

NO. 2


IRRIGATION AND POWER  
DEPARTMENT  
GOVERNMENT OF BALOCHISTAN

JAPAN INTERNATIONAL  
COOPERATION AGENCY  
JAPAN

**FEASIBILITY STUDY  
ON  
THE IRRIGATION WATER RESOURCES DEVELOPMENT  
WITH  
DELAY ACTION DAMS PROJECT  
IN  
BALOCHISTAN  
IN  
THE ISLAMIC REPUBLIC OF PAKISTAN**

**DRAWINGS**

**JUNE 1997**

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### LIST OF DRAWINGS

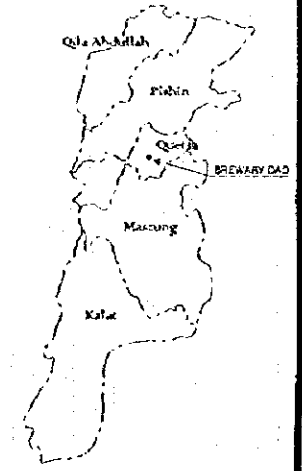
| D.No |                   | TITLE                                |
|------|-------------------|--------------------------------------|
| 1    | BREWARY DAM       | PLAN OF BREWARY DAM                  |
| 2    |                   | LONGITUDINAL SECTION OF DAM          |
| 3    | DARA DAM          | PLAN OF DARA DAM                     |
| 4    |                   | STANDARD/LONGITUDINAL SECTION OF DAM |
| 5    |                   | PLAN OF INFILTRATION POND            |
| 6    |                   | PLAN OF DETENTION BUNDS              |
| 7    | MURGI KOTAL DAM   | PLAN OF MURGI KOTAL DAM              |
| 8    | (UPSTREAM)        | STANDARD/LONGITUDINAL SECTION OF DAM |
| 9    | MURGI KOTAL DAM   | PLAN OF MURGI KOTAL DAM              |
| 10   | (DOWNSTREAM)      | STANDARD/LONGITUDINAL SECTION OF DAM |
| 11   |                   | PLAN OF SPILLWAY/INFILTRATION POND   |
| 12   |                   | PLAN OF DETENTION BUNDS              |
| 13   | KACH DAM          | PLAN OF KACH DAM                     |
| 14   | (RISING OF CREST) | STANDARD/LONGITUDINAL SECTION OF DAM |
| 15   |                   | PLAN OF SPILLWAY/INFILTRATION POND   |
| 16   |                   | PLAN OF DETENTION BUNDS              |
| 17   |                   | ALTERNATIVE PLAN OF KACH DAM         |
| 18   | JIGDA DAM         | PLAN OF JIGDA DAM                    |
| 19   |                   | STANDARD/LONGITUDINAL SECTION OF DAM |
| 20   |                   | PLAN OF SPILLWAY/INFILTRATION POND   |
| 21   |                   | PLAN OF DETENTION BUNDS              |

| D.No |                       | TITLE                                |
|------|-----------------------|--------------------------------------|
| 22   | SANZALI DAM           | PLAN OF SANZALI DAM                  |
| 23   |                       | STANDARD/LONGITUDINAL SECTION OF DAM |
| 24   |                       | PLAN OF SPILLWAY/INFILTRATION POND   |
| 25   |                       | PLAN OF DETENTION BUNDS              |
| 26   | GHAZLONA DAM          | PLAN OF GHAZLONA DAM                 |
| 27   |                       | STANDARD/LONGITUDINAL SECTION OF DAM |
| 28   |                       | PLAN OF SPILLWAY/INFILTRATION POND   |
| 29   |                       | PLAN OF DETENTION BUNDS              |
| 30   | SAKHOL DAM            | PLAN OF SAKHOL DAM                   |
| 31   |                       | STANDARD/LONGITUDINAL SECTION OF DAM |
| 32   |                       | PLAN OF SPILLWAY/INFILTRATION POND   |
| 33   | MANGI DAM             | PLAN OF MANGI DAM                    |
| 34   |                       | STANDARD/LONGITUDINAL SECTION OF DAM |
| 35   |                       | PLAN OF SPILLWAY/INFILTRATION POND   |
| 36   | KAD KOCHA II DAM      | PLAN OF KAD KOCHA II DAM             |
| 37   |                       | STANDARD/LONGITUDINAL SECTION OF DAM |
| 38   |                       | PLAN OF SPILLWAY/INFILTRATION POND   |
| 39   | GHUTAI SHELA DAM      | PLAN OF GHATAI SHELA DAM             |
| 40   | WALI DAD DAM          | PLAN OF WALI DAD DAM                 |
| 41   | SAMAKI DAM            | PLAN OF SAMAKI DAM                   |
| 42   | ISKALKOO DAM          | PLAN OF ISKALKOO DAM                 |
| 43   | DETAILS OF LINK CANAL |                                      |

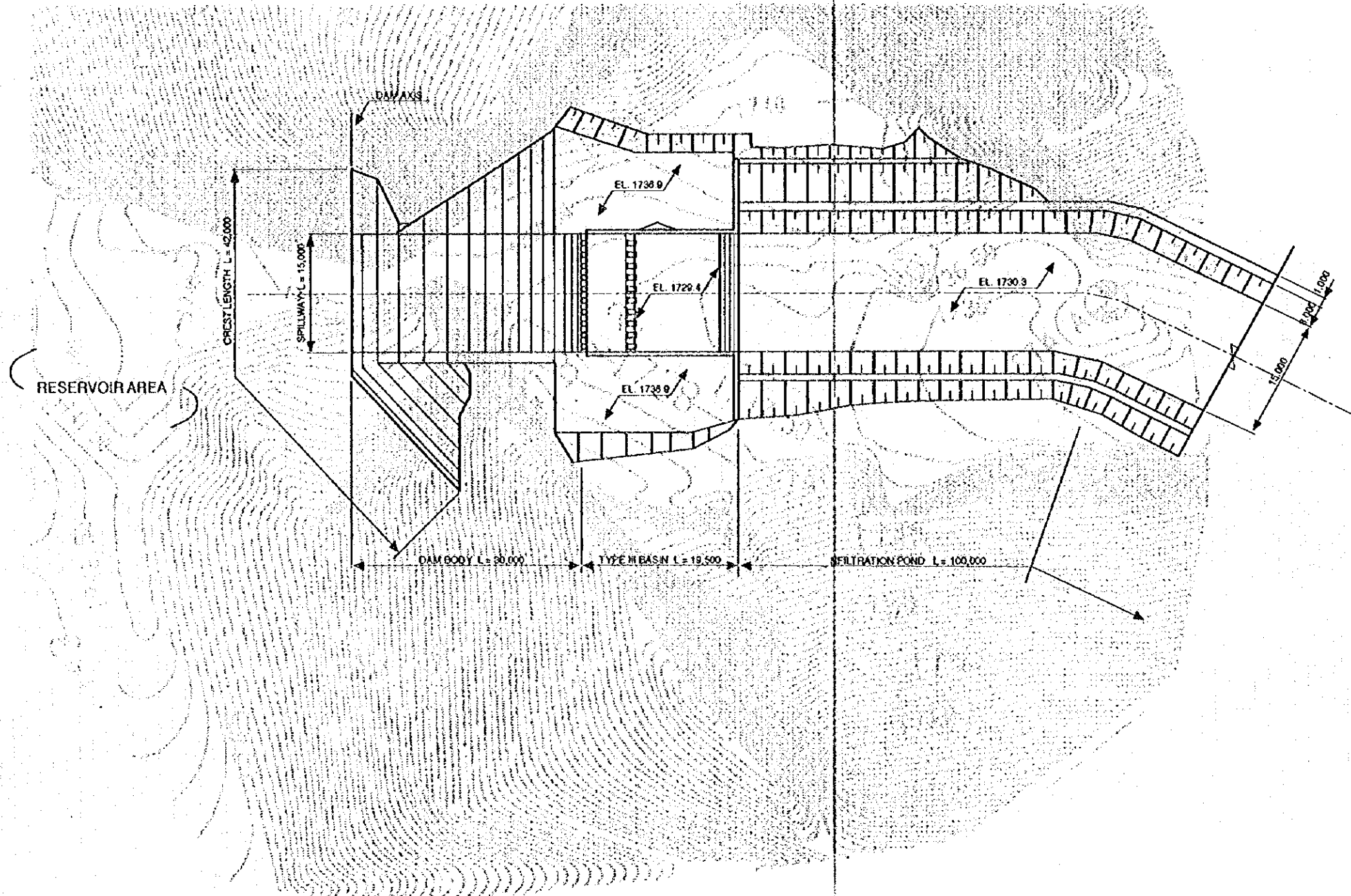


1138970 [7]

NOTES:  
 1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.  
 2. ALL ELEVATIONS (EL.) ARE IN METERS.

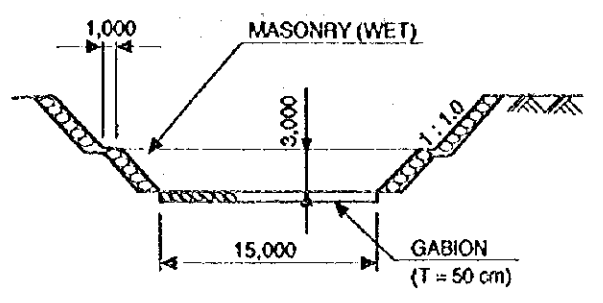


LOCATION OF DAMSITE

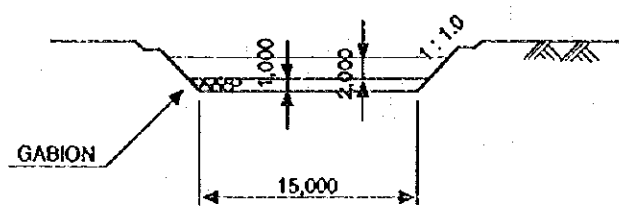


| GENERAL FEATURE OF DAM STRUCTURES |                        |
|-----------------------------------|------------------------|
| LOCATION                          | QUETTA                 |
| CATCHMENT AREA                    | 25.9 Km <sup>2</sup>   |
| DAM EMBANKMENT                    |                        |
| DAM TYPE                          | GRAVITY DAM            |
| CREST LENGTH                      | 42.0 m                 |
| DAM HEIGHT                        | 32.4 m                 |
| EMBANKMENT VOLUME                 | 9,600 m <sup>3</sup>   |
| CREST ELEVATION                   | 1,762.9 m              |
| FULL WATER LEVEL                  | 1,758.7 m              |
| LOW WATER LEVEL                   | 1,754.5 m              |
| TOTAL STORAGE CAPACITY            | 749,000 m <sup>3</sup> |
| EFFECTIVE STORAGE                 | 360,000 m <sup>3</sup> |
| DEAD STORAGE CAPACITY             | 389,000 m <sup>3</sup> |
| <b>SPILLWAY</b>                   |                        |
| DESIGN FLOOD DISCHARGE            | 165m <sup>3</sup> /sec |
| CREST WIDTH                       | 15.0m                  |
| ENERGY DISSIPATER LENGTH          | 19.5m                  |

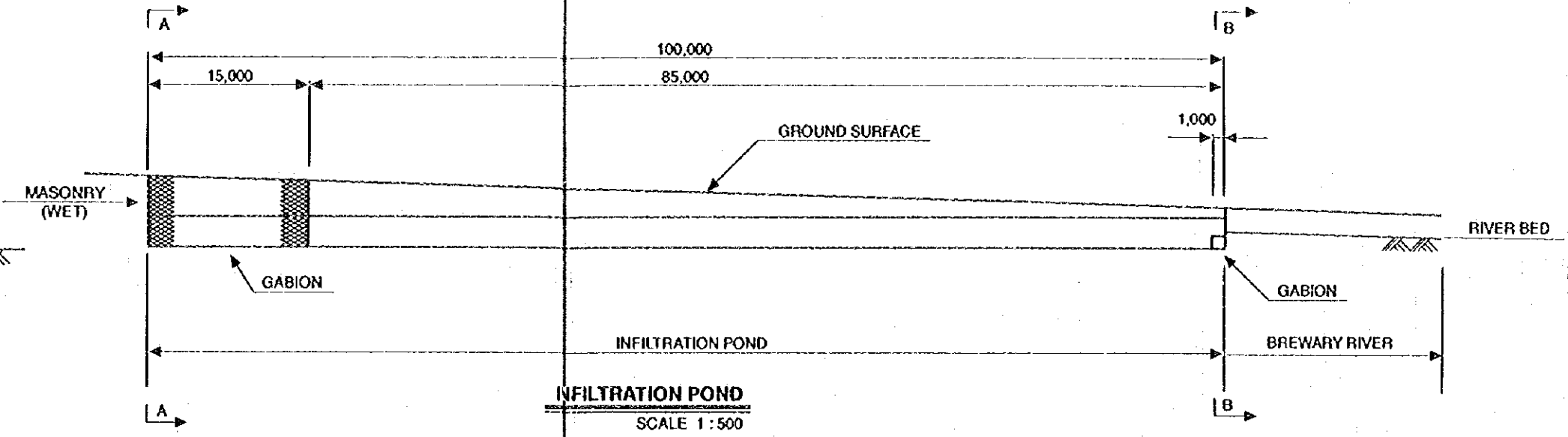
**PLAN OF BREWERY DELAY ACTION DAM**  
 SCALE 1:600



**A - A SECTION**  
SCALE 1:500

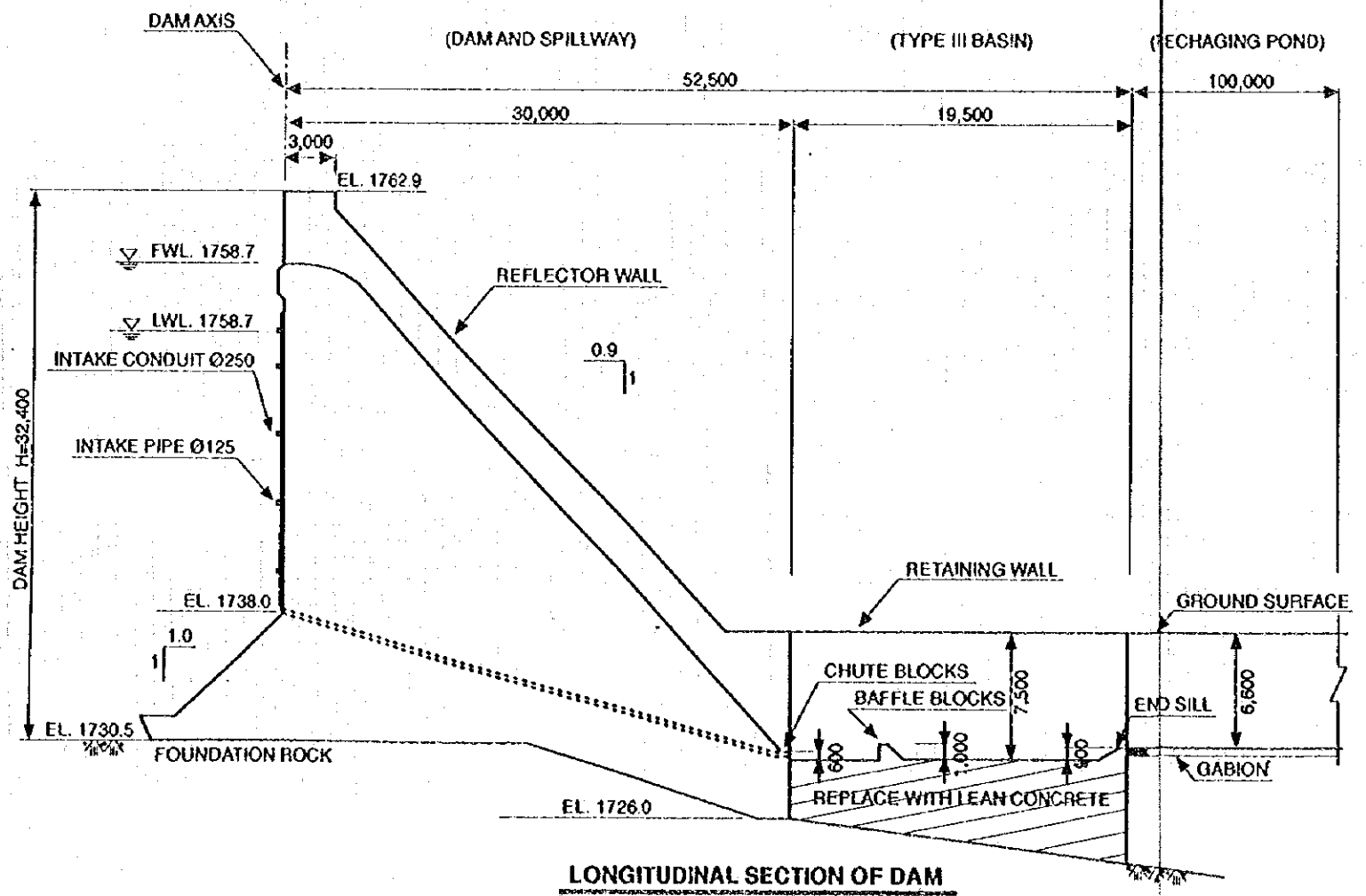


**B - B SECTION**  
SCALE 1:500

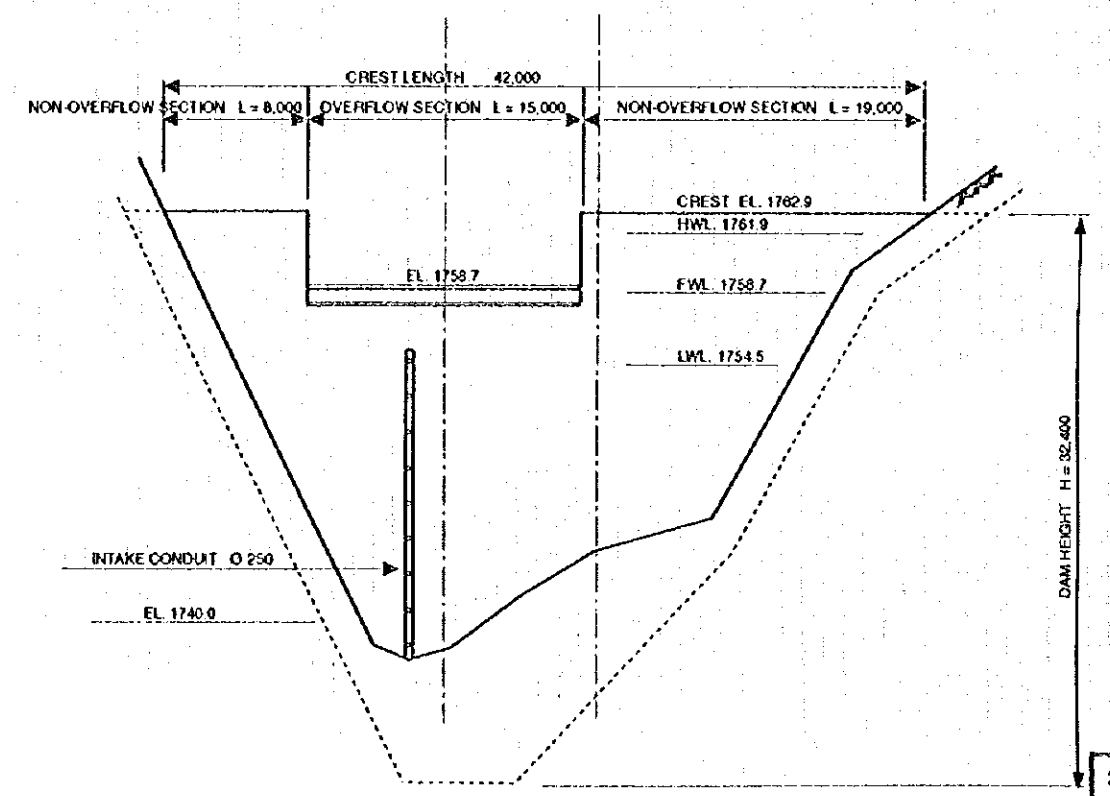


**INFILTRATION POND**  
SCALE 1:500

NOTES:  
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.  
2. ALL ELEVATIONS (EL.) ARE IN METERS.

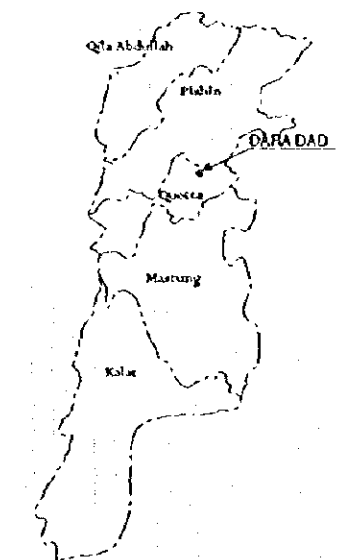


**LONGITUDINAL SECTION OF DAM**  
SCALE 1:400



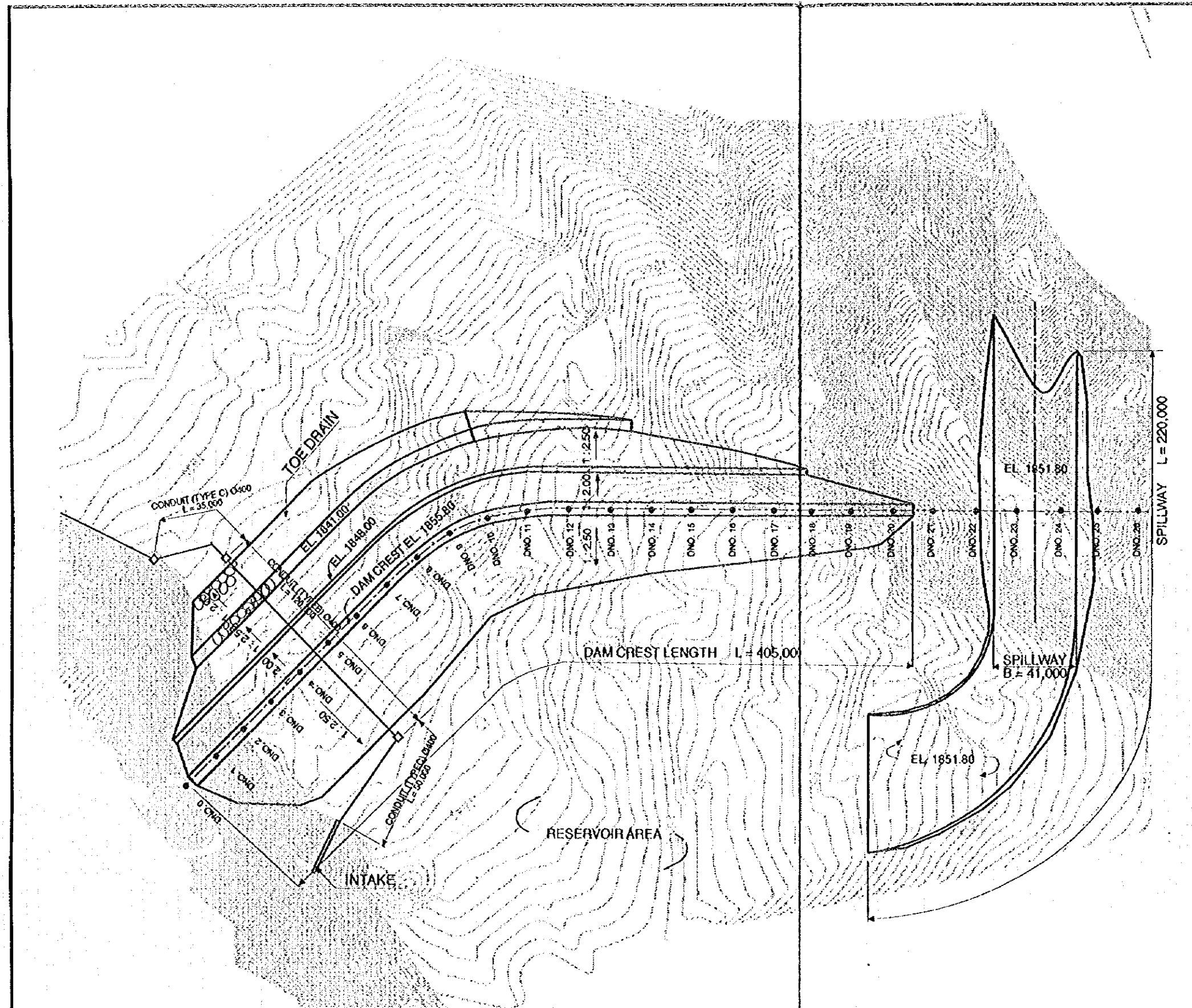
**CROSS SECTION**  
SCALE 1:400

IRRIGATION AND POWER DEPARTMENT  
GOVERNMENT OF BALUCHISTAN  
IRRIGATION WATER RESOURCES  
DEVELOPMENT PROJECT  
**LONGITUDINAL SECTION OF DAM**  
JAPAN INTERNATIONAL COOPERATION AGENCY



LOCATION OF THE DAMSITE

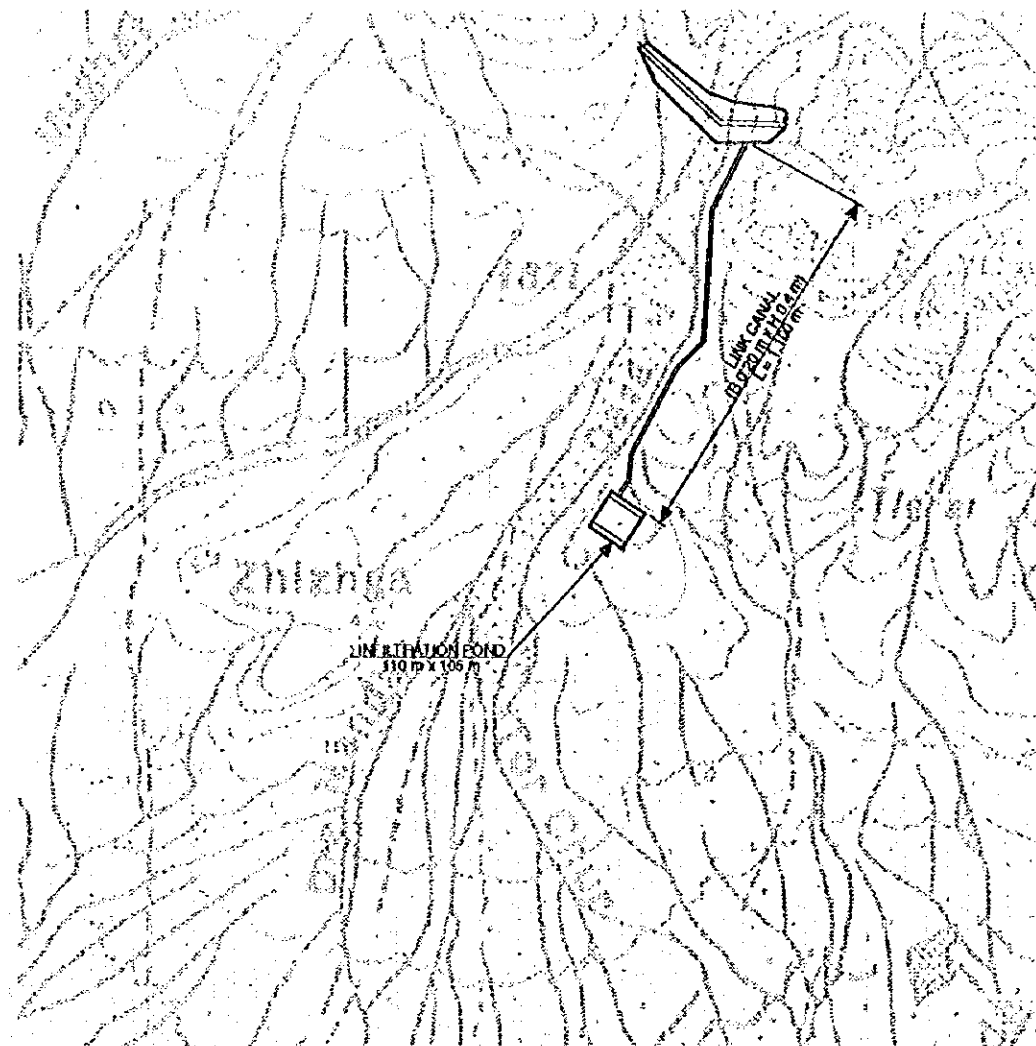
- NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
  2. ALL ELEVATIONS (EL.) ARE IN METERS.



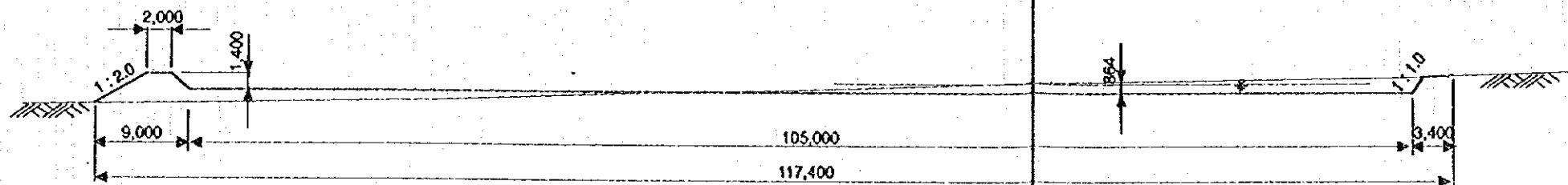
PLAN OF DARA DELAY ACTION DAM  
SCALE 1:2000

| GENERAL FEATURE OF DAM STRUCTURES |                         |
|-----------------------------------|-------------------------|
| LOCATION                          | QUETTA                  |
| CATCHMENT AREA                    | 16.6 Km <sup>2</sup>    |
| DAM EMBANKMENT                    | HOMOGENEOUS EARTH DAM   |
| DAM TYPE                          |                         |
| CREST LENGTH                      | 405.0 m                 |
| DAM HEIGHT                        | 22.8 m                  |
| DAM CREST WIDTH                   | 6.0 m                   |
| EMBANKMENT VOLUME                 | 297,000 m <sup>3</sup>  |
| CREST ELEVATION                   | 1855.8 m                |
| FULL WATER LEVEL                  | 1851.8 m                |
| LOW WATER LEVEL                   | 1849.5 m                |
| TOTAL STORAGE CAPACITY            | 589,000 m <sup>3</sup>  |
| EFFECTIVE STORAGE                 | 240,000 m <sup>3</sup>  |
| DEAD STORAGE CAPACITY             | 349,000 m <sup>3</sup>  |
| DRAIN TYPE                        | TOE DRAIN               |
| SPILLWAY                          |                         |
| DESIGN FLOOD DISCHARGE            | 109 m <sup>3</sup> /sec |
| TYPE OF SPILLWAY                  | CHUTE TYPE              |
| CREST WIDTH                       | 41 m                    |
| SPILLWAY LENGTH                   | 220 m                   |
| INTAKE WORKS                      |                         |
| TYPE OF INTAKE                    | INCLINED TYPE           |
| LENGTH OF CONDUIT                 | 205.0 m                 |

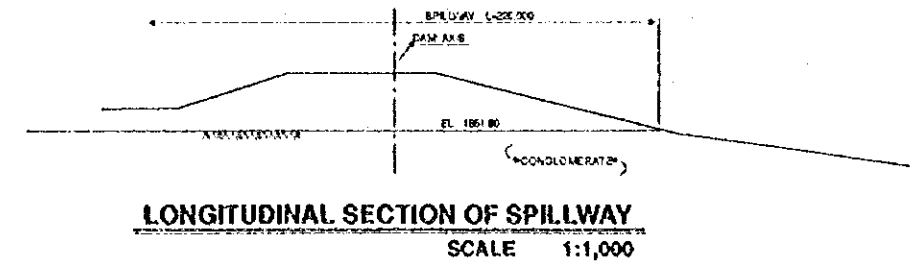




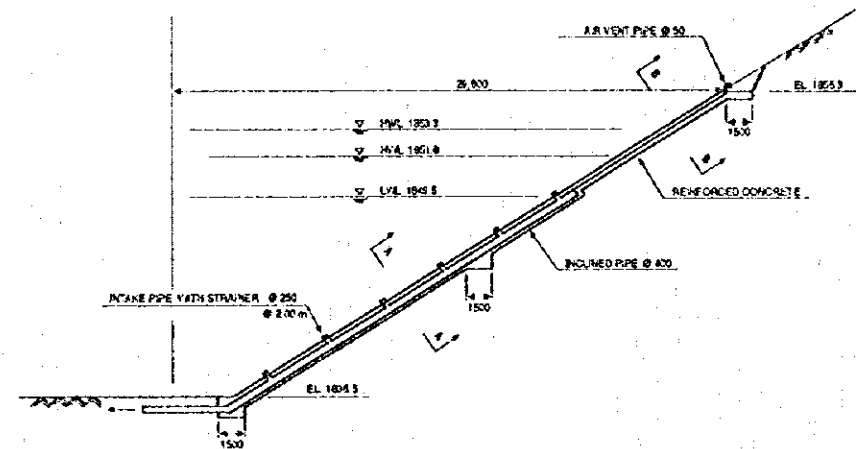
**PLAN OF INFILTRATION POND**  
(SCALE 1 : 20,000)



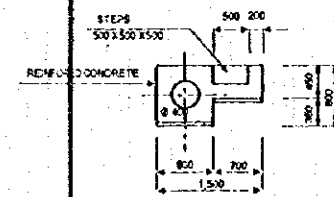
**INFILTRATION POND**  
(SCALE 1 : 400)



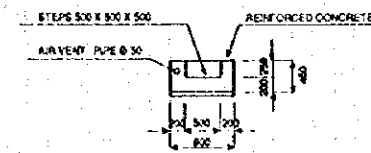
**LONGITUDINAL SECTION OF SPILLWAY**  
SCALE 1:1,000



**INCLINED INTAKE CONDUIT**  
SCALE 1 : 400

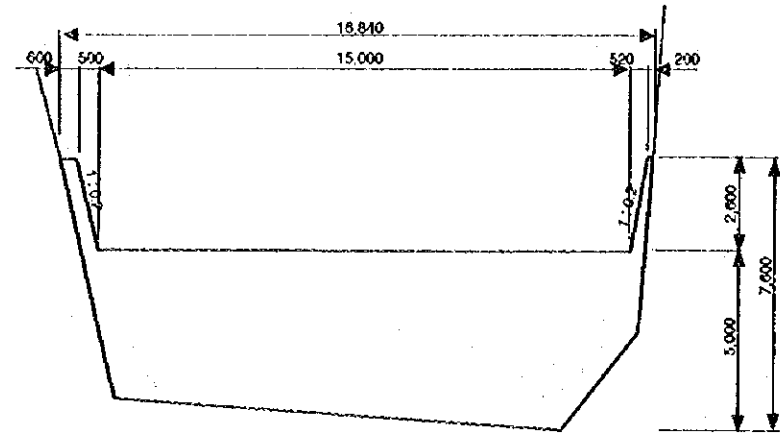


**A - A SECTION**  
SCALE 1 : 100

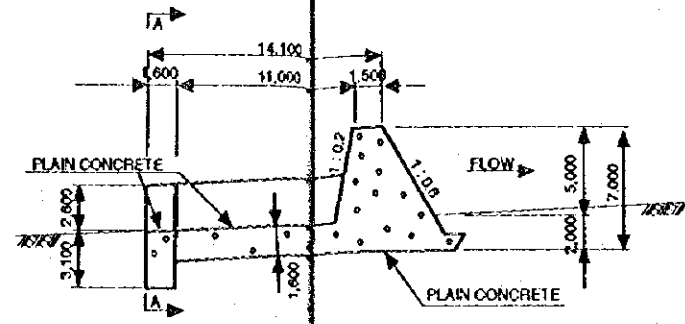


**B - B SECTION**  
SCALE 1 : 100

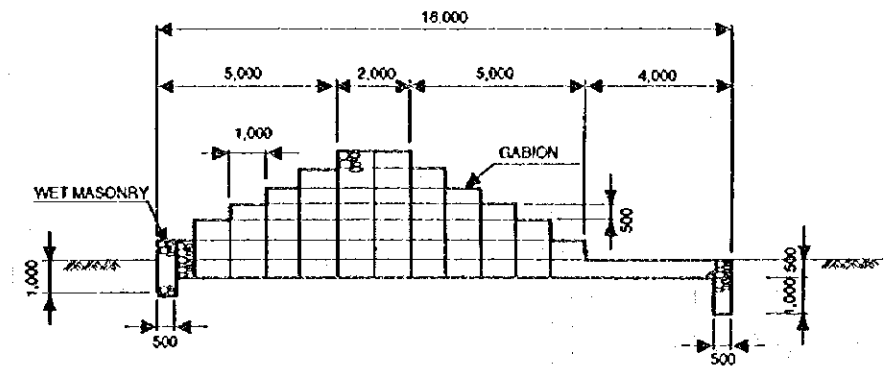
- NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
  2. ALL ELEVATIONS (EL.) ARE IN METERS.



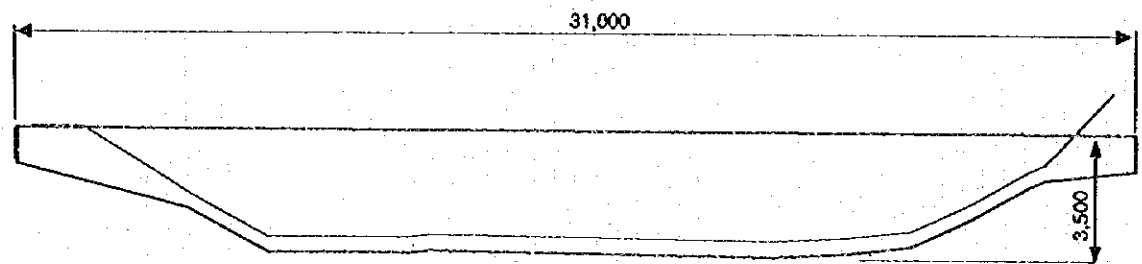
**DARA I (DETENTION BUND)**  
SCALE 1 : 200



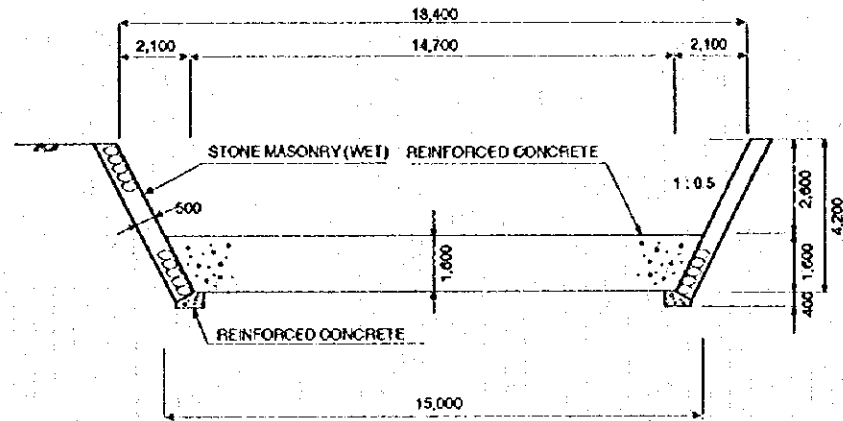
**TYPICAL CROSS SECTION OF DARA I DETENTION BUND**  
SCALE 1 : 400



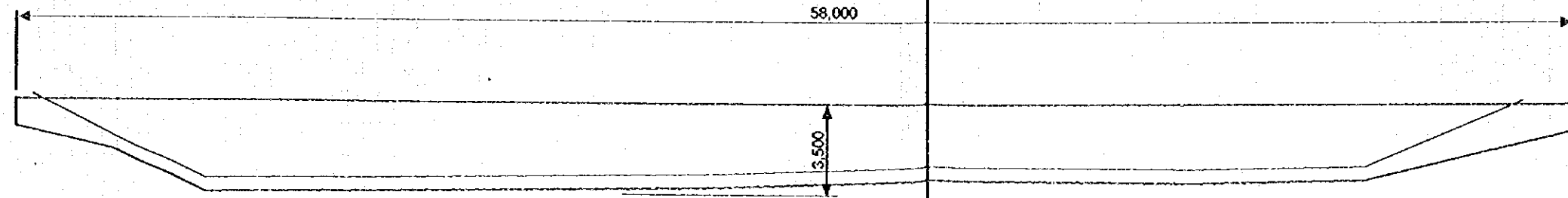
**TYPICAL CROSS SECTION OF DARA II, DARA III DETENTION BUND**  
SCALE 1 : 200



**DARA II (DETENTION BUND)**  
SCALE 1 : 200



**A - A SECTION**  
SCALE 1 : 200



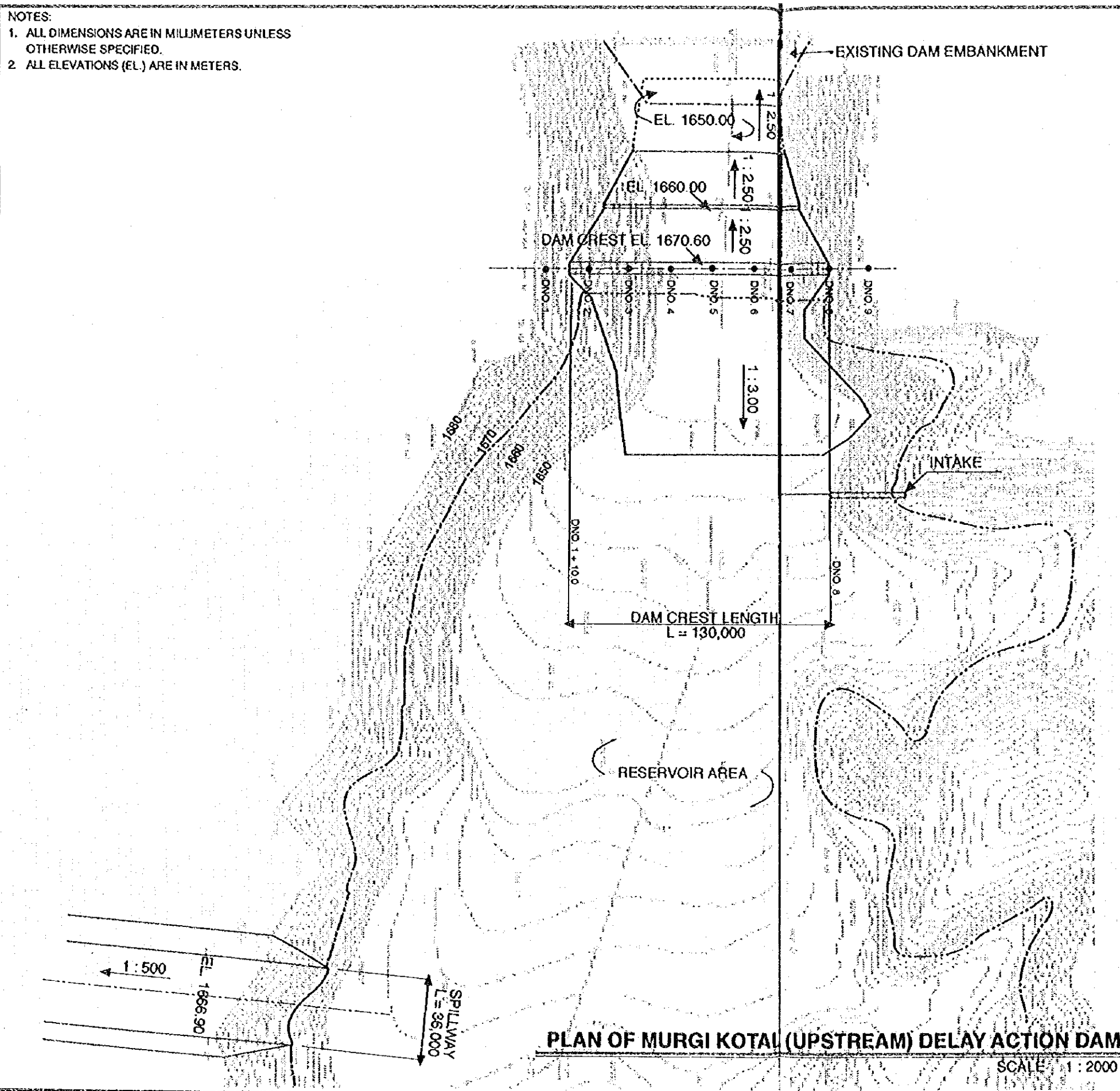
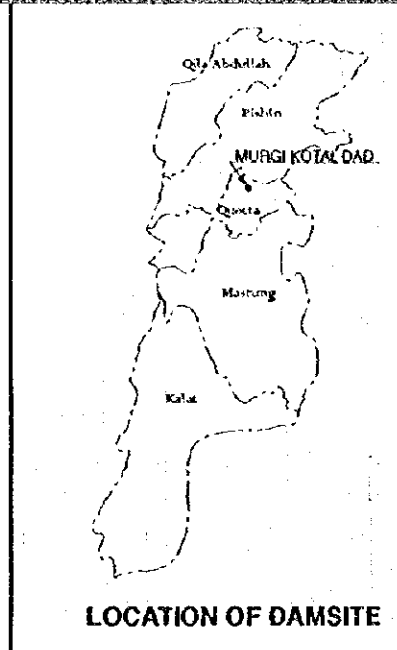
**DARA III (DETENTION BUND)**  
SCALE 1 : 200

- NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
  2. ALL ELEVATIONS (EL.) ARE IN METERS.



**NOTES:**

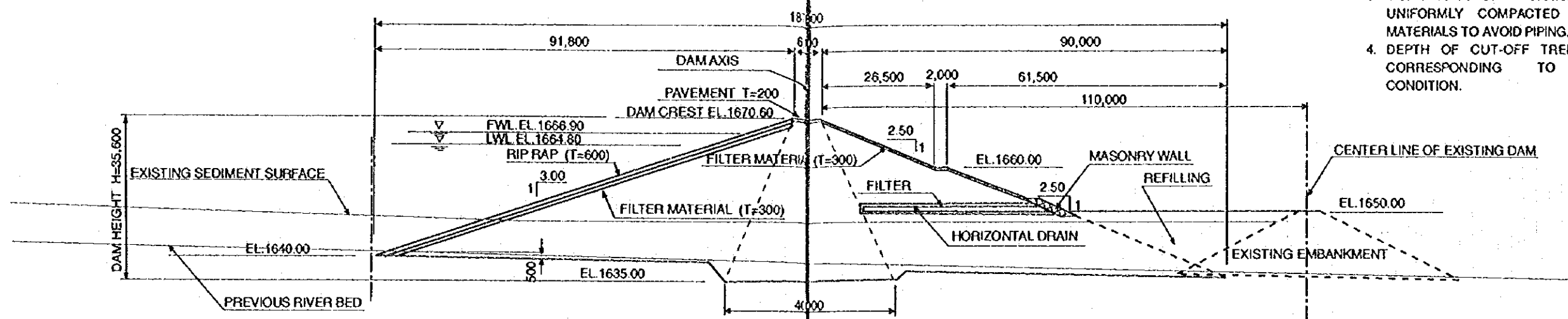
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
2. ALL ELEVATIONS (EL.) ARE IN METERS.



| GENERAL FEATURE OF DAM STRUCTURES |                          |
|-----------------------------------|--------------------------|
| LOCATION                          | QUETTA                   |
| CATCHMENT AREA                    | 19.7 Km <sup>2</sup>     |
| DAM EMBANKMENT                    | HOMOGENEOUS EARTH DAM    |
| DAM TYPE                          |                          |
| CREST LENGTH                      | 130.0 m                  |
| DAM HEIGHT                        | 35.6 m                   |
| DAM CREST WIDTH                   | 6.0 m                    |
| EMBANKMENT VOLUME                 | 278,000 m <sup>3</sup>   |
| CREST ELEVATION                   | 1,668.5 m                |
| FULL WATER LEVEL                  | 1,668.9 m                |
| LOW WATER LEVEL                   | 1,664.8 m                |
| TOTAL STORAGE CAPACITY            | 1,147,000 m <sup>3</sup> |
| EFFECTIVE STORAGE                 | 260,000 m <sup>3</sup>   |
| DEAD STORAGE CAPACITY             | 887,000 m <sup>3</sup>   |
| DRAIN TYPE                        | HORIZONTAL DRAIN         |
| SPILLWAY                          |                          |
| DESIGN FLOOD DISCHARGE            | 131 m <sup>3</sup> /sec  |
| TYPE OF SPILLWAY                  | CHUTE TYPE               |
| CREST WIDTH                       | 8.5 m                    |
| INTAKE WORKS                      |                          |
| TYPE OF INTAKE                    | INCLINED TYPE            |
| LENGTH OF CONDUIT                 | 200.0 m                  |

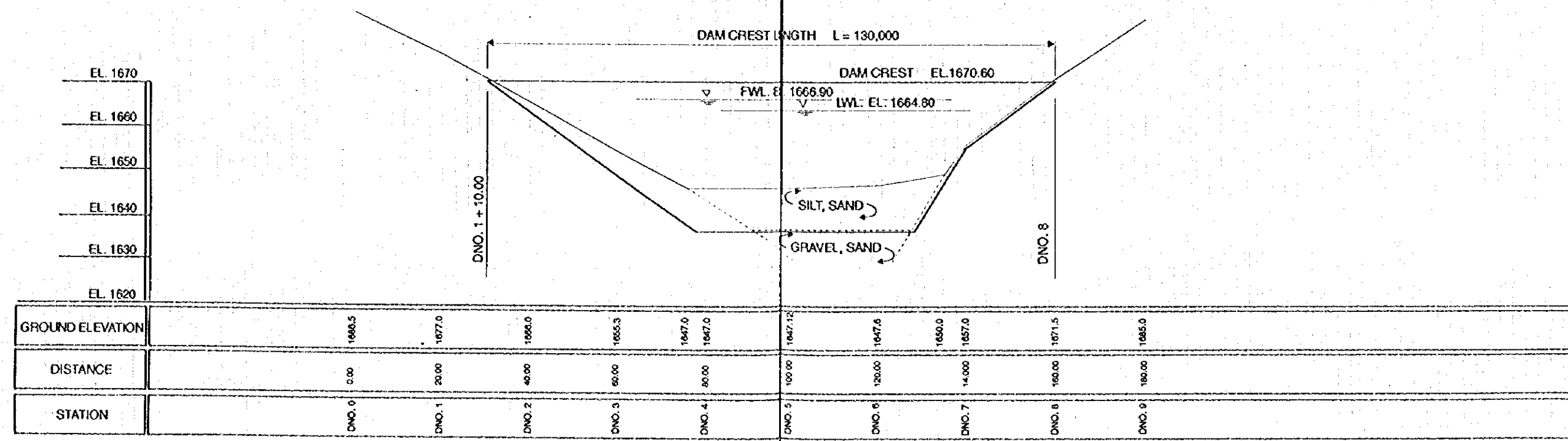
**PLAN OF MURGI KOTAL (UPSTREAM) DELAY ACTION DAM**  
SCALE: 1 : 2000

- NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
  2. ALL ELEVATIONS (EL.) ARE IN METERS.
  3. CORE ZONE OF EMBANKMENT SHALL BE UNIFORMLY COMPACTED WITH GRADED MATERIALS TO AVOID PIPING.
  4. DEPTH OF CUT-OFF TRENCH IS VARIED CORRESPONDING TO FOUNDATION CONDITION.



**STANDARD SECTION**

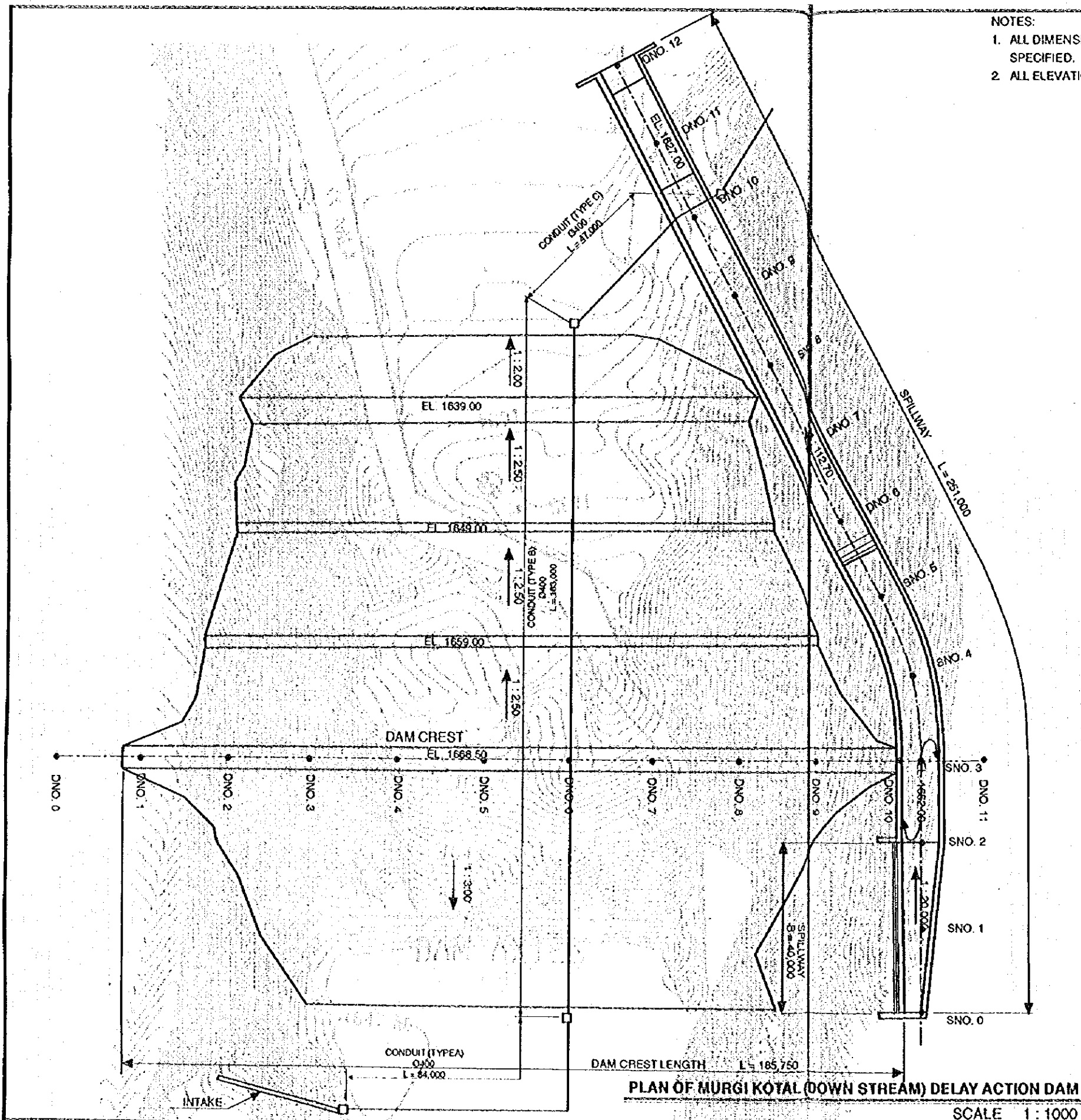
SCALE 1:1,000



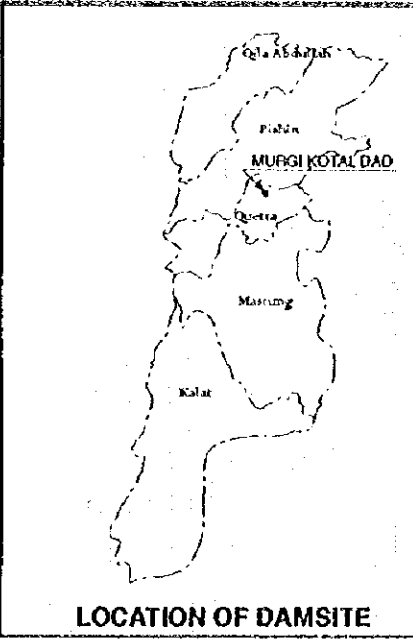
**LONGITUDINAL SECTION**

SCALE 1:1,000

IRRIGATION AND POWER DEPARTMENT  
GOVERNMENT OF BALUCHISTAN  
IRRIGATION WATER RESOURCES  
DEVELOPMENT PROJECT  
**STANDARD LONGITUDINAL  
SECTION OF DAM (UPSTREAM)**  
JAPAN INTERNATIONAL COOPERATION AGENCY

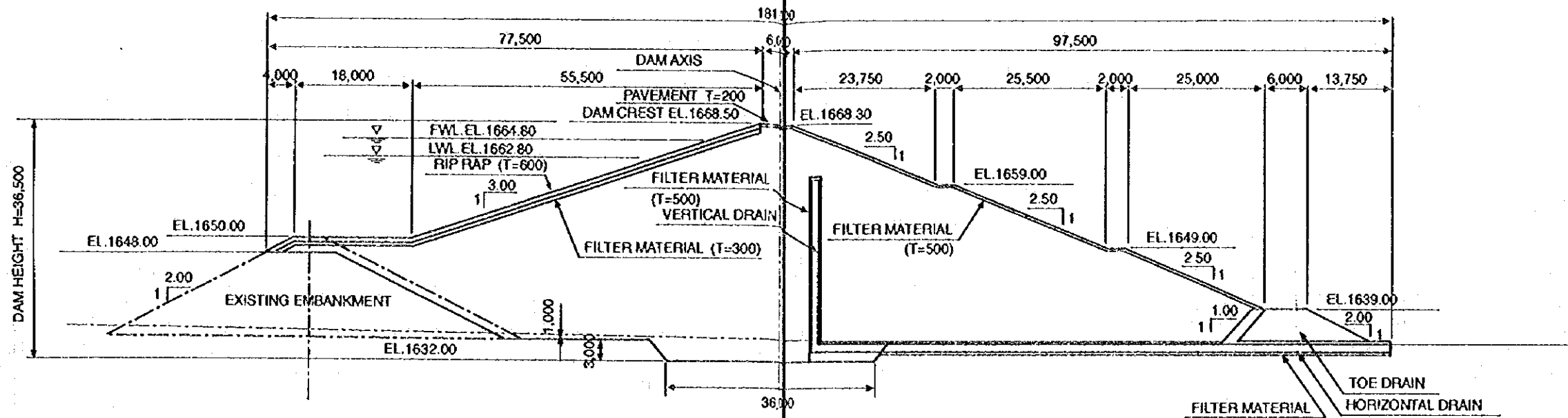


NOTES:  
 1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.  
 2. ALL ELEVATIONS (EL.) ARE IN METERS.



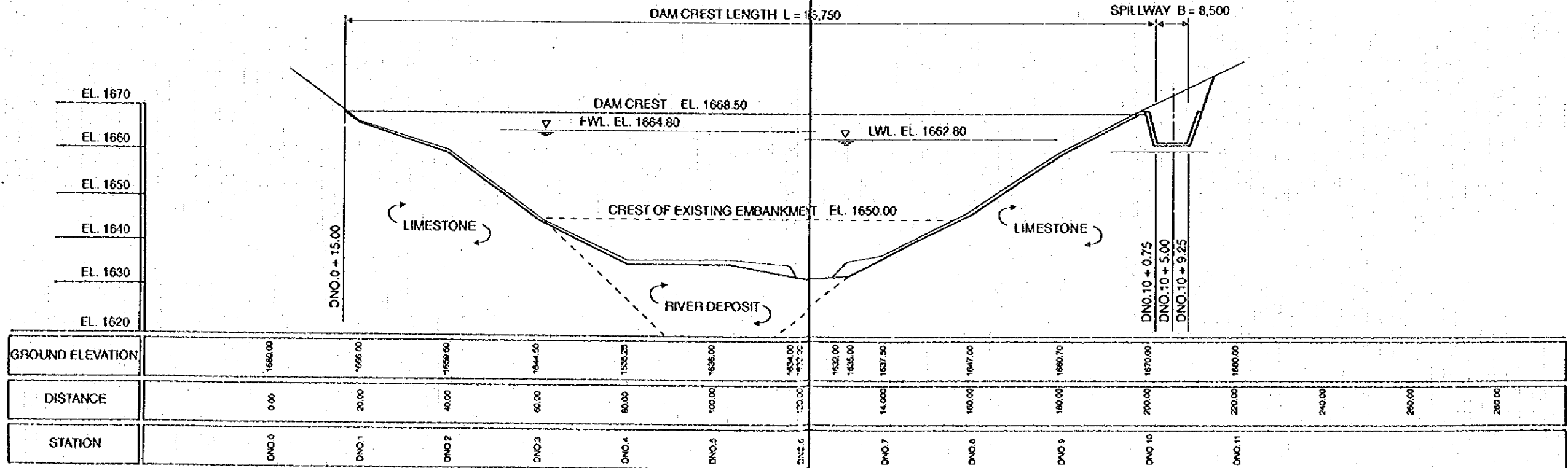
| GENERAL FEATURE OF DAM STRUCTURES |                          |
|-----------------------------------|--------------------------|
| LOCATION                          | QUETTA                   |
| CATCHMENT AREA                    | 19.7 Km <sup>2</sup>     |
| DAM EMBANKMENT                    | HOMOGENEOUS EARTH DAM    |
| DAM TYPE                          |                          |
| CREST LENGTH                      | 185.75 m                 |
| DAM HEIGHT                        | 36.5 m                   |
| DAM CREST WIDTH                   | 6.0 m                    |
| EMBANKMENT VOLUME                 | 458,000 m <sup>3</sup>   |
| CREST ELEVATION                   | 1668.5 m                 |
| FULL WATER LEVEL                  | 1664.8 m                 |
| LOW WATER LEVEL                   | 1662.8 m                 |
| TOTAL STORAGE CAPACITY            | 1,147,000 m <sup>3</sup> |
| EFFECTIVE STORAGE                 | 260,000 m <sup>3</sup>   |
| DEAD STORAGE CAPACITY             | 887,000 m <sup>3</sup>   |
| DRAIN TYPE                        | TOE DRAIN                |
| SPILLWAY                          |                          |
| DESIGN FLOOD DISCHARGE            | 131 m <sup>3</sup> /sec  |
| TYPE OF SPILLWAY                  | SOE SPILLWAY             |
| CREST WIDTH                       | 40.0 m                   |
| SPILLWAY LENGTH                   | 251 m                    |
| INTAKE WORKS                      |                          |
| TYPE OF INTAKE                    | INCLINED TYPE            |
| LENGTH OF CONDUIT                 | 210.0 m                  |

PLAN OF MURGI KOTAL (DOWN STREAM) DELAY ACTION DAM  
 SCALE 1 : 1000

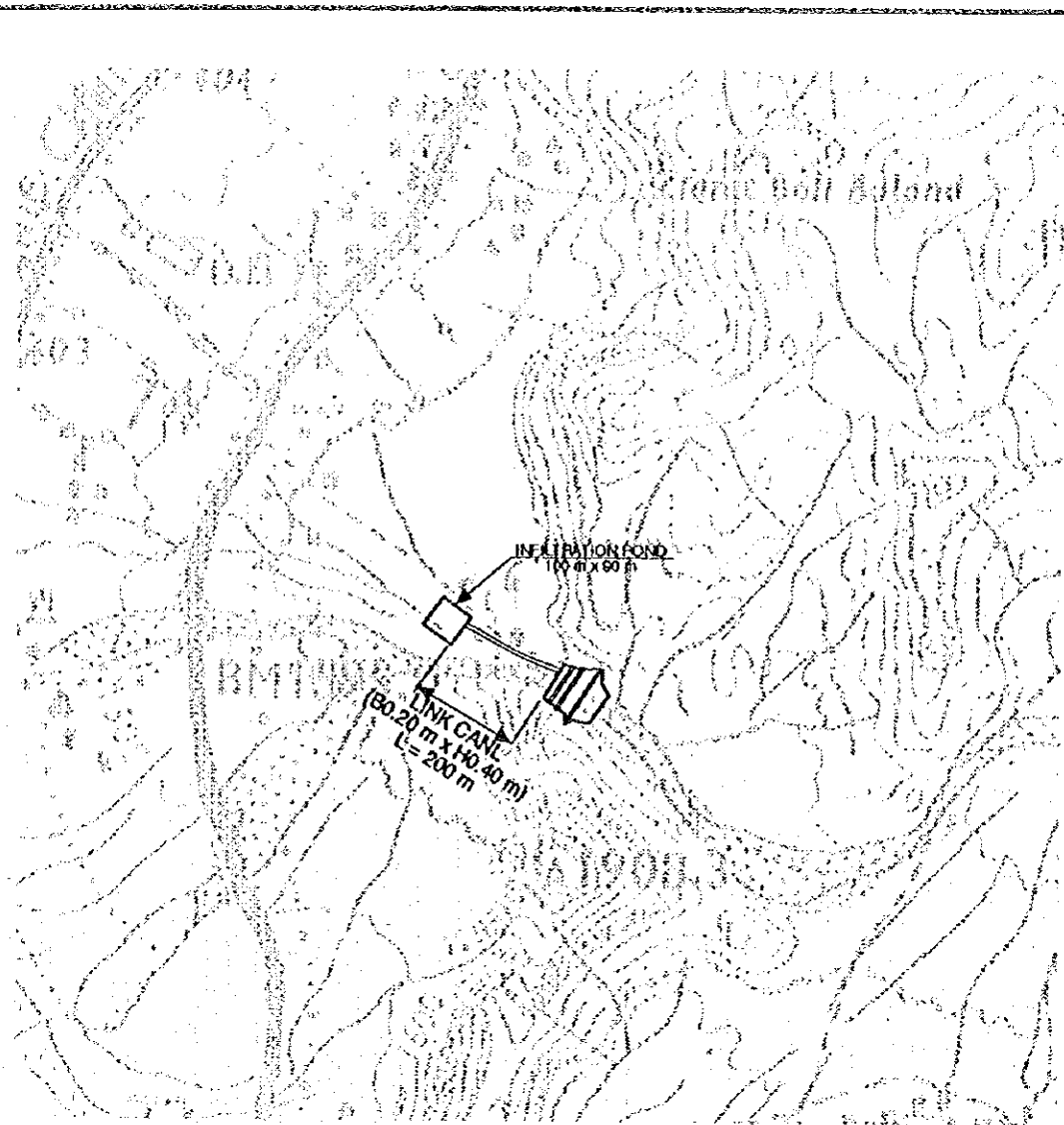


**STANDARD SECTION**  
SCALE 1:800

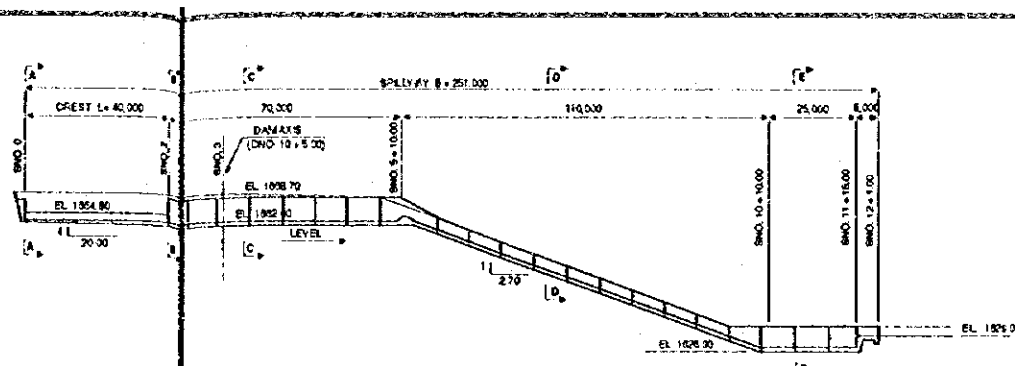
- NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
  2. ALL ELEVATIONS (EL.) ARE IN METERS.
  3. CORE ZONE OF EMBANKMENT SHALL BE UNIFORMLY COMPACTED WITH GRADED MATERIALS TO AVOID PIPING.
  4. DEPTH OF CUT-OFF TRENCH IS VARIED CORRESPONDING TO FOUNDATION CONDITION.



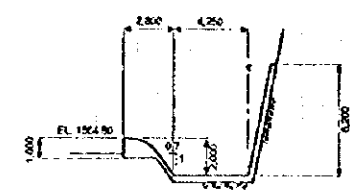
**LONGITUDINAL SECTION**  
SCALE 1:1000



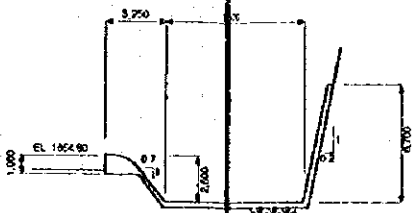
**PLAN OF INFILTRATION POND**  
(SCALE 1 : 20,000)



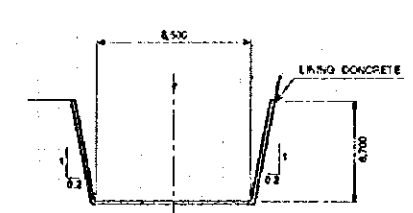
**LONGITUDINAL SECTION OF SPILLWAY**  
SCALE 1 : 2,000



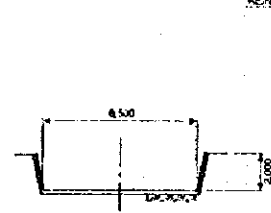
**SECTION A-A**  
SCALE 1 : 400



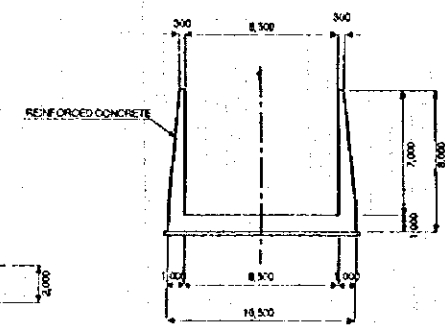
**SECTION B-B**  
SCALE 1 : 400



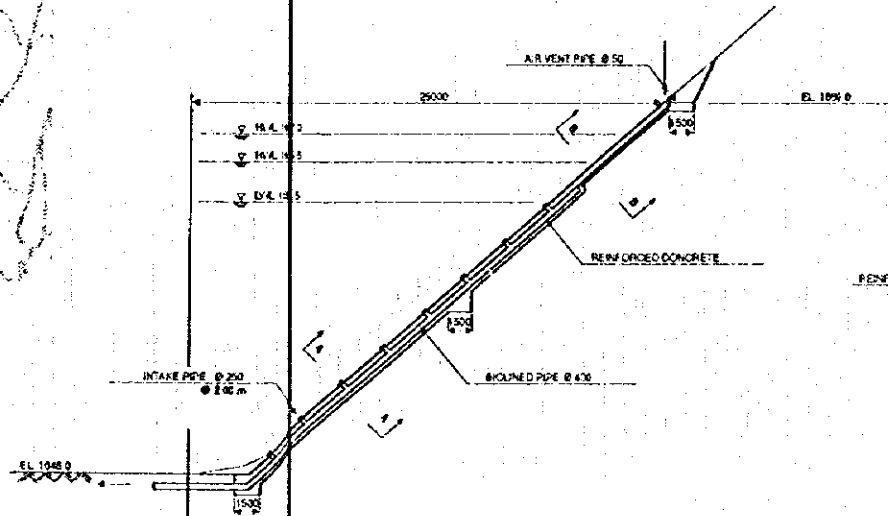
**SECTION C-C**  
SCALE 1 : 400



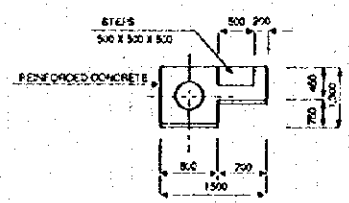
**SECTION D-D**  
SCALE 1 : 400



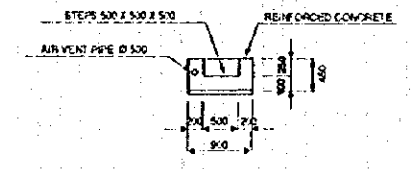
**SECTION E-E**  
SCALE 1 : 400



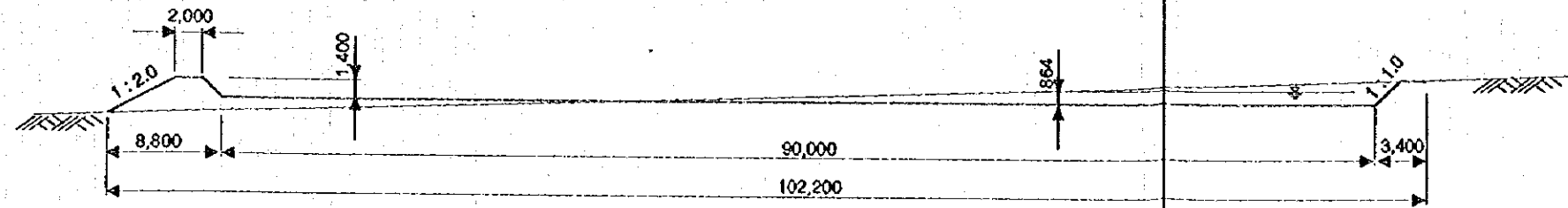
**INCLINED INTAKE CONDUIT**  
SCALE 1 : 400



**A-A SECTION**  
SCALE 1 : 100

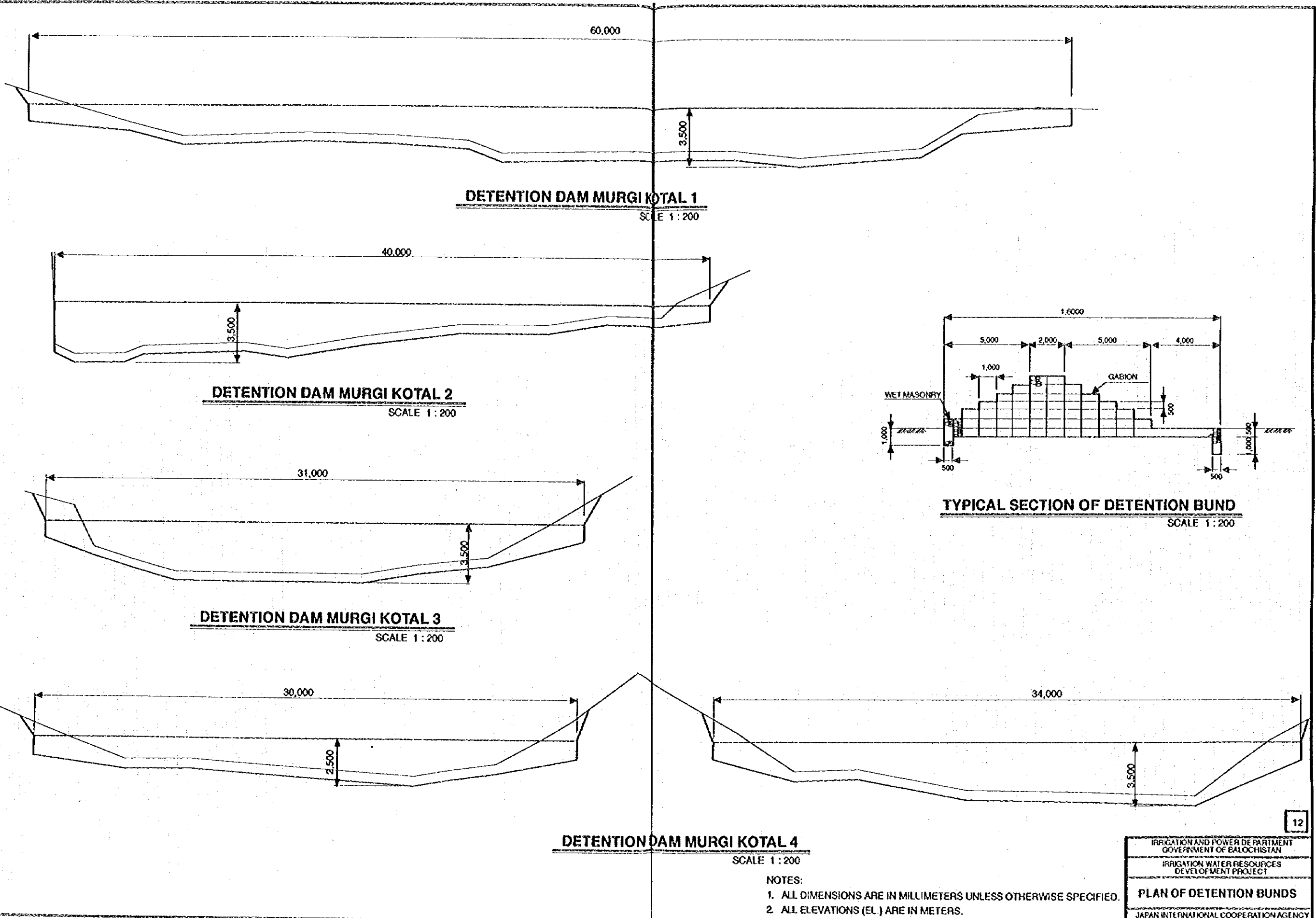


**B-B SECTION**  
SCALE 1 : 100



**INFILTRATION POND**  
(SCALE 1 : 500)

- NOTES:  
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.  
2. ALL ELEVATIONS (EL.) ARE IN METERS.



**DETENTION DAM MURGI KOTAL 1**

SCALE 1 : 200

**DETENTION DAM MURGI KOTAL 2**

SCALE 1 : 200

**DETENTION DAM MURGI KOTAL 3**

SCALE 1 : 200

**DETENTION DAM MURGI KOTAL 4**

SCALE 1 : 200

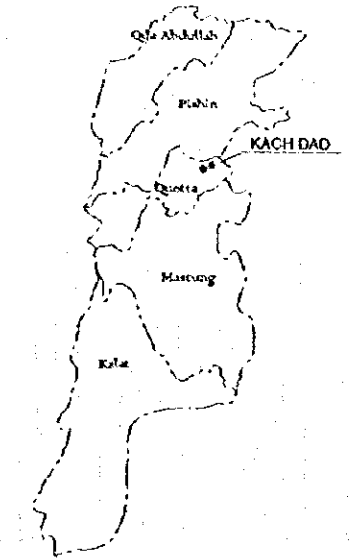
**TYPICAL SECTION OF DETENTION BUND**

SCALE 1 : 200

- NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
  2. ALL ELEVATIONS (EL.) ARE IN METERS.

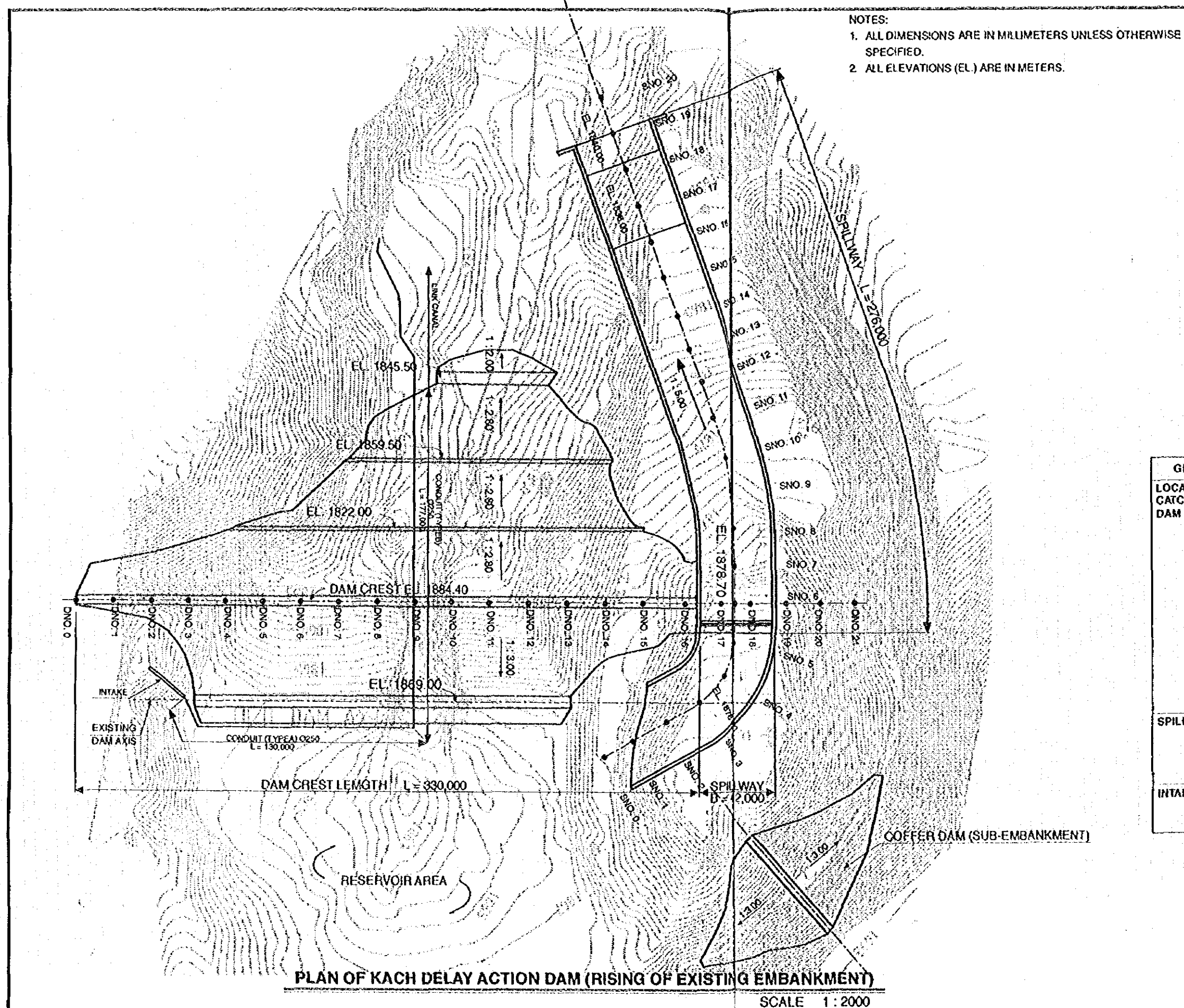
|   |
|---|
| IRRIGATION AND POWER DEPARTMENT<br>GOVERNMENT OF BALUCHISTAN<br>IRRIGATION WATER RESOURCES<br>DEVELOPMENT PROJECT |
| <b>PLAN OF DETENTION BUNDS</b>  |
| JAPAN INTERNATIONAL COOPERATION AGENCY  |

- NOTES:  
 1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.  
 2. ALL ELEVATIONS (EL.) ARE IN METERS.



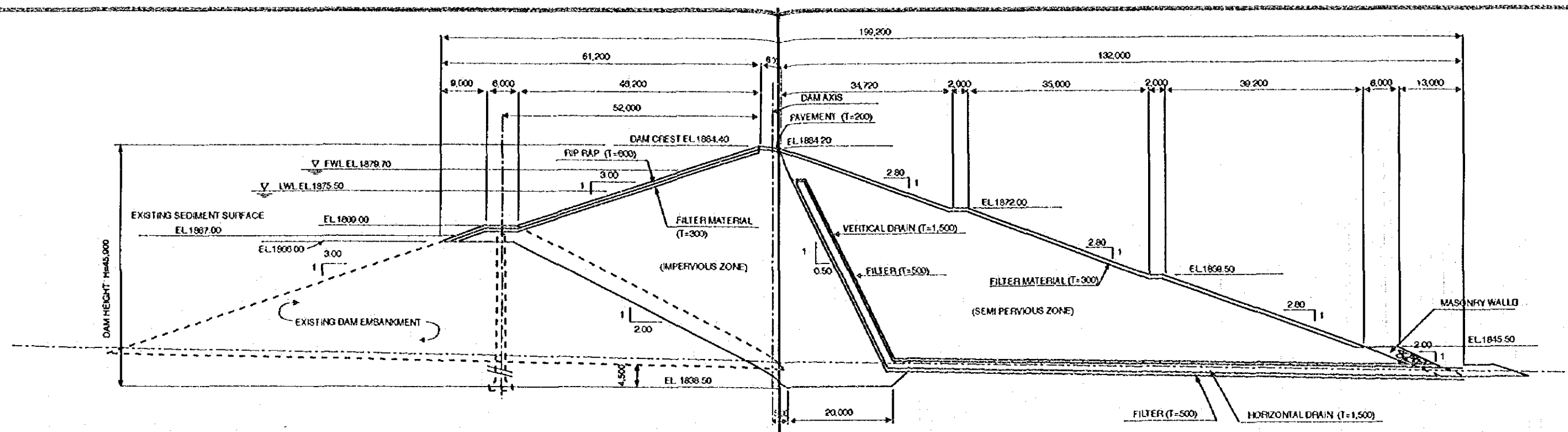
LOCATION OF DAM SITE

| GENERAL FEATURE OF DAM STRUCTURES |                          |
|-----------------------------------|--------------------------|
| LOCATION                          | QUETTA                   |
| CATCHMENT AREA                    | 56.5 Km <sup>2</sup>     |
| DAM EMBANKMENT                    | ZONE TYPE                |
| DAM TYPE                          | EARTH DAM                |
| CREST LENGTH                      | 330.0 m                  |
| DAM HEIGHT                        | 45.9 m                   |
| DAM CREST WIDTH                   | 6.0 m                    |
| EMBANKMENT VOLUME                 | 480,000 m <sup>3</sup>   |
| (COFFER DAM)                      | 125,000 m <sup>3</sup>   |
| CREST ELEVATION                   | 1884.2 m                 |
| FULL WATER LEVEL                  | 1870.7 m                 |
| LOW WATER LEVEL                   | 1884.4 m                 |
| TOTAL STORAGE CAPACITY            | 2,387,000 m <sup>3</sup> |
| EFFECTIVE STORAGE                 | 1,200,000 m <sup>3</sup> |
| DEAD STORAGE CAPACITY             | 1,187,000 m <sup>3</sup> |
| DRAIN TYPE                        | VERTICAL DRAIN           |
| SPILLWAY                          |                          |
| DESIGN FLOOD DISCHARGE            | 333 m <sup>3</sup> /sec  |
| TYPE OF SPILLWAY                  | CHUTE TYPE               |
| CREST WIDTH                       | 42 m                     |
| SPILLWAY LENGTH                   | 276 m                    |
| INTAKE WORKS                      |                          |
| TYPE OF INTAKE                    | INCLINED TYPE            |
| LENGTH OF CONDUIT                 | 307.0 m                  |



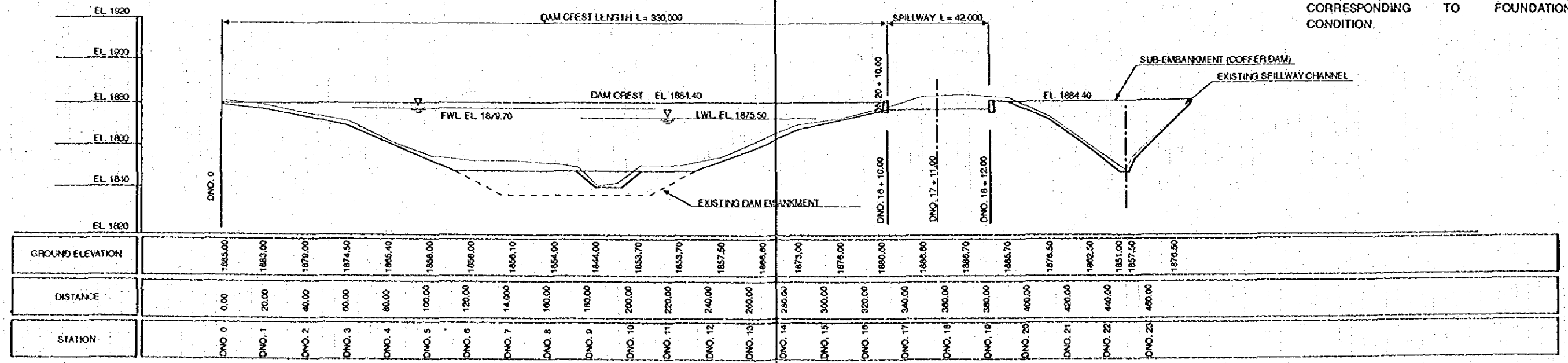
PLAN OF KACH DELAY ACTION DAM (RISING OF EXISTING EMBANKMENT)

SCALE 1:2000



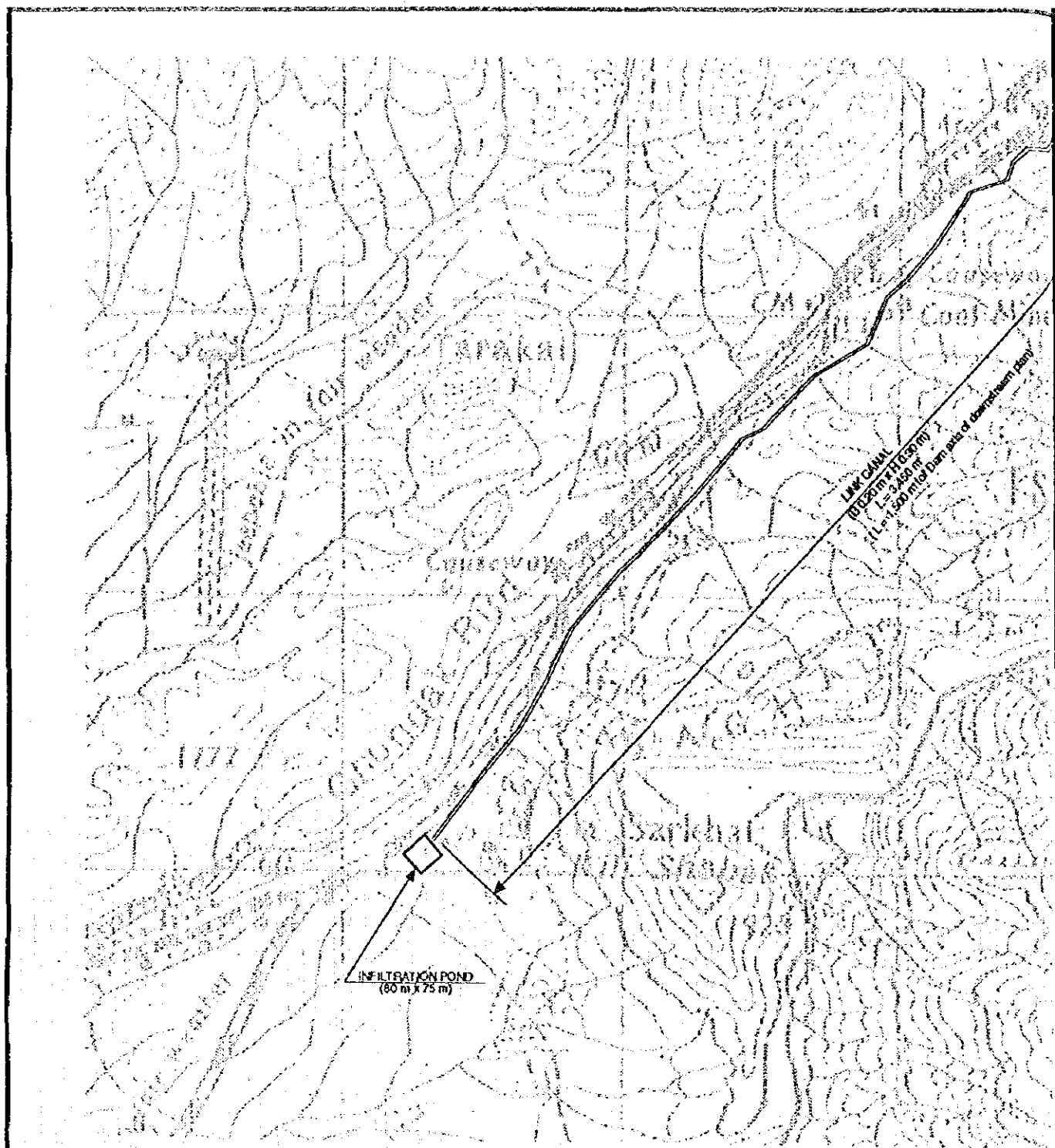
**STANDARD SECTION**  
SCALE 1:800

- NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
  2. ALL ELEVATIONS (EL.) ARE IN METERS.
  3. CORE ZONE OF EMBANKMENT SHALL BE UNIFORMLY COMPACTED WITH GRADED MATERIALS TO AVOID PIPING.
  4. DEPTH OF CUT-OFF TRENCH IS VARIED CORRESPONDING TO FOUNDATION CONDITION.

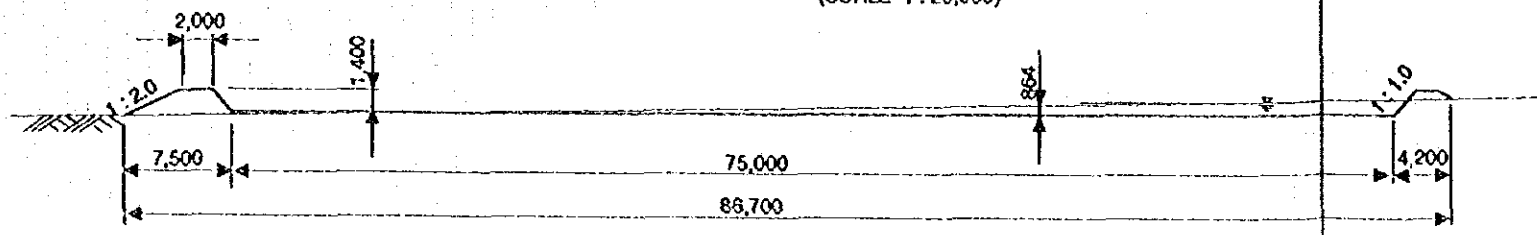


**LONGITUDINAL SECTION**  
SCALE 1:2,000

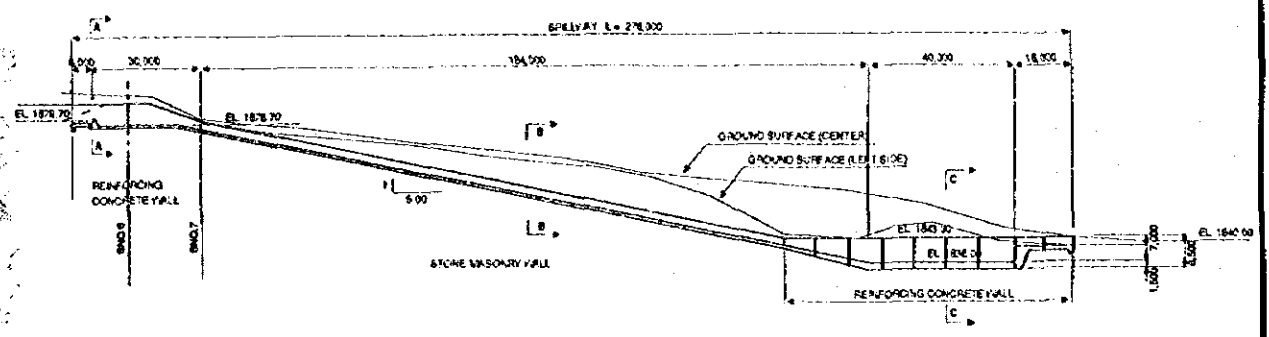




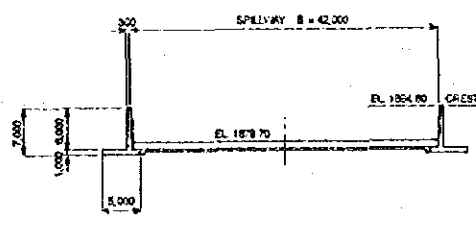
**PLAN OF INFILTRATION POND**  
(SCALE 1 : 20,000)



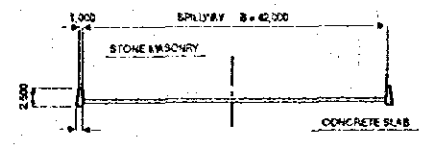
**INFILTRATION POND**  
(SCALE 1 : 500)



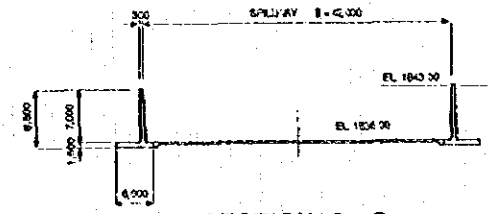
**LONGITUDINAL SECTION OF SPILLWAY**  
SCALE 1 : 2,000



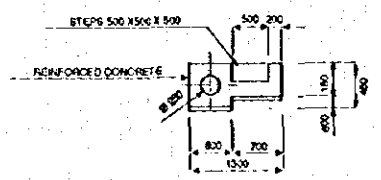
**SECTION A - A**  
SCALE 1 : 1,000



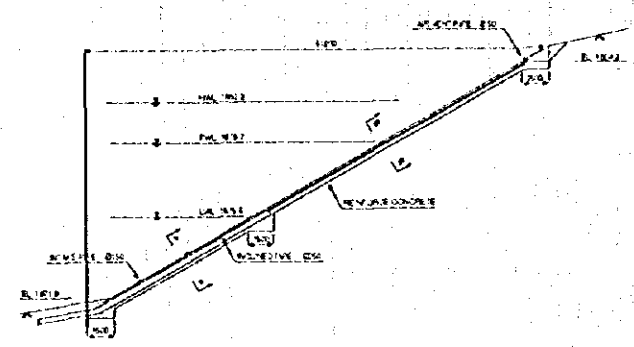
**SECTION B - B**  
SCALE 1 : 1,000



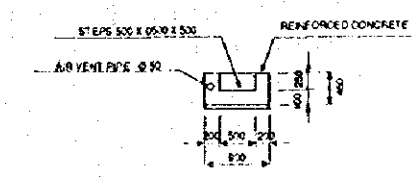
**SECTION C - C**  
SCALE 1 : 1,000



**SECTION A - A**  
SCALE 1 : 100



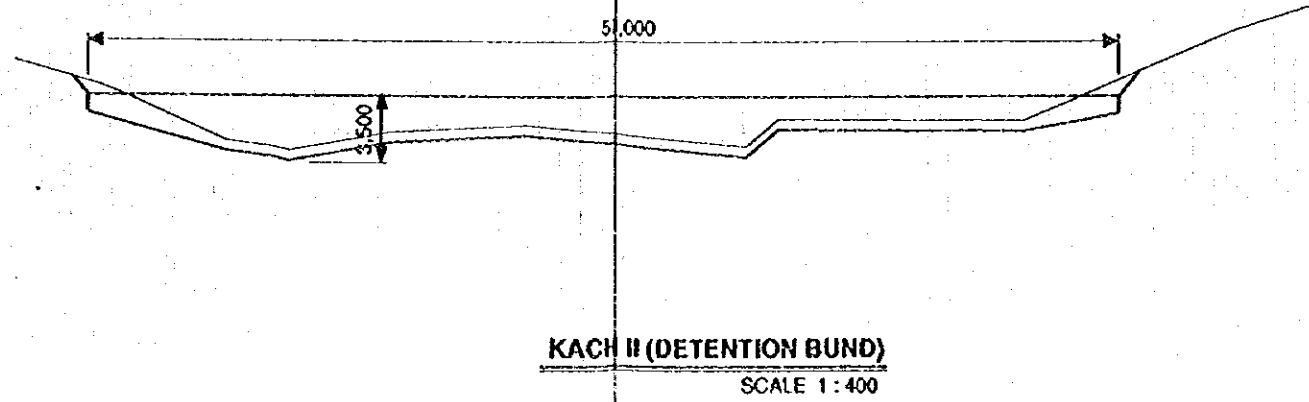
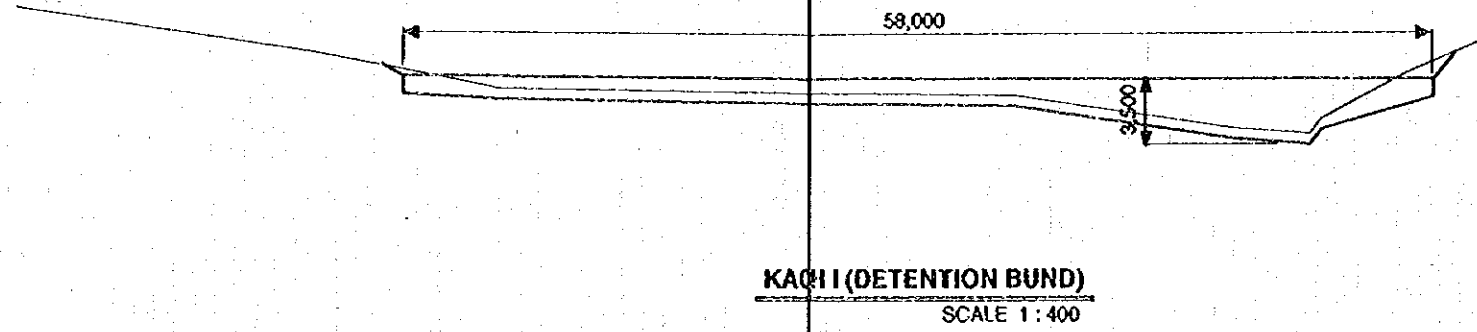
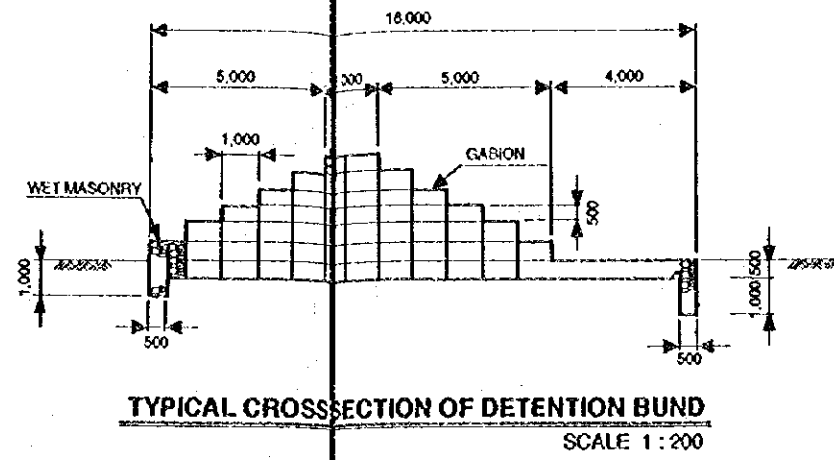
**INCLINED INTAKE CONDUIT**  
SCALE 1 : 400

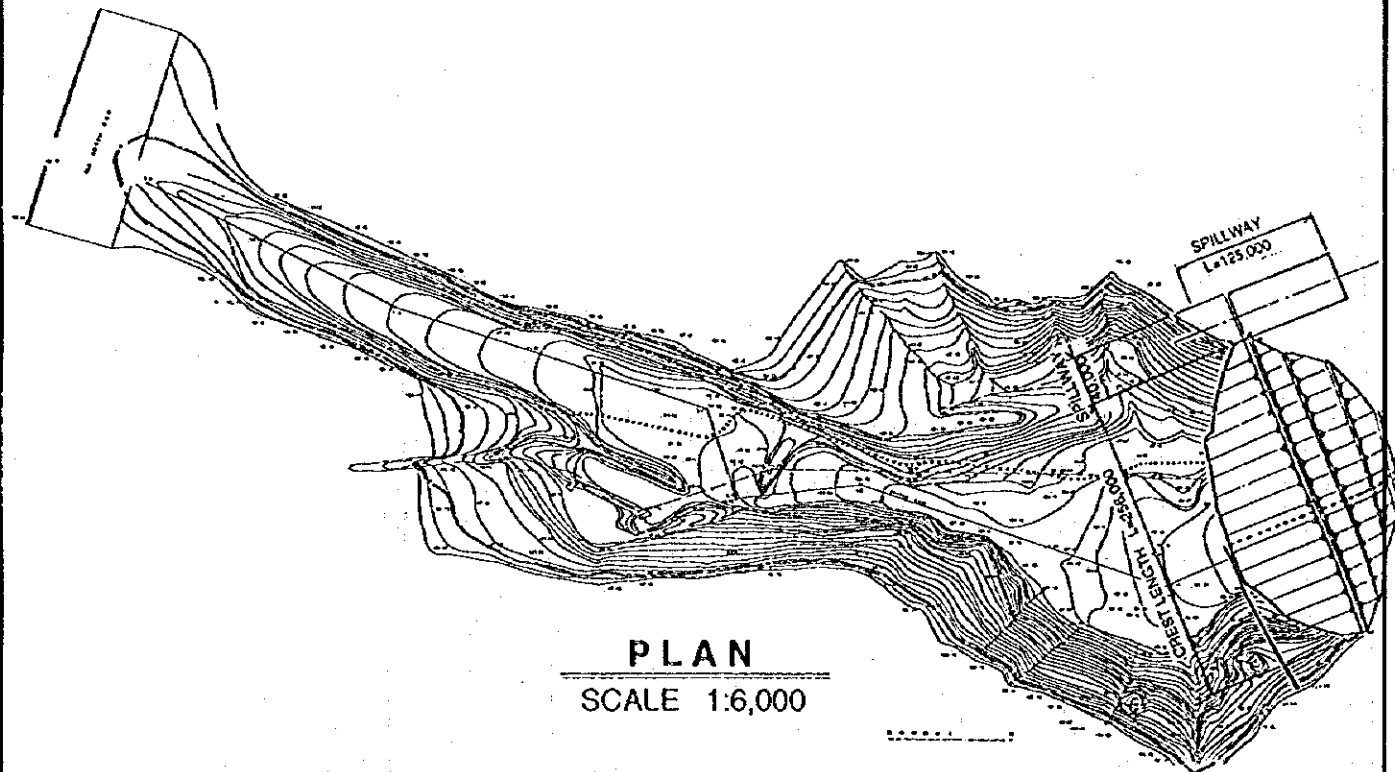


**SECTION B - B**  
SCALE 1 : 100

- NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
  2. ALL ELEVATIONS (EL.) ARE IN METERS.

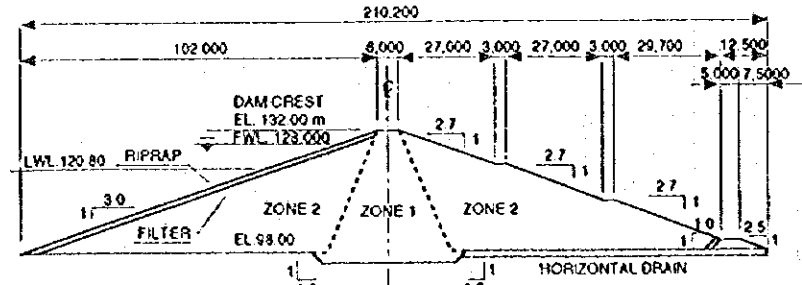
- NOTES:  
 1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.  
 2. ALL ELEVATIONS (EL.) ARE IN METERS.





**PLAN**  
SCALE 1:6,000

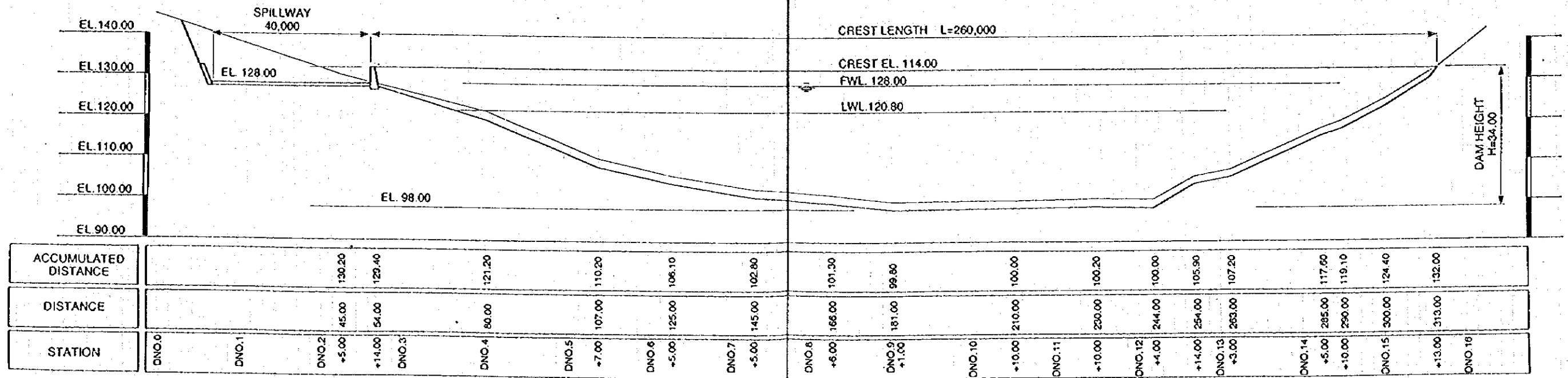
- NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
  2. ALL ELEVATIONS (EL.) ARE IN METERS.
  3. CORE ZONE OF EMBANKMENT SHALL BE UNIFORMLY COMPACTED WITH GRADED MATERIALS TO AVOID PIPING.
  4. DEPTH OF CUT-OFF TRENCH IS VARIED CORRESPONDING TO FOUNDATION CONDITION.



**STANDARD SECTION**  
SCALE 1:2,000

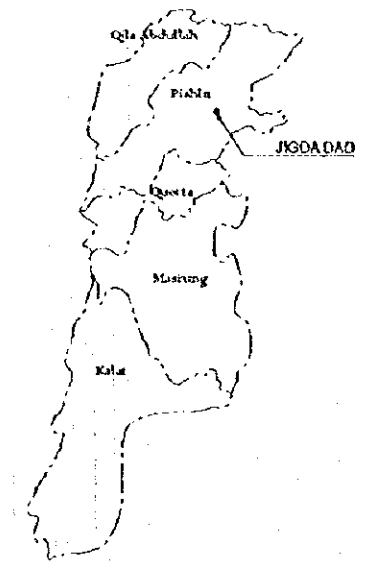
| GENERAL FEATURE OF DAM STRUCTURES |                           |
|-----------------------------------|---------------------------|
| LOCATION                          | QUETTA                    |
| CATCHMENT AREA                    | 57.2 km <sup>2</sup>      |
| DAM EMBANKMENT                    | ZONE TYPE                 |
| DAM TYPE                          | EARTH DAM                 |
| CREST LENGTH                      | 260.0 m                   |
| DAM HEIGHT                        | 34.0 m                    |
| DAM CREST WIDTH                   | 6.0 m                     |
| EMBANKMENT VOLUME                 | 600,000 m <sup>3</sup>    |
| CREST ELEVATION                   | 132.0 m                   |
| FULL WATER LEVEL                  | 128.0 m                   |
| LOW WATER LEVEL                   | 120.8 m                   |
| TOTAL STORAGE CAPACITY            | 2,387,000 m <sup>3</sup>  |
| EFFECTIVE STORAGE                 | 1,200,000 m <sup>3</sup>  |
| DEAD STORAGE CAPACITY             | 1,187,000 m <sup>3</sup>  |
| DRAIN TYPE                        | VERTICAL DRAIN            |
| <b>SPILLWAY</b>                   |                           |
| DESIGN FLOOD DISCHARGE            | 333.0 m <sup>3</sup> /sec |
| TYPE OF SPILLWAY                  | CHUTE TYPE                |
| CREST WIDTH                       | 40.0 m                    |
| SPILLWAY LENGTH                   | 125.0 m                   |
| <b>INTAKE WORKS</b>               |                           |
| TYPE OF INTAKE                    | INCLINED TYPE             |
| LENGTH OF CONDUIT                 | 300.0 m                   |

NOTE: ELEVATION IN DRAWING USES TEMPORARY ELEVATION.  
EL. 100 M IS EQUIVALENT TO EL. 1765 CM

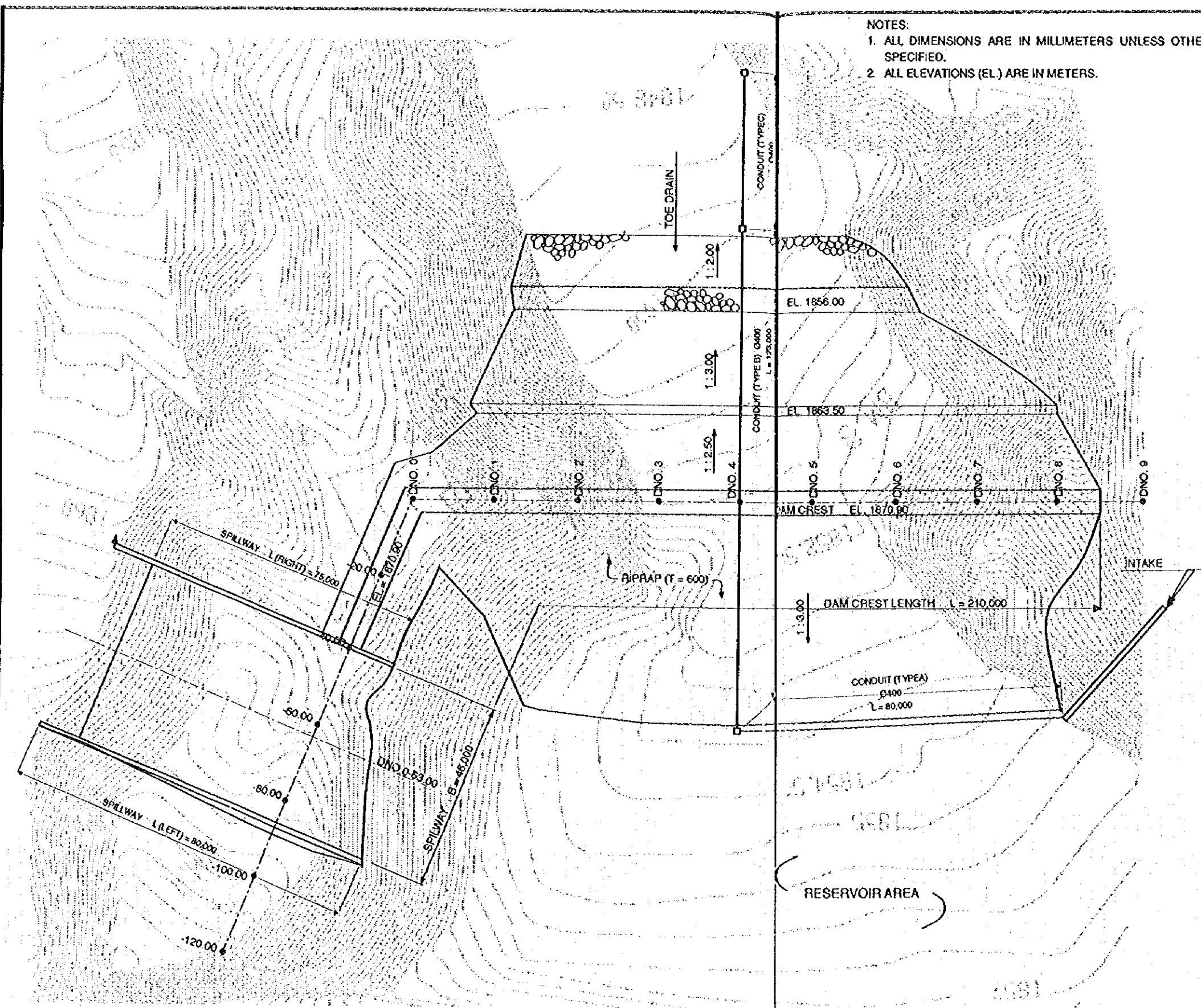


**LONGITUDINAL SECTION**  
SCALE 1:1,000

NOTES:  
 1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.  
 2. ALL ELEVATIONS (EL.) ARE IN METERS.

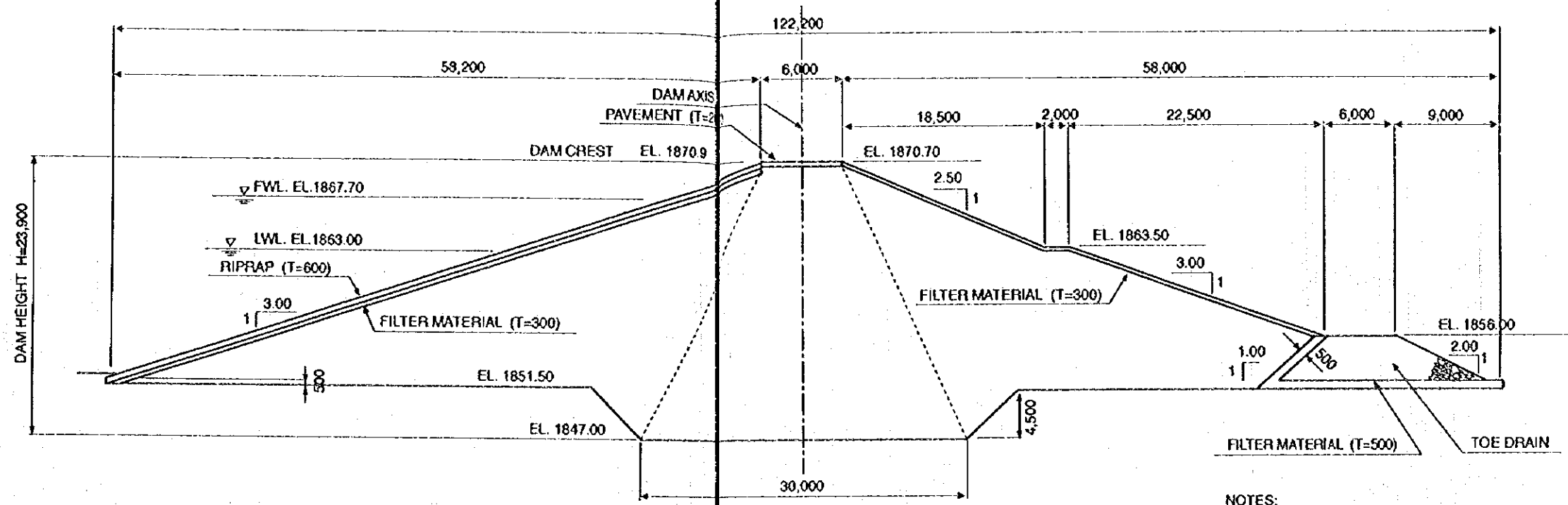


LOCATION OF DAM SITE



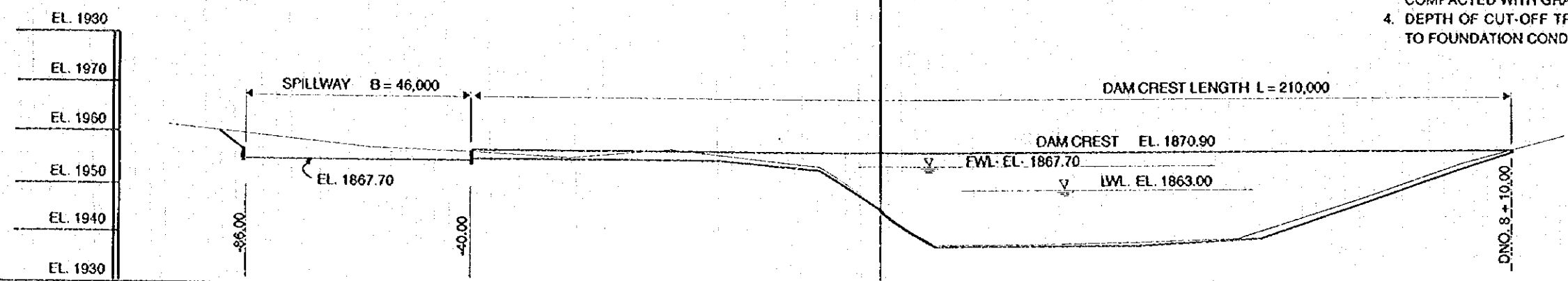
| GENERAL FEATURE OF DAM STRUCTURES |                             |
|-----------------------------------|-----------------------------|
| LOCATION                          | PISHIN                      |
| CATCHMENT AREA                    | 20.8 Km <sup>2</sup>        |
| DAM EMBANKMENT                    | HOMOGENEOUS EARTH DAM       |
| DAM TYPE                          |                             |
| CREST LENGTH                      | 210.0 m                     |
| DAM HEIGHT                        | 23.9 m                      |
| DAM CREST WIDTH                   | 6.0 m                       |
| EMBANKMENT VOLUME                 | 114,000 m <sup>3</sup>      |
| CREST ELEVATION                   | 1870.9 m                    |
| FULL WATER LEVEL                  | 1867.7 m                    |
| LOW WATER LEVEL                   | 1863.0 m                    |
| TOTAL STORAGE CAPACITY            | 508,000 m <sup>3</sup>      |
| EFFECTIVE STORAGE                 | 290,000 m <sup>3</sup>      |
| DEAD STORAGE CAPACITY             | 218,000 m <sup>3</sup>      |
| DRAIN TYPE                        | TOE DRAIN                   |
| <b>SPILLWAY</b>                   |                             |
| DESIGN FLOOD DISCHARGE            | 142 m <sup>3</sup> /sec     |
| TYPE OF SPILLWAY                  | CHUTE TYPE                  |
| CREST WIDTH                       | 46 m                        |
| SPILLWAY LENGTH                   | 80 (LEFT) m<br>75 (RIGHT) m |
| <b>INTAKE WORKS</b>               |                             |
| TYPE OF INTAKE                    | INCLINED TYPE               |
| LENGTH OF CONDUIT                 | 239.0 m                     |

PLAN OF JIGDA DELAY ACTION DAM  
 SCALE 1:1000



**STANDARD SECTION**  
SCALE 1:500

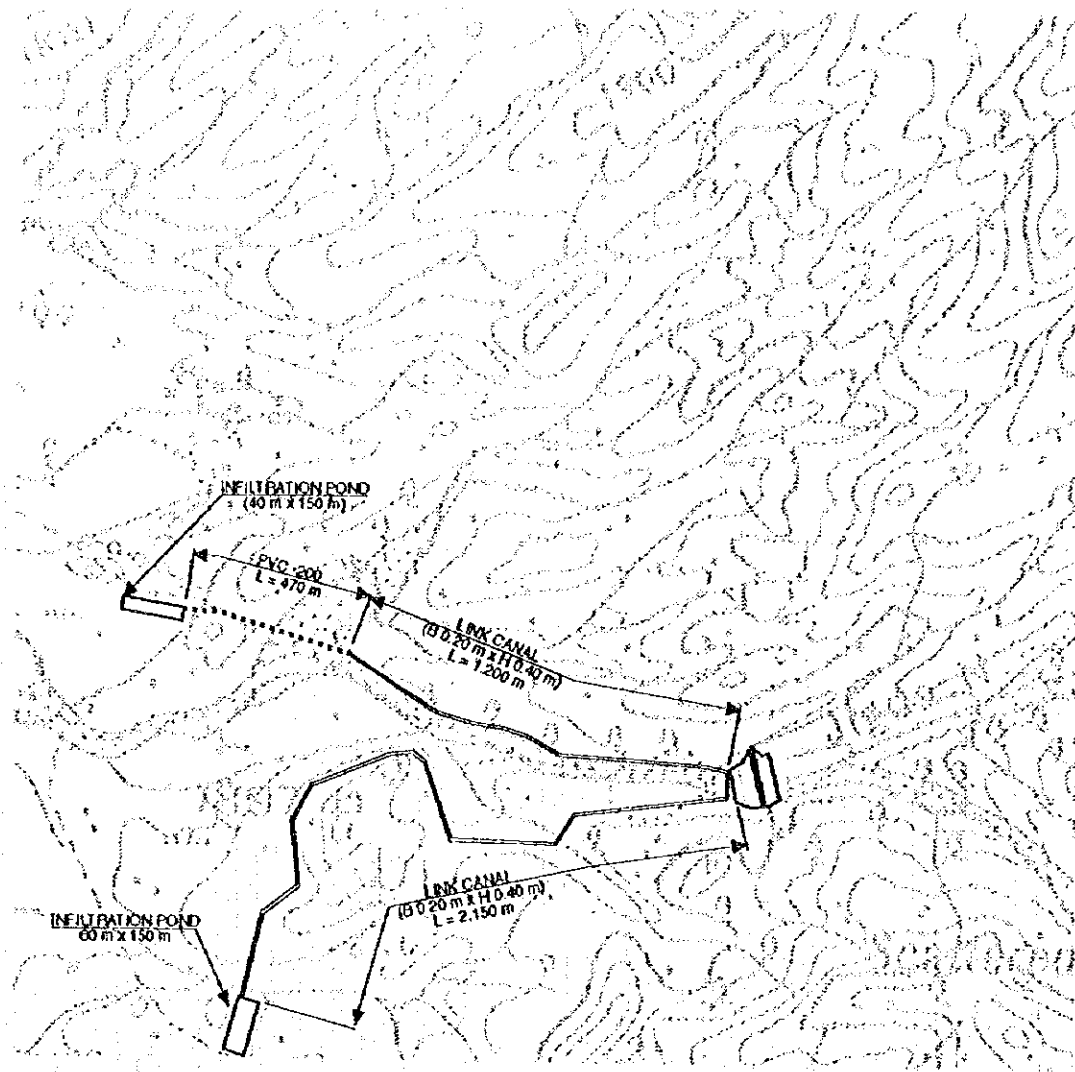
- NOTES:
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  2. ALL ELEVATIONS (EL.) ARE IN METERS.
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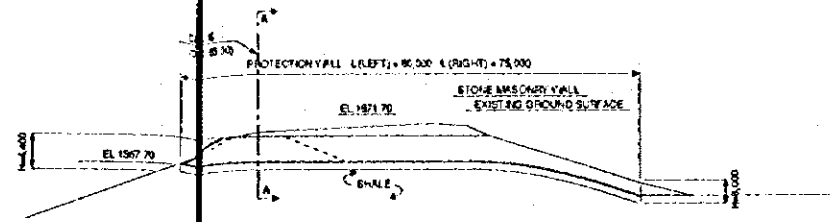
|                  |         |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
|------------------|---------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| GROUND ELEVATION | 1875.2  | 1873.2 | 1870.8 | 1870.4 | 1869.3 | 1870.6 | 1868.1 | 1864.8 | 1862.2 | 1862.1 | 1862.2 | 1863.4 | 1864.5 | 1861.2 | 1860.2 | 1873.5 |
| DISTANCE         | -100.00 | -80.00 | -60.00 | -40.00 | -20.00 | 0.00   | 20.00  | 40.00  | 60.00  | 80.00  | 100.00 | 120.00 | 140.00 | 160.00 | 180.00 |        |
| STATION          | -100.00 | -80.00 | -60.00 | -40.00 | -20.00 | DNO. 0 | DNO. 1 | DNO. 2 | DNO. 3 | DNO. 4 | DNO. 5 | DNO. 6 | DNO. 7 | DNO. 8 | DNO. 9 |        |

**LONGITUDINAL SECTION**  
SCALE 1:1,000

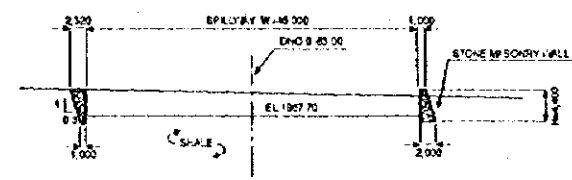
IRRIGATION AND POWER DEPARTMENT  
GOVERNMENT OF BALUCHISTAN  
IRRIGATION WATER RESOURCES  
DEVELOPMENT PROJECT  
**STANDARD / LONGITUDINAL  
SECTION OF DAM**  
JAPAN INTERNATIONAL COOPERATION AGENCY



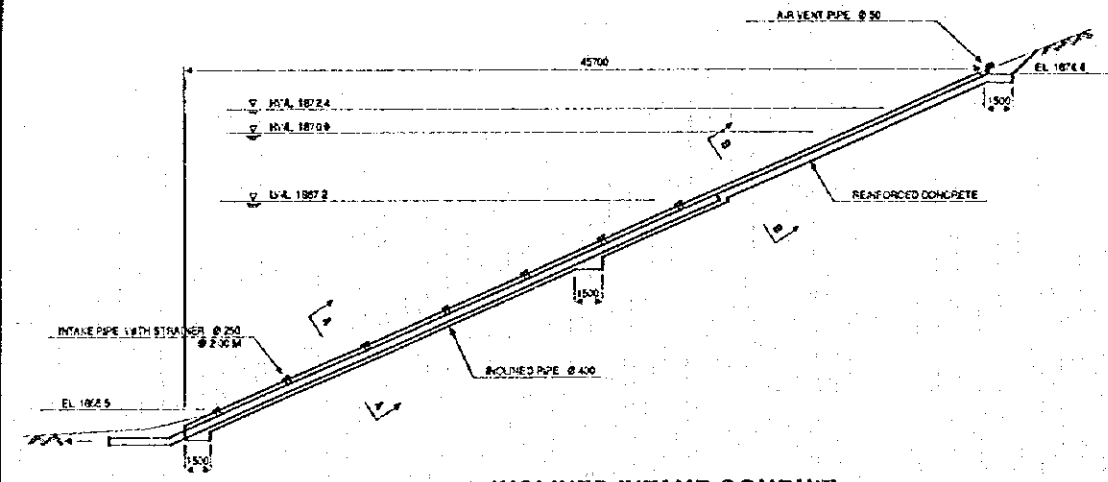
**PLAN OF INFILTRATION POND**  
(SCALE 1 : 20,000)



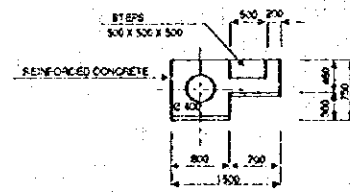
**LONGITUDINAL SECTION OF SPILLWAY**  
SCALE 1:1,000



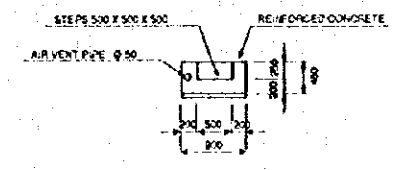
**SECTION A-A**  
SCALE 1:1,000



**INCLINED INTAKE CONDUIT**  
SCALE 1 : 400

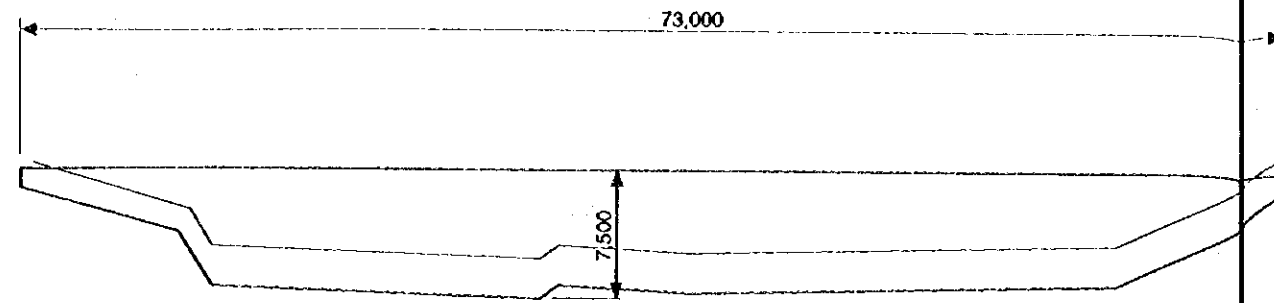


**A-A SECTION**  
SCALE 1 : 100

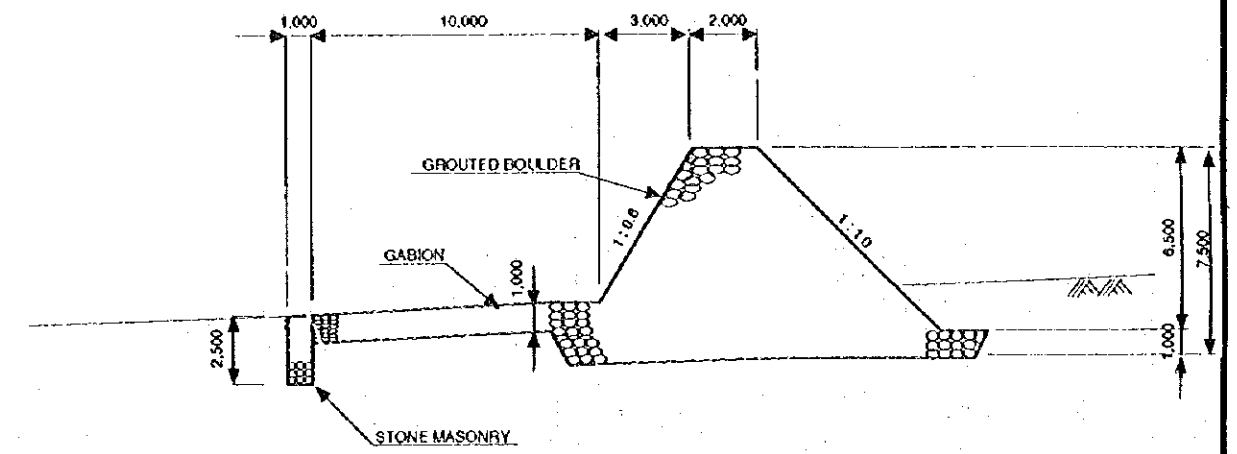


**B-B SECTION**  
SCALE 1 : 100

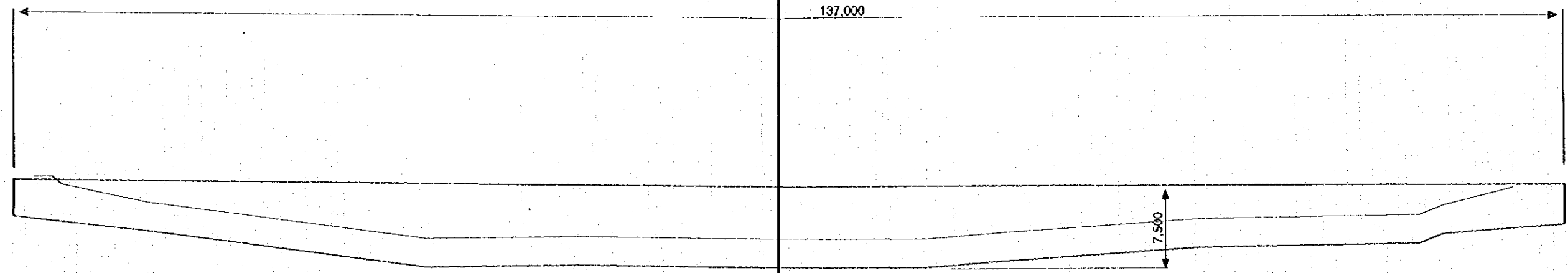
- NOTES:  
 1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.  
 2. ALL ELEVATIONS (EL.) ARE IN METERS.



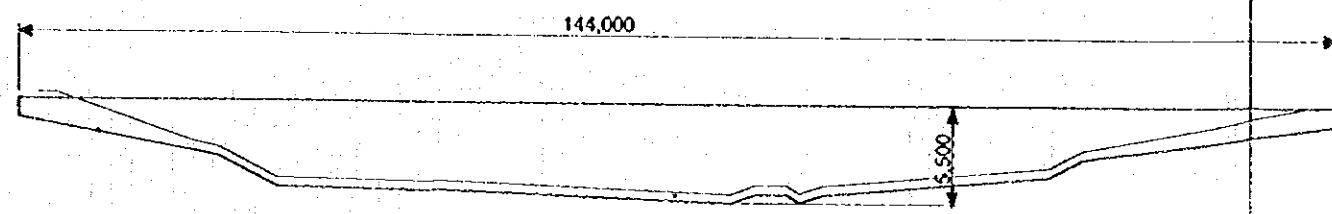
**JIGDA I (DETENTION BUND)**  
SCALE 1:400



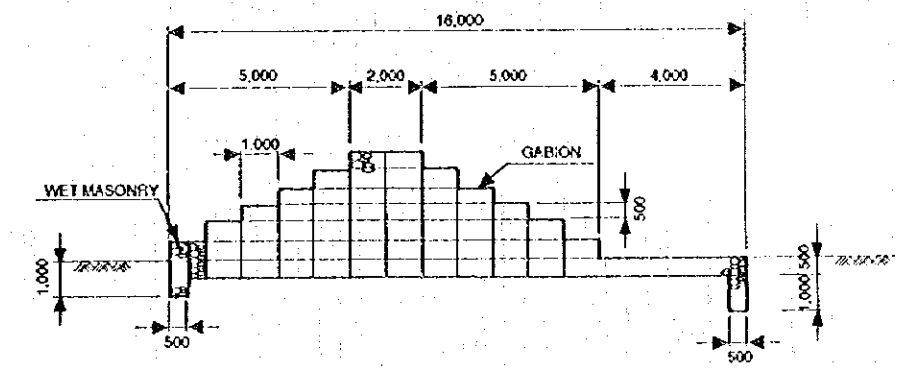
**TYPICAL CROSS SECTION OF JIGDA I, II DETENTION BUND**  
SCALE 1:250



**JIGDA II (DETENTION BUND)**  
SCALE 1:400



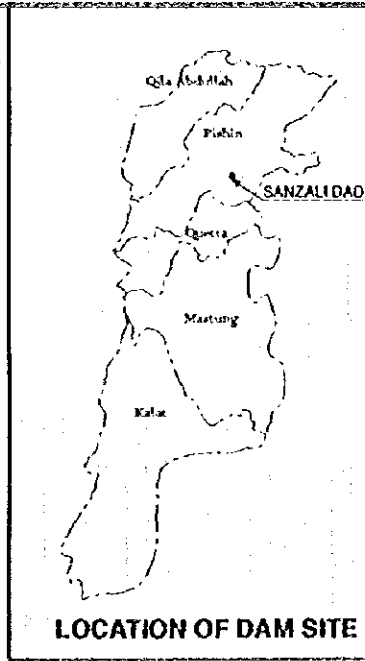
**JIGDA III (DETENTION BUND)**  
SCALE 1:800



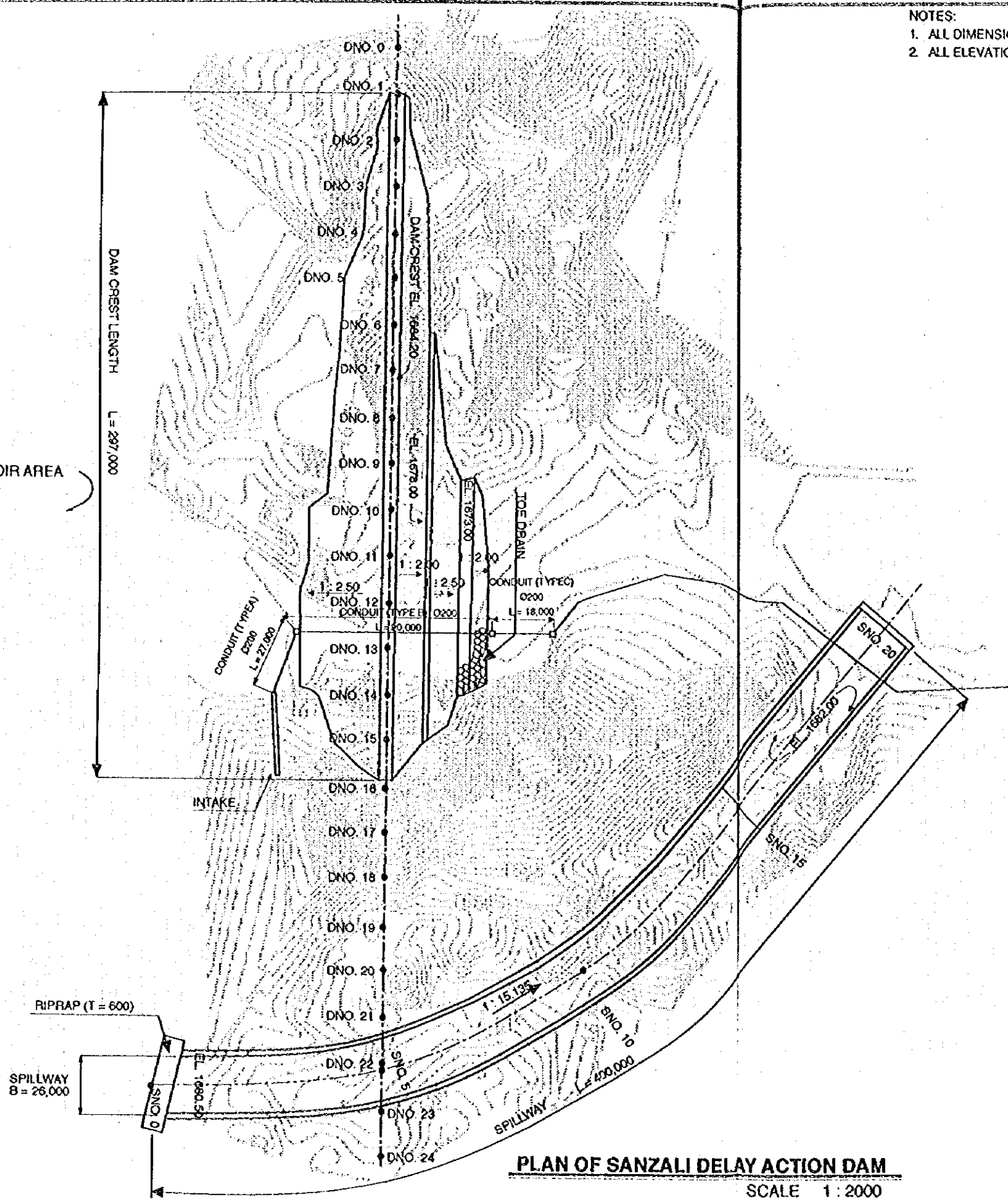
**TYPICAL CROSS SECTION OF JIGDA III DETENTION BUND**  
SCALE 1:250

- NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
  2. ALL ELEVATIONS (EL.) ARE IN METERS.

- NOTES:  
 1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.  
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RESERVOIR AREA



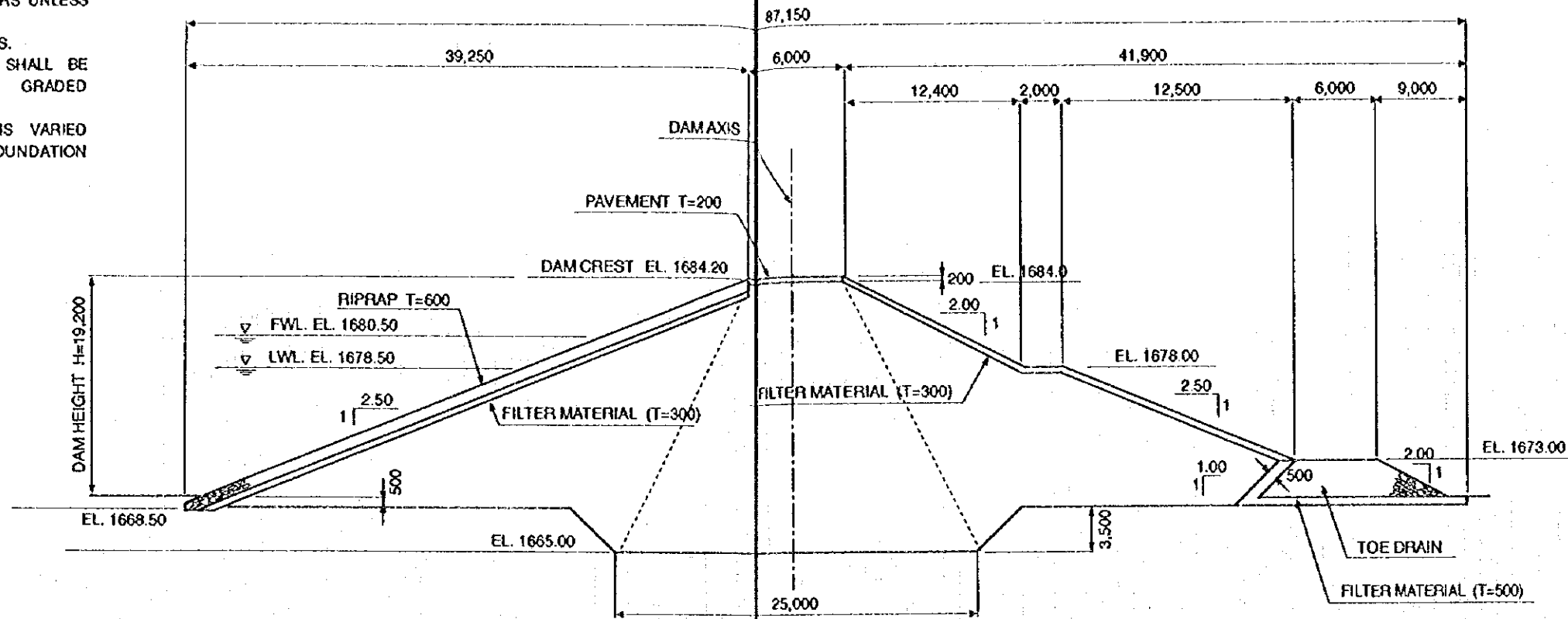
| GENERAL FEATURE OF DAM STRUCTURES |                        |
|-----------------------------------|------------------------|
| LOCATION                          | PIHSIN                 |
| CATCHMENT AREA                    | 10.4 Km <sup>2</sup>   |
| DAM EMBANKMENT                    | HOMOGENEOUS EARTH DAM  |
| DAM TYPE                          |                        |
| CREST LENGTH                      | 297.0 m                |
| DAM HEIGHT                        | 19.2 m                 |
| DAM CREST WIDTH                   | 6.0 m                  |
| EMBANKMENT VOLUME                 | 106,000 m <sup>3</sup> |
| CREST ELEVATION                   | 1684.2 m               |
| FULL WATER LEVEL                  | 1680.5 m               |
| LOW WATER LEVEL                   | 1678.5 m               |
| TOTAL STORAGE CAPACITY            | 394,000 m <sup>3</sup> |
| EFFECTIVE STORAGE                 | 160,000 m <sup>3</sup> |
| DEAD STORAGE CAPACITY             | 234,000 m <sup>3</sup> |
| DRAIN TYPE                        | TOE DRAIN              |
| SPILLWAY                          |                        |
| DESIGN FLOOD DISCHARGE            | 80 m <sup>3</sup> /sec |
| TYPE OF SPILLWAY                  | CHUTE TYPE             |
| CREST WIDTH                       | 26 m                   |
| SPILLWAY LENGTH                   | 400 m                  |
| INTAKE WORKS                      |                        |
| TYPE OF INTAKE                    | INCLINED TYPE          |
| LENGTH OF CONDUIT                 | 139.0 m                |

PLAN OF SANZALI DELAY ACTION DAM  
 SCALE 1:2000



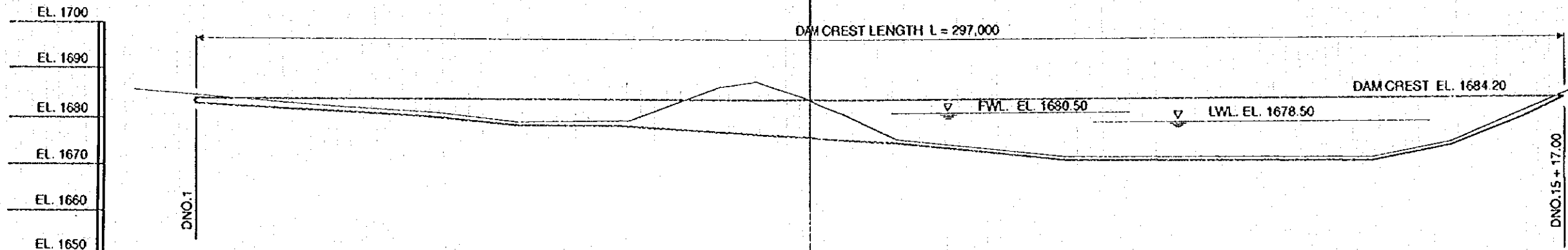
**NOTES:**

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
2. ALL ELEVATIONS (EL.) ARE IN METERS.
3. CORE ZONE OF EMBANKMENT SHALL BE UNIFORMLY COMPACTED WITH GRADED MATERIALS TO AVOID PIPING.
4. DEPTH OF CUT-OFF TRENCH IS VARIED CORRESPONDING TO FOUNDATION CONDITION.



**STANDARD SECTION**

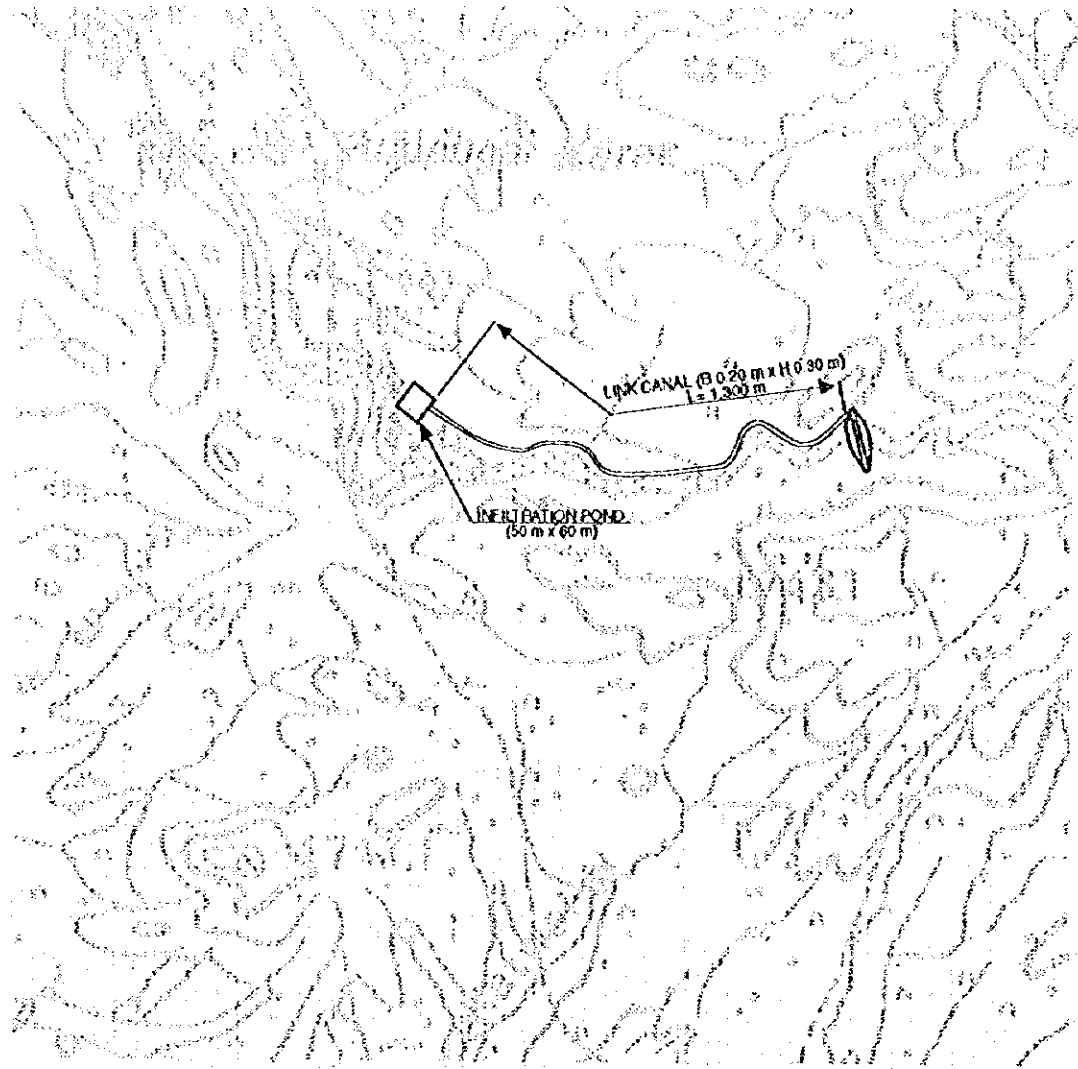
SCALE 1:400



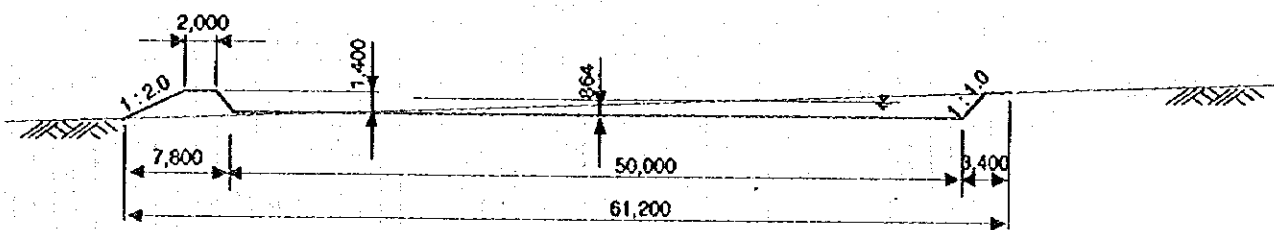
| GROUND ELEVATION | 1884.70 | 1882.10 | 1879.00 | 1880.97 | 1878.90 | 1879.35 | 1885.95 | 1887.30 | 1883.90 | 1874.00 | 1872.90 | 1870.85 | 1870.30 | 1870.45 | 1870.45 | 1874.90 | 1880.60 | 1887.50 |
|------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| DISTANCE         | 20.00   | 40.00   | 60.00   | 80.00   | 100.00  | 120.00  | 14,000  | 150.00  | 180.00  | 200.00  | 220.00  | 240.00  | 260.00  | 280.00  | 300.00  | 320.00  |         |         |
| STATION          | DNO.1   | DNO.2   | DNO.3   | DNO.4   | DNO.5   | DNO.6   | DNO.7   | DNO.8   | DNO.9   | DNO.10  | DNO.11  | DNO.12  | DNO.13  | DNO.14  | DNO.15  | DNO.16  |         |         |

**LONGITUDINAL SECTION**

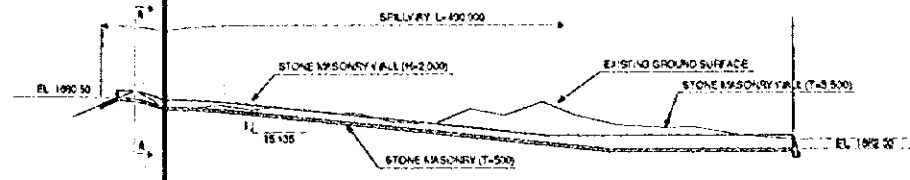
SCALE 1:1,000



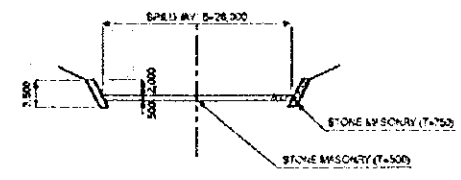
**PLAN OF INFILTRATION POND**  
SCALE 1 : 20,000



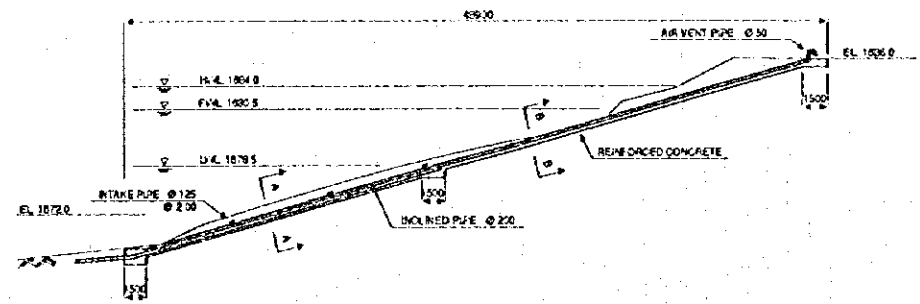
**INFILTRATION POND**  
SCALE 1 : 500



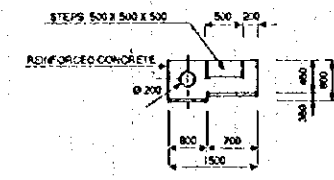
**LONGITUDINAL SECTION OF SPILLWAY**  
SCALE 1 : 4,000



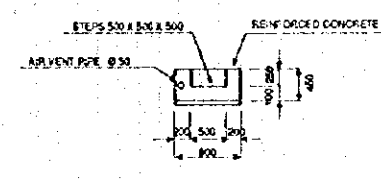
**SECTION A - A**  
SCALE 1 : 1,000



**INCLINED INTAKE CONDUIT**  
SCALE 1 : 500

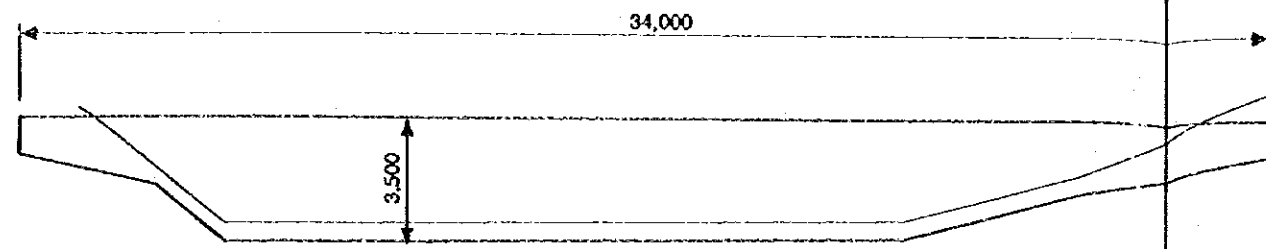


**A - A SECTION**  
SCALE 1 : 100

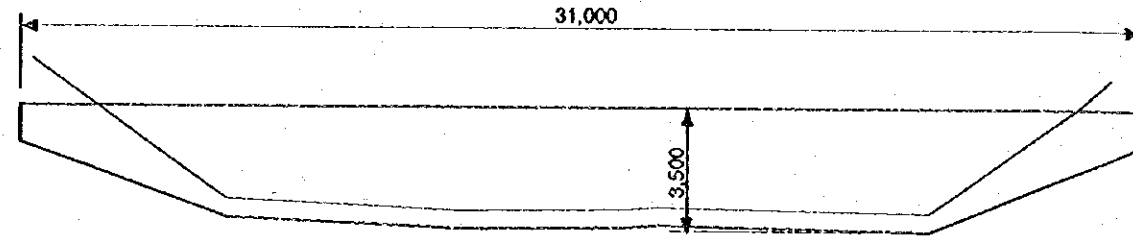


**B - B SECTION**  
SCALE 1 : 100

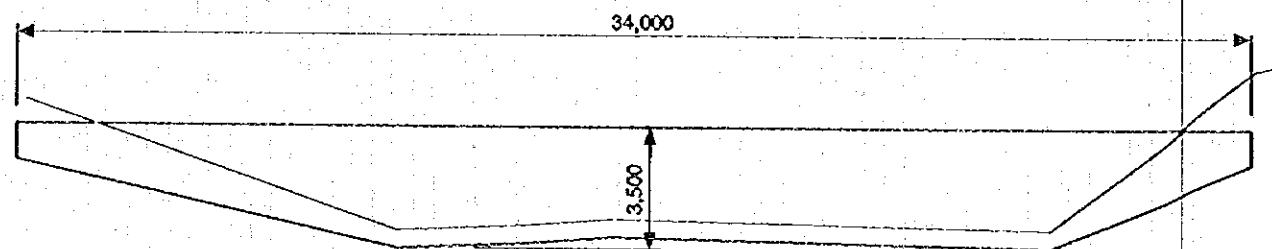
- NOTES:  
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.  
2. ALL ELEVATIONS (EL.) ARE IN METERS.



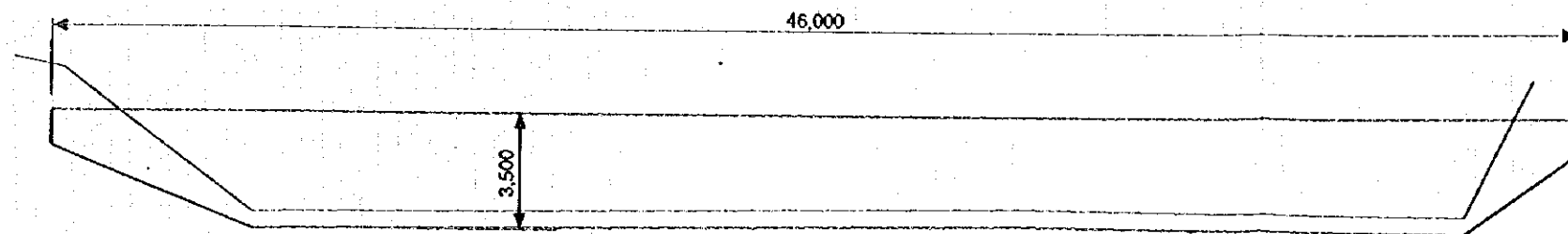
**LONGITUDINAL SECTION OF DETENTION BUND 1**  
SCALE 1 : 200



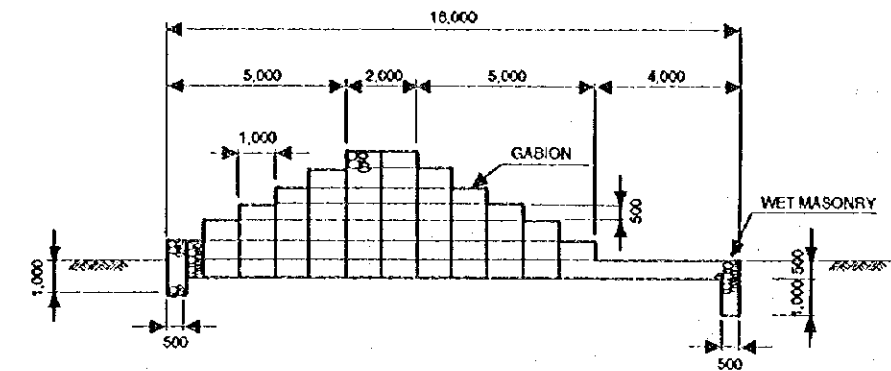
**LONGITUDINAL SECTION OF DETENTION BUND 2**  
SCALE 1 : 200



**LONGITUDINAL SECTION OF DETENTION BUND 3**  
SCALE 1 : 200

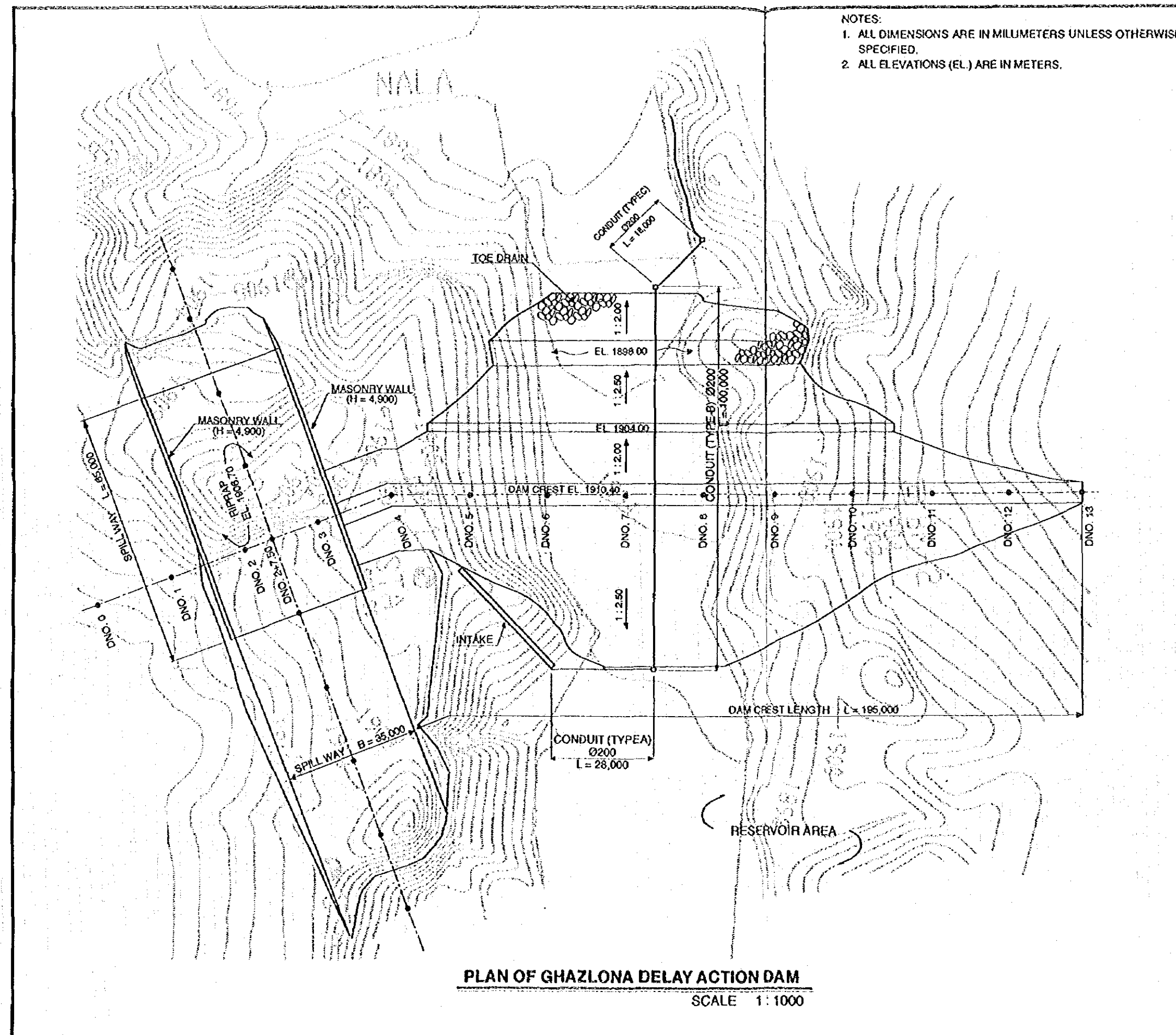


**LONGITUDINAL SECTION OF DETENTION BUND 4**  
SCALE 1 : 200

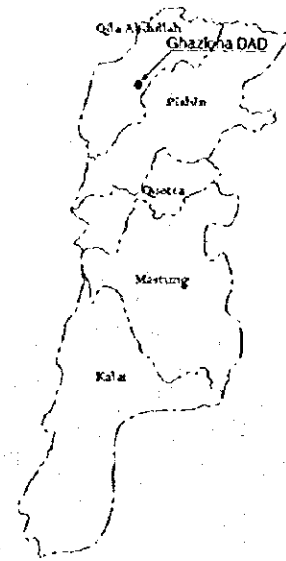


**TYPICAL CROSS SECTION OF SANZALI DETENTION BUND**  
SCALE 1 : 200

- NOTES:  
 1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.  
 2. ALL ELEVATIONS (EL.) ARE IN METERS.



NOTES:  
 1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.  
 2. ALL ELEVATIONS (EL.) ARE IN METERS.



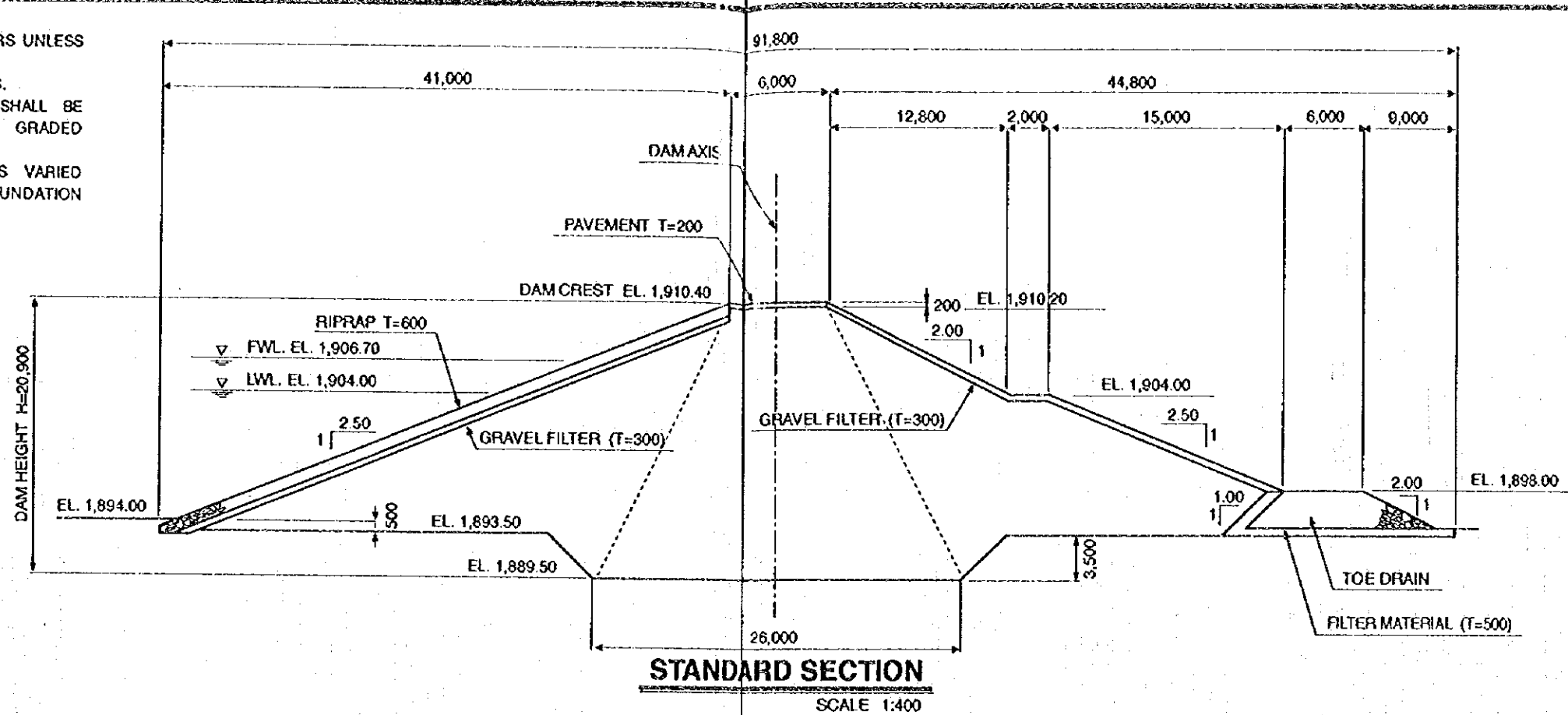
LOCATION OF THE DAM SITE

| GENERAL FEATURE OF DAM STRUCTURES |                         |
|-----------------------------------|-------------------------|
| LOCATION                          | QUILA ABU DULA          |
| CATCHMENT AREA                    | 9.1 Km <sup>2</sup>     |
| DAM EMBANKMENT                    | HOMOGENEOUS EARTH DAM   |
| DAM TYPE                          | HOMOGENEOUS EARTH DAM   |
| CREST LENGTH                      | 195.0 m                 |
| DAM HEIGHT                        | 20.9 m                  |
| DAM CREST WIDTH                   | 6.0 m                   |
| EMBANKMENT VOLUME                 | 7,6000 m <sup>3</sup>   |
| CREST ELEVATION                   | 1,910.4 m               |
| FULL WATER LEVEL                  | 1,906.7 m               |
| LOW WATER LEVEL                   | 1,904.0 m               |
| TOTAL STORAGE CAPACITY            | 331,000 m <sup>3</sup>  |
| EFFECTIVE STORAGE                 | 140,000 m <sup>3</sup>  |
| DEAD STORAGE CAPACITY             | 191,000 m <sup>3</sup>  |
| DRAIN TYPE                        | TOE DRAIN               |
| SPILLWAY                          |                         |
| DESIGN FLOOD DISCHARGE            | 109 m <sup>3</sup> /sec |
| TYPE OF SPILLWAY                  | CHUTE TYPE              |
| CREST WIDTH                       | 35 m                    |
| SPILLWAY LENGTH                   | 65 m                    |
| INTAKE WORKS                      |                         |
| TYPE OF INTAKE                    | INCLINED TYPE           |
| LENGTH OF CONDUIT                 | 146.0 m                 |

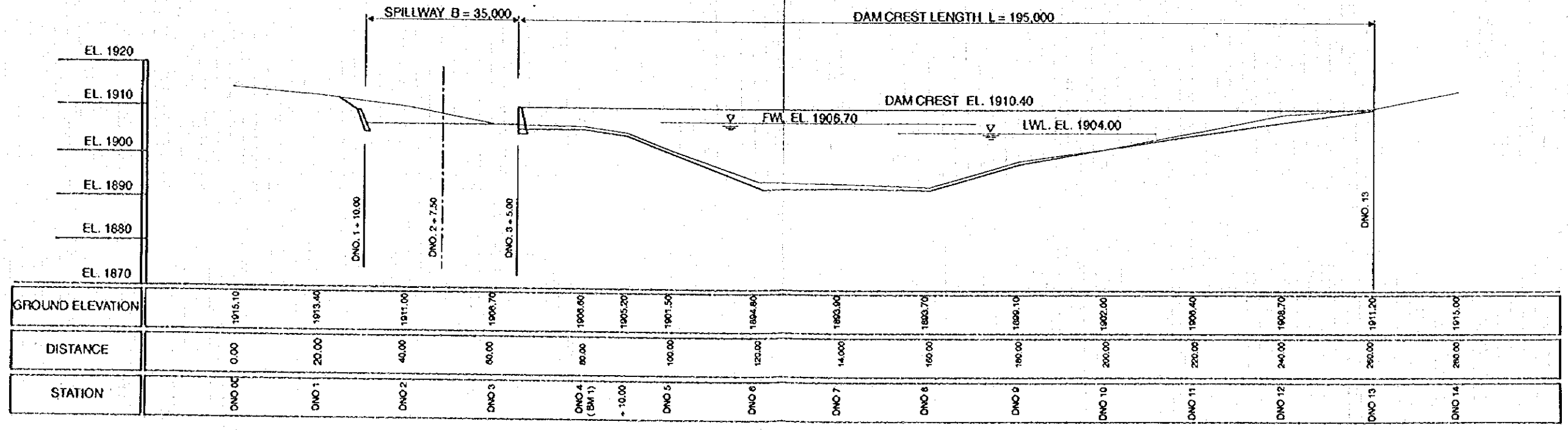
PLAN OF GHAZLONA DELAY ACTION DAM  
 SCALE 1:1000

**NOTES:**

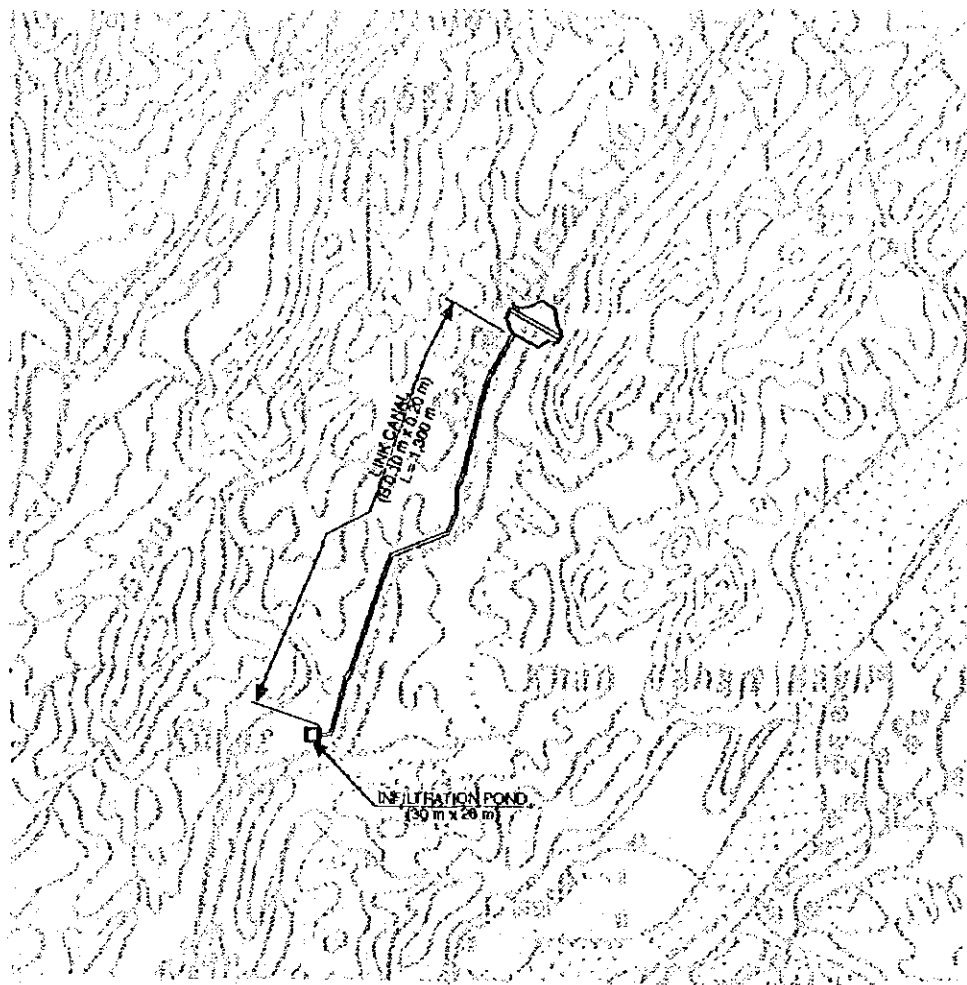
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
2. ALL ELEVATIONS (EL.) ARE IN METERS.
3. CORE ZONE OF EMBANKMENT SHALL BE UNIFORMLY COMPACTED WITH GRADED MATERIALS TO AVOID PIPING.
4. DEPTH OF CUT-OFF TRENCH IS VARIED CORRESPONDING TO FOUNDATION CONDITION.



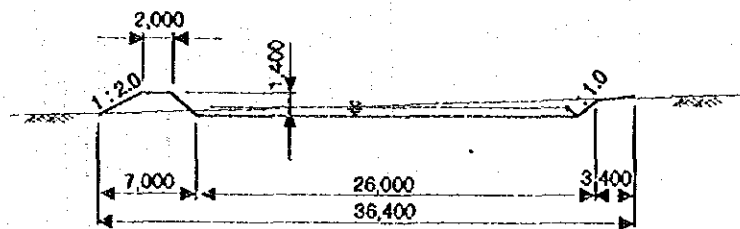
**STANDARD SECTION**  
SCALE 1:400



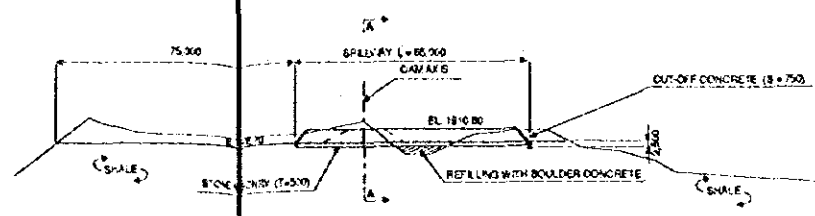
**LONGITUDINAL SECTION**  
SCALE 1:1000



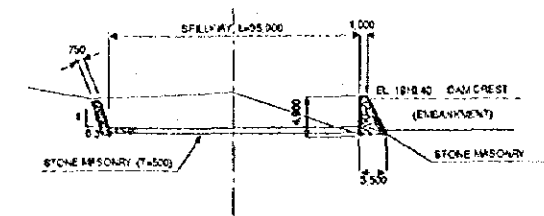
**PLAN OF INFILTRATION POND**  
(SCALE 1 : 20,000)



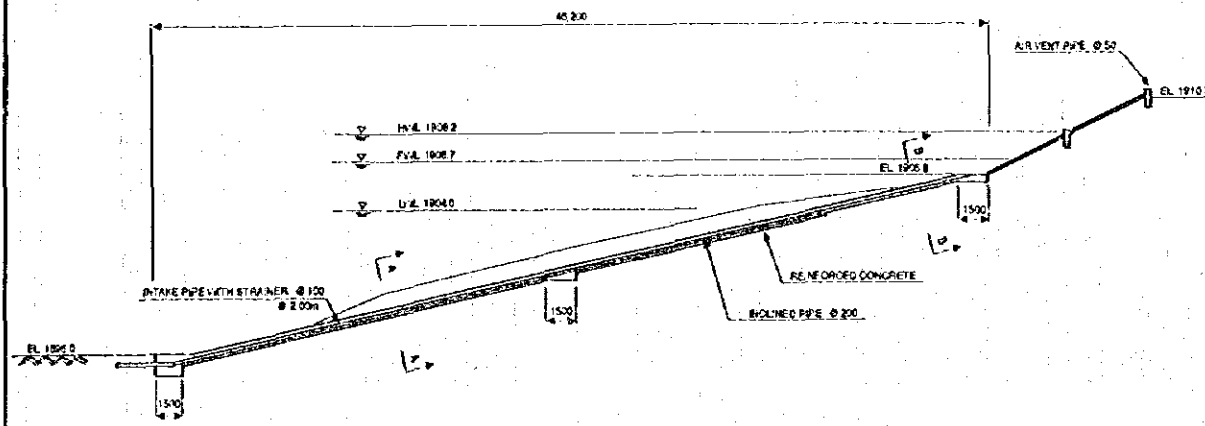
**INFILTRATION POND**  
SCALE 1:500



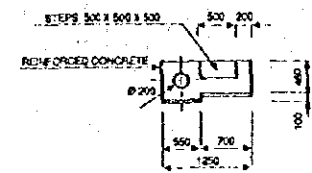
**LONGITUDINAL SECTION OF SPILLWAY**  
SCALE 1:2,000



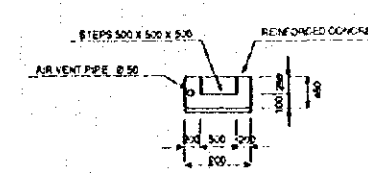
**SECTION A-A**  
SCALE 1:1,000



**INCLINED INTAKE CONDUIT**  
SCALE 1 : 400



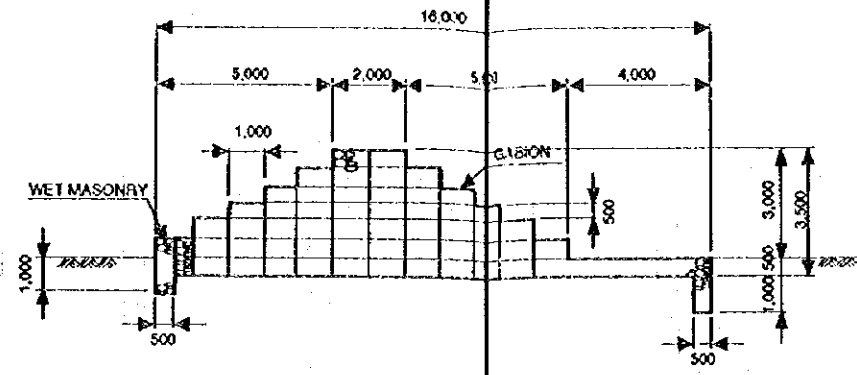
**A-A SECTION**  
SCALE 1 : 100



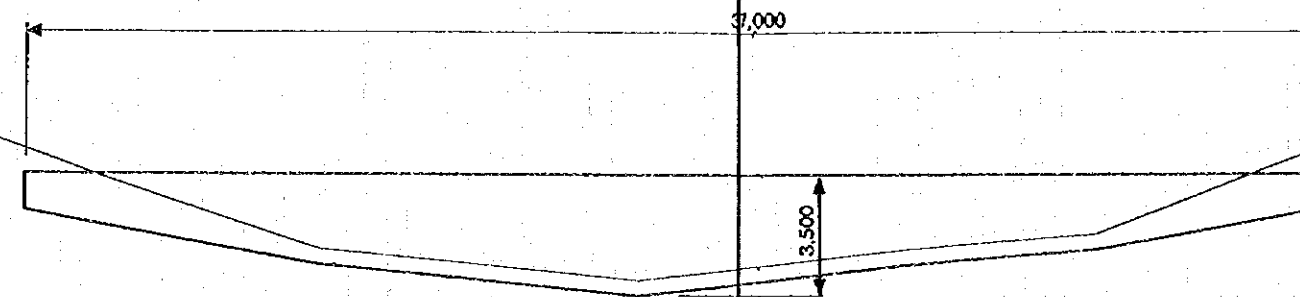
**B-B SECTION**  
SCALE 1 : 100

- NOTES:  
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.  
2. ALL ELEVATIONS (EL.) ARE IN METERS.

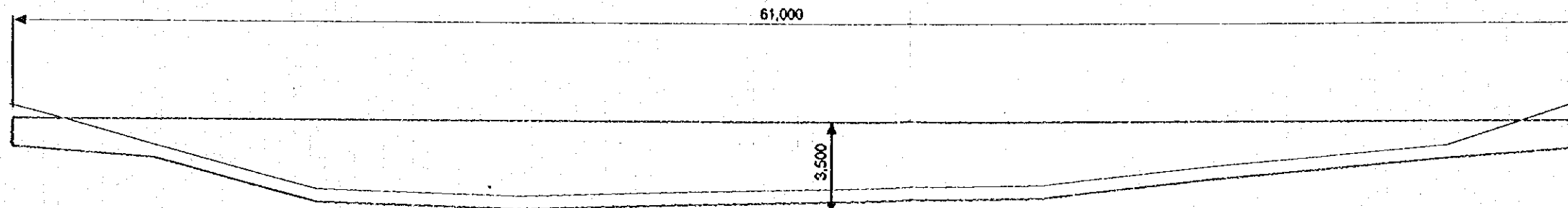
- NOTES:  
 1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.  
 2. ALL ELEVATIONS (EL.) ARE IN METERS.



**TYPICAL CROSS SECTION OF DETENTION BUND**  
 SCALE 1 : 200



**HAZLONA I (DETENTION BUND)**  
 SCALE 1 : 200

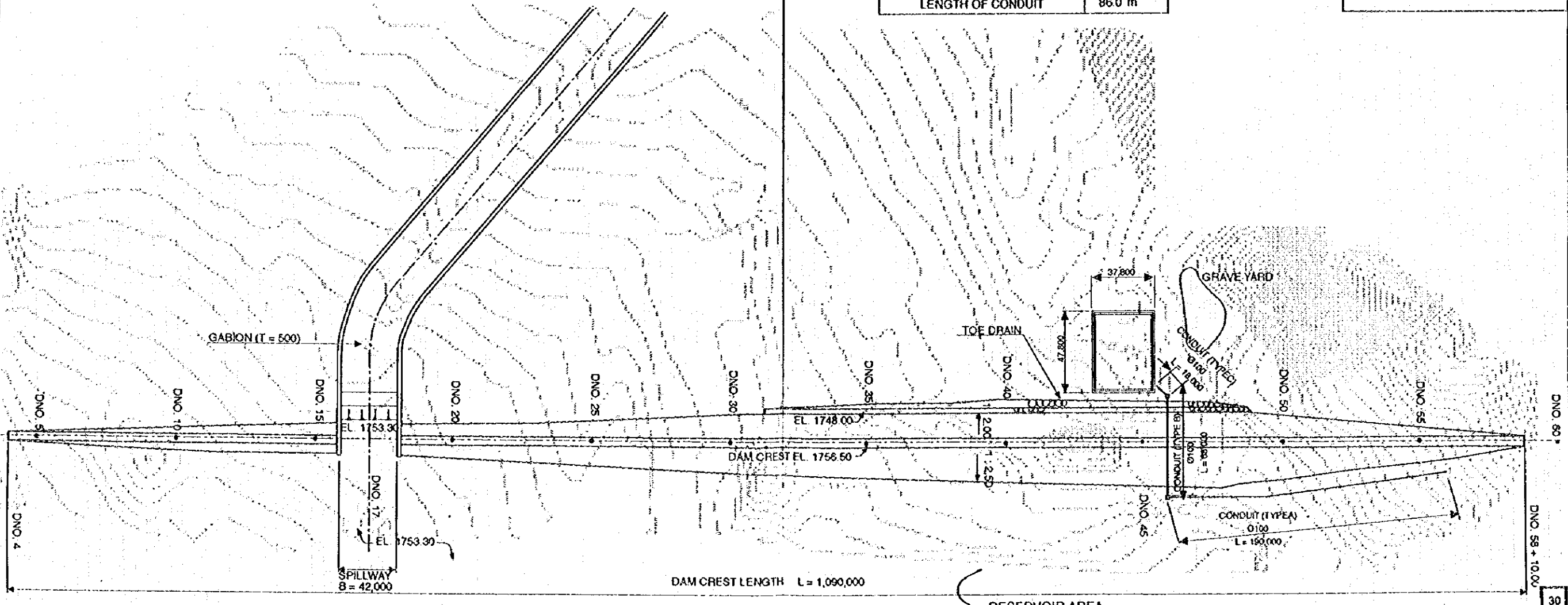
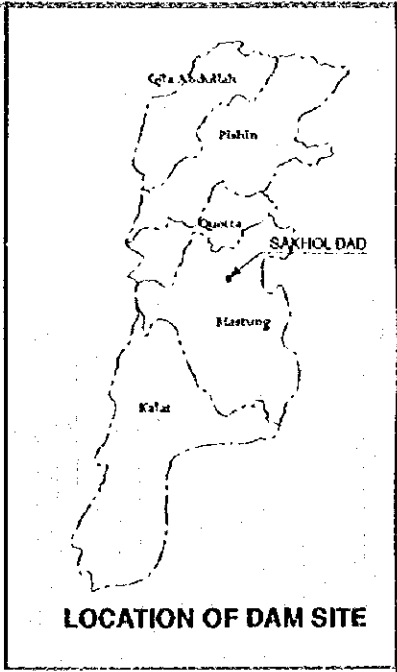


**HAZLONA II (DETENTION BUND)**  
 SCALE 1 : 200

**NOTES:**

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
2. ALL ELEVATIONS (EL.) ARE IN METERS.

| GENERAL FEATURE OF DAM STRUCTURES |                         |
|-----------------------------------|-------------------------|
| LOCATION                          | MASTUNG                 |
| CATCHMENT AREA                    | 22.3 Km <sup>2</sup>    |
| DAM EMBANKMENT                    | HOMOGENEOUS EARTH DAM   |
| DAM TYPE                          |                         |
| CREST LENGTH                      | 1,090.0 m               |
| DAM HEIGHT                        | 14.5 m                  |
| DAM CREST WIDTH                   | 6.0 m                   |
| EMBANKMENT VOLUME                 | 187,000 m <sup>3</sup>  |
| CREST ELEVATION                   | 1756.5 m                |
| FULL WATER LEVEL                  | 1753.3 m                |
| LOW WATER LEVEL                   | 1751.9 m                |
| TOTAL STORAGE CAPACITY            | 545,000 m <sup>3</sup>  |
| EFFECTIVE STORAGE                 | 210,000 m <sup>3</sup>  |
| DEAD STORAGE CAPACITY             | 335,000 m <sup>3</sup>  |
| DRAIN TYPE                        | TOE DRAIN               |
| <b>SPILLWAY</b>                   |                         |
| DESIGN FLOOD DISCHARGE            | 199 m <sup>3</sup> /sec |
| TYPE OF SPILLWAY                  | CHUTE TYPE              |
| CREST WIDTH                       | 42 m                    |
| SPILLWAY LENGTH                   | 47 m                    |
| <b>INTAKE WORKS</b>               |                         |
| TYPE OF INTAKE                    | INCLINED TYPE           |
| LENGTH OF CONDUIT                 | 86.0 m                  |



**PLAN OF SAKHOL DELAY ACTION DAM**  
SCALE 1 : 3000

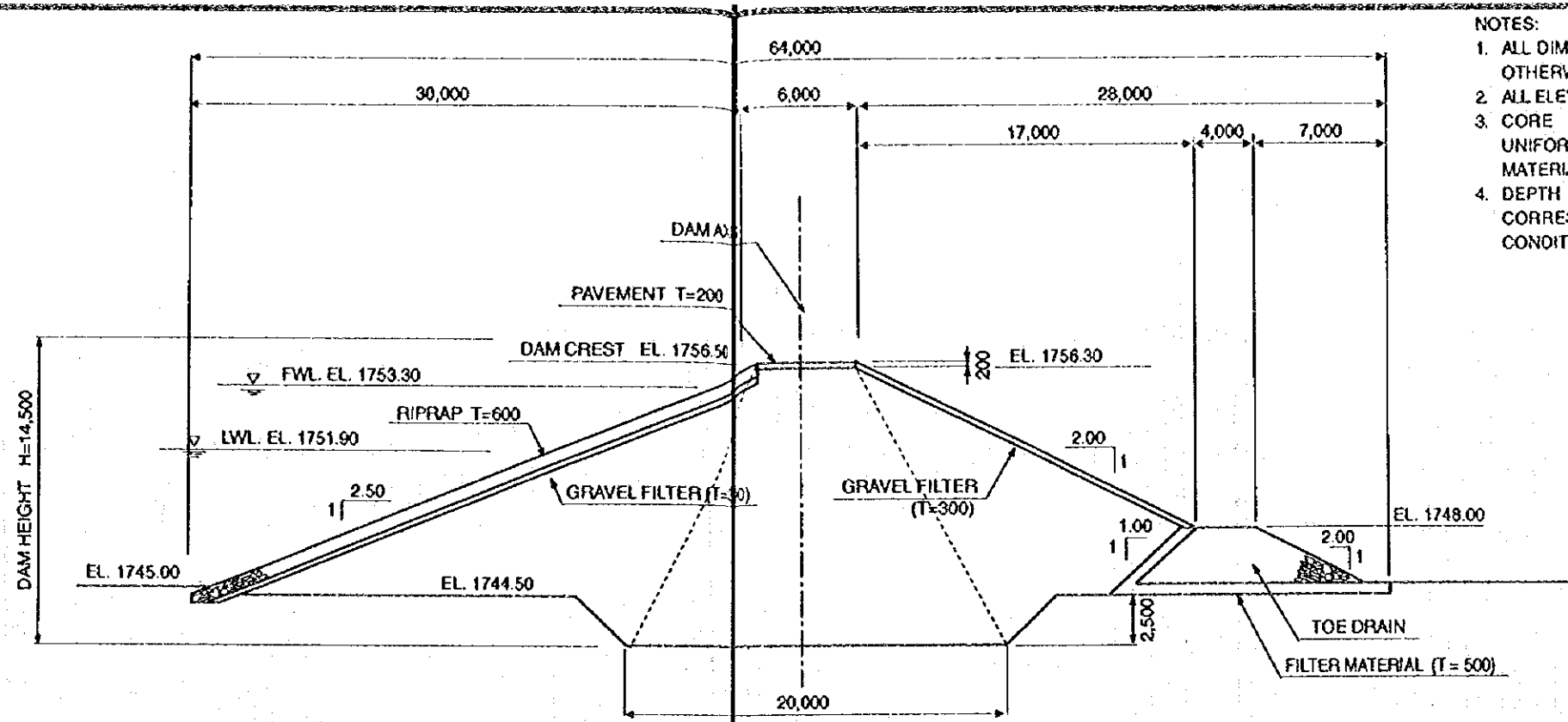
IRRIGATION AND POWER DEPARTMENT  
GOVERNMENT OF BALUCHISTAN

IRRIGATION WATER RESOURCES  
DEVELOPMENT PROJECT

**PLAN OF SAKHOL DAM**

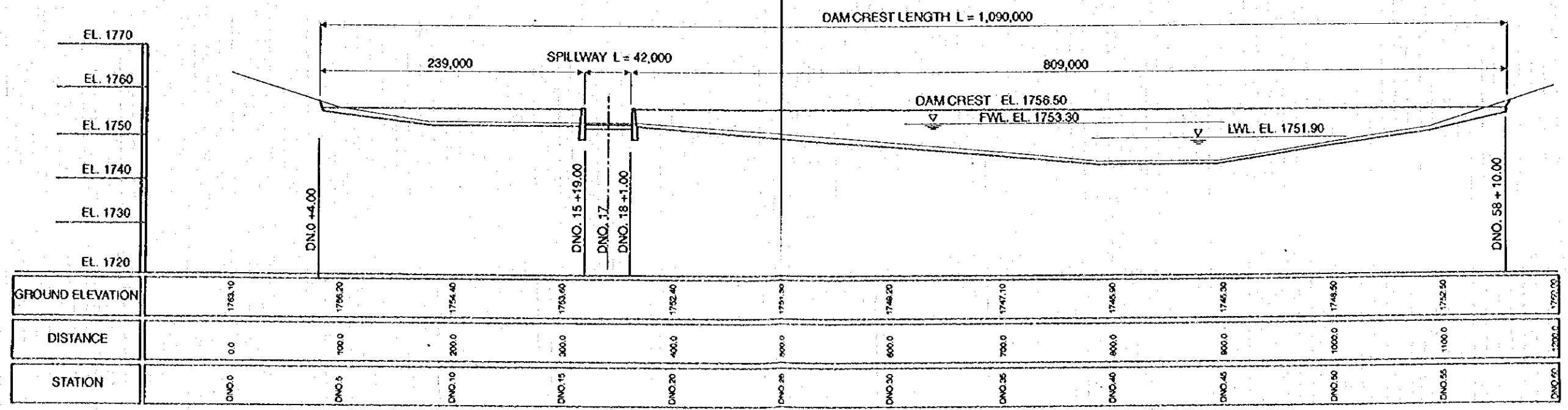
JAPAN INTERNATIONAL COOPERATION AGENCY





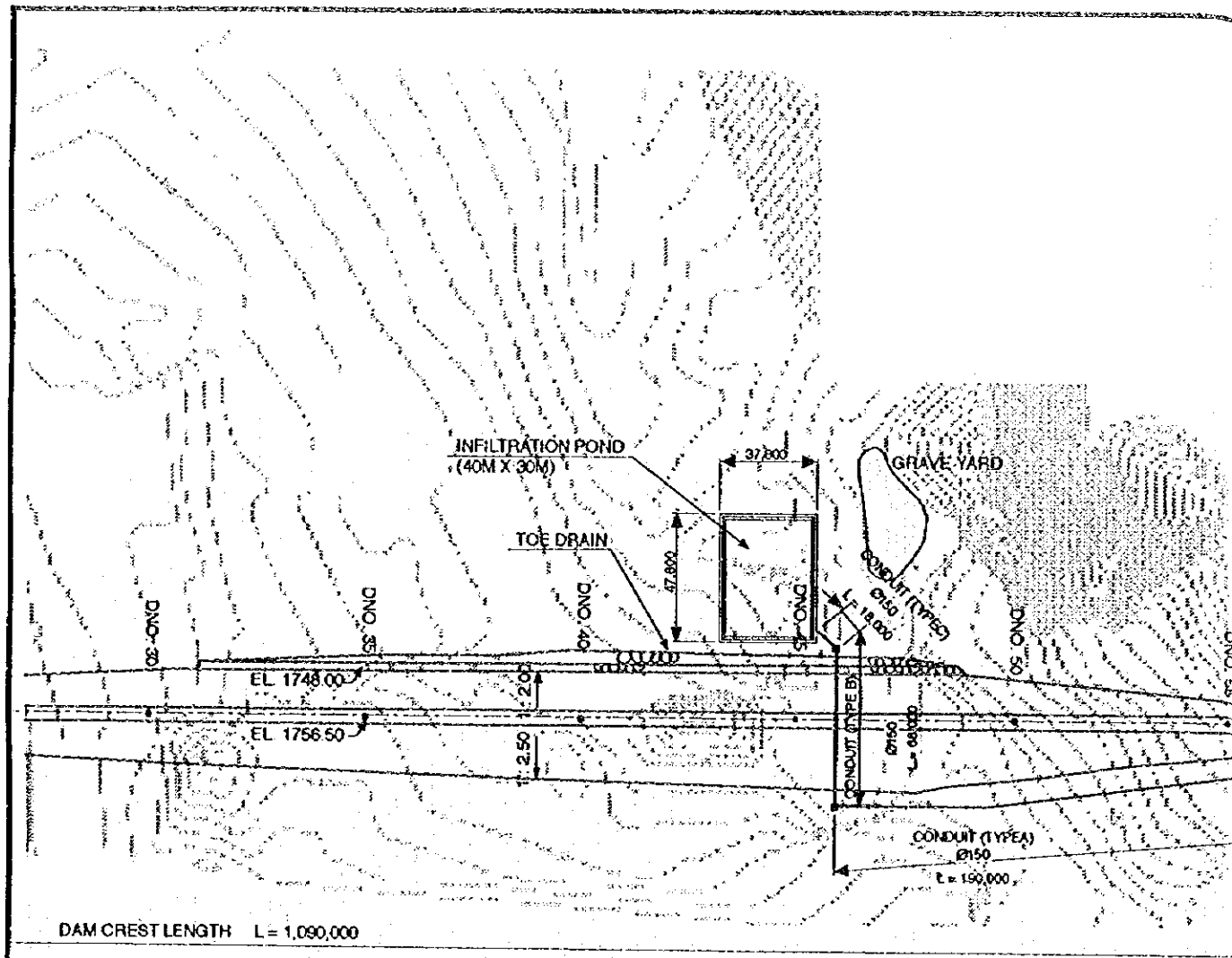
- NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
  2. ALL ELEVATIONS (EL.) ARE IN METERS.
  3. CORE ZONE OF EMBANKMENT SHALL BE UNIFORMLY COMPACTED WITH GRADED MATERIALS TO AVOID PIPING.
  4. DEPTH OF CUT-OFF TRENCH IS VARIED CORRESPONDING TO FOUNDATION CONDITION.

**STANDARD SECTION**  
SCALE 1:300

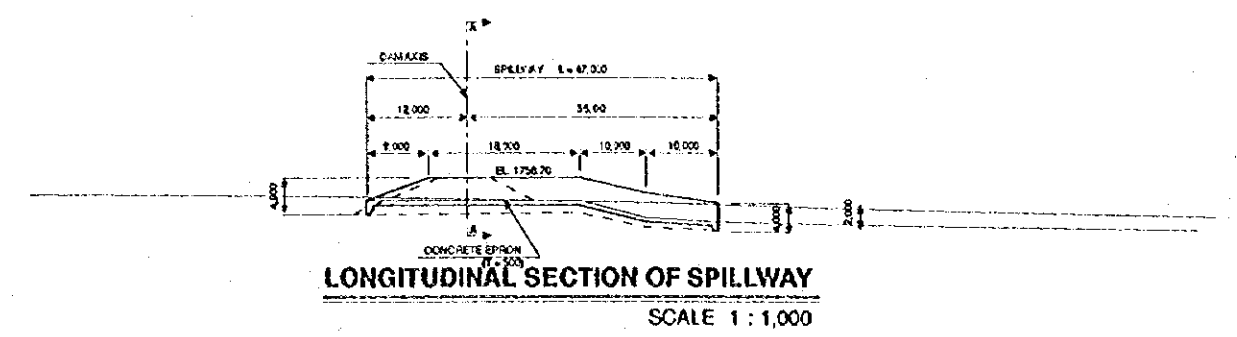


|                  |         |         |         |         |         |         |         |         |         |         |         |         |         |
|------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| GROUND ELEVATION | 1763.10 | 1756.20 | 1754.40 | 1753.60 | 1752.40 | 1751.30 | 1748.20 | 1747.10 | 1745.90 | 1745.30 | 1748.50 | 1752.50 | 1752.00 |
| DISTANCE         | 0.0     | 100.0   | 200.0   | 300.0   | 400.0   | 500.0   | 600.0   | 700.0   | 800.0   | 900.0   | 1000.0  | 1100.0  | 1200.0  |
| STATION          | DNO. 0  | DNO. 5  | DNO. 10 | DNO. 15 | DNO. 20 | DNO. 25 | DNO. 30 | DNO. 35 | DNO. 40 | DNO. 45 | DNO. 50 | DNO. 55 | DNO. 60 |

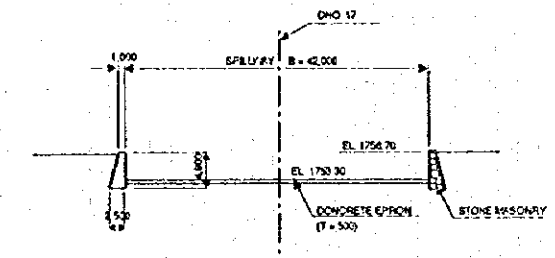
**LONGITUDINAL SECTION**  
SCALE H 1:4000 V 1:1000



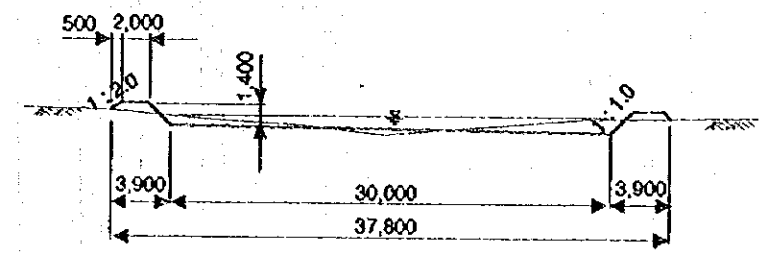
**PLAN OF INFILTRATION POND**  
SCALE 1 : 3,000



**LONGITUDINAL SECTION OF SPILLWAY**  
SCALE 1 : 1,000



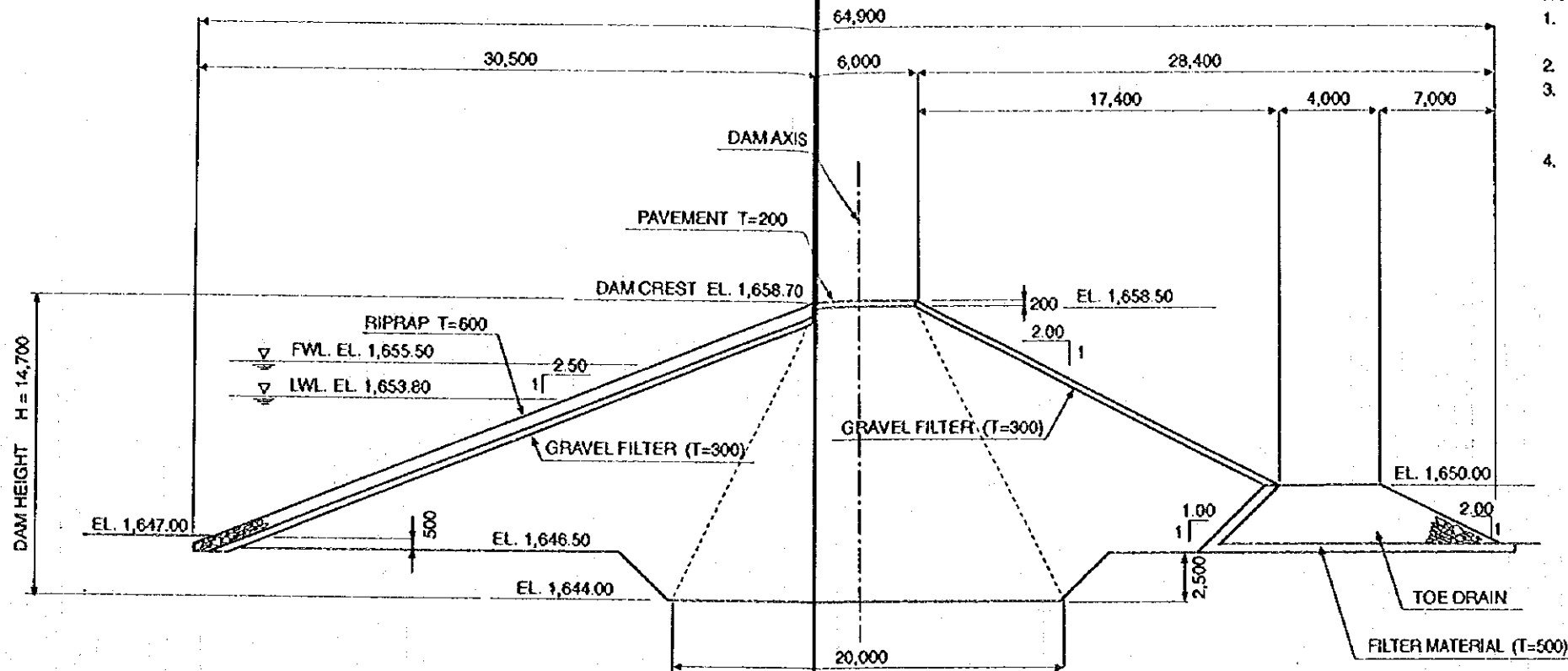
**SECTION A - A**  
SCALE 1 : 1,000



**INFILTRATION POND**  
SCALE 1 : 500

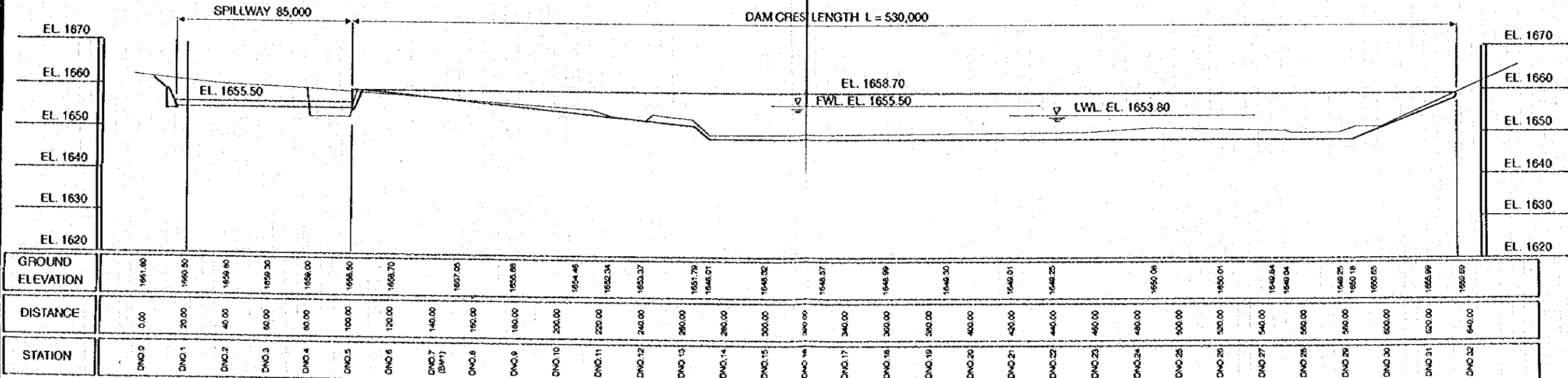
- NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
  2. ALL ELEVATIONS (EL.) ARE IN METERS.





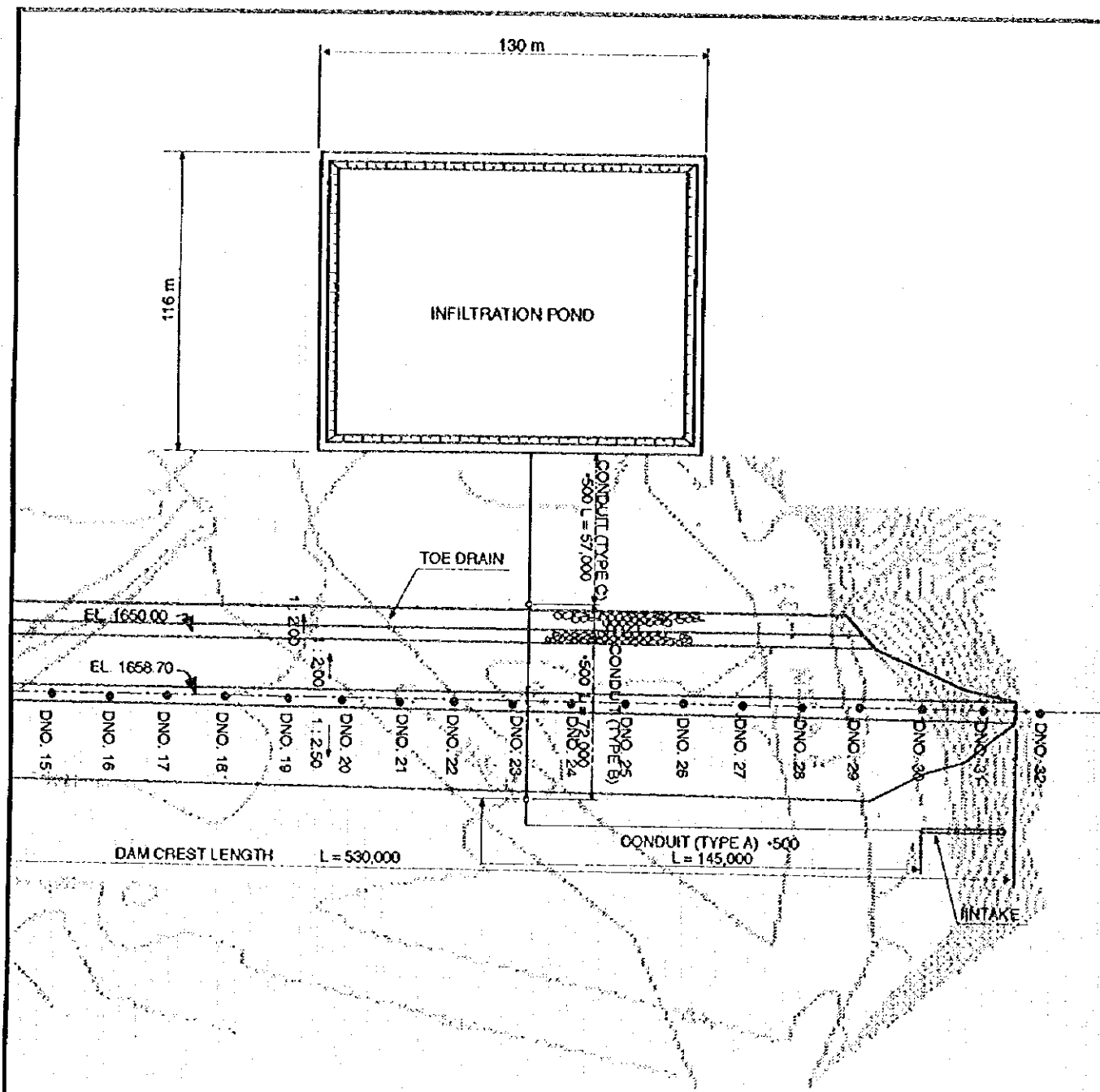
- NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
  2. ALL ELEVATIONS (EL.) ARE IN METERS.
  3. CORE ZONE OF EMBANKMENT SHALL BE UNIFORMLY COMPACTED WITH GRADED MATERIALS TO AVOID PIPING.
  4. DEPTH OF CUT-OFF TRENCH IS VARIED CORRESPONDING TO FOUNDATION CONDITION.

**STANDARD SECTION**  
SCALE 1:300

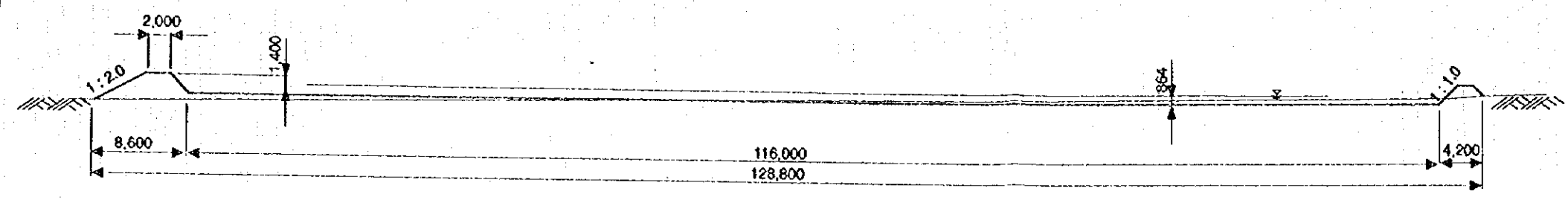


**LONGITUDINAL SECTION**  
SCALE H 1:2000 V 1:1000

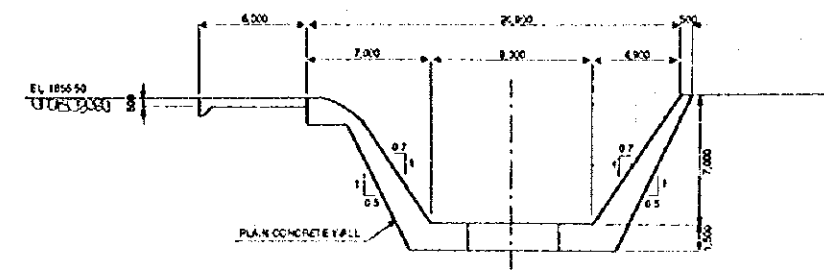
IRRIGATION AND POWER DEPARTMENT  
GOVERNMENT OF BALUCHISTAN  
IRRIGATION WATER RESOURCES  
DEVELOPMENT PROJECT  
**STANDARD / LONGITUDINAL  
SECTION OF DAM**  
JAPAN INTERNATIONAL COOPERATION AGENCY



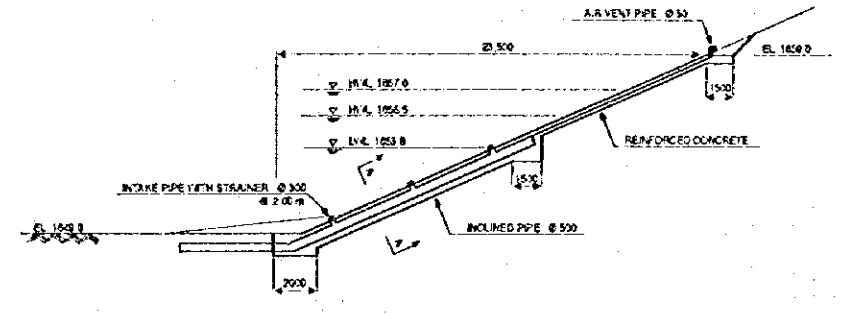
**PLAN OF INFILTRATION POND**  
SCALE 1 : 2,000



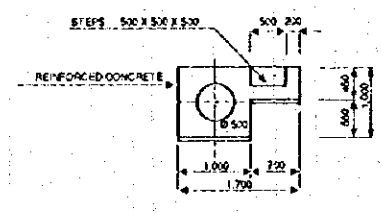
**INFILTRATION POND**  
SCALE 1 : 500



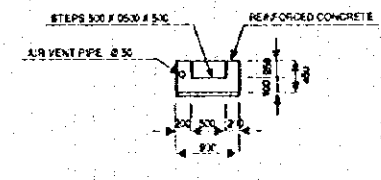
**SECTION OF SPILLWAY CANAL**  
SCALE 1:400



**INCLINED INTAKE CONDUIT**  
SCALE 1 : 400



**A-A SECTION**  
SCALE 1 : 100

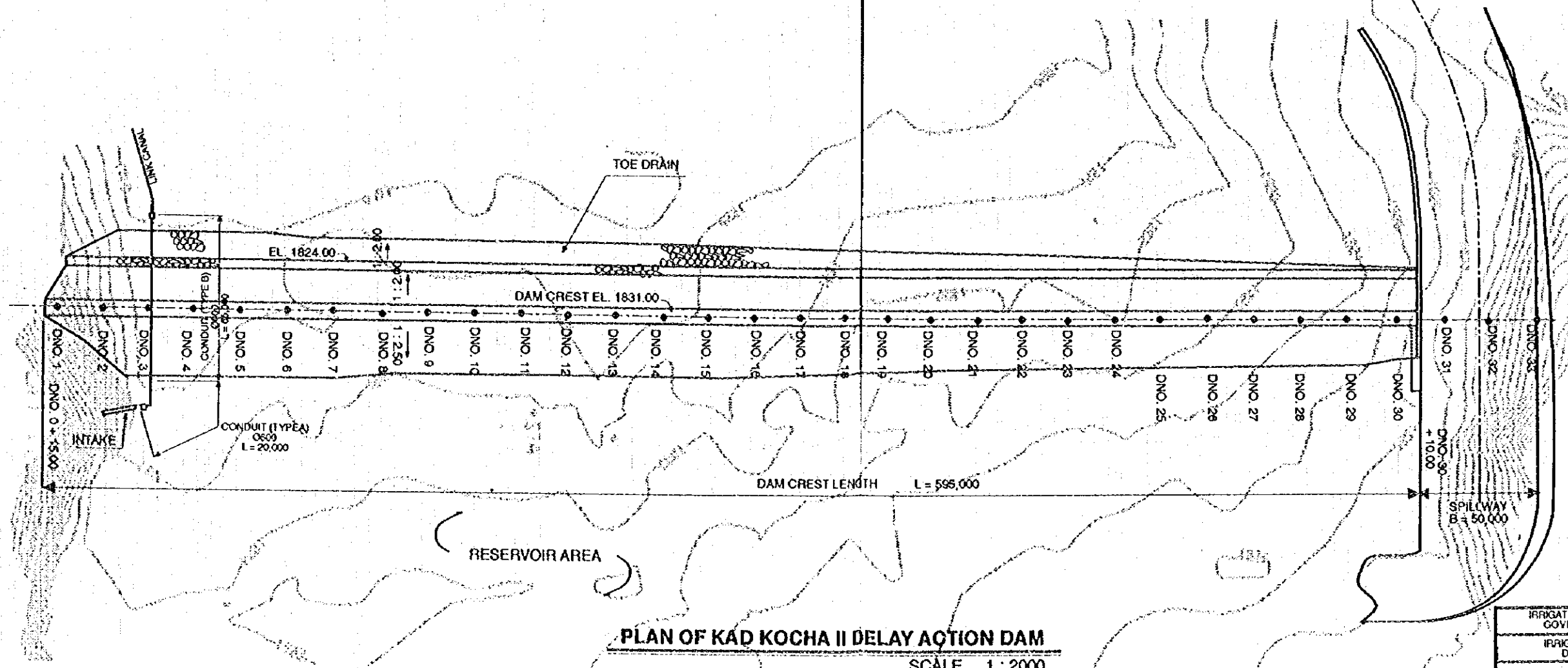
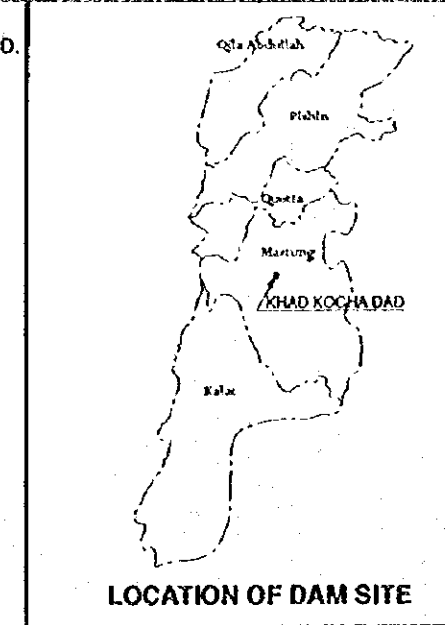


**B-B SECTION**  
SCALE 1 : 100

- NOTES:**
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
  2. ALL ELEVATIONS (EL.) ARE IN METERS.

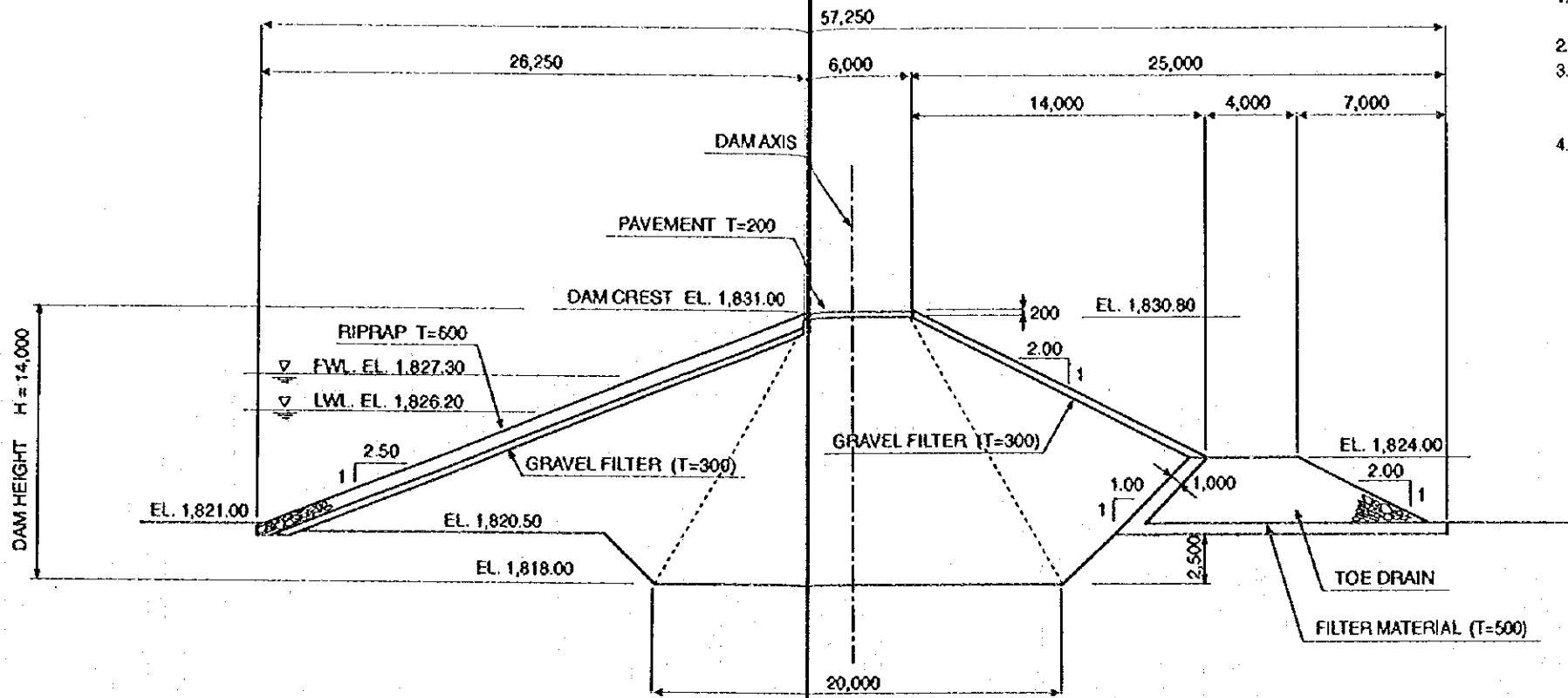
| GENERAL FEATURE OF DAM STRUCTURES |                         |
|-----------------------------------|-------------------------|
| LOCATION                          | MASTUNG                 |
| CATCHMENT AREA                    | 15.2 Km <sup>2</sup>    |
| DAM EMBANKMENT                    | HOMOGENEOUS EARTH DAM   |
| DAM TYPE                          |                         |
| CREST LENGTH                      | 595.0 m                 |
| DAM HEIGHT                        | 14.0 m                  |
| DAM CREST WIDTH                   | 6.0 m                   |
| EMBANKMENT VOLUME                 | 152,000 m <sup>3</sup>  |
| CREST ELEVATION                   | 1,830.8 m               |
| FULL WATER LEVEL                  | 1,827.3 m               |
| LOW WATER LEVEL                   | 1,826.2 m               |
| TOTAL STORAGE CAPACITY            | 368,000 m <sup>3</sup>  |
| EFFECTIVE STORAGE                 | 140,000 m <sup>3</sup>  |
| DEAD STORAGE CAPACITY             | 228,000 m <sup>3</sup>  |
| DRAIN TYPE                        | TOE DRAIN               |
| SPILLWAY                          |                         |
| DESIGN FLOOD DISCHARGE            | 389 m <sup>3</sup> /sec |
| TYPE OF SPILLWAY                  | CHUTE TYPE              |
| CREST WIDTH                       | 50 m                    |
| SPILLWAY LENGTH                   | 53.5 m                  |
| INTAKE WORKS                      |                         |
| TYPE OF INTAKE                    | INCLINED TYPE           |
| LENGTH OF CONDUIT                 | 85.0 m                  |

- NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
  2. ALL ELEVATIONS (EL.) ARE IN METERS.



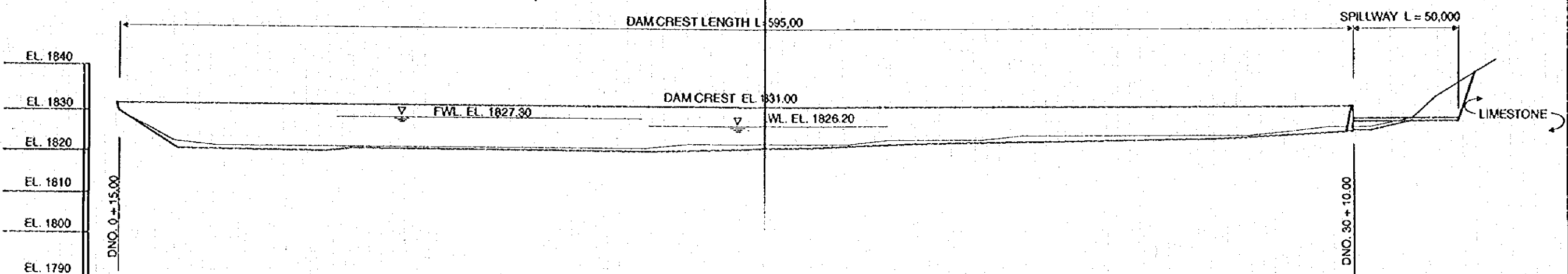
PLAN OF KAD KOCHA II DELAY ACTION DAM

SCALE 1:2000



- NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
  2. ALL ELEVATIONS (EL.) ARE IN METERS.
  3. CORE ZONE OF EMBANKMENT SHALL BE UNIFORMLY COMPACTED WITH GRADED MATERIALS TO AVOID PIPING.
  4. DEPTH OF CUT-OFF TRENCH IS VARIED CORRESPONDING TO FOUNDATION CONDITION.

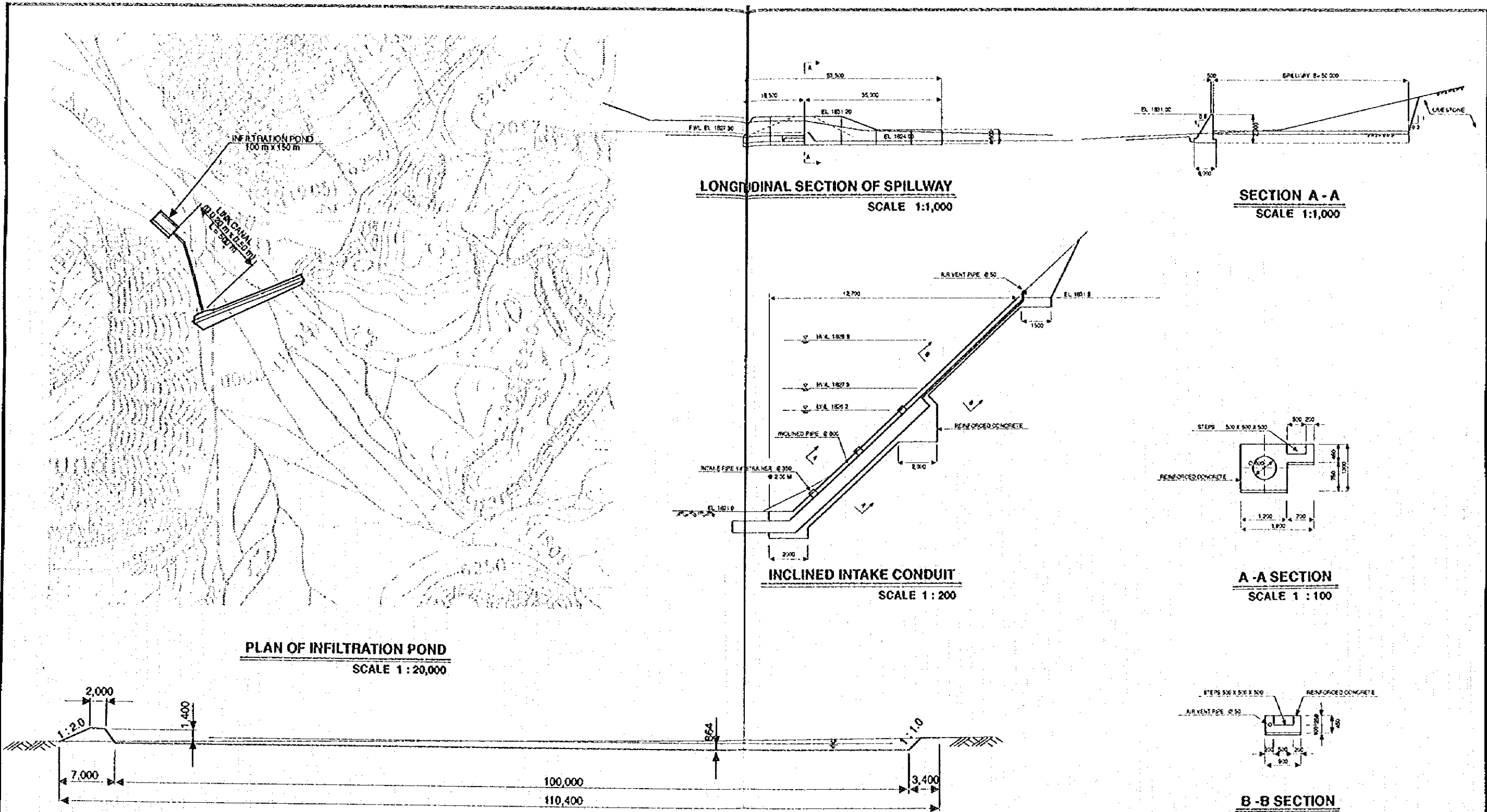
**STANDARD SECTION**  
SCALE 1:300



| GROUND ELEVATION | 1828.50 | 1827.80 | 1826.90 | 1826.35 | 1825.70 | 1821.20 | 1820.90 | 1821.10 | 1821.35 | 1821.40 | 1821.30 | 1821.30 | 1821.20 | 1821.10 | 1821.00 | 1821.80 | 1821.90 | 1822.15 | 1822.20 | 1822.00 | 1822.45 | 1823.20 | 1823.00 | 1824.10 | 1823.95 | 1824.02 | 1824.35 | 1824.87 | 1825.10 | 1825.55 | 1826.05 | 1827.80 | 1832.55 | 1838.00 |
|------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| DISTANCE         | 20.00   | 40.00   | 60.00   | 80.00   | 100.00  | 120.00  | 140.00  | 160.00  | 180.00  | 200.00  | 220.00  | 240.00  | 260.00  | 280.00  | 300.00  | 320.00  | 340.00  | 360.00  | 380.00  | 400.00  | 420.00  | 440.00  | 460.00  | 480.00  | 500.00  | 520.00  | 540.00  | 560.00  | 580.00  | 600.00  | 620.00  | 640.00  | 660.00  |         |
| STATION          | DNO. 1  | DNO. 2  | DNO. 3  | DNO. 4  | DNO. 5  | DNO. 6  | DNO. 7  | DNO. 8  | DNO. 9  | DNO. 10 | DNO. 11 | DNO. 12 | DNO. 13 | DNO. 14 | DNO. 15 | DNO. 16 | DNO. 17 | DNO. 18 | DNO. 19 | DNO. 20 | DNO. 21 | DNO. 22 | DNO. 23 | DNO. 24 | DNO. 25 | DNO. 26 | DNO. 27 | DNO. 28 | DNO. 29 | DNO. 30 | DNO. 31 | DNO. 32 | DNO. 33 | DNO. 34 |

**LONGITUDINAL SECTION**  
SCALE H=1:2,000 V=1:1,000

IRRIGATION AND POWER DEPARTMENT  
GOVERNMENT OF BALUCHISTAN  
IRRIGATION WATER RESOURCES  
DEVELOPMENT PROJECT  
**STANDARD / LONGITUDINAL  
SECTION OF DAM**  
JAPAN INTERNATIONAL COOPERATION AGENCY



**PLAN OF INFILTRATION POND**  
SCALE 1 : 20,000

**LONGITUDINAL SECTION OF SPILLWAY**  
SCALE 1:1,000

**SECTION A - A**  
SCALE 1:1,000

**INCLINED INTAKE CONDUIT**  
SCALE 1 : 200

**A - A SECTION**  
SCALE 1 : 100

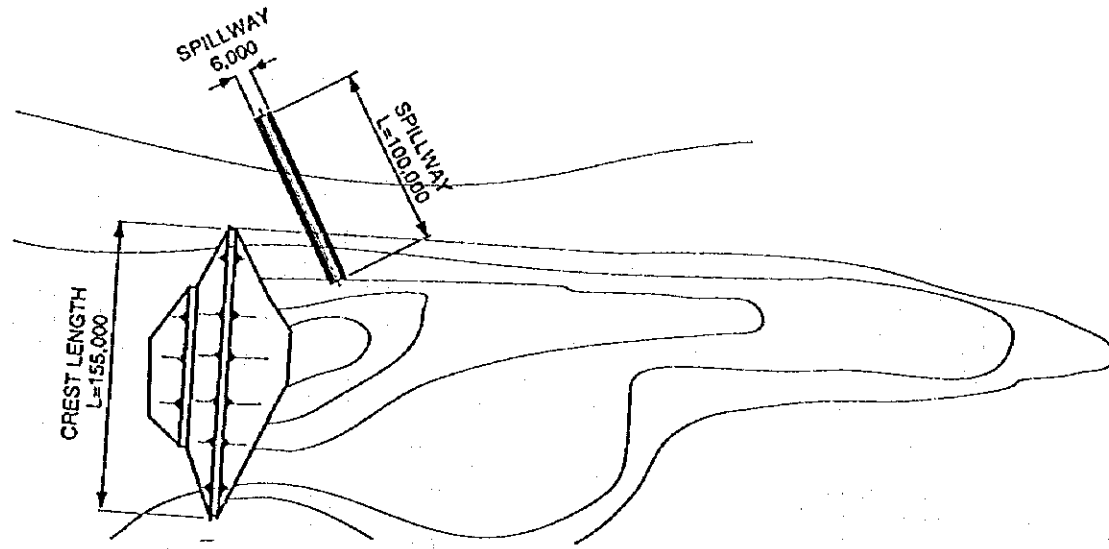
**INFILTRATION POND**  
SCALE 1 : 500

**B - B SECTION**  
SCALE 1 : 100

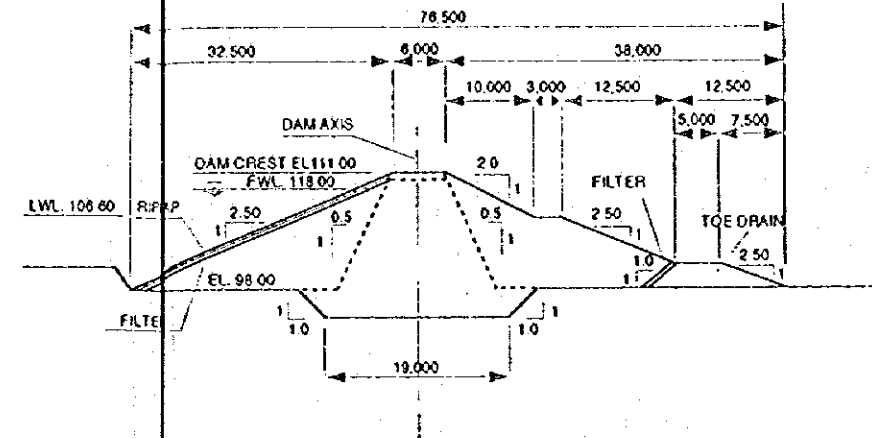
- NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
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  2. ALL ELEVATIONS (EL.) ARE IN METERS.
  3. CORE ZONE OF EMBANKMENT SHALL BE UNIFORMLY COMPACTED WITH GRADED MATERIALS TO AVOID PIPING.
  4. DEPTH OF CUT-OFF TRENCH IS VARIED CORRESPONDING TO FOUNDATION CONDITION.



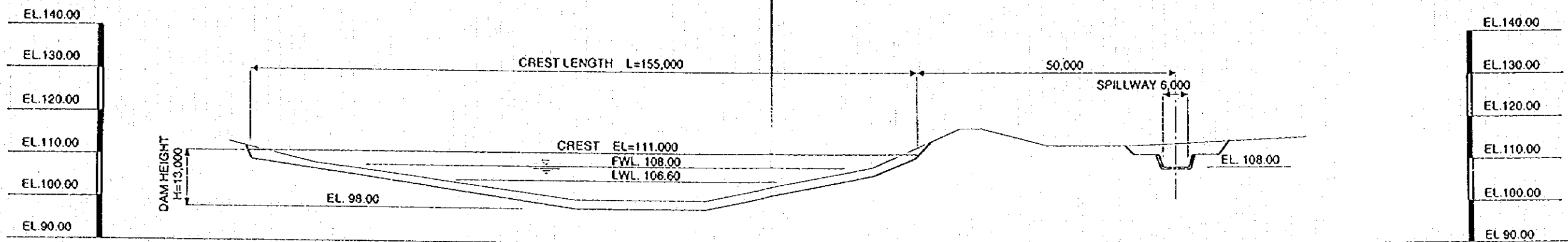
**PLAN**  
SCALE 1:400



**STANDARD SECTION**  
SCALE 1:800

| GENERAL FEATURE OF DAM STRUCTURES |                          |
|-----------------------------------|--------------------------|
| LOCATION                          | QUETTA                   |
| CATCHMENT AREA                    | 1.8 km <sup>2</sup>      |
| DAM EMBANKMENT                    | HOMOGENEOUS EARTH DAM    |
| DAM TYPE                          |                          |
| CREST LENGTH                      | 155.0 m                  |
| DAM HEIGHT                        | 13.0 m                   |
| DAM CREST WIDTH                   | 6.0 m                    |
| EMBANKMENT VOLUME                 | 33,000 m <sup>3</sup>    |
| CREST ELEVATION                   | 1,659.9 m                |
| FULL WATER LEVEL                  | 1,658.5 m                |
| LOW WATER LEVEL                   | 1,658.5 m                |
| TOTAL STORAGE CAPACITY            | 80,000 m <sup>3</sup>    |
| EFFECTIVE STORAGE                 | 42,000 m <sup>3</sup>    |
| DEAD STORAGE CAPACITY             | 38,000 m <sup>3</sup>    |
| DRAIN TYPE                        | TOE DRAIN                |
| <b>SPILLWAY</b>                   |                          |
| DESIGN FLOOD DISCHARGE            | 28.0 m <sup>3</sup> /sec |
| TYPE OF SPILLWAY                  | CHUTE TYPE               |
| CREST WIDTH                       | 6.0 m                    |
| SPILLWAY LENGTH                   | 100.0 m                  |
| <b>INTAKE WORKS</b>               |                          |
| TYPE OF INTAKE                    | INCLINED TYPE            |

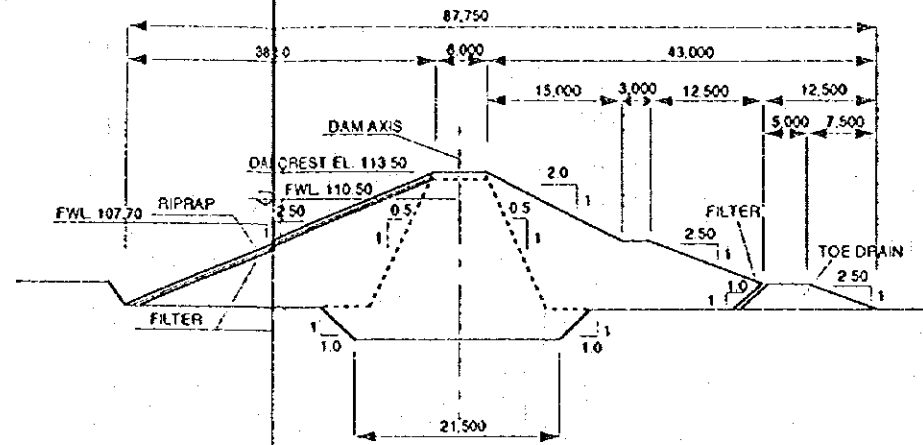
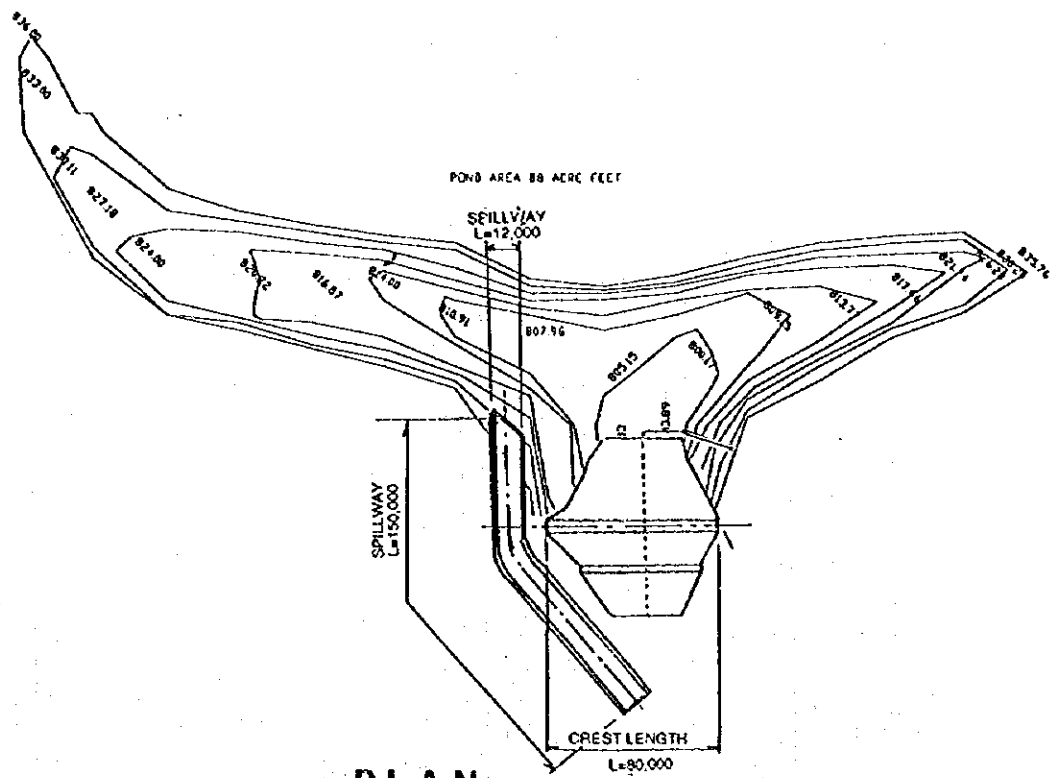
NOTE: ELEVATION IN DRAWING USES TEMPORARY ELEVATION.  
EL. 100 M IS EQUIVALENT TO EL. 1651.9 M.



|                      |  |        |        |                 |       |        |       |                 |       |                 |                 |                 |                  |                  |        |
|----------------------|--|--------|--------|-----------------|-------|--------|-------|-----------------|-------|-----------------|-----------------|-----------------|------------------|------------------|--------|
| ACCUMULATED DISTANCE |  | 113.00 | 108.00 | 106.00          |       | 100.00 |       | 100.00          |       | 108.00          | 117.00          | 117.00          | 113.00           | 113.00           |        |
| DISTANCE             |  | 0.00   | 20.00  | 35.00           |       | 80.00  |       | 110.00          |       | 150.00          | 170.00          | 175.00          | 190.00           | 210.00           | 213.00 |
| STATION              |  | DNO.0  | DNO.1  | +15.00<br>DNO.2 | DNO.3 | DNO.4  | DNO.5 | +10.00<br>DNO.6 | DNO.7 | +10.00<br>DNO.8 | +10.00<br>DNO.9 | +15.00<br>DNO.9 | +10.00<br>DNO.10 | +10.00<br>DNO.11 | DNO.12 |

**LONGITUDINAL SECTION**  
SCALE 1:1,000

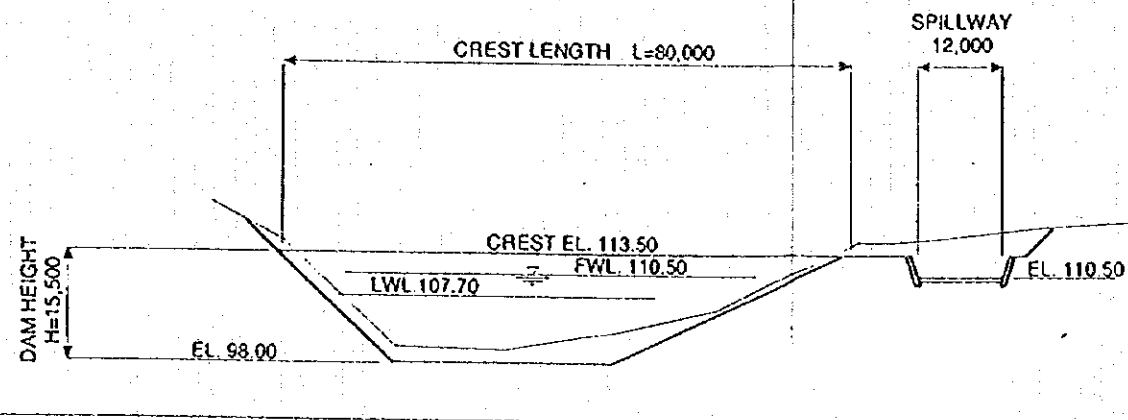
IRRIGATION AND POWER DEPARTMENT  
GOVERNMENT OF BALUCHISTAN  
IRRIGATION WATER RESOURCES  
DEVELOPMENT PROJECT  
**PLAN OF  
GHUTAI SHELA DAM**  
JAPAN INTERNATIONAL COOPERATION AGENCY



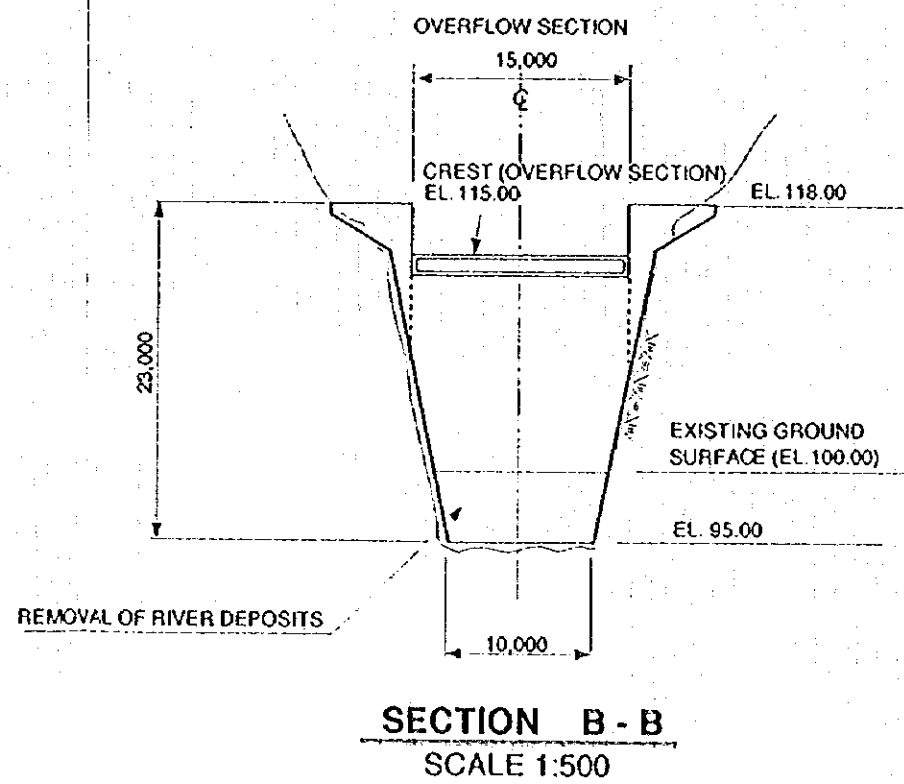
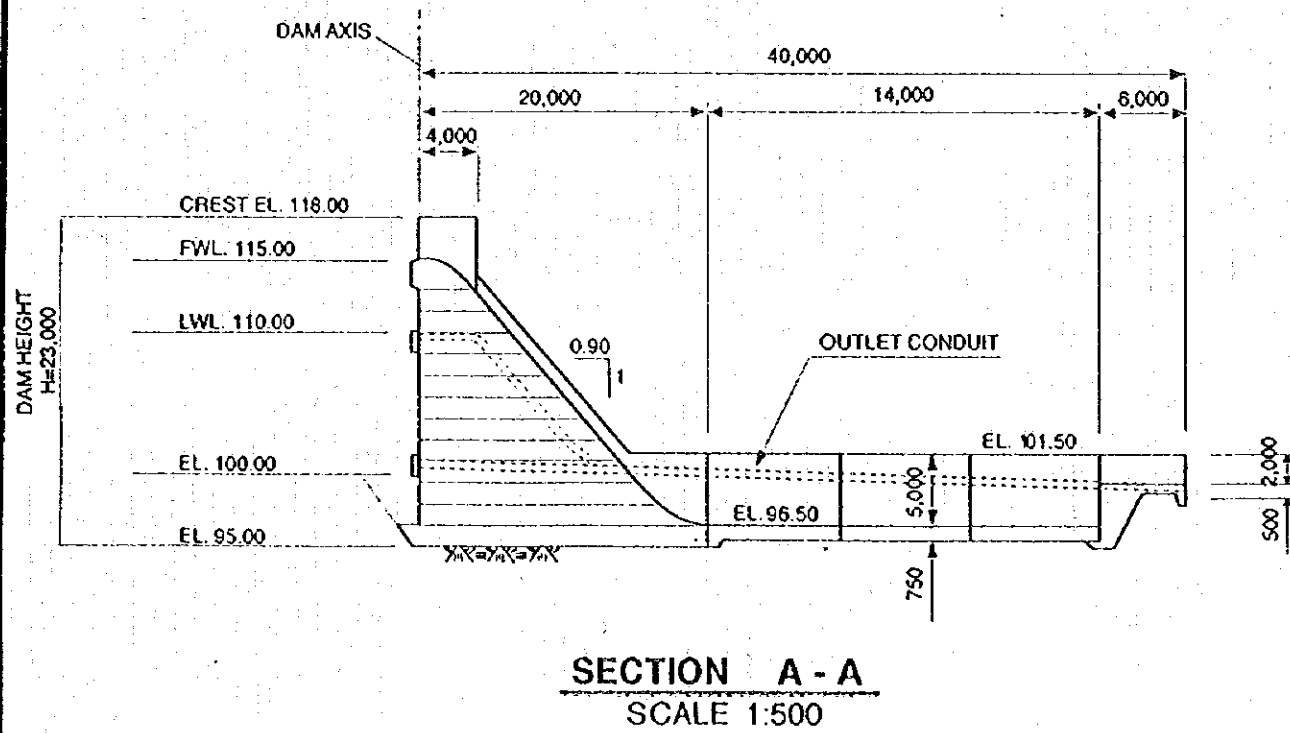
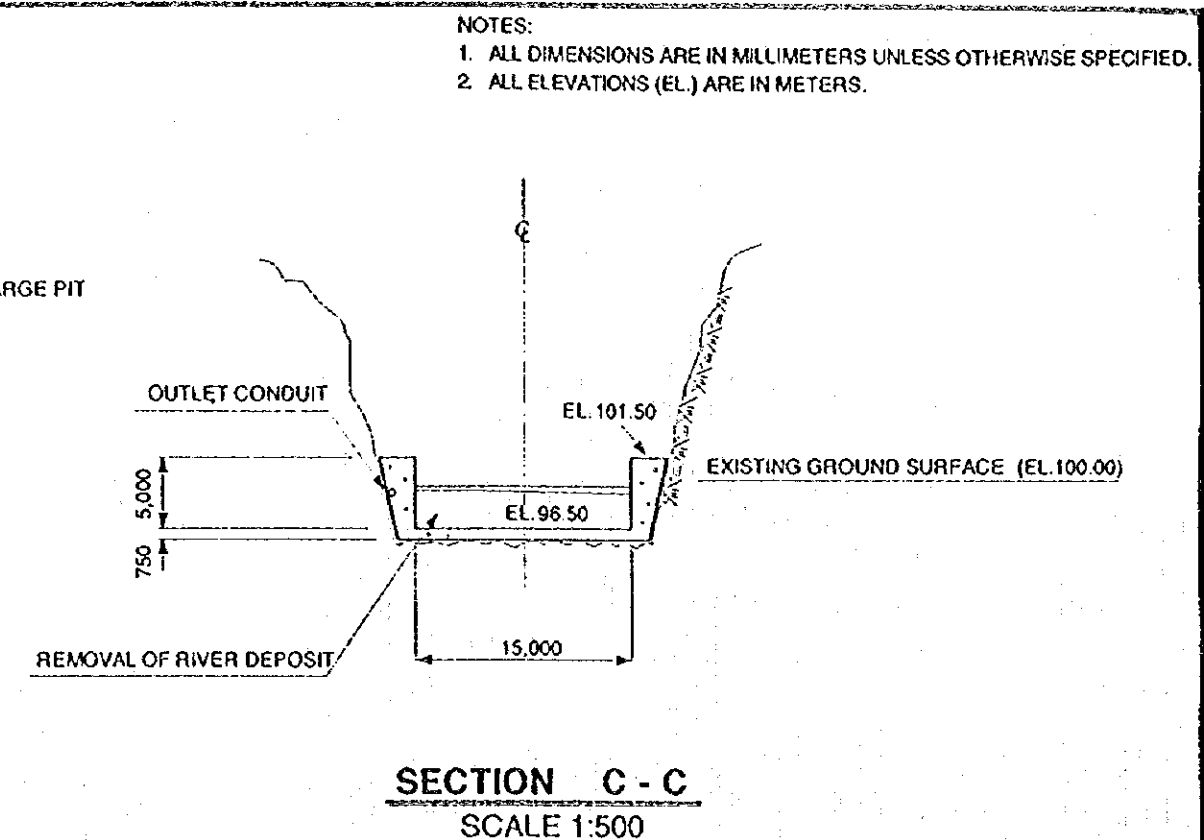
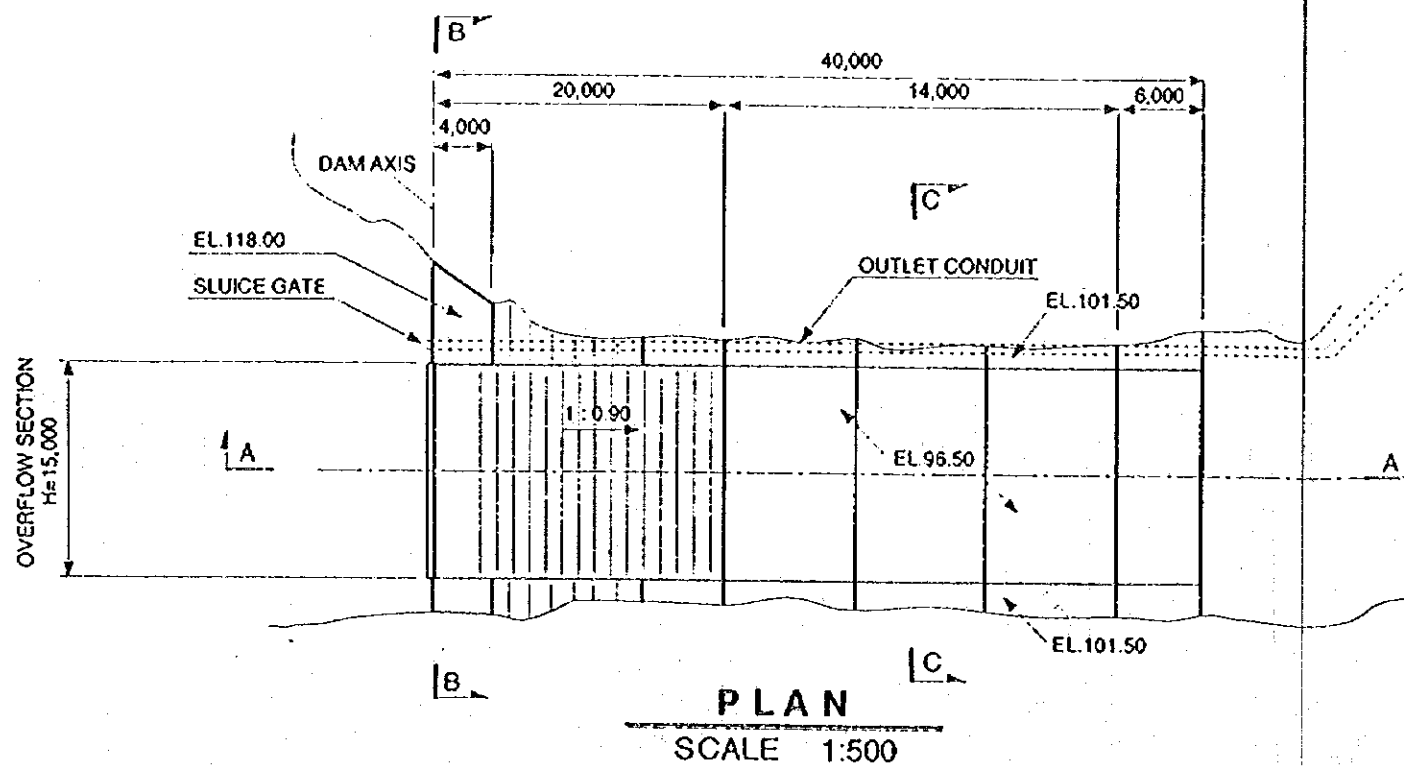
- NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
  2. ALL ELEVATIONS (EL.) ARE IN METERS.
  3. CORE ZONE OF EMBANKMENT SHALL BE UNIFORMLY COMPACTED WITH GRADED MATERIALS TO AVOID PIPING.
  4. DEPTH OF CUT-OFF TRENCH IS VARIED CORRESPONDING TO FOUNDATION CONDITION.

| GENERAL FEATURE OF DAM STRUCTURES |                          |
|-----------------------------------|--------------------------|
| LOCATION                          | QILA ABOULLAJ            |
| CATCHMENT AREA                    | 2.5 km <sup>2</sup>      |
| DAM EMBANKMENT                    | HOMOGENEOUS EARTH DAM    |
| DAM TYPE                          |                          |
| CREST LENGTH                      | 80.0 m                   |
| DAM HEIGHT                        | 15.5 m                   |
| DAM CREST WIDTH                   | 6.0 m                    |
| EMBANKMENT VOLUME                 | 35,000 m <sup>3</sup>    |
| CREST ELEVATION                   | 1958.4 m                 |
| FULL WATER LEVEL                  | 1955.4 m                 |
| LOW WATER LEVEL                   | 1950.8 m                 |
| TOTAL STORAGE CAPACITY            | 153,000 m <sup>3</sup>   |
| EFFECTIVE STORAGE                 | 100,000 m <sup>3</sup>   |
| DEAD STORAGE CAPACITY             | 53,000 m <sup>3</sup>    |
| DRAIN TYPE                        | TOE DRAIN                |
| <b>SPILLWAY</b>                   |                          |
| DESIGN FLOOD DISCHARGE            | 53.0 m <sup>3</sup> /sec |
| TYPE OF SPILLWAY                  | CHUTE TYPE               |
| CREST WIDTH                       | 12.0 m                   |
| SPILLWAY LENGTH                   | 150.0 m                  |
| <b>INTAKE WORKS</b>               |                          |
| TYPE OF INTAKE                    | INCLINED TYPE            |

NOTE: ELEVATION IN DRAWING USES TEMPORARY ELEVATION. EL.100 M IS EQUIVALENT TO EL. 1944.9 M.

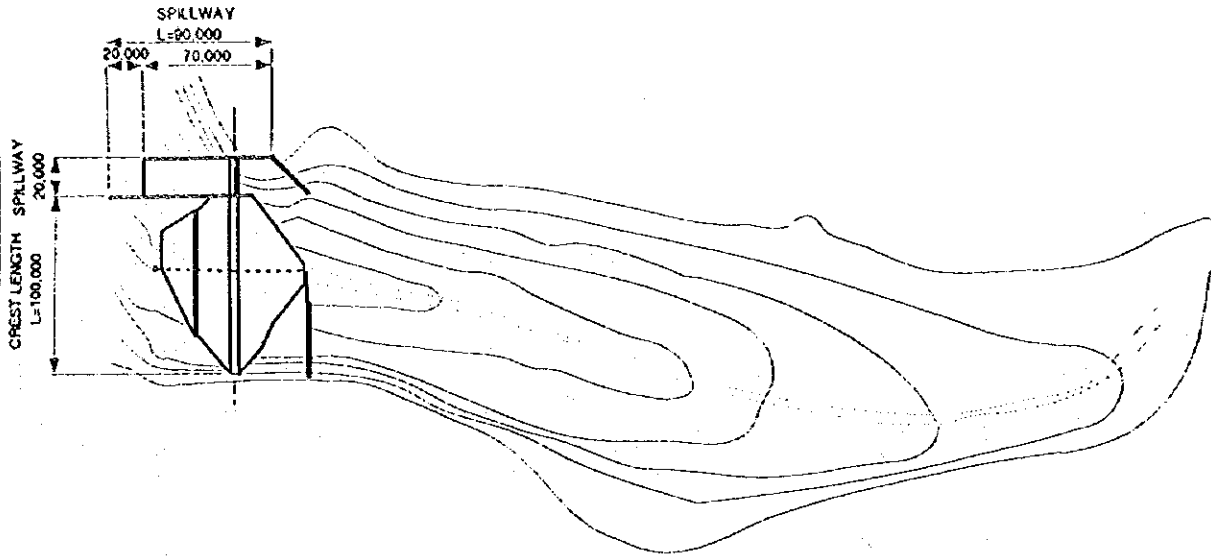


|                      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|----------------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| ACCUMULATED DISTANCE |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| DISTANCE             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| STATION              |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

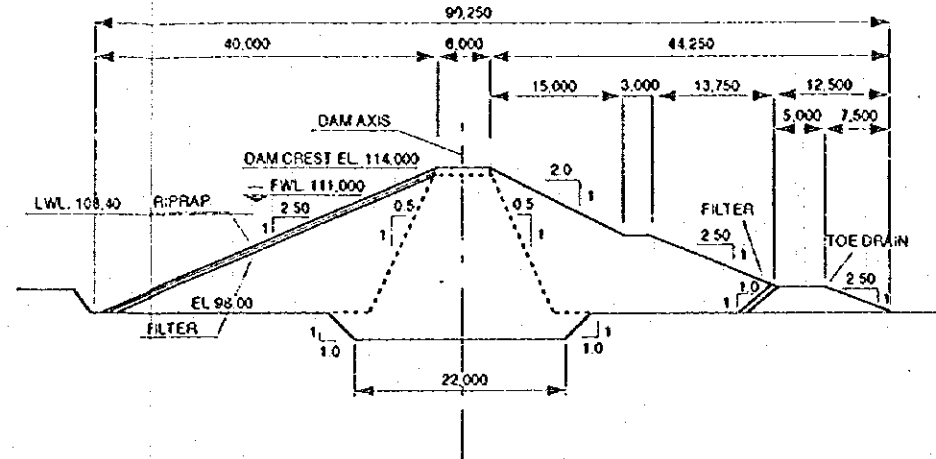


| GENERAL FEATURE OF DAM STRUCTURES |                        |
|-----------------------------------|------------------------|
| LOCATION                          | QUETTA                 |
| CATCHMENT AREA                    | 5.4 km <sup>2</sup>    |
| DAM EMBANKMENT                    | GRAVITY                |
| DAM TYPE                          | DAM                    |
| CREST LENGTH                      | 20.0 m                 |
| DAM HEIGHT                        | 23.0 m                 |
| DAM CREST WIDTH                   | 6.0 m                  |
| EMBANKMENT VOLUME                 | 3,700 m <sup>3</sup>   |
| CREST ELEVATION                   | 1,870.0 m              |
| FULL WATER LEVEL                  | 1,867.0 m              |
| LOW WATER LEVEL                   | 1,860.3 m              |
| TOTAL STORAGE CAPACITY            | 139,000 m <sup>3</sup> |
| EFFECTIVE STORAGE                 | 90,000 m <sup>3</sup>  |
| DEAD STORAGE CAPACITY             | 49,000 m <sup>3</sup>  |
| <b>SPILLWAY</b>                   |                        |
| DESIGN FLOOD DISCHARGE            | 8.6 m <sup>3</sup>     |
| CREST WIDTH                       |                        |
| ENERGY DISSIPATOR LENGTH          | 14.0 m                 |

NOTE: ELEVATION IN DRAWING USES TEMPORARY ELEVATION.  
EL. 100 MIS EQUIVALENT TO EL. 1852.0 M.



**PLAN**  
SCALE 1:4,000

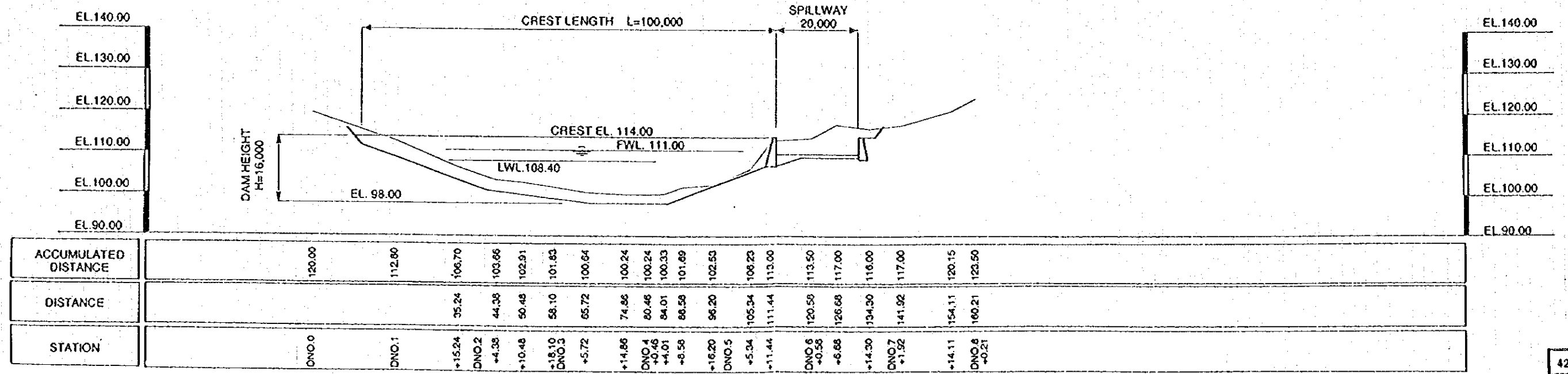


**STANDARD SECTION**  
SCALE 1:800

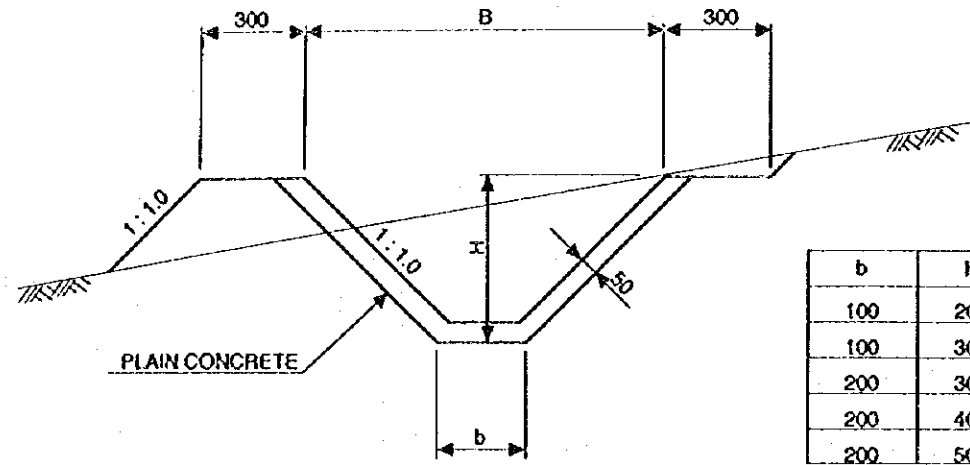
- NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
  2. ALL ELEVATIONS (EL.) ARE IN METERS.
  3. CORE ZONE OF EMBANKMENT SHALL BE UNIFORMLY COMPACTED WITH GRADED MATERIALS TO AVOID PIPING.
  4. DEPTH OF CUT-OFF TRENCH IS VARIED CORRESPONDING TO FOUNDATION CONDITION.

| GENERAL FEATURE OF DAM STRUCTURES |                           |
|-----------------------------------|---------------------------|
| LOCATION                          | KALAT                     |
| CATCHMENT AREA                    | 5.8 km <sup>2</sup>       |
| DAM EMBANKMENT                    | HOMOGENEOUS EARTH DAM     |
| DAM TYPE                          |                           |
| CREST LENGTH                      | 100.0 m                   |
| DAM HEIGHT                        | 16.0 m                    |
| DAM CREST WIDTH                   | 6.0 m                     |
| EMBANKMENT VOLUME                 | 46,000 m <sup>3</sup>     |
| CREST ELEVATION                   | 2,216.0 mm                |
| FULL WATER LEVEL                  | 2,213.0 m                 |
| LOW WATER LEVEL                   | 2,210.5 m                 |
| TOTAL STORAGE CAPACITY            | 170,000 m <sup>3</sup>    |
| EFFECTIVE STORAGE                 | 160,000 m <sup>3</sup>    |
| DEAD STORAGE CAPACITY             | 90,000 m <sup>3</sup>     |
| DRAIN TYPE                        | TOE DRAIN                 |
| <b>SPILLWAY</b>                   |                           |
| DESIGN FLOOD DISCHARGE            | 133.0 m <sup>3</sup> /sec |
| TYPE OF SPILLWAY                  | CHUTE TYPE                |
| CREST WIDTH                       | 20.0 m                    |
| SPILLWAY LENGTH                   | 90.0 m                    |
| <b>INTAKE WORKS</b>               |                           |
| TYPE OF INTAKE                    | INCLINED TYPE             |

NOTE: ELEVATION IN DRAWING USES TEMPORARY ELEVATION.  
EL. 100 M IS EQUIVALENT TO EL. 2202.0 M.

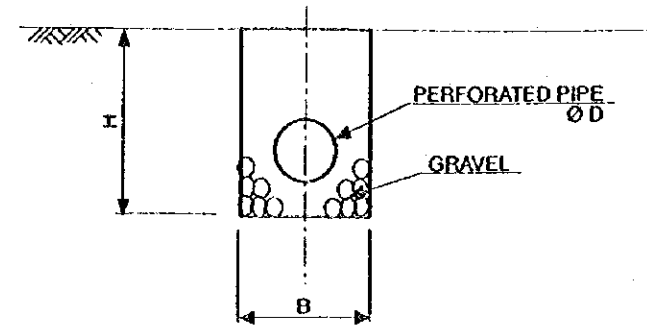


**LONGITUDINAL SECTION**  
SCALE 1:1,000



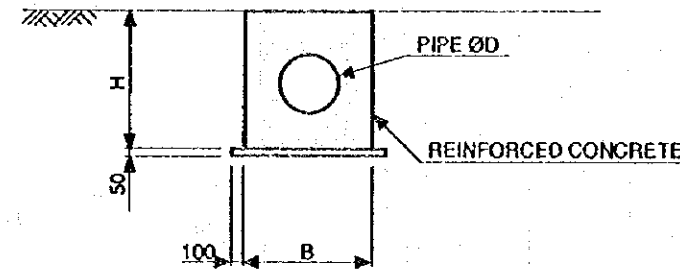
TYPICAL SECTION OF LINK CANAL

| b   | H   | B    |
|-----|-----|------|
| 100 | 200 | 500  |
| 100 | 300 | 700  |
| 200 | 300 | 800  |
| 200 | 400 | 1000 |
| 200 | 500 | 1200 |



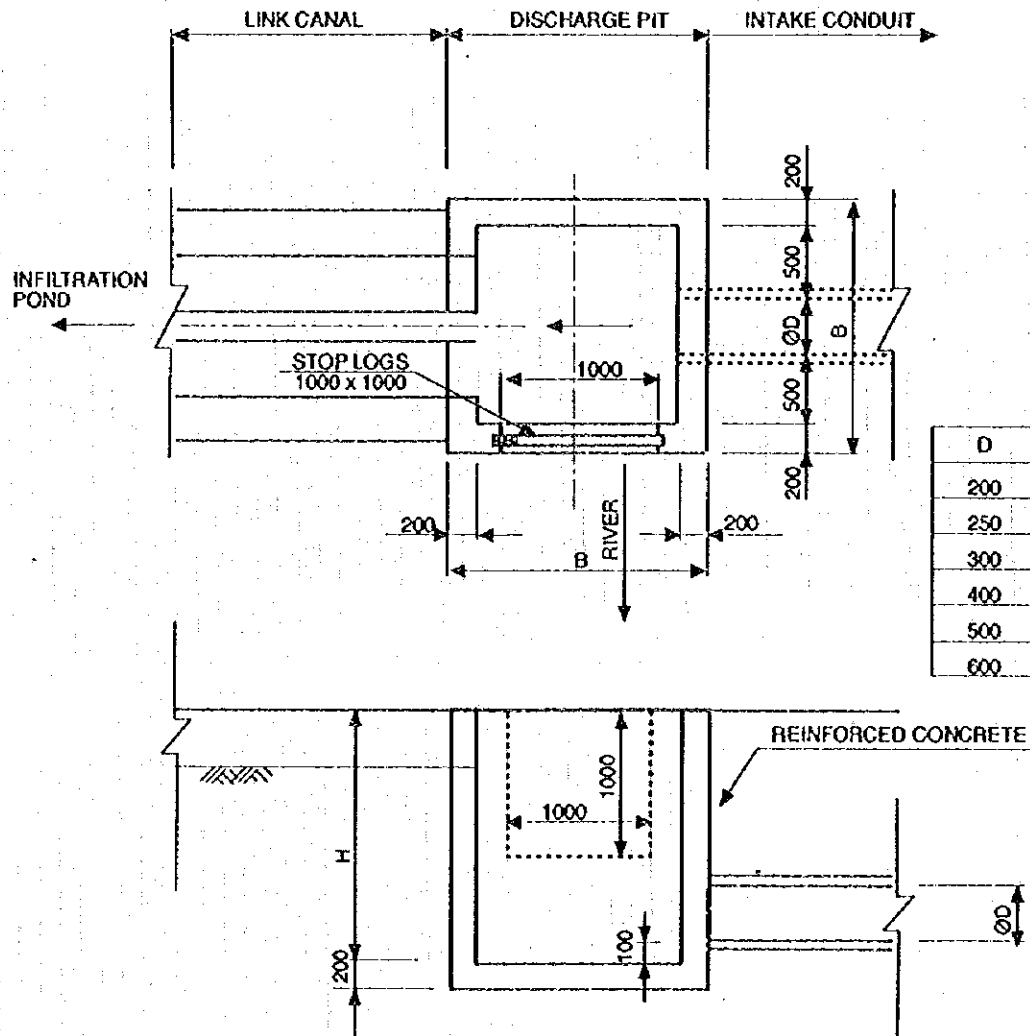
TYPE A

| Diameter (mm) | B (m) | H (m) |
|---------------|-------|-------|
| 200           | 0.550 | 0.900 |
| 250           | 0.600 | 0.950 |
| 300           | 0.650 | 1.000 |
| 400           | 0.800 | 1.100 |
| 500           | 1.000 | 1.250 |
| 600           | 1.200 | 1.400 |



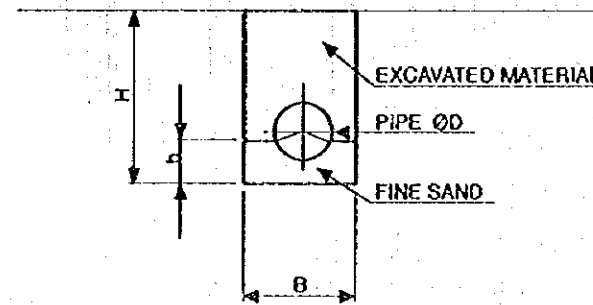
TYPE B

| Diameter (mm) | B (m) | H (m) |
|---------------|-------|-------|
| 200           | 0.550 | 0.550 |
| 250           | 0.600 | 0.600 |
| 300           | 0.650 | 0.650 |
| 400           | 0.800 | 0.800 |
| 500           | 1.000 | 1.000 |
| 600           | 1.200 | 1.200 |



PROFILE OF DISCHARGE PIT

| D   | H    | B    |
|-----|------|------|
| 200 | 1600 | 1300 |
| 250 | 1650 | 1450 |
| 300 | 1700 | 1600 |
| 400 | 1800 | 1900 |
| 500 | 1900 | 2200 |
| 600 | 2000 | 2500 |



TYPE C

| Diameter (mm) | B (m) | h (m) | H (m) |
|---------------|-------|-------|-------|
| 200           | 0.600 | 0.160 | 0.700 |
| 250           | 0.850 | 0.170 | 0.750 |
| 300           | 0.900 | 0.170 | 0.800 |
| 400           | 1.000 | 0.180 | 0.900 |
| 500           | 1.300 | 0.180 | 1.00  |
| 600           | 1.400 | 0.190 | 1.100 |

TYPICAL CROSS SECTION OF INTAKE CONDUIT

JICA

