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CONCRETE BUILDING PANELS AND CONSTRUCTION OF HOUSES IN CHILE

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FEASIBILITY STUDY FOR A PROJECT OF INDUSTRIALISED PRODUCTION OF CONCRETE BUILDING PANELS AND CONSTRUCTION OF HOUSES IN CHILE

JUNE, 1995

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ACRONYMS AND USEFUL DATA FOR AN EASY READING OF THE REPORT

Fifth Region:	The region including Valparaiso and Vina del Mar
GDP:	Gross Domestic Product
GNP:	Gross National Product
Metropolitan Region:	the region including Santiago
MIDEPLAN:	Ministerio de Planificaciòn y Cooperaciòn (Ministry of Planning and Co-operation)
MINVU:	Ministerio de Vivienda y Urbanismo (Ministry of Housing and Urbanism)
M.R.:	Metropolitan Region
peso:	local Chilean currency. 1 US$= 400 pesos, at the date of local data analysis and collection (April 1995). Rate adopted in the study
UF:	"unidad de fomento" - Reference cost unit applied in the construction sector. 1 UF= 29 US$ at the date of local data analysis and collection (April 1995). This rate has been adopted through the whole study.
USP:	Unified Subsidy Programme
VthR:	Fifth Region
VR:	Fifth Region

CHAPTER 1 - EXECUTIVE SUMMARY

1.1 Project background and basic idea

The background of the Project is the international experience gained by Intertransports Centre SpA, in the civil building construction field. Intertransports Centre SpA decided to verify the possibility of implementing a new project in Chile, utilising a special industrialised pre-fabrication technology which may allow a low construction cost also for high standard houses, provided the manufacturing factory utilisation factor is maintained at very high levels.

1.2 Presuppositions of the Feasibility Study

The Feasibility Study has been carried out on the basis of the following presuppositions, to be considered as the starting point of the Study. These presuppositions not have been discussed, nor have they been verified with a view of a possible Project optimisation:

- partners of the Company;
- machinery and structures necessary for the endowment of the production factory and for the following phases of housing assembly, as well as their costs for the Project;
- production process and sharing of the factory production among the several building types (see point 1.3);
- organisation of production;
- sharing of investment costs between the foreign currency (for supply from Italy) and local currency (for supply from Chile) equal to 85% and 15% respectively of the total investment cost.

On the basis of such presuppositions, the activities carried out within the framework of the Feasibility Study have involved in particular:

- the analysis of market trends, and the market forecast for the products in question;
- the verification of availability at the site of all raw materials and of man-power necessary for the operation of the factory and for the successive phases of production;
- the verification of the cost of raw materials and of man-power;
- the verification of possible law or regulation constraints susceptible to prevent a successful outcome of the Project;
- the analysis of the financial profitability of the Project.

During the implementation of the Study, the production programme initially foreseen by the Entrepreneurs has been partially modified (see point 1.3).

1.3 Reference Production Programme

The factory for industrialised fabrication of building panels and structures has been designed so as to allow the production capacity shown in Table I-1 (in the report, mentioned as Reference Production Programme).

YEARLY PRODUCTION	m^2/unit	n° units/building	n° buildings	tot units	total m^2
A					
IH 40/B type	40.40	1	150	150	6,060
IH 40/2B type	40.40	2	200	400	16,160
total A			350	550	22,220
B					
two-floor, two-units type	118.80	2	54	108	12,830
C					
four-floor, sixteen-unit building	90.00	16	18	288	25,920
(4 units/floor; ground floor + 3 floors; balcony excluded)					
total A + B + C			422	946	60,970

Table I-1 - Reference Production Programme

The characteristics of the house types selected are the following:

TYPE IH40/B (Two bedrooms, one living room, kitchen, bathroom). It is meant for one single family; it has a net surface of 40.4 m^2; on one single floor. The expected number of houses to be built is 150 per year, for a total surface of 6,060 m^2.

TYPE IH40/2B (Each building including two houses, each one consisting of two bedrooms, one living room, one kitchen and one bathroom). It is meant for two families; it consists of a couple of units of the previous type; it has a net surface of 80.8 m^2. The expected number of houses to be built is 200 per year (corresponding to No. 400 units of type IH40/B), for a total surface of 16,160 m^2.

TYPE "TWO FAMILIES" (One building of this type includes two units, each one consisting of three bedrooms, one living room, one office, kitchen, two bathrooms). It is a two-floor house meant for two families, consisting of two coupled units of 118,80 m^2 net surface (+ 27.12 m^2 arcade). The expected number of houses to be built is 54 per year (corresponding to 108 units), for a total surface of 12,830 m^2. This is also defined as "two-floor, two-unit house".

TYPE "MULTI-FLOOR" (One building of this type includes sixteen units, each one consisting of three bedrooms, one living room, kitchen, bathroom, balcony). These are four-floor buildings; the first floor is at ground level. There are 16 flats in each building, four on each floor. There are two staircases. Each flat has a net surface of 90 m^2, plus balcony. The expected number of buildings to be built is 18 per year (corresponding to 288 flats) for a total surface of 25,920 m^2. This is also defined as "four-floor, sixteen-unit house".

The factory is designed so as to manufacture the following number of houses in one year time: No. 550 one floor houses (150 of 40.40 m^2 and 400 of 80.80 m^2); No. 108 two-floor houses (of 118.80 m^2); No. 288 flats in four-floor buildings (of 90 m^2). Therefore, the total number of flats (living units) that can be manufactured in one year is 946, with 60,970 m^2 of net surface.

Even if the production programme was a fixed input, in the framework of this Feasibility Study, a proposal has been made to address the IH type production line towards house characteristics better fitting with market requirements.

According to this proposal, the yearly production capacity was modified as follows:

	m^2/unit	N° buildings	N° units (total)	m^2 total
- house IH40/2B	80.80	275	275	22,220
- two-floor, two-unit house	118.80	54	108	12,830
- four-floor, 16-unit building	90.00	18	288	25,920
Total		347	671	60,970

and it was incorporated into the financial analysis (Chapter 10).

1.4 Market analysis and marketing strategy

- Chile has developed an efficient private construction industry in housing, particularly during the last ten years.

- After a decade of five significant drops (1981-89), unit prices started to move during the last years slightly upwards.
  Economics of scale, confidence of adequate demand, greater specialisation of construction firms, simplification of permit and inspection procedures, are all elements which are being offset by the strong expansion in the construction activity and increases in labour cost and building materials. From 1990 to 1993, the number of square meters for the whole construction sector increased steadily up from 6.2 million to about 10 million. At the same time, the size of the houses showed a trend towards smaller apartments, with particular reference to the private market.

- The cost of constructing an acceptable quality house varies greatly reflecting local conditions of land, material supply and transport costs. In the Metropolitan Region of Santiago, a basic house of 50 m^2 costs less than 480 UF and a house on the private market of 100 m2 costs around 3,000 UF.

- In general, there is still sufficient land supply in the Project area (around Santiago and Valparaiso). However, the availability of adequate infrastructure (with special reference to sewerage) may be a constraint in certain areas of the Santiago Metropolitan Region, and, in the Fifth Region as well (with special reference to Valparaiso).

- Population increase and growth of urban area largely bypassed the Country's investment capacity with the result of a widespread housing deficit. It has been estimated that, at the Country level, more than 500,000 families living as "allegados" are affected by housing shortfall, while an extra 150,000 are living in sub-standard condition.

- The MINVU has calculated that, in order to prevent the situation to worsen, a minimum of annual need of 85,000 new units is required, for a total amount of 600,000 housing units up to year 2000. This amount would cope with population growth and deterioration of the housing stock.

- A different approach, leading to a higher figure, is followed by the MIDEPLAN (Ministry of Planning). According to this view, the Census of 1992 had detected unsatisfied housing needs of about 900,000 units.

- Moving from national to regional level or, more precisely, to the two specific Regions of the Project, the corresponding number of "allegados" needing a house was estimated at 385,000 people (42.7 % of the total) for the Santiago Metropolitan Region and 73,000 people (8.1 %) for the Fifth Region.

- However, it is very unlikely that these requirements will be met by actual construction. Over the last few years, the number of standard houses constructed increased from a yearly average of 80,000 (1989-91) to an average of 110,000 (1992-94), while housing initiated in 1993 reached a number of 50-55 thousand units in Santiago and 10 thousand in the Fifth Region. Most of them were very low-cost units, aimed at the low-income population.

- Since the technology proposed in this Project refers to rather high-standard houses, with a production cost which cannot be reduced too much, the market analysis must refer to the new housing requirements in a medium-top standard level range.

- A more realistic estimate of housing requirements, therefore, to be considered in the framework of the present Project, should take into account the actual planning of the MINVU regarding units of the top level, and that segment of private market incorporating housing units ranging from 1,700 to 3,000 UF.

- The housing planning of MINVU is based on demographic growth and on the need to renew the housing stock to prevent housing conditions from worsening. It is what it could be defined as a "minimum requirement" to maintain the "status quo". On this assumption and taking into account also low-cost units, a housing deficit of about 33,000 units per annum in Santiago Region and about 8-9,000 units for Valparaiso Region was calculated. In total, 41-42,000 units is the estimated annual deficit of these two Regions.

- The bulk of these housing needs concerns the poorest segment of the population. Taking into account the extremely low construction costs of the first two housing programmes of MINVU ("Vivienda Basica" e "Vivienda Progresiva") and very likely, also of the third one (P.E.T.), focus for the market strategy should be put on the so-called "Subsidio Urbano" (Unified Subsidy) programme, whose housing units are supposed to range from 500 to 1,500 UF. In physical terms, that means a market size of the order of 7,000 units.

- The market demand has been projected over the coming years. To get an idea of market development until the year 2000, the housing construction programme of MINVU and its minimum housing target may be assumed as basis.

The Table below shows this programme:

A) Minimum target to be achieved at national level by year 2000 : 600,000 housing units

B) Target for the Metropolitan Region and the Fifth Region:

	1995	1996	1997	1998	1999	2000	Total (95-2000)
1) Santiago Housing Units	39,400	40,708	41,358	42,008	42,658	42,658	246,190
2) V Region Housing Units	9,850	10,015	10,177	10,340	10,502	10,665	61,549
3) Total of above	49,250	50,073	50,885	51,698	52,510	53,323	307,739

If we consider the income class corresponding to the Unified Subsidy Programme (see Chapter 3) and we take into account the share of the total housing construction plan corresponding to such a programme (which insists on the fourth quintile of the household income structure), we obtain the projected market volume from 1995 to 2000. In quantitative terms, the following figures are obtained:

	1995	1996	1997	1998	1999	2000
1) M. R. of Santiago (% share: 17.2)	6,776	6,890	7,002	7,114	7,225	7,337
2) Vth Region (% share: 15.3)	1,507	1,532	1,557	1,582	1,607	1,632
3) Total of above	8,283	8,422	8,559	8,696	8,832	8,969

- On this basis, considering the productive capacity of the factory of the Project and, at the same time, the virtual absence of competition for prefabricated houses in Chile (no relevant experience can be found in this kind of product), a market share of the firm of some 9-10 % of market volume may be considered as realistic.

- Appears a share of 10% of the "rich" housing market (private; this market arrives at 800 units) also appears realistic.

- Globally, the market sector of the Unified Subsidy Programme and the private market sector appear compatible with the saturation capacity of the proposed factory (671 units per year).

- Sales prices (per house) in the Unified Subsidy Programme (USP) are ranging from 8,500 - 9,000 US$ (340-360 UF) for the first category to 30-33,000 US$ (1,200 - 1,320 UF) for the third category (see Chapter 3).

- As far as the private market is concerned, the bulk of houses constructed have a size of a maximum 100 m2. The relative prices are strictly comparable with the two first categories of USP, while the housing units with an average size of more than 100 m2 but less than 140 reach a price of 2,700 UF.

- As specified before, the production factory selected by Intertransports Centre S.p.A. was conceived for a well specified production programme (Reference Production Programme). Since the market analysis pointed out the existence of a great variety of building types, with an extremely wide range of sales prices, a comparison was made between the cost characteristics of the standard houses manufacturable by the proposed factory and the price characteristics of the existing market. Through this comparison, the assessment of products to be manufactured and marketed, was calculated.

- Relevant data of this comparison are summarised in Table I-2, where a typical and representative situation is shown, that of civil building constructions in 1993, with reference to the highest sectors of the market.

- Sales price per square meter ranges between 7.19 UF and 41.05 UF (or between 5.99 UF and 39.85 UF, if the cost of urbanised land is excluded from the sales price of the building).

- The three types of buildings which can be produced through the proposed factory have been compared with typical building requirements of the market from both the points of view of surface per unit and of compatibility between production cost and sales price.

- The comparison has brought to the exclusion of IH40 construction model, unless used in double-module houses, with a net surface of some 80 m^2. In this case, IH40 type (only IH40/2B) fits with the requirements of Unified Subsidy Programme type houses (third top segment), and with a segment of the private market, while the two-floor, two-unit buildings fit with requirements of the private sector only (starting from 71 m^2 of net surface) and the four-floor, sixteen-unit buildings fit with requirements of Unified Subsidy Programme type houses (third top segment) and with private sector requirements (in the range 71-140 m^2).

- The reference sale prices shown in Table I-3 were selected in the Financial Analysis.

MARKET TYPE REQUIREMENTS		PET	SUBSIDIO 1	SUBSIDIO 2	SUBSIDIO 3	PRIVATE 71/100 m^2	PRIVATE 101/140 m^2	PRIVATE from140m^2
HOUSE UNITS BUILT IN 1993		13,669	12,145	5,957	780	14,027	6,895	5,351
AVERAGE SURFACE (m^2)		**44.59**	**46.05**	**55.93**	**81.14**	**82.21**	**117.71**	**202.14**
AVERAGE SALE PRICE (US$/unit)		8,016	8,595	15,176	33,365	34,150	71,912	207,464
AVERAGE SALE PRICE (US$/$m^2$)		179.77	186.64	271.34	411.20	415.40	610.93	1,026.34
AVERAGE SALE PRICE (UF/m^2) (rate 1993: 25US$/UF)		7.19	7.47	10.85	16.45	16.62	24.44	41.05
AVERAGE SALE PRICE NO LAND (UF/m^2)		**5.99**	**6.27**	**9.65**	**15.25**	**15.42**	**23.24**	**39.85**
SUITABILITY AS FOR SURFACE	**average surface (m^2)**							
IH40	**40.4 / 80.8**	IH40/B	IH40/B	NOT	IH40/2B	IH40/2B	NOT	NOT
2-FLOOR,2-UNIT	**118.80**	NOT	NOT	NOT	NOT	YES	YES	YES ?
4-FLOOR,16-UNIT	**90.00**	NOT	NOT	NOT	YES	YES	YES	NOT
SUITABILITY AS FOR COST/PRICE	**simplified reference cost (UF/m^2)**							
IH40	**11.20**	NOT	NOT	NOT	YES	YES	YES	YES
2-FLOOR,2-UNIT	**10.41**	NOT	NOT	NOT	YES	YES	YES	YES
4-FLOOR,16-UNIT	**9.28**	NOT	NOT	YES	YES	YES	YES	YES
FINAL SUITABILITY ASSESSMENT		NOT	NOT	NOT	**IH40/2B**	**IH40/2B**	NOT	NOT
		NOT	NOT	NOT	NOT	**2-FL,2-UN**	**2-FL,2-UN**	**2-FL,2-UN**
		NOT	NOT	NOT	**4-FL,16-UN**	**4-FL,16-UN**	**4-FL,16-UN**	NOT
Note: the 1993 Exchange Rate has been applied: 25 US$ per UF								

Table I-2 - Selection of products (house types) to be marketed

Type of building	IH40/2B	Two-floor two-unit	Four-floor 16-unit
Unit surface (m^2)	80.80	118.80	90.00
Total surface (m^2)	22,220	12,830	25,920
Total units (-)	275	108	288
Reference sale price (UF/m^2)	15.25	20.00	18.00
Reference sale price (pesos/m^2)	178,349	233,900	210,510
Total revenues (pesos/year)	3,962,915,000	3,000,937,000	5,456,419,000

Table I-3 - Production Programme (data per year)

- Considering the "dualistic" character of the target market for Intertransports Centre S.p.A. (i.e. Unified Subsidy Programme on one hand and high level purely private market on the other), it seems reasonable to outline two different market strategies.

  A) Cost leadership strategy related to U.S.P.
  With reference to this segment of the market, a cost leadership strategy aiming at lower costs than those incurred by competitors seems the most appropriate. Provided that a certain initial market share (or a certain position in the market) is envisageable and that a preliminary determination of the price level of the final product is possible, the cost leadership strategy will aim at low sales prices in the market of this type of product. Moreover, on the medium long-term period, the qualitative aspect, which represents one of the main objectives of the Government social policy (see point 1.14), could become a determinant factor for the enlargement of the market share in order to benefit from the "economies of scale" and further improve the investment profitability.

  B) Differentiation strategy for the private "rich" market
  With respect to housing units of more than 2,700 UF, a feasible strategy is the "so-called" differentiation strategy of the final product. That means "marketing concentration" on the uniqueness of the housing typology proposed. From this point of view, the "sensitivity" to the price element would be reduced and protection from competitors would automatically be reinforced inasmuch as it binds the buyers to the brand of the firm.

1.5 Raw material and supplies

All materials and semifinished products needed in the various phases of the manufacturing and finishing processes were identified, with the aim at assessing their availability in the Country and their price.

Raw materials needed for one year production of concrete panels are the following:

Portland cement 525	t/year	10,350
aggregate (from mm 0.14 to mm 12.7)	t/year	54,717
iron bar (from mm 8 to 16 FeB 44K)	t/year	1,970
electrically welded mesh (15x15#5 and 20x20#15)	t/year	1,344
iron FeB 32K for pins and flasks	t/year	31
iron bushes (made in Italy)	n./year	27,550
polystyrene (density 12 kg/m^3, thickness from 3 to 18 mm)	m^3/year	26,854

Other needed materials are:		
fluidifying concrete additive	liter/year	186,000
oil to remove forms	liter/year	9,000
water to clean concrete mixing equipment	liter/year	350,000
service water	liter/year	900,000
panel production water	liter/year	5,465,000

All raw materials needed are available "in loco" in the amounts needed. Only some minor components could require to be imported, but this will not affect the economics of the Project. The cost of raw materials has been assessed.

1.6 Location and site

The Project foresees the building of the selected house types in the Metropolitan Region of Santiago and in the Fifth Region.

The distance between the production factory and the assembly area (yard) should be within a range of 200-300 km, depending on the cost and the time needed for the transport, which is a function of the existing connection facilities.

The soil for the construction of the manufacturing plant has not yet been bought nor chosen. The investors, however, focus their attention on the agricultural areas near the town of La Calera.

The Chilean Government started some rehabilitation programme of the road system in the Country. Most relevant actions regard the area of the Project, including connections between Santiago and Valparaiso, Santiago and San Antonio, Santiago and Los Vilos passing through the site where the factory should be built (La Calera).

The pipeline road improvement programmes, whose benefits will be felt since 1996, fully justify the Investors' choice of the plant location.

The factory, whose aim is to produce prefabricated elements and to transport them to the building yard in the areas of development of the Metropolitan Region and of the Fifth Region, would be located in the centre of an important arterial network that will ensure, in the prudential range of 200 km from the plant, the fast reaching of the assembly locations.

1.7 Environmental protection

Among the materials needed for the manufacturing processes, the following ones contribute to the production of wastes (data expressed with reference to one year of production of the plant):

-	polystyrene: 3% of year consumption	=	805	m^3/year
-	iron: 2.5% of year consumption	=	49.25	t/year
-	concrete mixing equipment washing water	=	350,000	liter/year
-	services water	=	900,000	liter/year
-	sewage water	=	1,300,000	liter/year

Polystyrene is a self-extinguishing material formed of 90% air; it does not produce any damage because it does not eject fibrous particles, it is odourless and inert. It may be 100% recycled, so the factory should have a simple collecting network of polystyrene residues, to be sent to recycling companies for the production of "cellular concrete", porous bricks, raw materials for other products destined to high energy efficiency applications. In Chile the companies possessing a sufficient technological level to carry out these processes already exist and moreover a network that will allow the material to arrive at the recycling sites is now growing.

Iron wastes are not a problem at all, owing to the nature of material and to the possibility of easy recycling.

Concerning the water for the concrete mixing washing equipment, a plant for the collection of the solid from the concrete mixing equipment washing, mainly cement particles, will be built.

Also fluids of the sewage system will be treated in a suitable plant.

1.8 Technology and equipment

The Project focuses on the production, assembling and sale of industrialised type houses for living. These activities will be carried out by a Company which will be established for this purpose, and include:

- production of building panels and structures, in the factory;
- transport of panels and structures to the site;
- assembling and finishing of houses;
- marketing and sales activity.

The technology for the industrialised production of panels for the buildings was not subjected to analysis for the selection of the most suitable one for the Project; the technology was selected by the Project promoter, who wishes to utilise it because of his know-how and experience.

The technology proposed has been extensively experimented in Italy.

The suggested system allows to realise civil buildings of medium-high level in a short time at competitive costs, thanks to the industrialised prefabrication of all the components of the building. Only the assembly, the sealing and the finishing of the living unit are made in the building yard.

The external wall panels and the base and covering slabs are insulated, thanks to a polystyrene foam layer put into the concrete during the casting.

Specially equipped walls contain the bathroom and kitchen systems.

The raceways for electric, telephone and TV systems, the boxes containing electric current taps, switches and boards are included in the panels. The door and window openings are made directly in the forms using special molds.

The construction is performed in three separate phases:

A) The components production of the plant.
B) The assembly and the sealing in the building yard for rough house type covered with a tile roof.

C) The finishing, including wiring harnessing, door and window frame installation, flooring, covering, bathroom devices setting up and external and internal painting.

The factory production process is based on a continuous manufacturing of panels and in their reintegration in the store, and is controlled by a computerised planning that takes into account the stock variations. The components are made of concrete mix with iron rods reinforcement.

The components (panels) without thermal insulation like beams, gutters, partitions, stairs and guards are made with a unique casting; the ones with insulation are made in two casting phases, the first one to make a bed, the second one to fill the form after the insertion of the insulating layer.

The proposed plant has a number of forms sufficient to ensure the maximum expected production in the eight working hours, leaving for the spontaneous curing the remaining 16 night hours.

The iron rod working and the electric-welded mesh processing as well as polystyrene cutting are performed is suitable departments.

The operations of assembly and sealing in the building yard are performed by special teams formed by Company personnel using a crane-truck and specific equipment. These operations are required to assemble the components, from the foundation casting (the digging is up to the Client), to the covering with the roof.

At the end of this process, the house is finished, and it is provided with coverage of floors, coatings, internal and external frames, electric and hydraulic connections, sanitary sets and external and internal painting. These operations are subcontracted to specialised firms found during the building yard installation.

The ideal surface for the installation of the prefabrication plant is m 280 x 180, for a total area of some 50,000 m^2.

This area will contain not only the main industrial building, but also all the services and infrastructures deeply connected to the operation of the plant.

The constructions that have to be built have the following surfaces:

plant building	8,816 m^2
equipment maintenance workshop	180 m^2
truck recovering and maintenance	504 m^2
polystyrene stocking and cutting store	720 m^2
auxiliary (accessories) store	240 m^2
offices	200 m^2
general services	510 m^2
TOTAL	11,170 m^2

The proposed technology is basically compatible with local standards and regulations. A systematic review of standards is nevertheless suggested at the starting of the implementation phase, but only minor possible adaptations may be envisaged which will not affect at all the outcome of the present Feasibility Study.

1.9 Organisation

The Company implemented by the Project will be provisionally subdivided into the following nine areas:

-A) General Administration, including the managing director and a secretary (provisionally located in dedicated premises in Santiago);

-B) Marketing, including three people, under direct control of the managing director (located in Santiago, in the same office as that of the general administration);

-C) Production and Construction, bearing the responsibility of management all activities at the factory and of assembly and finishing of the buildings, including the manager of the factory and two foremen. They are located at the factory;

-D) Factory Production, bearing the responsibility of all technical activities within the factory, for the construction of panels, including 63 people in the concrete-line and 28 people in the iron, mixing, polystyrene line. These people are considered in the category of costs directly associated to the product. They are located at the factory;

-E) Assembling and Finishing, bearing the responsibility of transporting, assembling and finishing the houses at the site. It includes 13 people not directly associated with the product, and 57 people considered in the category of costs directly associated with the product. They are only seldom located at the factory;

-F) Technical Office, bearing the responsibility of design activities regarding final products (houses/panels), as well as selection of construction techniques for panels and special design activities regarding the factory. It includes 5 people, located at the factory;

-G) Maintenance Unit, bearing the responsibility of the maintenance of all machinery, of the factory with its plants, of equipment utilised at the site (trucks, cranes, etc.). It includes 10 people, at the factory;

-H) Administration, Purchase, Personnel, bearing the responsibility of procurement, purchasing, administration. It operates under the guidance of the managing director and the manager of the factory. It includes 4 people, at the factory;

-I) General Services, including 30 people (drivers, messengers, keepers, auxiliaries), at the factory.

1.10 Human resources

The production proposed in the Project is based on 300 working days per year with one 8-hour shift per day (for most of the personnel; see Chapter 8).

Personnel required for the Project implementation include:

1) *Factory Personnel*

Direction	n° 4
1 factory manager	
2 unit supervisors	
1 maintenance supervisor	
Technical Department	n° 5
1 building engineer	
3 surveyors	
1 industrial technician	
Administration	n° 4
4 employees	
Direct Production	n° 91
48 concrete workers	
43 iron bar workers	
Maintenance	n° 9
2 electricians	
2 mechanics	
2 hydropneumatics	
3 steel structural workers	
Non-production personnel	n° 30
12 cleaning and internal transport workers	
5 crane operators (two shifts)	
8 loading workers (two shifts)	
2 Messagers and drivers	
3 keepers (24-hour/day)	
2) *Yard operation personnel*	n° 70
3) *Managing and marketing personnel*	n° 5
1 Managing Director	
1 Secretary	
3 Marketing personnel	
	====
GENERAL TOTAL OF PERSONNEL	218

All professional skills required are available in the Country.

1.11 Implementation planning

The Company which will be established to implement the Project will start activities after the provision of funding requested (at least, 85% of the investment cost).

The engineering phase will follow, immediately after the selection and purchase of the soil, the construction of civil works at the site, the procurement of machinery, the start-up of the factory, training of people.

Pre-production activities will last some 12 months.

1.12 Financial appraisal

The financial appraisal was performed utilising very conservative hypotheses as for plant utilisation. Even in the very conservative scenario of a very limited productivity (25% the first year, 50 the second year, 75% all subsequent years), the Project presents a financial Internal Rate of Return (I.R.R.) of 24.29% (including corporate taxes of 35%), with a discount rate of 12% and a positive Net Present Value. This represents a minimum but sustainable investment ratio, considering that additional tuning of data might increase the I.R.R. (i.e. including full production from the first year).

The Project, after a construction period of one year, will rely on a net profit (assuming a zero-level inflation rate and after 35% of corporate tax) from -516,480 US$ to a maximum level of 3,264,862 US$ in year 10.

The most sensible parameter from the point of view of financial profitability results the sales programme/productivity. All other parameters (investment and running costs) provide minimum modifications.

Two additional, less restrictive, sales / productivity programmes were considered:

Alternative 1:

a) year 1:50% of productivity for all products;

b) from year 2, ongoing: 75% of productivity for all products.

This solution provides an I.R.R. of 28%.

Alternative 2:

a) year 1: 50% of productivity for all products;

b) from year 2, ongoing: 100% of productivity for all products.

This solution provides an I.R.R. of 37%.

1.13 Conclusions of the Feasibility Study and Recommendations

The Feasibility Study has shown that the Project promoted by Intertransports Centre SpA is feasible under the technical point of view. Also the profitability of the Project appears sufficiently high.

In order to reduce the risks of the investment, it is strongly recommended that the Partners establish a very good marketing structure so as to allow a saturation of the production capacity of the factory.

1.14 Additional statements and information

In this paragraph, some additional information and data are reported, which may be useful for the Entrepreneurs in the phase of selecting the final production and marketing strategies.

1.14.1 The new Construction Master Plan

A ceremony chaired by the Secretary of State of "Vivienda y Urbanismo" gave start to the New Construction Master Plan of the urban area of Santiago, replacing the one in force since 1960. The main object of the new planning is to increase the density of inhabitants in Santiago by adopting City Master Plan instruments implying the reduction of almost one third of the available surface and the rise of population density, which will raise from 100 to 150 inhabitants per hectare.

According to the rate of growth of the Metropolitan Region of Santiago, in 25 years about nine million people are expected to live in the 59,000 hectares available for new housing and provided by the New Construction Market Plan. Between 1970 and 1990, the rate of expansion of Santiago has changed from 500 hectares per year to 1,000 hectares per year. The excessive increase of the city extension had to be regulated.

Due to the great extension that the city has reached during this period, the costs connected with the construction and management of infrastructures and utilities has become unbearable. To meet the needs of the local Administration, the schedule favours the utilisation of those districts that are already inhabited and which show a low living standard.

The suggested programme of industrialised fabrication described in the Project will be a great incentive for the next development of urban regions.

1.14.2 The Government-supported construction programmes and the present trends towards a better quality.

The "Ministerio de la Vivienda" programmed different types of actions to face the housing problems, with a specific reference to the needs of each social group. The programmes differentiate one from the other basically and mainly with regard to the extension and value of the house that is bought. They are described in paragraph 3.7.

These programmes are:

A VIVIENDA PROGRESIVA -
Target users are extremely poor people. The house construction is divided into two stages. In the first stage a very small nucleus is built, mainly technological; in the second stage this nucleus will be enlarged to meet the increasing needs of the family.

B. VIVIENDA BASICA -
Target users are families with a very low income.

C. P.E.T. (Programa Especial Trabajadores) -
Target users are families that do not own any house, that have never received any subsidy from the Government Programmes and that are organised in groups of workers.

D. SUBSIDIO GENERAL UNIFICADO -
Target users are families with poor economical resources and with an average income.

These Government Programmes are an appropriate answer to the increased demand for low cost housing coming from low income people.

On the other hand, these programmes brought to a low level the prices and finally the quality of the product. As a consequence, some works were contracted to Companies that succeeded in building the largest number of living units on the basis of a fixed budget.

The reduction of the house building costs led to the employment of low quality and easily perishable materials and contributed to reduce the living spaces down to uninhabitable dimensions with less than two meter wide rooms and very low ceilings. Many of the new houses are built with low quality wood, asbestos slabs, hardboard, vinyl floors, pipeline on sight, doors in plywood.
What, at first sight, may appear as an architectonic characteristic, typical the Country, is actually the result of economical choices.

This is mostly true for the two-floor Anglo-Saxon style houses, built according to the Government Programmes. The pitches of these houses have the gutters at the ground floor level and the ridges of the roof that have pronounced slope cover the upper floor. Under this roof there is a sort of mansard where dormers frequently are placed.

This technical solution saves materials and space, especially concerning the ground floor, because there are no more lateral walls. The relative architectonic characteristics now preferred by the users may be seen in the enclosed picture.

Actually politicians and entrepreneurs, operating in the building field, are becoming sensitive to the problem, and the lack of quality of the new buildings is now insistently declared. The attempt to face the situation and to cause a trend inversion is now being made.

The main expectations come from the building industry itself which, with empirical methods (reconversion of companies producing concrete prefabrication elements for the heavy industry), is trying to reorganise the building field through the production of industrialised or prefabricated components.

1.14.3 The definition of "prefabrication"

The word "prefabrication" has a different meaning in Chile as compared to Europe. In 1963, in the "Comuna de Vitacura", approximately 900 houses were built in reinforced concrete with sliding metallic form. Their sale was very slow because the houses, made with non-insulating concrete, were prone to problems of condensation and mould on the structures.

This method was put aside but the population thought that it was linked to low quality buildings.

Most of the one-family houses existing or under construction according to the Government Programmes in the Country are built with "prefabricated" materials and their standard is rather low.

Compounds of paperboard and calcined gypsum are the materials with which curtain walls of ground floor and partitions inside the flats are made. Also plywood panels are generally used as components.

Chileans associate the word "prefabrication" with these materials that, of course, are not accepted with enthusiasm because of their fragility.

The word "prefabrication" has a completely different meaning in the case of Intertransports Centre S.p.A. houses: in this case, prefabrication stands for industrialised production. Owing to the quite high standard of houses proposed in the Project, we suggest Intertransports Centre S.p.A. and its partners not to use the word "prefabrication" in advertising their products.

1.14.4 Products and quality standards of local competitors. The possibility of producing panels for third parties

Excluding companies present on the market with the so called "prefabricated" houses, which cannot be considered as competitors (see point 1.14.3), as well as the production of industrialised and non-industrialised wooden buildings, only a few attempts of standardisation of building components are present in the market.

Among these, some factories, that had produced big blocks in concrete for industrial applications, converted the production to obtain structures or parts of structures for house building such as slabs and precast beams.

In Chile there is also the Company "Monolite Chile S. A.", that produces a complete construction system of precast walls of foam polystyrene. This system includes: the supply of all the components in foam polystyrene, already covered with electrically welded mesh, their installation on the lot, and the total coating with a spray structural compound of concrete and sand.

At present, in the Country there is no factory producing panels made of insulated heavy concrete, quick to install, and large enough to achieve the object of this Study.

On the other hand, should factories of this kind be present in a neighbouring Country, they would not be interested in the Project market because for the best yield of this type of prefabrication system, the distance between the place of production and the place of installation should not exceed 250 - 300 km.

The production of prefabricated elements or components for the building that, put on the market, may be assembled by the user, is another relevant feature which may be of interest for many assembling and finishing construction Companies, in the framework of a new approach to industrialisation of the construction process.

1.14.5 Miscellaneous issues regarding building quality standard, which could have an impact on the Project

The increase in building activity in the Country and the opening of the market, that will push the industrial and construction operators to the use of advanced technologies, puts into evidence a certain lack of qualified workers.

Because of the last complaints and charges of low quality in the building field, with special reference to the houses for poor people as mentioned before, systems of technical inspection and of check in the building yards should be improved.

Authorities are also making a significant to make known the methods of usage of the houses which implies regular and periodic maintenance.

A high preparation level will allow to solve at least 30% of problems connected to the house maintenance, solving, gradually, a problem that worries the Country and that gave way to a law proposal that is now to be approved by the "Congreso Nacional".

Some of these problems could be explained by the progressive growth of the buildings that had as a consequence to make the qualified workers become insufficient; the growth was not controlled because of the urgency of the housing problem in Chile.

All Authorities agree on the need to change this situation and will carry out in a short time studies and programmes with the aim at improving the house standard in the Country. There are new financial tools to buy houses, like the house leasing (Law No. 19.281 of December 15, 1993) that allows the purchase of new or used houses through rent payment, with contemporary sale arrangement.

According to the law, the interested person will have to rent a house from a company, signing a rent contract with promise to buy; in this contract the price at which the house will be bought, the monthly rent and the time needed to complete the savings, must be stated.

There is also a law proposal that allows the owners of the houses in "Subsidio" to sell their living unit to buy a higher quality one.

All these efforts of the various political and ministerial Authorities give support to the hope for a future building development through the construction of houses that are more lasting and have a higher technical and distributive quality.

1.14.6 *Some notes on architectural features*

The architectural features of most houses in the Country show some differences with those of the Project.

The capability in introducing the new architectural types foreseen by Intertransports Centre S.p.A. will depend basically on the demonstration of the profound difference in spaces available and in space distribution. Free heights of ceilings substantially greater than 2.30 m as those used in Chile, large rooms, high quality standard of construction materials and accurate fittings of construction parts are all positive features which are in counter-tendency with local praxis.

A suggestion to the Entrepreneurs is to consider the opportunity of modifying some features of the Italian building types in order to make them more similar to the Chilean ones. It is advisable: to have larger windows; to add a "lavadero" near the kitchen and possibly in an area that communicates with the outside; probably, to increase the slope of roofs. Cost savings and increase in free space may be achieved through the elimination of bidets and the elimination of the second group of stairs of the four-floor type buildings.

CHAPTER 2 - PROJECT BACKGROUND AND BASIC IDEA

2.1 Project objective

The immediate objective of the Project is the establishment of a company in Chile, with a mixed share capital between Chilean and Italian Partners, whose purposes are the production of industrialised structures for living houses and the assembling, finishing and selling of houses based on the utilisation of such structures.

The key element of the Project is the construction of a factory for the production of prefabricated elements according to the technology of heavy prefabrication, which foresees the construction of the various prefabricated elements with characteristics similar to those of the finished products. In this way, the operations of construction at the site refer basically to assembling activities. Preliminary activities for the preparation of the ground and final operations of finishing as wall painting, assembling of doors and windows, etc., have to be added.

2.2 Project idea

The Project idea belongs to one of the two Entrepreneurs who will become a Partner in the proposed Company, and that gained a considerable experience in manufacturing and selling of prefabricated buildings for living purposes.

This Entrepreneur, with extensive experience in this field in Italy, Russia and Germany, decided to verify the possibility of implementing a new initiative in Latin America. Chile was selected because of two reasons: a) its favourable political, social and economic environment for foreign investments, and b) the possibility of creating a synergy with other initiatives in the field of prefabricated wooden production structures.

2.3 Suitability of local environment for the Project idea

The Chilean economy is moving towards the end of the structural adjustment process led by FMI, with the perspective of a higher level of economic activity coupled with a steady reduction of the inflation rate.
Economic activity was rather depressed in the last two years mainly in the "non-tradable" sectors, owing to the restrictive monetary policy and to the severe cut in Government expenditure.

Macro-economic policies have been kept basically unchanged from 1990 on, when Mr. Patricio Aylmin inherited the most dynamic and best-run economy in Latin America at the time.

Rather recently, to finance greater expenditure on public health, education and housing, the Government took several measures on the fiscal side.

In particular, it raised: a) the VAT rate by 2 percentage points to 18% (as of July 1990), b) the Corporate Income Tax from 10 % of distributed income to 15 % of all declared profits (whether distributed or not) and, finally, c) the personal income taxes.

Moreover, on the trade policy side, the uniform import tariff rate was cut to 11% in June 1991 with a view at fighting inflation and stimulating imports (and, by consequences, lowering the Peso).

Chile is undertaking an important restructuring process at both the production and the employment level in the framework of an externally open-economy.

This is implying the need for analysing and correcting the external distortion to make possible a greater gradualisation of those negative effects brought about by foreign competition and, at the same time, to support the private sector in implementing its modernisation efforts.

Economic policy for future years aims at attaining a solid and sustainable development coupled with a persistent reduction of the inflation rate. The achievement of these two objectives should facilitate the creation of new employment opportunities and a more solid basis for a sustained increase in real salaries. At the same time a larger share of the benefits of economic growth should be channelled to the poorest segment of the population.

In quantitative terms, Government is aiming at an average annual growth rate of 5.8 % between 1995 and 2000. To achieve this objective, a 3.5 % of productivity increase, with special reference to the public sector, will be necessary.

As far as the priority sectors are concerned, education and physical infrastructure will be the first two sectors in the Government agenda. Investments in infrastructure are, at present, lacking. Government stands ready to encourage investments from the private sector in this area.

Immediate perspectives for next year point to an economic growth of around 6 %, an inflation rate lower than 8 % and an unemployment rate of about 5.5 %.

It is expected that the growing economic and political stability will stimulate foreign private investments while public investments should continue to show the dynamism of recent years.

2.4 Project Promoter or Initiator

The promoter of the Project is the Company "Intertransports Centre S.p.A., a joint stock Company established in Italy, Via F. Ferrucci, 57, Prato, with a share capital of 24,000,000,000 ITL.

Intertransports Centre S.p.A. has gained a considerable experience in the field of industrialised building industry, also through controlled and shared Companies as Intervladsever (Russia), Intervaladles (Russia), La Nuova Legno S.p.A. (Italy). Intertransports Centre S.p.A. will own 51% of the shares of the new Company.

The other 49% of the shares will belong to the Chilean Company "Concretos y Paneles Quinta Region Ltda", Plaza de la Justicia 45, 8° Piso, Valparaiso.

The Company "Concretos y Paneles Quinta Region Ltda" was established with the specific purpose to invest, in joint-venture with Intertransports Centre S.p.A., in the

construction of a plant for the production of prefabricated reinforced concrete houses, following the "RAPID CASA" system, in Chile.

The partners of "Concretos y Paneles Quinta Region Ltda" hold important parcels of shares and own many anonymous companies of great economical importance in Chile.

Their main business is in the shipping and harbour fields. They are important shareholders in the Chilean shipping Company "L'Interoceanica S.A." and the "Cabo Froward S.A." too and are in the control party of these Companies. The "Cabo Froward S.A." owns harbour service Companies and sea terminals.

The same group invested also in the forest and mining field and in manufacturing companies.

2.5 Project History

The Project idea is of 1994, when Intertransports Centre S.p.A. verified the possibility of establishing a Joint Venture with a Chilean partner in a project of houses manufacture. It asked SACE for a buyer's credit guarantee, and requested UNIDO for independent assessment on the market potential of the proposed technology in Chile, as well as on the profitability of a Project of implementation of a factory in the same Country. The independent assessment will be used for commercial purposes..

2.6 Basic characteristics of the Project and their impact on the Feasibility Study

The implementation of the Project is based on the following:

- the utilisation, for the factory for the production of prefabricated structures, of a technology which has been utilised, developed and improved in Italy for a long time (technology RAPID CASA);

- the insurance coverage by SACE, Italy, for the acquisition of financial support to export, in the framework of the Italian law number 227 (24.5.77), which foresees a maximum value for the export credit of 85% of the contract value, with the condition that the amount of the credit would concern Italian goods only.

Because of the constraints imposed by these two conditions, the objective of the Feasibility Study has basically concerned the verification of the following aspects:

- suitability of the production technology proposed, to the socio-economic situation in Chile;

- existence of a potential market in the Project area capable, in principle, to absorb the scheduled production of the factory (i.e., to absorb the product of the Project);

- congruence between the building types utilised in the Country and the building types which are foreseen to be produced through the RAPID CASA technology;

- financial profitability of the Project.

2.7 Preparatory studies and related investigations

No preparatory study or special investigations are needed in the framework of this Project.

The Project implementation is conditional upon the granting of insurance coverage by SACE and the credit financing provided by a primary bank organisation.

The production process is well-known and tested; therefore, no special investigations were required. The Study, therefore, concentrated on the identification and analysis of the various cost items. Supplementary information, including site survey and costs of raw materials are being provided by the local Partner.

CHAPTER 3 - MARKET ANALYSIS AND MARKETING STRATEGY

3.1 Salient features of the construction sector in Chile

- Chile has developed an efficient private construction industry in housing, particularly during the last ten years. Most formal construction Companies belong to the Construction Chamber, which seems very effective in representing the interests of its members and in promoting industry.

- In 1993, the last year for which official data are available, the construction industry directly accounted for about 6 % of GNP and employed approximately 400,000 people (8 % of total employed labour force)[1]. According to the provisional data for 1994, the rate of increase of the construction industry declined sharply (from 14 % in 1993 to 2.0 in 1994), bringing down the contribution of the sector to 5.5 %. Available projections for 1995 point to a slight recovery (+ 5.3 % over the previous year) in the rhythm of growth, which is insufficient, however, to keep pace with the overall GDP growth (+ 6.0 %).

- This deceleration in the rhythm of the sector's expansion, however can be considered as physiological after the two booming years of 1992 and 1993 (plus 12.8 and 14.0 %, respectively).

- The cost of constructing an acceptable quality house varies greatly depending on local conditions of land, material supply and transport costs. In the Metropolitan Region of Santiago, a basic house of 50 m^2 costs less than 480 UF and a house on the private market of 100 m2 costs around 3,000 UF[2].

- In general, there is still sufficient land supply around Santiago and Valparaiso. However, the availability of adequate infrastructure (with special reference to sewerage) may be a constraint in certain areas of the Santiago Metropolitan Region, and, in the Fifth Region as well (with special reference to Valparaiso).

- After a decade of five significant drops (1981-89), unit prices started to move upwards over the last years.

  Economics of scale, confidence of adequate demand, greater specialisation of construction firms, simplification of permit and inspection procedures, are all elements which are being offset by the strong expansion in the construction activity and increases in labour cost and building materials. From 1990 to 1993, the number of square meters for the whole construction sector increased steadily up from 6.2 million to about 10 million. At the same time, the size of the houses showed a trend towards smaller apartments, with particular reference to the private market.

[1] However, when indirect production and employment effects (i.e. for materials, furnishing, appliances) are taken into account, the contribution to GNP increases significantly.

[2] By way of comparison, housing costs in the isolated regions of the extreme south are more than double those of Santiago.

3.2 Data and projection methods for market analysis

3.2.1 Data

Data needed for market analysis can be grouped into the following categories:

a) General economic indicators affecting the demand of the final product such as population, income per capita, growth rate of GDP and income distribution.

b) Government policy "vis-à-vis" the product in question, with special reference to sales taxes, subsidies and/or encouragement measures to the construction enterprises, exchange regulations, credit policy, etc..

c) Present level of domestic production (quantities and values) over a certain number of years in general and/or in the two selected Project areas.

d) Critical production factors, such as labour availability.

e) Government production targets to meet the requirements of local demand.

f) Psychological attitude and consumer preference toward the product under consideration.

3.2.2 Demand forecasting method

From a theoretical point of view, several methods of data evaluation and demand forecasting can be used.
As far as data evaluation is concerned, most of the data obtained from one source were cross-checked with similar or indirect data obtained by other sources, with special reference to official sources.
A case in point refers to the Government calculation of housing deficit.
Two different estimates were available:

- one, produced by the Ministry of Housing and Urbanism (MINVU), reached a value of 600,000 units as a minimum housing requirement up to year 2000;

- the other one, produced by the Ministry of Planning, ended-up with a value of more than 900,000 units.

An analysis of these two different data revealed that they underlined two different concepts, with a complete different view.

This brings us to the methods of demand determination used for the Project under consideration.

Initial annual housing need was determined by taking into account population growth rate in each of the two Regions selected and dividing by average family size. To this a coefficient of "nuclearisation" has been tentatively applied, to take into account the problem of "doubling-up" of families (more than one family per dwelling).

The resulting figures have been compared for consistency with the plan of the MINVU for the Country as a whole by taking on a "pro-rata basis" the relative weight of both the Metropolitan Region of Santiago (about 40% of the total) and the Fifth Region (10 %).

3.3 Determination of market size for houses

3.3.1 Size and composition of present effective demand

- Population increase and growth of urban areas largely bypassed the Country's investment capacity with the result of a widespread housing deficit[3]. It has been estimated that, at the Country level, more than 500,000 families living as "allegados" are affected by housing shortfall while an extra 150,000 are living in sub-standard condition.

- The MINVU has calculated that, in order to prevent the situation to worsen, a minimum of annual need of 85,000 units is required, for a total amount of 600,000 housing units up to year 2000. This amount would cope with population growth and deterioration of the housing stock.

- A different approach, leading to a higher figure, is followed by the MIDEPLAN (Ministry of Planning). According to this view, the Census of 1992 had detected unsatisfied housing needs of about 900,000 units [4] at national level, coming from the following two components:

  a) the difference between dwellings without housing (3,706,090) and housing units occupied by present persons (3,101,356);
  b) the needs of "reposiciòn", up to an amount of 300,000 housing units.

This figure of 900,000 however, has to be considered as a "potential" untapped demand resulting from the number of "Hogares" and "Nucleos" at present without housing.

Moving, in the same vein, from national to regional level or, more precisely, to the two specific Regions of the Project, the corresponding number of "allegados" was estimated at 385,000 people (42.7 % of the total) for Santiago Metropolitan Region and 73,000 people (8.1 %) for the Fifth Region.

When those figures are broken-down according to the available income distribution (see Table III-1), it appears that more than 90 % of the housing needs of Santiago Metropolitan Region and of the Fifth Region (i.e. 342,710 and 65,884 respectively) refer to people belonging to the first four income classes (that is up to a maximum of 75,547 pesos or 6.5 UF per-capita per month and, assuming an average of 4 persons per family, of 17 UF per "hogar")[5].

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[3] Practically all towns are affected by this problem.

[4] According to the most recent information, this figure has moved up to about 1.000.000 housing.

[5] It is worth noting that while population belonging to the first four quintiles amount up to 78 per cent of the total in Santiago and 84 per cent in the Fifth Region, their corresponding share of income is of barely 36 per cent in the first area and about 49 per cent in the second. Therefore the bulk of purchasing power is concentrated in the fifth quintile, whose average income per "hogar" and per month approximates 213,000 pesos in Santiago and 160,000 pesos in the Fifth Region. Maximum values, however, range from 1.3 million (Fifth Region) to 2.5 million pesos (R.M. Santiago), that is from 111 UF to 214 UF)

However, these requirements very unlikely are going to be met by actual construction. Over the last few years, the number of standard houses constructed passed from an yearly average of 80,000 (1989-91) to an average of 110,000 (1992-94), while housing initiated in 1993 reached a number of 50-55 thousand units in Santiago Metropolitan Region and 10 thousand in the Fifth Region.

A) Metropolitan Region	Housing number	Percentage of total	Monthly income per "hogar"[6] Total (pesos)	% quint.	Per-Capita (pesos)
I (up to 15,457 $)	52,703[7]	13.7	41,366.8	2.0	8,823.9
II (from 15,457 to 26,015)	110,579	28.8	91,503.2	5.9	20,905.4
III (from 26,015 to 41,977)	101,635	26.4	137,326.9	10.8	33,732.6
IV (from 41,977 to 75,548)	77,793	20.2	203,019.2	17.2	55,918.0
V (75,548 and above)	41,904	10.9	673,582.8	64.2	212,917.3
Total	384,614	100.0	269,482.5	100.0	79,310.6
B) Vth Region					
I (up to 15,457 $)	12,688	17.4	43,297.4	4.6	9,649.0
II (from 15,457 to 26,015)	21,820	30.0	87,392.6	9.3	20,641.6
III (from 26,015 to 41,977)	17,088	23.5	128,216.7	13.2	33,766.4
IV (from 41,977 to 75,548)	14,308	19.7	194,171.2	22.1	56,191.0
V (75,548 and above)	6,852	9.4	488,736.6	50.8	159,658.0
Total	72,736	100.0	187,827	100.0	55,772.2

Table III-1 - Unsatisfied housing requirements by income class, 1992
[General note: monetary income "per-capita" is composed by the three following components: a) Salary; b) Pensions and c) Poverty subsidies.]

A more realistic estimate of housing requirements, therefore, should take into account the actual planning of the MINVU on one side and that segment of purely and highly volatile private market incorporating housing units ranging from 1,700 to 3,000 UF on the other.

The housing planning of MINVU is based on demographic growth and on the need to renew the housing stock to prevent housing conditions from worsening. It is what it could be defined as a "minimum requirement" to maintain the "status quo"[8]. On this assumption it was calculated an housing deficit of about 33,000 units per annum in Santiago Region and about 8-9,000 units for Valparaiso Region. In total, 41-42,000 units is the estimated annual deficit of these two Regions.

The bulk of these housing needs concerns the poorest segment of the population. From Table III-2 it can be seen that the larger share of demands (i.e. 30,825 units) is

[6] "Hogar": statistical unit composed by a group of people living together and constituting an independent economic unit
[7] It excludes 67,927 nucleus "allegados" without any real purchasing power
[8] Figures on the two components are not readily available. However, new household formation should account for about 75 per cent of the needs.

concentrated on the first three income classes, that is up to a maximum of 11.7 UF. More precisely, 73.5 % (Santiago) and more than 77 % (Valparaiso) of these requirements come from these groups of people. If the fourth quintile (corresponding to 17.4 UF per "hogar") is added, percentages of 91 and 93 % respectively are obtained.

			UF	3.54 Q.I[9]	7.74 Q.II	11.74 Q.III	17.41 Q.IV	57.5 Q.V	
1. Deficit at national level	85,000/year								
2. Deficit: Metrop. Region	between 32,300 and 34,000			(26.7)	(24.4)	(22.4)	(17.2)	(9.3)	(100)
			N°	8811	8052	7392	5676	3069	3300
3. Deficit: Fifth Region				(35.4)	(23.5)	(18.4)	(15.3)	(7.4)	(100)
			N°	3009	1997	1564	1301	629	8500
Tot. (2+3)	between 40,800 and 42,500		N°	11820	10049	8956	6977	3698	41500

Table III-2 - Yearly annual housing needs, 1995

Since the quality standard of houses produced through the proposed technology is high and the construction cost cannot be significantly reduced, it is more logical to concentrate on the medium-top market of housing. The impact of the preliminary analysis for the identification of target markets for the Project products is twofold:

a) from one side, the target market is determined by that part of the population[10] on which it is concentrated the 60-65 % of the total purchasing power, with a minimum monthly income "per capita" of 75,548 pesos in 1992. This would correspond to about 3,700 housing units per annum, or 8-9 % of the whole housing deficit. As this number includes houses whose value ranges from 550 UF to about 8,000 UF, if reference is made to the structure of the private market over the last five years, it seems reasonable to focus on a market size of 900-1,000 units of 2,700 UF or more[11]

b) On the other side, referring to Government supported housing programmes (see point 1.14.2), taking into account the extremely low construction costs of the first two housing programmes of MINVU ("Vivienda Basica" e "Vivienda Progresiva) and very likely, also of the third zone (P.E.T.), focus should be put on the so-called "Subsidio General Unificado" Programme, whose housing units are supposed to range from 500 to 1,500 UF. In physical terms, that means a market size of the order of 7,000 units.

[9] Including the poorest group of population.
[10] This population share is equal to 22 per cent of the total in Santiago Region and 16 per cent in the richer area of Valparaiso and Vina del Mar.
[11] This would leave aside the remaining 2,700-2,800 units with a value from 500 to 1,200 UF for which there would be strong competition.

3.4 Estimate of the market development and of the expected market share for the Investors

Taking into account the future rate of growth of the population in the two Regions under examination and the likely rhythm to renew the housing stock, the current market volume should grow by an average rate of 1.4/1.5 % per year, only due to demographic increase. On top of this, another 0.4-0.5 % increase is due to the renewing process. In quantitative term, that means an increase of 133 units in 1996, corresponding to a percentage growth of 1.9 % over 1995.

	1995 Housing need	Estimated Yearly Population Growth	1996 Projected housing need (due to population growth)	Yearly increase due to renewing process	1996 Housing need
1. Valparaiso	1,301	1.25%	1,317	0.4%	1,322
2. M.R. Santiago	5,676	1.80%	5,778	0.5%	5,808
	6,997				7,130

To get an idea of market development until the year 2000, it is necessary to take as a basis the housing construction programme of MINVU and its minimum housing target. Table III-3 shows the main factors of this programme.

A) Minimum target to be achieved at national level by year 2000[12] : 600,000 housing units

B) Estimated target for a) M.R. of Santiago[12]: 240,000
b) Fifth Region: 60,000
c) a)+b)= Total: 300,000 units

C) MINVU Housing construction programme (national level):

	1994	1995	1996	1997	1998	1999	2000	Total
-Housing Units	96,884	98,500	100,145	101,770	103,395	105,020	106,645	712,359
-Leasing	----	108,500	110,145	-------	-------	--------	--------	
-Financial Resources (000 pesos)	14,469	14,410	15,022	15,266	15,509	15,753	15,997	
-Unit Cost (pesos/m^2)	149.35	146.29	150	150	150	150	150	

Source: MINVU

D) Estimated MINVU construction programme for:

	1995	1996	1997	1998	1999	2000	Total (95-2000)
1) Santiago (Housing Units[13])	39,400	40,708	41,358	42,008	42,658	42,658	246,190
2) V Region (Housing Units[13])	9,850	10,015	10,177	10,340	10,502	10,665	61,549
3) Total of above[13]	49,250	50,073	50,885	51,698	52,510	53,323	307,739

Table III-3 - Housing construction programmes
Source: Our estimates

[12] The period considered begins in year 1994.

[13] The year 1994 is not taken into account for our projections because it is not useful for our purposes.

If we consider the income class corresponding to the Unified Subsidy Programme and we take into account the share of the total housing construction plan corresponding to such a programme (which insists on the fourth quintile of our household income structure) we obtain the projected market volume from 1995 to 2000. In quantitative terms, the following figures are obtained:

	1995	1996	1997	1998	1999	2000
A) M. R. of Santiago (% share: 17.2)[14]	6,776	6,890	7,002	7,114	7,225	7,337
B) Vth Region (% share: 15.3)[10]	1,507	1,532	1,557	1,582	1,607	1,632
C) Total of above	8,283[15]	8,422	8,559	8,696	8,832	8,969

On this basis, considering the productive capacity of the factory of the Project and, at the same time, the virtual absence of competition for prefabricated houses in Chile (no relevant experience can be found in this kind of product), the maximum market share of a new firm entering into the market can be estimated at about 9-10 % of market volume. In quantitative terms that means a market share comprised between a minimum of 713 and 828 units in 1995 for the market segment covered by Unified Subsidy Programme.

For years 1996-2000, the corresponding market shares are the following (data in units):

1996	1997	1998	1999	2000
842	856	870	883	897

If, as a conservative estimate, the same share (10%) is applied to the "rich" housing market, it is reasonable to consider a maximum global market share of about 800-925 units for the year 1995. The same approach can be followed, as a first approximation, for the subsequent years.

3.5 Main characteristics of the housing market

As can be seen from Table III-4, the "purely" private market accounts, on average, for about one quarter of the total bulk of new construction of houses.

		1989	1990	1991	1992	1993	1994	Pro-memoria 1993 housing units
A)	Govt. Housing Programmes	81.0	84.9	77.3	72.5	64.3	72.9	75.528
B)	Private Market	19.0	15.1	22.7	27.5	35.7	(27.1)	41.855
C)	(A + B)	100.0	100.0	100.0	100.0	100.0	100.0	117.383

Table III-4 - Recent evolution of the housing market structure, 1989-1994
(housing units, in % of the total)

[14] The share has been kept fixed over the whole period. This assumption is to be considered as a very prudent one.
[15] This figure differs from 6977 shown in the Table II and obtained on the basis of an estimated housing deficit of 41,500 units because the 1995 Projection is based on the MINVU construction programme.

Starting with the Government Housing Programmes, it can immediately be seen (Table III-5) that the Unified Subsidy Programme with its percentage share of 28.6 ranks second with about 102,000 houses constructed between 1989 and 1993, immediately after the Basic Housing Programme (113,814 houses constructed over the period 1989-1993, accounting for 31.0 of the total).

	1989	1990	1991	1992	1993	1994[16]	1989-93	Percentage share 1989-93
1. Progressive Housing Programme[17]	5,406	2,186	2,483	8,169	8,287	10,000	26,531	7.5
2. Basic Housing Progr.	15,537	20,853	25,212	25,248	26,964	27,700	113,814	32.0
3. Rural Subsidy Programme	8,088	6,307	4,910	8,353	7,477	7,500	35,135	9.9
4. Special Programme for Worker (PET).	16,379	15,640	16,252	16,218	13,669	16,000	78,158	22.0
5. Unified Subsidy Programme, of which:	12,551	21,970	19,519	18,643	19,131	19,500	101,814	28.6
- First category	17,704	15,933	14,549	12,545	12,145	12,500	72,866	20.5
- Second category	3,802	4,249	3,325	4,164	5,797	5,500	21,337	6.0
- Third category	967	1,156	883	730	780	900	4,556	1.3
- Others	78	642	762	1164	409	600	3,055	0.8
6. Total of above	67,961	66,956	68,376	76,631	75,528	80,700	355,452	100.0

Table III-5 - Housing Units, by Government Programme

Within the Unified Subsidy Programme (USP), it is the first category (up to 500 UF of cost per unit) which is by far the most important component. More than 71 % of houses constructed under this programme belong to this category. Considering also the second category (21%), we reach 92% of the total.

Sales prices (US$ per house) in the Unified Subsidy Programme are ranging from 8,500 - 9,000 US$ (340-360 UF) for the first category to 30-33,000 US$ (1,200 - 1,320 UF) for the third category.

As far as the private market is concerned, the bulk of houses constructed have a size of a maximum 100 m2 (41,855 in 1993). The relative prices are strictly comparable with the two first categories of USP (see Table III-6), while the housing units with an average size of more than 100 m2 but less than 140 reach a price of 2,700 UF.

USP	
First class	500 UF
Second class	1,000 UF
Private Market	
From 36 m^2 to 70 m^2	545 UF
From 71 m^2 to 100 m^2	1,209 UF

Table III-6 - Comparison between Unified Subsidy Programme and private market prices

[16] Estimate
[17] Including the Sanitary Infrastructural Programme

3.6 Outline of the marketing strategy

Considering the "dualistic" character of the target market for Intertransports Centre S.p.A. (i.e. Unified Subsidy Programme on one hand and medium-high level private market on the other), it seems reasonable to outline two different market strategies.

A) Cost leadership strategy related to USP

With reference to this segment of the market, a cost leadership strategy aiming at lower costs than those incurred by competitors seems the most appropriate. Provided that a certain initial market share (or a certain position in the market) is envisageable and that a preliminary determination of the price level of the final product is possible, the cost leadership strategy will aim at low sales prices in the market of this type of product. Moreover, on the medium to long-term period, the qualitative aspect, which represents one of the main objectives of the Government social policy, could become a determinant factor for the enlargement of the market share to benefit from the "economies of scale" and improve further the investment profitability[18].

B) Differentiation strategy fro the private "rich" market

With respect to housing units of more than 2700 UF, a feasible strategy is the "so-called" differentiation strategy of the final product. That means "marketing concentration" on the uniqueness of the housing typology proposed. From this point of view, the "sensitivity" to the price element would be reduced and protection from competitors would automatically be reinforced inasomuch it binds the buyers to the brand or the firm.

3.7 Government Housing Programmes

Presently, the public sector implements its policies through five major Programmes (see point 1.14.2): 1. the Progressive Housing Programme ("Programa de Vivienda Progresiva"); 2. the Basic Housing Programme ("Programa de Vivienda Basica); 3. the Special Programme for Workers ("Programa Especial para Trabajadores" P.E.T.); 4. the Rural Subsidy Programme (Subsidio Habitacional para el Sector Rural"), and 5. the Unified Subsidy Programme ("Sistema General Unificado de Subsidio Habitacional")[19].

All these programmes share some common characteristics:
a) they are intended to provide housing solution to "non-owners" or "homeless" people;
b) they include "up-front" capital subsides provided through the Government budget to a maximum of 70-75 % of the housing value;
c) they rank potential beneficiaries through a transparent competition;
d) they make optimal use of the private sector;
e) they do not distort the private housing finance system;
f) they are "progressive" in what subsidies are related to the level of the household income.

[18] It must be considered however that even if sales volume and relative market share increases, it may not be possible to benefit immediately from a corresponding decrease in unit costs. Only at a later stage, then, with a further increase in the market share, it would be possible to benefit from the above mentioned "economies of scale".

[19] In addition, there is a related programme supported by a loan of 40 millions from A.I.D. ("Projects MINVU-AID N° 513-H6-010") to increase the participation of the private sector as well as Government institutions and NGO's in the area of mortgage credit.

The main and most significant difference among these programmes relates to the final value of the house on the market.

Hereafter, the main characteristics of each individual programme, are highlighted (with the exclusion of the Rural Subsidy Programme, which goes beyond the scope of this Study).

A) Progressive Housing Programme ("VIVIENDA PROGRESIVA")

This programme is focusing on individual families or organised groups without their own housing and sharing the status of "allegados". It has been designed for very-low-income families (first quintile), that is between 0 and 3 UF.
The programme is implemented in two steps. House sizes is approximately of 14 m2. House value is about 140 UF (3,500 US$) for the first step and 70 UF (1,750 US$)[20] for the second one.

Each step is financed as follows:

	First Step	Second Step	Total
Minimum saving	8 UF	5 UF	13 UF
Subsidy	132 UF	18 UF[21]	150 UF
Credit Serviu[22]	---------	47 UF	47 UF
	140 UF	70 UF	210 UF

B) Basic Housing Programme ("VIVIENDA BASICA")

People without housing are the target group. Basic Housing Programme (BHP) is intended mainly for families whose level of income is comprised between 3 and 8 UF. Average houses size equals 38 m2. Values of the housing range from 200 to 330 UF[23]. The BHP contracts with private contractors for the design and constructions of small completed houses. The financing mechanism is the following:

	SERVIU's modality	Private modality
Minimum saving	10 UF	20 UF
Subsidy	140 UF	140 UF
Credit SERVIU[18]	100 UF	100 UF at maximum

C) Special Programme for Workers (P.E.T.)

This programme (Decreto de Aplicaciòn 235/85) is intended for organised groups of workers whose minimum level of saving and income is apt to obtain a mortgage credit. This credit is extended by the "Banco del Estado" de Chile[24] and is going to benefit families with an income of 8 to 12 UF. Average value of houses is about 330 UF while the average size is 45 m2. In summary, the financing mechanism is the following:

[20] When the programme was launched the UF was 25 US$
[21] It becomes 35 UF when the first step is executed without subsidy
[22] Interest rate of 8 per cent
[23] 330 U.F. is for Regions XI and XII only
[24] By virtue of an agreement with the MINVU, the "Banco del Estado" is obliged to finance the programme

Minimum Saving	40 UF
Maximum Subsidy	90 UF
Mortgage credit (Banco del Estado)	200 UF
Total	330 UF

D) Unified Subsidy Programme ("SUDSIDIO GENERAL UNIFICADO")

This system is regulated by D.S. 44/88. The Unified Subsidy Programme distributes subsidy certificates to lower and middle-income families (between 14 and 20 UF) to facilitate acquisition or construction of housing for three different maximum housing values: 1) 500 UF, 2) 1000 UF and 3) 1500 UF. These certificates can be used to cover a portion of the purchase price of houses located by the beneficiaries on the private housing market. For the actual housing financing, the beneficiary can take advantage of three different sources of money: a) housing subsidy; b) previous saving; c) mortgage credit from the private financing market.

The different level of subsidy and the minimum need of saving according to the three above mentioned categories of housing values are presented below:

Housing value (UF)	Amount of subsidy (UF)	Minimum saving (UF)
1. Up to 500	130-120-110	50
2. From 500 to 1,000	110-100-90	100
3. From 1,000 to 1,500	90-80-70	150
4. Urban restructuring	200-190-180	50-100-150[25]

The mortgage credit is obtained from the private financial market, though, in connection with the first category, there is an agreement between the MINVU and the "Banco del Estado".

3.8 Housing supply

Statistics on housing construction are still rather incomplete; however, it appears that the number of standard houses constructed in the two most recent available years, (1992 and 1993), more than covered new housing need. According to the official statistics, against an average housing requirement of about 85,000 units at national level, actual construction reached 105,669 units in 1992 and 117,383 in 1993. Preliminary estimates for 1994 indicate a decline of 6 % with respect to the preceding year, for an absolute number of little more than 110,000 units. As a consequence of the restrictive measures adopted by the Government to reduce public spending (and, hence, inflation) as well as the deteriorating terms of trade, in 1994 housing investment recorded a decline of 4.5 % in real terms over 1993. This figure results from an increase of 9.7 % in public investment and a decrease of 7.2 % in private investment (see Table III-7).

[25] According to the housing value

A) Housing	- 4.5 %
- Public	+ 9.7 %
- Private	- 7.2 %
B) Infrastructure	+ 6.5 %
- Public	+ 19.7 %
- Private	+ 1.4 %

Table III-7 - 1994 Investment in housing and infrastructure
(changes in real terms)

The Metropolitan Region (M.R.) of Santiago is mainly responsible for this decline. In fact, in terms of square meters constructed, the M.R. showed a decline from about 3.7 million to an estimated value of 3.2 million in 1994, while for the other Regions taken together it appears an increase of about 200 thousand m2. It is worth to stress that a less negative trend can be detected for the number of housing units constructed. No detailed information was available for the Fifth Region (Valparaiso) but it is to be thought, that this Region behaved along with the other ones.
In summary, as can be seen from Table 8, the share of both the Fifth Region and the M.R. of Santiago in total national construction moved from 54.5 % in 1989 to 58.3 % in 1993. In 1994, preliminary estimates show a decline of the relative weight of the M.R. of Santiago (43.8 %), compensated by an increase of the share of the all other Regions taken together. However, as mentioned before, the decline of the M.R. of Santiago in 1994 has been more evident in terms of square meters occupied than in terms of number of units, which seem to indicate the orientation of housing supply towards houses of smaller sizes.

	1989	1990	1991	1992	1993	1994[26]
A) Total number of housing constructed, of which:	83,891	78,621	87,500	105,669	117,383	112,000
- Vth Region	6,869	7,127	6,726	10,433	10,866	.....
- M.R. Santiago	38,846	34,927	42,601	49,441	57,519	49,000
B) Percentage share	100	100	100	100	100	100
- Vth Region	8.2	9.1	7.7	9.9	9.3	.....
- M.R. Santiago	46.3	44.4	487	46.8	49.0	43.8

Table III-8 - Housing construction in Santiago M.R. and Fifth Region
Source: Camara Chilena de la Construccion and our estimates

A certain recovery is expected in 1995. From this point of view, it is revealing the estimated increase is the number of employed workers from Oct. 1994 on, as well as the concomitant increase in the use of basic material inputs. Overall, sector investments are expected to increase by around 6 %[27] in 1995, while relatively optimistic expectations are

[26] Estimates
[27] Of which more than 7 per cent from the private sector and 3.8 per cent from the public sector.

looming at medium-term, in view of the foreseen relaxation of the stringent government budget for next 3-4 years.
Coming to the size and the structure of the housing supply, the 1992 Census counted 3.1 million houses in Chile, both in rural an urban areas, of which 91.1 % were constructed of permanent material.
With reference to the urban areas only, this percentage reaches the values of 93.0 and 92.4% respectively in the Metropolitan Region and in the Fifth Region.
Most housing in Chile is one family and owner-occupied (74.2 % in Santiago and 79.0 percent in the Fifth Region), while apartments account for less than 15 % and 11 % in the two Regions respectively. Most housing units (61 % in 1989) are of one floor only, while two-floor houses accounted for 23.5 %.
At national level, more than 65 % of houses are owner occupied, while the rental market is rather limited for both cultural and political reasons. Mobility is low. Government policy emphasises home ownership by assisting families in acquiring their own home. At the same time, the Government is an important organiser of demand and supply, though actual design and construction is performed almost entirely through the private sector. In 1993, more than 99 % of total new constructions were performed through the private sector.

	M.R. Santiago		Fifth Region		Total Country	
Total	1,185.7	(100.0)	3,14.4	(100.0)	2,594.4	(100.0)
1. Permanent housing, of which:	1,091.2	(92.0)	290.6	(92.4)	2,392.9	(92.2)
Houses	879.5	(74.2)	248.4	(79.0)	2,060	(79.4)
Apartments	174.6	(14.7)	34.7	(11.0)	254.1	(9.8)
"Pieza en casa antigua o en conventillo"	37.2	(3.1)	7.5	(2.4)	78.3	(3.0)
2. Semi-permanent housing	93.4		23.5		199.9	
3. Mobil housing	0.2		0.1		0.6	
4. Other, not specified	0.9		0.2		1.9	

Table III-9 - 1992 Census - Urban Housing (Number in '000)
Source: Camara Chilena de la Construccion

3.9 Identification of products to be marketed and sales programme

As specified in Chapter 1, the production factory selected by Intertransports Centre S.p.A. was designed so as to allow a well defined production (Reference Production Programme; see Table III-10).

In the framework of this Feasibility Study (see Chapter 1), the production programme was considered as an input, and an activity of optimisation of the product in order to have it fitting better with market requirements was excluded. In fact, this would have brought to a possible modification of the design of the factory, which was excluded by Intertransports Centre S.p.A..

On the other hand, the analysis of the market pointed out the existence of a great variety of building types, with an extremely wide range of sales prices.

YEARLY PRODUCTION						
	m^2/unit	n° units/building	n° buildings	tot units	total m^2	
A						
IH 40/B type	40.40	1	150	150	6,060	
IH 40/2B type	40.40	2	200	400	16,160	
total A			350	550	22,220	
B						
two-floor, two-units type	118.80	2	54	108	12,830	
C						
four-floor, sixteen-unit building	90.00	16	18	288	25,920	
(4 units/floor; ground floor + 3 floors; balcony excluded)						
total A + B + C			422	946	60,970	

Table III-10 - Reference Production Programme

This has caused the necessity of an evaluation of cost characteristics of the house-types manufacturable through the proposed factory, to be compared with the price characteristics of the existing market. Through this comparison, an assessment of products to be manufactured and marketed, was performed.

Chapter 4, includes a detailed analysis of production costs for the three reference house types in the Project. In Chapter 7 and 8 there is a description of personnel involved and relative costs. Relevant data are summarised in both Table III-11 (showing dedicated direct costs for the construction of the houses, including all raw materials and dedicated personnel), and Table III-12. Table III-12 includes a cost item, called "overhead cost", which refers to fixed yearly production costs and takes into account depreciation of the investment costs (overheads). The depreciation has been calculated very roughly (in accordance with the limits of the objective of the analysis in this paragraph), assuming a recovery of investment costs in five years (translated into yearly costs equal to 20% of the total investment costs).

Cost figures of Table III-12 provide very important information for the identification of the marketing programme.

This programme was selected through a comparison with the real market of typical houses in the Country and with the sales prices in the various ranges of building standards.

Relevant data of this comparison are summarised in Table III-13, where a typical and representative situation is shown, that of civil building constructions in 1993, with reference to the highest sectors of the market.

Sales price per square meter ranges between 7.19 UF and 41.05 UF, or between 5.99 UF and 39.85 UF, if the cost of urbanised land is excluded from the sales price of the building.

The three types of buildings capable of being produced through the proposed factory are compared with typical building requirements of the market from both the points of view of surface per unit and of compatibility between production cost and sales price.

The comparison excludes the utilisation of IH40/A construction type, unless it is used in double-module houses, with a net surface of some 80 m^2. In this case, IH40/2B type may fit with requirements of Unified Subsidy Programme (third top range) type houses and with the private market (for limited surface), while the two-floor, two-unit buildings fit with requirements of the private sector only (starting from 71 m^2 of net surface) and the four-floor, sixteen-unit buildings fit with requirements of Unified Subsidy Programme (third top range) type houses and with private sector requirements (in the range 71-140 m^2). In the view of the financial analysis (Chapter 10), the production programme shown in Table III-14 has been assumed.

Type of building	IH40/2B	Two-floor two-unit	Four-floor 16-unit
Unit surface (m^2)	80.80	118.80	90.00
Total surface (m^2)	22,220	12,830	25,920
Total units (-)	275	108	288
Reference sales price (UF/m^2)	15.25	20.00	18.00
Reference sales price (Pesos/m^2)	178,349	233,900	210,510

Table III-14 - Production and sales programme (data per year)

TOTAL DIRECT COSTS DEDICATED TO PRODUCTION			
IH40 TYPE	**m^2 =**	**22,220**	
	pesos/year	**pesos/m^2**	
RAW MATERIALS CONSTRUCTION	803,007,650	36,139	
RAW MATERIALS ASSEMBLING	331,840,220	14,934	
FINISHING	1,227,982,000	55,265	
DEDICATED FACTORY PERSONNEL	74,100,000	3,335	
DEDICATED YARD PERSONNEL	29,250,000	1,316	
	2,466,179,870	**110,989**	
2-FLOOR,2-UNIT	**m^2 =**	**12,830**	
	pesos/year	**pesos/m^2**	
RAW MATERIALS CONSTRUCTION	483,309,438	37,670	
RAW MATERIALS ASSEMBLING	210,237,680	16,386	
FINISHING	540,111,640	42,098	
DEDICATED FACTORY PERSONNEL	38,870,000	3,030	
DEDICATED YARD PERSONNEL	34,125,000	2,660	
	1,306,653,758	**101,844**	
4-FLOOR,16-UNIT	**m^2 =**	**25,920**	
	pesos/year	**pesos/m^2**	
RAW MATERIALS CONSTRUCTION	792,027,912	30,557	
RAW MATERIALS ASSEMBLING	362,020,780	13,967	
FINISHING	1,052,624,010	40,610	
DEDICATED FACTORY PERSONNEL	60,385,000	2,330	
DEDICATED YARD PERSONNEL	29,250,000	1,128	
	2,296,307,702	**88,592**	

Table III-11 - Direct costs for construction of houses (dedicated personnel included)

SIMPLIFIED REFERENCE PRODUCTION COSTS				
OVERHEAD PERSONNEL COSTS (pesos/year)	182,179,000	9		
ADDITIONAL OVERHEADS (pesos/year)	20,500,000	13		
TOTAL INVESTMENT (expressed in pesos)	5,070,598,100	18		
YEARLY RECOVERY RATE (%/year)	20			
YEARLY INVESTMENT RECOVERY (pesos/year)	1,014,119,620			
SIMPLIFIED TOTAL YEARLY OVERHEAD (pesos/year)	**1,216,798,620**			
AVERAGE,SIMPLIFIED OVERHEAD COST (pesos/m^2)	19,957			
AVERAGE,SIMPLIFIED OVERHEAD COST (UF/m^2)	**1.706**			
		10		
PRODUCTION COSTS	**IH40**	**2-FL,2-UNIT**	**4-FL,16-UNIT**	**TOTAL**
DIRECT COSTS (pesos/year)	2,466,179,870	1,306,653,758	2,296,307,702	**6,069,141,330**
TOTAL CONSTRUCTION SURFACE (m^2/year)	22,220	12,830	25,920	**60,970**
DIRECT CONSTRUCTION COST (pesos/m^2)	110,989	101,844	88,592	
DIRECT CONSTRUCTION COST (UF/m^2)	9.490	8.708	7.575	
OVERHEAD COST (UF/m^2)	1.706	1.706	1.706	
TOTAL COST (UF/m^2)	**11.197**	**10.415**	**9.282**	
TOTAL COST (US$/m^2)	325	302	269	
TOTAL COST (UF/year)	**248,793**	**133,622**	**240,582**	**622,996**
TOTAL COST (US$/year)	7,214,991	3,875,031	6,976,866	18,066,888
TO 16				

Table III-12 - Reference Production Costs of Houses - Simplified method

MARKETING STRATEGY							
MARKET TYPE REQUIREMENTS	PET	SUBSIDIO 1	SUBSIDIO 2	SUBSIDIO 3	PRIVATE 71/100 m^2	PRIVATE 101/140 m^2	PRIVATE from140m^2
HOUSE UNITS BUILT IN 1993	13,669	12,145	5,957	780	14,027	6,895	5,351
AVERAGE SURFACE (m^2)	**44.59**	**46.05**	**55.93**	**81.14**	**82.21**	**117.71**	**202.14**
AVERAGE SALE PRICE (US$/unit)	8,016	8,595	15,176	33,365	34,150	71,912	207,464
AVERAGE SALE PRICE (US$/$m^2$)	179.77	186.64	271.34	411.20	415.40	610.93	1,026.34
AVERAGE SALE PRICE (UF/m^2) (rate 1993:25US$/U	7.19	7.47	10.85	16.45	16.62	24.44	41.05
AVERAGE SALE PRICE NO LAND (UF/m^2)	**5.99**	**6.27**	**9.65**	**15.25**	**15.42**	**23.24**	**39.85**
SUITABILITY AS FOR SURFACE							
IH40	YES	YES	NOT	(IH40/2B)	(IH40/2B)	NOT	NOT
2-FLOOR,2-UNIT	NOT	NOT	NOT	NOT	YES	YES	YES ?
4-FLOOR,16-UNIT	NOT	NOT	NOT	YES	YES	YES	NOT
SUITABILITY AS FOR COST/PRICE							
IH40	NOT	NOT	NOT	YES	YES	YES	YES
2-FLOOR,2-UNIT	NOT	NOT	NOT	YES	YES	YES	YES
4-FLOOR,16-UNIT	NOT	NOT	YES	YES	YES	YES	YES
FINAL SUITABILITY ASSESSMENT	NOT	NOT	NOT	**IH40/2B**	**IH40/2B**	NOT	NOT
	NOT	NOT	NOT	NOT	**2-FL,2-UN**	**2-FL,2-UN**	**2-FL,2-UN**
	NOT	NOT	NOT	**4-FL,16-UN**	**4-FL,16-UN**	**4-FL,16-UN**	NOT

Table III-13 - Selection of products (house types) to be marketed

3.10 Estimate of sales/revenues

The annual sales revenues, based on the production programme and referring to the products selected (see paragraph 3.9), are shown in Table III-15.

Type of building	IH40/2B	Two-floor two-unit	Four-floor 16-unit
Surface sold (m^2/year)	22,220	12,830	25,920
Ref. sales price (pesos/m^2)	178,349	233,900	210,510
Total revenues (pesos/year)	3,962,915,000	3,000,937,000	5,456,419,000

Table III-15 - Sales revenues selected for the financial analysis

3.11 Estimate of marketing costs

The marketing structure includes three people, who work under the direct responsibility of the managing director (see Chapters 7 and 8). They are located in the same office which hosts the administration of the Company.

Marketing costs include personnel costs, at the assumed rate of 12,000,000 pesos/year, and direct costs (15,000,000 pesos/year) for advertisement on newspapers and on T.V. broadcasting.

CHAPTER 4 - RAW MATERIAL AND SUPPLIES

In the evaluation of costs of the final product "house", all the materials and semifinished products used in the various phases of the manufacturing and finishing processes are considered here as "raw materials".

4.1 Raw materials and semifinished products needed to produce concrete panels in the plant

Raw materials needed for one year production of concrete panels are the following:

Portland cement 525	t/year	10,350
aggregate (from mm 0.14 to mm 12.7)	t/year	54,717
iron bar (from mm 8 to 16 FeB 44K)	t/year	1,970
electrically welded mesh (15x15#5 and 20x20#15)	t/year	1,344
iron FeB 32K for pins and flasks	t/year	31
iron bushes (made in Italy)	n/year	27,550
polystyrene (density 12 kg/m^3, thickness from 3 to 18 mm)	m^3/year	26,854

Other materials needed are:

fluidifying concrete additive	liter/year	186,000
oil to remove forms	liter/year	9,000
water to clean concrete mixing equipment	liter/year	350,000
service water	liter/year	900,000
panel production water	liter/year	5,465,000

The operation of the plant requires an installed electric power of 1,200 kVA.

4.2 Data and alternatives; cost estimate

In the Study, special attention has been devoted to availability and cost of the four most important materials, in the prefabrication process: cement, aggregate, iron and polystyrene.

CEMENT

The "Departamento de Estudios Camara Chilena de la Costruccion" published statistical data regarding the supplies from 1985 to 1993. Hereafter, the supplies are expressed as thousands of 42.5 kg bags, made by "Cemento El Melon" and by "Cemento Polpaico".

year 1985	Melon	13,228	-	Polpaico	12,998
year 1986	"	12,602	-	"	12,496
year 1987	"	14,591			
year 1988	"	16,922	-	"	16,177
year 1989	.."	17,286	-	"	18,313
year 1990	"	18,365	-	"	18,805
year 1991	.."	20,551	-	"	19,920
year 1992	"	24,780	-	"	24,410
year 1993	.."	28,623	-	"	22,982

The "Asociaciòn Chilena de Empresas Productoras de Hormigon premezclado" gives an estimate of the market of the ready-mixed concrete supplies: in the Metropolitan Region, the supplies increased from 345,877 m^3 in 1985 to 1,489,675 m^3 in 1993.

In the Country, there are three main cement producers:

"CEMENTO EL MELON S.A."
"CEMENTO POLPAICOS S.A."
"CEMENTOS BIO BIO S.A."

The cement factory "El Melon" is located in the town of La Calera, 110 km North-West from Santiago. The quarries used by this cement factory are a few km North near the town of Nogale. El Melon was the first cement factory in the Country (1908) and, because of its location near the areas taken into consideration for the building of the prefabrication factory, a bid for the cement supply was asked to them (see Annex 2).

Cement 525 is not produced in Chile; the characteristics of the two cements offered by El Melon Company are:

a) Melon Super cement, containing:

Portland clinker	96%
Gypsum	4%

The clinker content before the gypsum addition is equal to 100%, according to the European standards.

a) Melon Extra cement, containing:

Portland clinker	78%
Pozzuolana	16%
Gypsum	6%

The clinker content before the gypsum addition is equal to 83%, according to the European standards.

The technical specifications of the two types of materials are included in the offer.

The offer, made on March 30, 1995, concerns a supply of 13,200 t per year. The price of the "extra" type is 55,884 pesos per t, including transport to the plant. The price of the "super" type is 61,395 pesos per t. Both prices do not include VAT (18%).

AGGREGATE

Generally in the Country there are no problems connected with aggregate extraction.

Attention however must be paid to the city of Santiago because, due to the overflowings of the rivers Mapocho and Maipo, there is a continuous check on the extraction near the river basins. Urban areas near the basins are prone to the risk of floods and, because of their high inhabitants density, are under a stricter regulation.

However, in the nearby of the river Aconcagua, in the Fifth Region, the problem is smaller because of the lower density of inhabitants.

Should the owner Company, taking into consideration the location of the plant in the Fifth Region, decide to extract the aggregate herself, the local Administration of La Calera will have to be asked for the permit for the extraction.

The main extraction Companies on the market are the following:

- SOCIETAD MINERA ARRIP S.A.
- PETREOS S.A.
- COMPANIA MINERA TECNO ARIDOS.

The aggregates, washed and mechanically riddled, are in accordance with the Chilean standards (NCH 163) and are classified as follows:

-	coarse gravel aggregate	from 1 1/2" to 3/4"
-	fine gravel aggregate	from 3/4" to 5/16"
-	sand	5/16"
-	stabilised	less than 1 1/2"

IRON

There is an important iron and steel factory in the Eighth Region South of Santiago, that produces good material. There are also many metallurgic firms able to supply the market with finished products like smooth rods, improved bond rods and electric-welded meshes. The main production Companies are the following:

- CAP S.A.
- COMPANIA SIDERURGICA HUACHIPATO S.A.
- SIDERURGICA AZA S.A.

POLYSTYRENE

Due to the growth of the demand, the production of polystyrene in the Country has been steadily increasing over the last years. Excluding the packaging boxes and other containers, which are produced in big stocks for the market of transport and export of vegetables and fishes, there is a trend to an increased use of this material for the building sector also.

To present the alternative solutions, frequently adopted in the insulating field, were the use of hardboard-gypsum, fibre glass and wooden agglomerate panels.

The local Authorities of "La Florida" gave start to a programme, called "PIAT", "Programa de Incentivo al Acondicionamento Termico de viviendas"; after that the "Università Tecnica Federico Santa Maria" made experiments to put into evidence the gain in temperature and the power saving, connected to building insulation techniques. The owners whose design takes into consideration the building thermal insulation, receive financial incentives from the "PIAT" programme under the form of a discount on the cost of the building license.

There are only a few polystyrene factories in the Country and among them there are:

- AISLAPOL CHILE
- SHELL CHILE S.A.C.
- AISLANTES NACIONALES LTDA.

A wide documentation had been asked to the AISLAPOL CHILE, that provided a complete document about the materials they produce and an offer for the following types:

Polystyrene density 11kg/m^3_3	11,500 pesos/m^3
Polystyrene density 15kg/m_3	17,400 pesos/m^3
Polystyrene density 25kg/m	28,500 pesos/m^3

WATER

The analysis of water sources is strictly connected to the choice of the area for the manufacturing plant siting. Since the most probable area is in the Fifth Region North of Santiago, in agricultural zones, mainly without aqueducts, there will be the need to drill a well. To drill a well, a permit has to be obtained from the "Direccion General del Riego".

ADDITIONAL MATERIALS INCLUDED IN PANELS

The materials for the electric and hydraulic systems, that are to be placed within the form during the production of prefabricated panels, are available in the Country. A wide range of choices is available: from the high-quality b-Ticino production of electric devices, to the various productions of hydraulic material in copper, iron, cast iron and PVC.

ENERGY SUPPLIES

As mentioned before, the plant will need an electric power supply of 1,200 kVA. Electric equipment for electric distribution systems are available in the Country.[28]

As for the electric fees, they are divided into two classes on the basis of consumption characteristics:

AT2 is a contract for a fixed amount of power; even if consumed power amount is less than stated, the contract amount has to be paid.

AT3 is a more convenient contract, called "Domanda Maxima Promedio". The average consumption of three months is calculated and on this basis the price for the following months is fixed. The calculation of the average consumption is performed every three months.

[28] The Company "Transformadores LTDA" has been asked to make an offer for the supply of an oil cooled substation, divided into two sections for the BT and AT boards, according to the Chilean standards ANSI C571290. The cost of this equipment is US$ 56,200 for silicone transformer and US$ 45,450 for oil transformer.

In case of contract AT3, the cost per kWh is 17.846 pesos, corresponding to 0.044 US$. To this cost we must add a fixed cost of 2,578,912 pesos/month and another fixed cost of 1,215 pesos/month (in the framework of the financial analysis, only the consumption cost has been considered).

The costs of the contract, of the Project approval and the connection works must be evaluated; these costs vary according to the type of demand and to the kind of user. For example, the expenses for an isolated one-family house are about 550,000 pesos.

Concerning the gas, generally outside the Metropolitan Regions it is supplied by tank-trucks that fill big cylinders installed in the users' property. It is not possible to obtain supply offers without stating the precise technical characteristics of the equipment. For example, one kg of gas supplied to a small factory costs 215 pesos + VAT. The bigger the factory, the bigger will be the gas consumption, the less will be its unit price, that may arrive for large plants at 80-90 pesos/kg. A pressurised cylinder for 2000 kg (a 4 m^3 cylinder) costs some 1,000,000 pesos; a 15,000 kg cylinder, that is 30 m^3, costs 15,000,000 pesos.

In Tables IV-1 through IV-7, the costs of all raw materials needed in the various phases of the production process are listed, for the three types of panels (houses) of the Reference Production Programme.

TYPE IH 40/B - IH 40 2B				N° units =	550		rate US$/peso=	440
Materials	meas. unit	Q/unit	Q tot.	pesos/ meas. unit (supply)	pesos	(supply)	total cost (pesos)	eq. total cost (US$)
PORTLAND CEMENT 425	t	7.036	3,870	61,395		237,598,650	237,598,650	593,997
AGGREGATES (0.14 -12.7)	m³	21.455	11,800	3,200		37,760,000	37,760,000	94,400
IRON 8-16 mm	t	1.464	805	250,000		201,250,000	201,250,000	503,125
ELEC. WELD. MESH (diam. 5 15x15)	t	0.709	390	190,000		74,100,000	74,100,000	185,250
IRON-PIN-STACK (estimation)	t	0.056	31	*270,000*		8,370,000	8,370,000	20,925
STEEL BLUSHES (estimation)	n°	50.091	27,550	*550*		15,152,500	15,152,500	37,881
POLYSTYRENE 11 kg/m³	m³	19.782	10,880	11,500		125,120,000	125,120,000	312,800
FLUID ADDITIVES	liter	126.545	69,600	1,283		89,296,800	89,296,800	223,242
EXTRACTING OIL (estimation)	liter	6.091	*3,350*	610		2,043,500	2,043,500	5,109
WATER	liter	3,727.273	2,050,000	0		172,200	172,200	431
ELECTRIC WIRE DUCT (estimation)	m	60.000	*33,000*	128		4,224,000	4,224,000	10,560
HYDRAULIC PIPING (estimation)	m	12.000	*6,600*	1,200		7,920,000	7,920,000	19,800
							803,007,650	**2,007,519**
TWO-FLOOR TYPE				N° units =	108		rate US$/peso=	440
Materials	meas. unit	Q/unit	Q tot.	pesos/ meas. unit (supply)	pesos	(supply)	total cost (pesos)	eq. total cost (US$)
PORTLAAN CEMENT 425	t	22.204	2,398	61,395		147,225,210	147,225,210	368,063
AGGREGATES (0.14 -12.7)	m³	63.935	6,905	3,200		22,096,000	22,096,000	55,240
IRON 8-16 mm	t	4.176	451	250,000		112,750,000	112,750,000	281,875
ELEC. WELD. MESH (diam. 5 15x15)	t	3.315	358	190,000		68,020,000	68,020,000	170,050
POLYSTYRENE 11 kg/m³	m³	59.056	6,378	11,500		73,347,000	73,347,000	183,368
FLUID ADDITIVES	liter	400.000	43,200	1,283		55,425,600	55,425,600	138,564
EXTRACTING OIL (estimation)	liter	19.259	*2,080*	610		1,268,800	1,268,800	3,172
WATER	liter	11,731.481	1,267,000	0		106,428	106,428	266
ELECTRIC WIRE DUCT (estimation)	m	109.259	*11,800*	128		1,510,400	1,510,400	3,776
HYDRAULIC PIPING (estimation)	m	12.037	*1,300*	1,200		1,560,000	1,560,000	3,900
							483,309,438	**1,208,714**
MULTI-FLOOR TYPE				N° units =	288		rate US$/peso=	440
Materials	meas. unit	Q/unit	Q tot.	pesos/ meas. unit (supply)	pesos	(supply)	total cost (pesos)	eq. total cost (US$)
CEMENT PORTLAND 425	t	14.181	4,084	61,395		250,737,180	250,737,180	626,843
AGGREGATES (0.14 -12.7)	m³	40.625	11,700	3,200		37,440,000	37,440,000	93,600
IRON 8-16 mm	t	2.455	707	250,000		176,750,000	176,750,000	441,875
ELEC. WELD. MESH (diam. 5 15x15)	t	2.069	596	190,000		113,240,000	113,240,000	283,100
POLYSTYRENE 11 kg/m³	m³	33.333	9,600	11,500		110,400,000	110,400,000	276,000
FLUID ADDITIVES	liter	254.167	73,200	1,283		93,915,600	93,915,600	234,789
EXTRACTING OIL (estimation)	liter	12.326	3,550	610		2,165,500	2,165,500	5,414
WATER	liter	7,458.333	2,148,000	0		180,432	180,432	451
ELECTRIC WIRE DUCT (estimation)	m	82.986	*23,900*	128		3,059,200	3,059,200	7,648
HYDRAULIC PIPING (estimation)	m	11.979	*3,450*	1,200		4,140,000	4,140,000	10,350
							792,027,912	**1,980,510**

Table IV-1 - Raw materials for the production process at factory

IH 40/B - IH 40 2B TYPE					Number of units =	550	pesos/$ =	400	
Materials	meas. unit	Q/unit	Q tot	supply (pesos/meas. un.)	erection (pesos/meas.un.)	supply (pesos)	erection (pesos)	total cost (pesos)	eq. total cost (US$)
AGGLOMERATE	m³	1.64	900	4,500		4,050,000	0	4,050,000	10,125
PORTLAND CEMENT 425	t	0.40	220	61,395		13,506,900	0	13,506,900	33,767
POLYSTYRENE 25 kg/m³	m³	1.67	920	28,500		26,220,000	0	26,220,000	65,550
ASPHALT LAYER	m²	61.09	33,600	2,550		85,680,000	0	85,680,000	214,200
P.V.C. PIPING diam. 80	m	6.18	3,400	1,200		4,080,000	0	4,080,000	10,200
BENDING, diam. 80 30°-67°	n	4.07	2,240	570		1,276,800	0	1,276,800	3,192
PIPING BRACKETS diam. 80 30°-67°	n	6.11	3,360	57		191,520	0	191,520	479
GLUE AGENT	kg	7.64	4,200	5,230		21,966,000	0	21,966,000	54,915
PIPING OPENING diam. 60	n	2.04	1,120	1,500		1,680,000	0	1,680,000	4,200
RESIN	Gall.	3.45	1,900	2,850		5,415,000	0	5,415,000	13,538
CLAY TILES	n	1,527.27	840,000	187		157,080,000	0	157,080,000	392,700
RIDGE TILES	n	36.36	20,000	363		7,260,000	0	7,260,000	18,150
FOAMED INSUSLATOR	bag	1.84	1,010	3,400		3,434,000	0	3,434,000	8,585
TOTAL								**331,840,220**	**829,601**

Table IV-2 - Raw Materials for in-yard assembling

TWO-FLOOR, TWO-UNIT HOUSE TYPE					Number of units =	108	pesos/$ =	400	
Materials	meas. unit	Q/unit	Q tot	supply (pesos/meas. un.)	erection (pesos/meas.un.)	supply (pesos)	erection (pesos)	total cost (pesos)	eq. total cost (US$)
AGGLOMERATE	m³	3.38	365	4,500		1,642,500	0	1,642,500	4,106
PORTLAND CEMENT 425	t	0.51	55	61,395		3,376,725	0	3,376,725	8,442
POLYSTYRENE 25 kg/m³	m³	1.76	190	28,500		5,415,000	0	5,415,000	13,538
ASPHALT LAYER	m²	97.22	10,500	2,550		26,775,000	0	26,775,000	66,938
P.V.C. PIPING diam. 80	m	20.83	2,250	1,200		2,700,000	0	2,700,000	6,750
BENDING diam. 80 30°-67°	n	6.99	755	570		430,350	0	430,350	1,076
PIPING BRACKETS diam. 80 30°-67°	n	21.67	2,340	57		133,380	0	133,380	333
GLUE AGENT	kg	67.59	7,300	5,230		38,179,000	0	38,179,000	95,448
PIPING OPENING diam. 60+A3+A62	n	6.99	755	1,500		1,132,500	0	1,132,500	2,831
RESIN	Gall.	8.80	950	2,850		2,707,500	0	2,707,500	6,769
CLAY TILES	n	2,326.39	251,250	187		46,983,750	0	46,983,750	117,459
RIDGE TILES	n	37.50	4,050	363		1,470,150	0	1,470,150	3,675
POOR CONCRETE	m³	5.00	540		23,700	0	12,798,000	12,798,000	31,995
ASSEMBLED CONCRETE	m³	1.15	125		30,850	0	3,840,825	3,840,825	9,602
IRON	t	1.43	154	252,000		38,808,000	0	38,808,000	97,020
WHITE CEMENT	bag	1.20	130	7,750		1,007,500	0	1,007,500	2,519
ELECTRIC WIRE DUCT	m	74.07	8,000	126		1,008,000	0	1,008,000	2,520
SHAVING AGENT (estimation)	k	125.00	13,500	1,500		20,250,000	0	20,250,000	50,625
FIBER MESH	m²	20.83	2,250	702		1,579,500	0	1,579,500	3,949
TOTAL								**210,237,680**	**525,594**

Table IV-3 - Raw Materials for in-yard assembling

MULTI-FLOOR TYPE (Ground level + 3rd floor)					Number of units =	288	pesos/$ =	400	
Materials	meas. unit	Q/unit	Q tot	supply (pesos/meas. un.)	erection (pesos/meas.un.)	supply (pesos)	erection (pesos)	total cost (pesos)	eq. total cost (US$)
AGGLOMERATE	m³	1.56	450	4,500		2,025,000	0	2,025,000	5,063
PORTLAND CEMENT 425	t	0.28	80	61,395		4,911,600	0	4,911,600	12,279
POLYSTYRENE 25 kg/m³	m³	1.11	320	28,500		9,120,000	0	9,120,000	22,800
ASPHALT LAYER	m²	43.75	12,600	2,550		32,130,000	0	32,130,000	80,325
P.V.C. PIPING diam. 80	m	7.64	2,200	1,200		2,640,000	0	2,640,000	6,600
BENDING diam. 80 30°-67°	n	0.63	180	570		102,600	0	102,600	257
PIPING BRACKETS	n	5.00	1,440	57		82,080	0	82,080	205
GLUE AGENT	kg	33.75	9,720	5,230		50,835,600	0	50,835,600	127,089
PIPING OPENING diam. 60	n	0.63	180	1,500		270,000	0	270,000	675
RESIN	Gall.	4.17	1,200	2,850		3,420,000	0	3,420,000	8,550
POOR CONCRETE	m³	4.13	1,190		23,700	0	28,203,000	28,203,000	70,508
ASSEMBLED CONCRETE	m³	12.74	3,670		30,850	0	113,219,500	113,219,500	283,049
IRON	t	1.15	330	252,000		83,160,000	0	83,160,000	207,900
WHITE CEMENT	bag	0.63	180	7,750		1,395,000	0	1,395,000	3,488
ELECTRIC WIRE DUCT	m	34.72	10,000	126		1,260,000	0	1,260,000	3,150
SHAVING (estimation)	k	62.50	18,000	*1,500*		27,000,000	0	27,000,000	67,500
FIBER MESH	m²	11.11	3,200	702		2,246,400	0	2,246,400	5,616
TOTAL								**362,020,780**	**905,052**

Table IV-4 - Raw Materials for in-yard assembling

IH 40/B - IH 40 2B TYPE					Number of modules =	550	pesos/$ =	400	
Materials	meas. unit	Q/unit	Q tot	supply (pesos/meas. un.)	erection (pesos/meas.un.)	supply (pesos)	erection (pesos)	total cost (pesos)	eq. total cost (US$)
HYDRAULIC PIPELINE	m	2.04	1,120	1,077	2,615	1,206,240	2,928,800	2,928,800	7,322
DRAINING PIPE	m	1.64	900	450	3,100	405,000	2,790,000	2,790,000	6,975
ELECTRIC EQUIPMENT	n	21.16	11,640		7,550	0	87,882,000	87,882,000	219,705
ELECTRIC BOARD	n	0.95	520		33,650	0	17,498,000	17,498,000	43,745
WC	n	1.02	560	17,750	55,185	9,940,000	30,903,600	30,903,600	77,259
BATH WITH TAPS	n	1.02	560	39,100	78,900	21,896,000	44,184,000	44,184,000	110,460
SHOWER WITH TAPS (estimation)	n	1.02	560	11,289	*40,000*	6,321,840	22,400,000	22,400,000	56,000
BASIN WITH TAPS	n	1.02	560	24,750	48,900	13,860,000	27,384,000	27,384,000	68,460
KITCHEN BASIN WITH TAPS AND FURN	n	0.95	520	15,200	61,800	7,904,000	32,136,000	32,136,000	80,340
BATH TAP	n	1.02	560	17,700	INCLUDED	9,912,000	0	0	0
SHOWER TAP	n	1.02	560	13,636	INCLUDED	7,636,160	0	0	0
BASIN TAP	n	1.02	560	12,893	INCLUDED	7,220,080	0	0	0
KITCHEN BASIN TAP	n	0.95	520	9,475	INCLUDED	4,927,000	0	0	0
SHAVING	m²	187.27	103,000	755	2,256	77,765,000	232,368,000	232,368,000	580,920
VILYN FLOOR	m²	41.82	23,000	2,390	4,890	54,970,000	112,470,000	112,470,000	281,175
CONCRETE BED	m²	41.82	23,000		6,250	0	143,750,000	143,750,000	359,375
VINYL COVERING H 220	m²	37.09	20,400	1,589	1,940	32,415,600	39,576,000	39,576,000	98,940
VINYL BASEBOARD	m	214.55	118,000	677	1,010	79,886,000	119,180,000	119,180,000	297,950
WINDOW 130 x 130 ALL.	n	4.07	2,240		23,780	0	53,267,200	53,267,200	133,168
WINDOW 70 x 130 ALL.	n	1.02	560		13,590	0	7,610,400	7,610,400	19,026
GLASS FOR WINDOWS	m²	8.00	4,400		3,710	0	16,324,000	16,324,000	40,810
INSIDE DOOR 70 x 210	n	1.89	1,040	9,950	13,200	10,348,000	13,728,000	13,728,000	34,320
INSIDE DOOR 80 x 210	n	3.05	1,680	11,348	14,535	19,064,640	24,418,800	24,418,800	61,047
MAIN DOOR 100 x 200 (estimation)	n	0.95	520		*50,000*	0	26,000,000	26,000,000	65,000
DOOR AND OUTSIDE DOOR FRAME	m	29.45	16,200	1,263	INCLUDED	20,460,600	0	0	0
HANDLING AND LOCKING	n	5.89	3,240	da agg. porte	8,000	0	25,920,000	25,920,000	64,800
INTERNAL PAINTING	m²	187.27	103,000	99	422	10,197,000	43,466,000	43,466,000	108,665
EXTERNAL PAINTING	m²	216.73	119,200	226	854	26,939,200	101,796,800	101,796,800	254,492
TOTAL								**1,227,982,000**	**3,069,954**

Table IV-5 - Raw Materials for in-yard finishing

TWO-FLOOR TYPE					Number of modules =	108	pesos/$ =	400	
Materials	meas. unit	Q/unit	Q tot	supply (pesos/meas. un.)	erection (pesos/meas.un.)	supply (pesos)	erection (pesos)	total cost (pesos)	eq. total cost (US$)
HYDRAULIC PIPELINE	m	11.57	1,250	1,077	2,615	1,346,250	3,268,750	3,268,750	8,172
DRAINING PIPE	m	6.02	650	2,600	3,100	1,690,000	2,015,000	2,015,000	5,038
ELECTRIC EQUIPMENT	n	19.00	2,052		7,550	0	15,492,600	15,492,600	38,732
ELECTRIC BOARD	n	1.00	108		33,650	0	3,634,200	3,634,200	9,086
WC	n	2.00	216	17,750	55,185	3,834,000	11,919,960	11,919,960	29,800
BATH WITH TAP	n	1.00	108	39,100	78,900	4,222,800	8,521,200	8,521,200	21,303
BASIN WITH TAP	n	2.00	216	24,750	48,900	5,346,000	10,562,400	10,562,400	26,406
BIDET WITH TAP	n	2.00	216	23,250	42,300	5,022,000	9,136,800	9,136,800	22,842
KITCHEN BASIN WITH TAP AND FURNI	n	1.00	108	15,200	61,800	1,641,600	6,674,400	6,674,400	16,686
BATH TAP	n	1.00	108	17,700	INCLUDED	1,911,600	0	0	0
BASIN TAP	n	2.00	216	12,893	INCLUDED	2,784,888	0	0	0
BIDET TAP	n	2.00	216	12,893	INCLUDED	2,784,888	0	0	0
KITCHEN BASIN TAP	n	1.00	108	9,475	INCLUDED	1,023,300	0	0	0
SHAVING	m²	451.85	48,800	755	2,256	36,844,000	110,092,800	110,092,800	275,232
TILE FLOOR	m²	136.11	14,700	3,511	6,100	51,611,700	89,670,000	89,670,000	224,175
TILE COVERING H 220	m²	43.06	4,650	2,100	4,900	9,765,000	22,785,000	22,785,000	56,963
CONCRETE BED (estimation)	m²	136.11	14,700		*6,250*	0	91,875,000	91,875,000	229,688
TILE BASEBOARD	m	111.11	12,000	164	719	1,968,000	8,628,000	8628000	21,570
WINDOW 130 x 150	n	5.00	540		27,500	0	14,850,000	14,850,000	37,125
WINDOW 130 X 240	n	3.00	324		45,000	0	14,580,000	14,580,000	36,450
WINDOW 70 X 150	n	1.00	108		14,000	0	1,512,000	1,512,000	3,780
GLASS FOR WINDOWS	m²	20.12	2,173		3,710	0	8,061,830	8,061,830	20,155
MAIN DOOR 100 X 210 (estimation)	n	1.00	108		*50,000*	0	5,400,000	5,400,000	13,500
INTERNAL DOOR 70 X 210	n	2.00	216	11,460	16,870	2,475,360	3,643,920	3,643,920	9,110
INTERNAL DOOR 80 X 210	n	6.00	648	13,100	20,000	8,488,800	12,960,000	12,960,000	32,400
DOOR AND WINDOW FRAME	m	45.00	4,860	1,263	INCLUDED	6,138,180	0	0	0
INTERNAL PAINTING	m²	451.85	48,800	99	422	4,831,200	20,593,600	20,593,600	51,484
SMOOTH EXTERNAL PAINTING	m²	59.26	6,400	226	854	1,446,400	5,465,600	5,465,600	13,664
ROUGH EXTERNAL PAINTING	m²	203.24	21,950	700	1,807	15,365,000	39,663,650	39,663,650	99,159
STAIR RAILING	kg	90.28	9,750		495	0	4,826,250	4,826,250	12,066
HANDLING AND LOCKING	n	9.00	972	da agg. a port	8,000	0	7,776,000	7,776,000	19,440
LAVADERO C/RUBIN.	n	1.00	108	39,580	60,210	4,274,640	6,502,680	6,502,680	16,257
LAVADERO TAP	n	1.00	108	7,210	INCLUDED	778,680	0	0	0
TOTAL								**540,111,640**	**1,350,279**

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Table IV-6 - Raw Materials for in-yard finishing

MULTI-FLOOR TYPE (P.T. + 3 FLOOR)					Number of modules =	288	pesos/$ =	400	
Materials	meas. unit	Q/unit	Q tot	supply (pesos/meas. un.)	erection (pesos/meas.un.)	supply (pesos)	erection (pesos)	total cost (pesos)	eq. total cost (US$)
HYDRALIC PIPELINE	m	12.50	3,600	1,077	2,615	3,877,200	9,414,000	9,414,000	23,535
DRAINING PIPE	m	0.52	150	2,600	3,100	390,000	465,000	465,000	1,163
HEATING EQUIP. PIPELINE	m	2.08	600		3,250	0	1,950,000	1,950,000	4,875
ELECTRIC EQUIPMENT	n	17.00	4,896		7,550	0	36,964,800	36,964,800	92,412
ELECTRIC BOARD	n	0.06	18		33,650	0	605,700	605,700	1,514
WC	n	1.00	288	17,750	55,185	5,112,000	15,893,280	15,893,280	39,733
BATH WITH TAP	n	1.00	288	39,100	78,900	11,260,800	22,723,200	22,723,200	56,808
BASIN WITH TAP	n	1.00	288	24,750	48,900	7,128,000	14,083,200	14,083,200	35,208
KITCHEN BASIN WITH TAP AND FURN.	n	1.00	288	15,200	61,800	4,377,600	17,798,400	17,798,400	44,496
LAVADERO WITH TAP	n	1.00	288	39,580	60,210	11,399,040	17,340,480	17,340,480	43,351
BATH TAP	n	1.00	288	17,700	INCLUDED	5,097,600	0	0	0
BASIN TAP	n	1.00	288	12,893	INCLUDED	3,713,184	0	0	0
KITCHEN BASIN TAP	n	1.00	288	9,475	INCLUDED	2,728,800	0	0	0
LAVADERO TAP	n	1.00	288	7,210	INCLUDED	2,076,480	0	0	0
SHAVING	m²	349.31	100,600	755	2,256	75,953,000	226,953,600	226,953,600	567,384
TILE FLOOR	m²	104.17	30,000	3,511	6,100	105,330,000	183,000,000	183,000,000	457,500
CONCRETE BED (estimation)	m²	104.17	30,000		*6,250*	0	187,500,000	187,500,000	468,750
TILE COVERING H 220	m²	42.01	12,100	2,100	4,900	25,410,000	59,290,000	59,290,000	148,225
TILE BASEBOARD	m	79.86	23,000	164	719	3,772,000	16,537,000	16,537,000	41,343
WINDOWN 130 x 150	n	3.00	864		27,500	0	23,760,000	23,760,000	59,400
WINDOW 130 X 240	n	2.00	576		45,000	0	25,920,000	25,920,000	64,800
WINDOW 70 X 150	n	1.00	288		14,000	0	4,032,000	4,032,000	10,080
WINDOW 190 X 150	n	1.00	288		41,500	0	11,952,000	11,952,000	29,880
GLASS FOR WINDOW	m²	15.99	4,605		3,710	0	17,084,550	17,084,550	42,711
MAIN DOOR (estimation)	n	0.13	36		*70,000*	0	2,520,000	2,520,000	6,300
INTERNAL MAIN DOOR	n	1.00	288		*50,000*	0	14,400,000	14,400,000	36,000
HANDLING AND LOCKING	n	6.13	1,764	add doors	8,000	0	14,112,000	14,112,000	35,280
INTERNAL DOOR 80 X 210	n	5.00	1,440	13,100	20,000	18,864,000	28,800,000	28,800,000	72,000
DOOR AND MAIN DOOR FRAME	m	31.08	8,950	1,263	INCLUDED	11,303,850	0	0	0
INTERNAL PAINTING	m²	349.31	100,600	99	422	9,959,400	42,453,200	42,453,200	106,133
SMOOTH EXTERNAL PAINTING	m²	19.10	5,500	226	854	1,243,000	4,697,000	4,697,000	11,743
ROUGH EXTERNAL PAINTING	m²	84.38	24,300	700	1,807	17,010,000	43,910,100	43,910,100	109,775
STAIR RAILING	kg	59.38	17,100		495	0	8,464,500	8,464,500	21,161
TOTAL								**1,052,624,010**	**2,631,560**

Table IV-7 - Raw Materials for in-yard finishing

CHAPTER 5 - LOCATION, SITE AND ENVIRONMENT ASSESSMENT

The programme implies the building of house types described in paragraph 1.3 in the Metropolitan Region of Santiago and in the Fifth Region.

The Fifth Region is located North of the Metropolitan Region and reaches the Pacific coast. At present, in the outskirts of the urban areas, a fairly good building activity is going on in wide sectors of urbanised lots.

The East part of the Fifth Region is mainly concentrated on the agricultural sector; its location allows the production of large amounts of fruit and flowers, for both domestic consumption and export. The West side receives beneficial effects from the ocean coast. Located on the coast, Valparaiso and Vina del Mar are the places of highest urban concentration, although the town of Vina del Mar is mainly formed by intensive building for the seasonal tourism.

Along the inner state road n. 60, that drives North from Valparaiso, there are two important centres; the town of Quillota (60,000 inhabitants) and the town of La Calera (50,000 inhabitants).

A political programme foresees the building of intensive constructions in Quillota.

The town of La Calera is now in a phase of big expansion because its location is excellent for trade, transports and for mines exploitation. An increase of 15,000-20,000 inhabitants is expected within the year 2000. The ancient Cement Factory "El Melon", one of the biggest and the first one installed in Chile, is the main reason for the development of La Calera.

There is also a remarkable building activity along the state road that links Valparaiso to Limache.

5.1 Site Selection

The choice of the location of the plant for the production of prefabricated panels for building has to be careful and must take into account the areas object of the building planning.

In other words, the industrialised production of such goods should be realised in a baricentric area with regards to the places of building.

The distance between the production factory and the assembly area should vary within a maximum limit of 200-300 km, depending on the cost and the time needed for the transport, which is a function of the infrastructure connections.

The soil for the construction of the manufacturing plant has not jet been chosen or bought. Anyway the investors focus their attention on the agricultural areas near the town of La Calera.


IV REGION
N
CEANO
ACIFICO
5
LA
LIGUA
V REGION
CHILE
ARGENTINA
SAN FELIPE
NOGALES
HIJUELAS
LOS ANDES
LA CALERA
LA CRUZ
5
QUILLOTA
60
IÑA
EL MAR
OLMUE
LIMACHE
TILTIL
VALPARAISO
VILLA ALEMANA
COLINA
5
LAMPA
68
CASABLANCA
CURACAVI
68
SANTIAGO
78
REGION
TALAGANTE
METROPOLITANA
SAN ANTONIO
78
MELIPILLA
EL MONTE
5
PAINE
5
RANCAGUA
VI REGION

The negotiations are still pending which is why it was not possible to analyse a particular solution.

Two areas, object of analysis and preliminary negotiations, have been visited: they are both located along the Panamericana road that leads from Hijubelas to Llaillay (see enclosed planimetry).

The first one is in front of the street, near to the Aconcagua river, and for this reason, even though it is agricultural land, the ground should be pebbled and hard enough.

The second one is only a few km away from the first one and is limited by the Panamericana road and the railway parallel to this road. This land is for agricultural usage and has rights on a wood located one the other side of the road. The plot has an extension of 5.5 ha, is from 60 to 150 m wide and has the street side 500 m long.

The railway that runs along it, transports goods from Valparaiso to Los Andes (area near the Argentina border); the requested price is 12,000,000 pesos/ha, for a total of 66,000,000 pesos. The planimetry of the visited soil is enclosed. In our opinion, anyway, the sizes of this land is not suitable to the characteristics and requirements of the proposed factory because the plot is never wider than 150 m.

The mentioned plot is near to the new areas for the urban expansion of the town of Hijuelas; the expansion project made by the town Administration and that will be included in the City Master Plan, is available.

The agricultural soils in the Country are divided into three classes, according to the quality of the land. The best soil for agriculture is of class 1; this soil is not good for building activity because 40-50 cm of loam should be taken away to reach the more solid levels.

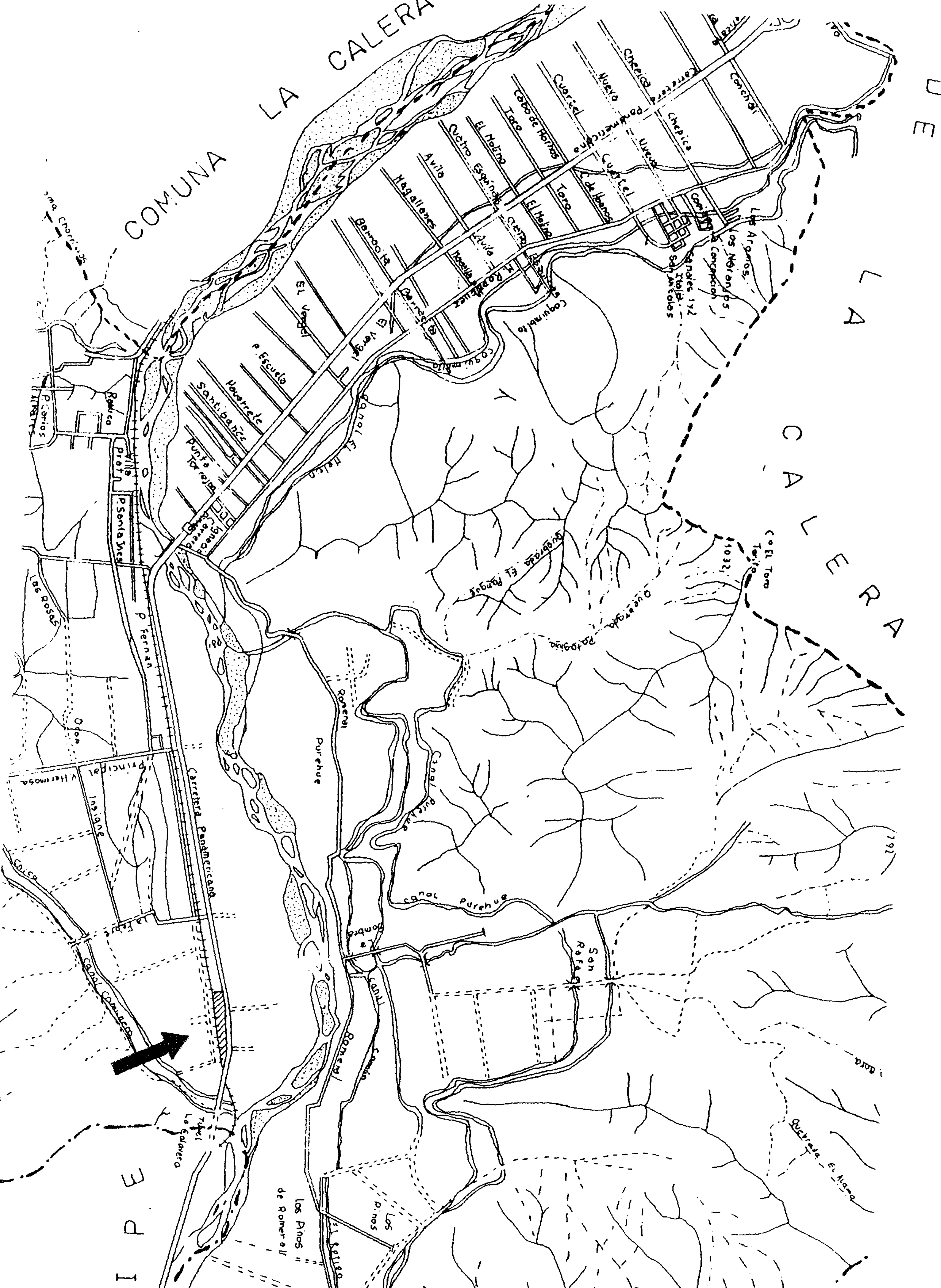
The benefits connected with the purchase of an agricultural soil are mainly connected to the low market price.

There is a high probability to find an agricultural and not an industrial soil for the plant and is therefore useful to ask for information the local Administration to check the possibility to change the soil destination. The local Authorities of the Hijuelas confirmed the possibility to change the destination through an application to the SAC (Servicio Agricola y Ganadero). The SAC verifies the Project of the plant and its non polluting characteristics, before giving the permit.

5.2 Climatic characteristics

Chile has been divided into nine climatic-living areas, according to the parallel crossing the Region. The areas are from "Norte desertica" to "Sur extremo". The Fifth Region, North of Santiago, and the Metropolitan Region are between the areas "Central Interior" and "Central litoral".

The "Central interior area" is the central valley between the North coast and the Cordellera of the Andes below 1,000 m of height.



COMUNA LA CALERA
DE LA CALERA
Carretera Panamericana
Canal El Melón
Canal Purehue
Purehue
Romeral
Canal Romeral
Canal Comunero
Quebrada El Pangue
Quebrada Patagua
Quebrada El Llano
San Rafael
El Vergel
Coquimbito
Magallanes
Avila
Cuatro Esquinas
El Molino
Toro
Cuartel
Nueva
Chepica
Conchal
Cabo de Hornos
Barrancas
Lo Rodríguez
Novatrete
Santibañez
Punta Tórtolas
P. Escuela
P. Santa Inés
P. Fernan
Villa Prat
Las Rosas
Principal
V. Hermosa
Insigne
Las Palmas
Los Pinos
Los Pinos de Romeral
Los Aromos
Los Naranjos
Sagrada Concepción
Túnel La Calavera
Cº El Toro


337.0
352.5
334.4
333.0
337.5
341.5
326.0
336.4
166000
325.0
326.3
334.1
338.0
341.5
328.1
334.0
336.5
330.5
326.0
331.6
365000
326.1
327.0
335.0
340.5
331.5
350
400
450
500
333.0
326.5
331.0
364000
330.9
330.8
308000
309000

The climate of this area is Mediterranean, with mild temperatures, 4 or 5 months long winter, normal vegetation, rain and frost increasing moving South, intense insulation in summer moving North, limited daily temperature variations, winds from SW.

The "Central litoral area" is the coastal region including the big valleys that correspond to the mouths of the rivers. The characteristics of this area are: marine climate; short winters, from 4 to 6 months; mild temperature; clouds on summer mornings; big rainfalls; normal vegetation; winds from W predominantly.

The climate characteristics of the biggest cities of the Fifth Region and the Metropolitan Region follow, as example.

	Temperature		Insulation	Rainfall	Snowing
	average Sum.-Win.	daily excursion Sum.-Win.	cal./cm^2 Sum.-Win.	mm/year	day/year
VALPARAISO	17.8-11.4	9.2-7.3	520-160	463	0
SANTIAGO	20.7-7.9	17.0-11.3	570-130	367	0.7

5.3 Roads and other traffic connections

Chile has a road network of 79,423 km, formed by a basic network and a town network. The basic network is formed by national roads, main and secondary roads.

In particular, the national network is formed by a long longitudinal road ("RUTA 5") with a length of 3,000 km that drives through the Country from North to South and which is the backbone of the long-distance industrial transport.

Furthermore, there are 2,000 km transversal roads that guarantee the connection between the main urban, productive, touristic and harbour centres of the Country.

An analysis made in 1991 about the real condition of the entire Chilean road network pointed out that only 48% of infrastructures were in good condition, while the remaining 52% needed immediate rebuilding works not to influence negatively the development of the Country, particularly in the industrial and touristic fields.

As a consequence, the Government started and promoted a wide programme of rebuilding of public works to improve the global efficiency in the field.

The biggest investment regarding those Projects (858 million of US$) is connected to the programmes called "Autopistas Centrales", whose aim is to rebuild the most important highway in the Country, the "RUTA 5", and to the project "Carretera 68" that will connect Santiago to the harbour of Valparaiso (estimated investment 200,000,000 US$). In the planned main road rebuilding, there are also 172 km of road that connect Los Vilos to Santiago passing through the centres of La Ligua, La Calera and Hijuelas, where the prefabrication plant is meant to be built.

Government Programmes want to improve the highway 78 that connects Santiago to San Antonio. Together with the improvement of the highway 68 from Santiago to Valparaiso, there is a new project called highway "La Dormida" that will connect Santiago to the harbour of Valpariso with a 3.2 km long tunnel. The tunnel will make it faster and easier

the travel on the old road around the mountain and will connect important industrialised areas like Quilicura, Til Til, Limache, Penablaca and Vina Del Mar.

All these programmes, whose benefits are going to be seen since 1996, fully justify the Investors' choice of the location of the plant.

As a matter of fact, the factory, whose aim is to produce prefabricated elements to be supplied to building yards in the areas of development of the Metropolitan Region and of the Fifth Region, would be located in the centre of an important arterial network that will ensure, in the prudential range of 200 km from the plant, the fast reaching of the assembly locations.

5.4 Environmental impact

5.4.1 General situation of the environmental sector in the Country

The "Division de desarrollo urbano" has an important role in the constitution of the "Unidad del Medio Ambiente" of the Ministry of Housing. The main aims of the Division are the following:

a) to define the environmental standards and norms to be included in the Ministry programmes. These standards refer also to the evaluation of the environmental impact in the urban development Projects (EIA);

b) to identify and suggest an institutional and operative plan to introduce the environmental standards in the management of the Ministry of Housing.

At present, the Division objective is to favour a more systematic introduction of sound environmental practices and economic instruments in the City Master Plan.

The National Commission of "Medio Ambiente" CONAMA is the official administrative body of control of Chilean environmental system. A topical subject is a Study, made in March 1995, about the programming of big investments in the evaluation of environmental impact.

The programmes focus on extraction activities, and on power sources, but will gradually deal with activities in the industrial, forestry, infrastructural, and touristic fields too. The subject is considered essential as precaution, because the polluting productive processes cause serious and harmful situations in the Country.

The "CONAMA" is now working out rules that will oblige those who want a permit for the installation of extractive or industrial plants, to make an environmental impact analysis.

An information system for the consumers is now being promoted, to make them aware of the origin and the fabrication quality of the products they are going to buy.

Nowadays a few factories show the non-polluting peculiarity of their products, but this will be compulsory for all products on the market in the near future.

A recent meeting of Canadian and Chilean Governments gave start to a seminar where condition environmental impact experts trained Chilean Government officials.

Many Projects regarding environment themes are now being developed; one of these is an approved law project that will require complex costs and benefits analyses before new environment, safety and health protection regulations may be issued.

Another Government Programme will reward those owners whose property value was reduced of 20% or more due to the application of prevention and environment protection regulations concerning lake soils and vegetation protection, and animals to save.

In practice, every factory must have its own waste disposal plant and if the plant waste is contaminated, an adequate discharge water purification plant also; every solution has to be approved by the "Ministerio de la Salud".

5.4.2 Waste owing to the Project implementation

To evaluate the introduction of the proposed industrial plant into the surrounding environment, the main solid and liquid wastes produced by the process in the factory have been taken into consideration.

Among the materials needed for the manufacturing processes, the following ones may be considered as "wastes" (data expressed with reference to one year of production of the plant at the rate capacity) :

-	polystyrene: 3% of year consumption	=	805 m^3/year	
-	concrete additive	=	negligible	
-	iron: 2.5% of year consumption	=	49.25 t/year	
-	electric wires	=	negligible	
-	hydraulic pipes	=	negligible	
-	concrete mixing equipment washing water	=	350,000	liter/year
-	services water	=	900,000	liter/year
-	sewage water	=	1,300,000	liter/year

Polystyrene is a self-extinguishing material, formed by 90% air; it does not produce any damage because it does not eject fibrous particles, it is odourless and inert.

The plant waste should have a simple collecting network of polystyrene residues, to be sent to recycling companies for the production of "cellular concrete", porous bricks, raw materials for other products destined to high energy efficiency applications. In Chile, the Companies with technology sufficient to carry out these processes already exist and moreover a network that will allow the material to arrive to the recycling sites is now growing.

The main polluting action is due to liquid wastes produced at the factory. These are grouped into two categories:

- water from washing concrete mixing equipment;
- sewer water due to closets and kitchen.

Owing to the profound differences of the two liquid wastes, two different treatment systems are foreseen, each one with dedicated piping and a dedicated process cycle.

5.4.2.1 Concrete mixing equipment washing water

Several technical solutions may be adopted. The solution here foreseen is mainly aimed at assessing the magnitude of cost of the plant needed.

Polluted water coming from the two concrete mixing plants is collected into a storage tank. A mixer allows fluid to be maintained in suspension. The fluid is sent, through pumping, to a sound clarifier and flocculator equipment. Suitable dosing device introduces a solution of aluminium polycloride, with the flocculating function. A pump draws sludge from the bottom to a 3-stage dehydration system.

Concentrated sludge is dried and stored, with possibility of being reutilised as filler in construction industry.

Treated fluid is sent to a neutralisation chamber, where a suitable HCl dosing system allows the correction of solution pH, before the delivery to the environment.

In Annex 1 is the result of a standard analysis of waste water produced in a similar plant in Italy.

5.4.2.2 Sewer water

A treatment plant dedicated to sewer fluids produced in the factory, is foreseen. It has been designed so as to handle the polluting load of 250 equivalent inhabitants.

The process is based on a biological cycle, which allows a high purification standard (90-98%). The process is completely automatic.

The plant includes a basin for oxidation and sedimentation, a basin for aired thickening and a basin for disinfenction.

5.4.2.3 Waste treatment plants costs

The costs of the two liquid treatment plants, utilised in the Financial Analysis, are the following:

-	concrete mixing equipment washing water		
	* electromechanical plants	US$	45,000
	* civil works	pesos	6,000,000
-	sewer water		
	* electromechanical plants	US$	30,000
	* civil works	pesos	6,000,000

5.4.2.4 Pollution standards

The above said plants were selected according to Italian environmental standards for liquid wastes to be introduced into the environment. The new Company will have to verify the applicable standards in Chile at the time of starting with Project implementation. It will have to select the process and the technology accordingly.

CHAPTER 6 - ENGINEERING AND TECHNOLOGY

6.1 Scope of the Project

The Project concerns the production, assembling and sale of industrialised type houses for living.

The Project activities will be carried out by a Company which will be established for this purpose, and include:

- production of building panels (and structures, assimilated to panels), in the factory;
- transport of panels to the site;
- assembling and finishing of houses;
- marketing and sales activity.

The following main functional areas may be recognised, under the point of view of relevance of machinery and infrastructures utilisation (for a detailed organisational structure, see Chapter 7):

- AREA FACTORY PRODUCTION (including storage of raw materials and of finished products, as well as auxiliaries);
- AREA ASSEMBLING AND FINISHING.

In this Chapter, production activities and equipment used within these two Areas are taken into particular consideration.

6.2 Technology selection

As specified in Chapter 1, the technology for the industrialised production of panels for the buildings was not subjected to analysis for the selection of the most suitable one for the Project: the technology was selected by the Project promoter, who wishes to utilise it because of his know-how and experience with that technology.

All following data refer to this well identified technology, and to a very precise factory, which is optimised for implementing the selected technology.

Since the technology proposed by Intertransports Centre S.p.A. is the result of highly specialised know how that has been experimented for a long time in Italy and since the Company has the patent right, exactly the same technology will be used for the house-building programme in Chile. The technology was initially developed by RAPID CASA (Italy), with satisfactory results. Several hundreds of houses were built in Italy. Intertransports Centre S.p.A. selected this technology because of its positive technical characteristics, its cost, the possibility of marketing it for Intertransports Centre S.p.A. itself. Intertransports Centre S.p.A. improved the technology through the study of applications in Angola. The same technology is presently proposed for Greece, Algeria, Lebanon, etc..

The suggested construction system allows to realise civil buildings of medium-high level in a short time and with competitive costs, thanks to the industrialised prefabrication of all

the components of the building. Adopting the Intertransports Centre S.p.A. technology, only the assembly, the sealing and the finishing of the house are performed in the building yard.

The external wall panels and the base and covering slabs are insulated, thanks to a polystyrene foam layer put into the concrete during the casting.
Particularly equipped walls contain the bathroom and kitchen systems.

The raceways for electric, telephone and TV systems, the boxes containing electric current taps, switches and boards are included in the panels, according to the design project diagram. The door and window openings are made directly in the forms using special molds.

6.3 Production Programme

The construction is performed in three separated phases:

A) the components production in the plant.

B) The assembly and the sealing in the building yard to have the rough house covered with a tile roof.

C) The finishing, including wiring harnessing, door and window frame installation, floor, covering, bathroom devices setting up and external and internal painting.

6.3.1 The production in the factory

The production process is based on the manufacturing of the standard components (panels), which are continuously reintegrated in the store, and is regulated by a computerised planning that takes into account the stock variations.

The components are made of concrete mix with iron rods reinforcement. Components (panels) that are in contact with the outside are insulated with an intermediate polystyrene layer fixed by electric-welded meshes linked to the main reinforcement.

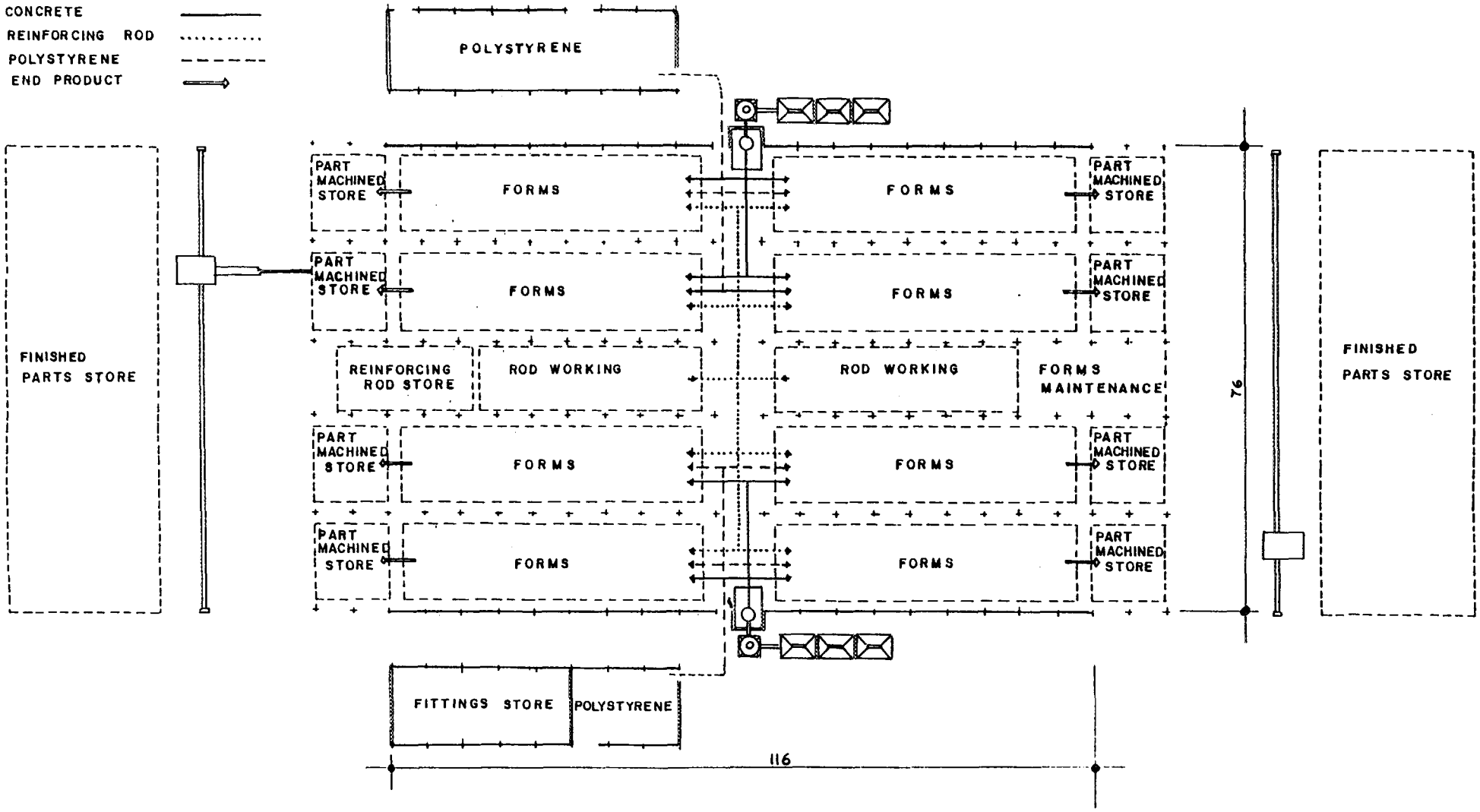
The components without thermal insulation like beams, gutters, partitions, stairs and guards are made with a unique casting; the ones with insulation are made in two casting phases, the first one to make a bed, the second one to fill the form after the insertion of the insulating layer.

The rate of production depends on the curing time, on the time spent working on the forms and on the number of installed forms.

The proposed plant has a number of forms sufficient to ensure the maximum expected production in the eight working hours, leaving for the spontaneous curing the remaining 16 night hours.

The iron rod working and the electric-welded mesh processing is organised according to the material type; for these operations a semifinished working area is needed.

MATERIALS AND PRODUCTS
FLUX LINES



The precise polystyrene cutting is performed directly in the store and the semifinished handling is made by means of dollies.

The extraction from the forms and the transport to the daily storing area are made by means of adequate bridge-cranes. The transport to the storing areas and the loading on the trucks is made by means of a bridge crane moving on tracks.

Concrete is a conveyed from the mixer (in electric controlled opening buckets) to the single form by means of a light bridge-crane moving on tracks, placed below the ones used for the extraction bridge-crane.

Taking into consideration the estimated daily number of trucks and the loading time, the shift of the personnel that have the task of truck loading at the factory, must be doubled.

Because of the scale of the plant, the aggregate supply should be made daily; the cement and polystyrene supplies are weekly.

The iron supplies, due to the bigger amount that can be stored, are less frequent.

6.3.2 Assembly and sealing in the building yard

These operations are made by special teams formed by Company personnel, using a crane-truck and specific equipment.

These operations are the ones necessary to assemble the components, from the foundation casting (the digging is up to the Client), to the covering with the roof.

6.3.3 The house finishing

The whole house finishing, meant as supply and installation of floors, coatings, internal and external frames, electric and hydraulic connections, sanitary sets and external and internal painting, is subcontracted to specialised firms found during the building yard installation.

6.4 Technology and equipment

The plant is designed to produce 60,970 m^2 of net living surface, in one year.

It is divided into three large departments:

a) IRON MACHINING
b) REINFORCEMENT ASSEMBLY
c) CONCRETE CASTING

The precise cutting of polystyrene slabs is made in its store; the finished products storing area may contain a 20-day production.

6.4.1 Production factory equipment

In the following, is a list of main equipment and machinery at the production factory.

A. Concrete production equipment (140 kW, 10 m^3 water consumption per day).

A1. Concrete mixing station
Two complete concrete mixing stations are foreseen in the factory.
Each concrete mixing station is formed by:

1 1,500 l forced mixer with hydraulic-opening discharge, fed with a loading skip, with a washing device that works at every mixer discharge. The equipment is located on a loading semi-trestle with an eccentric truncated cone gargoyle placed so that the discharge is 4.5 m high. The trestle has a stair and a service gangway.

1 Water batching plant with a self-acting liter-counter.

1 Cement balance with kg 750 weighing hopper directly installed on the mixer.

2 193 mm diameter, 8 m long screw feeder for each cement weighing hopper.

2 Cement filters.

2 40 t storage bins in carbon steel plate and steel sections, with charging pipes, venting pipe, explosion-proof valve and level indicator.

1 500 mm weighing belt with hopper.

1 3000 kg aggregate balance with leverage on the weighing belt.

3 40 m^3 aggregate hoppers, on steel frame, complete with pneumatic opening discharge. The hoppers are fed by dumpers, through dedicated loading ramp.

1 2 m high tank for concrete additive with automatic batching plant and electric board.

1 General electric board.

A2. Working equipment (8 kW).

- 3.5 m long iron rule, equipped with a rocking engine for superficial panel finishing n°12
- iron rule with vibrator for the ceiling panels superficial finishing n° 4
- iron rule with comb, wheel mounted and fixed to the forms for the superficial finishing of the vertical external type IH panels n° 2
- 40 mm diameter needle vibrator n° 4

B. Forms

B1. For production of IH type panels (for one-floor, one-unit house)

- Rocking forms, with a maximum rotation angle of 70 degrees, with planes of the specified size n° 15

The forms are made of 8 mm thick sheet, reinforced by 5 mm bars and equipped with 5 mm thick iron side panels, whose opening is made by a rotation and a translation, and are fixed on solid metallic frame beds, at the casting height.
Every bed has an adequate number of plates to anchor motor-vibrators and vibration-damping plates.
An oleodynamic system controlled by a gearbox (one every two forms) allows the form to rock and the side panel to be opened.

The forms have various characteristics, as follows.

4	one-impression benches for the supporting panels and the central wall panel	m	8.6x3.8
4	one-impression benches for curtain wall panel	m	6.7x2.8

Forms like the previous ones, with manual opening of side panels

2	one-impression benches for central partition	m	6.5x3.4
2	double-impression benches for fishbone partition panel	m	6.8x3.4
1	double-impression bench for fishbone partition panel	m	3.3x3.4
1	double-impression bench for equipped partition panel	m	6.5x3.0
1	double-impression bench for covering panel	m	3.0x1.7

- Fixed forms n° 21

The forms are made of 8 mm thick sheet, reinforced by 5 mm thick iron bars. They have side panels whose opening is made by a rotation and a translation, and are fixed on solid metallic frame beds at the casting height.
Every bed has an adequate number of plates to anchor motor-vibrators and vibration-damping plates.
An oleodynamic system controlled by a gearbox (one every two forms) allows the form to be opened.

The forms have various characteristics, as follows.

2	one-impression benches for central slab	m	6.8x2.4
4	one-impression benches for lateral slab	m	6.8x2.8
2	one-impression benches for porch panel	m	7.8x2.8
4	one-impression benches for ridge of the roof panel	m	6.8x2.7
2	one-impression benches for gutter	m	7.8x2.1
1	double-impression benches for lateral beam	m	7.7x1.9
1	one-impression benches for lateral beam	m	7.7x1.1
2	double-impression bench for connecting beam	m	6.4x1.5
1	one-impression benches for central beam	m	8.9x1.5
2	double-impression benches for gutters	m	7.2x2.6

B2. For two-floor and/or multi-floor production

- Rocking forms with maximum rotation of 70 degree n° 25

17 forms for 7.0x3.4 m panels.

The forms are made of 8 mm thick smooth sheet, reinforced by sections with 5 mm thick iron bars and have 5 mm thick side panels whose opening is made by a rotation and a translation, and are fixed on solid metallic frame beds at the casting height.

The lower side panel is fixed to the bench, the upper one has pockets for the flask exit (one every 11 cm) and has a manual sliding plate to close the pockets; the side panel and the plate overturn oleodynamically.
The two terminal stop-casting side panels may be fixed to the bench with flasks and have, as the longitudinal side panel, pockets for the flask exit.
Every bed has an adequate number of plates to anchor motor-vibrators and vibration-damping plates.
An oleodynamic system controlled by a gearbox (one every two forms) allows the form to rock and the side panel to be opened.

2 forms for gable panel with a width of 18 m and a height of 4 m in the centre and 1.8 m at the ends.

These forms have the same characteristics as the ones for the wall panels with an additional side panel and a 50 cm wide plate corresponding to the upper form profile.

6 forms for 7x3 m partition panels

The forms are equal to the ones for the wall panel but do not have flash exit pockets.

- Fixed forms n° 9

3 forms for 41.8x2.8m covering-race panels.

The races are made of 8 mm thick smooth plate, reinforced by suitable bars; these have 5 mm thick iron side panels and casting baffle plates. These are fixed on solid metallic frame bed at the casting height.
The longitudinal (upper and lower) and the terminal side panels have an oleodynamic opening system controlled by a gearbox. The casting baffle plates (5 for each race) have mechanical opening.
Every race has plates to anchor the motor-vibrators and vibration-damping plates, one every 2 m for the plain and one every 3 m for the longitudinal side plates.

1 form for gutter roof 10x1.7 m panel.

It has two/three casting diaphragms with automatic opening.

The form, equal to the previous ones, has side panels which are rotated oleodynamically.

1 form for 7x1 m plane gutter panel

Form as above.

1 form for 11x1.5 m guard panel

It has two/three casting diaphragms with automatic opening. The form, equal to the previous ones, has side panels with manual opening.

1 form for guard panel and terrace floor 7x2m panel

Form as above.

1 form for 2.5x1.2 stair

Form with same characteristics as above, with oleodynamic opening of sides.

1 form for 4.5x1.4 stair (stair and two 1 m landings)

Form as above.

B.3 Form servomechanisms (252 kW)

• High frequency motor vibrators, three phases, 42 V 6,000 rpm	n° 250
• High frequency motor vibrators, three phases, 42 V 3,000 rpm	n° 147
• Frequency converters for the mentioned vibrators	n° 12
• Oleodynamic gearboxes, hand driven, for the form turnover and the side panel opening (minimum 8 users, 4+4)	n° 36
• Various size piping and fittings for the oleodynamic circuit	m1,200
• Electric boards and push buttons to start converters and vibrators	n° 46
• Frequency converter electric boards	n° 12
• Board connection electric wire	m1,100

C. Handling (439 kW)

• 20 m high tower crane with a 40 m, 4 t at end load, moving on 80 m long rails	n° 2
• Casting truck on 16 m gage bridge (V= 5/40 m/min), including a 1,500 liter bucket moving on a dolly (V= 10 m/min), and an independent sliding push bottom. The bucket has an elevator for the positioning at the required height (1/3 m). (Special truck made by OMG Company from Perugia).	n° 4
• Double beam bridge-crane with winch-dolly: 6300 kg load, 16 m gage, 5 m/min hoisting, 10/40 m/min truck moving velocity, independent sliding pendant push bottom	n° 8
• Bridge-crane as above: 3000 kg load, 12 m gage	n° 2

- Bridge-crane rails complete with electric supply system — m 1,400
- 1.5 m^3 hydraulic bucket moving on track, electric control and 18 m long tracks included — n° 4
- Metallic frame bridge-crane entrance stair — n° 10
- 6 t, 5.5 m long arms for the vertical panel lifting and handling arms — n° 8
- Steel chains for horizontal components (slabs, stairs, beams, etc.) lifting and handling, with two 2.5 m long, 3 t, booms — n° 16
- Various size arms to handle the assembled iron (reinforcement for the IH type) made in iron bars, with an average weight of 130 kg. — n° 6
- Various size dollies to handle iron, made, according to the design, of metallic frame with an average weight of 200 kg and with rotative wheels — n° 12
- Various size dollies to handle polystyrene, made of metallic frame, with an average weight of 100 kg and with rotating wheels — n° 12

D. Storing

- Tubular structure for the temporary vertical panel storing, placed at the end of the casting lanes and anchored to the building pillars. These are made according to the design and have a total weight of 350 kg. — n° 4
- Frame with basement for the vertical panels external storing, capable of containing 20 panels (10 for each side), made according to the design, with a total weight of 450 kg. — n° 40

E. Iron machining (36 kW)

- Self-acting iron rectifying equipment for homogenous diameter rods up to 16 mm, with a capacity of 6,000 kg, including guides for cutted rods collection — n° 1
- Electric iron rod cutter, for less than 30 mm diameter rods, fixed on a dolly — n° 1
- Self-acting iron bending rolls for less than 30 mm diameter rods — n° 4
- 8 m long bending machine benches — n° 2
- Self-acting electric welded mesh cutter for maximum 10 mm diameter wire — n° 1

- Mesh bending machine for 6/8 m of length, for maximum diameter 10 mm electric welded mesh, with two bending pistons and 30 clamps n° 1

- Completely self-acting computerised flask maker to produce flasks with maximum 10 mm diameter wire n° 1

- Tools (manual cutters, tongs)

F. Iron assembly (9 kW)

- Bench template to assembly the reinforcement needed in the construction of the IH type. These are made, according to the design, in metallic frame. Max size 8.4x3.4, average weight 500 kg n° 8

- 2+2 mm manual spot welder n° 5

- Portable pneumatic cutter for less than 14 mm diameter wire n° 3

G. Polystyrene working (2kW)

- Hot wire polystyrene slab cutter, including a 4x1 m bench and a three wire loam n°2

H. Maintenance workshop (14 kW)

- 160 Ampere portable arc-welding machine n° 1
- Autogenous welder with dolly n° 1
- Bead welder n° 1
- 250 mm disk cropper n° 1
- Pillar drill with max. 30 mm chuck n° 1
- 2 m long bench with vise and drawers n° 1
- Wrenches and other tools (114 tools Beta type bench) n° 1

I. Analyses laboratory

- Hand driven 200 t hydraulic device for the concrete compression test n° 1
- 1.0 x 0.8 m steel bench with vibrating table n° 1
- 0.15 x 0.15 x 0.15 - 4 place dice molds n° 1
- Set of 200 mm diameter sieves for the granulometry curve (from 0.18 to 1.7 mm) n° 2
- 1.5 x 0.8 x 0.8 m steel tank for dice curing, including temperature control system n. 1
- ABRAMS cone for the concrete workability and consistence measurement n. 1
- Oven for accelerated curing of concrete n. 1

L. Lifting and transporting vehicles

- Little van n° 1
- 30 t crane truck n° 1
- 3 t frontal loading fork lift truck n° 1
- Fixed flatcar truck, equipped with crane (max 300 kg at 20 m height) n° 3

M. Miscellaneous

- 60 t underground electronic balance (20 kg precision, 14x3m plane) n° 1

N. Auxiliary systems

N.1 Electric system

It is built according to CEI standards and includes the following:

- Electric energy supply and distribution systems, internal and external lighting, internal communications.
  Wires, inside the factory, lay over an aerial raceway, with descending sections in correspondence with electric boards and with users (about 150).

- Grounding system
  The plant, closed loop type along the external perimeter of the building, is in copper plait, with dispersion bars. The loop is connected to the general electric board.

- Protection against atmospheric discharges
  Cage made of zinc plated strap, designed according to the local average meteorological conditions.

- Smoke detectors
  suitable smoke detectors are installed on the ceiling, with acoustic alarm at the main control board. This plant is limited to the area for storage and working of polystyrene.

Main equipment for the electric distribution system are:

- n° 2 600 kVA transformers
- n° 2 oil switches for high and medium voltage
- n° 1 general board with power factor correctors
- n° 13 area power control centres
- various small local boards
- wires and raceways
- n° 1 emergency electric generator, for operations of cleaning of casting trucks (100 kVA capacity).

N.2 Compressed air system

It includes a distribution aerial loop, connected to compressors located in the form maintenance workshop. The loop feeds the various users through descending piping.

Main equipment include:

- n°2 rotating compressors, 1,500 liters, 12 bar, 20 HP
- n°1 drier
- n°1 tank
- piping (about 800 m)
- n°30 condensate dischargers.
- n° 2 air compressors, 300 liters, 12 bar

N.3 Fire Protection System (12 kW)
Within the factory extinguishing systems are foreseen near electric boards (powder type).
Around the buildings for storage and working of polystyrene, is a water-based fire protection system including a water reservoir, a pumping station and a network for distribution of water including, in suitable boxes, nozzles and fire hoses.

N. 4 Hot Water Production Plant (40 kW)
A plant for production of hot water is foreseen for the supply of services of offices and of the building with locker room and dining room.
A boiler, electrically or gas-fired heated, will be foreseen.

O. Social Services Building (12kW)
The 510m^2 building includes dressing rooms, sanitary facilities (basins, WC, showers) and dining room and it is suitable for about 150 workers.
The plant includes lighting, socket and phone equipments, and:

dining room:
refrigerator and freezer
4-fire stove with oven, steaker and fryer
vent system
working bench
pots and pan rack
dishes and cutlery
hot-dishes bench
trays
tables and chairs

dressing room:
wardrobes

P. Office building and keeper's lodge (6kW)
The office building includes, apart from lighting, socket and phone equipment, the following:
office furniture
network computer system
printers
copiers

automatic fax
phone switchboard
drawing board
plotter
drawing boxes
iron shelving
filing equipment

The keeper's lodge is equipped with a table, chair and telephone.

6.4.2 Yard-use equipment

In the following, main equipment used at the yard are listed.

- Electric 300 liter concrete mixer	n° 4
- Erecting stands for transporting vertical panels, made of iron bars, 750 kg	n° 16
- Supporting framework for vertical panels, including tie plates, weight 22kg	n° 720
- Steel framework for horizontal panel	n° 1200
- Iron scaffolding for the storing of panels at the yard, 450 kg	n° 10
- Chains for lifting and transport of vertical panels (see point C)	n° 20
- Small equipment for the assembling team (drillers, linishers, jemmies, EE cables, small electric boards, trays, wrenches, stepladders)	n° 4
- Steel scaffolding equipped with erecting stands, stringers, diagonals and sheet iron docks	m^2 3,100
- Protections against accidents, prefabricated steel elements	n° 150
- Wooden panel for foundation forms, including vertical rods and wedges	m^2 350
- Tile sawing equipment complete with and water pump	n° 10
- Sheath burners	n° 10
- Auxiliary equipment for crane operation	n° 3

6.4.3 Additional transport means from the factory to the yard and yard erection equipment

The construction of houses at the yard requires the availability of additional trucks for transport from the factory to the yard as well as additional cranes for the implementation of the assembling phases.

These equipment may either be purchased by the Company of the Project, or be rent at the yard site. Owing to the high cost of rental in Chile, the solution of a purchase has been selected. Additionally, in order to reduce the investment cost, high-quality, used equipment will be bought.

In the following, is a list of such equipment:

N° 6 trucks, 25 t capacity, 12 m length loading plane
N° 4 trucks, 25 t capacity, 13.6 m length, depressed loading plane

N° 2 30 t crane truck (25 t is accepted)
N° 2 50 t crane truck.

6.4.4 Direction premises

Standard office furniture will be required in the Direction premises in Santiago, where General Management and Marketing personnel are located.

6.5 Equipment cost

The above described equipment have the costs indicated in Table VI-1.

6.6 Factory lay-out

The enclosed scheme shows the layout of the prefabrication plant.

The operation schedule begins with the machining of the iron rods and the electric welding of the meshes and arrives at the finished component through phases of reinforcement assembling, insulating and electrical and hydraulic devices positioning; it continues with the placing of the reinforcement in the forms, the concrete casting and ends with the extraction of the component (panel) at the end of the curing time.

The production departments are distributed along the five lanes of the building in the mentioned sequence to avoid flow inversions.

The plant, as a whole, has been designed to work at a constant rate with symmetrical flow from the centre towards peripheral equipment. Due to this scheme, the concrete mixing equipment, located on the transversal central line of the factory, concentrates the concrete castings without interfering with other processing and allows, therefore, the flow of dollies towards the ends of the plant to be regular. The products are taken from the dollies to the relative storage areas.

The iron machining is located in the central lane and feeds an intermediate store. From there the semifinished products arrive, by means of dollies, to the reinforcement assembly benches in other lanes or straight to the forms of the partitions for which no previous assembly is needed.

The iron department draws the material from the external store with a dedicated bridge crane.

The assembly template benches, provided for all the components except for the partitions, are located in the lanes of the corresponding forms to allow the reinforcement transport to be without other crossovers.

The reinforcements of beams and gutters as well as the semifinished products for the partitions are taken straight to the forms.

ITEMS GROUP	COST (US$)
CONCRETE MIXING STATION	425,330
WORKING EQUIPMENT	24,000
FORMS	2,628,840
FORM SERVOMECHANISMS	228,330
HANDLING	1,187,760
STORING	38,800
IRON MACHINING	122,670
IRON ASSEMBLING	23,000
POLYSTYRENE WORKING	3,180
MAINTENANCE WORKSHOP	5,350
ANALYSES LABORATORY	11,070
BASIC LIFTING AND TRANSPORT EQUIPMENT	586,220
BALANCE	28,130
AUXILIARY SYSTEMS	522,000
SOCIAL SERVICES	33,800
OFFICE FURNITURE	66,530
YARD-USE EQUIPMENT	280,400
TRUCKS AND LIFTING EQUIPMENT FOR IN-YARD OPERATION	1,430,000
TOTAL	7,645,410

Table VI-1 - Main Equipment supply

LOCATION PLAN

50'400 S.M. (280 x 180)

A + B + C + D = 8'816 S.M.

E = 720 S.M.

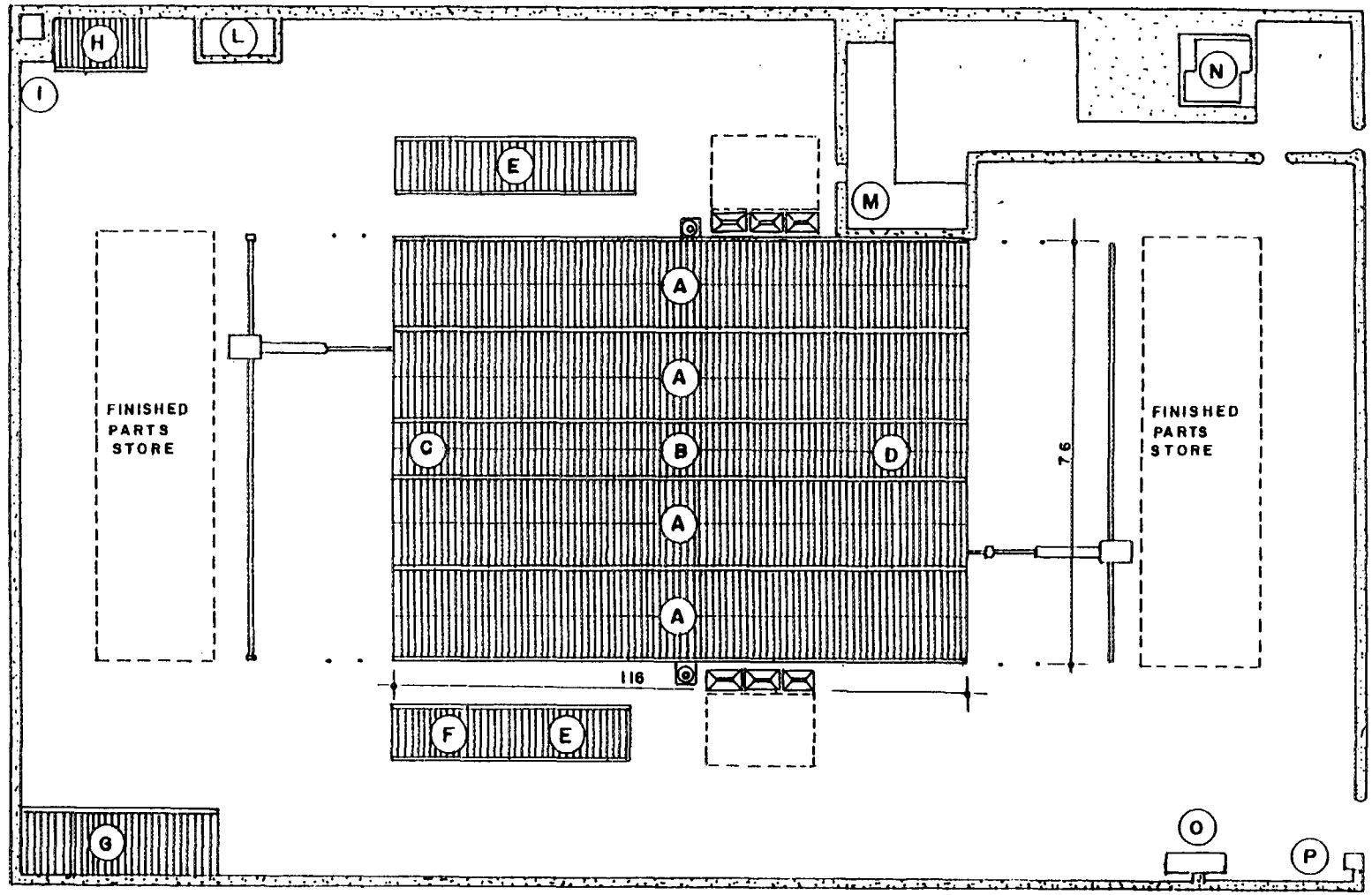
F = 240 S.M.

G = 504 S.M.

H = 180 S.M.

M = 510 S.M.

N = 100 S.M.



A - CONCRETE CASTING

B - ROD WORKING

C - REINFORCING ROD STORE

D - MAINTENANCE SHOP

E - POLYSTYRENE

F - FITTINGS STORE

G - MOTOR VEHICLES MAINTENANCE

H - SYSTEM MAINTENANCE

I - TRANSFORMER ROOM

L - WATER TANK

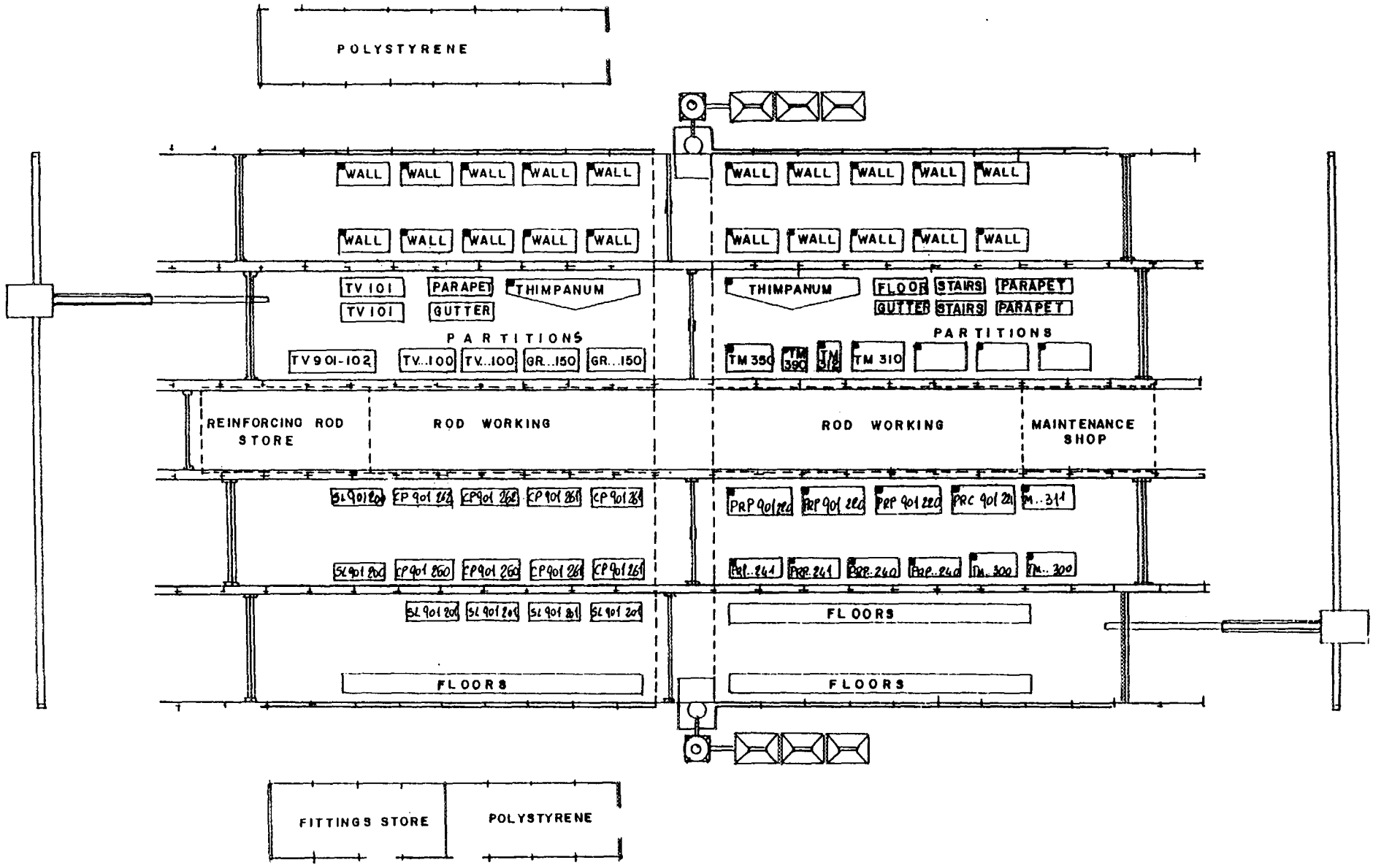
M - DRESSING - LOCKER ROOMS AND MESS - ROOM

N - OFFICES

O - ELECTRONIC WEIGHBRIDGE

P - PORTER BOX

LAY— OUT


POLYSTYRENE
WALL
TV 101
PARAPET
THIMPANUM
GUTTER
PARTITIONS
TV 901-102
TV..100
GR..150
TM 350
TM 390
TM 310
FLOOR
STAIRS
REINFORCING ROD STORE
ROD WORKING
MAINTENANCE SHOP
FLOORS
FITTINGS STORE

The reinforcement of walls, base slabs and covering panels that are to be completed with polystyrene or electric materials are taken to the finishing benches where, after the positioning of the mentioned materials, the electric welded mesh is supplied. The handling is made by means of bridge cranes with rockers with magnetic hooks.

The polystyrene already cutted comes, by means of dollies, straight from the two stores outside the factory.

The electric materials like boxes and wiring devices are also stored locally in the departments.

The two concrete mixing stations located on the external sides, are essentially formed by a mixer, a storage bin for cement and fixed hoppers for the aggregates.

The transport of concrete to the forms is made by hoppers with pneumatic openings.
The hoppers are taken from the external lanes to the mixers by means of the dedicated bridge cranes; the hoppers that feed the other lanes are installed on motorised dollies that go from the mixer to the corresponding bridge crane and back.

The dismantling at the end of the curing and the moving of the finished components to the storage areas are carried out by means of bridge-cranes.

The loading of the finished components is carried out by cranes, dedicated to the storing areas. The driveways that cross these areas allow the simultaneous loading of at least three trucks.

6.7. Civil engineering works

The ideal surface for the installation of the prefabrication plant is m 280 x 180, for a total area of about 50,000 m^2. See the enclosed planimetry.

This area will contain not only the main industrial building, but also all the services and infrastructures deeply connected to the operation of the plant.

Since the flow diagram of industrial processing is symmetrical from the centre to the peripherical equipment, the location of the building should be baricentrical for the available area. This solution will not only make it easier the building of the various accessories and services, but also will allow an easy and organic heavy vehicle circulation without interference with the equipment. The building itself will have a total covered surface of 8,816 m^2 and will be formed by four abreast sheds made by a metallic structure, with a span of 16 m and by the shed of the central lane, with a 12 m span.

Each one of the five sheds will be 116 m long with 6 m long bays. A bay with a span of 8 m will be added to each longitudinal structure that will be assigned to the concrete feeding line. The total dimensions will be therefore: 16+16+12+16+16 = 76 m on the transversal side and 6x9 m long bays X 2 + 8 m = 116 m on the other side. Globally, the covered surface will be 116 x 76 = m^2 8,816.

Far from the central services a workshop will be placed for the equipment maintenance, covering an area of 180 m^2 , near the electric substation hosting the transformers. Also

far, but easy to reach by means of the external ways, a metallic construction will be built for the parking and the maintenance of the trucks; its surface will be 504 m^2.

Two stores for the cutting and storage of polystyrene will be built over a surface of 720 m^2, as well as an auxiliary equipment storing building, over a surface of 240 m^2.

The factory will have two different entrances, one for personnel and the other one for industrial vehicles.

The industrial vehicle entrance will be equipped with an electronic balance and adequate door keepers box.

The personnel's entrance will be suitably separated from the industrial areas and sufficient parking places will be provided.

In this area, there will be the management and administration offices with a surface of approximately 100 m^2, as well as the building for the general services for the personnel, including a messhall with kitchen, depot rooms, dressing rooms, bathrooms with showers, with a total surface of 510 m^2.

The constructions that have to be built have the following surfaces:

plant building	8,816 m^2
equipment maintenance workshop	180 m^2
truck recovering and maintenance	504 m^2
polystyrene stocking and cutting store	720 m^2
auxiliary (accessories) store	240 m^2
offices	200 m^2
general services	510 m^2
TOTAL	11,170 m^2

The estimated costs of the buildings are shown in Chapter 10.

6.8 Analysis of compatibility of the proposed technology with local building regulatory standards

Any information connected with the building standards in Chile is found in the "Ordenanza General de Construccion".

The "Instituto Nacional se Normalizacion" publishes (NCH) up-to-date bulletins, identified by progressive numbers, containing the rules of application of such standards.

The most significant building standards have been examined, to make a comparison with the Italian ones with regard to the construction and assembly of prefabrication panels, aimed at verifying possible incompatibilities with RAPID CASA technology.

The above mentioned standards, which have been examined, are the following:
- Ordenanza General de urbanismo y construccion 1995-NCH 19.OF79 Prevencion de riesgos 1979 - NCH 853.OF91 Acondicionamiento ambiental 1991

- NCH 1079.OF77 Arquitect. y construcc. Zon. climatico habitac. 1977
- NCH 3.OF61 Escala de intensidad de los fenomenos sismicos 1994
- NCH 433 Diseno sismico de edificios (Comentario) 1993
- NCH 433.OF93 Diseno sismico de edificios 1993
- NCH 933.OF85 Prevencion de incendio en edificios 1985
- NCH 934.OF94 Prevencion de incendios-Clasificacion fuegos 1994
- NCH 935/1.OF84 Prevencion de incendio-ensayo de resistencia 1984
- NCH 806.EOF71 Arquitect. y construcc. Paneles prefabr. 1971
- NCH 801.EOF71 Arquitect. y construcc. Paneles prefabr. -Ensayo 1993
- NCH 802.EOF71 Arquitect. y construcc. Paneles prefabr.-Ensayo 1993
- NCH 803.EOF71 Arquitect. y construcc. Paneles prefabr.-Ensayo 1993
- NCH 804.EOF71 Arquitect. y construcc. Paneles prefabr.-Ensayo 1993

No relevant incompatibilities were identified, such to jeopardise the results of this Feasibility Study.

Nevertheless, before the implementation of the Project, the Company utilising the technology will have to analyse in detail, as compared with the standards stated by the "Ordenanza General de Urbanismo y Construccion" in force at that date , the compatibility of its products with the Chilean standards, and will make, if necessary, the changes in technical performance or in structural requirements to make the product suitable for the technical standards applicable at that moment.

The local rules state that every habitable room must have at least one window, without speaking about the surface of the room or about the possibility to install a ventilation or mechanical extraction in the bathroom or little kitchen without window. The net available height in a house is 230 cm; according to the Italian standards this height must reach at least 280 cm. That is one of the reasons why the houses built with this industrialised system will have better living characteristics than the average Chilean ones.

6.8.1 Standards to prevent fire risks

All buildings must follow the minimum fire safety standards. The "Ministerio de Vivienda y Urbanismo" published an official list containing the standard materials and their behaviour with fire. All materials used in building that are not included in the mentioned list have to be object of technical tests and approval by local Authorities.

With regard to the houses isolated, coupled or in group, with a net surface equal to or less than 140 m^2, they must have a fire resistance of all the structural and load bearing elements equal to F-15 (that according to the standard NCH 953/10F84 is between 15 and 29 minutes).

With particular regard to houses for living that have a surface equal or less than 140 m^2, they must have the following characteristics:

- partition walls between houses	F-60 = (between 60 and 89 minutes)
- load bearing vertical walls	F-30 = (between 30 and 59 minutes)
- no load bearing walls	No prescription
- roof covering	F-15 = (between 15 and 29 minutes).

According to the "Decreto con Fuerza de Ley N. 2 de 1959", a house with the considered surface of 140 m^2 is classified as "vivienda economica" and it is therefore possible for the owners of these houses to obtain fiscal benefits.

The texts of the corresponding Chilean technical standards have been handed over to Intertransports Centre SpA, to put it in a position to verify the compatibility of their products with the standards and to eventually make the appropriate changes.

6.8.2 Thermal insulation standards

The building insulation standards provide the thermal conductivity, the heat transmission coefficient and the thermal resistance to be adopted in design. These formulas may be applied to each single sample panel to verify if it is in accordance with the rules. In particular, the formulas to be applied are the ones regarding heterogeneous constructive elements (prefabricated products including polystyrene slabs are of this kind).

Thè texts of the Chilean technical standards have been given to Intertransports Centre SpA to verify that their products are in accordance with the standards and to make the appropriate changes, if needed.

On the basis of the climate data published in the standards NCH 1079, the frequent absence of the heating system in the houses, especially in the Fifth Region and in the Metropolitan Region of Santiago, may be justified.

A few very high standard houses have private gas heating system with radiant elements or low temperature floor radiant elements.

In the single houses as well as in the flats proposed in the Project, a copper pipe in the centre of the building will be installed; from this pipe, every owner could connect a central heating stove with an external connection to a balanced flow duct. Portable catalytic stoves moving on wheels with gas cylinder included, are also used in the coldest days; they can be pushed from room to room in the whole house. Obviously, no thermal equipment need to be installed during the house building, for these stoves.

6.8.3 Seismic standards

The Chilean standards classify the seismic phenomena according to 12 intensity levels; the first one is noticed only by particularly sensitive people, the last one is the one that produces total damages with general modification of the ground levels.
The Chilean ground is divided into three longitudinal seismic zones: the No. 1 is the band close to the Cordillera of Andes; the No. 2 is the central band; the No. 3 is the Pacific coastal zone.

The Metropolitan Region of Santiago is mainly in zone No. 2 and partially in zone No. 3; the Fifth Region is mainly in zone No. 3 and partially in zone No. 2.

The standards divide the buildings in classes according to their destination.
Class A: Government buildings
Class B: Public buildings bound to be crowded with people
Class C: Private buildings for habitation

Class D. Other buildings not meant for habitation.

The structural calculation may be made according to either the allowable stress method or the load and resistance factor method. Standards including the seismic calculus formula are available to enable to control the prefabricated structures and to make eventual changes.

6.8.4 Standards for the usage of prefabricated panels.

The Chilean standards divide the prefabricated panels into 7 types on the basis of the constructive characteristics and in 8 classes on the basis of the materials adopted for the construction.

The panels that are going to be utilised in the Project are of types 5 and 6 (monolithic with or without covering) and of class A (concrete).

Before being used, all the prefabricated panels, or anyway a significant number of them, have to be load tested according to the standards, in order to obtain the homologation.

These tests consist in:

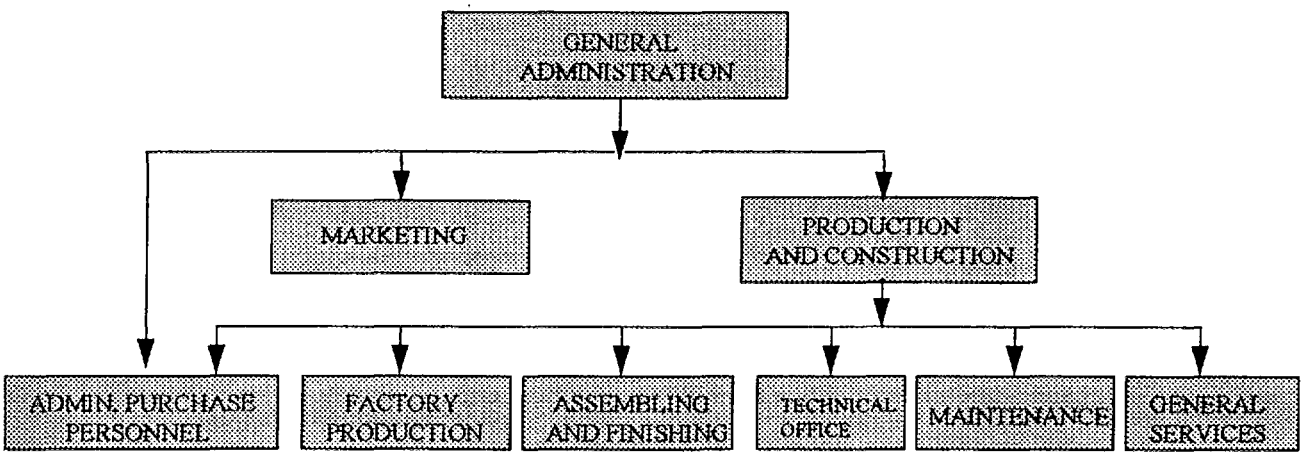
- pressure test RC
- horizontal load test RH
- bending load test RT
- impact resistance test.

These tests are described in the available standards 801.EOF71, 802.EOF71, 803.EOF71, 804.EOF71 and 806.EOF71.

CHAPTER 7 - ORGANIZATION AND OVERHEAD COSTS

7.1 Organisation

The Company which will implement the Project will be provisionally subdivided into nine areas from the organisational point of view:



-A) General Administration, including the managing director and a secretary (provisionally located in the premises in Santiago);

-B) Marketing, including three people, under direct control of the managing director (located in Santiago, in the same office as that of the general administration);

-C) Production and Construction, with the responsibility of all management of activities of the factory and of assembly and finishing of the buildings, including the manager of the factory and two foremen. They are located at the factory;

-D) Factory Production, with the responsibility of all technical activities within the factory, for the construction of panels, including 63 people in the concrete-line and 28 people in the steel, mixing, polystyrene line. These people are considered in the category of costs directly associated to the product. They are located at the factory;

-E) Assembling and Finishing, with the responsibility of transporting, assembling and finishing the houses at the site. It includes 13 people not directly associated with the product, and 57 people considered in the category of costs directly associated with the product. They are seldom located at the factory;

-F) Technical Office, with the responsibility of design activities regarding final products (houses/panels), as well as selection of construction techniques for panels and special design activities regarding the factory. It includes 5 people, located at the factory;

-G) Maintenance Unit, with the responsibility of maintenance of all machinery, of the factory with its plants, of equipment utilised at the site (trucks, cranes, etc.).
It includes 10 people, at the factory;

-H) Administration, Purchase, Personnel, with the responsibility of procurement, purchasing, administration. It operates under inputs by the managing director and by the manager of the factory. It includes 4 people, at the factory;

-I) General Services, including 30 people (drivers, messengers, keepers, auxiliaries), at the factory.

7.2 Overhead Costs

Overhead costs include mainly personnel costs. If cost of persons directly associable to products is taken away, the cost items to be considered are those indicated in Table VII-1.

In addition, other overhead costs are to be considered, as:

- cost for premises in Santiago	2.500.000 pesos/year
- legal/administrative costs	3.000.000 pesos/year
- direct costs for marketing	15.000.000 pesos/year

NON PRODUCTS-DEDICATED LABOUR				
PRODUCTION, NON PRODUCT-ASSOCIATED LABOUR				
Cat.	**Description**	**N°**	**Pesos/year per person**	**Pesos/year**
C	MANAGER OF THE FACTORY	1	7,150,000	7,150,000
C	FOREMEN	2	4,810,000	9,620,000
E	SKILLED WORKERS	8	3,640,000	29,120,000
E	CRANE OPERATORS	5	2,860,000	14,300,000
F	ENGINEER, TECH. OFF.	1	5,850,000	5,850,000
F	TECHNICIANS, TECH. OFF.	4	3,640,000	14,560,000
G	TECHNICIAN, MAINTEN.	1	4,550,000	4,550,000
G	SKILLED WORKERS, MAINTEN.	9	1,625,000	14,625,000
	subtotal	**31**		**99,775,000**
NON PRODUCTION LABOUR				
Cat.	**Description**	**N°**	**Pesos/year per person**	**Pesos/year**
A	MANAGING DIRECTOR	1	15,000,000	15,000,000
A	SECRETARY	1	2,000,000	2,000,000
B	MARKETING CLERKS	3	4,000,000	12,000,000
H	ADMINISTRATIVE CLERKS	3	3,640,000	10,920,000
H	ADMINISTRATIVE SECRETARY	1	1,300,000	1,300,000
I	DRIVERS	2	1,372,800	2,745,600
I	KEEPERS	3	1,372,800	4,118,400
I	AUXILIARIES	25	1,372,800	34,320,000
	subtotal	**39**		**82,404,000**
	TOTAL OVERHEAD PERSONNEL COST (pesos/year)		**182,179,000**	

Table VII-1 - Overhead Costs (Personnel)

CHAPTER 8 - HUMAN RESOURCES

8.1 Personnel at the factory dedicated to production

The production proposed in the Project is based on 300 working days per year with one 8-hour shift per day, according the following Table.

A. Concrete line and frame packaging

63 persons will be needed, divided into:

n° 30 for type 1 production (IH)
n° 13 for type 2 production (two-floor, two-unit)
n° 20 for type 3 production (four-floor, sixteen-unit)

The requirement of above personnel was obtained from one accurate analysis of working time requirements for the Reference Production Programme (see Chapter 1) as follows.

Type 1 - one-floor houses

	hour/year
Beams and gutters	12,467
Walls	19,083
Partitions	13,163
Slabs and coverings	28,050
Partial total	72,763

Type 2 and 3 - Two- floor and multi-floor houses

	hour/year
Walls	30,408
Floors	28,170
Partitions	7,576
Tympanums	4,716
Roof gutters	1,980
Guards	2,553
Stairs	1,512
Floor terraces	234
Special gutters	396
Partial total	77,545
Gran total	150,308

B. Iron manufacturing unit
It will require n° 19 workers

C. Mixing
It will require n° 5 workers

D. Polystyrene manufacturing
It will require n° 4 workers

91 workers are needed to operate the production plant, including 43 iron bars workers and 48 concrete workers.

8.2 In-yard assembling personnel

57 workers are needed, divided into:

Type 1	n° 18
Type 2	n° 21
Type 3	n° 18

5 crane operators, 8 assistant surveyors are also needed, for a total of 70 workers.

8.3 Total personnel requirements

In the following, is a complete list of personnel required to implement the Project.

1) *Factory Personnel*

Direction n° 4
1 factory manager
2 unit supervisors
1 maintenance supervisor

Technical Department n° 5
1 building engineer
3 surveyors
1 industrial technician

Administration n° 4
4 employees

Direct Production (see detailed list) n° 91
48 concrete workers
43 iron bar workers

Maintenance n° 9
2 electricians
2 mechanics
2 hydropneumatics
3 steel structural workers

Non-production personnel n° 30
12 cleaning and internal transport workers
5 crane operators (two shifts)
8 loading workers (two shifts)
2 Messagers and drivers

3 keepers (24-hour/day)

2)	*Yard operation personnel*	n° 70
3)	*Managing and marketing personnel*	n° 5

1 Managing Director
1 Secretary
3 Marketing personnel

	====
GENERAL TOTAL OF PERSONNEL	218

8.4 Cost of the required personnel

The cost of dedicated production personnel is shown in Table VIII-1.

In Table VIII-2, is a list of all human resources needed for the operation of the Company, with the yearly costs.

With reference to all categories of labour, data collected in Chile were increased by a factor 1.083, to take into account possible increase in labour cost which is expected as a consequence of present expansion situation (a 13th monthly salary has been added to the standard 12 salaries per year).

In addition, the requirement is to be considered of additional, temporary, skilled people operating at the factory to train local technicians in the first phase of plant operation:

N° 1 expert on product technology	(one month; overall cost: 9,000 US$)
N° 1 expert on steel working	(one month; overall cost: 9,000 US$)
N° 1 expert on concrete panel manufacturing	(one month; overall cost: 9,000 US$).

IH 40 TYPE			
	N°	**pesos/year per person**	**pesos/year**
CONCRETE PANEL LINE	30	1,625,000	48,750,000
STEEL WORKING, MIXING, POLYSTYRENE	10	2,535,000	25,350,000
(37,34% OF 28)			
			74,100,000
TWO-FLOOR, TWO-UNIT TYPE			
	N°	**pesos/year per person**	**pesos/year**
CONCRETE PANEL LINE	13	1,625,000	21,125,000
STEEL WORKING, MIXING, POLYSTYRENE	7	2,535,000	17,745,000
(23,85% OF 28)			
			38,870,000
FOUR-FLOOR, 16-UNIT TYPE			
	N°	**pesos/year per person**	**pesos/year**
CONCRETE PANEL LINE	20	1,625,000	32,500,000
STEEL WORKING, MIXING, POLYSTYRENE	11	2,535,000	27,885,000
(38,80% OF 28)			
			60,385,000

Table VIII-1 - Production Personnel, Dedicated

PRODUCTION LABOUR				
	Product-associated personnel			
	Description	N°	pesos/year per person	pesos/year
Cat.				
	SKILLED WORKERS (CONCRETE)	63	1,625,000	102,375,000
D	HIGHLY SKILLED WORKERS (STEEL WORKING, ETC)	28	2,535,000	70,980,000
D	SKILLED WORKERS ASSEMBLING (IH40)	18	1,625,000	29,250,000
E	SKILLED WORKERS ASSEMBLING (2-FLOOR,2-UNIT)	21	1,625,000	34,125,000
E	SKILLED WORKERS ASSEMBLING (4-FLOOR,16-UNIT)	18	1,625,000	29,250,000
E	subtotal	148		265,980,000
	Non-product-associated personnel			
	Description	N°	pesos/year per person	pesos/year
Cat.				
	MANAGER OF THE FACTORY	1	7,150,000	7,150,000
C	FOREMEN	2	4,810,000	9,620,000
C				
	SKILLED WORKERS	8	3,640,000	29,120,000
E	CRANE OPERATORS	5	2,860,000	14,300,000
E				
	ENGINEER, TECH. OFF.	1	5,850,000	5,850,000
F	TECHNICIANS, TECH. OFF.	4	3,640,000	14,560,000
F				
	TECHNICIAN, MAINTEN.	1	4,550,000	4,550,000
G	SKILLED WORKERS, MAINTEN.	9	1,625,000	14,625,000
G	subtotal	31		99,775,000
NON PRODUCTION LABOUR				
	Description	N°	pesos/year per person	pesos/year
Cat.				
	MANAGING DIRECTOR	1	15,000,000	15,000,000
A	SECRETARY	1	2,000,000	2,000,000
A				
	MARKETING CLERKS	3	4,000,000	12,000,000
B				
	ADMINISTRATIVE CLERKS	3	3,640,000	10,920,000
H	ADMINISTRATIVE SECRETARY	1	1,300,000	1,300,000
H				
	DRIVERS	2	1,372,800	2,745,600
I	KEEPERS	3	1,372,800	4,118,400
I	AUXILIARIES	25	1,372,800	34,320,000
I	subtotal	39		82,404,000
	TOTAL LABOUR (N°)	218		
	Product-associated personnel cost (pesos/year)		265,980,000	
	Non-product-associated personnel cost (pesos/year)		99,775,000	
	Non production labour (pesos/year)		82,404,000	
	TOTAL OVERHEAD PERSONNEL COST (pesos/year)		182,179,000	
	TOTAL PERSONNEL COST (pesos/year)		448,159,000	

Table VIII-2 - Human resources

CHAPTER 9 - IMPLEMENTATION PLANNING AND BUDGETING

The Company which will be established to implement the Project will begin activities after the provision of funding requested (at least, 85% of the investment cost).

The selection and purchase of the site, and the construction of civil works at the site will follow, with the engineering phase, the procurement of machinery, the start-up of the factory, training of people.

In Table IX-1 is the scheduling for main activities foreseen for the implementation of the Project.

In Table IX-2 is the scheduling for activities directly associated to factory construction and start-up.

	MONTH	before	0	1	2	3	4	5	6	7	8	9	10	11	12
	ACTIVITY														
1	feasibility study approval	X													
2	new Company establishment	X													
3	supply contract between Intertransports and the new Company	X													
4	loan agreement	X													
5	request of SACE approval	X													
6	SACE approval	X													
7	provision by the Company of 15% contract value	X													
8	establishment of project implementation management	X													
1	approval of 85% financing and guarantee by City Bank; starting time		X												
1	purchase of the land			X											
2	selection of final marketing strategy and identification of main factory requirements			XXXX											
3	engineering of factory equipment, technical specifications, purchase			XXXX	XXXX	XXXX	XXXX								
4	engineering of civil works at the site								XXXX	XXXX	XXXX				
5	build-up of administration						XXXX								
6	arrangements for local supplies								XXXX		XXXX		XXXX	XXXX	
7	recruitment and training of local staff and labour											XXXX	XXXX	XXXX	
8	arrangements for marketing											XXXX	XXXX	XXXX	
9	contacts with local authorities for approval of licences, etc.				XXXX			XXXX							
10	assembling of the plants at the factory									XXXX	XXXX	XXXX	XXXX	XXXX	
11	technical assistance by expatriates at the site														XXXX
12	purchase of spare parts												XXXX		
13	purchase of start-up raw materials													XXXX	XXXX
1	financing of 85% contract value							distributed over the 12 months							
	Note: time zero is the starting of the 12-month period foreseen for project implementation, according to financing contract														

Table IX-1 - Planning of implementation of activities

	MONTH	1	2	3	4	5	6	7	8	9	10	11	12
	ACTIVITY												
1	design and technical specifications	XXXX	XXXX	XXXX	XXXX								
2	purchase orders issue		XX	XX									
3	material shipment				1		2	3	4 5	6	7		
4	foundations for main building, waste treatment, aggregate hoppers						S						
5	tower crane foundations								S				
6	other metal building foundations							S					
7	electronic balance foundations									S			
8	social services building							S					
9	office building									S			
10	electric cabin						S						
11	assembling by skillied expatriates												
12	tower crane							D		XXX			
13	metal frame for main building				D		XX	XXXX	XX				
14	auxiliary plants						D	X	XXXX	XXX			
15	bridge crane, moulding crane and ground level hopper							D		XXX	XXX		
16	concrete mixing equipment, tanks								D		XXXX	XX	
17	forms and servomechanisms								D		XX	XXXX	
18	equipment for steel and polystyrene working and maintenance buildings							D		XXX	X		
19	social building equipment						D	X	X				
20	electronic balance									D		XX	
21	transport and lifiting equipment									D			
22	additional equipment and frames for the factory									D		X	
23	analyses laboratory									D		X	
24	office furniture and equipment										D		
25	concrete working equipment										D		
26	yard equipment										D		
27	in-site training by expatriates												XXXX
28	supply of raw materials											XXXX	XXXX
29	supervision and technical assistance at the site							XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
	D = goods delivery date; S = civil works starting date												

Table IX-2 - Factory implementation

CHAPTER 10 - FINANCIAL APPRAISAL

The project, based on a joint venture agreement, aims at producing pre-assembled houses to be marketed in the local market. The agreement, will be using the patented technology of the Italian partner.

The foreseen plant capacity is 60.970 m^2. The Chilean partner will be in charge of obtaining the necessary permits and licenses. Issues related to land, building, local labour, collection and procurement of raw material and any other input related to the operational aspect of the Project will also fall under his supervision and responsibility.

The Italian party will be responsible for the technology transfer, training of technicians and, acquisition of machinery and plants.

The financial analysis regarding this investment project has been carried out using COMFAR, the financial package developed by the Industrial Investment Division of UNIDO.

The following Tables present the input data which have been used to perform the financial analysis with the UNIDO COMFAR system (see also Annex 6).

Data have been rearranged on the basis of the information provided by the project team members following a supervision mission in the Country.

The Project intends to produce and sell on the Chilean market three different products/types of prefabricated houses.

The prices (costs and sales) are constant over the 10 years of cash flow calculation.

The construction phase will last one year (1996).

10.1 Investment costs

In Table X-1, is the list of investment costs for the Project.

It includes the following items: fixed investment costs, pre-production costs, net initial capital.

1. Fixed investment costs.

   They include:
   - site preparation
   - civil works
   - plant machinery supply
   - auxiliary equipment and works
   - environmental protection system
   - incorporated fixed assets as engineering and technical assistance and training.

INVESTMENT COSTS		LOCAL COSTS	LOC. COSTS (equivalent, in US$)	FOREIGN COSTS
		pesos	US$	US$
LAND PURCHASE		70,000,000	175,000	
SITE PREPARATION				
	STRIPPING	45,000,000	112,500	
	FOUNDATION DIGGING	480,000	1,200	
CIVIL WORKS				
	PLANT BUILDING	58,185,600	145,464	1,062,328
	FOUNDATIONS	39,200,000	98,000	
	FOUNDATION STEEL	29,400,000	73,500	
	STEEL BUILD. COVERAGE	117,152,000	292,880	
	MAINTENANCE BUILD.	7,308,000	18,270	21,690
	OFFICES	39,440,000	98,600	
	SOCIAL BUILDING	100,572,000	251,430	
	POLYSTYRENE STORE	29,232,000	73,080	86,760
	ACCESSORIES STORES	9,744,000	24,360	28,920
	TRUCK BUILDING	7,056,000	17,640	60,732
	ELECTRIC STATION	200,000	500	
	KEEPER LODGE	200,000	500	
PLANT MACHINERY SUPPLY				
	MACHINERY			7,645,410
	TRANSPORT	40,000,000	100,000	815,000
	ASSEMBLING			211,750
AUX. EQUIPMENT AND WORKS				
	FENCING	5,980,000	14,950	
	GAS STORAGE	1,000,000	2,500	
	GAS DISTRIBUTION	812,500	2,031	
	EXTERNAL LIGHTING	6,600,000	16,500	
	DRAIN AND SEWAGE SYSTEM	2,080,000	5,200	
	GREEN AREAS AND CURBS	9,750,000	24,375	
	ASPHALT AND SURF.FINISH.	64,470,000	161,175	
ENVIRONMENTAL PROTECTION				
	CEMENT PLANT TREATMENT	6,000,000	15,000	45,000
	SEWAGE TREATMENT	6,000,000	15,000	30,000
ENGIN. & TECH. ASSISTANCE				149,250
TRAINING				60,000
PARTIAL TOTAL		695,862,100	1,739,655	10,216,840
TOTAL	11,956,495			
ADDITIONAL FINANCIAL REQUIREMENTS				
PRE-PRODUCTIVE EXPENSES				
	PRE-INVESTMENT ACTIVITIES			320,000
NET INITIAL CAPITAL				400,000
PARTIAL TOTAL		0		720,000
TOTAL	720,000			
TOTAL INVESTMENT	12,676,495			

Table X-1 - INVESTMENT COSTS

2. Additional fixed financial requirements

They include:
- pre-investment activities
- net initial capital requirements

Most items were described in previous Chapters.

Transport of supplies refers to transport of imported machinery and of parts of buildings which are to be imported (see Chapter 1).

Assembling refers to the technical staff which will operate at the site for the assembling and start-up of imported machinery. It was evaluated on the basis of 26 man/months of expatriates with a monthly, overall salary of 7,000US$ per month, and of n° 17 round tickets.

Engineering and technical assistance includes the selection of machinery according to the final marketing programme, the selection of final factory layout, the design and technical specifications of the buildings and of auxiliary systems, as well as a 6-month supervision during the factory construction.

Item "training" refers to three expatriates for one month in Chile (3 x 8,000 US$; plus 3 round trip tickets) and five Chileans to be trained in Italy (the factory manager, the two foremen, the head of maintenance and one technician) for about 20 days.

The fixed investment costs (see Table X-2), have been allocated following the list presented in the COMFAR system. The total amount represents the amount (in Dollars and Pesos) necessary to install the manufacturing plant and the machinery. The total amount inputed in the COMFAR in year 1 of the project (1996), is 13,643,855 US$.

The total investment of 13,643,855 US$ has been allocated as follows: 11,603,885 US$ in fixed assets and the balance in net working capital and pre-production expenditures, in order to meet the cash requirements of the Project for the first months of operation.

Investment in land purchase has been estimated at 70 million Pesos.

A total sum of about 2,000,000 US$, distributed between civil works and auxiliary and plant equipment, has been envisaged for the factory construction, procurement of fuel/gas containers and the auxiliary and plant equipment.

In the basic assumption, selected conservatively, the productivity has been estimated as follows:

- The first production year (1997), the productivity is estimated at 25% of the rated value.
- The second production (1998), the productivity is estimated at 50% of the rated value.
- From the third year the productivity is confirmed at 75% of the rated value.

These assumptions allow the evaluation of the benefits in a "risky" situation. In the sensitivity analysis, different productive projections have been estimated and calculated.

FIXED INVESTMENT COSTS - TOTAL
us dollars

	Total construction	Total production	Construction 1996
Land purchase	175000.00	0.00	175000.00
Site preparation and development	113700.00	0.00	113700.00
Civil works, structures and buildings	2354654.00	0.00	2354654.00
plant building 1	1082323.00	0.00	1082323.00
foundations	98000.00	0.00	98000.00
foundations steel	73500.00	0.00	73500.00
maintenance build.2	18270.00	0.00	18270.00
offices	98600.00	0.00	98600.00
social building	251430.00	0.00	251430.00
polystyrene store 2	86760.00	0.00	86760.00
accessories store 2	28920.00	0.00	28920.00
trucks building 2	17640.00	0.00	17640.00
electric station	500.00	0.00	500.00
keeper lodge	500.00	0.00	500.00
plant building 2	145464.00	0.00	145464.00
maintenance build. 1	21690.00	0.00	21690.00
polystyrene store 1	73080.00	0.00	73080.00
accessories store 1	24360.00	0.00	24360.00
trucks building 1	60732.00	0.00	60732.00
steel building coverage	292880.00	0.00	292880.00
Plant machinery and equipment	8168910.00	0.00	8168910.00
assembling	211750.00	0.00	211750.00
transport 2	211750.00	0.00	211750.00
machinery	7645410.00	0.00	7645410.00
transport 1	100000.00	0.00	100000.00
Auxiliary and service plant equipment	226731.25	0.00	226731.25
fencing	14950.00	0.00	14950.00
gas storage	2500.00	0.00	2500.00
external lighting	16500.00	0.00	16500.00
green area	24375.00	0.00	24375.00
gas distribution	2031.25	0.00	2031.25
asphalt and surf.	161175.00	0.00	161175.00
drain & sewage system	5200.00	0.00	5200.00
Environmental protection	105000.00	0.00	105000.00
cement plant 1	15000.00	0.00	15000.00
cement plant 2	45000.00	0.00	45000.00
sewage treat 1	15000.00	0.00	15000.00
sewage treat 2	30000.00	0.00	30000.00
Incorporated fixed assets (project overheads)	0.00	0.00	0.00
Contingencies	460000.00	0.00	460000.00
contingencies	60000.00	0.00	60000.00

INVESTMENT COSTS - TOTAL
us dollars

	Total construction	Total production	Construction 1996
Total Fixed Investment Costs	11603995.25	0.00	11603995.25
Total Pre-Production Expenditures	1634250.00	0.00	1634250.00
Pre-Production Expenditures (net of interest)	529250.00	0.00	529250.00
Interests	1105000.00	0.00	1105000.00
Increase in Net Working Capital	80000.00	311788.25	80000.00
TOTAL INVESTMENT COSTS	13318245.25	311788.25	13318245.25
Foreign share (%)	83.78	28.70	83.78

Table X-2 - Fixed investment costs

10.2 Operation costs

The nominal production capacity of 60,970 m^2 for the equivalent of 671 pre-assembled houses, will produce 45,727 m^2 of houses at the assumed productive capacity of 75% from the third year of production onwards.

Given the "unlimited" availability of raw material involved, the estimated production capacity should be achieved without shortcomings. Also from the sales point of view, given the high level of demand due to the large governmental housing schemes, which guarantees the complete absorption of the project's production, no market failure is assumed.

The Project is labour-intensive.

The labour requirements, classified according to main groups, present the following range of payrates: from 3,432 US$/year, to 17,875 US$/year, including taxes and social contributions. At full operation, 218 people will be employed by the project including the administration and management work force.

In the "Pre-productive expenses" item, a training component has been estimated.

In the "Working Requirements" table, the following parameters for the success of the Project have been taken into consideration:

a) Given the unperishable nature of the products, 60 days of finished product is the mandatory stock requirement condition which must be met.

b) In order to counter-balance the cash requirements of the Project's major inputs, a period of 30 days has been foreseen for both "Accounts receivable" and "Accounts payable".

The production indirect recurrent costs (see Annex 6), are mainly represented by labour costs both in the production and installation phase, administrative and marketing costs. Administrative overheads (general costs) have been also included.

The total amount considered is 506,698 US$ recurrent every year starting from the first production year (1997), to the last year of the calculation (2006).

The direct production costs are related to the three products foreseen: namely IH40, two-floor two-unit, and four-floor sixteen-unit types.

Those costs are the following:

IH40 type:	6,378,293 US$ per year;
2-FL, 2-UN type:	3,389,532 US$ per year;
4-FL, 16-UN type:	5,980,055 US$ per year.

The total costs per year are 15,747,880 US$.

10.3 Sales and revenues

The sales programme, has been considered according to the total square meters produced, multiplied by the sales price in Pesos. Data referring to nominal rated production capacity are in Table X-3.

10.4 Costs and Sales

The cash flow Table (see Annex 6) presents the flows of costs and sales over the 10 years of project calculation.

The presented cash flow is based on the assumption that only the 75% of the productivity will be maintained from the third year of the productive phase. This basic assumption allows to re-examine the sales programme inputing higher productive parameters in the sensitivity analysis.

10.5 Project financing

The Joint-Venture's structure foresees an equal distribution of the Company's shares between the two Partners for a total value of 2,000,000 US$.

The remaining 11,700,000 US$ need to be covered by external financing. The proposed scheme for such coverage is 11,700,000 US$ in the international market, at 8% interest rate, to be reimbursed over a 5 year period.

10.6 Financial results

Tables in Annex 6 report the results of the financial analysis performed through the COMFAR system. In all Tables, data are restricted to 2002, being the data the same for all subsequent years.

The Project presents a financial IRR of 24.29% (including corporate taxes of 35%), with a discount rate of 12% and a positive Net Present Value. This represents a minimum but sustainable investment ratio, considering that additional tuning of data might increase the IRR (i.e. including full production from the first year).

10.6.1. Net income statement:

This Table provides a concise and yearly overview of the annual turnover (total sales), direct costs, indirect costs, depreciation, interest expenditures, income tax expenses and net profit generated by the investment project.

The Project, after a construction period of one year, will rely on a net profit (assuming a zero-level inflation rate and after 35% of corporate tax) from -516,480 US$ to a maximum level of 3,264,862 US$ in year 10.

		TOTAL	IH40	2-FL,2-UN	4-FL,16-UN
NOMINAL SURFACE PRODUCED	m2/year	60,970	22,220	12,830	25,920
UNIT SALES REVENUES	pesos/m2		178,349	233,900	210,510
STANDARD YEAR PRODUCTION	m2/year	60,970	22,220	12,830	25,920
SALES REVENUES	pesos/year	**12,420,270,980**	3,962,914,780	3,000,937,000	5,456,419,200
SALES REVENUES	US$/year	**31,050,677**	9,907,287	7,502,343	13,641,048
FIRST-YEAR PRODUCTION	m2/year	40,113	15,554	6,415	18,144
SALES REVENUES	pesos/year	**8,094,002,286**	2,774,040,346	1,500,468,500	3,819,493,440
SALES REVENUES	US$/year	**20,235,006**	6,935,101	3,751,171	9,548,734

Table X-3 - Nominal sales revenues

10.6.2. Cash Flow

The liquidity aspect of the Project is clearly illustrated in the "Cash Flow" Table. This Table is a further confirmation that the Project should not encounter any short-term cash deficit.

10.6.3. Working Capital Requirements

This Table calculates the working capital requirement of the Joint Venture on the basis of the estimated coverage days indicated in point 10.2. At full utilisation capacity, the net working capital of the project equals 891,788 US$.

10.6.4. Sensitivity analysis

The most sensible parameter results the sales programme/productivity. All other parameters (investment and running costs) provide minimum modifications.

Therefore, we estimated two additional, less restrictive, sales/productivity programmes as follows:

Alternative 1:

a) year 1: 50% of productivity for all products;

b) from year 2, ongoing: 75% of productivity for all products.

This alternative provides an I.R.R. of 28%.

Alternative 2:

a) year 1: 50% of productivity for all products;

b) from year 2, ongoing: 100% of productivity for all products.

This alternative provides an I.R.R. of 37%.

ANNEX 1 - TYPICAL COMPOSITION OF LIQUID WASTE FROM THE FACTORY

CTA
Centro Tecnico Ambientale
e Antinquinamento s.r.l.

CERTIFICATO N. 902/L/92 DEL 18/02/1992

Ragione sociale : RAPID CASA
Sede : Terni
Campione di : acque lavaggio betoniere
Data prelievo : 06.02.92
Punto prelievo : 1a vasca

CARATTERISTICHE ORGANOLETTICHE

- Stato fisico : liquido - Aspetto: opalescente
- Colore : incolore - Odore : s.g.

VALORI CONSENTITI IN ITALIA

RISULTATO DELLE ANALISI CHIMICHE

		TAB. A (L. 319/76)
- Acidita' attuale come pH.....un,pH	+10,92	5,5-9,5
- Solidi sedimentabili 2h.....ml/l	+4,6	0,5
- Conducibilita' elettrica.....uS/cm	870	-
- Materiali in sospensione.....mg/l	+110	80
- BOD5.....mg/l	=	40
- COD.....mg/l	150	160
- Azoto ammoniacale.....mg/l	0,3	15
- Azoto nitroso.....mg/l	=	0,6
- Azoto nitrico.....mg/l	=	20
- Fosforo totale.....mg/l	=	10
- Tensioattivi.....mg/l	=	2
- Cloruri.....mg/l	=	1.200
- Solfati.....mg/l	=	1.000
- Solfiti.....mg/l	=	1
- Grassi e olii animali e vegetali...mg/l	=	20
- Olii minerali.....mg/l	4,1	5
- Fenoli totali.....mg/l	=	0,5
- Cianuri totali.....mg/l	<0,01	0,5
- Bario.....mg/l	=	20
- Cadmio.....mg/l	<0,01	0,02
- Cromo III.....mg/l	<0,01	2
Cromo VI.....mg/l	<0,02	0,2
- Ferro.....mg/l	0,55	2
- Mercurio.....mg/l	=	0,005
- Nichel.....mg/l	=	2
- Piombo.....mg/l	0,11	0,2
- Rame.....mg/l	0,01	0,1
- Zinco.....mg/l	0,10	0,5

GIUDIZIO: i valori riscontrati non rientrano nei limiti previsti dalla tab. A della L. 319/76 limitatamente ai valori di "pH-MATERIALI IN SOSPENSIONE- SOLIDI SEDIMENTABILI".

Convenzionato Delta Control

ANNEX 2 - OFFER FOR CEMENT SUPPLY

Cemento Melón S.A.
Miraflores 178 - 4° Piso
Santiago de Chile

Telefono: (56-2) 6381005
Fax: (56-2) 6394979

Cemento Melón

30 de Marzo, 1995
96-C-V/95

Señor
Nelson Cataldo
Intertransports Center S.P.A.
Presente

Estimado señor :

De acuerdo a lo solicitado, tengo el agrado de hacer llegar a usted, nuestras condiciones comerciales de precio de cemento para el Proyecto **"Instalación Planta Prefabricados de Hormigón Liviano"**

Cantidad	:	Aproximadamente 13.800 ton/año.
Producto y Precio	:	Cemento Melón Extra Granel. $ 55.884,00 + I.V.A. por tonelada. Cemento Melón Super Granel. $ 61.395,00 + I.V.A.
Lugar de entrega	:	Puesto en vuestra planta.
Forma de pago	:	Contado.
Reajustabilidad	:	El precio se reajustará mensualmente de acuerdo a la variación que experimente el Indice de Precios al Consumidor (I.P.C.), entre el mes anterior a la fecha de facturación y el mes de febrero de 1995 (245,25).
Asesoría Técnica	:	Cemento Melón cuenta con un equipo de profesionales que pueden asistir a sus técnicos en el mejor uso de nuestros productos, lo que incide directamente en la calidad de las obras a ejecutar. Este servicio es gratuito y puede ser utilizado según acuerdo mutuo.

Cemento Melón S.A.
Miraflores 178 - 4º Piso
Santiago de Chile

Teléfono: (56-2) 6381005
Fax: (56-2) 6394979

Cemento Melón

Accesos : Se entiende que los precios y condiciones ofrecidas están sujetas a que los accesos a la faena permiten la operación normal de tránsito y descarga de nuestros productos con carga completa.

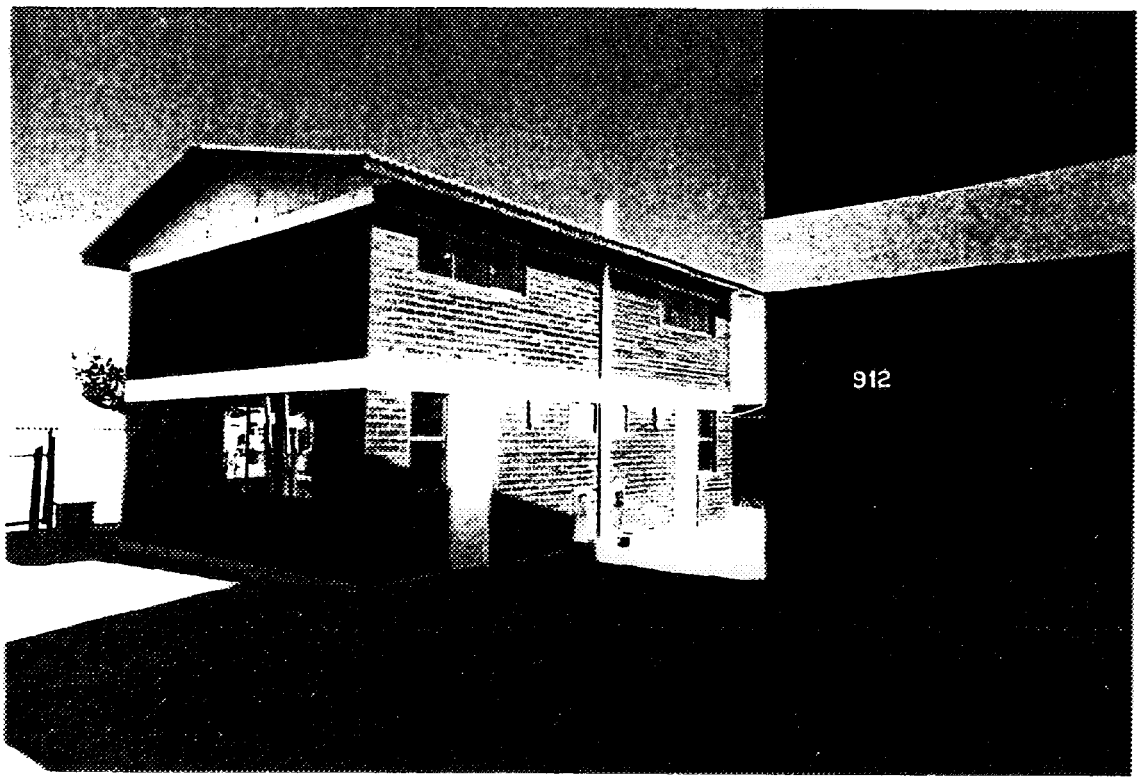
Validez de Oferta : 07 de abril, 1995.

Saluda muy atentamente a usted.

Patricio Díaz M.
Jefe Zonal de Ventas

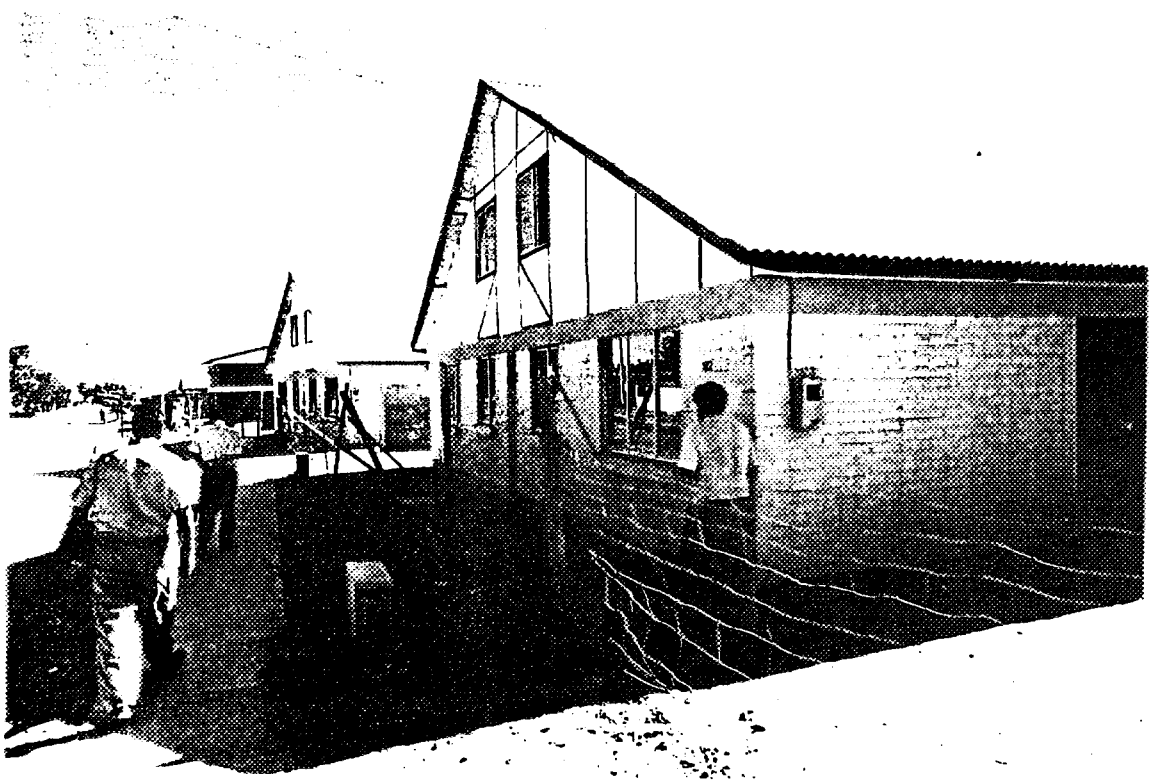
PDM/nor
c.c.: Archivo

ANNEX 3 - CHILEAN HOUSE CHARACTERISTICS IN THE RANGE OF LOW AND MEDIUM INCOME

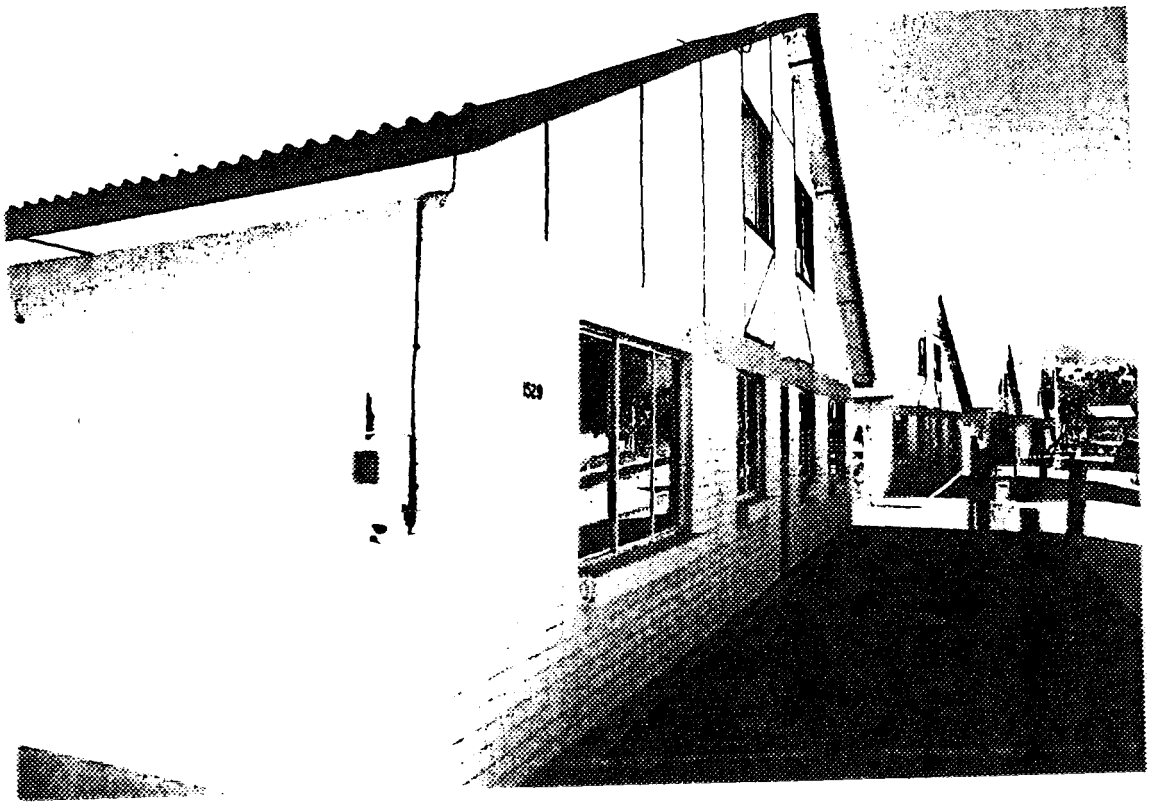


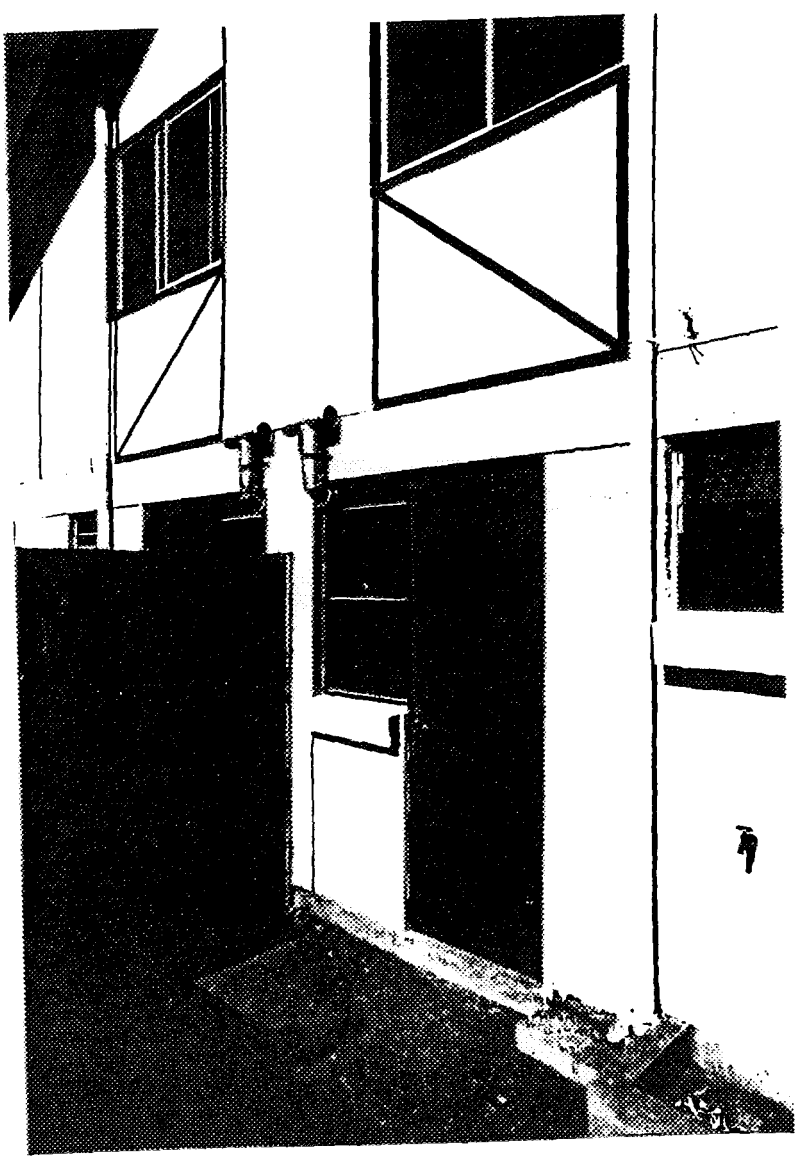
"VIVIENDA BASICA" 30 S.m.

LA CALERA



"SUBSIDIO UNIFICADO" 59 S.m. 840 U.F = $ 24'560

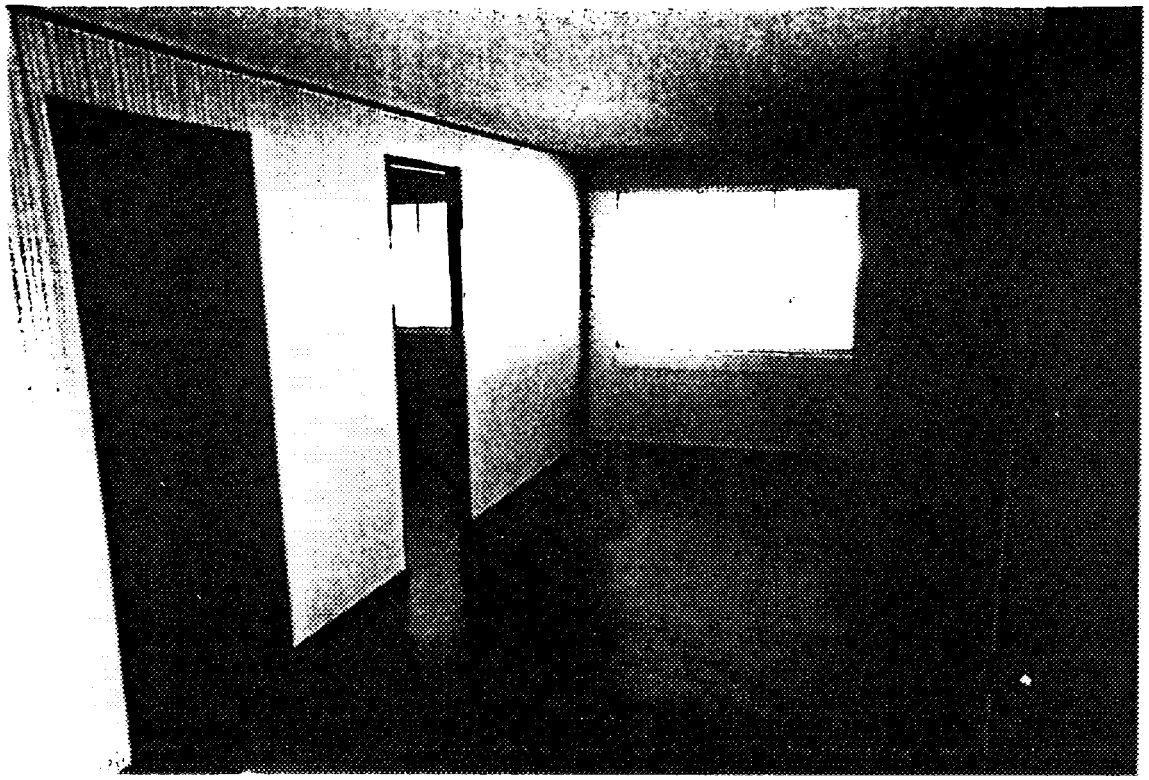




"SUBSIDIO UNIFICADO"

59 S.m.

840 U.F. = $ 24'560



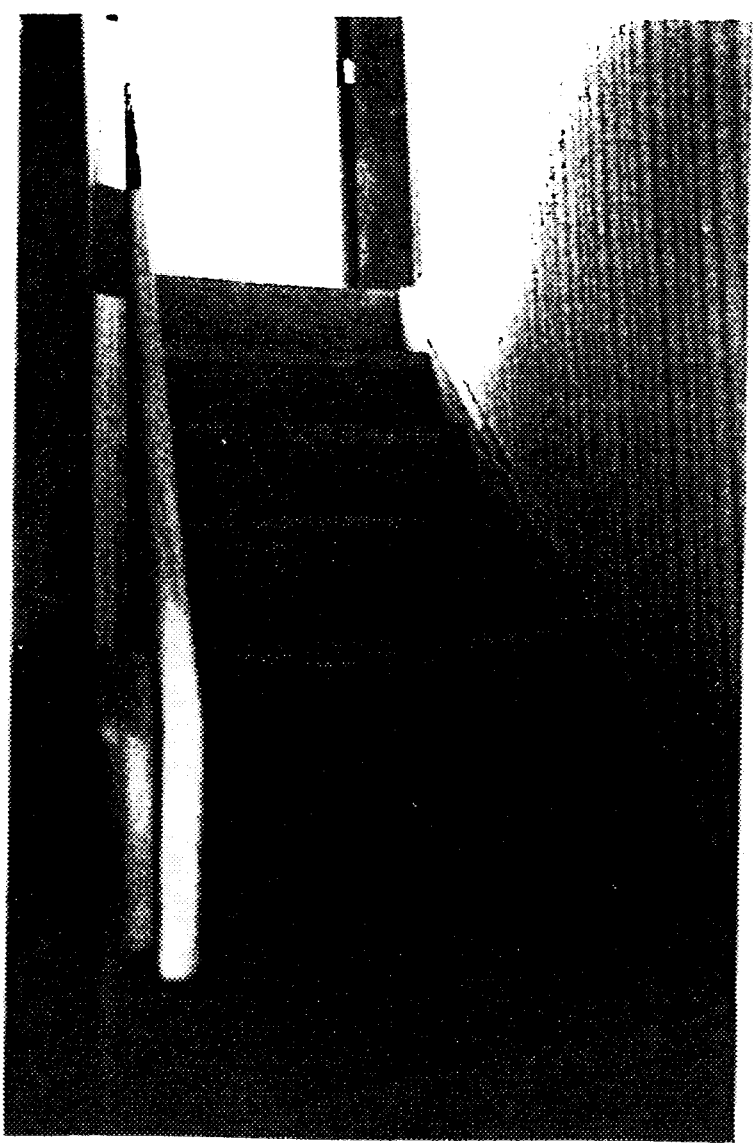
LIVING

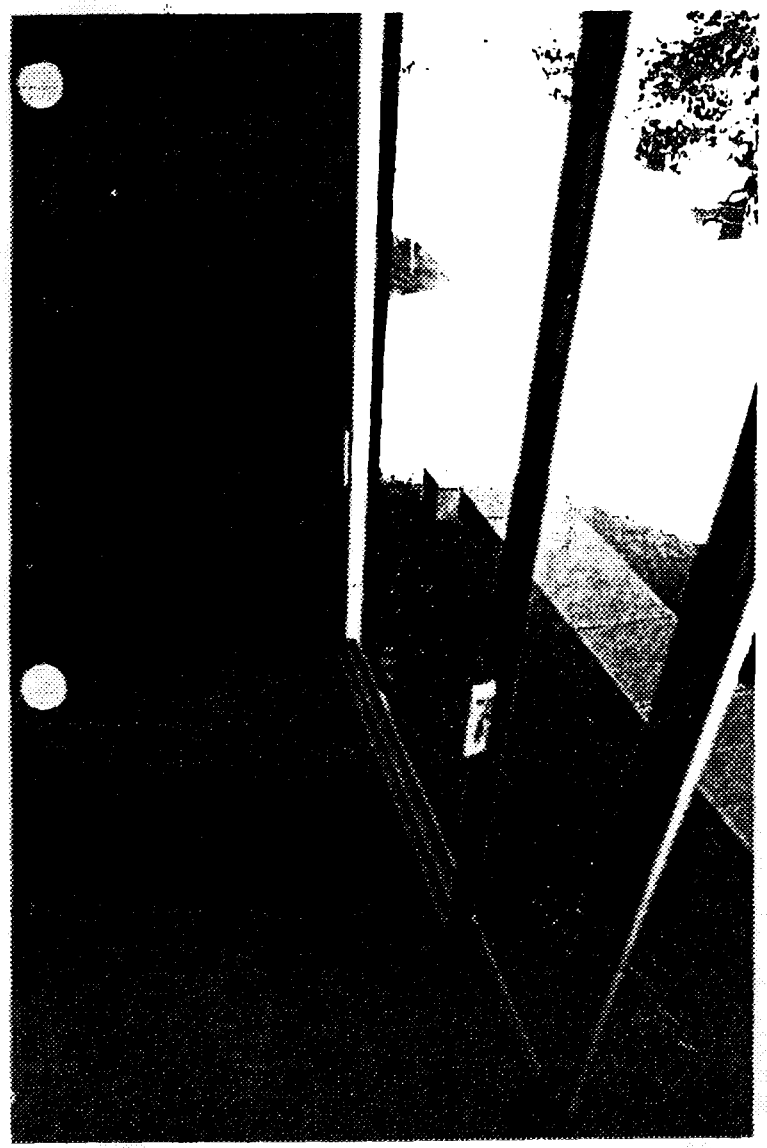
"SUBSIDIO UNIFICADO"
59 S.m.
840 U.F = $ 24'580

BATH-ROOM

KITCHEN

"SUBSIDIO UNIFICADO"
50 S.m.
840 U.F. = $ 24'560

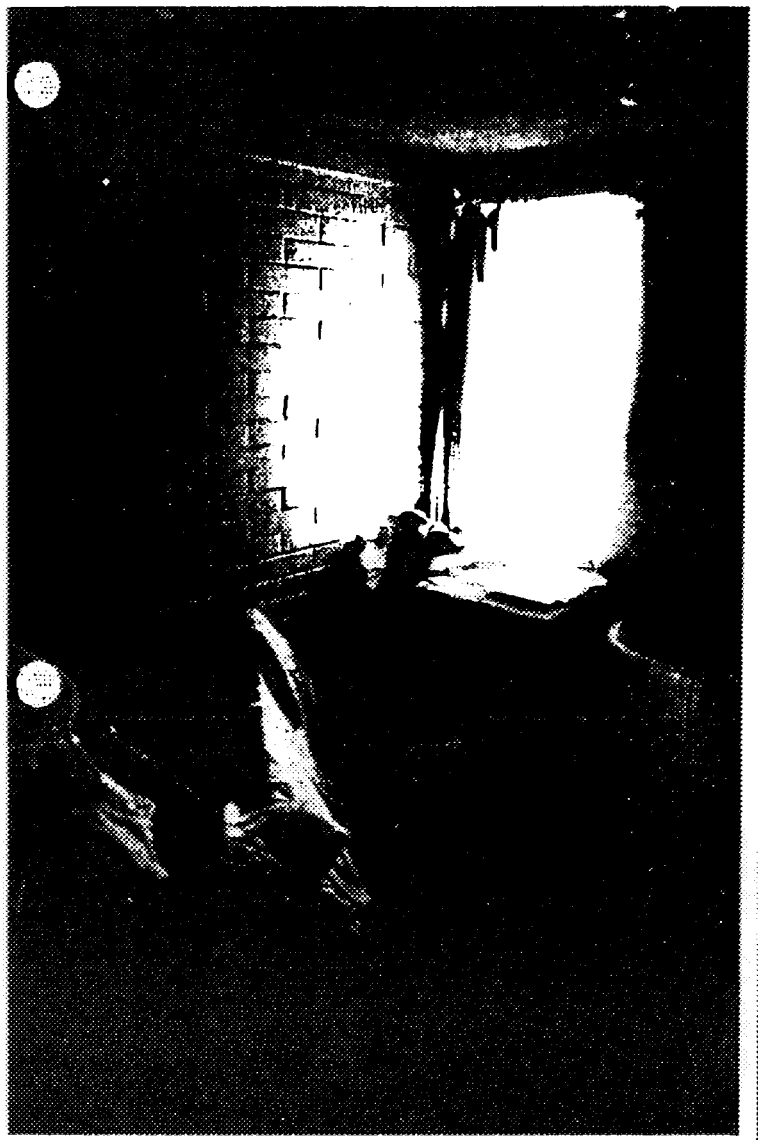




BEDROOM

"SUBSIDIO UNIFICADO"
59 S.m.
840 U.F = $ 24'560

LIVING



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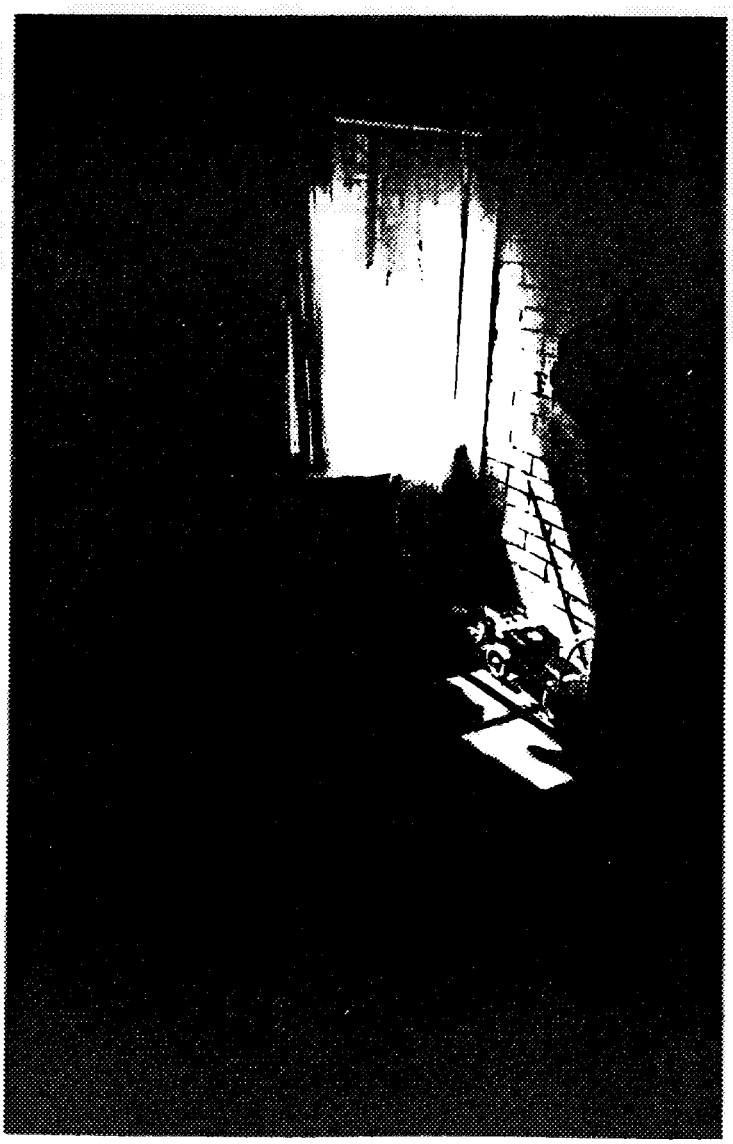
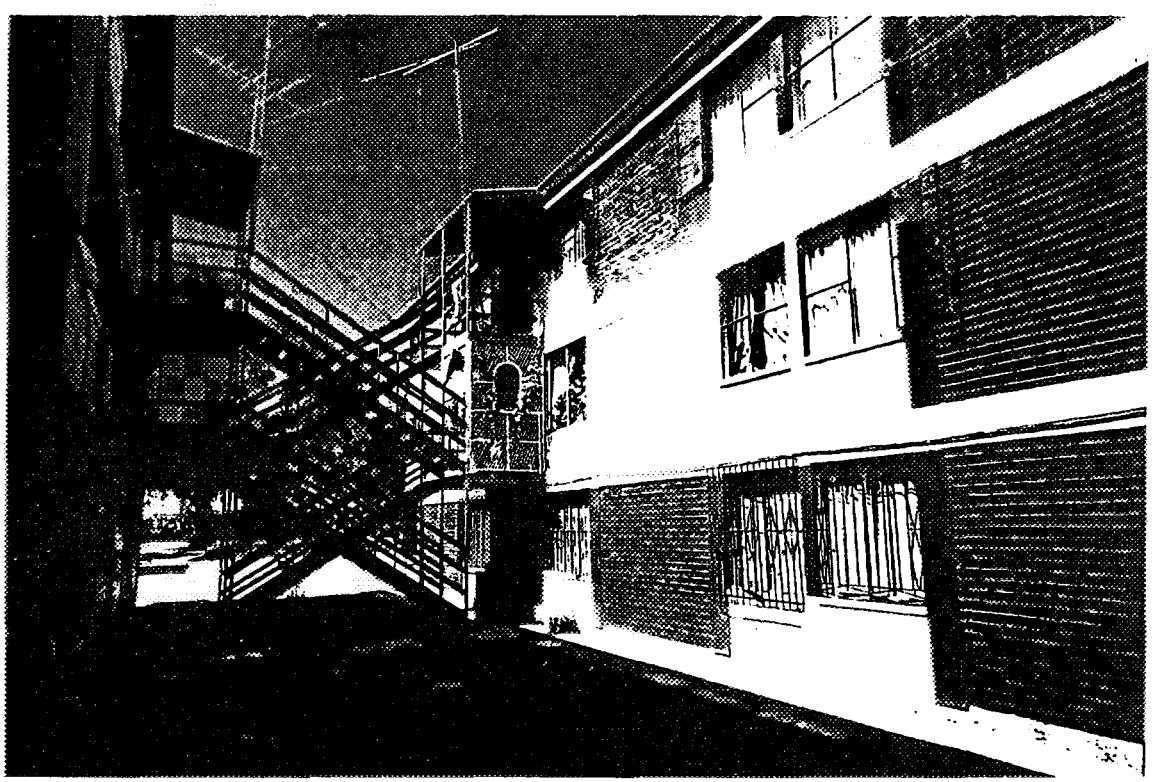
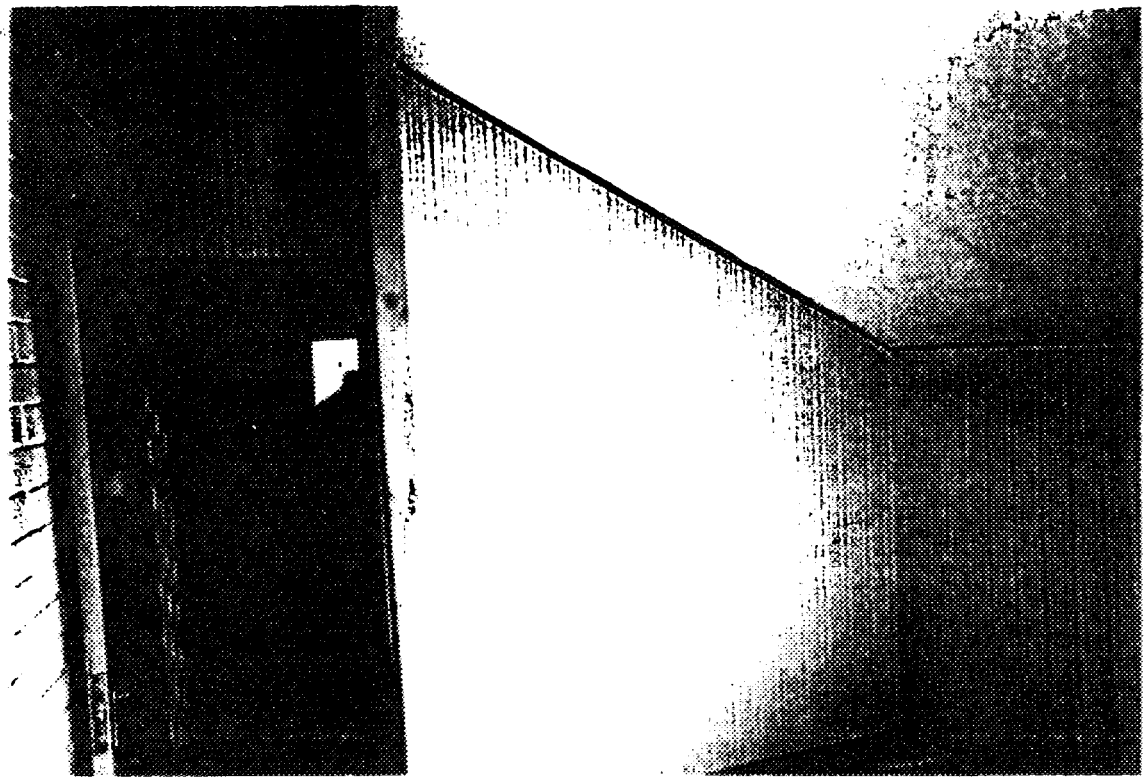


BEDROOM

LA CALERA

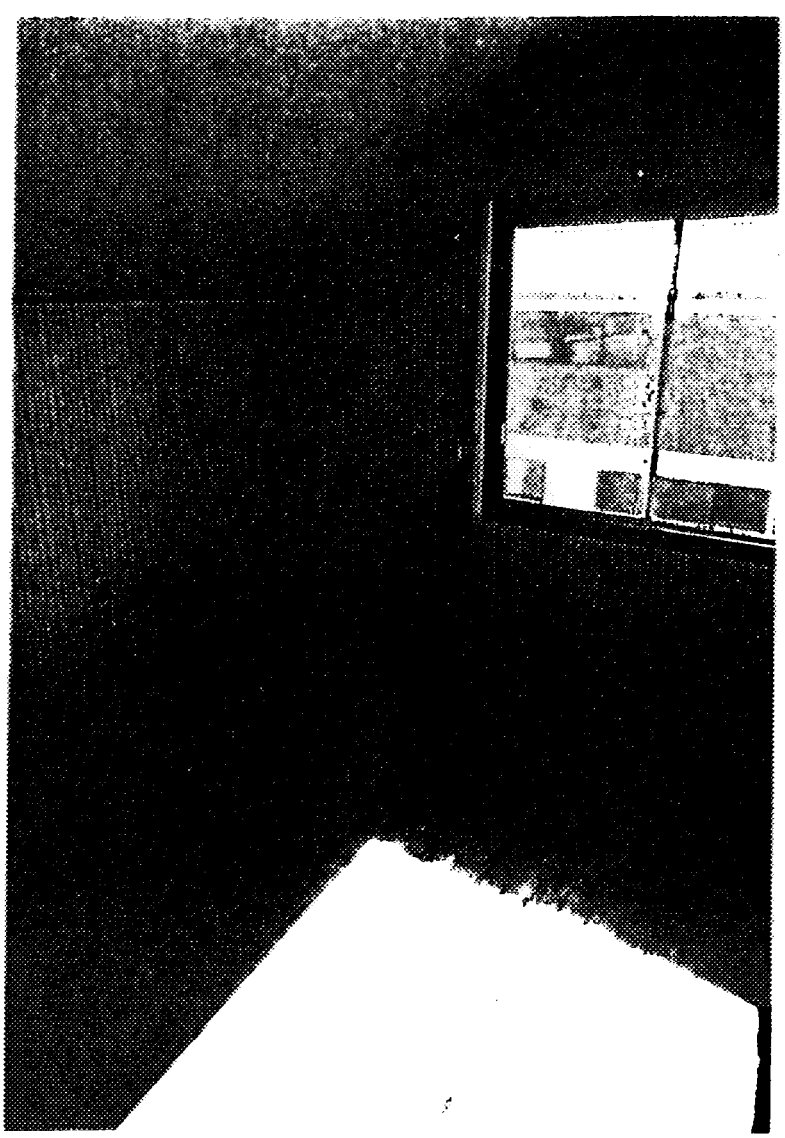


"SUBSIDIO UNIFICADO" 56 S.m. 500 U.F. = $ 14.600



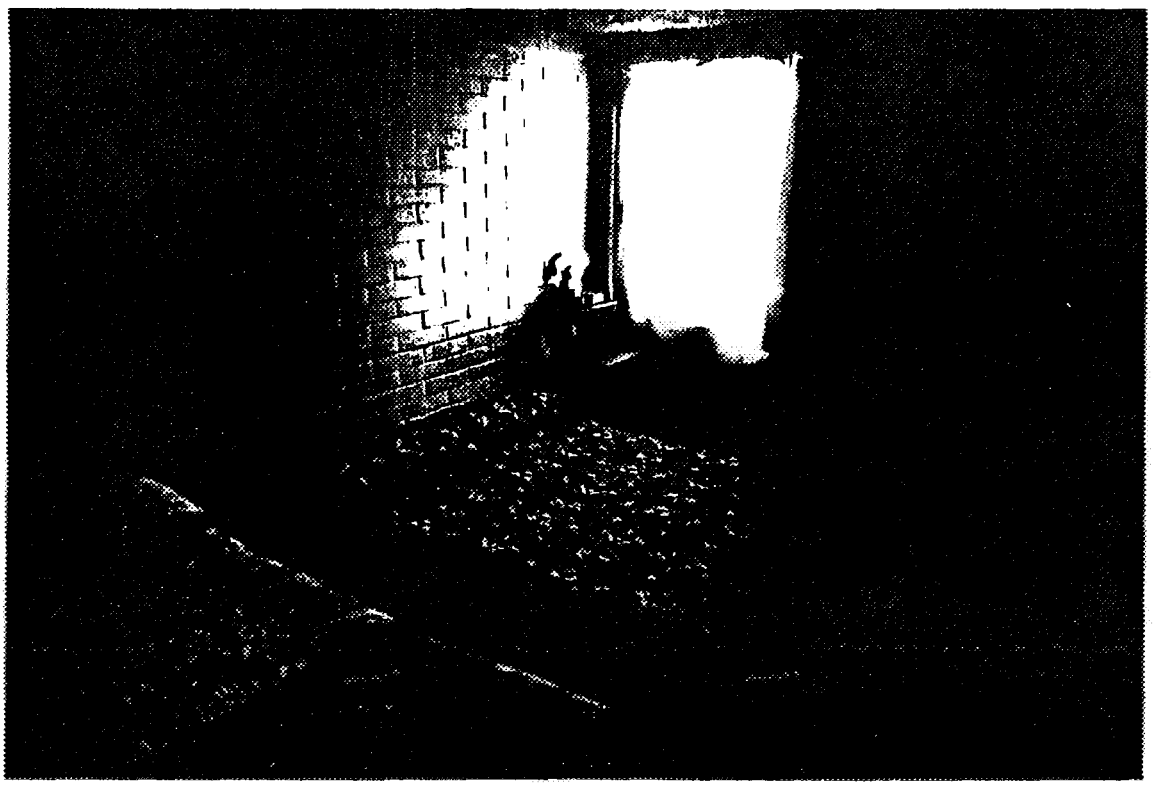
BEDROOM

"SUBSIDIO UNIFICADO"
59 S.m
840 U.F. = $ 24'560



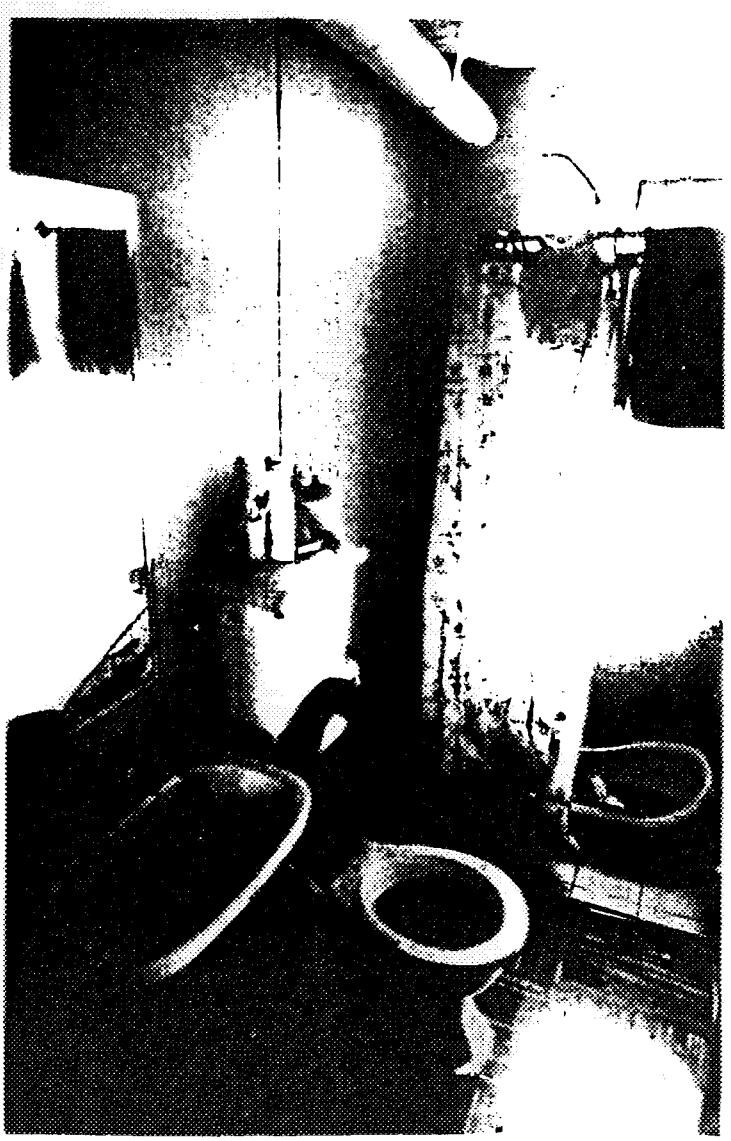
BEDROOM

BEDROOM



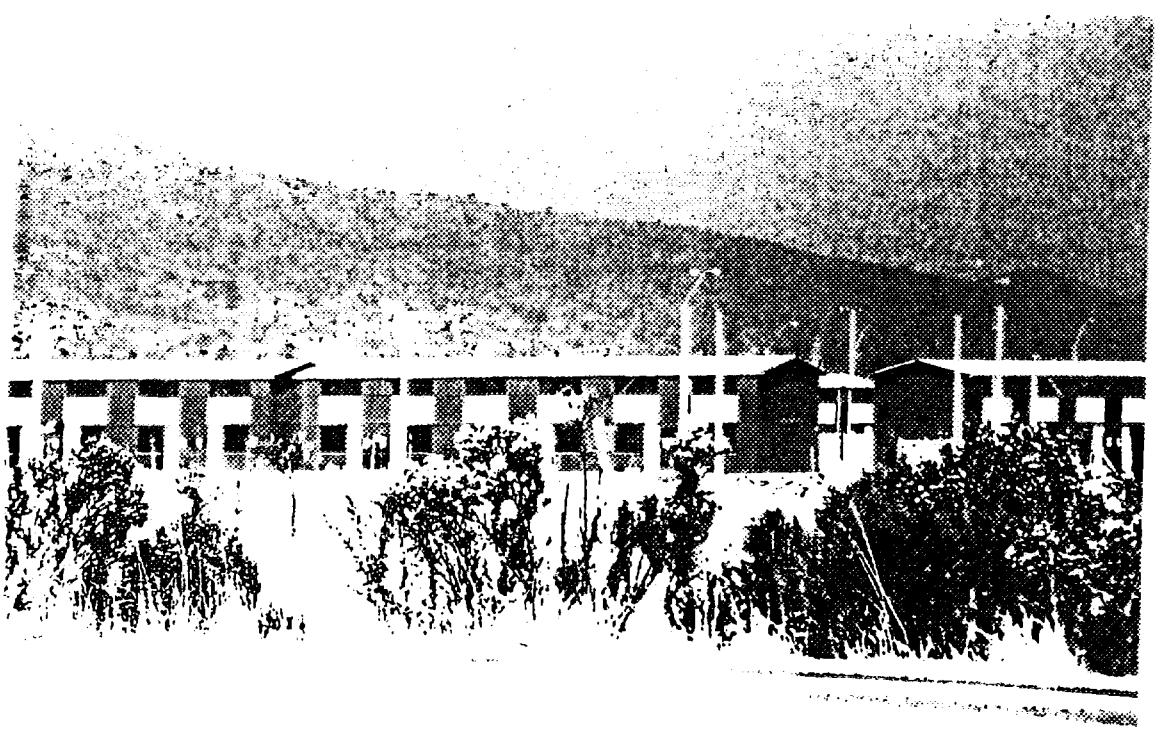
LIVING

KITCHEN



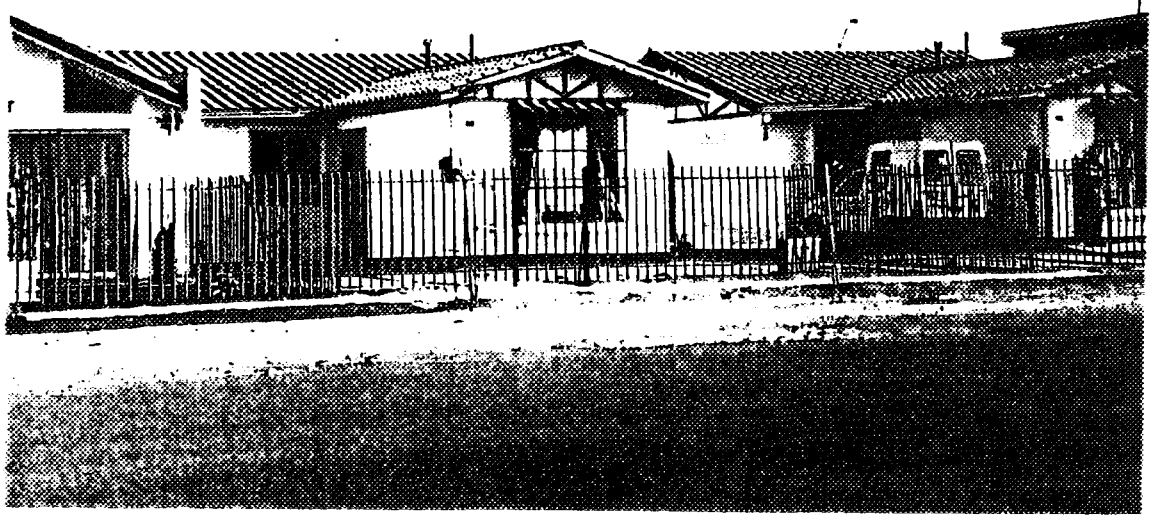
BATH-ROOM

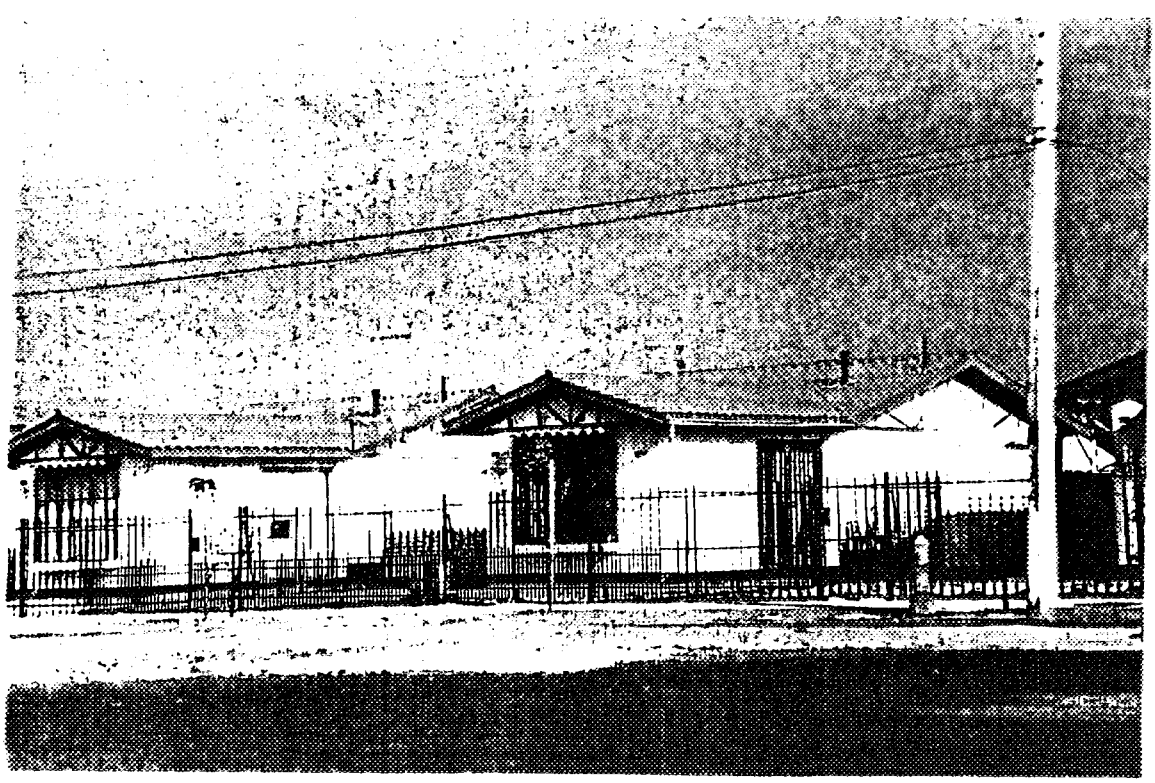
VILLA ALEMANA



SANTIAGO

VILLA ALEMANA





ANNEX 4 - CHILEAN HOUSE CHARACTERISTICS IN THE PRIVATE SECTOR (MEDIUM-HIGH AND HIGH INCOME RANGES)

PLAN DE VENTAS

PRECIO: DE 690 a 890 U.F.

FORMA DE PAGO:

- 10% a la reserva.• 15% durante período construcción.
- 75% a la entrega (Crédito Hipotecario)

EJEMPLO:

CON SUBSIDIO

Precio	Subsidio	Ahorro	Crédito	Dividendo 12 años	Dividendo 20 años
U.F. 690	U.F. 110	U.F. 60	U.F. 520	U.F. 5,6	U.F. 4,4
U.F. 780	U.F. 100	U.F. 70	U.F. 610	U.F. 6,6	U.F. 5,1
U.F. 820	U.F. 100	U.F. 80	U.F. 640	U.F. 7,0	U.F. 5,4

SIN SUBSIDIO

Precio	Pie	Crédito	Dividendo 12 años	Dividendo 20 años
U.F. 690	U.F. 180	U.F. 510	U.F. 6,0	U.F. 4,9
U.F. 780	U.F. 200	U.F. 580	U.F. 6,9	U.F. 5,6
U.F. 820	U.F. 210	U.F. 610	U.F. 7,2	U.F. 5,8

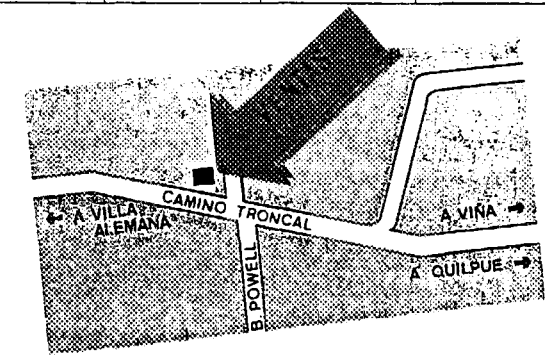
SU PLAN DE PAGO:

Precio	Reserva	Pie	Crédito	Dividendo 12 años	Dividendo 20 años

VENTAS:

R. Freire 1685
Camino Troncal
Paradero 17 El Belloto
(Ex. Base Aeronaval)

941343

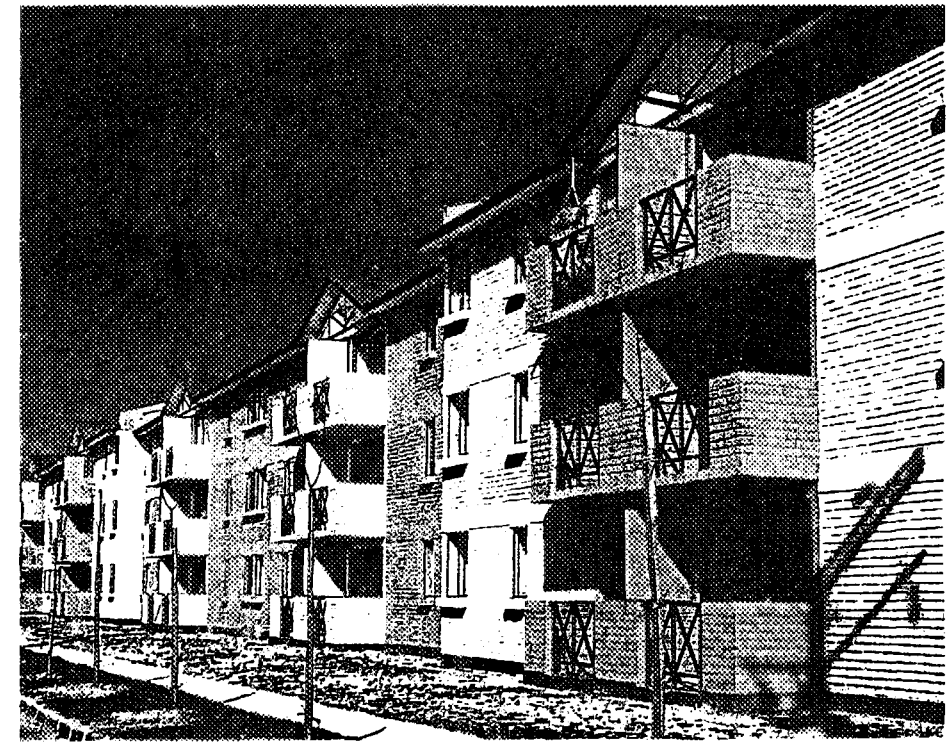


Atención todos los días del año

Propietario : Inmobiliaria El Belloto 2.000 S.A.

PARQUE RESIDENCIAL
El Belloto 2000

naturaleza..sol... y tranquilidad



PARQUE RESIDENCIAL

El Belloto 2000

Una gran urbanización en un excelente sector de la ciudad de Quilpué. Su buen clima, rodeado de naturaleza y tranquilidad le harán disfrutar plenamente su nuevo hogar.

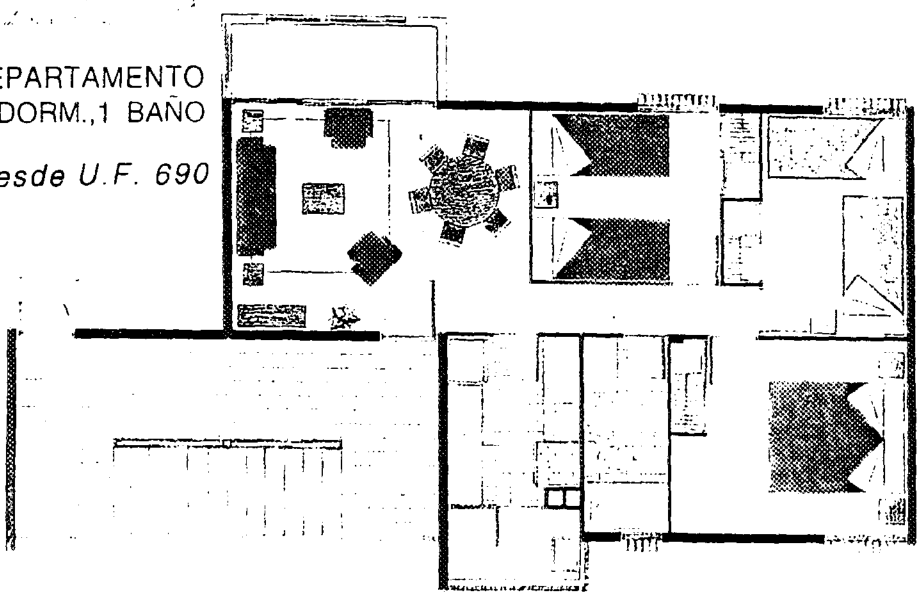
- Ubicación en el corazón de El Belloto (Ex Base Aeronaval) junto al camino troncal.
- Urbanización completa con amplias avenidas.
- Areas verdes
- Centro Comercial
- Inmejorable oportunidad de inversión
- Ventas con y sin subsidio

Caraterísticas de los departamentos

- Albañilería reforzada a la vista
- Tres dormitorios alfombrados
- Piso de flexit en living - comedor
- Baño completo con tina
- Closets terminados
- Loggia con lavadero
- Balcón
- Excelentes terminaciones

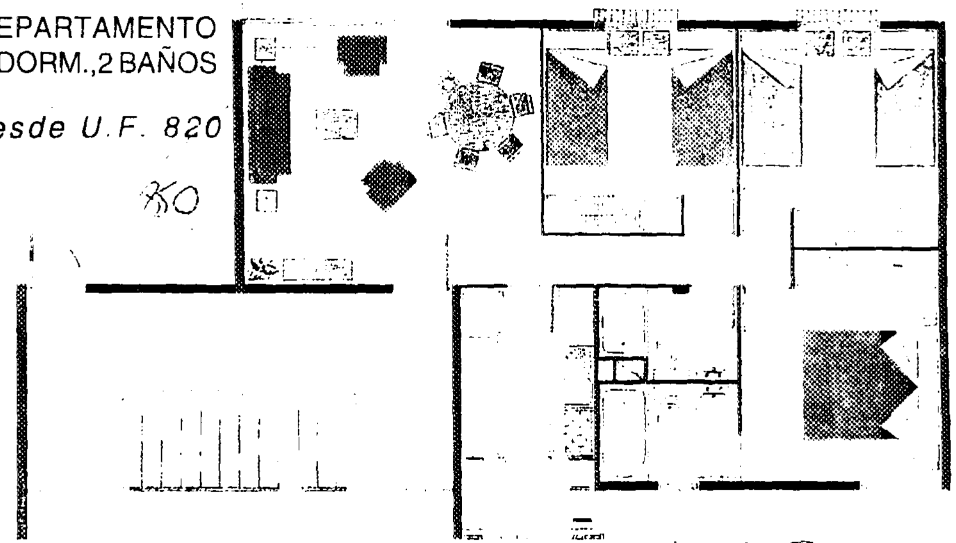
DEPARTAMENTO
3 DORM.,1 BAÑO

Desde U.F. 690



DEPARTAMENTO
3 DORM.,2 BAÑOS

Desde U.F. 820



P L A N D E V E N T A S

PRECIO: 1650 a 1860 U.F.

FORMA DE PAGO:

- 10% a la reserva.
- 15% durante período construcción.
- 75% a la entrega (Crédito Hipotecario)

EJEMPLO:

Precio	Reserva	Pie	Crédito	Dividendo 12 años	Dividendo 20 años
1650	165	255	1230	13,0	9,9
1700	170	260	1270	13,4	10,3
1800	180	270	1350	14,2	10,9
1860	186	284	1390	14,7	11,2

SU PLAN DE PAGO:

Precio	Reserva	Pie	Crédito	Dividendo 12 años	Dividendo 20 años

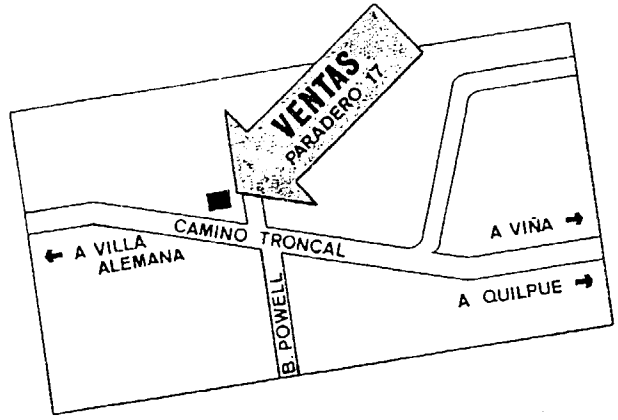
Los Gastos Generales de Operación se pagan al momento de firmar promesa de Compraventa.
La empresa tramita su crédito hipotecario

VENTAS:

R. Freire 1685
Quilpué
Fono: 941343

Atención todos los días del año

Arquitecto : C. Aguirre M.
Cálculo : ARCOSEN LTDA.
Construye : El Canelo S.A.
Financia : Banco Concepción

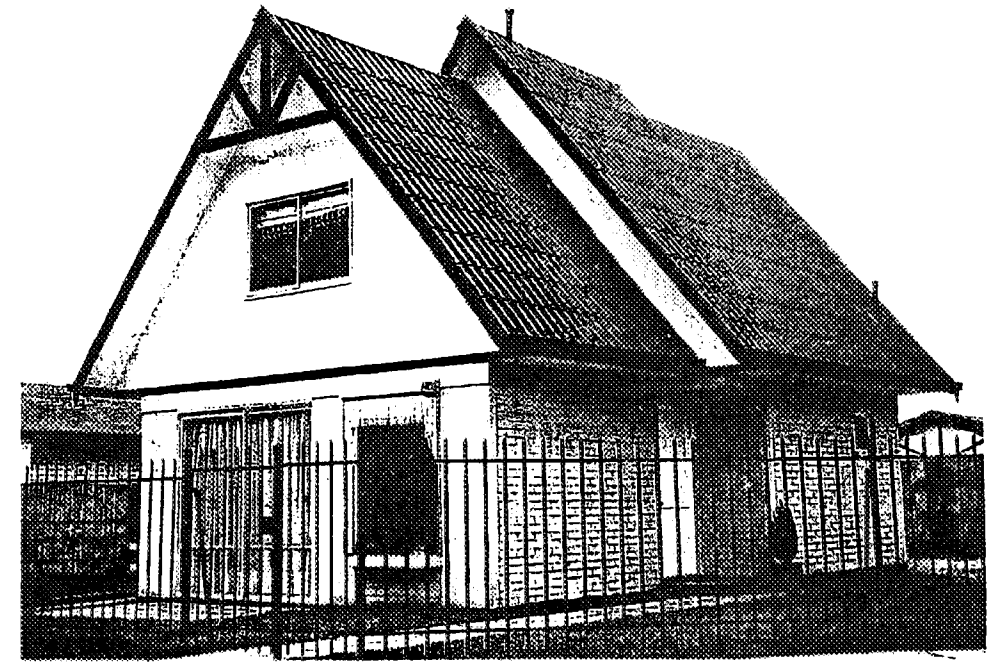


Propietario : Inmobiliaria El Belloto 2.000 S.A.

CONJUNTO RESIDENCIAL

Los Reyes

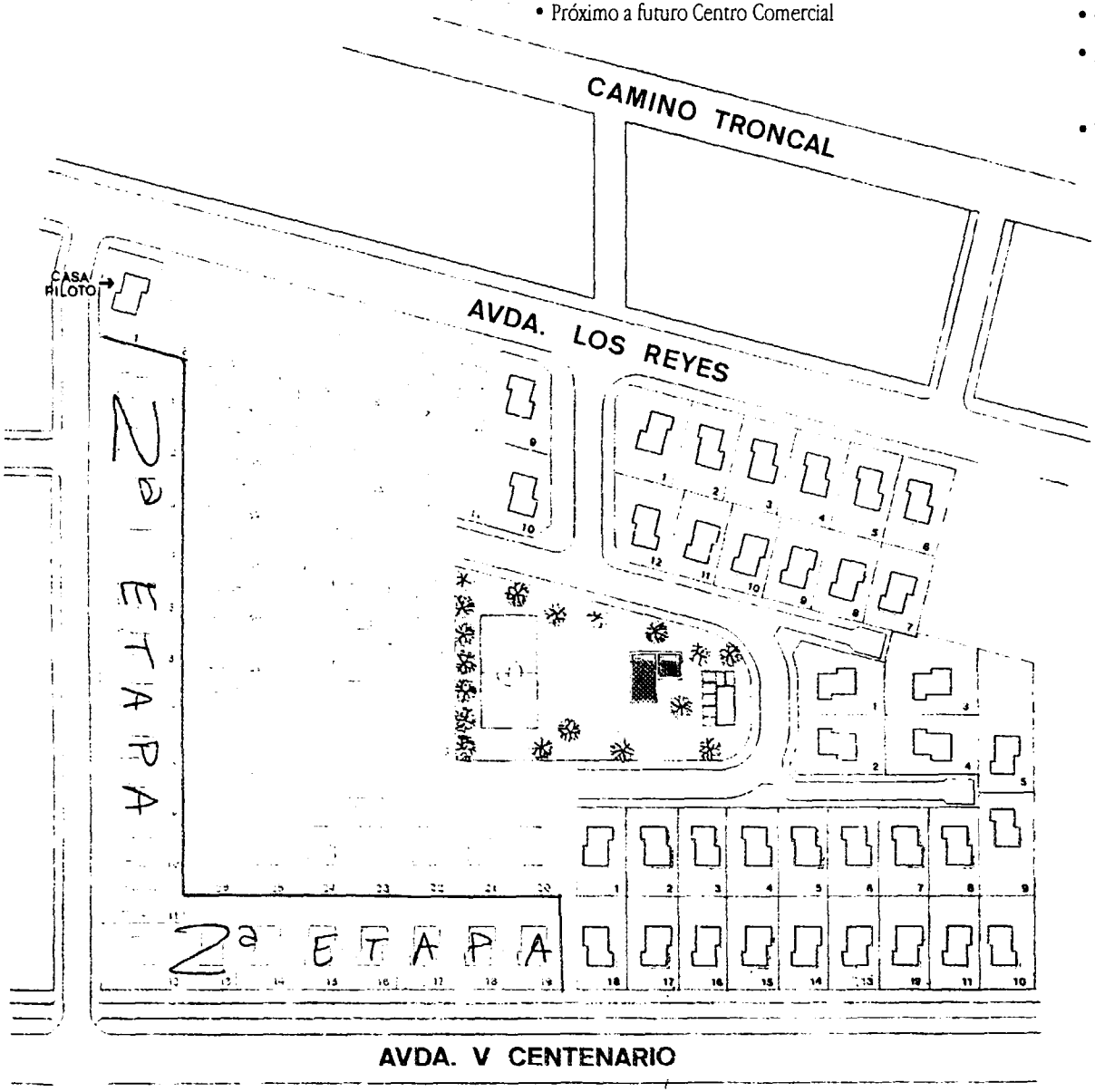
Casas aisladas de 90 m²



Los Reyes

El entorno

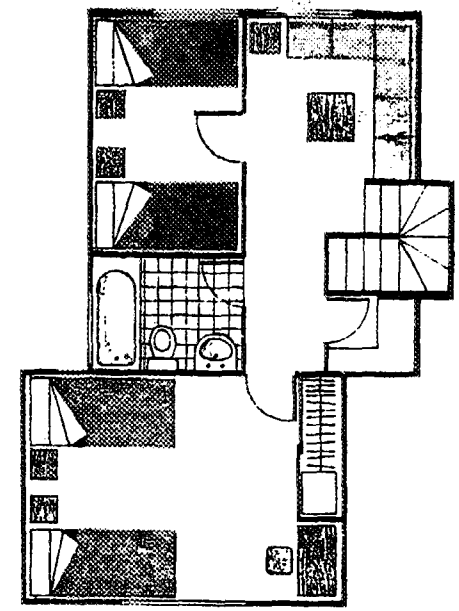
- Nueva Urbanización con Amplias avenidas y calles pavimentadas
- Toda la movilización a 150 mts.
- Multicancha y área verde construídas
- Piscina y Club House del Conjunto
- Próximo a futuro Centro Comercial



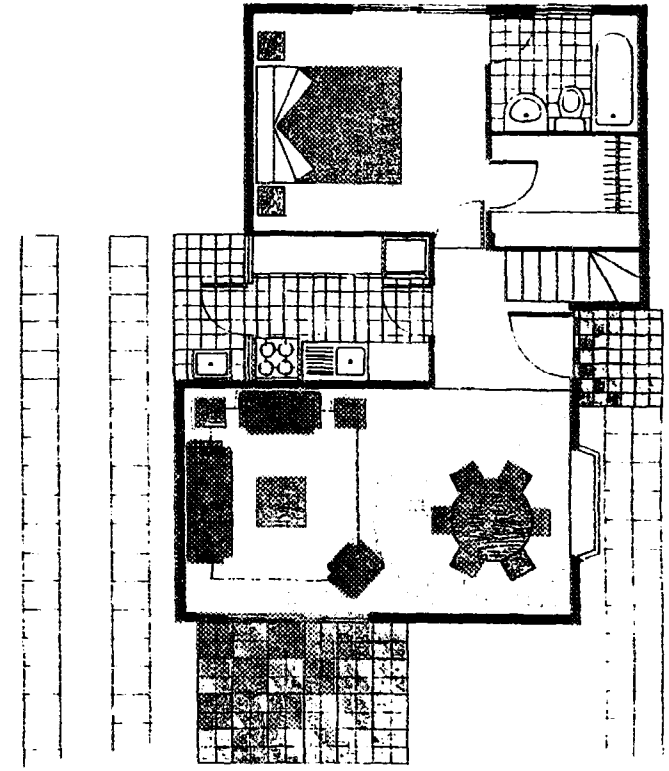
Su casa

- Casa aislada de 90 m² útiles. Ampliables
- Tres dormitorios, 2 baños ppal. en suite.
- Sala de estar familiar
  Amplios terrenos (220 mts²) con entrada para 2 autos.
- Cierros completos
- Finas terminaciones: Parquet - Alfombra - Cerámicos - 2 walk in closet - Cocina equipada
- Teléfono y TV Cable instalados

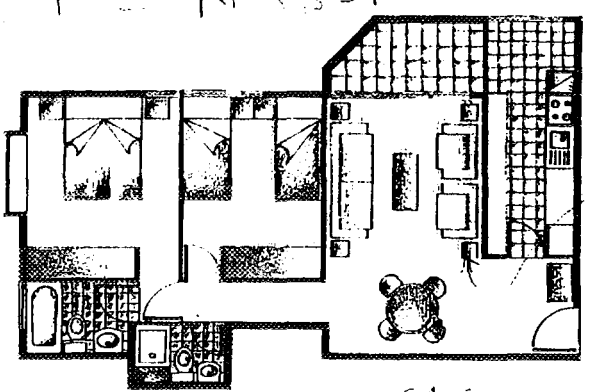
PLANTA MANSARDA

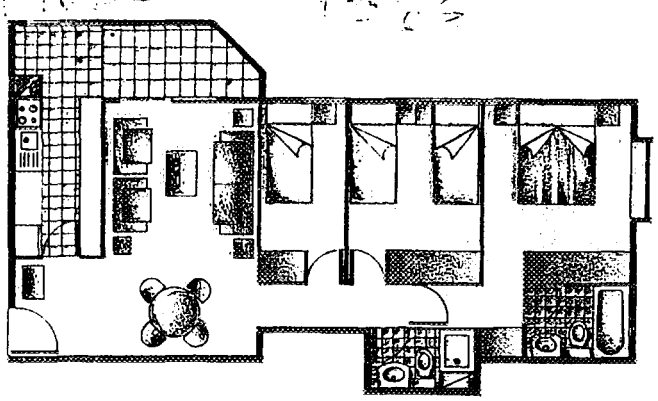


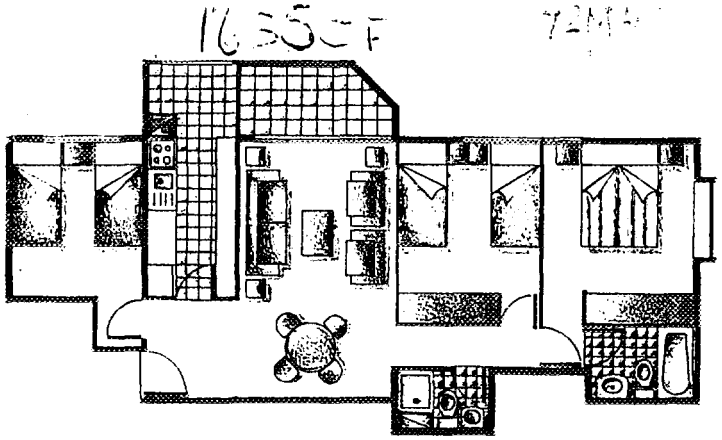
PLANTA PRIMER PISO



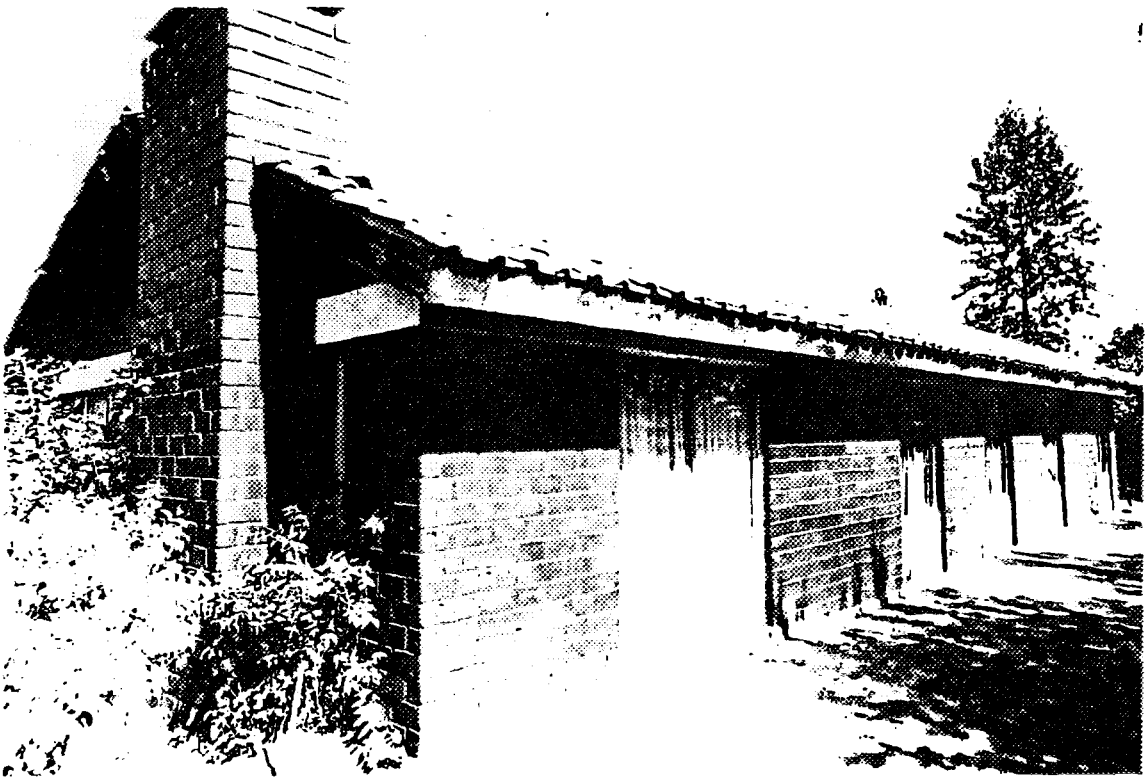
Elija el Departamento
Que Más le Acomode





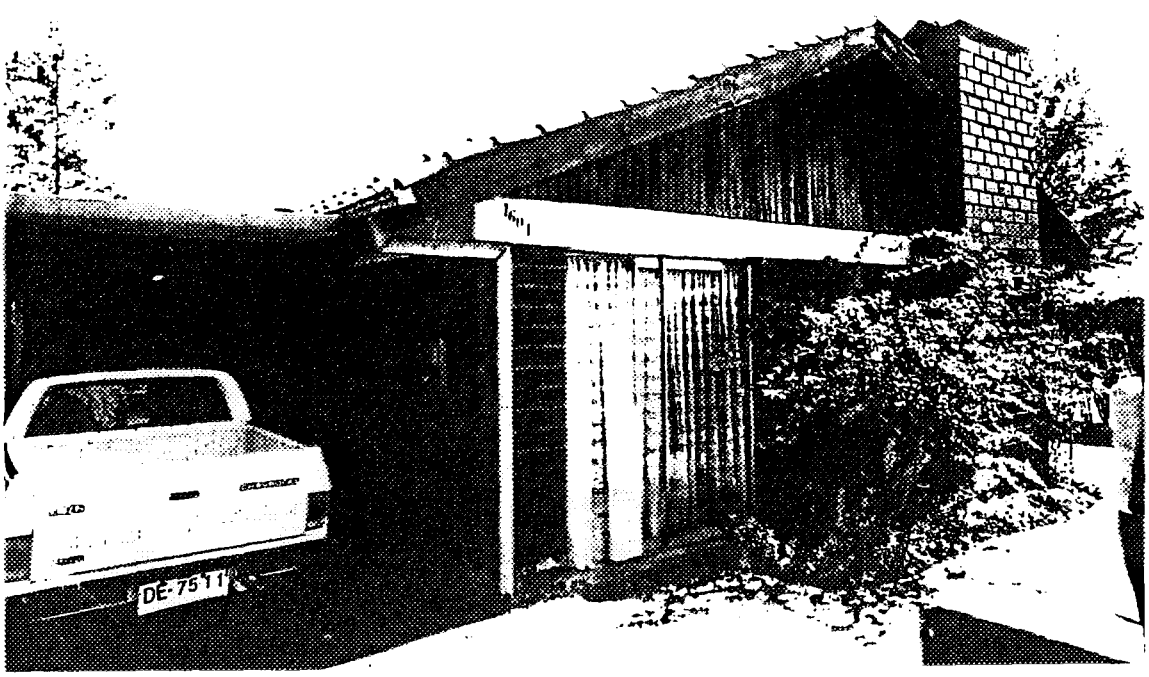


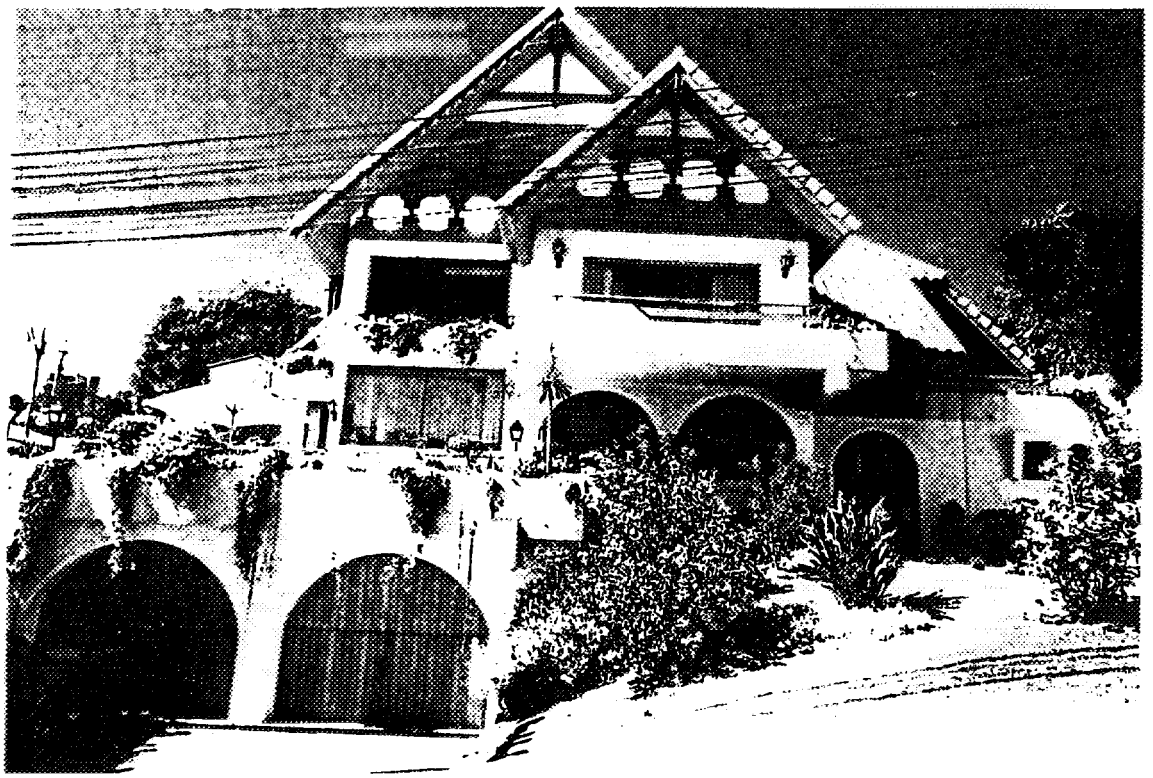
La arquitectura interior de estos departamentos, ha sido proyectada pensando en dar la mayor comodidad y seguridad a los usuarios.



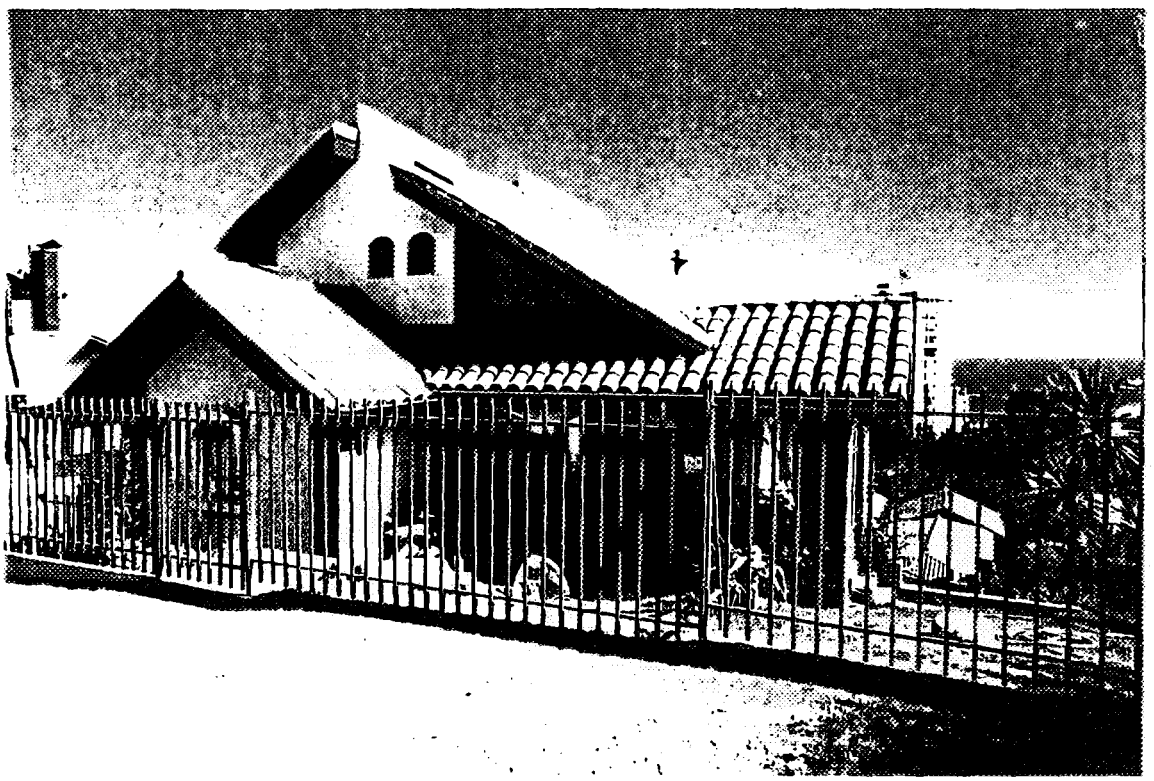
SANTIAGO — VILLA ELDORADO

99,5 S.m. 10'344 U.F. =302'432



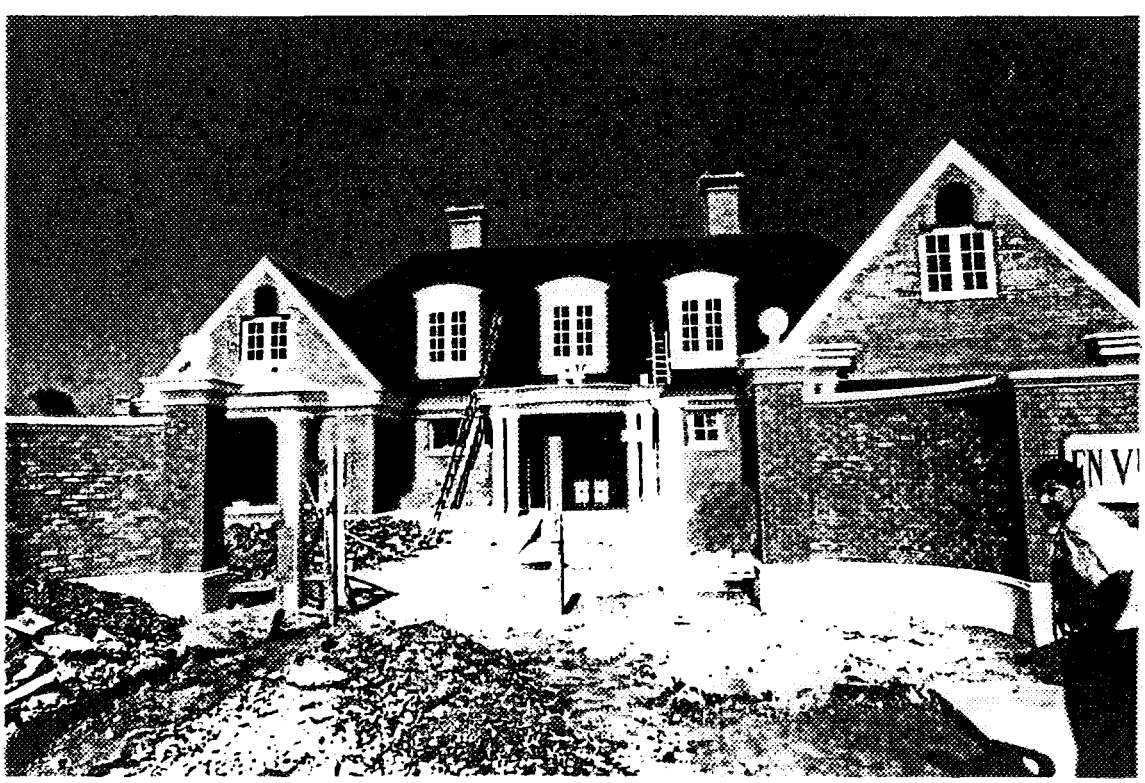


VIÑA DEL MAR

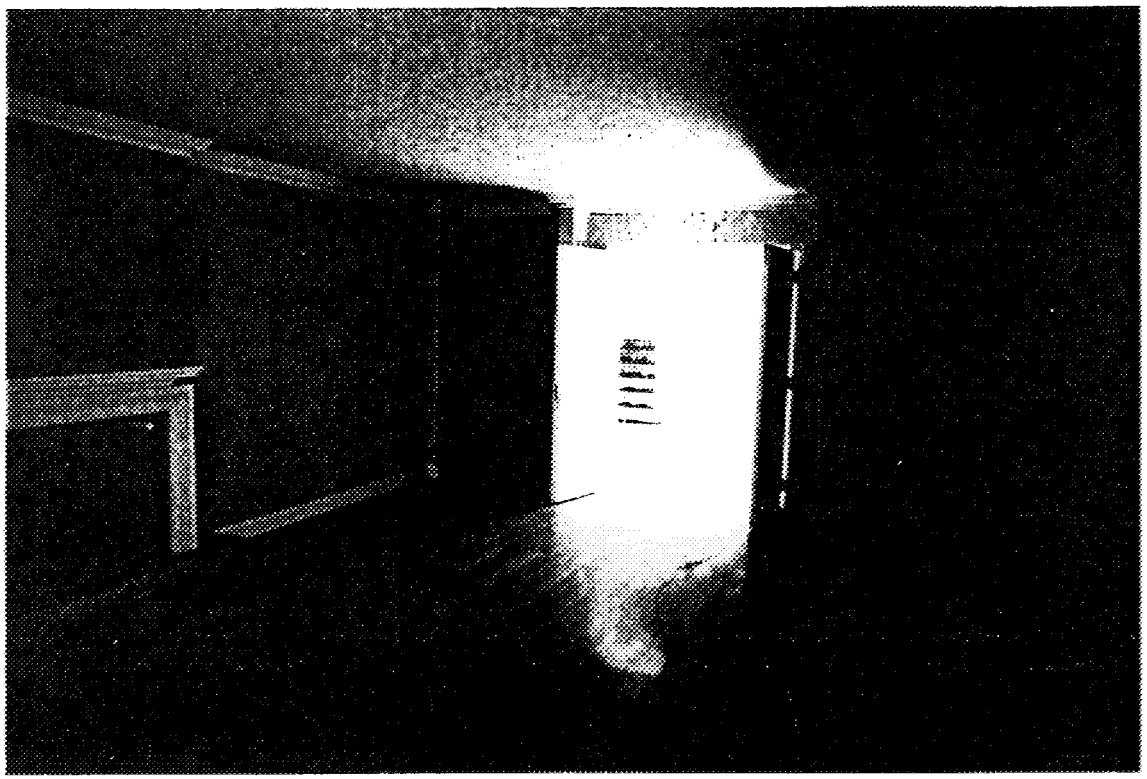


VIÑA DEL MAR

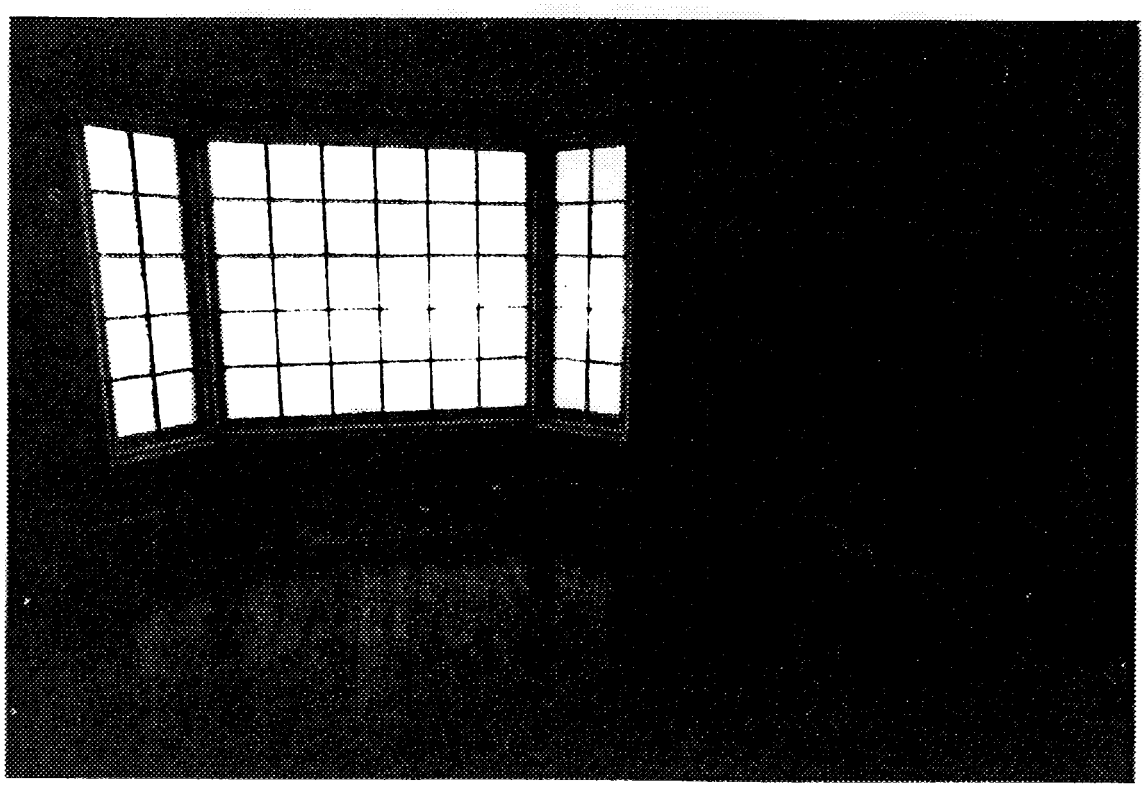
LA DEHESA — SANTIAGO



440 S.m. 18.500 UF. = 540.000



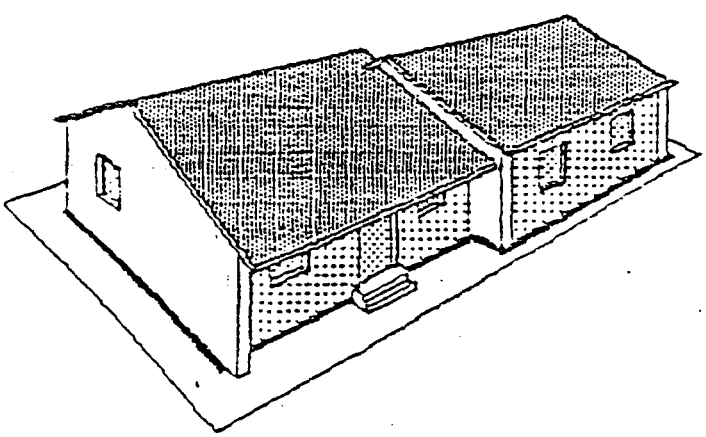
440 S M. 18'500 U.F. = $ = 540'000

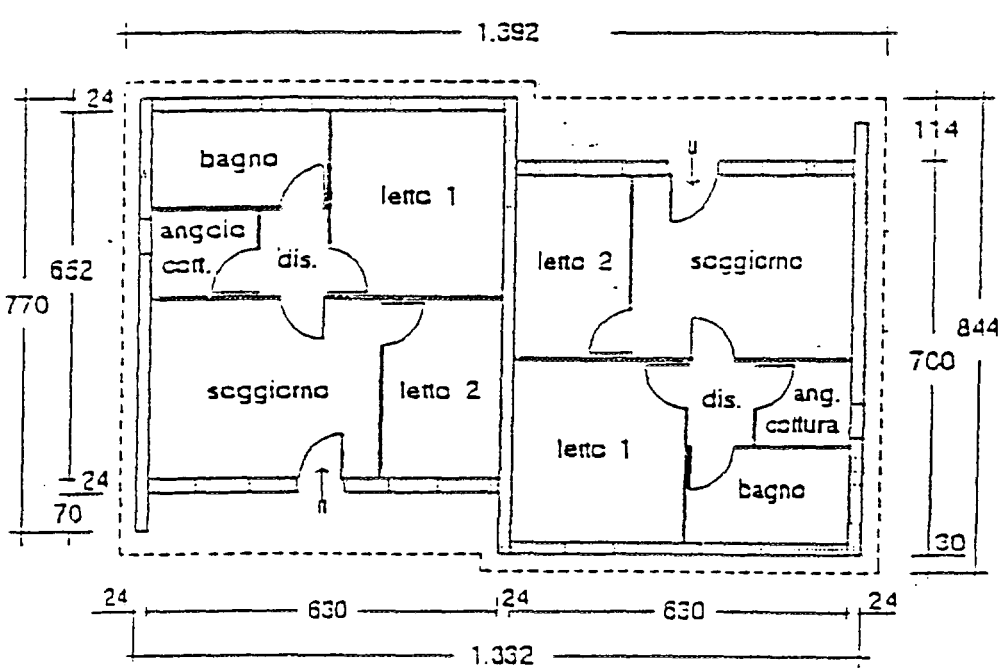


ANNEX 5 - CHARACTERISTICS OF HOUSES PRODUCIBLE THROUGH THE PROPOSED TECHNOLOGY

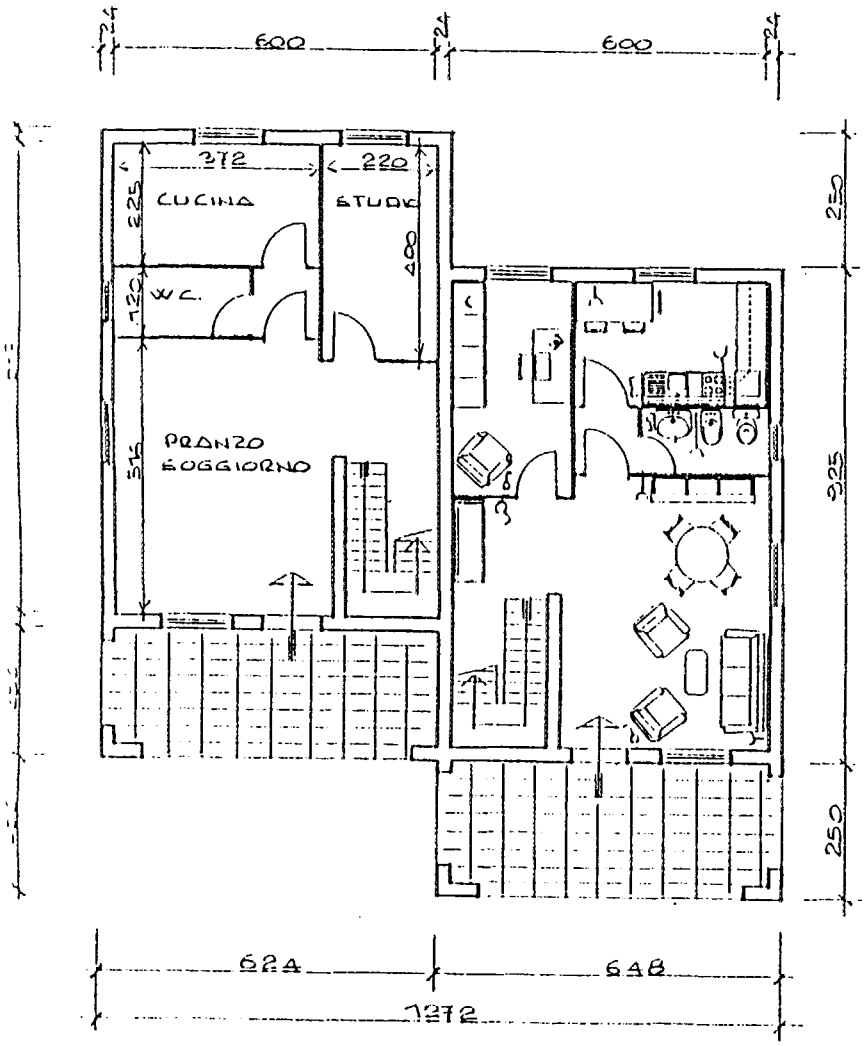
2.1 TIPOLOGIE IDENTIFICATE - paragrafo 2.1.4

tipo		IH 40x2 / B		note
codice n.		1 04 000		
superficie coperta	mq.	117,50		
superficie lorda	mq.	93,90		
soggiorno	cm.	415 x 323,5		
letto 1	cm.	315 x 323,5		I due appartamenti
letto 2	cm.	210 x 323,5		hanno le stesse
bagno	cm.	310 x 170,0		superfici interne
angolo cottura	cm.	180 x 148,5		
disimpegno	cm.	125 x 148,5		

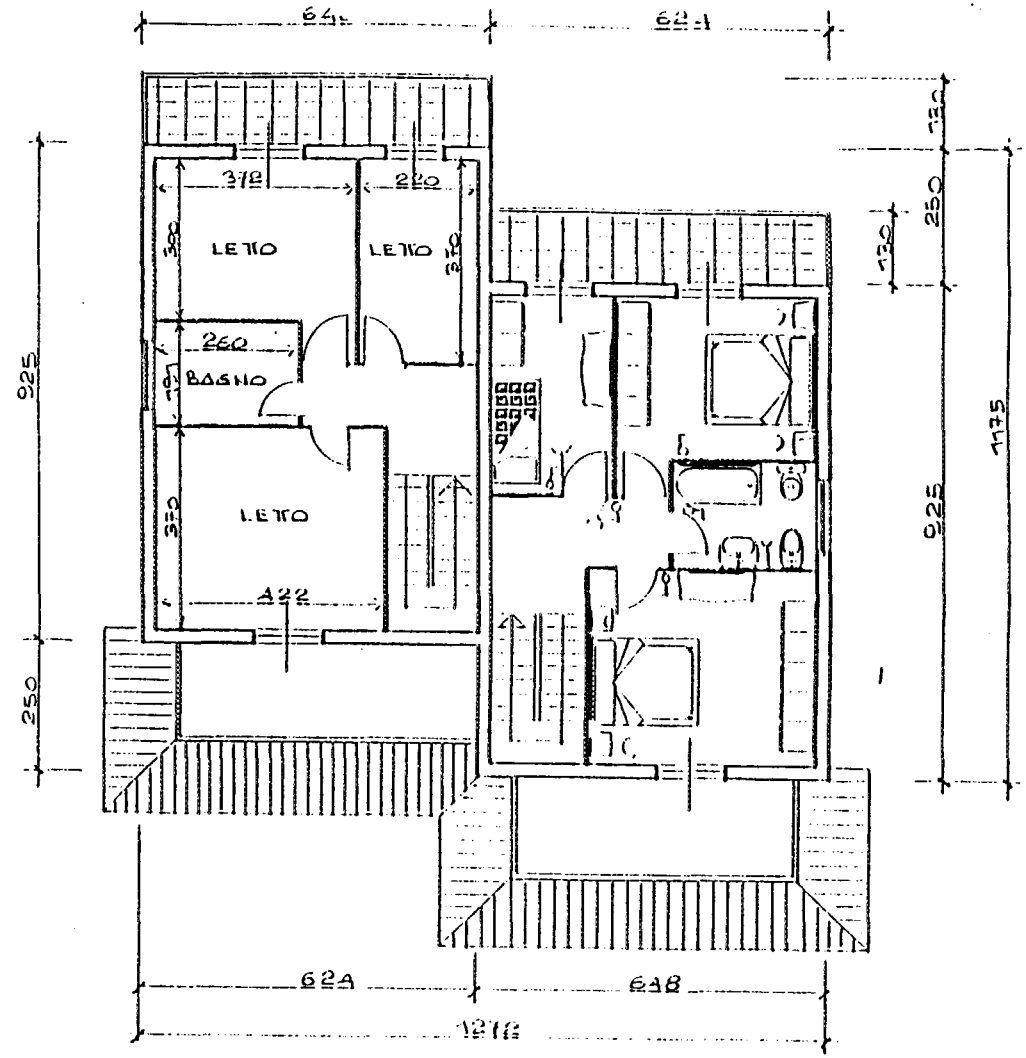




dimensioni in centimetri

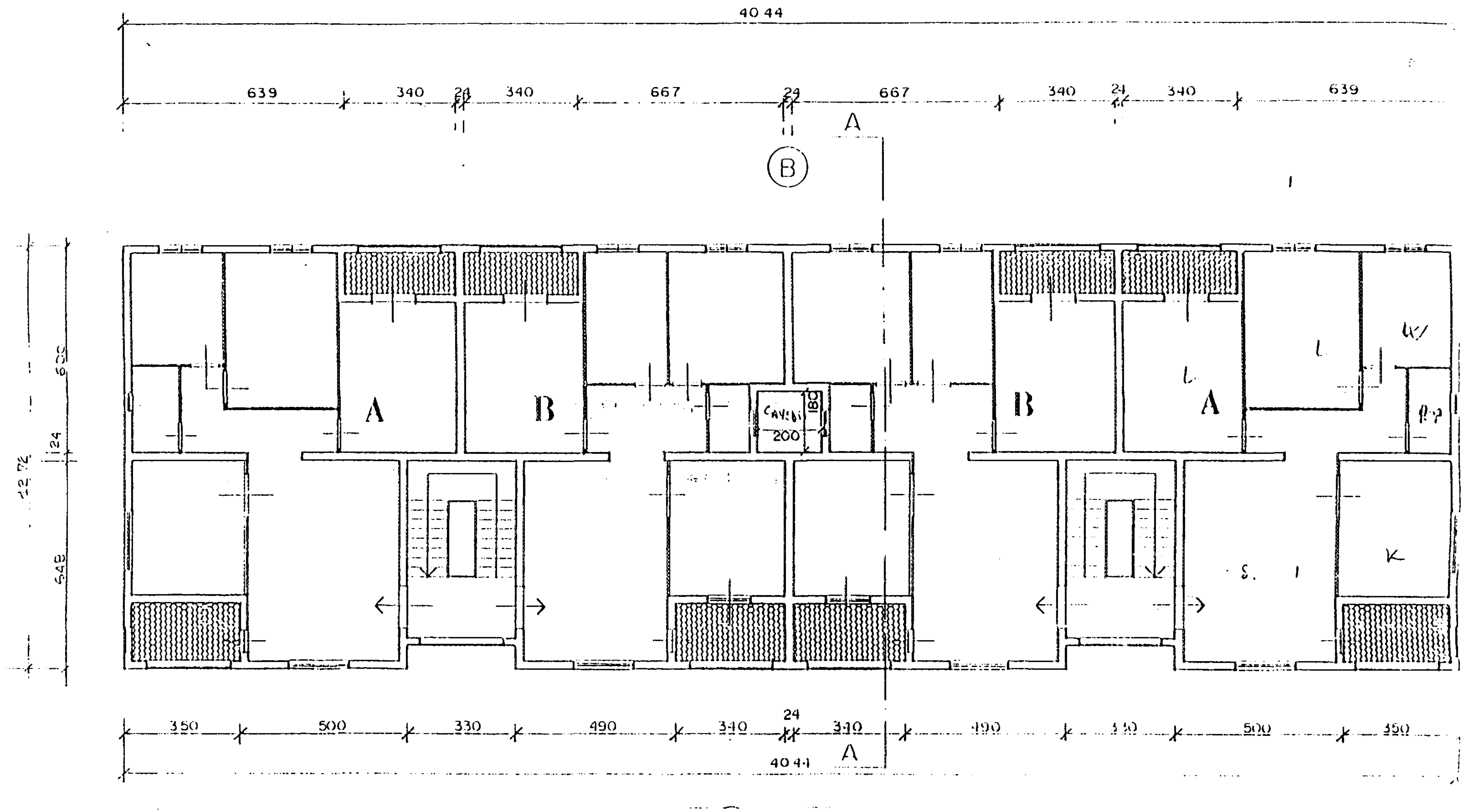


PIANO TERRA



PIANO PRIMO

ALLEGATO 2



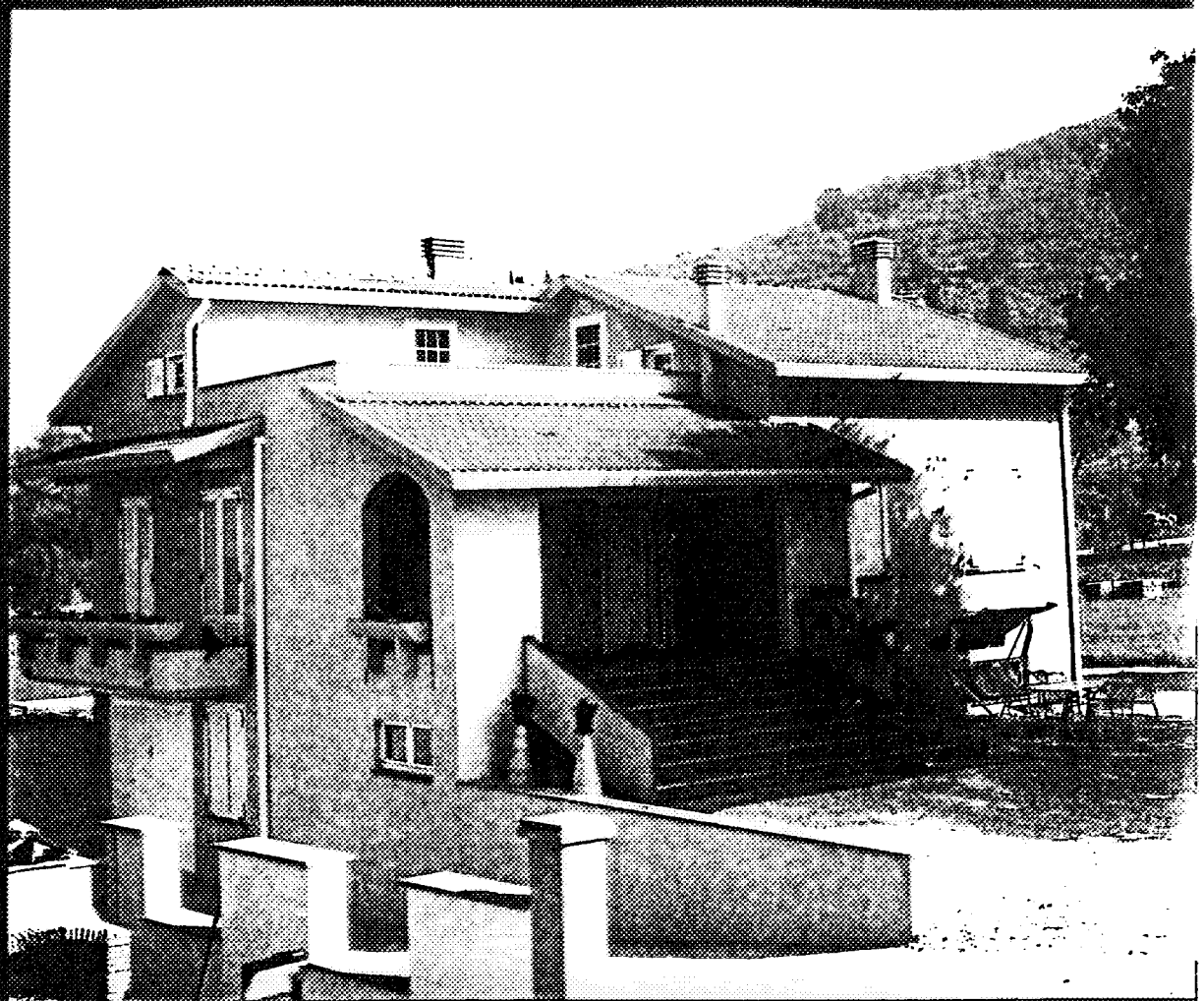
40 44
639
340
24
340
667
24
667
340
21
340
639
A
B
A
B
B
A
CAVEDI
180
200
24
350
500
330
490
340
24
340
490
500
350
40 44
A

UNIFAMILIARE
un piano con seminterrato e mansarda (loc. Terni 1989)

SINGLE FAMILY
1 floor with basement and attic (loc. Terni 1989)

UNIFAMILIARE
un piano con seminterrato (loc. Fabriano 1990)

SINGLE FAMILY
1 floor and basement (loc. Fabriano 1990)

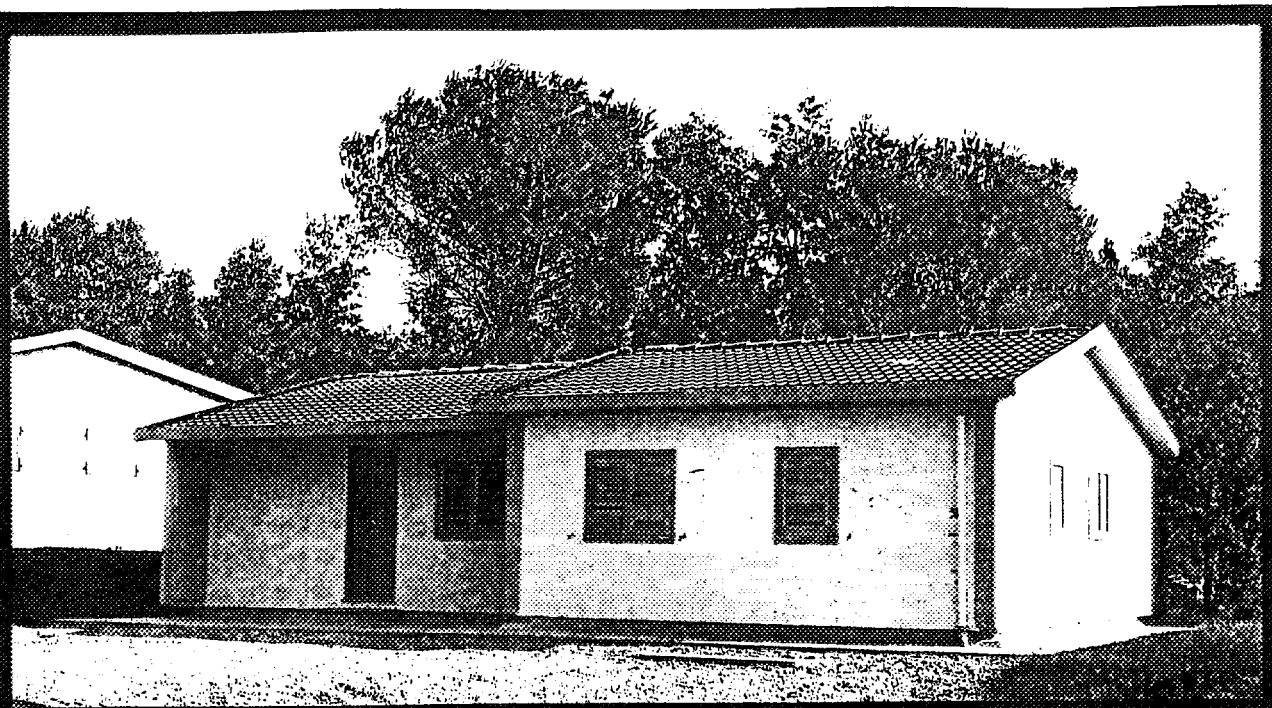


UNIFAMILIARE
1 piano e interrato
(loc. Trevi
PG 1991)

SINGLE FAMILY
1 floor and
basement
(loc. Trevi
PG 1991)

BIFAMILIARE
2 piani e interrato
(loc. Montegabbione
TR 1991)

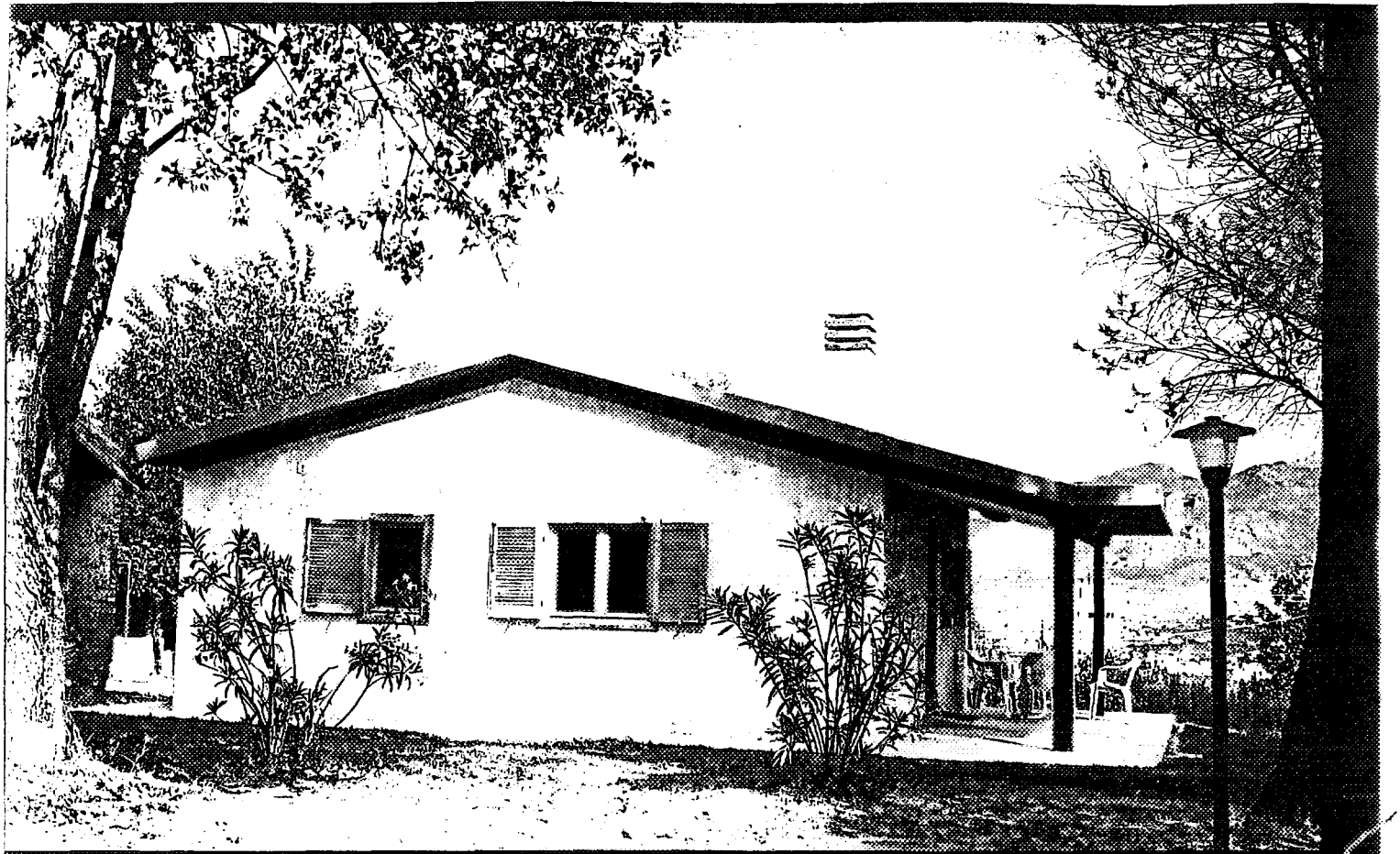
TWO FAMILY
2 floor
(loc. Montegabbione
TR 1991)



RC 40 x 2

RC 80/B
con 4 verande

RC 40
con veranda



RC 40
con veranda

La Rapidcasa, azienda leader nel settore della prefabbricazione in cemento armato per civile abitazione, ha tra la sua produzione una linea di prefabbricati standard particolarmente studiati per ottenere un eccezionale confort ed ottime doti di abitabilità sfruttando superfici relativamente ridotte. Modelli base di tale linea sono i prefabbricati tipo RC 30 ed RC 40, unità abitative rispettivamente di circa 30 e 40 mq. Sono interamente costruiti con pannelli in cemento armato, con uno strato interno di materiale coibente per un efficace isolamento termoacustico.
Gli spessori dei vari componenti sono i seguenti:
- cm. 24 per le pareti ed i solai di base;
- cm. 20 per i solai di copertura;
- cm. 5 per i divisori interni.

Gli impianti elettrico ed idrico sono incorporati nei pannelli.
Per il posizionamento occorre un terreno sufficientemente consistente e ben livellato, in quanto le costruzioni sono dotate di travi di base o basamenti prefabbricati.
L'assemblaggio è rapidissimo, consentendoci di effettuare il montaggio di un modulo RC 30 od RC 40 in circa 4 ore lavorative con l'impiego di tre operai.
L'eccezionale versatilità dei modelli RC 30 ed RC 40 permette di creare numerose soluzioni di superfici e divisioni interne. Si possono così ricavare locali da m 20-30-40-60-80-90-120 ecc.
In conclusione, i prefabbricati mod. RC 30 ed RC 40 si presentano come una tradizionale abitazione in muratura.

DICHIARAZIONE DI IDONEITÀ

IL PRESIDENTE DEL CONSIGLIO SUPERIORE DEI LAVORI PUBBLICI

- Vista la legge 2 febbraio 1974, n. 64;
- Vista la Circolare del Servizio Tecnico Centrale n. 6090 dell'11 agosto 1969;
- Vista la domanda presentata in data 27 febbraio 1987 dalla RAPIDCASA S.p.A. con sede in Sangemini (TR) afferente la richiesta di rinnovo del certificato di idoneità tecnica del sistema di prefabbricazione ''RAPIDCASA'';
- Vista la documentazione tecnica presentata ad illustrazione del sistema;
- Vista la precedente dichiarazione di idoneità tecnica rilasciata in data 13 marzo 1985 con validità triennale;
- Visto il voto n. 153 espresso dalla I Sezione del Consiglio Superiore dei Lavori Pubblici, nell'adunanza del 23/30 aprile 1987;
- Considerato che il sistema non ha subito alcuna modifica, ma degli aggiornamenti che non incidono sulla staticità del sistema.

DICHIARA

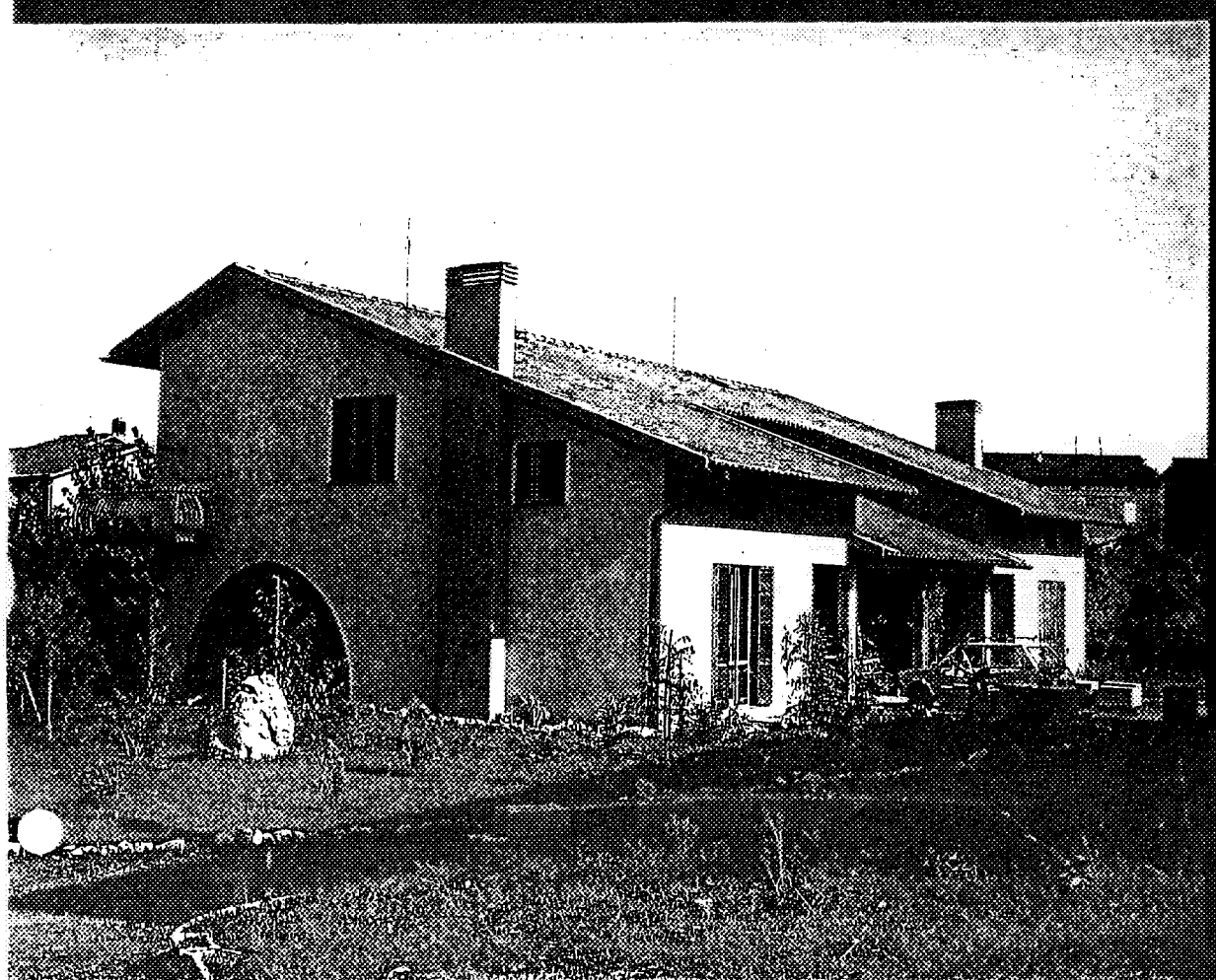
Le strutture portanti realizzate secondo il sistema di prefabbricazione ''RAPIDCASA'' definite, per quanto attiene alle loro caratteristiche tecniche, dalla descrizione che fa parte integrante del presente certificato, sono considerate idonee ai fini della costruzione di edifici anche in zone sismiche, a condizione che siano rispettate le prescrizioni dianzi riportate.
Il presente certificato di idoneità è valido per tre anni a decorrere dal 13 marzo 1988, data di scadenza della precedente dichiarazione ed è rinnovabile su domanda che dovrà pervenire al Servizio Tecnico Centrale almeno tre mesi prima della scadenza, corredata della documentazione delle più significative applicazioni fatte e dei relativi collaudi statici.

Roma, 13 MAG. 1988

IL PRESIDENTE
(Dott. Ing. Giuseppe d'Amore)

FABBRICATO
4 piani con
10 appartamenti
(loc. Rieti 1987)

FABRICATED
4 floors with
10 apartments
(loc. Rieti 1987)



UNIFAMILIARE
2 piani
(loc. Marsciano
1979)

SINGLE FAMILY
2 floors
(loc. Marsciano
1979)

QUADRIFAMILIARE
al grezzo 2 piani
e seminterrato
(loc. Perugia 1993)

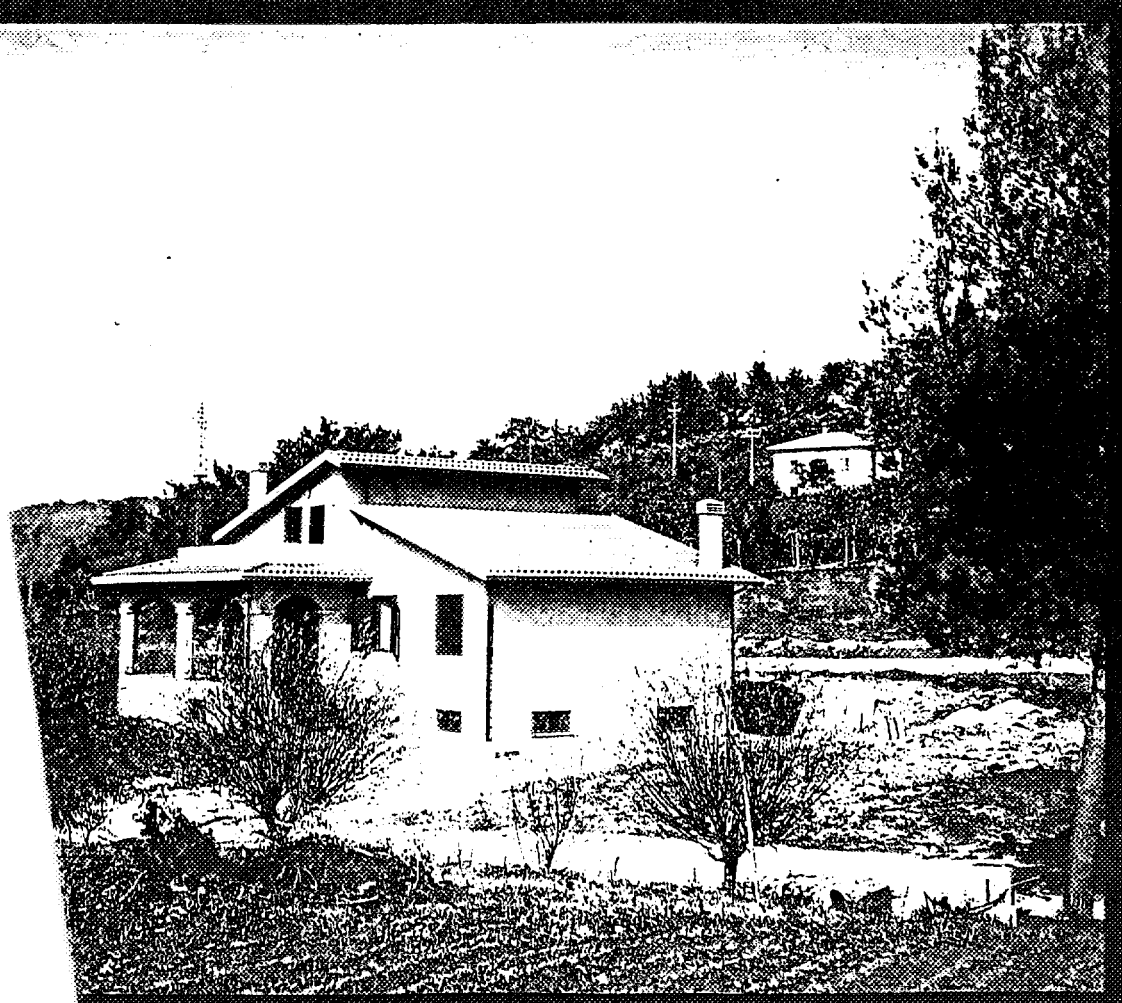
FOUR FAMILY
non-finished 2 floor
and basement
(loc. Perugia 1993)

UNIFAMILIARE
1 piano con
seminterrato e
mansarda
(loc. Foligno
PG 1992)

SINGLE FAMILY
1 floor basement
and attic
(loc. Foligno
PG 1992)

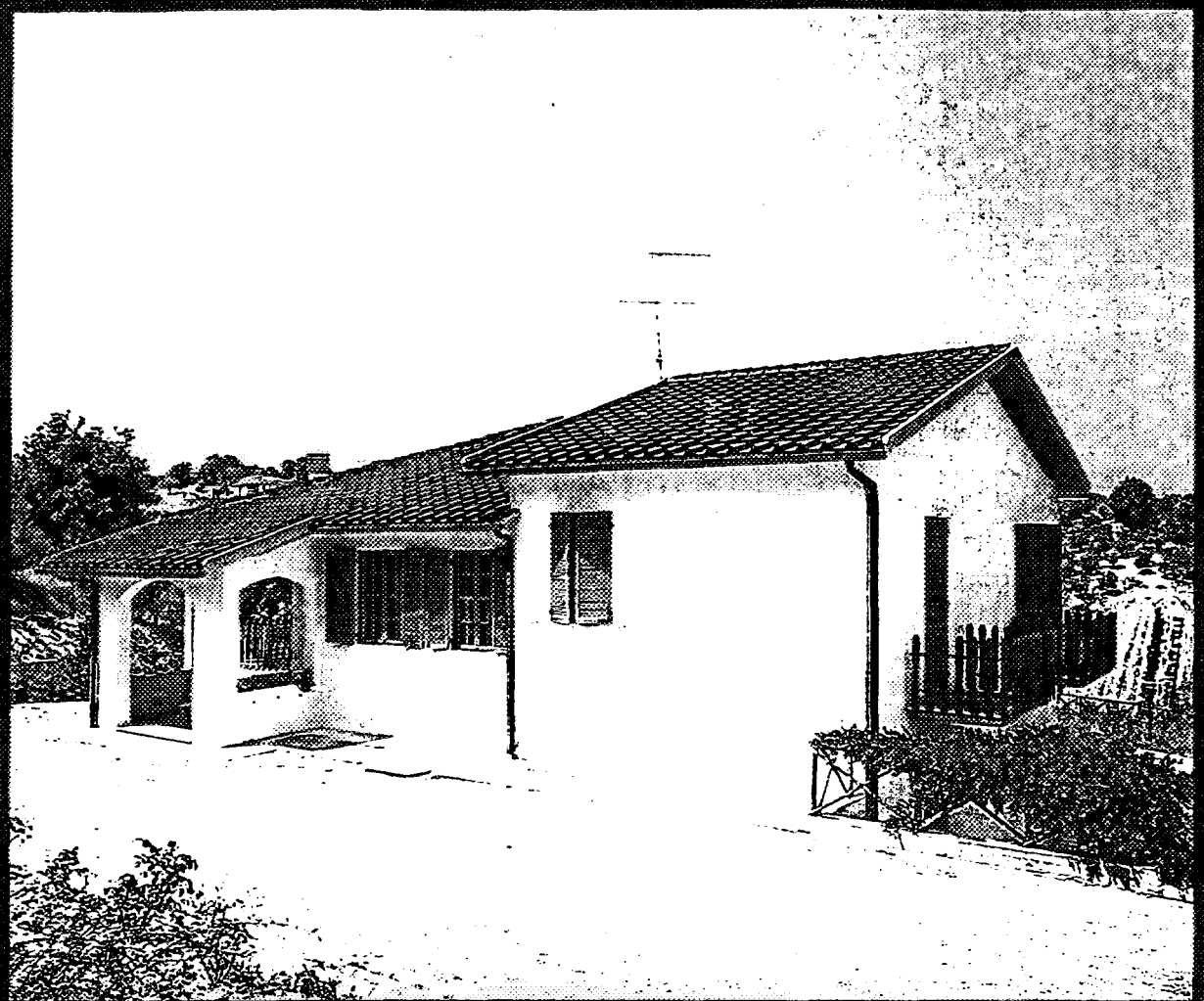
UNIFAMILIARE
1 piano con interrato e mansarda
(loc. Terni 1992)

SINGLE FAMILY
1 floor basement and attic
(loc. Terni 1992)



UNIFAMILIARE
1 piano con seminterrato e mansarda
(loc. Foligno PG 1992)

SINGLE FAMILY
1 floor basement and attic
(loc. Foligno PG 1992)



UNIFAMILIARE
2 piani
(loc. Terni 1979)
SINGLE FAMILY
2 floors
(loc. Terni 1979)

ANNEX 6 - COMFAR OUTPUT TABLES

SUMMARY SHEET

Project title: case prefabbricate
Project description: allestimento di un impianto per la produzione di case prefabbricate
Date and time: 27.july. 1995

Project classification: New project
Joint venture project

Construction phase: 1/1996 - 12/1996
Length: 1 years
Production phase: 1/1997 - 12/2006
Length: 10 periods

Accounting currency: us dollars
Units: Absolute
Reference currency: usdollars
Exchange rate: 400

INVESTMENT COSTS

	Total construction	Total production	Total investment
Total Fixed Investment Costs	11603995.25	0.00	11603995.25
Total Pre-Production Expenditures	1959860.09	0.00	1959860.09
Increase in Net Working Capital	80000.00	811788.28	891788.28
TOTAL INVESTMENT COSTS	13643855.34	811788.28	14455643.62

SOURCES OF FINANCE

	Total inflow
Equity capital	2639162.34
Long term loans	11004693.00
Total short term loans	3620091.66
TOTAL SOURCES OF FINANCE	17263947.00

INCOME AND COSTS FROM OPERATIONS

	First year 1997	Reference year 2000	Last year 2006
SALES REVENUE	4882500.00	14647875.00	14647875.00
Factory costs	3491826.75	8729793.97	8729793.97
Administrative overhead costs	51250.00	51250.00	51250.00
OPERATING COSTS	3543076.75	8781043.97	8781043.97
Depreciation	790931.31	790931.31	790931.31
Financial costs	1100469.30	497691.88	0.00
TOTAL PRODUCTION COSTS	5434477.36	10069667.17	9571975.29
Marketing costs	53750.00	53750.00	53750.00
COSTS OF PRODUCTS SOLD	5488227.36	10123417.17	9625725.29
Interest on securities	470.23	715.66	715.66
GROSS PROFIT FROM OPERATIONS	-516480.39	4525173.49	5022865.37
Extraordinary income	0.00	0.00	0.00
Extraordinary loss	0.00	0.00	0.00
Depreciation allowances	0.00	0.00	0.00
GROSS PROFIT	-516480.39	4525173.49	5022865.37
Investment allowances	0.00	0.00	0.00
TAXABLE PROFIT	0.00	4525173.49	5022865.37
Income (corporate) tax	0.00	1583810.72	1758002.88
NET PROFIT	-516480.39	2941362.77	3264862.49

SUMMARY SHEET

RATIOS

Net present value	at 12.00 %	8987126.04
Internal rate of return on investment (IRR)	24.29 %	
Modified IRR on investment	12.12 %	
Internal rate of return on equity (IRRE)	30.78 %	
Modified IRRE on equity	18.49 %	

FIXED INVESTMENT COSTS - TOTAL

us dollars

	Total construction	Total production	Construction 1996
Land purchase	175000.00	0.00	175000.00
Site preparation and development	113700.00	0.00	113700.00
Civil works, structures and buildings	2354654.00	0.00	2354654.00
plant building 1	1062328.00	0.00	1062328.00
foundations	98000.00	0.00	98000.00
foundations steel	73500.00	0.00	73500.00
maintenance build.2	18270.00	0.00	18270.00
offices	98600.00	0.00	98600.00
social building	251430.00	0.00	251430.00
polystyrene store 2	86760.00	0.00	86760.00
accessories store 2	28920.00	0.00	28920.00
trucks building 2	17640.00	0.00	17640.00
electric station	500.00	0.00	500.00
keeper lodge	500.00	0.00	500.00
plant bulding 2	145464.00	0.00	145464.00
maintenance build. 1	21690.00	0.00	21690.00
polystyrene store 1	73080.00	0.00	73080.00
accessories store 1	24360.00	0.00	24360.00
trucks building 1	60732.00	0.00	60732.00
steel building coverage	292880.00	0.00	292880.00
Plant machinery and equipment	8168910.00	0.00	8168910.00
assembling	211750.00	0.00	211750.00
transport 2	211750.00	0.00	211750.00
machinery	7645410.00	0.00	7645410.00
transport 1	100000.00	0.00	100000.00
Auxiliary and service plant equipment	226731.25	0.00	226731.25
fencing	14950.00	0.00	14950.00
gas storage	2500.00	0.00	2500.00
external lighting	16500.00	0.00	16500.00
green area	24375.00	0.00	24375.00
gas distribution	2031.25	0.00	2031.25
asphalt abd surf.	161175.00	0.00	161175.00
drain & sewage system	5200.00	0.00	5200.00
Environmental protection	105000.00	0.00	105000.00
cement plant 1	15000.00	0.00	15000.00
cement plant 2	45000.00	0.00	45000.00
sewage treat 1	15000.00	0.00	15000.00
sewage treat 2	30000.00	0.00	30000.00
Incorporated fixed assets (project overheads)	0.00	0.00	0.00
Contingencies	460000.00	0.00	460000.00
contingencies	60000.00	0.00	60000.00
net initial capital	400000.00	0.00	400000.00
TOTAL FIXED INVESTMENT COSTS	11603995.25	0.00	11603995.25

NET WORKING CAPITAL REQUIREMENTS - TOTAL
us dollars

	Coefficient of turnover	Construction 1996	Production 1997
Total inventory	0.00	80000.00	311581.13
Raw materials	0.00	25000.00	79614.79
Factory supplies	0.00	25000.00	69.44
Utilities	0.00	2500.00	7.33
Energy	0.00	2500.00	13.48
Spare parts consumed	0.00	25000.00	338.53
Work in progress	0.00	0.00	116394.22
Finished product	0.00	0.00	115143.33
Accounts receivable	0.00	0.00	116935.00
ih40b	0.00	0.00	70422.72
bifam	0.00	0.00	19568.38
multipiano	0.00	0.00	26943.90
Cash-in-hand	30.00	0.00	32654.63
CURRENT ASSETS	0.00	80000.00	461170.76
Current liabilities			
Accounts payable	0.00	0.00	107162.22
ih40b	0.00	0.00	54969.42
bifam	0.00	0.00	13766.24
multipiano	0.00	0.00	19732.98
Indirect costs	0.00	0.00	18693.59
TOTAL NET WORKING CAPITAL REQUIREMENT	0.00	80000.00	354008.53
INCREASE IN NET WORKING CAPITAL	0.00	80000.00	274008.53
Foreign share (%)	0.00	0.00	22.44

NET WORKING CAPITAL REQUIREMENTS - TOTAL
us dollars

	Production 1998	Production 1999	Production 2000
Total inventory	566394.17	821193.86	815659.75
Raw materials	156597.78	233577.03	231011.05
Factory supplies	69.44	69.44	69.44
Utilities	7.70	8.07	8.06
Energy	19.80	26.13	25.92
Spare parts consumed	598.96	859.36	850.68
Work in progress	205175.76	293952.36	290993.13
Finished product	203924.72	292701.47	292701.47
Accounts receivable	205716.38	294493.13	294493.13
ih40b	123887.03	177351.92	177351.92
bifam	34429.88	49285.94	49285.94
multipiano	47399.48	67855.27	67855.27
Cash-in-hand	41321.30	49987.13	49698.27
CURRENT ASSETS	813431.85	1165674.12	1159851.15
Current liabilities			
Accounts payable	190350.44	273398.06	267977.31
ih40b	106469.74	158024.76	154610.37
bifam	26704.86	39651.44	38832.03
multipiano	38260.65	56806.67	55619.71
Indirect costs	18915.19	18915.19	18915.19
TOTAL NET WORKING CAPITAL REQUIREMENT	623081.42	892276.06	891873.84
INCREASE IN NET WORKING CAPITAL	269072.88	269194.64	-402.22
Foreign share (%)	25.07	26.11	26.13

NET WORKING CAPITAL REQUIREMENTS - TOTAL
us dollars

	Production 2001	Production 2002	Production 2003
Total inventory	815659.75	815659.75	815659.75
Raw materials	231011.05	231011.05	231011.05
Factory supplies	69.44	69.44	69.44
Utilities	8.06	8.06	8.06
Energy	25.92	25.92	25.92
Spare parts consumed	850.68	850.68	850.68
Work in progress	290993.13	290993.13	290993.13
Finished product	292701.47	292701.47	292701.47
Accounts receivable	294493.13	294493.13	294493.13
ih40b	177351.92	177351.92	177351.92
bifam	49285.94	49285.94	49285.94
multipiano	67855.27	67855.27	67855.27
Cash-in-hand	49698.27	49698.27	49698.27
CURRENT ASSETS	1159851.15	1159851.15	1159851.15
Current liabilities			
Accounts payable	268062.87	268062.87	268062.87
ih40b	154665.08	154665.08	154665.08
bifam	38844.54	38844.54	38844.54
multipiano	55638.06	55638.06	55638.06
Indirect costs	18915.19	18915.19	18915.19
TOTAL NET WORKING CAPITAL REQUIREMENT	891788.28	891788.28	891788.28
INCREASE IN NET WORKING CAPITAL	-85.56	0.00	0.00
Foreign share (%)	26.13	26.13	26.13

NET WORKING CAPITAL REQUIREMENTS - TOTAL
us dollars

	Production 2004	Production 2005	Production 2006
Total inventory	815659.75	815659.75	815659.75
Raw materials	231011.05	231011.05	231011.05
Factory supplies	69.44	69.44	69.44
Utilities	8.06	8.06	8.06
Energy	25.92	25.92	25.92
Spare parts consumed	850.68	850.68	850.68
Work in progress	290993.13	290993.13	290993.13
Finished product	292701.47	292701.47	292701.47
Accounts receivable	294493.13	294493.13	294493.13
ih40b	177351.92	177351.92	177351.92
bifam	49285.94	49285.94	49285.94
multipiano	67855.27	67855.27	67855.27
Cash-in-hand	49698.27	49698.27	49698.27
CURRENT ASSETS	1159851.15	1159851.15	1159851.15
Current liabilities			
Accounts payable	268062.87	268062.87	268062.87
ih40b	154665.08	154665.08	154665.08
bifam	38844.54	38844.54	38844.54
multipiano	55638.06	55638.06	55638.06
Indirect costs	18915.19	18915.19	18915.19
TOTAL NET WORKING CAPITAL REQUIREMENT	891788.28	891788.28	891788.28
INCREASE IN NET WORKING CAPITAL	0.00	0.00	0.00
Foreign share (%)	26.13	26.13	26.13

INVESTMENT COSTS - TOTAL
us dollars

	Total construction	Total production	Construction 1996
Total Fixed Investment Costs	11603995.25	0.00	11603995.25
Total Pre-Production Expenditures	1959860.09	0.00	1959860.09
Pre-Production Expenditures (net of interest)	529250.00	0.00	529250.00
Interests	1430610.09	0.00	1430610.09
Increase in Net Working Capital	80000.00	811788.28	80000.00
TOTAL INVESTMENT COSTS	13643855.34	811788.28	13643855.34
Foreign share (%)	83.44	28.70	83.44

PRE-PRODUCTION EXPENDITURES - TOTAL
us dollars

	Total construction	Total production	Construction 1996
engineering & tech assistance	149250.00	0.00	149250.00
pre-investment activities	320000.00	0.00	320000.00
pre-production supply	0.00	0.00	0.00
training	60000.00	0.00	60000.00
Pre-Production Expenditures (net of interest)	529250.00	0.00	529250.00
Interests	1430610.09	0.00	1430610.09
TOTAL PRE-PRODUCTION EXPENDITURES	1959860.09	0.00	1959860.09
oreign share (%)	77.54	0.00	77.54

ANNUAL COSTS OF PRODUCTS SOLD - TOTAL
us dollars

	Production 1997	Production 1998	Production 1999
Raw materials	2411360.35	4720850.09	7030227.56
Factory supplies	25000.00	25000.00	25000.00
Utilities	2511.54	2522.70	2533.87
Energy	2696.03	2885.75	3075.46
Spare parts consumed	121869.97	215625.16	309369.97
Repair, maintenance, material	109369.97	203125.16	296869.97
Royalties	0.00	0.00	0.00
Labour	609018.90	775263.99	941493.90
Labour overhead costs (taxes etc.)	200000.00	200000.00	200000.00
Factory overhead costs	10000.00	10000.00	10000.00
FACTORY COSTS	3491826.75	6155272.86	8818570.72
Administrative overhead costs	51250.00	51250.00	51250.00
OPERATING COSTS	3543076.75	6206522.86	8869820.72
Depreciation	790931.31	790931.31	790931.31
Financial costs	1100469.30	916589.18	716159.85
Interests	1100469.30	916589.18	716159.85
Leasing costs	0.00	0.00	0.00
TOTAL PRODUCTION COSTS	5434477.36	7914043.35	10376911.89
Direct marketing costs	0.00	0.00	0.00
Marketing overhead costs	53750.00	53750.00	53750.00
COSTS OF PRODUCTS SOLD	5488227.36	7967793.35	10430661.89
Foreign share (%)	47.12	40.01	36.19
Variable share (%)	50.15	67.97	77.45

ANNUAL COSTS OF PRODUCTS SOLD - TOTAL
us dollars

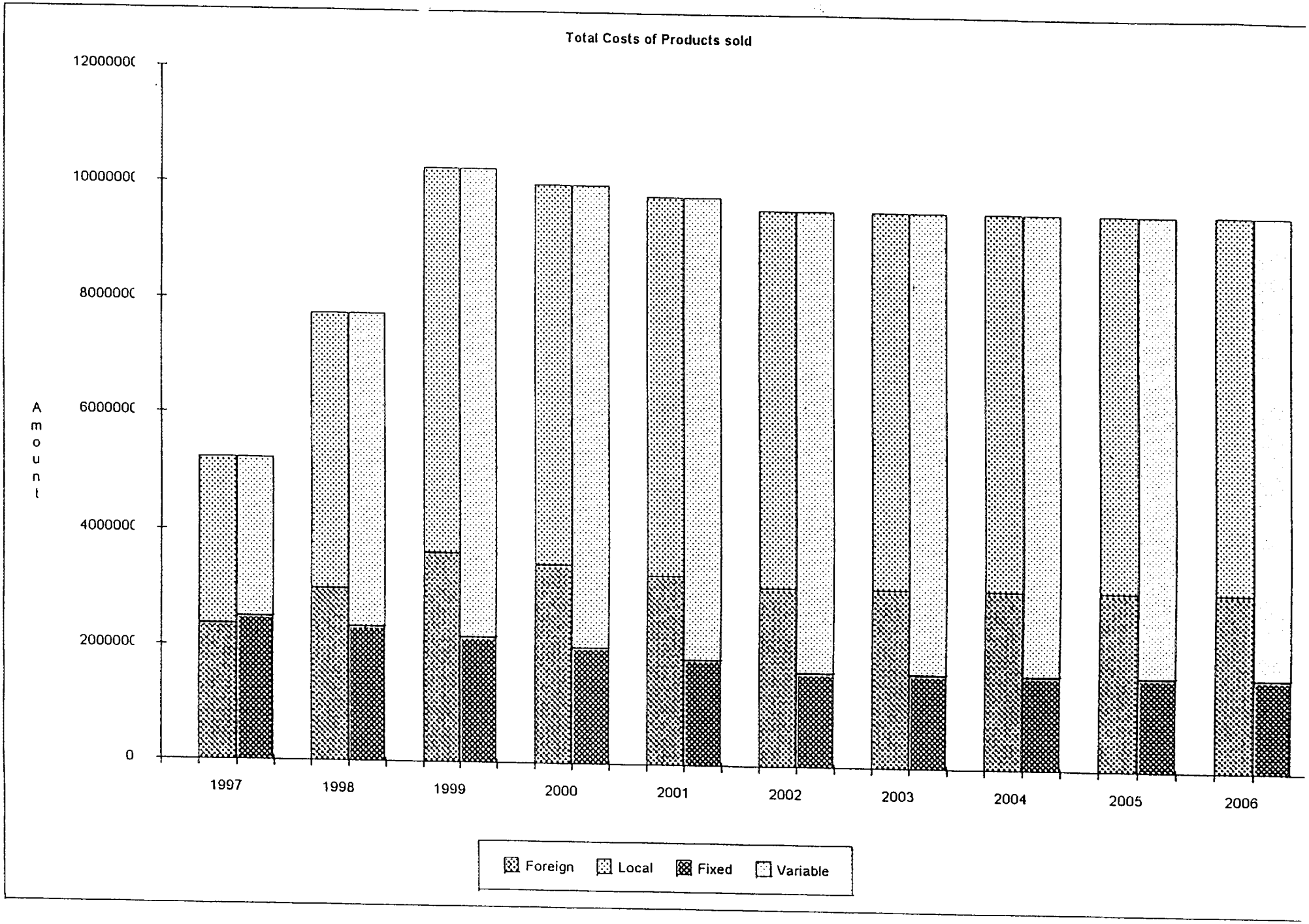
	Production 2000	Production 2001	Production 2002
Raw materials	6953248.20	6953248.20	6953248.20
Factory supplies	25000.00	25000.00	25000.00
Utilities	2533.50	2533.50	2533.50
Energy	3069.14	3069.14	3069.14
Spare parts consumed	306245.13	306245.13	306245.13
Repair, maintenance, material	293745.13	293745.13	293745.13
Royalties	0.00	0.00	0.00
Labour	935952.89	935952.89	935952.89
Labour overhead costs (taxes etc.)	200000.00	200000.00	200000.00
Factory overhead costs	10000.00	10000.00	10000.00
FACTORY COSTS	8729793.97	8729793.97	8729793.97
Administrative overhead costs	51250.00	51250.00	51250.00
OPERATING COSTS	8781043.97	8781043.97	8781043.97
Depreciation	790931.31	790931.31	790931.31
Financial costs	497691.88	259561.79	0.00
Interests	497691.88	259561.79	0.00
Leasing costs	0.00	0.00	0.00
TOTAL PRODUCTION COSTS	10069667.17	9831537.08	9571975.29
Direct marketing costs	0.00	0.00	0.00
Marketing overhead costs	53750.00	53750.00	53750.00
COSTS OF PRODUCTS SOLD	10123417.17	9885287.08	9625725.29
Foreign share (%)	35.10	33.77	32.26
Variable share (%)	78.93	80.83	83.01

ANNUAL COSTS OF PRODUCTS SOLD - TOTAL
us dollars

	Production 2003	Production 2004	Production 2005
Raw materials	6953248.20	6953248.20	6953248.20
Factory supplies	25000.00	25000.00	25000.00
Utilities	2533.50	2533.50	2533.50
Energy	3069.14	3069.14	3069.14
Spare parts consumed	306245.13	306245.13	306245.13
Repair, maintenance, material	293745.13	293745.13	293745.13
Royalties	0.00	0.00	0.00
Labour	935952.89	935952.89	935952.89
Labour overhead costs (taxes etc.)	200000.00	200000.00	200000.00
Factory overhead costs	10000.00	10000.00	10000.00
FACTORY COSTS	8729793.97	8729793.97	8729793.97
Administrative overhead costs	51250.00	51250.00	51250.00
OPERATING COSTS	8781043.97	8781043.97	8781043.97
Depreciation	790931.31	790931.31	790931.31
Financial costs	0.00	0.00	0.00
Interests	0.00	0.00	0.00
Leasing costs	0.00	0.00	0.00
TOTAL PRODUCTION COSTS	9571975.29	9571975.29	9571975.29
Direct marketing costs	0.00	0.00	0.00
Marketing overhead costs	53750.00	53750.00	53750.00
COSTS OF PRODUCTS SOLD	9625725.29	9625725.29	9625725.29
Foreign share (%)	32.26	32.26	32.26
Variable share (%)	83.01	83.01	83.01

ANNUAL COSTS OF PRODUCTS SOLD - TOTAL
us dollars

	Production 2006
Raw materials	6953248.20
Factory supplies	25000.00
Utilities	2533.50
Energy	3069.14
Spare parts consumed	306245.13
Repair, maintenance, material	293745.13
Royalties	0.00
Labour	935952.89
Labour overhead costs (taxes etc.)	200000.00
Factory overhead costs	10000.00
FACTORY COSTS	8729793.97
Administrative overhead costs	51250.00
OPERATING COSTS	8781043.97
Depreciation	790931.31
Financial costs	0.00
Interests	0.00
Leasing costs	0.00
TOTAL PRODUCTION COSTS	9571975.29
Direct marketing costs	0.00
Marketing overhead costs	53750.00
COSTS OF PRODUCTS SOLD	9625725.29
Foreign share (%)	32.26
Variable share (%)	83.01


Total Costs of Products sold
1200000
1000000
800000
600000
400000
200000
0
Amount
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
Foreign
Local
Fixed
Variable

PRODUCTION AND SALES PROGRAMME - TOTAL
us dollars

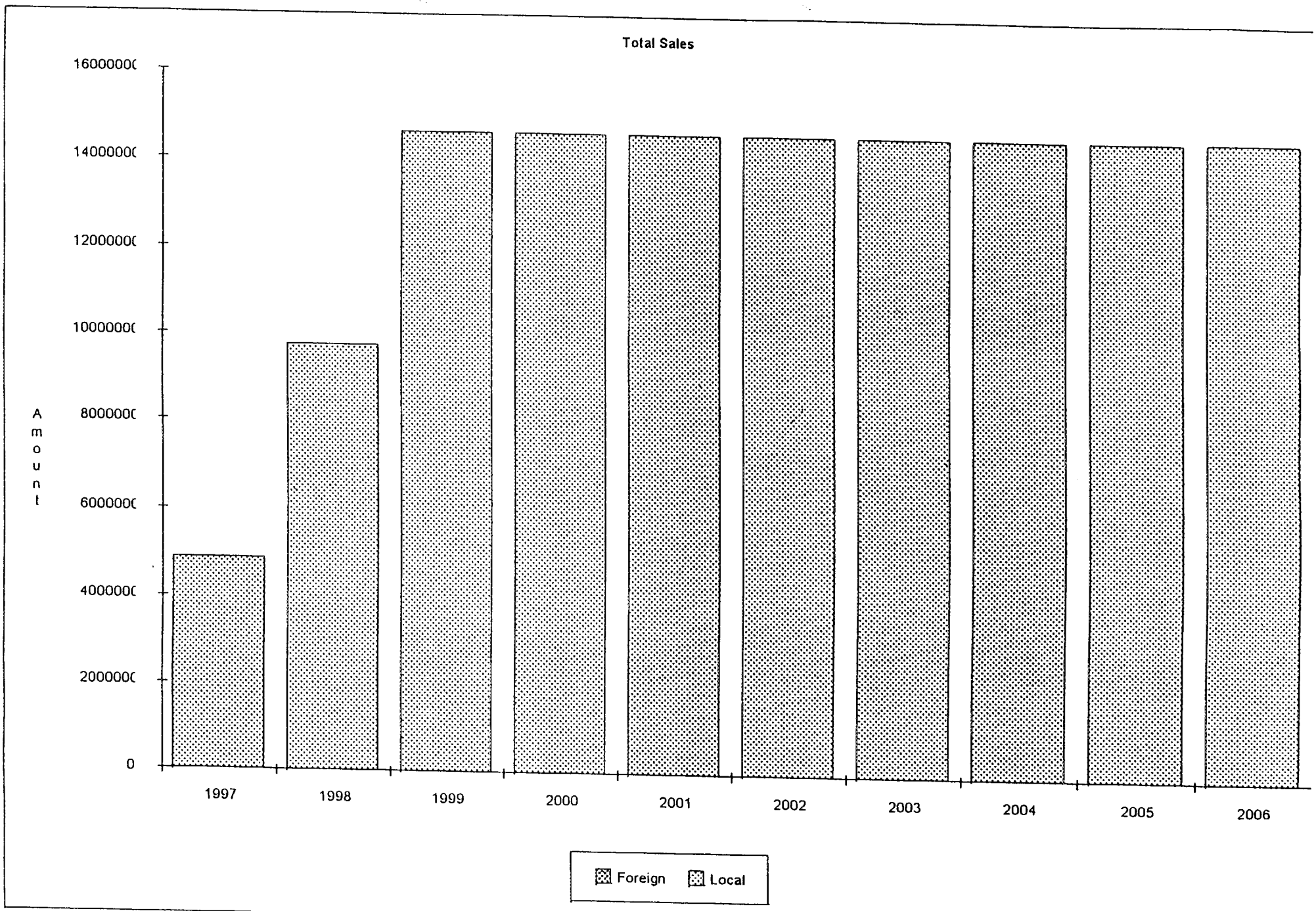
	Production 1997	Production 1998	Production 1999	Production 2000
Gross sales revenue	5859000.00	11718450.00	17577450.00	17577450.00
Less sales tax	976500.00	1953075.00	2929575.00	2929575.00
Net sales revenue	4882500.00	9765375.00	14647875.00	14647875.00
Subsidy	0.00	0.00	0.00	0.00
SALES REVENUE	4882500.00	9765375.00	14647875.00	14647875.00
Foreign share (%)	0.00	0.00	0.00	0.00

PRODUCTION AND SALES PROGRAMME - TOTAL
us dollars

	Production 2001	Production 2002	Production 2003	Production 2004
Gross sales revenue	17577450.00	17577450.00	17577450.00	17577450.00
Less sales tax	2929575.00	2929575.00	2929575.00	2929575.00
Net sales revenue	14647875.00	14647875.00	14647875.00	14647875.00
Subsidy	0.00	0.00	0.00	0.00
SALES REVENUE	14647875.00	14647875.00	14647875.00	14647875.00
Foreign share (%)	0.00	0.00	0.00	0.00

PRODUCTION AND SALES PROGRAMME - TOTAL
us dollars

	Production 2005	Production 2006
Gross sales revenue	17577450.00	17577450.00
Less sales tax	2929575.00	2929575.00
Net sales revenue	14647875.00	14647875.00
Subsidy	0.00	0.00
SALES REVENUE	14647875.00	14647875.00
Foreign share (%)	0.00	0.00


Total Sales
16000000
14000000
12000000
10000000
8000000
6000000
4000000
2000000
0
Amount
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
Foreign
Local

PRODUCTION AND SALES PROGRAMME - IH40B - TOTAL
us dollars

	Production 1997	Production 1998	Production 1999	Production 2000
Stock brought forward	0.00	185.17	370.33	555.50
Quantity produced	5740.17	11295.17	16850.17	16665.00
Stock carried forward	185.17	370.33	555.50	555.50
Quantity sold	5555.00	11110.00	16665.00	16665.00
Gross unit price (average)	270.00	270.00	270.00	270.00
Net unit price (average)	225.00	225.00	225.00	225.00
Sales tax per unit (average)	45.00	45.00	45.00	45.00
Gross sales revenue	1499850.00	2999700.00	4499550.00	4499550.00
Less sales tax	249975.00	499950.00	749925.00	749925.00
Net sales revenue	1249875.00	2499750.00	3749625.00	3749625.00
Subsidy	0.00	0.00	0.00	0.00
SALES REVENUE	1249875.00	2499750.00	3749625.00	3749625.00
Foreign share (%)	0.00	0.00	0.00	0.00

PRODUCTION AND SALES PROGRAMME - IH40B - TOTAL
us dollars

	Production 2001	Production 2002	Production 2003	Production 2004
Stock brought forward	555.50	555.50	555.50	555.50
Quantity produced	16665.00	16665.00	16665.00	16665.00
Stock carried forward	555.50	555.50	555.50	555.50
Quantity sold	16665.00	16665.00	16665.00	16665.00
Gross unit price (average)	270.00	270.00	270.00	270.00
Net unit price (average)	225.00	225.00	225.00	225.00
Sales tax per unit (average)	45.00	45.00	45.00	45.00
Gross sales revenue	4499550.00	4499550.00	4499550.00	4499550.00
Less sales tax	749925.00	749925.00	749925.00	749925.00
Net sales revenue	3749625.00	3749625.00	3749625.00	3749625.00
Subsidy	0.00	0.00	0.00	0.00
SALES REVENUE	3749625.00	3749625.00	3749625.00	3749625.00
Foreign share (%)	0.00	0.00	0.00	0.00

PRODUCTION AND SALES PROGRAMME - IH40B - TOTAL
us dollars

	Production 2005	Production 2006
Stock brought forward	555.50	555.50
Quantity produced	16665.00	16665.00
Stock carried forward	555.50	555.50
Quantity sold	16665.00	16665.00
Gross unit price (average)	270.00	270.00
Net unit price (average)	225.00	225.00
Sales tax per unit (average)	45.00	45.00
Gross sales revenue	4499550.00	4499550.00
Less sales tax	749925.00	749925.00
Net sales revenue	3749625.00	3749625.00
Subsidy	0.00	0.00
SALES REVENUE	3749625.00	3749625.00
Foreign share (%)	0.00	0.00

PRODUCTION AND SALES PROGRAMME - BIFAM - TOTAL
us dollars

	Production 1997	Production 1998	Production 1999	Production 2000
Stock brought forward	0.00	106.90	213.83	320.73
Quantity produced	3313.90	6521.93	9728.90	9622.00
Stock carried forward	106.90	213.83	320.73	320.73
Quantity sold	3207.00	6415.00	9622.00	9622.00
Gross unit price (average)	450.00	450.00	450.00	450.00
Net unit price (average)	375.00	375.00	375.00	375.00
Sales tax per unit (average)	75.00	75.00	75.00	75.00
Gross sales revenue	1443150.00	2886750.00	4329900.00	4329900.00
Less sales tax	240525.00	481125.00	721650.00	721650.00
Net sales revenue	1202625.00	2405625.00	3608250.00	3608250.00
Subsidy	0.00	0.00	0.00	0.00
SALES REVENUE	1202625.00	2405625.00	3608250.00	3608250.00
Foreign share (%)	0.00	0.00	0.00	0.00

PRODUCTION AND SALES PROGRAMME - BIFAM - TOTAL
us dollars

	Production 2001	Production 2002	Production 2003	Production 2004
Stock brought forward	320.73	320.73	320.73	320.73
Quantity produced	9622.00	9622.00	9622.00	9622.00
Stock carried forward	320.73	320.73	320.73	320.73
Quantity sold	9622.00	9622.00	9622.00	9622.00
Gross unit price (average)	450.00	450.00	450.00	450.00
Net unit price (average)	375.00	375.00	375.00	375.00
Sales tax per unit (average)	75.00	75.00	75.00	75.00
Gross sales revenue	4329900.00	4329900.00	4329900.00	4329900.00
Less sales tax	721650.00	721650.00	721650.00	721650.00
Net sales revenue	3608250.00	3608250.00	3608250.00	3608250.00
Subsidy	0.00	0.00	0.00	0.00
SALES REVENUE	3608250.00	3608250.00	3608250.00	3608250.00
Foreign share (%)	0.00	0.00	0.00	0.00

PRODUCTION AND SALES PROGRAMME - BIFAM - TOTAL
us dollars

	Production 2005	Production 2006
Stock brought forward	320.73	320.73
Quantity produced	9622.00	9622.00
Stock carried forward	320.73	320.73
Quantity sold	9622.00	9622.00
Gross unit price (average)	450.00	450.00
Net unit price (average)	375.00	375.00
Sales tax per unit (average)	75.00	75.00
Gross sales revenue	4329900.00	4329900.00
Less sales tax	721650.00	721650.00
Net sales revenue	3608250.00	3608250.00
Subsidy	0.00	0.00
SALES REVENUE	3608250.00	3608250.00
Foreign share (%)	0.00	0.00

PRODUCTION AND SALES PROGRAMME - MULTIPIANO - TOTAL
us dollars

	Production 1997	Production 1998	Production 1999	Production 2000
Stock brought forward	0.00	216.00	432.00	648.00
Quantity produced	6696.00	13176.00	19656.00	19440.00
Stock carried forward	216.00	432.00	648.00	648.00
Quantity sold	6480.00	12960.00	19440.00	19440.00
Gross unit price (average)	450.00	450.00	450.00	450.00
Net unit price (average)	375.00	375.00	375.00	375.00
Sales tax per unit (average)	75.00	75.00	75.00	75.00
Gross sales revenue	2916000.00	5832000.00	8748000.00	8748000.00
Less sales tax	486000.00	972000.00	1458000.00	1458000.00
Net sales revenue	2430000.00	4860000.00	7290000.00	7290000.00
Subsidy	0.00	0.00	0.00	0.00
SALES REVENUE	2430000.00	4860000.00	7290000.00	7290000.00
Foreign share (%)	0.00	0.00	0.00	0.00

PRODUCTION AND SALES PROGRAMME - MULTIPIANO - TOTAL
us dollars

	Production 2001	Production 2002	Production 2003	Production 2004
Stock brought forward	648.00	648.00	648.00	648.00
Quantity produced	19440.00	19440.00	19440.00	19440.00
Stock carried forward	648.00	648.00	648.00	648.00
Quantity sold	19440.00	19440.00	19440.00	19440.00
Gross unit price (average)	450.00	450.00	450.00	450.00
Net unit price (average)	375.00	375.00	375.00	375.00
Sales tax per unit (average)	75.00	75.00	75.00	75.00
Gross sales revenue	8748000.00	8748000.00	8748000.00	8748000.00
Less sales tax	1458000.00	1458000.00	1458000.00	1458000.00
Net sales revenue	7290000.00	7290000.00	7290000.00	7290000.00
Subsidy	0.00	0.00	0.00	0.00
SALES REVENUE	7290000.00	7290000.00	7290000.00	7290000.00
Foreign share (%)	0.00	0.00	0.00	0.00

PRODUCTION AND SALES PROGRAMME - MULTIPIANO - TOTAL
us dollars

	Production 2005	Production 2006
Stock brought forward	648.00	648.00
Quantity produced	19440.00	19440.00
Stock carried forward	648.00	648.00
Quantity sold	19440.00	19440.00
Gross unit price (average)	450.00	450.00
Net unit price (average)	375.00	375.00
Sales tax per unit (average)	75.00	75.00
Gross sales revenue	8748000.00	8748000.00
Less sales tax	1458000.00	1458000.00
Net sales revenue	7290000.00	7290000.00
Subsidy	0.00	0.00
SALES REVENUE	7290000.00	7290000.00
Foreign share (%)	0.00	0.00

FINANCIAL FLOW - TOTAL
us dollars

	Total inflow	Construction 1996	Production 1997	Production 1998
Equity capital	2639162.34	2639162.34	0.00	0.00
Ordinary capital	2000000.00	2000000.00	0.00	0.00
Preference capital	0.00	0.00	0.00	0.00
Subsidies, grants	0.00	0.00	0.00	0.00
Automatic equity	639162.34	639162.34	0.00	0.00
Long term loans	11004693.00	11004693.00	-1838801.19	-2004293.30
Suppliers credit	0.00	0.00	0.00	0.00
Development finance institutions	0.00	0.00	0.00	0.00
Commercial banks	11004693.00	11004693.00	-1838801.19	-2004293.30
Government loans	0.00	0.00	0.00	0.00
Others	0.00	0.00	0.00	0.00
TOTAL LONG-TERM FINANCE	13643855.34	13643855.34	-1838801.19	-2004293.30
Total short term loans	3620091.66	0.00	1945521.02	952361.71
Short term loans	0.00	0.00	0.00	0.00
Accounts payable	273483.62	0.00	107162.22	83188.21
Automatic overdraft	3346608.04	0.00	1838358.80	869173.50
TOTAL FINANCIAL FLOW	17263947.00	13643855.34	106719.83	-1051931.59
Foreign share (%)	75.79	95.32	-1696.57	188.11

FINANCIAL FLOW - TOTAL
us dollars

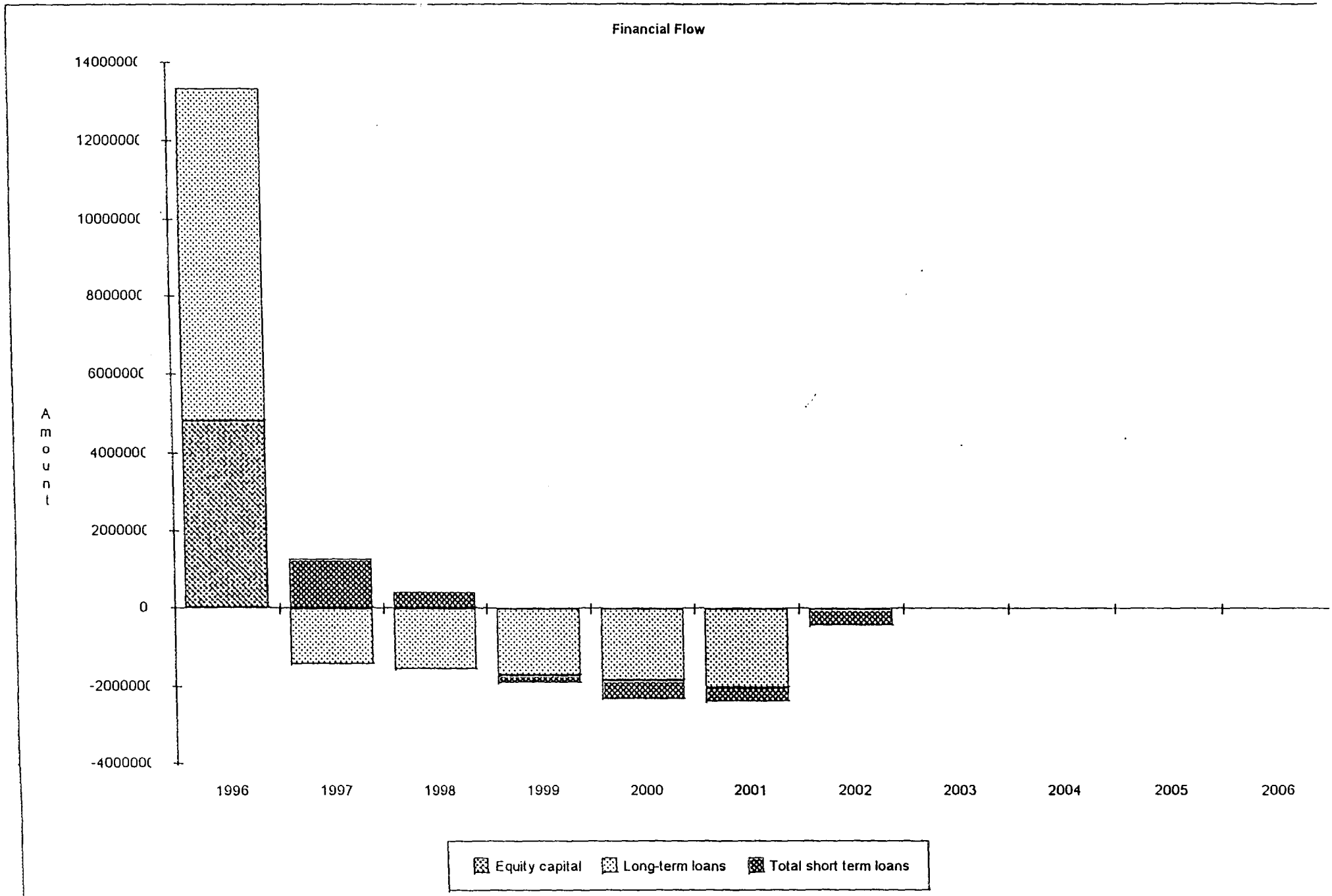
	Production 1999	Production 2000	Production 2001	Production 2002
Equity capital	0.00	0.00	0.00	0.00
Ordinary capital	0.00	0.00	0.00	0.00
Preference capital	0.00	0.00	0.00	0.00
Subsidies, grants	0.00	0.00	0.00	0.00
Automatic equity	0.00	0.00	0.00	0.00
Long term loans	-2184679.70	-2381300.87	-2595617.95	0.00
Suppliers credit	0.00	0.00	0.00	0.00
Development finance institutions	0.00	0.00	0.00	0.00
Commercial banks	-2184679.70	-2381300.87	-2595617.95	0.00
Government loans	0.00	0.00	0.00	0.00
Others	0.00	0.00	0.00	0.00
TOTAL LONG-TERM FINANCE	-2184679.70	-2381300.87	-2595617.95	0.00
Total short term loans	346310.00	113865.20	256612.97	-2423362.56
Short term loans	0.00	0.00	0.00	0.00
Accounts payable	83047.62	-5420.75	85.56	0.00
Automatic overdraft	263262.38	119285.95	256527.41	-2423362.56
TOTAL FINANCIAL FLOW	-1838369.69	-2267435.66	-2339004.97	-2423362.56
Foreign share (%)	117.45	105.10	110.97	0.00

FINANCIAL FLOW - TOTAL
us dollars

	Production 2003	Production 2004	Production 2005	Production 2006
Equity capital	0.00	0.00	0.00	0.00
Ordinary capital	0.00	0.00	0.00	0.00
Preference capital	0.00	0.00	0.00	0.00
Subsidies, grants	0.00	0.00	0.00	0.00
Automatic equity	0.00	0.00	0.00	0.00
Long term loans	0.00	0.00	0.00	0.00
Suppliers credit	0.00	0.00	0.00	0.00
Development finance institutions	0.00	0.00	0.00	0.00
Commercial banks	0.00	0.00	0.00	0.00
Government loans	0.00	0.00	0.00	0.00
Others	0.00	0.00	0.00	0.00
TOTAL LONG-TERM FINANCE	0.00	0.00	0.00	0.00
Total short term loans	-923245.48	0.00	0.00	0.00
Short term loans	0.00	0.00	0.00	0.00
Accounts payable	0.00	0.00	0.00	0.00
Automatic overdraft	-923245.48	0.00	0.00	0.00
TOTAL FINANCIAL FLOW	-923245.48	0.00	0.00	0.00
Foreign share (%)	0.00	0.00	0.00	0.00

FINANCIAL FLOW - TOTAL
us dollars

	Scrap 2007
Equity capital	0.00
Ordinary capital	0.00
Preference capital	0.00
Subsidies, grants	0.00
Automatic equity	0.00
Long term loans	0.00
Suppliers credit	0.00
Development finance institutions	0.00
Commercial banks	0.00
Government loans	0.00
Others	0.00
TOTAL LONG-TERM FINANCE	0.00
Total short term loans	-268062.87
Short term loans	0.00
Accounts payable	-268062.87
Automatic overdraft	0.00
TOTAL FINANCIAL FLOW	-268062.87
Foreign share (%)	28.97


Financial Flow
1400000
1200000
1000000
800000
600000
400000
200000
0
-200000
-400000
Amount
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
Equity capital
Long-term loans
Total short term loans

DEBT SERVICE - TOTAL
us dollars

	Total inflow	Construction 1996	Production 1997	Production 1998
Total long term loans				
Disbursement	11004693.00	11004693.00	0.00	0.00
Repayment	11004693.00	0.00	1838801.19	2004293.30
Debt balance end of year	0.00	11004693.00	9165891.81	7161598.51
Exchange rate adjustments	0.00	0.00	0.00	0.00
Capitalized interest	0.00	0.00	0.00	0.00
Interest payable	4131847.18	990422.37	990422.37	824930.26
Other financial costs	789234.92	440187.72	110046.93	91658.92
Commitment	110046.93	110046.93	0.00	0.00
Agency fee	110046.93	110046.93	0.00	0.00
Guarantee	459094.13	110046.93	110046.93	91658.92
Other fee	110046.93	110046.93	0.00	0.00
Total short term loans				
Disbursement	0.00	0.00	0.00	0.00
Repayment	0.00	0.00	0.00	0.00
Debt balance end of year	0.00	0.00	0.00	0.00
Exchange rate adjustments	0.00	0.00	0.00	0.00
Capitalized interest	0.00	0.00	0.00	0.00
Interest payable	0.00	0.00	0.00	0.00
Other financial costs	0.00	0.00	0.00	0.00
TOTAL DEBT SERVICE				
Disbursement	11004693.00	11004693.00	0.00	0.00
Repayment	11004693.00	0.00	1838801.19	2004293.30
Debt balance end of year	0.00	11004693.00	9165891.81	7161598.51
Exchange rate adjustments	0.00	0.00	0.00	0.00
Capitalized interest	0.00	0.00	0.00	0.00
Interest payable	4131847.18	990422.37	990422.37	824930.26
Other financial costs	789234.92	440187.72	110046.93	91658.92

DEBT SERVICE - TOTAL
us dollars

	Production 1999	Production 2000	Production 2001	Production 2002
Total long term loans				
Disbursement	0.00	0.00	0.00	0.00
Repayment	2184679.70	2381300.87	2595617.95	0.00
Debt balance end of year	4976918.81	2595617.95	0.00	0.00
Exchange rate adjustments	0.00	0.00	0.00	0.00
Capitalized interest	0.00	0.00	0.00	0.00
Interest payable	644543.87	447922.69	233605.62	0.00
Other financial costs	71615.99	49769.19	25956.18	0.00
Commitment	0.00	0.00	0.00	0.00
Agency fee	0.00	0.00	0.00	0.00
Guarantee	71615.99	49769.19	25956.18	0.00
Other fee	0.00	0.00	0.00	0.00
Total short term loans				
Disbursement	0.00	0.00	0.00	0.00
Repayment	0.00	0.00	0.00	0.00
Debt balance end of year	0.00	0.00	0.00	0.00
Exchange rate adjustments	0.00	0.00	0.00	0.00
Capitalized interest	0.00	0.00	0.00	0.00
Interest payable	0.00	0.00	0.00	0.00
Other financial costs	0.00	0.00	0.00	0.00
TOTAL DEBT SERVICE				
Disbursement	0.00	0.00	0.00	0.00
Repayment	2184679.70	2381300.87	2595617.95	0.00
Debt balance end of year	4976918.81	2595617.95	0.00	0.00
Exchange rate adjustments	0.00	0.00	0.00	0.00
Capitalized interest	0.00	0.00	0.00	0.00
Interest payable	644543.87	447922.69	233605.62	0.00
Other financial costs	71615.99	49769.19	25956.18	0.00

DEBT SERVICE - TOTAL
us dollars

	Production 2003	Production 2004	Production 2005	Production 2006
Total long term loans				
Disbursement	0.00	0.00	0.00	0.00
Repayment	0.00	0.00	0.00	0.00
Debt balance end of year	0.00	0.00	0.00	0.00
Exchange rate adjustments	0.00	0.00	0.00	0.00
Capitalized interest	0.00	0.00	0.00	0.00
Interest payable	0.00	0.00	0.00	0.00
Other financial costs	0.00	0.00	0.00	0.00
Commitment	0.00	0.00	0.00	0.00
Agency fee	0.00	0.00	0.00	0.00
Guarantee	0.00	0.00	0.00	0.00
Other fee	0.00	0.00	0.00	0.00
Total short term loans				
Disbursement	0.00	0.00	0.00	0.00
Repayment	0.00	0.00	0.00	0.00
Debt balance end of year	0.00	0.00	0.00	0.00
Exchange rate adjustments	0.00	0.00	0.00	0.00
Capitalized interest	0.00	0.00	0.00	0.00
Interest payable	0.00	0.00	0.00	0.00
Other financial costs	0.00	0.00	0.00	0.00
TOTAL DEBT SERVICE				
Disbursement	0.00	0.00	0.00	0.00
Repayment	0.00	0.00	0.00	0.00
Debt balance end of year	0.00	0.00	0.00	0.00
Exchange rate adjustments	0.00	0.00	0.00	0.00
Capitalized interest	0.00	0.00	0.00	0.00
Interest payable	0.00	0.00	0.00	0.00
Other financial costs	0.00	0.00	0.00	0.00

DEBT SERVICE - TOTAL
us dollars

	Scrap 2007
Total long term loans	
Disbursement	0.00
Repayment	0.00
Debt balance end of year	0.00
Exchange rate adjustments	0.00
Capitalized interest	0.00
Interest payable	0.00
Other financial costs	0.00
Commitment	0.00
Agency fee	0.00
Guarantee	0.00
Other fee	0.00
Total short term loans	
Disbursement	0.00
Repayment	0.00
Debt balance end of year	0.00
Exchange rate adjustments	0.00
Capitalized interest	0.00
Interest payable	0.00
Other financial costs	0.00
TOTAL DEBT SERVICE	
Disbursement	0.00
Repayment	0.00
Debt balance end of year	0.00
Exchange rate adjustments	0.00
Capitalized interest	0.00
Interest payable	0.00
Other financial costs	0.00

CASH FLOW FOR FINANCIAL PLANNING - TOTAL
us dollars

	Construction 1996	Production 1997	Production 1998
TOTAL CASH INFLOW	13004693.00	4990132.45	9849158.24
Inflow funds	13004693.00	107162.22	83188.21
Total Equity	2000000.00	0.00	0.00
Total long term loans	11004693.00	0.00	0.00
Total short term loans	0.00	107162.22	83188.21
Inflow operation	0.00	4882970.23	9765970.03
Sales revenue	0.00	4882500.00	9765375.00
Interest on securities	0.00	470.23	595.03
Other income	0.00	0.00	0.00
TOTAL CASH OUTFLOW	13643855.34	6828491.25	10718331.74
Increase in fixed assets	12133245.25	0.00	0.00
Fixed investments	11603995.25	0.00	0.00
Pre-Production Expenditures (net of interest)	529250.00	0.00	0.00
Increase in current assets	80000.00	381170.76	352261.10
Operating costs	0.00	3454300.00	6117741.47
Marketing costs	0.00	53750.00	53750.00
Income (corporate) tax	0.00	0.00	660435.32
Financial costs	1430610.09	1100469.30	916589.18
Loan repayment	0.00	1838801.19	2004293.30
Dividends payable	0.00	0.00	613261.37
intertransport	0.00	0.00	306630.68
chile	0.00	0.00	306630.68
Others	0.00	0.00	0.00
Equity capital refund	0.00	0.00	0.00
SURPLUS (DEFICIT)	-639162.34	-1838358.80	-869173.50
CUMULATIVE CASH BALANCE	-639162.34	-2477521.14	-3346694.64
Foreign surplus (deficit)	1620680.63	-3703509.59	-4774998.46
Local surplus (deficit)	-2259842.97	1865150.79	3905824.96
Foreign cumulative cash balance	1620680.63	-2082828.96	-6857827.42
Local cumulative cash balance	-2259842.97	-394692.18	3511132.78
Net flow of funds	11574082.91	-2832108.27	-3450955.63

CASH FLOW FOR FINANCIAL PLANNING - TOTAL
us dollars

	Production 1999	Production 2000	Production 2001
TOTAL CASH INFLOW	14731642.44	14648590.66	14648676.22
Inflow funds	83047.62	0.00	85.56
Total Equity	0.00	0.00	0.00
Total long term loans	0.00	0.00	0.00
Total short term loans	83047.62	0.00	85.56
Inflow operation	14648594.81	14648590.66	14648590.66
Sales revenue	14647875.00	14647875.00	14647875.00
Interest on securities	719.81	715.66	715.66
Other income	0.00	0.00	0.00
TOTAL CASH OUTFLOW	14994904.82	14767876.61	14905203.63
Increase in fixed assets	0.00	0.00	0.00
Fixed investments	0.00	0.00	0.00
Pre-Production Expenditures (net of interest)	0.00	0.00	0.00
Increase in current assets	352242.27	-5822.97	0.00
Operating costs	8781043.97	8781043.97	8781043.97
Marketing costs	53750.00	53750.00	53750.00
Income (corporate) tax	1507348.39	1583810.72	1667156.25
Financial costs	716159.85	497691.88	259561.79
Loan repayment	2184679.70	2386721.62	2595617.95
Dividends payable	1399680.65	1470681.38	1548073.66
intertransport	699840.32	735340.69	774036.83
chile	699840.32	735340.69	774036.83
Others	0.00	0.00	0.00
Equity capital refund	0.00	0.00	0.00
SURPLUS (DEFICIT)	-263262.38	-119285.95	-256527.41
CUMULATIVE CASH BALANCE	-3609957.02	-3729242.97	-3985770.38
Foreign surplus (deficit)	-5935710.99	-5894486.65	-5933125.94
Local surplus (deficit)	5672448.61	5775200.70	5676598.53
Foreign cumulative cash balance	-12793538.41	-18688025.06	-24621151.00
Local cumulative cash balance	9183581.39	14958782.09	20635380.62
Net flow of funds	-4217472.57	-4355094.88	-4403167.84

CASH FLOW FOR FINANCIAL PLANNING - TOTAL
us dollars

	Production 2002	Production 2003	Production 2004
TOTAL CASH INFLOW	14648590.66	14648590.66	14648590.66
Inflow funds	0.00	0.00	0.00
Total Equity	0.00	0.00	0.00
Total long term loans	0.00	0.00	0.00
Total short term loans	0.00	0.00	0.00
Inflow operation	14648590.66	14648590.66	14648590.66
Sales revenue	14647875.00	14647875.00	14647875.00
Interest on securities	715.66	715.66	715.66
Other income	0.00	0.00	0.00
TOTAL CASH OUTFLOW	12225228.10	12225228.10	12225228.10
Increase in fixed assets	0.00	0.00	0.00
Fixed investments	0.00	0.00	0.00
Pre-Production Expenditures (net of interest)	0.00	0.00	0.00
Increase in current assets	0.00	0.00	0.00
Operating costs	8781043.97	8781043.97	8781043.97
Marketing costs	53750.00	53750.00	53750.00
Income (corporate) tax	1758002.88	1758002.88	1758002.88
Financial costs	0.00	0.00	0.00
Loan repayment	0.00	0.00	0.00
Dividends payable	1632431.25	1632431.25	1632431.25
intertransport	816215.62	816215.62	816215.62
chile	816215.62	816215.62	816215.62
Others	0.00	0.00	0.00
Equity capital refund	0.00	0.00	0.00
SURPLUS (DEFICIT)	2423362.56	2423362.56	2423362.56
CUMULATIVE CASH BALANCE	-1562407.82	860954.74	3284317.29
Foreign surplus (deficit)	-3146109.60	-3146109.60	-3146109.60
Local surplus (deficit)	5569472.15	5569472.15	5569472.15
Foreign cumulative cash balance	-27767260.60	-30913370.20	-34059479.79
Local cumulative cash balance	26204852.78	31774324.93	37343797.09
Net flow of funds	-1632431.25	-1632431.25	-1632431.25

CASH FLOW FOR FINANCIAL PLANNING - TOTAL
us dollars

	Production 2005	Production 2006	Scrap 2007
TOTAL CASH INFLOW	14648590.66	14648590.66	6814393.37
Inflow funds	0.00	0.00	0.00
Total Equity	0.00	0.00	0.00
Total long term loans	0.00	0.00	0.00
Total short term loans	0.00	0.00	0.00
Inflow operation	14648590.66	14648590.66	0.00
Sales revenue	14647875.00	14647875.00	0.00
Interest on securities	715.66	715.66	0.00
Other income	0.00	0.00	6814393.37
TOTAL CASH OUTFLOW	12225228.10	12225228.10	268062.87
Increase in fixed assets	0.00	0.00	0.00
Fixed investments	0.00	0.00	0.00
Pre-Production Expenditures (net of interest)	0.00	0.00	0.00
Increase in current assets	0.00	0.00	0.00
Operating costs	8781043.97	8781043.97	0.00
Marketing costs	53750.00	53750.00	0.00
Income (corporate) tax	1758002.88	1758002.88	0.00
Financial costs	0.00	0.00	0.00
Loan repayment	0.00	0.00	268062.87
Dividends payable	1632431.25	1632431.25	0.00
intertransport	816215.62	816215.62	0.00
chile	816215.62	816215.62	0.00
Others	0.00	0.00	0.00
Equity capital refund	0.00	0.00	0.00
SURPLUS (DEFICIT)	2423362.56	2423362.56	6546330.49
CUMULATIVE CASH BALANCE	5707679.85	8131042.41	14677372.90
Foreign surplus (deficit)	-3146109.60	-3146109.60	1223411.77
Local surplus (deficit)	5569472.15	5569472.15	5322918.72
Foreign cumulative cash balance	-37205589.39	-40351698.99	-39128287.22
Local cumulative cash balance	42913269.24	48482741.40	53805660.12
Net flow of funds	-1632431.25	-1632431.25	-268062.87

DISCOUNTED CASHFLOW - TOTAL CAPITAL INVESTED
us dollars

	Construction 1996	Production 1997	Production 1998
TOTAL CASH INFLOW	0.00	4882970.23	9765970.03
Inflow operation	0.00	4882970.23	9765970.03
Sales revenue	0.00	4882500.00	9765375.00
Interest on securities	0.00	470.23	595.03
Other income	0.00	0.00	0.00
TOTAL CASH OUTFLOW	12213245.25	3782058.53	7100999.68
Increase in fixed assets	12133245.25	0.00	0.00
Fixed investments	11603995.25	0.00	0.00
Pre-Production Expenditures (net of interest)	529250.00	0.00	0.00
Increase in net working capital	80000.00	274008.53	269072.88
Operating costs	0.00	3454300.00	6117741.47
Marketing costs	0.00	53750.00	53750.00
Income (corporate) tax	0.00	0.00	660435.32
NET CASH FLOW	-12213245.25	1100911.69	2664970.35
CUMULATIVE NET CASH FLOW	-12213245.25	-11112333.56	-8447363.21
Net present value	-12213245.25	982956.87	2124498.05
Cumulative net present value	-12213245.25	-11230288.38	-9105790.33
NET PRESENT VALUE	at 12.00 %	8987126.04	
INTERNAL RATE OF RETURN	24.29 %		
MODIFIED INTERNAL RATE OF RETURN	12.12 %		
NORMAL PAYBACK	at 0.00 %	6	
DYNAMIC PAYBACK	at 12.00 %	7	
NPV RATIO	0.70		

DISCOUNTED CASHFLOW - TOTAL CAPITAL INVESTED
us dollars

	Production 1999	Production 2000	Production 2001
TOTAL CASH INFLOW	14648594.81	14648590.66	14648590.66
Inflow operation	14648594.81	14648590.66	14648590.66
Sales revenue	14647875.00	14647875.00	14647875.00
Interest on securities	719.81	715.66	715.66
Other income	0.00	0.00	0.00
TOTAL CASH OUTFLOW	10611337.01	10418202.47	10501864.66
Increase in fixed assets	0.00	0.00	0.00
Fixed investments	0.00	0.00	0.00
Pre-Production Expenditures (net of interest)	0.00	0.00	0.00
Increase in net working capital	269194.64	-402.22	-85.56
Operating costs	8781043.97	8781043.97	8781043.97
Marketing costs	53750.00	53750.00	53750.00
Income (corporate) tax	1507348.39	1583810.72	1667156.25
NET CASH FLOW	4037257.81	4230388.18	4146725.99
CUMULATIVE NET CASH FLOW	-4410105.40	-179717.22	3967008.78
Net present value	2873640.36	2688488.17	2352963.69
Cumulative net present value	-6232149.97	-3543661.80	-1190698.11

NET PRESENT VALUE	
INTERNAL RATE OF RETURN	
MODIFIED INTERNAL RATE OF RETURN	
NORMAL PAYBACK	
DYNAMIC PAYBACK	
NPV RATIO	

DISCOUNTED CASHFLOW - TOTAL CAPITAL INVESTED
us dollars

	Production 2002	Production 2003	Production 2004
TOTAL CASH INFLOW	14648590.66	14648590.66	14648590.66
Inflow operation	14648590.66	14648590.66	14648590.66
Sales revenue	14647875.00	14647875.00	14647875.00
Interest on securities	715.66	715.66	715.66
Other income	0.00	0.00	0.00
TOTAL CASH OUTFLOW	10592796.85	10592796.85	10592796.85
Increase in fixed assets	0.00	0.00	0.00
Fixed investments	0.00	0.00	0.00
Pre-Production Expenditures (net of interest)	0.00	0.00	0.00
Increase in net working capital	0.00	0.00	0.00
Operating costs	8781043.97	8781043.97	8781043.97
Marketing costs	53750.00	53750.00	53750.00
Income (corporate) tax	1758002.88	1758002.88	1758002.88
NET CASH FLOW	4055793.80	4055793.80	4055793.80
CUMULATIVE NET CASH FLOW	8022802.58	12078596.38	16134390.19
Net present value	2054791.36	1834635.14	1638067.09
Cumulative net present value	864093.25	2698728.40	4336795.49
NET PRESENT VALUE			
INTERNAL RATE OF RETURN			
MODIFIED INTERNAL RATE OF RETURN			
NORMAL PAYBACK			
DYNAMIC PAYBACK			
NPV RATIO			

DISCOUNTED CASHFLOW - TOTAL CAPITAL INVESTED
us dollars

	Production 2005	Production 2006	Scrap 2007
TOTAL CASH INFLOW	14648590.66	14648590.66	6546330.49
Inflow operation	14648590.66	14648590.66	0.00
Sales revenue	14647875.00	14647875.00	0.00
Interest on securities	715.66	715.66	0.00
Other income	0.00	0.00	6546330.49
TOTAL CASH OUTFLOW	10592796.85	10592796.85	0.00
Increase in fixed assets	0.00	0.00	0.00
Fixed investments	0.00	0.00	0.00
Pre-Production Expenditures (net of interest)	0.00	0.00	0.00
Increase in net working capital	0.00	0.00	0.00
Operating costs	8781043.97	8781043.97	0.00
Marketing costs	53750.00	53750.00	0.00
Income (corporate) tax	1758002.88	1758002.88	0.00
NET CASH FLOW	4055793.80	4055793.80	6546330.49
CUMULATIVE NET CASH FLOW	20190183.99	24245977.79	30792308.28
Net present value	1462559.90	1305857.06	1881913.59
Cumulative net present value	5799355.39	7105212.45	8987126.04
NET PRESENT VALUE			
INTERNAL RATE OF RETURN			
MODIFIED INTERNAL RATE OF RETURN			
NORMAL PAYBACK			
DYNAMIC PAYBACK			
NPV RATIO			

NET INCOME STATEMENT
us dollars

	Production 1997	Production 1998	Production 1999
Sales revenue	4882500.00	9765375.00	14647875.00
Less variable costs	2663302.50	5326743.97	7990046.47
Material	2403326.98	4806768.97	7210095.96
Personnel	166230.39	332475.00	498705.39
Marketing (except personnel)	0.00	0.00	0.00
Other variable costs	93745.13	187500.00	281245.13
VARIABLE MARGIN	2219197.50	4438631.03	6657828.53
in % of sales revenue	45.45	45.45	45.45
Less fixed costs	1635678.81	1635678.81	1635678.81
Material	80000.00	80000.00	80000.00
Personnel	647247.50	647247.50	647247.50
Marketing (except personnel)	43750.00	43750.00	43750.00
Depreciation	790931.31	790931.31	790931.31
Other fixed costs	73750.00	73750.00	73750.00
OPERATIONAL MARGIN	583518.69	2802952.21	5022149.71
in % of sales revenue	11.95	28.70	34.29
Interest on securities	470.23	595.03	719.81
Financial costs	1100469.30	916589.18	716159.85
GROSS PROFIT FROM OPERATIONS	-516480.39	1886958.06	4306709.68
in % of sales revenue	-10.58	19.32	29.40
Extraordinary income	0.00	0.00	0.00
Extraordinary loss	0.00	0.00	0.00
Depreciation allowances	0.00	0.00	0.00
GROSS PROFIT	-516480.39	1886958.06	4306709.68
Investment allowances	0.00	0.00	0.00
TAXABLE PROFIT	0.00	1886958.06	4306709.68
Income (corporate) tax	0.00	660435.32	1507348.39
NET PROFIT	-516480.39	1226522.74	2799361.29
in % of sales revenue	-10.58	12.56	19.11
Dividends payable	0.00	613261.37	1399680.65
RETAINED PROFIT	-516480.39	613261.37	1399680.65
Ratios (%)			
Net profit / equity capital	-25.82	61.33	139.97
Net profit / Net worth	-24.33	44.83	67.69
Net profit + interest / investment	4.20	15.11	24.32

NET INCOME STATEMENT
us dollars

	Production 2000	Production 2001	Production 2002
Sales revenue	14647875.00	14647875.00	14647875.00
Less variable costs	7990046.47	7990046.47	7990046.47
Material	7210095.96	7210095.96	7210095.96
Personnel	498705.39	498705.39	498705.39
Marketing (except personnel)	0.00	0.00	0.00
Other variable costs	281245.13	281245.13	281245.13
VARIABLE MARGIN	6657828.53	6657828.53	6657828.53
in % of sales revenue	45.45	45.45	45.45
Less fixed costs	1635678.81	1635678.81	1635678.81
Material	80000.00	80000.00	80000.00
Personnel	647247.50	647247.50	647247.50
Marketing (except personnel)	43750.00	43750.00	43750.00
Depreciation	790931.31	790931.31	790931.31
Other fixed costs	73750.00	73750.00	73750.00
OPERATIONAL MARGIN	5022149.71	5022149.71	5022149.71
in % of sales revenue	34.29	34.29	34.29
Interest on securities	715.66	715.66	715.66
Financial costs	497691.88	259561.79	0.00
GROSS PROFIT FROM OPERATIONS	4525173.49	4763303.57	5022865.37
in % of sales revenue	30.89	32.52	34.29
Extraordinary income	0.00	0.00	0.00
Extraordinary loss	0.00	0.00	0.00
Depreciation allowances	0.00	0.00	0.00
GROSS PROFIT	4525173.49	4763303.57	5022865.37
Investment allowances	0.00	0.00	0.00
TAXABLE PROFIT	4525173.49	4763303.57	5022865.37
Income (corporate) tax	1583810.72	1667156.25	1758002.88
NET PROFIT	2941362.77	3096147.32	3264862.49
in % of sales revenue	20.08	21.14	22.29
Dividends payable	1470681.38	1548073.66	1632431.25
RETAINED PROFIT	1470681.38	1548073.66	1632431.25
Ratios (%)			
Net profit / equity capital	147.07	154.81	163.24
Net profit / Net worth	52.47	43.28	37.16
Net profit + interest / investment	23.79	23.21	22.59

NET INCOME STATEMENT
us dollars

	Production 2003	Production 2004	Production 2005
Sales revenue	14647875.00	14647875.00	14647875.00
Less variable costs	7990046.47	7990046.47	7990046.47
Material	7210095.96	7210095.96	7210095.96
Personnel	498705.39	498705.39	498705.39
Marketing (except personnel)	0.00	0.00	0.00
Other variable costs	281245.13	281245.13	281245.13
VARIABLE MARGIN	6657828.53	6657828.53	6657828.53
in % of sales revenue	45.45	45.45	45.45
Less fixed costs	1635678.81	1635678.81	1635678.81
Material	80000.00	80000.00	80000.00
Personnel	647247.50	647247.50	647247.50
Marketing (except personnel)	43750.00	43750.00	43750.00
Depreciation	790931.31	790931.31	790931.31
Other fixed costs	73750.00	73750.00	73750.00
OPERATIONAL MARGIN	5022149.71	5022149.71	5022149.71
in % of sales revenue	34.29	34.29	34.29
Interest on securities	715.66	715.66	715.66
Financial costs	0.00	0.00	0.00
GROSS PROFIT FROM OPERATIONS	5022865.37	5022865.37	5022865.37
in % of sales revenue	34.29	34.29	34.29
Extraordinary income	0.00	0.00	0.00
Extraordinary loss	0.00	0.00	0.00
Depreciation allowances	0.00	0.00	0.00
GROSS PROFIT	5022865.37	5022865.37	5022865.37
Investment allowances	0.00	0.00	0.00
TAXABLE PROFIT	5022865.37	5022865.37	5022865.37
Income (corporate) tax	1758002.88	1758002.88	1758002.88
NET PROFIT	3264862.49	3264862.49	3264862.49
in % of sales revenue	22.29	22.29	22.29
Dividends payable	1632431.25	1632431.25	1632431.25
RETAINED PROFIT	1632431.25	1632431.25	1632431.25
Ratios (%)			
Net profit / equity capital	163.24	163.24	163.24
Net profit / Net worth	31.33	27.09	23.86
Net profit + interest / investment	22.59	22.59	22.59

NET INCOME STATEMENT
us dollars

	Production 2006
Sales revenue	14647875.00
Less variable costs	7990046.47
Material	7210095.96
Personnel	498705.39
Marketing (except personnel)	0.00
Other variable costs	281245.13
VARIABLE MARGIN	6657828.53
in % of sales revenue	45.45
Less fixed costs	1635678.81
Material	80000.00
Personnel	647247.50
Marketing (except personnel)	43750.00
Depreciation	790931.31
Other fixed costs	73750.00
OPERATIONAL MARGIN	5022149.71
in % of sales revenue	34.29
Interest on securities	715.66
Financial costs	0.00
GROSS PROFIT FROM OPERATIONS	5022865.37
in % of sales revenue	34.29
Extraordinary income	0.00
Extraordinary loss	0.00
Depreciation allowances	0.00
GROSS PROFIT	5022865.37
Investment allowances	0.00
TAXABLE PROFIT	5022865.37
Income (corporate) tax	1758002.88
NET PROFIT	3264862.49
in % of sales revenue	22.29
Dividends payable	1632431.25
RETAINED PROFIT	1632431.25
Ratios (%)	
Net profit / equity capital	163.24
Net profit / Net worth	21.32
Net profit + interest / investment	22.59

PROJECTED BALANCE SHEET
us dollars

	1996	1997	1998
TOTAL ASSETS	13643855.34	13750575.17	13925166.32
Total current assets	80000.00	461170.76	1426693.22
Inventory on materials & supplies	80000.00	80043.57	157293.69
Work in progress	0.00	116394.22	205175.76
Finished product	0.00	115143.33	203924.72
Accounts receivable	0.00	116935.00	205716.38
Cash-in-hand	0.00	28736.07	36362.75
Securities	0.00	3918.56	4958.56
Cash surplus, finance available	0.00	0.00	613261.37
Total fixed assets, net of depreciation	13563855.34	12772924.03	11981992.72
Fixed investments	0.00	11603995.25	11603995.25
Construction in progress	11603995.25	0.00	0.00
Total Pre-Production Expenditures	1959860.09	1959860.09	1959860.09
Less accumulated depreciation	0.00	790931.31	1581862.63
Less depreciation allowance	0.00	0.00	0.00
Accumulated losses brought forward	0.00	0.00	516480.39
Loss in current year	0.00	516480.39	0.00
TOTAL LIABILITIES	13643855.34	13750575.17	13925166.32
Total current liabilities	0.00	1945521.02	2897882.73
Accounts payable	0.00	107162.22	190350.44
Bank overdraft	0.00	1838358.80	2707532.30
Total long term loans	11004693.00	9165891.81	7161598.51
Total Equity	2639162.34	2639162.34	2639162.34
Ordinary capital	2639162.34	2639162.34	2639162.34
Preference capital	0.00	0.00	0.00
Subsidies, grants	0.00	0.00	0.00
Reserves, retained profit brought forward	0.00	0.00	0.00
Net profit after tax	0.00	0.00	1226522.74
Dividends payable	0.00	0.00	613261.37
Retained Profit	0.00	0.00	613261.37
Net worth	2639162.34	2122681.95	2735943.32
Ratios (%)			
Equity / total liabilities	19.34	19.19	18.95
Net worth / total liabilities	19.34	15.44	19.65
Long-term debt / net worth	4.17	4.32	2.62
Current assets / current liabilities	0.00	0.24	0.49

PROJECTED BALANCE SHEET
us dollars

	1999	2000	2001
TOTAL ASSETS	13756416.17	13030662.62	12317123.59
Total current assets	2565354.77	2630532.53	2707924.81
Inventory on materials & supplies	234540.04	231965.15	231965.15
Work in progress	293952.36	290993.13	290993.13
Finished product	292701.47	292701.47	292701.47
Accounts receivable	294493.13	294493.13	294493.13
Cash-in-hand	43988.67	43734.48	43734.48
Securities	5998.46	5963.79	5963.79
Cash surplus, finance available	1399680.65	1470681.38	1548073.66
Total fixed assets, net of depreciation	11191061.40	10400130.09	9609198.78
Fixed investments	11603995.25	11603995.25	11603995.25
Construction in progress	0.00	0.00	0.00
Total Pre-Production Expenditures	1959860.09	1959860.09	1959860.09
Less accumulated depreciation	2372793.94	3163725.25	3954656.56
Less depreciation allowance	0.00	0.00	0.00
Accumulated losses brought forward	0.00	0.00	0.00
Loss in current year	0.00	0.00	0.00
TOTAL LIABILITIES	13756416.17	13030662.62	12317123.59
Total current liabilities	3244192.74	3358057.94	3614670.91
Accounts payable	273398.06	267977.31	268062.87
Bank overdraft	2970794.68	3090080.63	3346608.04
Total long term loans	4976918.81	2595617.95	0.00
Total Equity	2639162.34	2639162.34	2639162.34
Ordinary capital	2639162.34	2639162.34	2639162.34
Preference capital	0.00	0.00	0.00
Subsidies, grants	0.00	0.00	0.00
Reserves, retained profit brought forward	96780.98	1496461.63	2967143.01
Net profit after tax	2799361.29	2941362.77	3096147.32
Dividends payable	1399680.65	1470681.38	1548073.66
Retained Profit	1399680.65	1470681.38	1548073.66
Net worth	4135623.97	5606305.35	7154379.01
Ratios (%)			
Equity / total liabilities	19.18	20.25	21.43
Net worth / total liabilities	30.06	43.02	58.08
Long-term debt / net worth	1.20	0.46	0.00
Current assets / current liabilities	0.79	0.78	0.75

PROJECTED BALANCE SHEET
us dollars

	2002	2003	2004
TOTAL ASSETS	11610549.86	12319735.62	13952166.87
Total current assets	2792282.40	4292399.47	6715762.03
Inventory on materials & supplies	231965.15	231965.15	231965.15
Work in progress	290993.13	290993.13	290993.13
Finished product	292701.47	292701.47	292701.47
Accounts receivable	294493.13	294493.13	294493.13
Cash-in-hand	43734.48	43734.48	43734.48
Securities	5963.79	5963.79	5963.79
Cash surplus, finance available	1632431.25	3132548.32	5555910.88
Total fixed assets, net of depreciation	8818267.47	8027336.15	7236404.84
Fixed investments	11603995.25	11603995.25	11603995.25
Construction in progress	0.00	0.00	0.00
Total Pre-Production Expenditures	1959860.09	1959860.09	1959860.09
Less accumulated depreciation	4745587.88	5536519.19	6327450.50
Less depreciation allowance	0.00	0.00	0.00
Accumulated losses brought forward	0.00	0.00	0.00
Loss in current year	0.00	0.00	0.00
TOTAL LIABILITIES	11610549.86	12319735.62	13952166.87
Total current liabilities	1191308.36	268062.87	268062.87
Accounts payable	268062.87	268062.87	268062.87
Bank overdraft	923245.48	0.00	0.00
Total long term loans	0.00	0.00	0.00
Total Equity	2639162.34	2639162.34	2639162.34
Ordinary capital	2639162.34	2639162.34	2639162.34
Preference capital	0.00	0.00	0.00
Subsidies, grants	0.00	0.00	0.00
Reserves, retained profit brought forward	4515216.67	6147647.92	7780079.16
Net profit after tax	3264862.49	3264862.49	3264862.49
Dividends payable	1632431.25	1632431.25	1632431.25
Retained Profit	1632431.25	1632431.25	1632431.25
Net worth	8786810.26	10419241.50	12051672.75
Ratios (%)			
Equity / total liabilities	22.73	21.42	18.92
Net worth / total liabilities	75.68	84.57	86.38
Long-term debt / net worth	0.00	0.00	0.00
Current assets / current liabilities	2.34	16.01	25.05

PROJECTED BALANCE SHEET
us dollars

	2005	2006
TOTAL ASSETS	15584598.11	17217029.36
Total current assets	9139124.59	11562487.14
Inventory on materials & supplies	231965.15	231965.15
Work in progress	290993.13	290993.13
Finished product	292701.47	292701.47
Accounts receivable	294493.13	294493.13
Cash-in-hand	43734.48	43734.48
Securities	5963.79	5963.79
Cash surplus, finance available	7979273.44	10402635.99
Total fixed assets, net of depreciation	6445473.53	5654542.22
Fixed investments	11603995.25	11603995.25
Construction in progress	0.00	0.00
Total Pre-Production Expenditures	1959860.09	1959860.09
Less accumulated depreciation	7118381.81	7909313.13
Less depreciation allowance	0.00	0.00
Accumulated losses brought forward	0.00	0.00
Loss in current year	0.00	0.00
TOTAL LIABILITIES	15584598.11	17217029.36
Total current liabilities	268062.87	268062.87
Accounts payable	268062.87	268062.87
Bank overdraft	0.00	0.00
Total long term loans	0.00	0.00
Total Equity	2639162.34	2639162.34
Ordinary capital	2639162.34	2639162.34
Preference capital	0.00	0.00
Subsidies, grants	0.00	0.00
Reserves, retained profit brought forward	9412510.41	11044941.66
Net profit after tax	3264862.49	3264862.49
Dividends payable	1632431.25	1632431.25
Retained Profit	1632431.25	1632431.25
Net worth	13684104.00	15316535.24
Ratios (%)		
Equity / total liabilities	16.93	15.33
Net worth / total liabilities	87.81	88.96
Long-term debt / net worth	0.00	0.00
Current assets / current liabilities	34.09	43.13

FINANCIAL RATIOS
us dollars

	1996	1997	1998
Long-term debt / net worth	4.17	4.32	2.62
Current assets / current liabilities	0.00	0.24	0.49
Net cash flow / long term debt	-1.11	0.12	0.37
Accounts receivable / accounts payable	0.00	1.09	1.08
Net cash flow / long term debt service	-8.54	0.37	0.91

FINANCIAL RATIOS
us dollars

	1999	2000	2001
Long-term debt / net worth	1.20	0.46	0.00
Current assets / current liabilities	0.79	0.78	0.75
Net cash flow / long term debt	0.81	1.63	0.00
Accounts receivable / accounts payable	1.08	1.10	1.10
Net cash flow / long term debt service	1.39	1.47	1.45

FINANCIAL RATIOS
us dollars

	2002	2003	2004
Long-term debt / net worth	0.00	0.00	0.00
Current assets / current liabilities	2.34	16.01	25.05
Net cash flow / long term debt	0.00	0.00	0.00
Accounts receivable / accounts payable	1.10	1.10	1.10
Net cash flow / long term debt service	0.00	0.00	0.00

FINANCIAL RATIOS
us dollars

	2005	2006
Long-term debt / net worth	0.00	0.00
Current assets / current liabilities	34.09	43.13
Net cash flow / long term debt	0.00	0.00
Accounts receivable / accounts payable	1.10	1.10
Net cash flow / long term debt service	0.00	0.00

EFFICIENCY RATIOS
us dollars

	Production 1997	Production 1998	Production 1999
Sales / total capital investment	0.35	0.69	1.01
Initial investment / personnel cost	17.11	14.48	12.61
Inventory / sales	15.67	17.24	17.84
Net cash flow / Total sales	0.23	0.27	0.28

EFFICIENCY RATIOS
us dollars

	Production 2000	Production 2001	Production 2002
Sales / total capital investment	1.01	1.01	1.01
Initial investment / personnel cost	12.61	12.61	12.61
Inventory / sales	17.96	17.96	17.96
Net cash flow / Total sales	0.29	0.28	0.28

EFFICIENCY RATIOS
us dollars

	Production 2003	Production 2004	Production 2005
Sales / total capital investment	1.01	1.01	1.01
Initial investment / personnel cost	12.61	12.61	12.61
Inventory / sales	17.96	17.96	17.96
Net cash flow / Total sales	0.28	0.28	0.28

EFFICIENCY RATIOS
us dollars

	Production 2006
Sales / total capital investment	1.01
Initial investment / personnel cost	12.61
Inventory / sales	17.96
Net cash flow / Total sales	0.28

EFFICIENCY RATIOS
us dollars

	Production 2006
Sales / total capital investment	1.01
Initial investment / personnel cost	12.61
Inventory / sales	17.96
Net cash flow / Total sales	0.28