

**Fig. II-10 General Layout of Irrigation and Drainage System (Seberang Perak Scheme)**

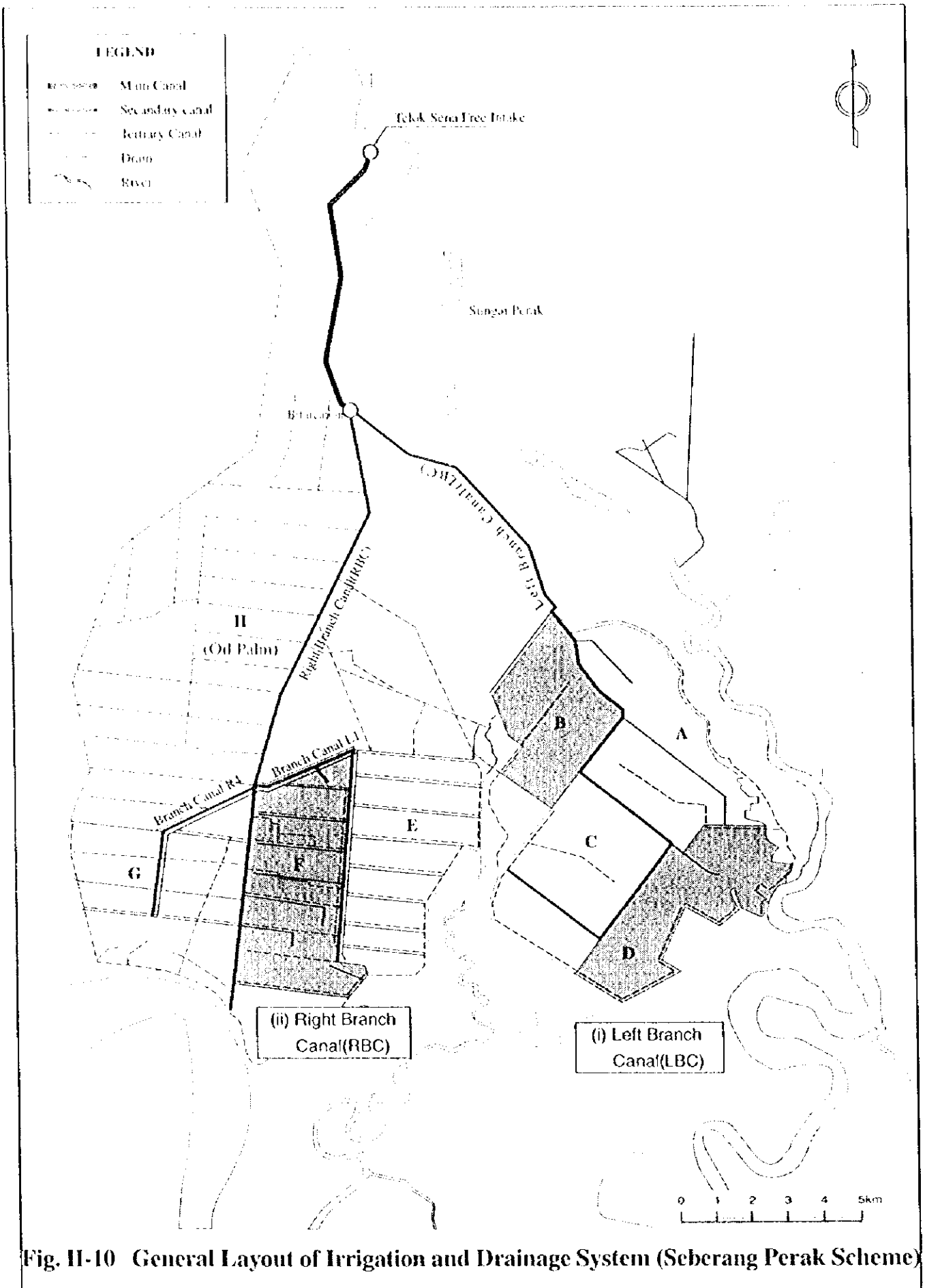


Fig. II-11 (1/4) Irrigation Water Distribution Diagram  
Seberang Perak Scheme, Block- A,B,C&D

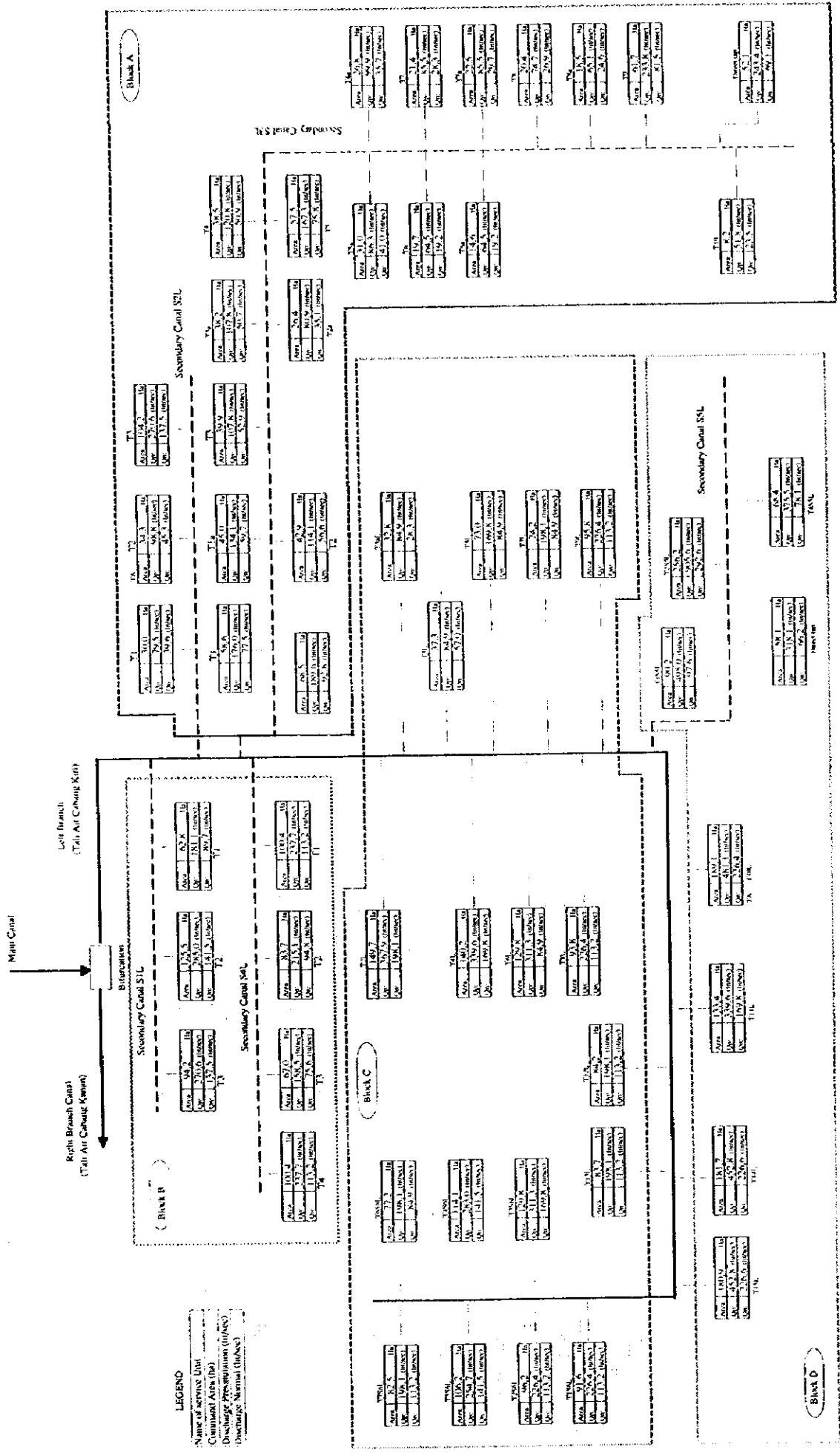


Fig. II-11 (24)

Irrigation Water Distribution Diagram  
Seberang Perak Scheme, Block-E

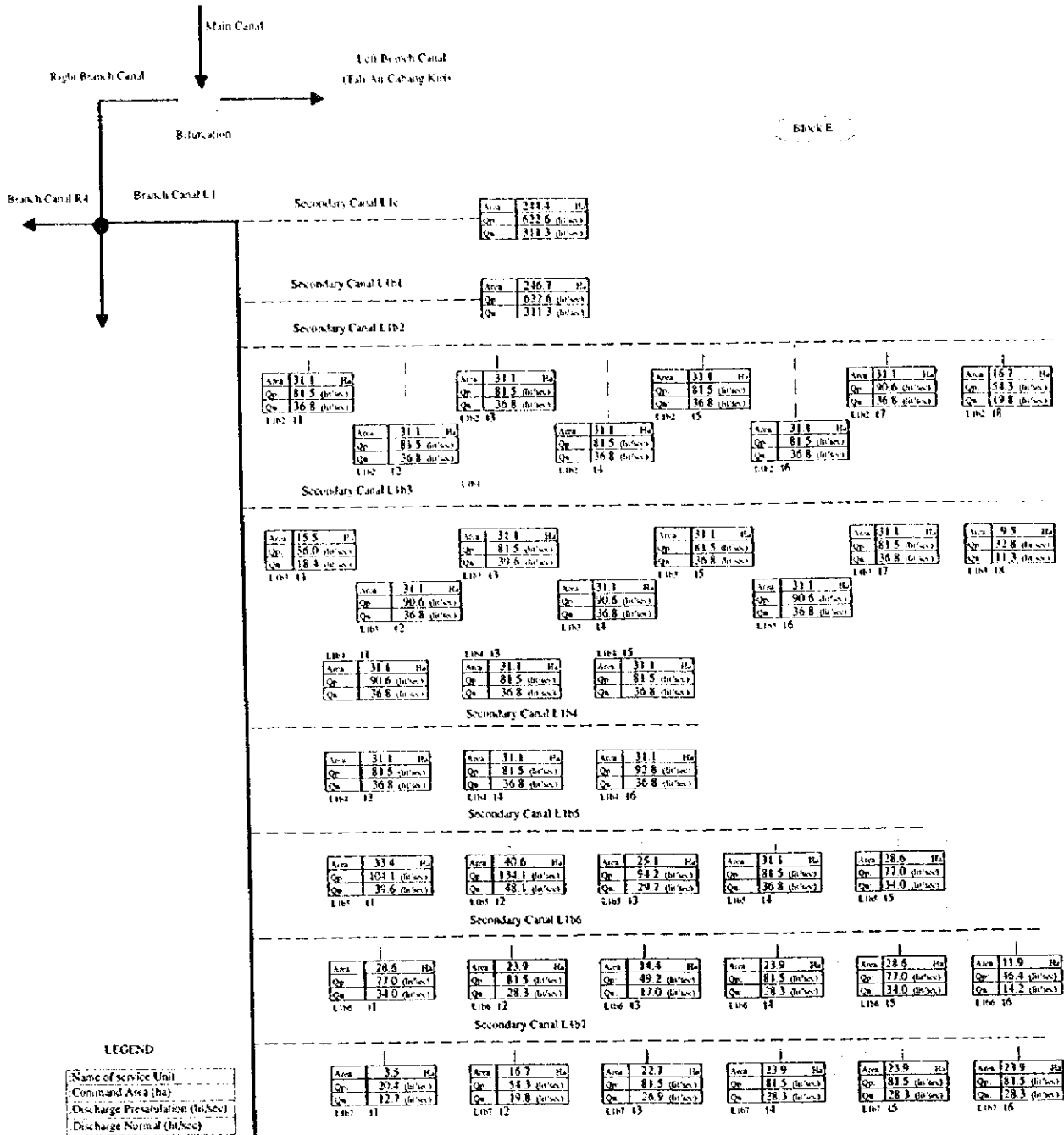


Fig. II-F-11 (3/4)

Irrigation Water Distribution Diagram  
Seberang Perak Scheme, Block-F

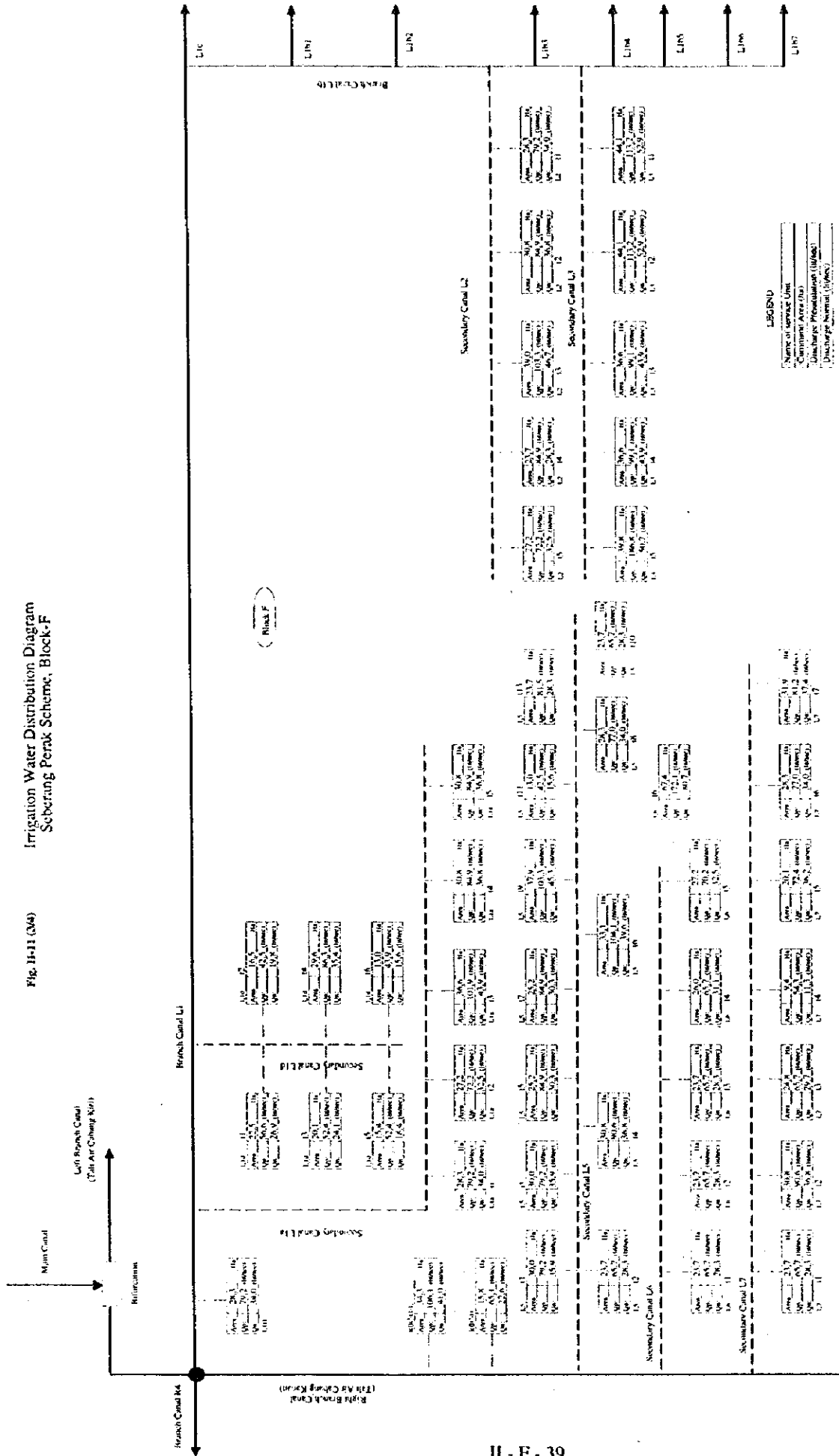
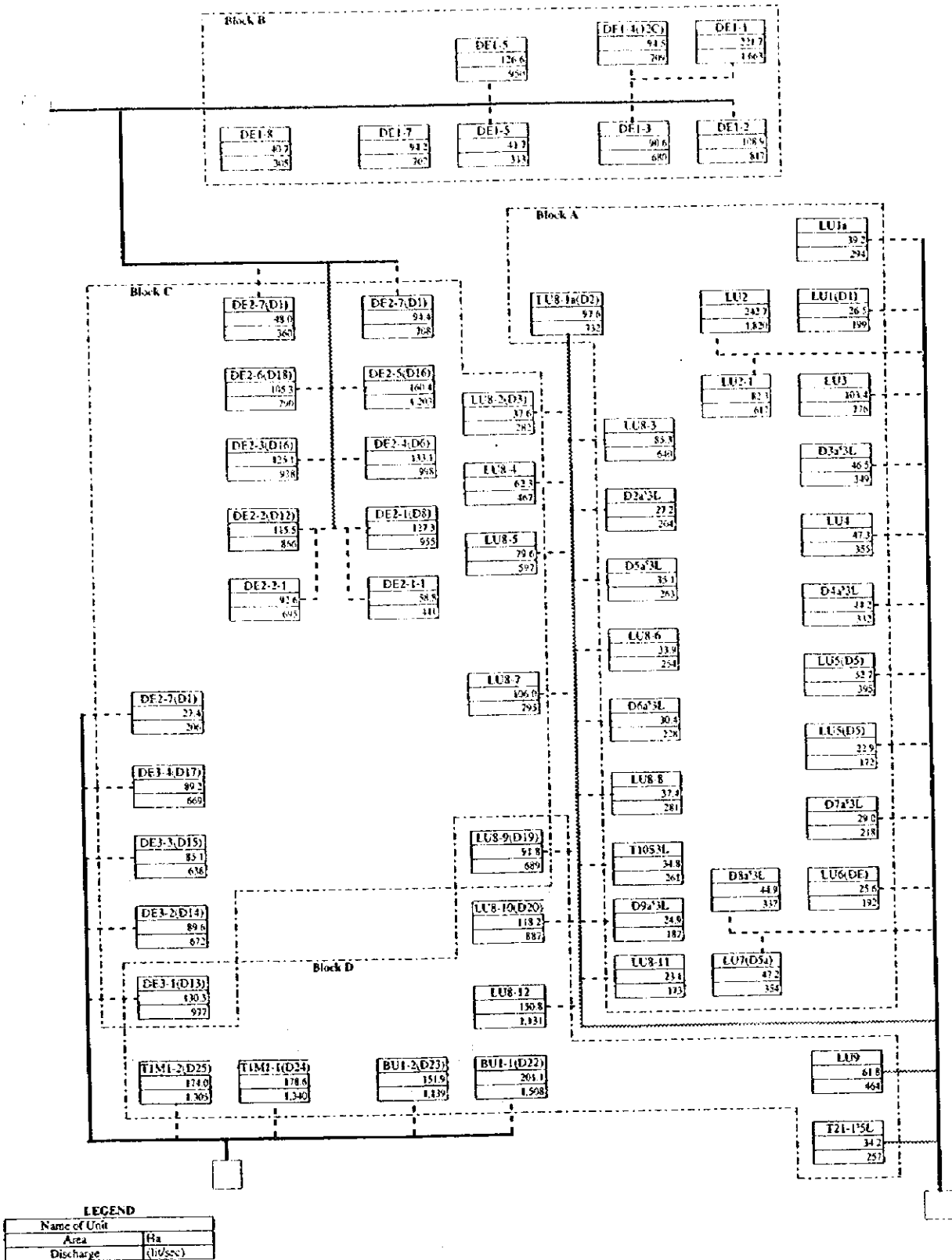


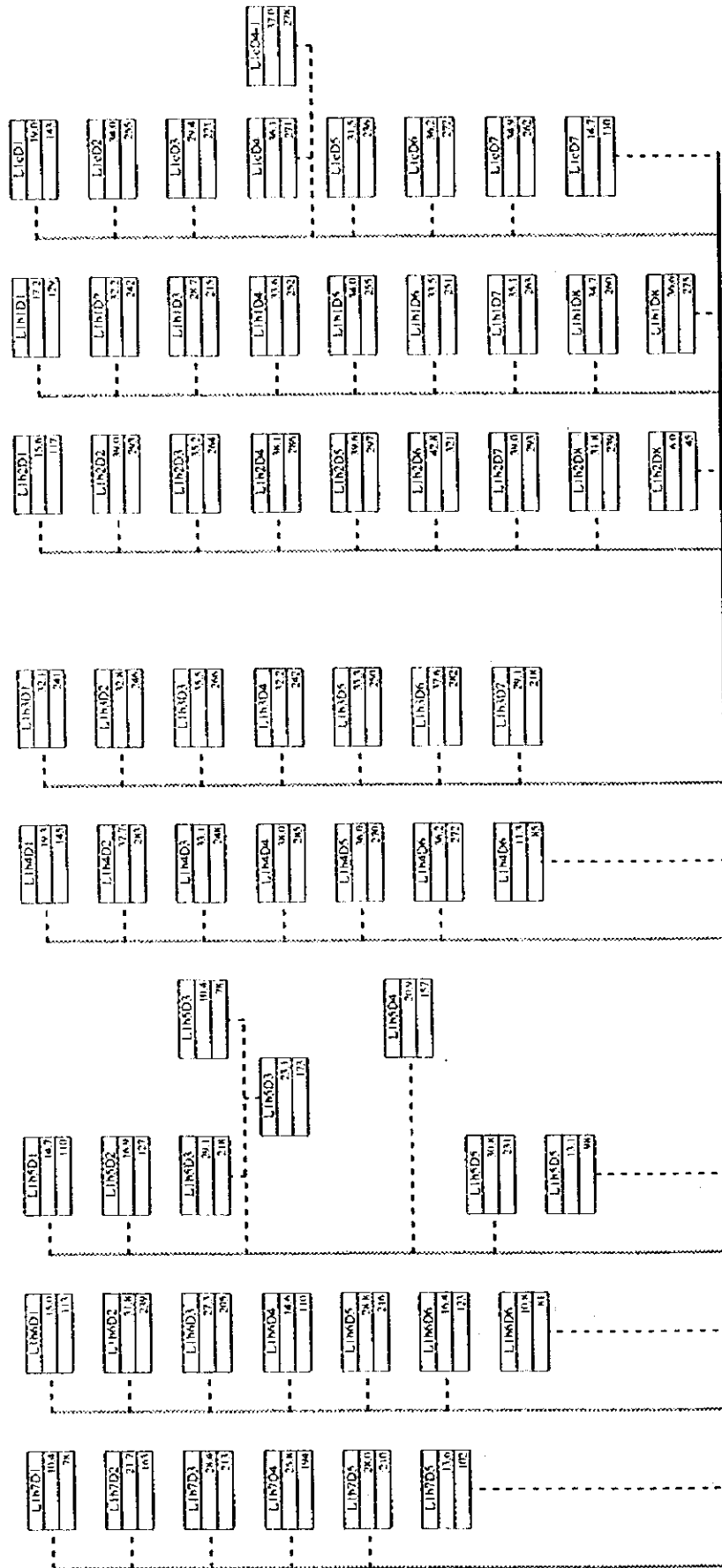


Fig. II-12 (1/5) Drainage Diagram  
 Seberang Perak Scheme, Block A,B,C & D



Drainage Diagram  
Seberang Perak Scheme, Block E

Fig. II-12 (2/5)

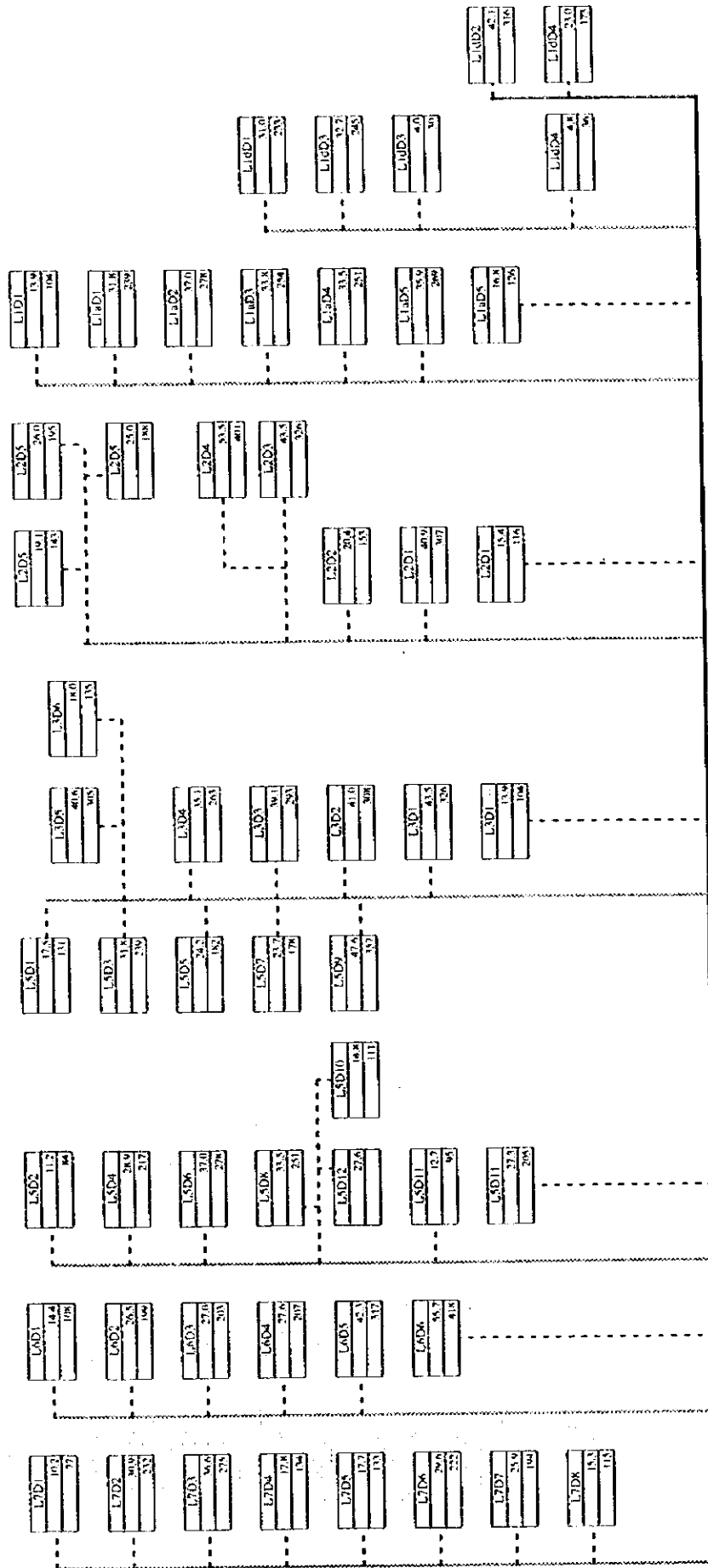


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| Name of Unit | Hi        |
|--------------|-----------|
| Accu         |           |
| Discharge    | (tub/sec) |



Fig. II-12 (3/5) Drainage Diagram  
Seberang Perak Scheme, Block F



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|              |           |
|--------------|-----------|
| Name of Unit | Fig.      |
| Area         | (10/1000) |
| Discharge    | (lit/sec) |

Fig. II-12 (4/5)

Drainage Diagram  
Seherang Perak Scheme, Block G

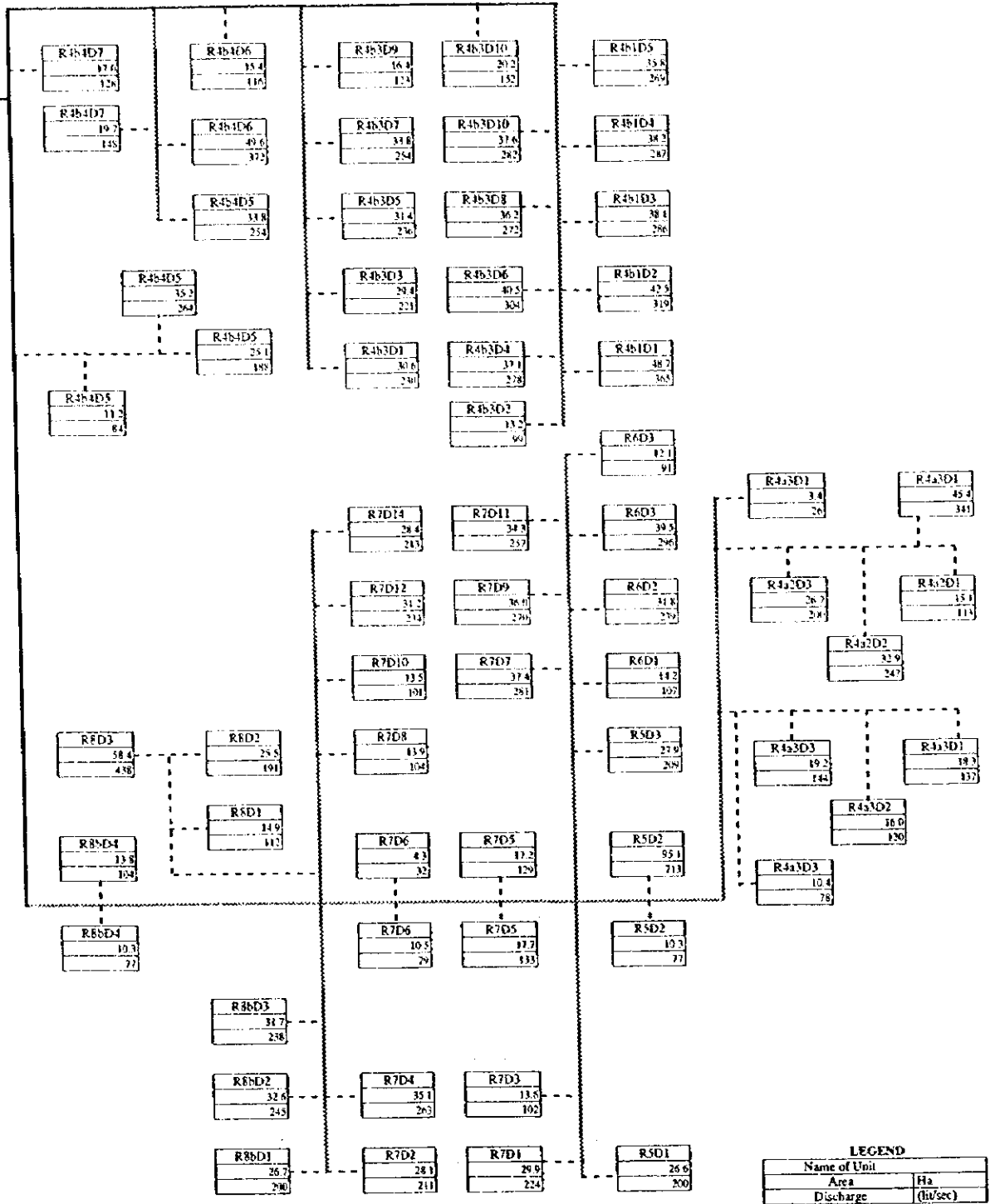
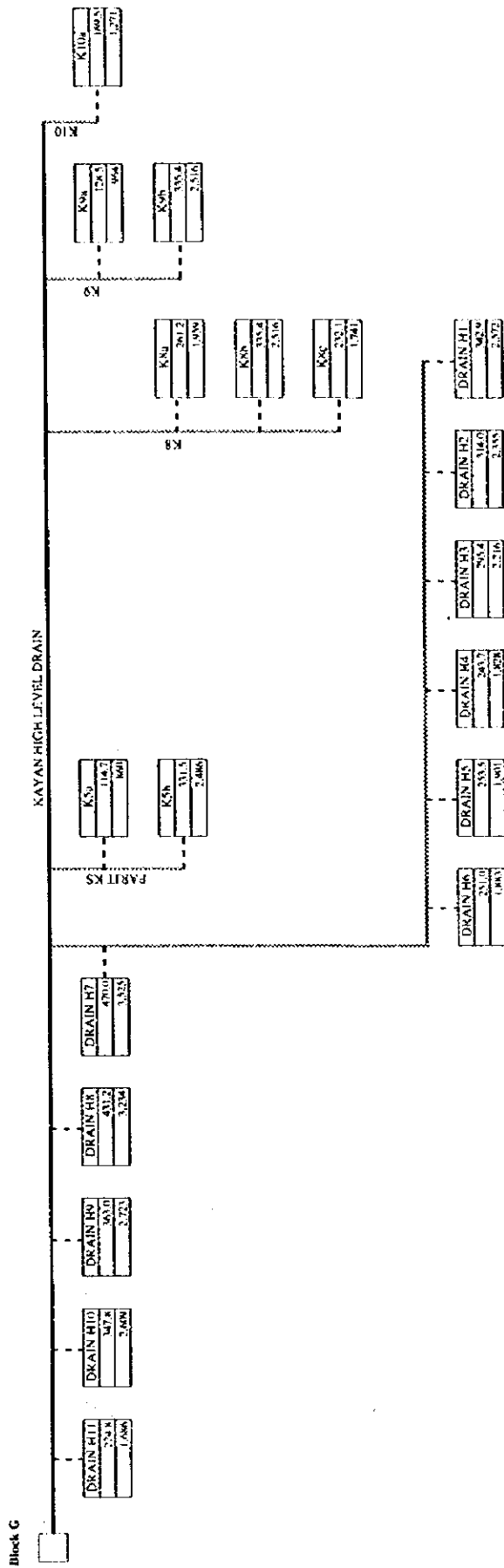
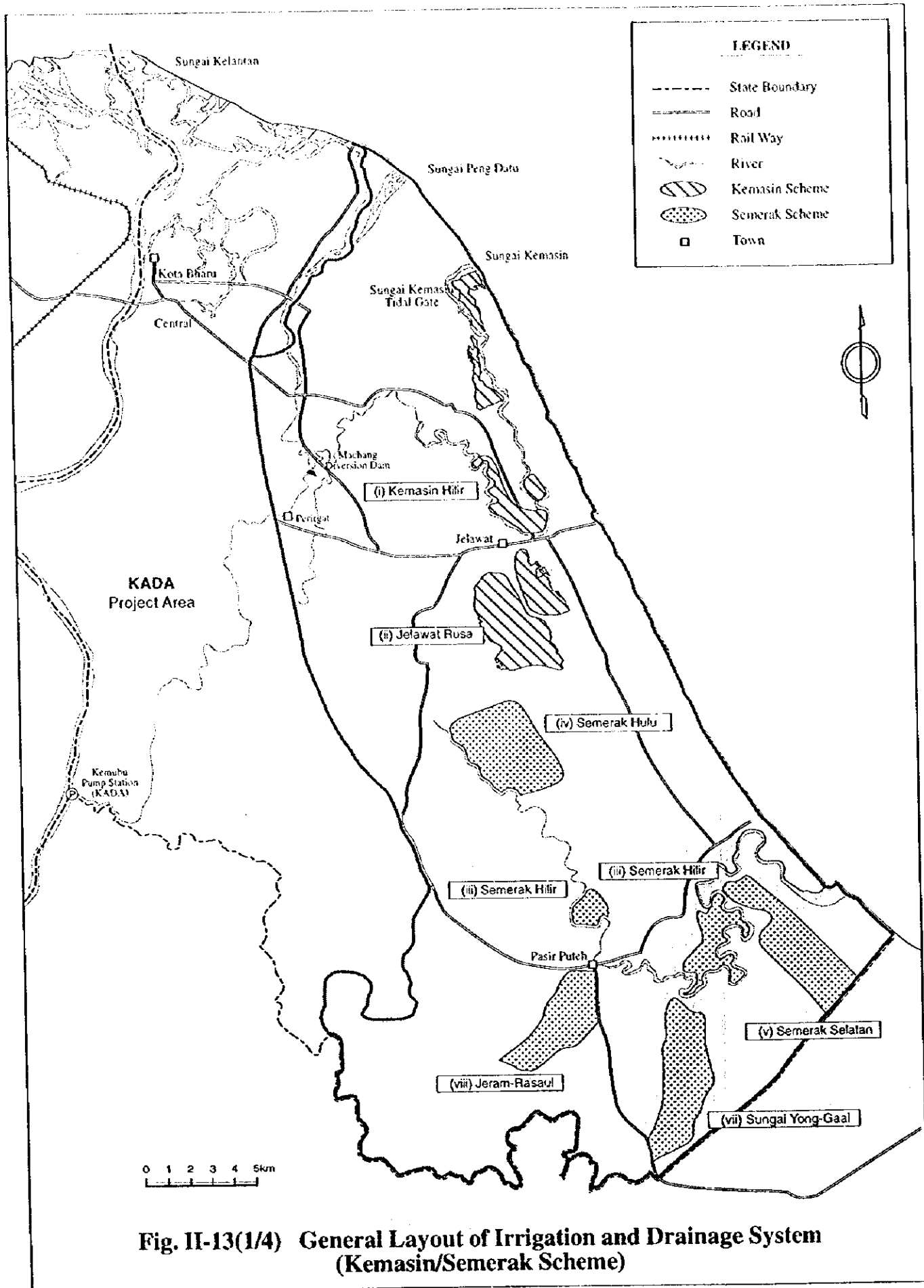


Fig. II-12 (5/5)  
Drainage Diagram  
Seberang Perak Scheme, Block H

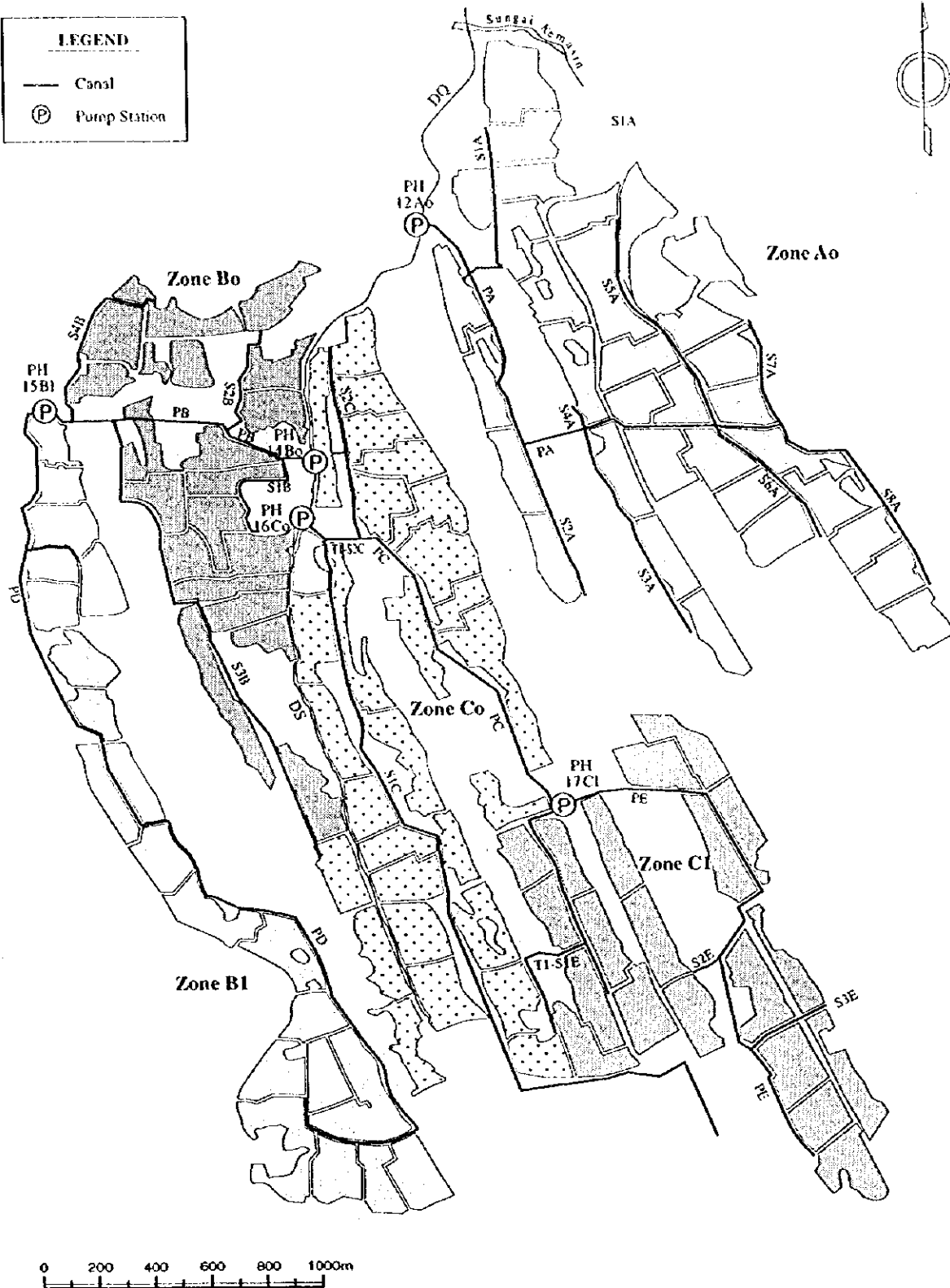




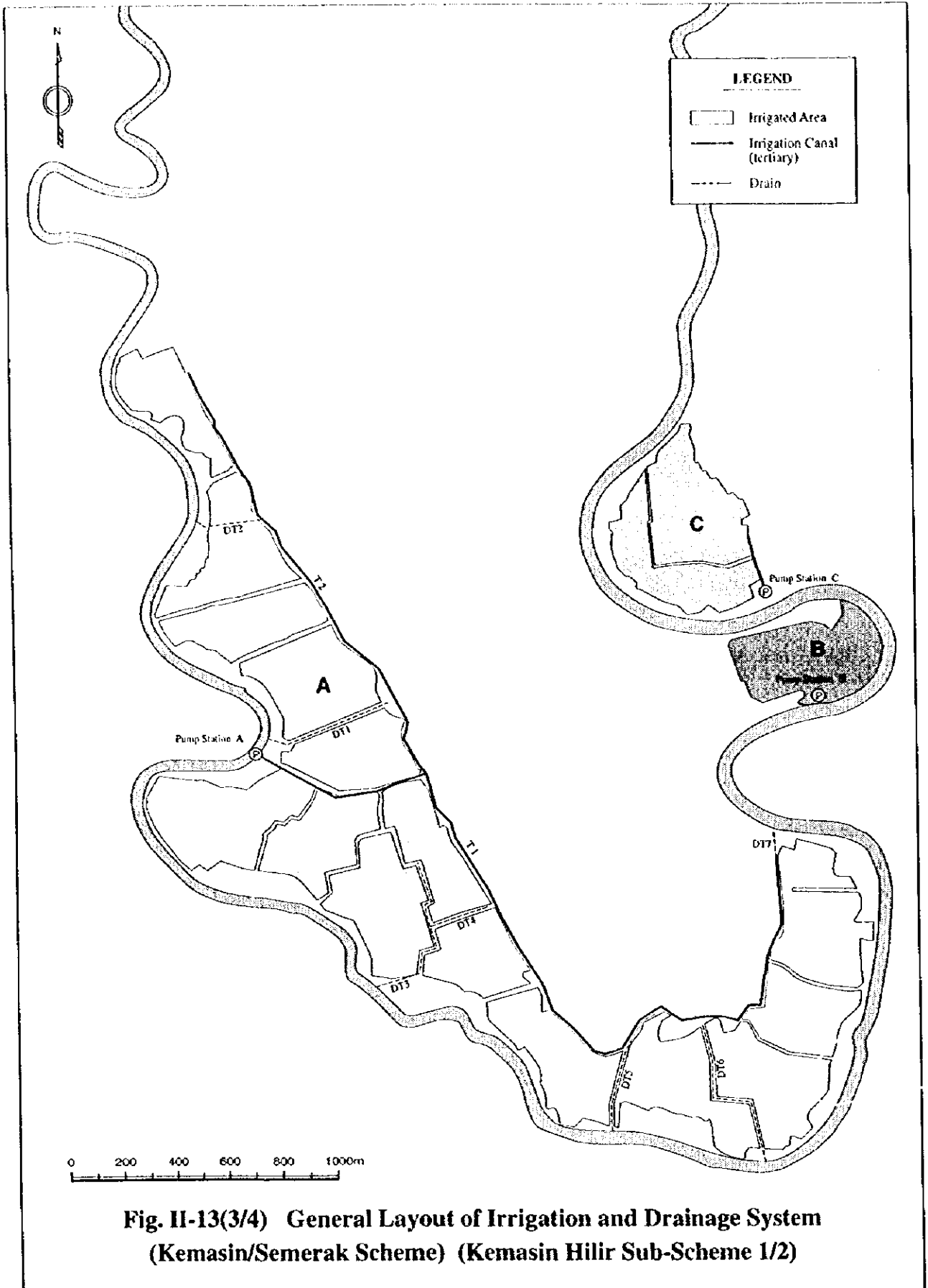
**LEGEND**

— Canal

⊙ Pump Station



**Fig. II-13(2/4) General Layout of Irrigation and Drainage System  
(Kemasin/Semerak Scheme) (Jelawat Rusa Sub-Scheme)**



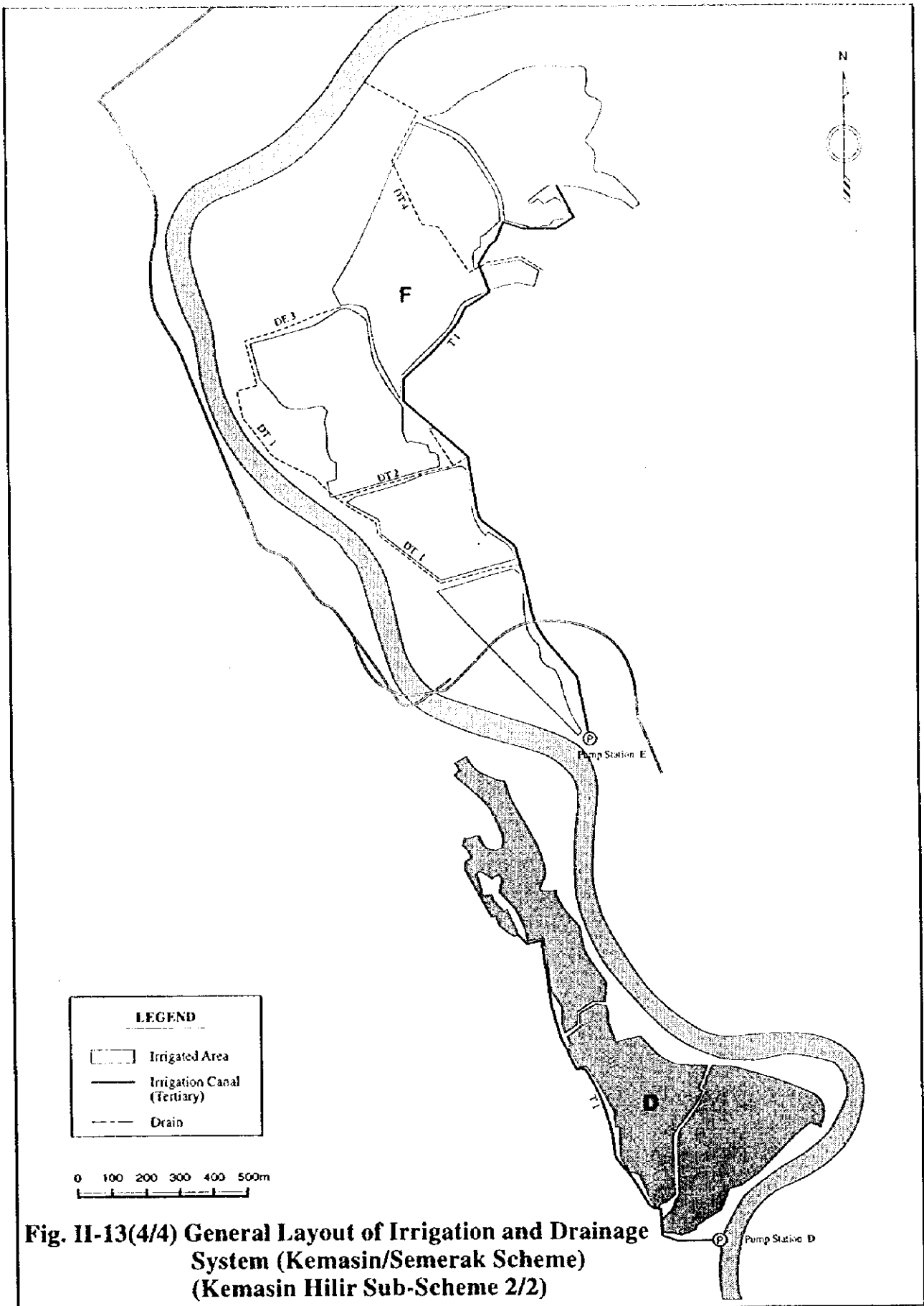


Fig H-14 (1/8)

Irrigation Water Distribution Diagram  
 Kemasin / Semarak Irrigation Scheme, Jelawat Rusa Block A0

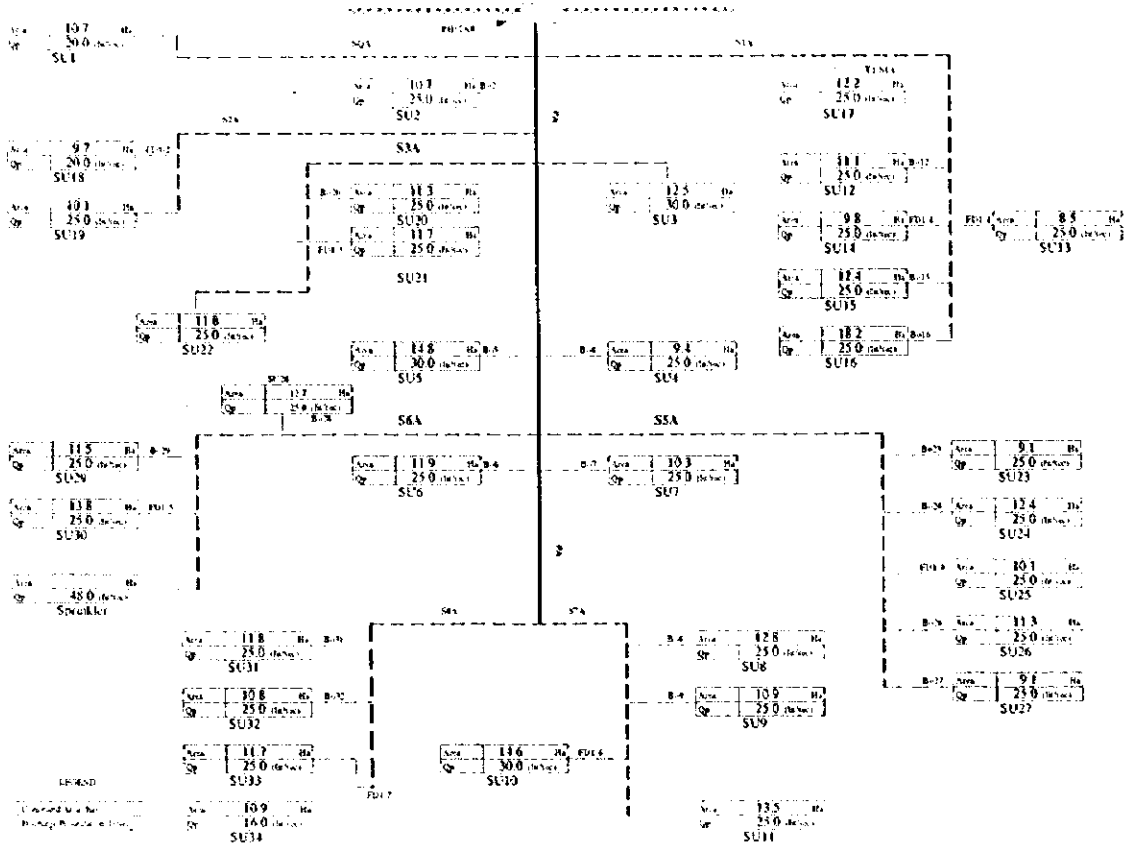




Fig. II-14 (2/8)

Irrigation Water Distribution Diagram  
 Kemasin / Semerak Irrigation Scheme, Jelawat Rusa Block B0

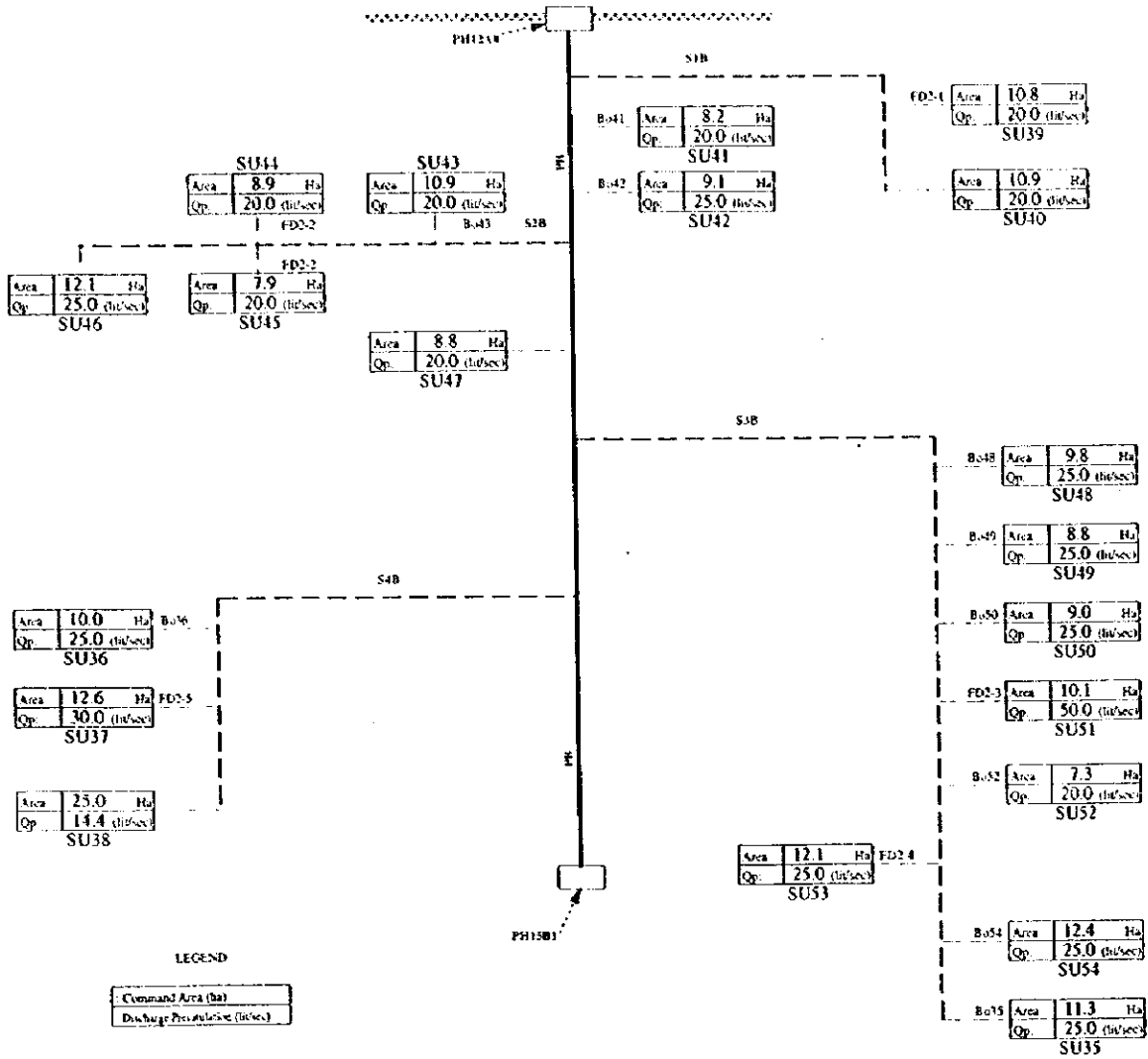


Fig. II-14 (3/8)

Irrigation Water Distribution Diagram  
 Kemasin / Semarak Irrigation Scheme, Jelawat Rusa Block C0

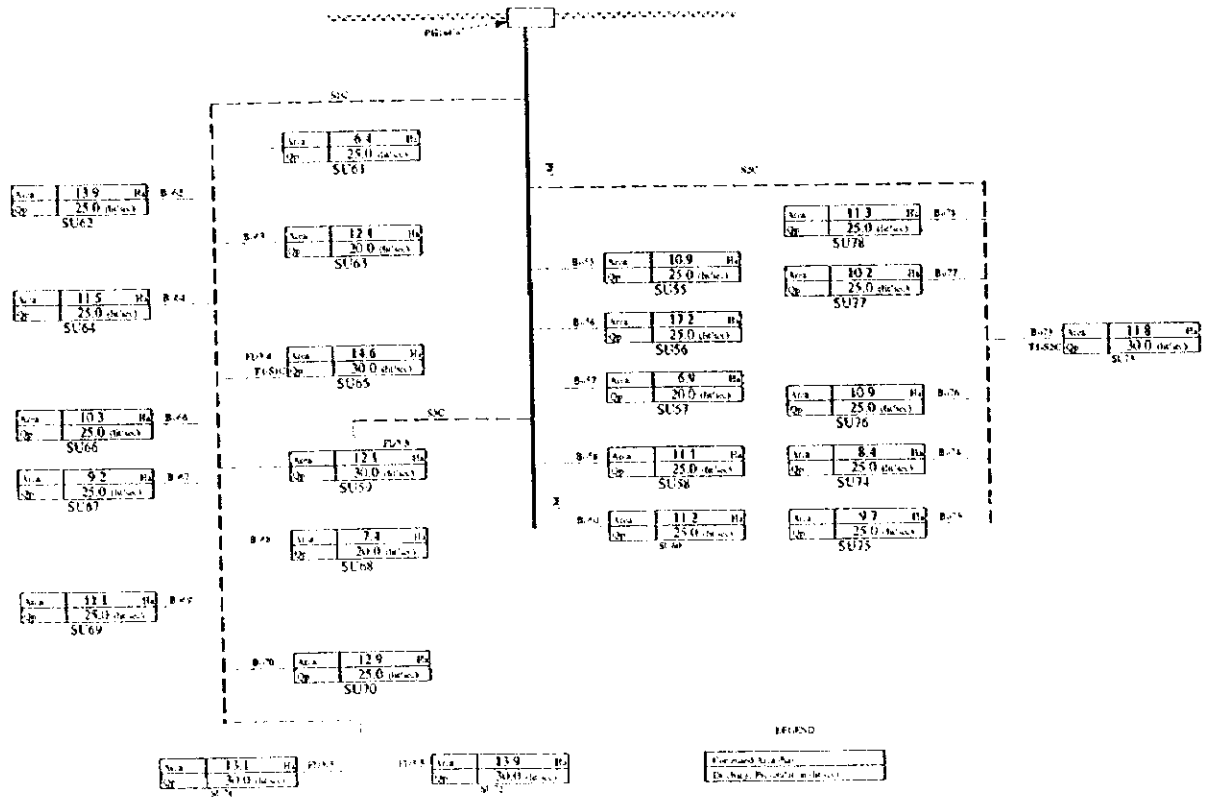


Fig. II-14 (4/8)

Irrigation Water Distribution Diagram  
 Kemasin / Semerak Irrigation Scheme, Jelawat Rusa Block B1

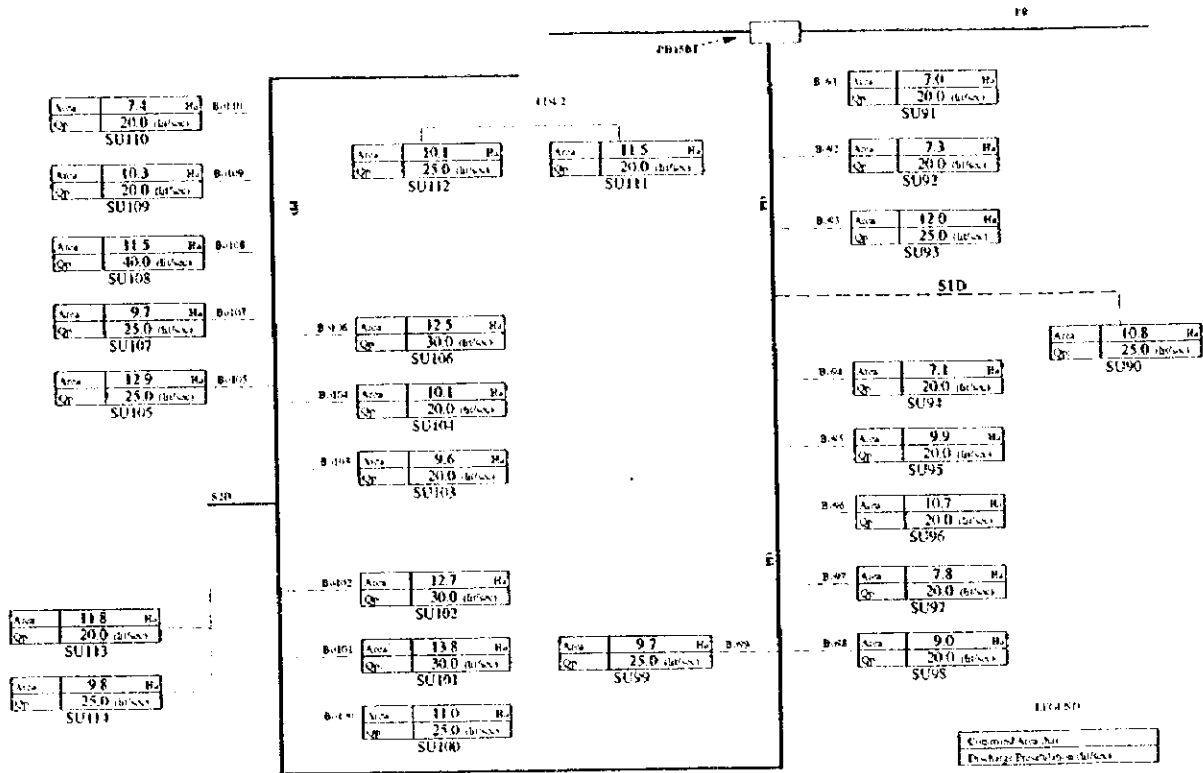


Fig. II-14 (5/8)

Irrigation Water Distribution Diagram  
 Kemasin / Semerak Irrigation Scheme, Jelawat Rusa Block C1

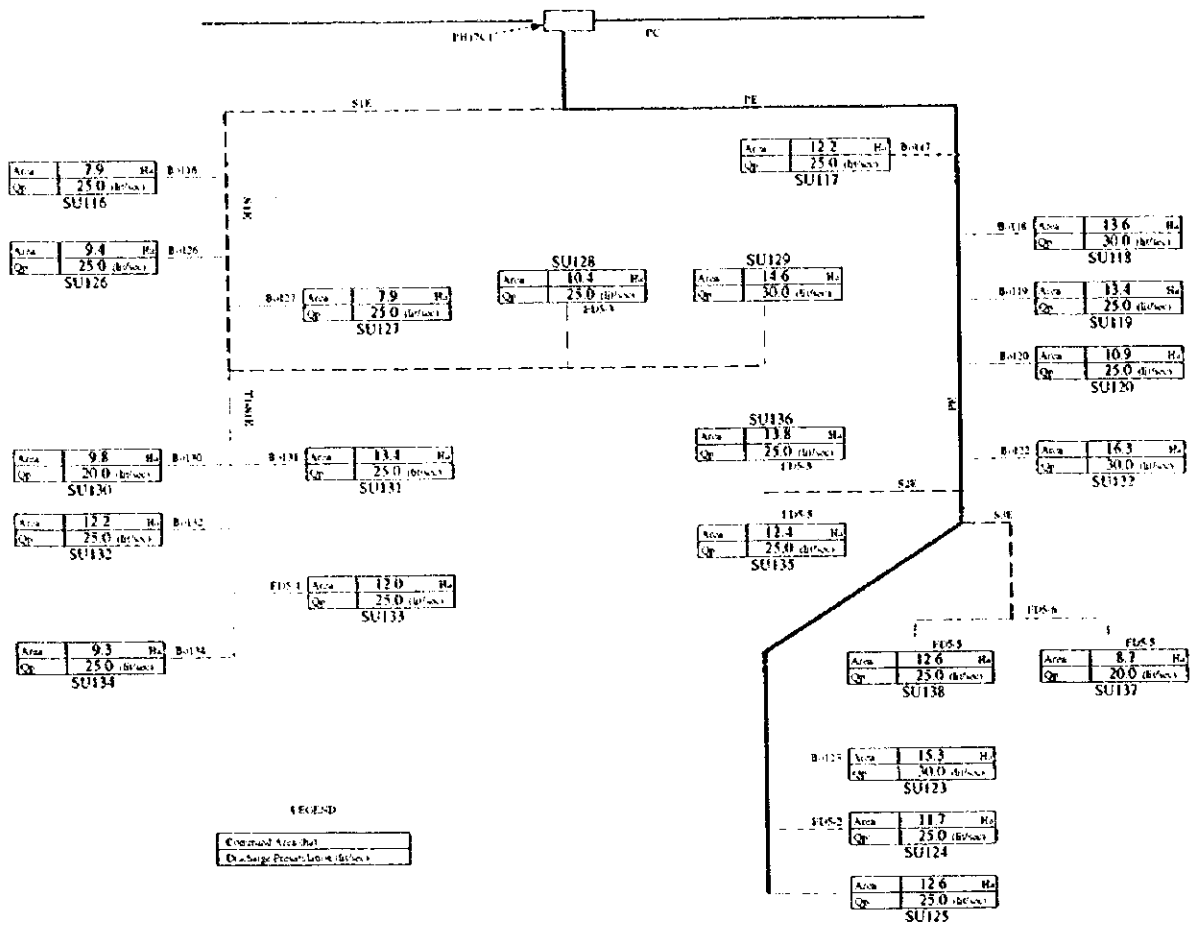


Fig. II-14 (6/8) Irrigation Water Distribution Diagram  
 Kemasin / Semerak Irrigation Scheme, Kemasin Hilir Block A

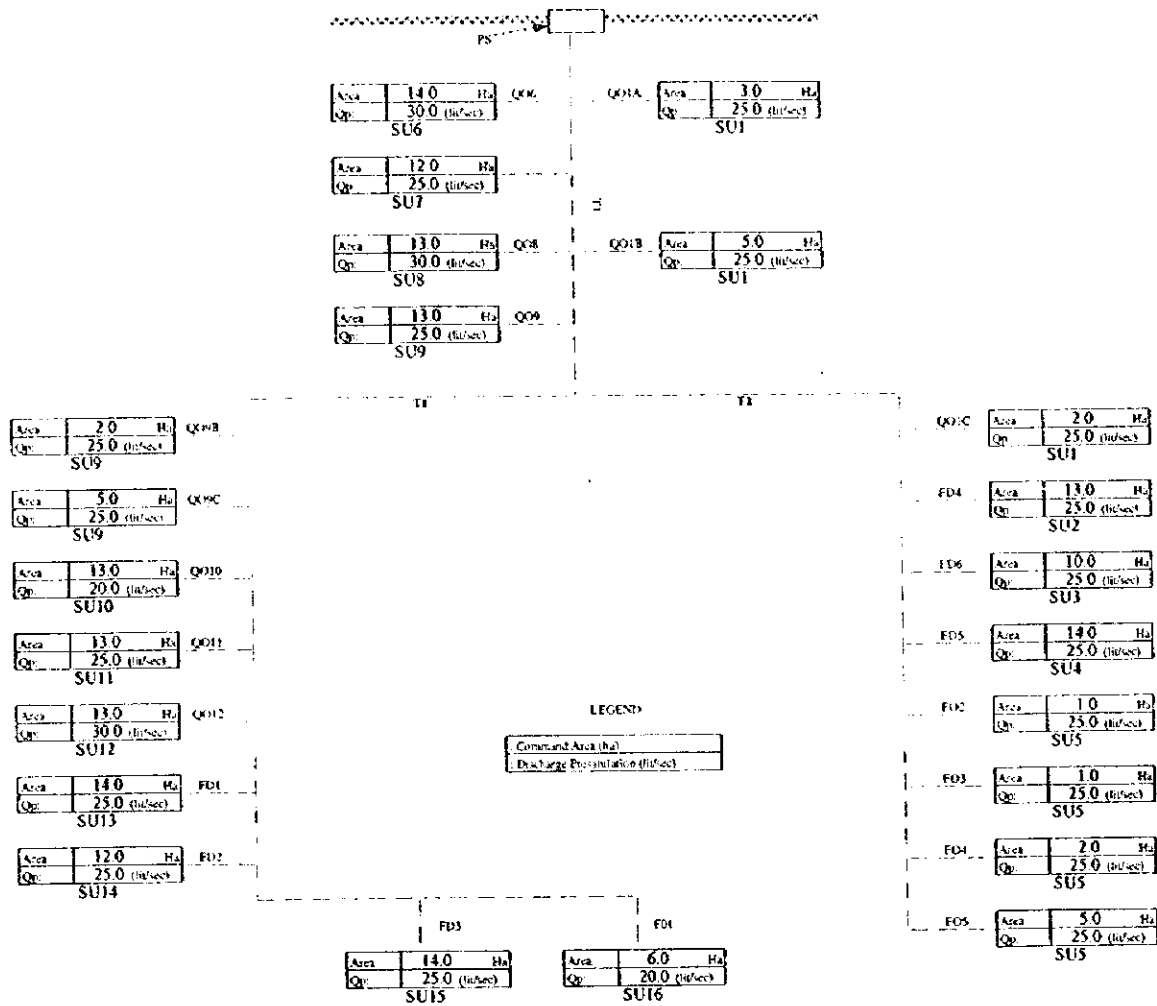


Fig. II-14 (7/8)

Irrigation Water Distribution Diagram  
 Kemasin / Semerak Irrigation Scheme, Kemasin Hilir

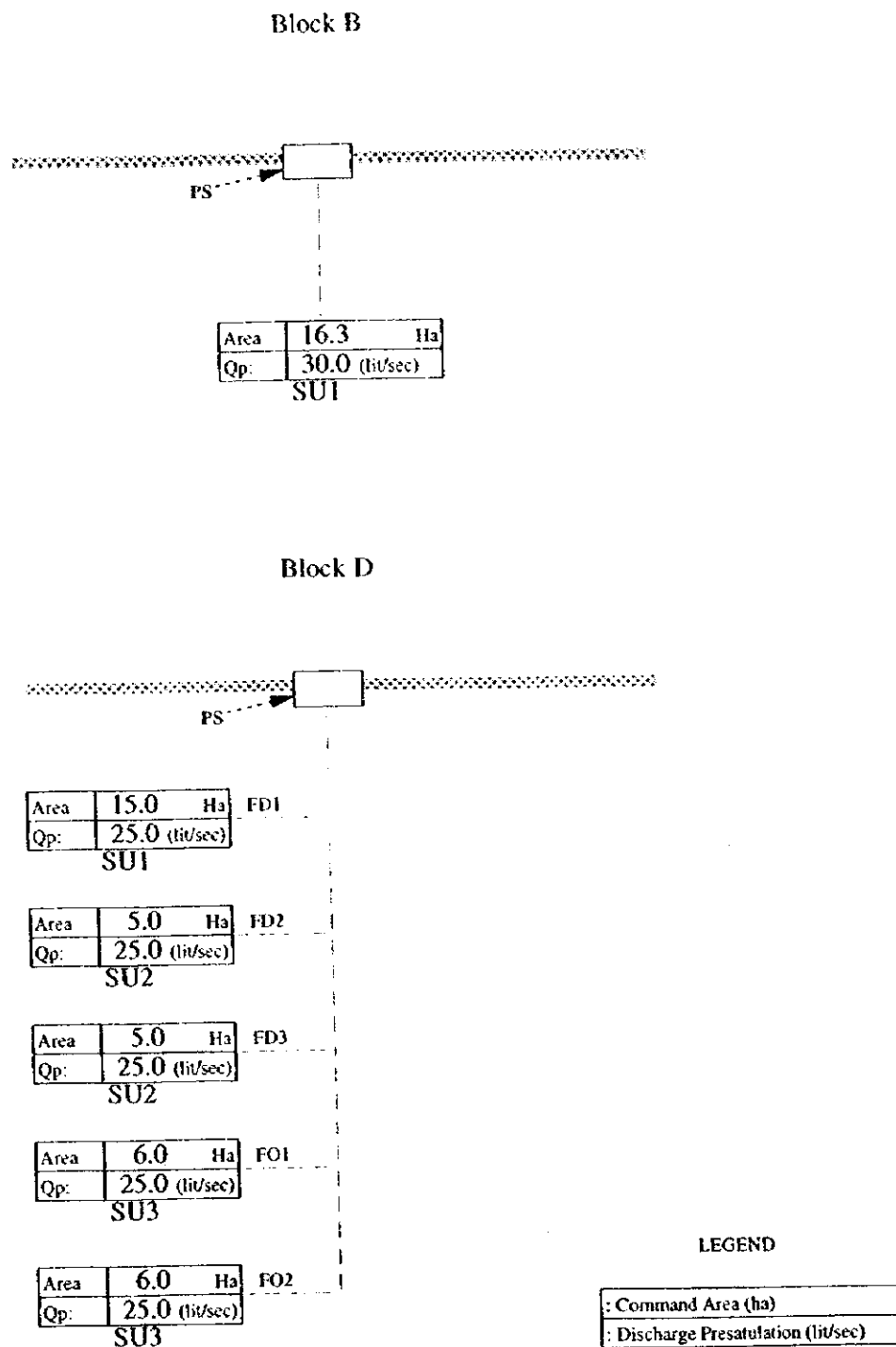
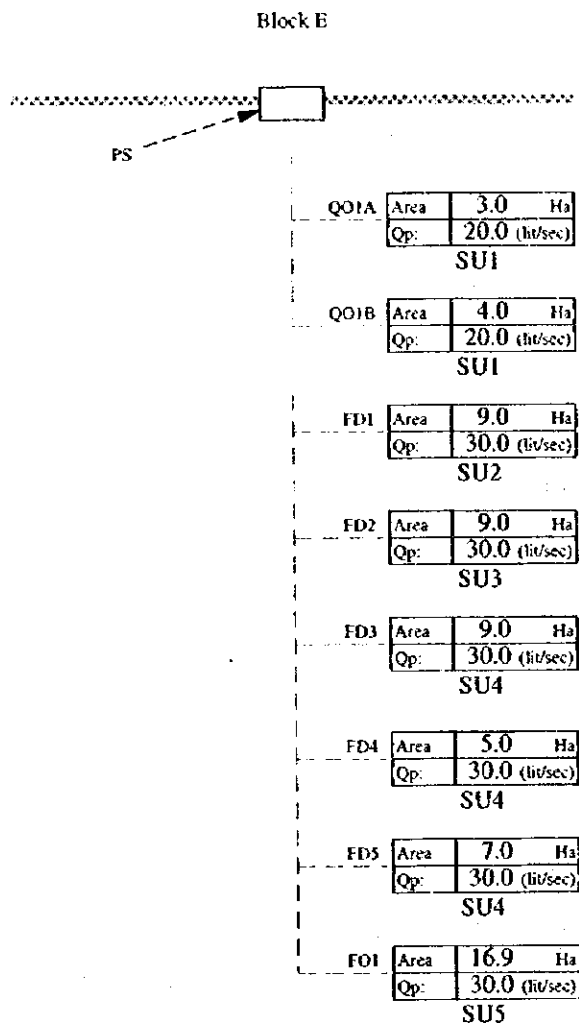
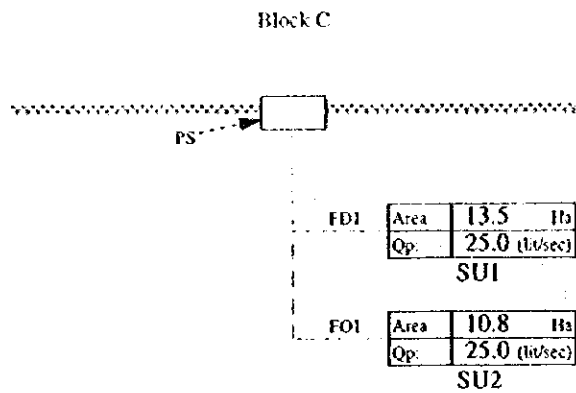
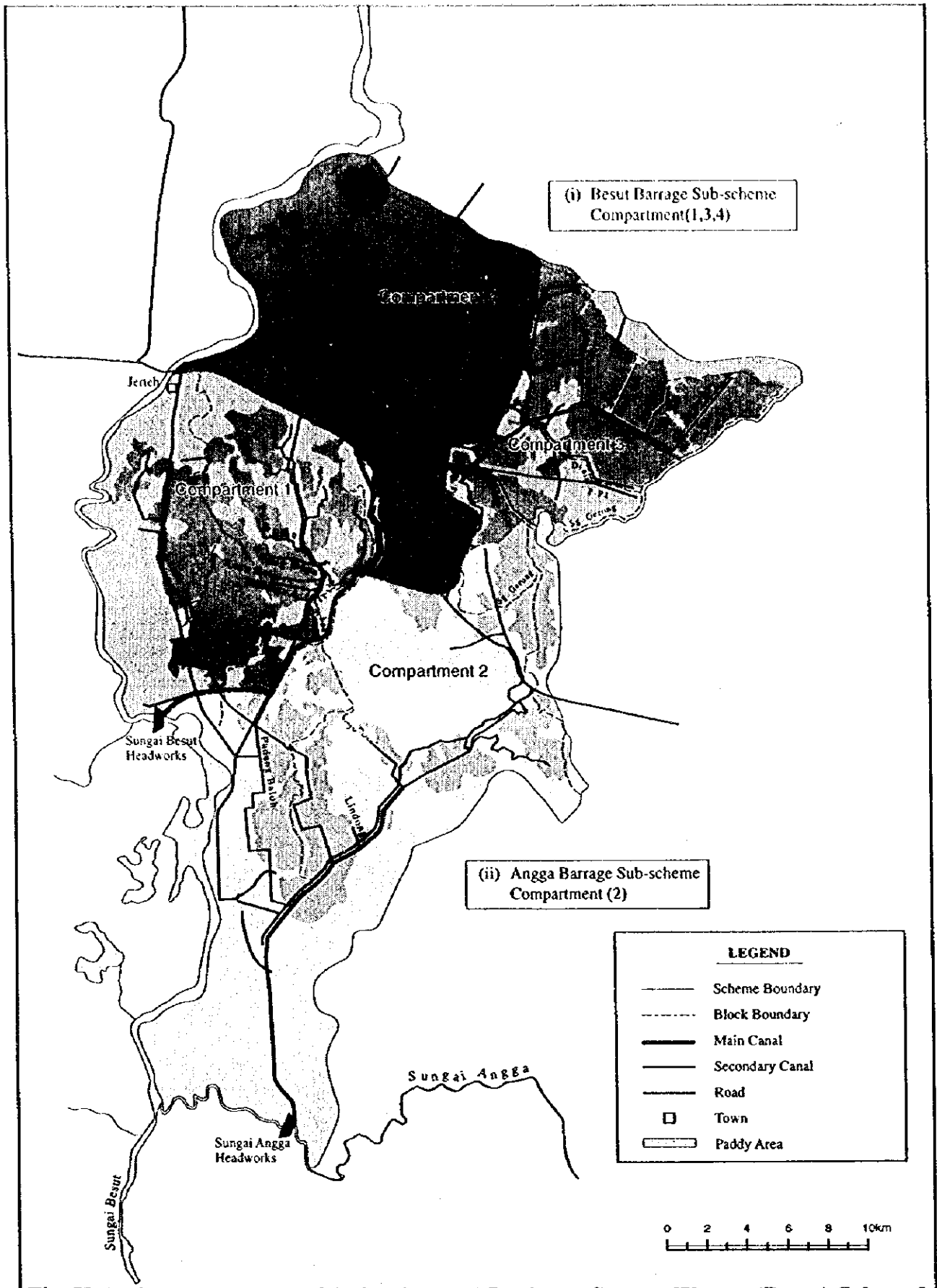


Fig. II-14 (8/8) Irrigation Water Distribution Diagram  
Kemasin / Semerak Irrigation Scheme, Kemasin Hilir



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|                                     |
|-------------------------------------|
| : Command Area (ha)                 |
| : Discharge Presatulation (lit/sec) |



**Fig. II-15 General Layout of Irrigation and Drainage System [Ketara(Besut) Scheme]**



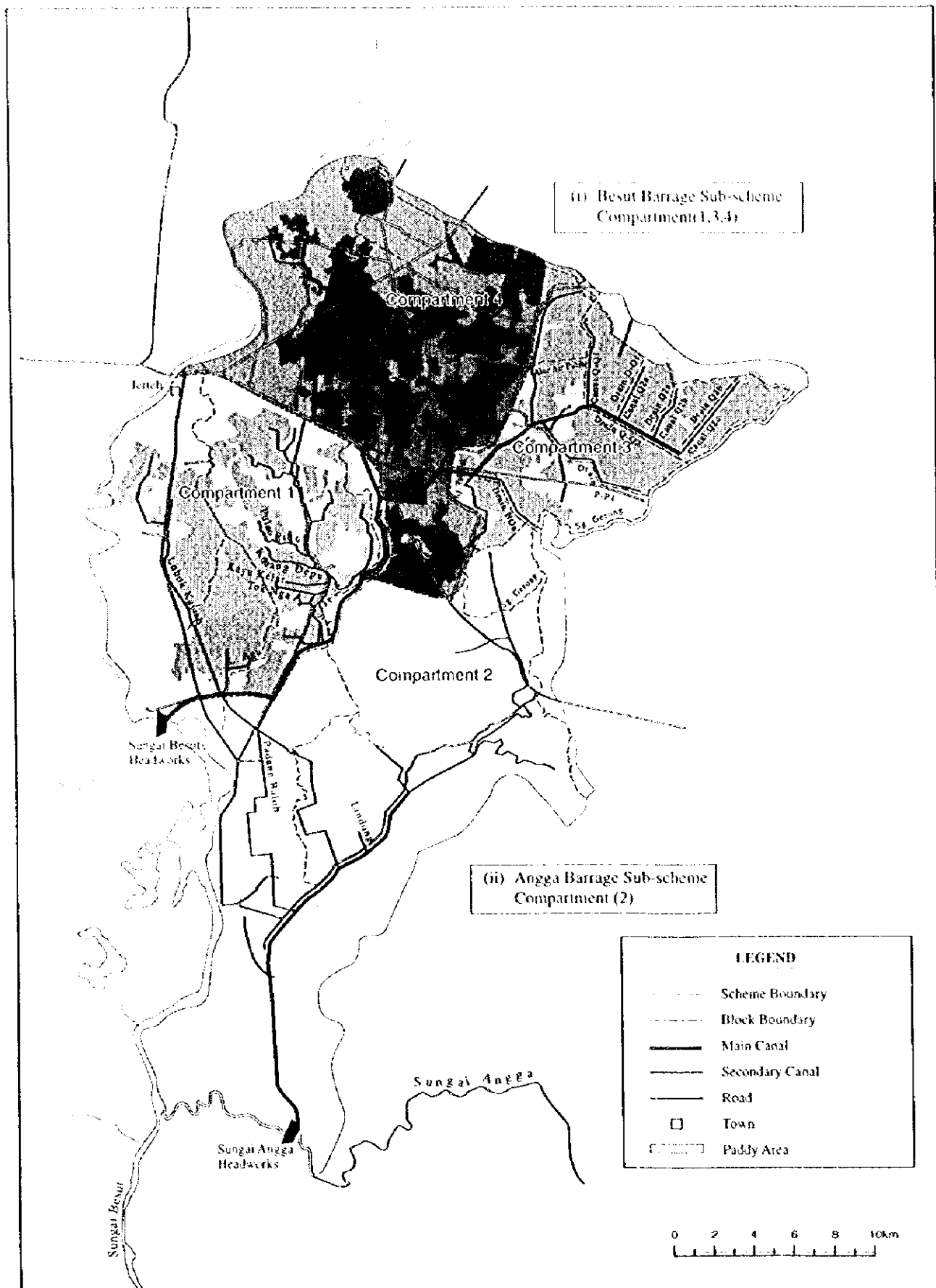


Fig. II-15 General Layout of Irrigation and Drainage System [Ketara(Besut) Scheme]

Fig. II-16 (1/6) Irrigation Water Distribution Diagram  
Besut Irrigation Scheme: Compartment No. 1 (1/2)

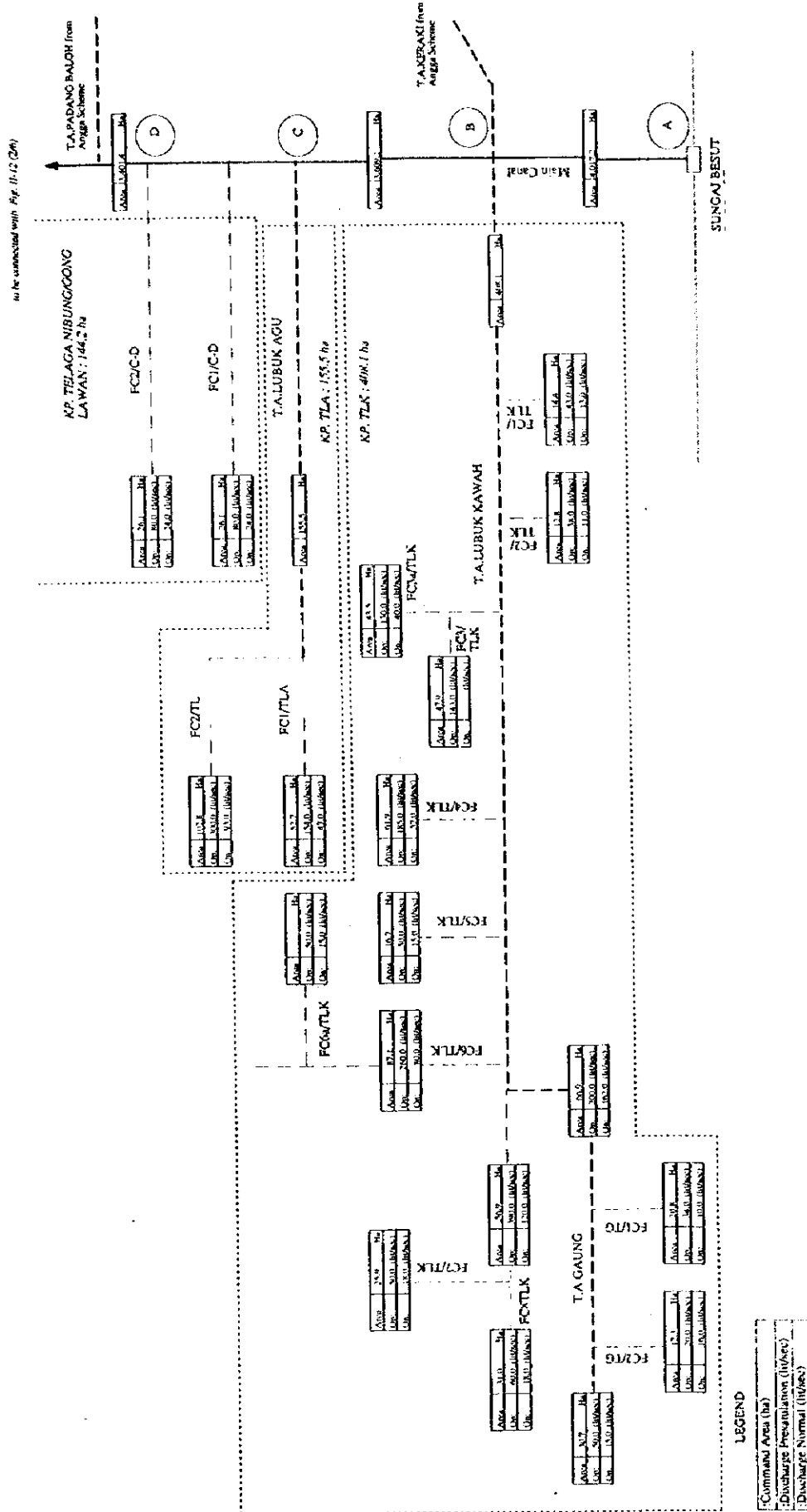


Fig. II-16 (2/6) Irrigation Water Distribution Diagram  
 Benut Irrigation Scheme: Compartment No. 1(2/2)

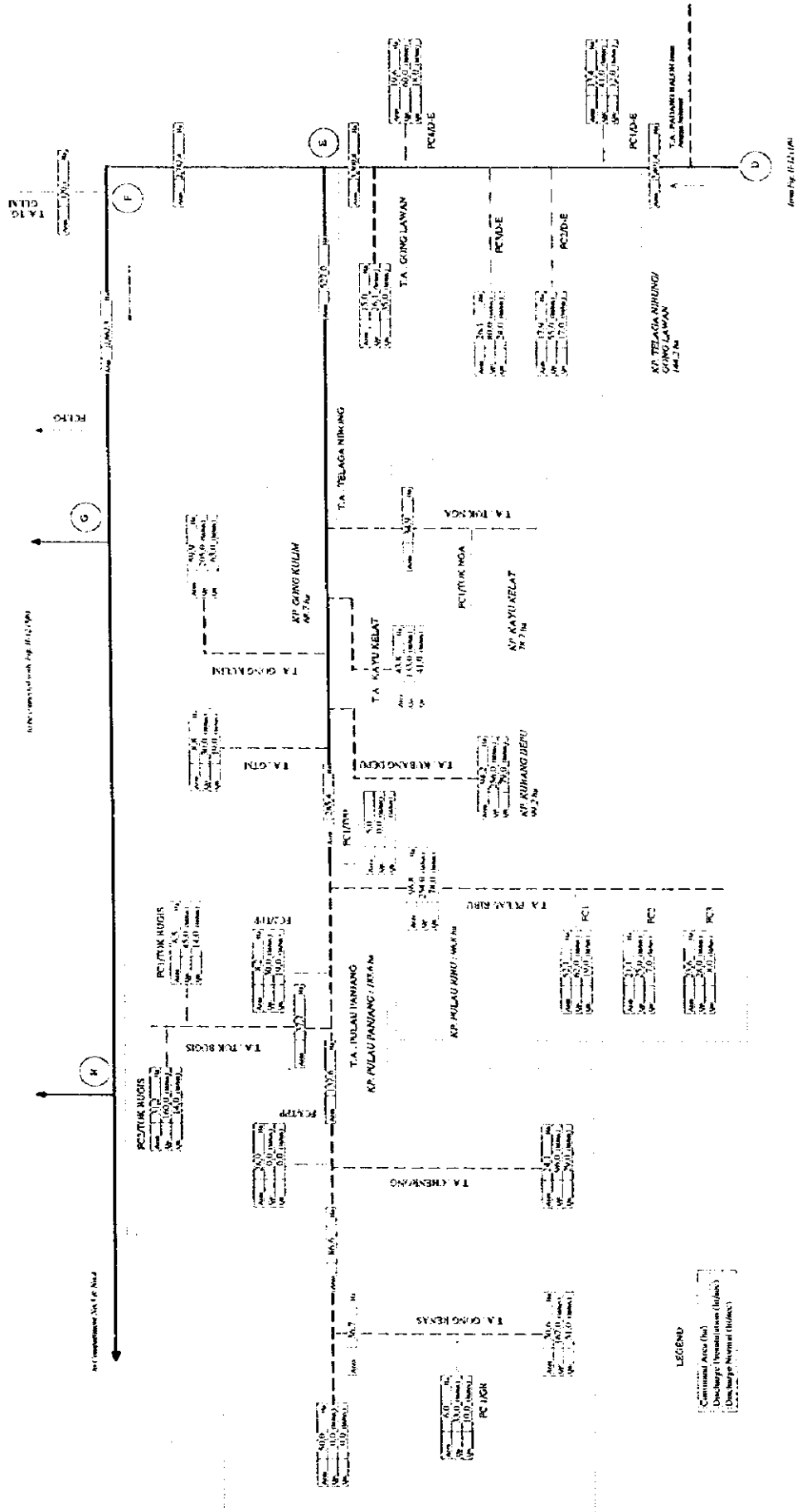


Fig. II-16 (3/6) Irrigation Water Distribution Diagram  
Besut Irrigation Scheme: Compartment No. 2

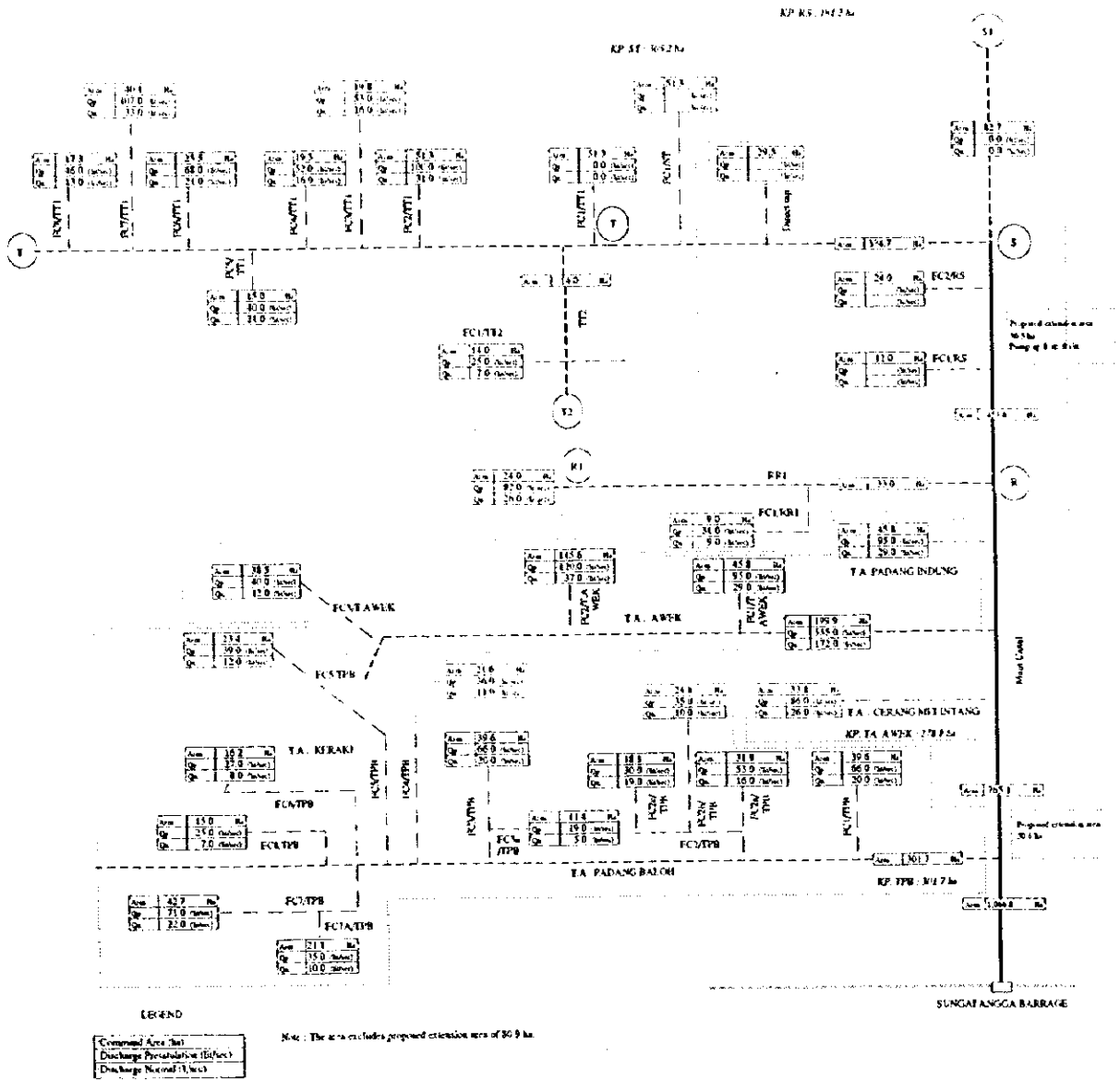


Fig. II-16 (4/6) Irrigation Water Distribution Diagram  
Besut Irrigation Scheme: Compartment No.3

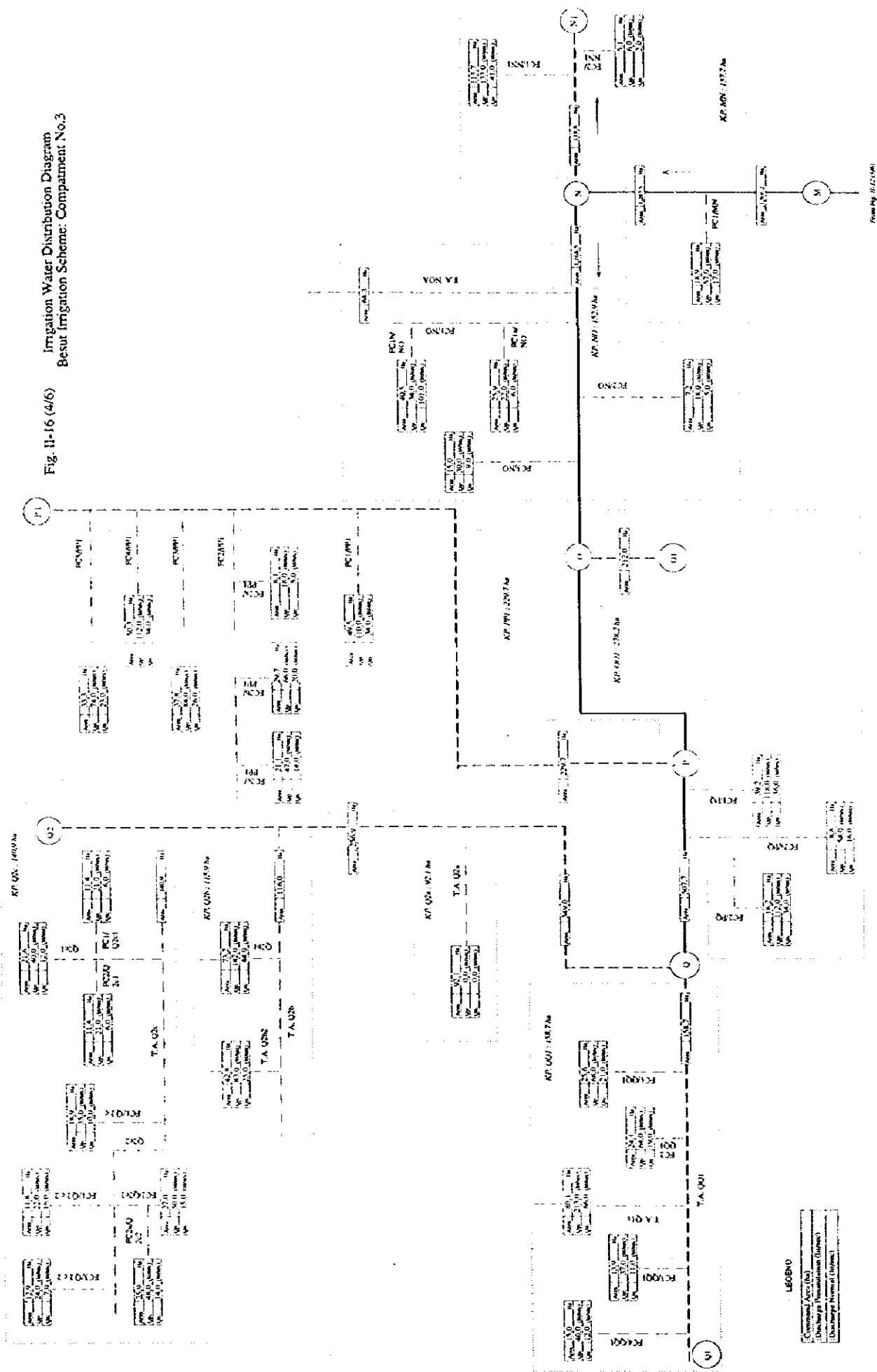


Fig. II-16 (5/6)

Irrigation Water Distribution Diagram  
Besut Irrigation Scheme: Compartment No.4(1/2)

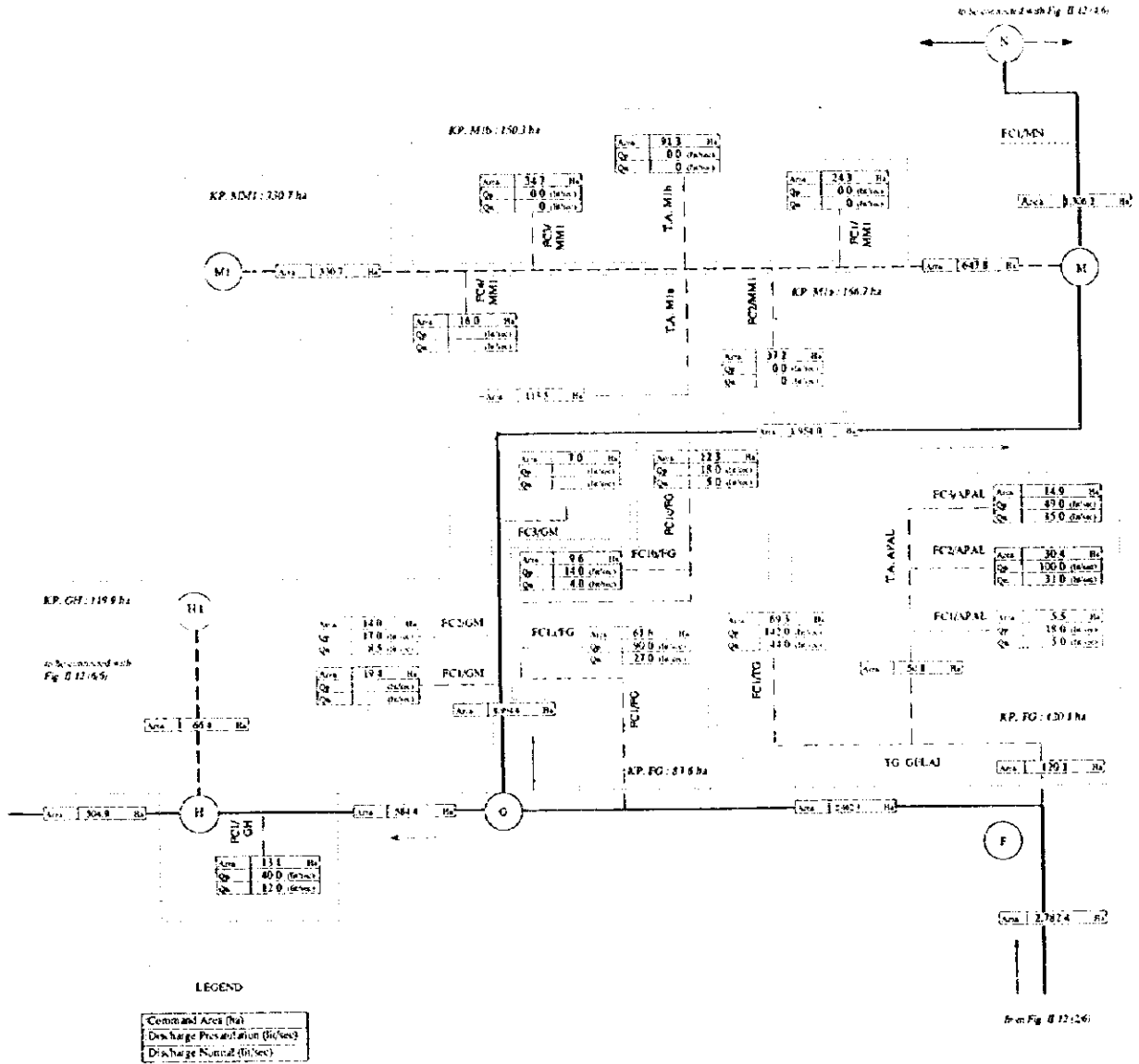


Fig. II-16 (6/6)  
 Irrigation Water Distribution Diagram  
 Besur Irrigation Scheme: Compartment No.4(2/2)

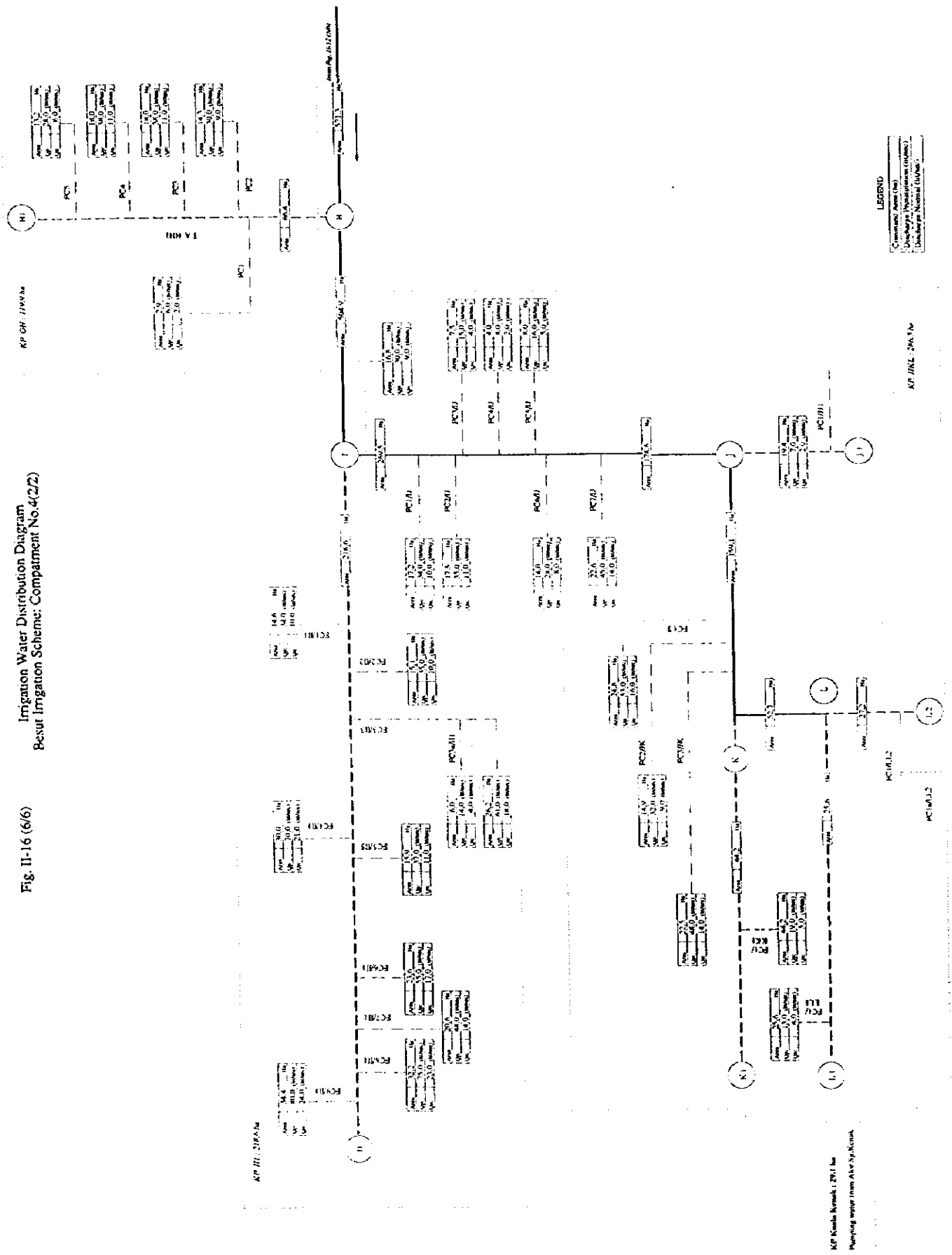
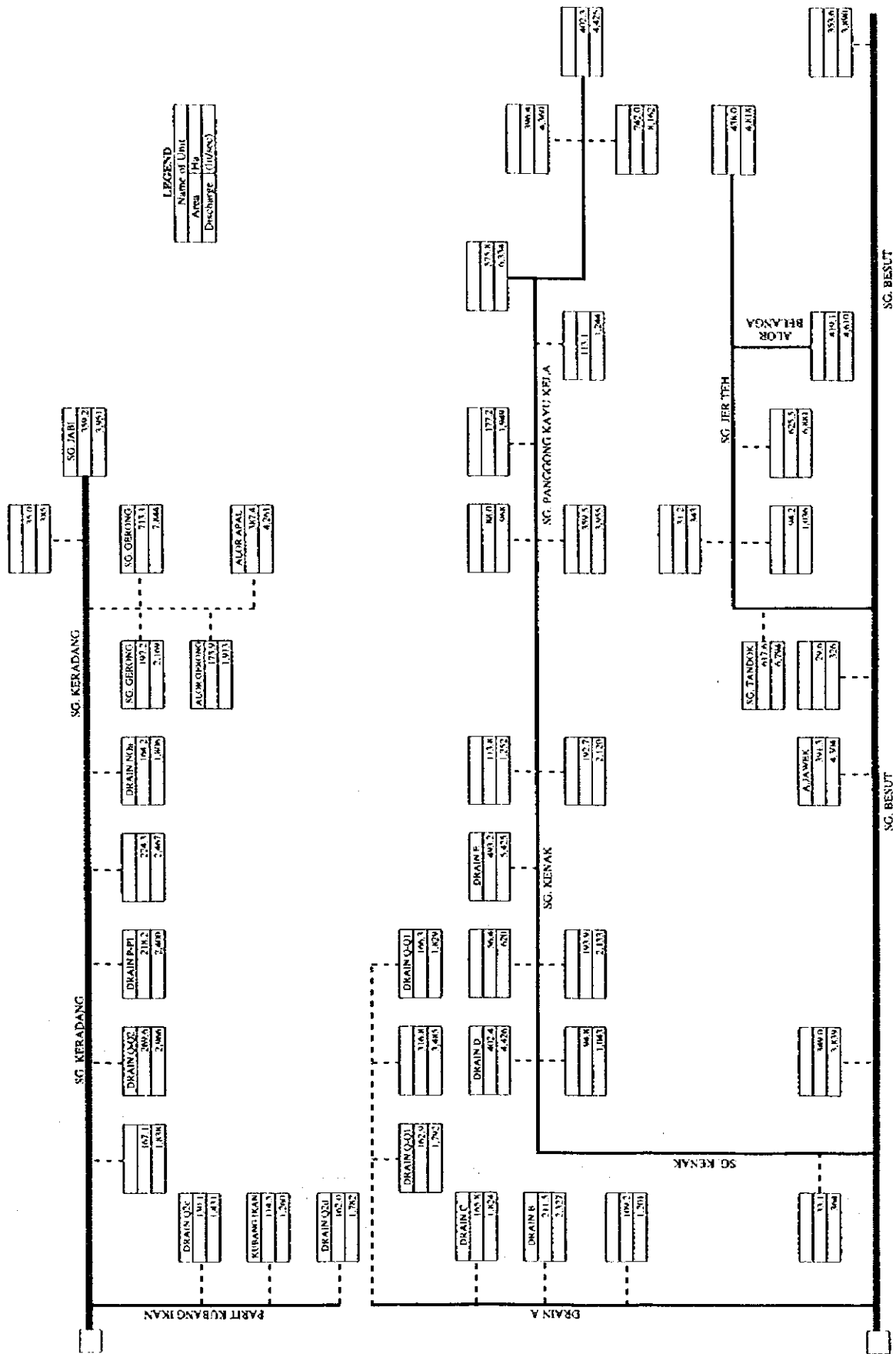


Fig. II-17

Drainage Diagram  
Besut Scheme





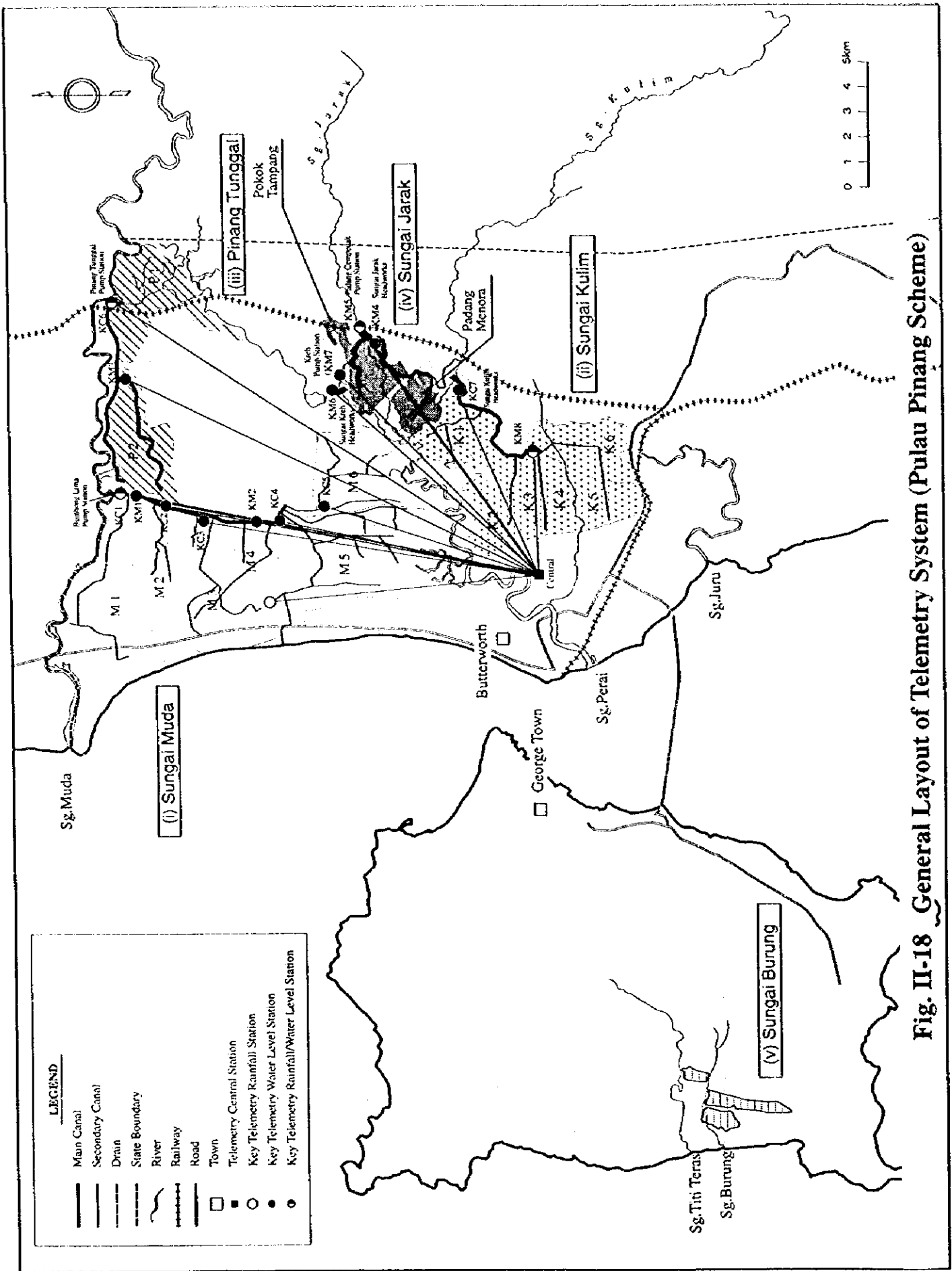


Fig. II-18 General Layout of Telemetry System (Pulau Pinang Scheme)

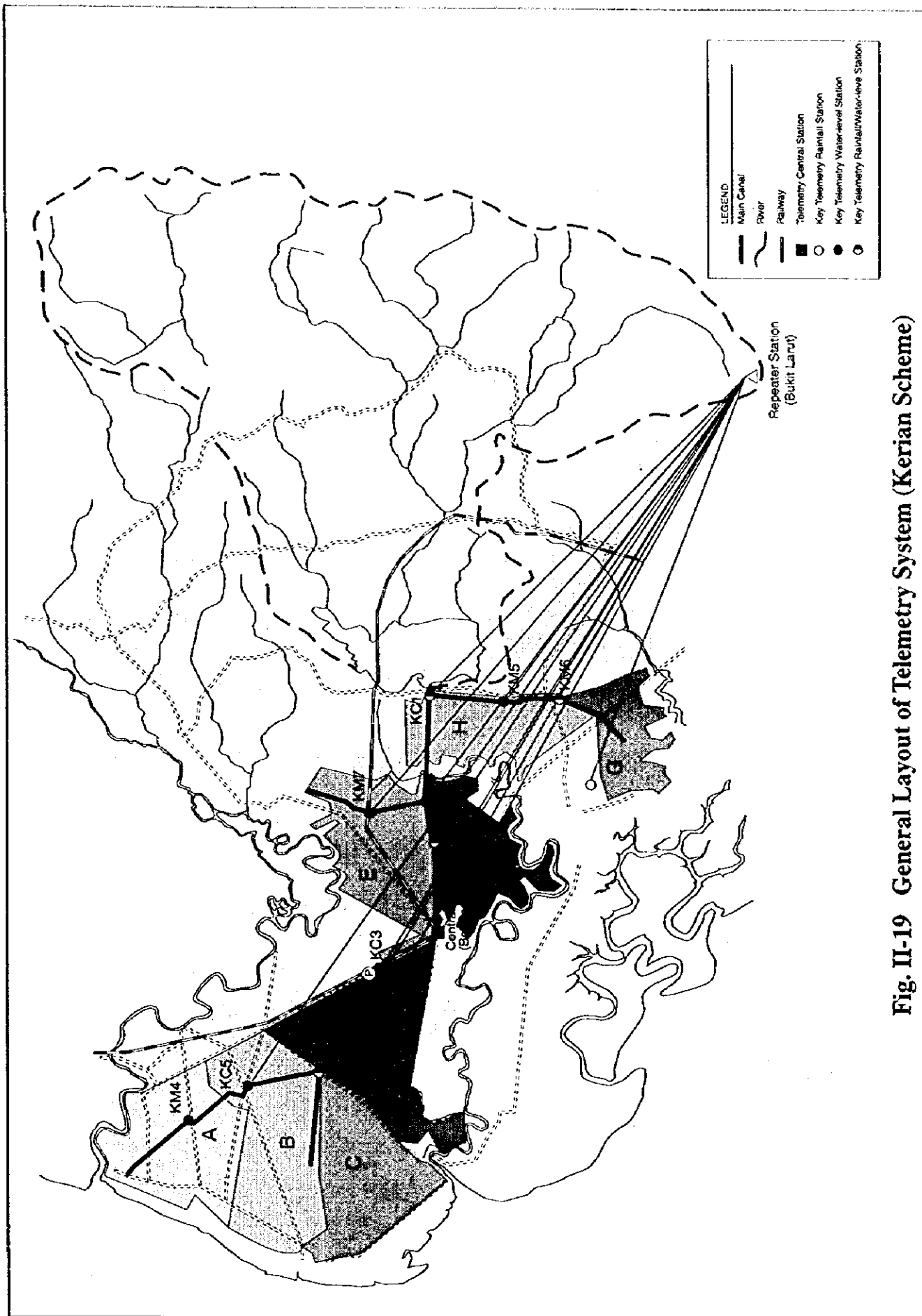


Fig. II-19 General Layout of Telemetry System (Kerian Scheme)

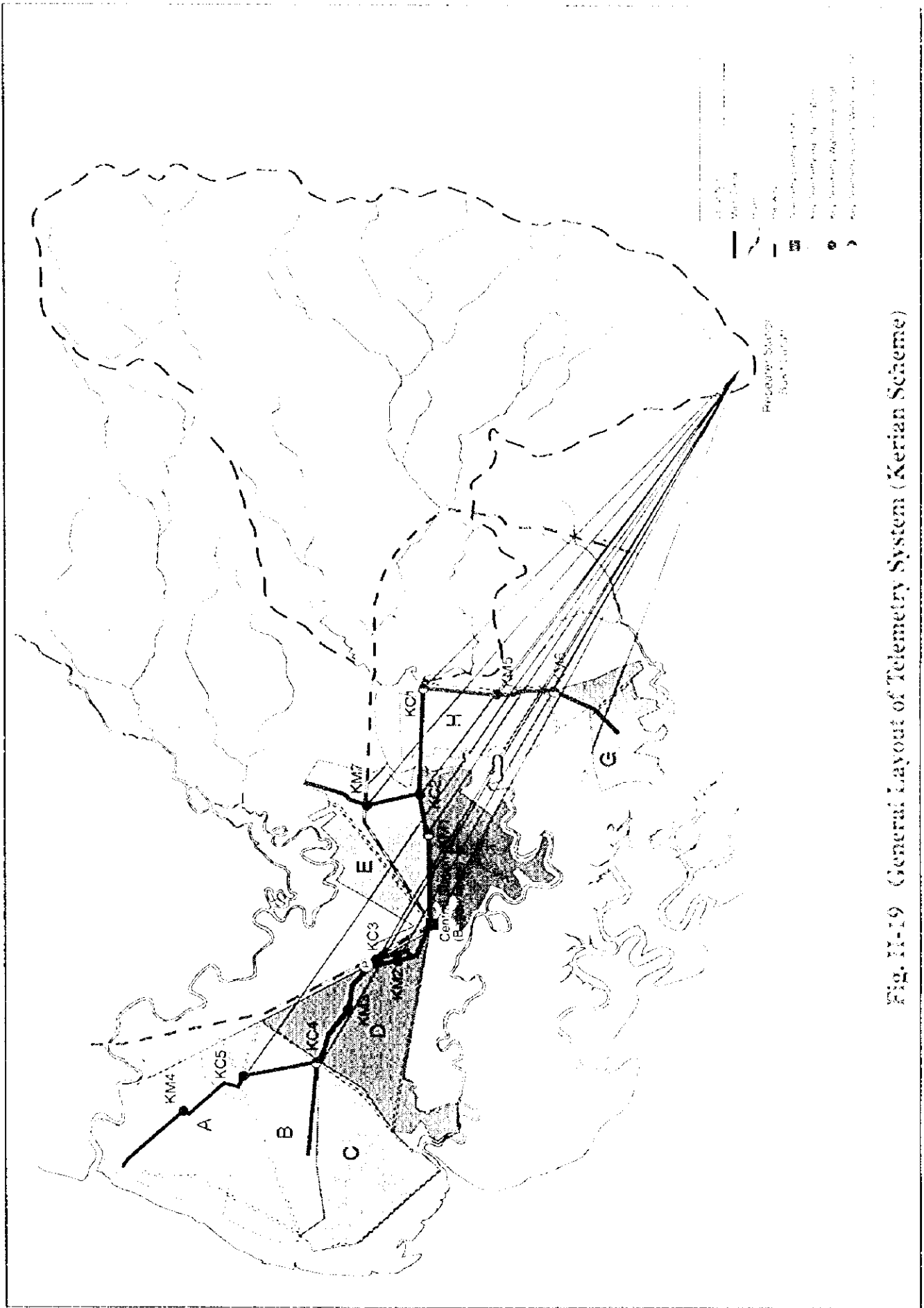
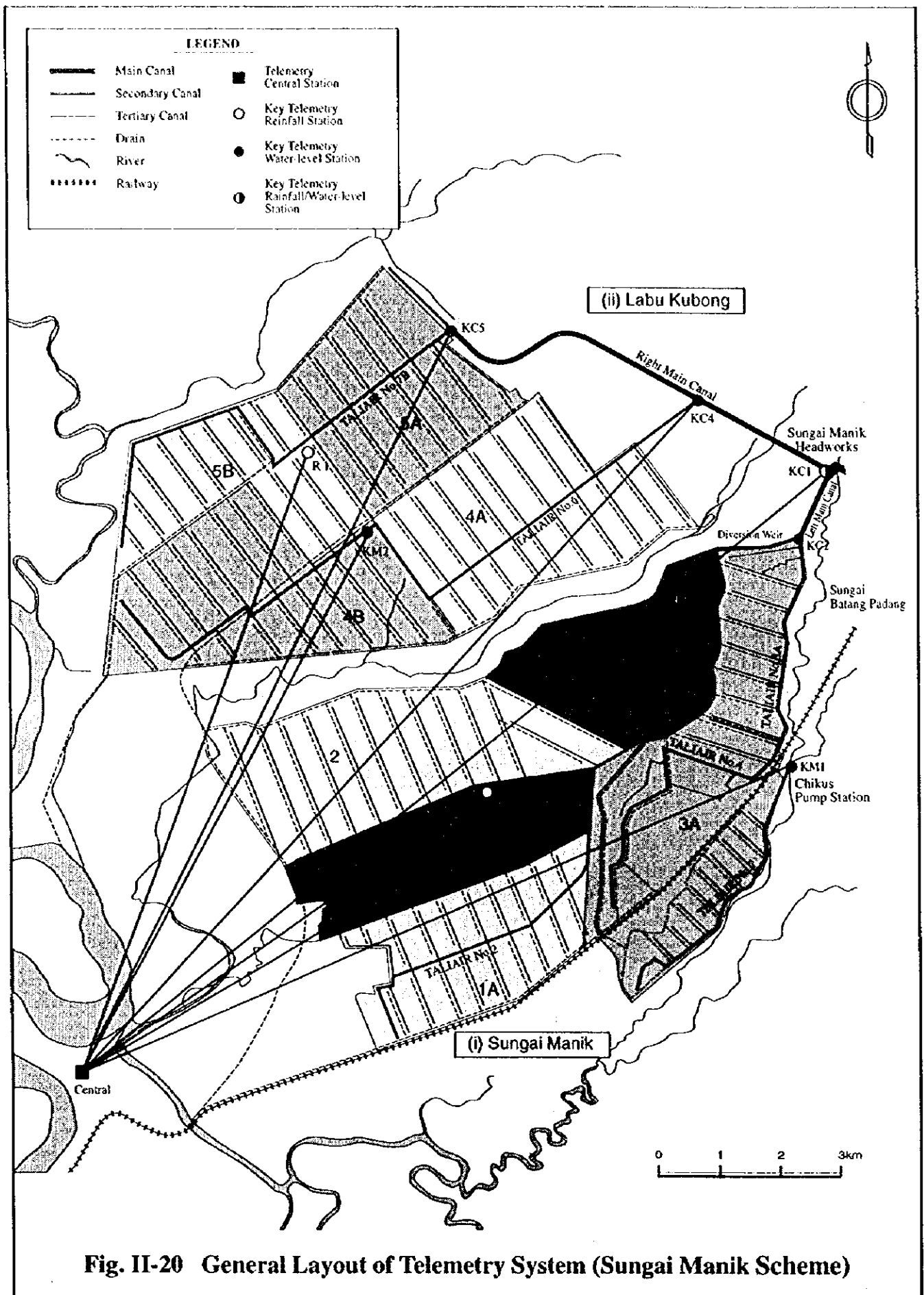


Fig. 11-19 General Layout of Telemetry System (Kerian Scheme)



**Fig. II-20 General Layout of Telemetry System (Sungai Manik Scheme)**

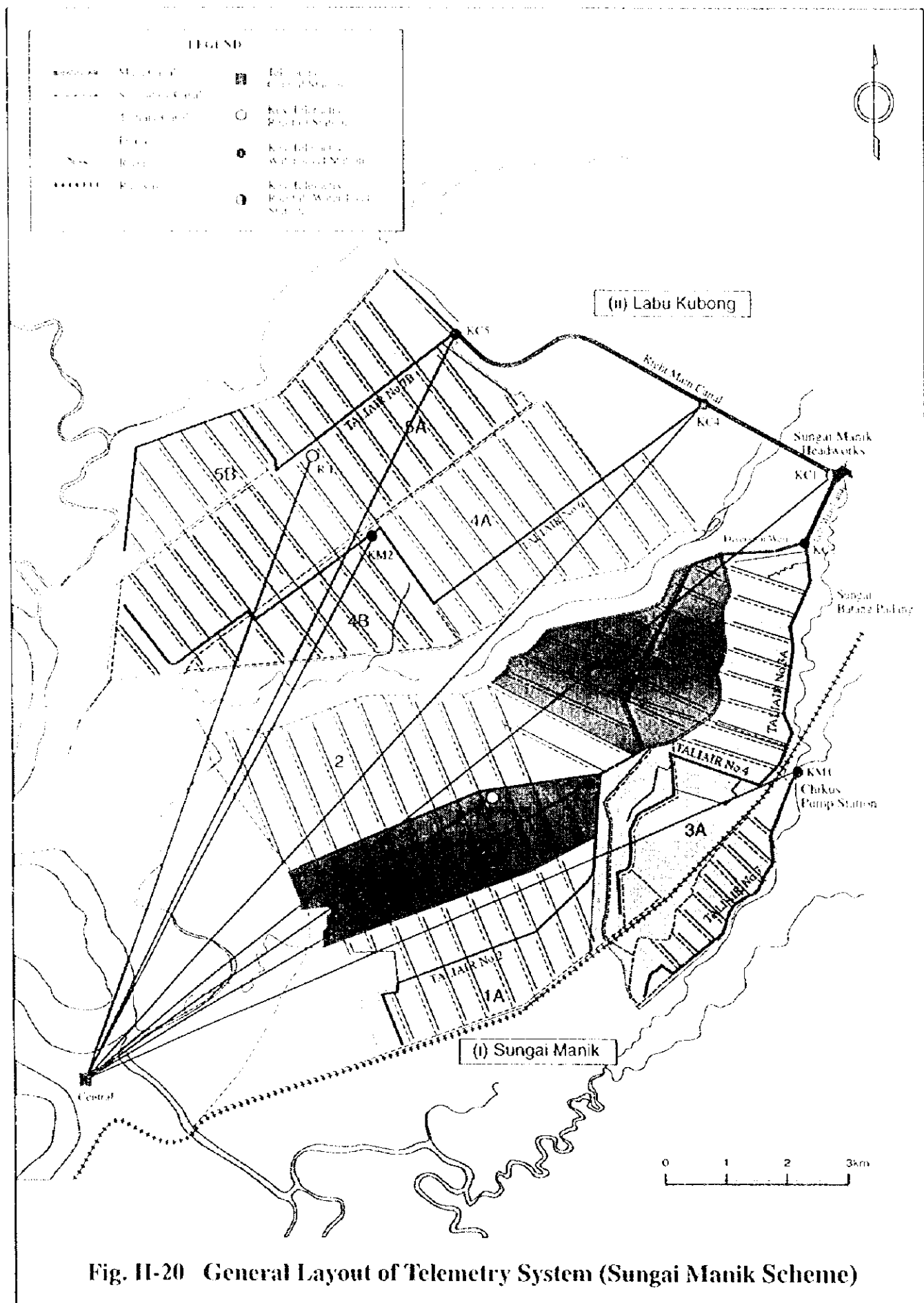
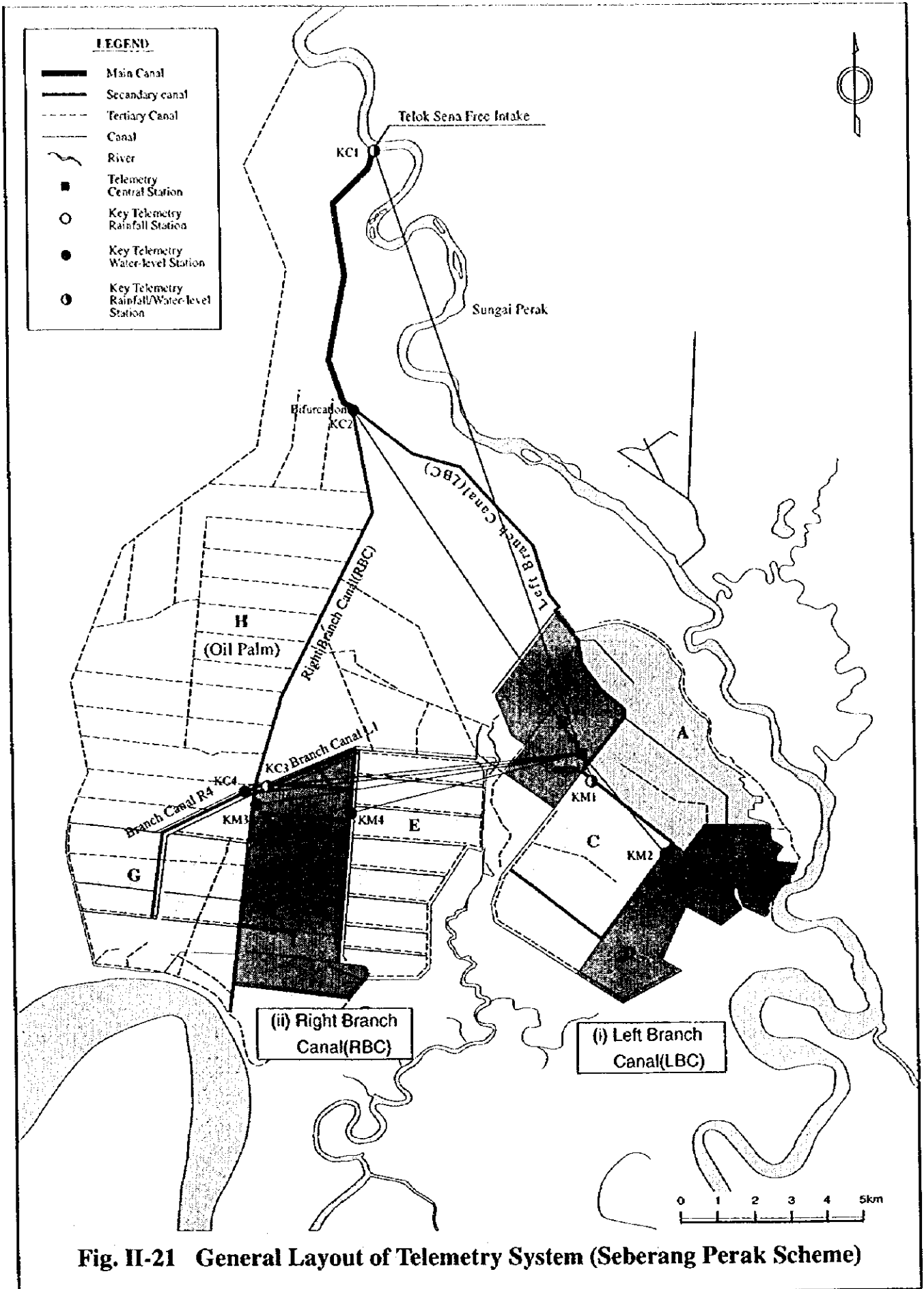


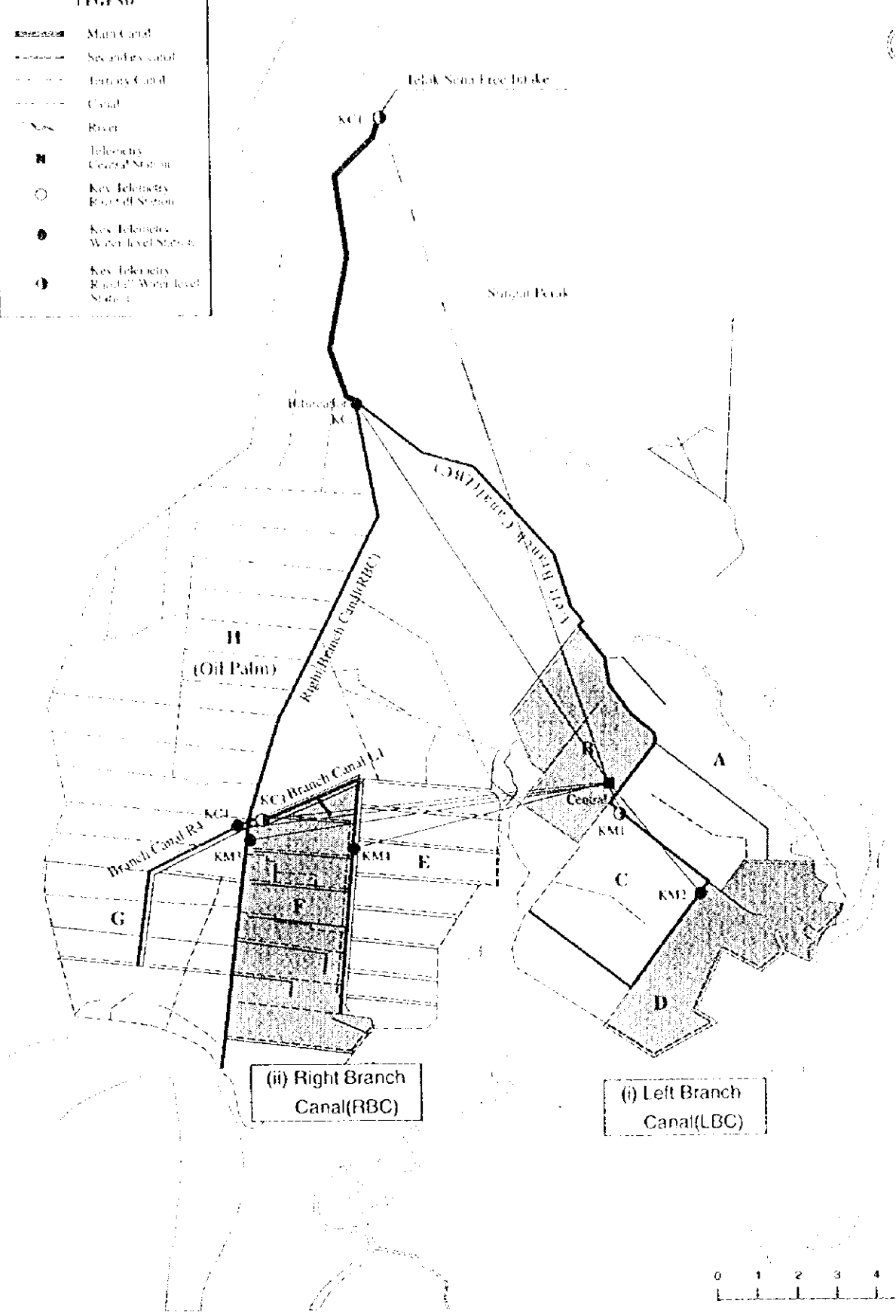
Fig. II-20 General Layout of Telemetry System (Sungai Manik Scheme)



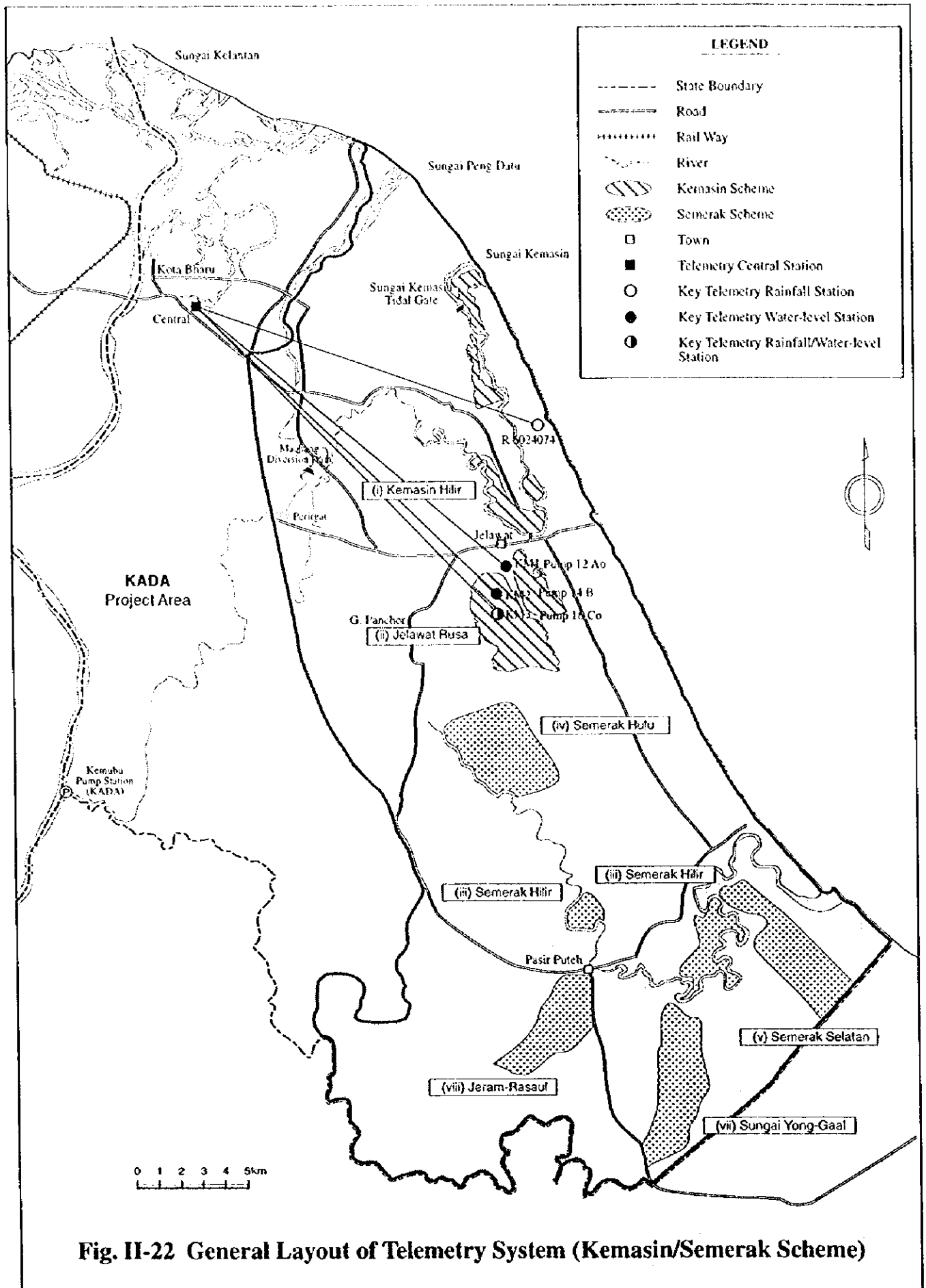
**Fig. II-21 General Layout of Telemetry System (Seberang Perak Scheme)**

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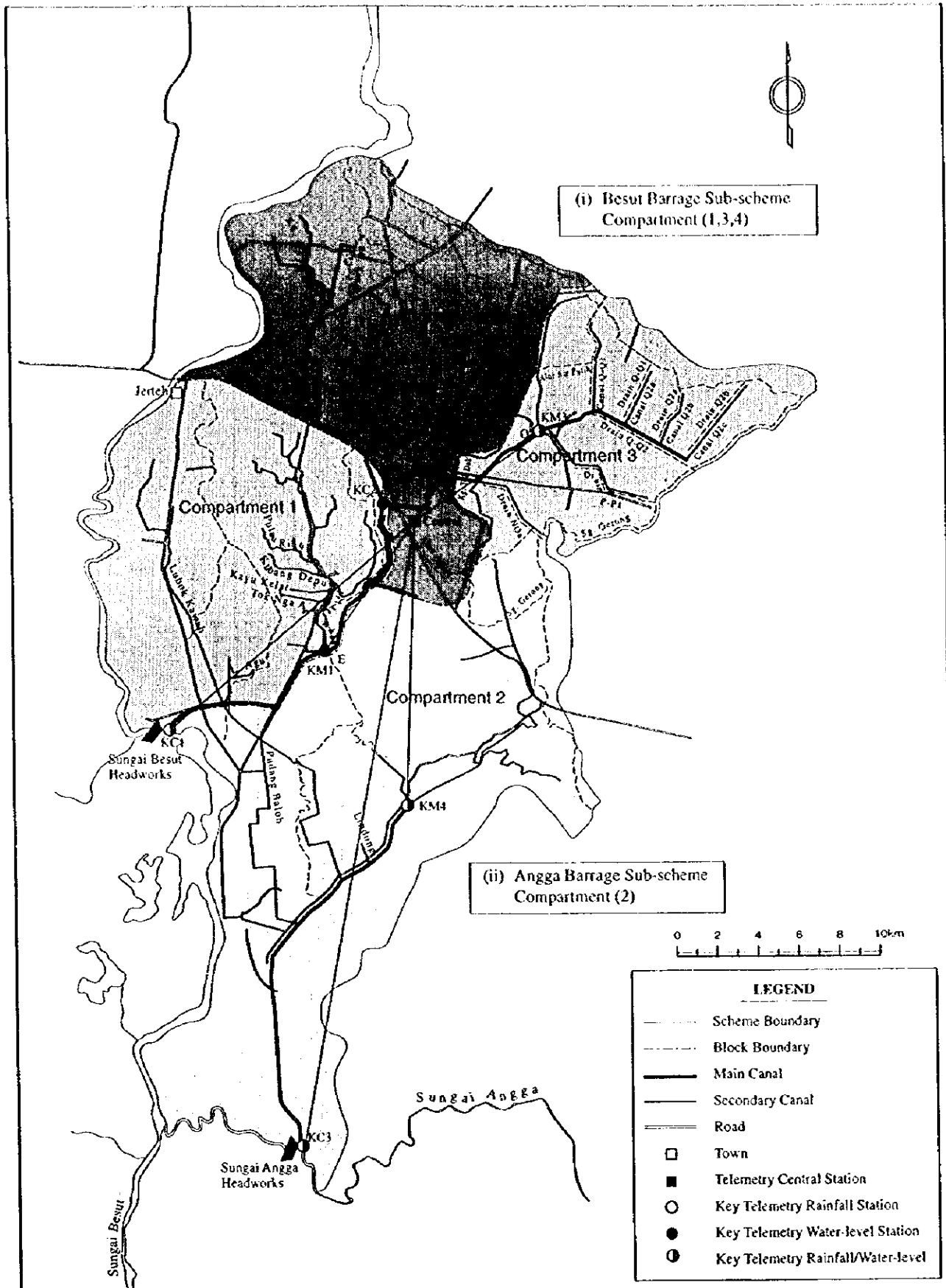
|  |  |
|--|--|
|  | Main Canal                             |
|  | Secondary canal                        |
|  | Tertiary Canal                         |
|  | Canal                                  |
|  | River                                  |
|  | Telemetry Control Station              |
|  | Key Telemetry Broadcast Station        |
|  | Key Telemetry Water level Station      |
|  | Key Telemetry Road/Water level Station |



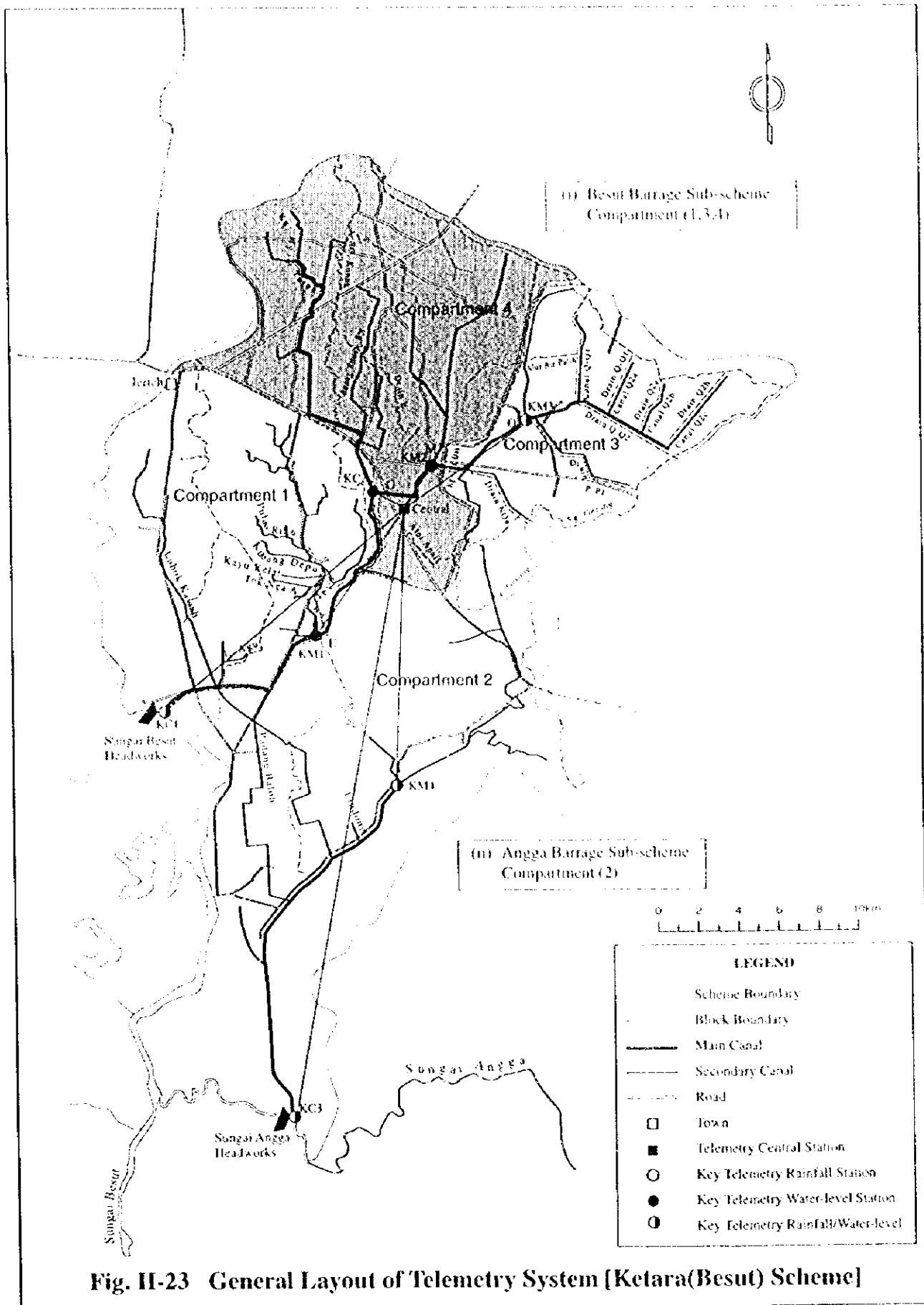
**Fig. II-21 General Layout of Telemetry System (Seberang Perak Scheme)**







**Fig. II-23 General Layout of Telemetry System [Ketara(Besut) Scheme]**



**Fig. II-23 General Layout of Telemetry System [Ketara(Besut) Scheme]**

Fig. II-24 Implementation Schedule for Five Granary Schemes (Master Plan)

| Scheme                                     | Year |      | 7th Malaysia Plan |      |      |      | 8th Malaysian Plan |      |      |      | 9th Malaysian Plan |      |      |  |
|--|------|------|-------------------|------|------|------|--------------------|------|------|------|--------------------|------|------|--|
|  | 1998 | 1999 | 2000              | 2001 | 2002 | 2003 | 2004               | 2005 | 2006 | 2007 | 2008               | 2009 | 2010 |  |
| <b>I. Kerian Scheme</b>                    |      |      |                   |      |      |      |                    |      |      |      |                    |      |      |  |
| 1. Improvement of System Infrastructures   |      |      |                   |      |      |      |                    |      |      |      |                    |      |      |  |
| 2. Improvement of In-field Infrastructures |      |      |                   |      |      |      |                    |      |      |      |                    |      |      |  |
| 3. Water Management / Monitoring System    |      |      |                   |      |      |      |                    |      |      |      |                    |      |      |  |
| 4. Training of Water Users Group           |      |      |                   |      |      |      |                    |      |      |      |                    |      |      |  |
| <b>II. Besut Scheme</b>                    |      |      |                   |      |      |      |                    |      |      |      |                    |      |      |  |
| 1. Improvement of System Infrastructures   |      |      |                   |      |      |      |                    |      |      |      |                    |      |      |  |
| 2. Improvement of In-field Infrastructures |      |      |                   |      |      |      |                    |      |      |      |                    |      |      |  |
| 3. Water Management / Monitoring System    |      |      |                   |      |      |      |                    |      |      |      |                    |      |      |  |
| 4. Training of Water Users Group           |      |      |                   |      |      |      |                    |      |      |      |                    |      |      |  |
| <b>III. Pulau Pinang Scheme</b>            |      |      |                   |      |      |      |                    |      |      |      |                    |      |      |  |
| 1. Improvement of System Infrastructures   |      |      |                   |      |      |      |                    |      |      |      |                    |      |      |  |
| 2. Improvement of In-field Infrastructures |      |      |                   |      |      |      |                    |      |      |      |                    |      |      |  |
| 3. Water Management / Monitoring System    |      |      |                   |      |      |      |                    |      |      |      |                    |      |      |  |
| 4. Training of Water Users Group           |      |      |                   |      |      |      |                    |      |      |      |                    |      |      |  |
| <b>IV. Sungai Manik Scheme</b>             |      |      |                   |      |      |      |                    |      |      |      |                    |      |      |  |
| 1. Improvement of System Infrastructures   |      |      |                   |      |      |      |                    |      |      |      |                    |      |      |  |
| 2. Improvement of In-field Infrastructures |      |      |                   |      |      |      |                    |      |      |      |                    |      |      |  |
| 3. Water Management / Monitoring System    |      |      |                   |      |      |      |                    |      |      |      |                    |      |      |  |
| 4. Training of Water Users Group           |      |      |                   |      |      |      |                    |      |      |      |                    |      |      |  |
| <b>V. Seberang Perak Scheme</b>            |      |      |                   |      |      |      |                    |      |      |      |                    |      |      |  |
| 1. Improvement of System Infrastructures   |      |      |                   |      |      |      |                    |      |      |      |                    |      |      |  |
| 2. Improvement of In-field Infrastructures |      |      |                   |      |      |      |                    |      |      |      |                    |      |      |  |
| 3. Water Management / Monitoring System    |      |      |                   |      |      |      |                    |      |      |      |                    |      |      |  |
| 4. Training of Water Users Group           |      |      |                   |      |      |      |                    |      |      |      |                    |      |      |  |
| <b>VI. Kemasin/Semerak Scheme</b>          |      |      |                   |      |      |      |                    |      |      |      |                    |      |      |  |
| 1. Improvement of System Infrastructures   |      |      |                   |      |      |      |                    |      |      |      |                    |      |      |  |
| 2. Improvement of In-field Infrastructures |      |      |                   |      |      |      |                    |      |      |      |                    |      |      |  |
| 3. Water Management / Monitoring System    |      |      |                   |      |      |      |                    |      |      |      |                    |      |      |  |
| 4. Training of Water Users Group           |      |      |                   |      |      |      |                    |      |      |      |                    |      |      |  |

Note : Dotted lines in Kemasin/Semerak Scheme show the expected schedule for other than Jelawat Rusa and Kemasin Hilir sub-schemes, where are under implementing Flood Mitigation Project.

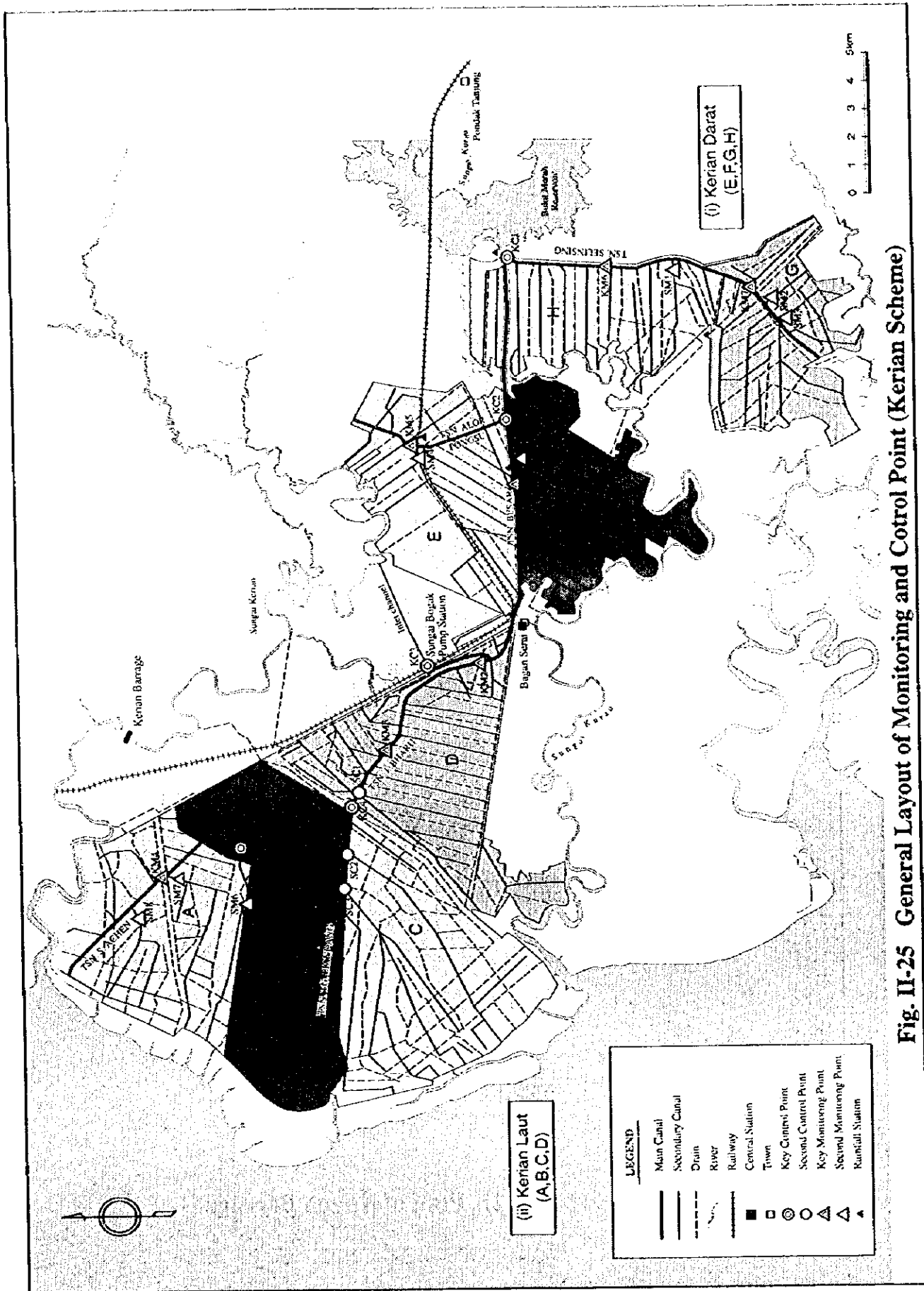


Fig. II-25 General Layout of Monitoring and Control Point (Kerian Scheme)

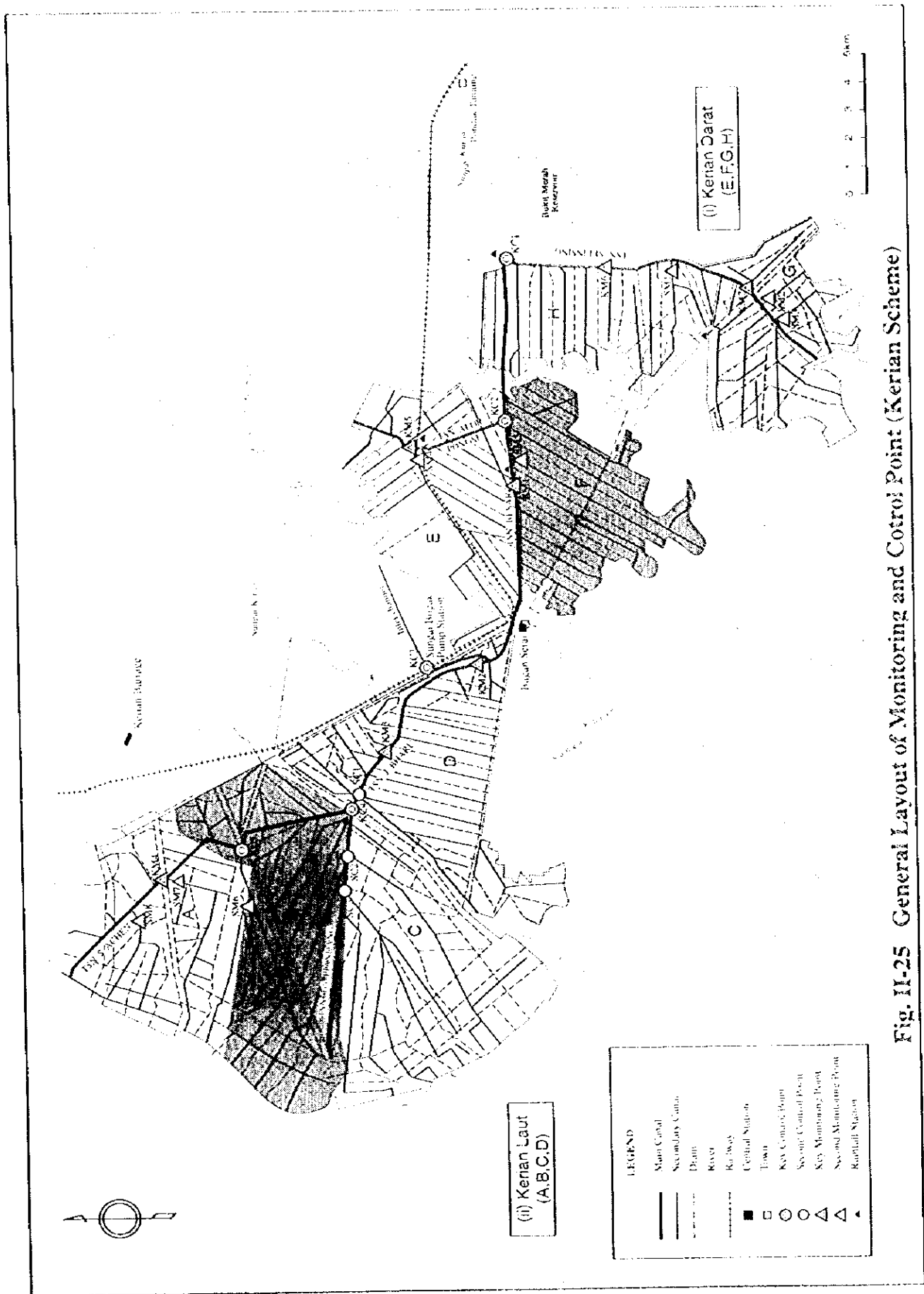
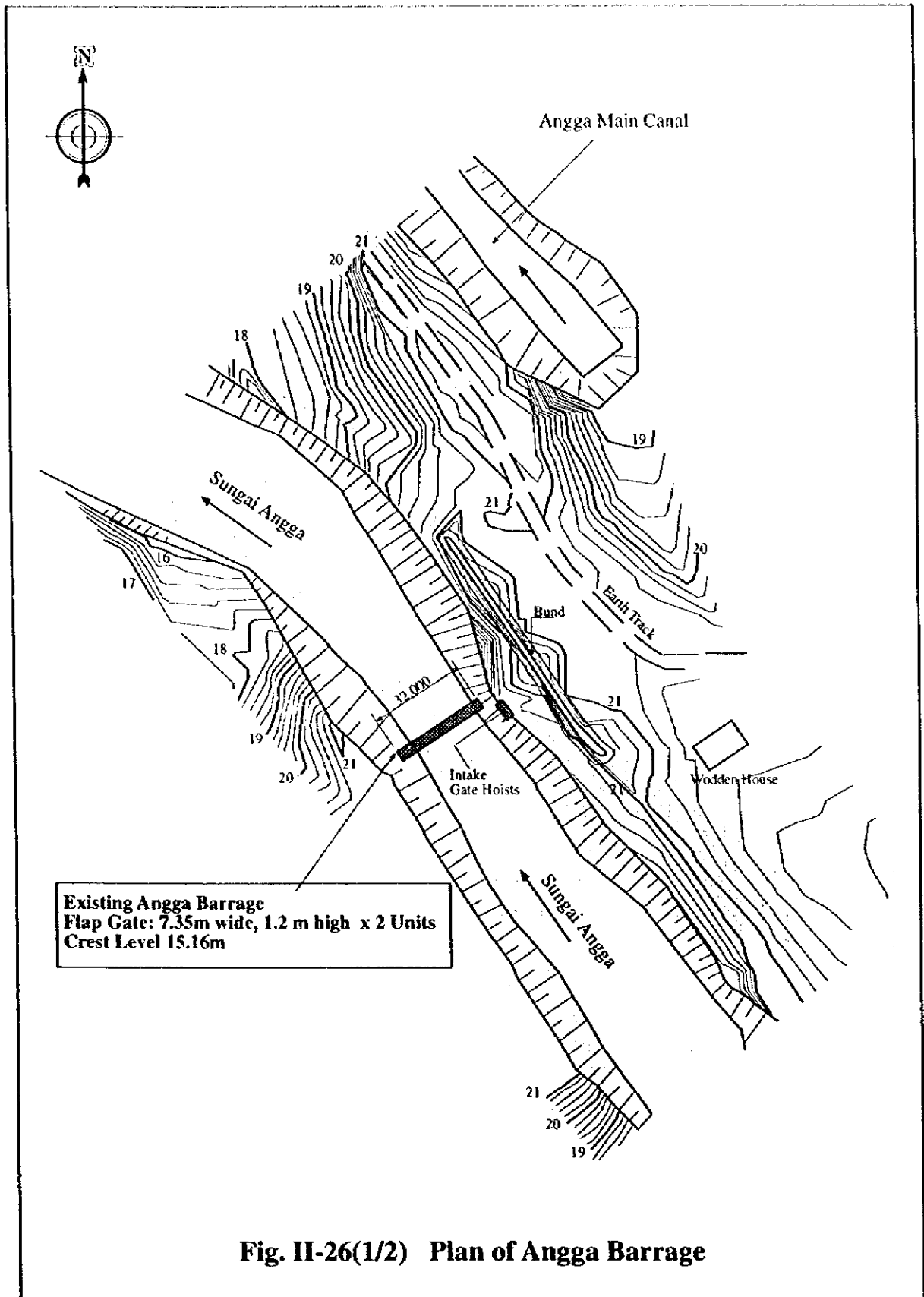
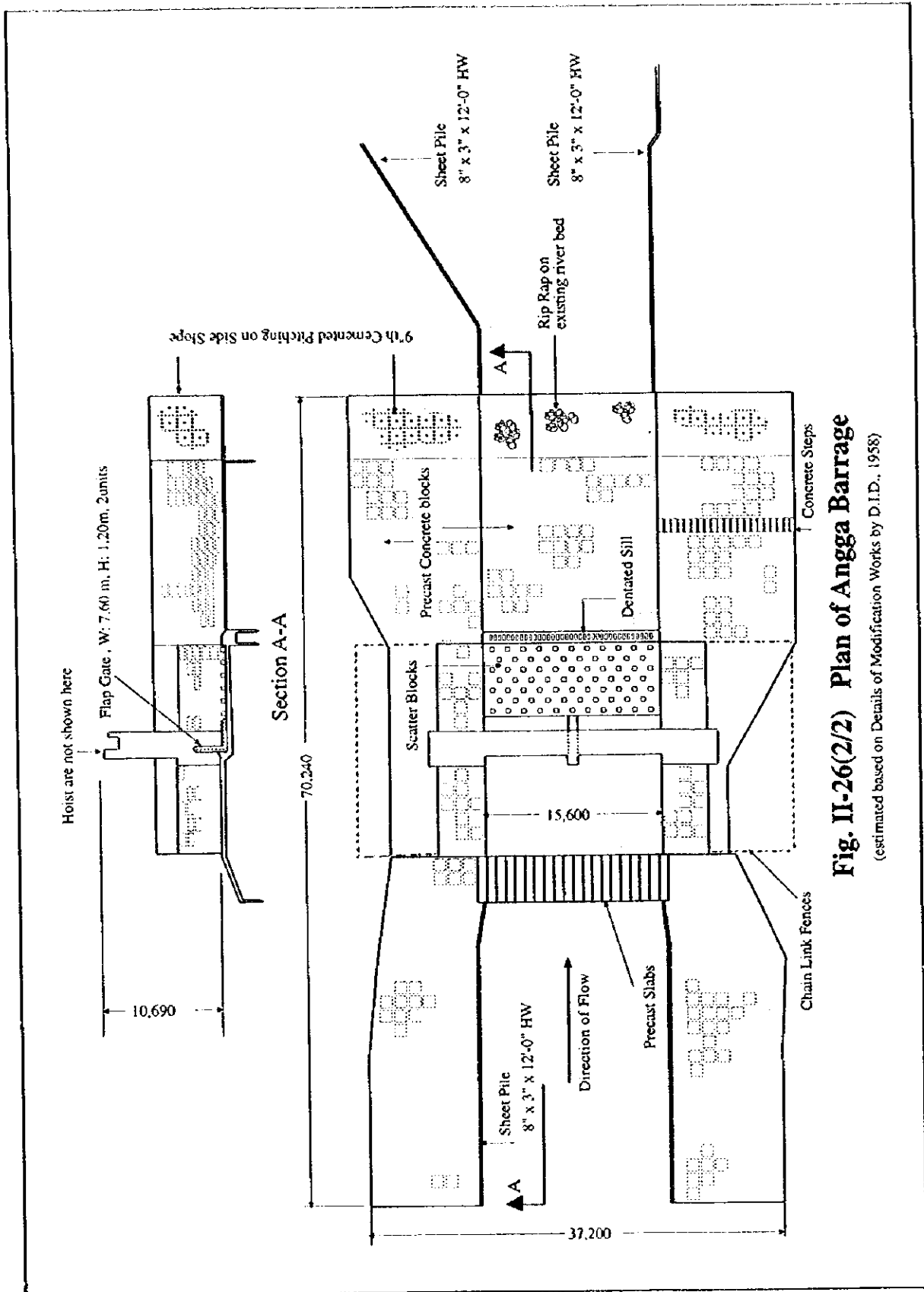


Fig. II-25 General Layout of Monitoring and Control Point (Kerian Scheme)

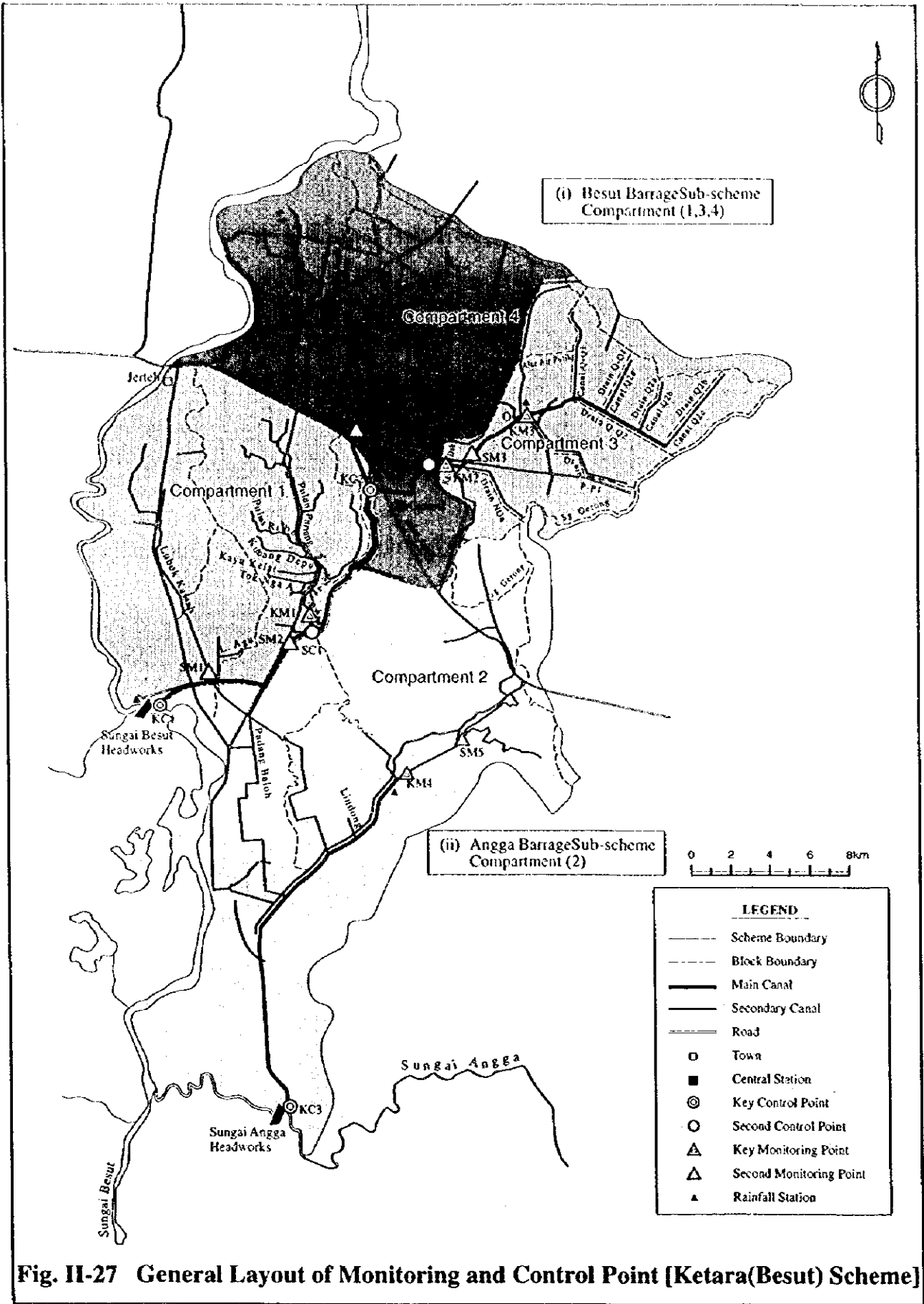


**Fig. II-26(1/2) Plan of Angga Barrage**

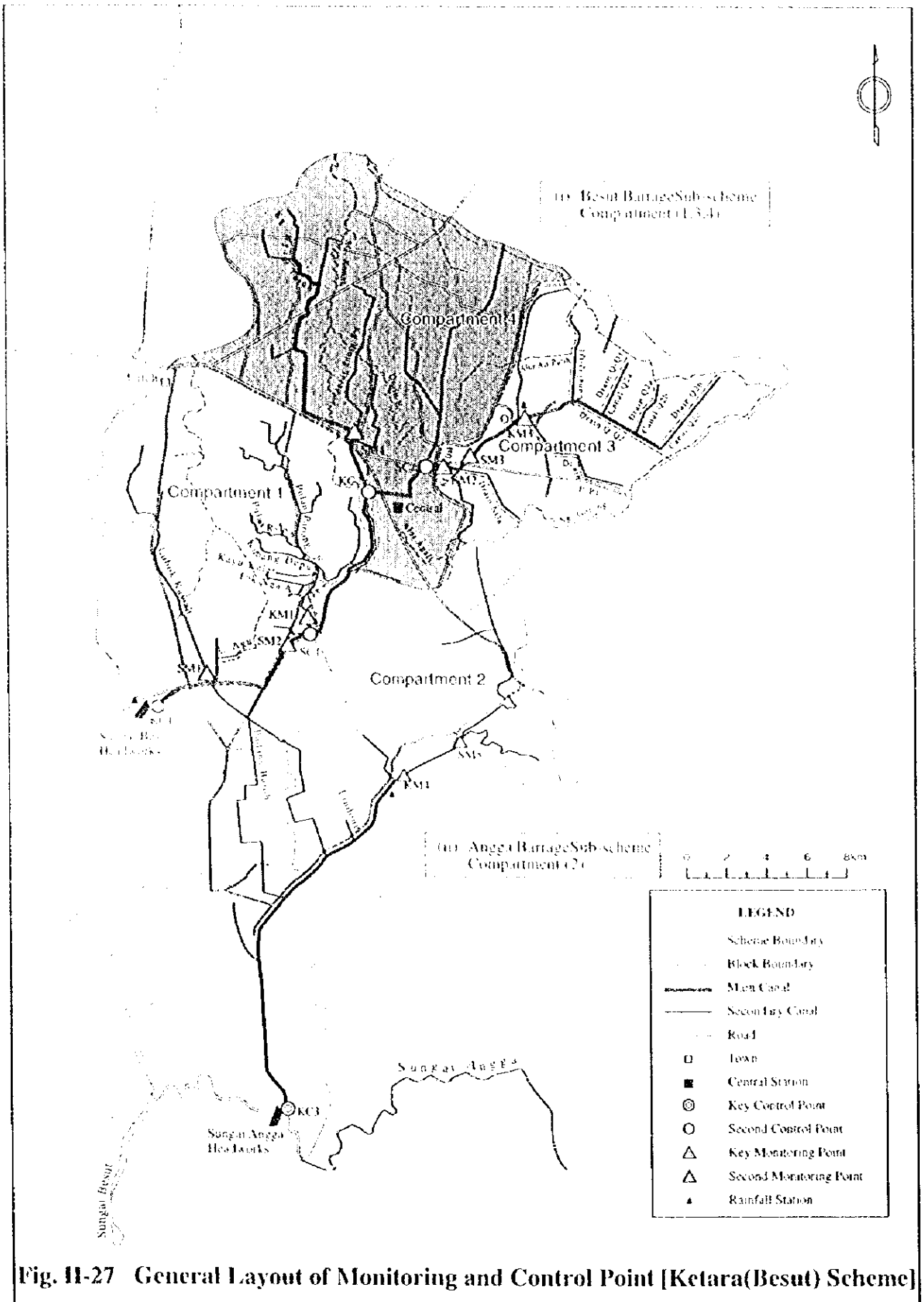


**Fig. II-26(2/2) Plan of Angga Barrage**

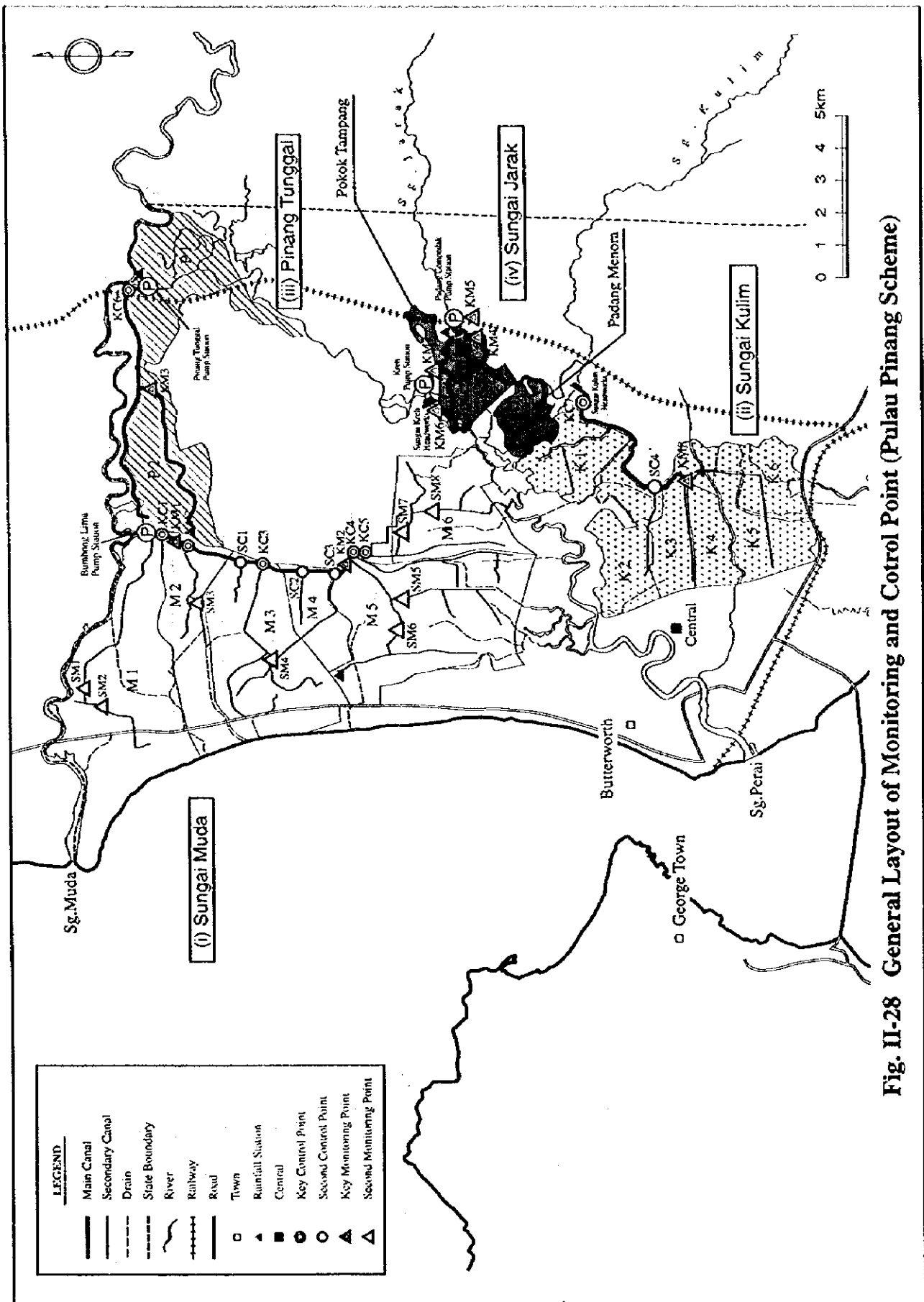
(estimated based on Details of Modification Works by D.I.D., 1958)







**Fig. II-27 General Layout of Monitoring and Control Point [Ketara(Besut) Scheme]**



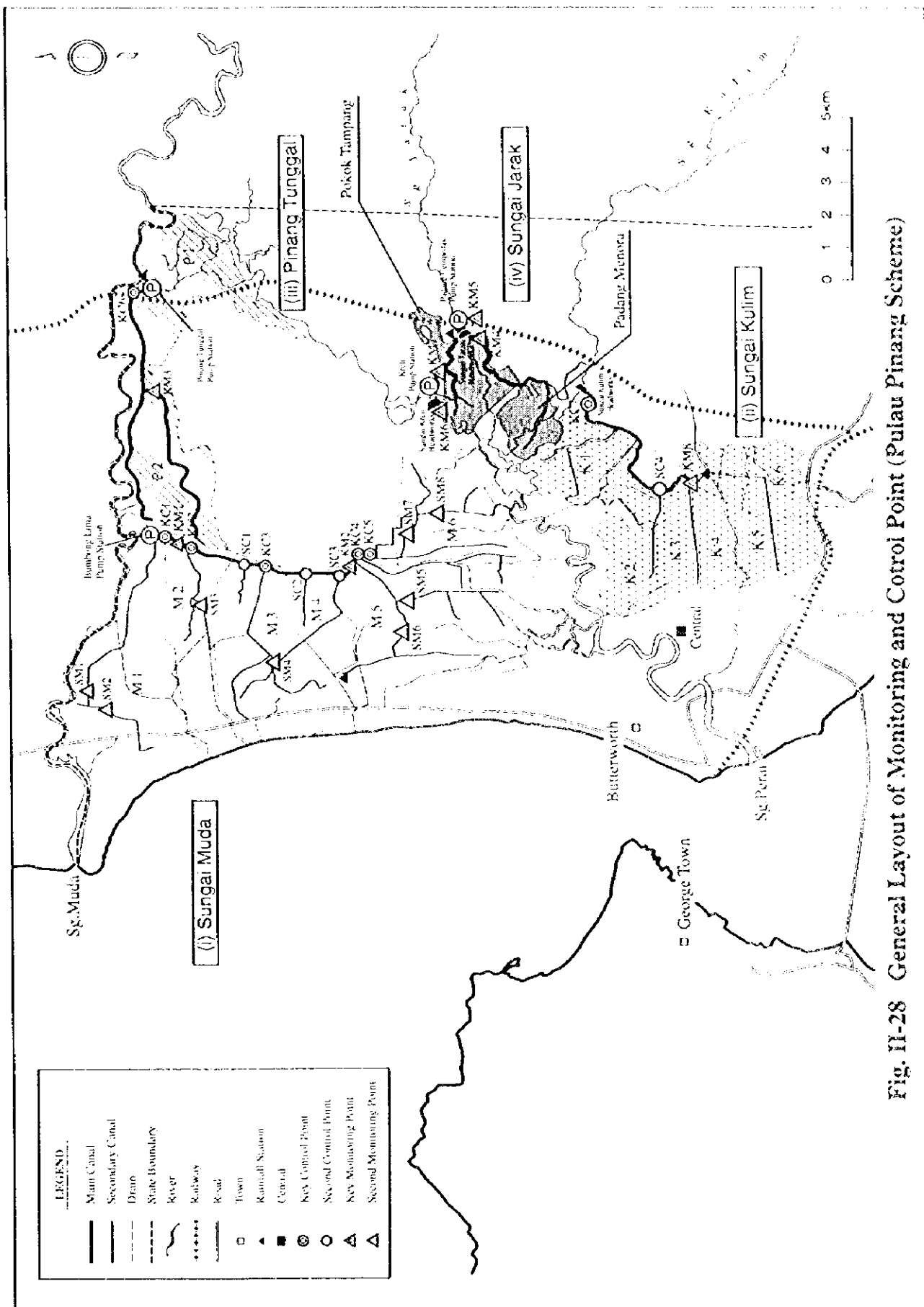


Fig. II-28 General Layout of Monitoring and Control Point (Pulau Pinang Scheme)

Fig. II-29 Implementation Schedule for Kerian Scheme

| Work Item                                   | 7th Malaysian Plan |      | 8th Malaysian Plan |      |      |      | 9th Malaysian Plan |      |      |      |      |      |      |      |      |
|---|--------------------|------|--------------------|------|------|------|--------------------|------|------|------|------|------|------|------|------|
|   | 1996               | 1997 | 1998               | 1999 | 2000 | 2001 | 2002               | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
| I. Improvement of System Infrastructures    |                    |      |                    |      |      |      |                    |      |      |      |      |      |      |      |      |
| 1. Concrete lining of canals                |                    |      |                    |      |      |      |                    |      |      |      |      |      |      |      |      |
| 2. Improvement of drainage facilities       |                    |      |                    |      |      |      |                    |      |      |      |      |      |      |      |      |
| 3. Improvement of farm road                 |                    |      |                    |      |      |      |                    |      |      |      |      |      |      |      |      |
| 4. Improvement of related structures        |                    |      |                    |      |      |      |                    |      |      |      |      |      |      |      |      |
| II. Improvement of In-field Infrastructures |                    |      |                    |      |      |      |                    |      |      |      |      |      |      |      |      |
| 1. Land leveling                            |                    |      |                    |      |      |      |                    |      |      |      |      |      |      |      |      |
| 2. In-field structures                      |                    |      |                    |      |      |      |                    |      |      |      |      |      |      |      |      |
| III. Water Management / Monitoring System   |                    |      |                    |      |      |      |                    |      |      |      |      |      |      |      |      |
| 1. Telemetry and telecontrol system         |                    |      |                    |      |      |      |                    |      |      |      |      |      |      |      |      |
| 2. Feedback system                          |                    |      |                    |      |      |      |                    |      |      |      |      |      |      |      |      |
| IV. Training of Water Users Group           |                    |      |                    |      |      |      |                    |      |      |      |      |      |      |      |      |

Fig. II-30 Implementation Schedule for Besut Scheme

| Work Item                                   | 7th Malaysian Plan |      | 8th Malaysian Plan |      |      |      | 9th Malaysian Plan |      |      |      |      |      |      |      |      |
|---|--------------------|------|--------------------|------|------|------|--------------------|------|------|------|------|------|------|------|------|
|   | 1996               | 1997 | 1998               | 1999 | 2000 | 2001 | 2002               | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
| I. Improvement of System Infrastructures    |                    |      |                    |      |      |      |                    |      |      |      |      |      |      |      |      |
| 1. Replacement of Besut Barrage Improvement |                    |      |                    |      |      |      |                    |      |      |      |      |      |      |      |      |
| 2. Construction of New Angga Barrage        |                    |      |                    |      |      |      |                    |      |      |      |      |      |      |      |      |
| 3. Concrete lining of canals                |                    |      |                    |      |      |      |                    |      |      |      |      |      |      |      |      |
| 4. Improvement of drainage facilities       |                    |      |                    |      |      |      |                    |      |      |      |      |      |      |      |      |
| 5. Improvement of farm road                 |                    |      |                    |      |      |      |                    |      |      |      |      |      |      |      |      |
| 6. Improvement of related structures        |                    |      |                    |      |      |      |                    |      |      |      |      |      |      |      |      |
| II. Improvement of In-field Infrastructures |                    |      |                    |      |      |      |                    |      |      |      |      |      |      |      |      |
| 1. Land leveling                            |                    |      |                    |      |      |      |                    |      |      |      |      |      |      |      |      |
| 2. In-field structures                      |                    |      |                    |      |      |      |                    |      |      |      |      |      |      |      |      |
| III. Water Management / Monitoring System   |                    |      |                    |      |      |      |                    |      |      |      |      |      |      |      |      |
| 1. Telemetry and telecontrol system         |                    |      |                    |      |      |      |                    |      |      |      |      |      |      |      |      |
| 2. Feedback system                          |                    |      |                    |      |      |      |                    |      |      |      |      |      |      |      |      |
| IV. Training of Water Users Group           |                    |      |                    |      |      |      |                    |      |      |      |      |      |      |      |      |

Fig. II-31 Implementation Schedule for Pulau Pinang Scheme

| Work Item                                   | Year |      | 7th Malaysian Plan |      |      |      |      | 8th Malaysian Plan |      |      |      |      | 9th Malaysian Plan |      |      |  |  |
|---|------|------|--------------------|------|------|------|------|--------------------|------|------|------|------|--------------------|------|------|--|--|
|   | 1996 | 1997 | 1998               | 1999 | 2000 | 2001 | 2002 | 2003               | 2004 | 2005 | 2006 | 2007 | 2008               | 2009 | 2010 |  |  |
| I. Improvement of System Infrastructures    |      |      |                    |      |      |      |      |                    |      |      |      |      |                    |      |      |  |  |
| 1. Concrete lining of canals                |      |      |                    |      |      |      |      |                    |      |      |      |      |                    |      |      |  |  |
| 2. Improvement of drainage facilities       |      |      |                    |      |      |      |      |                    |      |      |      |      |                    |      |      |  |  |
| 3. Improvement of farm road                 |      |      |                    |      |      |      |      |                    |      |      |      |      |                    |      |      |  |  |
| 4. Improvement of related structures        |      |      |                    |      |      |      |      |                    |      |      |      |      |                    |      |      |  |  |
| II. Improvement of In-field Infrastructures |      |      |                    |      |      |      |      |                    |      |      |      |      |                    |      |      |  |  |
| 1. Land leveling                            |      |      |                    |      |      |      |      |                    |      |      |      |      |                    |      |      |  |  |
| 2. In-field structures                      |      |      |                    |      |      |      |      |                    |      |      |      |      |                    |      |      |  |  |
| III. Water Management / Monitoring System   |      |      |                    |      |      |      |      |                    |      |      |      |      |                    |      |      |  |  |
| 1. Telemetry and telecontrol system         |      |      |                    |      |      |      |      |                    |      |      |      |      |                    |      |      |  |  |
| 2. Feedback system                          |      |      |                    |      |      |      |      |                    |      |      |      |      |                    |      |      |  |  |
| IV. Training of Water Users Group           |      |      |                    |      |      |      |      |                    |      |      |      |      |                    |      |      |  |  |

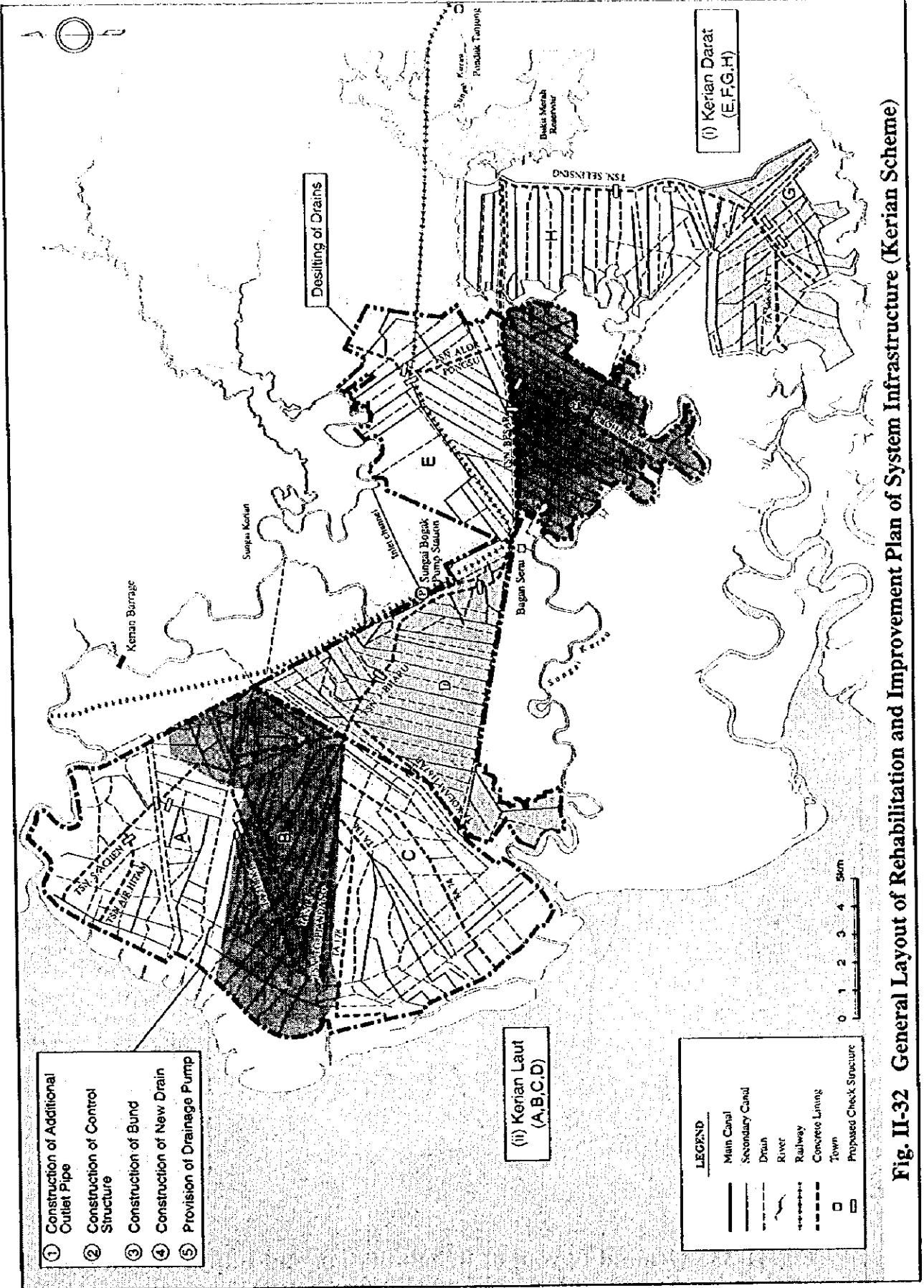


Fig. II-32 General Layout of Rehabilitation and Improvement Plan of System Infrastructure (Kerian Scheme)

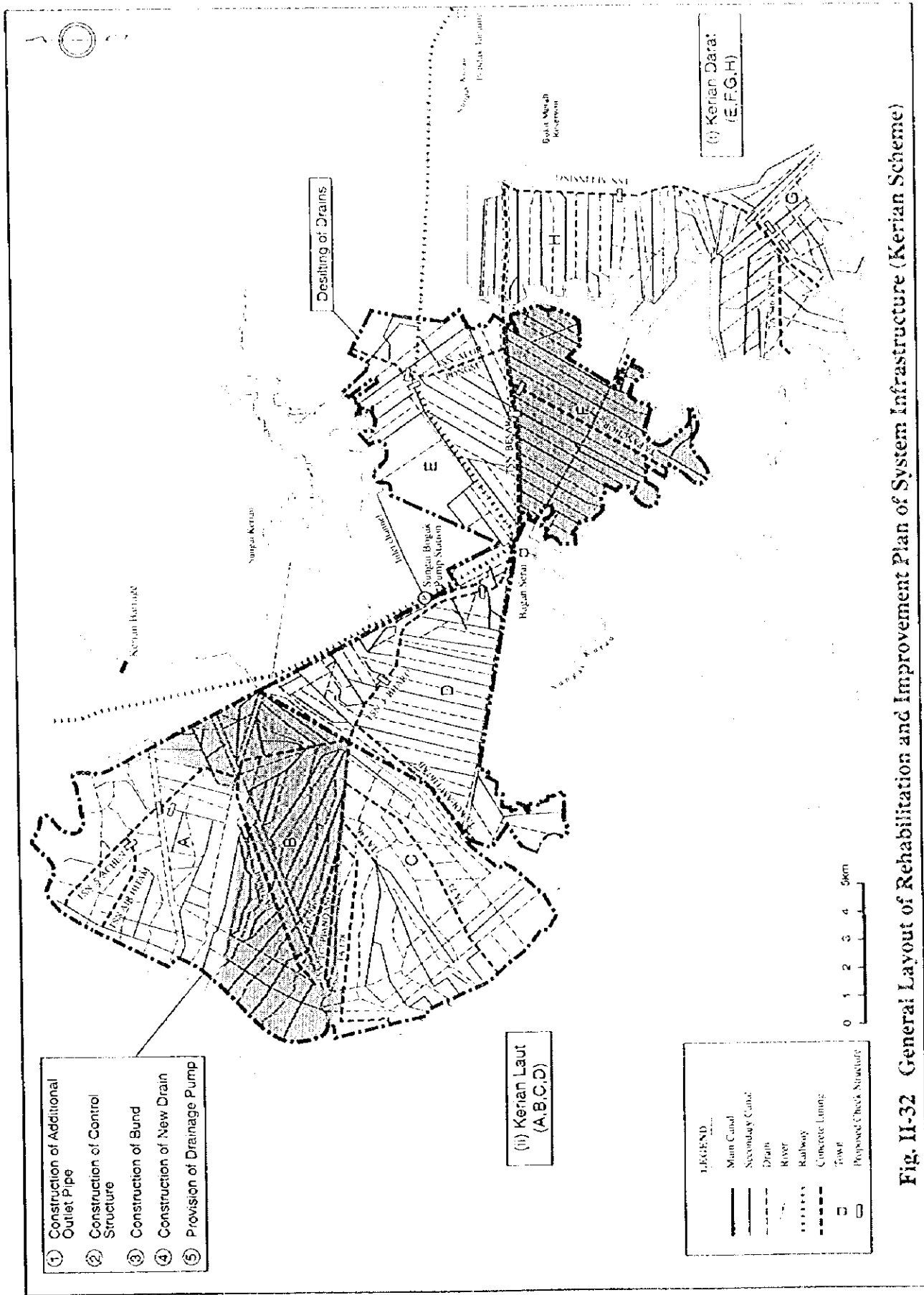
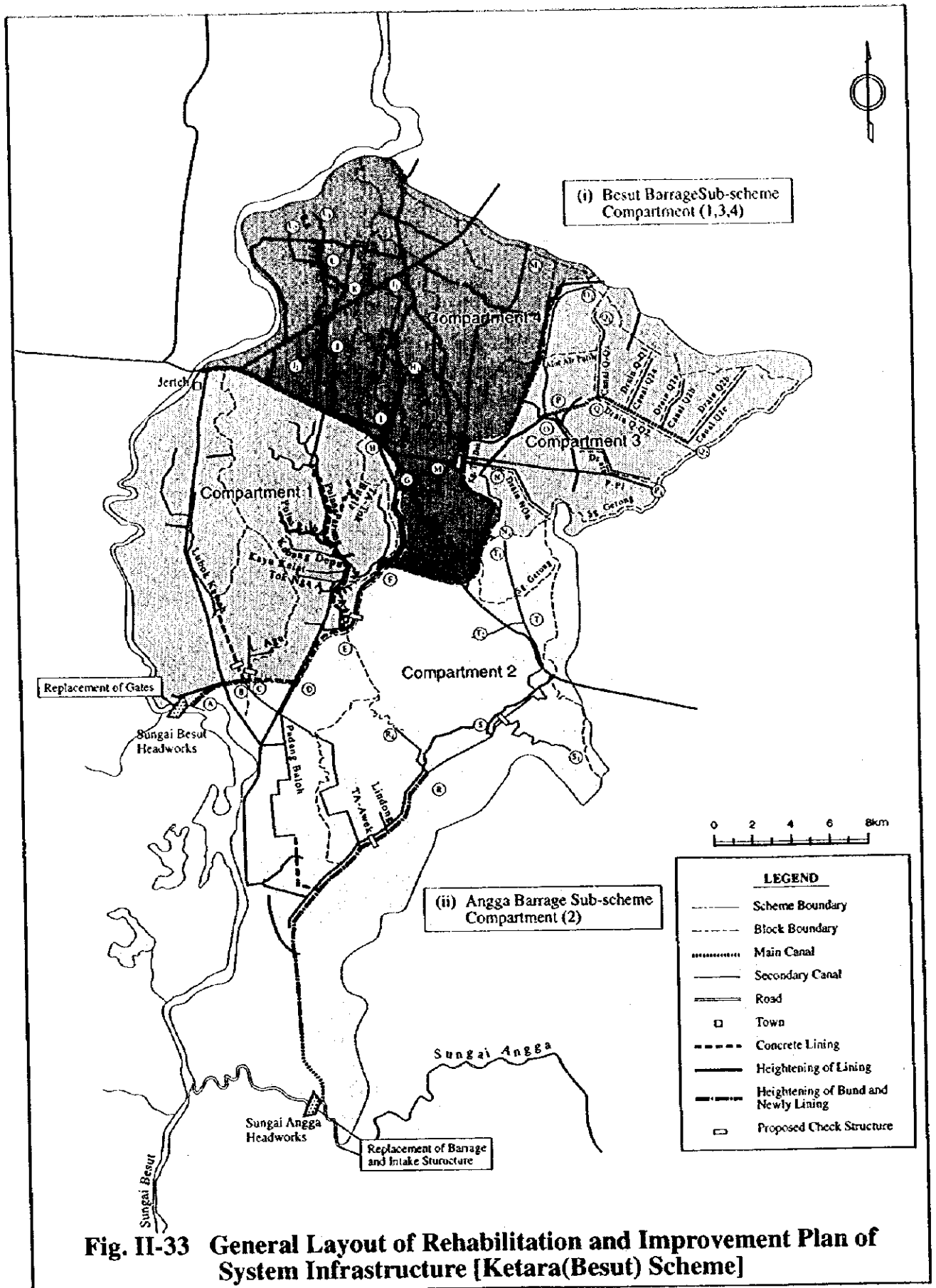
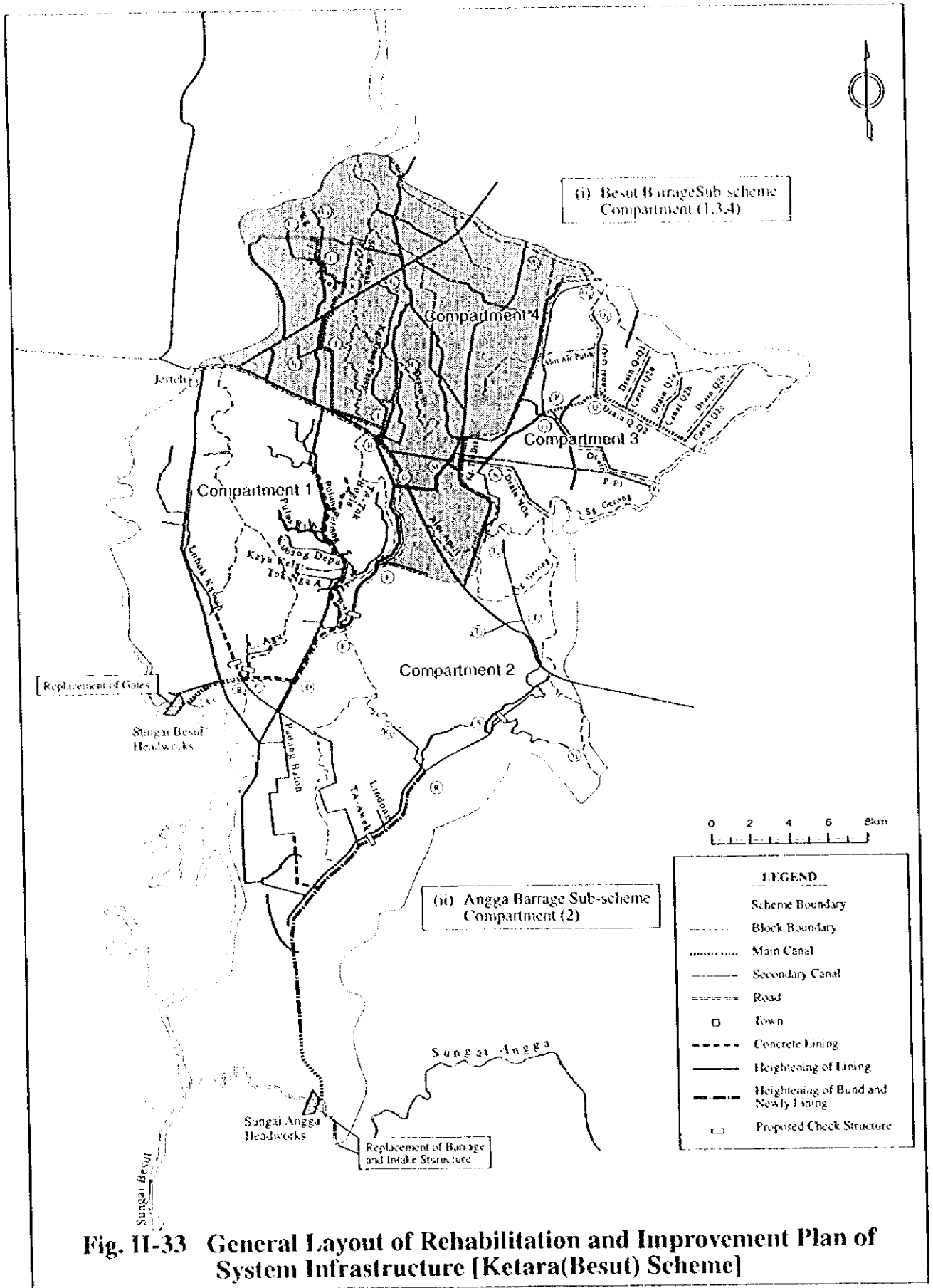


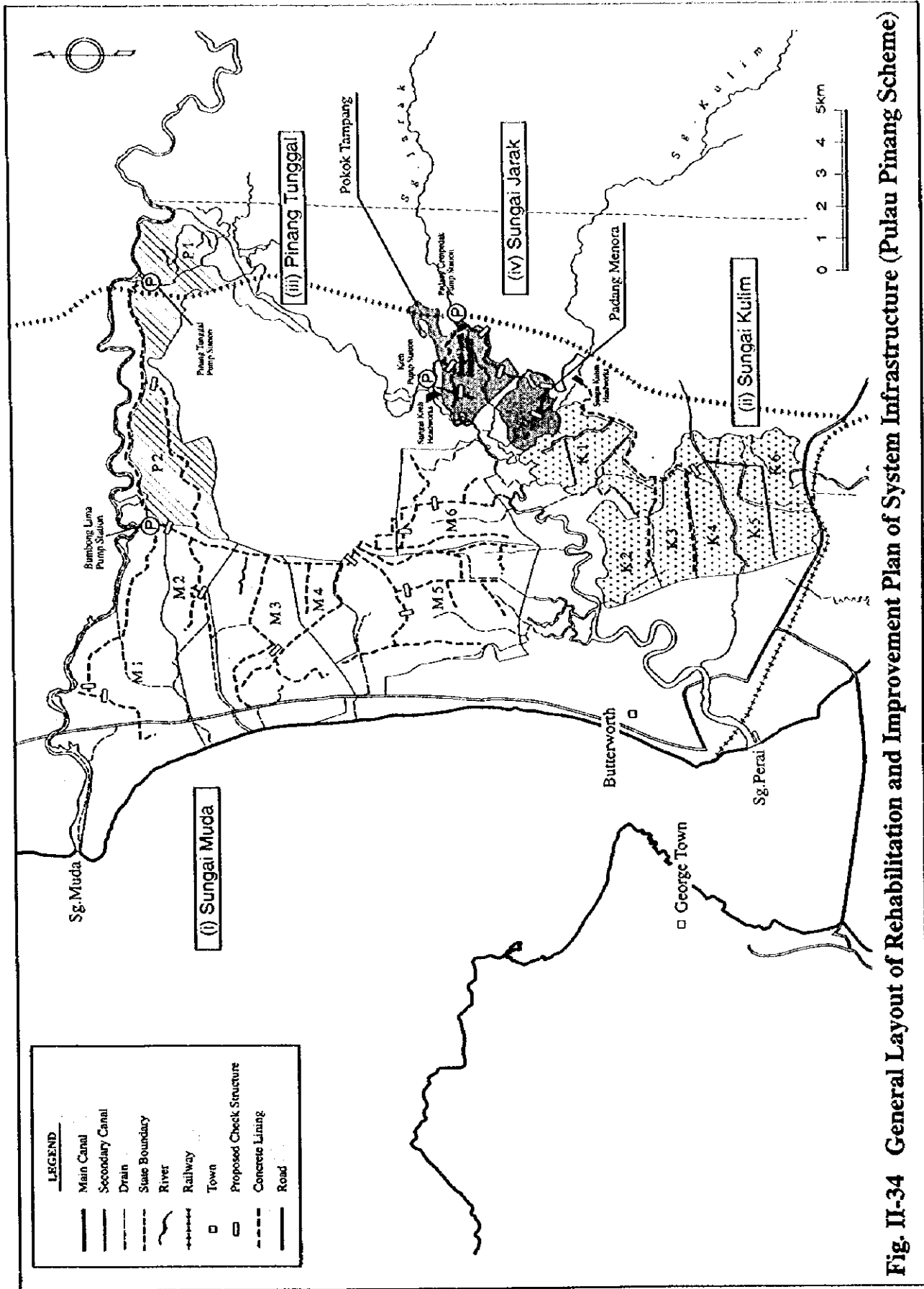
Fig. II-32 General Layout of Rehabilitation and Improvement Plan of System Infrastructure (Kerian Scheme)



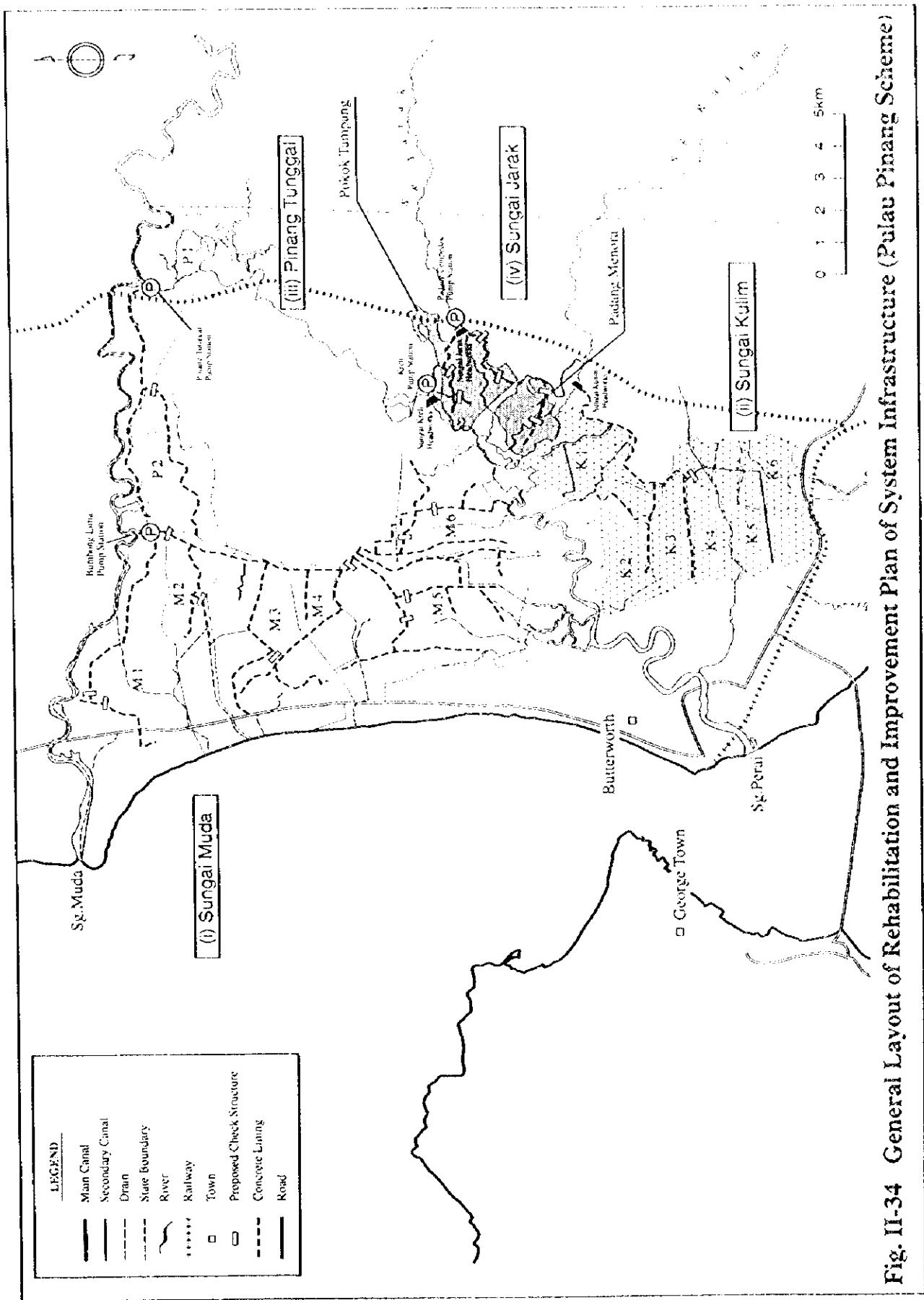


**Fig. II-33 General Layout of Rehabilitation and Improvement Plan of System Infrastructure [Ketara(Besut) Scheme]**





**Fig. II-34 General Layout of Rehabilitation and Improvement Plan of System Infrastructure (Pulau Pinang Scheme)**



**Fig. II-34 General Layout of Rehabilitation and Improvement Plan of System Infrastructure (Pulau Pinang Scheme)**

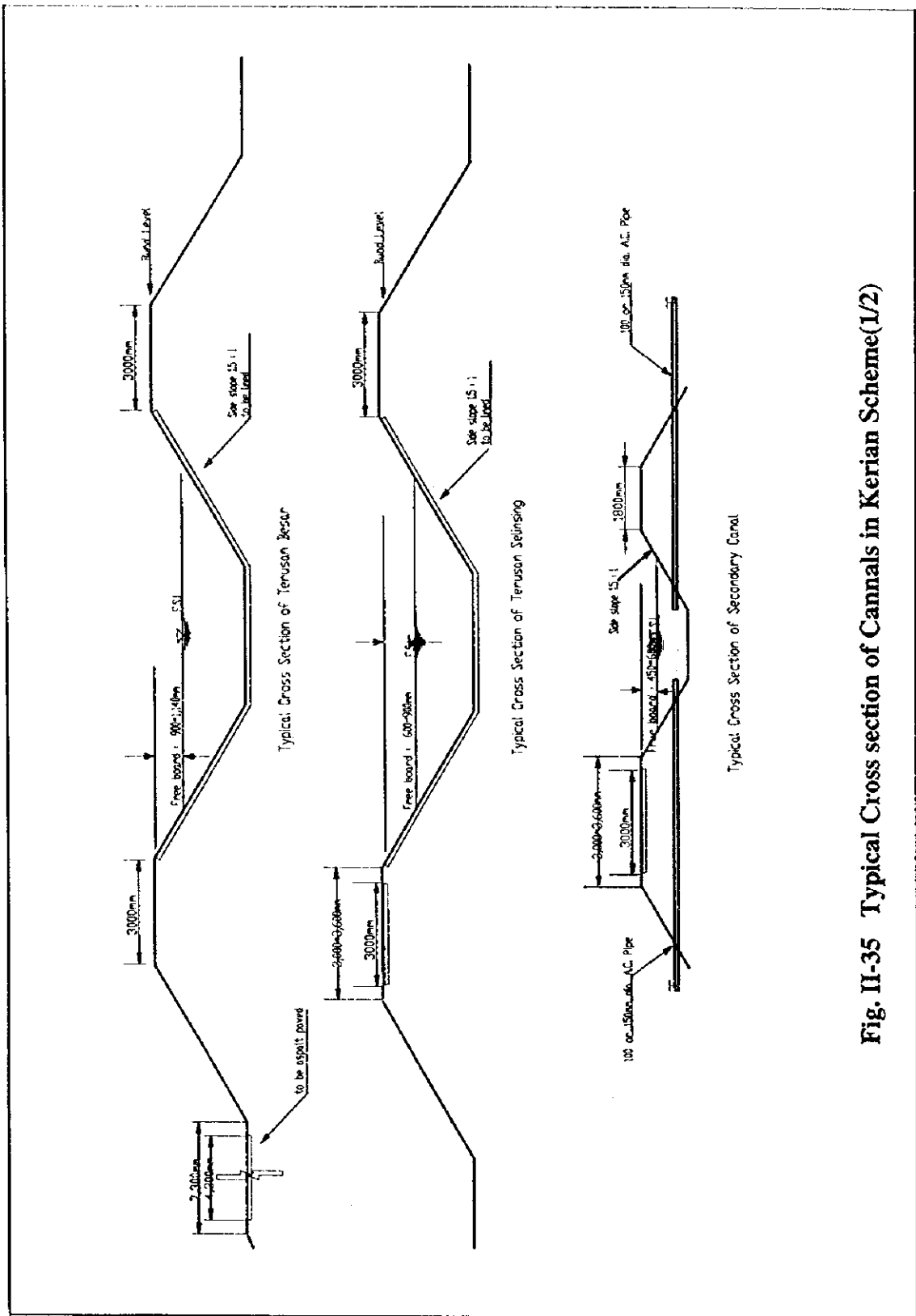
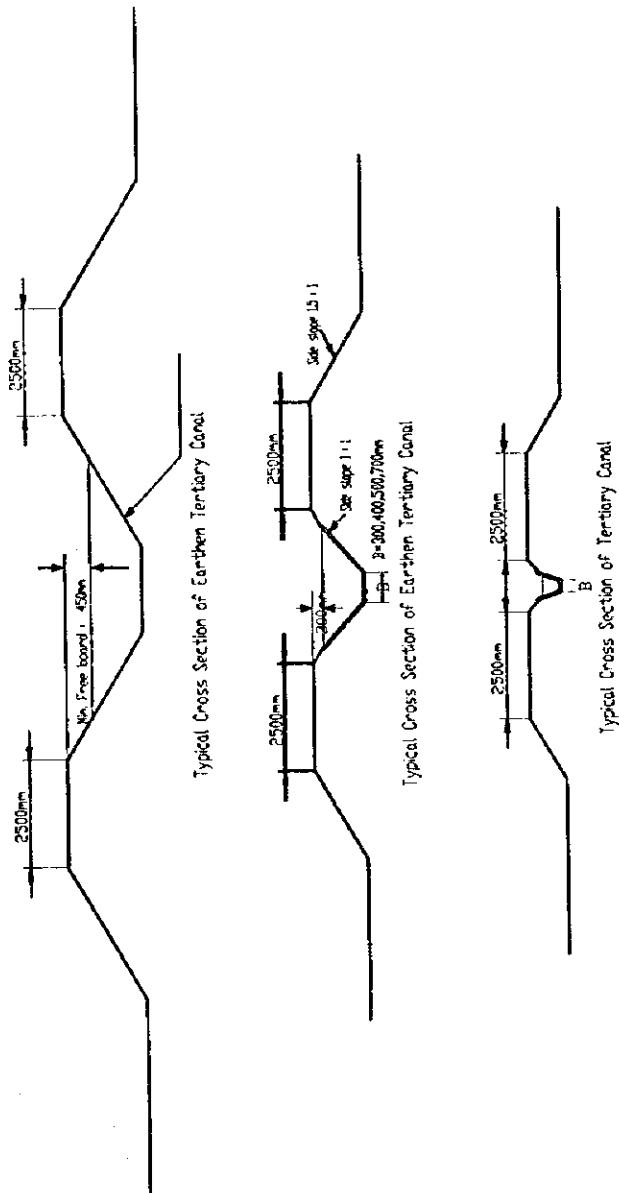
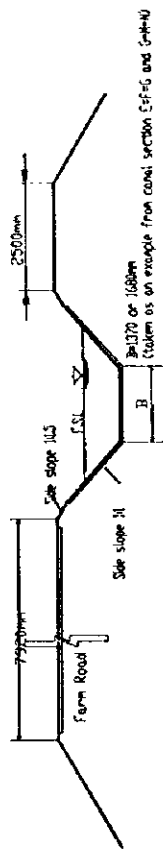


Fig. II-35 Typical Cross section of Canals in Kerian Scheme(1/2)

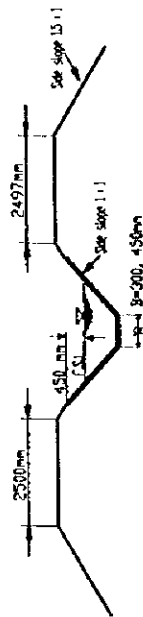


| Size of Block Section | b    | h    | B    | r    | n <sub>0</sub> |
|-----------------------|------|------|------|------|----------------|
| 610mm(24")            | 308  | 568  | 2921 | 1324 | 762            |
| 457mm(18")            | 381  | 381  | 2413 | 1143 | 762            |
| 381mm(15")            | 3175 | 3175 | 1905 | 889  | 762            |

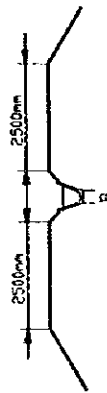
Fig. II-35 Typical Cross section of Cannals in Kerian Scheme(2/2)



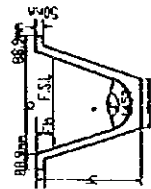
Typical Cross Section of Main and Secondary (lined portion)



Typical Cross Section of Lined Canal (trapezoidal)



Typical Cross Section of Tertiary Canals (Block Section)



| Size of Block Section | b     | h     | B     | r     | fb   |
|-----------------------|-------|-------|-------|-------|------|
| 610mm(24")            | 30.8  | 30.8  | 292.1 | 152.4 | 76.2 |
| 457mm(18")            | 38.1  | 38.1  | 241.3 | 114.3 | 76.2 |
| 380mm(15")            | 31.75 | 31.75 | 190.5 | 88.9  | 76.2 |

units mm

Fig. II-36 Typical Cross section of Cannals in Ketara(Besut) Scheme

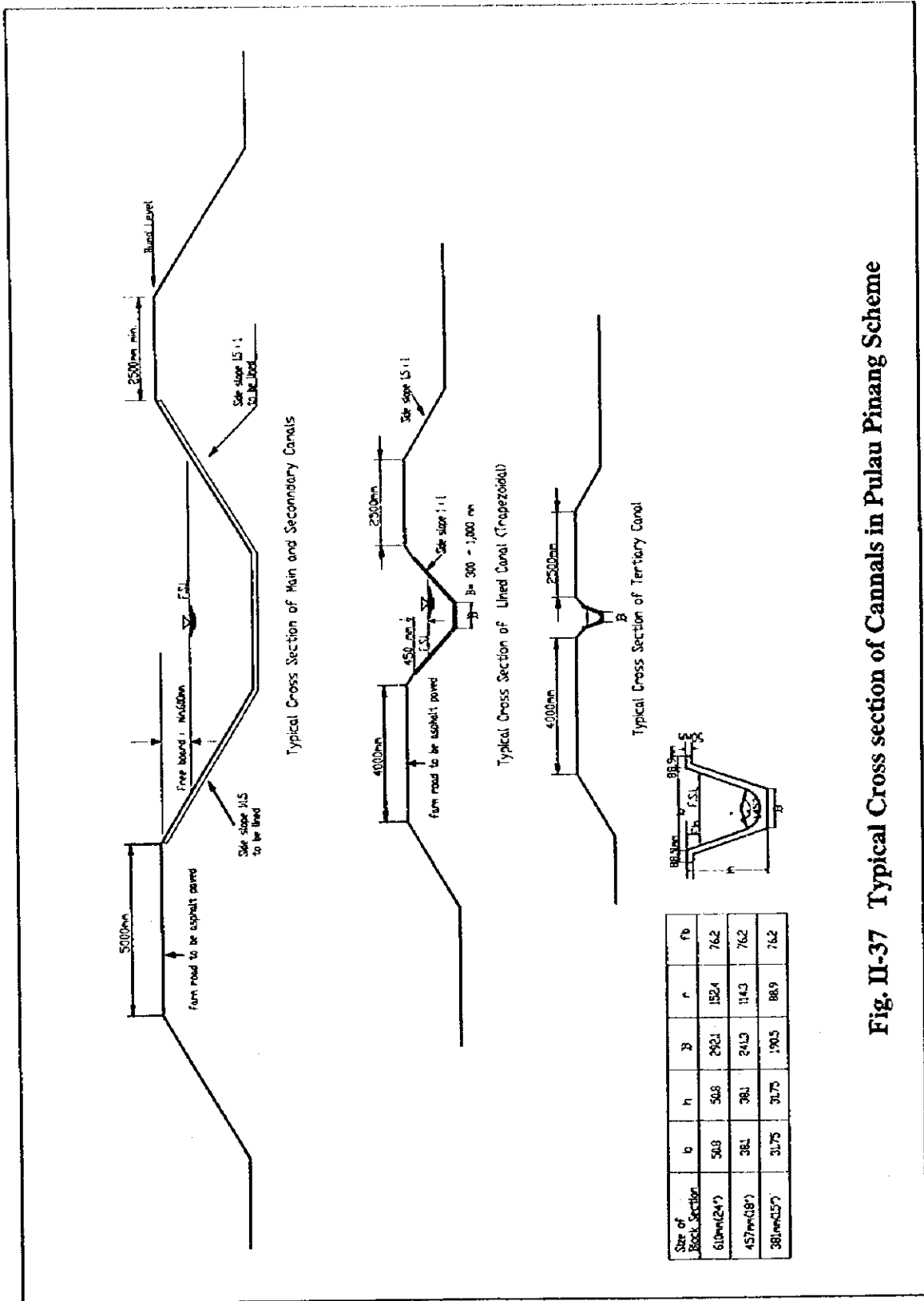


Fig. II-37 Typical Cross section of Cannals in Pulau Pinang Scheme



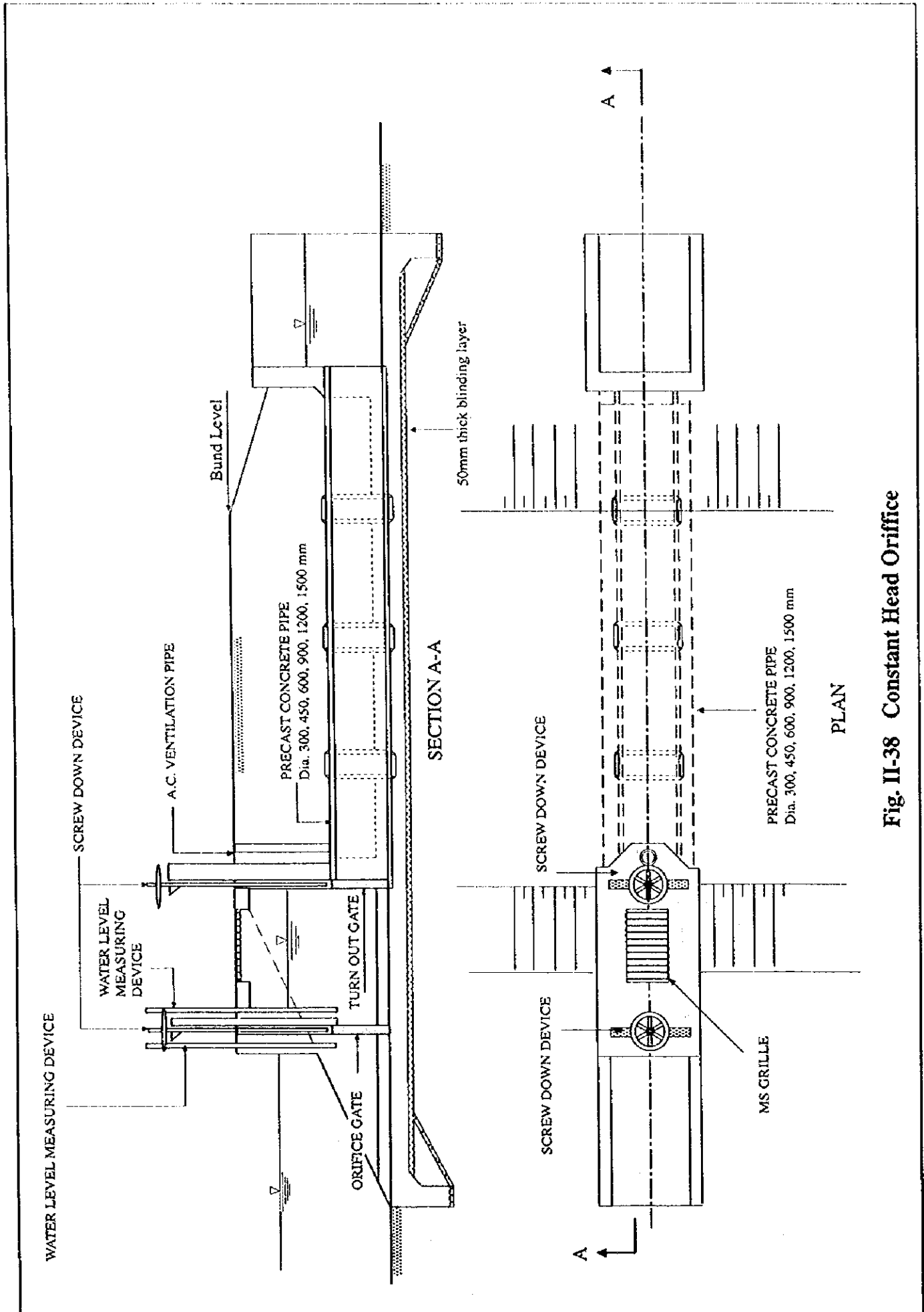
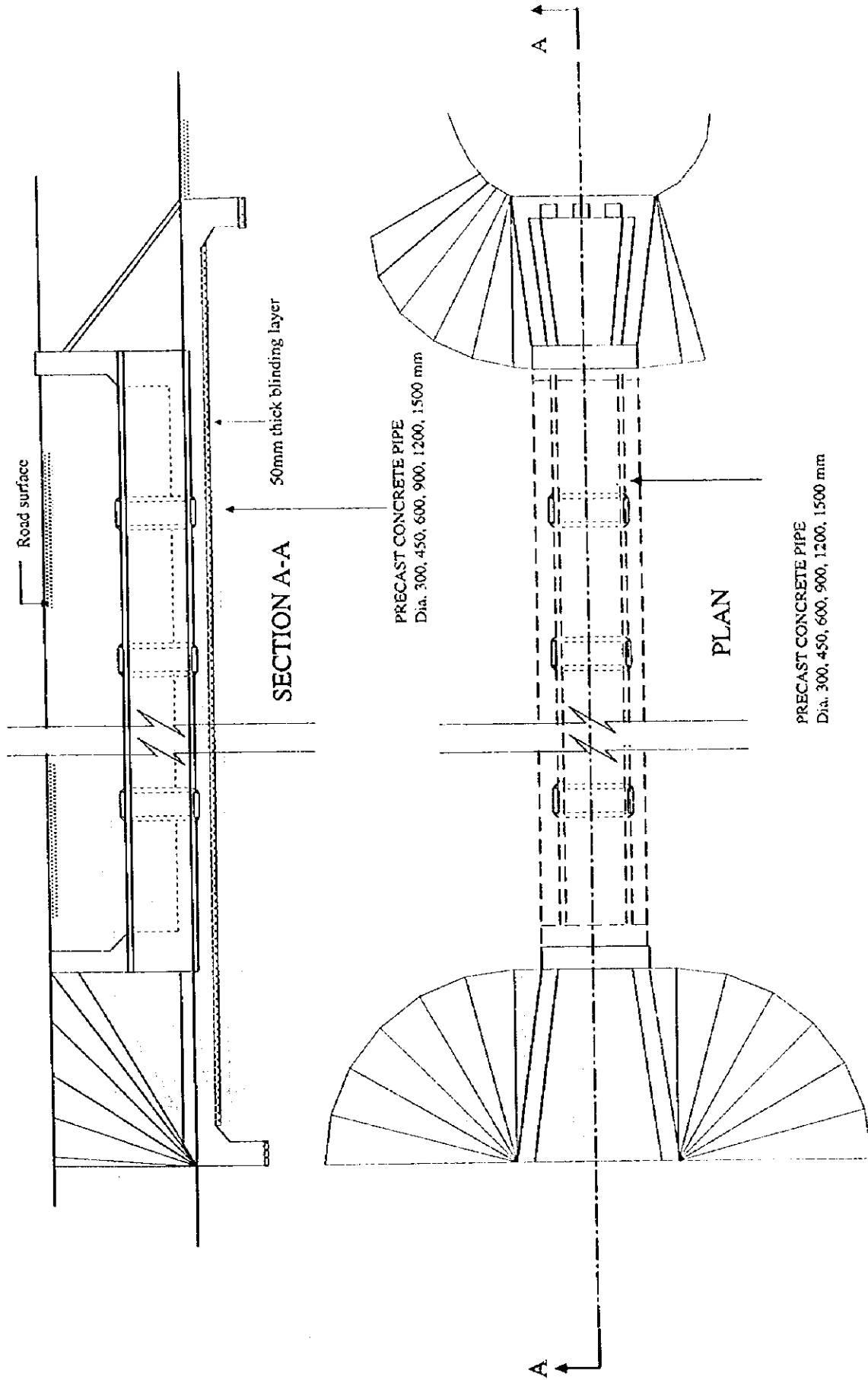
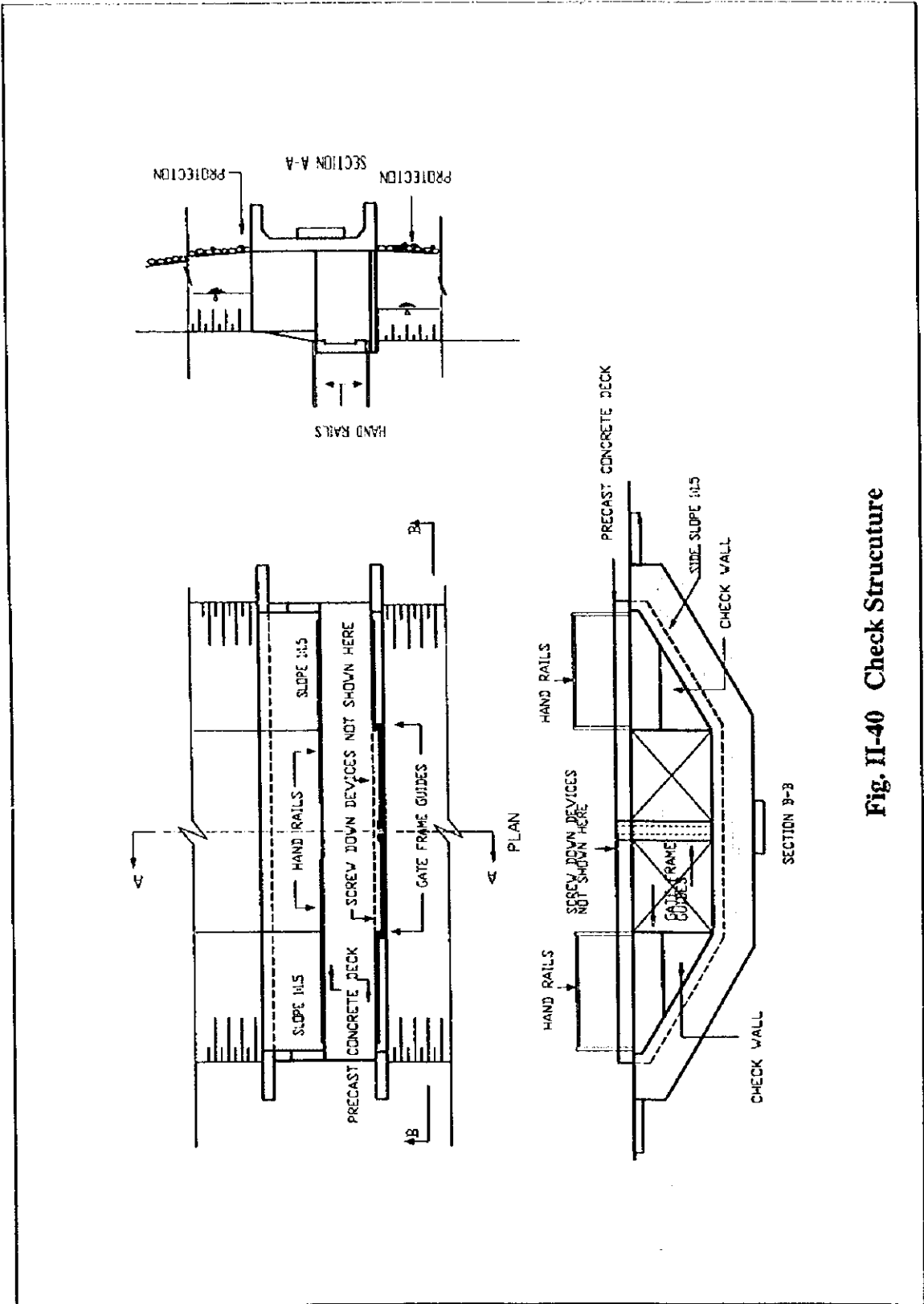


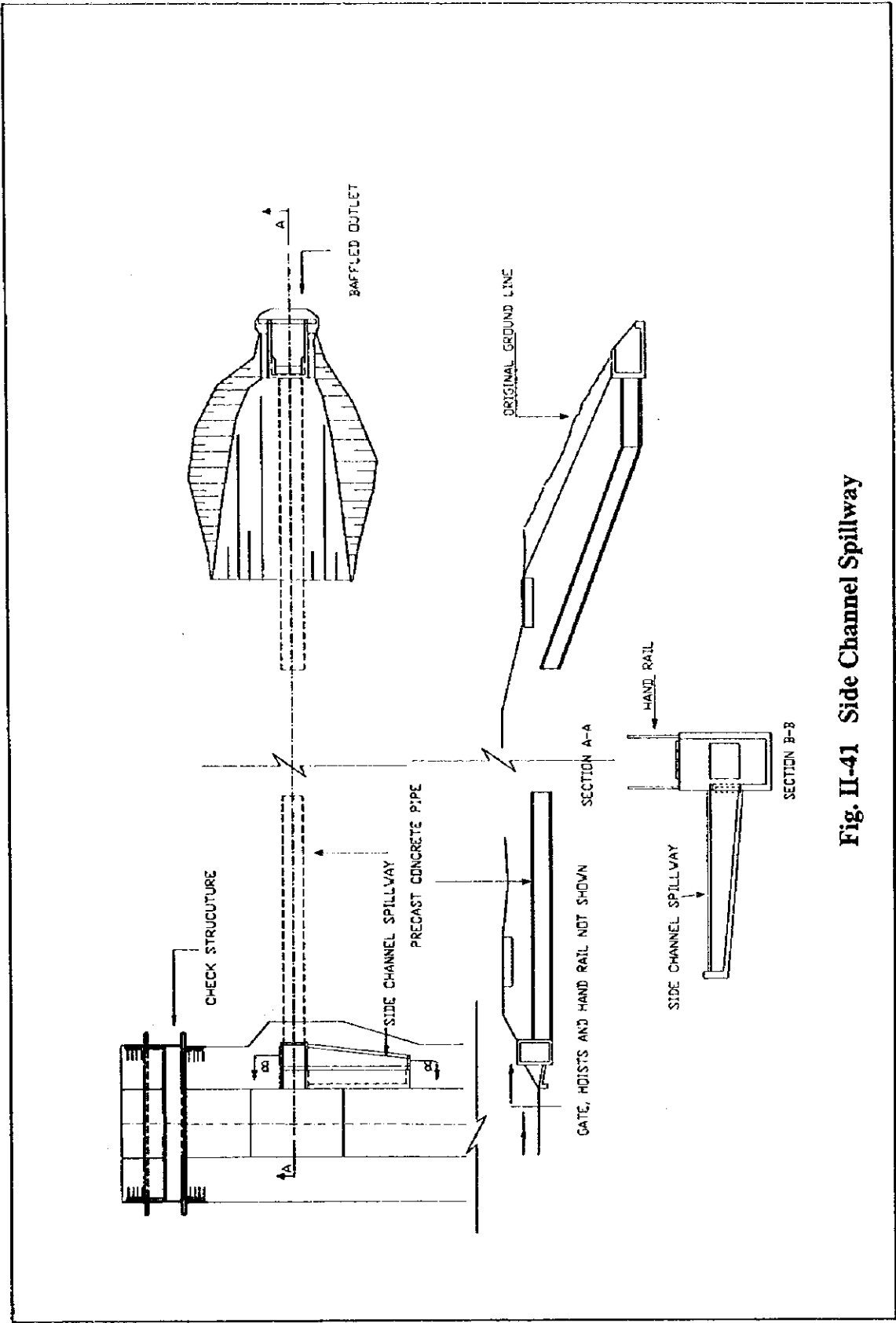
Fig. II-38 Constant Head Orifice



**Fig. II-39 Road Culvert**



**Fig. II-40 Check Structure**



**Fig. II-41 Side Channel Spillway**

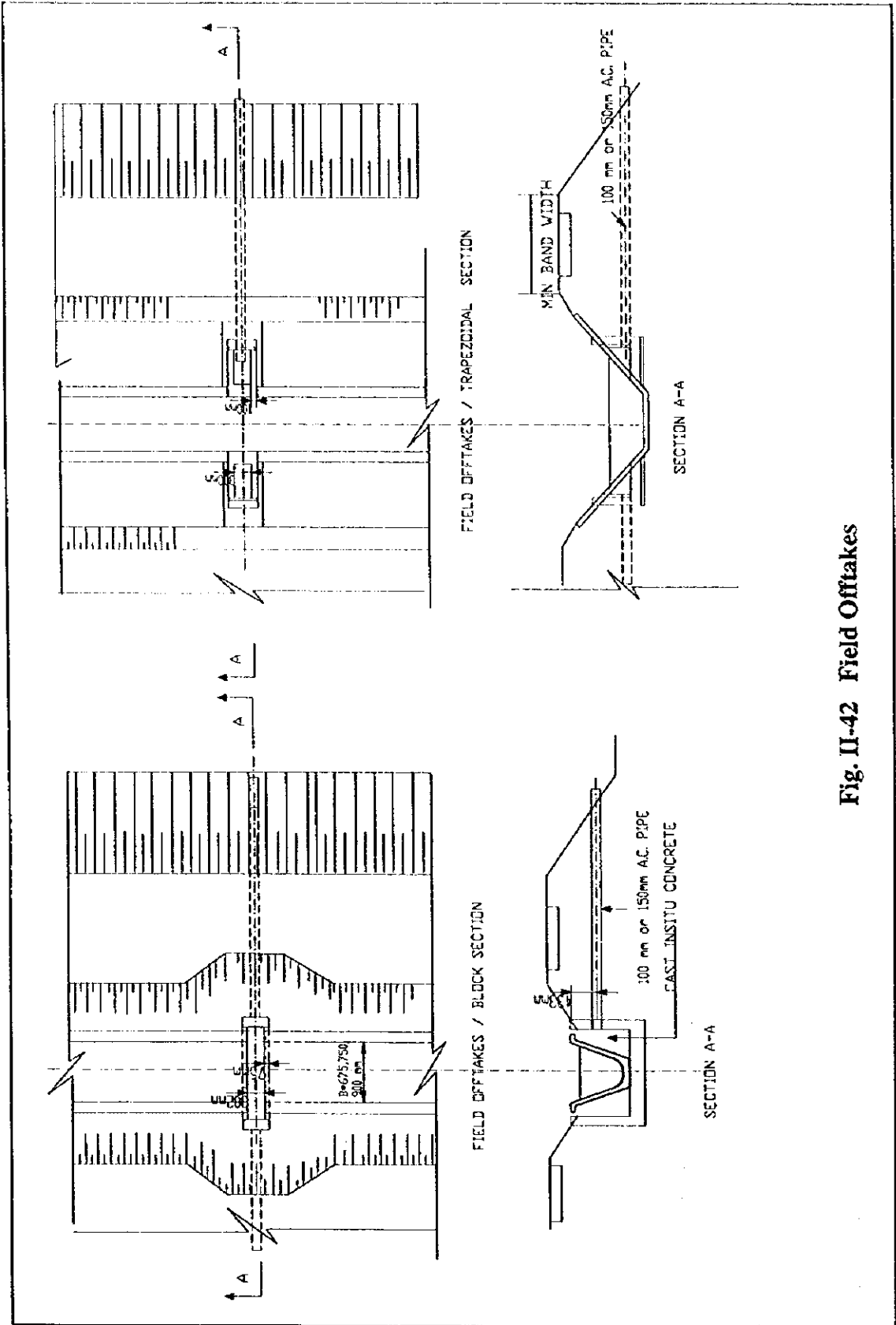


Fig. II-42 Field Offtakes

SCREW DOWN DEVICES

OPERATION PLATFORM

SIDE OPENING

Bund Level

PRECAST CONCRETE PIPE

CONTROL GATE

SECTION A-A

50mm thick blinding layer

SCREW DOWN DEVICES

PRECAST CONCRETE PIPE

PLAN

Fig. II-43 Drainage End Control