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| Draw. No. | Title |
|--|---|
| Concepcion Hydroelectric Power Plant | |
| Civil Works | |
| CC-CV-01 | Water Pipe, General Plan (1/2) |
| CC-CV-02 | Water Pipe, General Plan (2/2) |
| CC-CV-03 | Water Pipe, Profile (1/2) |
| CC-CV-04 | Water Pipe, Profile (2/2) |
| CC-CV-05 | Water Pipe, Typical Sections |
| CC-CV-06 | Valve Pits, Details |
| CC-CV-07 | Concrete Blocks, Details |
| CC-CV-08 | Powerhouse, General Layout Plan |
| CC-CV-09 | Powerhouse, Sections (1/2) |
| CC-CV-10 | Powerhouse, Sections (2/2) |
| CC-CV-11 | Powerhouse, Typical Sections |
| CC-CV-12 | Powerhouse, Concrete Outline Plan |
| CC-CV-13 | Powerhouse, Concrete Outline Profile and Sections |
| CC-CV-14 | Powerhouse, Reinforcement Arrangement |
| Electro-mechanical and Electrical Works | |
| CC-EM-01 | Equipment Layout Plan |
| CC-EM-02 | 34.5kV Single Line Diagram |
| CC-EM-03 | 34.5kV Power Cable Route |
| CC-EM-05 | Communication Cable Route |
| CC-EM-04 | Control Room (Concepcion Water Treatment Plant) |
| CC-EM-05 | Communication Cable Route |

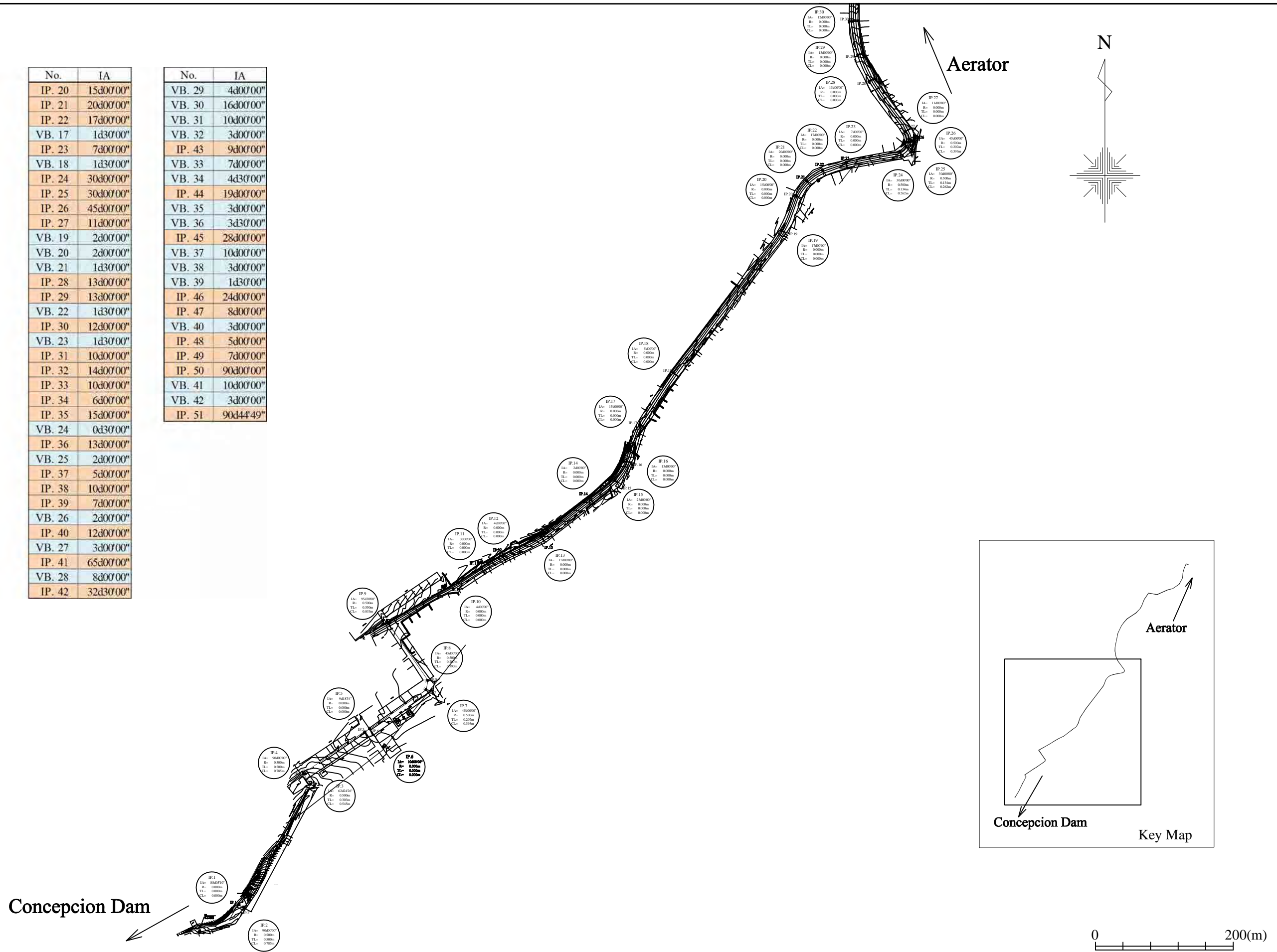
| Draw. No. | Title |
|--|---|
| Picacho Hydroelectric Power Plant | |
| Civil Works | |
| PC-CV-01 | Powerhouse Area, General Plan |
| PC-CV-02 | Powerhouse, General Layout Plan |
| PC-CV-03 | Powerhouse, Sections (1/3) |
| PC-CV-04 | Powerhouse, Sections (2/3) |
| PC-CV-05 | Powerhouse, Sections (3/3) |
| PC-CV-06 | Powerhouse, Concrete Outline Plan and Sections |
| PC-CV-07 | Powerhouse, Concrete Outline Profile and Sections |
| PC-CV-08 | Powerhouse, Reinforcement Arrangement |
| Electro-mechanical and Electrical Works | |
| PC-EM-01 | Equipment Layout Plan |
| PC-EM-02 | 13.8kV Single Line Diagram |
| PC-EM-03 | 13.8kV Power Cable and Distribution Line Route |
| PC-EM-04 | Control Room (Picacho Water Treatment Plant) |
| PC-EM-05 | Communication Cable Route |

CONCEPCIÓN HYDROELECTRIC POWER PLANT

| No. | IA |
|--------|-----------|
| IP. 1 | 88d05'10" |
| IP. 2 | 90d00'00" |
| VB. 1 | 12d00'00" |
| VB. 2 | 5d30'00" |
| VB. 3 | 2d30'00" |
| VB. 4 | 3d00'00" |
| VB. 5 | 1d00'00" |
| IP. 3 | 62d24'26" |
| IP. 4 | 90d00'00" |
| VB. 6 | 2d30'00" |
| IP. 5 | 9d18'34" |
| IP. 6 | 10d00'00" |
| VB. 7 | 0d30'00" |
| IP. 7 | 45d00'00" |
| IP. 8 | 45d00'00" |
| IP. 9 | 95d30'00" |
| VB. 8 | 1d00'00" |
| IP. 10 | 4d00'00" |
| IP. 11 | 3d00'00" |
| VB. 9 | 2d00'00" |
| IP. 12 | 4d30'00" |
| VB. 10 | 2d00'00" |
| IP. 13 | 12d00'00" |
| VB. 11 | 0d30'00" |
| IP. 14 | 2d00'00" |
| IP. 15 | 23d00'00" |
| VB. 12 | 1d30'00" |
| IP. 16 | 13d00'00" |
| VB. 13 | 4d00'00" |
| IP. 17 | 15d00'00" |
| VB. 14 | 1d00'00" |
| IP. 18 | 5d00'00" |
| VB. 15 | 1d00'00" |
| VB. 16 | 1d00'00" |
| IP. 19 | 17d00'00" |

| No. | IA |
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| IP. 20 | 15d00'00" |
| IP. 21 | 20d00'00" |
| IP. 22 | 17d00'00" |
| VB. 17 | 1d30'00" |
| IP. 23 | 7d00'00" |
| VB. 18 | 1d30'00" |
| IP. 24 | 30d00'00" |
| IP. 25 | 30d00'00" |
| IP. 26 | 45d00'00" |
| IP. 27 | 11d00'00" |
| VB. 19 | 2d00'00" |
| VB. 20 | 2d00'00" |
| VB. 21 | 1d30'00" |
| IP. 28 | 13d00'00" |
| IP. 29 | 13d00'00" |
| VB. 22 | 1d30'00" |
| IP. 30 | 12d00'00" |
| VB. 23 | 1d30'00" |
| IP. 31 | 10d00'00" |
| IP. 32 | 14d00'00" |
| IP. 33 | 10d00'00" |
| IP. 34 | 6d00'00" |
| IP. 35 | 15d00'00" |
| VB. 24 | 0d30'00" |
| IP. 36 | 13d00'00" |
| VB. 25 | 2d00'00" |
| IP. 37 | 5d00'00" |
| IP. 38 | 10d00'00" |
| IP. 39 | 7d00'00" |
| VB. 26 | 2d00'00" |
| IP. 40 | 12d00'00" |
| VB. 27 | 3d00'00" |
| IP. 41 | 65d00'00" |
| VB. 28 | 8d00'00" |
| IP. 42 | 32d30'00" |

| No. | IA |
|--------|-----------|
| VB. 29 | 4d00'00" |
| VB. 30 | 16d00'00" |
| VB. 31 | 10d00'00" |
| VB. 32 | 3d00'00" |
| IP. 43 | 9d00'00" |
| VB. 33 | 7d00'00" |
| VB. 34 | 4d30'00" |
| IP. 44 | 19d00'00" |
| VB. 35 | 3d00'00" |
| VB. 36 | 3d30'00" |
| IP. 45 | 28d00'00" |
| VB. 37 | 10d00'00" |
| VB. 38 | 3d00'00" |
| VB. 39 | 1d30'00" |
| IP. 46 | 24d00'00" |
| IP. 47 | 8d00'00" |
| VB. 40 | 3d00'00" |
| IP. 48 | 5d00'00" |
| IP. 49 | 7d00'00" |
| IP. 50 | 90d00'00" |
| VB. 41 | 10d00'00" |
| VB. 42 | 3d00'00" |
| IP. 51 | 90d44'49" |



JAPAN INTERNATIONAL
COOPERATION AGENCY

Project & Location

The Preparatory Survey for the Project of
Micro- Hydroelectric Power Generation in Metropolitan Area of
Tegucigalpa in the Republic of Honduras

Drawing Title

**Concepcion Hydroelectric Power Plant
Water pipe, General plan (1/2)**

DWG No.

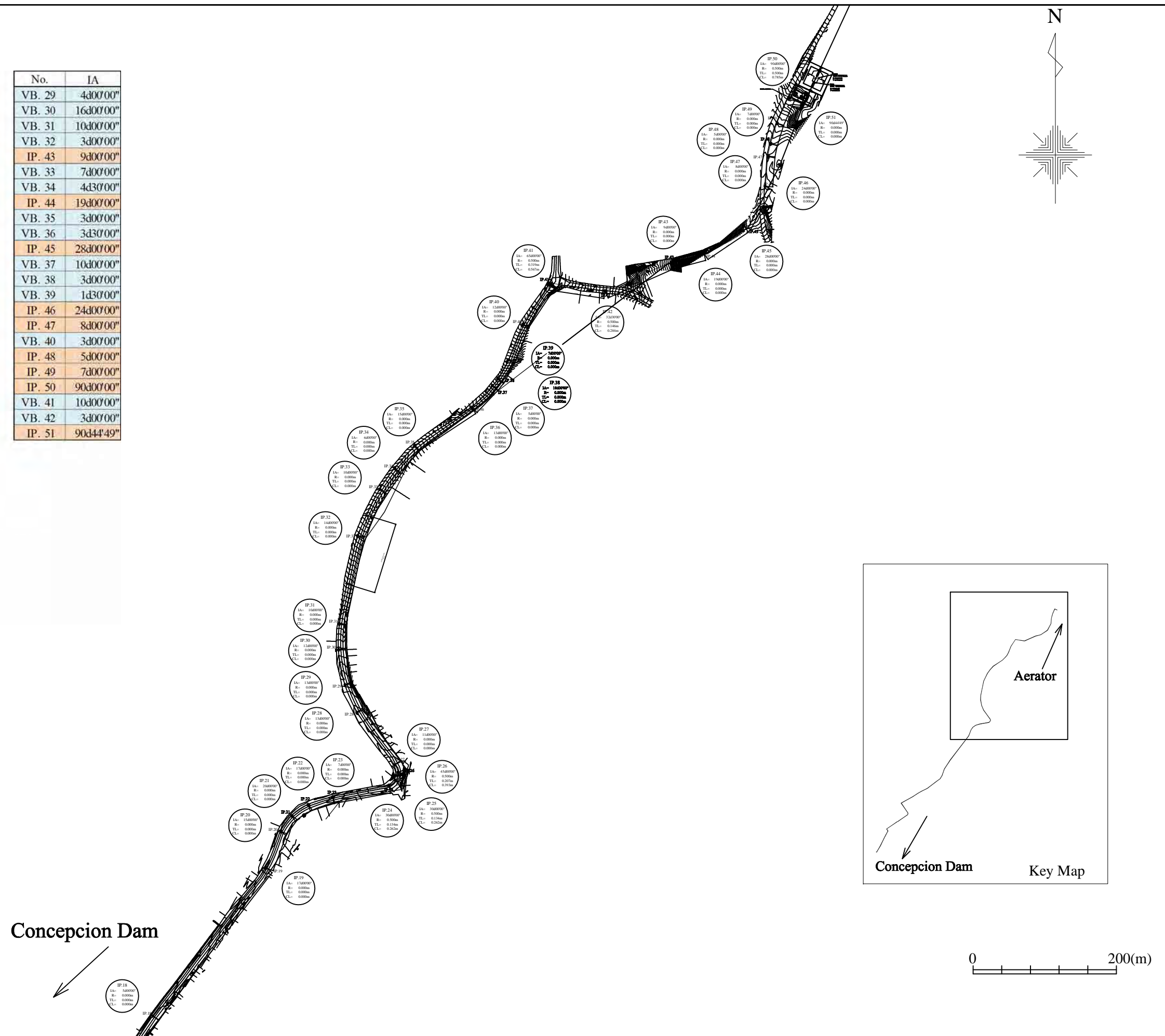
CC-CV-01

Dec.2012

| No. | IA |
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| IP. 2 | 90d00'00" |
| VB. 1 | 12d00'00" |
| VB. 2 | 5d30'00" |
| VB. 3 | 2d30'00" |
| VB. 4 | 3d00'00" |
| VB. 5 | 1d00'00" |
| IP. 3 | 62d24'26" |
| IP. 4 | 90d00'00" |
| VB. 6 | 2d30'00" |
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| IP. 6 | 10d00'00" |
| VB. 7 | 0d30'00" |
| IP. 7 | 45d00'00" |
| IP. 8 | 45d00'00" |
| IP. 9 | 95d30'00" |
| VB. 8 | 1d00'00" |
| IP. 10 | 4d00'00" |
| IP. 11 | 3d00'00" |
| VB. 9 | 2d00'00" |
| IP. 12 | 4d30'00" |
| VB. 10 | 2d00'00" |
| IP. 13 | 12d00'00" |
| VB. 11 | 0d30'00" |
| IP. 14 | 2d00'00" |
| IP. 15 | 23d00'00" |
| VB. 12 | 1d30'00" |
| IP. 16 | 13d00'00" |
| VB. 13 | 4d00'00" |
| IP. 17 | 15d00'00" |
| VB. 14 | 1d00'00" |
| IP. 18 | 5d00'00" |
| VB. 15 | 1d00'00" |
| VB. 16 | 1d00'00" |
| IP. 19 | 17d00'00" |

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| IP. 22 | 17d00'00" |
| VB. 17 | 1d30'00" |
| IP. 23 | 7d00'00" |
| VB. 18 | 1d30'00" |
| IP. 24 | 30d00'00" |
| IP. 25 | 30d00'00" |
| IP. 26 | 45d00'00" |
| IP. 27 | 11d00'00" |
| VB. 19 | 2d00'00" |
| VB. 20 | 2d00'00" |
| VB. 21 | 1d30'00" |
| IP. 28 | 13d00'00" |
| IP. 29 | 13d00'00" |
| VB. 22 | 1d30'00" |
| IP. 30 | 12d00'00" |
| VB. 23 | 1d30'00" |
| IP. 31 | 10d00'00" |
| IP. 32 | 14d00'00" |
| IP. 33 | 10d00'00" |
| IP. 34 | 6d00'00" |
| IP. 35 | 15d00'00" |
| VB. 24 | 0d30'00" |
| IP. 36 | 13d00'00" |
| VB. 25 | 2d00'00" |
| IP. 37 | 5d00'00" |
| IP. 38 | 10d00'00" |
| IP. 39 | 7d00'00" |
| VB. 26 | 2d00'00" |
| IP. 40 | 12d00'00" |
| VB. 27 | 3d00'00" |
| IP. 41 | 65d00'00" |
| VB. 28 | 8d00'00" |
| IP. 42 | 32d30'00" |

| No. | IA |
|--------|-----------|
| VB. 29 | 4d00'00" |
| VB. 30 | 16d00'00" |
| VB. 31 | 10d00'00" |
| VB. 32 | 3d00'00" |
| IP. 43 | 9d00'00" |
| VB. 33 | 7d00'00" |
| VB. 34 | 4d30'00" |
| IP. 44 | 19d00'00" |
| VB. 35 | 3d00'00" |
| VB. 36 | 3d30'00" |
| IP. 45 | 28d00'00" |
| VB. 37 | 10d00'00" |
| VB. 38 | 3d00'00" |
| VB. 39 | 1d30'00" |
| IP. 46 | 24d00'00" |
| IP. 47 | 8d00'00" |
| VB. 40 | 3d00'00" |
| IP. 48 | 5d00'00" |
| IP. 49 | 7d00'00" |
| IP. 50 | 90d00'00" |
| VB. 41 | 10d00'00" |
| VB. 42 | 3d00'00" |
| IP. 51 | 90d44'49" |



JAPAN INTERNATIONAL
COOPERATION AGENCY

Project & Location

The Preparatory Survey for the Project of
Micro- Hydroelectric Power Generation in Metropolitan Area of
Tegucigalpa in the Republic of Honduras

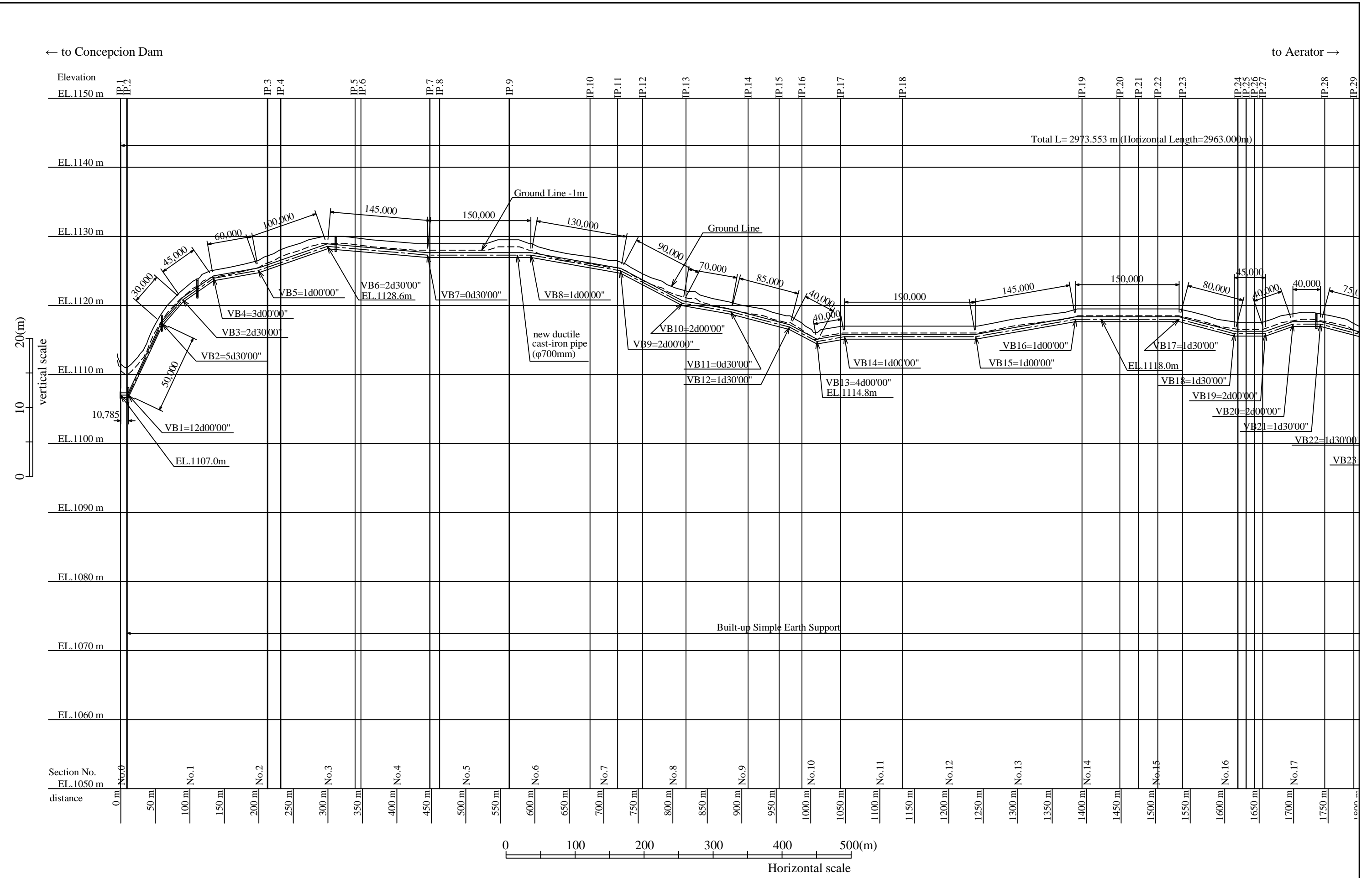
Drawing Title

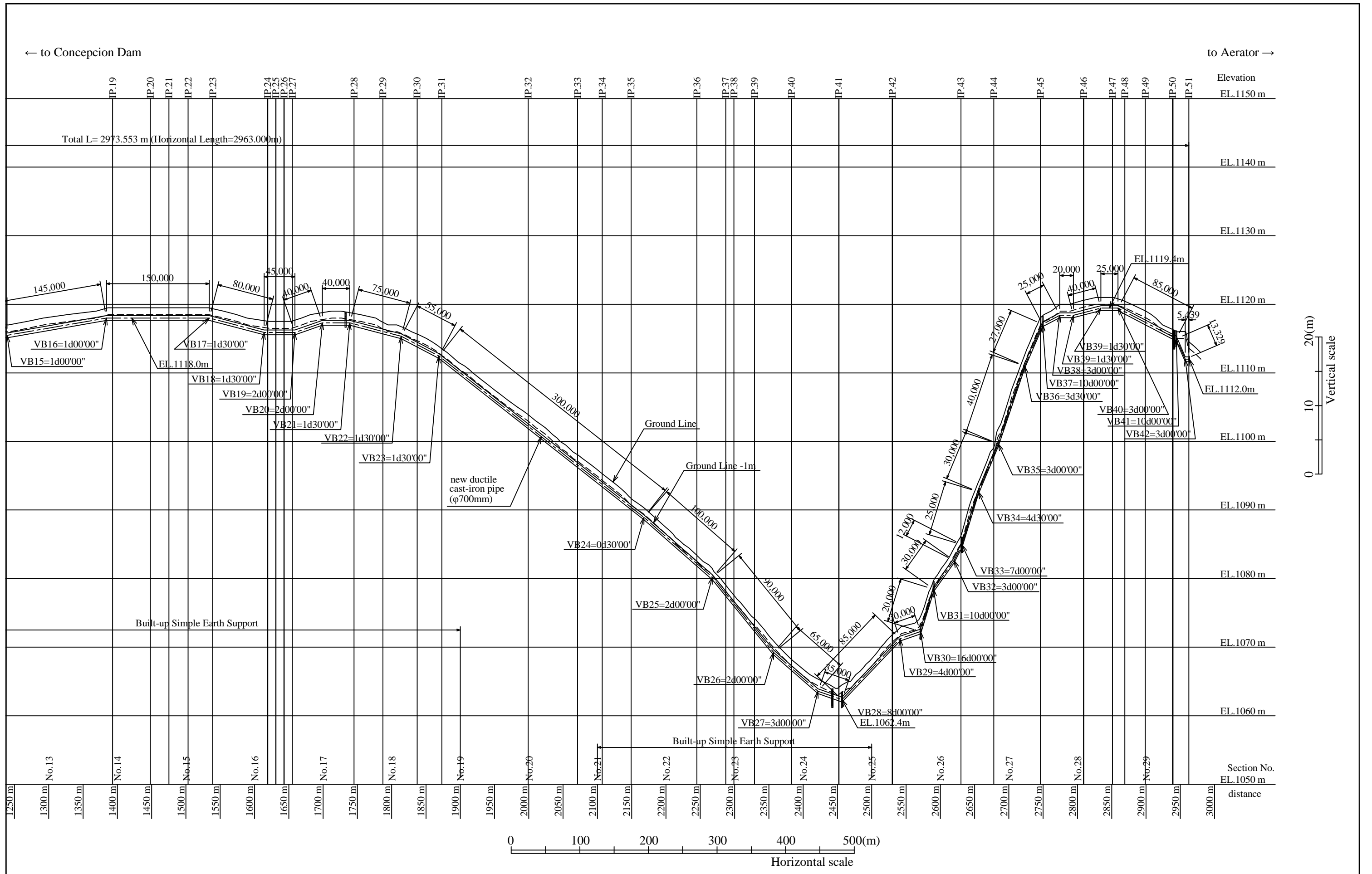
**Concepcion Hydroelectric Power Plant
Water pipe, General plan(2/2)**


DWG No.

CC-CV-02

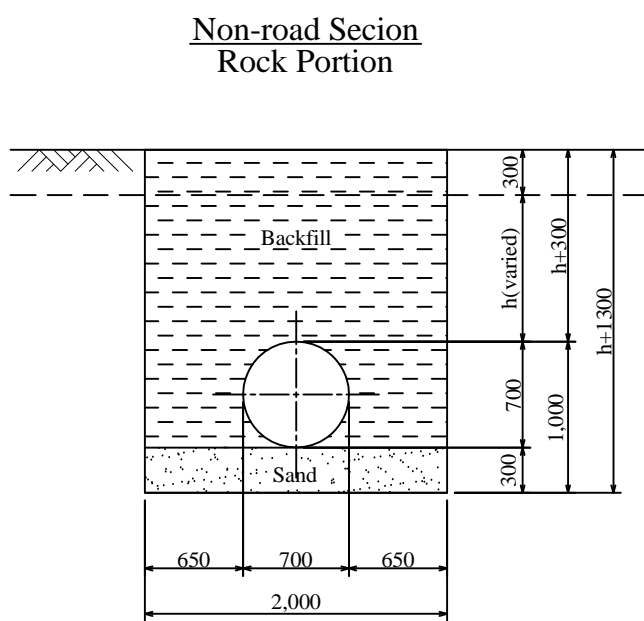
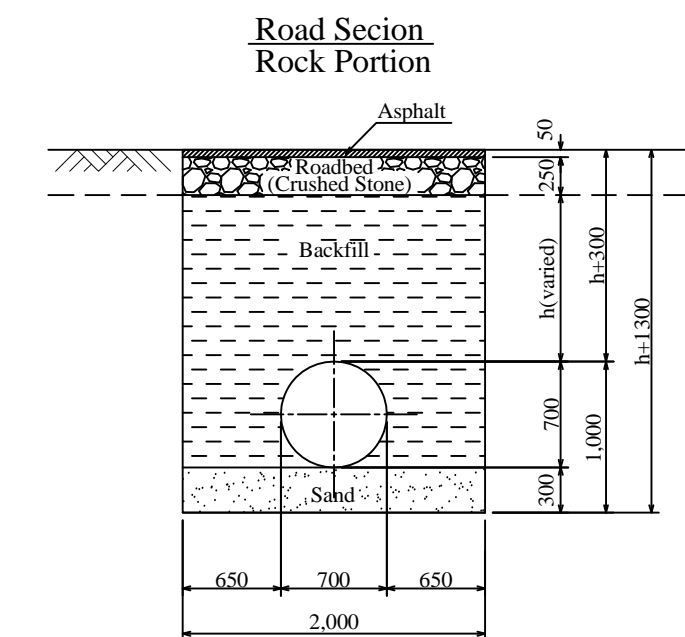
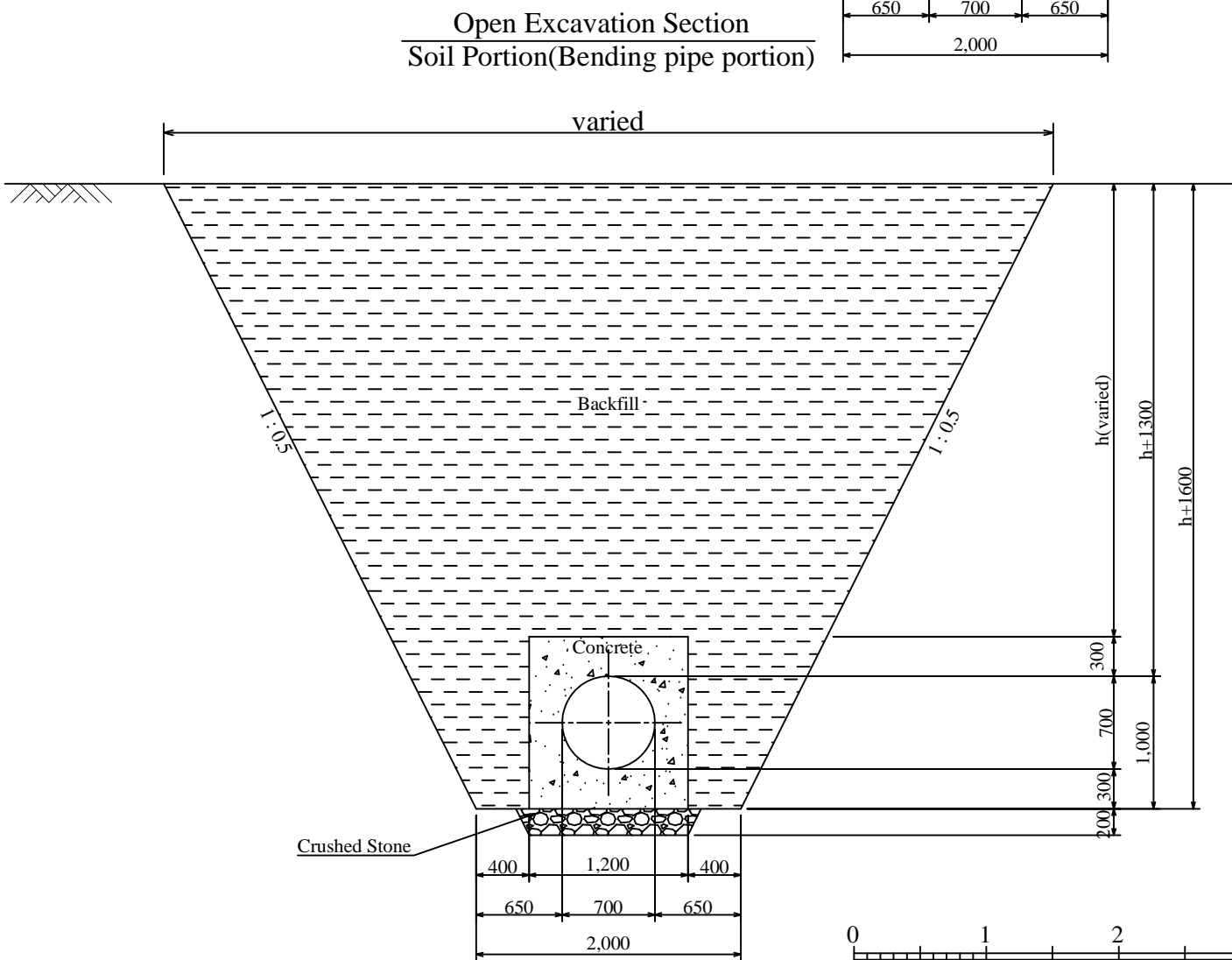
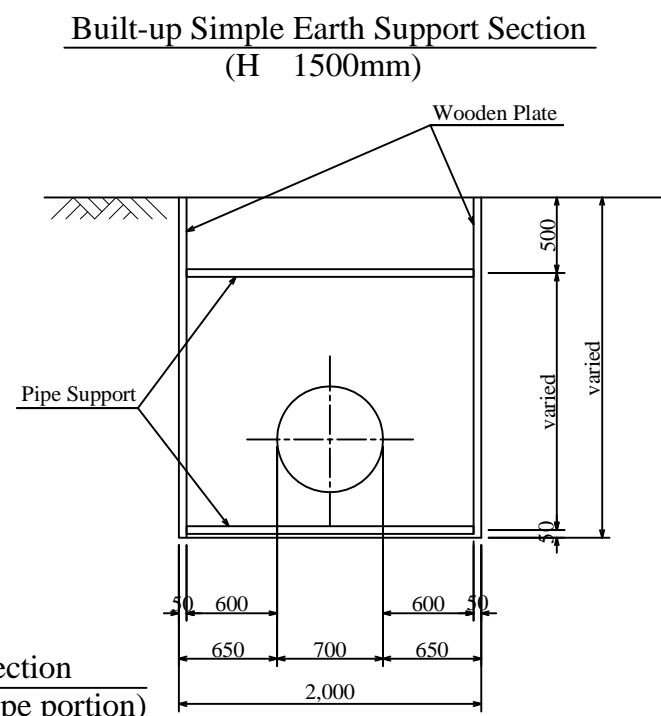
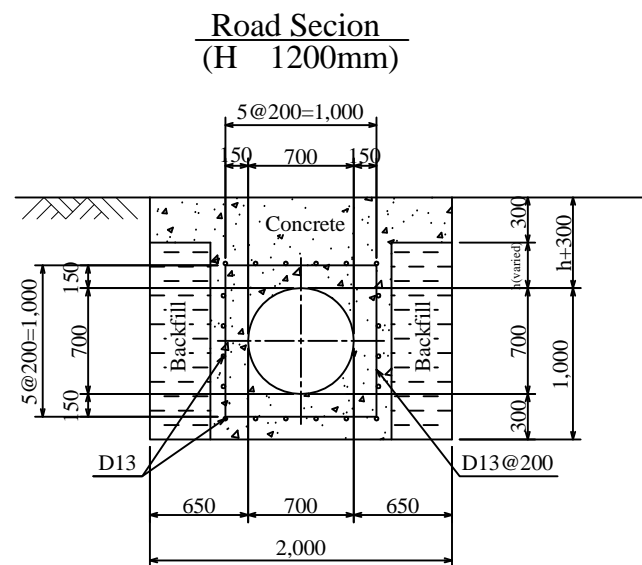
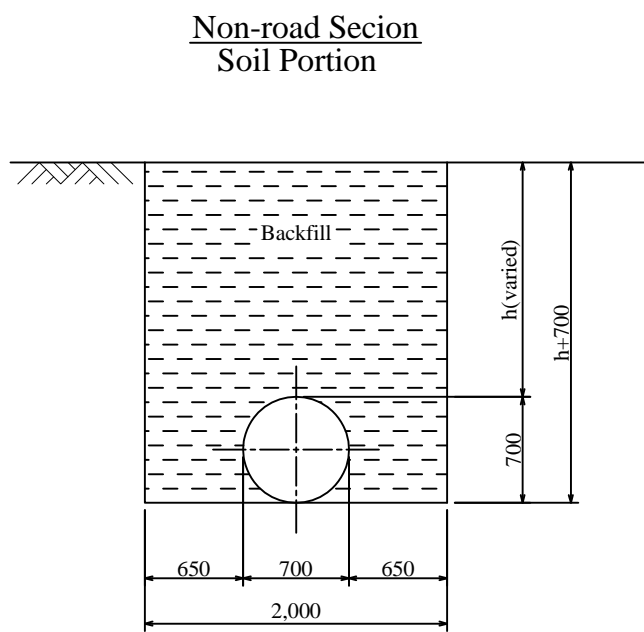
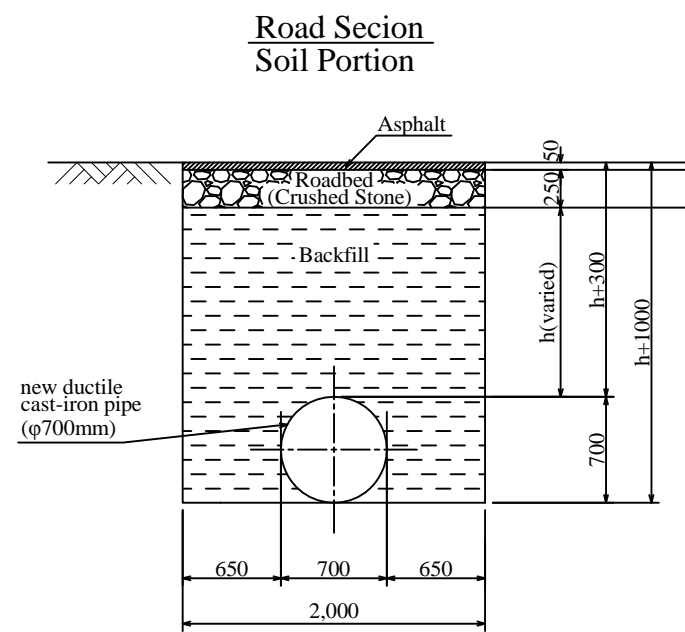
Dec.2012





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|  JAPAN INTERNATIONAL COOPERATION AGENCY | Project & Location | | Drawing Title | DWG No. |
| | The Preparatory Survey for the Project of Micro- Hydroelectric Power Generation in Metropolitan Area of Tegucigalpa in the Republic of Honduras | | Concepcion Hydroelectric Power Plant Water pipe, Profile (2/2) | CC-CV-04 |
| | | | | Dec.2012 |

Typical Cross Section



JAPAN INTERNATIONAL
COOPERATION AGENCY

Project & Location

The Preparatory Survey for the Project of
Micro- Hydroelectric Power Generation in Metropolitan Area of
Tegucigalpa in the Republic of Honduras

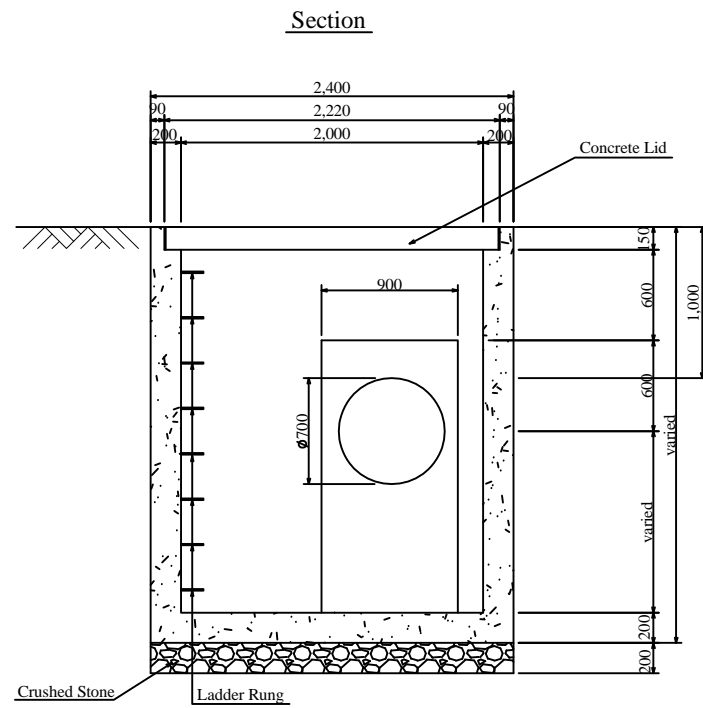
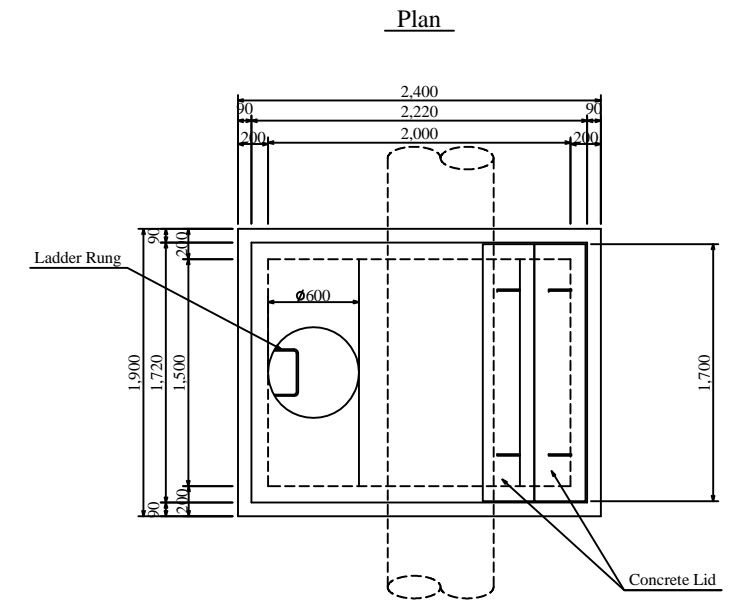
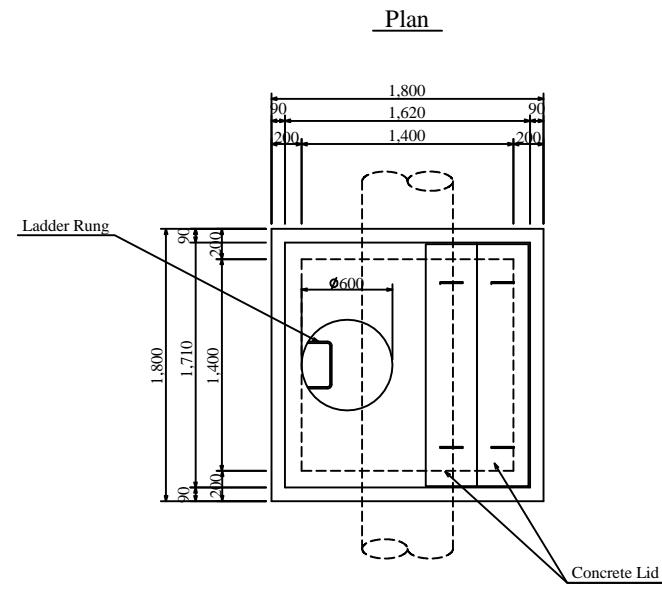
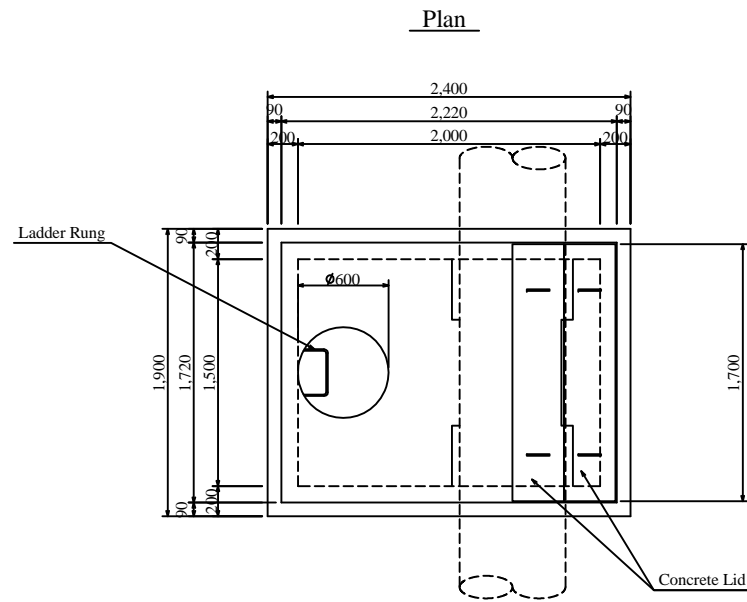
Drawing Title

**Concepcion Hydroelectric Power Plant
Water pipe, Typical Sections**

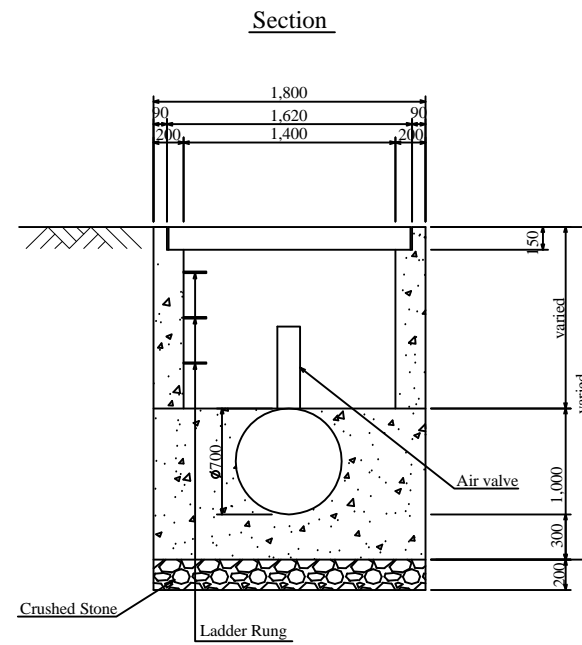
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CC-CV-05

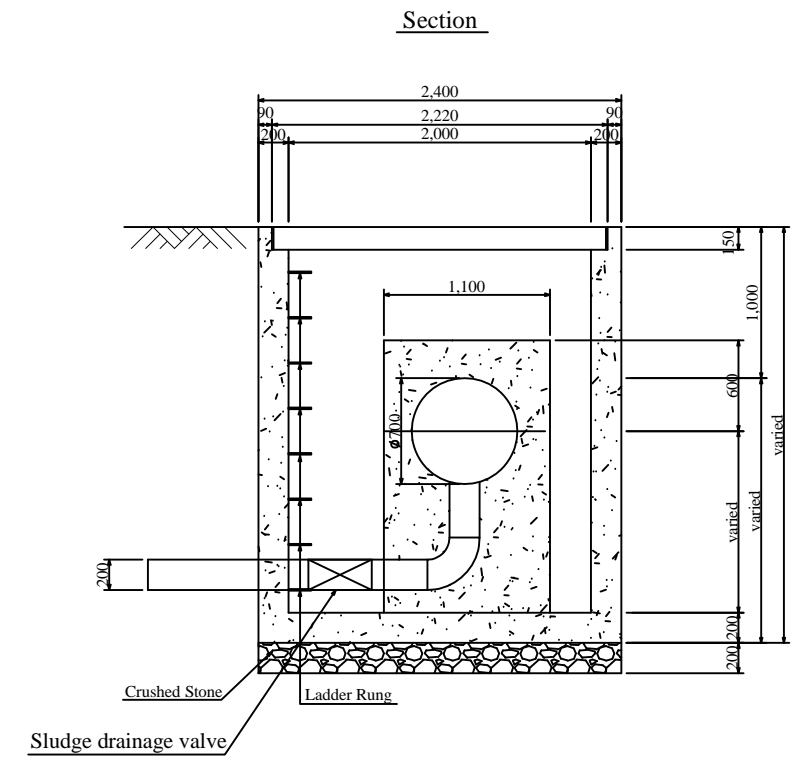
Dec.2012



Gate Valve Pit



Air Valve pit



Sludge Drainage Valve



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Project & Location

The Preparatory Survey for the Project of
Micro- Hydroelectric Power Generation in Metropolitan Area of
Tegucigalpa in the Republic of Honduras

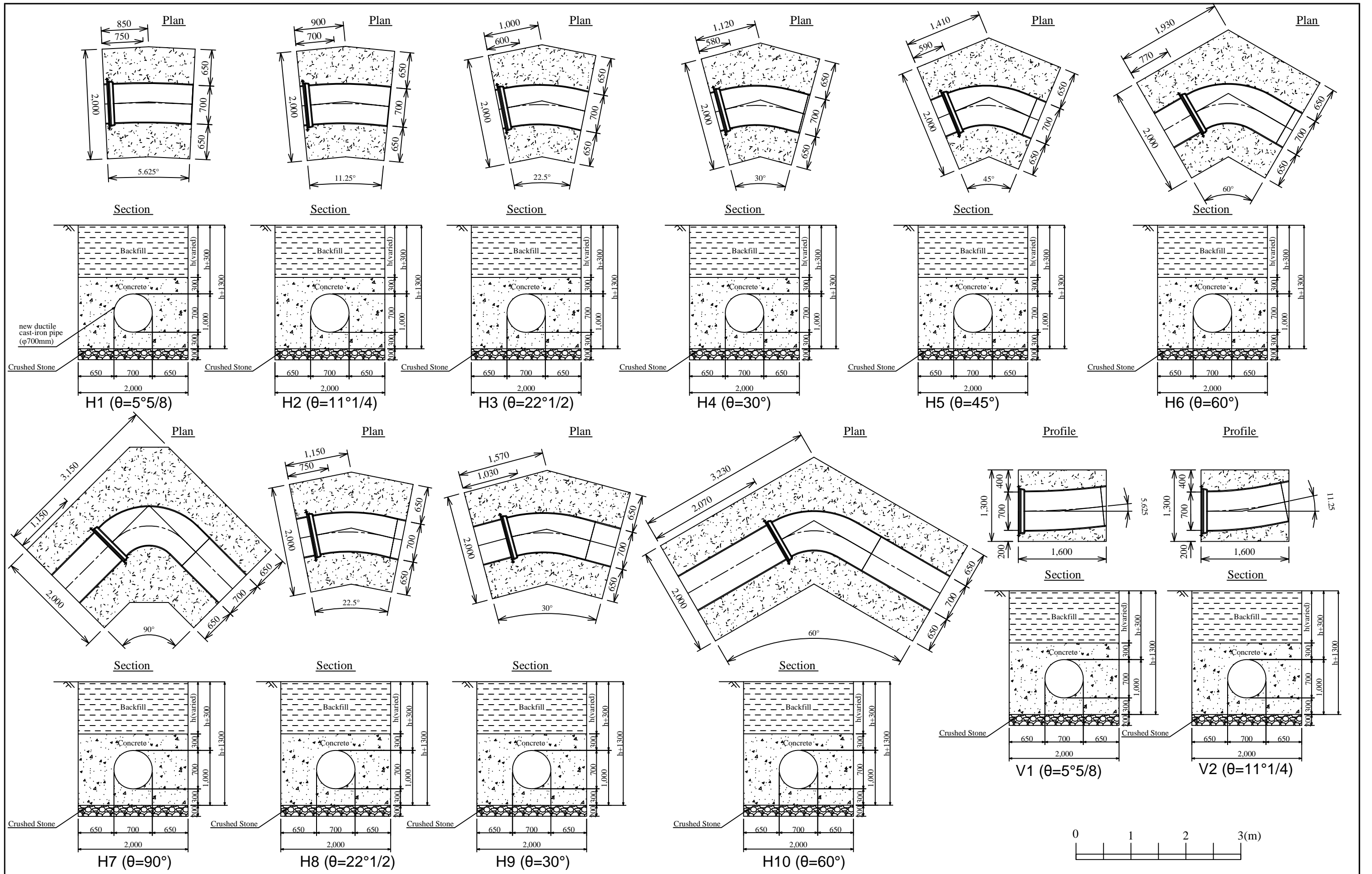
Drawing Title

**Concepcion Hydroelectric Power Plant
Valve Pits,Details**


DWG No.

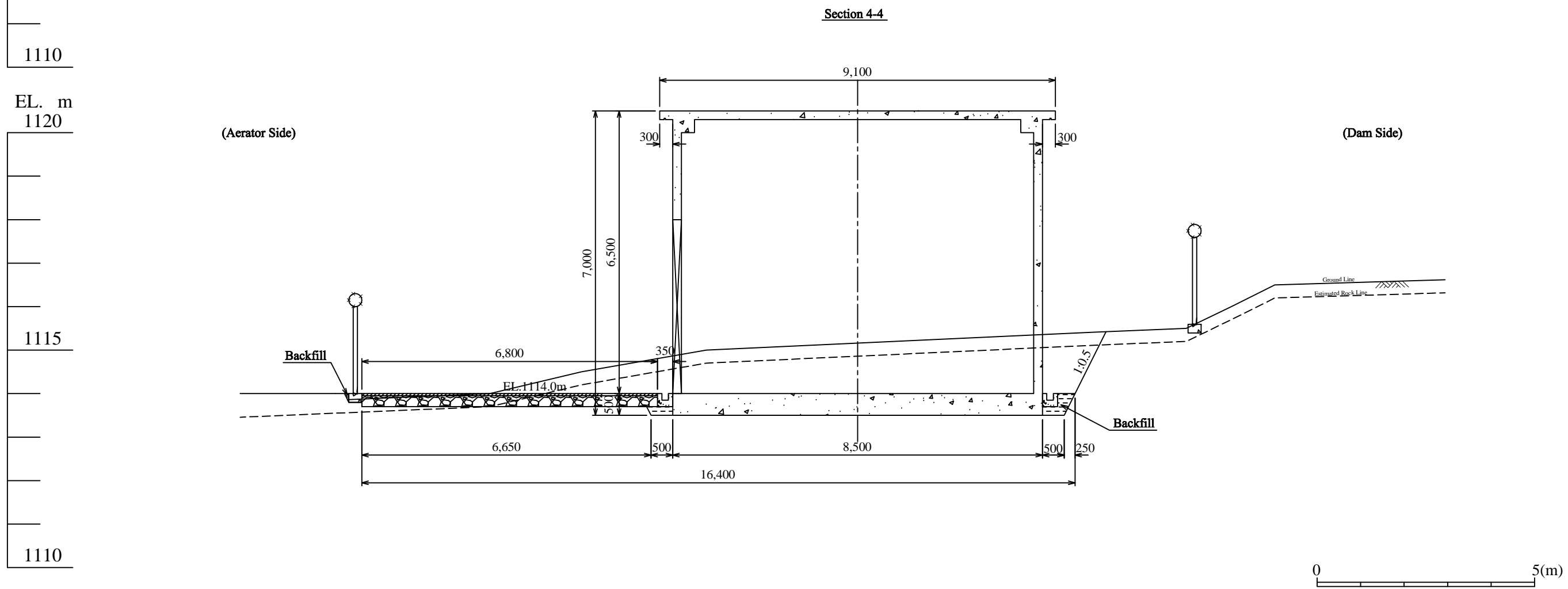
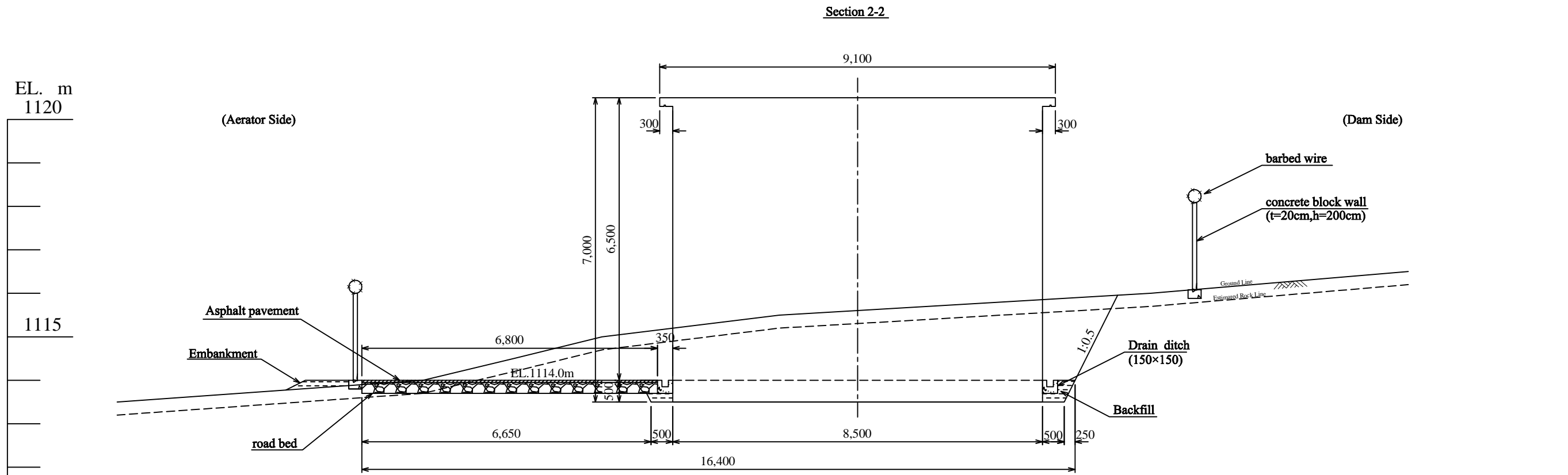
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Dec.2012





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|  JAPAN INTERNATIONAL COOPERATION AGENCY | Project & Location | Drawing Title | DWG No. |
| | The Preparatory Survey for the Project of Micro- Hydroelectric Power Generation in Metropolitan Area of Tegucigalpa in the Republic of Honduras | Concepcion Hydroelectric Power Plant Powerhouse, General Layout plan | CC-CV-08 |
| | | | Dec.2012 |

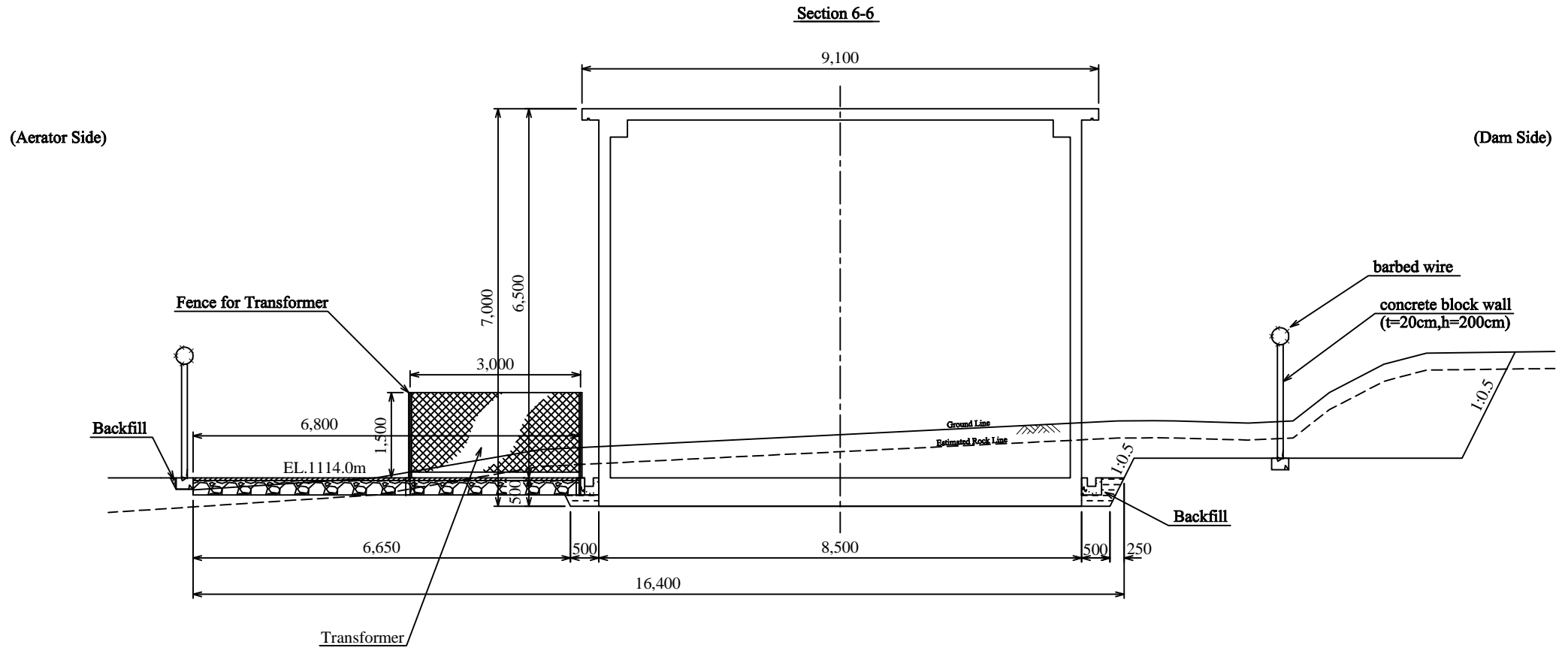


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|  JAPAN INTERNATIONAL COOPERATION AGENCY | Project & Location | Drawing Title | DWG No. |
| | The Preparatory Survey for the Project of Micro- Hydroelectric Power Generation in Metropolitan Area of Tegucigalpa in the Republic of Honduras | Concepcion Hydroelectric Power Plant Powerhouse, Sections(1/2) | CC-CV-09 |
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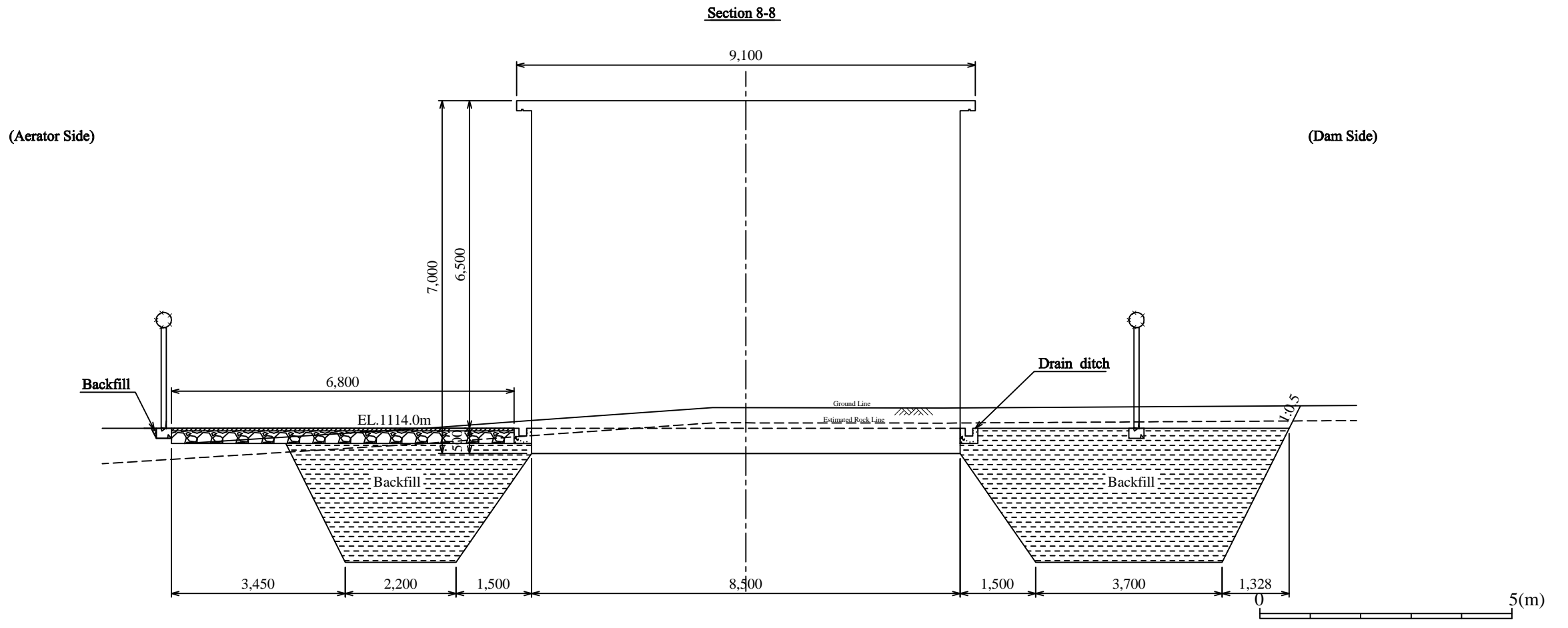
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JAPAN INTERNATIONAL
COOPERATION AGENCY

Project & Location

The Preparatory Survey for the Project of
Micro- Hydroelectric Power Generation in Metropolitan Area of
Tegucigalpa in the Republic of Honduras

Drawing Title

**Concepcion Hydroelectric Power Plant
Powerhouse, Sections(2/2)**

DWG No.

CC-CV-10

Dec.2012

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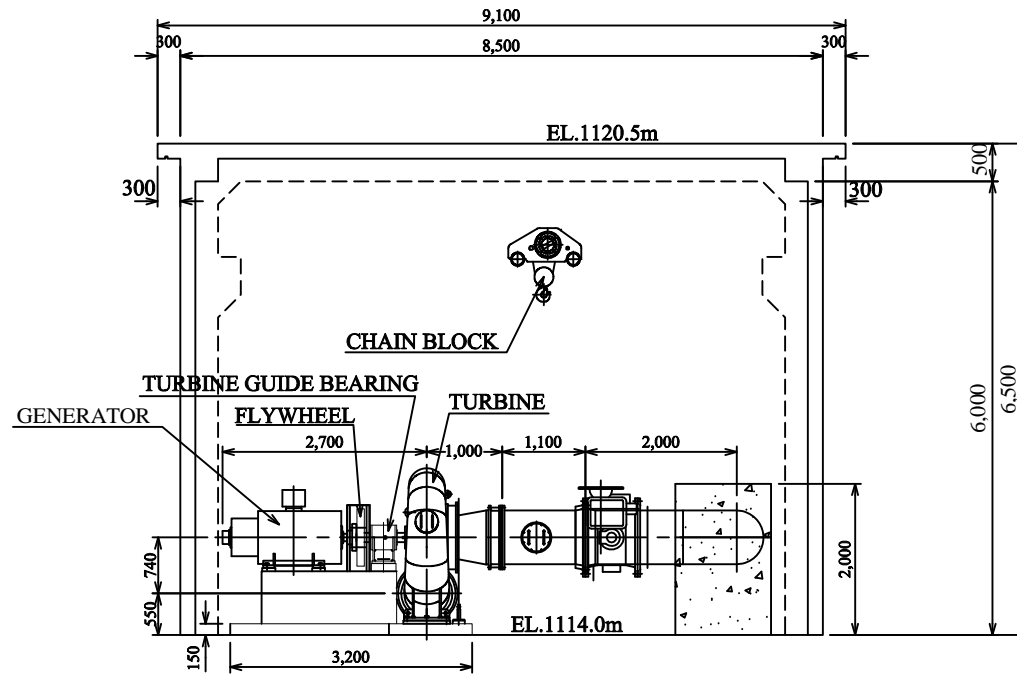
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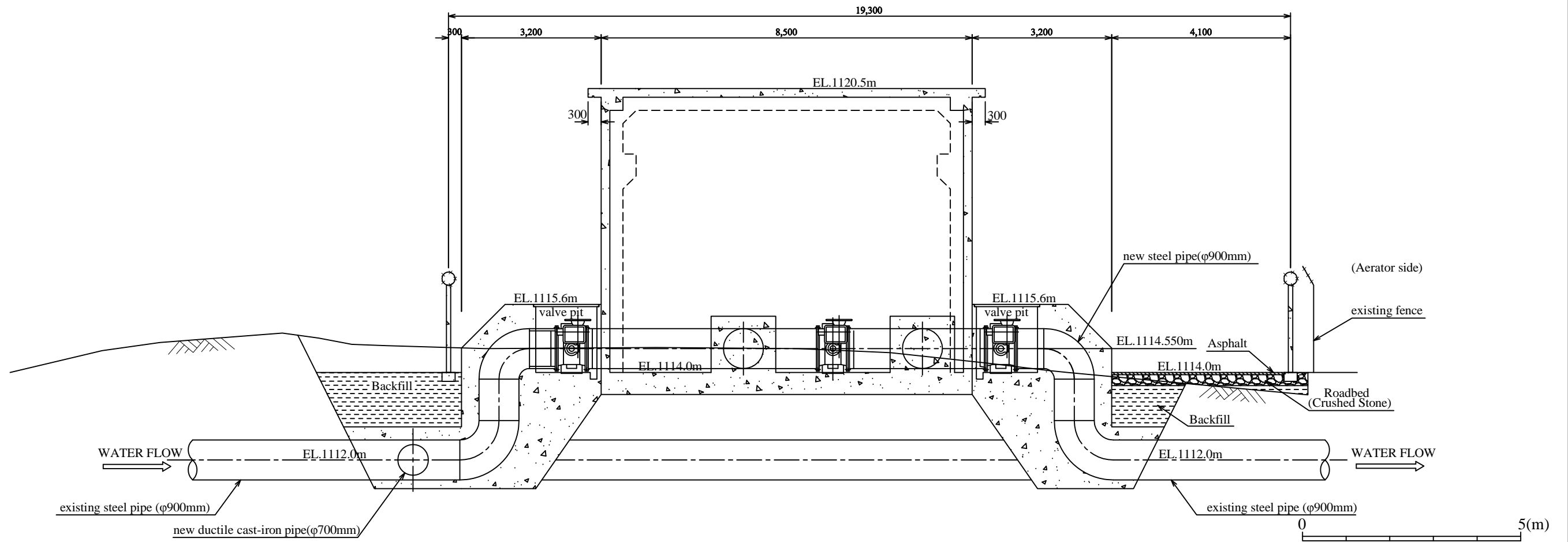
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Section a-a



Section b-b



JAPAN INTERNATIONAL
COOPERATION AGENCY

Project & Location

The Preparatory Survey for the Project of
Micro- Hydroelectric Power Generation in Metropolitan Area of
Tegucigalpa in the Republic of Honduras

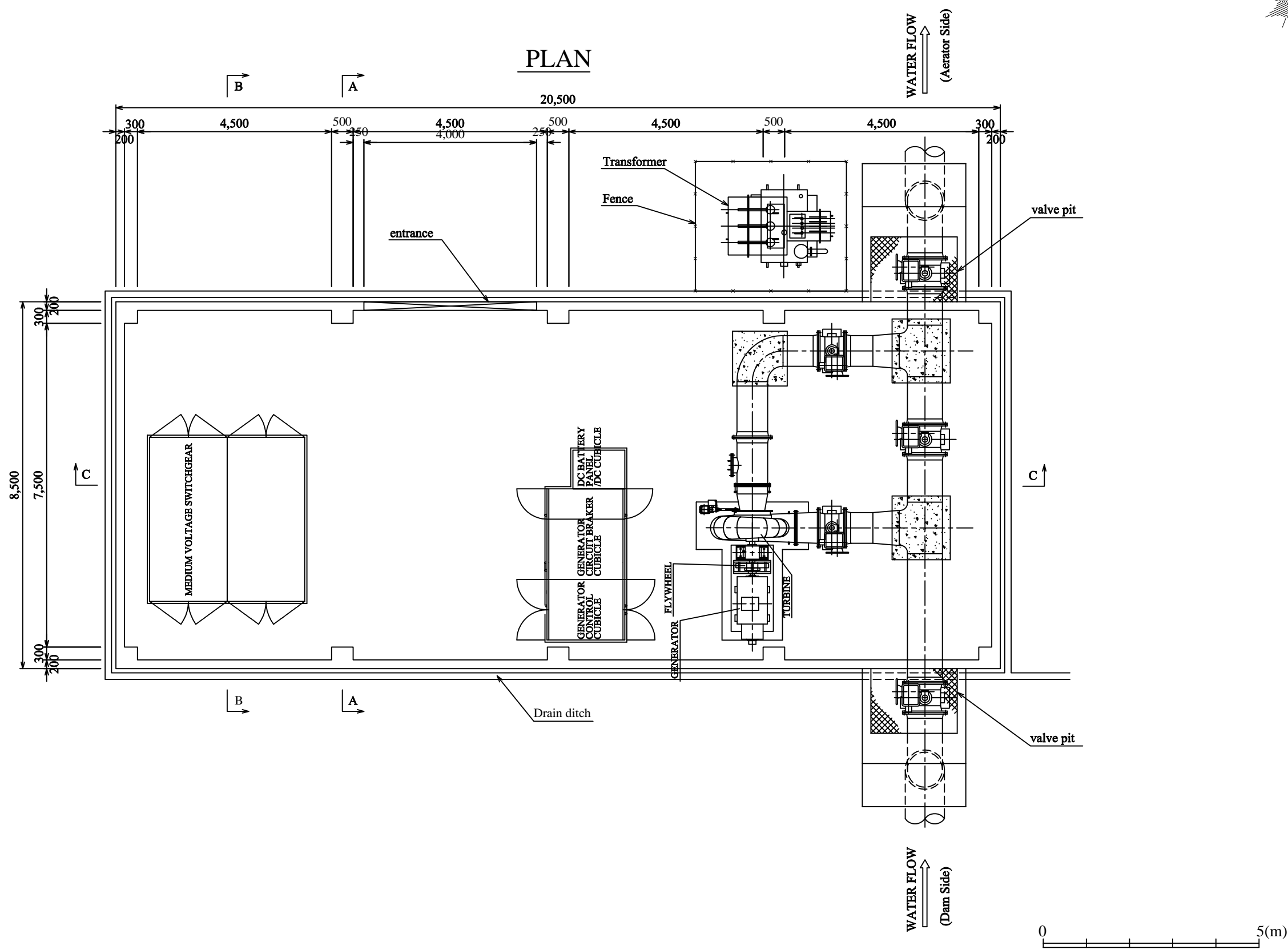
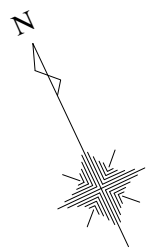
Drawing Title


**Concepcion Hydroelectric Power Plant
Powerhouse, Typical Sections**

DWG No.

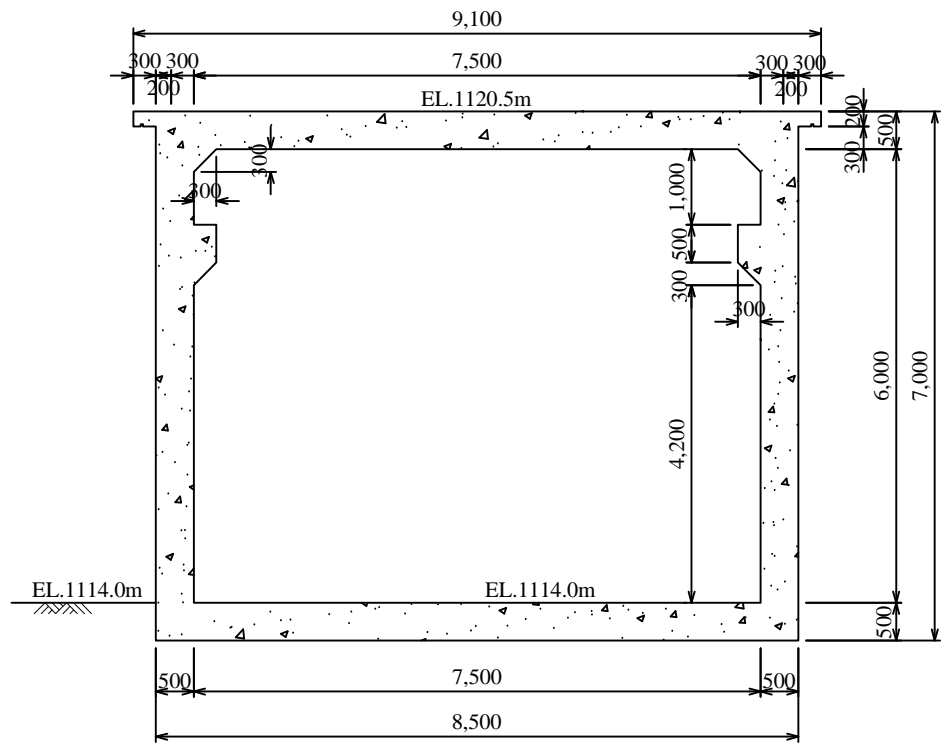
CC-CV-11

Dec.2012

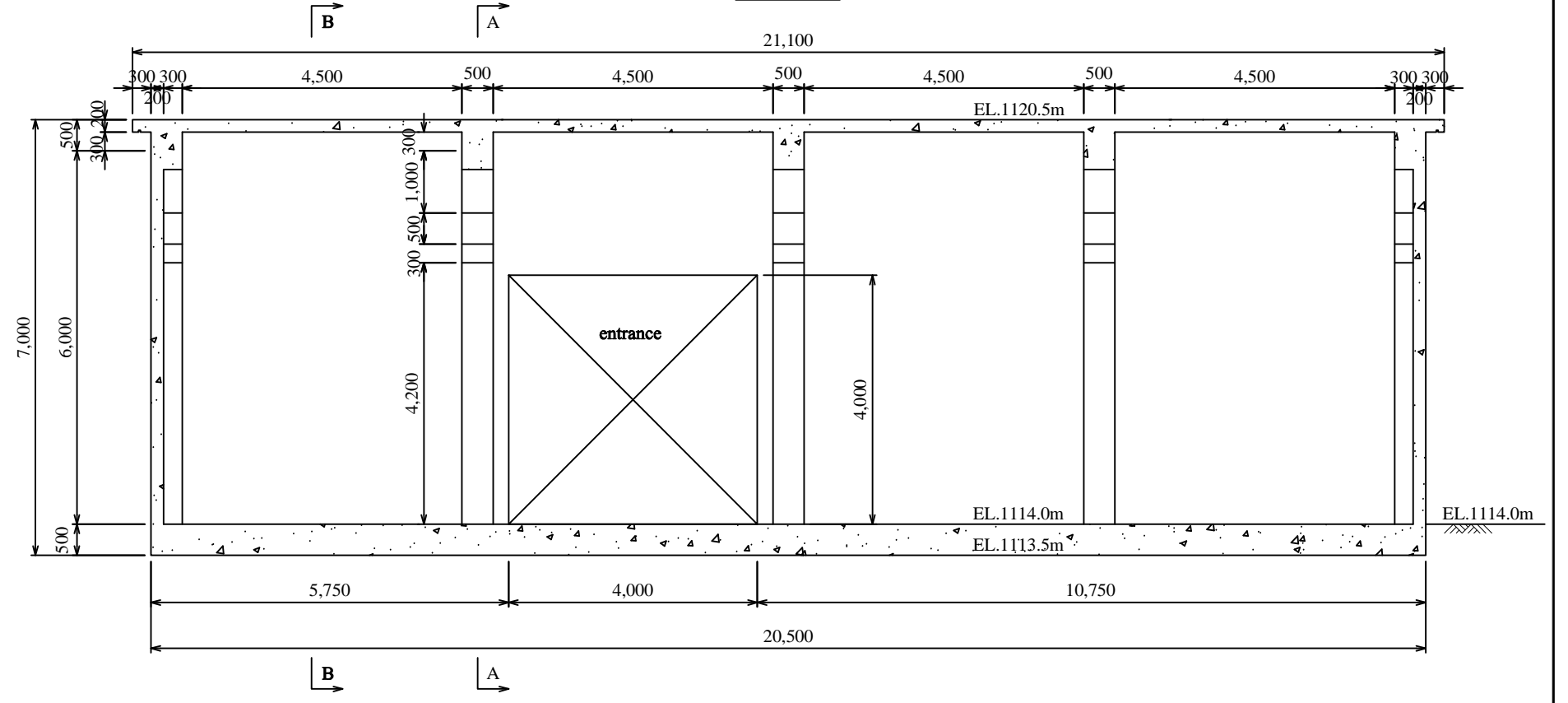


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|  JAPAN INTERNATIONAL COOPERATION AGENCY | Project & Location | Drawing Title | DWG No. |
| | The Preparatory Survey for the Project of Micro- Hydroelectric Power Generation in Metropolitan Area of Tegucigalpa in the Republic of Honduras | Concepcion Hydroelectric Power Plant Powerhouse, Concrete Outline Plan | CC-CV-12 |
| | | | Dec.2012 |

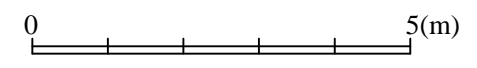
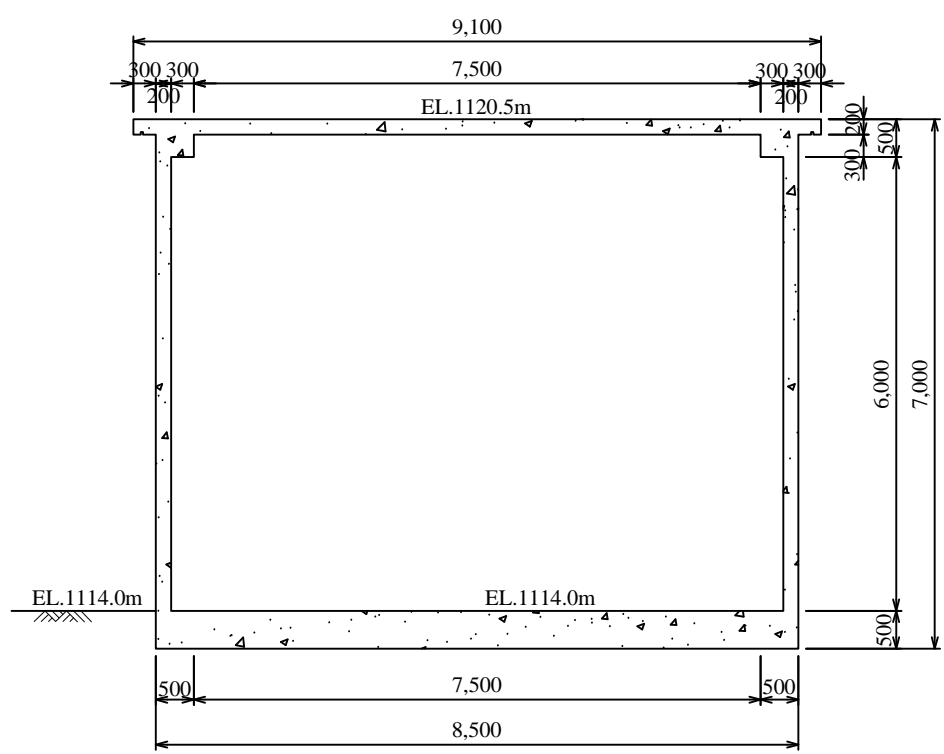
A - A




C - C

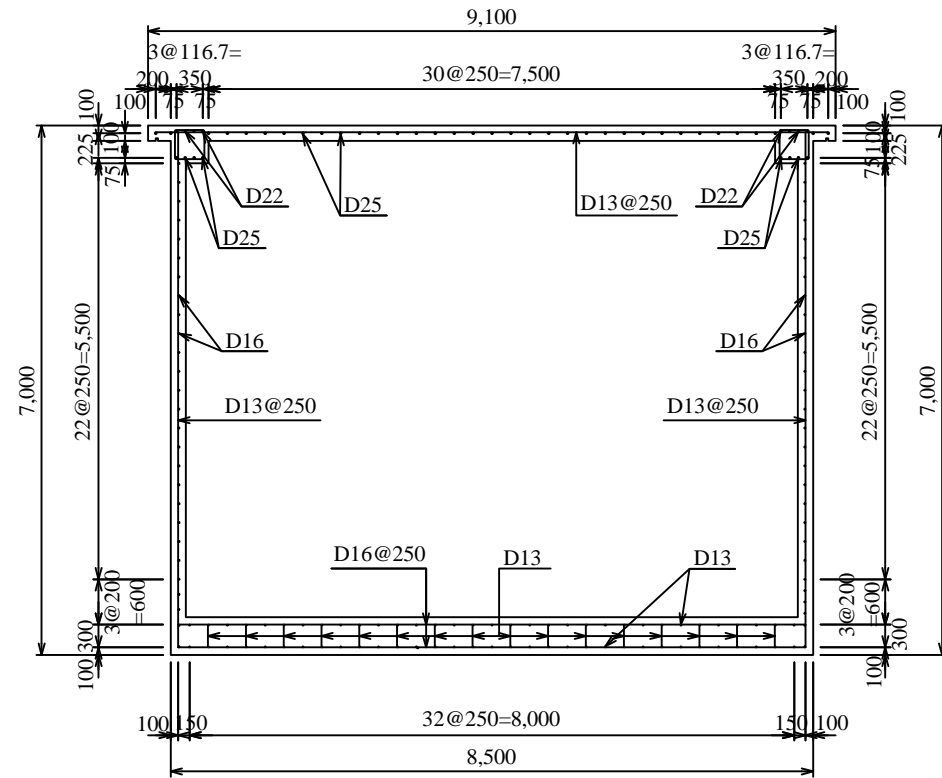


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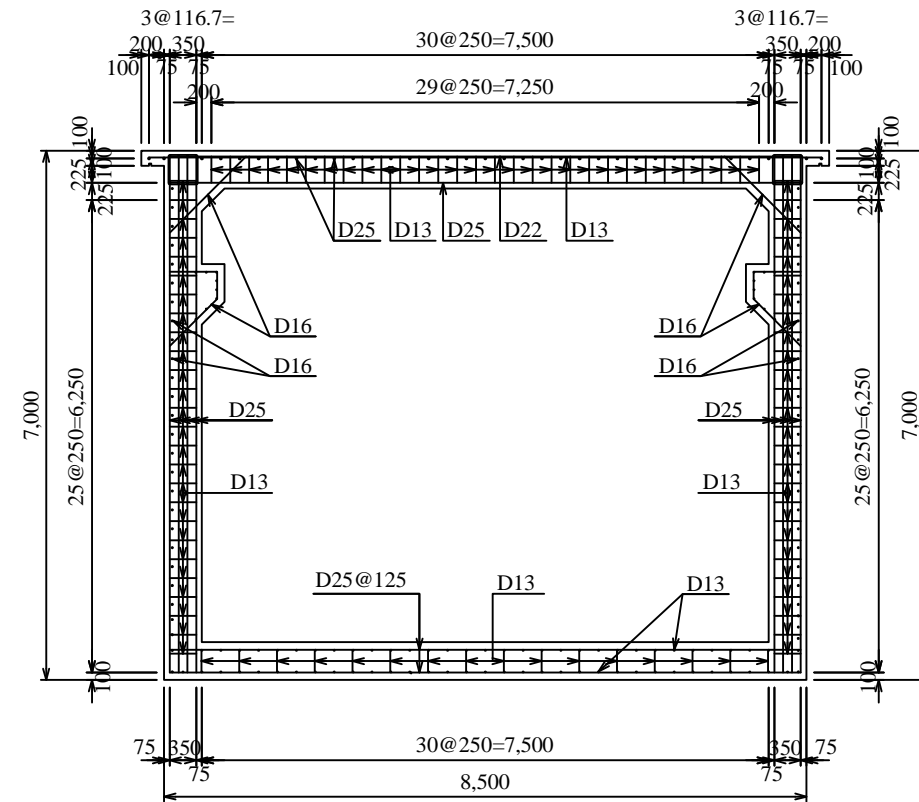


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|  JAPAN INTERNATIONAL COOPERATION AGENCY | Project & Location | Drawing Title | DWG No. |
| | The Preparatory Survey for the Project of Micro- Hydroelectric Power Generation in Metropolitan Area of Tegucigalpa in the Republic of Honduras | Concepcion Hydroelectric Power Plant Powerhouse, Concrete Outline Profile and Sections | CC-CV-13 |
| | | | Dec.2012 |

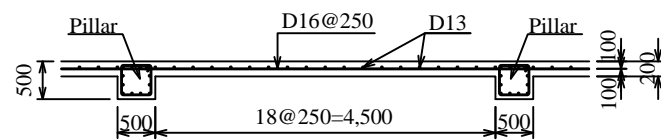
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Scale1



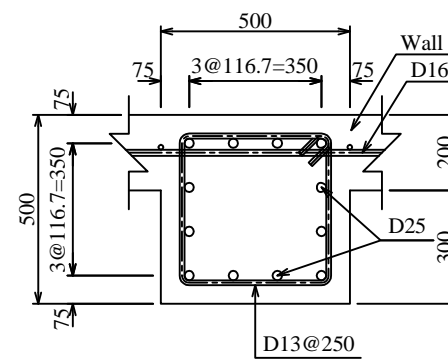
Pillar Section
Scale1



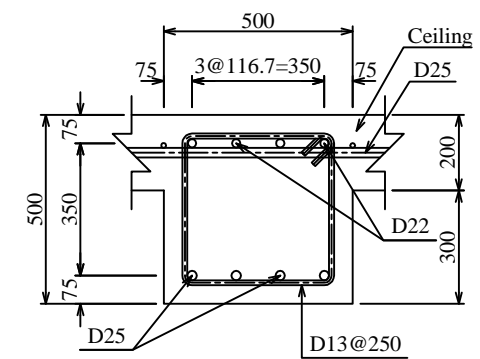
Wall Section
Scale1



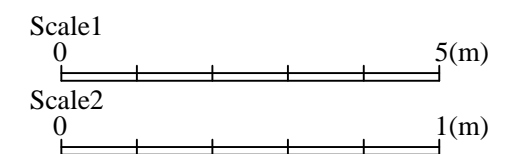
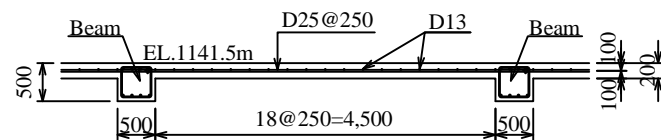
Pillar Section
Scale2



Beam Section
Scale2



Ceiling Section
Scale1



JAPAN INTERNATIONAL
COOPERATION AGENCY

Project & Location

The Preparatory Survey for the Project of
Micro- Hydroelectric Power Generation in Metropolitan Area of
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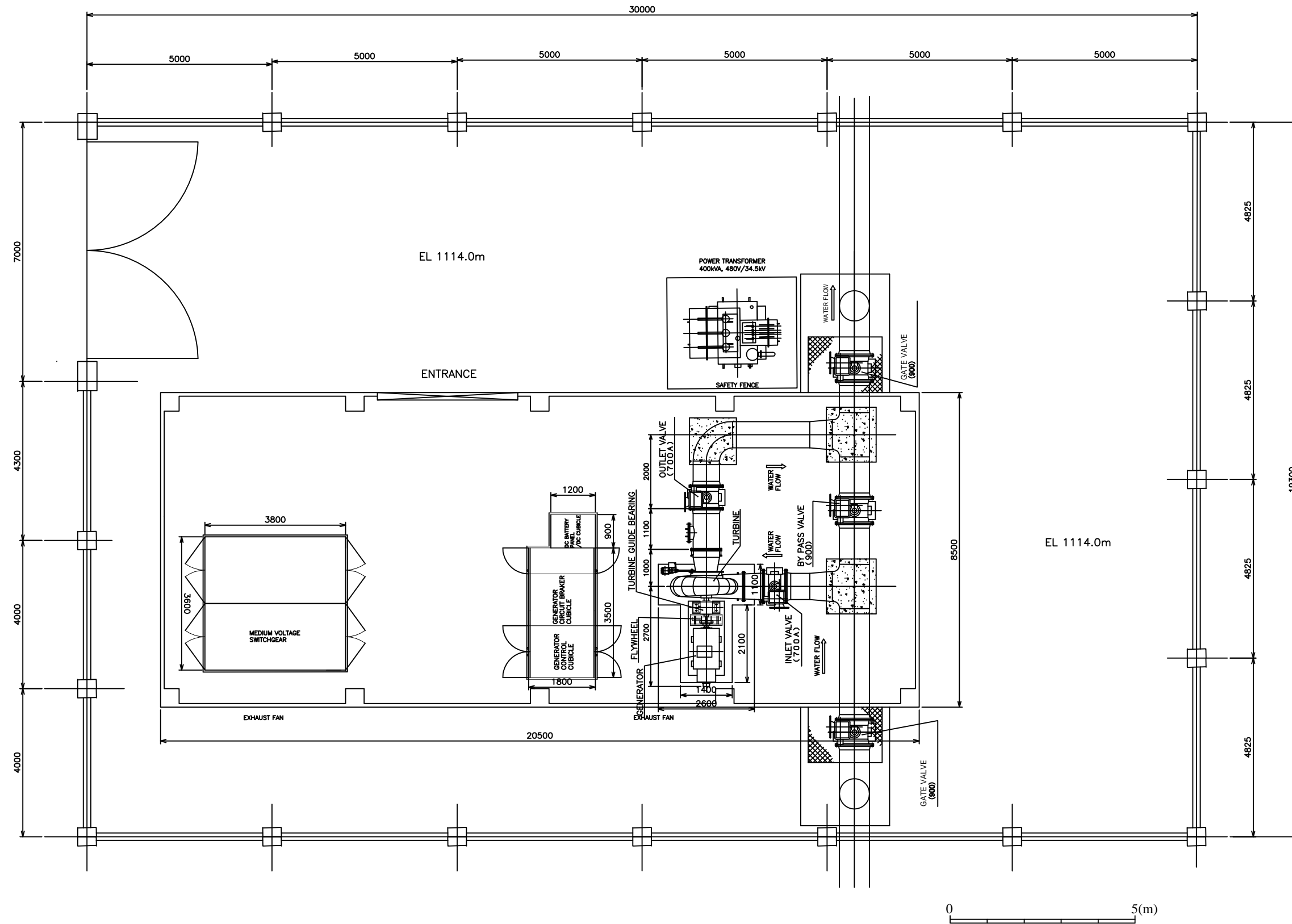
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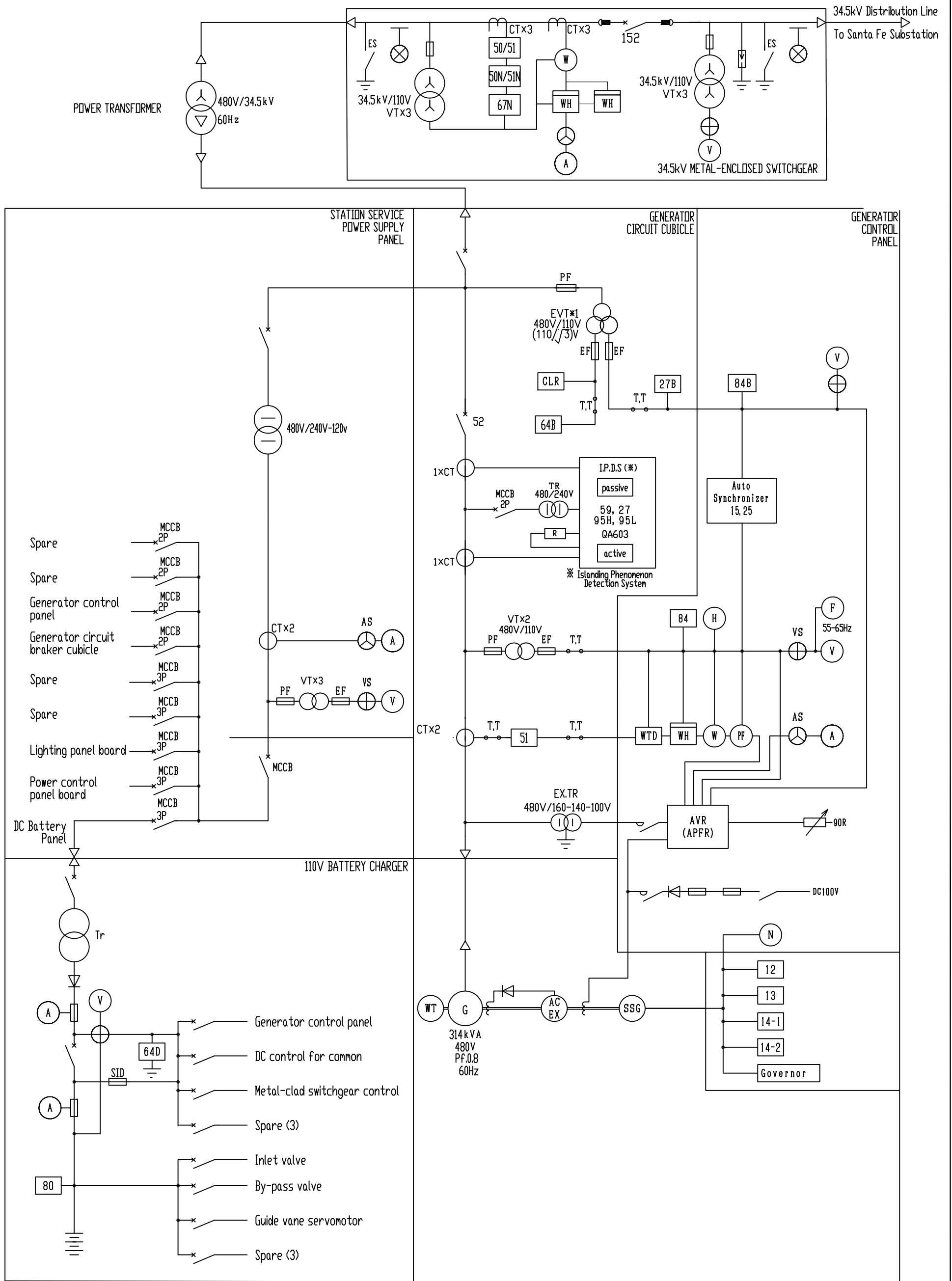
**Concepcion Hydroelectric Power Plant
Powerhouse, Reinforcement Arrangement**

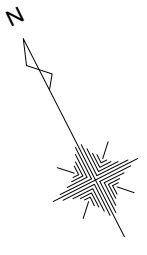
DWG No.

CC-CV-14

Dec.2012







Existing 34.5kV Distribution Line

Existing 34.5kV Distribution Line Pole

AERATOR

New 34.5kV Power Cable

EL. 1114.0m

New 34.5kV Power Cable

ENTRANCE

EL. 1114.0m

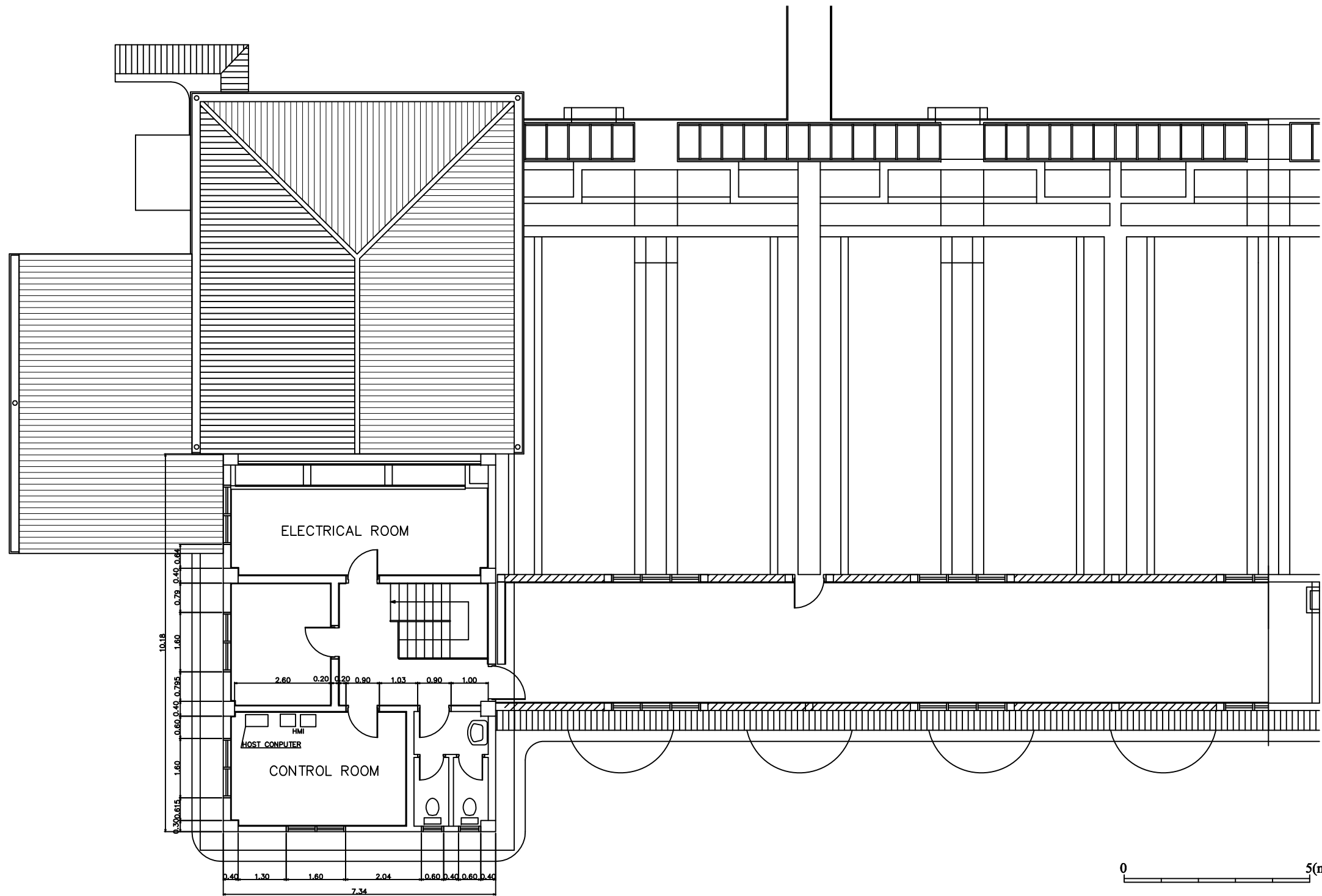
19300

CONCEPCION POWERHOUSE


Existing 34.5kV Distribution Line Pole

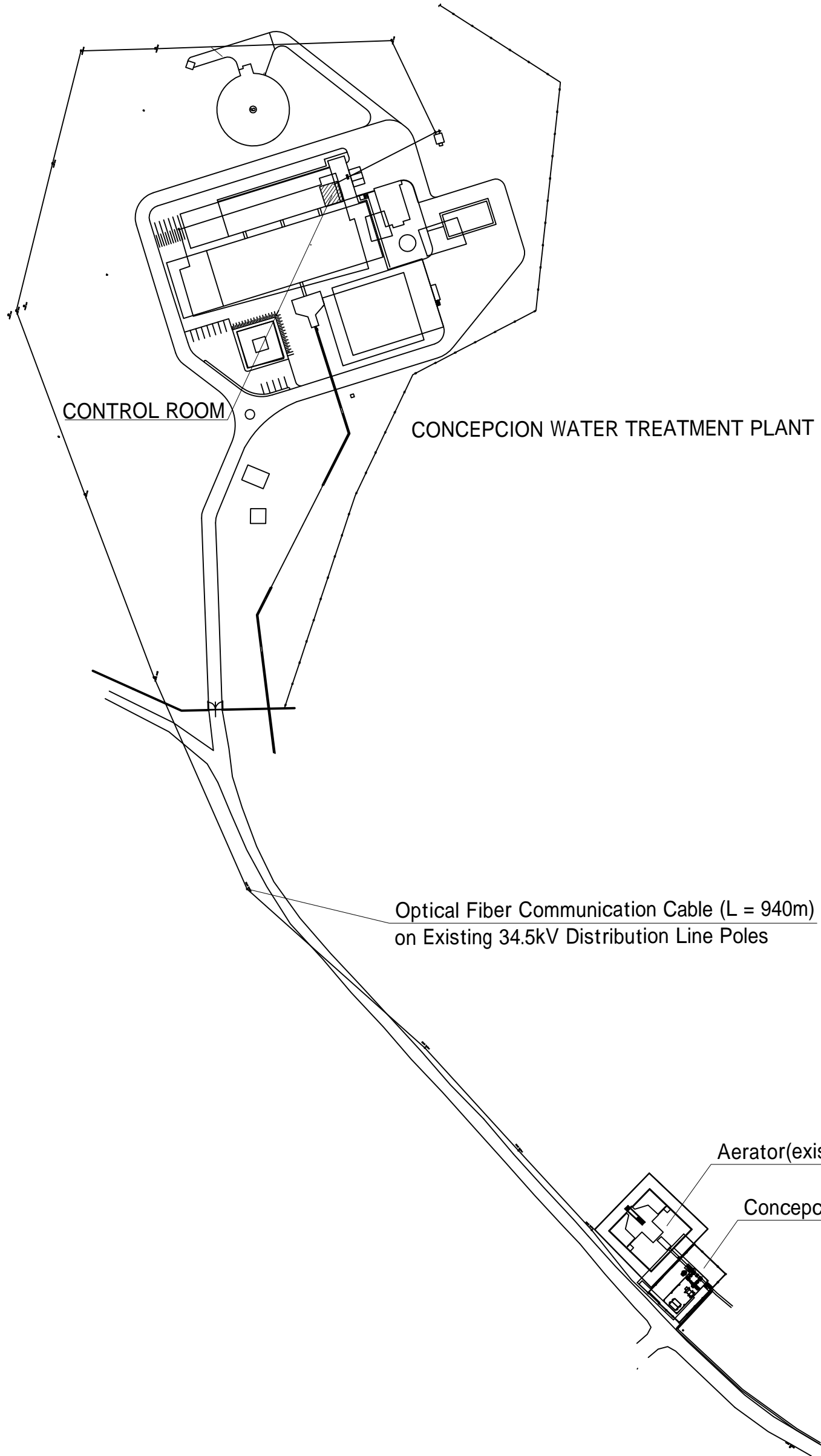
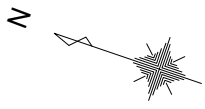
Existing 34.5kV Distribution Line

0 5.0 m




CONCEPCION WATER TREATMENT PLANT

| | | | |
|---|---|--|----------------|
|  JAPAN INTERNATIONAL COOPERATION AGENCY | Project & Location | Drawing Title | DWG No. |
| | The Preparatory Survey for the Project of Micro- Hydroelectric Power Generation in Metropolitan Area of Tegucigalpa in the Republic of Honduras | Concepcion Hydroelectric Power Plant Control Room (Concepcion Water Treatment Plant) | CC-EM-04 |
| | | | Dec. 9, 2012 |




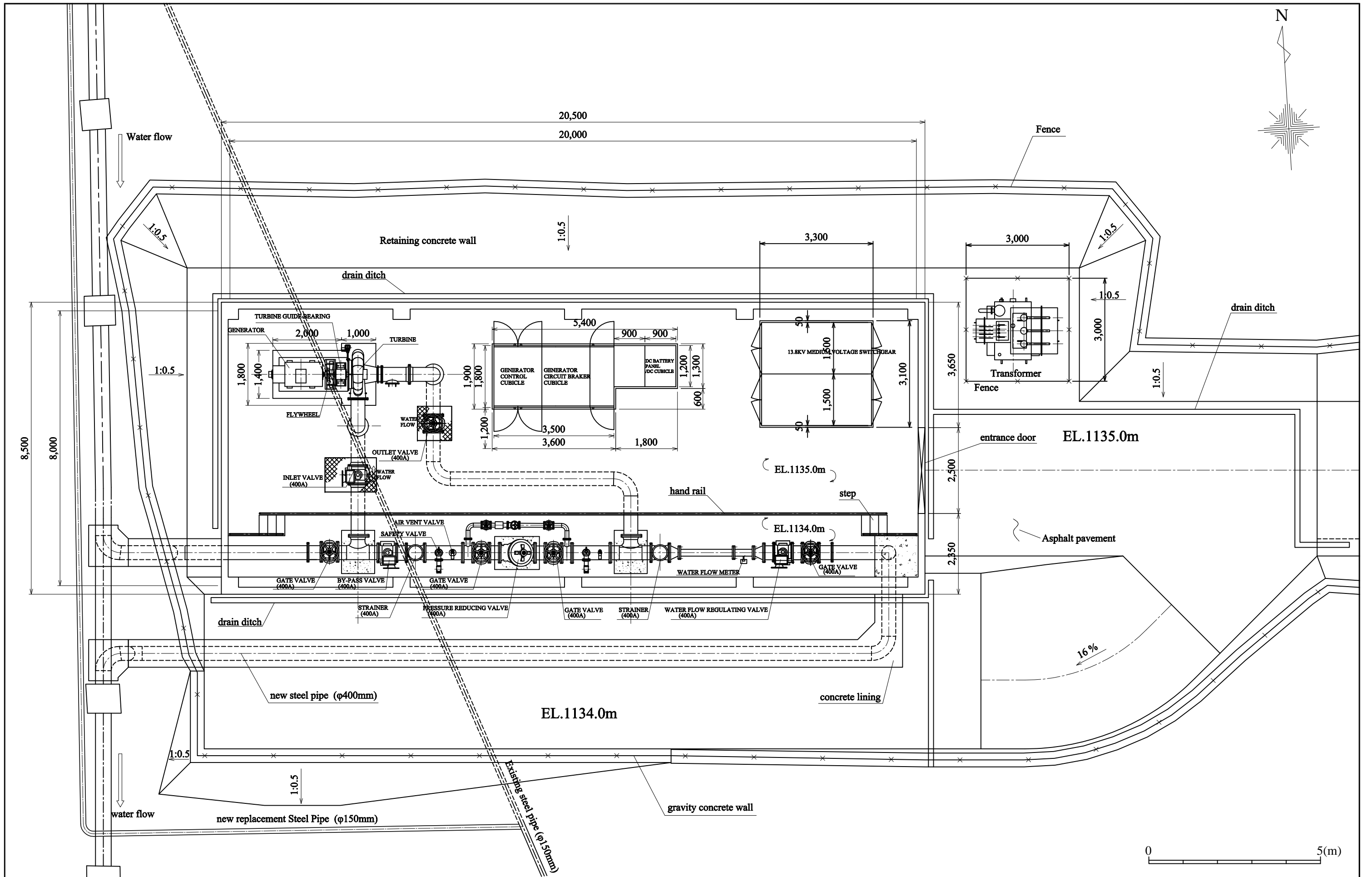
0 100 (m)


| | | | |
|---|---|---|--------------------------|
|  JAPAN INTERNATIONAL COOPERATION AGENCY | Project & Location | Drawing Title | DWG No. |
| | The Preparatory Survey for the Project of Micro- Hydroelectric Power Generation in Metropolitan Area of Tegucigalpa in the Republic of Honduras | Concepcion Hydroelectric Power Plant Communication Cable Route | CC-EM-05 Dec. 9, 2012 |

PICACHO HYDROELECTRIC POWER PLANT



| | | | | | | |
|--|---|--|--|--|-----------------|--|
|  JAPAN INTERNATIONAL COOPERATION AGENCY | Project & Location | | Drawing Title | | DWG No. | |
| | The Preparatory Survey for the Project of Micro- Hydroelectric Power Generation in Metropolitan Area of Tegucigalpa in the Republic of Honduras | | Picacho Hydroelectric Power Plant Powerhouse Area, General plan | | PC-CV-01 | |
| | | | | | Dec.2012 | |



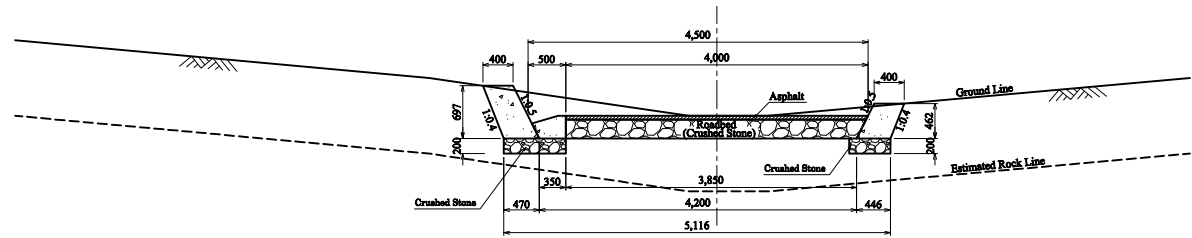
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|  JAPAN INTERNATIONAL COOPERATION AGENCY | Project & Location | Drawing Title | DWG No. |
| | The Preparatory Survey for the Project of Micro- Hydroelectric Power Generation in Metropolitan Area of Tegucigalpa in the Republic of Honduras | Picacho Hydroelectric Power Plant Powerhouse, General Layout plan | PC-CV-02 |
| | | | Dec.2012 |

EL. m
1135

1130

1125

Section 0-0

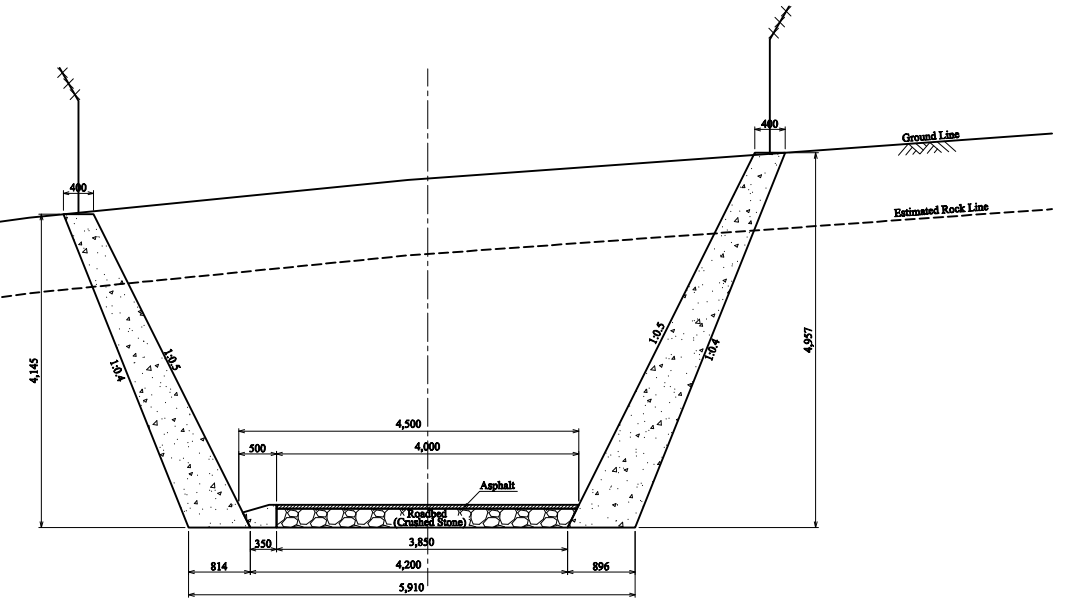


EL. m
1140

1135

1130

Section 4-4

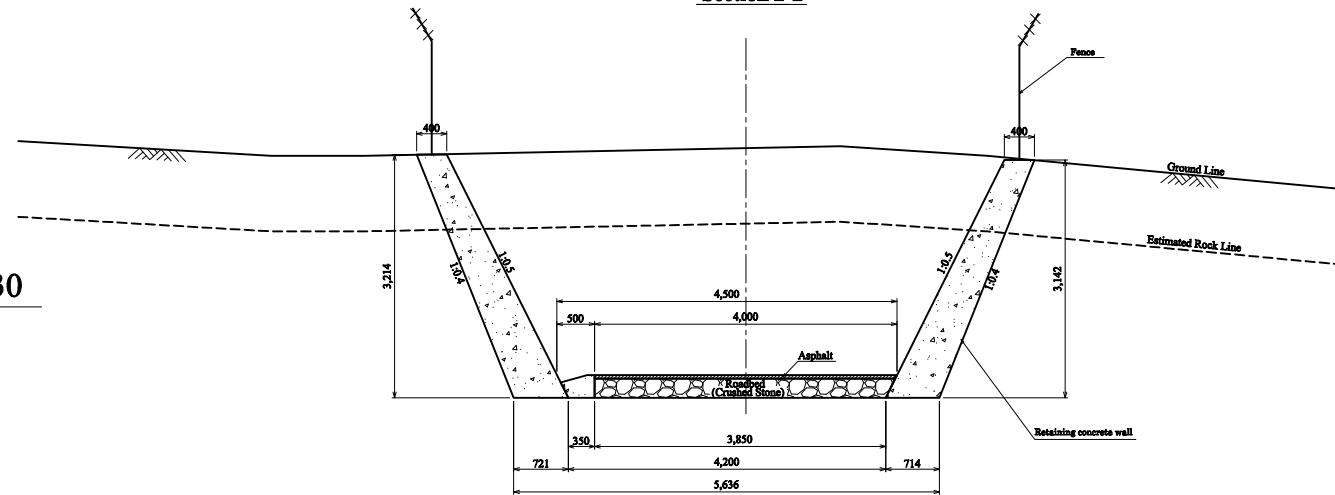


EL. m
1135

1130

1125

Section 2-2

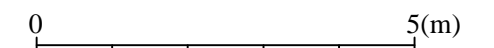
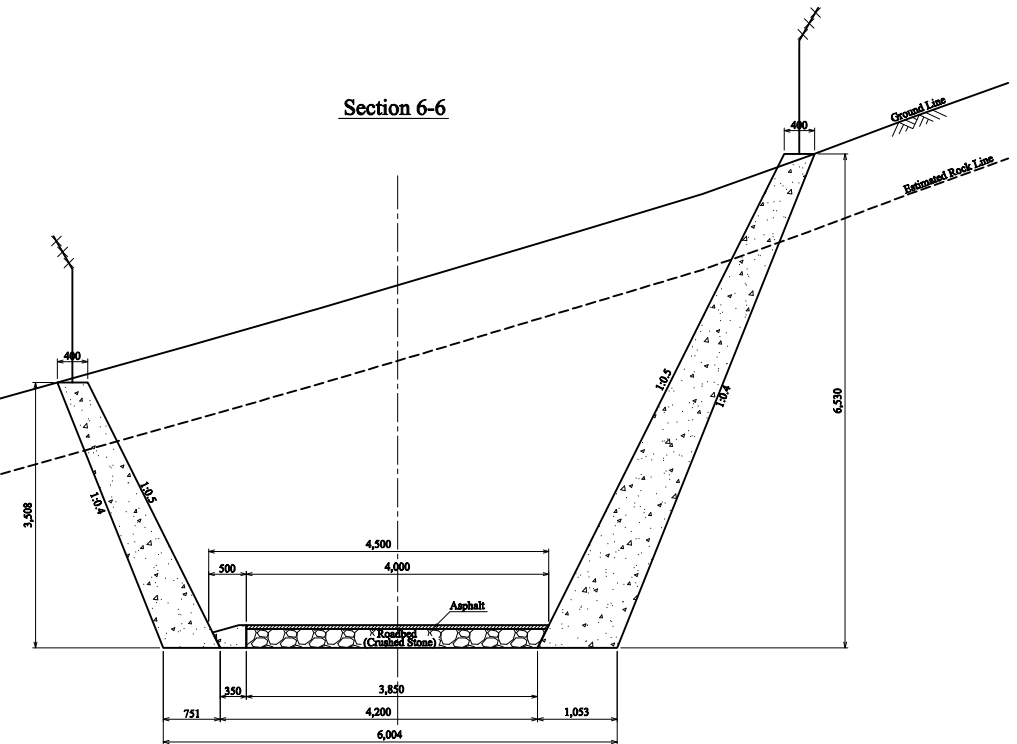


EL. m
1140

1135

1130

Section 6-6



JAPAN INTERNATIONAL
COOPERATION AGENCY

Project & Location

The Preparatory Survey for the Project of
Micro- Hydroelectric Power Generation in Metropolitan Area of
Tegucigalpa in the Republic of Honduras

Drawing Title

Picacho Hydroelectric Power Plant
Powerhouse, Sections (1/3)

DWG No.

PC-CV-03

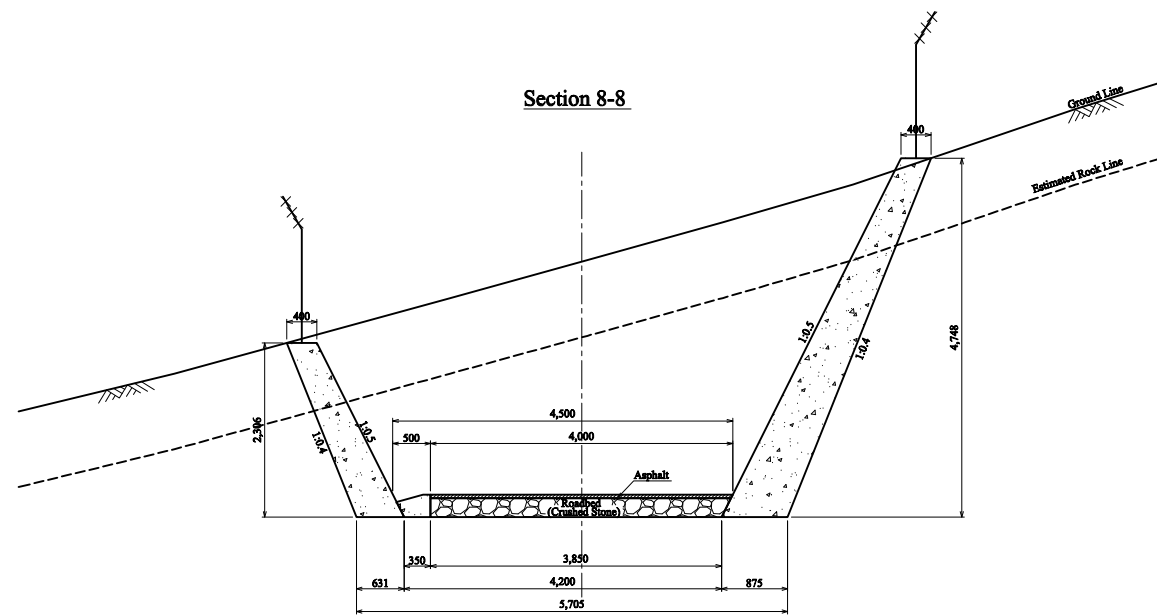
Dec.2012

EL. m
1140

1135

1130

Section 8-8

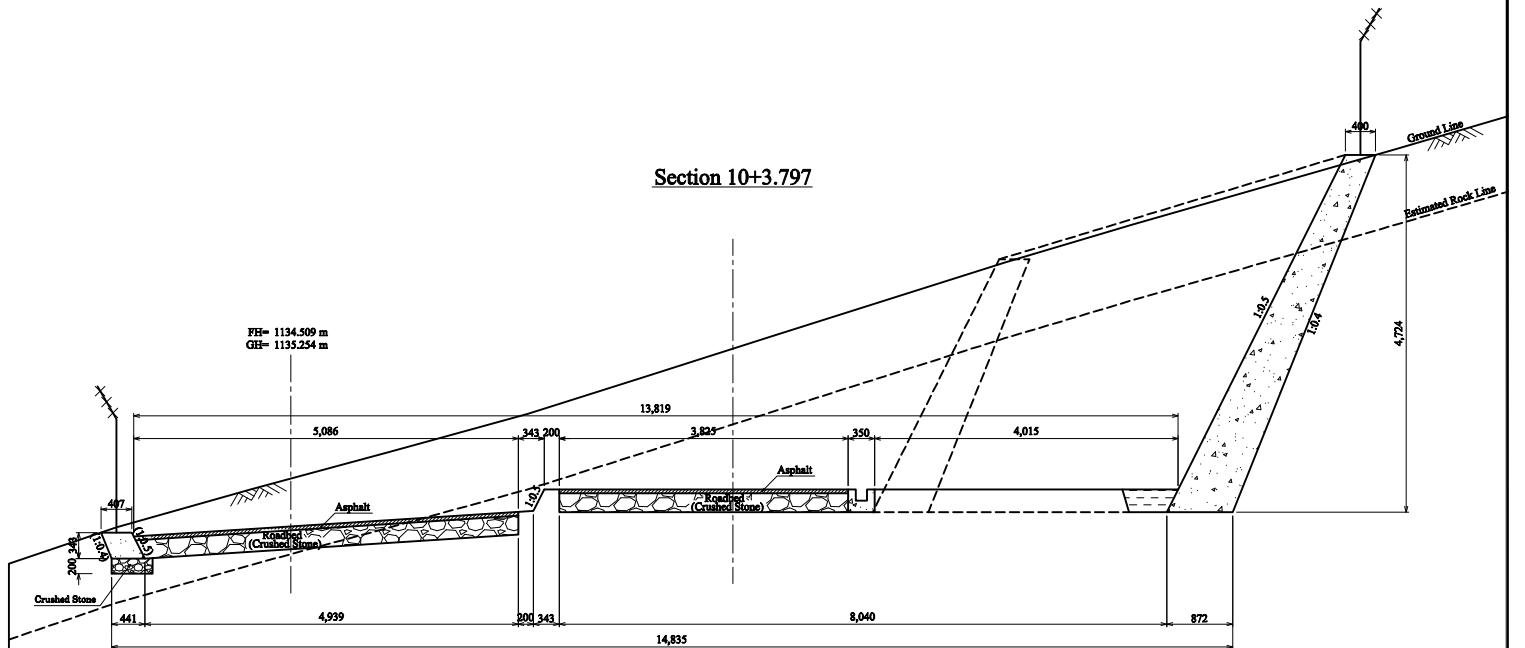


EL. m
1140

1135

1130

Section 10+3.797

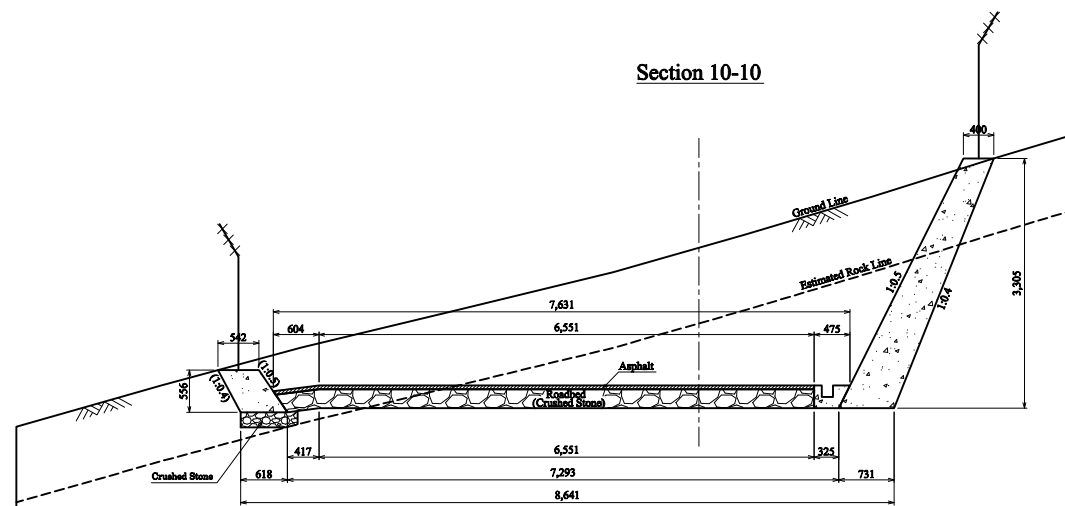


EL. m
1140

1135

1130

Section 10-10

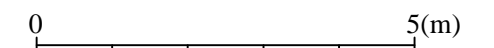
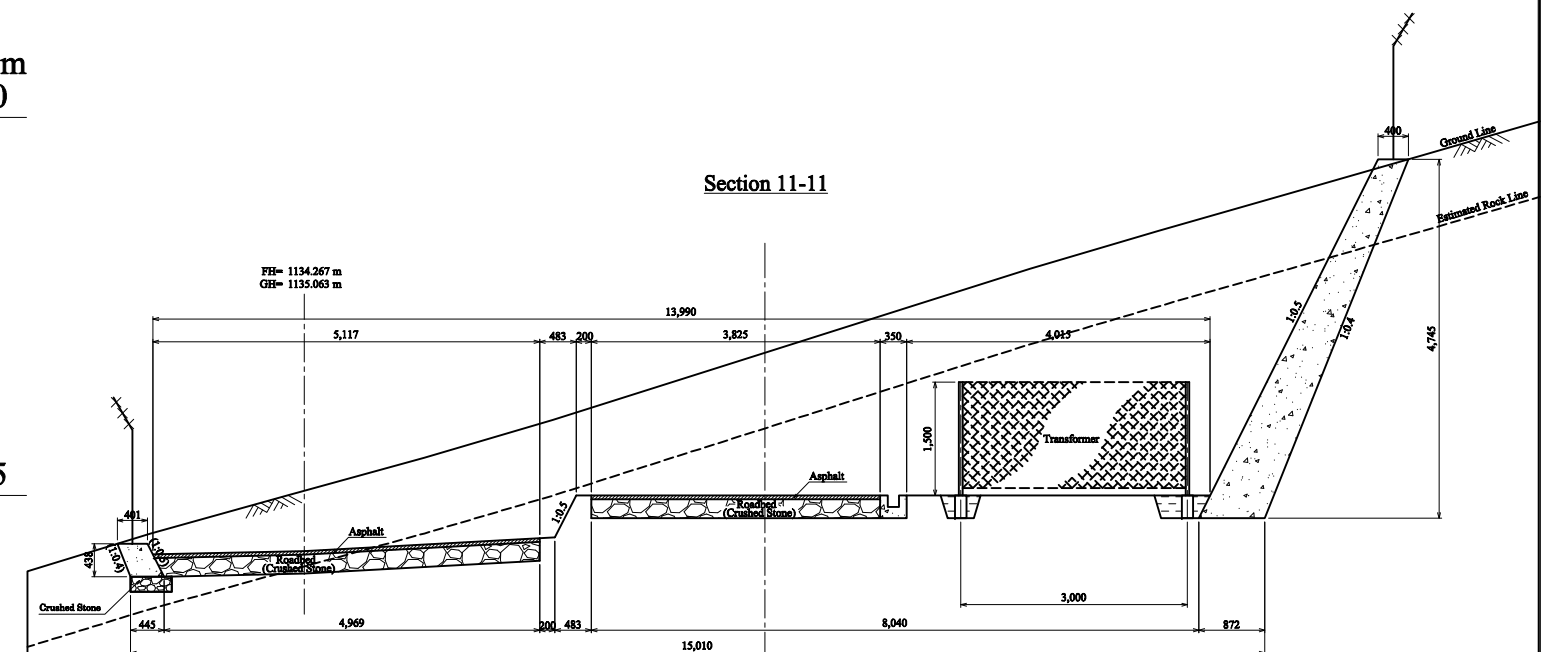


EL. m
1140

1135

1130

Section 11-11



JAPAN INTERNATIONAL
COOPERATION AGENCY

Project & Location

The Preparatory Survey for the Project of
Micro- Hydroelectric Power Generation in Metropolitan Area of
Tegucigalpa in the Republic of Honduras

Drawing Title

Picacho Hydroelectric Power Plant
Powerhouse, Sections (2/3)

DWG No.

PC-CV-04

Dec.2012

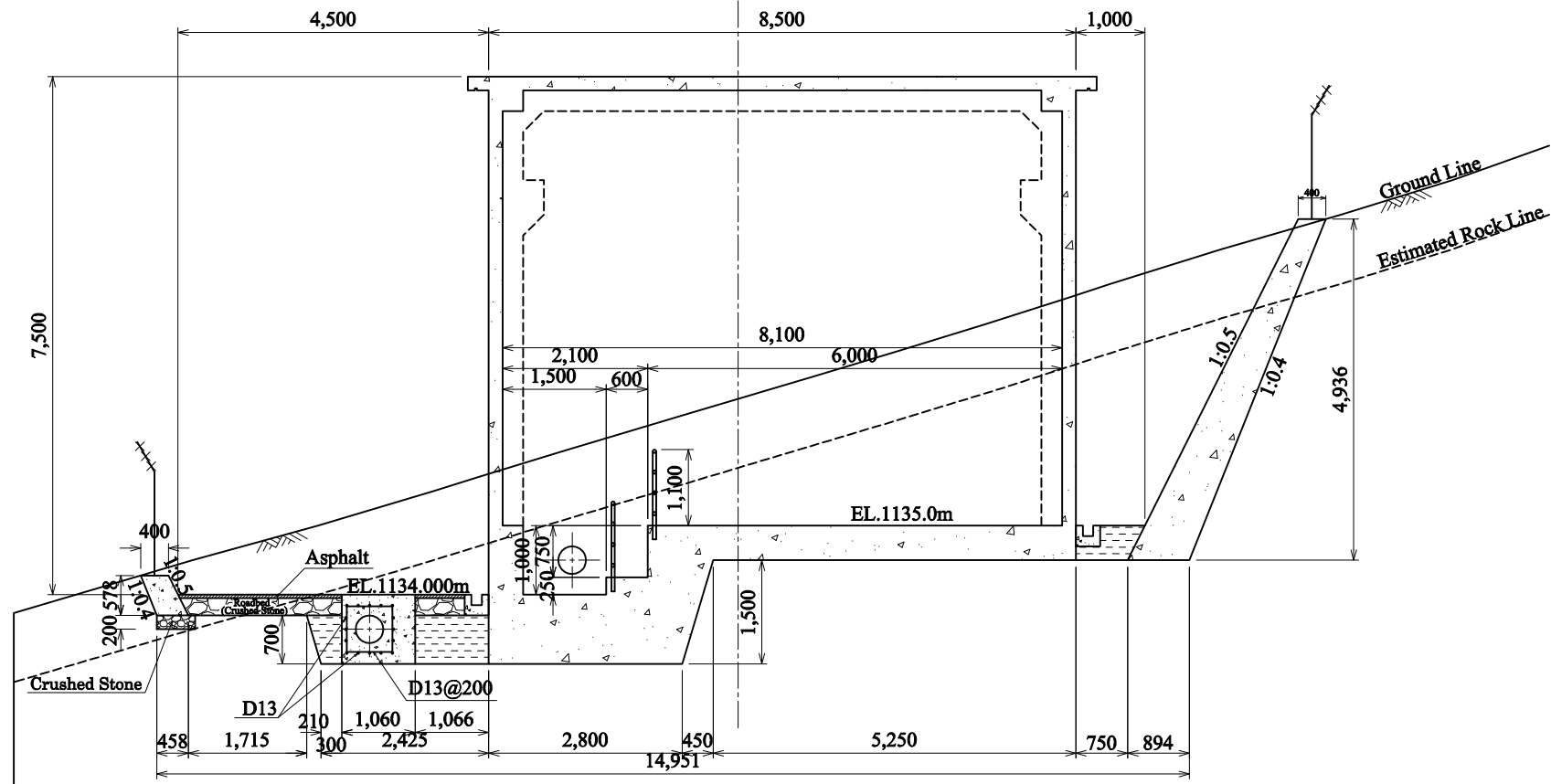
EL. m 1142

1140

1135

1129

Section 12-12



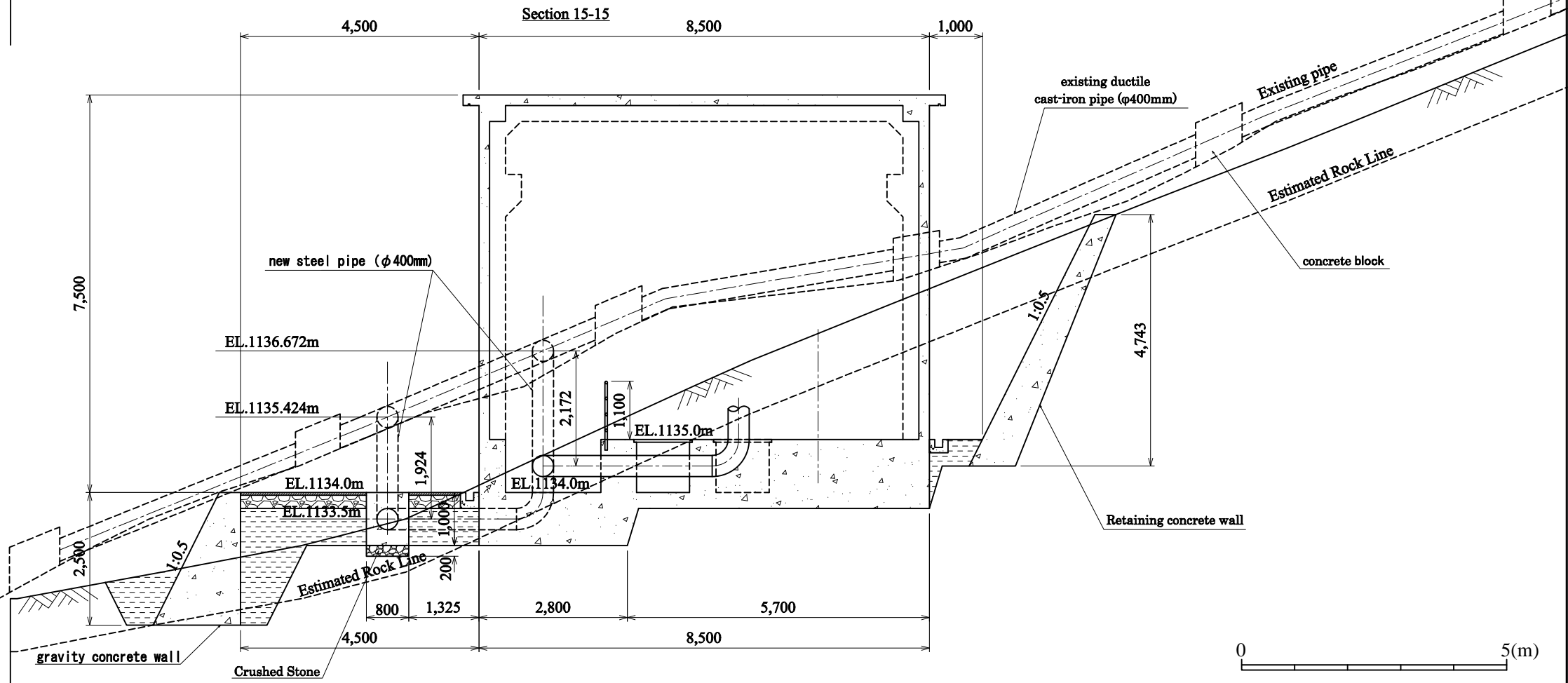
EL. m 1142

1140

1135

1129

Section 15-15



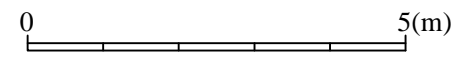
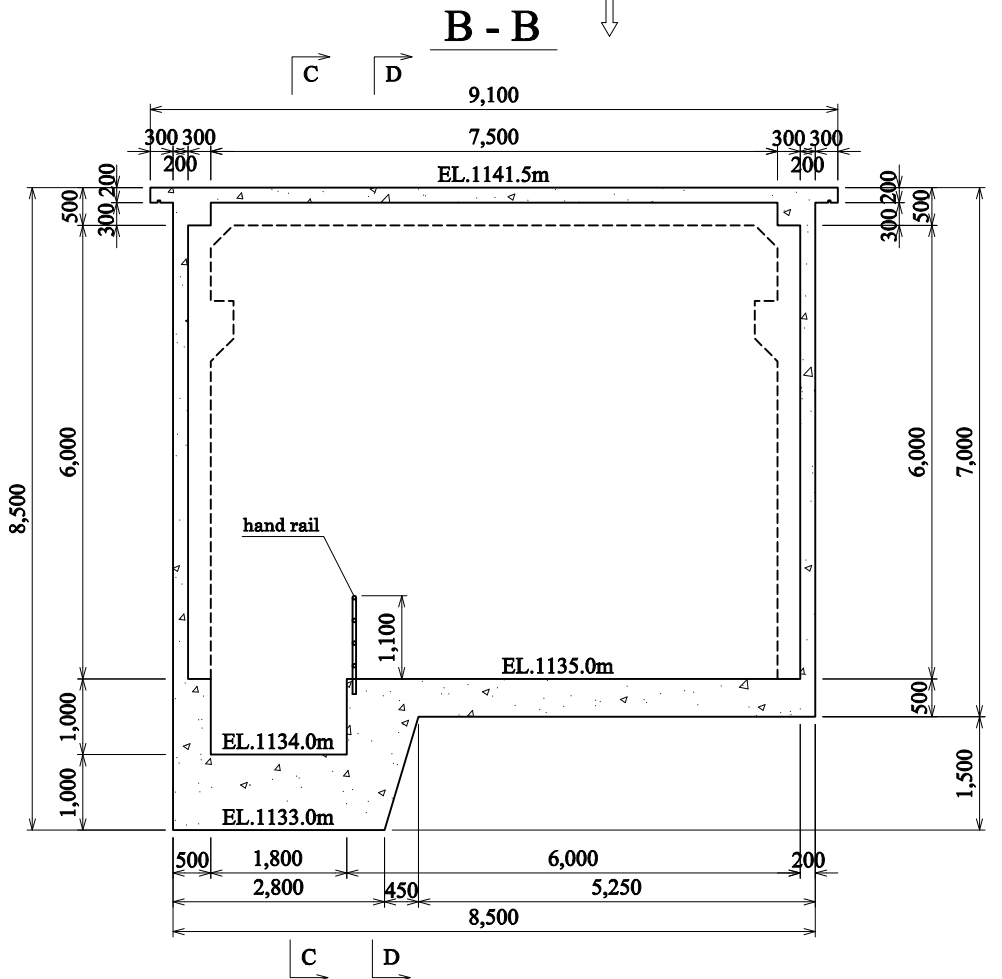
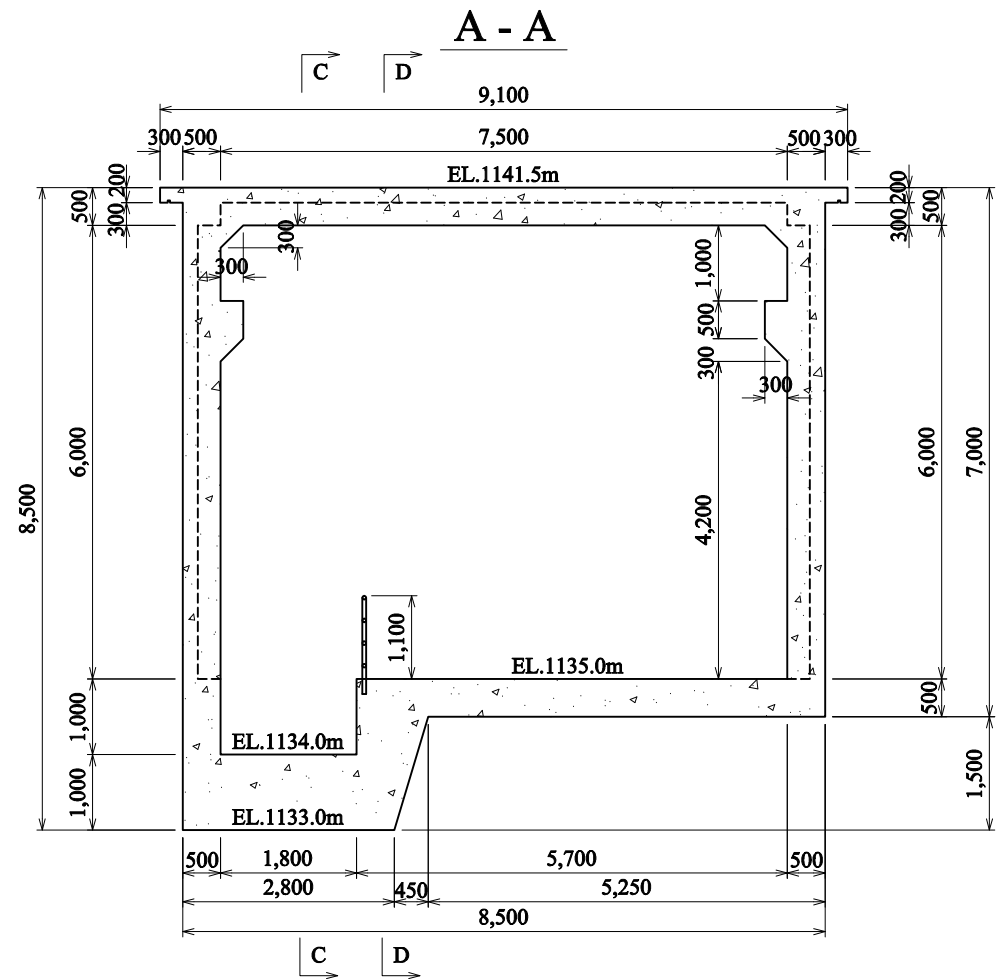
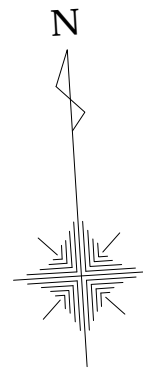
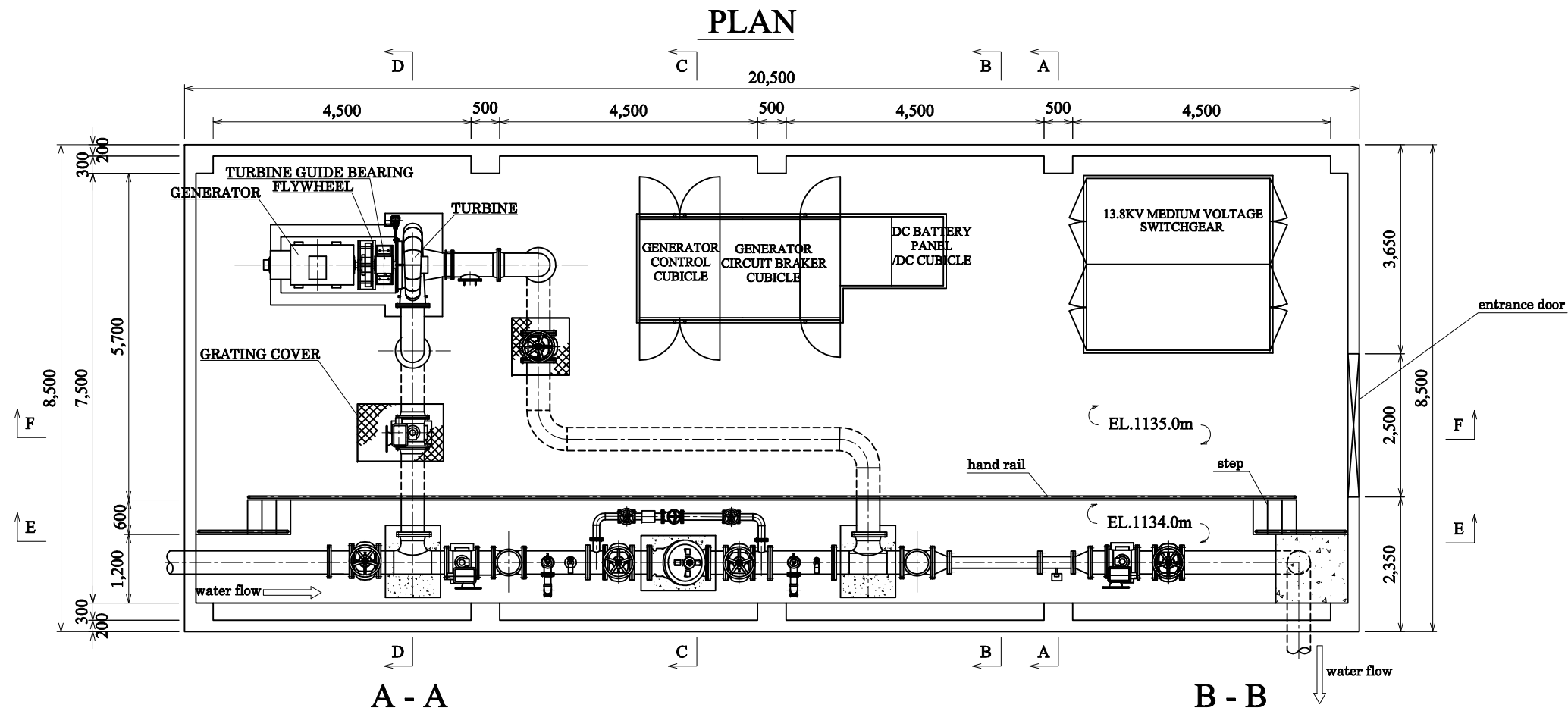
0 5(m)

 JAPAN INTERNATIONAL COOPERATION AGENCY

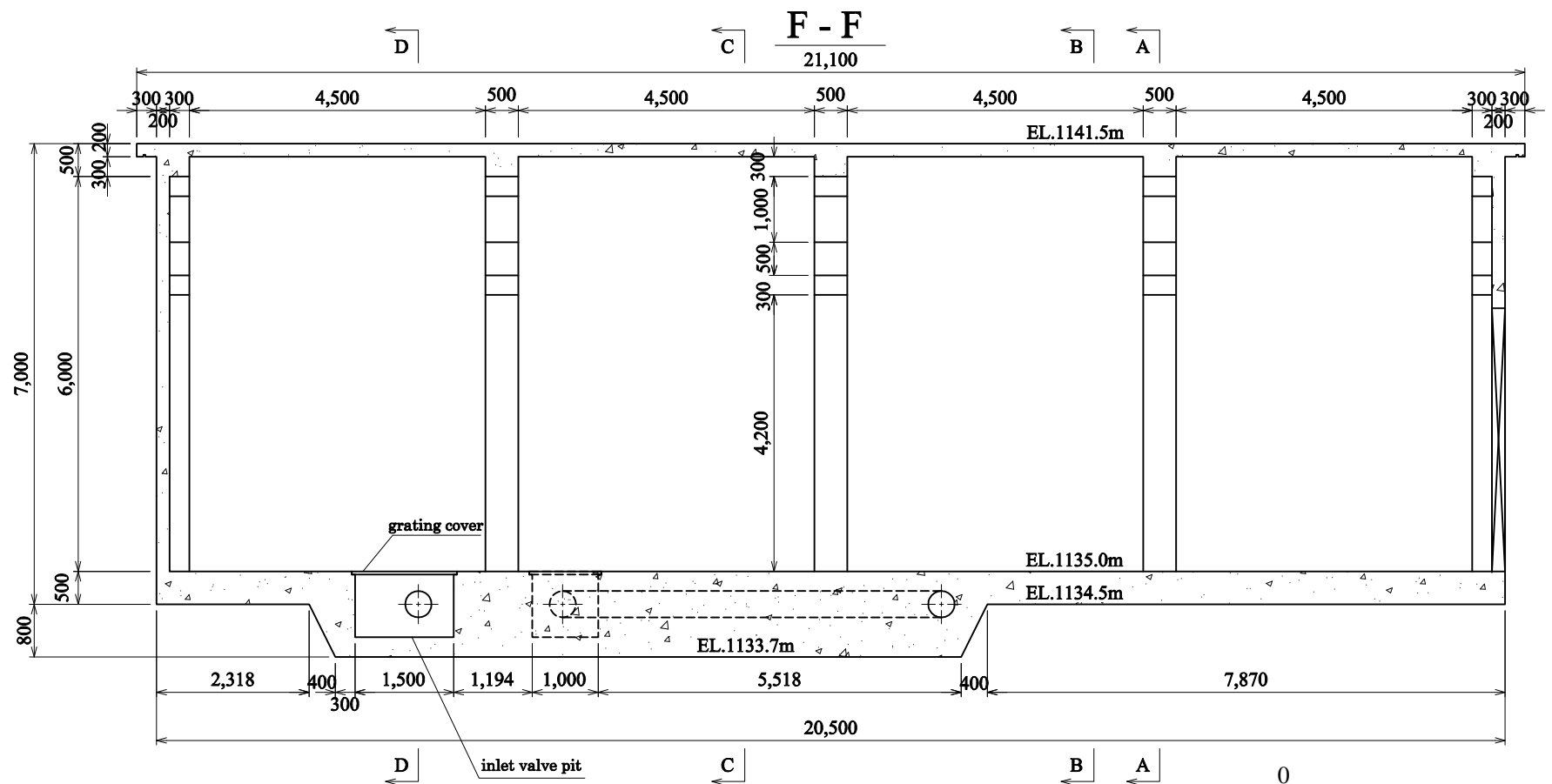
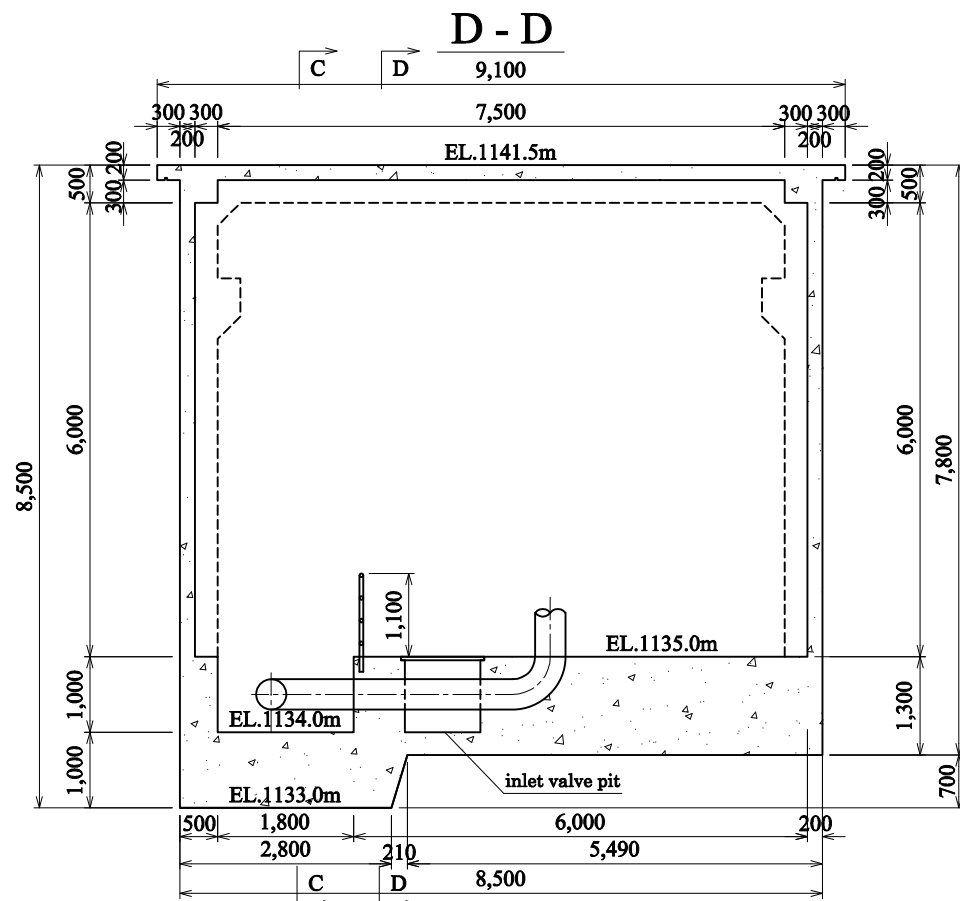
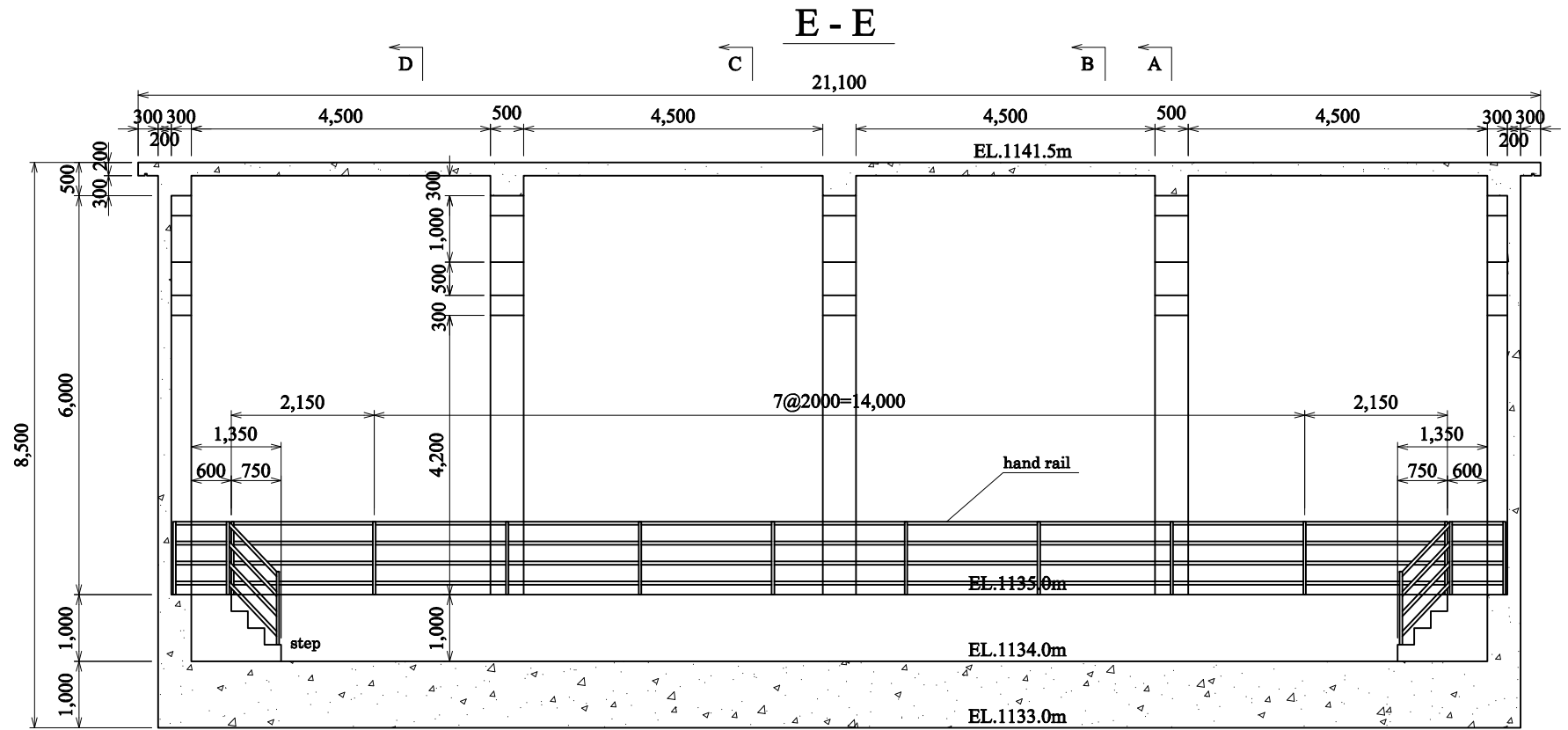
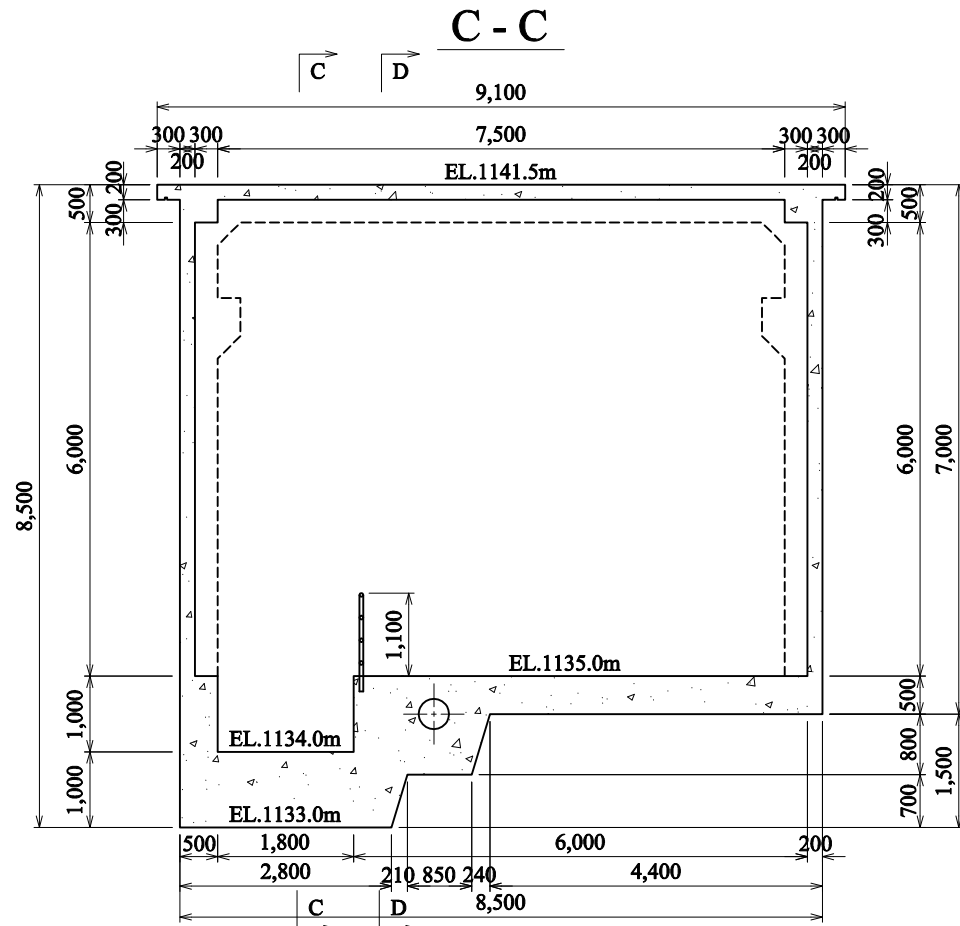
Project & Location
 The Preparatory Survey for the Project of Micro- Hydroelectric Power Generation in Metropolitan Area of Tegucigalpa in the Republic of Honduras

Drawing Title
Picacho Hydroelectric Power Plant Powerhouse, Sections (3/3)

DWG No.
 PC-CV-05
 Dec.2012



| | | | |
|---|---|---|-----------------|
| JAPAN INTERNATIONAL COOPERATION AGENCY | Project & Location | Drawing Title | DWG No. |
| | The Preparatory Survey for the Project of Micro- Hydroelectric Power Generation in Metropolitan Area of Tegucigalpa in the Republic of Honduras | Picacho Hydroelectric Power Plant Powerhouse, Concrete Outline Plan and Sections | PC-CV-06 |
| | | | Dec.2012 |



JAPAN INTERNATIONAL
COOPERATION AGENCY

Project & Location

The Preparatory Survey for the Project of
Micro- Hydroelectric Power Generation in Metropolitan Area of
Tegucigalpa in the Republic of Honduras

Drawing Title

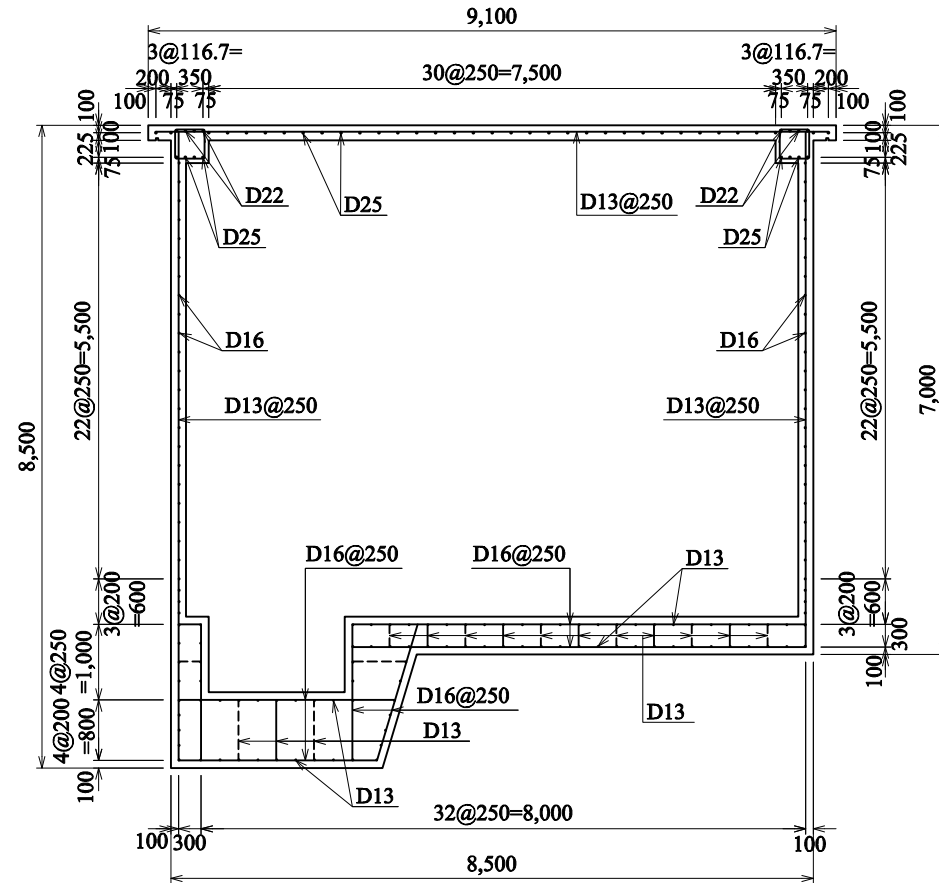
**Picacho Hydroelectric Power Plant
Powerhouse, Concrete Outline Profile and Sections**

DWG No.

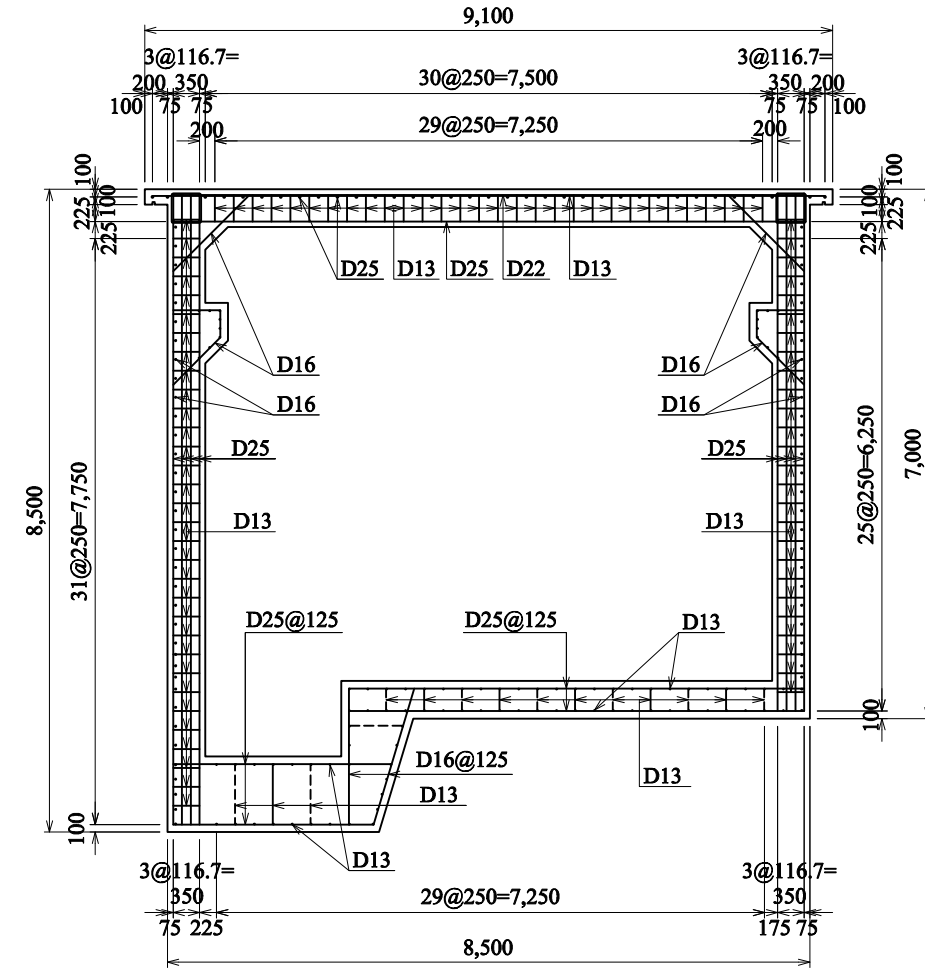
PC-CV-07

Dec.2012

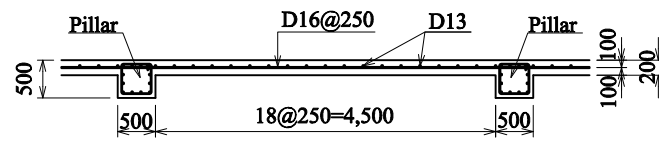
Non Pillar section
scale 1



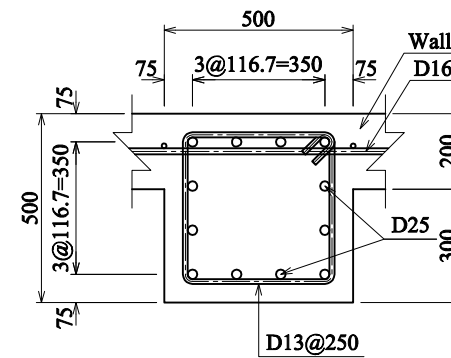
Pillar Section
scale 1



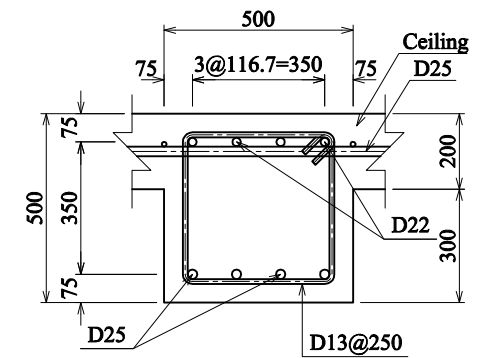
Wall Section
scale 1



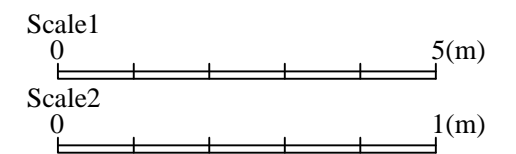
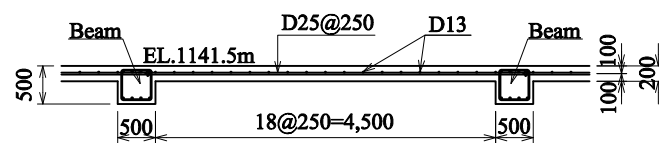
Pillar Section
scale 2

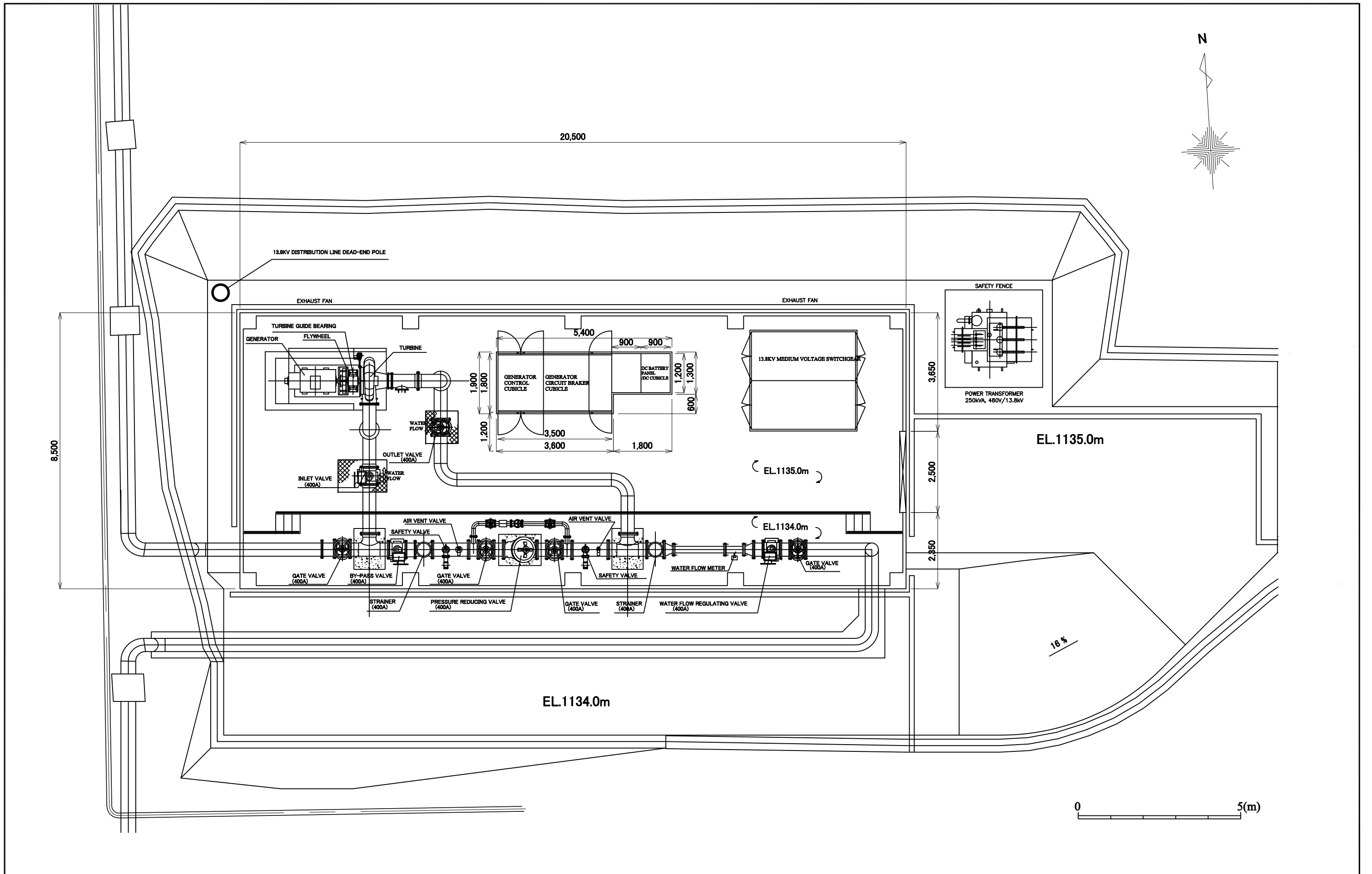



Beam Section
scale 2

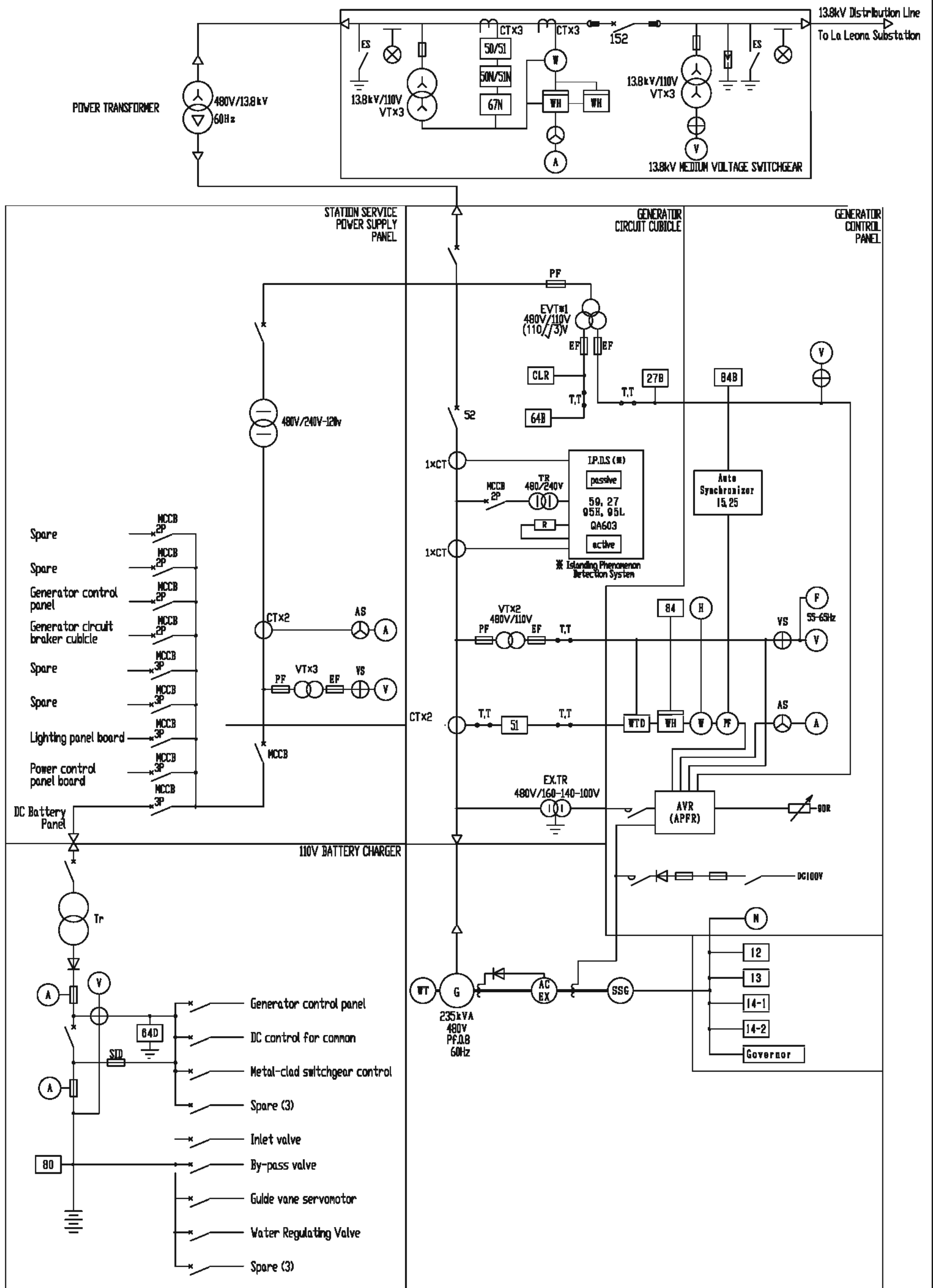


Ceiling Section
scale 1





| | | | |
|---|---|--|----------------|
|  JAPAN INTERNATIONAL COOPERATION AGENCY | Project & Location | Drawing Title | DWG No. |
| | The Preparatory Survey for the Project of Micro- Hydroelectric Power Generation in Metropolitan Area of Tegucigalpa in the Republic of Honduras | Picacho Hydroelectric Power Prant Equipment Layout Plan | PC-EM-01 |
| | | | Dec. 9, 2012 |



JAPAN INTERNATIONAL COOPERATION AGENCY

Project & Location

The Preparatory Survey for the Project of Micro-Hydroelectric Power Generation in Metropolitan Area of Tegucigalpa in the Republic of Honduras

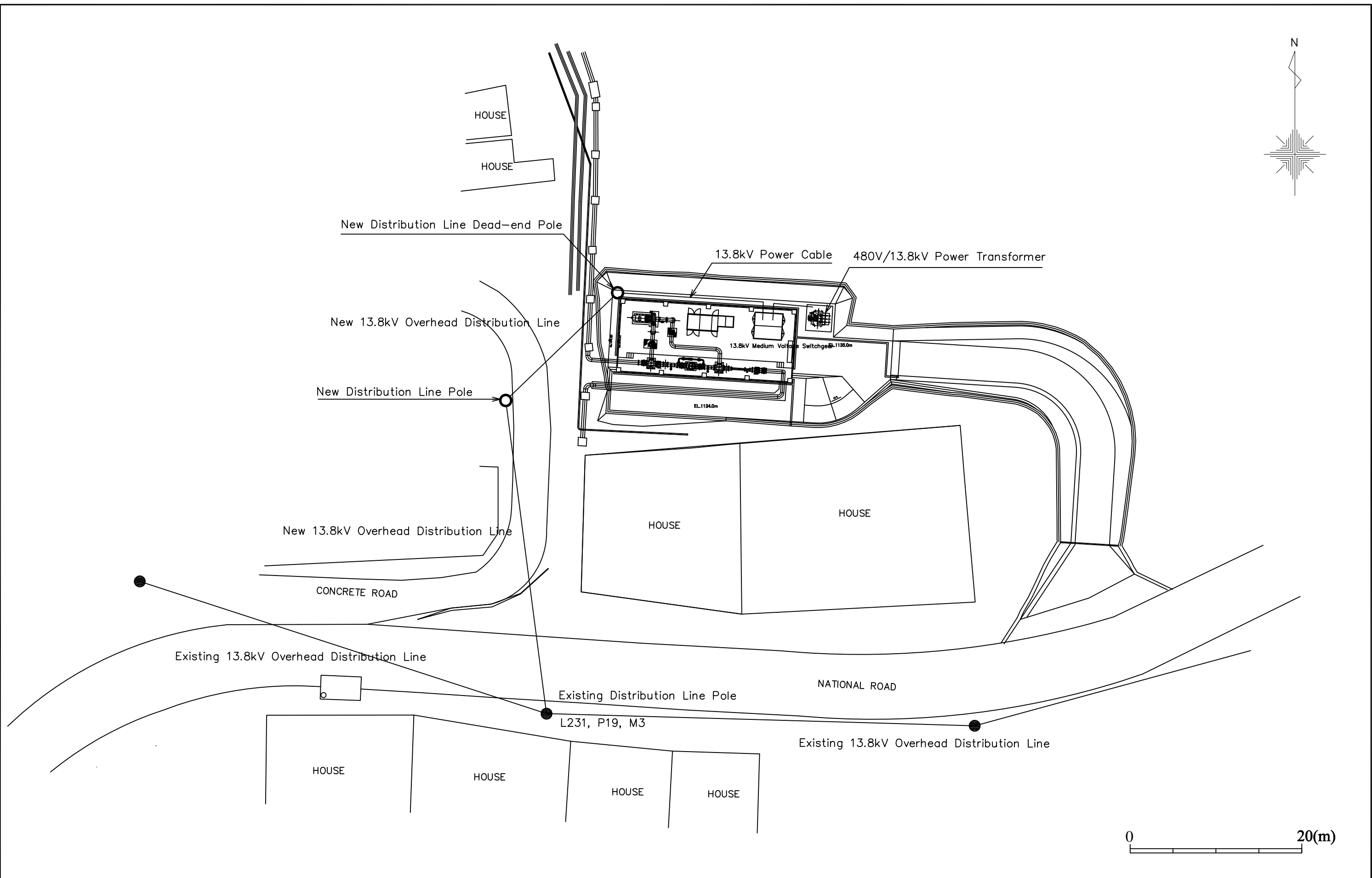
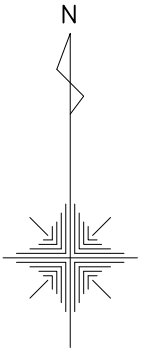
Drawing Title


**Picacho Hydroelectric Power Plant
13.8kV Single Line Diagram**

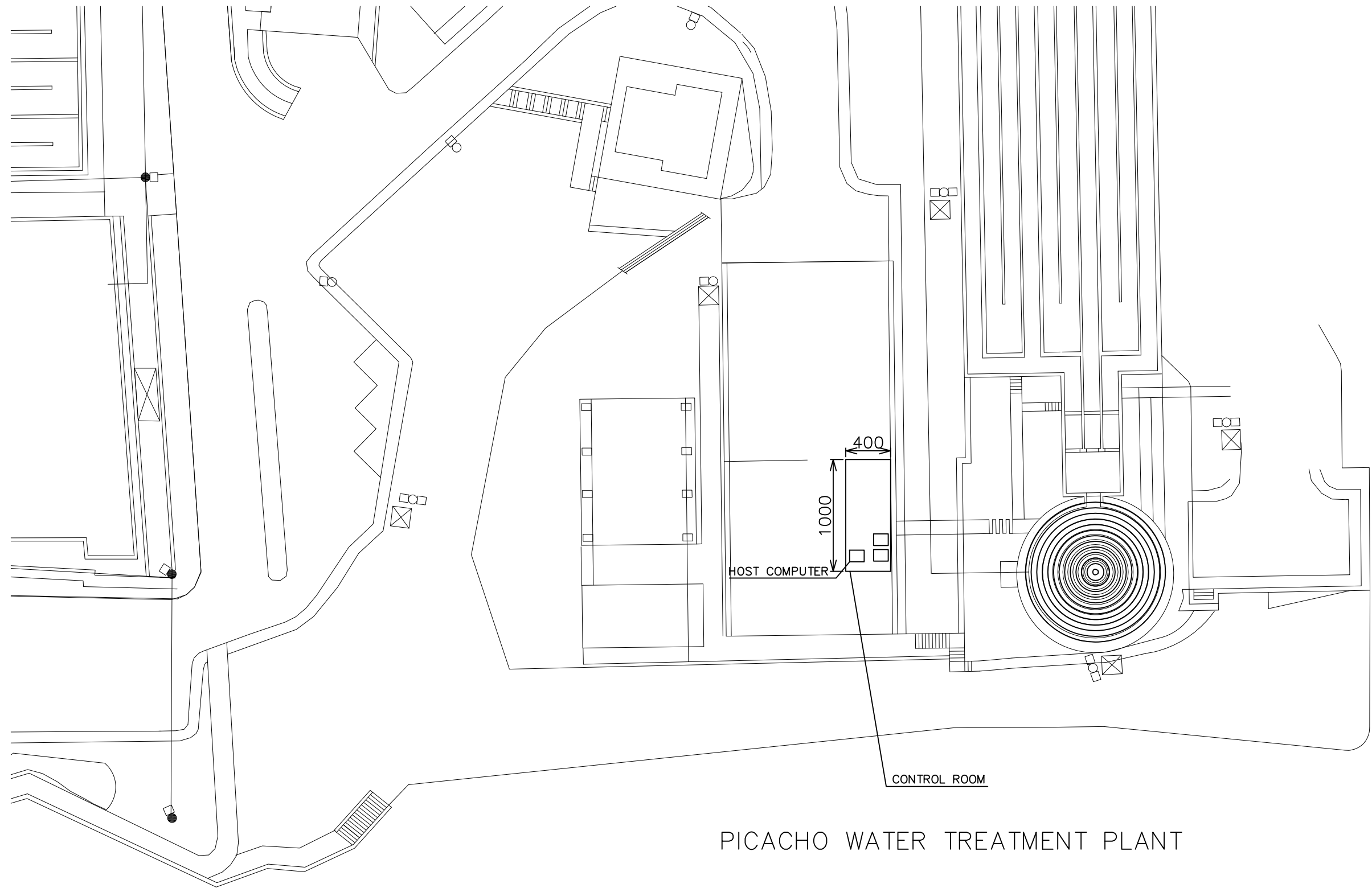
DWG No.

PC-EM-02

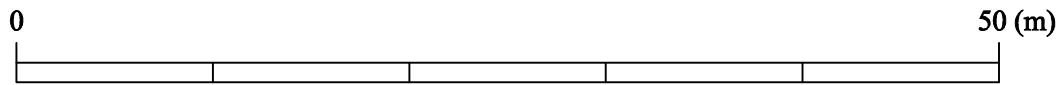
Dec. 9, 2012



| | | | |
|---|---|--|----------------|
|  JAPAN INTERNATIONAL COOPERATION AGENCY | Project & Location | Drawing Title | DWG No. |
| | The Preparatory Survey for the Project of Micro- Hydroelectric Power Generation in Metropolitan Area of Tegucigalpa in the Republic of Honduras | Picacho Hydroelectric Power Prant 13.8kV Power Cable and Distribution Line Routes | PC-EM-03 |
| | | | Dec. 9, 2012 |



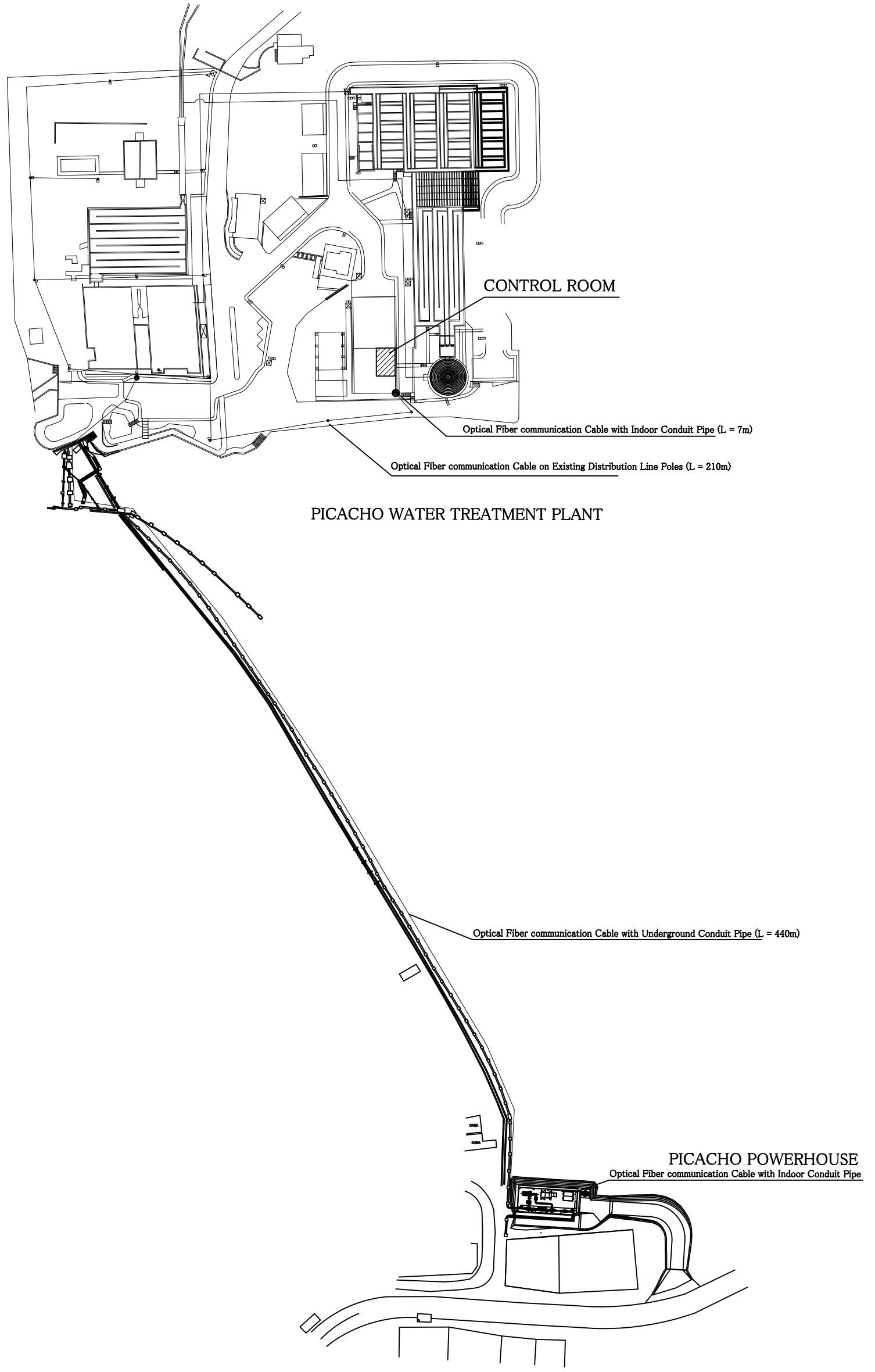
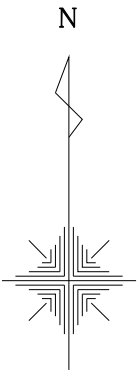
PICACHO WATER TREATMENT PLANT



Project & Location
 The Preparatory Survey for the Project of
 Micro- Hydroelectric Power Generation in Metropolitan Area of
 Tegucigalpa in the Republic of Honduras

Drawing Title
Picacho Hydroelectric Power Prant
Control Room
(Picacho Water Treatment Plant)


DWG No.
 PC-EM-04
 Dec. 9, 2012



PICACHO WATER TREATMENT PLANT

PICACHO POWERHOUSE

0 50 (m)

| | | | |
|---|---|--|--------------------------|
|  JAPAN INTERNATIONAL COOPERATION AGENCY | Project & Location | Drawing Title | DWG No. |
| | The Preparatory Survey for the Project of Micro- Hydroelectric Power Generation in Metropolitan Area of Tegucigalpa in the Republic of Honduras | Picacho Hydroelectric Power Prant Communication Cable Route | PC-EM-05 Dec. 9, 2012 |

資 料

1. 調査団員・氏名
 2. 調査行程
 3. 関係者(面会者)リスト
 4. 討議議事録(M/D)
 5. ソフトコンポーネント計画書
 6. 参考資料／収集資料リスト
 7. その他資料・情報
-

1. 調査団員・氏名

調査団員氏名、所属

第1次現地調査

| No. | 氏名 | 担 当 | 所 属 |
|-----|--------|------------------|--------------------------------|
| 1 | 前田 秀 | 総括 | JICA 産業開発・公共政策部 技術審議役 |
| 2 | 宮田 智代子 | 計画管理 | JICA 産業開発・公共政策部 資源・エネルギー第二課 |
| 3 | 佐野 裕一 | 業務主任／電力・運転保守管理計画 | (株)ニュージェック |
| 4 | 有田 一博 | 施工計画 | 日本テクノ株式会社 |
| 5 | 常木 繁 | 電気・機械設備／保護・制御計画 | (株)ニュージェック |
| 6 | 堀江 俊樹 | 資機材調達計画／積算 | 日本テクノ(株) |
| 7 | 加藤 留未 | 環境社会配慮 | (株)ニュージェック |
| 8 | 竹澤 文雄 | 土木建設計画／設計 | (株)OT 設計 |
| 9 | 皆木 昭宏 | 自然条件調査 | (株)ニュージェック |
| 10 | 岡村 章夫 | 通訳 | (株)テクノスタッフ |

第2次現地調査(協力準備調査報告書(案)の現地説明・協議)

| No. | 氏名 | 担 当 | 所 属 |
|-----|--------|------------------|--------------------------------|
| 1 | 前田 秀 | 総括 | JICA 産業開発・公共政策部 技術審議役 |
| 2 | 宮田 智代子 | 計画管理 | JICA 産業開発・公共政策部 資源・エネルギー第二課 |
| 3 | 佐野 裕一 | 業務主任／電力・運転保守管理計画 | (株)ニュージェック |
| 4 | 有田 一博 | 施工計画 | 日本テクノ株式会社 |
| 5 | 常木 繁 | 電気・機械設備/保護・制御計画 | (株)ニュージェック |
| 6 | 岡村 章夫 | 通訳 | (株)テクノスタッフ |

2. 調査行程

調査行程

第1次現地調査日程

| Date | Day | 官団員 | | コンサルタント団員 | | | | | | | | |
|-----------|-----|--|---|--|--|--|--|---|--|--|--|------|
| | | 総括 Leader | 計画管理 Project Coordinator | 業務主任/電力・運転保守管 理計画 | 施工計画 | 電気・機械設備/ 保護・制御計画 | 資機材調達計画/ 積算 | 環境社会配慮 | 土木建設計画/設計 | 自然条件調査 | 西語通訳 | |
| | | Mr. Shigeru Maeda/ JICA | Ms. Chiyoiko Miyata/ JICA | Mr. Sano/ NEWJEC Inc. | Mr. Arita/ JAPAN TECHNICO Co., Ltd. | Mr. Tsuneki/ NEWJEC Inc. | Mr. Horie/ JAPAN TECHNICO Co., Ltd. | Ms. Kato/ NEWJEC Inc. | Mr. Takezawa OT Sekkel Co., Ltd. | Mr. Minagi/ NEWJEC Inc. | Mr. Okamura/ TECHNO STAFF Co., Ltd. | |
| 2012/8/8 | Wed | | | 15:45 Narita (DL296) - 15:05 Atlanta | | | | | | | | |
| 2012/8/9 | Thu | | | 10:00 Atlanta (DL849) - 11:42 Tegucigalpa PM Meeting with JICA | | | | | | 10:40 Guatemala (TA701) - 12:08 Tegucigalpa PM Meeting with JICA | | |
| 2012/8/10 | Fri | | | SANAA表敬、現場視察 | | | | | | SANAA表敬、現場視察 | | |
| 2012/8/11 | Sat | | | サイト視察 | 15:45 Narita (DL296) - 15:05 Atlanta | | | 15:45 Narita (DL296) - 15:05 Atlanta | | サイト現場視察 | 15:45 Narita (DL296) - 15:05 Atlanta | |
| 2012/8/12 | Sun | Haneda 00:45 - 19:10 Los Angeles (at Aug. 11) (DL636) Los Angeles 22:40 - 06:50 Atlanta (DL2354) Atlanta 10:00 - 11:42 Tegucigalpa (DL849) 団内調整会議 | | 団内調整会議 | 10:00 Atlanta (DL849) - 11:42 Tegucigalpa | | | 10:00 Atlanta (DL849) - 11:42 Tegucigalpa | | 団内調整会議 | 10:00 Atlanta (DL849) - 11:42 Tegucigalpa | |
| 2012/8/13 | Mon | | JICA表敬 Tegucigalpa市役所表敬・協議 SANAA表敬・協議 ENE表敬・協議 | | | | | JICA表敬 Tegucigalpa市役所表敬・協議 SANAA表敬・協議 ENE表敬・協議 | | JICA表敬 Tegucigalpa市役所表敬・協議 SANAA表敬・協議 ENE表敬・協議 | | |
| 2012/8/14 | Tue | | SERNA表敬・協議 Picachoサイト視察 Concepcionサイト視察 | | 12:56 San Jose (DL412) - 18:59 Atlanta | | | SERNA表敬・協議 Picachoサイト視察 Concepcionサイト視察 | | SERNA表敬・協議 Picachoサイト視察 Concepcionサイト視察 | | |
| 2012/8/15 | Wed | | ENE表敬・協議 SEPLAN表敬・協議 SANAA-M/D協議、インセプションレポート説明 | 現地調査 | 10:00 Atlanta (DL849) - 11:42 Tegucigalpa | | | ENE表敬・協議 SEPLAN表敬・協議 SANAA協議 | | 現地調査・測量準備 | ENE表敬・協議 SEPLAN表敬・協議 SANAA協議 | |
| 2012/8/16 | Thu | | SANAA-M/D協議 M/D調印 JICA報告 | 現地調査 | SANAA-M/D協議 M/D調印 JICA報告 | | | SANAA-M/D協議 M/D調印 JICA報告 | | 現地調査・測量準備 | SANAA-M/D協議 M/D調印 JICA報告 | |
| 2012/8/17 | Fri | | Tegucigalpa 12:55 - 18:35 Atlanta (DL552) Atlanta 21:54 - 23:37 Los Angeles (DL2355) | SANAA協議 | 現地調査 | SANAA協議 | | SANAA協議 | | 現地調査・測量準備 | SANAA協議 | |
| 2012/8/18 | Sat | | Los Angeles 01:10 - | | 現地調査 | | | 現地調査 | | 現地調査・測量準備 | 通訳業務 | |
| 2012/8/19 | Sun | | - 04:55 Haneda (DL635) | 資料整理 | 資料整理 | 資料整理 | | 資料整理 | | 資料整理 | 通訳業務 | |
| 2012/8/20 | Mon | | | SANAA協議 流量測定立会 現地調査 | ENE協議 サイト候補地調査 | | | ENE協議 サイト候補地調査 | | SANAA協議 流量測定立会 現地調査 | ENE協議 サイト候補地調査 | |
| 2012/8/21 | Tue | | | SANAA協議 流量測定立会 現地調査 | SANAA協議 サイト候補地調査 基本設計検討 | 15:45 Narita (DL296) - 15:05 Atlanta | | SANAA協議 サイト候補地調査 環境社会配慮調査 聞き取り調査 | | 測量作業管理 流量測定立会 現地調査 | | |
| 2012/8/22 | Wed | | | SANAA協議 流量測定立会 現地調査 | SANAA協議 サイト候補地調査 基本設計検討 | 10:00 Atlanta (DL849) - 11:42 Tegucigalpa | | 水源調査 聞き取り調査 | | 測量作業管理 流量測定立会 現地調査 | | |
| 2012/8/23 | Thu | | | SANAA協議 流量測定立会 現地調査 | SANAA協議 サイト候補地調査 基本設計検討 | | 現場確認 | サイト状況調査 環境社会配慮調査 聞き取り調査 | | 測量作業管理 流量測定立会 現地調査 | | |
| 2012/8/24 | Fri | | | SANAA協議 流量測定立会 現地調査 | SANAA協議 サイト候補地調査 基本設計検討 | | 価格調査 資料調査 | サイト状況調査 環境社会配慮調査 聞き取り調査 | | 測量作業管理 流量測定立会 現地調査 | | |
| 2012/8/25 | Sat | | | 現地調査 | | | 価格調査 資料調査 | 現地調査 | | 測量作業管理 現地調査 | 通訳業務 | |
| 2012/8/26 | Sun | | | 資料整理 | 資料整理 | 資料整理 | 資料整理 | 資料整理 | | 16:35 Tegucigalpa (TA700) - 17:53 Guatemala | 通訳業務 | |
| 2012/8/27 | Mon | | | 流量、圧力測定立会 SANAA協議 基本設計検討 | 現地調査 施工計画検討 輸送ルート調査 | 流量、圧力測定立会 SANAA/ENE協議 電気機械設備計画 | 価格調査 建設会社労務単価調査 | サイト状況調査 環境社会配慮調査 SANAA協議 | | | 通訳業務 | |
| 2012/8/28 | Tue | | | 流量、圧力測定立会 SANAA協議 基本設計検討 | 現地調査 施工計画検討 輸送ルート調査 | 流量、圧力測定立会 SANAA/ENE協議 電気機械設備計画 | 価格調査 建設会社労務単価調査 | サイト状況調査 環境社会配慮調査 SANAA協議 | | | 通訳業務 | |
| 2012/8/29 | Wed | | | 流量、圧力測定立会 SANAA/SERNA協議 基本設計検討 | 現地調査 施工計画検討 輸送ルート調査 | 流量、圧力測定立会 SANAA/ENE協議 電気機械設備計画 | 価格調査 建設会社労務単価調査 | サイト状況調査 環境社会配慮調査 SERNA/市役所協議 | 15:45 Narita (DL296) - 15:05 Atlanta | | 通訳業務 | |
| 2012/8/30 | Thu | | | 流量、圧力測定立会 SANAA/ENE協議 基本設計検討 | 現地調査 施工計画検討 輸送ルート調査 | 流量、圧力測定立会 SANAA/ENE協議 電気機械設備計画 | 価格調査 建設会社労務単価調査 | サイト状況調査 環境社会配慮調査 SANAA協議 | 10:00 Atlanta (DL849) - 11:42 Tegucigalpa | | 通訳業務 | |
| 2012/8/31 | Fri | | | ピカチョ上流代替サイト 調査、配水池の現地調査 | | | | | | | | 通訳業務 |
| 2012/9/1 | Sat | | | ピカチョ上流代替サイト調査 配水池の現地調査 | 12:55 Tegucigalpa (DL552) - 18:35 Atlanta | ピカチョ上流代替サイト調査 配水池の現地調査 | | 12:55 Tegucigalpa (DL552) - 18:35 Atlanta | ピカチョ上流代替サイト調査 配水池の現地調査 | | ピカチョ上流代替サイト調査 配水池の現地調査 | |
| 2012/9/2 | Sun | | | 資料整理 | 13:50 Atlanta (DL295) - | 資料整理 | 資料整理 | 13:50 Atlanta (DL295) - | 資料整理 | 10:40 Guatemala (TA701) - 12:08 Tegucigalpa | 通訳業務 | |
| 2012/9/3 | Mon | | | SANAAとの協議 ピカチョ上流代替サイト調査 配水池の現地調査 発電基本計画 | - 16:30 Narita | SANAA/ENE協議 ピカチョ上流代替サイト調査 電気機械設備計画 | 価格調査 建設会社労務単価調査 | - 16:30 Narita | ピカチョ上流代替 サイト調査 現地調査 土木施設計画 | SANAA協議 ピカチョ上流代替サイト調査 配水池の現地調査 測量作業整理 | 通訳業務 | |
| 2012/9/4 | Tue | | | SANAAとの協議 ピカチョ上流代替サイト調査 配水池の現地調査 発電基本計画 | | SANAA/ENE協議 ピカチョ上流代替サイト調査 電気機械設備計画 | 価格調査 建設会社労務単価調査 | | ピカチョ上流代替 サイト調査 現地調査 土木施設計画 | SANAA協議 ピカチョ上流代替サイト調査 配水池の現地調査 測量作業整理 | 通訳業務 | |
| 2012/9/5 | Wed | | | SANAAとの協議 ピカチョ上流代替サイト調査 配水池の現地調査 発電基本計画 | | SANAA/ENE協議 ピカチョ上流代替サイト調査 電気機械設備計画 | 価格調査 建設会社労務単価調査 | | ピカチョ上流代替 サイト調査 現地調査 土木施設計画 | SANAA協議 ピカチョ上流代替サイト調査 配水池の現地調査 測量作業整理 | 通訳業務 | |
| 2012/9/6 | Thu | | | SANAAとの協議 ピカチョ上流代替サイト調査 配水池の現地調査 発電基本計画 | | SANAA/ENE協議 ピカチョ上流代替サイト調査 電気機械設備計画 | 価格調査 建設会社労務単価調査 | | ピカチョ上流代替 サイト調査 現地調査 土木施設計画 | SANAA協議 ピカチョ上流代替サイト調査 配水池の現地調査 測量作業整理 | 通訳業務 | |
| 2012/9/7 | Fri | | | SANAAとの協議 ピカチョ上流代替サイト調査 配水池の現地調査 発電基本計画 | | SANAA/ENE協議 ピカチョ上流代替サイト調査 電気機械設備計画 | 価格調査 建設会社労務単価調査 | | ピカチョ上流代替 サイト調査 現地調査 土木施設計画 | SANAA協議 ピカチョ上流代替サイト調査 配水池の現地調査 測量作業整理 | 通訳業務 | |
| 2012/9/8 | Sat | | | ピカチョ上流代替サイト調査 配水池の現地調査 発電基本計画 | | ピカチョ上流代替サイト調査 電気機械設備計画 | 価格調査 建設会社労務単価調査 | | ピカチョ上流代替 サイト調査 現地調査 土木施設計画 | SANAA協議 ピカチョ上流代替サイト調査 配水池の現地調査 測量作業整理 | 通訳業務 | |
| 2012/9/9 | Sun | | | 資料整理 | | 資料整理 | 資料整理 | | 資料整理 | 資料整理 | 通訳業務 | |
| 2012/9/10 | Mon | | | SANAAプレゼンテーションJICA 進捗報告 | | SANAAプレゼンテーション JICA進捗報告 | | | | SANAAプレゼンテーション JICA進捗報告 | | |
| 2012/9/11 | Tue | | | 12:55 Tegucigalpa (DL552) - 18:35 Atlanta | | 12:55 Tegucigalpa (DL552) - 18:35 Atlanta | 12:55 Tegucigalpa (DL552) - 18:35 Atlanta | | 現地調査 土木施設計画 | 測量作業整理 成果品チェック SANAA聞き取り調査 | 通訳業務 | |
| 2012/9/12 | Wed | | | 8:10 Atlanta (DL563) - 10:25 Seattle (DL183) - 12:10 Seattle (DL183) - | | 8:10 Atlanta (DL563) - 10:25 Seattle (DL183) - 12:10 Seattle (DL183) - | 13:50 Atlanta (DL295) - | | 現地調査 土木施設計画 | 測量作業整理 成果品チェック SANAA聞き取り調査 | 通訳業務 | |
| 2012/9/13 | Thu | | | - 15:35 Kansai | | - 15:35 Kansai | - 16:30 Narita | | 現地調査 土木施設計画 | 測量作業整理 成果品チェック SANAA聞き取り調査 | 通訳業務 | |
| 2012/9/14 | Fri | | | | | | | | 現地調査 土木施設計画 | 測量作業整理 成果品チェック SANAA聞き取り調査 | 通訳業務 | |
| 2012/9/15 | Sat | | | | | | | | 現地調査 土木施設計画 | 測量作業整理 成果品チェック SANAA聞き取り調査 | 通訳業務 | |
| 2012/9/16 | Sun | | | | | | | | 資料整理 | 資料整理 | 通訳業務 | |
| 2012/9/17 | Mon | | | | | | | | SANAA聞き取り調査 土木施設計画 | 測量成果品チェック SANAA聞き取り調査 | 通訳業務 | |
| 2012/9/18 | Tue | | | | | | | | SANAA聞き取り調査 土木施設計画 | 測量成果品チェック SANAA聞き取り調査 | 通訳業務 | |
| 2012/9/19 | Wed | | | | | | | | 12:55 Tegucigalpa (DL552) - 18:35 Atlanta | 16:35 Tegucigalpa (TA700) - 17:53 Guatemala | 12:55 Tegucigalpa (DL552) - 18:35 Atlanta | |
| 2012/9/20 | Thu | | | | | | | | 8:10 Atlanta (DL563) - 10:25 Seattle (DL183) - 12:10 Seattle (DL183) - | | 8:10 Atlanta (DL563) - 10:25 Seattle (DL183) - 12:10 Seattle (DL183) - | |
| 2012/9/21 | Fri | | | | | | | | - 15:35 Kansai | | - 15:35 Kansai | |

M/D: Minutes of Discussions
(Minuta de Discusiones)

| | | |
|--------------|------------|--|
| ENE | ホンジュラス電力公社 | Empresa Nacional de Energía Eléctrica |
| SANAA | ホンジュラス水道公社 | Servicio Autónomo Nacional de Acueductos y Alcantarillas |
| SERNA | 天然資源管理委員会 | Secretaría de Recursos Naturales y Ambiente |
| Municipality | テグシガルパ市 | Tegucigalpa Municipality |
| MOH | 保健省 | Ministry of Health |

第2次現地調査日程

| | | 官団員 | | コンサルタント団員 | | | |
|------------|-----|---|-----------------------------|------------------------------------|---|-------------------------------------|--|
| Date | Day | 総括 Leader | 計画管理 Project Coordinator | 業務主任/電力・運転保守管理計画 | 施工計画 | 電気・機械設備/ 保護・制御計画 | 西語通訳 |
| | | Mr.Shigeru MAEDA/ JICA | Ms.Chiyoko MIYATA/ JICA | Mr.Yuichi SANO/ NEWJEC Inc. | Mr. Kazuhiro ARITA/ JAPAN TECHNO Co., Ltd. | Mr. Shigeru TSUNEKI/ NEWJEC Inc. | Mr. Akio OKAMURA/ TECHNO STAFF Inc. |
| 2012/12/12 | Wed | | | Depart from Japan | | | Depart from Japan |
| 2012/12/13 | Thu | | | Arrive at Tegucigalpa SANAA 打合せ | | | Arrive at Tegucigalpa SANAA 打合せ |
| 2012/12/14 | Fri | | | 資料作成 | | | 資料作成 |
| 2012/12/15 | Sat | | | 資料整理 | Depart from Japan | | 資料整理 |
| 2012/12/16 | Sun | | | コンサルタント内 打合せ | Arrive at Tegucigalpa コンサルタント内 打合せ | | コンサルタント内 打合せ |
| 2012/12/17 | Mon | Haneda 00:30 - 17:40 Los Angeles (at Dec.16) (DL636) Los Angeles 22:45 - 05:58 Atlanta (DL1354) Atlanta 09:55 - 12:45 Tegucigalpa (DL849) | | JICA事務所 SANAA 準備協力調査報告書(案)説明 | | | |
| | | JICA事務所 打合せ JICA調査団内 打合せ | | ENEE、SANAA 系統連系協議 | | | |
| 2012/12/18 | Tue | JICA事務所 準備協力調査報告書(案)説明、協議 (出席者) SANAA、ENEE、Tegucigalpa Municipality、SERNA、SEPLAN 準備協力調査報告書(案)協議、質疑・応答、負担事項の確認 (出席者) SANAA | | | | | |
| 2012/12/19 | Wed | SANAA M/D(案)協議 | | | | | |
| | | SANAA M/D最終化 | | Depart from Tegucigalpa | SANAA M/D最終化 | | |
| 2012/12/20 | Thu | SANAA M/D署名 JICA事務所 報告 サイト視察 日本大使館 | | Arrive in the USA | SANAA M/D署名 JICA事務所 報告 サイト視察 日本大使館 | | |
| 2012/12/21 | Fri | Tegucigalpa 06:40 - 07:45 San Salvador (TA480) San Salvador 08:57 - 12:27 Los Angeles (TA522) Los Angeles 16:55 - | | Arrive in Japan | 資料収集、整理 | | |
| 2012/12/22 | Sat | 22:30 Haneda (DL637) | | | Depart from Tegucigalpa | | |
| 2012/12/23 | Sun | | | | Arrive in the USA | | |
| 2012/12/24 | Mon | | | | Arrive in Japan | | |

3. 関係者(面会者)リスト

関係者(面会者)リスト

| | |
|---------------------------------|-----------------------|
| 国家上下水道公社 (SANAA) | |
| Danilo Alvarado Rodriguez | 総裁 |
| Carlos Humberto Hernandez Rodas | 本部役員 |
| Walter R. Pavón. V | 投資部門役員 |
| Marcio Rodriguez A. | 計画部門役員 |
| Pedro E. Ortiz | テクニカルアドバイザー |
| Melvin A. Guevara | プロジェクトエンジニア |
| German Leonel Andino | 計画局コーディネーター |
| Tomas Romero Artica | オペレーション部門長 |
| Roberto Daniel Medrano | コンセプション浄水場 システム長 |
| Oscar Enrique Salgado | コンセプション浄水場 ダム担当 |
| Roger Omar Avilez | ピカチョ浄水場 システム長 |
| Edmond Gerardo Madrid | オペレーション部門 アシスタント |
| Rosbel Rene Rodriguez Nuñez | 環境課課長 |
| Carlos Tosta | 流域部アシスタント |
| Francisco Guitarro | 計画課エンジニアアシスタント |
| 国家電力会社 (ENEE) | |
| Francisco Ramon Larios Z. | 開発局水力発電プロジェクトコーディネーター |
| Glenda Castillo | 開発局長 |
| Percy Buck | 管理部 テクニカルアドバイザー |
| Jorge Moraza | 再生資源部長 |
| Elmer Bustith | 配電部課長 |
| Luis Borjas | 配電部課長 |
| Roque Lopez | UREE 部長 |
| Lucas Raveos | 送電部長 |
| テグシガルパ市役所 | |
| Jose Oswaldo Guillen | 助役 |
| Jose Teruel | 市浄水衛生部 |
| 天然資源環境省 (SERNA) | |
| Julio E. Eguiguren | 環境評価・管理局長 |
| 国家計画・国際協力庁 (SEPLAN) | |
| José Antonio Silva | 計画局 専門家 |
| Ana Galeano | 国際協力局 専門家 |
| Clarissa Lanza | 事務局 担当者 |
| JICA ホンジュラス事務所 | |
| 山田 章彦 | 所長 |
| 西木 広志 | 次長 |
| Sandra Rivera | 気候変動プログラムオフィサー |

4. 討議議事録(M/D)

Minutes of Discussions
on
**the Preparatory Survey for the Project of Micro-Hydroelectric
Power Generation in Metropolitan Area of Tegucigalpa
in the Republic of Honduras**

In response to the request from the Government of the Republic of Honduras (hereinafter referred to as "GOH"), the Japan International Cooperation Agency (hereinafter referred to as "JICA"), in consultation with the Government of Japan (hereinafter referred to as "GOJ"), decided to conduct a Preparatory Survey (hereinafter referred to as "the Survey") on the Project of Micro-Hydroelectric Power Generation in Metropolitan Area of Tegucigalpa (hereinafter referred to as "the Project").

JICA dispatched the Preparatory Survey Team (hereinafter referred to as "the Team") to Honduras, headed by Mr. Shigeru MAEDA, Technical Senior Advisor to the Director General, Department of Industrial Development and Public Policy, JICA. The Team is scheduled to stay in Honduras from August 9 to September 21, 2012.

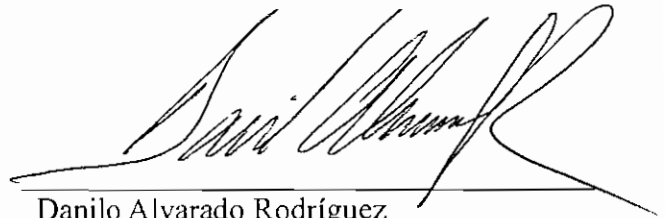
The Team held discussions with the officials of concerned authorities in Honduras (hereinafter referred to as "the Honduras side"), and conducted a series of field survey. In the course of the discussions, both the Honduras side and the Team (hereinafter referred to as "Both sides") have confirmed the main items described in the sheets attached hereto.

Tegucigalpa, August 16th, 2012

前田 秀

Shigeru MAEDA

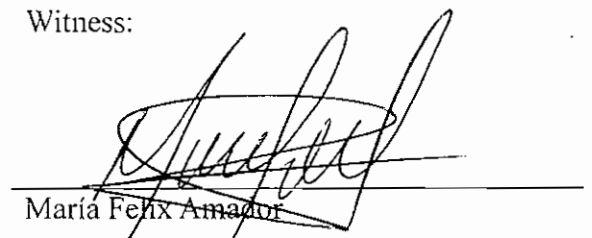
Leader
Preparatory Survey Team
Japan International Cooperation Agency



Danilo Alvarado Rodríguez

Director General
Servicio Autónomo Nacional de
Acueductos y Alcantarillados

Witness:



María Félix Amador

Especialista en Cooperación Externa
Secretaría Técnica de Planificación y
Cooperación Externa

ATTACHMENT

MFAE

1. Objective of the Project

The objective of the Project is to construct small-scale hydropower plants in Concepcion and Picacho Water Treatment Stations for contributing to improvement of financial business operation of Servicio Autónomo Nacional de Acueductos y Alcantarillados (SANAA).

2. Locations of Projects

The project sites are located in Concepcion and Picacho in Tegucigalpa as shown in Annex-1.

3. Responsible and Implementing Organizations

SANAA is the responsible organization and the implementing organization of the Project.

The Organization Structure of SANAA is shown in Annex-2.

4. Components Confirmed by Both Sides

Both sides confirmed that components of the Project are as follows.

- (1) Construction of small-scale hydropower plants and associated works on Concepcion and Picacho Water Treatment Stations.
- (2) Power dispatch to the existing grid and optimization in power generation.
- (3) Training on O&M and technology involved in newly introduced generation facility

JICA will assess the appropriateness of the components for Japan's Grant Aid and report the findings to GOJ.

5. Project Implementation Structure and concerned organizations

- (1) Empresa Nacional de Energía Eléctrica (ENEE)

As ENEE is the National Electric Power Corporation, which will be connected to the small-scale power plant built in the Project, both sides agreed that necessary information exchange with SANAA and their technical support is important for the success of the Project.

- (2) Tegucigalpa Municipality

Currently, the Project implementing organization is regarded as SANAA. However, considering that a part of SANAA's business will be transferred to Tegucigalpa Municipality, both sides agreed to involve the Municipality into the Project as a major concerned organization from the survey stage.

6. Utilization of generated power from the Project

The generated energy from small-scale hydropower plants will obtain the following benefits.

- (1) After consumption at Concepcion and Picacho Water Treatment Stations including relevant facilities, the surplus electricity will be sold to ENEE at the price of Renewable Energy Law.
- (2) All generated electricity from small-scale hydropower plants will be sold in the form of Energy Credit which alternate expenditure for pumping energy at all treatment plants.

Both sides agreed that SANAA will select one of above mentioned options and inform the survey

team before the survey team leaves Tegucigalpa in September 2012.

MFAE

7. Optimal Design

The survey team explained and the Honduras side agreed that the optimum design scheme shall be selected among the alternative schemes considering economical, reliable, sustainable, environmental, construction easiness and operation and maintenance easiness aspects through the survey.

8. Consideration of safety design

Both sides agreed that the survey shall be made considering the following safety aspects.

- (1) At the Picacho site, purified water is to be utilized for power generation, so the parts of plant shall be selected and assembled with enough measures to protect purified water from oil leak, rusting, erosion etc., and the adequate maintenance shall be carried out.
- (2) Existing water pipes shall not be damaged by water hammer pressures due to water turbine.
- (3) Construction methods shall be examined to minimize adverse effects on the surrounding areas.
- (4) In case of accident and repair of the turbine, the primary function of the existing infrastructure shall be guaranteed.

9. Japan's Grant Aid Scheme

- (1) JICA confirmed that the Honduras side understood Japan's Grant Aid Scheme explained by the Team as described in Annex-3 and 4.
- (2) The Honduras side will take the necessary measures, as described in Annex-5, for smooth implementation of the Project as prerequisites for the Japan's Grant Aid to be implemented.

10. Environmental and Social Considerations

- (1) The Honduras side agreed to comply with the JICA Guidelines for Environmental and Social Considerations (hereinafter referred to as "JICA Guidelines") as well as laws and regulations in Honduras, and was requested to prepare Environmental Checklist and Monitoring Form which are designated by JICA Guidelines for an outline design.
- (2) The Honduras side agreed to make necessary arrangements with concerned governmental organizations in order to secure funding for and execution of the above environmental matters in a schedule as required for smooth execution of the Project.
- (3) A part of area in Picacho site may be located in the national park area. Both sides agreed that the status of the area should be firstly clarified then the survey team will confirm necessary procedures for project implementation in that area in cooperation with SANAA.

11. Schedule of the Survey

The team will continue with the Field Survey in Honduras until 21st September, 2012 and report the result to GOJ. Based on the results of the Survey, JICA will dispatch the team to Honduras to explain the report of the Preparatory Survey in December, 2012.

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12. Other Relevant Issues

- (1) Status of the Survey

The Team explained that the purpose of the Survey is to collect information and data necessary

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for the outline design and cost estimates of the Project components which are confirmed through the Survey and the analysis in Japan.

(2) Coordination of SANAA and other relevant organizations

Both sides confirmed that the Honduras side will take proper action to coordinate SANAA and other relevant organizations.

(3) Assignment of counterpart personnel

Both sides confirmed the need of assignment of counterpart personnel from the Honduras side.

(4) Major equipment installed in the Project

The JICA team explained that the Project will be conducted under the Japanese Grant Aid Program aiming at promoting "Green Growth", which GOJ puts stress on, by introducing small scale hydropower plants with elaborated technologies of Japan.

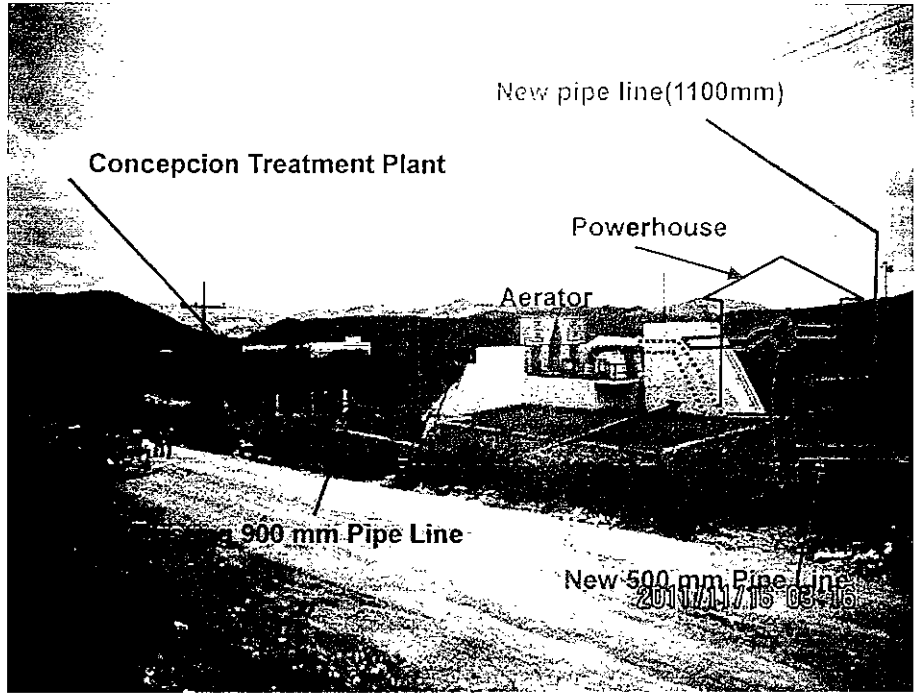
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- Annex-1 Project Sites
- Annex-2 Organization Chart of SANAA
- Annex-3 Japan's Grant Aid
- Annex-4 Flow Chart of Japan's Grant Aid Procedures
- Annex-5 Major Undertakings to be taken by Each Government

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Project Sites



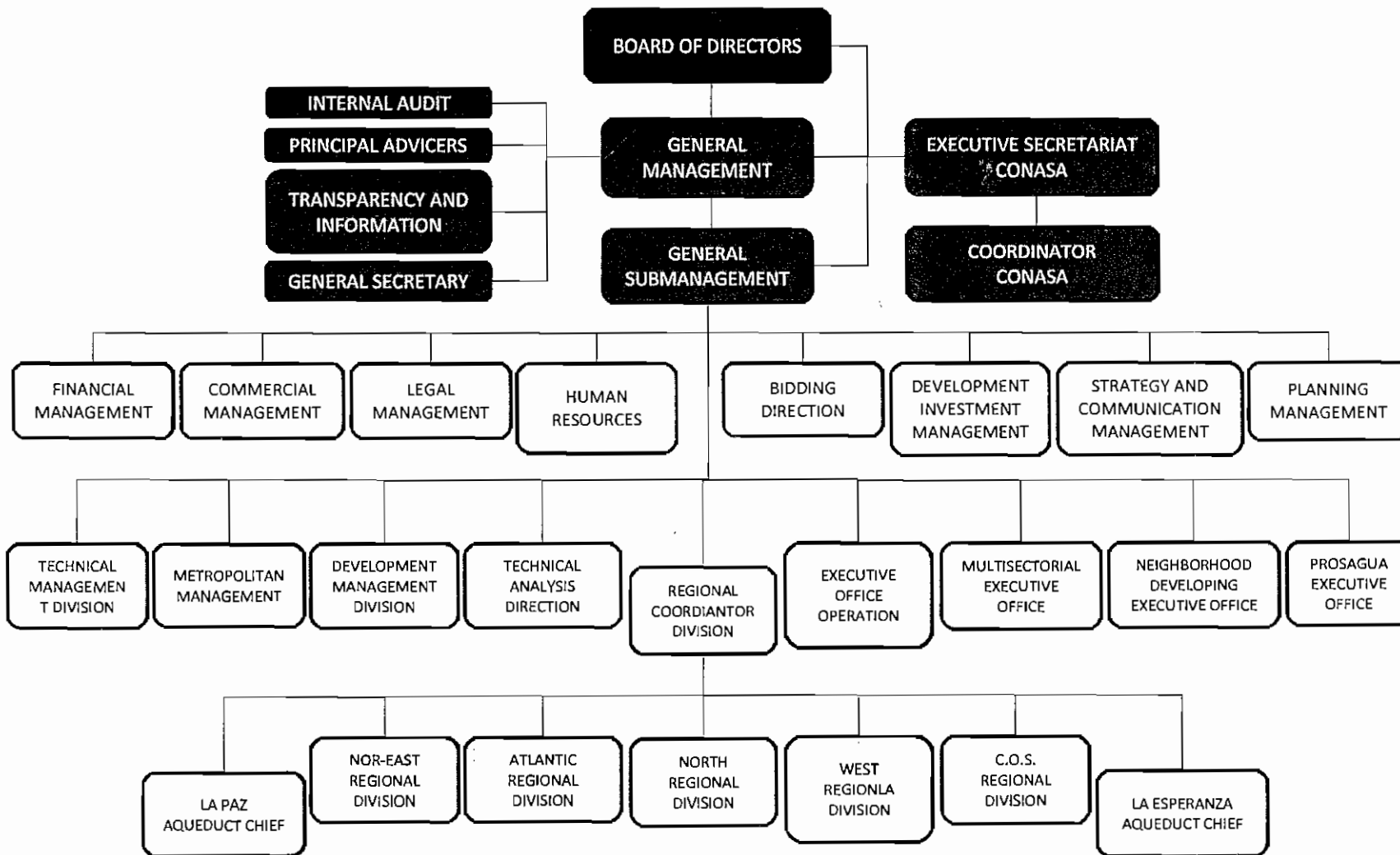
Concepcion Site



Picacho Site

ORGANIZATION CHART OF SANAA
 SERVICIO AUTONOMO NACIONAL DE ACUEDUCTOS Y ALCANTARILLADOS

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JAPAN'S GRANT AID

The Government of Japan (hereinafter referred to as “the GOJ”) is implementing the organizational reforms to improve the quality of ODA operations, and as a part of this realignment, a new JICA law was entered into effect on October 1, 2008. Based on this law and the decision of the GOJ, JICA has become the executing agency of the Grant Aid for General Projects, for Fisheries and for Cultural Cooperation, etc.

The Grant Aid is non-reimbursable fund provided to a recipient country to procure the facilities, equipment and services (engineering services and transportation of the products, etc.) for its economic and social development in accordance with the relevant laws and regulations of Japan. The Grant Aid is not supplied through the donation of materials as such.

1. Grant Aid Procedures

The Japanese Grant Aid is supplied through following procedures:

- Preparatory Survey
 - The Survey conducted by JICA
- Appraisal & Approval
 - Appraisal by the GOJ and JICA, and Approval by the Japanese Cabinet
- Authority for Determining Implementation
 - The Notes exchanged between the GOJ and a recipient country
- Grant Agreement (hereinafter referred to as “the G/A”)
 - Agreement concluded between JICA and a recipient country
- Implementation
 - Implementation of the Project on the basis of the G/A

2. Preparatory Survey

(1) Contents of the Survey

The aim of the preparatory Survey is to provide a basic document necessary for the appraisal of the Project made by the GOJ and JICA. The contents of the Survey are as follows:

- Confirmation of the background, objectives, and benefits of the Project and also institutional capacity of relevant agencies of the recipient country necessary for the implementation of the Project.
- Evaluation of the appropriateness of the Project to be implemented under the Grant Aid Scheme from a technical, financial, social and economic point of view.
- Confirmation of items agreed between both parties concerning the basic concept of the Project.

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- Preparation of a basic design of the Project.
- Estimation of costs of the Project.

The contents of the original request by the recipient country are not necessarily approved in their initial form as the contents of the Grant Aid project. The Basic Design of the Project is confirmed based on the guidelines of the Japan's Grant Aid scheme.

JICA requests the Government of the recipient country to take whatever measures necessary to achieve its self-reliance in the implementation of the Project. Such measures must be guaranteed even though they may fall outside of the jurisdiction of the organization of the recipient country which actually implements the Project. Therefore, the implementation of the Project is confirmed by all relevant organizations of the recipient country based on the Minutes of Discussions.

(2) Selection of Consultants

For smooth implementation of the Survey, JICA employs (a) registered consulting firm(s). JICA selects (a) firm(s) based on proposals submitted by interested firms.

(3) Result of the Survey

JICA reviews the Report on the results of the Survey and recommends the GOJ to appraise the implementation of the Project after confirming the appropriateness of the Project.

3. Japan's Grant Aid Scheme

(1) The E/N and the G/A

After the Project is approved by the Cabinet of Japan, the Exchange of Notes(hereinafter referred to as "the E/N") will be signed between the GOJ and the Government of the recipient country to make a pledge for assistance, which is followed by the conclusion of the G/A between JICA and the Government of the recipient country to define the necessary articles to implement the Project, such as payment conditions, responsibilities of the Government of the recipient country, and procurement conditions.

(2) Selection of Consultants

In order to maintain technical consistency, the consulting firm(s) which conducted the Survey will be recommended by JICA to the recipient country to continue to work on the Project's implementation after the E/N and G/A.

(3) Eligible source country

Under the Japanese Grant Aid, in principle, Japanese products and services including transport or those of the recipient country are to be purchased. When JICA and the Government of the recipient country or its designated authority deem it necessary, the Grant Aid may be used for the purchase of the products or services of a third country. However, the prime contractors, namely, constructing and procurement firms, and the prime consulting firm are limited to "Japanese nationals".

114
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(4) Necessity of "Verification"

The Government of the recipient country or its designated authority will conclude contracts denominated in Japanese yen with Japanese nationals. Those contracts shall be verified by JICA. This "Verification" is deemed necessary to fulfill accountability to Japanese taxpayers.

(5) Major undertakings to be taken by the Government of the Recipient Country

In the implementation of the Grant Aid Project, the recipient country is required to undertake such necessary measures as Annex.

(6) "Proper Use"

The Government of the recipient country is required to maintain and use properly and effectively the facilities constructed and the equipment purchased under the Grant Aid, to assign staff necessary for this operation and maintenance and to bear all the expenses other than those covered by the Grant Aid.

(7) "Export and Re-export"

The products purchased under the Grant Aid should not be exported or re-exported from the recipient country.

(8) Banking Arrangements (B/A)

a) The Government of the recipient country or its designated authority should open an account under the name of the Government of the recipient country in a bank in Japan (hereinafter referred to as "the Bank"). JICA will execute the Grant Aid by making payments in Japanese yen to cover the obligations incurred by the Government of the recipient country or its designated authority under the Verified Contracts.


b) The payments will be made when payment requests are presented by the Bank to JICA under an Authorization to Pay (A/P) issued by the Government of the recipient country or its designated authority.

(9) Authorization to Pay (A/P)

The Government of the recipient country should bear an advising commission of an Authorization to Pay and payment commissions paid to the Bank.

(10) Social and Environmental Considerations

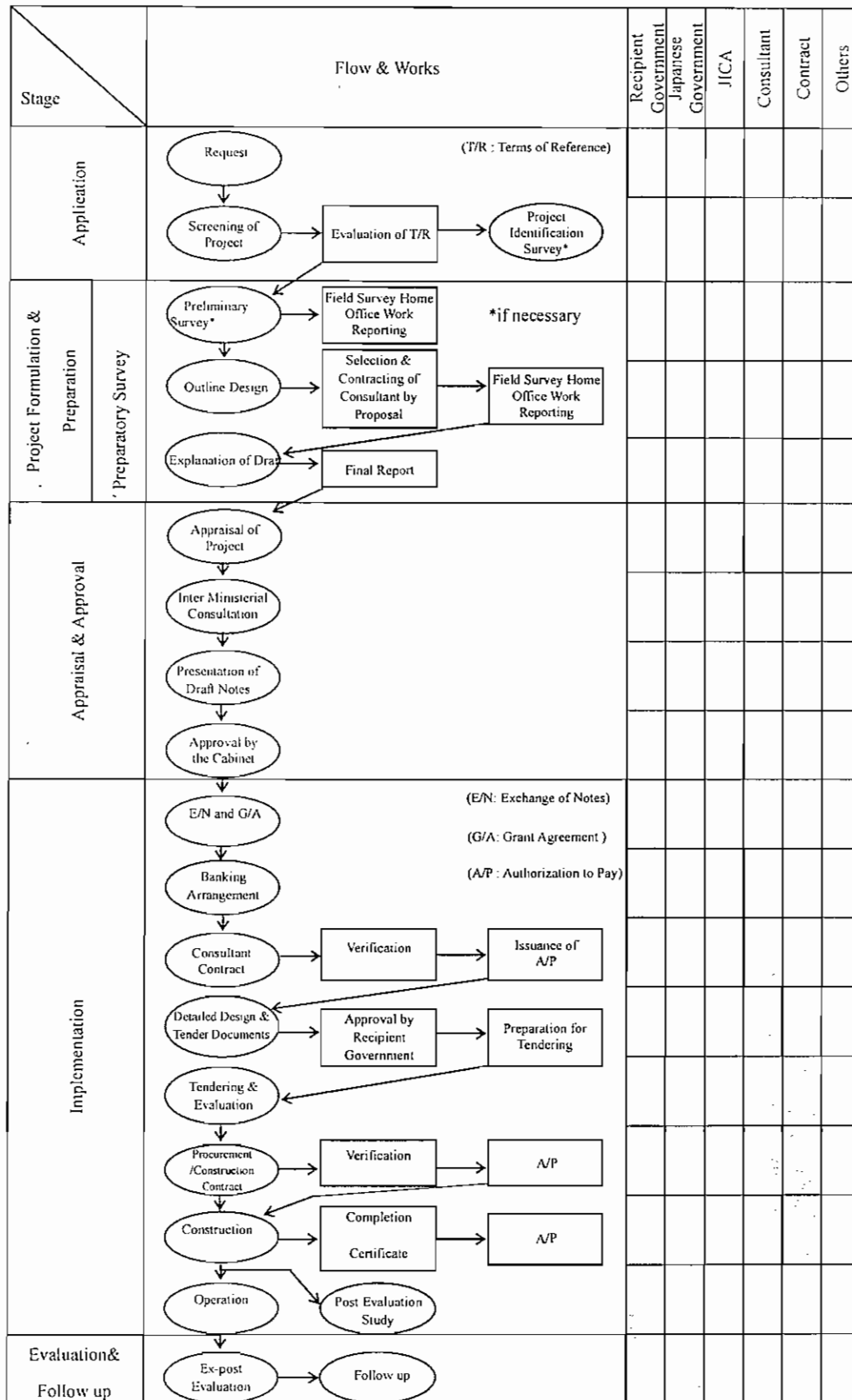
A recipient country must carefully consider social and environmental impacts by the Project and must comply with the environmental regulations of the recipient country and JICA socio-environmental guidelines.

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Flow Chart of Japan's Grant Aid Procedures



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Major undertakings to be taken by each Government

| No. | Items | To be covered by Grant Aid | To be covered by Recipient Side |
|-----|--|----------------------------|---------------------------------|
| 1 | to secure [a lot] / [lots] of land necessary for the implementation of the Project and to clear the [site] / [sites]: | | • |
| 2 | To construct the following facilities | | |
| | 1) The building | • | |
| | 2) The gates and fences in and around the site | | • |
| | 3) The parking lot | • | |
| | 4) The road within the site | • | |
| | 5) The road outside the site | | • |
| 3 | To provide facilities for distribution of electricity, water supply and drainage and other incidental facilities necessary for the implementation of the Project outside the [site] / [sites] | | |
| | 1) Electricity | | |
| | a. The distributing power line to the site | | • |
| | b. The drop wiring and internal wiring within the site | • | |
| | c. The main circuit breaker and transformer | • | |
| | 2) Water Supply | | |
| | a. The city water distribution main to the site | | • |
| | b. The supply system within the site (receiving and elevated tanks) | • | |
| | 3) Drainage | | |
| | a. The city drainage main (for storm sewer and others to the site) | | • |
| | b. The drainage system (for toilet sewer, common waste, storm drainage and others) within the site | • | |
| | 4) Gas Supply | | |
| | a. The city gas main to the site | | • |
| | b. The gas supply system within the site | • | |
| | 5) Telephone System | | |
| | a. The telephone trunk line to the main distribution frame/panel (MDF) of the building | | • |
| | b. The MDF and the extension after the frame/panel | • | |
| | 6) Furniture and Equipment | | |
| | a. General furniture | | • |
| | b. Project equipment | • | |
| 4 | To ensure prompt unloading and customs clearance of the products at ports of disembarkation in the recipient country and to assist internal transportation of the products | | |
| | 1) Marine (Air) transportation of the Products from Japan to the recipient country | • | |
| | 2) Tax exemption and custom clearance of the Products at the port of disembarkation | | • |
| | 3) Internal transportation from the port of disembarkation to the project site | • | |
| 5 | To ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the recipient country with respect to the purchase of the products and the services [be exempted] / [be borne by the Authority without using the Grant] | | • |
| 6 | To accord Japanese nationals whose services may be required in connection with the supply of the products and the services such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work | | • |
| 7 | To ensure that [the Facilities and the products] / [the Facilities] / [the products] be maintained and used properly and effectively for the implementation of the Project | | • |
| 8 | To bear all the expenses, other than those covered by the Grant, necessary for the implementation of the Project | | • |
| 9 | To bear the following commissions paid to the Japanese bank for banking services based upon the B/A | | |
| | 1) Advising commission of A/P | | • |
| | 2) Payment commission | | • |
| 10 | To give due environmental and social consideration in the implementation of the Project. | | • |

*1 B/A : Banking Arrangement, A/P : Authorization to pay) *2 If the environmental screening category is C, No. 10 is unnecessary

Minutes of Discussions
on
the Preparatory Survey for the Project of Micro-Hydroelectric
Power Generation in Metropolitan Area of Tegucigalpa
in the Republic of Honduras
(Explanation on Draft Final Report)

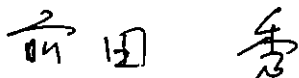
In response to the request from the Government of the Republic of Honduras (hereinafter referred to as "GOH"), the Japan International Cooperation Agency (hereinafter referred to as "JICA"), in consultation with the Government of Japan (hereinafter referred to as "GOJ"), decided to conduct a Preparatory Survey (hereinafter referred to as "the Survey") on the Project of Micro-Hydroelectric Power Generation in Metropolitan Area of Tegucigalpa (hereinafter referred to as "the Project").

From August to September 2012, JICA dispatched the Preparatory Survey Team (hereinafter referred to as "the Team") to Honduras, and through discussions, field surveys and technical examination of the results of the surveys in Japan, JICA prepared a Draft Final Report of the Outline Design.

In order to explain and to consult with the concerned officials of GOH (hereinafter referred to as "the Honduras side") on the components of the Draft Final Report, JICA dispatched the Team again to Honduras, which is headed by Mr. Shigeru MAEDA, Executive Technical Advisor to the Director General, Department of Industrial Development and Public Policy, JICA, from December 13th to 22nd, 2012.

And as a result of discussion, the Honduras side and the Team (hereinafter referred to as "both sides") confirmed the main items described in the sheets attached hereto.

Tegucigalpa, December 20th, 2012



Shigeru MAEDA

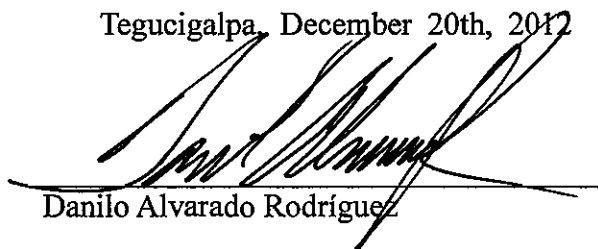
Leader
Preparatory Survey Team
Japan International Cooperation Agency

Witness:



Christa Castro

Asistente del Vice Alcalde
Alcaldía Municipal del Distrito Central



Danilo Alvarado Rodríguez

Director General
Servicio Autónomo Nacional de
Acueductos y Alcantarillados

Witness:



Karoline Pacheco Suazo

Sub Secretaria de Estado de Planificación
del Desarrollo
Secretaria Técnica de Planificación y
Cooperación Externa

ATTACHMENT

1. Components of the Draft Final Report

The Honduras side agreed and accepted in principle the components of the Draft Final Report including Draft Technical Specifications explained by the Team.

2. Components of the Project confirmed by both sides

The components of this project are as follows;

- (1) Construction of a Small-scale Hydropower Plant (hereinafter referred to as "SHP") at the Concepcion Water Treatment Station. (See Annex-1)
- (2) Construction of a SHP at the Picacho Water Treatment Station (See Annex-1)
- (3) Soft Component (Technical Assistance)

The Team explained that the following ideas of soft component were under consideration for the smooth start of utilization of the SHPs.

- 1) Technical guidance on Operation and Maintenance (hereinafter referred to as "O&M") of SHPs in consideration with water distribution plan to general users and interconnection to the electricity grid
- 2) Technical guidance on medium and long term O&M planning done by Servicio Autónomo Nacional de Acueductos y Alcantarillados (hereinafter referred to as "SANAA") from the technical and financial aspects
- 3) Technical guidance on total monitoring of SHP operation

However, the soft component provided by the Japanese Consultants contracted by the Honduras side, and initial operation instructions done by hydro turbine or generator manufactures, should not be duplicated. Accordingly, ideas of soft component in the Draft Final Report could be partially modified by the result of more careful examination of soft component and manufacturers' instructions.

3. Responsible and Implementing Organizations, and concerned organizations

- (1) Servicio Autónomo Nacional de Acueductos y Alcantarillados (SANAA)

SANAA is the responsible organization and the implementing organization of the Project. The Organization Structure of SANAA is shown in Annex-2.

- (2) Empresa Nacional de Energía Eléctrica (ENEE)

As ENEE is the National Electric Power Corporation, which will be connected to the SHPs built in the Project, both sides agreed and requested that necessary information should be exchanged with SANAA and technical support to SANAA should be provided for the success of the Project during both the construction stage and the plant operation stage.

- (3) Tegucigalpa Municipality (Alcaldía Municipal del Distrito Central: AMDC)

Currently, the Project implementing organization is regarded as SANAA. However, considering that a part of SANAA's business will be transferred to Tegucigalpa Municipality, both sides agreed to involve the Municipality into the Project as a major concerned organization during both the construction stage and the plant operation stage.

4. Confirmation of progress made from the previous M/D

- (1) Project site and capacity of SHP

Both sides confirmed that project sites were Concepcion and Picacho Water Treatment

Stations. The Team explained that the design capacity of SHPs to be constructed in Concepcion site would be 250kW and in Picacho site 180kW based on the result of outline design and cost estimation.

(2) Application of the Related Laws and Regulations

Based on the previous Minutes of Discussions (hereinafter referred to as "M/D"), the Team reconfirmed that the Honduras side agreed to obtain the permission to construct SHP and to have it connected to the national grid. It was also confirmed by both sides that SANAA should obtain the permission of ENEE for the operation of SHP to be connected to the national grid by the commencement of the construction work of SHPs.

5. Project Cost

The Honduras side agreed that the Project cost should not exceed the upper limit of amount agreed on the Exchange of Note (E/N) and the Grant Agreement (G/A). Both sides confirmed that the Project cost contains procurement cost of equipment, the cost for transportation up to the Project Site, installation cost, and the consultant fee that includes the cost for soft component for the technical assistance of operation and maintenance of SHP and related equipment as a whole.

The Honduras side understood that the Project Cost Estimation attached as Annex-3 is not final and is subject to change by the result of examination through revision of the Outline Design Study.

6. Undertakings required by the Honduras side

The Honduras side agreed that the Honduras side should abide by the following undertakings, though these were included in major undertakings described in Annex 7.

(1) Allocation of land/space for installation of the relevant equipment and materials for SHPs

As the owners of the land where a part of the relevant equipment and materials for SHPs will be installed are private personnel, both sides confirmed SANAA would implement necessary land acquisition through appropriate procedures according to domestic laws and the JICA Guidelines for Environmental and Social Considerations (hereinafter referred to as "JICA Guidelines") before the Project starts.

(2) Relocation of existing distribution water pipeline

There is existing distribution water pipeline, which cross the space for the newly constructed powerhouse at Picacho site. Honduras side agreed that they would relocate this pipeline before the Project starts.

(3) Ownership and Responsibilities for Operation and Maintenance

The Honduras side reconfirmed that SANAA was primarily the owner of the SHPs constructed by the Project, and SANAA was primarily responsible for O&M of the SHPs.

The Honduras side confirmed the estimated cost for O&M described in Annex 4 and agreed that SANAA would secure necessary budget and assign necessary personnel for the O&M of the SHPs under the Project.

However, the Honduras side confirmed that SANAA and/or Tegucigalpa Municipality should be responsible for allocation of necessary budget and O&M personnel even after a part of business of SANAA shall be transferred to Tegucigalpa Municipality following the relevant laws.

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7. Japan's Grant Aid Scheme

- (1) The Team confirmed that the Honduras side understood Japan's Grant Aid Scheme explained by the Team as described in Annex-5 and 6.
- (2) The Honduras side will take the necessary measures, as described in Annex-7, for smooth implementation of the Project as prerequisites for the Japan's Grant Aid to be implemented.

8. Confidentiality of the Project

- (1) Detailed specifications of the Facilities and Equipment

Both sides confirmed that all the information related to the Project should not be released to any outside parties before conclusion of all the contract(s) for the Project because they are confidential document that contains information related to the tender.

Such information includes the followings:

- a) detailed drawings, specifications of the facilities and equipment, and other technical information of the facilities and equipment;
- b) the Draft Final Report;
- c) the Final Report

- (2) Confidentiality of the Cost estimation

The Team explained the estimated cost of the project as described in Annex 3. The Honduras side agreed that the estimated cost of the Project should never duplicated or disclosed to any outside parties (i.e. outside of JICA and the Honduras side) before tender for the project.



9. Environmental and Social Considerations

- (1) The Honduras side agreed to comply with the JICA Guidelines for Environmental and Social Considerations (hereinafter referred to as "JICA Guidelines") as well as laws and regulations in Honduras. In particular, the Honduras side confirmed that land necessary for the Project also should be secured complying with JICA Guidelines and domestic laws and regulations in Honduras.
- (2) Both sides confirmed that SANAA would make necessary arrangements with concerned governmental organizations in order to secure funding for and execution of the environmental and social matters in a schedule as required for smooth execution of the Project. Such information on environmental and social consideration including major impacts and relevant mitigation measures will be summarized and finalized in the Environmental Checklist in the Preparatory Survey Final Report. SANAA confirmed that they would inform JICA about any major changes which may affect environmental and social considerations made for the Project by revising the Checklist in a timely manner.
- (3) Both sides confirmed that environmental monitoring would be conducted by SANAA in accordance with the Environmental Monitoring Plan described in the Preparatory Survey Final Report.
- (4) SANAA confirmed that it would take stipulated procedures for information disclosure in accordance with "Ley general de medio ambiente" and "Sistema Nacional de Evaluacion de Impacto Ambiental". In addition, the Team requested SANAA to disclose the monitoring results to local project stakeholders, and SANAA agreed to disclose monitoring results on their website or in their field offices.
SANAA agreed that JICA would disclose provided monitoring results in the monitoring form on its website.
- (5) Both sides confirmed that this project was expected to contribute to mitigation of climate change.

10. Schedule of the Survey

JICA will complete the final report in accordance with the confirmed items and comments from the Honduras side and send it to SANAA by the end of April 2013.

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11. Other Relevant Issues

(1) Coordination of SANAA and other relevant organizations

Both sides confirmed that SANAA will take proper action to coordinate SANAA and other relevant organizations.

(2) Assignment of counterpart personnel

Both sides confirmed the need of assignment of counterpart personnel from the Honduras side.

(3) Customs and Tax Exemption

Based on the previous M/D, the Honduras side agreed that Honduras side should be responsible for the exemption of all customs, tax, levies and duties incurred in Honduras for implementation of the project.

(4) "Green Growth" policy and Major equipment installed in the Project

The Honduras side recognized, as the Embassy of Japan explained, that the Project will be formulated and conducted in accordance with the "Green Growth" policy of the Government of Japan, which emphasizes on utilizing the major equipment such as hydro turbines made by Japan's small and medium enterprises.

(5) SANAA's Request

SANAA strongly requested that the Project should include soft component required enough for SANAA's smooth start of operation of Small Hydropower Generation because it was the first experience for them to work on electric power generation. As well as soft component, SANAA referred to the necessity of spare parts provided by the Project and they requested the Project cost covers primary spare parts as much as possible. The team explained to SANAA that JICA also understood the necessity of soft component and spare parts, but items of soft component and spare parts covered by the Project should be limited due to budget constraints. SANAA understood it.

(End)

- Annex-1 Project Sites
- Annex-2 Organization Chart of SANAA
- Annex-3 Project Cost Estimation (Confidential)
- Annex-4 Estimated cost for O&M
- Annex-5 Japan's Grant Aid
- Annex-6 Flow Chart of Japan's Grant Aid Procedures
- Annex-7 Major Undertakings to be taken by Each Government

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Project Site



Concepcion Site

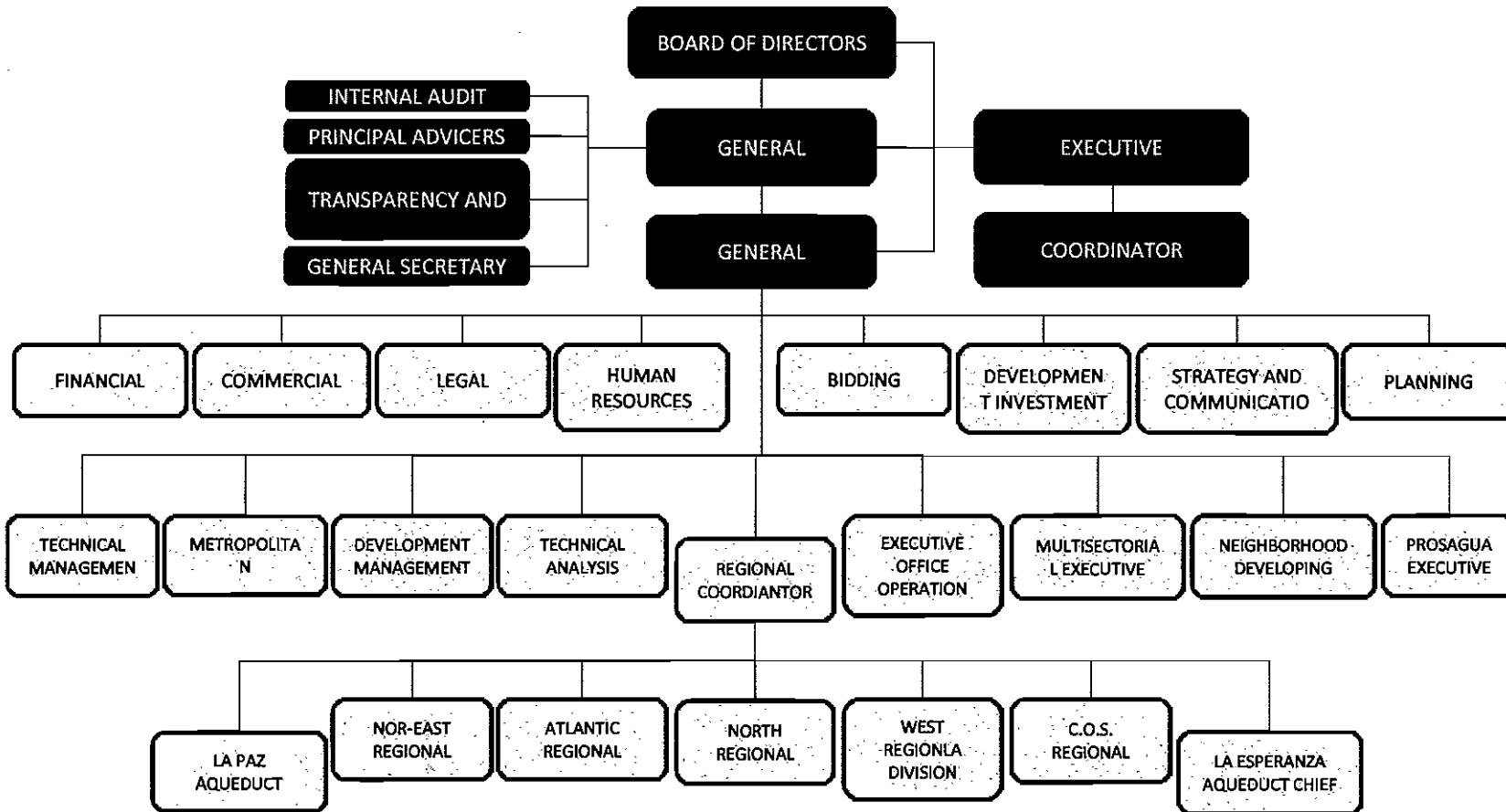


Picacho Site

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ORGANIZATION CHART OF SANAA
SERVICIO AUTONOMO NACIONAL DE ACUEDUCTOS Y ALCANTARILLADOS



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Project Cost Estimation
(Confidential)

The total amount of grant provided to the project under the Grant-in-aid scheme "promotion of green growth (alternative energy introduction / promotion)" is 9.5 hundreds million yen. The allocation of expense obligations, which pertain to the allocation of responsibilities between Japan side and Honduras side mentioned in the previous chapter, are estimated as following (1) and (2). However, the amount is not necessary limit maximum amount of the grant under an Exchange of Notes.

- (1) Cost of the Construction, Procurement and Services
Project costs covered by the Grant is estimated as follows

Table 3-1 Project cost covered by Japan side

| Item | | Project Cost (a million yen) | | |
|---------------------------|--|------------------------------|---------|-------|
| | | Concepcion | Picacho | |
| Construction works | Civil works, Power house construction, etc | 241.2 | 81.9 | 842.9 |
| Installation works | Installation works of turbines, generators, control systems, valves, power lines etc | 275.9 | 243.9 | |
| Consulting Services | | 89.1 | | |
| Soft Components Programme | | 19.4 | | |
| Total | | 951.4 | | |

- (2) Cost of Honduras side
Project costs covered by the Honduras side is estimated as follows

Table 3-2 Project cost covered by Honduras side

| Item | Lps. | a million Yen | Remarks |
|--|--------------|---------------|--|
| Acquisition of Lands | | | To be identified |
| Diversion of existing pipelines at proposed location of the power house in Picacho construction site | 160,000 Lps. | 0.7 | Pipe Diameter 150mm, Steel Pipe 48m length |
| Cost of banking services, B/A and A/P | 240,000 Lps. | 1.0 | 0.1% of the Total Project Cost |
| Total | | | |

Estimated Cost for O&M

Since this Project is implemented within the framework of the grant assistant, the initial cost such as the construction, procurement and installation costs including the site test cost is granted, however, it is necessary to cover the necessary expenses related personnel expenses, maintenance and management in order to operate a sustainable hydroelectric power generation business. These expenses, for increased burden does not occurred due to reduction of SANAA's electricity consumed price by selling the electric energy to be generated by the hydroelectric power plants.

Table 4-1 Maintenance Cost Items

| The main expenditure items |
|---|
| 1) Labor costs (power plant operating personnel, maintenance personnel) |
| 2) Cost of purchasing spare parts |
| 3) Other direct costs (such as office supplies) |
| 4) Overhaul costs etc. |

(1) Assumed Labor Cost

Four (4) operators for each hydroelectric power plant and two (2) maintenance crews, totally ten (10) personnel would be assigned. Expected labor cost is shown as below.

Table 4-2 Labor Cost of Operation and Maintenance

| Name | Number of staff | Salary | Remarks |
|----------------------|--|---|---|
| 1) Operators | 4 personnel × 2 Sites = 8 personnel | Lp.15, 000 / month × 8 personnel = Lp.120, 000 | Salary of newly hired operator is Lp12,000/month. Salary of experienced hired operator is Lp15,000 - 18,000/month |
| 2) Maintenance Crews | 2 personnel | Lp.20, 000 / month × 2 personnel = Lp.40, 000 | Salary of newly hired engineer (ENEE) is Lp20,000 – Lp22, 000/month. Salary of experienced hired engineer (ENEE) is Lp25,000 - 28,000/month. |
| | | Lp.160,000/month | |

(2) Purchase Cost of Spare Parts

The table below shows the spare parts to be delivered in this Project. Of these, the replacement which may become necessary on a regular basis is a kind of valve seals and turbine shaft water seal packing. This cost is estimated Lps.24,000/year (about ¥100,000/year). If spares are used in the repairing work, it is necessary to purchase and keep them for future maintenance.

Table 4-3 List of Spare Parts

| | Name | Quantity | Remarks |
|---|--------------------------|----------|--------------------------|
| Concepcion Hydroelectric Power Plant | | | |
| 1. Turbine | Bearings | | to be decided |
| | Shaft water seal packing | 1 lot | Replacement is necessary |
| | Packing | 1 lot | Replacement is necessary |
| 2. Generator | Bearings | | to be decided |
| 3. Control and Switchgear | Protection relay | 1 set | |
| | Auxiliary relay | 1 set | |
| Picacho Hydroelectric power plant | | | |
| 1. Turbine | Bearings | | to be decided |
| | Shaft water seal packing | 1 lot | Replacement is necessary |
| | Packing | 1 lot | Replacement is necessary |
| 2. Generator | Bearings | | to be decided |
| 3. Control and Switchgear | Protection relay | 1 set | |
| | Auxiliary relay | 1 set | |

(3) Other Direct Costs (Consumables)

Consumables such as printer cartridges of the printers for the control system, grease for the generator and office supplies are estimated as Lps.12,000/year (about ¥50,000/year).

(4) Overhaul Costs, etc.

The overhaul of the turbine and the generator in every 10 years would be implemented by the manufacturer's engineers. The replacement of the turbine water seal packing and the valve seals is assumed in the overhaul.

The overhaul cost is Lps.718,000/overhaul (about ¥3,000,000/overhaul) including costs of dispatching the manufacturer's engineer and spare parts such as the turbine water seal packing and valve seals.

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JAPAN'S GRANT AID

The Government of Japan (hereinafter referred to as “the GOJ”) is implementing the organizational reforms to improve the quality of ODA operations, and as a part of this realignment, a new JICA law was entered into effect on October 1, 2008. Based on this law and the decision of the GOJ, JICA has become the executing agency of the Grant Aid for General Projects, for Fisheries and for Cultural Cooperation, etc.

The Grant Aid is non-reimbursable fund provided to a recipient country to procure the facilities, equipment and services (engineering services and transportation of the products, etc.) for its economic and social development in accordance with the relevant laws and regulations of Japan. The Grant Aid is not supplied through the donation of materials as such.

1. Grant Aid Procedures

The Japanese Grant Aid is supplied through following procedures:

- Preparatory Survey
 - The Survey conducted by JICA
- Appraisal & Approval
 - Appraisal by the GOJ and JICA, and Approval by the Japanese Cabinet
- Authority for Determining Implementation
 - The Notes exchanged between the GOJ and a recipient country
- Grant Agreement (hereinafter referred to as “the G/A”)
 - Agreement concluded between JICA and a recipient country
- Implementation
 - Implementation of the Project on the basis of the G/A

2. Preparatory Survey

(1) Contents of the Survey

The aim of the preparatory Survey is to provide a basic document necessary for the appraisal of the Project made by the GOJ and JICA. The contents of the Survey are as follows:

- Confirmation of the background, objectives, and benefits of the Project and also institutional capacity of relevant agencies of the recipient country necessary for the implementation of the Project.
- Evaluation of the appropriateness of the Project to be implemented under the Grant Aid Scheme from a technical, financial, social and economic point of view.
- Confirmation of items agreed between both parties concerning the basic concept of the Project.
- Preparation of a basic design of the Project.

- Estimation of costs of the Project.

The contents of the original request by the recipient country are not necessarily approved in their initial form as the contents of the Grant Aid project. The Basic Design of the Project is confirmed based on the guidelines of the Japan's Grant Aid scheme.

JICA requests the Government of the recipient country to take whatever measures necessary to achieve its self-reliance in the implementation of the Project. Such measures must be guaranteed even though they may fall outside of the jurisdiction of the organization of the recipient country which actually implements the Project. Therefore, the implementation of the Project is confirmed by all relevant organizations of the recipient country based on the Minutes of Discussions.

(2) Selection of Consultants

For smooth implementation of the Survey, JICA employs (a) registered consulting firm(s). JICA selects (a) firm(s) based on proposals submitted by interested firms.

(3) Result of the Survey

JICA reviews the Report on the results of the Survey and recommends the GOJ to appraise the implementation of the Project after confirming the appropriateness of the Project.

3. Japan's Grant Aid Scheme

(1) The E/N and the G/A

After the Project is approved by the Cabinet of Japan, the Exchange of Notes(hereinafter referred to as "the E/N") will be signed between the GOJ and the Government of the recipient country to make a pledge for assistance, which is followed by the conclusion of the G/A between JICA and the Government of the recipient country to define the necessary articles to implement the Project, such as payment conditions, responsibilities of the Government of the recipient country, and procurement conditions.

(2) Selection of Consultants

In order to maintain technical consistency, the consulting firm(s) which conducted the Survey will be recommended by JICA to the recipient country to continue to work on the Project's implementation after the E/N and G/A.

(3) Eligible source country

Under the Japanese Grant Aid, in principle, Japanese products and services including transport or those of the recipient country are to be purchased. When JICA and the Government of the recipient country or its designated authority deem it necessary, the Grant Aid may be used for the purchase of the products or services of a third country. However, the prime contractors, namely, constructing and procurement firms, and the prime consulting firm are limited to "Japanese nationals".

(4) Necessity of "Verification"

The Government of the recipient country or its designated authority will conclude contracts denominated in Japanese yen with Japanese nationals. Those contracts shall be verified by JICA. This "Verification" is deemed necessary to fulfill accountability to Japanese taxpayers.

(5) Major undertakings to be taken by the Government of the Recipient Country

In the implementation of the Grant Aid Project, the recipient country is required to undertake such necessary measures as Annex.

(6) "Proper Use"

The Government of the recipient country is required to maintain and use properly and effectively the facilities constructed and the equipment purchased under the Grant Aid, to assign staff necessary for this operation and maintenance and to bear all the expenses other than those covered by the Grant Aid.

(7) "Export and Re-export"

The products purchased under the Grant Aid should not be exported or re-exported from the recipient country.

(8) Banking Arrangements (B/A)

a) The Government of the recipient country or its designated authority should open an account under the name of the Government of the recipient country in a bank in Japan (hereinafter referred to as "the Bank"). JICA will execute the Grant Aid by making payments in Japanese yen to cover the obligations incurred by the Government of the recipient country or its designated authority under the Verified Contracts.

b) The payments will be made when payment requests are presented by the Bank to JICA under an Authorization to Pay (A/P) issued by the Government of the recipient country or its designated authority.

(9) Authorization to Pay (A/P)

The Government of the recipient country should bear an advising commission of an Authorization to Pay and payment commissions paid to the Bank.

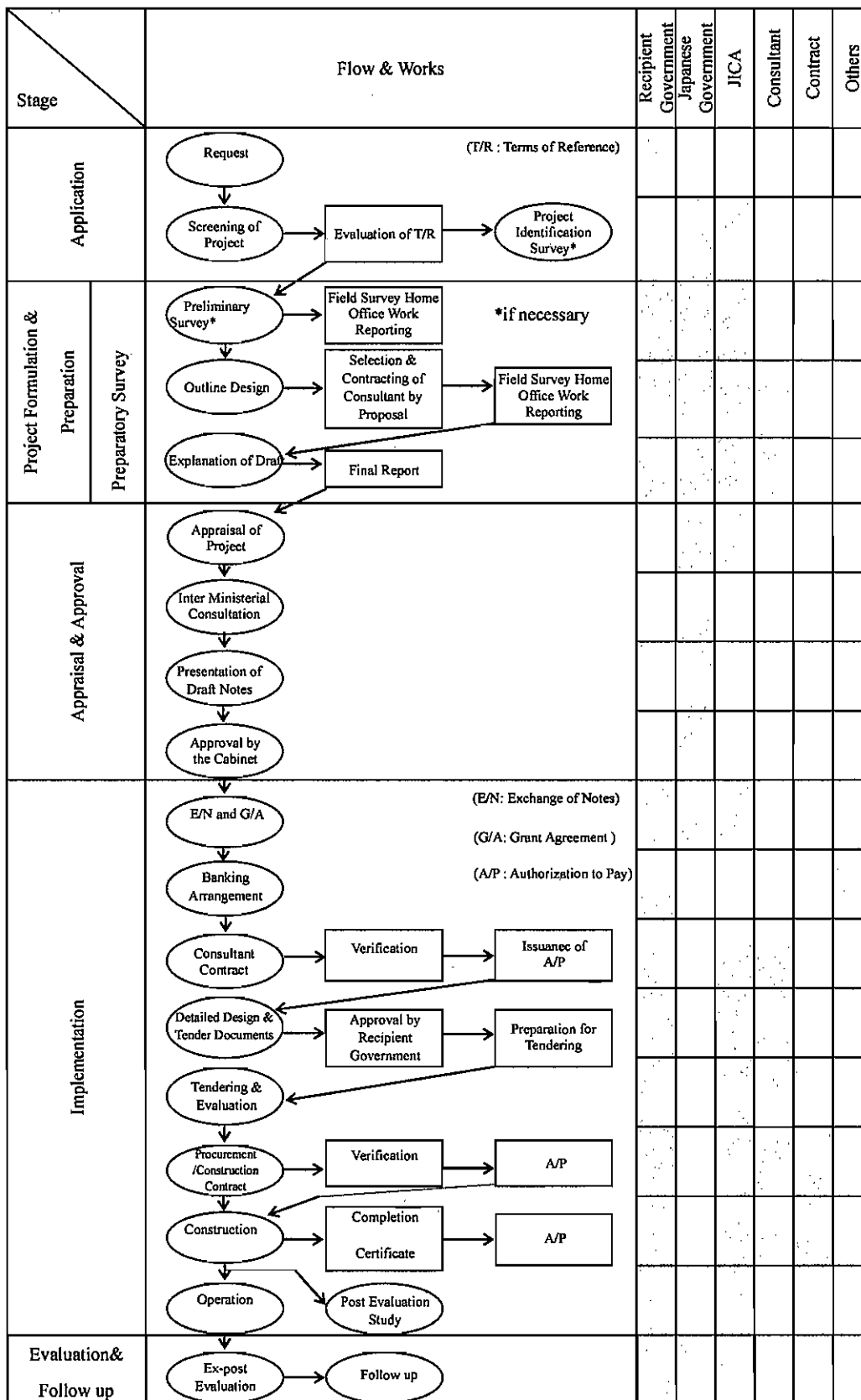
(10) Social and Environmental Considerations

A recipient country must carefully consider social and environmental impacts by the Project and must comply with the environmental regulations of the recipient country and JICA socio-environmental guidelines.

(End)



Flow Chart of Japan's Grant Aid Procedures



CCV.

Major undertakings to be taken by each Government

| No. | Items | To be covered by Grant Aid | To be covered by Recipient Side |
|-----|--|----------------------------|---------------------------------|
| 1 | to secure [a lot] /[lots] of land necessary for the implementation of the Project and to clear the [site]/[sites]; | | ● |
| 2 | To construct the following facilities | | |
| | 1) The building | ● | |
| | 2) The gates and fences in and around the site | | ● |
| | 3) The parking lot | ● | |
| | 4) The road within the site | ● | |
| | 5) The road outside the site | | ● |
| 3 | To provide facilities for distribution of electricity, water supply and drainage and other incidental facilities necessary for the implementation of the Project outside the [site]/[sites] | | |
| | 1)Electricity | | |
| | a. The distributing power line to the site | | ● |
| | b. The drop wiring and internal wiring within the site | ● | |
| | c. The main circuit breaker and transformer | ● | |
| | 2) Water Supply | | |
| | a. The city water distribution main to the site | | ● |
| | b. The supply system within the site (receiving and elevated tanks) | ● | |
| | 3) Drainage | | |
| | a. The city drainage main (for storm sewer and others to the site) | | ● |
| | b. The drainage system (for toilet sewer, common waste, storm drainage and others) within the site | ● | |
| | 4) Gas Supply | | |
| | a. The city gas main to the site | | ● |
| | b. The gas supply system within the site | ● | |
| | 5) Telephone System | | |
| | a. The telephone trunk line to the main distribution frame/panel (MDF) of the building | | ● |
| | b. The MDF and the extension after the frame/panel | ● | |
| | 6) Furniture and Equipment | | |
| | a. General furniture | | ● |
| | b. Project equipment | ● | |
| 4 | To ensure prompt unloading and customs clearance of the products at ports of disembarkation in the recipient country and to assist internal transportation of the products | | |
| | 1) Marine (Air) transportation of the Products from Japan to the recipient country | ● | |
| | 2) Tax exemption and custom clearance of the Products at the port of disembarkation | | ● |
| | 3) Internal transportation from the port of disembarkation to the project site | ● | |
| 5 | To ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the recipient country with respect to the purchase of the products and the services [be exempted] / [be borne by the Authority without using the Grant] | | ● |
| 6 | To accord Japanese nationals whose services may be required in connection with the supply of the products and the services such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work | | ● |
| 7 | To ensure that [the Facilities and the products]/[the Facilities]/ [the products] be maintained and used properly and effectively for the implementation of the Project | | ● |
| 8 | To bear all the expenses, other than those covered by the Grant, necessary for the implementation of the Project | | ● |
| 9 | To bear the following commissions paid to the Japanese bank for banking services based upon the B/A | | |
| | 1) Advising commission of A/P | | ● |
| | 2) Payment commission | | ● |
| 10 | To give due environmental and social consideration in the implementation of the Project. | | ● |

*1 B/A : Banking Arrangement, A/P : Authorization to pay) *2 If the environmental screening category is C, No. 10 is unnecessary

5. ソフトコンポーネント計画書

ホンジュラス共和国

テグシガルパ市内給水施設小水力発電
導入計画準備調査

ソフトコンポーネント計画書

平成 25 年 3 月

目 次

| | | |
|------|------------------------------------|---|
| 1. | ソフトコンポーネントを計画する背景..... | 1 |
| 2. | ソフトコンポーネントの目標..... | 1 |
| 3. | ソフトコンポーネントの成果..... | 1 |
| 4. | ソフトコンポーネントの成果の確認方法..... | 2 |
| 5. | ソフトコンポーネントの活動（投入計画）..... | 3 |
| 5.1 | 適正な事業運営体制、制度の確立..... | 4 |
| 5.2 | 適正な水力発電所運用制度の確立..... | 4 |
| 5.3 | 発電運用・設備と協調した適切な浄水設備運用計画・方法の確立..... | 5 |
| 6. | ソフトコンポーネントの実施リソースの調達方法..... | 6 |
| 7. | ソフトコンポーネントの実施工程..... | 6 |
| 8. | ソフトコンポーネントの成果品..... | 8 |
| 9. | ソフトコンポーネントの概算事業費..... | 8 |
| 10. | 相手国実施機関の責務..... | 9 |
| 添付-1 | ソフトコンポーネント内訳書 | |
| 添付-2 | コンセプション浄水場組織図 | |
| 添付-3 | ピカチョ浄水場組織図 | |

1. ソフトコンポーネントを計画する背景

「ホ」国テグシガルパ市内給水施設小水力発電導入計画」環境・気候変動対策無償は、同国の SANAA が管理するコンセプション浄水場とピカチョ浄水場において、現在、有効活用されていない未利用エネルギーを利用して、2 箇所合計で発電所出力約 430kW の小規模水力発電を行うことにより、発生電力を ENEE に売電し、SANAA の財政を圧迫している電気料金の支払いを軽減し、水道料金の値下げや適切な設備投資などのより良いサービスを利用者に提供するものである。

本件については、通常の小水力発電単体の設置事業とは異なり、浄水場の効率的な運用と本事業にて整備される小水力発電設備の設備利用率の最大化を両立させることが極めて重要である。SANAA は浄水設備単体の運用については優れた能力を持つものの、これまで水力発電所を所有したことがないことから、発電所の運転、維持・管理及び電気事業運営の知見はなく、右能力の強化及び体制の構築が必要である。さらに、浄水設備の運用と水力発電所の運用双方に目を配り、全体を統一のとれたシステムとして運用させるために必要な管理体制の構築が不可欠である。

SANAA は、上水道設備の運転、維持・管理の経験は豊富であるとともに、自社内に、機械、電気関係の技術者を有する等、水力発電技術を習得する素地は十分にある。また、SANAA も積極的に当該技術の習得と組織内での技術移転に取り組む姿勢もあることから、上述した各種能力の強化及び体制構築を行うにあたり適当な人材を確保できると考えられる。

なお、上下水道事業の SANAA からテグシガルパ市への移管（2013 年 10 月予定）に伴う運営維持管理体制の継続性については、上下水道設備（本発電所も含む）のテグシガルパ市への移管後も、事業ノウハウの保持等の面から、SANAA 技術者が引き続き事業運営、運転、維持・管理に従事する予定である。したがって、上記した能力強化／体制構築にかかる支援は、SANAA に対して実施することが適当である。

2. ソフトコンポーネントの目標

相手国実施機関である SANAA において、既存の浄水設備と本事業により整備された発電設備を最適かつ適正に運転、維持・管理し、持続的な浄水／電気事業の運用を行なうためのマネージメント体制が確立されることを目指す。

3. ソフトコンポーネントの成果

上記の目標が達成された場合の成果は以下の通りである。

- ① 適正な電気事業運営体制、制度が確立される。
- ② 適正な水力発電所運用制度が確立される。
- ③ 発電運用・設備と協調した適切な浄水設備運用計画・方法が確立される。

4. ソフトコンポーネントの成果の確認方法

ソフトコンポーネントの実施期間は、施工中及び運転開始（竣工）直後の 2 回実施する。成果達成度の確認は 2 回目のソフトコンポーネント実施時期となる。

各成果について以下の方法で確認を行い、後述成果品として報告書にとりまとめる。具体的な指標は、SANAA と協議して、ソフトコンポーネント実施開始までに設定する。

(1) 適正な事業運営体制、制度の確立

1) 運営体制

- ・ 発電設備の運転及び保守を行う小水力発電所チームが強化される。
- ・ 運転及び保守管理要員が水力発電技術の基礎知識を理解している。
- ・ 運転及び保守管理要員が発電・配電及び浄水設備の基本知識（機能、構造）を理解している。

2) 運営制度

- ・ 電気事業運営要領が作成され、整備される。
- ・ 発電設備の運転及び保守を行う小水力発電所チームの文書管理システムが整備される。
- ・ 発電事業の収支報告書が作成される。（月報、年報）
- ・ 設備、予備品、備品の台帳が作成され、整備される。

3) モニタリング体制

- ・ SANAA 内部のモニタリング体制ができている。
- ・ 定期的なモニタリング様式が整備され、モニタリングの内容を理解し、実践訓練（On-the-Job-Training）が行われる。
- ・ 定期的に施設のモニタリングが実施され定期的に報告される。

(2) 適正な水力発電所運用制度の確立

1) 浄水設備運用と協調した水力発電所の運転、維持管理

- ・ 水力発電所の運用管理要領が整備され、手順、内容を理解し、実践訓練（On-the-Job-Training）が行われる。
- ・ 運転要員が業務分担（内容）、業務フロー、責任範囲を理解し、業務を遂行している。
- ・ 運転要員が運転日誌を記載し日常点検を行い、適正な運転を行っている。
- ・ 浄水設備運用に支障なく発電が行われる。
- ・ 保守管理要員が業務分担（内容）、業務フロー、責任範囲を理解し、業務を遂行している。
- ・ 保守管理要員が保守作業を行い、保守記録、補修記録を記載し、適正な維持管理を行っている。
- ・ スペアパーツ、消耗品が適正に管理されている。

2) 事故時、緊急時の対策

- ・ 事故時、緊急時の対策マニュアルが整備される。
- ・ 運転及び保守管理要員に緊急事故対策のための知識が身についている。
- ・ 事故時、緊急時の対策に対して、トラブルシューティングが作成され、ケーススタディによる研修が行われ、対応能力が身についている。
- ・ 機器故障時の連絡先リストが整備される。（本邦業者、現地業者）

3) 浄水事業への影響を考慮した中長期のメンテナンス計画

- ・ オーバーホール、主要な取替パーツの中長期のメンテナンス計画が策定される。
- ・ 中長期のメンテナンス計画の予算計画が策定される。

(3) 発電運用・設備と協調した適切な浄水設備運用計画・方法の確立

1) 発電運用と協調した適切な浄水設備運用計画

- ・ 発電運用と協調した浄水設備運用計画が策定される。

2) 発電設備と協調した適切な浄水設備運用方法

- ・ 発電運用と協調した浄水設備の運用要領が整備され、手順、内容を理解し、実践訓練（On-the-Job-Training）が行われる。

5. ソフトコンポーネントの活動(投入計画)

上記の3つの成果を達成するため、以下の活動を実施する。

ソフトコンポーネントに先だつて、施設、機材の初期操作指導、維持管理方法の説明は、本邦の建設業者および機材納入業者によって実施される。

ソフトコンポーネントは、発電及び浄水設備の運転、保守点検能力の強化と運営主体となる小水力発電チームの組織、制度の整備を支援し、プロジェクトが円滑に立ち上がり、水力発電所の持続的な運用、維持管理を確保するために行うものである。

このため、SANAA で新しく発電事業を行う小水力発電チームが、作業毎に具体的な業務の手順、やり方を示した電気事業運営要領、運用管理要領を整備して、発電所の運用を円滑に立ち上げる必要があり、ソフトコンポーネントではこれらの指導を行うものである。メーカーは個々の設備の詳細な運転、保守マニュアルを準備するもので、このマニュアルだけでは、発電設備と浄水設備の一貫した運用管理が十分に行われるものではありません。

なお、ソフトコンポーネントのメンテナンスの対象は、日常点検、軽微なメンテナンスであり、大規模なオーバーホール、大規模なスペアパーツの取替は中長期計画を策定し、メーカーに発注されるものとする。

5.1 適正な事業運営体制、制度の確立

- ① 対象者：発電所運転員と保守管理要員、SANAA 保守部門関係者、SANAA モニタリング関係者、ENEE 計画部門関係者
- ② 期間：1回（竣工直後） 国内 0.8ヶ月
現地 1.0ヶ月（竣工直後）
- ③ 実施リソース：本邦コンサルタント
業務主任／電気事業運営指導：1名（国内 0.8MM（16日）、
現地 1.0MM（30日））
- ④ 活動項目と方法

| 活動項目 | 方法 |
|---------------------------------|---|
| SANAA 関係者の説明、協議 | 第2回に2回行う。関係者全員で情報を共有し、効率的な活動を行う。 |
| 1) 発電計画、電気事業に係る講習 | 電気事業運営要領作成を支援し、講習を行う。SANAA と発電と協調した適切な配水計画・運用方法について協議する。 |
| 2) 収支報告書の作成支援 | 収支報告月報、年報作成を支援するための講習を行い、OJTにより指導する。OJTの結果に基づき修正を行う。 |
| 3) 設備、予備品、備品の管理 | 設備、予備品、備品の台帳作成を支援し、OJTにより指導する。OJTの結果に基づき修正を行う。 |
| 4) 発電・配電及び浄水設備のモニタリング計画の策定 | 効果的なモニタリング体制と方法について関係機関と協議し計画を策定する。 モニタリングフォーム作成を支援し、OJTにより指導する。 |
| 5) 電気事業運営、モニタリングに係る帳票、要領等の最終版作成 | OJT結果、SANAA との協議に基づいて修正を行い最終化する。 |

- ⑤ 成果品の種類
電気事業運営要領、実施状況報告書、設備、予備品台帳、収支報告書、定期モニタリングフォーム等

5.2 適正な水力発電所運用制度の確立

- ① 対象者：発電所運転員と保守管理要員、SANAA 保守部門関係者、ENEE 技術部門関係者
- ② 期間：2回（施工中及び竣工直後）
国内 0.8ヶ月
現地 0.5ヶ月（施工中）現地 1.0ヶ月（竣工直後） 計 1.5ヶ月

- ③ 実施リソース：本邦コンサルタント
 水車発電機設備保守指導：1名（国内0.8MM（16日）、
 現地1.5MM（45日））
 水道設備保守指導：1名（国内0.6MM（12日）、
 現地1.3MM（39日））

なお、発電・配電関連については、ローカルリソースとして、ENEE技術者の協力を得るものとする。

④ 活動項目と方法

| 活動項目 | 方法 |
|--------------------------------|---|
| SANNA関係者の説明、協議 | 第1回、第2回それぞれ2回ずつ行う。関係者全員で情報を共有し、効率的な活動を行う。 |
| 1) 水力発電技術の基礎の講習 | 水力発電技術の基礎に関する講習を行う。 |
| 2) 発電及び浄水設備の基本技術の講習 | 発電及び浄水設備の設計および機能に関する講習を行う。 |
| 3) 水力発電所の運用管理 | 水力発電所の運用管理要領作成を支援し、OJTにより指導を行う。 運転日誌、日常点検簿作成を支援し、OJTにより指導する。OJTの結果に基づき修正を行う。 保守記録、補修記録簿作成を支援し、OJTにより指導する。OJTの結果に基づき修正を行う。 |
| 4) 事故時、緊急時の対策 | 事故時、緊急時の対策マニュアル作成を支援するための講習を行う。 事故時の連絡体制、補修業者をリスト化する。 |
| 5) 水力発電所の運転及び日常点検の確認 | 2サイトにおいて要領通りに運転、点検が行なわれているかを確認する。 |
| 7) 水力発電所の運用管理に係る帳票、要領等の最終版作成 | OJT結果、SANAAとの協議に基づいて修正を行い最終化する。 |
| 8) 浄水事業への影響を考慮した中長期メンテナンス計画の策定 | 大規模なオーバーホール、主要取替パーツのスケジュール及び予算の計画を策定する。 |

備考：活動1)は水車発電機設備保守指導のみ、2)～8)は両担当者が行う。

⑤ 成果品の種類

水力発電所の運用管理要領、実施状況報告書、事故時、緊急時の対策マニュアル、事故時の連絡体制、補修業者リスト等

5.3 発電運用・設備と協調した適切な浄水設備運用計画・方法の確立

① 対象者：発電所運転員と保守管理要員、SANAA保守部門関係者

② 期間：1回 国内 0.2ヶ月
 現地 0.2ヶ月（竣工直後）

- ③ 実施リソース：本邦コンサルタント
水道設備保守指導：1名（国内 0.2MM（4日）、現地 0.2MM（6日））

④ 活動項目と方法

| 活動項目 | 方法 |
|--------------------------------|---|
| 1) 浄水設備運用計画（案）の策定及び運用方法に係る資料作成 | 発電と協調した浄水設備運用計画策定のための講習を行う。 |
| 2) 浄水設備運用計画の策定及び運用方法に係る講習及び協議 | SANAA と発電と協調した適切な浄水設備運用計画・運用方法の案について協議する。 |

- ⑤ 成果品の種類
浄水場設備運用計画、運用要領、実施状況報告書等

6. ソフトコンポーネントの実施リソースの調達方法

SANAA は現在、水力発電所を所有していないので、発電所の運転、維持・管理及び電気事業運営経験は無い。しかしながら、SANAA は浄水設備の運転、維持・管理の経験は豊富であり、機械、電気関係の技術者を有しており、水力発電技術を習得する素地があり、積極的にその技術習得と組織内での技術移転に取り組む姿勢もある。したがって、電力設備の運転、保守技術の技術移転に関しては、適当な人材を確保できると考えられる。

このため、水力発電所、浄水場設備の運転、保守技術を有する本邦コンサルタントが SANAA の指導にあたるのが適当である。ローカルリソースとしては、水力発電及び配電設備に関連しては、「ホ」国で水力発電所・配電設備の運転、維持・管理を行っている ENEE の技術協力を依頼する。講習、OJT 等の活動は全てスペイン語で行う必要があるが、「ホ」国においては、水力発電及び水道技術の専門用語を理解して、通訳できる人材の調達が困難であることから、邦人の通訳を配置することとした。

今後、発電設備の運用を継続的に行っていくためには、SANAA 内部の電気、機械の保全担当箇所の協力を得るとともに、電力設備の豊富な技術を有する ENEE からの技術支援も効果的であると考える。

7. ソフトコンポーネントの実施工程

本プロジェクトは政府間交換公文（E/N）締結後、24 カ月の工程で実施される。工事期間は、調達、施設建設、機材の輸送、据付、検査・試運転を含めて約 17 ヶ月を要すると想定される。

工事着工前には、E/N、コンサルタント契約、詳細設計、入札図書作成、入札、入札評価、業者契約が行われる。ソフトコンポーネントの詳細工程表を表 7-1、7-2 に、全体実施工程表を表 7-3 に示す。

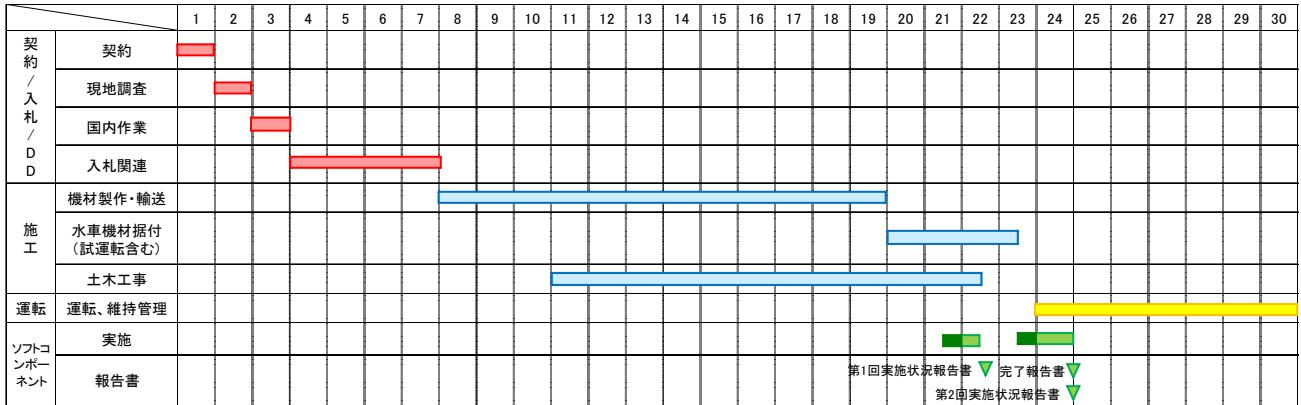
表 7-1 第 1 回ソフトコンポーネント 詳細工程(案)

| 項目 | 活動 | | 国内作業 | | 現地作業 | |
|----------|----------------------------------|--------|------|----|------|---|
| | | | -1週 | 1週 | 2週 | |
| 活動 内容 | 水力発電の基礎に係る講習資料作成 | | ■ | | | |
| | 浄水設備運用計画（案）の策定及び運用方法（案）に係る講習資料作成 | | ■ | | | |
| | 水車発電機及び浄水設備の設計、機能に係る講習資料作成 | | | ■ | | |
| | SANAA関係者へのソフトコン(案)説明、協議 | 2サイト合同 | | ■ | | ■ |
| | 水力発電の基礎に係る講習 | 2サイト合同 | | | ■ | |
| | 浄水設備運用計画の策定及び運用方法に係る講習及び協議 | 2サイト合同 | | | ■ | |
| | 水車発電機及び浄水設備の設計、機能に係る講習 | 2サイト合同 | | | | ■ |
| 指導者 | 水車発電機設備担当 | 1人 | ■ | ■ | ■ | ■ |
| | 水道設備担当者 | 1人 | ■ | ■ | ■ | ■ |

表 7-2 第 2 回ソフトコンポーネント 詳細工程(案)

| 項目 | 活動 | | 国内作業 | | | 現地作業（運転開始後） | | | |
|-----------|--|----------------|------|-----|-----|-------------|----|----|----|
| | | | -3週 | -2週 | -1週 | 1週 | 2週 | 3週 | 4週 |
| 活動 内容 | 発電計画、電気事業運営に係る講習資料作成 | | ■ | | | | | | |
| | 電気事業運営に係る帳票、運営要領の作成 | | | ■ | | | | | |
| | 定期モニタリング計画に係る資料作成 | | | | ■ | | | | |
| | 浄水設備運用計画の策定及び運用方法に係る資料作成 | | | | ■ | | | | |
| | 運転日誌、点検様式、運用管理要領等の作成 | | | ■ | | | | | |
| | 浄水事業への影響を考慮した中長期メンテナンス計画に係る資料作成 | | | | ■ | | | | |
| | SANAA関係者へのソフトコン説明、協議 | 2サイト合同 | | | | ■ | | | ■ |
| | 浄水設備運用計画の策定及び運用方法に係る協議 | 2サイト合同 | | | | ■ | | | |
| | 発電計画、電気事業に係る講習 - 発電計画 - 電気事業運営 | 2サイト合同 | | | | | ■ | | |
| | 電気事業運営に係る On-the-Job Training - 収支報告の作成支援 - 台帳類の作成支援 | 2サイト合同 | | | | | | ■ | |
| | 発電及び浄水設備の運用管理に係る 講習及び On-the-Job Training | コンセプト ヒアリング | | | | | ■ | | |
| | 発電・配電及び配水設備の事故時、緊急時 の対策に係る研修 | コンセプト ヒアリング | | | | | | ■ | |
| | 定期モニタリング計画の策定、協議 | 2サイト合同 | | | | | | | ■ |
| | 浄水事業への影響を考慮した中長期メンテナンス計画の策定、協議 | 2サイト合同 | | | | | | | ■ |
| | 電気事業運営、モニタリングに係る帳票、運営要領のファイル作成 | 2サイト合同 | | | | | | | ■ |
| | 運転日誌、点検様式、運用管理要領等のファイル作成 | 2サイト合同 | | | | | | | ■ |
| | 発電・配電及び浄水設備の運用モニタリング 発電及び浄水設備の運用管理の確認 | コンセプト ヒアリング | | | | | | | ■ |
| | 指導者 | 業務主任/電気事業運営 | 1人 | ■ | ■ | ■ | ■ | ■ | ■ |
| 水車発電機設備担当 | | 1人 | | ■ | ■ | ■ | ■ | ■ | ■ |
| 水道設備担当者 | | 1人 | | ■ | ■ | ■ | ■ | ■ | ■ |

表 7-3 ソフトコンポーネントの全体実施工程(案)



8. ソフトコンポーネントの成果品

ソフトコンポーネントの成果品は次表のとおりである。

| 項目 | 時期 |
|----------------------|-------------------------------------|
| 1. 完了報告書 | 完了後 |
| 2. 実施状況報告書 | |
| 1) 第1回 | 第1回研修実施後 |
| 2) 第2回 | 第2回研修実施後 (On-the-Job Training 結果含む) |
| 3. 電気事業運営要領 | 完了後 |
| 4. 水力発電所の運用管理要領 | 完了後 (運転日報、日常点検簿、点検、保守記録、緊急時対策等含む) |
| 5. 発電運用と協調した浄水設備運用計画 | 完了後 |
| 6. 発電設備と協調した浄水設備運用要領 | 完了後 (点検、保守記録、緊急時対策等含む) |
| 7. 定期モニタリングフォーム | 完了後 |
| 8. 設備、予備品管理台帳 | 完了後 |
| 9. 中長期メンテナンス計画 | 完了後 |

9. ソフトコンポーネントの概算事業費

ソフトコンポーネントに要する概算費用は 15.1 百万円と見積もられる。

内訳は以下の通りであり、また、内訳の詳細は本計画書の文末に添付する。

| | |
|-------|----------|
| 直接経費 | 4.6 百万円 |
| 直接人件費 | 4.6 百万円 |
| 間接費 | 5.9 百万円 |
| 合計 | 15.1 百万円 |

10. 相手国実施機関の責務

本計画で建設された発電所を継続的に適正に運用、維持管理を行っていくために、相手国実施機関である SANAA は以下に示す責務を負う必要がある。

テグシガルパ市の上水道施設は、法律でテグシガルパ市に移管される予定になっており、2 か所の発電施設も含まれることが予想される。しかしながら、運転、点検・保守は SANAA 職員が引続き行う可能性が予定されており、ソフトコンポーネントによる技術移転の対象は SANAA 職員となる。

なお、SANAA が想定している 2 箇所の水力発電所運営組織は、図 10-1 に示すようであり、運転員が各 4 名、保守要員が 2 名の計 10 名から構成される。

- (a) ソフトコンポーネント実施に必要な SANAA の責任者、カウンターパート要員が確保される。
- (b) ソフトコンポーネント実施に必要な SANAA 側の予算が確保される。
- (c) 発電所運転要員及び点検・保守要員が選定される。
- (d) 技術を習得した発電所運転員及び点検・保守要員が継続的に勤務する。
- (e) 発電所運転員及び点検・保守要員の後継者が育成される。
- (f) SANAA の継続した発電所のモニタリング体制が確立される。
- (g) 発電・配電設備の維持・管理に係る ENEE の継続的な技術支援が行われる。
- (h) 大規模事故、天災被害等に対する「ホ」国側の財務支援が行われる。

これらの責務に対する実現の可能性、想定される阻害要因また阻害された時取るべき必要な措置等を次表に纏める。

| | 実現可能性 | 想定される阻害要因 | 阻害された時取るべき必要な措置等 |
|-----|--|-------------------------------|---|
| (a) | 準備協力調査時の C/P が継続 | 特にない。 | |
| (b) | SANAA の人件費、交通費のみで対応可 | 特にない。 | |
| (c) | 新規雇用の計画 | SANAA 予算不足により、新規雇用ができない。 | SANAA 内部で人材を確保し、研修を受ける。 |
| (d) | 今後 SANAA と協議、対応可 | 発電による収入不足、発電施設の故障等の停止に伴う無収入状況 | SANAA が 1 時的に職員の給与を支払う等の予算措置を行う。 |
| (e) | 今後 SANAA と協議、対応可 | 後継者のための技術研修が行われない。適当な候補者がいない。 | SANAA が予算措置を行う。新規雇用計画を立てる。 |
| (f) | 今後 SANAA と協議、対応可 | SANAA の担当者が不在、予算がない。 | SANAA がモニタリング計画に従って、人員配置を決め、必要なアレンジを行う。(人員、予算) |
| (g) | 今後 ENEE と協議の必要はあるが、事故対応のための技術者応援の可能性はある。 | 対応可能な電気、機械技術者が不在である。 | ENEE と継続的な連絡をとり、事故時に備えた体制を構築する。 |
| (h) | 今後 SANAA と協議、対応困難 | 財務支援の人材、予算の不足。 | 自然災害等の予期されない大規模な事故被害に関しては外部からの支援が必要であり、必要に応じて、援助機関の協力の可能性を調査する。 |

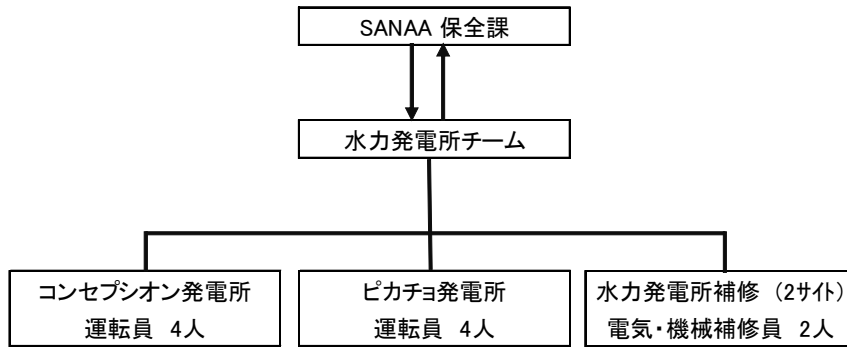


図 10-1 発電所の運転、維持管理組織(案)

添付-1 ソフトコンポーネント内訳書

| | | |
|---|--------------|-----------------------|
| 1 | 積算時点/ 想定入札時点 | 平成24年09月 /平成25年9月 |
| 2 | 国名 | ホンジュラス共和国 |
| 3 | 案件名 | テグシガルパ市内給水施設小水力発電導入計画 |
| 4 | 工事区分 | その他 |
| 5 | コンサルタント名 | 株式会社ニュージェック/日本テクノ株式会社 |
| 6 | O/D契約日 | 2012年7月12日 |
| 7 | O/D契約額 | ¥62,195,700 |

積算時点 2012年8月 交換レート 1米ドル= 81.09円 1現地貨= 4.1798円

| | 総額 | 日本円 | 現地貨 | | 米ドル | | 円換算 | 価格変動を加味しない積算金額 |
|-------------------------------------|-------------------|-------------------|--------------|---------------|-----------------|----------------|----------------|-------------------|
| | ③+④ | ④ | HNL | 円換算(円) ① | US\$ | 円換算(円) ② | ③=①+② | |
| ソフトコンポーネント費 { 1)+2)+3) } | 15,071,000 | 14,632,000 | 8,160 | 34,000 | 5,000.00 | 405,000 | 439,000 | 15,071,000 |
| 1) 直接人件費 | 4,609,000 | 4,609,000 | | | | | | 4,609,000 |
| 2) 直接経費 | 4,562,000 | 4,123,000 | 8,160 | 34,000 | 5,000.00 | 405,000 | 439,000 | 4,562,000 |
| 3) 間接費 | 5,900,000 | 5,900,000 | | | | | | 5,900,000 |

1米ドル = 81.09 円

1現地貨 = 4.1798 円

| No. | 名 称 | 区 別 | 単 位 | 数 量 | 単 価 | | | 金 額 | | | 備 考 |
|-----|--------------|-----|-----|------|---------|-----|------|-----------|-------|----------|--------------|
| | | | | | 日本円 | 現地貨 | US\$ | 日本円 | 現地貨 | US\$ | |
| 1 | 直接人件費 | | | 5.72 | | | 総合計 | 4,609,780 | | | |
| | (1)現地業務 | | | | | | | | | | |
| | 業務主任 | 2号 | 人・月 | 0.83 | 896,000 | | | 743,680 | | | (移動は施工監理で計上) |
| | 水車発電機設備担当 | 3号 | 人・月 | 1.16 | 770,000 | | | 893,200 | | | (移動は施工監理で計上) |
| | 水道施設担当 | 3号 | 人・月 | 1.33 | 770,000 | | | 1,024,100 | | | (移動は施工監理で計上) |
| | 現地合計 | | | 3.32 | | | | | | | |
| | (2)国内業務 | | | | | | | | | | |
| | 業務主任 | 2号 | 人・月 | 0.80 | 896,000 | | | 716,800 | | | H24年度人件費 |
| | 水車発電機設備担当 | 3号 | 人・月 | 0.80 | 770,000 | | | 616,000 | | | H24年度人件費 |
| | 水道施設担当 | 3号 | 人・月 | 0.80 | 770,000 | | | 616,000 | | | H24年度人件費 |
| | 現地合計 | | | 2.40 | | | | | | | |
| 2 | 直接経費 | | | | | | 総合計 | 4,123,800 | 8,160 | 5,000.00 | |
| | (1)通訳費 | 4号 | 人・月 | 1.66 | 626,000 | | | 1,039,160 | | | H24年度人件費 |
| | (2)旅費・日当・宿泊費 | | | | | | | | | | |
| | 1)旅費 | | | | | | | | | | |
| | ①航空運賃 | | | | | | | | | | |
| | 水道施設担当 | 3号 | 往復 | 1.00 | 421,280 | | | 421,280 | | | 資材単価-8-010 |
| | 通訳 | 4号 | 往復 | 2.00 | 421,280 | | | 842,560 | | | 資材単価-8-010 |
| | ②国内旅費 | | | | | | | | | | |
| | 水道施設担当 | 3号 | 往復 | 1.00 | 5,100 | | | 5,100 | | | |
| | 通訳 | 4号 | 往復 | 2.00 | 5,100 | | | 10,200 | | | |

1米ドル = 81.09 円

1現地貨 = 4.1798 円

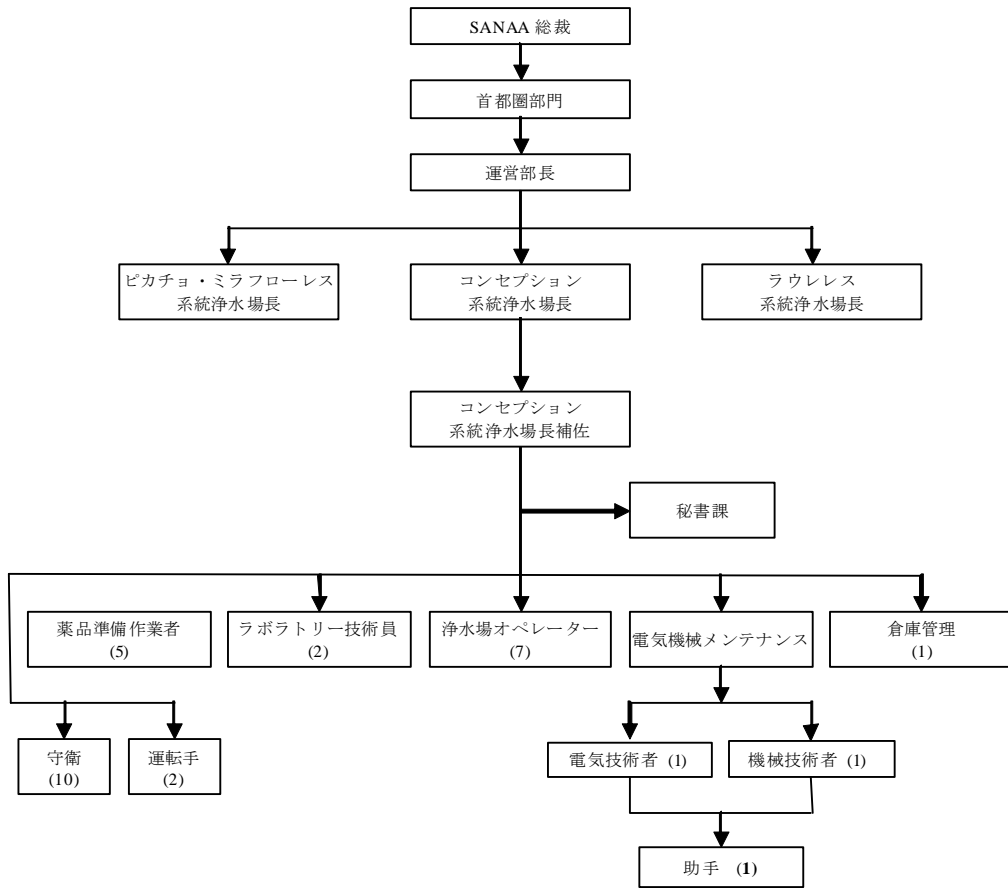
| No. | 名 称 | 区 別 | 単 位 | 数 量 | 単 価 | | | 金 額 | | | 備 考 |
|-----|------------|--------|-----|-------|--------|-----|--------|---------|-----|--------|---------------|
| | | | | | 日本円 | 現地貨 | US\$ | 日本円 | 現地貨 | US\$ | |
| | 2) 日当 | | | | | | | | | | |
| | 1回目 | | | | | | | | | | |
| | 水車発電機設備担当 | 10日 | 日 | 10.00 | 3,800 | | | 38,000 | | | 設計・積算マニュアル補完編 |
| | 通訳 | 10日 | 日 | 10.00 | 3,800 | | | 38,000 | | | 設計・積算マニュアル補完編 |
| | 2回目 | | | | | | | | | | |
| | 業務主任 | 25日 | 日 | 25.00 | 4,500 | | | 112,500 | | | 設計・積算マニュアル補完編 |
| | 水車発電機設備担当 | 25日 | 日 | 25.00 | 3,800 | | | 95,000 | | | 設計・積算マニュアル補完編 |
| | 水道施設担当 | 40日 | 日 | 40.00 | 3,800 | | | 152,000 | | | 設計・積算マニュアル補完編 |
| | 通訳 | 40日 | 日 | 40.00 | 3,800 | | | 152,000 | | | 設計・積算マニュアル補完編 |
| | 3) 宿泊費 | | | | | | | | | | |
| | 1回目 | | | | | | | | | | |
| | 水車発電機設備担当 | 10日-1日 | 日 | 9.00 | 11,600 | | | 104,400 | | | 設計・積算マニュアル補完編 |
| | 通訳 | 10日-1日 | 日 | 9.00 | 11,600 | | | 104,400 | | | 設計・積算マニュアル補完編 |
| | 2回目 | | | | | | | | | | |
| | 水車発電機設備担当 | 25日-1日 | 日 | 24.00 | 11,600 | | | 278,400 | | | 設計・積算マニュアル補完編 |
| | 水道施設担当 | 25日-1日 | 日 | 24.00 | 11,600 | | | 278,400 | | | 設計・積算マニュアル補完編 |
| | 通訳 | 40-1日 | 日 | 39.00 | 11,600 | | | 452,400 | | | 設計・積算マニュアル補完編 |
| | (2) 車両費 | | | | | | | | | | |
| | 1) 車輛借り上げ費 | | | | | | | | | | |
| | ① 1回目 | | | | | | | | | | |
| | レンタカー | 10日-5日 | 日 | 5.00 | | | 125.00 | | | 625.00 | 資材単価-9-079 |

1米ドル = 81.09 円

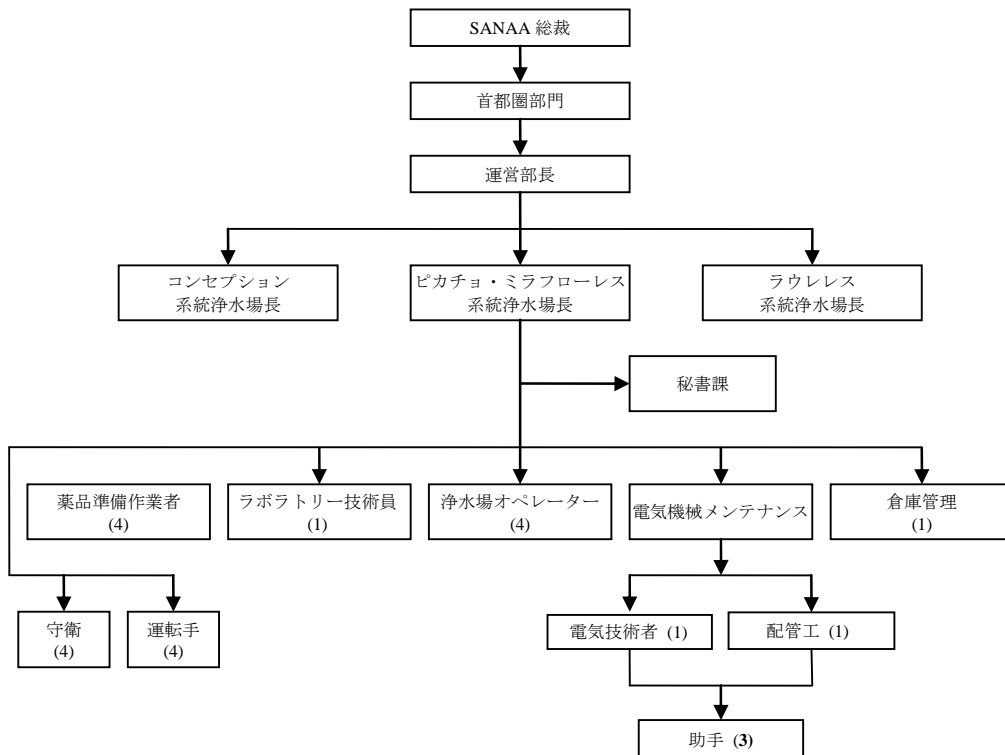
1現地貨 = 4.1798 円

| No. | 名 称 | 区 別 | 単 位 | 数 量 | 単 価 | | | 金 額 | | | 備 考 |
|-----|----------|-----------------|-----|-------|-----------|-----|--------|-----|-----------|----------|---------------|
| | | | | | 日本円 | 現地貨 | US\$ | 日本円 | 現地貨 | US\$ | |
| | ② 2回目 | | | | | | | | | | |
| | レンタカー | 40日-5日 | 日 | 35.00 | | | 125.00 | | | 4,375.00 | 資材単価-9-079 |
| | 2) 燃料費 | | | | | | | | | | |
| | ① 1回目 | | | | | | | | | | |
| | レンタカー | 10日-5日 | 日 | 5.00 | | 204 | | | 1,020 | | 資材単価-9-121 |
| | ② 2回目 | | | | | | | | | | |
| | レンタカー | 40日-5日 | 日 | 35.00 | | 204 | | | 7,140 | | 資材単価-9-121 |
| | 3 間接費 | | | | | | | | 5,900,518 | | |
| | (1) 諸経費 | 直接人件費×90% | 式 | 0.90 | 4,609,780 | | | | 4,148,802 | | 設計・積算マニュアル補完編 |
| | (2) 技術経費 | (直接人件費+諸経費)×20% | 式 | 0.20 | 8,758,582 | | | | 1,751,716 | | |
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添付-2 コンセプション浄水場運転維持管理組織図



添付-3 ピカチヨ浄水場運転維持管理組織図



6. 参考資料／収集資料リスト

収集資料リスト

調査名 ホンジュラス国テグシガルパ市内給水施設小水力発電導入計画調査

| 番号 | 資料の名称 | 発行機関 | 発行年 |
|----|---|----------|-----------|
| 1 | SANAA 月別生産量 2009/2011 | SANAA | 2009/2011 |
| 2 | Daily Rainfall Concepcion コンセプション日雨量 | SANAA | 2006-2011 |
| 3 | Daily Rainfall Picacho ピカチョ日雨量 | SANAA | 2006-2011 |
| 4 | Información final de Hazama (proyecto urgente) 緊急給水計画基本設計調査関連資料 | Hazama | |
| 5 | Horarios y servicios de agua potable año 2009-2012 水管理スケジュール (2009-2012) | SANAA | 2012 |
| 6 | Producciones y gastos de quimicos año 2009-2012 生産量と化学品費用 (2009-2012) | SANAA | 2012 |
| 7 | Niveles y Volúmenes Concepcion コンセプションダム水量 | SANAA | 2012 |
| 8 | Balance General del SANAA de los Años (2006-2011) SANAA決算報告(2006-2011) | SANAA | 2006-2011 |
| 9 | Informe técnico de bombeo booster ブースターポンプに関する技術レポート | SANAA | 1991 |
| 10 | コンセプション浄水場運転維持管理組織図 | SANAA | 2012 |
| 11 | ピカチョ浄水場運転維持管理組織図 | SANAA | 2012 |
| 12 | Plano unificar subestación Santa Fe - Concepción y Picacho サンタフェ変電所からコンセプション-ピカチョ間の系統図 | ENEE | 2010 |
| 13 | Requerimientos de información para realizar estudios de interconexión 系統連系 | ENEE | 2012 |
| 14 | Decreto 70-2007 Ley promoción energía renovable 再生エネルギー法 | ホンジュラス政府 | 2007 |
| 15 | Código hondureño de construcción 建設規制 | ホンジュラス政府 | 2000 |
| 16 | Decreto 189-569 Código del trabajo y sus reformas 労働法 | ホンジュラス政府 | 1959 |
| 17 | Power Purchase Agreement for Nacaome Project ナカオメプロジェクト売買電合意書 | ENEE | 2003 |
| 18 | Velocidad mínima básica del viento 風力データ | ホンジュラス政府 | 1999 |
| 19 | Mapa de zonas sísmicas 地震マップ | ホンジュラス政府 | 1999 |
| 20 | Ley General del Ambiente 環境法 | ホンジュラス政府 | 1993 |
| 21 | Compendio de Legislación Ambiental de Honduras 2011 ホンジュラス環境関連法概要 | ホンジュラス政府 | 2011 |
| 22 | SINEIA (Sistema Nacional de Evaluación de Impacto Ambiental) 2009 環境影響評価システム | ホンジュラス政府 | 2009 |
| 23 | Reglamento del Sistema Nacional de Áreas Protegidas 保護区基準 | ホンジュラス政府 | 1999 |

* 資料は全て電子データ

略 語 SANAA / Servicio Autónomo Nacional de Acueductos y Alcantarillados / 国家上水道公社
ENEE / Empresa Nacional de Energía Eléctrica / 国家電力会社