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**LOCATION OF INDUSTRY
IN THE SULCIS-IGLESIENTE BASIN**





I N T R O D U C T I O N

The present study is based on the second report by the Society of Applied Mathematics and Economics (SOMEA), on the possibility of introducing the aluminium conversion industry into Sardinia. The study was conducted for the European Coal and Steel Community High Authority and the Sarda Region. It included a report on factors affecting location of industry in the Sulcis-Iglesiente area, and secondarily, in the Cagliari industrial area. Having regard to the general validity of data and indications presented, the High Authority has considered it appropriate to include the report in the series on industrial redevelopment to inform Italian and foreign industrialists of the possibilities. The report includes six chapters, an appendix and six maps.

Information on the areas explored is given in Chapter I, the Portovesme area having been selected for extensive analysis. The same Chapter describes the principal characteristics of the Sulcis-Iglesiente industrial area, including natural features, main centres of population, industrial and agricultural activities, tourism and communications.

Chapter II deals with local factors affecting industrial development such as, availability of land, problems of water and energy supply etc., based on information contained in proposals by the Industrial Development Commission.

Maritime transport is the subject of Chapter III, with particular reference to the ports of S. Antioco, Portovesme and Cagliari.

Quantitative and qualitative information is given in Chapter IV on labour problems in the area.

Chapter V provides information on factors affecting location of the new Cagliari industrial area as provided in the development plan.

The Appendix summarises the principal fiscal facilities, credits, and the rules governing capital contributions, assistance available from Southern Area Development Funds and the Sarda Region.

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CHAPTER I

THE SULCIS-IGLESIENTE INDUSTRIAL CENTRE



1 - INTRODUCTION

The Sulcis-Iglesiente region in the Cagliari province occupies the south-west part of Sardinia bounded in the north-east by the Campidano Plain and in the south-west by the sea. The region is divided in two by the Cixerri and Flumentepido Valleys.

The northern sector of the Iglesias proper is composed of a massive hill range and is the most important area in Italy for lead and zinc production. The southern sector, named Sulcis, comprises the Rio Palmas Valley, the coastal area between Cap Altano to the north and Cap Teulada to the south plus the islands S. Pietro and S. Antioco. The coastline is very irregular and in some stretches bordered by pools.

Solid fuel seams are present in the Sulcis area and their exploitation began in 1935. The mining industry developed substantially until the end of the second world war, but has reached a state of crisis accentuated in the past few years by exhaustion of some deposits and competition from foreign products.

2 - GENERAL CHARACTERISTICS OF THE INDUSTRIAL CENTRE

2.1 - Preliminary observations

A large area of the southern part of the island is undergoing economic development and expanding westwards towards Sulcis-Iglesiente and north-west towards Villacridio, almost reaching the Oristano territory.

This area has been designated the Cagliari economic "gravitation superzone" and includes four homogeneous areas. The Muravera and S. Gavino areas are mainly agricultural, while the Cagliari and Sulcis-Iglesiente areas are predominantly industrial.

The south-west zone comprises 22 municipalities with a total population of about 150,000. Six of these municipalities, with an area of 59,584 hectares and a population of 88,658 at the 1961 census, constitute the industrial centre of Sulcis-Iglesiente.

In October 1963, the Cagliari Chamber of Commerce promoted a consortium for this centre and the development plan for industry was presented on 2nd April 1965 for approval by the Southern Italy Development Board and the Ministerial Committee concerned.

If the industrial development plan is approved within the present year, as is expected, contracts for preliminary work should be placed early in 1966.

The principal factors influencing the choice of area for development were :

- The presence of a super thermo-electric power station utilizing local coal and capable of supplying about 2,500 million kWh per annum.
- Availability of two second class ports with complementary characteristics and only 20 km apart.
- Abundant local labour reserves in Carbonia, and to some extent, in Iglesias.
- Existing mining resources.
- Relative proximity of the Cagliari major centre of population with 183,784 inhabitants at the 1961 census.

The Sulcis-Iglesiente region has a particularly complex structure which has provoked many discussions.

It includes three areas having interesting characteristics from the industrial development aspect as follows :

- The principal industrial area of Portovesme, about 700 hectares, is indicated in the development plan as the major area of industrial concentration. It is foreseen that this area will become the fulcrum of industrial development in the region and the infrastructure considered is orientated to that end.
- There are already several industrial undertakings in S. Antioco complementary to those in Portovesme. An area of about 100 hectares has been selected for industrial development by the S. Antioco Council, and possibly a further 87 hectares obtainable by reclamation of a lagoon area. The development plan for this area therefore, only requires limited infrastructural adjustments.

- The Iglesias area is an industrial centre with about 30,000 inhabitants and the chief mining area of Iglesiente. At the present time, no infra-structural adjustment is required by the development plan.

After describing the general characteristics of the Sulcis-Iglesiente region, this report will examine factors affecting industrial development of the Portovesme area apart from those applying particularly to S. Antioco and Iglesias.

The reasons for this separation derive from the following conditions and considerations :

- It has been decided that basic primary production of aluminium should be located in the Portovesme area.
- The aluminium transformation industry considered here, could best be located adjacent to the primary plant to achieve economic operation by using a common foundry.

It is relevant to observe that some industries could be located in other areas of the region, or perhaps in the relatively nearby Cagliari industrial area.

In the last chapter of the report, it has been considered appropriate to include some information on the Cagliari industrial area having regard to the importance it will assume as regional capital on completion of the proposed developments.

Except in some particular respects, it has been considered superfluous to make a factual comparison between the Cagliari and Portovesme areas in view of their different structure. While Cagliari already has several undertakings favouring establishment of other important units, the Portovesme area requires new construction for almost all the principal works under consideration. Moreover, some associated problems have yet to be resolved.

2.2 - Climate

There are no substantial climatic differences between the region and other insular Mediterranean localities, including Sardinia itself and other parts of southern Italy. Annual rainfall is low however, while wind velocity and its frequency are high (note 1).

Average winter temperature is between 14°C in December and 11-12°C in January and February. Average summer temperature is 24-25°C in July and August. Temperature data available was taken in the Portovesme area during 1958, considered to be a normal and representative year, and 1960.

<u>Temperatures in °C</u>		
January	Monthly average (1958)	11.8
	Minimum of month (1960)	11.3
	Maximum of month (1960)	13.3
July	Monthly average (1958)	23.9
	Minimum of month (1960)	21.8
	Maximum of month (1960)	25.0
Year	Average (1958)	17.9

(Note 1) The prevailing wind is the mistral (northerly), with average velocities of 20-25 km/h., often reaching 60-70 km/h., with gusts exceeding 100 km/h.

<u>Relative Humidity %.</u>	<u>1960</u>	<u>1961</u>
Minimum monthly average	58.0 (August)	67.1 (August)
Maximum monthly average	73.3 (December)	83.0 (January)
Annual average	67.4	72.1
<u>Barometric Pressure (mm/Hg).</u>	<u>1960</u>	<u>1961</u>
Minimum monthly average	756.0 (February)	755.1 (February)
Maximum monthly average	762.4 (May)	765.5 (December)
Annual average	760.0	761.2
<u>Rainfall (mm).</u>	<u>1960</u>	<u>1961</u>
Minimum monthly average	- (August)	- (July-August)
Maximum monthly average	149.2 (December)	144.2 (January)
Annual total	482.2	448.2

2.3 - Development Region Centres and Populations.

The six municipalities composing the Sulcis-Iglesiente Region had a population of 88,658 at the 1961 census.

Only three of these had a population exceeding 10,000 :

Carbonia	35,327
Iglesias	28,004
S. Antioco	10,993

The Portovesme Municipality, where the Portovesme industrial area is situated, has a population of less than 4,000.

The main centre of the area is Carbonia, situated 15 km from Portovesme, 15-16 km from S. Antioco, and about 71 km from Cagliari. Initial expansion and the subsequent crisis in 1937 were directly due to variation in mining activity in the area.

In 1950, the city had a population of about 48,000, but this has now progressively declined to below 35,000. At the same time, labour employed in the Coal Mining Industry fell from 17,000 in 1947, to 3,000 in 1964. Only two mines are operating now, one of which (Nuraxi Figus), employs 1,600 men. These two mines have been expropriated by the ENEL for some months.

2.4 - Industrial activities

At the present time, mining represents the most important activity in the region. At the 1961 census, 75 % of employed industrial labour was engaged in mining activities, (9,750 out of 12,900). The principal metals mined in the northern industrial zone at Iglesias are zinc and lead and represent 80 % and 60 % respectively of total Italian production.

Major companies operating in this sector are :

- Monteponi Montevecchio
- Ammi
- Pertusola.

Other quantitatively important non-metallic mining activities include extraction of baryta and fluorite.

The two coal mines still operating produce a total of about 1,000,000 tons per annum. Each mine will provide fuel for a group of thermo-electric power stations situated near Portovesme.

No other important industrial activities exist in the industrial region at present, but some small enterprises employing labour forces of 30 to 100 men operate in various fields as follows :

- Carbonia. Plastic hulls, mostly for export.
A paint factory opened recently by a Turin company.
- Iglesias. A substantial carpentry and heavy engineering industry, largely engaged on mine maintenance work and mine wagon production. If the proposed industrial development plan exceeds, this company intends to build a new factory at S. Antioco or Portovesme.
There is also a boot and shoe factory producing 150,000 pairs per annum, largely exported to Europe and America.
- S. Giovanni Suergiu. A pasta factory.
- S. Antioco. Marble working industry.
Wine production.
Baryta grinding.
A small furniture factory.
A salt works, to begin production within a year, (State monopoly).
A barium extraction plant in course of completion.
Magnesium oxide and limestone extraction.

Among the projects with definite or probable prospects of realization are :

- A plant for primary aluminium production of about 100,000 tons per annum at Portovesme.
- An alloy steel and chrome steel production plant of 20,000 tons at Portovesme.
- A zinc and lead foundry with an annual production of 100,000 tons per annum, probably at S. Antioco. In the whole industrial region, there is at present only one foundry in operation. This is for calamine fusion and is at Iglesias.

2.5 - Agriculture

The Sulcis-Iglesiente region includes the mountainous section referred to previously, the Cixerri Valley and the Basso Sulcis plains.

The first is mainly devoted to stock raising, and except for a few woods, the other two areas are open country.

The principal produce of the plains is grain, and more recently, some vegetables, cotton, beet, groundnuts, horticulture, artichokes, and grapes, serving the local wine industry at S. Antioco are being produced.

A consortium at Cixerri and Basso Sulcis is carrying out an extensive drainage and irrigation scheme to serve a large area of south-west Sardinia. The area which can be irrigated in the industrial development region is about 11,500 hectares. 2,800 hectares of this have been prepared, of which, 1,400 hectares have been effectively irrigated.

Basis of the Basso Sulcis project is the water reserves provided by the Monte Pranu Dam, having a capacity of about 50 million m³ of water.

According to the programme envisaged, cultivation of irrigated areas will produce :

- 78 % cereals and vegetables
- 10 % citrus fruits
- 12 % horticulture and fruits.

2.6 - Communications

2.6.1 - Roads

The State and provincial roads serving the development area are sufficient for present requirements and important projects now in progress should improve the situation considerably. Municipal and minor roads are numerous and good as a whole.

The most important arterial roads are :

- S.S. 130 Cagliari-Siliqua-Iglesias
- S.S. 126 Iglesias-Carbonia-S.Antioco, connected to the S.S.130
- S.S. 195 Sulcitana-Cagliari-Teulada-S.Giovanni Suergiu.

Among the provincial roads, that providing direct connection between Cagliari and Carbonia, and the S.S. 130 at Siliqua, are of importance.

Also of particular importance is the road connecting Portovesme with Port S. Antioco, beginning from Portoscuso, passing through Portovesme, and connecting with the S.S. 126 between S.Antioco and S. Giovanni Suergiu (map 1).

Principal improvements proposed in the development plan are :

- A new dual carriage-way (7.25 m wide each) from Portovesme to Carbonia
- Widening of the S.S. 126 from Portovesme to Iglesias by the National Roads Board (in progress). Old dimension 6 m., new 7.25 m.
- Widening of the Carbonia-Siliqua road from 6 m to 7.5 m.

Distances in kilometres

Town	From Portovesme (km)	From Cagliari (km)
Carbonia	15.0	71.4 (1)
Iglesias	22.7	56.4
Port S. Antioco	22.0	83.7 (1)
Gonnesa	12.4	66.7 (2)
S. Giovanni Suergiu	16.5	75.4 (1)
Portoscuso	1.5	79.5 (2)
(1) Via Villamassargia (provincial road)		
(2) Via Iglesias.		

2.6.2 - Railway Connections

The standard gauge principal State Railways connect Cagliari with Iglesias, and via Villamassargia, Cagliari with Carbonia. There is therefore no direct connection between Cagliari and Carbonia, and a change must be made at Villamassargia.

The secondary system provided by Sarde Southern Railways has a reduced gauge of one metre and connects Iglesias with Calasetta via Gonnese, Carbonia, S. Giovanni Suergiu and S. Antioco. There is also a direct connection between Siliqua and S. Giovanni Suergiu.

In the past, this system was used for transporting coal from the mines to Port S. Antioco and there is a double track one metre gauge connection with Carbonia used for transporting special goods. If this track could be converted to State Railways' standard gauge, S. Antioco could be integrated into the main rail system.

Portovesme has no primary or secondary railway link, the only available connection being a disused subgauge track to Iglesias owned by the Montepioni Company.

2.6.3 - Ports

The industrial development region is served by the two complementary ports of S. Antioco and Portovesme, 22 km apart by coastal road. The former port is equipped to handle bulk and general cargoes, while the latter has mechanical equipment for baled goods.

In the years 1961/1962/1963, cargoes handled at S. Antioco amounted to an average of 350,000 tons per annum, about 90 % of which was outgoing.

Average for Portovesme in the same period was about 190,000 tons per annum, about 90 % of which was incoming (note 1).

2.6.4 - Airports

The nearest airport is Elmas-Cagliari, about 80 km from Portovesme.

2.7 - Services

2.7.1 - Administration

With local exceptions in respect of the National Health and Industrial Injuries Insurance Services, the Labour Office and Lower Courts situated at Carbonia and Iglesias, all administrative services such as administrative and finance offices, direct taxation department, chamber of commerce, etc., are at Cagliari.

2.7.2 - Health Services

There are two hospitals in the region, a new one at Iglesias nearing completion, and the other in Carbonia.

The Carbonia Municipal Hospital is of modern construction and is equipped for 260 beds. In addition to a National Health Service Day Clinic, there are two Municipal First Aid Stations, an Anti-Tuberculosis and an Anti-Trachoma Dispensary. There are also three mining First Aid Stations.

The new hospital at Iglesias will have about 250 beds. There is also a Traumatological Centre provided by the Industrial Injuries Service having 108 beds, and a Social Insurance T.B. Sanatorium with 300 beds.

The total number of pharmacies in the six municipalities of the development region is 14.

(Note 1) Only general indications of port activity are given here, since sea transport is fully dealt with in Chapter III.

2.7.3 - Education

All six centres of the development region have primary and secondary schools. The senior secondary schools include :

- Three secondary science schools at Iglesias, Carbonia and S. Antioco.
- A College of Mining Technology at Iglesias.
- A classical secondary school in Carbonia.
- A polytechnic technical commercial and draughtsman's school in Carbonia-Iglesias.
- A teachers' training college in Iglesias.

There are eight colleges and vocational training centres, four in Carbonia, two in Iglesias, and two in S. Antioco. Six of these are for industrial operatives and craftsmen, one in Carbonia for higher studies, and another in Iglesias concerned with fishing. There is no technical industrial type of college in the region. The attendance record at obligatory schools and senior colleges in Carbonia is among the highest in southern Italy.

2.7.4 - Commercial and Banking Services

According to Italian commercial references, the development region is divided into two commercial areas, the municipalities of Gonnesa and Portoscuso being orientated towards Iglesias, while S. Antioco and S. Giovanni Suergiu gravitate towards Carbonia.

The number of wholesale and retail licenses issued in the two commercial areas considered is as follows :

Commercial Area	Number of Licenses				
	Wholesale		Retail		
	Foodstuffs	Other	Foodstuffs	Other	Mixed
Iglesias	42	34	394	276	-
Carbonia	46	8	325	242	22

Carbonia also has a large department store.

Six banking services are available in the region :

- Three in Iglesias : Banca Nazionale del Lavoro
Banco di Sardegna
Credito Italiano.
- Two in Carbonia : Banco di Sardegna
Banco di Napoli.
- One in S. Antioco : Banco di Napoli.

2.7.5 - Housing

The housing situation should be considered in the light of programmes of development being studied rather than the existing situation. According to present tendencies, new dwellings would be constructed along the sea front near the Portovesme industrial area.

In 1961, the six municipalities had 71,465 rooms, including those unoccupied. The average number of persons per room at the same date

was 1.24, with a minimum of 1.17 in Portoscuso and a maximum of 1.30 in S. Giovanni Suergiu. (Cagliari 1.09 and the national average 1.07).

The number of dwellings available in Carbonia at present is adequate due to substantial emigration in the past few years.

The most common types of construction are large blocks and four-family groups in the suburban area. Dwellings having no bath or shower amount to 30 % of the total.

2.7.6 - Tourism possibilities

Some areas of the region offer good possibilities for tourist trade development, particularly the south-west and south-east coastal strips in S. Antioco and some areas north of Portoscuso.

Part of the land has already been acquired by Continental interests and a consortium has been formed in S. Antioco to develop local tourist trade.

Another acquisition worth mentioning concerns a coastal area north of Portoscuso where it is proposed to provide buildings and appropriate space suitable for film production, to be leased as required. Hotels should also be built to serve the dual purpose of accommodating tourists or film artists and technicians.

2.8 - The Political Situation

After the 1964 local elections, five of the six municipalities in the development region formed left-centre administrative councils. The one exception is S. Antioco which is Christian-democrat. This should offer some assurance of political uniformity within the region. Previous municipal councils of Carbonia, Iglesias and Gonnese were left wing.

It should be mentioned that the six councils, Chamber of Commerce, Federation of Italian Trade Unions, and other public and private undertakings, are all represented on the consortium directorate for industrial development of the region.

It is emphasized moreover, that the Cagliari Council, the Sardinia Regional Council, and the Regional Government, all have the same left-centre policies as the majority of the municipal councils.

The political composition of the two most important municipal councils is as follows :

	<u>Carbonia</u>	<u>Iglesias</u>
Christian Democrat.	14	10
Communist.	15	8
Socialist.	4	6
Socialist Democrat.	-	3
Socialist Proletarian.	3	1
Sardinia Action (Socialist)	3	-
Missini (neo Fascist)	1	2
	<hr/>	<hr/>
	40	30
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CHAPTER II

THE PORTOVESME INDUSTRIAL AREA



1 - INTRODUCTION

Information provided in this chapter must be regarded as provisional since the development plan had not been approved at the time this report was published. Neither were associated works around the industrial area approved and no industrial undertaking has yet been set up in the area. Moreover, land has not yet been allocated for the various projects and details are not available as to water, electricity, telephone, and sewerage systems.

This chapter is therefore limited to indicating existing resources in the immediate vicinity and evaluating the area's internal structure as provided in the development plan.

2 - POSITION AND AREA BOUNDARIES

The Portovesme industrial area within the municipality is almost equidistant between the three main regional centres, Carbonia, Iglesias, and S. Antioco. The southern boundary is about 11 km from the built-up area of Carbonia while that to the north is about 16 km from the Iglesias urban centre. The industrial area is therefore quite near the two places mentioned, and these represent the most important labour reserve centres in the whole region.

The Portovesme industrial area is also near the new thermo-electric power station and Portovesme port where substantial land areas are available. Total area is 695 hectares, of which 135 hectares are occupied or reserved for the port, the power station and services.

Some companies have made a provisional selection of land areas for factory construction. The Sarda Aluminium Company would be set up by the following firms :

- The Sarda Coal Mining Company (majority holding)
- Montecatini
- The Belga Atlantic Group
- The Harvey American Group.

This consortium will construct its own factories for primary aluminium production of 100,000 tons per annum in the area near the port and power station.

The aluminium transformation industries should be located nearby in the northern section of the industrial area bounded by the Gonnese-Iglesias and Carbonia-S. Antioco roads, (map 3).

3 - LAND

The land reserved for the industrial area is mainly flat with a slight declivity towards the sea and the aluminium production plant will be located in the lower section which is almost completely level.

Except for some small areas under grape cultivation, the land is not used for agriculture. The soil is sandy and unfruitful on a trachyte base. No earthquakes or landslides have ever been recorded.

The area is therefore ideal for any type of foundation with a bearing capacity probably of the order of 2 kg/cm².

Site clearance will be confined to demolition for a few rural buildings and the development plan provides for diversion of a small watercourse, which is dry for most of the year, and also draining a small salt lake.

A small marshy pool has also been reclaimed by filling with waste material during power station construction, and this too will be utilized.

The area is not liable to any particular hazards, such as flooding.

Land ownership in the development area is widely spread, the largest holding being more than 150 hectares owned by the Sarda Coal Mining Company. The second owner of importance is the Monteponi-Montevocchio Company and the remainder is divided between about a hundred owners, many of whom are private residents in Portoscuso.

In general terms, the cost of land in the development area should be about 150-200 lire per square metre, according to position.

4 - WATER RESOURCES

4.1 - Industrial supplies

The greatest difficulty facing the consortium is the lack of sufficient water since quantities available are barely adequate to meet present demands.

This is not a question of constructing a new aqueduct, but of providing a technical solution for meeting future needs.

The solution proposed in the development plan to bring an alternative water source to the plain has been set aside as being too costly. The consortium has recently had a hydrological survey made of the Monte Pranu Basin and the results are positive.

The average flow into the catchment basin is 80 million cubic metres per annum, but the useful dam capacity is only 50 million cubic metres.

A committee of experts is studying the hydrological survey report to find the best possible solution and their conclusions should soon be known.

It is considered however, that some rational regulation of flow could quickly meet both industrial and agricultural requirements pending resolution of the general problem.

The Monte Pranu Dam, near S. Giovanni Suergiu, was constructed in 1951 for the Basso Sulcis Drainage Consortium to irrigate an area of about 5,000 hectares of agricultural land, but less than 2,000 hectares is being irrigated at present.

The Drainage Consortium is supplying about 2 million cubic metres of water per annum to the Sardamag industrial plant at S. Antioco through a gravity aqueduct having the following characteristics :

- Duct diameter 400 mm
- Duct length 14.3 km
- Capacity 120 litres per second.

Additionally in 1961, the Consortium undertook to supply the Sarda Coal Mining Company with 10 million cubic metres of industrial water per annum, but this has not yet been utilized.

The industrial development plan provides for an industrial water requirement in the S. Antioco-Portovesme areas of about 19 million cubic metres per annum. Cost of water delivered to user is difficult to evaluate at present, but an approximation would be about 10 to 16 lire per cubic metre.

Comparative water cost to users in the Cagliari industrial area will probably be not less than about 7.5 to 8 lire per cubic metre. Evaluation of the water cost for the Portovesme industrial area is based on the following considerations :

- On the basis of the 1961 agreement between the Sarda Coal Mining Company and the Consortium, the cost of water delivered is 10 lire per cubic metre, but this includes the plant amortization quota and maintenance costs. In average utilization conditions, this could be reduced to about a half (5 lire).
- To this must be added the transmission cost which includes operation charges and aqueduct amortization which would amount to 4-6 lire per cubic metre.

From the qualitative aspect, the Monte Pranu Basin water is suitable for industrial uses, the chemical analysis being as follows :

- Total hardness	18.3°
- Temporary hardness	9.5°
- Permanent hardness	8.8°
- Residue up to 105°C	385.2 mg/l
- Residue up to 180°C	367.2
- SiO ₂	10.55
- Fe ₂ O ₃ - Al ₂ O ₃	1.00
- CaCO ₃	102.99
- MgCO ₃	72.54
- Sulphates	44.41
- Chlorides	118.2
- Organic substances	45.0
- Suspended substances	3.9

On the basis of positive results from drilling tests, underground resources could be integrated in part to increase reserves available. The quantity is small however, and there are no wells in the area.

A further possibility of constructing a sea water purification plant might be considered provided that the cost of fresh water produced could be substantially reduced.

4.2 - Drinking water

The drinking water requirement for the industrial region is assessed at about 250,000 cubic metres per annum in the development plan and can easily be met.

Map 4 shows the main reservoirs for distribution in the region.

A project has been approved for construction of a dam at Baupressin, about 27 km from Carbonia, to provide drinking water for all municipalities in the development region except Iglesias, where a dam is being constructed on the Rio Canonica.

5 - ENERGY RESOURCES

Electric power requirements will be fully met by the new thermo-electric power station at Portovesme. The generating plant consists of three sets of 250 MW each and two of these are complete and will begin operation in 1965. Solid fuel from the Sulcis mines will be used.

The third set, belonging to the ENEL, has not yet been installed and is intended to supply power to the new primary aluminium plant.

The transformation industries, including the aluminium plant, will be supplied with power at the standard charge prevailing throughout Italy, as provided by CIP 941 of 29th August 1961.

The new power station will transmit power through two lines at 220 kV to substations at Villasor and Ploaghe. There will also be a connection to the continental network to permit power transmission in either direction. These lines are nearing completing and should be ready for operation by the end of January 1966.

There are two other power stations near Portovesme, one of which is out of operation, and substations in the development area at S. Giovanni Suergiu, Carbonia, Iglesias and Nuraxi Figus (map 4).

The development plan also provides for construction of two transformers and distribution centres in the region.

Regarding other energy sources, there is no gas in the development region. Requirements for petroleum products will be met by construction of a refinery which could be near the SARAS plant at Sarroch. This is operated by the ESSO group and is about 100 km from Portovesme and about 22 km from Cagliari.

6 - SERVICES

6.1 - Telephone network

The industrial development region can be connected to the Portoscuso municipality telephone exchange which is a part of the Iglesias division. The automatic exchange at Portoscuso is now equipped for 50 lines, but this should be expanded immediately to 400 lines which would be ample for the Portoscuso municipality, including the industrial area.

6.2 - Sewerage and sewage treatment

The development plan provides for a sewerage system to include domestic discharge and polluted industrial water, but slightly polluted discharge will be partly purified at source to permit direct transmission to the sea with rain water drainage.

Main sewers will probably be the Grès type, 35 cm in diameter and with inspection wells at 100 metre intervals. A sufficient gradient will be provided to permit gravity flow.

Sewage treatment plant will probably be provided near the power station and the effluent discharged into the sea mixed with exhaust cooling water.

6.3 - Unpolluted rain water drainage

A separate drainage system will be provided for unpolluted rain water with a main conduit for direct discharge into the sea.

6.4 - Auxiliary services

An area of about 6 hectares is provided in the development plan for auxiliary services which would include :

- A petrol distribution station with workshop attached.
- A medical treatment centre.
- A limited number of shops.
- A bus station.
- A parking area.

This service area will be located between the aluminium plant and the area reserved for the high tension electricity transmission lines, (map 3).

7 - COMMUNICATIONS (1)

7.1 - Road conditions

There are two roads providing internal connection in the industrial region, both asphalted and 5 m wide. The first connects Portoscuso with Carbonia, and at S. Antioco, joins the S.S. 126, Iglesias-Carbonia-S. Antioco (map 2). The second is a branch which joins the Portoscuso-Carbonia road with the Portoscuso-Gonnesa-Iglesias road.

The development plan proposes to maintain these two roads as the main regional arteries with certain improvements. The most important of these is the construction of a double carriageway connecting the industrial region with Carbonia. A total roadbed width of 40 m will provide for two 7.25 m carriageways, two cycle paths, and a band of trees.

Service roads to the port will be 7.5 or 10.5 m wide according to importance with borders and paths in addition (map 3).

Three principal road junctions are provided with roundabouts at main road crossings.

7.2 - Railway connections

As indicated in chapter I, the industrial region is not directly connected by either the State or the Sarde railway systems. Only a single connection exists, Portovesme-Bacu Abis (thence Iglesias) by means of a subgauge line belonging to the Monteponi-Montevecchio Company which is disused at present.

(1) For seaborne transport see chapter III following.

CHAPTER III

MARITIME TRANSPORT

1 - INTRODUCTION

This chapter contains a general review of the S. Antioco and Portovesme ports.

As a basis of comparison, information is also provided on the Cagliari port. Construction and equipment of this port is described in chapter V on the Cagliari industrial area.

The two ports of S. Antioco and Portovesme are about 22 km apart and almost constitute a single integrated unit. In a wider sense, the Cagliari port can be considered integrated with the two industrial region ports of Sulcis-Iglesiente.

S. Antioco is equipped for movement of baled goods and heavy lifts, while Portovesme is more suitable for handling bulk cargoes.

2 - PORTOVESME

2.1 - Internal organization

Port equipment at Portovesme belongs to the Sarda Coal Mining Company and there is no separate concern employing dockers since all bulk cargoes are handled mechanically.

2.2 - Equipment

The main installation for loading minerals is a two tier wharf, the lower being accessible to wheeled vehicles, while the upper tier is equipped with two belt conveyors having a capacity of 400 tons per hour each and two travelling elevators for loading and discharge of fine grained materials. With minor adaptations, this installation could be used for discharging bauxite or alumina, about 200,000 tons of the latter being required to produce 100,000 tons of primary aluminium.

Wharfage is limited, the main accommodation being provided by a right angled pier and a small wharf.

Provision is made in the development plan for some improvements, including :

- Dredging to increase port and access channel depth from 6.5 m to about 9.5 m.
- Construction of two outer breakwaters.
- Lengthening of the existing pier and wharf.

One of the two breakwaters has been completed recently and dredging operations will begin soon.

As previously indicated, the port has a subgauge railway track which is out of use. The development plan provides for road construction to connect the port to the industrial area road system, (map 3).

2.3 - Sea connections and port movements

No regular line to or from the Continent calls at Portovesme, but there is a daily service in both directions to S. Pietro Island, (Carloforte), operated by the Tirrenia Company.

The following table shows total annual movement of cargoes in tons :

Year	Inward	Outward
1961	13,928	184,572
1962	18,938	178,939
1963	4,509	167,334
1964 (Four months)	1,805	31,522

Principal movement of goods included the following :

Type of goods	Inward (cwt)	Outward (cwt)
Ferrous ores	2,450	277,660
Zinc and cadmium	319	144,110
Metallic ores	1,340	43,160
Sulcis coal	-	1,070,280
Pit coal	4,400	152,800
Metalloids	920	44,620
Pure magnesium	-	9,374
Sodium sulphide	1,802	-
Lead sulphate	2,082	-
Silicates	2,463	-
Chemical products	2,151	-
Explosives	14,169	-
Pit props	27,545	-
Timber	6,508	-
Iron and steel scrap	-	10,030
Steel grit	-	1,264
Iron castings	602	10,030
Aluminium ingots and bars	-	413
Aluminium sections and bars	-	74
Aluminium sheet	78	-
Lead ingots, plates and grids	-	82,660
Zinc ingots	-	184,047
Zinc powder	-	3,122
Rough worked metals	1,220	61,268
Expanded metals	2,230	-

3 - S. ANTIOCO PORT

3.1 - Organization and equipment

A concession for the State Port of S. Antioco is held by the Sarda Coal Mining Company who also own the cranes. Movement of goods is controlled by a Port Authority. A shipping and forwarding agency operates in the port, a dependent of the S.M.C.S.

As a guide, the following table shows charges for loading and discharge of various goods as at 1st July 1965 :

Type of goods	Crane charges (Lit)	Port charges (1)	
		Tariff (Lit)	Tax
<u>Iron and similar</u> - ships of any tonnage	265	804	106.22 %
<u>Piece goods</u> - ships up to 500 gross tons - ships over 500 gross tons	265	1,006 1,131	106.22 % 106.22 %
<u>Sacked goods</u> - ships up to 500 gross tons, with ship's own gear or cranes : . sacks up to 50 kg . sacks over 50 kg . sacked flour, sugar and vegetables up to 100 kg - ships over 500 gross tons, with ship's own gear or cranes : . sacks up to 50 kg . sacks over 50 kg . sacked flour, sugar and vegetables up to 100 kg	265	731 536 + 30 % 491 823 603 + 30 % 502	106.22 % 106.22 % 106.22 % 106.22 % 106.22 % 106.22 %
<u>Drums (oil - petrol)</u> - ships up to 500 gross tons - ships over 500 gross tons	265	541 640	106.22 % 106.22 %
<u>Ores in bulk</u> - baryta rock by bucket - cement in bulk - zinc blende etc.	145	78 162 118	106.22 % 106.22 % 106.22 %

(1) Corresponding local dues are payable in addition.

3.2 - Equipment

The contour of S. Antioco Port is trapezoidal and includes a large pier and the east and west wharves, (map 5). Depth of water is about 8.5 metres.

A substantial amount of mechanical equipment has been installed, including the following :

- Five 10-ton travelling cranes on rail tracks with a total handling capacity of 150 tons per hour each.

- One 5-ton crane with a handling capacity of 75 tons per hour.
- One derrick elevator with a handling capacity of 250 tons per hour.

The port is connected by State Road 126, Iglesias-Carbonia-S. Antioco and by the subgauge track of the Sarde Railways southern section through Carbonia and Iglesias.

Provisions of the development plan include :

- (a) Lengthening of the Carbonia-S. Antioco section of the State Railway, (single track).
- (b) Construction of new wharves about 1,000 metres long.
- (c) Provision of additional mechanical equipment.
- (d) Provision of store yards.
- (e) Increasing the depth of water to 9 metres.

It is not certain however, that funds will be found for all the works in the port development plan since it is not as yet included in the regional plan.

A rail track for a 10-ton travelling crane on the south wharf is now nearing completion.

3.3 - Maritime connections and port movements

No regular shipping line calls at S. Antioco Port. Total cargo movements in tons are shown in the following table :

Year	Inward	Outward
1961	45,047	395,217
1962	30,930	276,093
1963	42,184	270,663
1964 (Four months)	21,182	105,766

Present port equipment could handle 1,500,000 tons per annum and semi-worked products from aluminium factories in the Portovesme industrial area could be loaded without difficulty.

Principal movements of goods in 1961 were as follows :

Type of goods	Inward (cwt)	Outward (cwt)
Wheat meal	17,145	20
Wine	3	14,604
Natural bentonite	6,150	10
Fuller's Earth	-	5,800
Barium and barytes ores	17,130	760,063
Fluorine ore	-	52,000
Metallic ores	4,050	660,312
Sulcis coal	-	2,443,090
Raw and free sulphur	2,150	-
Barium sulphate	-	1,887
Sodium sulphate	34,091	-
Sodium silicate	20,251	430
Explosives	6,389	-
Pit props	99,331	-
Building materials	114,267	4,507
Iron and steel products	11,096	439

4 - CAGLIARI COMMERCIAL PORT

4.1 - Internal organization

Although inadequate for the traffic developed in the past few years, Cagliari Port is one of the major Italian ports of call. In 1961, about two million tons of goods were handled, more than half the total of all Sardinian ports. The internal organization however, cannot be taken as an example of efficiency.

Tariffs levied by the Port Authority are considered by economic operators to be too high due to the substantial incidence of various surcharges on labour costs. The government sponsored concern managing port equipment is not always able to consider the need for economic operation.

Port operations are not sufficiently rapid and secure, and damage to cargoes often occurs during loading or discharge.

Minimum time for delivery of goods from the Continent is in theory 10 days, but in practice, 25-30 days.

4.2 - Equipment

Cagliari Port is situated in the inner gulf and comprises the east and west docks, and, in the inner port, the basin, the via Roma wharf, and the east pier. The new east dock is partly occupied by naval forces and by the salt basin.

It is proposed to complete the west basin by doubling the wharf length and executing strengthening and improvement works.

Equipment is inadequate in some respects and consists of 18 cranes with a total capacity of 120 tonnes and two transit sheds for perishable goods.

There are no silos at present, though provision is being made, and warehouse space is insufficient.

4.3 - Sea connections and port movements

Port traffic is at present operated by:

- ships of the Tirrenia Company
- tramp shipping.

The Tirrenia Shipping Company operates passenger and cargo services providing direct connection with the following ports:

Civitavecchia (daily)
 Naples (twice weekly)
 Palermo (weekly)
 Tunis (fortnightly)

The following table shows regular voyages by the Tirrenia Line to and from Cagliari in 1959 and 1964:

Voyage	No. of return voyages		No. of passengers		Goods (t)		Accompanied cars	
	1959	1964	1959	1964	1959	1964	1959	1964
Cagliari-Civitavecchia	338	366	173.410	297.708	36.608	50.481	4.862	11.060
Cagliari-Naples	97	104	15.272	30.467	19.876	25.528	392	1.440
Cagliari-Palermo	47	52	15.368	28.757	9.280	9.641	392	1.956
Genoa-Sardinia-Sicily-Tunis	24	26	2.269	3.563	19.565	14.832	12	216

The tariffs levied by the Tirrenia Company for freights are considered by local economic operators to be high in relation to tramp charges. In consequence, the amounts carried by Tirrenia are small, less than 5% of total cargo movements in the port.

Moreover, the time spent in port for loading or discharging these ships is only 7-8 hours.

A new ferry ship named "Canguro Rosso" owned by Traghetto Sardi Ltd., a mixed public and private company, will come into service shortly. This will provide a connection between Cagliari, Olbia, and Genoa and carry 700 passengers, 70 cars, and 48 articulated vehicles or coaches.

Within two years, a second ship will provide a thrice weekly service between Cagliari and Genoa for about 350 tons of cargo in trailer containers.

The following table shows the tonnage of goods loaded or discharged in Cagliari Port:

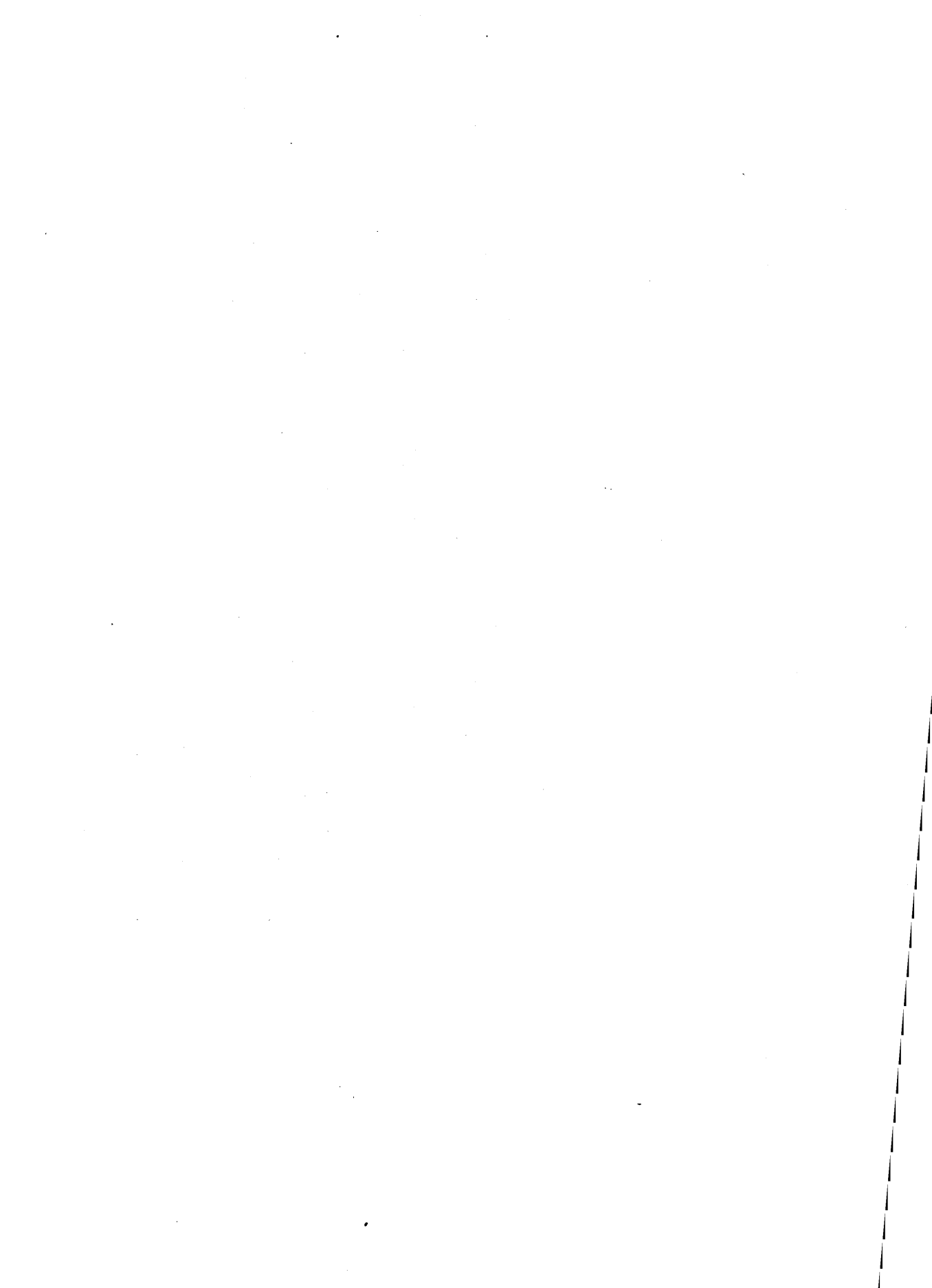
Year	Inward	Outward
1961	948.055	687.055
1962	852.617	733.693
1963	956.922	737.283
1964 x	361.504	242.696

x Four months.

Incoming goods include manufactured products, machinery, clothing, and foodstuffs; while those outgoing are largely ores, marine salt, refractories, wine, fruit and flowers.

CHAPTER IV

LABOUR



1 - THE ACTIVE POPULATION

At the last census, the employment position in the six municipalities of the industrial development region was as follows:

Municipality	Active population			Seeking first employment	Total
	Agriculture	Industry	Other work		
Carbonia	559	5,494	2,625	1,139	9,817
Iglesias	435	4,018	3,235	509	8,197
S.Antioco	865	1,330	945	175	3,315
Gonnesa	134	848	294	152	1,428
S.Giovanni Suergiu	528	661	260	65	1,514
Portoscuso	103	550	241	92	986
Totals	2,624	12,901	7,600	2,132	25,254

55.5% of the active population were employed in industrial activities largely in the mining sector, 33% in tertiary activities, and only 11.5% in agriculture. The average number of women employed in the six municipalities is 12% of the overall total, with a minimum of 6% at Portoscuso and a maximum of 15% at Iglesias.

This percentage of female workers could be increased substantially, since the national average is about 25% and that in Sardinia as a whole 14%.

2 - WORKING AGE POPULATION

It is evident that a reserve of female labour exists in the development region which has not yet found productive employment. A further reserve is provided by young people of working age not yet having found employment.

The following table based on the 1961 census shows the resident population in the various development region municipalities as compared with Cagliari:

Resident population

Municipality	Age group 14-25			Age group 14-65		
	Male	Female	Total	Male	Female	Total
Carbonia	3,587	3,577	7,120	10,757	10,430	21,187
Gonnesa	491	443	934	1,541	1,464	3,005
Iglesias	2,971	2,660	5,631	8,660	8,501	17,161
Portoscuso	367	313	680	1,113	1,033	2,146
S.Giovanni Suergiu	485	502	987	1,558	1,473	3,031
S.Antioco	1,101	1,097	2,198	3,462	3,339	6,801
Sulcis- Iglesient regional total	9,002	8,548	17,550	27,091	26,240	53,331
Cagliari	17,863	19,803	37,666	56,711	62,366	119,077

This table illustrates the large numbers of young people resident in the region. Many of these however, have either left or are preparing to leave for other areas offering better opportunities for employment.

The following table shows the 1964 monthly averages of emigrants and immigrants in respect of the development region and Cagliari:

Average monthly population changes 1964.

Municipality	Emigrants	Immigrants
Portoscuso	5	25
Carbonia	150	5
Gonnesa	20	1
Iglesias	50	15
S.Antioco	30	5
S.Giovanni Suergiu	15	10
Cagliari	140	600

It will be seen that emigration to Cagliari assumes alarming proportions and in 1964 the number was almost 2,000.

The numbers of registered unemployed in the region are greater in Carbonia than in other areas due to the crisis in the mining industry.

Numbers of registered unemployed at 31st May 1965

Municipality	Total	Aged over 21	Nos. of women incl. in col. 3
Portoscuso	170	139	-
Carbonia	1,500	650	430
Gonnesa	190	130	10
Iglesias	600	380	80
S.Antioco	400	270	20
S.Giovanni Suergiu	290	170	10
Totals	3,150	1,739	550
Cagliari (x)	2,300	1,900	320

These figures are susceptible to sudden increases when employment opportunities offered stimulate more registrations for work.

(x) The numbers indicated for Cagliari are given for comparison only.

3 - HIGHER EDUCATION

The problem of higher education for the young and retraining of the unemployed is one of the most difficult to be resolved by Local Authorities. The difficulty is not so much financial as due to a lack of qualified teachers, and in consequence, the general educational standard is not satisfactory from either the quantitative or qualitative viewpoint.

According to the 1961 census, the proportion of the Sardinian resident population aged six years and upwards having educational qualifications from elementary to schoolleaving certificate was about 64%. The national average is 76%.

There are about 177,000 illiterate people, more than one third of those without academic qualification.

3.1 - Educational facilities

As indicated in Chapter I, there are both primary and secondary schools in the six municipalities of the development region.

In the school year 1964/65, the following places had senior secondary schools:

- Carbonia: - Secondary Classic with 51 pupils, including 26 females, opened in 1960 and registered first class.
- A Grammar School with 113 pupils, including 78 females, registered as fourth class.
- A Technical/Commercial and draughtman's school for having 247 pupils, including 144 females, registered first class.
- Iglesias: - A Secondary Scientific School having 76 pupils, half of which are females, registered first class.
- A Teachers' Training College with 203 students, including 164 females, registered first class.
- A Technical/Commercial School having 145 students, including 78 females, registered first class.
- A Technical Draughtsman's School having 107 pupils, including one female, registered first class.
- A Technical School of Mining having 53 students, registered first class.
- S.Antioco: - A Secondary Scientific School, detached from Iglesias, having 34 pupils, including seven females, registered first class.

Cagliari. Besides Senior Secondary Schools, Teachers' Training Colleges, and Commercial Training Colleges, there are the following specialist training centres:

- a Nautical College
- an Agricultural College
- a Technical Institute for Women
- an Industrial and Technical Institute having 761 students, registered first class, and specializing in electrical technology, mechanics, building, and chemistry.

Cagliari also has a university offering the following faculties: medicine, engineering, law, commercial economics, arts, philosophy, teaching, languages, mathematics, natural sciences, pharmacy, chemistry, and political science.

There are eight training centres for craftsmen in the development region, four at Carbonia, two at Iglesias, and two at S.Antioco. The figures which follow refer to the 1964/65 school year.

- Carbonia:

- ENAP, a National Vocational Training Organization, offers courses in the following trades:

- . smithery (15 places per annum)
- . welder (16 places per annum)
- . fitter-mechanic (16 places per annum)

- INAPLI, a National Industrial Training Organization, offers courses in the following trades:

- . electrician
- . welder
- . car electrician
- . turner
- . fitter
- . automobile engineer

There are 15 places per annum for each course.

- INARP, a National Business Training Organization, offers courses for the following:

- . secretary shorthand-typist
- . wages clerk

There are 15 places per annum for each course.

- A branch of the State Training Organization for Industry and Handicrafts at Cagliari offers courses for:

- . installation electrician (31 places per annum)

- Iglesias:

- ACLI, another National Training Organization, offers the following courses:

- . general mechanic
- . oxy-acetylene welder
- . draughtsman
- . carpenter
- . radio technician
- . electrician.

There are 15 places per annum for each course.

- A branch of the State Training Organization for Industry and Handicrafts at Cagliari offers courses for:

- . mining mechanics.

There are 18 places per annum for this course.

- S.Antioco:

- The National Fishing Institute provides a single annual course for 20 students.

- A branch of the State Training Organization for Industry and Handicrafts provides courses for fitter-mechanics.

In general, duration of courses is two years. The age group eligible for registration is 15 to 35 years, but most students are between 17 and 20 years.

For industrial courses, the minimum educational qualification is an elementary school certificate. A total of 1,200 hours instruction is given per annum.

For commercial courses, the minimum admission qualification is a high school education. The annual number of hours instruction given is 750.

Within the Cagliari industrial development area there are seven vocational schools and one for new subjects such as market research etc. More than 50 courses are offered and the principal specializations are fitter-mechanic, joiner and carpenter, electrician and installation engineer, general mechanic, electrical mechanic, technical draughtsman, hydraulics engineer, turner, etc.

4 - QUALITATIVE ASPECTS OF LABOUR RECRUITMENT

Labour requirements for the Portovesme industrial area will be met mainly from Carbonia and to a minor extent from Iglesias. These two places are about 15 and 22 km respectively from Portovesme and the transport problem could soon be resolved by organizing a regular bus service. Some operatives may use their own transport.

Portoscuso is only a short distance from Portovesme and the development plan provides for its expansion as a residential centre within a few years.

Executives, technicians, and higher grade craftsmen are scarce in Sardinia and almost nonexistent in the development region, but could be recruited from those who have worked in the economic triangle for some years. Their attitude towards new arrangements in their birth-place is favourable.

Social attitudes of the local population and qualitative aspects of labour in Carbonia are dealt with extensively in a study by "CRIS", referred to later. For present purposes, only a summary of indications emerging from this analysis of the Carbonia community is given.

The Carbonia population is prevalently young, 51% being under 21 at the 1961 census. The figure for Italy was 33,6%. Of these, 20% were in the 14 to 25 age group, the total number being 7,120. These young people are particularly receptive and intellectually alert, having the typical mentality of an industrial centre, and illiteracy has disappeared.

Young women too, in the 18 to 25 age group have an open mind towards industrialization and the possibility of taking up work outside the home. They could easily be employed in manufacturing processes if instructional courses could be organized. Courses for women in Carbonia at present are limited to dressmaking, sewing, knitting, and training for secretary-shorthand typist.

Retraining and employment of miners presents a major problem, but this could be resolved by organizing appropriate training courses. On the other hand, the mining crisis is now moving towards a solution and stable conditions may soon be achieved.

The main problem in Carbonia is concerned with young people who are unwilling to leave the city to foresake family and friends, but in growing numbers are compelled to seek employment elsewhere due to lack of local opportunities.

Important industries will be established soon in the Portovesme industrial area and these will absorb part of the labour available in Carbonia. This could be advanced a stage further by setting up small manufacturing industries producing sub-contracted items for the motor industry, thus absorbing a considerable quota of surplus labour.

It is unfortunate that industrial initiative, usually by private enterprise, may meet development difficulties due to local lack of enterprise and the necessary technical executives. Although Carbonia is an industrial city, its characteristics derive from a single industry based on State operation of the mines.

The solution seems to rest on mixed financing with private and public capital, or perhaps by Continental private enterprise associated with the most active and dynamic elements in the Cagliari Province.

Local social organization has modern tendencies, the working classes being politically minded and very class conscious. It has been demonstrated recently however, that the most active trade unions can adopt realistic attitudes.

Wages

With the exception of higher grade craftsmen, wage rates for workers in Cagliari Province are based on the minimum scale, in contrast with northern Italy where a super-minimum applies generally.

Even the minimum scale in Cagliari is lower than elsewhere, and particularly low when compared with Milan or Turin.

The following table shows the minimum hourly wage rates for workers over 20 in the general mechanical industries of Milan and Cagliari Provinces. (This contingency allowance relates to the quarter May/July 1965).

Province	Specialists Grade I	Craftsmen Grade II	Unskilled Grade III
<u>Milan</u>			
- Basic pay (lire/hr)	263.15	235.25	221.30
- Contingency allowance	75.88	68.00	64.68
Total	<u>339.03</u>	<u>303.25</u>	<u>285.98</u>
<u>Cagliari</u>			
- Basic pay	222.45	198.85	187.05
- Contingency allowance	62.25	58.50	55.68
Total	<u>284.70</u>	<u>257.35</u>	<u>242.73</u>

To determine labour cost per hour, the following additions to basic rate plus contingency allowance must be made:

- minor wages components such as shift allowance, works canteens, production bonus, etc.
- contractual charges such as paid annual holidays, paid bank holidays, bonuses, retirement gratuities, etc.
- social insurance charges for insurance stamps, pension fund, health insurance, integration fund, industrial injuries insurance, etc.

In addition, paid absences and sick absences must be taken into account.

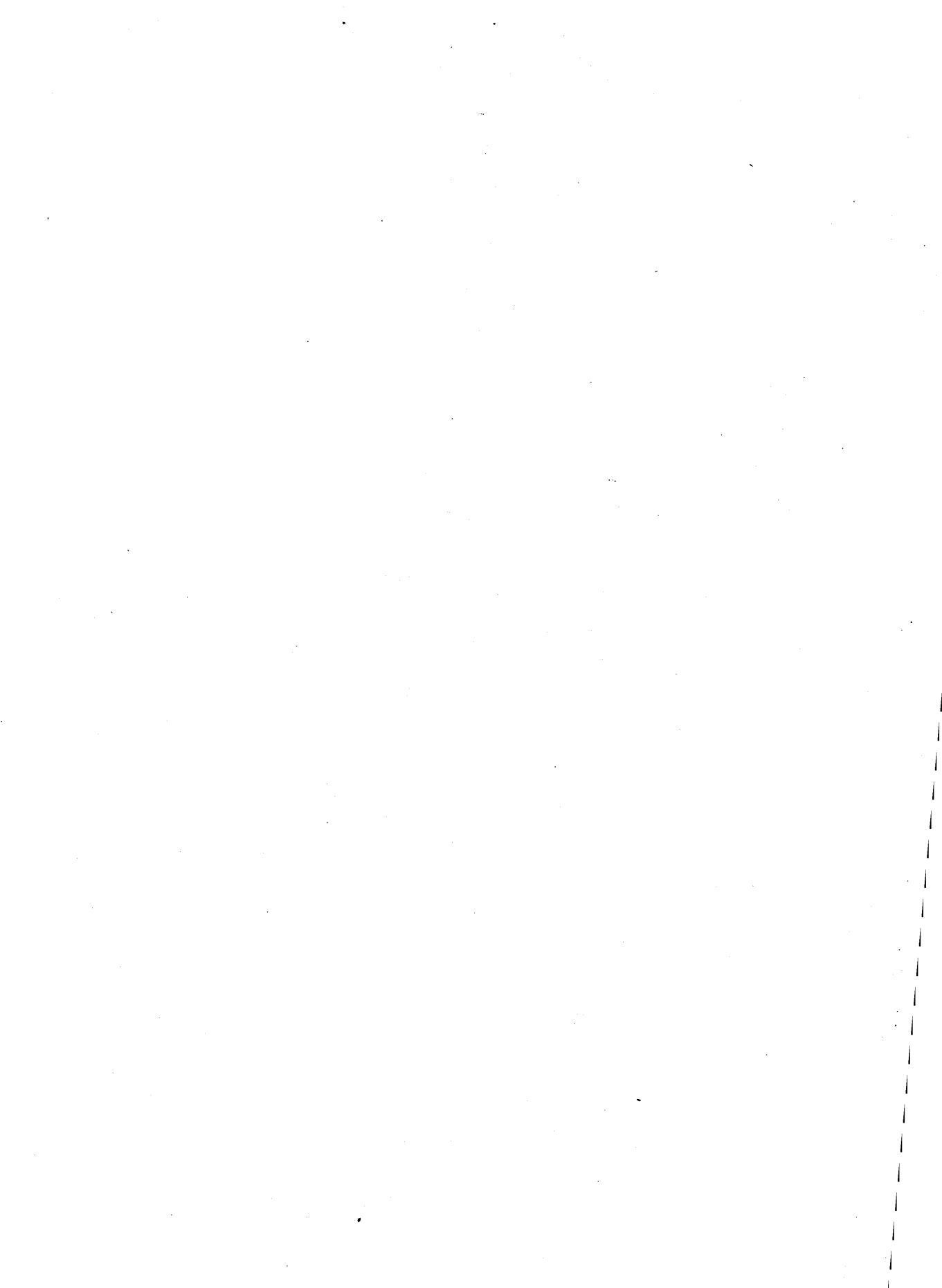
The present labour cost per hour in the Cagliari Province for the general mechanical industries is therefore about 800 lire per hour. This shows a difference of 100-200 lire per hour as compared with Milan Province.

Present tendencies however, are towards a general levelling of labour costs throughout Italy and it seems reasonable to assume that present differences have little future significance.

On this assumption, Cagliari labour costs will be similar to those in northern Italy and particularly in Milan.

CHAPTER V

THE DEVELOPMENT AREA AND THE CAGLIARI INDUSTRIAL ZONE



1 - INTRODUCTION

Cagliari is the principal economic centre and port in the island, and seat of the Sardinian Regional Government. At the 1961 census, the resident population was 183,784.

Situated on the south coast in the middle of the Gulf of Angels, between S.Gilla Basin to the west, and the Molentargius Basin to the east, the city has developed considerably in the past few years, both commercially and industrially.

In addition to substantial development of traditional industries connected with building, recent establishment of the petro-chemical industry promises further industrial development in the next few years. This will depend upon new initiative in the manufacturing sector, such as sub-contract work for the motor industry, perhaps in plastics.

The RUMIANCA Group has been operating for a few months and includes seven companies producing from sodium chloride and naphta, sodium, caustic soda, poly-vinyl chloride, high and low density polyethylene, trichloroethylene, ethylene perchlorate and acrylic nitriles. The LYSANDRA-LEONARDO Group of Villacidro will produce, initially, acrylic fibre from acrylic nitriles from Rumanca, and later acrylic fibre yarns.

The SARAS Sardinian Refinery can process 5,000,000 tons of crude per annum to produce super and medium grade petrols, kerosene, diesel oil, fuel oils, and liquid gas.

Local agriculture is of no great importance as yet, but could be organized to extend into the preserved foodstuffs field.

The quantity of goods handled in the Cagliari commercial port increased from 1,376,052 tons in 1958 to 1,659,412 tons in 1963, an increase of 20.6% in five years.



2 - THE INDUSTRIAL DEVELOPMENT AREA

2.1 - General considerations

The Cagliari industrial area includes 22 municipalities within a 25 km radius, covering 158,811 hectares, with a population of about 300,000 at the 1961 census. Demographic density is 190 per km², the average for Sardinia being 59 and the national average 167. About 60% of the population is concentrated in the chief town.

At 31st December 1964, 34.26% of commercial and industrial finance was directly concerned with the Cagliari industrial area. The following figures permit comparison with other areas:

- Sassari Portotorres	26.00%
- Tortoli-Arbatax	12.88%
- Villacidro	9.09%
- Sulcis-Iglesiente	3.87%

2.2 - Economic structure of the area

At the 1961 census, unemployment distribution in economic sectors was as follows:

- primary:	18,700 unemployed (19.7%)
- secondary:	20,400 unemployed (21.5%)
- tertiary:	55,900 unemployed (58.8%)

Compared with 1951, there has been a reduction of unemployment in agriculture and mining, an increase in the manufacturing industries (+ 3,500), and a substantial increase in building (+ 5,000 approx.) The unemployment situation in the industrial sector at the 1961 census was as follows:

Class of activity	1961 Census (provisional figures)		
	No. of firms	Unemployed	Unemployed per firm
Extractive industries	31	1,193	38.5
Manufacturing:	2,224	10,897	4.9
- food and processing	176	1,982	11.3
- clothing and furnishing	740	1,203	1.6
- timber	383	1,057	2.6
- mechanical	620	2,596	4.2
- metal ore extraction	126	2,364	18.8
- chemical and refining	16	375	23.4
Building and plant	395	7,224	18.3
Electricity, gas and water	19	1,088	57.3
TOTALS	2,669	20,402	7.6

In general, the traditional type industries are small and invariably craft enterprises. This applies particularly to metal working which has been developed with some difficulty during the past few years.

An economic investigation in 1962 showed the local character of these small industries, most of them being confined to commercial activities or services complementary to the construction sector.

Metal working contractors who were interviewed on the subject considered the main difficulty to be slow development of the commercial and productive infrastructure causing high maintenance costs and material supply difficulties. Further difficulties were caused by the onerous conditions attaching to sea transport.

3 - INTERNAL STRUCTURE

3.1 - Road connections

There are three main roads connecting Cagliari with the most important centres in Sardinia as follows:

- the S.S. 130 connecting the chief town with Iglesias
- the S.S. 131 connecting Cagliari with Oristano and Sassari
- the S.S. 125 connecting Cagliari with Tortoli-Arbatax and Olbia, and via the S.S. 128, with Nuoro.

The area centres are connected to the chief town by adequate minor roads. The distances between Cagliari and the other industrial areas are as follows:

- Villacidro	46 km
- Portovesme	79 km
- Oristano	92 km
- Tortoli	139 km
- Porto Torres	234 km
- Olbia	317 km

3.2 - Railway connections

The State Railways system connects Cagliari with Iglesias, Carbonia, Oristano, Sassari, Porto Torres, Olbia and the Orange Gulf, where there are ferries.

The sub-gauge secondary system connects the chief town with the agricultural area, Traxenta - Marmilla - Tortoli - Arbatax. Provision for an adequate system of connections with the industrial region is made in the development plan. Railway distances between Cagliari and distant industrial centres are as follows:

- Porto Torres	260 km
- Olbia	380 km
- Tortoli	229 km

3.3 - Sea and air connections

Reference is made to the analysis of sea connections in Chapter III.

The Elmas civil airport is about six kilometres from the city centre and can be reached in about 10-15 minutes. It is connected by a daily service to Rome, Milan and Genoa. In the winter period, an intermediate stop is made at Alghero on the Genoa-Milan route.

3.4 - Water resources

Surface and subterranean water flow in the area is insufficient to ensure adequate water supplies. Water courses are of torrential character and often dry up in the summer period. Springs are rare due to the impermeable nature of the geological structure.

Water supplies therefore rely largely on catchment basins, particularly the reservoirs constructed on the Flumendosa and Mulargia by the local organization of the Flumendosa for irrigation exploration of Campidano Cagliari.

According to a study by this organization, utilization of the Flumendosa Basin resources together with minor sources could provide 90 million m³ of water for industrial requirements without prejudice to the irrigation programme.

Cagliari is at present supplied with 5 million m³ per annum from the Rio Corongiu reservoirs and, through a Flumendosa organization aqueduct delivering 16 million m³ per annum.

In addition, a 40 million m³ per annum industrial aqueduct is in an advanced stage of construction linking the irrigation channel system to the Rumianca industrial complex in the Cagliari industrial zone. The first section has been completed as far as Rumianca. According to an approximate valuation, the cost of industrial water delivered to user will be not less than 7.5 - 8 lire per m³.

3.5 - Energy resources

Electric power requirements can easily be met by the six minor existing power stations in the area and the Sulcis super thermo-electric power station. The power transmission system is also adequate to meet foreseeable future developments. The Villasor transformer station thus assumes a major importance since it connects the lines from the High Flumendosa and Taloro and provides a link for the line continuing southwards to Cagliari and the S.Gilla and Molentargiu sub-stations.

In the context of general energy resources, supplies of mineral oils will to a considerable extent be met by the Saras Refinery at Sarroch situated about 22 km from the chief town.

4 - THE INDUSTRIAL ZONE

Industrial enterprises started by small firms in the past few years are situated mainly in the area north-west of Cagliari towards Elmas, between State road 130 (Iglesiente) and 131 (Carlo Felice) as shown in map 6.

No space is available within the port area due to near-by urban concentration.

The industrial area covers about 745 hectares where industrial activities of many kinds, both large and small, are carried on. There are also warehouses and assembly workshops which have been erected in the past few years.

An approximate valuation shows that the cost of land in this area varies according to position and distance from Cagliari, sites nearest the city centre being 3,000 lire per m², down to 1,000 lire per m² in the area towards Elmas.

Maximum values apply to sites near main roads and the port, those on the Iglesias State Road being 5/6,000 lire per m², while a figure of 8/9,000 lire per m² may apply along the Carlo Felice. Internal sites far from the road may cost as little as 800-500 lire per m².

The Cagliari Industrial Development Plan presented for ministerial approval in March 1964 provides for a new industrial area.

It is intended that small and medium size industries should be set up in an area west of the S.Gilla Basin between State Road 130 (Iglesiente) and 195 (Sulcitana). This latter road connects Cagliari with the southern Sulcis-Iglesiente area, and has long stretches following the southern coastline.

The new area covers 4,320 hectares of which some 1,290 hectares will be utilized in the first phase. Some industries have already been established, mainly in the vicinity of Rumianca.

Present land prices in the area, considered, vary from 350 to 500 lire per m² with maxima up to 1,000 lire per m². Ownership of land is divided into a large number of small lots.

The most important project in the industrial area will be the canal port with a canal depth of 12 metres to permit transit of ships from 18/20,000 tons. This will provide access to the canal basin which will serve as the industrial area port. From the main canal proceeding inland, lateral canals will be constructed in a herringbone pattern, the total number intended being five.

These minor canals will form the boundaries of sites destined for large industries having their own direct access to the port. There will be about 100 such sites, each with an average water frontage of 1.85 km.

An additional provision is to be a subsidiary commercial dock for the Cagliari Port, and a dry dock will be constructed to the west of the new dock.

Total areas available will be:

- 800 hectares for sites round the industrial port with reserved frontage
- 550 hectares for sites along the industrial canal
- 35 hectares adjacent to the commercial dock wharf
- 65 hectares for the dry dock.

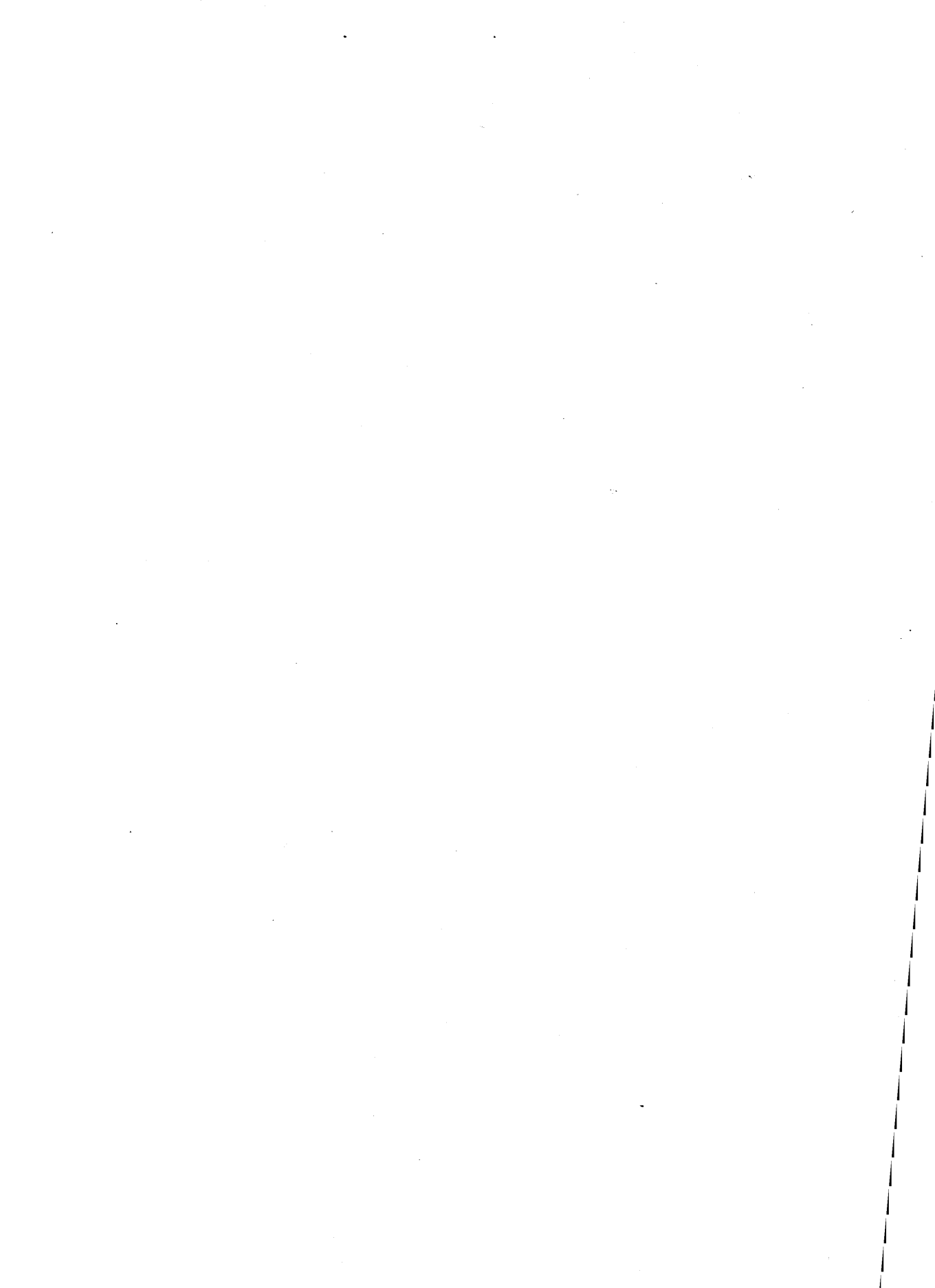
Industrial site boundaries will be at least 30 metres from the water front to leave space for standard gauge railway tracks, rail crane tracks, a dual carriageway road, pipes and cables for various services.

A common sewerage system will be provided to discharge industrial waste water into the canal, each industry providing its own purification plant discharging into interconnected conduits.

It is also envisaged that each industry will contribute to the construction of electric power supply installations by providing their own transformer substation and internal distribution system.

APPENDIX I

FINANCE AND CREDIT FACILITIES



FINANCE AND CREDIT FACILITIES

The following list of finance and credit facilities available under statutory provisions for new developments in Sardinia is extracted from a pamphlet issued by the CIS entitled "Opportunities for investment in Sardinia".

1 - FISCAL FACILITIES, GRANTS AND TARIFFS

These include the following:

- exemption from income tax for 10 years on industrial company profits which increase or extend
- exemption from import duty on materials, machinery and initial equipment items for extension, conversion and reactivation of industrial establishments, (note 1)
- a 50% reduction of turnover tax due for materials and machinery referred to at the second item
- a reduction of registration and transfer fees fixed at 500 lire for the first land and buildings transfer for each industrial development
- stamp duty exemption for registrations and mortgages in respect of all provisions, deeds and contracts relating to financing operations
- exemption from corporation tax (section 7 of statute 645 of 29th Jan. 1958) for a period of 10 years for companies constituted for new productive enterprises
- application of special rail and sea tariffs, (20% repayment on freights carried in subsidized shipping lines), for transport of machinery and materials necessary for industrial development
- declaration of public utility for initiating industrial developments. Under this procedure, an appropriate request to the Prefect must be made accompanied by details of the plan, when provision will be made for expropriation by urgency procedure, of areas and property required.

Note 1 From 1st Jan. 1966, these exemptions are abolished by Statute 717 of 26th June 1965.

2 - PLANT AND EXTENSION OF INDUSTRIAL ESTABLISHMENTS

Credit facilities include loans in addition to tax concessions on plant for extension and reactivation of industrial establishments, as well as finance for raw material supplies.

The amount of industrial loans is normally limited to two thirds of the cost of plant, acquisition of land, building construction, machinery and equipment.

Financial aid can be increased to a maximum of 70% when loans are granted on the basis of Statute 623 and subsequent modifications.

Loans are granted for 10 years plus a pre-amortization period up to a maximum of 5 years, two for execution of the works and three to establish operation.

Utilization of loans is gradual and subject to presentation of documents regularly certified as to progress of building work, and manufacture of machinery and equipment.

The interest rate is 3% up to 1,500 million lire granted in accordance with Statute 623 and subsequent modifications.

For larger amounts, the rate is:

- 4% for investments up to 6,000 million lire and for finance up to 4,200 millions;
- 5% for investments above 6,000 millions and finance exceeding 4,200 millions, when Southern Area Development Funds and Ministry of Industry and Commerce contributions are involved in interest payments.

By virtue of Regional Statute 23 of 18th May 1957 and subsequent modifications, it is possible to obtain loans for industrial concerns for periods of not less than one year for raw material supplies or conservation of finished products.

The maximum amount is 75 million lire at the following rates:

- 3% up to 25 millions;
- 4% up to 50 millions;
- 5% above 50 millions.

3 - NON-REPAYABLE GRANTS FROM THE REGIONAL AND SOUTHERN ITALY DEVELOPMENT FUNDS

Non-repayable grants are available from the Southern Italy Development Fund under Act 634 of 29th July 1957 and subsequent amendments, and from the Sardinia Region under numerous statutory provisions applying to various productive sectors.

For construction of new industrial plants and extension of existing plants, the Development Fund contribution is 20% of the building costs, including plant and equipment installation. The contribution can be increased up to 30% in respect of expenditure on machinery and equipment manufactured in southern territory.

The provisions of Sardinian Regional Act 22 of 1953 include:

- usage concessions and free title to State owned areas;
- contributions for acquiring areas necessary for industrial development;
- execution of port works, railways, roads, sanitary arrangements, electricity supply connections, water and telephone services necessary for economic development of an industrial area of regional significance;
- contributions towards the cost of executing the works referred to in the third item when not of a general character;
- assistance towards expenses relating to water, electric power consumption and other motive power sources for a period of 10 years when these factors directly affect production costs;
- facilities for transporting raw materials and finished products in respect of activities qualifying under the provisions of Regional Statute 22;
- direct contributions to relieve the burden of social charges in the initial stages of industrial activity for a period not exceeding three years;
- institution of apprenticeship training courses in the establishment or elsewhere as a total charge to the Region.

4 - AUTHORITY TO ISSUE BEARER SHARES

Regional Act 10 of 12th April 1957 is a Sardinian Regional statutory provision of considerable importance to industrial development of the island. This concerns authority to issue bearer shares conceded to companies operating in Sardinian territory, with the object of creating and operating:

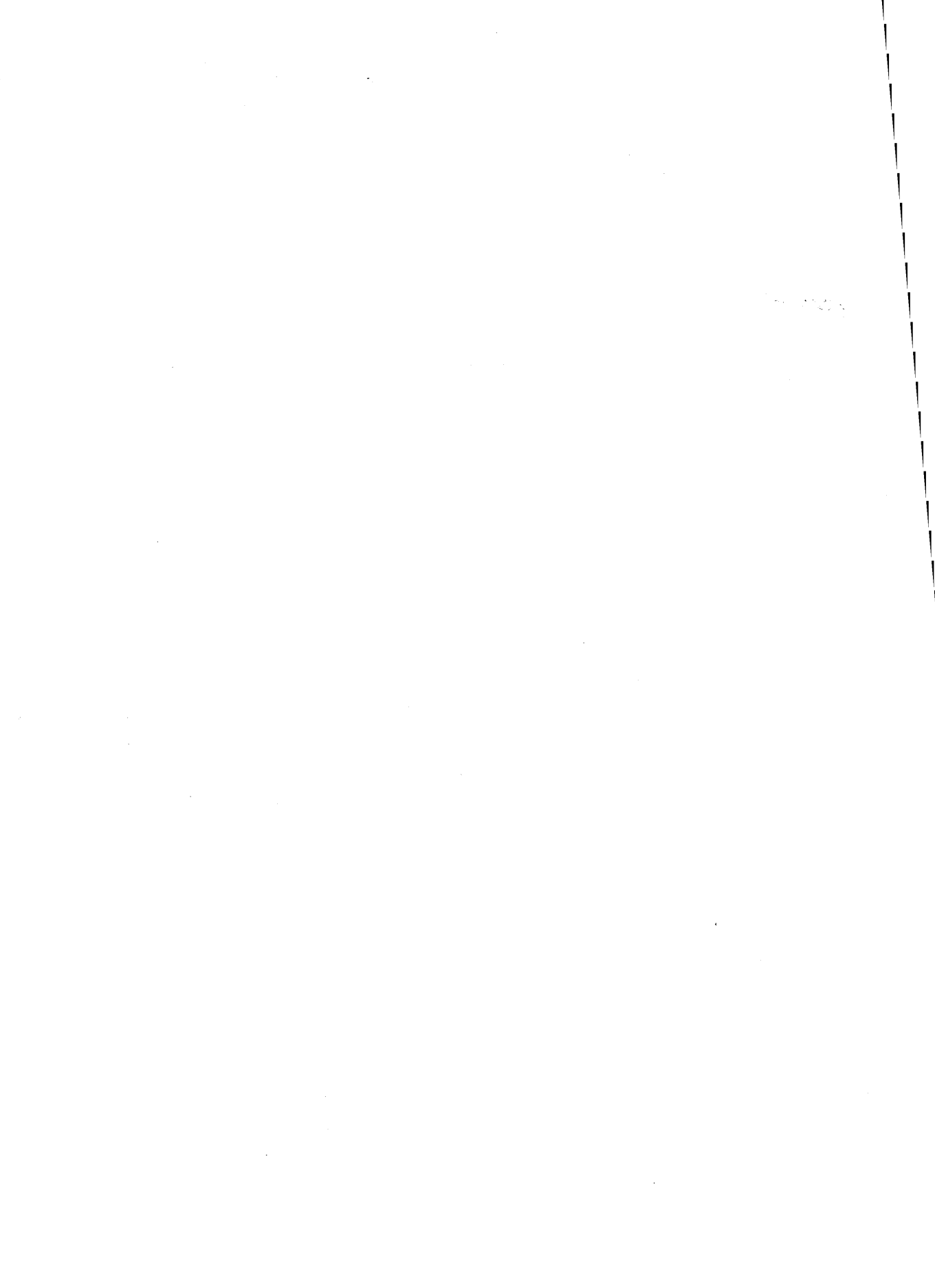
- new industrial plants technically organized for production of goods and services;
- new developments by shipowners having their operating base and installations in Regional territory.

Applications for the foregoing authority must be sent to the Regional Board for Industry and Commerce on stamped paper with a copy on plain paper, accompanied by the company's Memorandum and Articles of Association, ratified by the competent tribunal, also in duplicate.

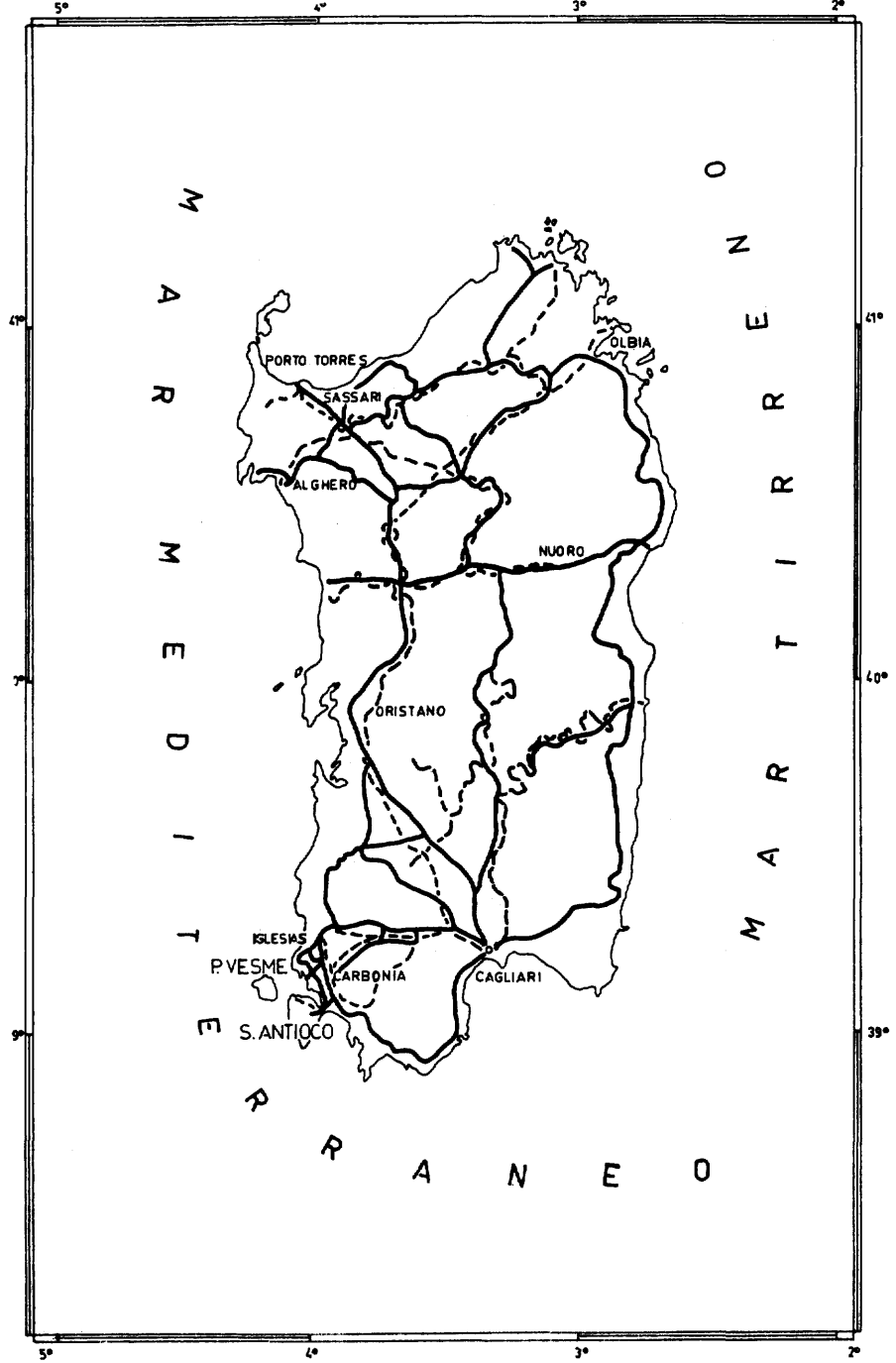
When the application is received, the Regional Board will ask the applicant for the usual one tenth deposit provided by law.

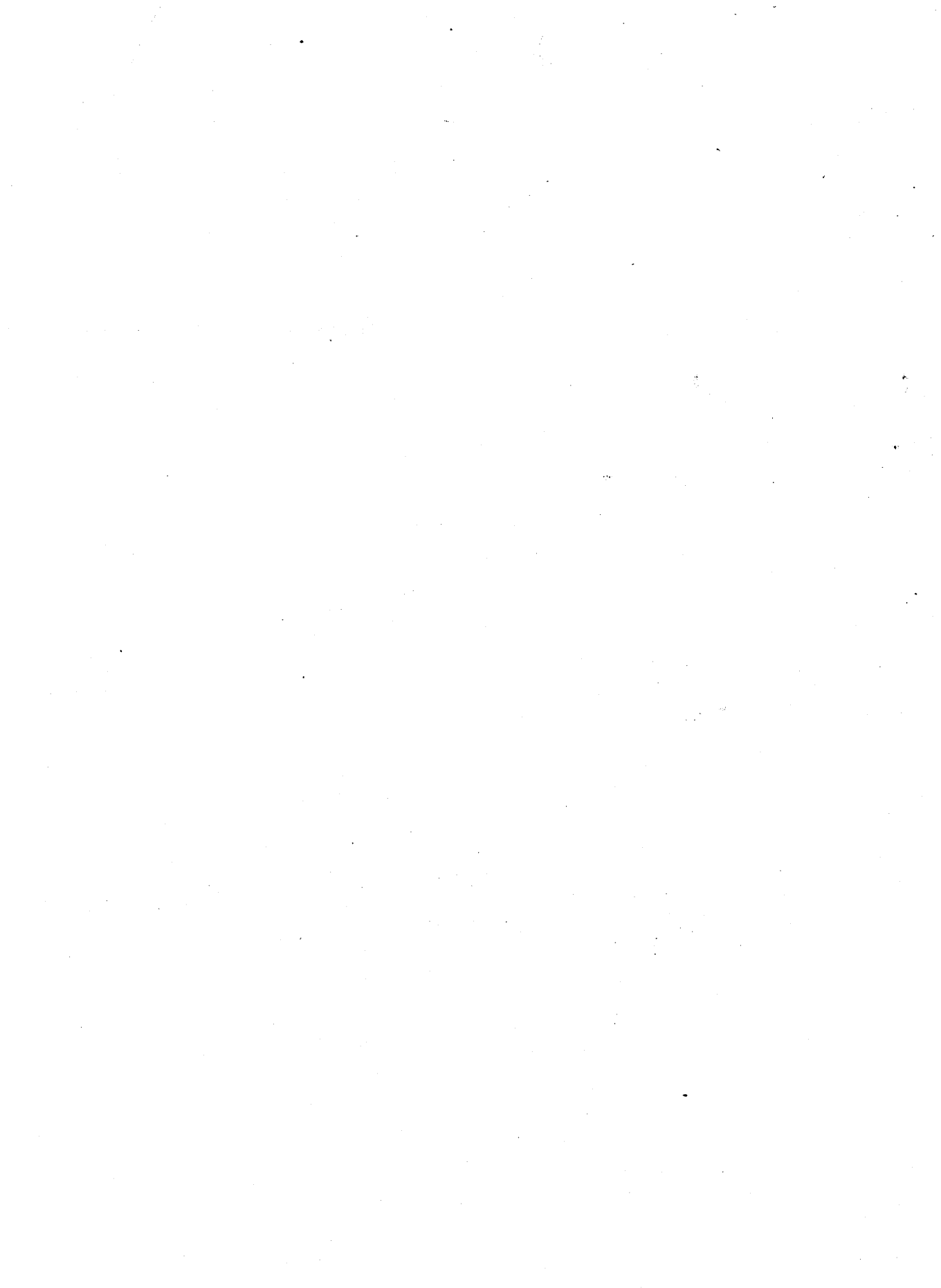
Other provisions refer to the constitution of industrial development areas and industrialization centres.

MAPS



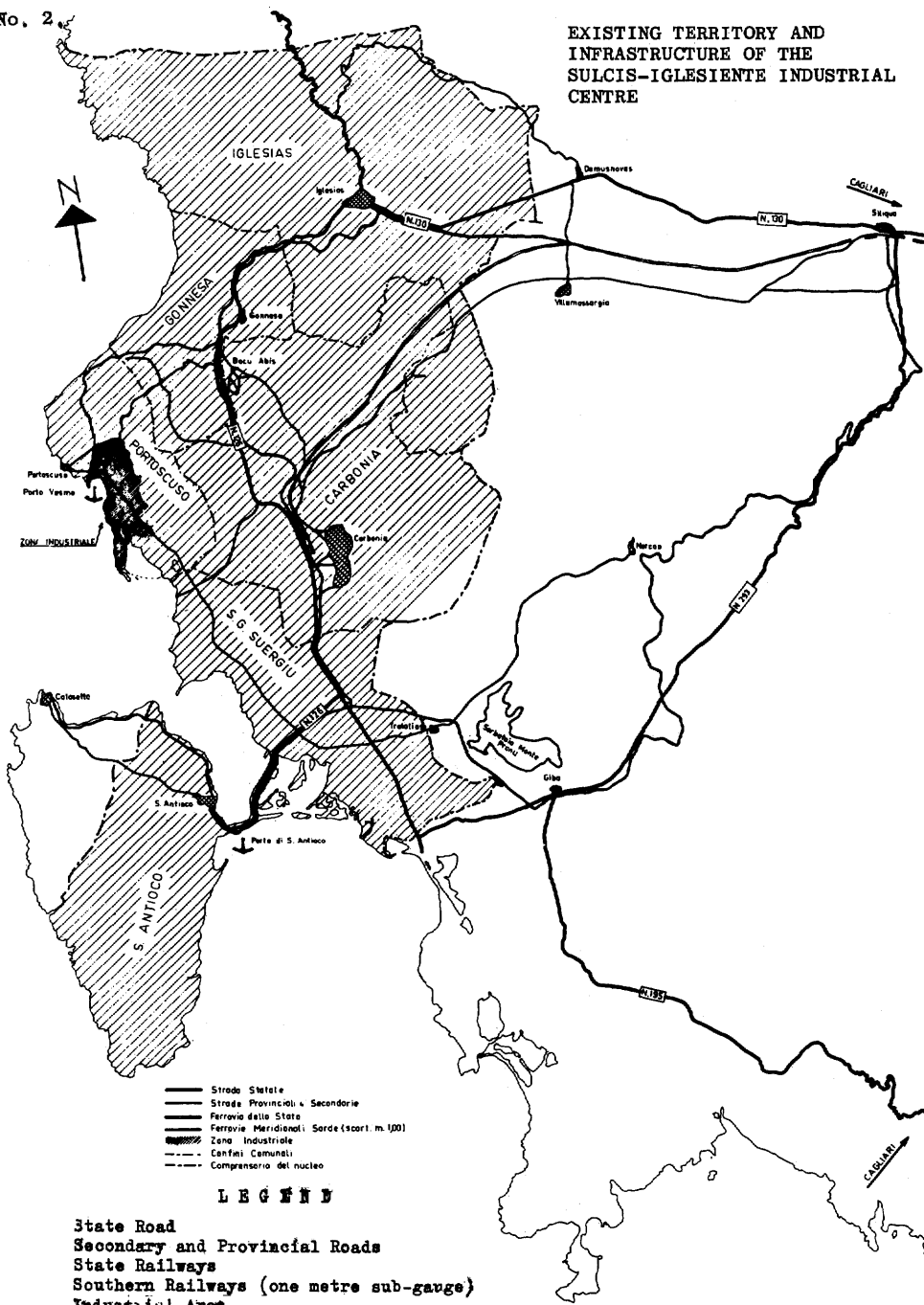
Map No. 1. PRINCIPAL ROAD AND RAIL CONNECTIONS IN SARDINIA





Map No. 2

EXISTING TERRITORY AND
INFRASTRUCTURE OF THE
SULCIS-IGLESIENTE INDUSTRIAL
CENTRE



- Strade Statali
- Strade Provinciali e Secondarie
- Ferrovie dello Stato
- Ferrovie Meridionali Sarda (scorri. m. 100)
- ▨ Zona Industriale
- - - - - Confini Comunali
- Compensario del nucleo

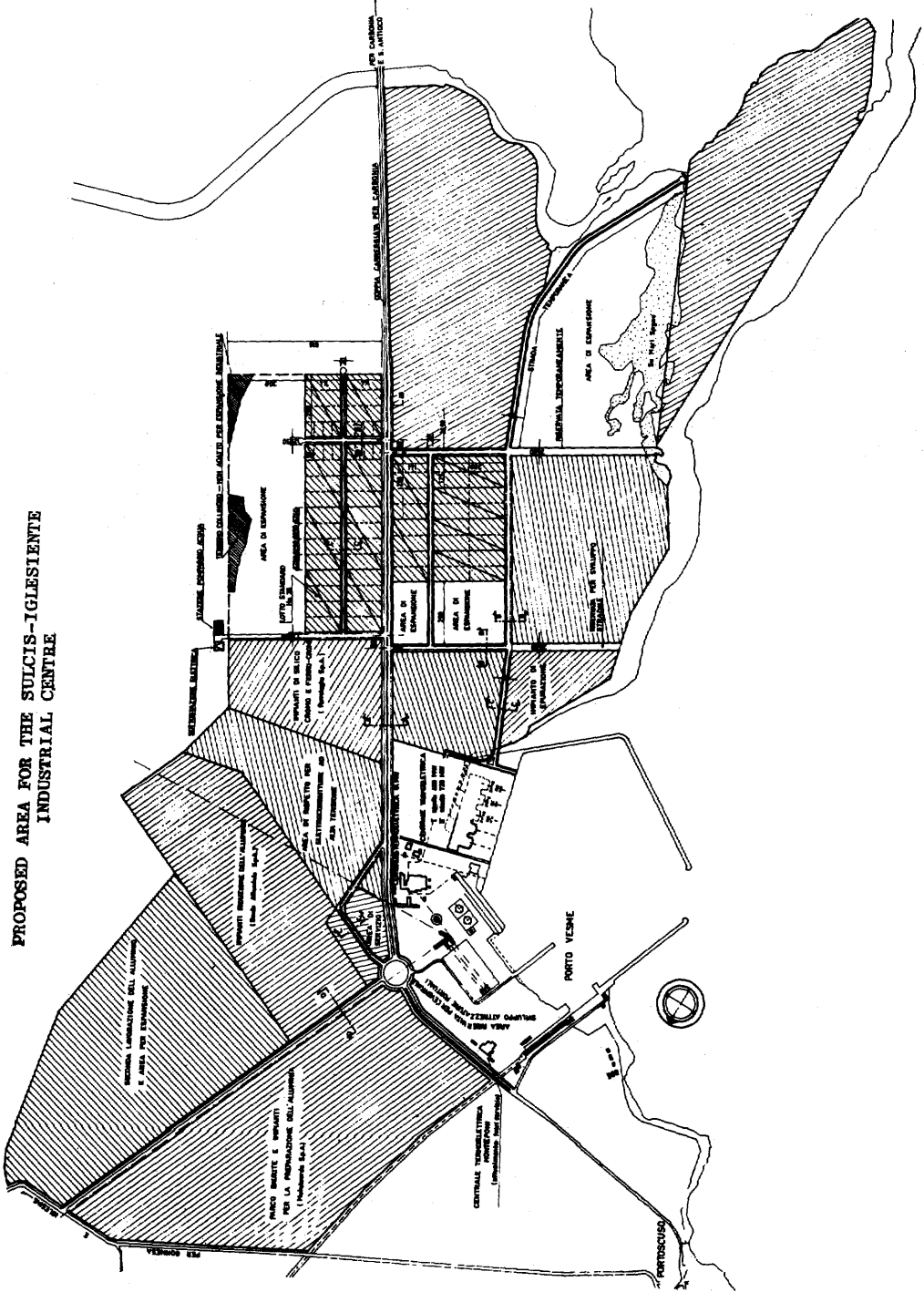
LEGEND

State Road
 Secondary and Provincial Roads
 State Railways
 Southern Railways (one metre sub-gauge)
 Industrial Area
 Municipal Boundaries
 Industrial Centre Boundary



Map No. 3.

**PROPOSED AREA FOR THE SULCIS-IGLESIENTE
INDUSTRIAL CENTRE**



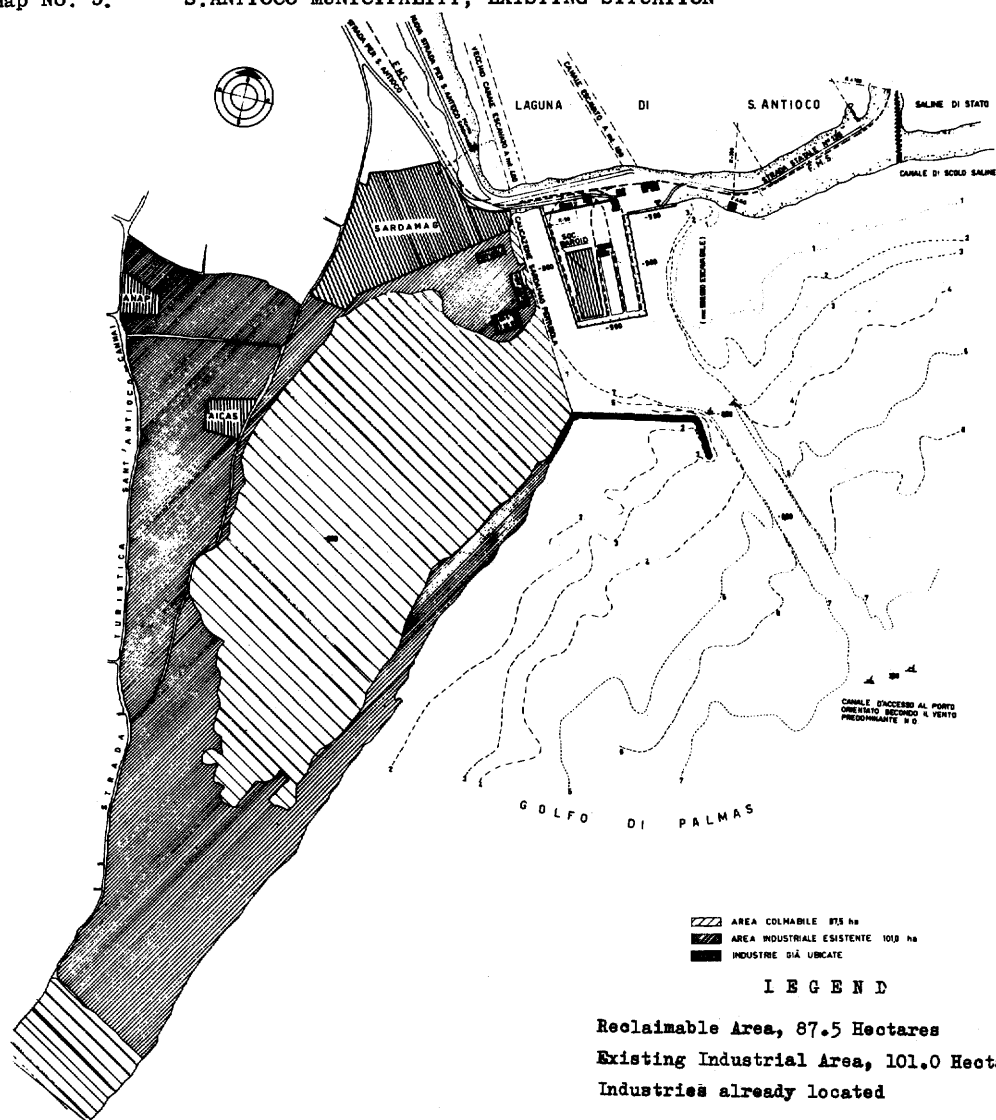
L E G E N D

Thermo-Electric Power Station
 Electrical Sub-station
 Electrical Kiosk
 Water Spring (raising system)
 Water Divider
 Water Reservoir
 230 kV Transmission Line
 230 kV Transmission Line under
 construction
 70 kV Transmission Line
 70 kV Transmission Line under
 construction
 15 kV Transmission Line
 5 kV Transmission Line
 Drinking Water Conduit
 Drainage Canal
 Industrial Water Conduit
 Industrial Centre Boundary

L E G G E N D A

Centrale Termoelettrica
 Sottostazione Elettrica
 Gabina Elettrica
 Sorgente Idrica (Impianto di sollevamento)
 Partitore Idrico
 Serbatoio Idrico
 Terna a 230 kV
 Terna in Costruzione a 230 kV
 Terna a 70 kV
 Terna in Costruzione a 70 kV
 Terna a 15 kV
 Terna a 5 kV
 Condotta Idrica (Potabile)
 Canale di Bonifica
 Condotta Idrica (Industriale)
 Limite del Nucleo

Map No. 5. S. ANTIOCO MUNICIPALITY, EXISTING SITUATION



L E G E N D

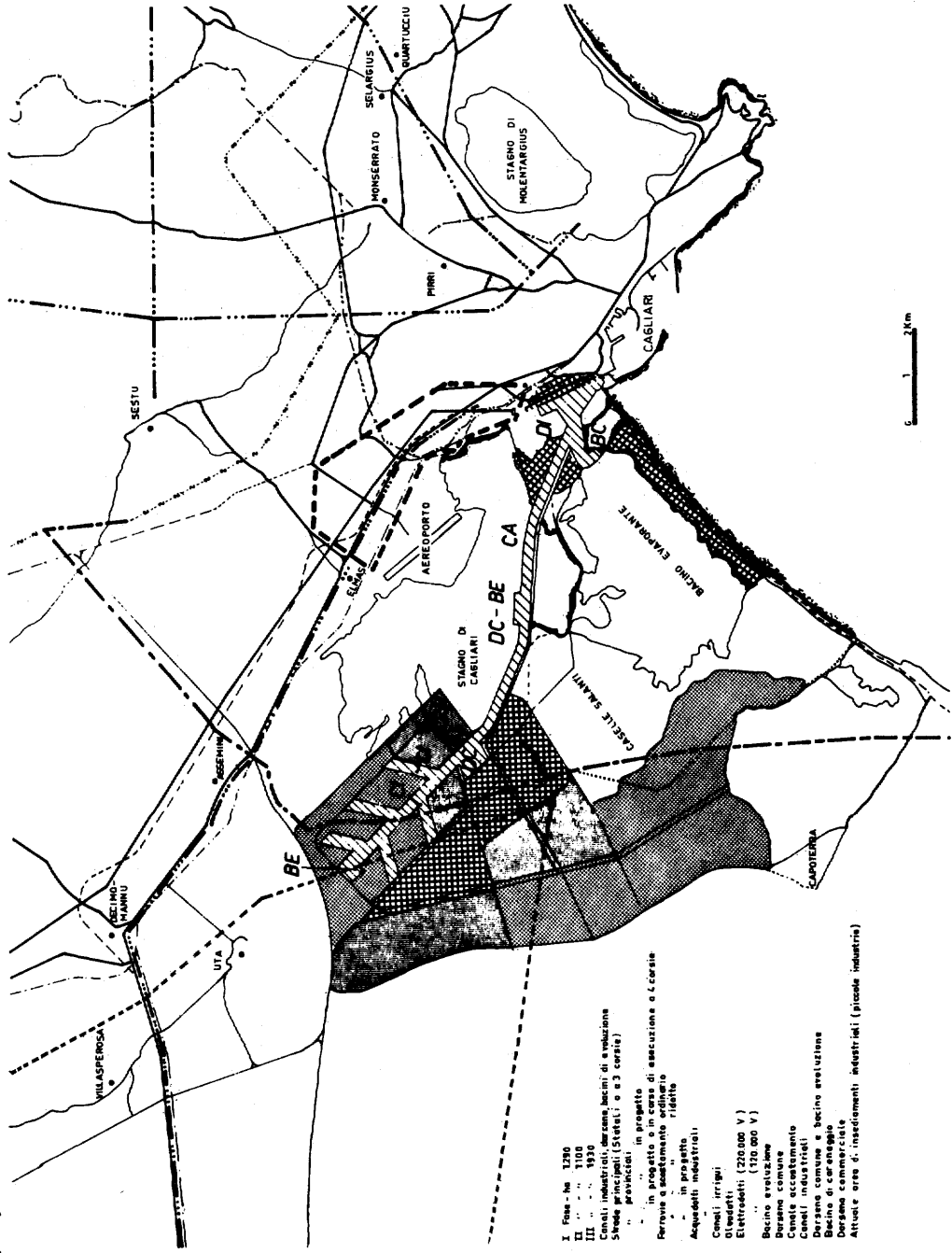
Phase I, 1290 Hectares
 Phase II, 1100 Hectares
 Phase III, 1930 Hectares
 Industrial Canals, Wet Docks , and
 Manoeuvring Basins
 Main Roads (State or 3-lane)
 Provincial Roads
 Planned Provincial Roads
 Roads Planned or in course of
 construction - 4 Lane
 Standard Gauge Railways
 Sub-gauge Railways
 Railways Projected
 Industrial Aqueducts
 Industrial Aqueducts
 Irrigation Canals
 Oil Pipelines
 220 kV Transmission Lines
 120 kV Transmission Lines
 BE Manoeuvring Basin
 DC Municipal Wet Dock
 CA Approach Channel
 CI Industrial Canals
 DC-BE Municipal Wet Dock and
 Manoeuvring Basin
 BC Repair Dock
 DI Commercial Wet Dock
 Present Industrial Area, small
 industries

L E G G E N D A

I Fase-ha 1290
 II Fase-ha 1100
 III Fase-ha 1930
 Canali industriali, darsene, bacini
 di evoluzione
 Strade principali (Statali o a 3 corsie)
 Strade provinciali
 Strade provinciali in progetto
 Strade in progetto o in corso di
 esecuzione a 4-corsie
 Ferrovie a scostamento ordinario
 Ferrovie a scostamento ridotto
 Ferrovie in progetto
 Acquedotti industriali
 Acquedotti industriali
 Canali irrigui
 Oleodotti
 Elettrodotti (220.000 V)
 Elettrodotti (120.000 V)
 Bacino evoluzione
 Darsena comune
 Canale Accostamento
 Canali industriali
 Darsena comune e bacino evoluzione
 Bacino di carenaggio
 Darsena commerciale
 Attuale area di insediamenti industriali
 (piccole industrie)

THE CAGLIARI INDUSTRIAL AREA, EXISTING AND PLANNED INFRASTRUCTURE

Map No. 6.



- I. Fiume - No. 1230
- II. " " " 1100
- III. " " " 1930
- Canali industriali, dorsane, bacini di evulsione
- Suole private (Stretti, o S3 corsie)
- " " " " " in progetto
- " " " " " in progetto o in corso di esecuzione o c.corsie
- Perone a smontamento fisso
- Acquedotti industriali
- Canali irrigui
- Oliveti
- Elettrodi (220.000 V)
- " " (120.000 V)
- Bacino evulsione
- Perone comune
- Canali industriali
- Dorsane comuni e bacino evulsione
- Bacino di caronaggio
- Dorsane commerciali
- Attuale area di insediamenti industriali (piccola industria)

=====	BE
	CA
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