3.4 Staging of Impremementation

It is one of major concernment of the Master Plan, to assess the local conditions in terms of drainage requirements and urgencies and drow up programme of priority areas to be provided with drainage system. Emphasis should be put on identifining areas to be furnished with a drainage system during early stage, say the first ten years or so, of the Master Plan period.

Accounting the conditions and requirements of the Project Area, following factors are considered the principles for drowing an order of priority. First, even the scale is in the degree of minor "nuisance" flooding, the damages due to repetitious pontages to public health can not be ignored, so flood-prone areas have the higher priority.

Second, the priority is high in the areas within which rapid urbanization is proceeding, consequently stormwater runoff quantities will increase and cause deteriorate situations in terms of drainage conditions in the near future.

It was also considered that in case of the furnishment of network of smaller drains, ~~simaltanious~~ simultaneous construction with the sanitary sewer would be preferable.

Therefore, the staging scheme of sewerage systems is counted as another important factor for establishing construction staying of the drainage system.

Following staging scheme is proposed for this Project and shown in Figure IV-15. Table IV-5 gives construction costs of individual stage.

3.4.1 First Stage Programme

The first stage programme includs the construction of main drains in Butterworth area (B-IV) for the purpose of alleviation of local flooding occurred at present and of coping with the expected increase in stormwater

runoff quantities resulted from rapid urbanization which is proceeded now. The provided main drains would function as the back bones of the drainage system in the area. As a result many ponding areas would be dried up and it would contribute to the controling of mosquito breeding. Development in the area would be accelerated because of land conditions of free from flooding problem. The furnishment of network of smaller drains would be carried out at the same time with the provision of sanitary sewers in the area.

Another area included in the first stage programme is the portion covered by sub-basin S2-2, S2-4 and S2-7. (See Figure IV-15). Although the drainage problem in the area is not critical now, along with the development expected in the near future the improvement of drainage system has to be considered. In accordance with the construction of sanitary sewer systems, the area will be provided with elaborate drainage systems.

3.4.2 The Second Stage Programme

The improvement of two main drains flowing along the boundary of the Air Force Base, Bengali and Bagan Tambang drains, are to be included in the second stage programme.

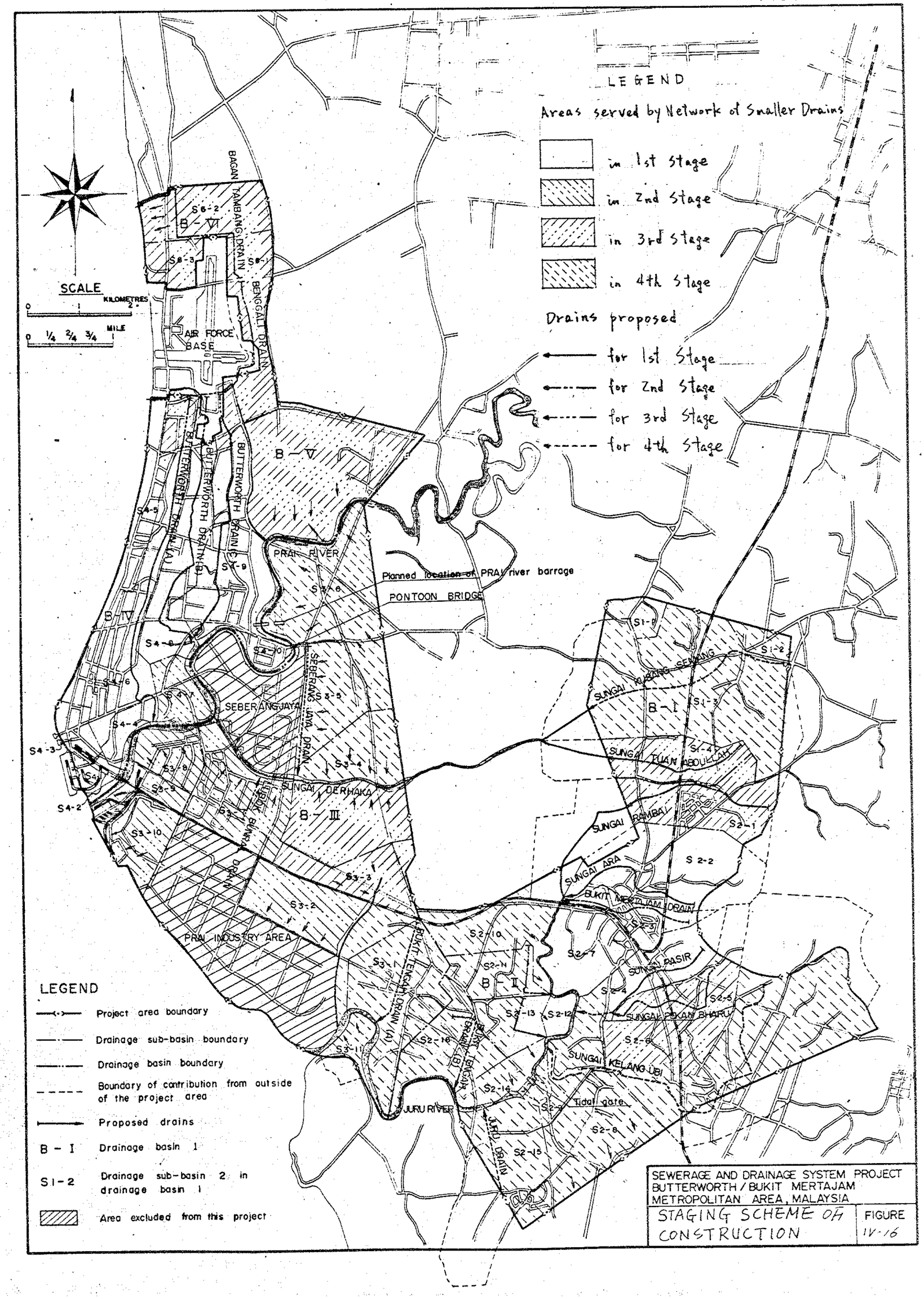
By these reinforced drains, the safty of the air field, in terms of flooding due to stormwater runoff from outside of the area, will be guaranteed.

The improvement of network of smaller drains in existing built-up areas including S2-9 and S3-10 will be conducted in this stage.

By the end of the second stage programme, the majority of existing built-up areas would be served by elaborate drainage systems.

3.4.3 The Third and Fourth Stage Programme

The provision of new drainage systems in the area covered by agricultural land use or forest predominantly at present but in the future development is expected, will be intended as shown in Figure . The simultaneous construction with the sanitary sewers is the major factor to be considered for the purpose of a selection of an individual stage.



SEWERAGE AND DRAINAGE SYSTEM PROJECT
BUTTERWORTH / BUKIT MERTAJAM
METROPOLITAN AREA, MALAYSIA

STAGING SCHEME OF CONSTRUCTION | FIGURE IV-16

TABLE 4-5 Drainage Construction Cost by Stage

(1000 M$)

Description	1st Stage (1981-1985)	2nd Stage (1986-1990)	3rd Stage (1991-1995)	4th Stage (1996-2000)	Total	Remaks
a. Main Drains	63,102	15,538	26,574	46,100	151,314	
b. Network of Smaller Drains	58,089	31,653	78,590	183,353	351,685	
c. Reservoir	654	-	-	-	654	
d. Land Acquisition	3,226	2,707	1,309	824	8,066	
(A) Sub Total	125,071	49,898	106,473	230,277	511,719	
(B) Contingency	25,014	9,980	21,295	46,055	102,344	(A)x0.20
(C) Engineering Fee						
Design	7,504	2,994	6,388	13,816	30,702	(A+B)x0.05
Supervision	7,504	2,994	6,388	13,816	30,702	(A+B)x0.05
Total	165,093	65,866	140,544	303,964	675,467	

Note: Escalation Rate is estimated at 5 percent per year (base 1976).

3-5. Benefits

Proper construction and operation of drainage systems will result in certain types of benefits accuruing to inhabitants of the areas concerned. These benefits include items, both tangible and intangible, as follows:

(a) Prevention of the occurence of flood damages;
(b) Stimulation of development in the protected areas and increase of land value;
(c) Improvement of comfort and convenience of the individual and community;
(d) Decrease of health hazard;
(e) Improvement in the attractiveness of the City.

The items above are discussed in detail in the following sections.

5.1 Tangible Benefits

5.1.1 Stimulation of development in the protected areas and increase of land value;

The land value will be course be raised by investments in infrastructure including drainage system, sewerage and other public utilities such as water, electricity and road improvements. The value added to the land tends to equal or exceed the pro rata share of the total investment involved. The present price of the land in developable areas in the Project Area is stated to be about $ /m^2 ($ /ft^2) for ,$ /m^2 ($ /ft^2) for and $ /m^2 ($ /ft^2) for .

The part of the land value increase due to the investment for the drainage systems was assumed to be about 10 per cent of the whole. Table shows the projected land values and benefits. This shows the benefits to be derived from the provision of new drainage systems are sbout $ in developable areas, which is

5.2 Intangible Benefits

5.2.1 Comfort and Convenience of the Individual and Community

Benefits under this item can be understood easily when situations in which certain area is flooded and all kinds of waste waters including sullage, human excrita and discharge from industry, are mixed each other spreading coliforms, disease germs and toxic materials.

It is generally recognized through plenty of experiences in the past that after flooding the case of waterborne disease increases. The contributions of the drainage systems to public health improvement can be expected to be very significant, especially in areas where people depend on backet systems and pit privies for disposal of excreta.

5.2.3 Decrease Swampy Area and Mosquito Breeding

Considerable part of the Project Area is occupied by swampy areas which arise the problem of mosquit breeding. PWMC has spent a great deal of mony every year for spreading chemicals to prevent mosquit breeding. The provision of proper drainage systems will be resulted in the reduction of marshy area and breeding of mosquits. Thus the considerable part of recurrence costs for maintenance limiting mosquitos is expected to be reduced.

PART V

SOCIO-ECONOMIC, ORGANIZATIONAL AND LEGISLATIVE STUDIES

Table of Contents

PART V SOCIO-ECONOMIC, ORGANIGATIONAL AND LEGISLATIVE STUDIES

CHAPTER I

Socioeconomic Background

The socio-economic characteristics of the Federation of Malaysia as a whole and the Project Area in STate of Penang closely related are presented to enlighten the peripheral aspects of the proposed Project.

Population projection and domogrophic characteristics of the Project Area are alos emphasized as they are factors important to economic analysis and justification of the project.

1.1 Government Framework

There are 13 states in Malaysia 2 states one the Island of North Borneo, Sabah and Sarawak and 11 states of the former Federation of Malaysia (now officially known as Peninsular Malaysia); Johore, Malacca, Negri Sembilan, Pahang, Selangor, Trengganu, Kelantan, Perlis, Kedah, Perak, and Penang.

States are govened by the Federal Government ruled by National Parliament consisting of two houses - the Senate and the House of Representative.

The Federal Government is responsible for basic national policy such matters as foreign relations security, education, defence, finance, transport, communications and immigration while State Government is responsible for matters such as land, water, agriculture and forestry and entertainment. Under the legislative and executive authority of the State Government, there exist a number of different forms of local government.

1.2 Nation's Economy

1.2.1 General Economic Indicators

Malaysian economy is in transition driving ahead towards industrization. Economic growth for the past few years are remarkable although they experienced a sluggish growth in 1975 due to after-effects of international oil

crisis. The real Gross National Product have grown by almost 9% amounting to M$25,064 million in 1976, as indicated in TABLE V-1.

TABLE V-1

GROSS NATIONAL PRODUCT AT CURRENT PRICES,

1970 - 1976 (M$ Million)

	1970	1971	1972	1973	1974	1975	1976
Private Consumption	7,486	8,059	8,381	9,901	12,011	12,052	13,185
Public Consumption	1,997	2,243	2,777	3,122	3,811	4,745	5,220
Private Fixed Investment	1,459	1,675	1,779	2,243	3,223	3,320	3,602
Public Fixed Investment	693	852	1,308	1,552	2,157	2,518	2,890
Exports of Goods & Services	5,602	5,473	5,293	7,994	11,051	10,165	13,040
Change in Stock	+315	-136	-63	+228	+683	-667	-125
Less: Import of Goods & Services	5,397	5,665	5,832	7,597	11,702	10,386	12,748
Gross National Product	12,155	12,501	13,643	17,443	21,234	21,747	25,064
Per Capita Income (M$)	1,087	1,118	1,209	1,530	1,813	1,807	2,049

* M$1.00 = US$0.4

Source: Economic Report, 1976/77 Treasury Malaysia

The Malaysian economy is substantially dependent on the export of domestic products. Malaysia's favourable trade balance for the past several years has been contributing to the steady growth of the national economy. Gross international reserves, which comprise the reserve holdings of Bank Negara, stood at $1,917 million at the end of September 1976. It is estimated that net international reserves could increase by $1,500 million to $5,430 million. Export items of major significance are rubber, manufactured goods, petroleum (crude and partly refined), tin, palm oil, sawlogs, sawn timber, and others, accounting for 25%, 22%, 14% 10% 7%, 5% and 5% respectively of total export value of M$12,030 million for 1976. Corresponding to increasing external

demand and higher level of domestic economic activity. The Gross Domestic Product (GDP) at factor cost has been increased to M$22,052 million in current prices attributed by increased production of key commodity such as petroleum, rubber, palm oil, sawlogs, sawn timber, tin and manufactured goods.

Agricultural sector has been the largest contributing sector for nation's economy accounting for 30% of GDP. The second largest and the fastest growing sector is the manufacturing sector which has been a grwoth leader of nation's economy.

The manufacturing sector is encouraged by the government and emerged as the main source of new job opportunities through the granting of incentives to selected industries mainly for pioneer status, investment, tax credit, labour utilization relief, and locational incentives. Effort is being made for encouraging a more balanced industrial growth.

The Locational Incentive Scheme implemented since January 1975 has enabled the less developed areas to gain the benefits of industrialization with the gazetting of these areas as Locational Incentive Areas. Efforts are also made for establishment of industrieal estates, the provision of adequate infrastucture. The Prai, Bayan Lepas, Sungei Way, Taujung Keling and Bata Berendam areas were gazetted as free trade zone areas in 1976.

Federal Government's expenditure, which is the major component of the public sector, is expected to constitute 65% of the estimated total public spending and State Government's expenditures are expected to comprise about 21% of total public spending with the rest being shared by statutory bodies and municipalities. The public sector spending is estimated to reach M$9,210 million stimulated by public investment which is expected to reach M$3,405 million in current prices in 1976 with the intention of the Government to expedite the development project during the early years of Third Malaysian Plan (1976 - 1980).

The development expenditure in 1977 is estimated at M$4,494 million reflecting the objectives of the TMP (Third Malaysian Plan) which emphasize the eradication of poverty, restructure of society and national security. The expenditure on the services which will especially benefit the poor, like agriculture and rural development, social and community services, health are increased. The agriculture and rural development sector will receive the largest allocations with emphasis on land development.

Net domestic borrwings is estimated to reach M$2,000 million, comprising of M$1,700 million in Government Securities and M$300 million in Treasury bills.

Malaysia's high credit standing permitted ready access to multilateral lending agencies and international capital markets.

The gross foreign loans are estimated at M$733 million in 1976, comprising M$376 million in market loans and M$357 million in project loans, from the World Bank (M$100 million), the Asian Development Bank (M$90 million) United States (M$90 million), Japan (M$62 million), and other bilateral sources (M$15 million).

The number of project loan has been increasing in recent years and would continue to increase during the Third Malaysian Plan period when M$3.5 billion of the total loan of M$5.8 billion is expected to be obtained from multilateral lending agencies and foreign governments.

Continued emphasis will be given to the raising of project-related loans during the TMP as they are relatively inexpensive and are long-term in nature.

During the TMP, it is estimated that about 36% (M$5,040 million) of total Federal Government development expenditure of M$14,143 million would be disbursed as loans. Reflecting the continuing emphasis on the improvement of infrastructural facilities, especially for the poorer states, the largest portion of loan allocations during the TMP (31% or M$1,640 million) would

be made to public utilities including electricity, water supply, transport and communications.

The inflation has been stabilised in lower rate of 5% as reflected by the Consumer Price Index (CPI) which stood at 148 in 1976 based on 100 as of 1967 registering an annual increase of 3.3%.

The slower pace of increase in the CPI is mainly attributable to the declining rate of international inflation and to a large extent the improvement in food prices. The Government has been continuing the enforcement of the Control of Supplies Act 1961 to control the inflation regularising and supervising the supply and distribution of essential commodities.

Malaysia has a well-established banking system. Bank Negara as the central bank of Malaysia is charged with supervising banking activities to maintain monetary stability together with controlling Foreign Exchange. Commercial banks well developed are the most important local sources of financing in Malaysia and they are closely supervised by Bank Negara. There are a total of 11 merchant banks operating in Malaysia. These banks provide a wide range of specialized services of financial and management consulting.

The rate of interest charged by commercial banks for loans is maximum 10% per annum. Interest payable on one-year fixed deposits ranged from 7% to 9.1% against merchant banks.

The economic recovery and corresponding pick-up in export-oriented and labor intensive industries enhanced the employment. The agricultural, forestry and fishing sectors were major sources of employment accounting for approximately 48% of total employment followed by the manufacturing sector. The unemployment rate decreased from 7% in 1975 to 6.8% in 1976 corresponding to over all improvement of employment. The majority of registered unemployment falls in the 15 - 29 age group reflecting the degree of unemployment among youths. The unemployment levels is higher in the urban than in rural areas presumably due to the drift of unemployed rural people. Labor organizations are active with increasing of collec-

tive agreement signed for improvement of employment conditions and higher wages. Remarkable improvement and stabilization of labor management relations in Malaysia are expected after passage of the amendments to the Industrial Relations Act of 1967, the Employment Ordinance and Trade Unions submitted to improve and broaden the effectiveness of the arbitration system. The basic salary and wage rates availed in 1975 are shown in Table V-2.

TABLE V-3 indicates the progress of public utilities development in the past 10 years.

TABLE V-2

BASIC SALARY AND WAGE RATES 1975 (IN US$)

	MALAYSIA		
	High	Low	Average [a]
I. TECHNICAL SCIENTIFIC, PROFESSIONAL			
1. Accountant	$1,045	$260	$650
2. Architect	1,090	350	720
3. Auditor	1,045	260	650
4. Chemical Engineer	870	325	600
5. Chemist	785	325	555
6. Civil Engineer	1,520	325	925
7. Clinic Physician	1,305	785	1,045
8. Dentist	1,090	370	730
9. Economist	450	350	400
10. Electrical Engineer	1,085	325	710
11. Geodetic Engineer	785	305	545
12. Geologist	785	390	590
13. Industrial Engineer	1,090	325	705
14. Laboratory Technician	370	95	235
15. Legal Officer	1,090	370	730
16. Mechanical Engineer	870	325	600
17. Mining Engineer	1,595	390	995
18. Nurse	350	110	230
19. Personnel Officer	1,045	150	600
20. Pharmacist	870	220	545
21. Programmer	785	325	555
22. Purchaser/Buyer	520	220	370
23. Salesman	350	130	240
24. Statistician	785	325	555
25. Systems Analyst	650	305	480
26. Trial Lawyer	1,090	260	675
II. CLERICAL AND ADMINISTRATIVE			
1. Accounting Machine Operator	260	95	135
2. Bookeeper	390	85	240
3, Cashier	250	110	185
4. Clerk/Typist	150	65	110
5. Console Operator	325	195	260
6. Draftsman	435	90	260
7. Executive Secretary	585	305	445
8. Keypunch Operator/Verifier	260	95	180
9. Librarian	720	175	445
10. Messenger	65	35	50
11. Office Clerk	285	55	170
12. Secretary	350	130	240
13. Stenotypist	330	85	210
14. Storekeeper	215	50	135
15. Telegraph Operator	220	90	150
16. Telephone Operator	130	65	100

	MALAYSIA		
	High	Low	Average
III. LABOR, TRADES, SKILLED CRAFTS			
1. Carpenter	8.70	2.60	5.65
2. Driver	8.70	1.30	5.00
3. Electrician	4.35	2.85	3.60
4. Janitor	4.35	1.10	2.70
5. Laborer (Unskilled)	6.50	1.10	3.80
6. Lathe Operator	7.25	2.90	5.10
7. Mechanic	12.30	1.90	7.10
8. Painter	3.90	1.50	2.70
9. Plumber	3.50	2.20	2.85
10. Radio Technician	5.85	3.00	4.45
11. Security Gurd/Watchman	5.00	1.10	3.05
12. Tool and Diemarker	7.25	2.90	5.10

EXCHANG RATE USED (National Currency to US$1.00) M$2.34

I & II: Monthly rates

III : Daily rates

Source: The SGV Group

TABLE V-3

	1965	1975
Road(miles)		
Hard Surface	9,504	11,306
Earth Surface	488	597
Water Supply		
Served Population (million)	3.4	6.4
Public Stand Pipes	10,980	19,810
Telephone-subscribers' Lines	69,691	143,829
Electricity Consumption		
No. of Industrial Consumers (million KWH)	620	2,819
No. of Domestic Consumers (million KWH)	376	886
Drainage & Irrigation		
Flood Prevention (acres)	50,145	881,994
Wet Season (Padi acreage)	560,740	784,098
Off Season (")	70,551	561,643
Health		
Beds per 1000 population	1.87	1.66

Source: Economic Report 1976/77

1.3 Economy of Project Area

1.3.1 Economy

State of Penang is divided into two Local Authorities, namely Municipal Council of Penang of the Penang island and Municipal Council of Province Wellesley on the mainland. Municipal council is financially autonomous and the most highly empowered authority among various forms of local government. The authority is derived from the Municipal Ordinance.

The Project Area of Butterworth and Bukit/Mertajam are urban area administered by Municipal Council of Province Wellesley. Province Wellesley is separated from Penang Island by a water channel, two miles wide at the closest points of separation and eight miles at the furthest.

The Penang Island is, however, linked to Province Wellesley by a 24 hour ferry system. In contrast with Penang Island, which is typified by mountainous terrain, Province Wellesley is a flat, low-lying coasted plain and only interrupted by patches of hilly land at the south-eastern border of State.

During the early days after independence from 1957 to 1967 the economic structure were largely based on trade sectors and agriculture sector while manufacturing sector was given less encouragement to develop.

The leading sectors in Penang's economic structure are agriculture, trade and manufacturing. The agriculture account for large percentage of the land area in Penang State. Out of 203 square miles of Province Wellesley, 80% mostly alienated land is devoted to agricultural use. Major crops are rubber, padi, coconuts and oilpalms. Oilpalm is in the initial stage of development as a new crop with high economic return.

Penang has been an important trading center in the South East Asian region with its strategic location as the northern gate way to Malaysia, and well established port facilities and transportation.

Penang is traditionally a Free Port as a part of old Strait Settlement which enhances the handling of import and export business with advantageous privilege. Every measure is being embarked by the State to promote the port operation with provision of modern port support facilities to cope with the demand for modern cargo transfer and ship handling in the light of major technological changes.

Newly constructed deep water wharves in Butterworth in project area provides a vital contribution in handling cargo moving through the port.

It should be noted, however, that above mentioned agriculture and trade were the main contributing factors for the economic growth of the State from 1957 to 1969 when new economic restructuring is necessitated by significant increase of population and labour force which outstripped the growth of agriculture and trade sectors.

The limited capacities of the agriculture and trade sectors to absorb ever-increasing labour force and corresponding imbalance in the labour market necessitated manufacturing sector as a new growth generating sector.

This manufacturing sector has been emphasized since 1970 with growing support of both the State and Federal Governments.

This dramatic evolution in economic structure is illustrated by TABLE V-4, 5, 6 and 7.

TABLE V-4

PENANG ECONOMY, 1969

Economic Sector	Employment Distribution		Gross Regional Product	
	Number ('000)	Per Cent	Amount ($Million)	Per Cent at Total
Agriculture, Forestry & Fishery	65.5	31.2	110.0	16.2
Mining & Quarrying	0.5	0.2	1.0	0.1
Manufacturing	21.0	10.0	81.0	11.9
Construction	8.0	3.8	45.0	6.6
Electricity, Water & Sanitary Services	2.0	1.0	16.0	2.4
Transportation, Storage and Communication	13.0	6.2	36.0	5.3
Trade, Government and Services	100.0	47.6	391.0	57.5
All Sectors	210.0	100.0	680.0	100.0

Source: Penang Development Cooperation (PDC)

TABLE V-5

PENANG ECONOMY PROJECTIONS, 1975

ECONOMIC SECTOR	Empoyment Distribution		Gross Regional Product	
	Number ('000)	Per Cent of Total	Amount ($Million)	Per Cent of Total
Agriculture, Forestry and Fishery	65.5	22.6	140.0	11.8
Mining and Quarrying	0.6	0.2	1.4	0.1
Manufacturing	51.4	17.7	258.0	21.7
Construction	14.1	4.9	95.0	8.0
Electricity, Water and Sanitary Services	3.2	1.1	32.0	2.7
Transportation, STorage and communication	19.7	6.8	65.0	5.5
Trade, Government and Services	135.5	46.7	596.6	50.2
All Sectors	290.0	100.0	1,188.0	100.0

Source: Penang Development Cooperation (PDC)

TABLE V-6

EMPLOYMENT, UNEMPLOYMENT AND LABOUR FORCE, 1976

	Number ('000)	Per Cent of Total
Employment	230.0	85.5
Full	210.0	78.1
Partial (Underemployed)	20.0	7.4
Unemployment	39.0	14.5
Labour Force	269.0	100.0

Source: Penang Development Cooperation (PDC)

TABLE V-7

EMPLOYMENT, UNEMPLOYMENT AND LABOUR FORCE

PORJECTIONS 1975

	Number ('000)	Per Cent of Total
Employment	305.0	93.1
Full	290.0	88.5
Partial (Underemployed)	15.0	4.6
Unemployment	22.5	6.9
Labour Force	327.5	100.0

Source: Penang Development Cooperation (PDC)

The projected sectorial growth pattern in Penang is in sharp contrast to that in most of West Malaysia where expansion in land cultivation is expected to provide a major source of new development.

The import-substituting industries have already been firmly provided at strategic location and a new phase of export oriented industrialization, with the provision of free trade zones is in progress in consistent with national goal of diversification of export.

The major industries are concentrated in Project Area on Mainland due land availability and development of the Butterworth wharves, mainly in the Butterworth/Prai urbanized area and Bukit/Mertajam and mostly in the Mak Mandin and Prai Industrial Estates. The continuous effort has been made for further successful economic expansion and reduction of unemployment by encouraging new growth-generating sectors as tourism, fisheries and construction.

Penang has well-developed infrastructure advantageous for economic development. The port of Penang administered by the Penang Port Commission is presently well equipped with advanced facilities to handle increasing cargoes. The further expansion and improvement are contemplated. The Bayan Lepas Airport on Penang Island is one of the two international airports in Malaysia with wider coverage of service to domestic and international routes. The expansion program is in progress to cope with increasing passengers and enlarging aircrafts.

Malayan Railway provides both freight and passenger service between Butterworth, Kedah, Southern Thailand, Bangkok and Kuala Lumpur. The branch line extends through Butterworth and Bukit/Mertajam into the Port area and industrial zone to facilitate direct transport of raw materials and goods.

The bus services are provided by public and private companies. The urban services are provided for factory, office and other workers, school children and general public. Rural services are provided to primarily

agricultural population. The taxis are easily available especially in George town on Penang Island and more less in Butterworth area on the mainland. The new improvements and expansions of bus services are required to provide for more frequent and broader service to labor force anticipated to increase at developing industrial area. Telecommunications and postal services including telex and telephone services are presently adequate in general with highly developed system through extensive domestic and international circuit. Data in 1974 from Telecommunications Department indicates that 15 telephone exchanges are provided in Penang Island, Butterworth and Bukit Mertajam area with 15,000 subscribers in Penang Island, 3,000 in Butterworth and 1,000 in Bukit/Mertajam.

Further expansion have been programmed in Butterworth area reflecting the developments in industrial areas. The electricity supply in Province Wellesley is provided by National Electricity Board (NEB) while Municipal Council of Penang Island is responsible for electricity supply in Penang Island. NEB's thermal generating plant located at the Prai Industrial Estate has a capacity of 90 megawatts with planned capacity of 270 megawatts. Water supply in Province Wellesley is administered by the Penang Water Authority which has four separate sources of water supply having a combined minimum yield of 45 MGD.

Other facilities for education, medical and health and recreation are well developed, however, they are, in general, concentrated in Island area and required to be developed in Project Area.

As regards sanitation facilities they are unbecomingly underdeveloped in sharp contrast with other infrastructural system. This inadequate sewage disposal system is serious in Project Area in Province Wellesley where only available systems are limited number of septic tanks, night soil collection, pit latrines or open drains without any treatment plant.

The trenching for night soil has exhausting the readily available sites and the soils in many areas are approaching to saturation.

Banking systems are well established in the State of Penang with 15 commercial banks in operation at the end of October, 1974 which provide normal banking services, including acceptance of deposits, making loans and advances, discounting bills and provision of business investment advisory services.

The merchant banks are also being set up reflecting recent economic restructuring with emphasis on industrialization.

The average rate of interest charged by banks for loans and advances are at the range of 8% to 9.7% depending on borrowing sectors.

1.3.2 Population and Employment

The demographic characteristic associated with engineering planning of sewerage and drainage services in the Project Area is provided in other chapter with detailed population projection.

The population projection in this chapter is an economic measurement basically connected with economic activities in the Project Area.

State of Penang is characterized as the most densely populated area with the significantly high annual increase rate of population of about 3% attributable to relative high rate of birth, reduced death rate and balanced distribution between male and female as shown in TABLE V-8.

The population composition is also characterized by its various ethnic groups of Malays, Chinese, Indians and others. The chinese make a majority group accounting for about 56% of total state population and are mainly distributed in Penang Island and predominantly concentrated in urban area accounting for 67% of chinese in State. The Malays accounting for about 30% of total state population are concentrated in Province Wellesley and mainly in rural areas. Indians/Pakistans are largely residents of Penang Island and predominantly in urban areas as indicated in TABLE V-9.

Geographically the population is less distributed in Province Wellesley compared with Penang Island. About 44% of total population is in Province Welleslay against 56% in Island. Province Wellesley is presently not only less populous but also less urbanized than Penang Island however, it can be expected a significant increase in population in North and Central Districts of Province Wellesley in the light of the projected development. In addition to natural growth of population there is likelihood that there might be an influx of people in Province Wellesley with increased development and expanded economic activities.

TABLE V-8

POPULATION OF PENANG 1957 - 1970

Year	Malay			Chinese			Indians			Others			Total		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
1957	81,242	83,850	165,092	164,882	162,358	327,240	42,072	26,963	69,035	6,198	4,535	10,733	294,394	277,706	572,100
1970	116,904	120,003	236,907	213,176	222,147	435,323	49,262	40,133	89,395	6,265	5,437	11,702	385,607	387,720	773,327
Increase	35,622	36,153	71,815	48,294	59,789	108,083	7,190	13,170	20,360	67	902	969	91,213	110,014	201,227

Source: Department of Statistics, Population Census 1970

TABLE V-3 POPULATION OF PENANG 1970

LOCATION	Malay			Chinese			Indian			Other			Total		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Province Wellesley															
North-District	22,109	23,082	45,191	29,124	29,185	58,309	7,036	6,483	13,519	243	213	456	58,512	58,963	117,475
Central District	38,309	39,707	78,016	33,429	32,250	65,679	8,560	7,426	15,986	1,058	785	1,843	81,356	80,168	161,524
South District	11,359	12,068	23,427	14,926	14,812	29,738	5,354	5,054	10,408	19	34	53	31,658	31,968	63,626
Sub-Total	71,777	74,858	146,634	77,479	76,247	153,726	20,950	18,963	39,913	1,320	1,032	2,352	171,526	171,099	342,625
Penang Island															
North-East District	29,679	29,058	58,737	122,218	132,757	245,975	26,957	20,091	47,048	4,888	4,343	9,231	183,742	186,249	369,991
South-West District	15,448	16,088	31,536	13,479	13,143	26,622	1,355	1,079	2,434	57	62	119	30,339	30,372	60,711
Sub-Total	45,127	45,146	90,273	135,697	145,900	281,597	28,312	21,170	49,482	4,945	4,405	9,350	214,081	216,621	430,702
Total	116,904	120,003	236,907	213,176	222,147	435,323	49,262	40,133	89,395	6,265	5,437	11,702	385,607	387,720	773,327
Percent of Total	15.11	15.52	30.63	27,57	28.73	56.30	6.37	5.19	11.56	0.81	0.70	1.51	49.86	50.14	100

Source: Department of statistics, Population Census 1970

TABLE V-10 PROJECTED POPULATION BY FIVE YEAR AGE-GROUPS AND SEX - PENANG: 1970, 1975 and 1980

AGE-GROUP	1970			1975			1980		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
ALL AGES	776,124	387,619	388,505	864,771	431,658	433,113	968,220	483,143	485,077
0 - 4	105,051	53,444	51,607	118,060	60,480	57,580	134,625	68,948	65,677
5 - 9	110,221	56,356	53,865	101,966	51,786	50,180	117,903	60,285	57,618
10 - 14	103,482	52,616	50,866	110,832	56,549	54,283	102,520	51,952	50,568
15 - 19	89,790	44,729	45,061	104,932	53,255	51,677	112,356	57,206	55,150
20 - 24	69,524	33,530	35,994	88,035	43,862	44,173	103,004	52,309	50,695
25 - 29	50,866	25,084	25,782	67,466	32,444	35,022	85,562	42,525	43,037
30 - 34	47,031	23,291	23,740	49,769	24,499	25,270	65,792	31,561	34,231
35 - 39	38,840	18,749	20,091	45,930	22,664	23,266	48,556	23,800	24,756
40 - 44	36,725	18,095	18,630	37,647	18,092	19,555	44,443	21,822	22,621
45 - 49	30,044	15,076	14,968	35,172	17,237	17,935	36,032	17,218	18,814
50 - 54	27,075	13,607	13,468	28,307	14,060	14,247	33,107	16,047	17,060
55 - 59	21,694	11,158	10,536	24,709	12,210	12,499	25,804	12,590	13,214
60 - 64	18,471	9,224	9,247	18,928	9,467	9,461	21,486	10,319	11,167
65 - 69	11,985	6,129	5,856	15,053	7,197	7,856	15,386	7,346	8,040
70 - 74	7,815	3,558	4,257	8,962	4,304	4,658	11,209	5,015	6,194
75+	7,510	2,973	4,537	9,003	3,552	5,451	10,435	4,200	6,235

Source: Department of Statistics

TABLE V-7 PROJECT POPULATION BY FIVE YEAR AGE-GROUP

- PENANG: 1970 - 1980

Age-Group \ Year	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
ALL AGES	776,124	789,922	807,275	825,506	844,650	864,771	883,654	903,406	924,057	945,640	968,220
0 - 4	105,051	105,124	108,200	111,379	114,665	118,060	121,208	124,437	127,749	131,143	134,625
5 - 9	110,221	108,480	106,801	105,155	103,543	101,966	104,941	108,022	111,207	114,501	117,903
10 - 14	103,482	104,855	106,316	107,795	109,301	110,832	109,102	107,406	105,743	104,114	102,520
15 - 19	89,790	92,576	95,522	98,562	101,698	104,932	106,372	107,835	109,318	110,823	112,356
20 - 24	69,524	72,795	76,312	80,025	83,933	88,035	90,846	93,746	96,736	99,822	103,004
25 - 29	50,866	53,803	56,916	60,219	63,728	67,466	70,709	74,136	77,754	81,562	85,562
30 - 34	47,031	47,531	48,069	48,619	49,184	49,769	52,604	55,611	58,802	62,188	65,792
35 - 39	38,840	40,162	41,531	42,946	44,411	45,930	46,429	46,939	47,462	47,999	48,556
40 - 44	36,725	36,888	37,059	37,241	37,437	37,647	38,919	40,230	41,586	42,989	44,443
45 - 49	30,044	31,024	32,013	33,033	34,084	35,172	35,323	35,482	35,652	35,834	36,032
50 - 54	27,075	27,342	27,576	27,815	28,057	28,037	29,209	30,138	31,097	32,085	33,107
55 - 59	21,694	22,262	22,815	23,406	24,034	24,709	24,920	25,135	25,353	25,576	25,804
60 - 64	18,471	18,614	18,692	18,770	18,850	18,928	19,375	19,852	20,361	20,904	21,486
65 - 69	11,985	12,586	13,150	13,749	14,381	15,053	15,118	15,184	15,251	15,318	15,386
70 - 74	7,815	8,075	8,279	8,497	8,723	8,962	9,361	9,784	10,231	10,706	11,209
75+	7,510	7,805	8,024	8,295	8,621	9,003	9,218	9,469	9,755	10,076	10,435

Source: Department of Statistics

The age group under 15 years of age accounts for 41% of total population indicating lower rate as compared with 44% of whole West Malaysia while the working age group in the range from 15 to 54 years bracket accounts for higher rate of 51% as compared with about 46% of whole West Malaysia as shown in TABLES V-10 & 11.

The accelerated population growth coupled with increased labor force is an impetus for development, however, it requires corresponding social and economic improvement to accomodate the increased labor force. The labor force in Penang State is abundant accounting for 278,800 in 1973 with competitive priced labor, however, unemployment rate is relatively high with about 9% of the labor force as indicated by TABLE V-12. This unemployment rate is, however, estimated to be reduced to 6.9% in 1975 as indicated previously by TABLE V-7.

TABLE V-12.

POPULATION, EMPLOYMENT AND UNEMPLOYMENT 1973

POPULATION	NUMBER ('000)
	864.0
Employment	278.8
Full	262.3
Partial	16.5
Unemployment	27.5
Labor Force	306.3

Source: Penang Development Corporation

The labor force in Penang State is competitive in quantity and quality. About 60% of labor force have completed their lower secondary education and a very small fraction is not educated.

The wages rates vary depending on the qualifications and skills of laborers. The wage rates for top management range from $2,000 to $4,500 per month. The daily wages for unskilled workers range from $3.- to $5.-. For skilled workers the daily wage rates are ranged from $8.- to $10.0.

There was no published data of individual household income which directly contributes to the revenue strategies in financial evaluation of the Project.

The field survey was, therefore, performed in an attempt to estimate those incomes of households among potential consumers of the sewerage services substantially representing various levels of income status in the study areas. The average household income is M$500.- as indicated by TABLE V-13.

TABLE V-13 Monthly Income by Housing Type

Income M$/month	Number of households by housing type							
	Total	A	B	C	D	E	F	G
less than 201	12	11	1					
201 - 400	24	7	12	2	3			
401 - 600	16	1	5	4	6			
601 - 800	7			3	2			2
801 - 1000	6		3				2	1
1001 - 1200	3			1			1	1
more than 1200	2		1				1	
Total	70	19	22	10	11		4	4
Average	500	200	500	600	500		1300	900

Note: A -- Kampong house
B -- One-storied attached terrace house
C -- Two-storied attached terrace house
D -- Flat house
E -- Commercial house
F -- Semi-detached house
G -- Isolated house

1.4 National Development Plan

An essential component of each economic development order in Malaysia is based on the New Economic Policy (NEP) designed to achieve national unity through the two-pronged objectives of eradicating poverty irrespective of race and restructuring society to eliminate the imbalance between racial groups in participation in social functions.

1.4.1 Second Malaysia Plan

Under the NEP the Second Malaysia Plan (1971-1975) has been completed recently and favorable progress has been attained in respect of eradication of poverty, reduction of economic imbalances and overall economic development despite the uncertainties of the international economic situation. The manufacturing sector contributed significantly to enhance a rate of employment growth which was recorded at 3.3% per annum. The agricultural development was also accelerated by various government efforts as land development, stabilization of rubber prices, encouragement of double cropping system, improvement of socio-economic condition os estates workers. The provision of housing and other social amenities to enhance the well-being of urban poor was also achieved under the Second Malaysia Plan. The government policy was also directed towards assisting the Malays and other indigenous people to participate fully in the growth of commerce and industry including training programme to upgrade their capabilities.

1.4.2 Third Malaysia Plan (1976-1980)

The Third Malaysia Plan is a logical extension of the Second Malaysia Plan (SMP) and represents a continuation of all efforts previously made to implement the primary objectives of NEP. The forecasted expansion of world economic activity following the worldwide recession of 1974/75 encouraged the government to permit an enlarged commitment to the task for this five year's plan with sufficient investible resources to be generated

by inflows of foreign capital in addition to further boost to external earnings by export of petroleum products. The total investment target under the TMP is therefore sizable amounting to M$44.2 billion in current prices which indicates the increase of 49.3% over the cumulative amount expended during the period of SMP.

The major enlarged tasks to be undertaken during TMP include.

i) to ensure equal opportunities for the poor to improve their income and quality of life
ii) to reduce economic imbalances between racial groups and regions
iii) to promote further utilization of countries human resources through education and training in the sciences, technology and business management
iv) to develop agriculture and industries for further increase of employment
v) to promote the balanced distributions of racial groups in various aspects of economy as employment, ownership of wealth.
vi) to reduce the urban poor by expanding employment opportunities in manufacturing and construction with provision of low-cost housing and other amenities.
vii) to safegard the nation's security from antinational elements seeking subversive destructive actions, and
viii) to direct appropriate attention to safeguard the environment from any progress of degradation before it can not be dealt with low cost.

CHAPTER 2

Orgainzation

2.1 General

There is no organized modern sewerage system in the Project Area presently except for rudimentary sewage disposal system as septic tank, night-soil buckets collection and surface drains, hence, no comprehensive sewerage organization to undertake effective planning, construction, operation, maintenance, management, and administration of the sewerage systems.

The existing organizations which are directly concerned with sanitary control in Project Area are Engineering Department and Health Department of Municipal Council, Province Wellesley. The Engineering Department is mainly reponsible for operation and control of existing urban drainage including desludging of septic tanks and imhoff tanks. The Health Department is generally concerned with administrative control for public health regulating nuisance wholly or partly related to sanitary systems in the Project Area including collection of night-soil bucket.

The completely new organization or a paetly modification to existing organization will be necessary to be charged with the functions required when proposed plan is implemented. The new organization is suggested with due consideration on combining the existing situation with the organization standard generally accepted for the sewerage and drainage works. During the course of the consideration for an appropriate body to be administratively responsible for the implementation of the project, some alternatives are attempted as can be seen in Appendix J .

The proposed organization structure presented in this chapter is, however, the suggested guideline to be followed with appropriate modifications which are largely dependent on the Government's own political arrangements.

2.2 Basic Organization Requirements

For any case when it is necessary to create or remodel the organization for newly planned sewerage and drainage works, the following basic objective and functions commonly required for such works are conveniently utilized for an orientation of a new functional frame work.

Basic Objectives

(1) To establish the most effective organization with strong financial capabilities in financially self-supporting and staffed with the most experienced and qualified personnel available.

(2) To provide a dependable system of wastewater collection, treatment, and disposal for households, commercial establishments, institutions and industries.

(3) To seek the maximum utilization of the sewerage facilities and render service at the lowest possible cost.

(4) To coordinate with other bodies and agencies and integrate the sewerage programme into development programme for the overall improvement of health and sanitation.

Functional Units

(1) Administration Division

(a) Personnel Section

The personnel recruitment and training as well as wage and salary administration would be contained in this section.

(b) Procurement Section

The procurement management of local and offshore supply would be the responsibility of this section.

(c) Finance Section

The activities of this section would include budgeting, accounting, payroll, billing, and collection of bills for the services rendered. The financial reports would be prepared to provide adequate information for evaluating and controlling sewerage operation, and for planning future development of sewerage systems.

(d) Legal Section

The section would provide legal advice or take appropriate measures to ensure proper operation and maintenance of sewerage and drainage system in compliance with ordinances including acquisition of rights-of-way and land.

(2) Engineering Division

(a) Design Section

The activities of this section include detailed designing of all new construction including new service connection with cost estimation, the drawing and reproduction of engineering plans, and control of plumbing and service connections through the inspection and permits. The maintenance of engineering records would be also contained in this section.

(b) Section of Construction

The responsibilities of this section would be supervision of all new construction with surveys and inspections to assure compliance with established regulations.

(3) Operation/Maintenance Division

(a) Operating Section

This section would be responsible for the efficient operation of the treatment plants and pumping stations on a continuous base and monitoring of stream, river, drain and illegal effluent from cesspools and septic tanks as well as industries.

(b) Maintenance Section

This section would be responsible for keeping entire sewerage and drainage systems in good working order, including plants, pumps, pipes, canals, drains, buildings and grounds, and perform necessary repairs for damaged facilities and pertinent equipments.

2.3 Proposed Organization

The advantages and disadvantages of all alternatives as explored in Appendix J were evaluated taking into account the background and current situation.

The second alternative was found to be desirable theoretically, however, it may not be practicable to propose a plan requiring major changes in the established governmental framework.

The third alternative is deemed to be practical approach that is attainable and consistent with present government policy.

The organizational functions for proposed sewerage are therefore suggested to be provided in the organizational framework of existing Municipal Council, Province Wellesley, by adding needed staff.

This new organization would be responsible for the planning, design, construction, operation and maintenance of the entire sewerage and drainage systems of the Project Area with the objective of ultimate disposal of domestic and industrial wastewater including sewage, sullage with munimum hazard or nuisance to the residents of the Project Area.

2.3.1 Functional Units in Municipal Council, P.W.

Under the president of the present Council, there is a Board of Council which administers the activities of six major departments.

These major departments are: Department of Secretariat, Department of Finance and Treasury, Department of Health, Department of Engineering, Department of Valuation and Department of Building & Planning.

Department of Secretariat:

This department is an administrative centre for all municipal activities with coordination of the objective of the Board and activity of each department.

This department also performs planning and evaluation of development project, personnel administration, public information service, and legal administration.

Department of Finance and Treasury:

The functions of financial department is to provide management information budgeting payroll, billing preparation of revenue and expenditure statement and other accounting report.

Department of Health:

This department is presently the largest department in the council with over 900 staffs occupying approximately 70% of council's total staff.

The main responsibility of this department is to safeguard and enhance the public and community health. The activities are generally categorized in cleaning of urban area, night soil disposal, inspection and licensing for sanitary control of health related commercial activities, vetenary services, mosquite eradication, public amenities all concerned with sanitary control.

The cleaning of urban area is the biggest activity and this includes refuse collection and disposal, cleaning of drains and roads which requires the great number of staff up to about 70% of total staff of this department.

About 7,300 night soil buckets in Butterworth and Bukit/Mertajam area are collected and disposed at night-soil/sludge disposal ground at Telok Wang, central part of Province Wellesley.

The installation of private flush laterines and public toilets is also the responsibility of this department.

In addition to above functions this department has recently been charged with an important task of pollution control. The water samples collected by this department at strategic monitoring points are analysed by laboratory testing in Department of Chemistry of State Government. The relative organization is referred in section 5, Water Quality Surveillance, Appendix F.

Department of Engineering:

The main activities of this department are, development of recreational area, beautification of parks, roads and gardens. This department involves in the planning of the roads to be constructed by private developer. These roads are, however, to be owned by the State Government. The department also undertake the construction of and sewage disposal facilities and maintenance work for septic tanks and imhoff tanks including desludging of these tanks as well as flush laterines.

Department of Valuation:

Under Section 59 of Municipal Ordinance, the Council is empowered to levy any separate or consolidated rate or rates on the annual value of all houses, buildings, lands to compensate any public services rendered by Council.

This assessment is a major revenue source of the council sharing about 85% of total revenue. This department is responsible for the important task of evaluation of above mentioned properties to be levied.

Departmen tof Building & Planning:

This department is responsible for overall control of all kinds of building with planning and issuing the approved certificates.

2.3.2 Suggested Functional Units

The new functional units are suggested on the concept that existing departments would be incorporated to meet the requirements of the sewerage and drainage programmes to the maximum extent possible.

In this arrangement new functional units are expanded on the basis of existing Engineering Department. Basically a self-contained organization is desirable for the efficient operation of sewerage and drainage programme, however, in the proposed organization, some functional untis usually required as presented in previous paragraphs are not contained in this new sewerage and drainage organization due mainly to obvious shortage of sufficient personnel.

The simplification and economies for the startup of the new organization by utilizing existing supporting untis are suggested providing, however, that close coordination is maintained with those other functional untis.

The following existing functional units are proposed to extend their functions for sewerage and drainage operations.

Department of Secretariat:

Administration Section:

This section should perform personnel administration and control over procurement and supplies of materials for sewerage and drainage operation.

Legal Section:

This section should expand its functions necessary for proper operation of the new systems as specified in 1.04 of Functional Units.

Special Task Section:

The public relation services presently undertaken by this section is proposed to undertake an intensive public relations program to enhance public concerns to environment sanitary and encourage public to avail themselves of the sewerage systems.

Department of Finance and Treasury:

This department is presently undertaking financial control over all activities inyolved in Municipal Council, however, a separate financial section exclusively for sewerage and drainage system operation is suggested to perform financial functions as budgeting accounting, billing and maintenance of financial records separately from other departments in order to provide lending agency with useful management information and accurate operating result of the proposed sewerage and drainage systems.

FIGURE V-1 Municipal Council, Province Wellesley

Added Functional Unit in Existing Organization

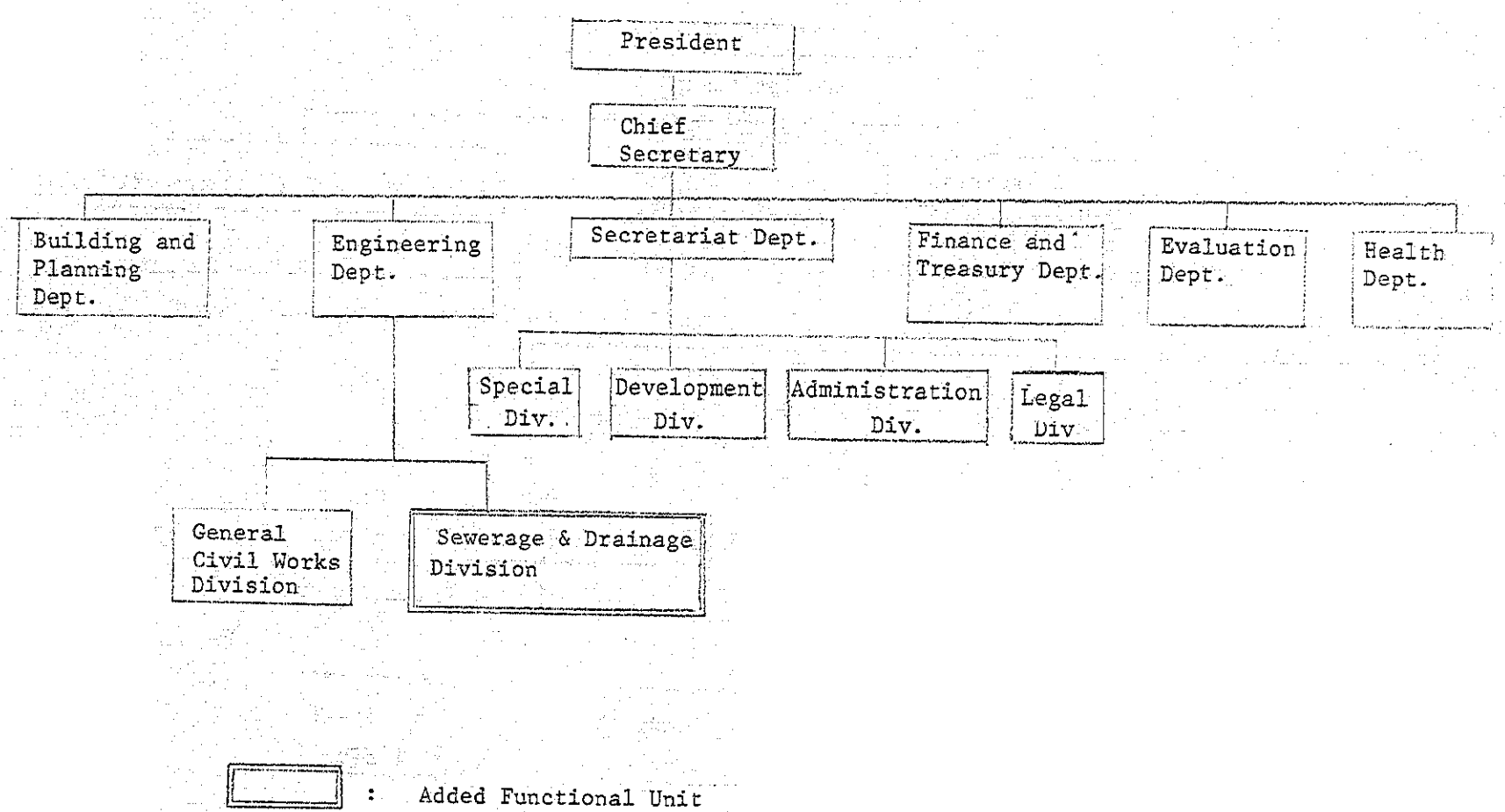


FIGURE V-2 Sewerage & Drainage Works Organization

Suggested functional Units

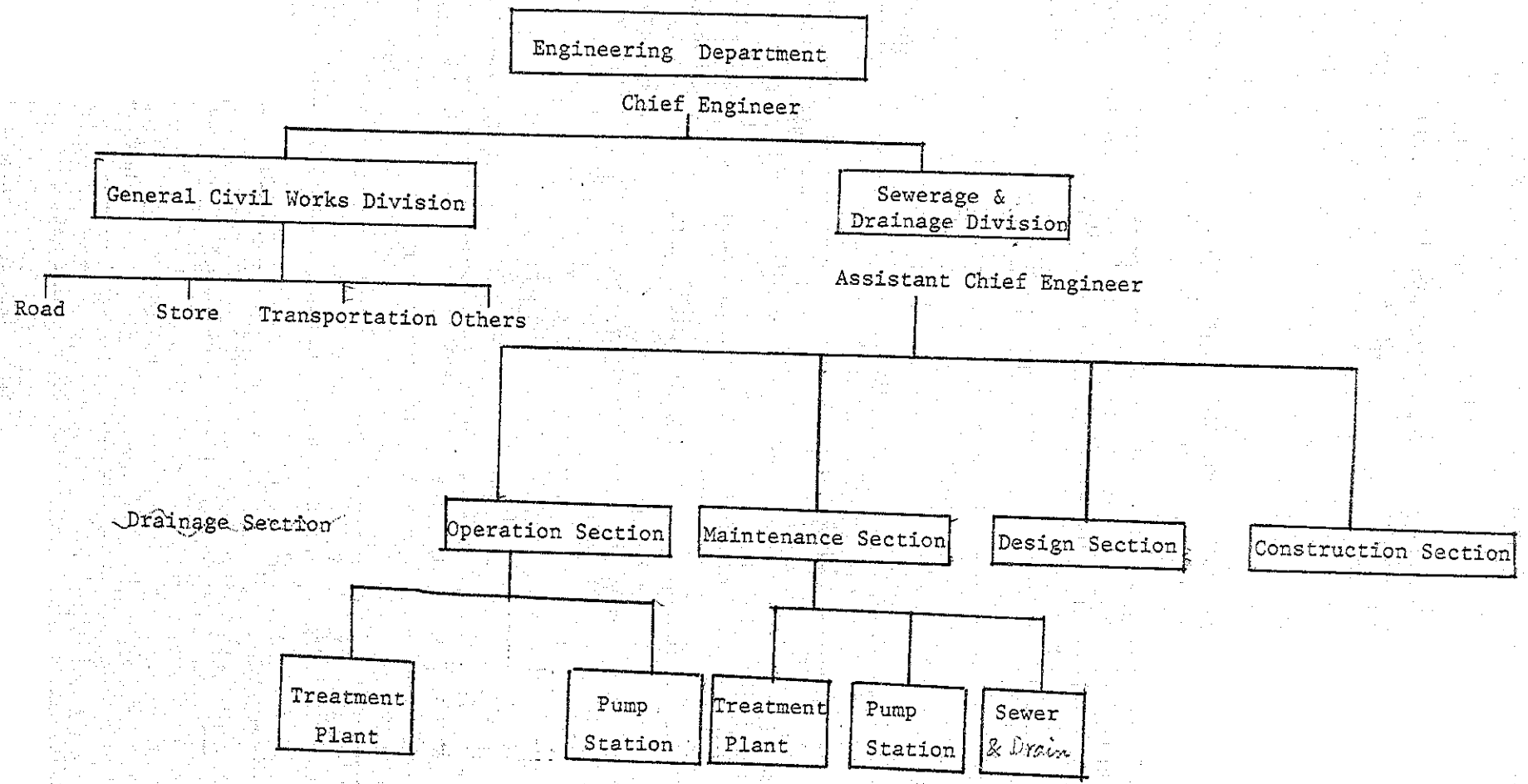


TABLE V-14 ESTIMATED STAFF SCHEDULE

JOB TITLE	1980	1981	1982	1983	1984	1985	1990	1995	2000
SEWERAGE DIVISION									
Assistant Chief Engineer		1	1	1	1	1	1	1	1
Secretary-Typists				2	2	2	3	3	3
Clerks				2	2	2	2	2	2
OPERATIONS SECTION									
Section Head		1	1	1	1	1	1	1	1
Plant Operation Sub-Section									
Chief Operator					1	1	2	3	4
Assistant Engineers					1	1	2	3	4
Assistant Operators					2	2	4	6	8
Labourers						2	4	6	8
PUMP OPERATION SUB-SECTION									
Sub-Section Chief				1	1	1	2	3	4
Assistant Engineers				1	1	1	2	3	4
Pump Operators				2	2	2	4	6	8
Technicians				2	2	2	4	6	8
Labourers				2	2	2	4	6	8
PLANT LABORATORY SUB-SECTION									
Laboratory Chief					1	1	1	1	1
Chemists					1	1	1	2	2
Laboratory Assistants					2	2	2	4	4

	1980	1981	1982	1983	1984	1985	1990	1995	2000
MAINTENANCE SECTION									
Section Head		1	1	1	1	1	1	1	1
Plant Maintenance Sub-Section									
Sub-Section Chief					1	1	1	1	1
Assistant Engineer							1	1	1
Electricians					2	2	3	3	3
Mechanics					2	2	3	3	3
Buildings/Grounds Foremen					1	1	1	1	1
Carpenters					1	1	1	1	1
Labourers					2	2	4	6	8
PUMP MAINTENANCE SUB-SECTION									
Sub-Section Chief				1	1	1	1	1	1
Assistant Engineers						1	1	1	1
Repair Crew Foremen				1	1	1	1	1	1
Labourers				2	2	2	2	2	2
SEWER & DRAIN MAINTENANCE SUB-SECTION									
Sub-Section Chief				1	1	1	1	1	1
Assistant Engineers				1	1	1	2	3	4
Crew Foremen				4	4	8	10	10	10
Equipment Operators				4	8	10	16	16	16
Labourers				8	16	20	32	32	32

	1980	1981	1982	1983	1984	1985	1990	1995	2000
DESIGN SECTION									
Section Head	1	1	1	1	1	1	1	1	1
Design Engineers	1	1	1	1	1	1	1	1	1
Assistant Engineers	1	1	1	1	1	2	2	2	2
Draftsmen	2	2	2	2	2	4	4	4	4
Clerk-Typists	2	2	2	2	2	2	2	2	2
CONSTRUCTION (SUPERVISION) SECTION									
Section Head		1	1	1	1	1	1	1	1
Inspectors		1	1	1	1	1	2	2	2
Clerk-Typists		1	1	1	1	1	1	1	1
Additional staff needed in existing organization units for sewerage programme									
DEPARTMENT OF SECRETARIAT									
ADMINISTRATION DIVISION									
Administration Division									
Personnel Officers	1	1	1	1	1	1	1	1	1
Purchasing Officials		1	1	2	2	4	4	4	4
DEPARTMENT OF FINANCE & TREASURY									
Budget Officers				2	2	2	4	4	4
Accounting Officers				2	2	2	4	4	4
Billing Clerks				1	2	3	3	3	3
Bill Collectors				5	10	15	15	15	15
Cash Clerks				3	5	7	7	7	7

Department of Health:

This department has recently expanded its activities involving in pollution control programme. The routine sampling and laboratory testings for sewage and industrial wastewater usually required for sewerage and drainage operation would be performed by this department.

The newly added functions for sewerage and drainage systems operation are proposed to undertake activities in conformance with basic guideline for functional untis described in previous paragraph, page . The description of new functional units required to meet the existing situation are presented in the succeeding paragraph.

The new organization for proposed project as graphically indicated by Fig. V-1& 2 will need a Chief Assistant Engineer to perform newly added functions under Chief Engineer of Engineering Department.

These functions are:

Operating Section:

Two sub-sections for each objective are provided under the head of Operating Section. Sub-section of Treatment Plant will be responsible for proper operation of treatment plant to achieve desired quality of effluent and target volume of sewage treated and proper disposal of plant effluent.

Sub-section of Pump Station will be responsible for proper operation of pumping stations to ensure uninterrupted conveyance of sewage.

Maintenance Section:

Sub-section of Treatment Plant will be responsible for the maintenance and repair of the treatment plant works and equipments to keep it in good working order including structures and plant premises.

Sewer & Drain Sub-section will be responsible for proper maintenance of the public sewers and drains, and their appurtenances conducting routine inspection for physical damage and obstruction in the sewers and

and drains including control of the illegal discharge from industries, septic tank into main sewers and drains. Any violation of related regulations established in Municipal Ordinance and/or related By-Laws detected by inspection will be reported to initiate filing of court suits against violators.

The Sub-section of Pump Station will be responsible for overall maintenance of pumps and its appurtenances including pump station buildings and grounds.

Section of Designing:

This section will be responsible for preparation of engineering design and specification necessary to receive tenders for construction of sewerage and drainage systems including service connection with pertinent cost estimation, drawings and reproduction of engineering plans, and the issuance of permits for new service connections requested by owners of buildings.

Section of Construction:

This section will be responsible for supervision of all new construction with attendant surveys and inspections to assure compliance with required specification and standards.

Taking into consideration the probable shortage of required staff to be assigned in Design Section and Construction Section which will be a restraint to initiation of the implementation of planned project, the external engineering consultants are suggested to undertake detailed designing and preparation of tender documents and subsequent supervision of construction at initial stage of programme.

Only a few selected key personnel as counterpart staff are required to participate with consultants' work to develop their capability gradually with ultimate objective to undertake designing and construction supervision as well as operation and maintenance of the sewerage and drainage systems on independent base at subsequent stages.

There are also functions related to overall sanitation and waste disposal including night soil collection and disposal, septic tank desludging, and drain cleaning which are not included in the strict definition of functional organization for sewerage system development and operation.

The proposed sewerage and drainage project will eventually replace night soil collection and septic tank systems with complete sewerage systems, however, there will be a continuing need to collect and dispose of night soil and septic tank deposits and clean the drains.

The Department of Health and Department of Engineering are taking parts of above environmental sanitation activities. There is an apparent need for coordination between new sewerage organization and other organization units in this respect.

* As an alternative approach, the existing Drainage and Irrigation Department of State Government (DID) is suggested to undertake the implementation of proposed drainage project since this department under direct control of State Government has been contributing to the development programme of the State by providing engineering services on planning, designing and implementation of schemes of urban drainage, irrigation and flood mitigation and its experience and present capability is considered to be sufficient to take part of the proposed project.

2.4 Staffing Schedule

The estimation of staff required for the proposed sewerage and drainage programme are presented in Table-11 to be utilized as guidelines in determining the number of staff and needed skill to carry out the required functions.

The estimation of staffing should be reviewed periodically on a continuing basis to be adjusted in accordance with existing conditions. The staff estimations indicate the projected number of personnel at the end of each calendar year. The staffing schedule has been prepared on the assumption that the proposed plan will be approved before 1979 or 1980, and detail designing will be completed in 1980, and the start of construction in 1981 (the initiation of the 4th Malaysian Plan), the start of operations in 1983, and the completion of the First Stage Programme in 1985.

The additional staff required in the existing departments to be coordinated with proposed sewerage organization are also estimated.

The vigorous effort will be required to recruit the required numbers of qualified staff scheduled.

The competitive remuneration to attract and retain qualified individuals will be required. In case the competitive salaries can not be provided, private or quasi-public consulting firms will be necessary. In any event, a foreign consulting firm experienced in this type of project will apparently be necessary to undertake the initial part of the project with objective to transfer the skills and expertise to the staff of respective organization proposed as indicated previously.

CHAPTER 3

Legal Aspects

3.1 General

It is important that the explicit set of published regulations be available for the efficient operation of the sanitary sewerage system and Municipal Council, Province Wellesley be given authority to issue and enforce regulations in day-to-day operations to achieve the basic objectives set in Sewerage and Drainage Master Plan with due regard to costs and the necessity for meeting its financial maximum health and sanitation benefits to the Project Area protecting sewerage and drainage systems capacity by controlling and regulating the quality, quantity and the manner of waste disposal.

The existing regulations or by-laws pertinent to proposed Project are reviewed and some suggestions and recommendations are presented in the following paragraphs.

3.2 Municipal Ordinance

The Municipal Ordinance enacted as Chapter 133 of old Strait Settlement in 1913 involves the provisions pertinent to the work proposed in this report. The substantial parts of the pertinent sections of ordinance are outlined as follows:

Financial Power

Section 59: Municipal Council is empowered to levy a separate or consolidated rate or rates limited to the maximum 35% based on the annual rental value of all rated properties including buildings and lands within the municipality for the capital cost of sewerage works. There is no provision to charge the capital cost to the owners of the properties directly benefited by the construction of sewerage facilities.

Section 229: The power is given to recover the cost incurred in part or in whole for the connection, and fee for sewage removal as the operation cost in addition to any rate levied under section 59. The above sewage removal fee is limited to M$2.00 monthly per water closet or urinal.

The rate was established in 1959 and appears to be outmoded to meet the current practice of sewerage system operation.

Section 215, 220 and 230: Power is given to collect fees for licencing public latrines and inspection fees for sewer and etc. and night soil collection fees as prescribed by the municipality.

Section 343 and 344: The Municipal Council may borrow such sums of money as are necessary for the acquisition of land, the erection of buildings and execution of any permanent work including sewerage works. The amount of loan shall not exceed five time the annual rental value of all rated properties including buildings and land for remunerative works provided that the loan for unremunerative works shall not exceed double the annual rental value.

This power for loan limited especially for unremunerative works including sewerage works will impose a restriction on the construction development programme.

Executive Power

Section 133 and 134: Power is given to the Municipal Council for the construction and maintenance of sewage disposal systems.

Required Use of Public Sewers

Section 221, 222 and 223: It is prohibited to discharge or deposit in any stream, the solid, industrial wastewater or liquid sewage matter. No difinition is made for above liquid sewage matter, however, it is normally defined as combination of the liquid and water-carried wastes from sanitary conveniences of residences, commercial buildings, industrial plants and institutions including "sullage" and these sections should suggest the "sullage"indicating all domestic waste to be disposed to public sewers.

Section 140: It is empowered to require the owners of a house the installment of proper water-closets, urinals, sinks and bathrooms and require such water-closets, urinals, sinks and bathrooms to be connected with public sewers provided that there is a public sewer 100 ft of the boundary of the premises where house is located.

Private Sewage Disposal Systems

Section 219 & 220: Power is given to regulate and control of the construction and maintenance of private sewage and wastewater disposal systems including septic tank and cess-pool, and to enter any land or building for inspection, alternations and repairs of such systems. The By-law of this Ordinance, Building By-Laws, 1950 include the provisions pertinent to the construction and maintenance of private sewage disposal systems in its Article III - Works and Fittings.

Plumbing

There is no specific provision regulating the connection of building sewer with the public sewer, however, by Section 143 power is given to make by laws for plumbing.

In the Building By-Laws 1950 includes the provisions for this purpose in the Article III - Works and Fittings.

Regulations on Discharge into Public Sewers

There is no provisions regulating the substance or materials to be discharged to public sewers except Section 113 which regulates the rain water discharge from roof of the house. Section 136 requires the consent of Municipal Council to make any drain into public sewers and permits to discharge the night-soil or excrementious matter from water-closet or privy into public sewers.

Other Provisions

Section 363, 364 & 365: Powers are given to purchase or sell any land and obtain easement or right of way for the public purposes authorized by Municipal Council.

Section 367: Powers are granted to enter into and upon any building or land for inspection as well as the execution of the work authorized by the Ordinance.

Section 390 and 391: Any person who commit any offence under the Ordinance or its by-laws shall be arrested by police and shall be subject to prosecution and penalties.

3.3 Street, Drainage and Building Act, 1974

The Municipal Ordinance as outlined in previous sections is apparently old regulations and appears to be outmoded in various respects to meet the current practice of sewerage works.

The recently published Street, Drainage and Building Act, 1974 includes the provisions required for sewerage works with adequate amendment and consolidation of provisions set forth in Municipal Ordinance.

The legal powers and their applications particularly relevant to sewerage management required in the proposed project are presented as follows.

Executive Power:

Section 49 and 50 : The power is given to local authority for which definition is made to include Municipal Council, to undertake the construction and maintenance of sewerage and drainage works.

Financial Power

It is of vital importance that a legal supports to financial operations are given to sewerage authorities especially if financially autonomous authority is required. The provisions for this purpose are significantly improved as against Municipal Ordinance.

Section 51: Local Authority is given power to recover the capital cost of the sewerage and drainage works including cost of land acquisition by means of frontage charge.

It is also authorized to recover the cost from any developper in such a manner that they may be claimed by way of deposit before developpers proceed to develop an area.

Section 64: Local Authority is given the powers to levy fees or charges as may be prescribed to be paid by the sewer users.

This section implies that the Local Authority may recover the cost for the sewerage operation and maintenance by setting fees in an appropriate manner as a surcharge to water consumption.

There is no particular reference to rate or tax as indicated by Section 59 of Municipal Ordinance. If the rate or tax is regarded as necessary to be included in rate structure of proposed sewerage works, the Section 59 of Municipal Ordinance should be applied.

Section 132: The power is given to Local Authority to establish "Improvement Service Fund". This Fund can be administered by Local Authority at its absolute discretion. This suggests that the completely separate account can be maintained for the capital investments and operation financing of sewerage services. This section, therefore, deemed to be appropriately applied to the financially autonomous management of proposed organization.

Required Use of Public Sewers

Section 58 (2) & (7): The power is given to require the owner(s) of any house or building the installment of water-closets, urinals, sinks, and bathrooms to be connected with public sewer if the public sewer is available within 100 ft of the boundary of the premises.

Above section stipulate the mandatory use of public sewers, however, it may be necessary to provide the stipulation requiring the such connetions to be made at the expense of the owner(s).

Private Sewage Disposal Systems

Section 58 (3) & (14): Private disposal systems as septic tank, and cesspool are allowed to be provided where there is no sewer under the direction of local Authority and such systems are required to be kept in proper order.

Section 62: Local Authority may in its discretion decide to take over the control, supervision, maintenance and repair of private septic tanks or other sewage purification plants to such extent that fees or charges may be levied.

There is no specific provision for such septic tank and cess-pool to be abandoned at such time a public sewer becomes available.

The mandatory use of public sewer as stipulated in Section 58 (2) should also be effectuated by provisions enforcing direct connection with sewers when it becomes available.

Plumbing

No specific provisions are found in this Act. for the control of the connection of public sewer with building disposal facilities. The Building By-Laws 1950 includes the provisions in its Article III - Works and Fittings.

Regulations on Discharge into Public Sewers

Section 55: The prior written permission is required to make any drain into any of the public sewers. No night-soil, excrementitious matter trade effluent can be discharged into sewers without prior written permission of Local Authority.

The discharge of trade effluent or industrial wastewaters are subject to specific conditions to be imposed by Local Authority.

There is a apparent need to control and regulate the quality, quantity and the manner of discharge into the sewerage systems in order to keep the satisfactory performance of the system's functions.

The domestic sewage may be controlled without providing specific conditions due to its constituent easily prescribed. The industrial wastewater should, however, be controlled by providing more specific and individual conditions.

There is a likelihood of attending problem in controlling the industrial wastewater because of different interests and opinions towards industrial development policy and control of the resultant waste. It will be necessary, however, to provide certain standards on which the owner(s) of industries and Local Authority can negotiate to achieve agreement satisfactory to both parties.

It is suggested here that the relevant articles of the model ordinance developed by the Sub-committee on Municipal Sewer Ordinances of the Water Pollution Control Federation of U.S.A. be utilized with appropriate modification to develop an acceptable standards on industrial wastewater control in Study Area.

Such articles relevant to control of discharge into sewers and/or sewage treatment plants are quoted below with minor adjustments.

Section 1. No person shall discharge or cause to be discharged any storm water, surface water, groundwater, roof runoff, subsurface drainage, uncontaminated cooling water, or unpolluted industrial process waters to any sanitary sewer.

Section2. Storm water and all other unpolluted drainage shall be discharged to such sewers as are specifically designated as combined sewers or storm sewers, or to a natural outlet approved by the Local Authority. Industrial cooling water or unpolluted process waters may be discharged, on approval of the Local Authority, to a storm sewer, combined sewer, or natural outlet.

Section 3. No person shall discharge or cause to be discharged any of the following described waters or wastes to any public sewers:

(a) Any gasoline, benzene, naphtha, fuel oil, or other flammable or explosive liquid, solid, or gas.

(b) Any waters or wastes containing toxic or poisonous solids, liquids, or gases in sufficient quantity, either singly or by interaction with other wastes, to injure or interfere with any sewage treatment process, constitute a hazard to humans or animals, create a public nuisance, or create any hazard in the receiving waters of the sewage treatment plant, including but not limited to cyanides in excess of two (2) mg/l as CN in the wastes as discharged to the public sewer.

(c) Any waters or wastes having a pH lower than 5.5, or having any other corrosive property capable of causing damage or hazard to structures, equipment, and personnel of the sewage works.

(d) Solid or viscous substances in quantities or of such size capable of causing obstruction to the flow in sewers or other interference with the proper operation of the sewage works such as, but not limited to, ashes, cinders, sand, mud, straw, shavings, metal, glass, rags, feathers, tar, plastics, wood, unground garbage, whole blood, paunch manure, hair and fleshings, entrails and paper dishes, cups, milk containers, etc. either whole or ground by garbage grinders.

Section 4. Np person shall discharge or cause to be discharged the following described substances, materials, waters, or wastes if it appears likely in the opinion of the Local Authority that such wastes can harm either the sewage treatment process, or equipment, have an adverse effect on the receiving stream, or can otherwise endanger life, limb, public property, or constitute a nuisance. In forming his opinion as to the acceptability of these wastes, the Local Authority give consideration to such factors as the quantities of subject wastes in relation to flows and velocities in the sewers, materials of construction of the sewers, nature of the sewage treatment process, capacity of the sewage treatment plant, degree of treatability of wastes in the sewage treatment plant, and other pertinent factors. The substances prohibited are:

(a) Any liquid or vapor having a temperature higher than sixty-five (65)°C.

(b) Any water or waste containing fats, wax, grease, or oils, whether emulsified, or not, in excess of one hundred (100) mg/l or containing substances which may solidify or become viscous at temperatures between zero(0)° and sixty-five (65)°C.

(c) Any waters or wastes containing strong acid, iron, pickling wastes, or concentrated plating solutions whether neutralized or not.

(d) Any waters or wastes containing strong acid, iron, pickling wastes, or concentrated plating solutions whether neutralized or not.

(e) Any waters or wastes containing phenols or other taste-or odor-producing substances, in such concentrations exceeding limits which may be established by the Local Authority as necessary, after treatment of the composite sewage, to meet the requirements of the Government of Malaysia for such discharge to the receiving waters.

(f) Any radioactive wastes or isotopes of such half-life or concentration as may exceed limits established by the Local Authority in compliance with applicable regulations.

(g) Any waters or wastes having a pH in excess of 9.5.

(h) Materials which exert or cause:

(1) Unusual concentrations of inert suspended solids (such as, but not limited to, Fullers earth, lime slurries, and lime residues) or of dissolved solids (such as, but not limited to, sodium chloride and sodium sulfate).

(2) Excessive discoloration (such as, but not limited to, dye wastes and vegetable tanning solutions).

(3) Unusual BOD, chemical oxygen demand, or chlorine requirements in such quantities as to constitute a significant load on the sewage treatment works.

(4) Unusual volume of flow or concentration of wastes constituting "Slugs" as defined herein.

(i) Waters or wastes containing substances which are not amenable to treatment or reduction by the sewage treatment processes employed, or are amenable to treatment only to such degree that the sewage treatment plant effluent can not meet the requirements of other agencies having jurisdiction over discharge to the receiving waters.

Section 5. If any waters or wastes are discharged or are proposed to be discharged to the public sewers, which waters contain the substances or possess the characteristics enumerated in Section 4 and which in the judgment of the Local Authority may have a deleterious effect upon the sewage works, processes, equipment, or receiving waters, or which otherwise create a hazard to life or constitute a public nuisance, the Local Authority:

(a) Reject the wastes.

(b) Require pretreatment to an acceptable condition for discharge to the public sewers.

(c) Require control over the quantities and rates of discharge, and/or

(d) Require payment to cover the added cost of handling and treating the wastes not covered by existing taxes or sewer charges under the provisions of Section 10.

If the Local Authority permits the pretreatment or equalization of waste flows, the design and installation of the plants and equipment shall be subject to the review and approval of the Local Authority and subject to the requirements of all applicable codes, ordinances, and laws.

Section 6. Grease, oil, and sand interceptors shall be provided when, in the opinion of the Local Authority, they are necessary for the proper handling of liquid wastes containing grease in excessive amounts, or any flammable wastes, sand, or other harmful ingredients; except that such interceptors shall not be required for private living quarters or dwelling units. All interceptors shall be of a type and capacity approved by the Local Authority, and shall be located as to be readily and easily accessible for cleaning and inspection.

Section 7. Where preliminary treatment or flow-equalizing facilities are provided for any waters or wastes, they shall be maintained continuously in satisfactory and effective operation by the owner at his expense.

Section 8. When required by the Local Authority the owner of any property serviced by a building sewer carrying industrial wastes shall install a suitable control manhole together with such necessary meters and other appurtenances in the building sewer to facilitate observation, sampling, and measurement of the wastes. Such manhole, when required, shall be

accessibly and safely located and shall be constructed in accordance with plans approved by the Local Authority. The manhole shall be installed by the owner at his expense, and shall be maintained by him so as to be safe and accessible at all times.

Section 9. All measurements, tests, and analyses of the characteristics of waters and wastes to which reference is made in this ordinance shall be determined in accordance with the latest edition of "Standard Methods for the Examination of Water and Wastewater", published by the American Public Health Association, and shall be determined at the control manhole provided, or upon suitable samples taken at said control manhole. In the event that no special manhole has been required, the control manhole shall be considered to be the nearest downstream manhole in the public sewer to the point at which the building sewer is connected. Sampling shall be carried out by customarily accepted methods to reflect the effect of constitutents upon the sewage works and to determine the existence of hazards to life, limb, and property. (The particular analyses involved will determine whether a twenty-four (24) hour composite of all outfalls of a premise is appropriate or whether a grab sample or samples should be taken. Normally, but not always, BOD and suspended solids analyses are obtained from 24-hr. composites of all outfalls whereas pH's are determined from periodic grab samples.)

Section10. No statement contained in this article shall be construed as preventing any special agreement or arrangement between the Local Authority and any industrial concern whereby an industrial waste of unusual strength or character may be accepted by the Local Authority for treatment, subject to payment therefore, by the industrial concern.

Other Provisions

The Local Authority is empowered to enter into any private property or premises to execute the works as altering, enlarging, repairing or cleaning the sewers and drains by Sections 52 and 53.

Section 97 reads in part "Any Local Authority may, for the purposes of this Act, ... enter at all reasonable hours .... any building or land as well for the purpose of making any survey or inspection as for the purpose of executing any work authorized by this Act ..... Section 122, 123, 124, 125, 126 provide legal procedures as court trial, prosecution, conviction, arrest for any person guilty of an offence under this Act or any by-laws made thereunder.

All sections as above mentioned are deemed necessary for achieving the basic objectives of the sewerage operations of MCPW. It should be noted, however, the certain sections of Municipal Ordinance and Street, Drainage and Building Act, 1974 overlap. The sections of Drainage and Building Act, 1974 are proposed to be applied in these cases.

3.4 The Environmental Quality Act, 1974

Under this Act, the Minister is appointed to be charged with the responsibility for environmental protection of whole of Malaysia.

Under this Minister, Director General of Environmental Quality is appointed to execute all activities required to environmental pollution control. The Environmental Quality Council is also established as an advisory council consisting of the members representing various kinds of authorities and institutions.

The provisions which have direct or indirect bearings on sewerage works are section 21, 24 and 25 for regulation on discharge of waste into soil, land and inland waters and sections 26, 27 and 29 on oil discharge into Malaysian waters, and Section 31 which enforce the provision of adequate equipment to control and eliminate polluted waste from industries.