

ブラジル連邦共和国

スアッペ臨海工業開発計画

資料No. 8

TOMO II
PART 2
1.0

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PART II

STUDIES FOR PHYSICAL AND
TERRITORIAL PLANNING

8

1.0 BASIC STUDIES

PART 2 - STUDIES FOR PHYSICAL AND TERRITORIAL PLANNING

1.0 BASIC STUDIES

1.1 PHYSIOGRAPHIC ANALYSIS OF MICRO-AREAS

1.1.1 GENERAL

The physiographic features of the area were analyzed with a view to their adequacy to specific purposes in the Complex — residential, industrial, and/or administrative.

In order to simplify the work, the area was subdivided into the following zones:

- a) The vicinities of Nossa Senhora do Ó were studied with a view to the installation of residential areas only.
- b) The area of the Massangana sugar mill was studied for installation of the Complex's administrative center.
- c) Areas in the neighborhood of Cabo, Ponte dos Carvalhos and Ipojuca were studied in order to estimate the growth potential of these nuclei, the optimal areas being selected from a physiographic viewpoint.
- d) The Tabatinga and Massangana valleys and the region North of the Massangana sugar mill were analyzed with a view to their multiple use: industrial and residential.
- e) The beach areas at the Cupe spit, at Gaibu, Itapuana and Paiva were analyzed with a view to their basically touristic utilization.

The scope of the analysis varied from one area to the other and with the degree of detail needed for definition of the project.

1.1.2 METHODOLOGY

The choice of areas suitable for residential use was based on the analysis of physiographic components, with the employ of the methodology developed by McHarg (*). This technique consists of the preparation of a set of transparent analytical maps, where the different degrees of physical limitations for the use of the land are indicated by shades of gray. By superimposing these maps, a map is obtained with some 7 shades of gray which indicate the physical suitability to residential use in a gradation which goes from optimal to the totally inadequate.

The analytical maps for each limiting factor were prepared from the analysis of aerial photographs, in stereoscopic pairs, in the scale 1:30,000, taken in 1969. Other complementary sources were also used, such as the geological map, the topographical map, and the map of vegetation to be preserved.

The following factors were used as prerequisites in the demarcation of the area:

a) Areas for Preservation of Vegetation

The mangrove swamp areas were pointed as inadequate for residential use according to recommendations in the Report on Areas to be Preserved. The areas in the East region, which are of a rugged nature and show the risk of erosion, and which can act as a barrier against sound pollution from highway PE-60 were also considered as preservation areas.

b) Tidal Flood Areas

Areas located between the high tide and low tide lines were considered to be inadequate for residential use.

(*) Ian McHarg, Design with Nature, 1969.

c) Morphology

Topographic conditions of land with 0 to 15% slope were considered good, average those of land with 15 to 20% slope, and bad those of land with more than 20% slope.

d) Surface Drainage

An area's surface drainage results from its topography, from the level of the water tables and from the geologic features of its soil and sub-soil. Based on this, the area was assigned 3 points of suitability from a surface drainage viewpoint.

On the basis of the analysis of aerial photography, the area was assigned 3 points as regarded the risk of flooding. A distinction was made between areas presenting high, average or low risk of flooding. This distinction was made on the basis of their topography and of their location in relation to streams.

e) Soil for Construction

Location of areas having adequate soil for light structures, and of those rocky (bedrock) areas capable of supporting heavy structures, was based on the available geological map. The crystalline area was not given consideration, since it has a changing layer of variable thickness which might generate landsliding and rock displacement problems.

It should be emphasized that the lack of knowledge on the stratigraphy of the area's quaternary makes it possible to foresee the geologic structure of those locations where it does not appear on the surface, particularly on low plains.

f) Erosion Risk

Taking into account the topography and the geological material in each area, it was possible to clearly define 3 types of areas, with high, average or low erosion risk. Those with high erosion risk

were considered inadequate for residential use.

1.1.3 ANALYSIS OF THE AREAS IN THE VICINITIES OF NOSSA SENHORA DO Ó

A. Description of the Location

This area is located in the southern portion of the IC, its west limit being formed by highway PE-60, the north limit by the Ipojuca river, the southern limit by the Restitution limit, and the east limit by the tidal flooding plain, between Nossa Senhora do Ó and the coastal dune line.

The area presents different topographic profiles. Around Nossa Senhora do Ó and in the valley of the Ipojuca, the terrain is level with only small elevations more than 5 meters high, also level (quaternary sandy terraces) and the coastal dunes. The remaining area is plane, influenced by salty or fresh waters, depending on the tides.

B. Morphological Aspects

In those places where the topography rises above elevation 5, there are 3 distinct zones:

- a) steep slope areas in the region west of PE-60, with rolling hills up to 50 meters high. The hills are long shaped, with a base of 800 to 1,000 meters, the valleys between them being very narrow.
- b) softer hilled areas, with smaller slopes than the previous zone and not as high (30 to 40 meters). The base of the hills is round shaped, with a diameter of approximately 400 meters.
- c) a zone related and mixed with the previous one, with slightly rolling hills and soft slopes.

C. Hydrological Aspects

The surface hydrology of these areas is quite varied, and there are several characteristic zones:

a) tidal flooding areas, where salt water periodically penetrates.

b) plains influenced by streams, of which the Ipojuca river is the most important. It should be noted that areas with different flooding risks could be distinguished in this region, although the surface drainage is poor in all of them. The water table in this zone is near the surface during the better part of the year.

These zones have a better drainage system due to the existence of irrigation channels required by the sugar cane plantations. These channels may be utilized in order to facilitate drainage.

c) plane or slightly rolling zone, with elevation between 5 and 25 meters, where surface drainage may be difficult, the water tables reaching the surface in times of great rainfall. These zones were classed as of average surface drainage.

d) hilly and coastal sand zones, with good surface drainage, though presenting certain problems in the valleys between the hills.

The possibility of flooding caused by heavy rains in the interior exists in the valley of the Ipojuca only, where serious problems may arise, including the blocking off of the accesses to Mossa Senhora do O; occupation of the neighborhood of this valley is not advisable.

Another factor that should be taken into account in the planning of the selected area is the determination of the water table supply sources, so that these zones are not occupied by construction. The

purpose is to prevent jamming the water stream sources and the occurrence of surfacing problems in water tables at blocked up places. This fact should be given attention during the first stage of the project, and no construction should be allowed in zones which may be suspected of having this type of problem.

D. Geological Aspects

The region is composed of various geological types, as follows:

a) Pre-Cambrian

Consisting of gneiss and granite reaching 4 to 5 meters above the surface. This fact is important because it may bring instability problems for construction on these rocks and the problem of boulders rolling down, particularly in view of the rugged topography there.

b) Tertiary or Cretaceous

Arkosean conglomerate of Cabo supposedly free of geotechnical problems for foundations, except in faulty zones which should be previously studied.

c) Tertiary - Arkosean of Cabo

These are feldspathic sandstones totally altered into kaolinite. Soils are supposedly more argillaceous than other similar sandy materials, with the possibility of settling problems.

It is recommended that the soil in the area be studied in detail during the first stage of the project, for an evaluation of the importance of this problem.

d) Quaternary

Dune and/or fluvial sand deposits associated with the coastal plains. They may be marine or continental, the geological study not giving a clear picture of the distribution and stratigraphy of these sediments.

In addition to the sands, there are argillaceous and argillous-sandy layers, both continental and marine, their structure being also unknown (horizontal and vertical).

The fact that the stratigraphy of the quaternary is not exactly known, makes it difficult to plan the utilization of areas presenting these sediments, in view of the existence, in the sub-soil, of sedimentation having a greatly varied size consist.

For a more detailed study, we recommend a complete analysis of the quaternary in order that planning can be done in a more secure manner, particularly in the case of the construction of large buildings.

E. Analysis of Biologic Factors

Vegetation consists of some residual thickets on hillock tops, and mangroves. The remaining land is fully occupied by sugar cane plantations, and a few areas with orchards and ornamental plants. On the coastal sandy zones, practically the entire area is covered with coconut palms and some residual salt marsh brush.

F. Selected Areas

The final map, resulting from the superimposition of the partial maps, separates the unsuitable areas; those optimal areas, with no utilization restrictions, are left white. Below are the areas which were thus selected:

- a) a strip of varying width from 200 to 500 meters and 3,000 meters

long, with a SW-NE orientation, with its center on part of the present nucleus at Nossa Senhora do Ó.

The only limitation which certain locations may present is the difficulty in surface drainage. Both the topography and geology are favorable, in addition to not offering flooding or erosion risks.

b) an area of 2,400 meters by 2,400 meters, located between the valley of the Ipojuca, highway PE-60, and the projected area limit of the Industrial Complex. The entire zone has only one small limitation, i.e., a certain erosion risk. The favorable features are: good surface drainage, no risk of flooding, slightly rolled terrain, and favorable geological material.

1.1.4 AREA NEAR THE MASSANGANA SUGAR MILL

This area consists of zones having different topographic features, and is much varied from this point of view. In the vicinities of the Tatuoca stream and its affluents, there stretches an alluvial plain which soon becomes a tidal flooding plain. The other zone, to the North and West, has a highly rolling terrain. Finally, there is a zone to the East, near the intersection of the two projected roads, where the terrain is slightly rolling.

Drainage does not seem to present many flooding or flowing problems, in view of the short extension of water streams and the permeable geological material. In addition, the construction of dams on the Massangana river should control drainage, and these zones may be considered free from hydrological problems.

The geological material consists of the tertiary arkosean in Cabo, and quaternary arkosean on the alluvial or marine plains.

The tertiary presents no problem for excavation of foundations, due to its sandy, non-cemented nature. The quaternary may pre-

sent problems due to the existence of argillaceous layers in the sub-soil, although they are not expected to be very thick.

The Massangana sugar mill areas of certain hillock tops with subsisting vegetation were considered as permanent preservation areas. In addition, it was deemed useful to annex a preservation area, parallel to highway PE-60, to be added to the Massangana sugar mill for control of the highway's sound pollution.

In view of its location in relation to prevailing winds in summer (SE) and in winter (S), and of the presence of manufacturing plants, this area should be subject to air pollution, and is not recommended for use for permanent housing.

North of the area being studied, there is a concession for exploitation of clay. This type of exploitation is expected to lose its interest when the land value increases with industrialization. This will make it necessary to re-evaluate the most suitable use for this area.

Steep hilled areas offer a high erosion risk, due to the topography and the inconsistent, sandy geological material of the tertiary. This problem can be obviated if urbanization is carefully planned, by anchoring those materials offering sliding risks and by regulating drainage.

1.1.5 ANALYSIS OF AREAS SUITABLE FOR URBANIZATION IN THE VICINITIES OF PONTE DOS CARVALHOS

Here, there areas considered as suitable for urbanization were selected from the aerial photography of the region, taking into account the best geological, topographic and hydrographic conditions and the basence of flooding or erosion risks.

Areas to be preserved, both for landscaping reasons and for erosion

control, were also indicated. In addition, a 15-meter wide strip of land was also recommended for preservation, on both sides of the right-of-way of highway BR-101, for the purpose of preventing construction with direct access to the road and of avoiding sound pollution. As for the current use of the land, the utilization of existing urbanized areas is indicated, and it is proposed that non-designated areas should continued to be used for non-specific agricultural and pastoral purposes.

A. Description of Selected Areas

Area PC 1 - Located east of Ponte dos Carvalhos.

This area is considered for residential purposes, since the land is even and has good drainage conditions and no flooding risk. As regards the geological material, quaternary or tertiary, of the Barreiras formation, special care should be taken for erosion control.

Area PC 2 - Similar to the previous one where physical conditions are concerned.

Area PC 3 - Physical conditions are inferior to those of areas PC 2 and PC 1. Varied topography, some areas having drainage problems; considerable risk of erosion; geological material similar to that in PC 2 and PC 1, with greater risk of erosion due to topographic conditions.

B. Current Use of Selected Areas

Area PC 1 - In part, this is land already divided into building lots, but not yet urbanized. A small area near the highway has a coconut plantation.

Area PC 2 - The larger part is covered by sugar cane plantations, except a small area near the highway, to the North, which is scarcely inhabited, and an area covered by a forest.

Area PC 3 - Most of it is covered by sugar cane plantations.

1.1.6 ANALYSIS OF AREAS SUITABLE FOR URBANIZATION IN THE VICINITIES OF CABO

It was noted that the majority of residential houses in the city of Cabo were located on a high, extremely rolling zone, upon the conglomerates of the Cabo formation. It can easily be deduced that this spontaneous growth aimed at occupying cheaper land or at avoiding areas that might be flooded by the Pirapama river. The only nucleus built on alluvial soil is a COHAB type residential complex (non-spontaneous), and some buildings in the neighborhood of the highway and the railroad.

The industrial zone is spread out in a scattered manner, having its platform at the south, built by excavation and tearing down of hillocks or by filling the alluvial plain with materials also extracted from nearby hills.

The Pirapama river flows down from a zone of mountain ranges of crystalline material, its course being strongly influenced by the local tectonics, with waterfalls and sudden changes of direction. It soon runs down between the hills of the Cabo formation, gnawing a deep bed into the alluvial land until it reaches the fluvial-marine plain on the coast, where it meanders through a non-excavated course. Because of this, it is believed that this river has high peaks of sudden flooding in the rainy season, due to the low retaining power of crystalline rocks and to its steep slope, affecting the plains near the city of Cabo.

On the basis of these features and of previous considerations, 3 zones suitable for urbanization were selected which satisfy the following requirements: a) no flooding risk; b) favorable topographic conditions, and c) easily removable sub-soil.

The areas where vegetation is to be preserved have been indicated, either for erosion control or for landscaping purposes. 15-meter wide zones were also reserved on both sides of the PE-60's right-of-way, in order to avoid uncontrolled access of construction and

sound pollution.

Non-designated areas were considered as being used for indiscriminate agricultural and pastoral uses.

A. Description of Selected Areas

Zone C 1 - This area is located upon the fluvial-marine plain on the coast, at such a height that little flooding risk exists.

It is divided in two parts: one upon a hill of tertiary trachytic lava, the other upon a plain of quaternary sedimentary material of unknown composition (it is believed to be sandy) and unknown origin (whether marine or continental).

It would not present any problems from the hydrological viewpoint, due to the absence of water streams and to the fact that it is located on a higher level than the rest of the plain.

Zone C 2 - This area is located in a region where the terrain is not much rugged, situated on the Cabo formation conglomerates, and having no flooding problems, the Cabo formation presenting less risk of erosion than the Barreiras formation.

Zone C 3 - Conditions here are similar to the previous zones, its location being nearer the roads and nearer Vila Charneca.

Zone C 4 - This zone was located on an alluvial-marine valley covered by quaternary sedimentation of various size consists, with a few hills made up of sandstone and of the tertiary Barreiras formation. The level area may present some surface drainage problems and some risk of flooding, which may be solved with a good drainage network and fills.

For this purpose, the hills contained in the area may be easily

excavated, since they are made up of not very consistent sedimentation.

The area was demarcated in such a way as to be grouped with the future touristical areas near the Itapuama beach. Areas granted for the purpose of clay exploitation remained as such. When concessionaires stop exploiting clay, the entire area should become a forest reserve, in the same way as the protective barrir in Cabo.

At present, the region is occupied by sugar cane plantations and by residual shrubs.

It is recommended that, in the detailed study of this area's occupation, the quaternary be studied in order to verify the possible occurrence of argillaceous layers which may cause settling problems for the fills or for housing to be constructed.

1.1.7 SELECTION OF AREAS FOR URBANIZATION EAST OF PE-60

The same methodology was used as for the areas in the vicinities of Cabo and Ponte dos Carvalhos.

It should be noted that we also recommend preservation of 15-meter wide land strips, beyond the right-of-way of PE-60, for control of the access to the highway and of sound pollution.

A. Description of Selected Areas

In the P-1 area, east of highway PE-60, the terrain is slightly rolling and the material can easily be removed.

Its geology consists of tertiary conglomerates of the Cabo formation, and of sandstones from the same formation. It is possible that this valley contains a few meters' layer of quaternary inundation silting and of soils brought down from nearby hillocks.

Drainage does not seem to present any problem, and the risk of flooding does not exist. Reforestation of the areas indicated for erosion control is recommended.

Area P-1, east of PE-60, has a geological composition of tertiary sandstone from the Cabo formation, and quaternary sandy sedimentation along the level of the tides, which presents no geotechnical problems.

A certain erosion risk exists, and the preservation of hills shown on the map is recommended. The hydrology of the area may present certain water table problems near the surface, as well as incoming salt water.

Area P-2 is made up of little rolling land on both sides of the Tabatinga stream. The Tabatinga and Congaré streams plain area may offer certain risk of flooding, which will be eliminated by the Massangana dams construction. As soon as the dams are built, this valley will be excellent for occupation, except at some locations near the water streams, which may have drainage problems.

The geological composition of both zones is the same: the tertiary conglomerate of the Cabo formation, with quaternary inundation silting of varied thickness.

Area I-1 has the advantage of being located near the present town of Ipojuca, toward which it will be more logical to grow.

Topographical conditions are unfavorable to the steep slopes and the scarcity of plane areas. On the other hand, the geological composition is of crystalline, and we assume it will be difficult to remove rocks for the obtention of planer areas. It is possible that the proximity of the fault between the Cabo formation and the crystalline may have formed more easily alterable or mylonitized crystalline areas, not difficult to remove. A detailed mapping of the location will be necessary in order to determine this area's use.

On the other hand, the steep slope areas may present similar va-

riable thicknesses of flood silting, and there may be the danger of dislocation of masses or wash-outs after the land is cleared.

Area I-2 is similar to the above one, but it is located on a valley and has fewer slope problems; it may, however, present certain draining problems and a high risk of flooding, due to the vicinity of the Ipojuca river.

Area I-3 is part of a region where the terrain is less undulated (it is almost plane on some locations), upon the Cabo formation's tertiary conglomerate.

Urbanization of this zone would be less problematic, and it does not present any erosion or flooding risks.

There will be air pollution problems here, and its utilization as a residential area becomes more difficult; a good vegetation barrier should be planned for.

Area I-4 is located in a region with a wavy morphology, and a plane area with flooding risks.

The material is crystalline, difficult to move. The remainder is covered by quaternary material.

Area I-5 is imbedded among valleys and little undulated hills, formed upon crystalline. By its geological conditions and the proximity of the Ipojuca river, a certain risk of flooding should be expected in these valleys.

The construction of the Ipojuca river dam will eliminate part of this flooding risk. At any rate, an adequate drainage network for flooding control should be built in this area, so that it may be utilized.

1.1.8 ANALYSIS OF AREAS SUITABLE FOR URBANIZATION IN THE VICINITIES OF PONTAL DO CUPE

Here, those coastal sandy areas were selected as fit for construction, the mangrove areas being considered unfit. The existing residual vegetation on salt marshes was also preserved, due to their high value as samples of this type of vegetation, which has practically disappeared today.

Coconut plantations are also earmarked for preservation, in view of their high ornamental value in a predominantly touristic zone.

1.1.9 ANALYSIS OF AREAS SUITABLE FOR URBANIZATION ON THE GAIBU, IPOJUCA AND PAIVA BEACHES

This area was given special care as regarded identification of the potential urban development areas related with tourism.

The analysis attempted to determine possible occupation problems, and establish which areas should be preserved, in order to prevent destruction of their natural values through uncontrolled division into building lots.

On the other hand, the physical factors were analyzed in an integrated manner (geology, hydrology and geomorphology), various sub-zones being separated.

a) Zone of Hills of Barreira's Tertiary Formation

This zone stretches from the top of the Cape of Santo Agostinho up to the hills west of Paiva beach. These hills reach considerable height (up to 75 meters), with a steep slope, and include relatively narrow valleys between them. On these hills, water streams are short and scarce.

In the vicinities of the Cape of Santo Agostinho, particularly near the contact with the crystalline, and due to the land clearing,

there are evident signs of well advanced erosion with landslides by washout. This phenomenon is less evident at the northeast and western part of the area, due to adequate preservation of the woods.

The reason for the occurrence of erosion is, doubtless, the clearing of a region made up of easily worn out material. For this reason, the preservation of this area, without urbanization, was considered imperative for landscaping preservation. When crossing these hills, roads should be carefully planned in order to avoid unnecessary cuts and land clearing. Another advantage of preserving the woods when planning reforestation of this region is the mitigation of possible air pollution originating from the industrial center.

b) Cape of Santo Agostinho and the Pedras Pretas Point

These two coastal projections are made up of rock of volcanic origin. Calcareous alkalyne granite appears at the surface on the Cape of Santo Agostinho. Trachytes and quartz-trachytes appear at the surface on the Pedras Pretas point.

These two landmarks constitute an important access to mooring facilities or shelters for light vessels which may be built there.

c) Plane and Scarcely Undulated Areas with Quaternary Deposits

These areas form the valley between the tertiary hills down to the vicinities of the sea, where the coast sands begin.

The lithologic composition of these sediments is varied due to the intertwining of coastal and continental silting, both of flooding and alluvial origin, and a study of drillings on this land is recommended.

The majority of the water streams in this region cross these plane areas, there being no inundation problems due to their short length.

d) Sand Strip Along the Coast

This sand strip stretches along the entire coast, except at the already mentioned points, and has its largest width on the Paiva beach (400 m). The maximum thickness of these deposits should not be more than 10 meters. There are few dune formations due to the present vegetation coverage (coconut plants) which replaces the original one (salt marsh brush).

These sands cover all types of rocks, including the reefs which, at the beginning of the Paiva beach, are noticed only because of changes in the coastal line and by the appearance, in aerial photos, of waves breaking in the open sea opposite this location.

If large structures are projected for construction on this strip, drilling of the subsoil is necessary, due to the variations in the thickness of sand layers and the underlying rocks which may appear.

e) Reefs

These appear in two locations -- the Gaibu and Paiva beaches -- and are pointed out because of the problems they may bring to the touristic utilization of the beaches.

1.1.10 ANALYSIS OF BIOLOGICAL FACTORS

Another kind of residual vegetation is that which exists on valleys, a type of vegetation which requires more water. Its preservation is not imperative, but it is advisable to leave a green strip along water streams as a form of hydraulic control.

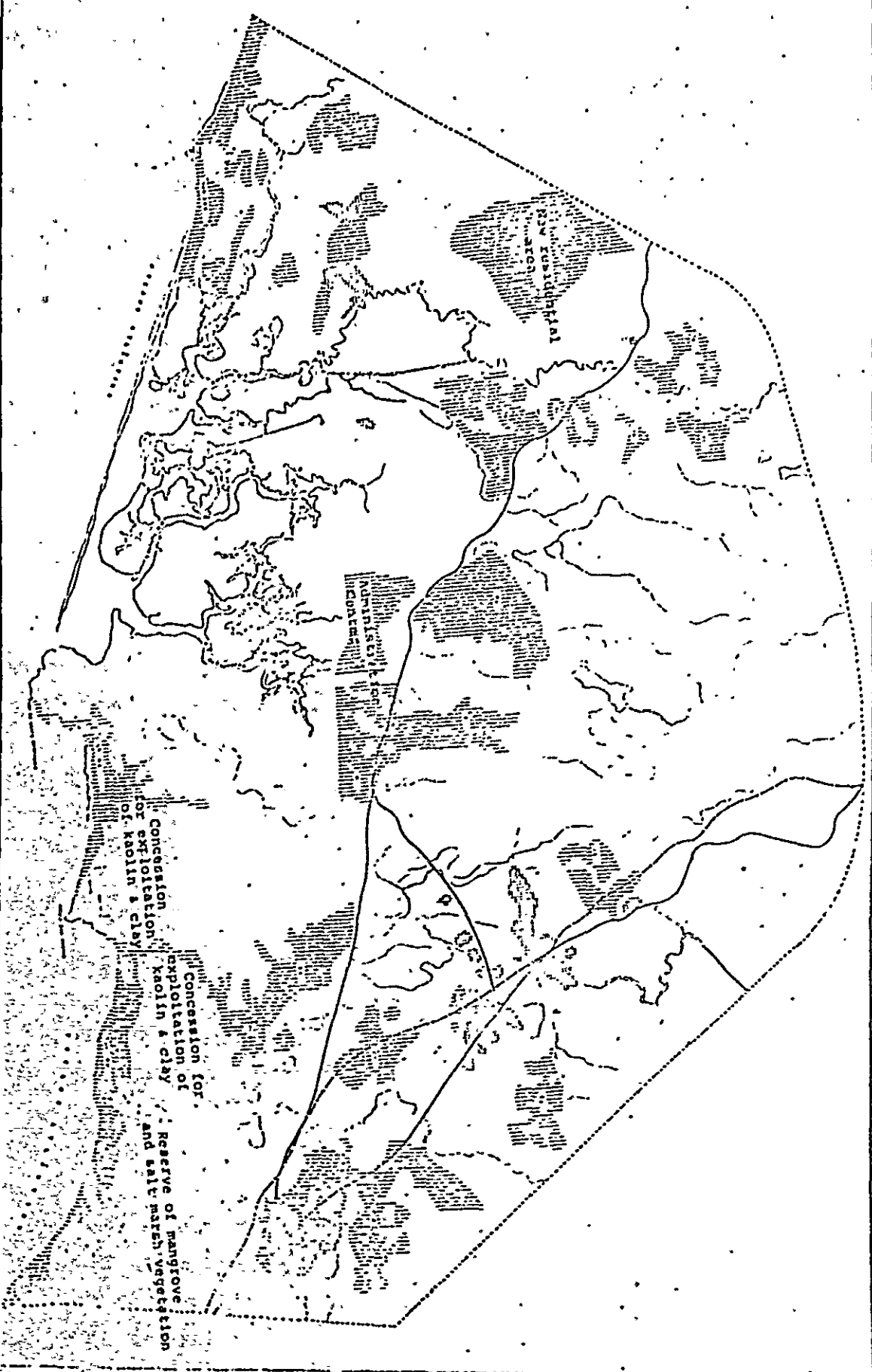
The other type of vegetation is of antropical origin, mostly coconut palms. They are distributed among the coastal sand strip, the valleys and the plane area between tertiary hills.

Preservation of the coconut palms on the sand strip is deemed neces-

sary, since they are a vegetation of unquestionable landscaping value, useful to urbanization schemes.

The existing mangrove swamps should be preserved, as recommended in the report on Areas To Be Preserved.

OPTIMUM AREAS FOR URBANIZATION
 AREAS TO BE CONSIDERED FOR THE EXISTING WOODS
 IN FOR REFORESTATION
 HIGHWAY WITH RELATIVE AREA OF 400 ON EACH SIDE
 RAILROAD
 WATER RESERVOIRS



PHYSIC GRAPHIC ANALYSIS OF
 MICRO-AREAS

1.2 POPULATION ESTIMATE

1.2.1 EXISTING POPULATION

The population of the Metropolitan Area of Recife was studied, to which the municipality of Ipojuca was added. From this universe, the sector including the municipalities of Cabo, Jaboatão and Ipojuca, where the Industrial Complex of Suape is located, was separated.

The population study was based on IBGE data relative to the 1940, 1950, 1966 and 1970 census.

The global projection of the population in the Recife metropolitan area was initially made, with basis on the census taken from 1940 to 1970.

The second step consisted of the control of the evolution of the sections of urban population in respect to total population.

Then the populational growth curves were studied for the municipalities in relation to the metropolitan area population curve.

Once the future populations of municipalities which integrate the metropolitan area were defined, the sector where the Suape Industrial Complex is located was taken out.

The current population distribution was studied, as well as its trends as they can be projected for the next twenty five years.

PROJECTIONS FOR 1980

Every projection or estimate of populational distribution is based on pre-established assumptions. In the case of the universe under consideration, the populational growth indices observed during the last few years were maintained.

This assumption was applied at the level of the metropolitan areas, the extrapolation to the municipality level being made in accordance with the following methodology:

- a) The future average population was determined by means of application of short-run indices (1960-1970), when the maximum values curve was obtained.
- b) The minimum values curve was taken from the long-run growth indices (1940-1970).

A populational estimate does not necessarily lead to the determination of the exact number of inhabitants in a certain nucleus, and its purpose is closer to the description of future conditions.

POPULATIONAL DISTRIBUTION

Populational distribution by municipalities and townsites was put in the form of graphs showing its evolution during the period from 1940 to 1970, the analysis of which gave rise to the need to correct growth indices for the municipality of Jaboaño, since it is unlikely that the observed rate will continue to subsist.

The curve of future percentages was taken from the distribution of the nuclei percentages in relation to the universe in the long run (1940-1970).

POPULATIONAL PROJECTION FOR THE YEAR 2000

The projection of the population for the year 2000 depends on several factors, of which only few are constant. The populational growth rate may be reduced, while any impact in the region may totally change the development poles.

The methodology adopted for this case is the same as for the projection for the previous item, the following assumptions being added:

- a) A decrease in the growth rate: the populational growth rate should decrease, except in municipalities and cities with a small population.
- b) Stabilization of the level of populational decline in towns undergoing a decadence phase.

Taking as universe the merge of the 3 municipalities under consi-

deration, we have:

POPULATIONAL GROWTH BY MUNICIPALITY

MUNICIPALITY/YEAR	1940	1950	1960	1970	1980	1990	2000
MUNICIPALITY GABO	5,813	7,264	15,930	40,730	32,711	129,930	213,263
MUNICIPALITY ABOATÃO	13,339	39,574	34,639	137,521	337,303	462,330	667,261
MUNICIPALITY IPOJUCA	3,062	3,332	7,546	10,144	14,266	17,690	21,457

PROJECTED POPULATIONAL GROWTH OF MAIN CITIES
IN THE MUNICIPALITIES UNDER CONSIDERATION

	1940	1950	1960	1970	1980	1990	2000
POPULATION of UNIVERSE	22.219	50.720	100.105	238.395	435.319	610.000	894.452
	100%	100%	100%	100%	100%	100%	100%
Cabo	4.685	6.029	10.050	27.020	53.109	79.910	123.823
	21.09%	11.89%	9.29%	11.33%	12.2%	13.1%	14.0%
PTE. DOS CARVALHOS	569	1.131	5.187	12.917	29.602	50.020	89.445
	2.56%	2.23%	4.8%	5.42%	6.8%	8.2%	10.00%
JUSSARAL	424	453	581	712	-	-	-
	1.91%	0.89%	0.54%	0.3%	-	-	-
SANTO AGOSTINHO	140	101	112	81	-	-	-
	0.63%	0.2%	0.1%	0.03%	-	-	-
JABOATÃO	13.060	33.459	33.963	53.027	*	*	*
	58.78%	65.97%	31.4%	22.24%	*	*	*
CAVALEIRO	-	-	35.216	59.049	*	*	*
	-	-	32.56%	24.77%	*	*	*
MURIBECA	279	5.395	15.510	75.445	161.503	256.810	423.970
	1.26%	10.64%	14.34%	31.65%	36.9%	42.1%	47.4%
IPOJUCA	1.415	1.829	2.744	3.456	3.700	4.575	6.367
	6.37%	3.61%	2.54%	1.45%	0.85%	0.75	0.6%
CAMELA	528	740	2.510	3.529	6.530	7.930	9.839
	2.38%	1.46%	2.32%	1.48%	1.5%	1.3%	1.1%
N.S.do O	1.083	1.313	2.292	3.159	4.136	5.185	6.261
	4.87%	2.59%	2.12%	1.32%	0.95%	0.85%	0.7%

For calculation purposes, Jaboatão and Cavaleiro were grouped together, the following results being obtained:

	1980	1990	2000
JABOATÃO	176.304	205.570	243.291
CAVALEIRO	40.5	33.7	27.2

1.2.2 POPULATION ATTRACTED BY THE INDUSTRIAL COMPLEX

A - Jobs Generated by the Industrial Complex

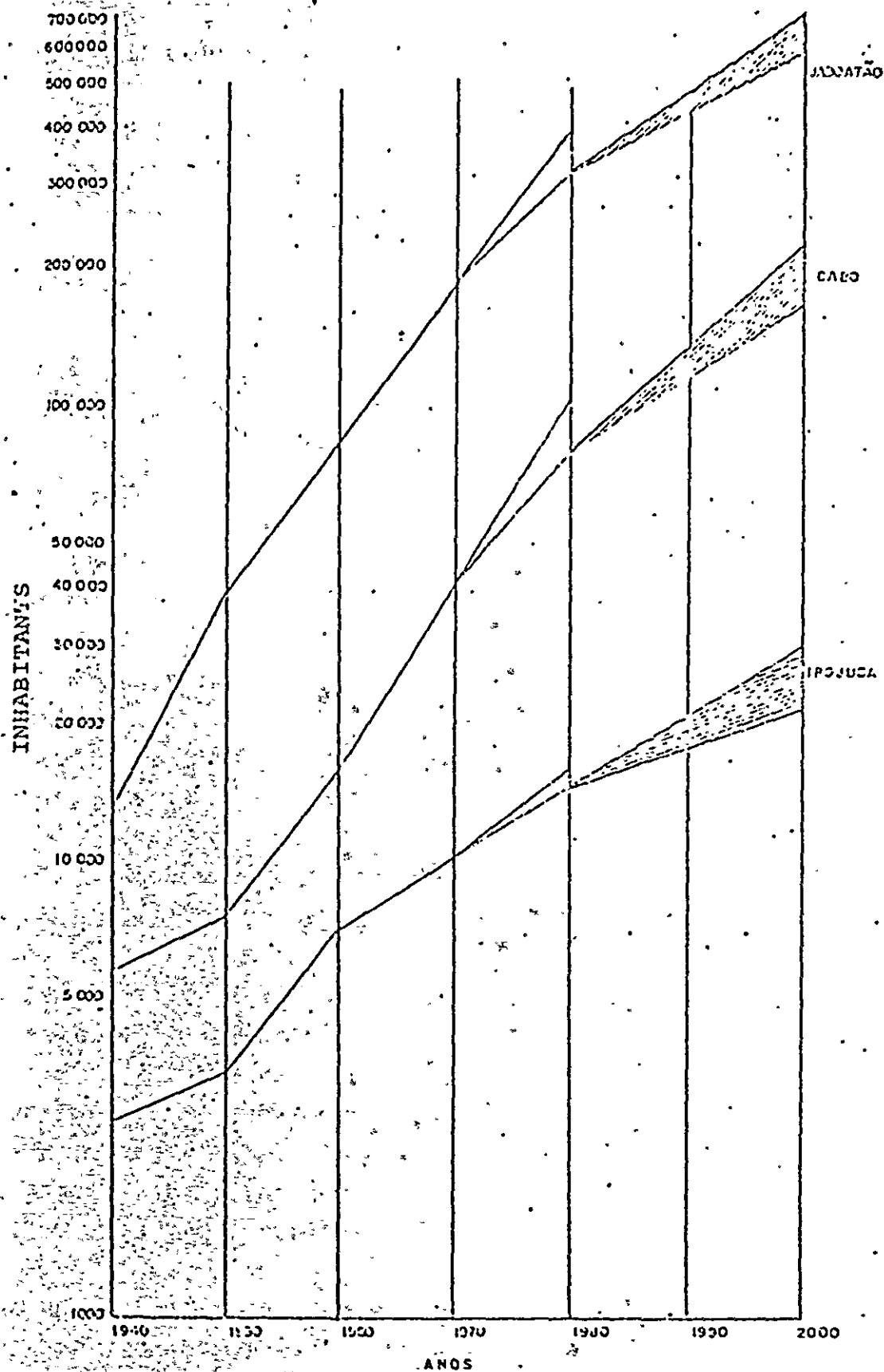
In view of the difficulty in forecasting the types of industrial plants which will integrate the Industrial Complex in its maximum occupation phase, we adopted an average number of employees/ha., obtained through the analysis of several industrial complexes with characteristics similar to those of Suape s.

The tables below show the data obtained for the industrial complexes of Cubatão and Aratu.

I) 12 industrial plants were researched in the Cubatão Industrial Complex:

	NUMBER OF EMPLOYEES	AREA IN M2
Refinery	3,259	1,965,000
Steel Mill	6,436	3,045,595
Petrochemical A	278	1,198,940
Cement	94	30,403
Petrochemical B	353	771,925
Petrochemical C	153	294,735
Chemical	119	1,094,730
Petrochemical D	133	533,330
Leather, Weaving	153	14,055
Paper	505	235,700
Hydroelectric	363	743,355
Petrochemical E	351	1,150,370
TOTAL	12,207	11,129,193

DENSITY: 11 employees/hectare.



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GOV. DO ESTADO DE PERNAMBUCO
SECRETARIA DE PLANEJAMENTO E DESENVOLVIMENTO REGIONAL
INSTITUTO DE PLANEJAMENTO E DESENVOLVIMENTO REGIONAL

GROWTH OF URBAN POPULATION
IN THE MUNICIPALITIES
OF JABOTÃO, CABO & IPOJUCA

1980

II) - Aratu Industrial Complex

For the studies of the industry/population ratio at the Aratu Industrial Complex, higher density indices were adopted, related to type of industrial plant.

DEVELOPMENT PHASE

Heavy Industry	- 15 empl./ha. I.
Light Industries	- 20 empl./ha. I.

FINAL PHASE

Heavy Industry	- 20 empl./ha. I.
Light Industry	- 30 empl./ha. I.

The forecasts for the number of jobs generated by the industries to settle at the Suape Industrial Complex during the first phase conclude that there will be 5,200 jobs in an area of 564 ha, which corresponds to an average density of 9.2 jobs per industrial hectare.

Since the index calculated from the data for the C.I. at Cubatão was the one closest to the one figured from the economical studies made, and since this is an existing and operating complex, this Cubatão complex was adopted for the calculation of the number of jobs at the Suape Industrial Complex.

Therefore, for a surface of 5,760 ha in the area of highest industrial concentration, located south of the Cape of Santo Agostinho, we conclude that there will be $5,760 \text{ ha} \times 11 \text{ employees/ind.ha.} = 63,360$ industrial employees.

For the calculation of the number of jobs generated by the collective port, the same index observed at the port of Recife was adopted. The latter, for a dock length of 2,500 m, utilizes a work force of approximately 1,500 employees, which means an index of 600 employees per kilometer of docking.

At the Suape Industrial Complex, a collective port with approximately 5,000 m of docking length is projected during its maximum occupation phase, which gives us an estimate of 3,000 employees.

Consequently, it is estimated that, for the maximum occupation of the area south of the Cape of Santo Agostinho, of high industrial concentration, there will be a total of $63,360 + 3,000 = 66,360$ employees.

B - Calculation of the Dependent Population

For the calculation of the dependent population, two parameters were compared: the number of economically active persons per family and average family size.

In determining the average family size, data supplied by IBGE were used (1970 census, at a micro-region level), which give the total urban population and the number of urban residences:

We have then:

Urban population	- 1,615,635
Number of residences	- 294,907
Number of persons per residence	- 5.3

SOURCE: - FIBGE, 1970 Census

The second parameter to be determined is the number of economically active persons per residence. Again based on the FIBGE Census for 1970, the percentage of economically active persons can be estimated as 27.52% of the population in the micro-region of Recife.

We thus have:

No of economically active persons per family:

$$= 0.2752 \times 5.3 \approx 1.5$$

On the basis of these data, it may be said that:

$$\text{Attracted population} = \frac{5.3}{1.5} \times \text{number of jobs.}$$

Therefore:

$$\text{Attracted population} = \frac{5.3}{1.5} \times 66,360 = 234,472 \text{ people.}$$

C - Geographic Distribution of Employees during Maximum Occupation

For the maximum occupation phase, total occupation of the projected townsites was considered, other employees being distributed among the neighboring townsites.

As we have seen before, the total number of employees in the area of highest industrial concentration during the final phase was estimated at 66,360 employees, which, by the coefficient calculated in the previous item, represents a population of 234,432 people directly dependent on the CI's activities in the area of highest industrial concentration, south of the Cape of Santo Agostinho.

In the residential program, the following have been forecasted:

- 1) Residential area near Nossa Senhora do O
- 2) Residential area southwest of the Industrial Complex
- 3) Residential areas northwest of the I.C. near Cabo.

These areas meet 71% of the residential demand generated by the Suape Complex, the remaining population being distributed among the main towns of neighboring municipalities.

The criteria of accessibility and generation of trips were used to evaluate this distribution.

The projection of the urban population of the municipalities for the year 2000 was taken as a basis for evaluating the generation of trips, while the square of the distance was used as accessibility factor.

Population attracted by the IC	- 234,432
Population of nucleus near	
Nossa Senhora do Ó	- 10,400
Population of nucleus southwest	
of the I.C. (Boasica)	- 81,400
Population of nucleus northwest	
of the I.C.	- 75,560
Population to be distributed	- 234,432 - 167,360 =
	67,072

GEOGRAPHICAL DISTRIBUTION OF POPULATION

	URBAN INHABITANTS	ACCESSIBI- LITY $1/D^2$	INHABIT- TANTS/ D^2	%	POPULATION
Cabo	213,263	.00694	1,430	34.14	23,569
Ipojuca	21,467	.00909	195	4.63	3,105
Joboatão	667,261	.00111	741	17.59	11,798
S.Lourenço	347,950	.00057	191	4.53	3,039
Recife	1,907,132	.00073	1,392	33.05	22,167
Olinda	435,341	-.00049	213	5.06	3,394
TOTAL			4,212	100.00	67,072

We thus have the following distribution:

DIRECTLY ALLOCATED POPULATION

	EMPLOYEES	POPULATION
Nuclei near Nossa Senhora do Ó	2,943	10,400
Boassica	23,038	81,400
Nuclei northwest of the I.C.	21,335	75,560
TOTAL	47,366	167,360

POPULATION DISTRIBUTED BY MODEL

MUNICIPALITY	EMPLOYEES	POPULATION
Cabo	6,671	23,569
Ipojuca	379	3,105
Jaboatão	3,340	11,793
São Lourenço	360	3,039
Recife	6,275	22,167
Olinda	961	3,394
TOTAL	13,983	67,072

TOMOTI
PART 2
2.0

2.0. USE AND OCCUPATION OF GROUND

2.0 USE AND OCCUPATION OF GROUND

2.1 CONSIDERATIONS FOR PLANNING THE SUAPE REGION

Current discussion of marine oil terminals and possible refinery facilities are not comparable, as regards dimensions and function, to Suape or other developments in Europe. In Great Britain, the Labor Government policy specifically prohibited demarcation of land for industrial plants in the proposal for a marine oil terminal and a container port in Maplin Sands, in spite of the proven necessity of greater job opportunities in the Essex county. Originally, the Port of London plan for Maplin Sands was adjacent to a location proposed for the future, larger London airport, projected by the British Airports Authority. The project for the third London airport was cancelled in the summer of 1974. The proposed Maplin port may have the same destiny, and even so many old London docks, inadequate as regards the ground area and the depth of the channel for modern ships, are now being converted into residential and commercial zones. Tilbury, the most recent port development, with 429 hectares of land and the newest containers and facilities for uniform cargo, will have its capacity exhausted before 1980.

Suape is more than the most significant proposal for industrial development in the Western Hemisphere. Suape should become an example to the world of industrial planning and integrated community, for three reasons:

- 1) A planned neighborhood to be developed there will shorten work trips for many of those who will be employed in Suape;
- 2) Historical areas will be preserved and related to the Suape development plan; and
- 3) The establishment of touristic facilities on the Suape coast

will prove that heavy industry, if carefully planned and developed according to the highest standards of modern technology, may be compatible with Man and his habitat.

2.2 PLAN FOR LAND USE AND OCCUPATION

The main objective of the Land Use Plan is to orient the utilization of the total I.C. area, so as to guarantee, in time and space, adequate environmental conditions for the populations which will settle there, together with the adequate implementation of infrastructures and of port and industrial facilities through the efficient use of resources invested in the region.

Since the Suape Project is basically an industrial and port complex, the basic aspects of zoning are closely related with the port concept. Thus the offer of maritime access makes possible the installation of industries directly or indirectly dependent upon ocean transportation. Land intended for industries related with these basic industrial plants is also planned for, whether they are needed by the industrial process of production itself or for the rendering of services. Another type of industries for which areas were also planned are the independent industries — those that may operate in locations far from the coast, but that keep some relation with the basic industries.

The following types of appeal for industries to be located near the port can be mentioned:

- a) Receipt of raw materials by sea, at lower transportation costs.
- b) Export of finished products by sea, at lower transportation costs.
- c) Interchange of finished or unfinished products with other industries which can be reached by sea.
- d) Dependence on sea or on ships.

As for the location near the sea, the following attractions were identified:

- a) need to have treated industrial wastes discharged into the sea.
- b) utilization of large amounts of water in their industrial processing.

Finally, for industries to be located near each other, in certain cases, there are the following attractions:

- a) proximity of a research center
- b) concentration allowing for a scale economy
- c) savings in the infra-structure costs
- d) proximity of regional roads system
- e) interchange of products with complementary industries
- f) utilization of the local manpower supply in view of the size of the enterprise
- g) utilization of governmental incentives and interest in the development of the region after implantation of the I.C.

The port area is intended for direct servicing of industries and utilization of the collective port.

Location of industries along the wet perimeter was conditioned by the size of the industry and the depth needed by the size of the ships that may be required to serve these industries.

The industrial areas having a port front were sized as per a pre-fixed module, as a function of the berth length, so as to facilitate balancing with the land behind it.

In addition to these two functions, a dock near the Collective Port was projected for use by fishing activities.

Residential zones were located at strategic points within the I.C., and an attempt was made to locate the majority of the work force

involved in the project around the work areas, with a view to reduce internal transportation costs and to permit the harmonious integration of the various functions.

The plan for utilization of the land has two structural components: zoning and the road system.

For certain functions, specific areas were demarcated, with an inter-relation and hierarchy based on their degree of affinity.

The port zone ZP includes the Collective Port, with areas for all activities of a public port, such as a bulk cargo terminal, containers, roll-on/roll-off, etc.

The fishing port includes areas for both artisan and industrial fishing activities. In the land behind it, an area is planned for installation of industries connected with fishery.

The industrial zone ZI was subdivided in accordance with the type of industrial plants to be installed, classified according to their dependence on the sea and their degree of generative power.

At Z-1 there will be located those industries requiring private terminals for the receipt of raw materials or for the exportation of their products.

At ZI-2 there will be located those industries directly related with the basic ones at ZI-1. Also in this zone those industries will be located which, even though they receive their raw material by sea, have no need of docks because they are supplied by means of special transportation systems, such as pipelines.

Also projected for this area is the installation of industries

which, though depending on marine transportation, do not operate at such a scale as to justify a direct access to the sea.

Zone ZI-3 was defined as for utilization by independent or peripheral industries, that is, those which are not attracted by the offer of a port front, but by the infra-structure offered by the complex, and by the service and product demand generated by the industries located in the two previous zones.

A zone was planned for supporting services, such as maintenance, manufacture of construction components or of items for consumption by the industrial units which integrate the I.C.

The Industrial District of Cabo, located within the legal area of the complex, was defined as an existing industrial zone, the neighboring areas, which have a spontaneous vocation for industrial occupation, being defined as ZI-2.

The area intended for the administration was named ZCA, specific sections of it being defined for different functions. Thus, ZCA-1 was defined as the location where the Center of Administrative Activities will be installed, as well as all basic services necessary to the operation of the system. Also located in this area is the nucleus of community support and the maintenance services. An area destined for leisure completes the ZCA-1 group.

At ZCA-2 there will be located a public recreation park, with areas for sports, woods, playground, etc. The idea is to center upon this zone all the sporting or recreation interests of the population residing in the I.C. area.

ZCA-3 was defined as the area where Port Administration activities will take place, the entire social infra-structure being projected which is inherent to this type of activity.

Residential areas were classified in accordance with the implementation scheme and the approach level of each.

The area destined for urbanization in the vicinities of Nossa Senhora do O was classified as ZR-1; installation here is planned to take place in stages; and the occupation is projected for the beginning of the construction work.

The social infra-structure existing in the present townsite of Nossa Senhora do O will give support to the first residential groups.

With the densification of the new areas, other community facilities will be created, the occupation plan being defined, however, as the dependence, in terms of more complete community facilities, on the nucleus to be created in the location presently occupied by the Boasica Sugar Mill.

The Urban Nucleus to be created, called ZR-2, will house a population of approximately 32,000 inhabitants, that is, about 50% of the total population projected for the I.C. area. This nucleus is different from the previous one in that it follows a concept of a planned occupation of an area, while Nossa Senhora do O utilizes an existing, though incipient, infra-structure in order to initiate the urbanization process.

The areas for urban expansion, around the existing nuclei, were classified as ZR-3, and they should be integrated in the urbanistic plans of the areas of which they are satellites.

Within the coastal strip, destined for touristic utilization, areas for residential use were defined and should be used by high income families. Their planning will be incorporated into the study made for touristic areas. These areas were defined as ZR-4.

In order to minimize the impact of population increase in the area in view of the projected implementation scheme, either by

personnel employed in the construction work or in the first industries to be installed, an area was projected, called ZR-P, of temporary housing, destined to camping of workers, preferably single. This area should be implemented together with the construction work, the cost of the implementation being planned for inclusion in budgets and chronograms of infra-structural work.

The beaches on the I.C. area were defined as zones for touristic utilization, ZT, seeking a compatibility between the heavy industries proposed for the area, man, and his habitat. Two levels of occupation were defined for the touristic zone:

At ZT-1, a complete infra-structure will be developed to enable the installation of a touristic industry. ZT-2 was projected for a type of tourism which we may call temporary, such as the camping areas, an infra-structure being planned for the area on a scale compatible with this type of occupation.

The free areas included in the area planned for the I.C. were classified according to the destination of each one of them, their purpose being the preservation of the environment, with a view to endowing the region with a landscaping-recreational equipment, the extension and quality of which will be beneficial also to the inhabitants of the Recife metropolitan area.

As an Ecological Preservation Zone ZPE, the wet strip was considered located along the coast, where the mangroves, the plots occupied by the existing coconut palms in the coastal sandy strip, and the protective and spatial isolation barrier of the city of Cabo are located, formed by large concentrations of residual woods which, made continuous by means of a landscaping reforestation, will constitute part of this barrier.

Also the reforestation of the areas on both sides of the strip demarcated by PE-60 will join the great forest clump of the region, represented by the "Zombi woods" and their prolongation, thereby bringing about an integration of the areas to be preserved for historical or ecological reasons.

From the ecological viewpoint, this clump of vegetation will constitute the main area for the climactic comfort of the region and a large reserve for the region's flora.

Urban green areas were classified as ZVU and given denominations according to the predominant functions of each. These green areas created for suavization of the landscape, such as squares, gardens, rose beds or any other green plot utilizable from a landscaping viewpoint were classed as ZVU-1.

At ZVU-2, a park is proposed where, through an urbanization study to be developed later, construction would be permitted for hotels, motels, bars, restaurants and similar installations, which would be incorporated to the green areas and would serve as a social infra-structure for the Port Administration area planned for the opposite side of the road called distributing main.

The park near the residential area of Boasica, called ZVU-3, was planned for the purpose of creating a reserve of local flora and fauna from the elements already existing in the area, on a scale compatible with the proposed townsite, in addition to creating a barrier against the advance of the urban network toward PE-60, which would disarrange the urbanization scheme projected in the master plan.

The attached table shows the different I.C. zones, with their respective areas and percents of occupation in relation to similar uses and to the total group.

DESCRIPTION

	ha	%
1. ZP - PORT ZONE (2 + 3)	790	2.4
2. ZP-1 - Collective Port	703	2.1
3. ZP-2 - Fishing Port	67	0.3
4. ZI - INDUSTRIAL ZONE (9 + 10)	6,570	19.8
5. ZI-1 - Industries with Private Terminals	2,045	6.2
6. ZI-2 - Industries dependent on those of ZI-1	1,905	5.7
7. ZI-3 - Peripheral industries	2,059	6.2
8. ZI-4 - Support industries and services	345	1.2
9. Sub-total (5 + 6 + 7 + 8)	6,393	19.8
10. ZI-5 - Existing industries	177	0.5
11. ZCA - ADMINISTRATIVE ZONE (12 + 13 + 14)	152	0.5
12. ZCA-1 - Administrative Activities, Community Services and Leisure Centers	73	0.2
13. ZCA-2 - Community Sport Activities Centers	34	0.1
14. ZCA-3 - Port Administration Services Center	45	0.2
15. ZR - RESIDENTIAL ZONE (21 + 22)	3,232	10.2
16. ZR-1 - Moss Sabor do O	73	0.2
17. ZR-2 - Boasica	627	1.9
18. ZR-3 - Cabo (A), Cabo (B), Ponta dos Carvalhos (C), Boa Vista (D)	1,711	5.4
19. ZR-4 - High income residential areas (Grubu, Itaporma)	143	0.5
20. ZR-5 - Temporary housing (Encampments)	167	0.5
21. Sub-total (16 + 17 + 18 + 19 + 20)	2,533	8.5
22. ZR-6 - Existing residential areas (R.S.do O, Ipojuca, Cabo, Ponte. dos Carvalhos)	549	1.7
23. ZT - TOURISTIC DEVELOPMENT ZONE (24 + 25)	433	1.3
24. ZT-1 - Permanent Tourism (Grubu, Itaporma)	243	0.7
25. ZT-2 - Temporary Tourism (Gupe and Paiva)	392	1.1
26. ZE - SPECIAL ZONE (27 + 28 + 29 + 30)	140	0.4
27. ZE-1 - Airport	65	0.2
28. ZE-2 - Bus and Railroad Station	143	0.4
29. ZE-3 - Main Railroad Yard	45	0.1
30. ZE-4 - Bulk Storage Areas for ZI-2	20,177	60.7
31. ZL - FIER ZONES (32 + 33 + 34 + 35 + 36 + 37 + 3)	330	1.0
32. ZPC - Cultural Preservation	6,100	1.4
33. ZPE - Ecological Preservation	9,669	29.3
34. ZAF - Agriculture and Forest	1,162	3.5
35. ZCL - Mineral exploitation (legal concession)	900	2.7
36. ZVU-1 - Urban green areas	110	0.4
37. ZVU-2 - Green areas with tolerated use by hotels and motels	49	1.5
38. ZVU-3 - Parks	1,229	3.9
39. - PART OF LAKE IN THE INSTITUTED AND PLANNED AREA	2,206	4.0
40. PORT CHANNELS AND BASINS	33,133	100.0
41. TOTAL - INSTITUTED AND PLANNED AREA (*)	27,106	
42. AREA PROVIDED FOR BY DECREE No 2345 of JUNE 27, 1973		

11-12/2.10

(*) The lake's area was not computed in its entirety.

TOMO II
PAGE 2
3.0

3.0

HIGHWAY PLAN

3.1

DESCRIPTION OF CONDITIONS AND CAPACITY OF THE EXISTING HIGHWAY NETWORK

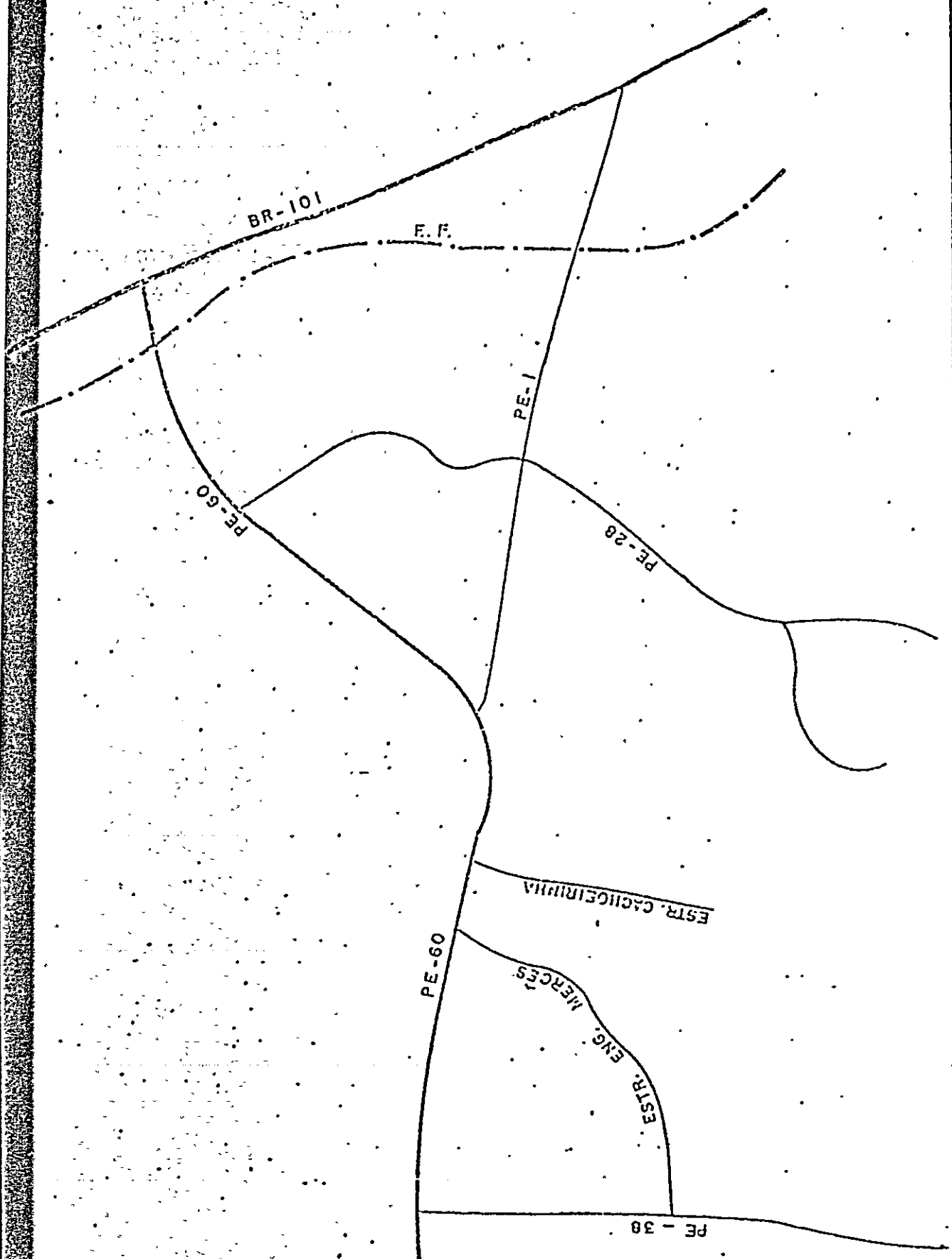
The Suape Industrial Complex area is crossed by two paved highways: federal highway BR-101, which passes by Recife, connecting the South of Brazil to Natal via the coast, and State highway PE-60, which begins at the junction with BR-101, outside the city of Cabo, passes the Suape area and reaches up to Barreiros, near the border with Alagoas.

Two other non-paved State highways are also in the IC area:

- PE-1, which is part of the old route of PE-60, interconnecting Ponte dos Carvalhos to PE-60 and passing next to the Boa Vista Sugar Mill;
- PE-23, which begins at kilometer 2 of PE-60, crosses with PE-1 next to the Boa Vista Sugar Mill, passes through the marshland and rolls on toward the Gaibu beach;
- PE-33, which begins at kilometer 14 of PE-60 and reaches up to the spit in Cupe, passing by Nossa Senhora do O.

Among the transited routes of the IC area, one may also name the variation of PE-33 at the interval between the Ipojuca river bridge and PE-60, passing by the Mercês Sugar Mill; the path of the mangrove fill connecting PE-60 to Ponta dos Franceses; the Cachoeirinha road, which begins on PE-60 near the Massangana Sugar Mill and ends at the Cachoeirinha point, surrounded by marshland; and finally the PE-23 ramifications with access to the Itapuama and Suape beaches.

The capacity of the present highway network at the IC may be considered satisfactory in relation to the demand; only BR-101 presents some problems, to be attributed to the bottlenecks which occurs on the Prazeres-Pontezinha stretch.



RAILROAD

FIGURA — 3-1

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TRANSCON SA

GOVERNO DO ESTADO DE PERNAMBUCO - DPAC
CENTRO DE ENGENHARIA E INDUSTRIA
DE PERNAMBUCO
COMPLEXO INDUSTRIAL DE GUAPE

EXISTING HIGHWAY
NETWORK

1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100	2101	2102	2103	2104	2105	2106	2107	2108	2109	2110	2111	2112	2113	2114	2115	2116	2117	2118	2119	2120	2121	2122	2123	2124	2125	2126	2127	2128	2129	2130	2131	2132	2133	2134	2135	2136	2137	2138	2139	2140	2141	2142	2143	2144	2145	2146	2147	2148	2149	2150	2151	2152	2153	2154	2155	2156	2157	2158	2159	2160	2161	2162	2163	2164	2165	2166	2167	2168	2169	2170	2171	2172	2173	2174	2175	2176	2177	2178	2179	2180	2181	2182	2183	2184	2185	2186	2187	2188	2189	2190	2191	2192	2193	2194	2195	2196	2197	2198	2199	2200	2201	2202	2203	2204	2205	2206	2207	2208	2209	2210	2211	2212	2213	2214	2215	2216	2217	2218	2219	2220	2221	2222	2223	2224	2225	2226	2227	2228	2229	2230	2231	2232	2233	2234	2235	2236	2237	2238	2239	2240	2241	2242	2243	2244	2245	2246	2247	2248	2249	2250	2251	2252	2253	2254	2255	2256	2257	2258	2259	2260	2261	2262	2263	2264	2265	2266	2267	2268	2269	2270	2271	2272	2273	2274	2275	2276	2277	2278	2279	2280	2281	2282	2283	2284	2285	2286	2287	2288	2289	2290	2291	2292	2293	2294	2295	2296	2297	2298	2299	2300	2301	2302	2303	2304	2305	2306	2307	2308	2309	2310	2311	2312	2313	2314	2315	2316	2317	2318	2319	2320	2321	2322	2323	2324	2325	2326	2327	2328	2329	2330	2331	2332	2333	2334	2335	2336	2337	2338	2339	2340	2341	2342	2343	2344	2345	2346	2347	2348	2349	2350	2351	2352	2353	2354	2355	2356	2357	2358	2359	2360	2361	2362	2363	2364	2365	2366	2367	2368	2369	2370	2371	2372	2373	2374	2375	2376	2377	2378	2379	2380	2381	2382	2383	2384	2385	2386	2387	2388	2389	2390	2391	2392	2393	2394	2395	2396	2397	2398	2399	2400	2401	2402	2403	2404	2405	2406	2407	2408	2409	2410	2411	2412	2413	2414	2415	2416	2417	2418	2419	2420	2421	2422	2423	2424	2425	2426	2427	2428	2429	2430	2431	2432	2433	2434	2435	2436	2437	2438	2439	2440	2441	2442	2443	2444	2445	2446	2447	2448	2449	2450	2451	2452	2453	2454	2455	2456	2457	2458	2459	2460	2461	2462	2463	2464	2465	2466	2467	2468	2469	2470	2471	2472	2473	2474	2475	2476	2477	2478	2479	2480	2481	2482	2483	2484	2485	2486	2487	2488	2489	2490	2491	2492	2493	2494	2495	2496	2497	2498	2499	2500	2501	2502	2503	2504	2505	2506	2507	2508	2509	2510	2511	2512	2513	2514	2515	2516	2517	2518	2519	2520	2521	2522	2523	2524	2525	2526	2527	2528	2529	2530	2531	2532	2533	2534	2535	2536	2537	2538	2539	2540	2541	2542	2543	2544	2545	2546	2547	2548	2549	2550	2551	2552	2553	2554	2555	2556	2557	2558	2559	2560	2561	2562	2563	2564	2565	2566	2567	2568	2569	2570	2571	2572	2573	2574	2575	2576	2577	2578	2579	2580	2581	2582	2583	2584	2585	2586	2587	2588	2589	2590	2591	2592	2593	2594	2595	2596	2597	2598	2599	2600	2601	2602	2603	2604	2605	2606	2607	2608	2609	2610	2611	2612	2613	2614	2615	2616	2617	2618	2619	2620	2621	2622	2623	2624	2625	2626	2627	2628	2629	2630	2631	2632	2633	2634	2635	2636	2637	2638	2639	2640	2641	2642	2643	2644	2645	2646	2647	2648	2649	2650	2651	2652	2653	2654	2655	2656	2657	2658	2659	2660	2661	2662	2663	2664	2665	2666	2667	2668	2669	2670	2671	2672	2673	2674	2675	2676	2677	2678	2679	2680	2681	2682	2683	2684	2685	2686	2687	2688	2689	2690	2691	2692	2693	2694	2695	2696	2697	2698	2699	2700	2701	2702	2703	2704	2705	2706	2707	2708	2709	2710	2711	2712	2713	2714	2715	2716	2717	2718	2719	2720	2721	2722	2723	2724	2725	2726	2727	2728	2729	2730	2731	2732	2733	2734	2735	2736	2737	2738	2739	2740	2741	2742	2743	2744	2745	2746	2747	2748	2749	2750	2751	2752	2753	2754	2755	2756	2757	2758	2759	2760	2761	2762	2763	2764	2765	2766	2767	2768	2769	2770	2771	2772	2773	2774	2775	2776	2777	2778	2779	2780	2781	2782	2783	2784	2785	2786	2787	2788	2789	2790	2791	2792	2793	2794	2795	2796	2797	2798	2799	2800	2801	2802	2803	2804	2805	2806	2807	2808	2809	2810	2811	2812	2813	2814	2815	2816	2817	2818	2819	2820	2821	2822	2823	2824	2825	2826	2827	2828	2829	2830	2831	2832	2833	2834	2835	2836	2837	2838	2839	2840	2841	2842	2843	2844	2845	2846	2847	2848	2849	2850	2851	2852	2853	2854	2855	2856	2857	2858	2859	2860	2861	2862	2863	2864	2865	2866	2867	2868	2869	2870	2871	2872	2873	2874	2875	2876	2877	2878	2879	2880	2881	2882	2883	2884	2885	2886	2887	2888	2889	2890	2891	2892	2893	2894	2895	2896	2897	2898	2899	2900	2901	2902	2903	2904	2905	2906	2907	2908	2909	2910	2911	2912	2913	2914	2915	2916	2917	2918	2919	2920	2921	2922	2923	2924	2925	2926	2927	2928	2929	2930	2931	2932	2933	2934	2935	2936	2937	2938	2939	2940	2941	2942	2943	2944	2945	2946	2947	2948	2949	2950	2951	2952	2953	2954	2955	2956	2957	2958	2959	2960	2961	2962	2963	2964	2965	2966	2967	2968	2969	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During January, 1974 traffic countings were made on the Cabo-Pontodos Carvalhos section. The average in this period was up to 7,324 vehicles per day, an amount which is probably above the yearly average, since January is the time of school vacations. In that total, there were 3,313 commercial vehicles, which represents 45% of the overall traffic. When we compare these amounts with the estimated capacity of the road, we see that, though there is a reasonable allowance for the next few years, even without taking the construction of Suape into account, it will be necessary to improve this part of BR-101 or build an alternate road. As to PE-60, its utilization in the stretch between Cabo and Ipojuca is still a modest one, not surpassing a total of 1,292 vehicles per day, of which 25% are trucks.

The unpaved roads in this region, where rainfall is high, are only temporarily utilized, and their traffic capacity, due to the precarious conditions of the road bed, is very low.

The construction of the Suape Industrial Complex should cause an impact upon the local cargo and passenger transportation system.

In the initial construction phase, loads should be carried via the current highway system or by sea, using small boats. The railroad system will be affected by the construction in the long run only.

Cargo transportation should not considerably change the traffic in local highways, where the participation of commercial vehicles already reaches up to 50%.

The impact upon the passenger transportation system will be much greater, as early as in the first phase, when 22,000 jobs should be generated. The increased number of trips to the worksite will generate a peak-hour traffic which will change the characteristics of the rural roads.

The intensity of this impact may, however, be moderated by the construction of new residential areas in the vicinities of the IC and by the diversification of transportation means, bicycles being used for short distance runs, and the suburban train for trips on the Suape-Recife axis.

DETERMINATION OF THE HIGHWAY NETWORK PLAN - HIGHWAY CLASSIFICATION

In order to meet the future demand, it will be necessary to plan for the Suape area a highway network much larger than the present one.

On a federal level, the highway network may be enlarged by duplicating BR-101 on the Cabo-Prazeres interval, and by constructing a road connecting BR-101 to the port of Suape, which might be included in the export corridors program. This new BR road, which would have a number in the 400 range, would utilize the initial stretch of PE-60 connecting Cabo to the Massangana sugar mill.

In the full occupation plan, the main highway passing by Suape will be PE-9, designed by CONDEPE, as an access road to the coastal strip. This highway moves away from the beach in order to go around the Suape IC in the interval between Piedade and Porto Galinhas. The present PE-23 should be paved after its route is improved in the marshland section.

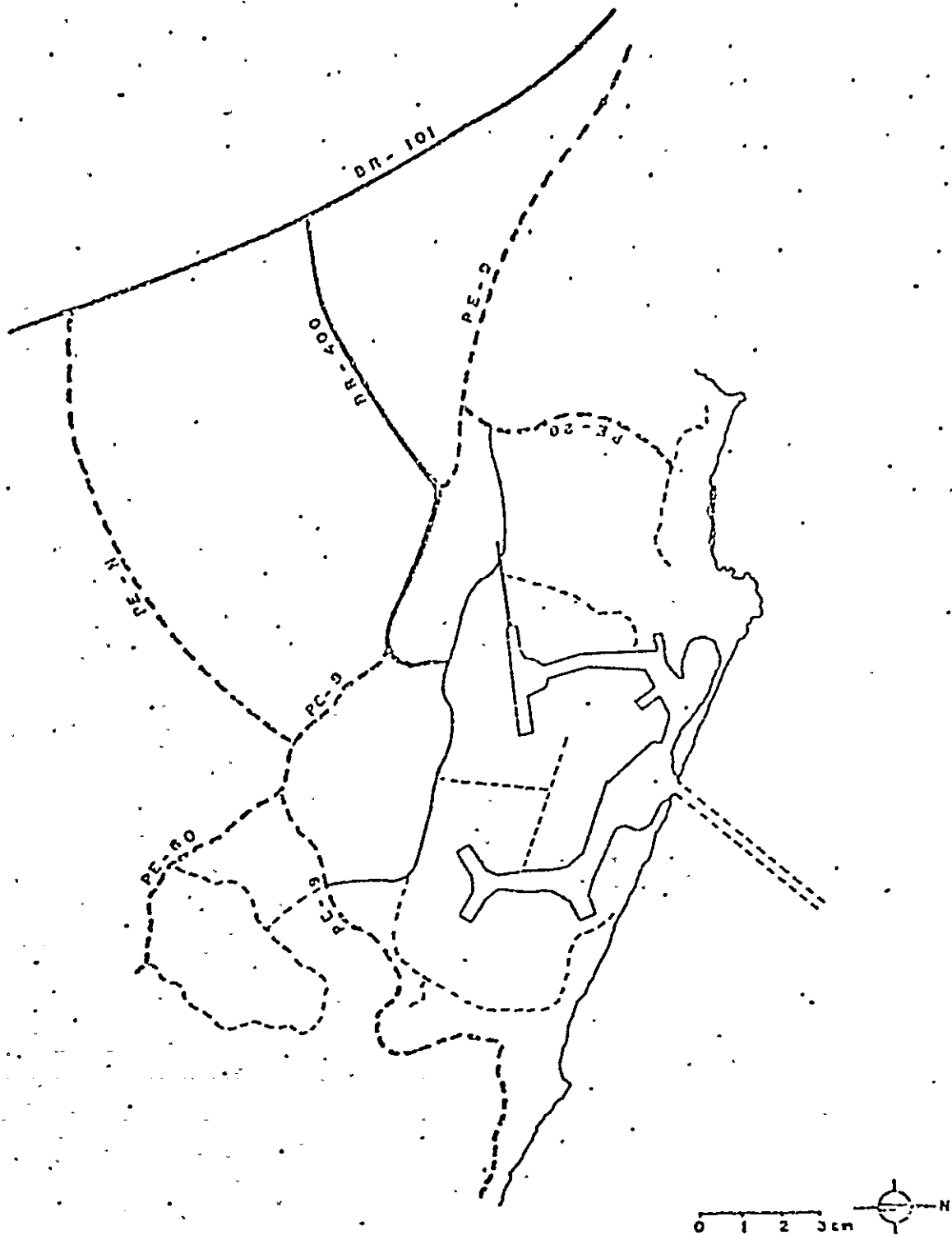
PE-60 will give up its initial section to BR-40X and PE-9. Its starting point will be at the junction of the present PE-60 with the Cupe road (PE-35).

A new State highway should be created, interconnecting BR-101, by Vila Charneca, to PE-60, near the Pindorama sugar mill.

This new highway should alleviate traffic on BR-101 and on the future BR-40X originating at the Suape IC and head to Cabo and the South.

On a local level, within the IC, a new road will be constructed in the primary distributor category, interconnecting PE-9 to PE-23.

Accesses to the Nossa Senhora do O and Boasica townsites, as well



———— FEDERAL HIGHWAY
 - - - - STATE HIGHWAY
 ———— PRIMARY DISTRIBUTOR
 - - - - SECONDARY DISTRIBUTOR

dipor



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GOVERNO DO ESTADO DE PERNAMBUCO
 COMISSÃO DE PLANEJAMENTO E ORÇAMENTO
 DE PERNAMBUCO

COMPLEXO INDUSTRIAL DE SUAPE

HIGHWAY CLASSIFICATION
 IN THE SUAPE IC AREA

17/11/78
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as the access road to the touristic areas of Gaibu and Itapuama, will be classed in the category of secondary distributors.

3.3.1 DIMENSIONING OF EXTERNAL HIGHWAY NETWORK IN THE MAXIMUM OCCUPATION PHASE

A Total Occupation Plan

From the number of jobs during the total occupation phase, the number of trips to work generated by the IC was calculated. It was considered that probably 30% of the employees would travel from home to work during the peak hours, which would come to approximately 53,000 trips.

The allocation of these trips to the network is based on a gravitational type model, which used the future urban population of the municipalities (year 2000) as an attraction factor, and the inverse square of the distance as the index of accessibility.

In order to avoid great distortions in the results obtained by the use of this model, resulting from a reversion of trends in the areas where the Nossa Senhora do Ó and Boasica townsites are located, the universe of the model was taken to be not the number of jobs, but the difference between these and the number of economically active persons living in the new townsites.

The basic reason for this premise is that the dwellers of the new towns will be connected by an employment link to the Industrial Complex, and will thus generate a flux that will exist not as a function of the accessibility factor, but by an imposition of planning.

Two alternatives were thus established, differing from each other in the degree of the direct allocation of the economically active population.

In the first alternative, the economically active population of Nossa Senhora do Ó and Boasica, representing 33% of the work force, was

directly allocated, while the remaining jobs were distributed by the gravitational model.

In the second alternative, in addition to the Nossa Senhora do O and Boasica populations, that of the new townsites near Cabo was also added, totaling 71% of the work force, simultaneous with the construction of a direct access from Cabo to the IC.

5 Distribution Model for Alternative 1:

Total number of trips in the peak hours: 53,033 trips.

population of the new townsites: 91,300 inhabitants, of which 25,931 are economically active.

Travelling during peak hours = $25,931 \times 0.3 = 20,735$ trips.

Home-to-work trips to be distributed: $53,033 - 20,735 = 32,303$

LOCATION	URBAN INHABITANTS	ACCESSIBILITY L/D ²	INHAB./ D ²	%	TRIPS
Cabo	213,268	.00694	1,480	35.14	11,351
Ipojuca	21,467	.00909	195	4.63	1,496
Jaboatão	667,261	.00111	741	17.59	5,682
S.Louranço	347,950	.00057	191	4.53	1,463
Recife	1,907,132	.00073	1,392	33.05	10,676
Olinda	435,341	.0004	213	5.06	1,635
TOTAL	3,592,419	-	-	100.00	32,303

Allocation of the traffic to the networks

With the definition, in the above item, of the number of trips to work between the IC and the various neighboring townsites, it is

now necessary, for the dimensioning of the network, to define the types of transportation and their importance.

study of the modal distribution

In the case of the Suape Industrial Complex, in addition to the indispensable walks on the short runs and on transshipments, the following types of transportation should be used:

- individual transportation:

bicycle

automobile

taxi

- collective transportation

bus

train

In the Transportation Study for the Greater Recife, it was observed that trips using collective transportation in the Metropolitan Area represent approximately 50% of the total.

This proportion can be safely assumed in the case of the Suape Industrial Complex.

In the particular case of the Nossa Senhora do Ó and Boasica town-sites, the great proximity of the work site and the low purchasing power of the population make it unlikely that automobiles will be used in trips to work. It was assumed that a rate of 10% of automobile use in the total trips to work would be acceptable. The remaining individual transportation trips would be made on bicycles or motorcycles.

For the purpose of dimensioning the network of access roads to these nuclei, an unfavorable assumption was taken, consisting in the

transportation of 90% of the work force by bus.

Allocation of collective transportation trips

In the above item, the use of trains and busses was considered as modes of collective transportation to the IC. The percentage of the distribution of trips to each of these types of transportation varies in accordance with the location of destination and the possibility of direct access.

The use of the train is not justified for very short runs, because here the waiting time is usually longer than the duration of the trip. This is the case for Ponte dos Carvalhos, Cobo, Ipojuca, Boasica and Nossa Senhora do O, for which all collective transportation may be allocated to busses.

Utilization of railroad transportation diminishes considerably when, due to the waiting time, there is the need of transshipments in order to reach destination. This is the case of Cavaleiro, Jaboatão and São Lourenço da Mata, which require transshipments in order to be reached by train. For this reason, it was assumed that only 15% of the trips generated in the first two locations would be made by train, the remaining 35% being made by bus. For São Lourenço da Mata, it is estimated that the participation of railroad transportation will be 5%, the remaining 45% being allocated to the busses.

The use of trains is advantageous for reasonably distant neighborhoods located along the railroad, as is the case of Piedade, Muri-
bea dos Guararapes, Boa Viagem and Recife. The appeal of railroad transportation increases as traffic jamming on the highways makes for longer bus or automobile trips.

The attraction of trips which are now made by bus or car is perfectly possible, and it may be assumed that, of trips to work made in the total occupation phase on the Suape-Recife stretch, around 35% will be made by train, and only 15% by bus.

Cargo transportation was not allocated to the network traffic. This does not normally present a problem, since a road network sized for peak hour traffic in an urban area can easily take in all other types of trips which are uniformly distributed throughout all other hours.

However, special precautions would be advisable in the case of the Guape Industrial complex, in view of the size of the project and its multiplication power, which would render useless any attempts at forecasting the future trucking traffic.

Conclusions

From the analysis of the highway traffic distribution (see Figure 3-II), it may be concluded that, if alternative 1 is adopted, there will be the need for 5 traffic lanes each way in the heavier traffic sections, on the basis of a capacity for 2,000 UCP's (hour/lane).

SUMMARY TABLE OF TRIP ALLOCATION
(ALTERNATIVE 1)

a) Locations for which direct allocation was used

PASSENGERS PER LOCATION	COLLECTIVE TRANSP.			INDIV. TRANSP.		TOTAL $UCP_T =$ $UCP^1 + UCP^2$
	TRAIN	BUS	UCP^1	AUTOMOBILES	UCP^2	
Ipojuca	-	382	32	42	28	60
Camela	-	328	27	327	218	245
Boasica (+parte forçada de N.S. do O)	-	18707	1559	2078	1385	2944
N.S. do O	-	375	31	42	28	59
TOTAL	-	19792	-	2489	-	3308

b) Locations for which the distribution model was used

PASSENGERS PER LOCATION	COLLECT. TRANSP.			INDIV. TRANSP.		TOTAL $UCP_T =$ $UCP^1 + UCP^2$
	TRAIN	BUS	UCP^1	AUTOMOBILES	UCP^2	
Cabo	-	3295	275	3295	2197	2472
Pte. Carvalhos	-	2381	198	2380	1587	1785
Guararapes	1264	1173	98	1173	782	880
Jaboatão/Calheiro	311	881	73	880	587	660
São Lourenço	73	695	58	695	463	521
Recife	3737	3470	289	3469	2313	2602
Olinda	-	818	68	817	545	613
TOTAL	5385	12713	-	12709	-	9533

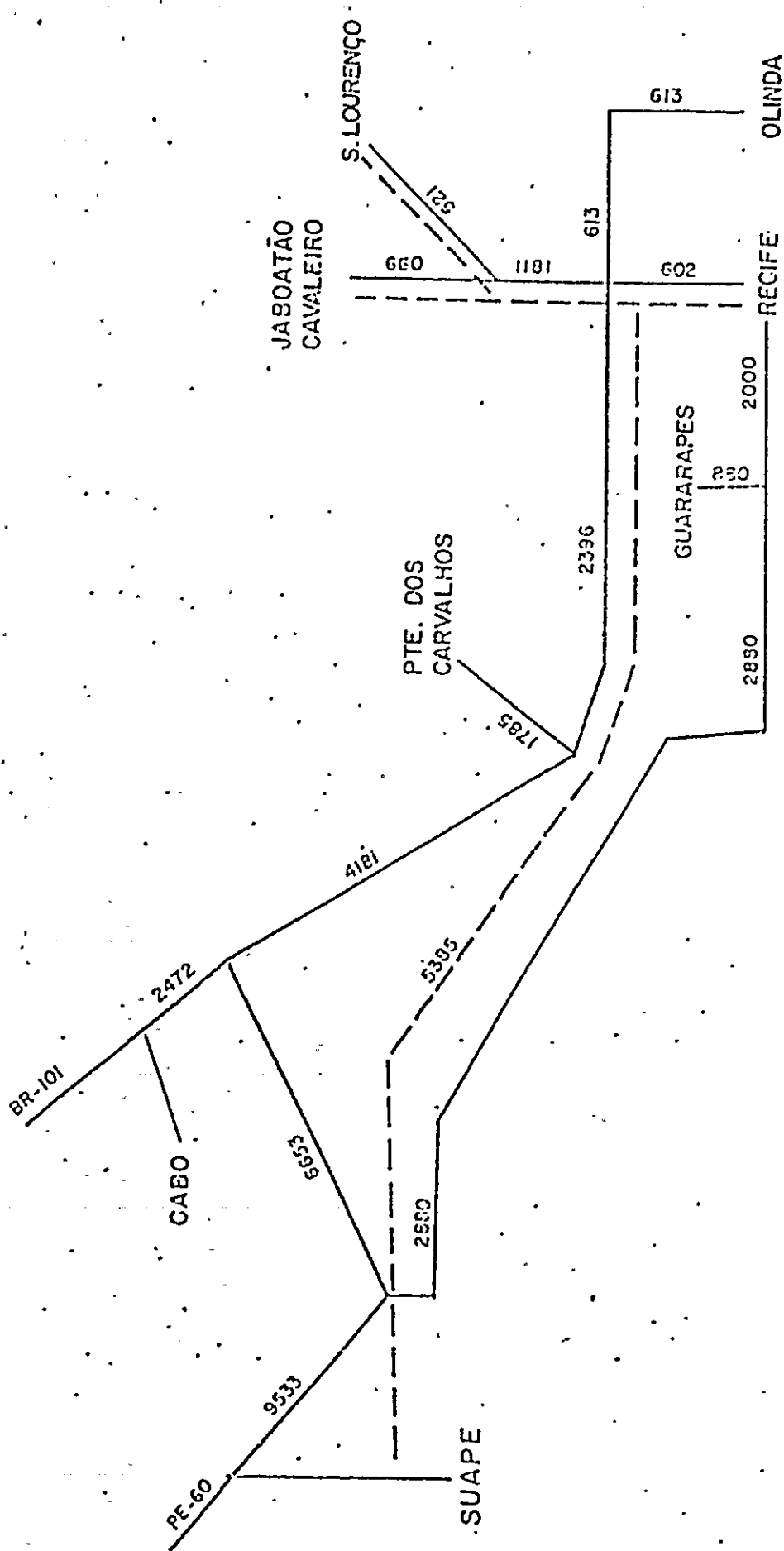


FIGURA 3-II

HIGHWAY - UCP UNITS

RAILROAD - PASSENGER UNITS

diper



TRANSLON SA

GOVERNO DO ESTADO DE PERNAMBUCO - CAC
CONSELHO DE PLANEJAMENTO E ORÇAMENTO
E DE FISCALIZAÇÃO

COMPLEXO INDUSTRIAL DE SUAPE

ALLOCATION OF TRAFFIC
TO NETWORK - ALTERN.1

1976

C

Distribution Model for Alternative 2

Total number of trips: 53,088.

Population of new townsites: 167,360 inhabitants = 47,366 employees

Number of trips during peak hour: $47,366 \times 0.8 = 37,893$

Number of trips to be distributed: $53,088 - 37,893 = 15,195$ trips

TABLE 3

LOCATION	URBAN INHABITANTS	ACCESSIBI- LITY $1/D^2$	INHABI- TANTS/ D^2	%	TRIPS
Cabo	213,263	.00694	1,430	35.14	5,340
Ipojuca	21,467	.00909	195	4.63	704
Jaboatão	667,261	.00111	741	17.59	2,673
S.Lourenço	347,950	.00057	191	4.53	638
Recife	1,907,132	.00073	1,392	33.05	5,022
Olinda	435,241	.00049	213	5.06	768
TOTAL	3,592,419	-	-	100.00	15,195

Allocation of trips to the transportation network.

The same methodology was used as in the previous hypothesis.

All comments made with relation to the use of collective transportation are also valid here.

SUMMARY TABLE OF TRIP ALLOCATION:
(ALTERNATIVE 2)

A) Locations where direct allocation was used

PASSENGERS PER LOCATION	COLLECTIVE TRANSP.			INDIVIDUAL TRANSP.		TOTAL $UCP_t =$ $UCP^1 + UCP^2$
	TRAIN	BUS	UCP ¹	AUTO- MOBILE	UCP ²	
Boasica (plus forced part of N.Senhora do O)	-	18,707	1,559	2,070	1,335	2,944
N.S.do O (na- tural growth)	-	176	15	20	13	28
Ipojuca	-	190	16	10	7	23
Camela	-	154	13	154	103	116
TOTAL	-	19,227	-	2,262	1,476	3,111

b) Locations where the distribution model was used

PASSENGERS PER LOCATION	COLLECTIVE TRANSP.		INDIVIDUAL TRANSP.			TOTAL
	TRAIN	BUS	UCP1	AUTO- MOBILE	UCP2	UCPT = UCP ¹ + UCP ²
Townsite, al- tern.	-	8,554	713	8,554	5,703	6,416
Cabo	-	1,550	129	1,550	1,033	1,162
Ponte dos Car- valhos	-	1,120	93	1,120	747	340
Guararapes	594	552	46	552	363	414
Jaboatão/Cava- leiro	146	415	35	414	276	311
S. Lourenço	34	327	27	327	213	245
Recife	1,753	1,632	136	1,632	1,033	1,224
Olinda	-	334	32	334	256	233
TOTAL	2,532	14,534	-	17,533	-	10,900

D Load comparison

The comparison of the network loads resulting from alternatives 1 and 2 show a better flow distribution in the second, where bottle-necking points were eliminated with the creation of the direct connection between Cabo and Suape and the interconnection of the IC's primary distributor with PE-28.

For alternative 2 to be successful, however, the residential policy is more important than the road network. Many transportation problems may be avoided through an efficient planning of the residential policy in the area near the IC at Suape.

E Dimensioning of road strips

For the calculated traffic flow, assuming a maximum volume in the 2,000 UCP/HOUR range during the maximum occupation phase, 3 traffic lanes would be necessary each way on PE-60 and on the road connect-



RAILROAD - PASSENGER UNITS

ALLOCATION OF TRAFFIC
TO NETWORK - ALTERN.II

1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100	2101	2102	2103	2104	2105	2106	2107	2108	2109	2110	2111	2112	2113	2114	2115	2116	2117	2118	2119	2120	2121	2122	2123	2124	2125	2126	2127	2128	2129	2130	2131	2132	2133	2134	2135	2136	2137	2138	2139	2140	2141	2142	2143	2144	2145	2146	2147	2148	2149	2150	2151	2152	2153	2154	2155	2156	2157	2158	2159	2160	2161	2162	2163	2164	2165	2166	2167	2168	2169	2170	2171	2172	2173	2174	2175	2176	2177	2178	2179	2180	2181	2182	2183	2184	2185	2186	2187	2188	2189	2190	2191	2192	2193	2194	2195	2196	2197	2198	2199	2200	2201	2202	2203	2204	2205	2206	2207	2208	2209	2210	2211	2212	2213	2214	2215	2216	2217	2218	2219	2220	2221	2222	2223	2224	2225	2226	2227	2228	2229	2230	2231	2232	2233	2234	2235	2236	2237	2238	2239	2240	2241	2242	2243	2244	2245	2246	2247	2248	2249	2250	2251	2252	2253	2254	2255	2256	2257	2258	2259	2260	2261	2262	2263	2264	2265	2266	2267	2268	2269	2270	2271	2272	2273	2274	2275	2276	2277	2278	2279	2280	2281	2282	2283	2284	2285	2286	2287	2288	2289	2290	2291	2292	2293	2294	2295	2296	2297	2298	2299	2300	2301	2302	2303	2304	2305	2306	2307	2308	2309	2310	2311	2312	2313	2314	2315	2316	2317	2318	2319	2320	2321	2322	2323	2324	2325	2326	2327	2328	2329	2330	2331	2332	2333	2334	2335	2336	2337	2338	2339	2340	2341	2342	2343	2344	2345	2346	2347	2348	2349	2350	2351	2352	2353	2354	2355	2356	2357	2358	2359	2360	2361	2362	2363	2364	2365	2366	2367	2368	2369	2370	2371	2372	2373	2374	2375	2376	2377	2378</
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ing the Pindorama sugar mill to the city of Cabo (which are the heavier traffic stretches). We thus obtain a 25% allowance in the road capacity in relation to demand.

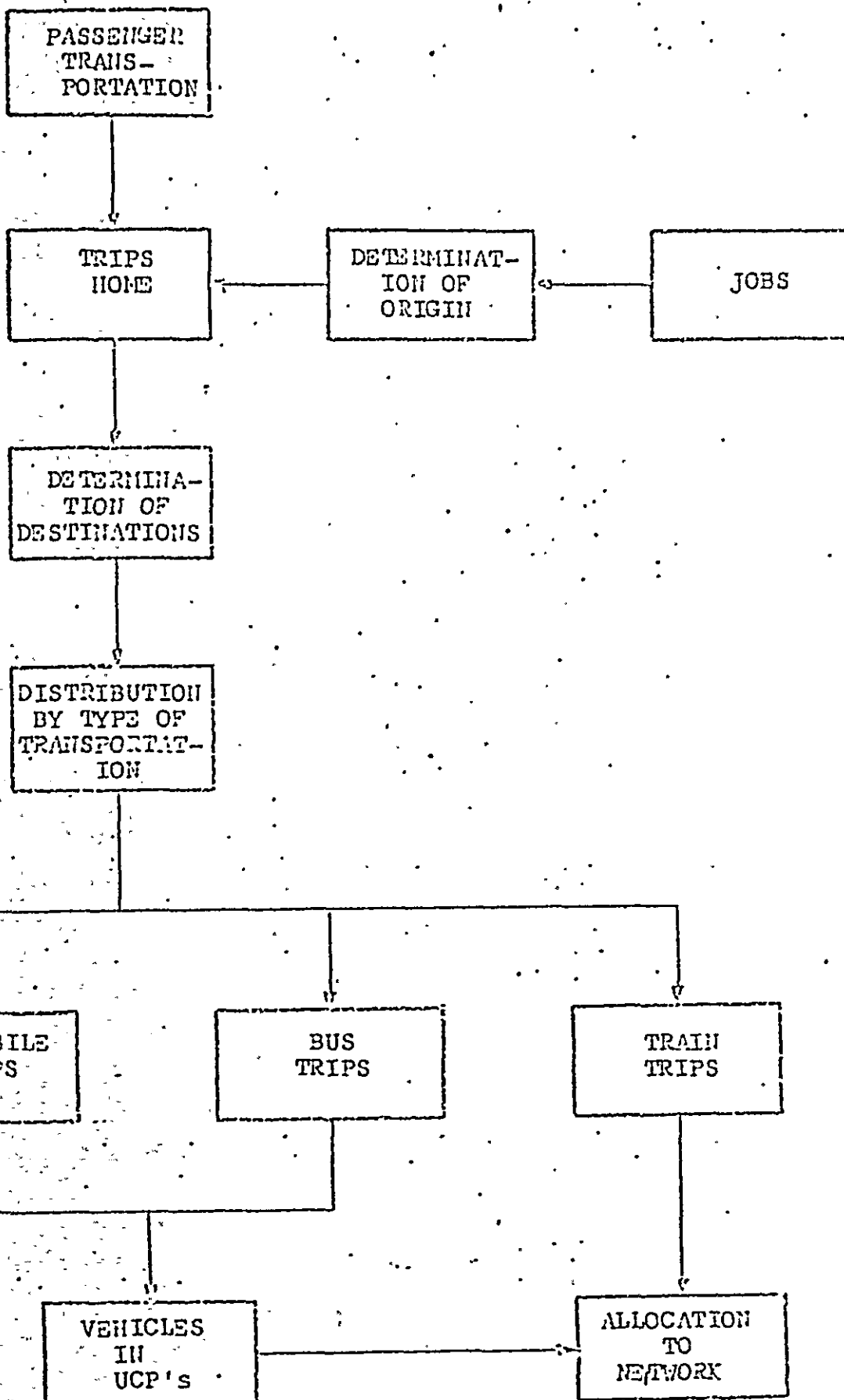
3.3.2 DIMENSIONING OF INTERNAL ROAD NETWORK DURING MAXIMUM OCCUPATION

A Methodology

For the dimensioning of internal roads at the Suape IC, the network was taken as planned for maximum occupation, and the serviced areas of each of the ramifications were considered.

The number of home-to-work trips in each area was calculated on the basis of the number of direct jobs forecasted for the IC at Suape in the maximum occupation phase.

Trips to work were converted into UCP's and finally allocated to the road network according to the following flow-chart:



dipor



TRANSCON SA

CONTENUTO DEDICATO AL PERSONALE DELLA
UNIVERSITA' DELL'INGEGNERIA E DELL'ARCHITETTURA
E DELL'EDILIZIA

COMPLESSO INDUSTRIALE 16/50116

FLOW-CHART OF ALLOCAT-
ION OF VEHICLES TO THE
NETWORK

CONTRIBUTO ALLA REALIZZAZIONE DEL PROGETTO
DIPOR - TRANSCON SA

B Determination of Home-to-Work Trips during Peak-Hours

It is estimated that the Suape IC will generate, during its maximum occupation phase, a total of approximately 66,360 jobs (see number of jobs generated during maximum occupation in item ...), 80% of which will travel from home to work during peak hours.

C Determination of Origin-Destination

Creation of townsites to the south and northwest of IC is planned, with a capacity to take care of approximately 71% of the residential density.

The townsites planned south of the IC (Boasica and an expansion of Nossa Senhora do Ó), with a capacity for 91,800 inhabitants, represent approximately 39% of the population attracted by the Industrial Complex.

The areas planned northwest of the IC (near the city of Cabo) have a capacity for approximately 75,600 persons, which represents 32% of the total, the remaining 29% being distributed in the Recife Metropolitan Area.

D Determination of type of Transportation

As we saw in the previous item, the case of Boasica and that of Nossa Senhora do Ó have peculiar characteristics in view of its great proximity to the IC.

Because of this, it may be forecasted that the number of automobiles used for travels to work in these zones will be well below normal. - For the purposes of dimensioning this area, we adopted the assumption of the modal distribution, consisting in the transportation of 90% of the employees by bus and 10% by automobiles.

This alternative may be considered as rather unfavorable, since traveling by bicycle, by motorcycle or on foot, without overloading the road network, may constitute a considerable percentage in this area.

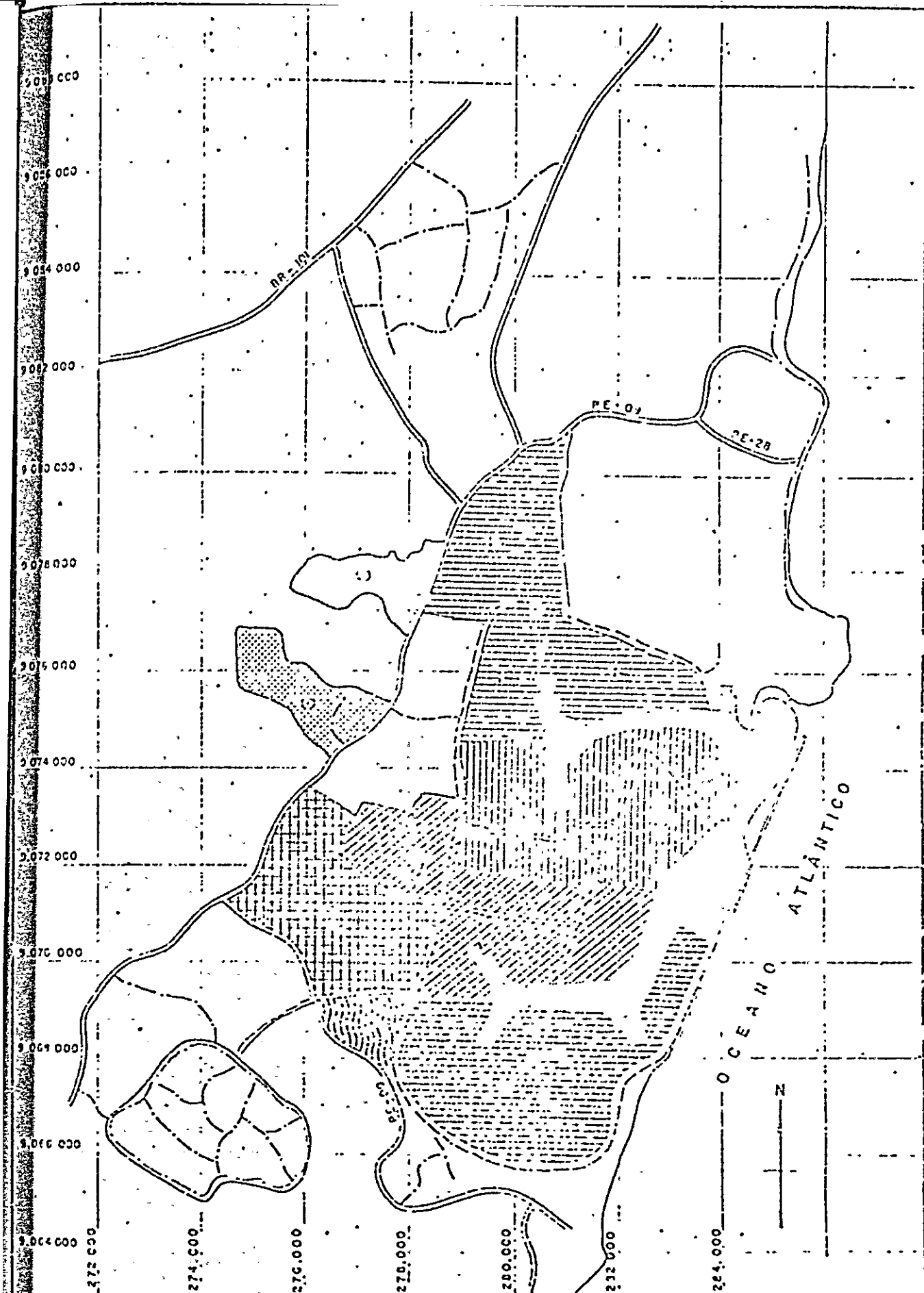
For the employees moving toward the townsites near the city of Cabo and the several townships in the Recife Metropolitan Area, we adopted the same percentages determined in the Study of Transportation for Greater Recife.

E Determination of Number of Employees by Zone of Influence

Since it is impossible to determine how many and which manufacturing units will constitute the Industrial Complex during its maximum occupation phase, and on the basis of research work done for already existing industrial complexes and ports, an average index per industrial hectare and an index for the number of employees per meter of docks were estimated.

On the basis of the zoning map of the internal road network at the Industrial Complex, the tributary basins of the various road ramifications were defined, each one of them being linked to a given number of employees which would use it for home-to-work traveling.

These areas are shown in Figure 3-VI. The table represents the area and the number of jobs created by each.



===== FEDERAL AND STATE HIGHWAYS
 - - - - - BICYCLES
 - - - - - PRIMARY ACCESS ROADS
 - - - - - SECONDARY ACCESS ROADS

SCALE

dipor



INSTITUTO BRASILEIRO DE PLANEJAMENTO E DESENVOLVIMENTO URBANO

GOVERNO DO ESTADO DO RIO DE JANEIRO
 SECRETARIA DE PLANEJAMENTO E DESENVOLVIMENTO URBANO
 COMPLEXO INSTITUCIONAL DO PLANEJAMENTO
**AREAS OF INFLUENCE OF
ROAD ACCESSES**

Elaborado por: []
 Data: []
 Escala: []
 Folha: []

AREA NUMBER	SURFACE AREA (Ha.)	NUMBER OF EMPLOYEES
1	1,290	14,190
2	165	1,815
3	810	8,910
4	1,115	12,265
5	1,120	12,320
6	330	3,630
7	585 + 5 m of docks	9,435
8	345	3,795
TOTAL	5,760	66,360

Figure 3-V is a graphic representation of what has been said above.

COMPLEXO INDUSTRIAL DE GUANABARA
ALLOCATION OF TRAFFIC
TO NETWORK - IN UCP'S

since traveling during the peak hours was taken at 80% of the number of employees, we have:

AREA NUMBER	Number of Employees travelling during peak hours (number of trips)
1	11,352
2	1,452
3	7,128
4	9,812
5	9,856
6	2,904
7	7,548
8	3,036
TOTAL	53,088

F Correspondence between Trips and Vehicles

In order to convert individual trips into vehicles, we assumed a capacity of 36 passengers per bus and 1.5 passenger by automobile. The equivalence of a bus to passenger car units is given by the Capacity Manual.

1 bus - 3 UCP's

Adopting this methodology and the forecasted modal distribution in the previous item, we obtain the following fluxes (in UCP's) which are shown in Figure 3-VI.

G

Allocation to the Road Network.

In allocating traffic to the road network, cargo traffic was not taken into account. This does not normally constitute a problem, since a road network which has been dimensioned for peak hour traffic in an urban zone can easily withstand all other types of trips uniformly distributed throughout all other hours.

In the case of the IC at Suape, however, special precautions are recommended, in view of the size of the project and its multiplying power, which would render useless any attempts at forecasting the future truck traffic.

H

Dimensioning of Road Strips

For the traffic flows calculated in the above item, and assuming a maximum volume of 2,000 UCP/hour per strip, we conclude that there will be road sections with 1, 2 and 3 lanes each way, as can be seen in Fig. 3-VI.

I

Typical Sections

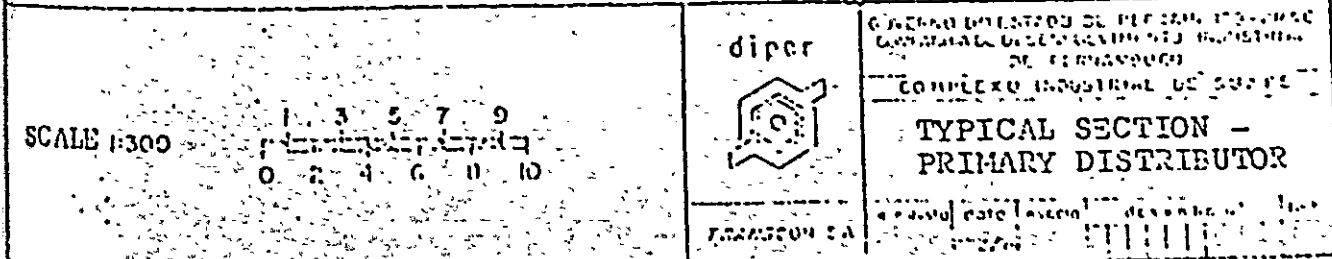
On the basis of item F, where the fluxes generated in the various sections of the project network were determined, it is suggested that the roads at the Suape Industrial Complex be divided among three categories:

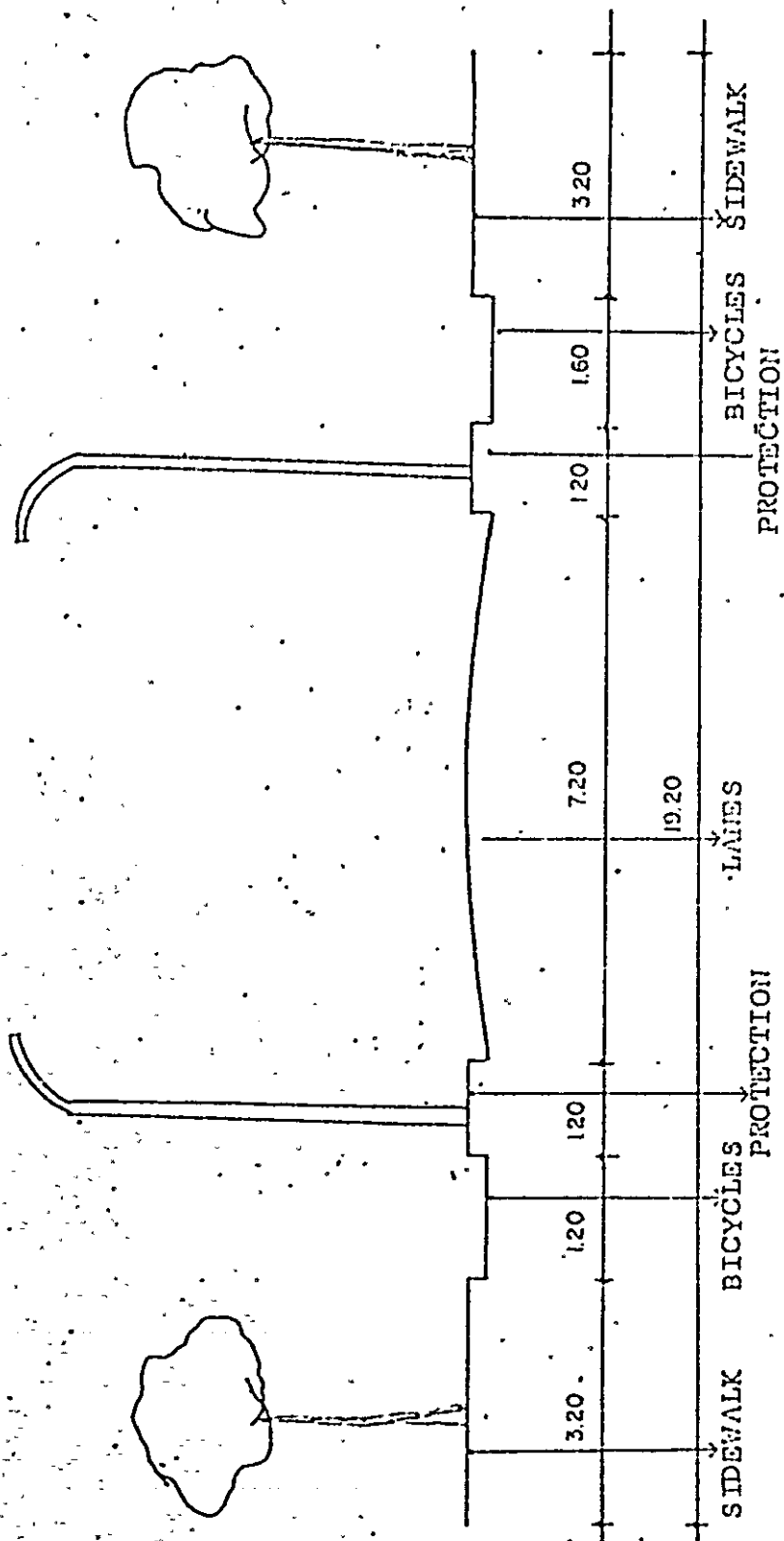
- 1 - Primary Distributor
- 2 - Secondary Distributor
- 3 - Local Roads

The first two categories comprehend the lower traffic roads in the Industrial Complex, such as the Main Access, the Distributor Main, the Port Mains and the Residential Access.

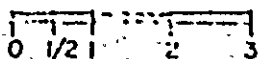
The Secondary Distributors will be those directly connected to the primary roads, serving as access to a neighborhood or industrial area.

Local roads are those directly connected to the secondary roads, acting as access to manufacturing industries to to residential areas.





SCALE 1:100



diper



TRIANGULO SA

GOBIERNO DEL ESTADO DE PUEBLA - 1982
 SECRETARÍA DE ECONOMÍA - DIRECCIÓN
 DE PLANEACIÓN

COMPLEJO INDUSTRIAL DE LA PLATA

TYPICAL SECTION -
 LOCAL ROADS

Auto del dato: 1/10/82. Desplazamiento: 1/10/82

3.3.3 STUDY OF INTERSECTIONS

Traffic flow intersections in the Suape IC area may be classified into two basic types -- highway intersections and urban intersections -- distinct from each other by the servicing level and traffic speed.

The most important highway intersections occurring in the Suape IC area, which should be studied in more detail during the project construction phase, are the following:

- 1) PE-60 with PE-9 (north side)
- 2) PE-60 with the Main Access Road
- 3) PE-60 with the new road to Cabo
- 4) PE-60 with the future PE-9 (south side)
- 5) PE-9 with Residential Access 1 (Boasica townsite)

Figure 1 shows these intersections. During the maximum occupation phase, these junctions will require intersection on different levels, preferably of the "trump" type, which should be gradually built as traffic volume grows.

The most important urban traffic intersections are the following:

- | | | | |
|-------|------------------|------|------------------------|
| I - | Distributor Main | with | Main Access Road |
| II - | " | " | " Port Main II |
| III - | " | " | " Port Main III |
| IV - | " | " | " Townsite Access Road |

At the intersection of the Distributor Main with the Main Access Road, a siding has been projected as well as a walkway for pedestrians connecting the CA to the bus station. If traffic volumes grow considerably in this area, the space occupied by the sidings

will permit the construction of the required intersection with level separation.

The two Distributor Main intersections with Port Mains II and III can be handled by light signaling, activated by the traffic, because its volume in the direction opposite to the traffic flow during peak hours is negligible.

Finally, in the case of the Distributor Main intersection with the Townsite Access Road I (Boasica townsite), a clover-like interchange was planned, utilizing the viaduct over the railroad track.

Time = 43.4 U.C.P.

FIGURA 1

diper



TRANSLATION 31

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DATE 08-28-2010 BY 60322 UCBAW/SJS

STUDY OF TRAFFIC FLOWS AND INTERSECTIONS

Page 17

The visual aspect of the highways and their integration to the environment by means of the landscaping treatment of the system will afford, in addition to greater aesthetic pleasure, a higher safety condition for the user.

On both sides of PE-60, vegetation curtains should be created that will establish the continuity of the natural preservation barrier.

Also PE-69, in view of its touristic nature, deserves a landscaping treatment which will be crowned by the gardens on the flooding strips of the dam at the Ipojuca River stabilizer lake.

In the IC central area, emphasis should be placed on the primary distributor main which, in the section between the administrative center and the access road to the Boasica townsite, will have its banks embellished by an ample green lane.

At the large intersections, the area at the sidings and the slopes of viaducts should be gardenized.

At the local roads, the planting of trees will follow those patterns established for public squares.

From the "Transportation Study in the Greater Recife," 50% of all trips made in the area utilize the collective transportation system.

Increased oil costs and a regional policy of the use of public resources recommend that these rates should be maintained in the future.

For this to happen, it is necessary to improve the quality of the collective transportation offered to the population, allowing for a maximum of comfort so as to render this transportation competitive in relation to the automobile.

In the case of the IC at Suape, the bus would be the transportation indicated for short and medium distance trips; it can also act as a "feeder" for the suburban railroad system to be built during the full occupation phase.

3.5.1 BUS STOPS

The collective transportation system user rates the time spent awaiting the vehicle higher than the time spent in the trip. In order to minimize this effect and render the collective transportation system more feasible, certain care has been planned for the bus stops projected for the IC at Suape, as follows:

Stop sidings at bus stops bring the vehicle away from the traffic lane, increasing its yield and the user's safety.

The user's comfort while waiting for the bus can be enhanced by building covers or pergolas, with benches, for the great comfort of the aged.

Bus stop signs should include information on bus lines itineraries and time schedules.

3.5.2 TERMINALS

Terminals would be created for the purpose of establishing intermediate points between local, short distance lines and those medium distance bus lines; or again to create connecting points with the railroad system of mass transportation. For the greater flexibility of the system, car parking lots are projected next to the terminals (park-and-ride system). The terminal next to the administrative center must be reachable by personnel working in the area by means of a short walk, to a maximum of 500 meters. For industries located farther away from the road, it will be necessary to create a local transportation system of circular busses.

PEDESTRIAN CIRCULATION

Walking trips, with no impact on the highway system, is responsible for more than 30% of trips made by the urban population, in addition to being the connecting link between the parking lot or the collective transportation terminal and the trip's destination.

The importance of these walking trips is greater in the central areas and in the nuclei of residential neighborhoods. For this reason, walkways exclusively for pedestrians have been projected in the administrative center and in the Boasica townsite. In the industrial zones, sidewalks projected are quite wide, in order to allow for agglomeration at checking-in and checking-out time. Here, however, distances are too large to permit walking trips.

BICYCLE CIRCULATION

The level land and the short and medium distances separating the industrial area from the Nossa Senhora do Ó and the Boasica townsites, make possible the use of bicycles on trips to work.

One of the factors that have hindered the use of bicycles is the unsafe conditions that the user has to cope with when riding on traffic lanes intended for automobiles. For this reason, strips have been projected exclusively for bicycles in the entire internal road network at the IC and townsites.

Objectives of the System Implementation

The bicycle traffic lanes aim at alleviating traffic rush during the peak hours, and will make possible for industries to operate, during the initial construction phase of the IC, when the number of trips is still insufficient to justify the creation of a collective transportation system.

B Integration with Other Means of Transportation

Another advantage of the use of bicycles would be the connection between the bus terminal and the work site, or between the bus terminal and the townsites. In case this use becomes feasible, it will be necessary to install sheds at these locations for the safe-keeping of bicycles.

3.7 RAILROAD TRANSPORTATION SYSTEM

Railroad access to the IC at Suape will at first meet the cargo transportation requirements. However, during the maximum occupation phase, the number of trips during peak hours and the diversified activities of the population in the Nossa Senhora do Ó and in the Boasica townsites -- which, by this time, will have already reached approximately 100,000 inhabitants -- will justify the construction of a suburban line for transportation of passengers to Boasica, with a station at the railroad-highway terminal at the Administrative Center. This proposal's feasibility is so much more evident as the "Transportation Study for the Greater Recife" recommends the construction of a line to Cabo, with a projection of 3,000 passengers during peak hours in 1980, a number which may reach 40,000 in the year 2000.

3.7.1 INTEGRATION WITH OTHER MEANS OF TRANSPORTATION

In order that the railroad system for passenger transportation may be utilized to the utmost efficiency level, it is necessary that its stations be inter-modal, with terminal bus feeder lines and adjacent parking lots for automobiles and bicycles.

3.7.2 JUSTIFICATION OF THE LOCATION OF THE MAIN BRANCH LINES

The railroad branch access line to the IC at Suape will begin at the junction of the Cabo branch line, near the bridge on the Pirapama river, running parallel to PE-1 up to the vicinities of the crossing with PE-28, where it goes parallel with the route of the IC primary distributor, passing next to the Administrative Center and following on until it reaches the access road to the Boasica townsite. From this main line, all ramifications branch out for the access to manufacturing plants, and which will be built as the need arises.

The main line route was planned as a function of the existing branch line, of the topographical conditions of the area, and of its location parallel to the coast, which will allow for perpendicular access roads to the various townsites and port sites, reaching up to the area intended for the future refinery.

3.7.3 RAILROAD-HIGHWAY CROSSINGS

The railroad route was planned in such a manner as to minimize the number of highway crossings. Those crossings which could not be avoided must be protected by safety measures which will comply with railroad standards.

As soon as the railroad passenger transportation system is implemented, it will be necessary to provide the main line with walkways with level separation that permit the speed and the frequency adequate to the level of services required.

In secondary branch lines, for the access to manufacturing plants, suspended walkways will be permitted as long as they are adequately signalized.

3.3 AIR TRANSPORTATION

The size and importance of manufacturing units which will be installed in the IC at Suape will require the constant moving about of high-level executives. Two different solutions may be adopted in order to meet these requirements:

- 1 - Utilization of the Recife airport
- 2 - Construction of an airport for executives

3.8.1 UTILIZATION OF THE RECIFE (GUARARAPES) AIRPORT

In the case of the first solution, it will be necessary to provide for rapid access to the IC from the International Airport of Guararapes.

The distance between the airport and the IC at Suape, by highway, is a little more than 30 kilometers, which is not an excessive distance, provided that the access roads conditions be improved.

Also in the case of the first alternative, a helicopter service might be used, departing from the heliport located at the Administrative Center of Suape to the Guararapes Airport.

3.8.2 AIRPORT FOR EXECUTIVE TYPE AIRPLANES

The second alternative would be to build an airport for executives within the IC area in Suape.

Initially, the characteristics of the new airport were defined in accordance with the DAC specifications. A 1,500 meter runway was decided upon, which meets the requirements of all executive type airplanes now in use.

A Justification of Location

The yearly predominance wind chart determined the orientation of the runway in the southeastern direction. In order to determine which was the best location for the runway, aerial photos of the area were studied, in the search for level ground with free approach within the required measurements. The best location found was that south of the industrial area, between the spit of Cupe and the town of Nossa Senhora do Ó.

B Pre-Dimensioning

The 140 Ha area is sufficient to house the landing strips and taxiways, as well as all passenger service facilities.

TOM II

PAGE 2 - 4.0

4.0 INDUSTRIAL AND PORT AREA

4.0

INDUSTRIAL AND PORT AREA

4.1

PORT AND INDUSTRIAL DEVELOPMENT PROJECTS SIMILAR TO THAT PROPOSED FOR SUAPE

The proposal to create a deep port and a planned industrial area in the South American continental region closest to Europe and Africa, in Pernambuco, Brazil, is the first relevant example, on the western coast of the Atlantic Ocean, of an already common practice in Europe. Similar large new projects would be those of Maasvlakte, the third development stage of a port and industrial area, near Rotterdam, and the expansion program of the three main French ports, namely, Fos, west of Marseille; Le Havre's expansion, the new marine terminal at Antifer; and the new development south of Dunkirk. The table below lists those land areas which are currently being utilized for greater economic development, and the size of the enormous ships which will call on these new port and industrial areas.

INDUSTRIAL GROUPINGS

PORT	INDUSTRIAL AREAS (Ha.)	CAPACITY OF SHIPS
Suape	5,760	250,000 tdw
Maasvlakte	2,430	250,000 tdw initially 500,000 tdw planned
Fos	planned 13,133 (25% port 4,535 (75% industry 13,603	500,000 tdw now 1,000,000 tdw planned
Le Havre	expansion 10,000	260,000 tdw
Antifer Oil Terminal	35	500,000 initially 1,000,000 tdw planned
Dunkirk	expansion 10,000	450,000 tdw planned 300,000 tdw initially

UTILIZATION OF INDUSTRIAL LAND IN THE PRINCIPAL PORT AREAS OF EUROPE AND THE U.S.

WOOD PLANKS

The majority of wood plank shipments is currently being packaged and other timber products are being standardized for the convenience of container ships. Only recently have deep draft freighters been built for the special purpose of transporting wood planks in the world navigation service. Dimensions of the new timber freighters are:

Length	-	213.4 meters
Maximum width	-	32.0 "
Draft	-	12.5 "

Timber freighters built for use between North America and Japan have the following measurements:

Length	-	193.2 meters
Maximum width	-	32.0 "
Draft	-	12.5 "

TILBURY

Tilbury facilities, in the Port of London, include four timber terminals for the receipt of packaged wood planks and other unitized cargo of timber products.

The channel depth along the docks is 13.4 meters.

The first and smallest of the timber terminals, located in the Main Dock Channel, has a 244-meter long dock and a support land area of 5.4 hectares.

The three other timber terminals, which have been more recently built, are located side by side in the Dock Extension Channel.

The total length of docks for the three terminals is 686 meters. The distance from the dock line to the back of the support land varies between 236 and 353 meters; the land areas are 5.8, 7.7 and 8.2 hectares. There are no timber industrial processing facilities in the entire Tilbury area of 429 hectares.

LE HAVRE

A timber log processing plant, which receives and processes tropical timber, is located near the port in a large, 15.3 hectare plot of land, having also a basin stockage of 2.5 hectares.

FOS

Although the Port of Fos has no timber terminal nor timber processing plant, the port of Saint Louis on the Rhone, which is an old port facility located south of and adjacent to the Port of Fos, has approximately 44.5 hectares of private yards for the storage of timber logs (construction or hardwood), in addition to 10 hectares (25 acres) of other stockage yards.

4.2.2 CEMENT AND CONCRETE PRODUCTS

LE HAVRE The "Société de Ciment La Farge" owns a large, 60-hectare tract of land in the new port and industrial area in the Central Marine Channel. This cement producing plant, considered to be the largest cement making facility in Europe, has been the largest supplier for the new heavy industry plants built in the area of the Le Havre industrial port, as well as for the construction of the new port at Antifer.

ANTIFER The construction at Antifer -- a marine oil terminal capable of handling oil tankers up to 540,000 tdw and, eventually, up to 1,000,000 tdw -- required enormous quantities of materials, most of which were available at the work site:

5,350,000 m³ of crushed rock

11,000,000 tons of limestone (taken from local cliffs)

5,000,000 m³ of rock from local quarries, in order to lay out the foundation of the future enormous oil storage tank (storage area: 35 hectares)

1,500,000 m³ of concrete

The main breakwater at this terminal, in Cap d'Antifer, is 3,520 meters long.

In addition to the rolled pebble bed, the mass of layers of slate, limestone and calcareous rock, there is a sub-base of concrete rocks covered by an upper layer of concrete blocks topped with concrete.

FOS The Port of Fos has a special "concrete sector" located on the east bank of the Arles channel, near the port of Saint Louis on the Rhone, which includes the follows industrial plants of port construction:

Société de Ciment La Forge	Storage of cement	2.5 hectares
Société des Sabliers au Delta	Sand supplier	1.7 hectares
Société des Ateliers de Construction	Iron-concrete materials	2.0 hectares
Schwartz-Haumont		

These facilities at Fos are located along the draft channel in Arles, at the western end of the Fos region, a place which is served by barge transportation.

4.3 GROUPING OF INDUSTRIES FOR THE SUAPE REGION

The Suape region is capable of attracting a extreme variety of industrial facilities which directly and/or indirectly depend on deep drafted ships. These industries have been classified into four groupings:

1. industries required for the construction of the port and of the industrial area;
2. main industries, directly dependent upon a marine location;
3. industries closely connected, through industrial processing or raw materials, to the main sea-side industries, and which can be located away from the coast;
4. port service industries.

4.3.1 TYPES OF INDUSTRIES FOR PORT LOCATION

Certain industrial facilities should be considered first, in the development plan for the Suape region, because they will be required during the initial phases of preparation of the port location and of industrial areas and, shortly thereafter, for the construction of port facilities and structures for the first important industrial plants. These first industrial plants include:

Sand and crushed rock -- sieving, washing and storage,
Storage and local assembly of structural steel and steel piping for oilducts,
Storage of asphalt,
Storage and machining of wood planks,
Local fabrication of pre-molded concrete products, as well as blocks, bricks and special molds, concrete slabs, coverings and blocks, concrete piping, storage tanks and large blocks for

breakwaters, dams, docks, etc.

The dredging of the Suape channel will probably provide for a substantial portion of the sand needed for local development. Other raw materials or partially manufactured materials required by the construction industries will probably be delivered in Suape, initially by truck and later by train, as the railroad system is expanded in the future port and industrial areas. Meanwhile, the better part of these basic materials might be transported to Suape by ships or ocean barges.

In the beginning, local manufacture of essential construction materials should be encouraged. All these manufacturing units could temporarily utilize locations having an access to the sea, even if supplied by barges. However, they should not be permitted to permanently occupy such locations, unless they can prove that they frequently use marine transportation. As the development of the Suape region progresses, some of these industries might be transferred inland, supplied by means of conveyor belts or other material handling equipment, or, in certain cases, by heavy vehicles.

A few port-located manufacturing units in the initial phase have, however, to be more dependent upon marine transportation, due to long-run transportation of products, and to the receipt of raw materials by coastal navigation. Thus the establishment of a permanent location, with access to the sea, should be considered for these industries, among which we can name the following: wood plank port (which must be part of a container port) and fabricated cement items, with large storage facilities.

Manufacture of pre-molded concrete products, specially those large sized reinforced concrete components for bridges or construction, large columns, etc.

finished metallic structural components, including assembly, of very large and/or very heavy objects, as well as drilling equipment, drilling towers, drilling platforms for exploration of oil and gas on the continental platform, bridge sections, towers, destilation columns, tanks, etc., for chemical products plants.

A - THE CEMENT AND CONCRETE PRODUCTS INDUSTRY

Cement will represent the largest tonnage transported for the building of Suape. The docks, the reinforcement of breakwater reefs, the foundations of the heavy industries to be installed there, all these will require an enormous amount of cement. Suape will therefore need either a large cement marine terminal or a plant for the local manufacture of cement utilizing the adequate raw material available in the neighborhood.

The small dimension of concreted areas at the Port of Fos is not adequate for the Port of Suape. The locations for the large scale mechanized production of structural reinforced concrete components, concrete piping, etc., in Suape, should vary between 20 and 40 ha. or more.

B - METAL PRODUCTS MANUFACTURING FACILITIES

The installation of this type of manufacturing units in Suape is necessary during the phase of land preparation, as the main heavy industries (ship repairs, oil ducts, refineries, chemical plants, power plants, etc.) build their own facilities.

a) Metallic Services Center

The supply of ferrous and non-ferrous semi-finished products will be necessary in Suape throughout its existence. During the initial construction phase, a metallic services wholesale center should be

installed on a location with access to the sea, in order to receive marine shipments of metal sheeting, bars, wires, plates and other semi-finished metallic products.

b) finished structural metal products

Later, there will be the need for shape manufacture for metal structures, including shops for products fabricated from plate, metal sheeting and, eventually, boiler shops for steam ships. These plants might initially process, for use in the construction work, the stock of bars, sheeting rolls, piping, tubes, laminated wire and those received by ocean transportation, which go from steel and non-ferrous metal rolls to designing and modelling plants.

These plants for metal structures could also later supply subcontracted services to the port set. Eventually, they might build towers, platforms and other structures required for exploration of oil and gas on the continental platform.

At Suape, the land for this type of facilities for metal fabrication might be located by the sea, and its area might vary between 15 and 40, or even 50 hectares.

4.3.2 MAIN INDUSTRIES DEPENDENT UPON OCEAN TRANSPORTATION

Suape has the potential for three main groups of industries dependent on ocean transportation: first, power industries; second, port installation industries; and thirdly, selected heavy industries.

A. Suape as Power Center

One of the basic purposes for the implementation of the Suape In-

Industrial Complex and ocean terminal is to create mooring facilities for super-tankers (VLCC's or very large crude (petroleum) carriers). This function should, however, be expanded, for Suape has the potential to become a major power receiving center. In the concept for land utilization we have thus set aside space for the major power sources:

Natural liquid gas

Oil

Coal

Generation of Electric Power

1. Oil

As the principal ocean port for docking of super oil-tankers, (VLCC's) of 250,000 tdw, Suape will require space for six different types of land utilization for oil purposes:

- a. receiving terminal;
- b. storage of crude oil;
- c. essential services to super oil-tankers (VLCC's);
- d. direct pipeline for crude oil and other oil products;
- e. refinery location;
- f. related industries, including petro-chemical industries.

4.3.3 ESSENTIAL SERVICES FOR SUPER OIL-TANKERS (VLCC'S)

Facilities being installed in Antifer (the oil port which is not located in an industrial zone) indicate practically all the equipment, services and supplies required when a super oil-tanker (VLCC) unloads at an oil terminal.

Antifer

The Service Port, located on the southern coast of the large oil storage area of Antifer, is protected by a separate breakwater in order to shelter tugboats and other service vessels, and in order to avoid traffic problems near the mooring site of the large oil tankers. Within the 8-hectare area of the Service Port, most of which consists of water, the following equipment, supplies and facilities are available:

- 4 tugboats
- pilot boats
- 3 motor-driven launches
- fire-fighting boat
- helicopter
- vehicles for personnel transportation between Antifer and Le Havre
- floating barriers against oil leakage at sea
- oil leakage treatment facilities
- signaling station radar
- heliport
- pontoons to load heavy parts onto the ships
- storage of heavy replacement parts for on-board repairs of oil tankers
- water tanks for 1,000 m³ (each ship's requisition takes about 300 m³)
- oil supply to ships
- a large telephone and telex network
- large buildings for use by the port administration personnel, i.e., to the Compagnie Industrielle Maritime, namely:
 - pilots
 - tugboat crews
 - police
 - customs
 - merchants
 - navigation agents
 - dispatchers

At the "energy" port, a facility for elimination of gases and another to alleviate ballast in oil tankers and natural liquid gas freighters.

Great depth port terminals have to supply services, equipment and essential facilities for a safe and efficient operation. The size of the public investment required to build and maintain a sufficiently deep port to handle super oil-tankers is very large. The tonnage traffic and the number of ship moorages must be kept at a maximum. The time needed for the safe turnover without causing pollution must also be kept at a maximum.

One of the main objectives of shipowners who desire a maximum return on their large capital investment, as well as of those outfitters who require fast and safe transportation for a now so valuable load, is turnover time. The port's and oil tankers' performance are basic for the economic transportation of large volumes of crude oil.

There are, however, certain economic factors which seem to work against the vessels' maximum efficiency:

In order to maximize the duration of a freighter's profitable use, the owners of large oil-tankers tend to minimize the frequency and the duration of scheduled moorages. On the other hand, the high cost of the ship's fuel and the high tariffs (for utilization of oil-tankers) have brought about the requirement of performance warranty to be given by the oil tanker owner to those who lease them, involving the ship's speed and its fuel consumption. In addition, freighters' crews have been reduced, particularly because of a manpower's shortage, and this, in its turn, has brought about a reduction of the amount of work performed by the crew at sea for the general maintenance of the tanker and for the repair of minor damages caused by atmospheric conditions.

To aggravate these problems even further, the dry-dock repairing of super tankers (VLCC's) has become extremely difficult for several reasons: there are not enough dry docks capable of accommodating super tankers (VLCC's); many of the repair installations are not located on the main commercial routes; some of the naval repair shipyards are located on zones where repairs are very expensive, such as the United States of America and Australia; and finally super tankers (VLCC's) compete with other types of naval customers for repair services.

Thus the capacity planned for Suape as regards shipyards and repairs sense of general cargo to container, from tanker to bulk carriers, and of conversion of ships which meet the requirements of the marine oil exploration industry, such as drilling boats. (NOTE: original is garbled.)

Thus the capacity planned for Suape as regards shipyards for naval repairs of super oil-tankers located on the navigation channel itself, without intermediate dry docks, will establish a kind of service which is equalled only by few ports. For instance, an oil tanker unloading at Fos would have to sail to Marseille, around 40 kilometers away, where dry dock 10, now being completed, would be able to make repair work on super oil tankers (VLCC's) of up to 800,000 tdw. Tankers unloading at Antifer are 24 kilometers away from Le Havre's shipyards.

A. Direct pipelines

Various oilducts will cross Suape, including:

1. Crude and refined oil ducts:

Crude oil duct, from the marine terminal to the intermediate storage areas.

Crude oil ducts, from the marine terminal to the nearby refineries.

Crude oil duct connected with the national oil duct system for possible conveyance to other refineries.

Oil duct for refined products, between the marine terminal and

the refined products storage areas.

oil ducts for refined products, between refineries and the marine terminal.

Between refineries and petrochemical plants;

between refineries, the marine terminal and the national oil duct system for refined products, for other metropolitan areas;

between refineries and the existing and future Recife airports.

2. Natural gas pipelines:

Gas pipelines between the liquid natural gas facility (LNG) and Suape's industries.

Gas pipeline between the liquid natural gas (LNG) facility and the national pipeline system for distribution of gas.

The width of direct oil ducts will vary. Crude oil ducts will probably have a width of 1.07 to 1.21 meters, located at 7.62 to 22.36 from each other, with a total width of 16.3 to 47 meters or more. The recent U.S. legislation for the Alaska oil duct established the direct oil duct on public land owned by the Federal Government, with 15.24 meters in addition to the oil duct width, and related installations, such as valves, pumping stations, storage areas, tank locations, etc., including access roads for repair work. Thus, in certain locations along the direct oil duct and related installations, the width is more than 500 meters. Refined products pipelines are usually 1.1 meters wide, plus 7.62 to 15.2 meters of land width.

Land on top of buried pipelines may be used for various activities. A main pipeline for gas distribution passing by Reston, Va. -- a planned town near the Dulles airport, in the Washington metropolitan area -- has a direct width of 53.4 meters. In Reston, the land on top of this pipeline is used by farms, kitchens and gardens of houses near the direct pipeline, grazing ground for

cattle and horses, plantations, and bicycle and horse-riding tracks. Though usually buildings are not constructed on such land, the Reston stable for horse riding was built on the gas pipeline right-of-way. Oil ducts are installed under airports, pass under city streets, and sometimes share space with electric transmission lines right-of-ways. Thus the land on top of these pipeline corridors, as well as the corridors for electric transmission lines, may be used for various public and private purposes, and may create open space areas for many recreational and aesthetic purposes.

B. Refineries

The land in Suape, with a surface of approximately 5,760 hectares, is sufficiently large to permit the installation of a refinery, in addition to adequate terrain for other industries that depend on ocean transportation and port facilities. The location for the refinery in Suape does not have to be near deep water.

C. Industries related with oil

In addition to the land requirements for the receipt, processing and distribution of oil -- terminal, storage yards, oil ducts and refinery -- it is necessary to plan for land, in Suape, to accommodate three types of industries connected with the basic oil exploiting activities: industries that render drilling services on the continental platform, industries that render essential services to the super oil-tankers (VLCC's), and the petro-chemical industries.

LNG (liquid natural gas) is another kind of energetic source for which facilities must be provided in the industrial port area at Suape. LNG regasification plants require locations next to deep waters. For an initial land estimate, 50 to 100 hectares will probably be required.

4.3.4 COAL TERMINAL AND STORAGE FACILITIES

Guape will require facilities for a coal terminal, if not as fuel in general, certainly as raw material for making steel and for electric-metallurgical plants. Coal and ore sometimes share the same anchoring place or doock, but have separate conveyor belt systems.

CRITERIA ADOPTED FOR INDUSTRIAL ZONING

4.4.1

Industries Requiring Deep Waters

Those large industries that process basic raw materials prefer to be located next to deep water sites.

The large amounts of raw materials require the use of bulk carriers, and these large ships require special equipment for loading and unloading operations.

The trend of size growth of ships and the speed of modern unloading methods exceed the capacity of the horizontal means of transportation and of railroad cars, bringing about the need for large storage areas in certain manufacturing plants located next to deep water sites.

Some of these industries requiring access to deep water are: oil refineries, chemical industries, steel mills, metallurgical plants, sugar refineries, and shipyards for naval building and repairs.

4.4.2

Related industries

Many industries are directly related to the basic industries. For instance, oil refineries generally require a great amount of electric power, and for this reason power generating plants are installed in their vicinity.

In addition, as the basic industry grows in size, the related industries also grow, as is the case with the large petro-chemical industries.

Grouping related industries together cuts down the cost of transporting raw materials as well as storage space; reduces the time

required for transportation and, consequently, reduces the traffic of cargo vehicles on the roads, bringing about a social benefit.

For instance, a steel manufacturing plant might supply the materials for the foundry or lamination plants, as well as to a large number of iron-consuming industries, such as makers of metallic structures, etc.

An alternative to the direct juxtaposition of subsidiary industries and basic processors could be a system of pipelines and barges, which would permit complementary industries to be located in more distant areas, but interconnected by a transportation system. This alternative is very important, particularly when the port front is of limited size.

4.4.3 Industries Requiring Shallow Draft

Among industries requiring shallow draft we may include the manufacture of bricks, clay and concrete products, and food industries such as canned and deep-frozen food.

As an example, on the San Francisco bay, the potential for industries requiring shallow draft greatly exceeds current use. As soon as ships begin operating, carrying loaded barges instead of compartmentalized cargo (containers), the system will allow for a great variety of industries next to shallowdraft areas to ship and receive great volumes of ocean cargo.

It could also bring about the development of wholesale commerce or product distribution to industries requiring shallow draft.

Faster barges and probably new types of shallow draft transportation, such as vehicles on air cushion like the Hovercraft, will make it possible to transport raw materials, finished products and

large cargos from one point to another.

4.4 Industries Requiring Large Amounts of Processing Water

A large number of industries utilize water in the production process. However, many of them do not consume water: the better part of it is used for cooling industrial equipment.

Typical of industries which utilize large amounts of water are: electric plants, metallurgical plants, refineries, food industries and chemical plants.

A large variety of manufacturing industries use water in processing and treating waste: most of them can use salt water.

ZONING OF THE INDUSTRIAL AREA

The industrial area zoning took into account not only the criteria mentioned above, but also a number of conditions thought to be prioritary for its location. Thus industrial areas were classified into four zones according to the degree of dependence upon the sea.

ZI.1 - Industries directly dependent on ocean transportation, located next to the wet perimeter in areas of channels with adequate depth for ships required by them and, consequently, with modules as a function of the berth length in their terminals;

ZI.2 - Industries related to those processing basic raw materials located in ZI.1, i.e., industries which naturally tend to be located near basic industries, located behind them in relation to the sea since they do not directly depend on ocean transportation.

Also in this zone are those industries which, though they depend on ocean transportation, do not operate on a scale which would justify a private terminal.

In this case, they are located in the direct influence area of the project bulk yards, or are strategically placed on port channels, with a possibility of being interconnected with them by means of special transportation systems (pipelines, conveyor belts, etc.).

ZI.3 - Industries considered as peripheral, attracted to the IC area by the existence of a port for

public use, by the existence of an infra-structure, by their affinity with industries in ZI.1 ZI.2, or by services demanded in the area.

ZI.4 - Support services, such as maintenance and/or manufacture of components for construction and/or consumption by the industrial units which integrate the IC.

Here, areas are also projected for parking large machines and equipment used in the construction and maintenance of the IC. As the Complex becomes consolidated, the activities grouped in ZI.4 will tend to assume the characteristics of those in ZI.3

In view of its functional characteristics, ZI.4 is located near the Administration Zone ZCA, the area intended for the encampment of personnel involved in the construction work, and ZI.3 in the Massangana river valley.

Figure 4.1 shows the main zoning lines.

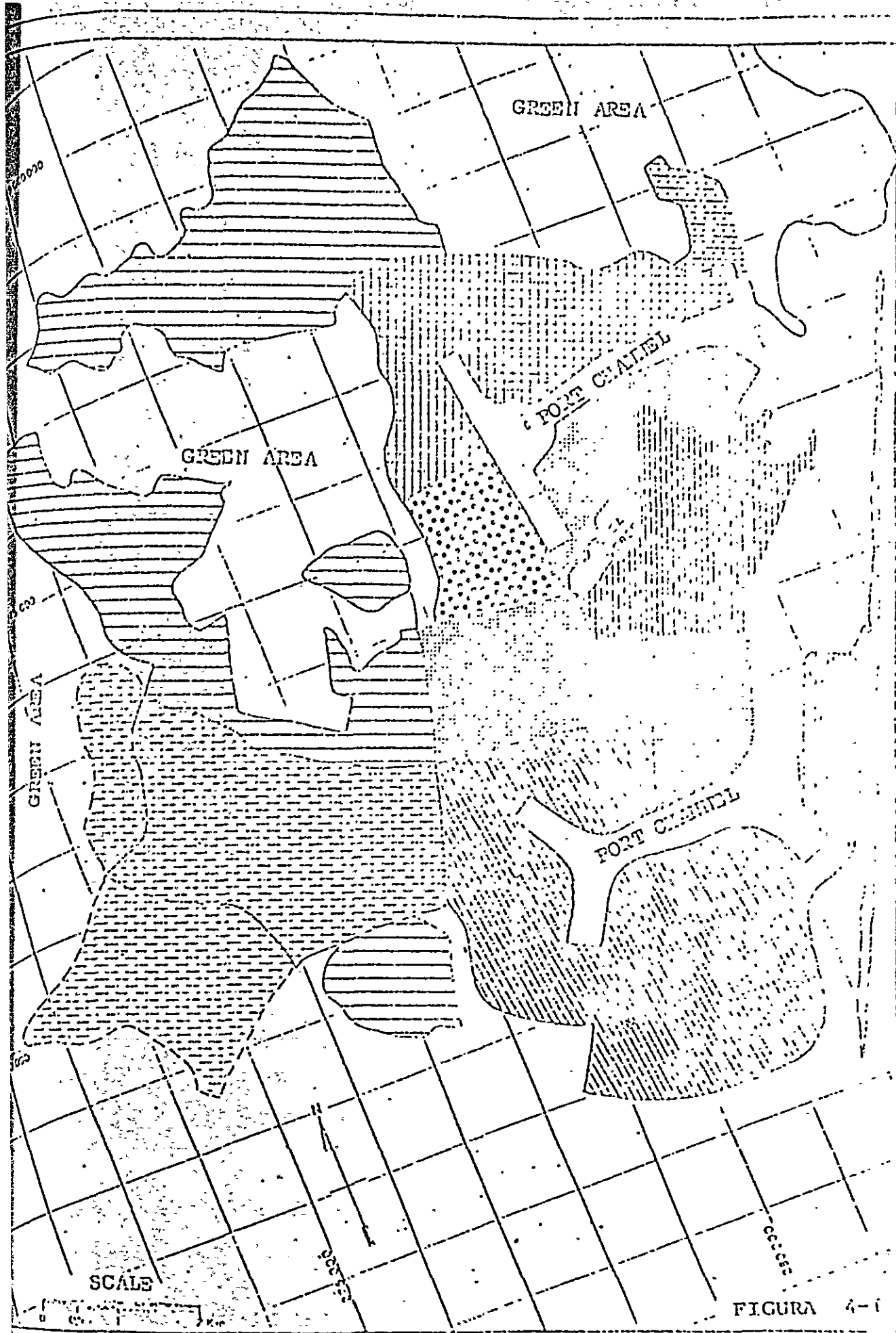


FIGURA 4-1

FISHING AREA	SERVICES AND CONSTRUCTION AREA
COLLECTIVE PORT	CHEMICALS AREA
LIGHT IND. AREA	MISCELLANEOUS ACTIVITIES AREA
METAL AREA	METALS OR SERVICES & CONSTRUCTION AREA
POWER CENTER	

GOVERNHO DO ESTADO DE PERNAMBUCO
 COMISSAO DE DESENVOLVIMENTO DO LITORAL
 DE PERNAMBUCO
 COMISSAO INDUSTRIAL DE ZONAS
 ZONING SCHEME
 PERNAMBUCO, BRASIL

INDUSTRIAL BREAKDOWN

This breakdown should be determined by:

1. each industry's functional schedule in order to meet a desired production level
2. planned expansion of such production capacity
3. optimization of marine and terrestrial accesses
4. the need to allow for an effective interchange of products among industries of integrated groups

The need to define parameters for the project's forecasts having been defined, the widest possible modular system was adopted to permit meeting this demand as it occurs.

The next Figure shows an outline of the modular network adopted and some of the possible combinations of parcels in order to form multiples and sub-multiples of this unit.

The modules will be arranged with such dimensions as required by the areas arrangement, the module for ZI.1 being the dimension(s) of the berth(s) related to this industrial area.

Figure 4-II gives an outline of the modular network and some of the possible arrangements of parcels into multiples and sub-multiples of the modules.

For the arrangements marked from A to G, it is understood that they were worked out with a view to future expansion, which does not mean that such expansion can extend beyond the indicated demarcation.

Since the basic objective is to optimize the use of the port front, as this front is extremely valuable, it must not be used for pur-

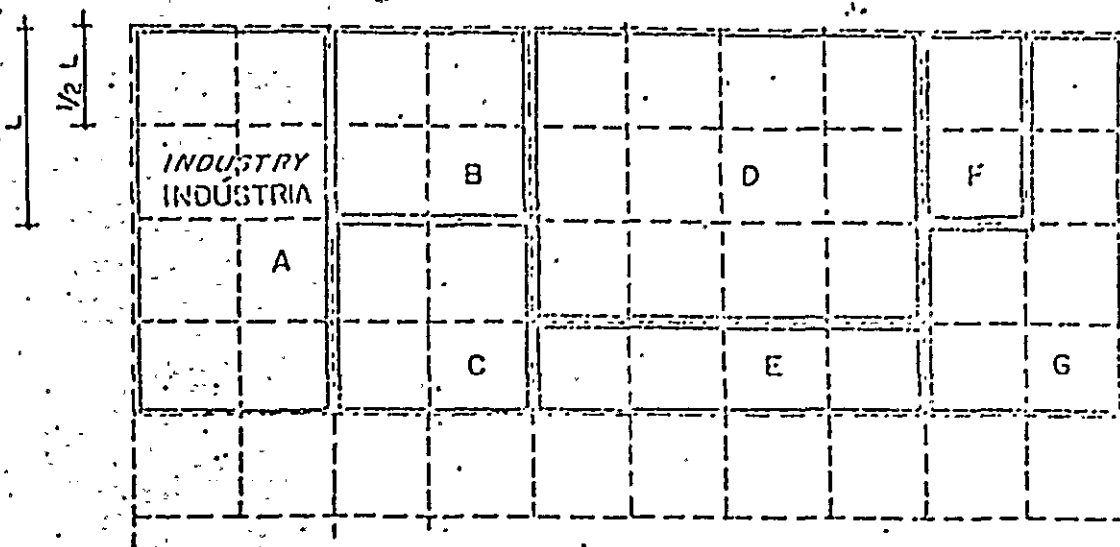


FIGURE 4-II

MODULAR NETWORK

diper



GOVERNO DO ESTADO DE PERNAMBUCO - PIAE
COMPANHIA DE DESENVOLVIMENTO INDUSTRIAL
DE PERNAMBUCO
COMPLEXO INDUSTRIAL DO S. APE

MODULAR IESH

LE COMPRIMENTO DO BRANCO (LENGTH OF THE BIRTH)

TRANSCON SA

PERSONAL 400 10000 000 000

11/11/11

poses that are not essential to its object, though within the industry itself. As an example, we can mention the case of large storage areas, of waste deposits, etc., which must be located in such a way as not to interfere in the marine loading and unloading traffic, that is to say, the port front must be made strictly compatible with the demand for port services.

On the other hand, the highway and railroad routes should not prevent the unnecessary blocking out of industrial areas with a port front. Wherever possible, these routes should follow the lines of the modular network, perpendicular to the mooring docks.

In order to optimize the port system, and in compliance with the recommendable criteria for the location of industries, it is deemed convenient to position an intercommunication strip along the entire channel front, and special areas consisting of yards for cargo destined to other industries not directly connected with specialized and private terminals and which, for this reason, are located near the port front but away from the banks of the channels.

Figure 4-III shows a scheme illustrating the proposed hierarchy for the circulation system.

SEA ACCESS
ACCESSO MARITIMO
FAIXA RODOVIÁRIA
E/OU FERROVIÁRIA
HIGHWAY AND/OR
RAILWAY STRIP

FAIXA RODOVIÁRIA
HIGHWAY STRIP

FAIXA FERROVIÁRIA
RAILWAY STRIP

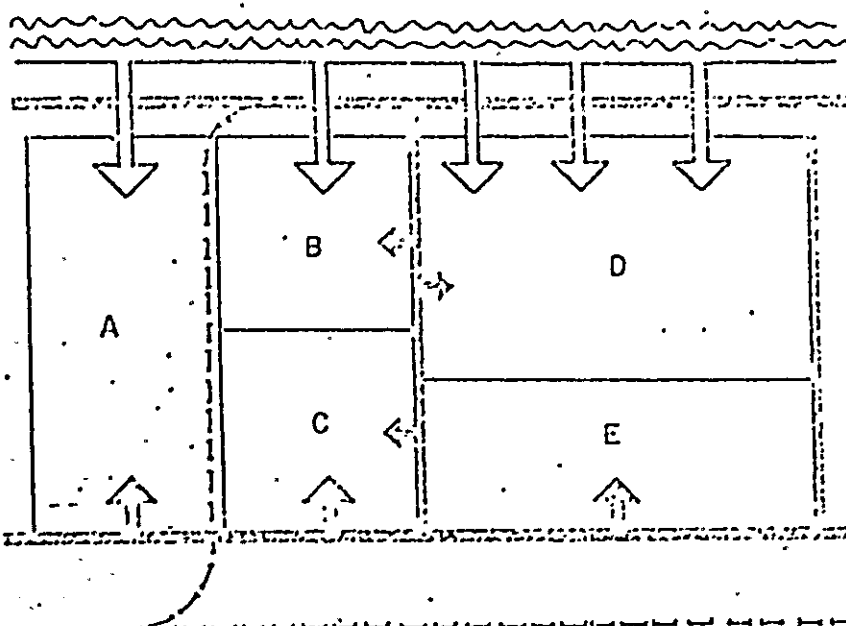


FIGURE 4-III

CIRCULATION SCHEME

dipcr



TRANSCON SA

GOVERNO DO ESTADO DE PERNAMBUCO - E.P.C.
COMPANHIA DE DESENVOLVIMENTO INDUSTRIAL
DE PERNAMBUCO
COMPLEXO INDUSTRIAL DE SUPE

CIRCULATION SCHEME

Projeto	10/74	Auto	10/74	Assinatura	
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TOMO II

PART 2 - 5.0

5.0 ADMINISTRATIVE CENTER PLAN

5.0 ADMINISTRATIVE CENTER PLAN

5.1 JUSTIFICATION OF LOCATION

5.1.1 PHYSIOGRAPHIC INTERPRETATION

The master plan provides for two zones, called ZCA-1, located south of the junction between PE-60 and the primary distributor, and ZCA-2, located north of ZCA-1. The two administrative zones mark the entrance to the IC at Suape.

These zones allow for various possibilities for the physical installation of the Administrative Center.

The topography is quite varied, and there are three distinct formations:

a) To the southwest, the land is scalloped and rugged. Hillocks rise to some 70 meters. Hillsides have 15% to 50% slopes, which make them uneconomical for building purposes.

On top of these hillocks, there are plateaus at 30 and 50 meter levels.

b) The southeast is an intermediate area between the large plains and Suape's hillocks.

Elevation curves reach up to 30 meters, and slopes vary between 0 and 15%. To the northwest, there is the Massangana Sugar Mill, which is also part of this intermediate zone.

c)) The northeast is occupied by the plain, with elevations not above 5 meters, which makes it subject to floodings.

The geology is typified by tertiary hillocks, with a great erosion risk.

The intermediate areas also have the same geological formation.

The plains are constituted by alluvial and flood deposits of the quaternary type.

Both the topography and the geology presented up to here justify locating the administrative center in these intermediate areas, which may be utilized without requiring great expenditures.

The greater part of the area is covered by sugar cane plantations, while the top of the hillocks keeps residual vegetation which should be preserved, as well as the Massangana Sugar Mill, which belongs to the Historical Patrimony.

5.1.2 INTEGRATION WITH MEANS OF TRANSPORTATION

The intermediate areas which are not a part of preservation areas, are all located to the southeast, exactly at the confluence of the primary distributor and the main access road to the center, in addition to being near the future highway-railroad station. The final choice of this intermediate area for the Administrative Center's location aims also at insuring a better integration with the means of transportation.

5.1.3 SYNTHESIS: INSTALLATION OF THE ADMINISTRATIVE CENTER

Within this intermediate area, the elevation reaching up to 20 or 30 meters has been selected, visible both from PE-60 and from the Suape Industrial Area; on the first elevation, after the plain, a dominating plateau will be created, 20 meters high, which will allow for a square of monumental character. Around this square, forming a first ring, the main buildings will be located, as architectural components accentuating the elevation character. The main circulation forms a second ring. The parking areas and work accesses are located in the strip between the two rings.

An ample walkway for pedestrians connects the monumental square to the bus-and-railroad station.

Crossing the primary distributor and the loop at the Administrative Center.

Initially, the connection with the Administrative Center will be built, providing for the installation, in the first phase, of a temporary terminal, 200 meters away from the Center.

The road network involves the central functions, such as administration, Cultural and Commercial Center; the remaining functions are grouped in the periphery on the other side of the network.

Though they are separate functions, they will be connected by pedestrian walks, based on direct fluxes and complying with a human scale of distances and declivity.

The volumes and masses suggested in the General Plan are oriented according to the insolation in the area and the direction of the prevailing winds.

5.2

PROGRAM

5.2.1

MAIN FUNCTION GROUPS

CENTRAL FUNCTIONS	AREAS (M ²)
ADMINISTRATION	9,500
CONFERENCE	250
SERVICES	250
EXPOSITIONS	400
LIBRARY	400
CONVENTIONS ROOM	1,200
RESTAURANT	600
CAFETERIA	1,200
TOTAL	13,740

PERIPHERAL FUNCTIONS	AREAS (m ²)
1 - RESIDENTIAL AND LEISURE	
Hotel	5,000
Motel	5,000
Club	4,000
T O T A L	<u>14,000</u>
2 - COMMUNITY SERVICES	
Training School	400
Medical Post (INPS)	150
First Aid Ward	150
Police Station	
Fire House	400
Surveillance Station	
T O T A L	<u>1,100</u>
3 - GENERAL SERVICES	
Maintenance Shops	260
Service Station	100
Heliport	10,000
T O T A L	<u>10,360</u>

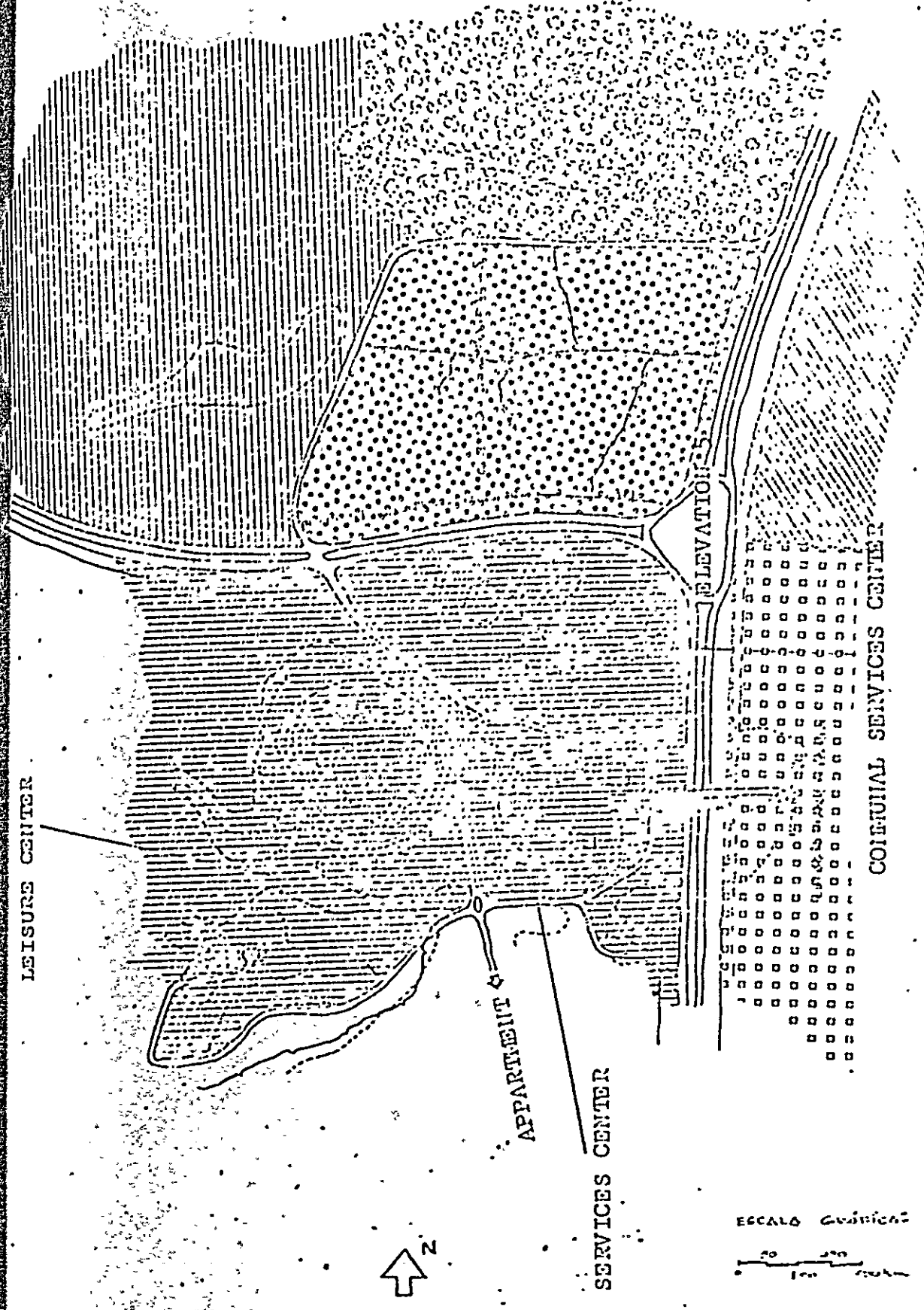
5.2.2 OPEN AND CONSTRUCTION AREAS

The total area of projected buildings is below the limits permitted by the A.T.E and the A.M.L.

There are ample reserves which permit the expansion beyond the projected limits in the total occupation plan, both in surface area and in height.

5.21 AREAS

INDEX FUNCTION	A		B		C		D		E		F	
	CONSTRUCTION AREA		TOTAL AREA OF ZONE		C = B x 0.4		D = B - C		A D		MINIMUM OPEN AREA (AML)	
	M ²	M ²	M ²	M ²	DEDUCTIONS FOR PUBLIC AREAS (CIRCULATION + PUBLIC GREEN AREAS) = 40%	M ²	LAND SURFACE	M ²	MAXIMUM TOTAL AREA FOR CONSTRUCTION (ATE)	ATE %	USUAL	EXISTING RESERVE
CENTER RESIDENTIAL/LEISURE COMMUNITY SERVICES GENERAL SERVICES	13,740	61,625	24,650	36,975					100%	37%	50%	30%
	14,000	60,000	24,000	36,000					50%	39%	50%	35%
	1,100	20,000	8,000	12,000					50%	10%	50%	40%
	10,360	50,000	14,400	30,000					50%	35%	50%	48%



	ZCA-1		ZVU-2
	ZCA-3		ZCA-2
	ZVC		ZC-2

dipor

TRANSCON-9A

GOVERNO DO ESTADO DE PERNAMBUCO
 SECRETARIA DE PLANEJAMENTO E ORÇAMENTO
 DE PERNAMBUCO
 COMPLEXO INDUSTRIAL DE SUAPE

ZONING OF SUAPE'S ADMINISTRATIVE CENTER

elaborado por: _____
 data: _____
 aprovado por: _____
 data: _____

TOMO II

PART 2 - 7.0

7.0 PLAN FOR HISTORICAL, CULTURAL,
ECOLOGICAL AND ENVIRONMENTAL
PROTECTION

7.0 PLAN FOR HISTORICAL, CULTURAL, ECOLOGICAL AND ENVIRONMENTAL PROTECTION

7.1 CULTURAL PRESERVATION AREAS

If, on one hand, the abundance of historical monuments in Suape restricts the use of the area, it does, on the other hand, constitute a valorization factor from the touristic and recreational viewpoint. Thus, Suape is not a region like the others; it has a past, historical precedents which, in their way, are in integral part of the cultural assets of the State. It seems to us that it will be wise to conciliate, here, in an organic and adjusted way, the developmental and cultural uses, thus enriching the geographical substratum from both viewpoints.

In a preliminary analysis, the historical assets to be preserved may be presented according to the following criterium:

a From the social-economical viewpoint - the Massangana Sugar Mill, which is already undergoing a restoration process.

b From the military viewpoint - the group of forts located in the Cape of Santo Agostinho area and in the bay of Suape, i.e., the Sea Castle, in reasonably good conditions, the Fort at the Suape spit, rather in shambles but, in the opinion of certain experts, still restorable; the Gaibu Fort, in similar conditions, and Fort Gysselingh location, in the Borges Island, to be submitted to a research and excavation process for clarification of its real situation.

c From the religious viewpoint - the Garapu Sugar Mill chapel, currently surrounded by industrial establishments, sets a remarkable architectural contrast between the utilitarian and the spiritual, and requires a solution capable of preserving it from destruction for the industrial use of the land and of allowing for touristic visitation, without interfering with the productive activities located around it. The Nazaré church and convent ("Ermita

de Nazaré); on the high land at the Cape of Santo Agostinho, which benefited from restoration work conducted by IPHAN; the Nossa Senhora do Ó church, in the town of the same name, and the most beautiful Ipojuca church and convent, at the top of the hill overlooking this town.

In addition to these special points, and also worthy of being listed here as locations to be preserved, there are the vegetable edge of the Bay of Suape and the set at the Cape of Santo Agostinho, which are traditional landscapes with both historical and aesthetic value.

ECOLOGICAL PRESERVATION ZONE

From the "Definition of Areas for Preservation," the assumption was made that, in order to somehow maintain a balance between the population and the natural formations, a minimum of 30% of the total area should be preserved.

According to the proposed plan of areas to be preserved, this pre-set goal was far exceeded.

7.2.1

NATURAL PRESERVATION AREAS

Forest Preservation Area to function as a Defensive Barrier against Pollution

This is a green, elongated area with variable width which begins on the Cape of Santo Agostinho, goes around the Industrial Complex, and separates the projected industrial area from the city of Cabo.

Its main purpose is to act as a defense barrier to protect the city of Cabo from pollution generated by the Industrial Complex, in addition to functioning as a natural recreational park for the surrounding population.

The creation of a State forest resort is justified for the purpose of preserving the exceptional forest assets of the most important forest complex in the region -- the Zombi woods.

The diversification of the woods (tableland vegetation mingled with poorly drained and marshland vegetation) which can be found in the park area constitutes a landscape asset which should be preserved.

Another important function of preserved woods is to provide for a shelter for the local fauna, now undergoing extinction.

Communal uses which are not destructive of the flora or fauna will be permitted: inns, restaurants, small shelters for visitors, and facilities for the comfort of users.

Those uses which favor or permit forest destruction will be forbidden. Indiscriminate land clearing will not be allowed in this area, nor shall it be used for pastoral or agricultural purposes.

For implementing the park, the area should first be fenced in; and those deforested zones where silvicultural treatments should be carried out in order to favor natural reforestation shall be demarcated. These silvicultural treatments should be such as to orient the natural reforestation toward a species population closer to the original, pre-discovery one.

The character to be acquired by the projected forest reserve, as a defensive barrier for the City of Cabo, was discussed in detail, and the option was made to form a State park for permanent preservation.

The points in favor of this alternative, versus the exploitation of the forest by private concerns, are the following:

- a) The creation of a State park will fully guarantee the preservation of the existing woods, as well as the reforestation of the now deforested areas, soon allowing for the desired defensive barrier, as well as preserving the existing ecological assets for the population's enjoyment.
- b) The developmental surge which the project will bring to the area will create a great demand for timber, the supply of which, as we know, is critical in the region. In the case of exploitation by private concerns, this demand could cause the complete deforestation of the park area.
- c) The possibility of having a large wooded area for pu-

public use, geographically connected with locations of historical and touristic interest (beaches), will enhance the natural attraction of these touristic centers, not only on a State level, but also on a national level.

The vicinity of Recife, little endowed with this type of leisure, should generate visiting groups at this park, making its use much more regional than local.

d) . At the critical points, where the park is crossed by the PE-9 and PE-60 highways and by the railroad, there should be strict control of soil utilization, in order to guarantee a closed, continuous vegetation barrier.

Residual Marshland Vegetation in the Cupe spit and at Gamboa

These woods are located at the southeastern end of the Cupe spit area and at some 200 m north of the spit. They cover some 60 hectares, and are remnants of the old marshland wood which was largely replaced by coconut plantations.

These wooded areas are extremely valuable from a forestation viewpoint, since they are the last remaining traces of the old coastal marshland woods which covered all coastal sandy soils and dunes.

Use of these areas will certainly be conservationist, and the areas must be fenced in, with permission only for uses which do not affect the integrity of the forest aggregate nor disturb its natural growth. The best solution would be to prohibit the admission of people; however, in view of their small size, it is advisable to exert a strict control on the communal use of these areas.

It is also desirable to have the State agency in charge of the State park, described in item A, also in charge of these areas, since they have the same conservationist character as the park.

Mangrove Swamps on the Pirapama and Jaboatão Rivers

These are areas subject to tidal floodings, located to the northeast of the area next to the Pirapama and Jaboatão Rivers, including a marshland wood inside these mangrove swamps which is still preserved. The area occupies some 2,000 hectares.

Preservation of this area is aimed at protecting the region's characteristic flora and its most varied fauna.

Agency that will Administer the Area

It is deemed convenient that the Administration of the State Park described in item A should include this area in its jurisdiction, thus compounding with the Cupe spit and the Gamboa woods the major conservation area of the State of Pernambuco.

7.2.2 OTHER AREAS FOR PERMANENT PRESERVATION THAT IS NOT NECESSARILY NATURAL

These areas are intended for permanent preservation, in the same way as those described in item A, with the difference that the preservation of their natural state is not strictly necessary; a natural or artificial vegetation may be preserved and maintained, depending on the interest and utilization of the area.

These are:

- a) Land strip between the Low Tide Line and the Area to be Urbanized

This land strip will have a width of around 80 meters, according to the location, and was plotted on the map as ecological preservation zones.

Private construction will not be permitted on this strip and, if

possible, the plantation of coconuts will be encouraged.

b) Land Strip at the Edge of the Lake

A land strip has been demarcated along the lake's edge which, according to the Federal Forest Code, should be preserved for the protection of natural or artificial lakes. Since the law does not determine its width, the strip has been plotted on the map with variable width, depending on the location.

This area may be used as a recreational green area by the populations in the neighborhood. Recreational and sports facilities and those required for the user's comfort will be permitted.

c) Green Strip along River Banks

According to the Forest Code (law 4,711 of September 1, 1965), the woods and other natural vegetation located along river banks or along any other type of streams are to be considered as for permanent preservation. This marginal strip will have a minimum width of:

- 1 5 meters for rivers less than 10 (ten) meters wide;
- 2 one half of the river's width when the river is between 10 (ten) and 200 (two hundred) meters wide;
- 3 100 meters for all water streams more than 200 (two hundred) meters wide.

Uses that allow for the recreation of riverside populations will be permitted.

These areas have not been plotted on the map due to their small dimensions.

d)

Suape Beach

In the Suape beach area, the creation of an ecological preservation zone has been proposed, with the objective of retaining the landscape features and the fishing center atmosphere among coconut plantations.

Uses

Only those uses related with the fishing center or facilities for touristic use will be permitted in this area.

Competent Agency:

This area should be administered by the competent office of the Industrial Complex Administrative Center.

7.3

URBAN GREEN AREAS

There are three different types of urban green areas, depending on the purpose of each one.

7.3.1

URBAN GREEN AREA

These are all the green areas which render the landscape more amenable within the urban scheme to be built. The project for these areas should be adequate to their purpose and to the characteristics of the areas where they are located.

7.3.2

GREEN AREAS WHERE HOTELS AND MOTELS ARE TOLERATED

These are green areas intended for landscaping amenableness, where, due to their location near the Administration zone, hotel, restaurant, motel services, etc., will be tolerated.

7.3.3

PARKS

In addition to the forest state park, a green area with park features has been proposed next to the residential district in Boasica.

Forest and Agricultural Zone

This zone has been demarcated for agricultural, horticultural, cattle growing and forest uses.

These areas should attend to the following:

a) Supply of rural products for the populations which will live in the residential nuclei.

The best solution would be for the competent office of the I.C. Administration Center to make an arrangement with State or Federal agencies (INCRA) in order to incentivate the formation of colonization nuclei for the production of horticultural products, which are almost inexistent in the area at present.

b) Supply of timber for the construction of the project and, in the future, to those timber industries which may appear.

Plans can be developed by an I.C. entity, through a covenant with IBDF, for the purpose of utilizing timber for industrial purposes.

TDMO. II

PART 2. - 6.0

6.0 PLAN FOR RESIDENTIAL AREAS

6.0 PLAN FOR RESIDENTIAL AREAS

Initially, the criteria for locating and sizing the residential nuclei were determined, and later the general guidelines were recommended for residential areas, highway system, distribution of communal equipment and green areas.

These guidelines, together with the theoretical model of residential programming, are the required devices for use in planning the residential areas. The projected model, which is rather theoretical, should be adjusted to each area's peculiarities according to the planner's common sense. Two examples of this model's application were developed for two residential nuclei intended for absorption of the pioneering manpower residing in the Suape Industrial and Port Complex.

6.1 STUDIES FOR LOCATING RESIDENTIAL AREAS

The studies for locating residential areas resulted from the natural evolution process of the master plan. Some of the guidelines which governed these studies pertain to the suitability of the residential areas from a physical viewpoint.

The areas that are most convenient for residential use should have a not much accidented topography and, wherever possible, should be located at a convenient distance from work sites and recreational centers.

In the selection of the total land required for the installation of residential areas we have also included that required for commerce, circulation, education, health and leisure or sports.

The areas to be avoided for the construction of residential nuclei are those whose topographical conditions and rocky nature of the

soil make the creation of an adequate environment too difficult or costly. Thus, extremely accidented areas, or areas located in low spots where drainage is problematic and are subject to flooding, should be eliminated.

Particularly indicated are those areas near lakes, rivers and parks.

On the basis of these considerations, the study of the most suitable areas for the installation of residential nuclei was done by means of the research and analysis of physical factors prevailing in the areas, those more vitally needed for other purposes being excluded. Thus, apart the areas intended for the Administrative Center, for industrial plants, for historical and ecological preservation, including those granted by legal concession and the existing residential areas, all others were studied through maps and photo-interpretation, on the basis of aerial photography taken by FAB (Brazilian Air Force) in 1969, in the scale 1:30,000.

Among the most adequate areas, we found:

- One central area, near the Administrative Center of the Industrial and Port Complex;
- Two areas in the south, one being contiguous to the town of Nossa Senhora do Ó, of small size due to the nearby flooding risks, and the other, larger one located between the first and the city of Ipojuca;
- Four areas in the north, all near to the city of Cabo, Ponte dos Carvalhos and Engenho Boa Vista;
- One on the ocean fringe at Gaibu and Itapuama beaches.

Once the areas had been selected by means of physiographic analysis, the potential offered by each one was studied as a function of their position in relation to the port, the manufacturing units, the projected roads, and also in relation to pollution. This study being completed, and bearing in mind the occupational requirements generated by the pioneering manpower's demand -- construction of manufacturing units, port and infra-structure -- and by the industrial demand, the areas were designated in accordance with two types of occupation:

- Temporary or provisory
- and permanent.

provisory occupation is that carried out by the personnel employed in the construction work of the Port and Industrial complex and is, therefore, of a temporary nature. This can be personnel employed in the construction of manufacturing plants, in the port works or in the infra-structure works such as highways, railroads, water system, power and sewage network, etc.

permanent occupation is that corresponding to:

- personnel employed in the manufacturing plants;
- personnel employed in the Administrative Center, such as management technicians, personnel employed in the operation and maintenance of the Suape I.C.

Thus the area near the Administrative Center and the I.C., which is much subject to pollution during the phase of industrial operation, was destined for temporary or provisory occupation, namely, for the encampment of workers during the phase free from pollution, whereas the other areas were destined for permanent occupation by the personnel employed in the area.

CRITERIA ADOPTED FOR SIZING THE PROPOSED RESIDENTIAL NUCLEI

The proposed residential nuclei were allocated to the respective selected areas, care being exercised to dimension them in accordance with the calculated demand for residential space, the estimated populational growth, and a recommended standard average density, namely, 140 inhabitants per hectare.

Having now all required parameters, the new residential areas were intended to perform certain specific functions according to a soil occupation model, selected as being the most probable.

As we know, there currently exist in the Suape area four residential nuclei: those of Cabo and Ponte dos Carvalhos, undergoing full growth due to the installation of local industries; the Ipojuca nucleus, in a process of decadence, living off sugar cane exploitation; and the Nossa Senhora do Ó nucleus, which is being kept alive with the little tourism on the part of those who, on weekends and holidays, come to take advantage of the beach and of a little fishing.

The nucleus intended for provisory occupation was designated ZR-R, i.e., Provisory Residential Zone. It is a 167-hectare area, and its function will be to shelter the working force, single or married without a family, during the construction phase of the Port and Industrial Complex; it will later be absorbed by the zone which surrounds it, the ZI-4, which is the zone destined for the support industries.

The two nuclei located in the south, also very close to the I.C., which, according to the plan, should be soon developed, will have the function of absorbing this pioneer manpower's residential demand, whose purchasing power is low. The area next to Nossa Senhora do Ó has good physical conditions, measures 75 hectares, and should be able to lodge 10,400 inhabitants. This area will somehow cause a possible saturation of the Ipojuca nucleus, perhaps keeping its typical and picturesque characteristics. Ipojuca has 3,460 in-

habitants without physical conditions for expansion. The other area was designated Boasica Nucleus, due to the existence there of a sugar mill named Boasica. It measures 627 hectares and should lodge a population of 81,400 inhabitants. Respectively, the first area corresponds to ZR-1 -- Residential Zone 1 -- and the other to ZR-2 -- Residential Zone 2.

The four nuclei in the north -- ZR-3A, ZR-3B, ZR-3C and ZR-3D -- measure 342 ha, 212 ha, 760 ha. and 567 ha. respectively.

Of the 71.4% of the population to be allocated to the I.C. area, according to the theoretical model adopted, 39.1% will be absorbed by ZR-1 and ZR-2, and the remaining 32.3% should be distributed among these nuclei in the north, in addition to the population owed to natural vegetative growth in the already existing nuclei of Cabo and Ponte dos Carvalhos.

Thus, the function of ZR-3 will be to capture the non-allocated ex-cedent population in ZR-1 and ZR-2 due to insufficiency of space, as well as to take care of the natural expansion demand in Cabo and Ponte dos Carvalhos.

The last residential nucleus, the one located near the Grubu and Itapuzma beaches, has a total of 133 ha (hectares) capable of containing a population of 5,490 inhabitants. This is ZRT -- Touristic Residential Zone -- whose very name indicates a touristic function, in addition to serving to eventually accommodate the higher revenue manpower from the I.C.

In a synthetic table, we may list:

SIZE AND CAPACITY OF RESIDENTIAL AREAS

Designation	ha	inhab.	inhab./ha
ZR-1	75	10,400	139
ZR-2	627	31,400	130
ZR-3A	342	43,000	140
ZR-3B	212	23,000	132
ZR-3C	760	93,330	123
ZR-3D	567	30,000	141
ZRT	133	5,490	30

6.3 DIMENSIONING OF THE RESIDENTIAL PROGRAM

6.3.1 TYPICAL HOUSES

From the analysis of the incidence and of the type of residential house most adequate to the preferences of dwellers in the region and in the Recife metropolitan area, those types of houses most suitable to local needs were defined and proposed.

From the analysis, it was concluded that the single-family units would be preferred to the multi-family ones, in view of the large number of people which constitute one family (5.3 inhab./family).

Apartment buildings were limited to a maximum of four floors, elevators being avoided.

The choice of three different types of single-family residential units was aimed at estimating an adequate demand for houses proportionate to the local realities, and also at allowing for a visual diversity in the environment, always recommendable, and thus avoiding monotony.

- An isolated house will be a single-family residential unit built in the middle of a plot of land, without touching another in any of its limits.

- A geminate house will be a single-family residential unit built in pairs, sharing at least one common wall.

- A lineal house will be the single-family residential unit built in such a way as to always have walls contiguous to those of lateral buildings.

Examples:

The table below shows the various types of residential units, the minimum dimensions of the plots of land where they should be built, and the most recommended rate of incidence.

Minimum area of land tracts by type of house and forecasted demand.

TYPE OF HOUSE	MINIMUM LAND SIZE (m)	AREA OF LAND (m ²)	DEMAND (%)
ISOLATED HOUSE	15 x 30	450	5%
SEMI-DETACHED HOUSE	12 x 15	120	20%
LINEAL HOUSE	6 x 25	150	50%
4-FLOOR APARTMENT HOUSES	40 x 50	2,000	25%

The residential composition by modules, according to the types of residential units mentioned above and the forecasted demand for each, resulted in the following tables:

Module A

1,100 Inhabitants = 207 Residential Units

	AREA OF LAND/ RESIDENT.UNIT	NUMBER OF UNITS	TOTAL AREA m2	TOTAL AREA ha
Isolated - 5%	450 m2	10	4,500	0.45
Lineal - 50%	150 m2	104	15,600	1.56
Geminate - 20%	180 m2	41	7,380	0.74
Appartments - 25%	40 m2	52	2,080	0.20
TOTAL		207	29,560	2.95

Module B

3,300 Inhabitants = 623 Residential Units

	AREA OF LAND/ RESIDENT.UNIT	NUMBER OF UNITS	TOTAL AREA m2	TOTAL AREA ha.
Isolated - 5%	450 m2	31	13,950	1.39
Lineal - 50%	150 m2	311	46,650	4.67
Geminate - 20%	180 m2	125	22,500	2.25
Appartments - 25%	40 m2	156	6,240	0.62
TOTAL		623	89,340	8.93

Module C

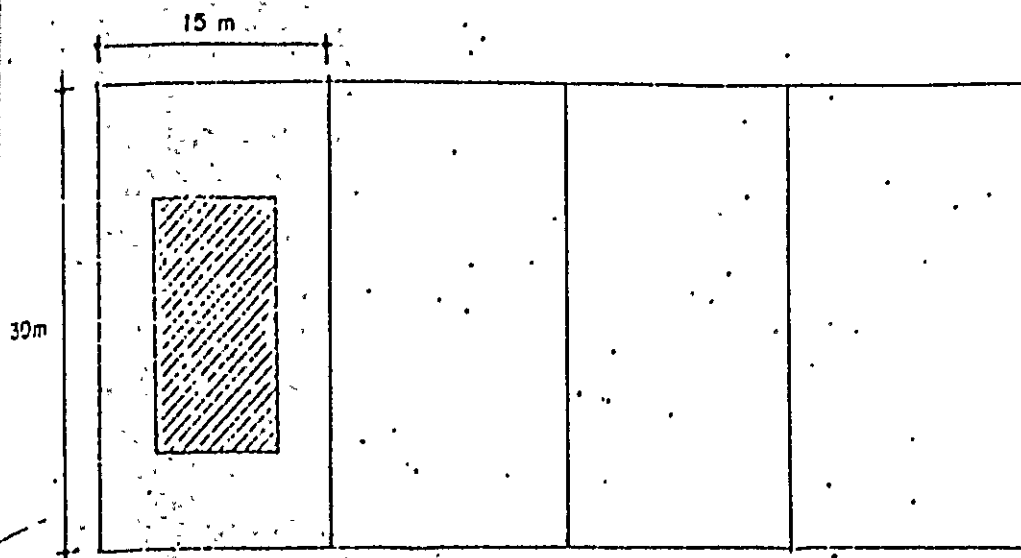
9,900 Inhabitants = 1,863 Residential Units

	AREA OF LAND/ RESIDENT. UNIT	NUMBER OF UNITS	TOTAL AREA m ²	TOTAL AREA ha.
Isolated - 5%	450 m ²	93	41,850	4.13
Lineal - 50%	150 m ²	934	140,100	14.01
Geminate - 20%	130 m ²	374	67,320	6.73
Appartments - 25%	40 m ²	467	13,600	1.36
TOTAL		1,863	267,370	26.73

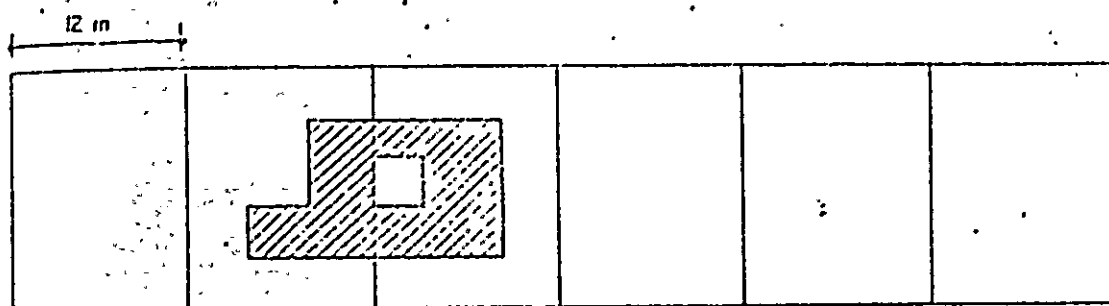
The calculation of the minimum areas required for the installation of the modules was done on the basis of the discrimination of land tracts for residential purposes and their probable demand, and on the estimated minimum areas required for trade, roads and green areas as per standard parameters.

MINIMUM AREAS REQUIRED FOR MODULES (ha)

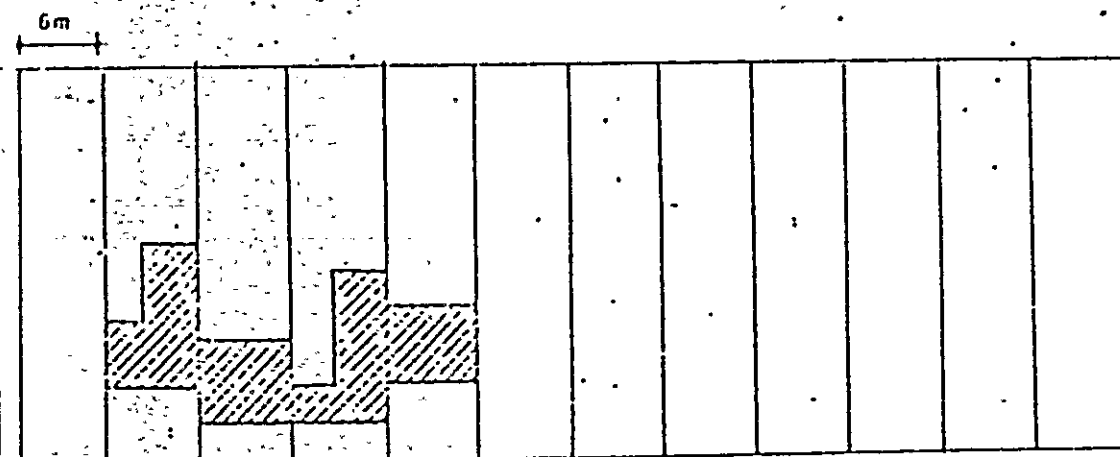
	MODULE A	%	MODULE B	%	MODULE C	%
RESIDENTIAL AREA	2.95	51	3.93	51	26.78	51
SERVICES AREA	0.09	2	1.37	10	5.31	11
ROADS AREA	1.36	32	5.60	32	16.30	32
GREEN AREAS	0.32	15	1.13	7	2.30	6
TOTAL	5.72	100	17.53	100	52.19	100



ISOLATED HOUSES

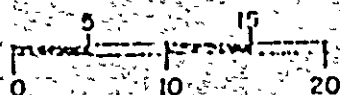


GEMINATE HOUSES



LINEAR HOUSES

SCALE 1:500



dipor



PLANITCON SA

GOBIERNO DEL ESTADO DE PUEBLA
COMANDO EN JEFE FUERZAS ARMADAS
DE PUEBLA

COMPLEJO INDUSTRIAL DE BUAP

TYPES OF RESIDENTIAL
UNITS

PROYECTO: BUAP [] AREA: [] DESCRIPCION: []

FECHA: []

HOJA: []

TOTAL: []

6.3.2 IN-STAGE CONSTRUCTION PLAN

The studied residential plan aimed at determining the main project guidelines and at furnishing a basis for cost analysis and financing programs.

The methodology adopted for the urbanistic pre-dimensioning was based on the composition of 1,100-inhabitant modules, with their respective demands for urban facilities and services in general.

Thus, each 1,100-inhabitant module is accompanied by a system of services which are deemed indispensable.

The composition of such modules resulted in a theoretical model of residential programming, with the advantage of allowing for construction in stages.

The theoretical model was thus organized:

MODULE	NUMBER OF INHABITANTS	SYSTEM OF SERVICES	COMBINATION OF MODULES
A	1,100	A	-
B	3,300	B	$B = 3A$
C	9,900	C	$C = 3B$ or $9A$
D	49,500	D	$D = 5C$, $15B$ or $45A$

As we can see, the sum of three A modules is one B module, and so on; five C modules originate a D module, which is considered as having the maximum ideal proportions for this model. Beyond module D, the growth of the residential nucleus would be completed by a new summation of modules, up to the creation of a new D module.

However, it is necessary to bear in mind that, if the number of inhabitants increases at an arithmetic rate, this is not the case

with the system of services, since these will be as much more sophisticated as the residential nuclei become larger.

Services deemed indispensable to each module are defined as follows:

SERVICE SYSTEM A (1,100 inha./207 residential units)

DESCRIPTION	CONSERVATION AREA
1) Commerce (Grocery, Greengrocery, Bakery)	150 m2
2) Small craft shops	50 m2
3) Miscellaneous	50 m2
4) Kindergarten	150 m2
TOTAL	400 m2

SERVICE SYSTEM B (3,300 inhab./623 residential units)

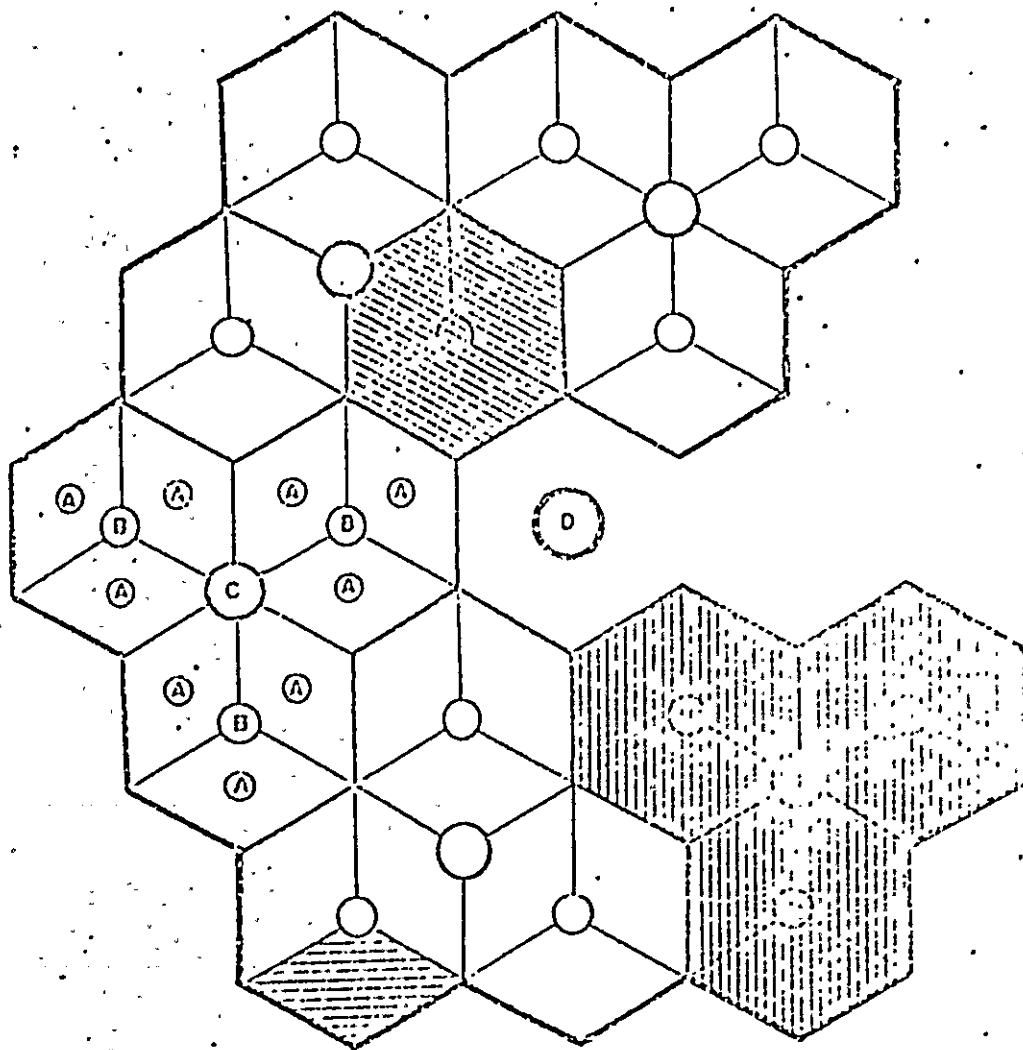
DESCRIPTION	CONSERVATION AREA
1) Commerce	500 m2
2) Small Craft Shops	100 m2
3) Bars, Restaurants	100 m2
4) Health Services	50 m2
5) Churches	225 m2
6) Grade Schools (16 classrooms - 430 students)	2,200 m2
7) Sports - Football field	10,600 m2
TOTAL	13,975 m2

SERVICE SYSTEM C (9,900 inhab./1,363 residential units)

DESCRIPTION	CONSERVATION AREA
1) Commerce	1,200 m2
2) Supermarket	500 m2
3) Public market, circus, feasts	10,000 m2
4) Offices, banks	500 m2
5) Restaurants	500 m2
6) Sports	600 m2
7) Health	1,000 m2
8) High School	2,800 m2
9) Miscellaneous	800 m2
TOTAL	17,900 m2

SERVICE SYSTEM D (population 49,500 inhab., 9,340 residential units)

1) Offices	2,300 m2
2) Community Center	500 m2
3) Market	3,000 m2
4) Hospital	10,000 m2
5) Hotel	4,000 m2
6) 2 Cinemas	4,300 m2
7) Bus Terminal	400 m2
8) Railroad Terminals	3,000 m2
9) Post Office	1,100 m2
10) Police	500 m2
11) Fire House	1,500 m2
12) Cultural Center (exhibits, auditoriums, etc.)	1,500 m2
TOTAL	33,100 m2



NUCLEUS A. 1,100 inhab. ☐

" D=34+3,269 " ☐

" C=34+2,500 " ☐

" D=34+2,500 " ☐

dipor



TRANSCON SA

GOVERNO DO ESTADO DE PERNAMBUCO
(SECRETARIA DE ENGENHARIA, ARQUITETURA E URBANISMO)

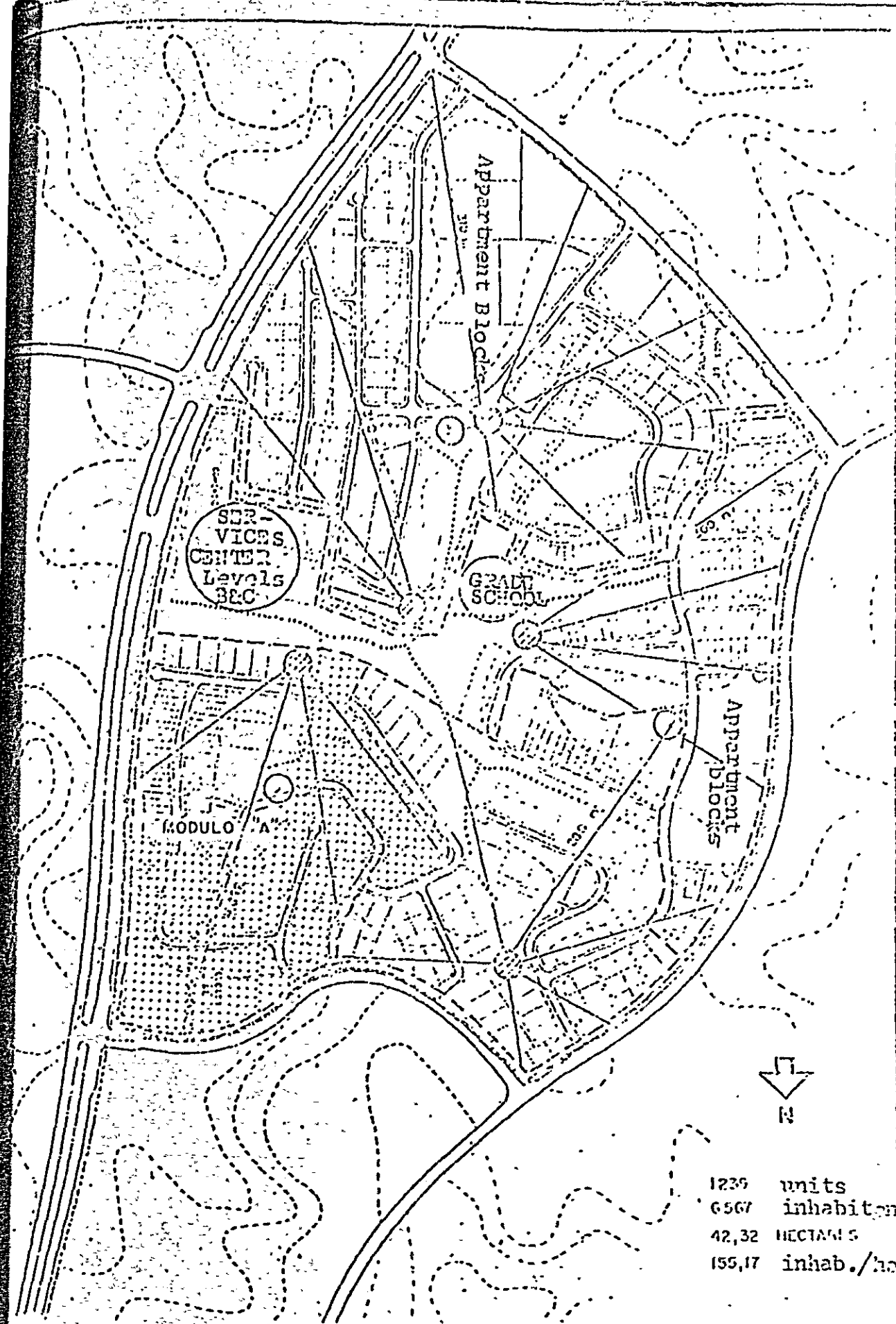
COMPLEXO INDUSTRIAL DE SOARES

THEORETICAL MODEL OF

RESIDENTIAL PROGRAM

construção data 1971

1/771



1236 units
 6567 inhabitants
 42,32 HECTARES
 155,17 inhab./ha.

○ Neighborhood Center - Level A	□ Residential Module - Level A	dipor INSTITUTO DE URBANISMO DE SÃO PAULO
○ Nursery School	□ Residential Module - Level B	
	□ Residential Module - Level 2A	

GOVERNMENT OF SÃO PAULO
 INSTITUTO DE URBANISMO DE SÃO PAULO
 COMPLEXO INDUSTRIAL DE SÃO PAULO
URBANIZATION SCHEME
 20-2
 Date: 1971
 Scale: 1:10,000

6.3.3

RESIDENTIAL AREAS

These are the areas considered good for residential purposes.

These areas should have a direct access to the pedestrians circulation system.

The general criterium adopted for distribution of the residential density was that of concentrating the multi-family unit areas (four-floor buildings) on those higher locations, closer to the primary access roads. This aims at:

- Cut down on the flow of vehicle traffic on low zones, thus preventing conflict with the pedestrian circulation proposed for these zones, and
- To prevent visual obliteration and provide for open space.

The single-family unit areas would be those located between the above and those of multi-family use, and those of recreational use and pedestrian circulation in lower areas.

6.3.4

ROAD SYSTEM

The road system hierarchy established the following categories of roads:

- Primary Distribution Roads:

These are the roads which provide for perimetral and transversal access to the city without direct access to land plots. Traffic on these roads is fast, intersecting only with secondary distribution roads. They should have the nature of an avenue, with a central isle to divide the two traffic lanes. Their typical sections should include special tracks for circulation of bicycles.

Secondary Distribution Roads:

These are the roads giving access to residential sectors, and should have no direct land plot fronts. Traffic on these roads is slower than in the primary roads, intersections occurring more frequently with the local collecting roads. The typical sections for these roads should have special tracks for bicycles and sidewalks for pedestrians.

Collector Roads for Local Traffic:

These are the roads giving direct access to residential units. They should lead into and away from the secondary distributors; or they may be dead ends, with a "cul-de-sac" type of turnabout. The typical section should include sidewalks and parking strips shoulders.

3.5 EXCLUSIVE PEDESTRIAN CIRCULATION SYSTEM

The existing low areas, or areas located at the bottom of the valleys, constitute a veritable mesh-work upon the urban area, and its current drainage function should be maintained. It constitutes a valuable unifying element for the area, which should be taken advantage of as a system of green spaces destined for pedestrian circulation and for the following purposes:

- To avoid construction in areas presenting a certain risk of flooding;
- To preserve the current natural drainage system, facilitating adduction work and the required protection;
- To take advantage of the aesthetic and recreational potential of water streams by creating small dams and attractive areas for the pedestrian;
- To facilitate accesses by intensifying their use and conservation;
- To create a pedestrians circulation system completely independent from the vehicle circulation.

The advantages of creating a system as the one proposed above are innumerable, and this circulation and leisure system should be

studied and planned at a detailed level that will guarantee its optimal use, as well as its execution and conservation.

The equipment suitable for this area would be:

- playgrounds, an area specially equipped for children's recreation;
- areas with sports fields for young adolescents and adults;
- quiet corners; with benches and suitable vegetation, adequate for the elders' recreation and leisure;
- a covered, multi-purpose area where craftsmanship could be exhibited, small theater plays could be shown, and musical bands could perform;
- kindergartens and grade schools.

In addition to the above, suitable vegetation and gardening, the required sanitation works and a minimum system of sidewalks for circulation should be projected for this area. Where the pedestrian circulation system intersects with vehicle traffic, there should be adequate signalling and traffic strips for pedestrian protection.

6.3.6 COMMUNITY FACILITIES

The type of dimensioning of the required community facilities was shown in detail with the theoretical model of residential programming.

As regards the distribution of such facilities in space, grouped as per the A, B, C and D service systems mentioned above, it is necessary to take into account that the function of one is to complete the other, and that as levels grow from A to D, the sophistication of services increases in quality and quantity.

Thus, when projecting a residential nucleus, the most adequate location for the creation of neighborhood centers should be planned for, in the most homogeneous possible way, by reserving those

spatially more suitable areas for each type of facility. For example: the service system D in easily accessible locations and quite central in relation to the entire community, commerce, market, hospital, church, public market, restaurant, bar, high school and neighborhood centers and kindergartens and grade schools and craft shops completely distributed throughout the urban network.

Schools should always be directly connected to the pedestrians circulation system, so as to minimize distances between dwelling places of the population which they will serve.

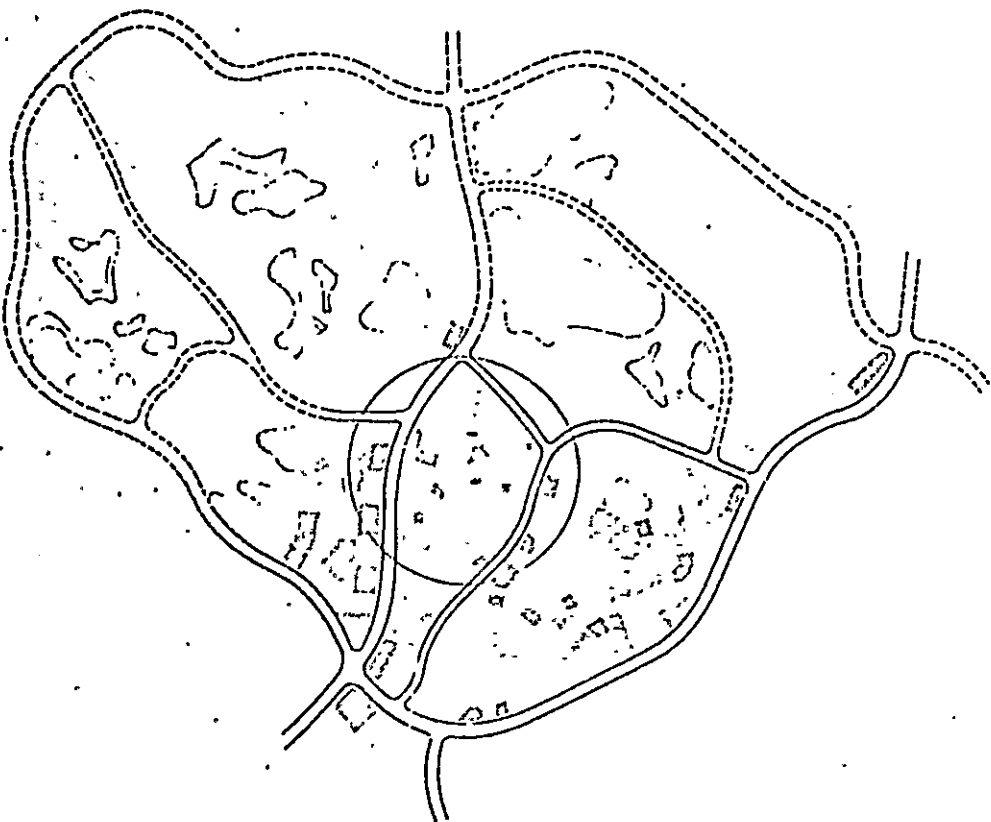
6.3.7 GREEN AREAS

In addition to the green areas for pedestrian circulation, we have those with a slope above 20%, which are deemed economically unsuitable for construction.

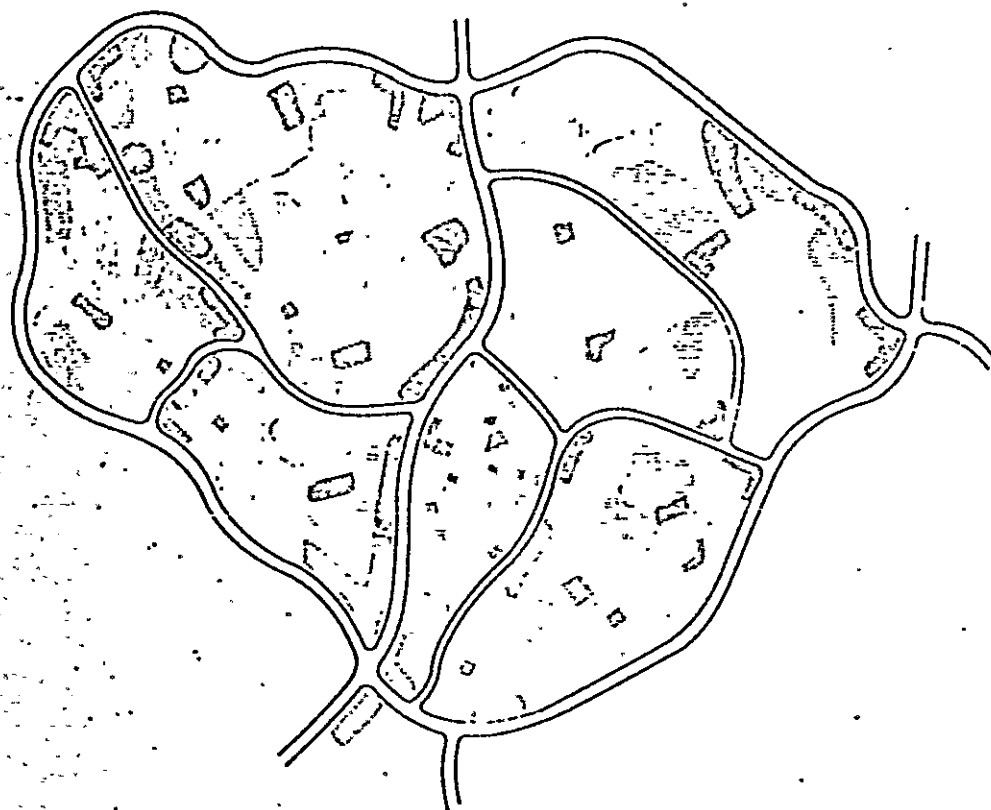
The preservation areas in residential nuclei where the topography is more accidented determine the distribution of urban occupation and should, therefore, be the first to be surveyed. No use should be planned for such areas, and the restitution of the natural vegetation is recommended, or reforestation, for the purpose of preserving hillocks from possible erosion risks.

The mass study presented for ZR-2 is a perfect illustration of the importance of the initial identification of these areas, so that the others can be selected later.

1st Stage Projection

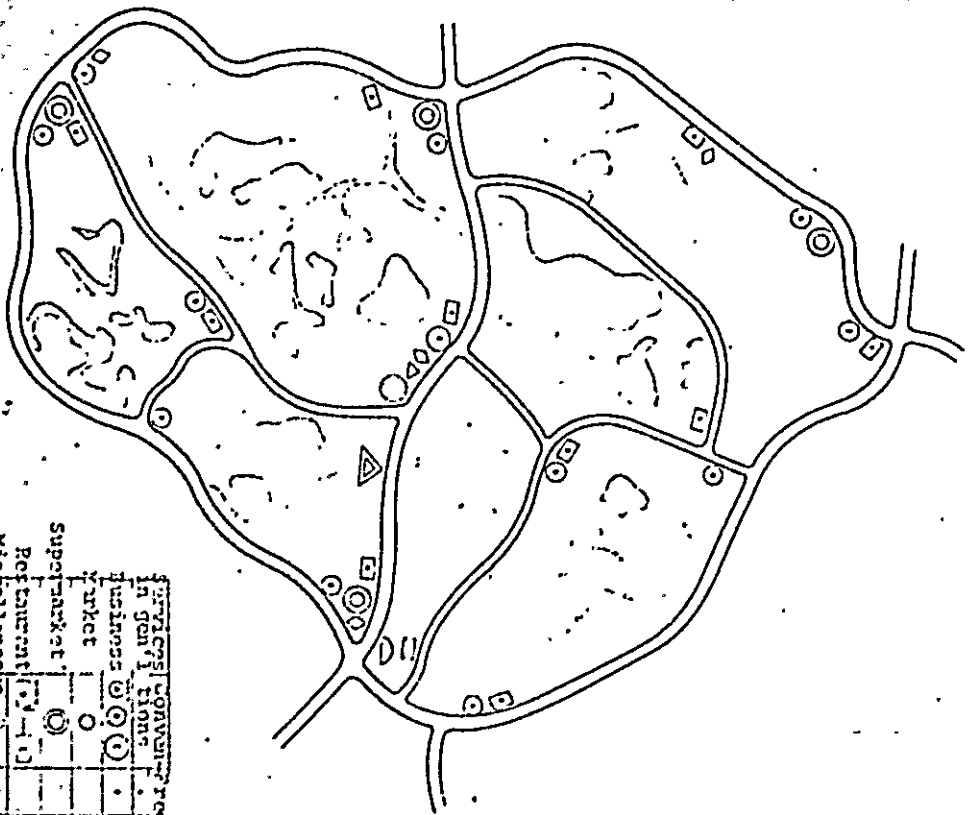


Maximum Occupation Projection



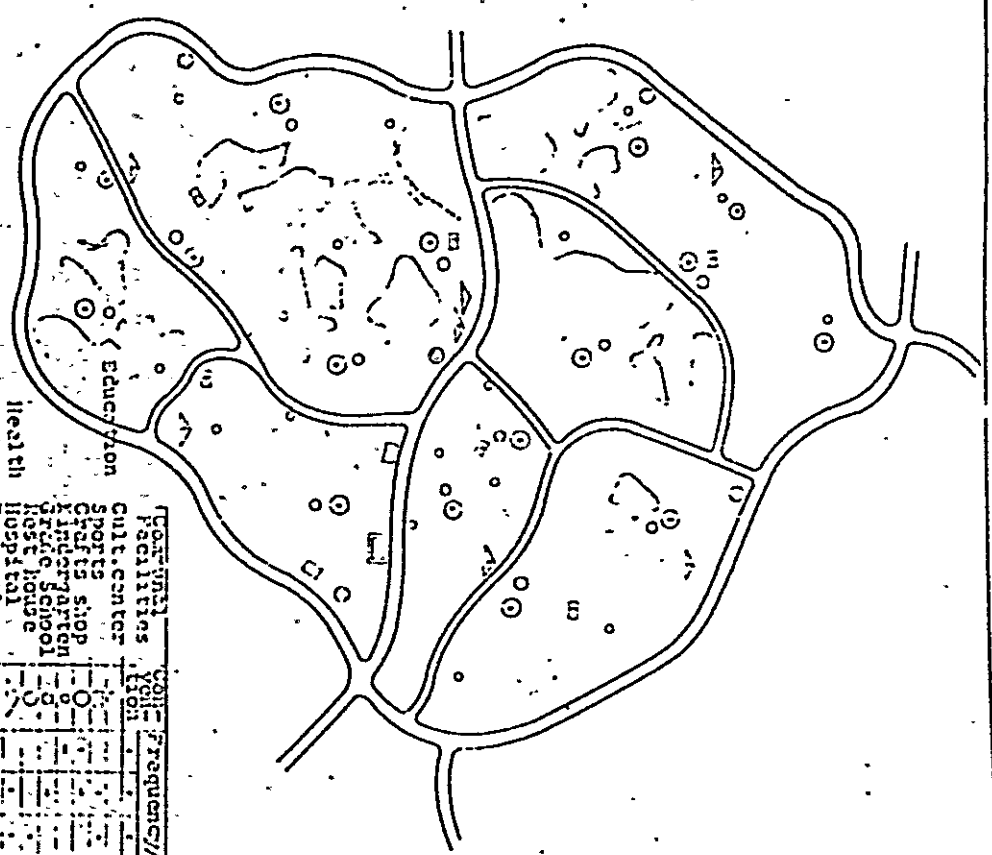
Population Estimate (inhab) -
1st Stage

Map of the 1st Stage Projection



Facilities: convenience frequency/modality
in general terms

Facilities	convenience	frequency	modality
Business	○	○	○
Market	○	○	○
Supermarket	○	○	○
Restaurant	○	○	○
Miscellaneous	○	○	○
Hotel	○	○	○
Post-Office	○	○	○
Bank	○	○	○
Police	○	○	○
Fire-house	○	○	○



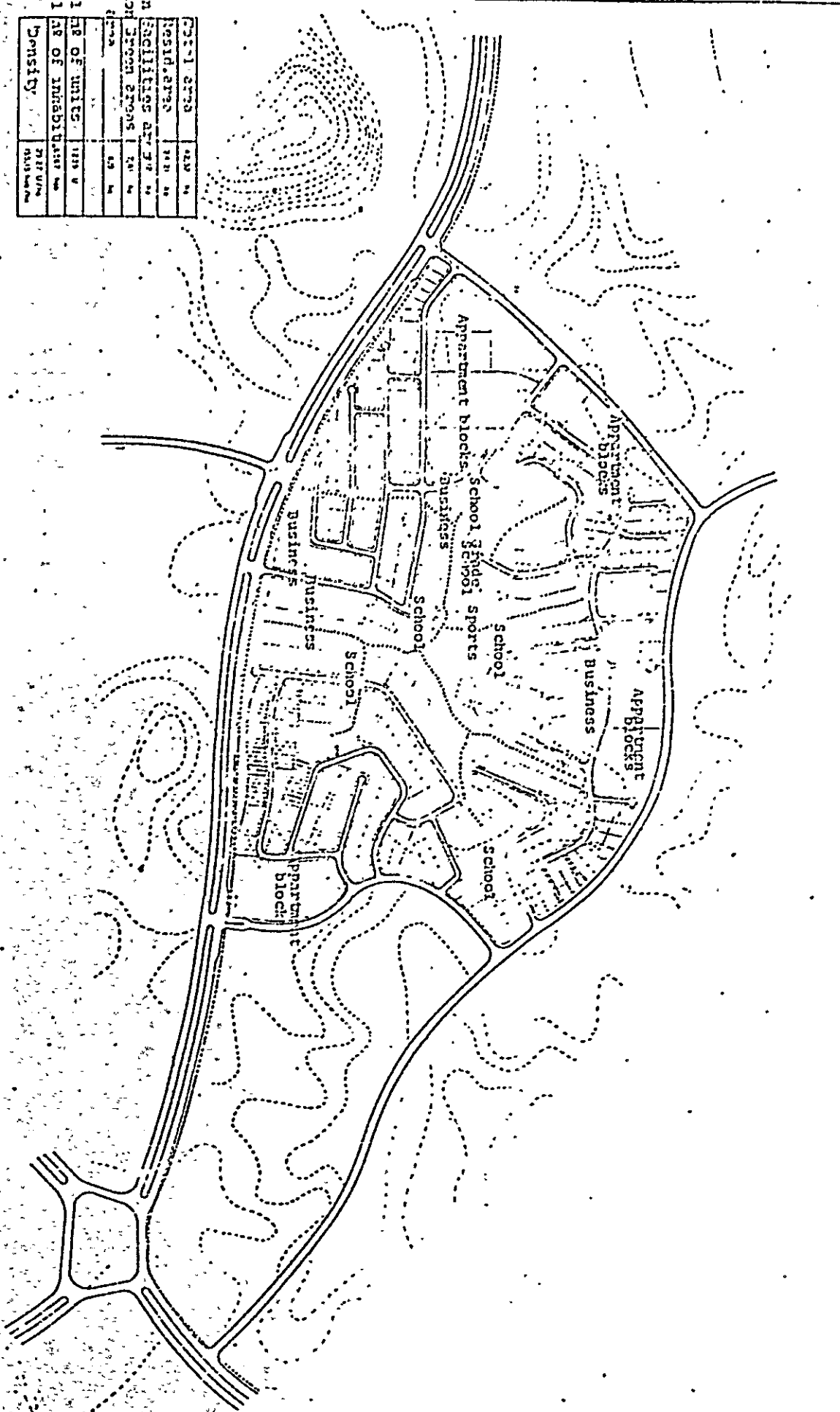
Facilities: convenience frequency/modality
in general terms

Facilities	convenience	frequency	modality
Education	○	○	○
Health	○	○	○
Leisure	○	○	○
Cinema	○	○	○
Cultural center	○	○	○
Sports shop	○	○	○
Amusement	○	○	○
Trade school	○	○	○
Hotel	○	○	○
Hospital	○	○	○
Post-Office	○	○	○
Market/center	○	○	○



Departamento de Vivienda y Urbanismo
Ministerio de Obras Públicas y Transportación
Instituto de Urbanización y Vivienda

Total area	425 ha
Residential	100 ha
Urban facilities at 30 m	
Control from 2000	100 ha
Ratio area	60 ha
Total no of units	1000
Total no of inhabitants	10000
Density	2000/m ²

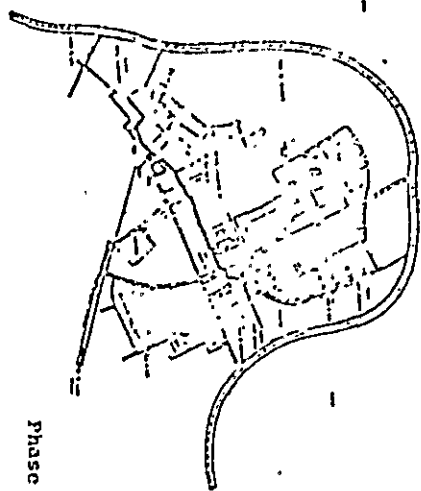


Green area
Linear house lot
Bicycle circulation
Road



dpur

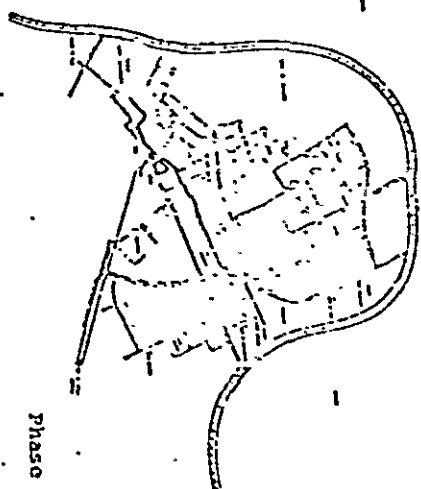
Urban and rural planning
Department of Urban Planning
University of the Witwatersrand
Johannesburg



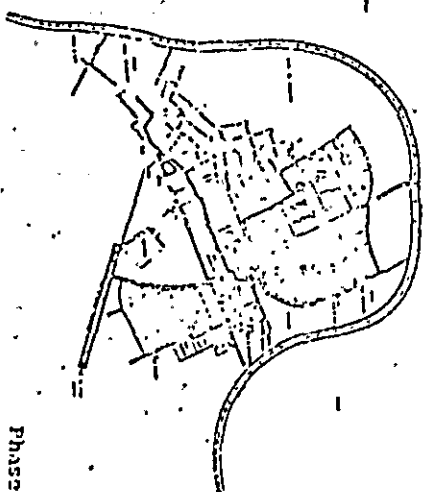
Phase 1



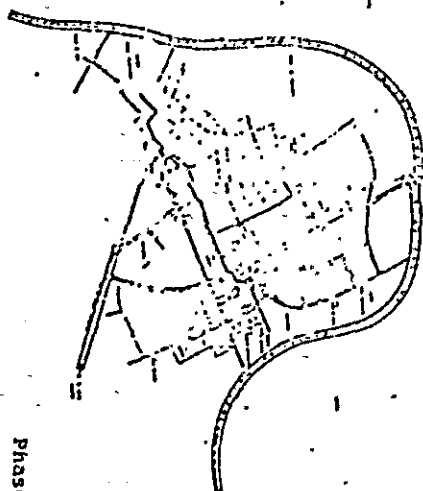
Phase 2



Phase 3



Phase 4



Phase 5

(REMARKS)

☐ Commercial and Institutional Center

Concentration of CCI's activities occurs in accordance with habitational growth stages, corresponding in the final stage to a level "C" Modulo.

PHASE YEAR BE BUILT TOTAL BUILT

Scale

diaper

ANIMACION PHASES OF THE PHASES

10110 -

PART 2 - 8.0

~~LA A-10110A 8.14~~

8.0 TOURISTIC DEVELOPMENT
PLAN

8.0 TOURISTIC DEVELOPMENT PLAN

8.1 JUSTIFICATION OF THE STUDY

In the section dealing with the planned use of the land, contained in the proposal for studies of the Suape Industrial Complex, the definition of areas intended for tourism and leisure is anticipated.

The creation of a touristic industry in the Suape Complex constitutes a substantial contribution to the economic support for the State of Pernambuco in particular, and to the Northeast in general, which is expected from the organized development of the area. A relative unbalance between natural resources available in other areas of the country, and the social needs represented by a growing, economically active population, without any job opportunities, establishes the necessity for a short-term focusing on this high priority aspect.

It so happens that physiographic conditions in the area facilitate a natural division between the industrial complex, which is being studied for implementation as a function of the port, and those areas intended for recreation and leisure.

The preliminary studies of environmental preservation, landscaping, natural conservation and optimization of the area's utilization, recommend that 30% of the total area, at least, should be preserved for this purpose.

This recommendation results not so much from the advantages of the environmental preservation and the consequent economy in maintenance costs, but rather from federal legislation impositions, as regards the preservation of the Historical Patrimony in the area.

Where tourism is concerned, the basic guideline will be to guarantee

the adequate and vocational utilization of beaches with a unique natural beauty, such as Gaibu, Itapoama and Cupe.

These areas have been protected from uncontrolled urbanization, which is a quality of Recife and of other metropolitan areas in the country, in virtue of the physical barrier which the Jaboatão River and the mangrove swamps represent. As a matter of fact, the absence of an access way and of an urban infra-structure have worked to preserve this zone of great natural beauty, which will now be utilized as a consequence of investments to be made in the Guape area. Located on the North-South line of the Industrial Complex, these beaches will be an appropriate location for leisure activities.

According to Erik Langdalen, the conflicts between tourists and social local interests may be a considerable factor in leisure planning.

The more sensitive planners take pains to avoid the conflict between local populations and mass tourism, a conflict which took on an obnoxious character for the social-cultural balance in such areas as Southern Spain and the Caribbean. Social tensions developed in the Caribbean which led to an atmosphere of hostility against the tourist, serious enough to render certain areas unsafe.

Brazil has not yet been touched by this type of event. The greatest difficulties here are the absence of a highway structure and of enough automobile owners to incentivate local tourism, in addition to the high cost of air transportation for international tourists.

These obstacles are gradually being surmounted: the increase in the highway tourism, which is evident through a yearly increase of more than 25% in the tourist flow in Salvador, is a significant indication of the demand in this field.

On the other hand, large airplanes -- the so-called DC-10 flying jumbos, the jumbos, and so on -- are scheduled to start flights this year. These air transportation means are feasible only to those touristic locations where there is an adequate shelter infrastructure. Thus the establishment of hotel networks has turned into an initiative which is supported by the large air transportation companies, a fact which can be observed internationally and locally.

Plans are known for a large hotel to be built in Piedade by a Brazilian aviation company, and for another chain of hotels in Salvador, belonging to a French airline.

It should also be noted that Salvador's position as a touristic attraction has been well defined in BNDE's 1971 research. In it a note was made that 40.4% of Recife's visitor came there for touristic reasons, whereas for Salvador this number was 70.1%.

The increased touristic activities in Salvador with the above mentioned hotel, plus the construction of Club Mediterranean-type complexes on Itaparica island, indicate that the attraction will be exerted on an international level.

However, there are no objective and concrete plans in Brazil for the creation of touristic complexes.

These complexes are usually located at a small distance from urban centers, so as to be able to act with a given degree of independence and, at the same time, to benefit from the logistic support of nearby towns.

Some of these complexes are remarkable examples and have constituted a model for similar implementation in other parts of the world. We can mention that of the southern coast of France, with the Languedoc Touristic Complex; the one in Costa do Algarve, in Portugal; the one in Costa Brava, in Spain; those being installed in Sardinia and in Corsica; those on the coastal beaches of Algeria, and others.

There are favorable conditions in Suape from the viewpoint of a sea resort. A pleasant climate, constant winds, and the traditional and picturesque "jangadas" (fishermen's catamarans) may give rise to a new touristic use which should grow as the national income level rises, and should offer an additional appeal to international tourism.

A market identification study will be carried out with the help of experts with international experience in the tourism methodology, in order to determine which are the largest potentials.

It is not only a matter of updating information, since world trends have changed rapidly due to latest occurrences as regards transportation costs and leisure supply and opportunities, but also one of locating areas where promotional stimulation can produce the best results.

If in Brazil, on one hand, the desire to get to know the Northeast is justified by questions of exchange revenue balance and valorization of our natural and cultural patrimony, working for the habit formation of using South America as a destination is indispensable abroad.

In this sense, the enterprise would aim at making Recife into an open door to tourists and an option for those who are headed for other attractions on the continent.

In addition to the incentive tourism, the second heaviest user of hotel facilities is the group represented by congresses and conferences. Here the work would aim at formulating a congress and conferences program, whose schedule would place an emphasis on the area, and where national and international participation would be the most adequate way of filling room vacancy, particularly during off-season times and/or local holidays coupled with weekends.

The job of dimensioning those resources to be developed in the hotel and conference facilities area will be carried out as a result of this type of research, so that private entrepreneurs may receive from DIPER an adequate orientation as regards the required scheduling, including the planning of promotional campaigns, opportunities for financing, sales planning, sales campaigns, programs, personnel selection, advertising and public relations, marketing and administration.

The divulgence of Pernambuco on a national scale was quite significant. A recent survey carried out by SUDEINE revealed that, in 63% of the total sample interviewed in the south, Northeastern capitals were compared with smaller cities. Thus, among every 10 interviewees, 2 compared Recife with Porto Alegre, and 1 found a resemblance between Recife and Niterói, Belo Horizonte and Florianópolis. Among the "cariocas," 34% did not know what cities Recife could be compared with.

On the other hand, as far as touristic appeal is concerned, it should be mentioned that, in a listing of the strongest touristic attractions, the three which had first place were: beaches (30%), historical places (32%), and folklore centers (11%). Other attractions (such as colonial architecture, shopping places, traditional festivities, rocky formations, cultural centers, etc.) received less than 6% of the mentions. For the Suape project, this is very significant, since there we have, simultaneously, beaches and historical places, and it is not difficult to promote within the Complex the next three attractives: folklore centers, typical food centers and traditional festivities.

As for colonial architecture, Recife and Olinda can offer their users a few exceptional opportunities.

Another facet of the market is the possibility of appeals to university students -- a growing public, both in quantity and in purchasing power. As a recent survey has pointed out, they are

a group of which 55% habitually take touristic trips and, among those who do, five take such trips or more times per year.

Another positive factor that can be mentioned for Recife is the existence of a development plan for Fernando de Noronha, which is now being approved by Embratur and which will certainly result in further access to Recife, both from abroad and from the interior of Brazil.

3.2 ANALYSIS OF BEACH CHARACTERISTICS

The major touristic attraction in the Suspe region are doubtless its beaches. The rational utilization of these beaches requires a detailed analysis of the following aspects:

Quality

Beach features can vary widely as regards natural beauty, size, width, etc. In order to facilitate an evaluation, three value categories were introduced, having as a reference the general aspects of a beach:

- exceptional
- average
- less attractive

The following criteria were taken into account, in the order of their importance, for the evaluation of a beach's category:

- accessibility
- vocation for fishing, swimming, surfing, sunbathing use
- width
- length
- shape: straight line or semi-circular

- degree of protection: protected or exposed to the open sea.
- scenery: flat land or vicinity of mountains, forests, dunes, coconut plantations, rock formations.
- adjoining areas: useful for construction or not.
- nearness to polluting sources, such as river mouths.

b) Areas

For calculation of utilisable areas, only those located between the water line and vegetation were taken into account, and which can be used for sunbathing.

c) Potential Occupation and Density

Usually, beaches cannot be considered as uniform density areas. There are differences between the various modes of utilization and, specially, between the habits of the different kind of bathers. The most attractive beaches are destined for a more carefully selected attendance. The area of beach per bather, in this case, is larger (25 m²) than that in an average beach (15 m²) or in an attractive beach (10 m²).*

d) Theoretical Number of Beds

When we divide the total area of the beach by the chosen density, we have the theoretical number of bathers. Three beds are estimated for each bather, since the simultaneous use by all bathers does not occur. These figures give the desirable maximum, no difference being made between tourists, permanent dwellers and service personnel. Outside bathers (from Suape, Cabo, Recife, etc.) have not been taken into account.

The fishing village in Suape, with its lobster fishing boats and jangadas, allow for other touristic possibilities, such as fishing sports and yachting. The agreeable climate and constant winds would be the major appeals, justifying the creation of a sailing center next to the Cape of Santo Agostinho (without the inconveniences of the Cabanga Yacht Club, whose members have to go a long way through the Passarinhos shallows up to the reef, and along these down to the port entrance).

The two rustic restaurants which exist at Gaibu take advantage of the touristic vocation of the area, and permit us to forecast their future possibilities. Rudimentary touristic installations also exist in Suape, Itapoama and Cupe, due to the beaches' appeal.

Location

Tourism is based upon the individual freedom of repose, diversion or physical development.* The location must be adequate for these purposes: the place should be sufficiently quiet for resting, and should have attractions for amusement and diversification for personality expansion. In the case of Gaibu, an area somewhat isolated among hillocks, with residual woods and beaches covered with coconut palms, these conditions are at an ideal level. The highway system avoids the passing-through traffic, by means of PE-9 and PE-26 to Suape and Recife. The same perpendicular access principle should be used for access to the beach, instead of parallel ones. This will also encourage the idea of "living on the beach." The walking distance to the beach should not be greater than 10 minutes. The "living on the beach" strip is thus reduced to a width of 500 to 600 meters. This utilizable area is limited also by topographic, geological and vegetational factors, and by the preservation areas.

Topography

The topography of the area is characterized by hillocks, between 10 and 30 meters high, and the plains located between them and the sea. Utilizable areas are restricted to the plains, with less than 10% slopes, in order to avoid interfering with the natural topography. Land filling work for the expansion of utilizable areas is not desirable, because it is a very expensive process and would offend the existing landscape, which is very attractive.

Geology

The hillocks, with the exception of the Cape of Santo Agostinho, are tertiary deposits, subject to a high risk of erosion if and when the formation is exposed. The plains are constituted by alluvial and flooding deposits, and by coastal marine deposits. Geological factors also restrict utilizable areas to the plains, due to the great risk of erosion.

Vegetation

An analysis of the vegetable cover reveals that ⁱⁿ the Suape area most hillock tops are still covered by residual woods. Sugar cane plantations develop down the slopes and valleys. In the sandy strip at the beach, coconut plantations are a source of economic wealth and, at the same time, a scenery of rare beauty; they should be preserved and even extended, in those areas where the plantations are discontinuous.

Preservation Areas

In the study of preservation areas, the protection of marshland woods, scenic coconut areas and residual woods has been recommended, for slope protection. The peninsula between the Jaboatão River and the Paiva Beach is a very restricted area, where nature prevails with the river, the sea, the beach, the dunes, the coconut palms and the mangrove swamps. No construction beyond an isolated tour-

istic facility should be tolerated in this area; neither should it be tolerated in the Cape of Santo Agostinho which, besides, has been registered as an historical area and should be preserved.

f) Legal Restrictions to Utilization

The tourism plan occupies part of the Suape area which has been declared, by a decree signed by the Government of the State of Pernambuco, to be of public interest, there being also the possibility of expropriating certain private properties. In the hillock zone, to the south, west and northwest of the Iapuama beach, there are concessions for kaolin exploitation. These areas do not interfere with the master plan, and are made up exclusively by non-constructed sections, outside of visual reach from the beach.

THE EXISTING TOURISTIC INFRA-STRUCTURE

HISTORICAL ATTRACTIONS

As a touristic attraction, the beach (30%) has already been analyzed. Next to the beach, there are the historical attractions (23%) and folk-lore centers (11%). The touristic utilization of the areas is, therefore, mandatory.

Here, where History is present in every detail, we find a remarkable group of seventeenth century forts.

The Sea Castle, overlooking the opening in the reefs, reasonably well preserved; the fort on the Suape spit and the one at Gaibu, in a precarious condition; and the Cysseling fort, where research work should be carried out.

Located atop the Cape of Santo Agostinho, the Nazaré chapel and the convent's ruins are, without any doubt, the most important monuments from a religious architecture viewpoint.

Somewhat further -- but still within the Suape area -- the church and convent at Ipojuca, the Nossa Senhora do Ó church and the Gurupu Sugar Mill chapel are outstanding.

From the viewpoint of economic tradition, we have the Boa Vista sugar mills, outstanding due to its integration in the scenery, and the Massangana sugar mill, which is connected to Joaquim Nabuco's name and to the fight against slavery. In the latter, there has been installed a museum showing utensils dating from the days of Slavery.

All the above mentioned historical monuments require preservation work, access ways and landscaping for the enhancement of their aesthetic aspect and for the greater comfort of visitors.

TOURISTIC DEMAND EXPECTATIONS

The distance between the beaches north of the Cape of Santo Agostinho and downtown Recife is approximately 30 kilometers; to the new center at Suape, 12 kilometers. Within this coastal strip, of 30 km to the north and 30 km to the south, the beaches at Suape represent 25% of the total. The population of the Greater Recife is today around 2,000,000 inhabitants. The regional and State demand is oriented toward week-end and vacation houses, rental of huts with hotel service, and clubs.

In national and international tourism, more than 50% of the tourists may seek lodge in hotels. If we take the total number of 56,215 guests in Recife's classe A hotels for the base year of 1973*, we can see that a 100-bed hotel would absorb ~ 10% of the current hotel market. Touristic incentives and the creation of a convention center may greatly increase the demand.

Recife acts as an incoming and outgoing point for European "charter" companies. There is a potential for short-duration international tourism (a minimum of 1 to 3 days). A combination of both national and international tourism is ideal, due to the disparate vacation periods, which permits a balanced occupation rate. To attract foreign tourists on a large scale, for the enjoyment of several vacation days on the Suape beaches, their natural attractions should be supplemented by sea pools, yacht ports, restoration of historical areas, golf lanes, horse club with horseriding, etc., in addition to the common touristic facilities, so as to provide for the most varied list* possible.

L'Architecture d'Aujourd'hui n° 162, P.15

* A Receita Turística em Pernambuco

Bulgaria: Zlatni Pjasáci

Algarve: Vilamoura

PROPOSAL FOR UTILIZATION OF THE TOURISTIC ZONE.

PROPOSED MODULATION

The utilization proposals are based on the physical aspects described below.

1) Gaibu beach is 3 km long and has roughly 250 ha of land which can be urbanized.

The area is relatively isolated, to the south, by the promontory at the Cape of Santo Agostinho, to the west by a mountain formation, and to the east by the sea. The location is exceptionally attractive, without any great obstacles to urbanization.

2) Itapoama beach is approximately 3 km long and has between 100 and 130 ha of land capable of being urbanized. It is relatively isolated by the mountains in the East and South, which separate it from the area described in item 1. To the north, the mangroves on the Jaboatão River separate this area from the Piedade beach.

The quality of this area seems to be inferior to the one described in item 1, particularly on the low zones, though there are no serious obstacles to urbanization.

It is also assumed that the mining concession areas, when exploited, will not create any visual or water pollution problems that may affect the above mentioned areas.

To facilitate the formulation of a touristic development concept for Suape, we have imagined a combination of the three following types:

a - Barra da Tijuca, which is similar in terms of lo-

cation and topography, the are in Suape having much less economic support than that afforded by Rio de Janeiro (in population and economic activity).

- b - Cabo Frio - in relation to Rio and cities in the interior, in terms of tourism and week-end trips, coming from Recife and cities in the interior.

There are different types of interest in the area's touristic market:

- a - Those who work in Recife or in Suape aim at a luxurious house or beach house for weekends and vacations.
- b - Dwellers in the interior, aim at houses to spend weekends and vacations.
- c - Dwellers in the region, in search of a short sojourn for recreation, weekend and vacations.
- d - National touristic market.
- e - International touristic market.

Summing up:

The Gaibu area is considered adequate for tourism by the middle and high classes, as per classification in the previous items.

At the Itapoama beach, development should aim at middle classed tourists, predominantly of the C type, with some possibility for the A and B types.

To start urbanization, the Gaibu area is the most indicated, and the following composition is recommended:

beach hotel - 100 rooms - 1 high-quality floor with extensive recreational areas.

200 isolated houses for sale or rental, of different architectural types and high quality.

recreational and sporting club with large, high-quality facilities.

500 adjoining plots of land, with between 1,000 and 1,500 m², for luxury houses.

business areas of the "resort" type, strictly controlled.

green areas, communal facilities, sailing port, etc.

The basic idea would be to create an isolated area for use by middle and high class tourists, residing in Recife and in the interior, with a support segment made up by domestic, middle and high-class tourism.

In accordance with the implementation time chart, the following hypotheses were considered:

- 1 - The construction of the hotel, financed by the sale of land tracts, would be the initial development step.
- 2 - The club, with sleeping facilities, would be the initial development step, followed by the sale of adjoining land tracts and, as soon as possible, by the construction of the hotel and recreational facilities.

The infra-structure of public services might be restricted to the nucleus in the initial phase, and would extend over the entire area

urbanization moves on.

The Gaibu area development might be performed by preset landowners, associated with financial enterprises.

Governmental participation would be limited to fiscal incentives and some financing. The project is one of the most adequate to northeastern entrepreneurs, because it requires a small starting capital with a high return in the short run. The above outlined implementation schemes take these criteria into consideration.

It is assumed that the Gaibu area can be completely urbanized in five years' time, generating profits in excess of the purchasing cost of the land.

Final considerations:

Recife may become the principal airport for incoming "charters" from Europe, which will unload their passengers there; these passengers will be transhipped to domestic lines or other types of transportation. The "charters" market in the U.S. behaves in a different manner, having only one destination at present in Brazil, which is Rio de Janeiro. Excursions leaving from Rio head for the Iguaçu Falls, Brasília and Salvador, and might be extended to the Guape area, which is not at present adequate to this kind of activity in terms of infra-structure and communications, and does not allow for an adequate economic return.

There are possibilities in the International Market for excursions of tourist groups to the European and American markets, though in competition with other Brazilian attractions, as well as with Argentina and the Western coast of South America and Venezuela. Unless the study area is indeed of first quality, it will be difficult to compete with all these alternatives.

The hotel operation should be entrusted to a national group with experience in high quality hotels. Motel operators should be avoided.

The location is inadequate for a convention center, except for local business meetings.

A study is required for defining all developmental aspects connected with tourism.

8.5.2 MASTER PLAN FOR TOURISTIC AREAS

The vocation analysis of existing areas reveals five larger tracts of land which are suitable for construction work. Each one of them would be able to house a new residential nucleus. The nuclei are always limited by natural obstacles, such as mountains, rivers and the sea; historical or ecological preservation areas, such as mangrove swamps, coconut plantations and forests. By accepting these natural limits, it is possible to avoid a monotonous and uniform development along the beach. The linear development, which results from the utilization of beaches, is interrupted, structured and subdivided into characteristic units. Another structuring factor, in addition to natural limits, are the functional limits. The number of people required to support a neighborhood center and a high school is estimated at 3,000 inhabitants, which coincides with the population of the planned areas. The nuclei may be compared with the traditional neighborhood units, but without their theoretical and rigid features. The intention is to create a typical environment, integrated into the local scenery, in the five following nuclei:

1 - Cupe Spit with	4,500 beds
2 - Gaibu Beach with	3,500 beds
3 - Pedras Pretas Beach with	3,300 beds
4 - Itapuama Beach with	2,200 beds
5 - Paiva Beach	2,800 beds

The PE-9 route, leading into the touristic area, is based on the principle of avoiding any passing-by traffic along the beaches, where only the local traffic is permitted. PE-23 is a road perpendicular to the beach, whose route should be improved. The last two kilometers include separate roads to the two nuclei. Access to the Cupe spit will also be done by means of a local road connected with PE-9.

The analysis reveals that the beaches capacity is twice as large as the capacity of the construction areas. This will permit expanding the areas indicated in the Master Plan, leaving an allowance for outside bathers, without interfering with the comfortable occupation of the beaches. This reserve of 100% seems to be adequate when the nearness of Recife's metropolitan area is considered.

The zoning of these areas is based on the idea that those near the beach will be predominantly for touristic use, and those more distant areas will have a mixed utilization. Urban density, established by the rate of occupation and by the total area for buildings, increases with the distance from the beach.

Buildings should not interfere with the natural scenery. Maximum height is set at two floors, three floors being permitted at the neighborhood centers. The pedestrian and the bather will prevail in the coastal strip, for the major access runs parallel to the beach, at a distance of 500-600m. The areas reserved for construction are subdivided into 4 zones:

- ZT-1A - For touristic enterprises
- ZT-1B - For open-air sports and recreation, or within clubs
- ZR-4 - Residential zone with the possibility of the addition of various plots of land for touristic use (ZT-1)
- CB-1 - Neighborhood center for mixed use.

The preservation areas are located around these four zones.

1st Nucleus: Gaibu Beach

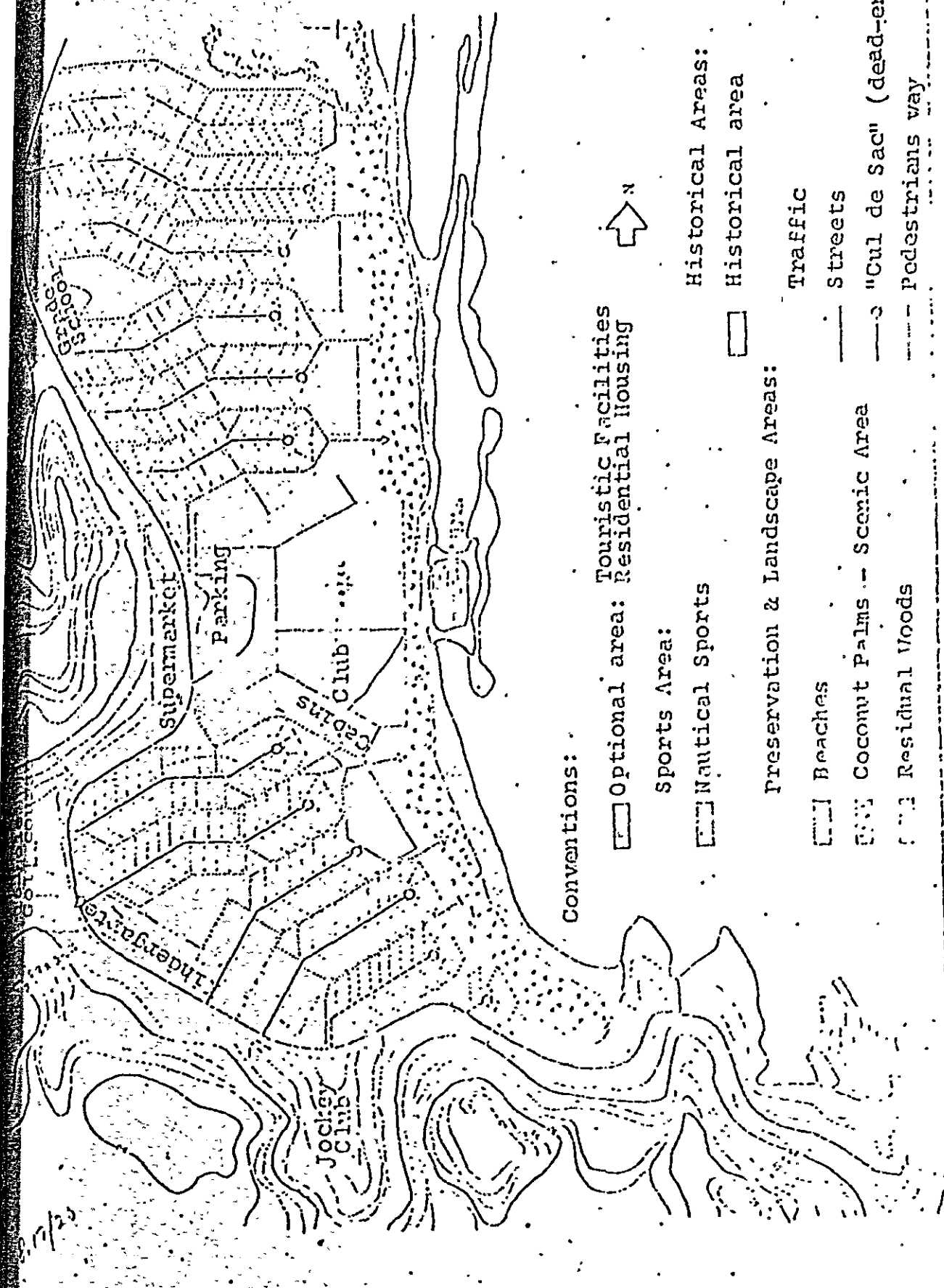
dipar



TRANSFORM 2A

Preliminary Design for
Touristic Area: Nucleus

Scale: 1:10,000
Date: 1978



Conventions:

[] Optional area: Touristic Facilities
[] Optional area: Residential Housing

Sports Area:

[] Nautical Sports

Preservation & Landscape Areas:

[] Beaches

[] Coconut Palms - Scenic Area

[] Residual Woods

Historical Areas:

[] Historical area

Traffic

[] Streets

[] "Cul de Sac" (dead-end)

[] Pedestrians way

8.6

RECOMMENDATIONS FOR PRELIMINARY STUDIES OF PHYSICAL PLANNING AND EVALUATION OF LARGE RECREATIONAL AND BEACH RESORT PROJECTS

8.6.1

ANALYSIS OF THE DEVELOPMENT POTENTIAL

- Identification of areas suitable for business utilization. Location: marketing basis, physical basis, restrictions imposed by laws and regulations, enterpriser's objectives which affect each location.
- Scale evaluation and time chart of potential absorption by the market for the previously identified uses in a given period of time.

Identification of the appropriate uses.

- 1 - Locational characteristics of the place
- 2 - Evaluation of physiographic characteristics of the place
- 3 - Infra-structure of public services (transportation, electric power, water, sanitation, communications, garbage collection)
- 4 - Limitations imposed by law and regulations
- 5 - Utilization pattern of the land, current and projected.

Analysis of market potential.

- 1 - Regional analysis
- 2 - Analysis of urbanization patterns - the real estate and recreations market
- 3 - Development potential of the location - the competitiveness of the location under study.

ANALYSIS OF THE DEVELOPMENT SCHEDULE

Identification of the basic characteristics of the project, its advantages, use of the land, real estate features, as well as the environmental objectives which are essential for the project's marketing support.

Formulation of alternatives for the development program, with yearly production increases, establishing the mixture of uses, time scheduling and general development and market statistics implicit in each alternative.

Formulation of the optimal program in relation to development objectives, market potential, and financial return.

Limitations of the development program.

- the area's capacity for development
- the market's absorbing capacity
- available financial resources for implementing and operating the project

Alternatives for the development program

- concept (of each alternative)
- market targets (for each alternative)
- strategy of development (for each alternative)
- use of the land (for each alternative)

Financial implications of the development alternatives.

- basic financial data (estimated capital cost, sales forecasts and yearly expenditures, available financial periods and their conditions, land costs, urbanization costs.

- financial analysis of proposed alternatives

Preliminary definition of the optimal development program and considerations with regard to its implementation.

6.3

FINANCIAL ANALYSIS

Projection of financial implications of implementing the optimal program, in the time sequence of each part of the project's operation.

Evaluation of financial sensitivity in relation to critical factors, and a revision of the landowners' role in primary activities and in implementing the infra-structure.

Supporting estimates and time-charts

- area definition and division
- use of land and densities
- proposed product lines, development costs and residual analysis
- time-chart of urbanization and production phases
- costs and profits scheduling

Cash-flow analysis

- analysis for the development of the project
- analysis of primary and secondary development activities
- financial implications of the proposed plan
- sensitivity analysis of the general program and of primary and secondary development activities.

DEFINITION OF THE TOURISTIC DEVELOPMENT ENTERPRISE

Definition of the owning company's resources and its operational capabilities, in order to determine their realistic application to the project.

Formulation of the ideal campaign program, bearing in mind the enterprise's objectives, the entrepreneur's resources and possibilities, available financing and financial return.

Owning company - resources and operational capabilities.

- establish the entrepreneur's objectives
- technical and finance capacity of owning company
- definition of the optimal legal structure and characteristics of the urbanizing company

Formulation of the owning company's role in the development

- possible creation of a "land bank" for the purchase of neighboring land, and scheduling of the urbanization and sale of lots
- Administrative and legal steps required for preparing the land for urbanization and sale
- optimal role of the owning company in the project's development, specifically as regards primary and secondary activities, and the operation.

- Analysis of the company's internal financial resources, and the possibility of using outside funds and financial methods.

- Financial implications of the land development proposed to the owning company as regards the rate of return, volume of return, time scheduling and total time of return, and exposure to risks.

TOMO II
PARTE 2 - 9.0

9.0 GUIDELINES FOR THE DEVELOP-
MENT OF THE AREA

GUIDELINES FOR THE DEVELOPMENT OF THE AREA

The following guidelines aim at determining the potential limit of the area in relation to the uses of the proposed project, on the basis of which planning must be carried out in stages corresponding to the reality of its implementation.

All constituted systems in the project were, wherever possible, planned in a modular manner, so as to enable its gradual implementation, adjusted to the effective demand and to the economic scale of the respective modules.

The development of the area should take place in a harmonious way, in response to the industrial demand, which ideally should be promoted on the basis of those industries with larger generative power and greater dependence on the sea, specially where ocean transportation is concerned.

The pioneer demand should also be stimulated by a pioneer supply, characterized herein as a first stage.

The activities to be implemented during this first stage were those identified as activities whose conditions are very likely to occur initially.

These activities served as a basis for dimensioning the resources needed for the initial implementation of the Complex, these resources being constituents of part of the first modules of the several systems.

Since the initiative must be caused at first by the supply, the first modules to be developed supply the needs in the first stage and retain the necessary allowance to take care of an increase in demand which has not been quantified in this report.

The Port Administration Services area ZCA-3 should be given much thought in the very long run, as the expansion of the collective port area - ZP - turns toward handling general cargo in its containerized and even fractioned versions.

The Communal Recreation area ZCA-2 should be initially prepared to congregate the population polarized by the I.C., its landscaping development growing gradually as these activities become more intense.

As regards Residential Zones, the project provides for one nucleus in the central area (ZRP), next to the Administration zone, intended for the camping of workers, preferably single, 2 nuclei in the south (ZR-1 and ZR-2), and 4 nuclei in the north (ZR-3), there being 3 around Cabo and Ponte dos Carvalhos, and one in the Boa-vista sugar-mill area.

Planning of these residential nuclei was oriented in such a way as to promote development toward the south, since the expansion of Cabo and Ponte dos Carvalhos is an accomplished fact.

Thus, taking advantage of the small infrastructure which exists at Nossa Senhora do Ó, urbanization would be immediately started through the incorporation of the existing activities, in order to permit the fixation of the additional population generated by the pioneer activities at the I.C., and which would expand to the limit of its physical conditions, and hence to the town projected for ZR-2-Boasica.

It is believed that, if Nossa Senhora do Ó receives better infra-structural conditions and ease of access through the I.C. Distributor Main, as well as through the implementation of PE-9 in the section PE-60-southern beaches, forming a dam around the lake projected for this location, its development will be considerably accelerated, polarized both by the proximity of the I.C. pioneering activities and by the southern beaches at the Cupe spit.

The development of Nossa Senhora do Ó (ZR-1) should alleviate the

of Ipojuca from the pressure of the demand generated by the activities, which will permit to preserve this town and keep its present characteristics.

It is thus deemed very important to carry out the immediate urbanization of the ZI-3 industrial area, located in the neighborhood of the area intended for the Refinery and between the projected ZR-1 and ZR-2 nuclei, and to conduct the implementation of the peripheral industries in that area, so as to orient expansion toward the south, and alleviate the pressure on Cabo and Ponte dos Carvalhos.

In order to control the impact that the entire Complex will experience with its construction, the nucleus intended for the encampment of single workers, ZRP, should be implemented together with the construction work, it being recommended that such implementation be regarded as a task for the contractors themselves.

The vegetative growth of Cabo and Ponte dos Carvalhos should promote the expansion of these cities along the present BR-101, particularly if we consider the new route for this road which is being studied by the DNER. Toward this end, the industrial activity in Cabo should expand along the projected ZI-3 area around BR-101 and BR-60, so as to fix its population in these cities' areas.

For this fixation, the expansion of the residential nuclei existing there should be oriented toward ZR-3B and ZR-3C, respectively, toward Cabo and Ponte dos Carvalhos.

As the IC develops and ZR-1 and ZR-2 begin to reach their saturation point, it is expected that the same will happen with the municipality of Cabo, ZR-3B and ZR-3C also becoming saturated. At this time, the development of ZR-3A and ZR-3D should be activated, west of Cabo and in the Boavista sugar mill area, respectively.

The residential nuclei for higher income personnel should be initially implemented in the Gaibu and Itapuama beach areas, so as to promote

the fixation of this personnel in the IC area and the development of these beach areas.

It is understood that, once the infrastructure projected for the first phase is implemented, the area's development process will be decentralized, and from then on it should occur in a disciplined way, as we recommend below.

The port system should be developed in two directions: opening up channels and turning basins, the wet perimeter being characterized in stages, with the necessary conditions for the use by ships.

Toward this end, channels and basins were subdivided into two areas, which were dimensioned in plan and profile for the largest possible ships for the zones in which such areas are located.

In this case, the mooring structures should always be dimensioned for the design depths of the area. Since the port installations are intended for industries, or collective port, located in areas where cargo movement is compatible with the design depth, the structures must be compatible with their purposes, so as to permit future depth expansion without further problems.

The access channel and area I, where the entrance basin is located, can grow in two stages: the first stage for ships up to 135,000 tdw, and the second for ships up to 260,000 tdw.

Toward this end, the piers at the entrance were initially designed with a depth for 260,000 tdw ships, with the end in view to facilitate expansion.

In the expansion, the opening on the reefs will have to be enlarged, as well as the access channel will have to be prolonged up to the 1000 m isobath.

The industrial occupation of ZI-1, that is, of the industrial zone embraced by the wet perimeter, should be preferably oriented toward the channels' extremity from the port entrance, each industry being

located in the channels area in a manner suitable to the demand of ships.

Occupation of ZI-2 should occur around the Port Access road III, and should expand toward the Port Access road II, trying to adjust itself to the location of the industries in the zone, in the most adequate possible manner in relation to the basic industry located in ZI-1 with which it has connection or affinity.

In sum, the industrial area development around the port area (ZI-1) should be oriented from the port entrance to upstream of the channels in their areas with depth compatible with the industrial scale, and by the central part, reached by Port Access Road III and by Port Railroad Branch Line II, and interior navigation channel and drainage in these surroundings, by industries directly dependent on those of ZI-1.

We believe that, in these circumstances, the occupation of ZI-1 and ZI-2 will take place in a disciplined manner from the center to the periphery and from the port entrance to the interior of the area intended for the industrial zone with high germinative power.

Likewise, the development of the area intended for the collective port should be oriented along the North channel (present Massangana River), from downstream to upstream.

Five industrial nuclei were planned for ZI-3, intended for peripheral industries, one being located in the Ipojuca Valley, near the area intended for the Oil Refinery and residential area ZR-2 (Boasica), two other located near PE-60, taking advantage of the Massangana and Prego river valleys respectively, another taking advantage of the Algodoads river valley at the western end of the collective port, and finally one to the North, between PE-9, PE-60 and BR-101, to attend to the expansion of Cabo.

The ZI-3 areas being those which will generate the largest number of

jobs, and it being intended to orient the development of the entire area towards south, where the implementation of two residential nuclei (ZR-1 and ZR-2) (Nossa Senhora do Ó and Boasica) has been projected, as well as the integration of the southern beaches by means of a prolongation of PE-9, starting from PE-60, toward these beaches, going around the lake planned for this location, the development of these areas should be started from the nucleus on the Ipojuca valley toward the Refinery, the remaining nuclei being developed as the previous ones become saturated.

It is thus recommended that, after saturation of the nucleus on the Ipojuca valley, those on the Algodoads, Massangana and Prego valleys be implemented, in that order.

Considering that the expansion of Cabo and that of Ponte dos Carvões are convergent, the ZI-3 area planned between BR-101, PE-60 and PE-9 is intended to absorb and fix the manpower resulting from the vegetative growth of these towns, thus reducing displacements.

An area has been projected, intended for the concentration of services connected with the construction of the IC and acting as a basis for such construction (ZI-4), central patches being installed there, next to the Administration zone (ZC-A), to the workers camp zone (ZRT) and to PE-60. The activities in this area, as the construction dynamics in the IC slow down, should change toward rendering support services to the installed industries, taking on the character of ZI-3 and expanding toward ZI-3, planned in the Massangana valley, on the other side of PE-60.

As for the Administration zone, development here should be oriented in the sense of immediately installing in the ZCA-1 area a basic structure for the Administrative Services Center and the Leisure Center, creating there a hotel structure capable of lodging "in loco," at the IC, highly qualified and temporary manpower, and then developing the Communal Services Center in ZCA-1, with health and educational facilities.

MEMO E

PARTE 2 : 10.0

10.0 - REGULATIONS

10.0 REGULATIONS FOR THE ZONING AND THE PARCELING
OF THE LAND IN THE SUAPE INDUSTRIAL COMPLEX

SUMMARY

CHAPTER I

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Sole section - General: Article 19 and 29

CHAPTER II

SOLE TITLE

Sole Section - Division into zones: Articles 39 and 49

CHAPTER III

Sole Section - Delimitation of the zones: Article 59

CHAPTER IV - Utilization of the zones

TITLE I - Plots

Section 1 - Present parceling: Article 69

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TITLE II

Sole Section - Permissible uses and activities - Article 99

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Subsection 3 - ZCA - 3 - Article 189

Section 2 - Industrial Zone - ZI

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Section 3 - Port Zone - ZP

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Section 4 - Residential Zone - ZR

Subsection 1 - ZR - 1, ZR - 2 and ZR - 3 - Articles 339 and 349

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Subsection 3 - ZR - E - Article 369

Subsection 4 - ZR - P - Article 379

Section 5 - Special Zone - ZE - Article 389

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Subsection 2 - ZE - 2 - Article 409

Subsection 3 - ZE - 3 - Article 419

Subsection 4 - ZE - 4 - Article 429

Section 6 - Tourist Zone

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Subsection 2 - ZT - 2 - Article 449

Section 7 - Zone of Ecologic Preservation - ZPE: Article 459 .

Section 8 - Zone of Cultural Preservation - ZPC: Article 469

Section 9 - Agricultural and forest zone - ZAF: Articles 479, 489, 499, 509

Section 10 - Green City Zone - ZVU

Subsection 1 - ZVU - 1 Article 519

Subsection 2 - ZVU - 2 - Article 529

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TITLE V - Restrictions

Sole section - Signs and posters

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Sole section - Miscellaneous Provisions - Articles 579 and 589

VEHICLE PARKING AND GARAGING SCHEDULE

TABLE OF UTILILIZATION

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Table 2 - Industrial Zone

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Table 6 - Special Zone

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REGULATIONS FOR THE PARCELING OF THE LAND

CHAPTER I - Opening of common ground, parceling and dismembering

Section 1 - Opening of common ground

Sole subsection - Technical conditions of the project - articles 19 to 89

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CHAPTER II - Protection of landscapes and public grounds and of watercourses

Section 1 - Landscape protection Article 119

Section 2 - Public grounds protection - 129 to 159

Section 3 - Protection of Watercourses - Articles 169. 179 and 189

ZONING REGULATIONS

CHAPTER I

SOLE TITLE

Sole Section - General

Art. 19

The present regulations define the types of use of the land in the Suape Industrial Complex, as well as the permissible activities.

Sole Paragraph

Uses, transformation in the use and activities shall be considered, according to the way they can be classified, as adequate, tolerable or prohibited in the zones in which their licensing may be requested.

Art. 29

Besides the norms for the use of the land, as defined in these regulations, any and all existing federal or state orders shall apply, when relative to:

- a) protection to historical monuments and registered buildings
- b) definition of "non-aedificandi" zone
- c) marine strips and alluvions
- d) landscape protection
- e) any and all areas governed by special legislation

CHAPTER II

SOLE TITLE

Sole section - Division into zones

Articl 39

For the effects of the application of the present regulations, the Suape Industrial Complex shall be divided into the following zones:

- central administrative zone - ZCA
- industrial zone - ZI
- port zone - ZP
- residential zone - ZR
- special zone - ZE
- zone for ecologic preservation - ZPE
- cultural preservation zone - ZPC
- agricultural and forest zone - ZAF
- green city zone - ZVU

§ 19 - The central administrative zone shall have three subdivisions:

- ZCA 1

Center of administrative activities, community services and recreation center

- ZCA - 2

Center of sports and community activities

- ZCA 3

Administrative center of the CI port

§29 - The industrial zone shall have five subdivisions:

- ZI - 1

industries directly related to the port

- ZI - 2

Industries that depend on those of ZI - 1

- ZI - 3
peripheric industries

- ZI - 4
industrial support area

- ZI - E
existing industrial area

§39 - The port zone shall have two subdivisions:

- ZP - 1
collective port

- ZP - 2
fishing port

§ 40 - The residential zone shall have six subdivisions:

- ZR - 1
residential zone of expansion of the Nossa Senhora do Ó nucleus

- ZR 2
Boasica residential zone

- ZR - 3
Residential zones of expansions of the cities of Cabo and Ponte dos
Carvalhos, with four subdivisions:

- ZR - 3 A - close to the city of Cabo

- ZR - 3 B - North of the city of Cabo

- ZR - 3 C - close to the city of Ponte dos Carvalhos

- ZR - 3 D - close to Engenho Boavista

- ZR - 4

high income residential zones in the areas of Gaibú and Itapuama

- ZR - E

existing residential zones, Nossa Senhora do Ó. Ipojuca, Cabo,
and Ponte dos Carvalhos

- ZR - P

provisional residential zone (camp for construction personnel)

§ 59 - The special zone shall be constituted by the areas intended
for transport terminals and shall have four subdivisions:

- ZE - 1

area intended for the executive planes airport

- ZE - 2

areas intended for railroad stations

- ZE - 3

area intended for the railroad yard

- ZE - 4

areas for bulk of ZI - 2

§ 6 - The tourist zone shall have two subdivisions:

- ZT - 1

intended for permanent installations

- ZT - 2

intended for temporary installations

§ 7 - The ecologic preservation zone includes the natural defensive barrier of the city of Cabo, on the shores of the lake, the beaches and the marshland zone East of the city of Ponte dos Carvalhos, to the mouth of the river Jaboatão

§ 8 - The cultural preservation zone includes:

- Santo Agostinho Cape
- Suape Strip
- Ponta dos Franceses
- Engenho Massangana

§ 9 - The agricultural and forest zone shall have no subdivisions.

§ 10 - The green city zone shall have three subdivisions:

- ZVU - 1

rest and recreation areas that shall have to be landscaped.

- ZVU - 2

green area close to the central administrative zone where the use of hotels and motels shall be tolerated.

- ZVU - 3

green area close to the Boasica residential area that shall have the features of a park.

Article 49

The common grounds that border two zones, or parts of a zone, shall be considered as pertaining to the more important zone, in accordance with a hierarchy that shall be determined by the competent organ of the administrative center of the CI

CHAPTER III

SOLE TITLE

Sole section - Delimitation of the zones

Article 59

The zones shall be delimited into areas, shown on the plans of the Suape Industrial Complex, to the scale of 1:20.000 that are attached to these regulations, and are an integral part of said regulations.

CHAPTER IV - Use of the zones

TITLE I - Parcels

Section 1 - Existing parceling

Article 69

The parcels that already exist in the areas to be developed shall be disappropriated, in accordance with the dispositions of decree.....

Section 2 - Future parcelings

Article 79

In the new parceling, the resulting plots shall have their use determined according to the zone within which they shall be situated.

Article 89

The parceling shall be made in accordance with the categories established in the Regulations for the Parceling of Ground

TITLE II

Sole Section - Permissible uses and activities

Article 99

The uses and the various commercial and industrial activities shall be permitted in the various zones in accordance with the table of uses attached to the present regulations.

Sole paragraph

the transformations in the use shall also obey the rules established in the table of uses attached to the present regulations.

TITLE III

Intensity of the utilization of the plots

Section 1 - Occupation of the plots by buildings

Article 109

The permissible types of buildings in each zone are those shown in the sectorial programs that are part of the CI General Plan. The other types shall be defined by the competent organ of the Administrative Center of the CI.

Article 119

The conditions of the buildings, according to the various zones where they are located and to their type, shall obey the features of each zone and the requirements of the competent organ of the Administrative Center of the CI.

Section 2 - Grouping of buildings

Article 129

The project for the grouping of buildings shall have to be submitted to the competent organ of the administrative center of the CI.

Section 3 - Parking and garaging of vehicles

Article 13 9

The locals for the parking and garaging of vehicles may be covered or in the open air.

Article 149

The dimensioning of the areas for the parking or garaging of vehicles shall obey the parking and garaging table attached to the present regulations.

Article 159

The parking areas shall not be computed in the total maximum building area (ATME)

TITLE IV

Features of the zones

Section 1 - Central administrative zone ZCA

Subsection 1 - ZCA - 1 Center of administrative activities, community center and recreation center of the CI

Article 169

The installation of the buildings in this zone shall obey basically the sectorial city development plan for the area, that is attached to the master plan of the CI

Subsection 2 - ZCA - 2 - Center for sports and community activities of the CI.

Article 17

The use of this zone shall be exclusively for sports fields, collective recreation and temporary events.

Subsection 3 - Administrative Center of the prot of the CI - ZCA - 3

Article 189

The occupation of the lots by buildings shall be regulated according to the following standards:

- A) Maximum total construction area equal to 200% (two hundred per cent.) of land area.
- B) Minimum free area in the plot equal to 50% (fifty per cent.) of land area.
- C) Minimum frontal setback of 8,00 m (eight meters)

Sole Paragraph

In the commercial face-fronting plots, the minimum setback will be 5,00 m (five meters), the construction of a marquee over same being allowed.

Section 2 - Industrial zone - ZI

Subsection 1 - ZI - 1 - Industries directly related with the port.

Article 199

Zone intended for the industries that depend directly on transport by sea, and with technical and economic justification for the use of private terminals.

Article 209

The occupation of the plots by buildings shall be established by the following standards:

- A) Total maximum building area equal to 100% of the land area.
- B) The minimum free area of the plot equal to 50% (fifty per cent.) of the area of the land.

C) The front and rear setbacks shall be of 10 m (ten meters) minimum.

Sole Paragraph

Within the perimeter of a privately used port, , the marginal strip defined by a distance of 20,00 m (twenty meters)+ D shall be considered shall be considered as a public right of free passage area.

Subsection 2 - ZI - 2 - Industries dependent upon those of ZI - 1.

Article 219

Zone intended for the complementary industries, or those that have clear interdependence with industries located in ZI-1, and that have no technical and economic justification for the ownership of private terminals.

Article 229

The occupation of plots by buildings shall be determined by the following standards:

A) Maximum total construction area equal to 100% of the land area.

B) Minimum free area of the plot equal to 50% of the land area.

C) The frontal and rear setbacks shall be 10,00 m (ten meters) minimum.

Subsection 3 - ZI - 3 - Peripheric Industries

Article 239

Zone intended for medium and light peripheric industries that do not necessarily depend on ZI - a or ZI - 1

Article 240

The occupation of plots by buildings shall be determined by the following standards:

A) Maximum total construction area equal to 100% (one hundred per cent.) of the land area.

B) Minimum free area on the lot equal to 50% (fifty per cent.) of the land area.

C) The front and rear setbacks shall be 10,00 m (ten meters) minimum.

Subsection 4 - ZI - 4 - Industrial Support Area

Article 250

Zone intended for the CI construction and operation support industries.

Article 260

The occupation of the plots by buildings shall be determined by the following standards.

A) Maximum total construction area equal to 100% (one hundred per cent.) of the land area.

B) Minimum free area of the plot equal to 50% (fifty per cent.) of the land area.

C) The front and rear setbacks shall be 10,00 m (ten meters) minimum.

Subsection 5 - ZI - E - Existing Industrial Area

Article 279

Intended for existing industries and expansion industries.

Article 289

A) Maximum total construction area equal to 100 % (One hundred per cent.) of the land area.

B) Minimum free area of the plot equal to 50% of the land area.

C) The front and rear setbacks shall be 10,00 m (ten meters) minimum.

Section 3 - Port Zone - ZP

Subsection 1 - ZP - 1 - Collective port

Article 299

Zone intended for the collective port, warehouses, deposits, cargo in general.

Article 309

The occupation of this zone shall depend on the requisites of the Administration of the Port of Recife, and shall have a specific project.

Subsection 2 - ZP - 2 - Fishing Port

Article 319

Zone intended for the Collective Fishing Port

Article 329

This zone shall require a specific project approved by the Administration of the CI

Section 4 - Residential Zone ZR -

Subsection 1 - Proposed residential zones ZR-1, ZR-2, ZR-3

Article 339

The occupation of the plots by the buildings shall be determined by the following standards:

A) Single family residential plots

a) Total area

Maximum of the construction equal to 10% of the land

b) Minimum free area of the plot equal to 66% (sixty six per cent.) of the land area.

c) Minimum frontal setback equal to 5,00 m (five meters)

B) Multiple family residential plots

a) Maximum total construction area equal to 100% (one hundred per cent.) of the land area

b) Minimum free area of the plot equal to 50% (fifty per cent) of the land area.

c) Minimum area of the habitational unit : 60,00 m² (sixty square meters)

d) Frontal setback: 8,00 m (eight meters) minimum

C) Plots intended for mixed use buildings

a) Maximum total building area equal to 100% (one hundred per cent.) of the land area

- b) Minimum free area of the plot equal to 50% (fifty per cent.) of the land area.
- c) Minimum frontal setback equal to 8,00 m (eight meters)

Article 349

The residential zones shall always have service areas, classified as Central Area (AC) and Basic Center (CB) in accordance with the specific sectorial plan for each residential zone.

Sole Paragraph

The occupation of the plots by the buildings shall be determined by the following standards:

A) Multiple family residential plots

- a) Maximum total building area equal to 200% (two hundred per cent.) of the land area.
- b) Minimum free area on the plot equal to 50% (fifty per cent.) of the land area.
- c) Minimum frontal setback: 8,00 m (eight meters)

B) Other plots

- a) Maximum total construction area equal to 200% (two hundred per cent.) of the land area
- b) Minimum free area on the plot equal to 50% (fifty per cent.) of the land area
- c) Minimum frontal setback: 5,00 m (five meters) on the commercial plots bordering pedestrian streets, and 8,00 m (eight meters) in all other cases.

Subsection 2 - ZR4 - High Income residential zone in the Gaibú and Itapoama areas.

Article 359

The occupation of the plots by buildings shall be determined by the

following standards.

A) Single family residential plots

- a) Maximum total building area equal to 30% (thirty per cent.) of the plot area.
- b) Minimum free area on the plot equal to 85% (eighty-five per cent.) of the area of the land.
- c) Minimum frontal setback equal to 8,00 m (eight meters).

B) Plots intended for non residential use:

- a) Maximum total building area equal to 100% (one hundred per cent.) of the area of the plot.
- b) Minimum free area on the plot equal to 50% (fifty per cent.) of the land area.
- c) Minimum frontal setback: 8,00 m (eight meters):

Subsection 3 - ZR - E - Existing residential zone, Nossa Senhora do Ó, Ipojuca, Cabo and Ponte dos Carvalhos

Article 369

The occupation of the plots by the buildings shall be determined according to the existing standards for each area. In case there should be no adequate regulations, these areas shall be assimilated to residential zone ZR - 1.

Subsection 4 - ZR-P - Provisional Residential Zone (camp for construction personnel)

Article 379

The occupation of the area shall obey a specific project

Section 5 - Special Zone ZE

Article 389

The special zones are intended for transport terminals.

Subsection 1 - ZE - 1 - Area intended for the airport.

Article 399

The occupation of the area shall obey a specific project

Subsection 2 - ZE - 2 Area intended for the railroad terminals of the Administrative Center and of Boasica

Article 409

The occupation of the areas shall obey a specific project

Subsection 3 ZE - 3 - Areas intended for the Railroad yard

Article 419

The occupation of the area shall obey a specific project

Subsection 4 - ZE 4 - Bulk Areas for ZI-2

Article 429

Area intended for loading and unloading as a support for the industries of ZI-2

Section 6 - Tourist Zone

Subsection 1 - ZT - 1 - intended for permanent installations

Article 439

The occupation of the area shall be in accordance with a specific project approved by the competent organ of the CI administration.

Subsection 2 - ZT - 2- intended for temporary installations

Article 449

The occupation of the area shall comply with a specific project approved by the competent organ of the CI Administration.

Section 7 - ZPE - Ecologic Preservation Zone

Article 459

The Ecologic Preservation zone includes the natural defensive barrier of the city of Cabo, the shores and banks of the rivers and lakes, the beaches and the marshland zones East of the city of Pontes dos Carvalhos, and the wood of Cupe Spit and Gamboa.

Sole paragraph

Any type of intervention that might modify the features of the area shall be prohibited.

Section 8 - ZPC - Cultural Preservation Zone

Article 469

The Cultural preservation zone includes Santo Agostinho Cape, the Suape spit, Ponta dos Franceses, Engenho Massangana and Engenho Boavista.

§ 1.

Any type of intervention that might alter the features of the area shall be prohibited

§2

The maintenance of the monuments shall be the responsibility of the administration of the competent organ of the Suape CI, under the control of the Patrimônio Histórico.

Section 9 - ZAF - Agricultural and forest zone

Article 489

The occupation of plots by buildings shall obey the following

dispositions.

A) Minimum free areal of the plot equal to 80% (eighty per cent.) of the total area of the land.

B) Minimum frontal setback equal to 10 m (ten meters)

Art. 499

In the agricultural and forest zone, the parcelings ontended for residential use shall be allowed if they are in accordance with the following conditions.

1 - The parceled area shall have at least two underground substructure services.

2 - The parceling is located contiguously in a developed area of the city.

Sole paragraph

In this case, the standards referring to the building and parceling shall be established by a competent organ.

Article 509

In the case of plots situated ind the agricultural and forest zone, that shall be considered for assessment purposes as city property, the dispositions of article 35 shall be obeyed.

Section 10 - ZVU - Green City Zone

Subsection 1 - ZVU - 1 - Areas that shall be landscaped for rest and recreation

Article 519

The forestry landscapingproject shall comply with the demands of the competent organ of the Administartive center of the CI.

Subsection 2 - ZVU - 2 - Green area close to the Administrative Center,

where the use of hotels and motels will be tolerated.

Art. 529

The occupation of the area by buildings shall comply with the conditions of the city development plan to be approved by the competent organ of the administrative center, complying with the following standards:

- a) Maximum total building area equal to 40% (forty per cent.) of the plot area.
- b) Minimum free areal of the plot equal to 80% (eighty per cent.) of the land area.

Subsection 3 - ZVU - 3 - Green area close to the Boasica residential area which will have the features of a park.

Article 539 - The intervention in the area shall comply with the requirements of the competent organ of the administrative center of the CI.

TITLE V - RESTRICTIONS

Sole Section - Signs and Posters

Article 549

The erection of signs and posters in the various zones shall be governed by the competent organ of the administrative center of the CI.

Article 559

The placement of signs and posters shall not interfere with:

- 1) traffic lights
- 2) the visibility of historic and artistic monuments
- 3) With the visibility of sites that present interest as landscapes

Article 569

The plates or signboards that are compulsory through federal or State legislation shall suffer no restriction of any kind for their installation in any place.

CHAPTER V

SOLE TITLE

Sole Section - Miscellaneous provisions

Article 579

Underground construction is allowed in the collective area for the parking or garaging of vehicles.

Article 589

Lighting or ventilation bays may be opened directly onto collective areas, complying with a setback of 1,50 m (one meter and fifty centimeters) minimum from the limit of the adjacent plot.

TABLE FOR THE PARKING AND GARAGING OF VEHICLES

TYPE OF BUILDING	SPACES PER UNIT, SQUARE METER OF BUILDING OR NUMBER OF EMPLOYEES	REMARKS
Multiple family, residential (1)	1:1 apartments	(1) Area intended for the for the storage of vehicles and not included in the total maximum construction area.
Hotel (1)	1:10 rooms	
School building	1:1 classroom	
Office (1)	1:100 m ²	
Commercial shops (1)	1:100 m ²	
Restaurants and similar with an area in excess of 300 m ²	1:60 m ²	
Supermarket (1)	1:60 m ²	
Theatres, movie houses and auditoriums (1)	1:100 m ²	
Hospitals, clinics etc (1)	1:500 m ²	
Industry and similar (1)	1:5 employees	

TABLE OF USES TABLE NO. 1

CENTRAL ADMINISTRATIVE ZONE

	USES			REMARKS
	ADEQUATE	TOLERATED	PROHIBITED	
ZCA-1	<p>Offices</p> <p>Administrative seats</p> <p>Banks and financial institutions</p> <p>Restaurant, bar, luncheonette</p> <p>Gasoline station (1, 2)</p> <p>Medical or dental clinic</p> <p>Clubs (1)</p> <p>Hotels (1)</p>	<p>Establishments for rendering of services (dry-cleaning etc.)</p> <p>Religious institutions</p>	<p>Other uses</p>	<p>1) In exclusive use building (a single activity per building)</p> <p>2) with an access by other means than non-distributed primaries</p>

TABLE OF USES TABLE Nº 2

CENTRAL ADMINISTRATIVE ZONE - ZCA

ZONE	USES			REMARKS
	ADEQUATE	TOLERATED	PROHIBITED	
ZCA-1	<p>School (1)</p> <p>Services of a collective nature (police, fire-fighting, post office, etc) (1)</p> <p>Business in general</p> <p>Cultural institutions</p> <p>Convention Center, theatres, movie houses, nightclubs etc.</p> <p>Amusement houses</p>			

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TABLE OF USES TABLE 1
CENTRAL ADMINISTRATIVE ZONE

ZONE	USES			REMARKS
	ADEQUATE	TOLERATED	PROHIBITED	
ZCA-2	Sports fields	Gymnasium Schools (1) Clubs (1) Amusement parks Circus Temporary events	Other uses	

TABLE OF USES TABLE NO 1

CENTRAL ADMINISTRATIVE ZONE - ZCA

ZONE	USES			REMARKS
	ADEQUATE	TOLERATED	PROHIBITED	
ZCA-3	Offices ADMINISTRATIVE SEATS Banks and financial Institutions Restaurants, bars and luncheonettes Medical or dental clinic Hotels Clubs Amusement houses Business in general	Schools Chapels Nightclubs Gasoline and service station Establishments for rendering of services	Other uses	

TABLE OF USES TABLE 2

INDUSTRIAL ZONE

ZONE	USES			REMARKS
	ADEQUATE	TOLERATED	PROHIBITED	
2I-1	Industries that depend directly on maritime transport, and with a technical and economic justification for the use of private terminals Ship building and/or repair yard	Control station (1) Clinics (2) Warehouses Maintenance shops Gasoline and service station (1) (3)	Other uses	(1) In exclusive use building (a single activity per building) (2) Part of the industrial installations programme (3) Duly justified

TABLE OF USES TABLE NO 2

INDUSTRIAL ZONE

ZONE	USES			REMARKS
	ADEQUATE	TOLERATED	PROHIBITED	
ZI-2	Complementary industries or those with clear dependency on those situated in ZI-1, and that have no technical or economic justification for the ownership of private terminals.	Those tolerated in ZI-1	Other uses.	

TABLE OF USES TABLE Nº 2

INDUSTRIAL ZONE

ZONE	USES			REMARKS
	ADEQUATE	TOLERATED	PROHIBITED	
ZI-3	Peripheric Industries	Those tolerated in ZI-1	Noxious or dangerous Industries Other uses	

TABLE OF USES TABLE NO 2

INDUSTRIAL ZONE

ZONE	USES			REMARKS
	ADEQUATE	TOLERATED	PROHIBITED	
ZI-4	Workshops in general Warehouses Garages, with or without repair shop Gasoline Station Construction materials	and other uses tolerated in ZI-1 and Wholesale trade	Other uses	

TABLE OF USES TABLE 3

PORT ZONE:

ZONE	USES			REMARKS
	ADEQUATE	TOLERATED	PROHIBITED	
ZP-1	Warehousing Deposits Cargo in General Control Station	Ship Chandlers Wholesale Trade Workshops Fuelling and service station (1) (2)	Other uses	1) In buildings for exclusive use 2) Duly justified

TABLE OF USES TABLE NO 3

PORT ZONE

ZONE	USES			REMARKS
	ADEQUATE	TOLERATED	PROHIBITED	
2P-2	Those of 2P-1 Food canning industries Frozen Foods industries	Those of 2P-1	Other uses	

TABLE OF USES TABLE NO 4

RESIDENTIAL ZONE

ZONE	USES			REMARKS
	ADEQUATE	TOLERATED	PROHIBITED	
ZR-1 ZR-2 ZR-3	<p>Single family residential use (one residential unit per plot)</p> <p>Multiple family residential use (more than one residential unit per plot)</p> <p>The uses in the special sub-zones CB and AC that are part of the Residential Zone</p>	<p>Home Crafts (2)</p> <p>Installations of services of a collective nature (water, power companies etc.)</p>	<p>Other uses</p>	<p>1) Exclusive use building (only one activity per building)</p> <p>2) Practiced by the dweller without a sign or any indication that the building is being used for commercial purposes</p> <p>3) For single persons, or couples without a family</p> <p>4) In provisional Installations</p> <p>5) In mixed use buildings</p>

TABLE OF USES TABLE NO 4

RESIDENTIAL ZONE

ZONE	USES			REMARKS
	ADEQUATE	TOLERATED	PROHIBITED	
ZR-4	Residential Single Family The uses of sub-zones CB and AC that are part of the Residential Zone.	The tolerated uses of ZR-1, ZR-2 and ZR-3	Other uses	

TABLE OF USES TABLE Nº 4

RESIDENTIAL ZONE

ZONE	USES			REMARKS
	ADEQUATE	TOLERATED	PROHIBITED	
ZR-P	Camp for the support of work (1) (3)	Clinics, grammar schools restaurants, bars etc. Movie houses Rendering of services	Other uses	

TABLE OF USES TABLE N94

RESIDENTIAL ZONE (DISTRICT CENTER)

ZONE	USES			REMARKS
	ADEQUATE	TOLERATED	PROHIBITED	
CB	<p>Multiple family residential use (5)</p> <p>Trade in general</p> <p>Establishments for the rendering of service (hairstylists etc).</p> <p>Workshops</p> <p>Temples and locals for religious worship</p> <p>Recreation Center</p> <p>Restaurant, bar and luncheonette</p>	<p>Hospital</p> <p>Boarding House</p> <p>Circus</p> <p>Amusement Park</p> <p>Mortuaries</p> <p>Coal dealer</p> <p>Carpenter</p> <p>Locksmith</p> <p>Joiner</p> <p>Tire repair</p> <p>Mechanical workshops</p> <p>Offices and doctors' offices</p> <p>Gasoline and service station</p>	<p>Any inconvenient, noxious or dangerous industry</p>	

TABLE OF USES TABLE NO 4

RESIDENTIAL ZONE - CENTRAL AREA

ZONE	USES			REMARKS
	ADEQUATE	TOLERATED	PROHIBITED	
AC	<p>The same uses as adequate in CB</p> <p>Sports Center</p> <p>Offices</p> <p>Market</p> <p>Gasoline station</p> <p>Banks and financial institutions</p> <p>Amusement houses</p> <p>Cultural Institutions</p> <p>Services of a collective nature (police, fire-fighting, post-office etc.)</p>	<p>The same uses as adequate in CB</p>	<p>Any inconvenient, noxious or dangerous activity</p>	

TABLE OF USES TABLE Nº 5

TOURIST ZONE

ZONE	USES			REMARKS
	ADEQUATE	TOLERATED	PROHIBITED	
ZT-1	Hotel (1) Movie house, theatre (1) Restaurant Nightclubs Amusement houses Shops Florist Jewelry Personal Services Art Gallery Recreation Clubs Motel	Crafts Religious Cult Gasoline and service Station (1) (2) Circus Amusement Park	Other uses	1) In exclusive use buildings 2) Duly justified

TABLE OF USES TABLE Nº 5

TOURIST ZONE

ZONE	USES			REMARKS
	ADEQUATE	TOLERATED	PROHIBITED	
ZT-2	Camping	Provisional Installations (2) Installations for the user's comfort (2)	Other uses	

TABLE OF USES TABLE Nº 6

SPECIAL ZONE

ZONE	USES			REMARKS
	ADEQUATE	TOLERATED	PROHIBITED	
ZE-1	Airport for executive planes	<p>Heliport</p> <p>Installations for the users' comfort (1)</p>	Other uses	1) Duly justified

TABLE OF USES TABLE NO 6

SPECIAL ZONE

ZONE	USES			REMARKS
	ADEQUATE	TOLERATED	PROHIBITED	
ZE-2	Railroad Terminal	Restaurant Newspaper stand Bootblack Hairdressers Barbers etc. Installations for the comfort of the users (1)	Other uses	

TABLE OF USES TABLE Nº 6

SPECIAL ZONE

ZONE	USES			REMARKS
	ADEQUATE	TOLERABLE	PROHIBITED	
ZE-3	Railroad yard	Warehouses Workshops Hangars	Other uses	

TABLE OF USES / TABLE Nº 6

SPECIAL ZONE

ZONE	USES			REMARKS
	ADEQUATE	TOLERATED	PROHIBITED	
ZE-4	Terminal for Bulk Control Station		Other uses	

TABLE OF USES TABLE Nº 7

ECOLOGIC PRESERVATION ZONE

ZONE	USES			REMARKS
	ADEQUATE	TOLERATED	PROHIBITED	
ZPE	Preservation of the flora and fauna of the region	Installations for the comfort of the users (1)	Other uses	1) Duly justified

TABLE OF USES

TABLE Nº 8

CULTURAL PRESERVATION ZONE

ZONE	USES			REMARKS
	ADEQUATE	TOLERATED	PROHIBITED	
ZPC	Preservation of cultural values	Installations for the comfort of the users	Other uses	

TABLE OF USES TABLE Nº 9

AGRICULTURAL AND FOREST ZONE

ZONE	USES			REMARKS
	ADEQUATE	TOLERATED	PROHIBITED	
ZAF	<p>Agricultural exploitation</p> <p>Vegetable gardening establishments</p> <p>Forestry - reforestation and logging</p> <p>Breeding</p> <p>Pastures</p>	<p>Single family residence</p> <p>Teaching</p> <p>Deposit for inflammable materials</p> <p>Commerce and industry related to agricultural and breeding activities</p>	Other uses	1) Duly justified

TABLE OF USES TABLE N° 10

GREEN CITY ZONE

ZONE	USES			REMARKS
	ADEQUATE	TOLERATED	PROHIBITED	
ZVU-1	Landscaping	Sports fields	Other uses	1) Building for exclusive use

TABLE OF USES TABLE NO 10

GREEN CITY ZONE

ZONE	USES			REMARKS
	ADEQUATE	TOLERATED	PROHIBITED	
ZVU-2	Landscaping	Hotels, Motels, Restaurants, bars (1)	Other Uses	

TABLE OF USES TABLE Nº 10

GREEN CITY ZONE

ZONE	USES			REMARKS
	ADEQUATE	TOLERATED	PROHIBITED	
ZVU-3	Park	Installations for the comfort of the users	Other Uses.	

TABLE OF USES TABLE NO. 11

LEGAL CONCESSION ZONE

ZONE	USES			REMARKS
	ADEQUATE	TOLERATED	PROHIBITED	
ZCL	Preservation of the Ecology	Mining	Other uses	

REGULATIONS FOR THE PARCELING OF THE LAND

CHAPTER 1 - OPENING OF COMMON GROUND, PARCELING AND DISMEMBERMENT

SOLE SUBSECTION - TECHNICAL CONDITIONS OF THE PROJECT

ARTICLE 19 The opening of common ground shall be compulsorily subordinated to the control of the Suape Industrial Complex, whatever the part of the area within the limits of the Master Plan of th CI, effected by private enterprise, through the city improvement project whichever the zones of its situation, type and dimensions.

Sole Paragraph: The projects for the opening of common ground and their details may be accepted or refused, considering the orientation determined by the various aspects of the Master Plan and the prepared sectorial plans.

ARTICLE 20 The opening of the common ground shall comply with the following standards:

A the common ground that shall contain the front of plots shall have a minimum width between alignments equal to 15,00 m (fifteen meters), except in the place of such ground the function of which is to collect local traffic

when the indications of the Master Plan shall be followed.

Sole Paragraph: grounds with a loop tracing with a maximum extension of 200,00 m (two hundred meters) shall be allowed, as well as dead-end streets with a maximum extension of 120,00 m (one hundred and twenty meters) provided their minimum width shall be 9,00 m (nine meters). In the case of dead-ends, a turning place at its extremity shall be required, with a minimum radius of 9,00 m (nine meters).

ARTICLE 49 In the district center (CB) and the central area (CA), the opening of common ground shall comply with the following standards:

- A) common ground containing the front of more than four commercial lots shall have:
 - a) a minimum width between alignments of 18,00 m (eighteen meters).
 - b) the flows in opposite directions shall be separated by an island, the minimum width of which shall be equal to 3,00 m (three meters).
 - c) The other common grounds shall have a minimum width between alignments equal to 20,00 m 20 meters.

Sole Paragraph: Pedestrian streets shall be allowed, with a width of 8,00 m (eight meters) provided they do not exceed 300,00 m (three meters) between intersections.

ARTICLE 59 In the Central Administrative Zone, the opening of common ground shall comply with the following standards:

- A) Minimum width between alignment equal to 18,00 m (eighteen meters).

- B) the flows in opposite directions shall be separated by an island the minimum width of which shall be 3,00 m (three meters).

Sole Paragraph: Pedestrian streets with a minimum width of 8,00 m (eight meters) between alignments shall be allowed, provided their length does not exceed 300,00 m (three hundred meters) between intersections.

ARTICLE 69 In the industrial zone (ZI), the opening of common grounds shall be allowed complying with the following standards:

- A) The thoroughfares intended for the main distribution of traffic (distributing trunk, main access, housing access and port axes) shall have a minimum width between alignments of 70,00 m (seventy meters)
- B) the thoroughfares intended for the secondary traffic distribution (streets that are directly connectw with the main distributors) shall have a minimum width between alignments equal to 37,00 m (thirty seven meters).
- C) the thoroughfares intended for the local distribution of traffic (sgreets directly ocnected with the secondary distributors) shall have a minimum width between alignments equal to 26,00 m (twenty-six meters).
- D) The thoroughfares intended for railroad transportation shall have a right of way with a minimum width of 20,00 m (twenty meters)

ARTICLE 70 In the tourist zone, the opening of thoroughfares shall comply with the following standards:

- A) the thoroughfares that contain the front of plots shall have a minimum width between alignments equal to 15,00 m (fifteen meters).

- B) all other thoroughfares shall have a minimum width between alignments equal to 18,00 m (eighteen meters), except in the case of thoroughfares that have for a function the collecting of local traffic, in which case the indications of the Master Plan shall be followed.

ARTIGO 89 in all other zones, the opening of thoroughfares shall comply with the instructions of the Master Plan.

SECTION 2 PARCELING AND DISMEMBERMENT

SOLE SUBSECTION

Article 99 The minimum dimensions allowed for the plots, autonomous parts of the project, vary with their purpose and the zone in which they are located, as discriminated below:

A) ZR - Residential Zone

a) ZR - 1 - ZR - 2 - ZR - 3

1. First category residential plot, single family - minimum front of 15,00 m (fifteen meters), and minimum area 300 m^2 (three hundred square meters).
2. Second category single family residential plot - minimum front of 12,00 m (twelve meters) and minimum area of $180,00 \text{ m}^2$ (one hundred and eighty square meters)
3. Third category single family residential plot - minimum front 6,00 m (six meters) and minimum area of $150,00 \text{ m}^2$ (one hundred and fifty square meters).
4. Multiple family residential lot, minimum front of 40,00 m (forty meters) and minimum area of 2.000 m^2 (two thousand square meters).

5. Plots intended for mixed use, minimum front 7,50 m (seven meters and fifty centimeters) and minimum area 150 m² (one hundred and fifty square meters).

b) CB District Center and AC Central Area

1. Plots intended for first category non-residential use, minimum frontage 12,00 meters (twelve meters) and minimum area 300 m² (three hundred square meters).
2. Plots intended for second category non-residential use, minimum frontage 10,00 m (ten meters) and minimum area 250,00 m² (two hundred and fifty square meters).
3. Plots intended for first category mixed use, minimum frontage 40,00 m (forty meters) and minimum area 2.000 m² (two thousand square meters)
4. Plots intended for second category mixed use, minimum frontage 7,50 meters (seven meters and fifty centimeters) and minimum area 150,00 m² (one hundred and fifty square meters).

c) ZR-4

1. The single family residential plots in this zone shall have a minimum frontage of 20,00 m (twenty meters) and a minimum area of 1.000 m² (one thousand square meters).
2. The plots intended for non-residential use shall have a minimum frontage of 20,00 m (twenty meters) and a minimum area of 600 m² (six hundred square meters).

- B). ZCA-1 - Administrative Center of the CI
ZCA-3 - Administrative Center of the CI Port

1. Plots for non-residential use - minimum frontage 20,00 m (twenty meters) and minimum area 500 m² (five hundred square meters)

- C) ZI-1 - Industrial Zone

1. The plots in this area shall have their area determined on the basis of the evidence of the projects for industrial installations or for expansion, and of due proof of the minimum necessary areas for the operation of the interested industry. The frontage shall be determined on the basis of the number of berths necessary to attend the requirements of the capacity for maritime transport.

- D. ZI-2 - Industrial Zone

1. The plots in this area shall have their area determined on the basis of the evidence of the projects for industrial installations and /or expansion, and of due proof of the minimum necessary areas for the operation of the interested industry.

- E. ZI-3 - Industrial Zone

1. The plots in this zone shall have a minimum frontage of 30,00 m (thirty meters) and a minimum area of 2.400,00 m² (two thousand four hundred square meters).

- F. ZI-4 - Industrial Zone

1. The plots in this zone shall have a minimum frontage of 20,00 m (twenty meters) and a minimum area of 1.200,00 m² (one thousand two hundred square meters).

G) ZT - Tourist Zone

1. The plots in this zone shall be defined by a city improvement project approved by the competent organ of the CI Administrative Center.

H) ZAF - Agricultural and Forest Zone

1. The minimum lot shall be no smaller than the rural module established by the competent federal organ.

ARTICLE 109 In all parcelings, there shall exist local shops and services, in accordance with the residential program of the Master Plan or with a proposal to be approved by the competent organ of the Administrative Center of the CI.

CHAPTER II - PROTECTION OF THE LANDSCAPES AND COMMON GROUNDS AND WATERCOURSES

Sole Paragraph: Besides the standards in this regulation, Federal and State standards shall apply.

SECTION 1 - PROTECTION OF LANDSCAPES

ARTICLE 110 - The zoning regulations shall define the sites, works, and monuments for which visibility conditions should be maintained.

Sole Paragraph: Whenever necessary, the competent organ of the Administrative center of the CI shall define all details to be obeyed in the works that are to be carried out in such places or in their vicinity, including the architectonic style of the façade, finishing and any other elements deemed indispensable for the preservation of the local typical and traditional aspects.

SECTION 2 - PROTECTION OF PUBLIC GROUNDS

ARTICLE 129 - The enclosures of land located on hillsides shall be of such a height that it will not impair the visibility of the panorama, considering that the observer is on the grounds.

Paragraph 1 - The competent organ of the Administrative Center of the CI shall have the right to demand the reduction in height of any enclosure already built, in order to comply with the conditions of the article above.

Paragraph 2 - Compliance with special types or heights of enclosures in certain places may also be required.

ARTICLE 139 The landowner shall maintain the sidewalks in a perfect state of preservation, using for repairs the type of material determined for the site.

ARTICLE 149 The façades of the buildings that are visible from public grounds, as well as enclosures of the front of plots shall be maintained in good conditions.

ARTICLE 159 Writing, hanging strips, sticking posters of any kind on columns, façades or other walls of buildings, enclosure walls of a plot, posts or trees on public grounds, on monuments, viaducts or any other premises opened to the public, including sidewalks or driveways is forbidden.

SECTION 3 - PROTECTION OF WATERCOURSES

ARTICLE 169 The owners of land crossed by watercourses or drains, riverlets, streams etc. canalized or not, or adjacent to such watercourses, are responsible for their conservation and cleanliness within the stretches included in the limits of said property, so that their flow shall be unobstructed at all times.

Sole Paragraph - Any water diversion or impoundment, alteration in the flow section, building or rebuilding of lateral walls or similar works on the banks, the beds of watercourses or on the watercourses, culverts, streams or riverlets etc. whether canalized or not, shall only be carried out with the authorization of the competent State organ, all works or services that might impair the free flow of the waters being forbidden.

ARTICLE 179 - Any construction or building project, whether industrial, commercial, residential or of any type, either by private parties or by any grantee or licensee of public services, by autarchies, enterprises, foundations or companies of the States or the Federal Government, whose work is within 50,00 m (fifty meters) of a watercourse, culvert, riverlet or stream etc., whether canalized or not, can only be approved after it shall have been examined by the competent State organ, as regards the conditions of flow.

Paragraph 19 - For this purpose, the competent State organ, besides determining the width of the protection strip, always established taking as a basis the axis of the watercourse, culvert, riverlet or stream, etc., whether canalized or not, in which no type of construction or building shall be permitted, may require the execution of work for the improvement of the flow section, correction, regularization etc, provided the same should cross the land or limit it.

Paragraph 29 - For the acceptance of the work, and the granting of the habitation license, the owner shall present a declaration from the competent State organ stating that the determinations of said organ were obeyed and executed.

Paragraph 39 - The fact of not showing on any project, of whatever type, the existence of watercourses, culverts, riverlets streams etc., whether canalized or not, in the conditions established in the present article, shall constitute a

gross misdemeanour, nullifying the approval of any project, even though it shall have been licensed and be under construction, the undertaking being immediately embargoed after the fact shall have been verified.

Paragraph 49 - In special cases, should the diversion or the rectification of the watercourse, culvert, rievrllet or stream etc., whether canalized or not, be possible, when the consitions of flow can be maintained adequately, by decision of the Secretary of Public Works of the State, after hearing the competent organs, their canalization with construction over the same may be allowed, provided all necessary precautions are taken, including the positioning of the foundation plates, and that the strip corresponding to the same is totally liberated, alway preserving a width equal to that of the canalization, plus a safety strip to be dimensioned by the same organs.

ARTICLE 189 - The responsibility for the maintenance and the cleanliness of the watercourses, culverts, riverlets or streams etc., whether canalized or not, and the maintenance of the free flow of its waters rests solely upon the owners of the lands or property crossed, or limited, by the same, without the need of the signing of a declaration of obligation.

GLOSSARY

SEPARATION or SETBACK

It is the smallest distance between two buildings or between a building and the borderlines of the plot on which it is located. The separation or setback is frontal, lateral, or to the rear, when these borderlines are respectively to the front, the sides or the back of the plot.

ALIGNMENT

The projected and located or indicated line that limits a plot in relation to the public thoroughfares.

ADVERTISEMENT

Any sign intended for propaganda and that has no relation with the actual use or activity attributed to a plot or a building.

MINIMUM FREE AREA OF THE PLOT

The open space, free from construction or building within the limits of a plot, and only one third of its area may be surfaced or paved. The Minimum Free Area of the Plot is calculated by means of a rate that is applied to the area of the lot.

"NON-AEDIFICANDI" AREA

The area in which any building or construction is forbidden by the existing legislation.

MAXIMUM TOTAL CONSTRUCTION AREA

The sum of the area of the floors of a building, determined through a rate to be applied to the area of the plot.

BAR

Commercial establishment for the serving of snacks and drinks, including alcoholic drinks, either at counters or tables.

PASSAGES

Generical designation of the spaces necessary for the traffic of people or vehicles.

BUILDING

A construction for the sheltering of any human activity

BUILDING FOR EXCLUSIVE UTILIZATION

A construction intended for the sheltering of only one commercial or industrial activity of a firm, showing only one numbering.

MIXED UTILIZATION BUILDING

A building that shelters various types of utilization, and, should one of these be residential, the access to the residential units shall always be through separate passages.

MULTIPLE FAMILY RESIDENTIAL BUILDING

Intended for multiple family use. The reunion of two or more residential units in only one building.

SINGLE FAMILY RESIDENTIAL BUILDING

Shelters only one residential unit

APARTMENT BUILDINGS

The same as multiple family residential building

COMMERCIAL BUILDING

Intended for shops or offices that require contact with the public or both, in which only the janitor's lodgings or those of the caretaker are used for residential purposes.

RESIDENTIAL BUILDING

That which is used for residential purposes.

OFFICE

Room or group of rooms intended for activities which are not directly oriented toward the public (see administrative seats)

PARKING FOR VEHICLES

Covered or open spot for the parking of vehicles on a plot.

LIMIT

Number of stories allowed or established for a building or construction in a specific zone.

SHED

A building usually intended for industrial or commercial purposes, formed by a roofing resting on walls or columns the area of which is totally or partially enclosed on its perimeter.

GARAGE

Covered area for the individual or collective safekeeping of vehicles.

GROUPING OF BUILDINGS

A complex of two or more buildings on the same plot.

HOTEL

A building for transitory multiple family residential use, serving independent persons or families, the access to which is controlled by a janitor service and that has rooms for common use, that may or may not serve meals.

LUNCHEONETTE

Commercial establishment where light meals and drinks are served, with the exception of alcoholic drinks, at counters or tables.

POSTER

A composition of letter or words for the identification of use or

activity on a plot or a building.

PUBLIC GROUNDS

That part of the area of the city intended for public traffic officially recognized and designated by a denomination.

SHOP

A building, or part of a building, intended for the practice of a commercial, industrial or storage activity, generally opening toward the outside (plot or public ground) or onto a gallery of shops.

PLOT

Autonomous parcel of a parceling or dismemberment, the front of which is adjacent to a recognized public thoroughfare.

PARCELING

A particular aspect of land division, characterized by the division of a land area into two or more autonomous pieces the involve, compulsorily, the opening of public grounds onto which the pieces mentioned will be fronted, then becoming known as plots.

MODIFICATION OF A BUILDING

The complex of works that, substituting totally or partially the essential constructive elements of a building (such as floors, walls, roofing, sashes, staircases, elevators etc.) modifies the shape, the area or the height of the divisions.

MOTEL

A hotel where the vehicle shelter, besides corresponding to the number of compartments for guests, is contiguous to each.

"NON-AEDIFICANDI"

Prohibition to build or construct on determined areas, established by laws, decrees or regulations.

PARCELING OF THE LAND

Division of an area of land into autonomous parts, under the shape of dismemberment or plots.

STORY

The complex of covered areas in a buildig, situated between the plane of a flooring and the ceiling immediately above.

RENDERING OF SERVICES

Commercial activity consisting in the rendering of daily services through professional works, such as cobbler, barber, dry-cleaning, plumber, glazier, tyre repair etc.

ALTERATION OF A BUILDING

The complex of works that subtitutes partially the essential constructive elements of a building (such as flooring, roofing, sashes, staircases, elevators etc.), without modifying, however, the shape, area or height of the divisions.

REPAIR OF A BUILDING

The same as refitting of a building

RESTAURANT

Commercial establishment where complete meals are served, at tables or counters with seats, with or without the service of alcoholic beverages.

COMMERCIAL OFFICE

Unit of a commercial building intended for businesses or liberal professions that demand a contact with the public, generally opening onto the internal passages of this building.

ADMINISTRATIVE SEATS

A public or private construction intended for offices that do not require a direct contact with the public.

PERSONAL SERVICES

A peculiar aspect of the rendering of services that may dispense a shop for its performance and may be rendered at home. Example: manicure, massagist.

CONDITIONS OF THE BUILDINGS

The characteristics of the installation and the construction of the building (setback, number of stories etc.)

FRONT OF THE PLOT

The line that separates the public grounds from the plot, and coincides with the existing or projected alignment established by the competent organ.

AUTONOMOUS UNIT

The part of the building entailed to an ideal fraction of land, subjected to legal limitations, constituted by premises and installations for private use, intended for residential or non-residential purposes, described by an alphabetical or numerical designation for identification and discrimination purposes.

RESIDENTIAL UNIT

A unit composed by at least one habitable compartment, a bathroom and a kitchen.

AQUATE USES

The uses normally permitted within a zone, that do not require special approval from the competent organ.

FORBIDDEN USES

The uses that are definitely prohibited within a zone.

TOLERATED USES

The uses that are permissible within a zone, with the approval of the competent organ.

TOMO II

PART E 2 - 11.0

11.0

SOCIAL INFRASTRUCTURE

11.1

HEALTH ASPECTS

The Suape Industrial Complex project, bringing to the region where it establishes itself the benefits inherent to the greatness of its conception, would come to a complete failure if it did not attend to the number one problem, that on which its real success depends -- man -- and examine it from its many angles and different facets.

Thus creating numberless job opportunities and residences in the area requires a well-founded basis upon which it will place its entire perspective of continuity of purposes and objectives to bring to the undertaking those large companies that are capable of lending the desired grandeur to the whole scheme. It thus did not evade the obligation to plan the entire indispensable, basic and fundamental social structure: Health, Education, Recreation, Leisure, Habitation, Transportation and Supply, thus indicating that it is fully conscious of the fact that it will retain man only if it gives him those minimum conditions of social welfare and insure him the physical and mental tranquillity which he needs in order to be more capable of productive work.

11.1.1

REGIONALIZING HEALTH SYSTEMS - PRESENT TRENDS

A health system is a mechanism by means of which human resources and the installed capacity of aid facilities are organized through administrative structures and medical technology to offer integrated health care, in a sufficient scale and adequate quality to meet the community's demand for services at a cost compatible with the available financial resources.

The rendering of health services must be within the reach of the

entire community, without exceptions, and in a continuous and integrated way, from conception and birth till death.

In Brazil, the Public Ministry has not yet defined an integrated health system; there are countless alternatives which now begin to be reviewed by Social Security. However, whichever is the guideline adopted, the regional characterization must be considered, as the foundation for the proper carrying out of an implementation policy, through the analysis of the available equipment in order to adequately complement it. Toward this end, the attached tables and graphs, extracted from the 1973 Statistical Yearbook, indicate what already exists and occurs in Pernambuco where health is concerned, as well as in the Greater Recife, giving an idea of what will be necessary to create in order that the new industrial area, growing at the planned rate, may have full medical and dentistry assistance coverage.

For the execution of a project for this purpose, resources must be planned for from various sources; since its articulation is usually slow due to the prevailing bureaucracy, it is a good practice to plan for local resources up to the time when the services can be transferred to the competent agencies, where these are governmental, autarchic or even of private enterprise.

DISTRIBUTION OF HOSPITALS BY SUPPORTING ENTITY
STATE OF PERNAMBUCO - 1971

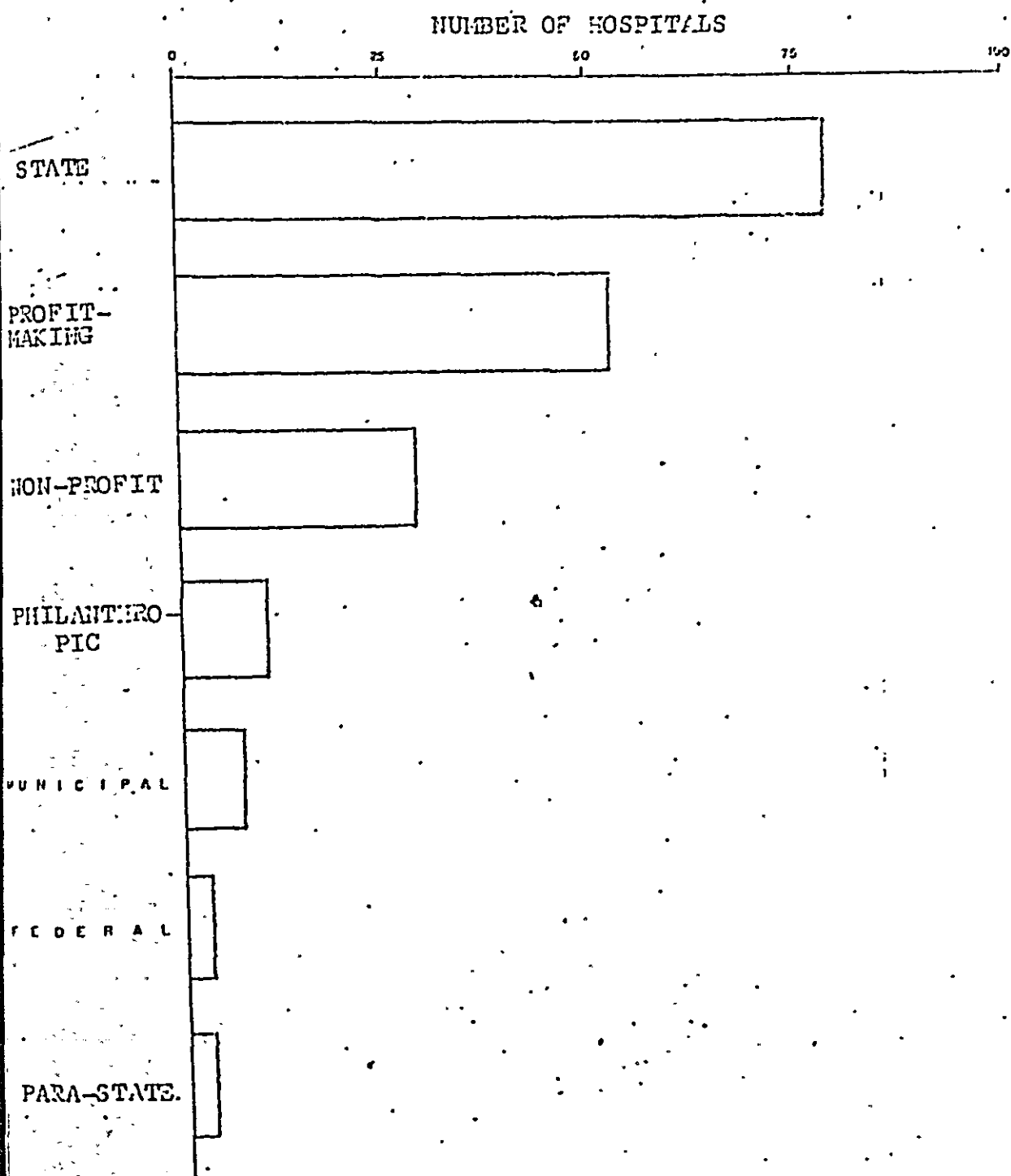
SPECIFICATION	HOSPITALS	
	NUMBER	PERCENT
Official	92	49.7
Private	93	50.3
TOTAL	185	100.00
OFFICIAL		
Federal	3	3.3
State	79	85.3
Municipal	7	7.6
Para-state	3	3.3
TOTAL	92	100.0
PRIVATE		
Profit-making	54	58.0
Non-profit making	29	31.2
Philanthropic	10	10.3
TOTAL	93	100.0

DISTRIBUTION OF HOSPITALS BY SPECIALTY
STATE OF PERNAMBUCO - 1971

SPECIFICATION	HOSPITALS	
	NUMBER	PERCENT
General	136	73.6
Pediatrics	8	4.3
Cancerology	1	0.5
Cardiology	2	1.1
Leprology	1	0.5
Neurology	1	0.5
Obstetrics	19	10.3
Psychiatric	13	7.1
Tuberculosis	1	0.5
Traumatology and orthopedics	-	-
Other	3	1.6
TOTAL	185	100.0

NUMBER OF HOSPITALS, BY SUPPORTING ENTITY

STATE OF PERNAMBUCO



11.1.2 INTEGRATED MEDICAL, DENTISTRY AND HOSPITAL ASSISTANCE, CENTRALIZED COORDINATION, HEALTH PLAN

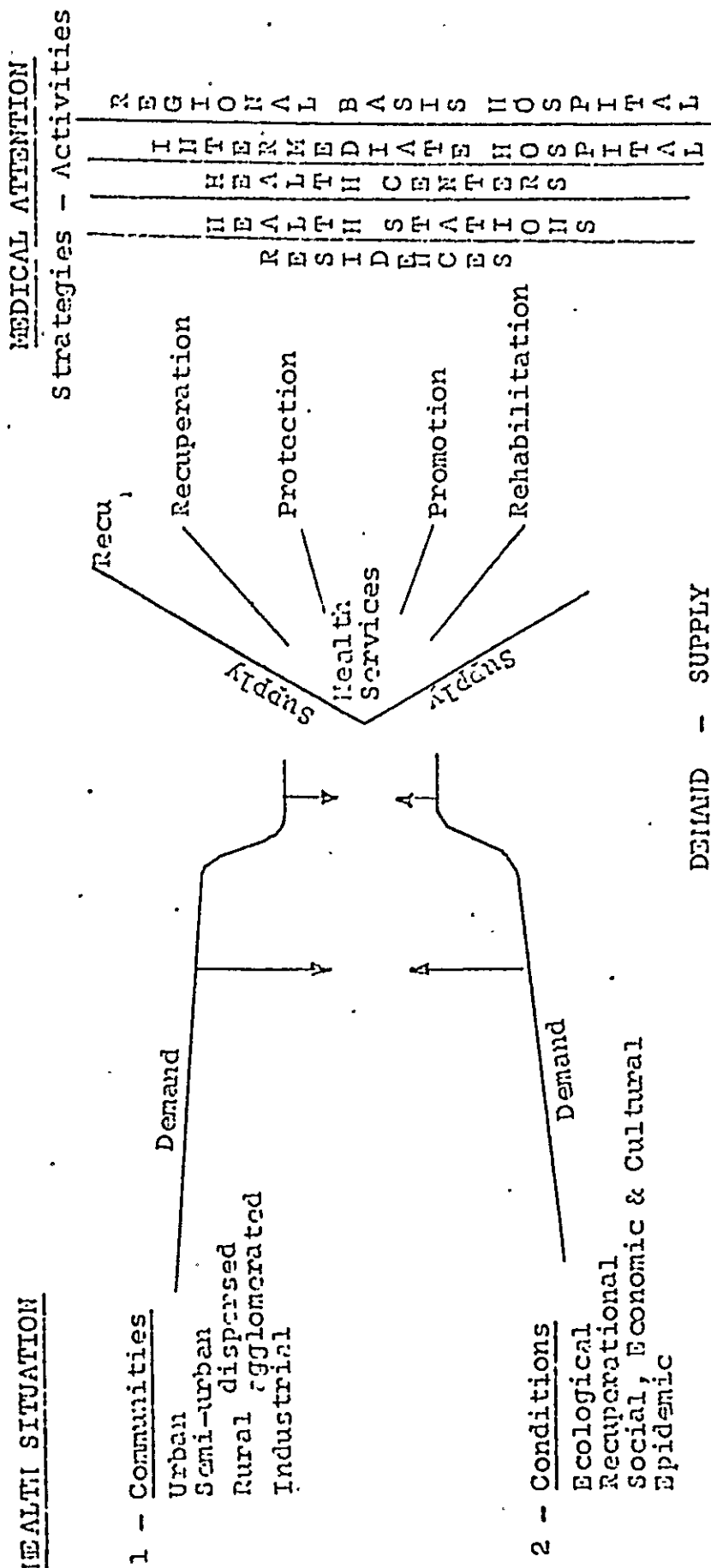
According to the recommendations of the World Health Organization and as per the good practice of Integrated Health Services planning, we can establish a General Master Plan with those features and alternatives which enable it to be gradually implemented, in accordance with the demand determined by the populational increase. The essential characteristics of this plan should be:

- 1) flexibility to adapt to contingencies caused by changes which always occur in the implementation of large sized projects;
- 2) progressiveness in the degree of attending to and assisting populations, so that its implementation can be carried out in phases of growing activity and control;
- 3) expansiveness planned in such a way as to always permit the enlargement of the initial nuclei with working modules that can be added to them.

In view of this, in terms of a communal health plan for the region where the Suape Project will be installed, we attempted to conceive a schematic, integrated one, under a sole coordination, and adaptable to the circumstances which the evolution of the planned program may suggest in its different phases and stages.

The coordination would have the great function of establishing a methodical ordination of the use of all human and material resources available in the various institutions, whether public or private, for health care. The following is emphasized as an essential goal: orientation of the different health entities toward the rational utilization of available resources, indicating methods for obtaining their maximum yield, and to insure that future investments and budgets are proportionate to the needs, so as to guarantee their full utilization.

HEALTH PLAN (Table 1)



The integration function would carry out the total technical, administration and financial fusion into a sole health organization in charge of formulating, organizing and executing a health policy for the community as a whole.

The medical care would comprehend a minimum of activities which may be broken down into the following:

protection
promotion
recuperation
rehabilitation

The responsibility for providing for this minimum of health activities belongs to the government and to the institutions, in order to safeguard a man's right which has already been included in the Constitution of the World Health Organization and which belongs to the Universal Declaration of the Rights of Man. The first of these documents has it that, "Health is a common ideal which should be attained by all peoples and by all nations, and an objective for each individual and for each organization in Society."

The second states that "all men are entitled to a standard of living which can insure health and well-being, including food, clothing, dwelling and medical care."

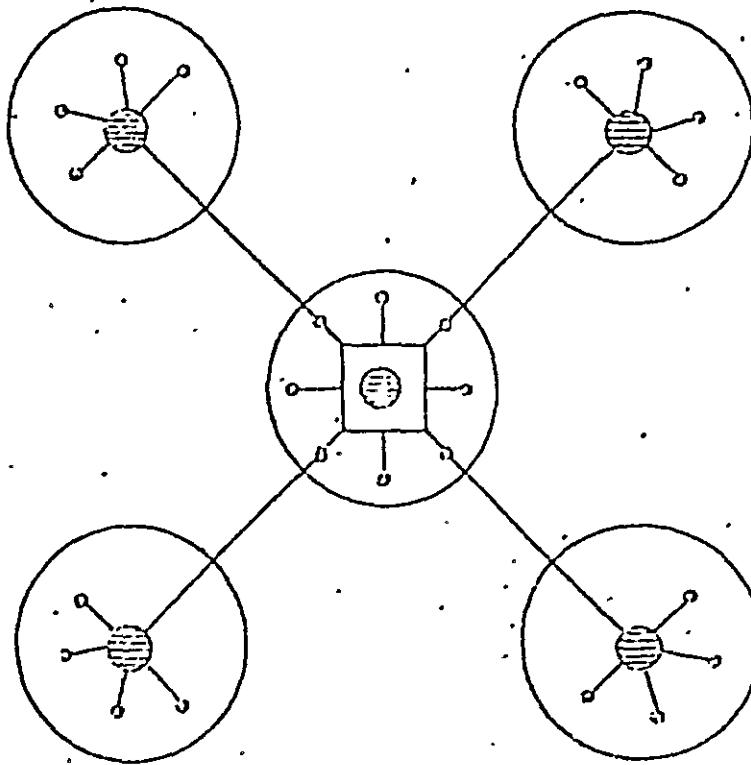
11.1.3 ALL ACTIVITIES NECESSARY FOR THE PROTECTION, PROVISION AND RECUPERATION OF HEALTH MUST BE PLANNED, ADMINISTERED AND CARRIED OUT UNDER A SOLE COMMAND, AND WILL INCLUDE, AT LEAST, THE FOLLOWING PROGRAMS:

- 1) Environmental contamination control
- 2) Control and elimination of avoidable diseases
- 3) Protection to the family
- 4) Organization of a system of integrated medical attention, with ample populational coverage.
- 5) Formation and training of the adequate human resources
- 6) Education of the community in problems related to health

7) Organization of every system of work safety and hygiene, within and outside the Plant.

Remark: Some of these activities require, as we have observed, the participation of disciplines and services that are alien to the Health Sector; however, since they are indispensable elements for its conservation and prevention, they should be directed and coordinated by the authority which dictated the health policy.

MODERN REGIONAL HEALTH SYSTEM

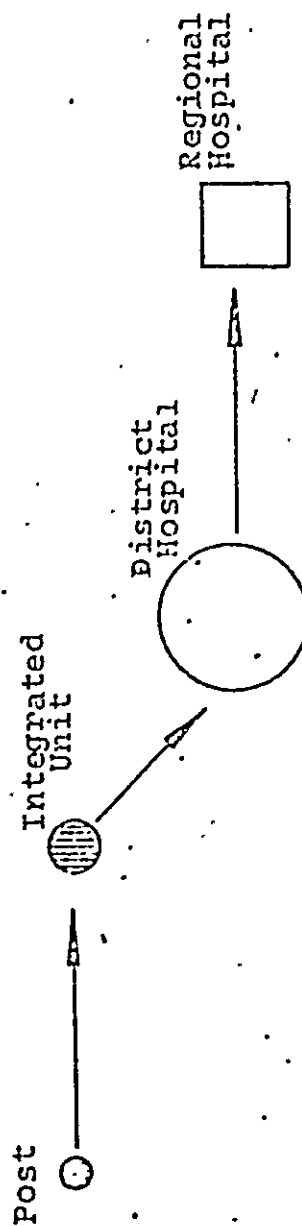


Regional or Base Hospital

Intermediate District Hospital

Rural Composite Unit or Integrated Unit

COORDINATED AND INTEGRATED
HEALTH CARE SYSTEM



STRUCTURES REQUIRED FOR THE PROTECTION OF THE INTEGRATED HEALTH SERVICES

After a whole political philosophy of action for communal health assistance has been established, it is obvious that one must know where, in which organizational structure entities the entire line of activities recommended will be carried out. It is thus necessary to create an entire physical structure of adequately engineered units and an entire administrative and organizational structure to mirror and reflect the above mentioned problematic.

From the viewpoint of the structuring of the aid entities, we know that the region, though it draws help from Recife, cannot essentially count with total support; therefore, the size of the industrial initiative in question, which intends to reach a population mass of 300 thousand people, will have to generate the better part of the units which it will need in order to provide for an efficient medical, odontological and hospital assistance to its dependents.

Thus, for a conscious orientation, it will be advisable that the Suape Project provide for this supplementation of the health equipment in order that basic conditions of social, physical and mental welfare and hygiene can be offered that will guarantee the expected production in every industry which installs itself in the area under study. It is one more task which cannot be avoided, at least initially. Thus, admitting the need to implement the social structure which the enterprise calls for, we shall indicate those units which are indispensable to the structuring of a coordinated and integrated system of health services in the region, in agreement, as we have said, with that which is already available in the Greater Recife area.

Taking into consideration the studies already made for the division into lots and for the urbanization of the area at the Suape Port, with the possible location of the several industries, plus the probable residential nucleus, it is easier to establish indications for the units which will render health care services to the population.

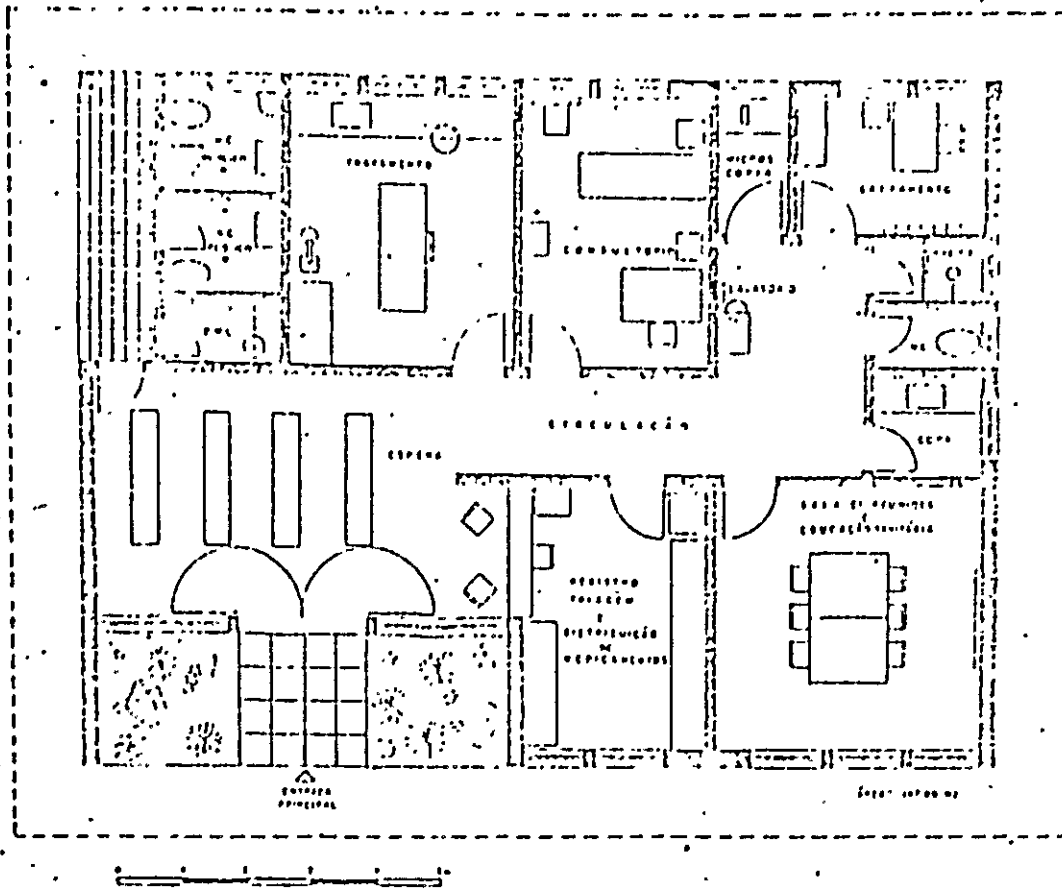
Thus, in their order of growing quantity, quality and medical, odontological and hospital attention, in a concentric scheme of work, going from the center to the periphery, the system would comprise the following elements:

- 1) Health Post, First Aid and Industrial Safety.
- 2) Integrated Health Unit, also called composite or, proper, Health Unit.
- 3) District or Intermediate Hospital
- 4) Base or Regional Hospital
- 5) Health Centers
- 6) Participation of Private Enterprise.

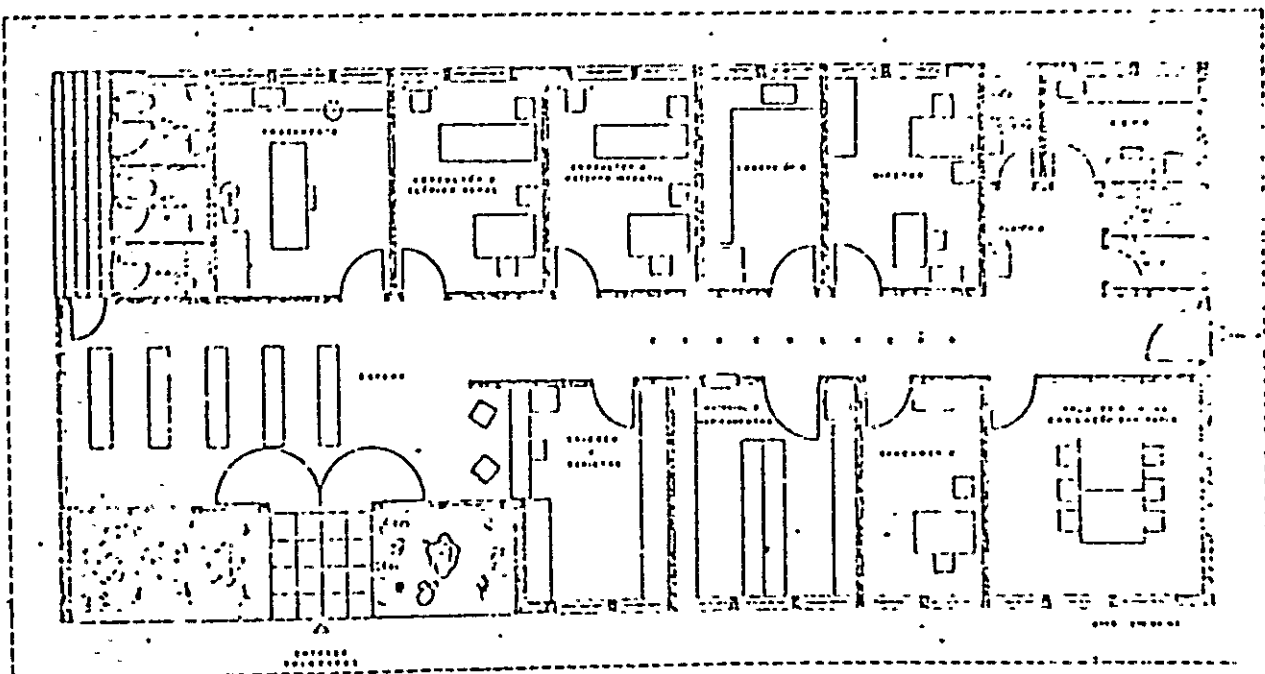
Health Posts - First Aid and Industrial Safety

These are the physical-functional structure units which vary in accordance to the area to be controlled. They will be installed as required by the contingency of constructions and the progress of implementation of industries, always aiming at environmental control, the prevention of accidents, the ready attention of emergencies and the hygiene of the environment, working 24 hours per day. As an illustration, we attach a few plans already approved by the competent sectors of the Ministry of Health, represented by the Medical-Hospital Assistance Coordination.

SANITARY UNIT - TYPE 1



SANITARY UNIT - TYPE 2



The number of such units will be a function of the evolution process in the region. It may grow considerably at the beginning, as the population increases or larger units are installed, adjusting themselves to real needs.

Integrated Health Unit

Will constitute the initial integrated nucleus, with the composite mission of basic sanitation, emergency treatment, sanitary control, nutritional guidance, clinical recovery activity, and selective choice

Its purpose is to render health services and will, essentially, be composed by the following elements:

- Administration area
- Public Health area
- Ward area
- Emergency area - First Aid
- Surgery Center area - Sterilization
- Internment area, with up to 50 beds
- Obstetrics area (optional)

The construction area here is approximately 3,000 m², and it should be located in the vicinities of the residential nuclei, with a close relationship with the posts in the other areas, whether industrial or administrative.

This type of unit, from the viewpoint of the recommended health system, seems ideal for assistance to growing communities, since it permits integrated attention and acts as a real support, in the phase when the industrial complexes are still being built and the populational nuclei are being delineated in the region, while intermediate hospitals required by the increased demand are being installed.

District or Intermediate Hospital

As the number of industries grow in the region, and the population

increases in the administration and workmen's centers, and in accordance with the patterns required by health organisms, it becomes imperative to erect the so-called district hospital or hospitals, which will attend to the defined communities with 50 to 60 thousand inhabitants, and which should have a number of beds not above 300, observing the Bidgman ratio of 5 beds per 1,000 inhabitants.

These should be projected in modules, so that they can expand in response to the demand. Usually, the support and space components are initially built for the internment of 100 patients. Later, internment spaces are added.

In this type of hospital, the so-called essential clinics will operate: medical, general surgery, obstetrics, gynecology, ear-nose-and-throat, ophthalmology and pediatrics, sided by the communal health services, wards and residential service.

In case the prognosis for regional development are confirmed, and the population reaches the 300,000 forecasted, the number of these units would reach 5 (five).

General Base Hospital

As the name indicates, it is the center, the base of the entire regional system, where the human, material and financial resources are concentrated for complete assistance in all medical, odontological and hospital specialties. It is a hospital which can be of use to teaching and Public Health, in addition to social-medical research. It should have no more than 500 beds, and its location will depend on regional growth, observing the need for easy access and easy regimentation of specialists. It is obvious that, due to the proximity of Recife, all this health equipment must always be measured as a function, also, of what the region can offer, by government or private initiative.

Health Center

According to the World Health Organization recommendations, the health centers, the Communal Health centers should be installed when human conglomerates reach 100 thousand inhabitants, and should be multiplied at each new 100 thousand. Obviously, within the project's forecast, they would be 3 in the final phase, and their physical and functional structure would meet the needs claimed by the public health programs, maternal-infant hygiene, bio-statistics, sanitary administration, basic sanitation, control of diseases and epidemics, in sum, everything involving health, in the sense of prevention, control, recuperation and care.

Participation of Private Enterprise

It is generally accepted that every pioneering initiative is encharged, most of the time, with the public power, that bears the onus of studying, planning, projecting, making resources viable, and introducing the implementation process.

However, as the enterprise evolves, opportunities arise that whet the interest of private enterprise which, then, becomes a part of the process, bringing along its cooperation and development. And in the medical, odontological and hospital field, there are many who will form a society and become integrated in the assemblage, offering, in various ways, their professional labor.

11.1.5 CONCLUSIONS

All these units should be organized into a business and regional administration, in which the General Base Hospital becomes an operations center for the entire given geographical region and renders technical support to the network of minor peripheral services, which take their assistance to the work sites and residences of the users of the institutions or enterprises.

The human resources available in the region, plus the specialists attracted toward the area, will be so distributed that specialized medical services can be centralized in the regional hospital, and the current medical practices can be decentralized to peripheral services.

In this manner, all persons residing in the region may enjoy the basic, indispensable health services, having also the right to highly specialized medical service in the hospital, when necessary. Toward this end, it is necessary to establish a good communications and transportation system to facilitate the double flow, of patients and staffs, between the units in the region.

Viability of the Planned Health Program

Given the purpose of working out the entire health infrastructure of a large area, where the Suape Project will be developed, with the participation of several industries, the plan becomes viable due to the multiple resources which can be mobilized; the government should participate in it, through its Social Security and Health agencies, as well as the municipal and state government and the industrial concerns involved in the Project, in addition to financing by adequate organs, according to the objective.

11.2 EDUCATION

11.2.1 EDUCATION TODAY

Education is an integral part of the Universal Declaration of the Rights of Man, and should be concerned with the Nation's interests, in a social integration process, giving emphasis to tradition but opening the ways to the future through the analysis of the present, with all its variations and hues.

The Brazilian Constitution (art. 160-II) reaffirms that all men are entitled to education and enlarges its compulsion to the ages between 7 and 14 years. It determines that education will be free for all in official grade schools, and in higher schools for those with good scholarship records and insufficient resources (art. 160-III). It has it that education should be administered at home or in the School, whether those kept by the Public Authorities or those of private origin, and whether education results from the compulsory cooperation of business, industrial and agricultural enterprises (art. 170). It is thus a basic right of peoples: Education and Culture in their different degrees and stages.

The school is for all individuals, with opportunities adjustable to each one and each case, making it possible, through flexibility, to have a equalitarian treatment, according to the democratic principle of equal opportunity for all.

Thus, education is today made part of a National Plan, which stipulates its objectives, the strategy of its attainment, the human and financial resources to be utilized in the zones and periods of its execution, its total duration, the evaluation of results, the procedures and programs. Every plan is clearly subject to modification during its implementation, and hence the periodicity of its enforcement in accordance with results attainable and attained within the stipulated periods of time.

Also, side by side with the National Education Plan, as many others are formulated as become necessary on a regional, state, territorial, municipal or other administrative level, but always in harmony with what the law establishes, the Constitution determines, and the environment requires.

11.2.2 STRUCTURING OF AN EDUCATIONAL SYSTEM FOR THE SUAPE REGION

The "Suape Project", in view of its dimensions, will bring to a large area an entire industrial complex which will lend to the region those typical characteristics of development and progress and which should be based upon a solid educational system in order to insure the basis of continuity to the Project for approximately 60 thousand jobs, with the probable fixation of a population of around 300 thousand people. An entire network of schools will thus have to be installed, at almost all levels, in order to meet the growing and gradual demand of those families that settle in the region. The network of schools will obviously follow the precepts of the current legislation, according to a program to be observed and carried out. As we know, it is the Schools that all the grandeur of institutions is forged, through the so-called education oriented towards development, as established by the Sectorial Education and Culture Plan which outlines the permanent objectives of Brazilian Education.

Thus it is society that must give, through education, those conditions for its members to become valuable human persons, so that they can take on, in a responsible manner, their social functions.

Demand and Probable Composition of the Student Body

According to the 1973 Statistic Yearbook, the population of the State of Pernambuco, surveyed in 1970, was 5,160,625 inhabitants, of which 1,060,701, that is, around one fifth, are concentrated in the capital.

The age bracket composition of Recife's population, according to an estimated calculation, is distributed as follows, which shows that roughly 50% is less than 25 years old, and around 5% is older than

60 years, which indicates the beginning of the great geriatric problem in the area.

<u>Age Bracket</u>	<u>No of Inhabitants</u>
0 - 4	166,518
5 - 9	153,956
10-14	131,423
15 - 19	113,196
20 - 24	89,241
25 - 29	66,544
30 - 39	109,593
40 - 49	86,525
50 - 59	59,246
60 - 69	33,679
70 and up	19,751
Unknown	2,260

Since this predominance of the young population is not an exclusivity of Pernambuco, but is common to the entire country, and if the populational growth in the area continues to be around 3% per year, with a final population in the Project of around 300 thousand people, we have sufficient data to project the composition of the student body and the school equipment which will be required for a continuous and gradual educational process, and considering that the number of schools and schoolrooms for the education in the 1st and 2nd grades is already insufficient, as it is in the entire State.

It is thus necessary to program an entire system to be developed by stages, in the measure that industries install themselves as projected in the Susepe Industrial complex.

The analysis of the above table reveals that around 20% of the population is in an age bracket where education is compulsory (7 to 14 years); such 1st grade education must be administered by government authorities and private institutions, have the duration of eight school years, using at least 720 hours of activities per year,

and the student must be at least seven years old at the time when he joins school.

By keeping the same proportions, and considering that, in the Suape Project area, there will be, at the end, a population of 300,000 people, we come to the conclusion that a real school network will have to be planned for the 1st degree education and, as its consequence, another of the 2nd degree, with updated characteristics and, above all, oriented toward labor and as professional as possible, due to the growing local demand.

In addition, the available resources for the various kinds of education should be rationally utilized in complete harmony with technical programs required for the industrial development in the area. Technical schools such as SESI, SENAI, SENAC and the University should participate in these programs, where the formation of high level professionals in the field of specialized technology is concerned.

In this manner, an entire "educational system" will be formed with local roots, for the 1st, second and technical degrees, so equipped as to permit "watching that children under seven years of age receive an adequate education in nursery schools, kindergartens and equivalent institutions."

For first degree education, the group of schools will be formed as population becomes denser. This, in accordance with existing indicators, will require the construction of some 60 units with approximately 720 classrooms, operating in two shifts, with the possible utilization of a third shift for supplementary education and in order to help expanding Mobral programs. Thus, the construction of these units should meet current requirements of multiple use, with the least rate of idleness, so as to permit facilitating the development of curricula adopted in the different levels of education, having always a common nucleus, interconnected disciplines, and with growing difficulty.

It should vary in content and procedures according to the student developmental phases, since it is intended for the formation of the child and pre-adolescent.

As for the 2nd degree education, it aims at the entire formation of adolescents, requiring for admission that the student has finished the 1st degree or had equivalent education, structured with 3 or 4 years, according to what has been projected for each type of formation, and comprising at least 2,200 and 2,900 hours of effective school work, respectively.

In accordance with Law no 5,692, dated of 1971, and taking into account that the area is still practically devoid of educational units, it is recommended that the 2nd degree schools to be built there should obey the recommendations put forth by the Ministry of Education which limit themselves to two types of structural solutions:

- 1) The so-called Integrated College, which will group in one establishment the services and disciplines or areas of study to fulfill both parts of the full curriculum: general education and special formation. This is particularly indicated for those locations which still do not have an organization to render this type of education, but intend to implement it in due time.
- 2) The so-called Inter-School Center, which is more indicated for densely populated locations where 2nd degree schools are available and lack the means to give a professional training to their students. These centers group the services and disciplines or study areas common to several other establishments.

The number of Integrated Colleges to be built will be a consequence of the local populational growth and of the demand for professional trainings. It is estimated that the distribution of 70% of matriculations for training in the Third Sector and 30% for the Second Sector will correspond approximately to the distribution of jobs to individuals with 2nd degree schooling.

Fluctuations in the labor market should determine a great flexibility in the structuring, organization and operation of integrated colleges, so that they may always alter their plans as to the offer of different types of training.

The modular architectural structure, the simplification of facilities and equipment rationalization should prevail for greater ease of the required adaptations. The following are basic professional fields, where the demand for 2nd degree specialized manpower is very great: Mechanics - Electrotechnics - Electronic - Civil Construction - Business and Services.

The choice of college type, with all details, such as number of classrooms for each educational department, amphitheaters, laboratories, audio-visual aids, demonstration, etc., will be made only with a view to convenience and opportunity.

It can, however, be estimated that, in order to meet the final demand, at least 6 to 9 of these establishments will be needed, between the two recommended types - 1 and 2 - both with their sub-types:

- A for 800 students per shift
- B for 600 students per shift
- C for 400 students per shift

Just as an illustration of what a 2nd degree college entails in area, rooms and cost, we give the following table:

ESTIMATED COST OF COLLEGE

Description of Parts	TOTAL COST IN CRUZEIROS		
	Type "A" 5,500 m2	Type "B" 4,500 m2	Type "C" 3,500 m2
Construction	3,300,000	2,700,000	2,100,000
Furniture	493,100	419,800	289,400
Equipment	1,548,300	1,343,200	1,029,350
Teaching . Material	115,400	85,400	73,300
Books	110,500	87,500	67,500
TOTAL	5,567,300	4,635,900	3,560,050

