

MASTER PLAN AND FEASIBILITY STUDY  
FOR  
SEWERAGE AND DRAINAGE SYSTEM PROJECT  
IN  
ALOR SETAR AND ITS URBAN ENVIRONS  
MALAYSIA

VOLUME VIII  
DRAWINGS  
FOR  
VOLUMES II, IV AND V

MARCH 1981

JAPAN INTERNATIONAL COOPERATION AGENCY

SDF

81-39(8/8)

VOLUME VIII  
PRELIMINARY ENGINEERING DRAWINGS AND MAPS

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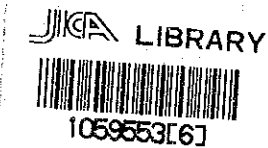
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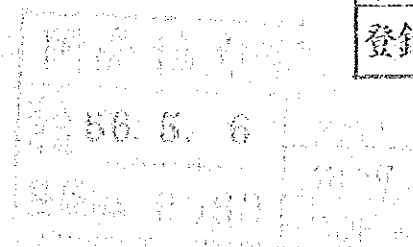
Note: SM, SF, and DF attached to Figure Numbers refer to Sewerage Master Plan, Sewerage Feasibility Study, and Drainage Feasibility Study respectively.

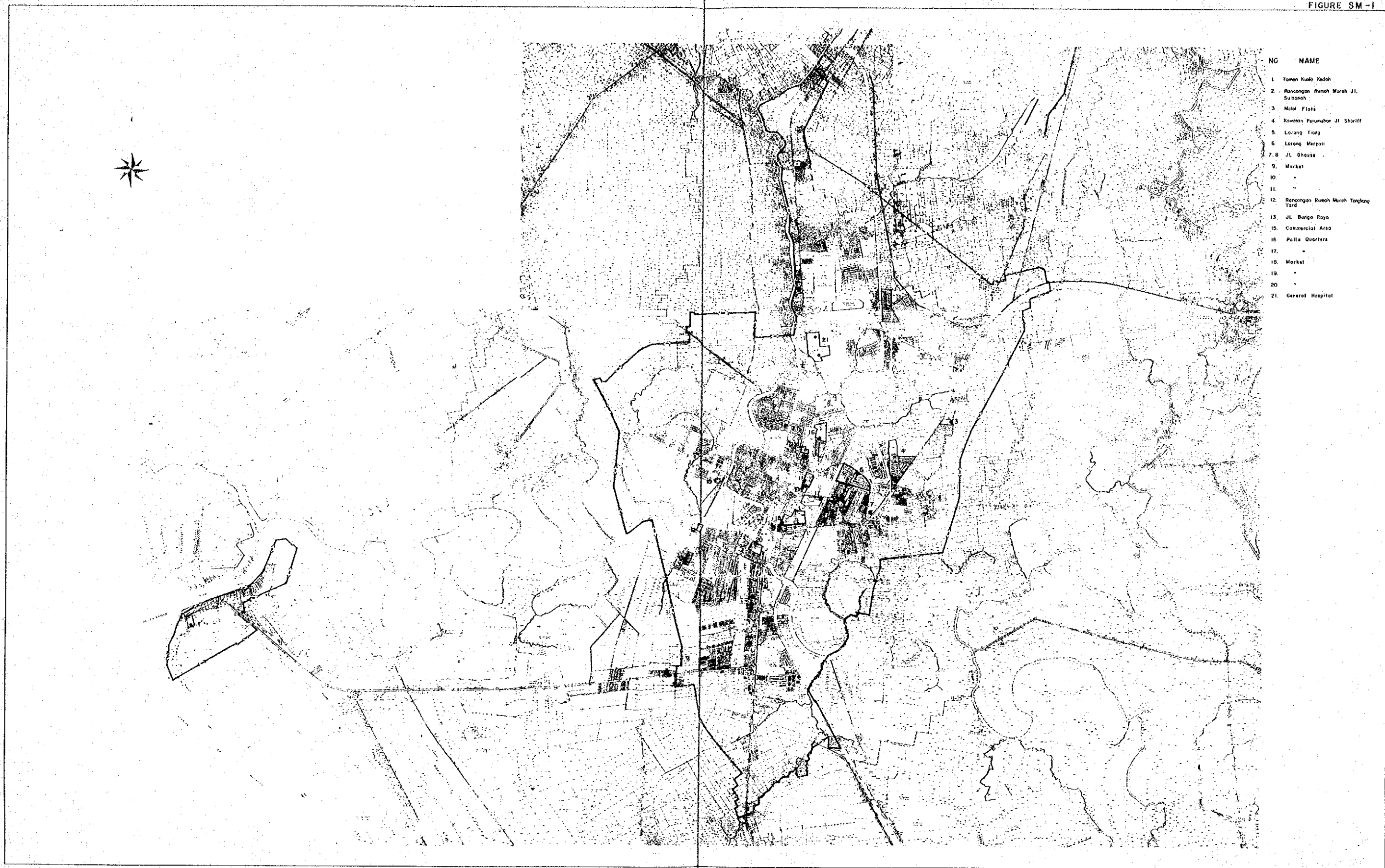
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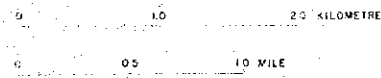
国際協力事業団	
受入 月日	'84. 5. 16
登録No.	04732
	113 61.8 SDF





- | NO  | NAME                               |
|-----|------------------------------------|
| 1   | Taman Kuala Kedah                  |
| 2   | Rancangan Rumah Muzah Jl. Sultanah |
| 3   | Makul Flora                        |
| 4   | Kawasan Perumahan Jl. Shoriff      |
| 5   | Lorong Troop                       |
| 6   | Lorong Marpati                     |
| 7,8 | Jl. Ghause                         |
| 9   | Market                             |
| 10  | "                                  |
| 11  | "                                  |
| 12  | Rancangan Rumah Muzah Tongkat Yard |
| 13  | Jl. Bangs Raja                     |
| 15  | Commercial Area                    |
| 16  | Polla Quadrata                     |
| 17  | "                                  |
| 18  | Market                             |
| 19  | "                                  |
| 20  | "                                  |
| 21  | General Hospital                   |

SCALE  
1:20000



LEGEND

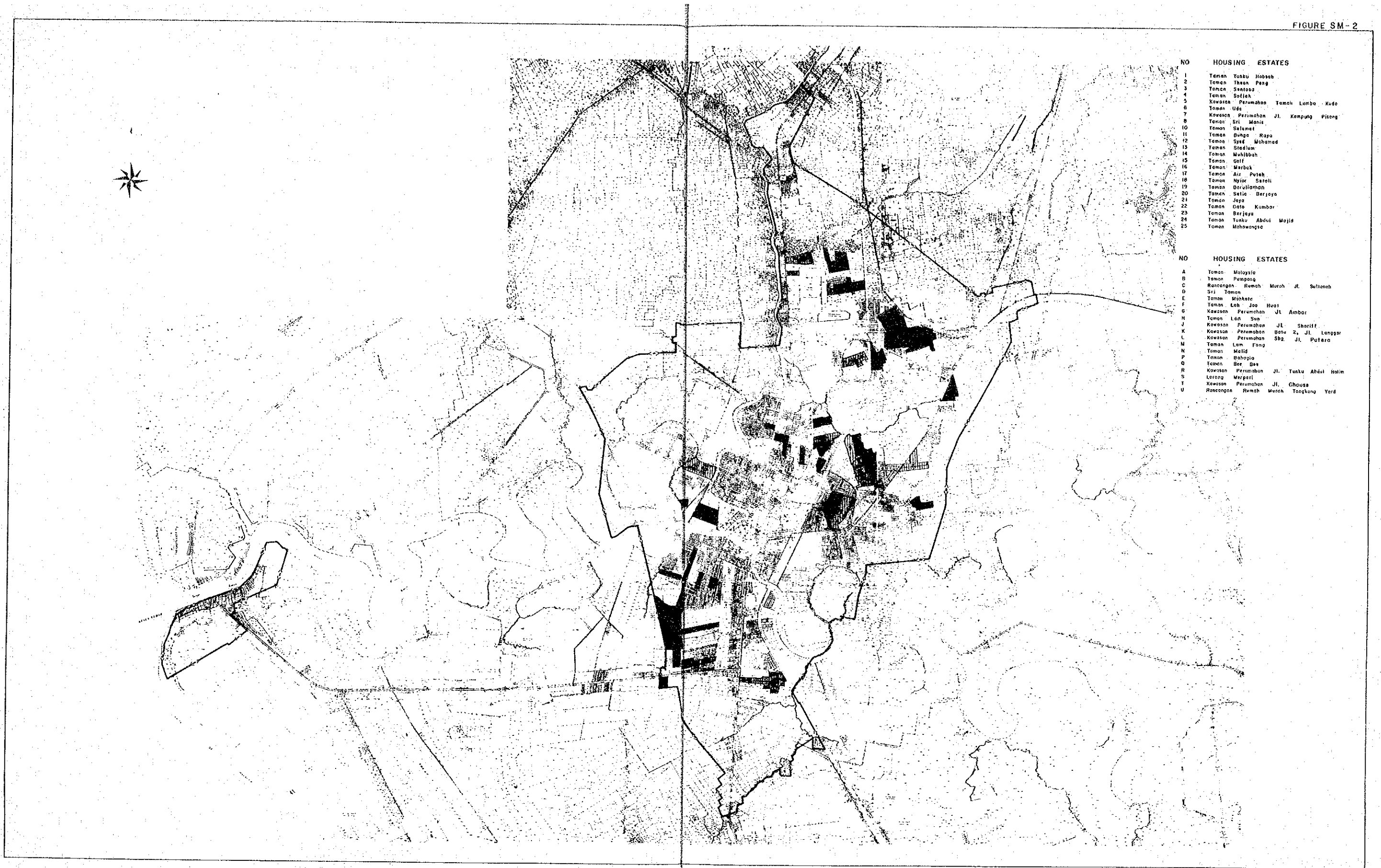
- Boundary of Study Area
- Location of Communal Septic Tank
- Served Area of Communal Septic Tank

MASTER PLAN AND FEASIBILITY STUDY FOR  
SEWERAGE AND DRAINAGE SYSTEM PROJECT IN  
ALOR SETAR AND ITS URBAN ENVIRONS

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LOCATIONS AND SERVED AREAS  
BY EXISTING COMMUNAL  
SEPTIC TANKS

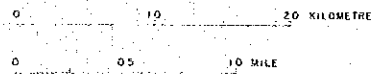
FIGURE  
SM-1



- | NO | HOUSING ESTATES                      |
|----|--------------------------------------|
| 1  | Taman Tuanku Jabbar                  |
| 2  | Taman Thean Peng                     |
| 3  | Taman Sentosa                        |
| 4  | Taman Sedjak                         |
| 5  | Kawasan Perumahan Taman Lumbo - Kudo |
| 6  | Taman Uda                            |
| 7  | Kawasan Perumahan Jl. Kempung Pitang |
| 8  | Taman Sri Manis                      |
| 10 | Taman Selamat                        |
| 11 | Taman Bunga Raya                     |
| 12 | Taman Suci Mahamad                   |
| 13 | Taman Stadium                        |
| 14 | Taman Muhibbah                       |
| 15 | Taman Golf                           |
| 16 | Taman Maybak                         |
| 17 | Taman Air Putih                      |
| 18 | Taman Nyior Sateli                   |
| 19 | Taman Daruliman                      |
| 20 | Taman Setia Berjaya                  |
| 21 | Taman Jaya                           |
| 22 | Taman Gato Kumbang                   |
| 23 | Taman Berjaya                        |
| 24 | Taman Tuanku Abdul Majid             |
| 25 | Taman Mahawangsa                     |

- | NO | HOUSING ESTATES                          |
|----|--|
| A  | Taman Malaysia                           |
| B  | Taman Perwaja                            |
| C  | Rancangan Ruruh Murah Jl. Sultanah       |
| D  | Siti Taman                               |
| E  | Taman Mahkota                            |
| F  | Taman Loh Joo Huar                       |
| G  | Kawasan Perumahan Jl. Ambar              |
| H  | Taman Lela Sun                           |
| J  | Kawasan Perumahan Jl. Shariff            |
| K  | Kawasan Perumahan Batu 2, Jl. Longgar    |
| L  | Kawasan Perumahan Sbg. Jl. Putera        |
| M  | Taman Lum Fong                           |
| N  | Taman Malid                              |
| P  | Taman Bahagia                            |
| Q  | Taman Bee Bee                            |
| R  | Kawasan Perumahan Jl. Tuanku Abdul Halim |
| S  | Lorong Mergil                            |
| T  | Kawasan Perumahan Jl. Ghausa             |
| U  | Rancangan Ruruh Murah Tongkang Yard      |

SCALE  
1:20 000



LEGEND

- Boundary of Study Area
- Location of Development Area after 1970
- Location of Development Area Between 1962 to 1968

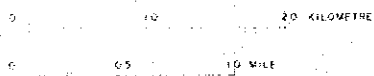
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









LOCATIONS OF EXISTING HOUSING DEVELOPMENT AREAS    FIGURE SM-2



SCALE  
1:20,000



LEGEND

-  Boundary of Study Area
-  Commercial Area
-  Residential Area
-  Industrial Area
-  School Area
-  Open Space & Park Etc. Area
-  Mosque Area
-  Paddy Field Area
-  Railway
-  River

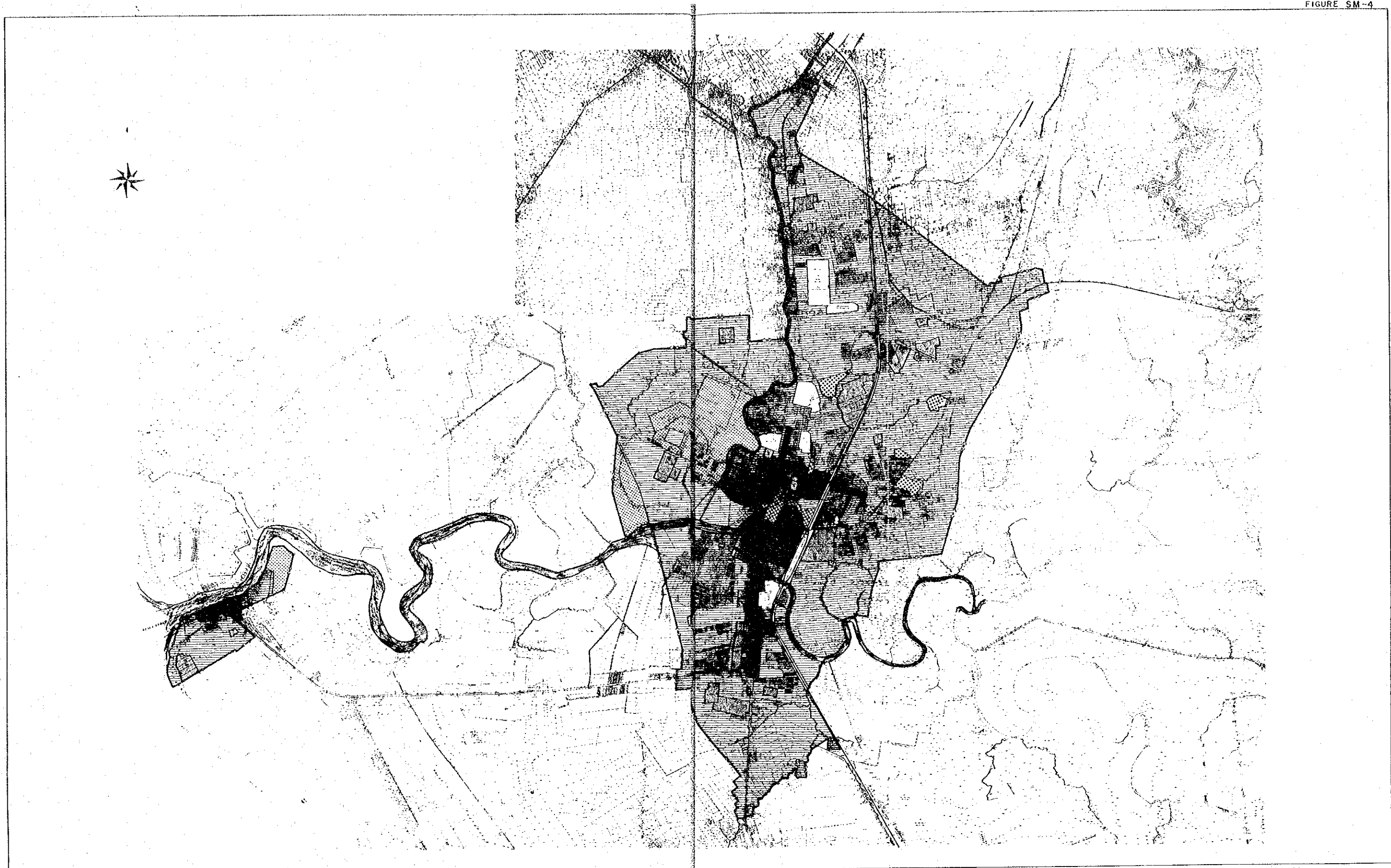
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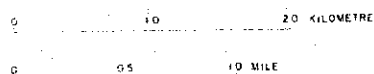
LAND USES IN 1979

FIGURE  
SM-3





SCALE  
1:20,000



LEGEND

- Boundary of Study Area
- Institutional Area
- Commercial Area
- Residential Area
- Industrial Area
- School Area
- Mosque Area
- Open Space (Vacant) Area
- Railway
- River

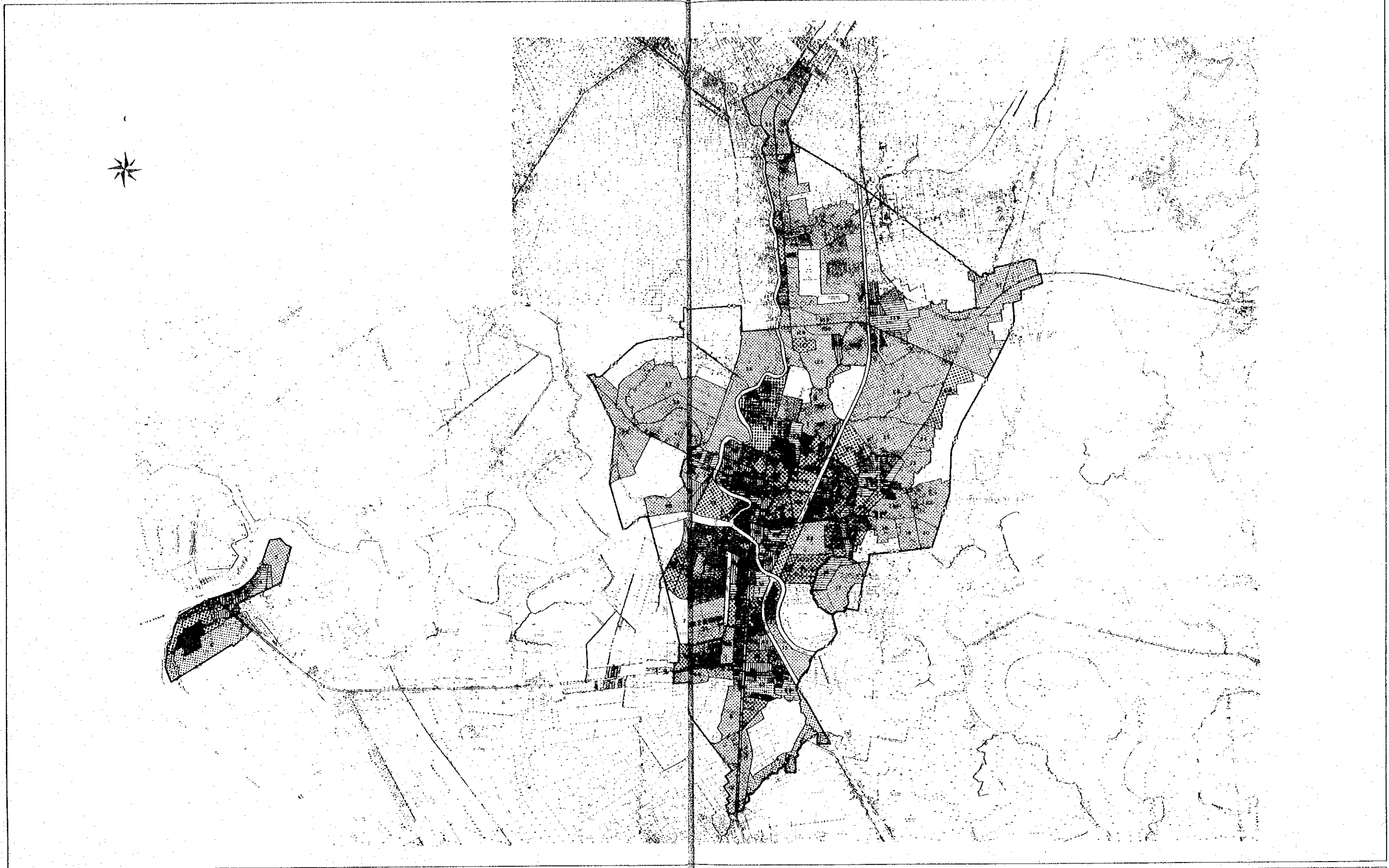
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ALOR SETAR AND ITS URBAN ENVIRONS

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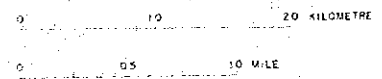
LAND USES IN 2000

FIGURE

SM-4



SCALE  
1:20,000



LEGEND

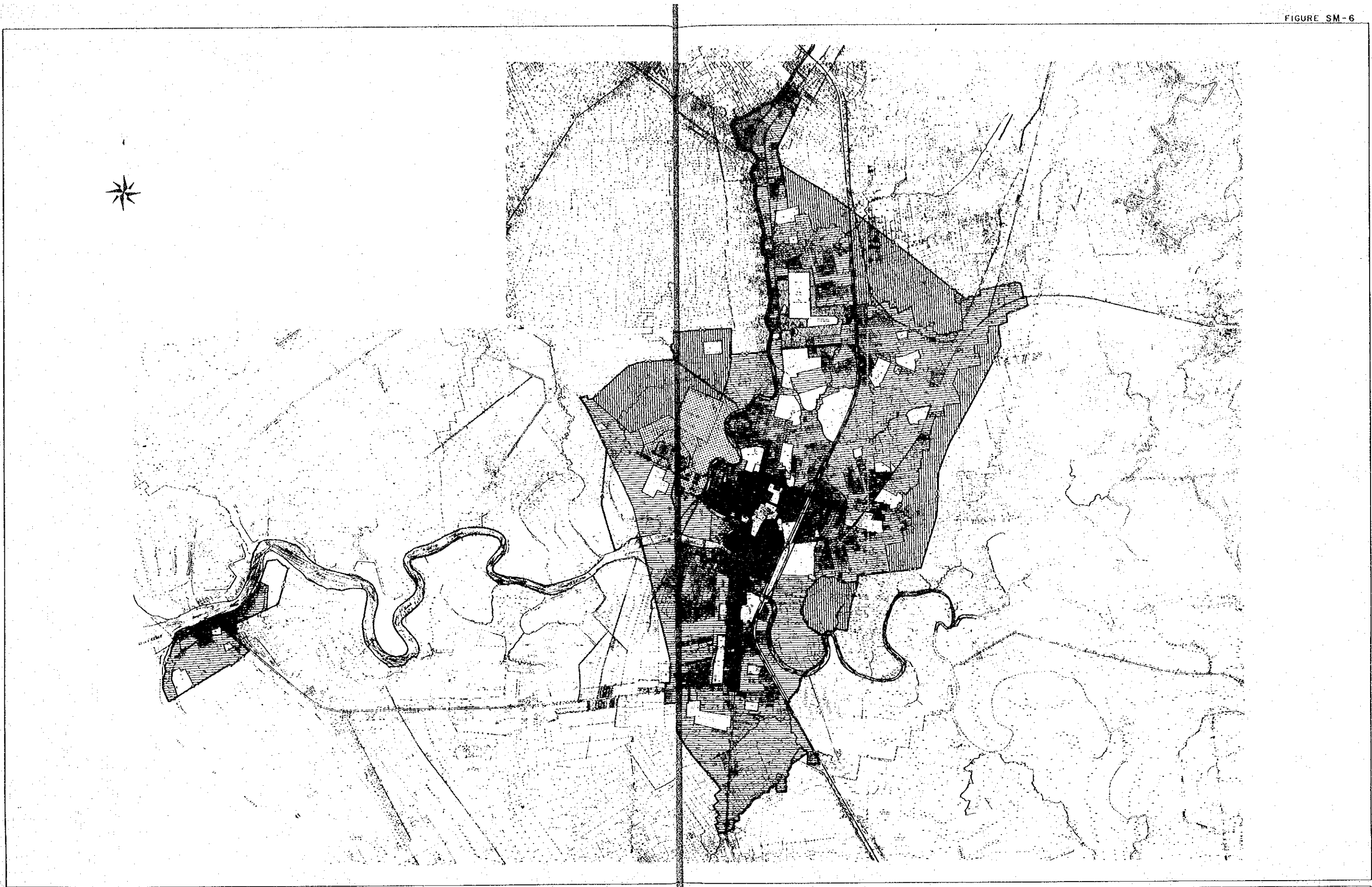
- Boundary of Study Area
- 0 Person / ha
- 1 - 49 Persons / ha
- 50 - 99 Persons / ha
- 100 - 149 Persons / ha
- 150 - 199 Persons / ha
- 200 - 249 Persons / ha
- 250 - Persons / ha

MASTER PLAN AND FEASIBILITY STUDY FOR  
SEWERAGE AND DRAINAGE SYSTEM PROJECT IN  
ALOR SETAR AND ITS URBAN ENVIRONS

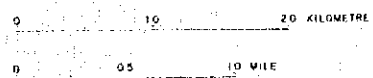
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POPULATION DISTRIBUTION IN 1979

FIGURE SM-5



SCALE  
1:20 000



LEGEND

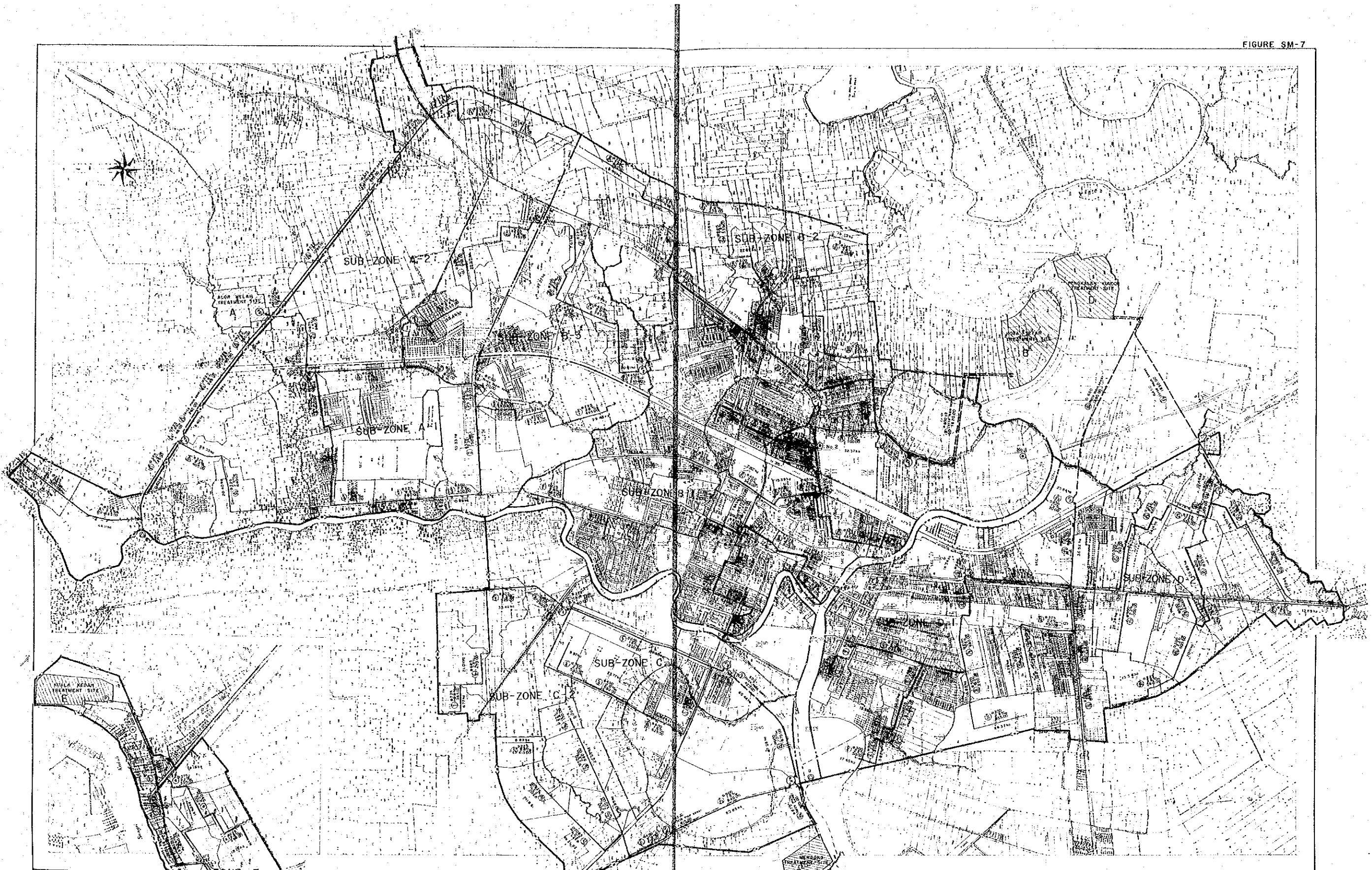
- |   |  |
|---|--|
| Boundary of Study Area                        | ①: Sultan's Palace, 150 persons                |
| Commercial Area, 200 persons/ha               | ②: Kedah Club, 1100 persons                    |
| Residential Area, 120 persons/ha              | ③: Police Quarter, 780 persons                 |
| Residential Area, 61.7 persons/ha             | ④: Aler Motel Fleet, 940 persons               |
| Industrial Area, North Mergong 100 persons/ha | ⑤: Mergong Housing Estate, 2000 persons        |
| Others 0 person/ha                            | ⑥: Tong Keag Yard Housing Estate, 1000 persons |
| Railway                                       |  |
| River   |  |

MASTER PLAN AND FEASIBILITY STUDY FOR  
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PROJECTED POPULATION DISTRIBUTION IN 2000  
FIGURE SM-6





SCALE  
1:10,000  
0 10 KILOMETRE  
0 0.5 MILE

- LEGEND**
- Boundary of Master Plan Study Area
  - Boundary of sewerage zone
  - Boundary of sewerage sub-zone
  - A: Sewer number
  - Ø225 Sewer diameter (mm)
  - 2.8% Slope
  - 420.00 Sewer length (m)
  - 19.01ha Served area for each sewer
  - Potential area for determination of sewer capacity
  - ▨ Proposed treatment site
  - Tr. sewer
  - Lateral and lateral sewer
  - Tr. main sewer
  - ⊕ Tr. pumping station
  - ⊙ Tr. boring point
  - ⊙ Manhole point

MASTER PLAN AND FEASIBILITY STUDY FOR  
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PLAN OF PROPOSED SEWERAGE SYSTEM    FIGURE SM-7

FIGURE SM - 8 - 1

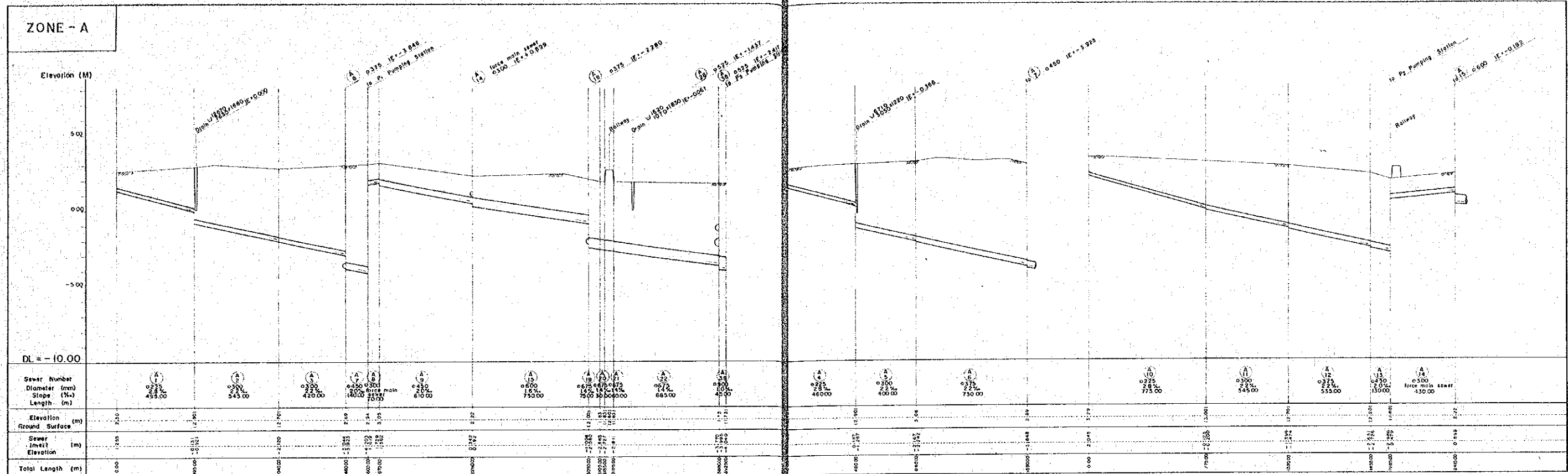
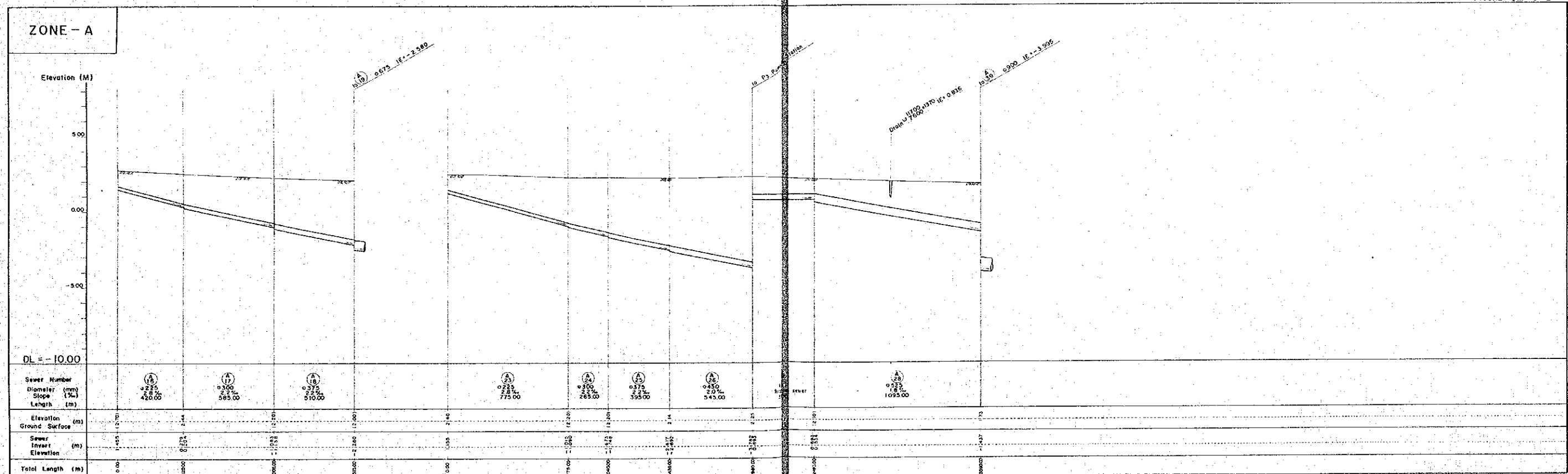


FIGURE SM - 8 - 2

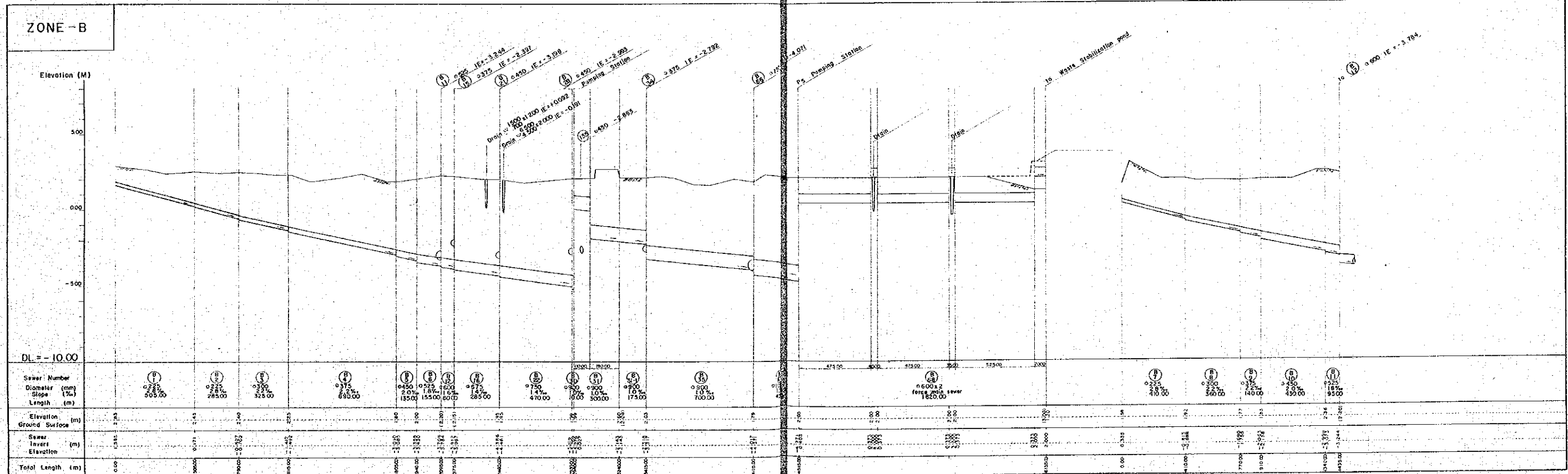
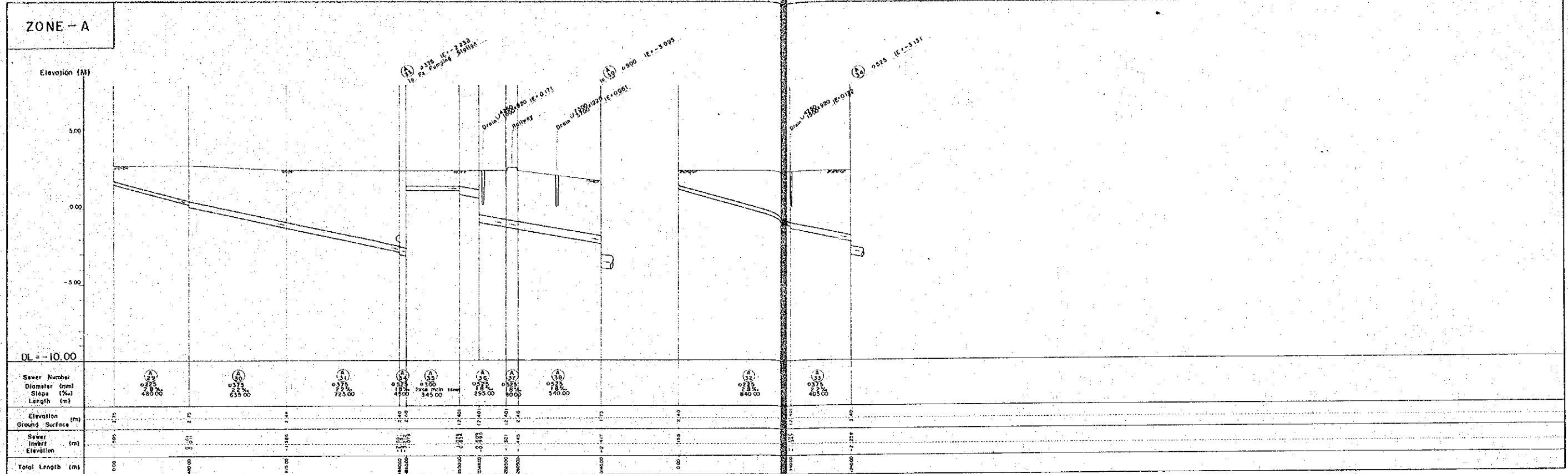


SCALE  
Horizontal 1 : 10,000  
Vertical 1 : 100

MASTER PLAN AND FEASIBILITY STUDY FOR SEWERAGE AND DRAINAGE SYSTEM PROJECT IN ALOR SETAR AND ITS URBAN ENVIRONS

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PROFILE OF PROPOSED SEWERS / FIGURE SM - 8



SCALE  
 Horizontal 1 : 10,000  
 Vertical 1 : 100

MASTER PLAN AND FEASIBILITY STUDY FOR SEWERAGE AND DRAINAGE SYSTEM PROJECT IN ALOR SETAR AND ITS URBAN ENVIRONS

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PROFILE OF PROPOSED SEWERS      FIGURE SM-9

FIGURE SM-10-1

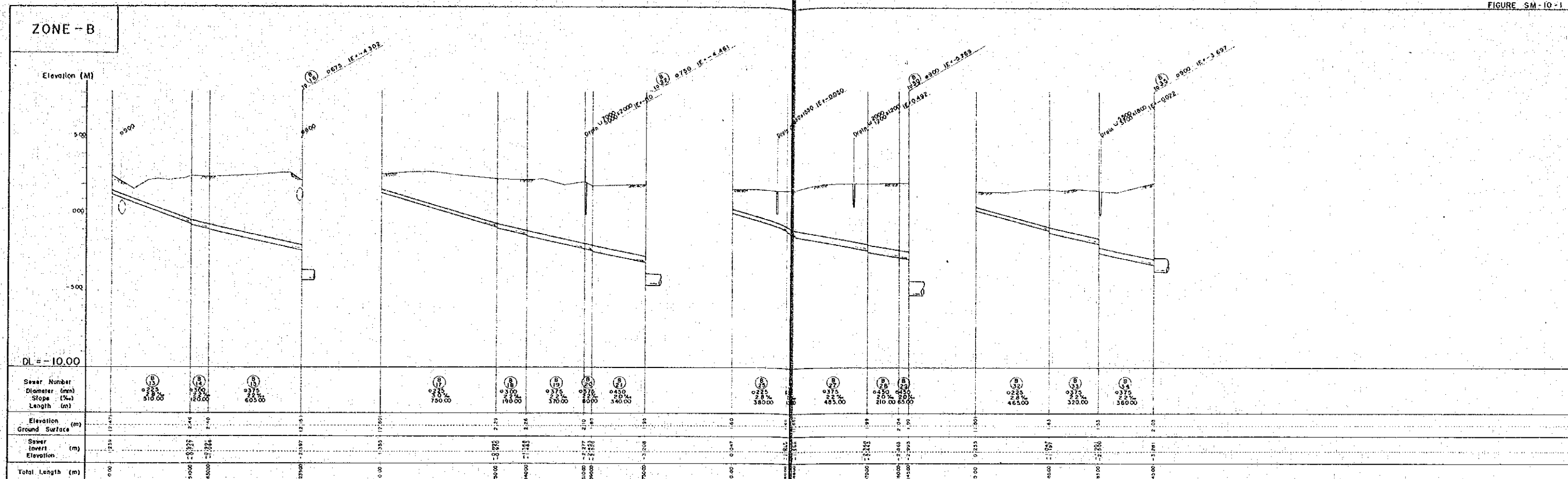
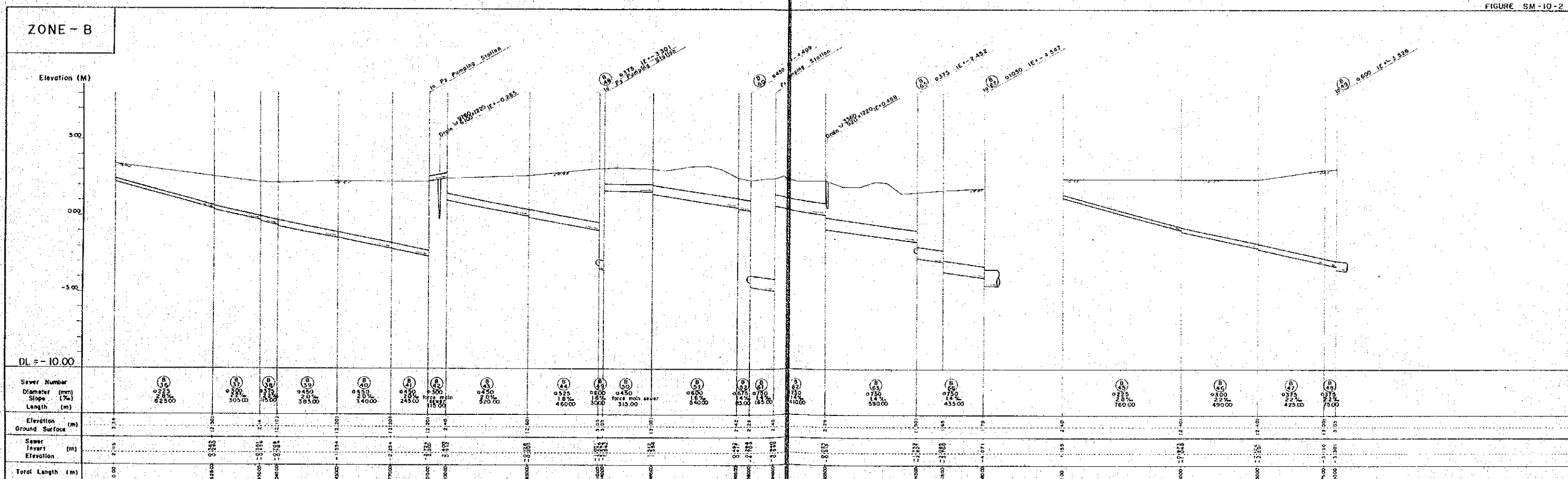
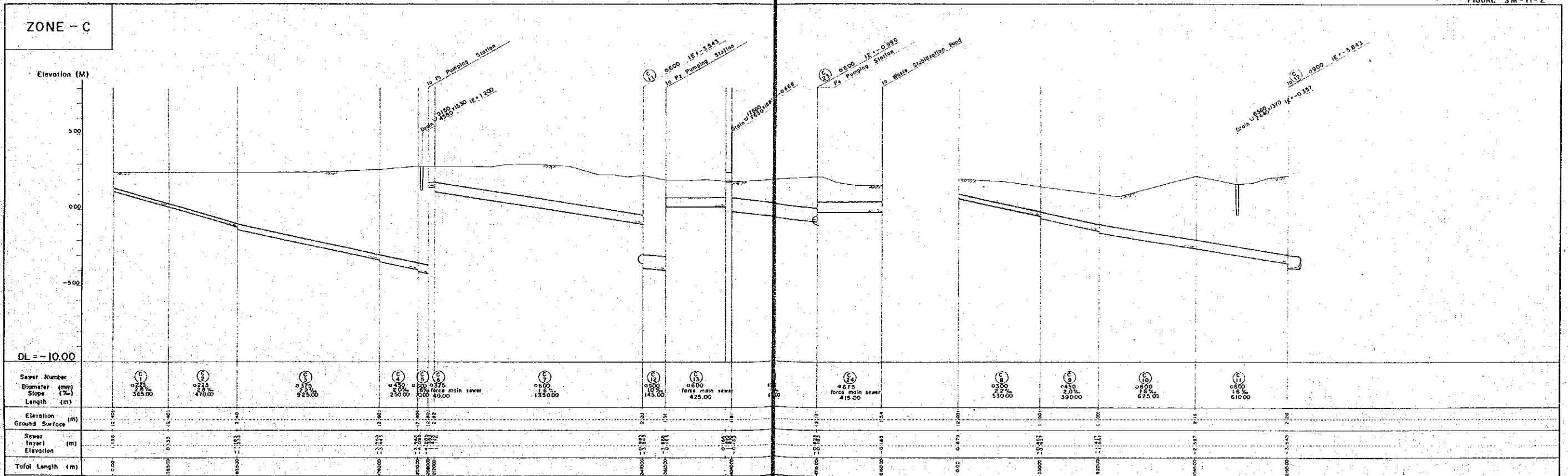
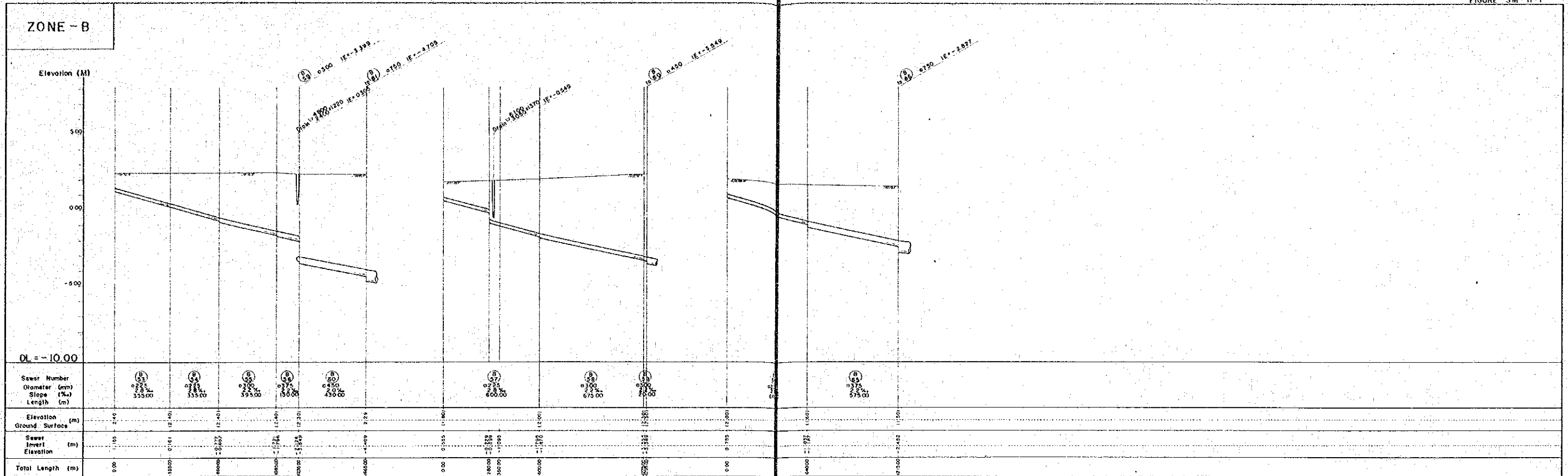


FIGURE SM-10-2

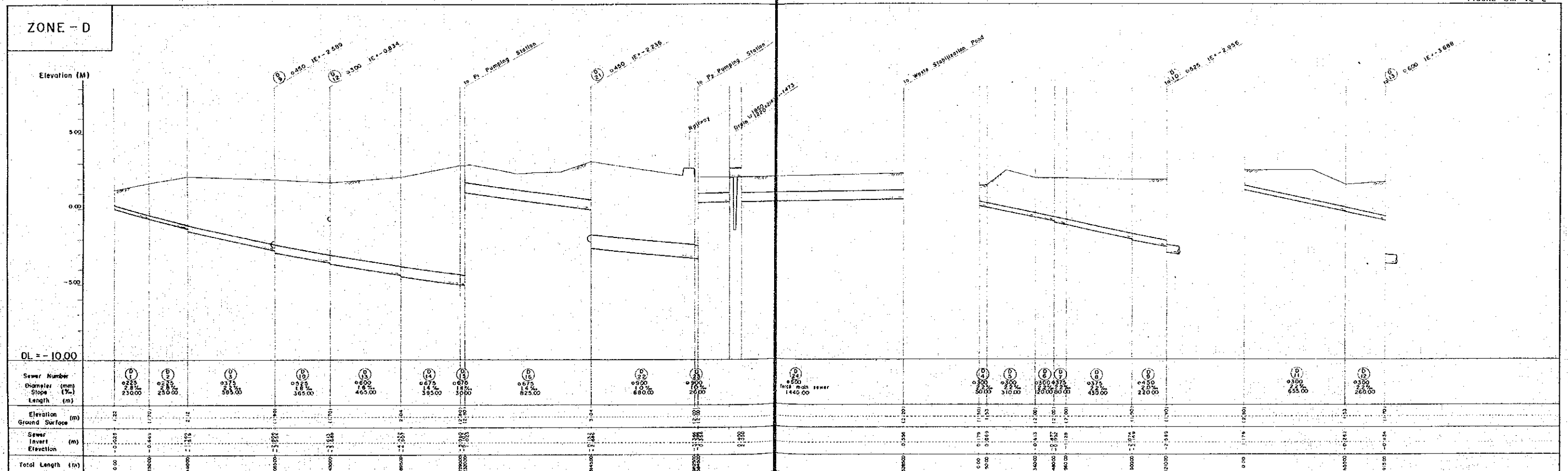
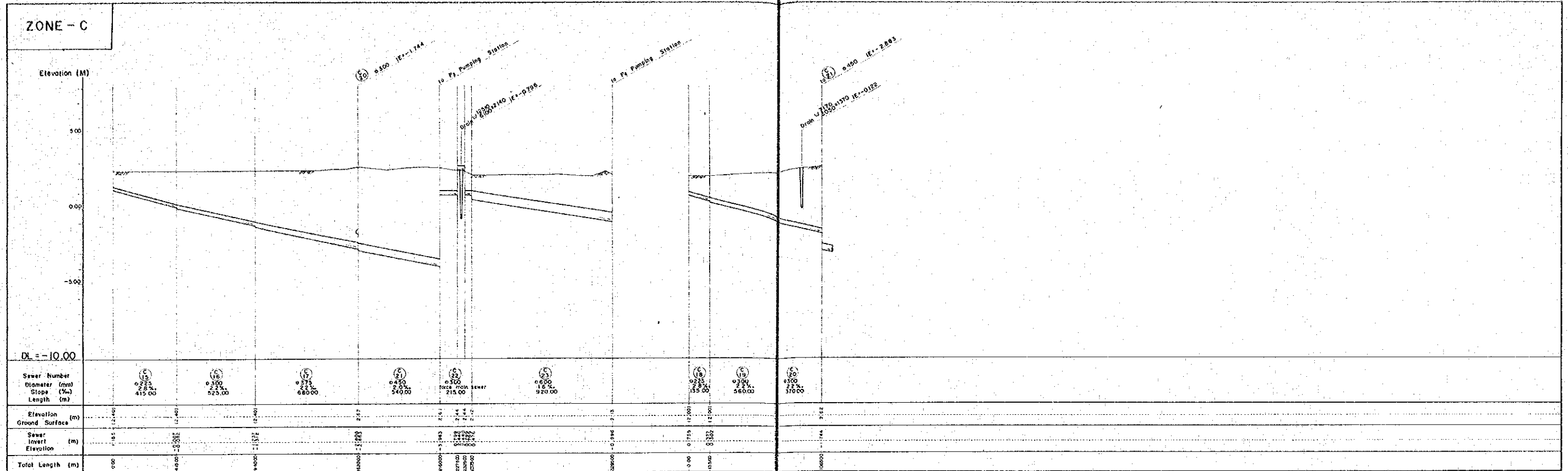


SCALE  
 Horizontal 1 : 10,000  
 Vertical 1 : 100

MASTER PLAN AND FEASIBILITY STUDY FOR SEWERAGE AND DRAINAGE SYSTEM PROJECT IN ALOR SETAR AND ITS URBAN ENVIRONS	
JAPAN INTERNATIONAL COOPERATION AGENCY	NIHON SUDO CONSULTANTS CO.,LTD. TOKYO, JAPAN
PROFILE OF PROPOSED SEWERS	FIGURE SM-10







SCALE  
Horizontal 1 : 10,000  
Vertical 1 : 100

MASTER PLAN AND FEASIBILITY STUDY FOR SEWERAGE AND DRAINAGE SYSTEM PROJECT IN ALOR SETAR AND ITS URBAN ENVIRONS

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PROFILE OF PROPOSED SEWERS      FIGURE SM-12

FIGURE SM-13-1

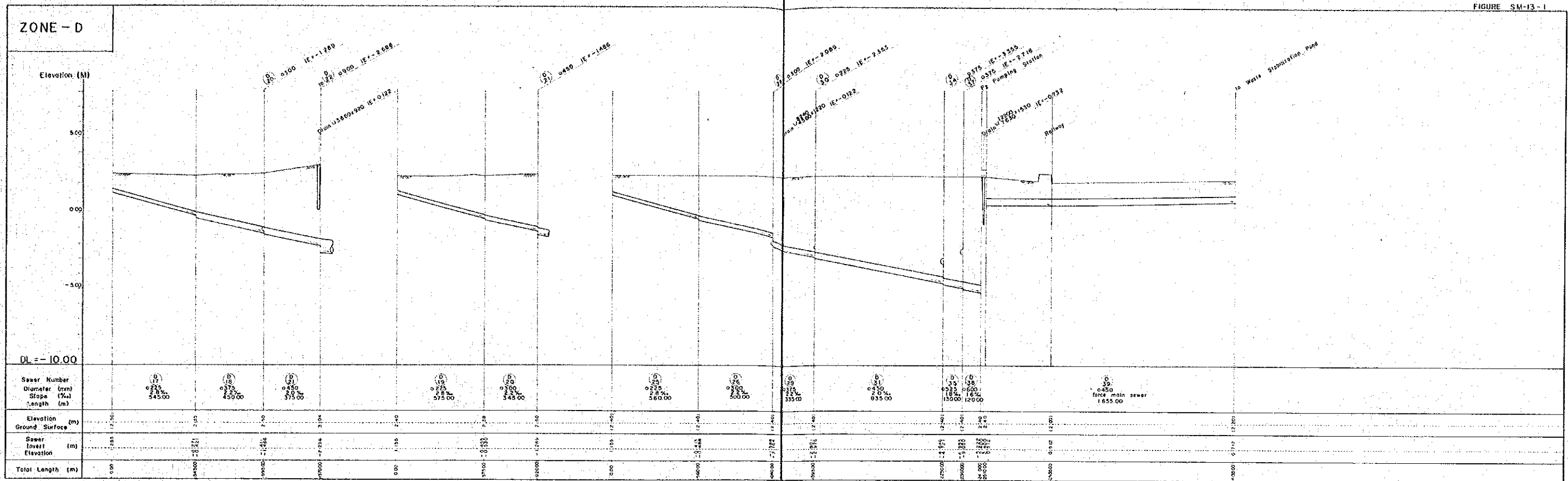
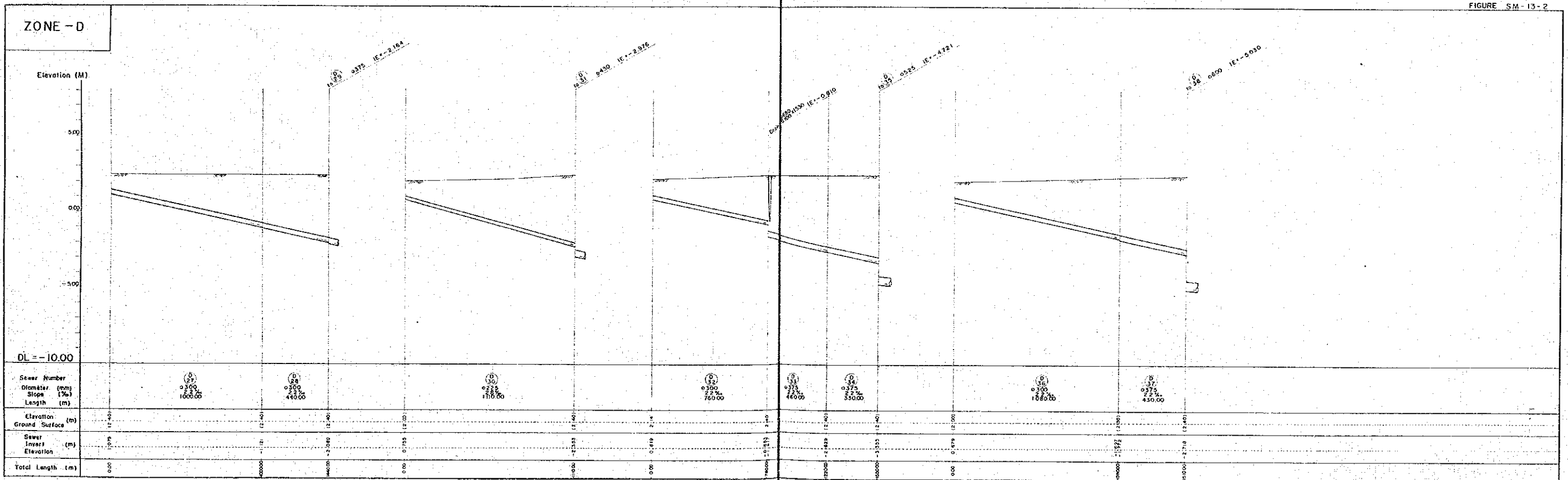


FIGURE SM-13-2



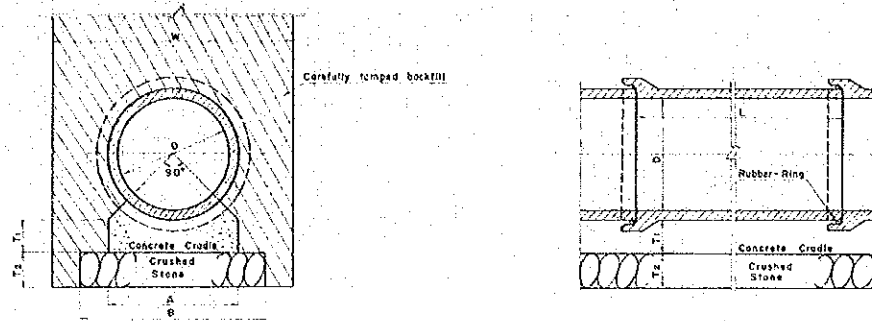
SCALE  
Horizontal 1 : 10,000  
Vertical 1 : 100

MASTER PLAN AND FEASIBILITY STUDY FOR SEWERAGE AND DRAINAGE SYSTEM PROJECT IN ALOR SETAR AND ITS URBAN ENVIRONS	
JAPAN INTERNATIONAL COOPERATION AGENCY	NIHON SUDO CONSULTANTS CO.,LTD. TOKYO, JAPAN
PROFILE OF PROPOSED SEWERS	FIGURE SM-13



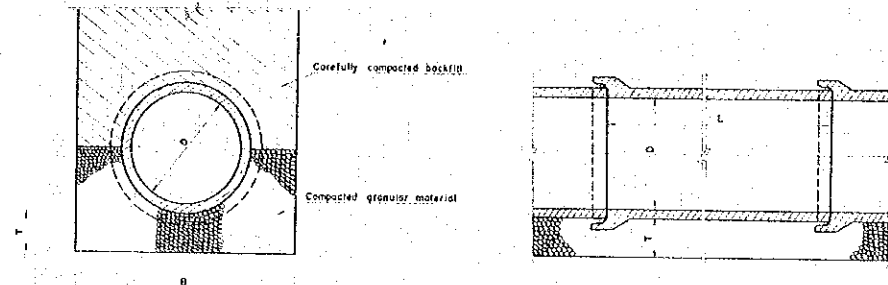
PIPE BEDDING DETAILS

CONCRETE CRADLE BEDDING



Dimensions in mm						
D	L	A	T <sub>1</sub>	B	T <sub>2</sub>	W
225	910	300	120	470	120	1100
300	910	350	120	560	120	1100
375	1830	400	120	660	120	1100
450	3050	550	150	750	150	1150
525	3050	630	180	830	150	1200
600	3050	700	150	900	150	1350
675	3050	800	180	1000	180	1500
750	3050	900	180	1100	180	1550
800	3050	1050	180	1250	180	1750

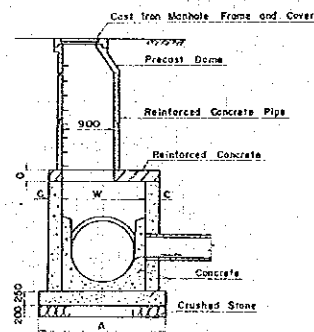
COMPACTED GRANULAR BEDDING



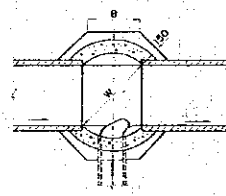
Dimension in mm			
D	L	T	B
225	910	90	1100
300	910	120	1100
375	1830	150	1100
450	3050	180	1150
525	3050	180	1200

MANHOLE STRUCTURE

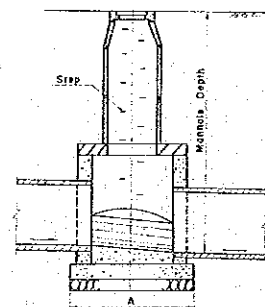
CROSS SECTION



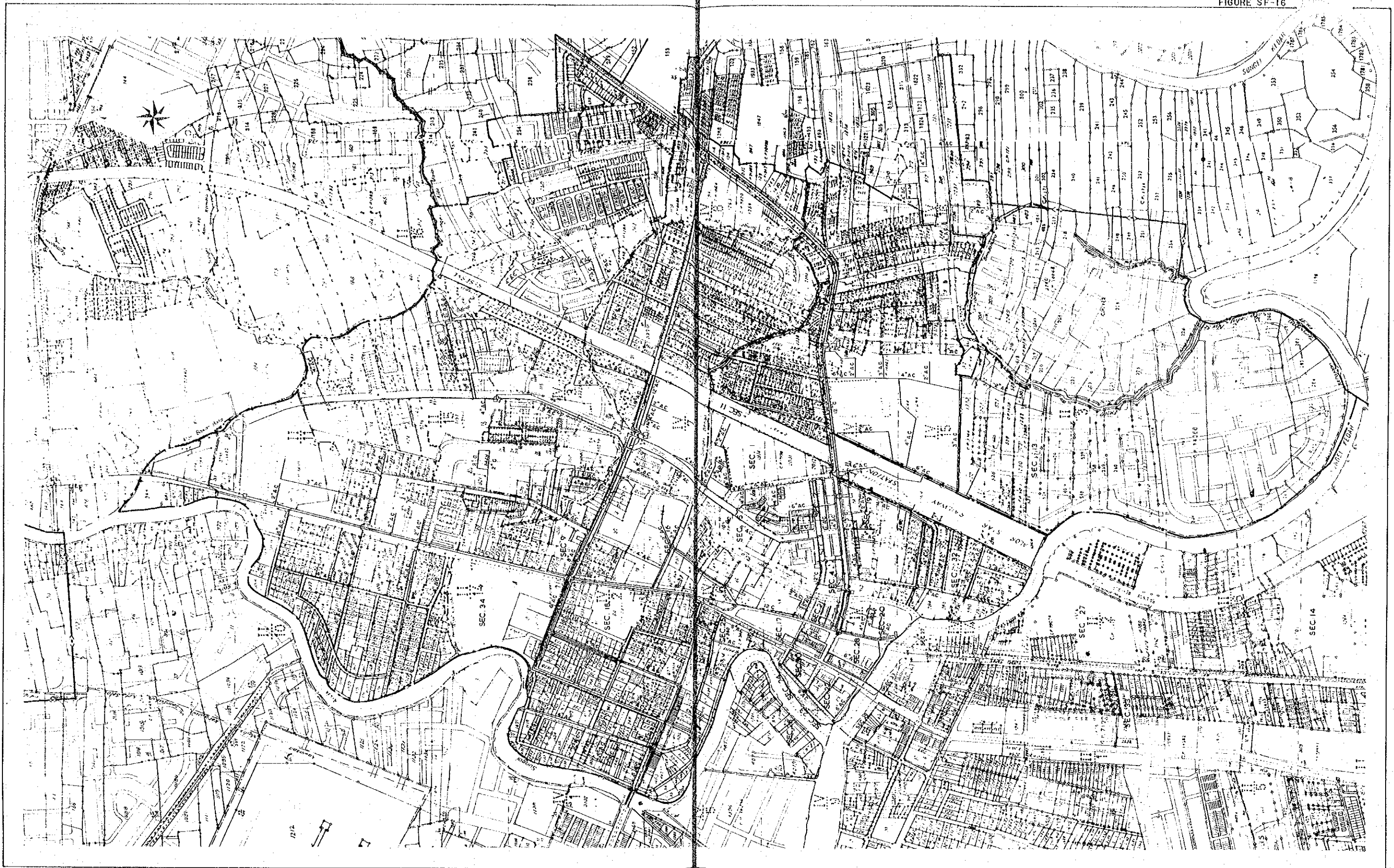
SECTIONAL PLAN



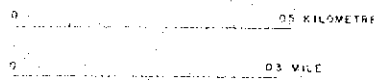
VERTICAL SECTION



Dimensions in mm					
Type of Manhole	W	A	B	C	D
I	1,200	2,000	830	250	200
II	1,500	2,300	950	250	200
III	1,800	2,700	1,120	300	250



SCALE  
1:5,000



LEGEND

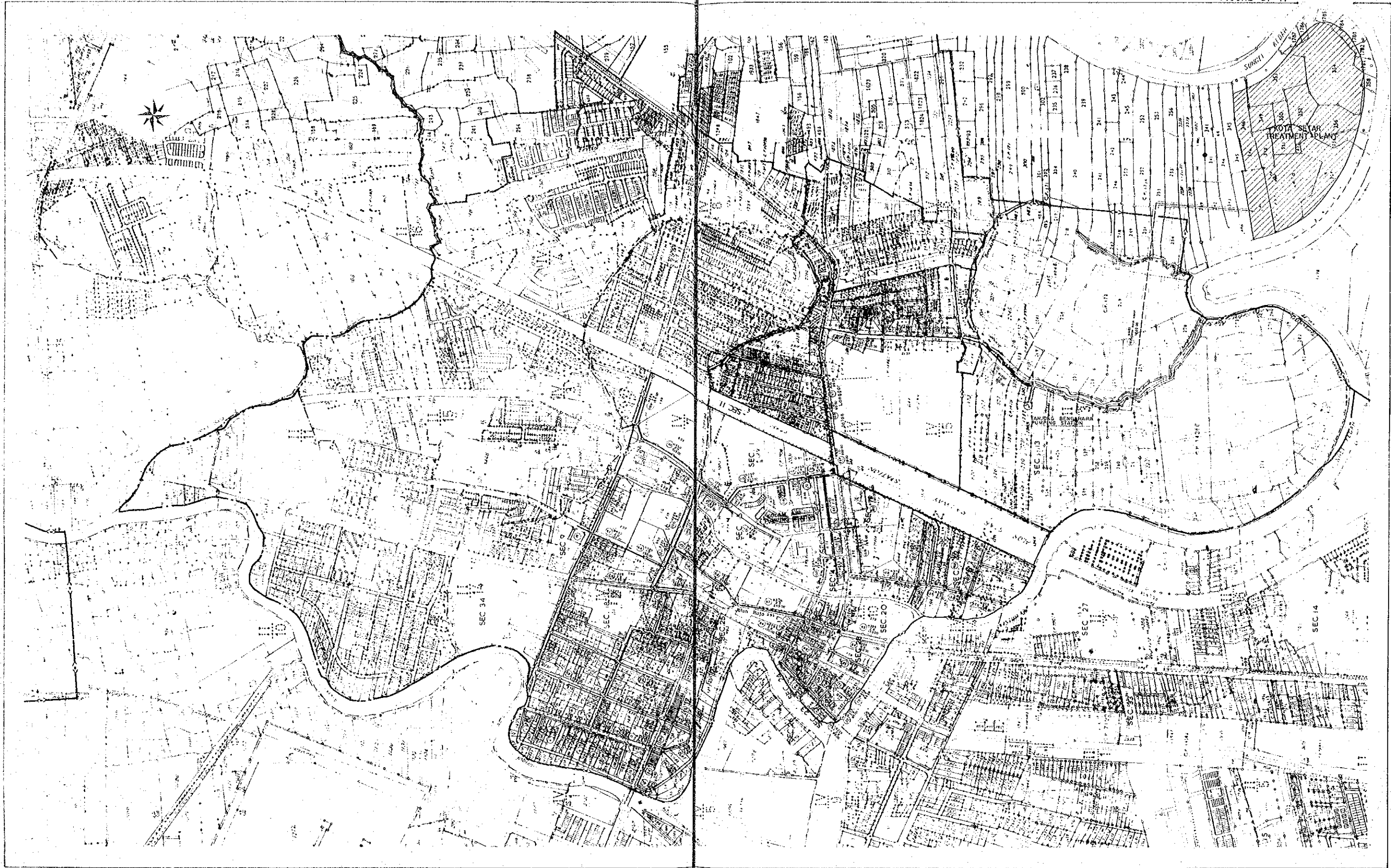
- Boundary of Master Plan Study Area
- - - Boundary of sewerage sub-zone
- Boundary of First Phase Area
- Water supply pipe
- Electric power cable

MASTER PLAN AND FEASIBILITY STUDY FOR  
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ALOR SETAR AND ITS URBAN ENVIRONS

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---	--

UNDERGROUND STRUCTURES	FIGURE SF-16
------------------------	-----------------





SCALE

LEGEND

- |  |                                       |  |   |
|--|---------------------------------------|--|---|
|  | Boundary of Master Plan Study Area    |  | Differential area for determination of sewer capacity |
|  | Boundary of sewerage sub-zone         |  | Location for proposed wastewater stabilization pond   |
|  | Boundary of first phase area          |  | Trunk sewer   |
|  | Sewer with flow direction and manhole |  | Branch and lateral sewer                              |
|  | Sewer number                          |  | Force main  |
|  | Sewer diameter (mm)                   |  | Sewage pumping station                                |
|  | Sewer slope (%)                       |  |   |
|  | Sewer length (m)                      |  |   |

MASTER PLAN AND FEASIBILITY STUDY FOR SEWERAGE AND DRAINAGE SYSTEM PROJECT IN ALOR SETAR AND ITS URBAN ENVIRONS	
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PLAN OF PROPOSED SEWERAGE SYSTEM	FIGURE SF-17

FIGURE SF-18-1

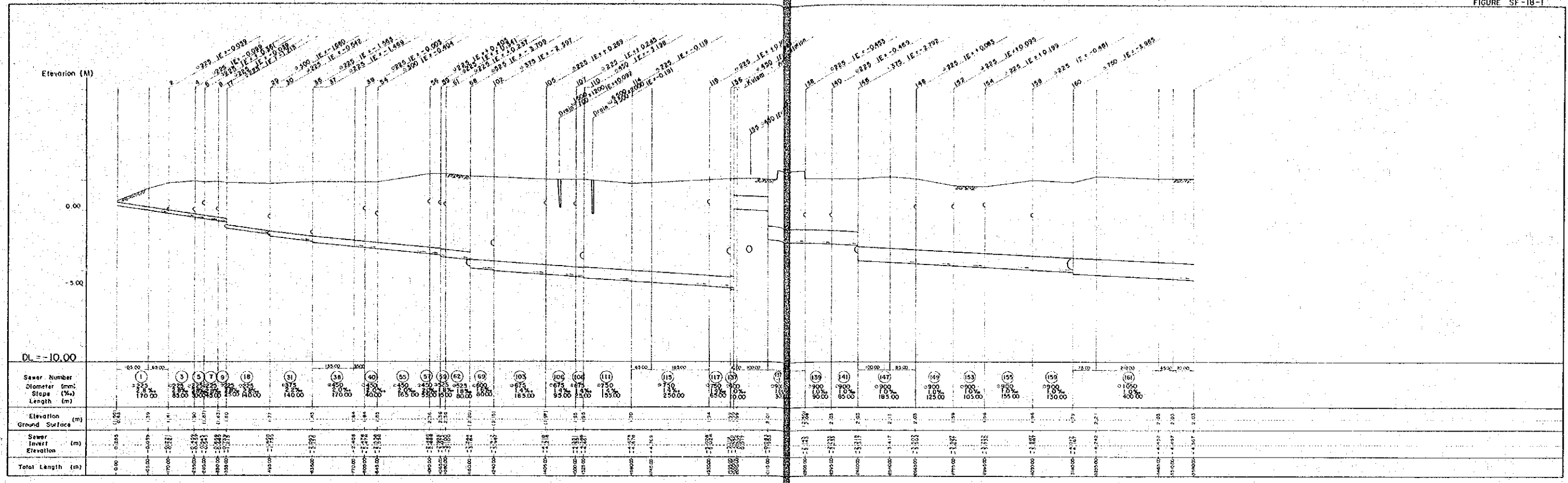
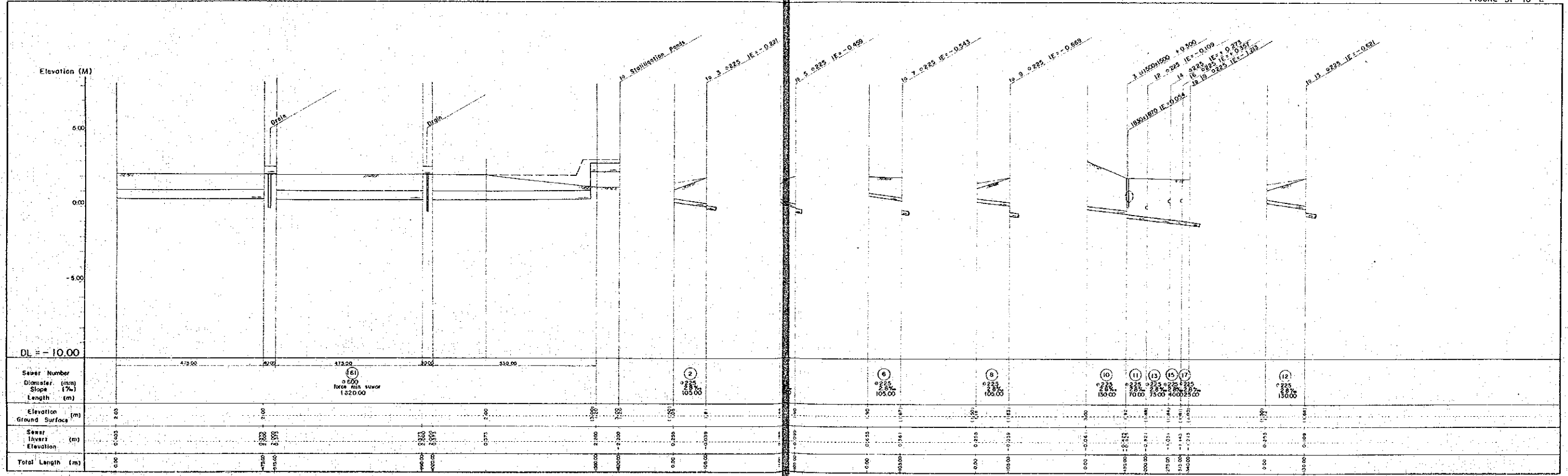


FIGURE SF-18-2



SCALE  
Horizontal 1: 5,000  
Vertical 1: 100

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TOKYO, JAPAN

PROFILE OF PROPOSED SEWERS      FIGURE SF-18

FIGURE SF-19-1

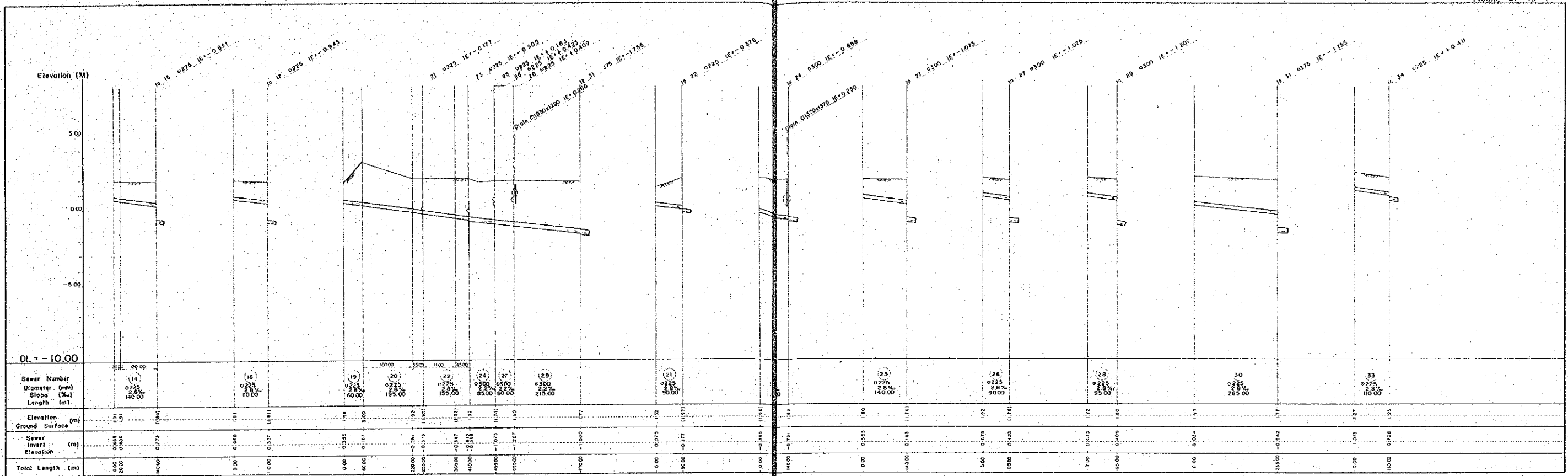
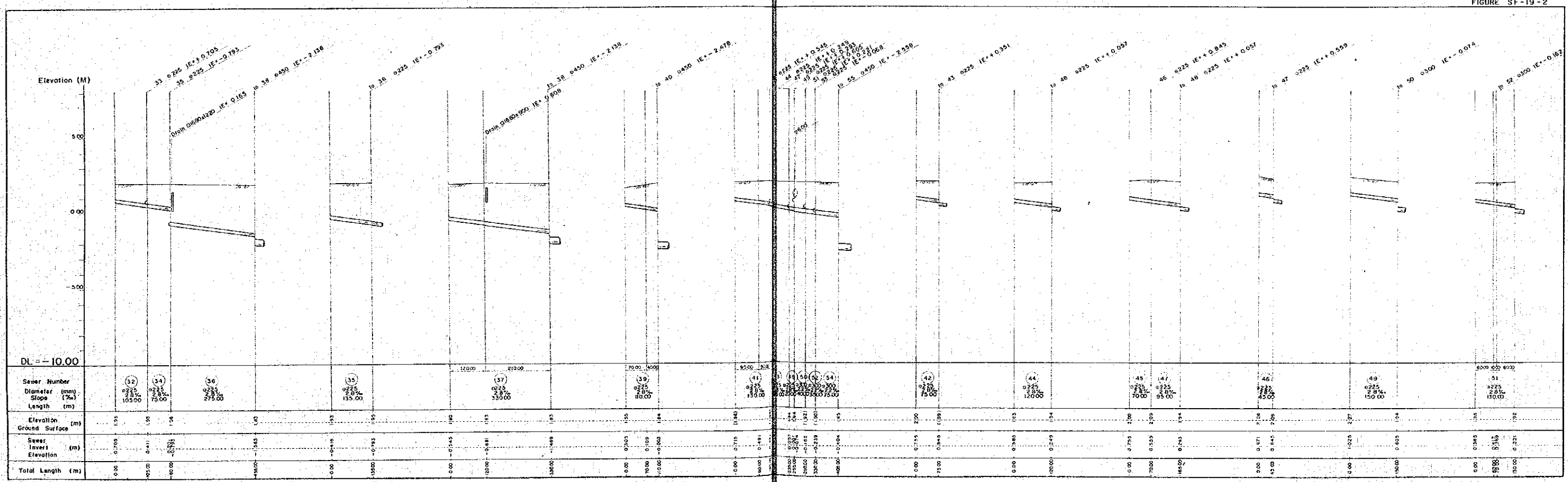


FIGURE SF-19-2

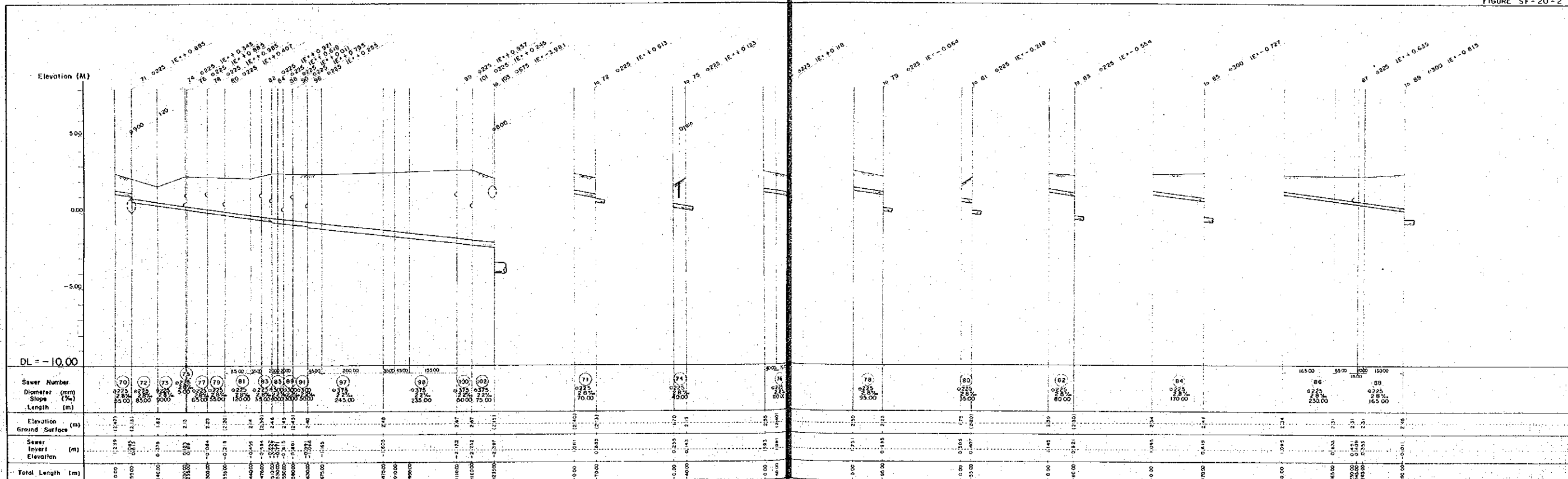
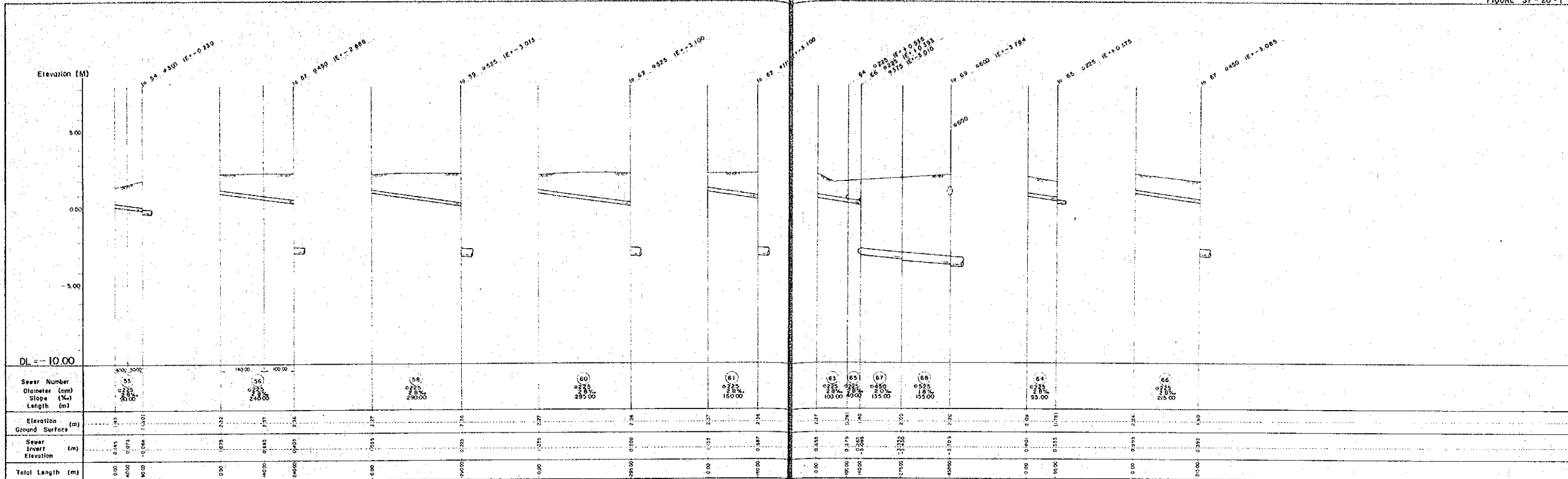


SCALE  
Horizontal 1 : 5,000  
Vertical 1 : 100

MASTER PLAN AND FEASIBILITY STUDY FOR SEWERAGE AND DRAINAGE SYSTEM PROJECT IN ALOR SETAR AND ITS URBAN ENVIRONS

JAPAN INTERNATIONAL COOPERATION AGENCY      NIHON SUICHO CONSULTANTS CO.,LTD TOKYO, JAPAN

PROFILE OF PROPOSED SEWERS      FIGURE SF-19



SCALE  
Horizontal 1:5,000  
Vertical 1:100

MASTER PLAN AND FEASIBILITY STUDY FOR SEWERAGE AND DRAINAGE SYSTEM PROJECT IN ALOR SETAR AND ITS URBAN ENVIRONS

JAPAN INTERNATIONAL COOPERATION AGENCY | NIMON SUIDO CONSULTANTS CO., LTD. TOKYO, JAPAN

PROFILE OF PROPOSED SEWERS | FIGURE SF-20

FIGURE SF-21-1

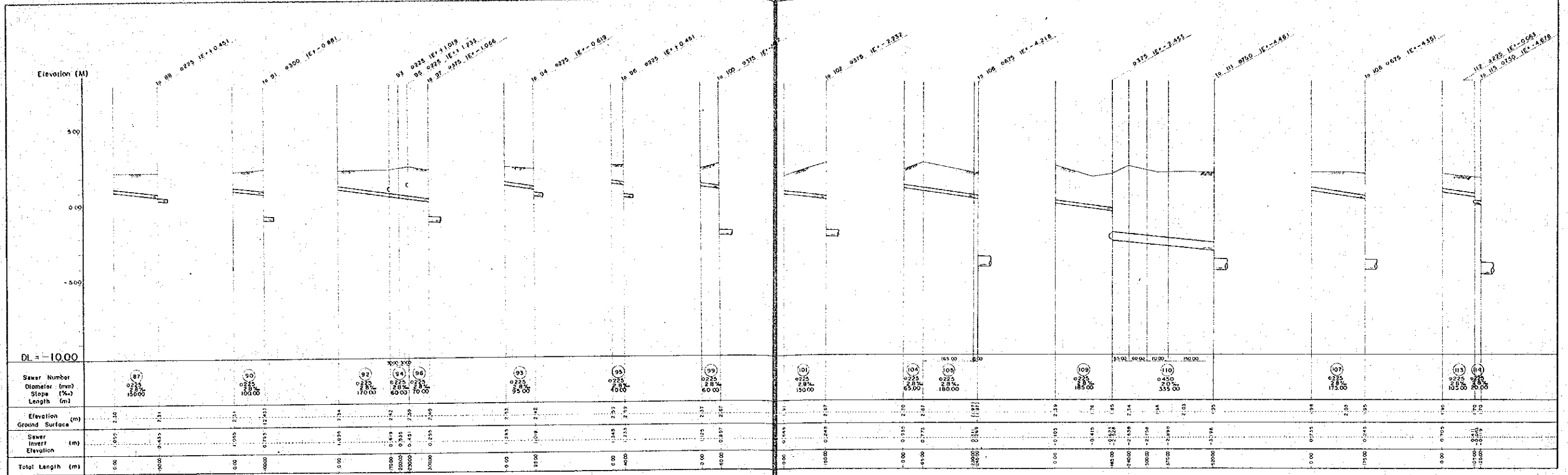
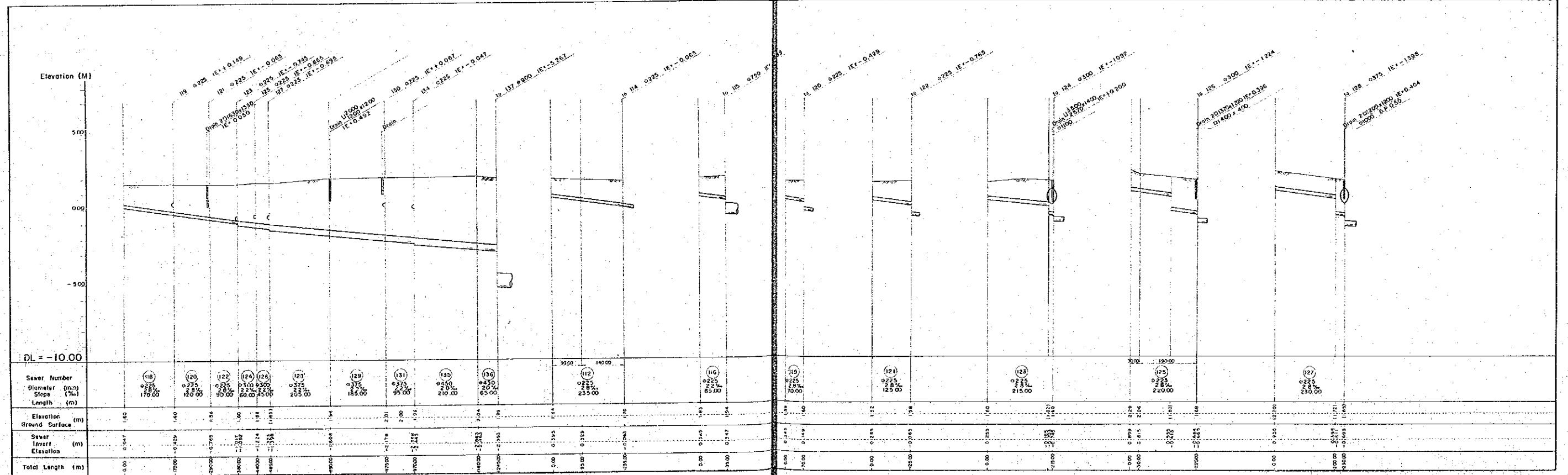


FIGURE SF-21-2



SCALE  
 Horizontal 1: 5,000  
 Vertical 1: 100

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JAPAN INTERNATIONAL COOPERATION AGENCY	NIKON SUDO CONSULTANTS CO.,LTD. TOKYO, JAPAN
PROFILE OF PROPOSED SEWERS	FIGURE SF-21



FIGURE SF-22-1

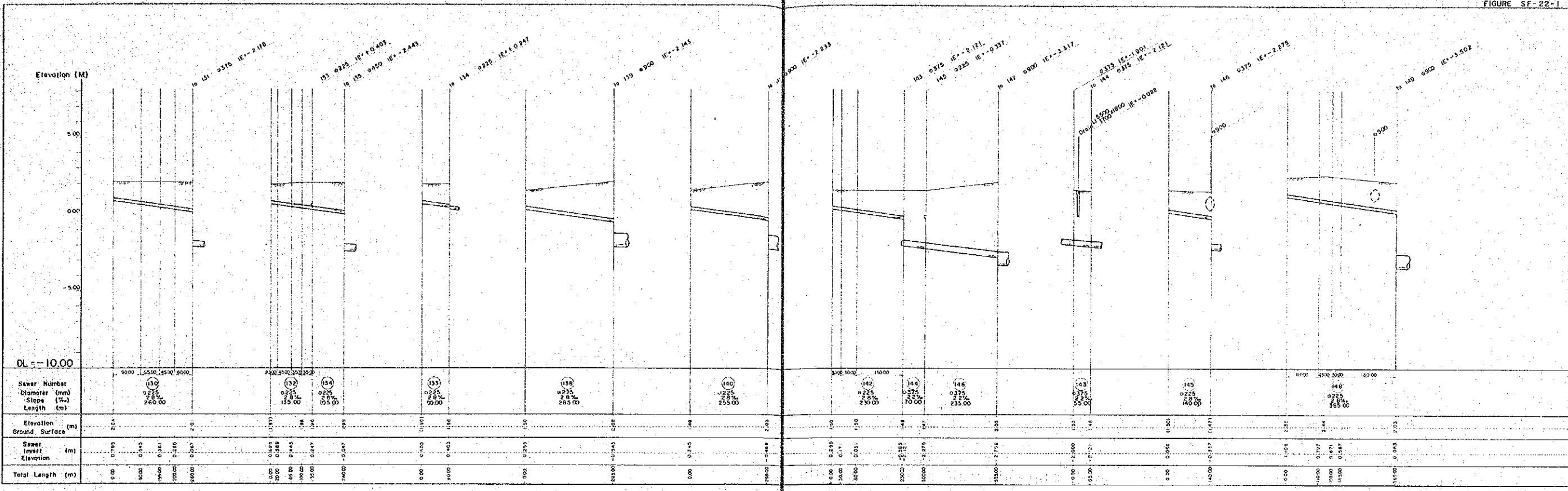
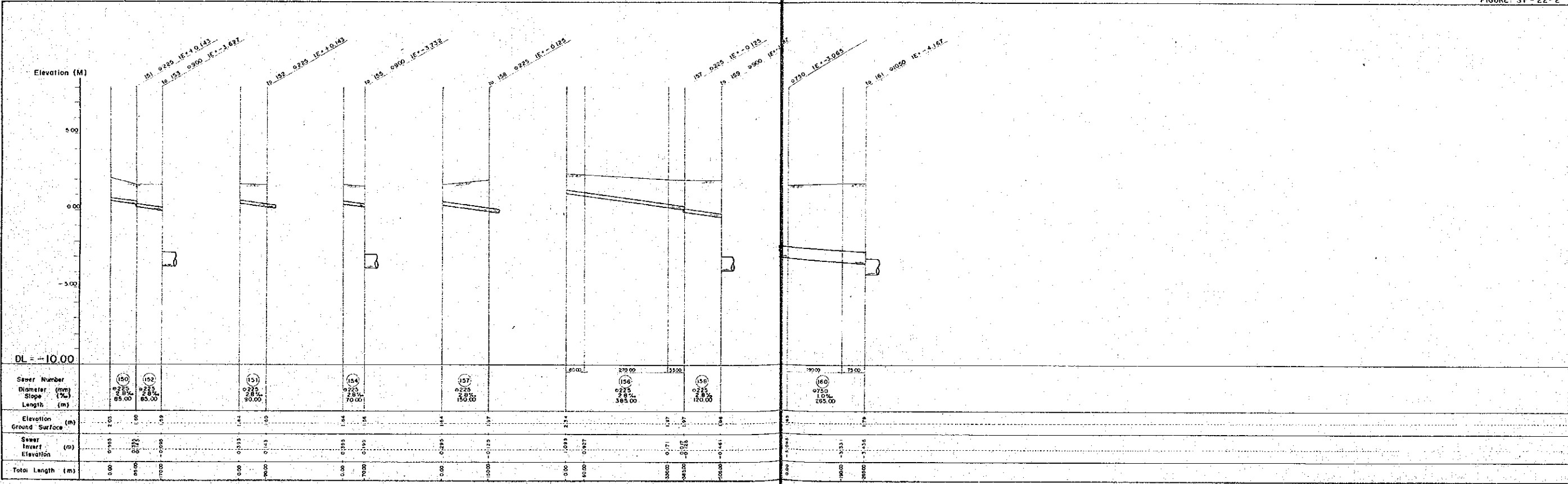


FIGURE SF-22-2

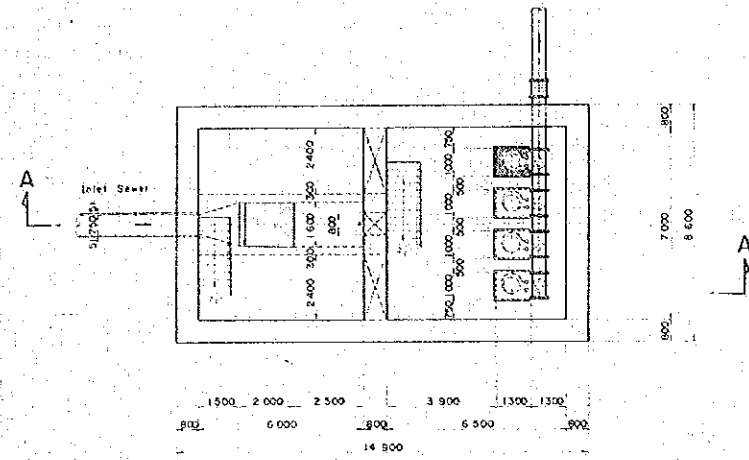


SCALE  
Horizontal 1 : 5,000  
Vertical 1 : 100

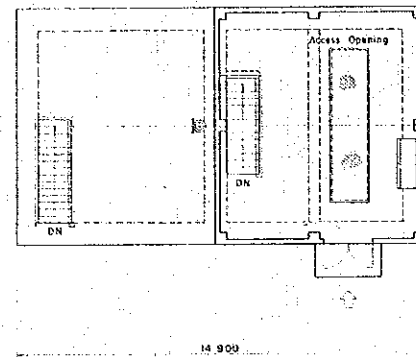
MASTER PLAN AND FEASIBILITY STUDY FOR SEWERAGE AND DRAINAGE SYSTEM PROJECT IN ALOR SETAR AND ITS URBAN ENVIRONS	
JAPAN INTERNATIONAL COOPERATION AGENCY	NIHON SUDO CONSULTANTS CO., LTD. TOKYO, JAPAN
PROFILE OF PROPOSED SEWERS	FIGURE SF-22

**KOLAM AIR PUMPNG STATION**  
SCALE 1:100

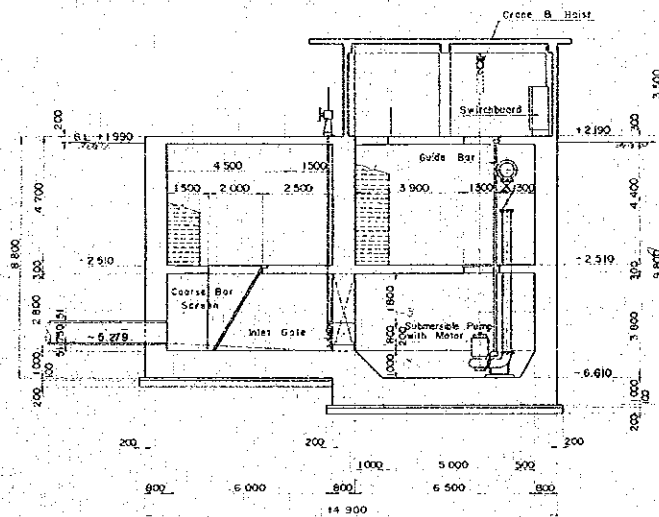
PLAN VIEW



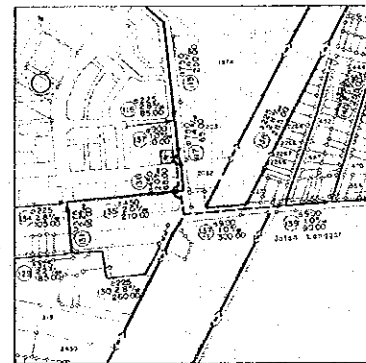
GROUND FLOOR LEVEL



SECTION A-A



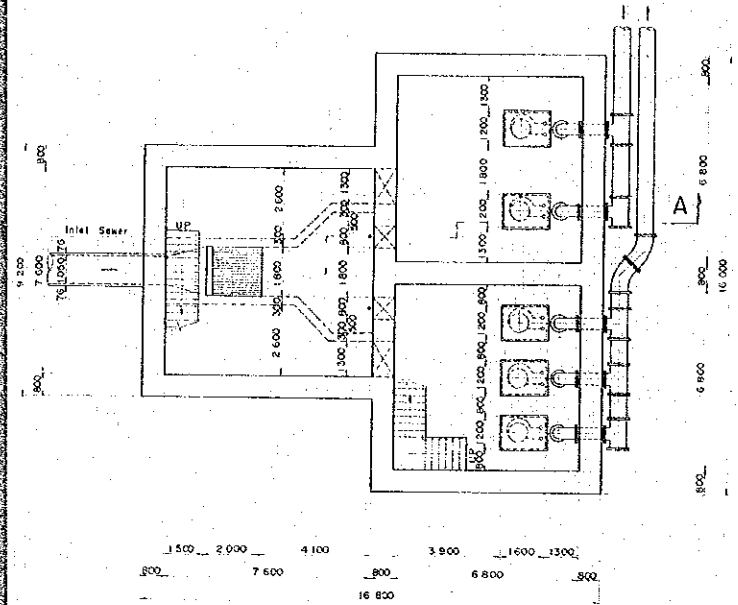
LOCATION SCALE 1:5000



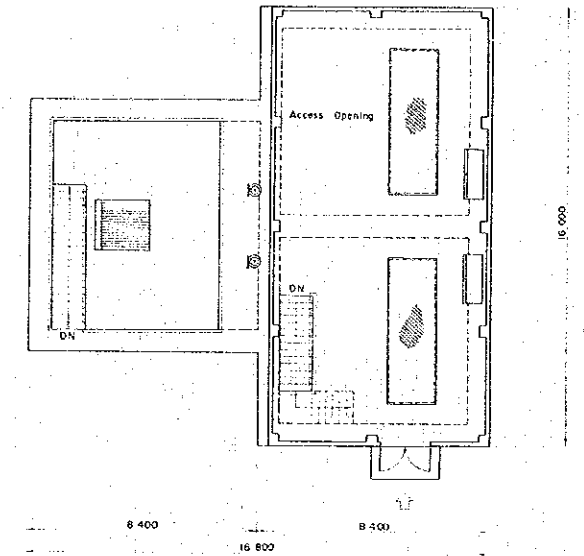
Note  
First Phase - To install 3 pump units  
Later Phase - To install additional 2 pump units

**TANJONG BENDAHARA PUMPING STATION**  
SCALE 1:100

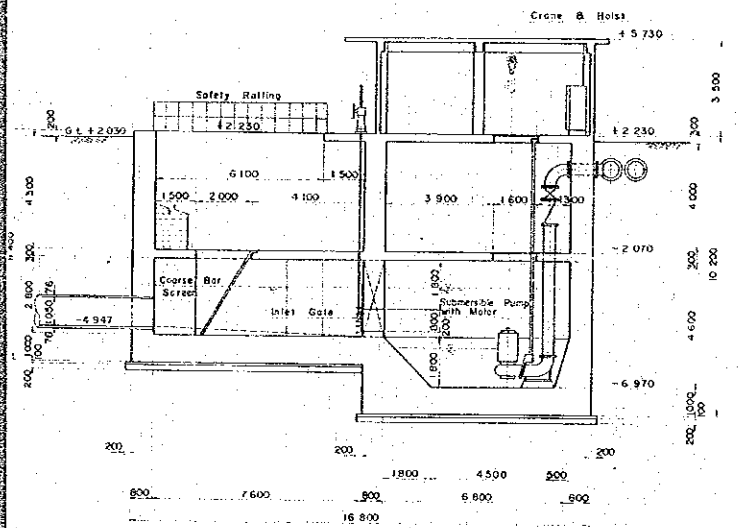
PLAN VIEW



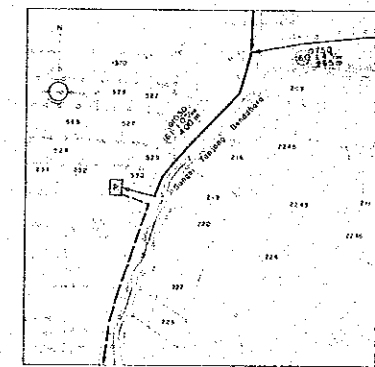
GROUND FLOOR LEVEL



SECTION A-A



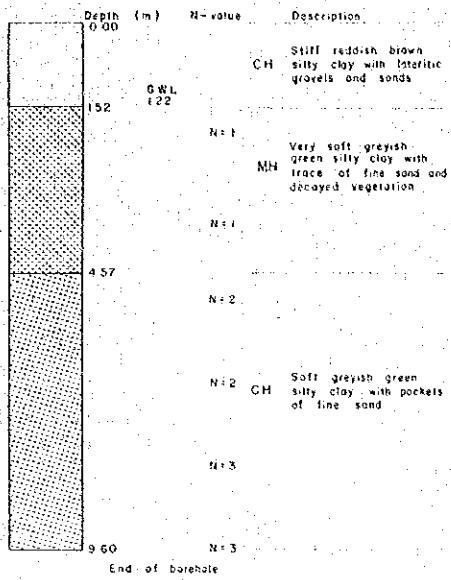
LOCATION SCALE 1:5000



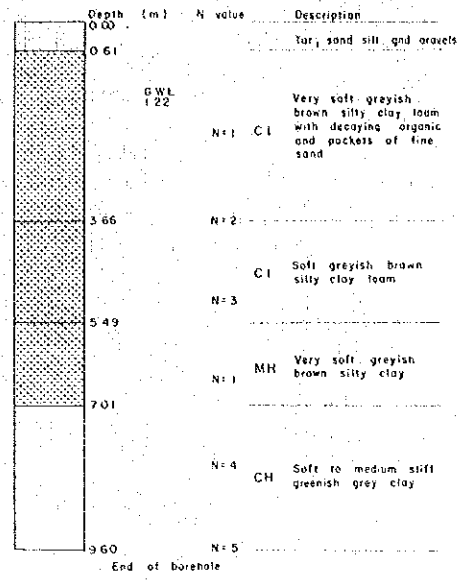
Note  
First Phase - To install 3 pump units  
Later Phase - To install additional 2 pump units

Dimension in millimeter

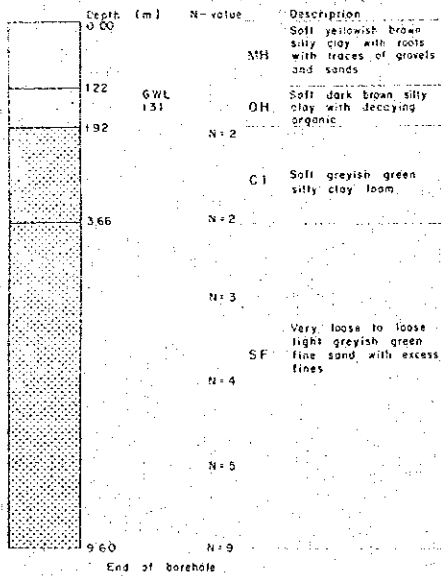
Borehole No. 1



Borehole No. 2



Borehole No. 3



MASTER PLAN AND FEASIBILITY STUDY FOR SEWERAGE AND DRAINAGE SYSTEM PROJECT IN ALOR SETAR AND ITS URBAN ENVIRONS

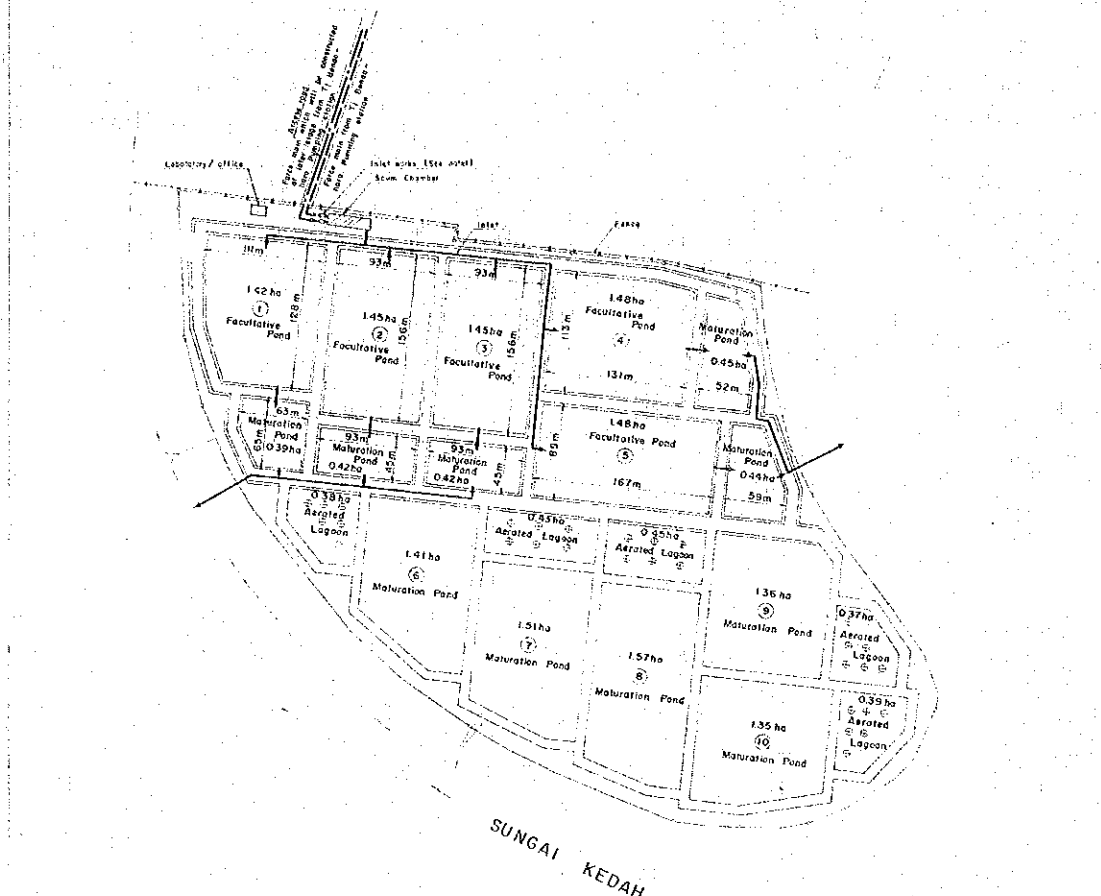
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BORING LOGS SURVEYED

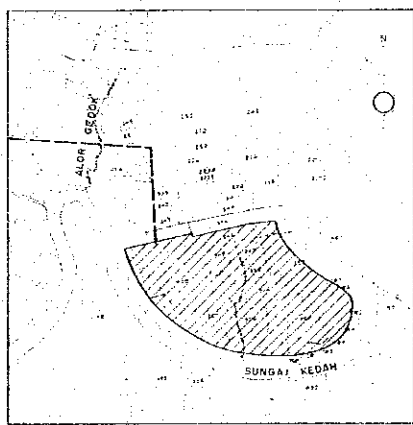
FIGURE SF-24

# KOTA SETAR TREATMENT PLANT

SCALE 1 : 2,500



LOCATION SCALE 1 : 10,000



- Notes
- (1) Inlet works
  - Flow
  - Flow recorder & recorder house
  - (2) Operation programme
  - First phase consists facilities of No 1, 2, 3, 4, 5, 6, 7, 8, 9, 10
  - Later phase consists facilities of No 1, 2, 3, 4, 5, 6, 7, 8, 9, 10
  - No 1, 2, 3, 4, 5 are covered into second phase process

MASTER PLAN AND FEASIBILITY STUDY FOR SEWERAGE AND DRAINAGE SYSTEM PROJECT IN ALOR SETAR AND ITS URBAN ENVIRONS	
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PLAN FOR WASTE STABILIZATION POND	FIGURE SF-25