ROGER J.FIELD

A CITY CENTRAL CORE FOR 2001

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# A CITY CENTRAL CORE FOR 2001

UNDERGRADUATE THESIS IN ARCHITECTURE

BY

ROGER J. FIELD

SUBMITTED TO THE SCHOOL OF ARCHITECTURE AS PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF BACHELOR OF ARCHITECTURE

AT

MONTANA STATE UNIVERSITY

BOZEMAN, MONTANA

MARCH 14, 1974

P378
F458

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ACKNOWLEDGEMENTS: Fred Herbold, Freshman
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THESIS: To intergrate structured and non-structured systems in such a way that appropriate flexibility is obtained.

SUBJECT OF THESIS: Developing a dead area of a city into a new central core. Specifically, renovation of a railway yard to a use which will meet the needs of today and tomorrow.

STRUCTURE: Something made up of more or less independent elements or parts.

STRUCTURED: Having definite structure. Exhibiting organized structure or differentiation of parts.

NON-STRUCTURE: Something having an un-fixed pattern or organization.

"All my life," he said, "I have searched for the treasure. I have sought it in the high places, and in the narrow. I have sought it in deep jungles, and at the ends of rivers, and in dark caverns - and yet have not found it.

"Instead, at the end of every trail, I have found you awaiting me. And now you have become familiar to me, though I cannot say I know you well. Who are you?

And the stranger answered:
"Thyself."

- From an old tale

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....When we have learned more
and when we can afford it
financially, we should bring
mans' systems of mechanical trans-
portation underground, to free
much more of the surface of the
earth for mans use and enjoyment....
Man will move to underground trans-
portation systems when he is able
to build them to his full satis-
faction in terms of travel time,
cost and comfort.

- C.A. Doxiadis

## THE CONDITIONS CREATING A NEED FOR THE FACILITY

Todays expanding technological and scientific advancement has completely left behind the slower advancement of architecture. New devices which could be implemented into architectural design take a longer period of time and are out-dated by the time they are used. In todays energy crisis and expanding demands on energy conservation in architectural design one has to utilize this technology in order to achieve this goal of energy conservation. First we must catch up to technology and then make it work towards the criteria set up by society at that period of time.

To achieve this goal architecture must become a very flexible expression of space in order to handle changes in the criteria set up by society and also new advancements in technology. Our designs must be set up in the program development stages to incorporate this flexibility into the architectural solution. We must define structured and non-structured flexibility into the program.

The conditions which will be set up as functions towards a set of criteria will deal with forseen advancements in technology for the years to come. By dealing with the future we eliminate some of the headaches which will occur when other architects deal with renovating or re-functioning of buildings in the future when said buildings become non-functional.

To research the future we must speculate that researched areas of change will in fact occur and not be out-dated by other technological advancement in the same field of study or be less efficient than existing technology.

By researching predicted areas of change and compiling this information for use in said facility one becomes aware of forseen changes and is able to utilize this into his programing and inevitably into his design solution.

Areas of Research

1) Transportation
2) Power Supply
3) Waste Processing
4) Building Methods
5) Space Utilization
6) Human Criteria
7) Sociological & Pyschological Effects in Humans
8) Environmental

9) Mechanical
10) Electrical
11) Space Travel - Communities
12) Communication

By compiling this information, that is, future research, and comparing it to the past and todays technology one is able to apply this research into his architectural solution.

Today our large and small cities are finding areas which have little use and are considered dead areas. As technology advances these dead areas will increase in number until the complete areas are useless. For example if tomorrow a better way of hauling freight on land was found and the railways were eliminated, we would be left with vast dead areas. It is improbable this would happen in a short time, however, city planners are in a habit of relocating new functions on new land which could have been used for farming, parks, recreation or just left to nature. Since most railway lands are in the centre of the city it could be developed into a new city core and utilize the modern criteria set up in its initial program stages. As areas around this centre become unfunctional they can be replaced by modern state ments of architecture that would function with the central core. Instead of destroying more land you make better use of the land you already have. To reach the same criteria and eliminate the land drain on farms and recreational land.

The conditions of our technology, society, environment, and architecture dictate a change which will occure in our way of living. We must conform to this change and do it in such a way that people will adapt with little effect upon them or their surrounding environment.

Man must not only look to the future for answers but at the past or present period of time for answers to some of his problems. The best and easiest way of learning is from others mistakes and successes. Our fathers and their fathers passed on these pit-falls in developing certain goals of achievement and ways to go about in reaching these goals. Architecture should be set up the same way with case histories on past and present buildings. We as architects will be able to use this information to achieve the best possible solution for our clients. Both failure and success should be recorded and computerized for fast recovery of information. This does not mean we will copy others successes, but will give us an insight to the success or failure of our proposed architecture. It will act as a check towards a certain goal to which we want to achieve.

In my thesis I will be taking an existing dead area and developing it into a central core of a city using predicted future technology. It will deal with an overlay of structured and non-structured systems in such a way that appropriate flexibility is obtained. It is these systems of design that will act as pressures to the final design solution.

## LOCAL AND REGIONAL ENVIRONMENTAL CONDITIONS

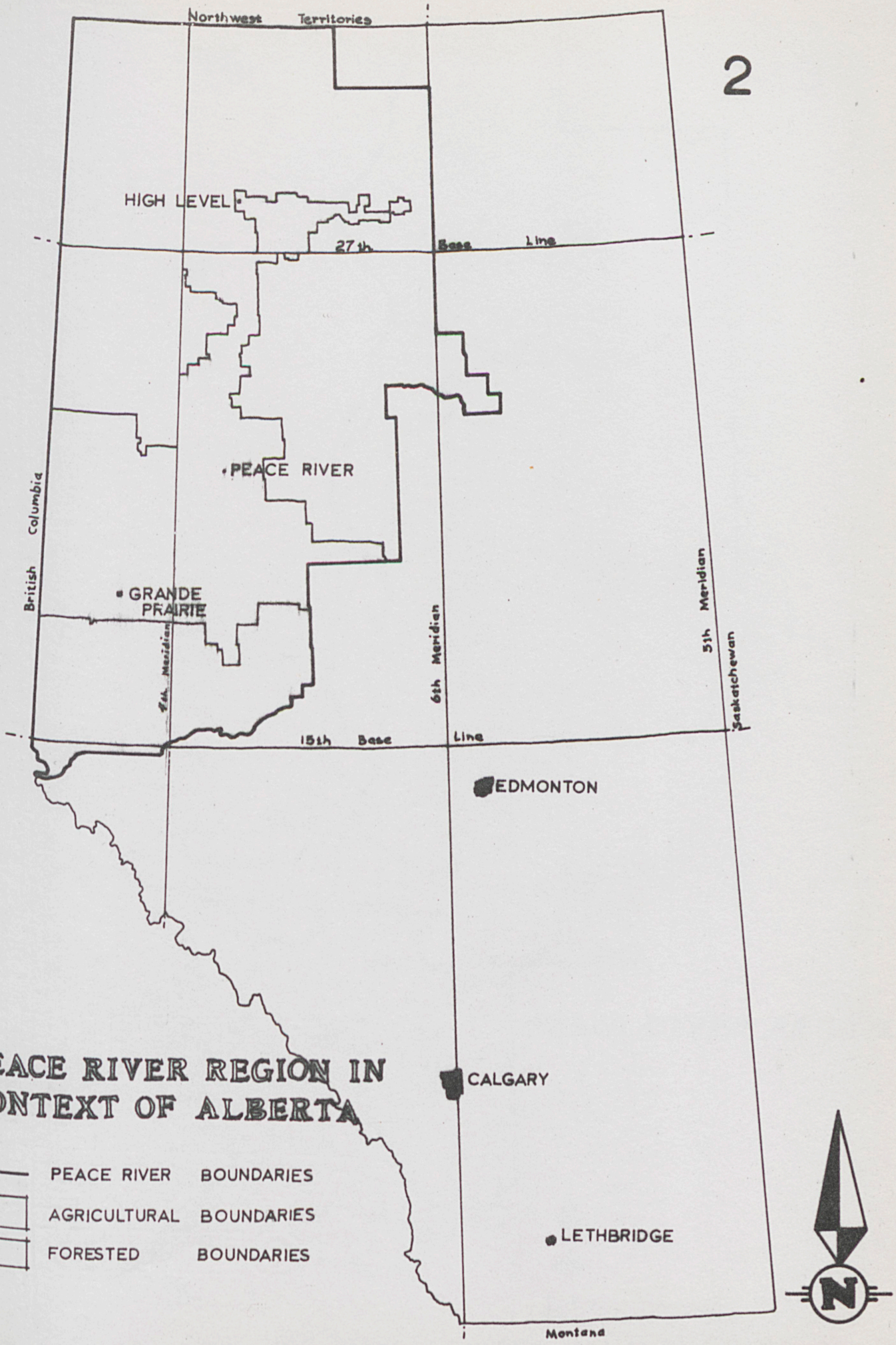
PHYSICAL GEOGRAPHY - Grande Prairie is a city located in an area known as the Peace River Region which is located in Northern Alberta, Canada. (see may 1) The Peace River Region lies between latitudes 53° and 60° north with Grande Prairie situated about 55° latitude and 118° longitude. (see map 2) Its latitude and insularity are perceived by people elsewhere as stamping the region with the mark of a settlement frontier. This is still true in terms of historical or contemporary patterns of economic activity, particularly in agricultural, the petroleum and natural gas industry, and the forest products industry. Yet this mental image of the Peace River Region to some belies an objective analysis of the isolation of the region. The choice of transportation or communication media makes isolation relative in terms of time of costs for goods or passengers.

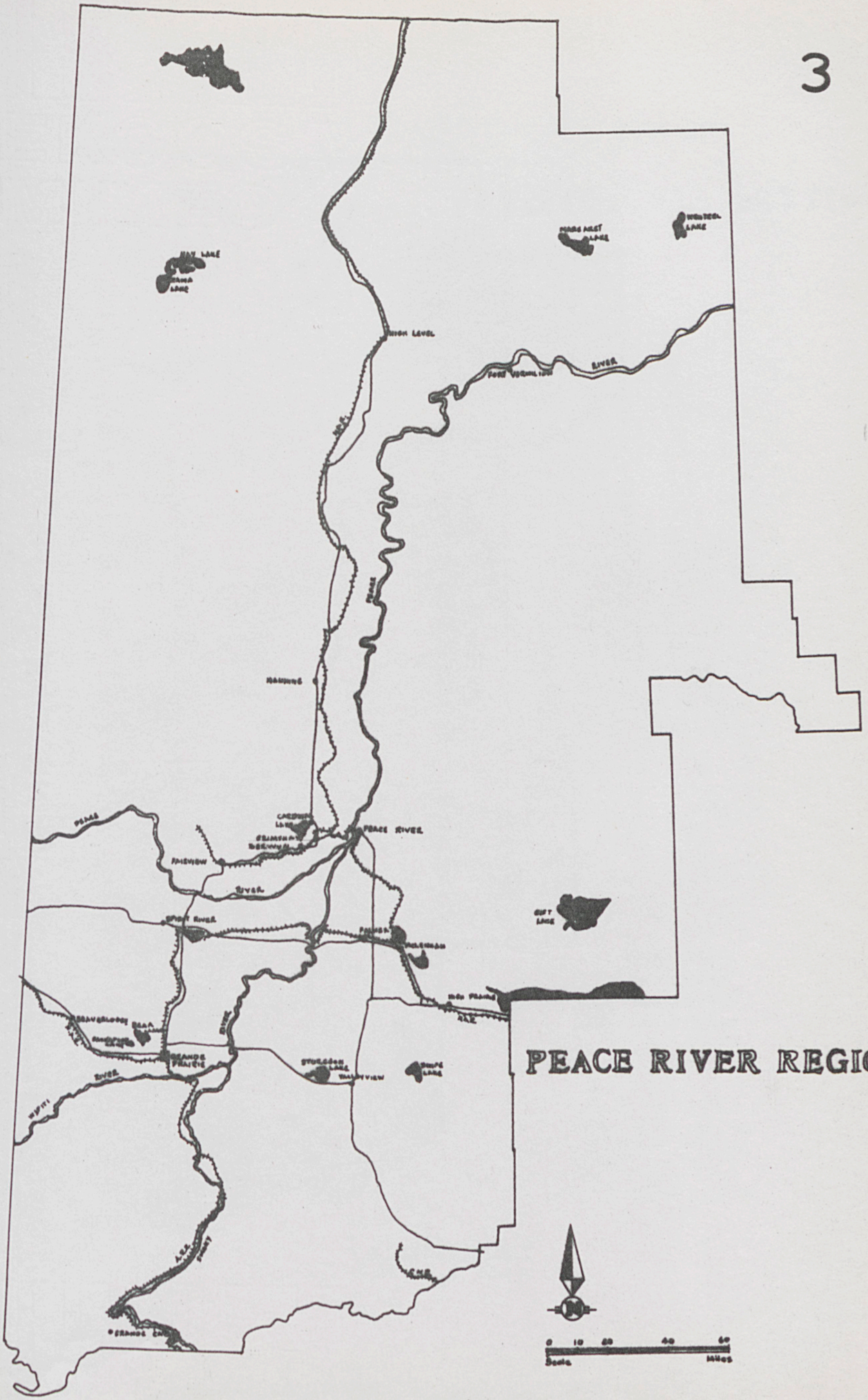
The Peace River Region knew no artificial boundaries in the time of the explorer Alexander MacKenzie; it was one vast wilderness. The area now comprises roughly one third of the total area of Alberta or 85,095 square miles. (see map 3)

Alexander MacKenzie spent much time in the region exploring and trapping. He travelled the rivers and lakes, crossed its plains and climbed its mountains. He would have known that the land slopped from the southwest to the northeast from his many voyages on the rivers of the area. (see map 4) Travelling west he encountered the Rocky Mountains which run in a southeast to northwest direction. From the mountainous southeast portion of the region, the land slopped downwards to the northeast. This general decrease in altitude was interspersed with upland areas of between 2500 to 3500 feet. Being familiar with the drainage systems of the area, MacKenzie would have known that these upland areas separated the two major drainage systems in the area: the Hay River and Peace River System. Having explored them extensively he knew that they both drained into the Arctic Ocean. As MacKenzie travelled up river the form of the river valley changed. The very broad flat valley of the lower portions of the systems gave way to narrower, steep-sided and very deep valleys farther up-stream. The plains he crossed were not flat but varied in relief. There were flat sections interspersed with gently rolling areas and very rugged sections of small hills of low relief.

He may have speculated on the formation of the land forms which he saw around him but it is unlikely that he knew that the surface features were a result of the ice age and post ice age period. Thousands of years ago glaciers covered the entire region. Passing over the area they laid down a covering of

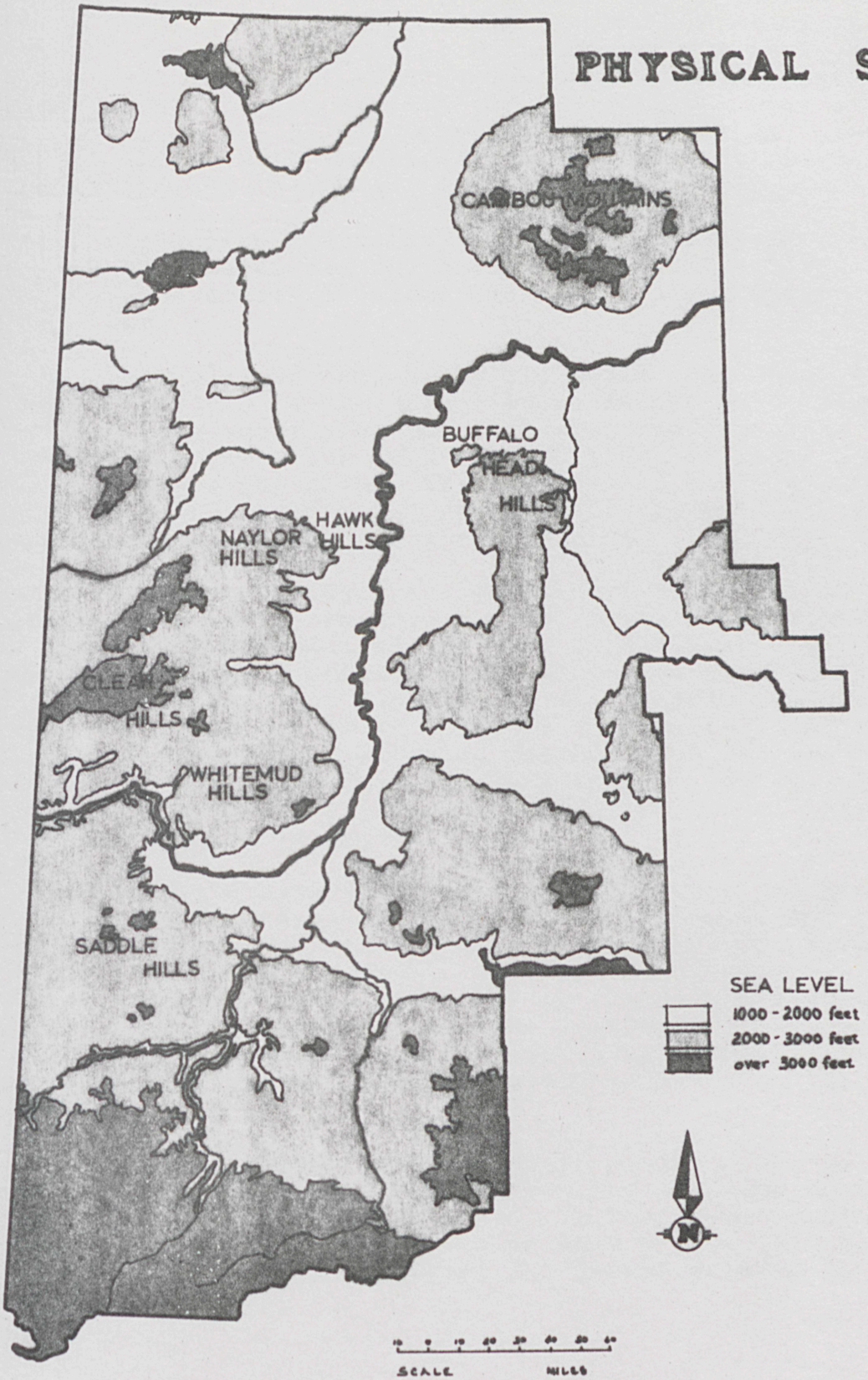

PEACE RIVER REGION IN CONTEXT OF WESTERN NORTH AMERICA
ALASKA
INUVIK
YUKON
WHITEHORSE
NORTHWEST TERRITORIES
YELLOWKNIFE
HAY RIVER
PRINCE RUPERT
BRITISH COLUMBIA
PEACE RIVER
GRANDE PRAIRIE
EDMONTON
ALBERTA
MANITOBA
VANCOUVER
CALGARY
SASKATOON
SASKATCHEWAN
REGINA
SEATTLE
WINNIPEG
UNITED STATES
SCALE 100 50 0 100 200 MILES


Northwest Territories
HIGH LEVEL
27th Base Line
PEACE RIVER
British Columbia
GRANDE PRAIRIE
4th Meridian
6th Meridian
5th Meridian
Saskatchewan
15th Base Line
EDMONTON
CALGARY
LETHBRIDGE
Montana
PEACE RIVER REGION IN CONTEXT OF ALBERTA
PEACE RIVER BOUNDARIES
AGRICULTURAL BOUNDARIES
FORESTED BOUNDARIES
N
SCALE: 1 in. = 75 miles




# PEACE RIVER REGION

# PHYSICAL SETTING



ground moraine - a highly compacted mixture of fine and coarse materials. This ground moraine accounts for most of the undulating topography in the region. In other areas, when the ice melted, glacial material was dumped in a haphazard arrangement of numerous hills of low relief. These are the rugged sections of the region. Most of the flat areas in the region were the beds of ancient glacial lakes. Winds swept the lake deposits into extensive sand dune areas when the waters of the lakes drained away.

When the glaciers retreated, the drainage systems re-established themselves and cut deep, steep-sided valleys into the easily erodable material and soft bedrock shales and sandstones.

It is very unlikely that MacKenzie would have known the geologic history of the area. He would not have known that the rock underlying the vast area was deposited by the seas which covered the area many millions of years ago. He would not have known that the rock was of the cretaceous period nor that even older rock of the friassic and jurassic periods could be found in the mountains.

Of course he would have been well aware of the climate. He did not know of the technical term 'continental climate' but he would have experienced the long cold winters and short warm summers which characterized this type of climate. He would have noted that January was the coldest month and July was the warmest and it is possible that he realized that the frost free period extented roughly from June 15 to August 31. He would not have known that it varied considerably throughout the region due to topography, altitude, vegetation, and water bodies.

MacKenzie would have known that precipitation was greater towards the mountains in the west and southwest and decreased with distance east and north from the mountains. Records show that the mountainous southeast corner of the region averages twenty inches of percipitation per year, while in the northern reaches the figure drips to fourteen inches. The bulk of the region receives between sixteen and eighteen inches of precipitation annually on the average.

MacKenzie would have been well aware of the winds of the region which are predominantly from the west and north with a significant southerly component in the warmer months of the year. It was while he was in this region that he experienced the chinooks which are looked forward to all winter.

Had MacKenzie examined the soil closely he would have been more aware of the production capacity. As it was, he may have noticed that soils of the plains were a dark grey and those forested areas were grey. What he saw was one of the great soil groups - the podzolic soils - which form in a cool, moist climate.

The dark grey soils are the most fertile and today support a wide variety of crops. On the other hand, the grey soils are much less productive and require heavy fertilization. Extensive peat bogs are found throughout the region.

The forest cover would have been much more extensive in MacKenzies' time but with the influx of homesteads, the forests were cleared to make way for the settlers' plough. Land clearing is being carried out even today as there are still large areas of land which have agricultural potential.

HISTORY - Before recorded history scattered bands of Indians roamed over the Peace River region. Over time they became sorted into the Beaver, Slave and Chipwyan tribes. Later Cree Indians, pushing westward and northward established themselves over large areas of northwest Alberta. These original inhabitants practised a nomadic way of life. They were hunters, gatherers, and fishermen and genrally subsided very well on the abundant game within the area. These were the people who inhabited the region when the explorers, fur traders, and missionaries arrived on the scene.

The Peace River Region has been known to the white man for only 150 years and has only been significantly settled by him since the opening of the Edson - Grande Prairie Trail in 1910. Previously, there were very few permanent white inhabitants, most of whom were connected with the fur trade.

Fur traders and explorers travelled the regions rivers and went upland in search of furs. Their occupancy in any one place was transient in nature, depending on competition with other trading posts and the supply of game. They traded with the Indians and in return for furs gave guns, steel traps, trinkets, and the more unscrupulous traded whiskey.

Explorers reports on the agricultural potential of the region gradually filtered back to more settled areas. Agriculture was already practiced on a limited scale to supplement the food supply of the trading posts. Dunvegan and Fort Vermilion are examples of early agricultural enterprises.

Gold seekers came to the region in 1870 to pan the rivers and streams. Many remained after the gold fever passed. Some of the regions most famous figures are from this period such as Twelve Foot Davis.

The next wave of goldseekers were Klondikers. Many never made it to the fabled gold filed of the Yukon. Some decided to stay in the Peace River region and took up homesteads. However, many more lie buried along the trail between Edmonton and Hudson Hope. Ill equiped and facing incredible hardships, they died of scurvy or starvation.

Concurrent with the gold seekers were the promoters such as J. Cornwell. Realizing the great potential of the area, he sought to attract settlers to the region.

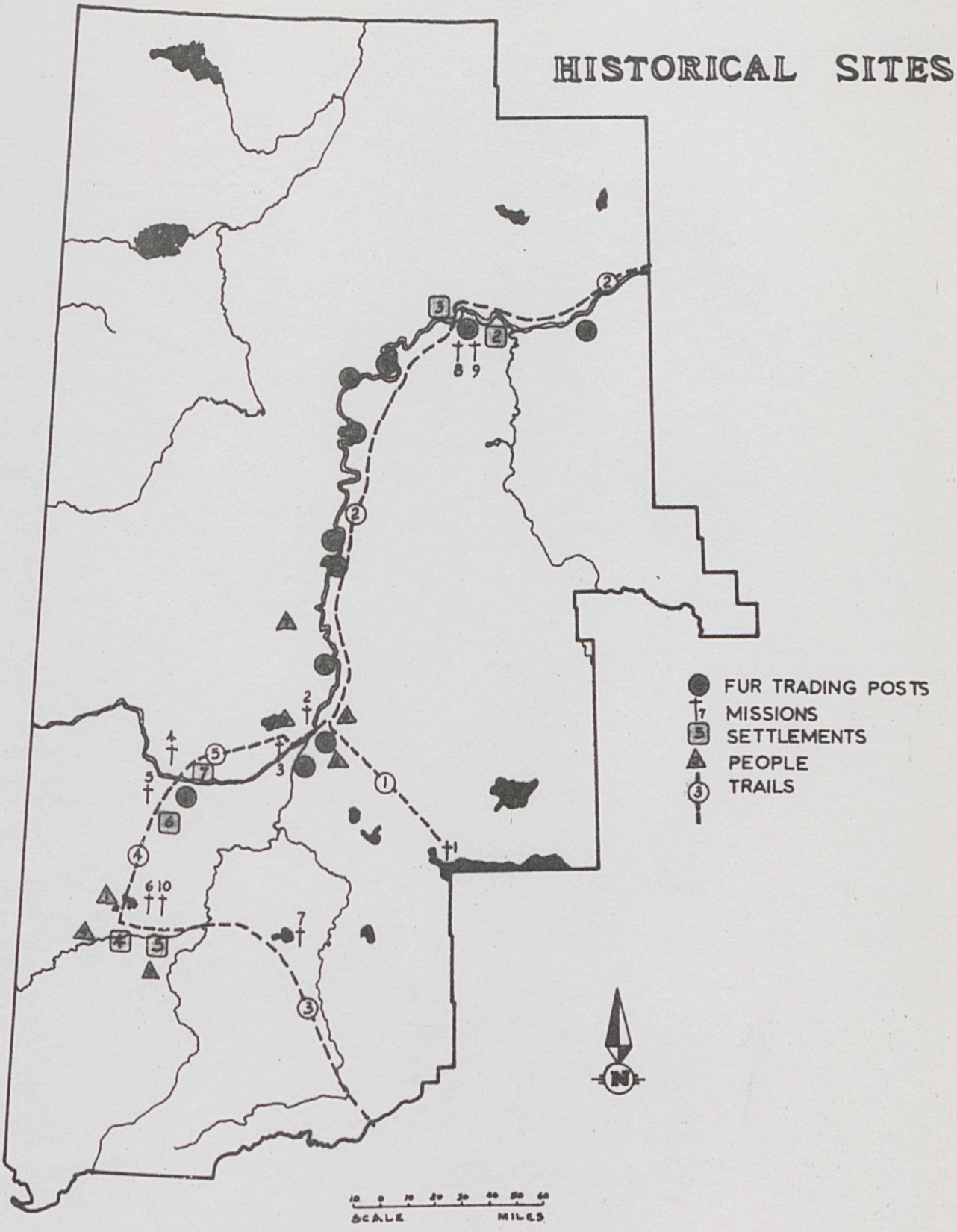
The vanguard of homesteaders began to move into the region in the last quarter of the nineteenth century. S. Lawrence, E. Martin and A. Monkman are names which have gone down in the regions' history as being amoung the first pioneers. These early settlers were only a trickle compared to the flood of homesteaders who later were moved to come to the Peace River region by the dream of a good life on ones' own land. It was these people who opened the land and pushed back the frontier.

Today the region has become more diversified and its economy is no longer solely based on agriculture and individual fortune seekers. Large multi-national companies have been lured to the region attracted by the rich reserves of timber, petroleum, natural gas and minerals. Service industries have followed.

The procession of people who have settled the region is as varied as their occupations. In addition to the original Indian inhabitants, Englishmen, French Canadians, Germans, and Scandinavians constitute a few of the ethnic groups who have made this area their home. As the region develops it appears that the population will become even more diversified.

The Peace River region is one of Canadas' unique areas. Its original isolated nature gave its inhabitants a great feeling of attachment, identity and solidarity with the region. There are very few areas in Canada where a person can identify so strongly with so well defined an area. So far the Peace River region has managed to maintain its unique identity in spite of increasing accessibility. (see map 5)

# HISTORICAL SITES



FUR TRADING POSTS:

1) Dunvegan
2) Fort Fork
3) St. Marys' House
4) McLeods' Fort
5) Horseshoe House
6) Battle River Port
7) Carcajou
8) Fort Vermillion I
9) Aspin House
10) Vort Vermillion II

MISSIONS:

1) Grouard (R.C.)
2) Shaftesbury (R.C.)
3) Shaftesbury
4) Dunvegan (Ang.)
5) Spirit River (R.C.)
6) Grande Prairie (R.C.)
7) Sturgeon Lake (R.C.)
8) Fort Vermillion (R.C.)
9) Fort Vermillion (Ang.)
10) Grande Prairie (Un.)

SETTLEMENTS:

1) Shaftesbury
2) Fort Vermillion
3) North Vermillion
4) Lake Saskatoon
5) Flyingshot Lake
6) Spirit River
7) Waterhole

PEOPLE

1) A. Monkman
2) Twelve Foot Davis
3) A. MacKenzie
4) W.D. Albright
5) Dr. O'Brien
6) S. Lawrence
7) C. Plevine

POPULATION - The population in the region (currently 95,000 1973) is growing more repidly than the population in the province as a whole although densities are low (.94 persons per sq. mile) The birth rate is higher than the province as a whole. Native Indians constitute 10.4% of the population compared with 2.1% of the population of the province as a whole. In the region the main ethnic origins of the populace are British (33.7%), French 15.1%) German (10.4%) Native Indian (10.4%), Scandinavian (8.5%) and Ukranian (6.4%). The regions population under the age of 20 years is 49.4% and 20 to 64 years is 44.9% which shows fewer people in the productive or working age group.

The rural development research branch estimates a population in 1976 of 110,583 and in 1986 of 138,355 people. Most estimates predict approximately 250,000 people in the region by the year 2001.

SOCIAL TRENDS - (see map 6)

HOSPITALS - EXISTING SITUATIONS - In the Peace River Region there are 13 Hospitals.

1. Many of the hospitals in the region are old and often contain limited amounts of the newest equipment, thus, they are limited in the services they can offer.
2. Though the hospitals are well dispersed throughout the region, there are often waiting lists for bed space.
3. Exclusive of Grande Prairie, regional hospitals have difficulty in retaining staff.
4. People living and working in the northern portion of the region are often a great distance from hospitals.

HOSPITALS - GOALS:

1. All persons of the region should be reasonably accessable to a hospital.
2. All hospitals in the region should have some surplus beds available most of the time.
3. All hospitals should maintain an adequate staff at all times.
4. All hospitals in the region should be maintained with modern equipment.
5. Hospitals should specialize in those functions they are best equipped to perform.

SCHOOLS - EXISTING SITUATION - In the Peace River region, Public Schools offer grades one to twelve in various locations throughout the region. There is a regional college at Grande Prairie which offers high school upgrading and the first two years of University, as well as many technical courses. The agricultural college at Fairview offers upgrading and technical courses.

SCHOOLS - GOALS:

1. Every child in the Peace River region should have the chance to be educated to his or her fullest potential.
2. A greater number of native people should be trained as educaters.
3. The distance some children travel to school should be reduced.
4. All teachers should have equal access to teaching aides and equipment.
5. All areas should have teachers of approximately equal ability and training.

POLICE - EXISTING SITUATION - The locations of the Royal Canadian Mounted Police in the Peace River region are shown on Map 6. Besides having personnel working in these centers the Royal Canadian Mounted Police have personnel working the rural areas adjacent to the areas where the police are stationed.

The Royal Canadian Mounted Police subdivision head quarters have on their staff: administration staff, air detachment, telecommunications section, identification section, plain clothes sections, and dogmaster.

POLICE - GOALS:

1. All people of the Peace River region should have access to police protection.
2. More efficient communications between outlying areas and the police detachment should be established.
3. Any new town or resource site of more than 1,000 inhabitants in the region would receive police protection at the time it is establised.

HEALTH AND SOCIAL DEVELOPMENT - EXISTING SITUATION - The department of health and social development offices offer social assistance, counselling, adoption services, guidance clinics, health nurses, foster parent services, and many additional services, of a local nature. The workers from the five centres travel to any location in the region that requires their special services. Not all the regional offices have identical services but where local services are deficient, specialists are available from Grande Prairie or Edmonton.

HEALTH AND SOCIAL DEVELOPMENT - GOALS:

1. All persons of the region should have equal access to the services of the department of health and social development.

RECREATION - EXISTING SITUATION - No sizeable centre in the region lacks such facilities as playgrounds or community halls. What is lacking are capital intensive facilities such as arenas, swimming pools, and cultural centres for the performances of the arts.

RECREATION - GOALS:

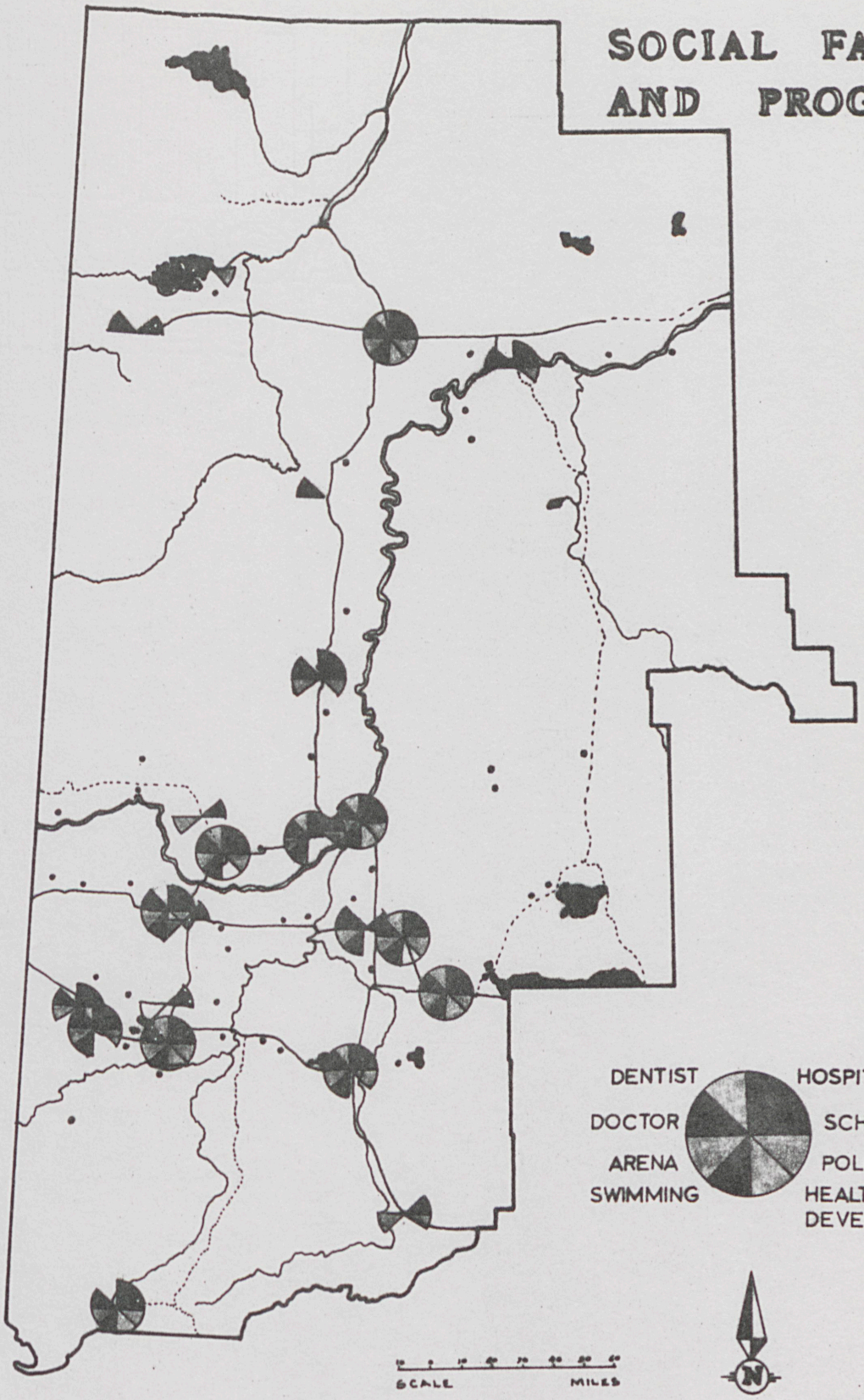
1. All people in the region should have the right to use existing facilites, whether they are residents of the centre in question or not. Cost-sharing arrangements between local governments should be arranged to facilitate construction and maintence.
2. All swimming pools built in the future should be covered even if fewer pools can be built. The pools that are built should be centralized according to population potential.
3. Arenas and swimming pools should be built close to schools.

DOCTORS AND DENTISTS - EXISTING SITUATION - The location of offices of doctors and dentists in the Peace River region as shown on Map 6. The exception to the Map is a dentist from Fort Smith who visits High Level and Fort Vermillion once monthly. Even the densely populated areas of the region do not have enough doctors or dentists. In making an appointment with a doctor, one must do so at least one week in advance. For a dentist appointment, one can expect up to a two month delay.

DOCTORS AND DENTISTS - GOALS:

1. All people in the region should have access to a doctor and a dentist.
2. Medical and dental personnel should be actively recruited for the region.

# SOCIAL FACILITIES AND PROGRAMS



ECONOMIC TRENDS

INTRODUCTION: In terms of the Peace River Region, the European settlemnt is relatvely young. The regions economic history spans the activites of the Indians, fur traders, gold seekers, homesteads, land promoters and industrialist. The fur trader held sway for the longest time in the region until he was displaced by agriculture and forestry in the early twentieth century. In the 1950s, the oil boom reached the Peace River region and subsequent drilling yielded fruitful results. Some manufacturing, mostly associated with resource extraction, also grew up followed by an increase in the service sector.

The region is still heavily dependent on resource industries and potential still exists for further development. Improved transportation has greatly facilitated development in the region.

PRIMARY SECTOR:
AGRICULTURE: It represents the way of life for roughly one-half of the people in the region and is still the largest single employer, however, it has been declining in numbers and relative importance in recent years. (see Map 7) Individual average farm size has also increased from its 1966 level of 569 acres to 689 acres. Thus the trend is to fewer but larger farms being operated at greater efficiency and productivity by fewer people and more machinery.

There is approximately 15.6 million acres of potentially arable land in the region of which five million acres are now in farmland. Thus there still remain approximately ten million acres which are available for agricultural production. By 1981 according to the human resources development authority an estimated seven million acres will be farmed of which four million acres will be improved land.

FARM TYPE: (By Percentage)

| | |
|---|---|
| Dairy | 0.8 |
| Cattle, Hog, Sheep | 16.3 |
| Poultry | 0.3 |
| Wheat | 10.7 |
| Small Grain (Excluding Wheat | 39.6 |
| Field Crops | 6.8 |
| Fruit & Vegetables | 0 |
| Forestry | 0 |
| Misc. Specialty | 1.8 |
| Mixed | 11.8 |
| Livestock Combination | 1.6 |
| Other Combination | 1.3 |
| Field Crops Combination | 8.9 |

SALES OF PRINCIPAL FARM PRODUCTS:

| | DOLLARS | PERCENT | AMOUNT |
|---|---|---|---|
| Grains other than wheat | 14,973,000. | 35.6% | 29,000,000 |
| Wheat | 7,403,000. | 17.6% | 8,959,000 |
| Cattle | 6,706,000. | 15.9% | 23,021 |
| Hay & Fodder | 5,776,000. | 12.4% | |
| Pigs | 2,602,000. | 6.2% | |
| Other Field Crops | 2,083,000. | 5.0% | |
| Other Agricultural Products | 1,721,000. | 4.1% | |
| Dairy Products | 731,000. | 1.7% | |
| Eggs | 275,000. | 0.7% | |
| Poultry | 38,000. | 0.1% | |

FOREST PRODUCTS: (see map 7 & 8) The region encloses forests containing approximately 40 billion board feet of coniferous saw-timber (10" diameter and up) and 100 million cords of coniferous pulpwood (4" to 9" diameter). The regions forests also contain similar quantities of poplar sawtimber and pulpwood. As an example of the way in which such resources may be disposed of, the cellulose mill now in operation will utilize one-half million cords of pulpwood annually.

MINES & QUARRIES: (see map 8) The region contains a wealth of mineral resources. Iron deposits found at Clear Hills are awaiting the development of an economical extraction process. Estimates of reserves of low-grade sedimentary iron ore in the Clear Hills and Spirit River region range between 250 million and 1 billion tons. The Alberta Resources Railway has enhanced the feasibility of developing this iron deposit and also vast gypsum ore near the British Columbia border.

Coal is found at Halcourt, Valhalla, Sexsmith, High Prairie, and Grande Cache. The best deposits are the Smokey River deposits found near the new town of Grande Cache. Reserves of coking coal in the Smokey River area range from 1 to 2 billion tons. Reserves of ordinary coal in four fields in the region total 1 billion tons.

Silica Sand, used in glass making is found north of Peace River town.

Salt is also found in the Peace River region.

Sand and gravel can be found in most of the regions river valley.

Peat moss has become an important local industry due to its plentiful supply throughout the region.

OIL & GAS: (see map 8) Oil and gas have resulted in the greatest financial returns to companies working in the region over all other resources in past years. Recoverable reserves of conventional crude oil total nearly 5 billion barrels. Additional oil could be extracted from oil bearing sands with an estimated 20 billion barrels of recoverable oil.

Total natural gas reserves of over 5,000 billion cubic feet which would satisfy the total requirements of the city of Grande Prairie for 5,900 years.

WATER RESERVES: A renewable resource which is becoming increasingly significant in the North American context, particularly in light of suggestions of massive inter-basin diversion schemes, is the Peace River regions' fresh water. Approximately 55 million acre-feet of fresh water is leaving the region each year. In the Peace River region alone, this annual volume of water is sufficient to meet the fresh water requirements of a city of 400 million people at present Grande Prairie consumption rates.

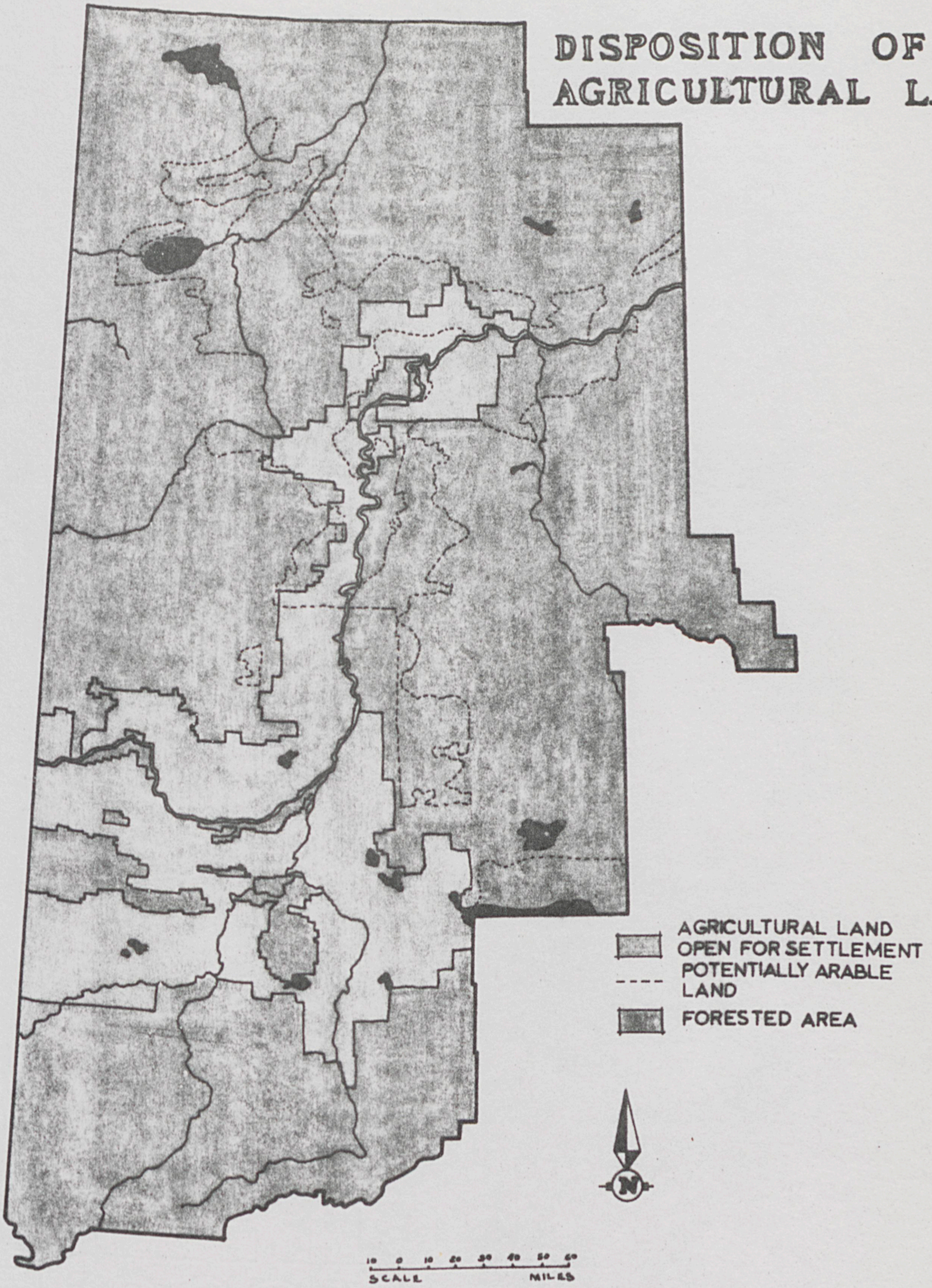
POWER: Stimulated by the oil boom, power needs grew so that the region eventually had to tie into the provincial grid system. The regions' continued growth is increasing power requirements, but, with its link with the provincial grid, demand for the next twenty-five years can be satisfied without hydro-electric development. The beauty of the region and the probable perfection of nuclear breeder reactions by 2,000 should result in the region being free of such unwise development indefinitely.

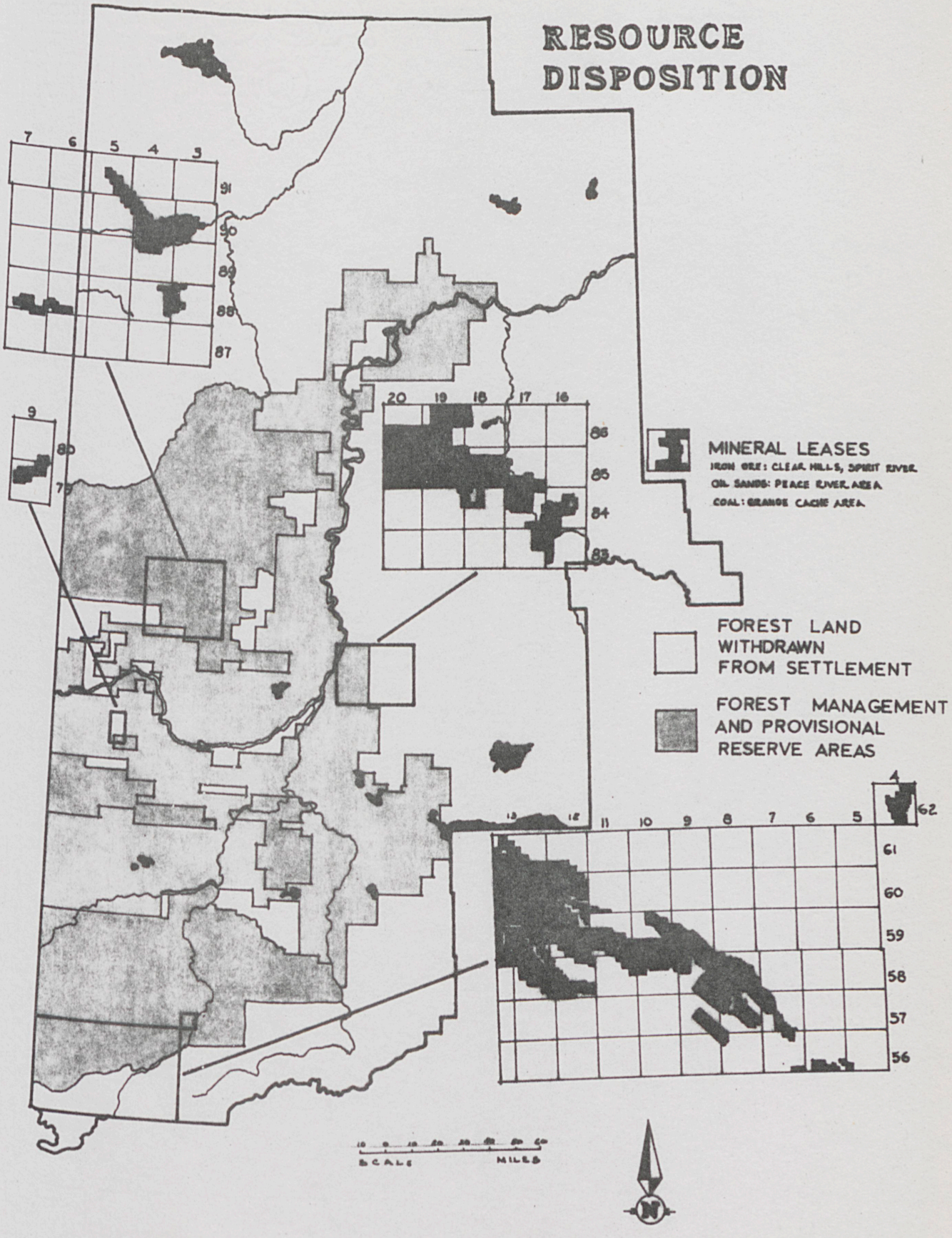
SECONDARY SECTOR

MANUFACTURING: Some types of manufacturing is desirable because it generates capital, jobs and stabilizes the economy through diversification. Manufacturing currently generates few employment positions in the region and the outlook is not good because of the growing importance of personal contact in plant location. At the present time, resource based processing firms seem to be offering the greatest stimulus for growth. The large corporations in the region are usually resource oriented.

CONSTRUCTION: The construction industry is a good indication of an areas' economic strength as a high volume of construction indicates willingness to locate in an area. Residential building accounted for over half of the building permits issued in 1972. The increasing amount of commercial construction shows that there is enough income in the region to support a wider variety of commercial outlets. Industrial, governmental and institutional construction has fluctuated widely.

# DISPOSITION OF AGRICULTURAL LAND




RESOURCE DISPOSITION
MINERAL LEASES
IRON ORE: CLEAR HILLS, SPIRIT RIVER
OIL SANDS: PEACE RIVER AREA
COAL: GRANDE CACHE AREA
FOREST LAND WITHDRAWN FROM SETTLEMENT
FOREST MANAGEMENT AND PROVISIONAL RESERVE AREAS
SCALE
MILES
N

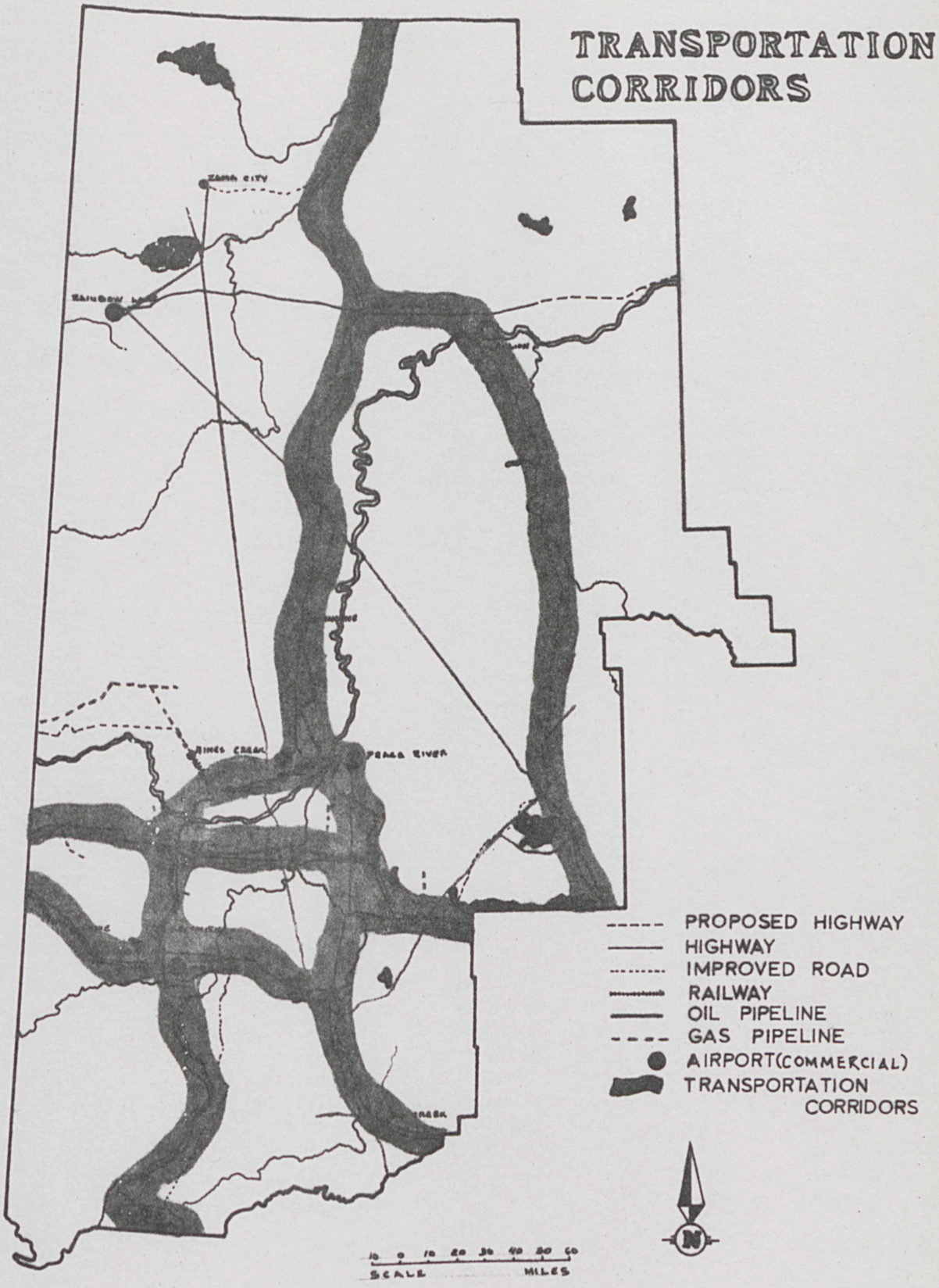
TRANSPORTATION: (see Map 9) The importance of transportation in regional economic growth cannot be underestimated. It has allowed natural resources to be tapped and facilitated settlement. Cheap, fast, flexible transporation is a prime consideration in a companys location decision. Today the region is well serviced by rail, road, air and telecommunications networks.

Trucks create stiff competition for the railways forcing each to specialize in the type of goods which they carry. Take-offs and landings at the commercial airports continue to increase. Construction is proceeding to increase the capacity of the regions' pipelines. In addition, telecommunications networks make communication with North America and the world instantaneous. It is essential that the transportation and communications networks complement the fast development of the region.

LABOUR FORCE: The size and structure of a regions' labour force is a powerful attraction for economic development. If the labour force is not highly trained employment creation will only induce immigration while local people will be ' 'passed over'.

In the Peace Region, the labour force is basically young and predominantly male due to the resource oriented nature of the jobs. Resource based processing activities are the major employment stimulant. The agricultural sector is resulting in few new employment positions, although it is the largest employer. The service sector employs the second largest number of people and forestry is growing in importance. Primary industry is becoming more and more capital intensive and needs less manpower. Yet, it is upon these industries that much of the regions' growth is based. Since employment creation is one of the few ways in which the region benefits from resource development, its future development in terms of demographic and economic growth, is limited unless undue environmental damage is to occur or new types of development emerge or more resource processing is to occur in the region.

# TRANSPORTATION CORRIDORS



SECTIONAL MONETARY FLOWS: (Dollars)

| SECTIONS | INFLOWS | OUTFLOWS | BALANCE |
|---|---|---|---|
| Agriculture | 44,998,500 | 35,638,812 | 9,359,688 |
| Forestry | 30,595,424 | 19,122,140 | 11,473,284 |
| Fishing and Trapping | 857,823 | 91,388 | 766,435 |
| Mine, Quarries, Oil Wells | 298,984,500 | 225,487,500 | 73,500,000 |
| Manufacturing | 42,227,597 | 12,967,674 | 29,259,923 |
| Construction | 22,150,000 | 4,539,920 | 17,610,000 |
| Transport, Communication, Utilities | 4,091,783 | 23,109,738 | 982,045 |
| Trade | 133,208,851 | 81,564,827 | 51,644,024 |
| Finance, Insurance, Real Estate | 4,239,080 | N/A | N/A |
| Business and Personal Services | Included with Trade | | |
| Public Administration and Defence | 73,611,502 | 13,460,000 | 60,151,502 |
| Total | 674,965,060 | 415,978,999 | 254,746,981 |

RECREATION AND PROTECTION

Today, the people of the Peace, like other North Americans, are finding themselves with more leisure time on their hands, with larger disposable incomes, and with considerably greater mobility than their predecessors had. At the present time, six provincial parks in the region provide 5600 acres of highly desirable recreational land for intensive use, with 360 spaces for overnight visits and 100 picnic tables. Department of highways and transport campsites in twenty-six locations throughout the region provide 237 picnic and camping sites on 220 acres of land adjoining primary and secondary highways. Thirteen Alberta forest service recreational areas provide camping and picnicing facilities in the wilderness environment, in locations dispersed throughout the Peace River region. Some 500 acres of recreational land maintained by interested local governments and citizens and making up 18 parks also exist. Some 87,000 acres of land with high carrying capacity for wildlife sanctuaries. Most of the forested areas of the Peace River region are open to recreation - hunting, fishing, primative camping, canoeing, hiking, and nature study with this area protected from settlement. The major areas described above are outlined in map 10 (a).

FUTURE GOALS: All river valleys will become protected areas for the use as recreational areas. No development will occur in the river valleys unless it is approved by a planning commission and the people affected by its development. In all cases, the responsibility will be on the developer to indicate why the river valley should be violated. One-half of the best fifty percent of the total perimeter of any lake must be available for public use. By protecting areas that can easily be damaged by poor land use policy we establish a permanent recreational area for now and the future. Map 10 (b) illustrates this development.

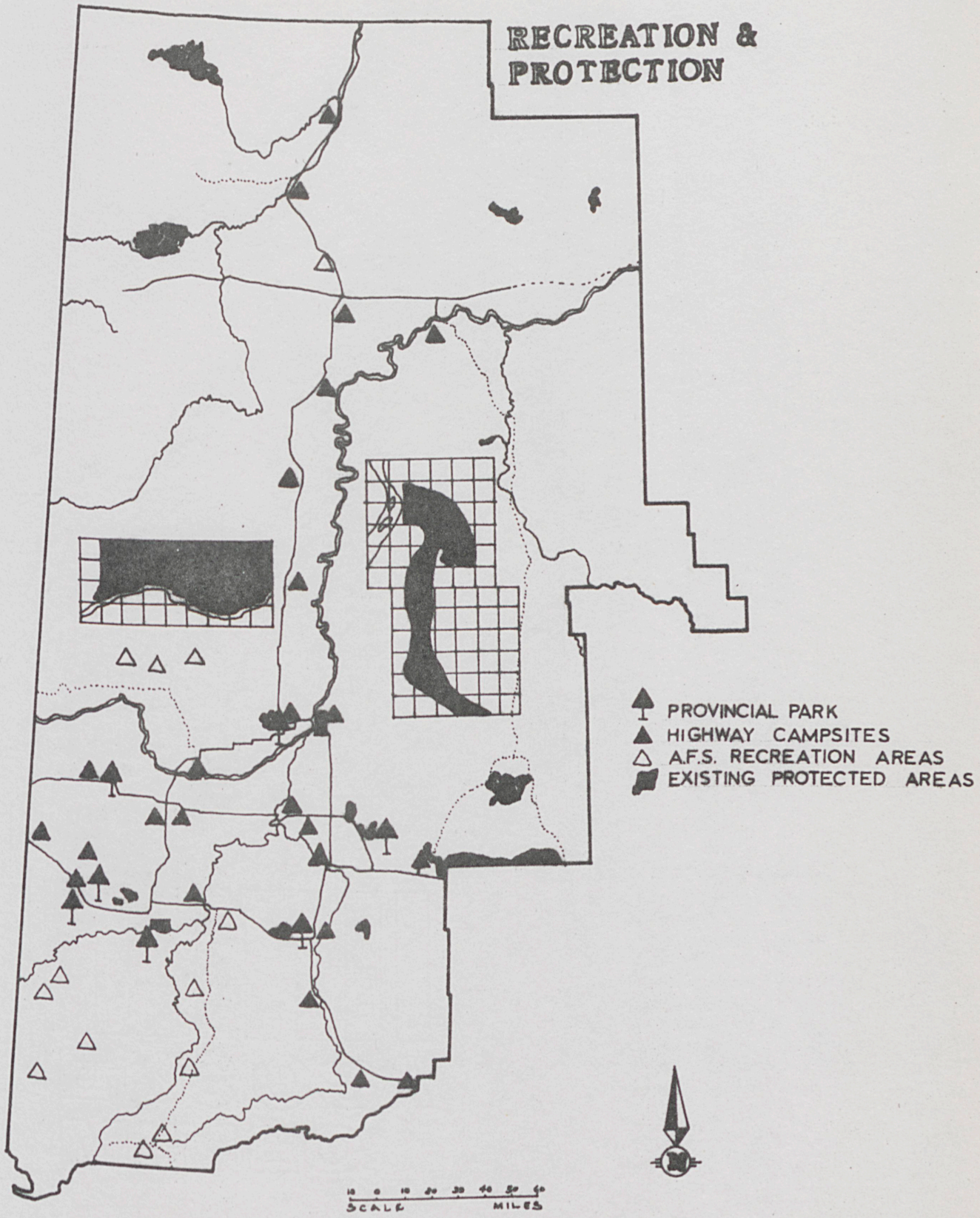
ENVIRONMENTAL CONDITIONS: The Peace River region is basically free of pollution at this stage of time. There are some areas that need cleaning up to completely eliminate pollution however these sources proved no threat to human health. It is the future to which the Peace River region must worry about a build up of pollution. It is in a good position now to put controls on industry to control pollution levels.

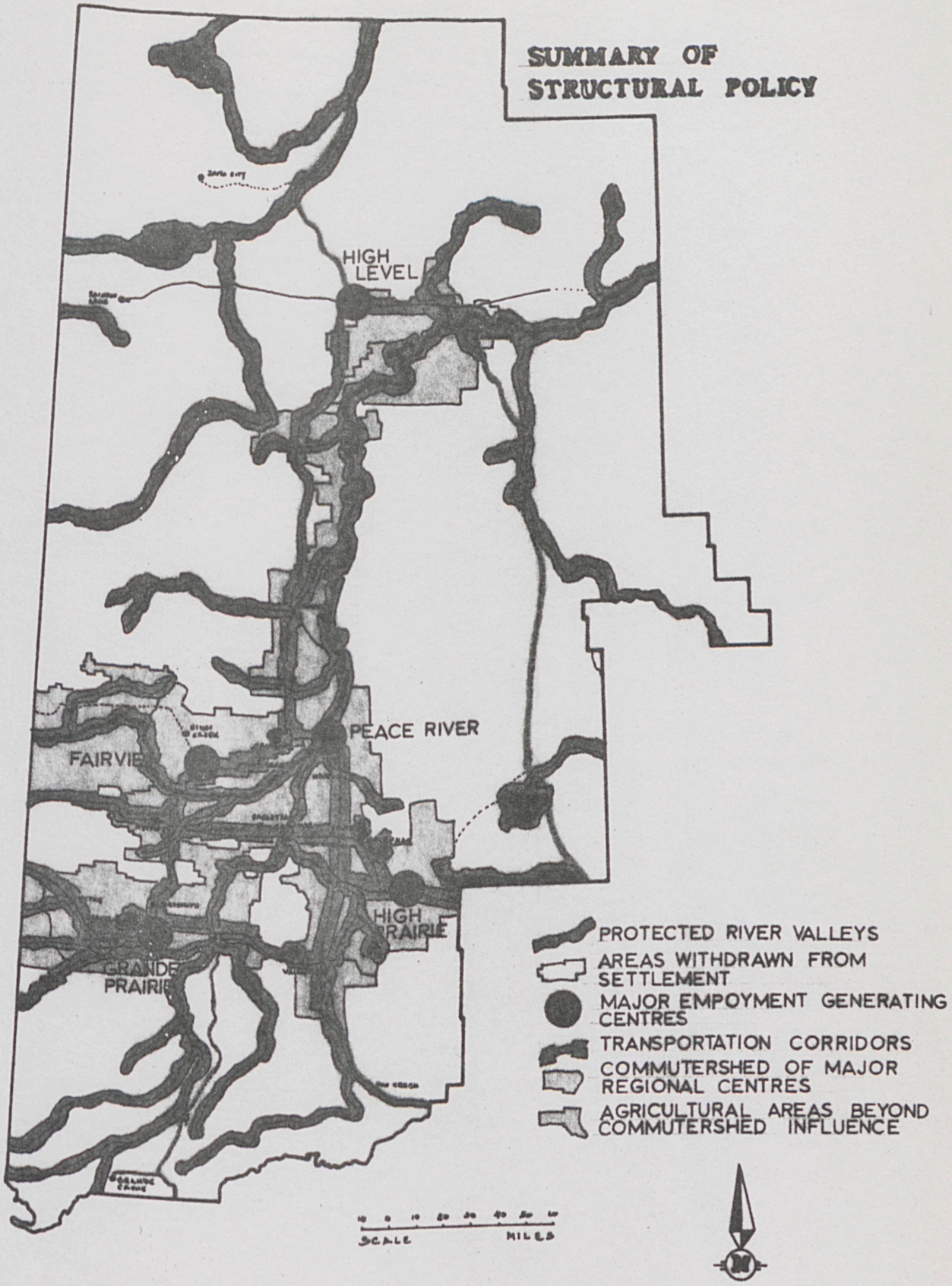
In the future those industries which are located in the region will be utilizing the latest methods of pollution control to ensure that their adverse effects upon local air-sheds and watersheds are non-existent. Solid waste materials from industrial processes and from human settlements will be disposed of by re-cycling waste material or in sanitary

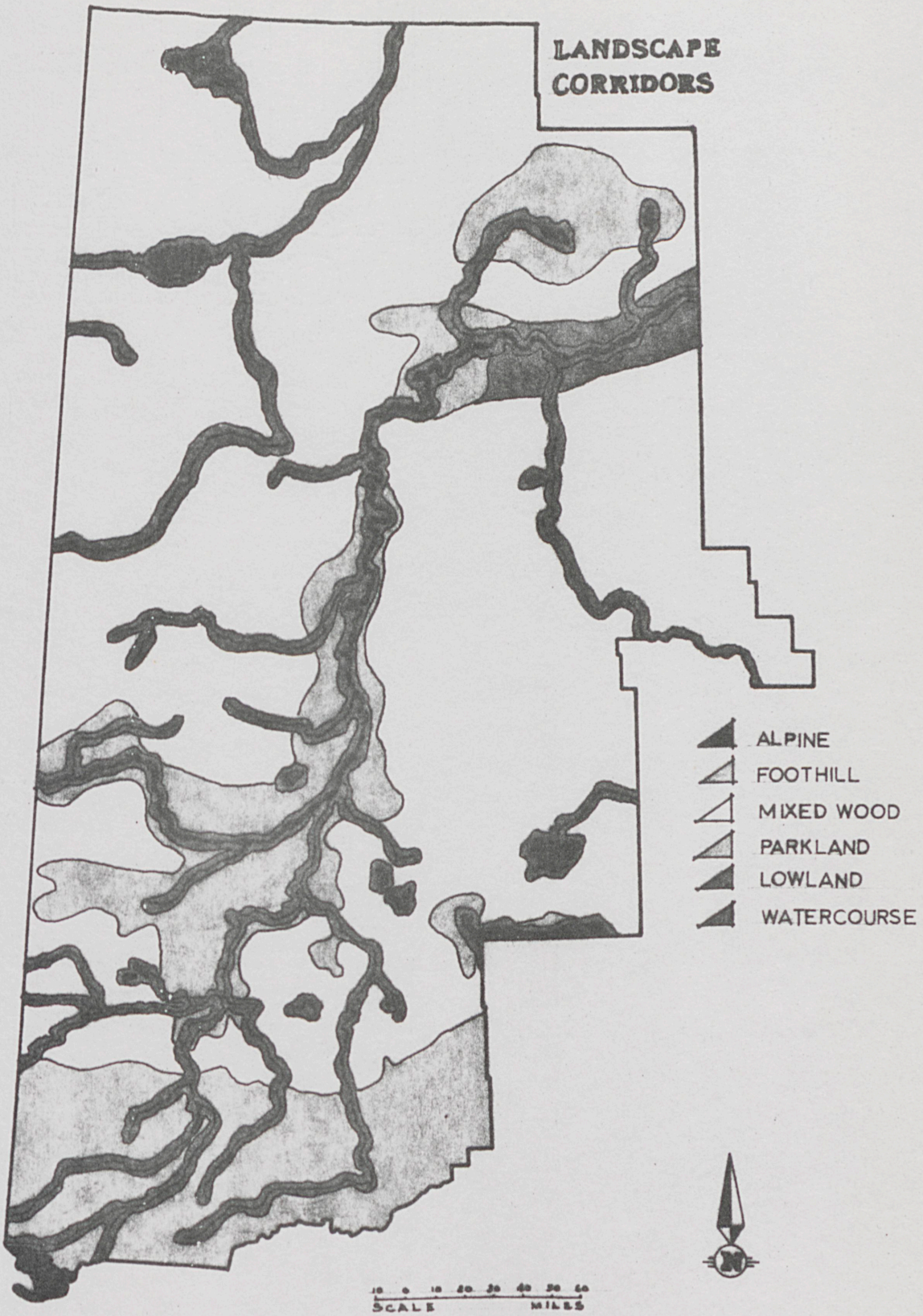
landfill and reclamation operations, located in areas strategically spaced between municipalities co-operating to achieve sound solid waste management practices.

It was estimated by the science council of Canada that Albertans generate approximately one ton of solid waste per person per year. This solid waste could be broken down into such materials as char residues, tar and pitch, light oil, ammonium sulfate, liquar and gas by a method known as pyrolysis. We can also generate heat from this process equivalent to one ton of coal from every one-half ton of garbage. Human and animal wastes can also be processed into methane gas, fertilizer and remaining bulk used for soil to cover strip mining projects as one of many uses. It will be discussed in greater detail and the recycling of waste material into usable material.

10 a


RECREATION &
PROTECTION
PROVINCIAL PARK
HIGHWAY CAMPSITES
A.F.S. RECREATION AREAS
EXISTING PROTECTED AREAS
SCALE
MILES


SUMMARY OF
STRUCTURAL POLICY
HIGH
LEVEL
PEACE RIVER
FAIRVIE
HIGH
PRAIRIE
GRANDE
PRAIRIE
PROTECTED RIVER VALLEYS
AREAS WITHDRAWN FROM
SETTLEMENT
MAJOR EMPOYMENT GENERATING
CENTRES
TRANSPORTATION CORRIDORS
COMMUTERSHED OF MAJOR
REGIONAL CENTRES
AGRICULTURAL AREAS BEYOND
COMMUTERSHED INFLUENCE
SCALE
MILES


LANDSCAPE
CORRIDORS
ALPINE
FOOTHILL
MIXED WOOD
PARKLAND
LOWLAND
WATERCOURSE
10 0 10 20 30 40 50 60
SCALE
MILES

LOCAL CONDITIONS OF GRANDE PRAIRIE (see map 11 & 12)

POPULATION TRENDS AND EFFECTS:

PREDICTED INCREASE IN POPULATION FOR 5 YEAR INTERVALS TO THE YEAR 2001. (Present population 19,000.)

| YEAR | PER CENT | INCREASE | POPULATION |
|---|---|---|---|
| 1966 - 1971 | 32% | 6,000 | 25,000 |
| 1971 - 1976 | 30% | 7,500 | 32,500 |
| 1976 - 1981 | 30% | 9,750 | 42,250 |
| 1981 - 1986 | 25% | 10,506 | 52,810 |
| 1986 - 1991 | 20% | 10,500 | 63,310 |
| 1991 - 1996 | 20% | 12,600 | 75,910 |
| 1996 - 2001 | 30% | 22,800 | 98,710 |

Estimated population of Grande Prairie by the year 2001 is 98,710 people. The city will also serve a rural population of 60,000 people in the surrounding area. The total population of the Peace River region is estimated at 250,000 people by the year 2001. Grande Prairie will act as the regional distribution centre to all areas in the Peace River region.

With the forseen expansion in population one can see a great deal of new facilities to meet the requirements of this expansion. The social requirements must be met with suggested improvements implemented into there establishments. Recreational requirements will also have to be expanded as well as transportation inside and outside the city.

ECONOMICS: Grande Prairies' economic condition is basically the same as that discribed under economic conditions for the Peace River region. Grande Prairie is the economic centre of the region and almost all monatary flow goes through Grande Prairie.

EXISTING CONDITIONS FOR GRANDE PRAIRIE 1973

| FUNCTION | ESTABLISHMENT | EMPLOYEES | SALARIES & WAGES | SELLING OF FACTORY SHIPMENTS |
|---|---|---|---|---|
| MANUFACT-URING | 25 | 2,000 | 10,600,000 | 45,000,000 |
| RETAIL | 250 | 800 | 3,200,000 | 35,000,000 |
| SERVICE | 75 | 250 | 750,000 | 3,500,000 |
| OTHERS | 125 | 425 | 1,750,000 | 10,000,000 |
| WHOLESALE | 70 | 250 | 1,650,000 | 20,000,000 |
| TOTAL | 545 | 3,725 | 17,950,000 | 113,500,000 |

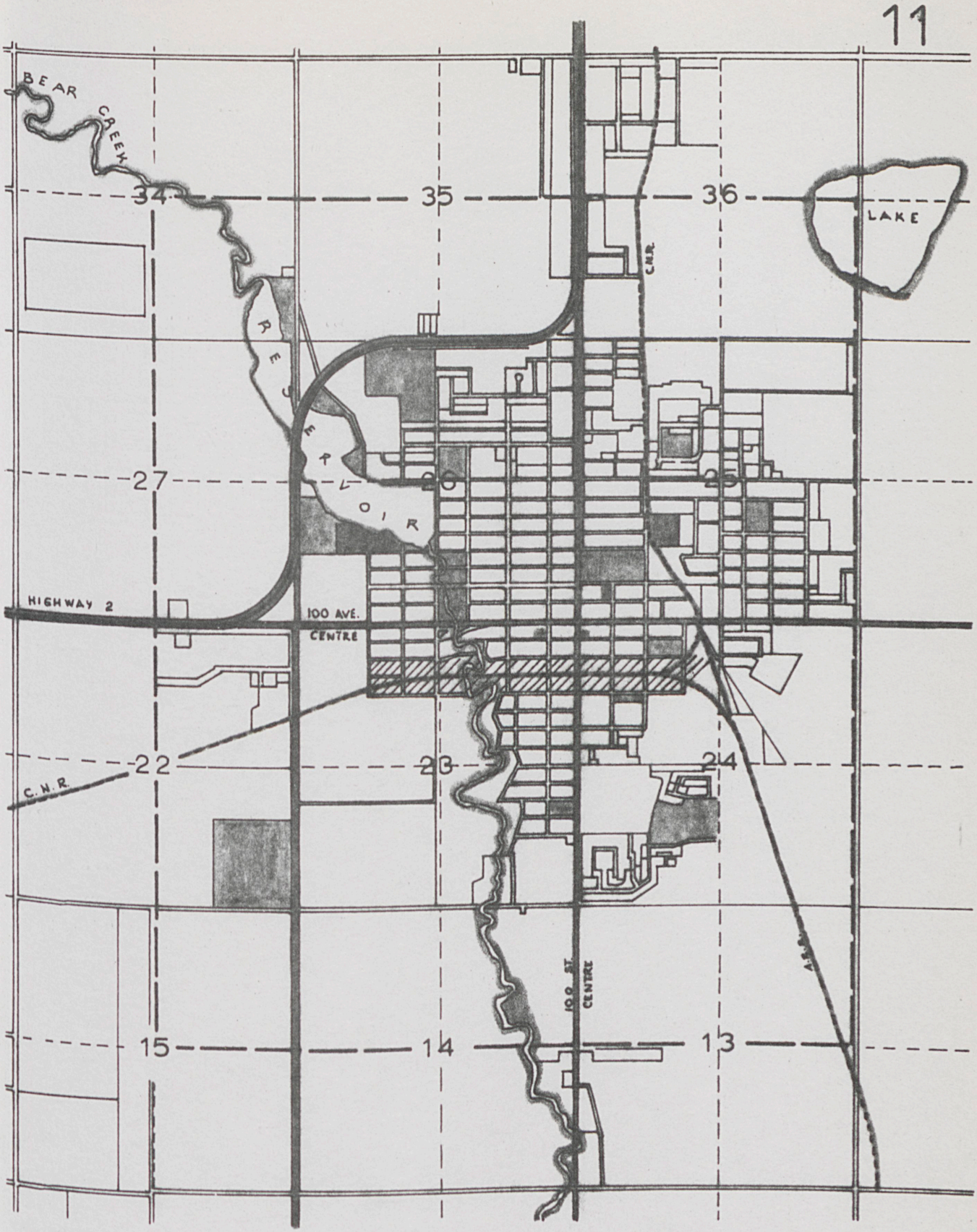
TRANSPORTATION (see map 11)

ENVIRONMENTAL (see map 10a & 10b) Grande Prairie will follow the environmental policy set up for the Peace River region. Today there is basically no set controls to safeguard the environment in Grande Prairie, however controls and by-laws are due in 1974.

In the future all efforts to maintain the basic concepts of ecology and conservation in the wilderness and in the actual city will be made.

FUTURE TRENDS The basic conception in the city of Grande Prairie is one of expansion and rapid unplanned re-development. No thought of the future is given to projects being built for residential use, commercial use, education and recreational use or industrial use. It is built to meet the needs of today and people are unconcerned about the future. Most of the people are transient workers or people making their fortunes and leaving the area. Because of these conditions the city fathers can get away with re-development that is usually a pipe dream of one man. People do not really care what happens outside their own personnel realm.

As the city grows and establishes a city master plan, that is realistic to its growth, its' haphazard appearance will become organized and relate to the majority of residences instead of a few. As the people becomemore permanent they will also become more active in the redevelopment of the city. The city fathers will have to meet the demands of the people and thus the city will become more unified and will have created participation in its re-development.

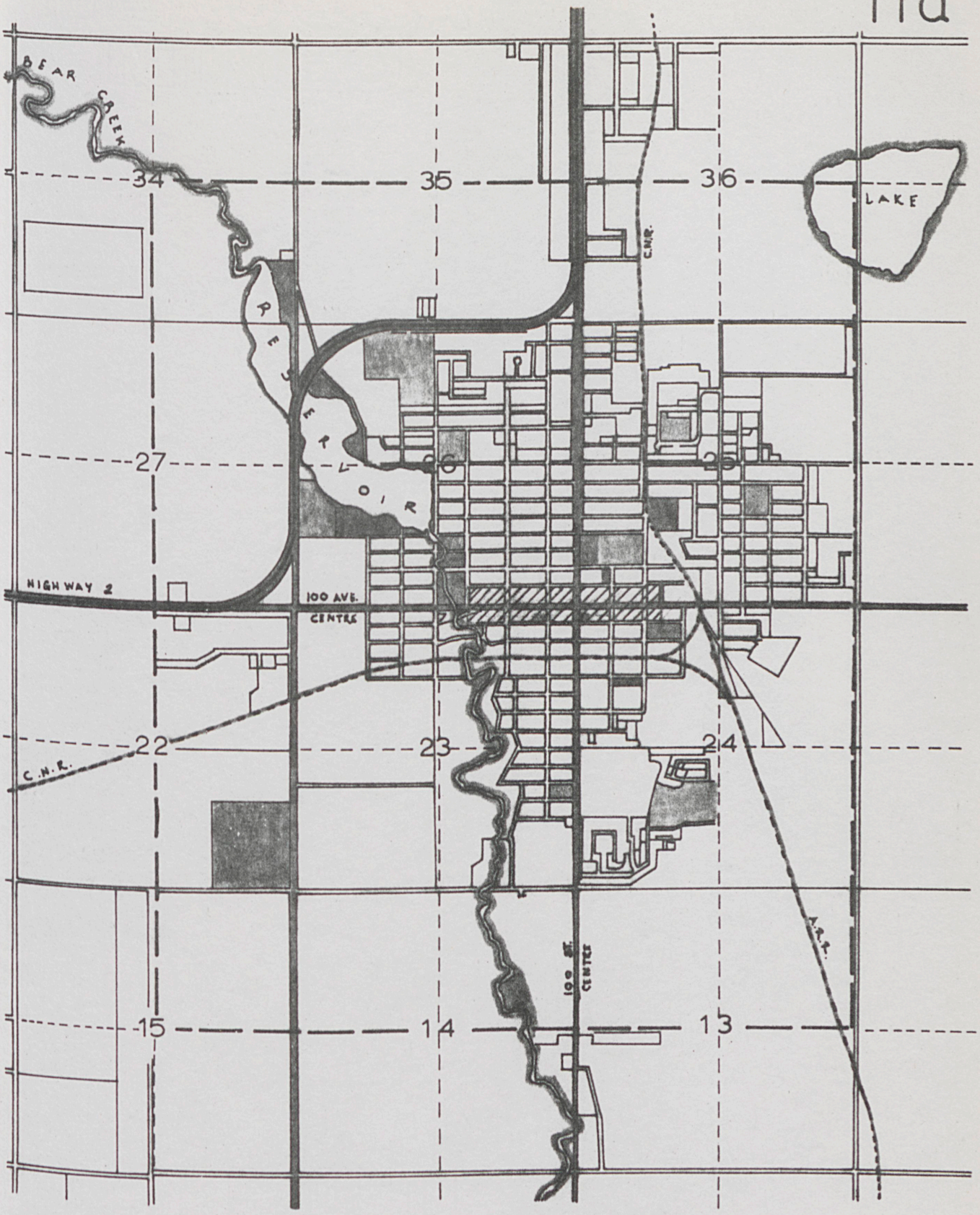



# CITY OF GRANDE PRAIRIE

SCHOOLS
HOSPITALS
GOVERNMENT
CITY
RECREATIONAL

TRANSPORTATION CORRIDORS
PROPOSED BUILDING SITE

N

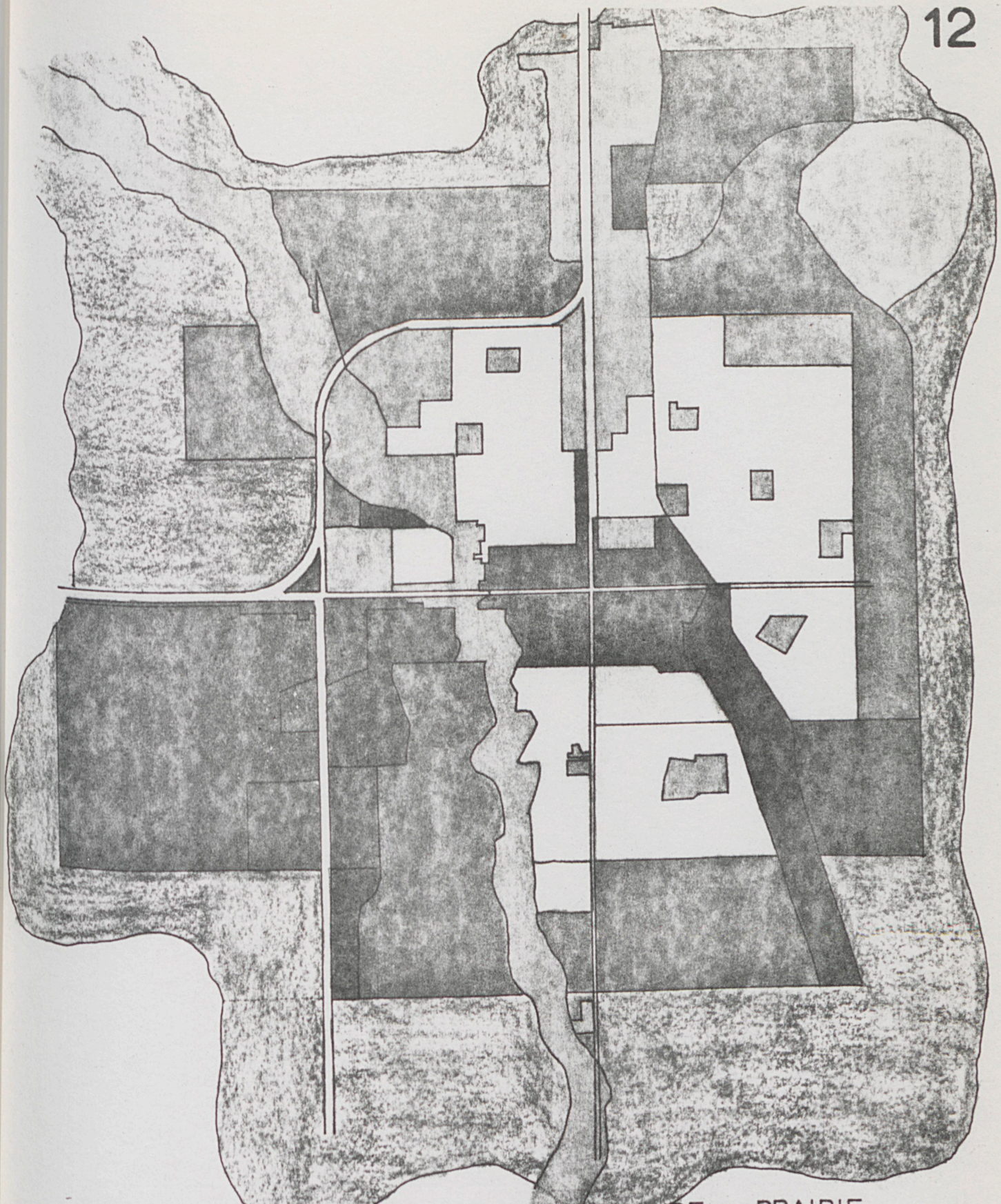



CITY OF GRANDE PRAIRIE

SCHOOLS
HOSPITALS
GOVERNMENT
CITY
RECREATIONAL

TRANSPORTATION CORRIDORS
EXISTING C. B. D.

N



ZONING & LAND USE FOR GRANDE PRAIRIE

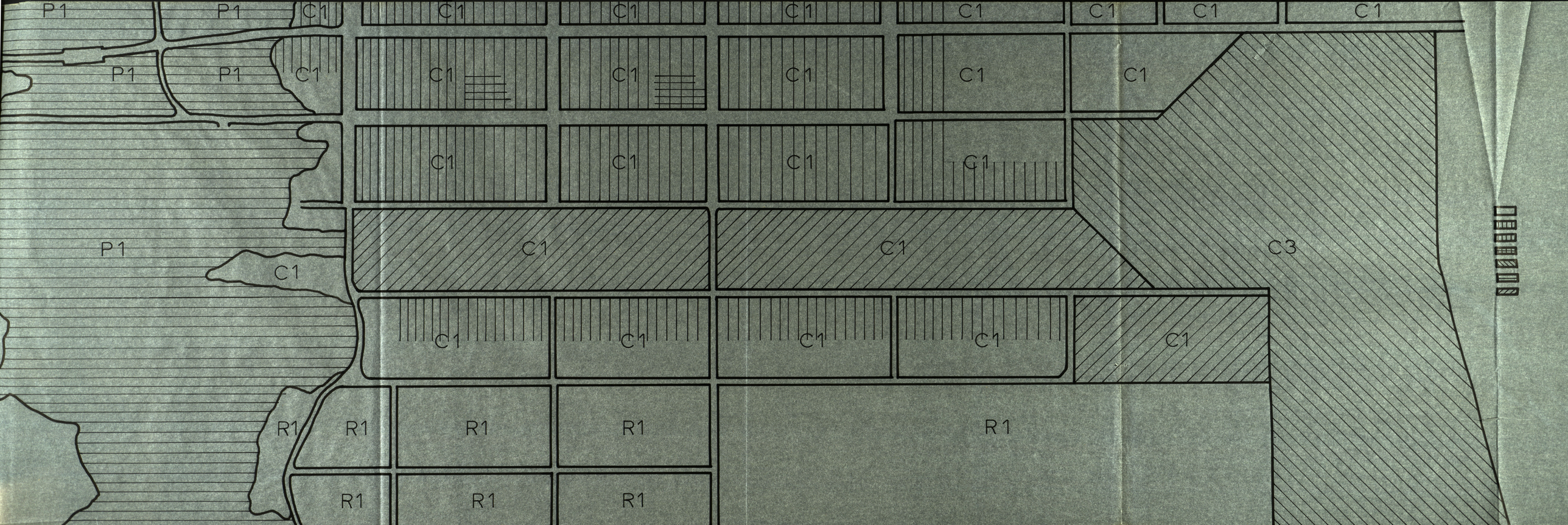
- RESIDENTIAL
- HIGH DENSITY RESIDENTIAL
- URBAN RESERVE
- SCHOOLS, PARKS, RECREATION
- INSTITIONAL
- C.B.D.
- SPECIAL COMMERCIAL
- HIGHWAY COMMERCIAL
- INDUSTRIAL
- AGRICULTURAL

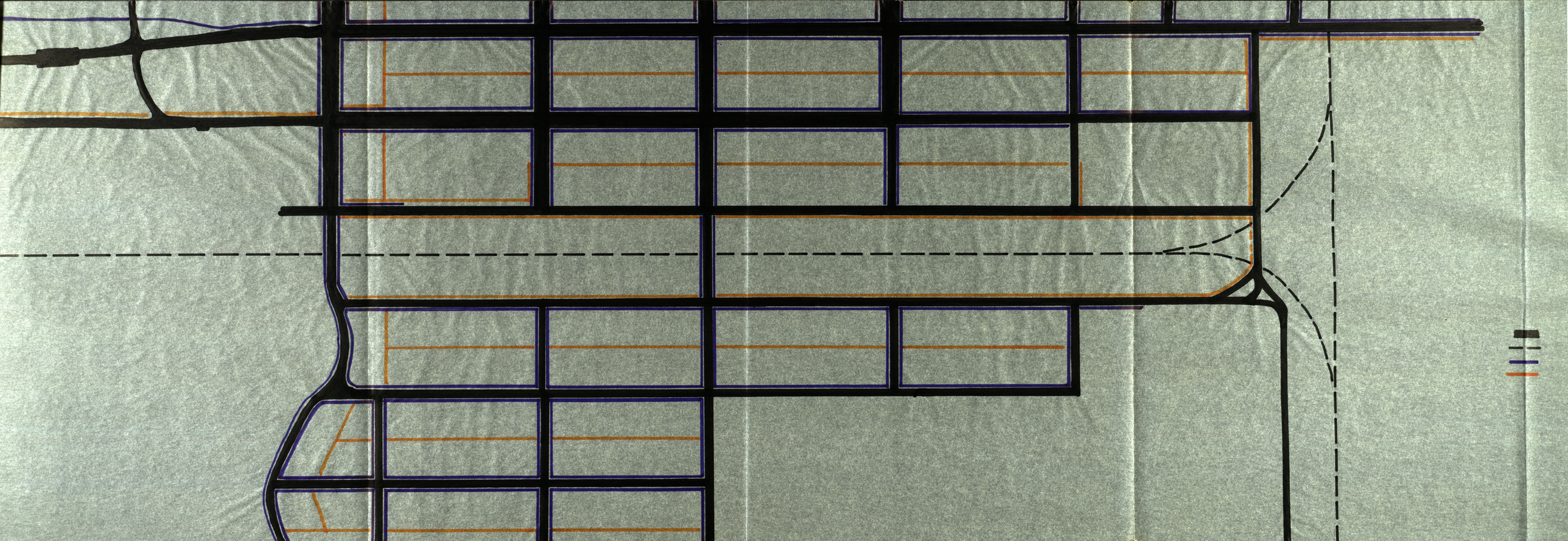
THE SITE SITUATION:

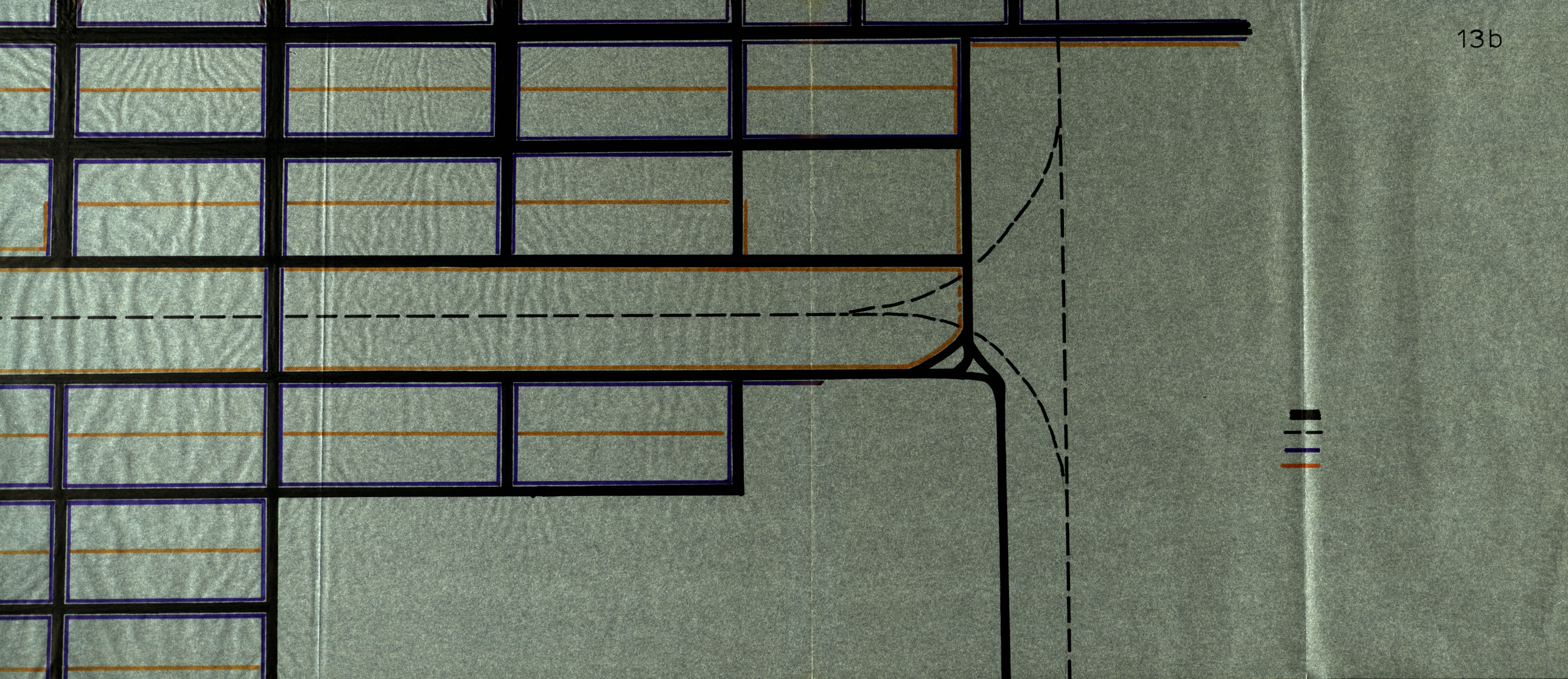
ADJACENT LAND USE AND ZONING (see map 13a)

CIRCULATION AND UTILITIES (see map 13b)

ENVIRONMENTAL FEATURES (see map 13c)


P1
C1
C3
R1






RICHMOND AVENUE
(100 ave.)
100 street
N




## BASE MAP SHOWING EXISTING CONDITIONS OF SITE

SCALE: 1" 100'-0"

- SITE BOUNDRIES
- TOPOGRAPHY
- FOLIAGE
- BUILDINGS TO BE REMOVED
- BUILDINGS TO REMAIN
- RAILWAY
- PAVED ROADS
- UNPAVED ROADS

## LANDUSE & ZONING

| | |
|---|---|
| RESIDENTIAL | R1 |
| COMMERCIAL - OFFICES | C1 |
| COMMERCIAL RETAIL | C1 |
| PARKING | C2 |
| INDUSTRIAL | C3 |
| GREENBELT | P1 |
| WAREHOUSE | C4 |

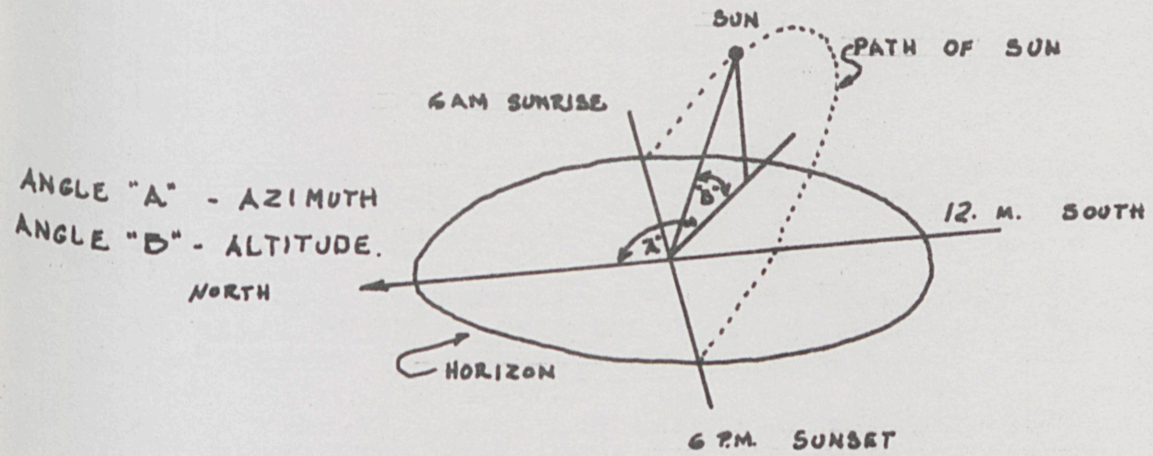
## CIRCULATION

- VEHICULAR
- TRAIN
- PEDESTRIAN
- UTILITIES

SITE CONDITIONS

SUN ANGLES:

| DEC. 22 WINTER | | | SEPT. 23 - MARCH 21 FALL - SPRING | | | JUNE 22 SUMMER | | |
|---|---|---|---|---|---|---|---|---|
| AM. - PM. | AZI. | ALT. | AM. - PM. | AZI. | ALT. | AM - PM | AZI. | ALT. |
| NOON | 180°-0' | 11°-30' | NOON | 180°-0' | 35°-0' | NOON | 180°-0' | 58°-30' |
| 10 - 2 | 152°-30' | 7°-30' | 10 - 2 | 145°-0' | 30°-0' | 11-1 | 154°-30' | 56°-30' |
| 9 - 3 | 139°-30' | 3°-0' | 8 - 4 | 115°-30' | 16°-30' | 10-2 | 132°-30' | 51°-30' |
| 8:30 - 3:30 | 134°-30' | 0°-0' | 6 - 6 | 90°-0' | 0°-0' | 8-4 | 100°-30' | 36°-0' |
| | | | | | | 5:30 - 8:30 | 45°30' | 0°-0' |
| | | | | | | | | |



SITE TOPOGRAPHY AND FOLAGE (see map 13c) The entire site is relatively level with just a gradual incline to the east. There is a small creek to the west of the site which forms a valley along the sites west axis. The area has numerous mature trees, mostly popular, on the west and south sides. There are no trees to the east or to the north. The site itself has no trees on its property.

SOILS CONDITIONS - The whole Peace River country is covered with an overburden of glacial till composed mainly of clay. This overburden exibits a high coefficient of expansion and contraction which changes with moisture content. This instability is activated by weathering, rain and frost, and the building placement interupting the normal moisture patterns. Where the soil dries out it shrinks, where the moisture content increases it swells, exerting upwards of 2 tons per square foot force. It is extremely difficult to prevent the soil changes which can result in extensive damage to buildings.

GENERAL RECOMMENDATIONS:

1) The foundation soil on which the footings are to be placed should be thoroughly compacted to minimize any possibility of settlement when full building loads are applied.

2) All organic topsoil material should be entirely removed from the proposed building site and stock piled.

3) Interior footings be founded at a depth of one foot below the finished grade elevation, utilizing a soil bearing pressure of 2,500 pounds per square foot.

4) The concrete floor slab be placed on a layer of thoroughly compacted and well graded crushed gravel not less than eight inches in thickness. The concrete floor slab be designed as panels, fifteen to twenty feet square, to permit future adjustment, if slab movement occurs.

5) A polythene vapour barrier should be placed immediately between the concrete floor slab to prevent the dessication of the sub-base material.

6) All back fill material adjustment to foundation walls and footings be thoroughly compacted to reduce settlement after landscaping operations are completed.

7) In view of higher concentration of water soluble sulphate in foundations soil, type V sulphate resistant cement be employed in all concrete mixes to be used in underground concrete installations.

VIEWS: (see pictures)

WINDS - The prevailing winds are north west and west south west during the summer. Directions of the winds should be considered to provide shelter for entrance doors, exterior spaces and walks between buildings. The wind averages 9.3 mph annually, and snow drifting and clearance must be remembered in site design.

MICRO - CLIMATE - Temperatures vary from a recoreded high of 94 degrees to a recorded low of -62 degrees. The summer average day time temperatures is 44.7 degrees, and the winters average day time temperature is 23.1 degrees. Annual snowfall of 64.1 inches and an average annual rainfall of 10.4 inches gives an yearly average precipitation of 17.4 inches of water. Because of the adverse weather one must design spaces which can give a warm feeling during the long winter months. Also protection from the elements must be incorporated into the design.

LAND USES (see map 13a) The sites main use at the present time is a railway yard for Northern A lberta Railways. It has grain elevators, warehouses, stockyards and bulk stations on each side of its right of way. The site runs east to west with city transportation running north to south at three locations.

OWNERSHIP - The land is owned by Northern Alberta Railways and covers an area of 10 blocks east to west and 2 blocks north and south. The city of Grande Prairie developed when the railway first reached the area. It has been the main means of transportation in the area and is credited with opening up the Peace River region. At present the Northern Alberta Railway is relocating its yards and station to the south east of its present location. The city has the option to buy the property for two million dollars.

## AREAS RESEARCHED AS FUNCTIONS OF THE FACILITY

LIVING UNITS - There will be some 5,000 people living in the facility. The units will be composed of bachelor, one bedroom and two bedroom units serving non-married and married couples without children over the age of three years old. Each unit will be equipped with up to date appliances and communication devices. Every unit will have a tube used to send their garbage to a waste re-cycling plant. It will handle all types of garbage, but will not handle acids or explosive type chemicals.

The units themselves will be medium rent apartments designed for the young. They will have built in laundry appliances and storage in the individual units. Some units will have access to both the outside and inside the covered mall. All tenants will have use of saunas, swimming pool, keep-fit gym, games room, party room, and library, as well as the use of facilities included in the commercial area.

UNITS:

| | Min. Req. Area | Design |
|---|---|---|
| A) BACHELOR - 750 Units | 500 sq. ft. | 550 sq. ft. |
| a) Entrance foyer | 20 | 30 |
| b) Kitchen - Dining | 100 | 120 |
| c) Living - Bedroom | 180 | 200 |
| d) Bathroom | 55 | 60 |
| e) Storage | 30 | 40 |
| | 385 sq. ft. | 450 sq. ft. |
| B) ONE BEDROOM - 750 Units | 650 sq. ft. | 750 sq. ft. |
| a) Entrance foyer | 20 | 40 |
| b) Kitchen | 60 | 65 |
| c) Dining | 70 | 80 |
| d) Living Room | 180 | 200 |
| e) Bedroom | 120 | 160 |
| f) Bathroom | 56 | 65 |
| g) Storage | 30 | 40 |
| | 536 sq. ft. | 660 sq. ft. |
| C) TWO BEDROOM - 500 Units | 805 sq. ft. | 950 sq. ft. |
| a) Entrance foyer | 30 | 40 |
| b) Kitchen | 60 | 70 |
| c) Dining | 80 | 100 |
| d) Living Room | 200 | 240 |
| e) Master Bedroom | 140 | 160 |
| f) Bedroom | 80 | 100 |
| g) Bathroom | 56 | 65 |
| h) One-Half Bath | 27 | 40 |
| i) Storage | 40 | 50 |
| | 713 sq. ft. | 865 sq. ft. |

SUMMARY OF UNITS: Total number of units is 2,000

| | Area of each unit | Total area |
|---|---|---|
| A) 750 Bachelor units | 550 sq. ft. | 412,500 |
| B) 750 One Bedroom | 750 sq. ft. | 552,500 |
| C) 500 Two Bedroom | 950 sq. ft. | 475,000 |
| Total Area of Units: | | 1,440,000 |
| Circulation: | | 144,000 |
| Support Facilities: | | 144,000 |
| Total Area of Living Units: | | 1,728,000 |

SUPPORT FACILITIES:

I) In Apartments

a) Intercom
b) Door Signals
c) Balconies
d) Air Conditioners
e) Television
f) Close Circuit T.V.
g) Telephone
h) Security System
i) Private Garden
j) Access to Mall
k) Access to Outside
l) Laundry

II) In Building

a) Commercial Space
b) Community Room
c) Closed-Circuit T.V.
d) Security System
e) Meeting Room
f) Health Club
g) Sheltered Swimming Pool
h) Valet Service
i) Exits
j) Elevators
k) Party Room
l) Games Room

III) Site

a) Gardens
b) Recreation Area
c) Country Club
d) Amenities
e) Swimming Pool

ENCLOSED SHOPPING CENTRE

TYPES OF FUNCTIONS:

i) MAJOR DEPARTMENT STORES - These are large space users and will create their own importance. They need comparatively cheap rental space on between two and five levels. The design and layout of the centre, as has already been mentioned, will be largely influenced by the presence of the department store. They are best positioned at the end of the principle mall. Too much window space is an expensive luxury for department stores who prefer rectangular sites fronting the mall.
Usual size: 120,000 sq. ft. to 230,000 sq. ft.

| Name of store: | Size: |
|---|---|
| A) Hudson Bay | 100,000 sq. ft. |
| B) Woodwards | 150,000 sq. ft. |
| C) Eatons | 100,000 sq. ft. |
| D) Sears | 100,000 sq. ft. |
| E) Johnstone Walkers | 60,000 sq. ft. |
| TOTAL AREA: | 510,000 sq. ft. |

ii) JUNIOR DEPARTMENT STORES - Could be a major tenant in a smaller shopping mall, however in larger malls they attract as traffic magnets along a public mall.
Usual size: 18,000 to 56,000 sq. ft.

| Name of store: | Size: |
|---|---|
| A) Woolworths | 60,000 sq. ft. |
| B) Zellers | 40,000 sq. ft. |
| C) Kresgies | 30,000 sq. ft. |
| D) Fields | 20,000 sq. ft. |
| E) Army & Navy | 20,000 sq. ft. |
| F) Co-op | 30,000 sq. ft. |
| G) Marshall Wells | 20,000 sq. ft. |
| TOTAL AREA: | 210,000 sq. ft. |

iii) SUPER MARKET - Adjacent to and preferably on the same level as the car loading area. Requires a large area, but only moderate frontage. Never the less, the width of the store is very important because it affects the number of check-out points. In smaller centres, the supermarket must be positioned so as to draw customers into and along the mall.
Usual size: 10,000 to 60,000 sq. ft.

| Name of store: | Size: |
|---|---|
| A) Safeway | 60,000 sq. ft. |
| B) Woodwards | 60,000 sq. ft. |
| C) I.G.A. | 30,000 sq. ft. |
| D) Co-op | 30,000 sq. ft. |
| E) Bay Mart | 30,000 sq. ft. |
| TOTAL AREA: | 210,000 sq. ft. |

iv) OTHER GENRATORS - Large fashion shops, post office, banks, libraries, markets and a cluster of personal - service shops also help to attract shoppers. Most of these centres enjoy monopoly or quasi - monopoly trading conditions; which means that the shoppers invariably have to seek out these units however inconveniently they are located.

| Type of store: | No. Req. | Size | Total |
|---|---|---|---|
| 1) Cafe/Snack Bar | 3 | 2,000 | 6,000 |
| 2) Fish & Chips | 1 | 500 | 500 |
| 3) Barber Shops | 4 | 600 | 2,400 |
| 4) Womens Hairdressing | 5 | 600 | 3,000 |
| 5) Restaurant | 6 | 2,100 | 12,600 |
| 6) Travel Agents | 5 | 400 | 2,000 |
| 7) Laundry | 2 | 1,000 | 2,000 |
| 8) Bar | 6 | 3,000 | 18,000 |
| 9) Photographic Studio | 4 | 600 | 2,400 |
| 10) Insurance Office | 6 | 1,000 | 6,000 |
| 11) Health Club | 3 | 3,000 | 9,000 |
| 12) Tailor Valet | 3 | 400 | 1,200 |
| 13) Accountant | 6 | 400 | 2,400 |
| 14) Doctors | 3 | 3,000 | 9,000 |
| 15) Dentists | 6 | 1,000 | 6,000 |
| 16) Bank | 6 | 2,000 | 12,000 |
| 17) Cleaner | 4 | 2,000 | 8,000 |
| 18) Estate Agent | 6 | 1,200 | 7,200 |
| 19) Stock Broker | 3 | 600 | 1,800 |
| 20) Nursery/Plant/Garden | 3 | 2,000 | 6,000 |
| 21) Post Office | 2 | 2,000 | 4,000 |
| 22) Shoe Repair | 4 | 400 | 1,600 |
| 23) T.V. Rental | 2 | 600 | 1,200 |
| 24) Optician | 4 | 600 | 2,400 |
| 25) Chiropodist | 2 | 600 | 1,200 |
| 26) Social Security Office | 1 | 1,200 | 1,200 |
| 27) Interior Decorator | 2 | 600 | 1,200 |
| 28) Health Welfare Clinic | 1 | 2,400 | 2,400 |
| 29) Architect | 4 | 1,600 | 2,400 |
| 30) Showrooms | | | |
| 31) Indoor Bowling Alley | 2 | 7,500 | 15,000 |

| Type of Store: | No. Req. | Size | Total |
|---|---|---|---|
| 32) Amusements | 4 | 1,000 | 4,000 |
| 33) Billiard Hall | 3 | 2,500 | 7,500 |
| 34) Business Equipment | 2 | 1,200 | 2,400 |
| 35) Cocktail Bar | 6 | 1,200 | 7,200 |
| 36) Surveyors and Valuers | 4 | 1,200 | 4,800 |
| 37) Key Shop | 2 | 400 | 800 |
| 38) Library | 2 | | |
| 39) Coffee Shop | 3 | 1,200 | 3,600 |
| 40) Art Gallery | 1 | | |
| 41) Second Hand Stores | 2 | 600 | 1,200 |

CONVENIENCE GOODS - Are generally described as daily shopping needs eg. food, drugstore, goods from variety stores.

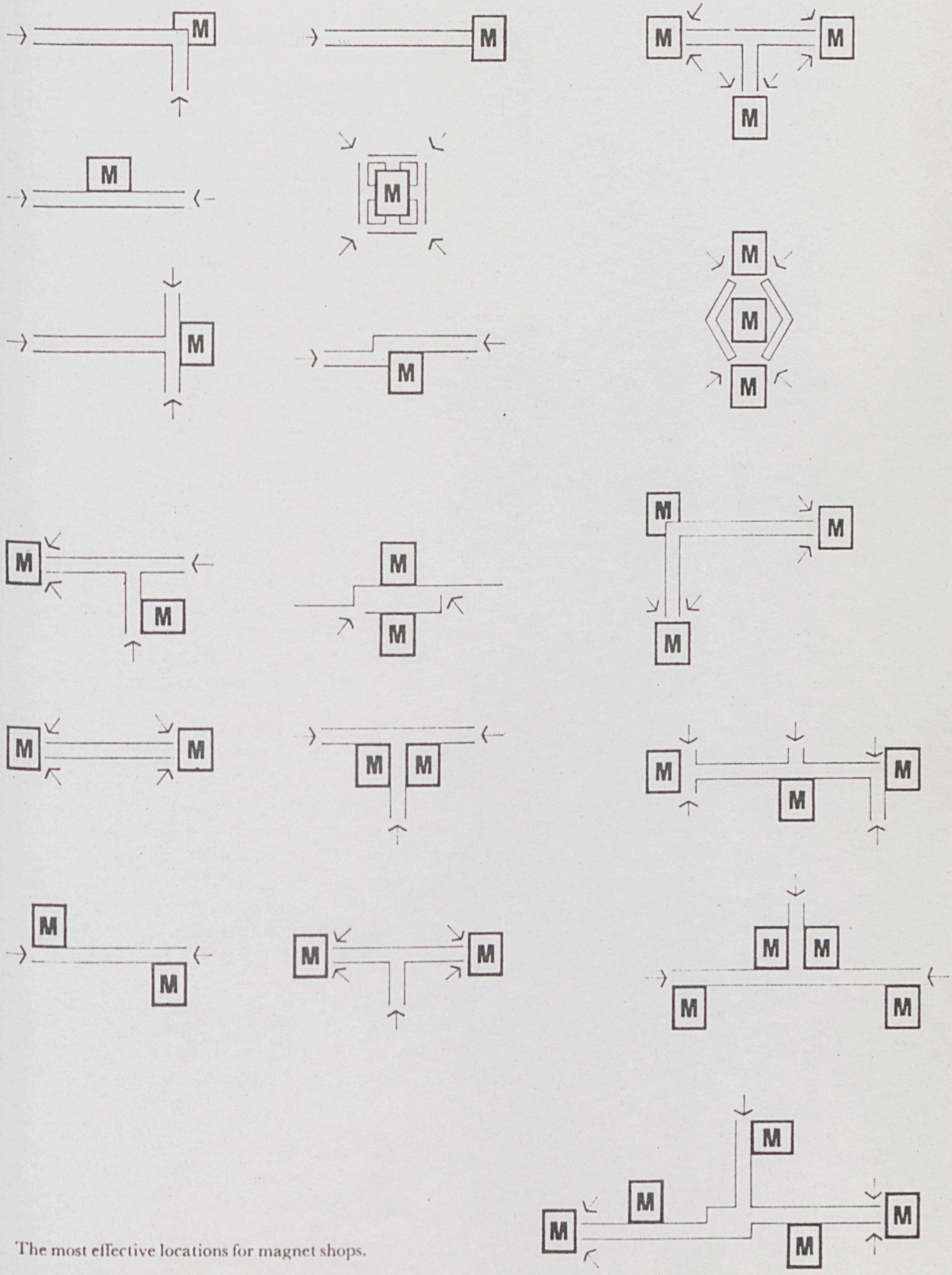
Usual size: As required by Lease.

| Type of Store: | No. Req. | Size | Total |
|---|---|---|---|
| 1) Supermarket | | | |
| 2) Baker | 2 | 5,000 | 10,000 |
| 3) Delicatessen | 6 | 1,200 | 7,200 |
| 4) Drug Store | 6 | 3,000 | 1,800 |
| 5) News Stand/Tobacconist | 5 | 1,000 | 5,000 |
| 6) Fish Market | 3 | 1,000 | 3,000 |
| 7) Liquor Venders | 2 | 2,000 | 4,000 |
| 8) Dairy Goods | 4 | 600 | 2,400 |
| 9) Speciality Foods | 3 | 600 | 1,800 |
| 10) Farmers Market | 1 | 5,000 | 5,000 |
| 11) Confectionery | 5 | 600 | 3,000 |
| 12) Butcher | 5 | 1,200 | 6,000 |
| 13) Hardware | 4 | 2,400 | 9,600 |
| 14) Stationery | 5 | 400 | 2,000 |
| 15) Green Grocer/Fruiterer | 5 | 600 | 3,000 |
| 16) Health Food | 3 | 600 | 1,800 |

COMPARISON GOODS - Include clothing, shoes, fashions, furniture, electrical appliances, gifts, jewellery, cameras, drapery, books, and carpets, Shoppers like to compare price, quality and variety, service and credit offered by competing stores.
Usual size: As required by lease.

| Type of store: | No. Req. | Size | Total |
|---|---|---|---|
| 1) Perfume | 1 | 400 | 400 |
| 2) Trouser Shop | 5 | 600 | 3,000 |
| 3) Books | 4 | 1,200 | 4,800 |
| 4) Cameras | 4 | 600 | 2,400 |
| 5) Electrical Appliances | 5 | 2,400 | 12,000 |

THE MOST EFFECTIVE LOCATIONS FOR MAGNET SHOPS




The most effective locations for magnet shops.

vii) KIOSK TENANTS - Small Stores located in the mall areas which take little space and serve high pedestian traffic areas. Usual size: 50 to 150 sq. ft.

| Type of store: | No. Req. | Size | Total |
|---|---|---|---|
| 1) Confectionary/Tobacco | 4 | 100 | 400 |
| 2) Magazines/Papers | 4 | 50 | 200 |
| 3) Shoe Repair/Key Cutter | 3 | 100 | 300 |
| 4) Fruit | 2 | 150 | 300 |
| 5) Gifts/Souvenirs | 3 | 100 | 300 |
| 6) Snack Bar | 6 | 150 | 900 |
| 7) Hosiery/Tights/Stockings | 3 | 50 | 150 |
| 8) Ties & Gifts | 3 | 50 | 150 |
| 9) Tourist Information | 3 | 50 | 150 |
| 10) Special Promotions by Charities | 6 | 50 | 300 |
| 11) Craft Shops | 3 | 150 | 450 |

LOCATION FACTORS:

I) FOOD SHOPS - Grouped around supermarket but not in prime locations nor in highest rental positions. Requires reasonable display frontage.

II) FASHION AND CLOTHING - Grouped together and preferably in logical sequence, as for sales counters in the department stores. Eg. shoes, hoisery, lingerie, separates, jewellery, fashion accessories, millinery, outdoor clothing, perfume and cosmetics. These shops require prime position, preferably in the centre of the main mall and away from the food stores. Good display frontages are vital. They also rely heavily on large pedestrian flows passing them. The best way to ensure this is to concentrate them in groups so that they form a magnet in their own right.

III) SPECIALITY SHOPS - These shops which include those selling leather, gifts, stationery, cameras, flowers, toys and fabrics, need good, prominent locations and good display frontages. Expert opion currently recommends locations throughout the centre and in the main square, for these areas do not generate traffic by themselves. They depend largerly on the flow generated by the bigger stores. These stores have a high profit margin and pay high rents which subsidize the lower rents payed by the larger department stores and other large generators of traffic.

Sometimes they can be positioned to advantage in 'surprise' locations such as in the household/furniture section so as to brighten up an otherwise dull stretch of the mall. This group is particularly adaptable to size and shape of individual units.

lV) SERVICE SHOPS - Those likely to be used at night, such as coin-ops and laundromats, should have double-fronted units so that when the mall is closed, access to the shop can be gained from areas outside the mall. Alternatively, they can be just outside the enclosed mall in a strip adjoining an entrance. Service shops are generally positioned in less attractive retail locations where rents are lower and sizes of shops smaller, eg. secondary malls and upper levels. It should be remembered that shoppers tend to seek out service shops. Only limited frontage and display space is required.

V) RESTAURANTS - These are an important asset to a centre. They can benefit from any position with a view even though it may only be over and along the main mall. Expert opinion currently recommends locations throughout the centre and in the main square, with as much as five per cent of the total area being allocated to this use.

VI) BARS - Bars will take many different types of units, including basement locations. They will need good access for both daytime and night time use. Genreally suitable are basements, first-floor, peripheral or even free-standing locations.

VII) FURNITURE, CARPETS AND HOUSEHOLD GOODS - This group includes hardware, electrical appliances, television and radio, furniture, drapery and antiques. They can be grouped more or less in one location or split into two or more groupson The larger stores, especially the furniture shops, will require inexpensive space at the rear of a smaller entrance unit fronting on to the mall. Many furniture shops need the maximum amount of wall space against which they can set a variety of displays and room settings. They are ideal tenants for L-shaped and T-shaped units where large display spaces are available.

VIII) UPPER OR BASEMENT TENANTS - A list of stores which could be placed on an upper or lower level other than the main mall level.are given below.

| RETAIL: | Units | Size | Total |
|---|---|---|---|
| Market | * 1 | 5,000 | 5,000 |
| Storage Linked with Shop | | | |
| Sports Equipment Sales | * 6 | 1,200 | 7,200 |
| Stamp Redemption | 2 | 50 | 100 |
| Antique Supermarket | 1 | 600 | 600 |
| Second-Hand Sales | * 2 | 600 | 1,200 |

| Type of store: | No. Req. | Size | Total |
|---|---|---|---|
| 6) Lamps and Shades | 2 | 1,200 | 4,800 |
| 7) Women's Wear | 6 | 2,400 | 14,400 |
| 8) Furniture | 6 | 3,000 | 18,000 |
| 9) Linen/Lace | | | |
| 10) Sewing Machines | 2 | 1,200 | 2,400 |
| 11) Shoes | 15 | 1,200 | 18,000 |
| 12) Sportswear | 4 | 1,200 | 4,800 |
| 13) Florist | 3 | 600 | 1,800 |
| 14) T.V./Radio | 4 | 1,200 | 4,800 |
| 15) Hobbies/Stamps/Coins | 6 | 600 | 3,600 |
| 16) Religious Goods | 2 | 600 | 1,200 |
| 17) Art Supplies and Frames | 4 | 600 | 2,400 |
| 18) Pets/Animal Foods | 4 | 1,200 | 4,800 |
| 19) Womens Fashion/Dresses | 6 | 2,400 | 14,400 |
| 20) Fashion Accessories | 6 | 600 | 3,600 |
| 21) Millinery/Hats | 2 | 400 | 800 |
| 22) Souvenirs | 4 | 600 | 2,400 |
| 23) Silver Goods | 6 | 400 | 2,400 |
| 24) Gloves/Scarves/Bags | 2 | 400 | 800 |
| 25) Bathroom Requisites | 1 | 600 | 600 |
| 26) Boat Showroom | 2 | 3,000 | 6,000 |
| 27) Baby Wear | 4 | 1,200 | 4,800 |
| 28) Childrens' Wear | 10 | 1,200 | 12,000 |
| 29) Carpets | 4 | 2,400 | 9,600 |
| 30) China, Glass, Pottery | 6 | 1,200 | 7,200 |
| 31) Gas Appliances | 2 | 2,400 | 4,800 |
| 32) Menswear | 6 | 1,200 | 7,200 |
| 33) Maternity Wear | 2 | 600 | 1,200 |
| 34) Jewellery | 6 | 600 | 3,600 |
| 35) Records/Music | 4 | 600 | 2,400 |
| 36) Fabrics/Material | 4 | 1,200 | 4,800 |
| 37) Beds/Bedding | 4 | 1,200 | 4,800 |
| 38) Toys | 4 | 600 | 2,400 |
| 39) Wallpaper/Paints | 4 | 1,200 | 4,800 |
| 40) Leather Goods/Luggage | 4 | 400 | 1,600 |
| 41) Cycles/Accessories | 4 | 1,200 | 4,800 |
| 42) Gifts | 5 | 600 | 3,000 |
| 43) Boutique | 6 | 1,200 | 7,200 |
| 44) Furrier | 2 | 1,200 | 2,400 |
| 45) Woolen Goods/Wools | 4 | 600 | 2,400 |
| 46) Camping/Sports Goods | 6 | 1,200 | 7,200 |
| 47) Antiques | 4 | 600 | 2,400 |
| 48) Shirt/Tie Shop | 2 | 600 | 1,200 |
| 49) Rainwear/Outdoor Clothing | 1 | 600 | 600 |
| 50) Discount Stores | 3 | 1,200 | 3,600 |

| SHOWROOM: | Units | Size | Total |
|---|---|---|---|
| Office Equipment | 3 | 1,200 | 3,600 |
| Central-Heating Equipment | 4 | 1,200 | 4,800 |
| Building Centre | 2 | 10,000 | 20,000 |
| Interior Decorating Centre | 2 | 5,000 | 10,000 |
| Double-Glazed Equipment | 4 | 1,200 | 4,800 |
| School Equipment | 5 | 600 | 3,000 |
| Boat Display | 2 | 3,000 | 6,000 |
| Camping Equipment | 2 | 1,200 | 2,400 |
| Carpet, Furniture Display | *6 | 3,000 | 18,000 |
| Catering Equipment | 3 | 2,000 | 6,000 |
| Medical Equipment | 1 | 1,200 | 1,200 |
| **SERVICES:** | | | |
| Ladies Hairdressing | *5 | 600 | 3,000 |
| Barbers | *4 | 600 | 2,400 |
| Travel Agent | *5 | 400 | 2,000 |
| Bank | *6 | 2,000 | 12,000 |
| Estate Agent | *6 | 1,200 | 7,200 |
| Driving School | 1 | 1,200 | 1,200 |
| Post Office | *2 | 2,000 | 4,000 |
| Optician | *4 | 600 | 2,400 |
| Tailor | *3 | 400 | 1,200 |
| Building Society | 1 | 1,200 | 1,200 |
| Rent Collection Office | 4 | 600 | 2,400 |
| Social Security Office | *1 | 1,200 | 1,200 |
| Clock and Watch Repair | 4 | 400 | 1,600 |
| Interior Decorator | *2 | 600 | 1,200 |
| Duplicating and Typing Agency | 4 | 600 | 2,400 |
| Lost Property Office | 1 | 600 | 600 |
| Employment Agency | 1 | 2,400 | 2,400 |
| Art Renovation | 2 | 600 | 1,200 |
| **OFFICES** | | | |
| Insurance Office | *6 | 1,000 | 6,000 |
| Stockbroker | *3 | 600 | 1,800 |
| Lawyer | 6 | 600 | 3,600 |
| Advertising Agency | 2 | 1,200 | 2,400 |
| Consultants (Architects, etc.) | *4 | 600 | 2,400 |
| Accountants | *6 | 400 | 2,400 |
| General Government Offices | 3 | 1,200 | 3,600 |
| Local Government Offices | 3 | 1,200 | 3,600 |
| Finance & Credit Companies | 6 | 600 | 3,600 |
| Mail Order Sales | 2 | 600 | 1,200 |
| Removal & Storage Companys Office | 4 | 400 | 1,600 |
| Publishing Company | 2 | 2,100 | 4,200 |
| Computer Services | 1 | 1,200 | 1,200 |

| WORK ROOMS, STUDIOS, ETC. | Units | Size | Total |
|---|---|---|---|
| Recording Studio | 1 | 2,400 | 2,400 |
| Photographic Studio | 4 | 600 | 2,400 |
| Rehearsal Studio | 2 | 400 | 800 |
| Tailors Workshop | 3 | 400 | 1,200 |
| Furrier | 1 | 1,200 | 1,200 |
| Pottery | 1 | 600 | 600 |
| Printers Workshop | 2 | 600 | 1,200 |
| Dressmakers Studio | 2 | 400 | 800 |
| Radio Station | 1 | 2,400 | 2,400 |
| Television Station | 1 | 5,000 | 5,000 |
| CATERING | | | |
| Bar | *6 | 3,000 | 18,000 |
| Restaurant/Cafe | *9 | 2,100 | 18,900 |
| Banquet Suites | 3 | 3,000 | 9,000 |
| Tea Rooms | 2 | 600 | 1,200 |
| ENTERTAINMENT | | | |
| Cinema | 3 | 8,000 | 24,000 |
| Dance Hall | 1 | 5,000 | 5,000 |
| Dance Studio | 2 | 1,200 | 2,400 |
| Night Club | 3 | 2,100 | 6,300 |
| Working Men's Club | 1 | 1,200 | 1,200 |
| Bingo Hall | | | |
| Prize Bingo | | | |
| Entertainment Centre | 1 | 20,000 | 20,000 |
| RECREATIONAL | | | |
| Indoor Sports Centre Y.M.C.A.,Y.W.C.A. | 1 | 40,000 | 40,000 |
| Sauna Baths | 10 | 120 | 1,200 |
| Roller Skating | | | |
| Squash Courts | | 25x45x20 | |
| Health Studios | | | |
| Gym/Training Centre | | | |
| Ice Skating | | 85x200 | |
| Tennis Courts | 10 | 60x120 | |
| Billard Hall | | | |
| Bowling Alley | | | |
| Swimming Pool | | | |
| Community Centre | | | |
| Handball | | | |
| CULTURAL AND EDUCATIONAL | | | |
| Lecture Rooms | | | |
| Library | | | |
| Art Gallery and Studios | | | |

| | Units | Size | Total |
|---|---|---|---|
| Museum | | | |
| Language Laboratories | | | |
| Church Hall | | | |
| Conference Rooms | | | |
| Theatre | | | |
| **MEDICAL AND WELFARE** | | | |
| Dental Clinic | | | |
| Doctors Clinic | | | |
| Chiropodist | | | |
| Welfare Clinic | | | |
| Nursery/Play School | | | |
| Family Planning Clinic | | | |
| **RESIDENTIAL** | | | |
| Flats/Apartments | | | |
| Hotel | | | |
| Youth Hostel | | | |
| **OTHER USES** | | | |
| Commercial Storage & Warehouse | | | |
| Wholesale Market | | | |
| Auction Rooms | | | |
| Exhibition Hall | | | |
| Headquarters for Political Clubs, Charities | | | |
| Parcel Post | | | |
| **NATURE AND SCIENCE** | | | |
| Zoo | | | |
| Parks | | | |
| Conservatory | | | |
| Planitarium | | | |
| Aquarium | | | |

CENTER INTERIORS- The design of the interior arcades, malls and courts should create a most inviting environment for the public. The elements used in this environment should provide the public with a satisfying emotional uplift on first visual contact.

The court or courts should become the focal magnet of shoppers and the public in general. Each court will have its own individual character, shape, color and decor. The main court being the central point of focal interest, functional and profitable uses, and an exciting place to sit, relax and both watch and meet people. These courts will also serve as areas for special events such as concerts, auto and boat shows, art shows, and community programs.

MALLS - The design of the mall and arcade leading to the different courts or main court, should strive for a lesser character than that of the courts. This should be done without producing a tunnel effect between major functions or create an area that causes people to want to leave the area. It mustboth move people along in such a way that they observe the stores along the mall and be comfortable in this movement. By allowing the public to view both the stores along the mall, glimpses of the courts at intervals along the mall, openings to different levels and glimpses of the outside, you reduce the feeling of lost, closed-in and other psychological effects upon the user.

HOTEL

Three Hotels: No. 1 - 100 Rooms
No. 2 - 200 Rooms
No. 3 - 300 Rooms

| BASIC AREA DATA | No. 1 | No. 2 | No. 3 |
|---|---|---|---|
| 1) Building Height (Stories) | 4 | 10 | 14 |
| 2) Ground Floor Area | 8,000 | 16,000 | 25,000 |
| 3) Typical Gust Floor Area | 5,000 | 8,000 | 13,000 |
| 4) Guest Room per Typical Floor | 13 Rms | 24 Rms | 36 Rms |
| 5) Guests Floor Stairways | 2 | 2 | 2 |
| 6) Elevators | 2 | 3 | 4 |
| 7) Lobby Including Front Office | 1,100 | 2,400 | 3,500 |
| 8) Front Office | 100 | 200 | 300 |
| 9) Lounge | 700 | 1,200 | 1,700 |
| 10) Public Corridors Adjoining Lobby | 400 | 500 | 700 |
| 11) Combined Lobby, Lounge & Adjoining Corridors | 1,800 | 3,500 | 5,000 |
| 12) Barber Shop | 180 | 340 | 500 |
| 13) Number ofRented Stores | 3 | 6 | 9 |
| 14) Mens' Toilets for Guests | 150 | 300 | 450 |
| 15) Womens' Toilets for Guest | 110 | 210 | 310 |
| 16) Womens' Rest Rooms for Guests | 100 | 200 | 300 |
| 17) Rented Stores Total Area | 2,000 | 4,000 | 6,000 |
| 18) Storage Space For Rented Stores | 400 | 800 | 1,200 |
| 19) Main Dining Room | 1,500 | 3,000 | 4,500 |
| 20) Main Kitchen | 1,000 | 2,100 | 3,200 |
| 21) Bake Shop | 200 | 400 | 600 |
| 22) Coffee Shop | 750 | 1,500 | 2,250 |
| 23) Private Dining Rooms Total Area | 750 | 1,500 | 2,250 |
| 24) Banquet Ballroom | 1,500 | 2,750 | 4,000 |
| 25) Banquet Ballroom Storage | 140 | 280 | 400 |
| 26) Auxiliary Kitchen (Coffee Shop) | | 280 | 420 |
| 27) Bar and Cocktail Lounge | 750 | 1,500 | 2,250 |
| 28) No. of Private Dining Rooms | 1 | 2 | 3 |
| 29) Banquet Ballroom Service Pantry | 300 | 600 | 900 |
| 30) Employees' Dining Room | 250 | 500 | 750 |
| 31) Stewards' Store Room | 400 | 750 | 1,200 |
| 32) Beverage Store Rooms (Liquar) | 150 | 300 | 400 |
| 33) Receiving Room | 175 | 350 | 450 |
| 34) Linen Room | 300 | 600 | 900 |
| 35) Laundry | 750 | 1,400 | 2,100 |
| 36) Mens' Toilet & Locker Room | 210 | 420 | 700 |
| 37) Garbage Room | 75 | 150 | 225 |
| 38) Managers' Office | 120 | 140 | 160 |
| 39) Accounting Office | 150 | 200 | 250 |
| 40) Womens' Toilet & Locker Room | 200 | 400 | 600 |
| 41) Maintence Shops | 450 | 750 | 1,350 |
| 42) Furniture Storage | 240 | 440 | 780 |
| 43) Boiler Room | 600 | 1,200 | 1,800 |
| 44) Fuel Storage | 200 | 400 | 640 |
| 45) Transformer Vault | 100 | 180 | 275 |

YOUTH HOSTELS:

CAPACITY: Sixteen Boys & Sixteen Girls

Youth Area:

| | | | | | |
|---|---|---|---|---|---|
| Unit Area: | 2 Bunk Rooms | - | 30' X 20' | - | 600# |
| | 2 Toilets | - | 8' X 24' | - | 192# |
| | 1 Kitchen | - | 17' X 10' | - | 170# |
| | 1 Dining & Common Room | - | 26' X 40' | - | 1,040# |

CAPACITY: Two Houseparents

Houseparents Area:

| | | |
|---|---|---|
| Unit Area: | 1 Bedroom + | 180# |
| | 1 Livingroom | 240# |
| | 1 Kitchen | 65# |
| | 1 Bathroom | 80# |
| | 1 Storage | 40# |
| | 1 Office | 100# |

VEHICAL STORAGE - Storage of vehicals: There will be some 15,000 vehicals requiring storage in this facility. As the vehicals enter the parking garage they are checked for any mal-function and if so are sent to a repair area. The parking and monitoring will be done by a computer which both parks and recalls vehicals as required. People will leave their vehical at the lower mall and the computer will take care of the vehical.

AREA REQUIRED:

Storage: $15,000 \times 200 \text{ Sq. Ft.} = \frac{3,000,000}{3 \text{ decks}} = 1,000,000$

Repair Area: 10,000 Sq. Ft. Included in 1,000,000 Sq. Ft

SERVICE MALL - The service mall will act as a distribution area between warehouse and commercial area. A conveyance system will service the commercial areas with goods from the warehouses and will be monitored by a computer.

The area will also serve as a parcel pick-up for customers wishing to shop at a different store and not pick up their goods until they are ready to go home. When they are ready to go home they will simply punch in their parcel pick-up numbers and their goods will be loaded into the vehical. The vehical will then go to where the person punched in and they will enter into the car and leave the centre. For their protection they will receive a card with the car number punched on it which will unlock the car when inserted into its lock.

The service mall will also act as storage areas for the commercial area above. They will keep most of their stock in these areas and alos will use this area to uncrate goods coming from the warehouse.

TRANSPORTATION:

i) CONTINENTAL TRANSPORTATION - SYSTEM C.T.S. I

DESCRIPTION OF SYSTEM (See Map 14) - C.T.S. I is a transportation system that would travel in a tube, two miles underground at speeds ranging between 350 m.p.h. (see diagram 1 & 2) The vehicals will be supported on super conducting magnets which both act as repulsive super conducting levitation and linear motor for propulsion. (see diagram 3). The vehicle will be raised about six inches off the track and for emergencies there will be a retractable landing wheel which the vehicle could ride on if the magnetic support was lost.

The guideway slopes downward as it leaves each station and rises as it approaches the next station. This gravity profile provides a large increment of acceleration and deceleration without a corresponding expenditure of power and without wasting energy on braking. It takes five time the energy for a linear motor to accelerate or decelerate, then for it to maintain its line speed. Furthermore, it appears that the added acceleration and deceleration contributed by gravity may cause none of the discomfort that equal accelerations would cause in horizontal travel.

The C.T.S. I system has a second ingenious feature that provides economies of power. The vehicles are sealed to maintain normal atmospheric pressure, and air is evacuated from the tube to reduce its pressure to 1 p s/a or about 7% of the normal atmosphere. The low pressure eliminates much of the air friction that otherwise would impede a vehicle travelling at high speeds.

At present high costs of tunnelling are an obvious obstacle to the installation of C.T.S. I systems. However, it appears that tunnelling costs may be greatly reduced through further development of mechanized tunnelling equipment. In the future, mechanized tunnelling equipment will use lasser, high pressure water, sound, chemical and heat as tools for tunnelling. A tunnelling mole in the future will be able to dig 168 miles per year in any kind of geological formation.

For emergencies and for tunnel maintenance, it must be possible to introduce air at atmospheric pressure into the tunnel between adjacent stations without distroying the vacuum in the entire system. (see diagram 5) For this reason, gate valves would be provided at each station to isolate the tubes between pairs of stations. By-passes around each vacuum pump will let air in, and additional inlets at intermediate points may prove to be desirable to speed the process.

GUIDWAY - The guidway for C.T.S. I would be an underground, sealed tunnel. Stations would be at the surface of the ground or below the foundations of buildings, if required. The tube will dip between stations so that gravity would accelerate and decelerate the vehicle.

A typical profile is shown in figure 1. This profile provides an actual acceleration of 10 feet per second (about 0.3g or 7 m.p.h./sec.) If the guidway were perfectly aligned the traveller would feel no acceleration in the direction of travel and only a slight apparent reduction in weight (about 0.05g).

Two 12 foot diameter tunnels in parallel, for traffic in opposite directions, will be used. (see diagram 4) The tunnel need be lined only to prevent collapse and to seal the tube against groundwater leakage or loss of vacuum. The only surface on the tunnel that requires careful preparation is the bottom or running surface.

VEHICLE - (see diagram 6) The main components of the vehicles are the passenger compartments, the suspension, the propulsion and the control systems. The proposed vehicle is about 11 feet in diameter and 80 feet long and seats passengers two abreast on each side of an aisle. It will carry 80 seated passengers and will have a gross weight of 24 tons when loaded.

The passenger compartment will be airtight and capable of withstanding an interval pressure of one atmosphere. The type of construction employed in the passenger compartment of high altitude aircraft is generally applicable. There will be at least two sliding doors on one side of the vehicle. To reduce delays in stations, one door may be used for entrance and the other for exit.

The motor is supported beneath the floor of the vehicle in a flexible mounting. It can adjust to vehicle motion while remaining centered on the inductor set into the tunnel floor. The air gap between the reaction rail and the motor windings is 4 inches wide on each side.

The control system for C.T.S. I is simplified by the use of the computer to monitor and compare data to a set system of norms. Headways of 90 seconds are readily attainable with todays control technology. With the perfection of the moving block system of train control, headways as low as 45 seconds for one car trains and 50 seconds for two to four car trains can be achieved if station time is no more than about 30 seconds. Speed control, braking and door controls at stations, and emergency controls are required. In addition, a communication system must be developed so that all vehicles are under the constant surveillance of a central dispatcher.

A positive and inexpensive method of establishing position and speed is the use of trackside markers, magnetic or optical, that are observed by an instrument on the vehicle; the time that they are observed is compared automatically with a stored program. The computer would automatically speed up or slow down the train as required. The accuracy of such a system can be improved by closer spacing of the markers up to the limit of response time of the traction motor.

For safety, the position and speed of each train should be monitored by a central computer that automatically over rides the on board control if the train deviates from the pre-set speed by more than a safe amount. Communication between the train and the central computer requires study. Conceivably, the tube itself can be used as a convenient wave-guide for micro-wave communication channels.

Control of cabin pressure will be a critical element. If the pressure in the cabin drops at more than a minium rate and long before the pressure has decreased to a dangerous level, the signal must be given to close the gate values and flood the tunnel with air. It may be necessary to equip cars with an emergency oxygen supply for the passengers.

The pressure rate control must be closely tied in with the door opening mechanism so that the train will not start until the door is properly sealed.

STATIONS, TERMINALS, AND YARDS (see diagram 7) - Stations will be located at ground level when possible. However, they may have to be as deep as 100 feet when the route passes beneath the foundations of buildings. The detailed design will depend on the location, capacity, interconnections with other elements of the transportation system, and other land uses in the vicinity. Platform length will depend on the maximum size of trains, normally only one train need be accommodated at a time. Stations will include an emergency section to hold following trains if the first train cannot depart on schedule. This section should be long enough to hold all trains already on the way from the nearest upstream station. If the delay is prolonged, air would be admitted to the guideway after closing the valves at both ends of the station and passengers would leave the train along a walkway at the side of the train.

Terminals will include turnabout facilities, which might be s simple transfer tables or turntables. At least one terminal on the line should have facilities for storage of unused vehicles and for maintenance purposes.

A central computer is provided at the administration terminal. This computer fullfills the following functions:

1) Arranging train length and headways according to demand.

2) Visual display of train location and speed.
3) Override train and station control in caseof emergency.
4) Central accounting function, including credit card billing to passengers.

OPERATIONS - CAPACITY: With flexibility in both train length and headways, the capcity of C.T.S. I will be highly variable. Sincle vehicles could be run as infrequently as desired to maintain minimum off-hour service. Single cars on 60 second headways would carry 4800 seated passengers each hour. Higher capacity can be obtained by using longer trains.

The seated capacity per hour, one-way, varies with train length and headway, as shown below.

| Train Length | No. of cars | C.T.S. I 80 Passenger Cars | | |
|---|---|---|---|---|
| | | 90 Sec. | 60 Sec. | 45 Sec. |
| 80 Ft. | 1 | 6,400 | 9,600 | 12,800 |
| 160 Ft. | 2 | 12,800 | 19,200 | 25,600 |
| 400 Ft. | 5 | 32,000 | 48,000 | 64,000 |
| 800 Ft. | 10 | 64,000 | 96,000 | 128,000 |
| | | 20 Passenger Cars | | |
| 40 Ft. | 1 | 1,600 | 2,400 | 3,200 |
| 120 Ft. | 3 | 4,800 | 7,200 | 9,600 |
| 200 Ft. | 5 | 8,000 | 12,000 | 16,000 |
| 400 Ft. | 10 | 16,000 | 24,000 | 32,000 |

AVERAGE SPEEDS - Travel time will depend, of coarse, on the distance between stations and on the loading time required at stations. C.T.S. I is envisioned to cover a 100 mile trip in about 20 minutes. The speed will vary between 350 and 650 m.p.h. and will average out at about 400 m.p.h.

MAINTENANCE - Maintenance is expected to be light. However, tunnels must be inspected for leakage and cracks due to earth settling, and must be kept in good condition. The pressure in the tunnel must be brought to atmospheric pressure prior to inspection, and service must be discontinued during inspection and repair and during the period required to restore the vacuum.

Stationary vacuum pumps will require periodic inspection and overhauls, but this work will not ordinarily interfere with operations. Vehicles must be checked routinely, particularly for leaks and fatique failure, much as airplanes are periodically inspected today.

DESIGN REQUIREMENTS:

| | C.T.S. 1<br>80 Passenger Car | C.T.S. I<br>20 Passenger Car |
|---|---|---|
| Length | 80'0" | 40'0" |
| Height | 11'0" | 11'0" |
| Width | 11'0" | 11'0" |
| Weight Empty | 32,000 lb. | 7,300 lb. |
| Weight empty Per Passenger | 400 lb. | 365 lb. |
| Weight per linear foot | 400 lb. | 183 lb. |
| Weight Loaded | 44,000 lb. | 10,300 lb. |
| No. of Cars | 5 | 5 |
| Nominal Train Length | 400 ft. | 200 ft. |
| Platform Length | 400 ft. | 200 ft. |
| Maximum Station Throughput | 32,000 pph | 12,000 pph |
| Floor Area | 60,000 sq. ft. | 30,000 sq. ft. |
| Cost - Tunnel Vehicle, Stations & Control | $2,000,000.00 Per Mile. | |

CURVATURE OF TUNNEL

| SPEED m.p.h. | HORGIZONTAL PREFERRED | CURVATURE MINIMUM |
|---|---|---|
| 120 | 1,910 ft. | 1,270 ft. |
| 160 | 3,430 ft. | 2,300 ft. |
| 250 | 4,500 ft. | 3,300 ft. |
| 350 | 5,500 ft. | 4,300 ft. |
| 650 | 10,000 ft. | 8,600 ft |

C.T.S. I GUIDEWAY PROFILE

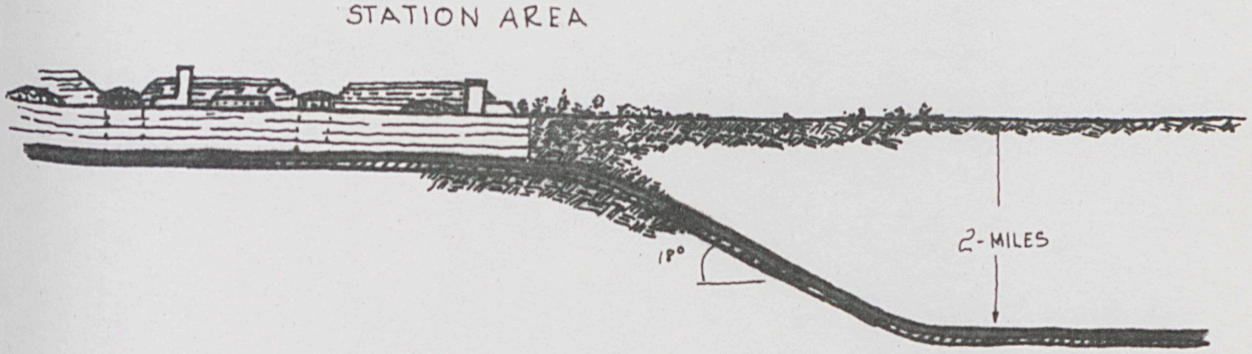
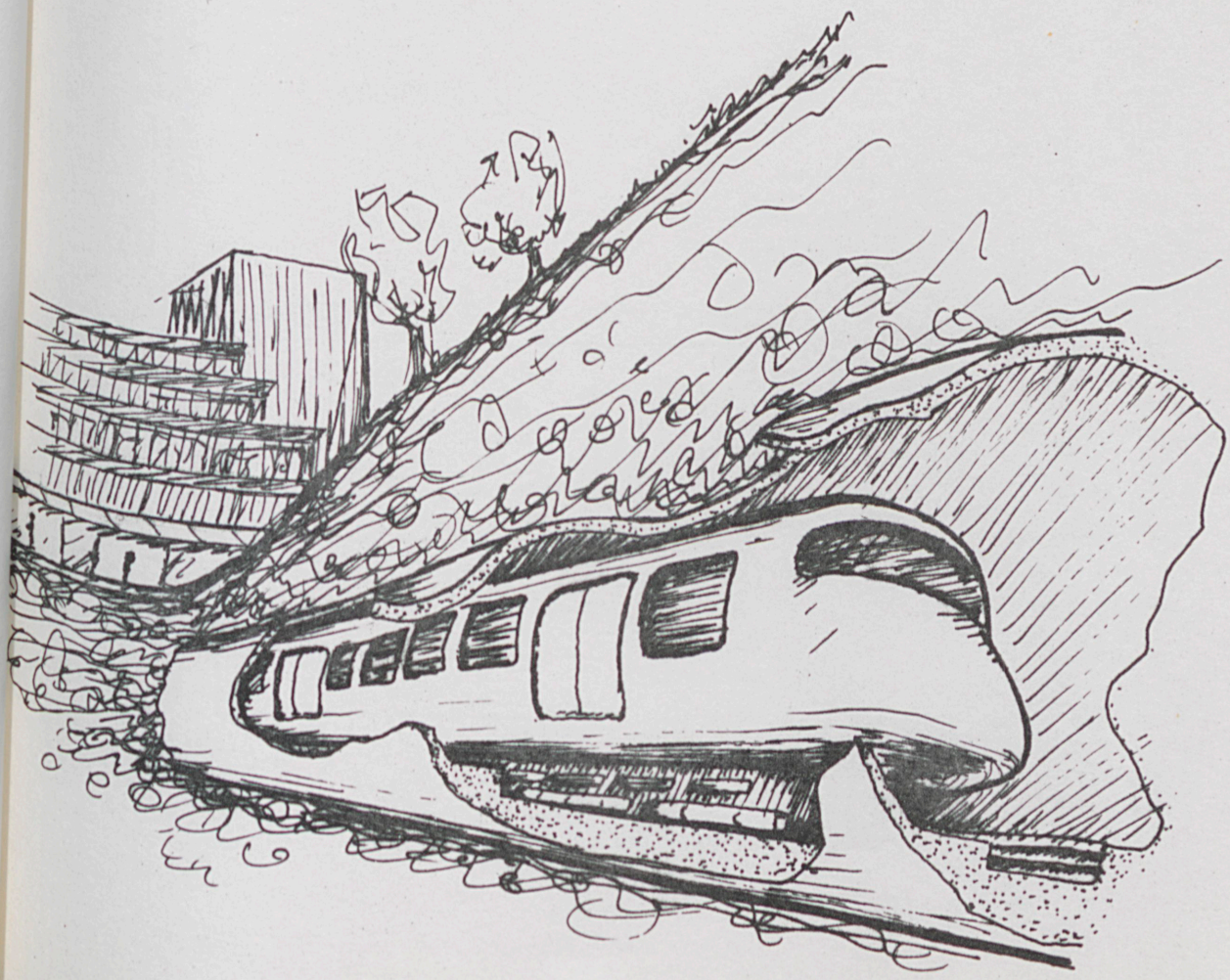
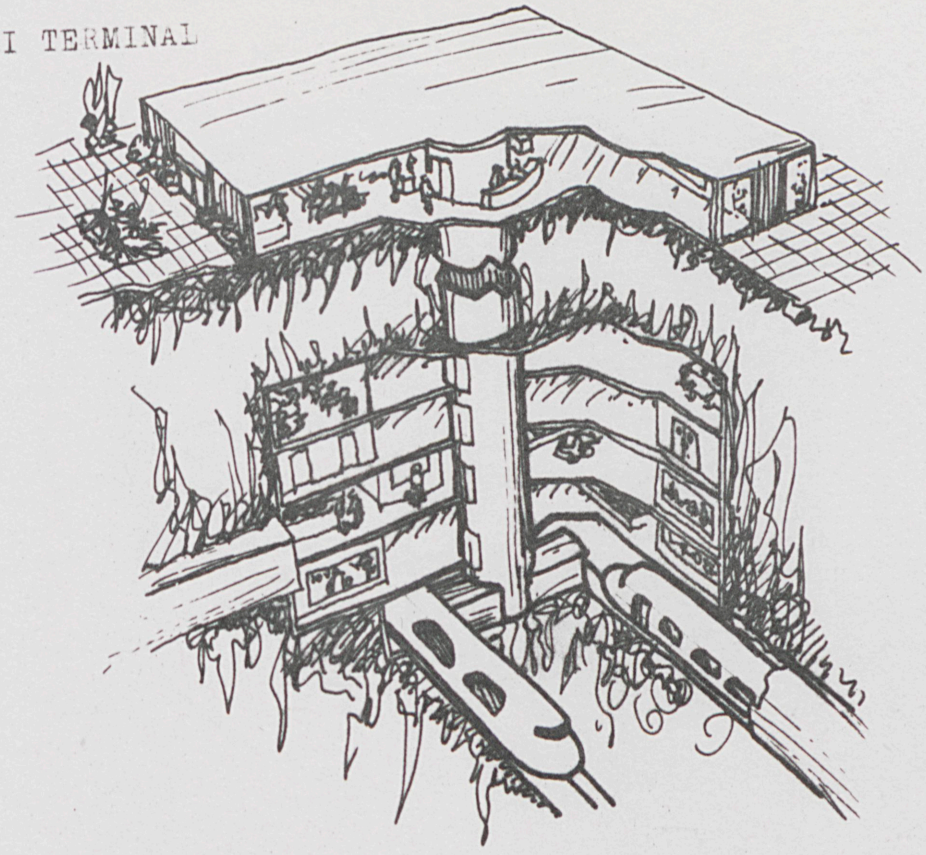


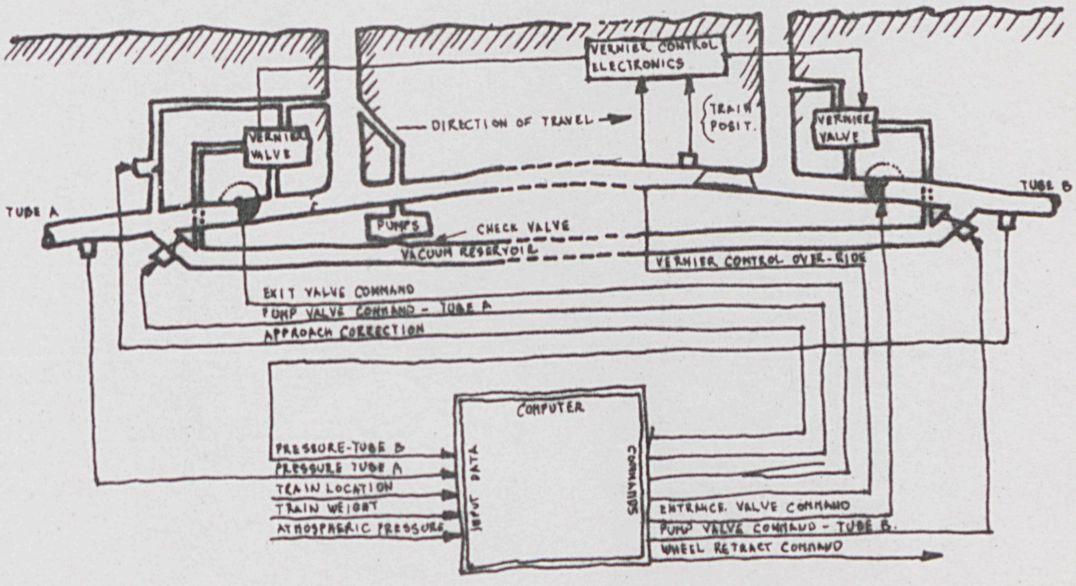

ILLUSTRATION OF C.T.S. I SYSTEM



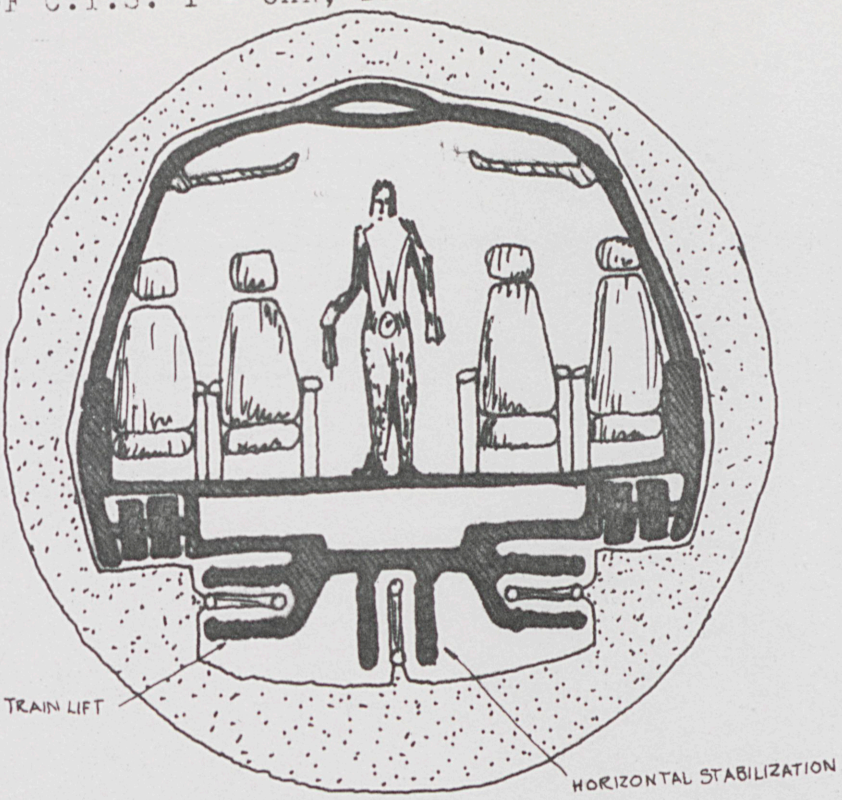
C.T.S. I TERMINAL



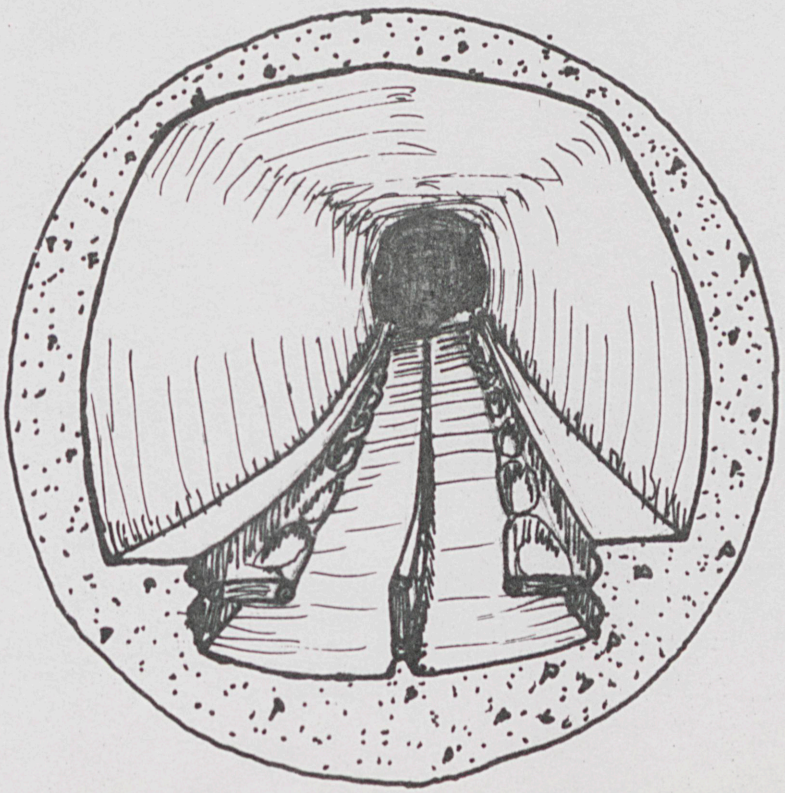
C.T.S. I CONTROL SCHEMATIC



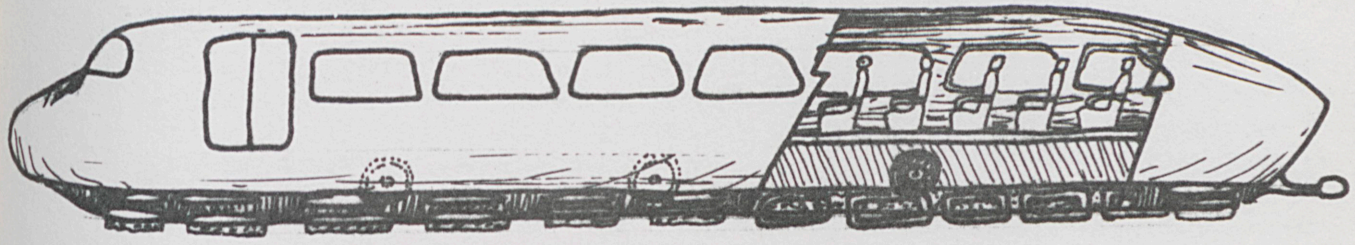
SECTION OF C.T.S. I - CAR, PROPULSION, SUSPENSION AND GUIDANCE



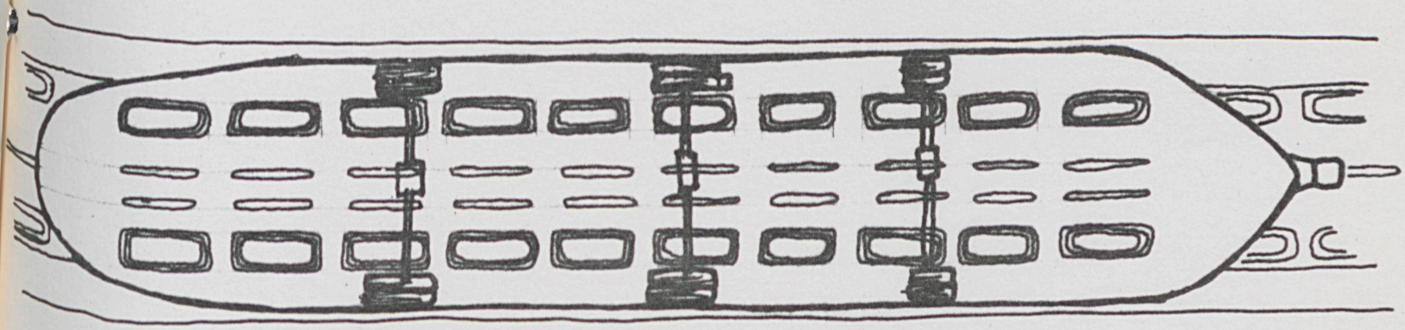

TUNNEL SECTION FOR C.T.S. I



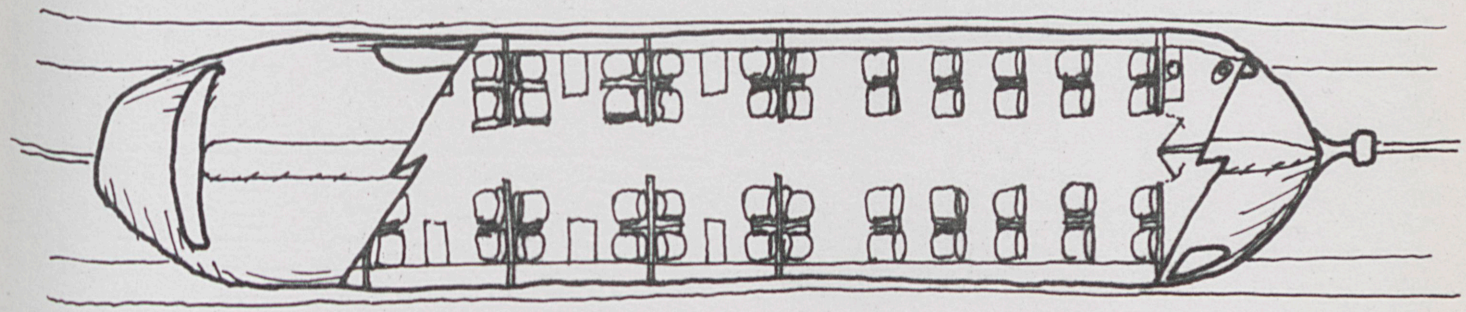
C.T.S. I VEHICLE



ELEVATION



PLAN



ROOF

REGIONAL TRANSPORTATION SYSTEM - R.T.S. 2

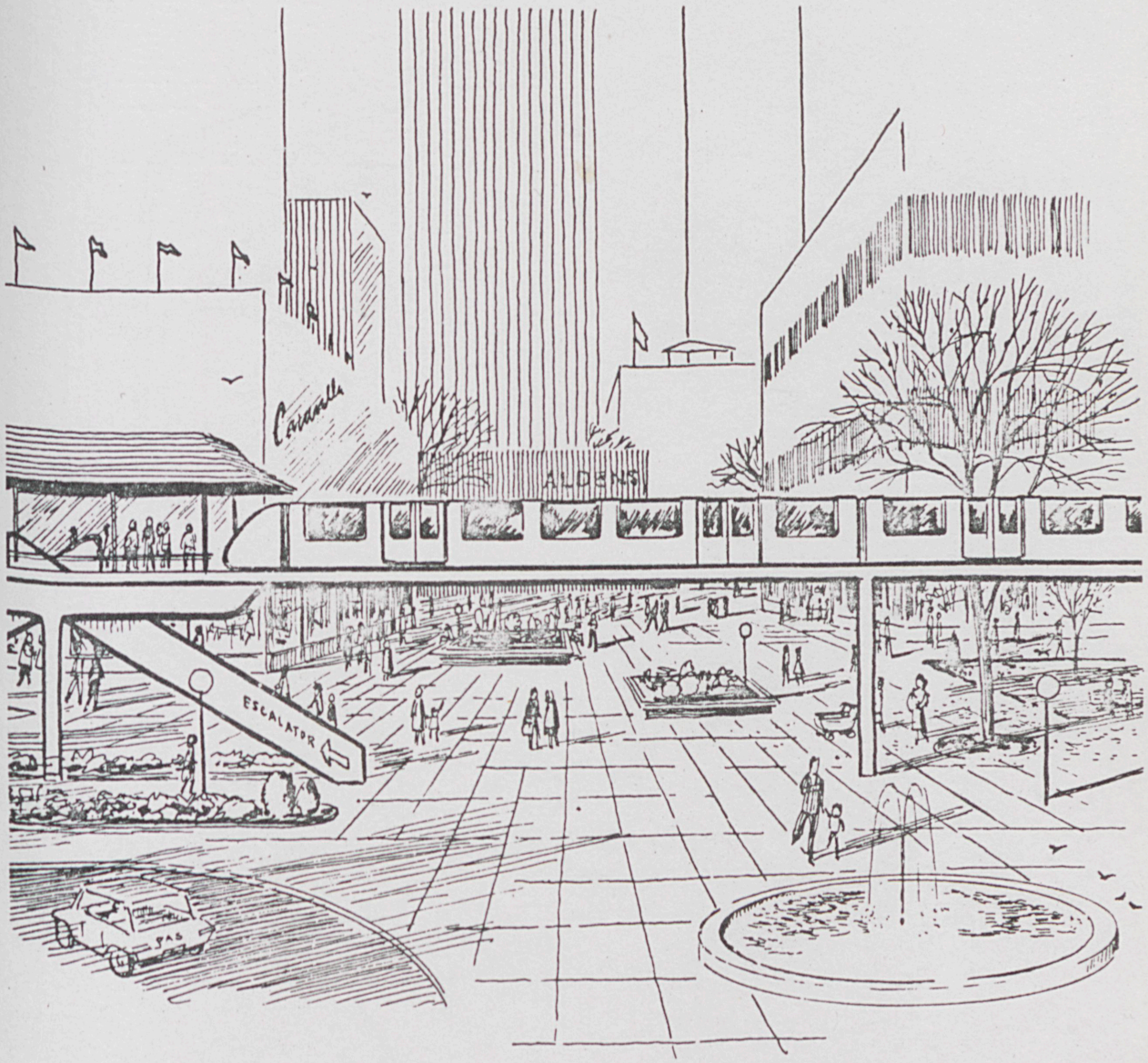
DISCRIPTION: (see map 15) R.T.S. 2 is a transportation system very similar to C.T.S. I except that is is above ground on an elevated track. The same vehicle is used for both systems except that above ground, special panels slide up into the fuselage to reveal the windows so that passengers can look at the country side. The same guidance system is used for both with C.T.S. I built into a tunnel and R.T.S. 2 built into an elevated track. (see diagram 8)

The basic dimensions of the vehicle are the same with only the speed changing to between 150 to 350 m.p.h.

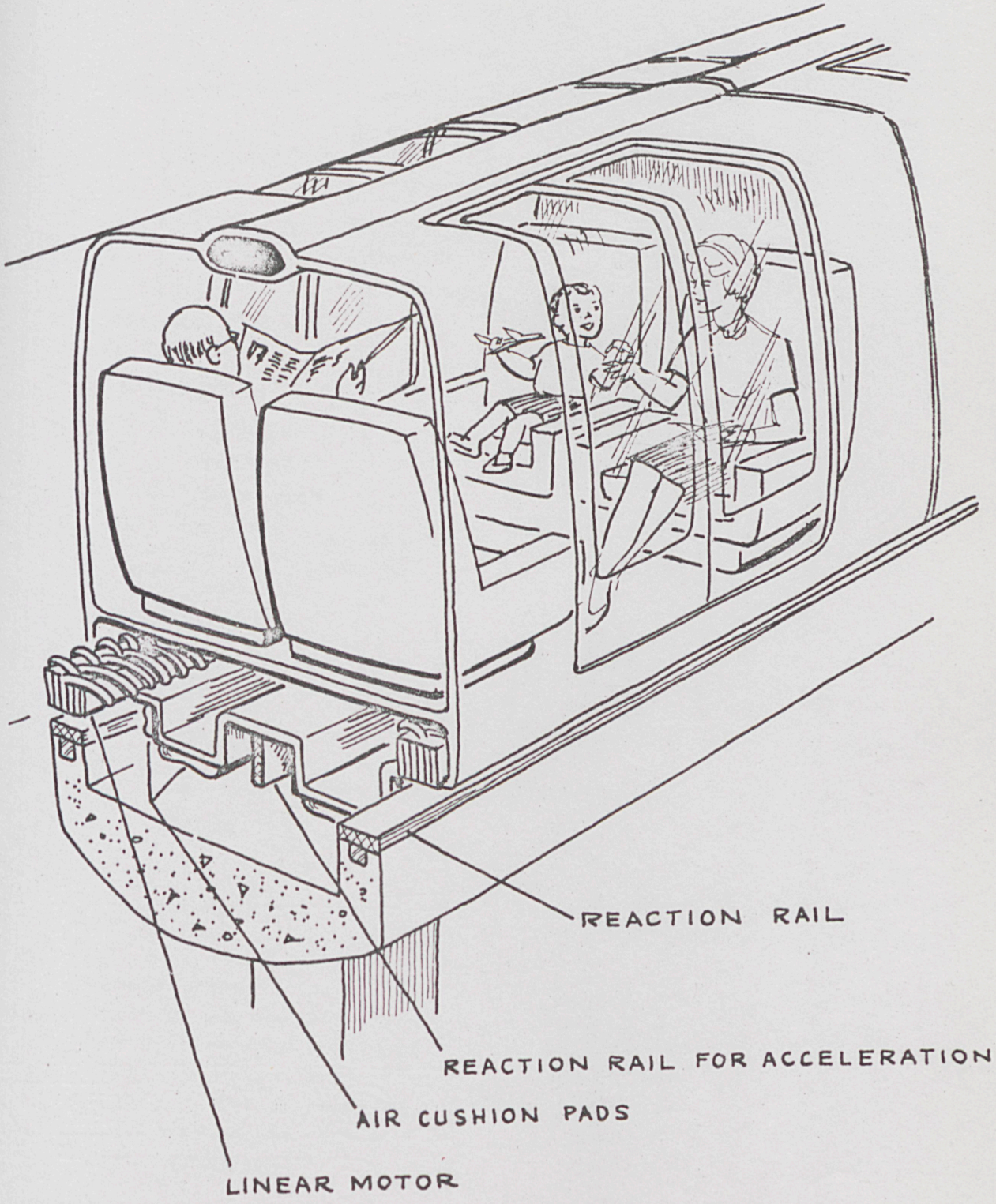
SEATED CAPACITY PER HOUR

| Train Length | No. of cars | R.T.S. 2 80 Passenger Cars | | |
|---|---|---|---|---|
| | | 90 Sec. | 60 Sec. | 45 Sec. |
| 80 | 1 | 3,200 | 4,800 | 6,400 |
| 160 | 2 | 6,400 | 9,600 | 12,800 |
| 400 | 5 | 16,000 | 24,000 | 32,000 |
| 800 | 10 | 32,000 | 48,000 | 64,000 |
| | | 20 Passenger Cars | | |
| 40 | 1 | 800 | 1,200 | 1,600 |
| 120 | 3 | 2,400 | 3,600 | 4,800 |
| 200 | 5 | 4,000 | 6,000 | 8,000 |
| 400 | 10 | 8,000 | 12,000 | 16,000 |

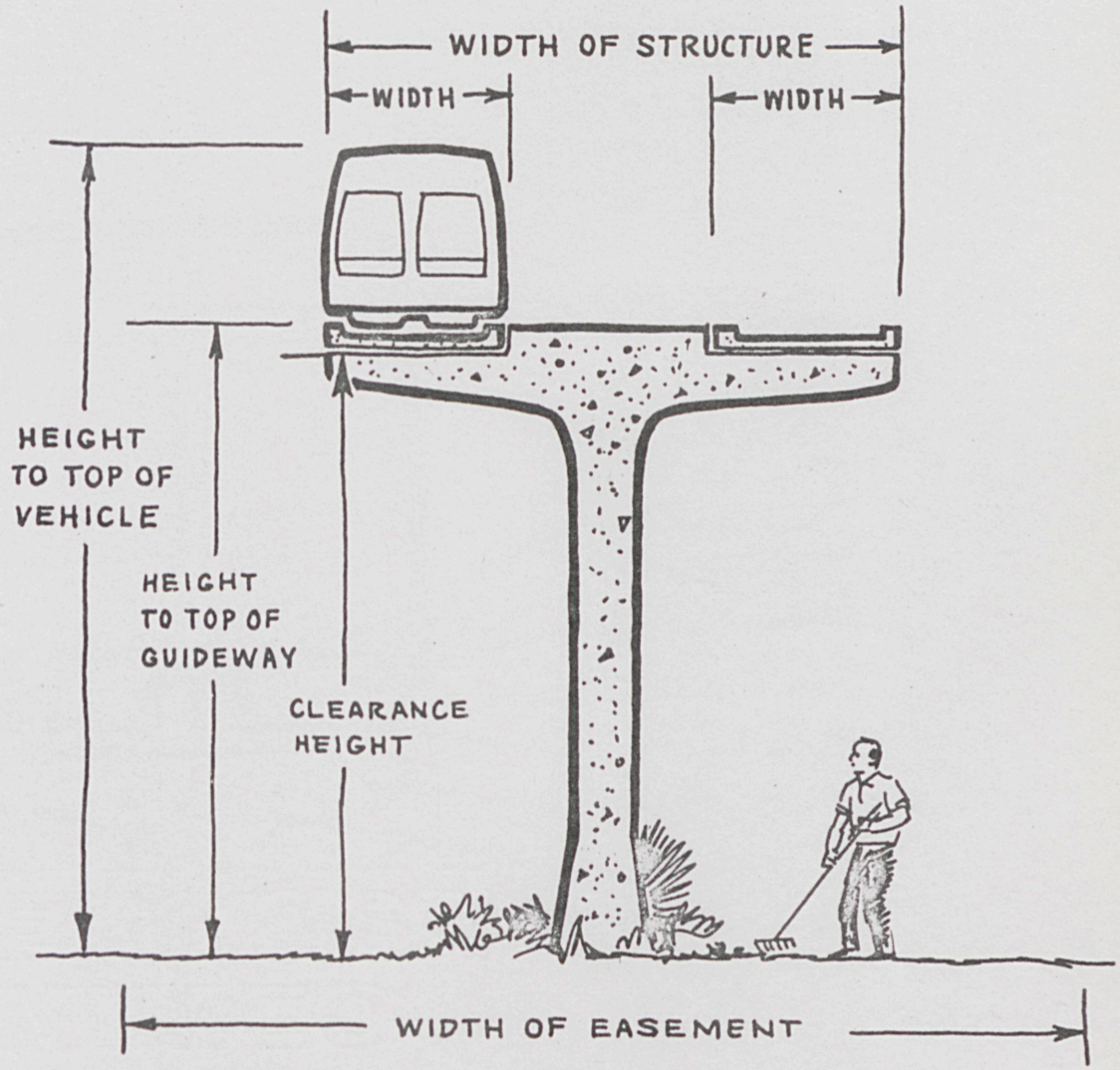
R.T.S. 2 VEHICLE AND TRACK PERSPECTIVE



R.T.S. 2 PASSENGER CAR

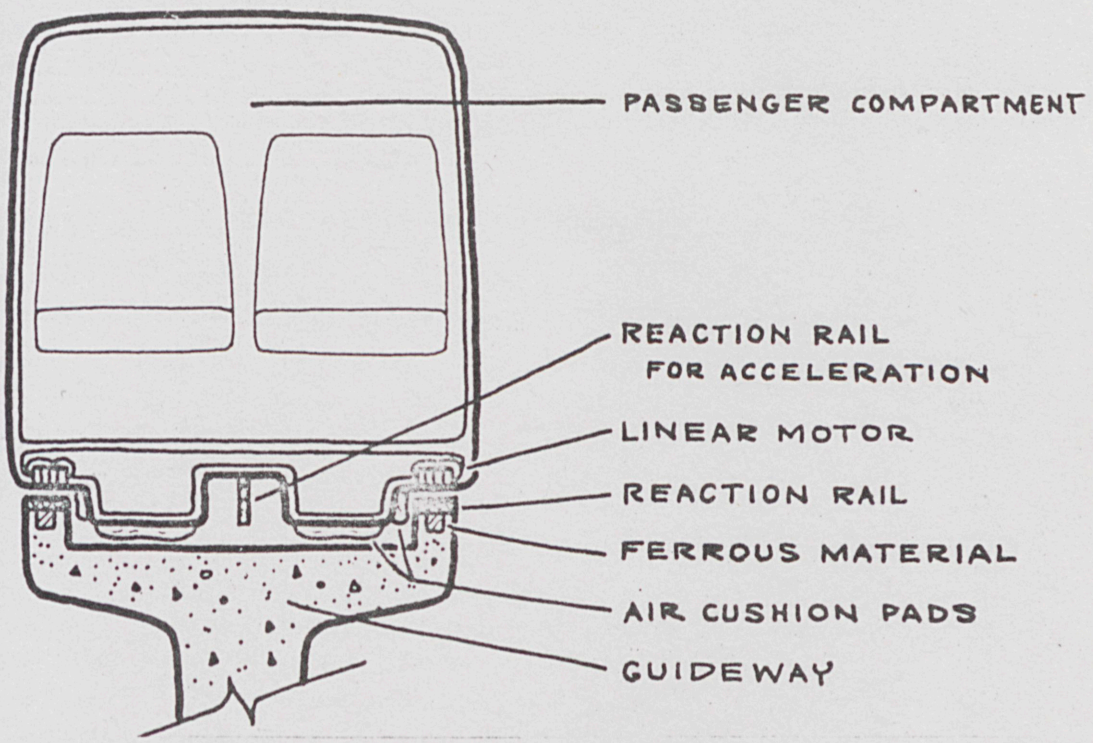


R.T.S. 2 GUIDEWAY STRUCTURE




| | FTL-1a 80-Passenger Vehicle | FTL-1b 20-Passenger Vehicle |
|---|---|---|
| General type | Split U | Shallow U |
| Width of one-way structure | 10'-6" | 5'-0" |
| Width of two-way structure | 30'-0" | 15'-0" |
| Clearance height above ground | 15'-0" | 15'-0" |
| Height to top of guideway | 18'-0" | 16'-8" |
| Height to top of vehicle | 25'-8" | 21'-8" |
| Width of easement | 50'-0" | 25'-0" |

R.T.S. II VEHICLE COMPONENT CONFIGURATION



CITY TRANSPORTATION SYSTEM - C.T.S. 3

DISCRIPTION - (see map 18) C.T.S. 3 will consist of dual mode vehicles that can leave the network and travel on city streets. When travelling in the network they will use magnetic leveation and the linear motor for propulsion. On the street the vehicle will use electric power stored in batteries and driven on wheels. The car will be able to be controlled by a central dispatch centre both in the network and on the street. The network system will consist of elevated guideways on which the vehicle travels. (see diagram 13)

VEHICLE HEADWAY - In the applications envisioned for the C.T.S. 3 system, small vehicles will sometimes be required to carry 10,000 passengers per hour or more over single lane guidways. This capacity would require very close headways between vehicles travelling along the networks. by using wayside monitoring devices and computer like controlsvehicles will be able to meet these short headways.

THEORETICAL LINE CAPACITIES - VEHICLES PER HOUR

| Safety Factor k | Speed 50 m.p.h. | 70 m.p.h. |
|---|---|---|
| 2 | 790 | 565 |
| 1 | 1,580 | 1,130 |
| 0.50 | 3,160 | 2,260 |
| 0.25 | 5,100 | 4,050 |
| 0.10 | 10,270 | 8,860 |

VEHICLES - The vehicle sizes will vary from four passenger vehicles to twelve passenger vehicles with the four passenger being the most widely used.

| No. of Passengers | Dimensions (feet) Length | Width | Height | Weight (lbs) Empty | Loaded |
|---|---|---|---|---|---|
| 12 | 16 | 5.5 | 7 | 4,800 | 6,840 |
| 4 | 9 | 4.0 | 7 | 2,000 | 2,680 |

SUSPENSION AND PROPULSION SYSTEMS - When operating on city streets the vehicles will be equipped with automotive suspensions and tires and be powered by rotary electric motors that deliver torque to the wheels. When vehicles are operating on the network system they are propelled by linear motors and suspended by magnetic leveation. (see diagram 18)

GUIDEWAYS - C.T.S. 3 Vehicles must have exclusive use of their special guideways; the guideways must also be protected from vandalism and must be kept free of frost, ice, and snow.

The guideways will be elevated and the vehicle will be suspended from this track. (see diagram 20)

| Vehicle Design Speed M.P.H. | Curves With 35% Superelevation | Flat Curves |
|---|---|---|
| 30 | 110 | 300 |
| 40 | 200 | 540 |
| 50 | 300 | 830 |
| 70 | 600 | 1,640 |

VEHICLE GUIDANCE AND SWITCHING - C.T.S. 3 systems must be accurately guided at all times and must be switched at stations, interchanges, and ramps. Each vehicle will be equipped with power steering apparatus. A wire embedded in the roadway will emit a signal that is tracked by an inductive pickup coil mounted in each vehicle. If a vehicle moves away from its alignment over the wire, the pickup will sense the direction of movement and generate a corrective signal that will transmitted to the vehicles power steering apparatus.

The method of diverting vehicles at switches is illustrated in figure 42. As a vehicle approaches the switching point it follows a signal of a specified frequency (ie. 400 cycles) that is radiated from the wire laid down the centre of the guideway. Before the vehicle reaches the switching point, it can be given a command to seek and follow a wide oarring a different frequency This approach might be accomplished as follows: (1) an active wayside sensor reads the car destination code and (2) the data are transmitted to a central computer. The computer makes a dispatching analysis and decision. If a vehicle is to switch to the right... for example, off the main line onto a station siding... an item of wayside apparatus will reset an item of on-board equipment and command the vehicle to follow the frequency (ie. 450 cycles) radiated from a wire lead going away from the main line into the station siding. The vehicle will continue to follow the 400 cycle signal until it senses the 450 cycle signal then it will follow the desired path to the station.

CONTROLS - Control systems must regulate vehicles speed and spacing, manage streams of vehicles at stations and in intersections, specify vehicle routing to avoid overloading individual links and nodes, dispatch empty vehicles, and handle all types of emergencies. To accomplish these functions, control systems will employ combinations of equipment located on board vehicles and fixed equipment at wayside locations, at stations, and at a central control facility.

SPEED CONTROL - Digital equipment on each car determines the actual speed, compares the actual speed, compares actual and desired speeds, and changes power when speed correction are needed. The digital technique makes it possible for all cars on a network link to travel at almost exactly the same speed.

HEADWAY CONTROL - Headway control problems will vary greatly for high speed streams moving along network links, in stations, in interchanges, and on ramps, and during speed reductions when cars are approaching and leaving stations. For each vehicle in a stream, the control system monitors vehicle speed, following distance, and the actions of one or more vehicles upstream. As headways decrease, measurement of position must be more accurate and velocity adjustments must be more precise. Each vehicle will use distance-measuring equipment (with radar-like capabilities) to measure the distance to the next vehicle ahead or to the next wayside reference point. Each car carries a radio frequency transmitter and receiver, a car-borne antenna assembly, and other related equipment.

MERGING CONTROL - Vehicle position and velocity would be measured continually and compared with a standard for the particular maneuver being performed. When errors are detected, vehicle acceleration or deceleration would be adjusted. The merging control must (1) identify the oncoming gap that can best be occupied by each merging vehicle; (2) adjust the position of the merging car by controlling its speed; (3) ensure that the vehicle is inserted into the oncoming gap on the main line without collisions; (4) ensure that the ride is smooth by eliminating jerks or excessive acceleration and deceleration rates.

AUTOMATIC ROUTING AND DISPATCHING - All vehicles would be routed automatically through the network to their selected destinations along the shortest (or best) available path. Empty vehicles would be dispatched to stations in accordance with anticipated demand.

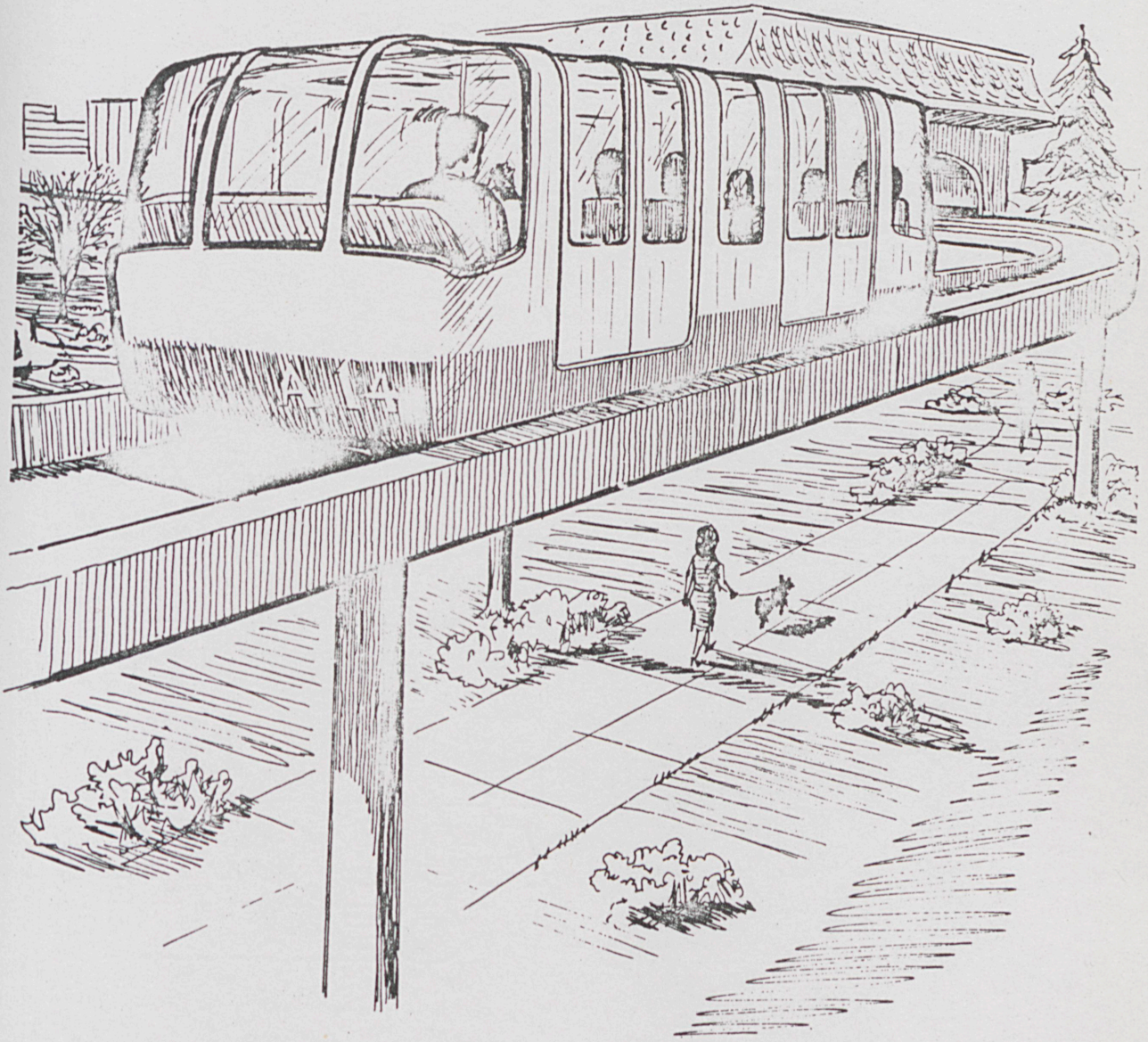
STATIONS AND TERMINALS - With 9-foot vehicles, a single dynamic platform would have capacity for 880 vehicles per hour. In this system, in which the platform moves along with the vehicle, the speed of the dynamic platform would be adjusted to accommodate the desired number of vehicles. If more than 880 vehicles per hour were required, the stream of incoming cars could be divided and served by two or three dynamic platforms in a line. The capacities of stations with one, two, and three platforms are:

| Size of Vehicles (Passengers | Number of Parallel Dynamic Platforms | Vehicle Per Hour | Theoretical Maximum passengers Per Hour | Expected Maximum Passengers Per Hour |
|---|---|---|---|---|
| 4 | 1 | 880 | 3,520 | 2,640 |
| 4 | 2 | 1,760 | 7,040 | 5,280 |
| 4 | 3 | 2,640 | 10,560 | 7,920 |
| 12 | 1 | 495 | 5,940 | 4,950 |
| 12 | 2 | 990 | 11,880 | 9,900 |
| 12 | 3 | 1,485 | 17,820 | 14,850 |

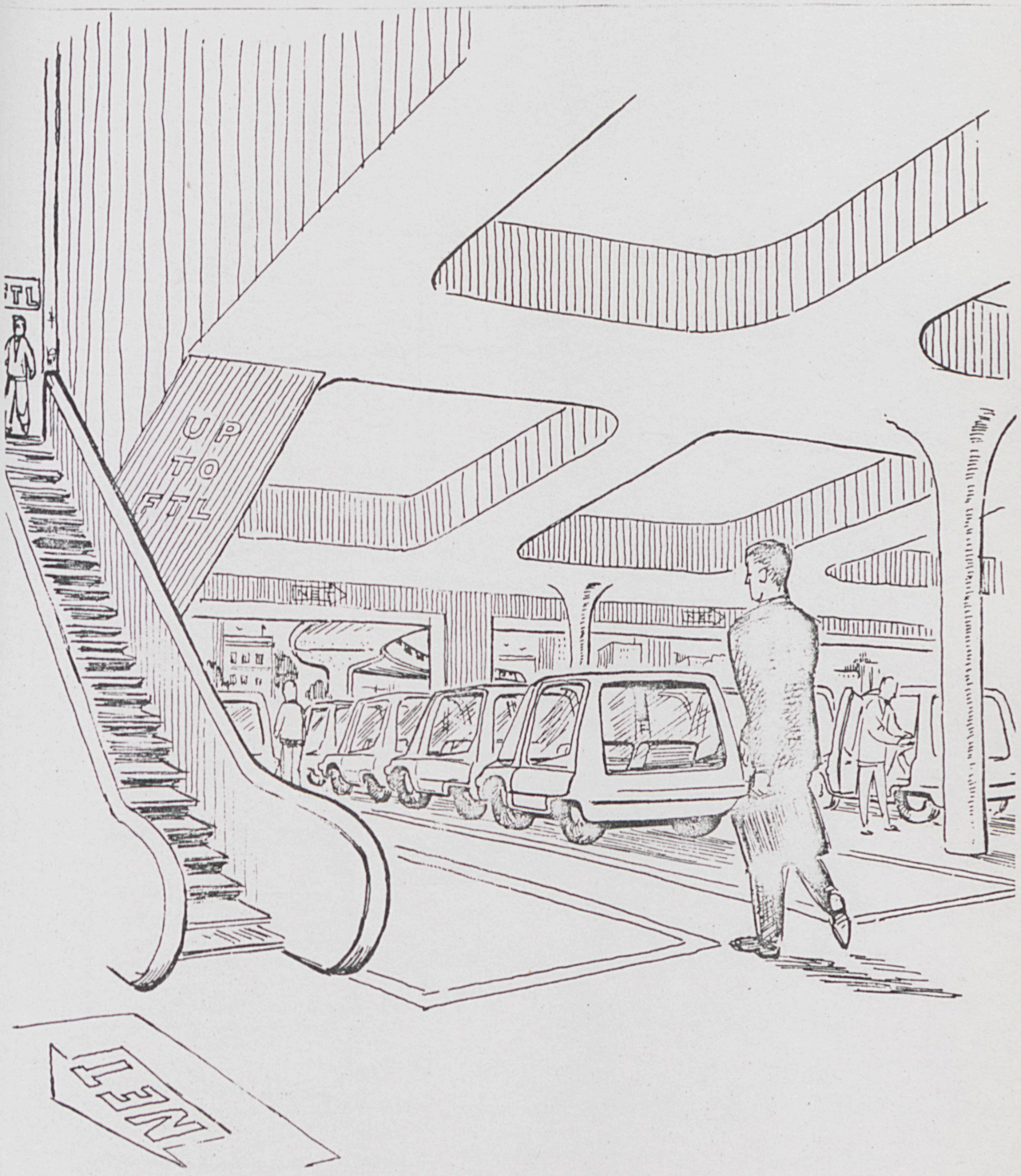
SPECIAL SIDINGS - Cars not suitable for operation (bad-order cars) will be identified at the stations and diverted to special sidingsor spurs for later repair and return to service. If this is not done, a bad-order car could block the stream of traffic and soon cause a general shutdown.

People with certain handicaps cannot use moving sidewalks and will not be able to use dynamic platforms. This problem might be solved either by providing special sidings or by momentarily stopping a platform.

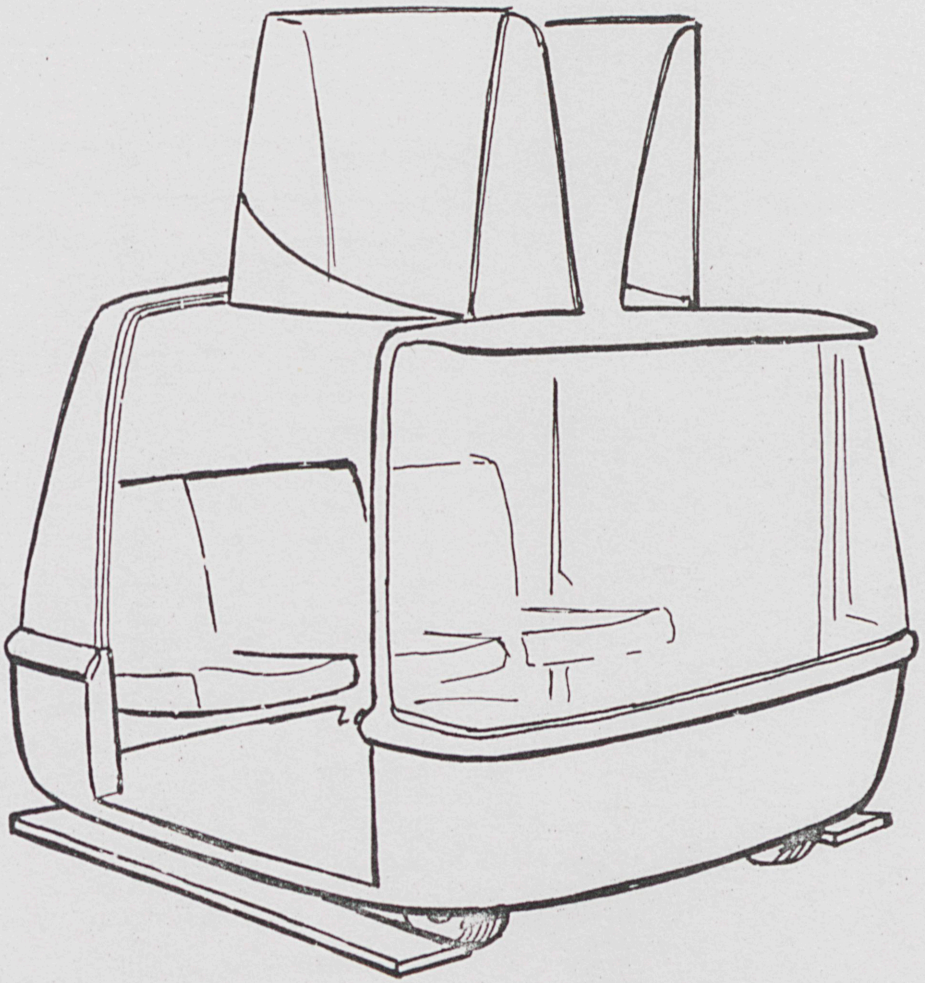
C.T.S. 3 VEHICLE AND TRACK PERSPECTIVE

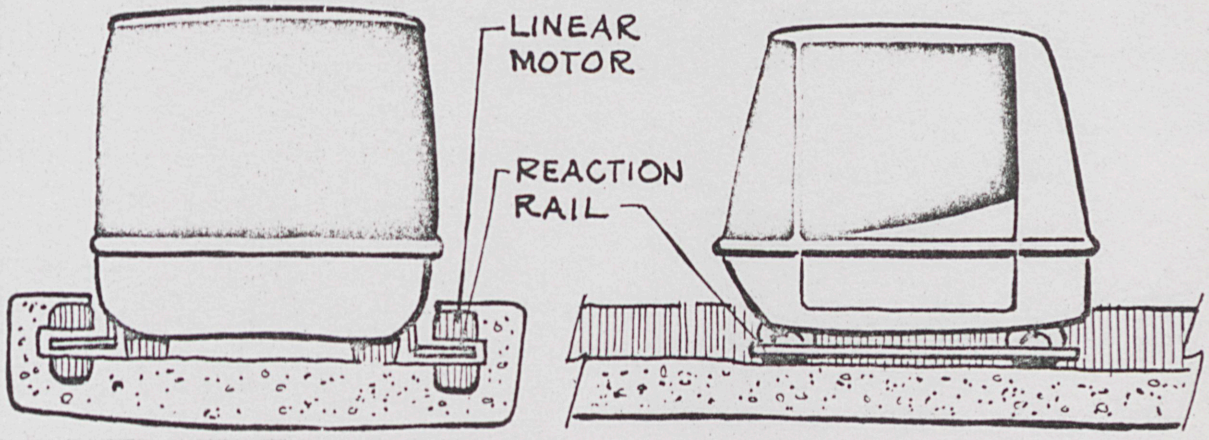


C.T.S. 3 INTERIOR VEIW OF A C.T.S. 3 GARAGE

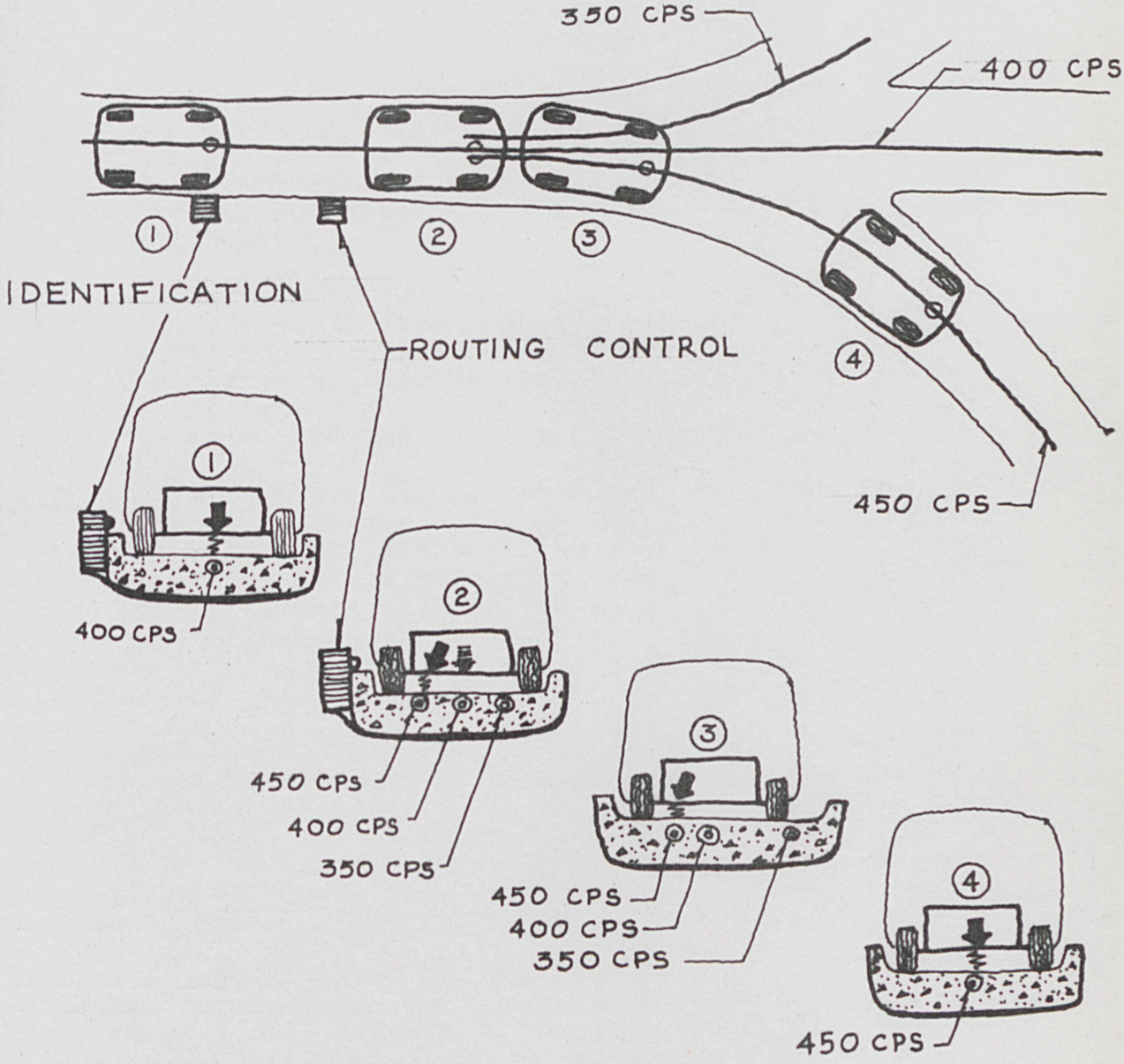


C.T.S. 3 VEHICLE





C.T.S. 3 VEHICLE SWITCHING AND GUIDANCE SYSTEMS



SERVICES

POWER - Along the underground transportation system at required intervals will be placed breeder reactors for the production of electricity and hot water. This hot water will be used to heat our homes and melt the snow off the sidewalks and streets. The electricity will be used to light our cities and supply power to our industries. The electrical power will also be used to power our transportation system.

This reactor is a special application of the fission principle. Fired by uranium and thorium this reactor creates more usable plutonium 239 fuel than it uses, something like 5 parts for every 4 it consumes. This not only feeds the reactor itself, but the excess is 'mined' and used in other fission reactors.

The heat given off by the reactor will be used to heat the facility in the winter and cool the building in the summer. In the summer the hot water will be used to evaporate freon 21 and the resulting drop in temperature used to cool the building. If extra heat is required, electric boosters will be used to meet both the heating and cooling requirements.

WASTE REMOVAL - Every day of our lives we create waste in the form of paper, foodwastes, glass, metal, plastic, and human wastes. In the Peace River region it is estimated that each person generates approximately one ton of solid waste per year. By the year 2001 this will amount to 250,000 tons of waste a year. By a process of destruction distillation we are able to return the organic fractions of garbage back into useable material and use the resulting heat to generate power.

This method is known as pyrolysis, which breaks the refuse down into such materials as char residues, tar and pitch, light oil, ammonium, sulfate, liquor and gas. The one product that stands out is the gas; 11,000 - 17,000 cubic feet of it, which is becoming very short in supply in some areas. The heat generated by this process is in the proportions of one ton of coal for every 1/2 ton of garbage.

Human and animal wastes can also be re-cycled into useful products. Methane gas can be produced when sewage is processed. Also fertilizer can be produced and used instead of manufacturing it from oil which we are in short supply. The remaining bulk left over from re-cycling sewage can be used as soil or where the land has been over farmed.

By developing this type of re-cycling, we speed up the time required for man to re-use a resource more than once in his lifetime.

Table showing products produced by re-cycling of garbage by volume.

| Products | One ton of Garbage | 250,000 Population by 2001 Peace River Production |
|---|---|---|
| Glass | 200 lbs | 50,000,000 lbs |
| Plastics | 100 lbs | 25,000,000 lbs |
| Paper | 400 lbs | 100,000,000 lbs |
| Metals | 200 lbs | 50,000,000 lbs |
| Liquar | 80 to 133 gals | 20,000,000 to 33,250,000 gals |
| Gas | 11,000 to 17,000 cf | 2.75 Billion to 4.25 Billion cf |
| Char | 154 to 230 lb | 50,000,000 lbs |
| Tar & Pitch | 1½ to 5 gal | 1,250,000 gal |
| Light oil | 1½ to 2 gal | 500,000 gal |
| Amm. Sulfate | 18 to 25 lbs. | 6,250,000 lbs. |
| Heat | Equivalent two tons coal. | Equivalent 500,000 tons coal. |

WATER - The existing water supply comes from the Wapiti River which is south of Grande Prairie. The river is a very good source of water and requires very little treatment except when high water levels causes the river to get muddy. The treatment plant is situated by the river and the treated water is piped to two storage tanks north of the city. The tanks are situated at the highest point of the city so that gravity instead of pumping is used to maintain pressure in the system.

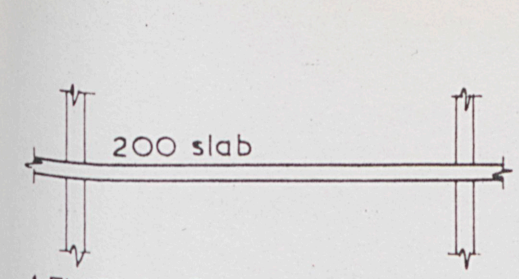
STRUCTURE - The structure of any building besides being strong, stiff and durabel, must also provide for the convenient installation and alteration of mechanical and electrical equipment. It must also allow for changes of use which may be needed from time to time, as well as being an integrol part of architecture. The structure must also satisfy economic conditions, which is most likely achieved by a simple and regular layout with moderate spans and repetitive details.

Since there are many functions in this facility the centre needs to be highly adaptable. Tenants, trading methods, and standards can all change radically. Areas need to be redivided, stairs or lifts have to be installed or removed; heating, ventilation, lighting and plumbing may be drastically altered several imes in the life of any part of the building, storage, access, and security requirements are not permanent. The aim is, therefore to provide a framework of floors, roofs, and columns within which areas can be re-divided, openings can be made or closed and pipes, ducts or wiring can be altered.

MATERIALS TO CONSIDER

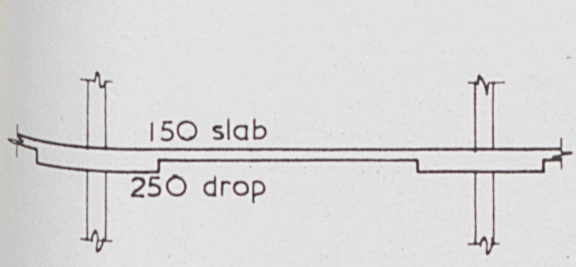
| Materials | Cost | Flexability | | Speed of Erection | Advantages | Disadvantages |
|---|---|---|---|---|---|---|
| | | Planing | Alteration | | | |
| Reinforced Concrete cast in situ | Low | High | Med. to High | Medium | Traditional Material | Difficult to Obtain High Quality Finishes. |
| Pre-cast Concrete System | Med. to High | Low to Med. | Low | High | Good Finish | Jointing Problems; Excellent Site organ. Required |
| Pre-cast Concrete Parts | Low | Med. | Low | High | Good Finish | High Repetition Required Trans of long Units costly |
| Steelwork | High (cased) Low (uncased) | High | Low | High | Traditional Material Light Weight | Poor Fire Resistance |
| Pre-Stressed Concrete cast in situ | High | Med. to High | Very Low | Low | Longer Spans Now Possible | Specialist Work |
| Load - Bearing Brickwork/ Blockwork | Low | Low | Low to Med. | Mec. | Traditional Material | Limited Stability |
| Steel Frame Pre-Cast Concrete Floors | High | High | Low | High | Developed Systems Available | Minimum Scaffolding. |

COST RELATIONSHIP



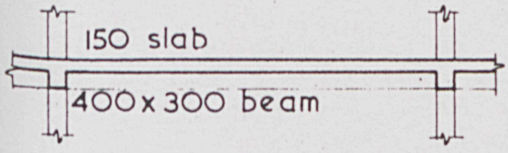

1. FLAT SLAB.

A



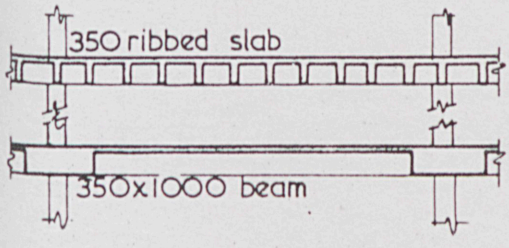

2. FLAT SLAB AND DROP.

A



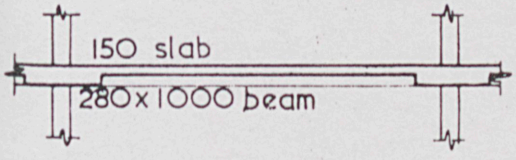

3. BEAM AND SLAB TWO WAY SPAN.

A




4 SHALLOW BEAM AND RIBBED SLAB

A

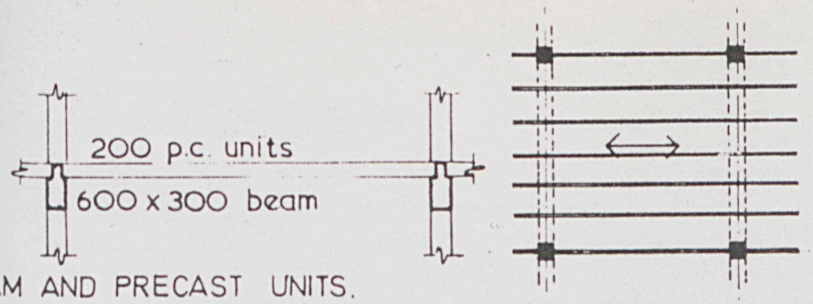



5. SHALLOW BEAM AND SLAB. TWO WAY SPAN.

A

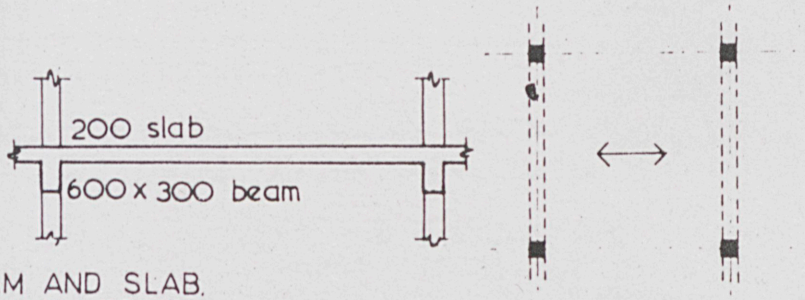
Figure 1. Floor slabs – comparison of structural costs.
Span 5·50 m. Superimposed load 8·50 kN/m².

COST RELATIONSHIP



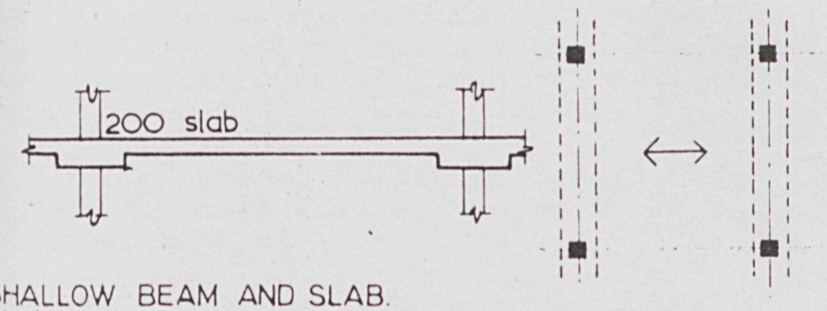

6. BEAM AND PRECAST UNITS.

A



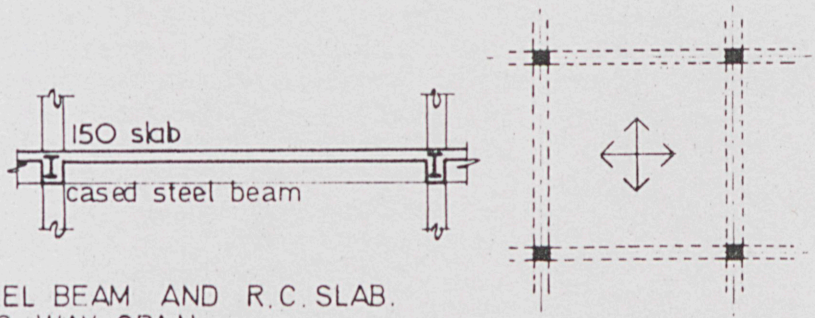

7. BEAM AND SLAB.
ONE WAY SPAN.

A+15%



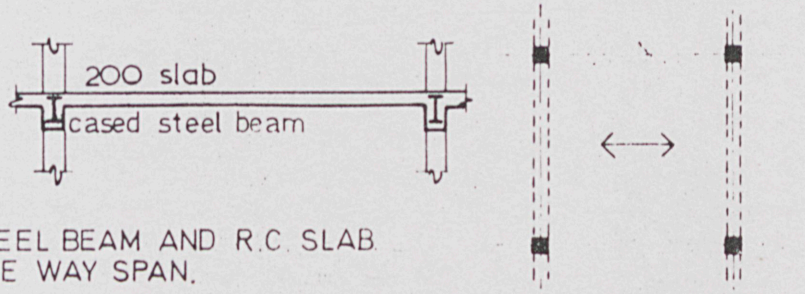

8. SHALLOW BEAM AND SLAB.
ONE WAY SPAN.

A+20%




9. STEEL BEAM AND R.C. SLAB.
TWO WAY SPAN.

A+30%




10. STEEL BEAM AND R.C. SLAB
ONE WAY SPAN.

A+50%

MECHANICAL & ELECTRICAL

MECHANICAL SYSTEMS - The complex will be completely climatized by one basic mechanical system. Using hot water from the breeder reactor for both heating and air-conditioning of the air in each space. Electric boosters will be used to supplement areas that need more heat than other areas. Conditioned air will be used as the medium to carry both heat and air conditioning. By using air one is able to change the arrangement of heating zoness and also the heat source. Flexability is achieved by using conditioned air.

The exhaust and plumbing systems will be designed to conform with all local and national building codes.

ELECTRICAL SYSTEMS - The electrical system for the complex will deal with basic power, lighting, telephone, t.v., computer and microwave systems. Auxiliary systems include music and paging systems, fire alarm, burglar alarm system, lighting and environmental monitoring systems, delivery signal system, closed-circuit television system, and computer terminal system. All systems will be monitored at a central station which is also the security station.

By using an open system of design, the flexiblity of the electrical systems will be achieved and change in location and size will be possible.

SECURITY SYSTEM = The main security office for the facility will be located at one centrally located area. This centre will monitor fire, theft, vandalism, demonstrations, and emergency situations. Throughout the facility will be secondary locations where emergency equipment and staff will be located.

1) Burglar Protection
   a) Motion Detection
   b) Noise Detection
   c) Glass Detection
   d) T. V. Monitoring
   e) Door Detection

II) Hold-Up Alarms

III) Electronic Inventory Control Systems

IV) Lock Control

V) Cash Control

VI) Emergency Communication

FIRE PROTECTION - The facility will use a foam type sprinkler system that is activated only where fire exists. The foam causes little damage and evaporates after the fire is extinguished.

I) Alarm Systems
   a) Smoke Detection
   b) Heat Detection
   c) T.V. Monitoring

MAINTENANCE AND OPERATION

MAINTENANCE - Common area maintenance is the charge that is added to the normal rent and covers the maintence and protection of those areas commonly used by all tenants and in some cases by the buying public.

Cost of maintenance and protection per square foot:

1) Indoor .30¢
2) Outdoor .15¢
3) Protection .20¢

Total cost per square foot = .65¢

DISTRIBUTION OF GOODS:- Conveyors will move all merchandise to the stores or back to the distribution centre. Tow carts will also be used to distribute goods that can not be put on the conveyor. Elevators will be used for larger goods.

Customers goods will also be delivered to parcel pick-up by conveyor. At the parcel pick-up, by demand from the customer, the goods will be loaded in a car and sent to the location of the customer.

MATERIALS FOR CLADDING EXTERIORS OF BUILDINGS - The following table gives details of materials suitable for external use. They are listed under the following headings:

1) STRUCTURAL CATEGORY (1) Suitable for load bearing walls, (2) Suitable for infill panels, (3) Suitable as a facing material. (4) Covers materials like mosaics usable only on continuous supporting elemtns. They can be used also in the first three categories.
2) WEATHING QUALITIES - refers to the degree of surface deterioration, colour-fastness, etc.
3) DESIGN DETAIL QUALITIES - refers, in general, to the flexibility of the material in design and construction terms, whether it requires complicated fixings and junction details and whether it can be easily shaped to corners radii, etc.
4) COLOUR RANGE
5) WEIGHT FACTOR - Is based on a comparative scale based on a norm of 11 in. cavity brickwork.
6) COST FACTOR is based on a norm of the cost per $m^2$ of self supporting 11 in. cavity brickwork wall (ignoring individual detailing problems).

*Materials for external cladding*

| Material | Structural category | Weathering qualities | Design detail qualities | Colour range | Cost factor | Comments |
|---|---|---|---|---|---|---|
| **Brickwork or Blockwork (solid)** | | | | | | Outer facing only described. Cost factor refers to a 35 cm. wall thickness of commons. |
| Clay bricks | 1 | Excellent | Good | Reasonable | 1·2 | Wide range of types of fair-faced brickwork. If surface is chipped, colour variation shows and brick deteriorates. |
| Sand lime bricks | 1 | Good | Good | Reasonable | 1·2 | Except for certain limited new ranges they have poor resistance to impact or abrasion. Same colour throughout. |
| Concrete, masonry | 1 | Good | Good | Good | 2·1 | Colour additives and surface texture moulding possible. |
| Special aggregate | 1 | Good | Good | Good | 2·4 | Colour additives and surface texture moulding possible. |
| **Cavity brick or Blockwork** | | | | | | Outerleaf only described. Cost factor applies to whole cavity wall construction. Inner leaf of concrete blockwork assumed. |
| Clay bricks | 1, 2 | Excellent | Good | Reasonable | 1·0 | Well used traditional material. |
| Sand lime bricks | 1, 2 | Good | Good | Reasonable | 1·0 | Narrower range of brick components than the other three types listed. |
| Concrete masonry | 1, 2 | Good | Good | Good | 1·9 | A new and widening range of materials which require careful choice. |
| Special aggregate | 1, 2 | Good | Good | Good | 2·2 | Vast choice available in size and colour. Large aggregate gives strong and bold effect. |
| **Stone** | | | | | | Most stones are subject to pattern staining and require careful weather detailing. |
| Natural stone | 1, 2, 3, 4 | Variable | Reasonable | Reasonable | 3·6 | Variable weathering qualities require careful consideration. Can enhance appearance. Polished or textured surfaces. Range from soft limestone to granite. |

# MATERIALS FOR EXTERNAL CLADDING

| Material | Structural category | Weathering qualities | Design detail qualities | Colour range | Cost factor | Comments |
|---|---|---|---|---|---|---|
| Marble | 1, 2, 3, 4 | Reasonable | Reasonable | Good | 4·3 | Some marbles are too soft for exterior use. |
| Slate | 1, 2, 3, 4 | Excellent | Poor | Poor | 4·2 | Excellent visual qualities. Basically either grey or green colour range. |
| Terrazzo | 1, 2, 3, 4 | Excellent | Excellent | Good | 1·7 | Can be used as pre-cast slabs. |
| **Plastic** | | | | | | Certain colour ranges are subject to fading. Most can be bonded to internal insulation. |
| Thermo-setting plastics | 2, 3 | Reasonable | Good | Good | 2·3 | Original form of plastic. Somewhat limited in use. |
| Reinforced plastics | 2, 3 | Good except in corrosive conditions | Excellent | Good | 2·4 | Normally used for moulded self-supported panels, as with GRP/fibreglass. |
| Thermo-plastic plastics | 2, 3 | Good except in corrosive conditions | Good | Good | 2·7 | Vast range now available. |
| Resin bonded chipboard, etc. | 2, 3 | Dependent on facing material | Good | Usually requires painting, etc. | 1·4 | Seldom used at present. Surface treatment and maintenance requires special consideration. |
| **Timber** | | | | | | Can raise specific fire proofing problems and higher insurance premiums. |
| Natural timbers | 2 | Usually good | Good | Reasonable | 1·7 | Self-weathering varieties such as Teak and Western Red Cedar are preferable. |
| Plywood | 2 | Good | Good | Reasonable | 1·5 | Self-weathering facing preferable as protective qualities of varnishes are dubious. |
| **Curtain walling** | | | | | | Quality of detailing varies, especially with regard to weather proofing and maintenance. Wholly impervious façades require special guttering, etc, at base and edges. Latest developments include curtain walling entirely supported with unobtrusive plastic strips. |
| Unit assembly | 3 | Good | Good | Anodised metal and infill material | 3·8 | Main design element occurs in choice of spandrel materials, and scale of grid. |
| Part assembly | 3 | Good | Good | Anodised metal and infill material | 4·0 | Main design element occurs in choice of spandrel materials, and scale of grid. |
| **Solid concrete** | | | | | | Solid concrete always presents water-proofing problems which are usually overcome with either vertical d.p.m., or waterproof additives or both. |
| Exposed aggregate | 1 (2, 3) | Excellent | Excellent | Good | 1·7 | Increasingly wide range of colours and textures. Almost vandal-proof. |
| Fair-faced | 1 (2, 3) | Good | Excellent | Poor | 1·5 | Detailing requires care to produce a good appearance. |
| Cast texture or design | 1 (2, 3) | Good | Excellent | Poor | 2·0 | Detailing requires care to produce a good appearance. Commonly used in system building. |
| **Concrete precast panels** | | | | | | |
| Fair faced | 2, 3, 4 | Good | Good | Poor | Variable | Gives opportunity for strongly moulded surface pattern and texture. |

| Material | Structural category | Weathering qualities | Design detail qualities | Colour range | Weight factor | Cost factor | Comments |
|---|---|---|---|---|---|---|---|
| **Glazing, framed, transparent, translucent or opaque, neutral or tinted** | | | | | Variable | Variable | The range and use of tinted glass is rapidly increasing. Apart from visual advantages it has practical benefits in climate control. |
| Single glazing | 2 (3, 4) | Excellent | Reasonable | Reasonable | Variable | Variable | Traditional material. |
| Double or multiple glazing, patent framed, patent sheet, purpose-made frame | 2 (3, 4) | Excellent | Reasonable | Reasonable | Variable | Variable | Double-glazing, either as a single sealed sheet, or as double sheets in a sealed frame, has considerable advantages in sound and heat control. |
| Composite glazing | 2 (3, 4) | Good | Reasonable | Good | Variable | Variable | Commonly of 'sandwich' construction with glass-fibre centre leaf. Patterned design possible. Certain colours subject to fading. Good insulation factor. |
| Wired cast panels | 2, 3, (4) | Good | Reasonable | Reasonable | Variable | Variable | Small range of colours. |
| Glass bricks | 2 (3) | Good | Poor | Reasonable | Variable | Variable | Non-structural material. |
| **Metals** | | | | | | | Most metals deteriorate in abrasive or corrosive conditions. Colour range dependent on anodising quality. |
| Steel | (2), (3), 4 | Poor, except when of special quality or plastic coated | Reasonable | Limited | Variable | Variable | As a cladding material, is usually plastic coated. Corrugated and moulded sheets commonly used as exterior cladding. |
| Stainless steel | (2), (3), 4 | Good | Reasonable | Poor | Variable | Variable | Mainly extruded sections or small-sheet sizes. |
| Aluminium | (2), (3), 4 | Reasonable when anodised | Reasonable | Reasonable | Variable | Variable | Mainly extruded sections or small-sheet sizes. |
| Bronze | (2), (3), 4 | Good | Reasonable | Poor | Variable | Variable | Mainly extruded sections or small-sheet sizes. |
| Others | (2), (3), 4 | Variable | Variable | Variable | Variable | Variable | This category includes sheet materials such as copper, zinc and lead, with widely different properties. Unusual materials for elevations and presenting special detailing problems. Expensive. |
| **Tiling** | | | | | Variable, dependent on supporting structure | Variable | Weathering and appearance depend on good detailing. |
| Ceramic | 4, (2), (3) | Good | Good | Good | Variable, dependent on supporting structure | Variable | Wide selection available. Careful choice of glaze essential. |

# MATERIALS FOR EXTERNAL CLADDING

| Material | Structural category | Weathering qualities | Design detail qualities | Colour range | Weight factor | Cost factor | Comments |
|---|---|---|---|---|---|---|---|
| Faience | 4, (3), 2 | Good | Good | Poor | Variable, dependent on supporting structure | Variable | Wide range available. Good weathering quality |
| Mosaic | 4, (3), (2) | Good | Excellent | Excellent | Variable, dependent on supporting structure | Variable | Very wide range of materials can be incorporated into Mosaics. Secure fixing essential. |
| Slip tiles | 4, (2), (3) | Good | Reasonable | Poor | Variable, dependent on supporting structure | Variable | Can be used to match bricks and other tiles in difficult areas. |
| **Asbestos cement** | 4, (2), (3) | Good | Poor | Reasonable | Variable, dependent on supporting structure | Variable | Commonly painted or enamelled. |
| **Rendering** | 1, 4, (2), (3) | Reasonable | Good | Reasonable | Variable, dependent on supporting structure | Variable | Proper mix essential. Detailed specification necessary. |

ASTHETICS

EXTERIOR AND INTERIOR DESIGN ELEMENTS:- To achieve a unified design one must use one or two major materials thoughtout the complex of buildings. In choosing the exterior material one must consider major factors sudh as waterproofing qualities, the ease of maintenance, the availability of selected material, the speed of assembling and erection and the energy used by both the manufacturing of said material and in its application.

The choice of materials and their proper use plays anuimportant role in the total design concept and in establishing the image of the centre, the main entries to the shopping malls and courts must have an inviting quality and at the same time be imposing enough to draw the shoppers attention, so that he is led in with anticipation.

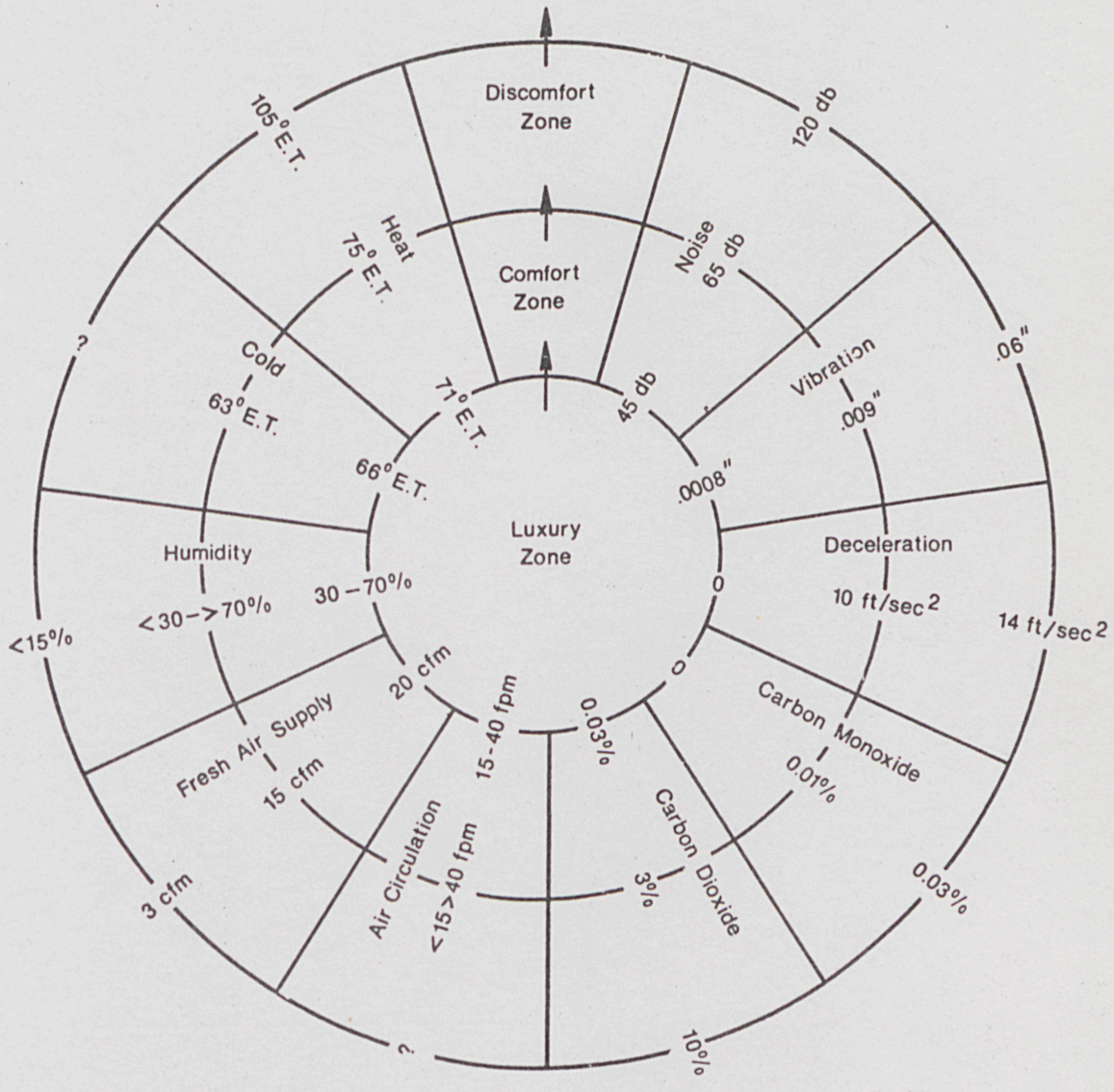
In the daylight hours, this means an exciting architectural concept of three dimensional quality and at night special lighting effects and entrance signs. The signs should be readable both in daylight and at night, and harmonize with the overall graphic lettering program for the entire centre.

Exterior signs for the individual tennant should be under strict control of architect and developer as to size, type and location. The use of directories showing ones location in relationship to the entire complex with store locations shown on it would eliminate some confussion. Close circuit T.V. of individual stores and their locations could tell the customer the loation of said store and if the store is cruded or empty, or even open. It could also act as a visual advertizing board to inform customers of store sales, mall activites and important announcements.

INTERIOR MALLS - Materials for the interior malls and courts should be choosen for permanence and minimum maintenance. Floor surface should be easily maintained and easily repaired. Materials used both on the floor and wall should realte to material used on the exterior of the vuilding. This will add continuity of design and develops a relationship between individual stores.

The illumination level for mall areas should be subdued and yet adequate to stimulate people and to create a restful and inviting atmosphere. Where daylight is added multi-level lighting controls should be provided to save energy costs and reduce maintenance.

HUMAN COMFORT - Physiologically Harmful Zone

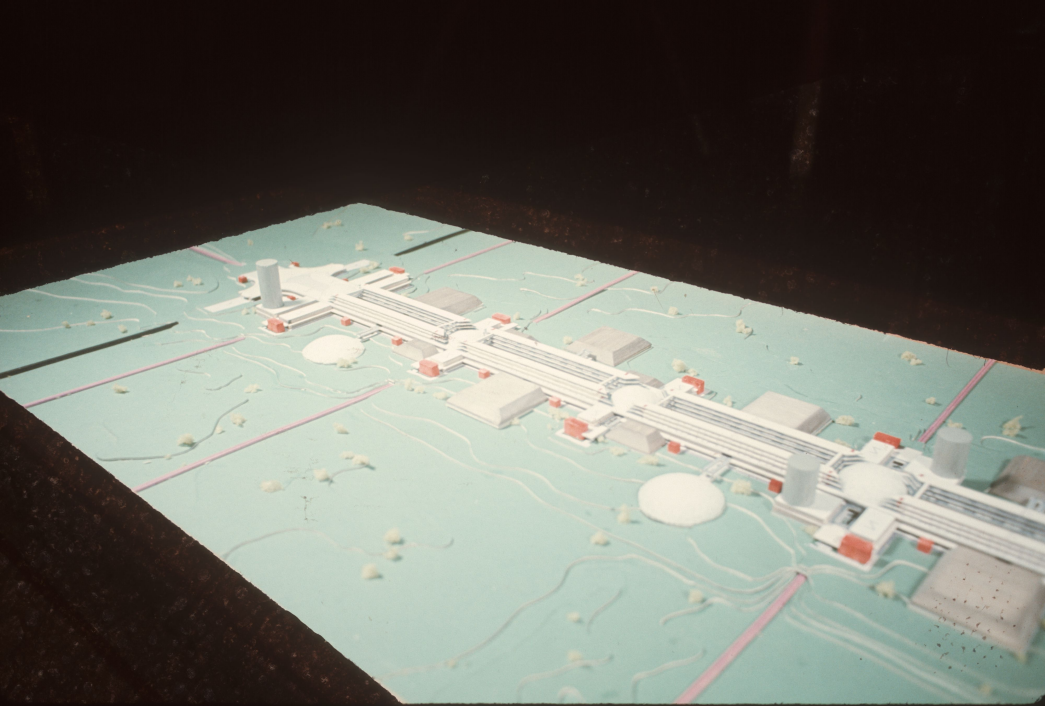


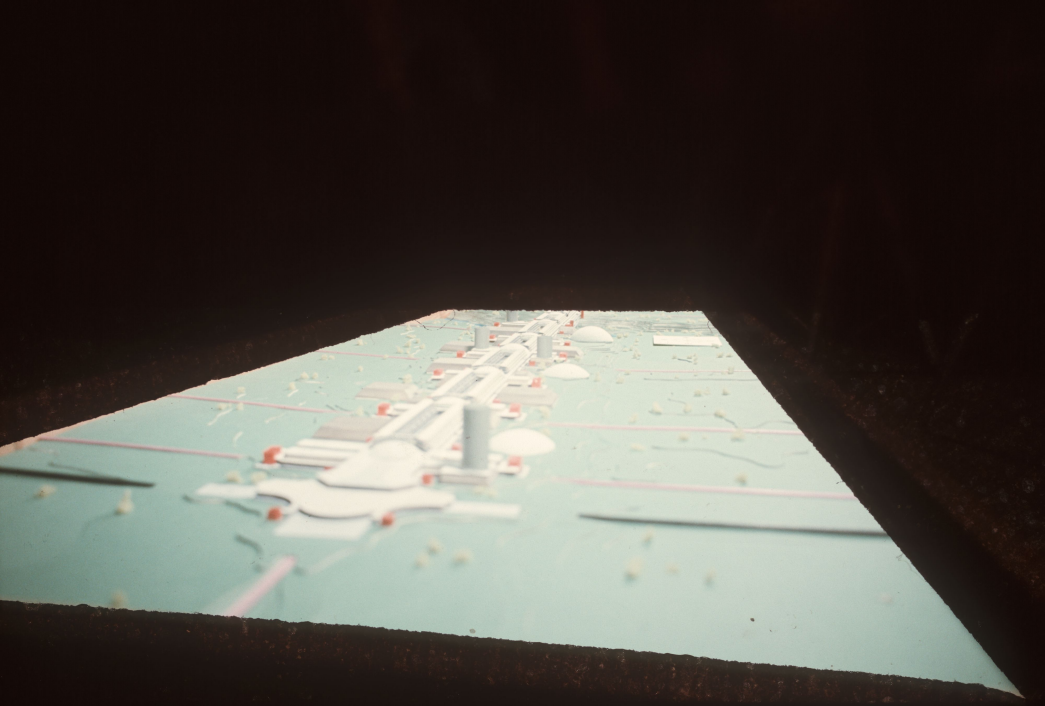
DESIGN SOLUTION: SLIDE FORM

PLANNING STUDY
- A) Country Study
- B) Regional Study
- C) City Study
- D) Site Study
- E) Area Study
- F) Functional Study

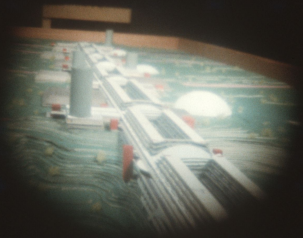
FINAL DESIGN SOLUTION: SLIDE FORM







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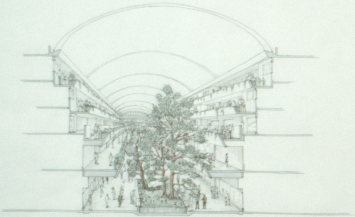




# A CITY CENTRAL CORE FOR 2001

## TERMINAL PROJECT

ROGER FIELD



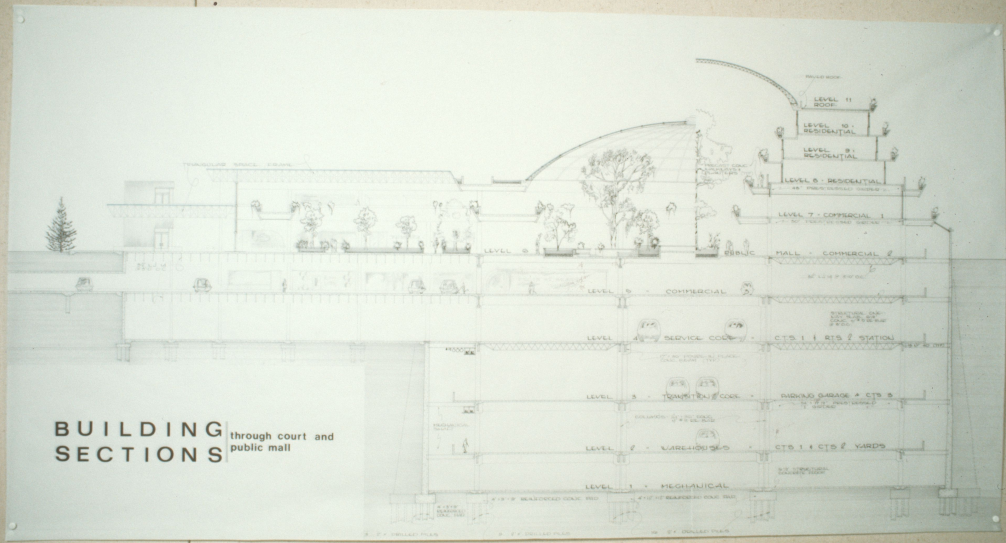
TYPICAL PUBLIC MALL

THESIS STATEMENT: to intergrate structured and non-structured systems in such a way that appropiate flexibility is obtained.

SUBJECT OF THESIS: developing a dead area of a city into a new central core. specifically, renovation of a railway yard to a use which will meet the needs of today and tomorrow.

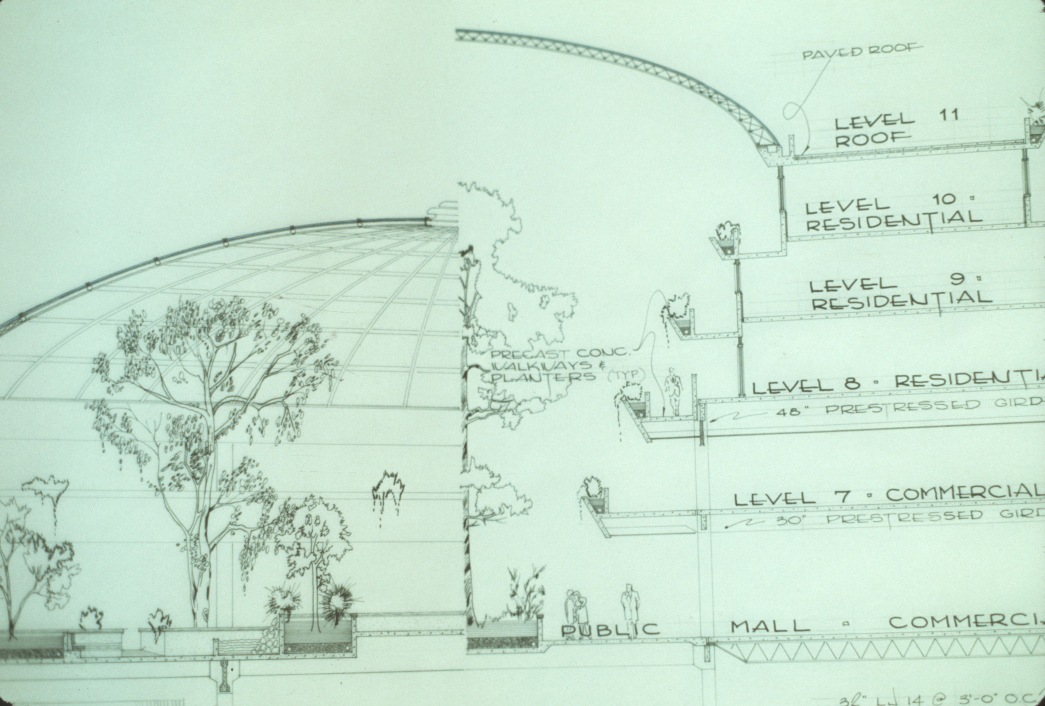


TYPICAL PUBLIC MALL

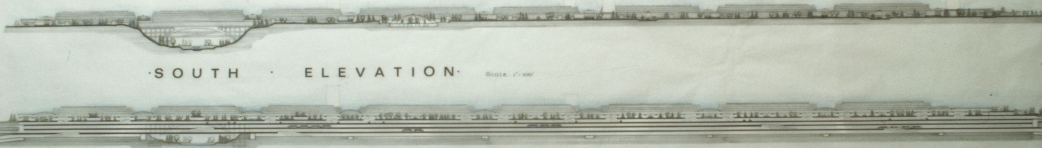



# BUILDING SECTIONS

through court and public mall


PAVED ROOF
LEVEL 11
ROOF
LEVEL 10 ▫
RESIDENTIAL
LEVEL 9 ▫
RESIDENTIAL
PRECAST CONC.
WALKWAYS &
PLANTERS (TYP.)
LEVEL 8 ▫ RESIDENTIA
48" PRESTRESSED GIRD
LEVEL 7 ▫ COMMERCIAL
30" PRESTRESSED GIRD
PUBLIC
MALL ▫ COMMERCI
3½" LW 14 @ 5'-0" OC

PLAN · LEVEL 1 · MECHANICAL Scale: 1"=100'



SOUTH · ELEVATION Scale: 1"=100'



BUILDING · SECTION Scale: 1"=100'

PLAN · LEVEL 11 · ROOF · Scale: 1"=10'

PLAN · LEVEL 11 · ROOF · Scale: 1" = 100'

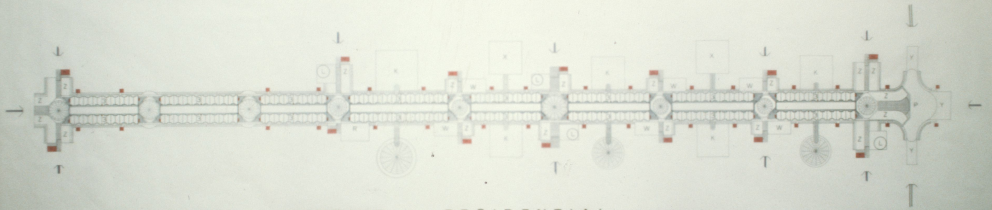
PLAN · LEVEL 10 · RESIDENTIAL · Scale: 1" = 100'

PLAN · LEVEL 10 · RESIDENTIAL · Scale: 1"=100'

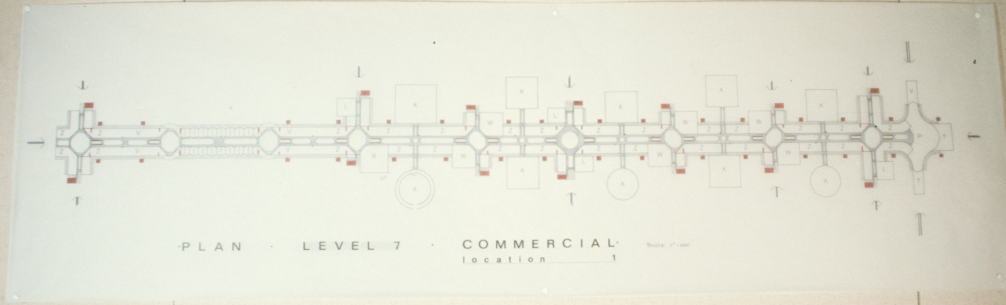


PLAN · LEVEL 9 · RESIDENTIAL · Scale: 1"=100'

PLAN · LEVEL 9 · RESIDENTIAL



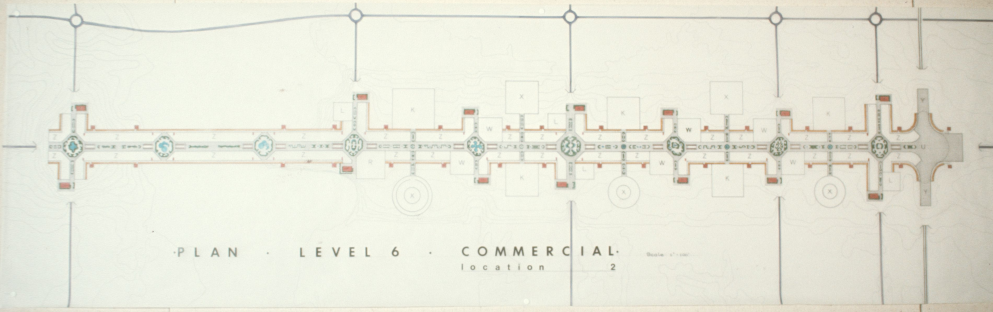
PLAN · LEVEL 8 · RESIDENTIAL



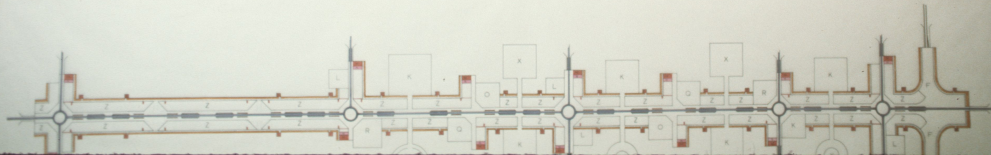
PLAN · LEVEL 7 · COMMERCIAL ·
location 1



PLAN · LEVEL 7 · COMMERCIAL
location 1

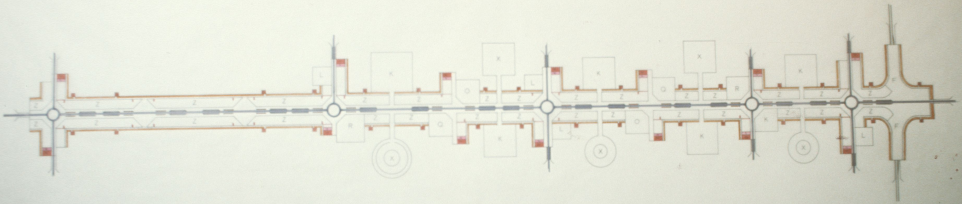


PLAN · LEVEL 6 · COMMERCIAL
location 2

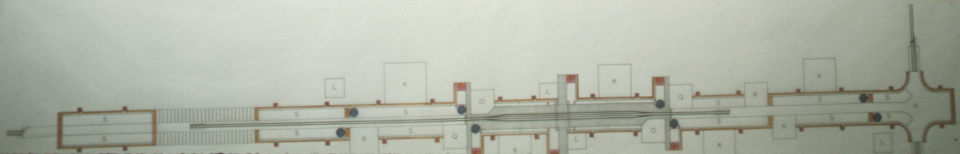


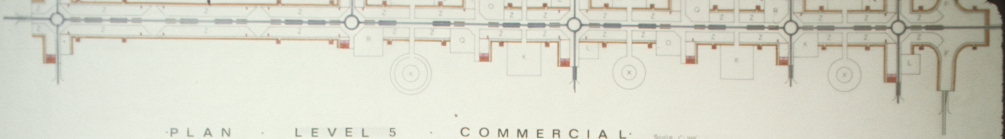


PLAN · LEVEL 6 · COMMERCIAL
location 2

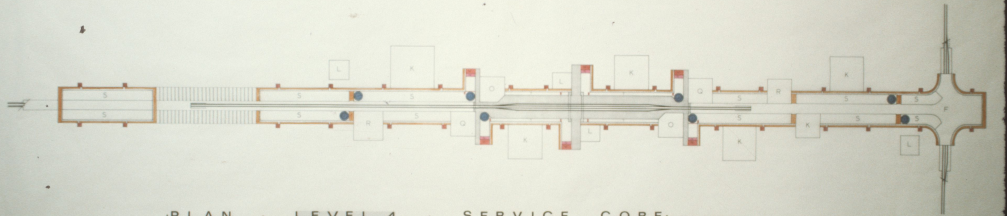


PLAN · LEVEL 5 · COMMERCIAL
location 3
&
C.T.S. 3

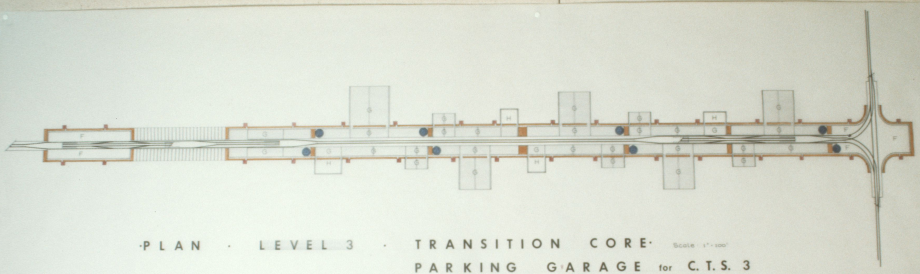




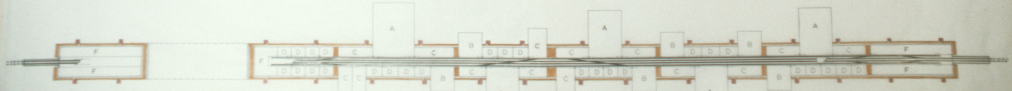
PLAN · LEVEL 5 · COMMERCIAL · Scale 1"=100'
location 3
&
C. T. S. 3



PLAN · LEVEL 4 · SERVICE CORE · Scale 1"=100'
C.T.S. 1 & R.T.S. 2 STATION

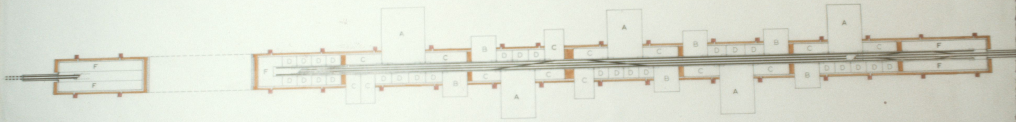


PLAN · LEVEL 3 · TRANSITION CORE · Scale 1"=100'
PARKING GARAGE for C.T.S. 3



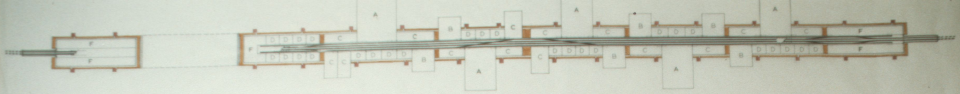


·PLAN · LEVEL 3 · TRANSITION CORE· Scale 1"=100'
PARKING GARAGE for C.T.S. 3

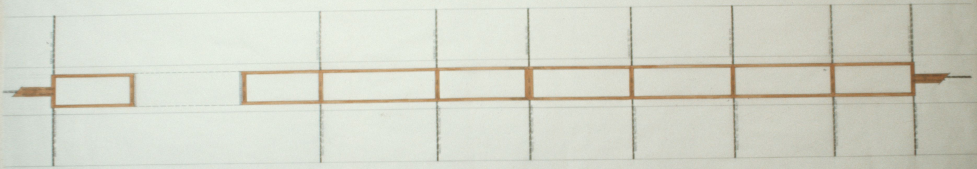


·PLAN · LEVEL 2 · WAREHOUSES· Scale 1"=100'
C.T.S. 1 & C.T.S. 2 YARDS





PLAN · LEVEL 2 · WAREHOUSES · Scale: 1"=100'
C.T.S. 1 & C.T.S. 2 YARDS



PLAN · LEVEL 1 · MECHANICAL · Scale: 1"=100'



SOUTH · ELEVATION · Scale: 1"=100'

# KEY TO BUILDING FUNCTIONS

color code


MECHANICAL SYSTEMS


VERTICAL CIRCULATION


DOUBLE HELIX CAR RAMP


WALKWAYS


SERVICE TO CITY


WASTES - TO RECYCLING PLANT


CITY TRANSPORTATION SYSTEM # 3


CITY TRANS SYS #1 & REGIONAL TRANS. SYS. # 2

A

BUILDING MATERIALS & FREIGHT STORAGE WAREHOUSE
5 UNITS @ 50,000 SQ FT - TOTAL 250,000 SQ FT

B

APPLIANCE WAREHOUSE
6 UNITS @ 20,000 SQ FT - TOTAL 120,000 SQ FT

C

FOOD & RECREATIONAL WAREHOUSE
14 UNITS @ 10,000 SQ FT TOTAL 140,000 SQ FT

D

FOOD, MEDICAL, EQUIPMENT STORAGE & SMALL WAREHOUSES
27 UNITS @ 5,000 SQ FT - TOTAL 135,000 SQ FT

E

STAIR & ELEVATOR SHAFTS
52 UNITS

F

TRANSPORTATION CONTROL, MAINTENANCE, MECHANICAL & STORAGE

G

TRIPLE LEVEL PARKING GARAGE w/ CTS 3
15,000 CARS - TOTAL AREA 1,000,000 SQ FT

H

REPAIR w/ CTS 3 & PARCEL PICK-UP
4 UNITS @ 20,000 SQ FT - TOTAL 80,000 SQ FT

J

DOUBLE HELIX RAMP
8 UNITS @ 3,000 SQ FT - TOTAL 24,000 SQ FT

K

LARGE DEPARTMENT STORES (4 Levels)
5 UNITS @ 200,000 SQ FT. TOTAL - 1,000,000

L

HOTEL COMPLEX
2 UNITS @ 200 ROOMS
2 UNITS @ 300 ROOMS

M

PUBLIC STAIRS + ELEVATORS
14 UNITS @ 1200 SQ FT. - TOTAL 16,800 SQ FT

N

PUBLIC WASHROOMS
20 UNITS @ 500 SQ FT. TOTAL 10,000 SQ FT

O

THEATRE - DOUBLE UNITS
4 UNITS @ 15,000 SQ FT - TOTAL 60,000 SQ FT

P

CHILDREN'S PARK + NURSERY
+ AREA 50,000 SQ FT

Q

RECREATIONAL FACILITIES
2 UNITS @ 30,000 SQ FT. - TOTAL 60,000 SQ FT

R

INDOOR SPORTS ARENAS
2 UNITS @ 30,000 SQ FT - TOTAL 60,000 SQ FT

S

SERVICE CORE for STORES ABOVE
TOTAL AREA 640,000 SQ FT

T

CTS 1 + RTS 2 SERVICE CORE + PLATFORM
* PLATFORM AREA - 100,000 SQ FT SERVICE AREA - 80,000 SQ FT.

U

FLEA + FARMER'S MARKET - INDOOR
AREA - 50,000 SQ. FT.

W

JUNIOR DEPARTMENT STORE (2 levels)
@ UNITS @ 80,000 SQ FT. TOTAL - 560,000 SQ FT.

X

CULTURAL + EDUCATIONAL FACILITIES
ZOO + AQUARIUM AREA 100,000 SQ FT. THEATRE + STUDIOS 200,000 SQ FT.
CONSERVATORY + ART GALLERY - 150,000 SQ FT.
AVIARY + CONSERVATORY - 50,000 SQ FT.
LIBRARY, PLANETARIUM + ARCHIVES - 200,000 SQ FT.

Y

FLEA + FARMER'S MARKET - OUTDOOR
AREA - 40,000 SQ FT.

Z

COMMERCIAL FACILITIES
LOCATION 1 - CRAFT + SEMI PROFESSIONAL SERVICES 750,000 SQ FT.
LOCATION 2 - CONVENTION GOODS, FASHIONS, SPECIALTIES 500,000 SQ FT.
LOCATION 3 - PROFESSIONAL SUITES - 750,000 SQ. FT.

RES

RESIDENTIAL AREA
1. 400 LIVING SPACES @ 1200 SQ FT. - TOTAL 480,000 SQ FT.
2. 400 LIVING SPACES @ 1500 SQ FT. - TOTAL 600,000 SQ FT.
3. 440 LIVING SPACES @ 1800 SQ. FT. - TOTAL 800,000 SQ FT.

ROOF

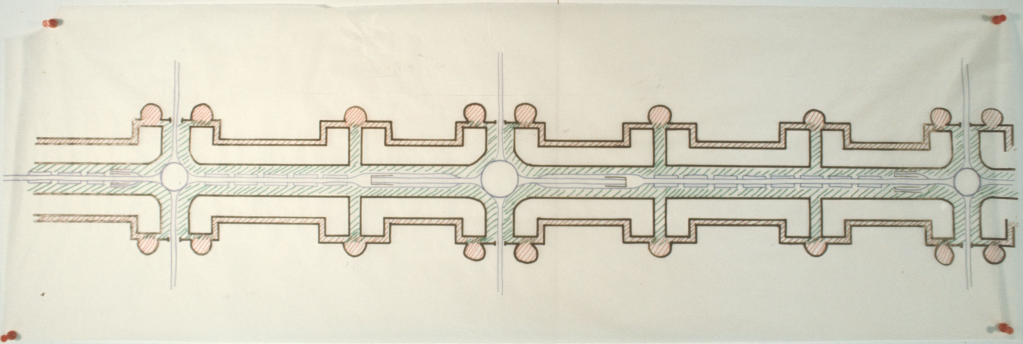
PLAYGROUNDS + GREENHOUSES

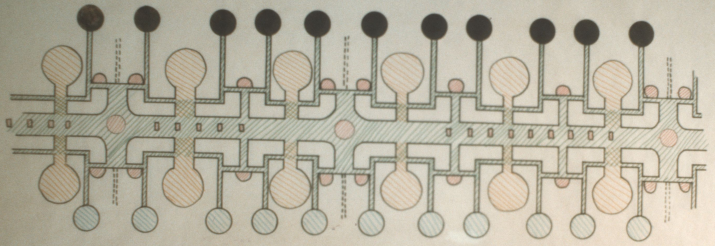

NATIONAL





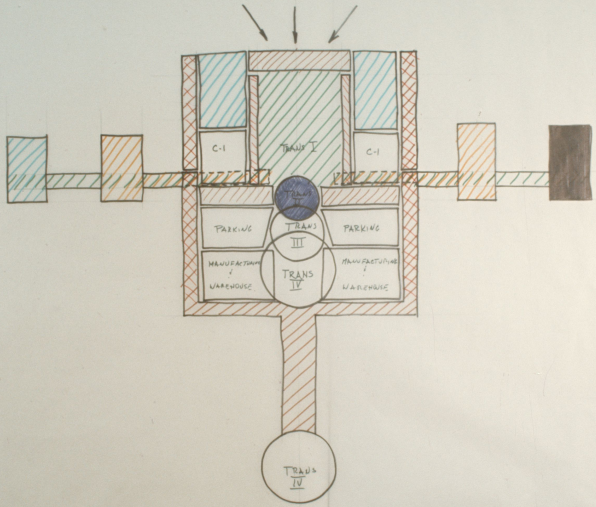

NATIONAL

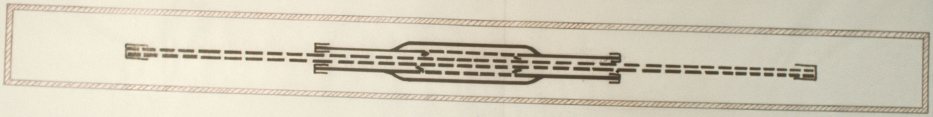


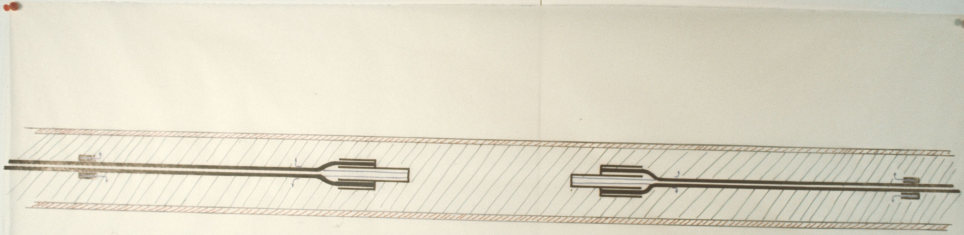


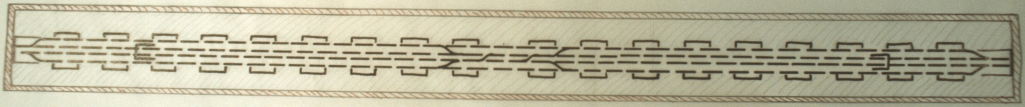
FUNCTION & TRANSPORTATION RELATIONSHIP

TRANS. I. PEDESTRIAN PUBLIC MALL
VERTICAL TRANSPORTATION CORES.
RECREATIONAL ARTS & CRAFTS SCIENTIFIC ANIMAL & MINERAL LIFE
COMMERCIAL AREAS.
OFFICES.
RESIDENTIAL HIGH DENSITY
PARKING
WAREHOUSE, MANUFACTURING
TRANS. II CITY TRANSPORTATION 55 kms.
TRANS. III REGIONAL TRANSPORTATION 175 kms. 350 kms.
TRANS. IV CONTINENTAL TRANSPORTATION 700 kms. 1400 kms.


C-1
TRANS I
C-1
PARKING
TRANS III
PARKING
MANUFACTURING
WAREHOUSE
TRANS IV
MANUFACTURING
WAREHOUSE
TRANS IV







AREA REQUIREMENTS (100 A 'HOT SPOTS') NO.(1)

| NO. | NAME | NO. OF AREAS NOW | ZONE | AREA/UNIT | TOTAL AREA |
|---|---|---|---|---|---|
| 1 | BAKERY | 2 | B | 3,000 NET | 6,000 |
| 2 | BOY'S CLOTHING | 6 | 12 | 1,200 | 7,200 |
| 3 | CANDY STORE | 9 | B | 200 | 1,800 |
| 4 | CHILDREN'S WEAR | 6 | 12 | 1,200 | 7,200 |
| 5 | COSMETICS/PERFUME | 9 | B | 900 | 8,100 |
| 6 | FURNITURE, JEWELRY | 6 | 12 | 600 | 3,600 |
| 7 | DEPARTMENT STORE | 1 | 10 | 10,000 | 10,000 |
| 8 | DRESSMAKER | 5 | 15 | 2,000 | 10,000 |
| 9 | FURS / FURS | 2 | 6 | 3,000 | 6,000 |
| 10 | FLORIST | 3 | 6 | 800 | 2,400 |
| 11 | GIFT SHOP | 5 | 10 | 1,000 | 5,000 |
| 12 | HOBBY SHOPS | 9 | 14 | 1,000 | 9,000 |
| 13 | LINGERIE | 20 | 40 | 3,000 | 12,000 |
| 14 | MILLINERY/HATS | 5 | 10 | 600 | 3,000 |
| 15 | MEN'S FURNISHINGS | 6 | 12 | 800 | 4,800 |
| 16 | MEN'S WEAR | 6 | 12 | 1,200 | 7,200 |
| 17 | JEWELRY | 5 | 10 | 600 | 3,000 |
| 18 | LADIES CLOTHING | 5 | 10 | 900 | 4,500 |
| 19 | SHOE'S | 10 | 20 | 700 | 7,000 |
| 20 | MEN'S CLOTHING | 6 | 12 | 1,200 | 7,200 |
| 21 | MILLINERY | 3 | 6 | 600 | 1,800 |
| 22 | NOVELTIES | 9 | B | 600 | 5400 |
| 23 | OPTICAL SHOP | 3 | 12 | 1,600 | 4,800 |
| 24 | PERFUMES SHOP | 5 | 10 | 600 | 3,000 |
| 25 | MEN'S FURNISHINGS | 5 | 10 | 1,200 | 6,000 |
| 26 | SHOE'S MEN'S | 10 | 20 | 700 | 7,000 |
| 27 | PHOTOGRAPHIC | 2 | 10 | 1,500 | 3,000 |
| 28 | PRESSED FLOWERS | 5 | 10 | 800 | 4,000 |
| 29 | RESTAURANT | 18 | 30 | 200 | 3,600 |
| 30 | SHOE'S - CHILDREN | 12 | 20 | 600 | 7,200 |
| 31 | SHOE'S - MEN'S | 12 | 20 | 700 | 8,400 |
| 32 | SHOE'S - WOMEN | 20 | 40 | 700 | 14,000 |
| 33 | SPORTSWEAR | 9 | B | 600 | 5400 |
| 34 | STATIONERY | 10 | 20 | 700 | 7,000 |
| 35 | TOILET GOODS | 24 | 40 | 600 | 7,200 |
| 36 | VARIETY STORE | 10 | 20 | 1800 | 18,000 |
| 37 | WOMEN'S WEAR | 10 | 20 | 1800 | 18,000 |
| 38 | | | | | |
| 39 | | | | | |
| 40 | | | | | |
| | | | | TOTAL: | 320,500 SQ.FT. |

AREA OF SHOPS FOR NO.(1) OR NO.(2)

| NO. | NAME | NO. OF AREAS NOW | ZONE | AREA/UNIT | TOTAL AREA |
|---|---|---|---|---|---|
| 1 | CAFETERIA | 1 | 6 | 6,000 | 36,000 |
| 2 | DRY GOODS | 14 | 30 | 1,000 | 28,000 |
| 3 | JEWELRY | 14 | 20 | 2000 | 7,000 |
| 4 | SERVICE SHOPS | 20 | 40 | 2,000 | 80,000 |
| 5 | | | | | |
| 6 | | | | | |
| 7 | | | | | |
| 8 | | | | | |
| 9 | | | | | |
| 10 | | | | | |
| | | | | TOTAL: | 150,000 SQ.FT. |

AREA OF SHOPS (MEAN 100 % 'HOT SPOTS') NO.(2)

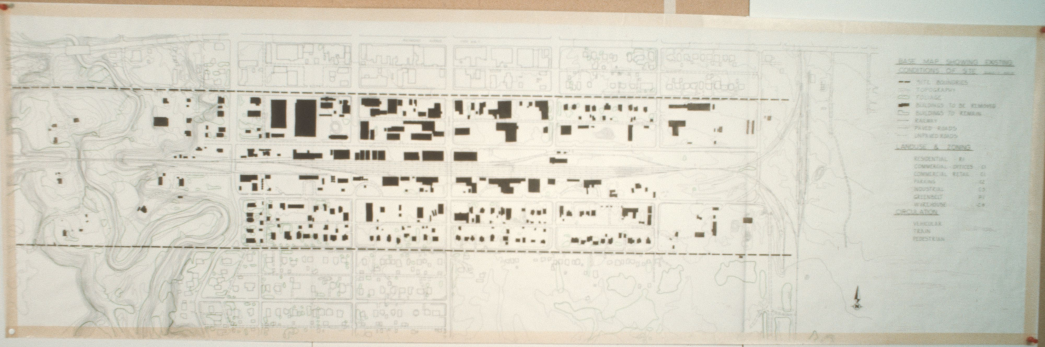
| NO. | NAME | NO. OF AREAS NOW | ZONE | AREA/UNIT | TOTAL AREA |
|---|---|---|---|---|---|
| 1 | ART SHOP | 1 | B | 600 | 9,800 |
| 2 | BOOKSELLER | 5 | 14 | 1,200 | 11,200 |
| 3 | BANKS | 6 | 18 | 9,000 | 97,000 |
| 4 | BAR (LIQUOR) | 12 | 24 | 1,200 | 13,800 |
| 5 | BARBER SHOP | 12 | 18 | 600 | 10,800 |
| 6 | BEAUTY SHOP | 10 | 20 | 600 | 11,000 |
| 7 | BICYCLE | 4 | 12 | 600 | 5,000 |
| 8 | BOOK AND MUSIC | 3 | 6 | 600 | 5,000 |
| 9 | CLEANING AND DYE | 4 | B | 2,000 | 24,000 |
| 10 | COCKTAIL LOUNGE | 6 | 18 | 1,200 | 21,600 |
| 11 | CORSET SHOP | 3 | 6 | 800 | 4,800 |
| 12 | DRUGGISTS/SODA | 2 | 10 | 1,600 | 17,000 |
| 13 | ELECTRICAL APPL. | 6 | 12 | 2,000 | 24,000 |
| 14 | FANCY GOODS | 1 | 3 | 2,000 | 6,000 |
| 15 | FANCY GOODS | 3 | 9 | 600 | 5,400 |
| 16 | FANCY GOODS | 4 | 8 | 1,000 | 8,000 |
| 17 | FANCY GOODS | 3 | 9 | 800 | 7,200 |
| 18 | FANCY GOODS | 2 | 6 | 1,200 | 7,200 |
| 19 | FOOTWEAR (MARKET) | 1 | 3 | 2,000 | 6,000 |
| 20 | GIFT SHOP | 3 | 6 | 600 | 3,600 |
| 21 | GROCERY | 3 | 9 | 2,000 | 18,000 |
| 22 | HABERDASHERY | 4 | 8 | 1,000 | 8,000 |
| 23 | HARDWARE | 2 | 6 | 1,200 | 7,200 |
| 24 | HOBBY SHOP | 2 | 6 | 600 | 3,600 |
| 25 | HOSIERY | 2 | 6 | 600 | 3,600 |
| 26 | JEWELRY | 3 | 9 | 1,000 | 9,000 |
| 27 | LEATHER GOODS | 2 | 6 | 600 | 3,600 |
| 28 | LIBRARY | 1 | 3 | 2,000 | 6,000 |
| 29 | LUGGAGE | 2 | 6 | 600 | 3,600 |
| 30 | MEN'S FURNISHINGS | 2 | 6 | 600 | 3,600 |
| 31 | MILLINERY | 2 | 6 | 600 | 3,600 |
| 32 | MUSIC | 1 | 3 | 2,000 | 6,000 |
| 33 | NOVELTIES | 2 | 6 | 600 | 3,600 |
| 34 | OPTICIAN | 2 | 6 | 600 | 3,600 |
| 35 | PHOTOGRAPHIC | 1 | 3 | 2,000 | 6,000 |
| | | | | TOTAL: | 422,600 SQ.FT. |

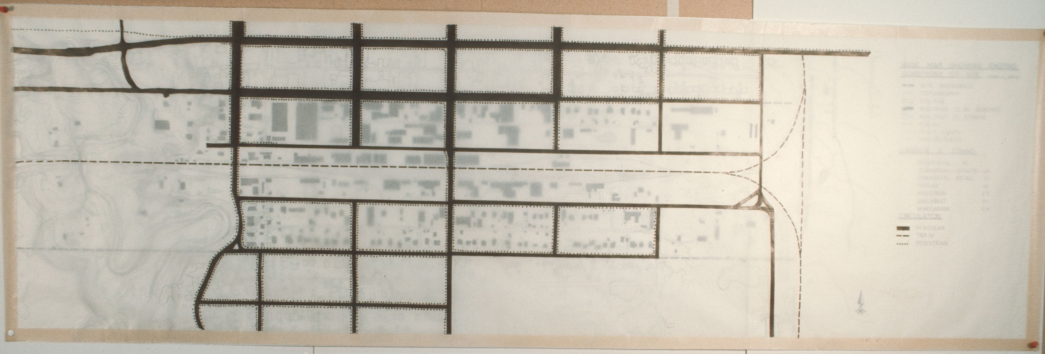
AREA OF SHOPS FOR NO. 3 LOCATIONS.

| NO. | NAME | NO. OF AREAS NOW | ZONE | AREA/UNIT | TOTAL AREA |
|---|---|---|---|---|---|
| 1 | ARMY SURPLUS STORE | 1 | 4 | 2,000 | 12,000 |
| 2 | ART REPRODUCTIONS | 3 | 6 | 600 | 3,600 |
| 3 | BABY FURNITURE SHOP | 3 | 6 | 600 | 3,600 |
| 4 | BATHROOM AND LAUNDRY | 1 | 4 | 1,200 | 5,000 |
| 5 | BOOKS STORE | 1 | 5 | 1,000 | 5,000 |
| 6 | BOWLING AND DANCE CLUB | 3 | 175 | 500 | 87,500 |
| 7 | CARPETS/FLOOR TILE | 3 | 6 | 600 | 3,600 |
| 8 | CHILDREN'S WEAR | 3 | 12 | 600 | 7,200 |
| 9 | CLOTHES STORE | 2 | 6 | 600 | 3,600 |
| 10 | CURIOSITIES | 6 | 15 | 2,000 | 30,000 |
| 11 | HARDWARE | 4 | 8 | 2,000 | 16,000 |
| 12 | HEALTH FOOD STORE | 1 | 5 | 600 | 3000 |
| 13 | HOBBY SHOP | 3 | 12 | 600 | 7200 |
| 14 | INTERIOR DECORATOR | 2 | 6 | 600 | 3600 |
| 15 | LADIES AND MEN'S WEAR | 4 | 12 | 600 | 7200 |
| 16 | MOTORCAR ACCESSORIES | 10 | 20 | 1,000 | 20000 |
| 17 | MUSIC SHOP/RECORDS | 2 | 4 | 1,000 | 8000 2,000 |
| 18 | OPTOMETRY/OPTICIAN | 4 | 12 | 1,000 | 12,000 |
| 19 | PAINT STORE | 4 | 8 | 1,000 | 8,000 |
| 20 | PHOTOGRAPHIC | 4 | 8 | 1,000 | 8,000 |
| 21 | PIZZA PLACE | 2 | 6 | 1,000 | 6,000 |
| 22 | POTTERY / CERAMICS | 4 | 8 | 600 | 4,800 |
| 23 | PRINT SHOPPING | 4 | 8 | 1,000 | 8,000 |
| 24 | POWER/LIGHT STORE | 1 | 4 | 6,000 | 24,000 |
| 25 | REAL ESTATE AGENCY | 14 | 24 | 1,000 | 14,000 |
| 26 | TOILET GOODS | 3 | 9 | 800 | 7,200 |
| 27 | TOURIST | 10 | 30 | 1,000 | 30,000 |
| 28 | TOILET GOODS | 1 | 4 | 800 | 3200 |
| 29 | TRAVEL BUREAU | 3 | 18 | 800 | 14,400 |
| 30 | | | | | |
| 31 | | | | | |
| 32 | | | | | |
| 33 | | | | | |
| | | | | TOTAL: | 480,300 |

| NO. | NAME | NO. OF AREAS NOW | ZONE | AREA/UNIT | TOTAL AREA |
|---|---|---|---|---|---|
| 1 | AUTOMOBILE SHOWROOM | 1 | 4 | 4,000 | 16,000 |
| 2 | BOWLING ALLEY | 1 | 4 | 7,000 | 28,000 |
| 3 | POOL HALL | 1 | 4 | 3,000 | 12,000 |
| 4 | CHILDREN'S PLAY GROUND | 2 | 6 | 2,000 | 12,000 |
| 5 | DANCE LOUNGE | 2 | 12 | 600 | 7,200 |
| 6 | QUALITY RESTAURANT | 2 | 8 | 1,200 | 9,600 |
| 7 | RADIO/TV STATIONS | 3 | 12 | 3,000 | 36,000 |
| 8 | NEWS THEATRE | 1 | 4 | 3,000 | 12,000 |
| 9 | | | | | |
| 10 | | | | | |
| 11 | | | | TOTAL: | 133,200 |
| 12 | | | | | |

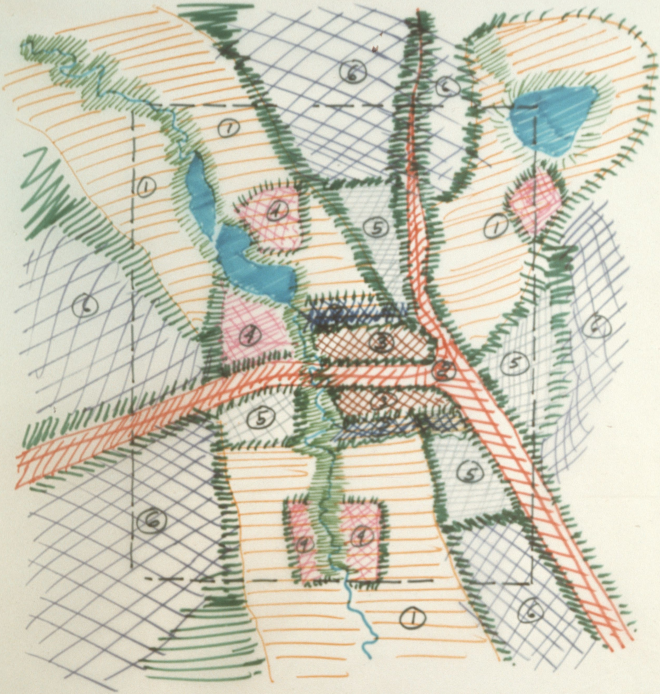



BASE MAP SHOWING EXISTING CONDITIONS OF SITE
SITE BOUNDARIES
TOPOGRAPHY
FOLIAGE
BUILDINGS TO BE REMOVED
RAILWAY
PAVED ROADS
UNPAVED ROADS
LAND USE & ZONING
RESIDENTIAL R1
COMMERCIAL - OFFICES C1
COMMERCIAL RETAIL C2
PARKING P2
INDUSTRIAL I3
GREENBELT P1
W'HOUSING C4
CIRCULATION
VEHICULAR
TRAIN
PEDESTRIAN



C1
R1


PEACE RIVER DISTRICT
BOZEMAN



AREA

(1) RESIDENTIAL AREA. - SINGLE - UNITS
MULTI - UNITS

(2) CENTRAL CORE

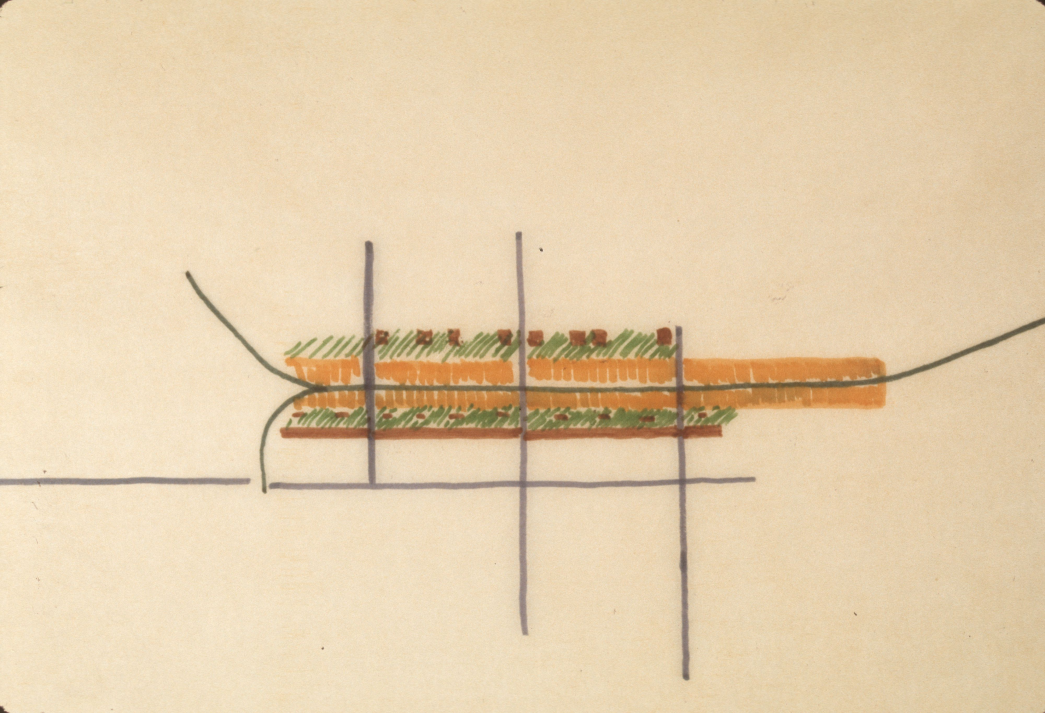
(3) SERVICE AREA

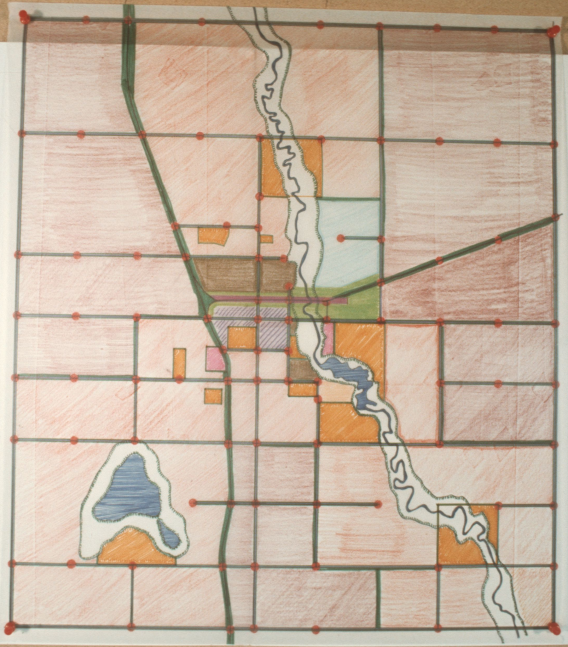
(4) EDUCATIONAL AREAS

(5) LIGHT INDUSTRY

(6) MEDIUM TO HEAVY INDUSTRY

(7) HIGH DENSITY AREAS.





MONTANA STATE UNIVERSITY LIBRARIES
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A city central core for 2001 /
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NA 2540
720.6
M76
LIB. USE ONLY