the walls, adding to the light, transparent and soothing quality of the interior. An amphitheatre-style auditorium and a large documentation centre are attached to the building at its entrance and basement levels.

The building is directed to the north with large glass surfaces to allow in light. On the east and west sides, the glass façades are protected from the scorching effects of the midday sun by vertical, slightly concave or convex ferrocement panels which hang apparently precariously, visually defying the laws of gravity and reinforcing the deconstructive image of the new buildings.

The new residential colony at YCC is built on a gently sloping site behind the old residential quarter, which is closer to the coastline. Rather than laying out the streets according to a simple herringbone pattern, as in the old quarter, the streets in the new settlement are laid out at different levels of the slope, following its contours, to produce a linear arrangement with house plots lining the gently curving vehicular and pedestrian roads, appropriately paved in brushed concrete. All residences are built facing the sea, so as to enjoy the magnificent sunset and the cool north-western breeze, with ample verandas to the front and, in some cases, to the back. The bachelor apartments are generally designed as double-storey villas with exterior stairs to reach the upper floors. Particularly in single villas, dining, living and family areas that align the seaside façades have frameless glass walls extending from floor to ceiling across the full width of each room, thus increasing the view towards the sea.

Even though the plan typologies of the residential accommodation are not numerous, an endless variety of unique façades has been obtained by combining interchangeable panels of different shapes, fitted with customized doors and windows. These façade panels, with their sometimes jagged, sometimes smoothly curving, irregular edges, are usually larger than the buildings behind them, and they extend beyond the side walls or the roofs of the houses, creating striking silhouettes against the sky or the sea. As a result, the whole settlement reminds one of a village that has been entirely built out of playing cards, playfully leaning over each other, as in a children’s game. The variable compositions of the panels, with

irregularly cut windows, skewed edges or half-finished vault forms, give a customized identity to almost every house, creating an animated environment.

C. Structure, materials and technology

Various structural systems and materials have been employed for the construction of the new buildings at the YCC New Village and different construction companies were responsible for different parts of the project. Different techniques for building with cement and concrete were used to achieve formal freedom in the architecture and to keep the budget low.

The main gate was constructed using the ferrocement technique, which does not require the use of formwork and can be executed manually. The ferrocement sandwich panels were prepared by laying wire mesh over both sides of a flexible, net-like steel structure that was bent into the desired form. The central layer was filled in with insulating material and the outer layers were plastered over by hand with a high-grade cement plaster. A waterproofing membrane was also applied over the exterior surfaces. Being a small, single-storey building, the main gate was easily constructed and did not need any extra supporting structural elements.

The production control tower, on the other hand, is built in steel, with an infill of Siporex blocks and rendered with Vetonite. The façade panels were to be constructed of ferrocement, as for the main gate, but the company responsible for the construction was reluctant to use this technique because of the inexperience of its workers. Hence, they were cast *in situ* using reinforced concrete.

The main structure of the technical building was also made of reinforced concrete, with twenty-four round columns bearing roughly square floor plates, with large, circular holes at their centres. However, the façade panels and interior partitions were executed by hand in ferrocement. In all three of these buildings, the glass curtain walls are made of dark green tinted glass with aluminium frames.

Although the ferrocement technique was also proposed for the execution of the façade panels in the new residential colony, here too the construction company felt that they did not have the experience to work with this technique. Therefore, all residential units in the new colony were constructed of reinforced-concrete load-bearing walls, with all the walls cast *in situ*, including the wide variety of façade panels.

D. Origins of technology, materials, labour force, professionals

The ferrocement technology proposed for the partial or total construction of various buildings in the new village is a well-known technique that has been used in various countries in Europe. Industrial materials – steel, glass, Siporex and Vetonite – were all imported from Europe. The cement, however, being the major ingredient of all the concrete work, was obtained locally from the factory.

Francesco Audrito and Athena Sampaniotou, the architects of the project, are of Italian and Greek origin respectively, and live in Turin, Italy, where they have their head office, Studio

65. Because they have been working in Saudi Arabia since the 1970s, they have a branch office in Jeddah under the same name.

From 1994 to 2000, several companies were involved with the construction of various buildings in the village. The construction company KHD Humboldt Wedag AG from Germany was responsible for the extension of the cement plant. In 1994, the Turkish construction company Mekon Group became involved with the building of the production control tower. However, it was finished by a UK-based Saudi firm called Teramwork of Jeddah, which does not exist anymore. The China-based Saudi company, Ret Ser of Jeddah, built the main gate and the technical building. Consultants for the ferrocement technique were called in from the University of Bangkok Department of Engineering. The Department suggested the invitation of NCL Stewart Scott Ltd, a consulting engineer company from London. This company sent Patrick Jennings as a consultant in ferrocement technique. Finally, the local Saudi firm International Centre for Commerce and Contracting were responsible for the new residential buildings and related facilities. All these firms were responsible for supplying their own machine parts and labour forces.

V. Construction Schedule and Costs

A. History of project

The programme for the extension of the YCC plant and village was initiated in 1994, through a decision taken by the board of trustees, headed by HRH Prince Mishaal Bin Abdulaziz. While a German construction company was commissioned to extend the plant itself, an invited architectural competition was held for the design of the technical building, the control tower and the main gate. While the construction of these three buildings was proceeding in 1995, a new competition was held for the extension of the old residential area.

After the signing of the contract, the design work was completed in November 1995. Construction of the new village was largely completed by the contract date of October 1999, but final completion took another five months, ending in April 2000. Occupancy of the new residences began in December 1999 and continues at present. Certain parts of the project and the landscaping of the site are expected to be implemented gradually.

B. Total costs and main sources of financing

The extension of the YCC village was completely financed by the company itself. The initial budget for the extension was SAR 140,000,000, which, at a rate of SAR 3.75 to USD 1, amounts to approximately USD 37,000,000. The land for the extension was bought for SAR 10,000,000, which amounts to approximately USD 2,700,000.

Analysis of the actual costs is as follows:

Infrastructure	SAR 33,000,000	(USD 8,800,000)
Labour	SAR 23,750,000	(USD 6,333,333)
Materials	SAR 71,250,000	(USD 19,000,000)

Professional fees	SAR 4,400,000	(USD 1,173,333)
Additional external work	SAR 40,000,000	(USD 10,666,667)
Total costs	SAR 172,400,000	(USD 45,973,333)

As is seen from this table, the initial budget of USD 37,000,000 was exceeded by approximately USD 9,000,000.

C. Comparative costs and qualitative analysis

The actual cost without the infrastructure and the professional fees amounts to SAR 2,671 (USD 712) per square metre. When the costs of the infrastructure and professionals fees are added, the cost amounts to SAR 3,411 (USD 909) per square metre. For comparison, good-quality construction in Saudi Arabia today costs SAR 2,000 (USD 533) per square metre.

D. Maintenance costs

The YCC administration has given the following figures as monthly maintenance costs for the new village:

Electricity	SAR 5,000	(USD 1,333)
Water	SAR 82,000	(USD 21,867)
Repairs and gardening	SAR 115,000	(USD 30,667)
Manpower	SAR 79,000	(USD 21,067)
Total cost	SAR 281,000	(USD 74,933)

VI. Technical Assessment

A. Functional assessment

All buildings in the YCC New Village are functioning properly. The site chosen for the technical building, between the residential colony and the main factory, is appropriate, because the trainees who attend classes here reside in the residential area and are trained in the factory. The building itself is planned efficiently too, with classrooms for trainees easily accessible on the lower levels, while the executive offices are located on the more private upper levels.

The production control tower is built too close to the factory and suffers from cement dust, which stains the façade panels, creating a dirty appearance. Furthermore, it stands in the shade of the tall factory, so its interior spaces receive insufficient daylight. The main gate is also functioning efficiently, but its environs have been cluttered with unnecessary signposts and flagpoles. The interior walls of the control room were thoughtlessly crowded with electronic equipment after the building was finished.

Eleven different typologies were designed for the new houses of the residential colony to achieve a variable environment. The site plan, with undulating parallel roads, works efficiently and the houses aligning the roads all face the sea so that they have fine views

beyond their gardens. Their customized façades add variety to the otherwise dull environment.

B. Climatic performance

The unbearable heat and humidity of western Saudi Arabia can be endured only with the help of mechanical cooling systems, which are installed in almost every new building in the kingdom today. In the YCC New Village too the public buildings are cooled by centrally installed air-conditioning systems. Single wall units cool the private houses, however. The houses are so placed on the site that in winter and early spring the north-western winds are allowed to pass through them, cooling their interiors.

Except for the production control tower, which is in the shade of the gigantic factory building, all public buildings and residences are flooded with daylight through their large glass surfaces. This is particularly noticeable in the technical building and in a few houses that were built separately for the executive directors of the company. These are locally nicknamed ‘butterfly houses’ because of their sharply rising concrete roofs, which allow extra height in the bedrooms. The eaves are adjusted so that, in spite of extensive glass walls facing the sea, the interiors are almost always protected from direct sunlight. These houses were meant for higher executives and royal guests, so they have the largest floor plans. While they are part of the general housing, they are located in a small cluster at one end of the housing area for reasons of security and privacy.

C. Environmental response

Even though the landscaping of the new village is yet to be implemented, the planting of private gardens has already started. Since every house is set within a private garden with pergolas covering open verandas, in the future the village will be much greener than it is today if the landscaping is carried out properly. It is intended that the roads will be planted with palm trees, the garden walls lined along the inside with evergreen hedges, and flowering bougainvillea plants will cover the pergolas. Another project that is expected to start soon is the creation of an educational park: here, date palms will be grown along water canals, according to the Saudi tradition, with fruit trees and vegetables planted under the shade of the palms. The park’s central area will be reserved for an edible date farm, with trees from all districts of the kingdom. The park is expected to be an innovative learning facility for children and older students. However, the implementation of water canals would seem to be difficult because of lack of sufficient water.

D. Choice of materials, level and technology

The choice of concrete as the major building material was most appropriate for the construction of a village for a large cement company. Furthermore, experimentation with various forms of concrete was even more pertinent to cement production. The creation of new architectural forms through the use of the ferrocement technique shows support for cement and concrete as a reliable building material. The choice of a traditional technique for the execution of the ferrocement panels, which were made simply by hand with basic hand tools,

was a positive step, paving the way for a possible revival of traditional building techniques in a country where every construction is realized by highly sophisticated means.

1. Design features

The initial decision to create a human and stimulating environment next to the huge industrial structure of the factory was a worthy one for such an isolated settlement in the desert, 80 kilometres from the nearest urban conglomeration. The effort to give a custom-made appearance to the exterior of each house by using interchangeable panels of different shapes and sizes has created a highly varied environment that always maintains the interest of the community. At the same time the invariable orientation and well-protected gardens of the houses respect family privacy.

2. Interior design and furnishing

Even though the architectural firm is well known for its interior and furniture designs in Europe, the architects did not furnish the new buildings in the YCC village. The furniture was bought by the company itself and is rather heavy and inappropriate for the cheerful and spacious interiors of these buildings. Oversized and thickly upholstered suites in dark tones, and old-fashioned thick cloth curtains crowd and clutter the living rooms in the houses.

In the technical building, where daylight, whiteness and transparency are key features, the choice of dark, ordinary office furniture in wood and metal is also unsuitable. Contemporary glass furniture of the sort that is so popular in Europe today would have been more appropriate and would have enhanced the sense of transparency inside the building.

VII. Users

A. User profile

Miles away from the nearest urban settlement, the village is used entirely by company administrators, engineers and workers and their families. About half of these people are bachelors who stay here temporarily. Except for the executive staff, most of the other members of the community are expatriates from various Muslim countries. Among short-term visitors to the village, the trainees are an important group. Since the establishment of the training centre in 1999, 22 engineers and 223 technicians have been trained there. At present 32 engineers and 12 technicians from other Saudi cement companies, 7 technicians from other Arab countries, and a group of 35 students from King Abdulaziz University in Jeddah, together with a group of students from Yanbu Industrial College, are being trained at the factory and are staying in the village as guests of the company. Some of the top executive administrators are based in Jeddah and commute to the village on an occasional basis.

B. User response

The response to the village by the users is very positive. Those members of the community who are staying in the older section of the village want to move to the new houses, which they feel are more comfortable, bright and sunny. Expatriates, who usually prefer to work in the larger towns of the kingdom and used to turn down job offers even from the provincial

industrial centre of Yanbu, gladly began to accept jobs here at the factory after the new village was finished. The project received a positive reaction from the Royal Family. HRH Crown Prince Abdullah gave the architect a prize in appreciation and the ceremony was shown on Saudi television in 1999. In December 2002 the project was given the Premio Dedalo Minosse prize in Italy and was published in the Italian design journal *l'ARCA.*

VIII. Project personnel

The enlargement of the cement factory and the village was first discussed and initiated by the members of the executive board of YCC, headed by HRH Prince Mishaal Bin Abdulaziz. Dr Saud Saleh Islam, general director of YCC and member of the board, was the key figure in the realization of the whole project. He was supported by his assistant and administration manager, Zuhair R. Al-Dabbagh. The civil works and support services manager of YCC, Issam A. A. Mullah, who is an architect, was the client's representative. Engineers Nabil Al-Rasi and Adnan Al-Afandi of YCC acted as the client's representatives for project engineering and project management respectively.

Architects: Francesco Audrito and Athena Sampaniotou of Studio 65, Turin, Italy
Construction of the factory: KHD Humboldt Wedag AG, Germany
Construction of the production control tower: Mekon Group, Ankara, Turkey; UK-based Saudi firm Teramwork
Construction of the main gate and technical building: China-based Saudi firm Ret Ser SA Ltd's of Jeddah, under the direction of engineer Jack Chang
Construction of the residential colony: International Centre for Commerce and Contracting: Jeddah, Saudi Arabia, under the general management of Dr Osama Salam
Structural design of the production control tower, the technical building and the residential colony: Ermanno Piretta, Studio 65, Turin, Italy
Structural design of the main gate: Patrick Jennings, NCL Stewart Scott Ltd., London, UK
Electrical engineer: Imtiaz Ahmed, Studio 65, Jeddah
Mechanical engineer: Jafar Sadiq, Studio 65, Jeddah
HVAC: Athar Hussein, Studio 65, Jeddah
Site supervision and team coordination: Evangelos Kiriakidis, Studio 65, Jeddah
Architectural site supervision: Nick Lo Presti, Studio 65, Turin
Architect Solaiman Al-Khereiji from Studio 65, Jeddah, was the consultant for the whole construction process
Consultants for the ferrocement technique were called in from the University of Bangkok Department of Engineering and from NCL Stewart Scott Ltd, a consulting engineer company from London

Yıldırım Yavuz
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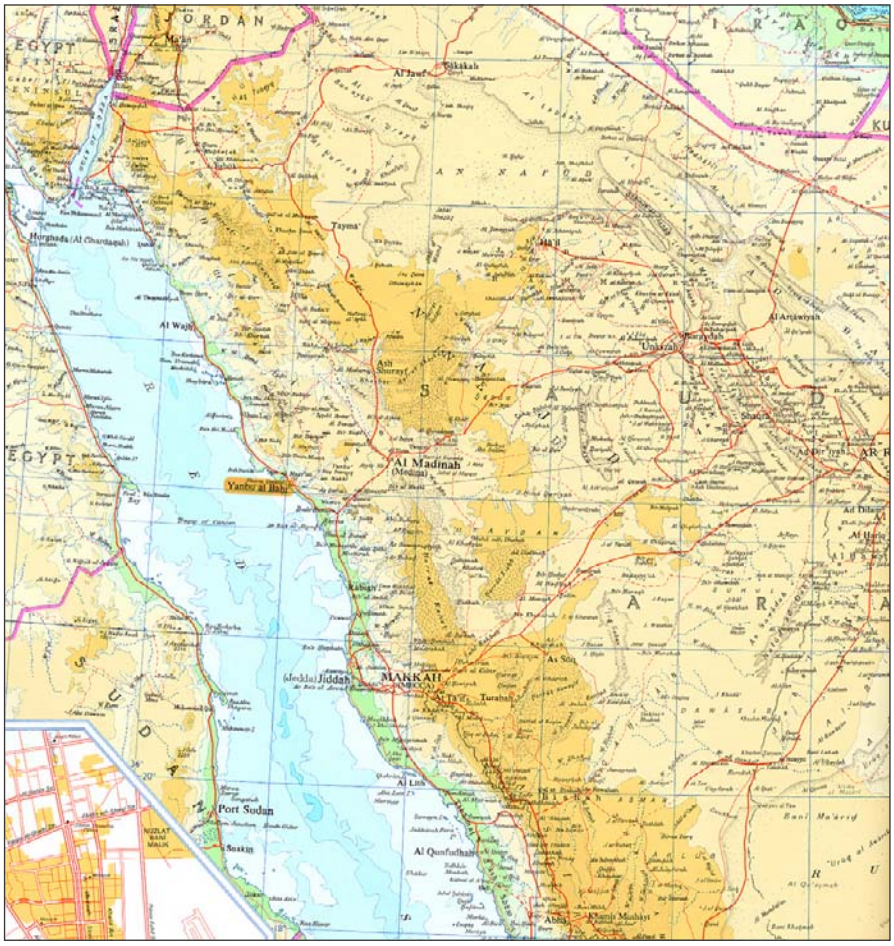
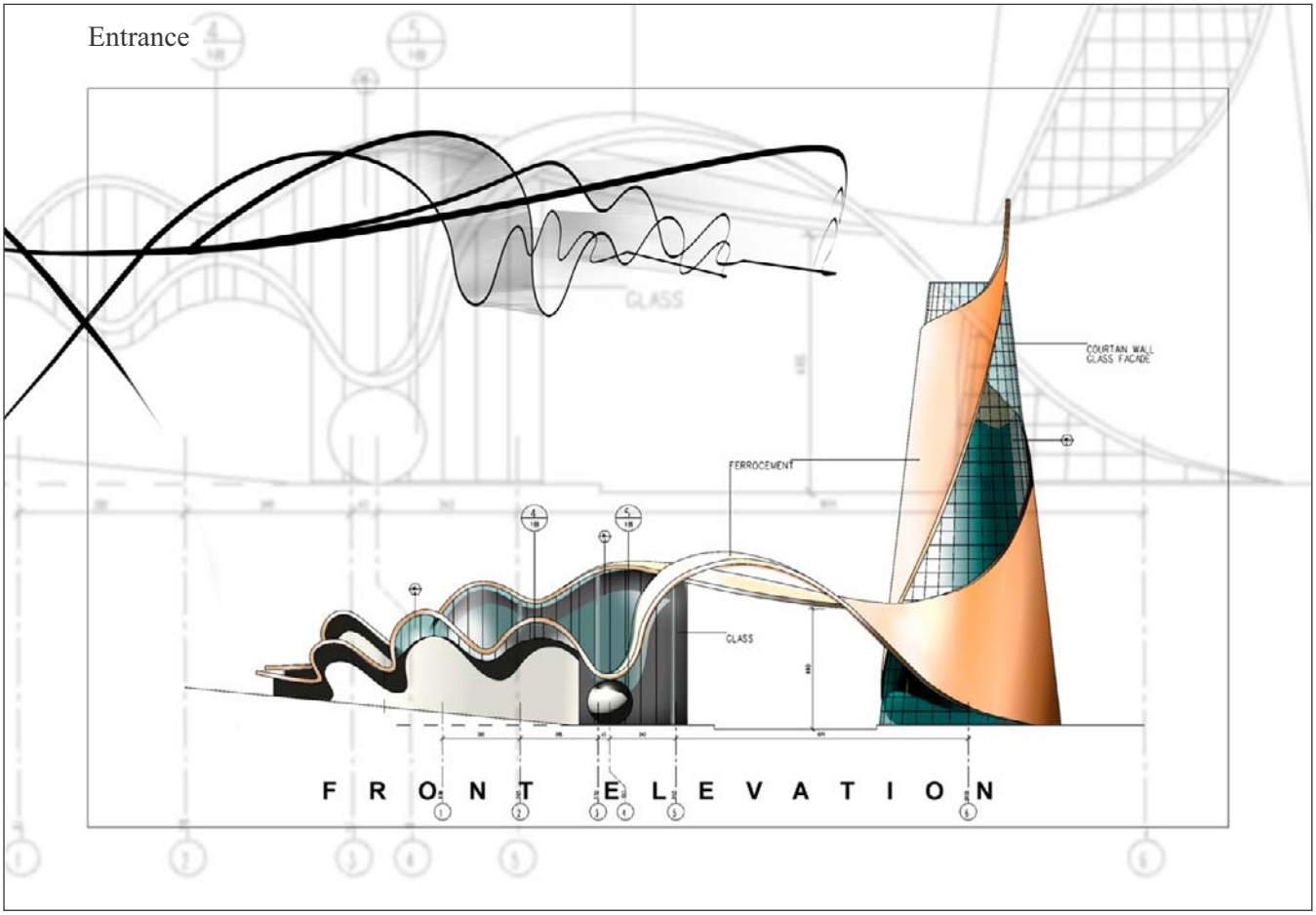
Site rendering: Yanbu Cement Company New Village is located 80 kilometres north of the city Yanbu, near the Red Sea shore.

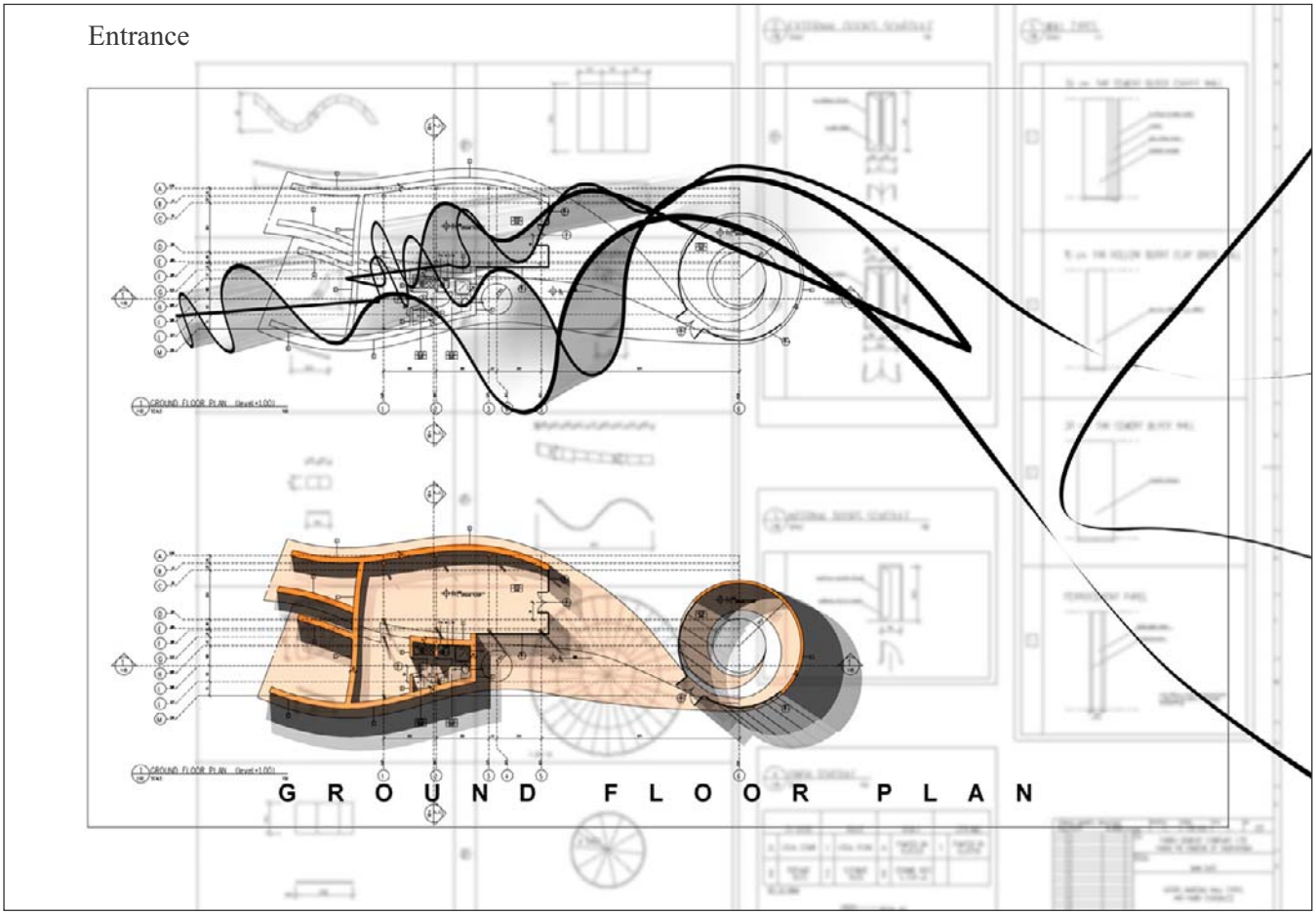


Map: Yanbu is on the western coast of Saudi Arabia, facing the Red Sea, and has a subtropical climate.

Entrance



Entrance



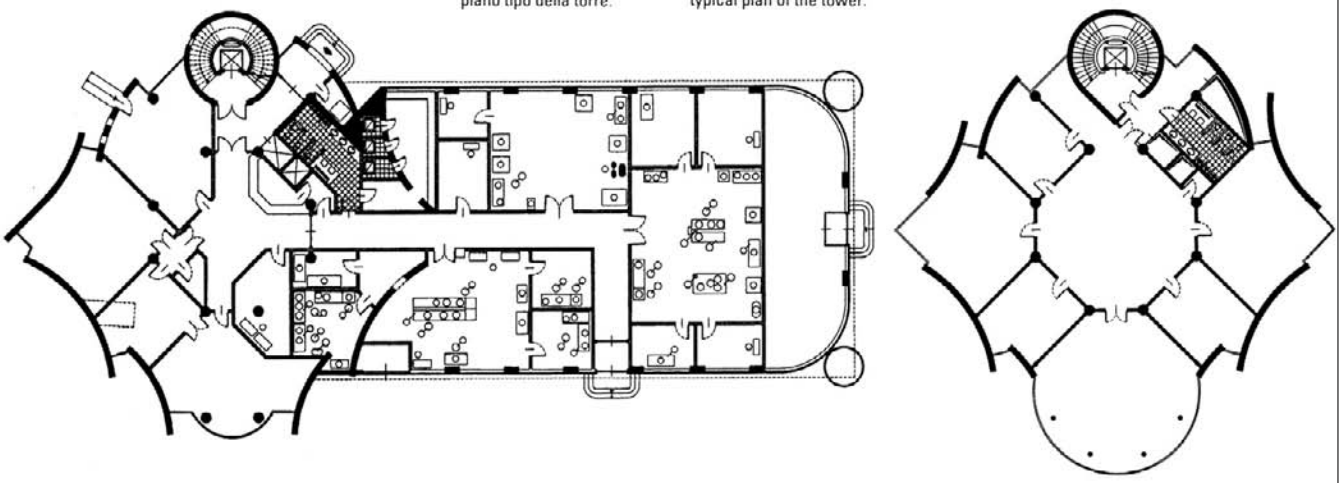
Central Control Tower

WEST ELEVATION

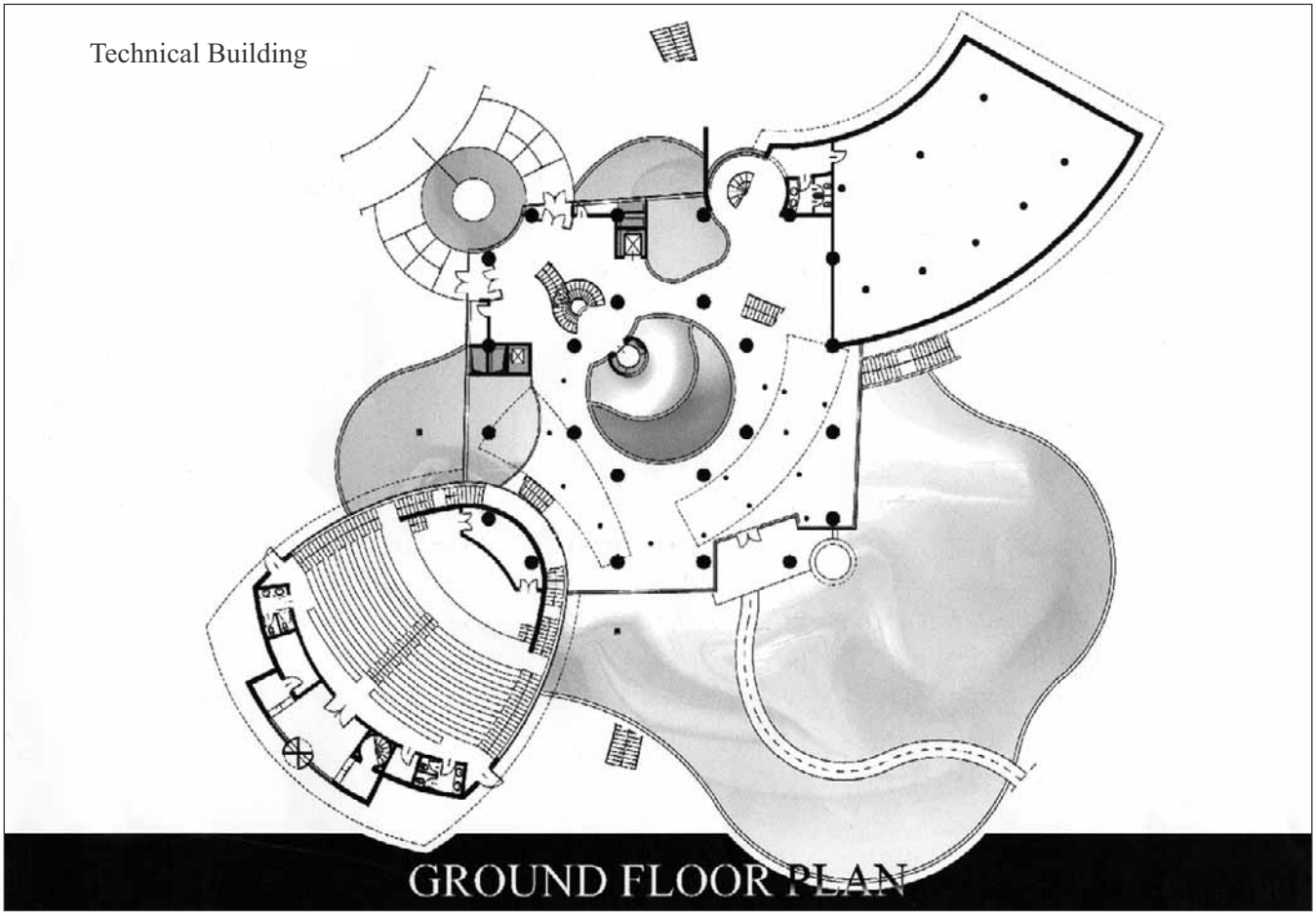
Central Control Tower

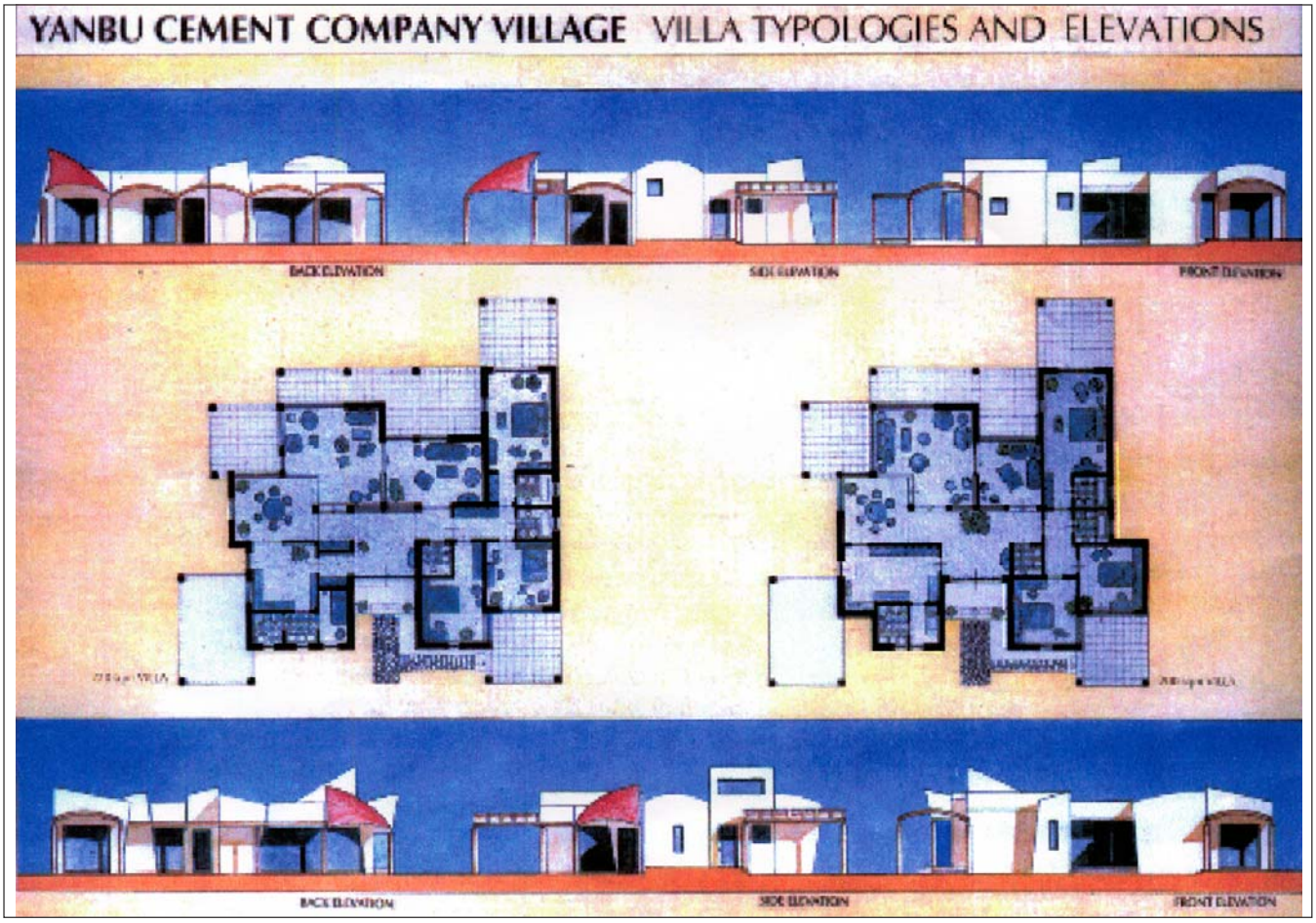
■ Pianta del piano terra e, a destra, pianta di un piano tipo della torre.

■ Plan of the ground floor, and, right, plan of a typical plan of the tower.



Technical Building



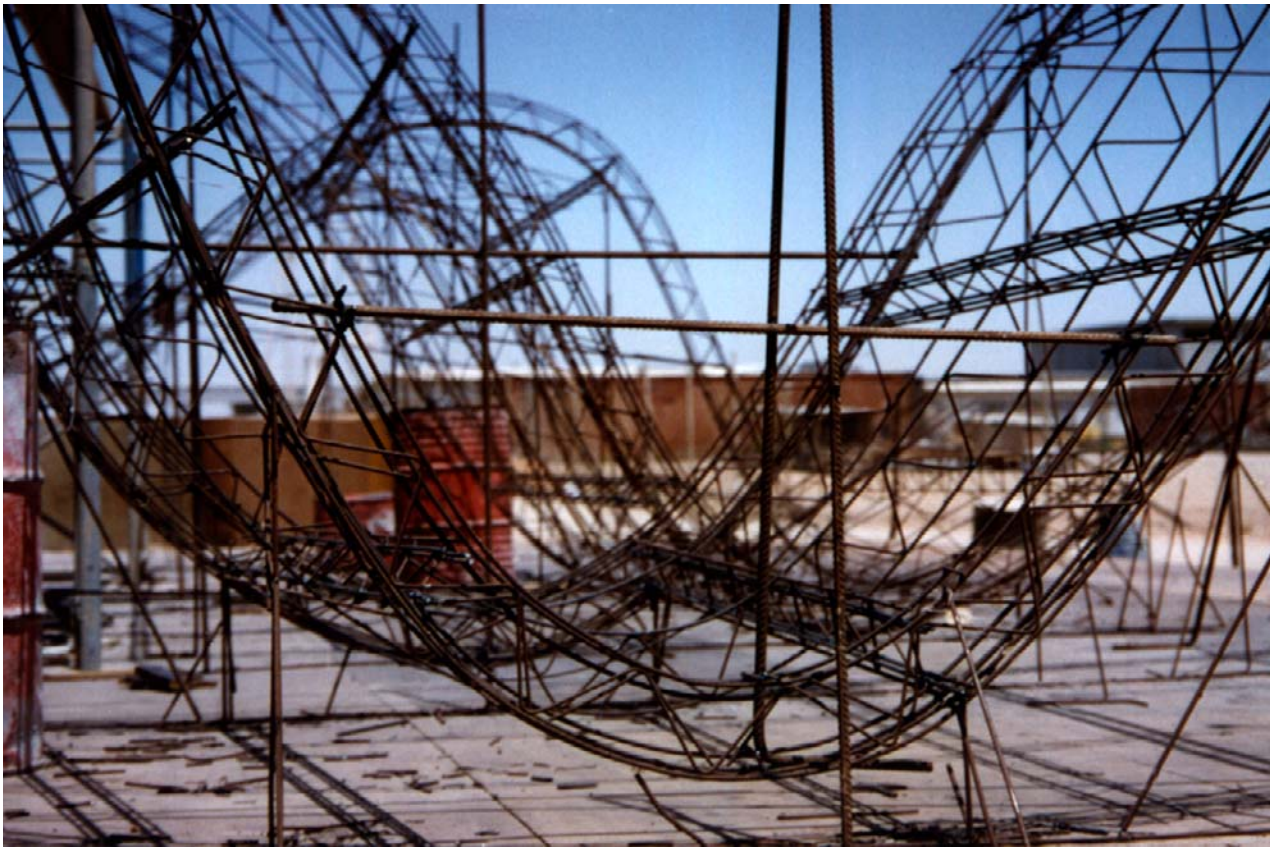


Aerial view of the village during construction.

The village consists of various types of houses and social, educational and recreational facilities, as well as a cement production control tower for the factory, and an office tower for the company administration.

Entrance to the residential compound is through the main gate. The conical tower is wrapped in a ferrocement panel that extends like a wave to form the entrance arch, and then falls down again in double folds to form the roof of the control room.

The use of ferrocement allowed great freedom in the composition of forms.



The technical building contains the administration centre and has large windows open to the north.

The technical building is protected from the harsh sun by “shields” constructed to protect and shade the glass surfaces facing east and west.

The central control tower is a six-storey building, with quality control laboratories on the ground floor that protrudes from the tower.

The central control tower contains production offices as well as executive and administrative offices.

Inside the technical building, a glass elevator rises through the atrium; the glass roof lets in daylight down to the ground level.

The interior of the technical building is conceived of as an oasis of water and vegetation, surrounded by an external seashell.

In the residential village, an endless variety of facade expressions were achieved by using a multitude of combinations of interchangeable façade panels.

The different combinations of the building panels, with irregularly cut windows, skewed edges or half-finished vault forms, give a customised identity to almost every house.