Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

# MAE HAT HYDROPOWER PROJECT

## WIANG HAENG DISTRICT CHIANG MAI PROVINCE

# CONTRACT C1

## CIVIL WORKS AND TRANSMISSION LINE

## VOLUME 4

P&C MANAGEMENT CO.,LTD.

# MAE HAT HYDROPOWER PROJECT

## CONTRACT C1 : LIST OF DRAWINGS

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| 1 | MH-GN-01 | PROJECT LOCATION MAP |
| 2 | MH-GN-02 | PROJECT LAYOUT |
| 3 | MH-GN-03 | SYMBOLS, ABBREVIATIONS, AND GENERAL NOTES |
| 4 | MH-GN-04 | PROJECT INFORMATION HYDROLOGY DATA |
| 5 | MH-GN-05 | POWER WATERWAY HYDRAULIC ARRANGEMENT |
| 6 | MH-GN-06 | GEOLOGICAL, PLAN |
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| 10 | MH-AR-02 | PLAN AND PROFILE, STA. 0+600 TO STA. 1+200 |
| 11 | MH-AR-03 | PLAN AND PROFILE, STA. 1+200 TO STA. 1+489.351 |
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| 20 | MH-WE-07 | 1.50x1.50 m. VERTICAL GATE (GATE DETAIL) |
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| 24 | MH-WE-11 | VERTICAL SCREW-LIFT CAPACITY 1,750 KG. |
| HEADRACE | | |
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| 27 | MH-HR-03 | PLAN AND PROFILE, STA. 1+000 TO STA. 1+500 |
| 28 | MH-HR-04 | PLAN AND PROFILE, STA. 1+500 TO STA. 2+000 |
| 29 | MH-HR-05 | PLAN AND PROFILE, STA. 2+000 TO STA. 2+097.998 |
| 30 | MH-HR-06 | TYPICAL SECTIONS |
| 31 | MH-HR-07 | CONCRETE PIER |
| 32 | MH-HR-08 | JOINT DETAILS FOR STEEL PIPE |
| 33 | MH-HR-09 | FITTINGS FOR STEEL PIPE |
| 34 | MH-HR-10 | DRAIN CULVERT STA. 0+413.534 PLAN AND SECTION |
| 35 | MH-HR-11 | DRAIN CULVERT STA. 0+413.534 REINFORCEMENT DETAILS |
| 36 | MH-HR-12 | DRAIN CULVERT STA. 0+515.748 PLAN AND SECTION |
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| 40 | MH-HR-16 | DRAIN CULVERT STA. 0+948.448 PLAN AND SECTION |
| 41 | MH-HR-17 | DRAIN CULVERT STA. 0+948.448 REINFORCEMENT DETAILS |
| 42 | MH-HR-18 | DRAIN CULVERT STA. 1+320.961 PLAN AND SECTION |
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| 45 | MH-HR-21 | DRAIN CULVERT STA. 1+508.437 REINFORCEMENT DETAILS |
| 46 | MH-HR-22 | DRAIN CULVERT STA. 1+903.095 PLAN AND SECTION |
| 47 | MH-HR-23 | DRAIN CULVERT STA. 1+903.095 REINFORCEMENT DETAILS |
| 48 | MH-HR-24 | DRAIN CULVERT STA. 1+944.718 PLAN AND SECTION |
| 49 | MH-HR-25 | DRAIN CULVERT STA. 1+944.718 REINFORCEMENT DETAILS |
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| 50 | MH-OM-01 | O&M ROAD PART 2 PLAN AND PROFILE, STA. 0+000 TO STA. 0+600 |
| 51 | MH-OM-02 | O&M ROAD PART 2 PLAN AND PROFILE, STA. 0+600 TO STA. 1+200 |
| 52 | MH-OM-03 | O&M ROAD PART 2 PLAN AND PROFILE, STA. 1+200 TO STA. 1+800 |
| 53 | MH-OM-04 | O&M ROAD PART 2 PLAN AND PROFILE, STA. 1+800 TO STA. 2+400 |
| 54 | MH-OM-05 | O&M ROAD PART 2 PLAN AND PROFILE, STA. 2+400 TO STA. 3+000 |
| 55 | MH-OM-06 | O&M ROAD PART 2 PLAN AND PROFILE, STA. 3+000 TO STA. 3+600 |
| 56 | MH-OM-07 | O&M ROAD PART 2 PLAN AND PROFILE, STA. 3+600 TO STA. 4+149.212 |
| 57 | MH-OM-08 | O&M ROAD PART 2 HORIZONTAL CURVE |
| 58 | MH-OM-09 | O&M ROAD PART 3 PLAN AND PROFILE, STA. 0+000 TO STA. 0+182.719 |
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| 61 | MH-OM-12 | DRAIN CULVERT REINFORCEMENT DETAILS |
| SURGE TANK | | |
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| 77 | MH-PS-04 | THRUST BLOCK PLAN, SECTIONS REINFORCEMENT DETAILS 3/4 |
| 78 | MH-PS-05 | THRUST BLOCK PLAN, SECTIONS REINFORCEMENT DETAILS 4/4 |
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| 81 | MH-PS-08 | EXPANSION JOINT, PLAN, SECTIONS AND DETAILS |
| 82 | MH-PS-09 | BEND DETAILS |
| 83 | MH-PS-10 | WELDING DETAILS |
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| 85 | MH-PH-02 | PLAN 1st FLOOR AND PLAN 2nd FLOOR |
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| 112 | MH-TS-01 | GENERAL PLAN |
| 113 | MH-TS-02 | PLAN AND PROFILE, STA. 0+000 TO 0+600 |
| 114 | MH-TS-03 | PLAN AND PROFILE, STA. 0+600 TO 1+200 |
| 115 | MH-TS-04 | PLAN AND PROFILE, STA. 1+200 TO 1+800 |
| 116 | MH-TS-05 | PLAN AND PROFILE, STA. 1+800 TO 2+400 |
| 117 | MH-TS-06 | PLAN AND PROFILE, STA. 2+400 TO 3+000 |
| 118 | MH-TS-07 | PLAN AND PROFILE, STA. 3+000 TO 3+600 |
| 119 | MH-TS-08 | PLAN AND PROFILE, STA. 3+600 TO 4+200 |
| 120 | MH-TS-09 | PLAN AND PROFILE, STA. 4+200 TO 4+800 |
| 121 | MH-TS-10 | PLAN AND PROFILE, STA. 4+800 TO 5+400 |
| 122 | MH-TS-11 | PLAN AND PROFILE, STA. 5+400 TO 6+000 |
| 123 | MH-TS-12 | PLAN AND PROFILE, STA. 6+000 TO 6+600 |
| 124 | MH-TS-13 | PLAN AND PROFILE, STA. 6+600 TO 7+200 |
| 125 | MH-TS-14 | PLAN AND PROFILE, STA. 7+200 TO 7+800 |
| 126 | MH-TS-15 | PLAN AND PROFILE, STA. 7+800 TO 8+086 |
| 127 | MH-TS-16 | POLE TYPE "A" AND "B" |
| 128 | MH-TS-17 | POLE TYPE "C" AND "D" |
| 129 | MH-TS-18 | POLE TYPE "E" |
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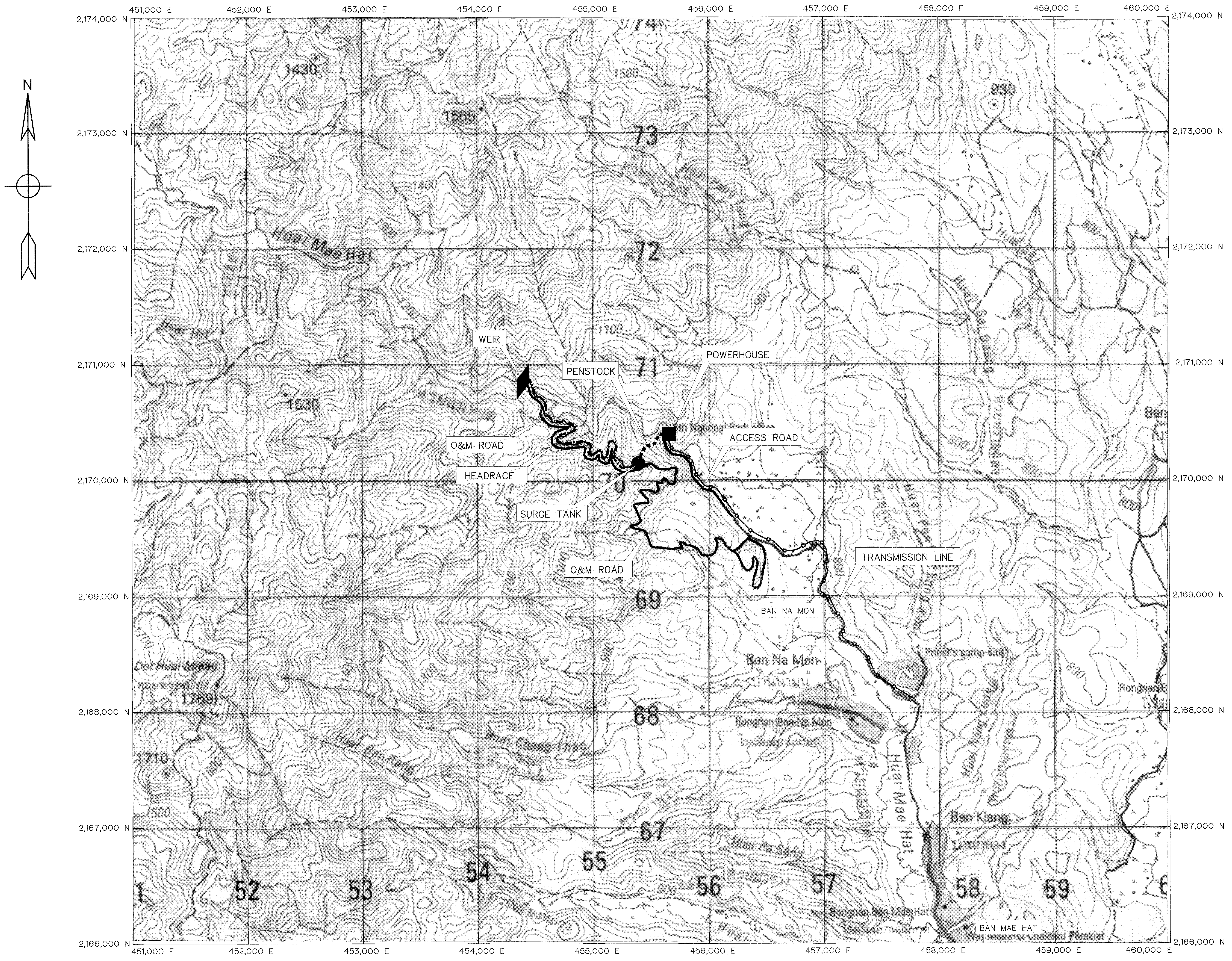
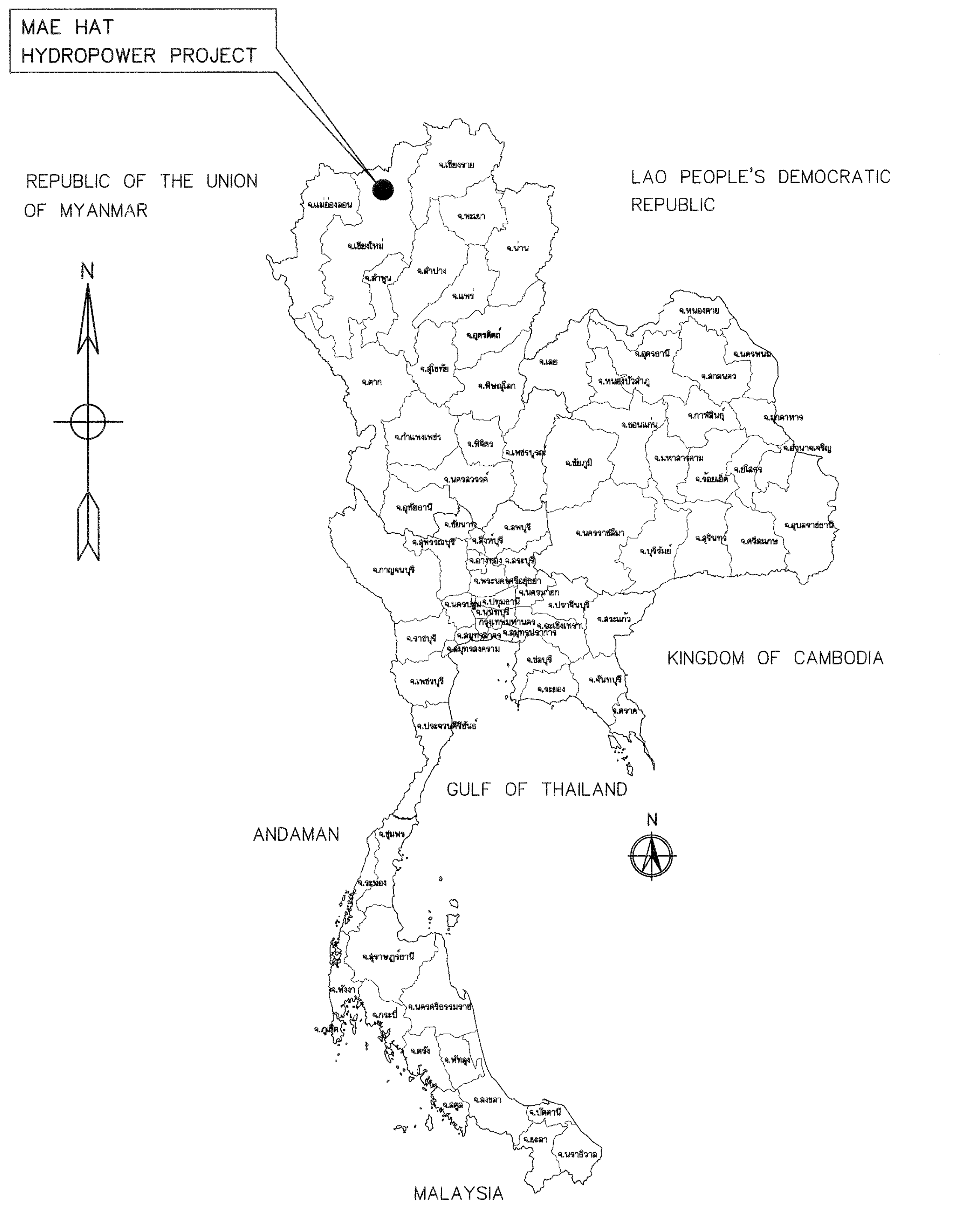


## PROJECT AREA MAP

SCALE 1:20,000



## LOCATION MAP

NOT TO SCALE

LEGENDS :

| | |
|---|---|
| 〰 | STREAM |
| ◆ | WEIR |
| —·— | HEADRACE |
| ● | SURGE TANK |
| ------ | PENSTOCK |
| ■ | POWERHOUSE |
| ━━ | ACCESS ROAD / O&M ROAD |
| —▫—▫— | TRANSMISSION LINE |

NOTES :

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS, UNLESS OTHERWISE SHOWN
2. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH-GN-03

0 500 1,000 1,500

SCALE 1:20,000 METERS

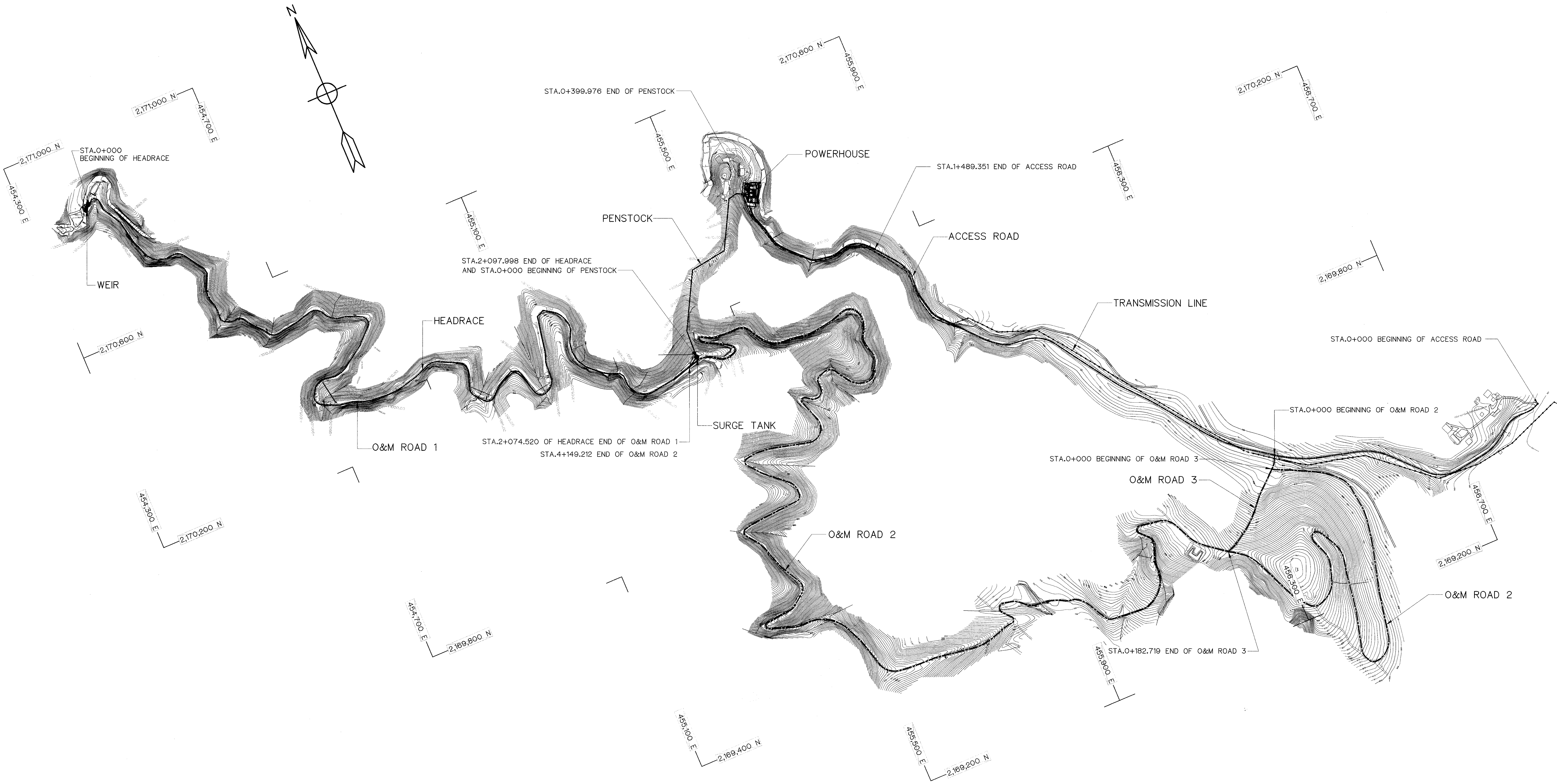
| NO. | DATE | REVISIONS | CHECKED | APPROVED |
|---|---|---|---|---|
| 3 | | | | |
| 2 | | | | |
| 1 | | | | |
| | CONSULTANTS | | DEDE | |

KINGDOM OF THAILAND
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
GENERAL DRAWING
PROJECT LOCATION MAP

| | |
|---|---|
| P&C MANAGEMENT CO.,LTD. | Department of Alternative<br>Energy Development and Efficiency<br>MINISTRY OF ENERGY |
| | REVIEWED |
| DESIGNED ภย.64624 สย.6226 | SUBMITTED Chamit |
| DRAWN | RECOMMENDED |
| CHECKED สย.6226 | APPROVED P. Hass.. |
| PROJECT MANAGER 08/03/2559 DATE | DRAWING NO. MH-GN-01 |
| | SHEET NO. 1 OF 130 |



## PROJECT LAYOUT

SCALE 1:4,000

0 50 100 150 200 250 300

SCALE 1:4,000 METERS

NOTES :

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS. UNLESS OTHERWISE SHOWN.
2. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH-GN-03

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
|---|---|---|---|---|
| 3 | | | | |
| 2 | | | | |
| 1 | | | | |
| | CONSULTANTS | | DEDE | |

KINGDOM OF THAILAND
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
GENERAL DRAWING
PROJECT LAYOUT

P&C MANAGEMENT CO.,LTD.

Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

| | |
|---|---|
| DESIGNED ภย.64624 สย.6226 | REVIEWED |
| DRAWN | SUBMITTED Chavit |
| CHECKED สย.6226 | RECOMMENDED |
| | APPROVED P. Hansell. |

08/03/2559
PROJECT MANAGER DATE

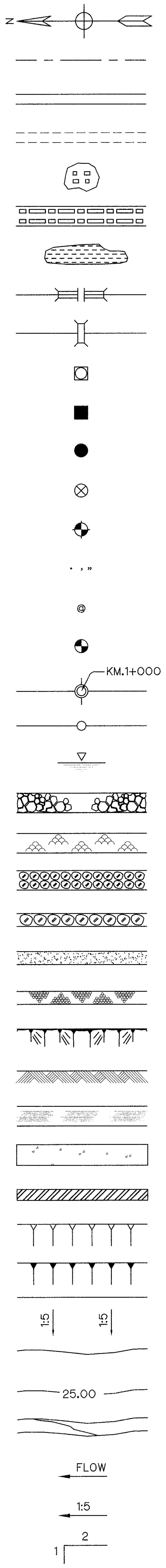
DRAWING NO. MH-GN-02

SHEET NO. 2 OF 130

## ABBREVIATIONS :

| | | | |
|---|---|---|---|
| A | CROSS-SECTION AREA OF FLOW | MAX. | MAXIMUM |
| AC. | ASBESTOS CEMENT PIPE | M.S.L. | MEAN SEA LEVEL |
| AGG. | AGGREGATE | MISC. | MISCELLANEOUS |
| ALT. | ALTERNATIVE | N. | NORTH |
| APPROX. | APPROXIMATE | n. | MANNING'S ROUGHINESS COEFFICIENT |
| AZ. | AZIMUTH | N.F. | NEAR FACE |
| B. | BEGINNING OF SURVEY | NGL. | NATURAL GROUND LEVEL |
| BC. | BEGINNING OF CURVE | NO. OR # | NUMBER |
| BEG. | BEGINNING | N.W.L. | NORMAL WATER LEVEL |
| BF. | BOTTOM FACE | OD. | OUTSIDE DIAMETER |
| B | BEAM | O.F. | OUTSIDE FACE |
| B.M. | BENCH MARK | O&M | OPERATION & MAINTENANCE |
| BOTT. | BOTTOM | PC. | POINT OF HONRIZONTAL CURVATURE |
| BRG. | BEARING | PI. | POINT OF HORIZONTAL INTERSECTION |
| C.B.R. | CALIFORNIA BEARING RATIO | PL. | PLATE |
| C/C | CENTER TO CENTER | P.O.C. | POINT ON CURVE |
| ℄ | CENTER LINE | P.O.T. | POINT ON TANGENT |
| CL. | CLEARANCE | P.O.S.T. | POINT ON SUB-TANGENT |
| CM. OR cm. | CENTIMETER | PRC. | POINT OF HORIZONTAL REVERSE CURVE |
| CM./S OR cm./s | CENTIMETER PER SECOND | PT. | POINT OF TANGENT |
| COL. | COLUMN | PVC. | POLYVINYL CHLORIDE |
| CONC. | CONCRETE | PVC. | POINT OF VERTICAL CURVATURE |
| D | DEGREE OF CURVE | PVI. | POINT OF VERTICAL INTERSECTION |
| DB. | DEFORM BAR | PVRC. | POINT OF VERTICAL REVERSE CURVE |
| d. | DEPTH OF WATER | PVT. | POINT OF VERTICAL TANGENT |
| DIA. OR Ø | DIAMETER | Q. | DISCHARGE |
| DOH. | DEPARTMENT OF HIGHWAY | QTY. QUAN. | QUANTITY |
| DWG. | DRAWING | R | RADIUS OF CURVATURE |
| DEDE. | DEPARTMENT OF ALTERNATIVE ENERGY | r | HYDRAULIC RADIUS |
| | DEVELOPMENT AND EFFICIENCY | RØ , Ø | ROUND BAR |
| E | EAST | RC. | REINFORCED CONCRETE |
| E | END OF SURVEY | RD. | ROAD |
| EA. | EACH | REF. | REFERENCE |
| E.C. | END OF CURVE | REINF. | REINFORCEMENT |
| E.F. | END OF FACE | REQ'D | REQUIRED |
| EL. OR ELEV. | ELEVATION | RID. | ROYAL IRRIGATION DEPARTMENT |
| EXIST. | EXISTING | SCH. | SCHEDULE |
| EXP. | EXPANSION | SE. | SUPERELEVATION |
| EXT. | EXTERIOR | SETC. | SECTION |
| EX. | EXTERNAL DISTANCE OF CURVE | S.P.C.T. | STANDARD PROCTOR COMPACTION TEST |
| f | FREE BOARD , FINISH | S.S. | SIDE SLOPE |
| F.F. | FAR FACE | STIR. | STIRRUP |
| F.S.L. | FULL SUPPLY LEVEL | STA. | STATION |
| FTG. | FOOTING | STD. | STANDARD |
| HD. | HEAD | STR. | STRUCTURE |
| HEX. | HEXAGONAL | SYMM. | SYMMETRICAL |
| HOR. | HORIZONTAL | T. | TANGENT LENGTH , THICKNESS |
| I.D. | INSIDE DIAMETER | T | TON |
| I.F. | INSIDE FACE | THK. | THICKNESS |
| IN. OR " | INCH | T.F. | TOP FACE |
| INT. | INTERIOR | T.I.S. | THAI INDUSTRIAL STANDARD |
| INV. | INVERT | Ts. | SUPERELEVATION TRANSITION LENGTH |
| Kg. | KILOGRAM | TYP. | TYPICAL |
| Km. | KILOMETER | V. | VELOCITY OF FLOW |
| KPH. | KILOMETER PER HOUR | V.C. | VERTICAL CURVE |
| KSC. | KILOGRAM PER SQUARE CENTIMETER | Vc. | LENGTH OF VERTICAL CURVE |
| L | LENGTH OF CURVE | VER. | VERTICAL |
| LC. | LENGTH OF HORIZONTAL CURVE | VOL. | VOLUME |
| LONG. | LONGITUDINAL | W/ | WITH |
| LT. | LEFT | W.C. | WATER CLOSET |
| L.W.L. | LOW WATER LEVEL | ◎ | ANGLE |
| M. OR m. | METER | △ | DEFLECTION ANGLE |
| $M^2$ OR $m^2$ | SQUARE METER | | |
| $M^3$ OR $m^3$ | CUBIC METER | | |
| MM. OR mm. | MILLIMETER | | |
| M./S OR m./s | METER PER SECOND | | |
| MIN. | MINIMUM | | |

## SYMBOLS :



TYPICAL NORTH ARROW
CENTER LINE
PAVED ROAD
DIRT ROAD, LATEITE ROAD OR TRACK
VILLAGE
CITY OR DISTRICT
POND OR SWAMP
CULVERT UNDER ROAD
BRIDGE
POLE
TEST PIT
HAND AUGER
EXISTING DRILL HOLES
DRILL HOLES
DEGREE, MINUTE, SECOND
AT EQUAL DISTANCE BETWEEN CENTER TO CENTER
B.M.
STATION
BC., EC., PC., PI., PT., PCV., PVT.
WATER LEVEL
PLAN OF RIPRAP
PLAN OF SLOPE RIPRAP
SECTION OF DUMPED RIPRAP
SECTION OF HAND PLACED RIPRAP
SECTION OF SAND
SECTION OF GRAVEL OR COARSE AGGREGATE
SECTION OF ROCK
SECTION OF EARTH
SECTION OF BACKFILL
SECTION OF CONCRETE
STEEL SECTION
ELEVATION OR PLAN OF EARTH CUT OR FILL
ELEVATION OR PLAN OF ROCK CUT
ELEVATION OR PLAN OF SLOPE
NATURAL GROUND LEVEL
CONTOUR LINE
RIVER, STREAM OR NATURAL DRAIN
FLOW DIRECTION
SLOPE DIRECTION
SLOPE RATIO

## GENERAL NOTES :

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS UNLESS OTHERWISE SHOWN.
2. DURING THE CONTRUCTION PERIOD, IT IS THE CONTRACTOR'S DUTY TO CHECK THE CORRECTION OF ALL RELEVANT LOCATIONS, DIMENSIONS, ELEVATIONS AND OTHER DATA AS PROVIDED BY THE DRAWING AND TECHNICAL SPECIFICATIONS BEFORE THE IMPLEMENTATION OF THE WORKS.
3. IN CASE OF ANY DETAILS BEING NOT MENTIONED OR NOT SHOWN IN THE DRAWING OR TECHNICAL SPECIFICATIONS, OR IN CASE OF ANY DISCREPANCY, DEFECTIVE DESCRIPTION, ERROR, DIMENSION OR AMBIGUTY BETWEEN OR IN ANY OF THE DRAWINGS, IT IS THE CONTRACTOR'S RESPONSIBILITY TO CORRECT AND/OR ADJUST THE RELEVENT DRAWINGS TO OBTAIN FIELD ENGINEER APPROVAL
4. ADDITIONAL SYMBOLS, IF REQUIRED, ARE DEFINED IN THE RESPECTIVE DRAWINGS.
5. THE SPECIFICATIONS AND THE QUANTITIES OF MATERIALS ARE SPECIFIED IN THE TECHNICAL SPECIFICATIONS.
6. ALL PLAIN CONCRETE CORNERS ARE TO BE CHEMFERED 2 cm. UNLESS OTHERWISE SHOWN.

## STRUCTURAL DESIGN NOTES :

1. THE ULTIMATE COMPRESSIVE STRENGTH OF CONCRETE OF STANDARD CYLINDER (Ø0.15x0.30 m.) TEST AT AGE 28 DAYS SHALL BE AS THE FOLLOWING, UNLESS OTHERWISE SHOWN.

| fc' (ksc) | DESCRIPTION |
|---|---|
| 350 | PRESTRESS CONCRETE |
| 210 | 1. WEIR |
| | 2. SURGE TANK |
| | 3. POWERHOUSE |
| | 4. TAILRACE |
| | 5. MANHOLE |
| | 6. ANCHOR BLOCK, PIPE SUPPORT |
| | 7. HEADRACE |
| | 8. BOX CULVERT |
| 140 | LEAN CONCRETE |

2. UNLESS OTHERWISE SHOWN, THE FOLLOWING CLEAR COVER OF CONCRETE OVER OF THE REINFORCEMENT SHALL BE USED :
   - FACE EXPOSED TO SCOUR 5.0 cm.
   - FACE EXPOSED TO EARTH OR WEATHER 5.0 cm.
   - FACE UNEXPOSED TO EARTH OR WEATHER 3.0 cm.
3. THE REINFORCEMENT LAP SPLICES SHALL NOT BE LESS THAN 50 DIAMETERS OF BIGGER THAN BAR WITH HOOKS, UNLESS OTHERWISE SHOWN.
4. EMBEDDED METALWORK SHALL BE SECURELY FASTENED IN POSITION BEFORE PLACING CONCRETE.
5. ALL CONSTRUCTION JOINT SHOULD BE TREATED AS DIRECTED IN ORDER TO ASSURE THE BEST BOND.
6. A 5 cm. (MIN.) LAYER OF LEAN CONCRETE (1:3:5 BY VOLUME) SHOULD BE PLACED BELOW CONCRETE STRUCTURES.
7. THE STRUCTURES SHOULD BE PLACED ON UNDISTURBED SOILS OR COMPACTED FILL AND BACKFILL AROUND THE STRUCTURES SHOULD BE COMPACTED.
8. THE FOUNDATION ELEVATIONS ARE SUBJECT TO CHANGE AS DIRECTED ACCORDING TO THE SOIL CONDITIONS.
9. ALL SIZES OF REINFORCING BARS AND STRUCTURAL STEELS ARE IN MILLIMETERS.
10. ALL STRUCTURAL STEELS ARE THOSE OF T.I.S. DESIGNATION Fe24.
11. REINFORCED STEEL BARS SHALL BE CONFORM TO T.I.S. AS FOLLOW :
    - DEFORMED BARS (SD30) – T.I.S. 24-2548
    - ROUND BARS (SR24) – T.I.S. 20-2543
12. ALLOWABLE BEARING CAPACITY OF FOUNDATION SHALL NOT BE LESS THAN AS FOLLOW :
    - INTAKE $Q_a$ = 15 $T/M.^2$
    - HEADRACE $Q_a$ = 15 $T/M.^2$
    - SURGE TANK $Q_a$ = 20 $T/M.^2$
    - POWERHOUSE $Q_a$ = 20 $T/M.^2$
    - PENSTOCK $Q_a$ = 20 $T/M.^2$

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
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MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
GENERAL DRAWING
SYMBOLS, ABBREVIATIONS, AND GENERAL NOTES

P&C MANAGEMENT CO.,LTD.
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DRAWN
CHECKED สย.6226
PROJECT MANAGER
DATE 08/03/2559

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SUBMITTED Chamit
RECOMMENDED
APPROVED P. Hansell

DRAWING NO. MH-GN-03
SHEET NO. 3 OF 130

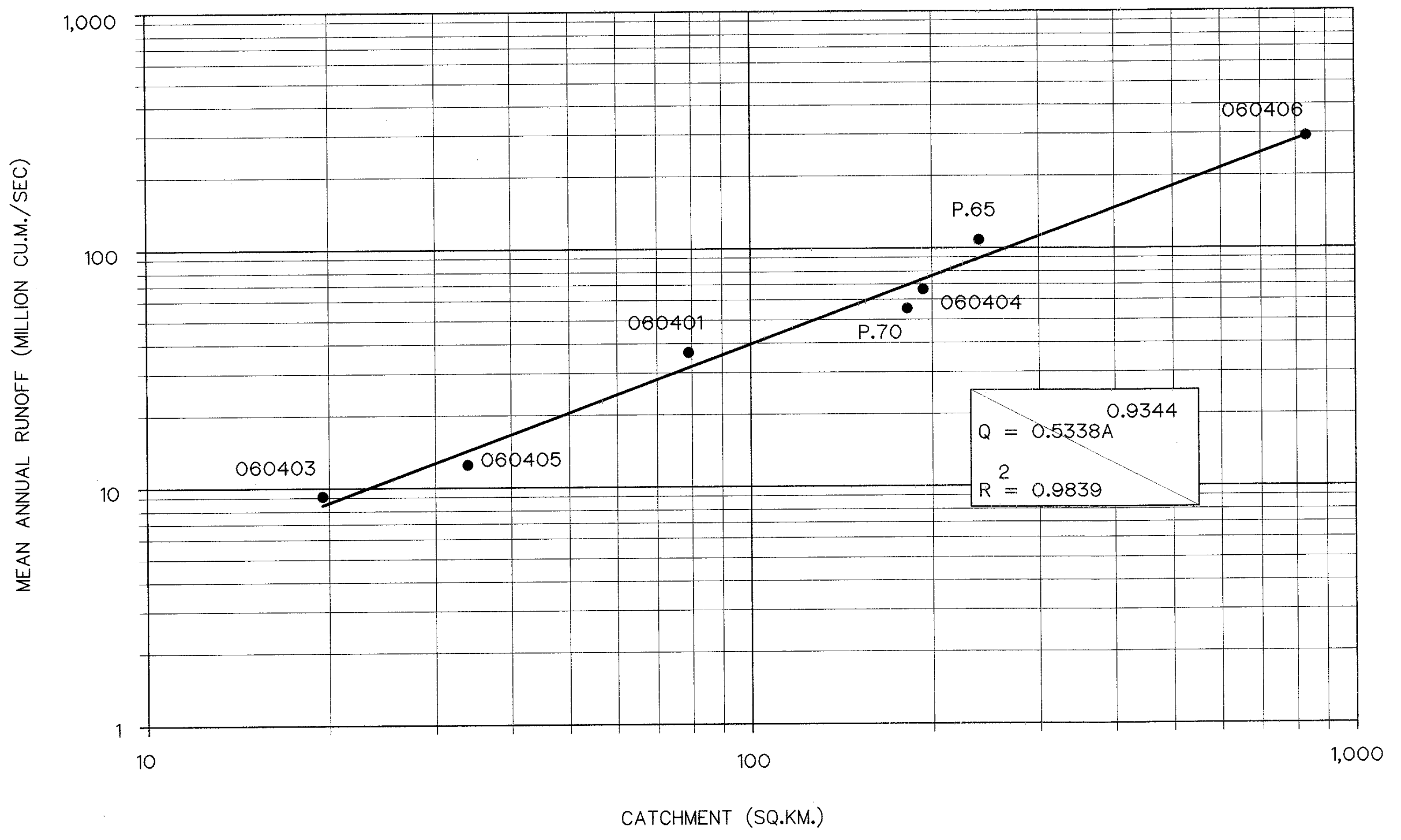
FIGURE 1 RELATIONSHIP BETWEEN MEAN ANNUAL RUNOFF AND CATCHMENT AREA

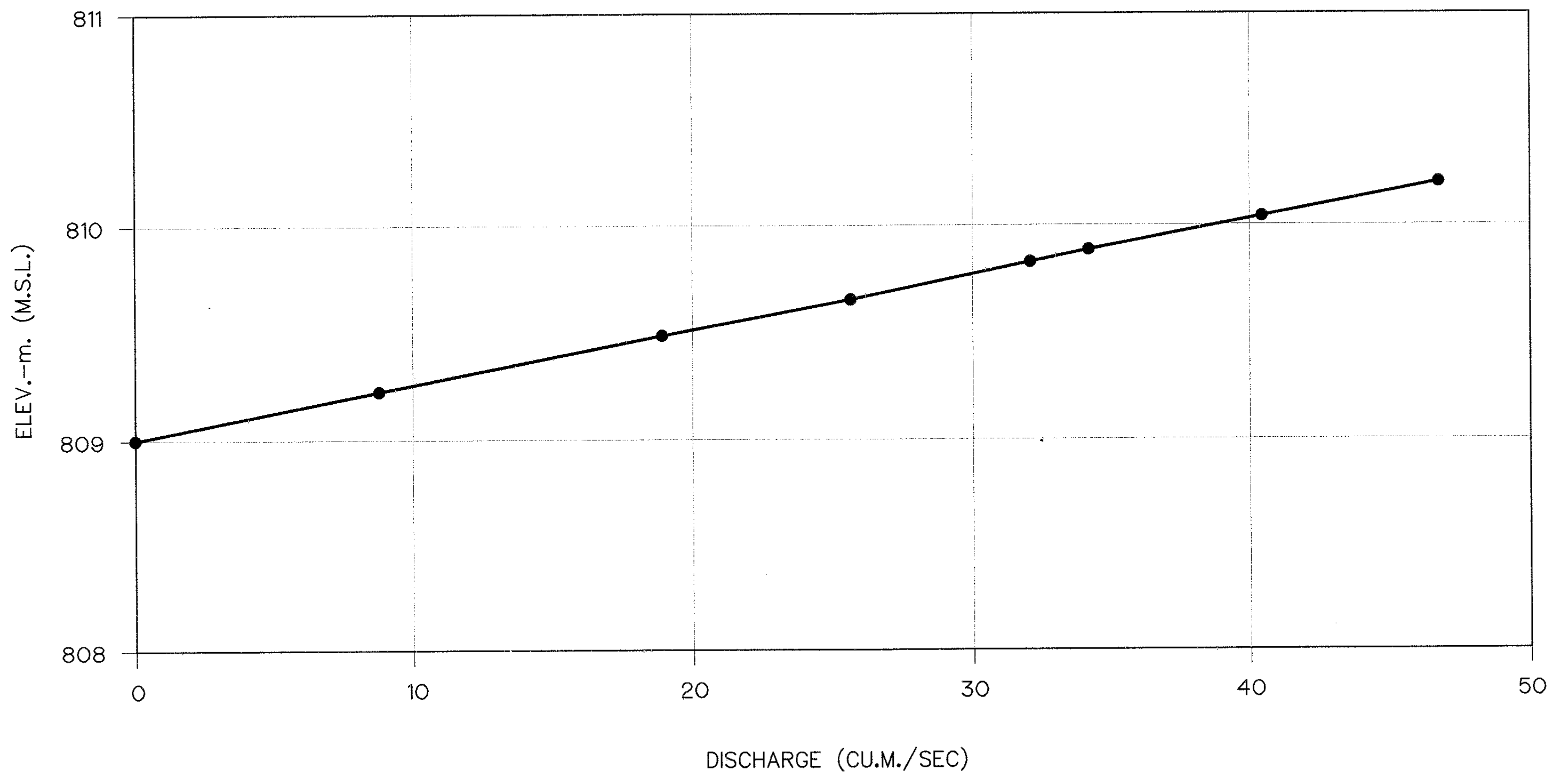
FIGURE 2 RELATIONSHIP BETWEEN ELEVATION AND DISCHARGE AT POWERHOUSE

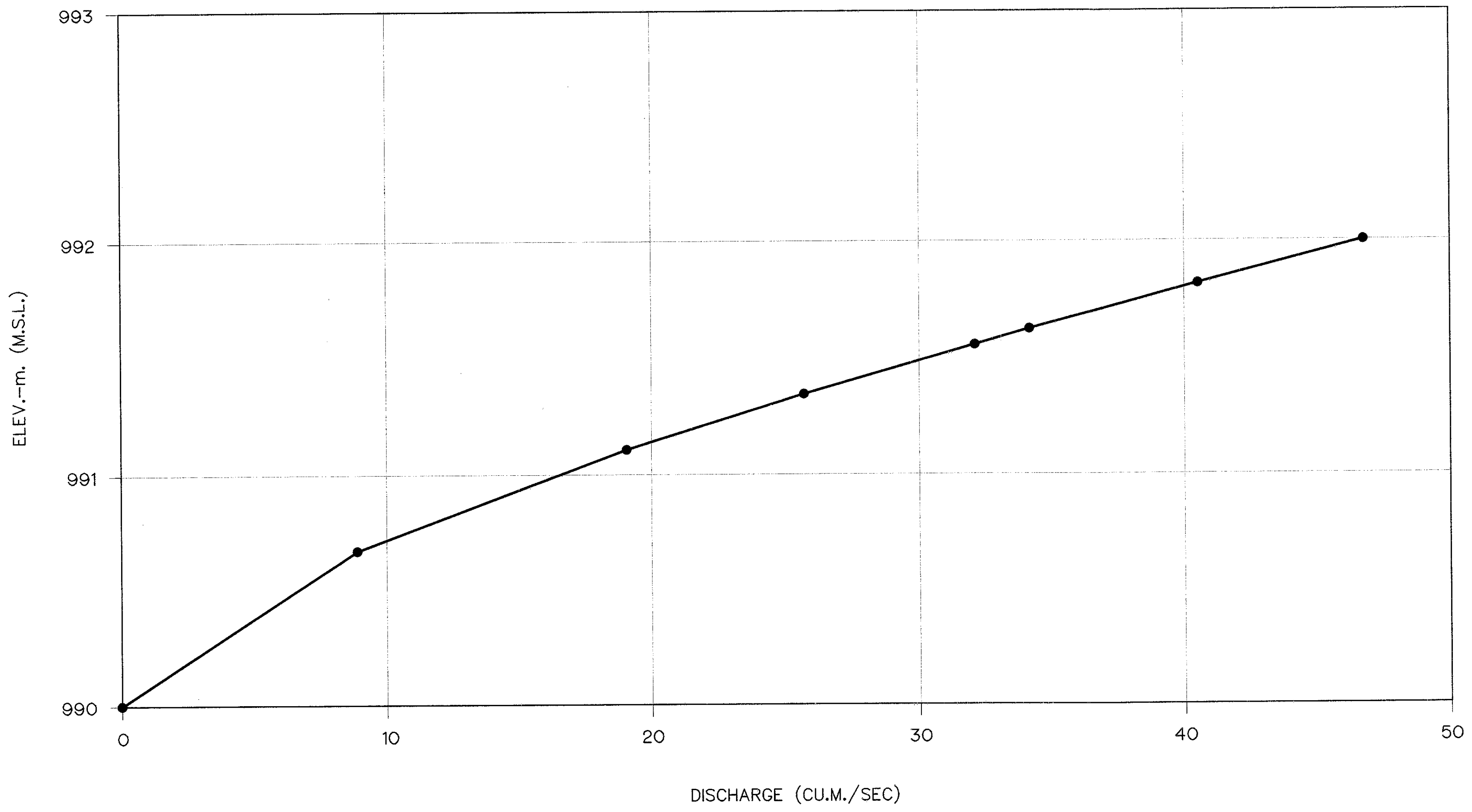
FIGURE 3 RELATIONSHIP BETWEEN ELEVATION AND DISCHARGE AT WEIR

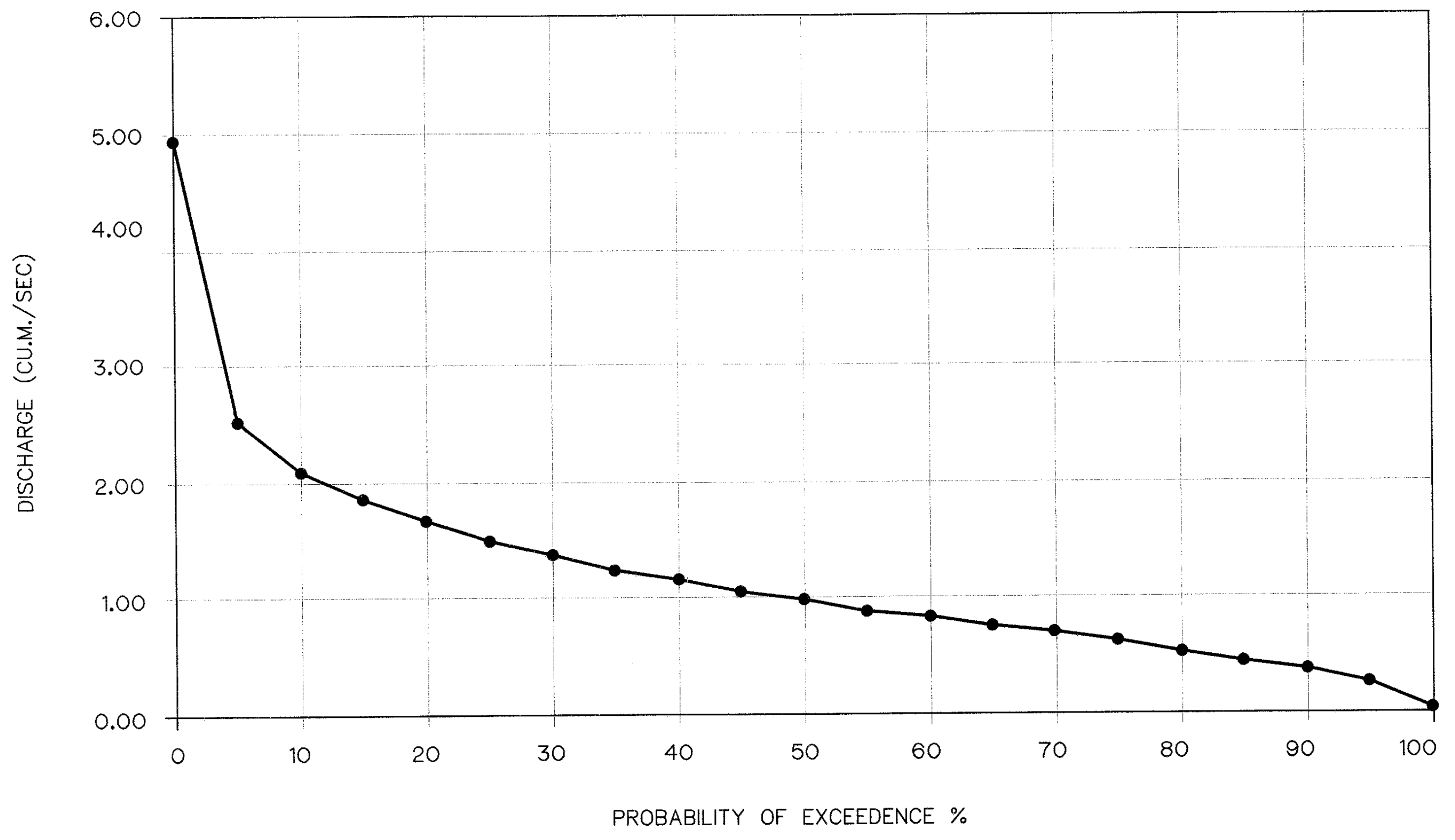
FIGURE 4 FLOW DURATION CURVE

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## MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
GENERAL DRAWING
PROJECT INFORMATION HYDROLOGY DATA

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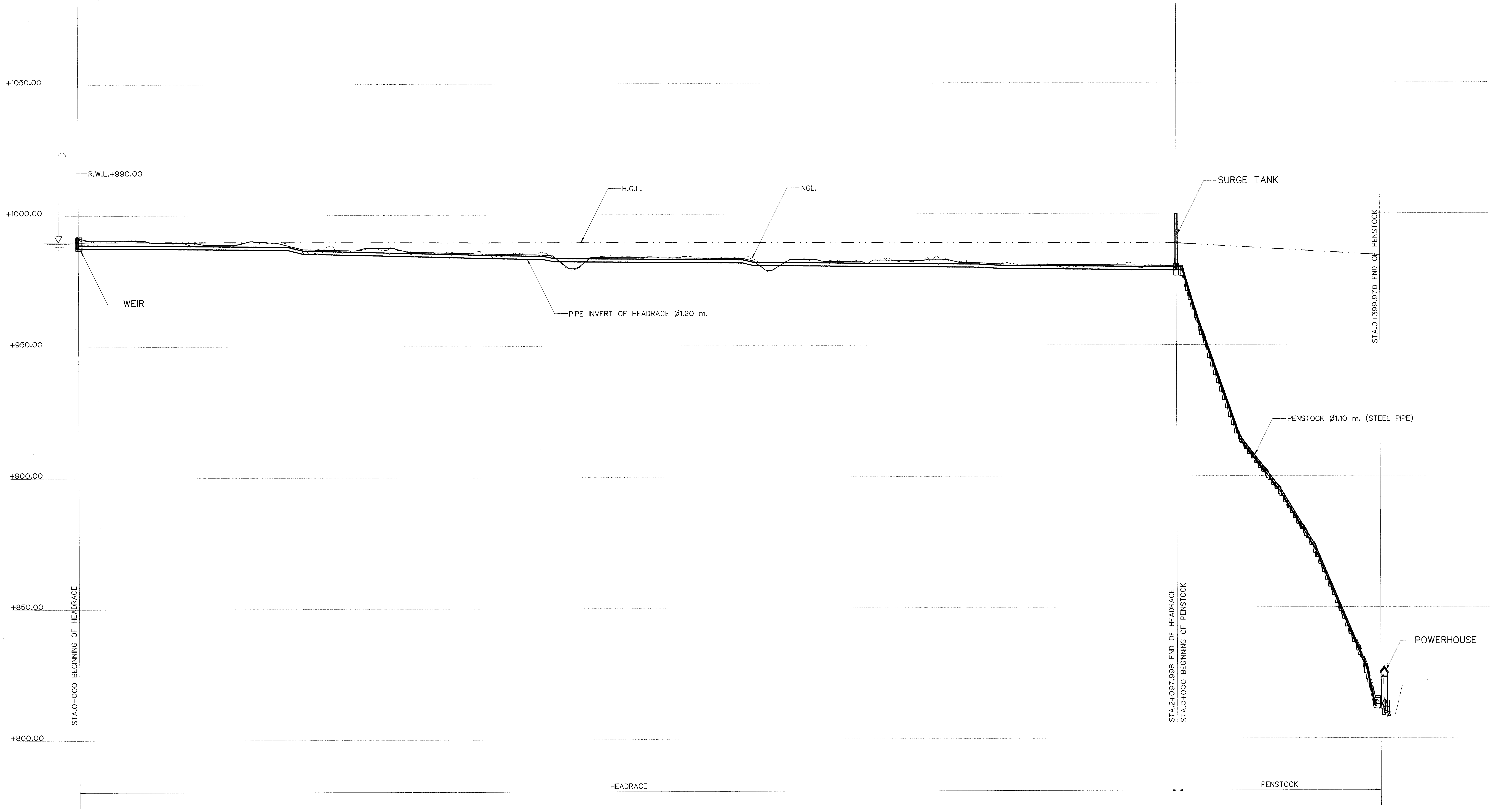
SUBMITTED Chamnit
RECOMMENDED
APPROVED P. Hansell

DRAWING NO. MH-GN-04
SHEET NO. 4 OF 130


+1050.00
+1000.00
+950.00
+900.00
+850.00
+800.00
R.W.L.+990.00
H.G.L.
NGL.
SURGE TANK
WEIR
PIPE INVERT OF HEADRACE Ø1.20 m.
STA.0+399.976 END OF PENSTOCK
PENSTOCK Ø1.10 m. (STEEL PIPE)
POWERHOUSE
STA.0+000 BEGINNING OF HEADRACE
STA.2+097.998 END OF HEADRACE
STA.0+000 BEGINNING OF PENSTOCK
HEADRACE
PENSTOCK

## PROFILE ALONG HEADRACE ℄

VERTICAL SCALE 1:800
HORIZONTAL SCALE 1:4,000

NOTES :

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS. UNLESS OTHERWISE SHOWN.
2. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH-GN-03

0 10 20 30 40 50 60
SCALE 1:800 METERS

0 50 100 200 300
SCALE 1:4,000 METERS

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
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MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
GENERAL DRAWING
POWER WATERWAY HYDRAULIC ARRANGEMENT

P&C MANAGEMENT CO.,LTD.

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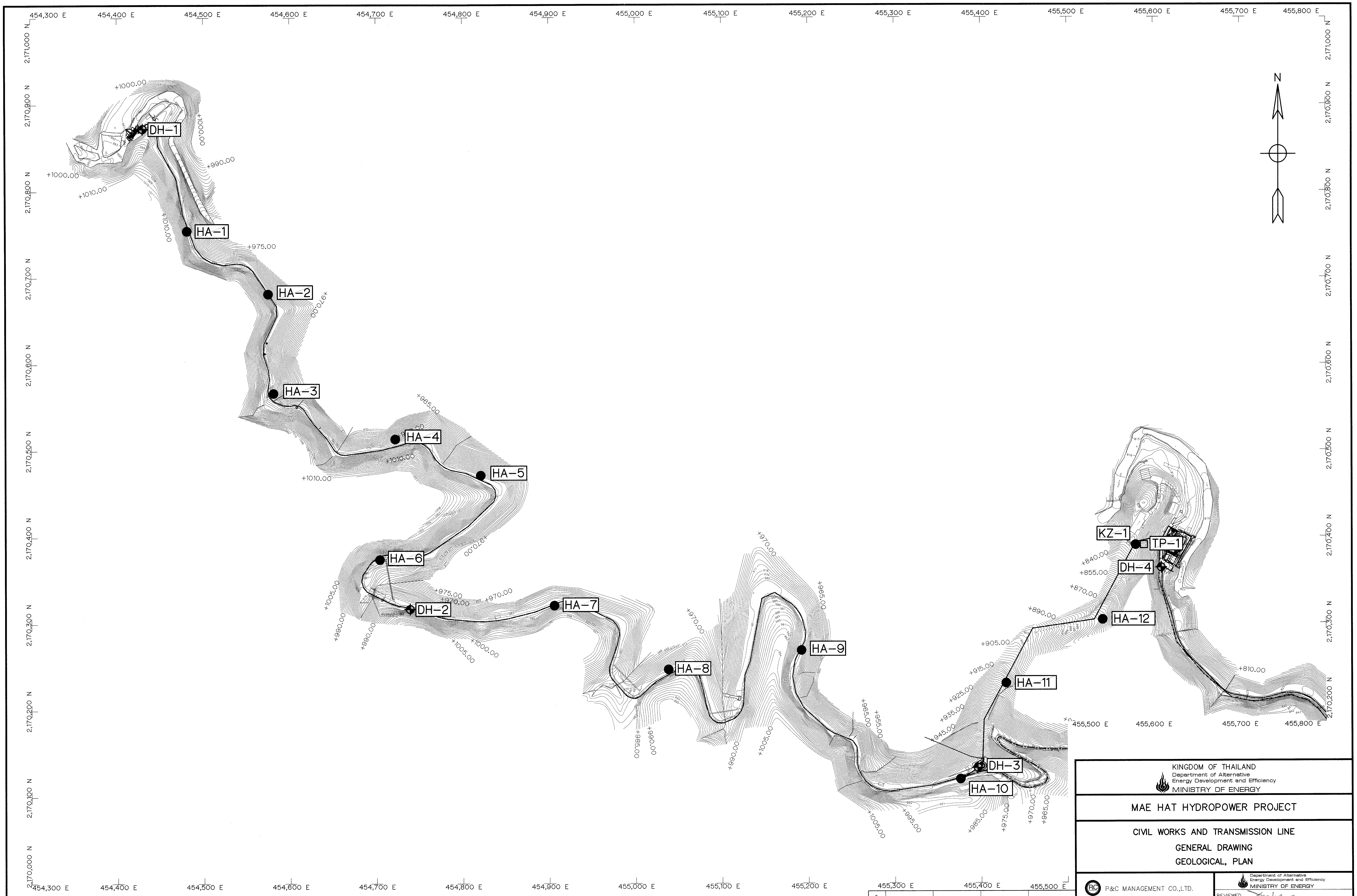
APPROVED P. Hans.ll.

DRAWING NO. MH-GN-05
SHEET NO. 5 OF 130



NOTES :

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS. UNLESS OTHERWISE SHOWN.
2. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH-GN-03

0 25 50 75 100 125 150
SCALE 1:2,000 METERS

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
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| 2 | | | | |
| 1 | | | | |

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MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
GENERAL DRAWING
GEOLOGICAL, PLAN

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CHECKED สย.6226
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DATE 08/03/2559

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MINISTRY OF ENERGY
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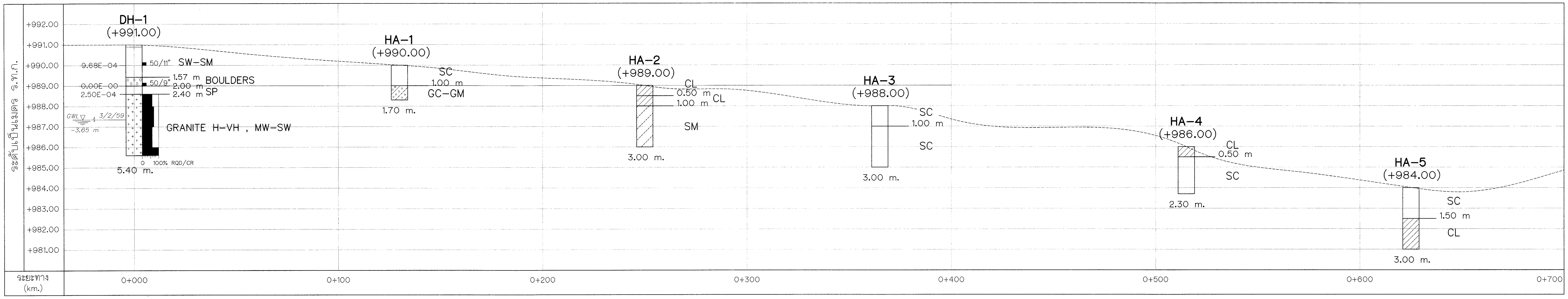
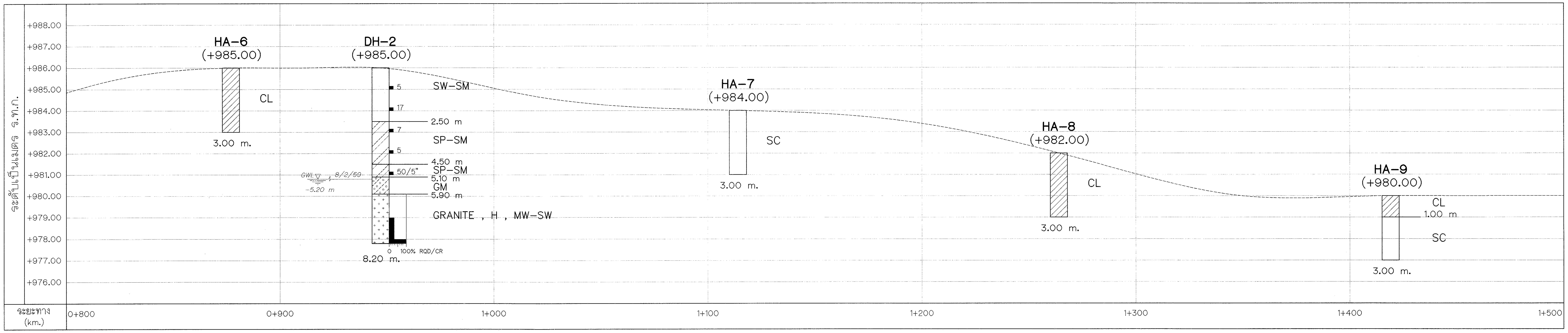
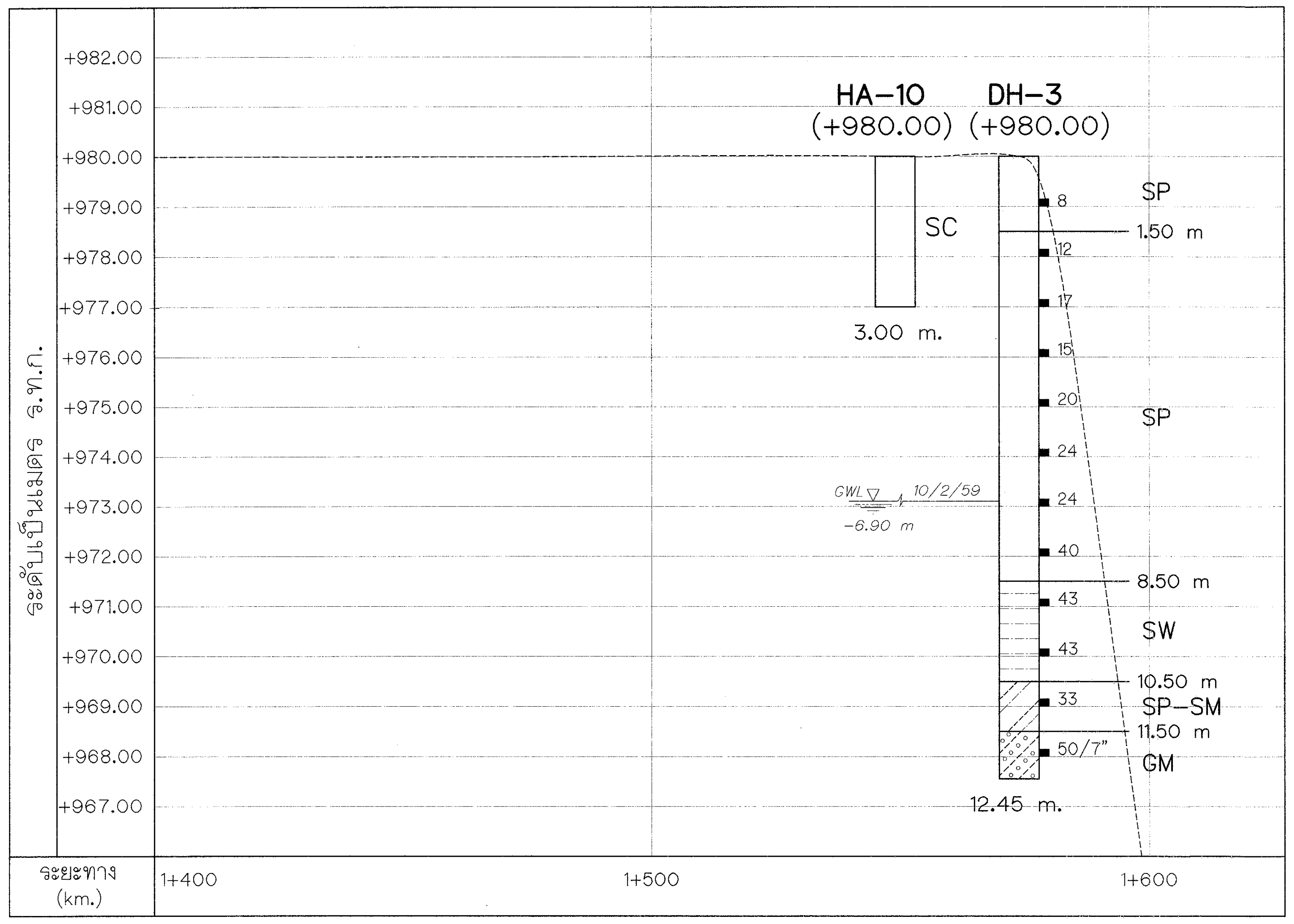
SUBMITTED Chawit
RECOMMENDED
APPROVED

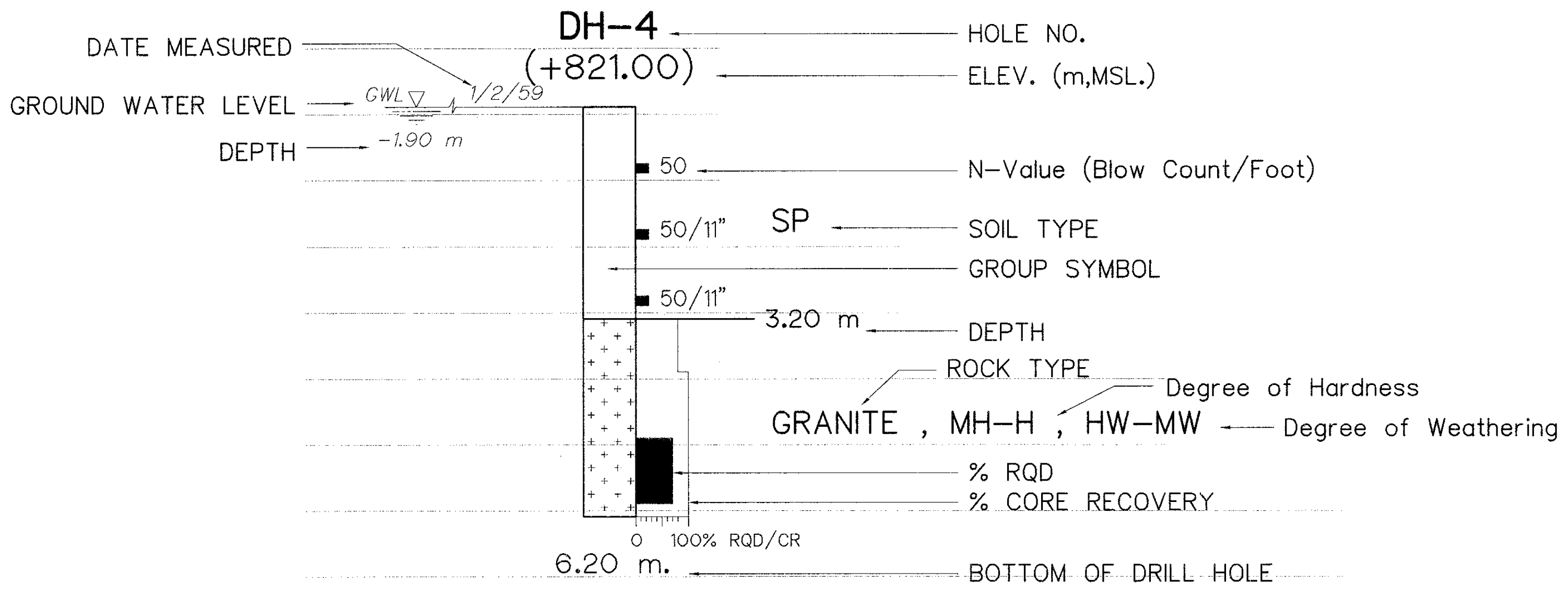
DRAWING NO. MH-GN-06
SHEET NO. 6 OF 130







## Explanation



## Legend

▨ CL = Lean Clay with Sand

▨ SC = Clayey Sand

▨ SP = Poorly Graded Sand

⁙ GRANITE

### Degree of Weathering

F = Fresh Rock
SW = Slightly Weathered Rock
MW = Moderately Weathered Rock
HW = Highly Weathered Rock
CW = Completely Weathered Rock

### Degree of Hardness

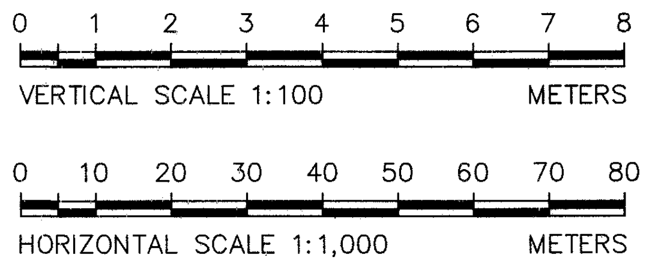
VS = Very Soft Rock
S = Soft Rock
MH = Medium Hard Rock
H = Hard Rock
VH = Very Hard Rock

### % RQD

< 25% = Very Poor Rock
25–50% = Poor Rock
50–75% = Fair Rock
75–90% = Good Rock
90–100% = Very Good Rock

### Degree of Permeability

1 = < 1 Lugeon or $<10^{-5}$ cm/sec = Impervious
2 = 1–5 Lugeon or $10^{-5}$ – $5\times10^{-5}$ cm/sec = Semi – Impervious
3 = 5–10 Lugeon or $5\times10^{-5}$ – $10^{-4}$ cm/sec = Semi – Pervious
4 = 10–50 Lugeon or $10^{-4}$ – $5\times10^{-4}$ cm/sec = Rather – Pervious
5 = > 50 Lugeon or $>5\times10^{-4}$ cm/sec = Pervious



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MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
GENERAL DRAWING
GEOLOGICAL, PROFILE (1/2)

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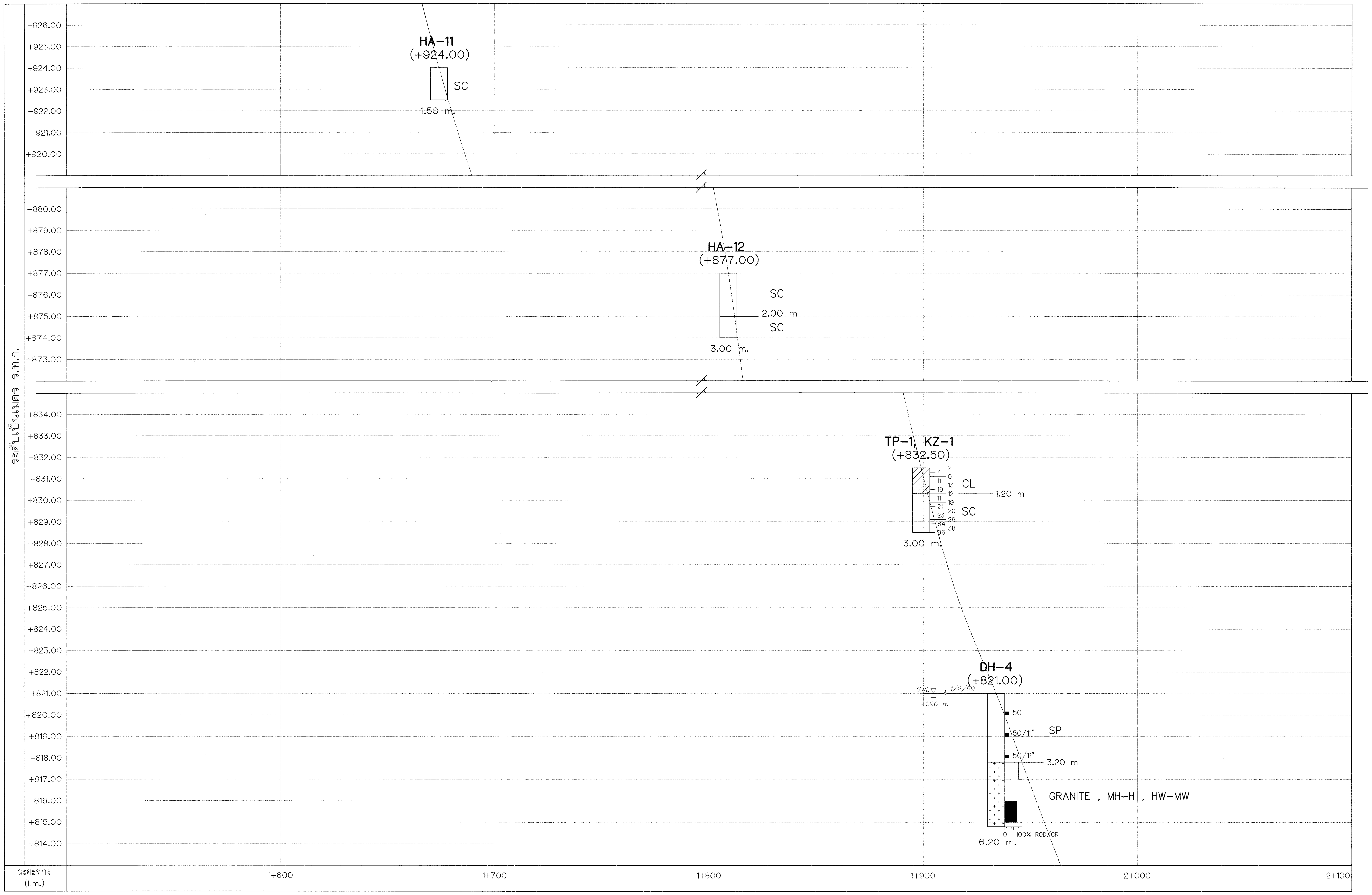
APPROVED P. Hansell

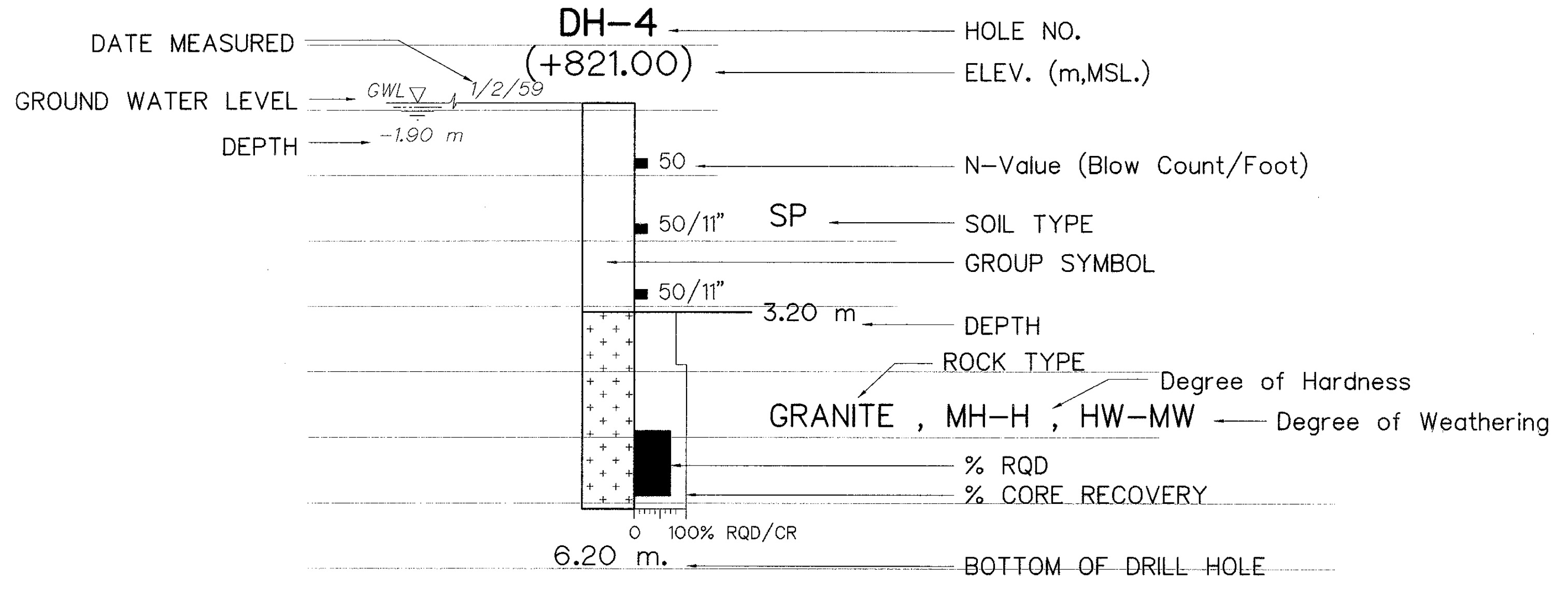
DRAWING NO. MH-GN-07
SHEET NO. 7 OF 130



## Legend

| | |
|---|---|
| ▨ | CL = Lean Clay with Sand |
| ▨ | SC = Clayey Sand |
| ▨ | SP = Poorly Graded Sand |
| ⁘ | GRANITE |

## Explanation



### Degree of Weathering

F = Fresh Rock
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HW = Highly Weathered Rock
CW = Completely Weathered Rock

### Degree of Hardness

VS = Very Soft Rock
S = Soft Rock
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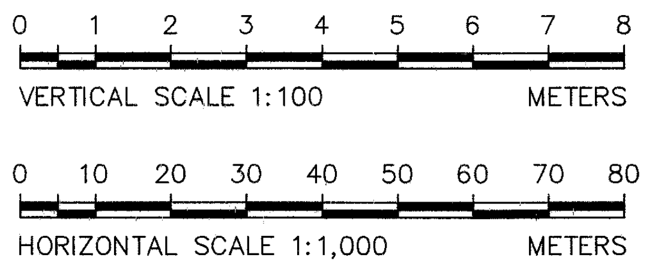
3 = 5–10 Lugeon or $5\times10^{-5} - 10^{-4}$ cm/sec = Semi – Pervious
4 = 10–50 Lugeon or $10^{-4} - 5\times10^{-4}$ cm/sec = Rather – Pervious
5 = > 50 Lugeon or $>5\times10^{-4}$ cm/sec = Pervious



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MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
GENERAL DRAWING
GEOLOGICAL, PROFILE (2/2)

P&C MANAGEMENT CO.,LTD.
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PROJECT MANAGER
DATE 08/03/2559

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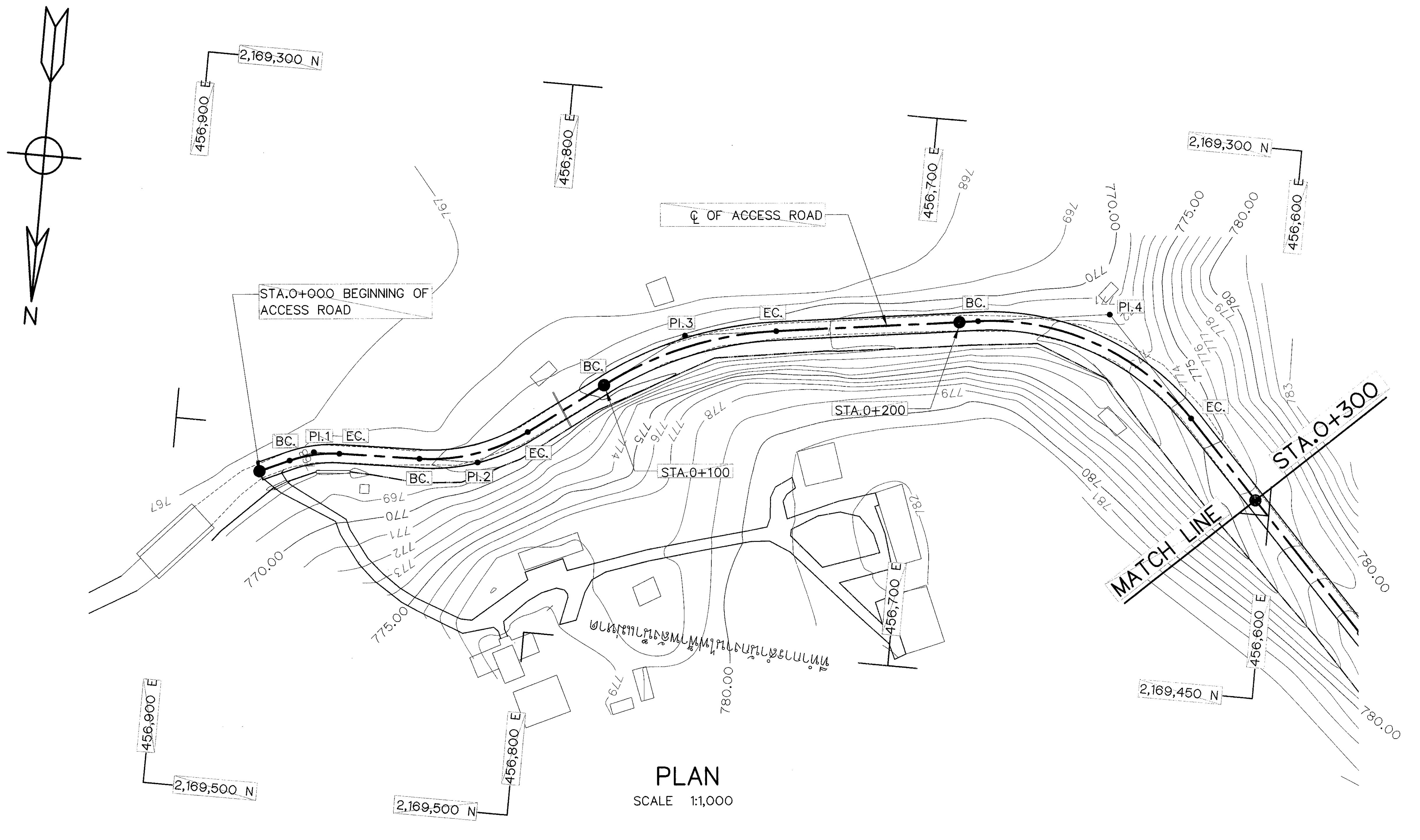
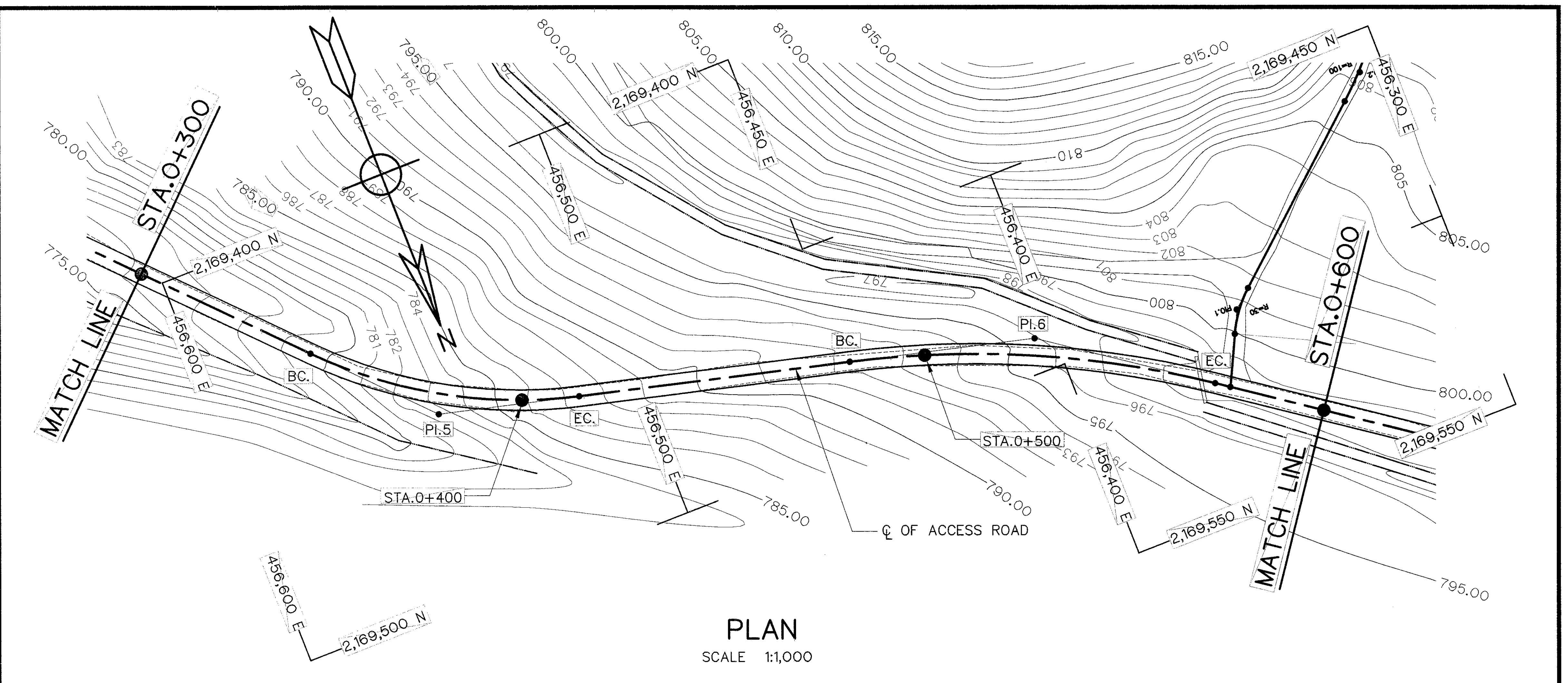
RECOMMENDED
APPROVED P. Hansell.

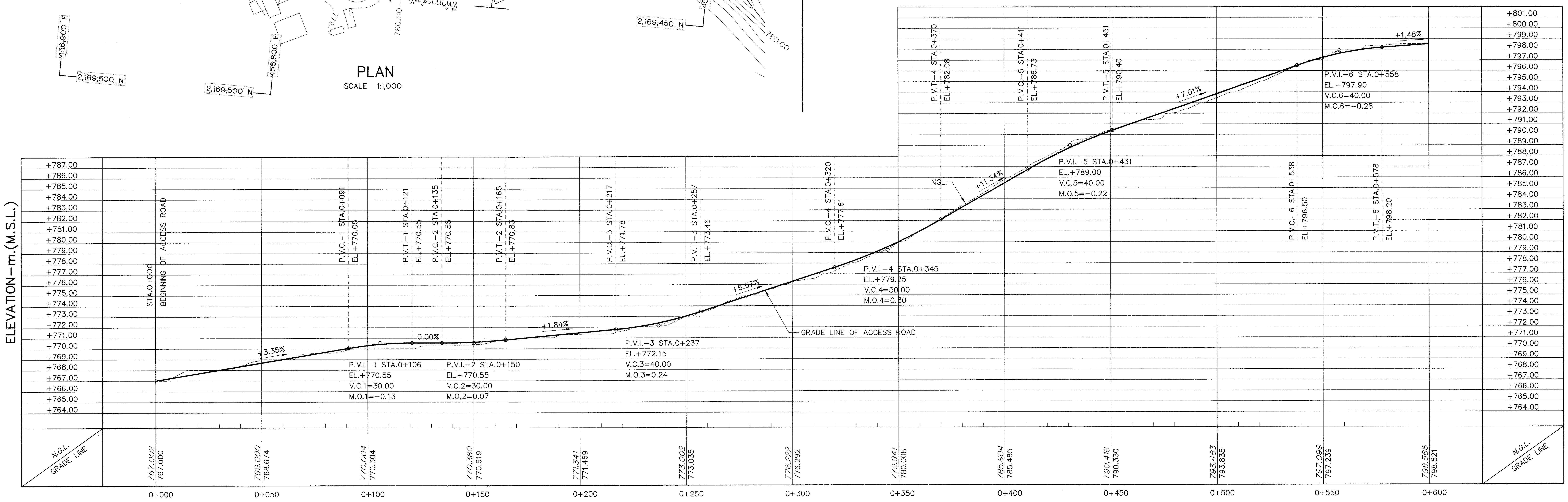
DRAWING NO. MH-GN-08
SHEET NO. 8 OF 130



PLAN
SCALE 1:1,000



PLAN
SCALE 1:1,000



PROFILE
VERTICAL SCALE 1:200
HORIZONTAL SCALE 1:1,000

## HORIZONTAL CURVE OF O&M ROAD PART 1

| NO. PI. | COORDINATE |  | PI. – PI. | DEFLECTION ANGLE (△) | TL. | R | LC. | BC. STA. | PI. STA. | EC. STA. | BEARING |
|---|---|---|---|---|---|---|---|---|---|---|---|
|  | N | E | (m) | ( ° – ' – " ) | (m) | (m) | (m) | (km) | (km) | (km) | (N/S ° – ' – " E/W) |
| BEG. | 2,169,412.613 | 456,875.924 | – | – | – | – | – | – |  | – | – |
| 1 | 2,169,406.079 | 456,861.589 | 15.754 | 22°–58'–49.03" | 7.000 | 34.436 | 13.812 | 0+008.754 | 0+015.754 | 0+022.566 | S65°–29'–46.13"W |
| 2 | 2,169,404.884 | 456,816.660 | 44.945 | 35°–00'–27.36" | 16.000 | 50.734 | 30.998 | 0+044.511 | 0+060.511 | 0+075.509 | S88°–28'–35.16"W |
| 3 | 2,169,365.374 | 456,763.326 | 66.374 | 28°–31'–20.24" | 25.000 | 98.358 | 48.963 | 0+100.883 | 0+125.883 | 0+149.846 | S53°–28'–07.80"W |
| 4 | 2,169,349.179 | 456,648.222 | 116.238 | 54°–41'–02.03" | 36.000 | 69.624 | 66.450 | 0+205.084 | 0+241.084 | 0+271.534 | S81°–59'–28.04"W |
| 5 | 2,169,455.067 | 456,548.351 | 145.556 | 32°–29'–19.88" | 35.000 | 120.123 | 68.114 | 0+346.090 | 0+381.090 | 0+414.204 | N43°–19'–29.93"W |
| 6 | 2,169,491.390 | 456,404.658 | 148.213 | 21°–11'–18.44" | 46.000 | 245.936 | 90.949 | 0+481.417 | 0+527.417 | 0+572.366 | N75°–48'–49.81"W |

NOTES :

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS UNLESS OTHERWISE SHOWN.
2. SYMBOL, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH-GN-03
3. THE CONTRACTOR HAS TO SUBMITED SURVEYING AND ROAD ALIGNMENT FOR APPROVAL.

REFERENCE DRAWINGS :

| | |
|---|---|
| 1. ACCESS ROAD PLAN AND PROFILE, STA. 0+600 TO STA. 1+200 | MH-AR-02 |
| 2. ACCESS ROAD TYPICAL SECTIONS, STOPPING AND PASSING PLACES | MH-AR-04 |
| 3. ACCESS ROAD TYPICAL SECTION AND DETAILS | MH-AR-05 |

0 5 10 15
SCALE 1:200 METERS

0 10 20 40 50 80
SCALE 1:1,000 METERS

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| NO. | DATE | REVISIONS | CHECKED | APPROVED |

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MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
ACCESS ROAD
PLAN AND PROFILE, STA. 0+000 TO STA. 0+600

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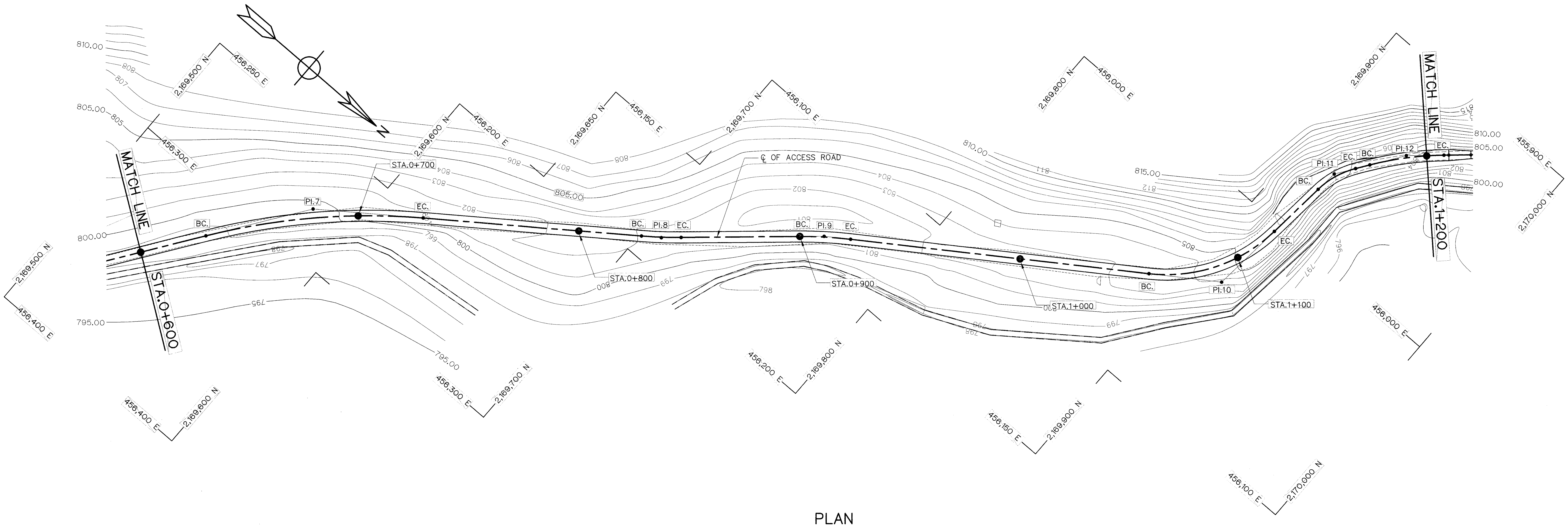
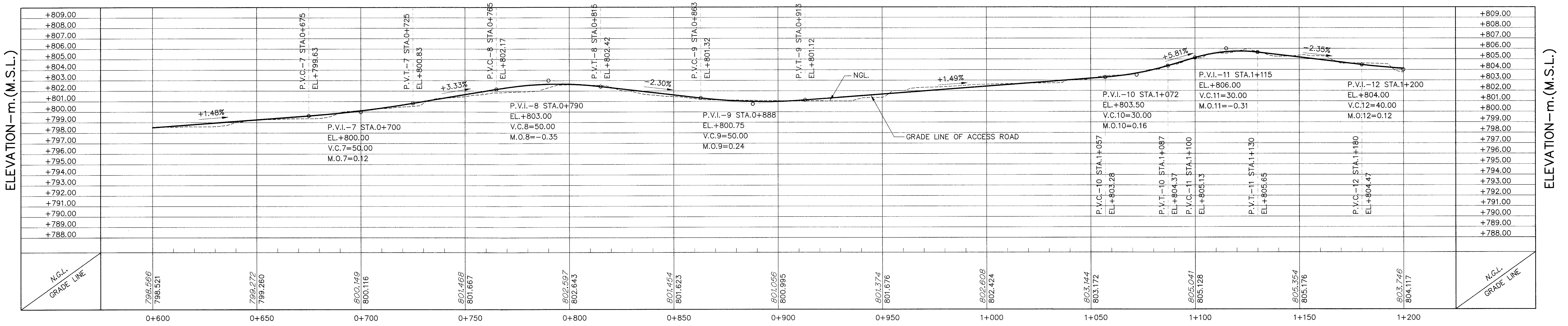
| PROJECT MANAGER | DATE 08/03/2559 |
| REVIEWED | |
| SUBMITTED | Charnit |
| RECOMMENDED | |
| APPROVED | P. Hansell |
| DRAWING NO. | MH-AR-01 |
| SHEET NO. | 9 OF 130 |



## PLAN

SCALE 1:1,000



DISTANCE – Km.

## PROFILE

VERTICAL SCALE 1:200
HORIZONTAL SCALE 1:1,000

### HORIZONTAL CURVE OF O&M ROAD PART 1

| NO. PI. | COORDINATE | | PI. – PI. | DEFLECTION ANGLE (△) | TL. | R | LC. | BC. STA. | PI. STA. | EC. STA. | BEARING |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | N | E | (m) | ( ° – ' – " ) | (m) | (m) | (m) | (km) | (km) | (km) | (N/S ° – ' – " E/W) |
| 7 | 2,169,580.540 | 456,279.094 | 153.994 | 18°–37'–54.99" | 50.000 | 304.799 | 99.117 | 0+630.359 | 0+680.359 | 0+729.477 | N54°–37'–31.37"W |
| 8 | 2,169,708.299 | 456,186.294 | 157.906 | 05°–08'–18.84" | 9.000 | 200.568 | 17.988 | 0+828.382 | 0+837.382 | 0+846.370 | N35°–59'–36.38"W |
| 9 | 2,169,763.715 | 456,137.897 | 73.574 | 06°–56'–51.31" | 12.000 | 197.682 | 23.971 | 0+898.945 | 0+910.945 | 0+922.915 | N41°–07'–55.23"W |
| 10 | 2,169,913.214 | 456,036.357 | 180.722 | 50°–16'–22.20" | 33.000 | 70.331 | 61.710 | 1+058.637 | 1+091.637 | 1+120.347 | N34°–11'–03.91"W |
| 11 | 2,169,920.015 | 455,966.274 | 70.412 | 29°–32'–13.19" | 10.000 | 37.933 | 19.555 | 1+147.760 | 1+157.760 | 1+167.315 | N84°–27'–26.11"W |
| 12 | 2,169,939.358 | 455,938.731 | 33.657 | 13°–22'–53.30" | 17.000 | 144.916 | 33.845 | 1+173.971 | 1+190.971 | 1+207.817 | N54°–55'–12.93"W |

NOTES :

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS UNLESS OTHERWISE SHOWN.
2. SYMBOL, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH–GN–03
3. THE CONTRACTOR HAS TO SUBMITED SURVEYING AND ROAD ALIGNMENT FOR APPROVAL.

0 5 10 15
SCALE 1:200 METERS

0 10 20 40 50 80
SCALE 1:1,000 METERS

REFERENCE DRAWINGS :

| | |
|---|---|
| 1. ACCESS ROAD PLAN AND PROFILE, STA. 0+000 TO STA. 0+600 | MH–AR–01 |
| 2. ACCESS ROAD PLAN AND PROFILE, STA. 1+200 TO STA. 1+489.351 | MH–AR–03 |
| 3. ACCESS ROAD TYPICAL SECTIONS, STOPPING AND PASSING PLACES | MH–AR–04 |
| 4. ACCESS ROAD TYPICAL SECTION AND DETAILS | MH–AR–05 |

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
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Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
ACCESS ROAD
PLAN AND PROFILE, STA. 0+600 TO STA. 1+200

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CHECKED สย.6226
PROJECT MANAGER 08|03|2559 DATE

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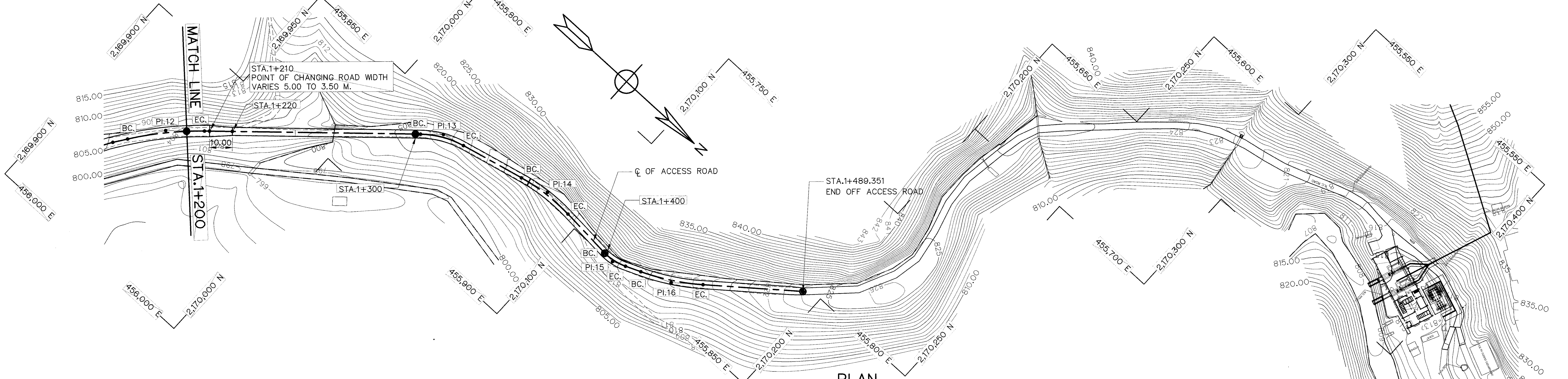
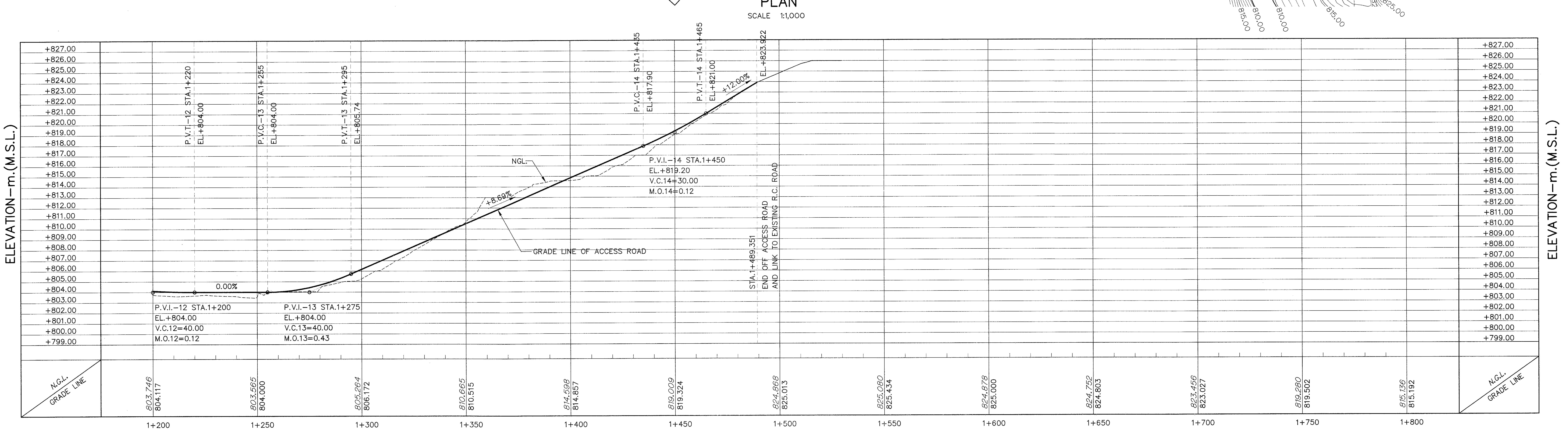
APPROVED P. Ha

DRAWING NO. MH–AR–02
SHEET NO. 10 OF 130



## PLAN

SCALE 1:1,000



DISTANCE – Km.

## PROFILE

VERTICAL SCALE 1:200
HORIZONTAL SCALE 1:1,000

## HORIZONTAL CURVE OF O&M ROAD PART 1

| NO. PI. | COORDINATE |  | PI. – PI. (m) | DEFLECTION ANGLE (△) ( ° – ' – " ) | TL. (m) | R (m) | LC. (m) | BC. STA. (km) | PI. STA. (km) | EC. STA. (km) | BEARING (N/S ° – ' – " E/W) |
|---|---|---|---|---|---|---|---|---|---|---|---|
|  | N | E |  |  |  |  |  |  |  |  |  |
| 12 | 2,169,939.358 | 455,938.731 | 33.657 | 13°–22'–53.30" | 17.000 | 144.916 | 33.845 | 1+173.971 | 1+190.971 | 1+207.817 | N54°–55'–12.93"W |
| 13 | 2,170,030.243 | 455,858.213 | 121.422 | 28°–02'–49.52" | 10.000 | 40.038 | 19.599 | 1+302.238 | 1+312.238 | 1+321.837 | N41°–32'–19.63"W |
| 14 | 2,170,080.717 | 455,846.103 | 51.906 | 17°–45'–55.66" | 13.000 | 83.180 | 25.791 | 1+350.744 | 1+363.744 | 1+376.535 | N13°–29'–30.11"W |
| 15 | 2,170,121.999 | 455,849.188 | 41.397 | 27°–04'–27.96" | 6.000 | 24.920 | 11.776 | 1+398.932 | 1+404.932 | 1+410.708 | N04°–16'–25.55"E |
| 16 | 2,170,147.010 | 455,838.674 | 27.131 | 15°–41'–23.12" | 14.000 | 101.611 | 27.825 | 1+417.839 | 1+431.839 | 1+445.664 | N22°–48'–02.41"W |
| END | 2,170,192.163 | 455,802.770 | 57.688 |  |  |  |  |  | 1+489.351 |  |  |

NOTES :

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS UNLESS OTHERWISE SHOWN.
2. SYMBOL, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH-GN-03
3. THE CONTRACTOR HAS TO SUBMITED SURVEYING AND ROAD ALIGNMENT FOR APPROVAL.

0 5 10 15
SCALE 1:200 METERS

0 10 20 40 50 80
SCALE 1:1,000 METERS

REFERENCE DRAWINGS :

| | |
|---|---|
| 1. ACCESS ROAD PLAN AND PROFILE, STA. 0+600 TO STA. 1+200 | MH-AR-02 |
| 2. ACCESS ROAD TYPICAL SECTIONS, STOPPING AND PASSING PLACES | MH-AR-04 |
| 3. ACCESS ROAD TYPICAL SECTION DETAIL | MH-HR-05 |

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
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## MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
ACCESS ROAD
PLAN AND PROFILE, STA. 1+200 TO STA. 1+489.351

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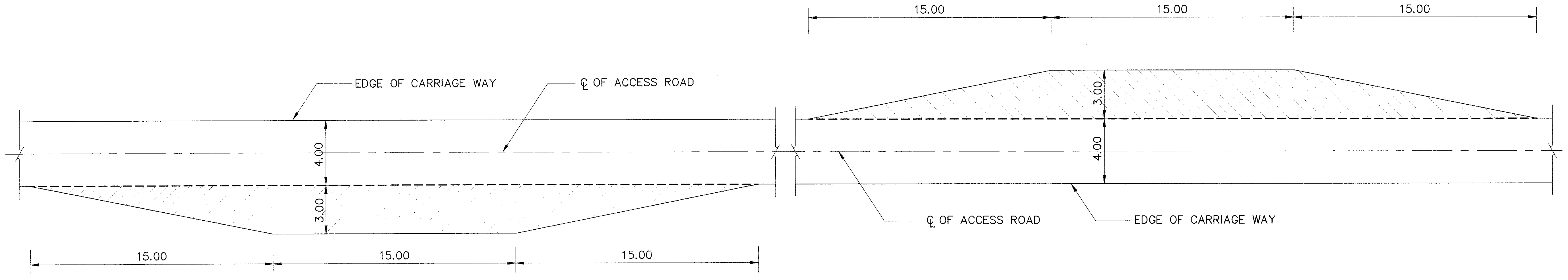
| DRAWN | SUBMITTED Chanit |
| CHECKED สย.6226 | RECOMMENDED |
|  | APPROVED P. Hanszell |
| PROJECT MANAGER — DATE 08/03/2559 | DRAWING NO. MH-AR-03 — SHEET NO. 11 OF 130 |



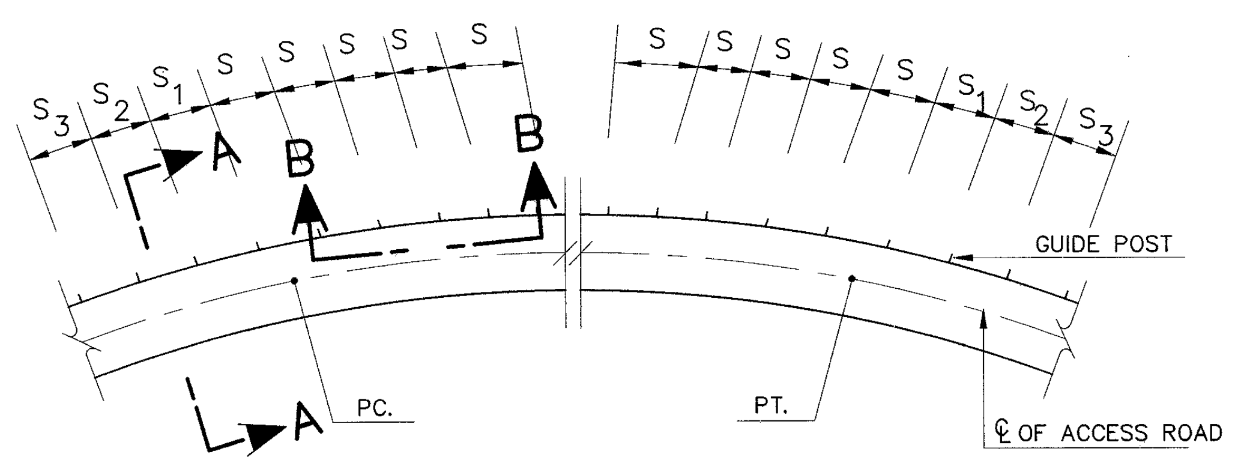
## PLAN SHOWING DETAIL OF STOPPING AND PASSING PLACES IN GENERAL

NOT TO SCALE

## NOTES :

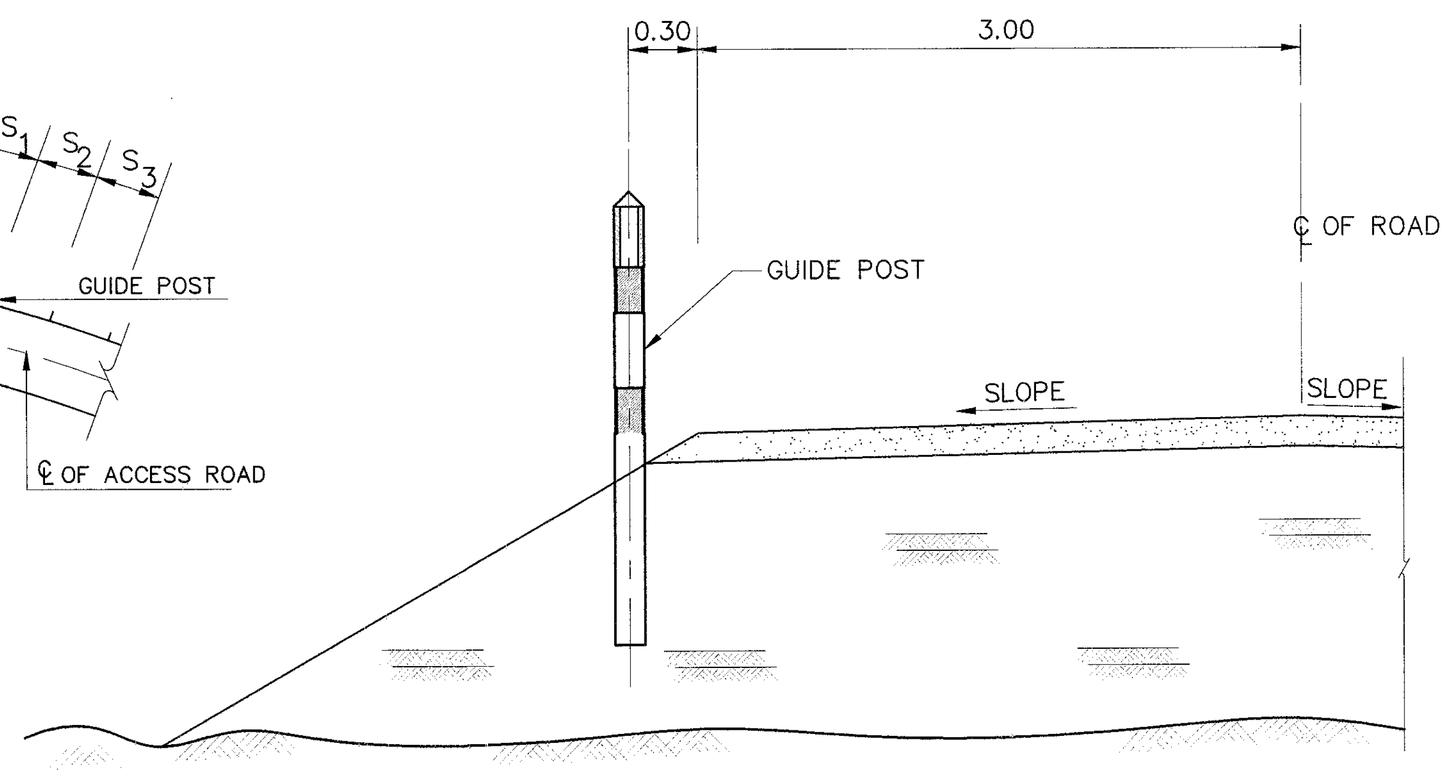
1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS, UNLESS OTHERWISE SHOWN.
2. CLEARING AND GRUBBING METHOD SHALL CONFORM TO THE REQUIREMENTS AS SPECIFILED IN THE TECHNICAL SPECIFICATIONS
3. SIDE DITCH SHALL BE PROVIDES FOR ROAD IN CUT SECTION AND IN FILL SECTION WHERE HEIGHT OF FILL FROM CARRIAGE WAY EDGE TO EXISTING GROUND LINE IS LESS THAN 0.50 METERS
4. ACCESS ROAD ALIGNMENT MAY BE RE–ADJUSTED TO SUIT THE FIELD CONDITIONS, BUT UNDER THE APPROVAL OF FIELD ENGINEERS
5. THE FIELD ENGINEER MAY ORDER SIDE SLOPE IN DIFFERENCE FROM TYPICALLY SHOWN IN THIS DRAWING
6. RC. PIPES ARE GROOVE AND TONGUE TYPE WHICH SPECIFIED IN THE TECHNICAL SPECIFICATIONS LOCATION AND SIZE OF RC. PIPE CULVERTS AS SHOWN IN PLAN AND PROFILE, MAY BE RE–ADJUSTED BY FIELD ENGINEER TO FIT WITH THE TERRAIN.
7. ALL RC. PIPE CULVERTS SHALL BE INSTALLED IN MANUFACTURED LENGTH WITHOUT FIELD CUTTINGS.
8. INVERT ELEVATIONS OF RC. PIPE CULVERTS WILL BE SET ON SITE, THE LENGTH SHOWN IN PLAN AND PROFILE SHEETS MAY BE VARIED TO SUIT FIELD CONDITIONS
9. EMBANKMENT SHALL BE CONSTRUCTED OF MATERIAL WITH AC. OR VALUE NOT LESS THAN 4%
10. THE MATERIAL FOR LATERITE CRUSHE STONE SHALL HAVE AC. OR VALUE NOT LESS THAN 15% AND ITS PHYSICAL PROPERTIES AS FOLLOWS
    - LIQUID LIMIT (LL) NOT GREATER THAN 34%
    - PLASTIC INDEX (P1) IN RANGE OF 5 TO 11
    - PERCENTAGE OF WEAR NOT GREATER THAN 50%

    AND OTHER PROPERTIES AS SPECIFIED IN THE TECHNICAL SPECIFICATIONS
11. LOCATION OF STOPPING AND PASSING PLACES SHALL BE INDICATED ON PLAN AND PROFILE DRAWING OR AS DIRECTED BY FIELD ENGINEER
12. THE PAVEMENT OF ACCESS ROAD IS DOUBLE SURFACE THEATMENT. PLAN AND PROFILE DRAWING OR AS DIRECTED BY THE CONTRACTOR AND APPROVAL BY FIELD ENGINEER



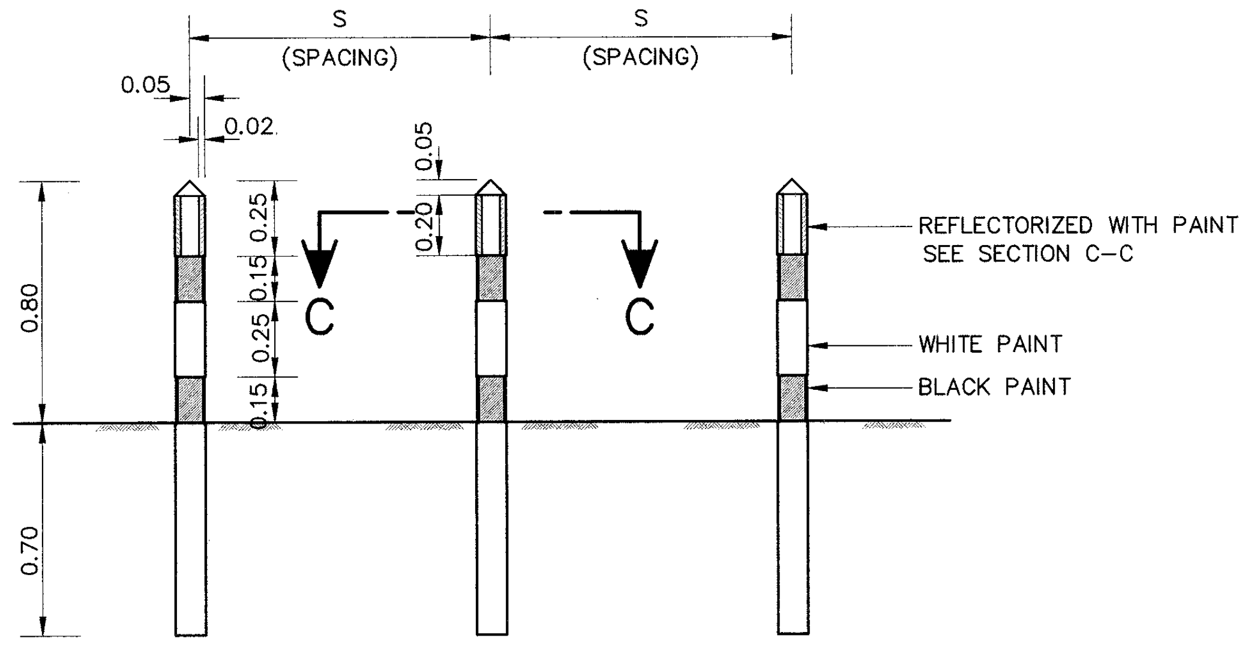
## PLAN

NOT TO SCALE



## SECTION A–A

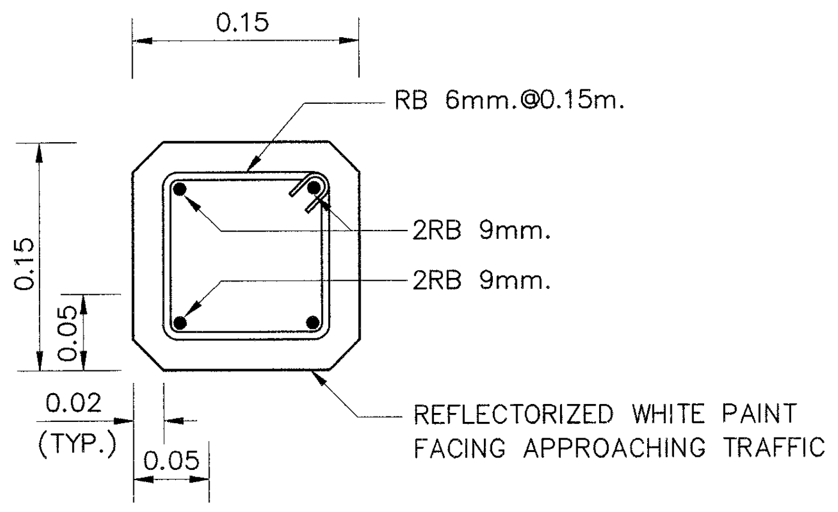
NOT TO SCALE



## SECTION B–B

NOT TO SCALE

## GUIDE POSTS



## SECTION C–C

NOT TO SCALE

TABLE

SPACING OF GUIDE POSTS

| RADIUS<br>M. | S<br>M. | S1<br>M. | S2<br>M. | S3<br>M. |
|---|---|---|---|---|
| 15 – 74 | 4 | 8 | 12 | 24 |
| 75 – 99 | 6 | 12 | 18 | 36 |
| LARGER THAN 100 | NO GUIDE POSTS INSTALLED | | | |

REFERENCE DRAWING :

1. ACCESS ROAD, PLAN AND PROFILE STA.0+000 TO STA.0+630.673 MH–AR–01 TO AR–02

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MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
ACCESS ROAD
TYPICAL SECTIONS, STOPPING AND PASSING PLACES

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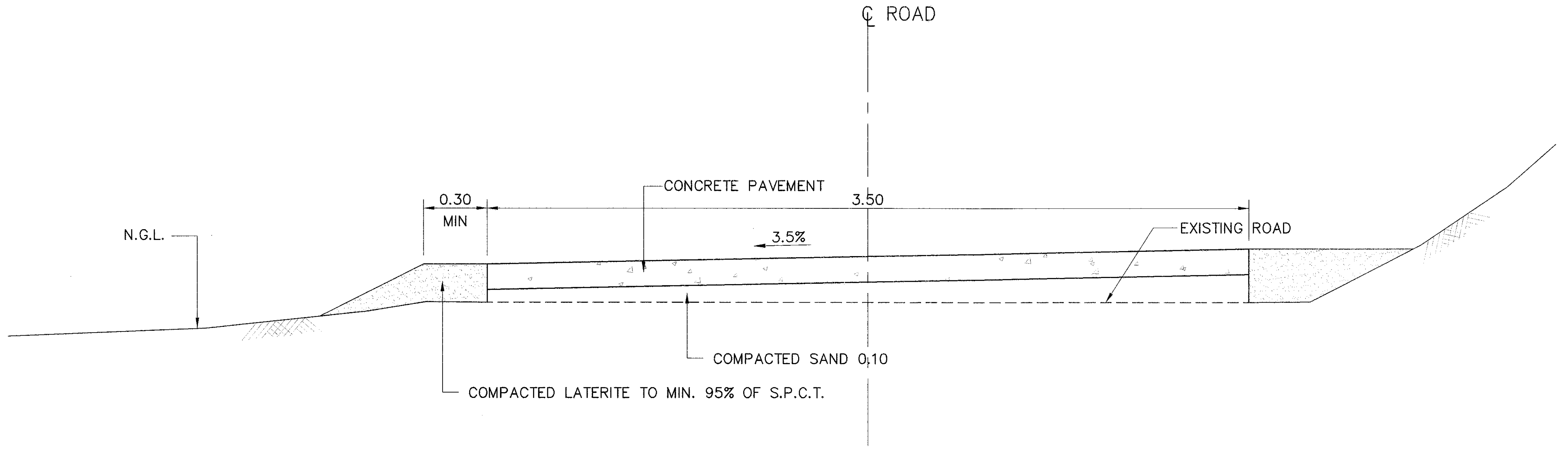
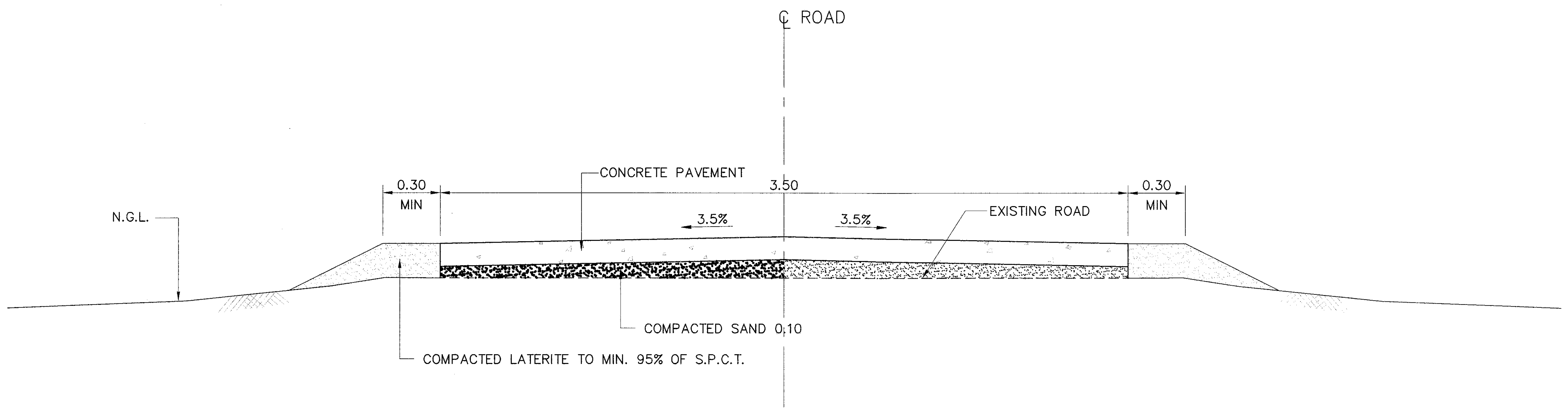
SUBMITTED
RECOMMENDED
APPROVED

DRAWING NO. MH–AR–04
SHEET NO. 12 OF 130



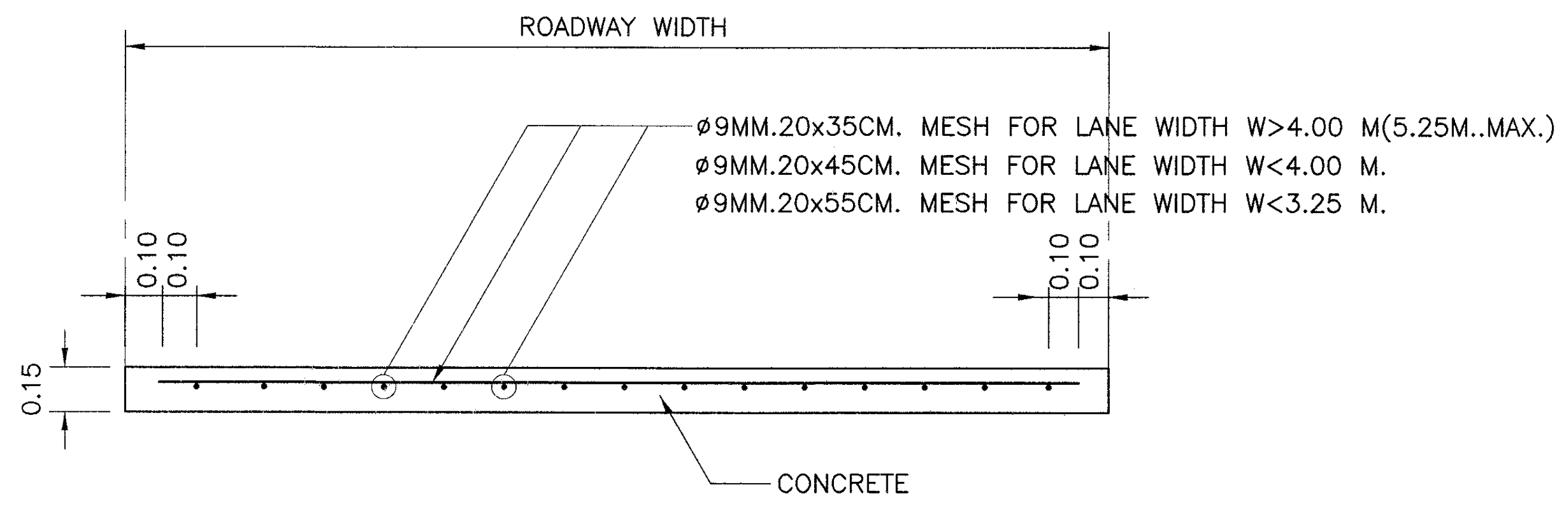
## TYPICAL SECTION FOR HILLSIDE

NOT TO SCALE



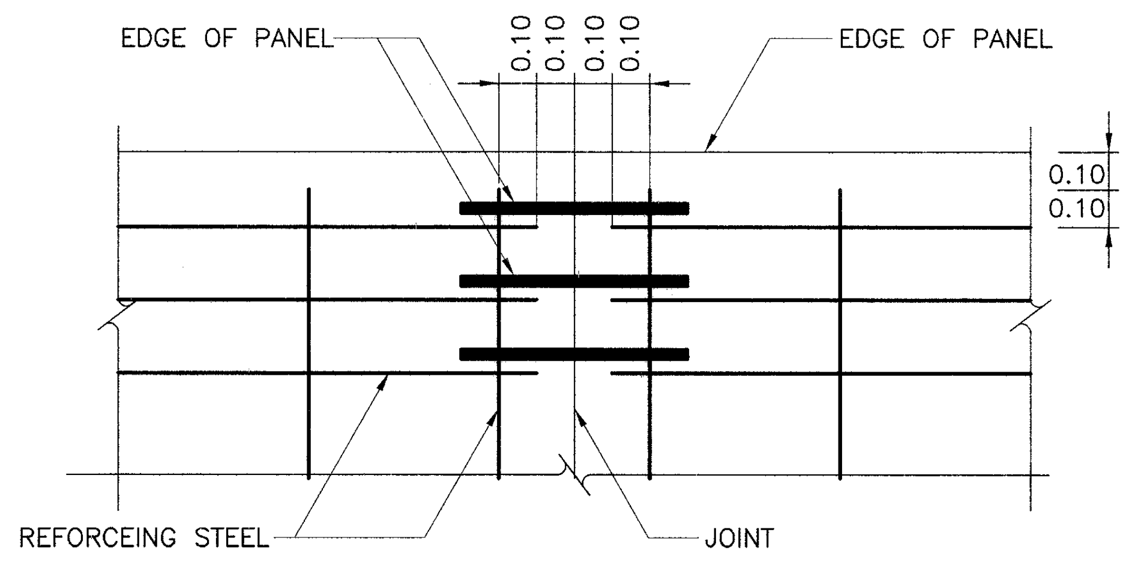
## TYPICAL SECTION FOR FLAT AREA

NOT TO SCALE


ROADWAY WIDTH
ø9MM.20x35CM. MESH FOR LANE WIDTH W>4.00 M(5.25M..MAX.)
ø9MM.20x45CM. MESH FOR LANE WIDTH W<4.00 M.
ø9MM.20x55CM. MESH FOR LANE WIDTH W<3.25 M.
0.10
0.10
0.10
0.10
0.15
CONCRETE

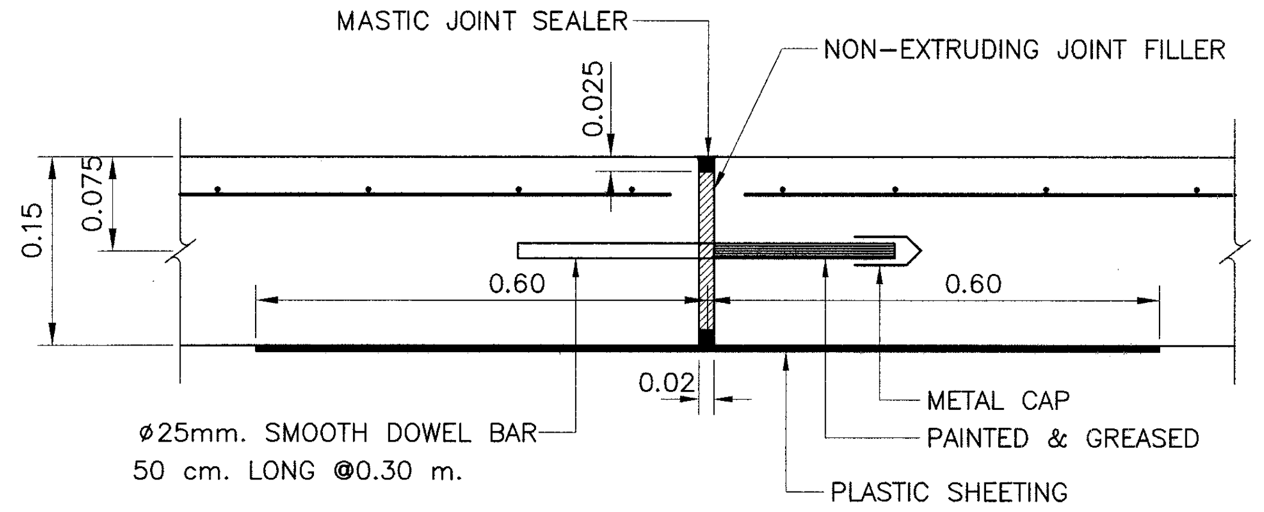
## REINFORCEMENT DETAIL OF CONCRETE PAVEMENT CROSS–SECTION

NOT TO SCALE



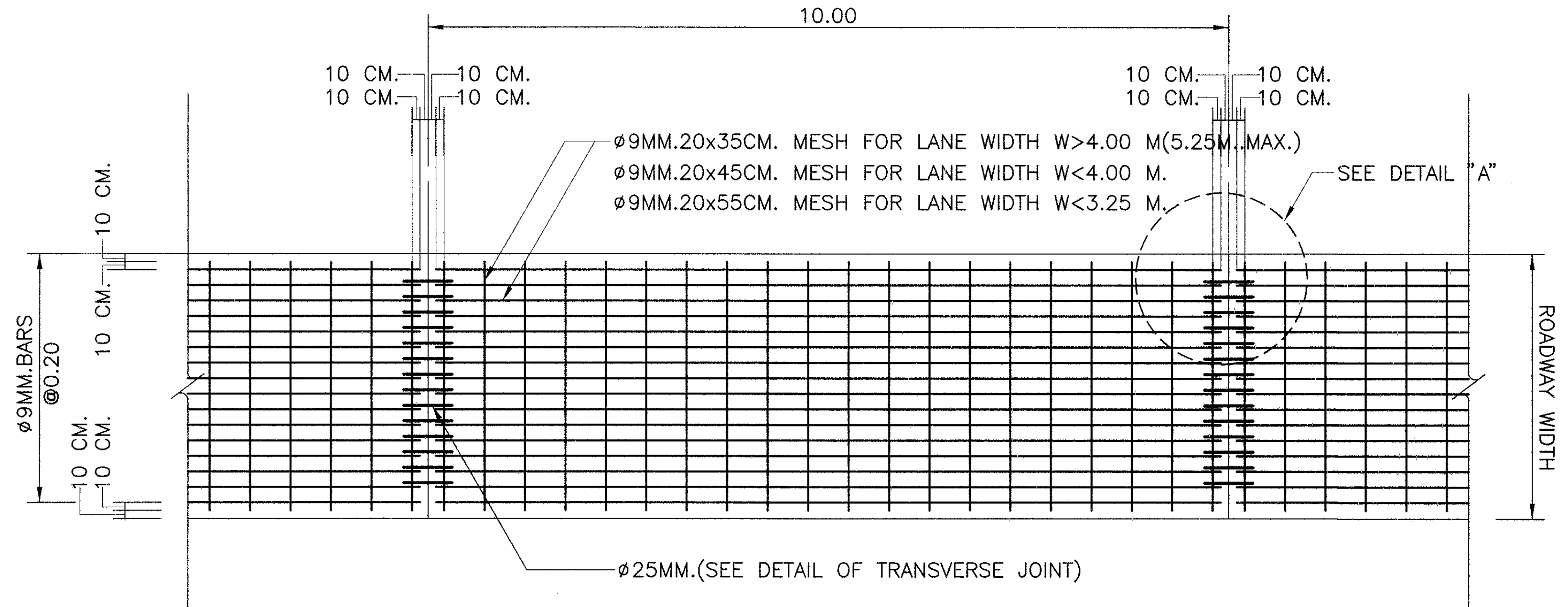
## DETAIL "A"

NOT TO SCALE



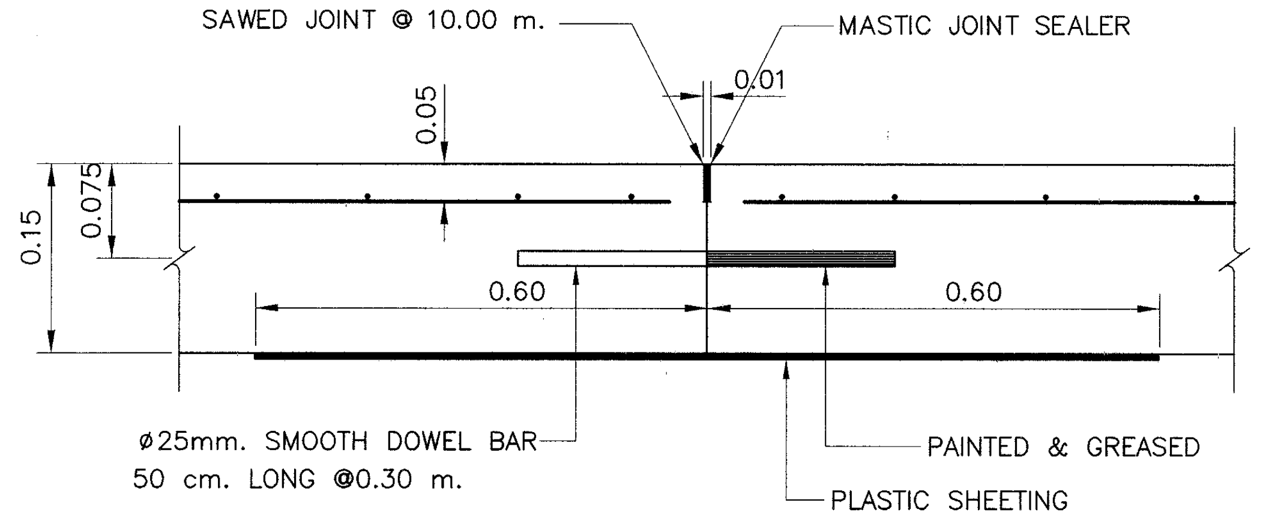
## DETAIL OF EXPANSION JOINT

NOT TO SCALE


10.00
10 CM.
10 CM.
10 CM.
10 CM.
10 CM.
10 CM.
10 CM.
10 CM.
ø9MM.20x35CM. MESH FOR LANE WIDTH W>4.00 M(5.25M..MAX.)
ø9MM.20x45CM. MESH FOR LANE WIDTH W<4.00 M.
ø9MM.20x55CM. MESH FOR LANE WIDTH W<3.25 M.
SEE DETAIL "A"
10 CM.
10 CM.
10 CM.
10 CM.
ø9MM.BARS @0.20
ROADWAY WIDTH
ø25MM.(SEE DETAIL OF TRANSVERSE JOINT)

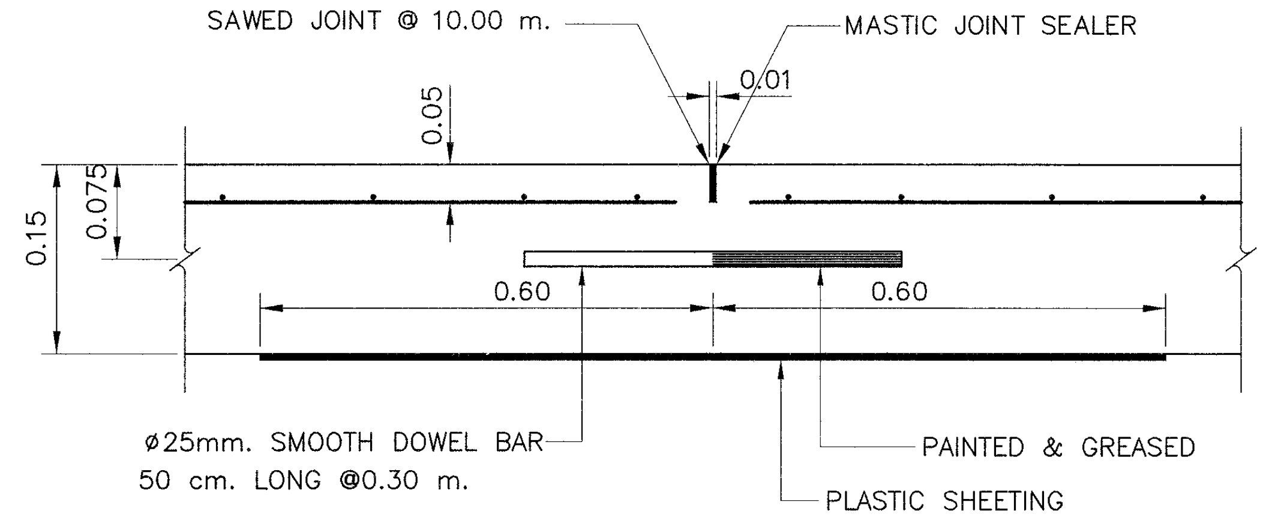
## PLAN OF REINFORCEMENT CONCRETE PAVEMENT

NOT TO SCALE



## DETAIL OF CONSTRUCTION JOINT

NOT TO SCALE



## DETAIL OF CONTRACTION JOINT

NOT TO SCALE

### NOTES 1 :

1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE INDICATED.
2. EXPANSION JOINT SHALL BE CONSTRUCTED AT THE INTERVAL OF 90 METERS.
3. MASTIC JOINT SEALER SHALL BE OF THE HOT POURED ELASTIC TYPE CONFORMING TO TIS.479.
4. JOINT FILLER SHALL CONFORM TO THE AASHTO M.213–74 OR ASTM.D1751–73 SPECIFICATION.
5. CONCRETE SHALL HAVE A MINIMUM ULTIMATE COMPRESSIVE STRENGTH OF 300 KSC. FOR 15x15x15 CM. CUBE AT 28 DAYS.
6. REINFORCING STEEL SHALL CONFORM TIS.20 GRADE SR 24 FOR ROUND BARS AND TIS.24 GRADE SD 30 FOR DEFORMED BAR.
7. PLASTIC SHEET USED IN CONSTRUCTION SHALL HAVE THE FOLLOWING REQUIREMENTS :
    - 7.1 THICKNESS OF 0.07 MM. WITH A TOLERANCE OF NOT MORE THAN 7 % SHALL BE REQUIRED.
    - 7.2 WIDTH SHALL NOT BE LESS THAN 1.20 M.
    - 7.3 IT SHALL BE COLOURLESS,TRANSPARENT AND WATERPROOF, FREE FROM POROUS AREA, TURN AREA AND BLISTERING AREA WHICH ARE VISIBLE BY NAKED EYE. EDGE SHALL BE STRAIGHT.
    - 7.4 CONTINUOUS LENGTH SHALL BE REQUIREMENT TO THE WIDTH OF TRAFFIC LANES. CONNECTION ALLOWED AT LONGITUDINAL JOINTS WITH NOT LESS. THAN 20 CM. OVERLAPPING SHALL BE REQUIRED.

### REFERENCE DRAWING :

1. ACCESS ROAD, PLAN AND PROFILE STA.0+000 TO STA.1+489.351 MH–AR–01 TO AR–03

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MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
ACCESS ROAD
TYPICAL SECTION AND DETAILS

P&C MANAGEMENT CO.,LTD.
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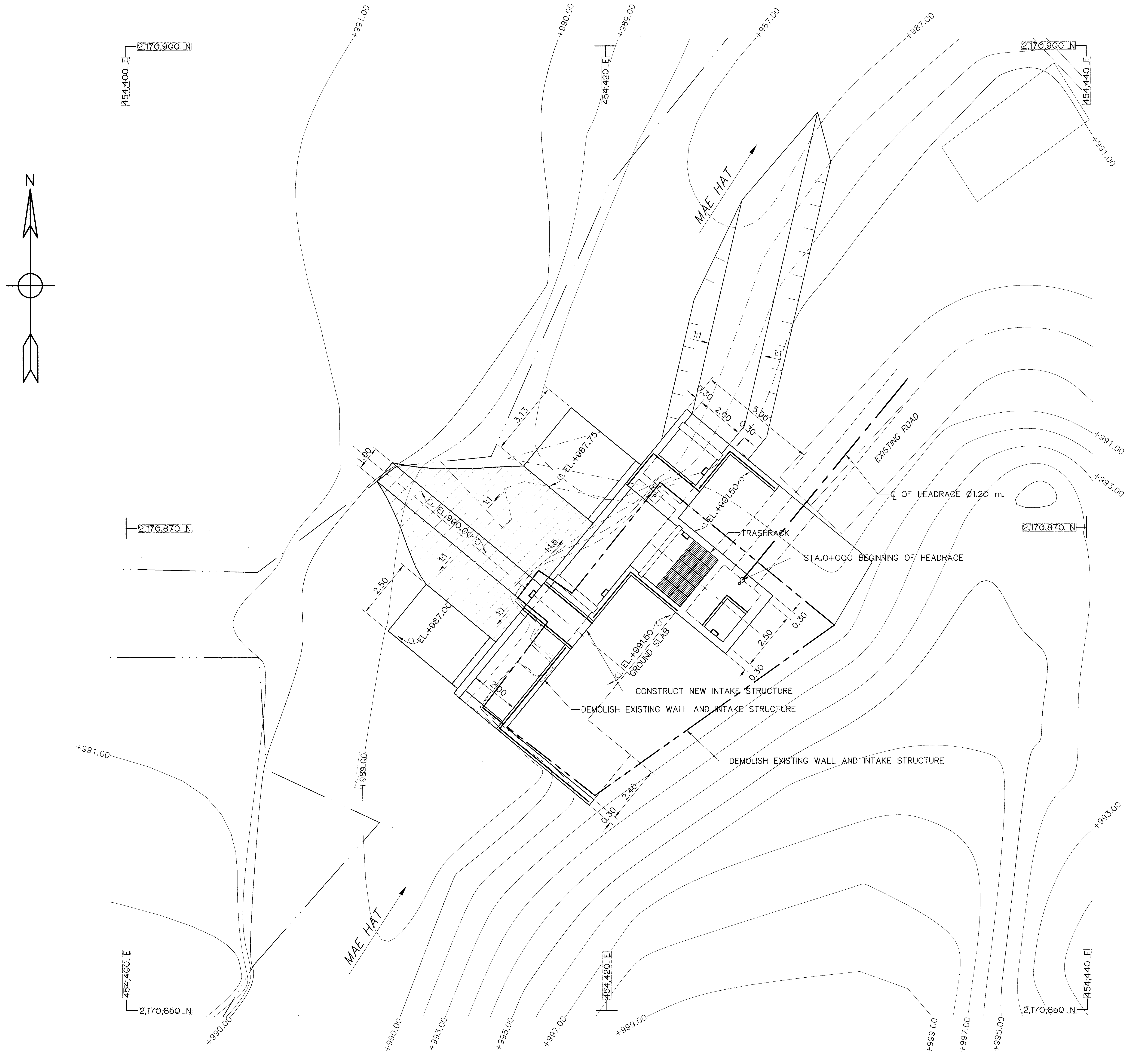
DRAWN
CHECKED สย.6226
PROJECT MANAGER
DATE 08/03/2559

Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY
REVIEWED
SUBMITTED Chart
RECOMMENDED
APPROVED P. Hansall

DRAWING NO. MH–AR–05
SHEET NO. 13 OF 130



## GENERAL LAY-OUT

SCALE 1:100

## LEGEND :

▨ WEIR REHABILITATION

## NOTES :

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS, UNLESS OTHERWISE SHOWN.
2. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH-GN-03
3. CONCRETE OF WEIR STRUCTURE TO BE MIN. 28 DAYS STANDARD CYLINDER COMPRESSIVE STRENGTH OF 210 KSC.
4. SPACING OF HANDRAIL CAN BE ADJUSTED IN THE FIELD TO FIT WITH THE STRUCTURE BY CONTRACTOR AND APPROVED BY ENGINEER.
5. WEIR SHALL BE PLACED ON BED ROCK FOUNDATION, OTHER MATERIALS SHALL BE REMOVED AND BACKFILLED WITH LEAN CONCRETE AND THE LEAN CONCRETE SHALL HAVE THE COMPRESSIVE STRENGTH OF 140 KSC. FOR STANDARD CYLINDER AT 28 DAYS.
6. ALLOWABLE BEARING CAPACITY NOT LESS THAN 10 $TON/M.^2$
7. VERTICLE GATES WITH OUTSIDE-SCREW RISING STEM SHALL BE MOTOR AND HAND OPERATED, SEE DETAIL TABLE

## REFERENCE DRAWINGS :

| | |
|---|---|
| 1. WEIR, PLAN AND SECTIONS | MH-WE-02 |

0 1 2 3 4 5 6 7 8

SCALE 1:100 METERS

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MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
WEIR
GENERAL LAYOUT PLAN

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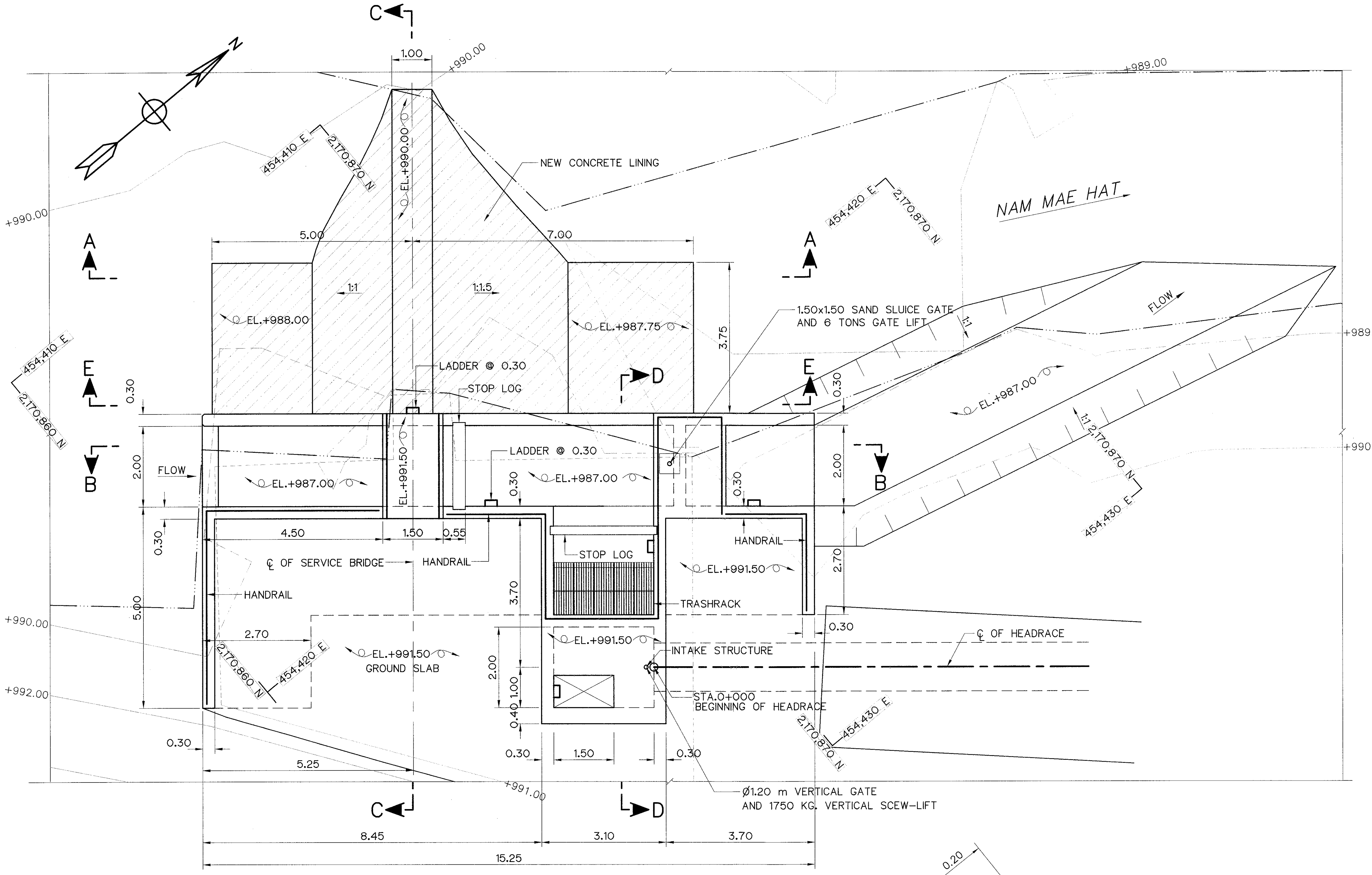
APPROVED P. Hansa

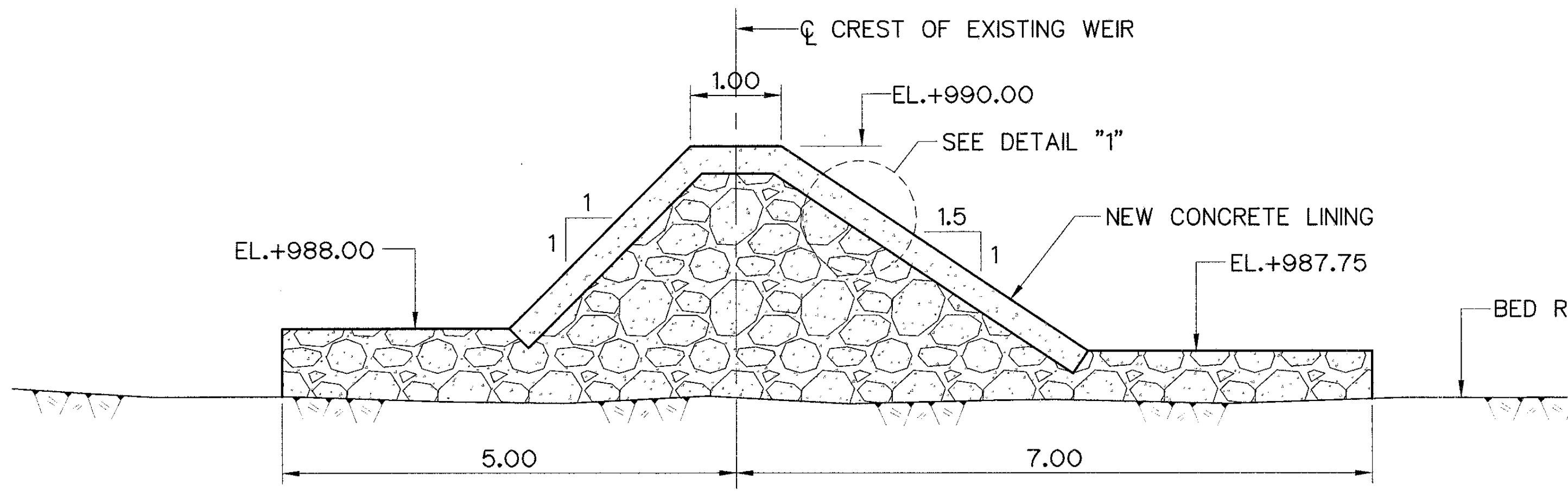
DRAWING NO. MH-WE-01

SHEET NO. 14 OF 130



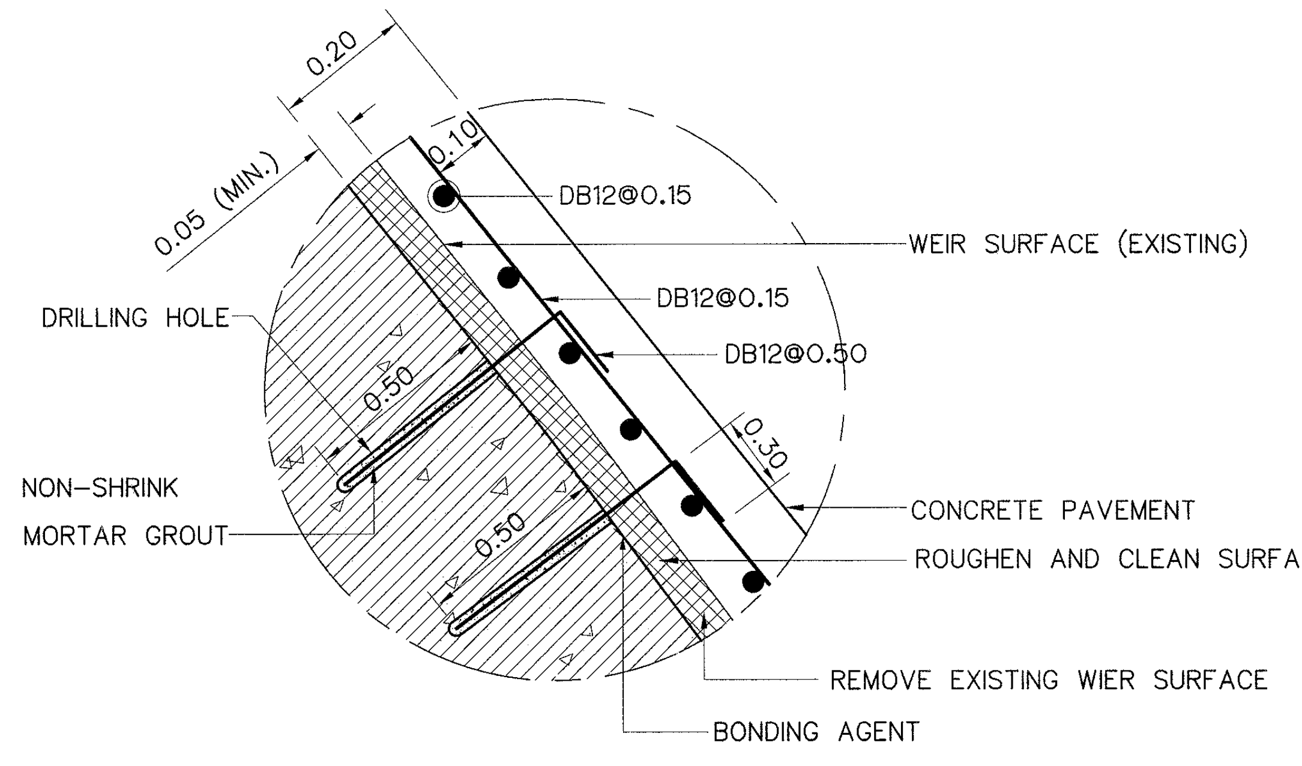
PLAN

SCALE 1:75



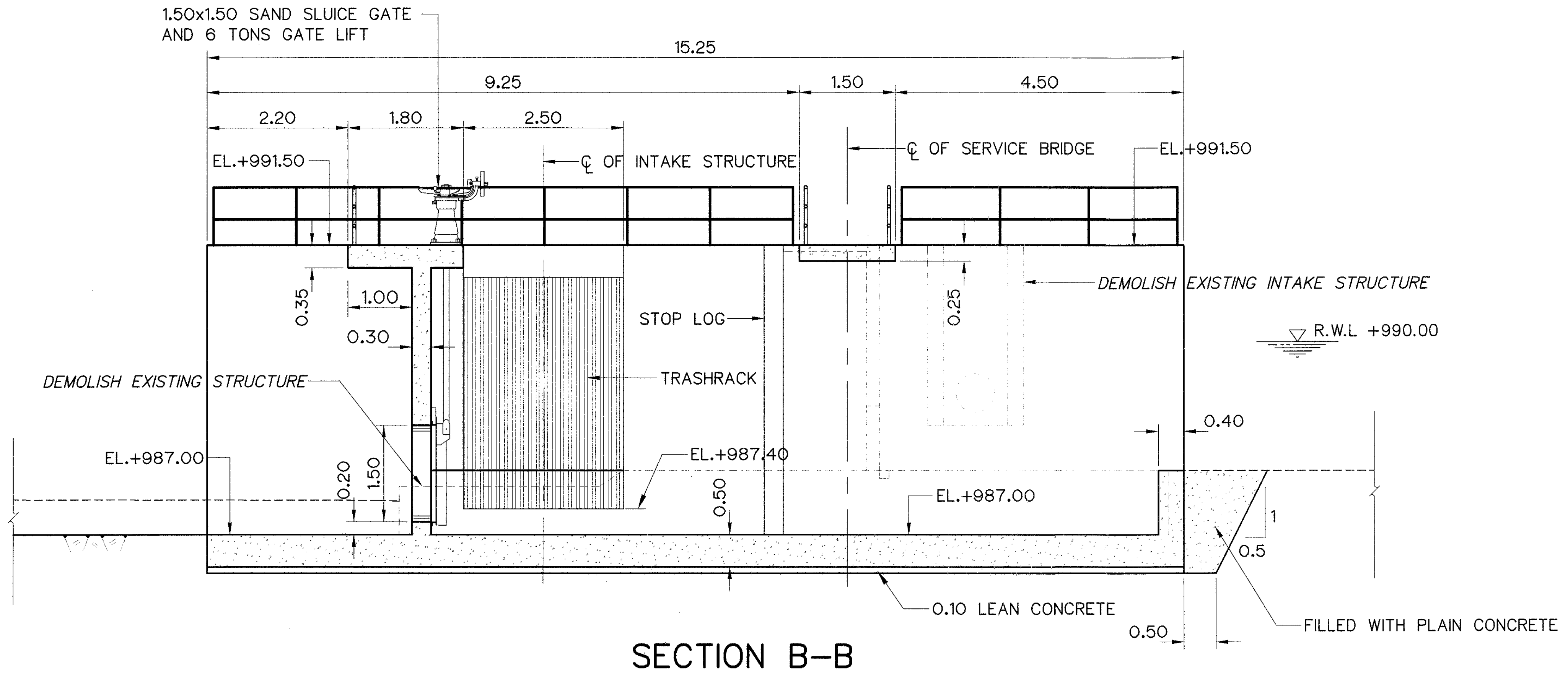
SECTION A–A

SCALE 1:75



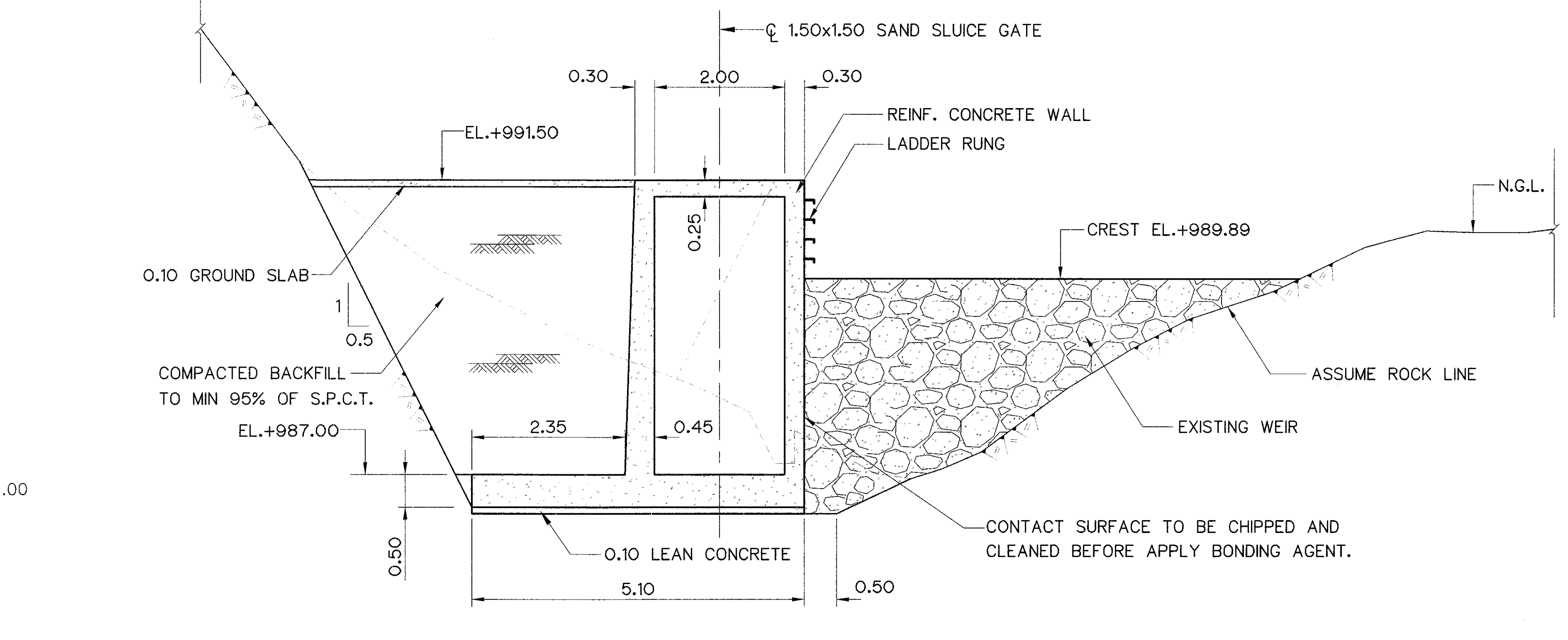
DETAIL "1"

SCALE 1:10



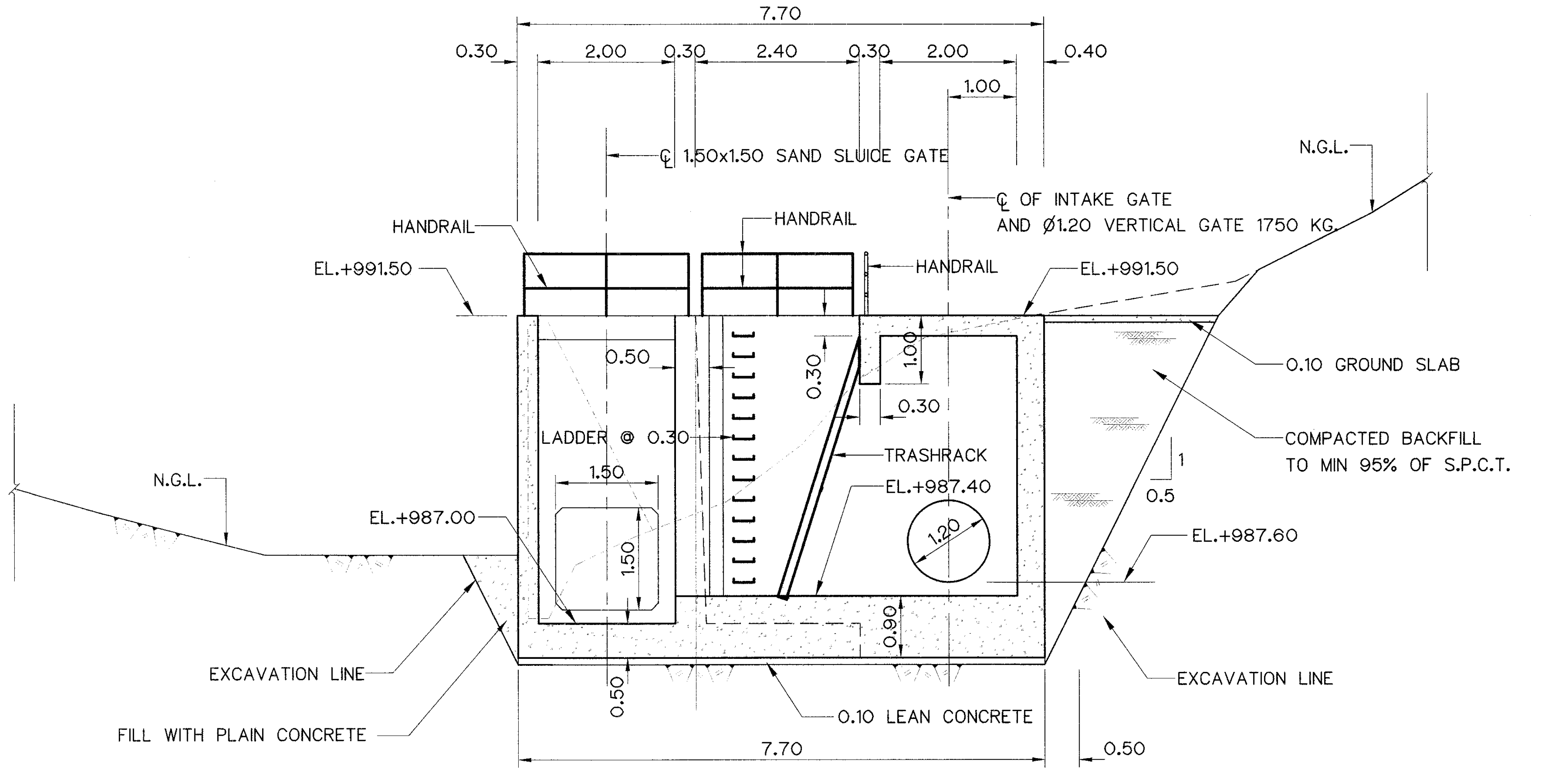
SECTION B–B

SCALE 1:75



SECTION C–C

SCALE 1:75



SECTION D–D

SCALE 1:75

## STEP OF LINING :

1. CONCRETE REMOVAL TECHNIQUES USED SHOULD BE EFFECTIVE, FAST, SAFE, ECONOMICAL AND ENVIRONMENTALLY FRIENDLY. THE EXISTING CONCRETE SURFACE MUST BE DRY, CLEAN, ROUGH AND FREE OF DUST SO THAT THE POURED CONCRETE WILL STICK TO THE OLD CONCRETE
2. THE REPAIRED SURFACE SHOULD BE CLEANED THOROUGHLY BY WET SAND BLASTING OR DRY SAND BLASTING OR SHOT BLASTING OR OTHER EQUIVALENT METHOD. FINALLY, IT SHOULD BE CLEANED BY WIND OR WATER USING PRESSURE.
3. A HOLE IS DRILLED TO INSTALL DOWEL BAR FIXED BY NON-SHRINK CEMENT GROUT AND INSTALL REINFORCED CONCRETE SO THAT THE POURED CONCRETE CAN REMAIN AND STICK TO THE OLD CONCRETE.
4. BEFORE POURING CONCRETE, APPLY MORTAR TO A THIN CONCRETE SURFACE NOT EXCEEDING 3 MM AND USE EPOXY RESIN BONDING AGENT, ASTM C881, TYPE II OR TYPE V.

## REFERENCE DRAWINGS :

| | | |
|---|---|---|
| 1. | WEIR REINFORCEMENT DETAILS (1/2) | MH-WE-03 |
| 2. | WEIR REINFORCEMENT DETAILS (2/2) | MH-WE-04 |
| 3. | WEIR MISCELLANEOUS DETAILS | MH-WE-05 |
| 4. | WEIR 1.50x1.50 VERTICAL GATE | MH-WE-06 TO WE-07 |
| 5. | WEIR DIA. 1.20 VERTICAL GATE | MH-WE-08 |

## NOTES :

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS, UNLESS OTHERWISE SHOWN.
2. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH-GN-03
3. CONCRETE OF WEIR STRUCTURE TO BE MIN. 28 DAYS STANDARD CYLINDER COMPRESSIVE STRENGTH OF 210 KSC.
4. SPACING OF HANDRAIL CAN BE ADJUSTED IN THE FIELD TO FIT WITH THE STRUCTURE BY CONTRACTOR AND APPROVED BY ENGINEER.
5. WEIR SHALL BE PLACED ON BED ROCK FOUNDATION, OTHER MATERIALS SHALL BE REMOVED AND BACKFILLED WITH LEAN CONCRETE AND THE LEAN CONCRETE SHALL HAVE THE COMPRESSIVE STRENGTH OF 140 KSC. FOR STANDARD CYLINDER AT 28 DAYS.
6. ALLOWABLE BEARING CAPACITY NOT LESS THAN 10 TON/sq.m.

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MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
WEIR
PLAN AND SECTIONS

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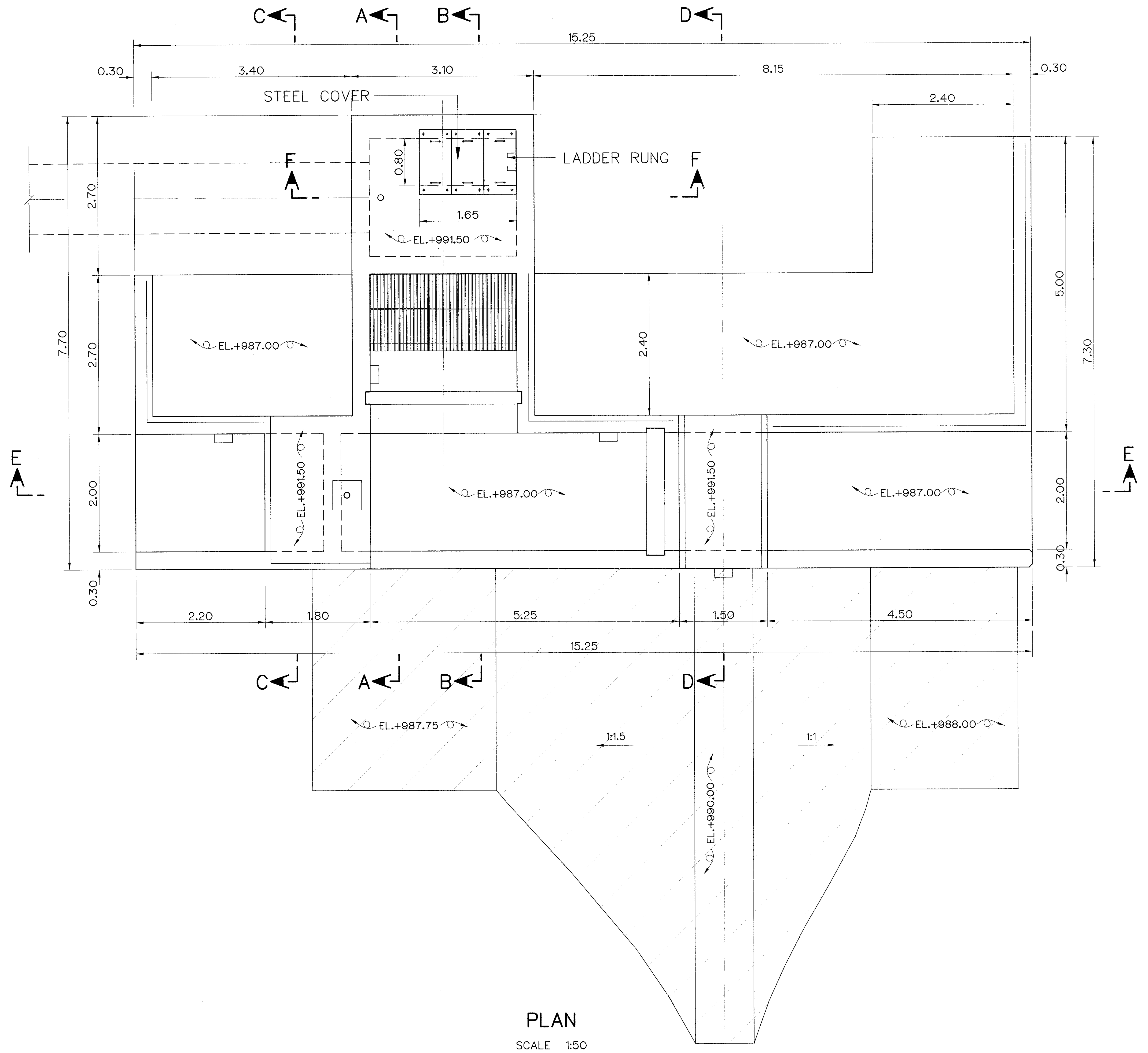
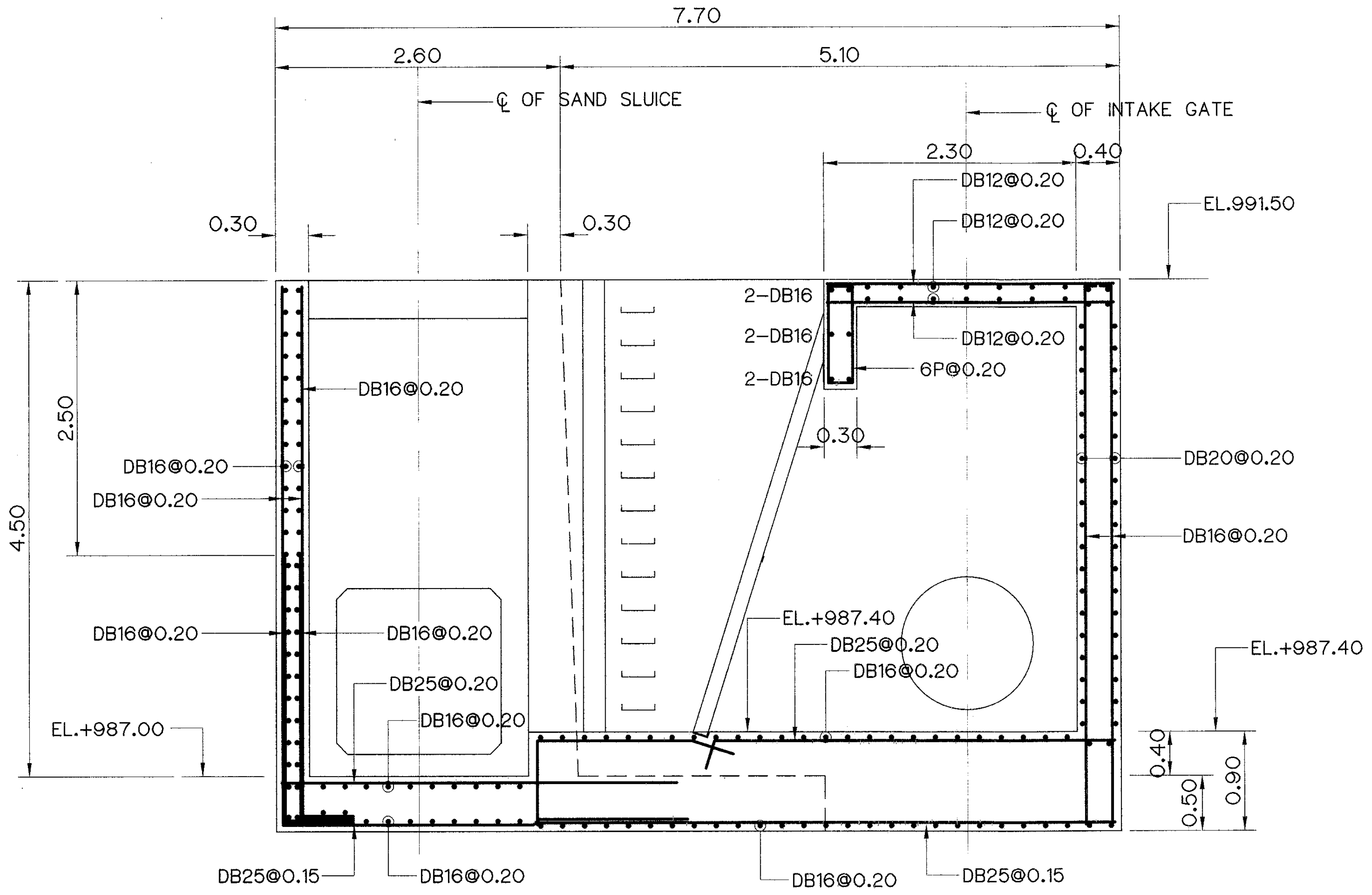


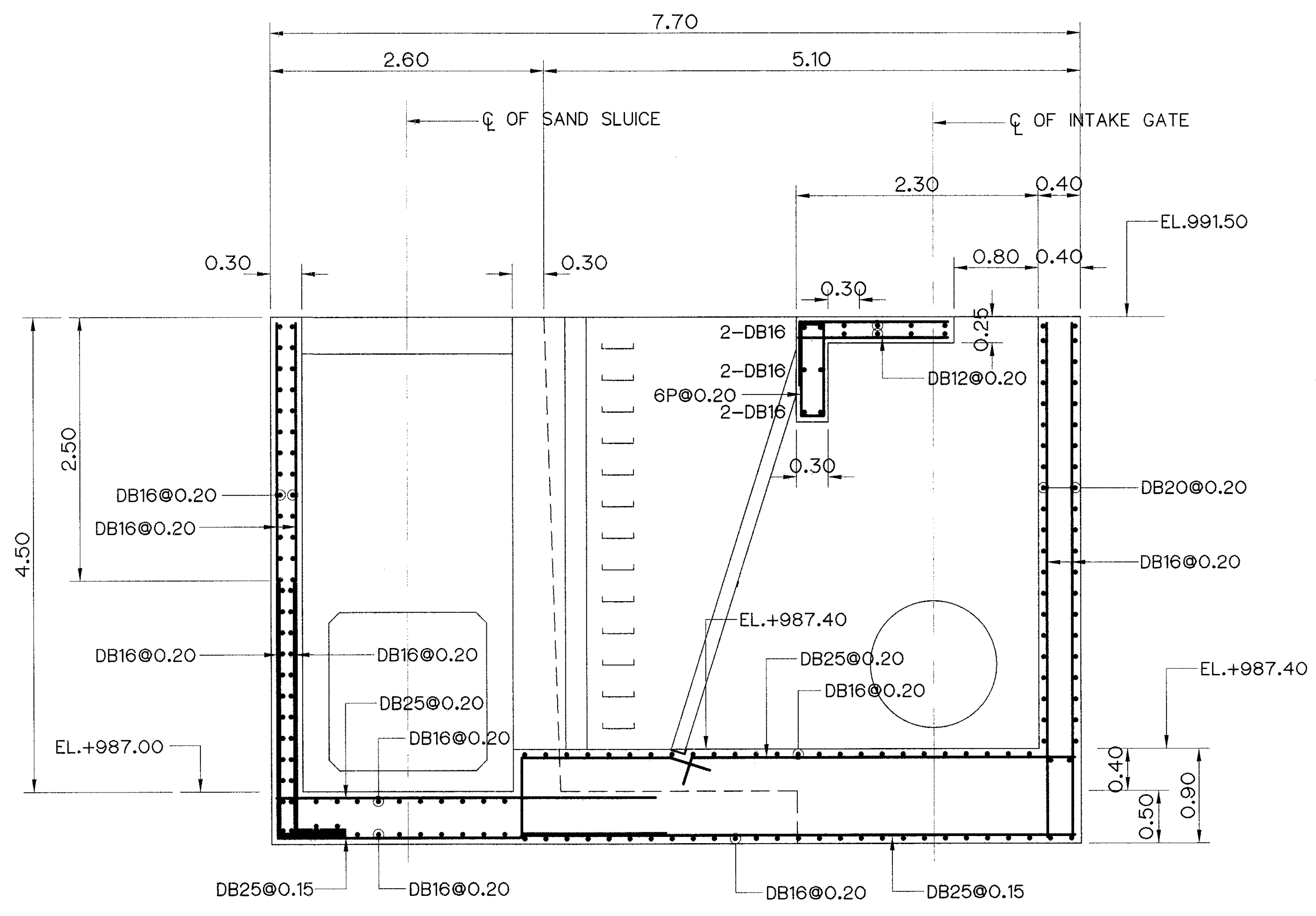
## PLAN

SCALE 1:50



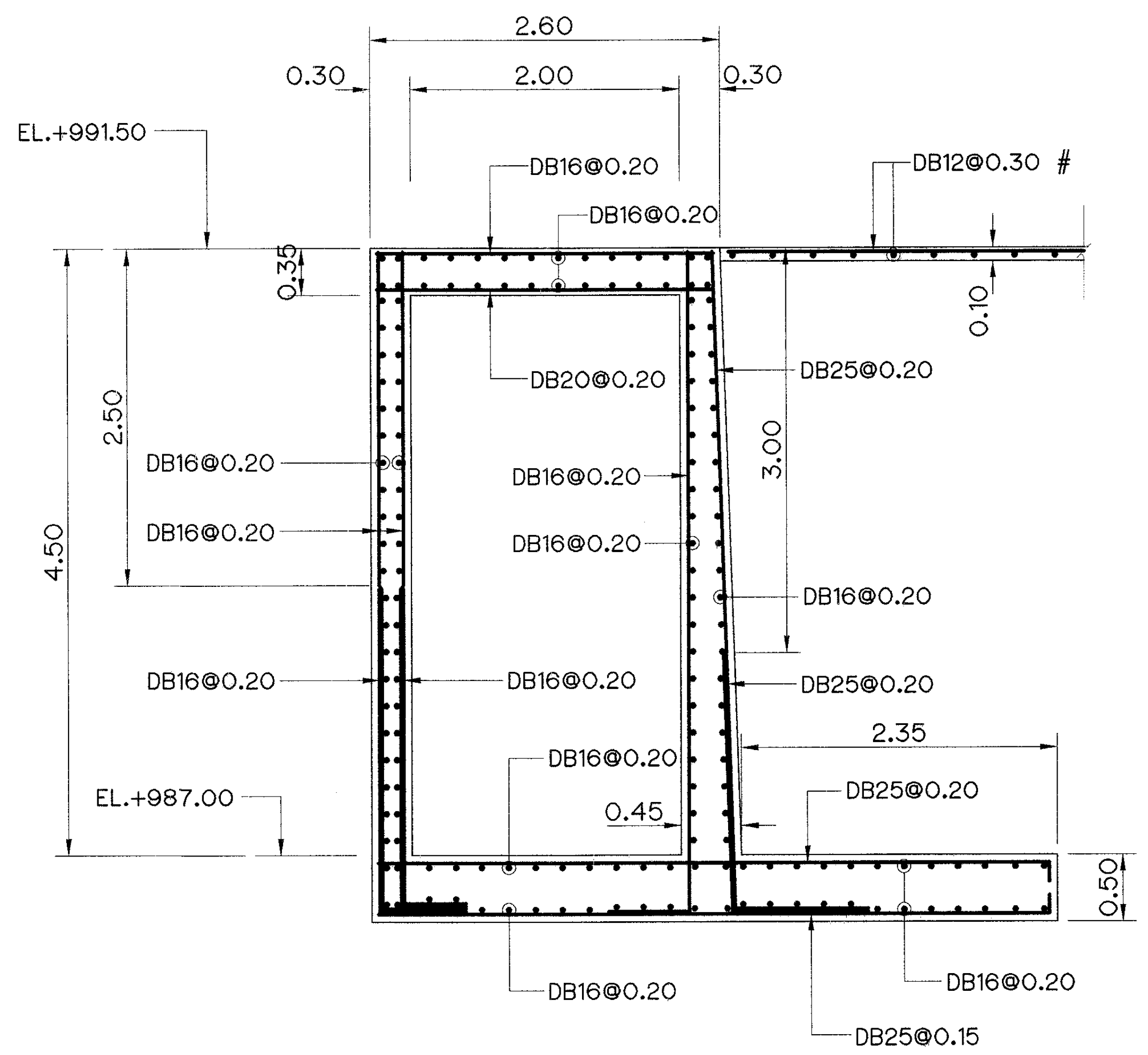
## SECTION A–A

SCALE 1:50



## SECTION B–B

SCALE 1:50



## SECTION C–C

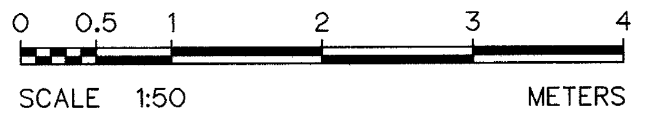
SCALE 1:50

## NOTES :

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS, UNLESS OTHERWISE SHOWN.
2. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH-GN-03
3. CONCRETE DESIGN BASED ON THE COMPRESSIVE STRENGTH OF 210 KSC, STANDARD CYLINDER Ø0.15x0.30 m. TEST AT AGE 28 DAYS. UNLESS OTHERWISE INDICATED IN SPECIFIC DRAWINGS.
4. ULTIMATE TENSILE STRESSES OF REINFORCING STEEL, CONFORM TO THE REQUIREMENT OF THAI INDUSTRIAL STANDARD DESIGNATION SR24 FOR STRUCTURAL GRADE PLAIN ROUND BAR AND SD30 FOR INTERMEDIATE GRADE DEFORMED BAR.

## REFERENCE DRAWINGS :

| | |
|---|---|
| 1. WEIR GENERAL LAY-OUT | MH-WE-01 |
| 2. WEIR REINFORCEMENT DETAILS (SHEET 2/2) | MH-WE-04 |
| 3. STEEL COVER | MH-ST-07 |



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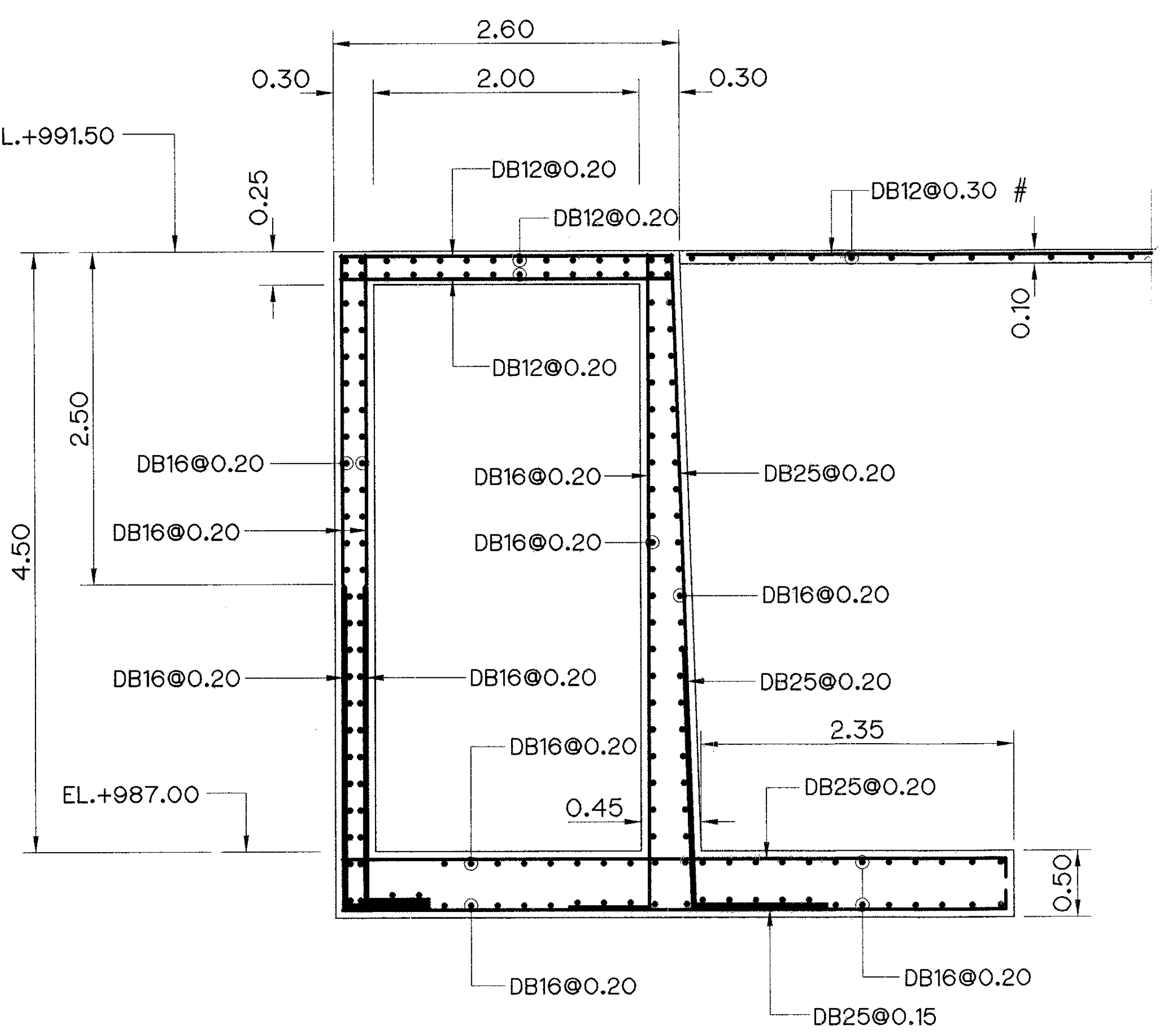
MAE HAT HYDROPOWER PROJECT

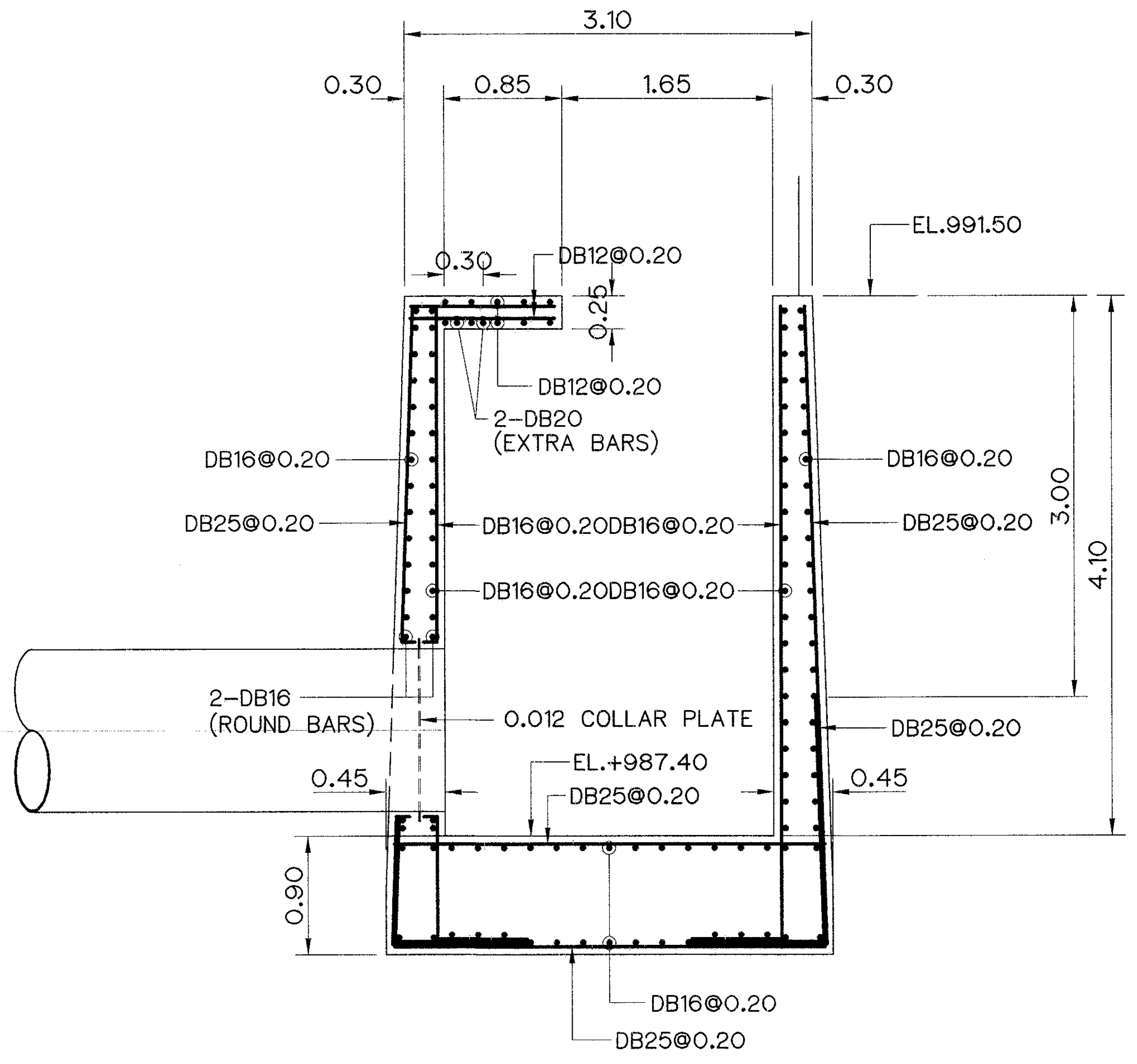
CIVIL WORKS AND TRANSMISSION LINE
WEIR
REINFORCEMENT DETAILS (SHEET 1/2)

| | |
|---|---|
| P&C MANAGEMENT CO.,LTD. | Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY |
| DESIGNED . ภย.64624 สย.6226 | REVIEWED |
| DRAWN | SUBMITTED Chant |
| CHECKED สย.6226 | RECOMMENDED |
| PROJECT MANAGER — DATE 08/03/2559 | APPROVED P. Hansell |
| | DRAWING NO. MH-WE-03 |
| | SHEET NO. 16 OF 130 |



## SECTION D–D

SCALE 1:50



## SECTION F–F

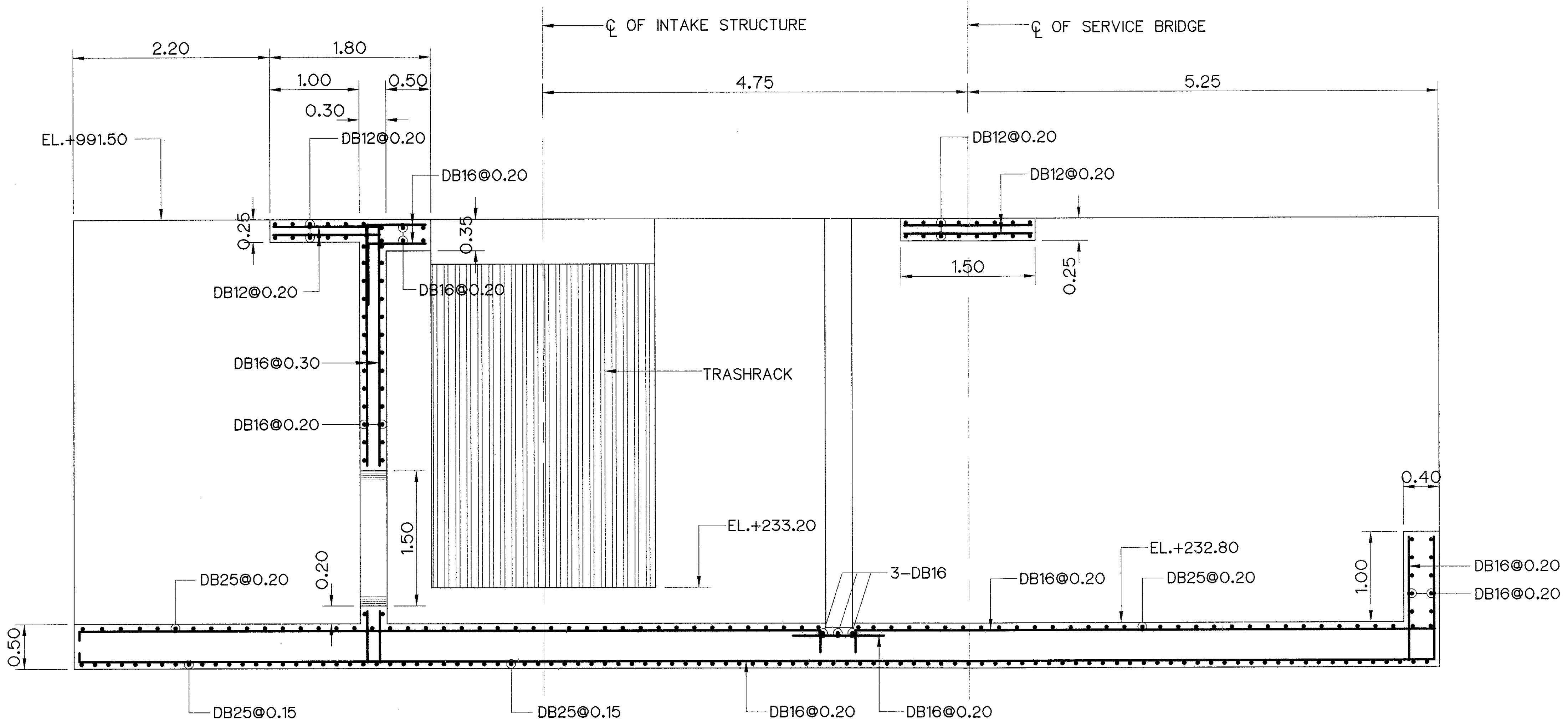
SCALE 1:50

**NOTES :**

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS, UNLESS OTHERWISE SHOWN.
2. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH–GN–03
3. CONCRETE DESIGN BASED ON THE COMPRESSIVE STRENGTH OF 210 KSC, STANDARD CYLINDER Ø0.15x0.30 m. TEST AT AGE 28 DAYS. UNLESS OTHERWISE INDICATED IN SPECIFIC DRAWINGS.
4. ULTIMATE TENSILE STRESSES OF REINFORCING STEEL, CONFORM TO THE REQUIREMENT OF THAI INDUSTRIAL STANDARD DESIGNATION SR24 FOR STRUCTURAL GRADE PLAIN ROUND BAR AND SD30 FOR INTERMEDIATE GRADE DEFORMED BAR.

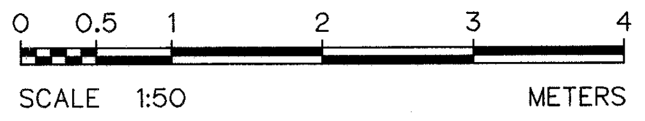
**REFERENCE DRAWINGS :**

| | |
|---|---|
| 1. WEIR GENERAL LAY–OUT | MH–WE–01 |
| 2. WEIR REINFORCEMENT DETAILS (SHEET 1/2) | MH–WE–03 |



## SECTION E–E

SCALE 1:50



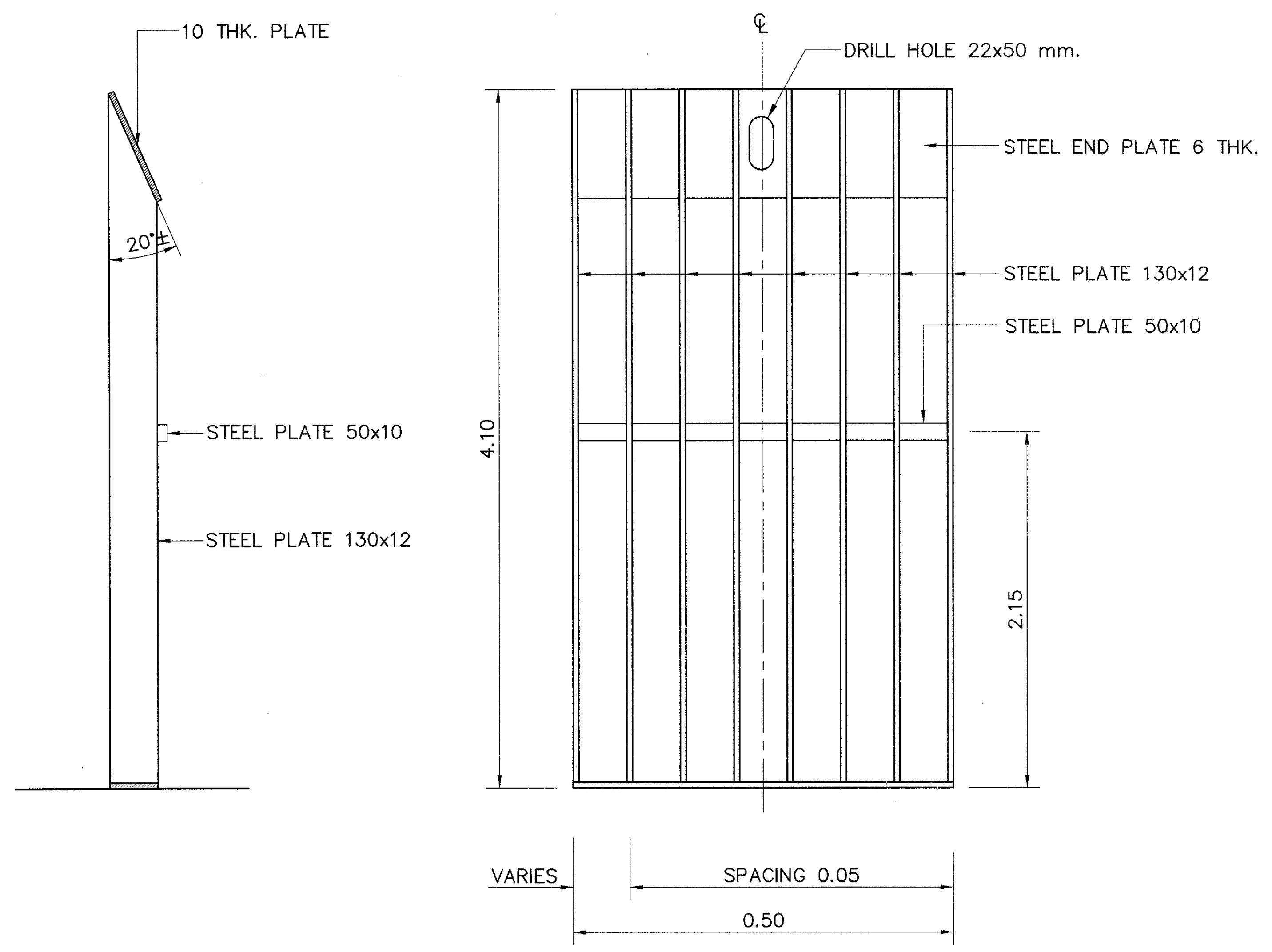
| 3 | | | | |
|---|---|---|---|---|
| 2 | | | | |
| 1 | | | | |
| NO. | DATE | REVISIONS | CHECKED | APPROVED |
| | CONSULTANTS | | DEDE | |

KINGDOM OF THAILAND
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

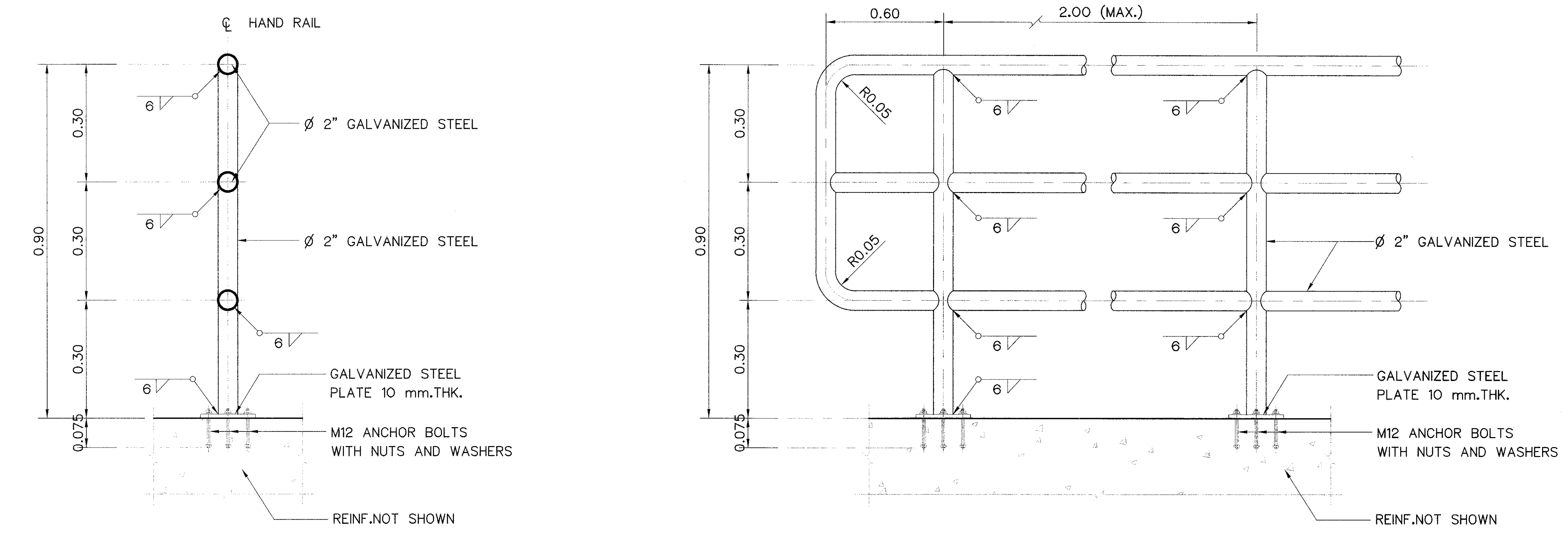
CIVIL WORKS AND TRANSMISSION LINE
WEIR
REINFORCEMENT DETAILS (SHEET 2/2)

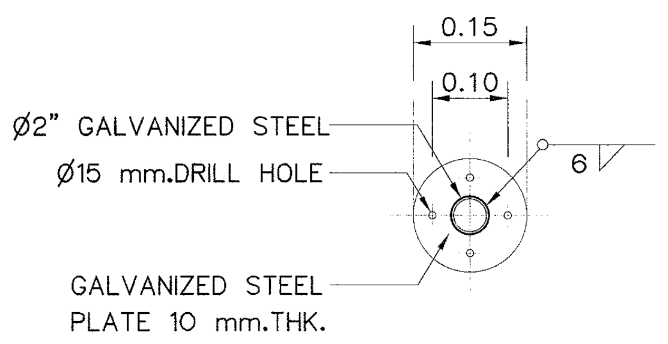
| | |
|---|---|
| P&C MANAGEMENT CO.,LTD. | Department of Alternative<br>Energy Development and Efficiency<br>MINISTRY OF ENERGY |
| | REVIEWED |
| DESIGNED ภย.64624 สย.6226 | SUBMITTED Chant |
| DRAWN | RECOMMENDED |
| CHECKED สย.6226 | APPROVED P. Hansell |
| PROJECT MANAGER — DATE 08/03/2559 | DRAWING NO. MH–WE–04 |
| | SHEET NO. 17 OF 130 |



## TRASHRACK DETAILS

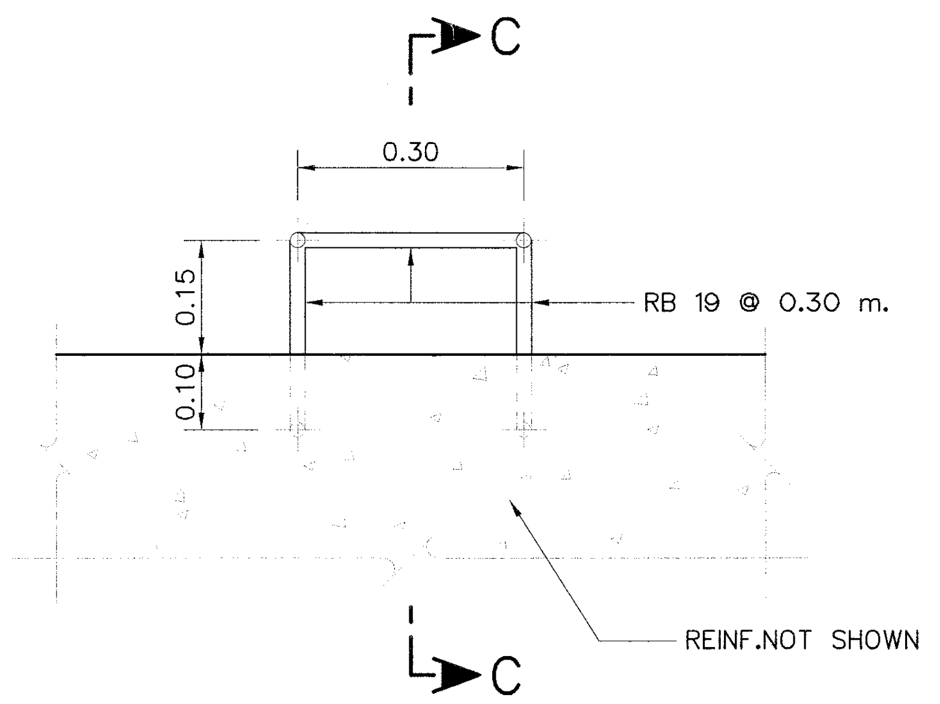
NOT TO SCALE





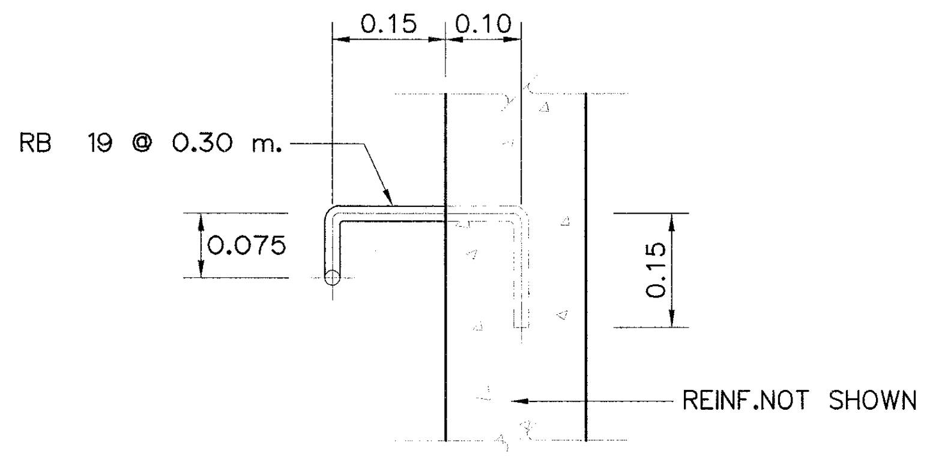
## DETAIL OF HANDRAIL

SCALE 1:20



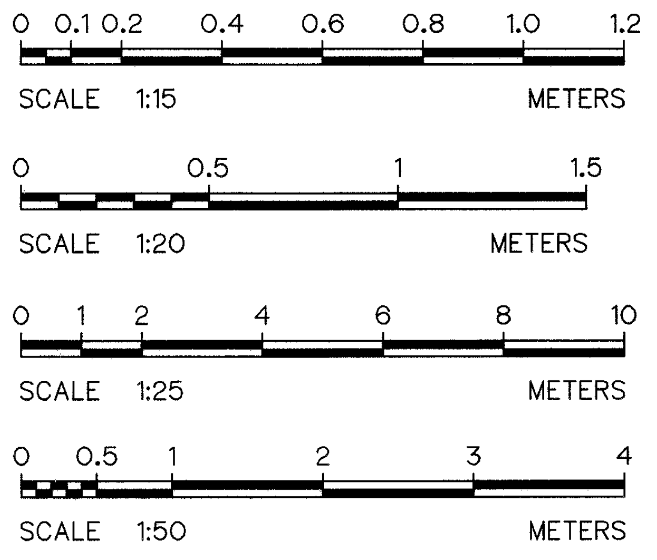
## DETAIL OF LADDER RUNG

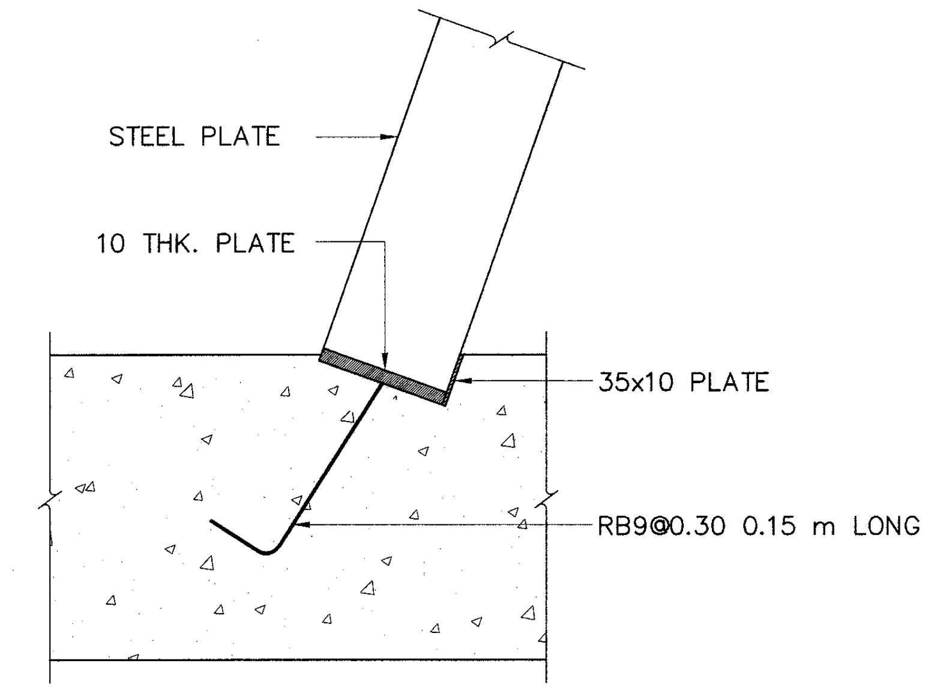
SCALE 1:20



## SECTION C – C

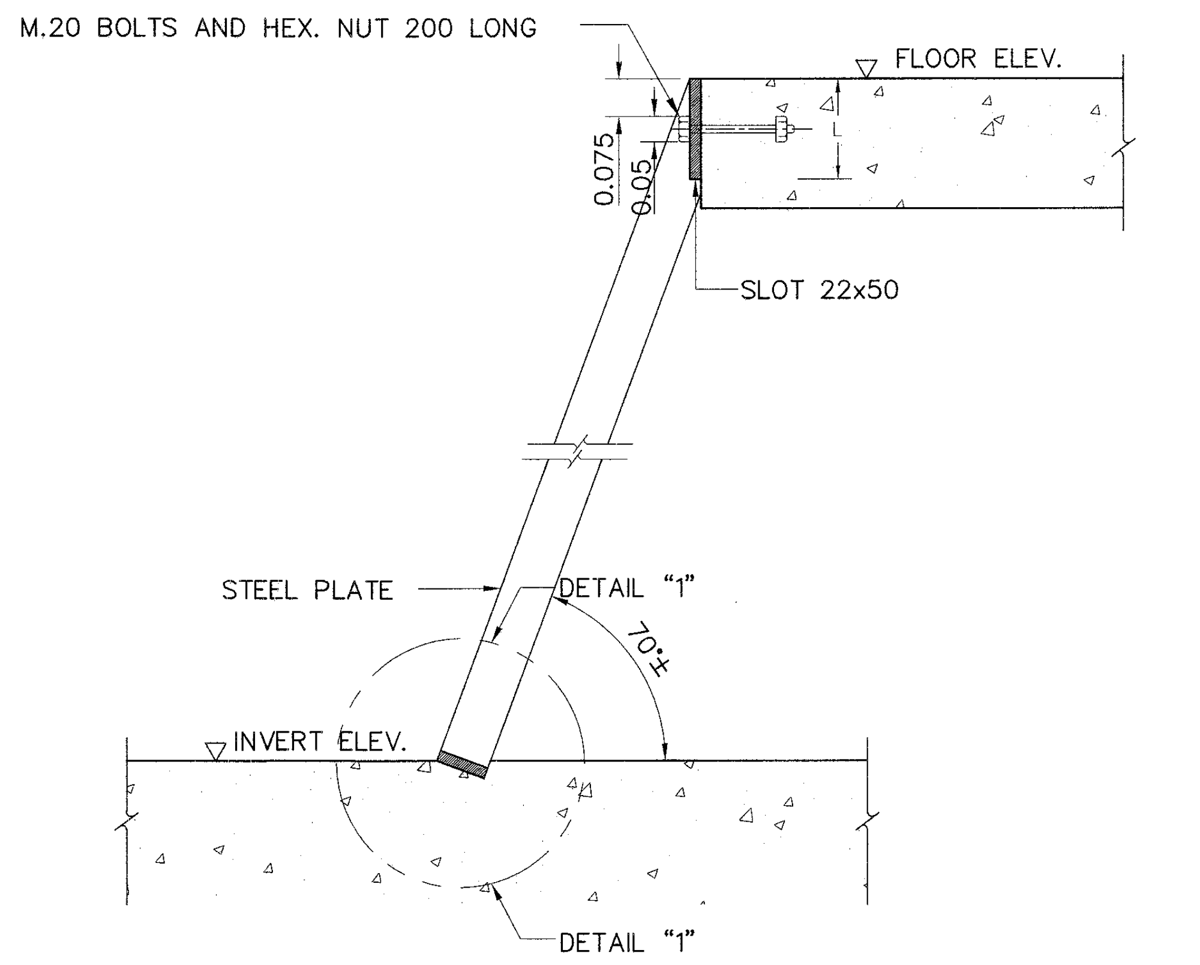
SCALE 1:20





## DETAIL "1"

NOT TO SCALE



## TRASHRACK INSTALLATION

NOT TO SCALE

**NOTES :**

1. ALL DIMENSIONS AND ELEVATIONS ARE IN METER.UNLESS OTHERWISE SHOWN
2. FOR GENERAL NOTES SEE DWG. NO MH-GN-03

KINGDOM OF THAILAND
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Energy Development and Efficiency
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MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
WEIR
MISCELLANEOUS DETAILS

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
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| 3 | | | | |
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| | CONSULTANTS | | DEDE | |

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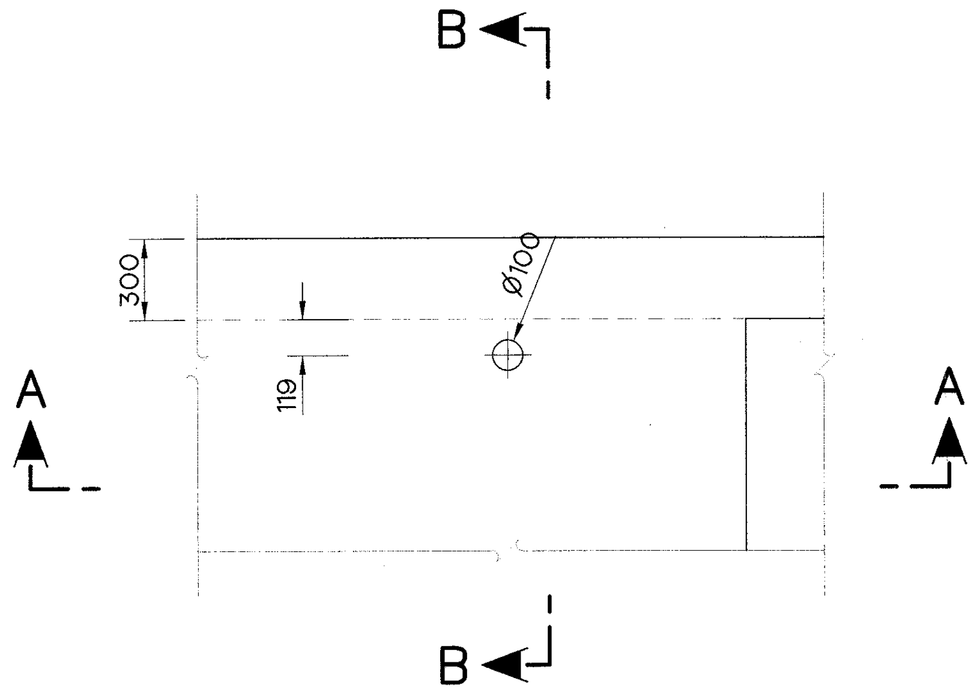
DRAWN
CHECKED สย.6226

PROJECT MANAGER
DATE 08/03/2559

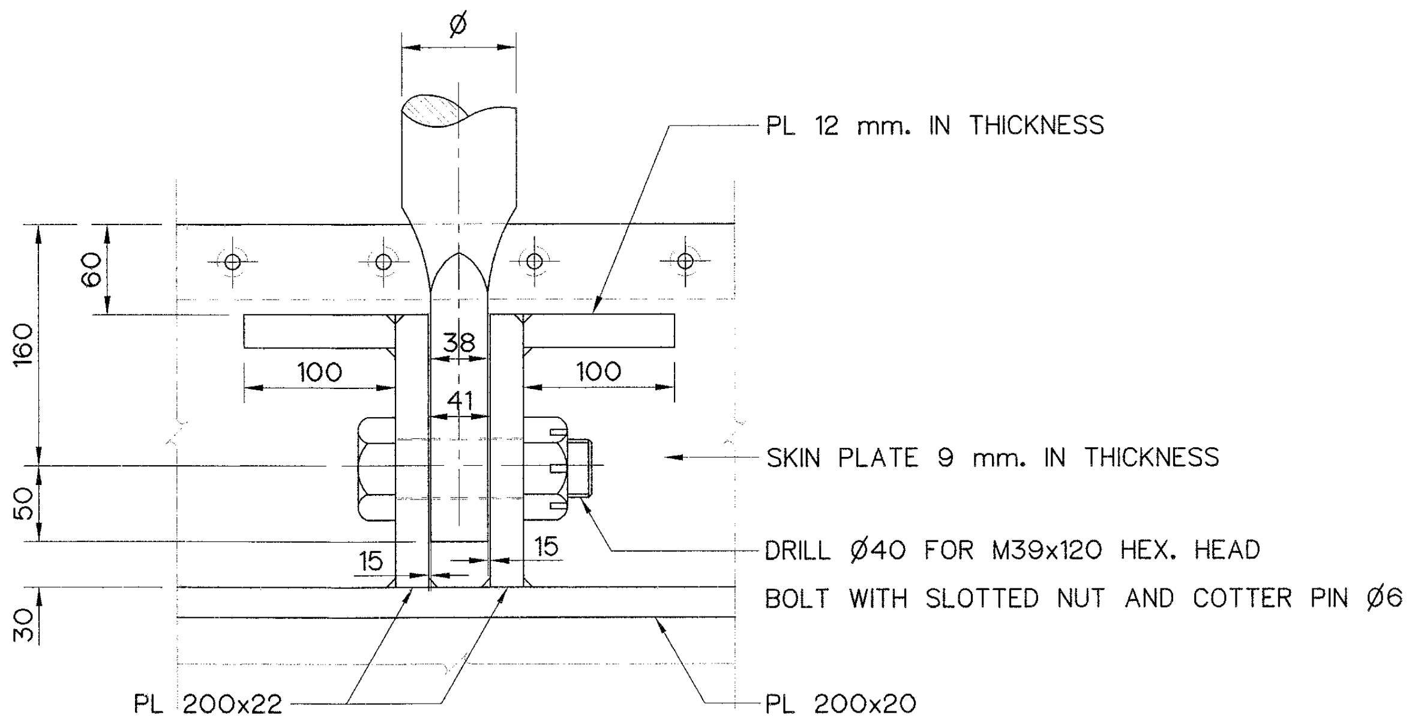
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

REVIEWED
SUBMITTED Chart
RECOMMENDED
APPROVED P. Henssell

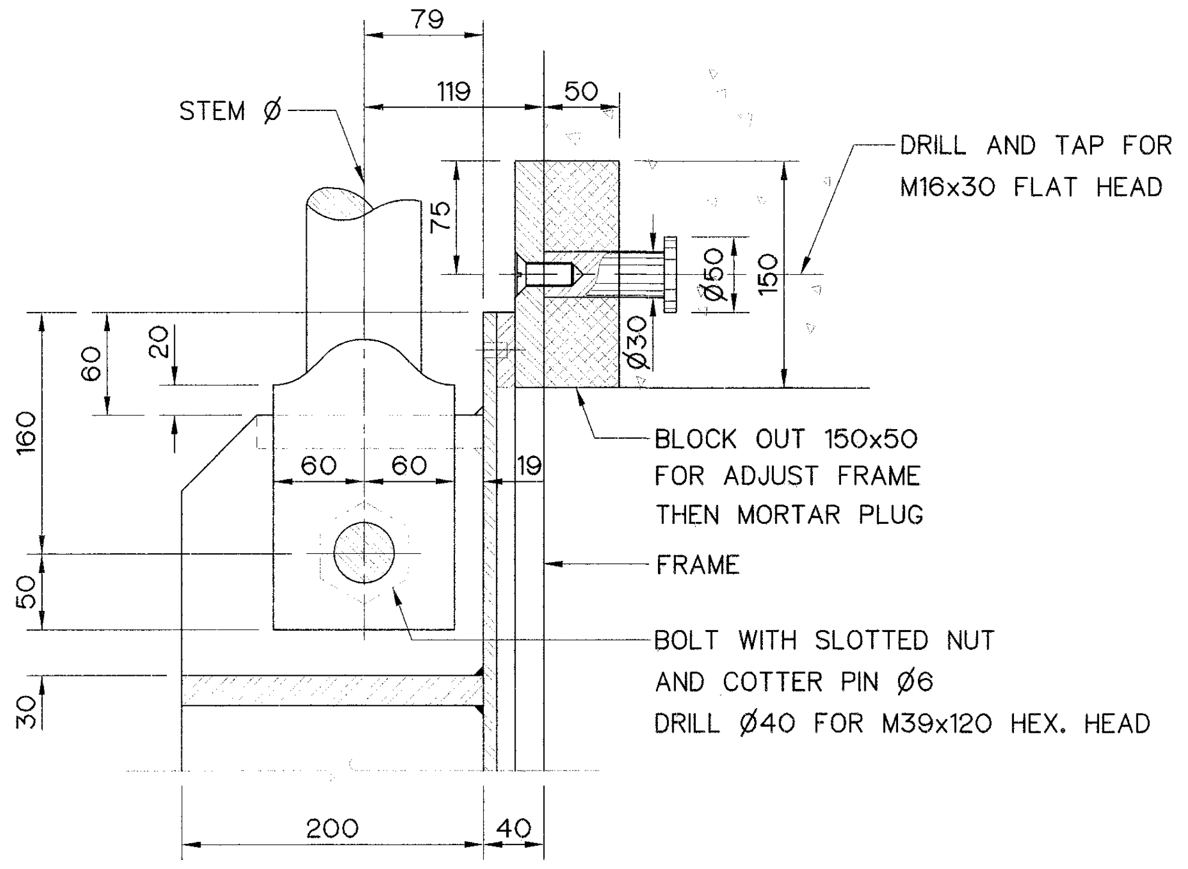
DRAWING NO. MH-WE-05
SHEET NO. 18 OF 130



## PLAN
NOT TO SCALE


Ø
PL 12 mm. IN THICKNESS
60
160
100
38
100
41
SKIN PLATE 9 mm. IN THICKNESS
50
15
15
DRILL Ø40 FOR M39x120 HEX. HEAD
BOLT WITH SLOTTED NUT AND COTTER PIN Ø6
30
PL 200x22
PL 200x20

## DETAIL "1"
NOT TO SCALE



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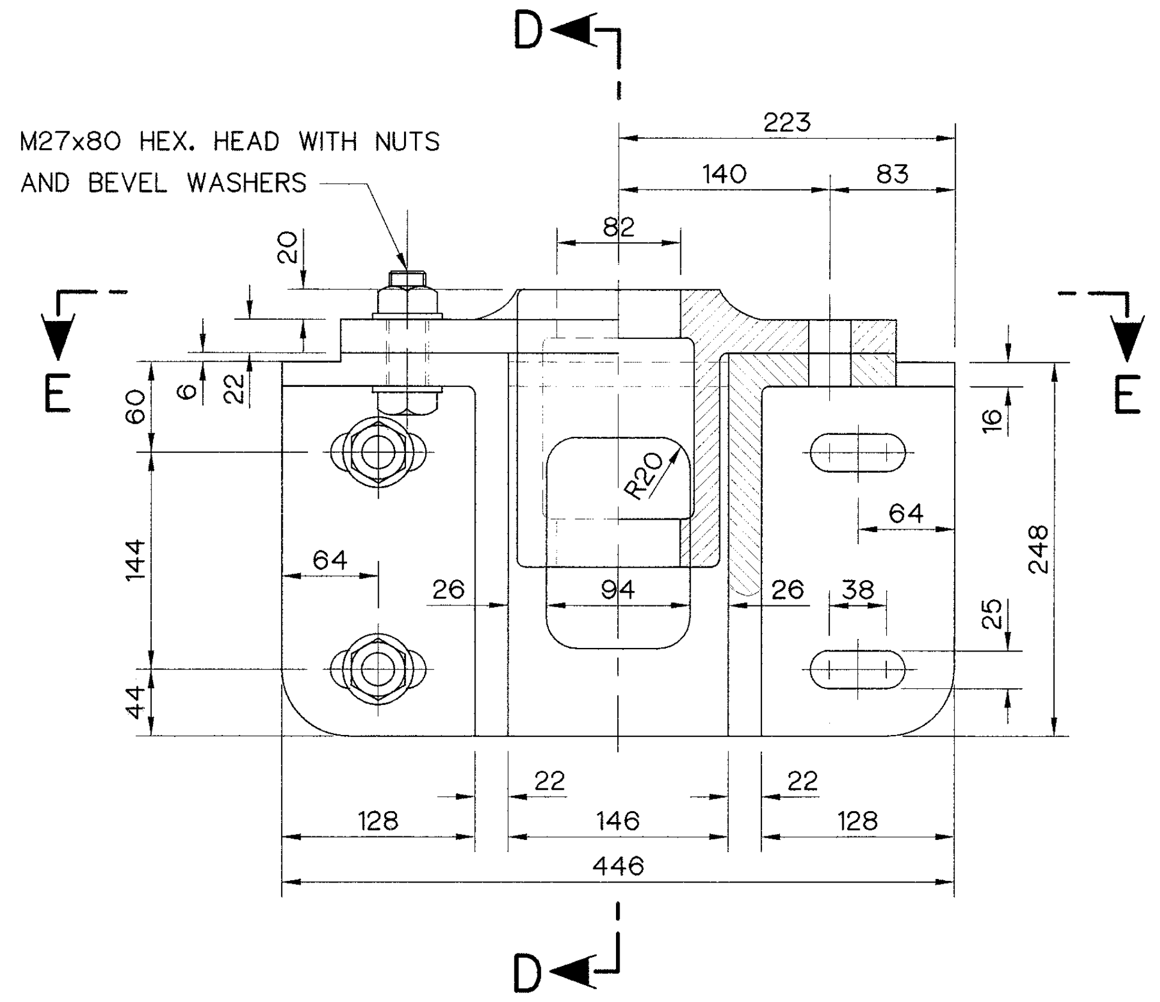
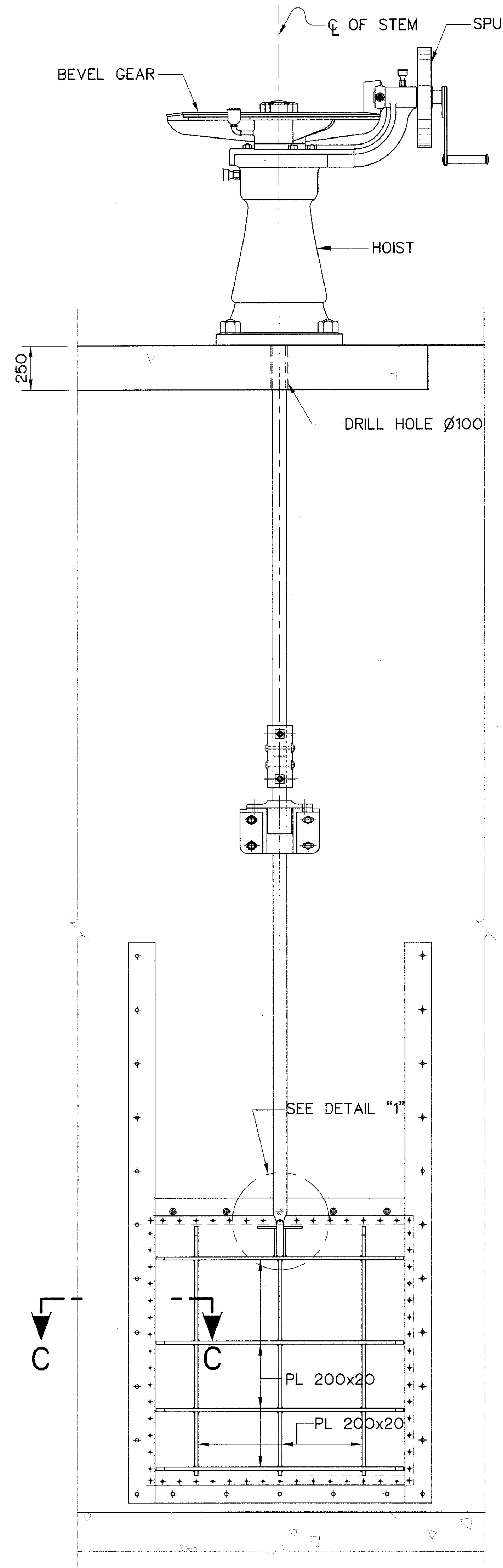
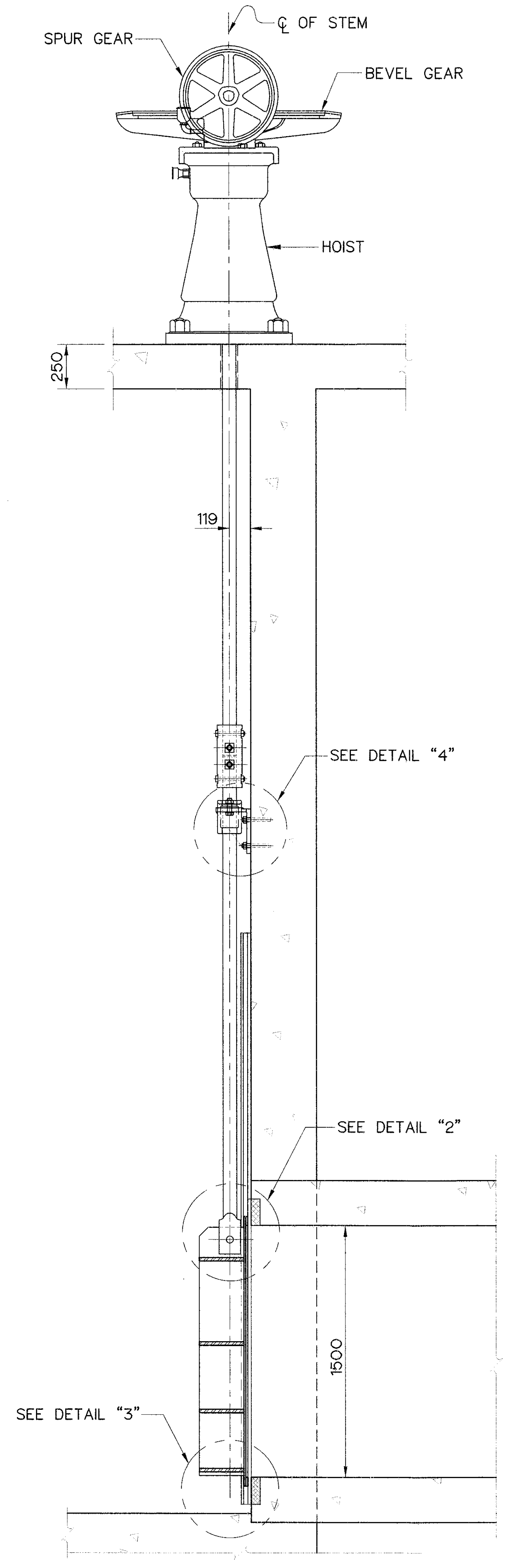


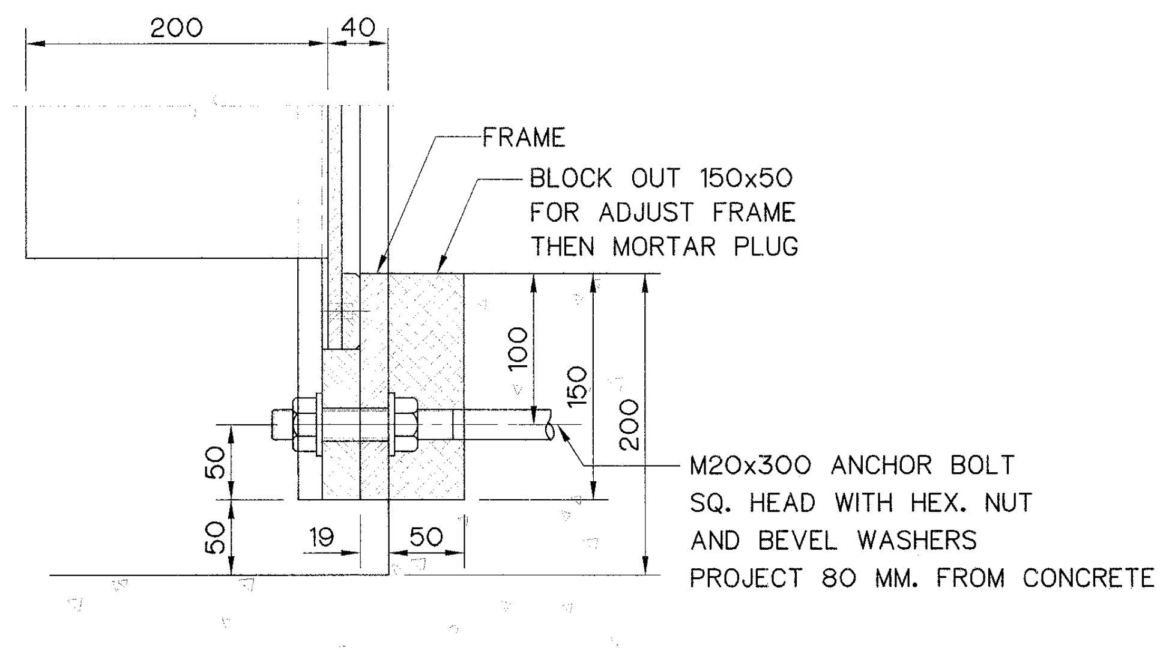
## STEM GUIDE
NOT TO SCALE



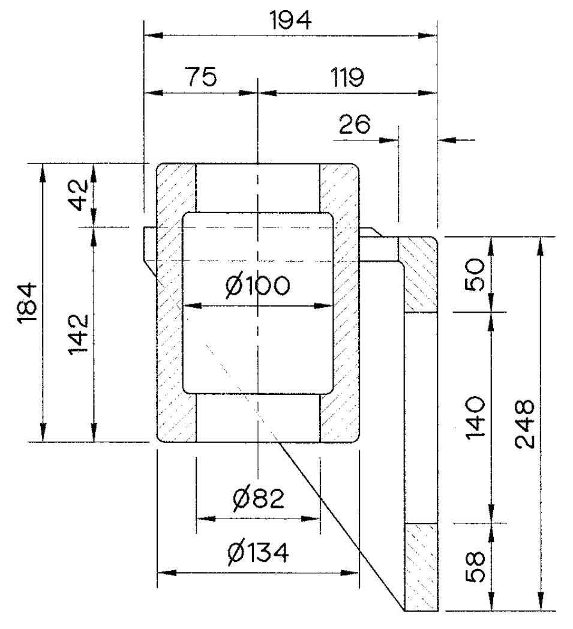
## SECTION A–A
NOT TO SCALE



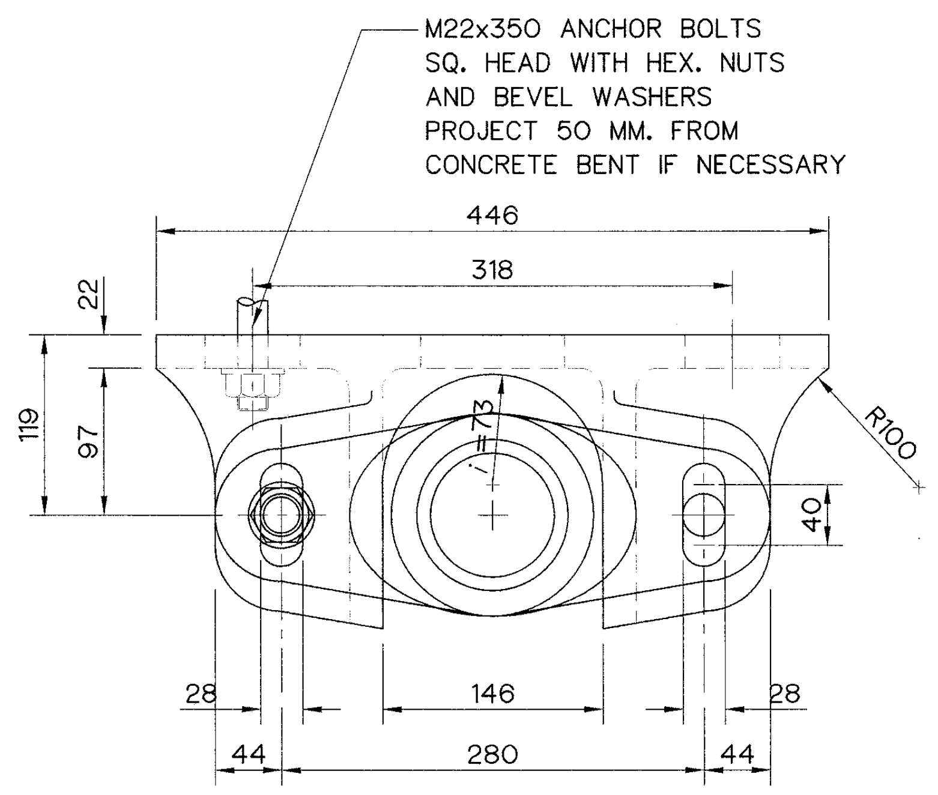
## SECTION B–B
NOT TO SCALE



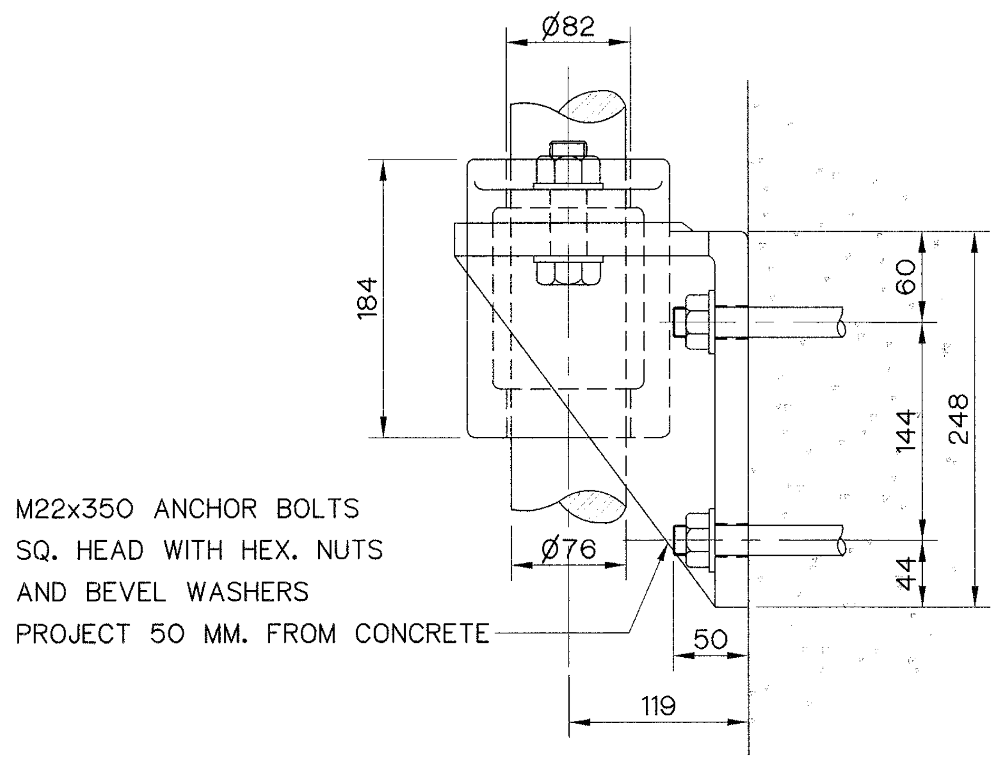
## DETAIL "3"
SCALE 1:5



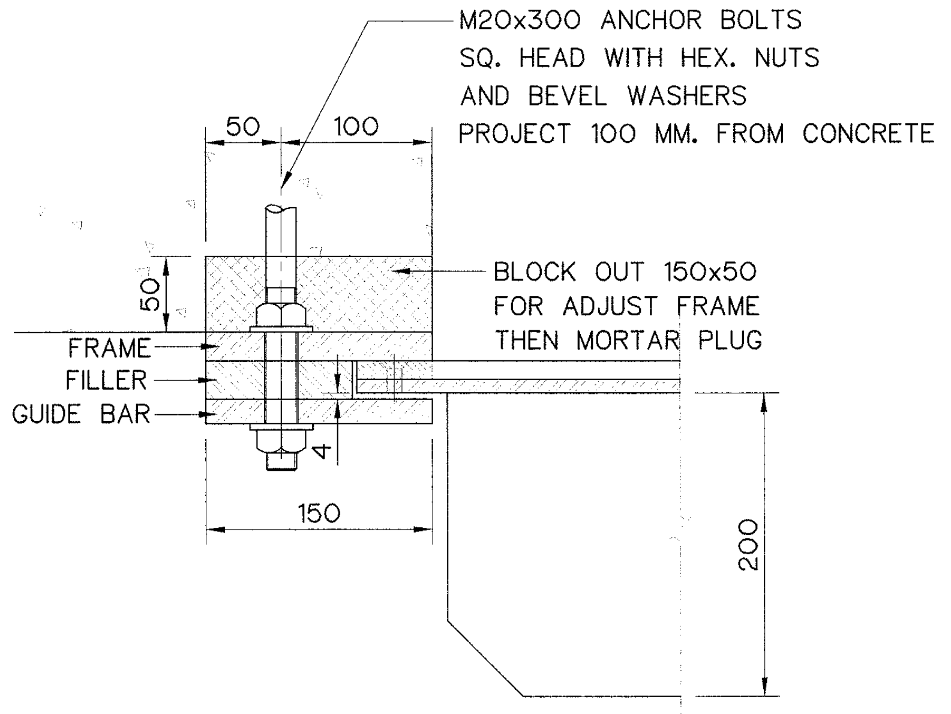
## SECTION D–D
SCALE 1:5



## SECTION E–E
SCALE 1:5



## DETAIL "4"
SCALE 1:5



## SECTION C–C
SCALE 1:5

## NOTE :

1. ALL DIMENSIONS ARE IN MILLIMETERS, AND ELEVATION ARE IN METERS UNLESS OTHERWISE SHOWN.
2. ALL WELDING WILL BE 6 MILLIMETERS, UNLESS OTHERWISE SHOWN.
3. ALL BOLTS AND NUTS USE ASTM A325.
4. ALL STRUCTURAL STEELS ARE JIS G 3101 SS400
5. ALL STAINLESS STEELS PLATES ARE JIS G 4304 SUS 304.
6. THIS DRAWING IS DESIGNED FOR GUIDE LINE ONLY, THE CONTRACTOR HAS TO SUBMITTED SHOP DRAWING TO FIELD ENGINEER FOR APPROVAL

## REFERENCE DWGS :

| | |
|---|---|
| 1. WEIR SECTIONS | MH–WE–02 |
| 2. 1.50x1.50 m. VERTICAL GATE (GATE DATAIL) | MH–WE–07 |
| 3. PEDESTAL SCREW LIFT CAPACITY 6.5 TONS | MH–WE–09 |

KINGDOM OF THAILAND
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MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
WEIR
1.50x1.50 m. VERTICAL GATE (GATE INSTALLATION)

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
|---|---|---|---|---|
| 3 | | | | |
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| | CONSULTANTS | | DEDE | |

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CHECKED สย.6226
PROJECT MANAGER
DATE 08/03/2559

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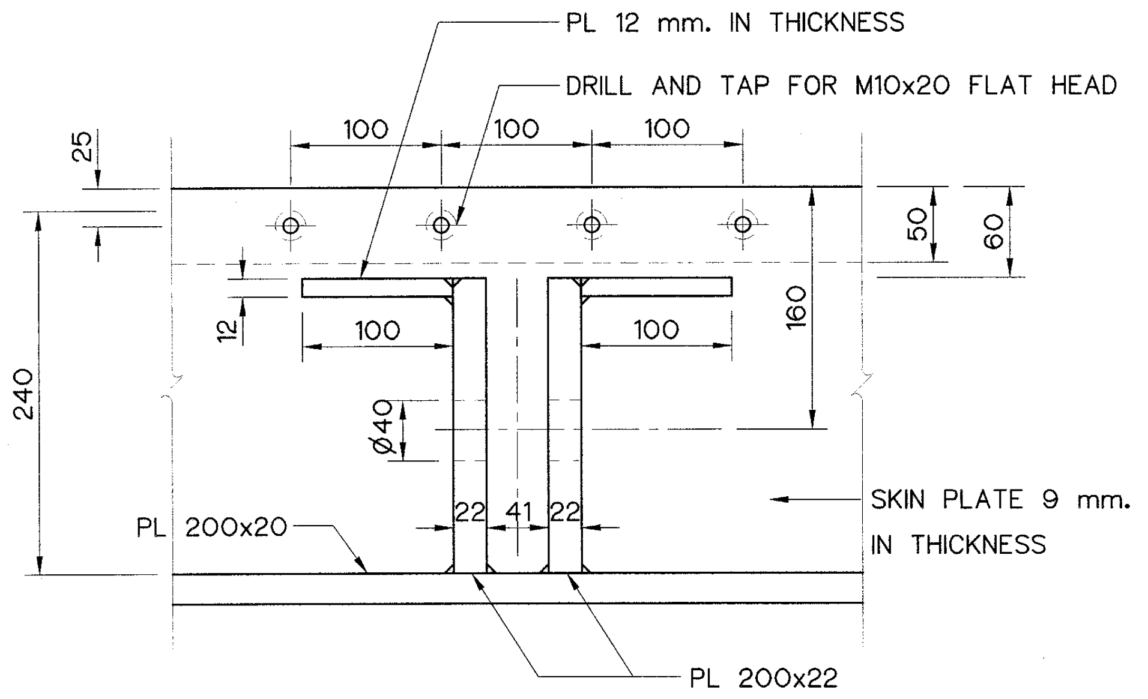
Energy Development and Efficiency
MINISTRY OF ENERGY

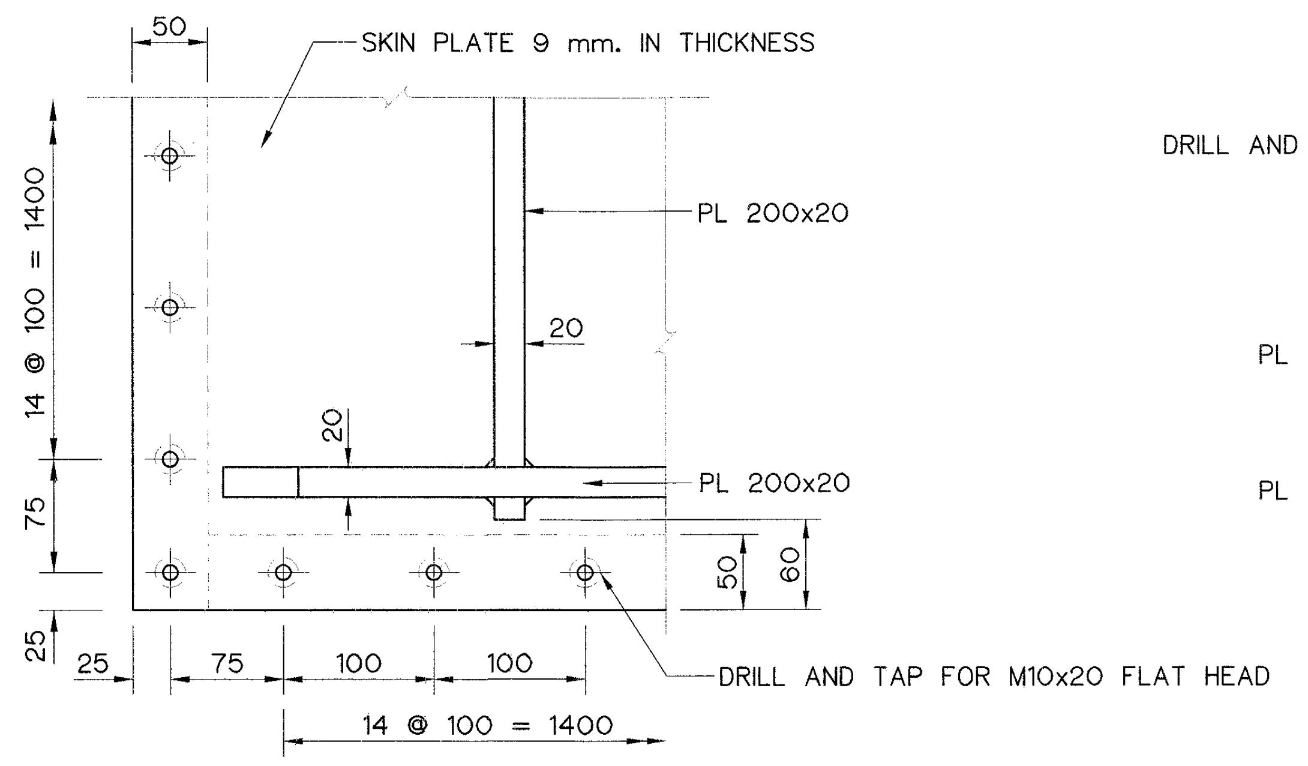
REVIEWED
SUBMITTED Chart
RECOMMENDED
APPROVED P. Hom

DRAWING NO. MH–WE–06
SHEET NO. 19 OF 130



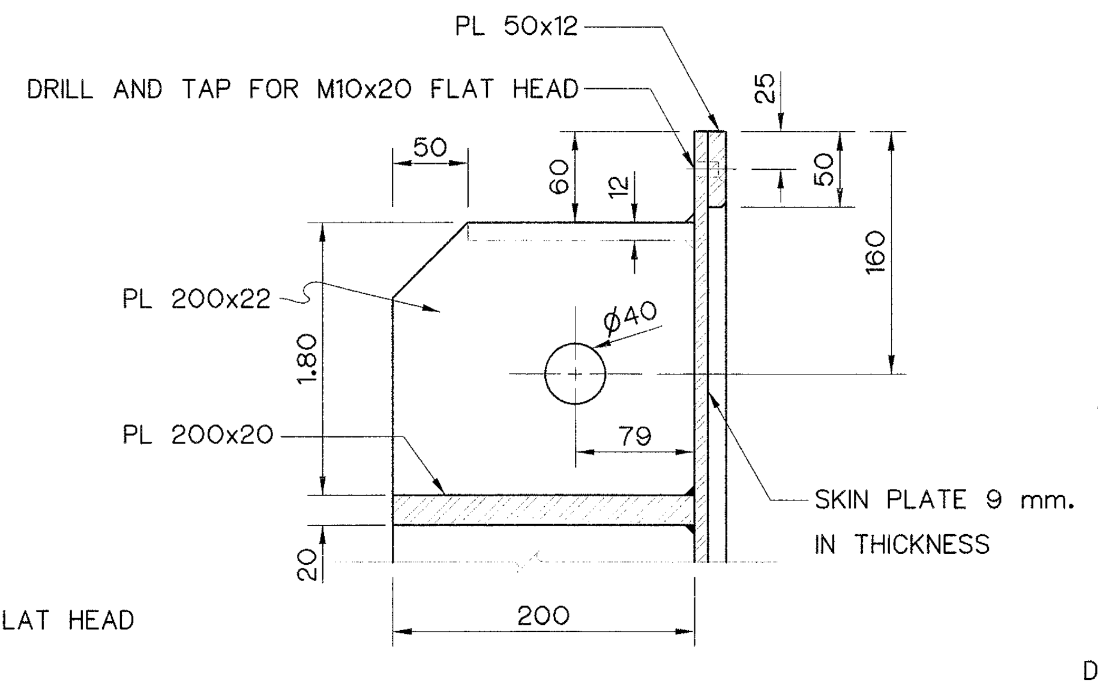
### DETAIL "1"

NOT TO SCALE



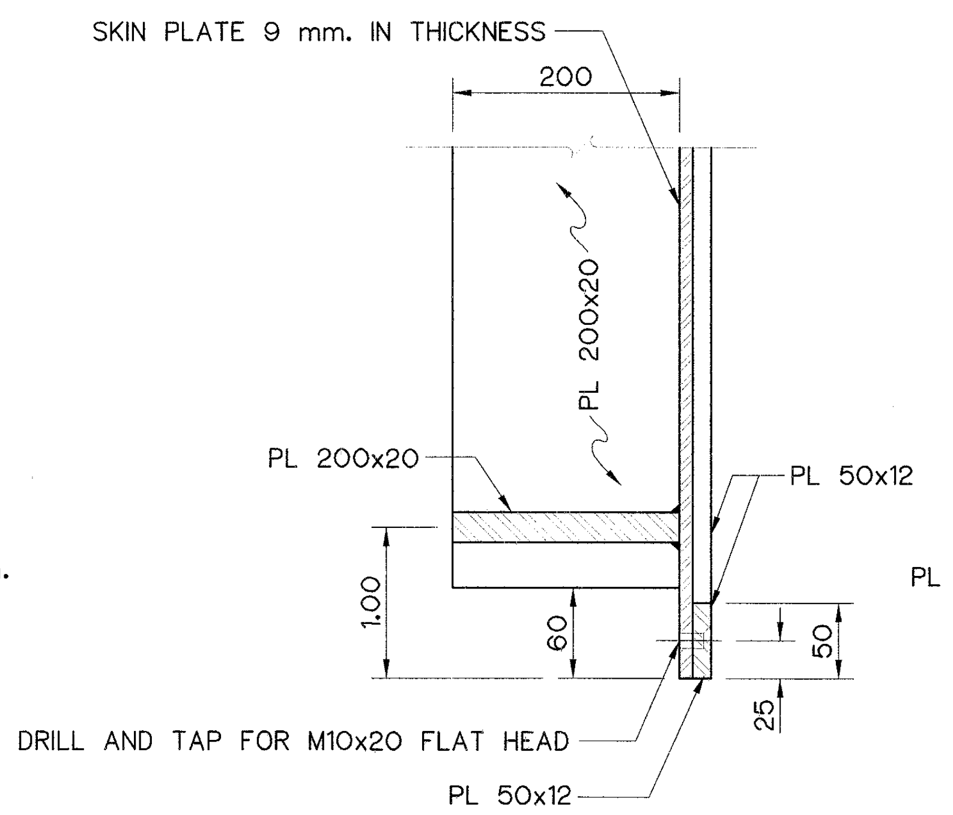
### DETAIL "2"

NOT TO SCALE


PL 50x12
DRILL AND TAP FOR M10x20 FLAT HEAD
50 60 12 25 50 160
PL 200x22
Ø40
1.80
PL 200x20
79
SKIN PLATE 9 mm. IN THICKNESS
20
200

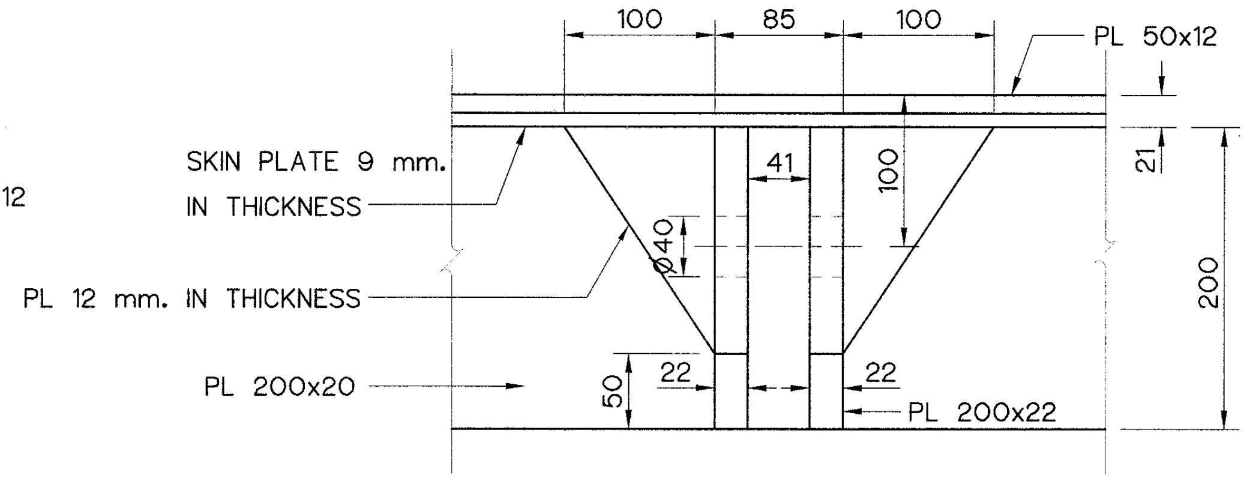
### DETAIL "3"

NOT TO SCALE


SKIN PLATE 9 mm. IN THICKNESS
200
PL 200x20
PL 200x20
PL 50x12
1.00
60 50 25
DRILL AND TAP FOR M10x20 FLAT HEAD
PL 50x12

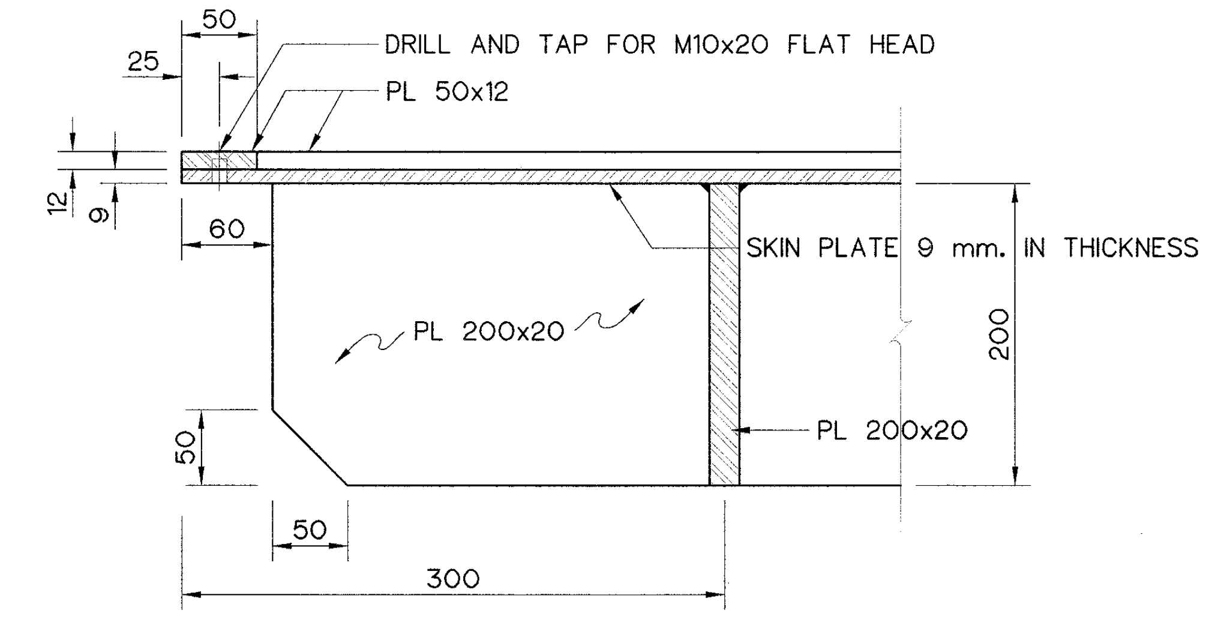
### DETAIL "4"

NOT TO SCALE



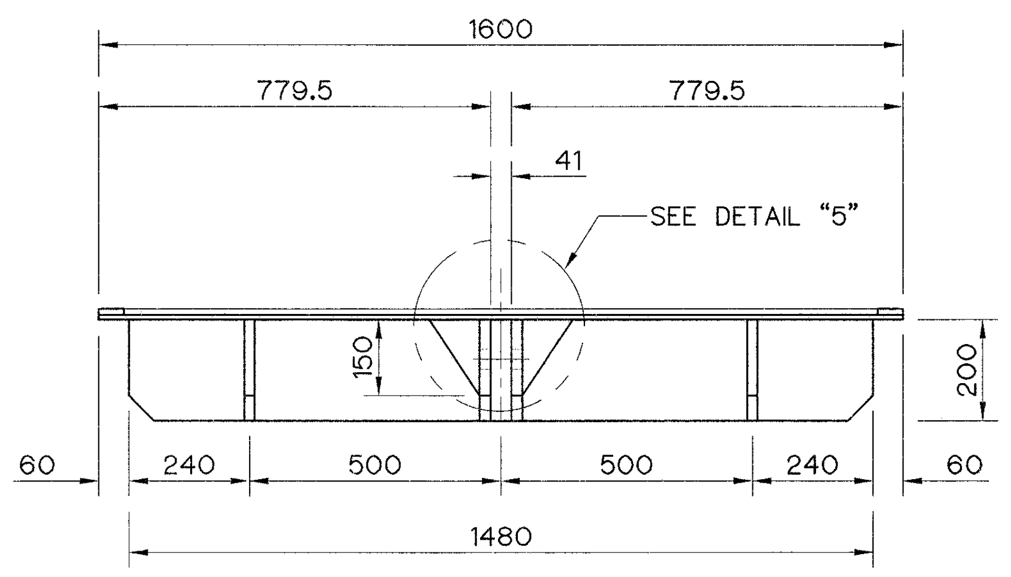
### DETAIL "5"

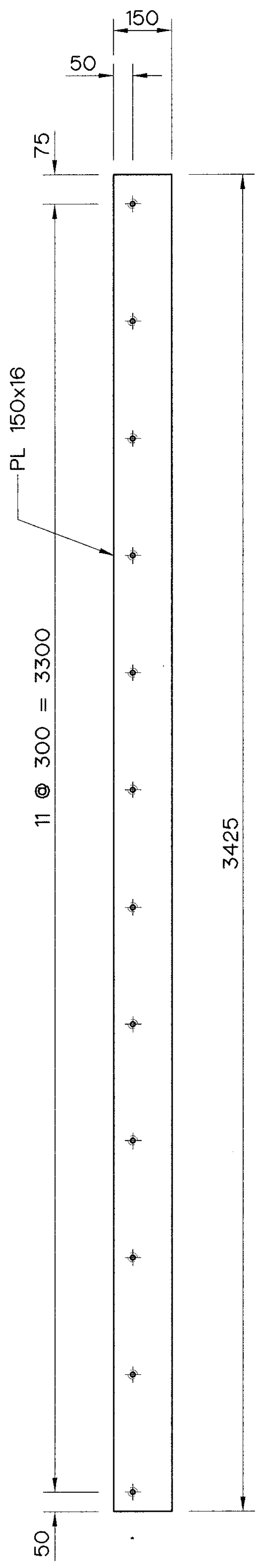
NOT TO SCALE


50 25
DRILL AND TAP FOR M10x20 FLAT HEAD
PL 50x12
12 9
60
SKIN PLATE 9 mm. IN THICKNESS
PL 200x20
200
PL 200x20
50
50
300

### SECTION B–B

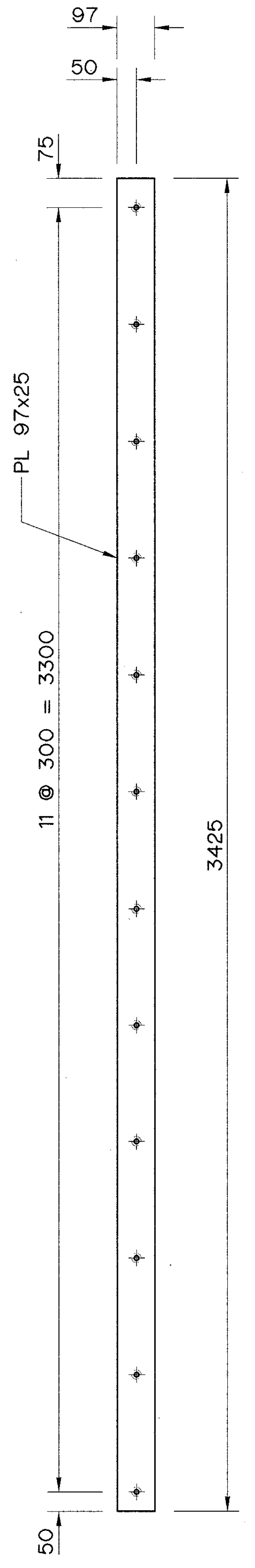
NOT TO SCALE





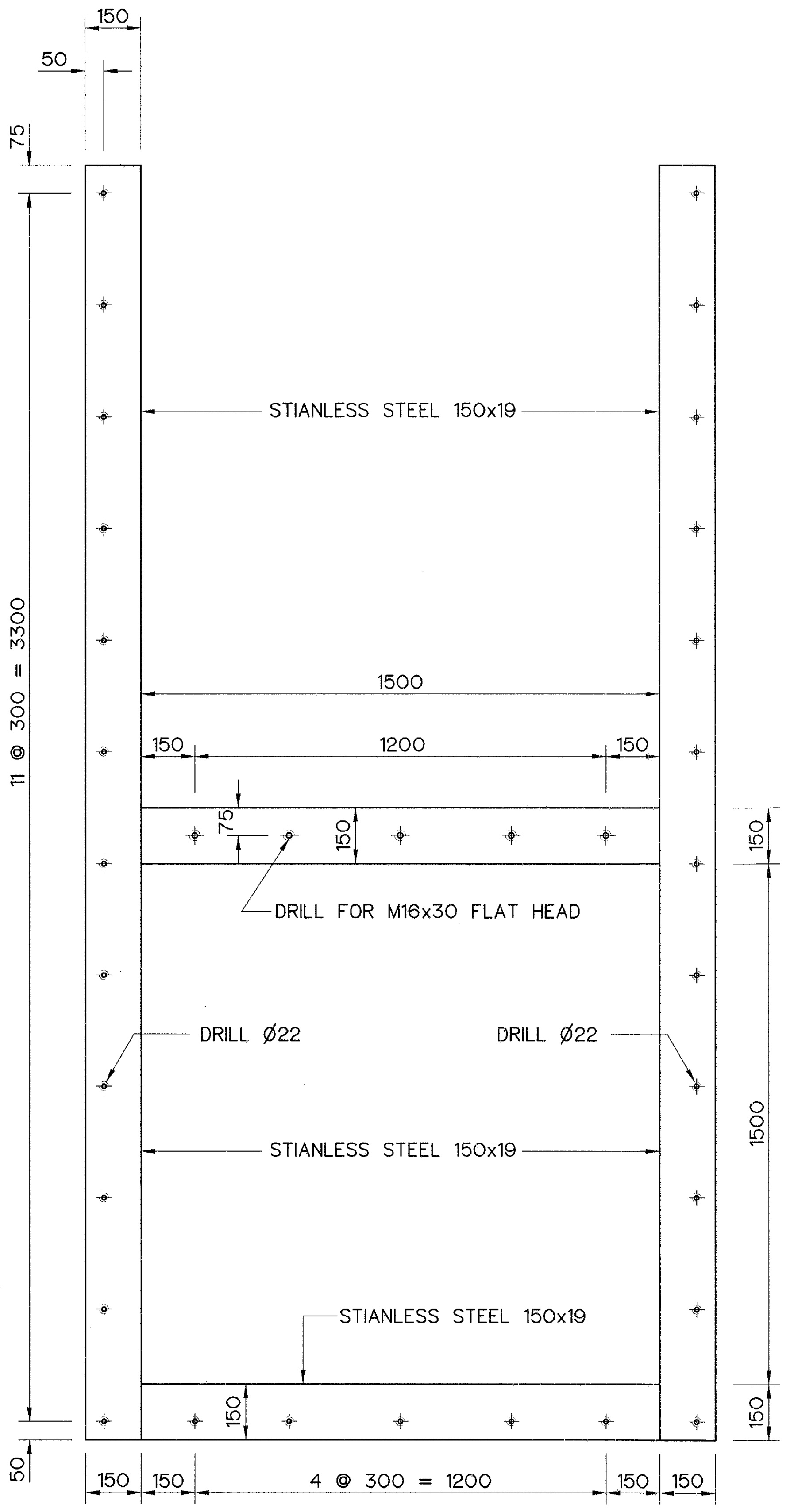
### GUIDE BAR

NOT TO SCALE



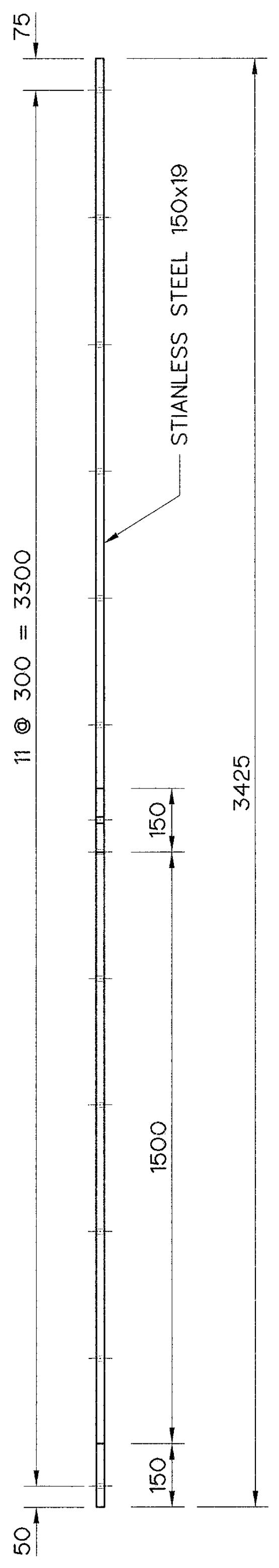
### FILLER

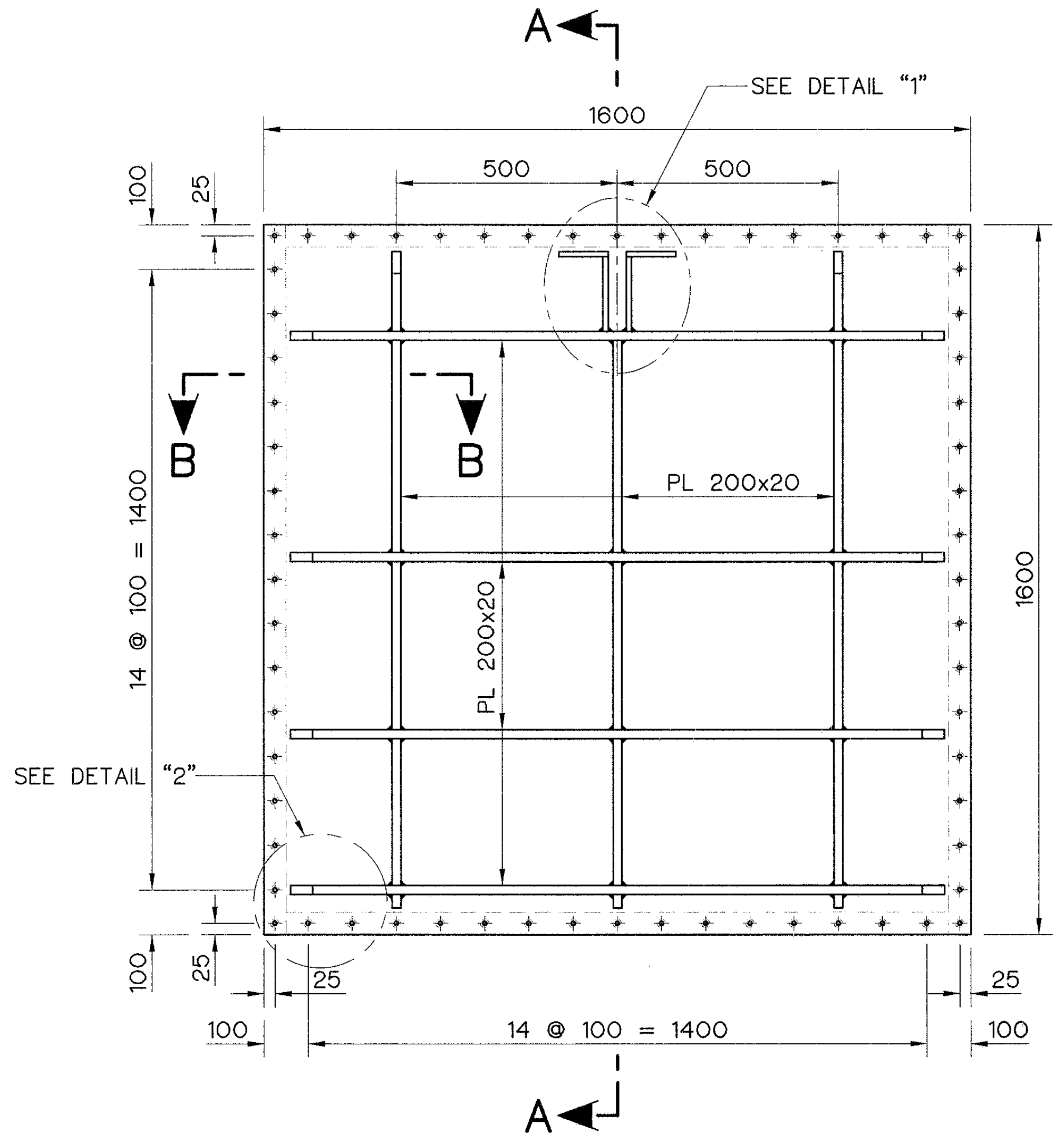
NOT TO SCALE



### FRAME

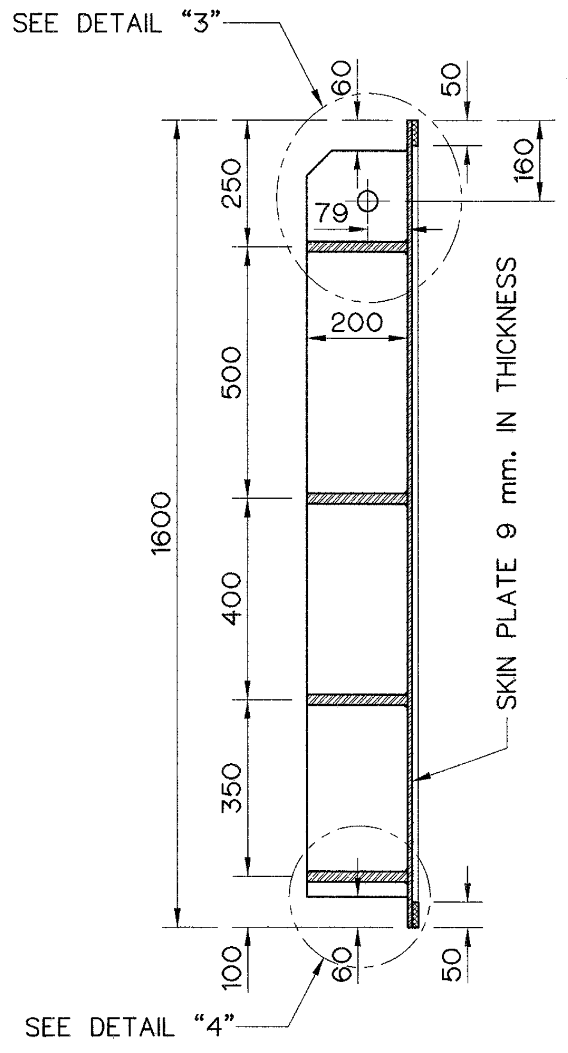
NOT TO SCALE





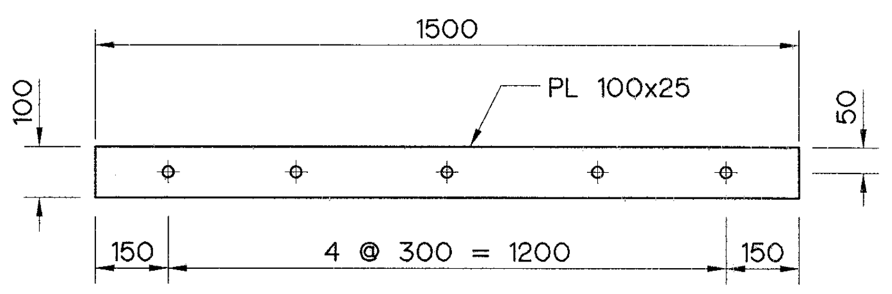
### GATE LEAF

NOT TO SCALE



### SECTION A–A

NOT TO SCALE



### BOTTOM BAR

NOT TO SCALE

**NOTE :**

1. ALL DIMENSIONS ARE IN MILLIMETERS, UNLESS OTHERWISE SHOWN.
2. ALL WELDING WILL BE 6 MILLIMETERS, UNLESS OTHERWISE SHOWN.
3. ALL BOLTS AND NUTS USE ASTM A325.
4. ALL STRUCTURAL STEELS ARE JIS G 3101 SS400
5. ALL STAINLESS STEELS PLATES ARE JIS G 4304 SUS 304.
6. THIS DRAWING IS DESIGNED FOR GUIDE LINE ONLY, THE CONTRACTOR HAS TO SUBMITTED SHOP DRAWING TO FIELD ENGINEER FOR APPROVAL

**REFERENCE DWGS :**

| | |
|---|---|
| 1. 1.50x1.50 m. VERTICAL GATE (GATE INSTALLATION) | MH-WE-06 |
| 2. PEDESTAL SCREW LIFT CAPACITY 6.5 TONS | MH-WE-09 |

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
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| 1 | | | | |

CONSULTANTS
DEDE

KINGDOM OF THAILAND
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Energy Development and Efficiency
MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
WEIR
1.50x1.50 m. VERTICAL GATE (GATE DETAIL)

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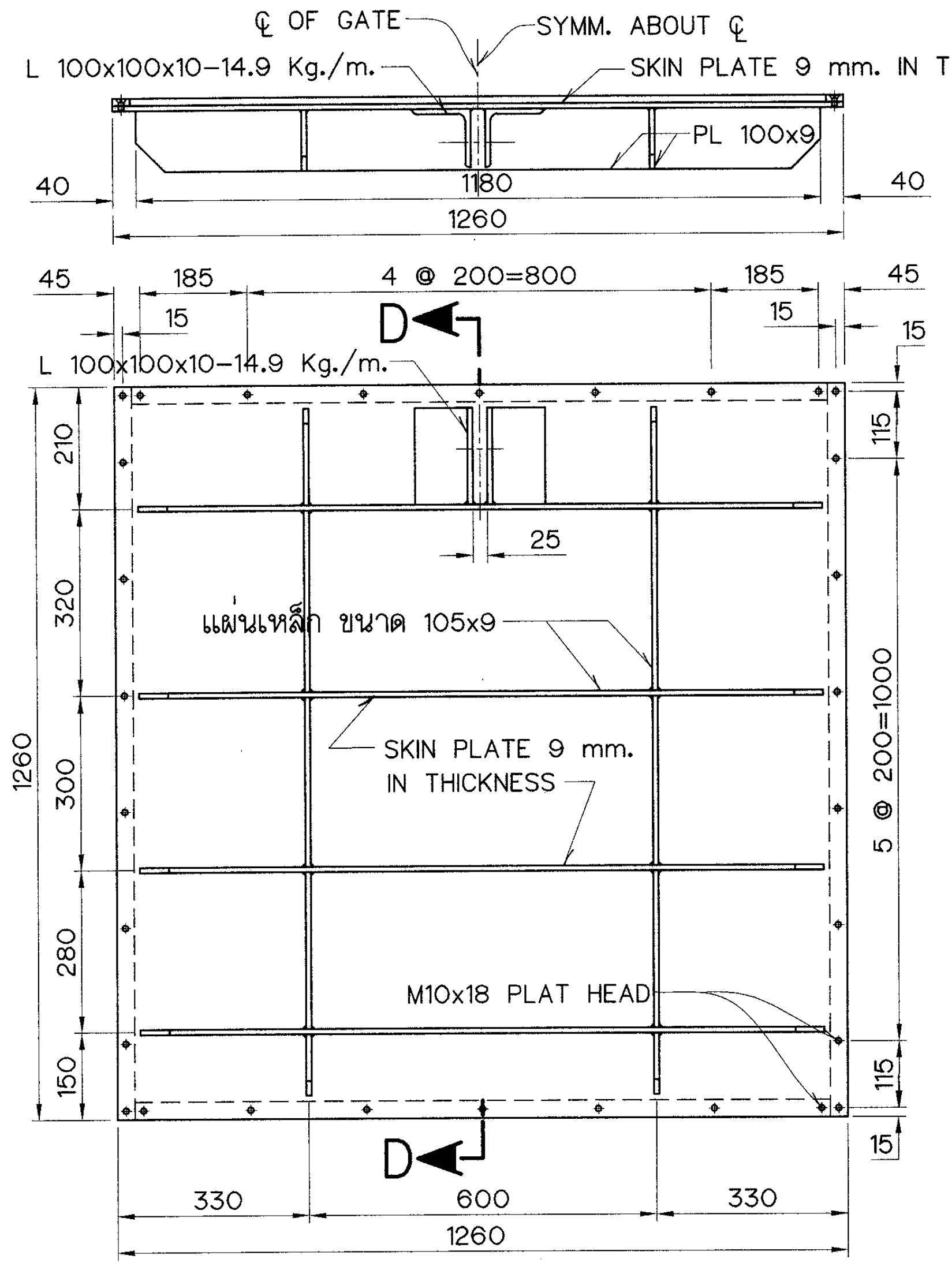
DESIGNED ภย.64624 สย.6226
DRAWN
CHECKED สย.6226
PROJECT MANAGER
DATE 08/03/2559

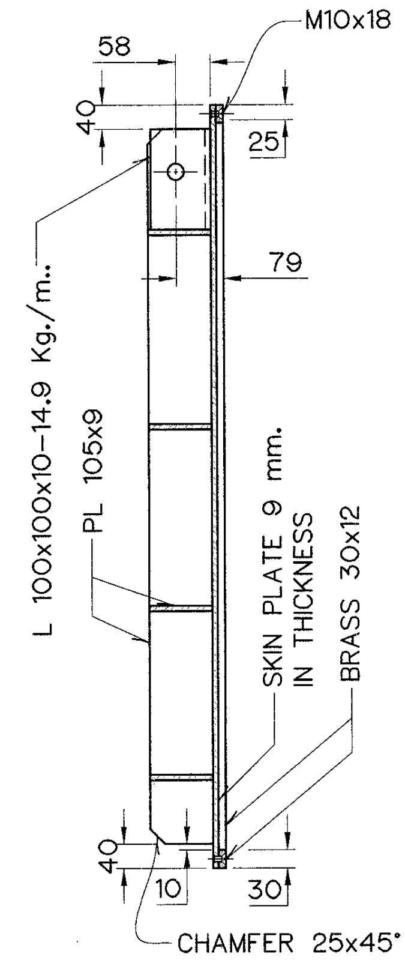
REVIEWED
SUBMITTED
RECOMMENDED
APPROVED

DRAWING NO. MH-WE-07
SHEET NO. 20 OF 130



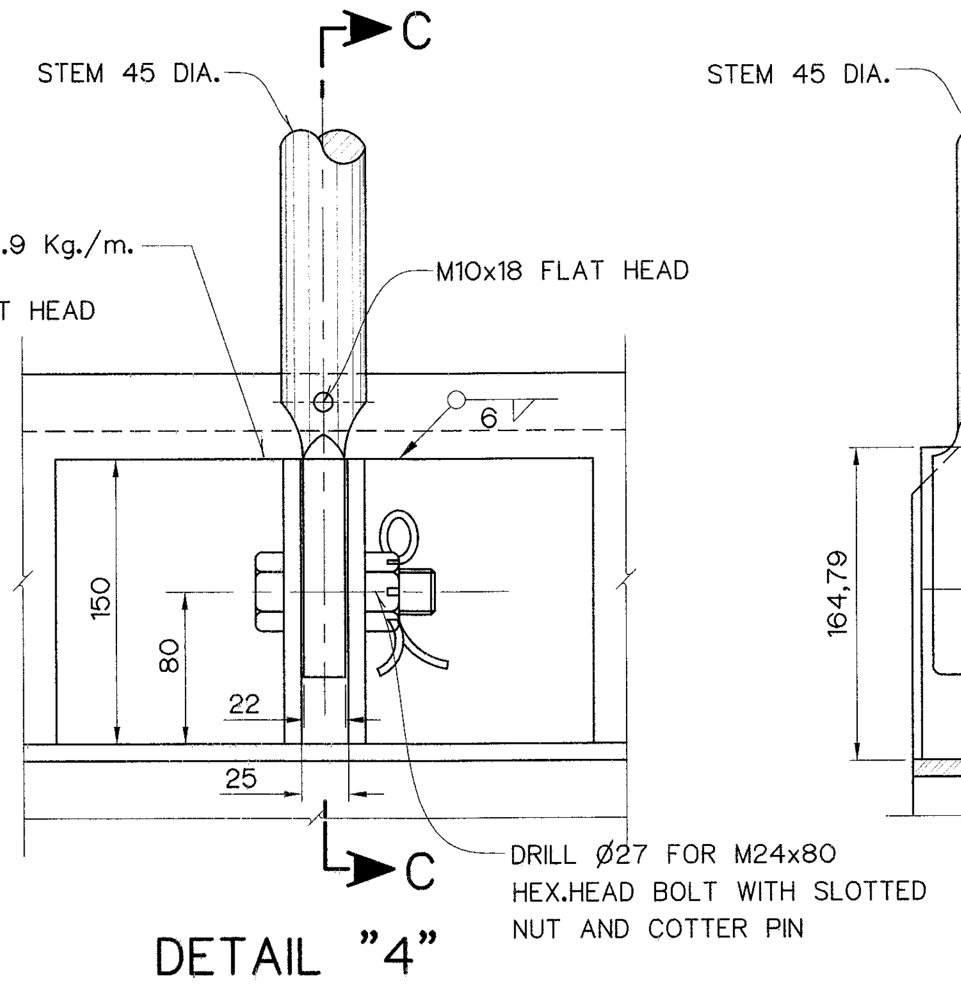
## GATE LEAF

NOT TO SCALE



## SECTION D–D

NOT TO SCALE



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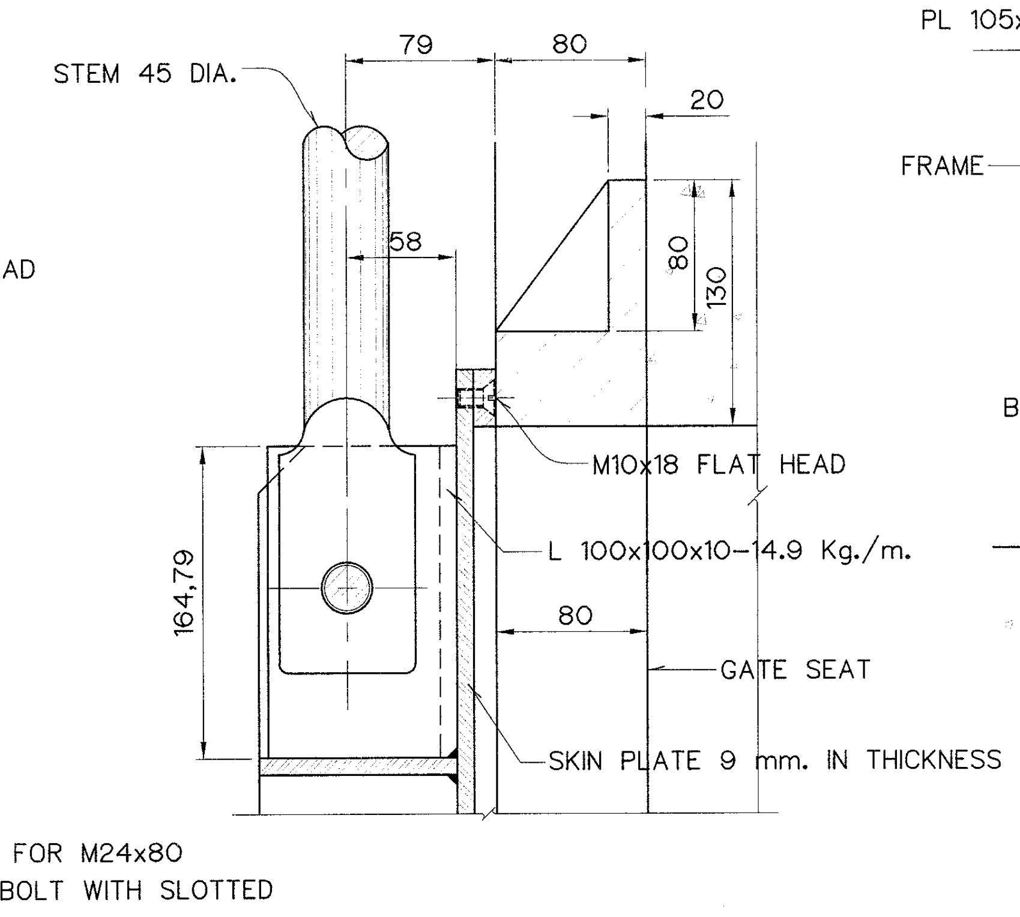
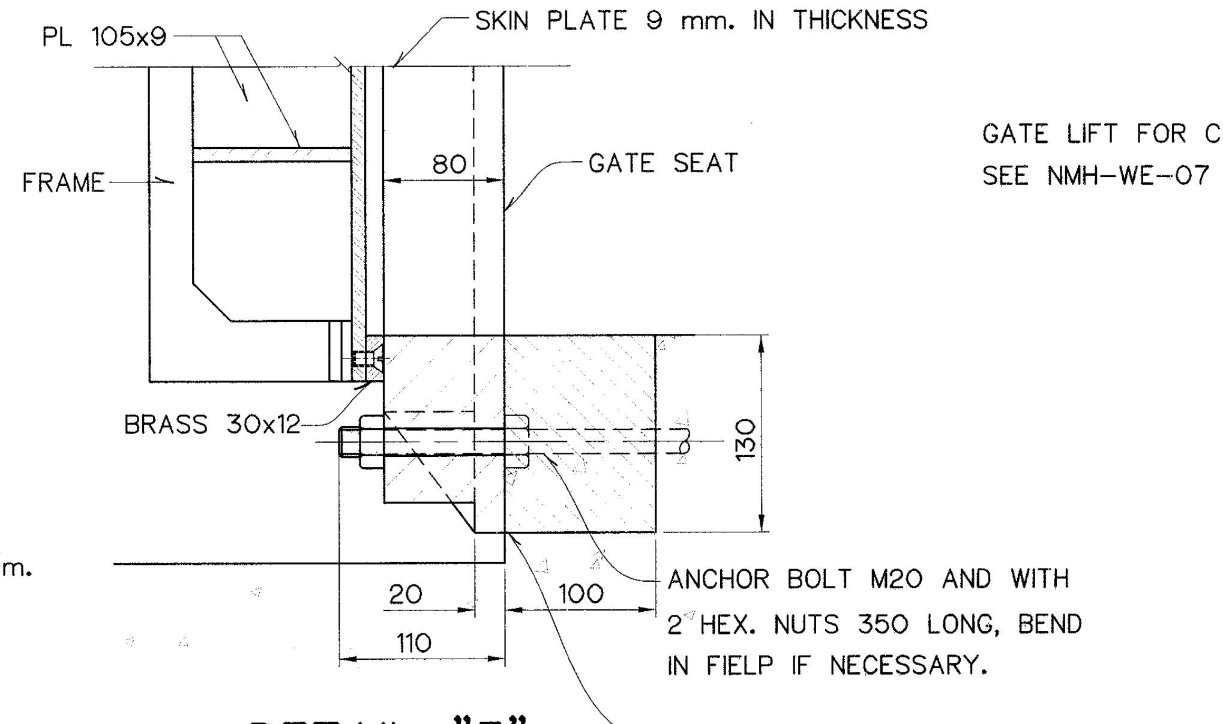


## SECTION C–C

NOT TO SCALE



## DETAIL "5"

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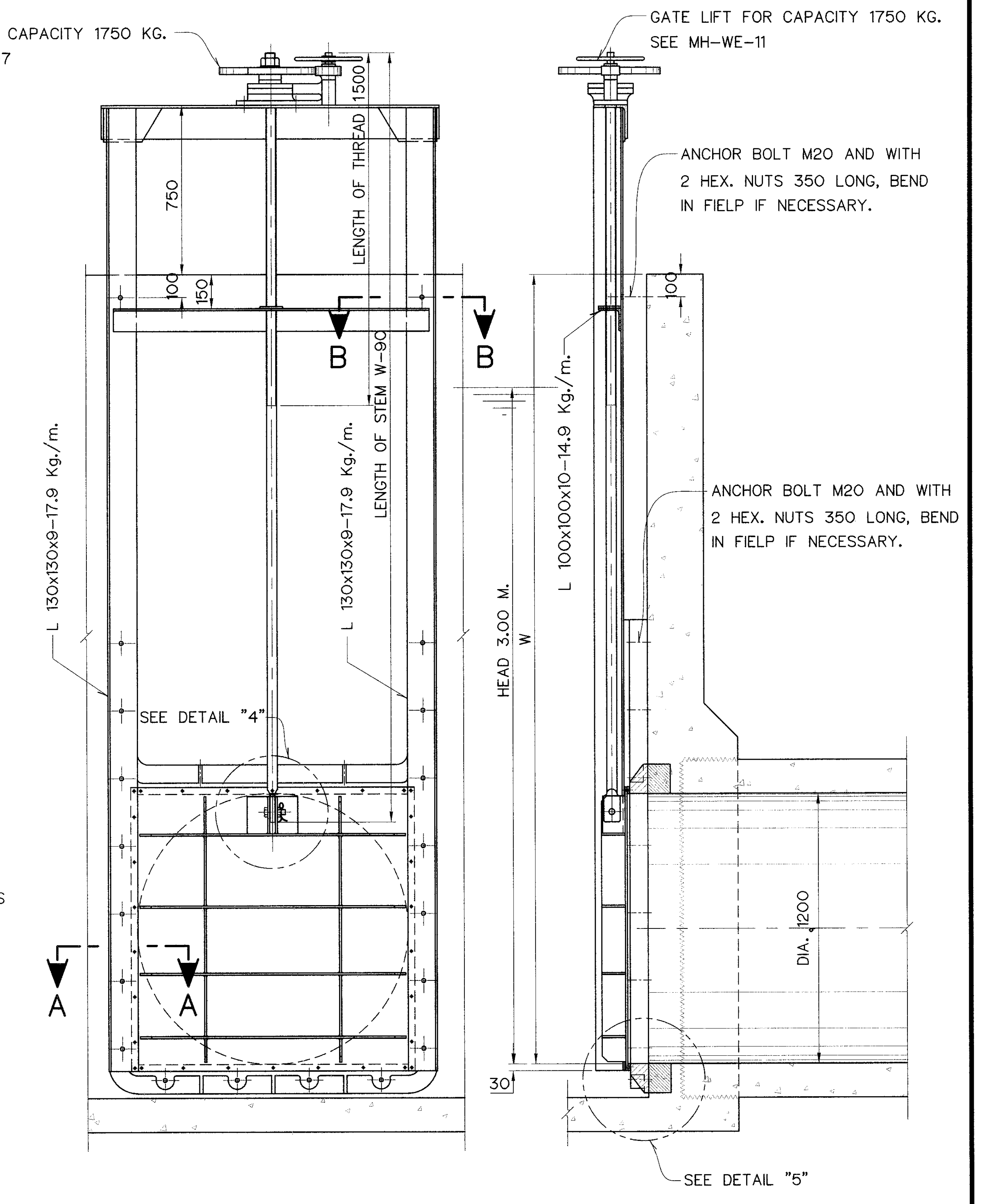
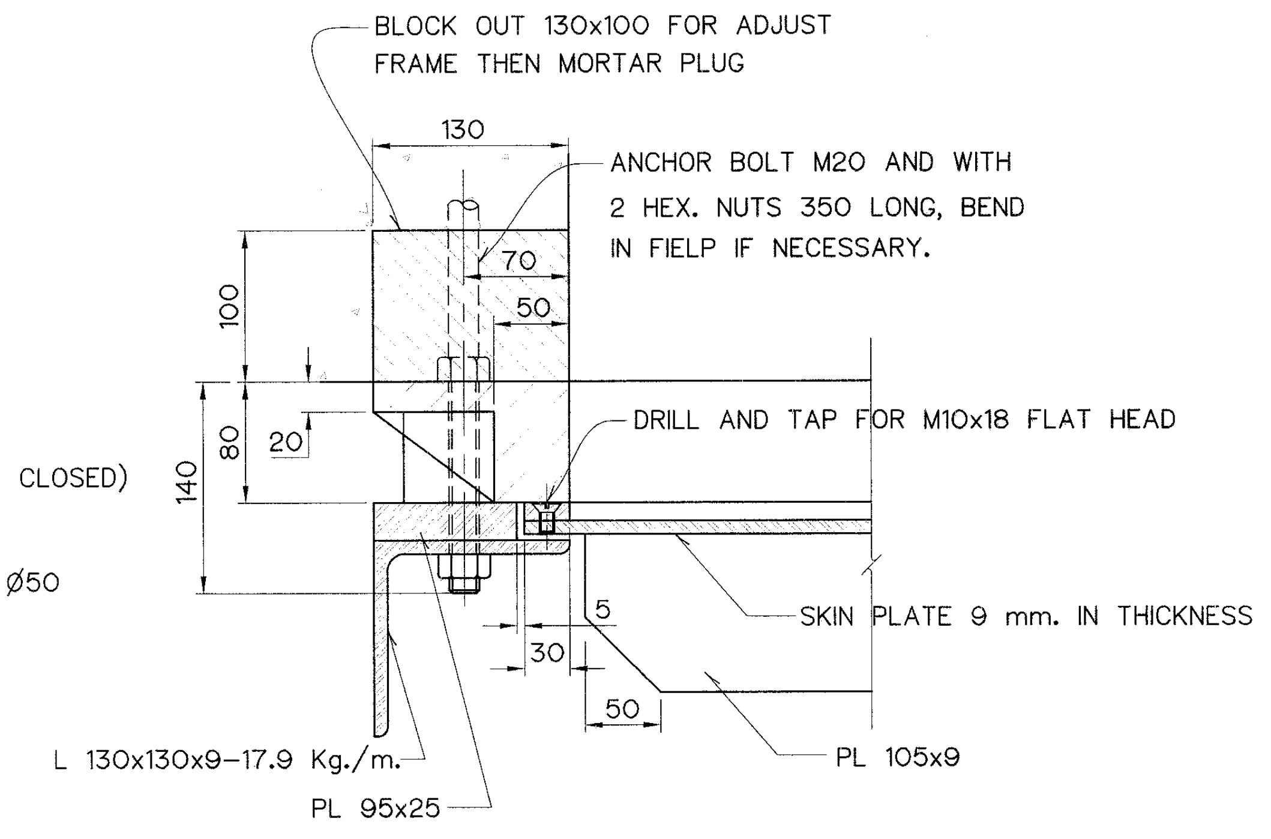


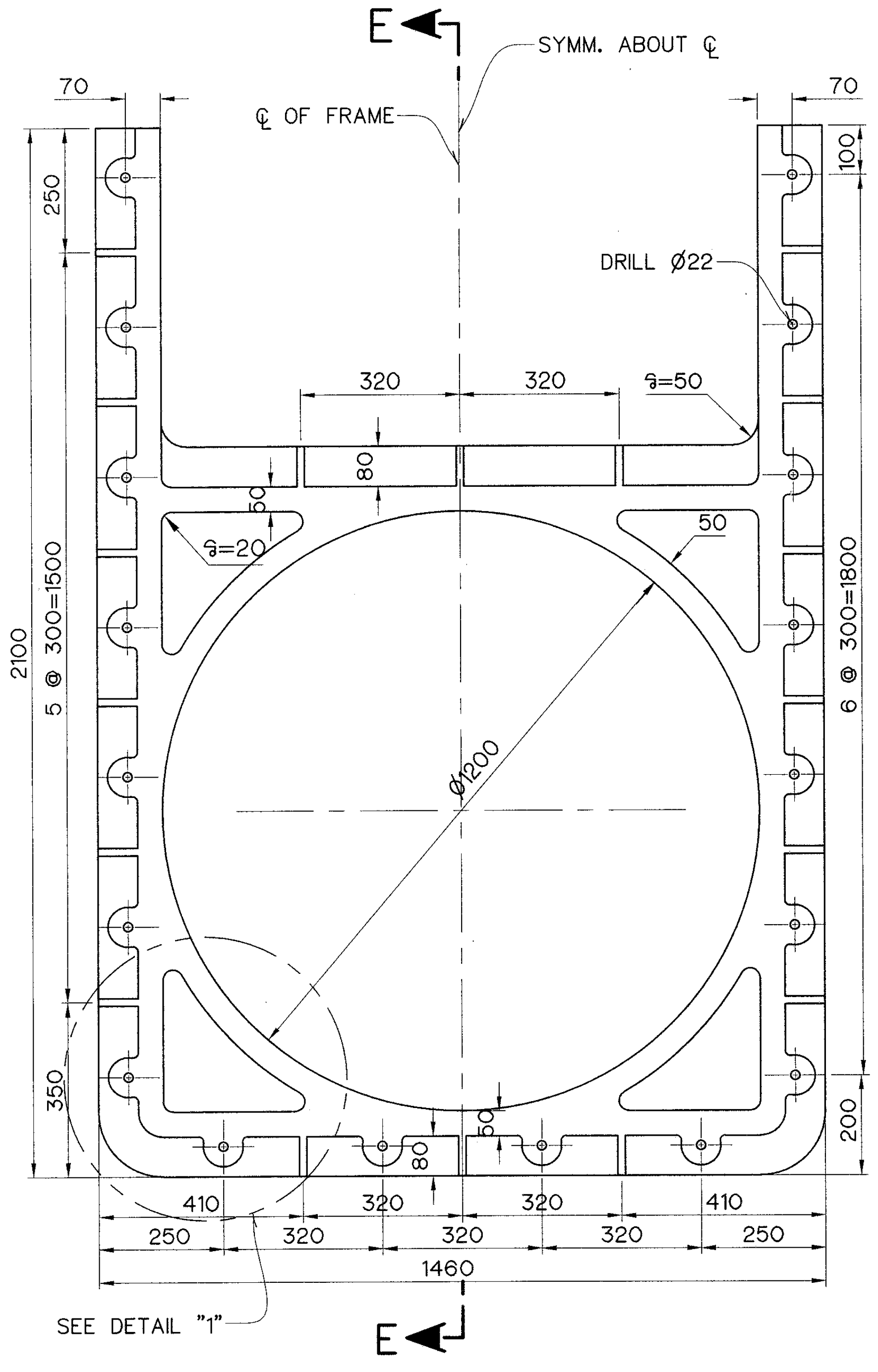
## ASSEMBLY

NOT TO SCALE



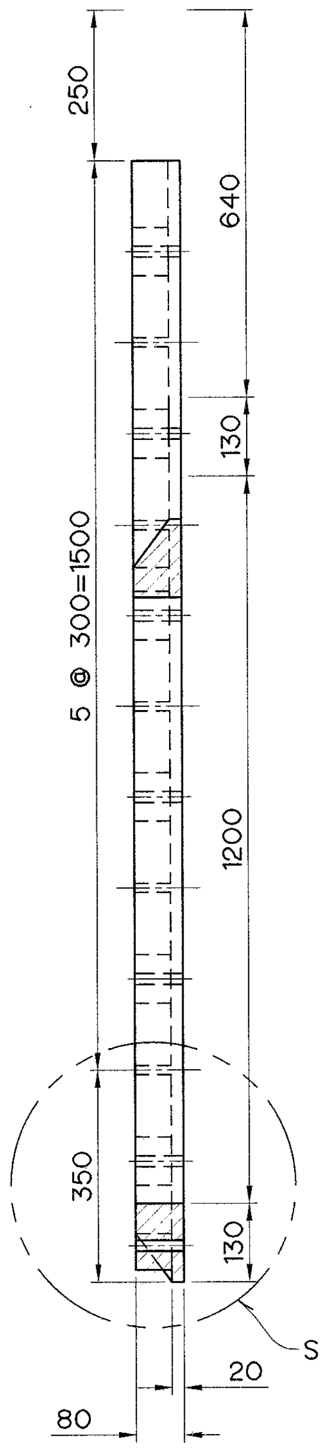
## SECTION A–A

NOT TO SCALE



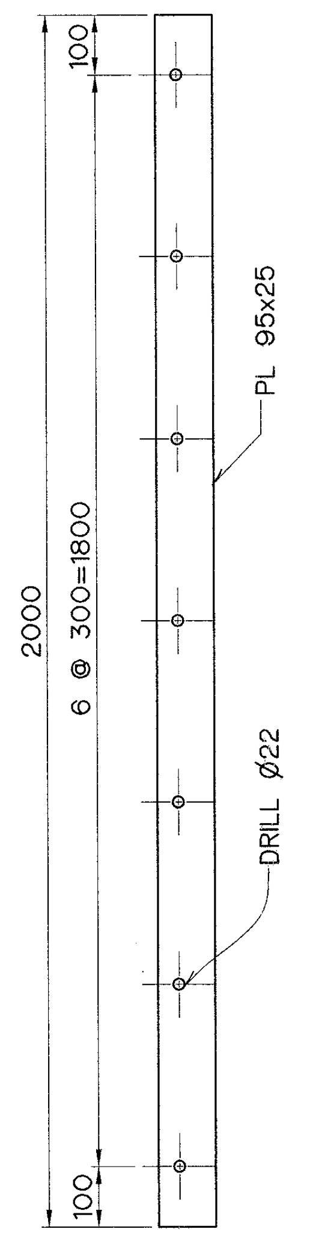
## GATE SEAT

NOT TO SCALE



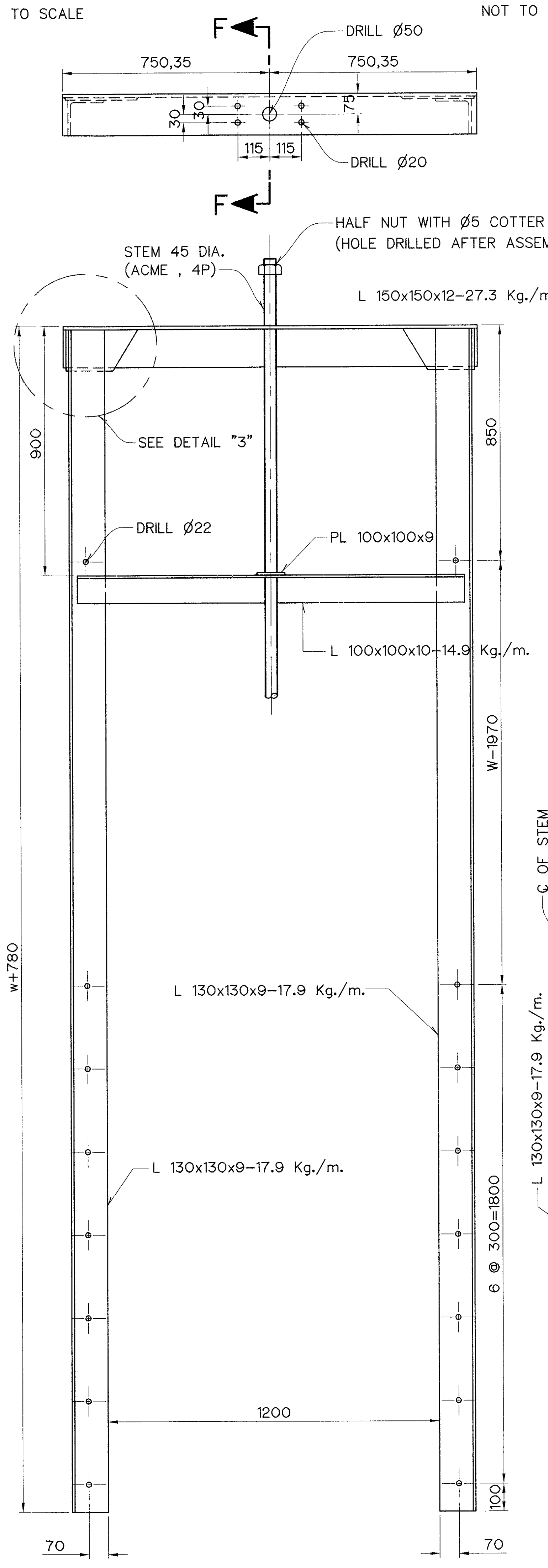
## SECTION E–E

NOT TO SCALE



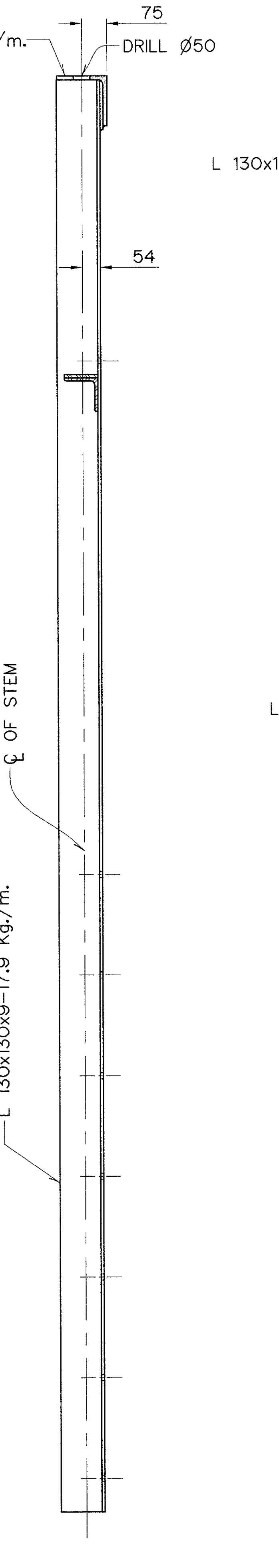
## FILLER

NOT TO SCALE



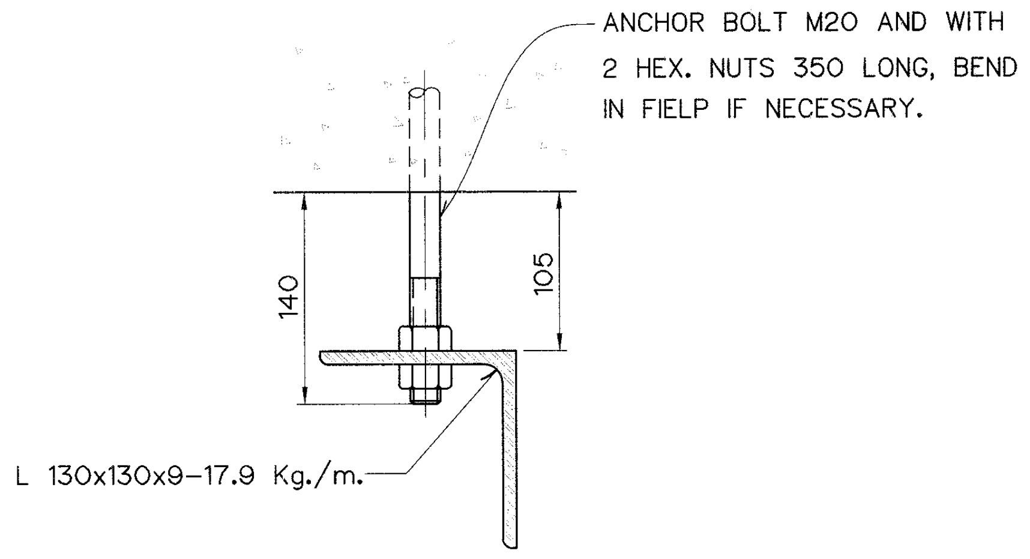
## FRAME

NOT TO SCALE



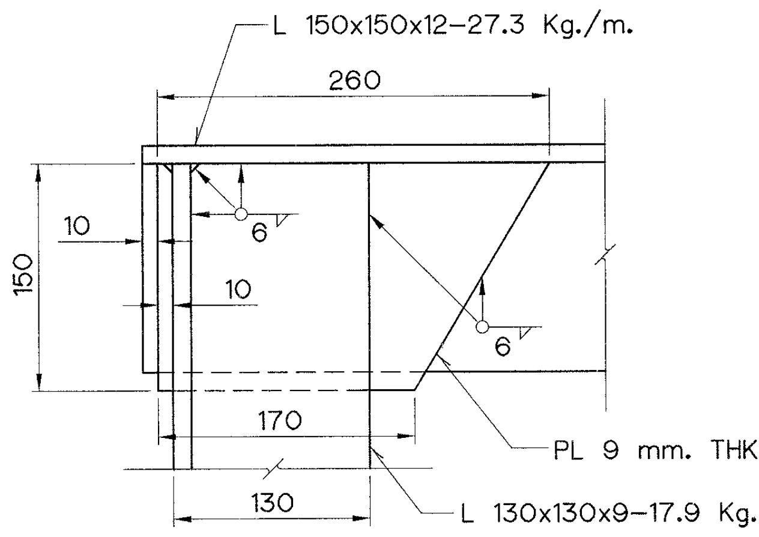
## SECTION F–F

NOT TO SCALE



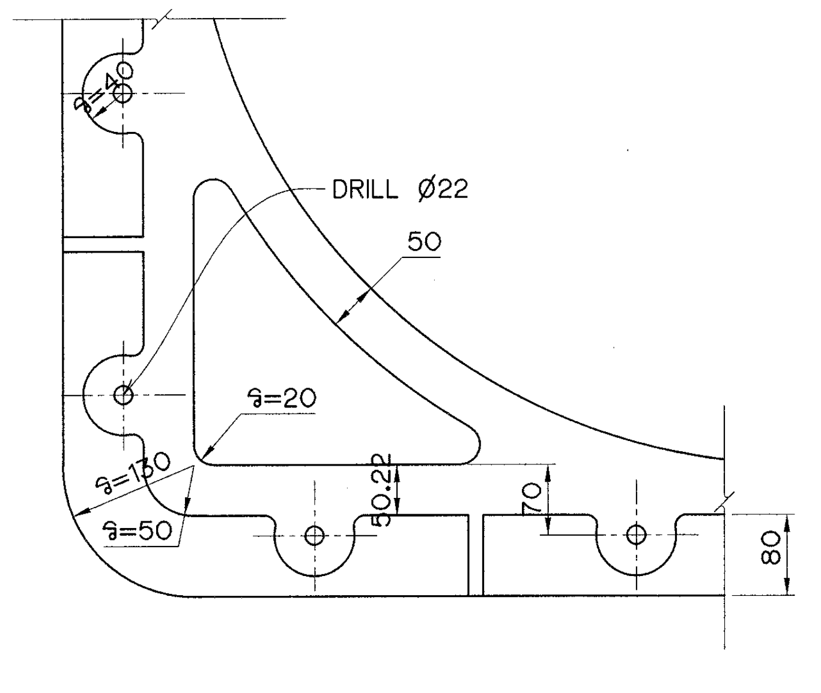
## SECTION B–B

NOT TO SCALE



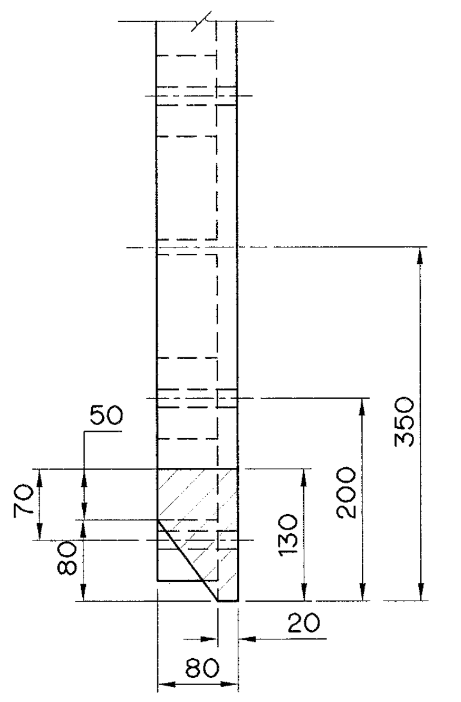
## DETAIL "3"

NOT TO SCALE



## DETAIL "1"

NOT TO SCALE



## DETAIL "2"

NOT TO SCALE

NOTE :

1. ALL DIMENSIONS ARE IN MILLIMETERS, UNLESS OTHERWISE SHOWN.
2. ALL WELDING WILL BE 6 MILLIMETERS, UNLESS OTHERWISE SHOWN.
3. ALL BOLTS AND NUTS USE ASTM A325.
4. ALL STRUCTURAL STEELS ARE JIS G 3101 SS400
5. ALL STAINLESS STEELS PLATES ARE JIS G 4304 SUS 304.

REFERENCE DWGS :

| | | |
|---|---|---|
| 1. | GATE–LIFT PEDESTAL AND HAND WHEEL | MH–WE–10 |
| 2. | VERTICAL SCREW–LIFT CAPACITY 1,750 KG. | MH–WE–11 |

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
|---|---|---|---|---|
| 3 | | | | |
| 2 | | | | |
| 1 | | | | |
| | CONSULTANTS | | DEDE | |

KINGDOM OF THAILAND
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
WEIR
DIA. 1.20 m. VERTICAL GATE

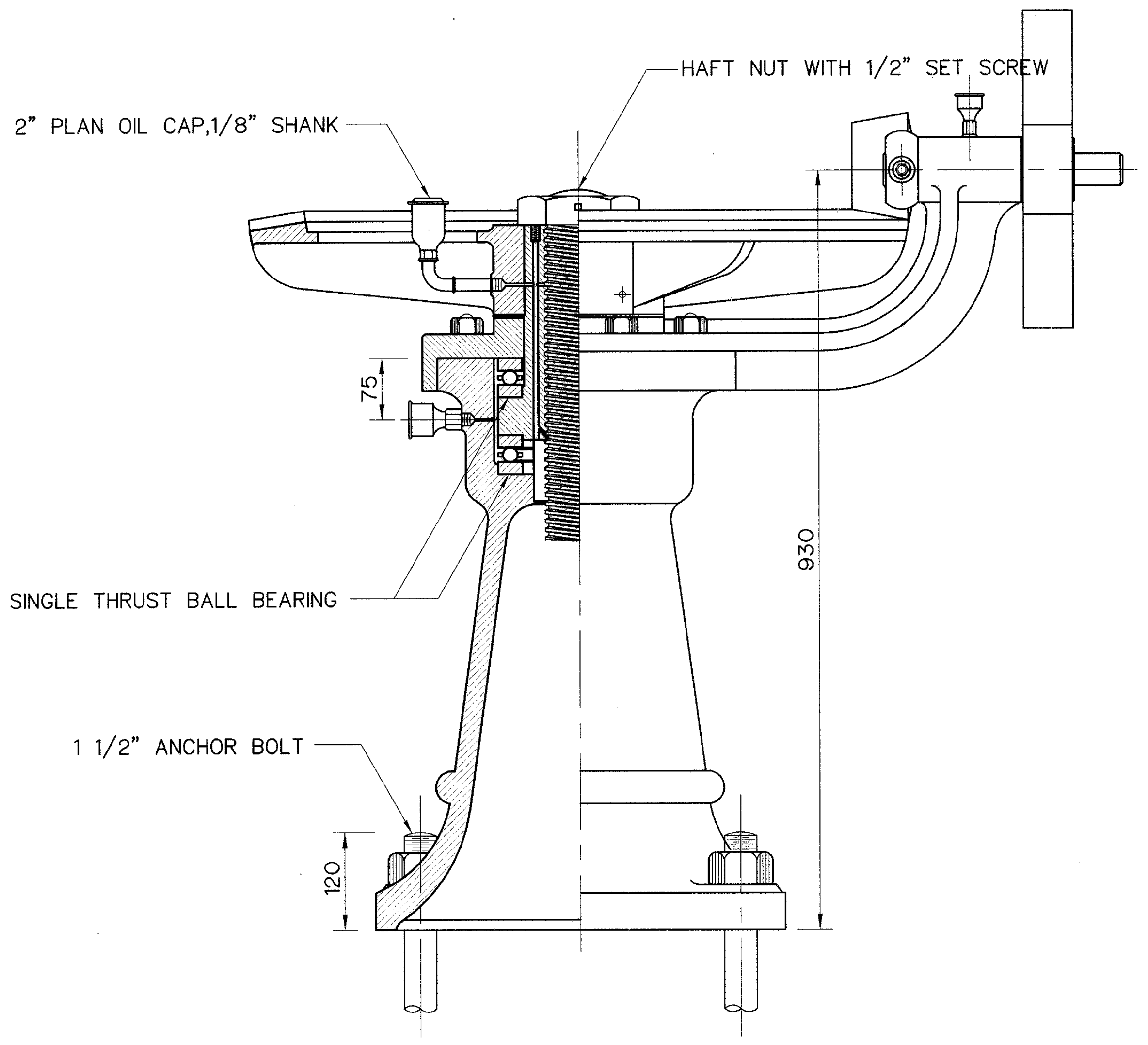
P&C MANAGEMENT CO.,LTD.

DESIGNED ภย.64624 สย.6226
DRAWN
CHECKED สย.6226
PROJECT MANAGER
DATE 08/03/2559

Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

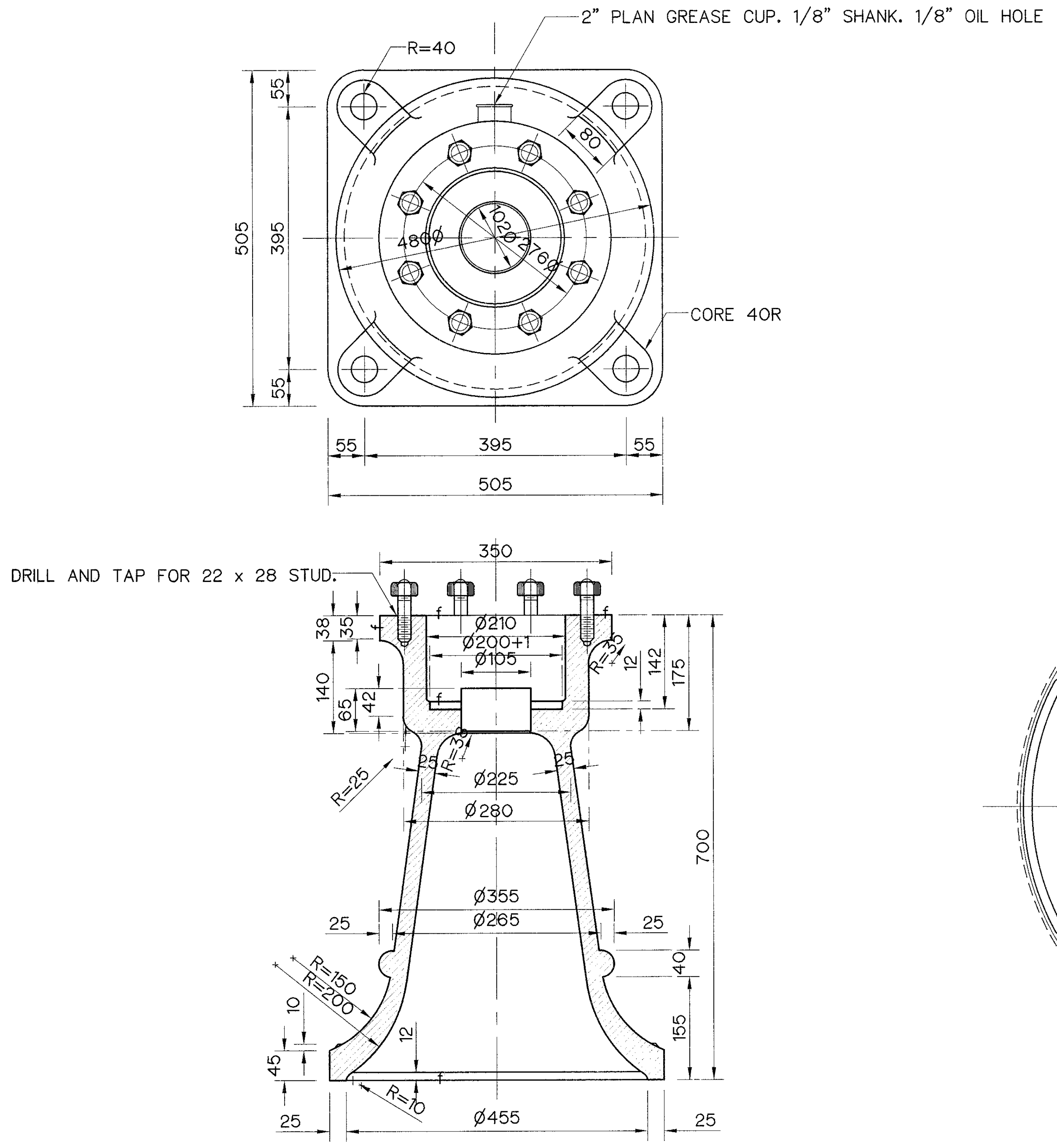
REVIEWED
SUBMITTED
RECOMMENDED
APPROVED P. Hans..

DRAWING NO. MH–WE–08
SHEET NO. 21 OF 130


2" PLAN OIL CAP,1/8" SHANK
HAFT NUT WITH 1/2" SET SCREW
SINGLE THRUST BALL BEARING
1 1/2" ANCHOR BOLT
75
930
120

## ASSEMBLY

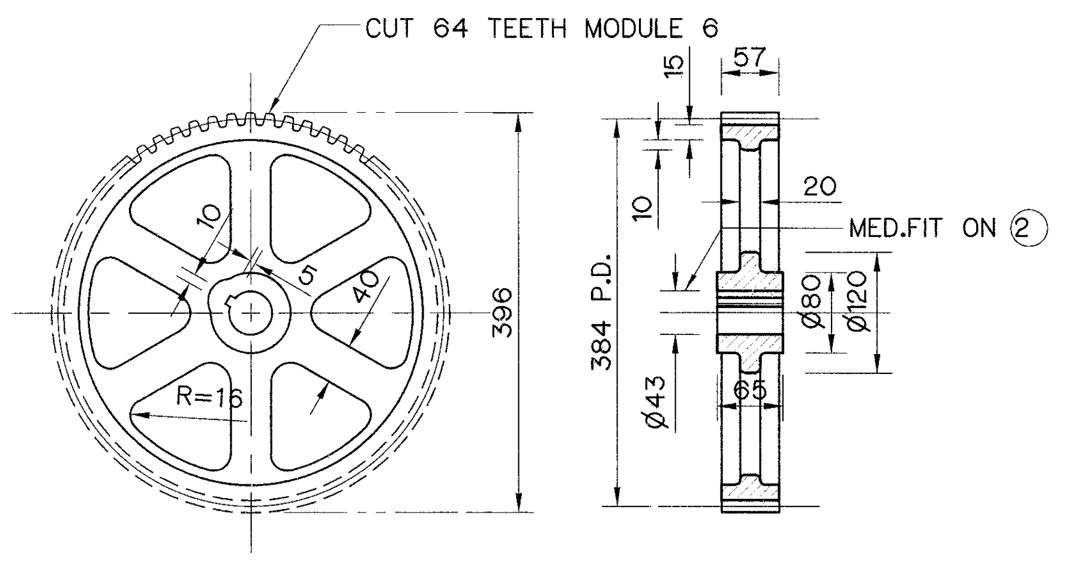
SCALE 1 : 7.5



## PEDESTAL

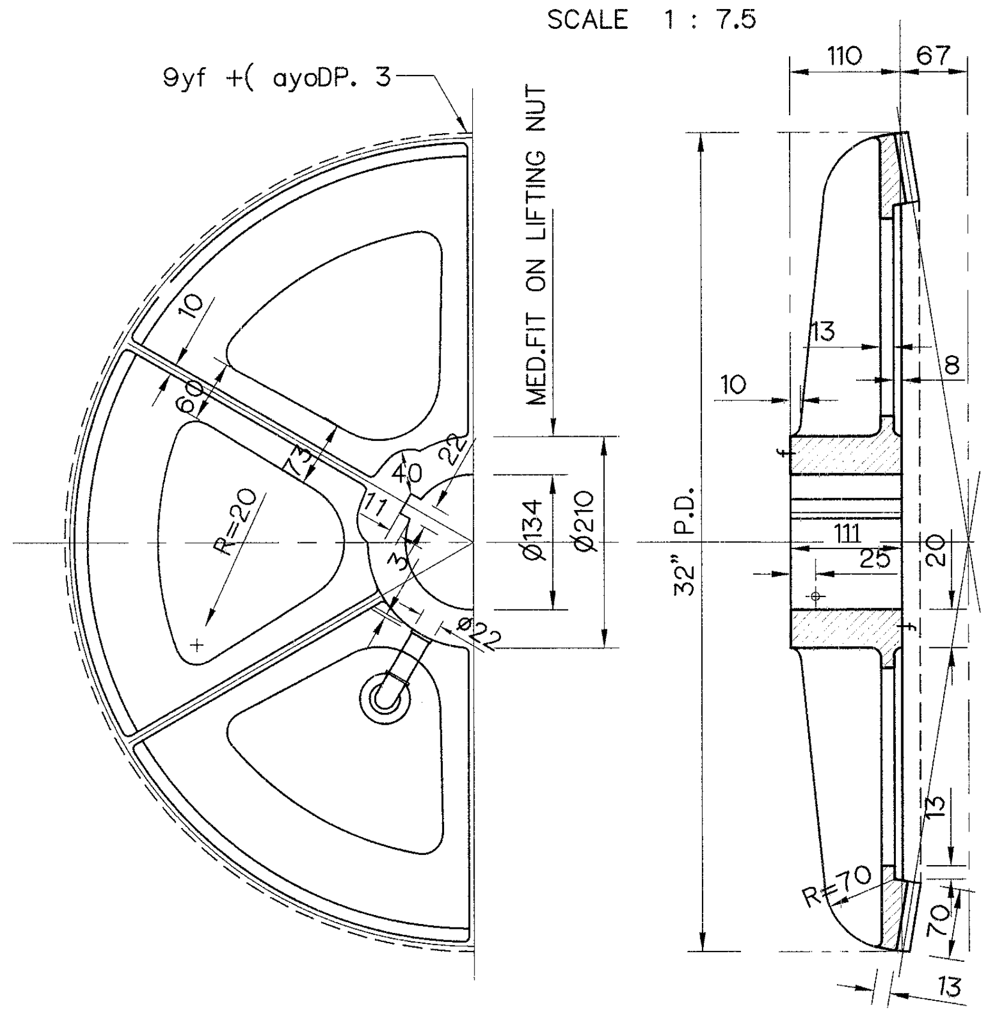
**CAST IRON**

SCALE 1 : 7.5



## SPUR GEAR

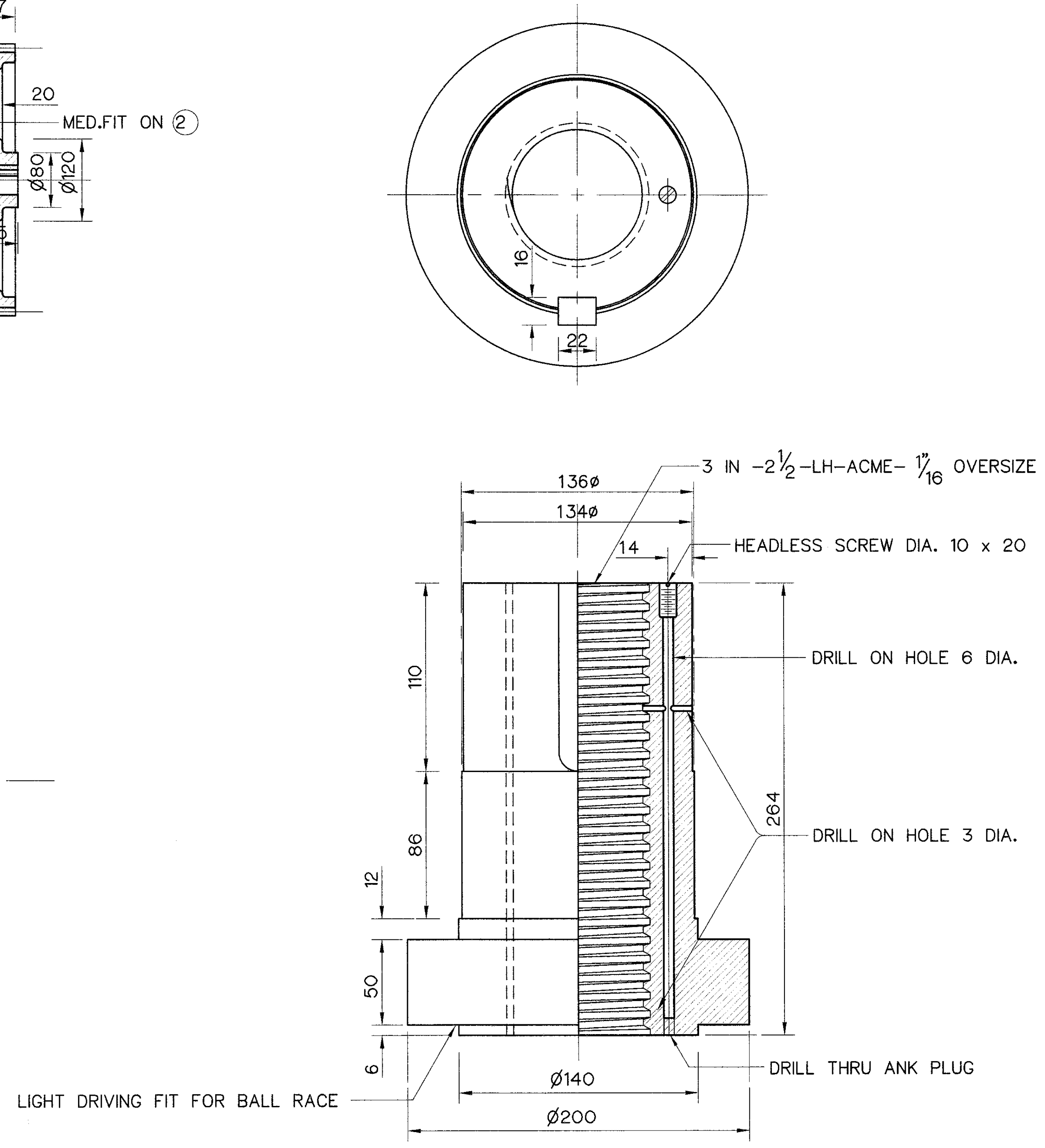
SCALE 1 : 7.5



## BEVEL GEAR

**CAST IRON**

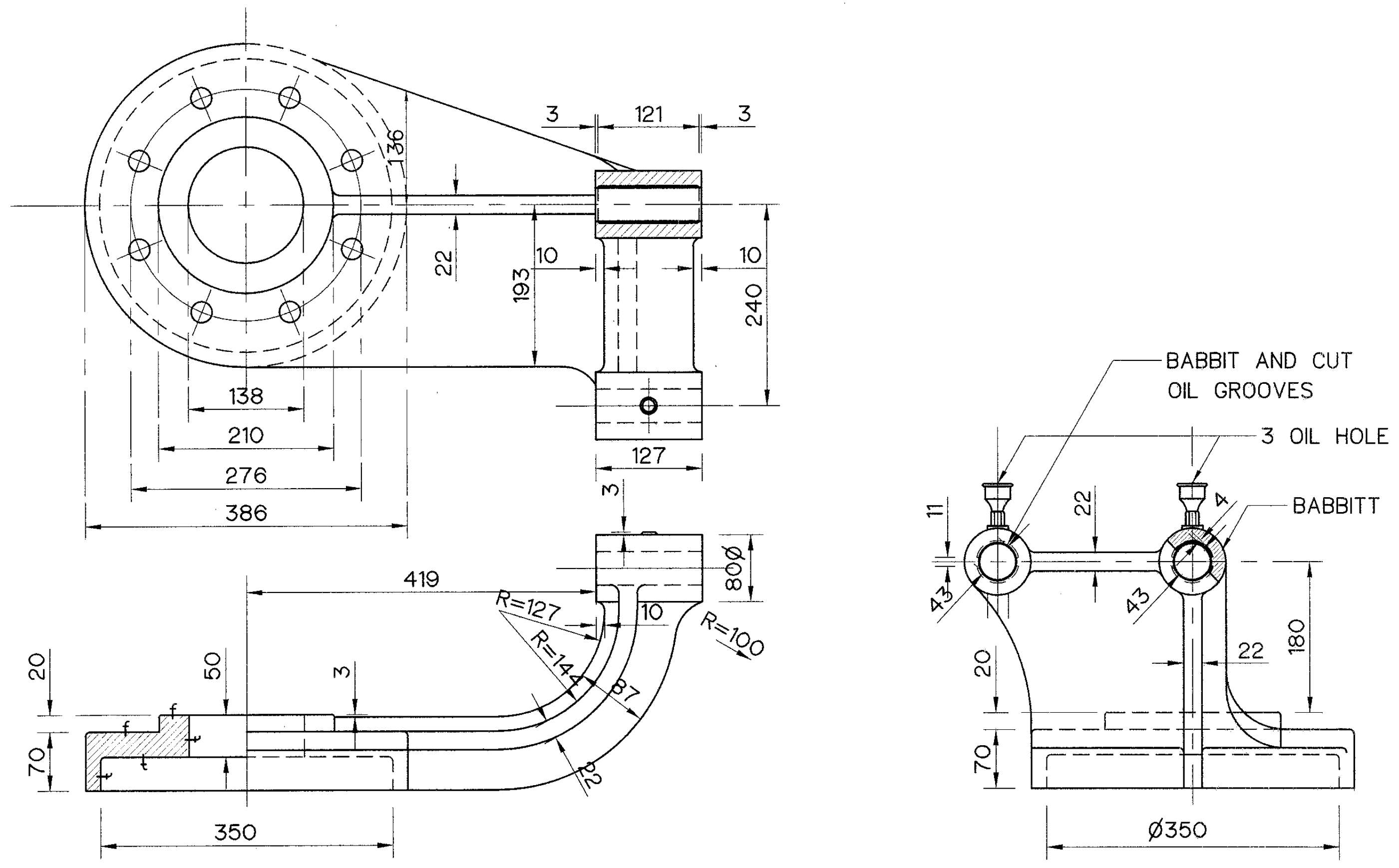
SCALE 1 : 7.5


3 IN -2½-LH-ACME- 1⁄16 OVERSIZE
136Ø
134Ø
HEADLESS SCREW DIA. 10 x 20
DRILL ON HOLE 6 DIA.
DRILL ON HOLE 3 DIA.
DRILL THRU ANK PLUG
LIGHT DRIVING FIT FOR BALL RACE
264
Ø140
Ø200

## LIFTING NUT

**PHOSPHOR BRONZE**

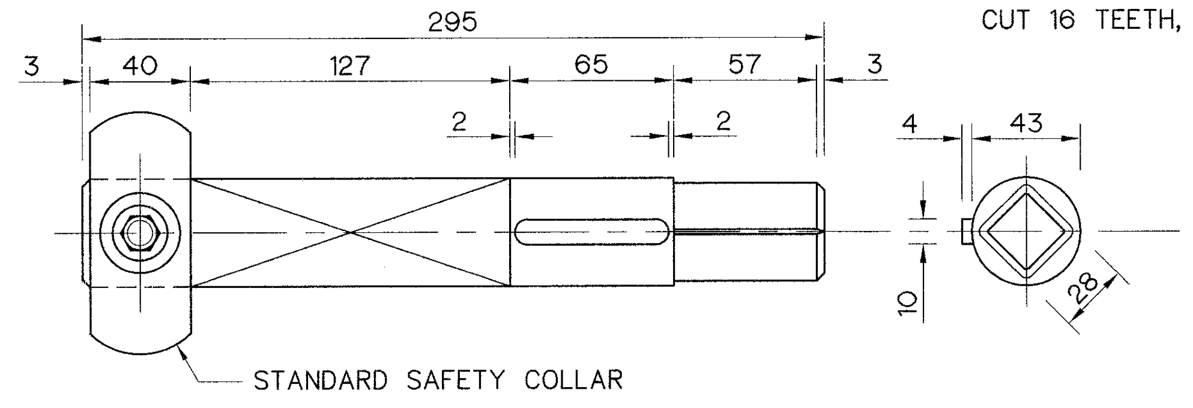
SCALE 1 : 3



## GAP AND BEARING

**CAST IRON**

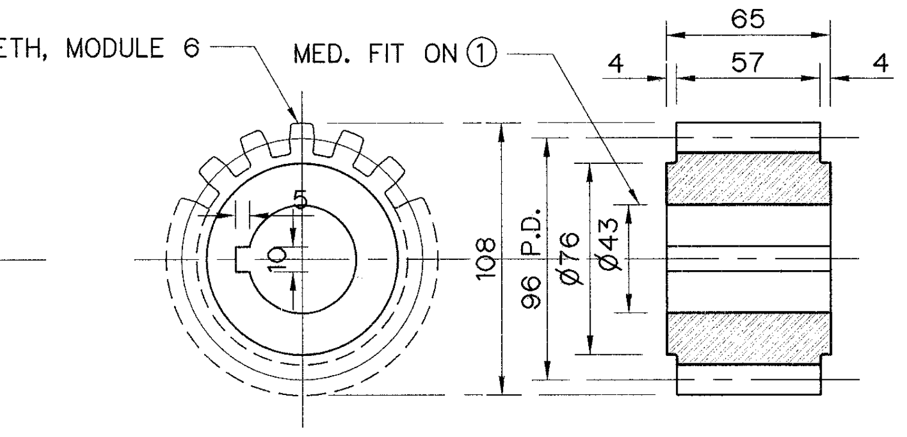
SCALE 1:7.5



## BEVEL PINION SHAFT

**COLD ROLLED STEEL**

SCALE 1 : 3



## SPUR PINION

**CAST IRON**

SCALE 1 : 3

**NOTES :**

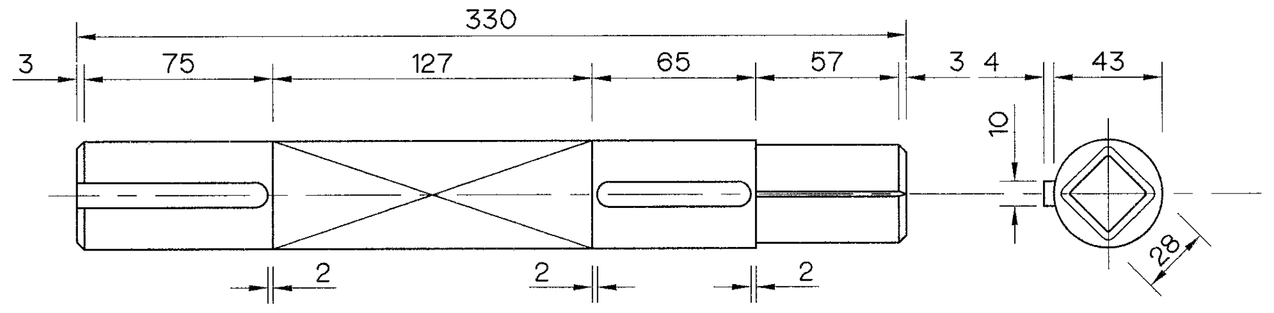
1. ALL DIMENSIONS ARE IN MILLIMETER, UNLESS OTHERWISE SHOWN.
2. THIS DRAWING IS DESIGNED FOR GUIDE LINE ONLY, THE CONTRACTOR HAS TO SUBMITTED SHOP DRAWING TO FIELD ENGINEER FOR APPROVAL

0 0.05 0.1 0.2 0.25

SCALE 1:3 METERS

0 0.1 0.2 0.3 0.4 0.5 0.6

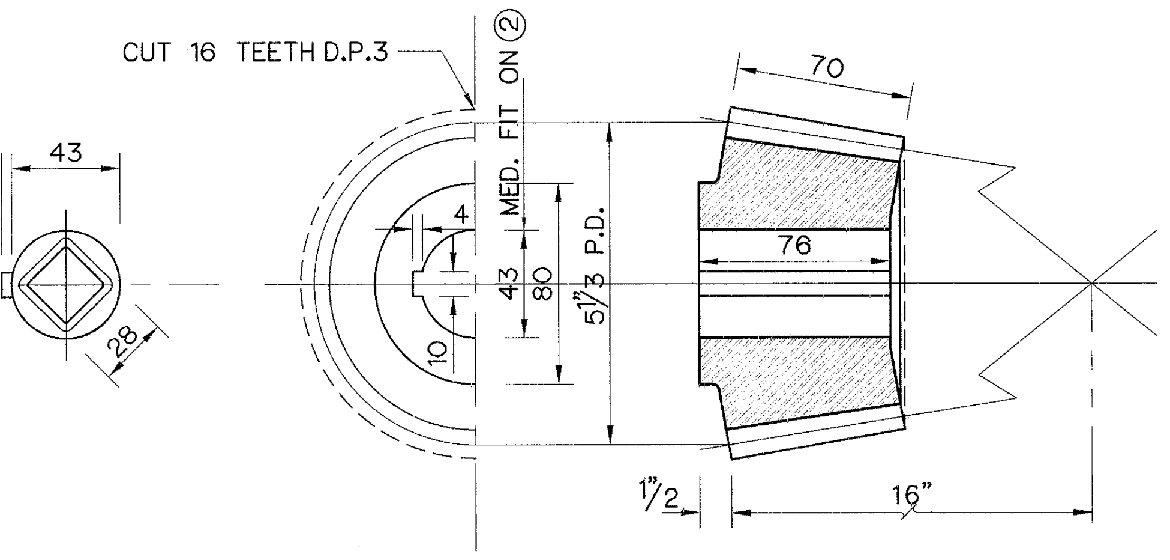
SCALE 1:7.5 METERS



## BEVEL GEAR SHAFT

**COLD ROLLED STEEL**

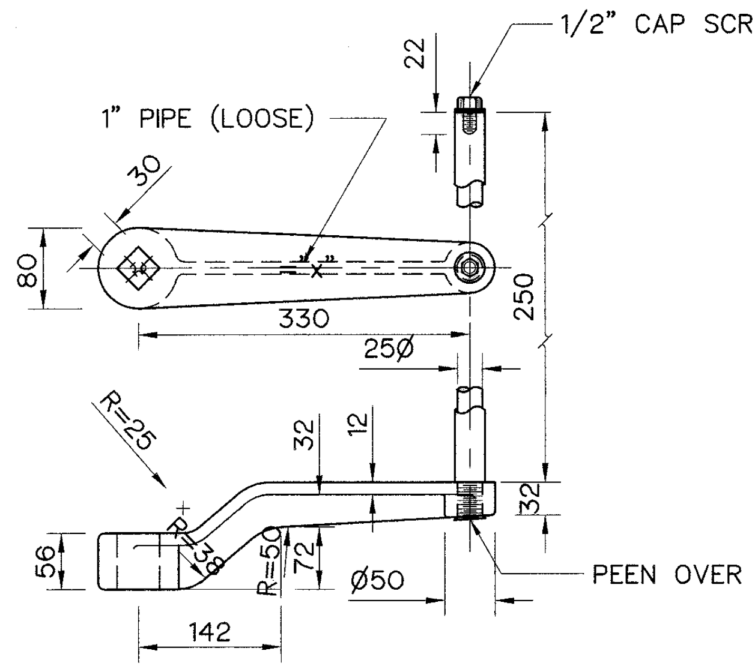
SCALE 1 : 3



## BEVEL PINION

**CAST IRON**

SCALE 1 : 3



## CRANK ARM

**CAST IRON**

SCALE 1 : 7.5

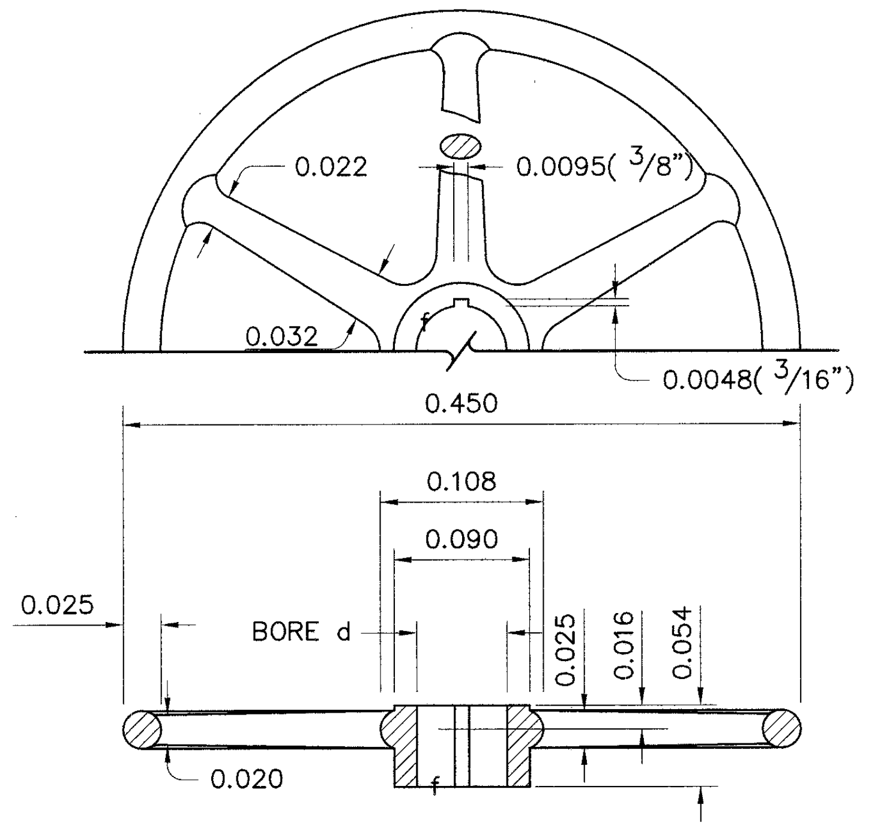
KINGDOM OF THAILAND
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
WEIR
PEDESTAL SCREW LIFT CAPACITY 6.5 TONS

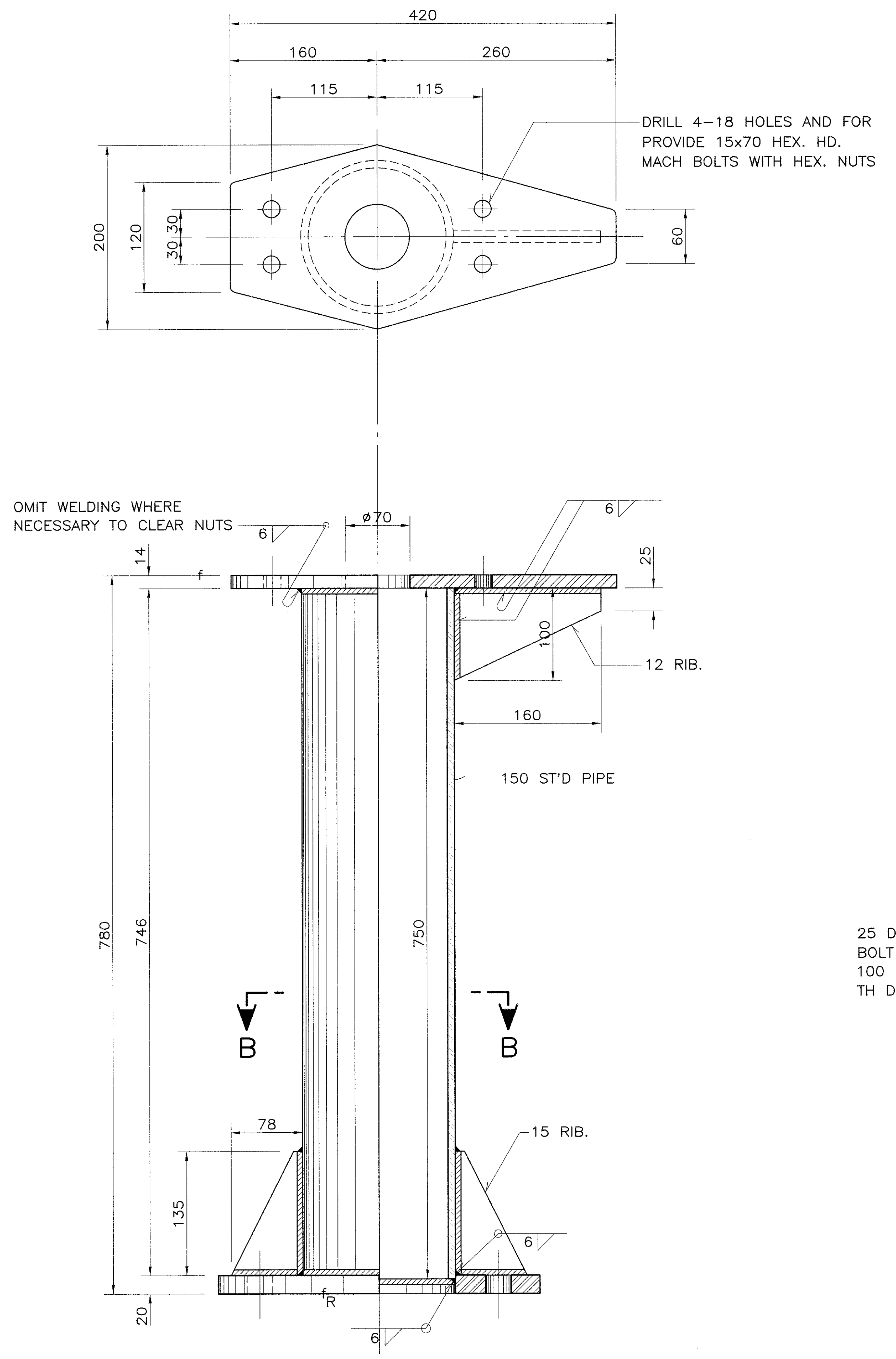
| NO. | DATE | REVISIONS | CHECKED | APPROVED |
|---|---|---|---|---|
| 3 | | | | |
| 2 | | | | |
| 1 | | | | |
| | CONSULTANTS | | DEDE | |

| P&C MANAGEMENT CO.,LTD. | | Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY | |
|---|---|---|---|
| | | REVIEWED | |
| DESIGNED | ลก.1950 | SUBMITTED | Chait |
| DRAWN | | RECOMMENDED | |
| CHECKED | ลก.1950 | APPROVED | P. Hamill. |
| PROJECT MANAGER | DATE 08/03/2559 | DRAWING NO. MH-WE-09 | SHEET NO. 22 OF 130 |



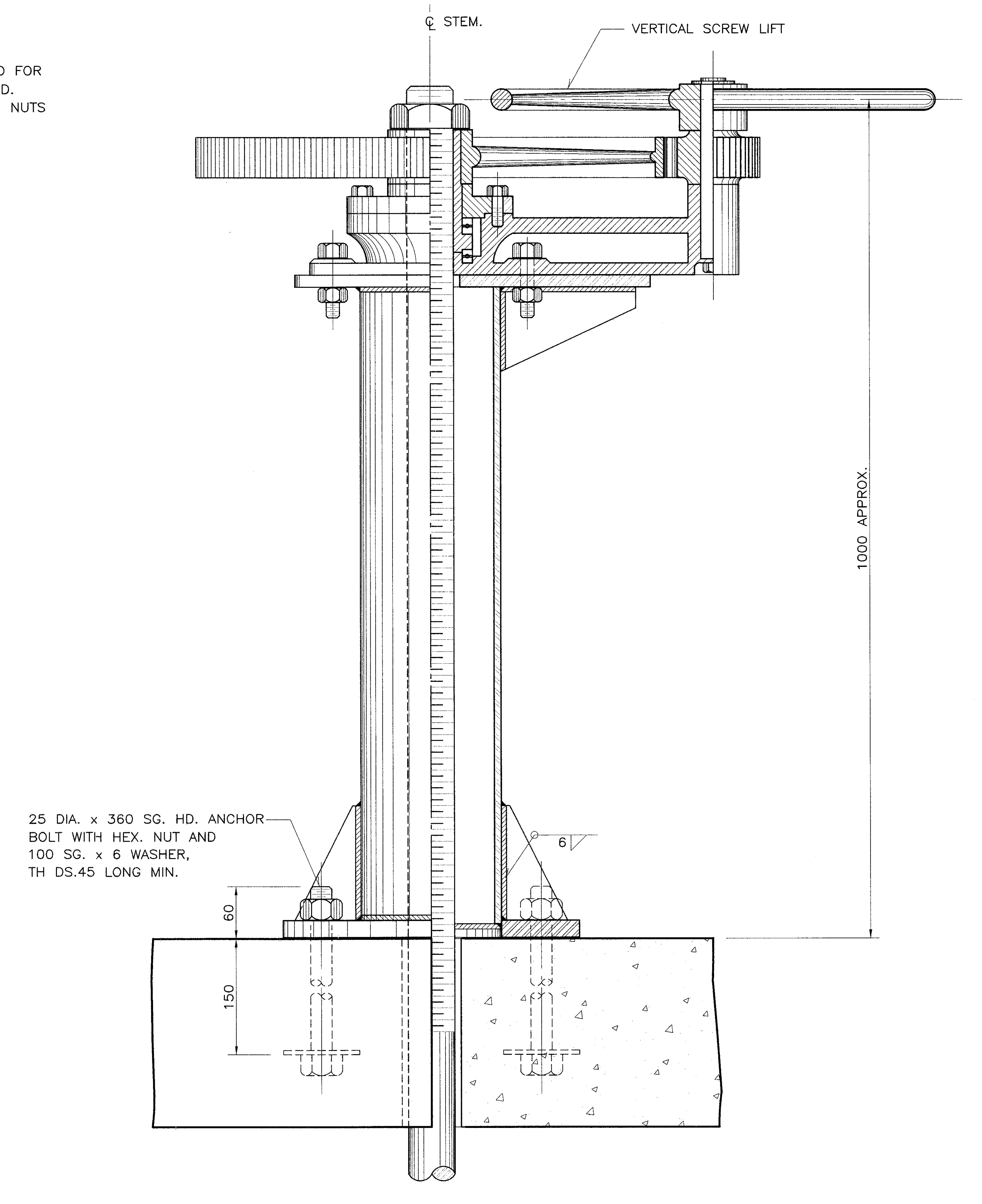
## 45–CM. DIA. HAND WHEEL

NOT TO SCALE


420
160
260
115
115
DRILL 4–18 HOLES AND FOR PROVIDE 15x70 HEX. HD. MACH BOLTS WITH HEX. NUTS
200
120
30 30
60
OMIT WELDING WHERE NECESSARY TO CLEAR NUTS
ø70
6
6
14
25
100
12 RIB.
160
150 ST'D PIPE
780
746
750
B
B
78
15 RIB.
135
20
6
6
R

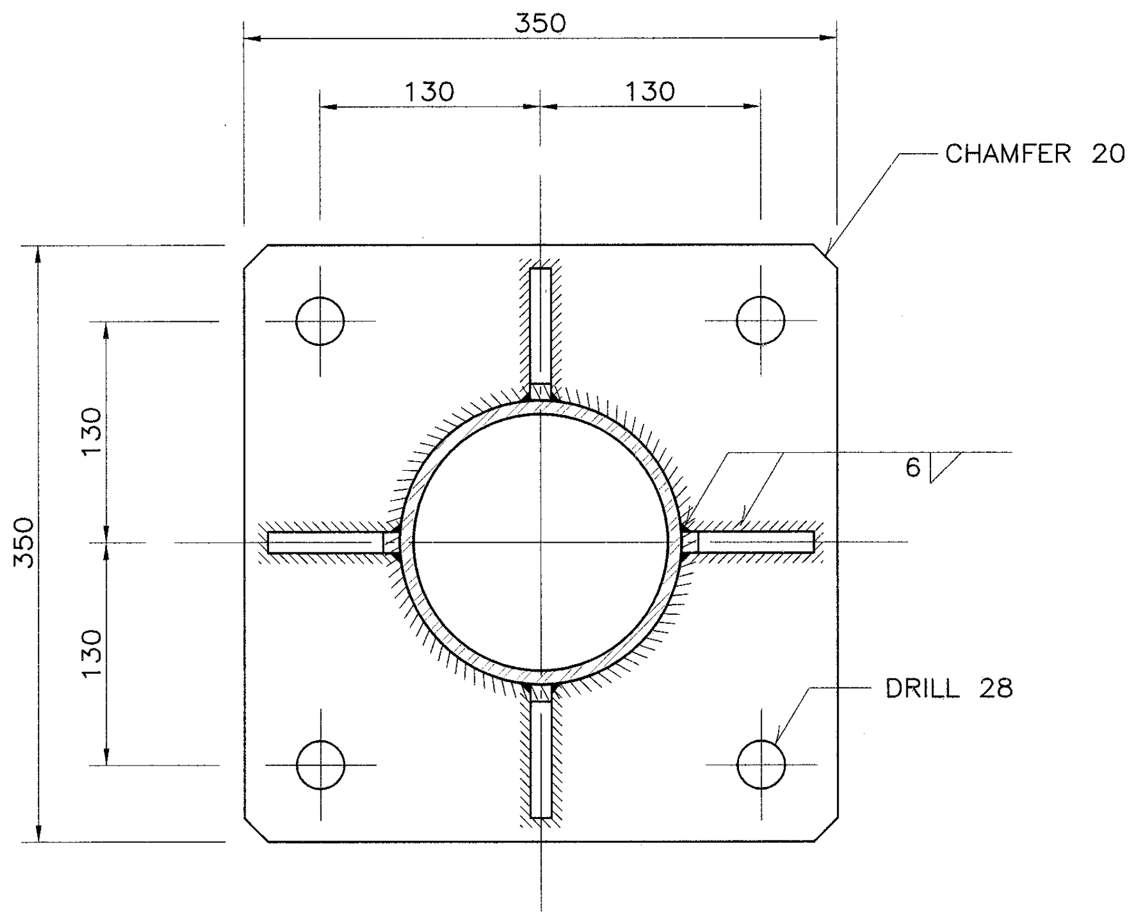
## PEDESTAL

NOT TO SCALE


℄ STEM.
VERTICAL SCREW LIFT
1000 APPROX.
25 DIA. x 360 SG. HD. ANCHOR BOLT WITH HEX. NUT AND 100 SG. x 6 WASHER, TH DS.45 LONG MIN.
6
60
150

## INSTALLATION

NOT TO SCALE



## SECTION B–B

NOT TO SCALE

NOTES :

1. ALL DIMENSIONS ARE IN MILLIMETER, UNLESS OTHERWISE SHOWN.

KINGDOM OF THAILAND
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
WEIR
GATE–LIFT PEDESTAL AND HAND WHEEL

| | | | | |
|---|---|---|---|---|
| 3 | | | | |
| 2 | | | | |
| 1 | | | | |
| NO. | DATE | REVISIONS | CHECKED | APPROVED |
| | CONSULTANTS | | DEDE | |

P&C MANAGEMENT CO.,LTD.

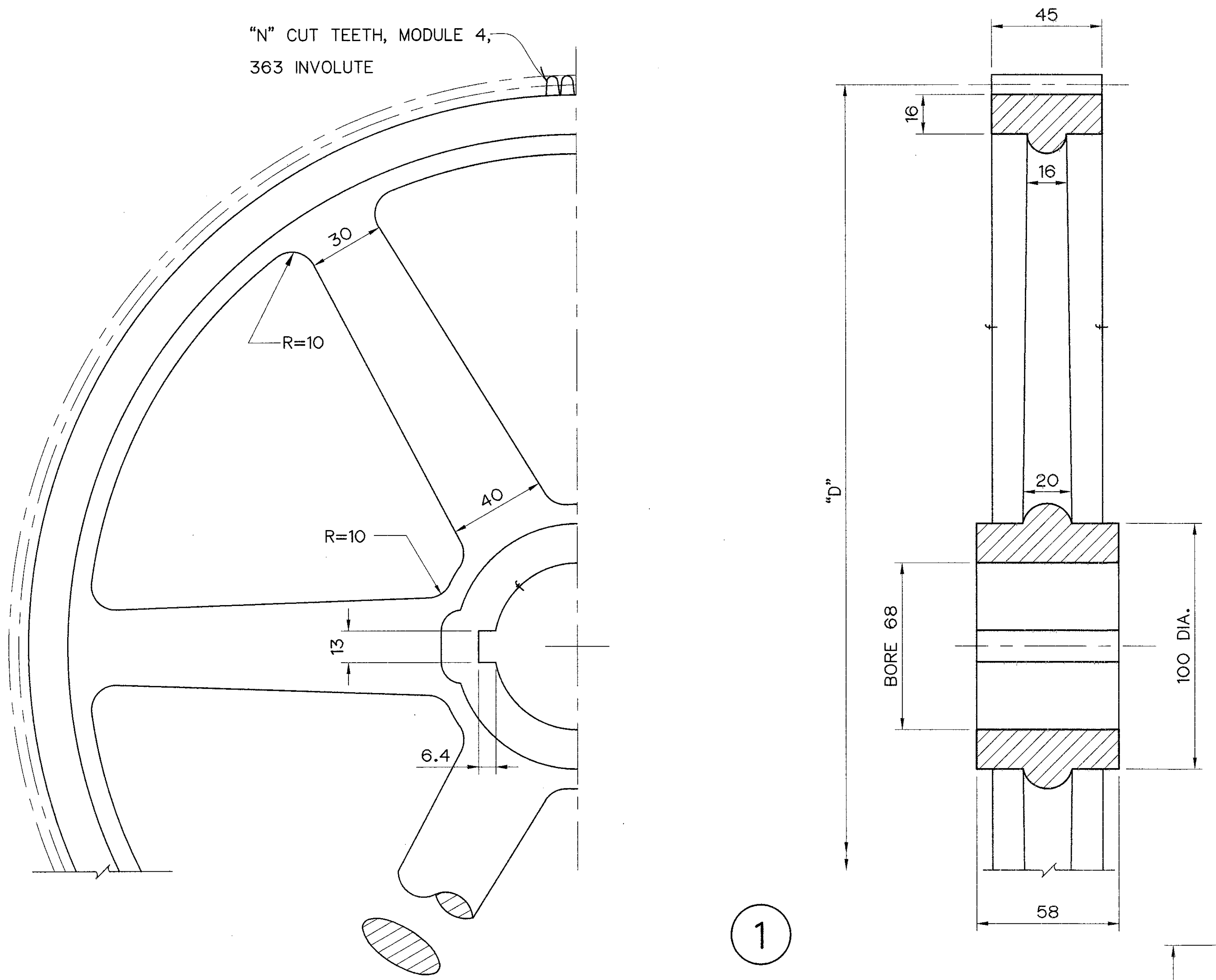
DESIGNED ลก.1950
DRAWN
CHECKED ลก.1950

08/03/2559
PROJECT MANAGER DATE

Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

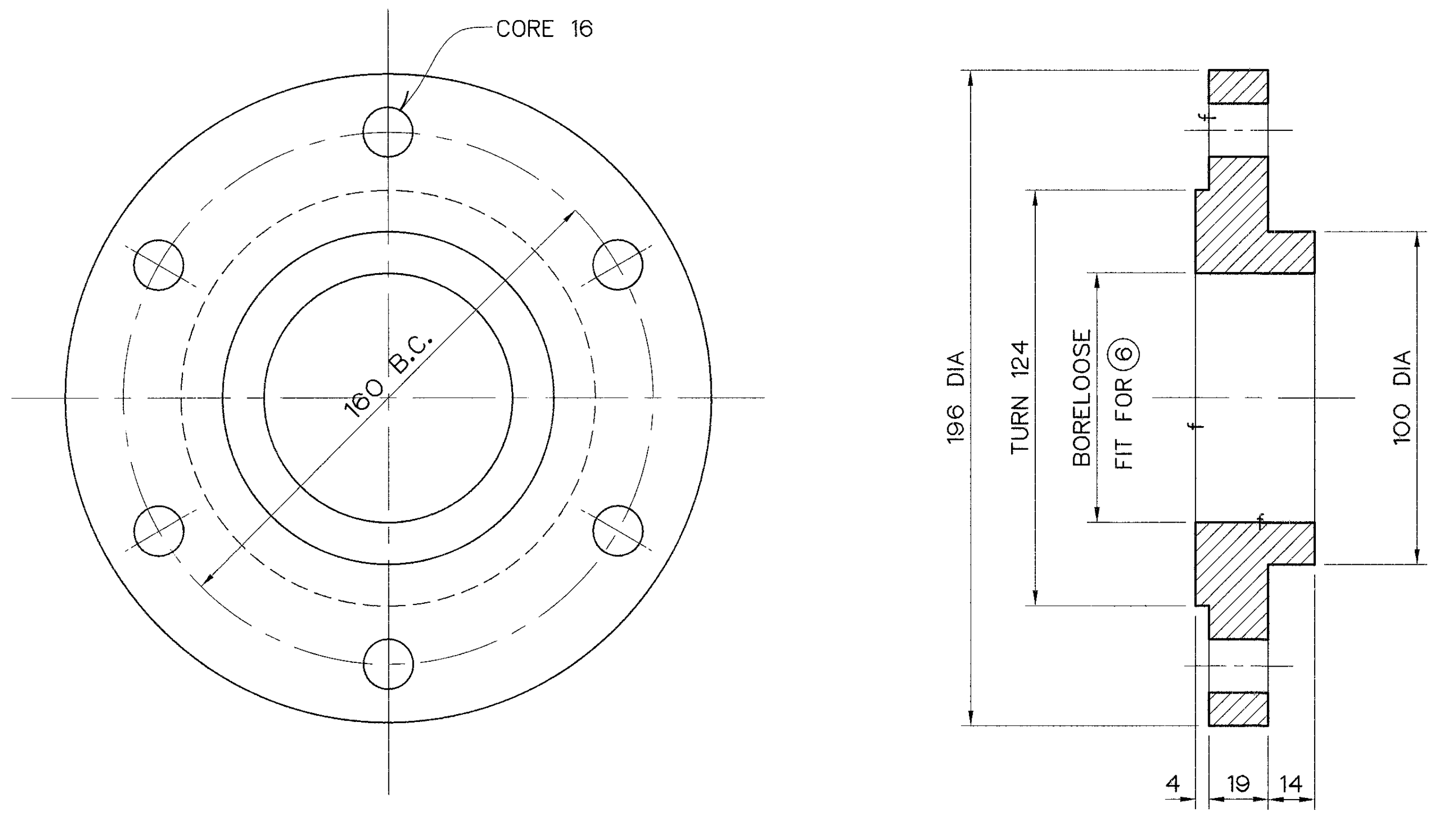
REVIEWED
SUBMITTED Chaiwit
RECOMMENDED
APPROVED P. Hansell

DRAWING NO. MH–WE–10
SHEET NO. 23 OF 130



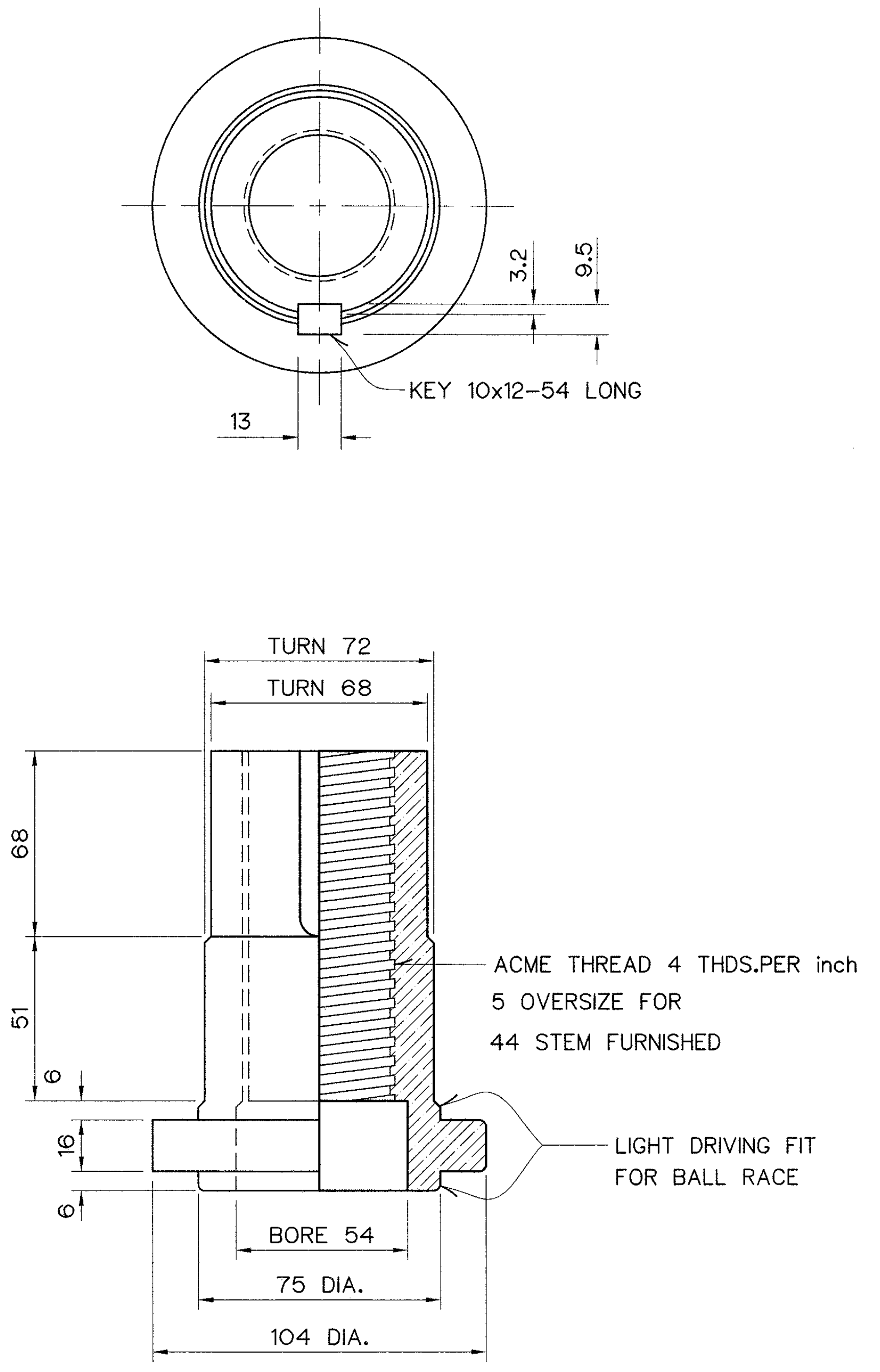
① 
## SPUR GEAR
CAST IRON

NOT TO SCALE



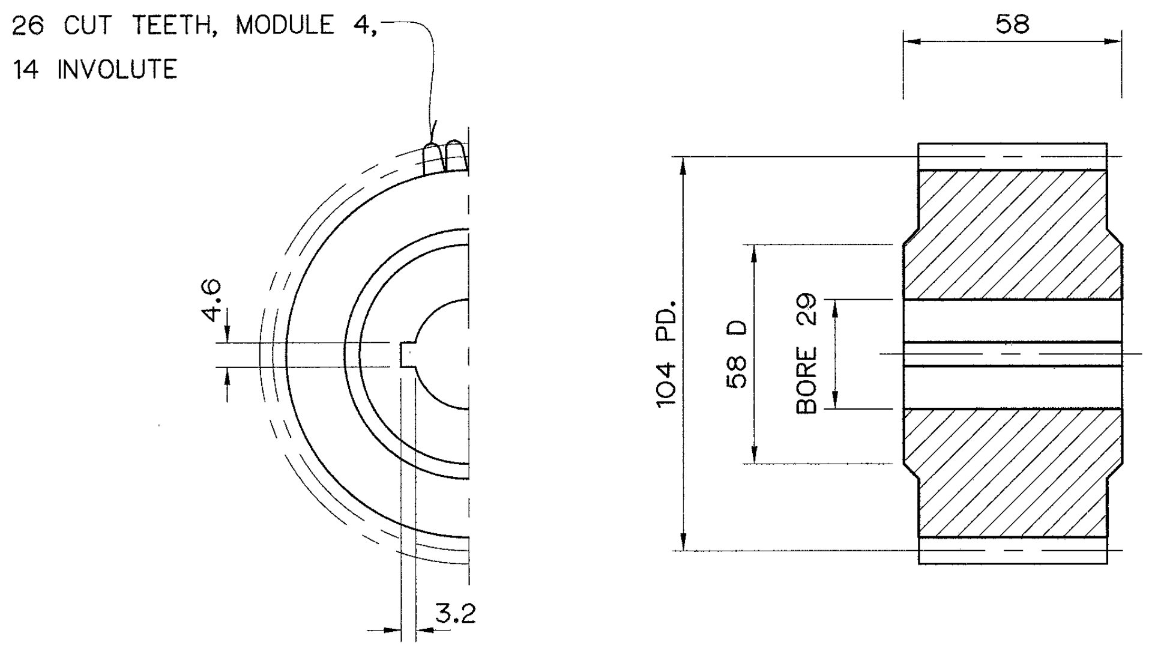
④
## COVER PLATE
CAST IRON

NOT TO SCALE



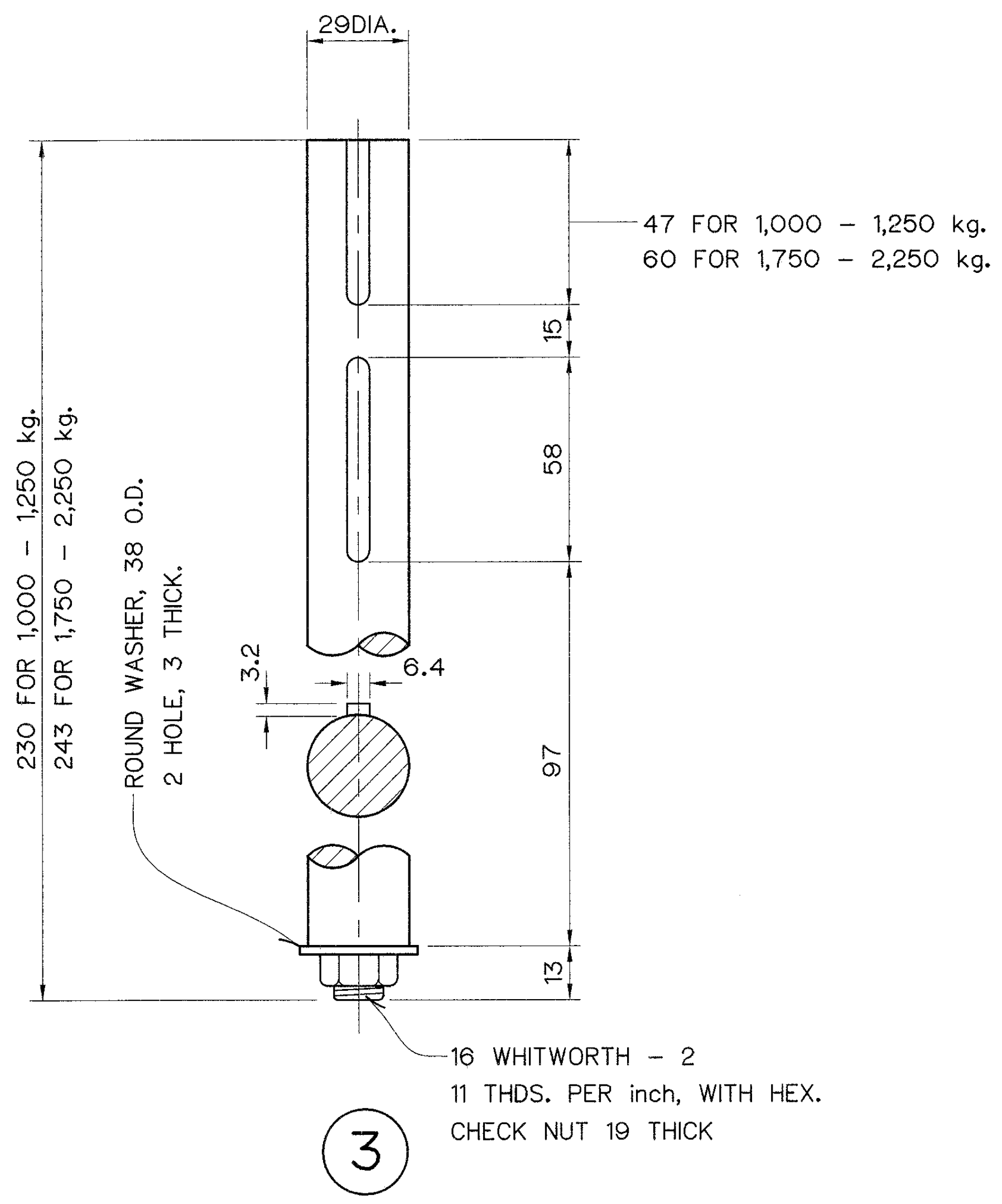
⑥
## LIFTING NUT
BRONZE

NOT TO SCALE



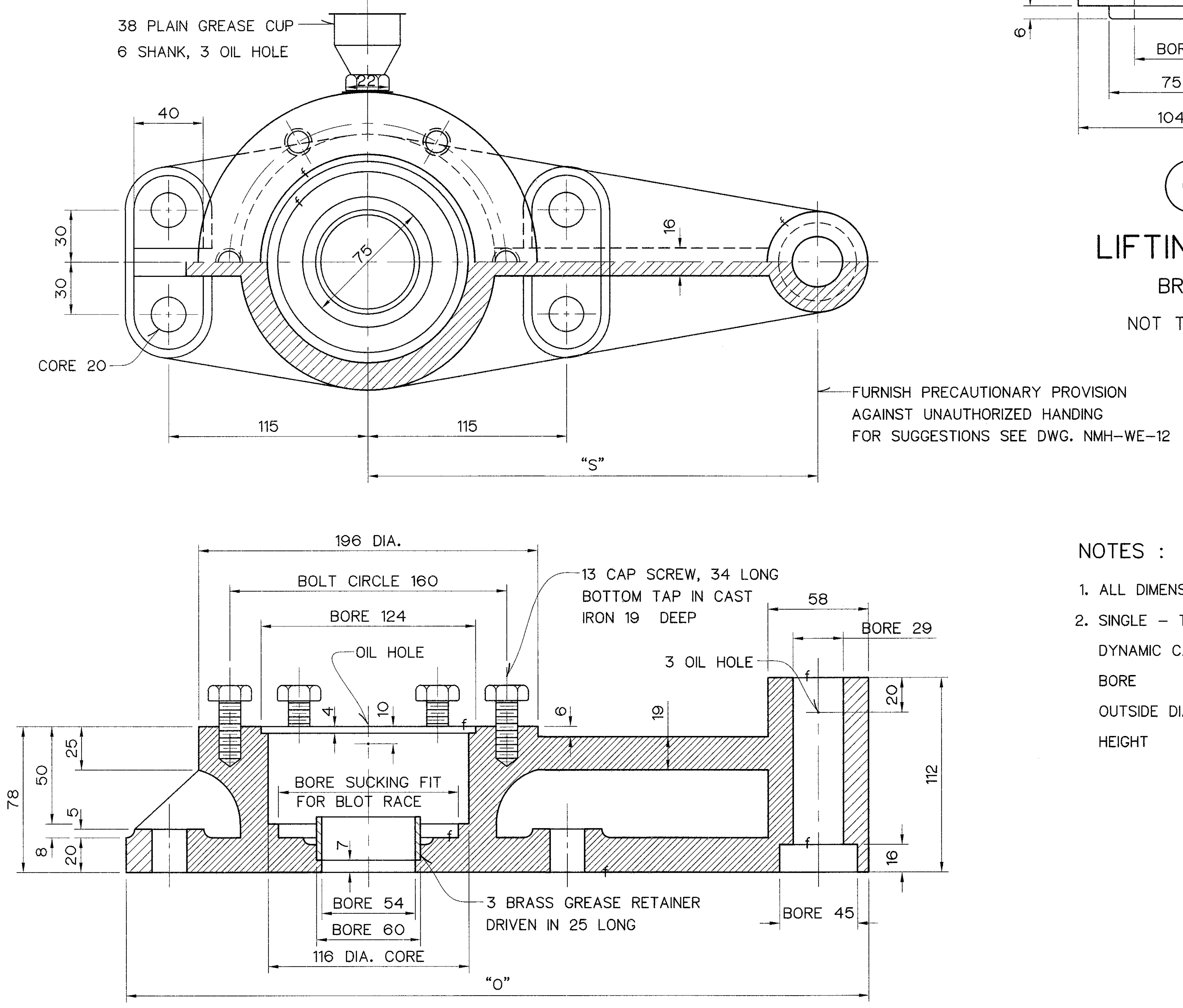
②
## PINION
CAST IRON

NOT TO SCALE



③
## PINION SHAFT
MILD STEEL

NOT TO SCALE



⑤
## BASE
CAST IRON

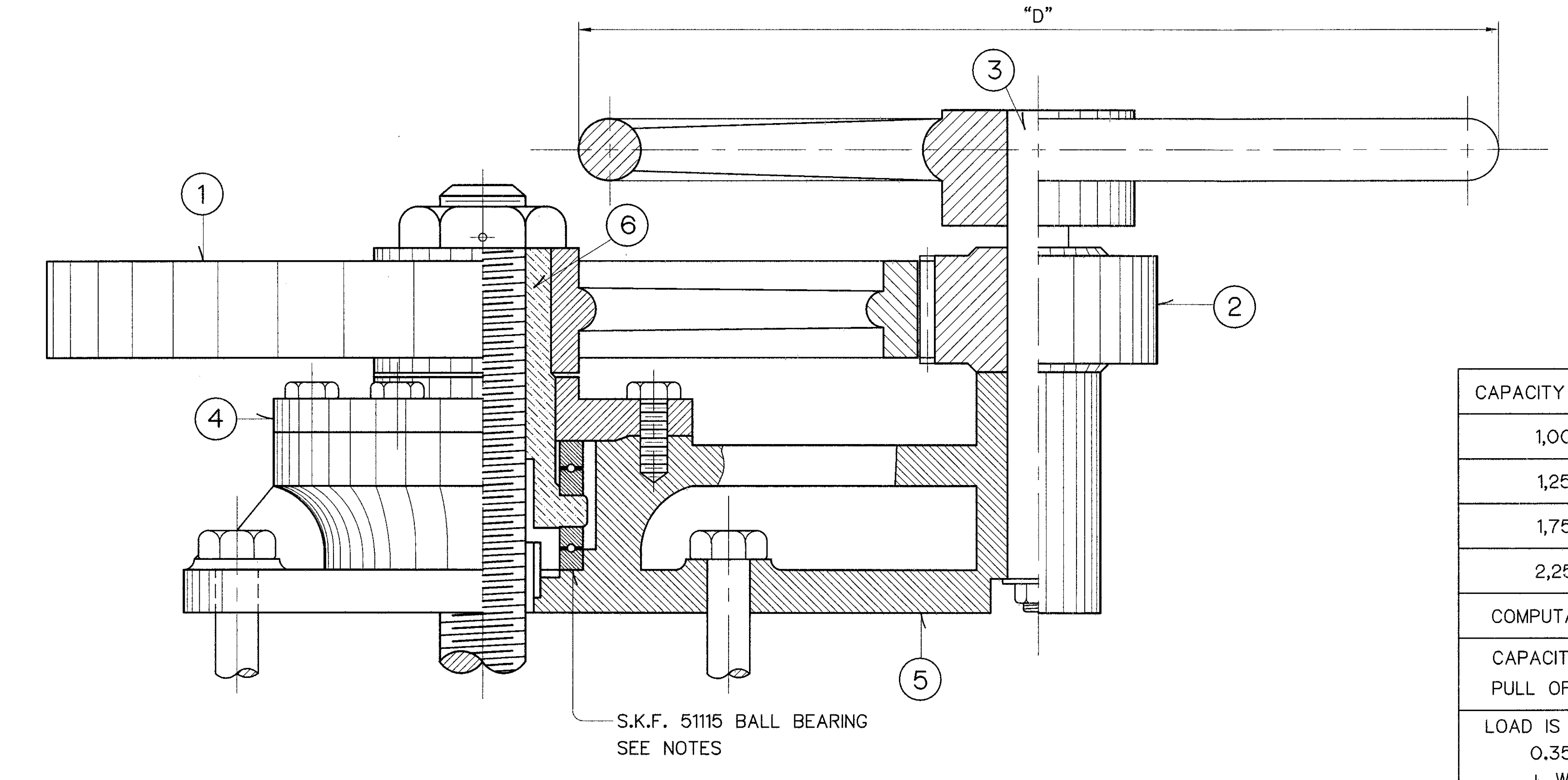
NOT TO SCALE

NOTES :

1. ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT AS SHOWN
2. SINGLE – THRUST BALL BEARING S.K.F. 51115

DYNAMIC CAPACITY = 8150 LBS. ( 3,700 kg.)

| | |
|---|---|
| BORE | = 75 |
| OUTSIDE DIAMETER | = 100 |
| HEIGHT | = 19 |



## ASSEMBLY
NOT TO SCALE

| CAPACITY ( Kg. ) | "N" | "D" | "S" | "O" | "D1" |
|---|---|---|---|---|---|
| 1,000 | 104 | 416 | 260 | 429 | 300 |
| 1,250 | 104 | 416 | 260 | 429 | 380 |
| 1,750 | 130 | 520 | 312 | 481 | 450 |
| 2,250 | 143 | 572 | 338 | 502 | 530 |

COMPUTATION NO. SCREW LIFT I

CAPACITY IS BASED ON A HANDWHEEL PULL OF 9 KG. (4.5 KG.PER HAND)

LOAD IS EQUAL TO 0.35xWATER PRESSUREON GATE LEAL + WEIGHT OF GATE AND STEM.

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
|---|---|---|---|---|
| 3 | | | | |
| 2 | | | | |
| 1 | | | | |

CONSULTANTS DEDE

KINGDOM OF THAILAND
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
WEIR
VERTICAL SCREW-LIFT CAPACITY 1,750 KG.

P&C MANAGEMENT CO.,LTD.

Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

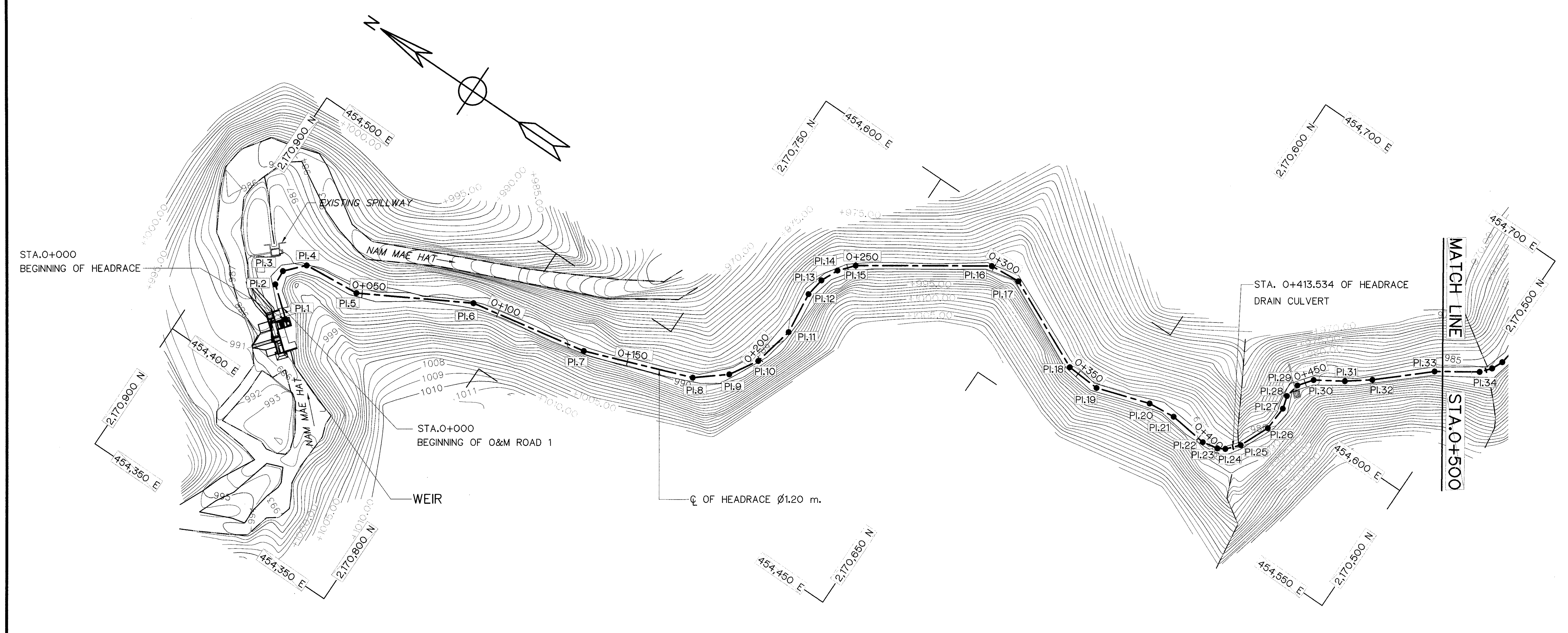
| | | |
|---|---|---|
| DESIGNED | | ลก.1950 |
| DRAWN | | |
| CHECKED | | ลก.1950 |

REVIEWED
SUBMITTED Chair
RECOMMENDED
APPROVED P. Hans

PROJECT MANAGER DATE 08/03/2559

DRAWING NO. MH-WE-11

SHEET NO. 24 OF 130

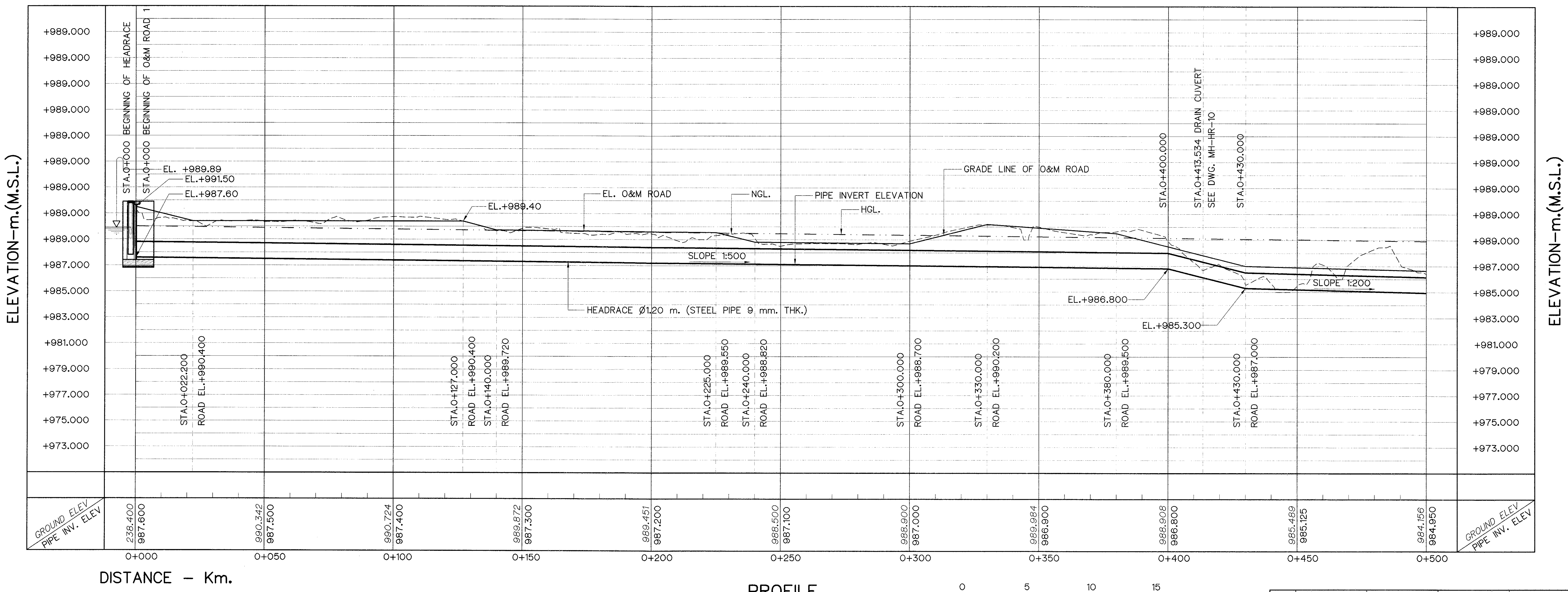


## PLAN

SCALE 1:1,000

## HORIZONTAL CURVE OF HEADRACE

| NO. PI. | COORDINATE OF PI. |  | PI. TO PI. (m) | DEFLECTION ANGLE (△) ( ° – ' – " ) | PI. STA. (km) | BEARING (N/S ° – ' – " E/W) |
|---|---|---|---|---|---|---|
|  | N | E |  |  |  |  |
| PI.1 | 2,170,867.819 | 454,425.669 | – | – | 0+000.000 | – |
| PI.2 | 2,170,877.907 | 454,433.994 | 13.080 | 46°– 31'– 52.45" | 0+013.080 | N39°– 31'– 50.67" E |
| PI.3 | 2,170,878.285 | 454,439.485 | 5.504 | 46°– 31'– 16.39" | 0+018.584 | N86°– 03'– 43.11" E |
| PI.4 | 2,170,872.294 | 454,446.004 | 8.854 | 42°– 23'– 59.62" | 0+027.438 | S47°– 25'– 00.50" E |
| PI.5 | 2,170,851.801 | 454,447.803 | 20.572 | 24°– 07'– 25.33" | 0+048.010 | S05°– 01'– 00.88" E |
| PI.6 | 2,170,814.728 | 454,468.472 | 42.445 | 18°– 20'– 24.28" | 0+090.455 | S29°– 08'– 26.21" E |
| PI.7 | 2,170,772.085 | 454,476.607 | 43.412 | 09°– 40'– 44.25" | 0+133.867 | S10°– 48'– 01.93" E |
| PI.8 | 2,170,734.171 | 454,490.767 | 40.472 | 18°– 58'– 23.23" | 0+174.339 | S20°– 28'– 46.18" E |
| PI.9 | 2,170,723.948 | 454,499.18 | 13.240 | 18°– 58'– 40.45" | 0+187.579 | S39°– 27'– 09.41" E |
| PI.10 | 2,170,717.952 | 454,508.938 | 11.453 | 18°– 58'– 31.33" | 0+199.032 | S58°– 25'– 49.86" E |
| PI.11 | 2,170,714.653 | 454,523.704 | 15.130 | 18°– 58'– 17.92" | 0+214.162 | S77°– 24'– 21.18" E |
| PI.12 | 2,170,716.366 | 454,539.03 | 15.421 | 15°– 37'– 28.60" | 0+229.583 | N83°– 37'– 20.90" E |
| PI.13 | 2,170,715.276 | 454,545.725 | 6.783 | 15°– 37'– 31.44" | 0+236.366 | S80°– 45'– 10.50" E |
| PI.14 | 2,170,712.423 | 454,551.879 | 6.783 | 15°– 37'– 31.01" | 0+243.149 | S65°– 07'– 39.06" E |
| PI.15 | 2,170,708.018 | 454,557.037 | 6.783 | 15°– 37'– 46.92" | 0+249.932 | S49°– 30'– 08.05" E |
| PI.16 | 2,170,667.236 | 454,584.413 | 49.118 | 29°– 25'– 38.79" | 0+299.050 | S33°– 52'– 21.13" E |
| PI.17 | 2,170,656.186 | 454,585.272 | 11.083 | 29°– 25'– 21.49" | 0+310.133 | S04°– 26'– 42.34" E |
| PI.18 | 2,170,623.496 | 454,570.044 | 36.063 | 21°– 20'– 46.15" | 0+346.196 | S24°– 58'– 39.15" W |
| PI.19 | 2,170,611.316 | 454,569.271 | 12.205 | 21°– 20'– 19.48" | 0+358.401 | S03°– 37'– 53.00" W |
| PI.20 | 2,170,592.314 | 454,575.338 | 19.947 | 12°– 18'– 50.46" | 0+378.348 | S17°– 42'– 26.48" E |
| PI.21 | 2,170,582.474 | 454,576.267 | 9.884 | 12°– 18'– 36.45" | 0+388.232 | S05°– 23'– 36.03" E |
| PI.22 | 2,170,568.617 | 454,574.586 | 13.959 | 18°– 19'– 10.00" | 0+402.191 | S06°– 55'– 00.42" W |
| PI.23 | 2,170,563.034 | 454,575.712 | 5.695 | 18°– 17'– 44.64" | 0+407.886 | S 11°– 24'– 09.58" E |
| PI.24 | 2,170,560.511 | 454,577.151 | 2.905 | 18°– 19'– 32.19" | 0+410.791 | S29°– 41'– 54.21" E |
| PI.25 | 2,170,556.701 | 454,581.386 | 5.697 | 18°– 18'– 34.69" | 0+416.488 | S48°– 01'– 26.41" E |
| PI.26 | 2,170,552.072 | 454,591.948 | 11.532 | 19°– 53'– 35.36" | 0+428.020 | S66°– 20'– 01.10" E |
| PI.27 | 2,170,551.489 | 454,600.788 | 8.859 | 19°– 53'– 48.43" | 0+436.879 | S86°– 13'– 36.46" E |
| PI.28 | 2,170,552.826 | 454,605.413 | 4.814 | 26°– 44'– 14.37" | 0+441.693 | N73°– 52'– 35.11" E |
| PI.29 | 2,170,551.839 | 454,610.68 | 5.359 | 26°– 43'– 29.80" | 0+447.052 | S79°– 23'– 10.52" E |
| PI.30 | 2,170,548.088 | 454,615.597 | 6.184 | 20°– 35'– 47.83" | 0+453.236 | S52°– 39'– 40.72" E |
| PI.31 | 2,170,538.542 | 454,621.577 | 11.264 | 04°– 50'– 22.73" | 0+464.500 | S32°– 03'– 52.89" E |
| PI.32 | 2,170,530.56 | 454,627.571 | 9.982 | 04°– 50'– 16.61" | 0+474.482 | S36°– 54'– 15.61" E |
| PI.33 | 2,170,513.681 | 454,642.632 | 22.622 | 08°– 01'– 33.31" | 0+497.104 | S 41°– 44'– 32.22" E |



## PROFILE

VERTICAL SCALE 1:200
HORIZONTAL SCALE 1:1,000

0 5 10 15
SCALE 1:200 METERS

0 10 20 40 60 80
SCALE 1:1,000 METERS

NOTES :

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS. UNLESS OTHERWISE SHOWN.
2. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH–GN–03
3. THE ALIGNMENT OF THE HEADRACE AND RELATED STRUCTURES SHALL BE CHECK AND CORRECTED BY THE CONTRACTOR TO SUIT THE FIELD CONDITIONS AND SHALL BE SUBMITTED TO DEDE'S FIELD ENGINEER FOR APPROVAL
4. REMOVE ALL EXISTING HEADRACE
5. DEMOLISH ALL EXISTING CONCRETE PAVEMENT
6. ALIGNMENT OF NEW O&M ROAD CONFORM TO EXISTING O&M ROAD

REFERENCE DRAWINGS :

| | |
|---|---|
| 1. HEADRACE PLAN AND PROFILE, STA. 0+500 TO STA. 1+000 | MH–HR–02 |
| 2. HEADRACE TYPICAL SECTIONS | MH–HR–06 |
| 3. DRAIN CULVERT STA. 0+413.534 | MH–HR–10 |

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
|---|---|---|---|---|
| 3 |  |  |  |  |
| 2 |  |  |  |  |
| 1 |  |  |  |  |
|  | CONSULTANTS |  | DEDE |  |

KINGDOM OF THAILAND
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
HEADRACE
PLAN AND PROFILE, STA. 0+000 TO STA. 0+500

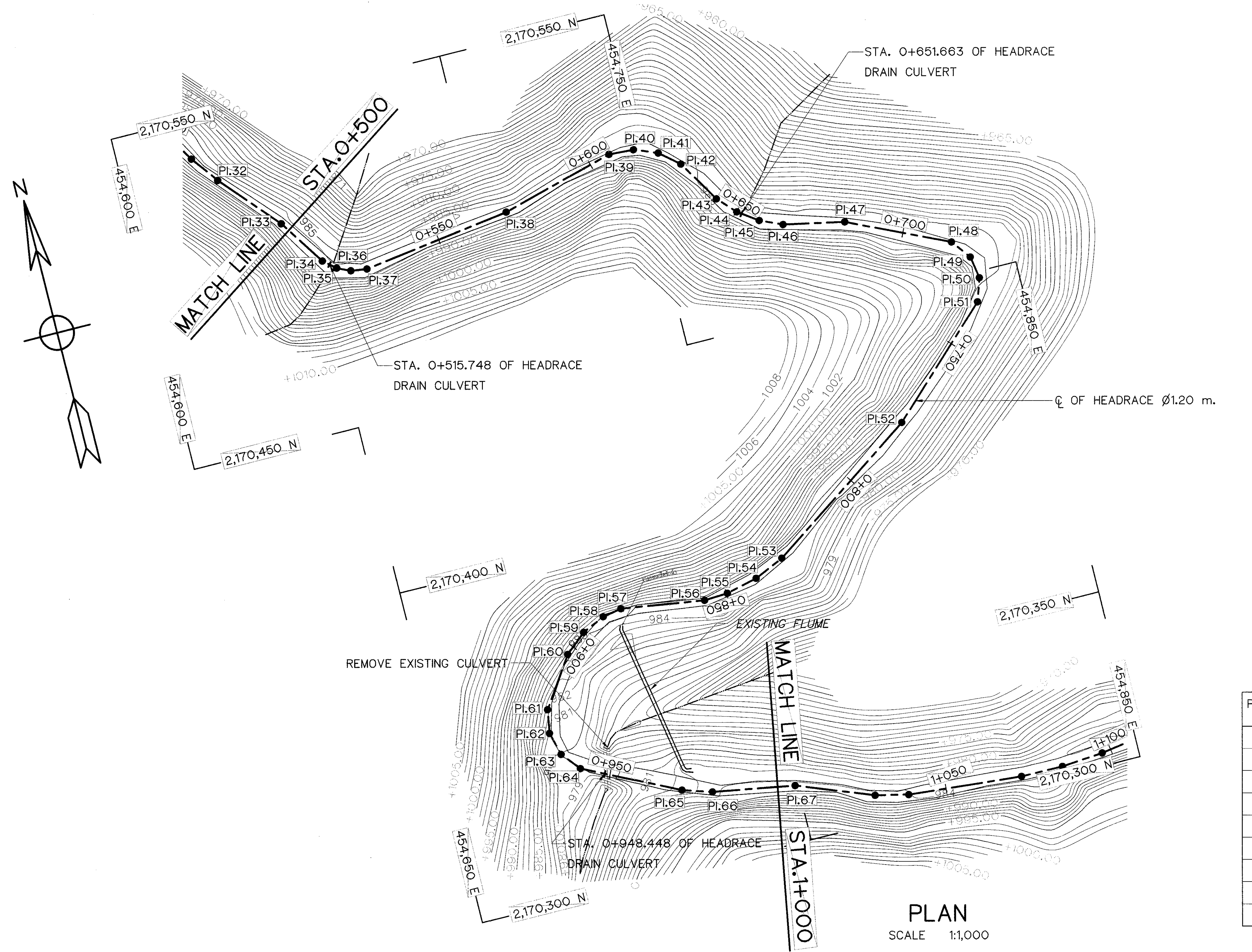
P&C MANAGEMENT CO.,LTD.

Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

| | | | |
|---|---|---|---|
| DESIGNED | ภย.64624 | สย.6226 | REVIEWED |
| DRAWN |  |  | SUBMITTED Chan |
| CHECKED |  | สย.6226 | RECOMMENDED |
|  |  |  | APPROVED P. Hang |

PROJECT MANAGER
DATE 08/03/2559

DRAWING NO. MH–HR–01
SHEET NO. 25 OF 130



## PLAN

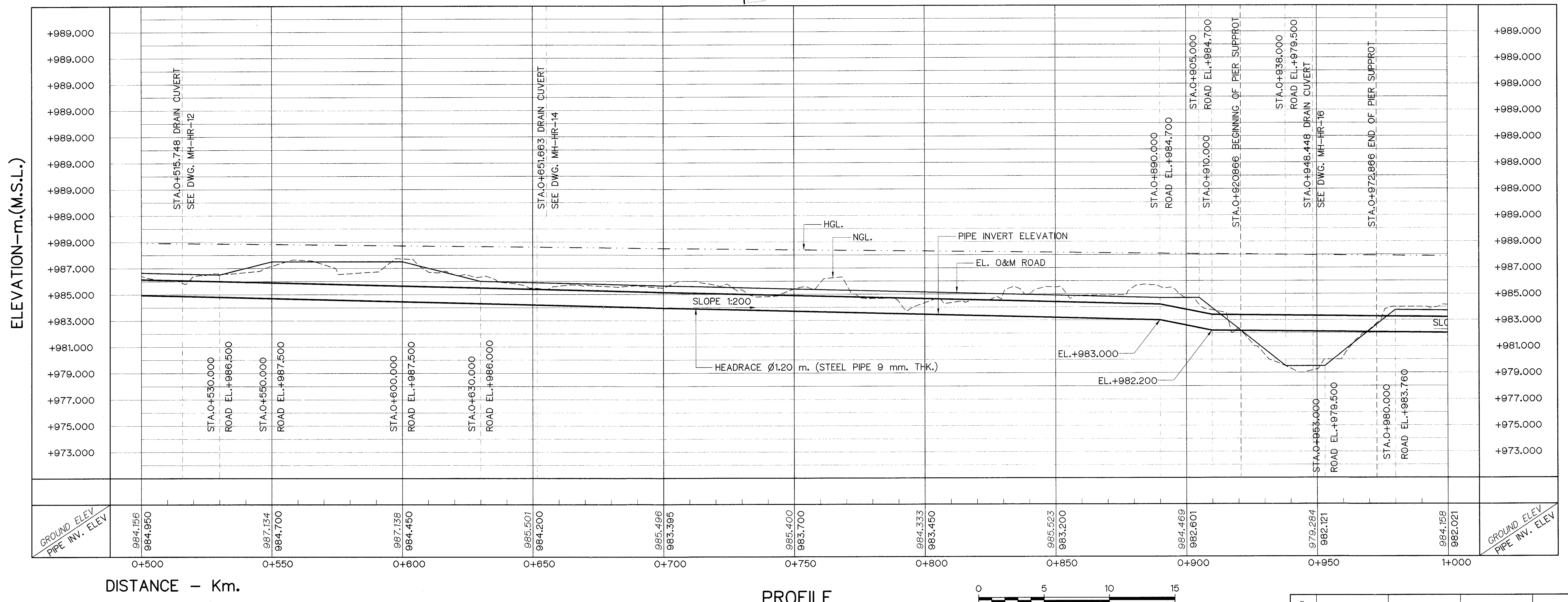
SCALE 1:1,000

## HORIZONTAL CURVE OF HEADRACE

| NO. PI. | COORDINATE OF PI. |  | PI. TO PI. (m) | DEFLECTION ANGLE (△) ( ° – ' – " ) | PI. STA. (km) | BEARING (N/S ° – ' – " E/W) |
|---|---|---|---|---|---|---|
|  | N | E |  |  |  |  |
| PI.34 | 2,170,500.109 | 454,651.689 | 16.317 | 16°– 02'– 40.12" | 0+513.421 | S 33°– 42'– 58.91" E |
| PI.35 | 2,170,497.005 | 454,655.357 | 4.805 | 16°– 04'– 33.25" | 0+518.226 | S 49°– 45'–39.03"E |
| PI.36 | 2,170,495.297 | 454,659.164 | 4.173 | 16°– 01'– 35.07" | 0+522.399 | S 65°– 50'– 12.28" E |
| PI.37 | 2,170,494.617 | 454,663.92 | 4.804 | 16°– 03'– 49.30" | 0+527.203 | S 81°– 51'– 47.35"E |
| PI.38 | 2,170,500.736 | 454,707.866 | 44.370 | 07°– 11'– 54.12" | 0+571.573 | N 82°– 04'–23.36"E |
| PI.39 | 2,170,509.8 | 454,741.4 | 34.737 | 18°– 22'– 45.40" | 0+606.310 | N 74°– 52'–29.24"E |
| PI.40 | 2,170,509.382 | 454,748.752 | 7.364 | 18°– 22'– 52.27" | 0+613.674 | S 86°– 44'–45.37"E |
| PI.41 | 2,170,506.667 | 454,755.597 | 7.364 | 18°– 23'– 04.28" | 0+621.038 | S 68°– 21'– 53.09"E |
| PI.42 | 2,170,501.932 | 454,761.236 | 7.363 | 18°– 22'– 46.67" | 0+628.401 | S 49°– 58'–48.82"E |
| PI.43 | 2,170,489.434 | 454,768.925 | 14.674 | 11°– 38'– 35.97" | 0+643.075 | S 31°– 36'– 02.14" E |
| PI.44 | 2,170,484.257 | 454,773.794 | 7.107 | 11°– 38'– 21.21" | 0+650.182 | S 43°– 14'– 38.11" E |
| PI.45 | 2,170,480.169 | 454,779.607 | 7.107 | 11°– 38'– 34.94" | 0+657.289 | S 54°– 52'–59.32"E |
| PI.46 | 2,170,477.338 | 454,786.126 | 7.107 | 11°– 38'– 30.64" | 0+664.396 | S 66°– 31'– 34.27"E |
| PI.47 | 2,170,473.613 | 454,803.907 | 18.167 | 12°– 52'– 11.55" | 0+682.563 | S 78°– 10'– 04.91" E |
| PI.48 | 2,170,60.22 | 454,833.023 | 32.049 | 27°– 54 08.10" | 0+714.612 | S 65°– 17'– 53.36"E |
| PI.49 | 2,170,454.595 | 454,837.323 | 7.080 | 27°–53'– 48.38" | 0+721.692 | S 37°– 23'– 45.25"E |
| PI.50 | 2,170,448.033 | 454,838.421 | 6.653 | 27°–54'– 02.92" | 0+728.345 | S 09°– 29'–56.88"E |
| PI.51 | 2,170,441.315 | 454,836.186 | 7.080 | 27°–53'– 58.13" | 0+735.425 | S 18°– 24'–06.05"W |
| PI.52 | 2,170,412.358 | 454,805.883 | 41.914 | 09°–30'– 38.88" | 0+777.339 | S 46°– 18'– 04.18"W |
| PI.53 | 2,170,382.448 | 454,761.852 | 53.229 | 10°– 29'– 43.01" | 0+830.568 | S 55°– 48'–43.06"W |
| PI.54 | 2,170,378.6 | 454,753.083 | 9.576 | 10°– 30'– 04.45" | 0+840.144 | S 66°– 18'– 26.07"W |
| PI.55 | 2,170,376.415 | 454,743.761 | 9.575 | 10°– 29'– 26.93" | 0+849.719 | S 76°– 48'–30.52"W |
| PI.56 | 2,170,376.084 | 454,736.744 | 7.025 | 11°– 02'– 19.47" | 0+856.744 | S 87°– 17'–57.46"W |
| PI.57 | 2,170,379.678 | 454,712.222 | 24.784 | 19°– 09'– 59.05" | 0+881.528 | N 81°– 39'–43.07"W |
| PI.58 | 2,170,378.604 | 454,706.607 | 5.717 | 13°– 12'– 52.75" | 0+887.245 | S 79°– 10'– 17.88"W |
| PI.59 | 2,170,375.602 | 454,699.878 | 7.368 | 15°– 54'– 52.30" | 0+894.613 | S 65°– 57'– 25.12" W |
| PI.60 | 2,170,370.425 | 454,693.699 | 8.061 | 15°– 55'– 19.41" | 0+902.674 | S 50°– 02'–32.82"W |
| PI.61 | 2,170,356.087 | 454,683.984 | 17.319 | 24°– 33 03.60" | 0+919.993 | S 34°– 07'– 13.41" W |
| PI.62 | 2,170,349.147 | 454,682.814 | 7.038 | 24°–32'– 43.36" | 0+927.031 | S 09°– 34'– 09.81"W |
| PI.63 | 2,170,342.347 | 454,684.633 | 7.039 | 24°–33'– 53.48" | 0+934.070 | S 14°– 58'–33.54"E |
| PI.64 | 2,170,336.919 | 454,689.114 | 7.039 | 24°–32'– 46.68" | 0+941.109 | S 39°– 32'–27.03"E |
| PI.65 | 2,170,323.544 | 454,716.643 | 30.606 | 08°–04'– 02.82" | 0+971.715 | S 64°– 05'– 13.71" E |
| PI.66 | 2,170,320.775 | 454,725.244 | 9.036 | 08°–03'– 34.47" | 0+980.751 | S 72°– 09'– 16.53" E |

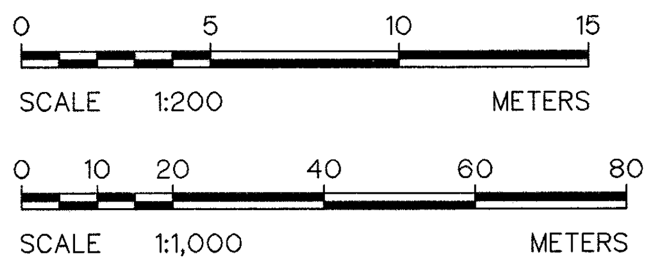
## TABLE OF PIER DIMENSIONS

| PIER NO. | STA. | N.G.L. | FOOTING ELEV. | PIPE INVERT ELEV. | NOTE |
|---|---|---|---|---|---|
| 1 | 0+920.866 | +982.176 | +980.176 | +982.176 |  |
| 2 | 0+927.866 | +980.848 | +978.848 | +982.165 |  |
| 3 | 0+934.866 | +979.762 | +977.762 | +982.151 |  |
| 4 | 0+942.366 | +979.000 | +977.000 | +982.136 |  |
| 5 | 0+946.366 | +979.078 | +977.078 | +982.128 |  |
| 6 | 0+953.366 | +978.000 | +976.000 | +982.114 |  |
| 7 | 0+960.366 | +978.326 | +976.326 | +982.100 |  |
| 8 | 0+967.366 | +982.000 | +980.000 | +982.086 |  |
| 9 | 0+972.866 | +982.718 | +980.718 | +982.075 |  |



## PROFILE

VERTICAL SCALE 1:200
HORIZONTAL SCALE 1:1,000



## NOTES :

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS. UNLESS OTHERWISE SHOWN.
2. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH-GN-03
3. THE ALIGNMENT OF THE HEADRACE AND RELATED STRUCTURES SHALL BE CHECK AND CORRECTED BY THE CONTRACTOR TO SUIT THE FIELD CONDITIONS AND SHALL BE SUBMITTED TO DEDE'S FIELD ENGINEER FOR APPROVAL
4. REMOVE ALL EXISTING HEADRACE
5. DEMOLISH ALL EXISTING CONCRETE PAVEMENT
6. ALIGNMENT OF NEW O&M ROAD CONFORM TO EXISTING O&M ROAD

## REFERENCE DRAWINGS :

|  |  |
|---|---|
| 1. HEADRACE PLAN AND PROFILE, STA. 0+000 TO STA. 0+500 | MH-HR-01 |
| 2. HEADRACE PLAN AND PROFILE, STA. 1+000 TO STA. 1+500 | MH-HR-03 |
| 3. HEADRACE TYPICAL SECTIONS | MH-HR-06 |
| 4. HEADRACE CONCRETE PIER | MH-HR-07 |
| 5. DRAIN CULVERT STA. 0+515.748 PLAN AND SECTION | MH-HR-12 |
| 6. DRAIN CULVERT STA. 0+651.663 PLAN AND SECTION | MH-HR-14 |
| 7. DRAIN CULVERT STA. 0+948.448 PLAN AND SECTION | MH-HR-16 |

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
|---|---|---|---|---|
| 3 |  |  |  |  |
| 2 |  |  |  |  |
| 1 |  |  |  |  |
|  | CONSULTANTS |  | DEDE |  |

KINGDOM OF THAILAND
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

# MAE HAT HYDROPOWER PROJECT

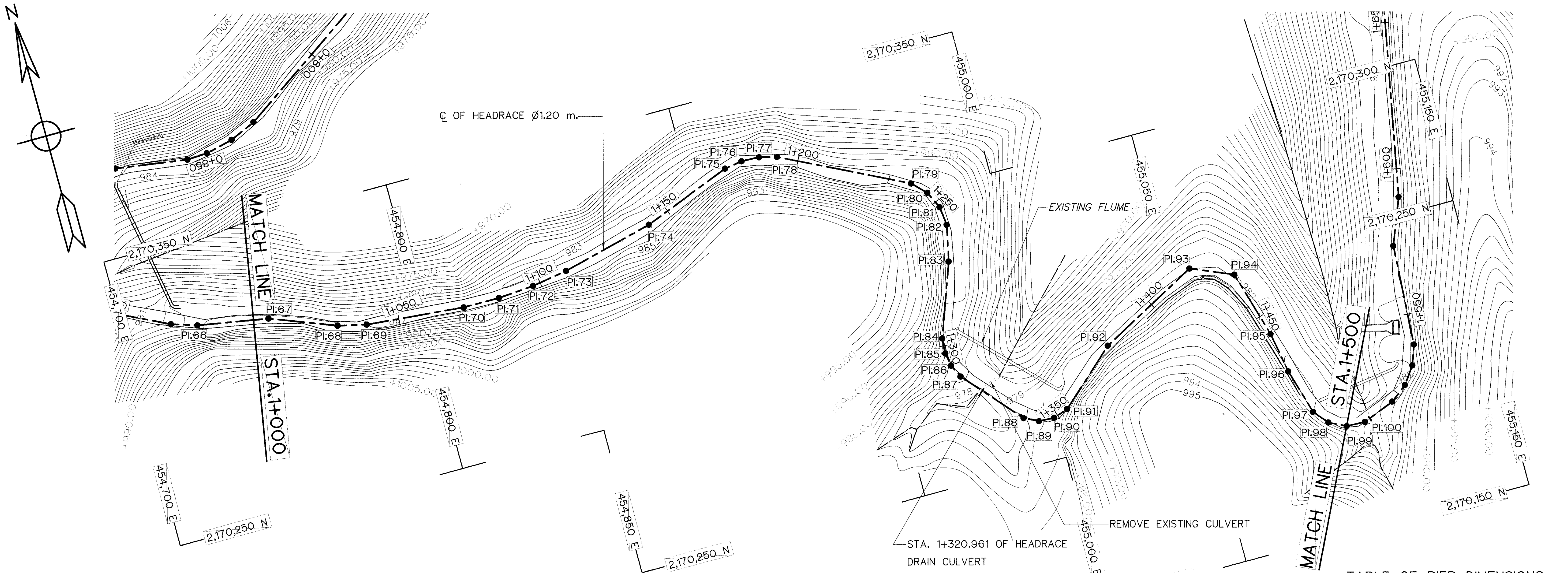
## CIVIL WORKS AND TRANSMISSION LINE
## HEADRACE
## PLAN AND PROFILE, STA. 0+500 TO STA. 1+000

P&C MANAGEMENT CO.,LTD.

DESIGNED ภย.64624 สย.6226
DRAWN
CHECKED สย.6226
PROJECT MANAGER DATE 08/03/2559

Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY
REVIEWED
SUBMITTED Chaw
RECOMMENDED
APPROVED P. Hansell

DRAWING NO. MH-HR-02
SHEET NO. 26 OF 130



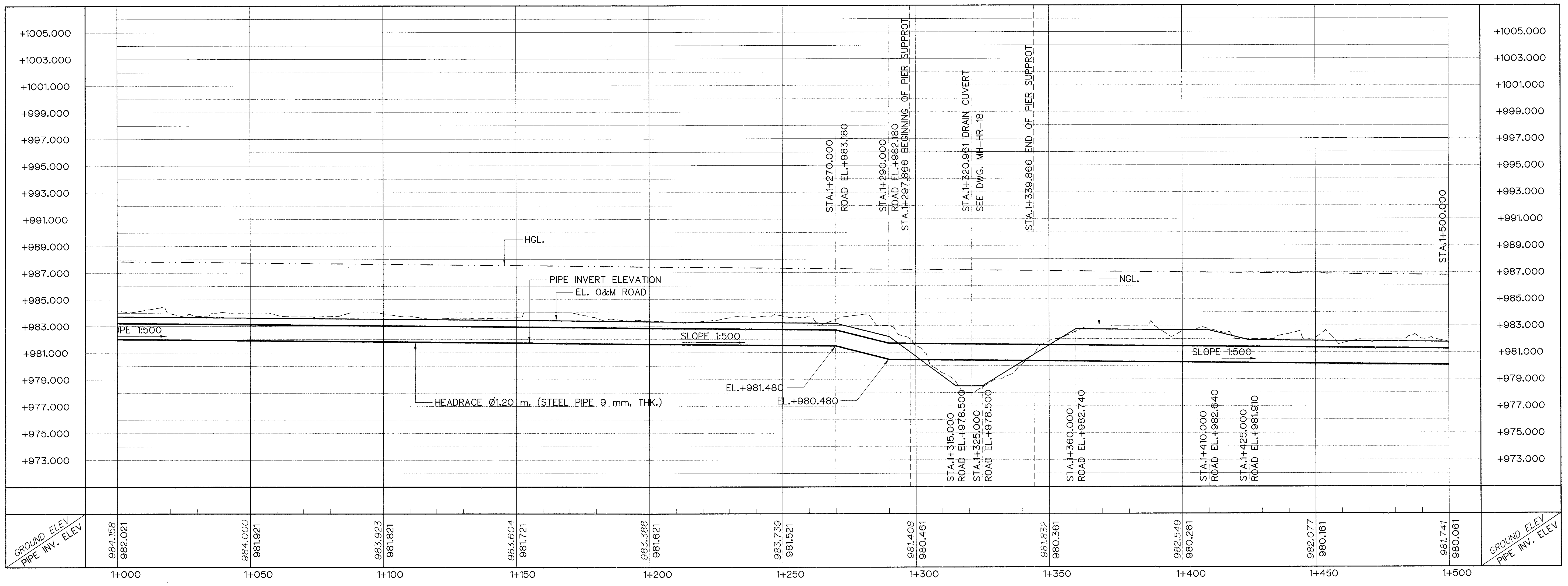
## PLAN
SCALE 1:1,000

## TABLE OF PIER DIMENSIONS

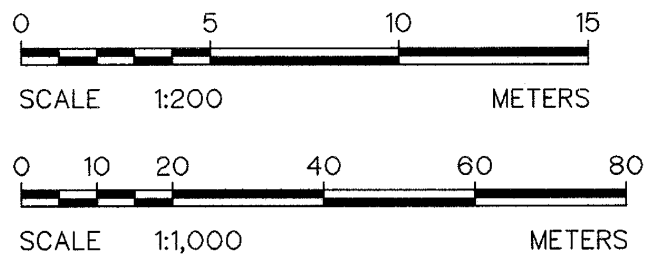
| PIER NO. | STA. | N.G.L. | FOOTING ELEV. | PIPE INVERT ELEV. | NOTE |
|---|---|---|---|---|---|
| 10 | 1+297.866 | +981.496 | +979.496 | +980.456 | |
| 11 | 1+303.866 | +981.000 | +980.000 | +980.454 | |
| 12 | 1+305.866 | +979.677 | +977.677 | +980.454 | |
| 13 | 1+310.866 | +979.115 | +977.115 | +980.434 | |
| 14 | 1+314.866 | +978.000 | +976.000 | +980.426 | |
| 15 | 1+321.866 | +978.332 | +976.332 | +980.412 | |
| 16 | 1+328.866 | +979.000 | +977.000 | +980.398 | |
| 17 | 1+334.366 | +980.000 | +978.000 | +980.383 | |
| 18 | 1+339.866 | +980.908 | +978.908 | +980.372 | |

## HORIZONTAL CURVE OF HEADRACE

| NO. PI. | COORDINATE OF PI. | | PI. TO PI. (m) | DEFLECTION ANGLE (△) ( ° – ' – " ) | PI. STA. (km) | BEARING (N/S ° – ' – " E/W) |
|---|---|---|---|---|---|---|
| | N | E | | | | |
| PI.67 | 2,170,316.623 | 454,749.317 | 24.428 | 11°– 14'– 32.42" | 1+005.179 | S 80°– 12'– 51.00" E |
| PI.68 | 2,170,308.086 | 454,771.524 | 23.791 | 07°– 59'– 45.65" | 1+028.970 | S 68°– 58'– 18.57" E |
| PI.69 | 2,170,305.842 | 454,781.219 | 9.951 | 07°– 59'– 28.88" | 1+038.921 | S 76°– 58'–04.22" E |
| PI.70 | 2,170,302.884 | 454,814.754 | 33.665 | 04°– 43'– 35.23" | 1+072.586 | S 84°– 57'–33.10" E |
| PI.71 | 2,170,302.816 | 454,827.148 | 12.394 | 04°– 43'– 45.73" | 1+084.980 | S 89°– 41'–08.33" E |
| PI.72 | 2,170,303.77 | 454,839.504 | 12.393 | 04°– 43'– 35.66" | 1+097.373 | N 85°– 35'–05.94" E |
| PI.73 | 2,170,305.739 | 454,851.74 | 12.393 | 04°– 43'– 37.41" | 1+109.766 | N 80°– 51'– 30.28" E |
| PI.74 | 2,170,313.49 | 454,883.134 | 32.337 | 07°– 25'– 28.92" | 1+142.103 | N 76°– 07'–52.88" E |
| PI.75 | 2,170,325.209 | 454,913.202 | 32.271 | 11°– 54'– 27.63" | 1+174.374 | N 68°– 42'–23.96" E |
| PI.76 | 2,170,326.211 | 454,919.264 | 6.144 | 11°– 54'– 50.82" | 1+180.518 | N 80°– 36'– 51.59" E |
| PI.77 | 2,170,325.94 | 454,925.401 | 6.143 | 11°– 54'– 04.89" | 1+186.661 | S 87°– 28'– 17.59" E |
| PI.78 | 2,170,324.409 | 454,931.351 | 6.144 | 11°– 54'– 21.35" | 1+192.805 | S 75°– 34'– 12.70" E |
| PI.79 | 2,170,303.738 | 454,973.11 | 46.595 | 18°– 56'– 28.89" | 1+239.400 | S 63°– 39'– 51.35" E |
| PI.80 | 2,170,299.167 | 454,977.637 | 6.433 | 18°– 56'– 19.11" | 1+245.833 | S 44°– 43'–22.46" E |
| PI.81 | 2,170,293.375 | 454,980.435 | 6.432 | 18°– 55'– 39.70" | 1+252.265 | S 25°– 47'–03.35" E |
| PI.82 | 2,170,286.988 | 454,981.203 | 6.433 | 18°– 56'– 23.13" | 1+258.698 | S 06°– 51'– 23.65" E |
| PI.83 | 2,170,274.81 | 454,978.596 | 12.454 | 07°– 47'– 01.82" | 1+271.152 | S 12°– 04'–59.48" W |
| PI.84 | 2,170,250.141 | 454,969.682 | 26.230 | 15°– 19'– 10.24" | 1+297.382 | S 19°– 52'– 01.30" W |
| PI.85 | 2,170,245.225 | 454,969.291 | 4.932 | 15°– 17'– 57.14" | 1+302.314 | S 04°– 32'– 51.06" W |
| PI.86 | 2,170,240.38 | 454,970.211 | 4.932 | 15°– 18'– 52.43" | 1+307.246 | S 10°– 45'–06.08" E |
| PI.87 | 2,170,235.95 | 454,972.378 | 4.932 | 15°– 18'– 40.28" | 1+312.178 | S 26°– 03'– 58.51" E |
| PI.88 | 2,170,216.627 | 454,989.4 | 25.751 | 22°– 41'– 47.22" | 1+337.929 | S 41°– 22'–38.79" E |
| PI.89 | 2,170,214.295 | 454,994.197 | 5.334 | 22°– 41'– 27.10" | 1+343.263 | S 64°– 04'– 26.01" E |
| PI.90 | 2,170,213.994 | 454,999.522 | 5.334 | 22°– 41'– 09.63" | 1+348.597 | S 86°– 45'– 53.11" E |
| PI.91 | 2,170,215.77 | 455,004.551 | 5.333 | 22°– 42'– 04.18" | 1+353.930 | N 70°– 32'–57.26" E |
| PI.92 | 2,170,233.018 | 455,023.605 | 25.701 | 13°– 53'– 54.04" | 1+379.631 | N 47°– 50'–53.08" E |
| PI.93 | 2,170,251.123 | 455,057.295 | 38.247 | 50°– 58'– 33.96" | 1+417.878 | N 61°– 44'– 47.13" E |
| PI.94 | 2,170,245.153 | 455,071.551 | 15.456 | 50°– 58'– 09.21" | 1+433.334 | S 67°– 16'– 38.91" E |
| PI.95 | 2,170,222.4 | 455,078.208 | 23.707 | 05°– 56'– 49.32" | 1+457.041 | S 16°– 18'– 29.71" E |
| PI.96 | 2,170,208.628 | 455,080.726 | 14.000 | 05°– 56'– 54.90" | 1+471.041 | S 10°– 21'– 40.38" E |
| PI.97 | 2,170,193.061 | 455,085.281 | 16.220 | 23°– 48'– 09.62" | 1+487.261 | S 16°– 18'– 35.28" E |
| PI.98 | 2,170,188.18 | 455,089.393 | 6.382 | 23°– 48'– 58.64" | 1+493.643 | S 40°– 06'–44.90" E |
| PI.99 | 2,170,185.375 | 455,095.126 | 6.382 | 23°– 48'– 31.00" | 1+500.025 | S 63°– 55'–43.54" E |



## PROFILE
VERTICAL SCALE 1:200
HORIZONTAL SCALE 1:1,000



NOTES :

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS. UNLESS OTHERWISE SHOWN.
2. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH–GN–03
3. THE ALIGNMENT OF THE HEADRACE AND RELATED STRUCTURES SHALL BE CHECK AND CORRECTED BY THE CONTRACTOR TO SUIT THE FIELD CONDITIONS AND SHALL BE SUBMITTED TO DEDE'S FIELD ENGINEER FOR APPROVAL
4. REMOVE ALL EXISTING HEADRACE
5. DEMOLISH ALL EXISTING CONCRETE PAVEMENT
6. ALIGNMENT OF NEW O&M ROAD CONFORM TO EXISTING O&M ROAD

REFERENCE DRAWINGS :

| | |
|---|---|
| 1. HEADRACE PLAN AND PROFILE, STA. 0+500 TO STA. 1+000 | MH–HR–02 |
| 2. HEADRACE PLAN AND PROFILE, STA. 1+500 TO STA. 2+000 | MH–HR–04 |
| 3. HEADRACE TYPICAL SECTIONS | MH–HR–06 |
| 4. HEADRACE CONCRETE PIER | MH–HR–07 |
| 5. DRAIN CULVERT STA. 1+320.961 PLAN AND SECTION | MH–HR–18 |

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
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CONSULTANTS | DEDE

KINGDOM OF THAILAND
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
HEADRACE
PLAN AND PROFILE, STA. 1+000 TO STA. 1+500

P&C MANAGEMENT CO.,LTD.

Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

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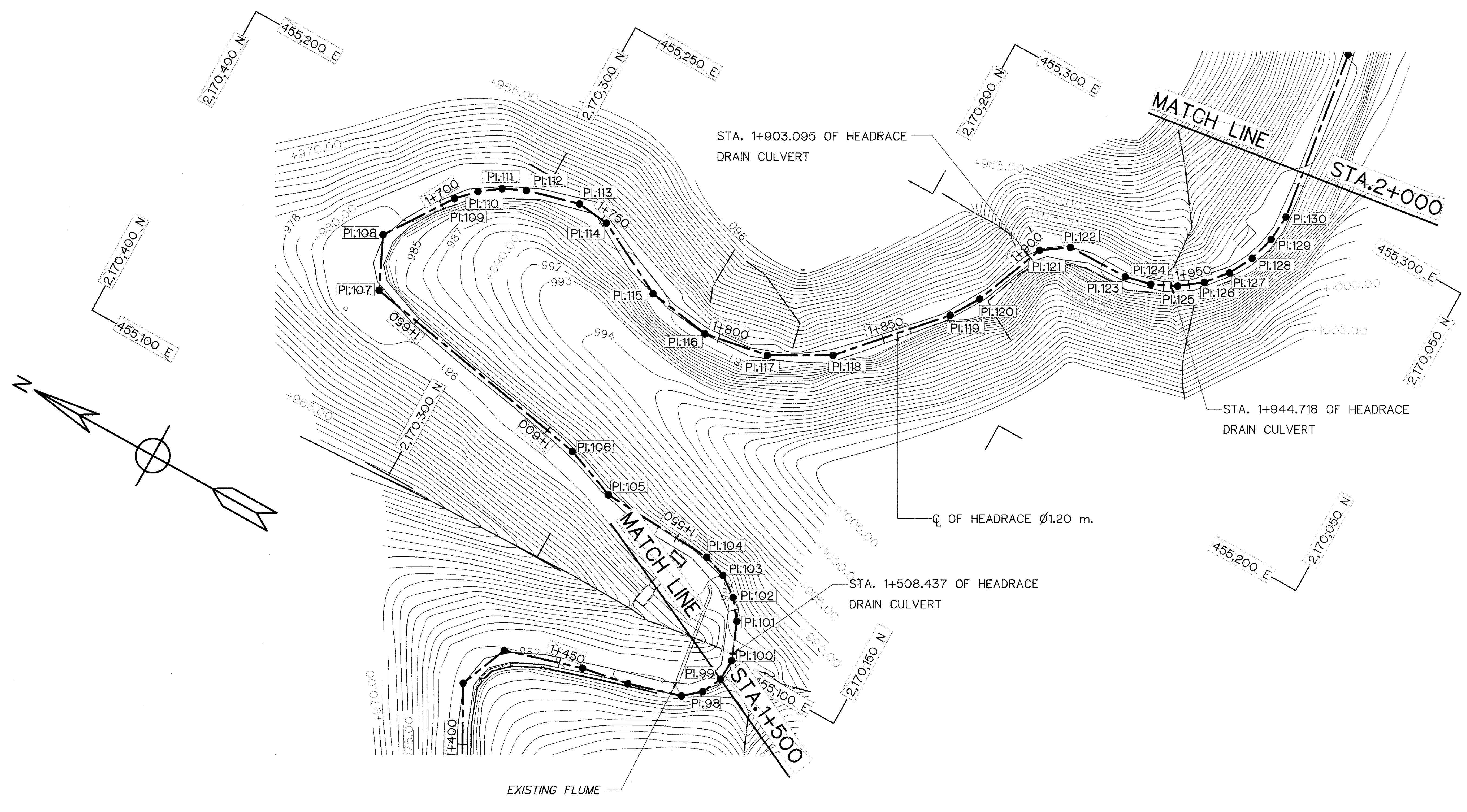
| DESIGNED ภย.64624 สย.6226 | REVIEWED |
| DRAWN | SUBMITTED Chanit |
| CHECKED สย.6226 | RECOMMENDED |
| PROJECT MANAGER | APPROVED P. Hang |
| DATE 08/03/2559 | DRAWING NO. MH–HR–03 |
| | SHEET NO. 27 OF 130 |

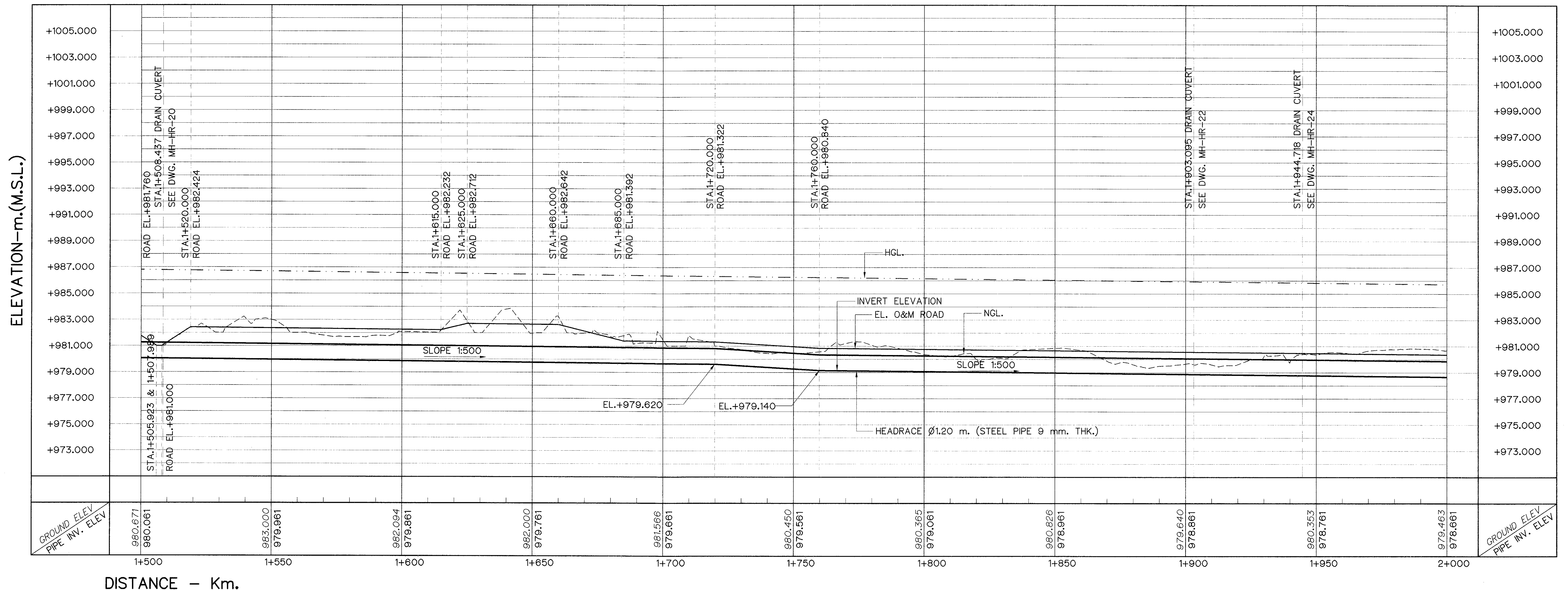


## PLAN

SCALE 1:1,000

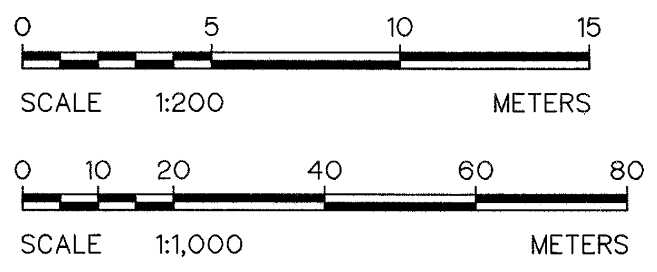
## HORIZONTAL CURVE OF HEADRACE

| NO. PI. | COORDINATE OF PI. N | COORDINATE OF PI. E | PI. TO PI. (m) | DEFLECTION ANGLE (△) (° – ' – ") | PI. STA. (km) | BEARING (N/S ° – ' – " E/W) |
|---|---|---|---|---|---|---|
| PI.99 | 2,170,185.375 | 455,095.126 | 6.382 | 23°– 48'– 31.00" | 1+500.025 | S 63°– 55'–43.54" E |
| PI.100 | 2,170,185.123 | 455,101.504 | 6.383 | 23°– 49'– 08.09" | 1+506.408 | S 87°– 44'– 14.55" E |
| PI.101 | 2,170,189.397 | 455,112.323 | 11.633 | 16°– 18'– 11.51" | 1+518.041 | N 68°– 26'–37.36" E |
| PI.102 | 2,170,193.775 | 455,117.955 | 7.133 | 16°– 18'– 48.07" | 1+525.174 | N 52°– 08'–25.85" E |
| PI.103 | 2,170,199.558 | 455,122.13 | 7.133 | 16°– 17'– 59.23" | 1+532.307 | N 35°– 49'–37.78" E |
| PI.104 | 2,170,206.28 | 455,124.514 | 7.132 | 16°– 18'– 52.54" | 1+539.439 | N 19°– 31'– 38.55" E |
| PI.105 | 2,170,240.467 | 455,126.433 | 34.241 | 18°– 00'– 29.41" | 1+573.680 | N 03°– 12'– 46.01" E |
| PI.106 | 2,170,255.999 | 455,132.464 | 16.662 | 10°– 36'– 15.96" | 1+590.342 | N 21°– 13'– 15.42" E |
| PI.107 | 2,170,328.709 | 455,146.093 | 73.976 | 54°– 38'– 09.48" | 1+664.318 | N 10°– 36'–59.45" E |
| PI.108 | 2,170,335.562 | 455,160.96 | 16.370 | 58°– 51'– 33.34" | 1+680.688 | N 65°– 15'–08.94" E |
| PI.109 | 2,170,322.353 | 455,180.461 | 23.553 | 10°– 15'– 27.60" | 1+704.241 | S 55°– 53'– 17.72" E |
| PI.110 | 2,170,317.321 | 455,185.605 | 7.196 | 10°– 15'– 34.34" | 1+711.437 | S 45°– 37'– 50.12" E |
| PI.111 | 2,170,311.454 | 455,189.77 | 7.195 | 10°– 15'– 32.11" | 1+718.632 | S 35°– 22'– 15.78" E |
| PI.112 | 2,170,304.938 | 455,192.824 | 7.196 | 10°– 15'– 29.55" | 1+725.828 | S 25°– 06'–43.67" E |
| PI.113 | 2,170,289.332 | 455,196.963 | 16.146 | 21°– 08'– 06.42" | 1+741.974 | S 14°– 51'– 14.13" E |
| PI.114 | 2,170,279.738 | 455,195.907 | 9.652 | 21°– 08'– 00.36" | 1+751.626 | S 06°– 16'– 52.29" W |
| PI.115 | 2,170,257.676 | 455,184.464 | 24.853 | 18°– 48'– 38.80" | 1+776.479 | S 27°– 24'–52.65" W |
| PI.116 | 2,170,238.549 | 455,181.57 | 19.345 | 18°– 48'– 17.45" | 1+795.824 | S 08°– 36'– 13.84" W |
| PI.117 | 2,170,219.51 | 455,184.996 | 19.345 | 18°– 48'– 26.24" | 1+815.169 | S 10°– 12'– 03.60" E |
| PI.118 | 2,170,202.592 | 455,194.377 | 19.345 | 18°– 48'– 34.04" | 1+834.514 | S 29°– 00'–29.84" E |
| PI.119 | 2,170,178.136 | 455,221.365 | 36.420 | 10°– 03'– 24.90" | 1+870.934 | S 47°– 49'–03.87" E |
| PI.120 | 2,170,172.859 | 455,229.769 | 9.923 | 10°– 03'– 38.63" | 1+880.857 | S 57°– 52'–28.78" E |
| PI.121 | 2,170,164.34 | 455,250.786 | 22.678 | 33°– 30'– 53.33" | 1+903.535 | S 67°– 56'– 07.41" E |
| PI.122 | 2,170,156.839 | 455,255.926 | 9.093 | 33°– 31'– 01.46" | 1+912.628 | S 34°– 25'– 14.08" E |
| PI.123 | 2,170,138.577 | 455,256.214 | 18.264 | 12°– 08'– 14.59" | 1+930.892 | S 00°– 54'– 12.62" E |
| PI.124 | 2,170,130.892 | 455,257.994 | 7.888 | 12°– 08'– 02.21" | 1+938.780 | S 13°– 02'– 27.21" E |
| PI.125 | 2,170,123.752 | 455,261.35 | 7.889 | 12°– 07'– 45.78" | 1+946.669 | S 25°– 10'– 29.42" E |
| PI.126 | 2,170,117.477 | 455,266.131 | 7.889 | 12°– 08'– 16.13" | 1+954.558 | S 37°– 18'– 15.20" E |
| PI.127 | 2,170,112.348 | 455,272.124 | 7.888 | 12°– 08'– 05.01" | 1+962.446 | S 49°– 26'– 31.33" E |
| PI.128 | 2,170,108.593 | 455,279.062 | 7.889 | 12°– 07'– 53.97" | 1+970.335 | S 61°– 34'–36.34" E |
| PI.129 | 2,170,106.38 | 455,286.634 | 7.889 | 12°– 08'– 26.75" | 1+978.224 | S 73°– 42'– 30.31" E |
| PI.130 | 2,170,105.809 | 455,294.502 | 7.889 | 12°– 07'– 46.00" | 1+986.113 | S 85°– 50'–57.06" E |



## PROFILE

VERTICAL SCALE 1:200
HORIZONTAL SCALE 1:1,000



NOTES :

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS. UNLESS OTHERWISE SHOWN.
2. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH-GN-03
3. THE ALIGNMENT OF THE HEADRACE AND RELATED STRUCTURES SHALL BE CHECK AND CORRECTED BY THE CONTRACTOR TO SUIT THE FIELD CONDITIONS AND SHALL BE SUBMITTED TO DEDE'S FIELD ENGINEER FOR APPROVAL
4. REMOVE ALL EXISTING HEADRACE
5. DEMOLISH ALL EXISTING CONCRETE PAVEMENT
6. ALIGNMENT OF NEW O&M ROAD CONFORM TO EXISTING O&M ROAD

REFERENCE DRAWINGS :

| | |
|---|---|
| 1. HEADRACE PLAN AND PROFILE, STA. 1+000 TO STA. 1+500 | MH-HR-03 |
| 2. HEADRACE PLAN AND PROFILE, STA. 2+500 TO STA.2+097.998 | MH-HR-03 |
| 3. HEADRACE TYPICAL SECTIONS | MH-HR-05 |
| 4. HEADRACE CONCRETE PIER | MH-HR-06 |
| 5. DRAIN CULVERT STA. 1+508.437 PLAN AND SECTION | MH-HR-20 |
| 6. DRAIN CULVERT STA. 1+903.095 PLAN AND SECTION | MH-HR-22 |
| 7. DRAIN CULVERT STA. 1+944.718 PLAN AND SECTION | MH-HR-24 |

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
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| 3 | | | | |
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| | CONSULTANTS | | DEDE | |

KINGDOM OF THAILAND
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

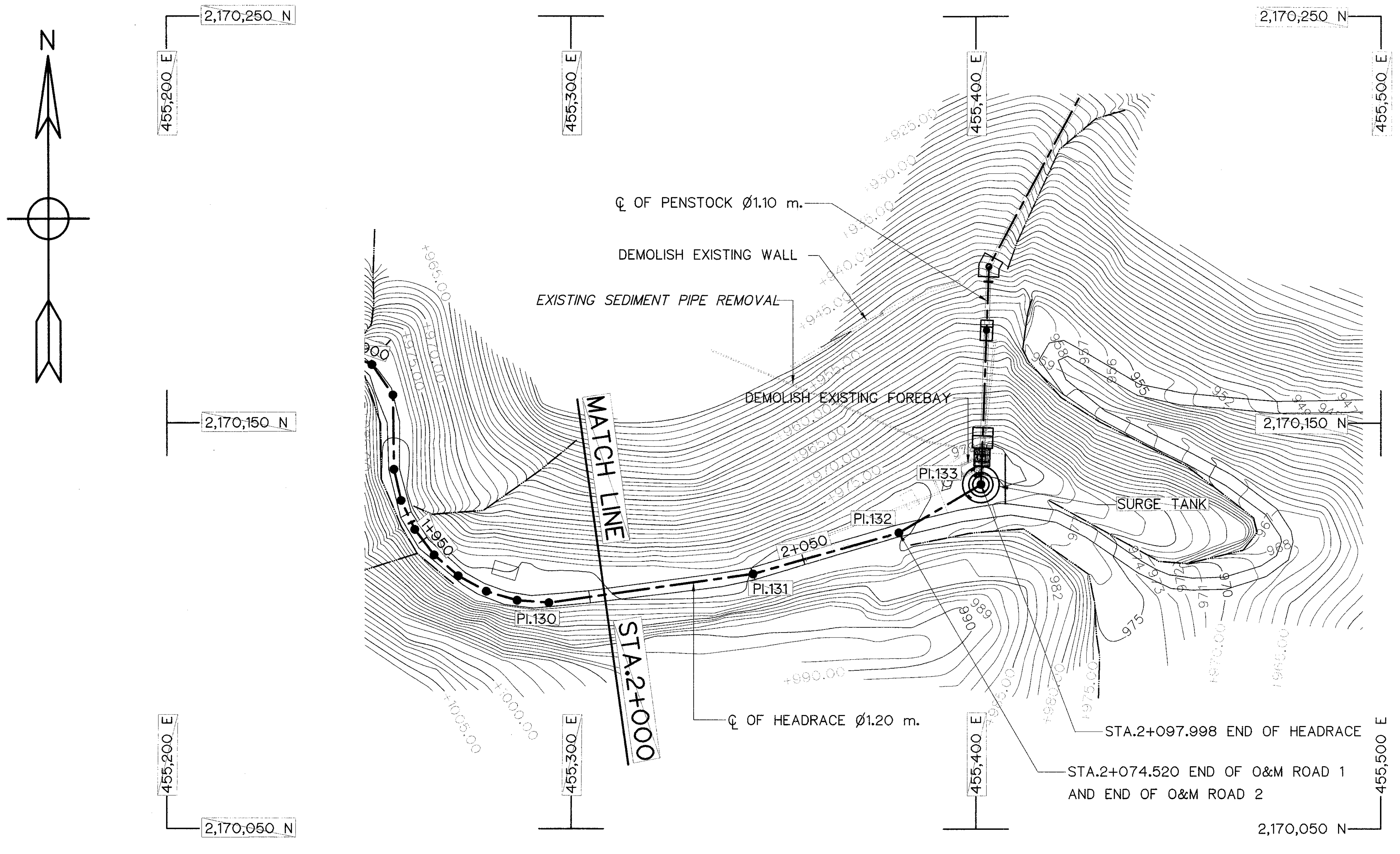
CIVIL WORKS AND TRANSMISSION LINE
HEADRACE
PLAN AND PROFILE, STA. 1+500 TO STA. 2+000

P&C MANAGEMENT CO.,LTD.

DESIGNED ภย.64624 ลย.6226
DRAWN
CHECKED ลย.6226
PROJECT MANAGER DATE 08/03/2559

Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY
REVIEWED
SUBMITTED Chant
RECOMMENDED
APPROVED P.Hang

DRAWING NO. MH-HR-04
SHEET NO. 28 OF 130

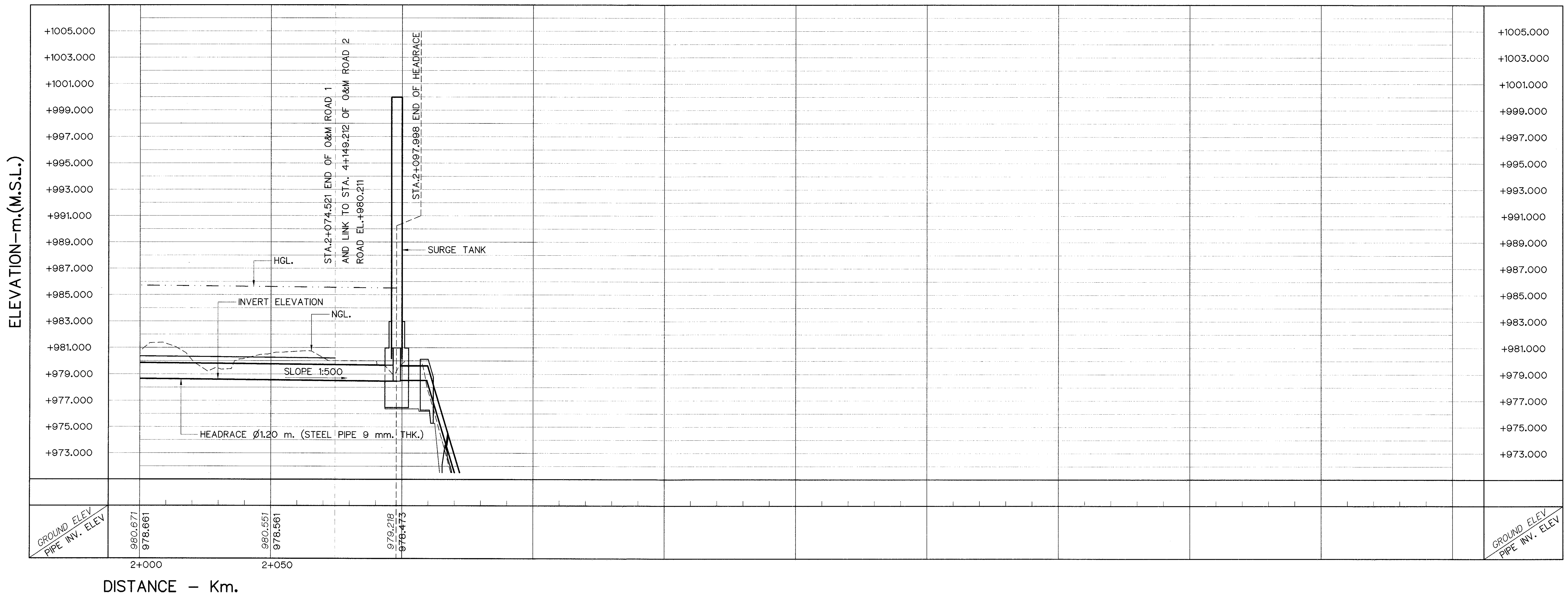


## PLAN

SCALE 1:1,000

## HORIZONTAL CURVE OF HEADRACE

| NO. PI. | COORDINATE OF PI. | | PI. TO PI. (m) | DEFLECTION ANGLE (△) ( ° – ' – " ) | PI. STA. (km) | BEARING (N/S ° – ' – " E/W) |
|---|---|---|---|---|---|---|
| | N | E | | | | |
| PI.131 | 2,170,112.885 | 455,344.987 | 50.978 | 07°–44'–34.96" | 2+037.091 | N 82°– 01'– 16.95" E |
| PI.132 | 2,170,123.027 | 455,381.016 | 37.429 | 14°– 48'– 01.96" | 2+074.520 | N 74°– 16'– 41.99" E |
| END | 2,170,134.951 | 455,401.241 | 23.478 | | 2+097.998 | |



## PROFILE

VERTICAL SCALE 1:200
HORIZONTAL SCALE 1:1,000

NOTES :

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS. UNLESS OTHERWISE SHOWN.
2. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH–GN–03
3. THE ALIGNMENT OF THE HEADRACE AND RELATED STRUCTURES SHALL BE CHECK AND CORRECTED BY THE CONTRACTOR TO SUIT THE FIELD CONDITIONS AND SHALL BE SUBMITTED TO DEDE'S FIELD ENGINEER FOR APPROVAL
4. REMOVE ALL EXISTING HEADRACE
5. DEMOLISH ALL EXISTING CONCRETE PAVEMENT
6. ALIGNMENT OF NEW O&M ROAD CONFORM TO EXISTING O&M ROAD

REFERENCE DRAWINGS :

| | |
|---|---|
| 1. HEADRACE PLAN AND PROFILE, STA. 2+000 TO STA. 2+500 | MH–HR–04 |
| 2. HEADRACE TYPICAL SECTIONS | MH–HR–06 |
| 3. HEADRACE CONCRETE PIER | MH–HR–07 |

0 5 10 15
SCALE 1:200 METERS

0 10 20 40 60 80
SCALE 1:1,000 METERS

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
|---|---|---|---|---|
| 3 | | | | |
| 2 | | | | |
| 1 | | | | |
| | CONSULTANTS | | DEDE | |

KINGDOM OF THAILAND
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

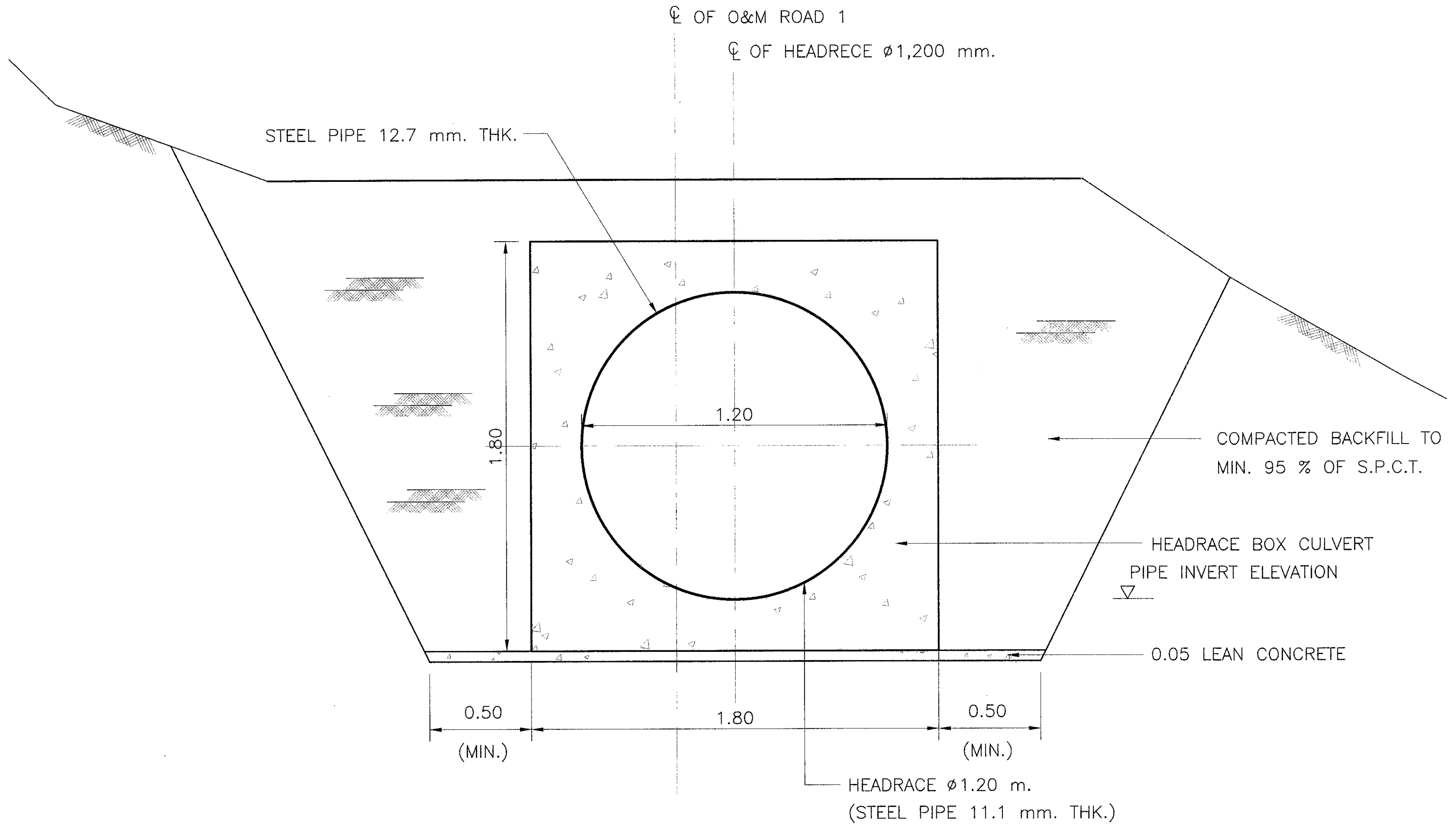
CIVIL WORKS AND TRANSMISSION LINE
HEADRACE
PLAN AND PROFILE, STA. 2+000 TO STA. 2+097.998

P&C MANAGEMENT CO.,LTD.

DESIGNED ภย.64624 สย.6226
DRAWN
CHECKED สย.6226
PROJECT MANAGER DATE 08/03/2559

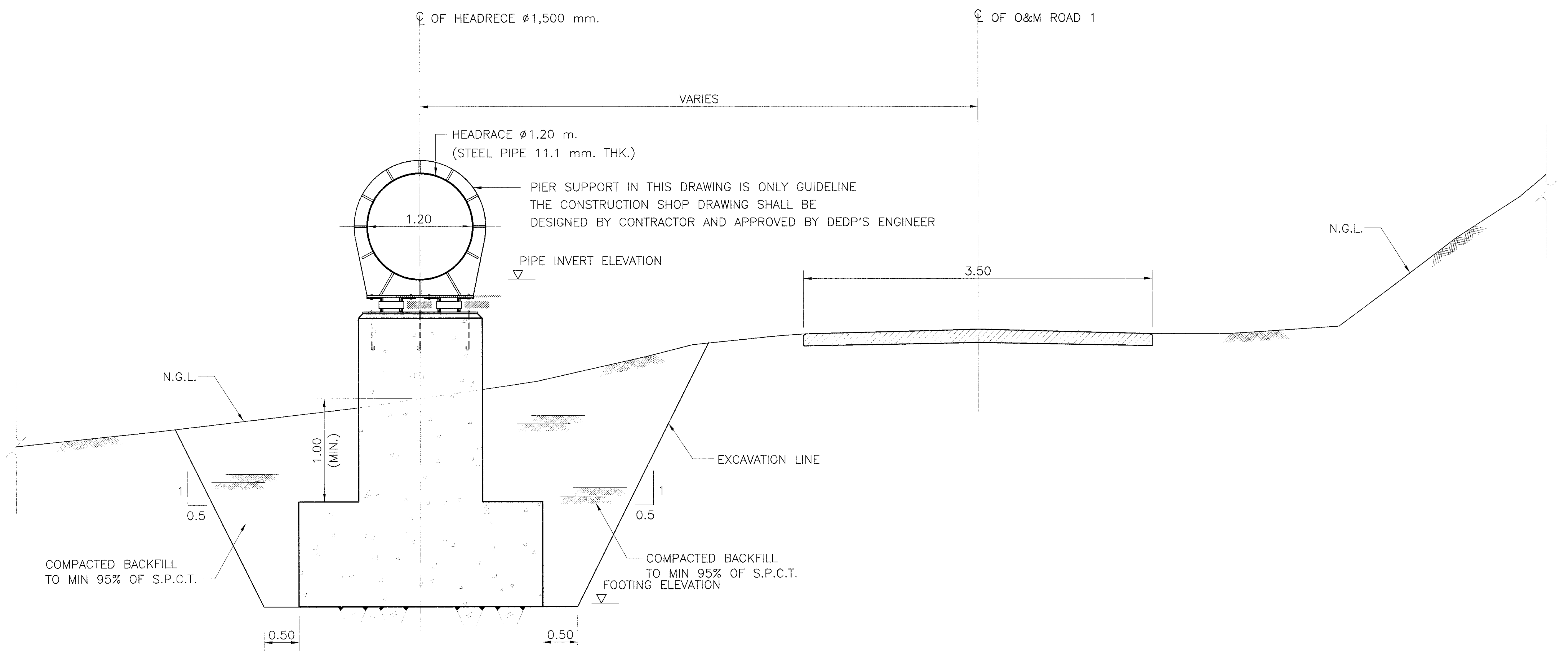
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY
REVIEWED
SUBMITTED Chant
RECOMMENDED
APPROVED P.Hansell

DRAWING NO. MH–HR–05
SHEET NO. 29 OF 130



## EARTH EXCAVATION

NOT TO SCALE

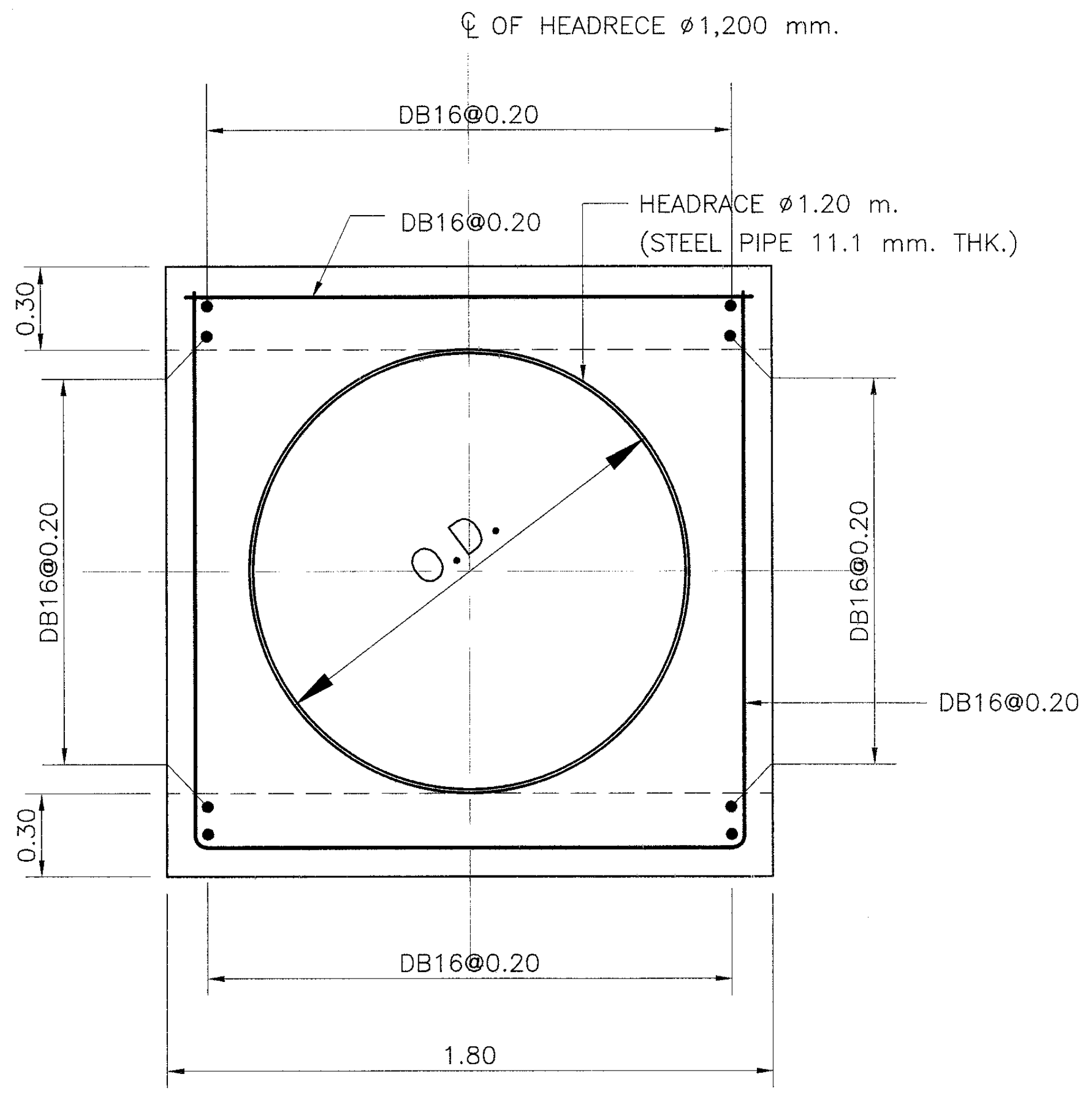


## CONCRETE PIER

SCALE 1:50

## TYPICAL SECTIONS OF HEADRACE

SCALE 1:50



## HEADRACE BOX CULVERT REINFORCEMENT DETAIL

NOT TO SCALE

TABLE OF HEADRACE SUPPORT

| STA TO STA | TYPE OF HEADRACE SUPPORT |
|---|---|
| 0+000 – 0+921 | EARTH EXCAVATION |
| 0+921 – 0+973 | PIER |
| 0+973 – 1+298 | EARTH EXCAVATION |
| 1+298 – 1+344.5 | PIER |
| 1+344.5 – 2+097.998 | EARTH EXCAVATION |

**NOTES :**

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS, UNLESS OTHERWISE SHOWN.
2. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH-GN-03
3. CONCRETE DESIGN BASED ON THE COMPRESSIVE STRENGTH OF 210 KSC, STANDARD CYLINDER Ø0.15x0.30 m. TEST AT AGE 28 DAYS. UNLESS OTHERWISE INDICATED IN SPECIFIC DRAWINGS.
4. ULTIMATE TENSILE STRESSES OF REINFORCING STEEL, CONFORM TO THE REQUIREMENT OF THAI INDUSTRIAL STANDARD DESIGNATION SR24 FOR STRUCTURAL GRADE PLAIN ROUND BAR AND SD30 FOR INTERMEDIATE GRADE DEFORMED BAR.

**REFERENCE DRAWINGS :**

1. HEADRACE PIER DIMENSIONS MH-HR-07

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
|---|---|---|---|---|
| 3 | | | | |
| 2 | | | | |
| 1 | | | | |
| | CONSULTANTS | | DEDE | |

KINGDOM OF THAILAND
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

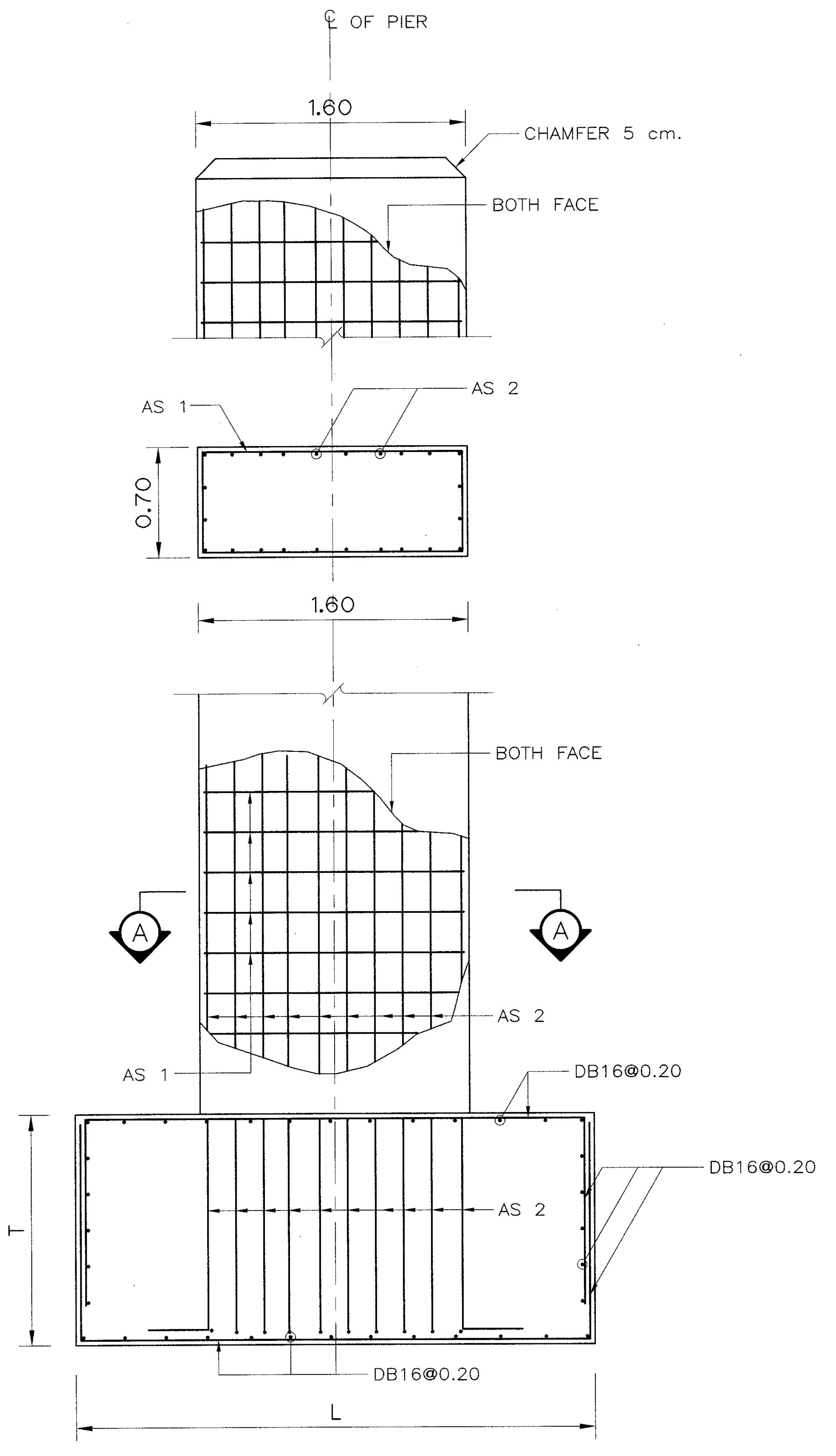
MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
HEADRACE
TYPICAL SECTIONS

P&C MANAGEMENT CO.,LTD.
DESIGNED ภย.64624 สย.6226
DRAWN
CHECKED สย.6226
PROJECT MANAGER 08/03/2559 DATE

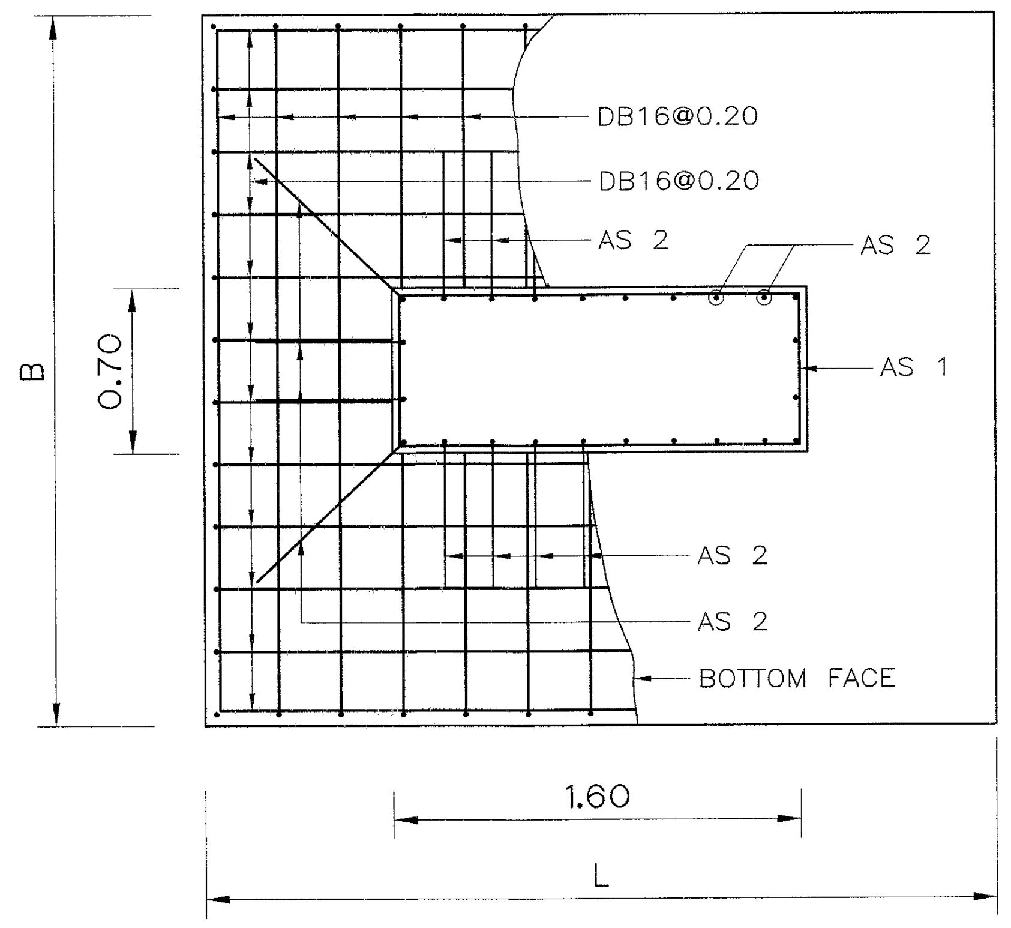
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY
REVIEWED
SUBMITTED Chait
RECOMMENDED
APPROVED P. Hangsell

DRAWING NO. MH-HR-06
SHEET NO. 30 OF 130



## RC. PIER DETAILS

SCALE 1:30

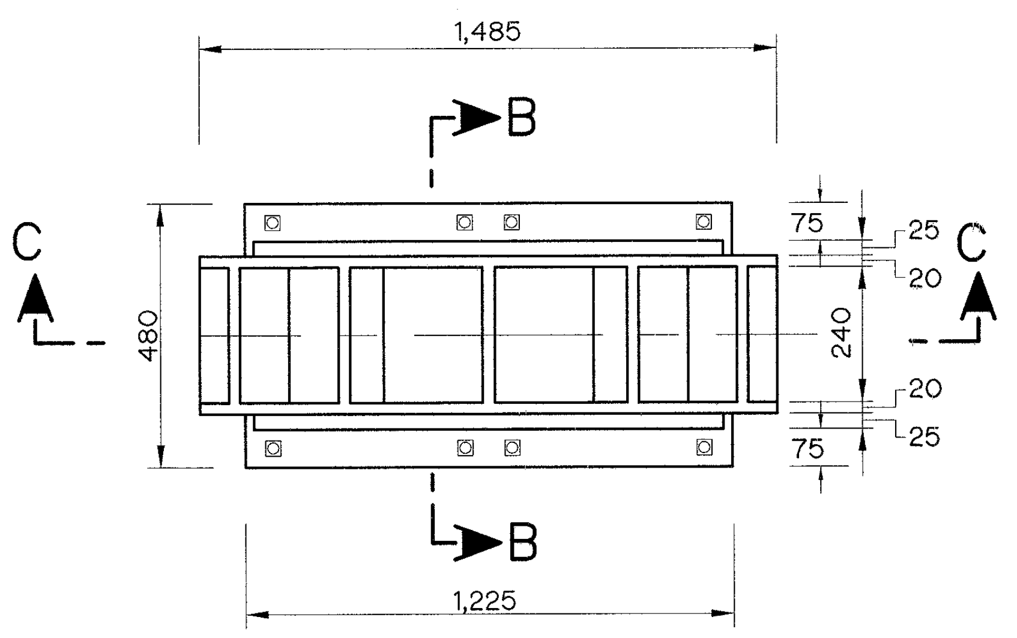


## SECTION A–A

SCALE 1:30

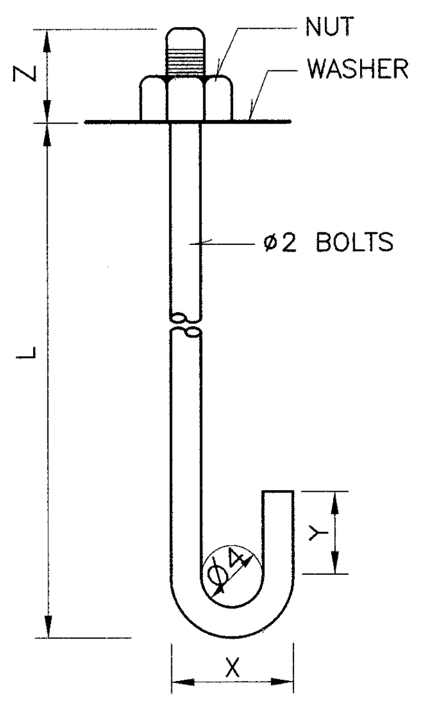
PIER DATA

| H | BXL | T | AS 1 | AS 2 |
|---|---|---|---|---|
| H < 1 | 1.80x1.80 | 0.60 | DB16@0.20 | DB16@0.20 |
| 1 < H ⩽ 2 | 2.00x2.00 | 0.60 | DB16@0.20 | DB16@0.20 |
| 2 < H ⩽ 3 | 2.40x2.20 | 0.80 | DB16@0.20 | DB16@0.15 |
| 3 < H ⩽ 4 | 2.60x2.60 | 0.80 | DB16@0.20 | DB16@0.15 |
| 4 < H ⩽ 5 | 3.00x2.80 | 1.00 | DB16@0.20 | DB20@0.20 |
| 5 < H ⩽ 6 | 3.00x3.00 | 1.00 | DB16@0.20 | DB20@0.15 |



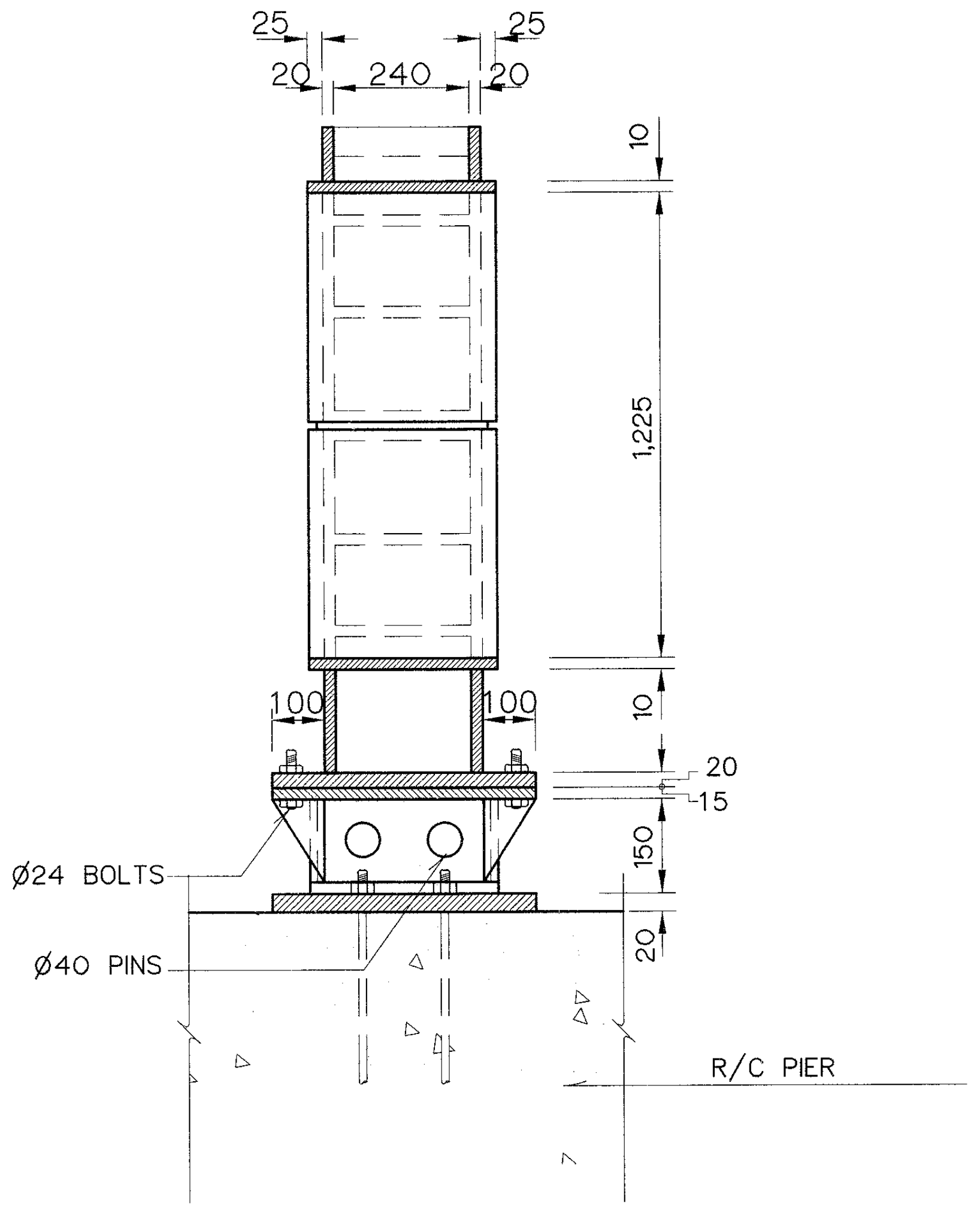
## PLAN

NOT TO SCALE



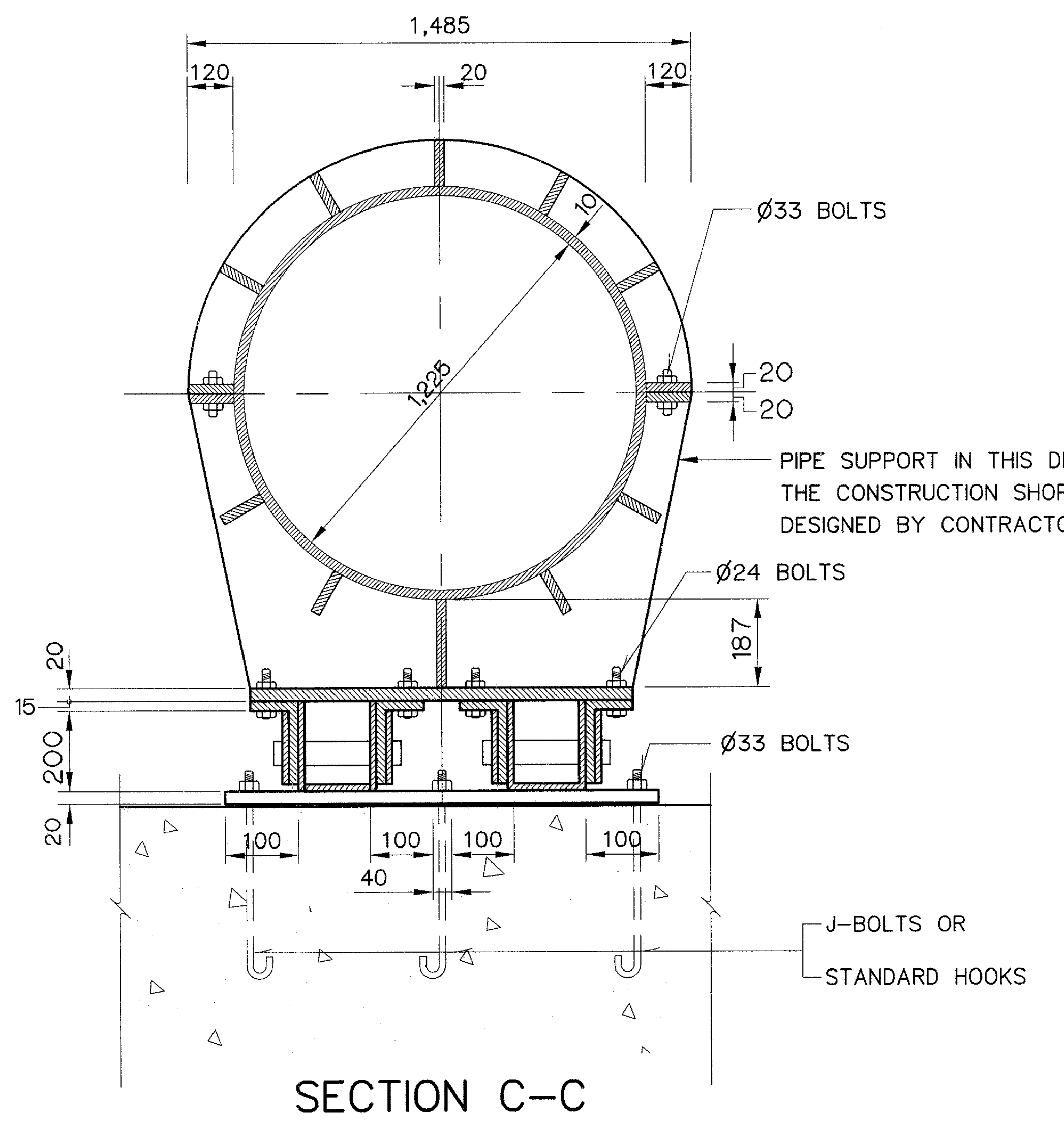
## HOOKED BOLT

NOT TO SCALE



## SECTION B–B

NOT TO SCALE



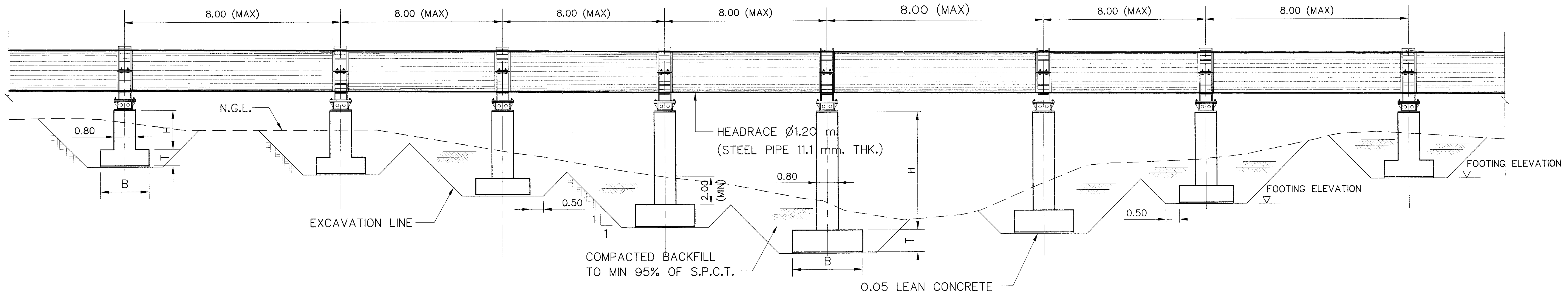
PIPE SUPPORT IN THIS DRAWING IS ONLY GUIDELINE
THE CONSTRUCTION SHOP DRAWING SHALL BE
DESIGNED BY CONTRACTOR AND APPROVED BY DEDP'S ENGINEER

## SECTION C–C

NOT TO SCALE

**NOTES :**

1. DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS, DIMENSIONS OF PIPE SUPPORT ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN.
2. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH–GN–03
3. CONCRETE DESIGN BASED ON THE COMPRESSIVE STRENGTH OF 210 KSC, STANDARD CYLINDER Ø0.15x0.30 m. TEST AT AGE 28 DAYS. UNLESS OTHERWISE INDICATED IN SPECIFIC DRAWINGS.
4. ULTIMATE TENSILE STRESSES OF REINFORCING STEEL, CONFORM TO THE REQUIREMENT OF THAI INDUSTRIAL STANDARD DESIGNATION SR24 FOR STRUCTURAL GRADE PLAIN ROUND BAR AND SD30 FOR INTERMEDIATE GRADE DEFORMED BAR.
4. ALLOWABLE BEARING CAPACITY NOT LESS THAN 15 TON/sq m.



## PROFILE OF CONCRETE PIER

NOT TO SCALE

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
|---|---|---|---|---|
| 3 | | | | |
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CONSULTANTS
DEDE

KINGDOM OF THAILAND
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Energy Development and Efficiency
MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
HEADRACE
CONCRETE PIER

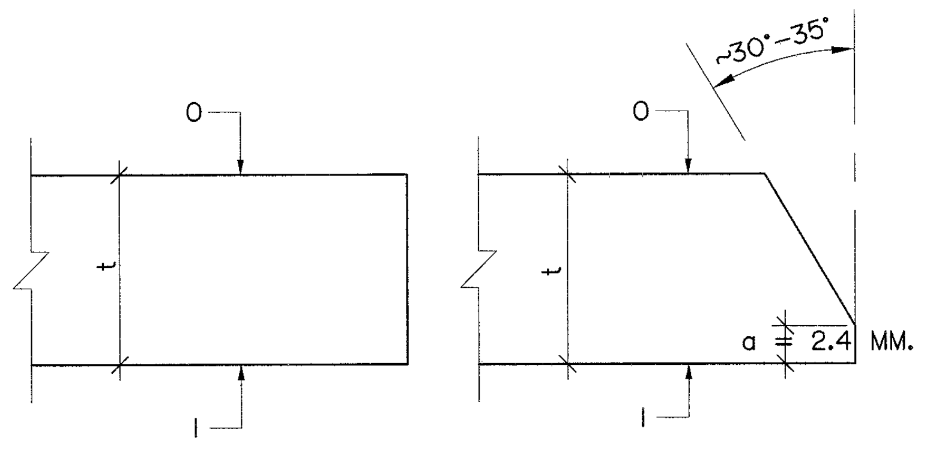
P&C MANAGEMENT CO.,LTD.

Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

DESIGNED ภย.64624 สย.6226
DRAWN
CHECKED สย.6226
PROJECT MANAGER
DATE 08/03/2559

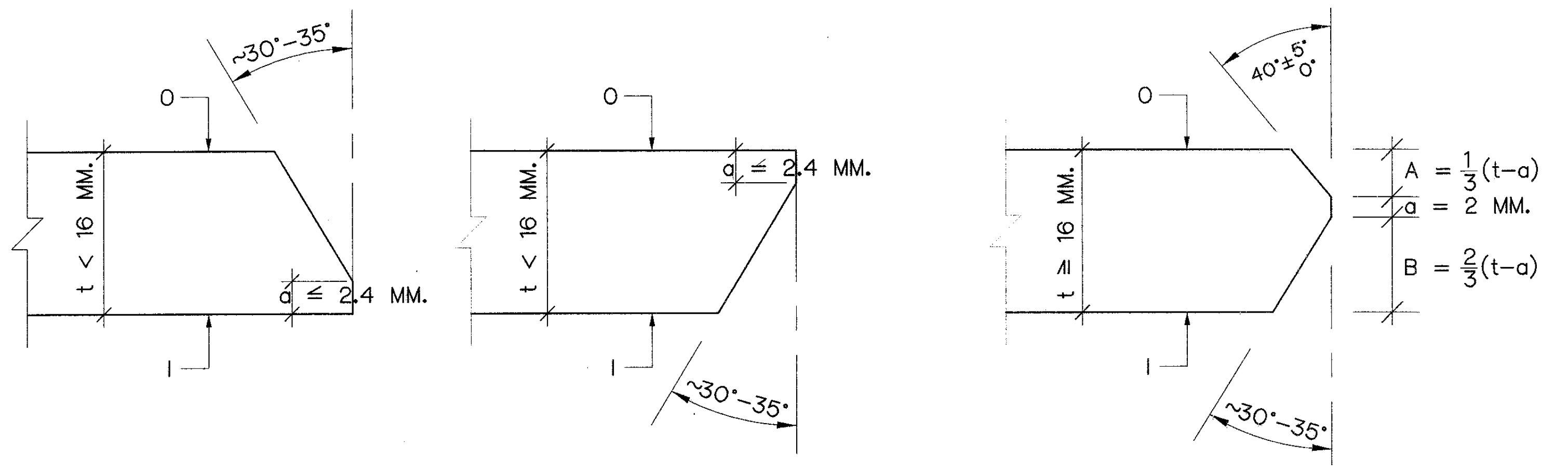
REVIEWED
SUBMITTED Chanit
RECOMMENDED
APPROVED P. Hong.M.

DRAWING NO. MH–HR–07
SHEET NO. 31 OF 130



## PIPE END DIMENSIONS

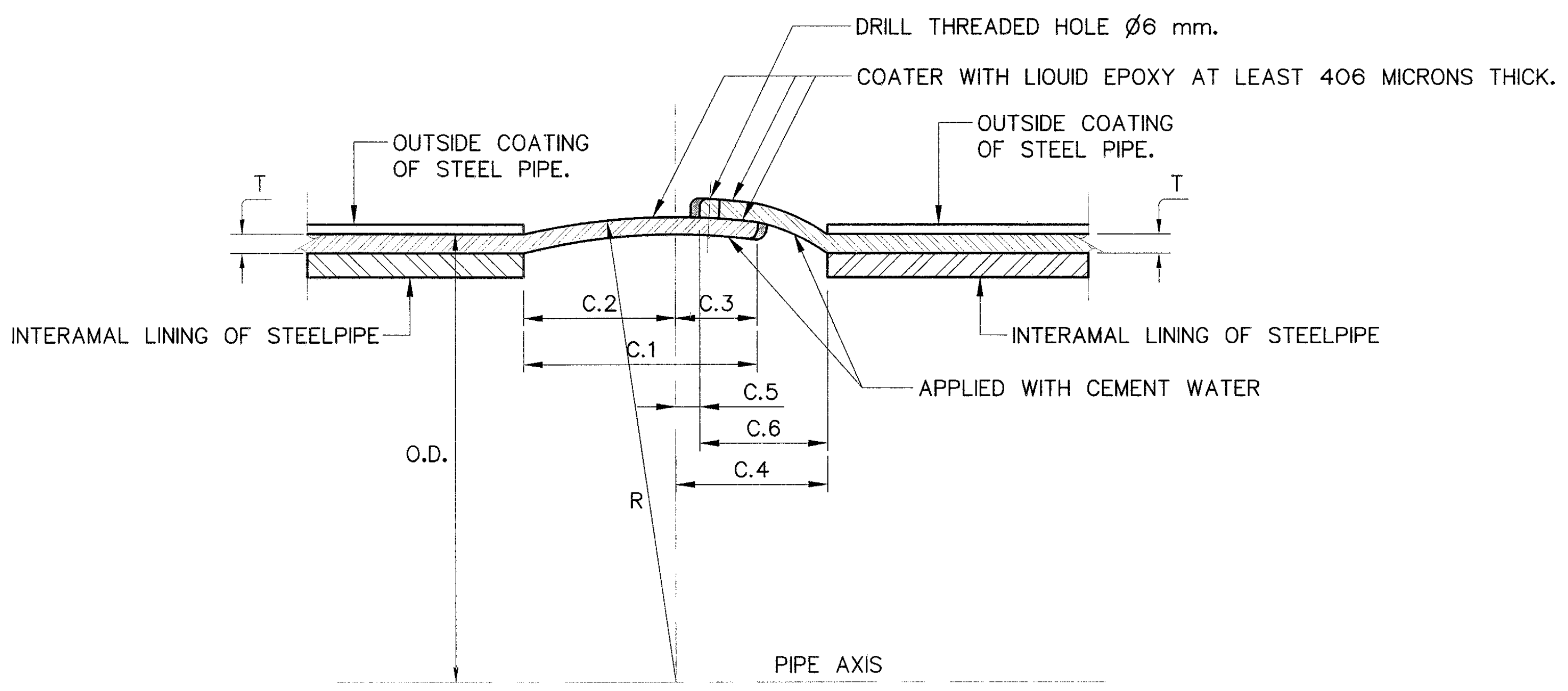
NOT TO SCALE



## PIPE END DIMENSIONS

FOR D ≥ 800 MM.

NOT TO SCALE


DRILL THREADED HOLE Ø6 mm.
COATER WITH LIQUID EPOXY AT LEAST 406 MICRONS THICK.
OUTSIDE COATING OF STEEL PIPE.
OUTSIDE COATING OF STEEL PIPE.
T
T
INTERAMAL LINING OF STEELPIPE
INTERAMAL LINING OF STEELPIPE
C.2
C.3
C.1
C.5
C.6
C.4
APPLIED WITH CEMENT WATER
O.D.
R
PIPE AXIS

## SURFACED SLEEVE WELDED JOINT

NOT TO SCALE

DIMENSIONS IN MILLIMETERS

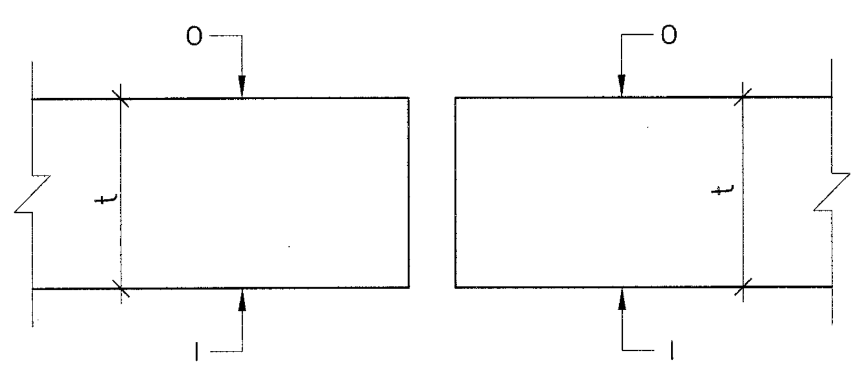
| NOMINAL DIAMETER | OUTSIDE DIA. OD. | THICKNESS t | R | C.1 (C.2 + C.3) | C.2 | C.3 | C.4 (C.5 + C.6) | C.5 | C.6 |
|---|---|---|---|---|---|---|---|---|---|
| 1,200 | 1219.2 | 11.1 | 641 | 316 | 197 | 119 | 224 | 25 | 199 |

NOTE :

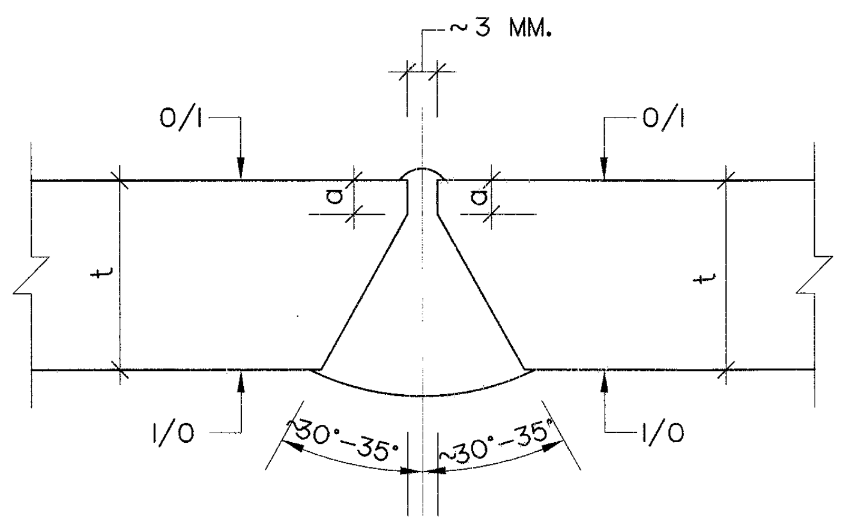
1. TOLERANE OUTSIDE CIRCUMFERENCE OF SPIGOT SHALL BE $^{+0}_{-6}$ mm.
2. TOLERANE OUTSIDE CIRCUMFERENCE OF SOCKET SHALL BE $^{+0}_{-6}$ mm.
3. IN CASE OF THE PIPE TO BE COATED INSIDE WITH LIQUID EPOXY THE COATING SHALL EXTEND TO PIPE ENDS.
4. ALL DIMENSIONS IN MILLIMETER, UNLESS OTHERWISE SHOWN.
5. SYMBOLS

t = PIPE THICKESS
O.D. = OUTSIDE DIAMETER
O = OUTSIDE FACE
I = INSIDE FACE

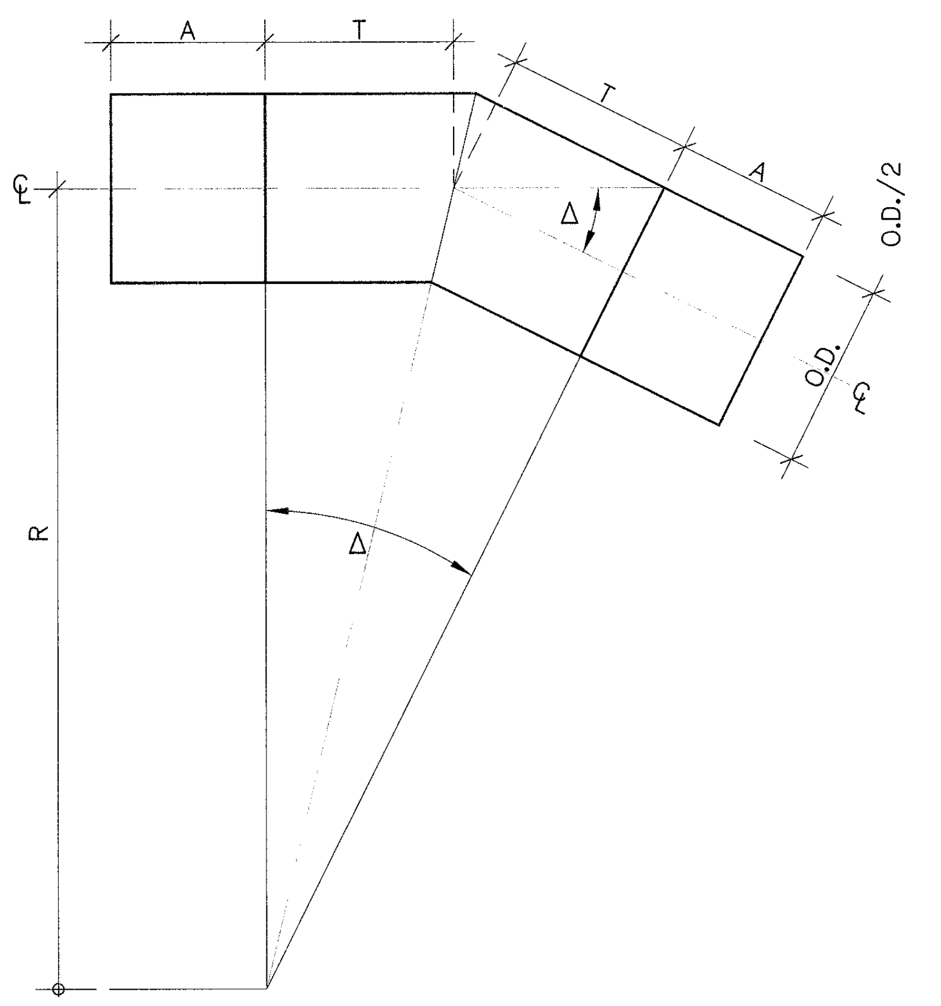
6. △ SHALL BE LESS THAN 22.5 DEGREE



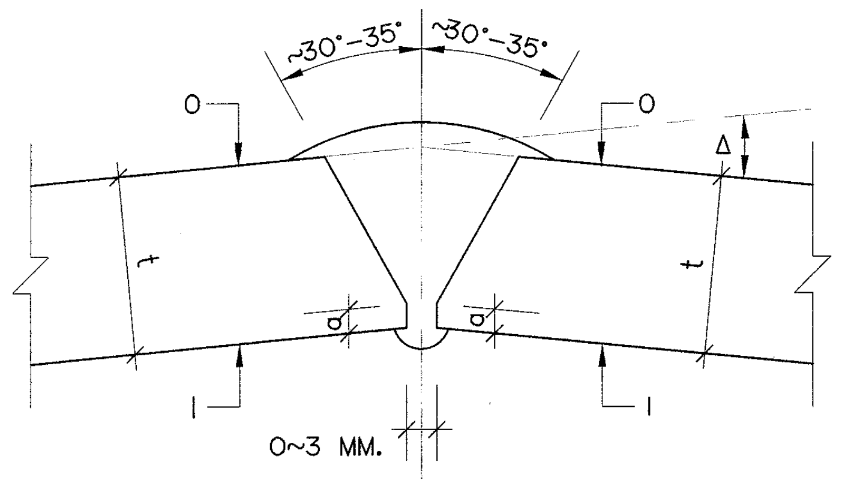
COUPLING



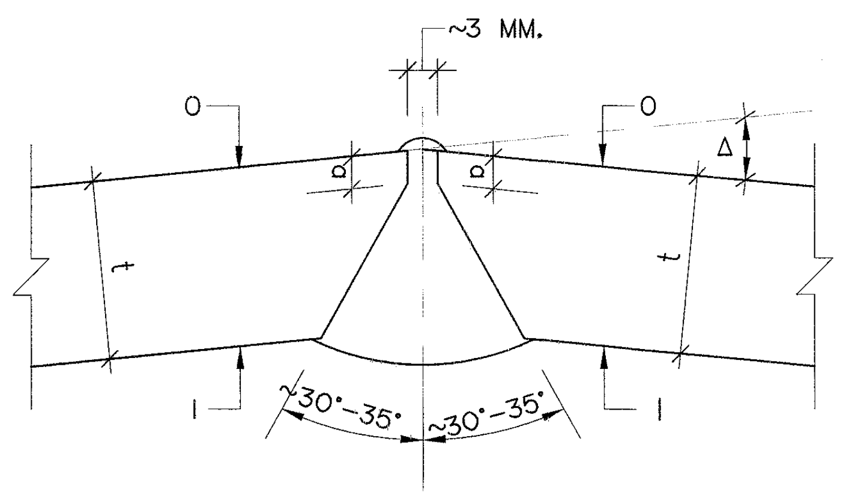
BUTT WELDED



PIPE BEND DETAILED



OUTSIDE WELD FOR BEND



INSIDE WELD FOR BEND

## DIMENSIONS FOR PIPE CONNECTING

NOT TO SCALE

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
|---|---|---|---|---|
| 3 | | | | |
| 2 | | | | |
| 1 | | | | |
| | CONSULTANTS | | DEDE | |

KINGDOM OF THAILAND
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

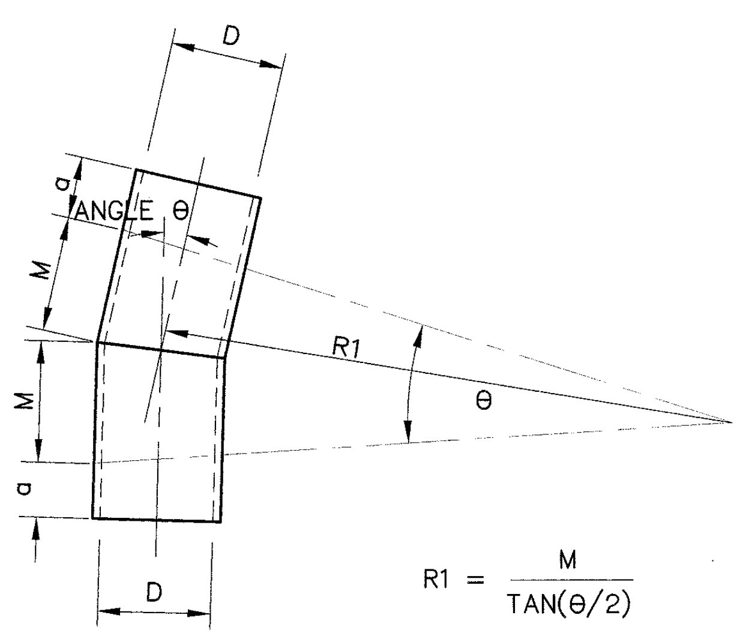
MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
HEADRACE
JOINT DETAILS FOR STEEL PIPE

P&C MANAGEMENT CO.,LTD.

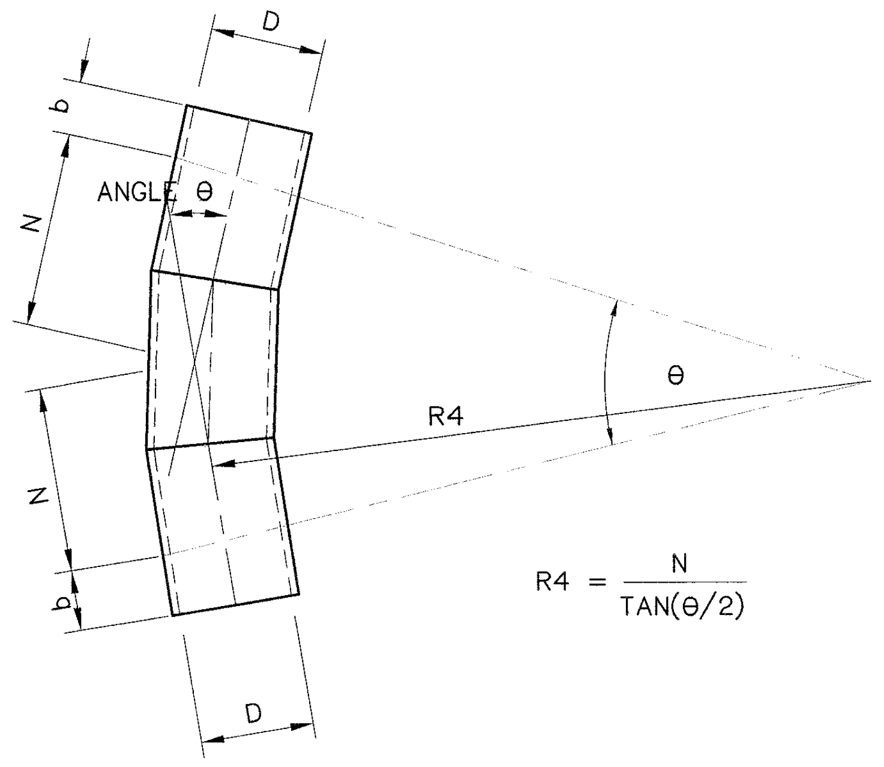
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

| | |
|---|---|
| DESIGNED ภย.64624 สย.6226 | REVIEWED |
| DRAWN | SUBMITTED Chanit |
| CHECKED สย.6226 | RECOMMENDED |
| PROJECT MANAGER 08/03/2559 DATE | APPROVED P.Hansell |
| | DRAWING NO. MH-HR-08 |
| | SHEET NO. 32 OF 130 |



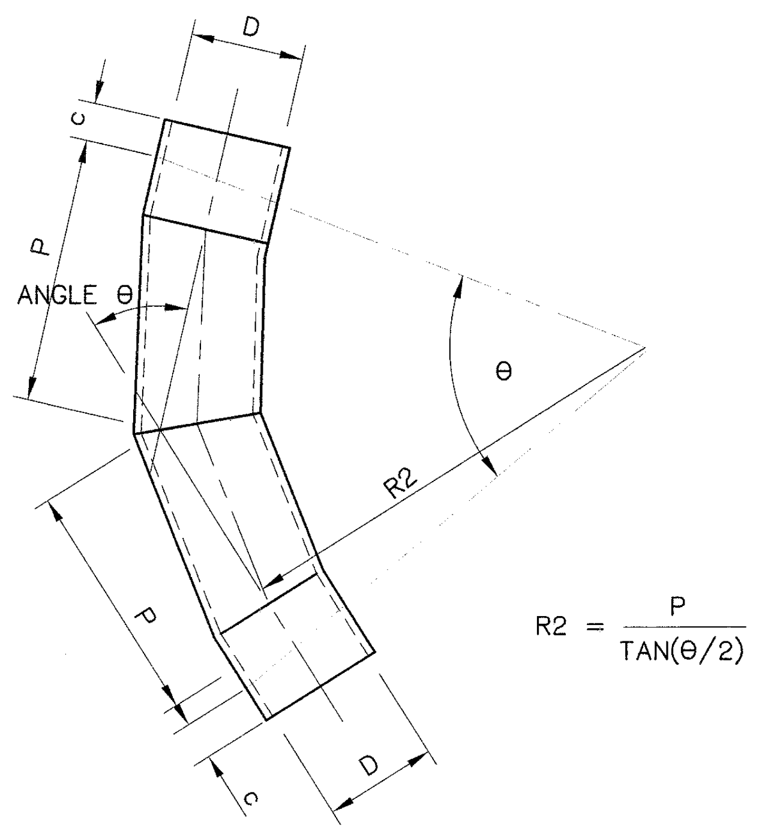
2–PIECE ELBOW

NOT TO SCALE



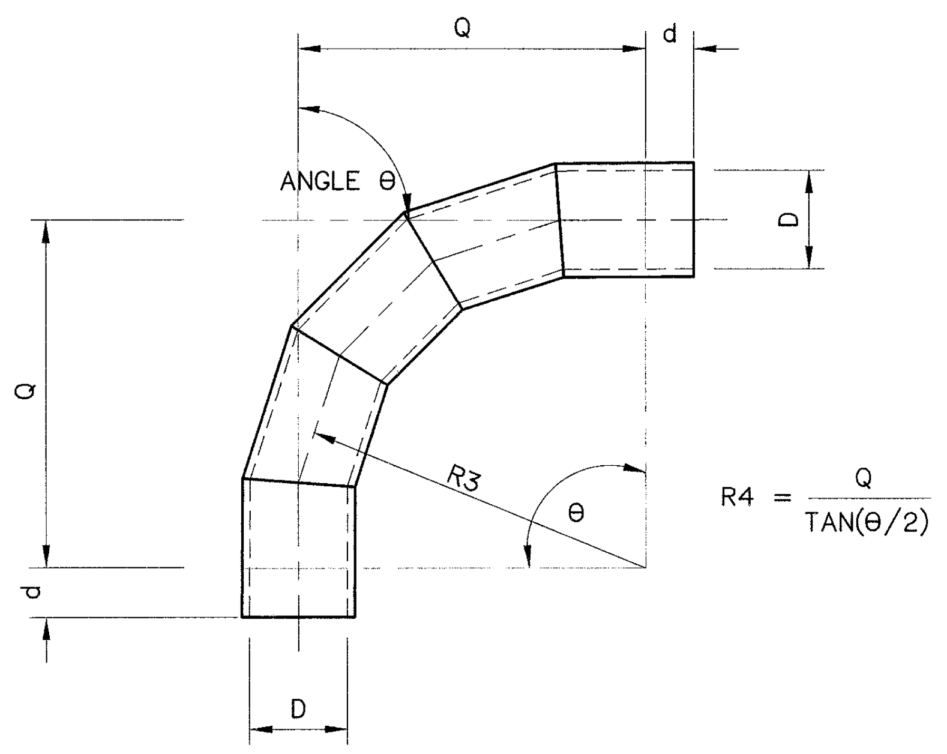
3–PIECE ELBOW

NOT TO SCALE



4–PIECE ELBOW

NOT TO SCALE



5–PIECE ELBOW

NOT TO SCALE

| D | ELBOW | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 2–PIECE<br>θ = 11.25° | | 3–PIECE<br>θ = 22.25° | | 4–PIECE<br>θ = 45° | | 5–PIECE<br>θ = 45° | |
| | M | a | N | b | P | c | Q | d |
| 150 | 100 | 250 | 175 | 225 | 275 | 225 | 375 | 250 |
| 200 | 100 | 250 | 200 | 225 | 300 | 225 | 450 | 250 |
| 250 | 100 | 250 | 225 | 200 | 350 | 225 | 500 | 250 |
| 300 | 125 | 275 | 250 | 275 | 400 | 275 | 575 | 300 |
| 400 | 150 | 350 | 300 | 325 | 500 | 325 | 700 | 350 |
| 500 | 175 | 350 | 350 | 325 | 550 | 325 | 825 | 350 |
| 600 | 200 | 350 | 400 | 350 | 650 | 350 | 650 | 350 |
| 700 | 225 | 400 | 450 | 400 | 725 | 400 | 950 | 375 |
| 800 | 225 | 475 | 500 | 450 | 800 | 450 | 1075 | 425 |
| 900 | 250 | 450 | 525 | 450 | 850 | 425 | 1175 | 475 |
| 1,000 | 250 | 525 | 550 | 500 | 875 | 500 | 1250 | 450 |
| 1,200 | 275 | 400 | 575 | 400 | 950 | 375 | 1300 | 525 |
| 1,500 | 300 | 475 | 675 | 475 | 1050 | 450 | 1375 | 400 |
| 1,800 | 325 | 450 | 700 | 425 | 1150 | 425 | 1575 | 550 |

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
|---|---|---|---|---|
| 3 | | | | |
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| 1 | | | | |

CONSULTANTS

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KINGDOM OF THAILAND
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
HEADRACE
FITTINGS FOR STEEL PIPE

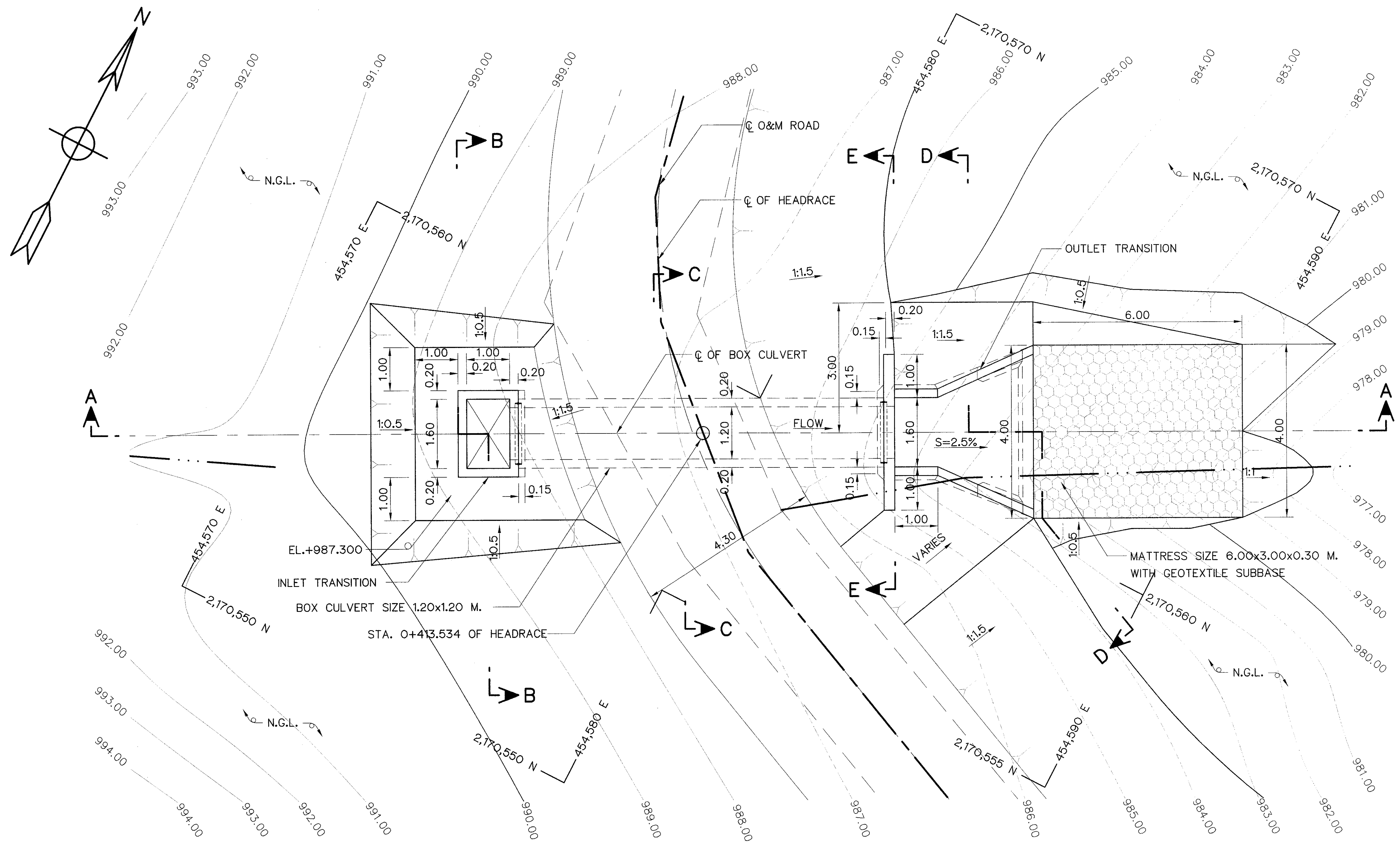
P&C MANAGEMENT CO.,LTD.

DESIGNED ภย.64624 สย.6226
DRAWN
CHECKED สย.6226
PROJECT MANAGER
DATE 08/03/2559

Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY
REVIEWED
SUBMITTED Chavit
RECOMMENDED
APPROVED P. Haus

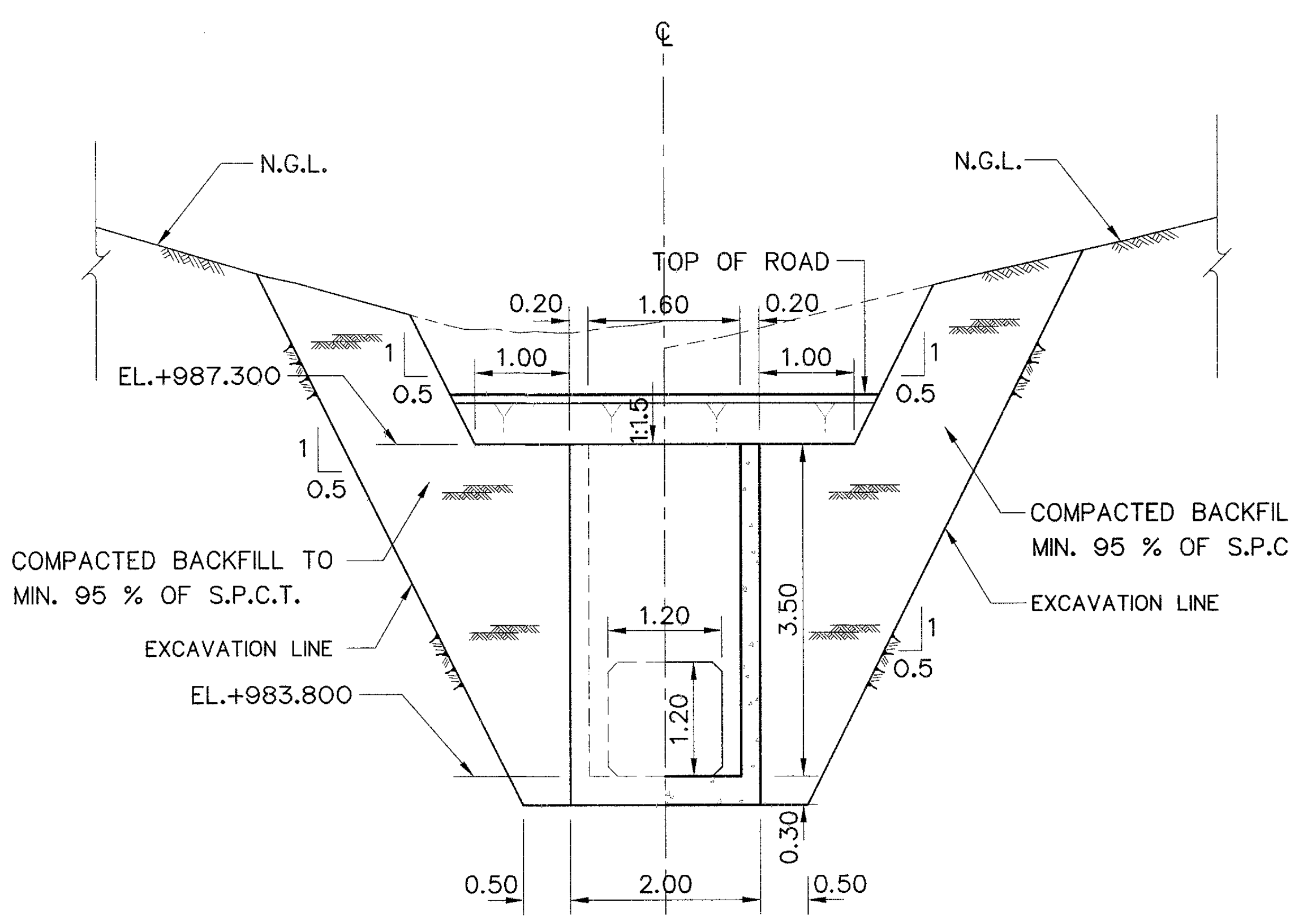
DRAWING NO. MH–HR–09

SHEET NO. 33 OF 130



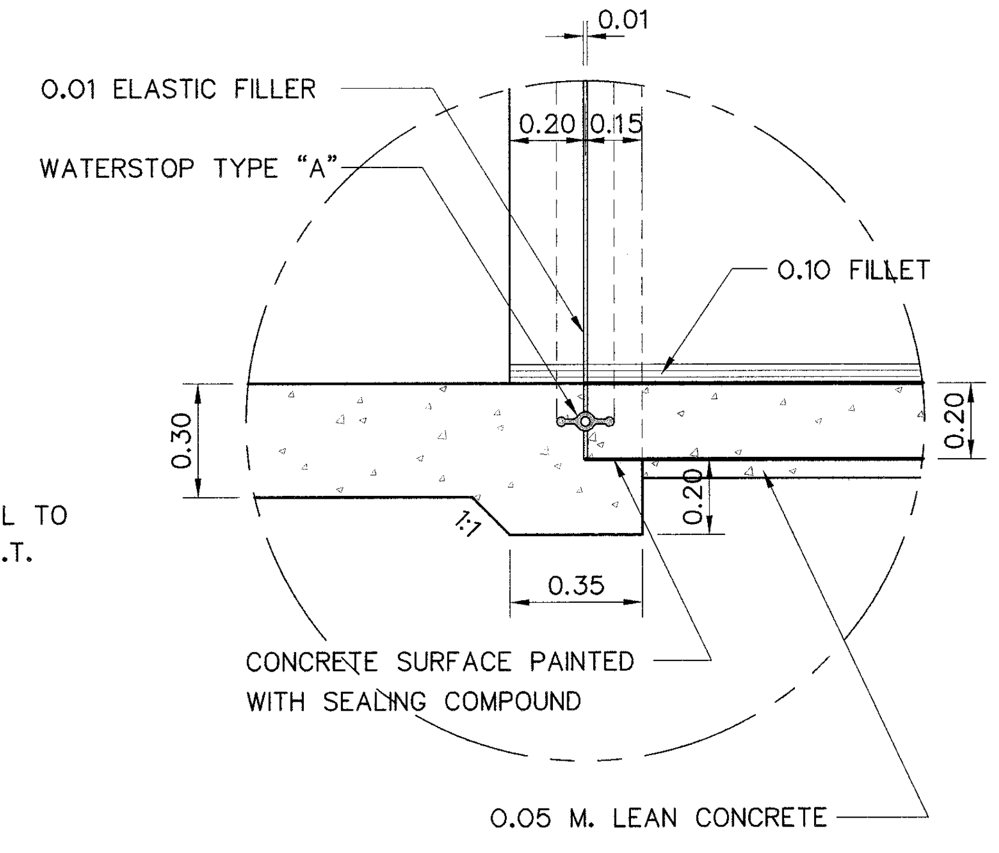
## PLAN

SCALE 1:75



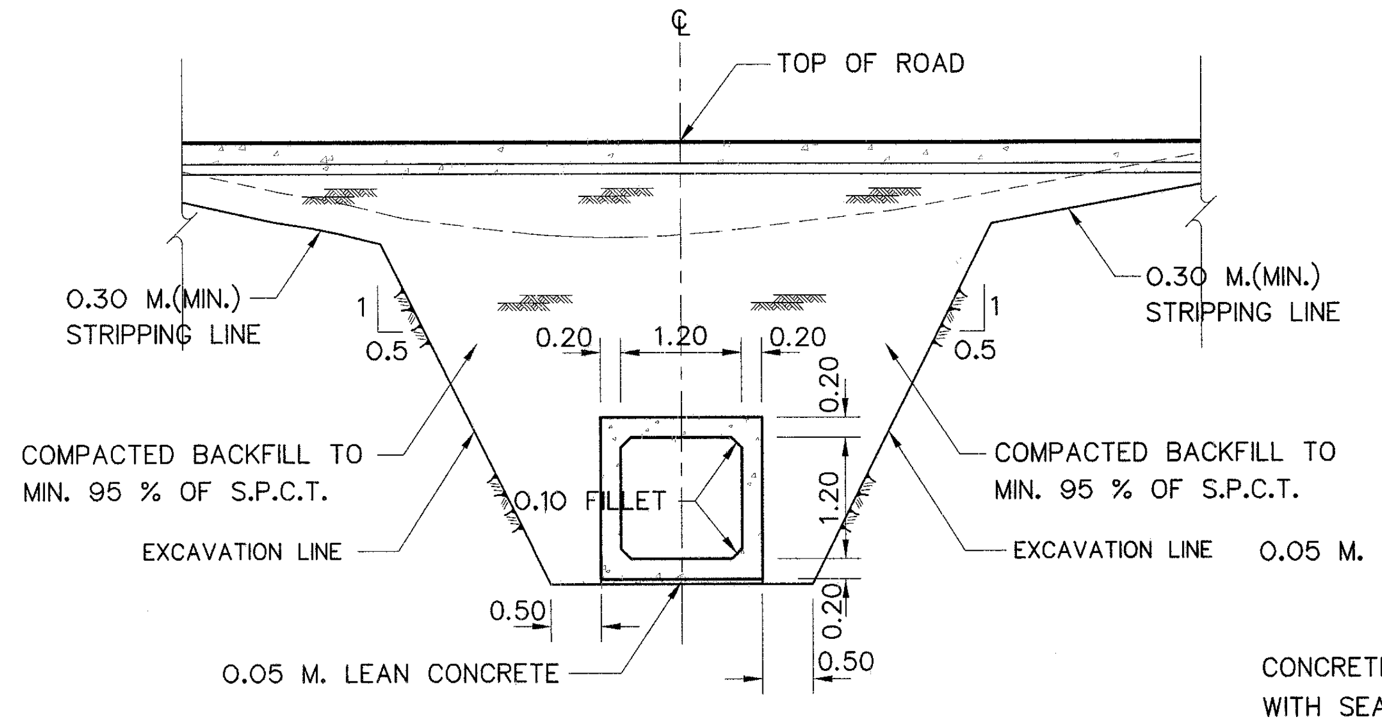
## SECTION B–B

SCALE 1:75



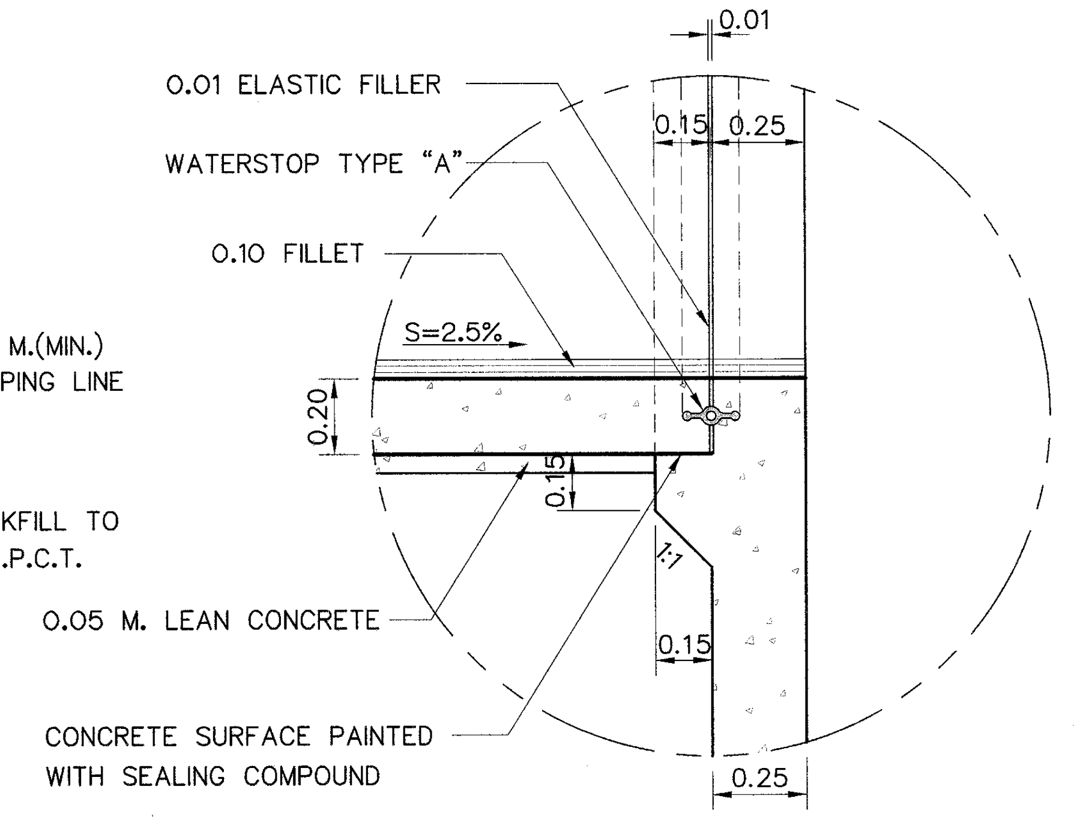
## DETAIL "1"

SCALE 1:20



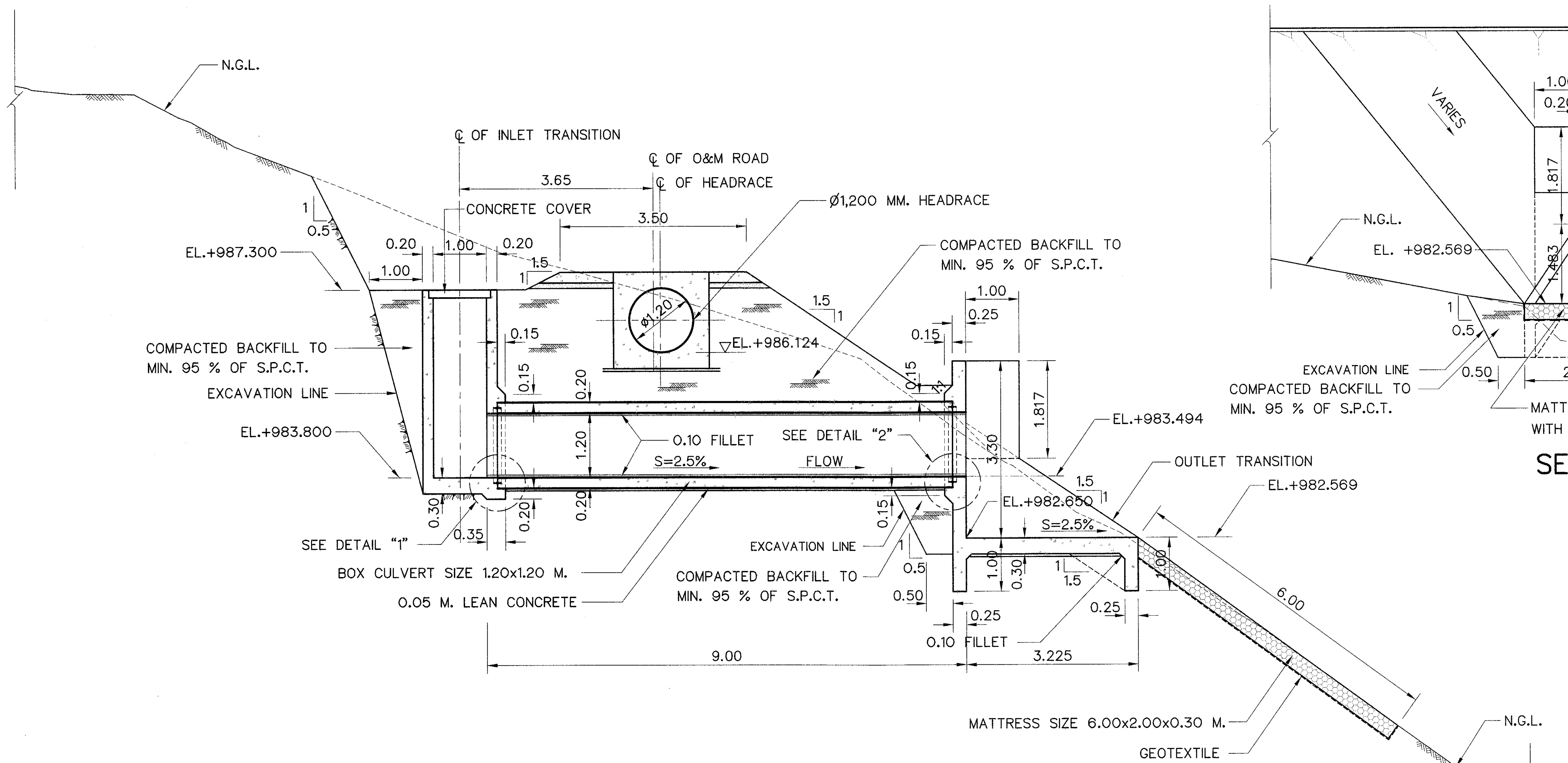
## SECTION C–C

SCALE 1:75



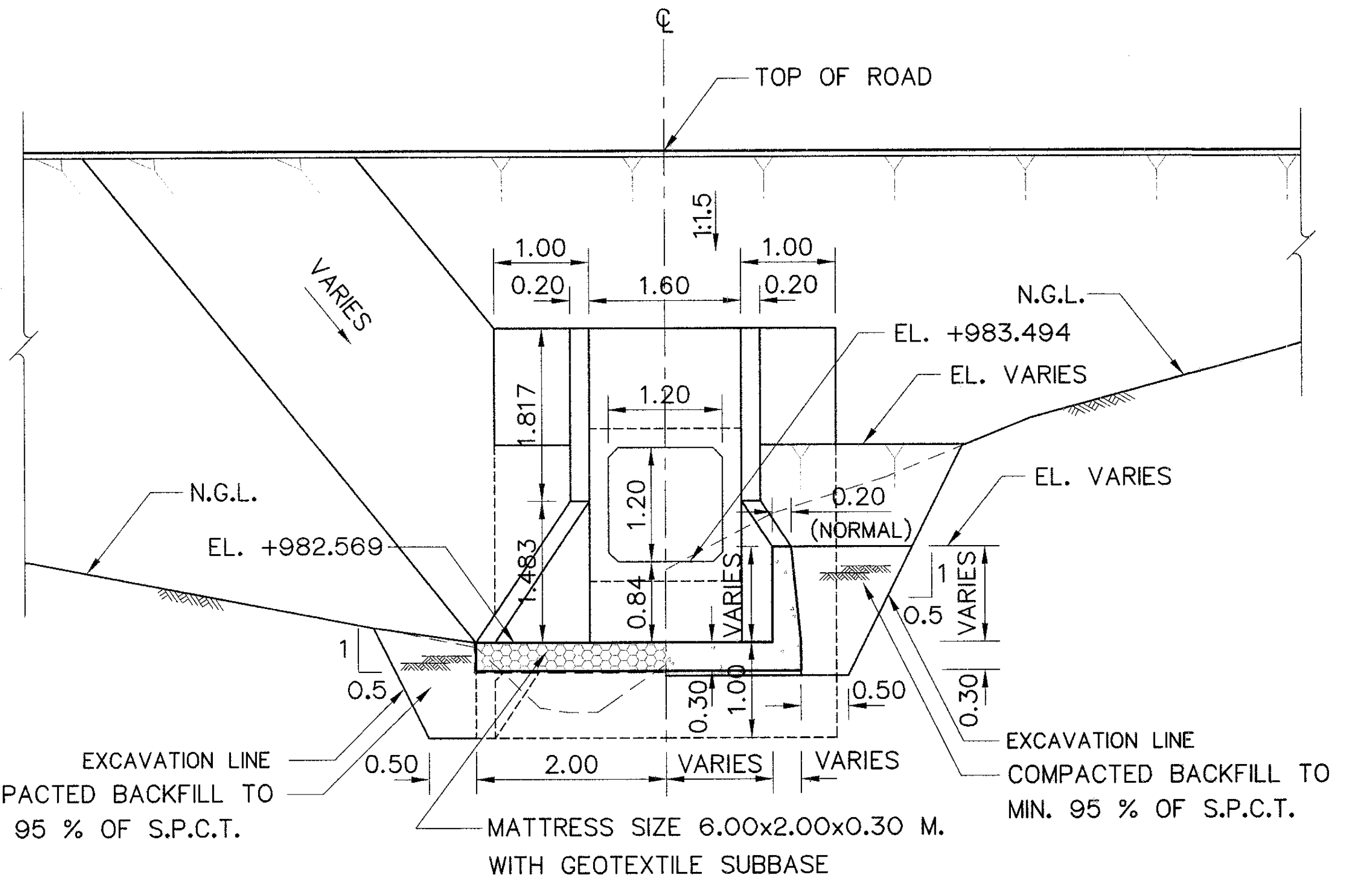
## DETAIL "2"

SCALE 1:20



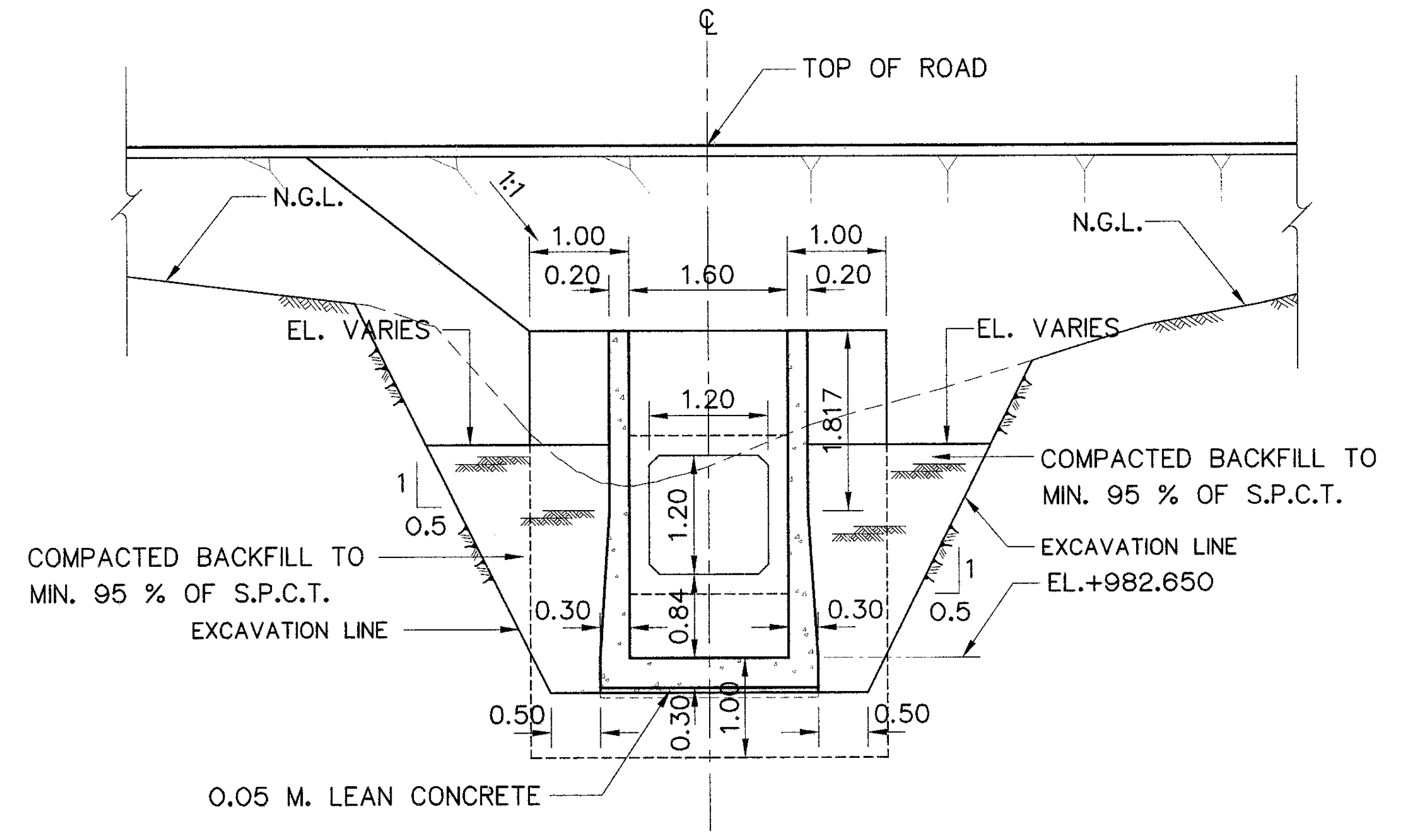
## SECTION A–A

SCALE 1:75



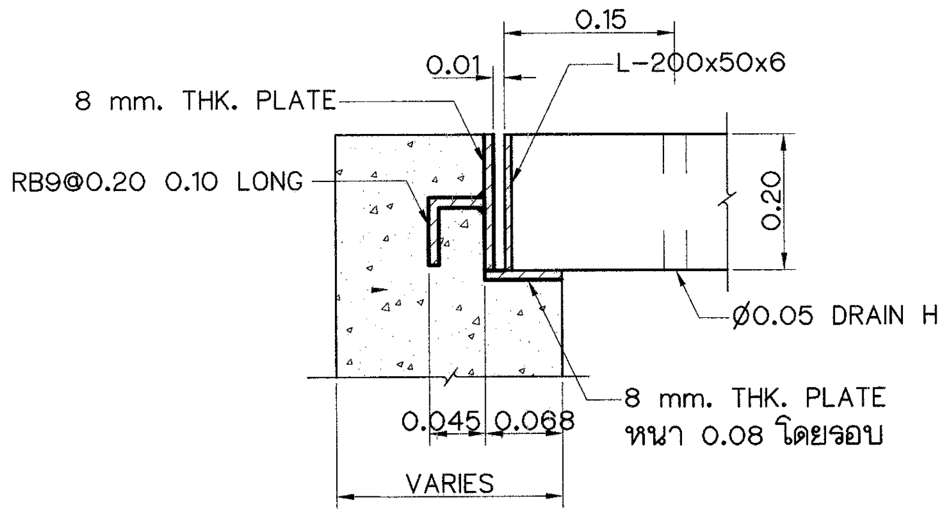
## SECTION D–D

SCALE 1:75



## SECTION E–E

SCALE 1:75



## DETAIL "2"

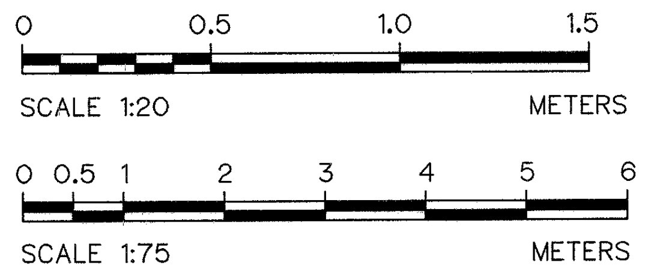
NOT TO SCALE

NOTES :

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS UNLESS OTHERWISE SHOWN.
2. SYMBOL, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH-GN-03

REFERENCE DRAWING :

| | |
|---|---|
| 1. HEADRACE PLAN AND PROFILE, STA. 0+000 TO STA. 0+500 | MH-HR-01 |
| 2. DRAIN CULVERT STA. 0+413.534, REINFORCEMENT DETAILS | MH-HR-11 |



| NO. | DATE | REVISIONS | CHECKED | APPROVED |
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| 3 | | | | |
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KINGDOM OF THAILAND
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MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
HEADRACE
DRAIN CULVERT STA. 0+413.534 , PLAN AND SECTION

P&C MANAGEMENT CO.,LTD.

Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

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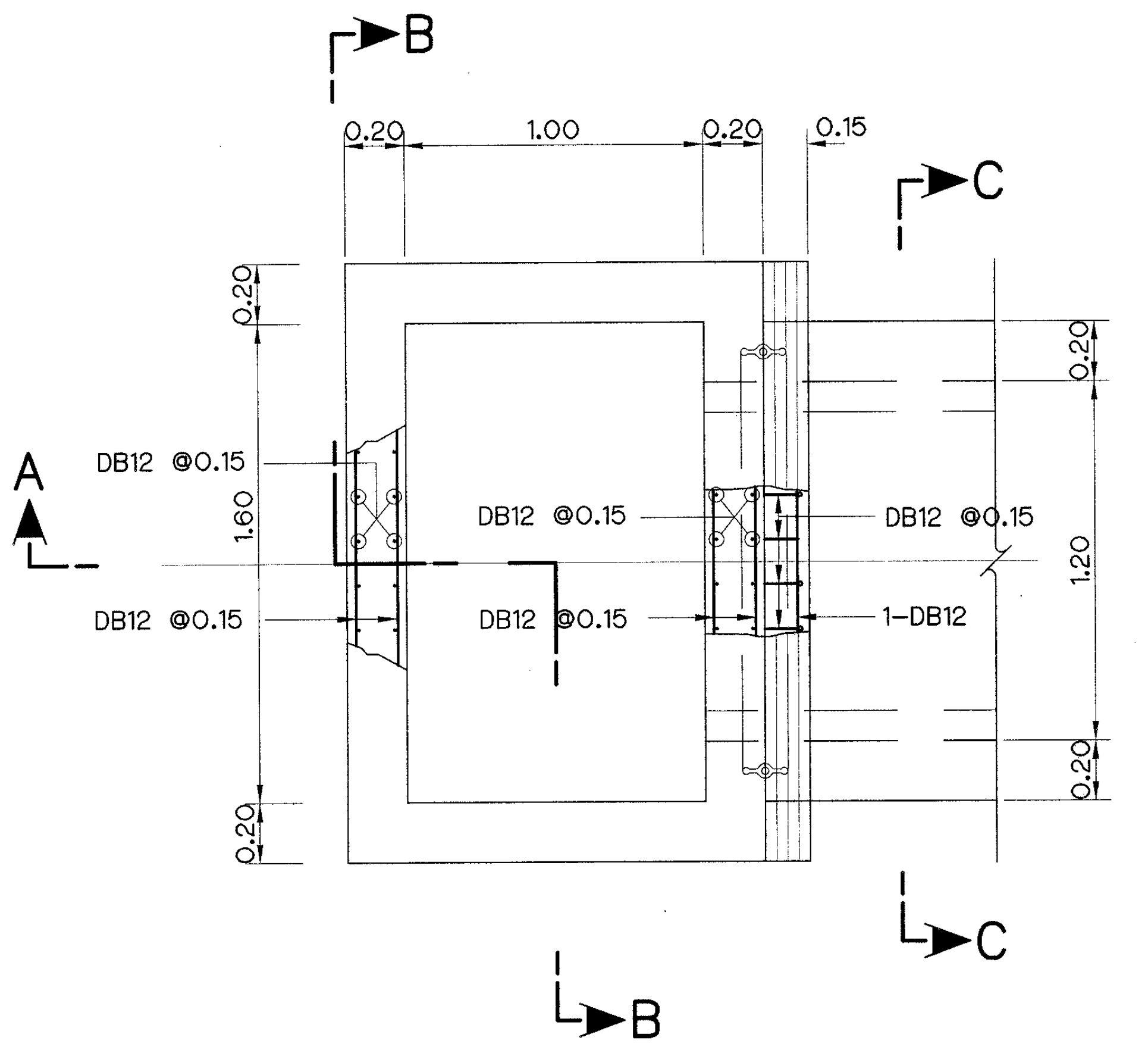
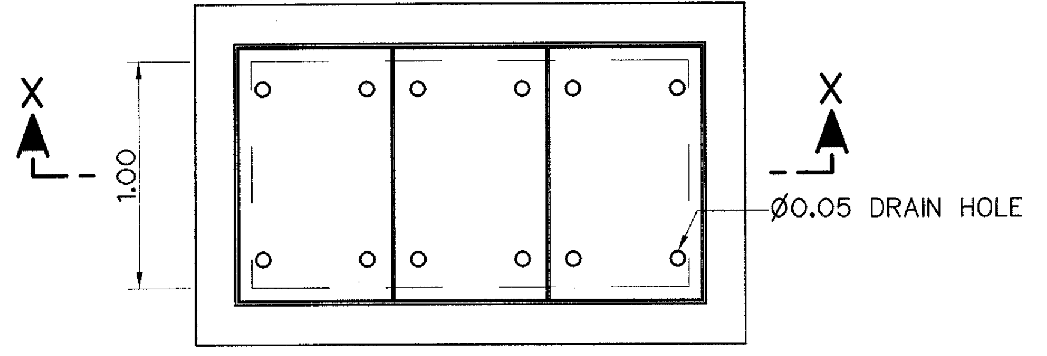
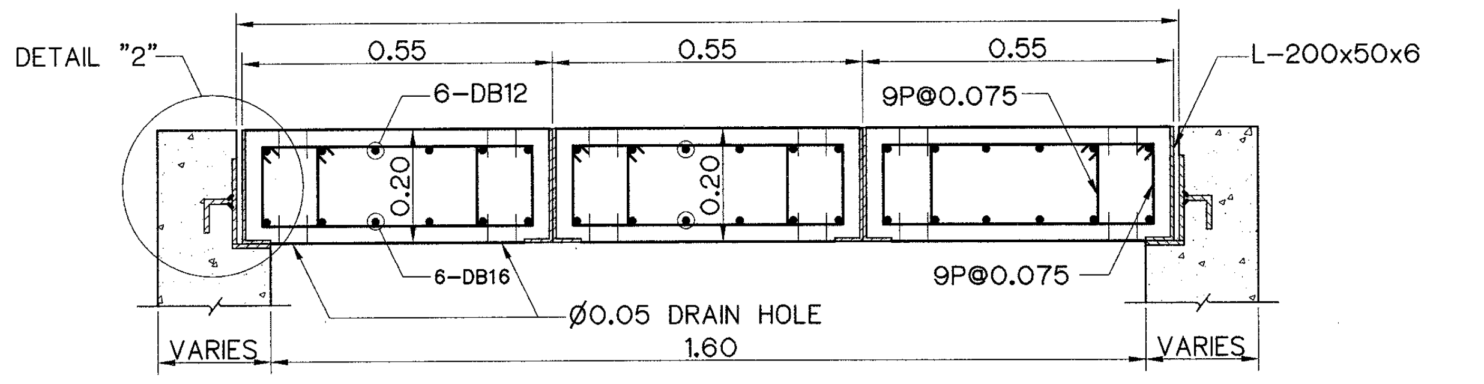
| CHECKED ลย.6226 | RECOMMENDED |
| PROJECT MANAGER 08/03/2559 DATE | APPROVED P. Hansell |
| | DRAWING NO. MH-HR-10 |
| | SHEET NO. 34 OF 130 |





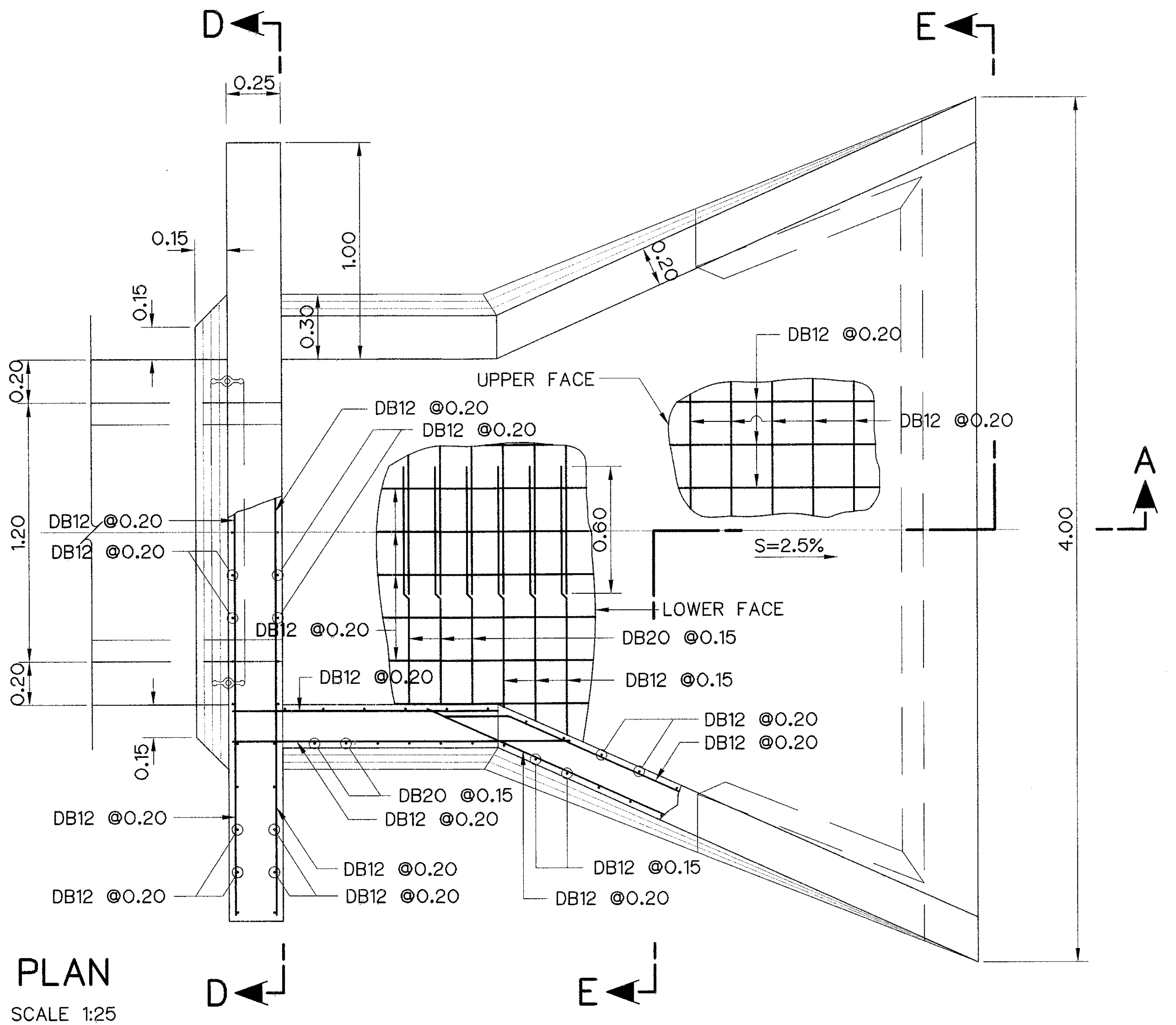
## CONCRETE COVER

NOT TO SCALE



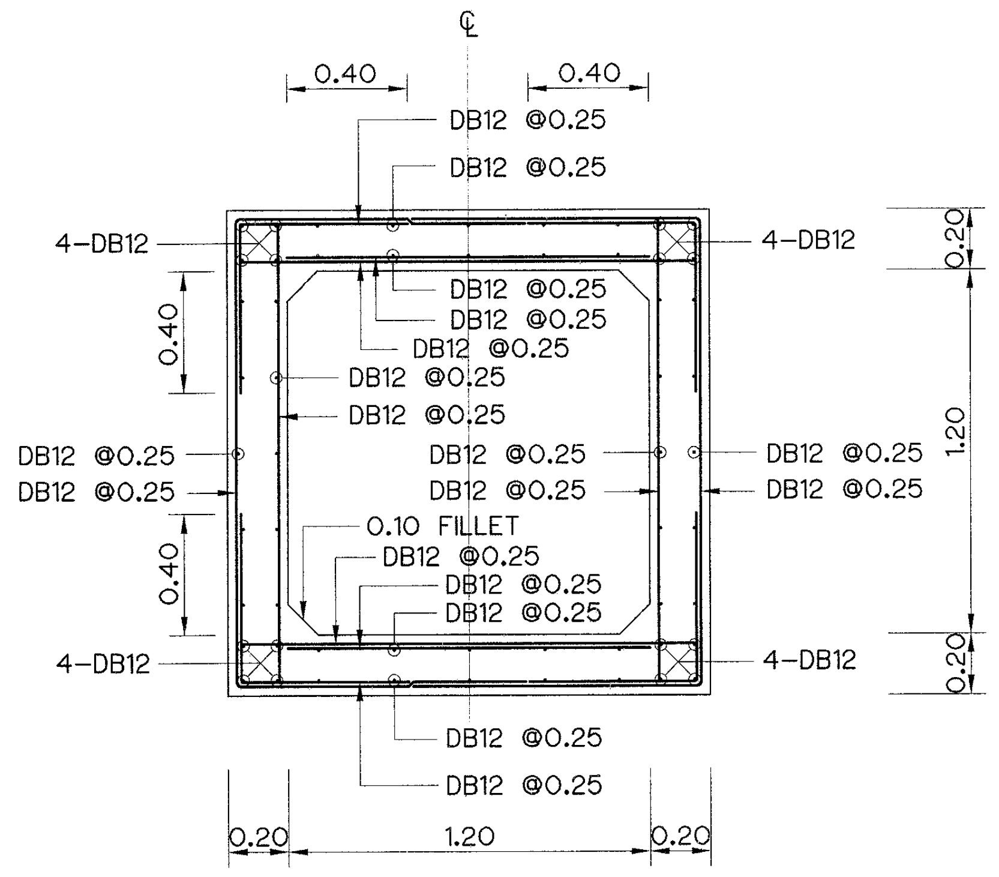
## SECTION X–X

NOT TO SCALE



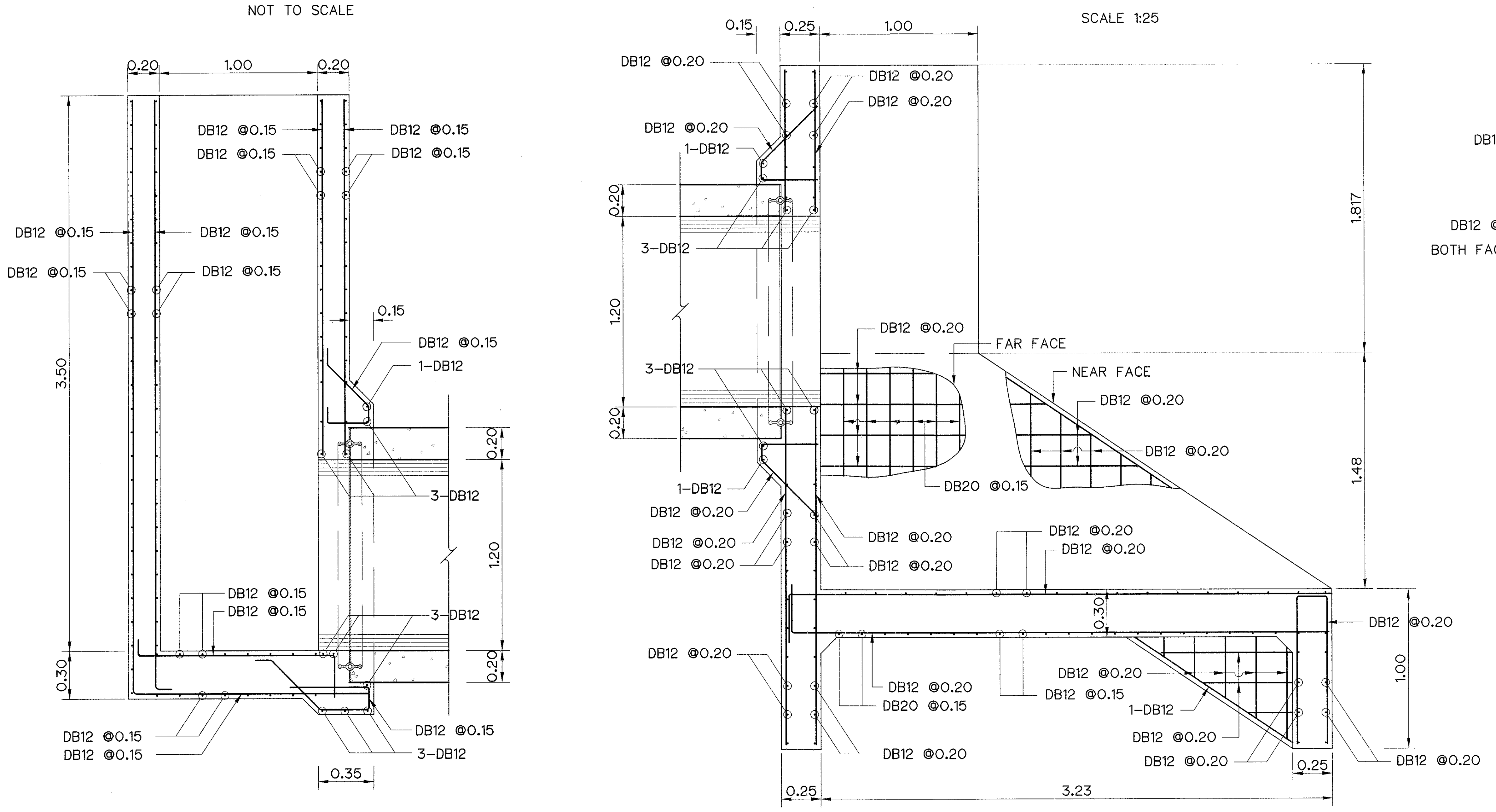
## PLAN

SCALE 1:25



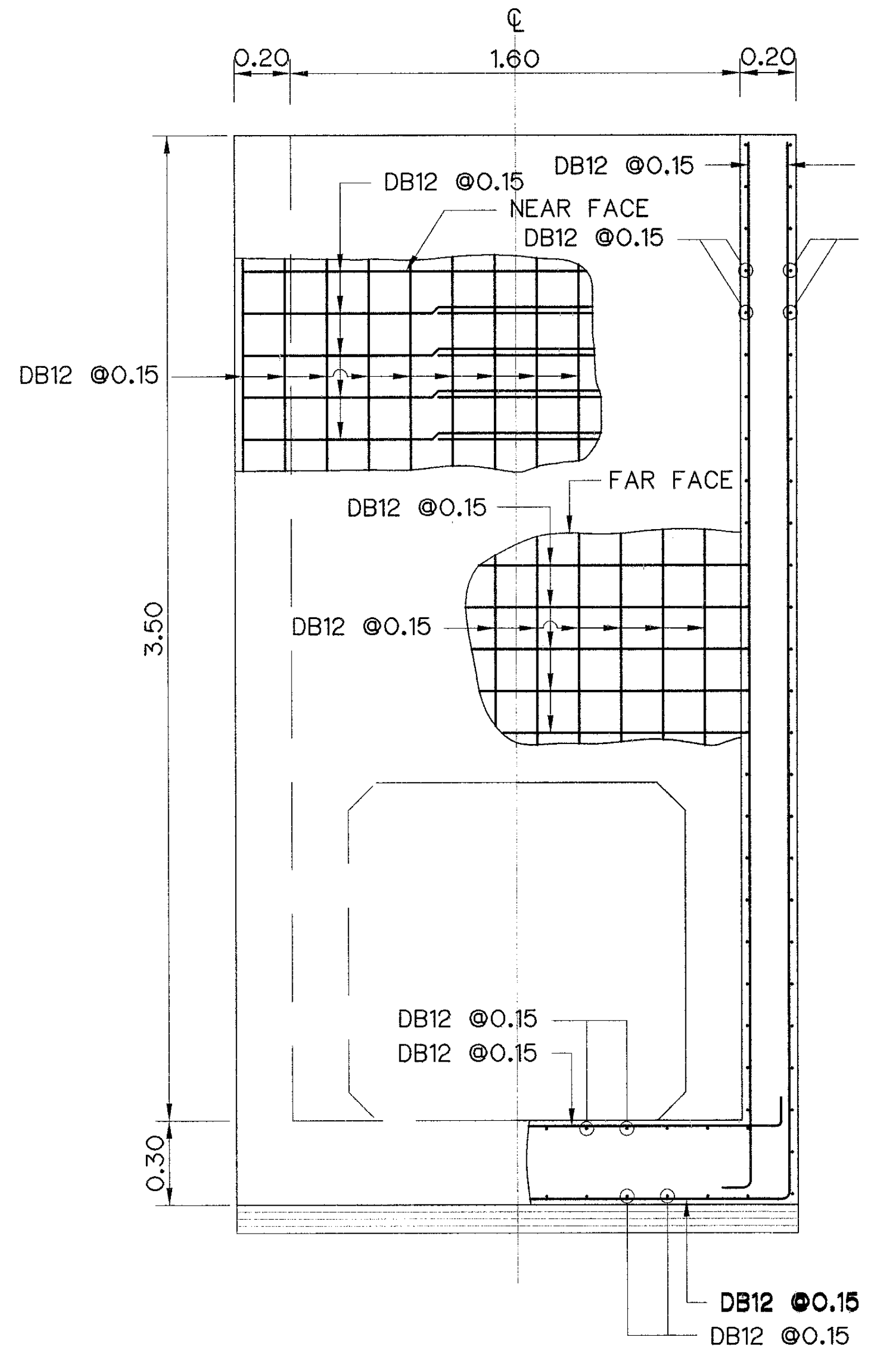
## SECTION C–C

SCALE 1:25



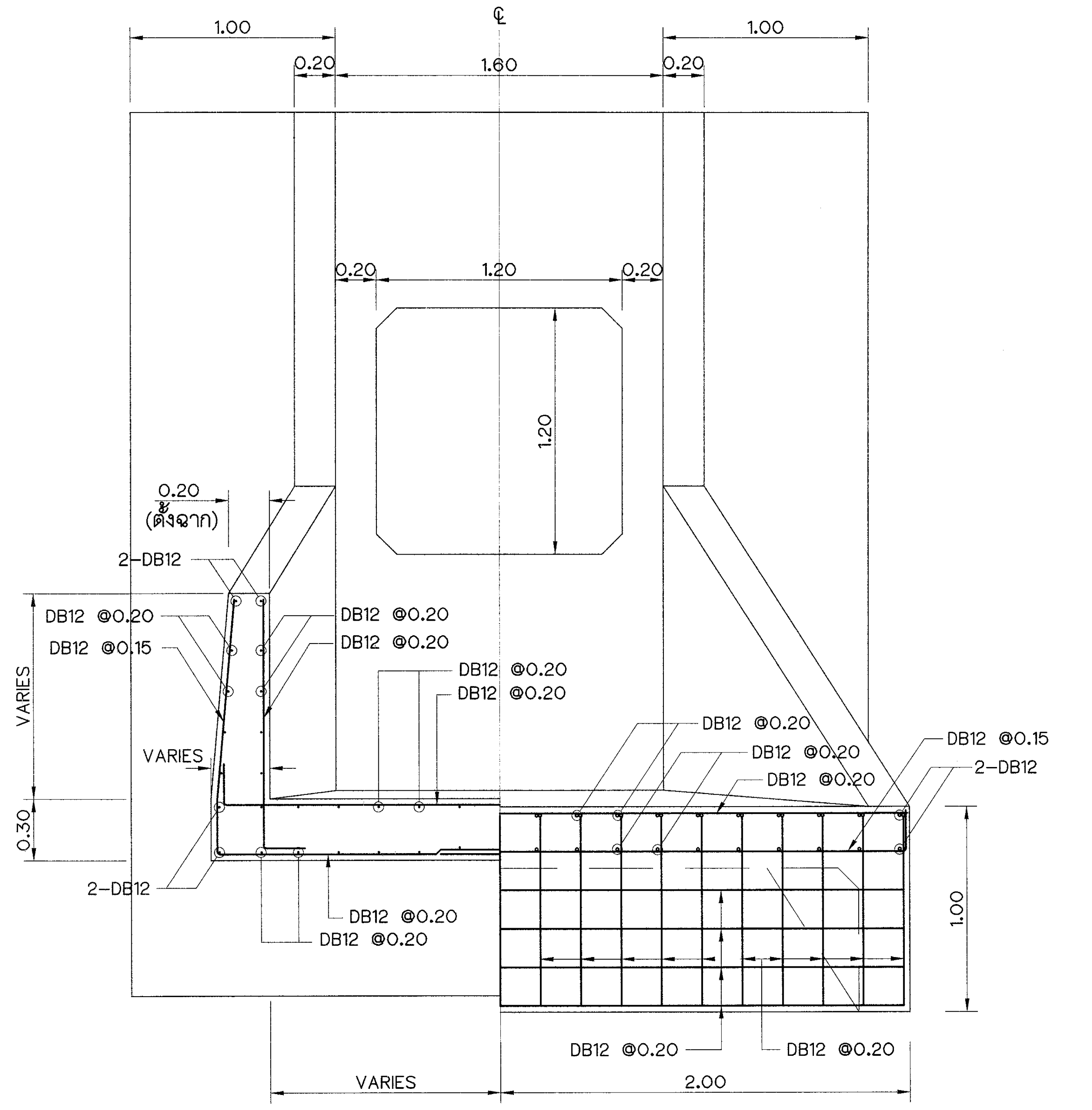
## SECTION A–A

SCALE 1:25



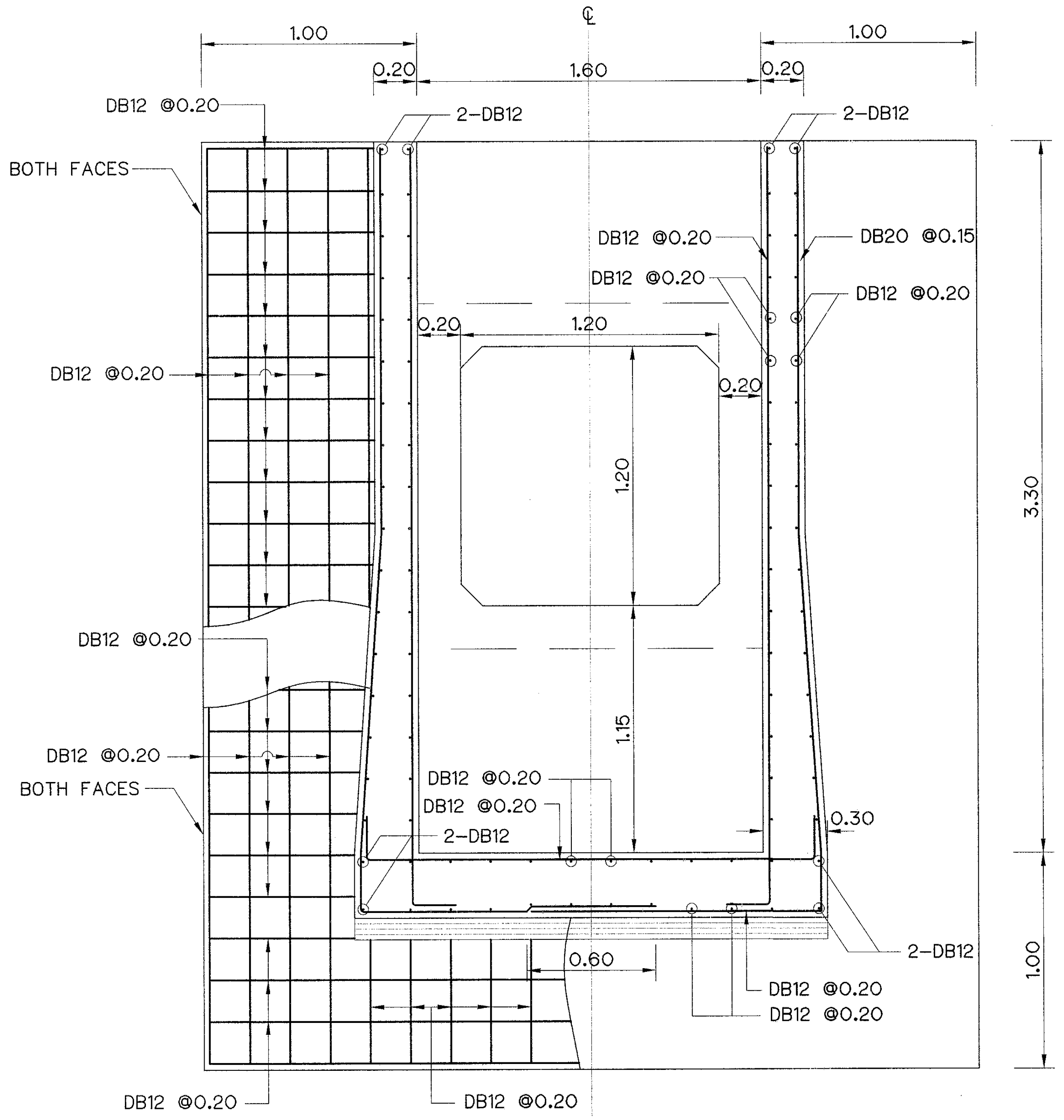
## SECTION B–B

SCALE 1:25



## SECTION E–E

SCALE 1:25



## SECTION D–D

SCALE 1:25

0 0.5 1.0 1.5 2.0

SCALE 1:25 METERS

**NOTES :**

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS, UNLESS OTHERWISE SHOWN.
2. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. NMH-GN-03
3. CONCRETE DESIGN BASED ON THE COMPRESSIVE STRENGTH OF 210 KSC, STANDARD CYLINDER Ø0.15x0.30 m. TEST AT AGE 28 DAYS. UNLESS OTHERWISE INDICATED IN SPECIFIC DRAWINGS.
4. ULTIMATE TENSILE STRESSES OF REINFORCING STEEL, CONFORM TO THE REQUIREMENT OF THAI INDUSTRIAL STANDARD DESIGNATION SR24 FOR STRUCTURAL GRADE PLAIN ROUND BAR AND SD30 FOR INTERMEDIATE GRADE DEFORMED BAR.

**REFERENCE DRAWINGS :**

| | |
|---|---|
| 1. DRAIN CULVERT STA. 0+413.534, PLAN AND SECTION | NMH-HR-10 |

KINGDOM OF THAILAND
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
HEADRACE
DRAIN CULVERT STA. 0+413.534 REINFORCEMENT DETAILS

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
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P&C MANAGEMENT CO.,LTD.

DESIGNED ภย.64624 สย.6226
DRAWN
CHECKED สย.6226
PROJECT MANAGER 08/03/2559 DATE

Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

REVIEWED
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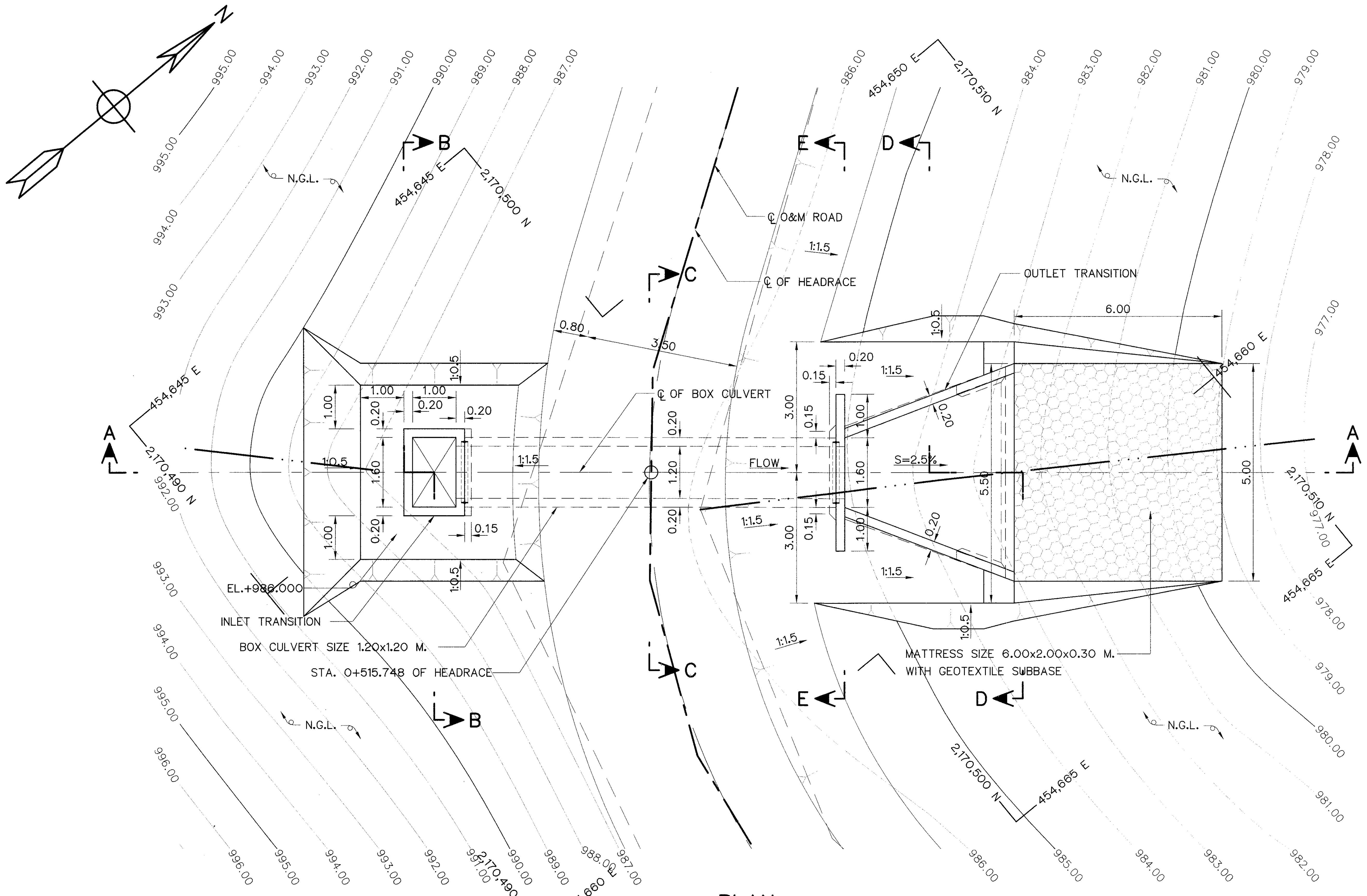
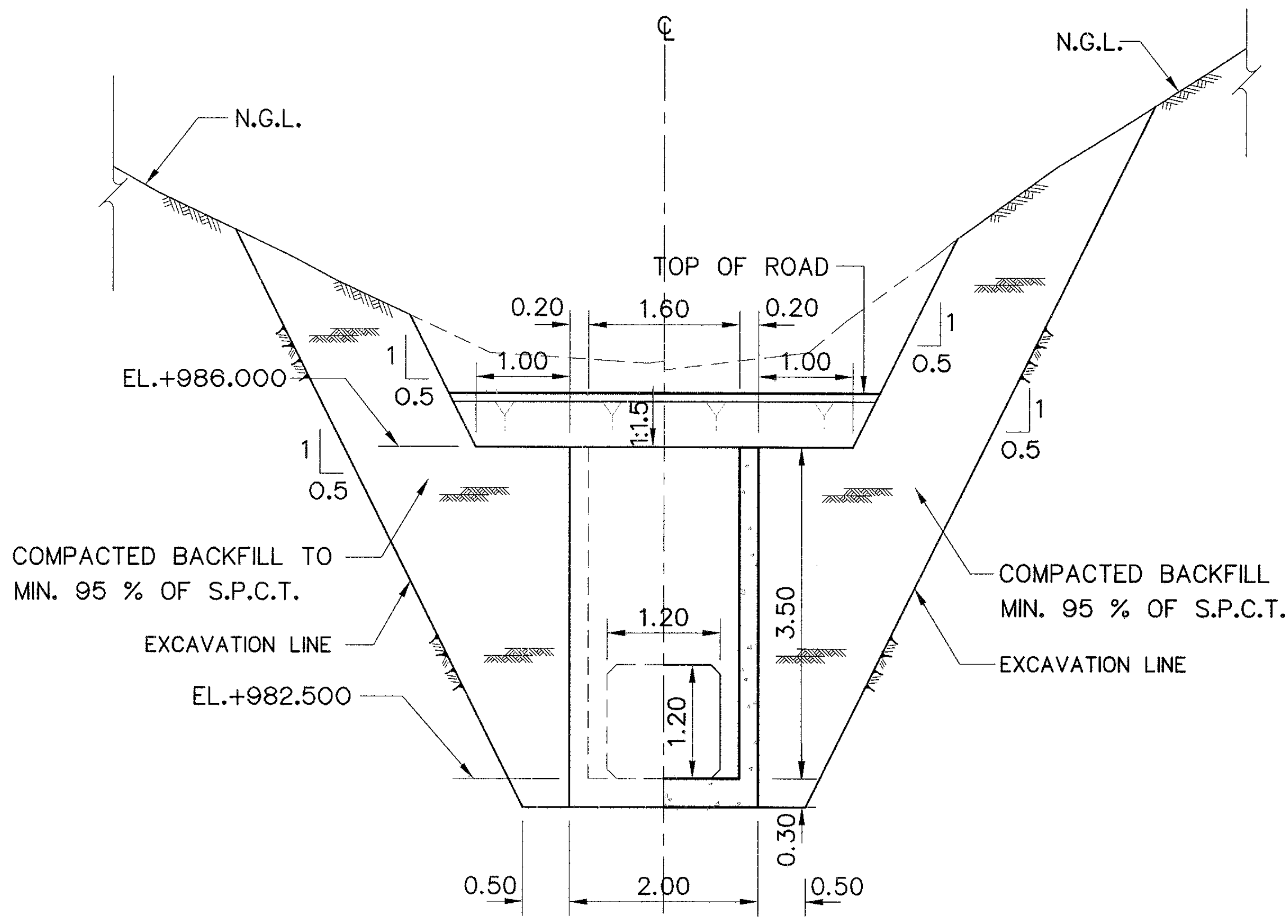
RECOMMENDED
APPROVED P. H

DRAWING NO. MH–HR–11

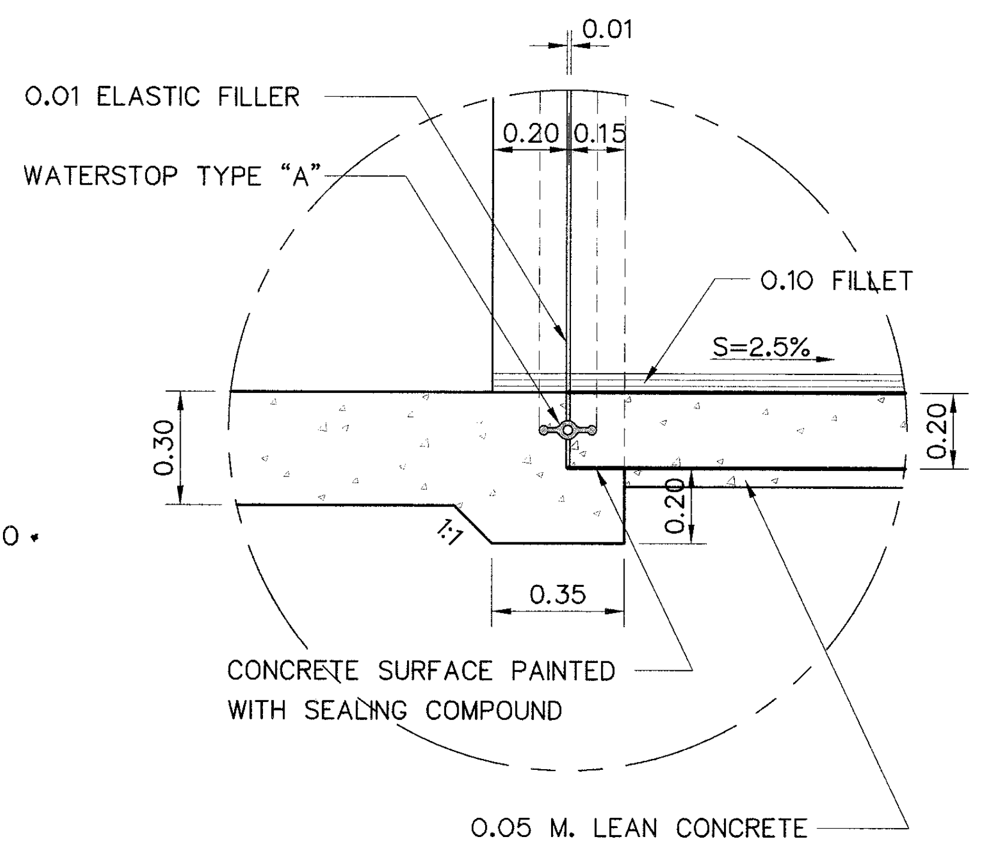
SHEET NO. 35 OF 130



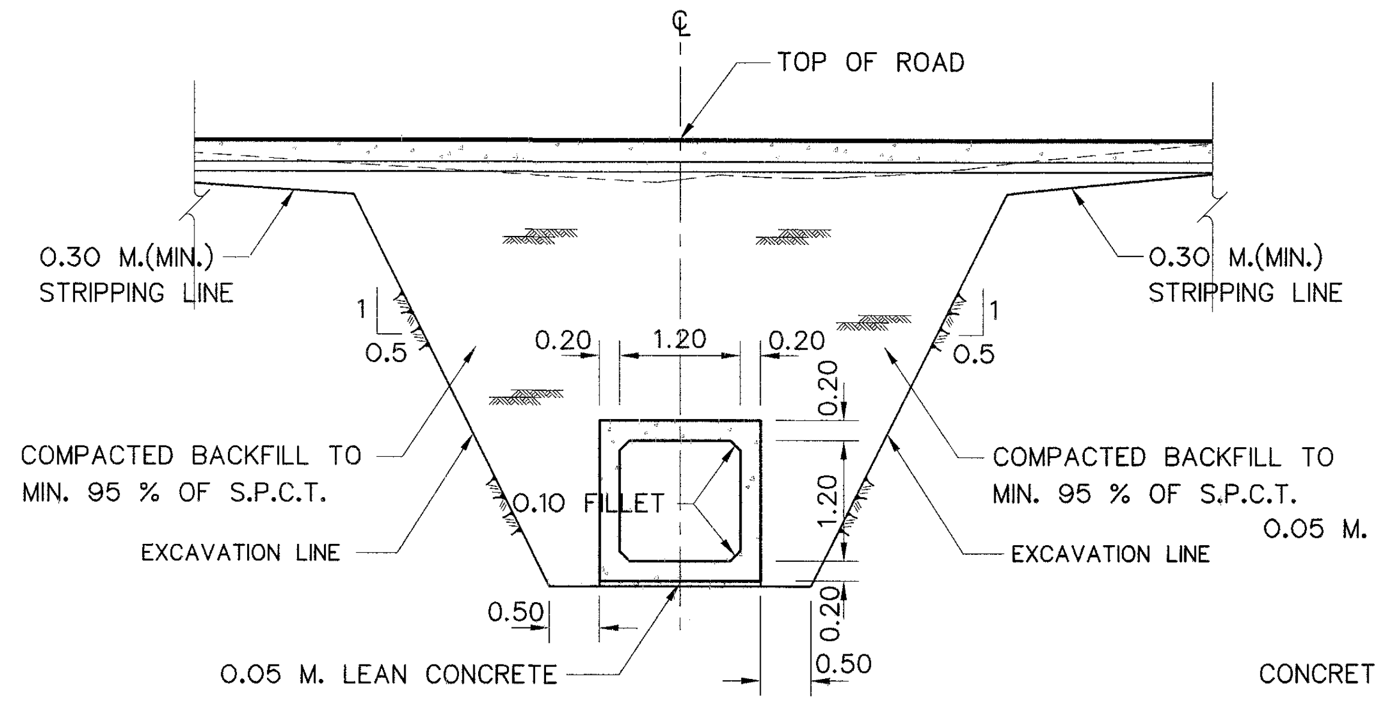
## PLAN
SCALE 1:75



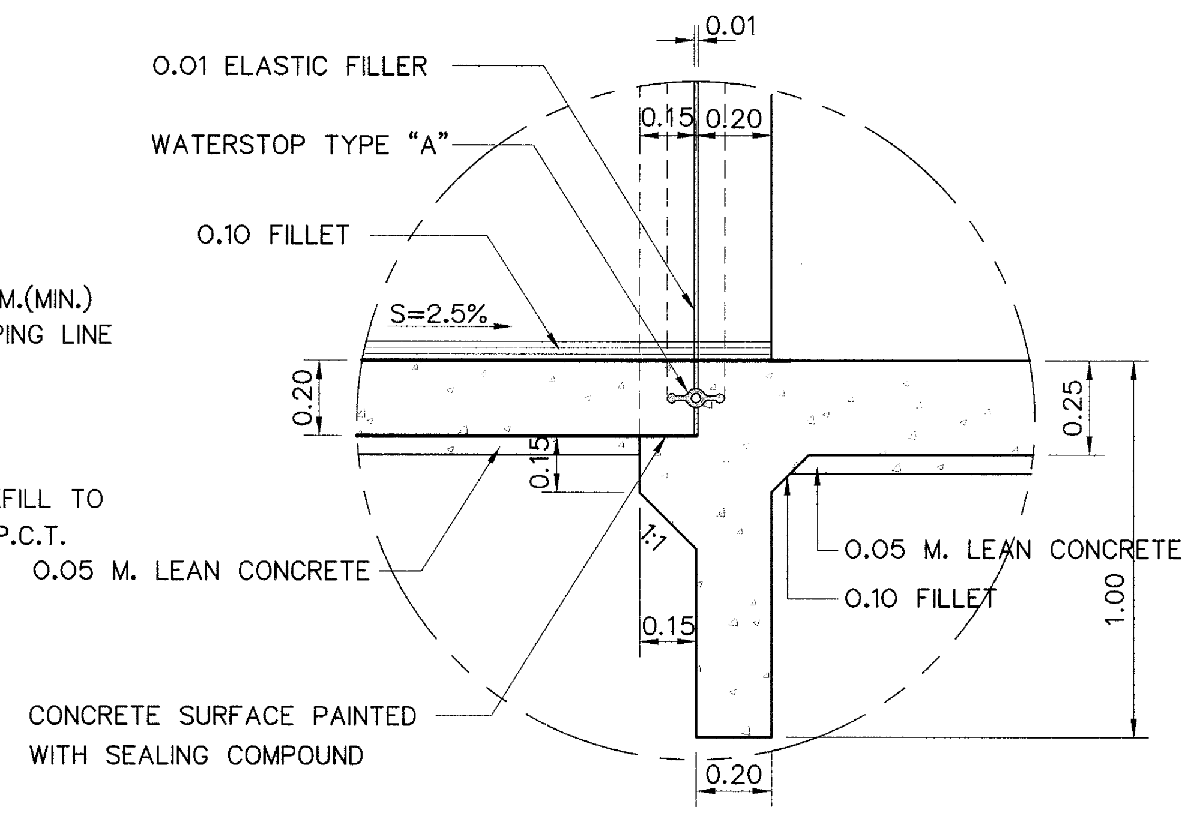
## SECTION B–B
SCALE 1:75



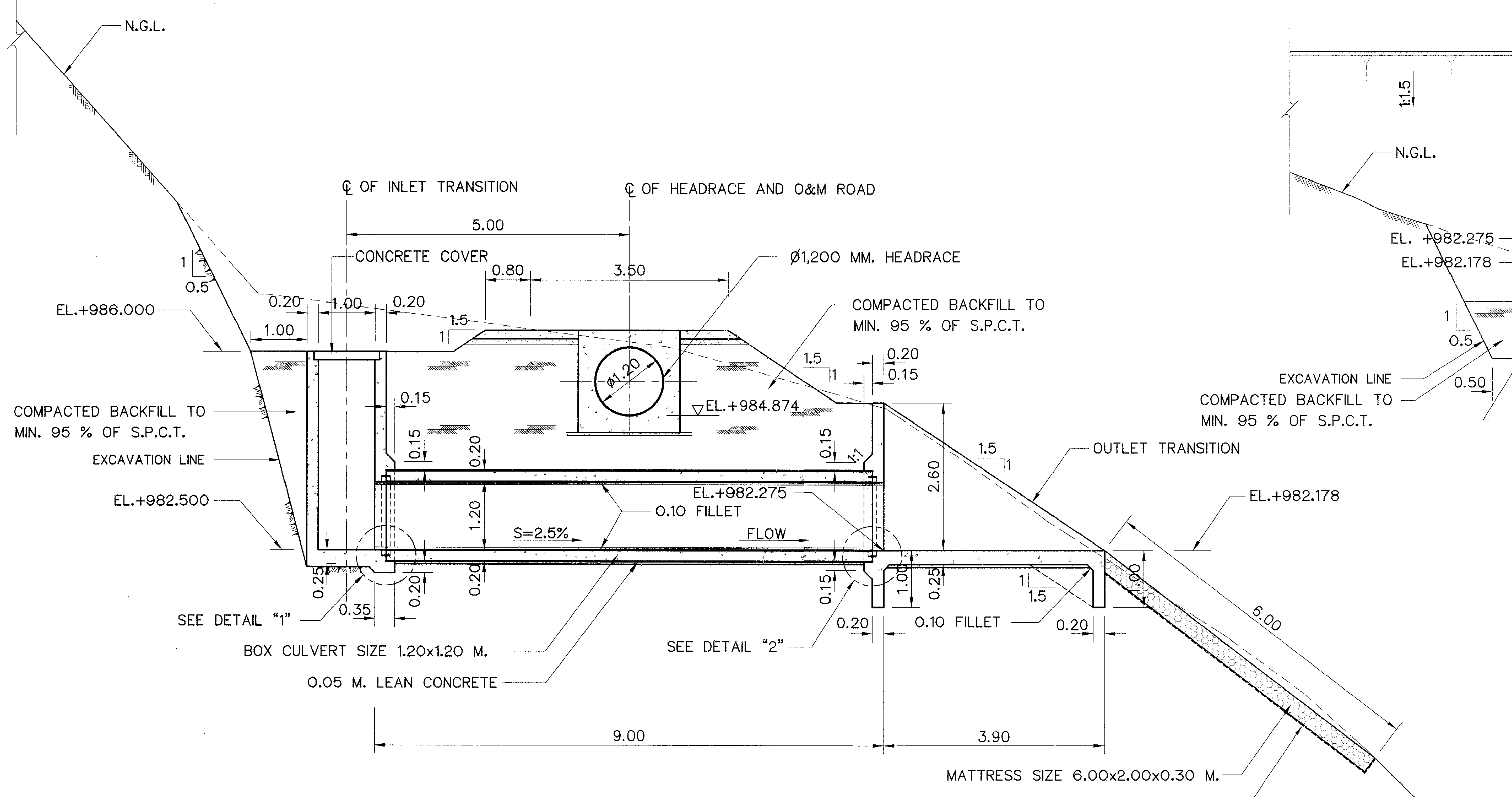
## DETAIL "1"
SCALE 1:20



## SECTION C–C
SCALE 1:75



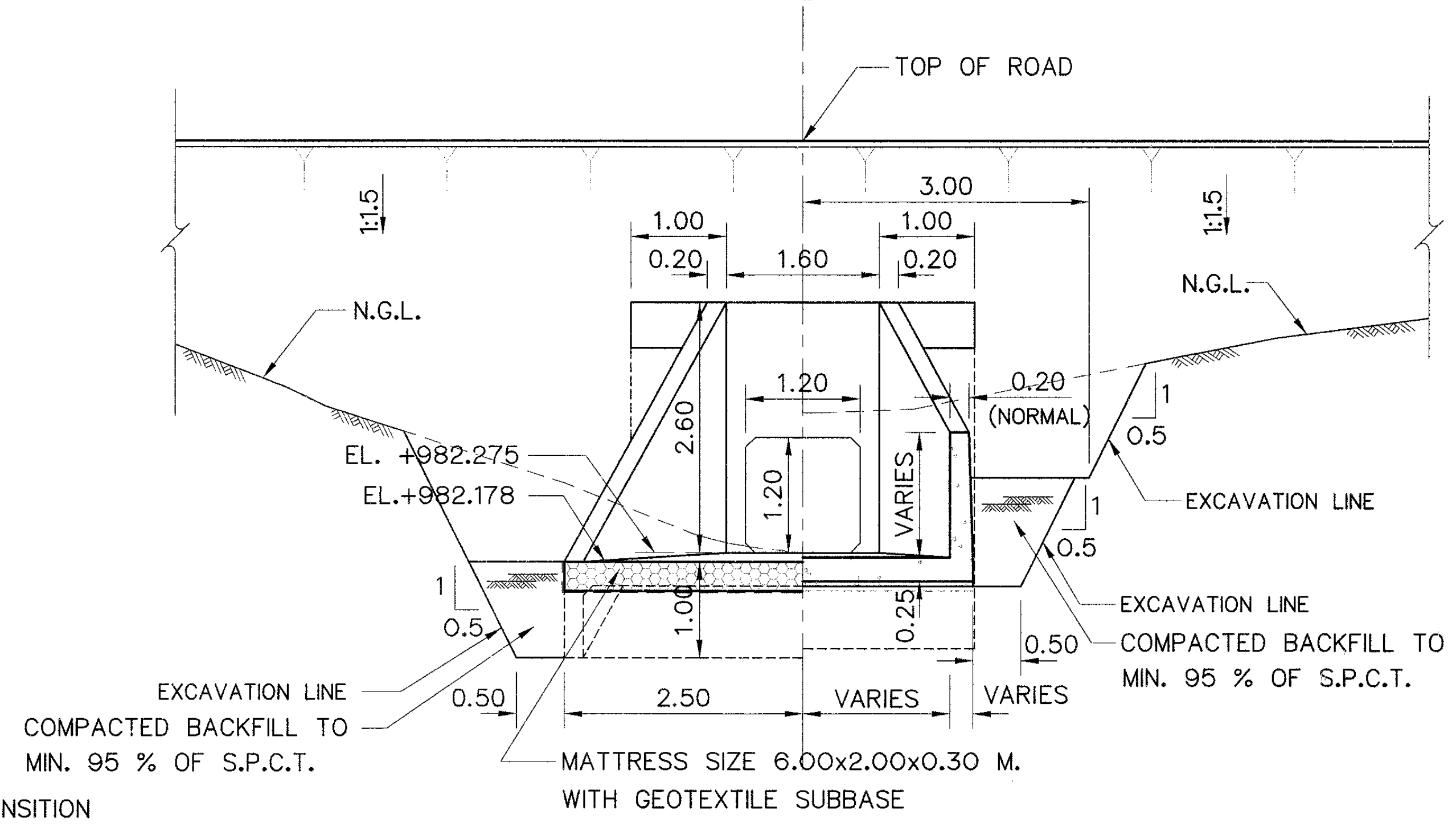
## DETAIL "2"
SCALE 1:20



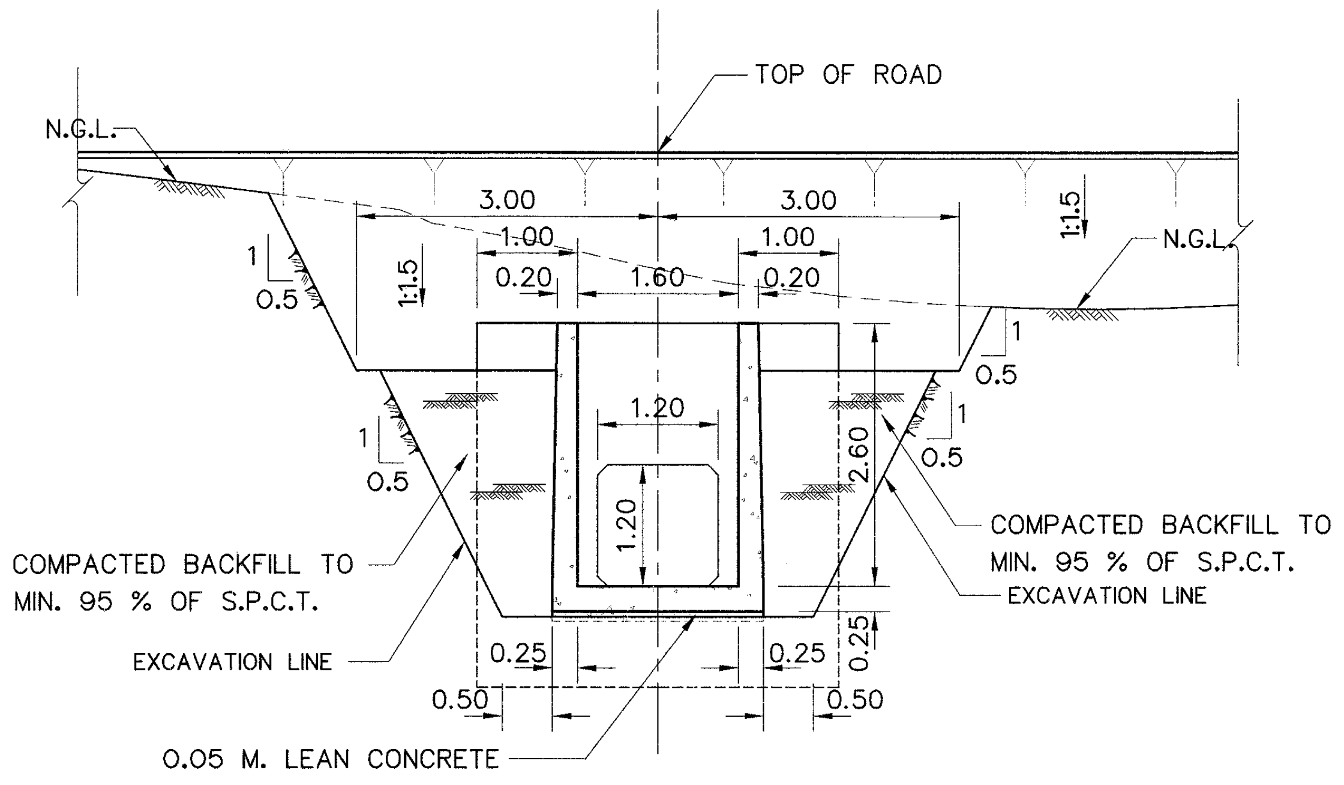
MATTRESS SIZE 6.00x2.00x0.30 M.

GEOTEXTILE

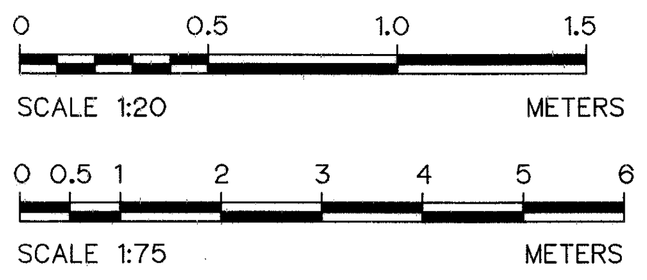
## SECTION A–A
SCALE 1:75



## SECTION D–D
SCALE 1:75



## SECTION E–E
SCALE 1:75



NOTES :

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS UNLESS OTHERWISE SHOWN.
2. SYMBOL, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH-GN-03

REFERENCE DRAWING :

| | |
|---|---|
| 1. HEADRACE PLAN AND PROFILE, STA. 0+500 TO STA. 1+000 | MH-HR-02 |
| 2. DRAIN CULVERT STA. 0+515.748, REINFORCEMENT DETAILS | MH-HR-13 |

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
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| | CONSULTANTS | | DEDE | |

KINGDOM OF THAILAND
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Energy Development and Efficiency
MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
HEADRACE
DRAIN CULVERT STA. 0+515.748 , PLAN AND SECTION

P&C MANAGEMENT CO.,LTD.

Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

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| DESIGNED ภย.64624 ลย.6226 | REVIEWED |
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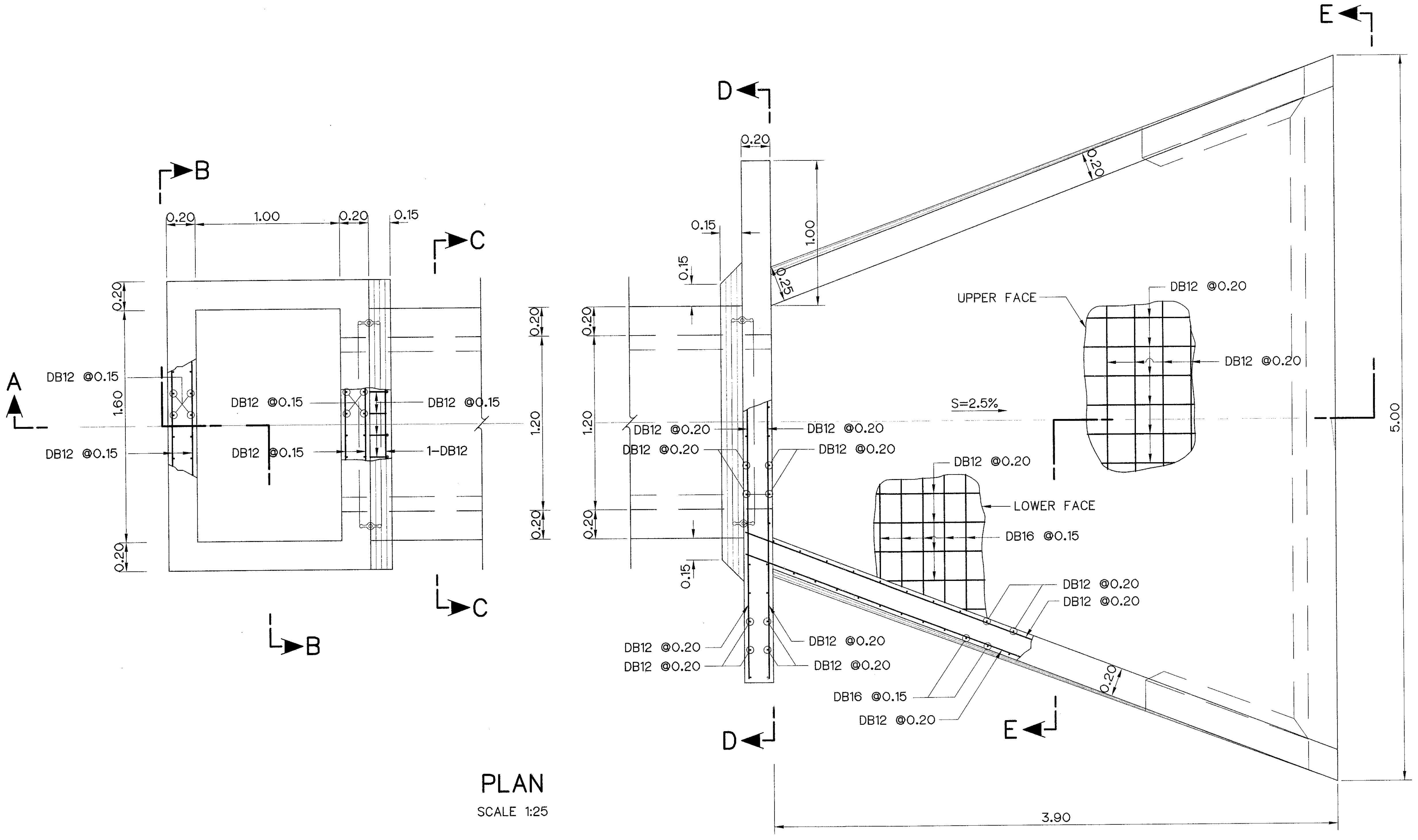
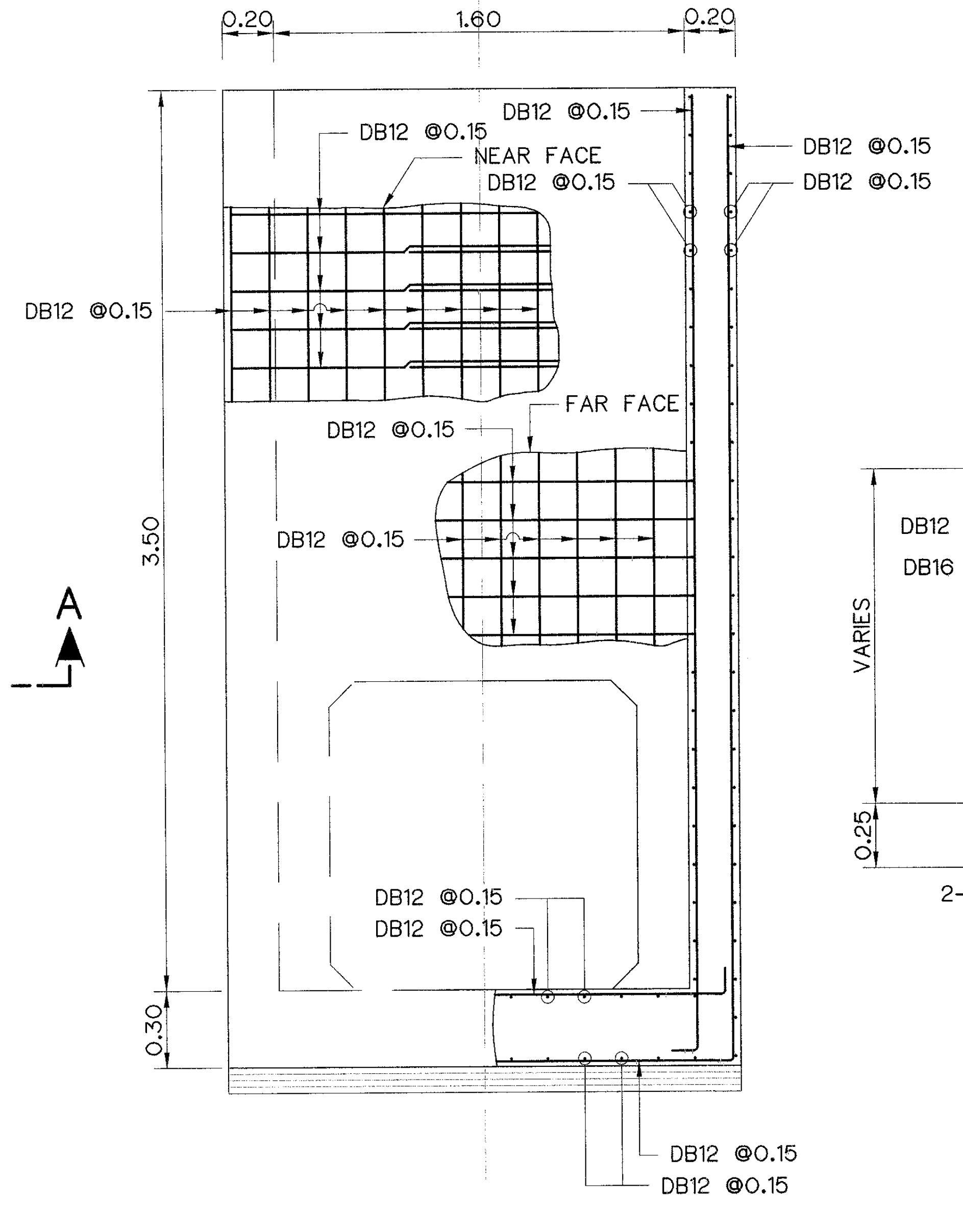
| PROJECT MANAGER / DATE 08/03/2559 | APPROVED P. Hang... |
| DRAWING NO. MH-HR-12 | SHEET NO. 36 OF 130 |



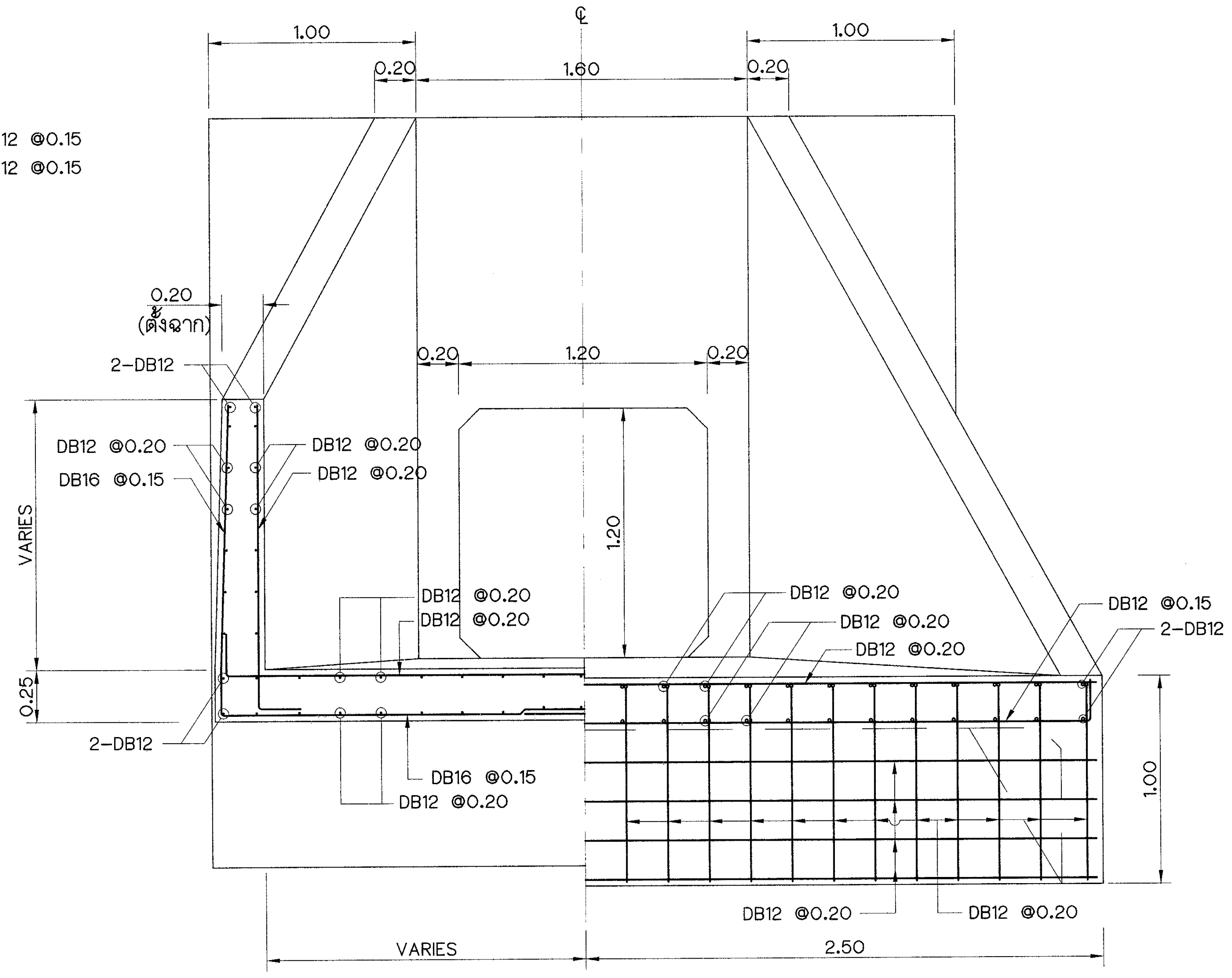
## PLAN

SCALE 1:25



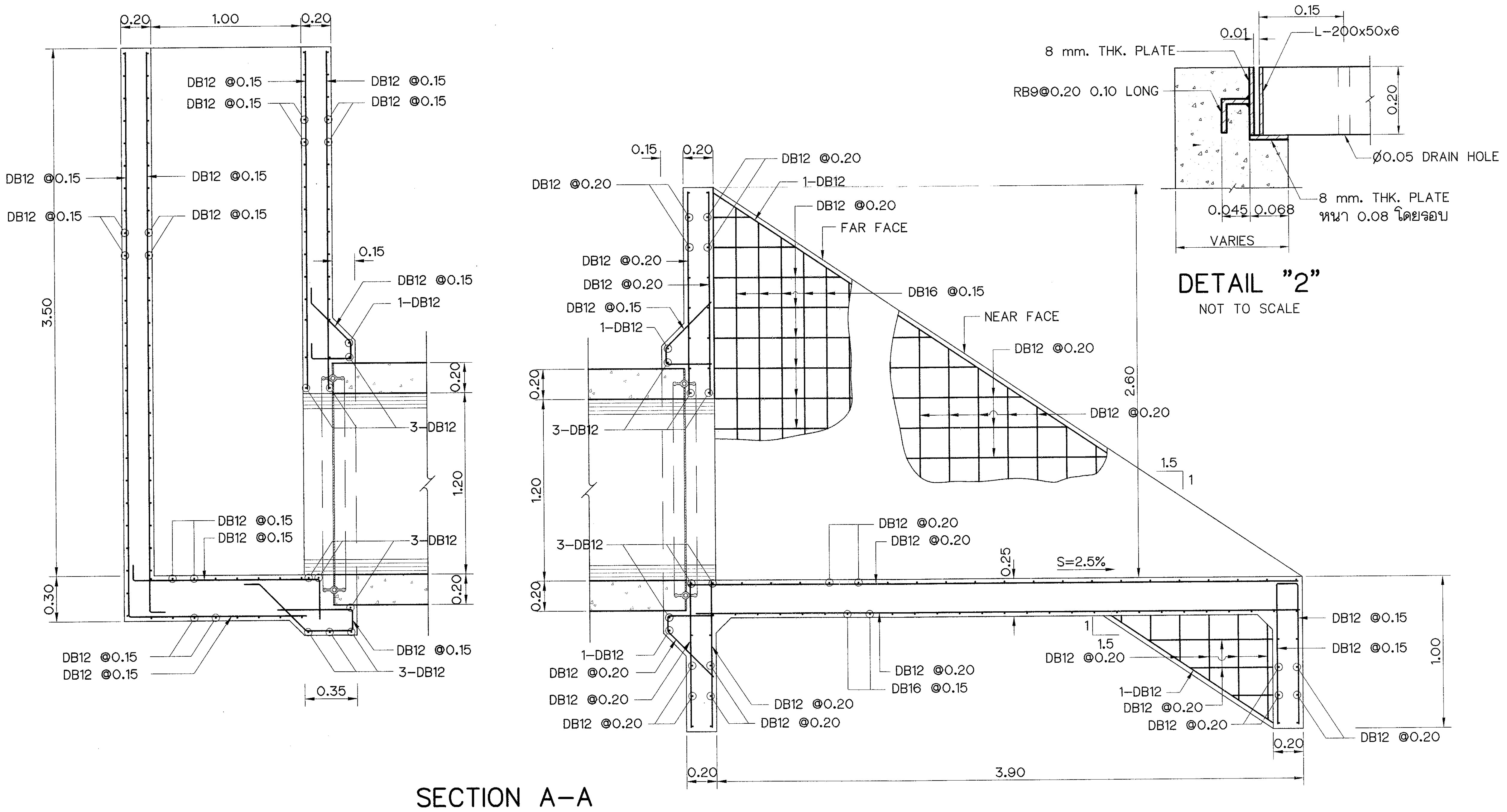
## SECTION B–B

SCALE 1:25



## SECTION E–E

SCALE 1:25

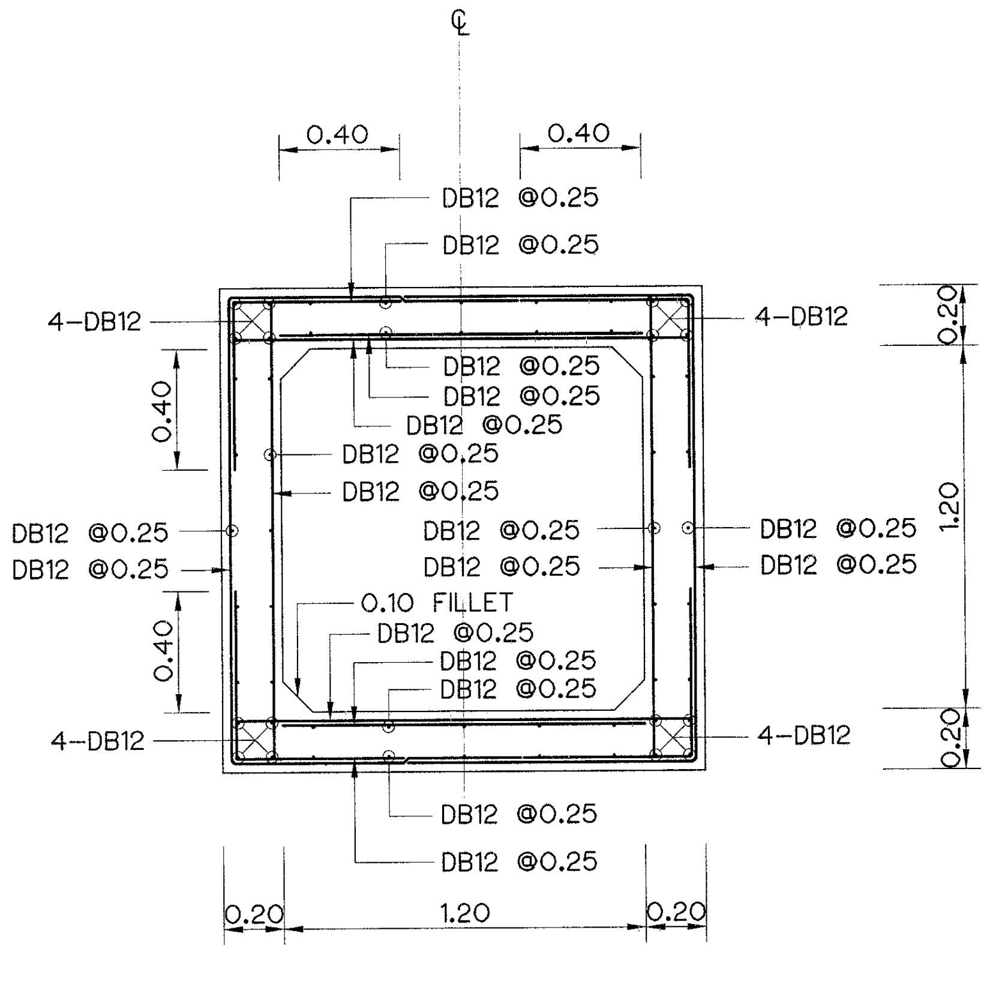


## SECTION A–A

SCALE 1:25

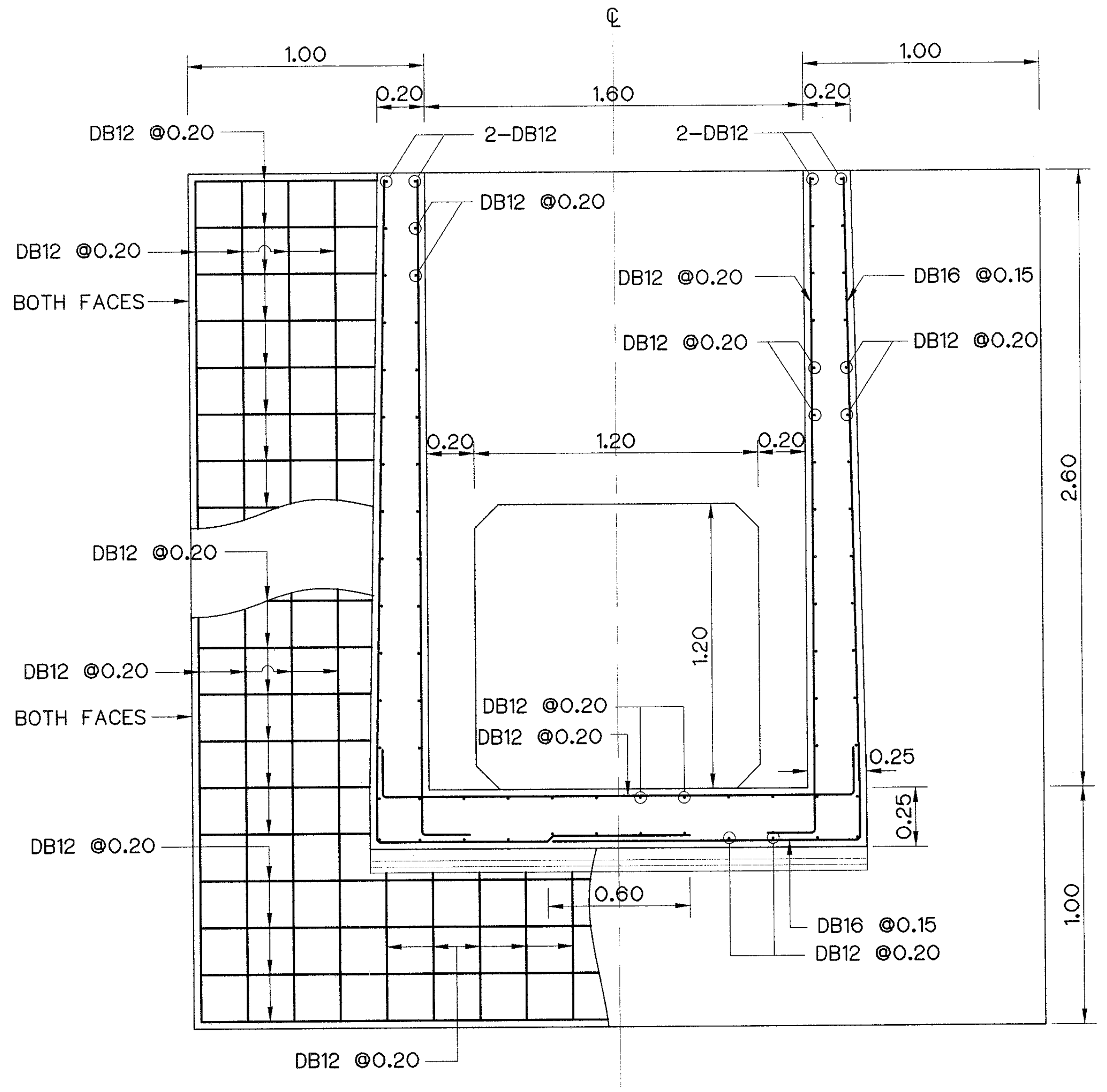
## DETAIL "2"

NOT TO SCALE



## SECTION C–C

SCALE 1:25



## SECTION D–D

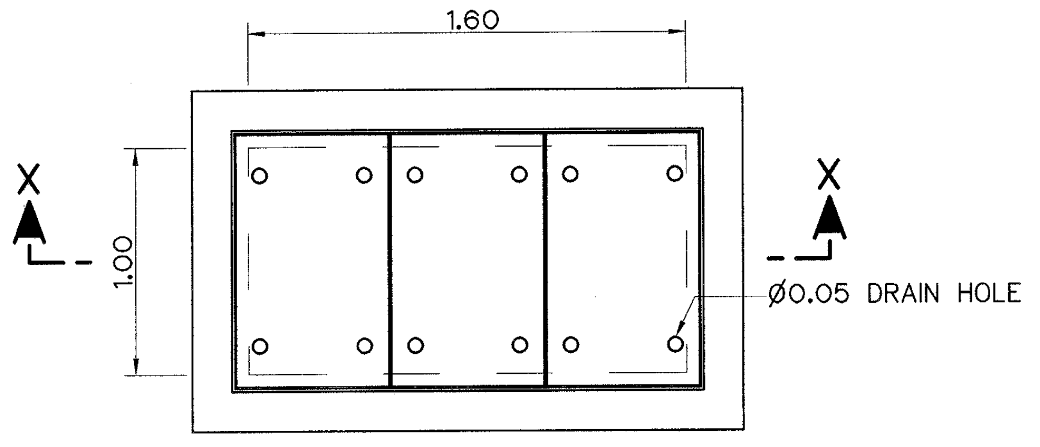
SCALE 1:25

## NOTES :

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS, UNLESS OTHERWISE SHOWN.
2. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH–GN–03
3. CONCRETE DESIGN BASED ON THE COMPRESSIVE STRENGTH OF 210 KSC, STANDARD CYLINDER Ø0.15x0.30 m. TEST AT AGE 28 DAYS. UNLESS OTHERWISE INDICATED IN SPECIFIC DRAWINGS.
4. ULTIMATE TENSILE STRESSES OF REINFORCING STEEL, CONFORM TO THE REQUIREMENT OF THAI INDUSTRIAL STANDARD DESIGNATION SR24 FOR STRUCTURAL GRADE PLAIN ROUND BAR AND SD30 FOR INTERMEDIATE GRADE DEFORMED BAR.

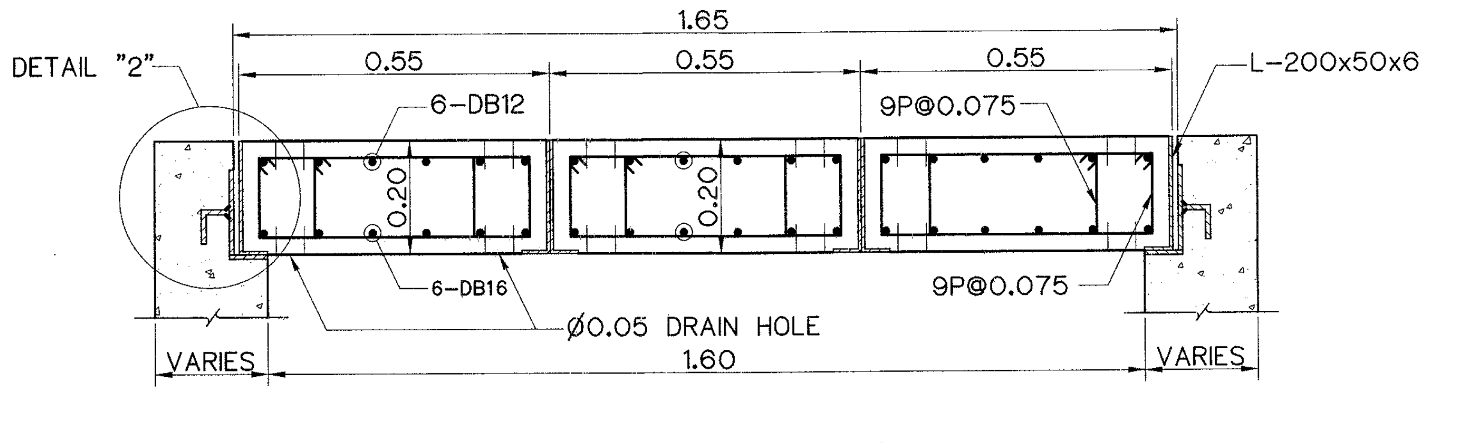
## REFERENCE DRAWINGS :

1. DRAIN CULVERT STA. 0+515.748, PLAN AND SECTION MH–HR–12



## CONCRETE COVER

NOT TO SCALE



## SECTION X–X

NOT TO SCALE

0.0 0.5 1.0 1.5 2.0

SCALE 1:25 METERS

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KINGDOM OF THAILAND
Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
HEADRACE
DRAIN CULVERT STA. 0+515.748 REINFORCEMENT DETAILS

P&C MANAGEMENT CO.,LTD.

DESIGNED ภย.64624 สย.6226
DRAWN
CHECKED สย.6226
PROJECT MANAGER DATE 08/03/2559

Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY
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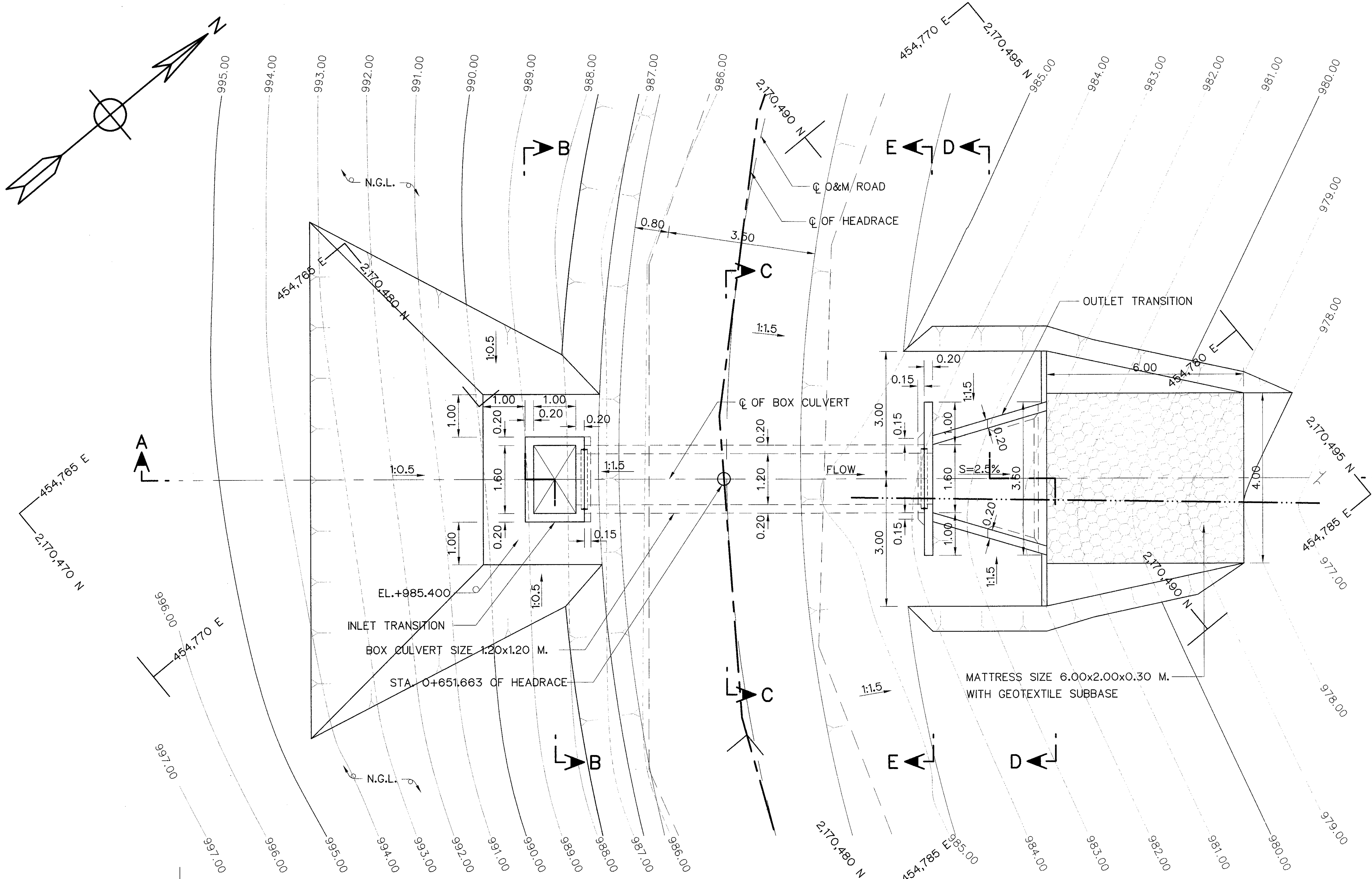
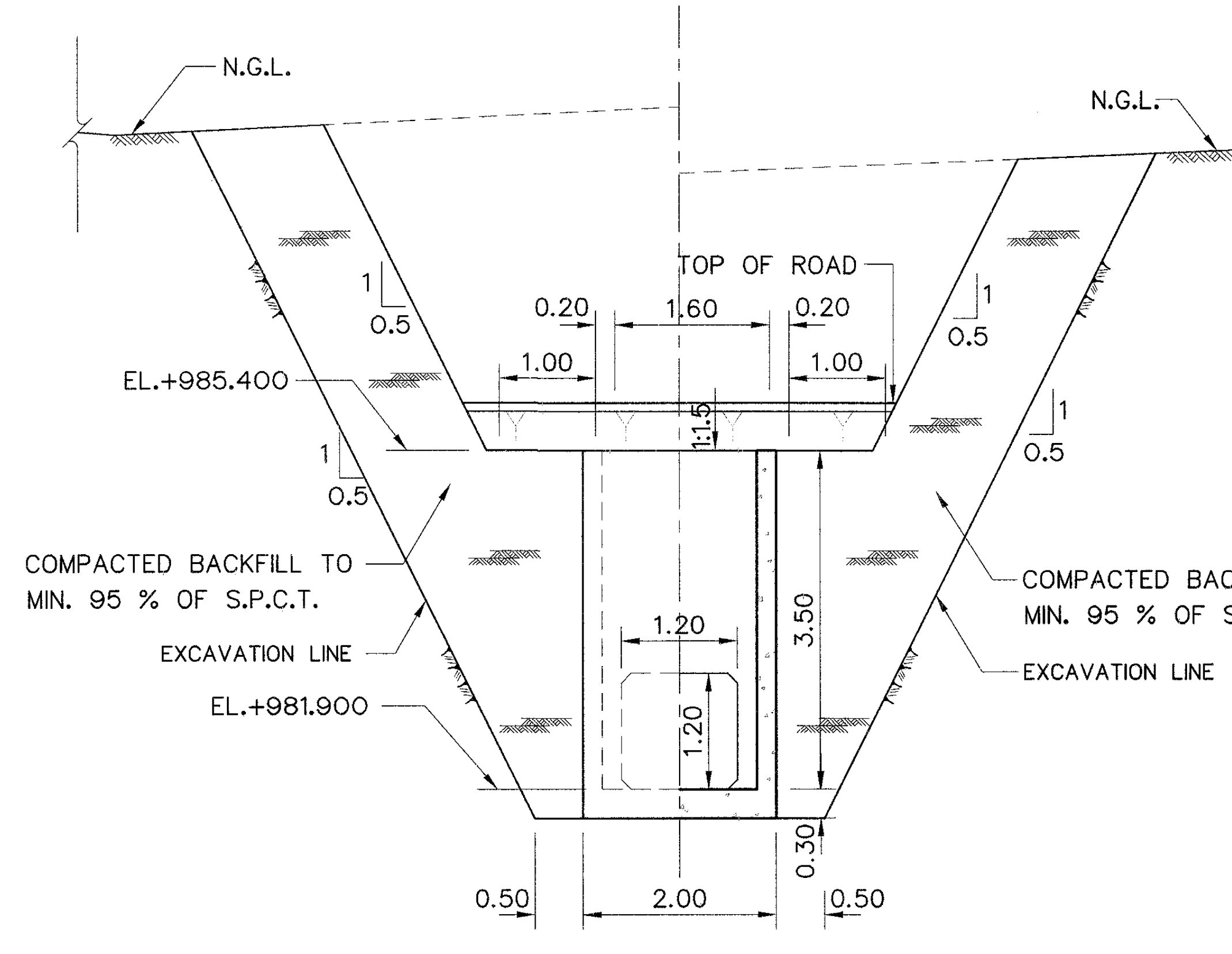
RECOMMENDED
APPROVED

DRAWING NO. MH–HR–13
SHEET NO. 37 OF 130



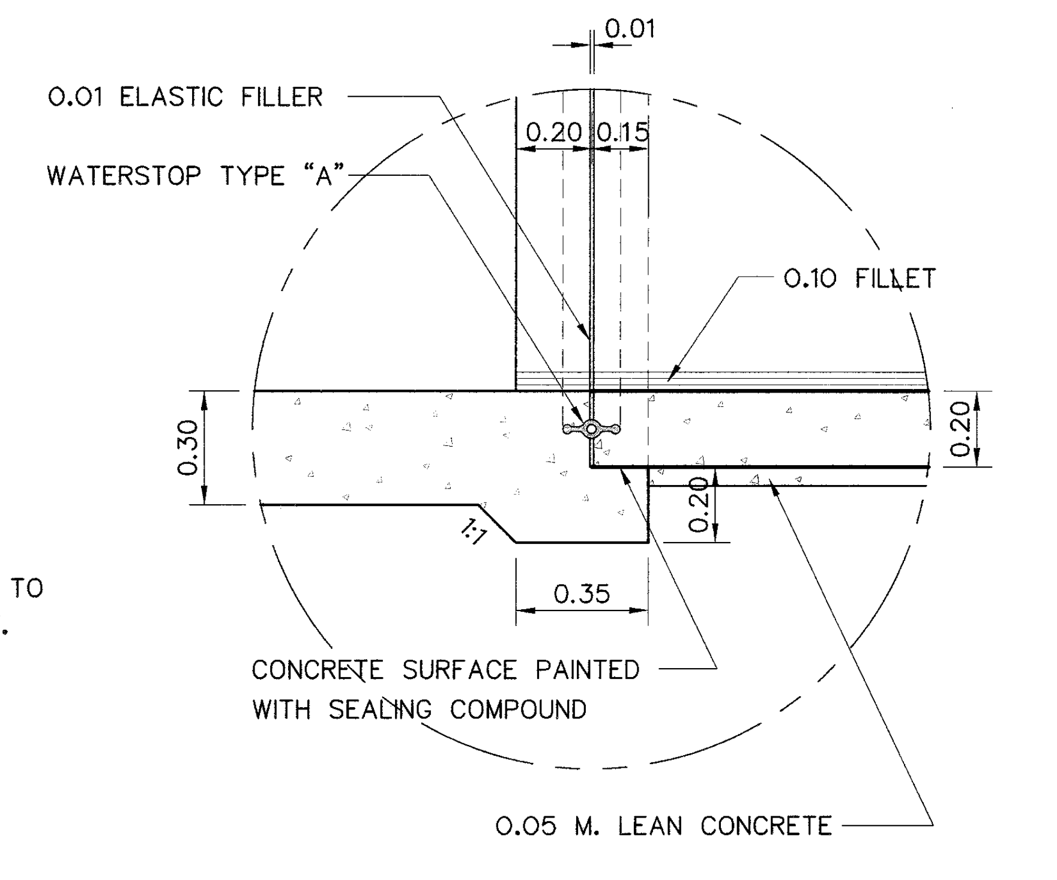
PLAN

SCALE 1:75



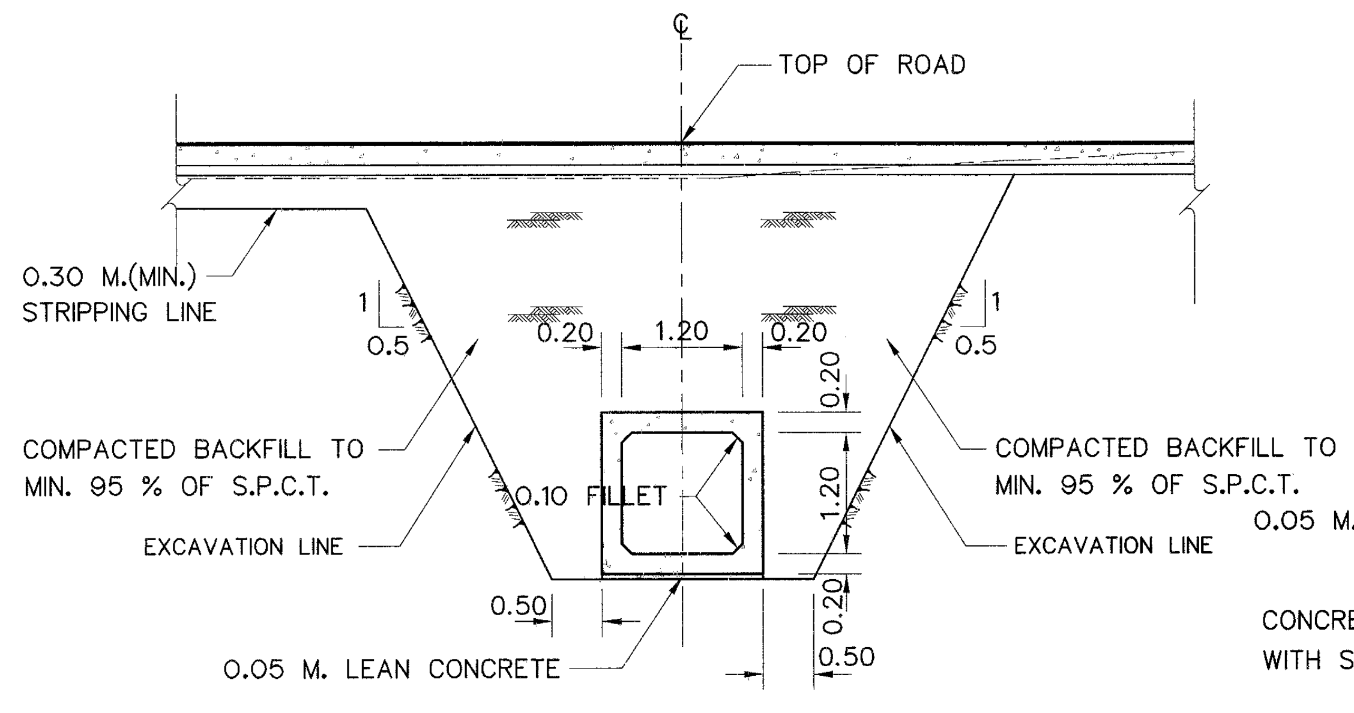
SECTION B-B

SCALE 1:75



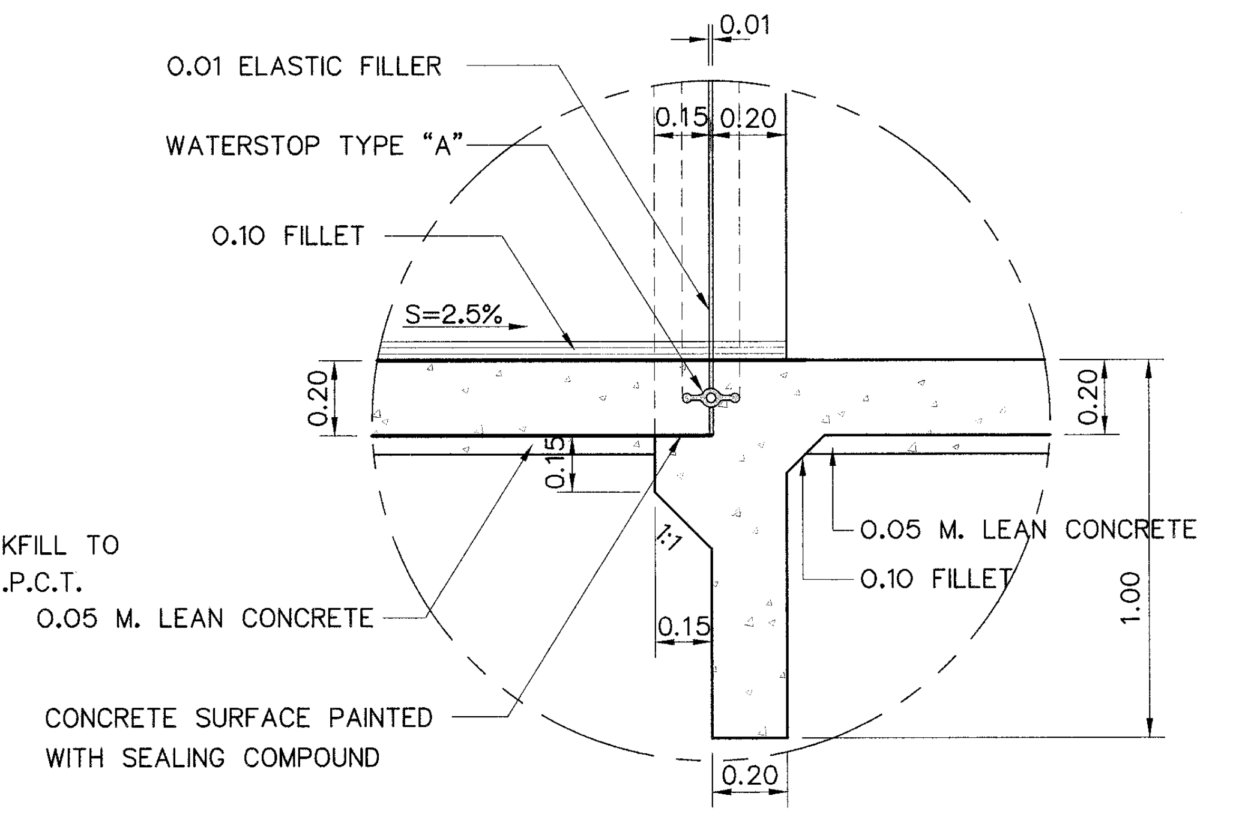
DETAIL "1"

SCALE 1:20



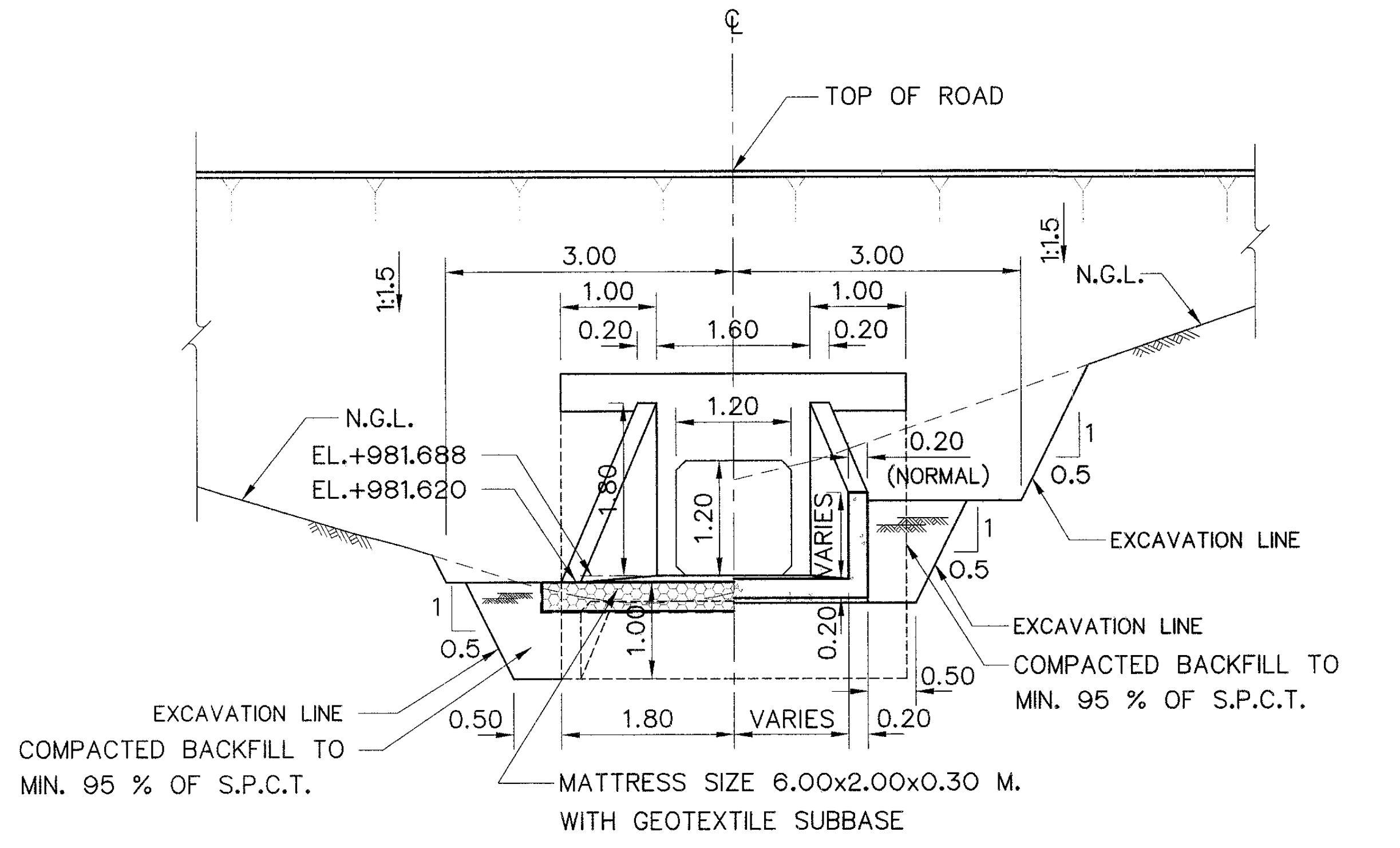
SECTION C-C

SCALE 1:75



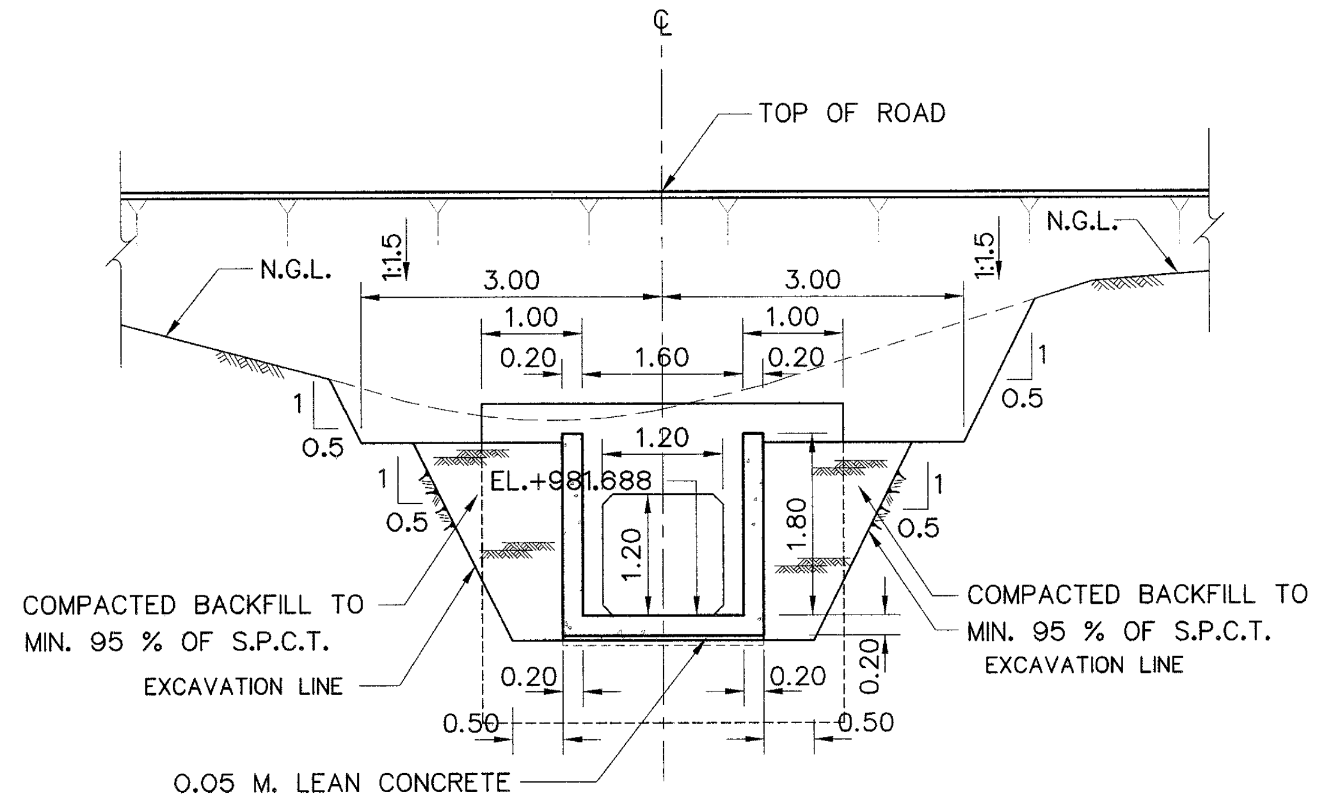
DETAIL "2"

SCALE 1:20



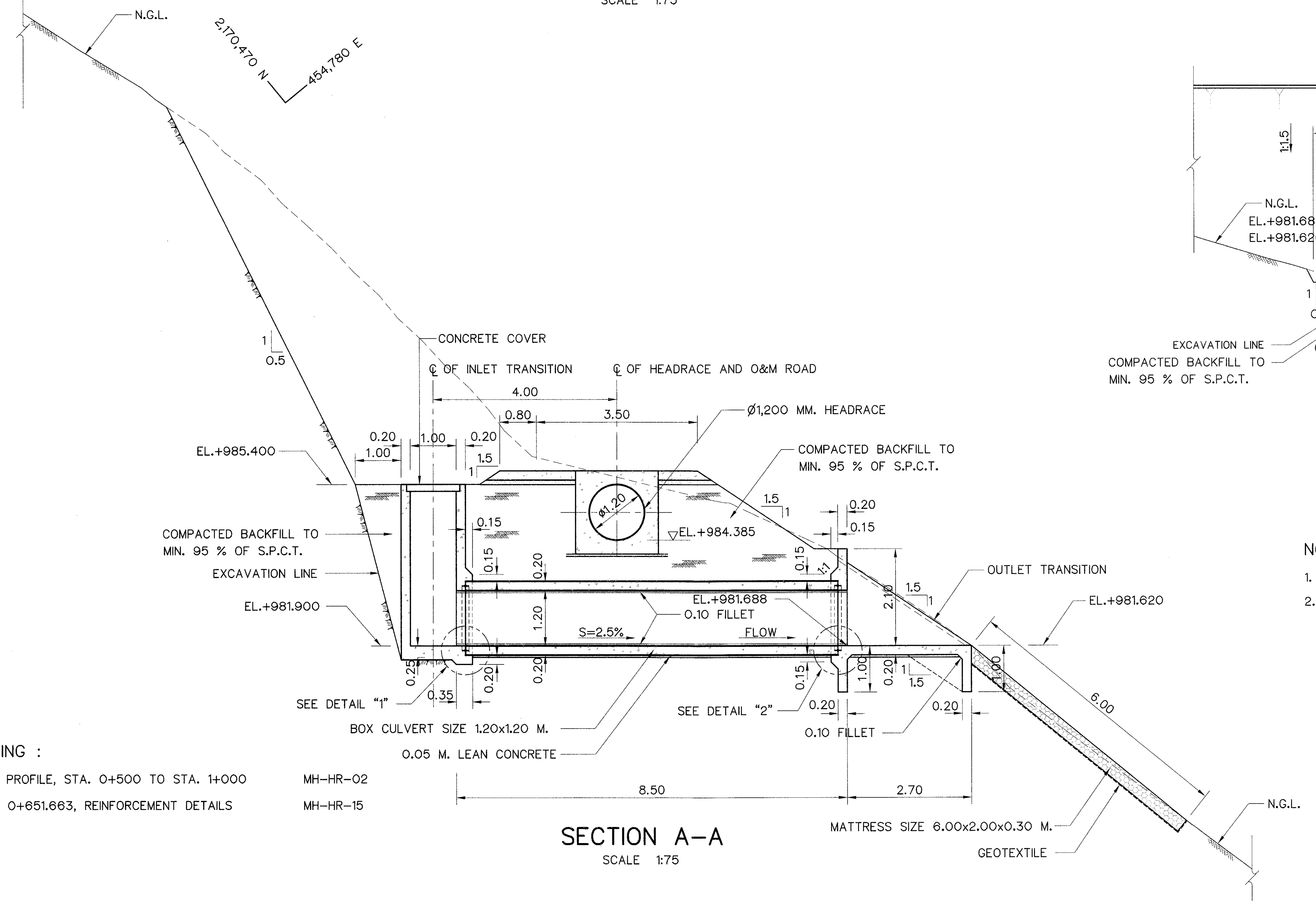
SECTION D-D

SCALE 1:75



SECTION E-E

SCALE 1:75



SECTION A-A

SCALE 1:75

REFERENCE DRAWING :

| | |
|---|---|
| 1. HEADRACE PLAN AND PROFILE, STA. 0+500 TO STA. 1+000 | MH-HR-02 |
| 2. DRAIN CULVERT STA. 0+651.663, REINFORCEMENT DETAILS | MH-HR-15 |

NOTES :

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS UNLESS OTHERWISE SHOWN.
2. SYMBOL, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH-GN-03

0 0.5 1.0 1.5
SCALE 1:20 METERS

0 0.5 1 2 3 4 5 6
SCALE 1:75 METERS

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
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| | CONSULTANTS | | DEDE | |

KINGDOM OF THAILAND
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

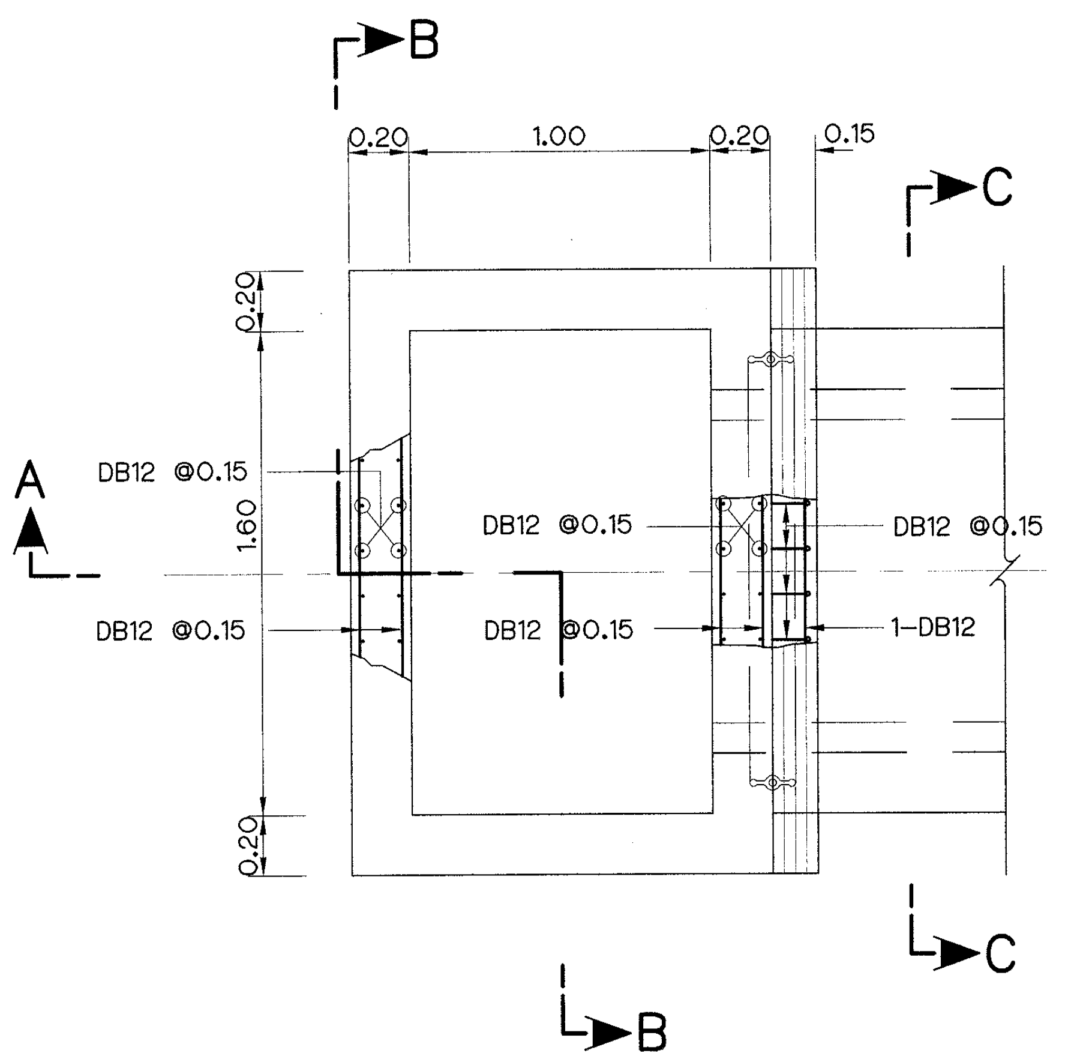
CIVIL WORKS AND TRANSMISSION LINE
HEADRACE
DRAIN CULVERT STA. 0+651.663 , PLAN AND SECTION

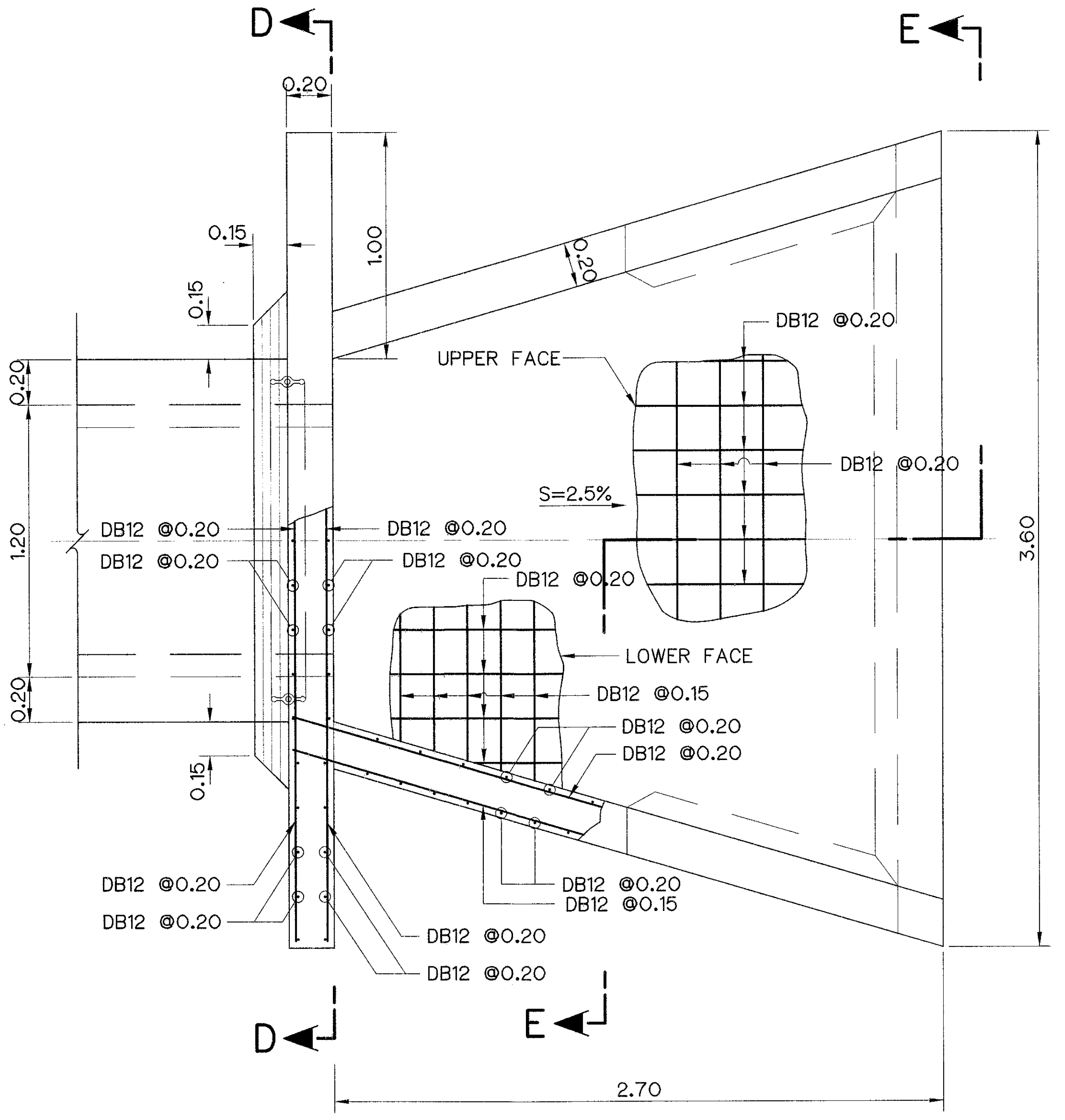
P&C MANAGEMENT CO.,LTD.

DESIGNED ภย.64624 สย.6226
DRAWN
CHECKED สย.6226
08/03/2559
PROJECT MANAGER DATE

Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY
REVIEWED
SUBMITTED Chawit
RECOMMENDED
APPROVED P. Hans..

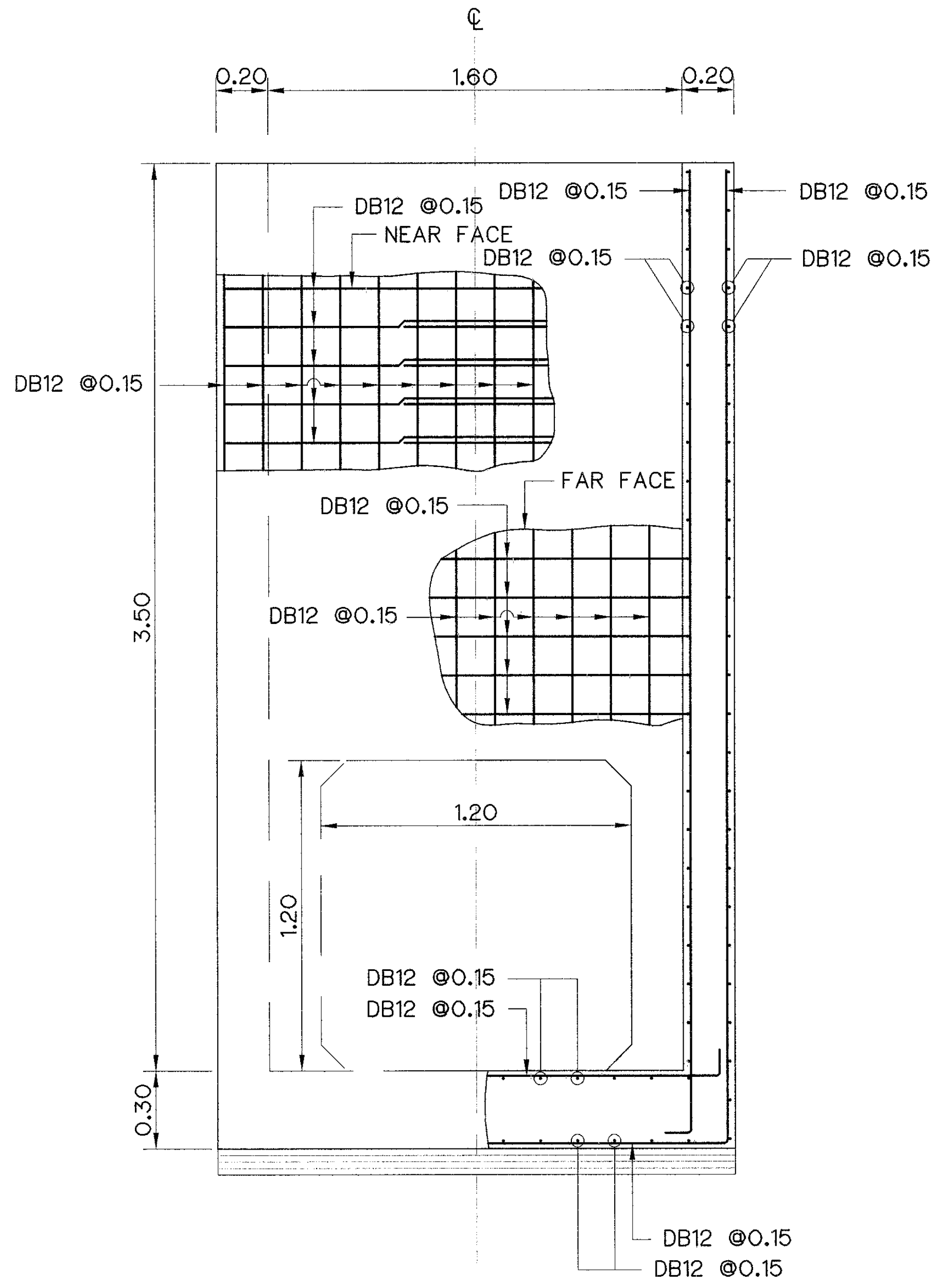
DRAWING NO. MH-HR-14
SHEET NO. 38 OF 130





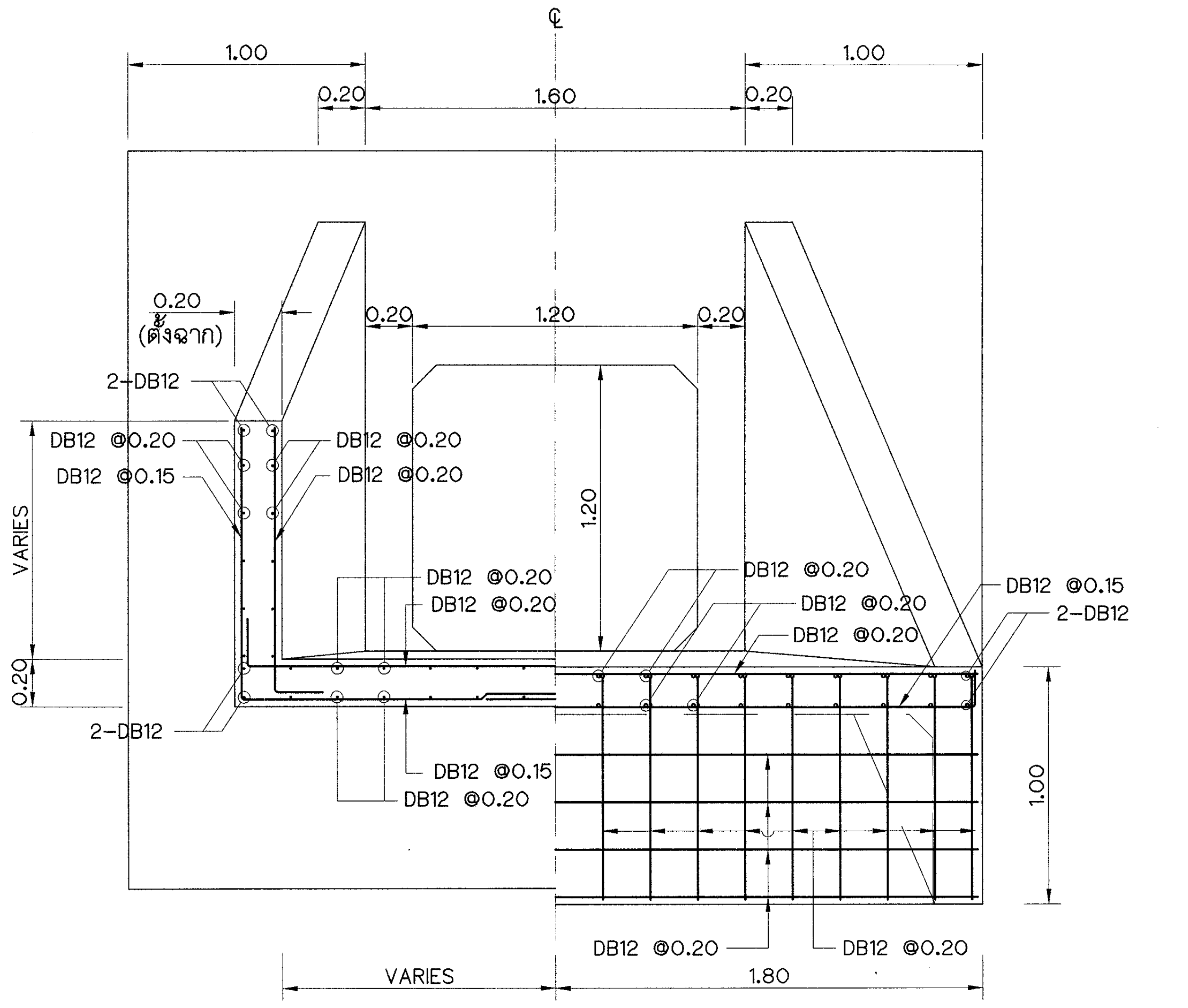
## PLAN

SCALE 1:25



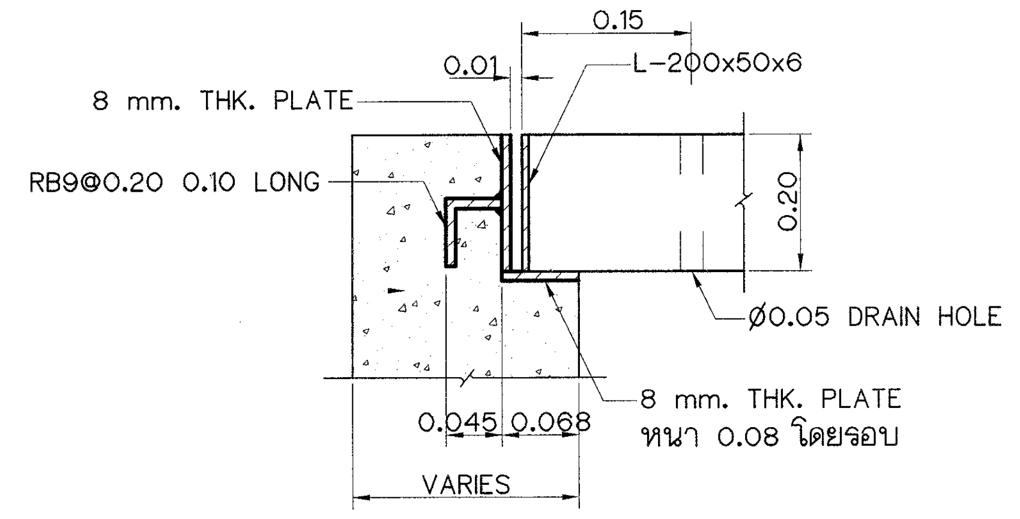
## SECTION B–B

SCALE 1:25



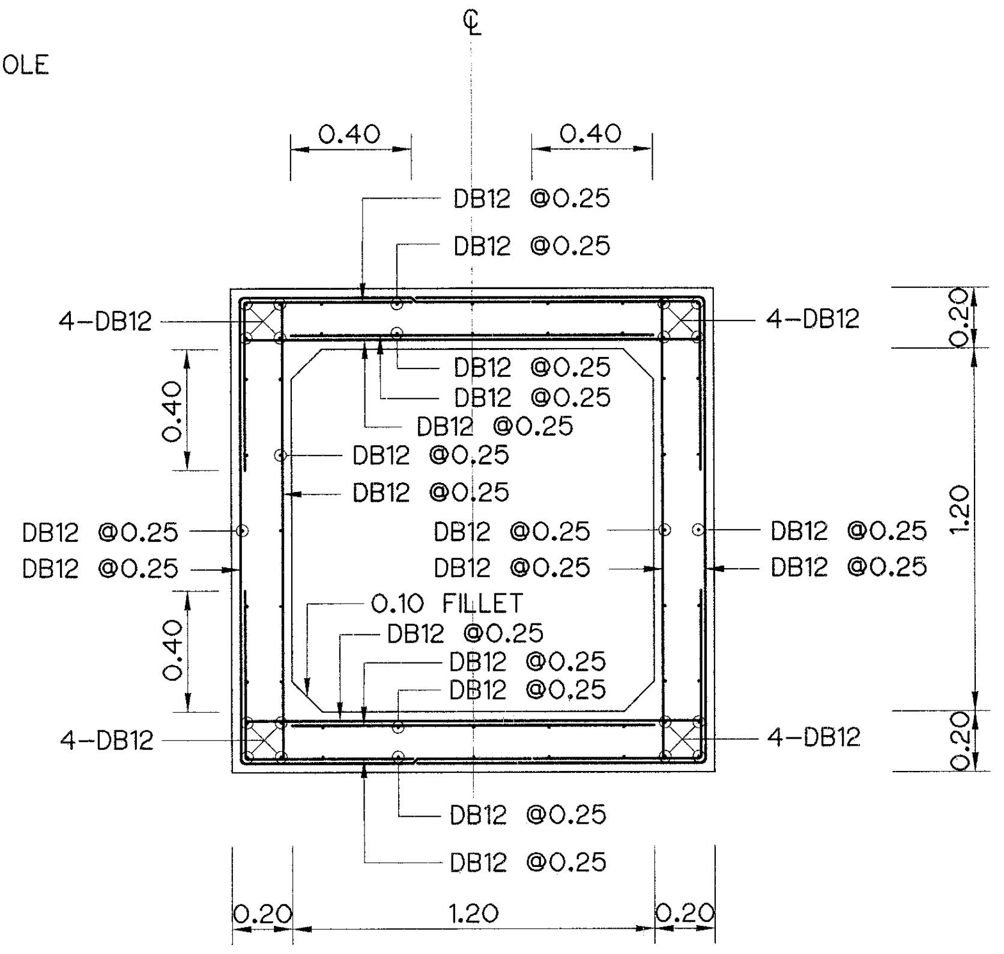
## SECTION E–E

SCALE 1:25



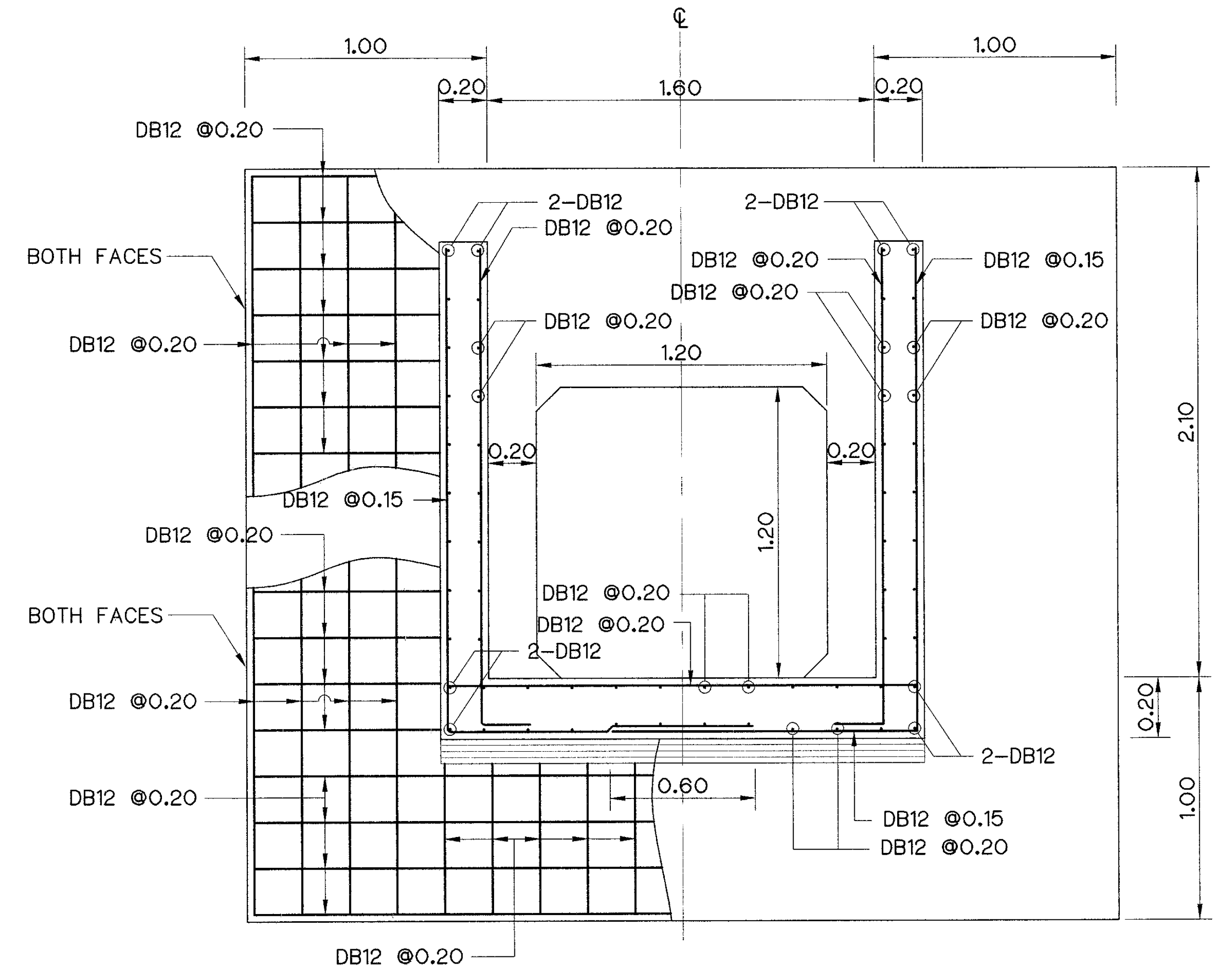
## DETAIL "2"

NOT TO SCALE



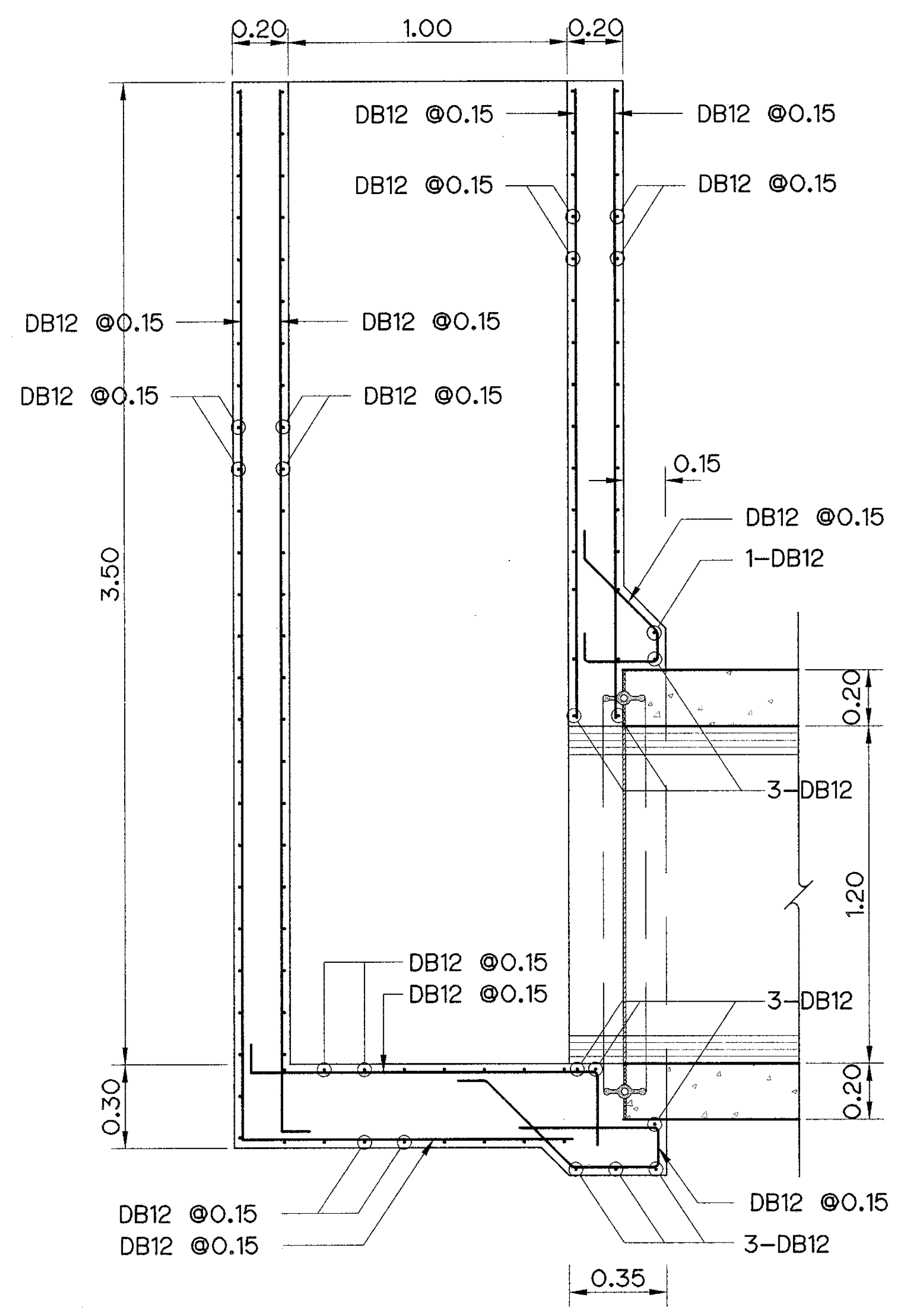
## SECTION C–C

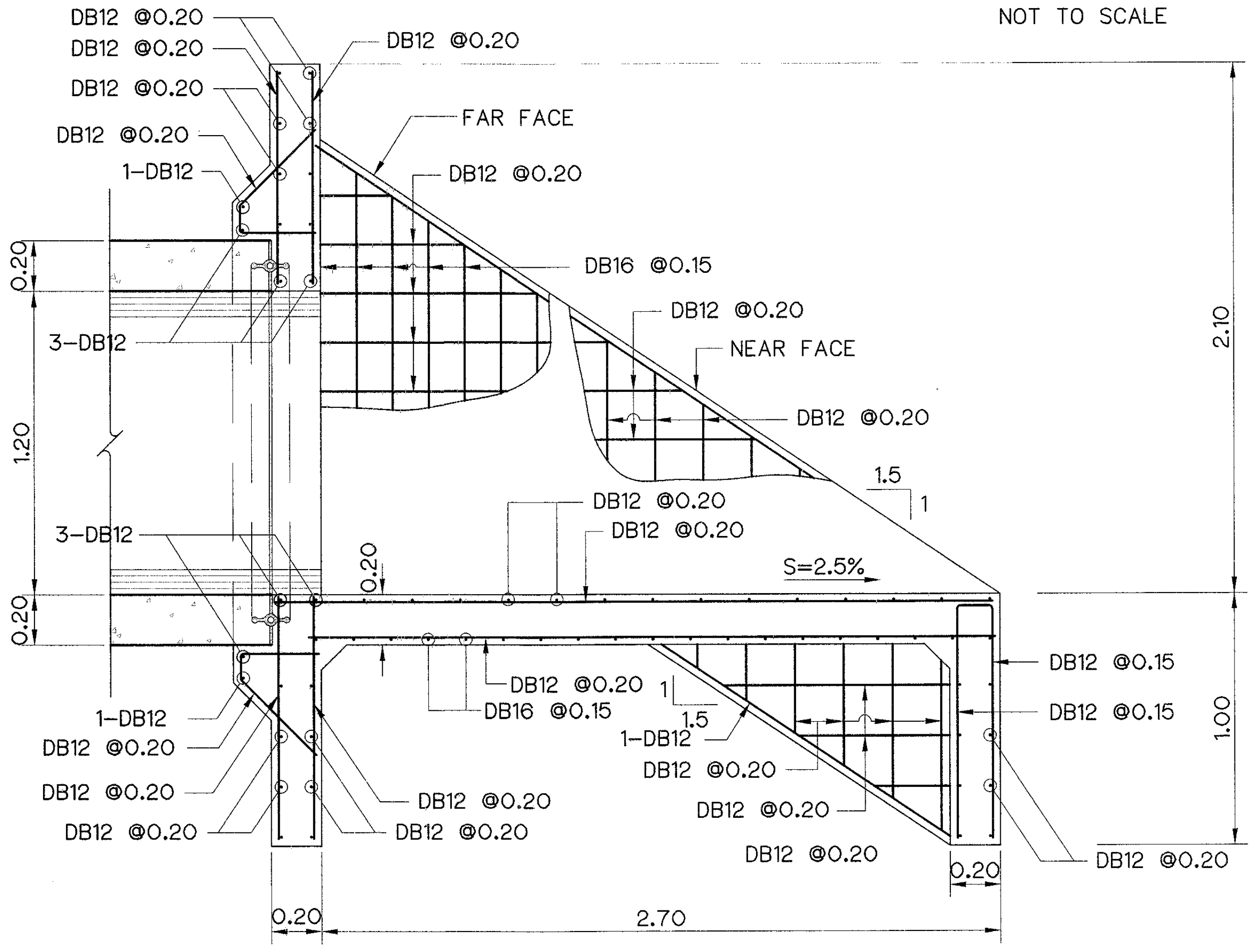
SCALE 1:25



## SECTION D–D

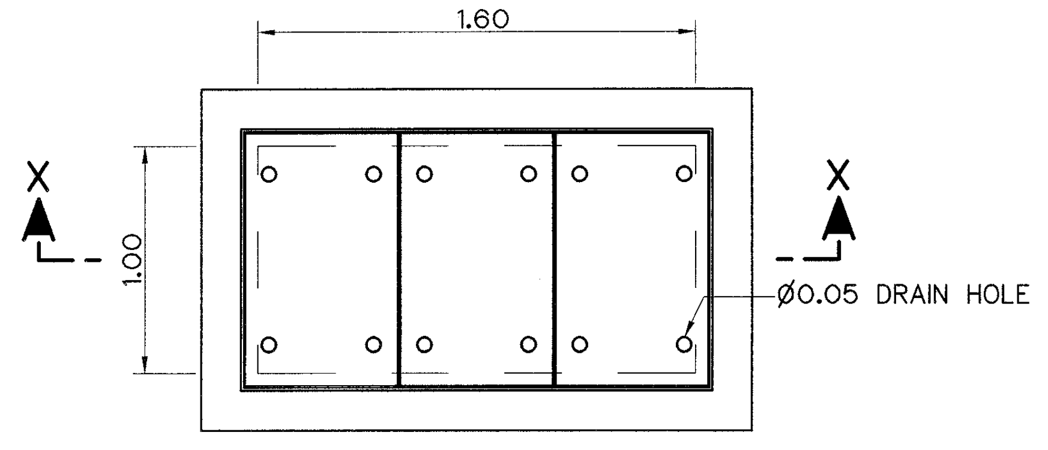
SCALE 1:25





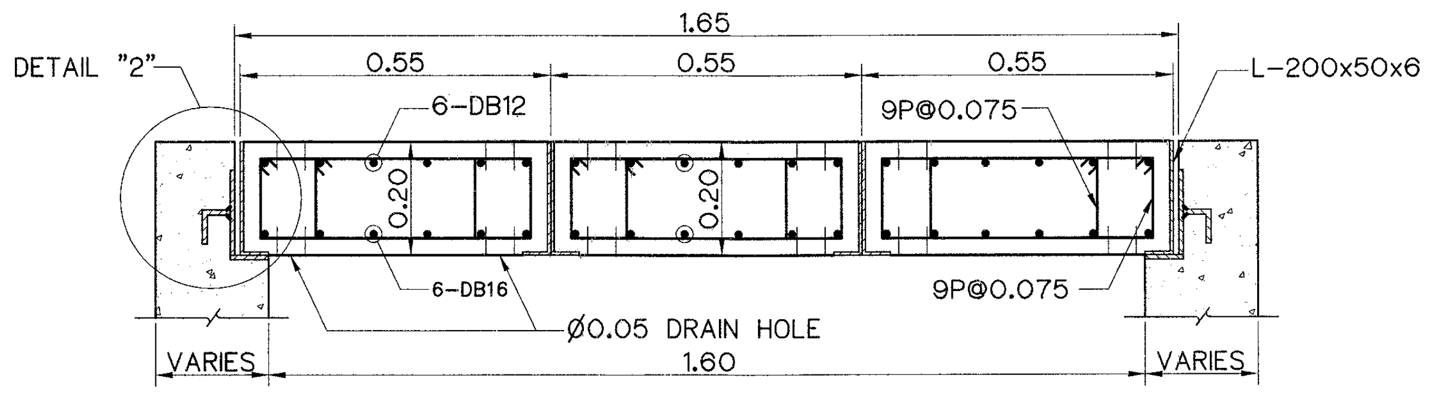
## SECTION A–A

SCALE 1:25



## CONCRETE COVER

NOT TO SCALE



## SECTION X–X

NOT TO SCALE

**NOTES :**

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS, UNLESS OTHERWISE SHOWN.
2. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH-GN-03
3. CONCRETE DESIGN BASED ON THE COMPRESSIVE STRENGTH OF 210 KSC, STANDARD CYLINDER Ø0.15x0.30 m. TEST AT AGE 28 DAYS. UNLESS OTHERWISE INDICATED IN SPECIFIC DRAWINGS.
4. ULTIMATE TENSILE STRESSES OF REINFORCING STEEL, CONFORM TO THE REQUIREMENT OF THAI INDUSTRIAL STANDARD DESIGNATION SR24 FOR STRUCTURAL GRADE PLAIN ROUND BAR AND SD30 FOR INTERMEDIATE GRADE DEFORMED BAR.

**REFERENCE DRAWINGS :**

1. DRAIN CULVERT STA. 0+651.663, PLAN AND SECTION MH-HR-14

0 0.5 1.0 1.5 2.0

SCALE 1:25 METERS

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
|---|---|---|---|---|
| 3 | | | | |
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| | CONSULTANTS | | DEDE | |

KINGDOM OF THAILAND
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
HEADRACE
DRAIN CULVERT STA. 0+651.663 REINFORCEMENT DETAILS

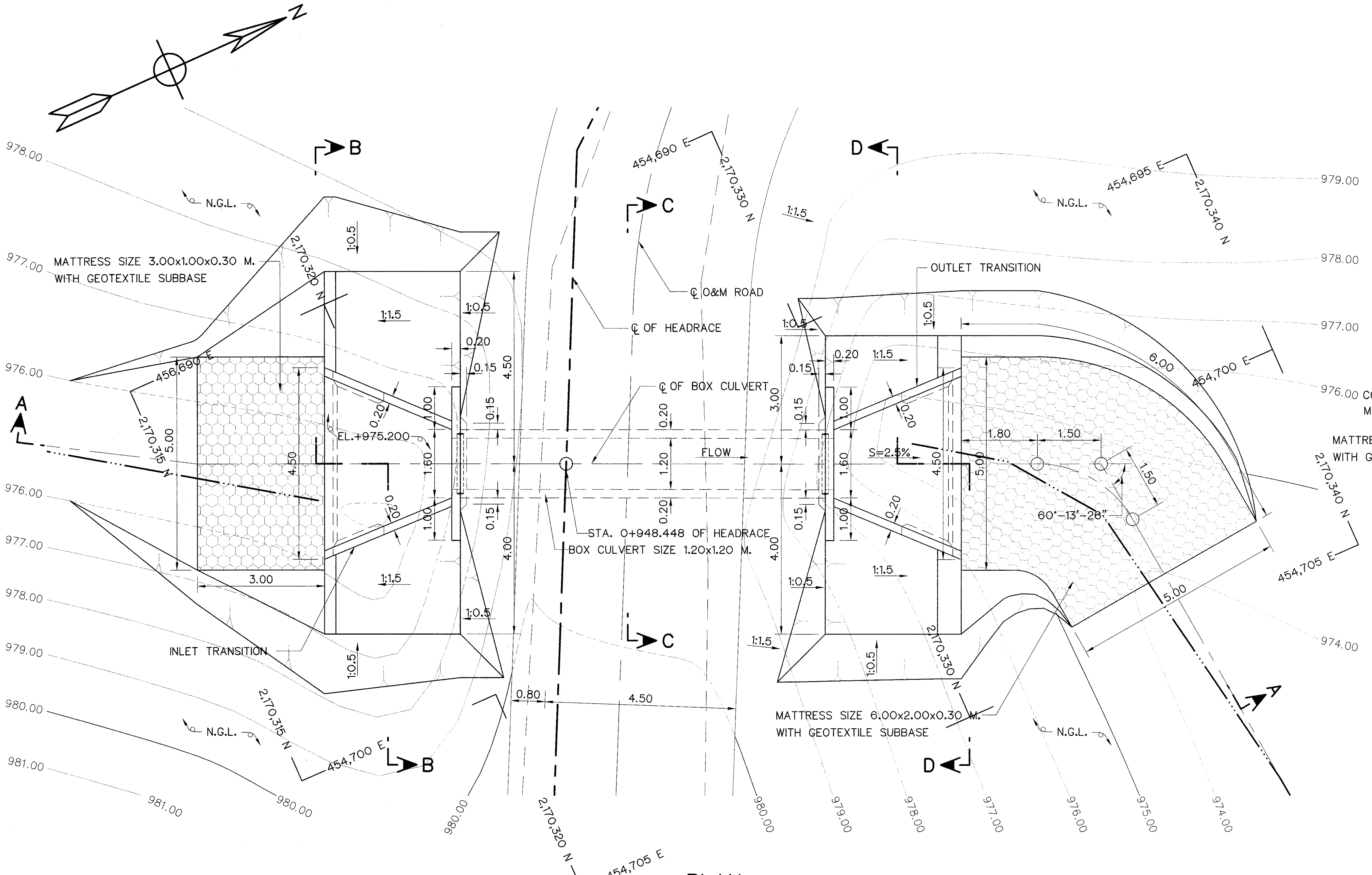
P&C MANAGEMENT CO.,LTD.

Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

DESIGNED ภย.64624 สย.6226
DRAWN
CHECKED สย.6226
PROJECT MANAGER
DATE 08/03/2559

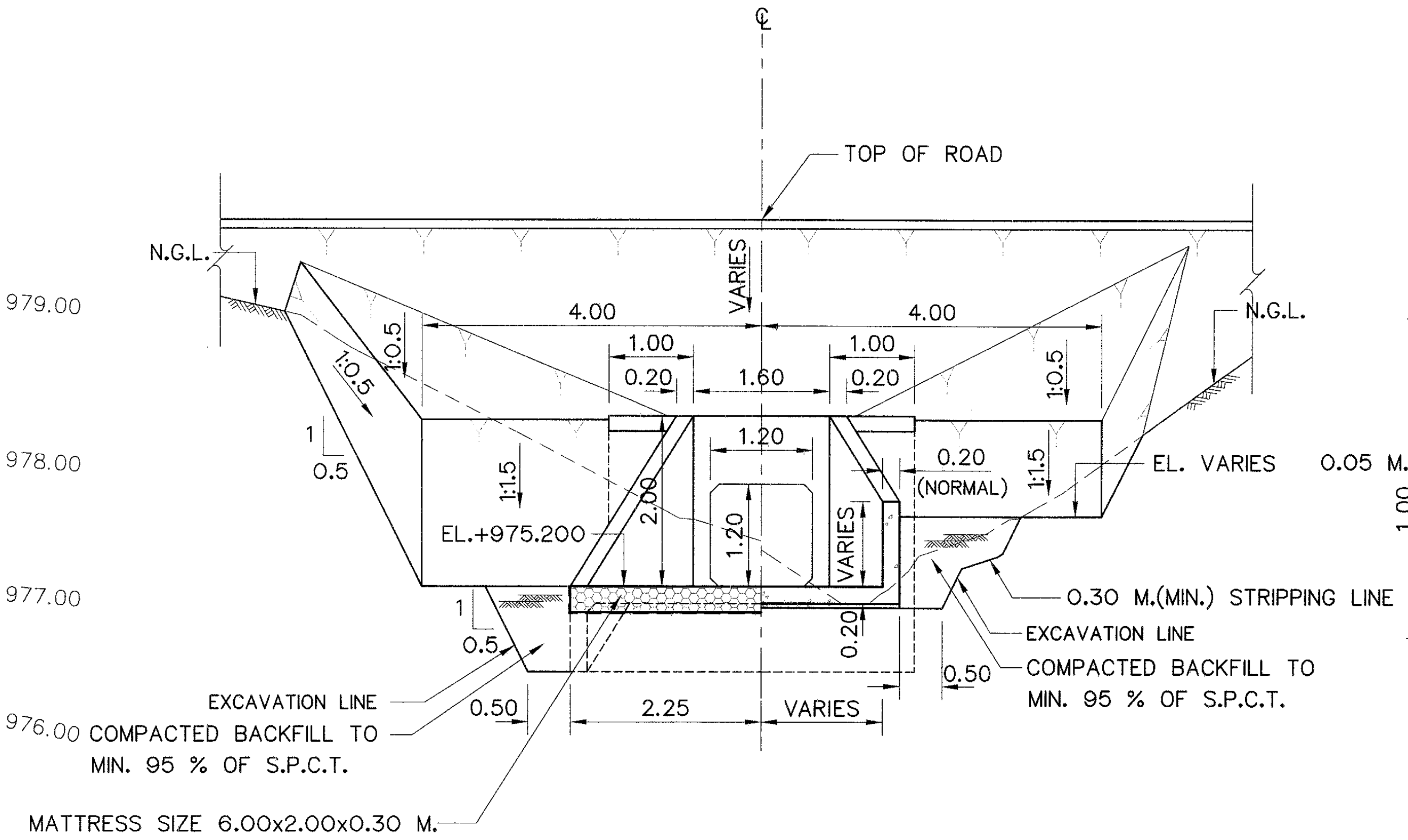
REVIEWED
SUBMITTED Chait
RECOMMENDED
APPROVED P. Hansell

DRAWING NO. MH-HR-15
SHEET NO. 39 OF 130



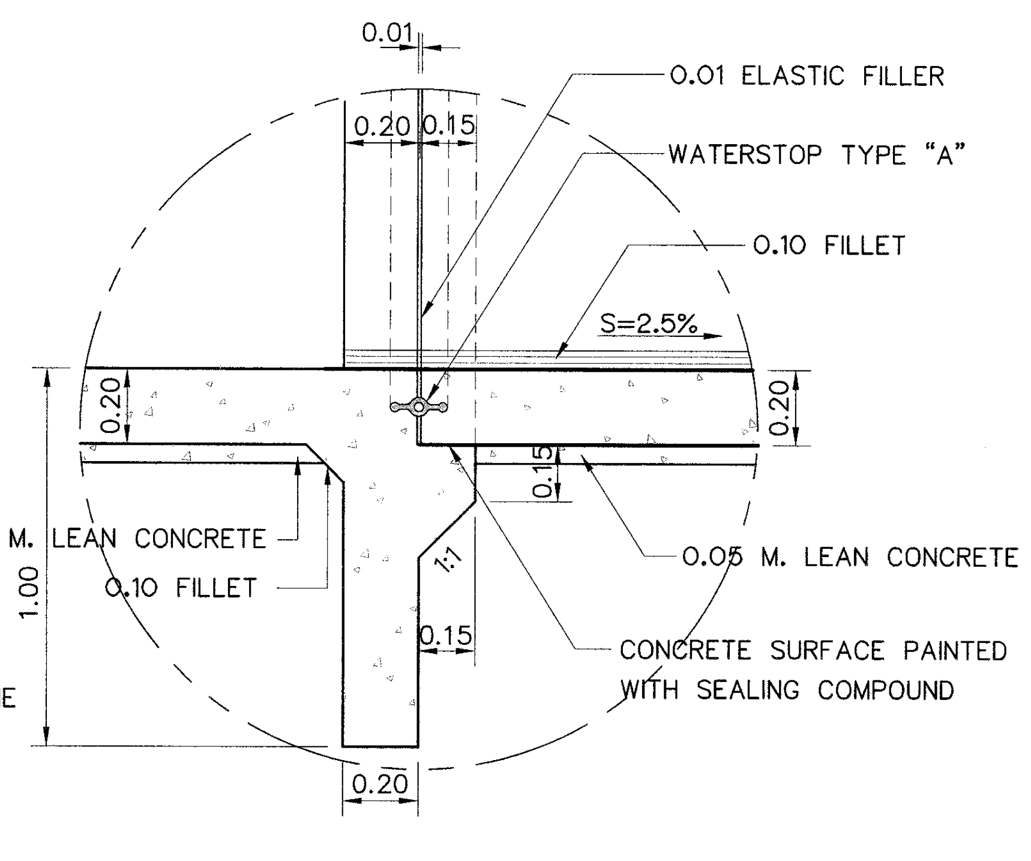
## PLAN

SCALE 1:75


℄
TOP OF ROAD
N.G.L.
VARIES
4.00
1.00
0.20
1.60
1.20
0.20 (NORMAL)
EL. VARIES
EL.+975.200
0.30 M.(MIN.) STRIPPING LINE
EXCAVATION LINE
COMPACTED BACKFILL TO MIN. 95 % OF S.P.C.T.
MATTRESS SIZE 6.00x2.00x0.30 M. WITH GEOTEXTILE SUBBASE
2.25
0.50

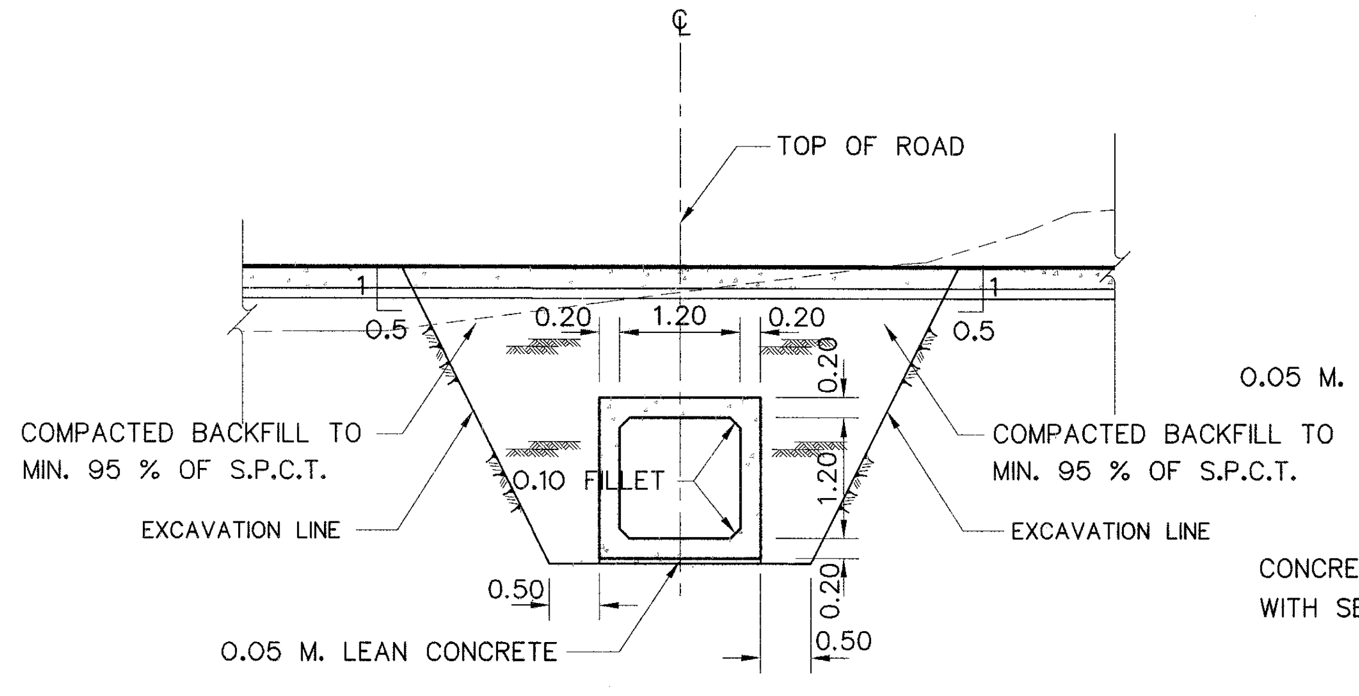
## SECTION B–B

SCALE 1:75



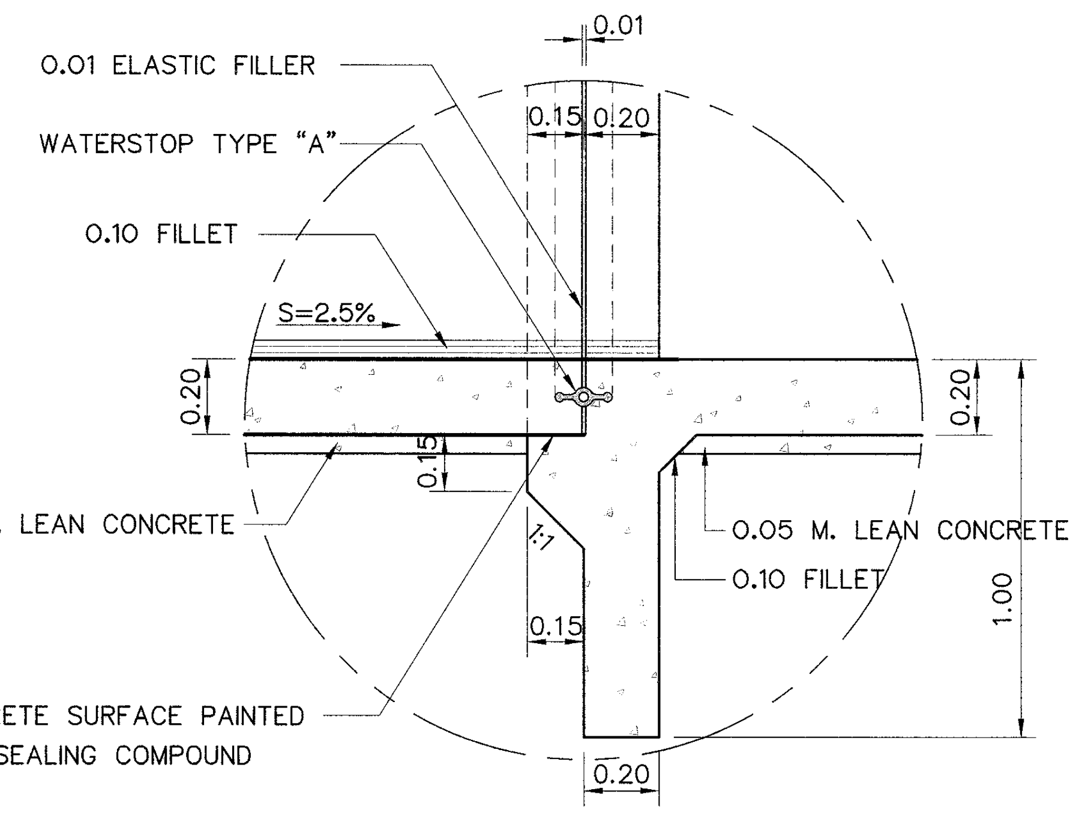
## DETAIL "1"

SCALE 1:20



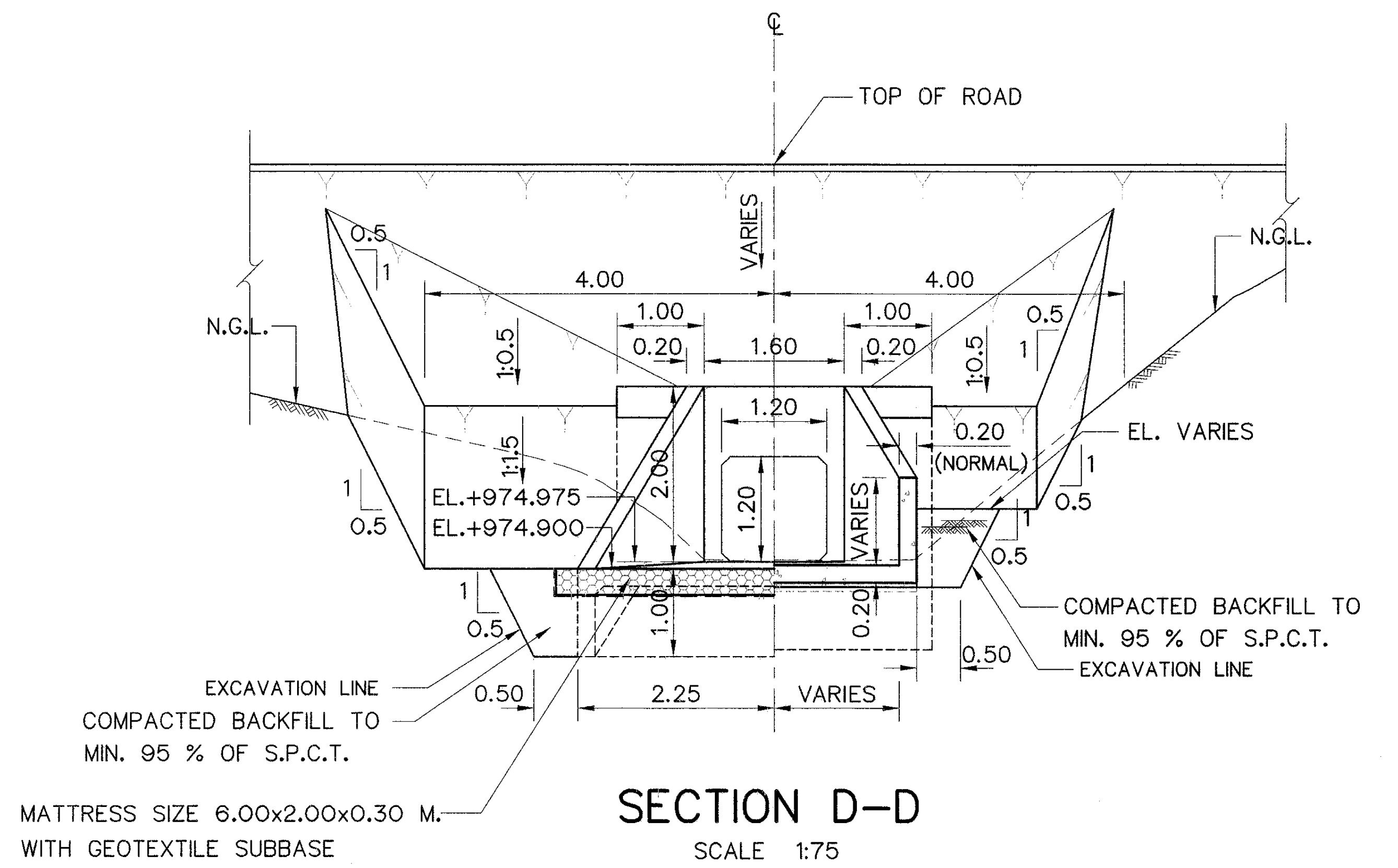
## SECTION C–C

SCALE 1:75



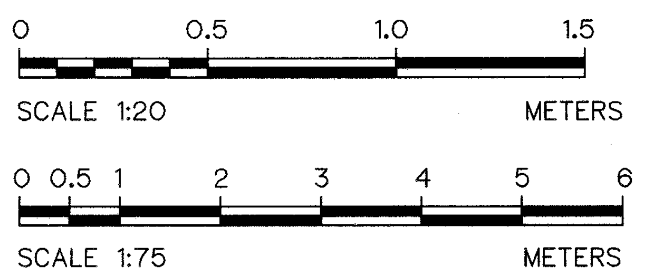
## DETAIL "2"

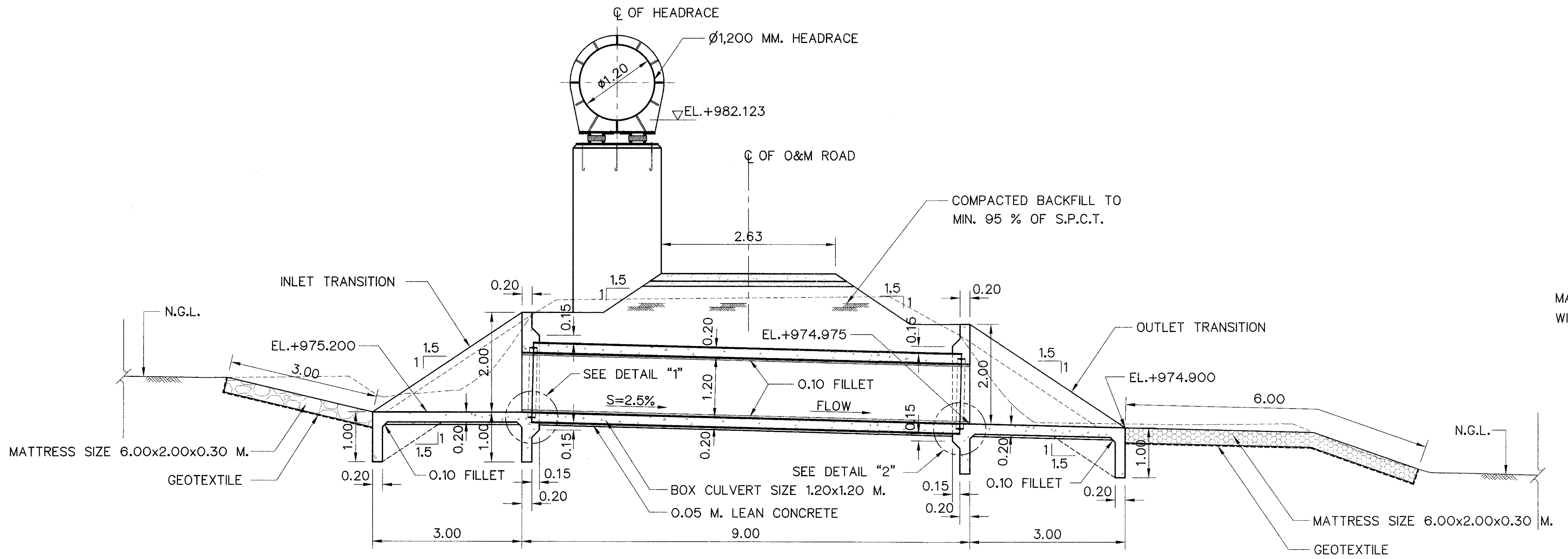
SCALE 1:20



## SECTION D–D

SCALE 1:75





## SECTION A–A

SCALE 1:75

NOTES :

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS UNLESS OTHERWISE SHOWN.
2. SYMBOL, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH-GN-03

REFERENCE DRAWING :

| | |
|---|---|
| 1. HEADRACE PLAN AND PROFILE, STA. 0+500 TO STA. 1+000 | MH-HR-02 |
| 2. DRAIN CULVERT STA. 0+948.448, REINFORCEMENT DETAILS | MH-HR-17 |

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
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| | CONSULTANTS | | DEDE | |

KINGDOM OF THAILAND
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
HEADRACE
DRAIN CULVERT STA. 0+948.448 , PLAN AND SECTION

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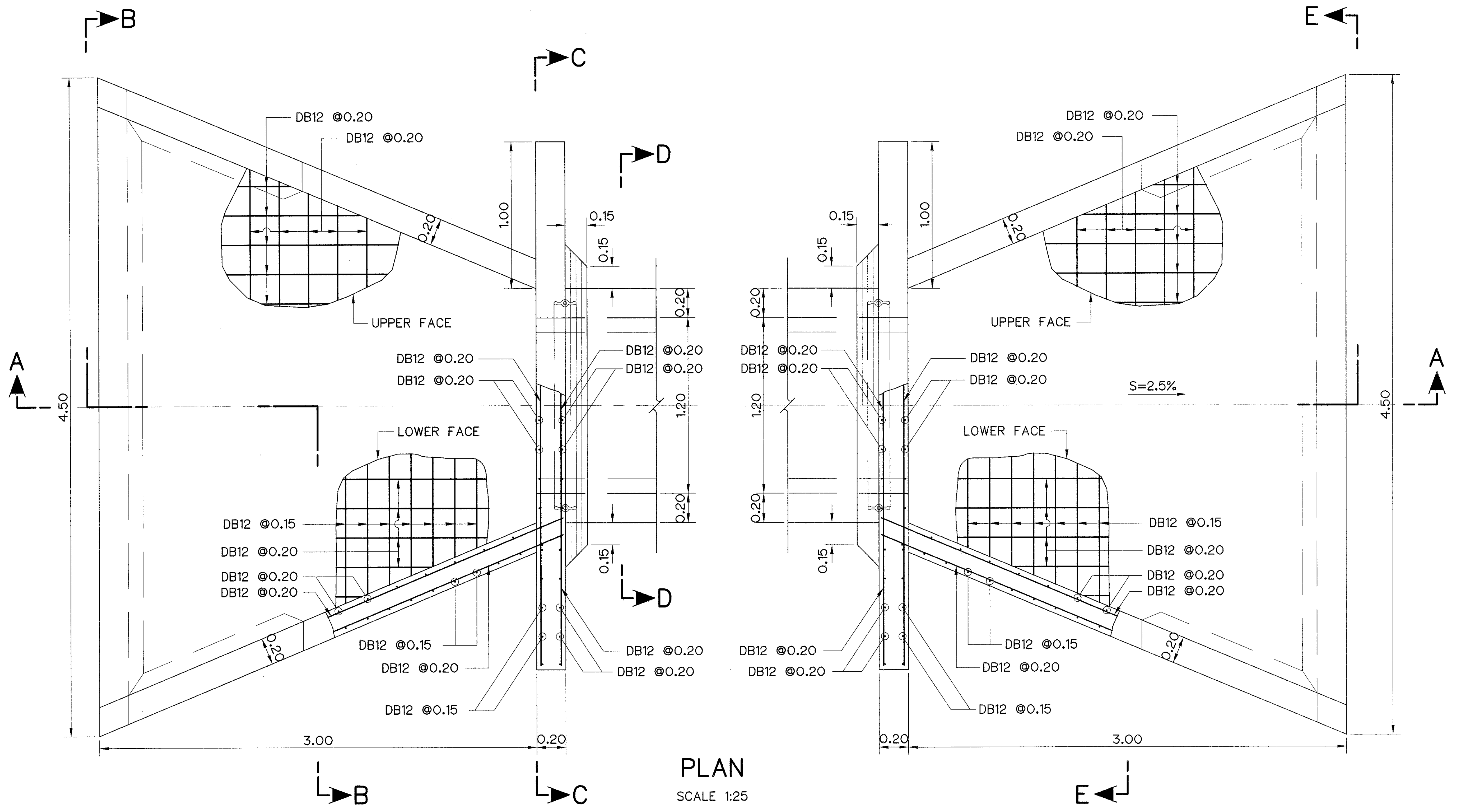
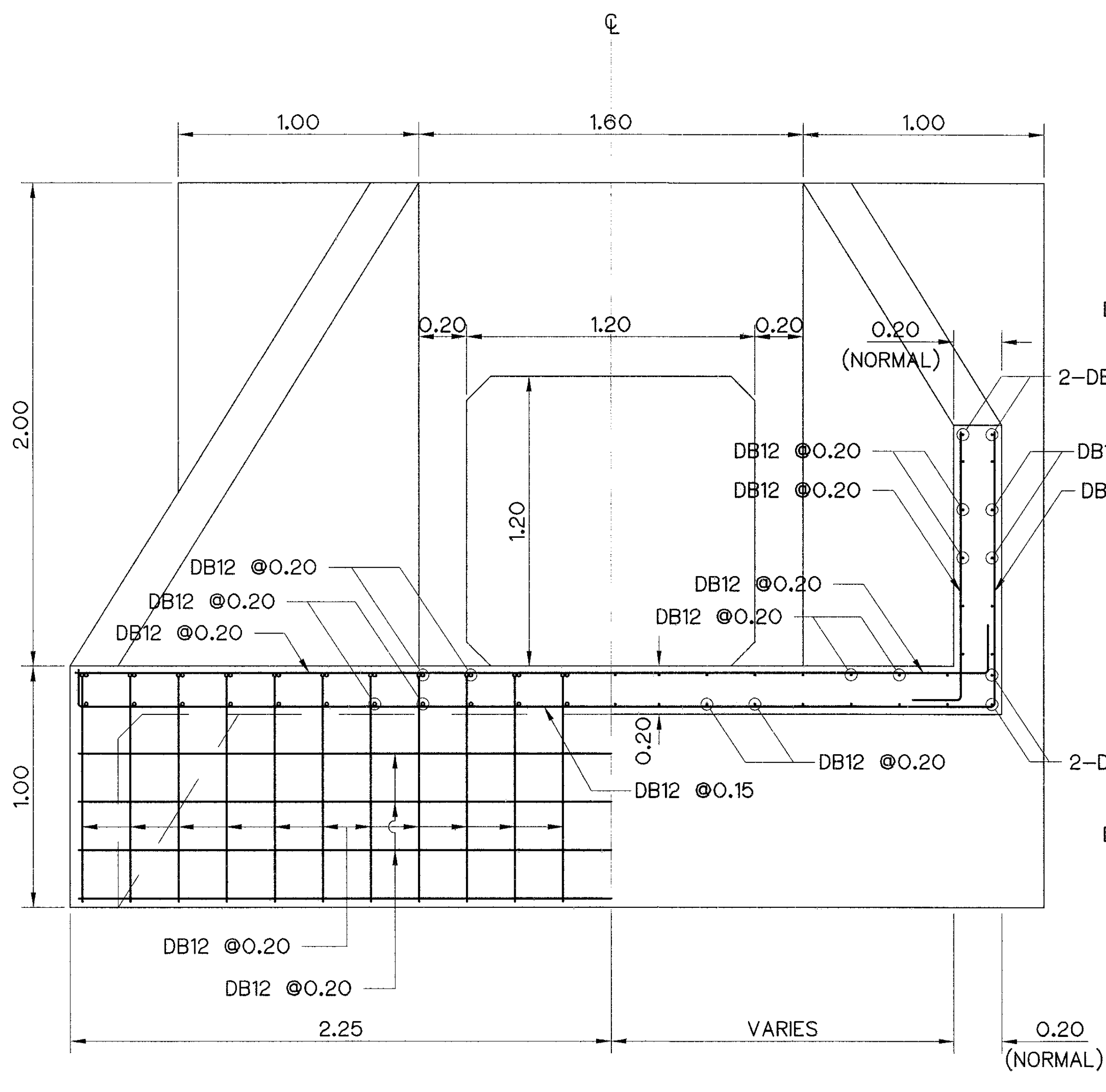
|---|---|
| P&C MANAGEMENT CO.,LTD. | Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY |
| | REVIEWED |
| DESIGNED ภย.64624 สย.6226 | SUBMITTED |
| DRAWN | RECOMMENDED |
| CHECKED สย.6226 | APPROVED P. Hannell |
| PROJECT MANAGER — DATE 08/03/2559 | DRAWING NO. MH-HR-16 — SHEET NO. 40 OF 130 |



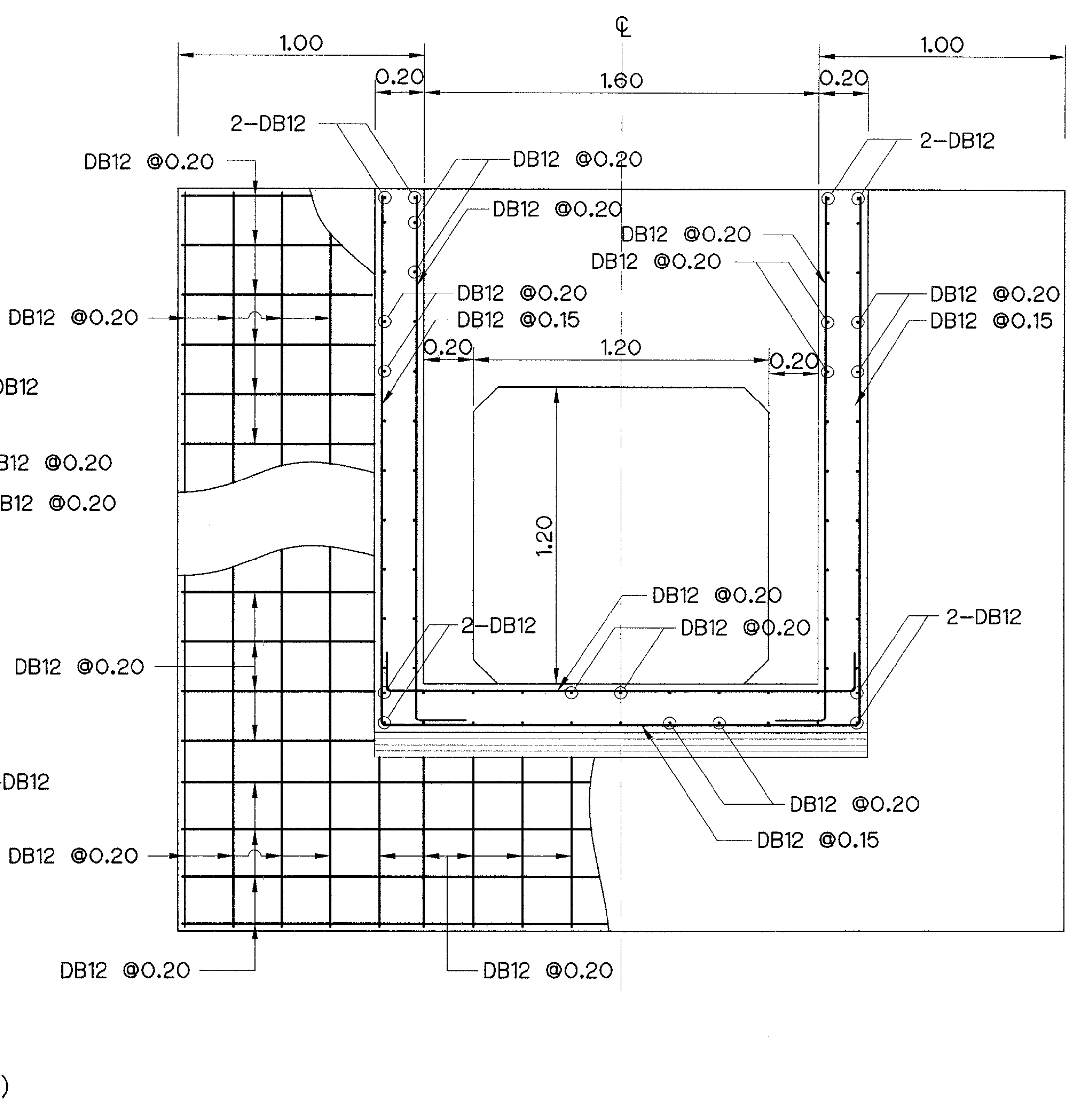
## PLAN

SCALE 1:25



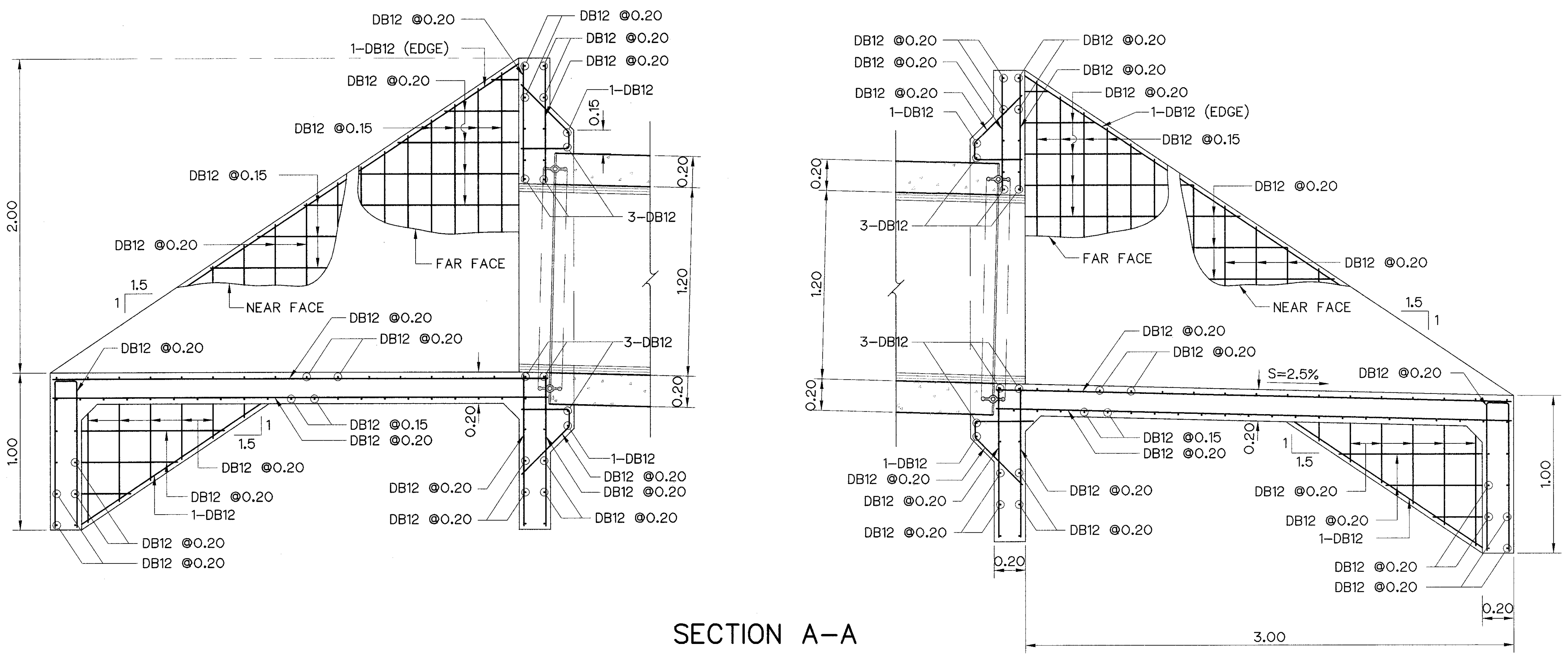
## SECTION B–B

SCALE 1:25



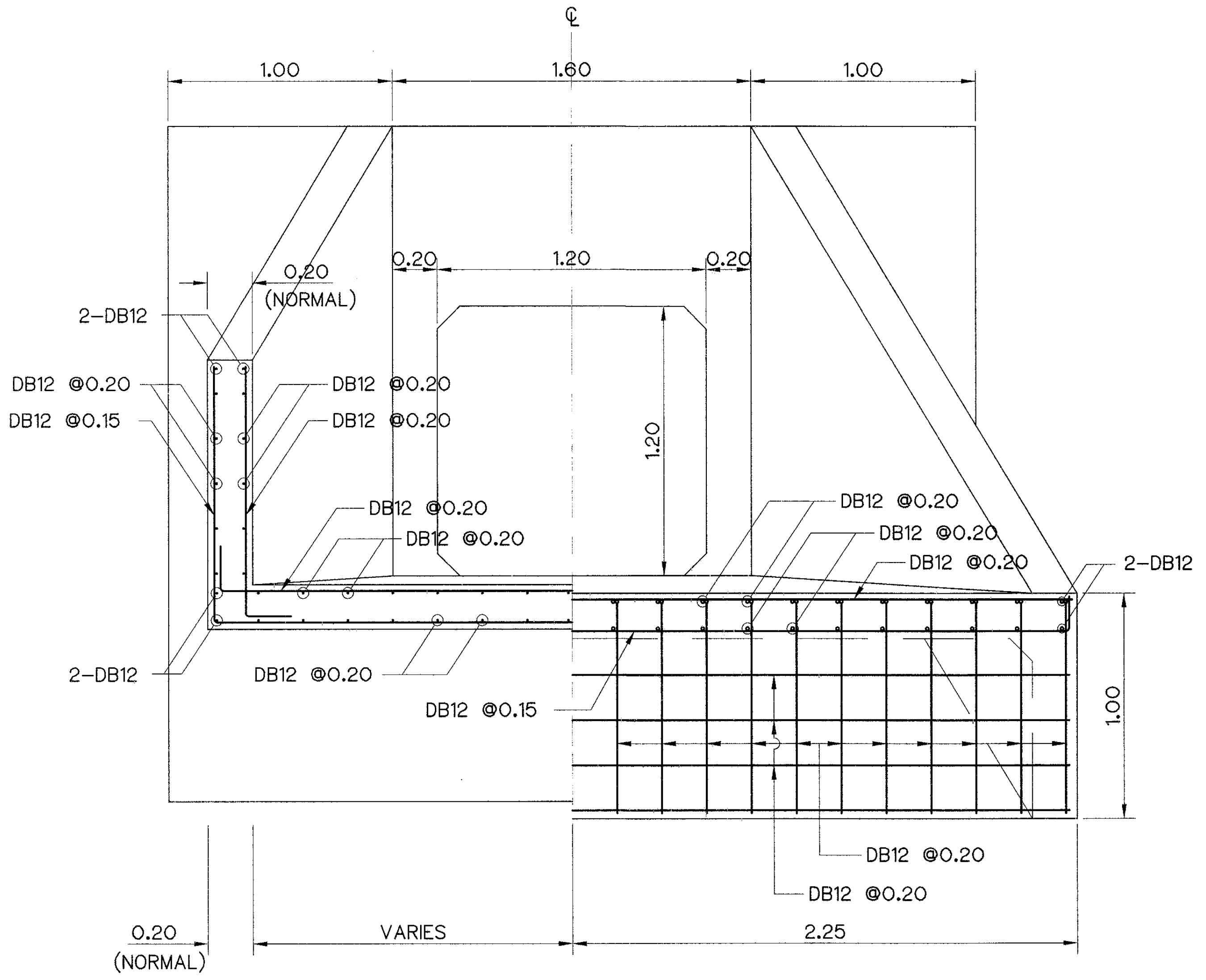
## SECTION C–C

SCALE 1:25



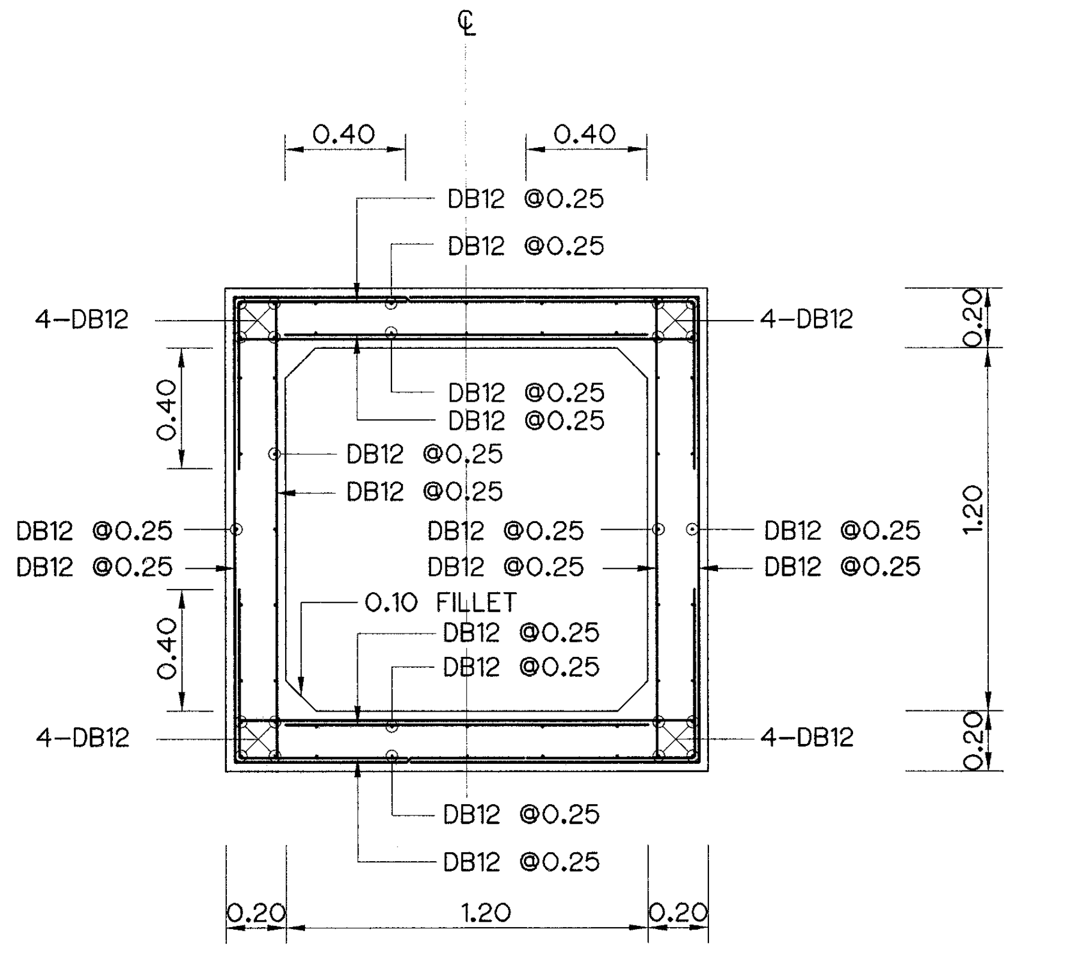
## SECTION A–A

SCALE 1:25



## SECTION E–E

SCALE 1:25



## SECTION D–D

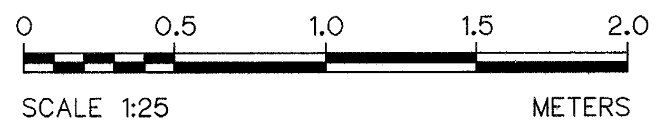
SCALE 1:25

**NOTES :**

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS, UNLESS OTHERWISE SHOWN.
2. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH–GN–03
3. CONCRETE DESIGN BASED ON THE COMPRESSIVE STRENGTH OF 210 KSC, STANDARD CYLINDER Ø0.15x0.30 m. TEST AT AGE 28 DAYS. UNLESS OTHERWISE INDICATED IN SPECIFIC DRAWINGS.
4. ULTIMATE TENSILE STRESSES OF REINFORCING STEEL, CONFORM TO THE REQUIREMENT OF THAI INDUSTRIAL STANDARD DESIGNATION SR24 FOR STRUCTURAL GRADE PLAIN ROUND BAR AND SD30 FOR INTERMEDIATE GRADE DEFORMED BAR.

**REFERENCE DRAWINGS :**

1. DRAIN CULVERT STA. 0+948.448, PLAN AND SECTION MH–HR–16



| NO. | DATE | REVISIONS | CHECKED | APPROVED |
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KINGDOM OF THAILAND
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

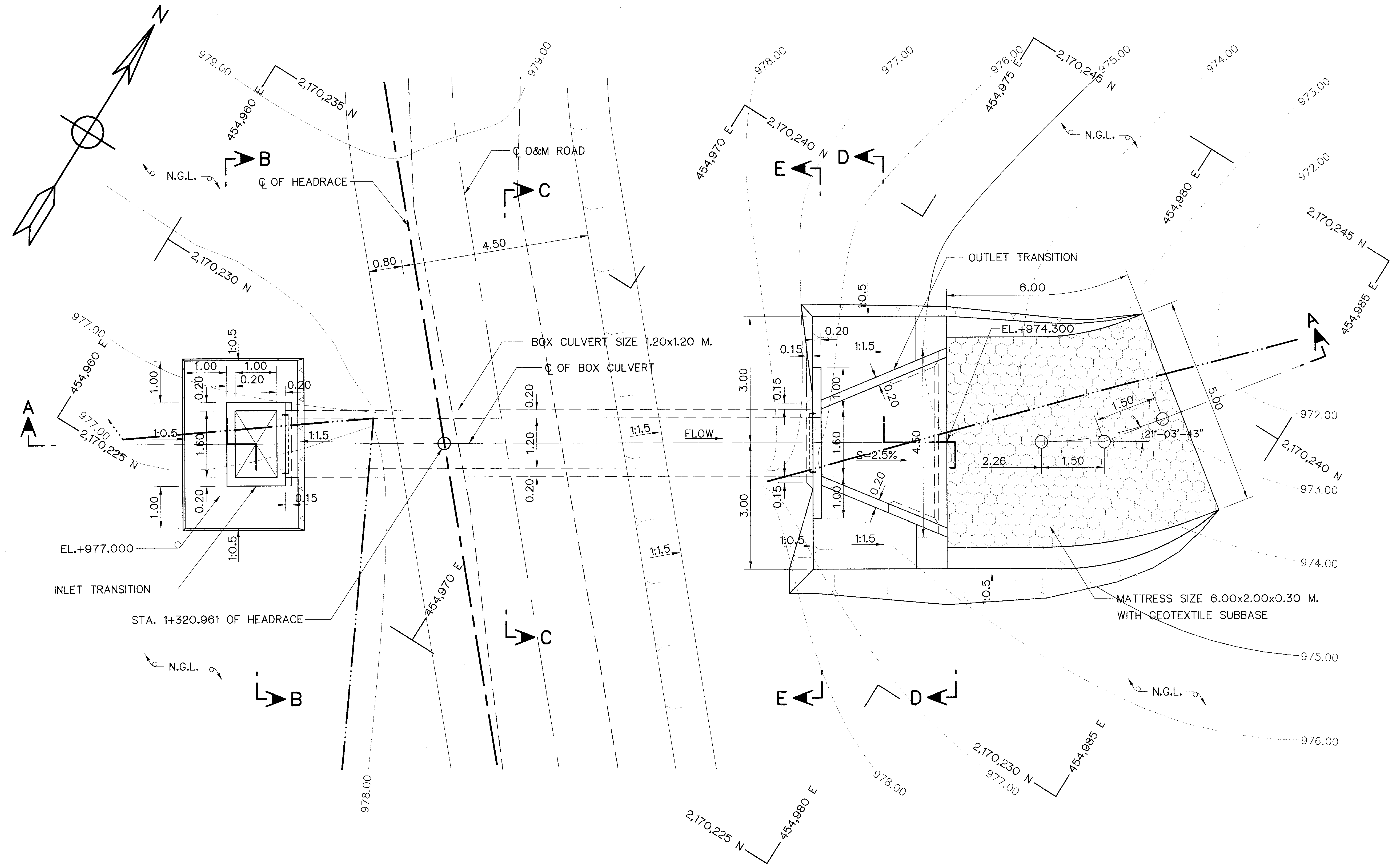
CIVIL WORKS AND TRANSMISSION LINE
HEADRACE
DRAIN CULVERT STA. 0+948.448 REINFORCEMENT DETAILS

P&C MANAGEMENT CO.,LTD.

DESIGNED ภย.64624 สย.6226
DRAWN
CHECKED สย.6226
08/03/2559
PROJECT MANAGER DATE

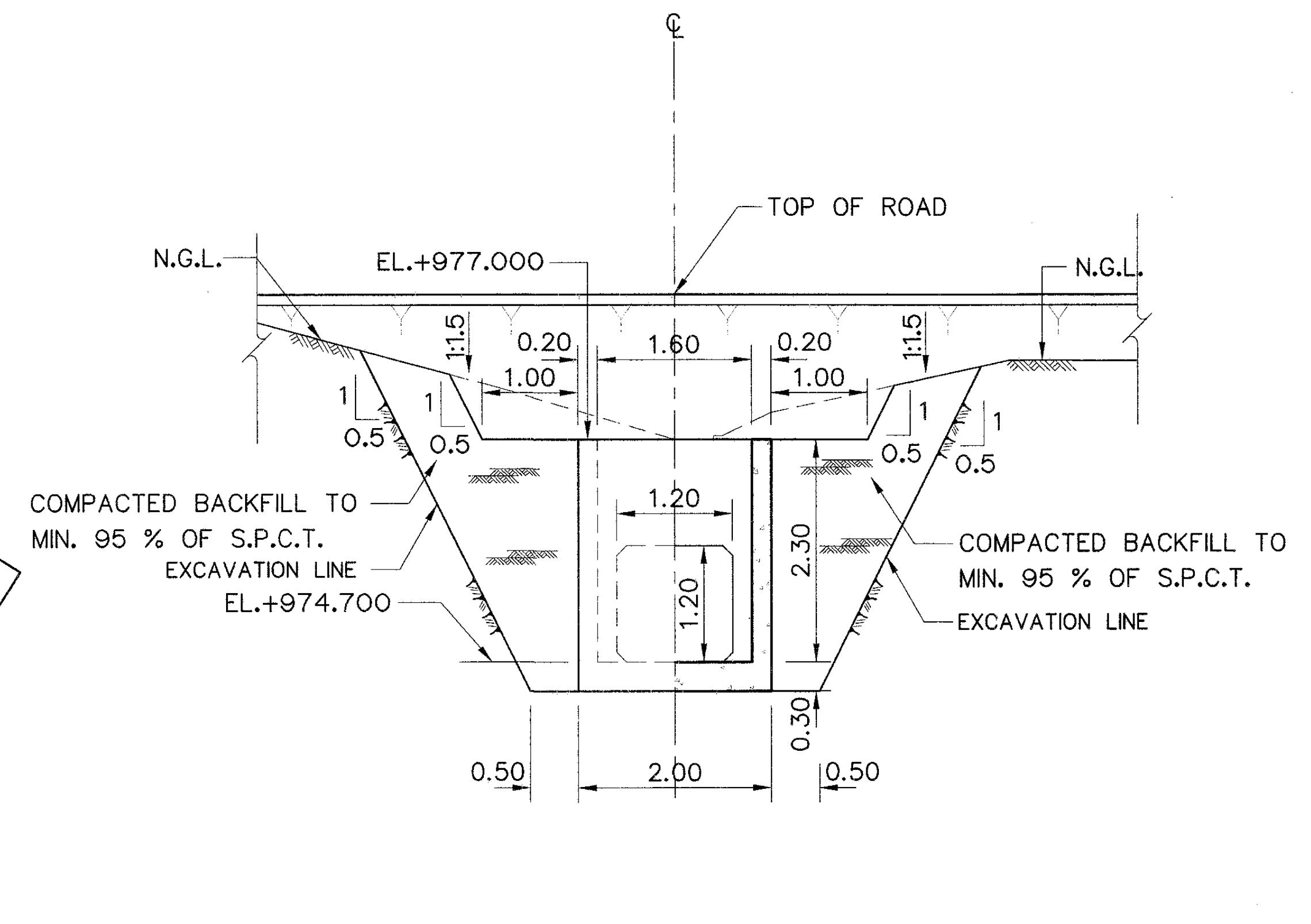
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY
REVIEWED
SUBMITTED Chaurit
RECOMMENDED
APPROVED P. Hansell

DRAWING NO. MH–HR–17
SHEET NO. 41 OF 130



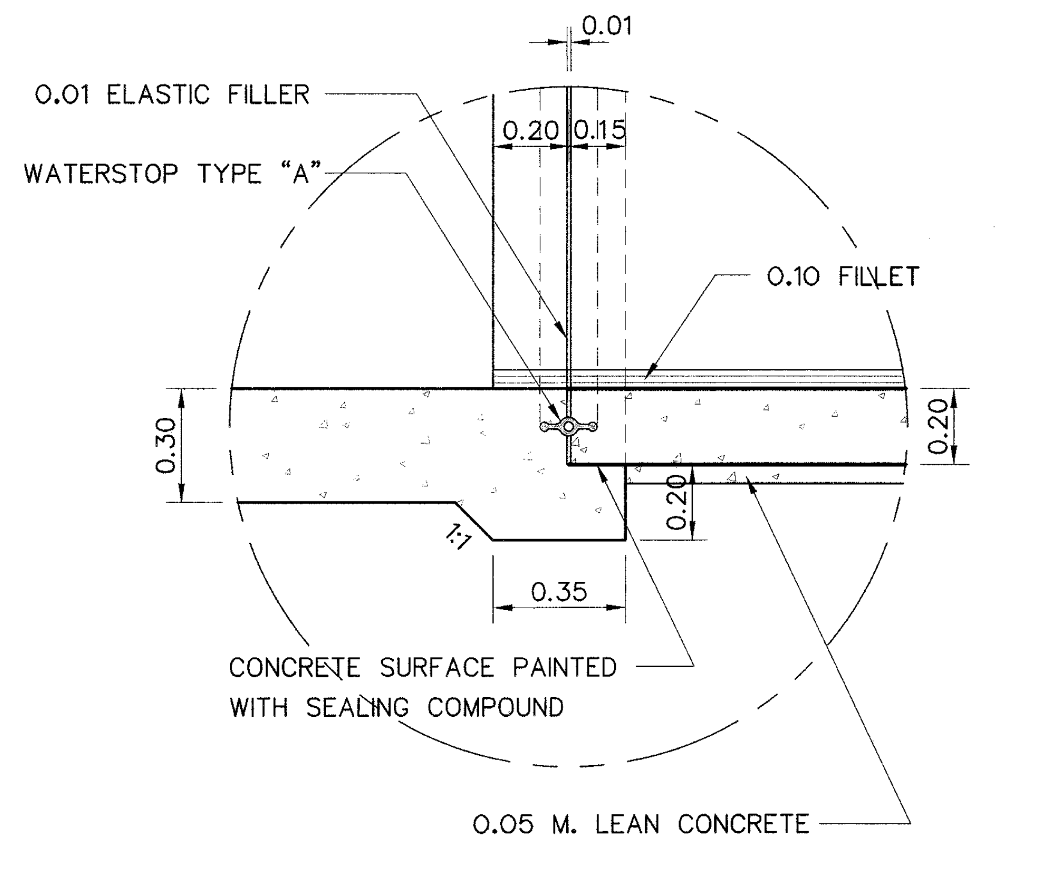
## PLAN

SCALE 1:75



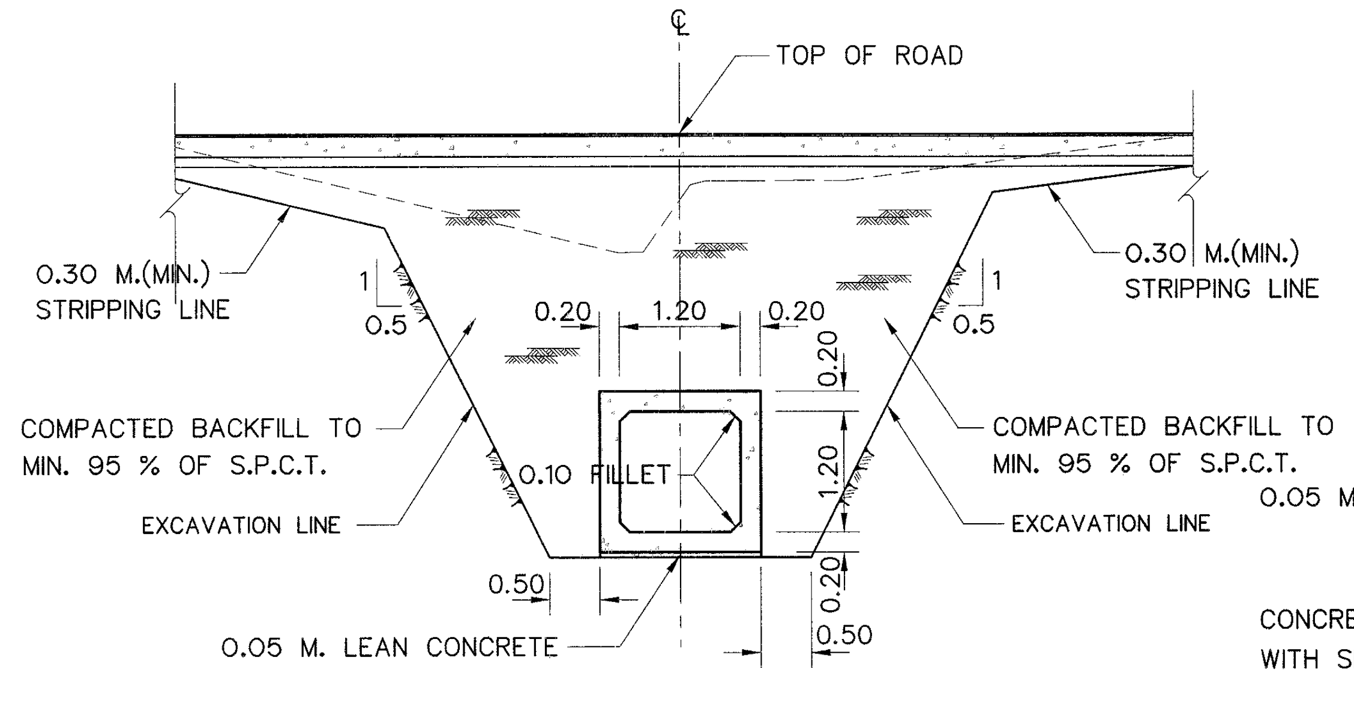
## SECTION B–B

SCALE 1:75



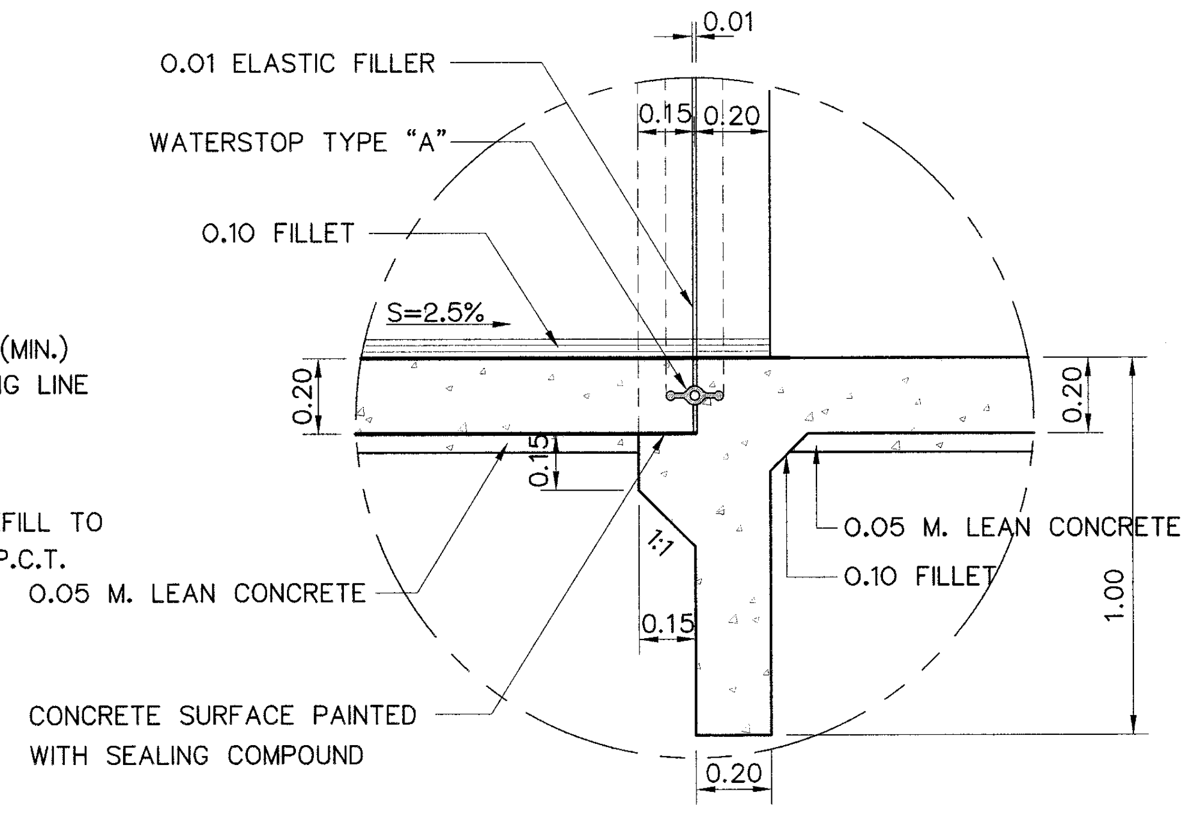
## DETAIL "1"

SCALE 1:20



## SECTION C–C

SCALE 1:75



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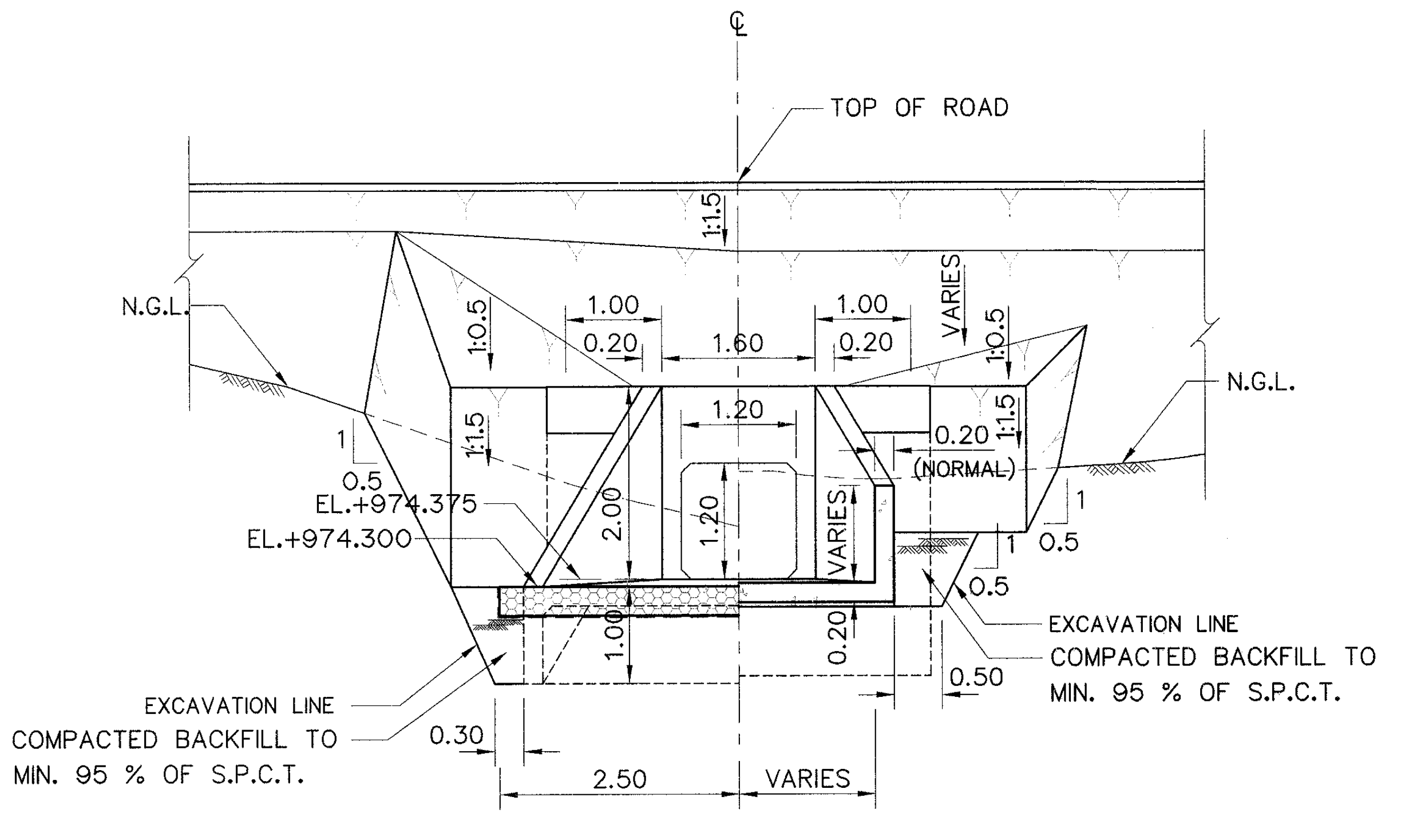
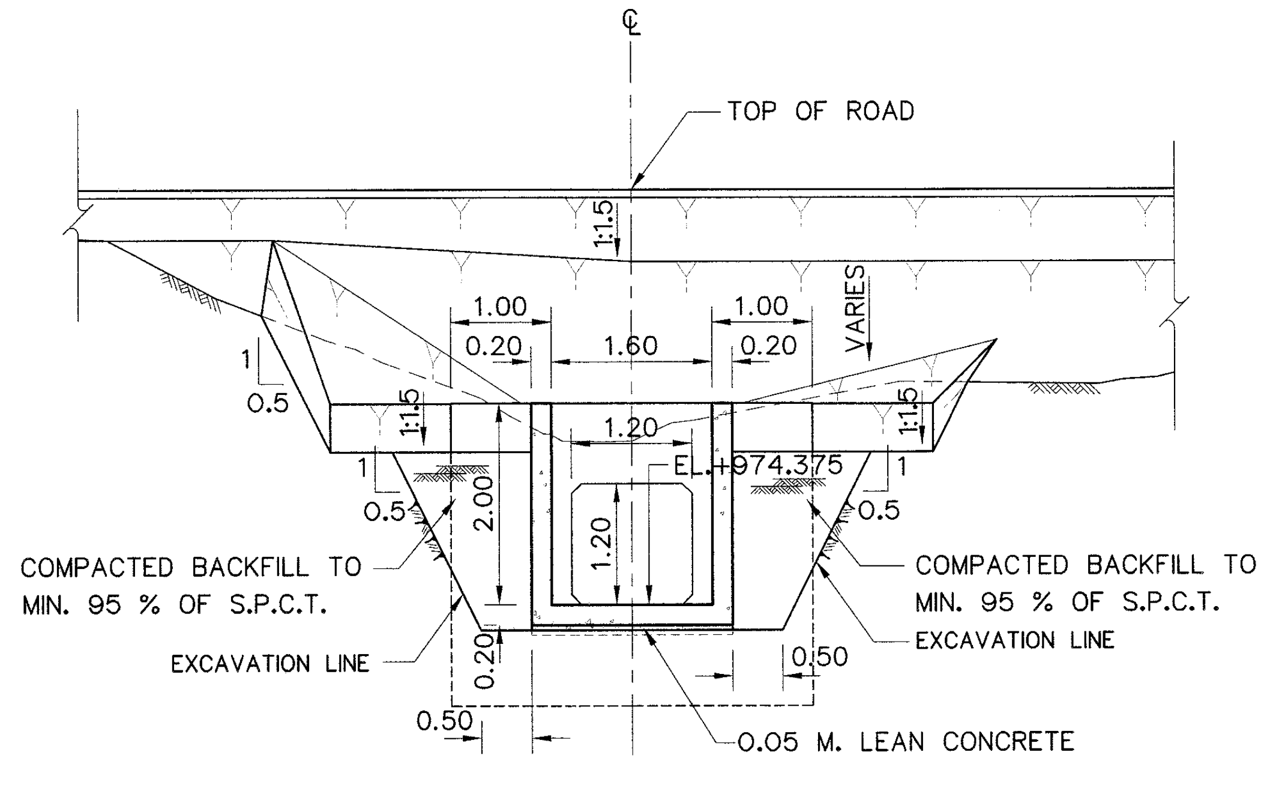


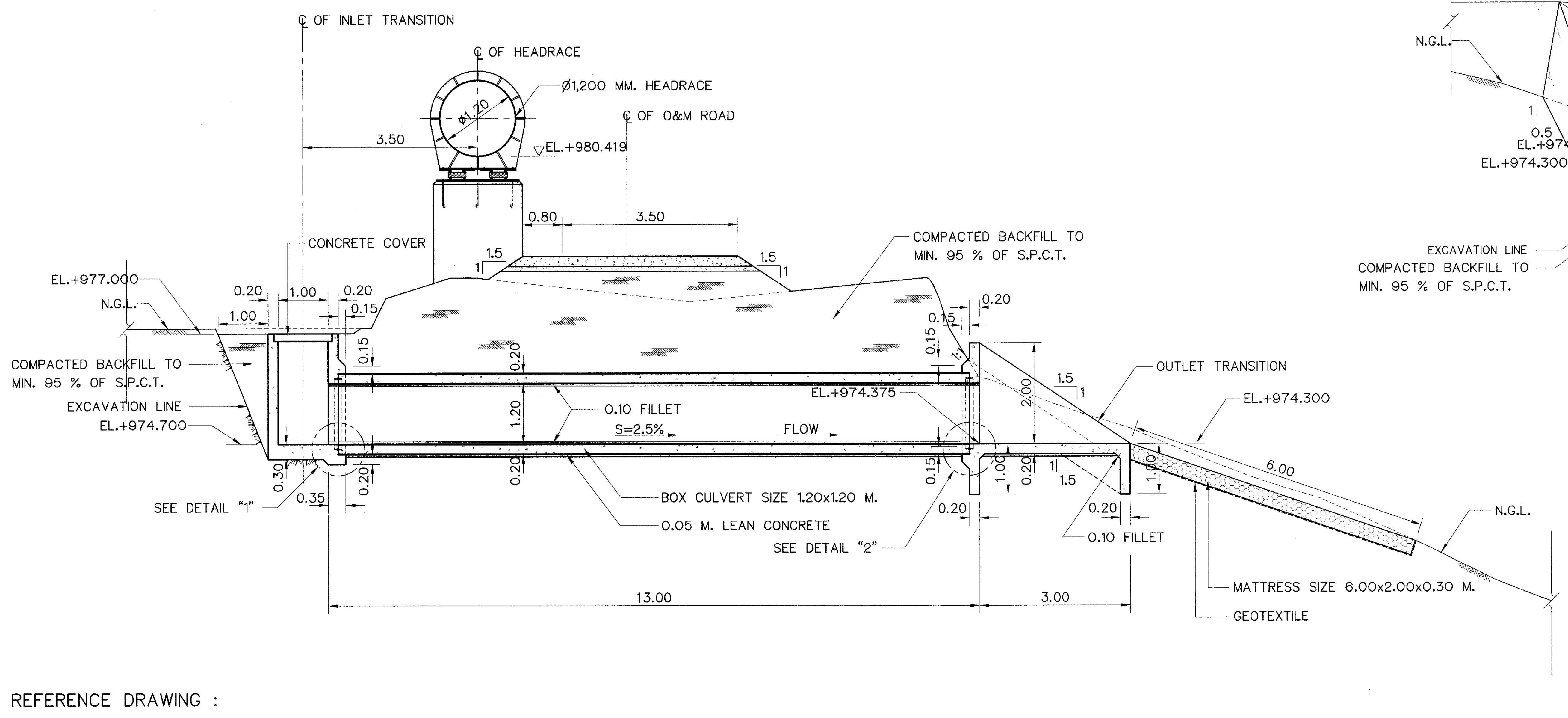
## SECTION D–D

SCALE 1:75



## SECTION E–E

SCALE 1:75



## SECTION A–A

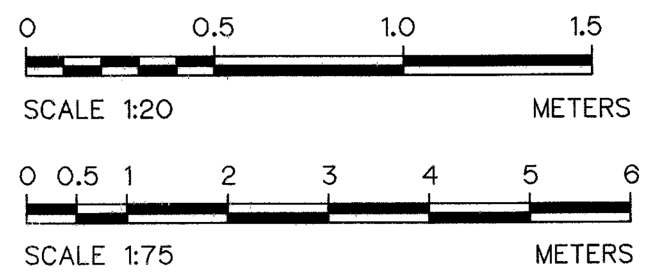
SCALE 1:75

REFERENCE DRAWING :

| | |
|---|---|
| 1. HEADRACE PLAN AND PROFILE, STA. 1+000 TO STA. 1+500 | MH–HR–03 |
| 2. DRAIN CULVERT STA. 1+320.961, REINFORCEMENT DETAILS | MH–HR–19 |

NOTES :

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS UNLESS OTHERWISE SHOWN.
2. SYMBOL, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH–GN–03



KINGDOM OF THAILAND
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MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
HEADRACE
DRAIN CULVERT STA. 1+320.961 , PLAN AND SECTION

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CONSULTANTS | DEDE

P&C MANAGEMENT CO.,LTD.

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MINISTRY OF ENERGY

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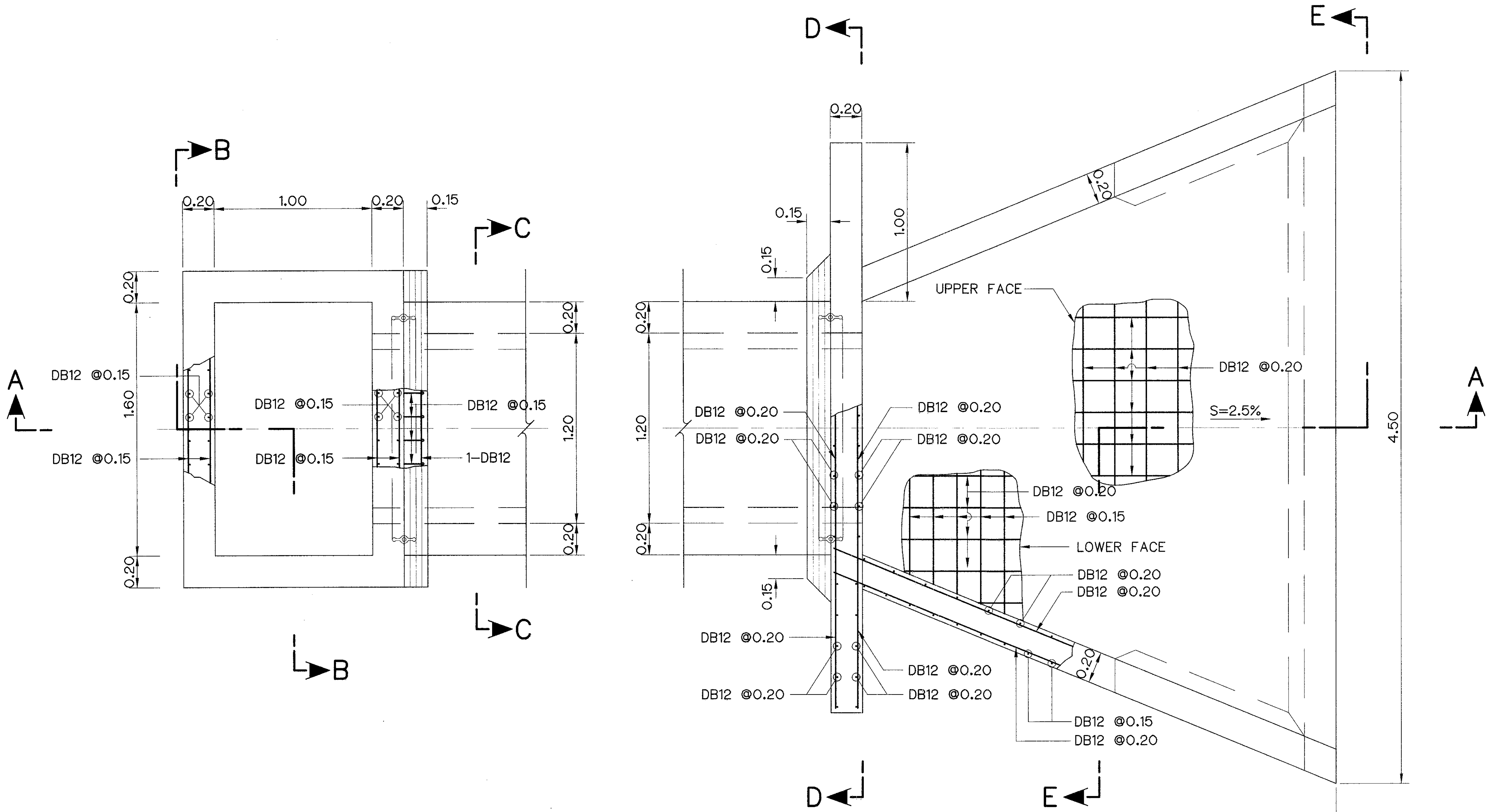
| PROJECT MANAGER | DATE 08/03/2559 | APPROVED P. Ham |

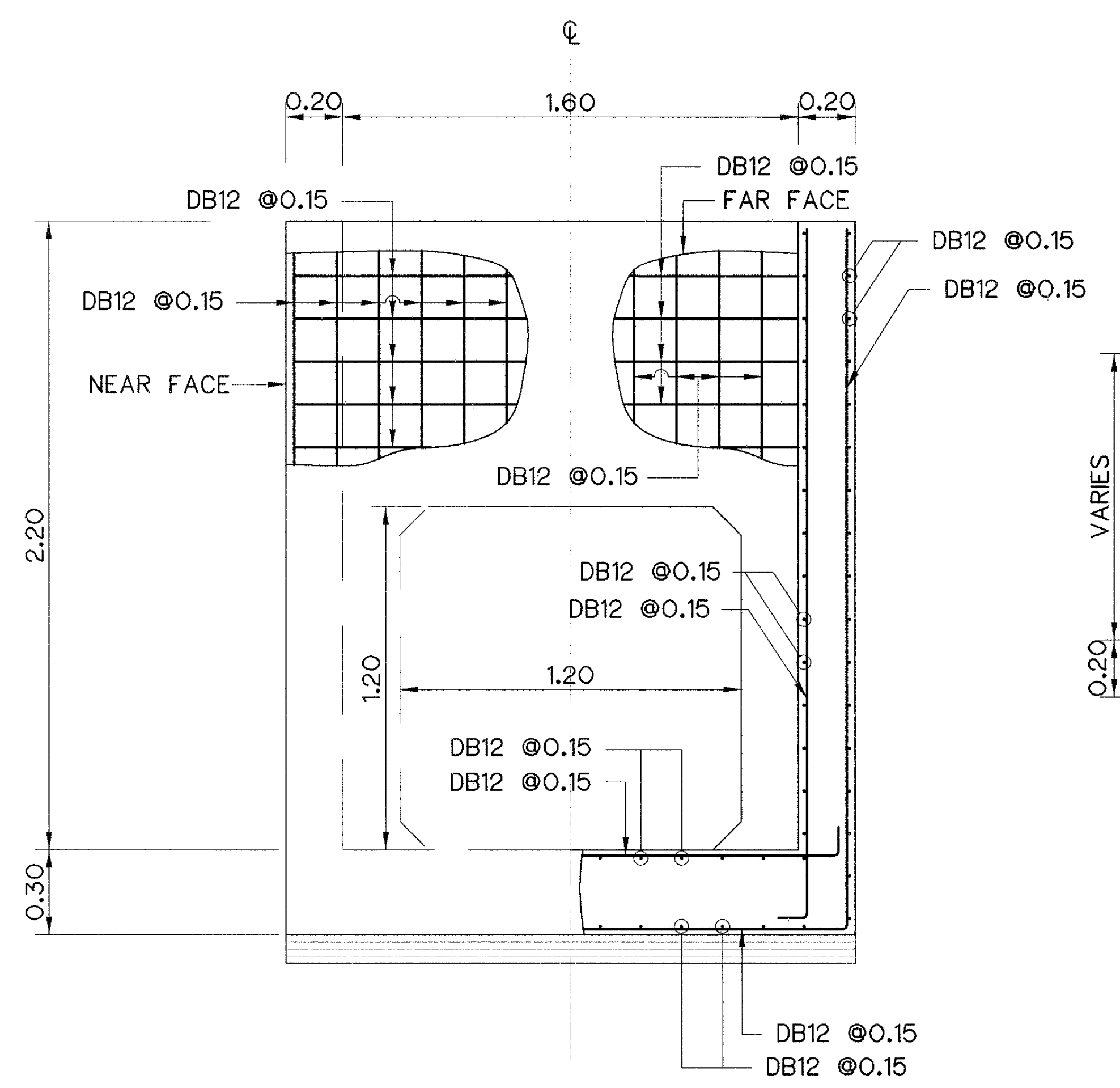
DRAWING NO. MH–HR–18

SHEET NO. 42 OF 130



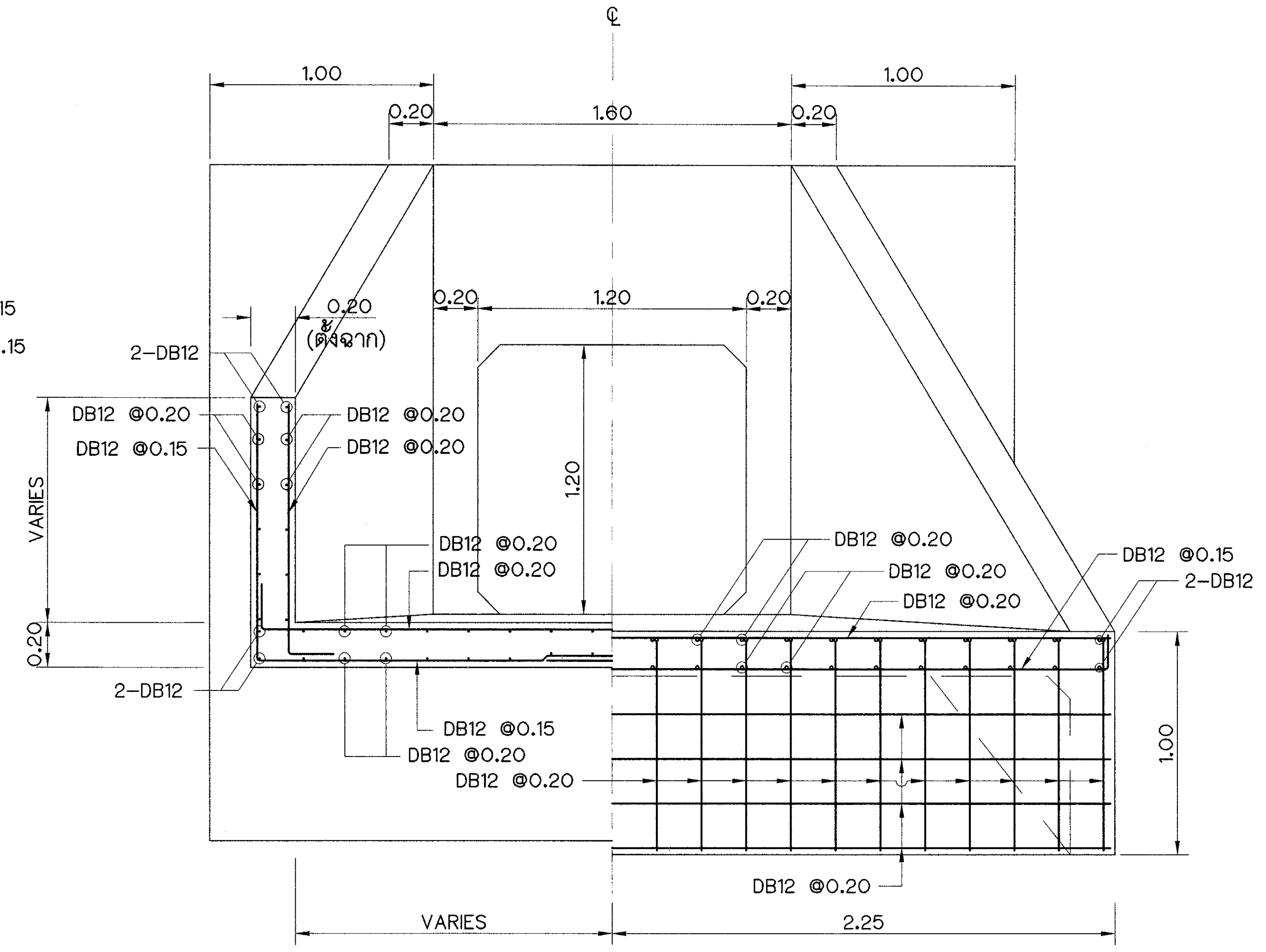
## PLAN

SCALE 1:25



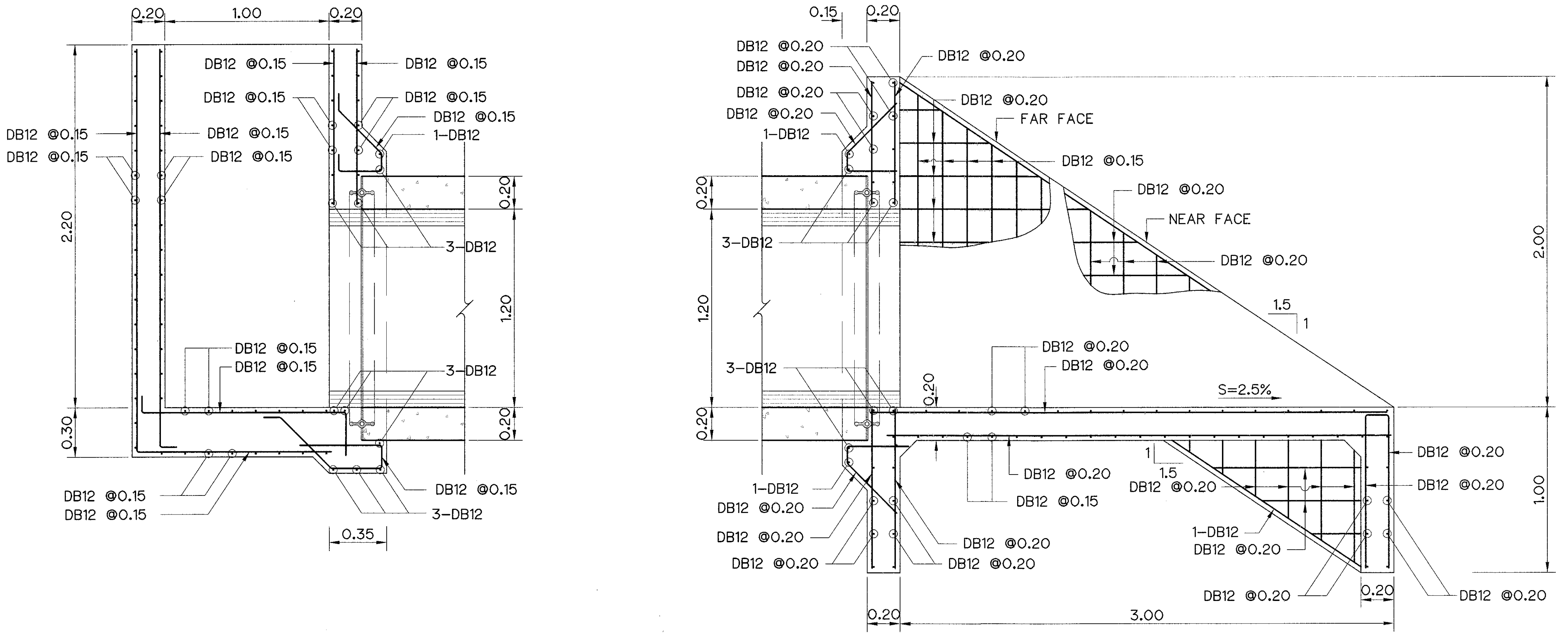
## SECTION B–B

SCALE 1:25



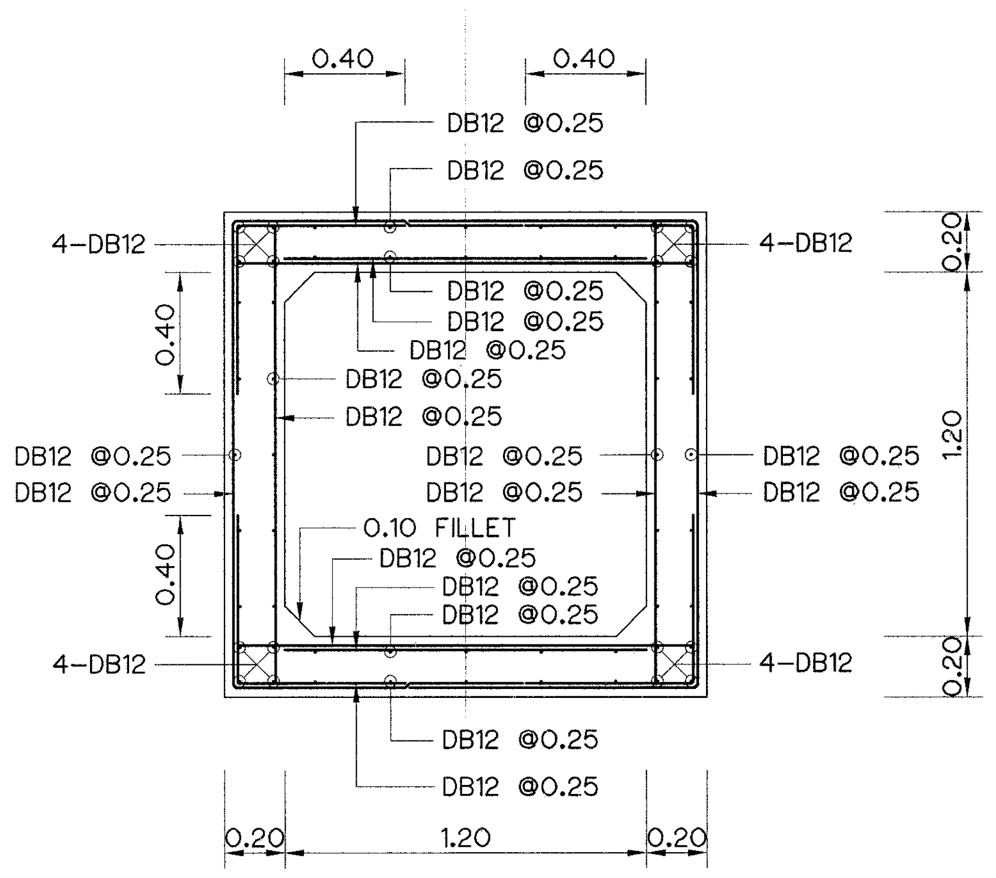
## SECTION E–E

SCALE 1:25



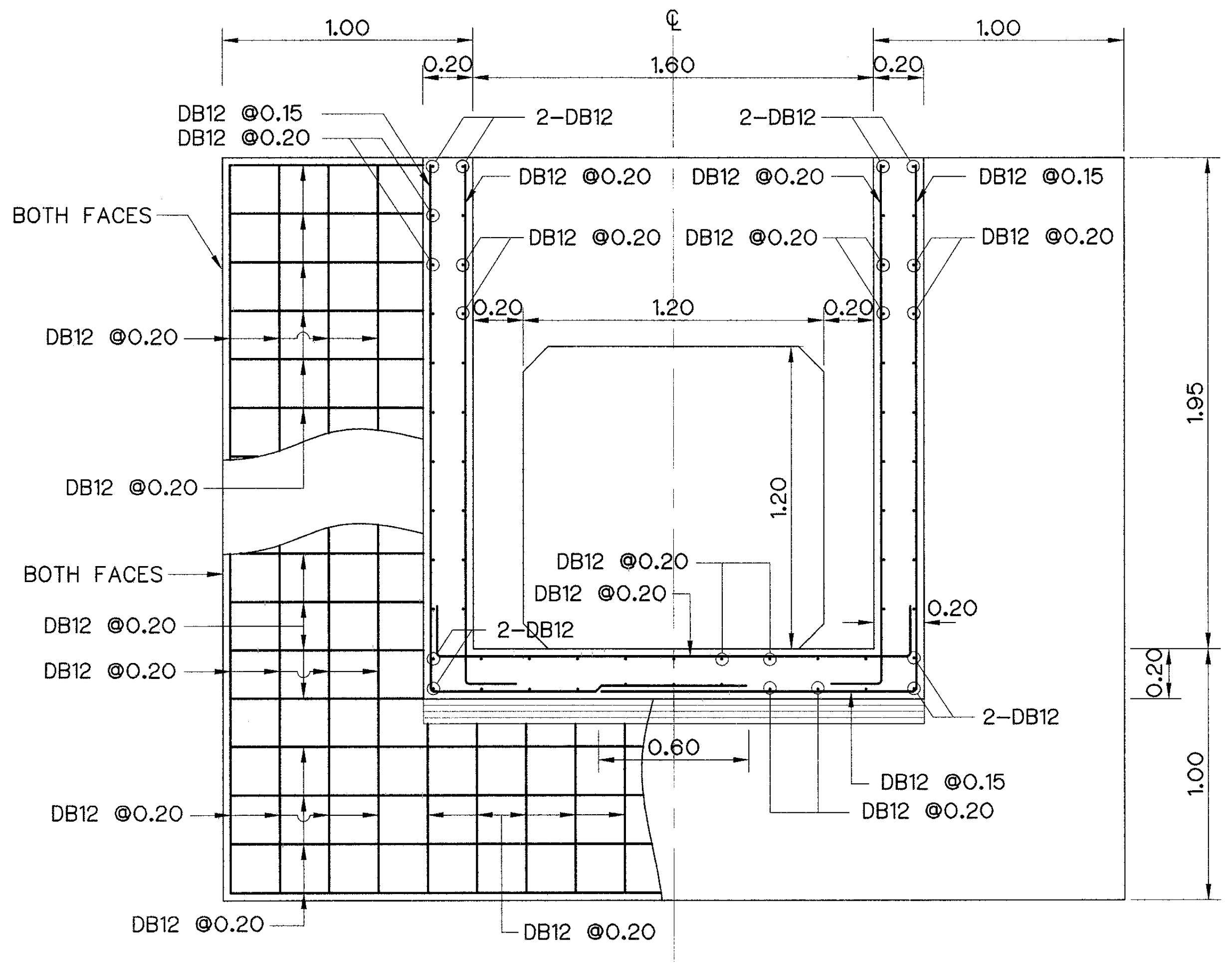
## SECTION A–A

SCALE 1:25



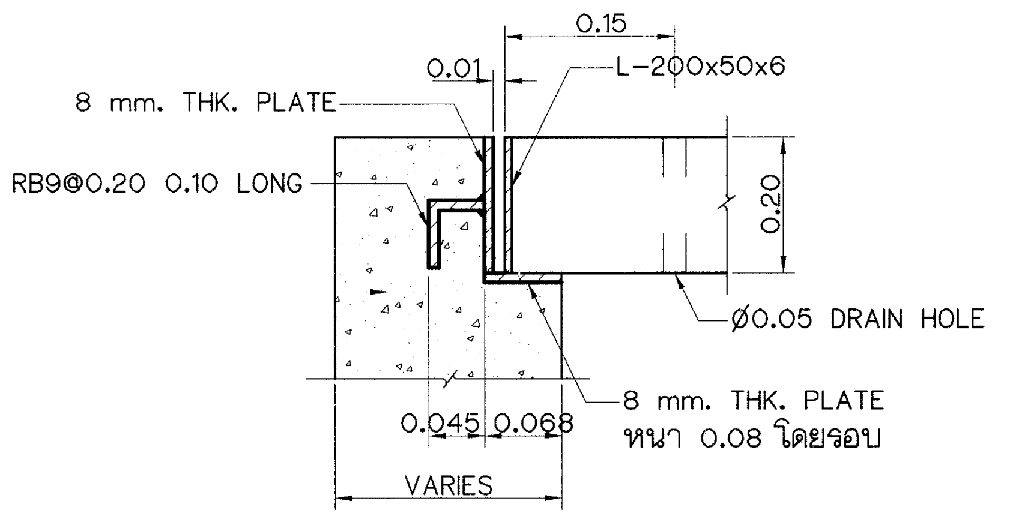
## SECTION C–C

SCALE 1:25



## SECTION D–D

SCALE 1:25



## DETAIL "2"

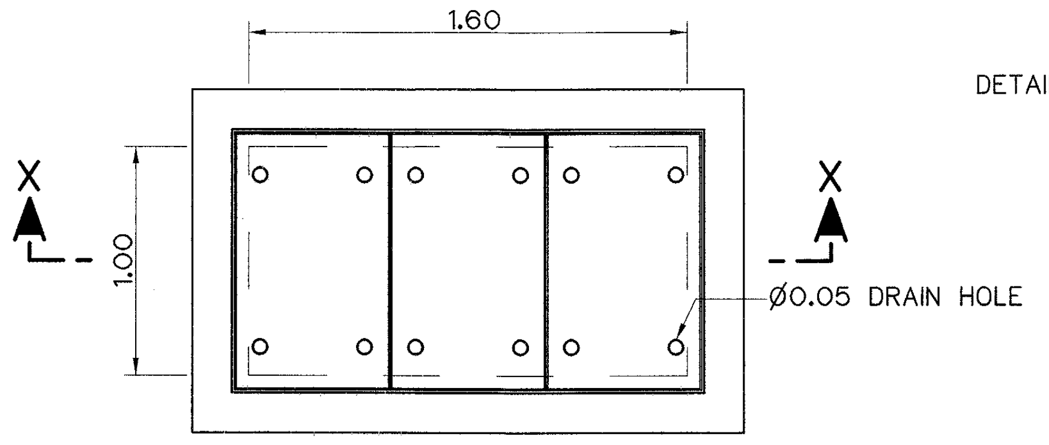
NOT TO SCALE

**NOTES :**

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS, UNLESS OTHERWISE SHOWN.
2. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH-GN-03
3. CONCRETE DESIGN BASED ON THE COMPRESSIVE STRENGTH OF 210 KSC, STANDARD CYLINDER Ø0.15x0.30 m. TEST AT AGE 28 DAYS. UNLESS OTHERWISE INDICATED IN SPECIFIC DRAWINGS.
4. ULTIMATE TENSILE STRESSES OF REINFORCING STEEL, CONFORM TO THE REQUIREMENT OF THAI INDUSTRIAL STANDARD DESIGNATION SR24 FOR STRUCTURAL GRADE PLAIN ROUND BAR AND SD30 FOR INTERMEDIATE GRADE DEFORMED BAR.

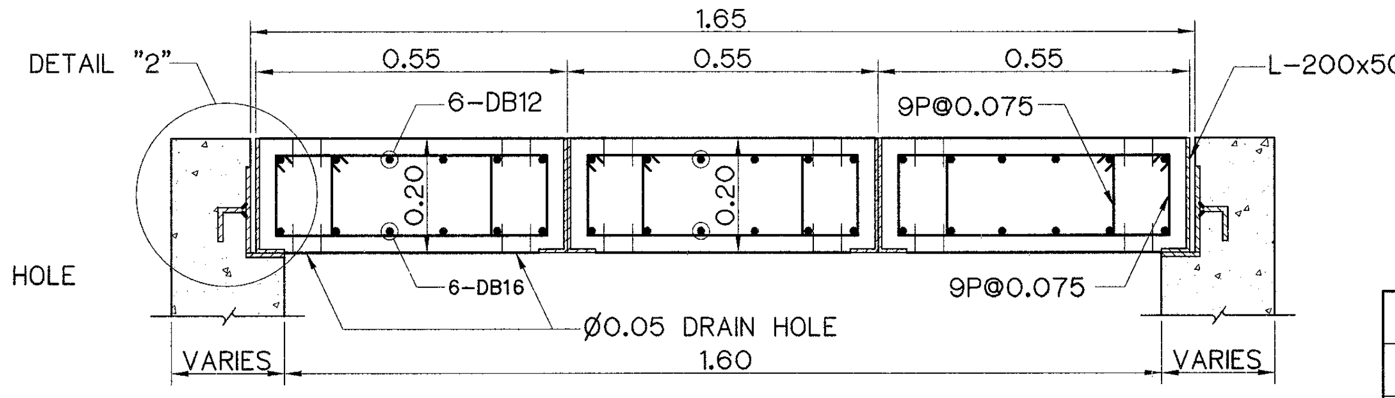
**REFERENCE DRAWINGS :**

1. DRAIN CULVERT STA. 1+320.961, PLAN AND SECTION MH-HR-18



## CONCRETE COVER

NOT TO SCALE



## SECTION X–X

NOT TO SCALE

0 0.5 1.0 1.5 2.0

SCALE 1:25 METERS

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CONSULTANTS DEDE

KINGDOM OF THAILAND
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MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
HEADRACE
DRAIN CULVERT STA. 1+320.961 REINFORCEMENT DETAILS

P&C MANAGEMENT CO.,LTD.

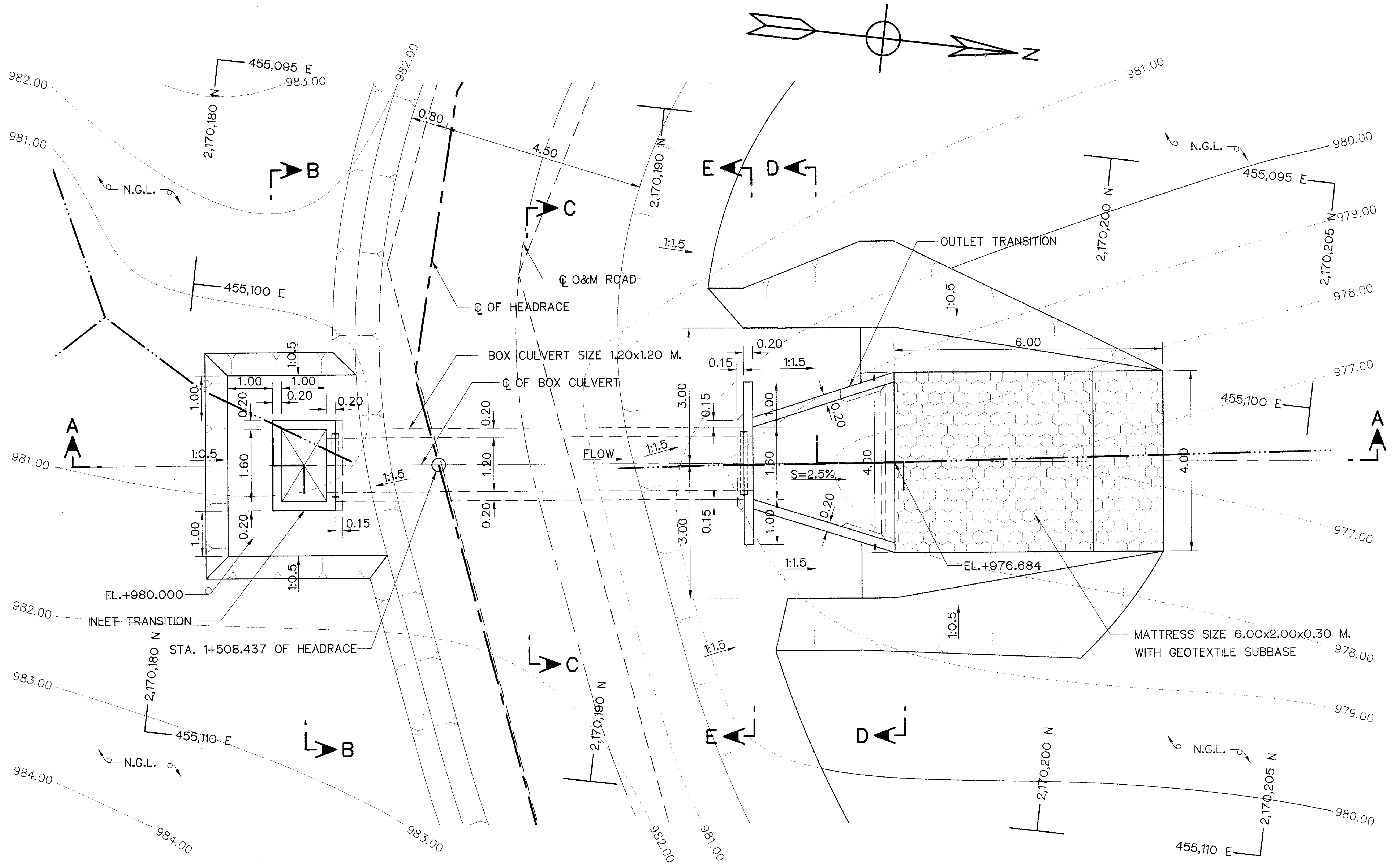
DESIGNED ภย.64624 ลย.6226
DRAWN
CHECKED ลย.6226
PROJECT MANAGER
DATE 08/03/2559

Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

REVIEWED
SUBMITTED Chaut
RECOMMENDED
APPROVED P. Hanz

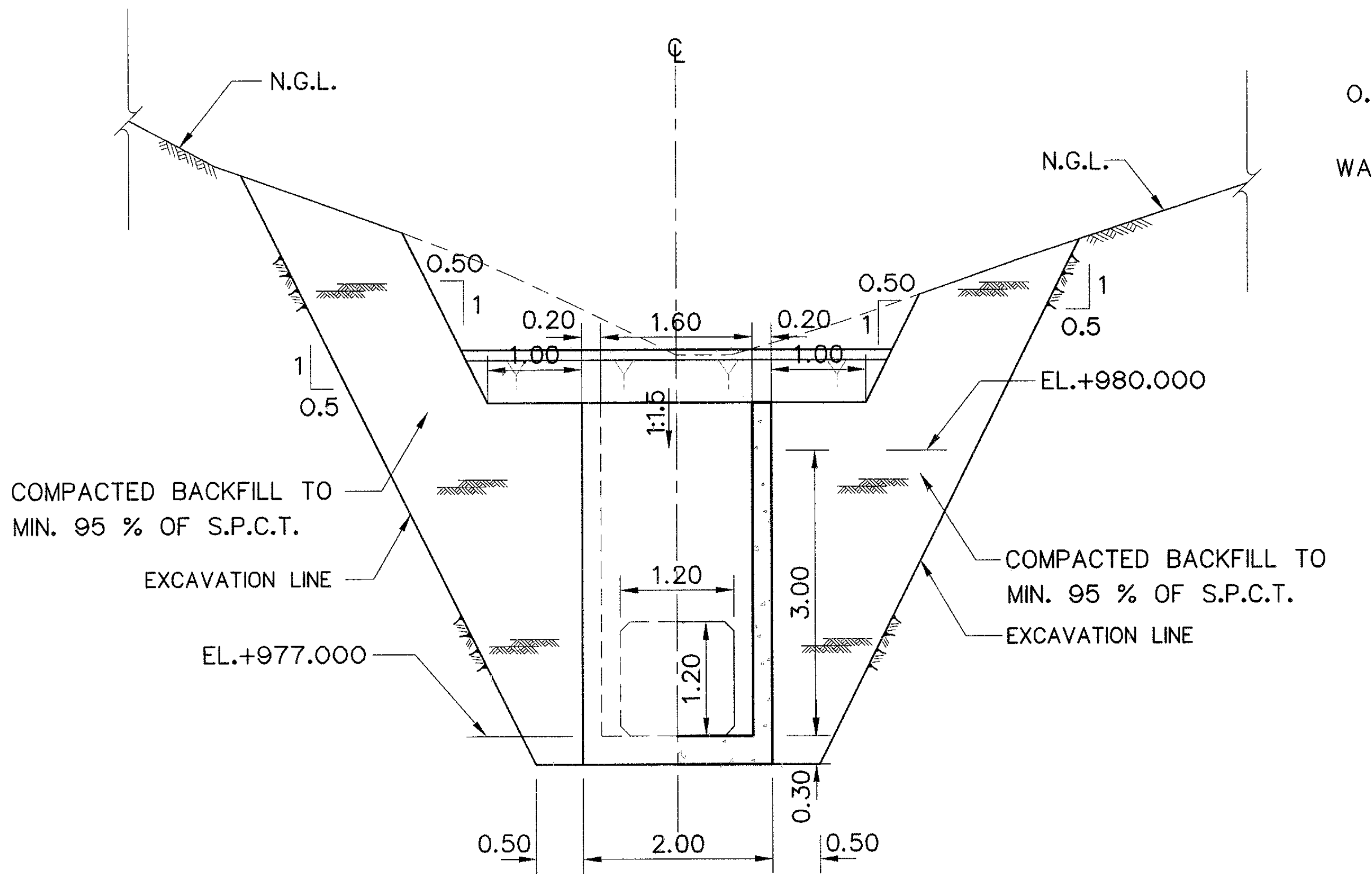
DRAWING NO. MH-HR-19

SHEET NO. 43 OF 130



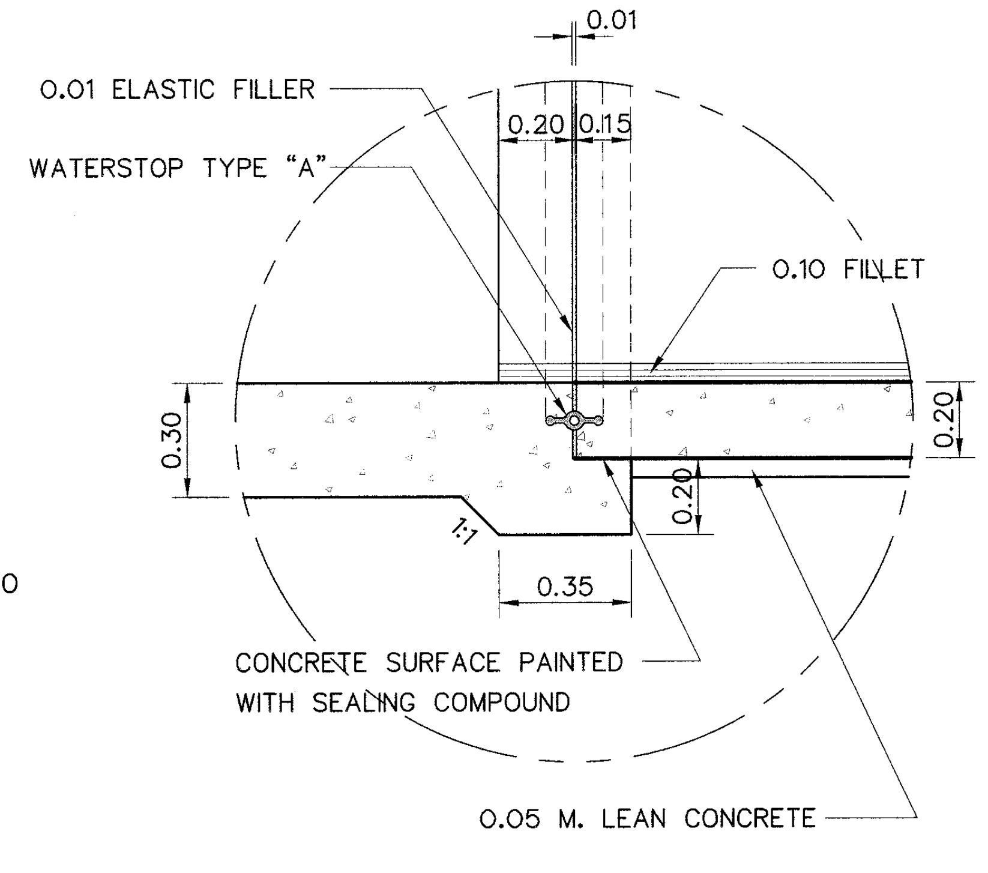
## PLAN

SCALE 1:75



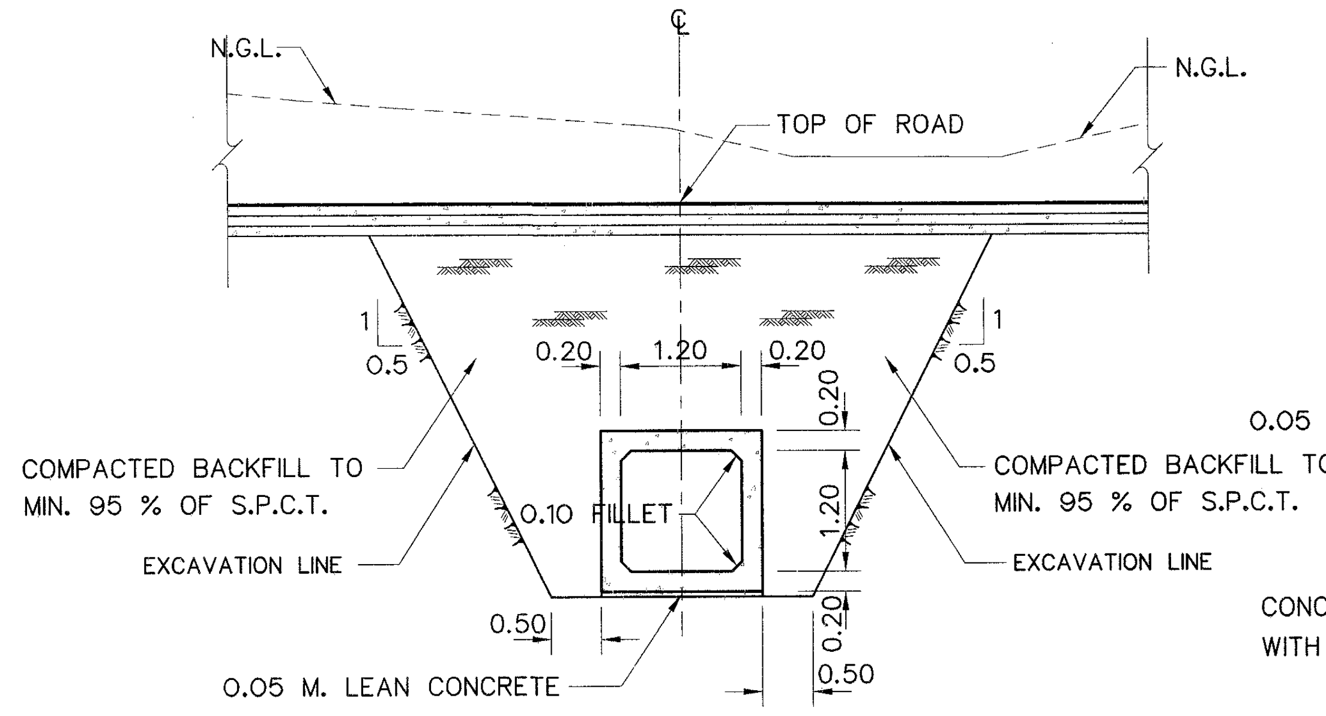
## SECTION B–B

SCALE 1:75



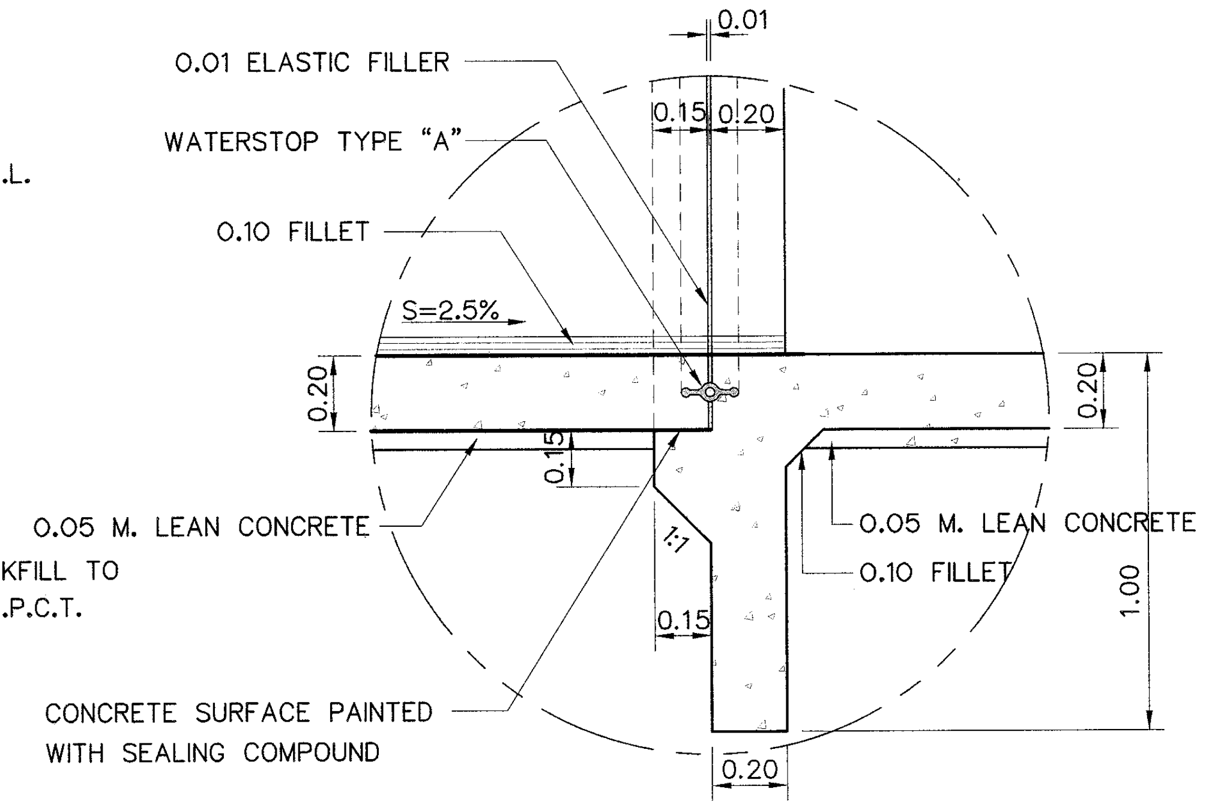
## DETAIL "1"

SCALE 1:20



## SECTION C–C

SCALE 1:75



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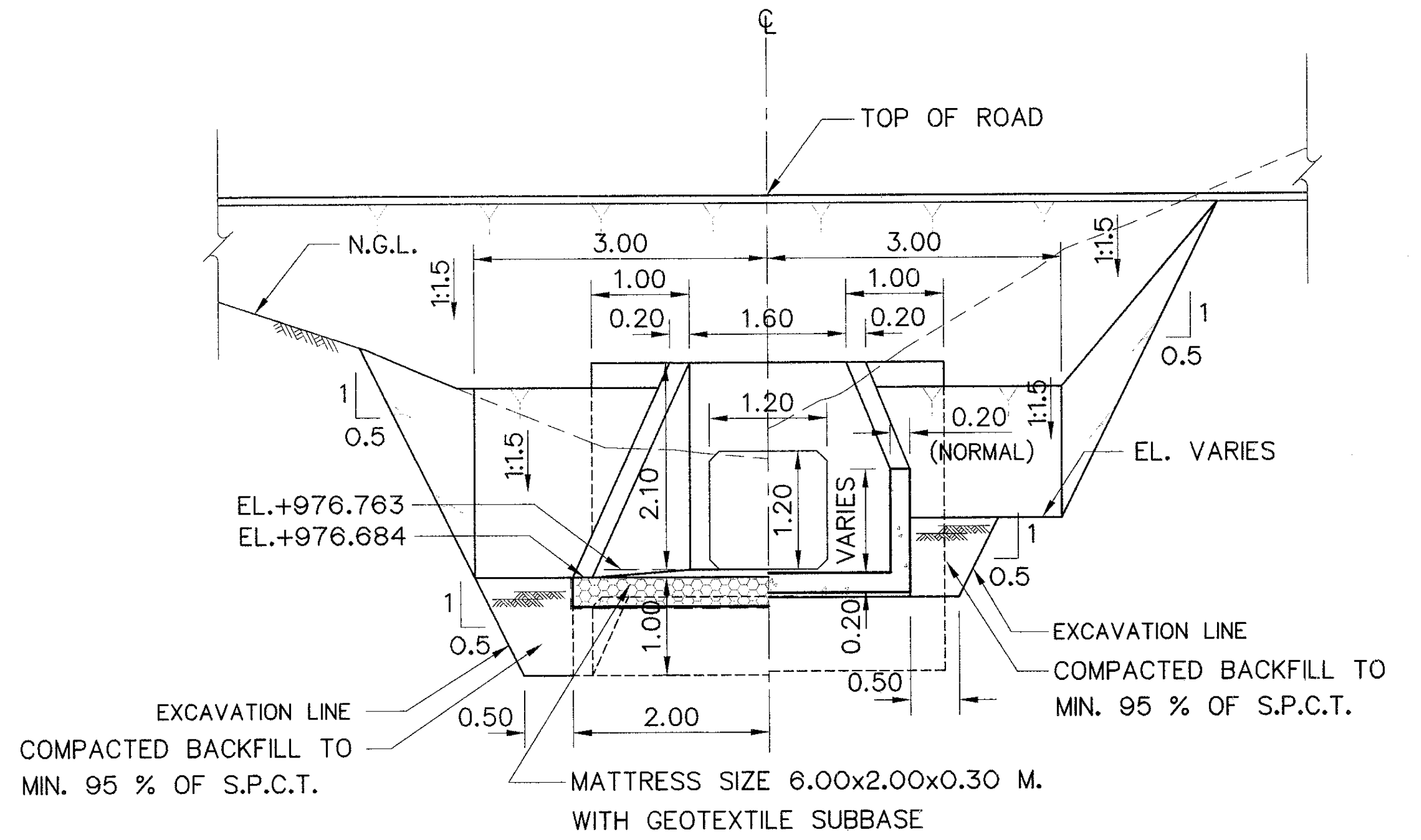
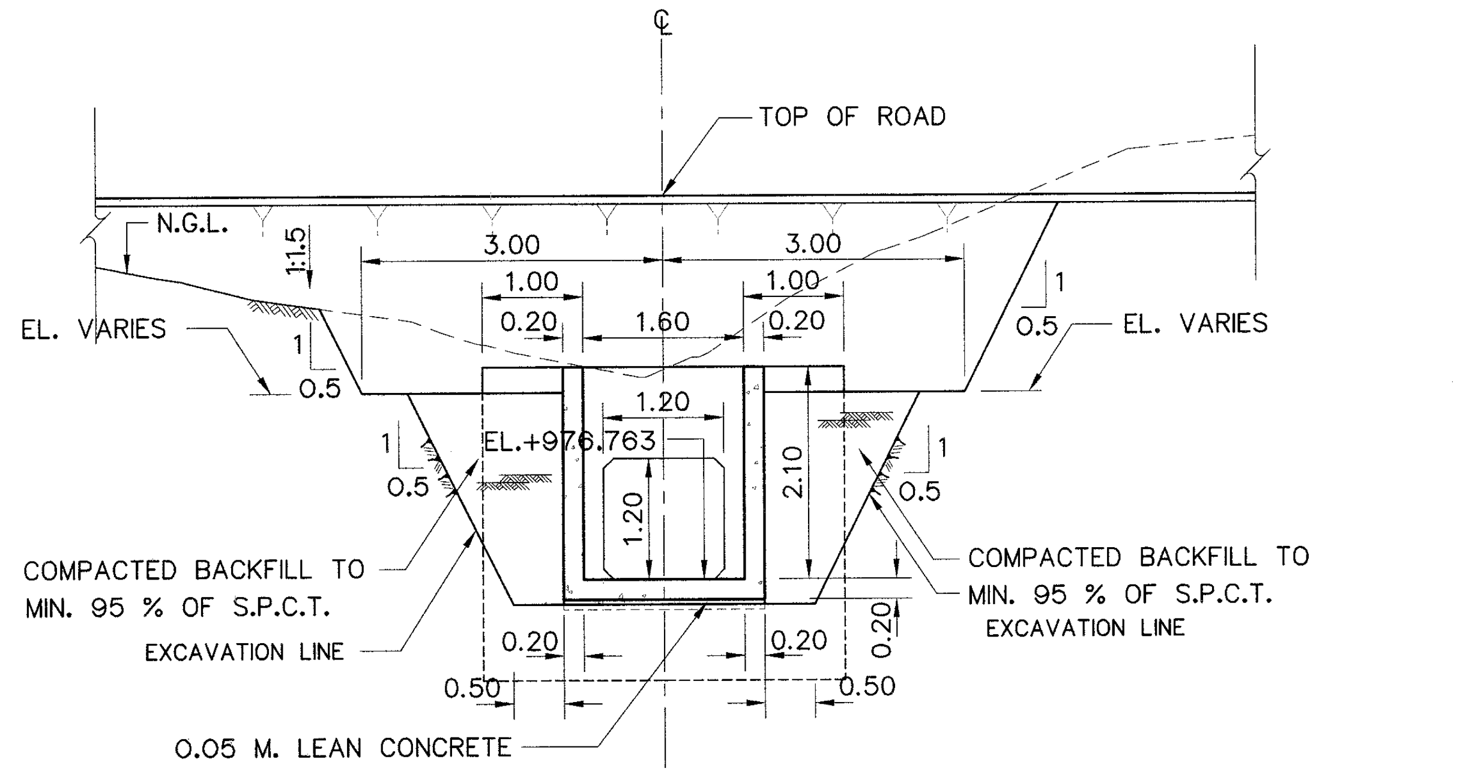


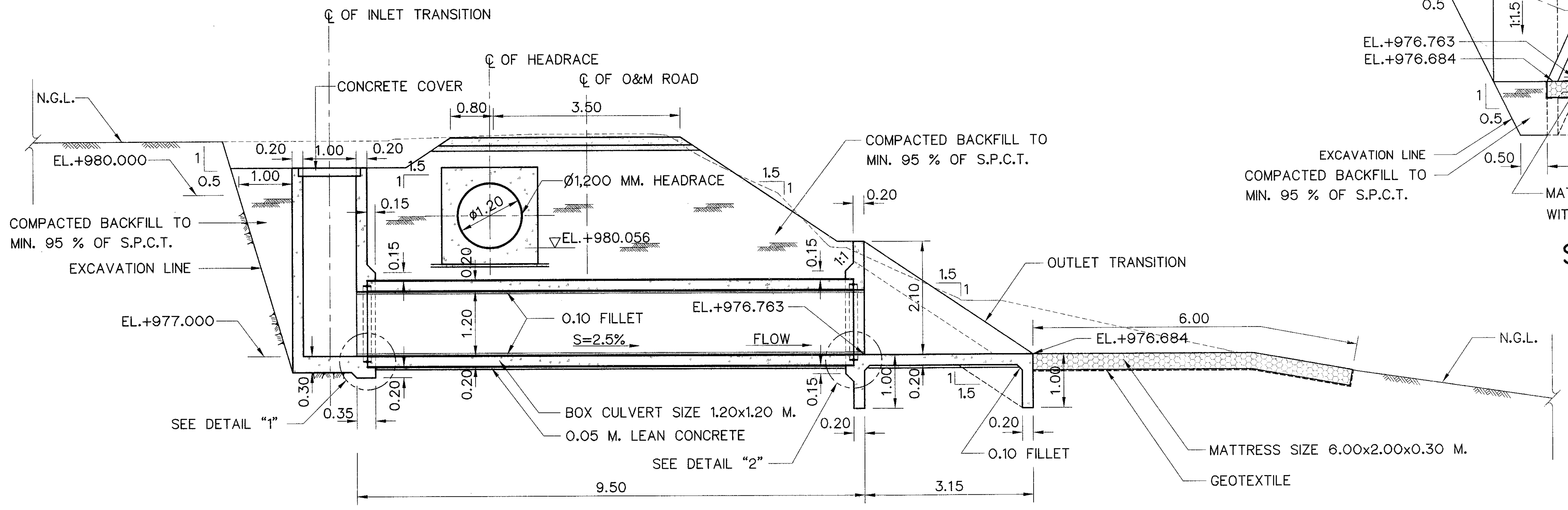
## SECTION D–D

SCALE 1:75



## SECTION E–E

SCALE 1:75



## SECTION A–A

SCALE 1:75

NOTES :

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS UNLESS OTHERWISE SHOWN.
2. SYMBOL, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH-GN-03

REFERENCE DRAWING :

| | |
|---|---|
| 1. HEADRACE PLAN AND PROFILE, STA. 1+500 TO STA. 2+000 | MH-HR-04 |
| 2. DRAIN CULVERT STA. 1+508.437, REINFORCEMENT DETAILS | MH-HR-21 |

0 0.5 1.0 1.5
SCALE 1:20 METERS

0 0.5 1 2 3 4 5 6
SCALE 1:75 METERS

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
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| 2 | | | | |
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KINGDOM OF THAILAND
Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

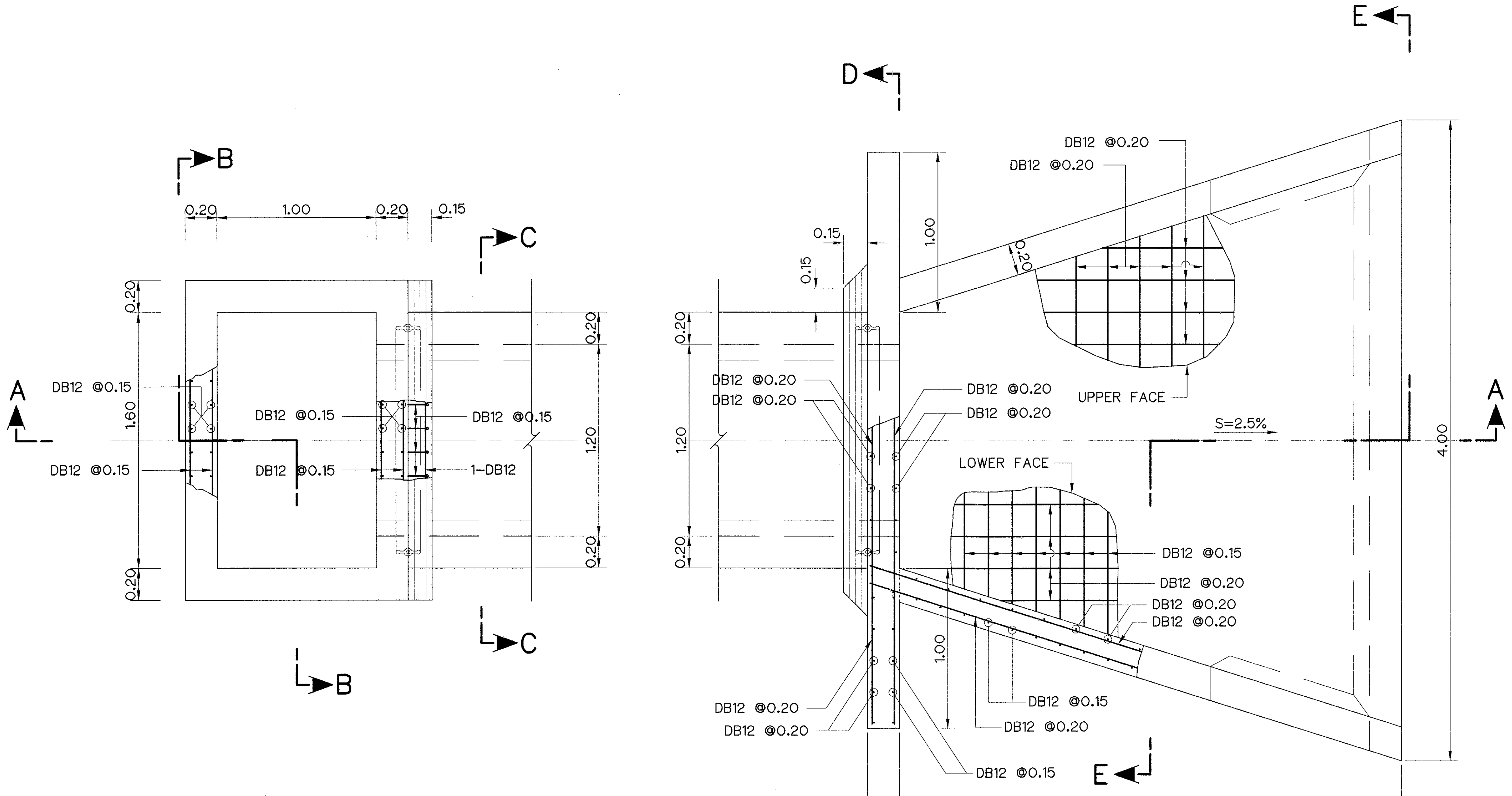
CIVIL WORKS AND TRANSMISSION LINE
HEADRACE
DRAIN CULVERT STA. 1+508.437 , PLAN AND SECTION

P&C MANAGEMENT CO.,LTD.

Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY

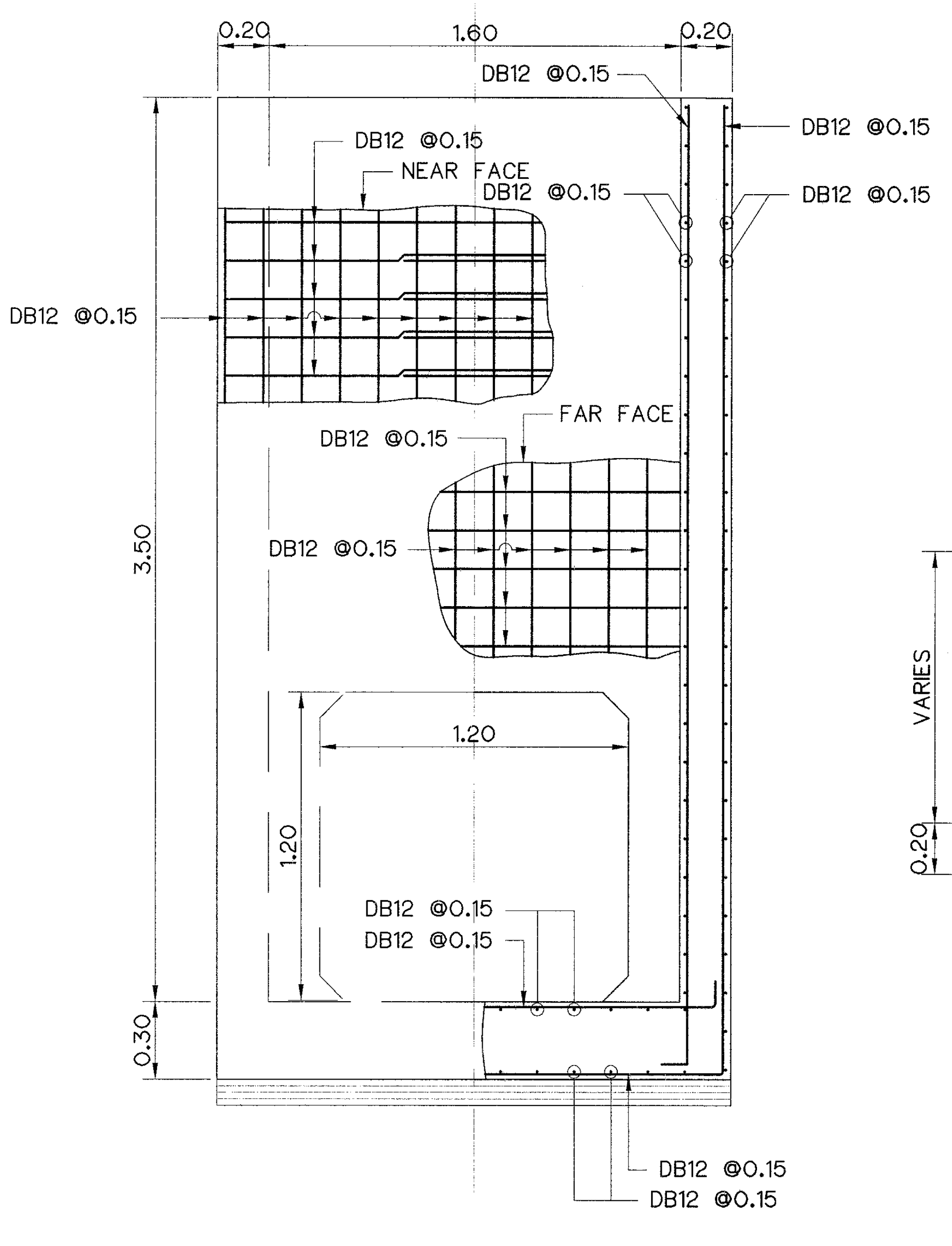
DESIGNED ภย.64624 สย.6226
DRAWN
CHECKED สย.6226
PROJECT MANAGER
DATE 07/03/2559

REVIEWED
SUBMITTED Chait
RECOMMENDED
APPROVED P. Hom
DRAWING NO. MH-HR-20
SHEET NO. 44 OF 130



## PLAN

SCALE 1:25



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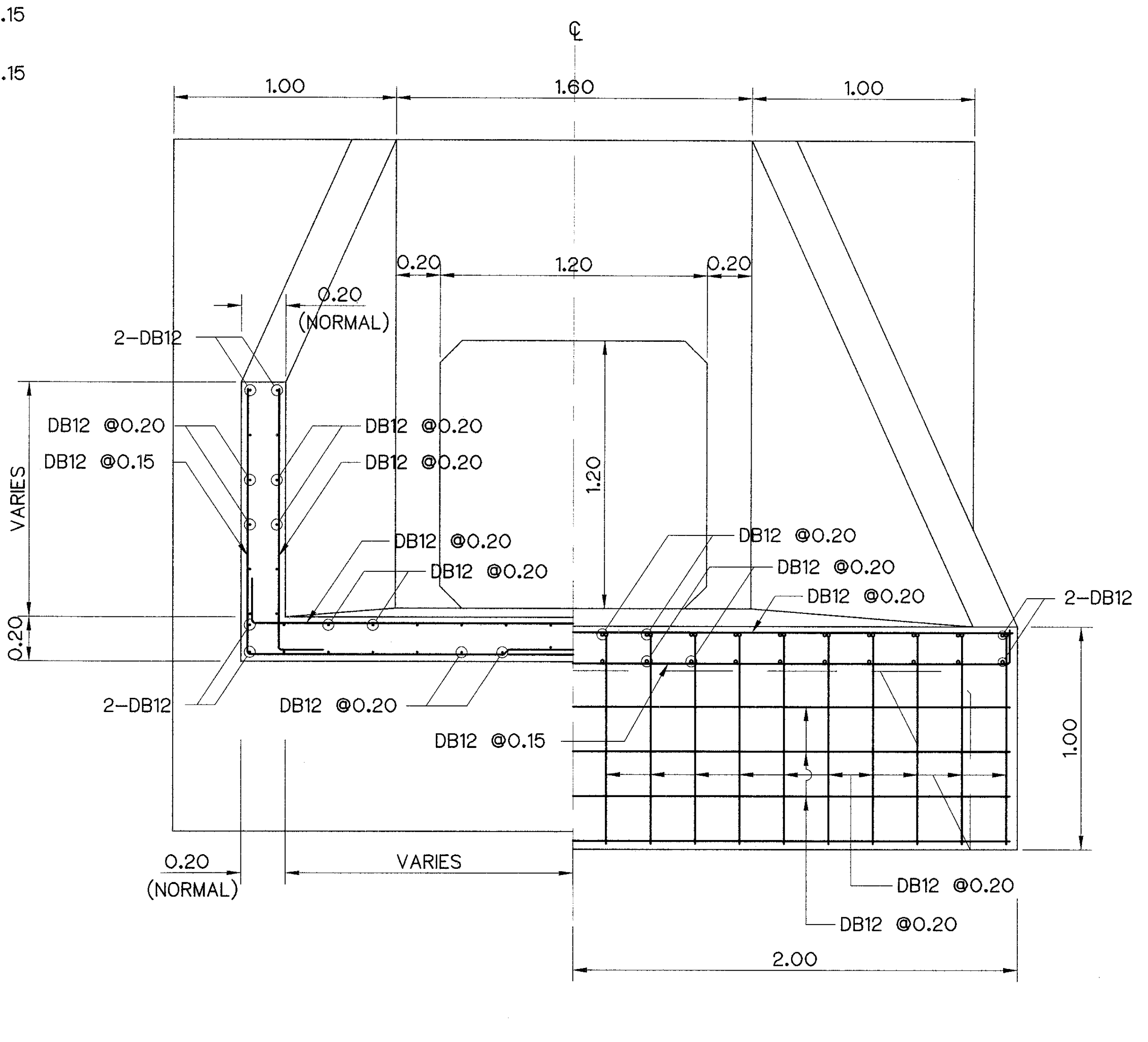
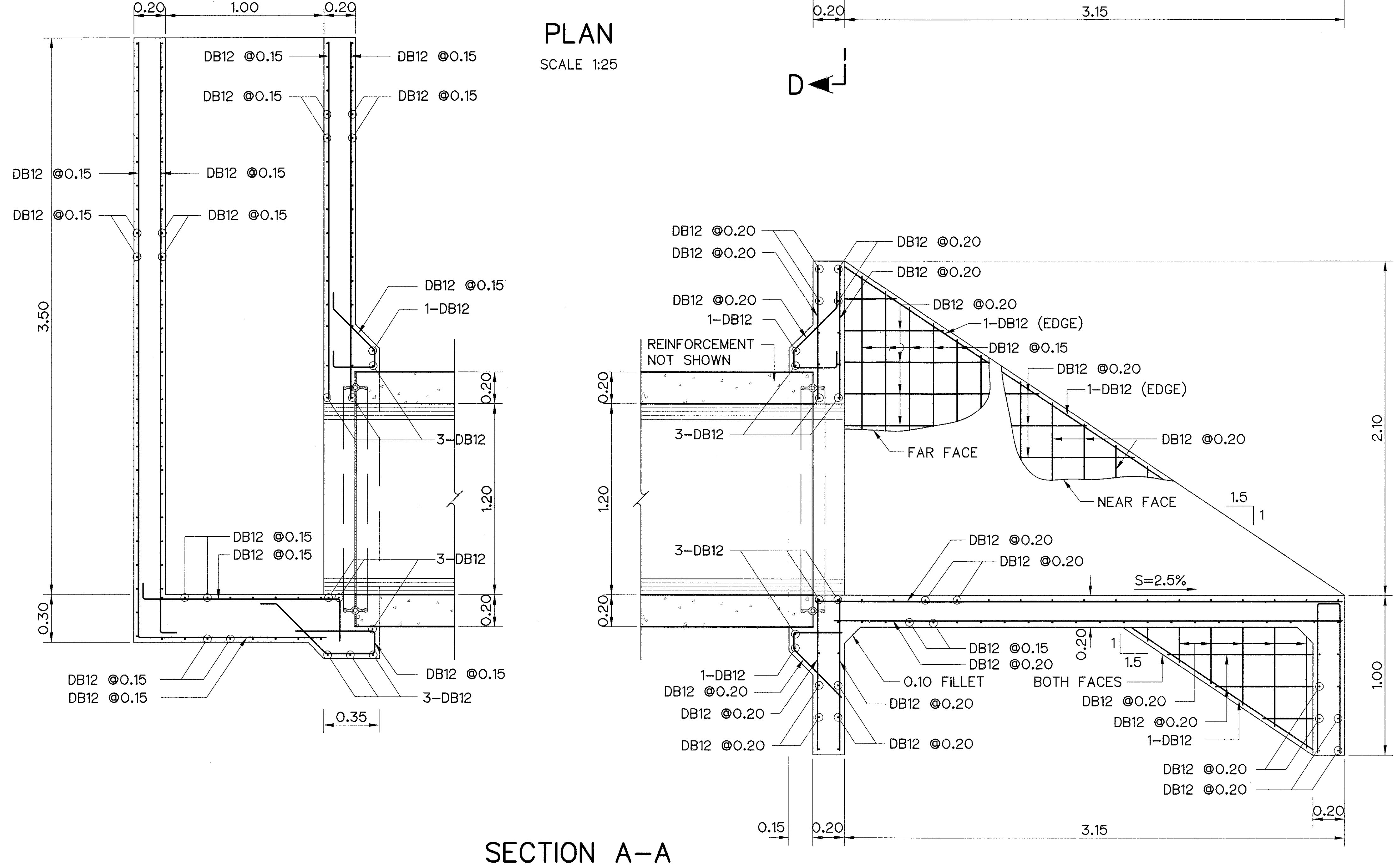
SCALE 1:25



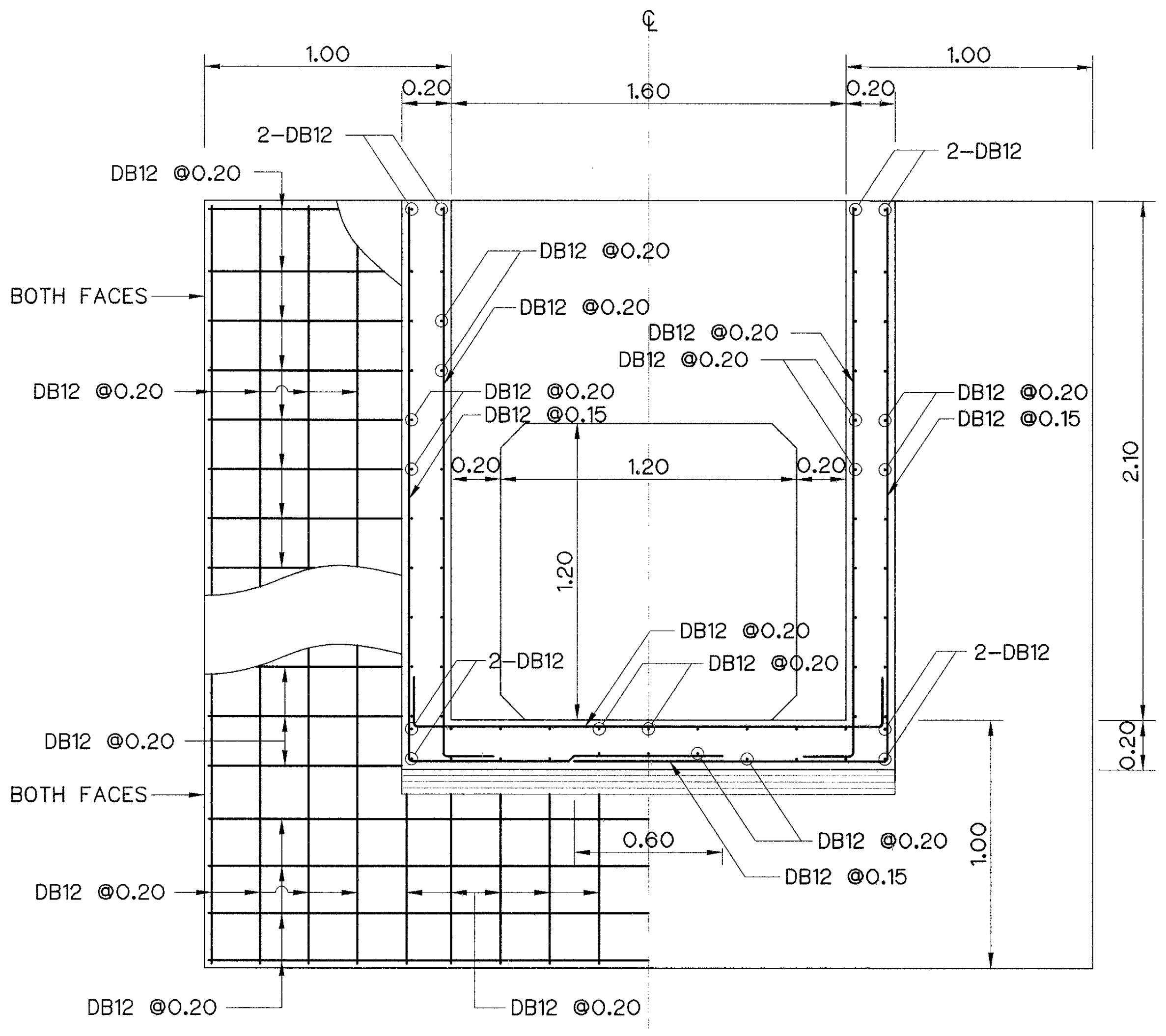
## SECTION E–E

SCALE 1:25



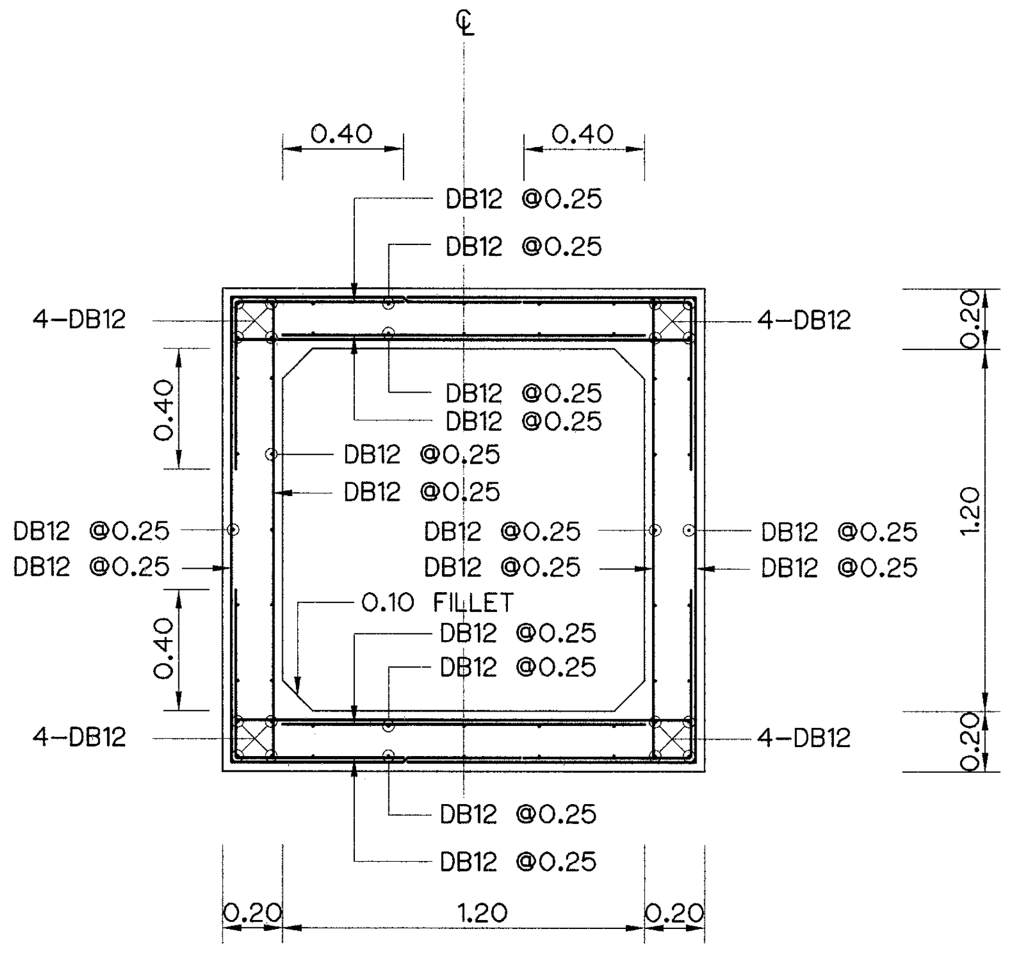
## SECTION A–A

SCALE 1:25



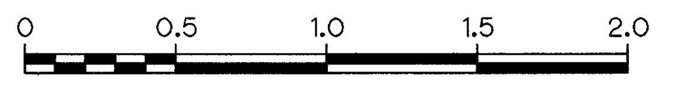
## SECTION D–D

SCALE 1:25

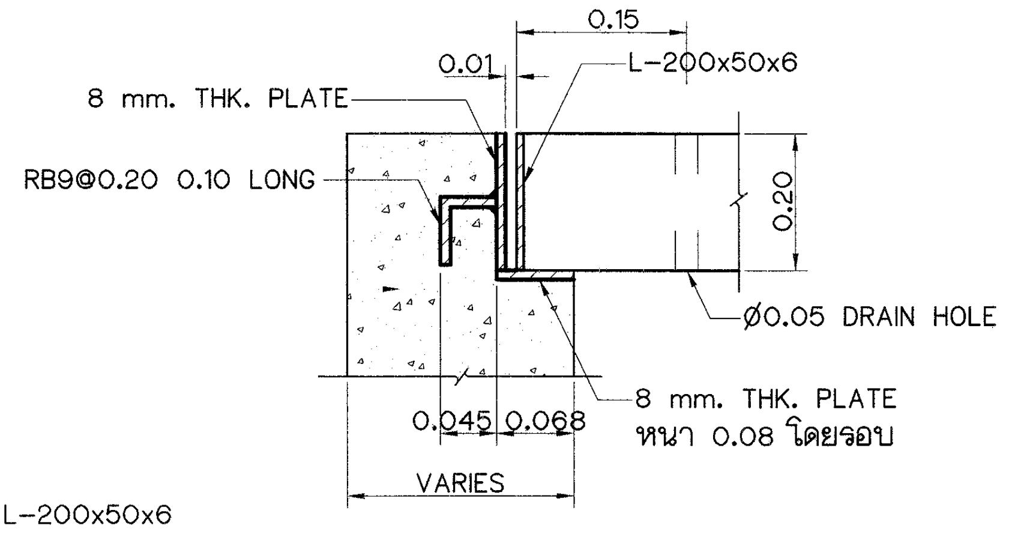


## SECTION C–C

SCALE 1:25



SCALE 1:25 METERS



## DETAIL "2"

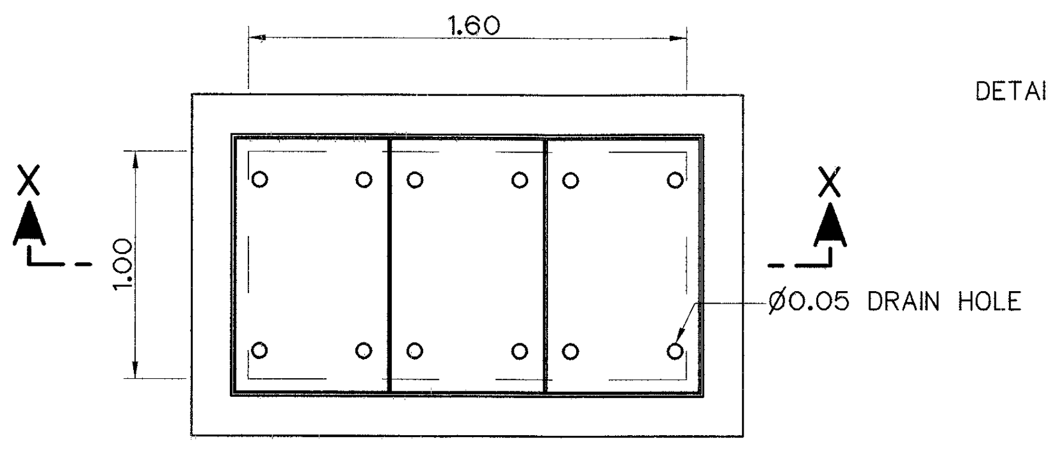
NOT TO SCALE

## NOTES :

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS, UNLESS OTHERWISE SHOWN.
2. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH-GN-03
3. CONCRETE DESIGN BASED ON THE COMPRESSIVE STRENGTH OF 210 KSC, STANDARD CYLINDER Ø0.15x0.30 m. TEST AT AGE 28 DAYS. UNLESS OTHERWISE INDICATED IN SPECIFIC DRAWINGS.
4. ULTIMATE TENSILE STRESSES OF REINFORCING STEEL, CONFORM TO THE REQUIREMENT OF THAI INDUSTRIAL STANDARD DESIGNATION SR24 FOR STRUCTURAL GRADE PLAIN ROUND BAR AND SD30 FOR INTERMEDIATE GRADE DEFORMED BAR.

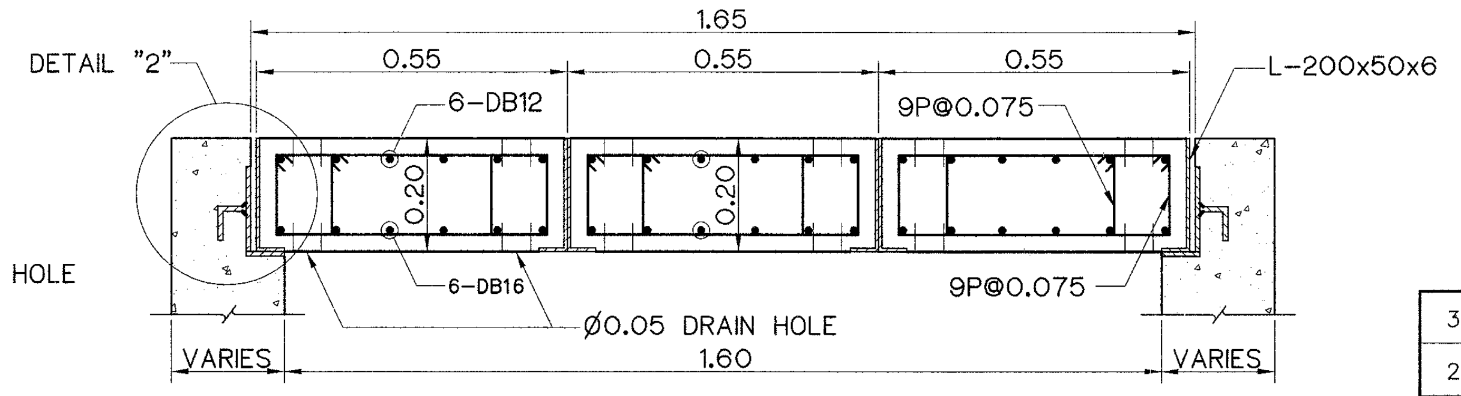
## REFERENCE DRAWINGS :

1. DRAIN CULVERT STA. 1+508.437, PLAN AND SECTION MH-HR-20



## CONCRETE COVER

NOT TO SCALE



## SECTION X–X

NOT TO SCALE

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CIVIL WORKS AND TRANSMISSION LINE
HEADRACE
DRAIN CULVERT STA. 1+508.437 REINFORCEMENT DETAILS

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
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| 3 | | | | |
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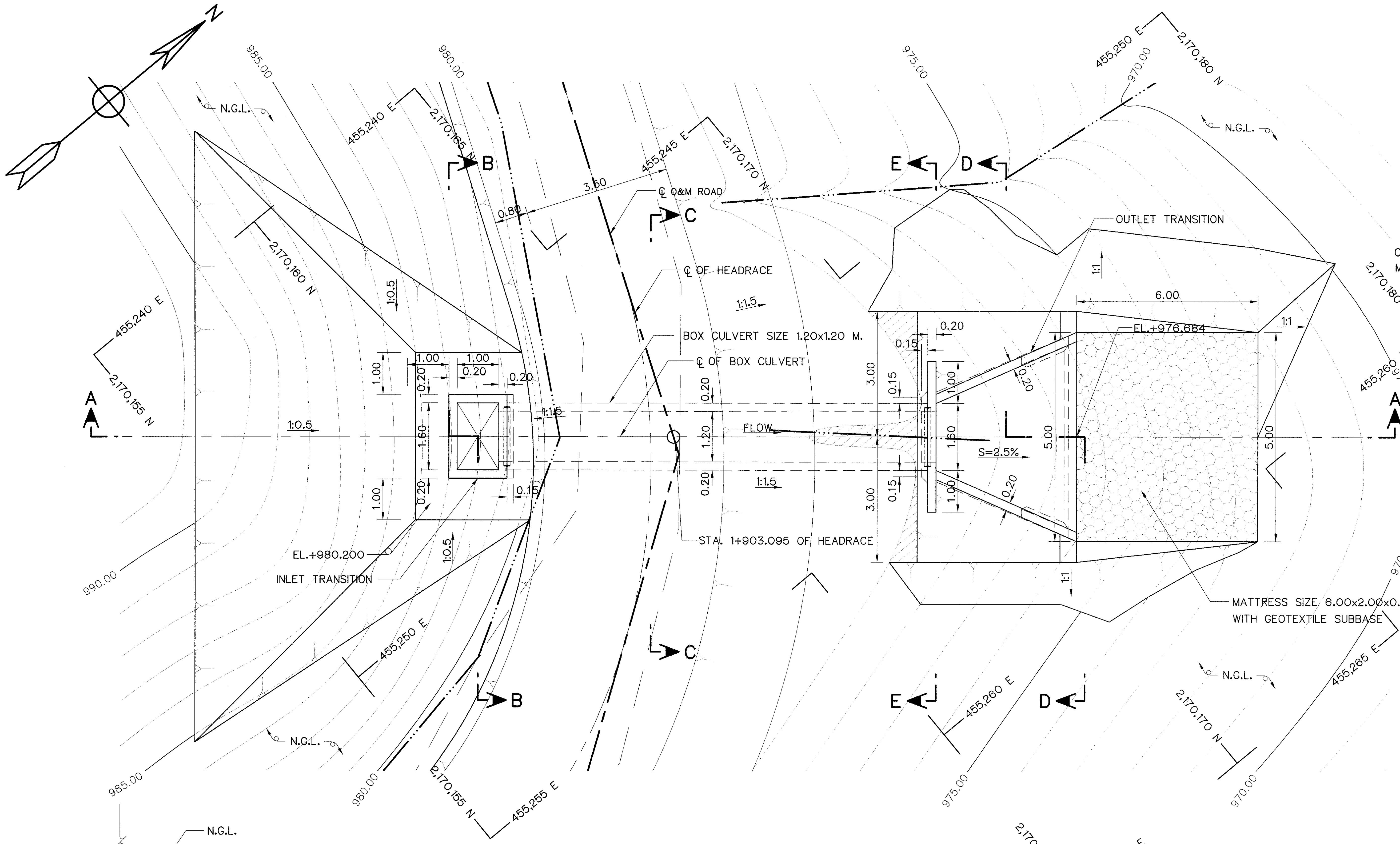
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

DESIGNED ภย.64624 สย.6226
DRAWN
CHECKED สย.6226
08|03|2559
PROJECT MANAGER DATE

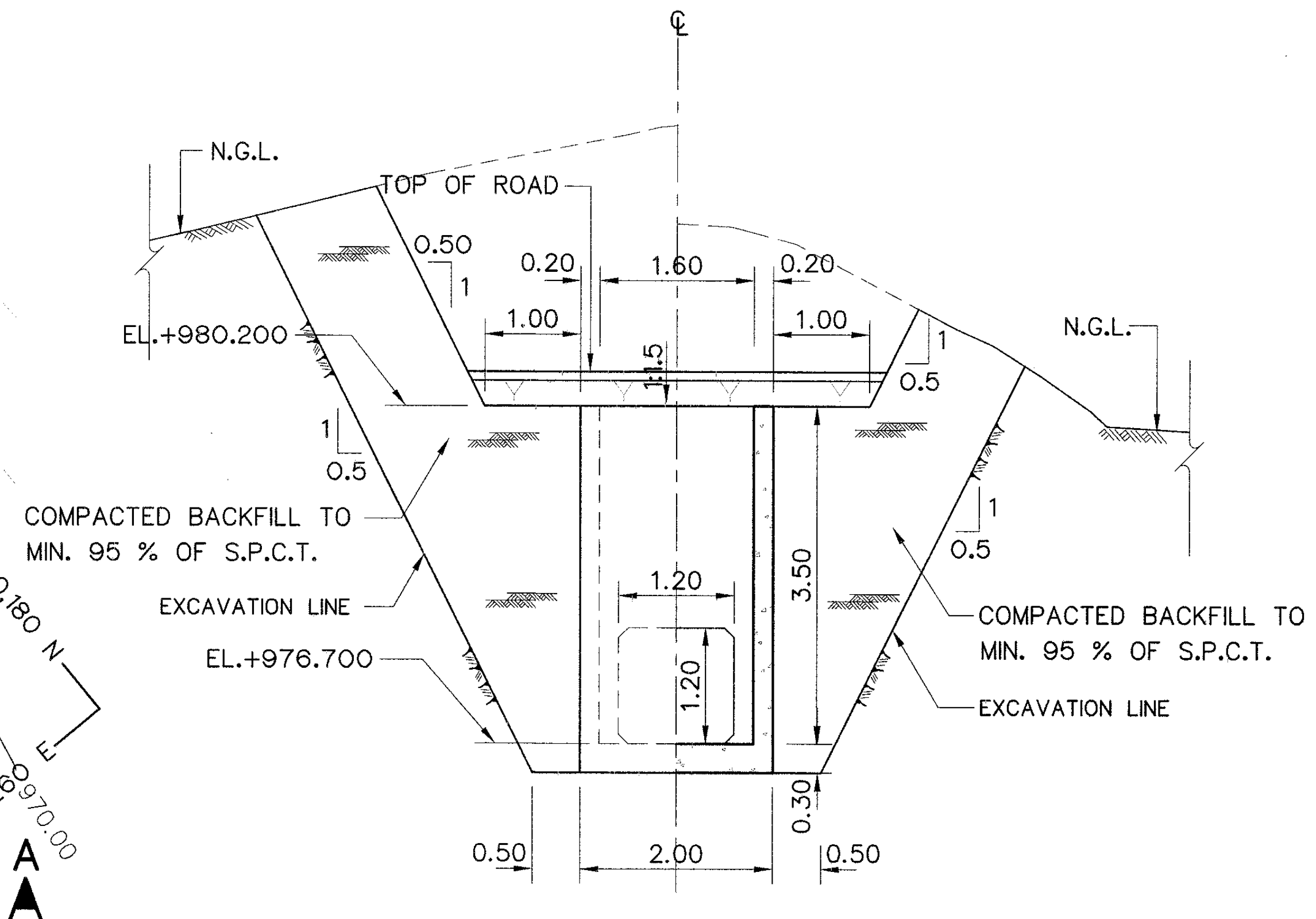
REVIEWED
SUBMITTED Chait
RECOMMENDED
APPROVED P. Hansell

DRAWING NO. MH-HR-21
SHEET NO. 45 OF 130



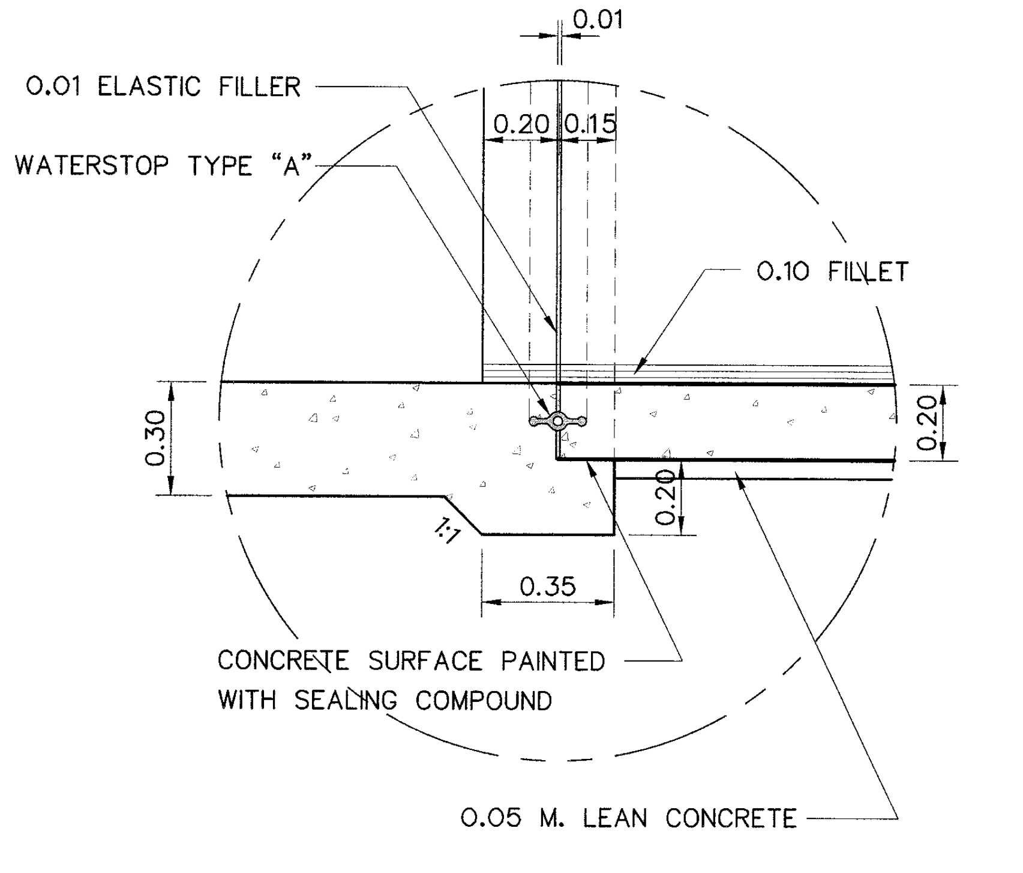
## PLAN

SCALE 1:75



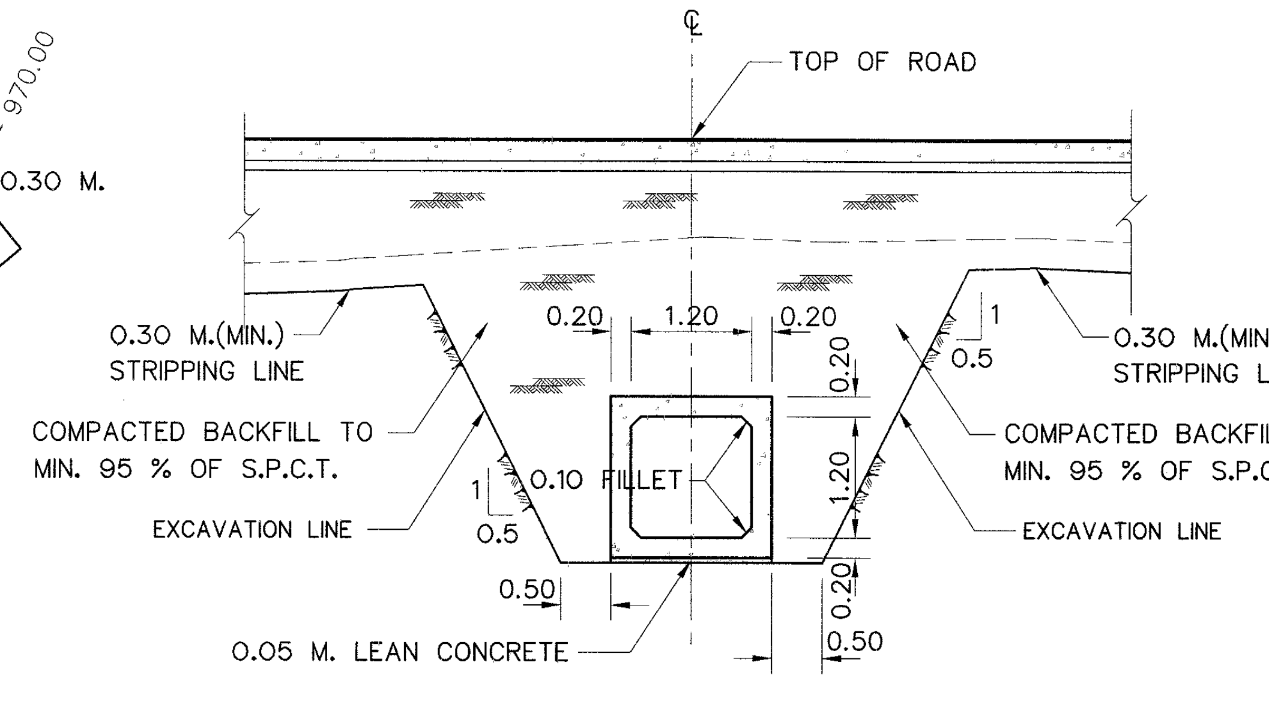
## SECTION B–B

SCALE 1:75



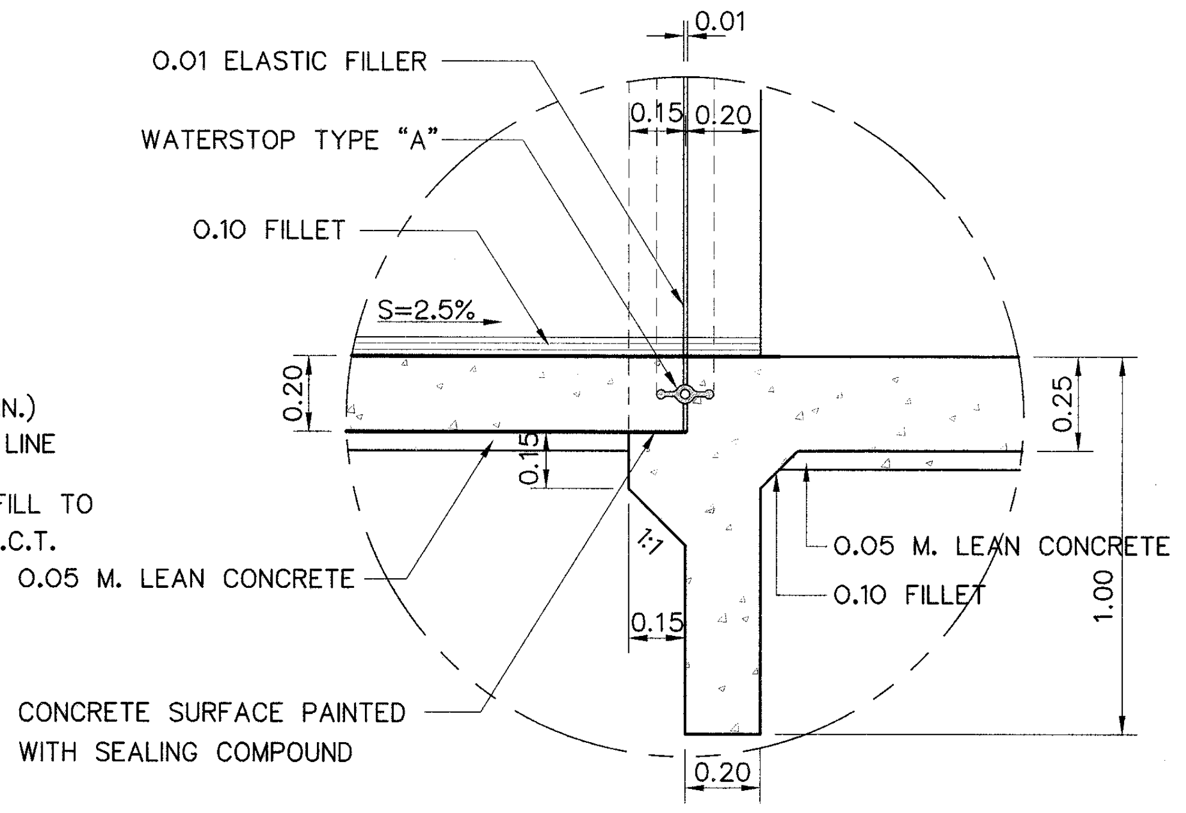
## DETAIL "1"

SCALE 1:20



## SECTION C–C

SCALE 1:75



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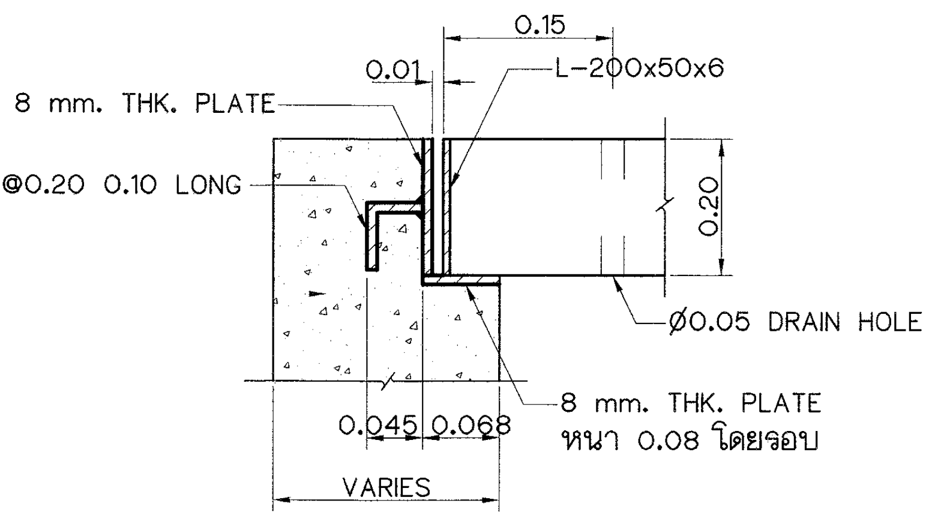

## DETAIL "2"

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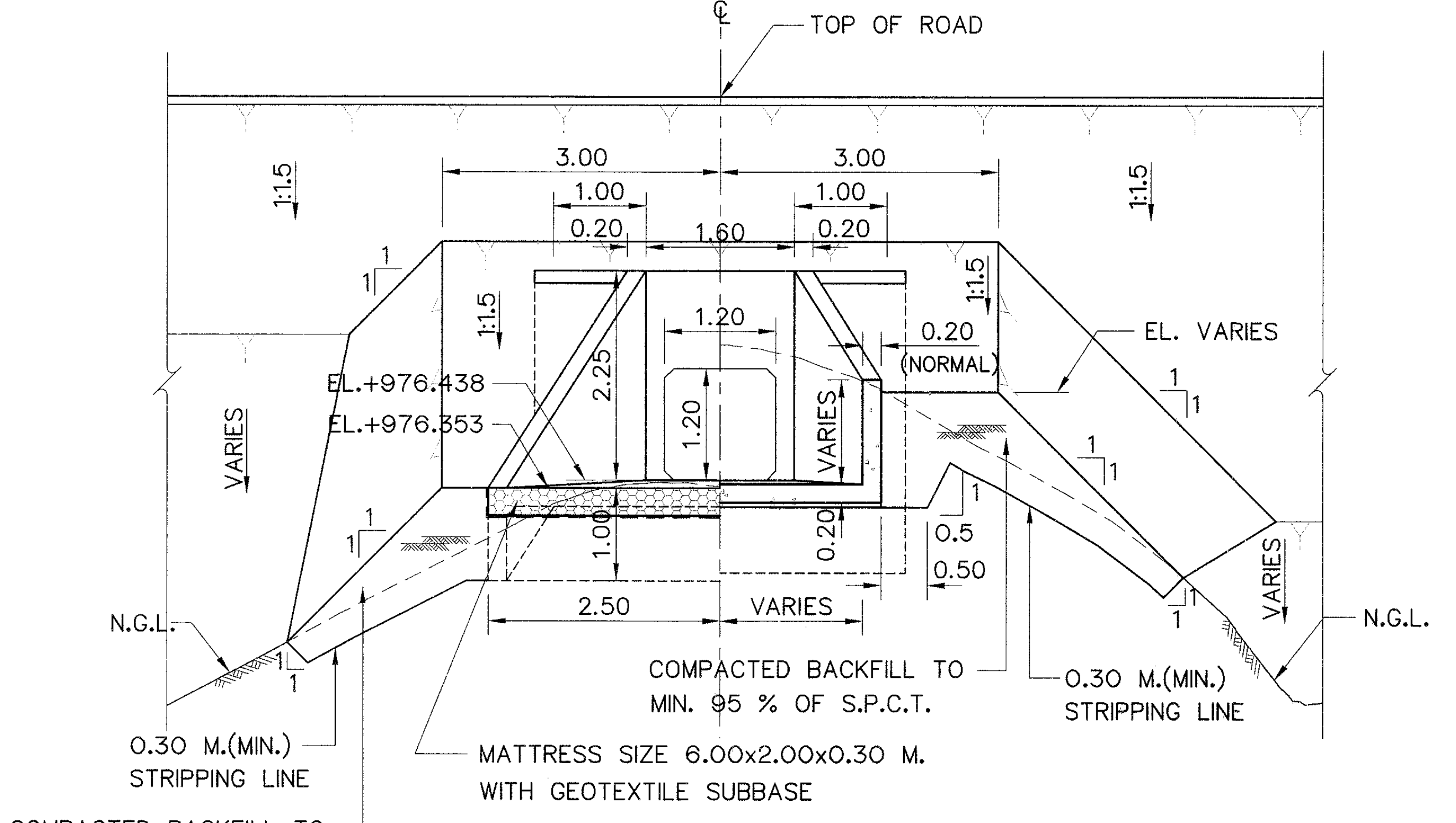
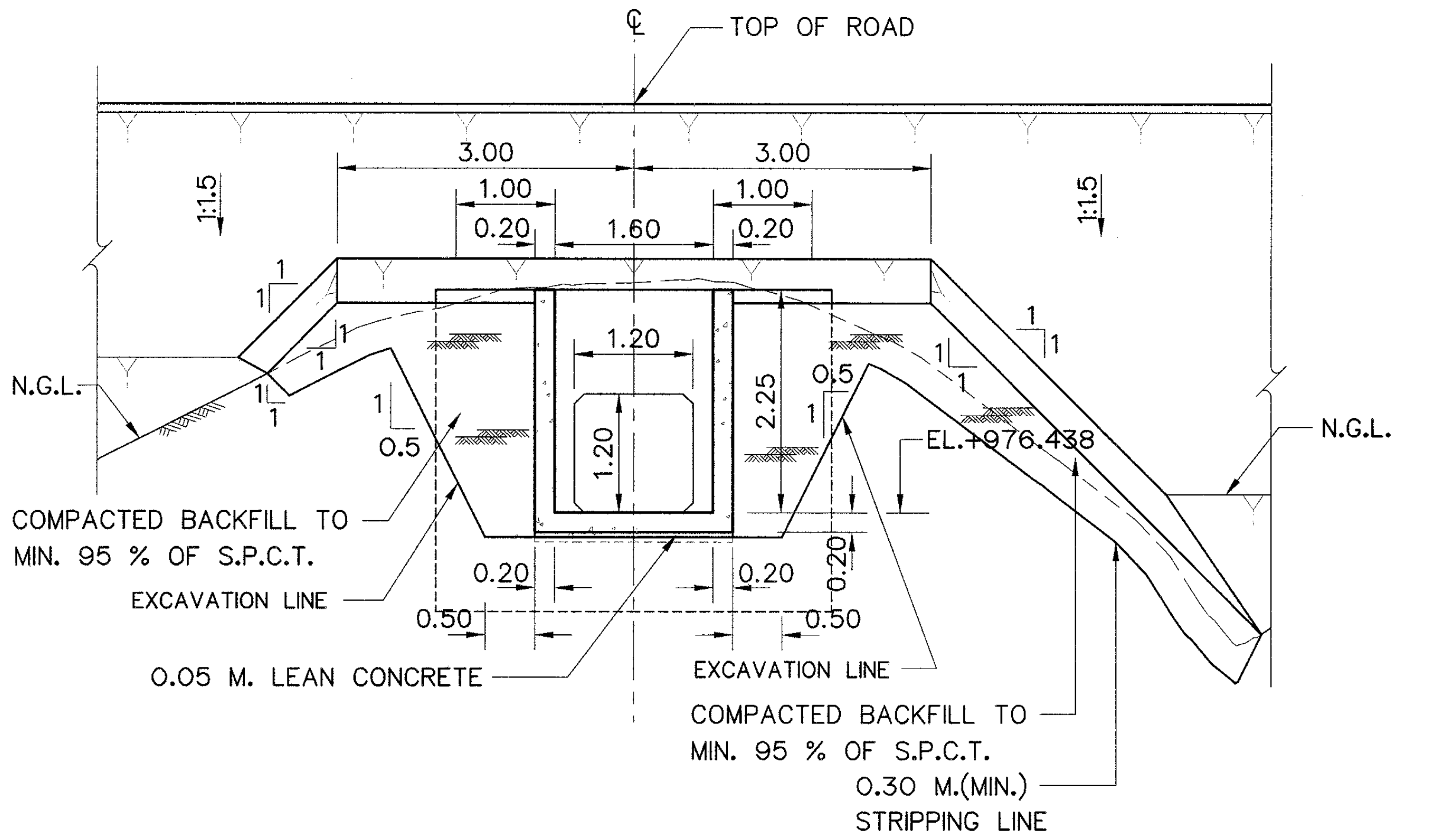


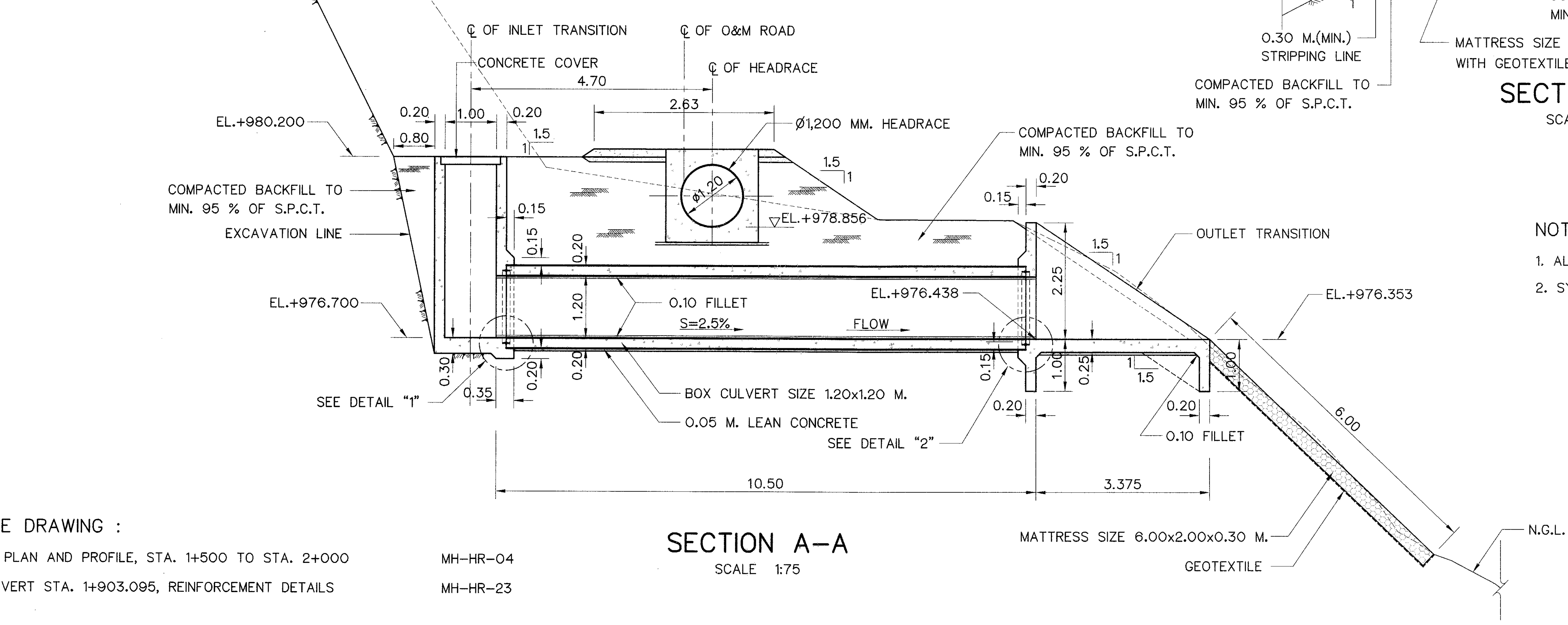
## SECTION D–D

SCALE 1:75



## SECTION E–E

SCALE 1:75



## SECTION A–A

SCALE 1:75

NOTES :

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS UNLESS OTHERWISE SHOWN.
2. SYMBOL, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH-GN-03

0 0.5 1.0 1.5
SCALE 1:20 METERS

0 0.5 1 2 3 4 5 6
SCALE 1:75 METERS

REFERENCE DRAWING :

| | |
|---|---|
| 1. HEADRACE PLAN AND PROFILE, STA. 1+500 TO STA. 2+000 | MH-HR-04 |
| 2. DRAIN CULVERT STA. 1+903.095, REINFORCEMENT DETAILS | MH-HR-23 |

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KINGDOM OF THAILAND
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MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
HEADRACE
DRAIN CULVERT STA. 1+903.095 , PLAN AND SECTION

P&C MANAGEMENT CO.,LTD.

Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY

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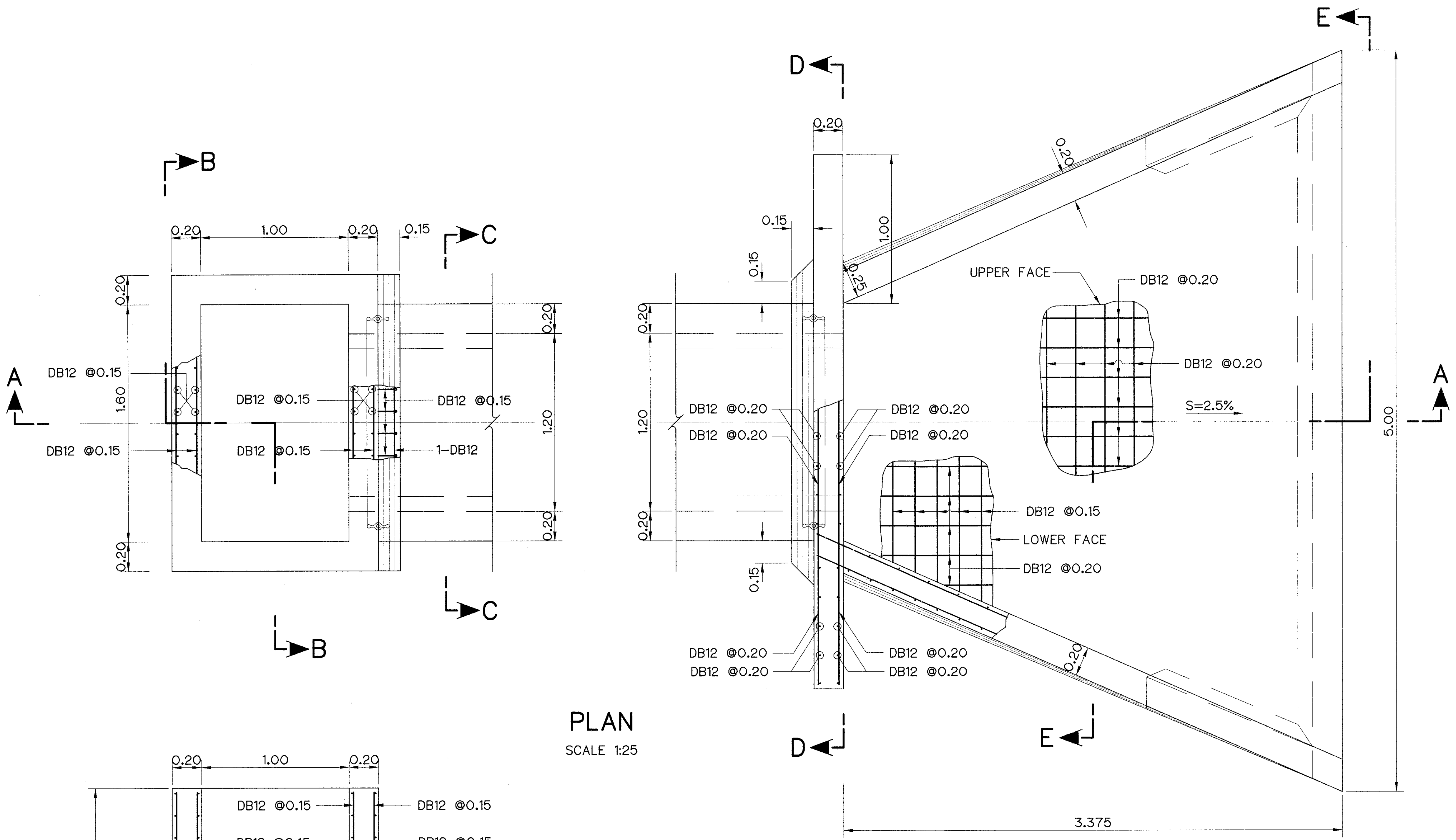
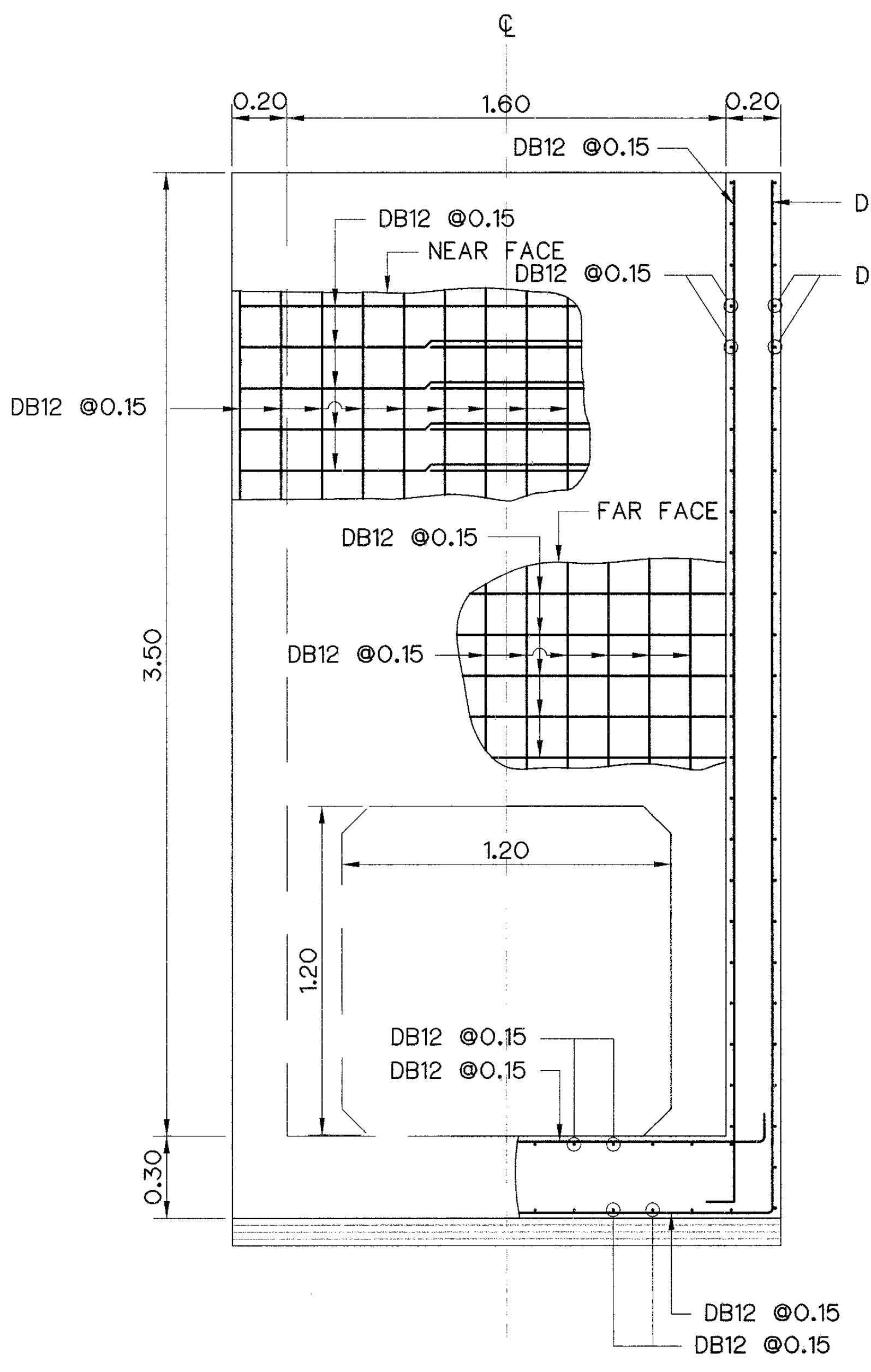
| DESIGNED ภย.64624 สย.6226 | REVIEWED |
| DRAWN | SUBMITTED Chan |
| CHECKED สย.6226 | RECOMMENDED |
| 08/03/2559 | APPROVED P. |
| PROJECT MANAGER DATE | DRAWING NO. MH-HR-22 |
| | SHEET NO. 46 OF 130 |



## PLAN
SCALE 1:25



## SECTION B-B
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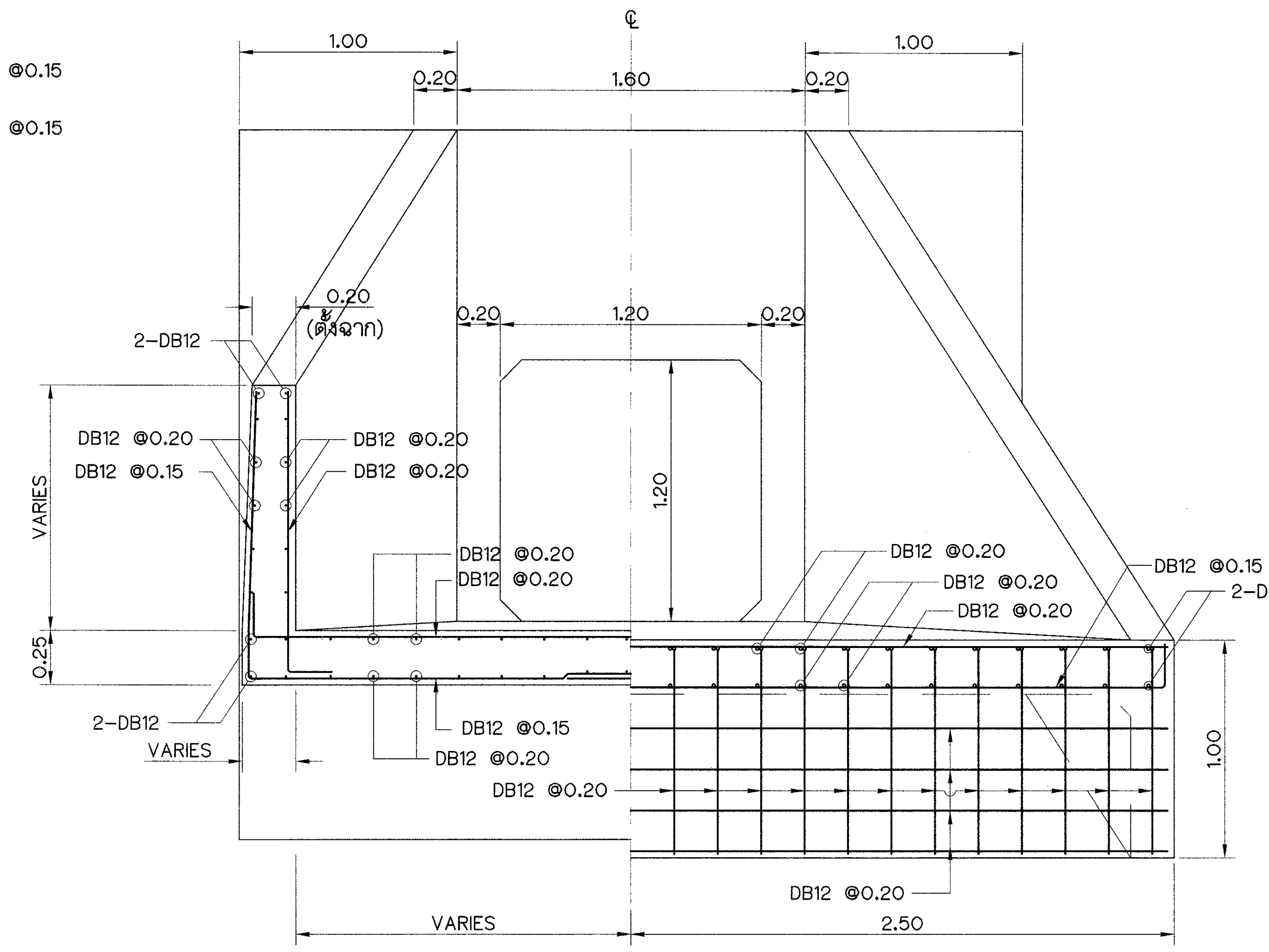
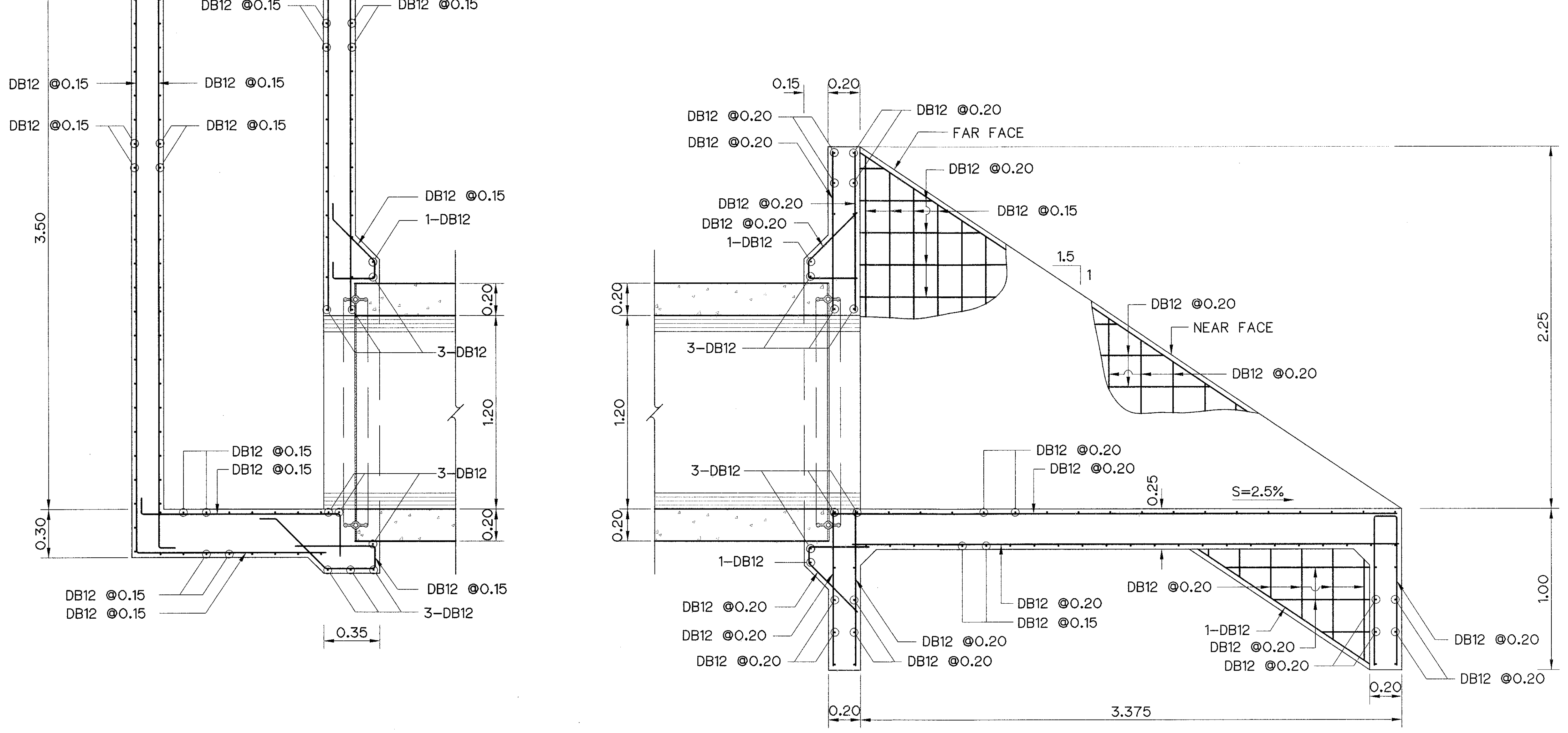
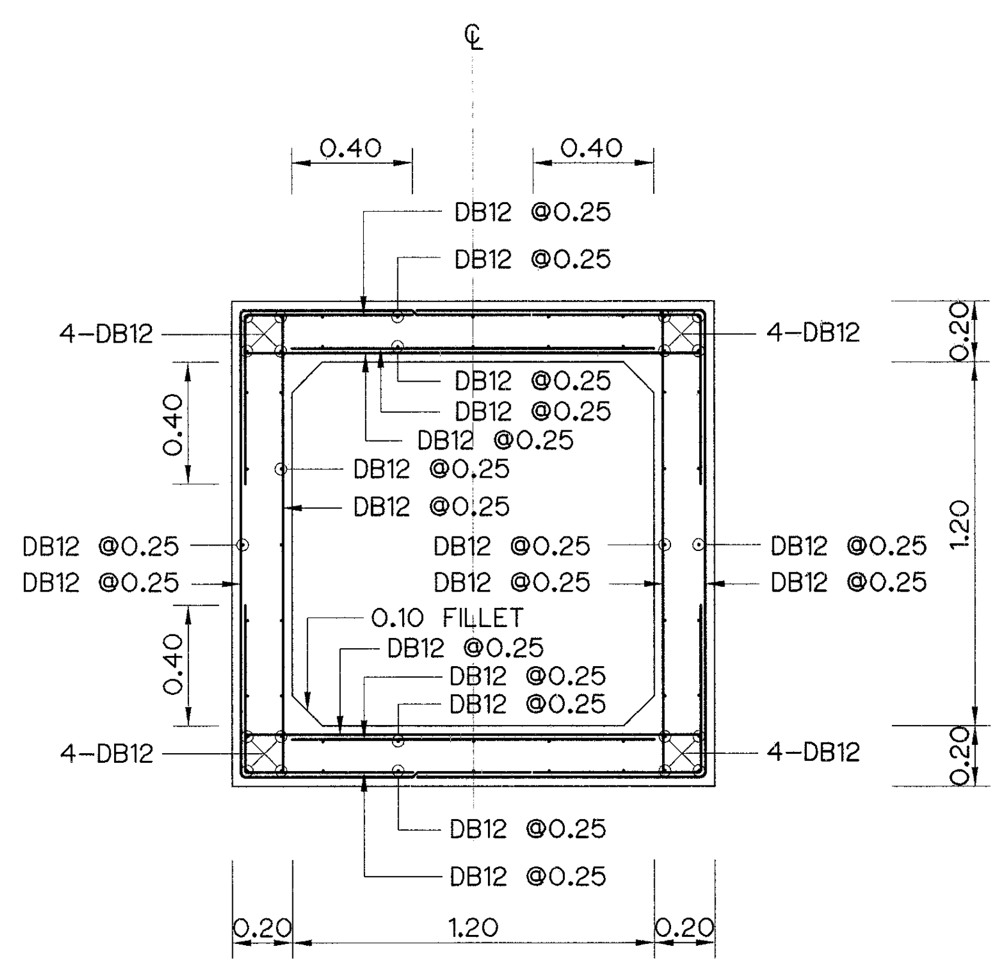


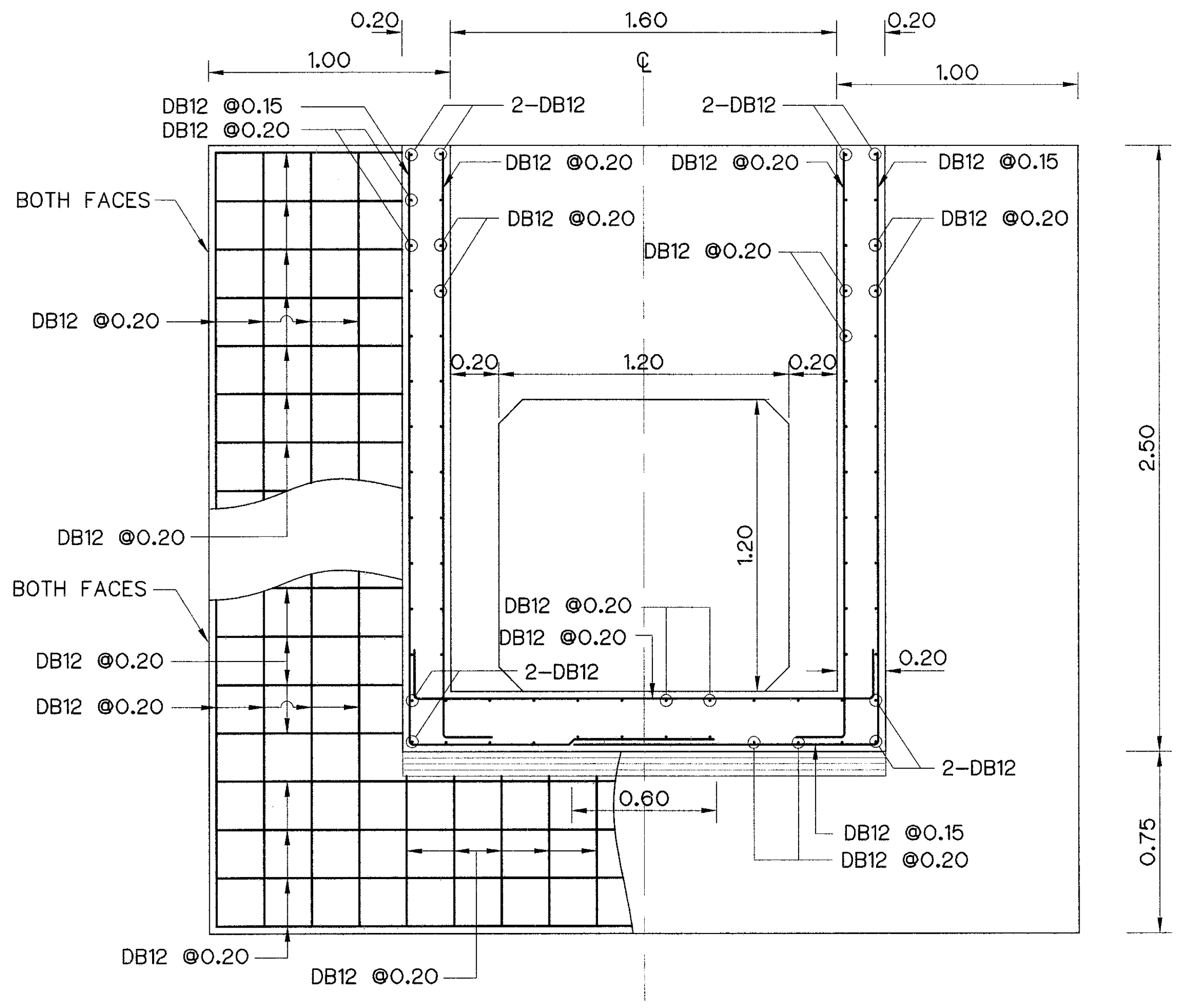
## SECTION E-E
SCALE 1:25



## SECTION A-A
SCALE 1:25



## SECTION C-C
SCALE 1:25



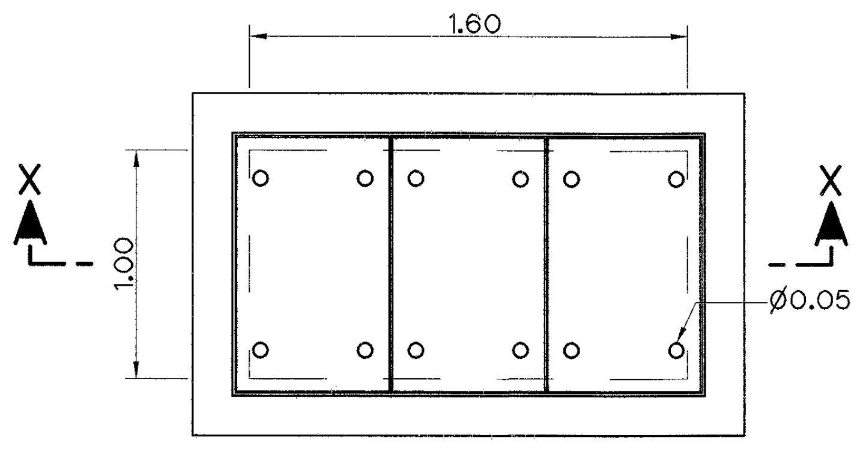
## SECTION D-D
SCALE 1:25

**NOTES :**

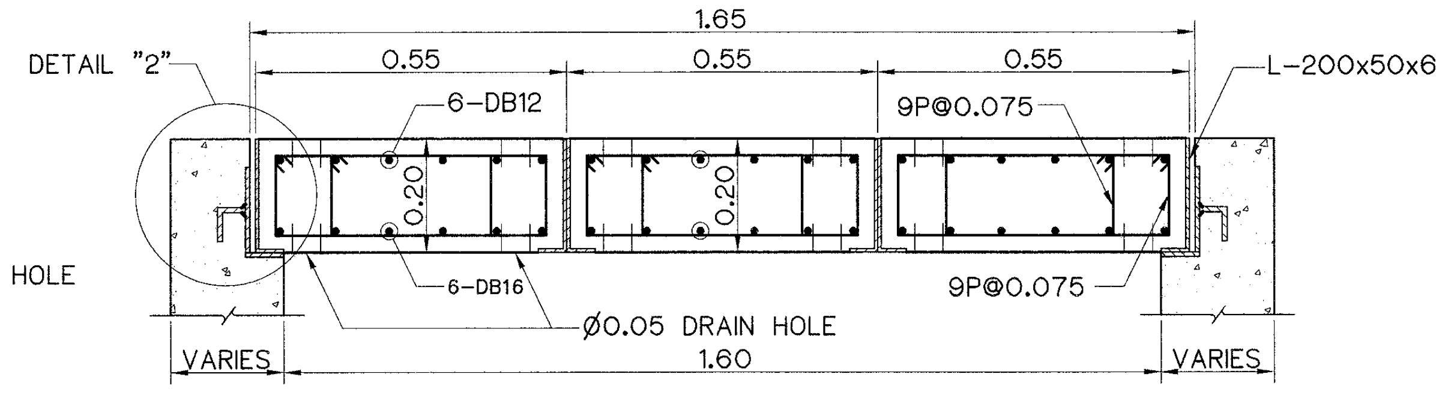
1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS, UNLESS OTHERWISE SHOWN.
2. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH-GN-03
3. CONCRETE DESIGN BASED ON THE COMPRESSIVE STRENGTH OF 210 KSC, STANDARD CYLINDER Ø0.15x0.30 m. TEST AT AGE 28 DAYS. UNLESS OTHERWISE INDICATED IN SPECIFIC DRAWINGS.
4. ULTIMATE TENSILE STRESSES OF REINFORCING STEEL, CONFORM TO THE REQUIREMENT OF THAI INDUSTRIAL STANDARD DESIGNATION SR24 FOR STRUCTURAL GRADE PLAIN ROUND BAR AND SD30 FOR INTERMEDIATE GRADE DEFORMED BAR.

**REFERENCE DRAWINGS :**

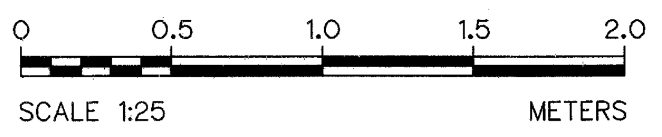
1. DRAIN CULVERT STA. 1+903.095, PLAN AND SECTION MH-HR-22



## CONCRETE COVER
NOT TO SCALE



## SECTION X-X
NOT TO SCALE



| NO. | DATE | REVISIONS | CHECKED | APPROVED |
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CONSULTANTS
DEDE

KINGDOM OF THAILAND
Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
HEADRACE
DRAIN CULVERT STA. 1+903.095 REINFORCEMENT DETAILS

P&C MANAGEMENT CO.,LTD.

Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY

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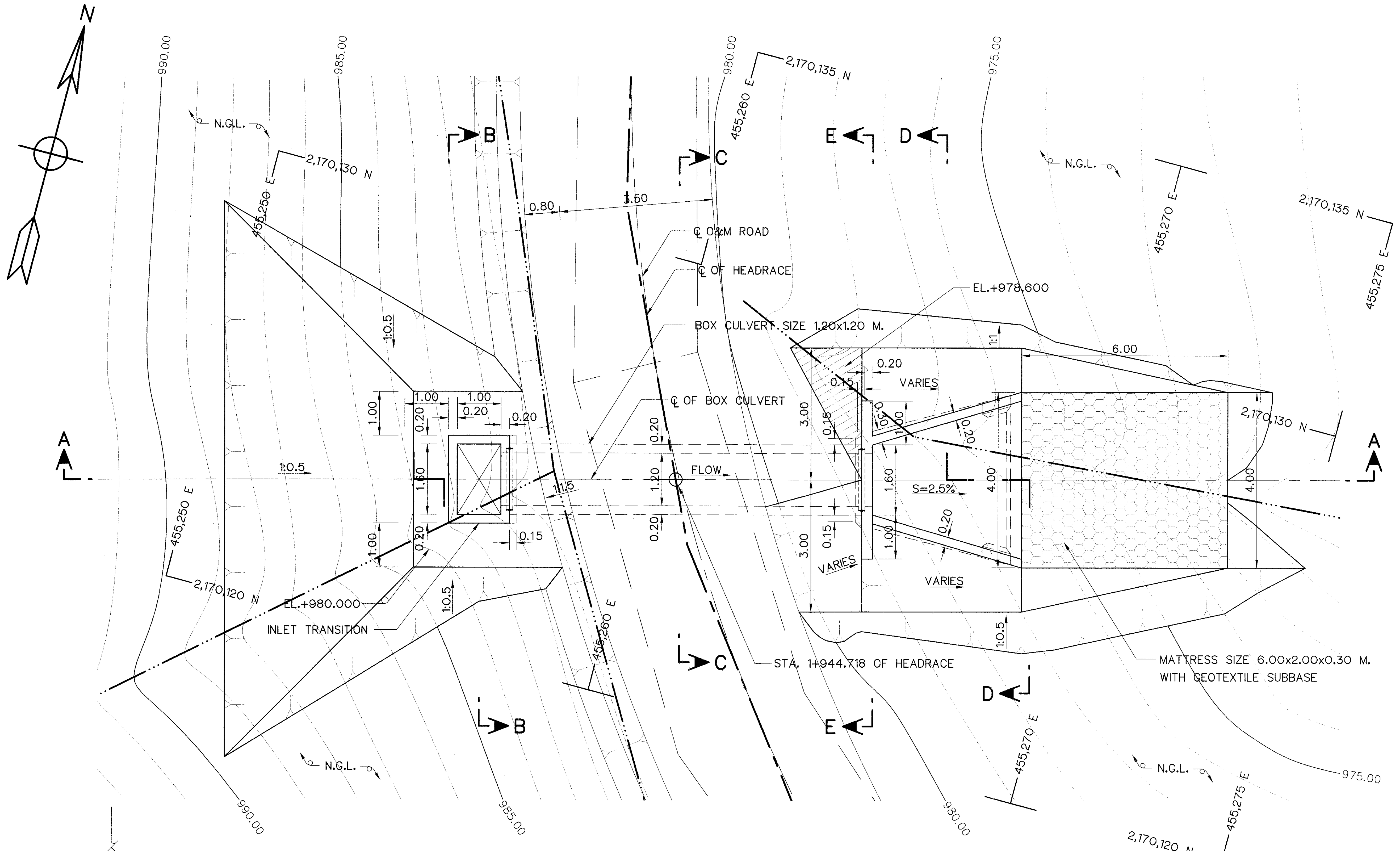
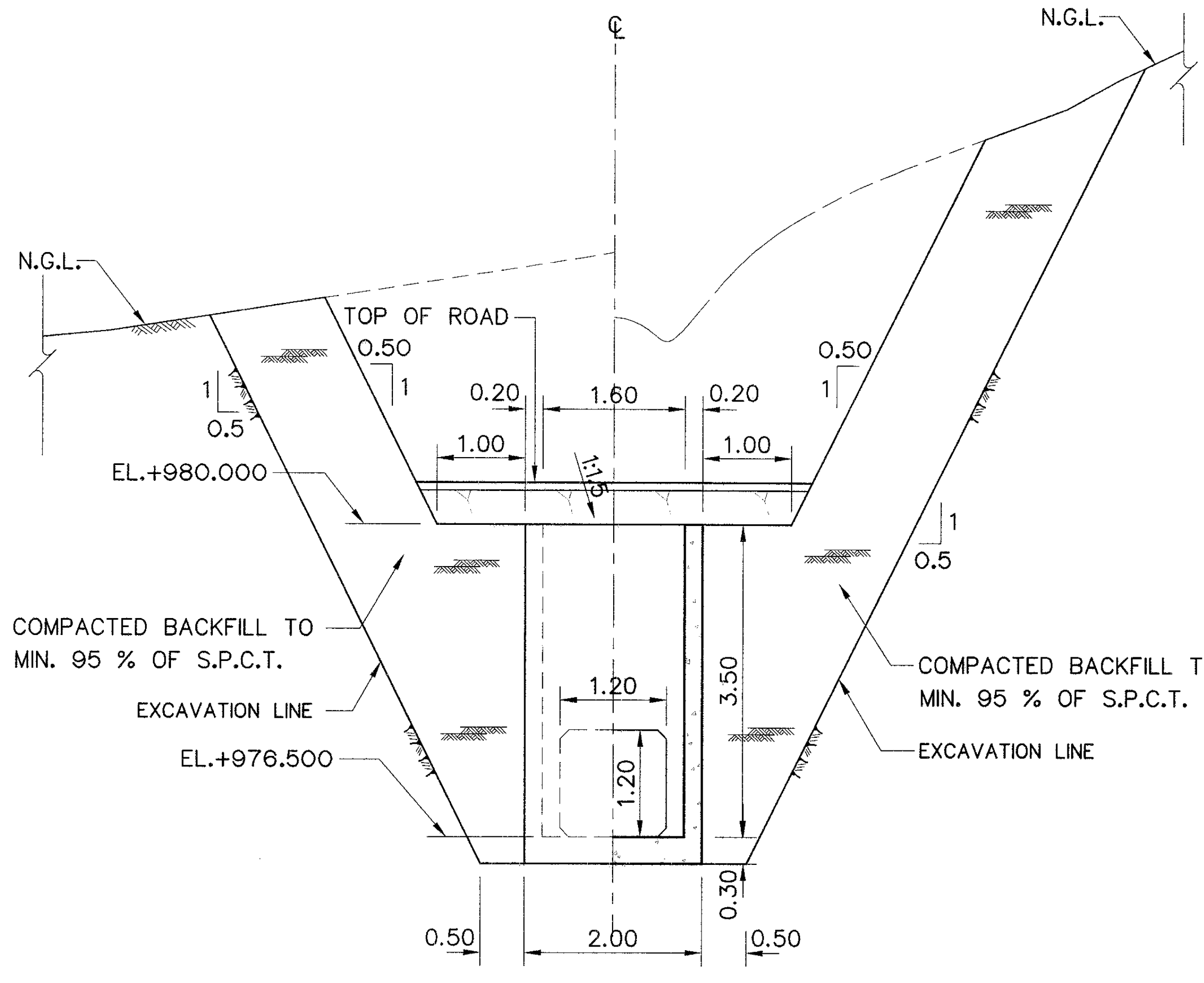
| DESIGNED ภย.64624 สย.6226 | REVIEWED |
| DRAWN | SUBMITTED |
| CHECKED สย.6226 | RECOMMENDED |
| | APPROVED P. Hansell |
| PROJECT MANAGER | DATE 08/03/2559 |

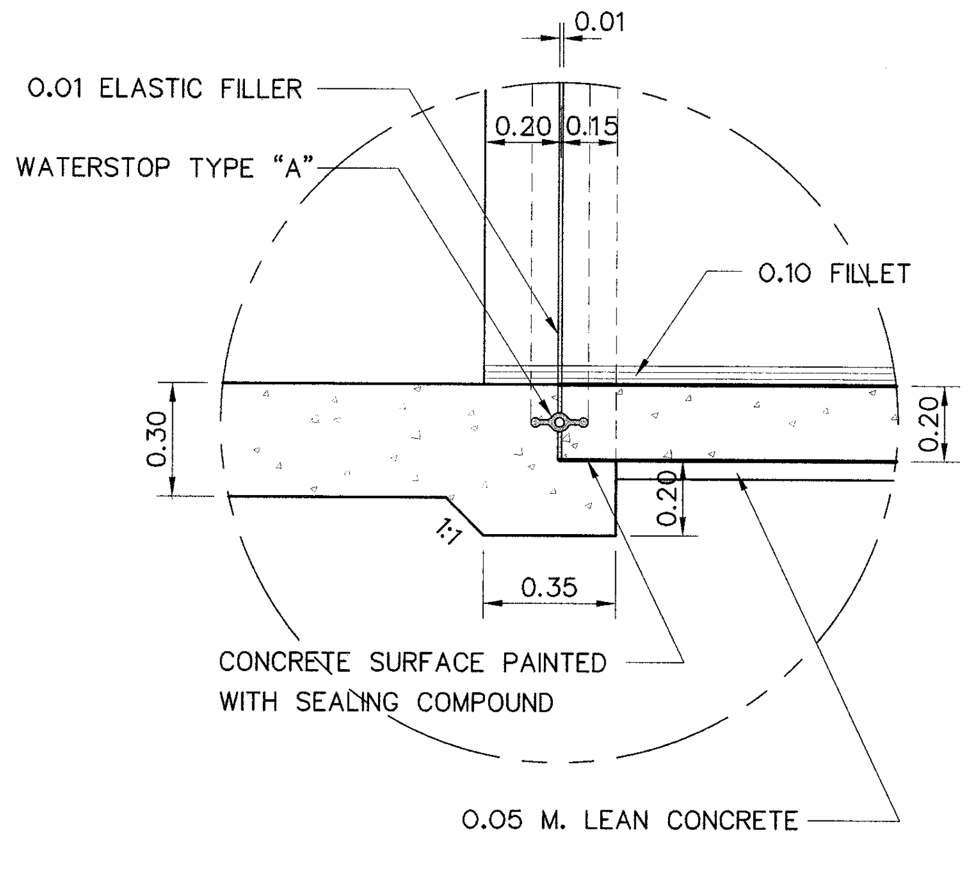
DRAWING NO. MH-HR-23
SHEET NO. 47 OF 130



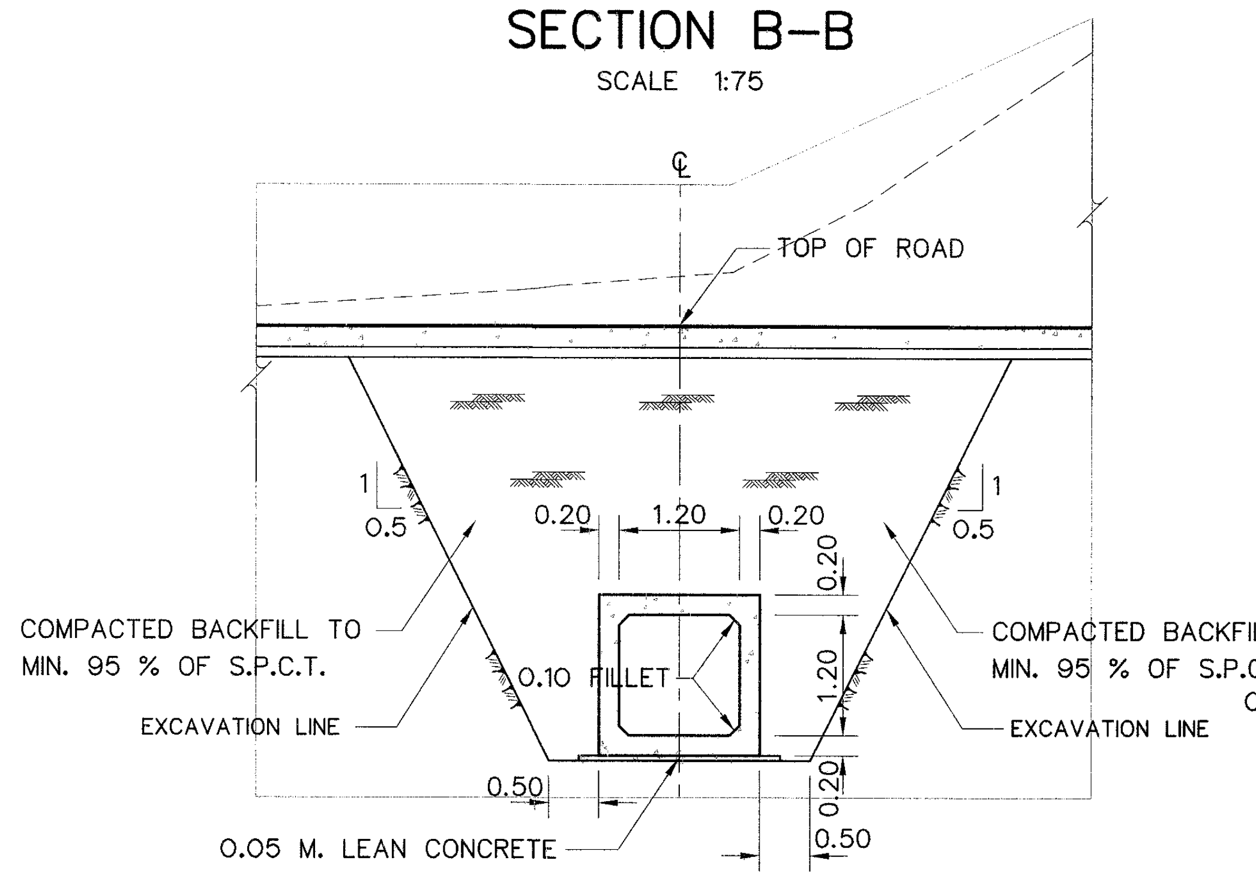
## PLAN
SCALE 1:75



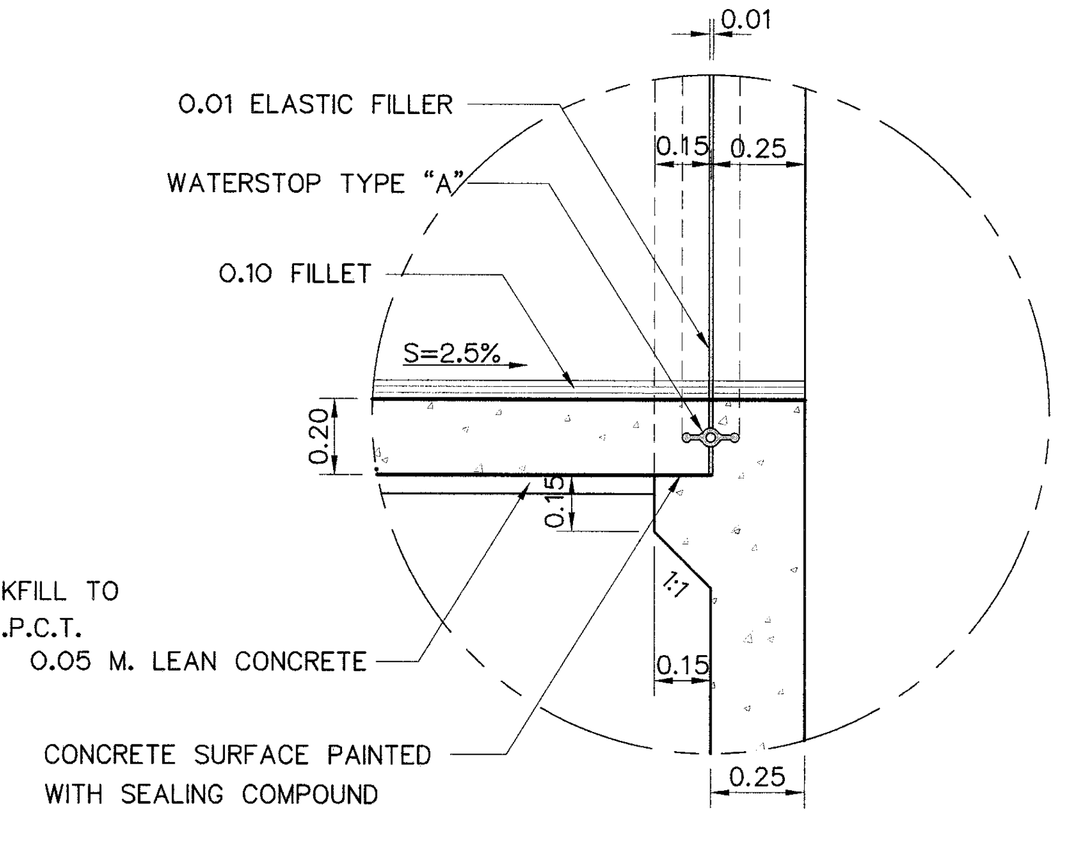
## SECTION B–B
SCALE 1:75



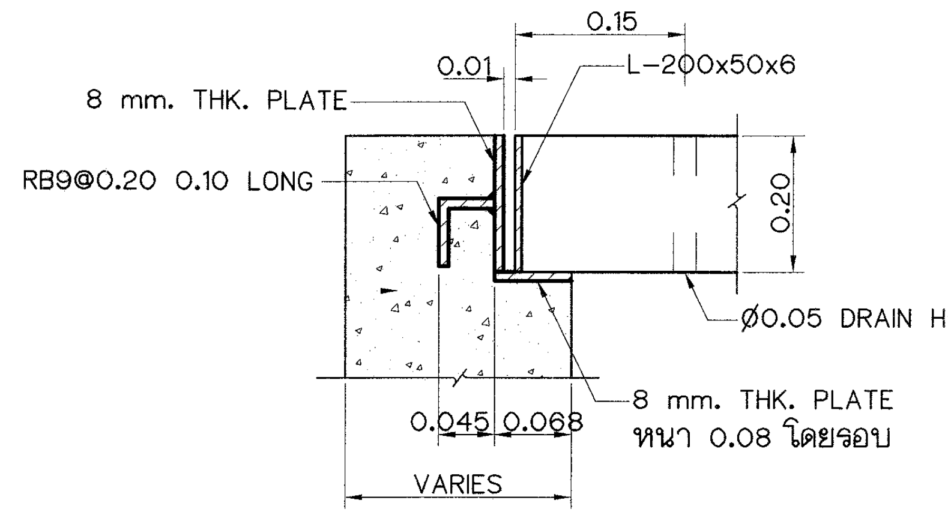
## DETAIL "1"
SCALE 1:20



## SECTION C–C
SCALE 1:75



## DETAIL "2"
SCALE 1:20



## DETAIL "2"
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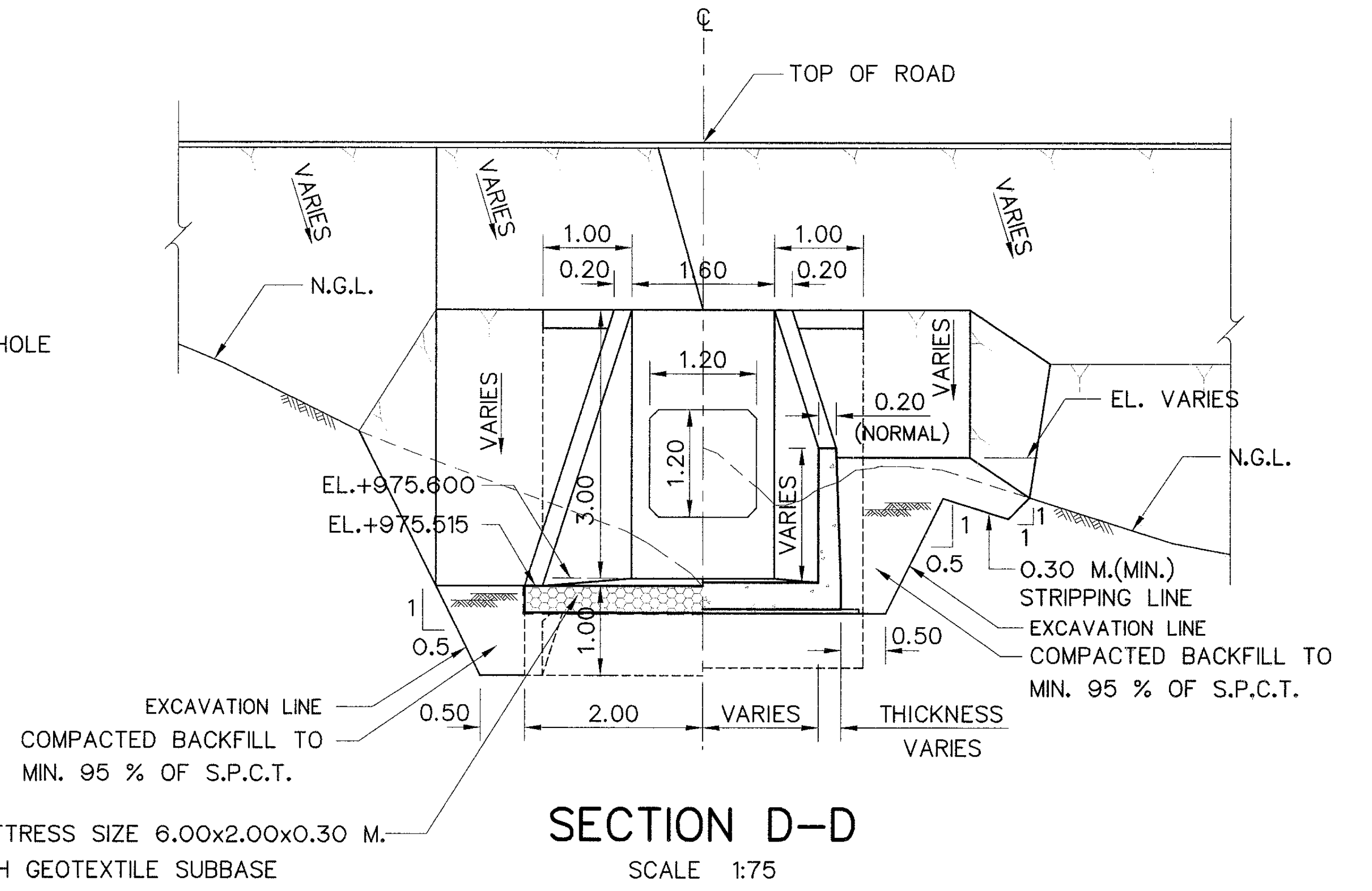
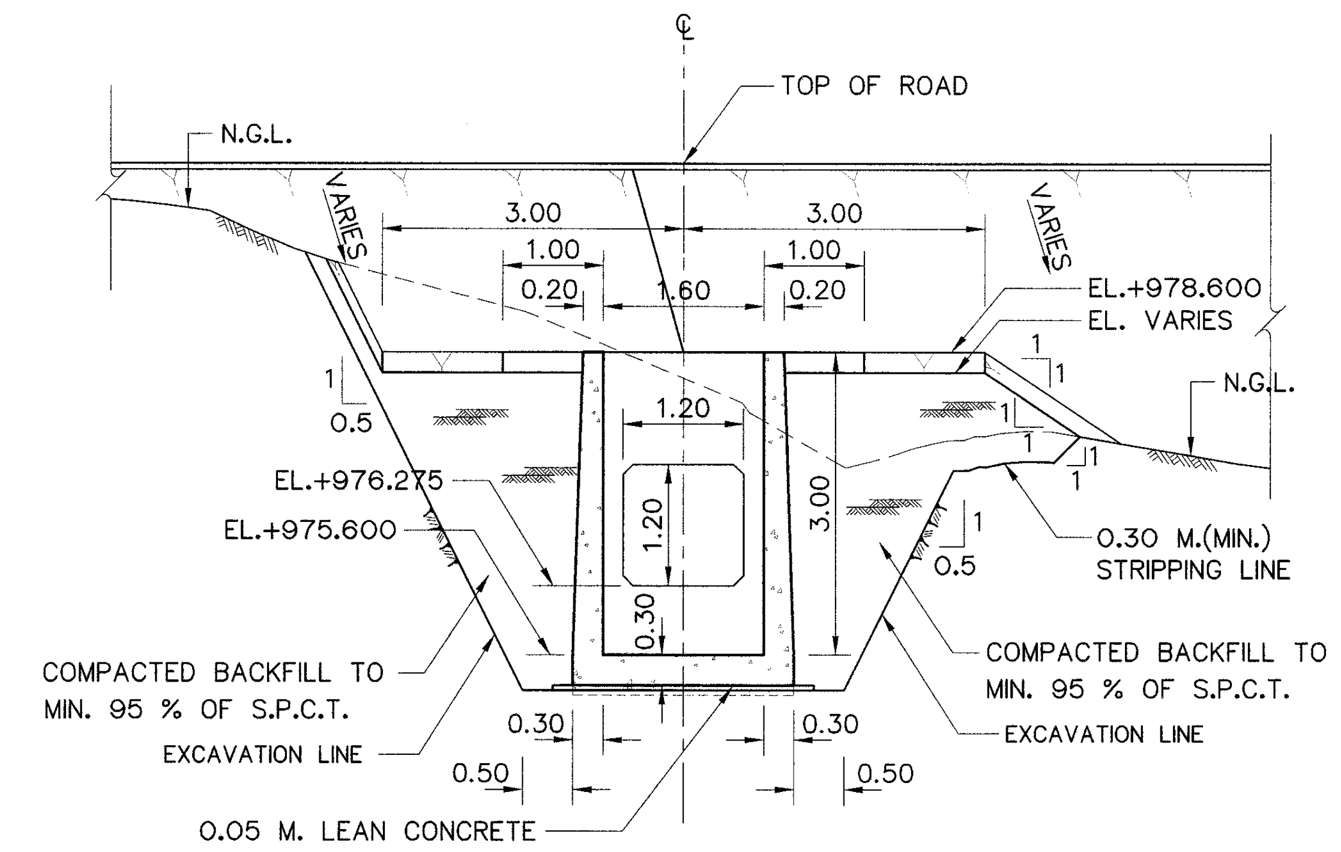
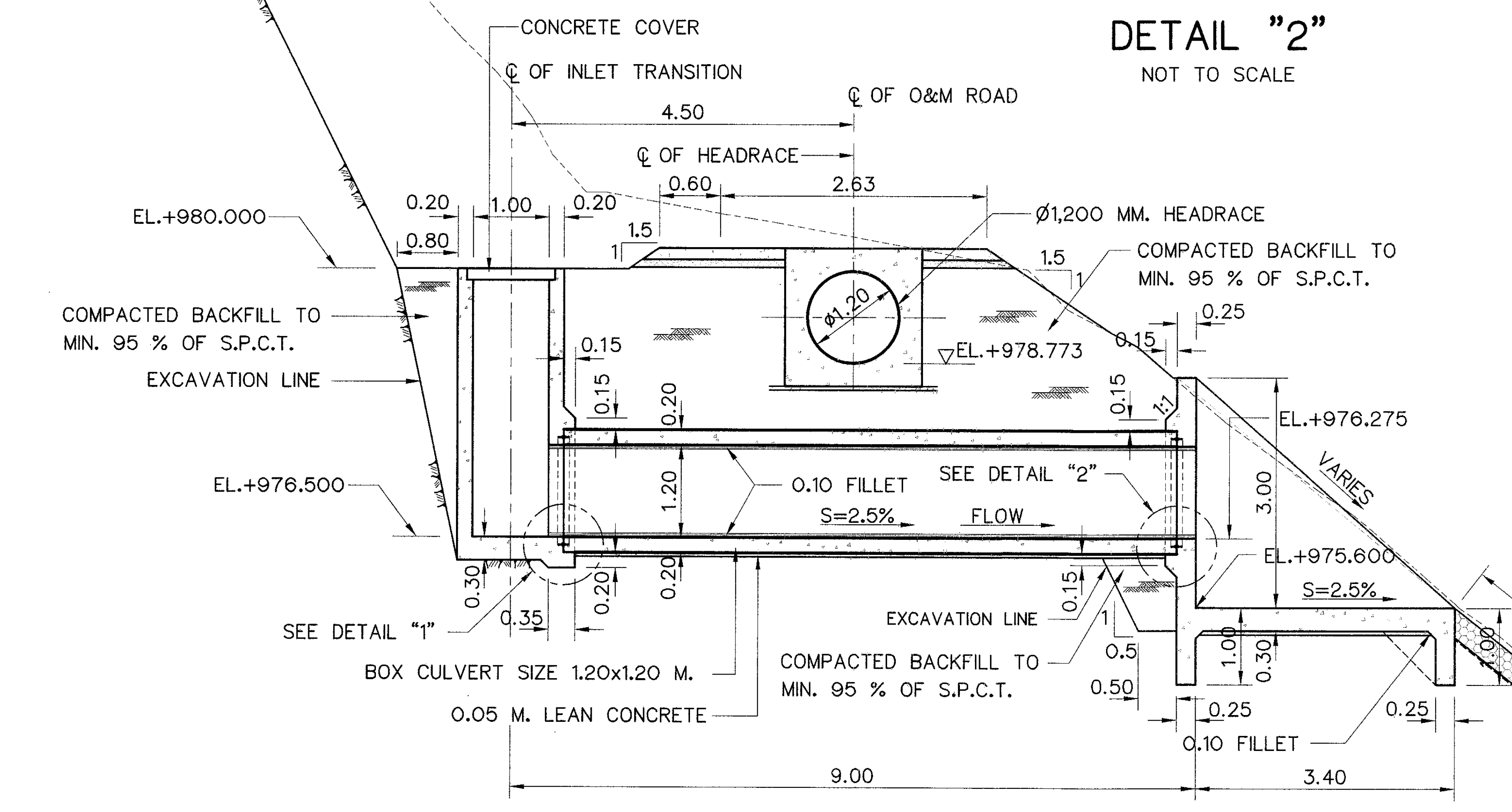


## SECTION D–D
SCALE 1:75



## SECTION E–E
SCALE 1:75



## SECTION A–A
SCALE 1:75

REFERENCE DRAWING :

| | |
|---|---|
| 1. HEADRACE PLAN AND PROFILE, STA. 1+500 TO STA. 2+000 | MH-HR-04 |
| 2. DRAIN CULVERT STA. 1+944.718, REINFORCEMENT DETAILS | MH-HR-25 |

NOTES :

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS UNLESS OTHERWISE SHOWN.
2. SYMBOL, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH-GN-03

0 0.5 1.0 1.5
SCALE 1:20 METERS

0 0.5 1 2 3 4 5 6
SCALE 1:75 METERS

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
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| | CONSULTANTS | | DEDE | |

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CIVIL WORKS AND TRANSMISSION LINE
HEADRACE
DRAIN CULVERT STA. 1+944.718 , PLAN AND SECTION

P&C MANAGEMENT CO.,LTD.

Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

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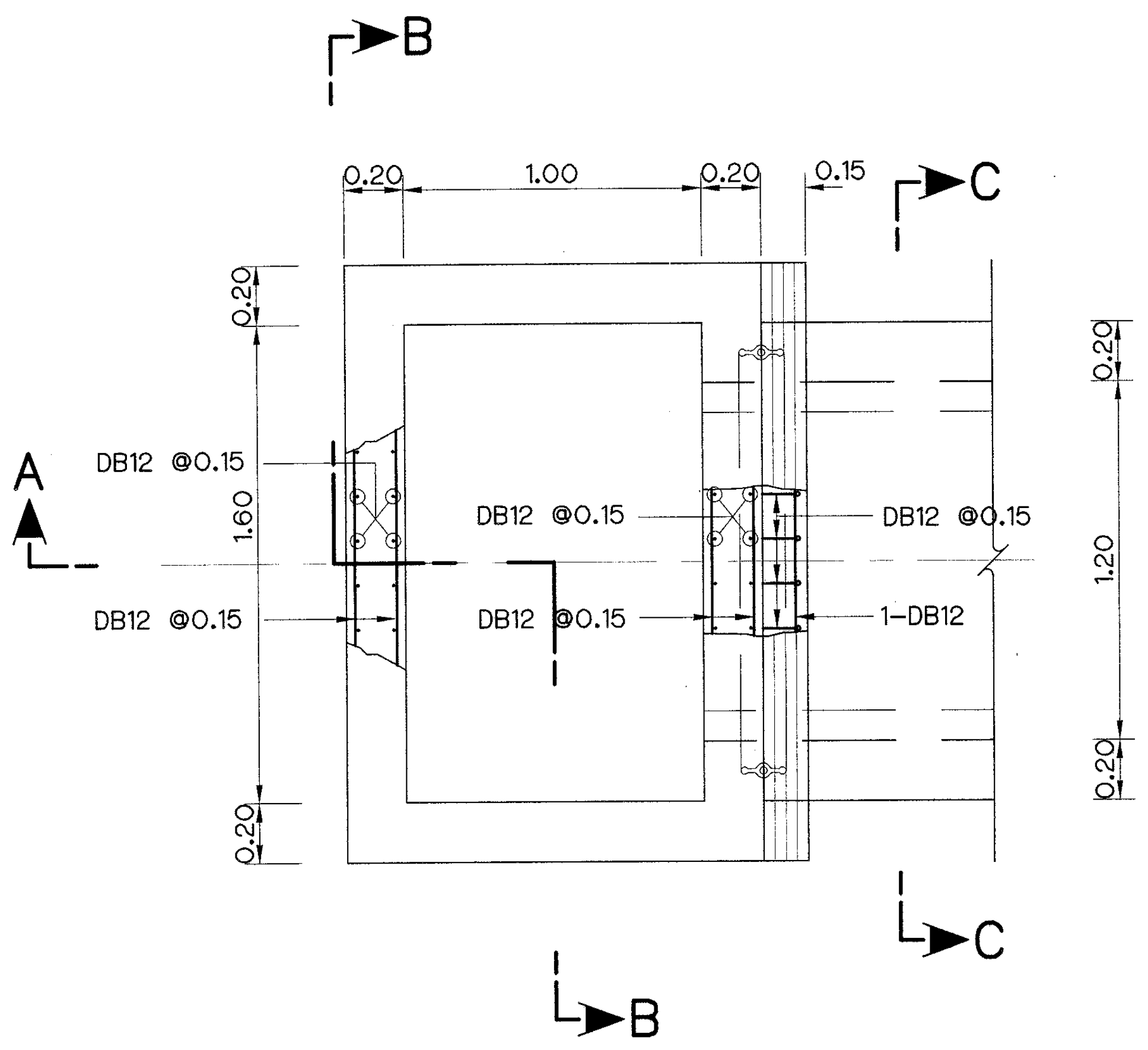
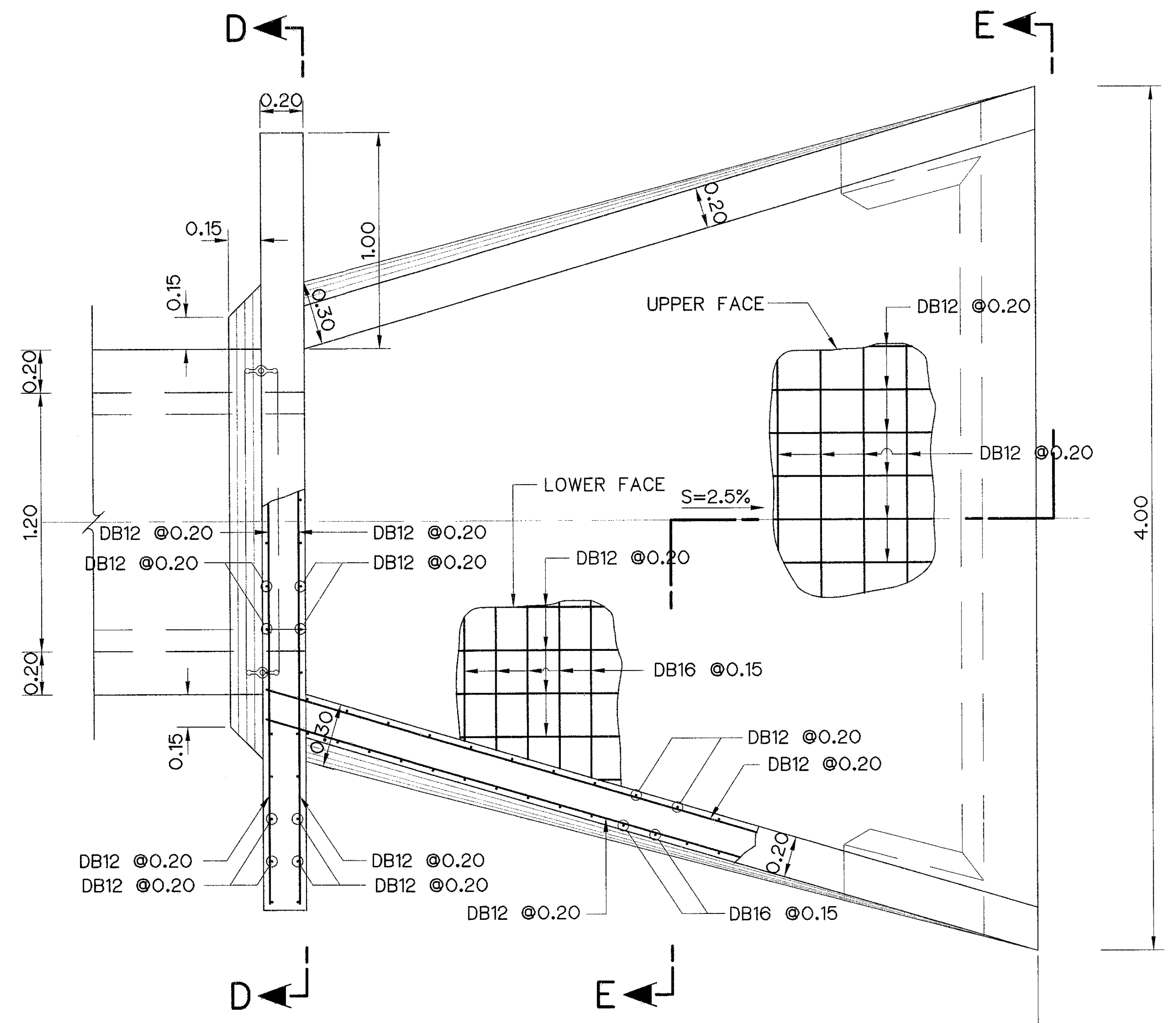
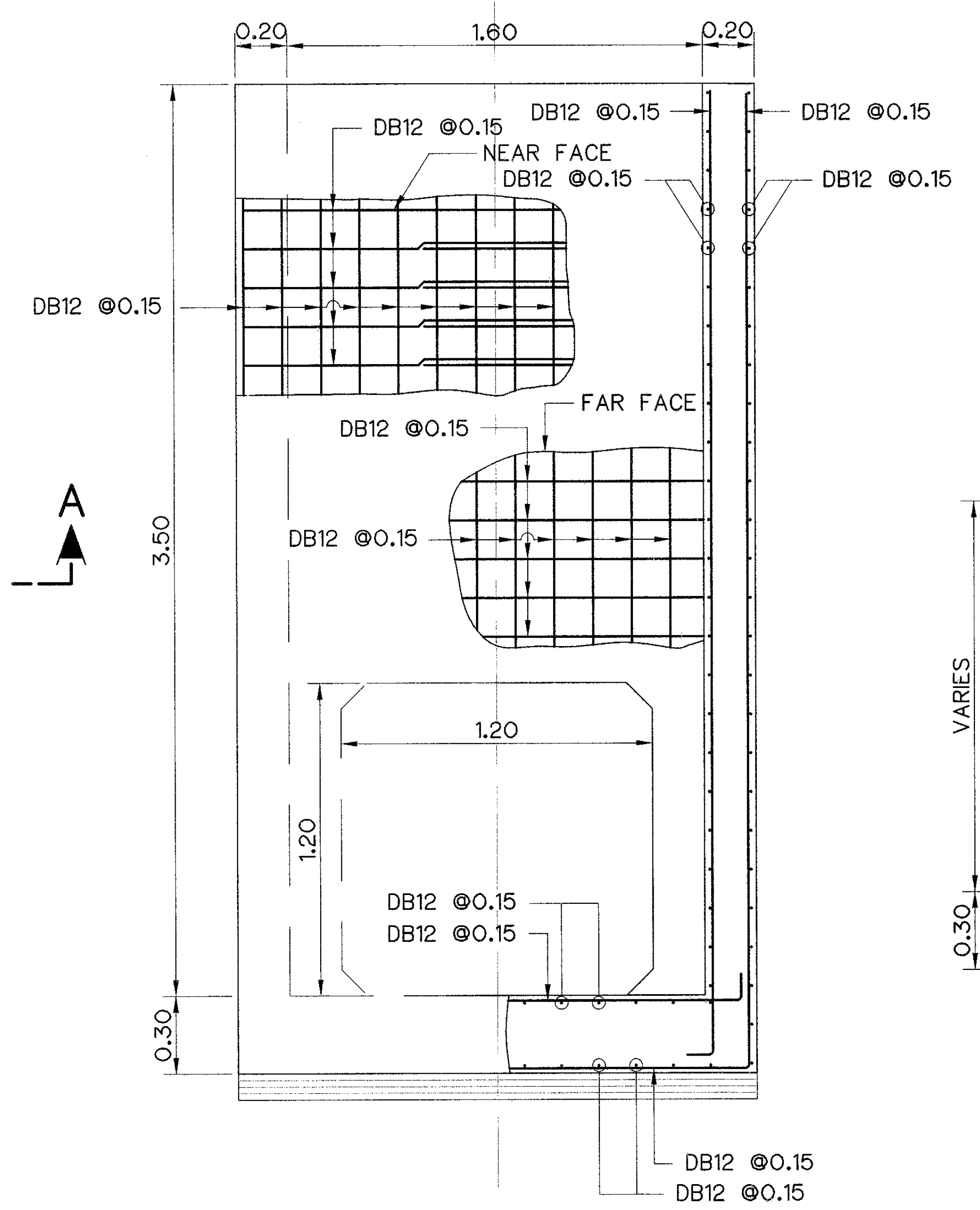
| DESIGNED .ภย.64624 สย.6226 | REVIEWED |
| DRAWN | SUBMITTED Chai |
| CHECKED สย.6226 | RECOMMENDED |
| PROJECT MANAGER / DATE 08/03/2569 | APPROVED P. Homsal |
| DRAWING NO. MH-HR-24 | SHEET NO. 48 OF 130 |





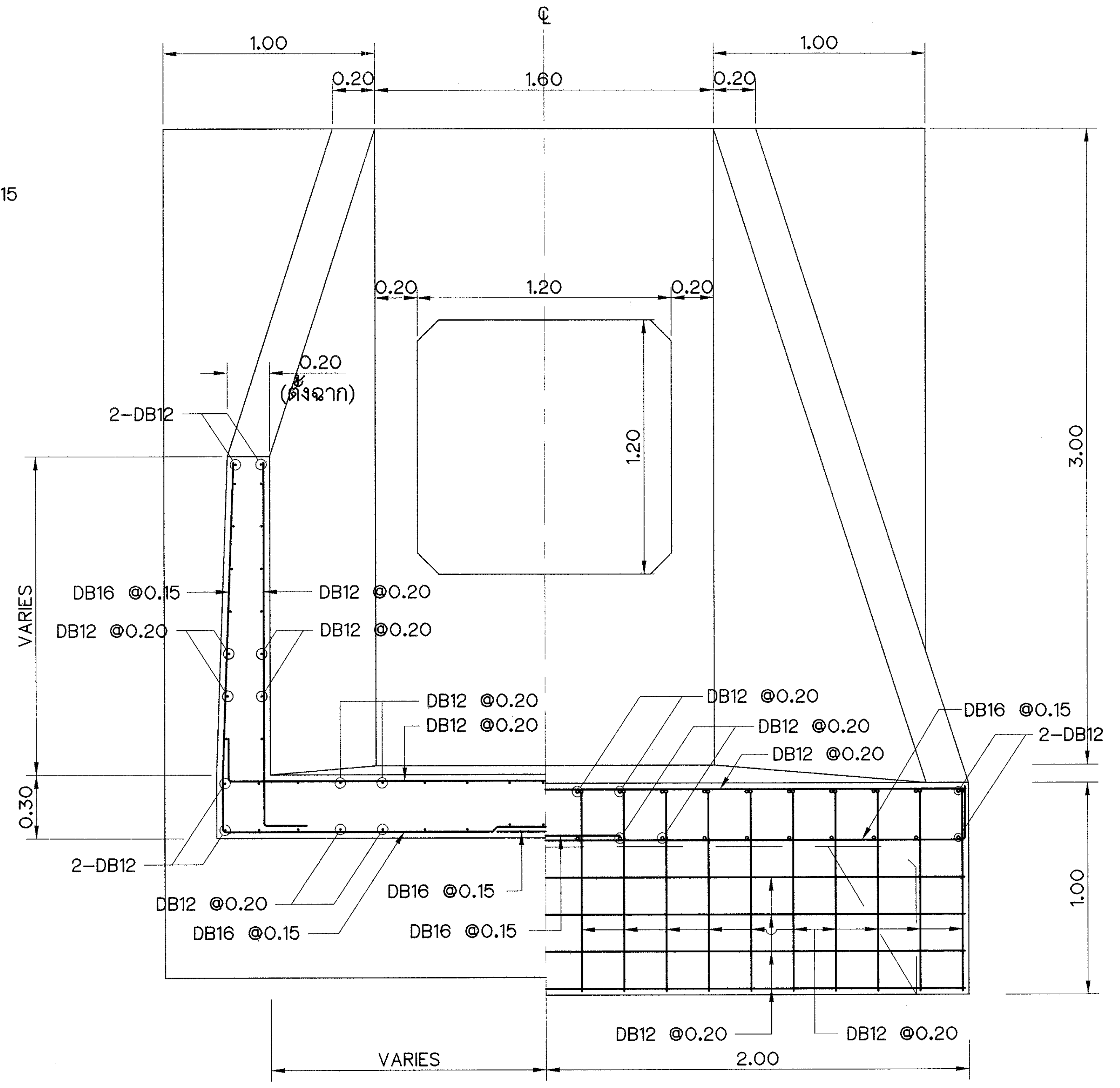
## PLAN

SCALE 1:25



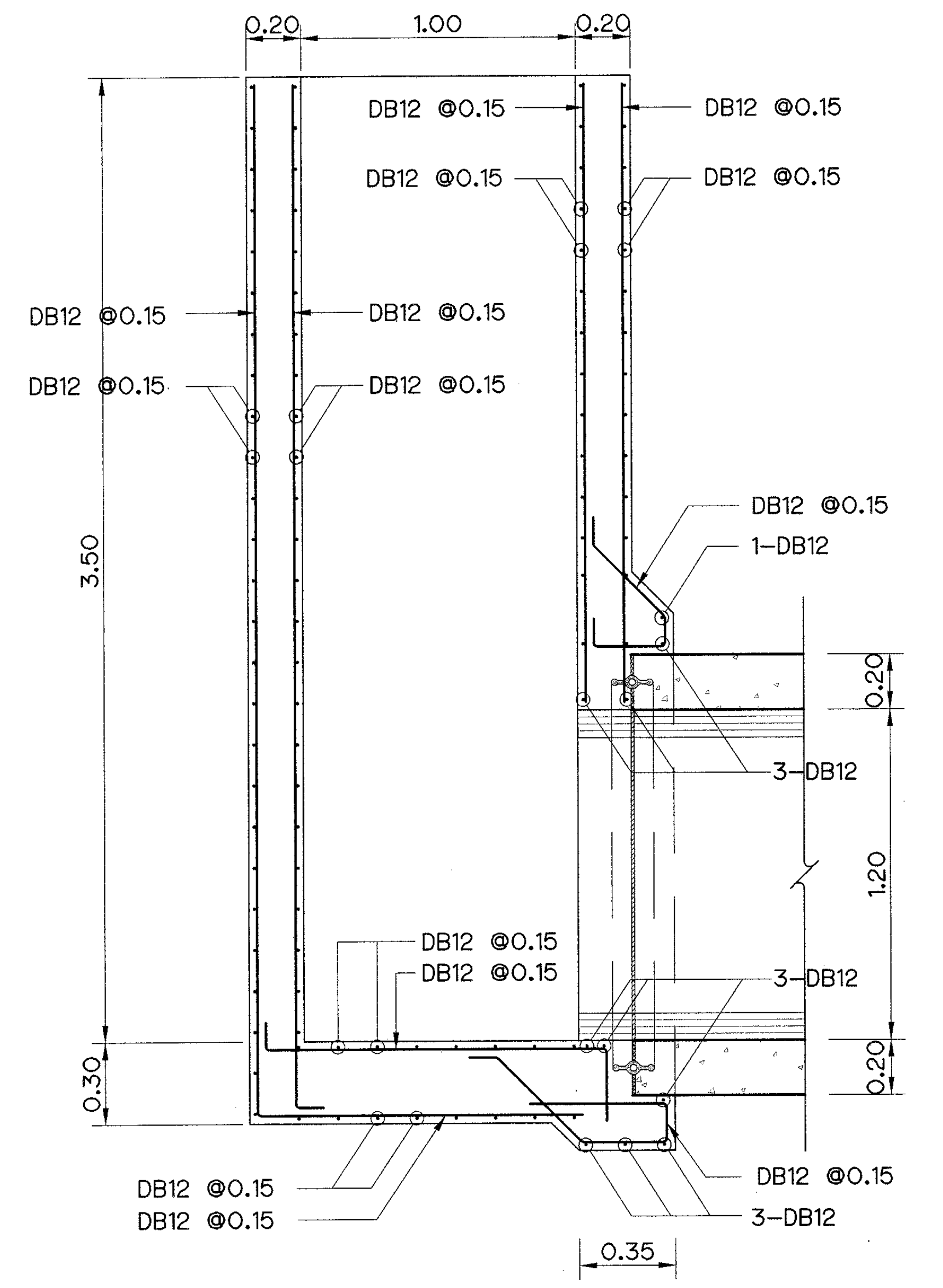
## SECTION B–B

SCALE 1:25



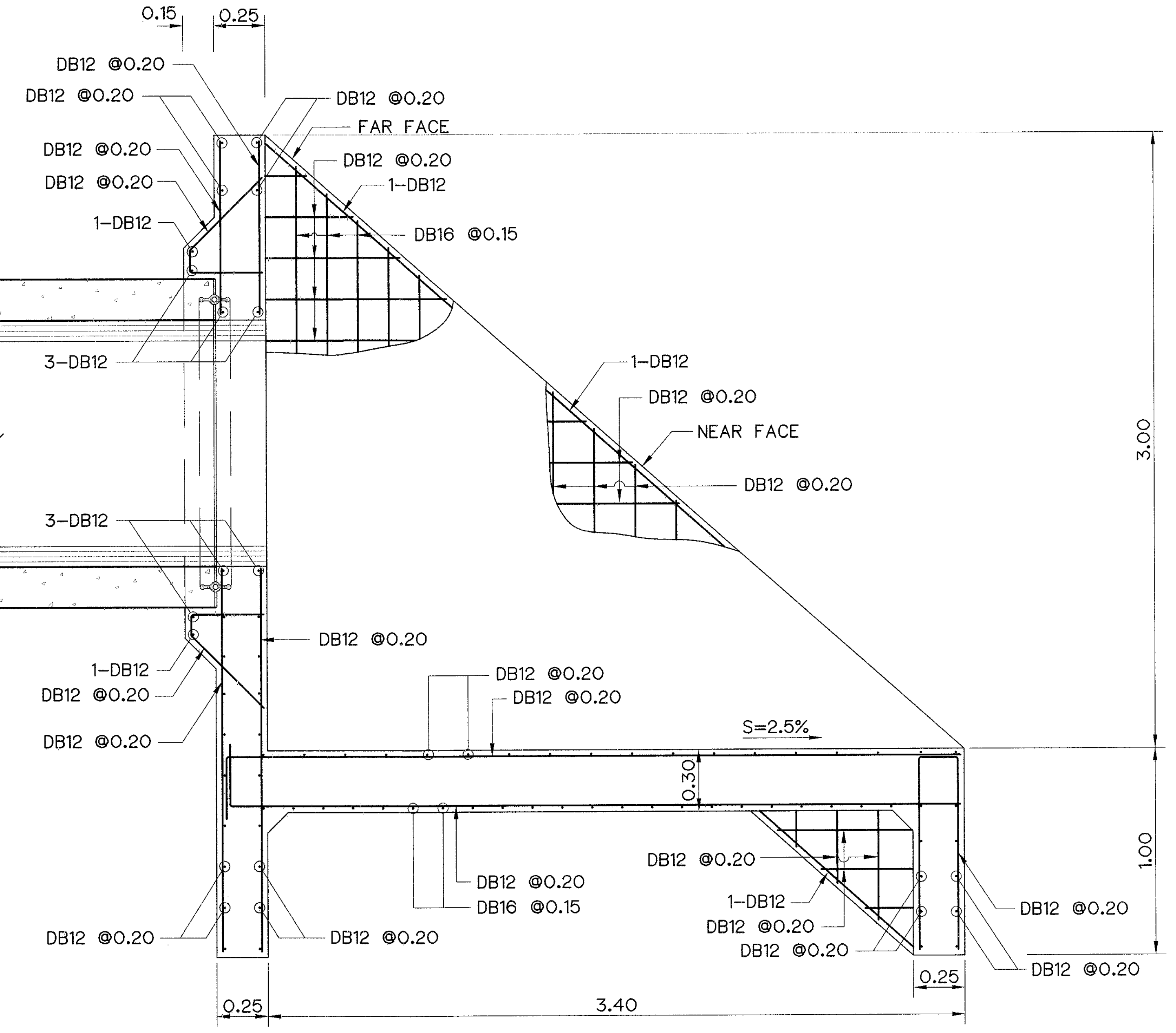
## SECTION E–E

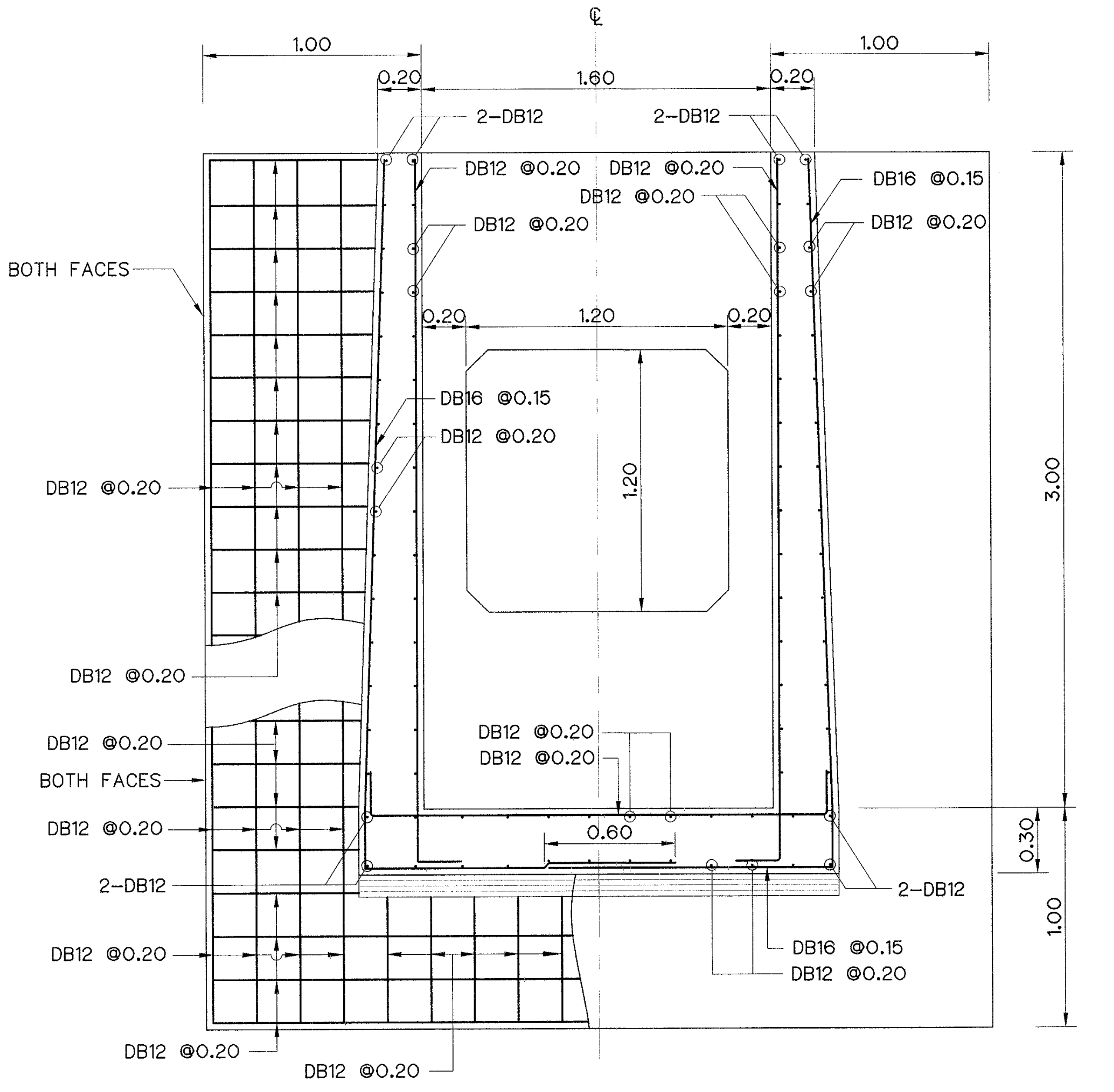
SCALE 1:25



## SECTION A–A

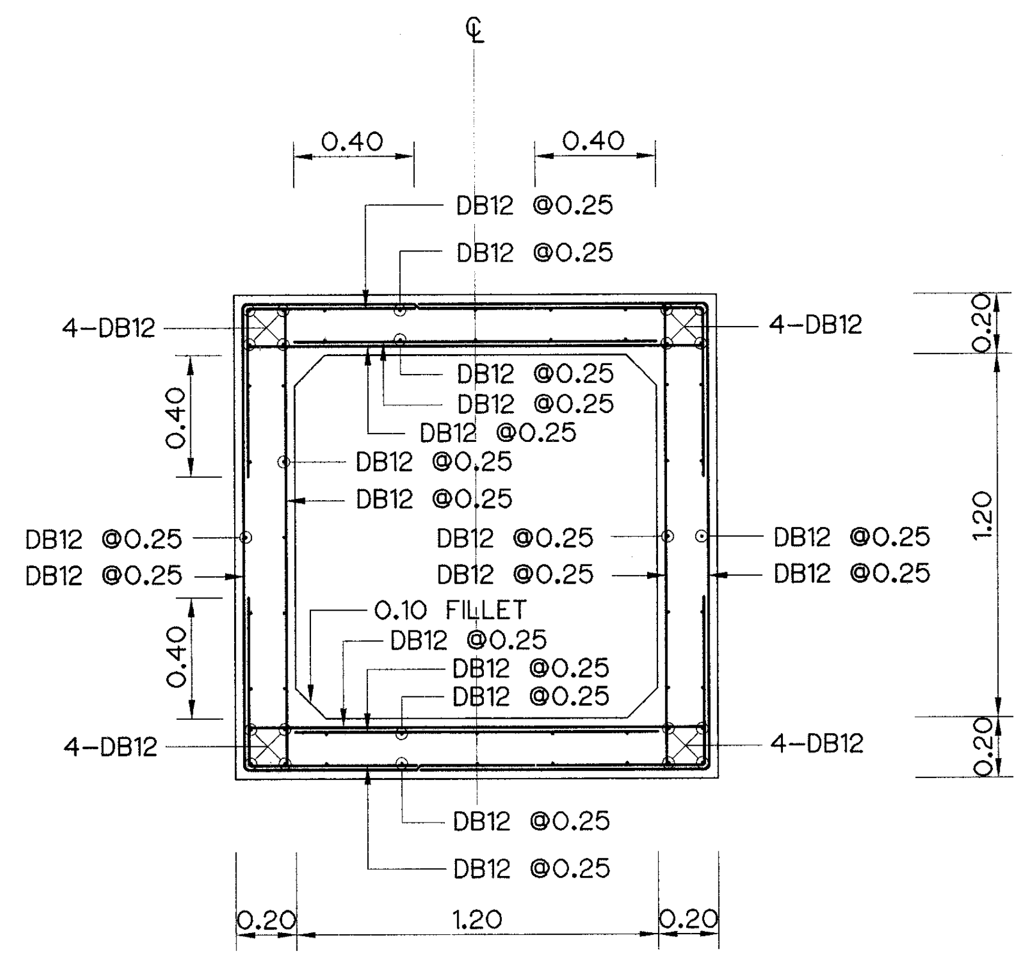
SCALE 1:25





## SECTION D–D

SCALE 1:25



## SECTION C–C

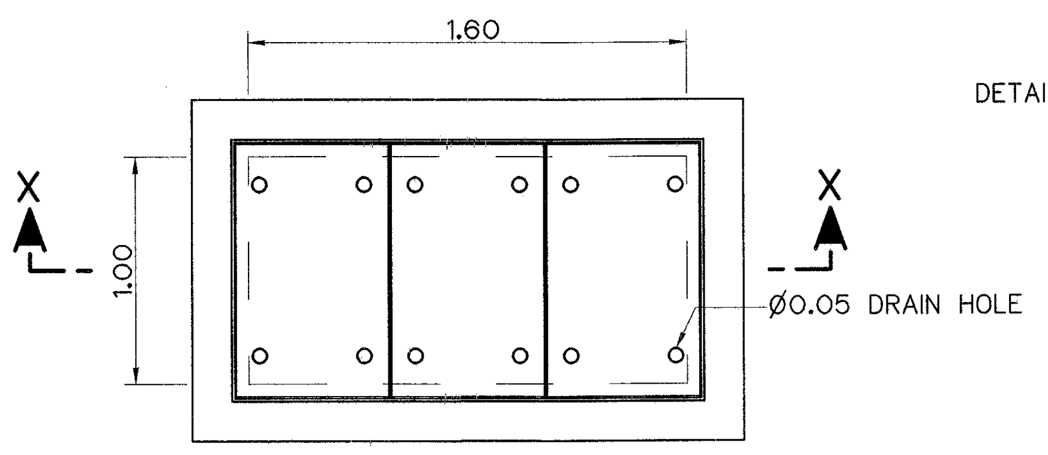
SCALE 1:25

**NOTES :**

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS, UNLESS OTHERWISE SHOWN.
2. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH–GN–03
3. CONCRETE DESIGN BASED ON THE COMPRESSIVE STRENGTH OF 210 KSC, STANDARD CYLINDER Ø0.15x0.30 m. TEST AT AGE 28 DAYS. UNLESS OTHERWISE INDICATED IN SPECIFIC DRAWINGS.
4. ULTIMATE TENSILE STRESSES OF REINFORCING STEEL, CONFORM TO THE REQUIREMENT OF THAI INDUSTRIAL STANDARD DESIGNATION SR24 FOR STRUCTURAL GRADE PLAIN ROUND BAR AND SD30 FOR INTERMEDIATE GRADE DEFORMED BAR.

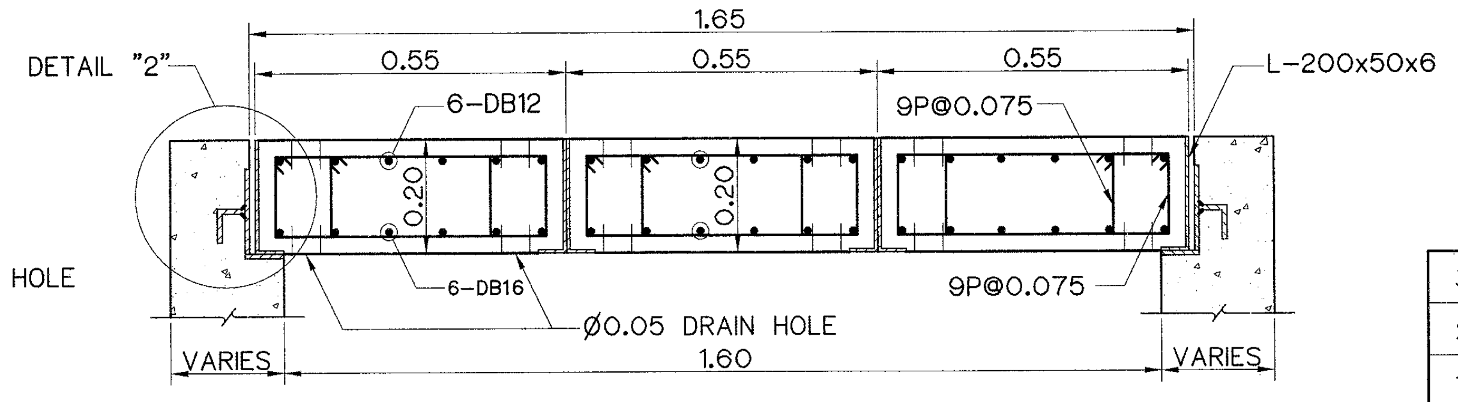
**REFERENCE DRAWINGS :**

1. DRAIN CULVERT STA. 1+944.718, PLAN AND SECTION MH–HR–24



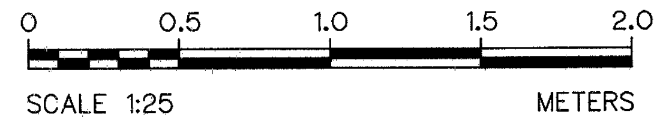
## CONCRETE COVER

NOT TO SCALE



## SECTION X–X

NOT TO SCALE



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MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
HEADRACE
DRAIN CULVERT STA. 1+944.718 REINFORCEMENT DETAILS

P&C MANAGEMENT CO.,LTD.

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MINISTRY OF ENERGY

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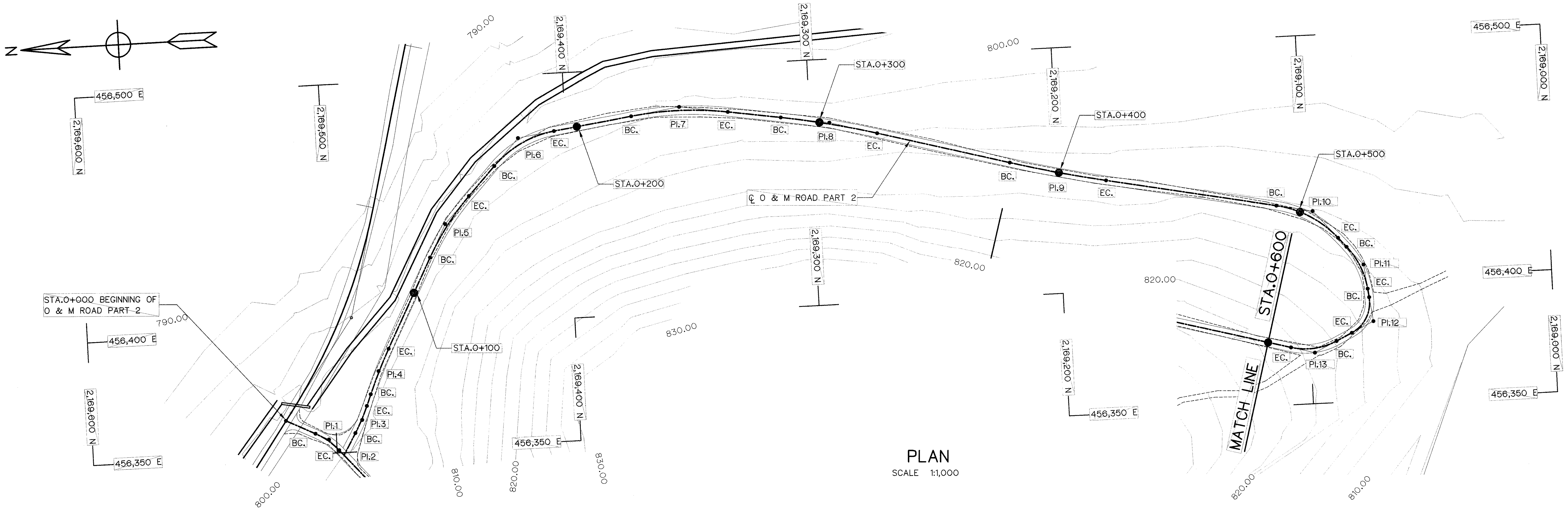
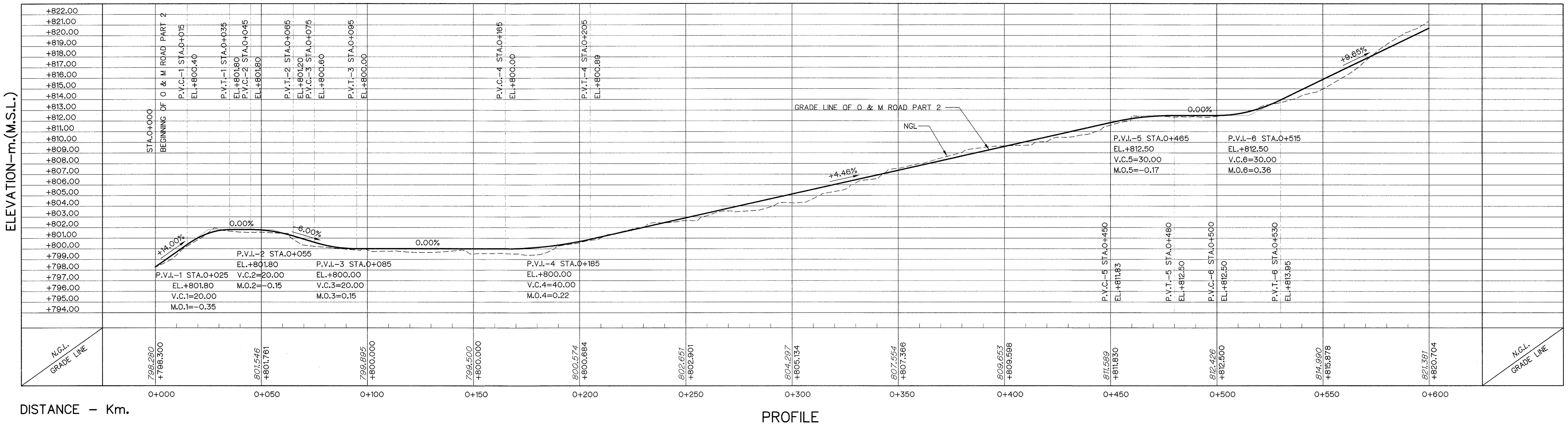
| | SHEET NO. 49 OF 130 |



## PLAN

SCALE 1:1,000



## PROFILE

VERTICAL SCALE 1:200
HORIZONTAL SCALE 1:1,000

### NOTES :

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS UNLESS OTHERWISE SHOWN.
2. SYMBOL, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH–GN–03
3. THE ALIGNMENT OF THE HEADRACE AND RELATED STRUCTURES SHALL BE CHECKED AND CORRECTED BY THE CONTRACTOR TO SUIT THE FIELD CONDITIONS AND SHALL BE SUBMITTED TO DEDE'S FIELD ENGINEER FOR APPROVAL

### REFERENCE DRAWINGS :

| | |
|---|---|
| 1. O&M ROAD PART 2 PLAN AND PROFILE, STA. 0+600 TO STA. 1+200 | MH–OM–02 |
| 2. O&M ROAD TYPICAL SECTIONS AND DETAILS | MH–OM–10 |
| 3. HEADRACE TYPICAL SECTIONS | MH–HR–06 |

0 5 10 15
SCALE 1:200 METERS

0 10 20 40 50 80
SCALE 1:1,000 METERS

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## MAE HAT HYDROPOWER PROJECT

## CIVIL WORKS AND TRANSMISSION LINE
## O&M ROAD PART 2
## PLAN AND PROFILE, STA. 0+000 TO STA. 0+600

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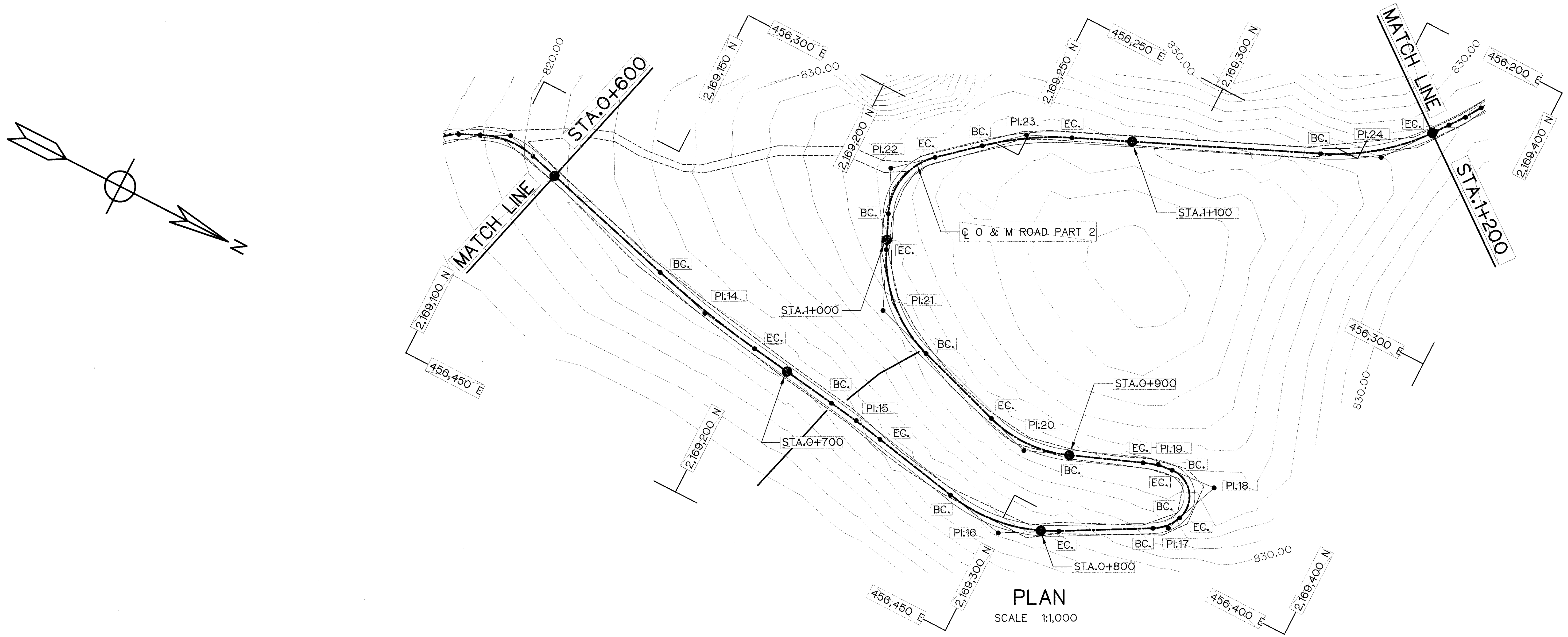
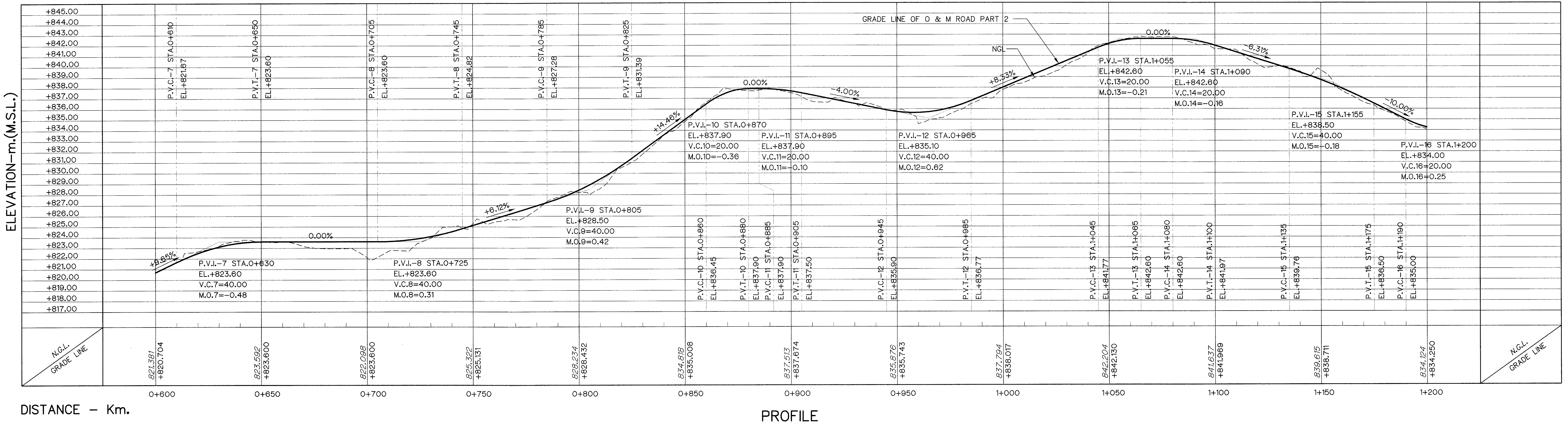
| PROJECT MANAGER 08/03/2559 DATE | RECOMMENDED |
| | APPROVED P. Hanzell |
| DRAWING NO. MH–OM–01 | SHEET NO. 50 OF 130 |



PLAN

SCALE 1:1,000



PROFILE

VERTICAL SCALE 1:200

HORIZONTAL SCALE 1:1,000

NOTES :

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS UNLESS OTHERWISE SHOWN.
2. SYMBOL, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH-GN-03
3. THE ALIGNMENT OF THE HEADRACE AND RELATED STRUCTURES SHALL BE CHECKED AND CORRECTED BY THE CONTRACTOR TO SUIT THE FIELD CONDITIONS AND SHALL BE SUBMITTED TO DEDE'S FIELD ENGINEER FOR APPROVAL

REFERENCE DRAWINGS :

| | |
|---|---|
| 1. O&M ROAD PART 3 PLAN AND PROFILE, STA. 0+000 TO STA. 0+600 | MH-OM-01 |
| 2. O&M ROAD PART 3 PLAN AND PROFILE, STA. 1+200 TO STA. 1+800 | MH-OM-03 |
| 3. O&M ROAD TYPICAL SECTIONS AND DETAILS | MH-OM-10 |
| 4. HEADRACE TYPICAL SECTIONS | MH-HR-06 |

0 5 10 15
SCALE 1:200 METERS

0 10 20 40 50 80
SCALE 1:1,000 METERS

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
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MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
O&M ROAD PART 2
PLAN AND PROFILE, STA. 0+600 TO STA. 1+200

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PROJECT MANAGER 08/03/2559 DATE

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MINISTRY OF ENERGY
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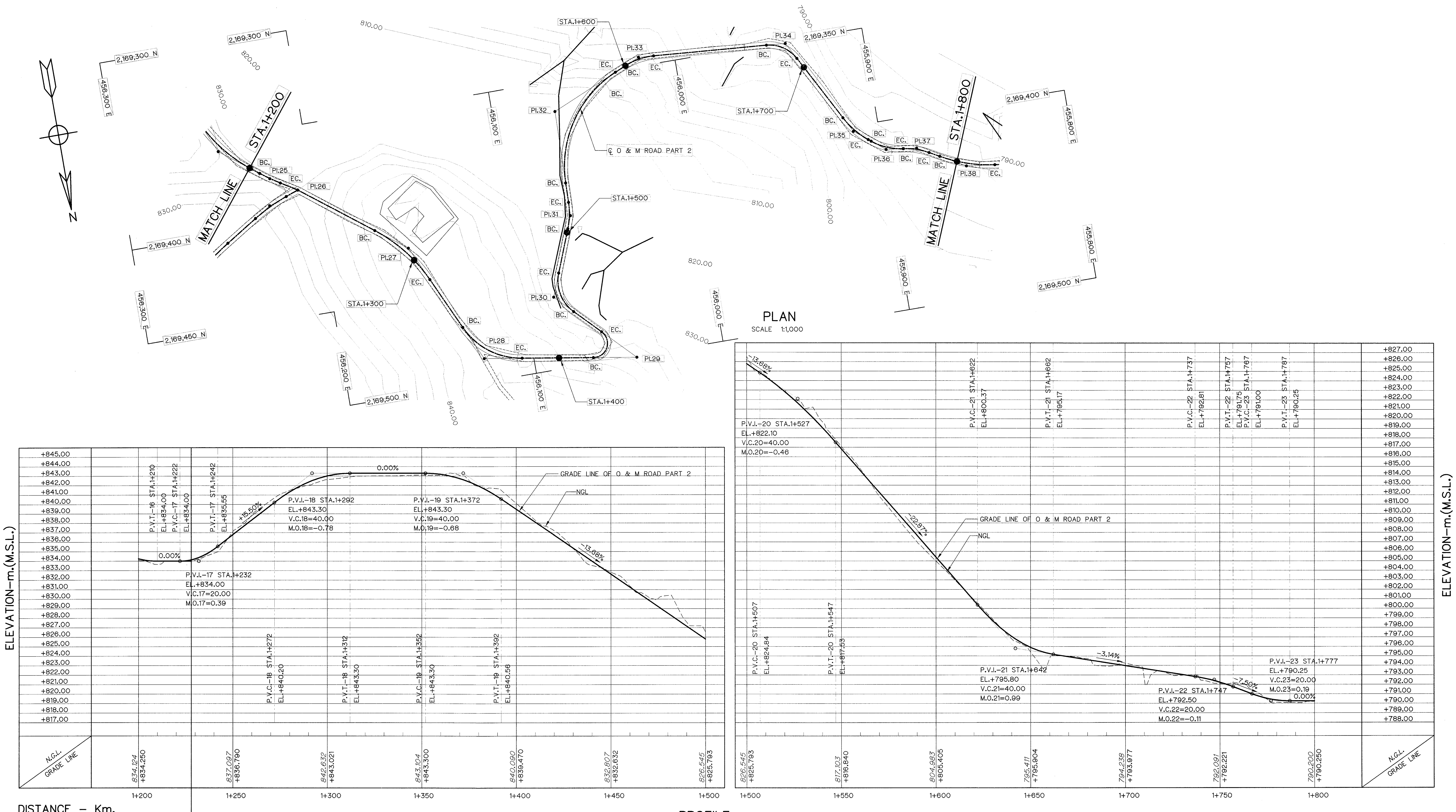
RECOMMENDED
APPROVED P.Hansell

DRAWING NO. MH-OM-02
SHEET NO. 51 OF 130


2,169,300 N
456,300 E
810.00
820.00
830.00
STA.1+200
MATCH LINE
2,169,400 N
BC.
PI.25
EC.
PI.26
PI.27
STA.1+300
456,300 E
2,169,450 N
456,200 E
2,169,500 N
840.00
PI.28
STA.1+400
456,100 E
PI.29
PI.30
PI.31
STA.1+500
PI.32
℄ O & M ROAD PART 2
STA.1+600
PI.33
456,000 E
456,100 E
PI.34
2,169,350 N
455,900 E
STA.1+700
PI.35
PI.36
PI.37
PI.38
STA.1+800
MATCH LINE
2,169,400 N
455,800 E
790.00
800.00
455,900 E
455,800 E
2,169,500 N
PLAN
SCALE 1:1,000
ELEVATION-m.(M.S.L.)
P.V.T.-16 STA.1+210 EL.+834.00
P.V.C.-17 STA.1+222 EL.+834.00
P.V.T.-17 STA.1+242 EL.+835.55
P.V.I.-17 STA.1+232 EL.+834.00 V.C.17=20.00 M.O.17=0.39
0.00%
+15.50%
P.V.I.-18 STA.1+292 EL.+843.30 V.C.18=40.00 M.O.18=-0.78
0.00%
P.V.I.-19 STA.1+372 EL.+843.30 V.C.19=40.00 M.O.19=-0.68
GRADE LINE OF O & M ROAD PART 2
NGL
-13.68%
P.V.C.-18 STA.1+272 EL.+840.20
P.V.T.-18 STA.1+312 EL.+843.30
P.V.C.-19 STA.1+352 EL.+843.30
P.V.T.-19 STA.1+392 EL.+840.56
N.G.L.
GRADE LINE
834.124 +834.250
837.097 +836.790
842.632 +843.021
843.104 +843.300
840.090 +839.470
832.807 +832.632
826.545 +825.793
1+200 1+250 1+300 1+350 1+400 1+450 1+500
+817.00 … +845.00
-13.68%
P.V.I.-20 STA.1+527 EL.+822.10 V.C.20=40.00 M.O.20=-0.46
-22.87%
P.V.C.-21 STA.1+622 EL.+800.37
P.V.T.-21 STA.1+662 EL.+795.17
P.V.C.-22 STA.1+737 EL.+792.81
P.V.T.-22 STA.1+757 EL.+791.75
P.V.C.-23 STA.1+767 EL.+791.00
P.V.T.-23 STA.1+787 EL.+790.25
P.V.C.-20 STA.1+507 EL.+824.84
P.V.T.-20 STA.1+547 EL.+817.53
P.V.I.-21 STA.1+642 EL.+795.80 V.C.21=40.00 M.O.21=0.99
-3.14%
P.V.I.-22 STA.1+747 EL.+792.50 V.C.22=20.00 M.O.22=-0.11
-7.50%
P.V.I.-23 STA.1+777 EL.+790.25 V.C.23=20.00 M.O.23=0.19
0.00%
826.545 +825.793
817.103 +816.840
804.283 +805.405
795.411 +795.904
794.238 +793.977
792.091 +792.221
790.200 +790.250
1+500 1+550 1+600 1+650 1+700 1+750 1+800
+788.00 … +827.00
DISTANCE - Km.

## PROFILE

VERTICAL SCALE 1:200
HORIZONTAL SCALE 1:1,000

NOTES :

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS UNLESS OTHERWISE SHOWN.
2. SYMBOL, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH-GN-03
3. THE ALIGNMENT OF THE HEADRACE AND RELATED STRUCTURES SHALL BE CHECKED AND CORRECTED BY THE CONTRACTOR TO SUIT THE FIELD CONDITIONS AND SHALL BE SUBMITTED TO DEDE'S FIELD ENGINEER FOR APPROVAL

REFERENCE DRAWINGS :

| | |
|---|---|
| 1. O&M ROAD PART 3 PLAN AND PROFILE, STA. 0+600 TO STA. 1+200 | MH-OM-02 |
| 2. O&M ROAD PART 3 PLAN AND PROFILE, STA. 1+800 TO STA. 2+400 | MH-OM-04 |
| 3. O&M ROAD TYPICAL SECTIONS AND DETAILS | MH-OM-10 |
| 4. HEADRACE TYPICAL SECTIONS | MH-HR-06 |

0 5 10 15
SCALE 1:200 METERS

0 10 20 40 50 80
SCALE 1:1,000 METERS

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MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
O&M ROAD PART 2
PLAN AND PROFILE, STA. 1+200 TO STA. 1+800

P&C MANAGEMENT CO.,LTD.

Department of Alternative Energy Development and Efficiency
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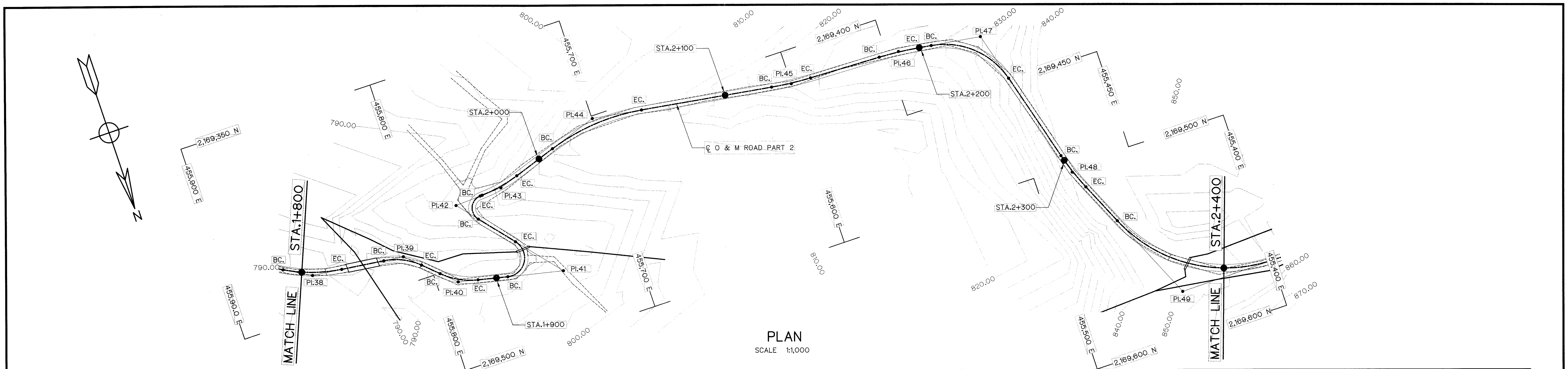
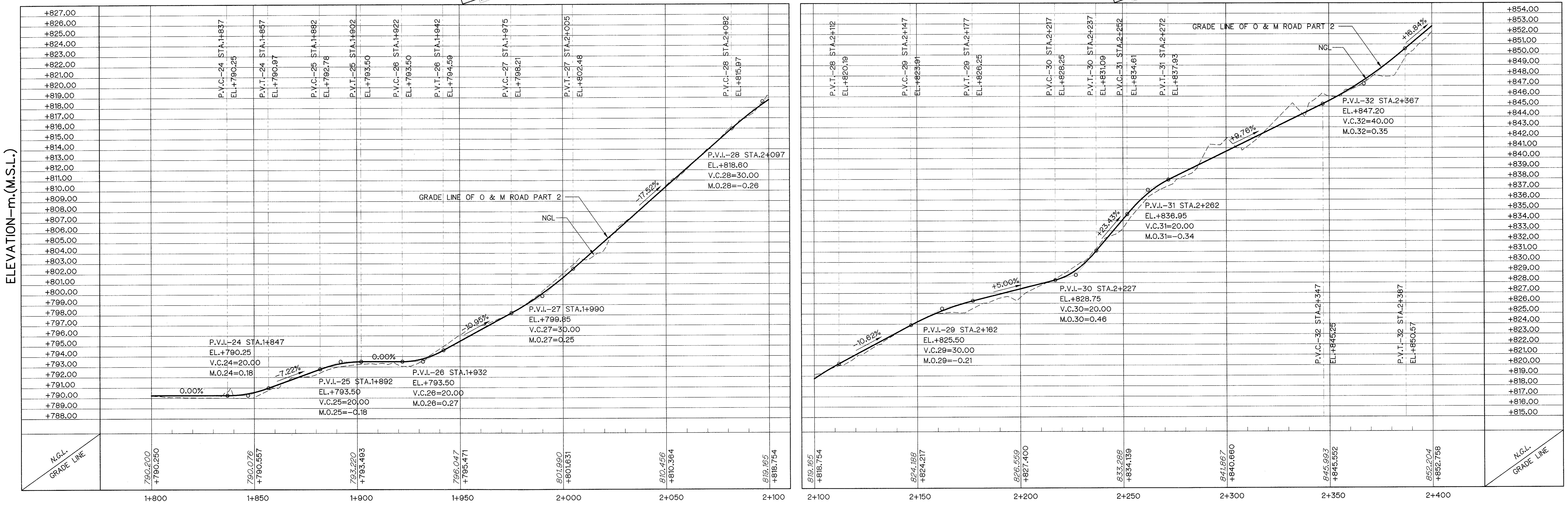
| PROJECT MANAGER | 08/03/2559 DATE | DRAWING NO. MH-OM-03 | SHEET NO. 52 OF 130 |



## PLAN
SCALE 1:1,000



## PROFILE
VERTICAL SCALE 1:200
HORIZONTAL SCALE 1:1,000

NOTES :

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS UNLESS OTHERWISE SHOWN.
2. SYMBOL, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH-GN-03
3. THE ALIGNMENT OF THE HEADRACE AND RELATED STRUCTURES SHALL BE CHECKED AND CORRECTED BY THE CONTRACTOR TO SUIT THE FIELD CONDITIONS AND SHALL BE SUBMITTED TO DEDE'S FIELD ENGINEER FOR APPROVAL

REFERENCE DRAWINGS :

| | |
|---|---|
| 1. O&M ROAD PART 3 PLAN AND PROFILE, STA. 1+200 TO STA. 1+800 | MH-OM-03 |
| 2. O&M ROAD PART 3 PLAN AND PROFILE, STA. 2+400 TO STA. 3+000 | MH-OM-05 |
| 3. O&M ROAD TYPICAL SECTIONS AND DETAILS | MH-OM-10 |
| 4. HEADRACE TYPICAL SECTIONS | MH-HR-06 |

0 5 10 15
SCALE 1:200 METERS

0 10 20 40 50 80
SCALE 1:1,000 METERS

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
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CIVIL WORKS AND TRANSMISSION LINE
O&M ROAD PART 2
PLAN AND PROFILE, STA. 1+800 TO STA. 2+400

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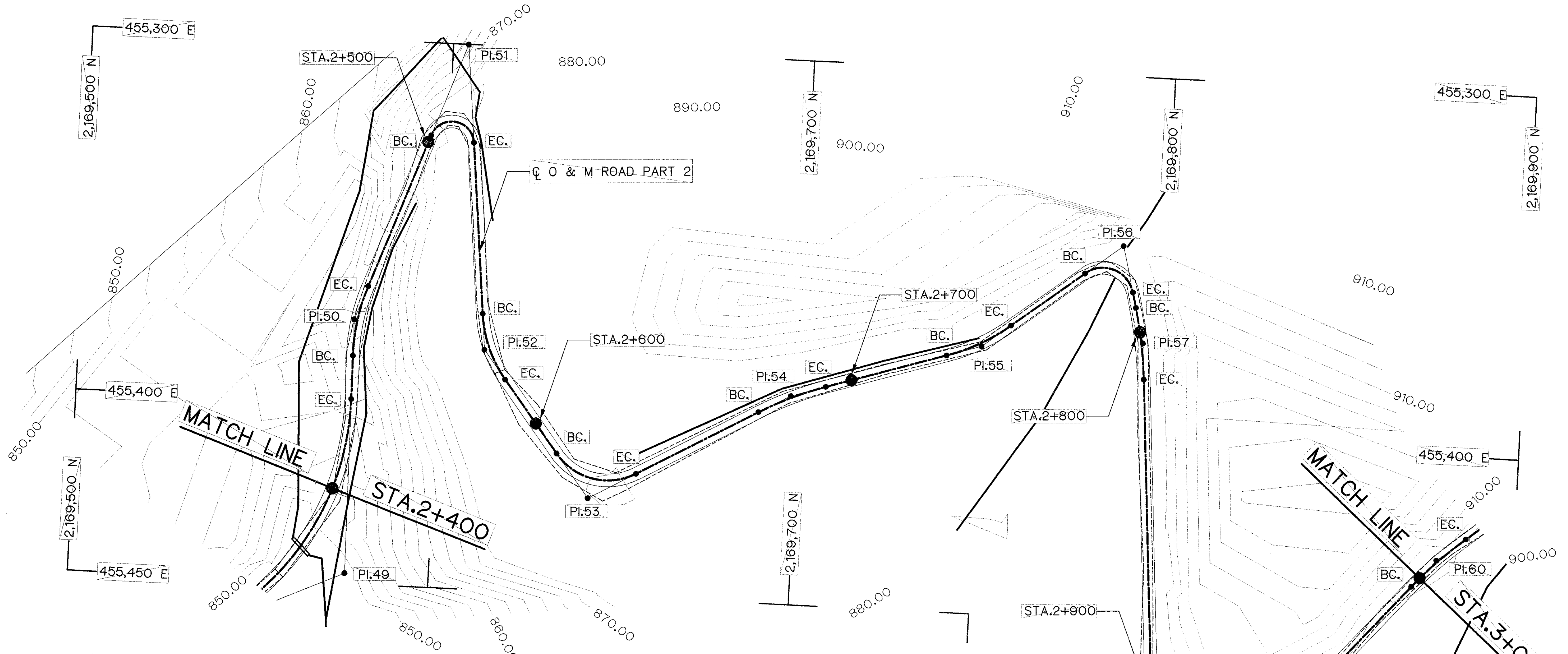
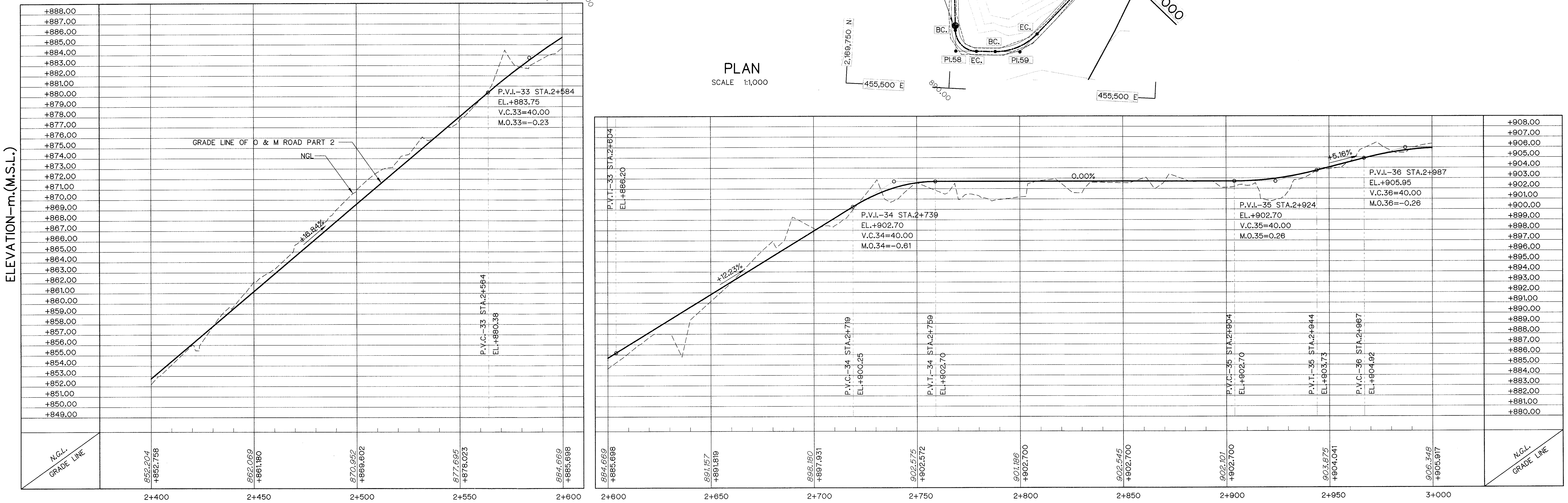
| PROJECT MANAGER DATE 08/03/2559 | APPROVED P. Hounsell |
| DRAWING NO. MH-OM-04 | SHEET NO. 53 OF 130 |



## PLAN

SCALE 1:1,000



DISTANCE – Km.

## PROFILE

VERTICAL SCALE 1:200
HORIZONTAL SCALE 1:1,000

NOTES :

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS UNLESS OTHERWISE SHOWN.
2. SYMBOL, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH-GN-03
3. THE ALIGNMENT OF THE HEADRACE AND RELATED STRUCTURES SHALL BE CHECKED AND CORRECTED BY THE CONTRACTOR TO SUIT THE FIELD CONDITIONS AND SHALL BE SUBMITTED TO DEDE'S FIELD ENGINEER FOR APPROVAL

REFERENCE DRAWINGS :

| | |
|---|---|
| 1. O&M ROAD PART 3 PLAN AND PROFILE, STA. 1+800 TO STA. 2+400 | MH-OM-04 |
| 2. O&M ROAD PART 3 PLAN AND PROFILE, STA. 3+000 TO STA. 3+600 | MH-OM-06 |
| 3. O&M ROAD TYPICAL SECTIONS AND DETAILS | MH-OM-10 |
| 4. HEADRACE TYPICAL SECTIONS | MH-HR-06 |

0 5 10 15
SCALE 1:200 METERS

0 10 20 40 50 80
SCALE 1:1,000 METERS

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# MAE HAT HYDROPOWER PROJECT

## CIVIL WORKS AND TRANSMISSION LINE
## O&M ROAD PART 2
## PLAN AND PROFILE, STA. 2+400 TO STA. 3+000

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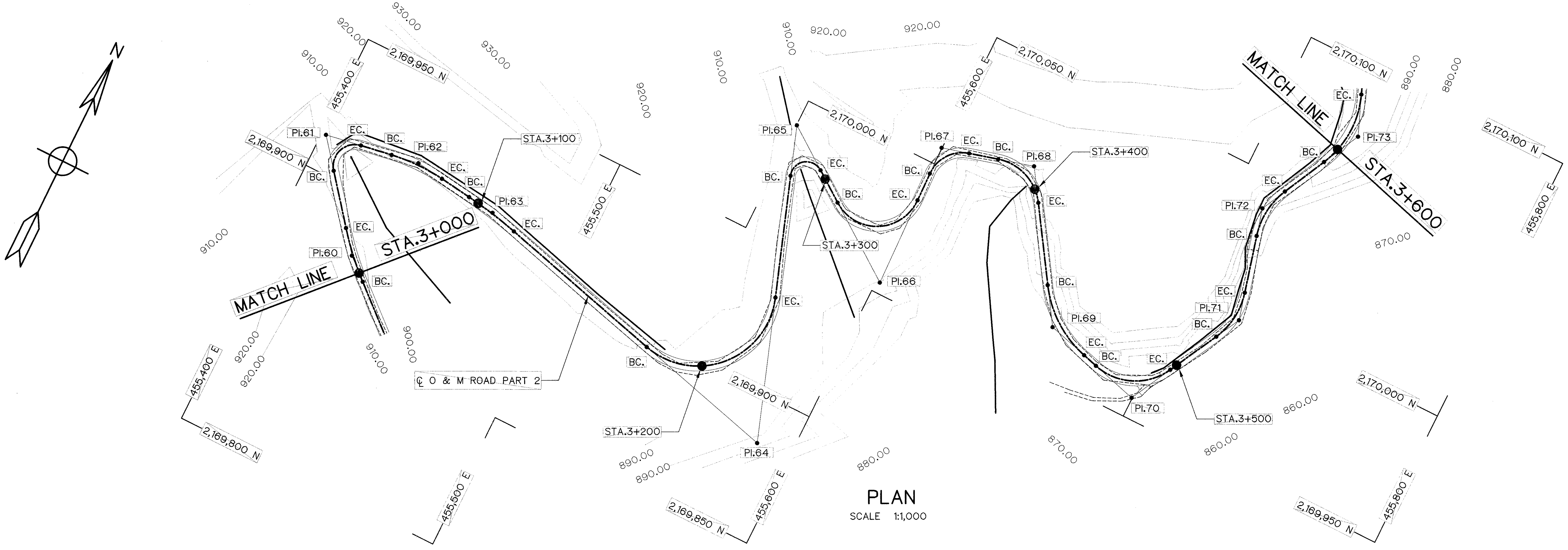
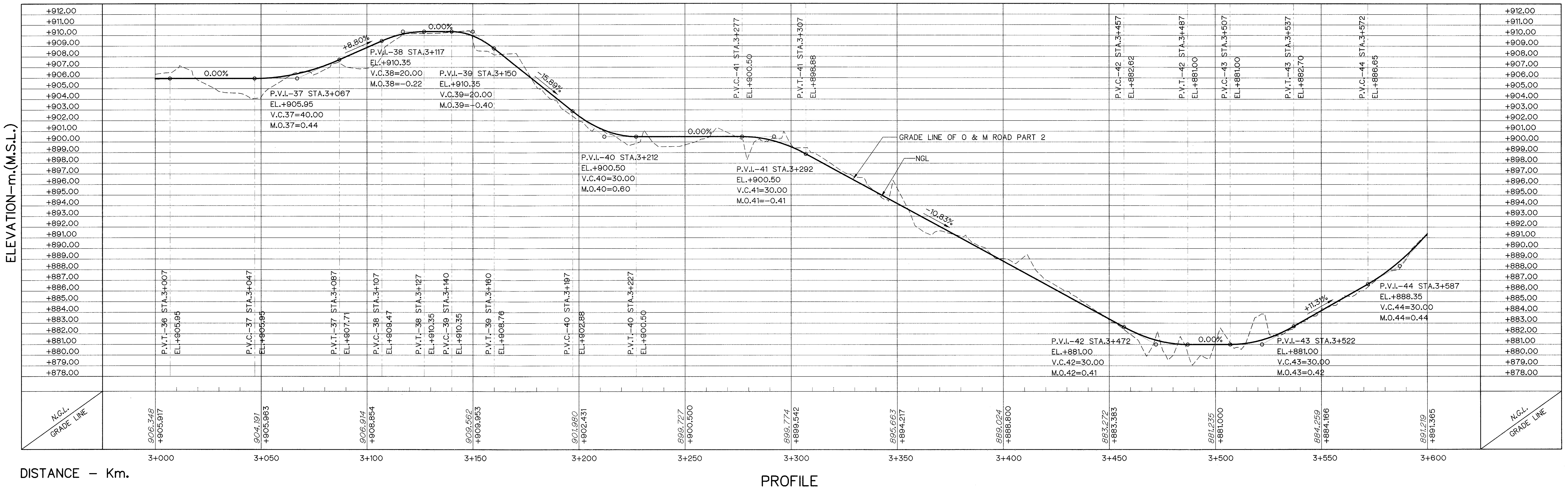
| CHECKED สย.6226 | RECOMMENDED |
| | APPROVED P. Hansell. |
| PROJECT MANAGER / DATE 08/03/2559 | DRAWING NO. MH-OM-05 / SHEET NO. 54 OF 130 |



## PLAN
SCALE 1:1,000



## PROFILE
VERTICAL SCALE 1:200
HORIZONTAL SCALE 1:1,000

NOTES :

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS UNLESS OTHERWISE SHOWN.
2. SYMBOL, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH-GN-03
3. THE ALIGNMENT OF THE HEADRACE AND RELATED STRUCTURES SHALL BE CHECKED AND CORRECTED BY THE CONTRACTOR TO SUIT THE FIELD CONDITIONS AND SHALL BE SUBMITTED TO DEDE'S FIELD ENGINEER FOR APPROVAL

REFERENCE DRAWINGS :

| | |
|---|---|
| 1. O&M ROAD PART 3 PLAN AND PROFILE, STA. 2+400 TO STA. 3+000 | MH-OM-05 |
| 2. O&M ROAD PART 3 PLAN AND PROFILE, STA. 3+600 TO STA. 4+149.212 | MH-OM-07 |
| 3. O&M ROAD TYPICAL SECTIONS AND DETAILS | MH-OM-10 |
| 4. HEADRACE TYPICAL SECTIONS | MH-HR-06 |

0 5 10 15
SCALE 1:200 METERS

0 10 20 40 50 80
SCALE 1:1,000 METERS

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
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| | CONSULTANTS | | DEDE | |

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MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
O&M ROAD PART 2
PLAN AND PROFILE, STA. 3+000 TO STA. 3+600

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| | REVIEWED |
| DESIGNED ภย.64624 ลย.6226 | SUBMITTED Chan't |
| DRAWN | RECOMMENDED |
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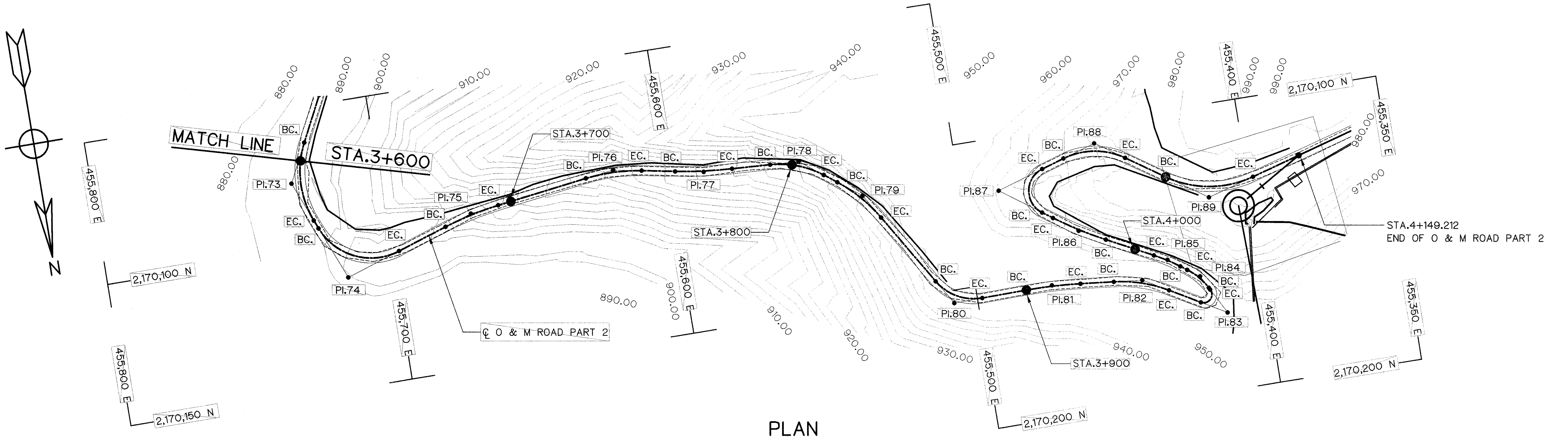
| PROJECT MANAGER DATE 08/03/2559 | DRAWING NO. MH-OM-06 |
| | SHEET NO. 55 OF 130 |



## PLAN

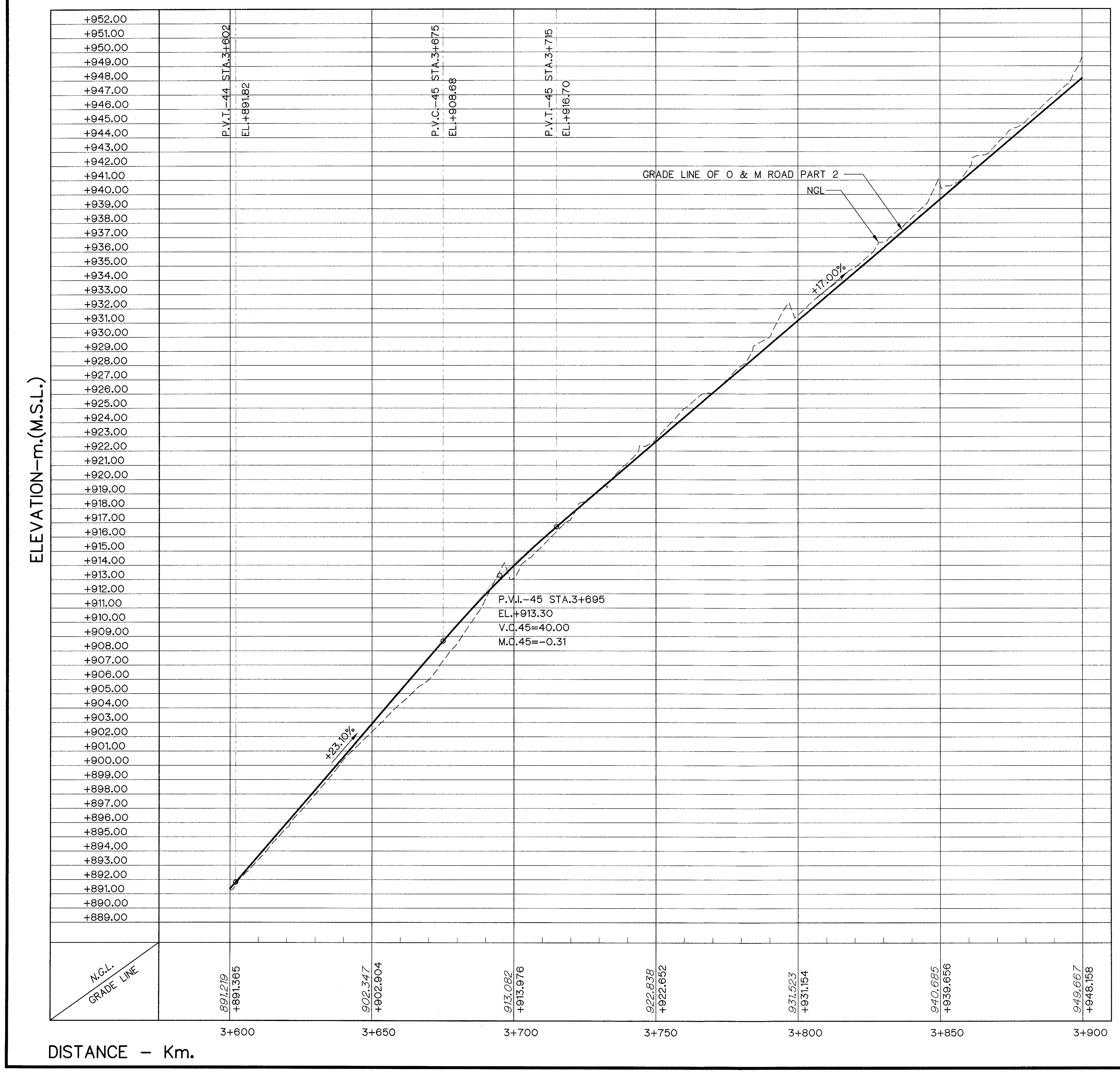
SCALE 1:1,000

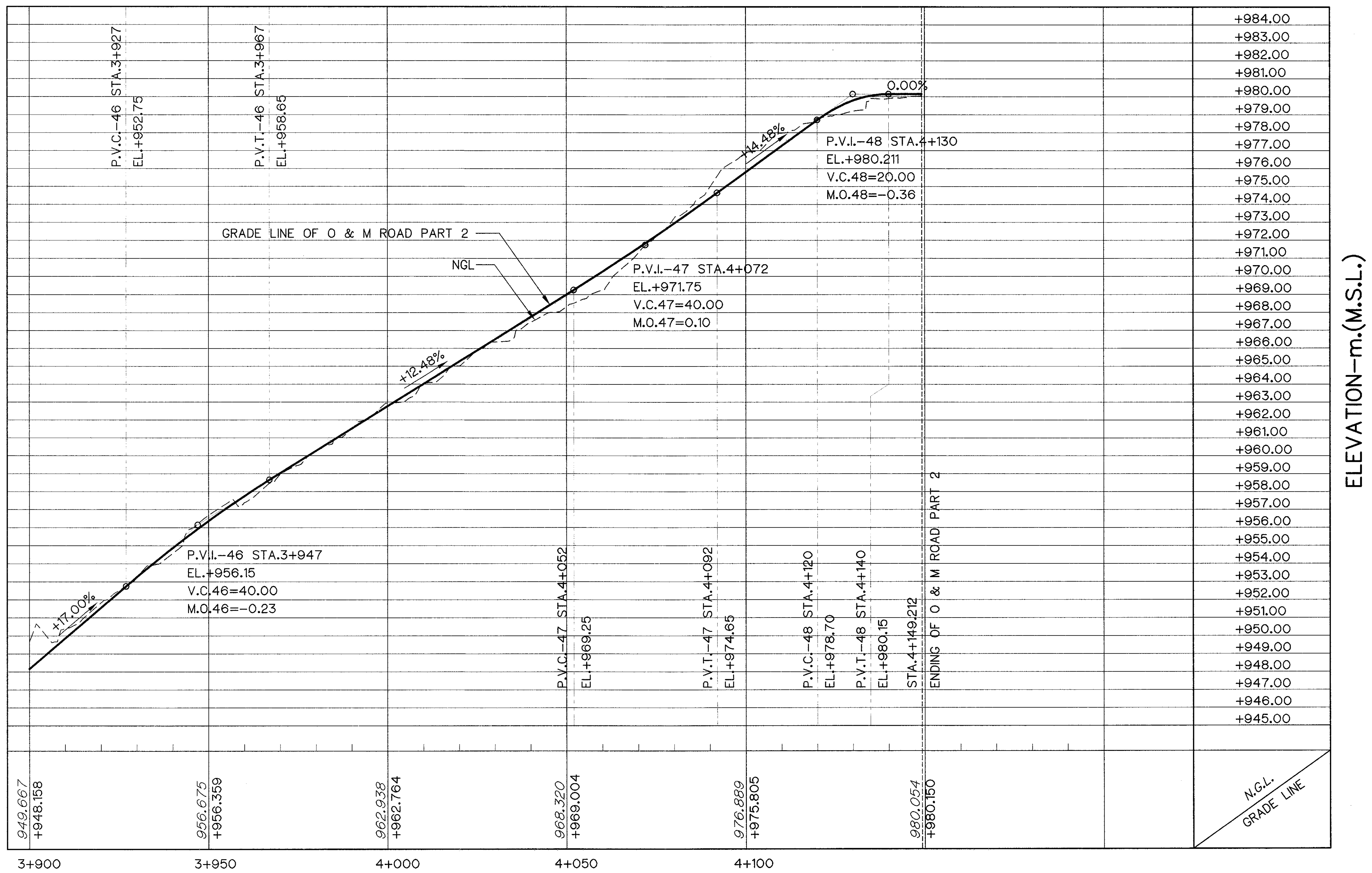
## NOTES :

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS UNLESS OTHERWISE SHOWN.
2. SYMBOL, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH-GN-03
3. THE ALIGNMENT OF THE HEADRACE AND RELATED STRUCTURES SHALL BE CHECKED AND CORRECTED BY THE CONTRACTOR TO SUIT THE FIELD CONDITIONS AND SHALL BE SUBMITTED TO DEDE'S FIELD ENGINEER FOR APPROVAL

## REFERENCE DRAWINGS :

| | |
|---|---|
| 1. O&M ROAD PART 3 PLAN AND PROFILE, STA. 3+000 TO STA. 3+600 | MH-OM-06 |
| 2. O&M ROAD TYPICAL SECTIONS AND DETAILS | MH-OM-10 |
| 3. HEADRACE TYPICAL SECTIONS | MH-HR-06 |





## PROFILE

VERTICAL SCALE 1:200
HORIZONTAL SCALE 1:1,000

0 5 10 15
SCALE 1:200 METERS

0 10 20 40 50 80
SCALE 1:1,000 METERS

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
|---|---|---|---|---|
| 3 | | | | |
| 2 | | | | |
| 1 | | | | |
| | CONSULTANTS | | DEDE | |

KINGDOM OF THAILAND
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
O&M ROAD PART 2
PLAN AND PROFILE, STA. 3+600 TO STA. 4+149.212

P&C MANAGEMENT CO.,LTD.
DESIGNED ภย.64624 สย.6226
DRAWN
CHECKED สย.6226
PROJECT MANAGER 08/03/2559 DATE

Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY
REVIEWED
SUBMITTED Chanit
RECOMMENDED
APPROVED P.Hom

DRAWING NO. MH-OM-07
SHEET NO. 56 OF 130

## HORIZONTAL CURVE OF O&M ROAD PART 2

| NO. PI. | COORDINATE |  | PI. – PI. | DEFLECTION ANGLE (△) | TL. | R | LC. | BC. STA. | PI. STA. | EC. STA. | BEARING |
|---|---|---|---|---|---|---|---|---|---|---|---|
|  | N | E | (m) | ( ° – ' – " ) | (m) | (m) | (m) | (km) | (km) | (km) | (N/S ° – ' – " E/W) |
| BEG. | 2,169,520.242 | 456,364.022 | – | – | – | – | – | – | 0+000.000 | – | – |
| 1 | 2,169,503.052 | 456,355.583 | 19.150 | 22°–45'–03.09" | 6.000 | 29.823 | 11.842 | 0+013.150 | 0+019.150 | 0+024.992 | S26°–08'–51.27"W |
| 2 | 2,169,497.255 | 456,348.939 | 8.818 | 108°–29'–01.32" | – | – | – | – | 0+027.809 | – | S48°–53'–54.35"W |
| 3 | 2,169,489.091 | 456,362.847 | 16.128 | 08°–49'–51.86" | 6.000 | 77.702 | 11.976 | 0+037.937 | 0+043.937 | 0+049.913 | S59°–35'–06.97"E |
| 4 | 2,169,481.371 | 456,382.361 | 20.986 | 05°–45'–56.73" | 10.000 | 198.577 | 19.983 | 0+054.899 | 0+064.899 | 0+074.882 | S68°–24'–58.83"E |
| 5 | 2,169,451.073 | 456,440.938 | 65.948 | 16°–05'–55.99" | 15.000 | 106.066 | 29.802 | 0+115.830 | 0+130.830 | 0+145.633 | S62°–39'–02.09"E |
| 6 | 2,169,419.451 | 456,474.321 | 45.982 | 38°–31'–58.14" | 15.000 | 42.914 | 28.861 | 0+161.615 | 0+176.615 | 0+190.476 | S46°–33'–06.10"E |
| 7 | 2,169,353.003 | 456,483.682 | 67.104 | 16°–54'–52.86" | 20.000 | 134.508 | 39.709 | 0+222.580 | 0+242.580 | 0+262.289 | S08°–01'–07.97"E |
| 8 | 2,169,292.008 | 456,474.135 | 61.738 | 06°–24'–44.24" | 20.000 | 357.039 | 39.958 | 0+284.027 | 0+304.027 | 0+323.985 | S08°–53'–44.89"W |
| 9 | 2,169,199.834 | 456,448.905 | 95.565 | 04°–09'–46.19" | 20.000 | 550.304 | 39.982 | 0+379.550 | 0+399.550 | 0+419.532 | S15°–18'–29.13"W |
| 10 | 2,169,096.423 | 456,428.532 | 105.398 | 38°–02'–14.19" | 15.000 | 43.517 | 28.890 | 0+489.931 | 0+504.931 | 0+518.821 | S11°–08'–42.94"W |
| 11 | 2,169,076.780 | 456,405.789 | 30.051 | 33°–41'–18.23" | 10.000 | 33.029 | 19.420 | 0+523.872 | 0+533.872 | 0+543.292 | S49°–10'–57.13"W |
| 12 | 2,169,073.862 | 456,382.458 | 23.513 | 71°–37'–17.19" | 10.000 | 13.860 | 17.325 | 0+546.805 | 0+556.805 | 0+564.130 | S82°–52'–15.36"W |
| 13 | 2,169,098.349 | 456,370.774 | 27.132 | 40°–38'–51.89" | 10.000 | 26.999 | 19.154 | 0+571.262 | 0+581.262 | 0+590.416 | N25°–30'–27.45"W |
| 14 | 2,169,181.911 | 456,393.384 | 86.567 | 07°–05'–49.34" | 20.000 | 322.515 | 39.949 | 0+646.983 | 0+666.983 | 0+686.932 | N15°–08'–24.44"E |
| 15 | 2,169,242.339 | 456,401.923 | 61.028 | 03°–05'–36.08" | 10.000 | 370.354 | 19.995 | 0+717.960 | 0+727.960 | 0+737.955 | N08°–02'–35.10"E |
| 16 | 2,169,300.854 | 456,413.441 | 59.638 | 40°–02'–26.61" | 20.000 | 54.889 | 38.359 | 0+767.593 | 0+787.593 | 0+805.951 | N11°–08'–11.18"E |
| 17 | 2,169,349.962 | 456,386.328 | 56.096 | 39°–18'–17.42" | 5.000 | 14.001 | 9.605 | 0+837.047 | 0+842.047 | 0+846.652 | N28°–54'–15.43"W |
| 18 | 2,169,357.386 | 456,367.757 | 20.000 | 116°–07'–37.77" | 15.000 | 9.350 | 18.950 | 0+846.652 | 0+861.652 | 0+865.602 | N68°–12'–32.85"W |
| 19 | 2,169,337.443 | 456,369.269 | 20.000 | 17°–00'–33.95" | 5.000 | 33.437 | 9.926 | 0+865.602 | 0+870.602 | 0+875.529 | S04°–20'–10.62"E |
| 20 | 2,169,295.955 | 456,385.483 | 44.544 | 38°–54'–10.68" | 15.000 | 42.473 | 28.838 | 0+900.072 | 0+915.072 | 0+928.911 | S21°–20'–44.56"E |
| 21 | 2,169,233.720 | 456,365.791 | 65.277 | 48°–25'–42.83" | 20.000 | 44.472 | 37.590 | 0+959.187 | 0+979.187 | 0+996.777 | S17°–33'–26.12"W |
| 22 | 2,169,214.694 | 456,323.087 | 46.751 | 73°–03'–41.84" | 15.000 | 20.249 | 25.820 | 1+008.528 | 1+023.528 | 1+034.348 | S65°–59'–08.95"W |
| 23 | 2,169,249.422 | 456,292.949 | 45.982 | 17°–22'–02.34" | 15.000 | 98.213 | 29.770 | 1+050.330 | 1+065.330 | 1+080.100 | N40°–57'–09.20"W |
| 24 | 2,169,356.687 | 456,246.118 | 117.042 | 29°–01'–30.75" | 20.000 | 77.264 | 39.141 | 1+162.143 | 1+182.143 | 1+201.284 | N23°–35'–06.87"W |
| 25 | 2,169,375.385 | 456,221.654 | 30.791 | 05°–36'–18.38" | 6.000 | 122.567 | 11.990 | 1+206.075 | 1+212.075 | 1+218.065 | N52°–36'–37.62"W |
| 26 | 2,169,383.755 | 456,208.146 | 15.891 | 05°–27'–49.35" | – | – | – | – | 1+227.956 | – | N58°–12'–56.00"W |
| 27 | 2,169,423.729 | 456,155.574 | 66.043 | 27°–47'–32.64" | 20.000 | 80.839 | 39.213 | 1+274.000 | 1+294.000 | 1+313.213 | N52°–45'–06.66"W |
| 28 | 2,169,487.644 | 456,125.825 | 70.499 | 55°–46'–58.84" | 20.000 | 37.787 | 36.789 | 1+343.712 | 1+363.712 | 1+380.501 | N24°–57'–34.02"W |
| 29 | 2,169,500.623 | 456,046.197 | 80.679 | 143°–44'–59.70" | 23.000 | 7.529 | 18.889 | 1+418.180 | 1+441.180 | 1+437.069 | N80°–44'–32.86"W |
| 30 | 2,169,461.965 | 456,084.176 | 54.193 | 65°–52'–20.78" | 13.000 | 20.067 | 23.071 | 1+455.261 | 1+468.261 | 1+478.332 | S44°–29'–32.55"E |
| 31 | 2,169,421.239 | 456,068.232 | 43.736 | 20°–10'–37.85" | 7.000 | 39.343 | 13.855 | 1+502.068 | 1+509.068 | 1+515.923 | S21°–22'–48.23"W |
| 32 | 2,169,365.994 | 456,067.072 | 55.257 | 65°–36'–53.97" | 38.000 | 58.948 | 67.507 | 1+526.180 | 1+564.180 | 1+593.687 | S01°–12'–10.38"W |
| 33 | 2,169,345.310 | 456,018.771 | 52.543 | 27°–28'–45.20" | 8.000 | 32.719 | 15.692 | 1+600.230 | 1+608.230 | 1+615.922 | S66°–49'–04.35"W |
| 34 | 2,169,351.143 | 455,941.142 | 77.848 | 57°–28'–23.42" | 10.000 | 18.238 | 18.294 | 1+675.770 | 1+685.770 | 1+694.064 | N85°–42'–10.45"W |
| 35 | 2,169,402.698 | 455,913.464 | 58.515 | 23°–13'–07.47" | 9.000 | 43.808 | 17.753 | 1+733.579 | 1+742.579 | 1+751.332 | N28°–13'–47.03"W |
| 36 | 2,169,415.007 | 455,898.018 | 19.751 | 31°–28'–51.77" | 9.000 | 31.932 | 17.545 | 1+753.083 | 1+762.083 | 1+770.628 | N51°–26'–54.50"W |
| 37 | 2,169,416.996 | 455,881.982 | 16.159 | 22°–09'–31.47" | 7.000 | 35.747 | 13.825 | 1+770.787 | 1+777.787 | 1+784.612 | N82°–55'–46.27"W |
| 38 | 2,169,430.644 | 455,857.591 | 27.950 | 22°–05'–54.78" | 15.000 | 76.816 | 29.627 | 1+790.561 | 1+805.561 | 1+820.189 | N60°–46'–14.80"W |
| 39 | 2,169,436.415 | 455,811.460 | 46.491 | 35°–53'–03.53" | 10.000 | 30.883 | 19.342 | 1+841.679 | 1+851.679 | 1+861.021 | N82°–52'–09.58"W |
| 40 | 2,169,457.012 | 455,789.384 | 30.192 | 30°–27'–11.10" | 10.000 | 36.739 | 19.527 | 1+871.214 | 1+881.214 | 1+890.741 | N46°–59'–06.05"W |
| 41 | 2,169,468.530 | 455,737.694 | 52.958 | 142°–52'–32.16" | 28.000 | 9.402 | 23.446 | 1+905.698 | 1+933.698 | 1+929.145 | N77°–26'–17.16"W |
| 42 | 2,169,420.697 | 455,778.279 | 62.731 | 127°–30'–47.43" | 13.000 | 6.409 | 14.263 | 1+950.876 | 1+963.876 | 1+965.139 | S40°–18'–49.32"E |
| 43 | 2,169,419.520 | 455,754.218 | 24.090 | 15°–41'–24.07" | 10.000 | 72.578 | 19.875 | 1+966.229 | 1+976.229 | 1+986.104 | S87°–11'–58.11"W |
| 44 | 2,169,401.329 | 455,699.821 | 57.358 | 27°–12'–27.70" | 25.000 | 103.307 | 49.057 | 2+008.462 | 2+033.462 | 2+057.519 | S71°–30'–34.04"W |
| 45 | 2,169,416.644 | 455,599.937 | 101.051 | 06°–51'–00.90" | 10.000 | 167.082 | 19.976 | 2+123.570 | 2+133.570 | 2+143.546 | N81°–16'–58.26"W |

## HORIZONTAL CURVE OF O&M ROAD PART 2(CONTINUED)

| NO. PI. | COORDINATE |  | PI. – PI. | DEFLECTION ANGLE (△) | TL. | R | LC. | BC. STA. | PI. STA. | EC. STA. | BEARING |
|---|---|---|---|---|---|---|---|---|---|---|---|
|  | N | E | (m) | ( ° – ' – " ) | (m) | (m) | (m) | (km) | (km) | (km) | (N/S ° – ' – " E/W) |
| 46 | 2,169,418.466 | 455,544.039 | 55.928 | 06°–28'–31.36" | 10.000 | 176.777 | 19.979 | 2+179.474 | 2+189.474 | 2+199.452 | N88°–07'–59.16"W |
| 47 | 2,169,424.511 | 455,502.815 | 41.665 | 65°–56'–29.58" | 25.000 | 38.540 | 44.355 | 2+206.117 | 2+231.117 | 2+250.472 | N81°–39'–27.80"W |
| 48 | 2,169,503.106 | 455,480.699 | 81.647 | 08°–46'–11.14" | 10.000 | 130.411 | 19.961 | 2+297.120 | 2+307.120 | 2+317.081 | N15°–42'–58.23"W |
| 49 | 2,169,576.810 | 455,447.132 | 80.988 | 66°–02'–48.59" | 48.000 | 73.847 | 85.126 | 2+340.069 | 2+388.069 | 2+425.195 | N24°–29'–09.37"W |
| 50 | 2,169,576.159 | 455,377.123 | 70.012 | 20°–33'–19.40" | 10.000 | 55.148 | 19.785 | 2+437.207 | 2+447.207 | 2+456.992 | S89°–28'–02.04"W |
| 51 | 2,169,604.237 | 455,300.074 | 82.006 | 154°–18'–00.47" | 27.000 | 6.159 | 16.586 | 2+501.998 | 2+528.998 | 2+518.584 | N69°–58'–38.56"W |
| 52 | 2,169,612.558 | 455,383.776 | 84.115 | 32°–02'–01.72" | 10.000 | 34.835 | 19.476 | 2+565.699 | 2+575.699 | 2+585.175 | N84°–19'–21.91"E |
| 53 | 2,169,643.066 | 455,423.233 | 49.876 | 81°–36'–08.46" | 15.000 | 17.377 | 24.749 | 2+610.051 | 2+625.051 | 2+634.800 | N52°–17'–20.19"E |
| 54 | 2,169,697.928 | 455,392.429 | 62.918 | 11°–57'–12.57" | 10.000 | 95.517 | 19.927 | 2+672.718 | 2+682.718 | 2+692.645 | N29°–18'–48.26"W |
| 55 | 2,169,749.986 | 455,376.155 | 54.542 | 20°–36'–23.01" | 10.000 | 55.009 | 19.784 | 2+727.188 | 2+737.188 | 2+746.972 | N17°–21'–35.70"W |
| 56 | 2,169,787.858 | 455,346.602 | 48.038 | 113°–47'–19.83" | 13.000 | 8.476 | 16.834 | 2+772.010 | 2+785.010 | 2+788.844 | N37°–57'–58.70"W |
| 57 | 2,169,794.558 | 455,373.124 | 27.355 | 10°–01'–04.61" | 10.000 | 114.095 | 19.949 | 2+793.199 | 2+803.199 | 2+813.148 | N75°–49'–21.12"E |
| 58 | 2,169,802.471 | 455,481.931 | 109.094 | 87°–58'–33.02" | 10.000 | 10.360 | 15.907 | 2+902.243 | 2+912.243 | 2+918.150 | N85°–50'–25.73"E |
| 59 | 2,169,833.528 | 455,480.773 | 31.079 | 46°–50'–50.39" | 12.000 | 27.699 | 22.648 | 2+927.228 | 2+939.228 | 2+949.876 | N02°–08'–07.29"W |
| 60 | 2,169,878.675 | 455,428.869 | 68.792 | 10°–27'–49.51" | 10.000 | 109.208 | 19.944 | 2+996.667 | 3+006.667 | 3+016.612 | N48°–58'–57.68"W |
| 61 | 2,169,912.867 | 455,401.653 | 43.701 | 119°–01'–35.51" | 13.000 | 7.654 | 15.899 | 3+037.313 | 3+050.313 | 3+053.213 | N38°–31'–08.17"W |
| 62 | 2,169,918.547 | 455,435.623 | 34.442 | 16°–38'–56.87" | 10.000 | 68.342 | 19.859 | 3+064.654 | 3+074.654 | 3+084.513 | N80°–30'–27.34"E |
| 63 | 2,169,914.610 | 455,466.978 | 31.601 | 07°–19'–33.38" | 10.000 | 156.206 | 19.973 | 3+096.114 | 3+106.114 | 3+116.087 | S82°–50'–35.79"E |
| 64 | 2,169,883.455 | 455,587.596 | 124.577 | 123°–45'–27.66" | 52.000 | 27.790 | 60.026 | 3+178.664 | 3+230.664 | 3+238.690 | S75°–31'–02.41"E |
| 65 | 2,169,990.465 | 455,550.174 | 113.365 | 144°–52'–57.55" | 18.000 | 5.696 | 14.402 | 3+282.055 | 3+300.055 | 3+296.457 | N19°–16'–30.07"W |
| 66 | 2,169,953.822 | 455,601.342 | 62.935 | 127°–14'–14.54" | 32.000 | 15.872 | 35.247 | 3+309.392 | 3+341.392 | 3+344.639 | S54°–23'–32.53"E |
| 67 | 2,170,006.226 | 455,599.851 | 52.425 | 76°–15'–57.23" | 10.000 | 12.738 | 16.956 | 3+355.065 | 3+365.065 | 3+372.021 | N01°–37'–47.07"W |
| 68 | 2,170,015.104 | 455,632.162 | 33.509 | 72°–16'–57.63" | 13.000 | 17.800 | 22.457 | 3+382.529 | 3+395.529 | 3+404.986 | N74°–38'–10.16"E |
| 69 | 2,169,967.126 | 455,663.416 | 57.260 | 41°–33'–55.39" | 15.000 | 39.524 | 28.673 | 3+434.246 | 3+449.246 | 3+462.918 | S33°–04'–52.21"E |
| 70 | 2,169,957.153 | 455,699.738 | 37.666 | 77°–37'–23.08" | 17.000 | 21.135 | 28.633 | 3+468.584 | 3+485.584 | 3+497.218 | S74°–38'–47.60"E |
| 71 | 2,169,998.904 | 455,721.686 | 47.168 | 42°–18'–07.32" | 10.000 | 25.847 | 19.083 | 3+517.386 | 3+527.386 | 3+536.469 | N27°–43'–49.32"E |
| 72 | 2,170,038.065 | 455,711.506 | 40.463 | 41°–21'–22.21" | 10.000 | 26.495 | 19.124 | 3+556.932 | 3+566.932 | 3+576.056 | N14°–34'–18.00"W |
| 73 | 2,170,075.902 | 455,730.606 | 42.385 | 48°–49'–04.86" | 15.000 | 33.054 | 28.163 | 3+593.440 | 3+608.440 | 3+621.603 | N26°–47'–04.21"E |
| 74 | 2,170,111.340 | 455,716.264 | 38.230 | 85°–58'–21.12" | 20.000 | 21.458 | 32.197 | 3+624.833 | 3+644.833 | 3+657.031 | N22°–02'–00.65"W |
| 75 | 2,170,096.375 | 455,670.223 | 48.412 | 10°–22'–12.63" | 10.000 | 110.199 | 19.945 | 3+675.443 | 3+685.443 | 3+695.388 | S71°–59'–38.23"W |
| 76 | 2,170,089.456 | 455,618.614 | 52.071 | 17°–58'–48.03" | 10.000 | 63.209 | 19.836 | 3+727.459 | 3+737.459 | 3+747.294 | S82°–21'–50.86"W |
| 77 | 2,170,095.147 | 455,587.435 | 31.694 | 07°–08'–55.65" | 10.000 | 160.087 | 19.974 | 3+758.988 | 3+768.988 | 3+778.963 | N79°–39'–21.10"W |
| 78 | 2,170,097.008 | 455,554.100 | 33.387 | 34°–02'–32.25" | 10.000 | 32.665 | 19.408 | 3+792.349 | 3+802.349 | 3+811.758 | N86°–48'–16.75"W |
| 79 | 2,170,112.357 | 455,533.906 | 25.365 | 21°–24'–13.69" | 10.000 | 52.914 | 19.767 | 3+817.123 | 3+827.123 | 3+836.890 | N52°–45'–44.50"W |
| 80 | 2,170,154.460 | 455,508.248 | 49.305 | 59°–35'–09.18" | 10.000 | 17.466 | 18.164 | 3+866.195 | 3+876.195 | 3+884.359 | N31°–21'–30.81"W |
| 81 | 2,170,153.888 | 455,473.550 | 34.703 | 06°–52'–47.60" | 10.000 | 166.360 | 19.976 | 3+899.062 | 3+909.062 | 3+919.037 | S89°–03'–20.01"W |
| 82 | 2,170,157.168 | 455,442.001 | 31.719 | 23°–52'–09.17" | 10.000 | 47.312 | 19.710 | 3+930.757 | 3+940.757 | 3+950.466 | N84°–03'–52.39"W |
| 83 | 2,170,173.004 | 455,414.355 | 31.860 | 148°–07'–23.99" | 10.000 | 2.856 | 7.383 | 3+962.327 | 3+972.327 | 3+969.710 | N60°–11'–43.22"W |
| 84 | 2,170,159.084 | 455,421.856 | 15.812 | 25°–32'–04.54" | 5.000 | 22.066 | 9.834 | 3+970.522 | 3+975.522 | 3+980.356 | S28°–19'–07.22"E |
| 85 | 2,170,151.569 | 455,432.144 | 12.740 | 08°–54'–55.80" | 5.000 | 64.136 | 9.980 | 3+983.096 | 3+988.096 | 3+993.076 | S53°–51'–11.76"E |
| 86 | 2,170,136.591 | 455,461.249 | 32.733 | 08°–29'–19.04" | 10.000 | 134.747 | 19.963 | 4+010.809 | 4+020.809 | 4+030.773 | S62°–46'–07.56"E |
| 87 | 2,170,118.341 | 455,486.628 | 31.259 | 127°–13'–46.72" | 17.000 | 8.433 | 18.727 | 4+035.032 | 4+052.032 | 4+053.759 | S54°–16'–48.53"E |
| 88 | 2,170,107.415 | 455,451.003 | 37.263 | 51°–23'–36.04" | 12.000 | 24.938 | 22.369 | 4+062.022 | 4+074.022 | 4+084.391 | S72°–56'–58.20"W |
| 89 | 2,170,132.424 | 455,414.400 | 44.331 | 50°–03'–51.10" | 17.000 | 36.403 | 31.809 | 4+099.722 | 4+116.722 | 4+131.530 | N55°–39'–25.77"W |
| END | 2,170,123.027 | 455,381.016 | 34.682 | – | – | – | – | – | 4+149.212 | – | S74°–16'–43.14"W |

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
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|  | CONSULTANTS |  | DEDE |  |

KINGDOM OF THAILAND
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

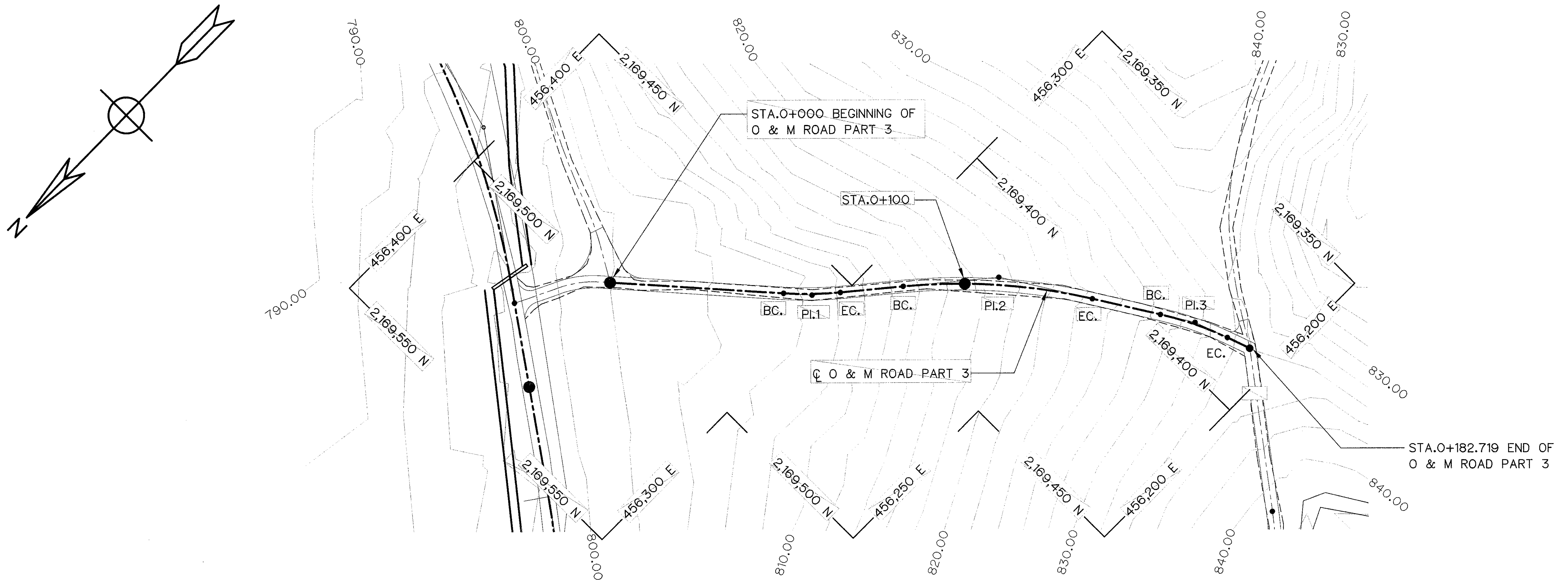
CIVIL WORKS AND TRANSMISSION LINE
O&M ROAD PART 2
HORIZONTAL CURVE

P&C MANAGEMENT CO.,LTD.

DESIGNED ภย.64624 สย.6226
DRAWN
CHECKED สย.6226
PROJECT MANAGER
DATE 08/03/2559

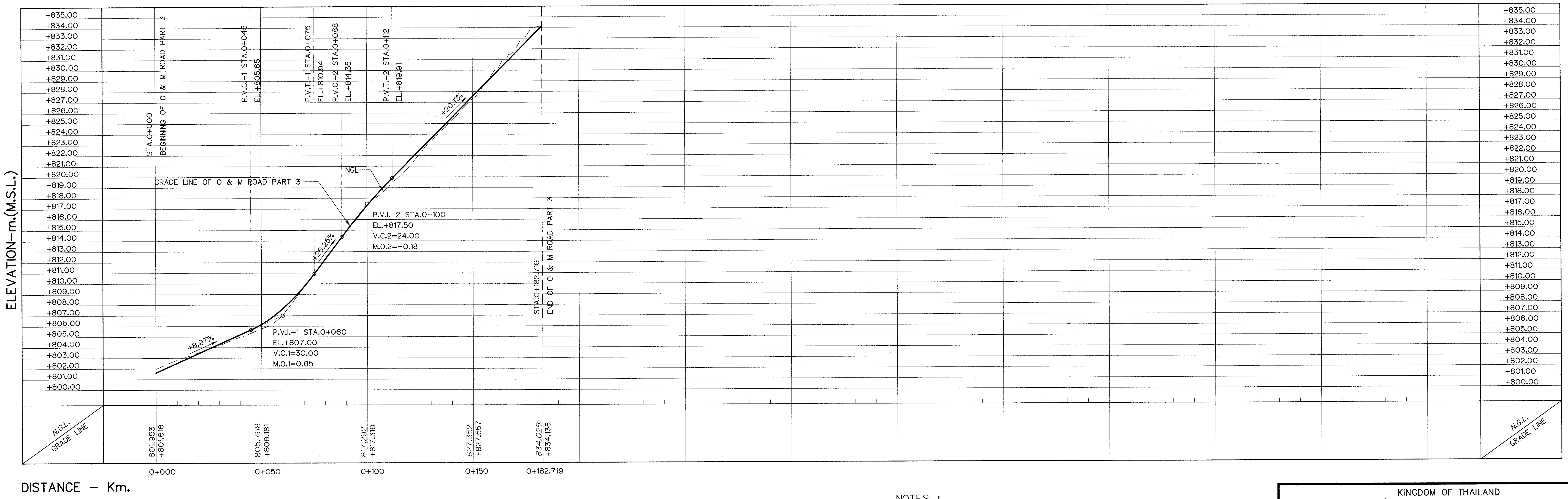
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY
REVIEWED
SUBMITTED Chanit
RECOMMENDED
APPROVED P. Hansell

DRAWING NO. MH-OM-08
SHEET NO. 57 OF 130



## PLAN

SCALE 1:1,000



## PROFILE

VERTICAL SCALE 1:200
HORIZONTAL SCALE 1:1,000

## HORIZONTAL CURVE OF O&M ROAD PART 3

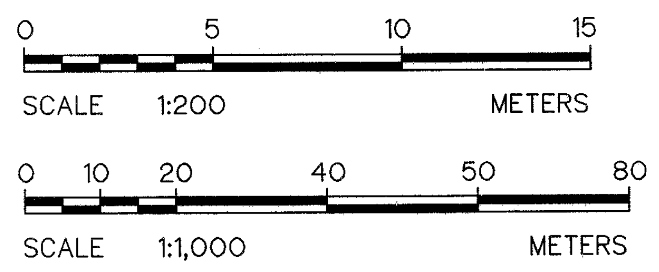
| NO. PI. | COORDINATE | | PI. - PI. (m) | DEFLECTION ANGLE (△) ( ° - ' - " ) | TL. (m) | R (m) | LC. (m) | BC. STA. (km) | PI. STA. (km) | EC. STA. (km) | BEARING (N/S ° - ' - " E/W) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | N | E | | | | | | | | | |
| BEG. | 2,169,497.256 | 456,348.939 | - | - | - | - | - | - | 0+000.000 | - | - |
| 1 | 2,169,459.822 | 456,306.030 | 56.943 | 09°-03'-08.29" | 8.000 | 101.060 | 15.967 | 0+048.943 | 0+056.943 | 0+064.910 | S48°-53'-54.80"W |
| 2 | 2,169,419.324 | 456,272.233 | 52.748 | 18°-16'-59.79" | 27.000 | 167.786 | 53.541 | 0+082.657 | 0+109.657 | 0+136.198 | S39°-50'-46.50"W |
| 3 | 2,169,389.417 | 456,224.130 | 56.642 | 12°-21'-54.58" | 10.000 | 92.313 | 19.922 | 0+155.840 | 0+165.840 | 0+175.763 | S58°-07'-46.29"W |
| END | 2,169,383.755 | 456,208.146 | 16.957 | - | - | - | - | - | 0+182.719 | - | S70°-29'-40.87"W |

NOTES :

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS UNLESS OTHERWISE SHOWN.
2. SYMBOL, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO.NMH-GN-03
3. THE ALIGNMENT OF THE HEADRACE AND RELATED STRUCTURES SHALL BE CHECKED AND CORRECTED BY THE CONTRACTOR TO SUIT THE FIELD CONDITIONS AND SHALL BE SUBMITTED TO DEDE'S FIELD ENGINEER FOR APPROVAL

REFERENCE DRAWINGS :

| | |
|---|---|
| 1. O&M ROAD TYPICAL SECTION AND DETAILS | MH-OM-10 |



| NO. | DATE | REVISIONS | CHECKED | APPROVED |
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| | CONSULTANTS | | DEDE | |

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MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
O&M ROAD PART 3
PLAN AND PROFILE, STA. 0+000 TO STA. 0+182.719

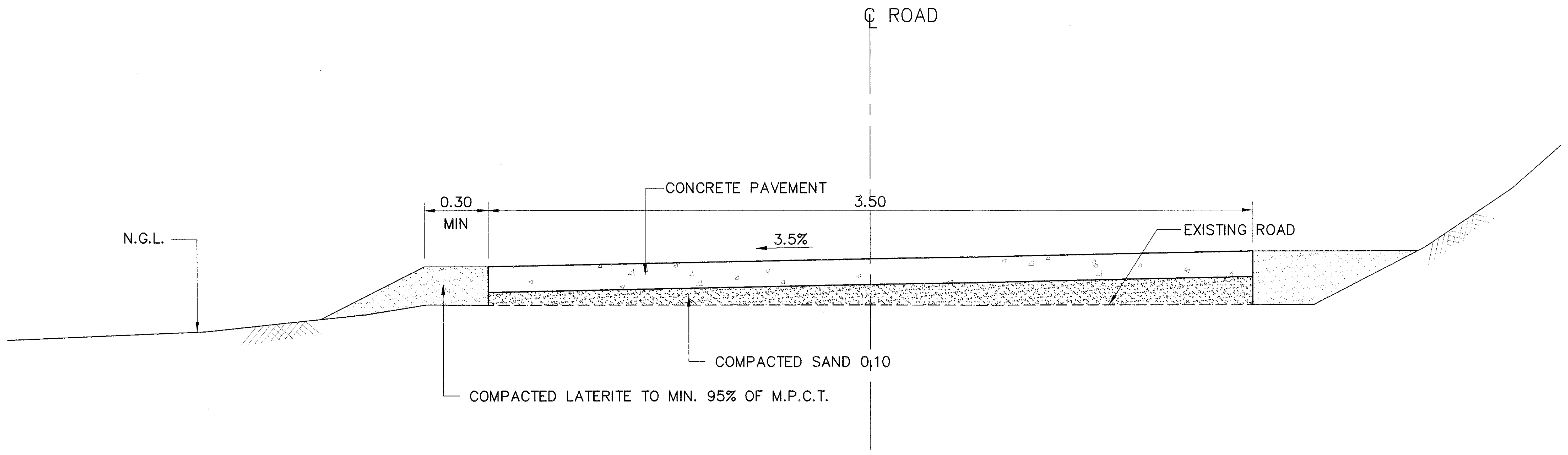
P&C MANAGEMENT CO.,LTD.

DESIGNED ภย.64624 สย.6226
DRAWN
CHECKED สย.6226
PROJECT MANAGER
DATE 08/03/2559

Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

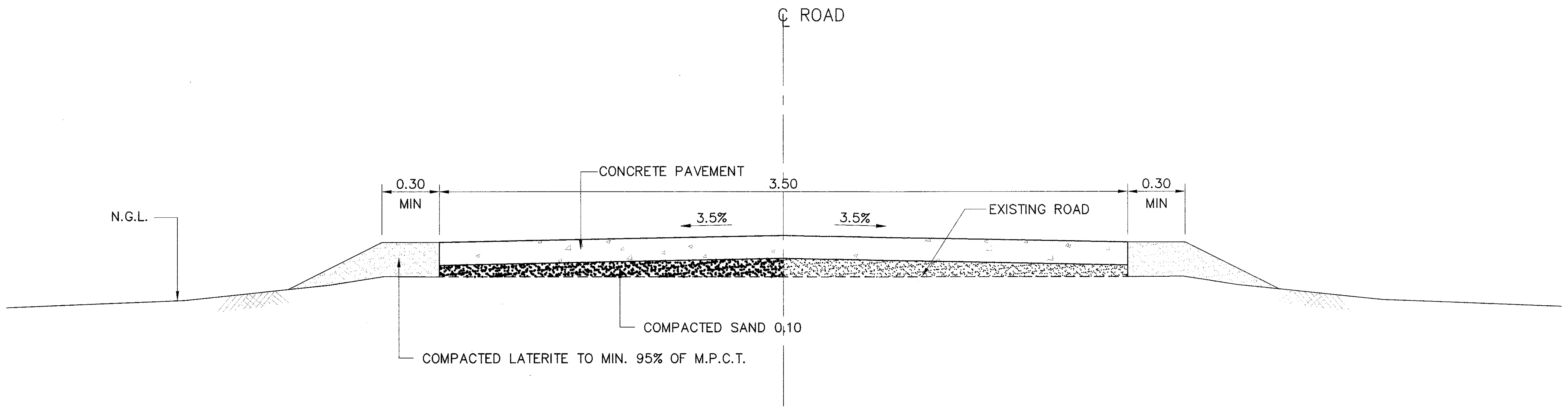
REVIEWED
SUBMITTED
RECOMMENDED
APPROVED P.Hansell

DRAWING NO. MH-OM-09
SHEET NO. 58 OF 130



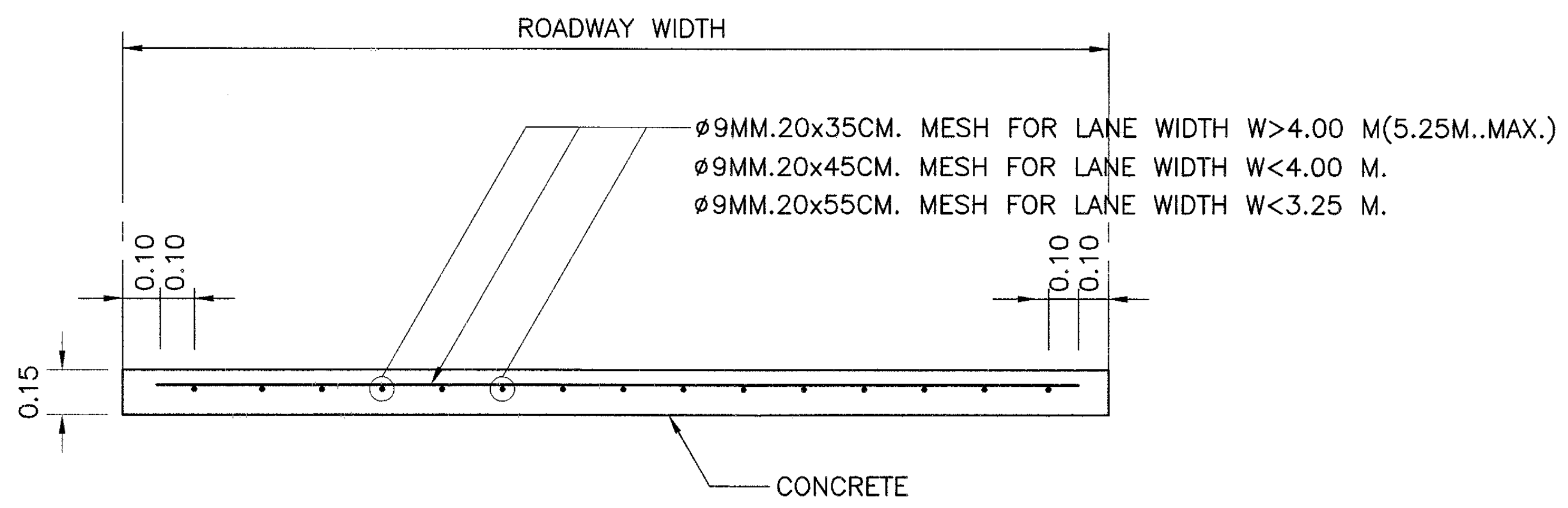
## TYPICAL SECTION FOR HILLSIDE

NOT TO SCALE



## TYPICAL SECTION FOR FLAT AREA

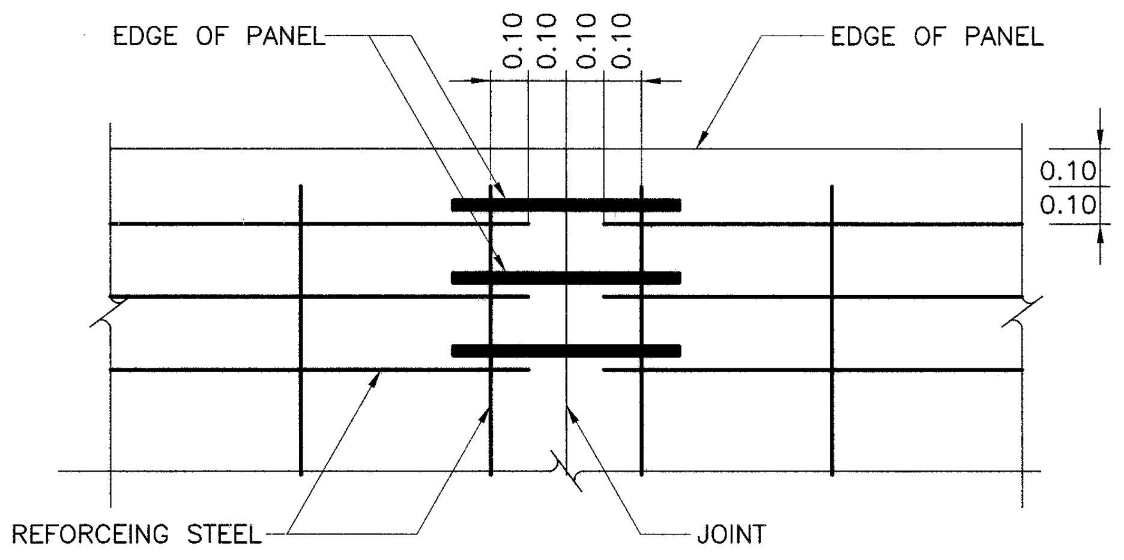
NOT TO SCALE



ROADWAY WIDTH
ø9MM.20x35CM. MESH FOR LANE WIDTH W>4.00 M(5.25M..MAX.)
ø9MM.20x45CM. MESH FOR LANE WIDTH W<4.00 M.
ø9MM.20x55CM. MESH FOR LANE WIDTH W<3.25 M.
0.10
0.10
0.10
0.10
0.15
CONCRETE

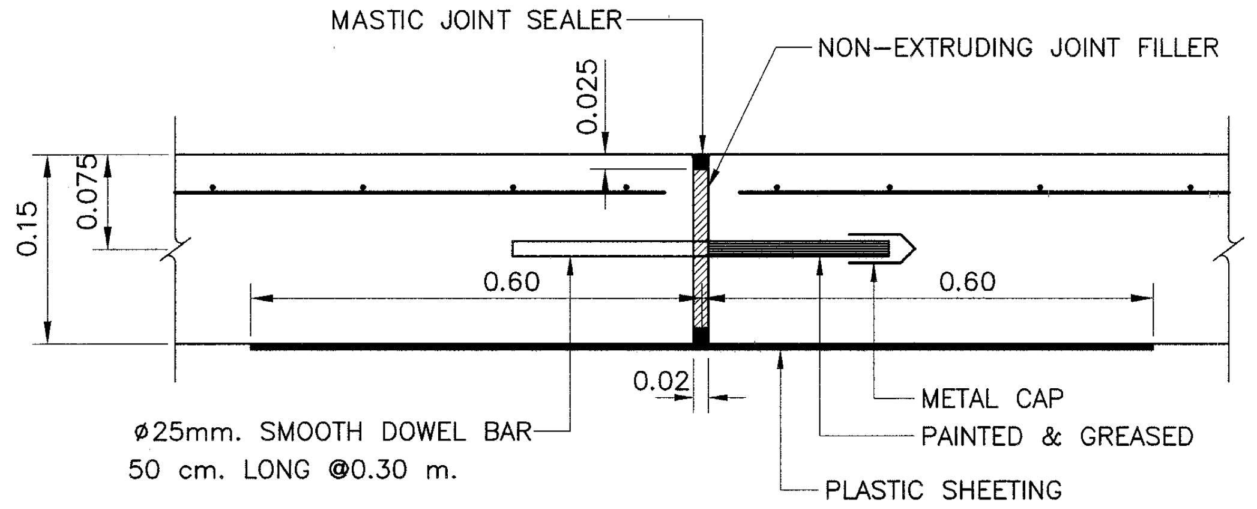
## REINFORCEMENT DETAIL OF CONCRETE PAVEMENT CROSS–SECTION

NOT TO SCALE



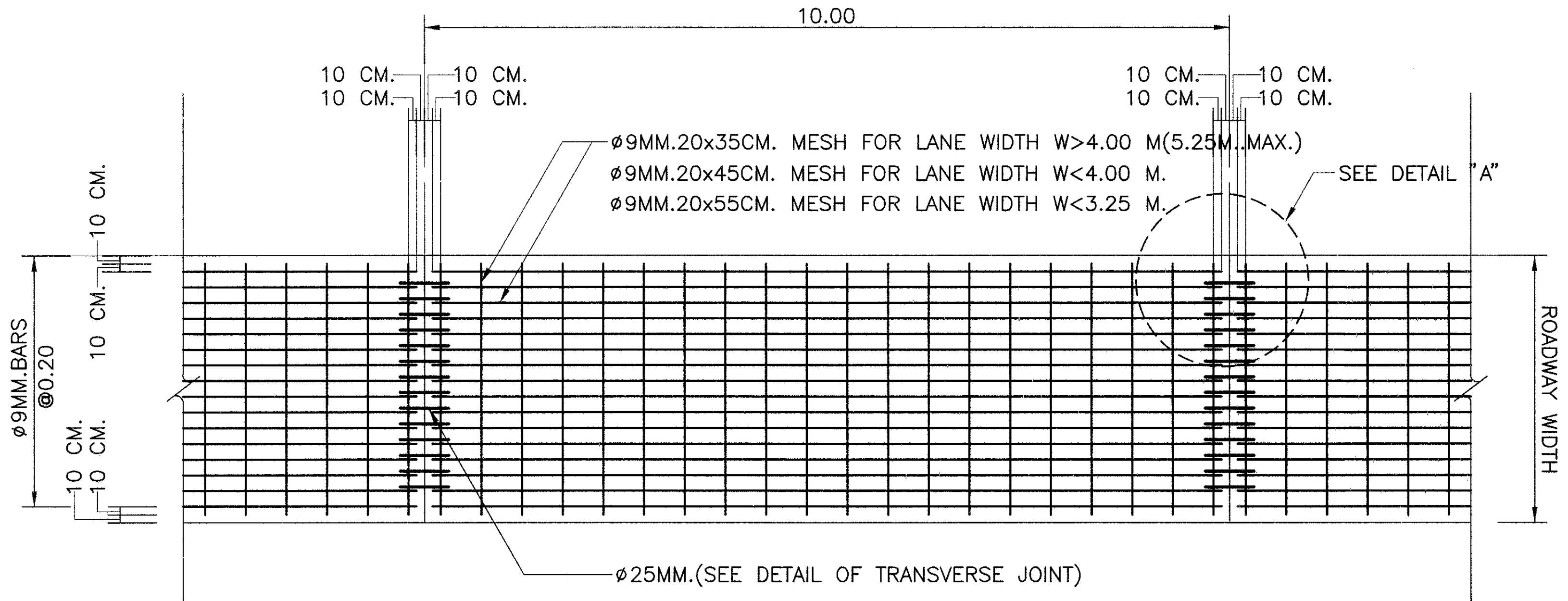
## DETAIL "A"

NOT TO SCALE



## DETAIL OF EXPANSION JOINT

NOT TO SCALE



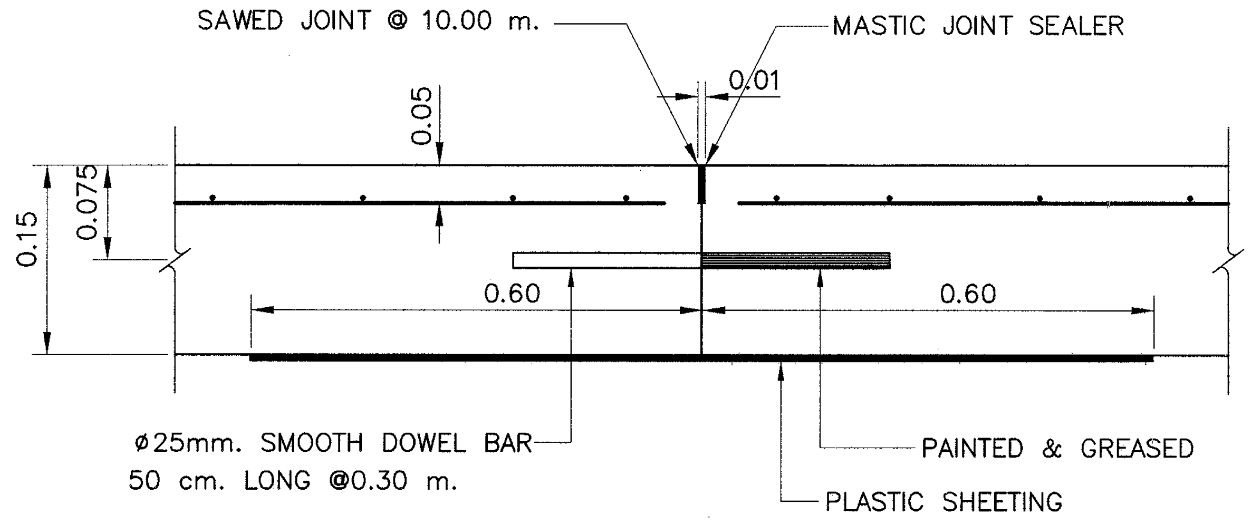
10.00
10 CM.
10 CM.
10 CM.
10 CM.
10 CM.
10 CM.
10 CM.
10 CM.
ø9MM.20x35CM. MESH FOR LANE WIDTH W>4.00 M(5.25M..MAX.)
ø9MM.20x45CM. MESH FOR LANE WIDTH W<4.00 M.
ø9MM.20x55CM. MESH FOR LANE WIDTH W<3.25 M.
SEE DETAIL "A"
10 CM.
10 CM.
10 CM.
10 CM.
ø9MM.BARS
@0.20
ROADWAY WIDTH
ø25MM.(SEE DETAIL OF TRANSVERSE JOINT)

## PLAN OF REINFORCEMENT CONCRETE PAVEMENT

NOT TO SCALE

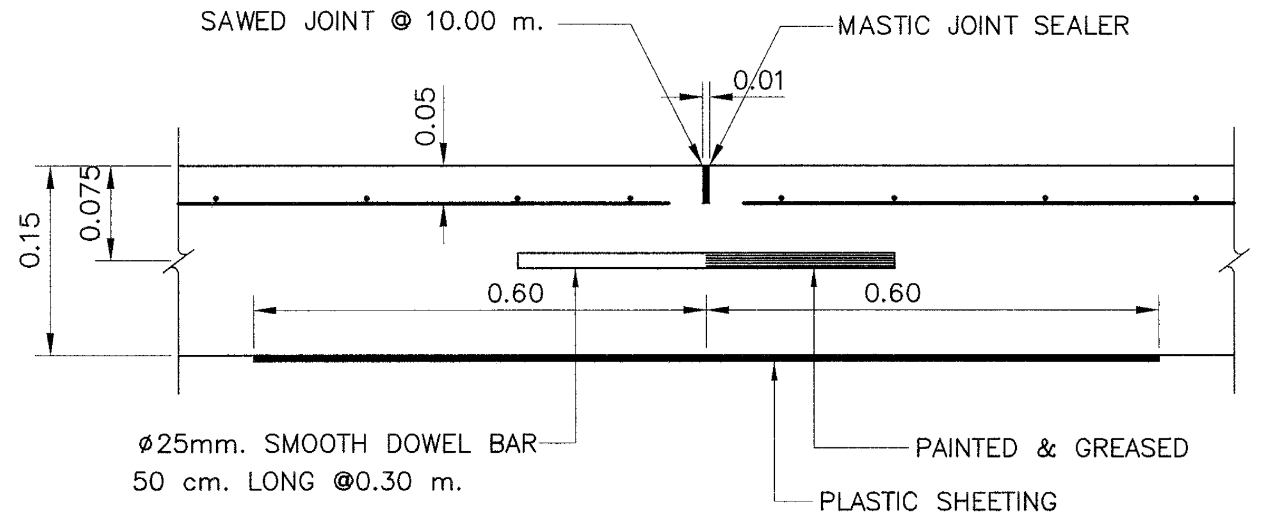
## NOTES 1 :

1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE INDICATED.
2. EXPANSION JOINT SHALL BE CONSTRUCTED AT THE INTERVAL OF 90 METERS.
3. MASTIC JOINT SEALER SHALL BE OF THE HOT POURED ELASTIC TYPE CONFORMING TO TIS.479.
4. JOINT FILLER SHALL CONFORM TO THE AASHTO M.213–74 OR ASTM.D1751–73 SPECIFICATION.
5. CONCRETE SHALL HAVE A MINIMUM ULTIMATE COMPRESSIVE STRENGTH OF 300 KSC. FOR 15x15x15 CM. CUBE AT 28 DAYS.
6. REINFORCING STEEL SHALL CONFORM TIS.20 GRADE SR 24 FOR ROUND BARS AND TIS.24 GRADE SD 30 FOR DEFORMED BAR.
7. PLASTIC SHEET USED IN CONSTRUCTION SHALL HAVE THE FOLLOWING REQUIREMENTS :
    - 7.1 THICKNESS OF 0.07 MM. WITH A TOLERANCE OF NOT MORE THAN 7 % SHALL BE REQUIRED.
    - 7.2 WIDTH SHALL NOT BE LESS THAN 1.20 M.
    - 7.3 IT SHALL BE COLOURLESS,TRANSPARENT AND WATERPROOF, FREE FROM POROUS AREA, TURN AREA AND BLISTERING AREA WHICH ARE VISIBLE BY NAKED EYE. EDGE SHALL BE STRAIGHT.
    - 7.4 CONTINUOUS LENGTH SHALL BE REQUIREMENT TO THE WIDTH OF TRAFFIC LANES. CONNECTION ALLOWED AT LONGITUDINAL JOINTS WITH NOT LESS. THAN 20 CM. OVERLAPPING SHALL BE REQUIRED.



## DETAIL OF CONSTRUCTION JOINT

NOT TO SCALE



## DETAIL OF CONTRACTION JOINT

NOT TO SCALE

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Energy Development and Efficiency
MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

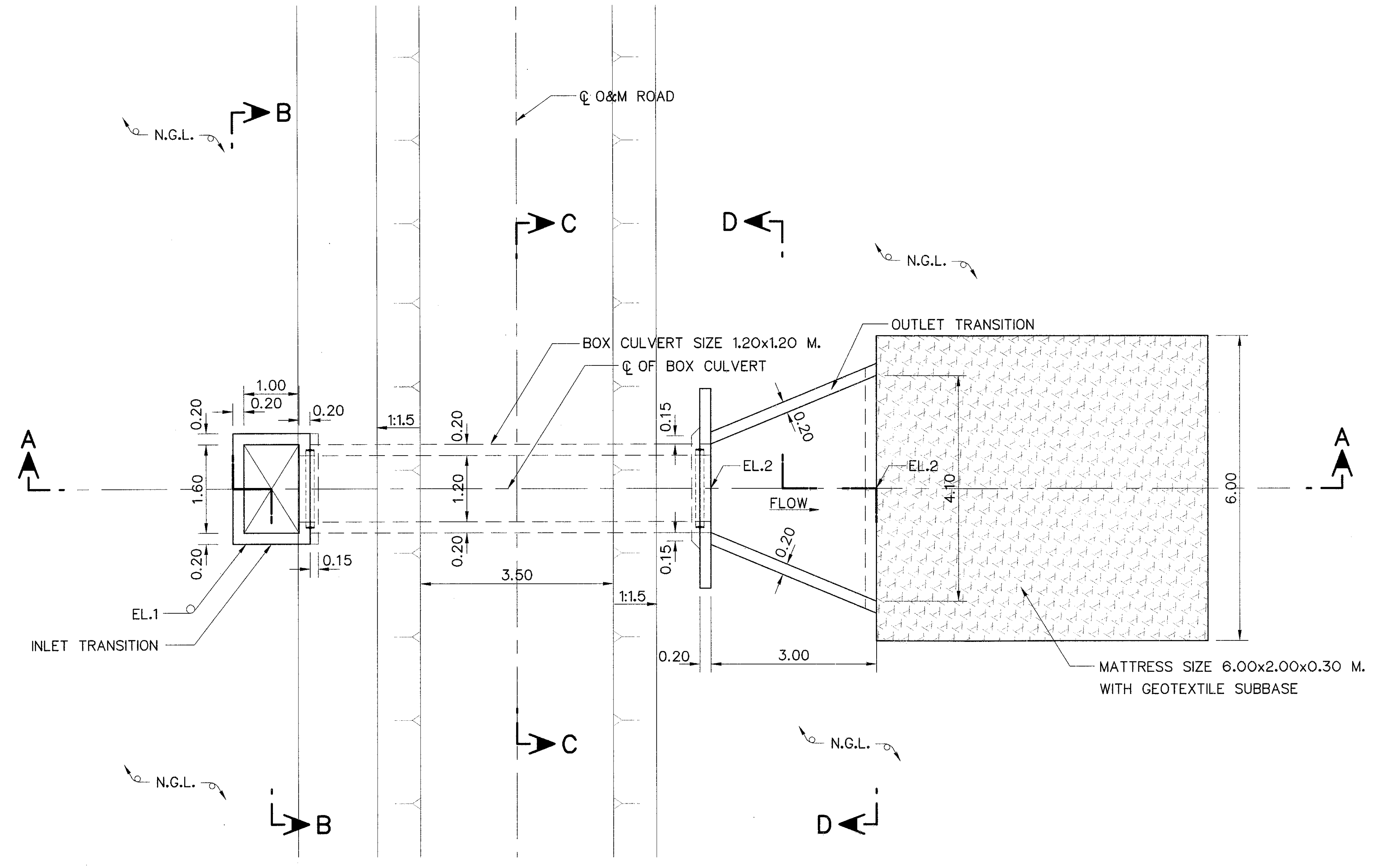
CIVIL WORKS AND TRANSMISSION LINE
O&M ROAD
TYPICAL SECTION AND DETAILS

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
|---|---|---|---|---|
| 3 | | | | |
| 2 | | | | |
| 1 | | | | |
| | CONSULTANTS | | DEDE | |

P&C MANAGEMENT CO.,LTD.
DESIGNED ภย.64624 ลย.6226
DRAWN
CHECKED ลย.6226
08/03/2559
PROJECT MANAGER DATE

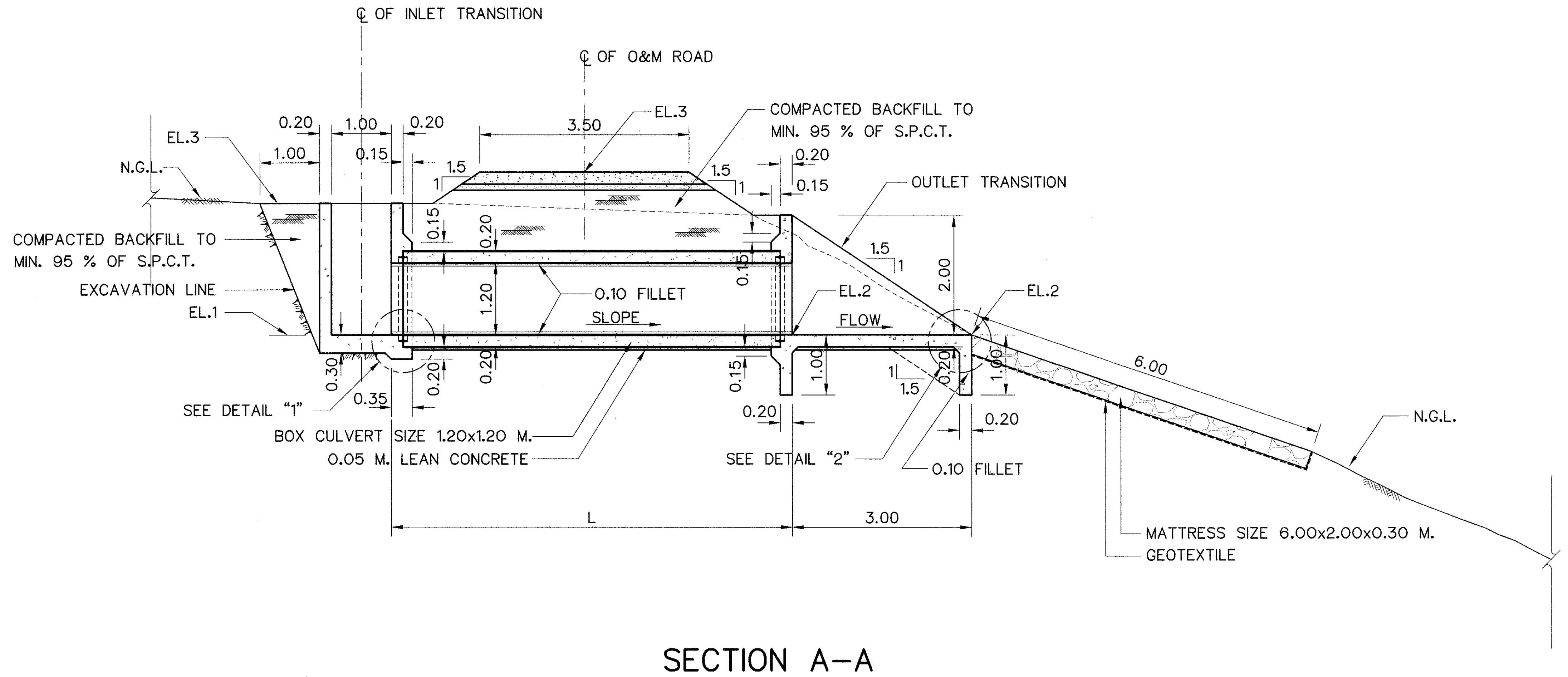
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY
REVIEWED
SUBMITTED Chan'i
RECOMMENDED
APPROVED P. Hamza W.

DRAWING NO. MH–OM–10
SHEET NO. 59 OF 130



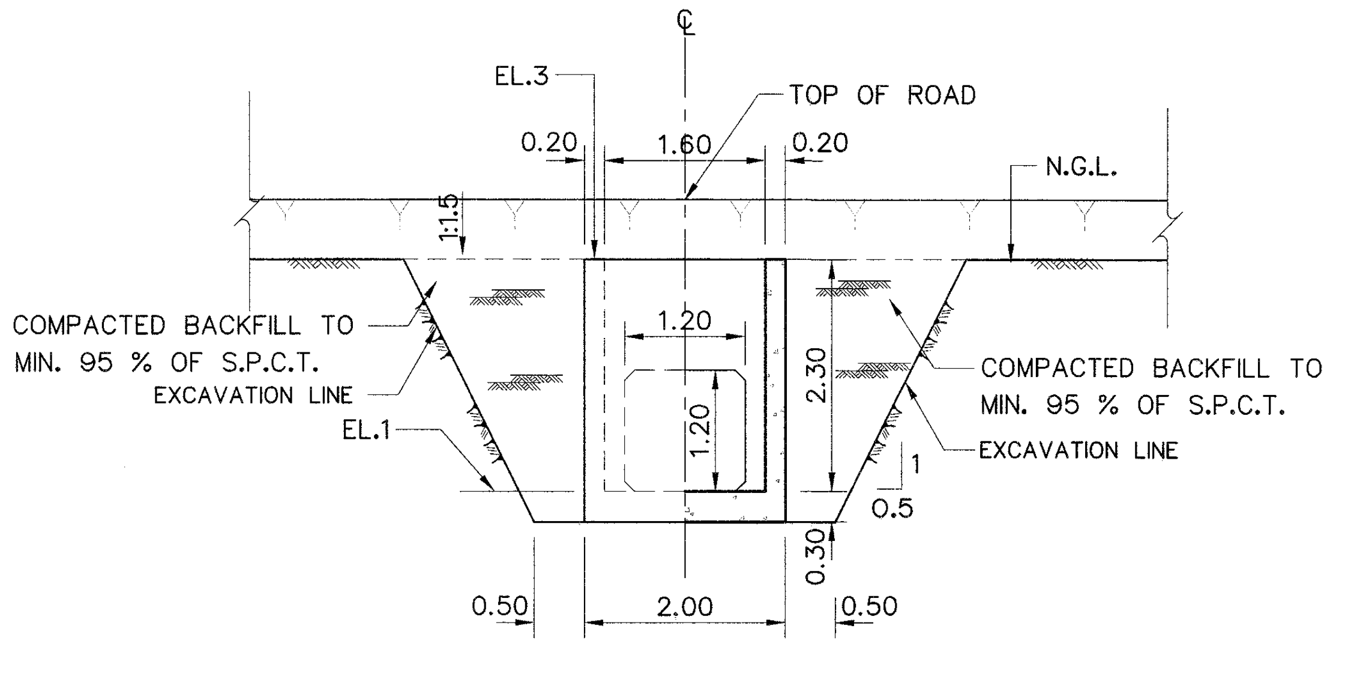
## PLAN

SCALE 1:75



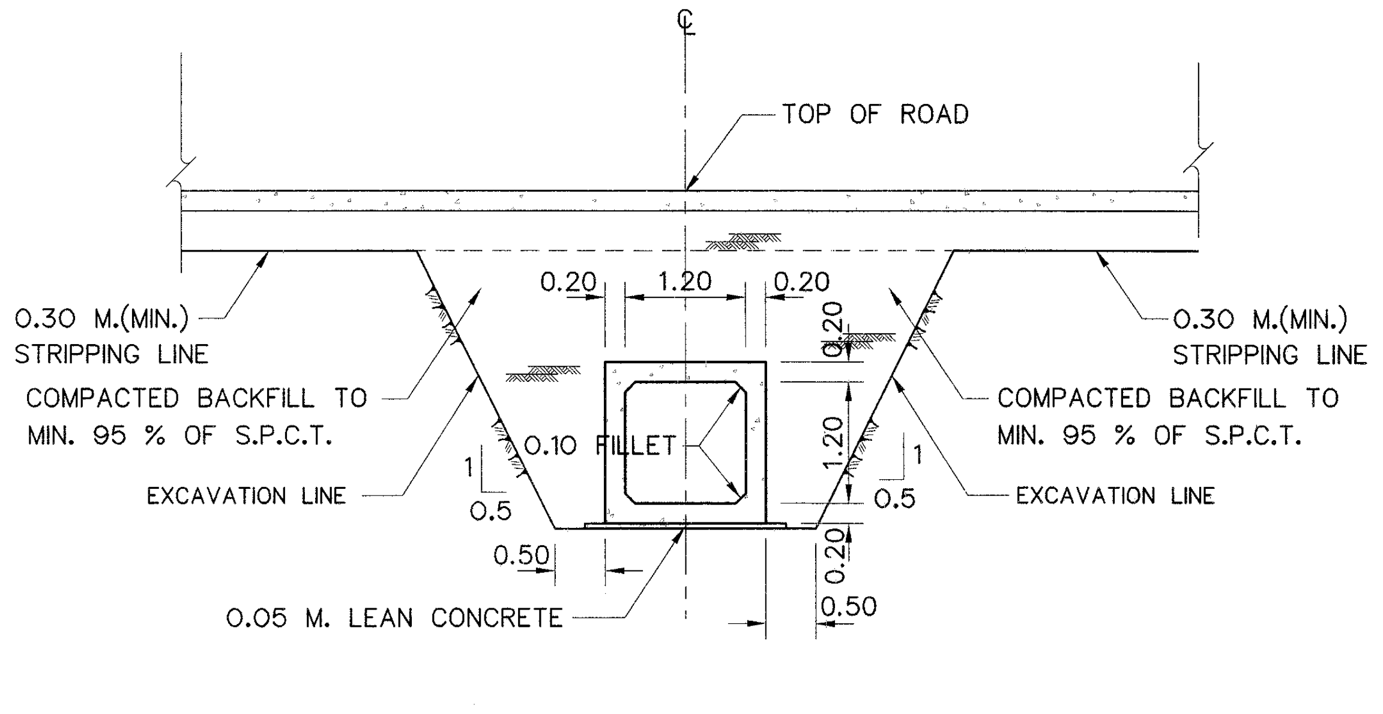
## SECTION A–A

SCALE 1:75



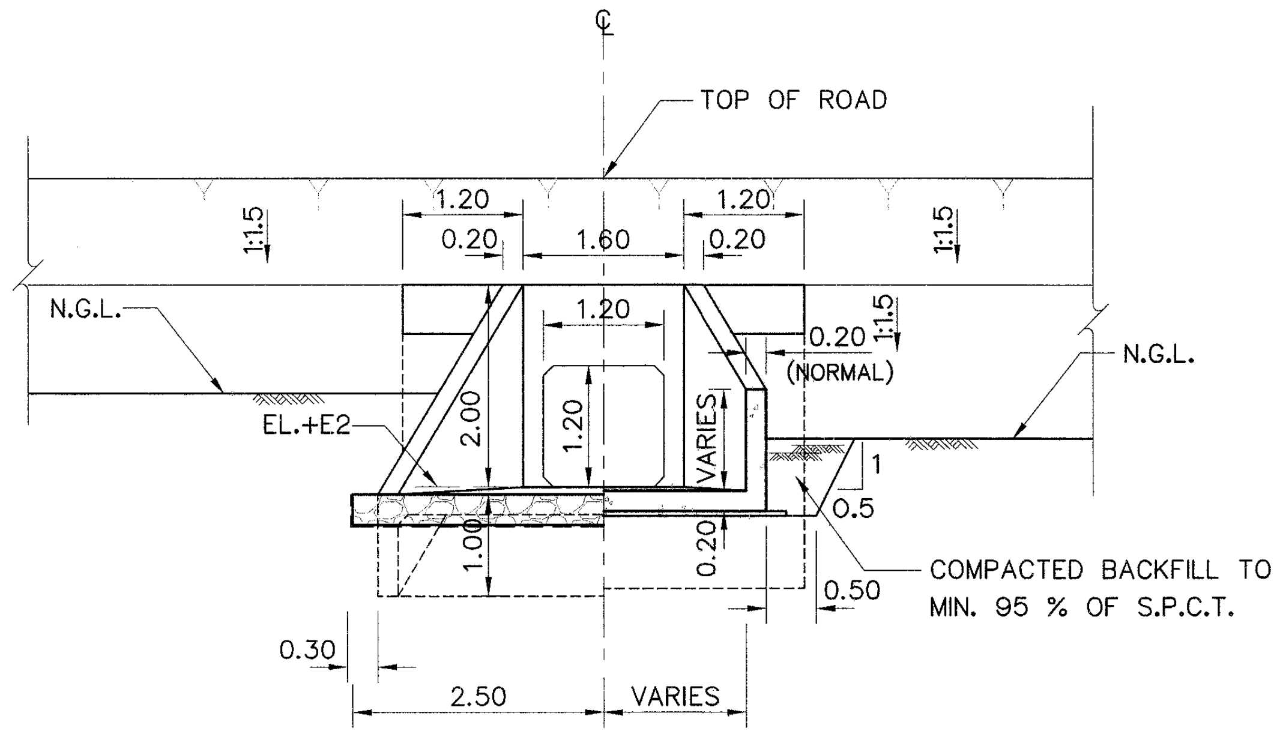
## SECTION B–B

SCALE 1:75



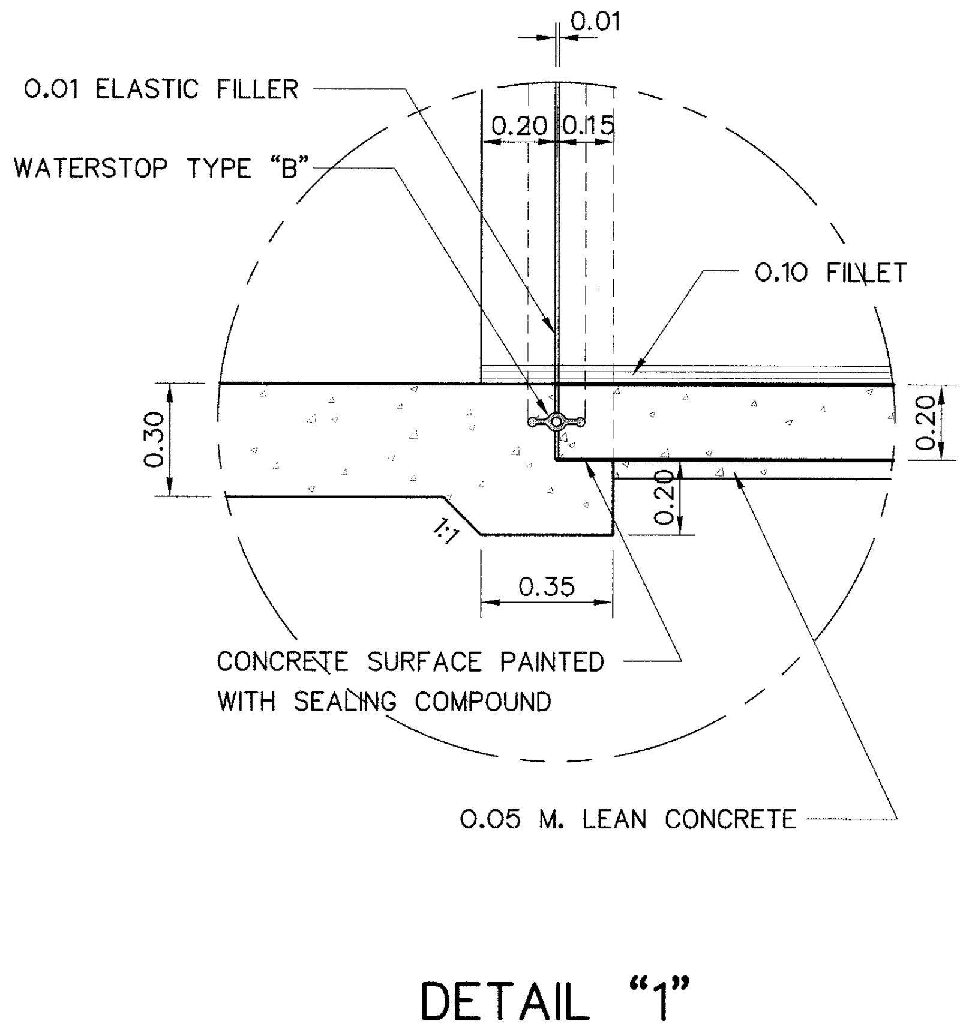
## SECTION C–C

SCALE 1:75



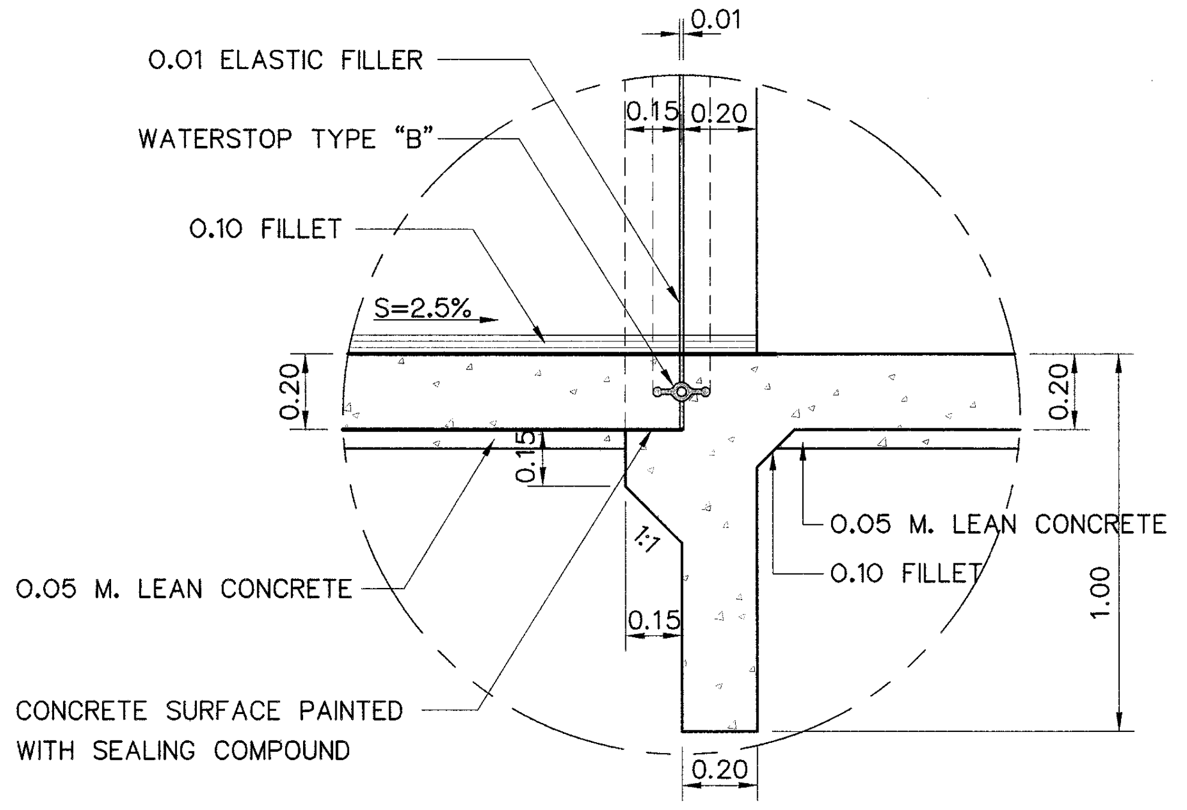
## SECTION D–D

SCALE 1:75



## DETAIL "1"

SCALE 1:20



## DETAIL "2"

SCALE 1:20

NOTES :

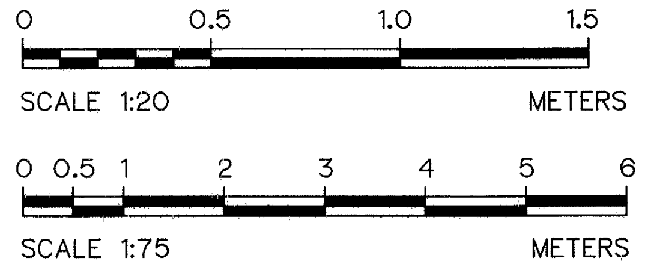
1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS UNLESS OTHERWISE SHOWN.
2. SYMBOL, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. NMH-GN-03

REFERENCE DRAWING :

| | |
|---|---|
| 1. O&M ROAD PLAN AND PROFILE, STA. 0+000 TO STA. 4+149.212 | MH-OM-01 TO 07 |
| 2. O&M ROAD DRAIN CULVERT REINFORCEMENT DETAILS | MH-OM-12 |

## INSTALLATION TABLE OF O&M DRAIN CULVERT

| No. | STA. | L (m.) | ELEVATION (m.MSL.) | | | | |
|---|---|---|---|---|---|---|---|
| | | | EXISTING ROAD | N.G.L. | EL.1 | EL.2 | EL.3 |
| 1 | 2+781.442 | 7.00 | +902.70 | +902.00 | +899.800 | +899.625 | +902.700 |
| 2 | 3+047.000 | 8.00 | +905.95 | +905.00 | +902.800 | +902.600 | +905.950 |
| 3 | 3+287.649 | 6.00 | +900.29 | +900.00 | +897.800 | +897.650 | +900.290 |



| NO. | DATE | REVISIONS | CHECKED | APPROVED |
|---|---|---|---|---|
| 3 | | | | |
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| | CONSULTANTS | | DEDE | |

KINGDOM OF THAILAND
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
O&M ROAD
DRAIN CULVERT, PLAN AND SECTION

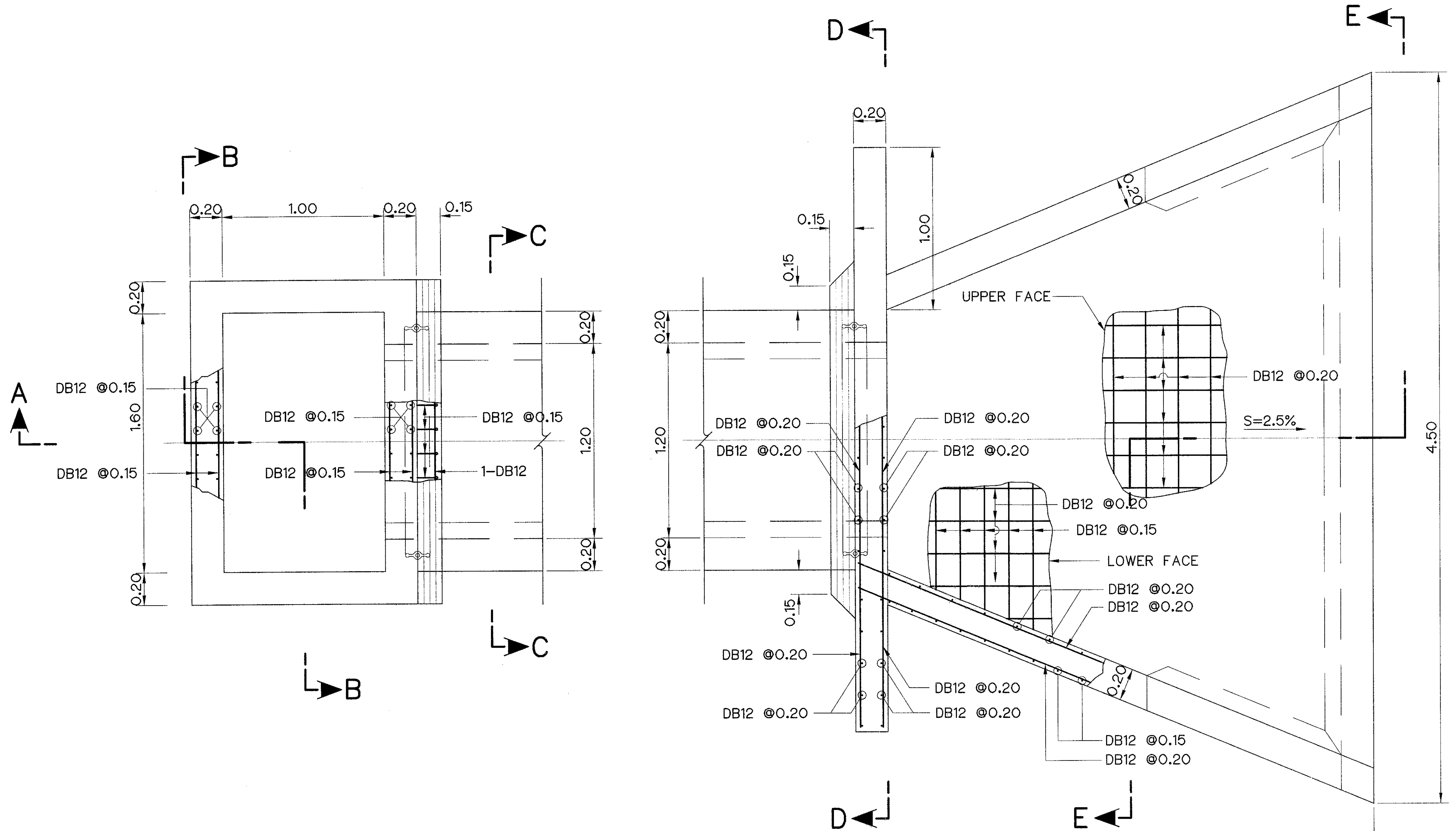
P&C MANAGEMENT CO.,LTD.

DESIGNED ภย.64624 สย.6226
DRAWN
CHECKED สย.6226
PROJECT MANAGER
DATE 08/03/2559

Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

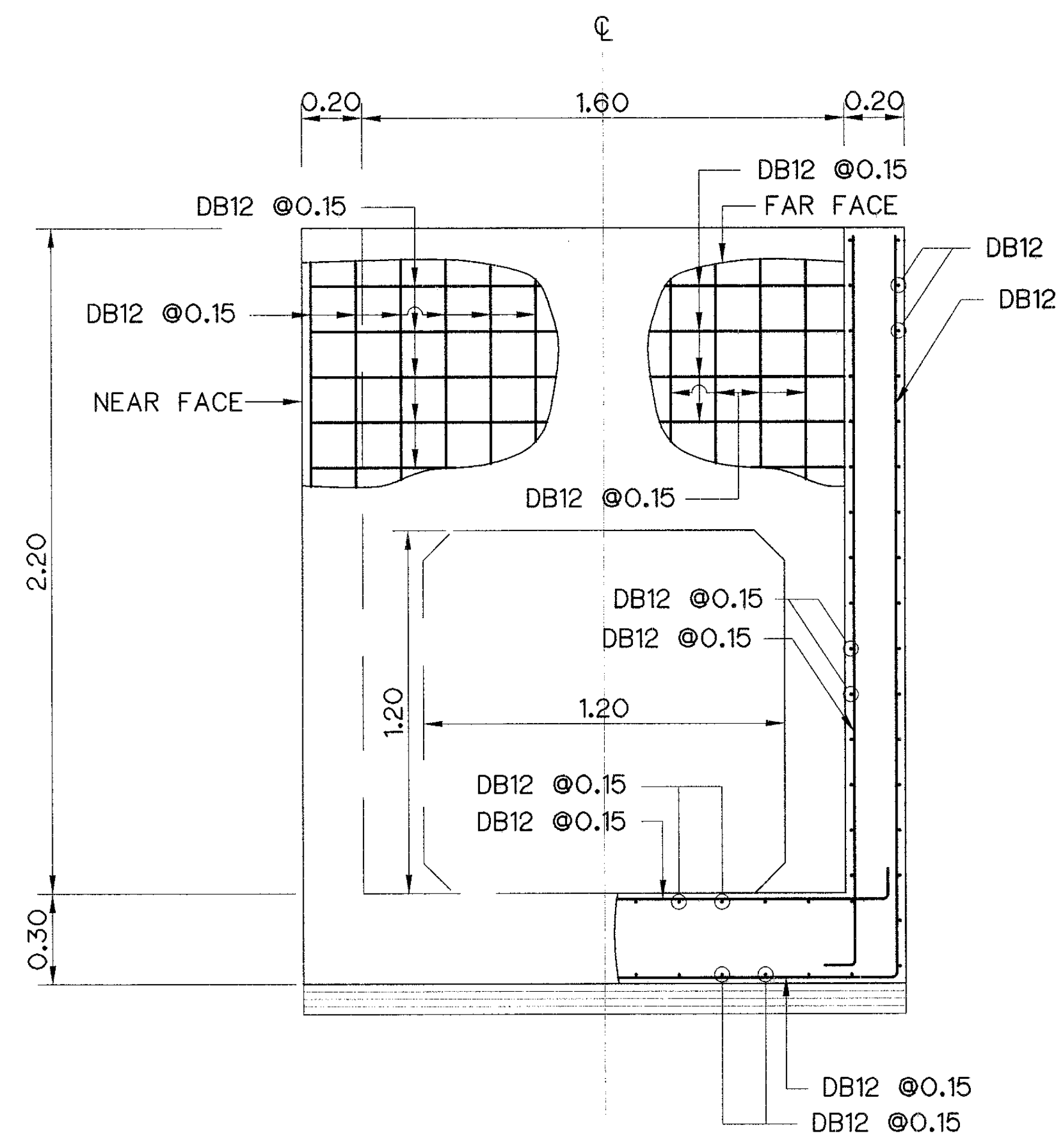
REVIEWED
SUBMITTED Chant
RECOMMENDED
APPROVED P.Hansell

DRAWING NO. MH-OM-11
SHEET NO. 60 OF 130



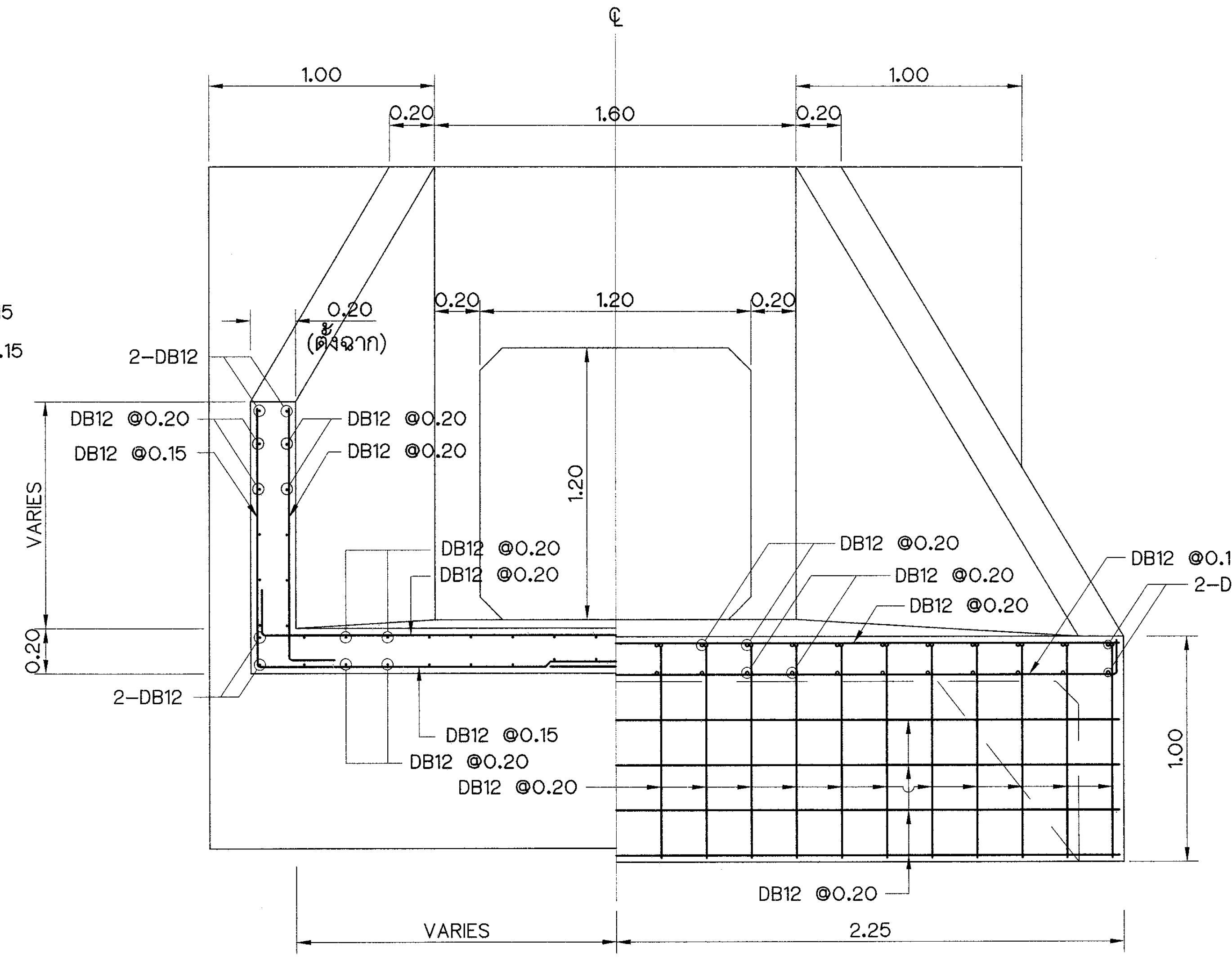
PLAN

SCALE 1:25



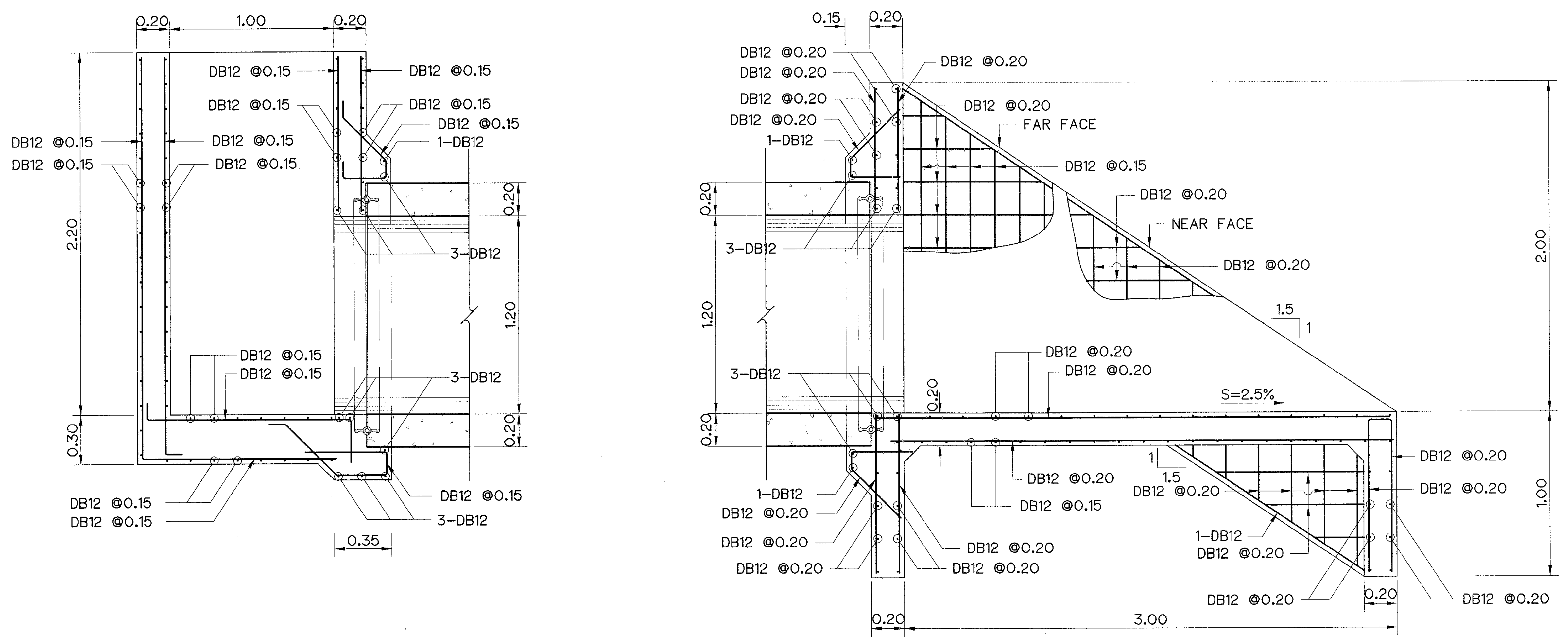
SECTION B-B

SCALE 1:25



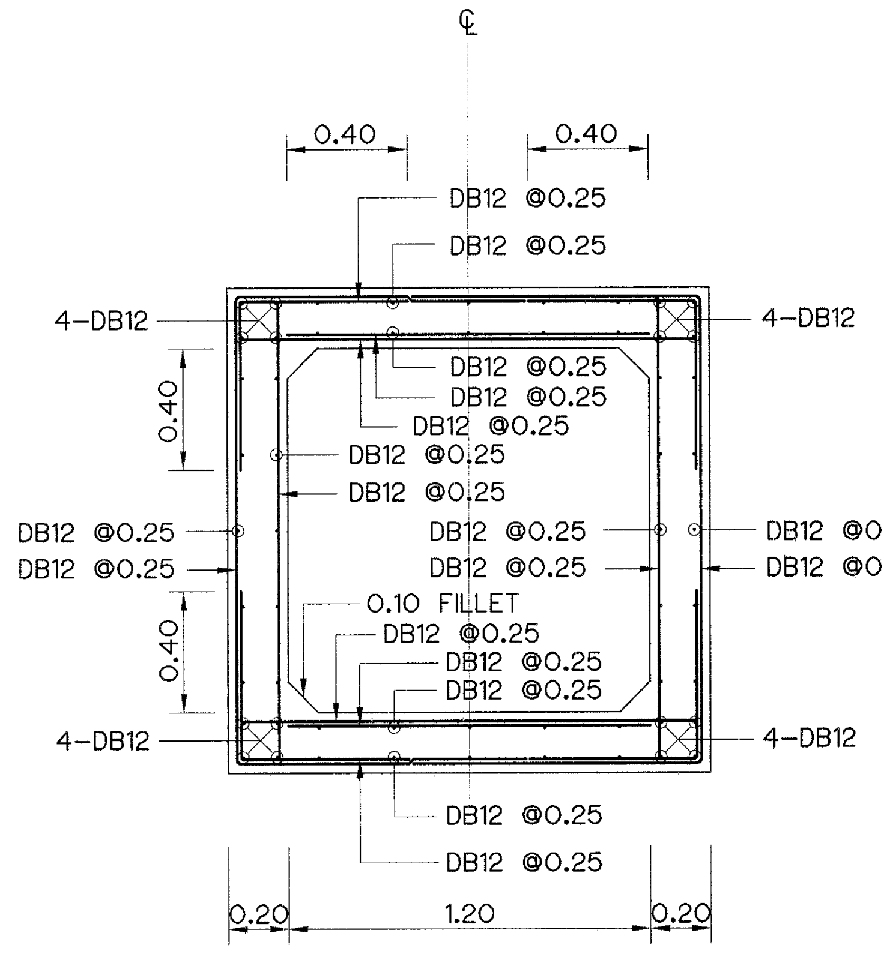
SECTION E-E

SCALE 1:25



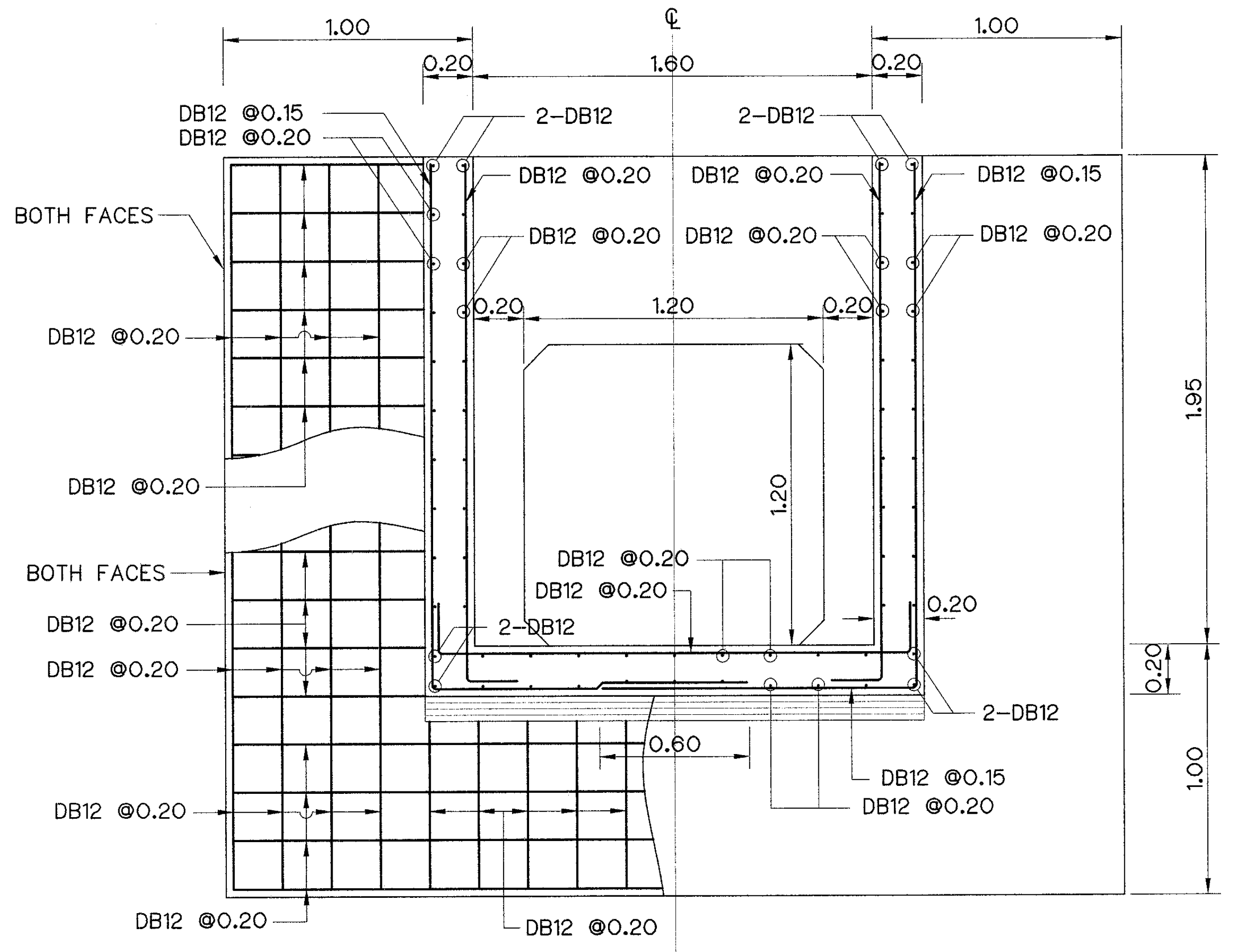
SECTION A-A

SCALE 1:25



SECTION C-C

SCALE 1:25



SECTION D-D

SCALE 1:25

**NOTES :**

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS, UNLESS OTHERWISE SHOWN.
2. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. NMH-GN-03
3. CONCRETE DESIGN BASED ON THE COMPRESSIVE STRENGTH OF 210 KSC, STANDARD CYLINDER Ø0.15x0.30 m. TEST AT AGE 28 DAYS. UNLESS OTHERWISE INDICATED IN SPECIFIC DRAWINGS.
4. ULTIMATE TENSILE STRESSES OF REINFORCING STEEL, CONFORM TO THE REQUIREMENT OF THAI INDUSTRIAL STANDARD DESIGNATION SR24 FOR STRUCTURAL GRADE PLAIN ROUND BAR AND SD30 FOR INTERMEDIATE GRADE DEFORMED BAR.

**REFERENCE DRAWING :**

1. O&M ROAD DRAIN CULVERT, PLAN AND SECTION MH-OM-11

0 0.5 1.0 1.5 2.0

SCALE 1:25 METERS

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
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CONSULTANTS DEDE

KINGDOM OF THAILAND
Department of Alternative
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MINISTRY OF ENERGY

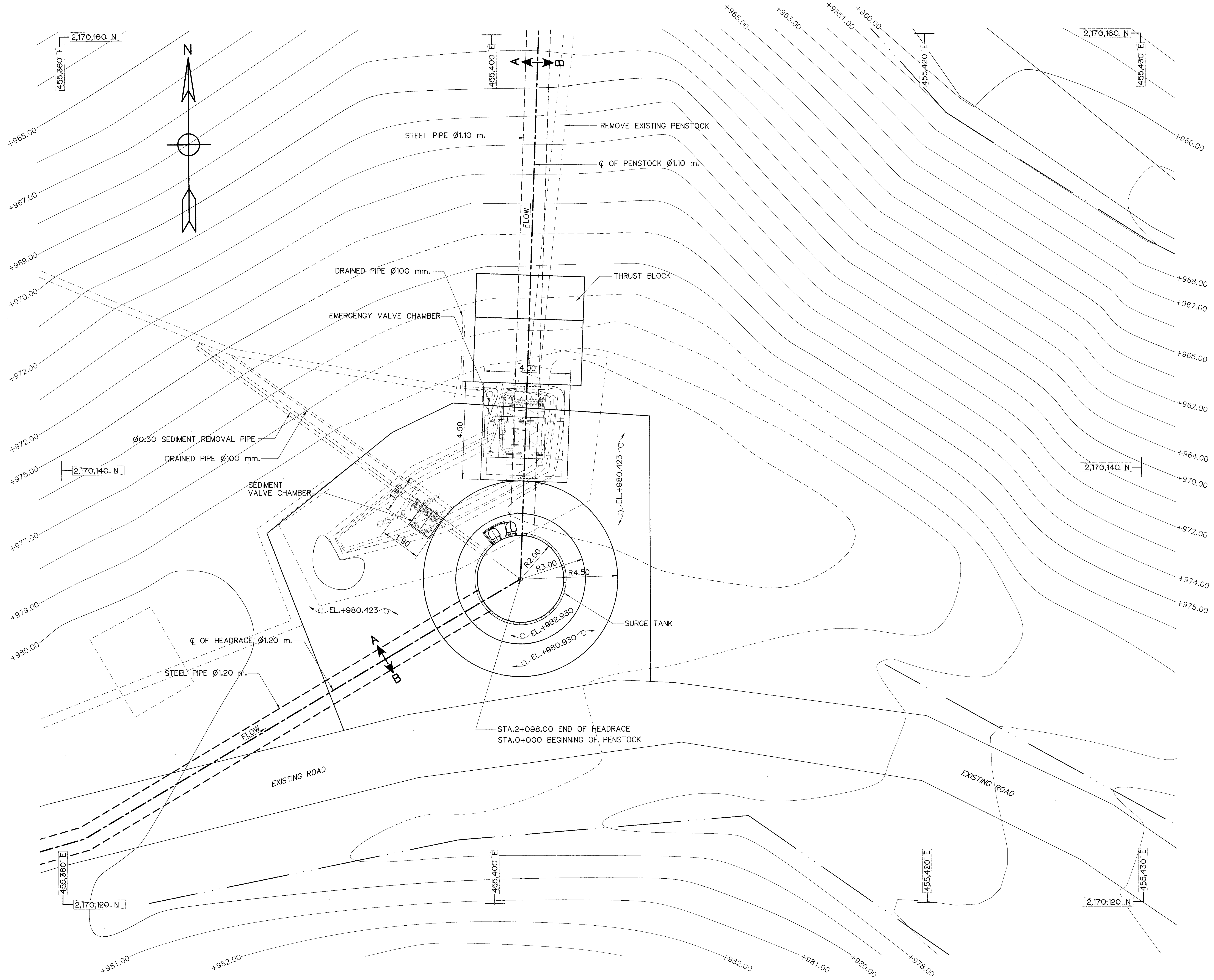
MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
O&M ROAD
DRAIN CULVERT REINFORCEMENT DETAILS

P&C MANAGEMENT CO.,LTD.
DESIGNED .ภย.64624 ลย.6226
DRAWN
CHECKED ลย.6226
PROJECT MANAGER DATE 08/08/2559

Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY
REVIEWED
SUBMITTED Chanit
RECOMMENDED
APPROVED P. Hansa

DRAWING NO. MH-OM-12
SHEET NO. 61 OF 130



GENERAL LAY-OUT

SCALE 1:100

## NOTES :

1. ALL DIMENSIONS AND ELEVATIONS ARE IN METERS, UNLESS OTHERWIRE SHOWN.
2 STEEL PIPE SHELL CONFORM TO JIS G 3101 SS34
3. BASE OF CONCRETE FOUNDATION SHALL BE DETERMINED IN FIELD BY EMBEDING TO STABLE ROCK FOUNDATION WITH A ALLOWABLE BEARING CAPACITY NOT LESS THAN 25 T/m$^2$
4. COROSINE PROTECTION OF STEEL PIPE OR GARDRAIL IS WARNED TO STRICTLY FOLLOW GALVANIZE SPECIFICATION
5. STEEL TANK , GIRDER AND STIFFENER SHALL CONFORM TO JIS G 3101 SS34

## REFERENCE DRAWING :

| | |
|---|---|
| 1. SURGE TANK SECTIONS | MH-ST-02 |
| 2. EMERGENCY VALVE CHAMBER PLAN SECTIONS AND DETAILS | MH-ST-07 |
| 3. SEDIMENT VALVE CHAMBER PLAN SECTIONS AND DETAILS | MH-ST-09 |

0 1 2 3 4 5 6 7 8
SCALE 1:100 METERS

KINGDOM OF THAILAND
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MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
SURGE TANK
GENERAL LAY-OUT

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
|---|---|---|---|---|
| 3 | | | | |
| 2 | | | | |
| 1 | | | | |

| CONSULTANTS | DEDE |
|---|---|

P&C MANAGEMENT CO.,LTD.

| | |
|---|---|
| DESIGNED | ภย.64624 สย.6226 |
| DRAWN | |
| CHECKED | สย.6226 |
| PROJECT MANAGER | DATE 08/03/2559 |

Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

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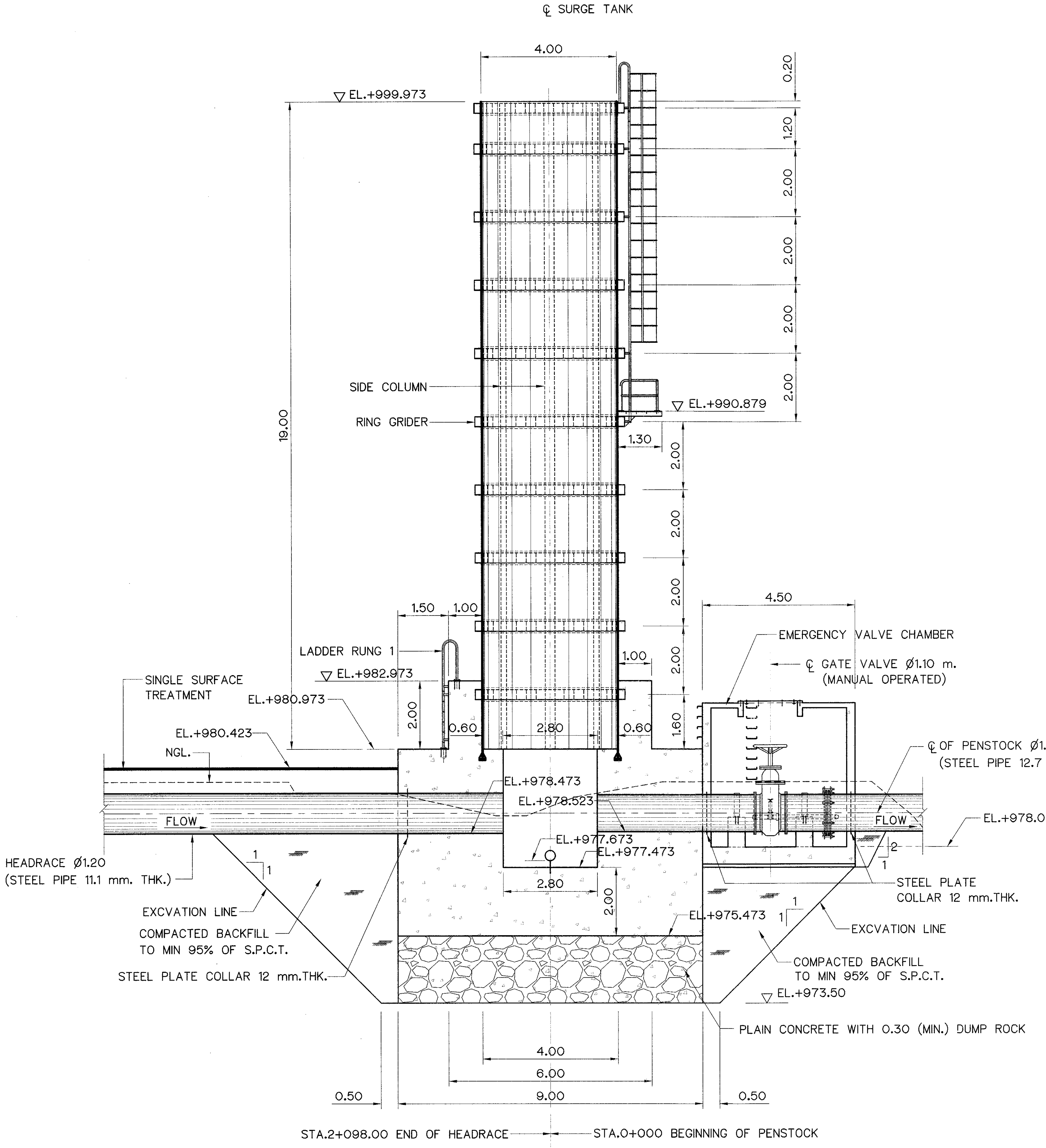
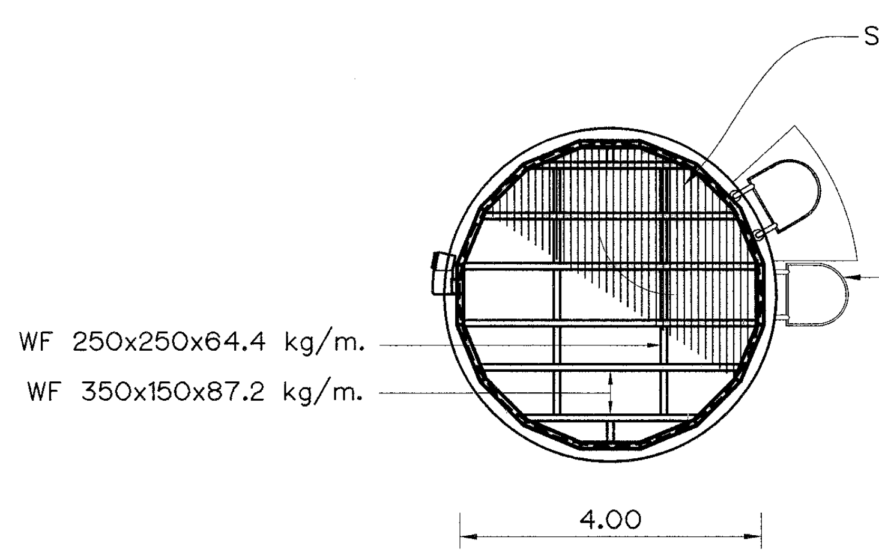
|---|---|
| REVIEWED | |
| SUBMITTED | Chanit |
| RECOMMENDED | |
| APPROVED | P. Hom |

| DRAWING NO. | SHEET NO. |
|---|---|
| MH-ST-01 | 62 OF 130 |



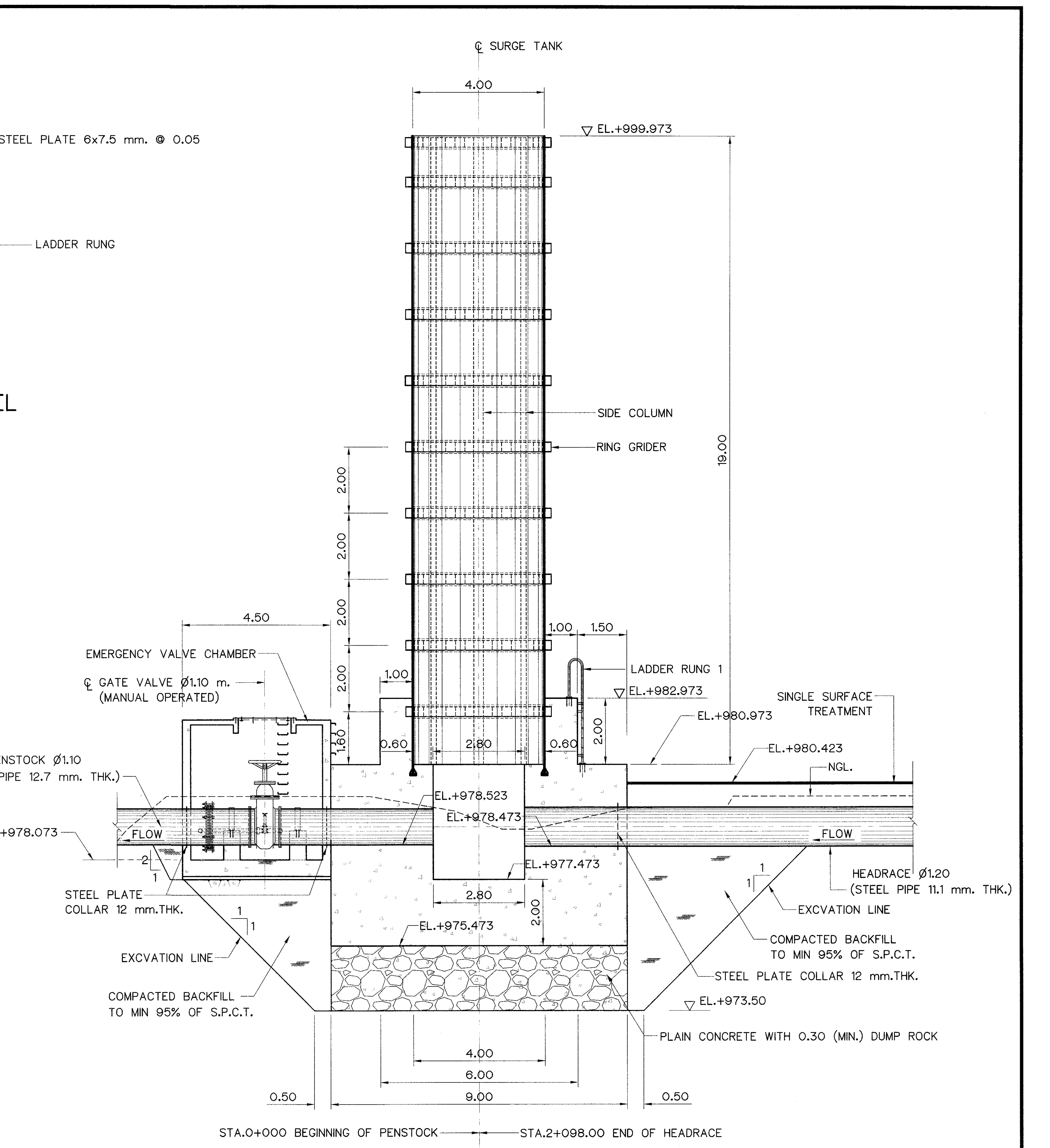
## SECTION A–A

SCALE 1:100



## PLAN ON TOP LEVEL

SCALE 1:100


℄ SURGE TANK
4.00
EL.+999.973
SIDE COLUMN
RING GRIDER
19.00
2.00
2.00
2.00
2.00
4.50
1.00
1.50
EMERGENCY VALVE CHAMBER
℄ GATE VALVE Ø1.10 m. (MANUAL OPERATED)
1.00
LADDER RUNG 1
EL.+982.973
SINGLE SURFACE TREATMENT
EL.+980.973
℄ OF PENSTOCK Ø1.10 (STEEL PIPE 12.7 mm. THK.)
1.60
0.60
2.80
0.60
2.00
EL.+980.423
NGL.
EL.+978.523
EL.+978.473
EL.+978.073
FLOW
FLOW
EL.+977.473
HEADRACE Ø1.20 (STEEL PIPE 11.1 mm. THK.)
STEEL PLATE COLLAR 12 mm.THK.
2.80
EXCVATION LINE
EL.+975.473
2.00
COMPACTED BACKFILL TO MIN 95% OF S.P.C.T.
EXCVATION LINE
STEEL PLATE COLLAR 12 mm.THK.
COMPACTED BACKFILL TO MIN 95% OF S.P.C.T.
EL.+973.50
PLAIN CONCRETE WITH 0.30 (MIN.) DUMP ROCK
4.00
6.00
9.00
0.50
0.50
STA.0+000 BEGINNING OF PENSTOCK
STA.2+098.00 END OF HEADRACE

## SECTION B–B

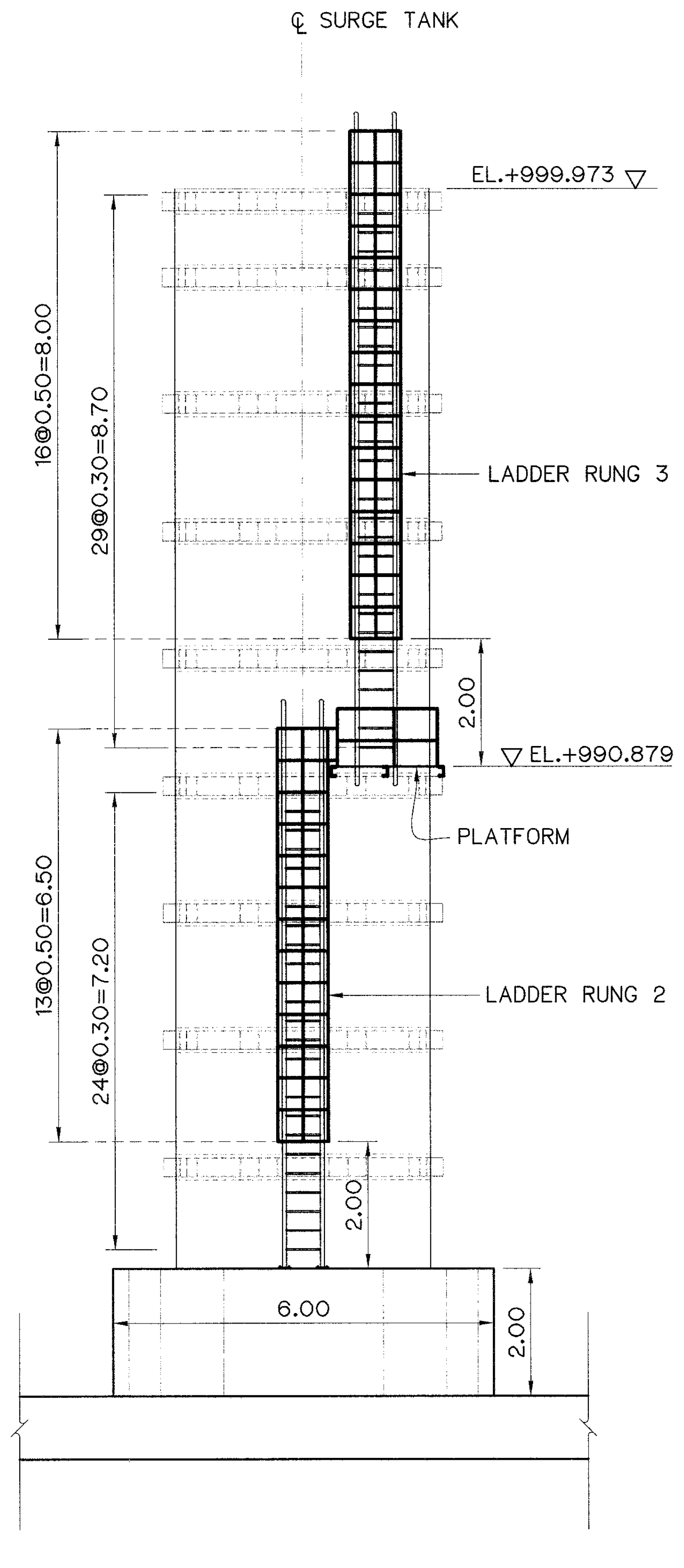
SCALE 1:100

**NOTES :**

1. ALL DIMENSIONS AND ELEVATIONS ARE IN METERS, UNLESS OTHERWIRE SHOWN.
2 STEEL PIPE SHELL CONFORM TO JIS G 3101 SS34
3. BASE OF CONCRETE FOUNDATION SHALL BE DETERMINED IN FIELD BY EMBEDING TO STABLE ROCK FOUNDATION WITH A ALLOWABLE BEARING CAPACITY NOT LESS THAN 25 T/m$^2$
4. COROSINE PROTECTION OF STEEL PIPE OR GARDRAIL IS WARNED TO STRICTLY FOLLOW GALVANIZE SPECIFICATION
5. STEEL TANK , GIRDER AND STIFFENER SHALL CONFORM TO JIS G 3101 SS34

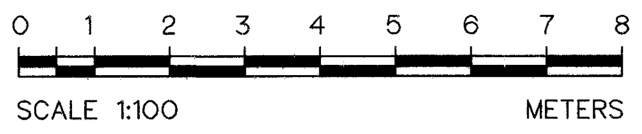
**REFERENCE DRAWING :**

| | |
|---|---|
| 1. SURGE TANK GENERAL LAY-OUT | MH-ST-01 |
| 2. LADDER RUNG DETAILS | MH-ST-03 |
| 3. PLATFORM DETAILS | MH-ST-04 |
| 4. RING GRIDER AND HANDRAIL | MH-ST-05 |



## LADDER RUNG 2&3 ELEVATION

SCALE 1:100



KINGDOM OF THAILAND
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
SURGE TANK
SECTIONS

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
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| 3 | | | | |
| 2 | | | | |
| 1 | | | | |

CONSULTANTS
DEDE

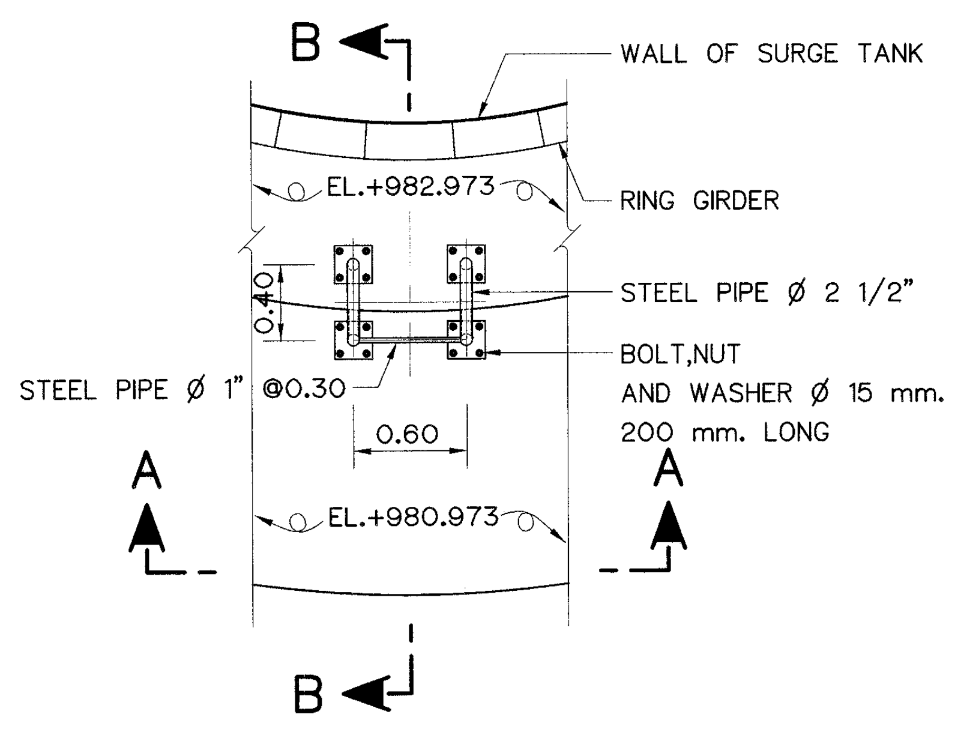
P&C MANAGEMENT CO.,LTD.

DESIGNED ภย.64624 ลย.6226
DRAWN
CHECKED ลย.6226
PROJECT MANAGER
DATE 08/03/2559

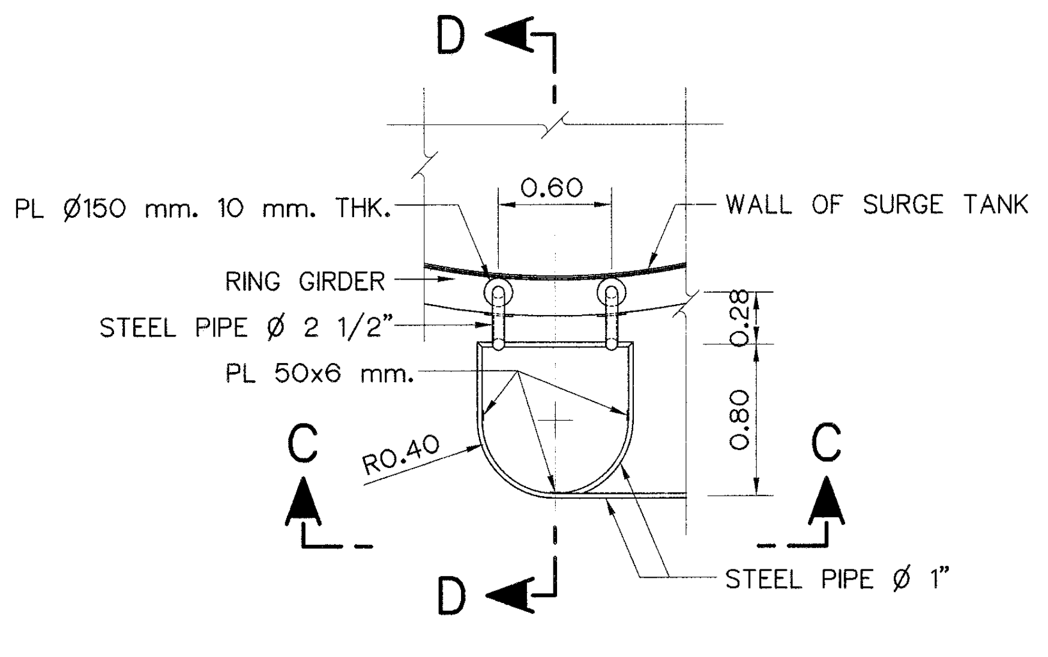
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

REVIEWED
SUBMITTED Chan Y
RECOMMENDED
APPROVED P. Hanz U.

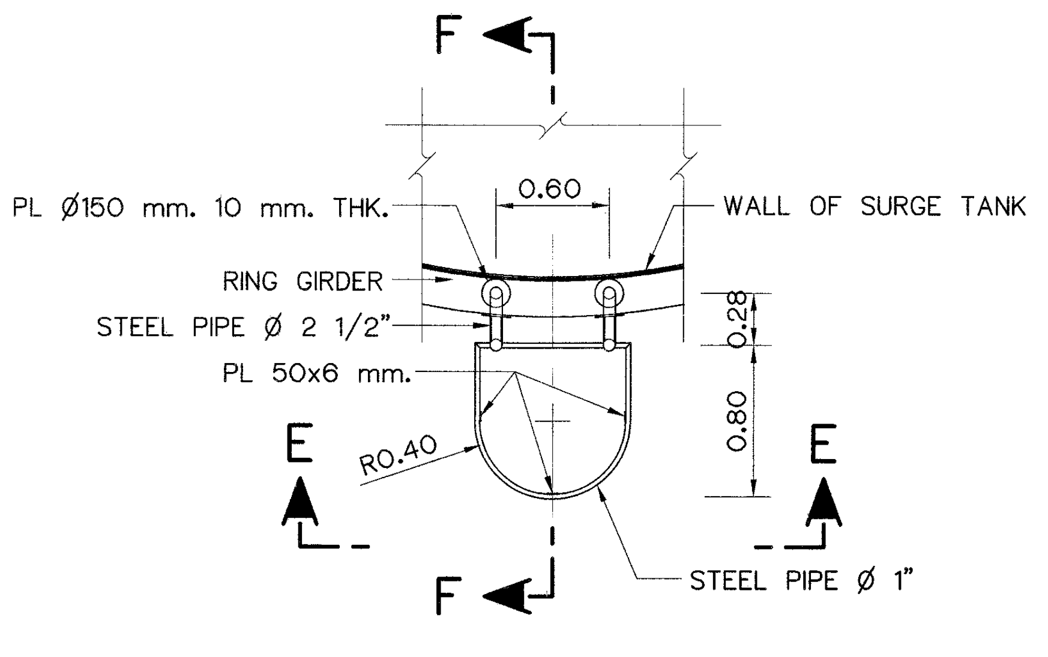
DRAWING NO. MH–ST–02
SHEET NO. 63 OF 130



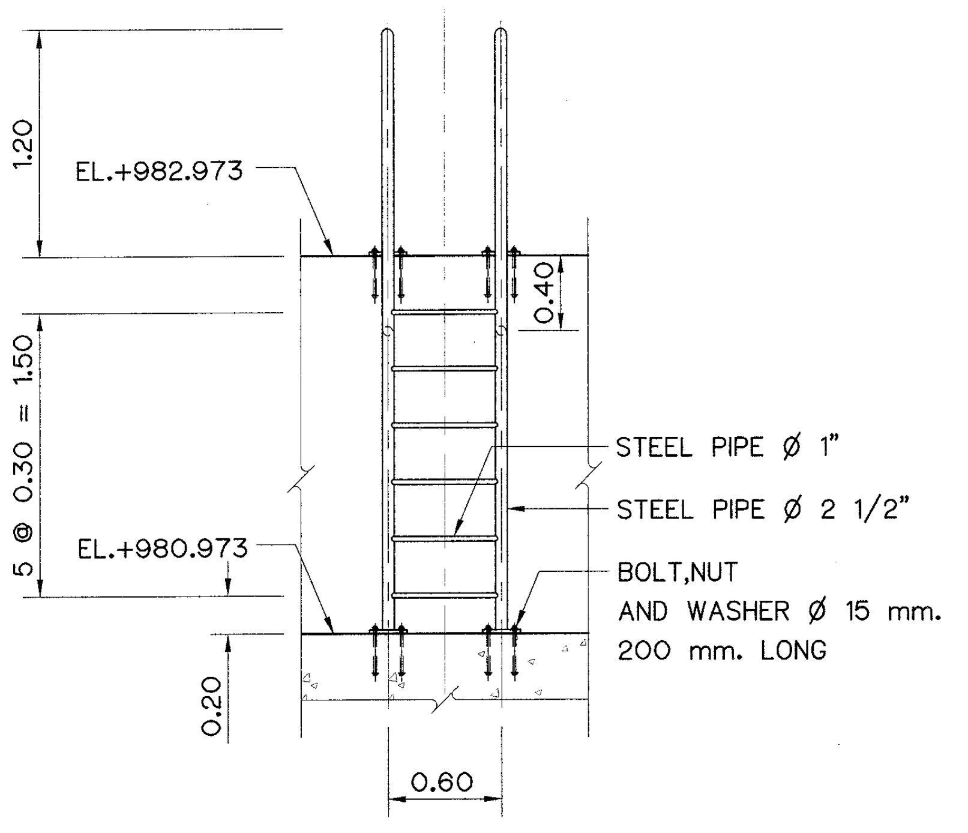
### PLAN LADDER RUNG 1
SCALE 1:40



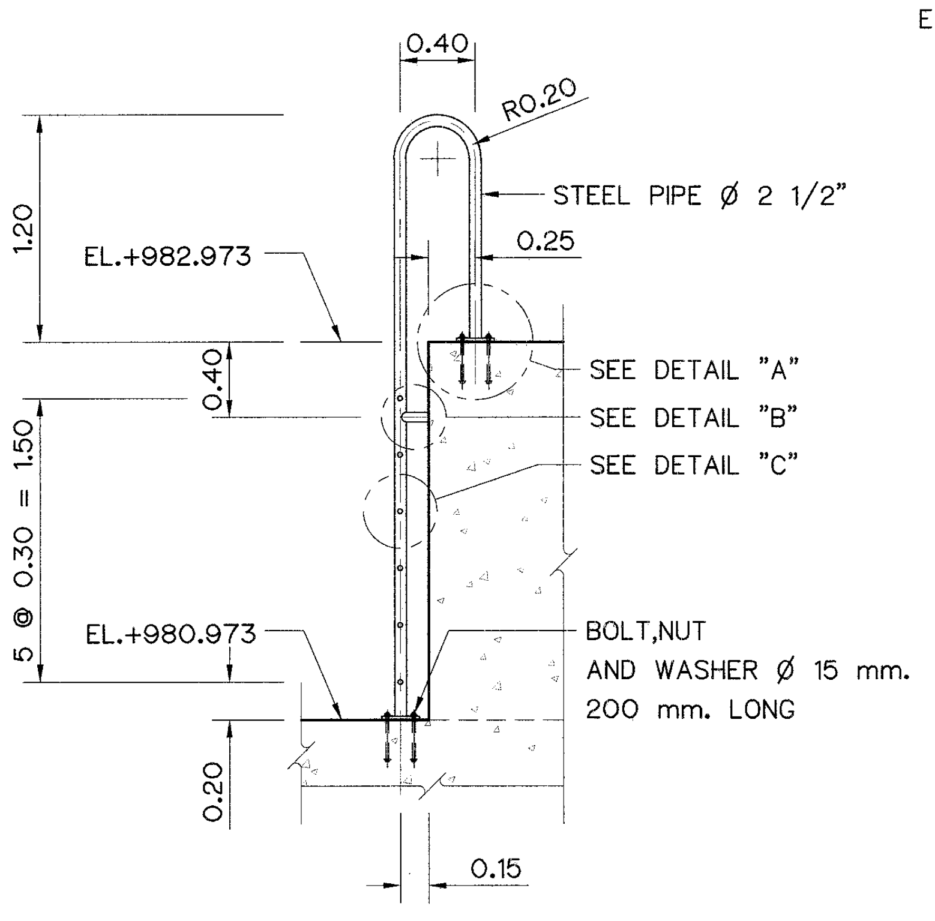
### PLAN LADDER RUNG 2
SCALE 1:40



### PLAN LADDER RUNG 3
SCALE 1:40



### SECTION A–A
SCALE 1:40



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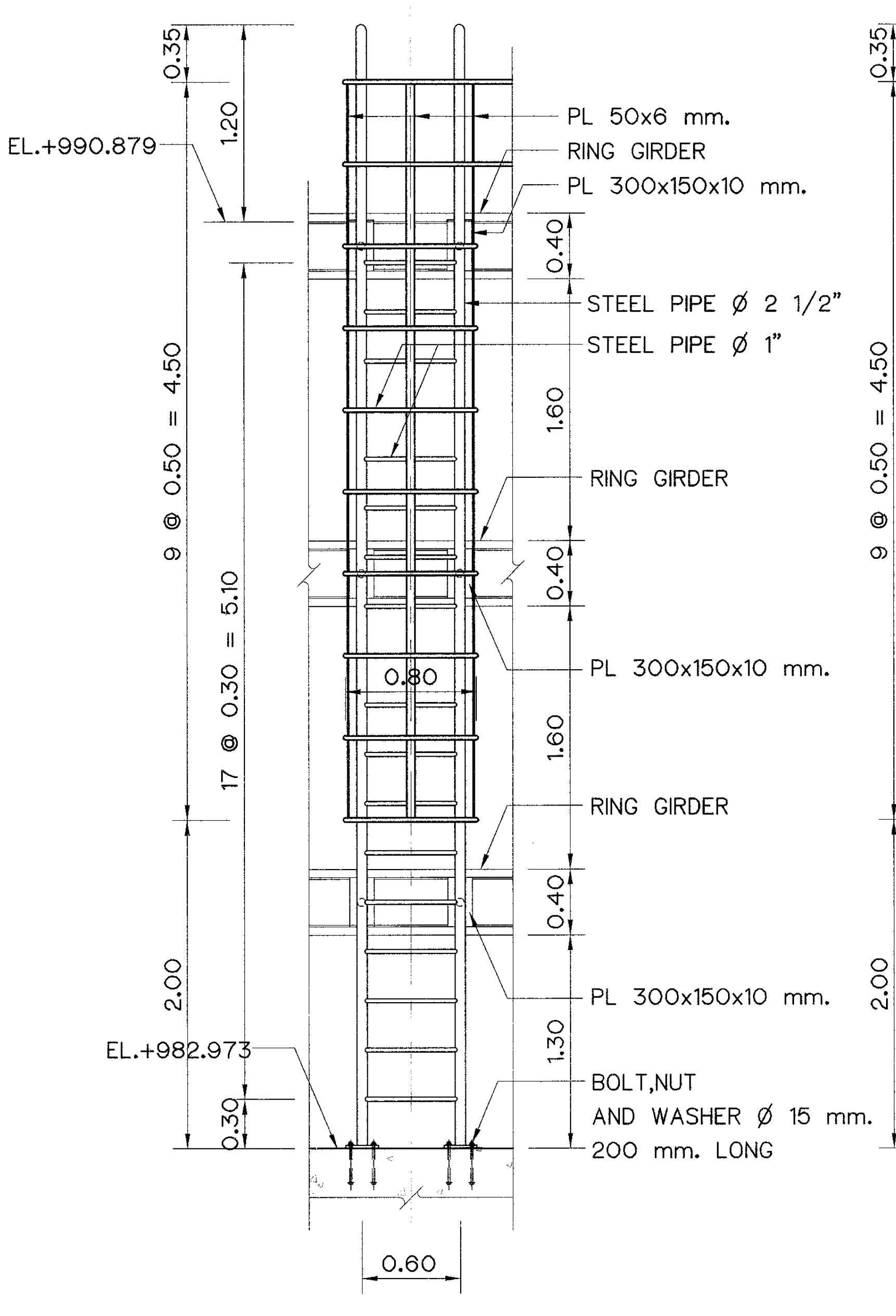
SCALE 1:40



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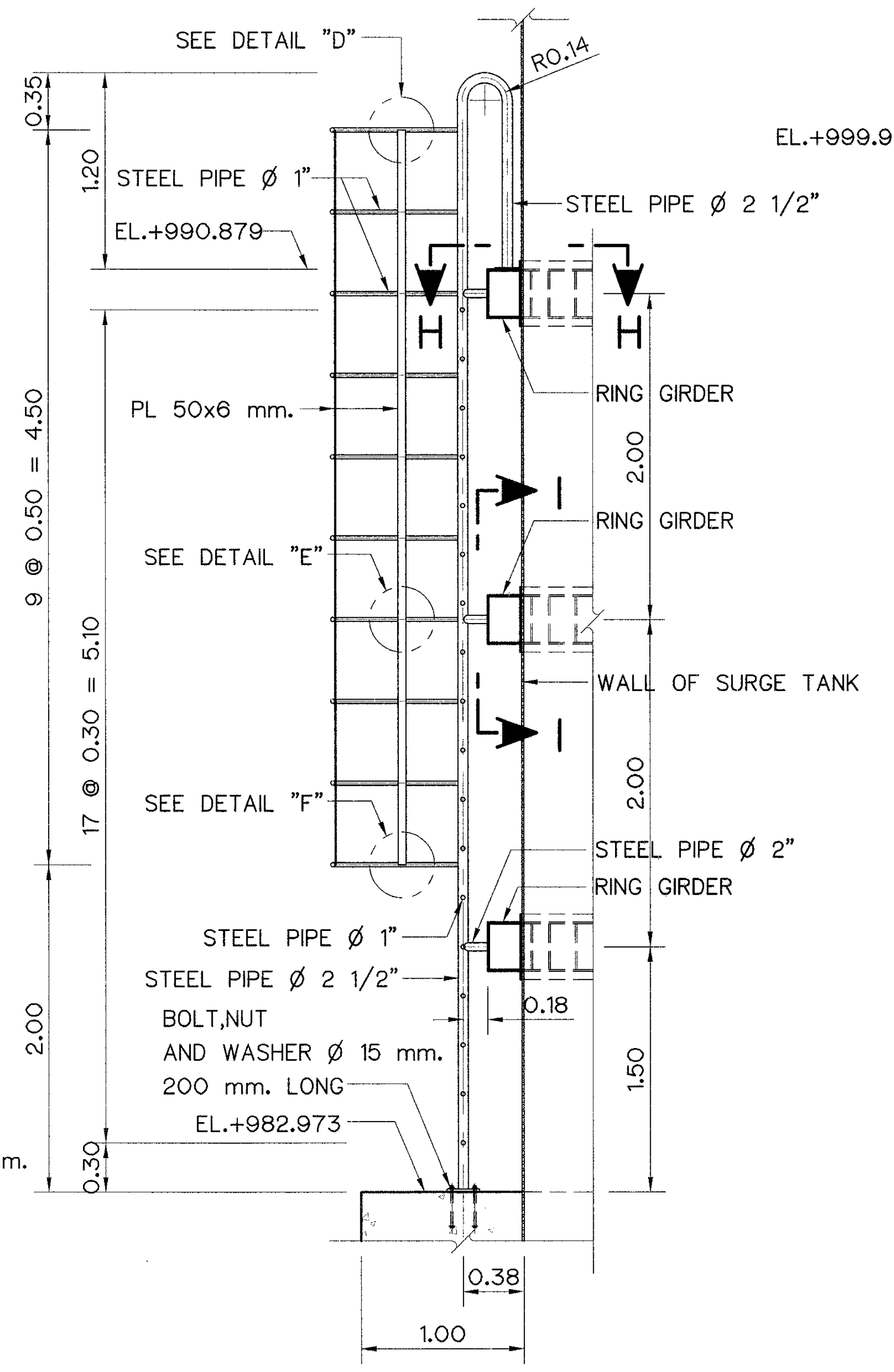
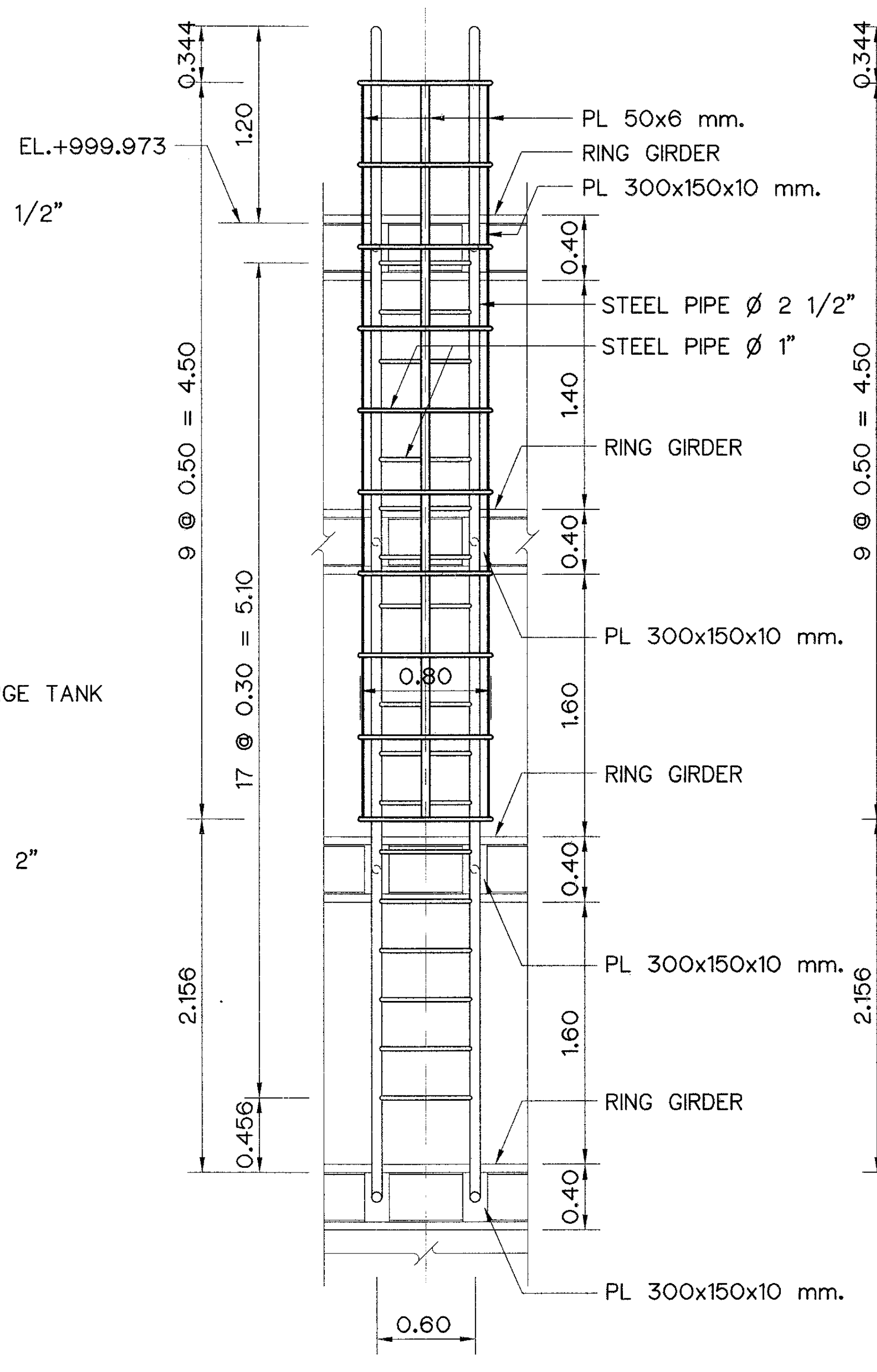
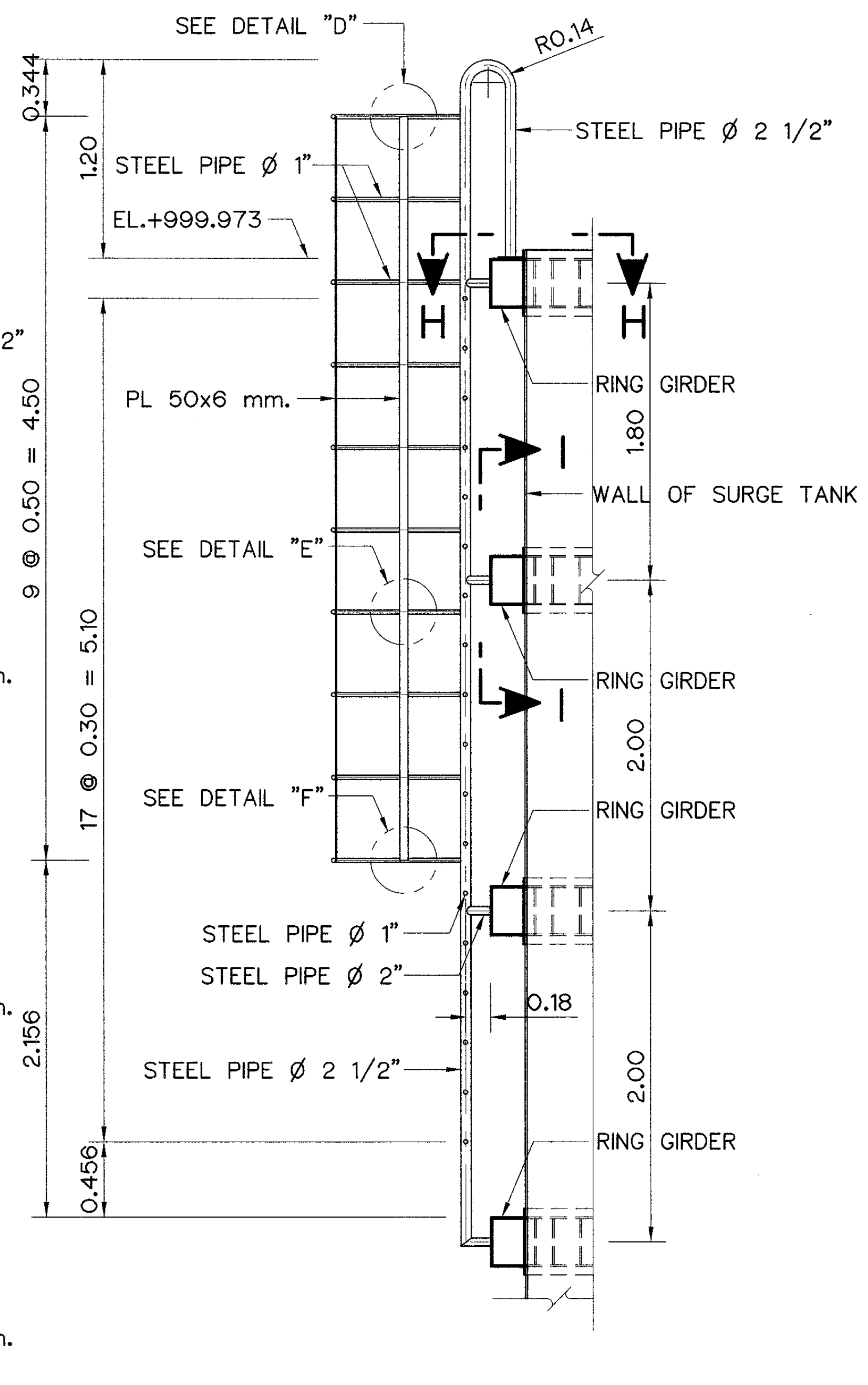
SCALE 1:40



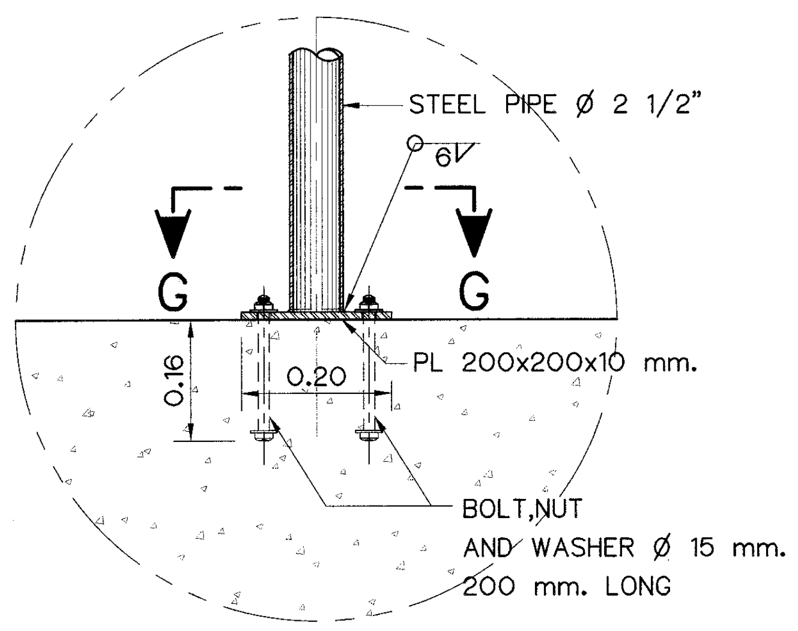
### SECTION D–D
SCALE 1:40



### SECTION E–E
SCALE 1:40



### SECTION F–F
SCALE 1:40



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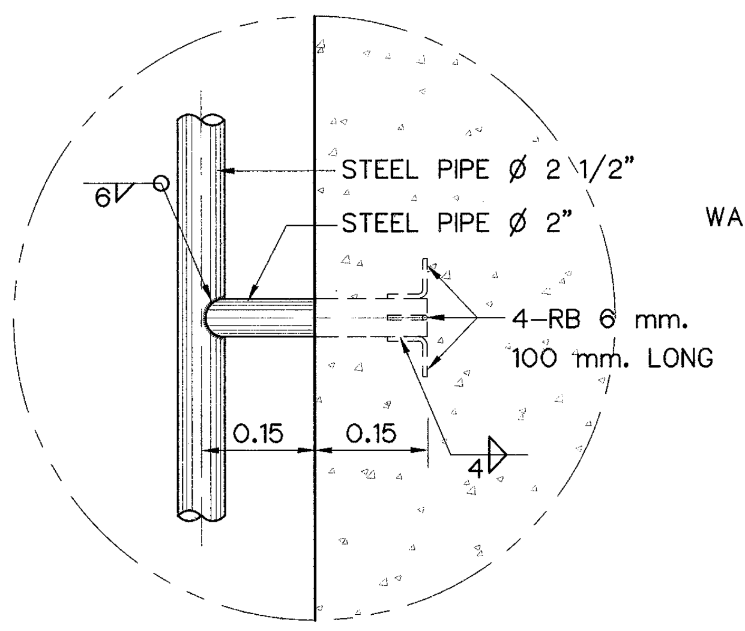
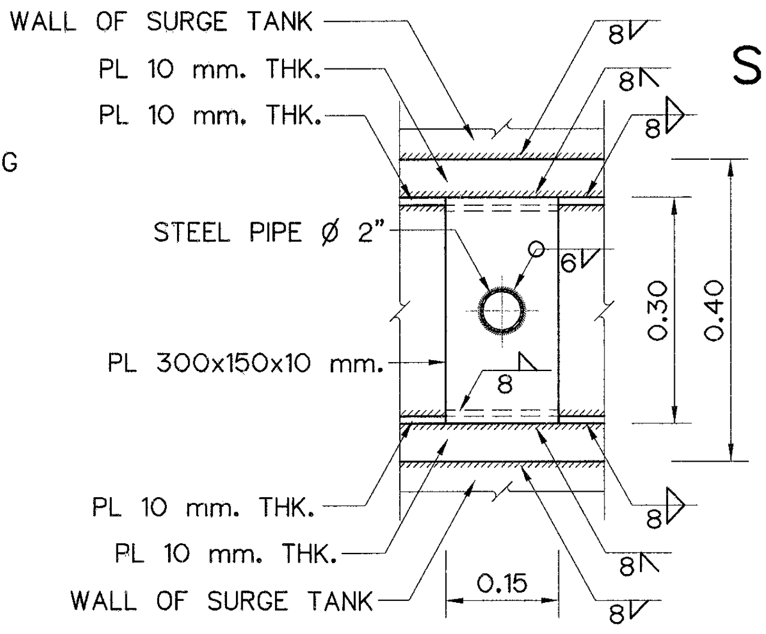
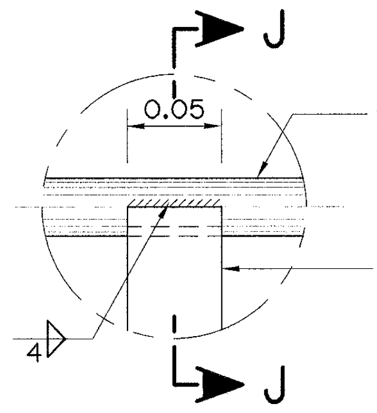
SCALE 1:25

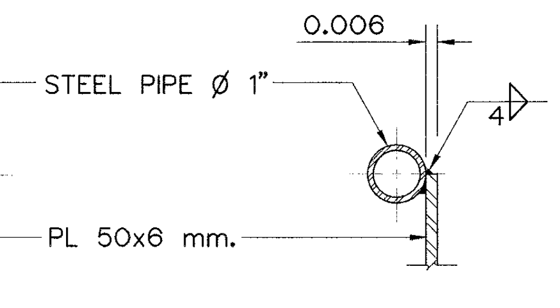


### DETAIL "B"
SCALE 1:25



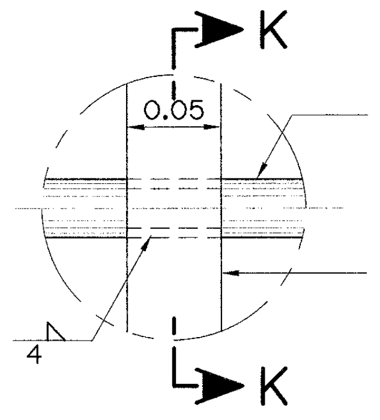
### SECTION I–I
SCALE 1:25

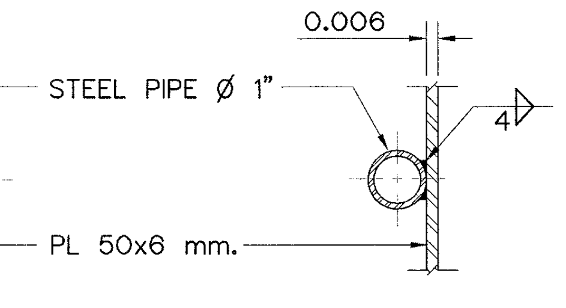




### DETAIL "D"
SCALE 1:10

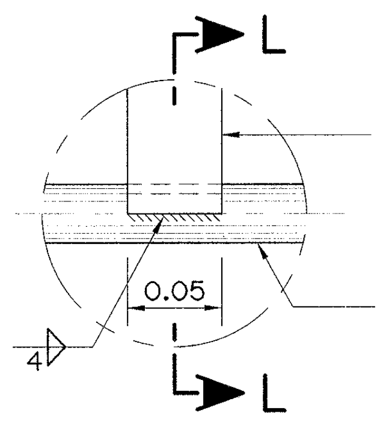
### SECTION J–J
SCALE 1:10

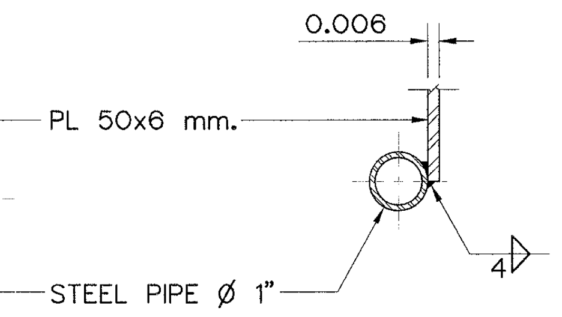




### DETAIL "E"
SCALE 1:10

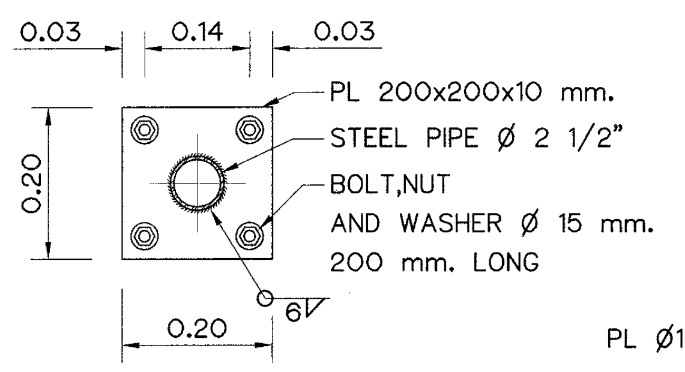
### SECTION K–K
SCALE 1:10



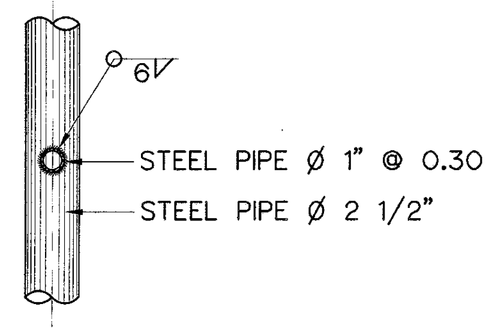


### DETAIL "F"
SCALE 1:10

### SECTION L–L
SCALE 1:10



### SECTION G–G
SCALE 1:25



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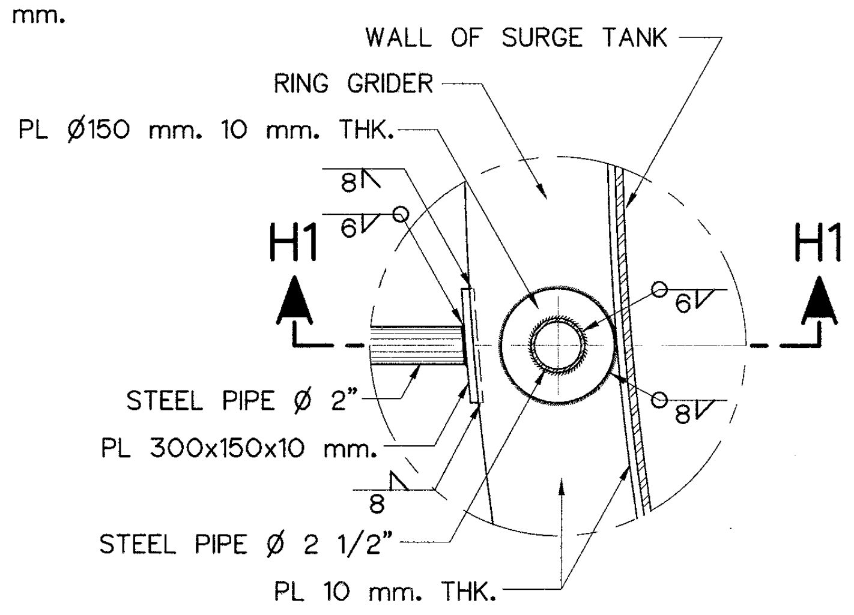
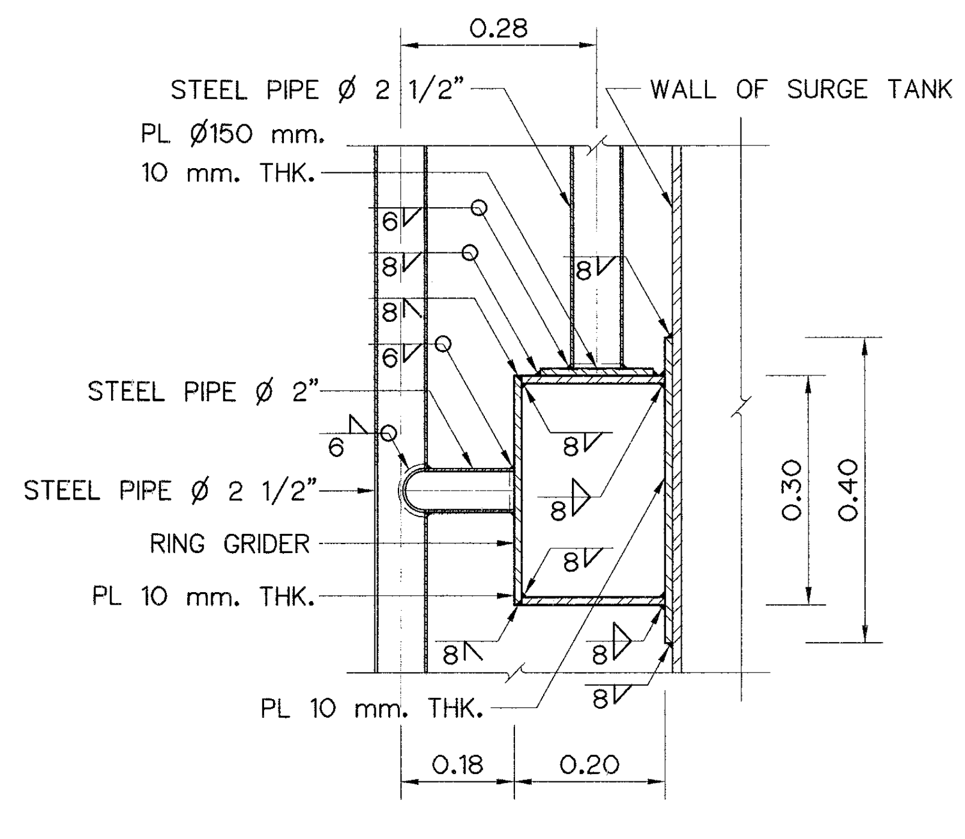
SCALE 1:25



### SECTION H–H
SCALE 1:25



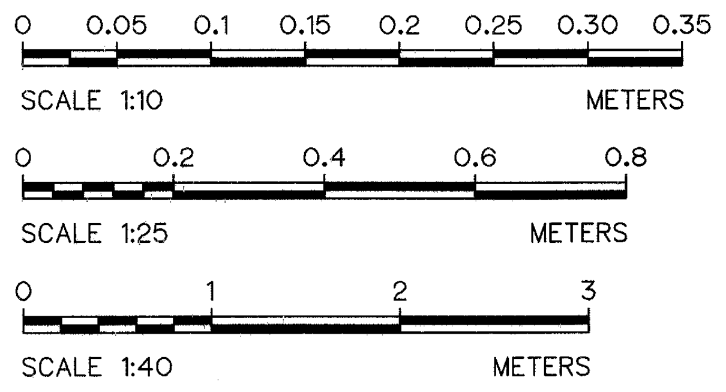
### SECTION H1–H1
SCALE 1:25

### NOTE :

1. ALL DIMENSIONS AND ELEVATIONS ARE IN METERS, UNLESS OTHERWISE SHOWN
2. STEEL PIPE CONFORM TO JIS G 3101 SS34
3. COROSION PROTECTION OF STEEL PIPE OR GARDRAIL IS WARNED TO STRICTLY FOLLOW GALVANIZE SPECIFICATION
4. STEEL TANK , GIRDER AND STIFFENEL SHALL CONFORM TO JIS G 3101 SS34

### REFERENCE DRAWING :

| | |
|---|---|
| 1. SURGE TANK GENERAL LAY-OUT | MH-ST-01 |
| 2. SURGE TANK SECTIONS | MH-ST-02 |
| 3. SURGE TANK LADDER RUNG DETAILS 2 | MH-ST-04 |
| 4. SURGE TANK RING GRIDER AND RAILING FALL DETAILS | MH-ST-05 |



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DEDE

KINGDOM OF THAILAND
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
SURGE TANK
LADDER RUNG DETAILS

P&C MANAGEMENT CO.,LTD.

Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

| | |
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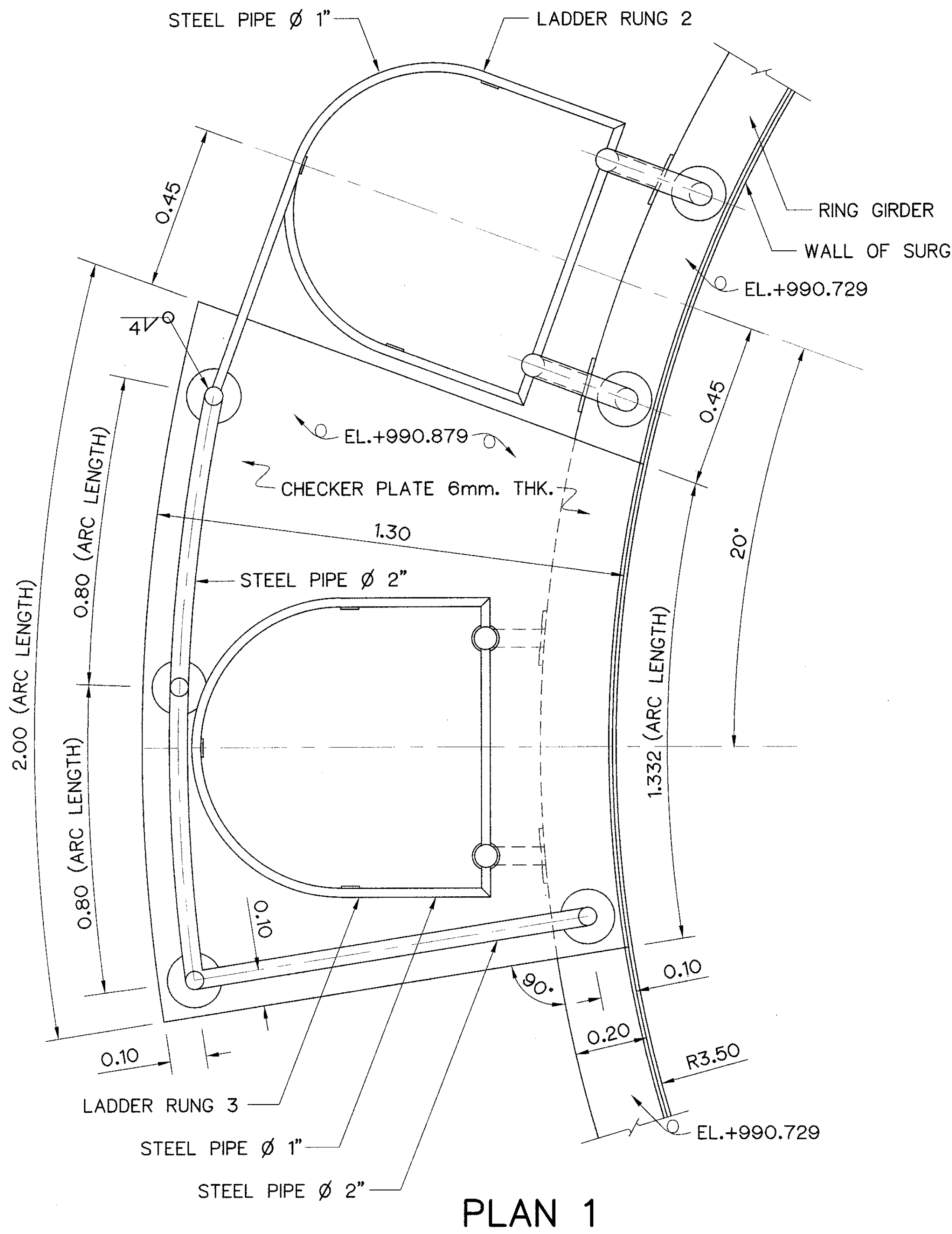
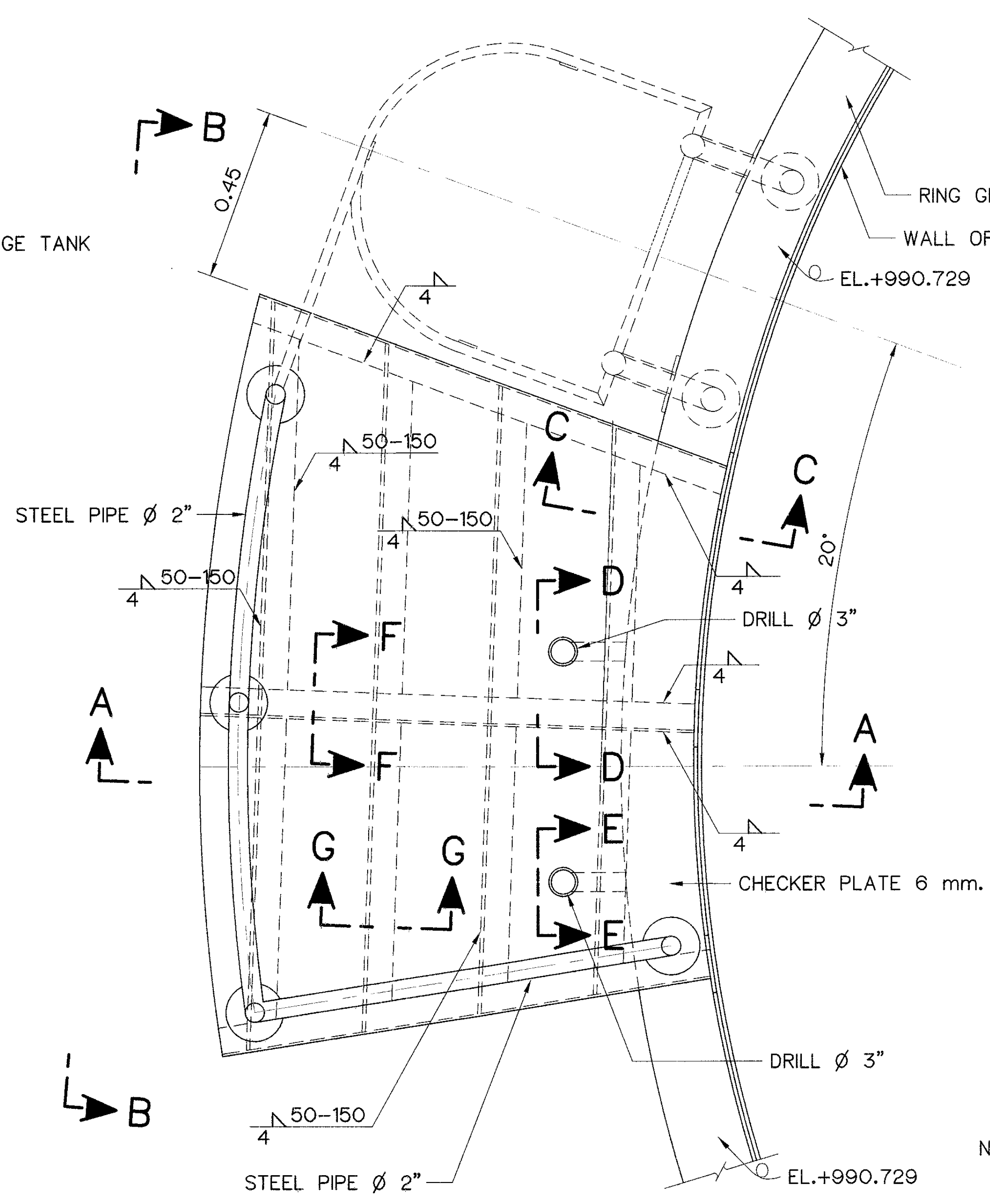
| DESIGNED ภย.64624 สย.6226 | REVIEWED |
| DRAWN | SUBMITTED Chan Y |
| CHECKED สย.6226 | RECOMMENDED |
| PROJECT MANAGER / DATE 08/03/2559 | APPROVED |

DRAWING NO. MH-ST-03
SHEET NO. 64 OF 130



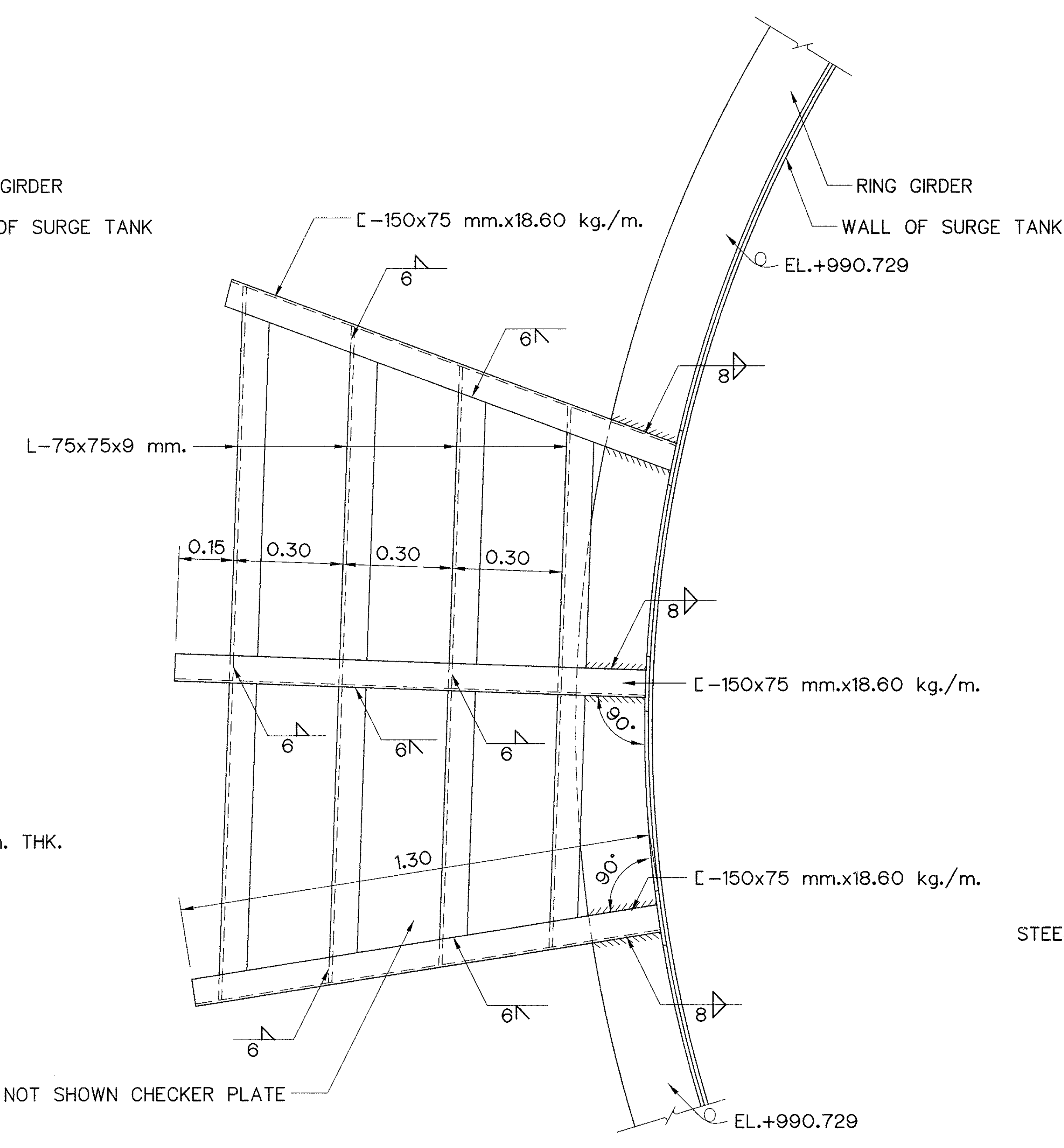
## PLAN 1

SCALE 1:15



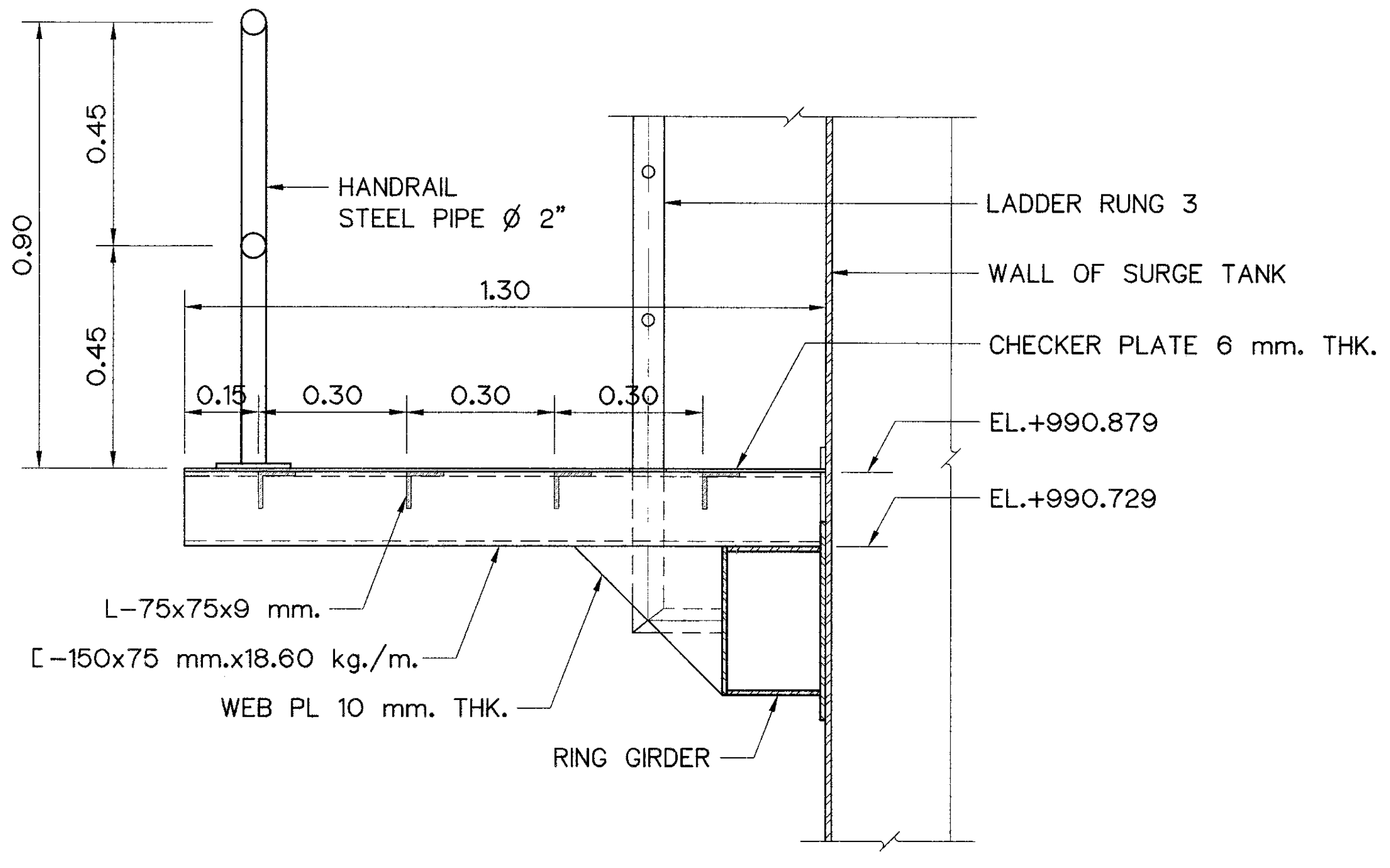
## PLAN 2

SCALE 1:15



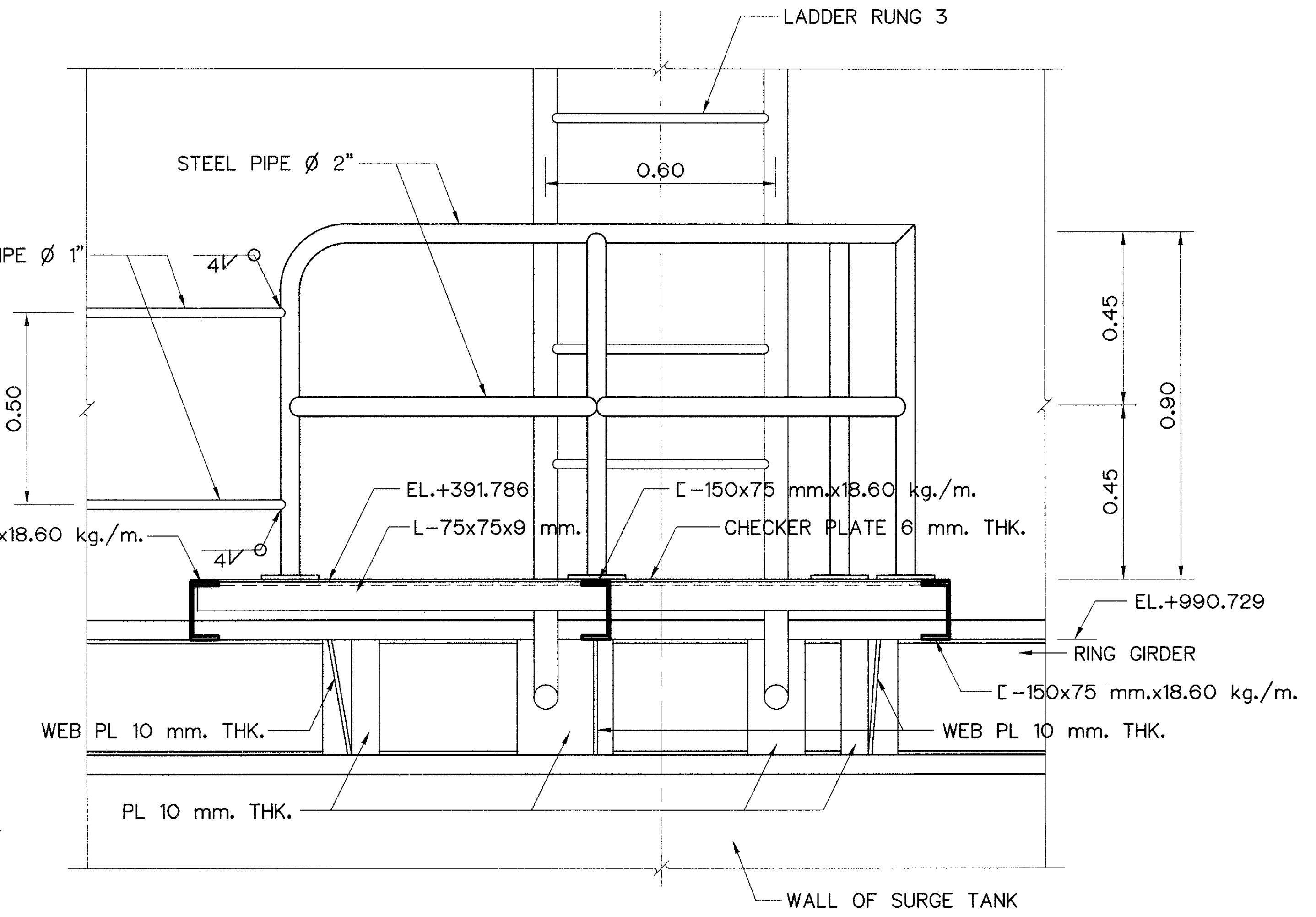
## PLAN 3

SCALE 1:15



## SECTION A–A

SCALE 1:15

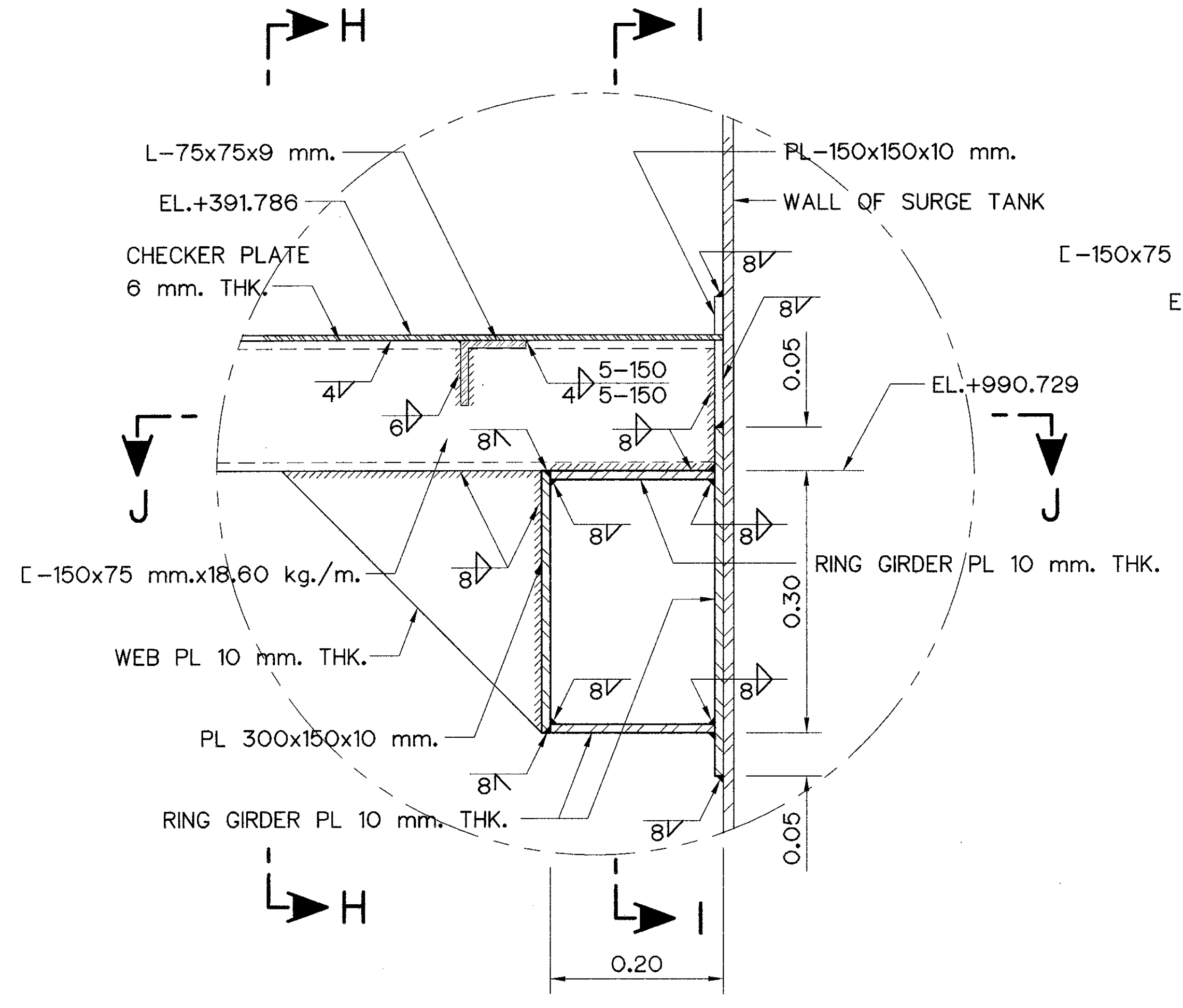


## SECTION B–B

SCALE 1:15

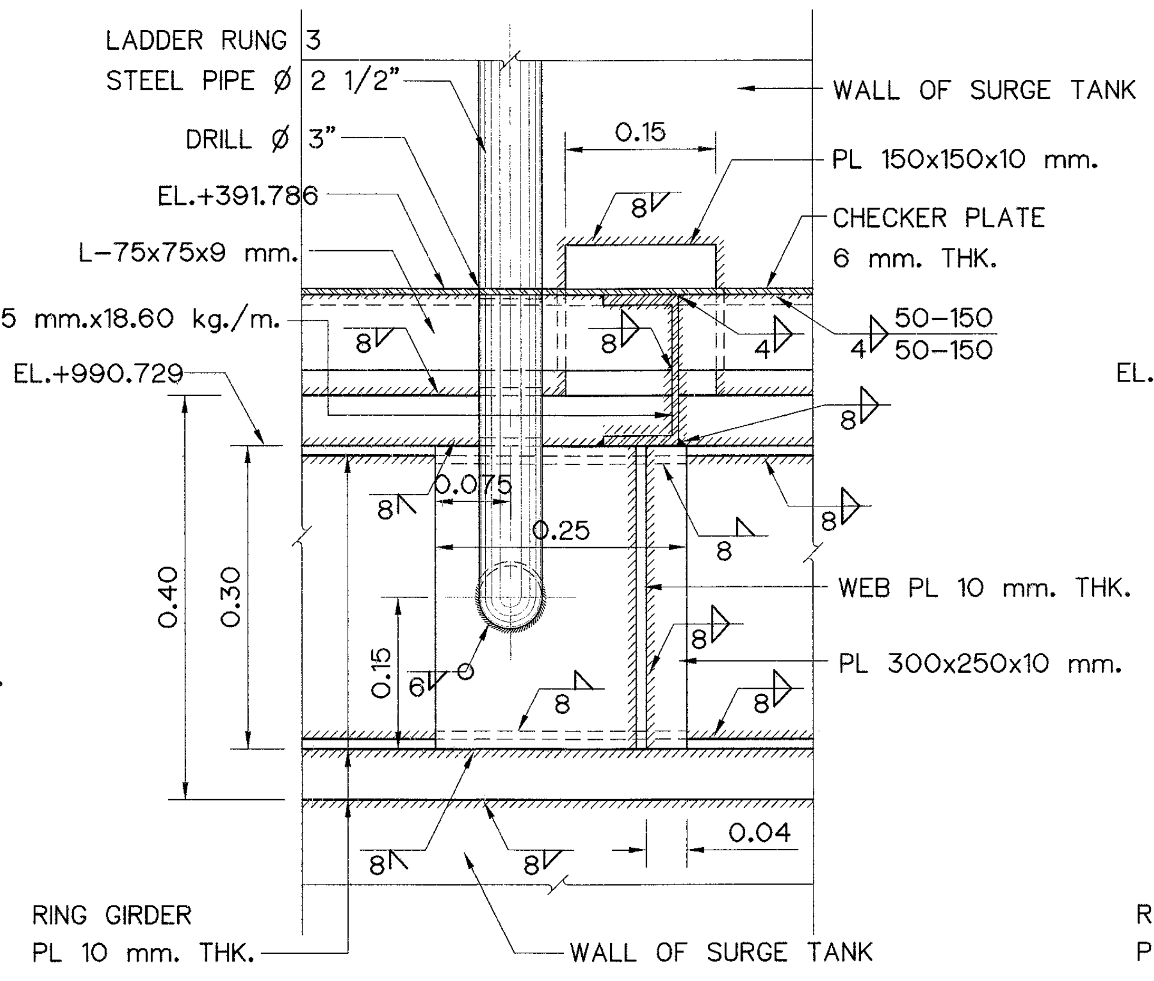
## NOTE :

1. ALL DIMENSIONS AND ELEVATIONS ARE IN METERS, UNLESS OTHERWISE SHOWN
2. STEEL PIPE CONFORM TO JIS G 3101 SS34
3. COROSION PROTECTION OF STEEL PIPE OR GARDRAIL IS WARNED TO STRICTLY FOLLOW GALVANIZE SPECIFICATION
4. STEEL TANK , GIRDER AND STIFFENEL SHALL CONFORM TO JIS G 3101 SS34



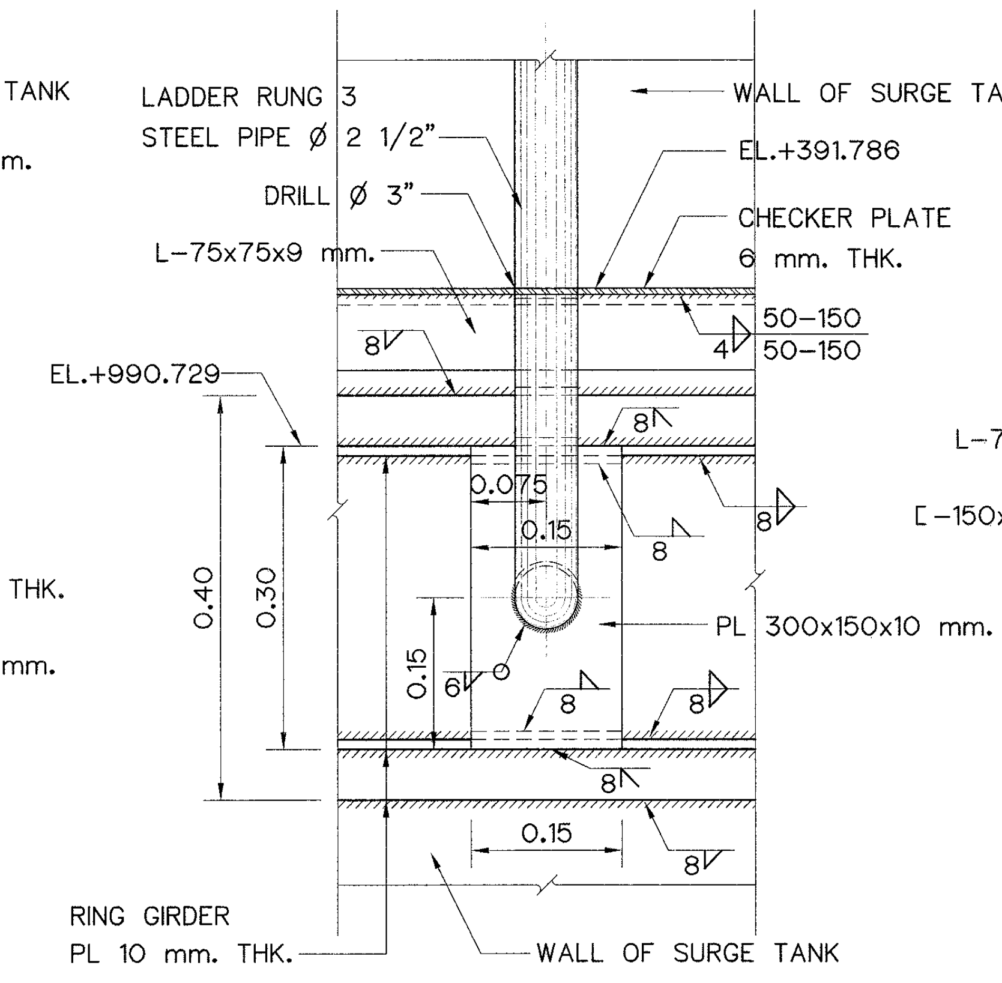
## SECTION C–C

SCALE 1: 7.5



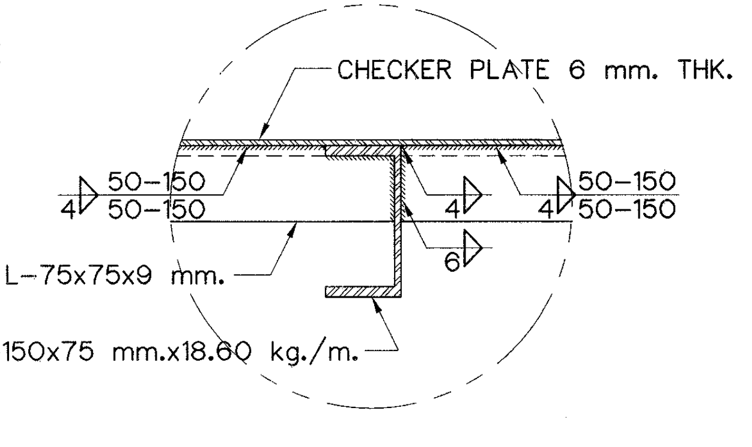
## SECTION D–D

SCALE 1: 7.5



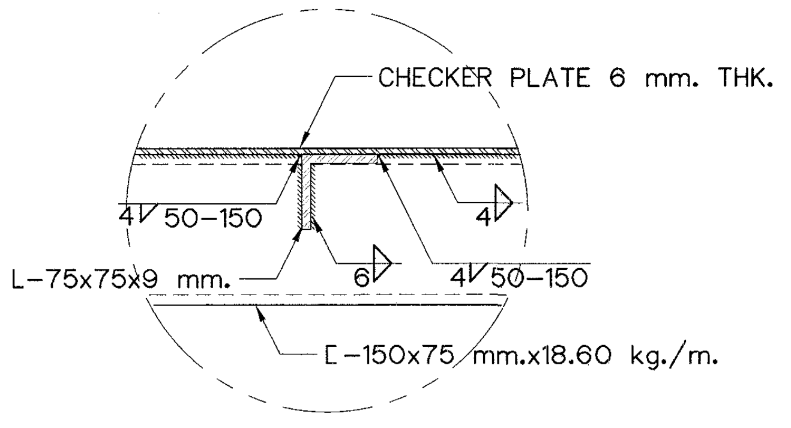
## SECTION E–E

SCALE 1: 7.5



## SECTION F–F

SCALE 1: 7.5

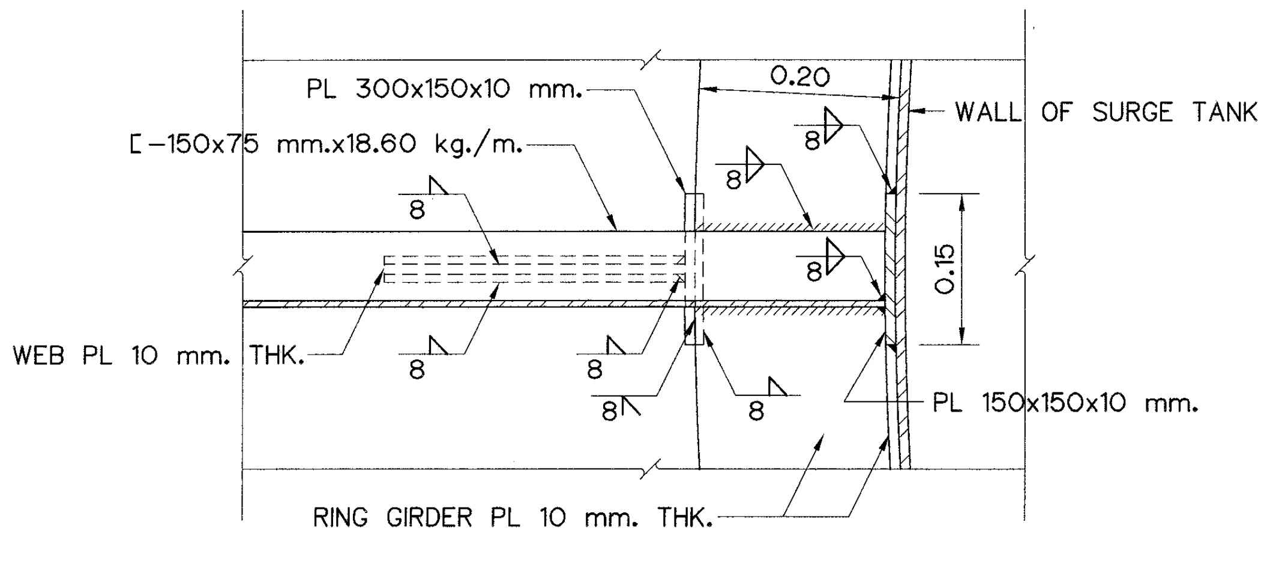


## SECTION G–G

SCALE 1: 7.5

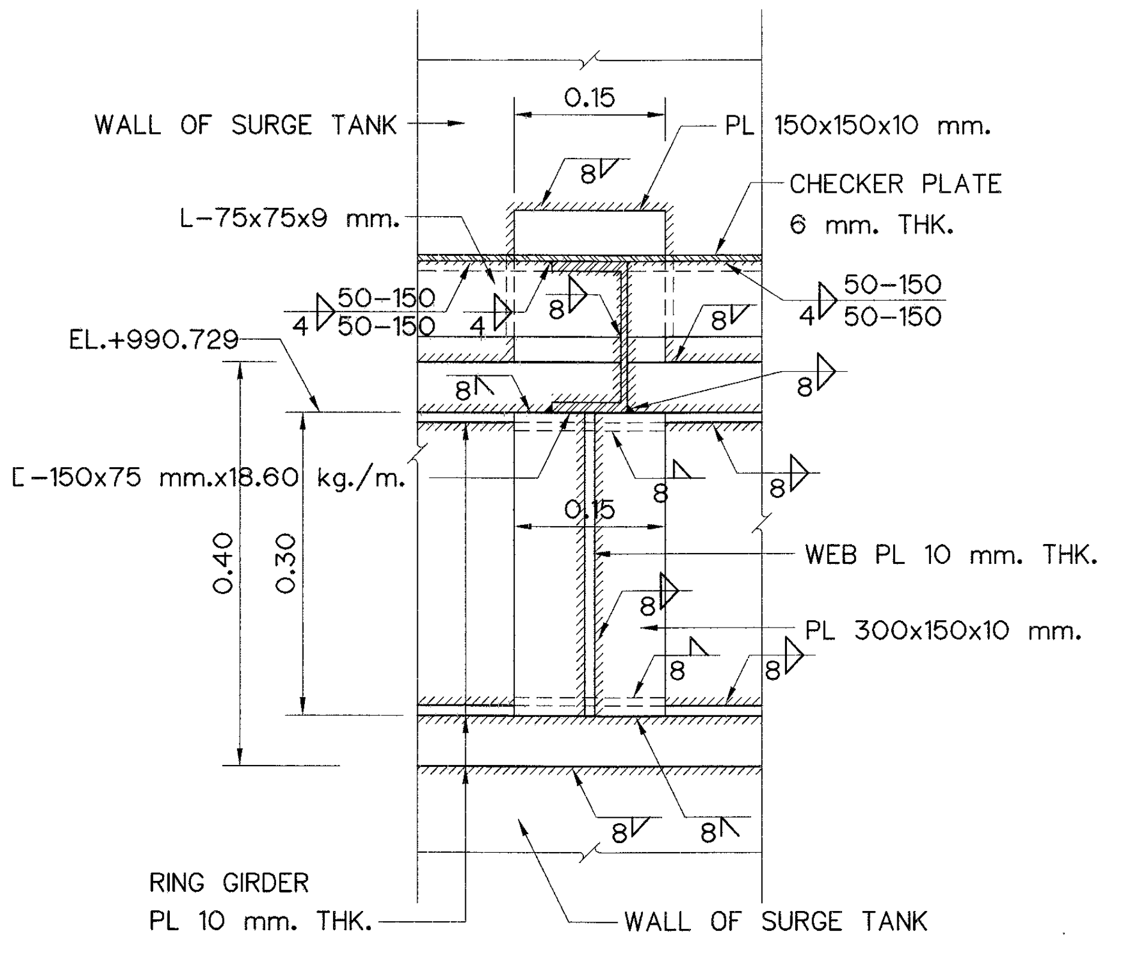
## REFERENCE DRAWING :

| | |
|---|---|
| 1. SURGE TANK GENERAL LAY-OUT | MH-ST-01 |
| 2. SURGE TANK SECTIONS | MH-ST-02 |
| 3. SURGE TANK LADDER RUNG DETAILS 1 | MH-ST-03 |
| 4 SURGE TANK RING GRIDER AND RAILING FALL DETAILS | MH-ST-05 |



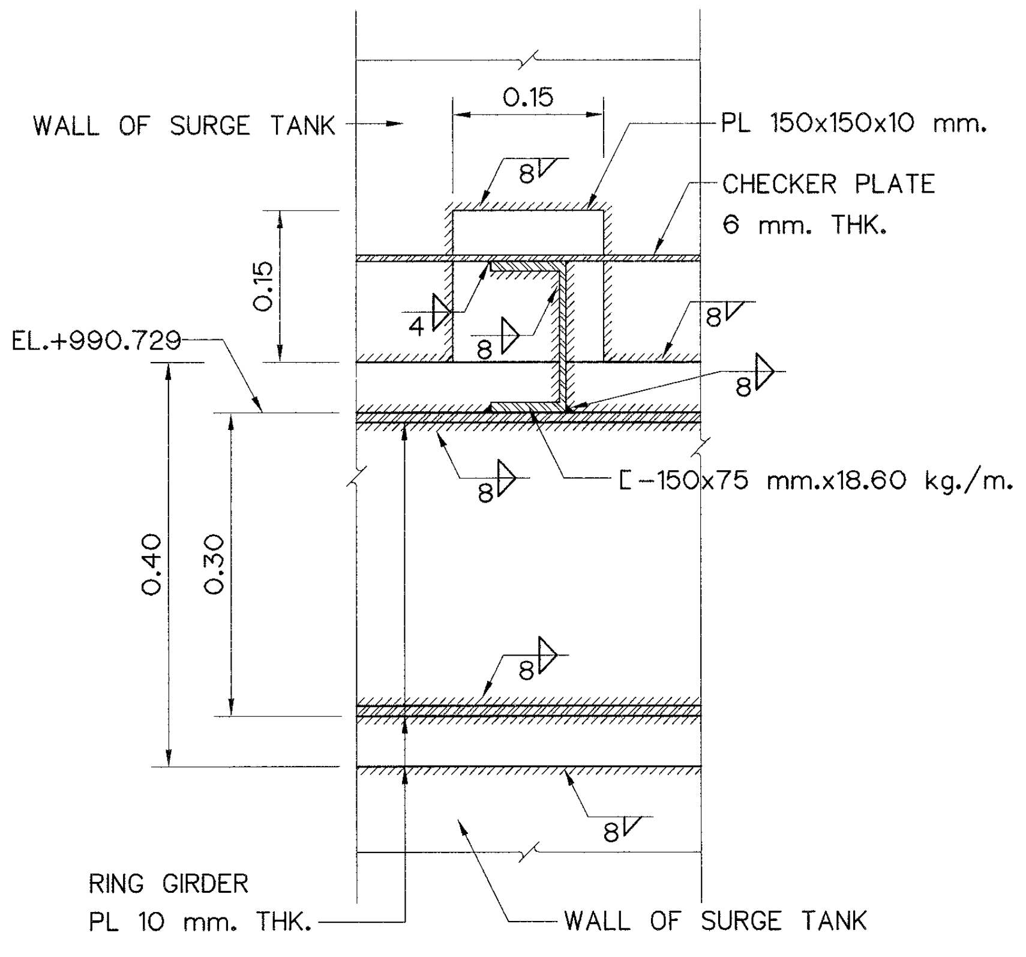
## SECTION J–J

SCALE 1: 7.5



## SECTION H–H

SCALE 1: 7.5



## SECTION I–I

SCALE 1: 7.5

0 0.075 0.15 0.30 0.45 0.60
SCALE 1:7.5 METERS

0 0.15 0.3 0.6 0.9 1.2
SCALE 1:15 METERS

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
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| | CONSULTANTS | | DEDE | |

KINGDOM OF THAILAND
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CIVIL WORKS AND TRANSMISSION LINE
SURGE TANK
PLATFORM DETAILS

P&C MANAGEMENT CO.,LTD.

Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

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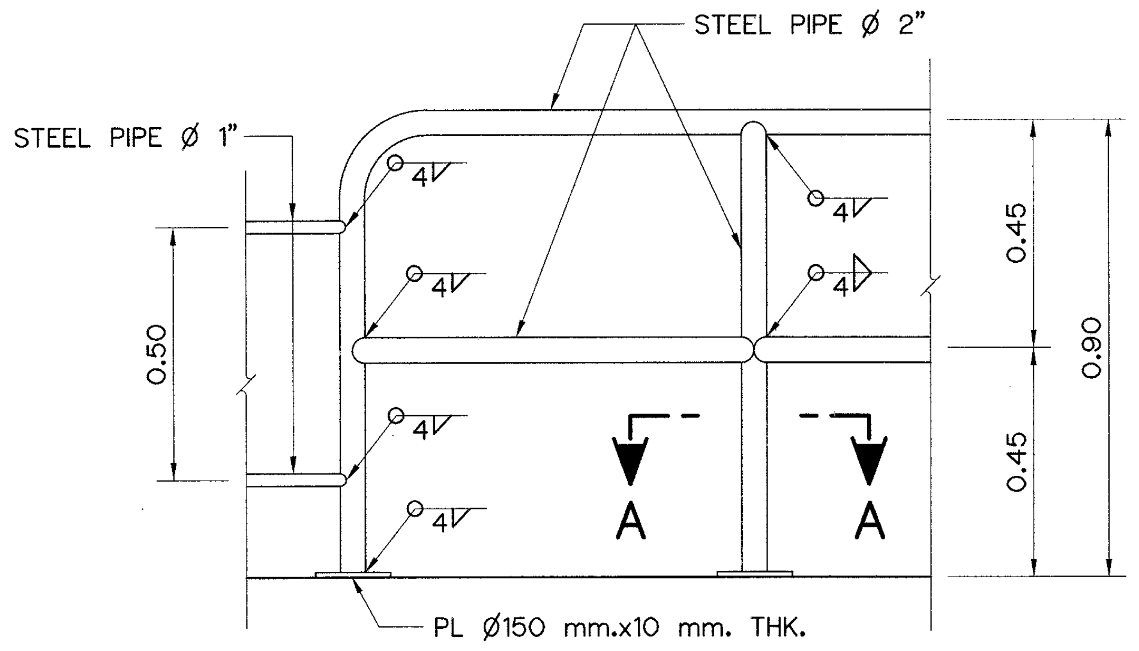
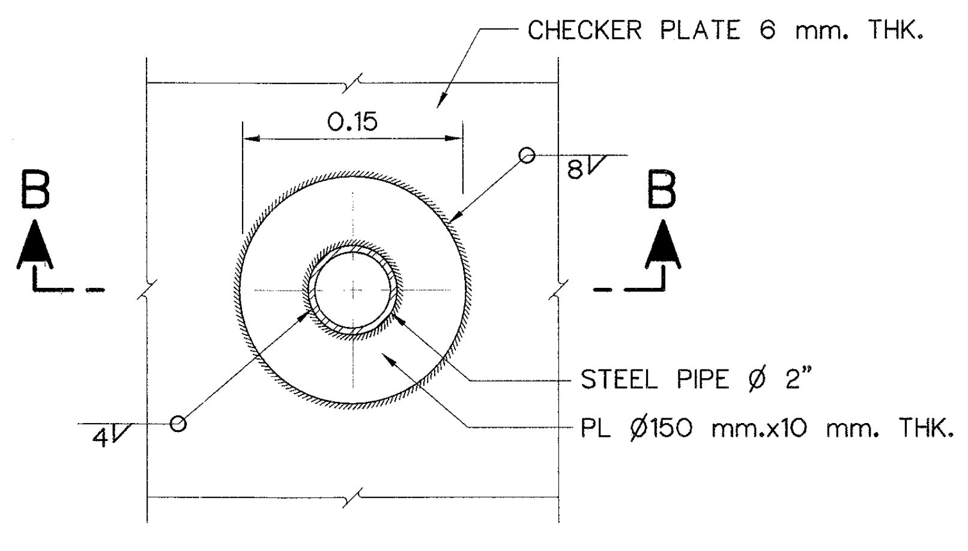
| DESIGNED | ภย.64624 | สย.6226 | SUBMITTED Chanit |
| DRAWN | | | RECOMMENDED |
| CHECKED | | สย.6226 | APPROVED P.Hanse-N- |
| PROJECT MANAGER | | DATE 08/03/2559 | REVIEWED |

DRAWING NO. MH-ST-04
SHEET NO. 65 OF 130



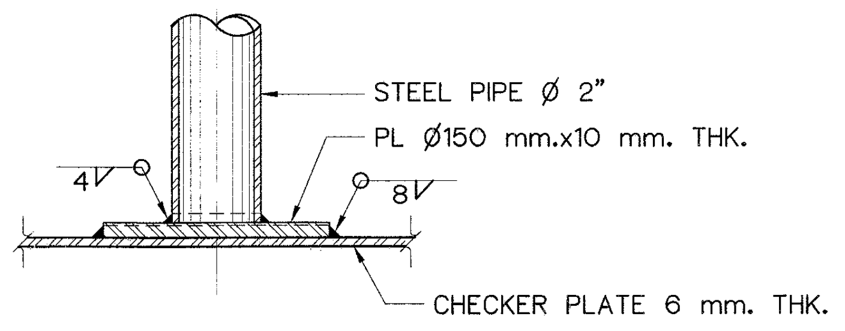
GUARDRAIL DETAILS

SCALE 1:15



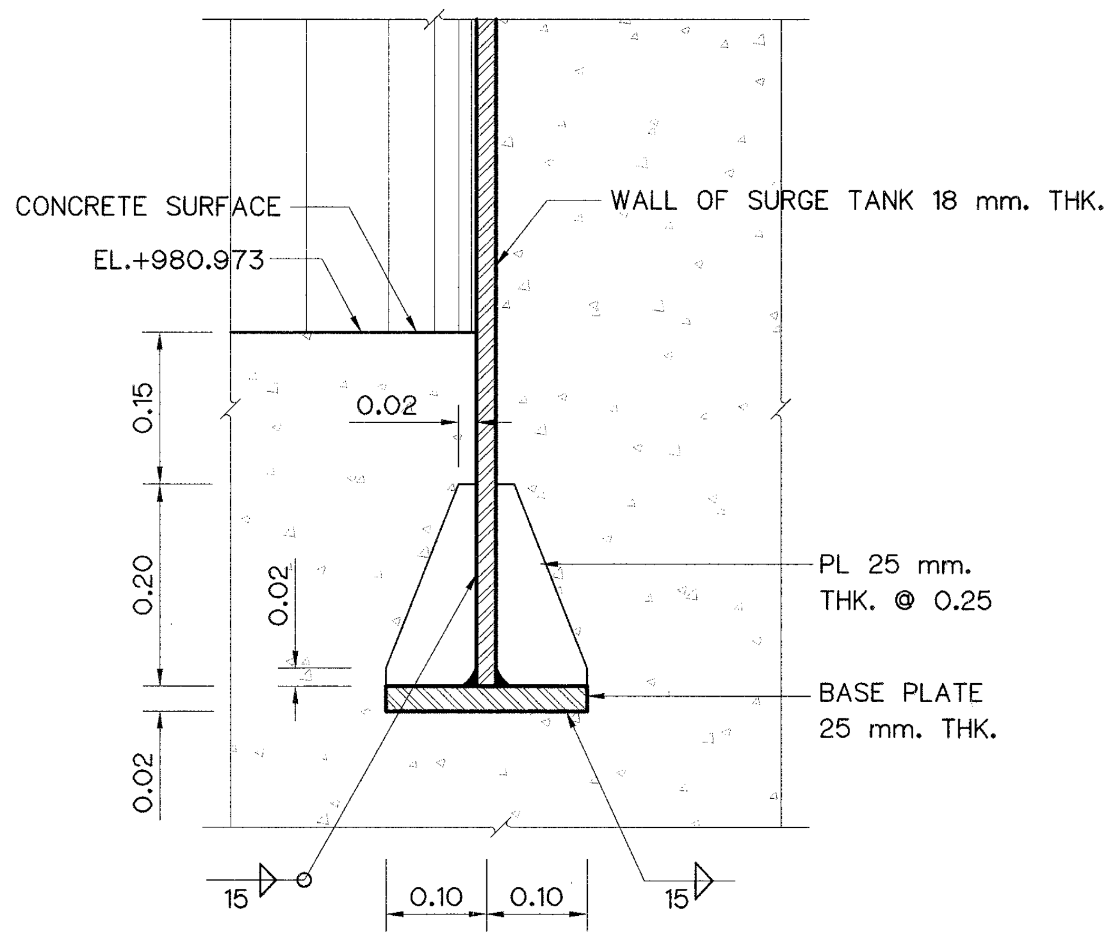
SECTION A–A

SCALE 1:5



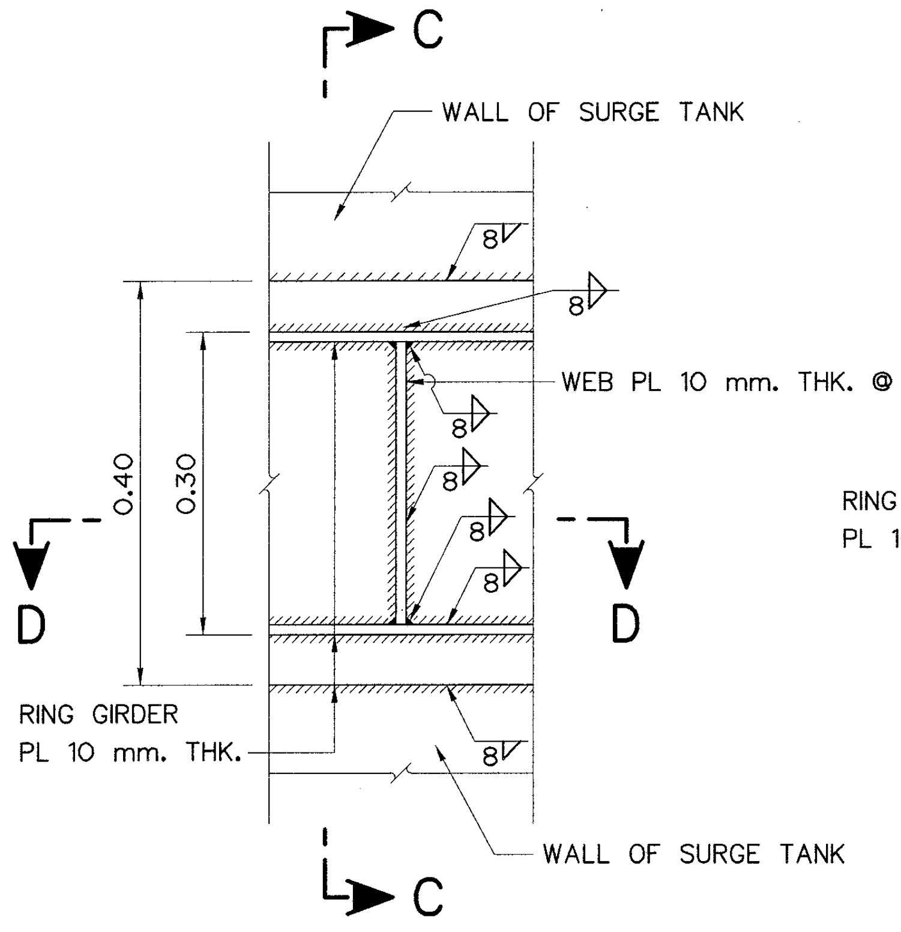
SECTION B–B

SCALE 1:5



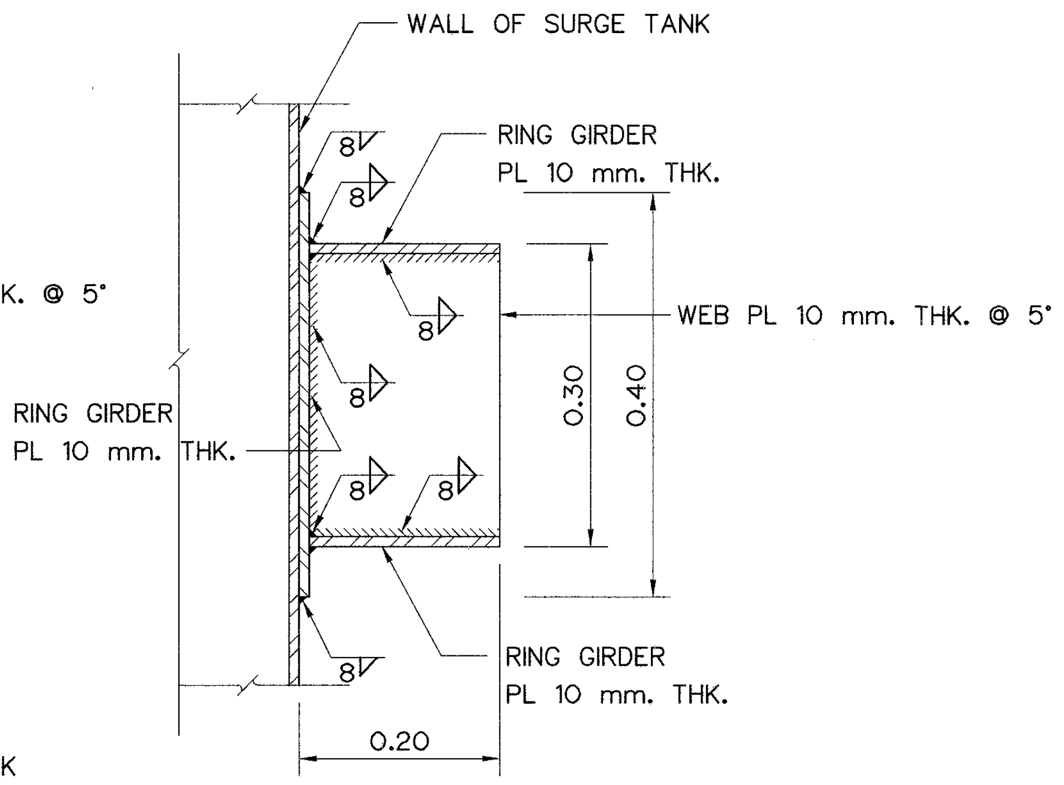
DETAIL "A"

SCALE 1:10



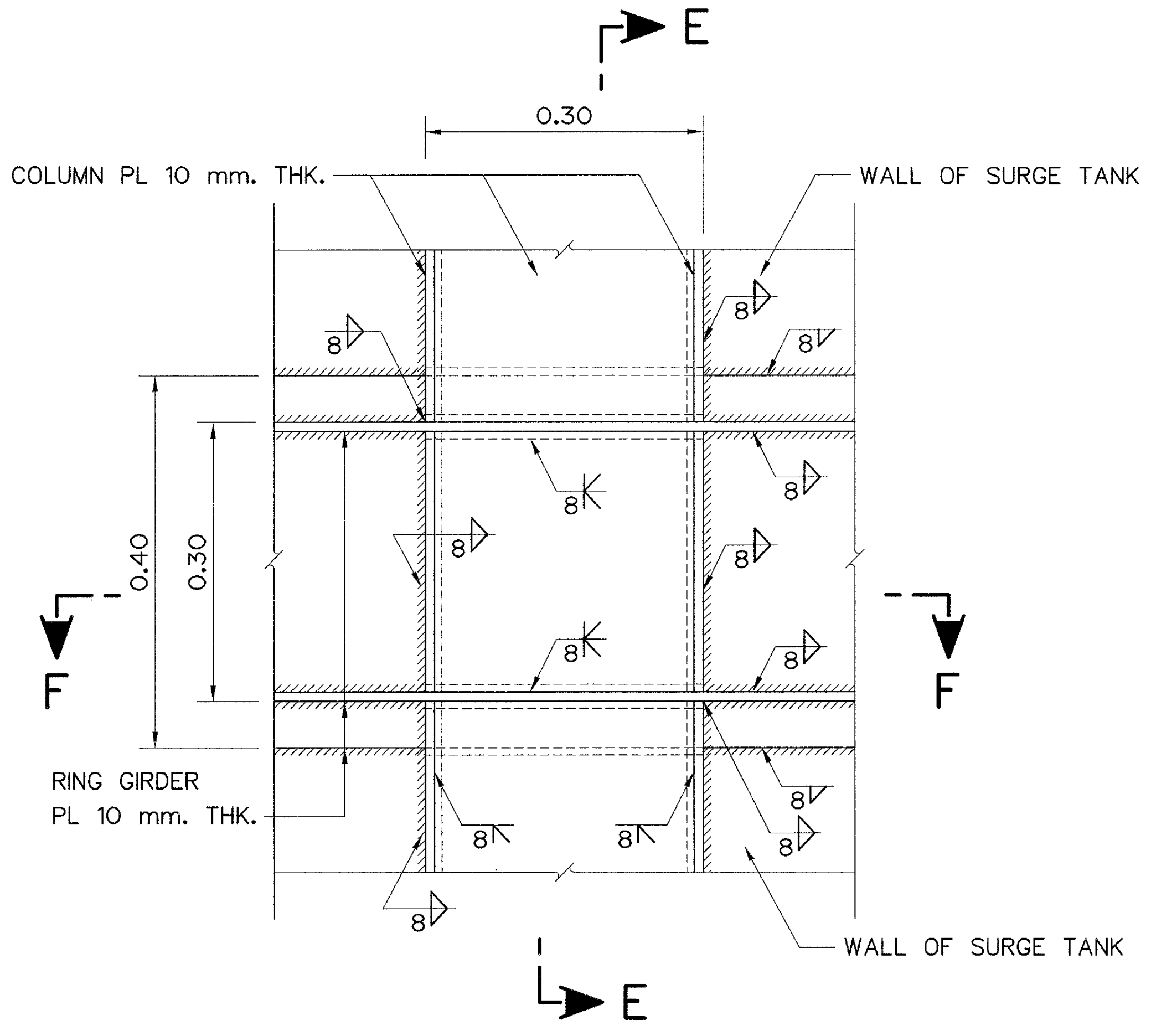
SIDE VIEW OF RING GIRDER

SCALE 1:7.5


WALL OF SURGE TANK
RING GIRDER PL 10 mm. THK.
WEB PL 10 mm. THK. @ 5"
8
RING GIRDER PL 10 mm. THK.
0.30
0.40
RING GIRDER PL 10 mm. THK.
0.20

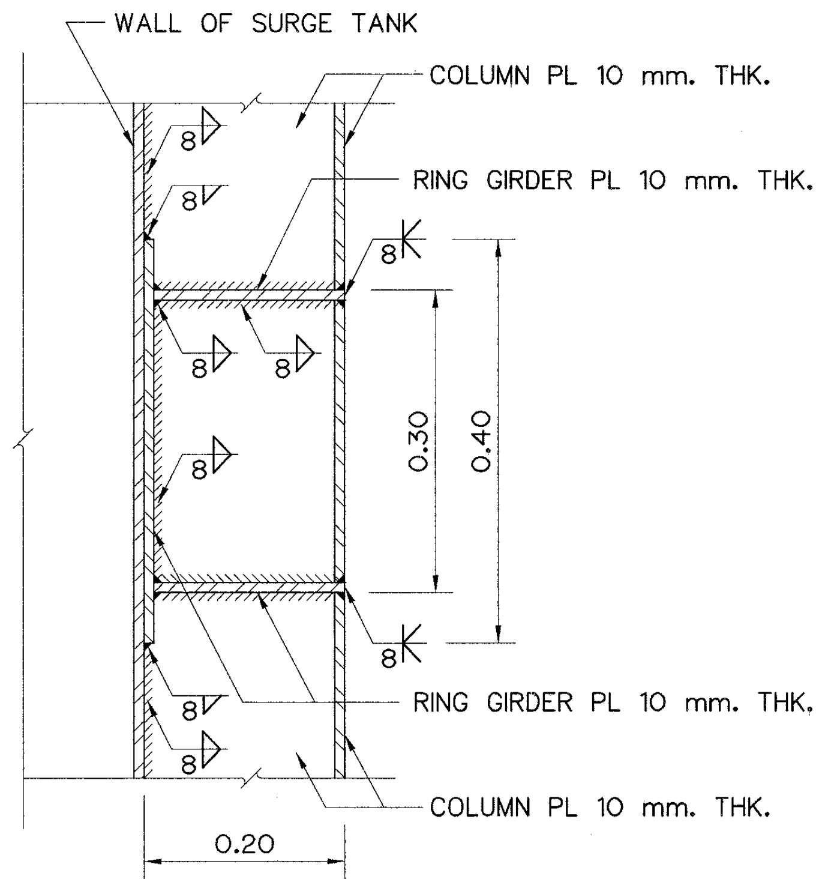
SECTION C–C

SCALE 1:7.5



SIDE VIEW OF COLUMN AND RING GIRDER

SCALE 1:7.5



SECTION E–E

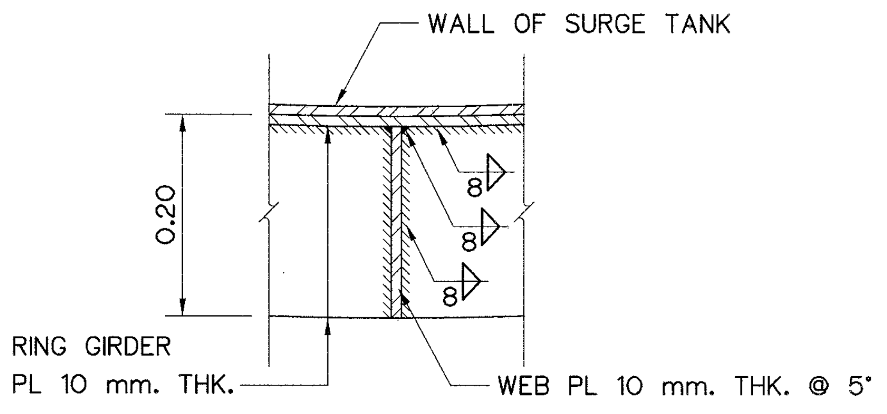
SCALE 1:7.5

## NOTE :

1. ALL DIMENSIONS AND ELEVATIONS ARE IN METERS, UNLESS OTHERWISE SHOWN
2. STEEL PIPE CONFORM TO JIS G 3101 SS34
3. COROSION PROTECTION OF STEEL PIPE OR GARDRAIL IS WARNED TO STRICTLY FOLLOW GALVANIZE SPECIFICATION
4. STEEL TANK , GIRDER AND STIFFENEL SHALL CONFORM TO JIS G 3101 SS34

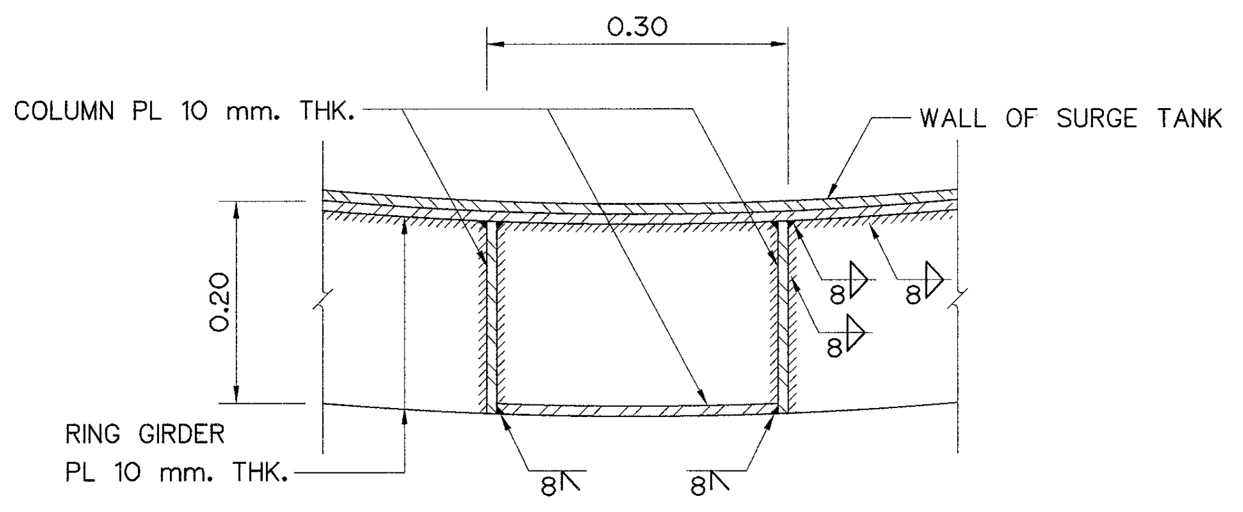
## REFERENCE DRAWING :

| | |
|---|---|
| 1. SURGE TANK GENERAL LAY–OUT | MH–ST–01 |
| 2. SURGE TANK SECTIONS | MH–ST–02 |
| 3. SURGE TANK LADDER RUNG DETAILS 1 | MH–ST–03 |
| 4 SURGE TANK LADDER RUNG DETAILS 2 | MH–ST–04 |



SECTION D–D

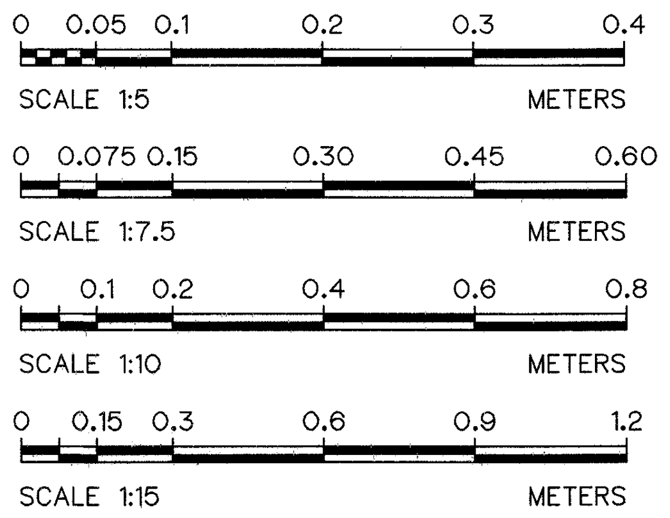
SCALE 1:7.5



SECTION F–F

SCALE 1:7.5

## RING GRIDER DETAILS



KINGDOM OF THAILAND
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
SURGE TANK
RING GRIDER AND HANDRAIL

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
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P&C MANAGEMENT CO.,LTD.

Department of Alternative
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MINISTRY OF ENERGY

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| DESIGNED ภย.64624 สย.6226 | REVIEWED |
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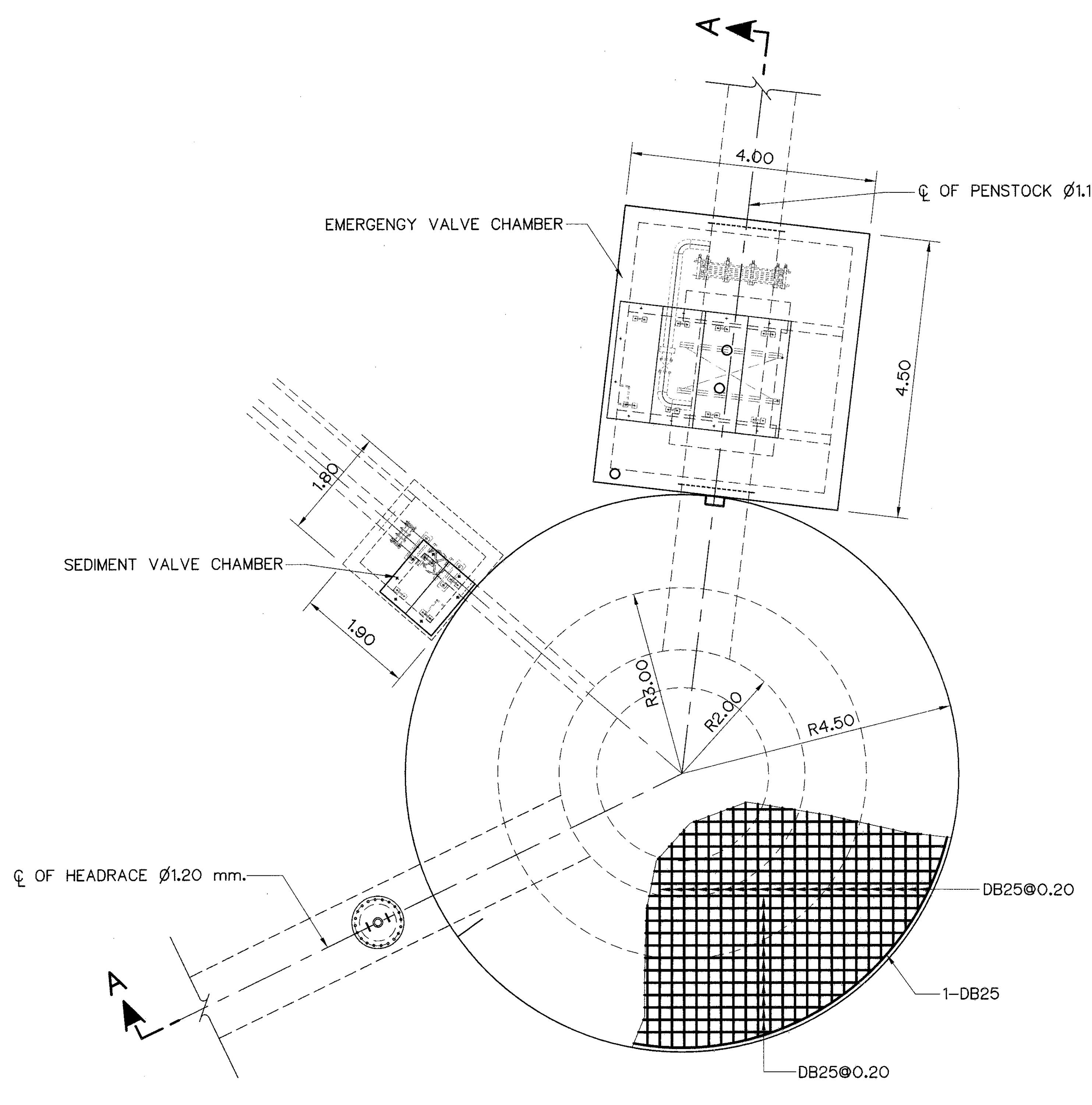
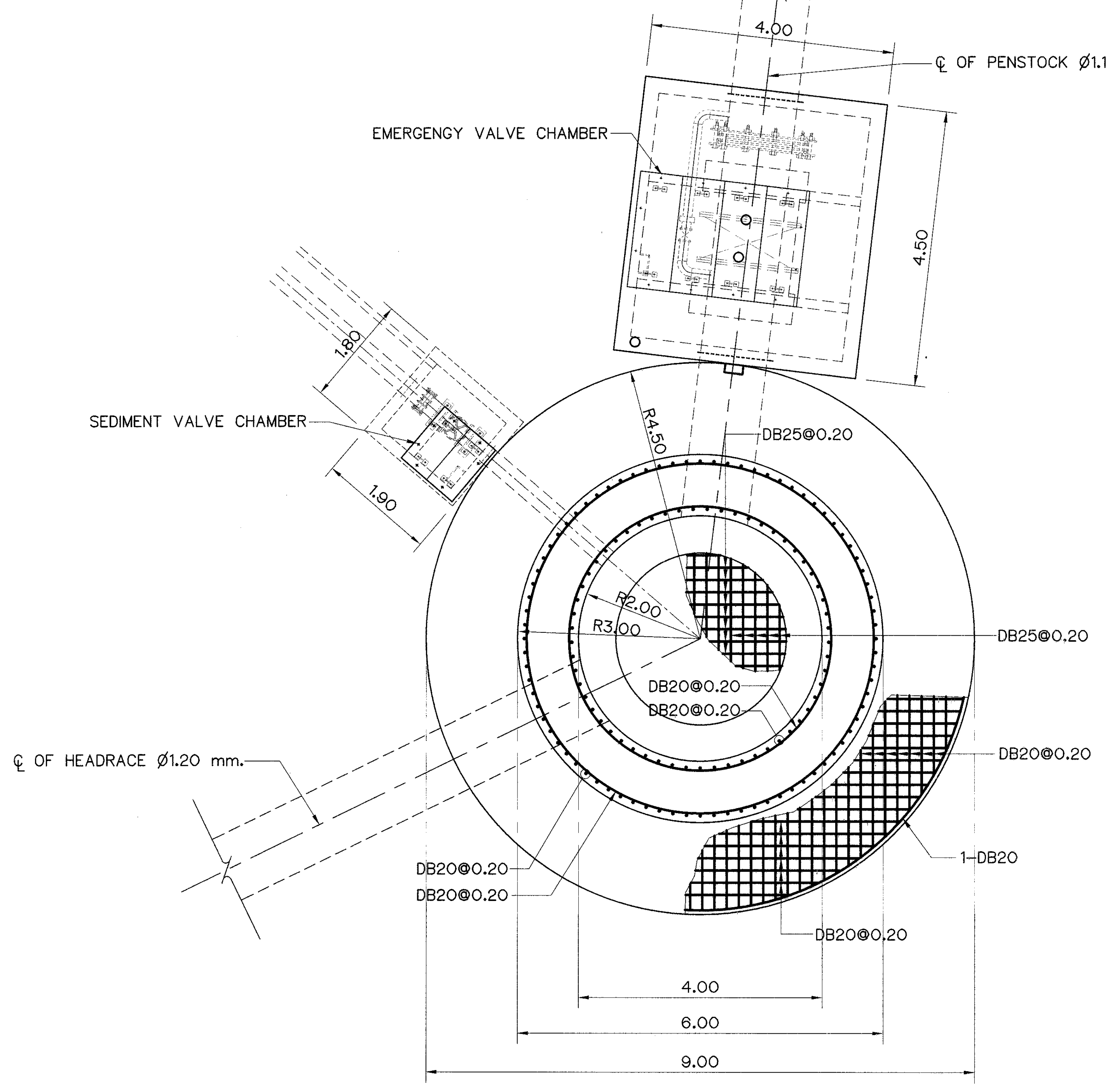
| | APPROVED |
| PROJECT MANAGER — DATE 08/03/2559 | DRAWING NO. MH–ST–05 |
| | SHEET NO. 66 OF 130 |



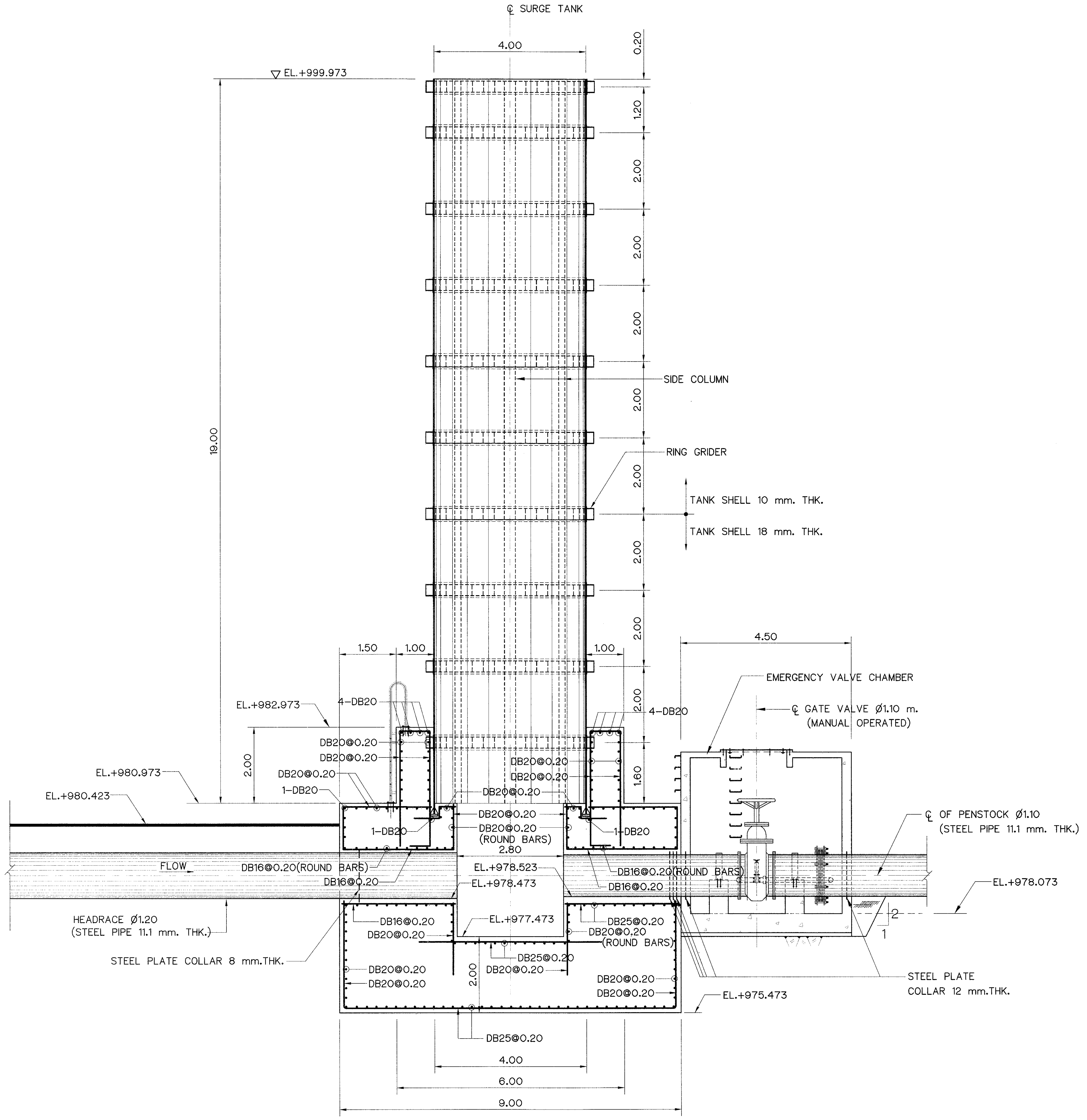
## LOWER STEEL PLAN

SCALE 1:75



## UPPER STEEL PLAN

SCALE 1:75



## SECTION A-A

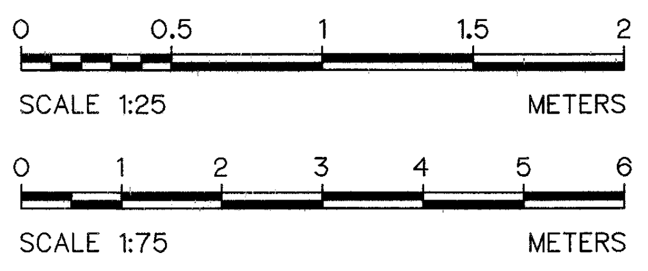
SCALE 1:75

## NOTES :

1. ALL DIMENSIONS AND ELEVATIONS ARE IN METERS, UNLESS OTHERWISE SHOWN
2 STEEL PIPE CONFORM TO JIS G 3101 SS34
3. BASE OF CONCRETE FOUNDATION SHALL BE DETERMINED IN FIELD BY EMBEDING TO STABLE ROCK FOUNDATION WITH A ALLOWABLE BEARING CAPACITY NOT LESS THAN 25 T/m$^2$
4. COROSINE PROTECTION OF STEEL PIPE OR GARDRAIL IS WARNED TO STRICTLY FOLLOW GALVANIZE SPECIFICATION
5. STEEL TANK , GIRDER AND STIFFENER SHALL CONFORM TO JIS G 3101 SS34

## REFERENCE DRAWING :

1. SURGE TANK, GENERAL LAY-OUT MH-ST-01
2. SURGE TANK, PLAN AND SECTIONS MH-ST-02



KINGDOM OF THAILAND
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
SURGE TANK
REINFORCEMENT DETAILS

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
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DRAWN
CHECKED สย.6226
PROJECT MANAGER
DATE 08/03/2559

Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY
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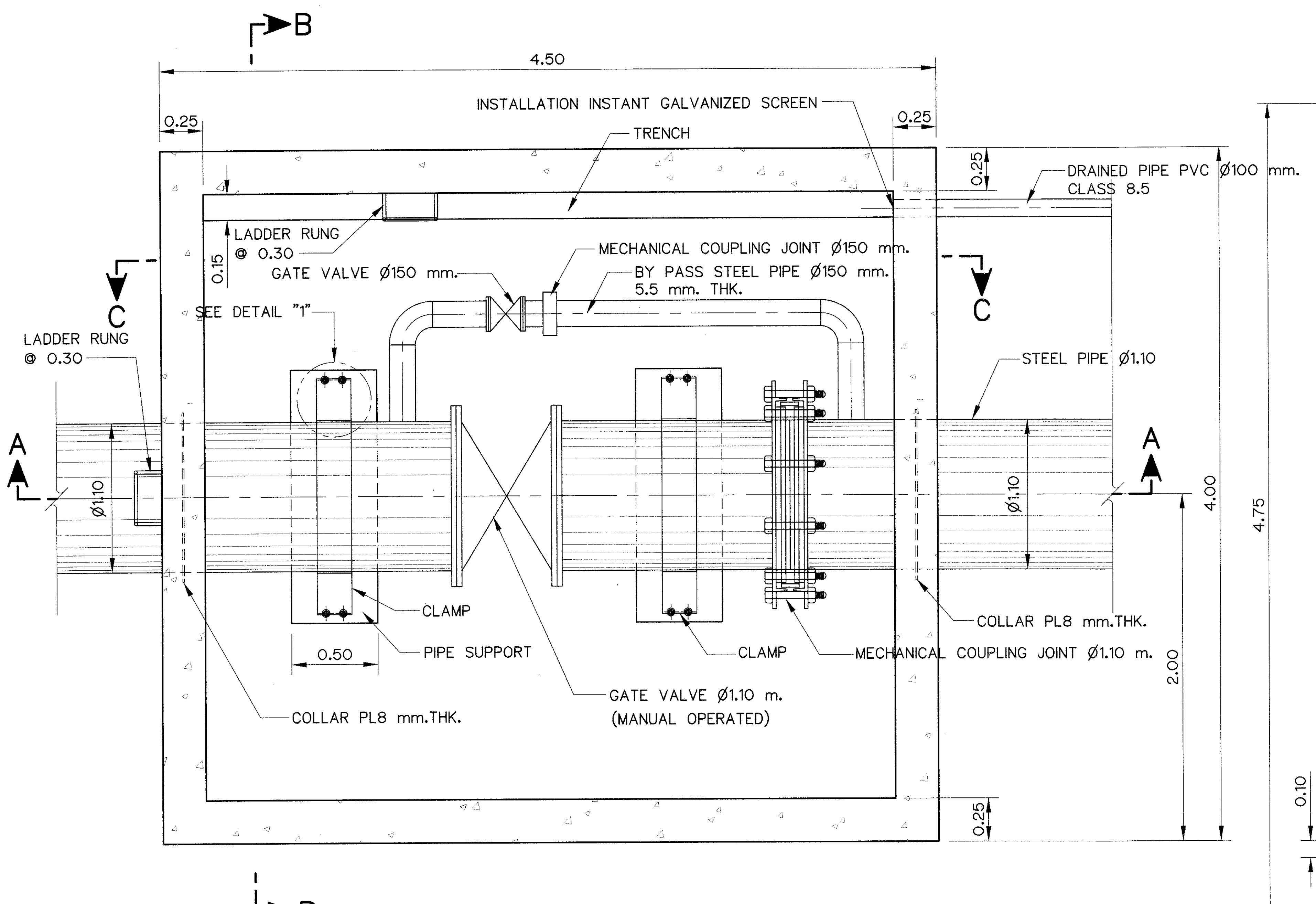
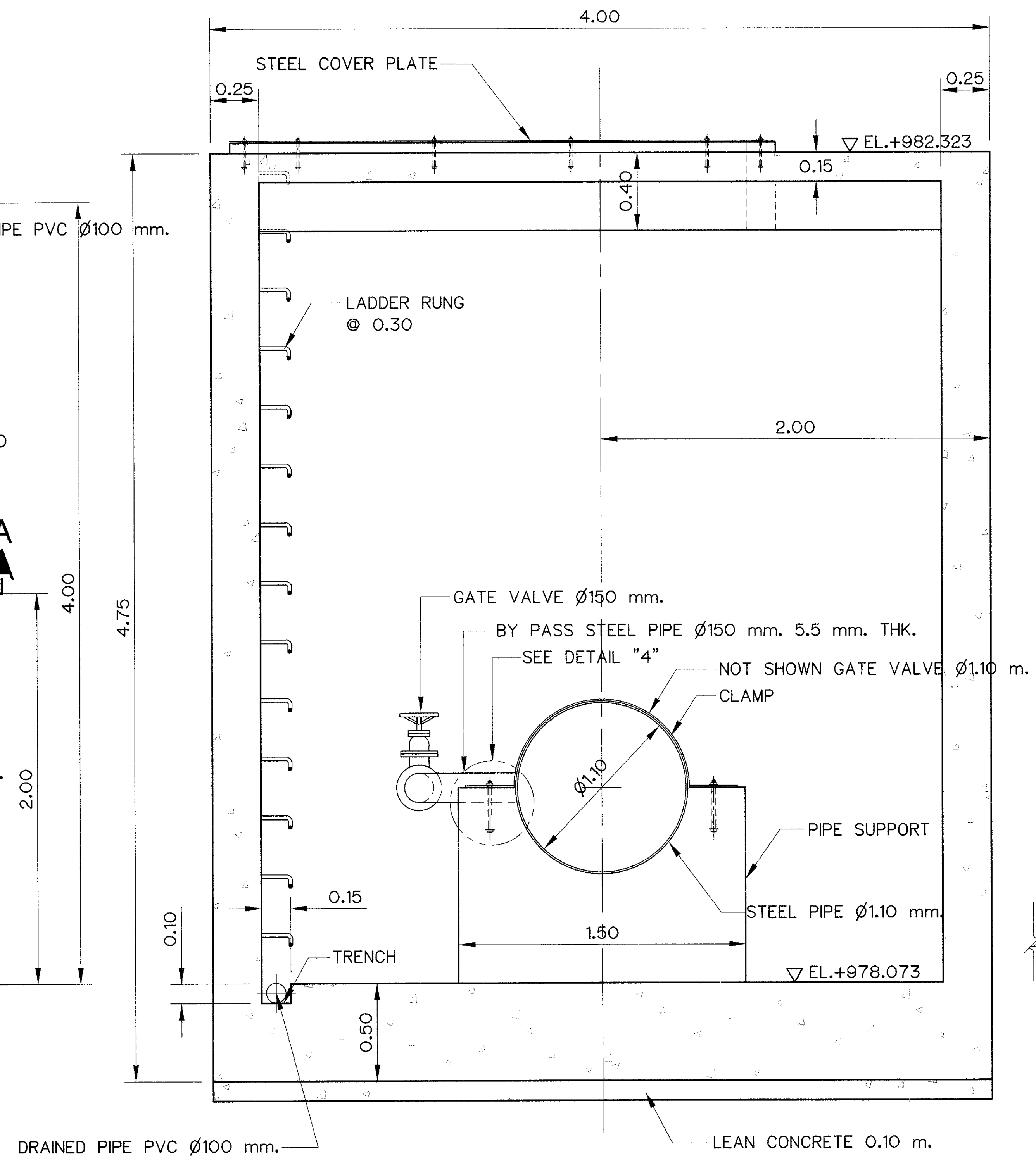
RECOMMENDED
APPROVED P. Hansell

DRAWING NO. MH-ST-06
SHEET NO. 67 OF 130



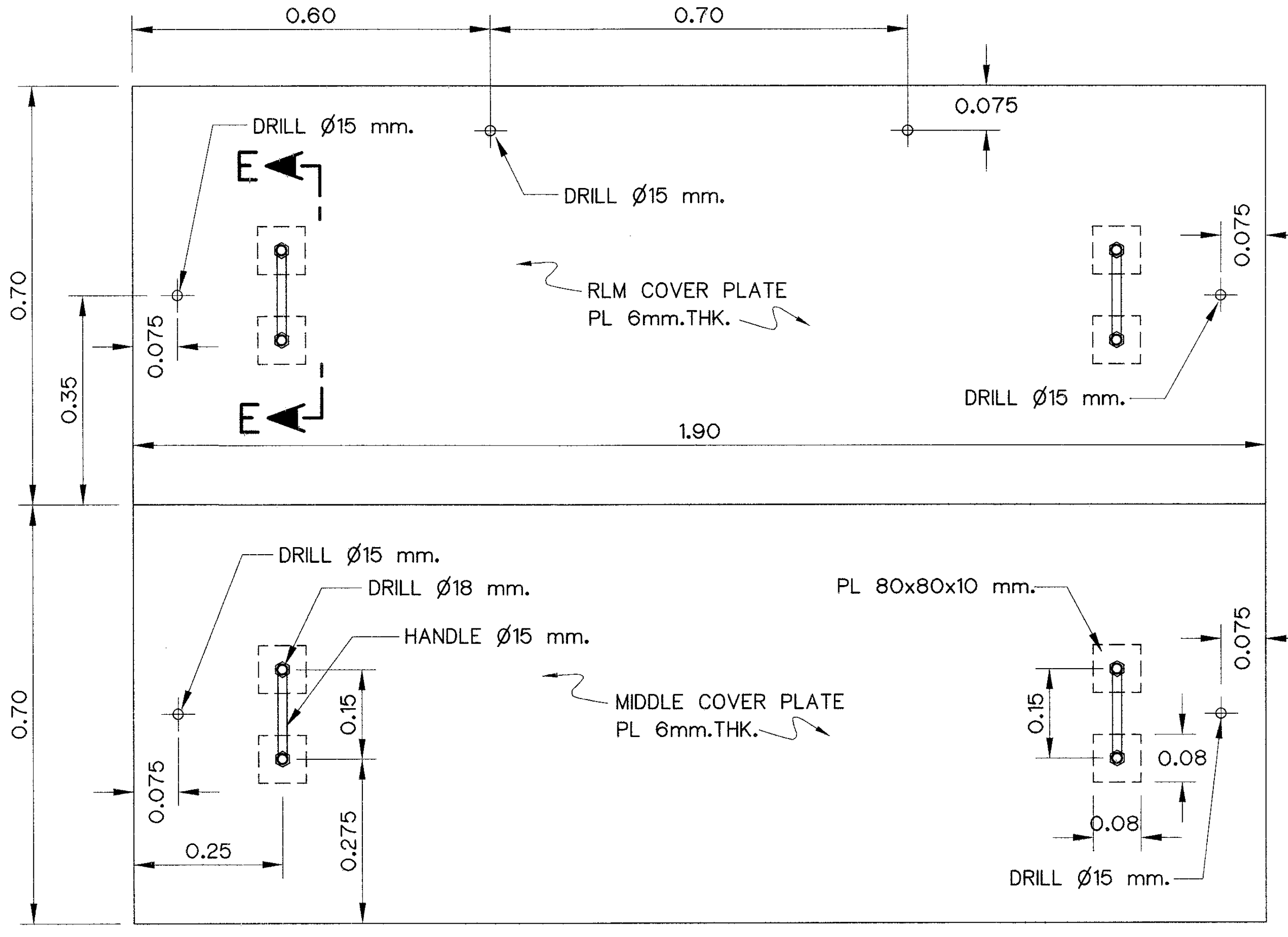
## PLAN

SCALE 1:25



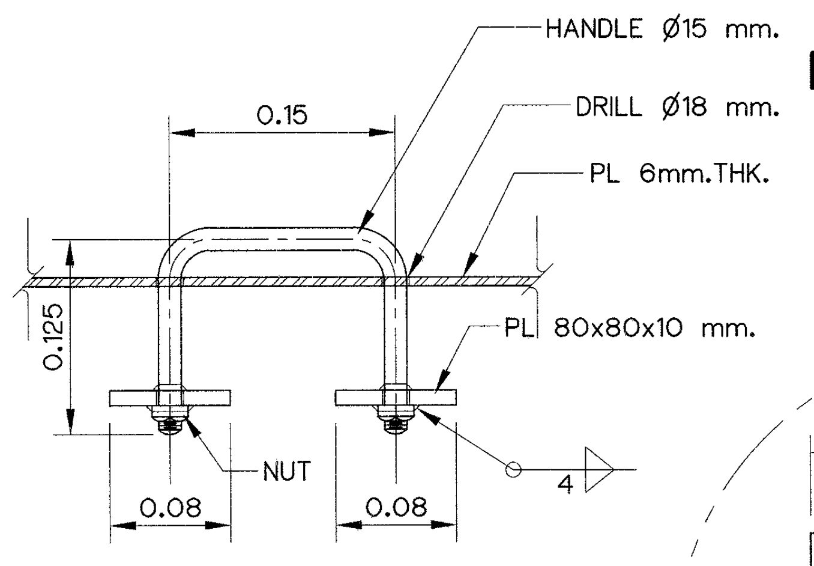
## SECTION B-B

SCALE 1:25



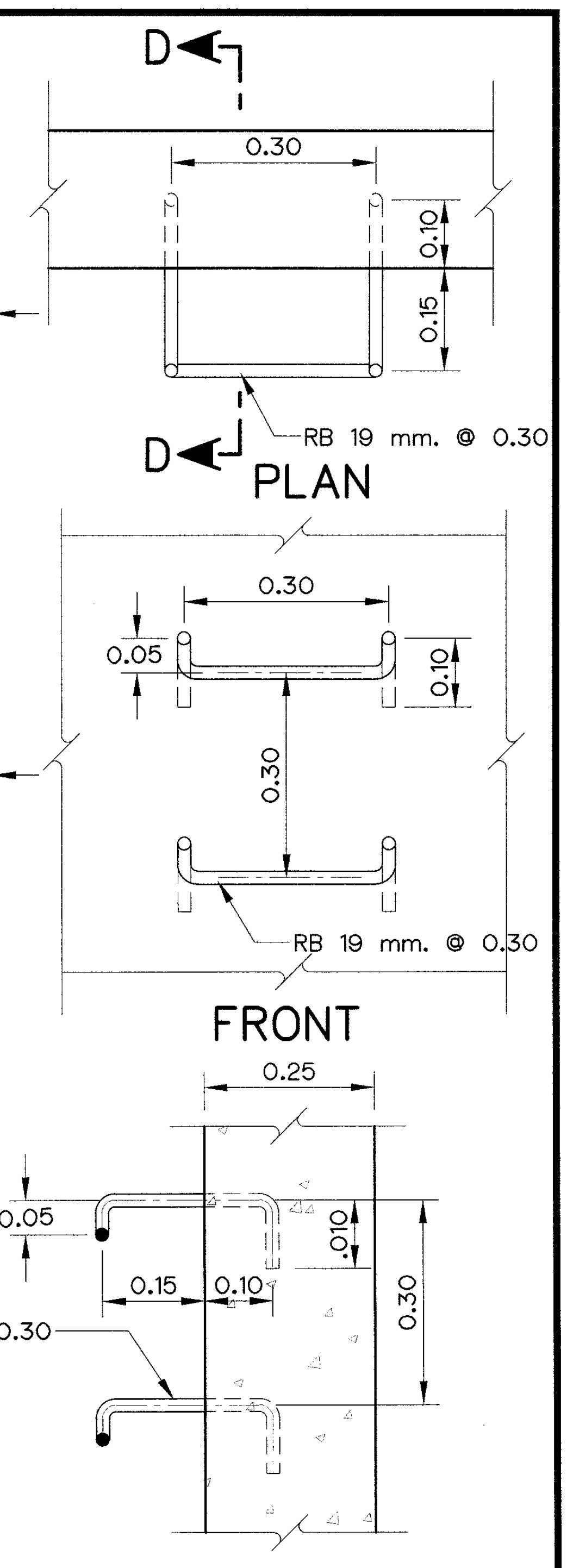
## PLAN STEEL COVER PLATE

SCALE 1:10



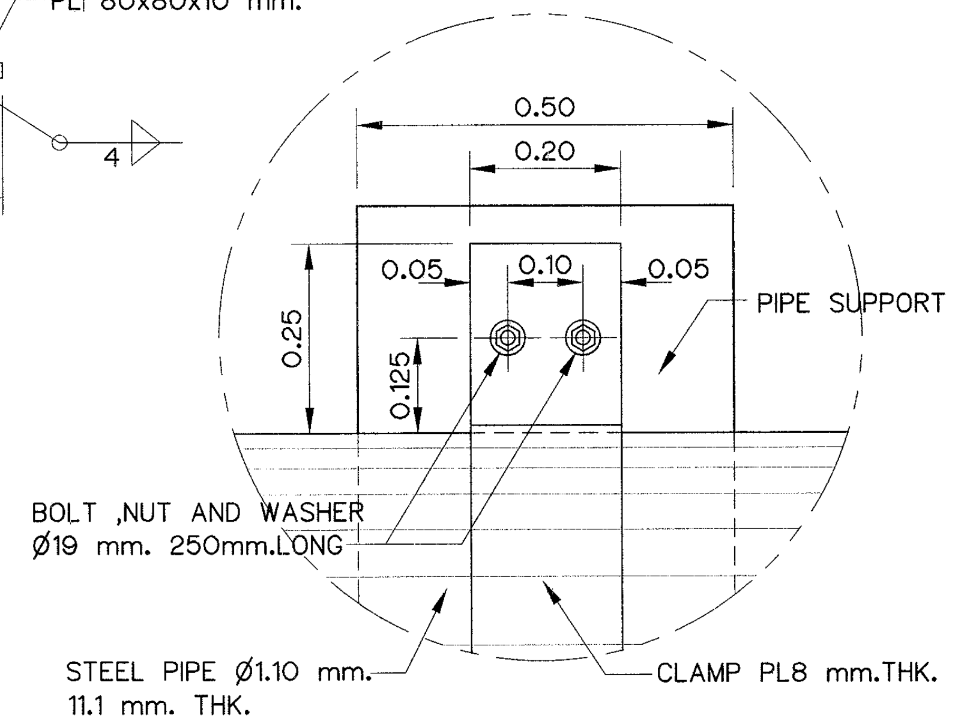
## SECTION E-E

SCALE 1:5



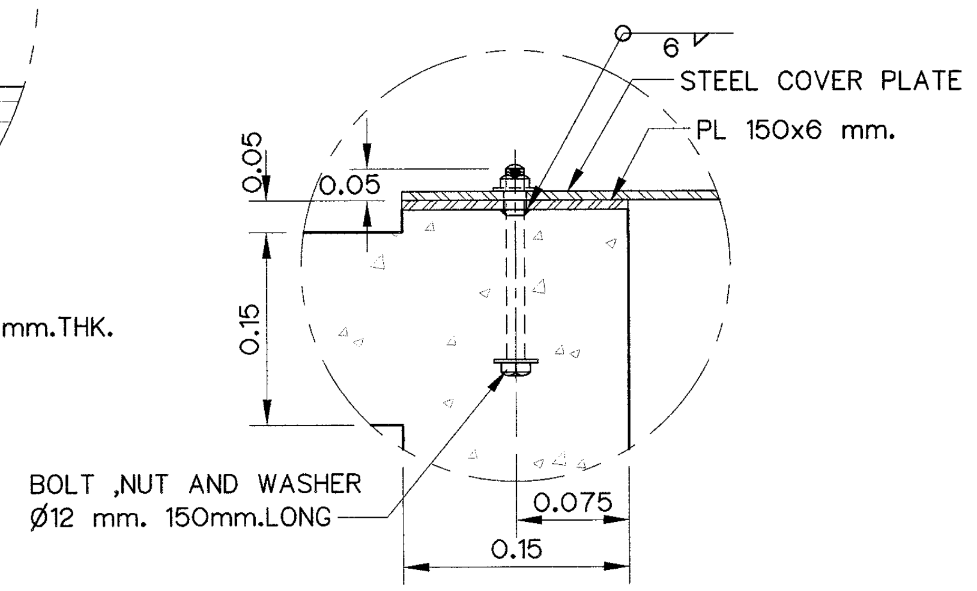
## SECTION D-D
## DETAIL OF LADDER RUNG

SCALE 1:10



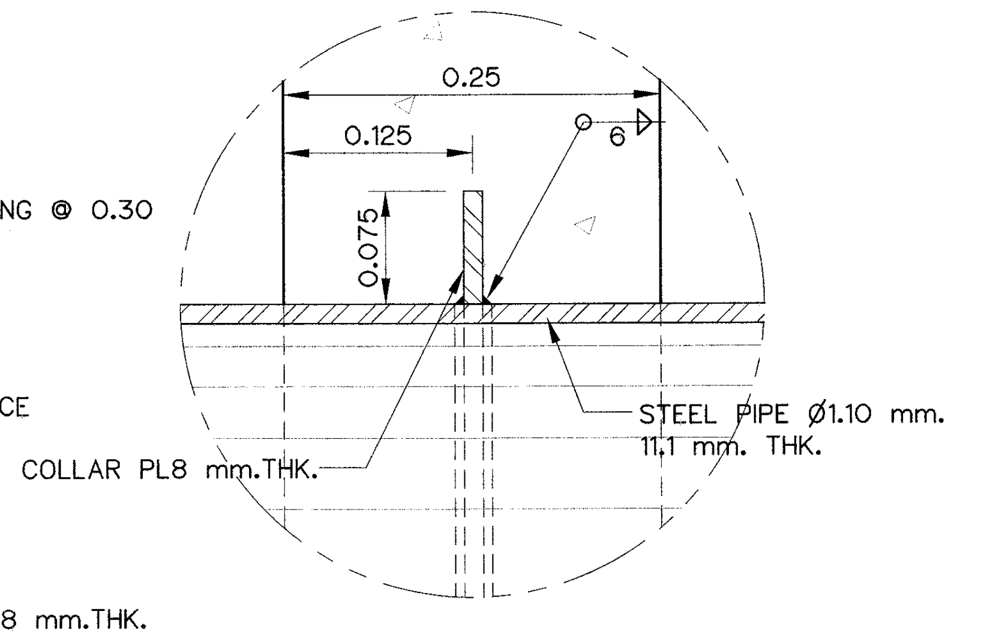
## SEE DETAIL "1"

SCALE 1:10



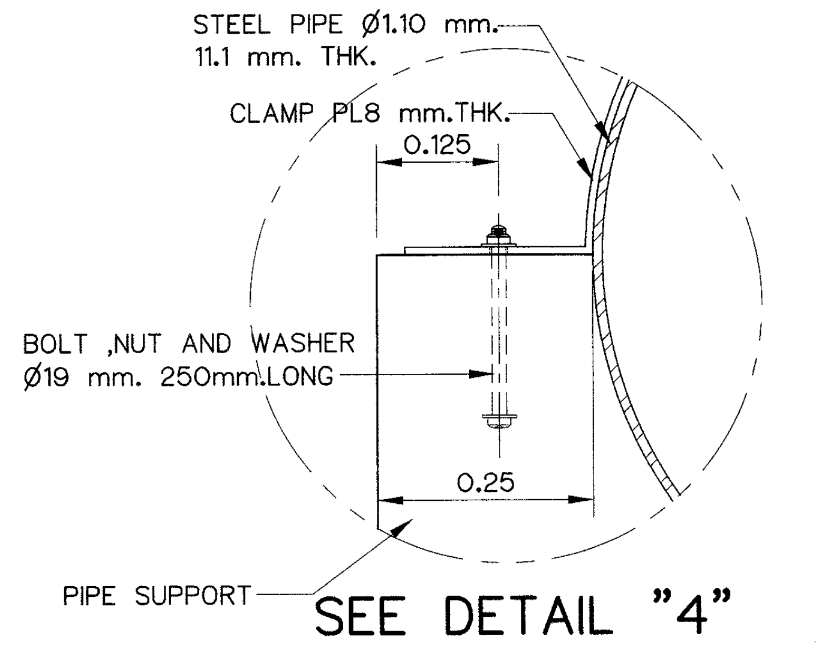
## SEE DETAIL "2"

SCALE 1:5



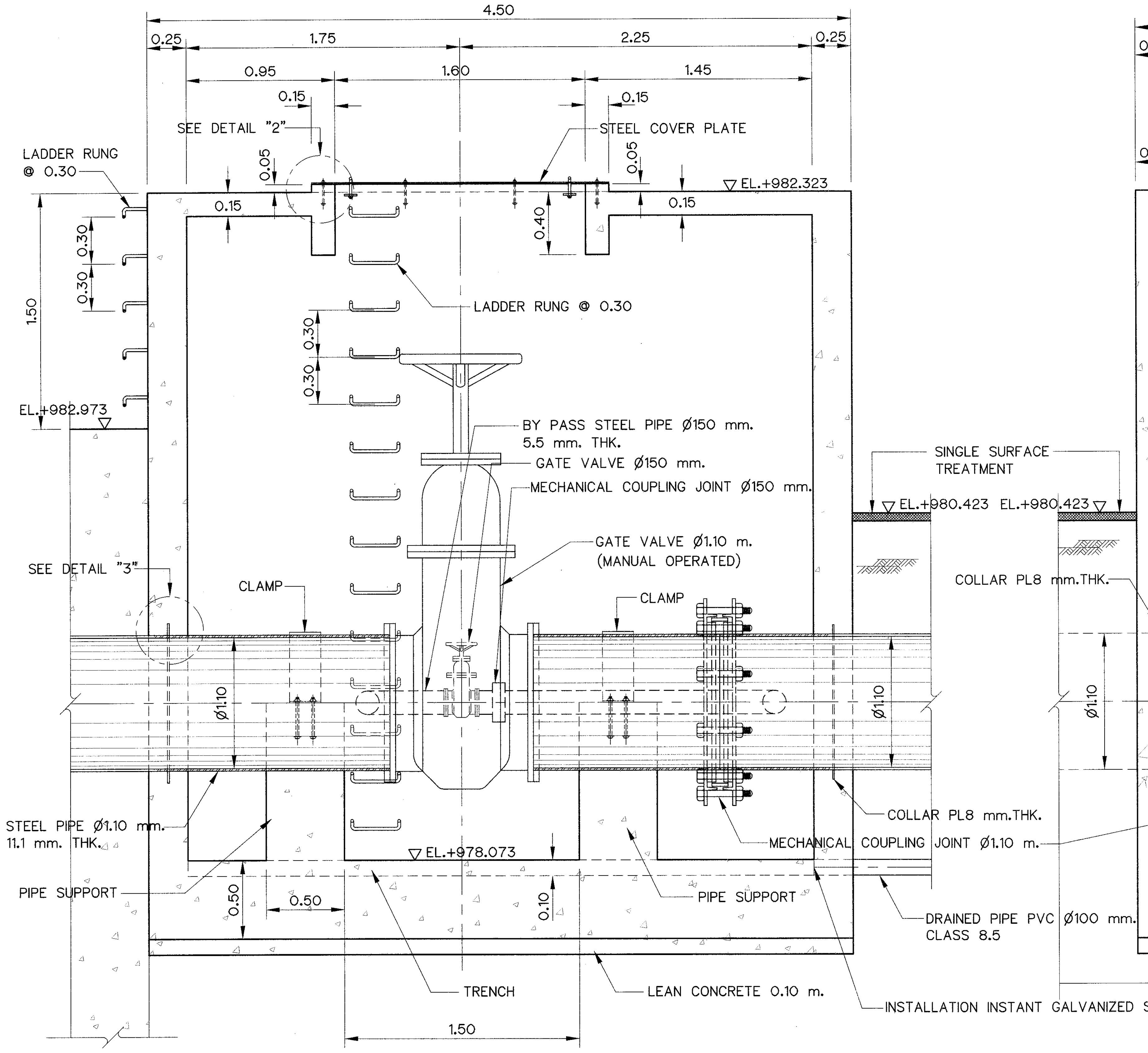
## SEE DETAIL "3"

SCALE 1:10



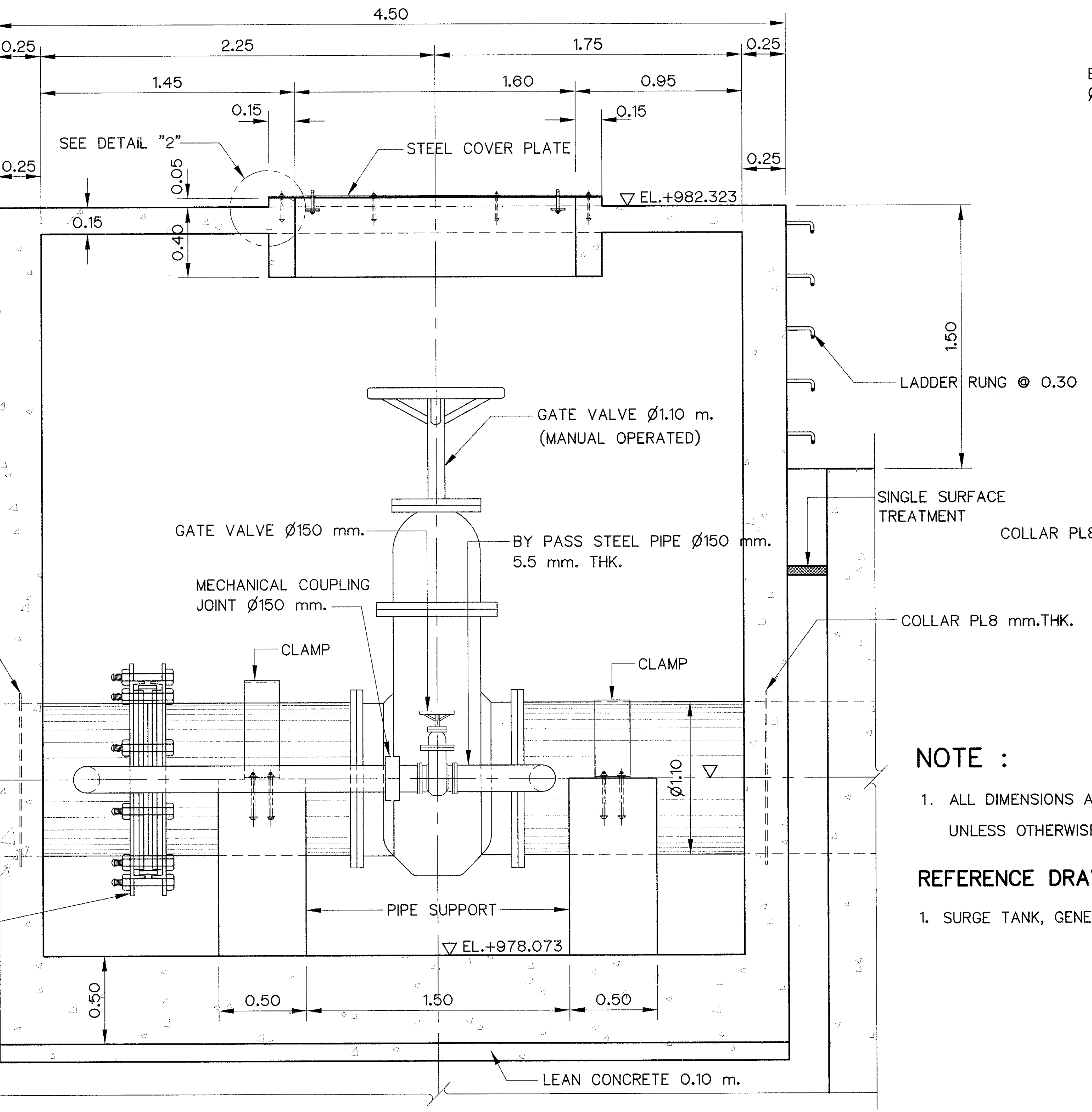
## SEE DETAIL "4"

SCALE 1:10



## SECTION A-A

SCALE 1:25



## SECTION C-C

SCALE 1:25

0 0.0125 0.25 0.375
SCALE 1:5 METERS
0 0.25 0.5 0.75
SCALE 1:10 METERS
0 0.5 1 1.5 2
SCALE 1:25 METERS

**NOTE :**

1. ALL DIMENSIONS AND ELEVATIONS ARE IN METERS, UNLESS OTHERWISE SHOWN

**REFERENCE DRAWING :**

1. SURGE TANK, GENERAL LAY-OUT MH-ST-01

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
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MINISTRY OF ENERGY

# MAE HAT HYDROPOWER PROJECT

## CIVIL WORKS AND TRANSMISSION LINE
## SURGE TANK
## EMERGENCY VALVE CHAMBER PLAN SECTIONS AND DETAILS

P&C MANAGEMENT CO.,LTD.

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| DESIGNED | สย.64624 สย.6226 |
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| CHECKED | สย.6226 |
| PROJECT MANAGER | DATE 08/03/2559 |

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Energy Development and Efficiency
MINISTRY OF ENERGY

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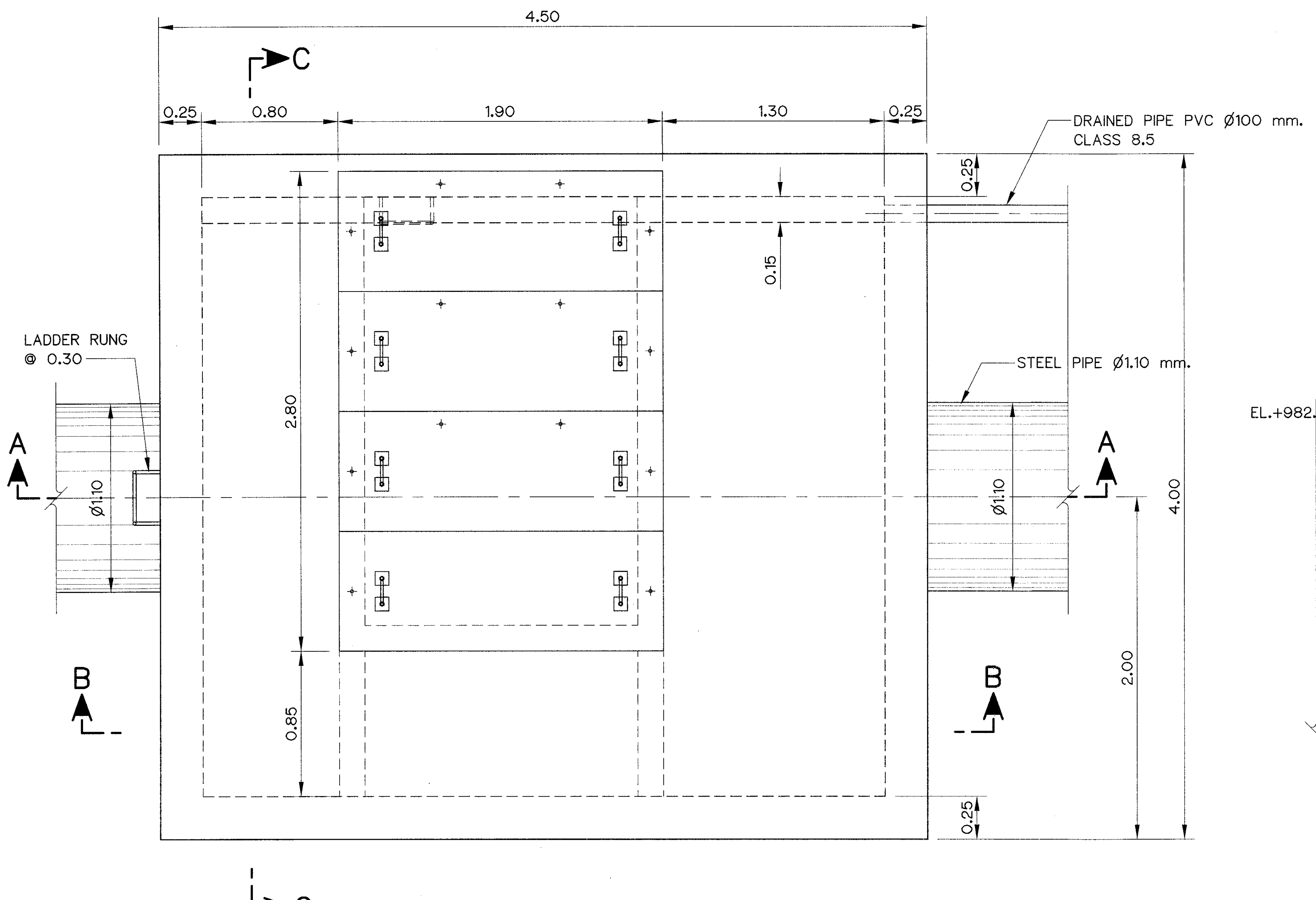
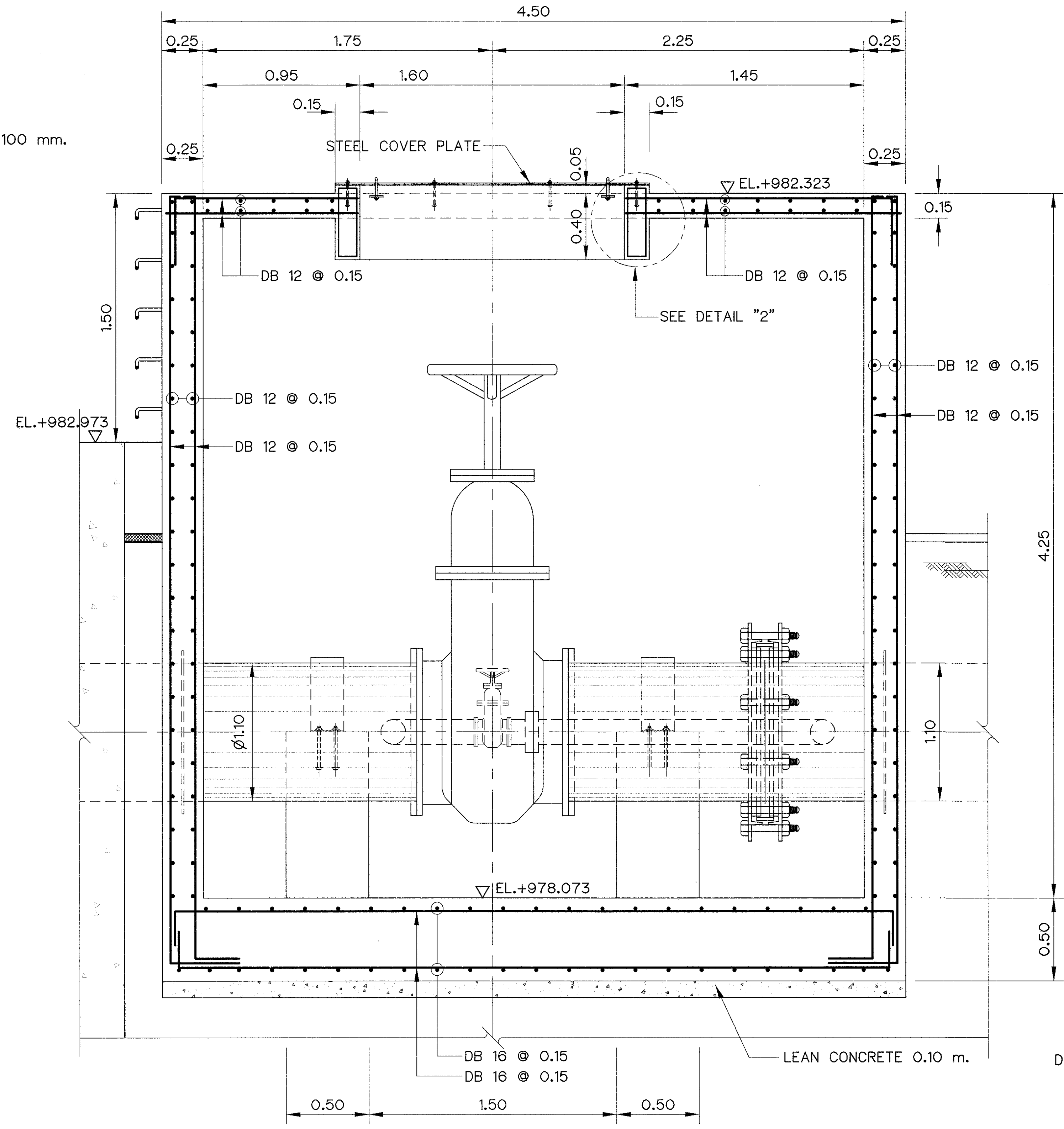
| RECOMMENDED | |
| APPROVED | P. Hamsil |

DRAWING NO. MH-ST-07
SHEET NO. 68 OF 130



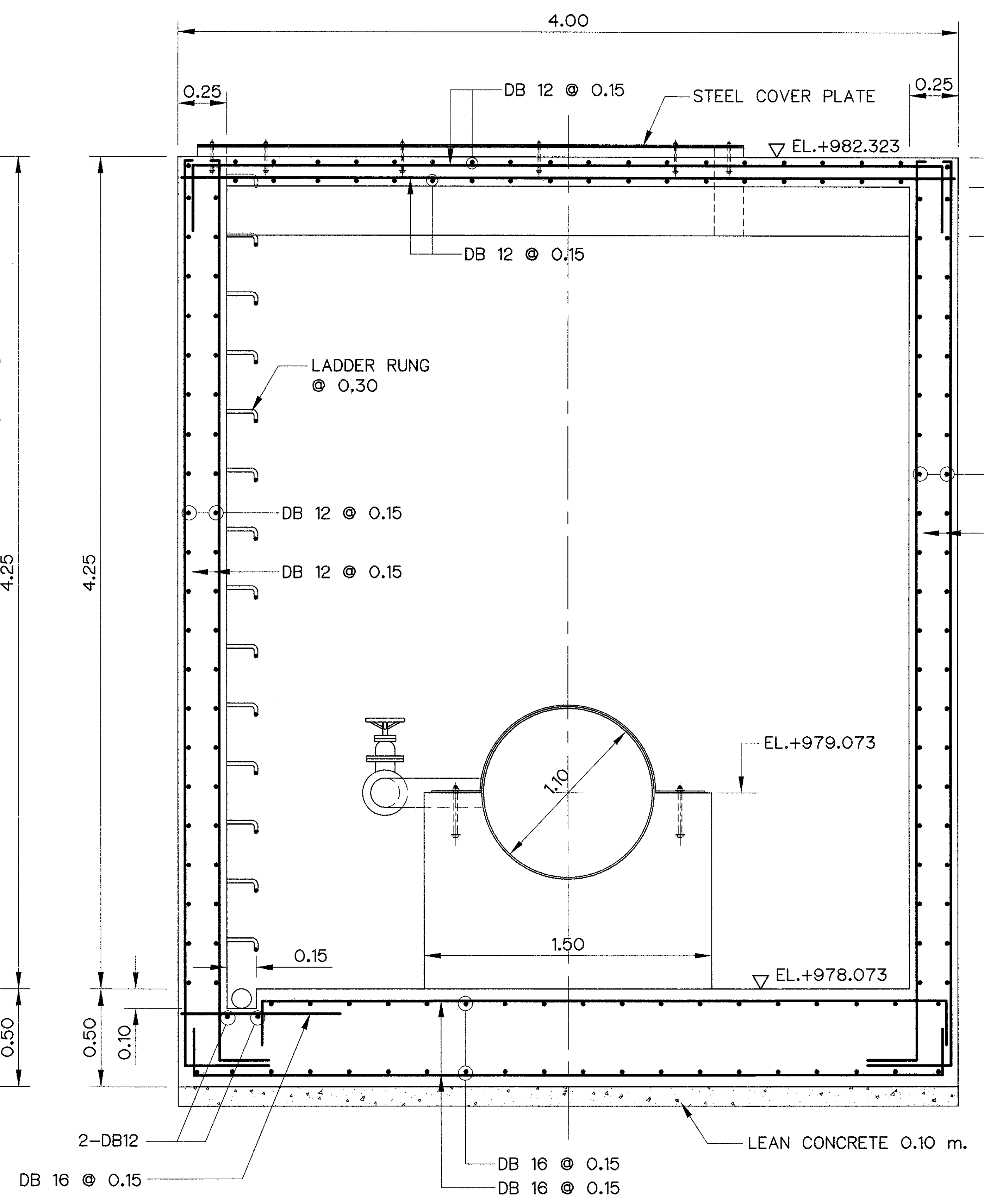
## PLAN

SCALE 1:25



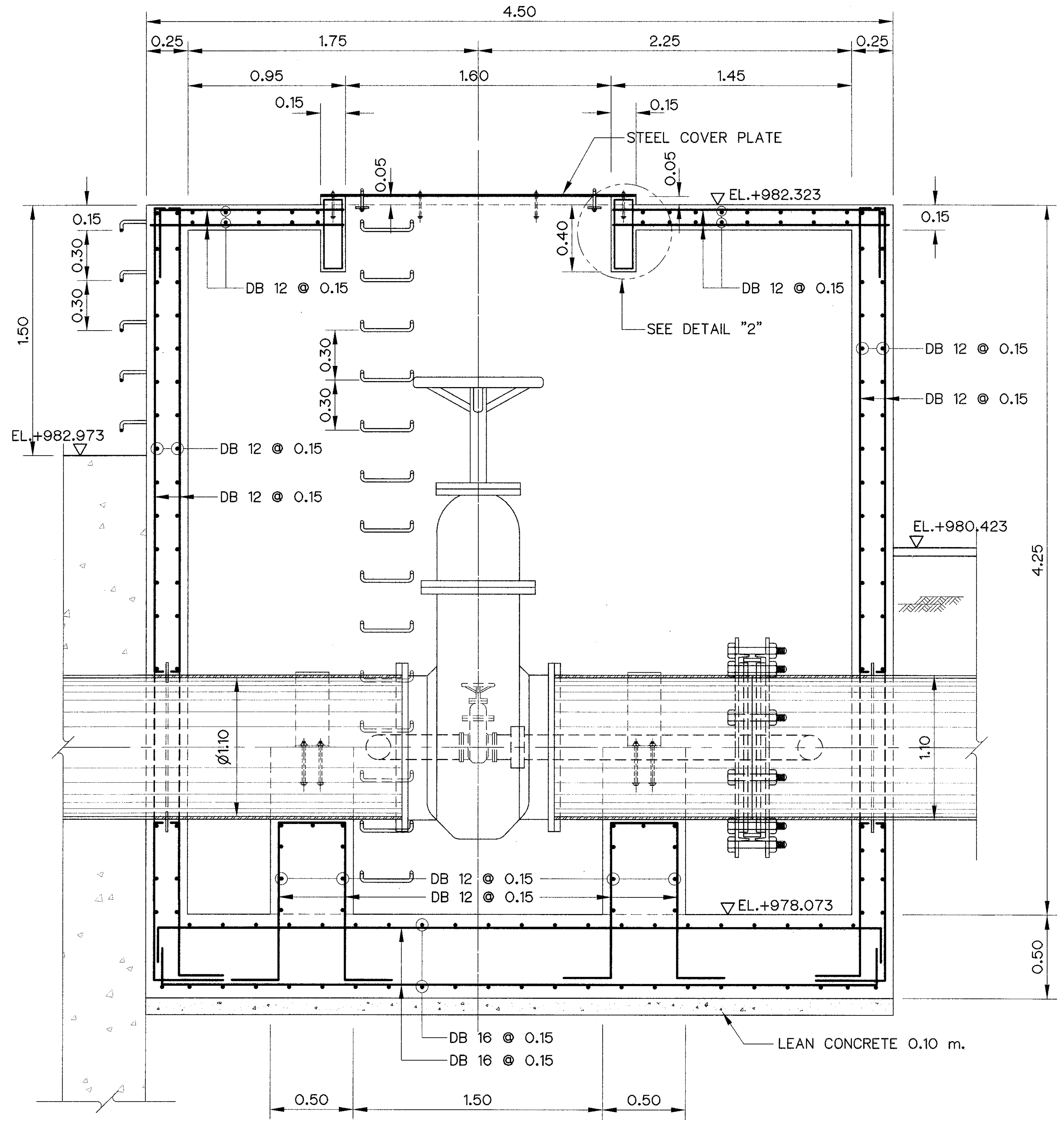
## SECTION B–B

SCALE 1:25



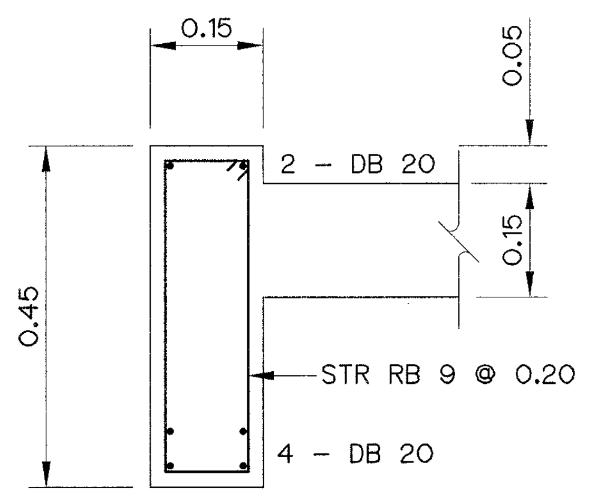
## SECTION C–C

SCALE 1:25



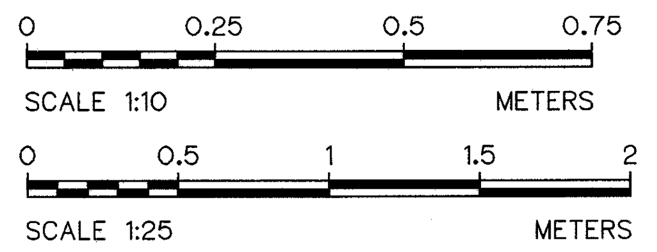
## SECTION A–A

SCALE 1:25



## DETAIL "2"

SCALE 1:10



## NOTE :

1. ALL DIMENSIONS AND ELEVATIONS ARE IN METERS, UNLESS OTHERWISE SHOWN

**REFERENCE DRAWING :**

1. EMERGENCY VALVE CHAMBER PLAN SECTIONS AND DETAILS MH–ST–07

KINGDOM OF THAILAND
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MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
SURGE TANK
EMERGENCY VALVE CHAMBER REINFORCEMENT DETAILS

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
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PROJECT MANAGER
DATE 08/03/2559

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MINISTRY OF ENERGY

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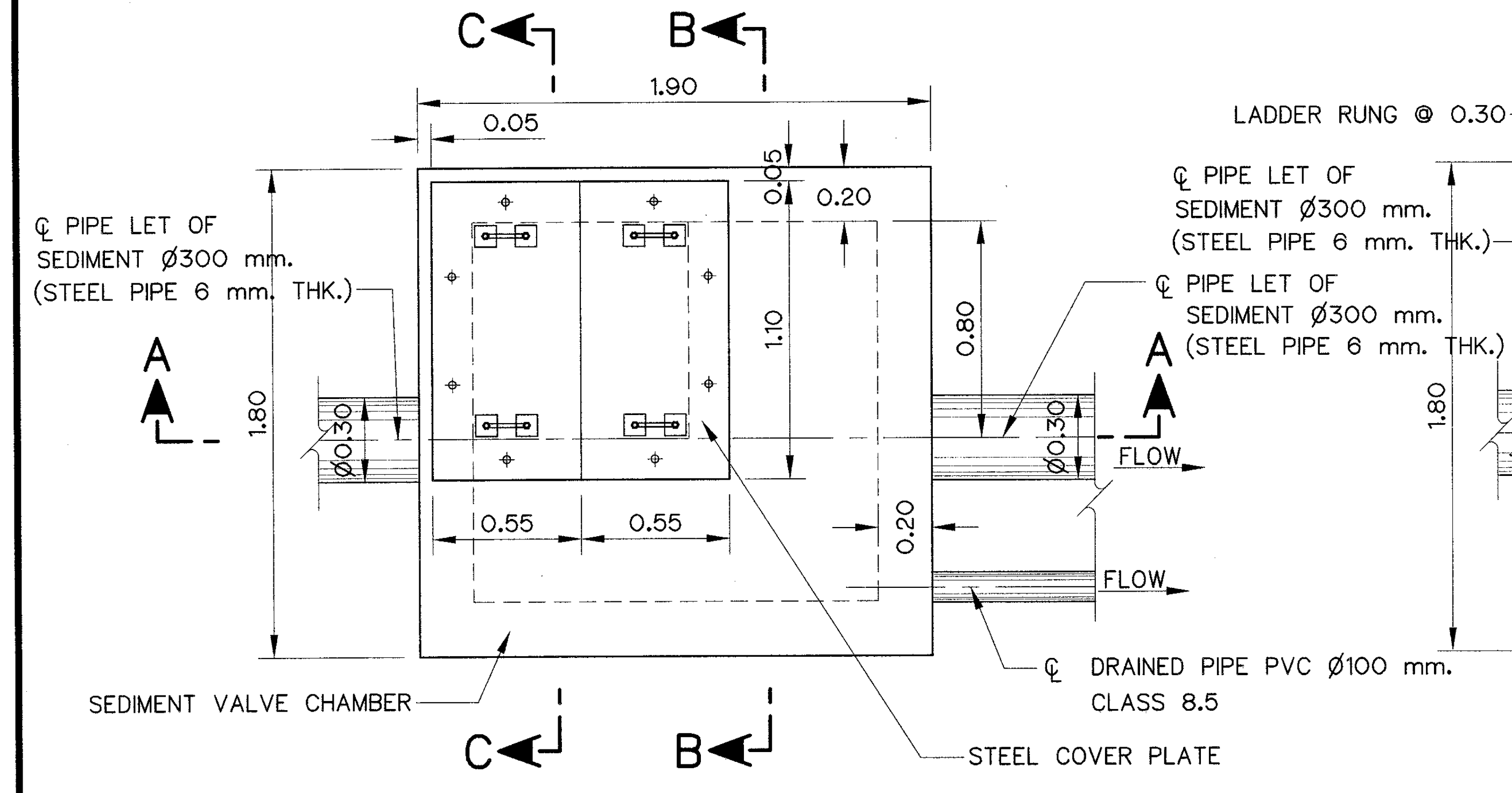
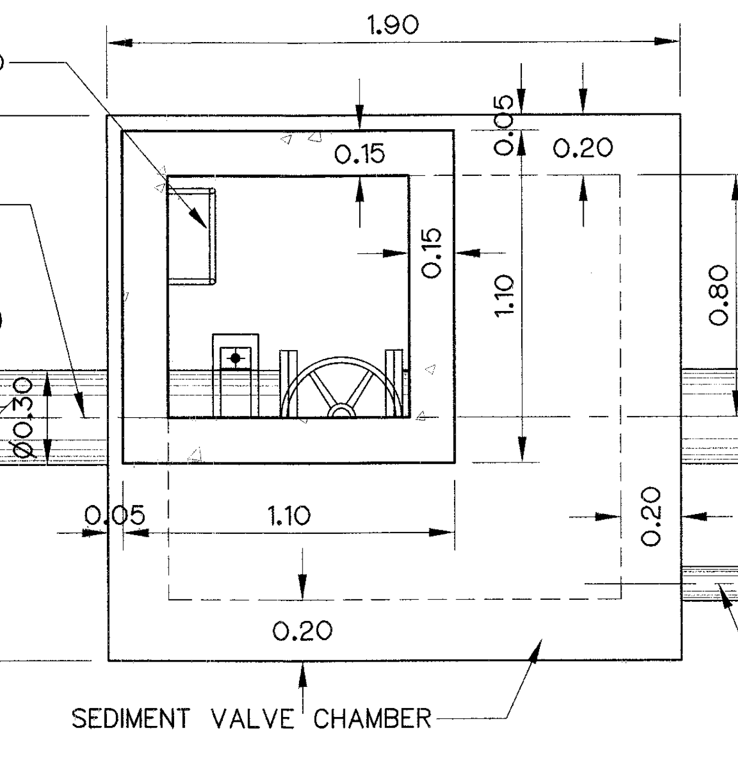
SUBMITTED Chan
RECOMMENDED
APPROVED P. Hang

DRAWING NO. MH–ST–08
SHEET NO. 69 OF 130


C
B
1.90
0.05
0.20
0.05
1.10
0.80
1.80
Ç PIPE LET OF SEDIMENT Ø300 mm. (STEEL PIPE 6 mm. THK.)
Ç PIPE LET OF SEDIMENT Ø300 mm. (STEEL PIPE 6 mm. THK.)
A
A
Ø0.30
Ø0.30
FLOW
FLOW
0.55
0.55
0.20
Ç DRAINED PIPE PVC Ø100 mm. CLASS 8.5
SEDIMENT VALVE CHAMBER
STEEL COVER PLATE
C
B

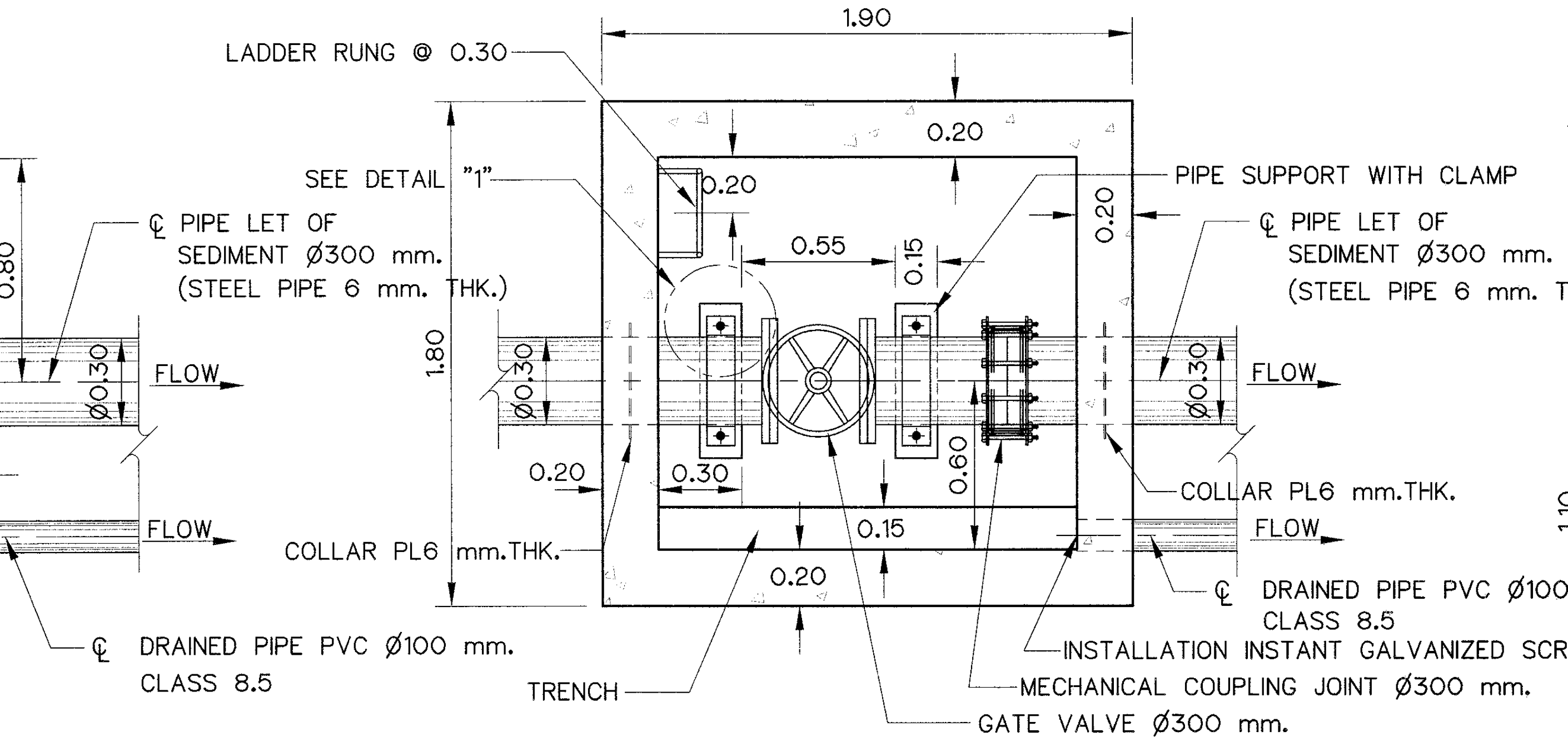
## PLAN

SCALE 1:25



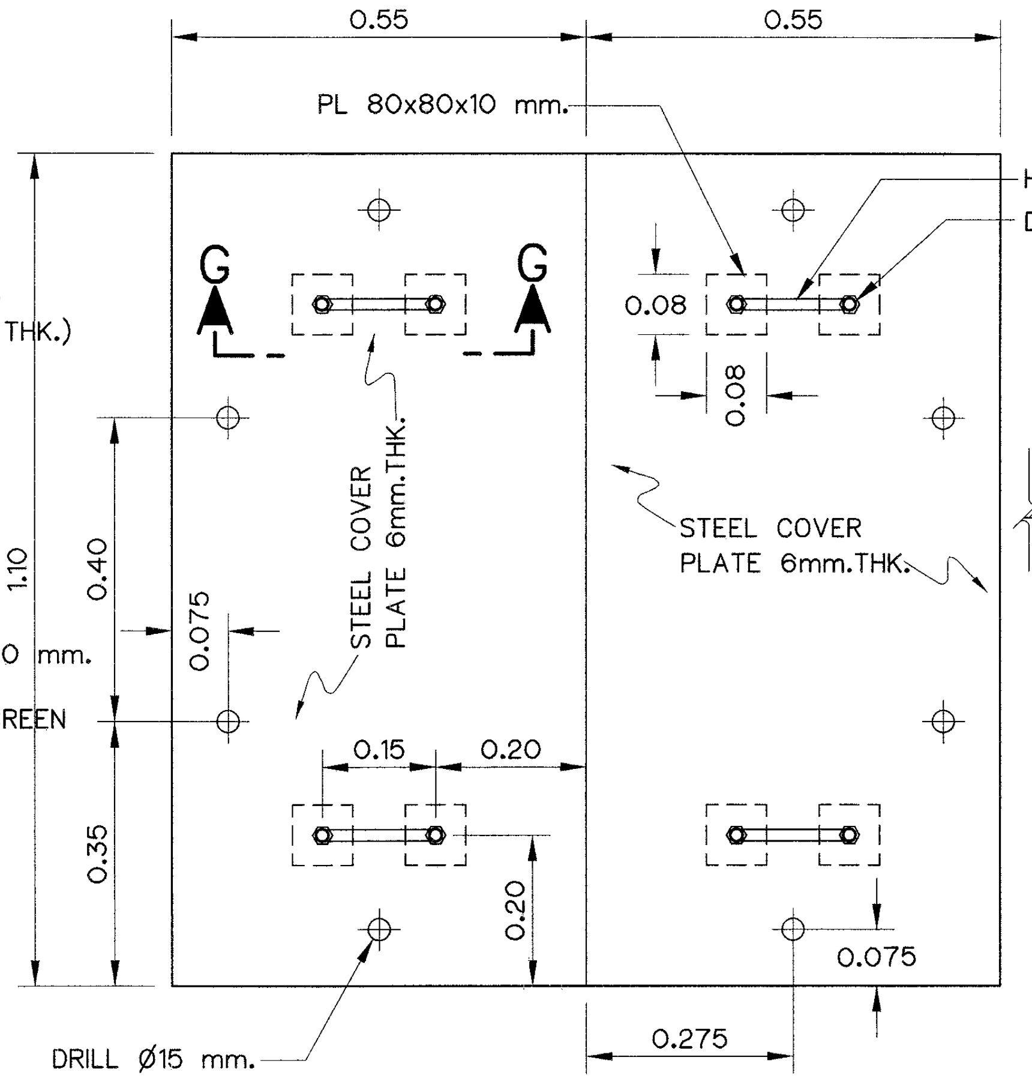
## SECTION D–D

SCALE 1:25



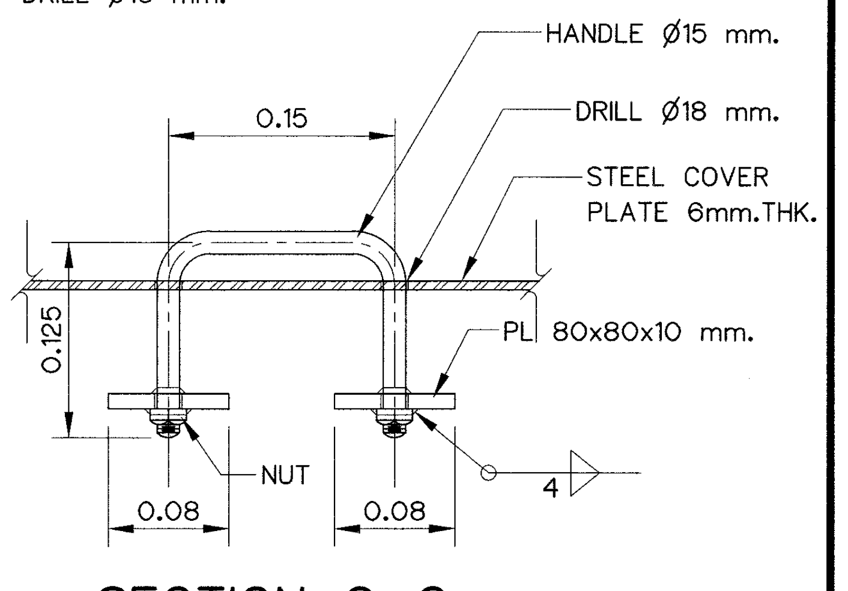
## SECTION E–E

SCALE 1:25



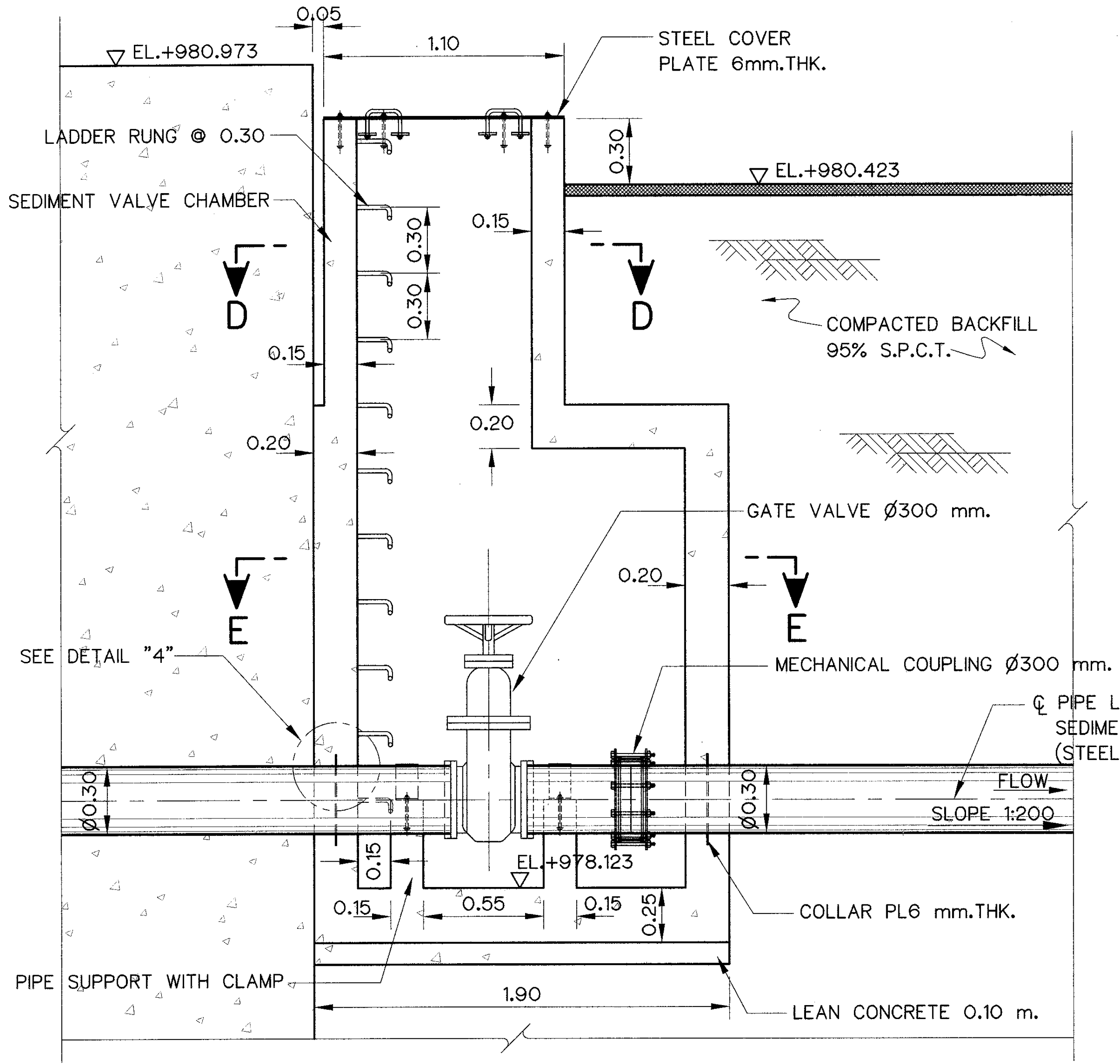
## PLAN STEEL COVER PLATE

SCALE 1:10



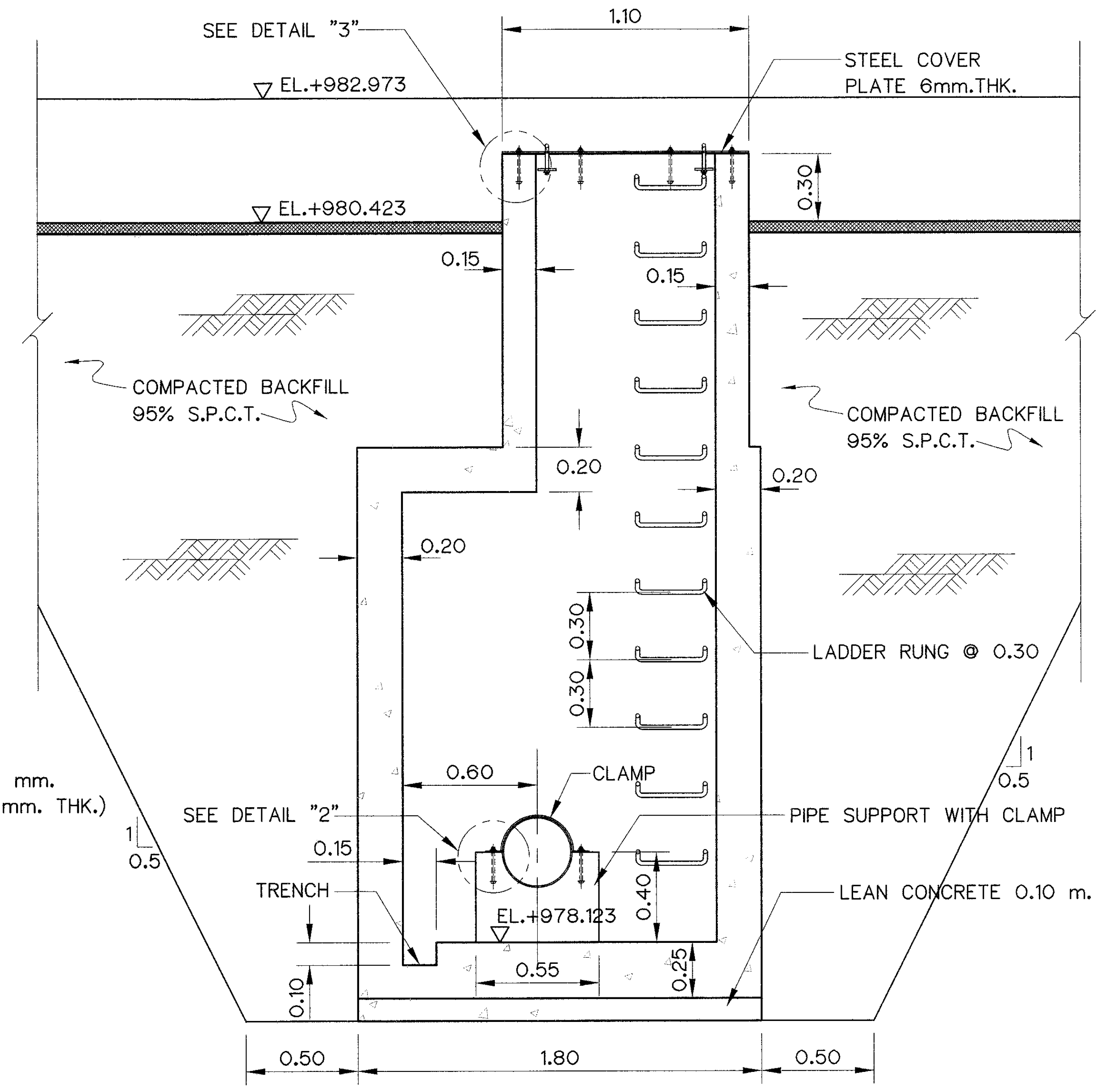
## SECTION G–G

SCALE 1:5



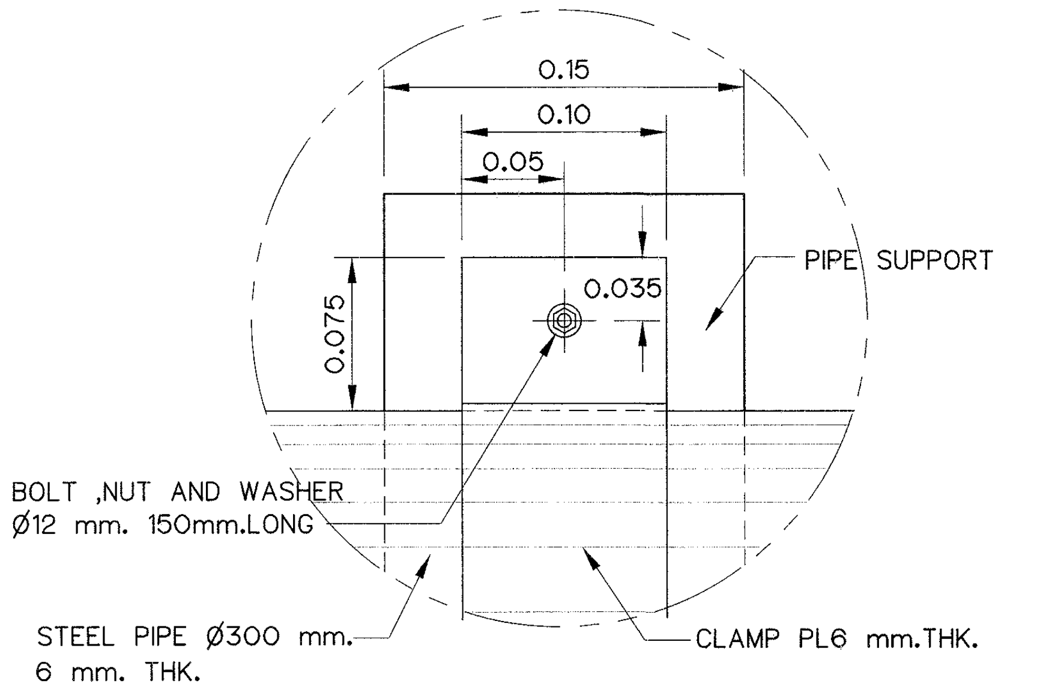
## SECTION A–A

SCALE 1:25



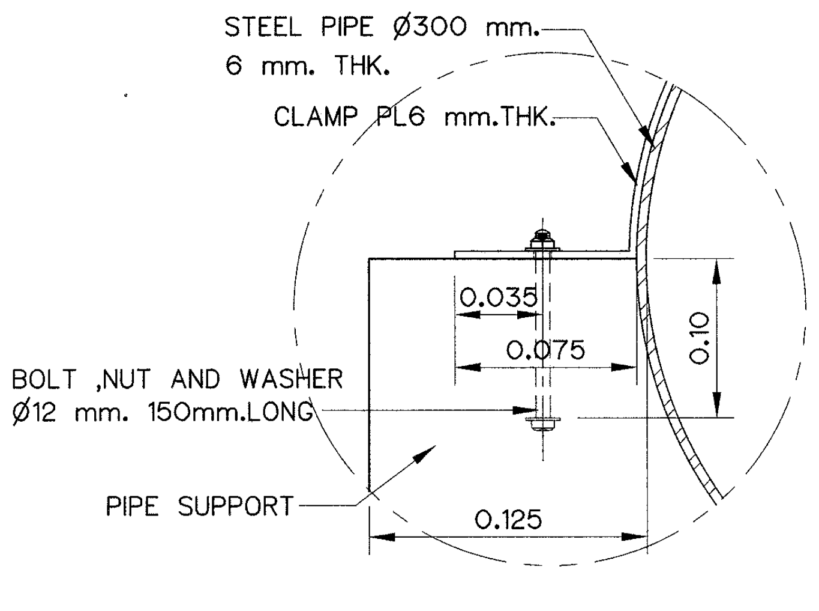
## SECTION C–C

SCALE 1:25


0.15
0.10
0.05
0.035
0.075
PIPE SUPPORT
BOLT ,NUT AND WASHER Ø12 mm. 150mm.LONG
STEEL PIPE Ø300 mm. 6 mm. THK.
CLAMP PL6 mm.THK.

## SEE DETAIL "1"

NOT TO SCALE


STEEL PIPE Ø300 mm. 6 mm. THK.
CLAMP PL6 mm.THK.
0.035
0.075
0.10
BOLT ,NUT AND WASHER Ø12 mm. 150mm.LONG
PIPE SUPPORT
0.125

## SEE DETAIL "2"

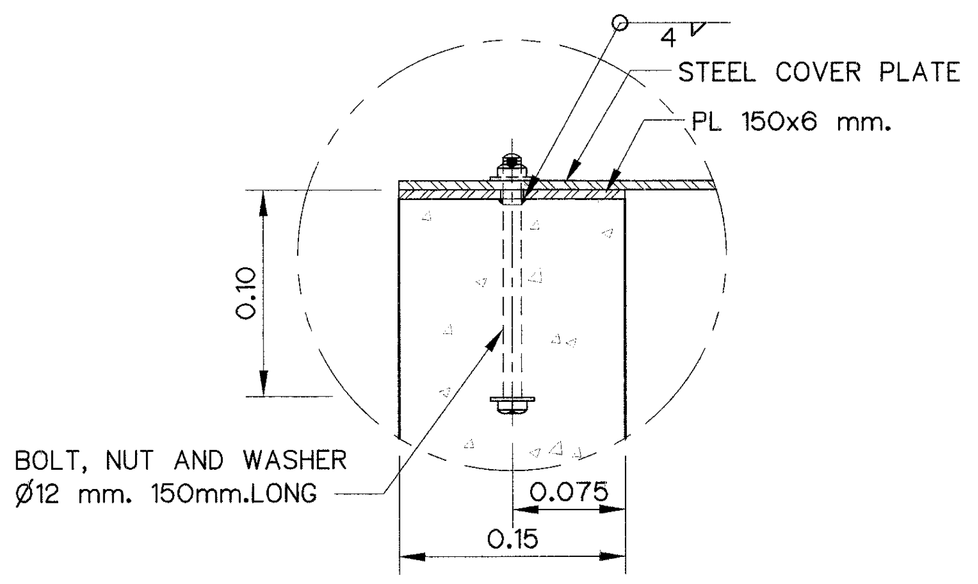
NOT TO SCALE

NOTE :

1. ALL DIMENSIONS AND ELEVATIONS ARE IN METERS, UNLESS OTHERWISE SHOWN

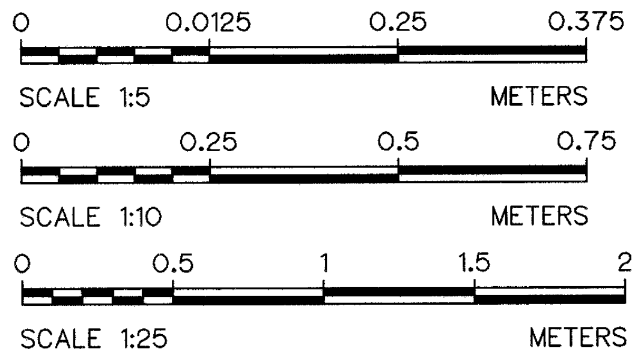
REFERENCE DRAWING :

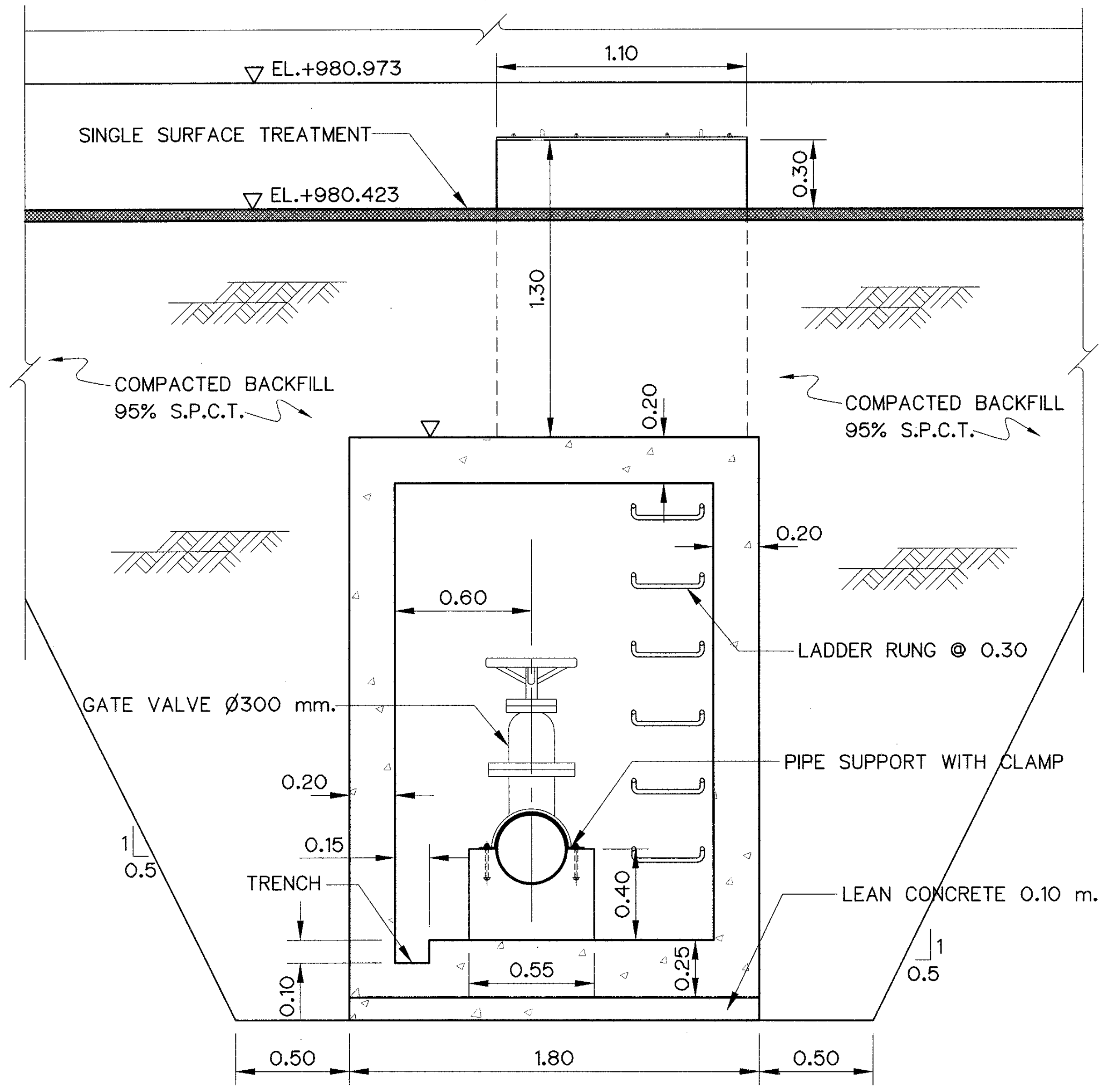
1. SURGE TANK, GENERAL LAY-OUT MH-ST-01



## SEE DETAIL "3"

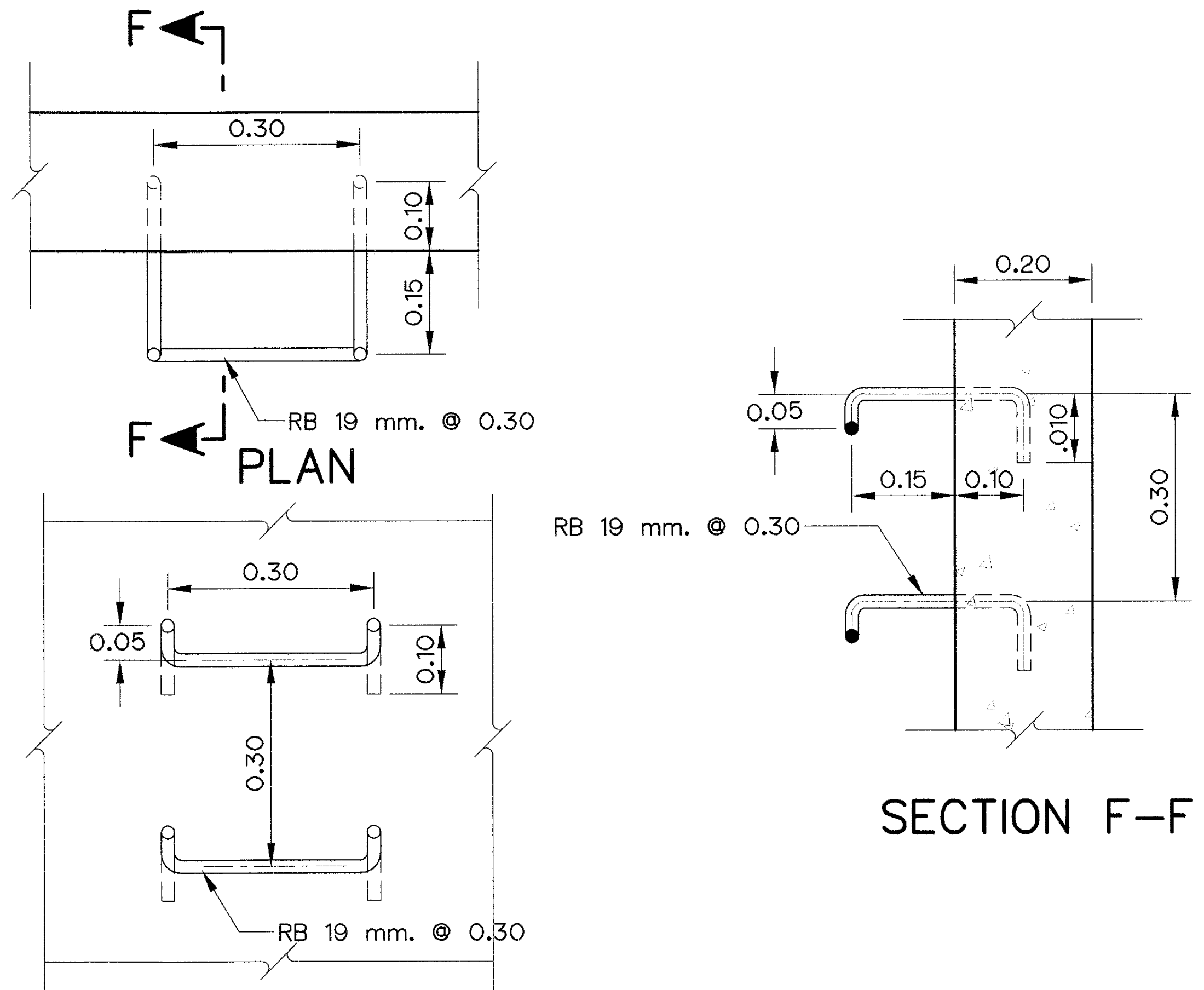
NOT TO SCALE





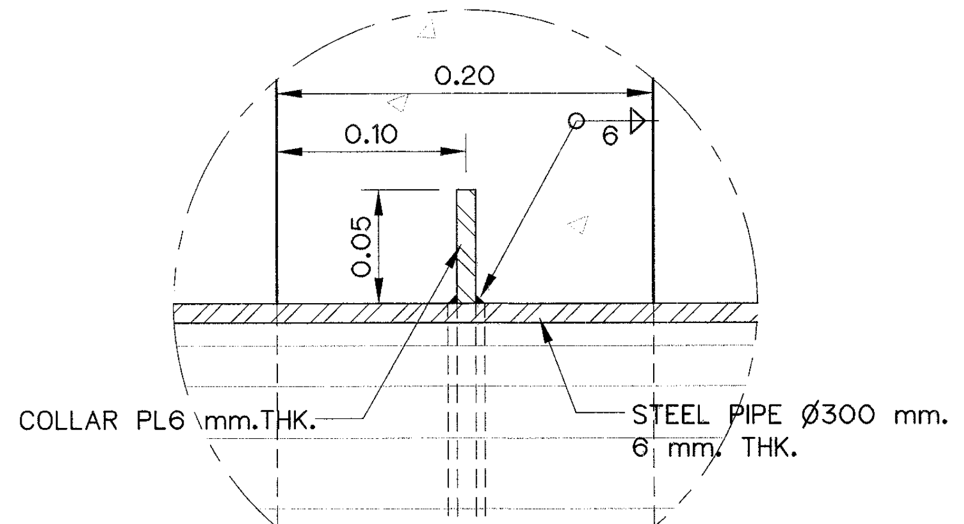
## SECTION B–B

SCALE 1:25



## DETAIL OF LADDER RUNG

SCALE 1:10



## SEE DETAIL "4"

NOT TO SCALE

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MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
SURGE TANK
SEDIMENT VALVE CHAMBER PLAN SECTIONS AND DETAILS

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
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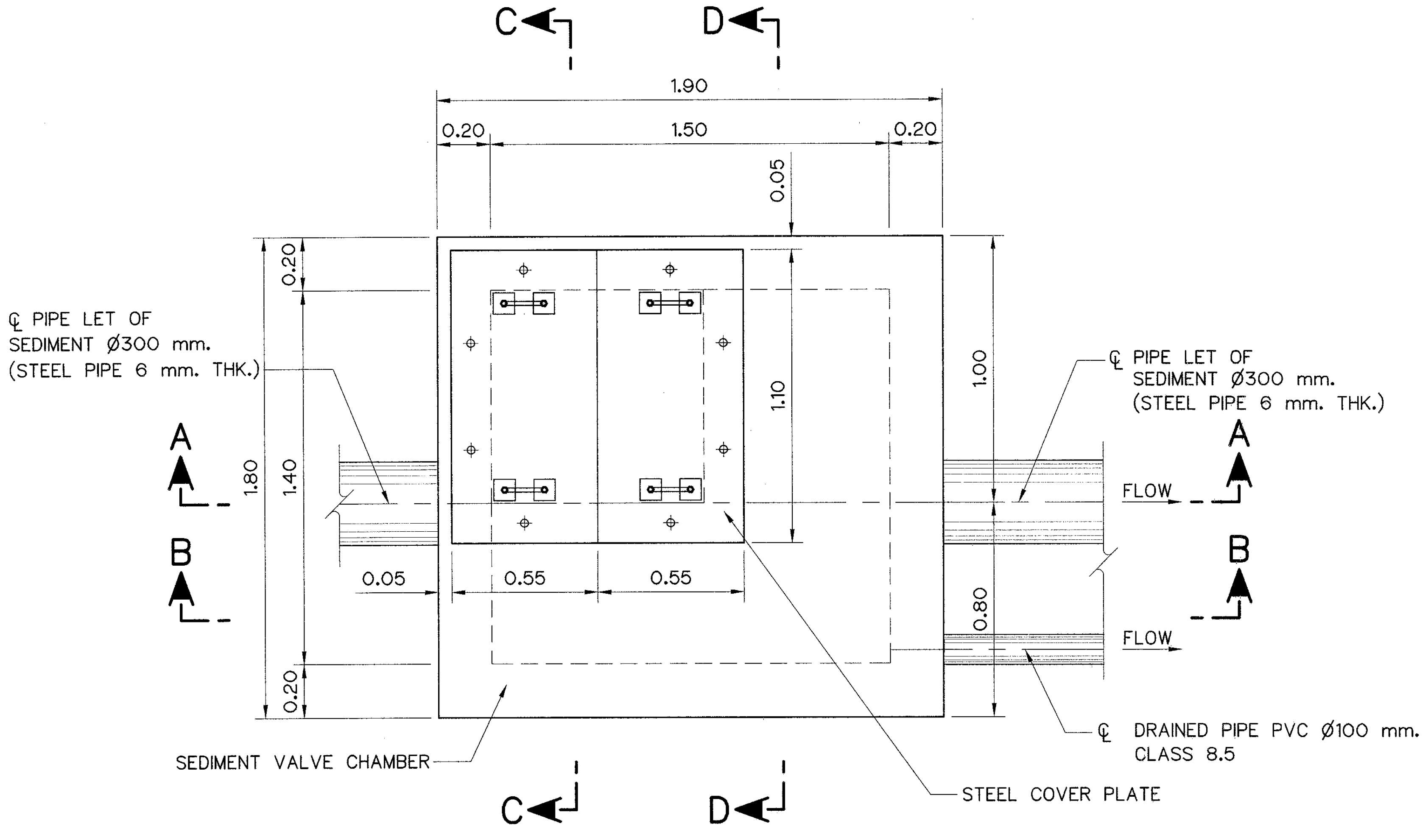
| | CONSULTANTS | | DEDE | |

P&C MANAGEMENT CO.,LTD.

DESIGNED ภย.64624 สย.6226
DRAWN
CHECKED สย.6226
08/03/2559
PROJECT MANAGER DATE

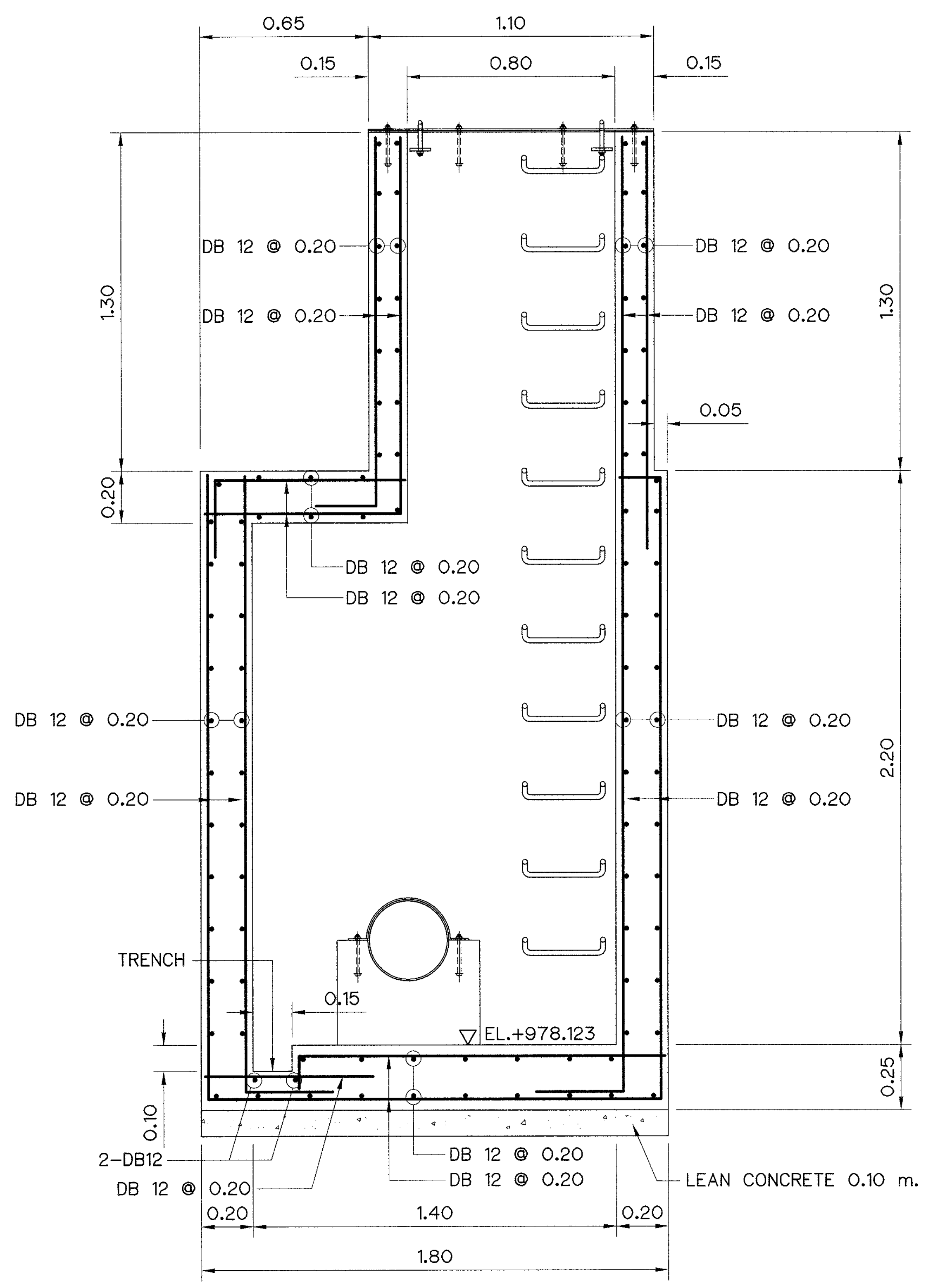
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY
REVIEWED
SUBMITTED Chant
RECOMMENDED
APPROVED P. Hansell

DRAWING NO. MH-ST-09
SHEET NO. 70 OF 130


C
D
1.90
0.20
1.50
0.20
0.05
0.20
1.10
1.00
℄ PIPE LET OF SEDIMENT Ø300 mm. (STEEL PIPE 6 mm. THK.)
℄ PIPE LET OF SEDIMENT Ø300 mm. (STEEL PIPE 6 mm. THK.)
A
A
1.80
1.40
B
B
FLOW
FLOW
0.05
0.55
0.55
0.80
0.20
℄ DRAINED PIPE PVC Ø100 mm. CLASS 8.5
SEDIMENT VALVE CHAMBER
STEEL COVER PLATE
C
D

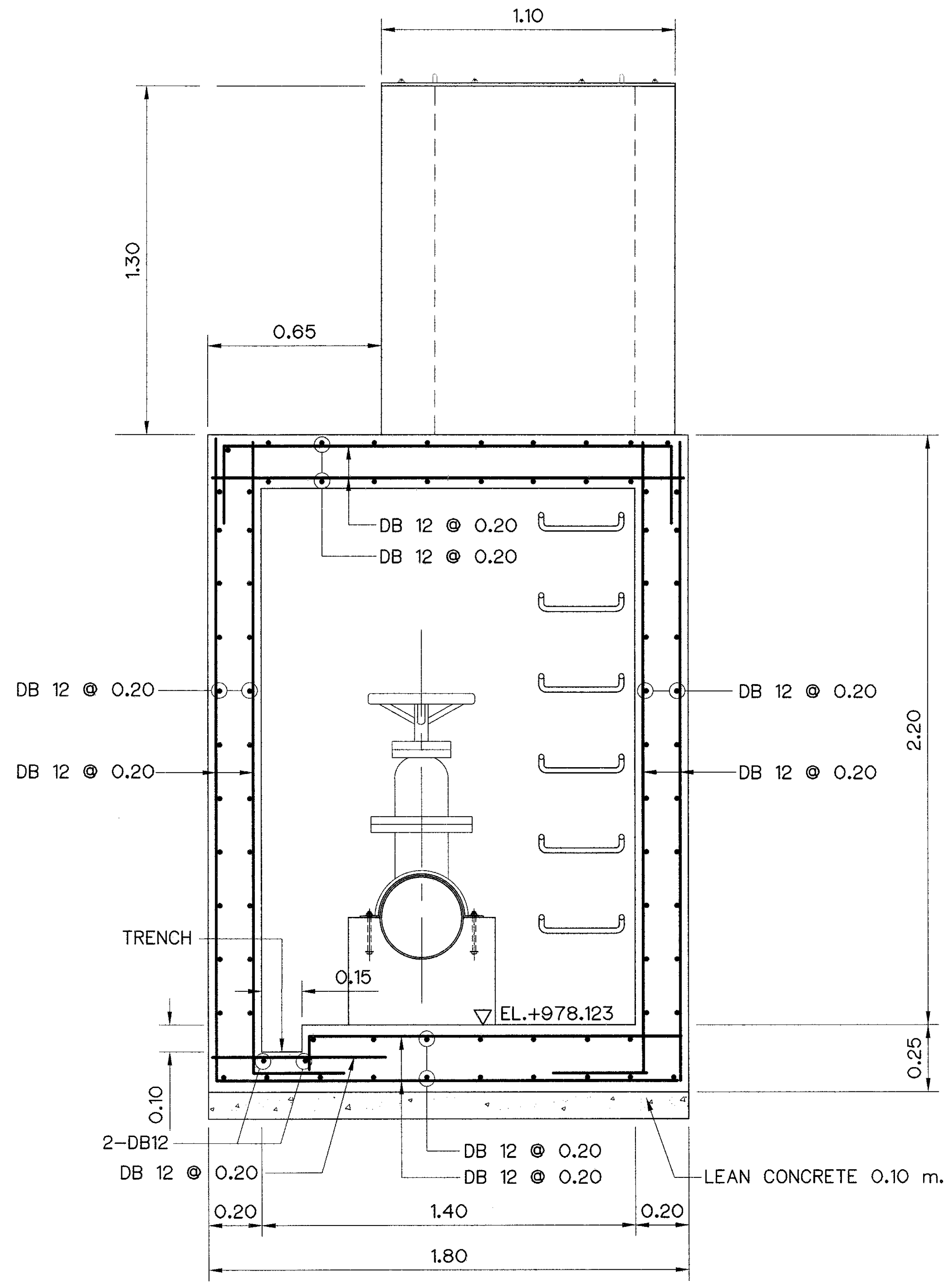
## PLAN

SCALE 1:20



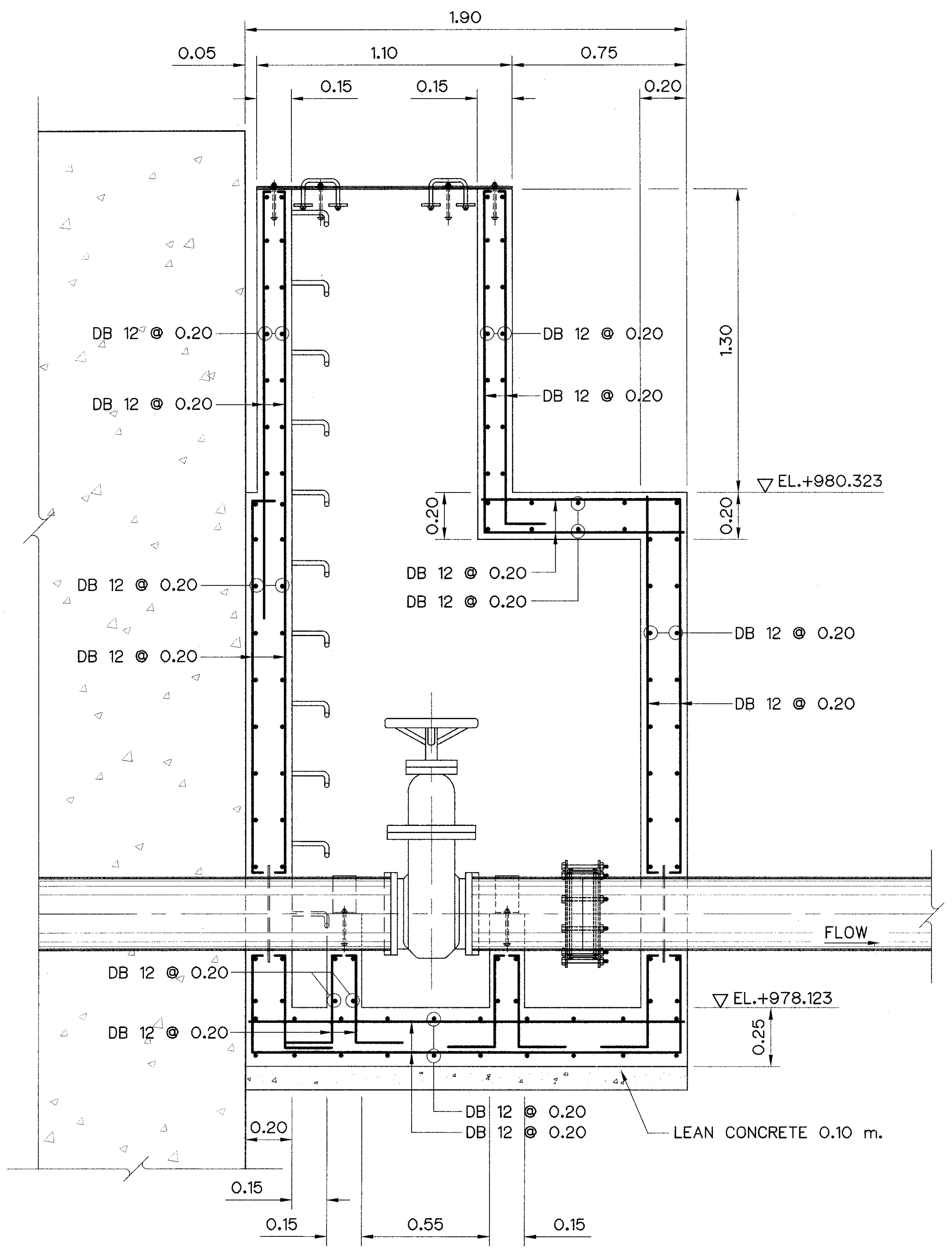
## SECTION C–C

SCALE 1:20



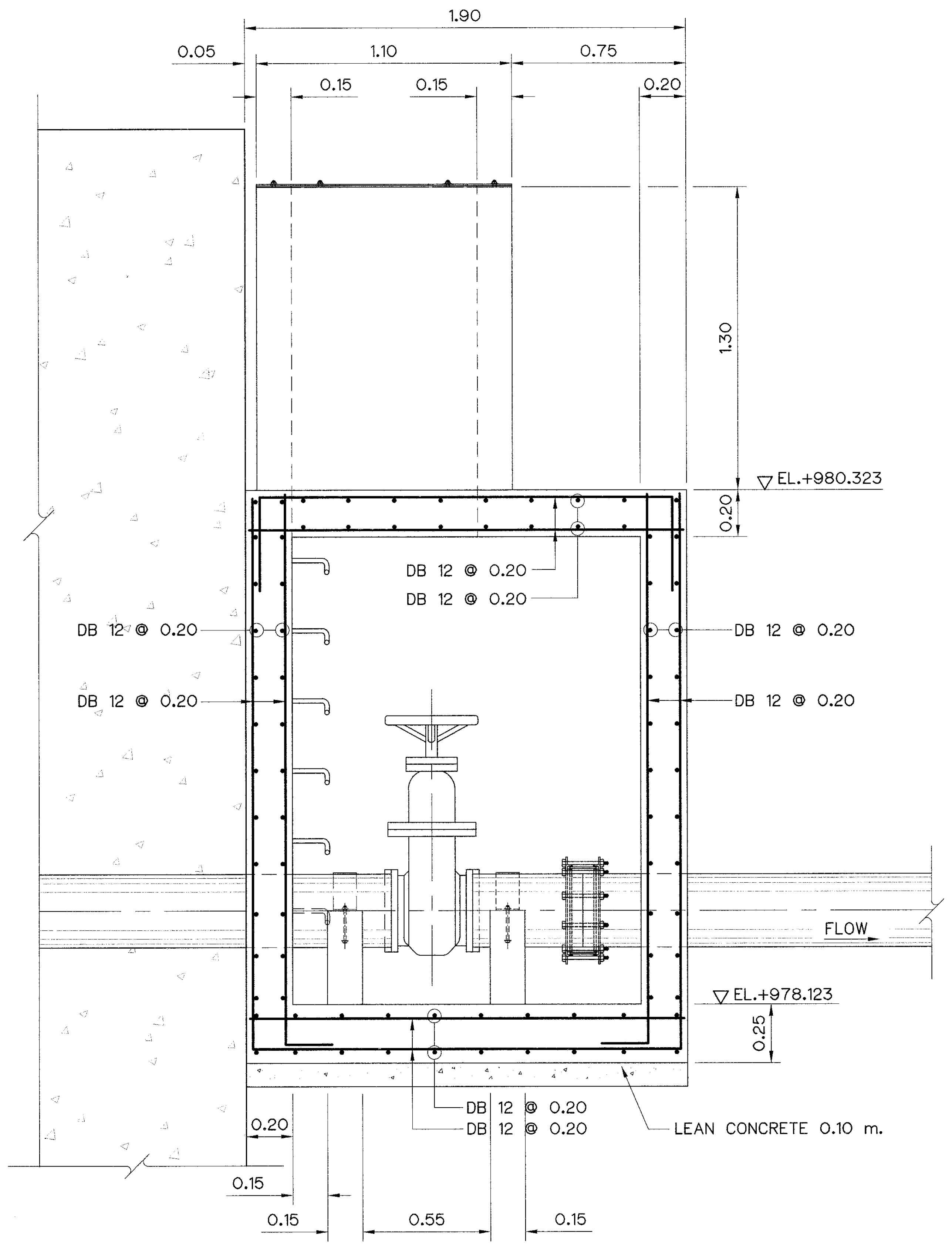
## SECTION D–D

SCALE 1:20



## SECTION A–A

SCALE 1:20



## SECTION B–B

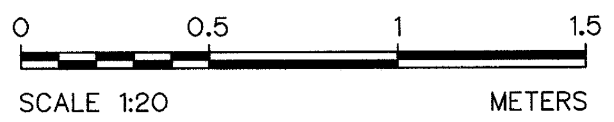
SCALE 1:20

## NOTE :

1. ALL DIMENSIONS AND ELEVATIONS ARE IN METERS, UNLESS OTHERWISE SHOWN

## REFERENCE DRAWING :

1. SEDIMENT VALVE CHAMBER PLAN SECTIONS AND DETAILS MH–ST–09



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MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
SURGE TANK
SEDIMENT VALVE CHAMBER REINFORCEMENT DETAILS

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
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P&C MANAGEMENT CO.,LTD.

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DRAWN
CHECKED สย.6226
PROJECT MANAGER
DATE 08/03/2559

Department of Alternative
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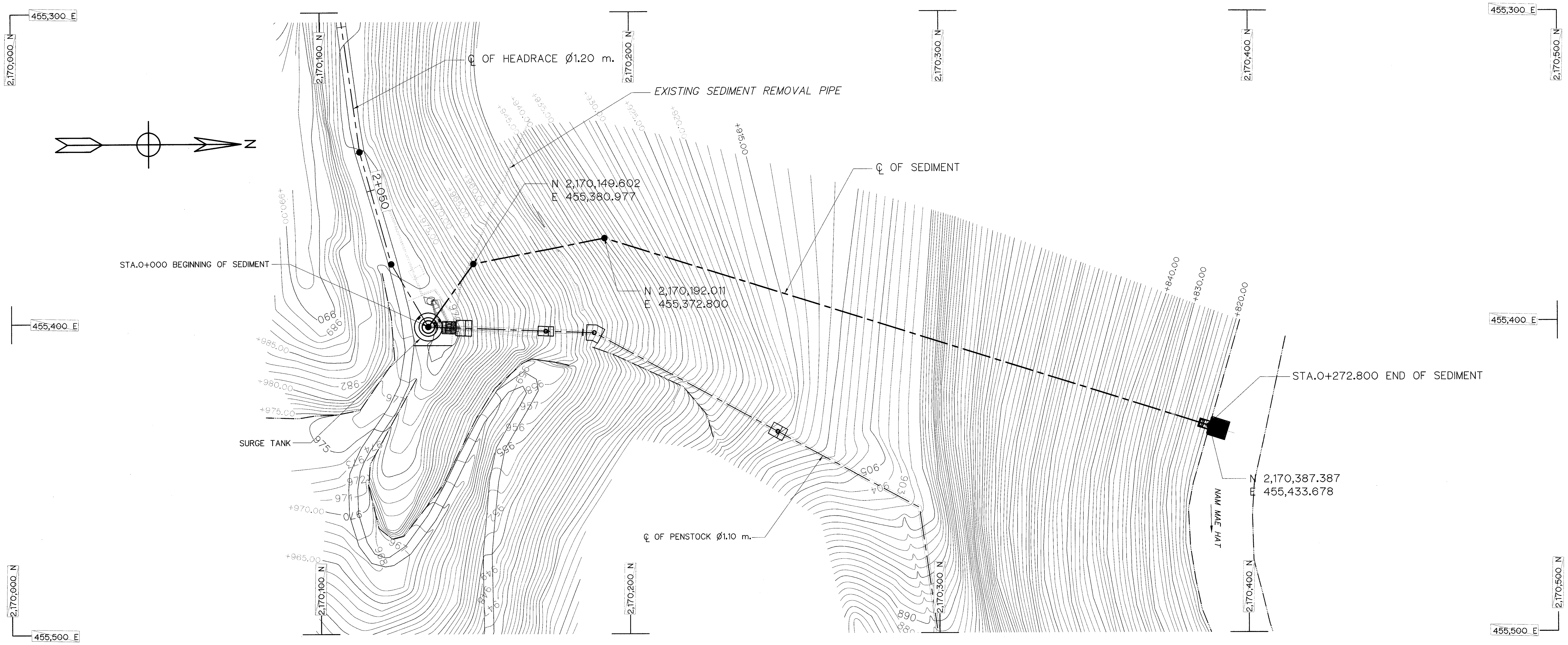
MINISTRY OF ENERGY

REVIEWED
SUBMITTED Chant
RECOMMENDED
APPROVED P.

DRAWING NO. MH–ST–10

SHEET NO. 71 OF 130



## PLAN

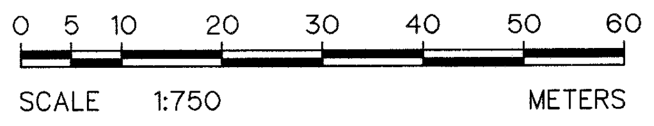
SCALE 1:750

NOTES :

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS. UNLESS OTHERWISE SHOWN.
2. SYMBOLE, ABBREVIATIONS AND CENERAL NOTES SEE DWG. NO.NMH-GN-03

REFERENCE DRAWINGS :

1. SURGE TANK SEDIMENT OUTLET PLAN SECTION AND DETAILS MH-PS-12



| NO. | DATE | REVISIONS | CHECKED | APPROVED |
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CONSULTANTS DEDE

KINGDOM OF THAILAND
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
SURGE TANK
PLAN, SEDIMENT STA. 0+000 TO STA. 0+272.800

P&C MANAGEMENT CO.,LTD.

DESIGNED ภย.64624 สย.6226
DRAWN
CHECKED สย.6226

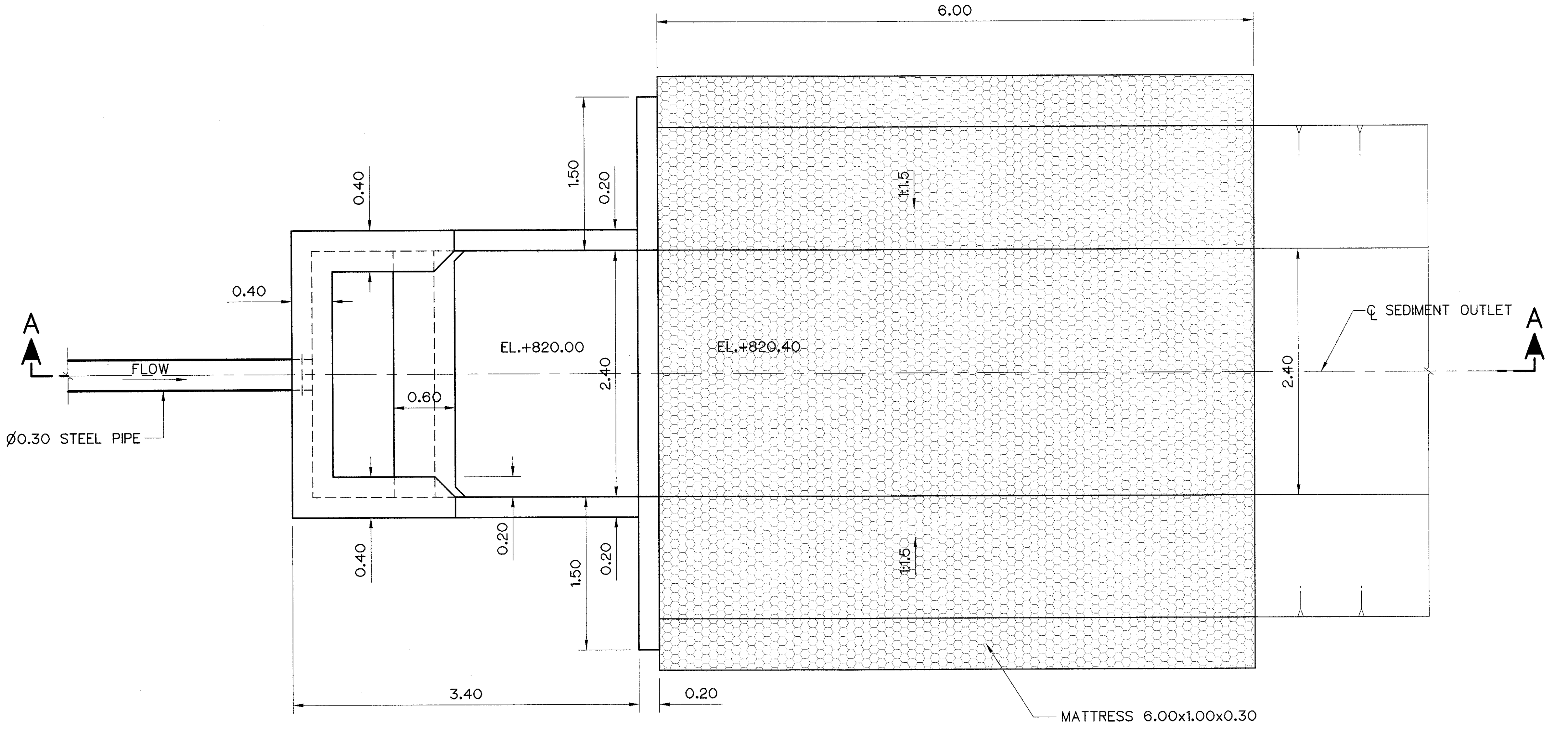
08/03/2559
PROJECT MANAGER DATE

Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

REVIEWED
SUBMITTED
RECOMMENDED
APPROVED P.Hansell

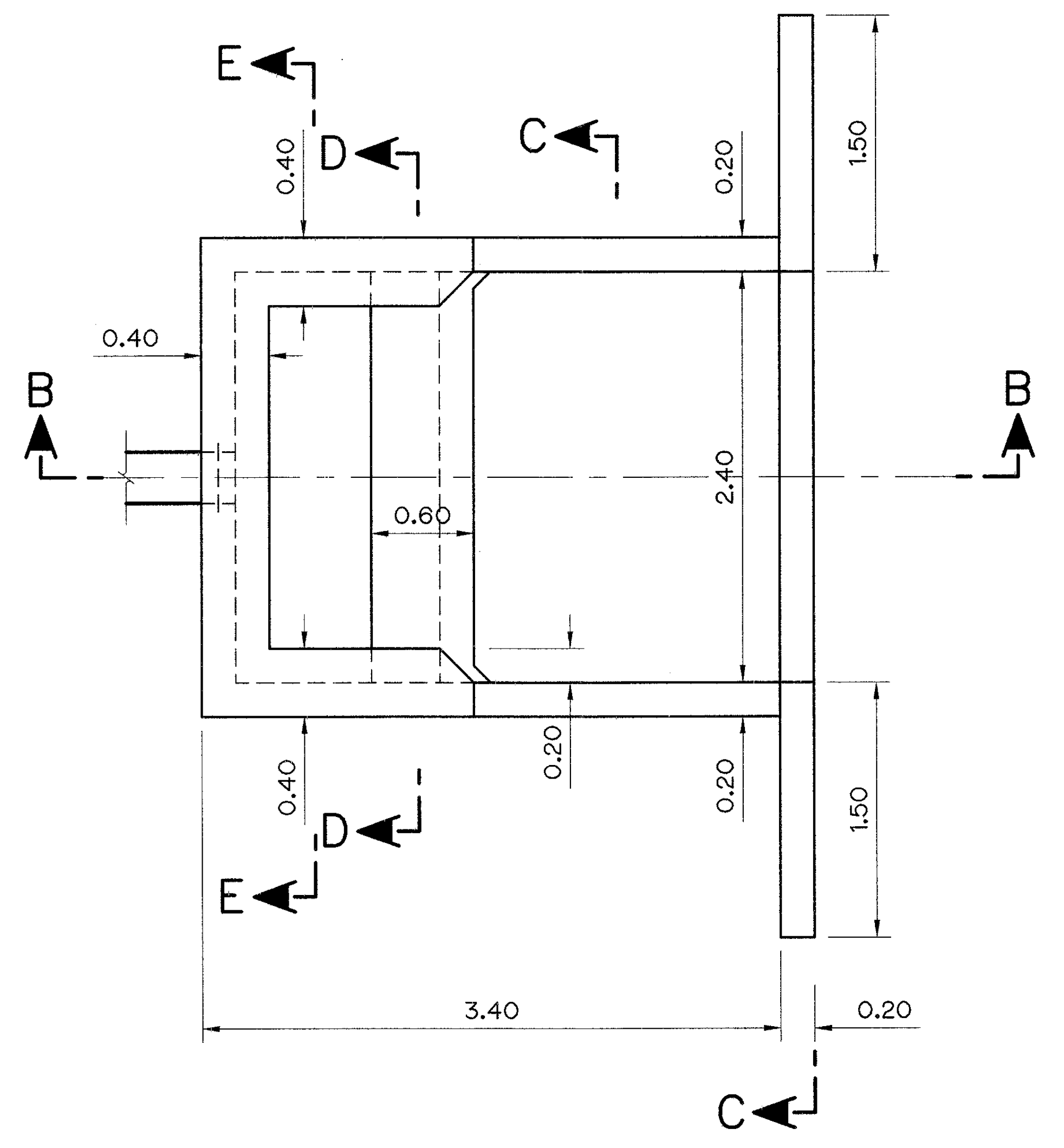
DRAWING NO. MH-ST-11

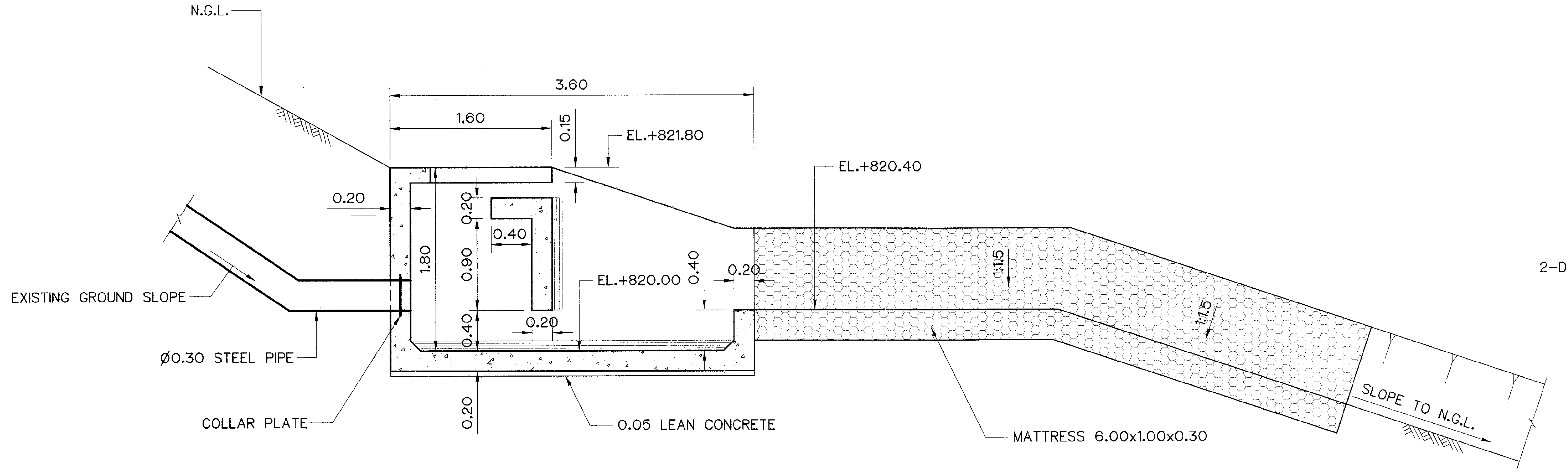
SHEET NO. 72 OF 130



## PLAN

SCALE 1:40





## SECTION A–A

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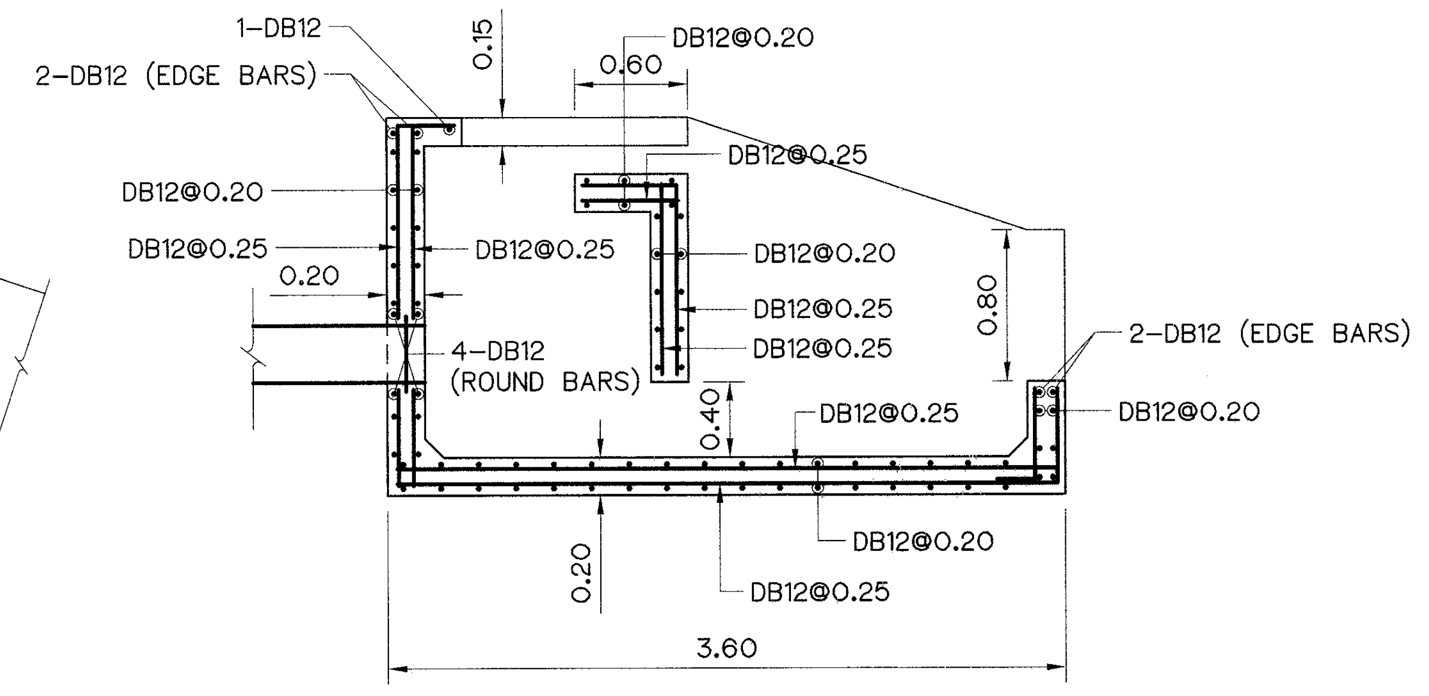
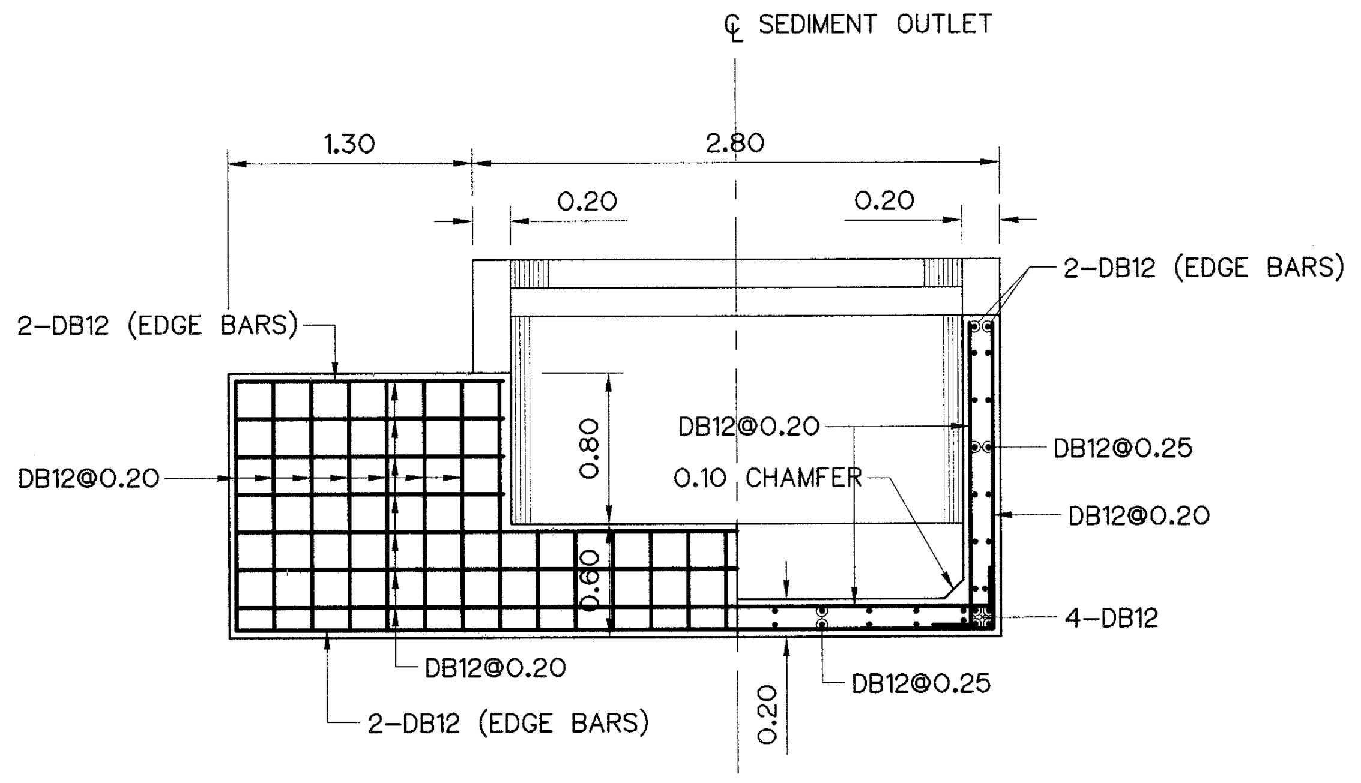


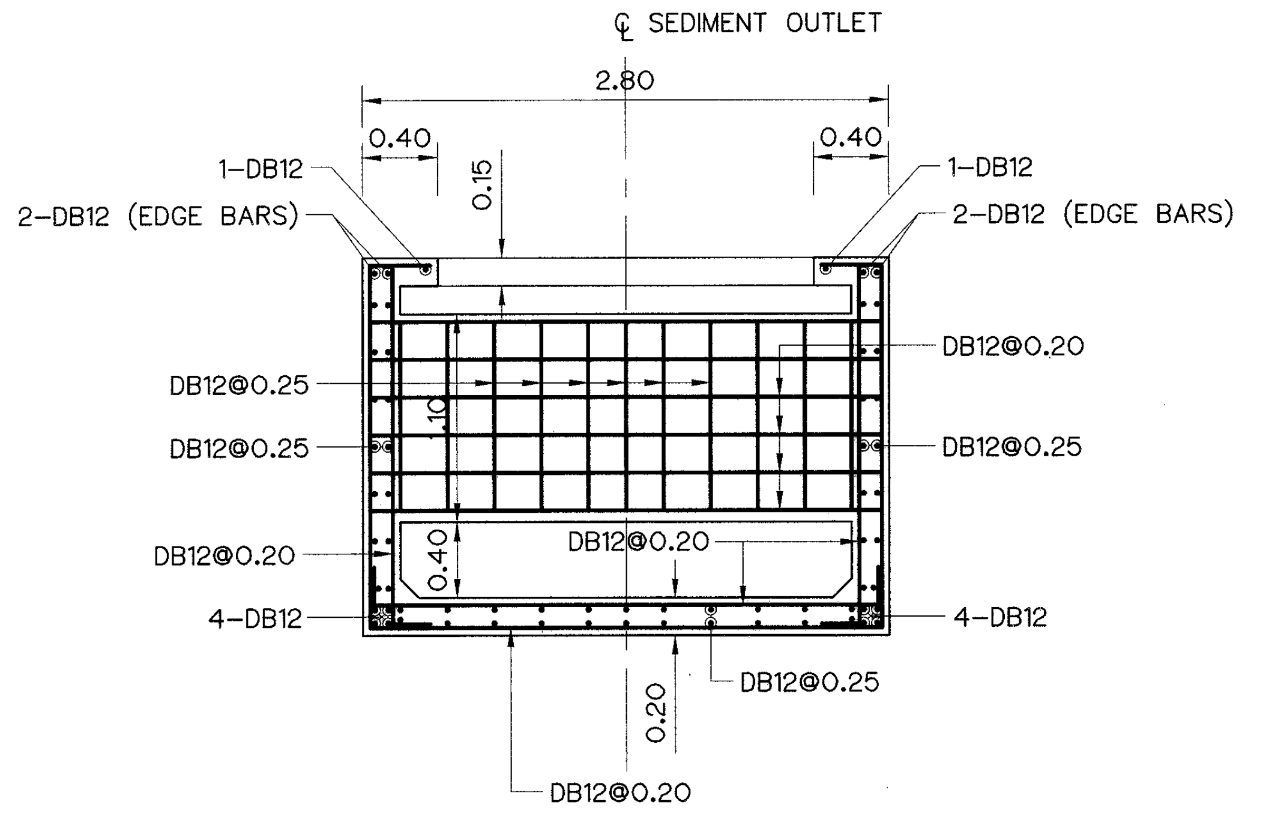
## SECTION B–B

SCALE 1:40



## SECTION C–C

SCALE 1:40



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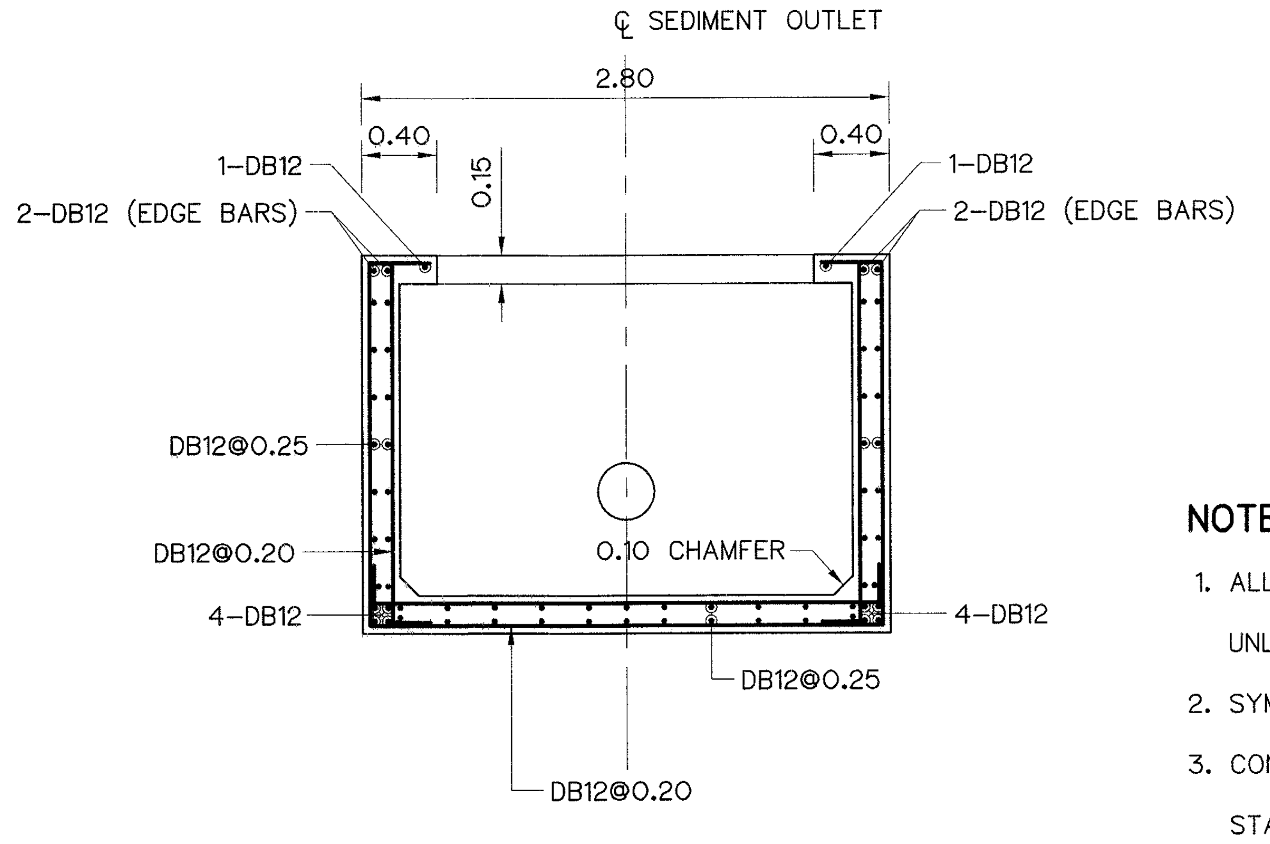
SCALE 1:40



## SECTION E–E

SCALE 1:40

**NOTES :**

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS, UNLESS OTHERWISE SHOWN.
2. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. NMH–GN–03
3. CONCRETE DESIGN BASED ON THE COMPRESSIVE STRENGTH OF 210 KSC, STANDARD CYLINDER Ø0.15x0.30 m. TEST AT AGE 28 DAYS. UNLESS OTHERWISE INDICATED IN SPECIFIC DRAWINGS.
4. BEARING CAPACITY NOT LESS THAN 5 T/sq m

**REFERENCE DRAWINGS :**

1. SURGE TANK PLAN, SEDIMENT STA. 0+000 TO STA. 0+272.800 NMH–ST–11

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
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CONSULTANTS | DEDE

KINGDOM OF THAILAND
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

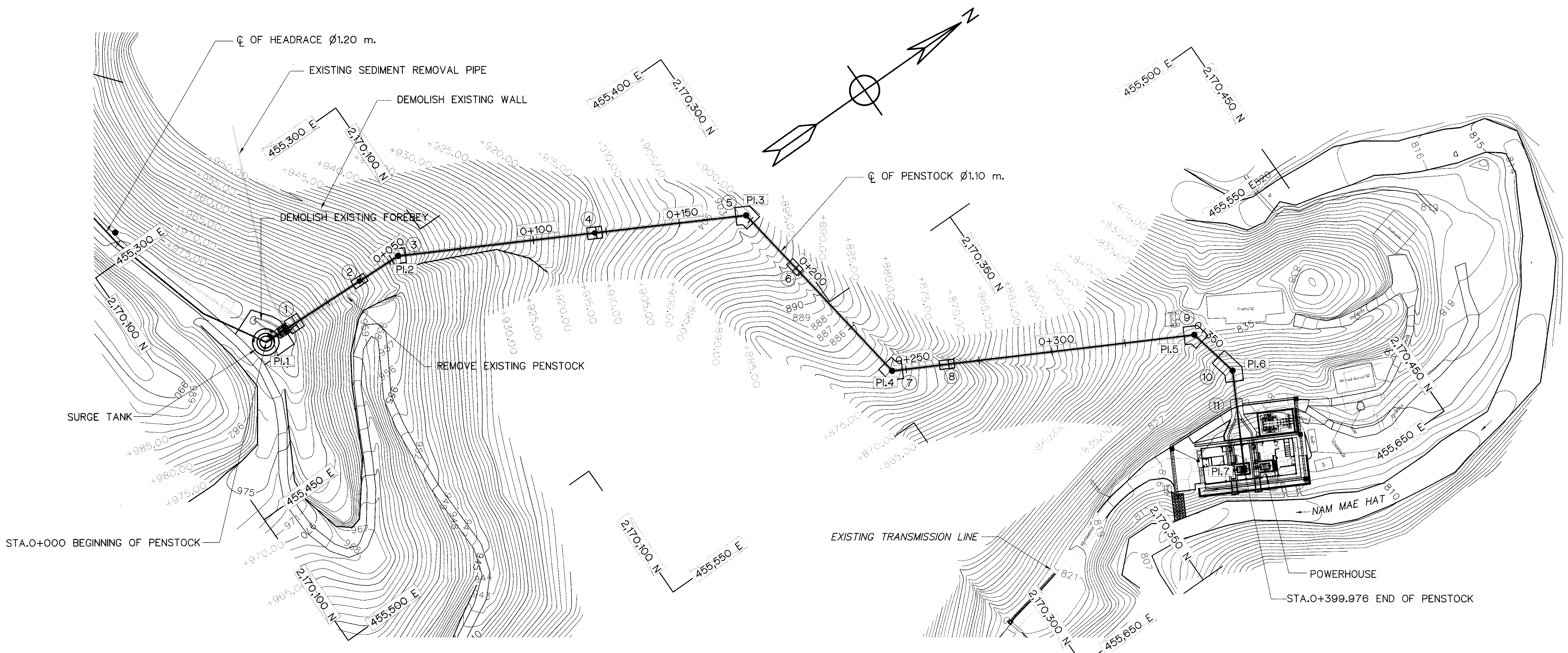
MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
SURGE TANK
SEDIMENT OUTLET PLAN SECTION AND DETAILS

P&C MANAGEMENT CO.,LTD.

Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

| | |
|---|---|
| DESIGNED | ภย.64624 สย.6226 |
| DRAWN | |
| CHECKED | สย.6226 |
| PROJECT MANAGER | DATE 08/03/2559 |
| REVIEWED | |
| SUBMITTED | Chanit |
| RECOMMENDED | |
| APPROVED | P. Hansell |
| DRAWING NO. | MH–ST–12 |
| SHEET NO. | 73 OF 130 |

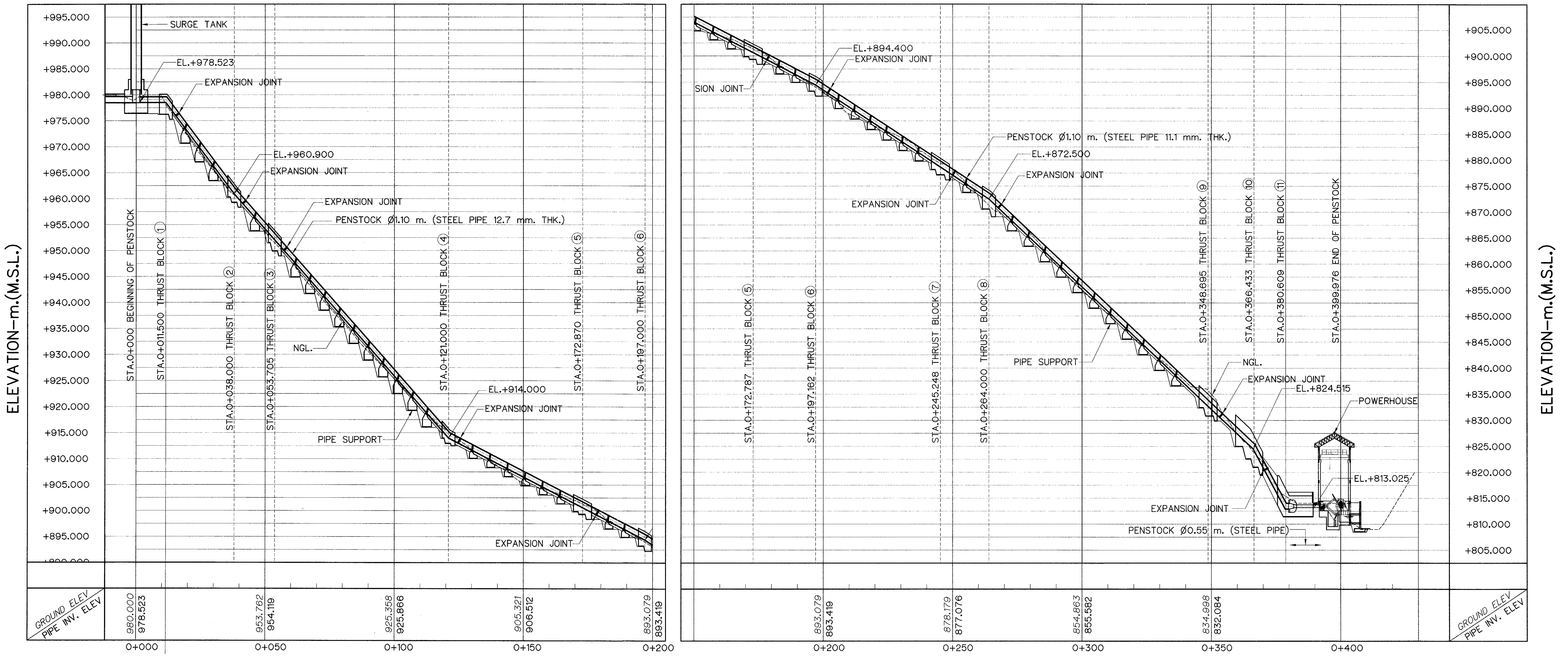


## PLAN

SCALE 1:1,000

## HORIZONTAL CURVE OF PENSTOCK

| NO. PI. | COORDINATE OF PI. |  | PI. TO PI. | DEFLECTION ANGLE (△) | PI. STA. | BEARING |
|---|---|---|---|---|---|---|
|  | N | E | (m) | ( ° – ' – " ) | (km) | (N/S ° – ' – " E/W) |
| PI.1 | 2,170,134.951 | 455,401.241 | – | – | 0+000.000 | – |
| PI.2 | 2,17,0188.62 | 455,403.218 | 53.705 | 2°– 11'– 18.03" | 0+053.705 | N 02°– 06'–34.72" E |
| PI.3 | 2,170,293.544 | 455,459.709 | 119.165 | 53°– 23'– 21.94" | 0+172.870 | N 28°– 17'– 52.76" E |
| PI.4 | 2,170,304.008 | 455,531.327 | 72.378 | 53°– 27'– 12.97" | 0+245.248 | N 81°– 41'– 14.70" E |
| PI.5 | 2,170,395.148 | 455,580.265 | 103.448 | 49°– 36'– 01.30" | 0+348.695 | N 28°– 14'– 01.73" E |
| PI.6 | 2,170,398.886 | 455,597.605 | 17.738 | 40°– 24'– 01.65" | 0+366.433 | N 77°– 50'–03.03" E |
| PI.7 | 2,170,383.018 | 455,627.156 | 33.542 |  | 0+399.976 |  |



## PROFILE

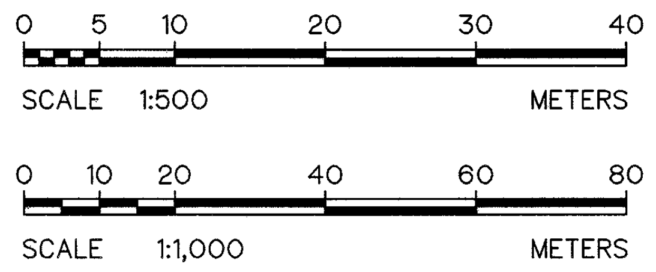
VERTICAL SCALE 1:500
HORIZONTAL SCALE 1:1,000

NOTES :

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS. UNLESS OTHERWISE SHOWN.
2. SYMBOLE, ABBREVIATIONS AND CENERAL NOTES SEE DWG. NO.MH-GN-03
3. THE ALIGNMENT OF THE HEADRACE AND RELATED STRUCTURES SHALL BE CHECK AND CORRECTED BY THE CONTRACTOR TO SUIT THE FIELD CONDITIONS AND SHALL BE SUBMITTED TO DEDE'S FIELD ENGINEER FOR APPROVAL

REFERENCE DRAWINGS :

| | |
|---|---|
| 1. PENSTOCK THRUST BLOCK PLAN ,SECTIONS REINFORCEMENT DETAILS 1/4 | MH-PS-02 |
| 2. PENSTOCK THRUST BLOCK PLAN ,SECTIONS REINFORCEMENT DETAILS 2/4 | MH-PS-03 |
| 3. PENSTOCK THRUST BLOCK PLAN ,SECTIONS REINFORCEMENT DETAILS 3/4 | MH-PS-04 |
| 4. PENSTOCK THRUST BLOCK PLAN ,SECTIONS REINFORCEMENT DETAILS 4/4 | MH-PS-05 |
| 5. PENSTOCK PIPE SUPPORT SECTIONS AND DETAILS | MH-PS-06 |
| 6. PENSTOCK WYE, PLAN, SECTIONS AND DETAILS | MH-PS-07 |



KINGDOM OF THAILAND
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
PENSTOCK
PLAN AND PROFILE, STA. 0+000 TO STA. 0+389.376

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
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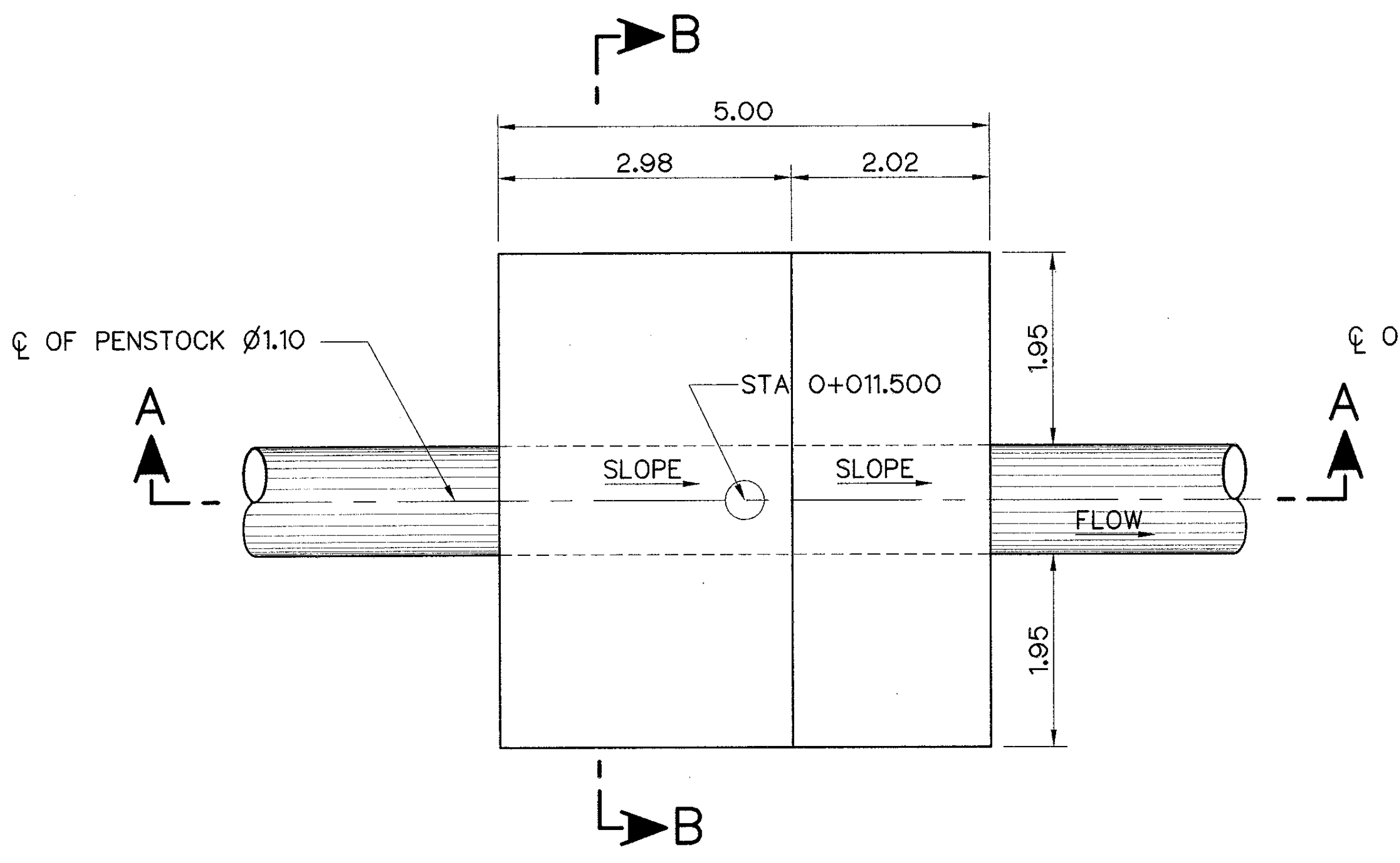
P&C MANAGEMENT CO.,LTD.

DESIGNED . ภย.64624 ลย.6226
DRAWN
CHECKED ลย.6226
PROJECT MANAGER DATE 08/03/2559

Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

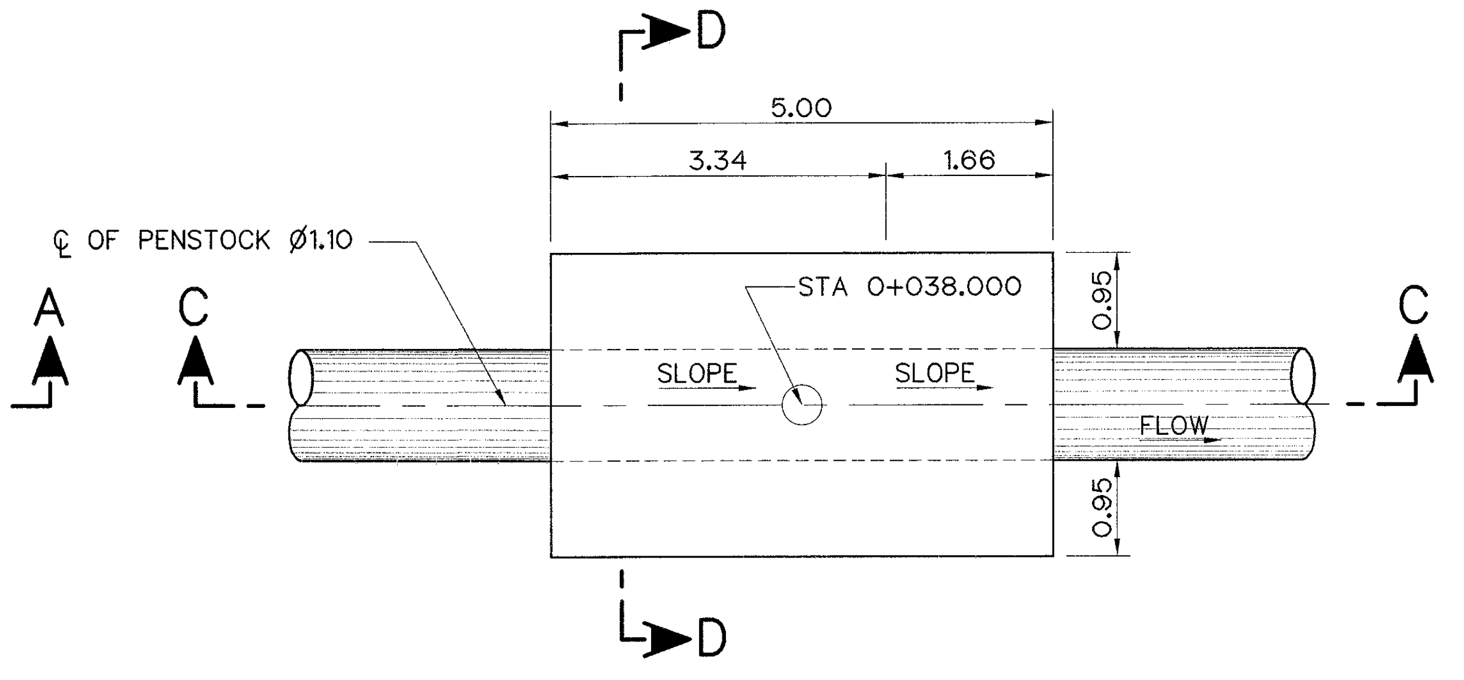
REVIEWED
SUBMITTED Chait
RECOMMENDED
APPROVED P.Hanssell.

DRAWING NO. MH-PS-01
SHEET NO. 74 OF 130



PLAN (THRUST BLOCK ①)

SCALE 1:75



PLAN (THRUST BLOCK ② )

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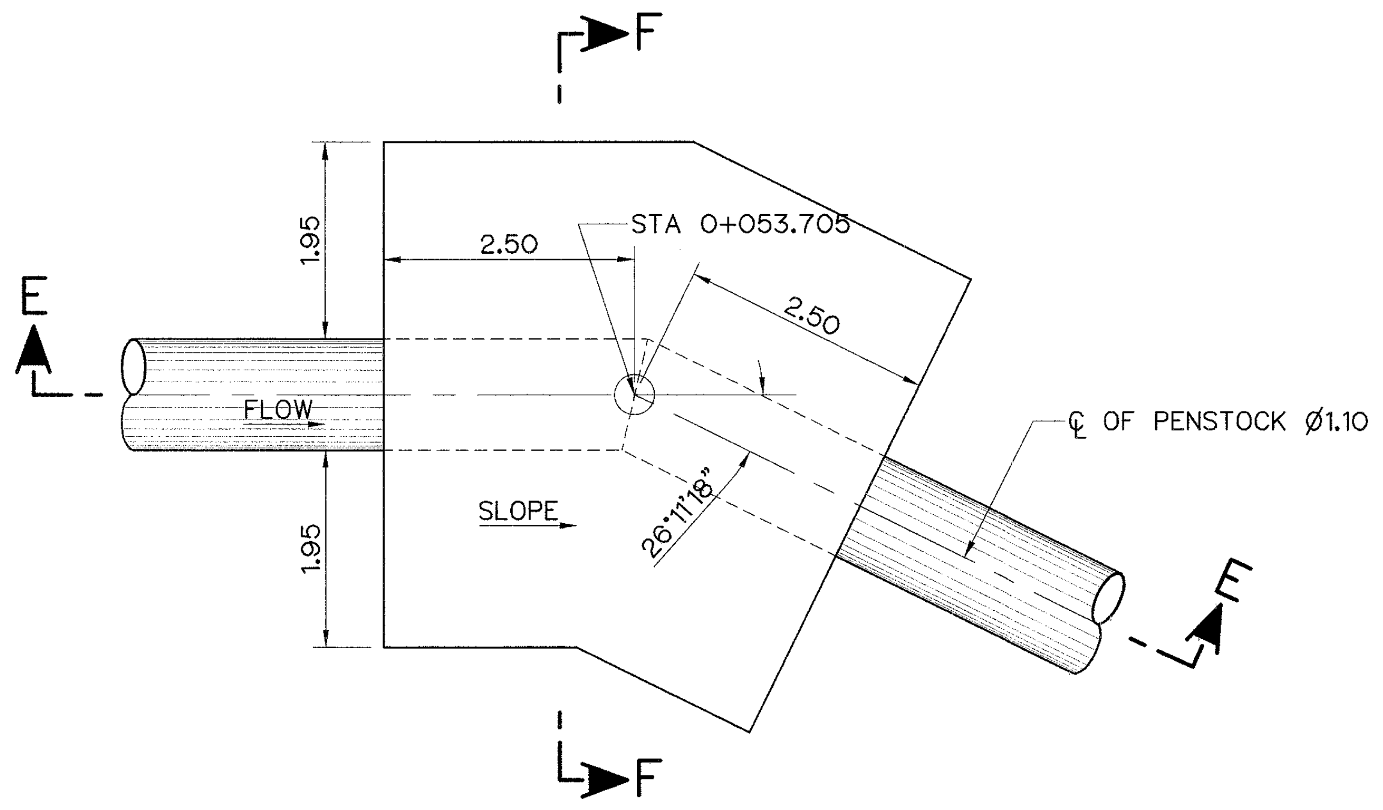

PLAN (THRUST BLOCK ③ )

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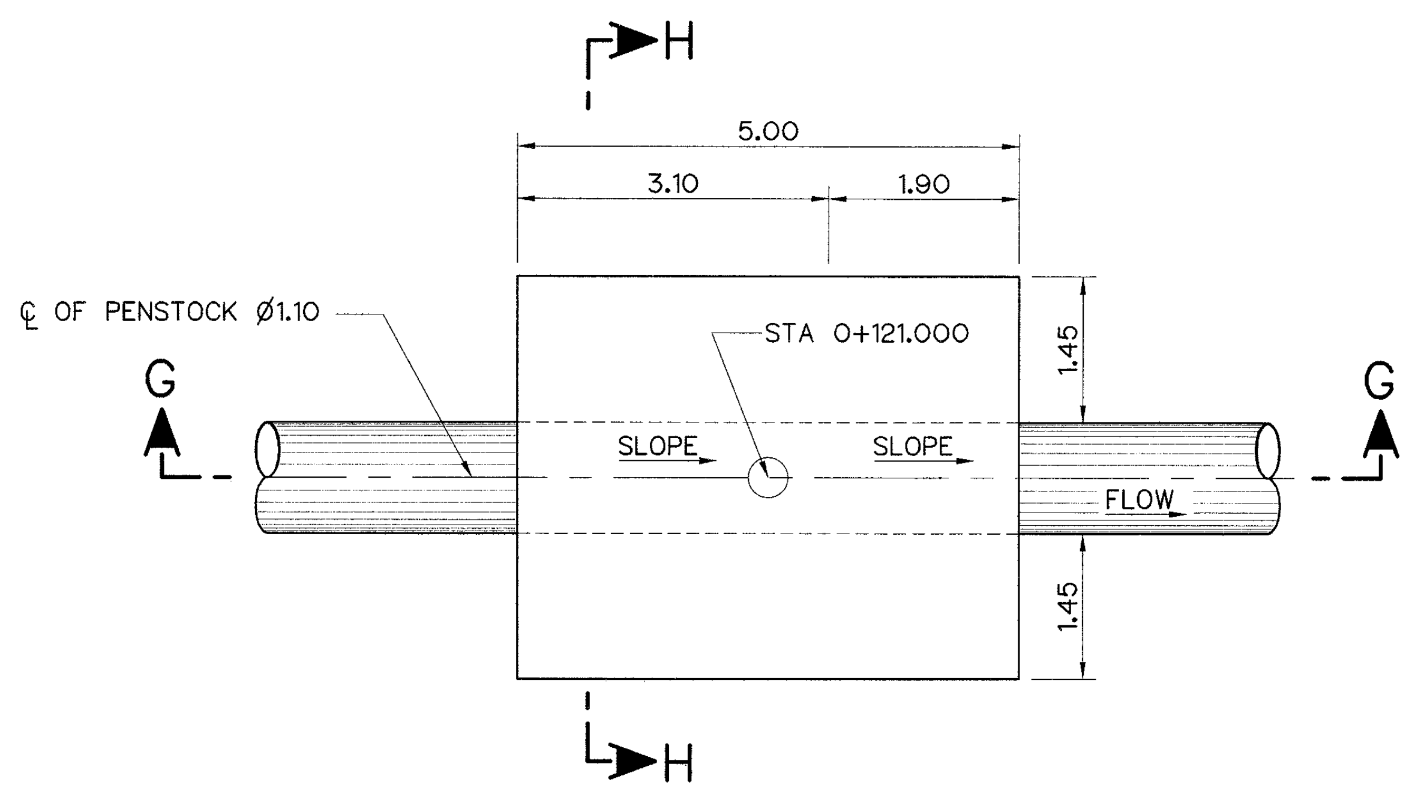

PLAN (THRUST BLOCK ④ )

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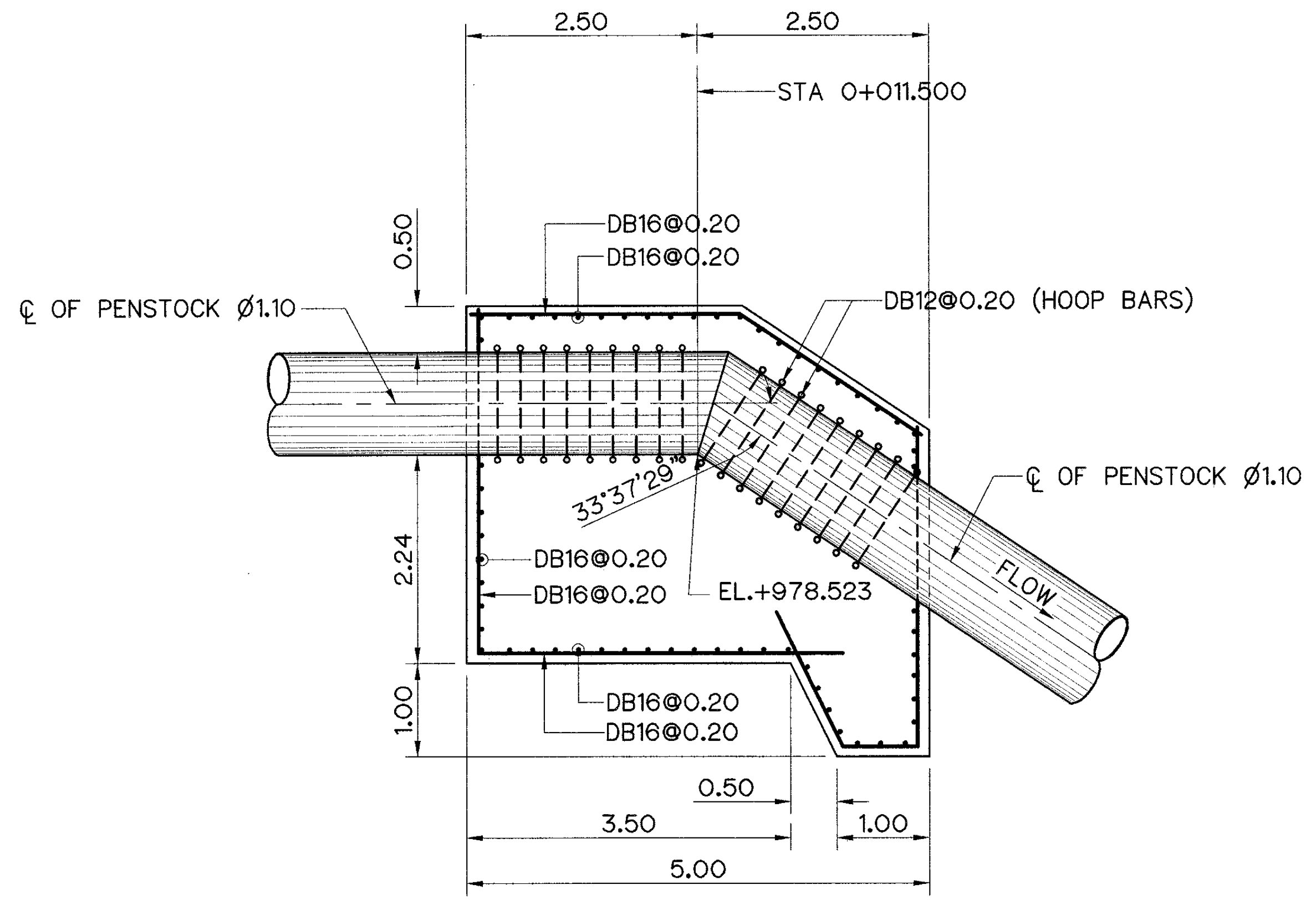
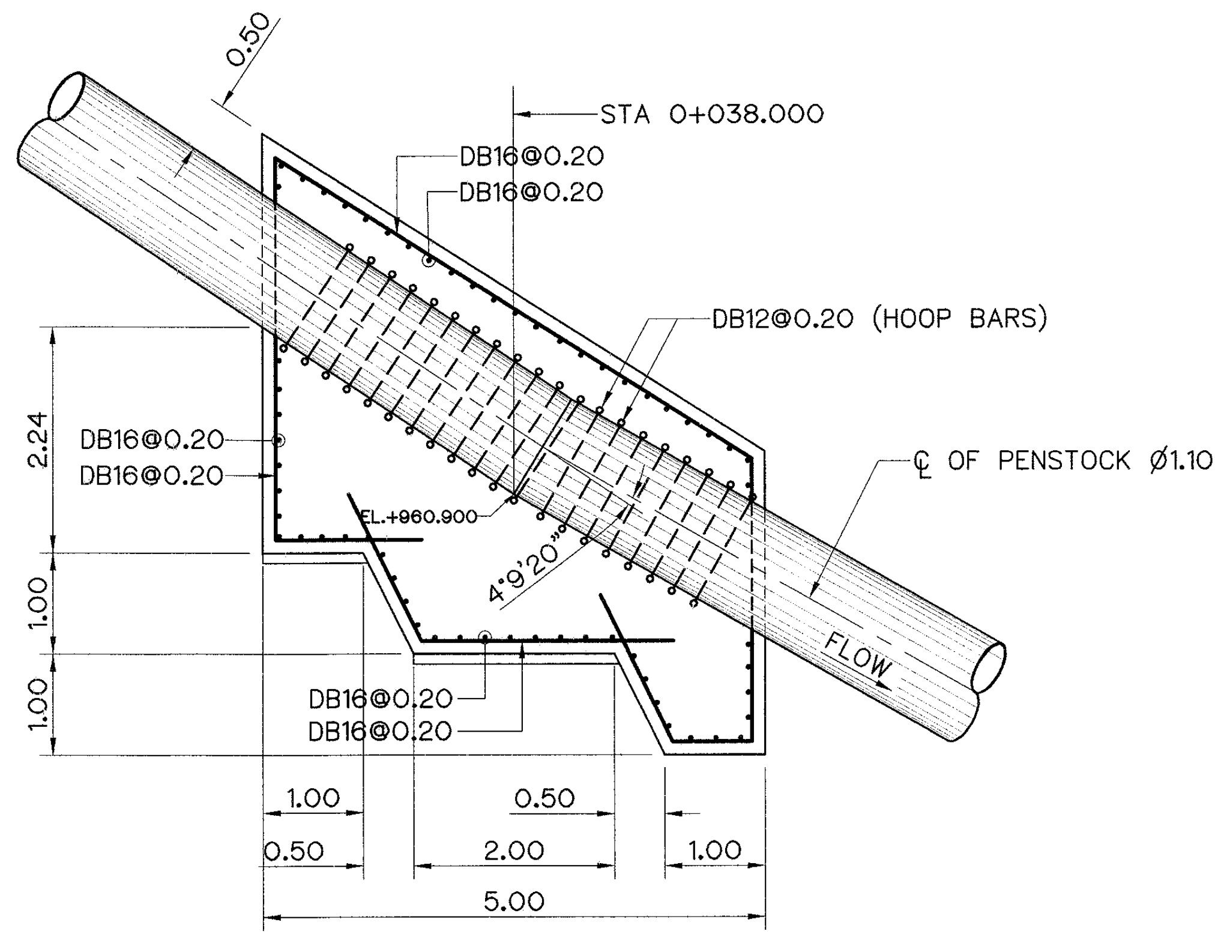


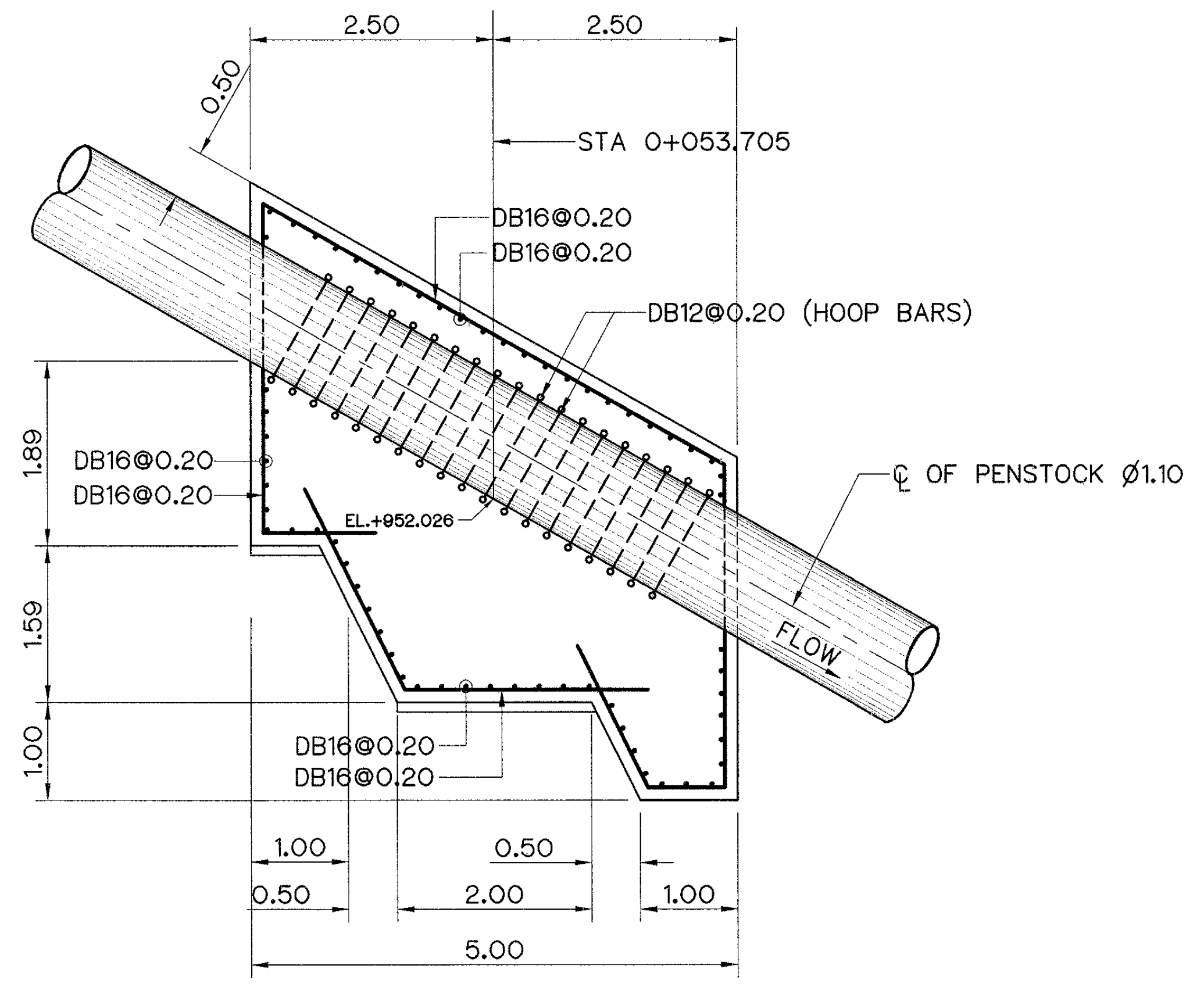
SECTION A–A

SCALE 1:75



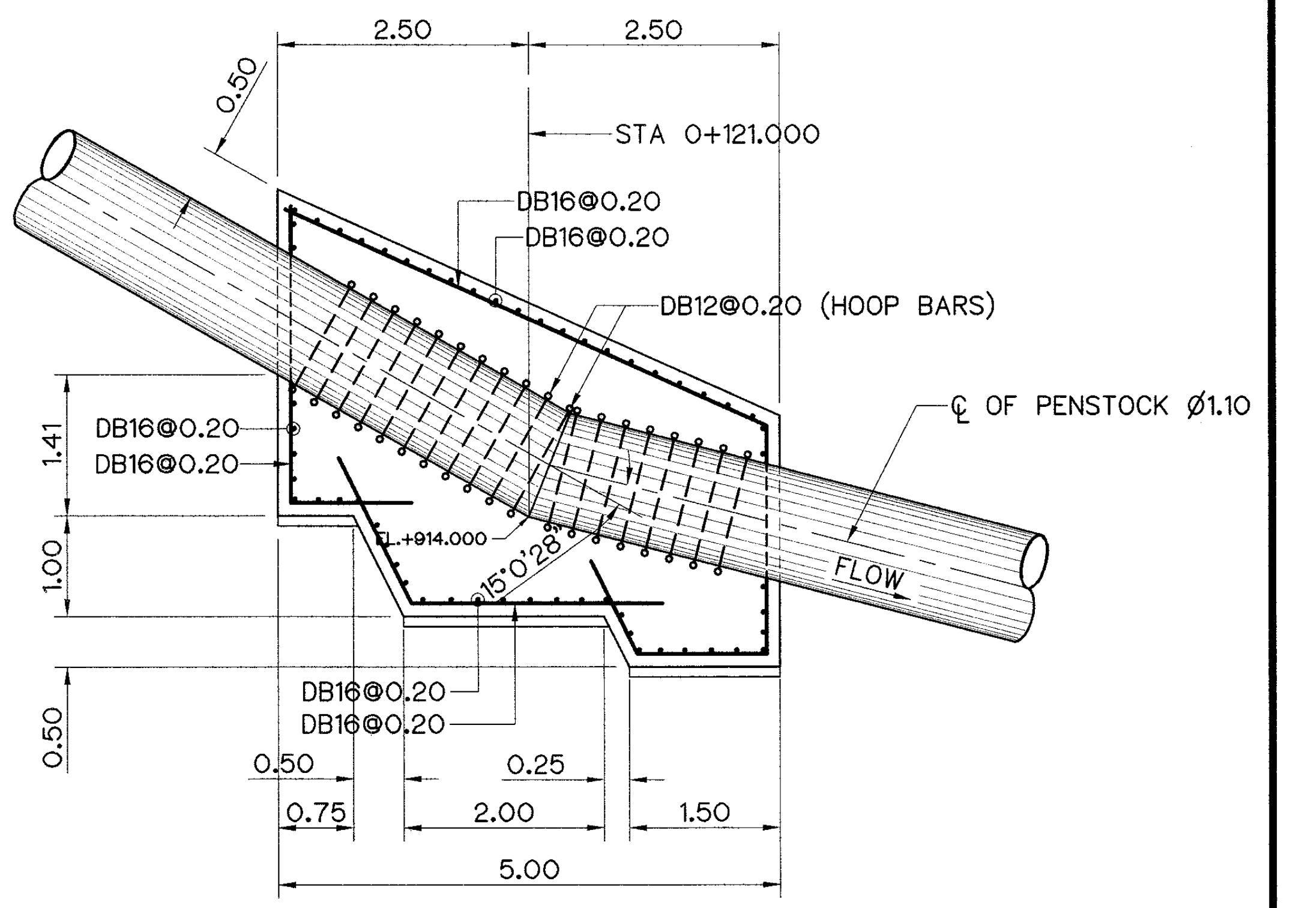
SECTION C–C

SCALE 1:75



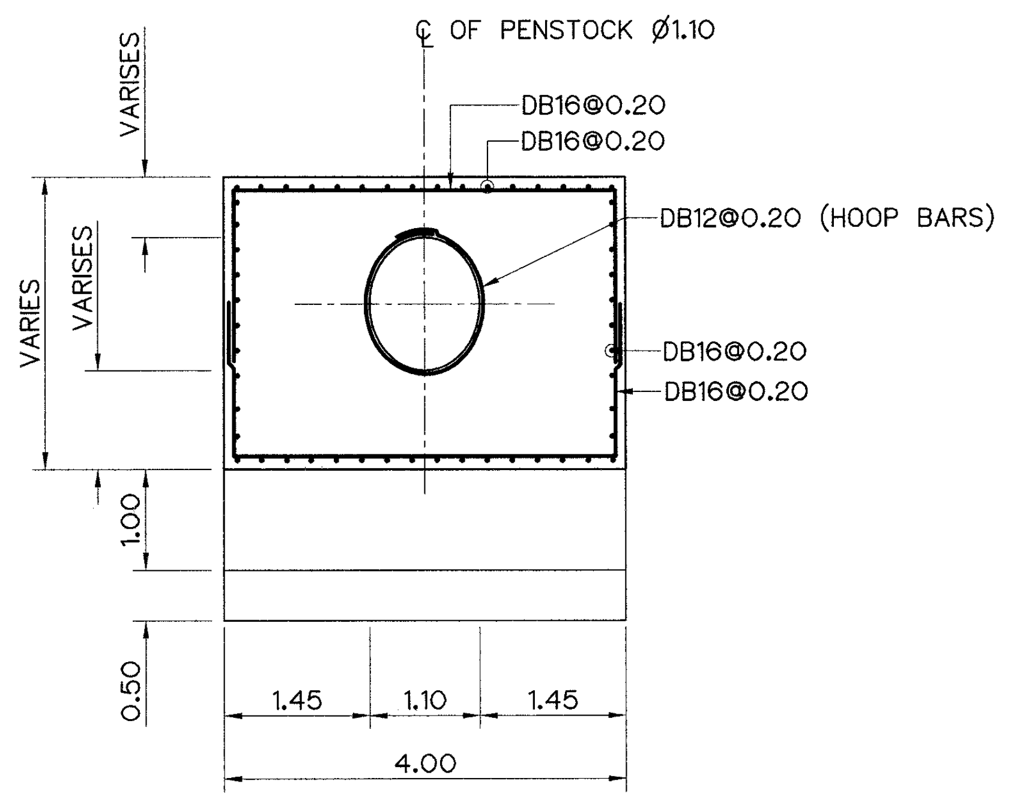
SECTION E–E

SCALE 1:75



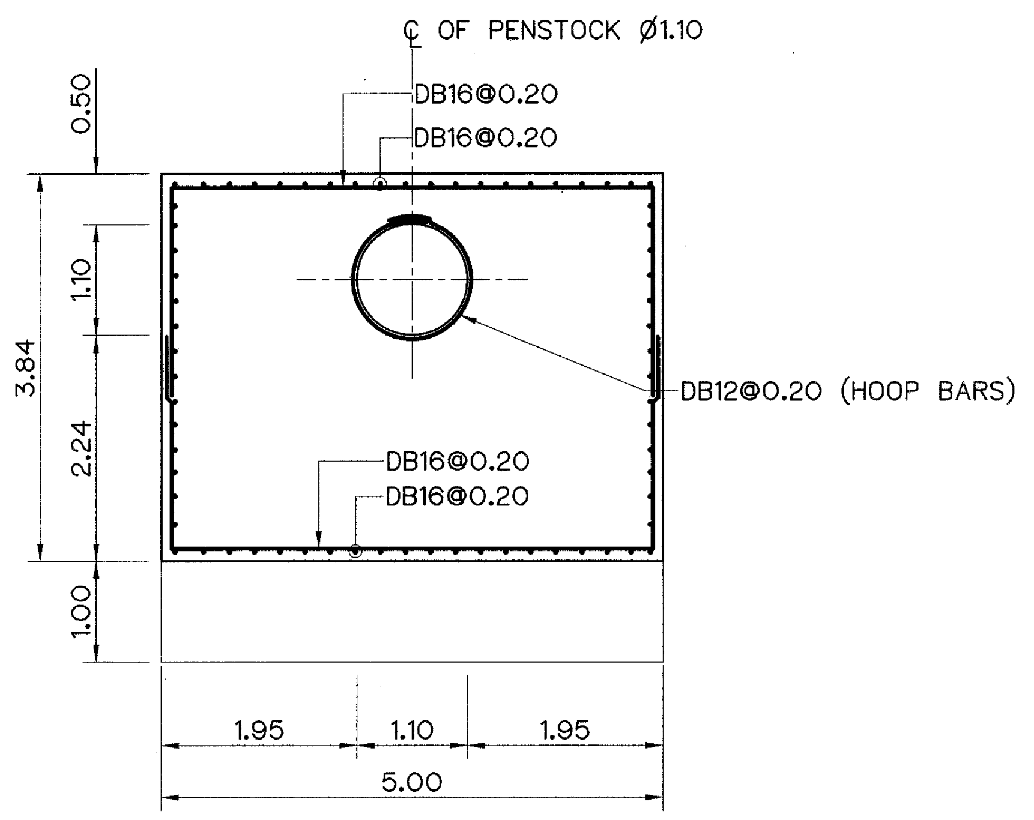
SECTION G–G

SCALE 1:75



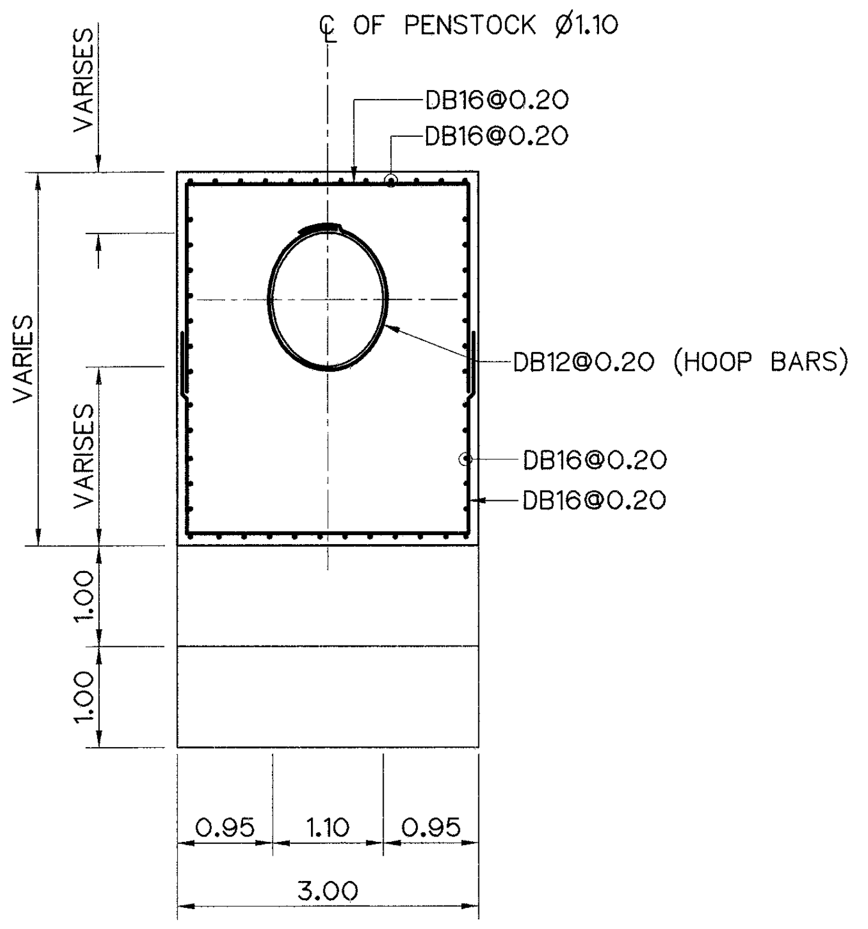
SECTION H–H

SCALE 1:75



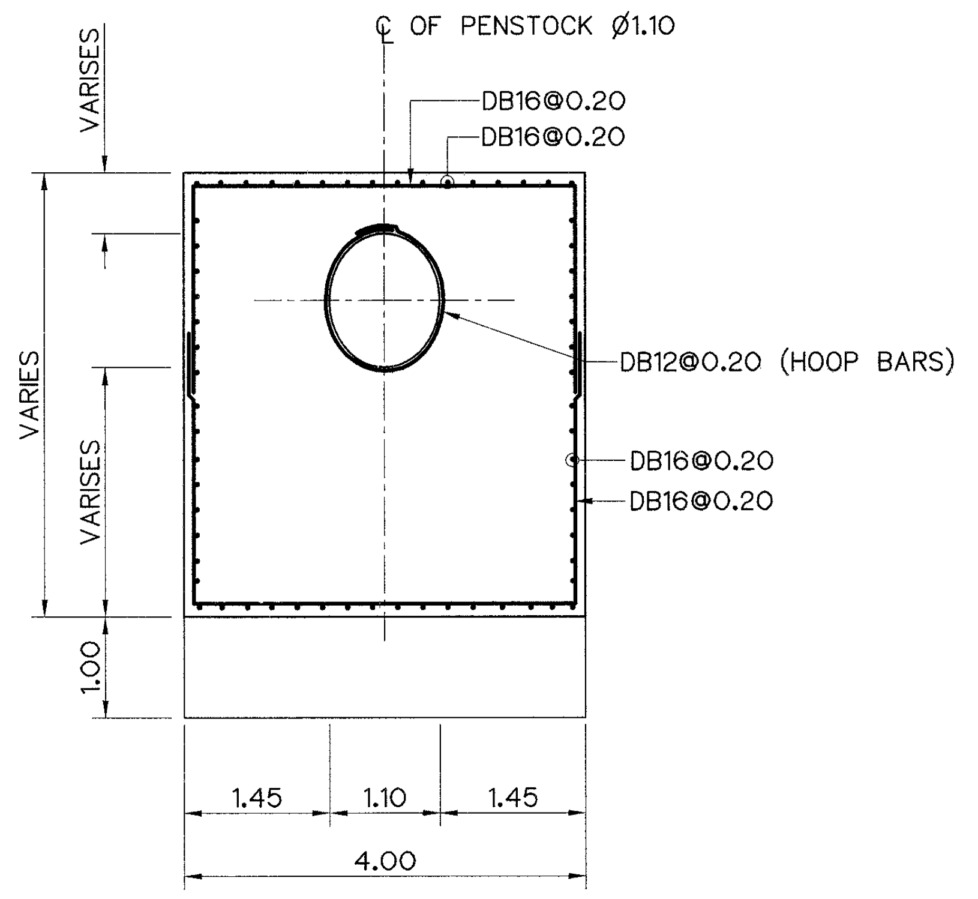
SECTION B–B

SCALE 1:75



SECTION D–D

SCALE 1:75



SECTION F–F

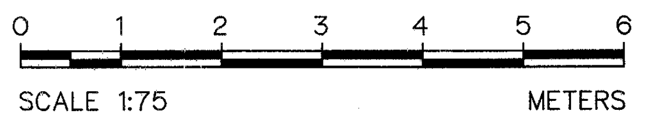
SCALE 1:75

NOTES :

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS. UNLESS OTHERWISE SHOWN.
2. SYMBOLE, ABBREVIATIONS AND CENERAL NOTES SEE DWG. NO. MH–GN–03
3. THE ALIGNMENT OF THE HEADRACE AND RELATED STRUCTURES SHALL BE CHECK AND CORRECTED BY THE CONTRACTOR TO SUIT THE FIELD CONDITIONS AND SHALL BE SUBMITTED TO DEDE'S FIELD ENGINEER FOR APPROVAL

REFERENCE DRAWINGS :

1. PENSTOCK PLAN AND PROFILE, STA. 0+000 TO STA. 0+389.376 MH–PS–01



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KINGDOM OF THAILAND
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

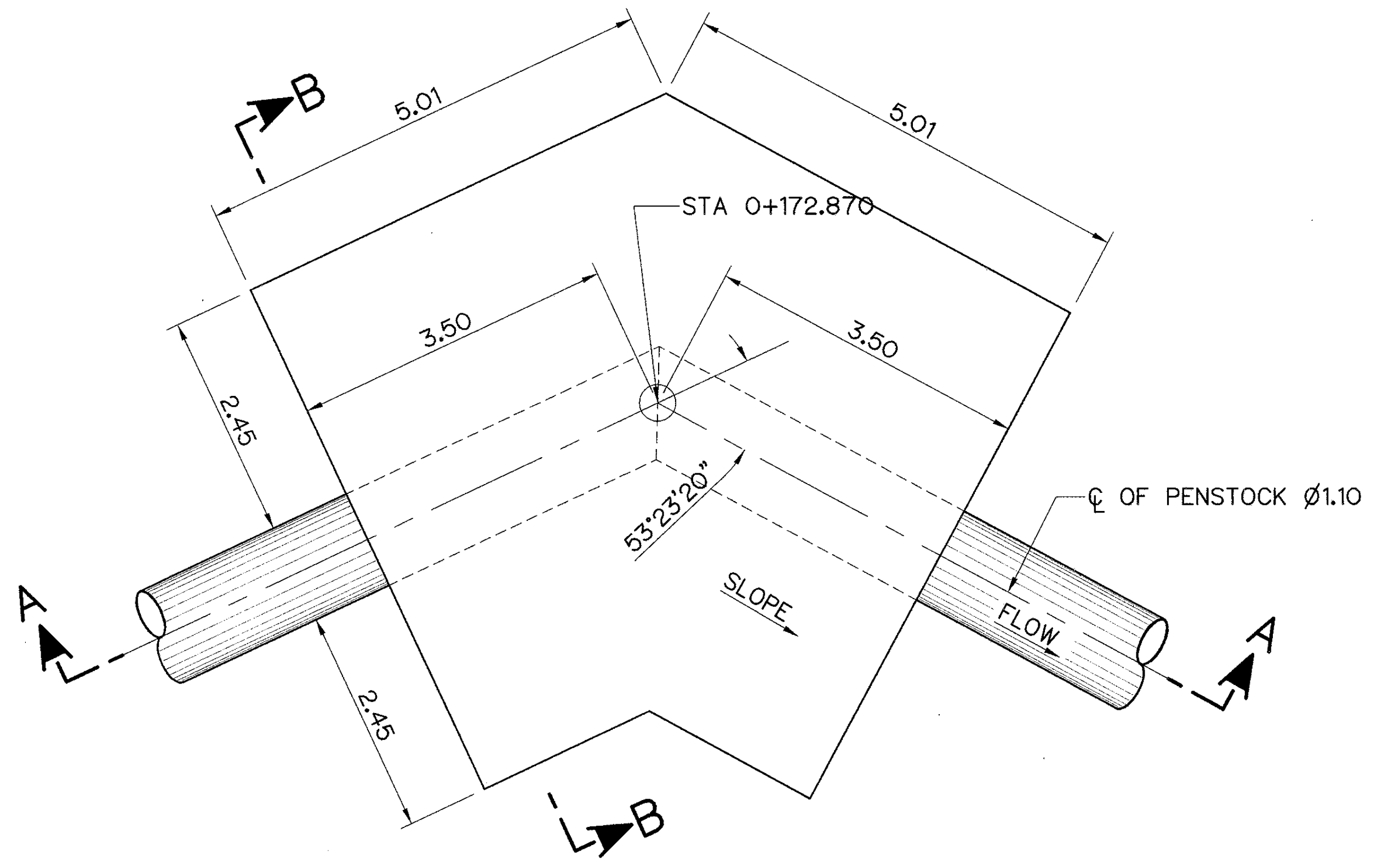
CIVIL WORKS AND TRANSMISSION LINE
PENSTOCK
THRUST BLOCK PLAN, SECTIONS REINFORCEMENT DETAILS 1/4

P&C MANAGEMENT CO.,LTD.

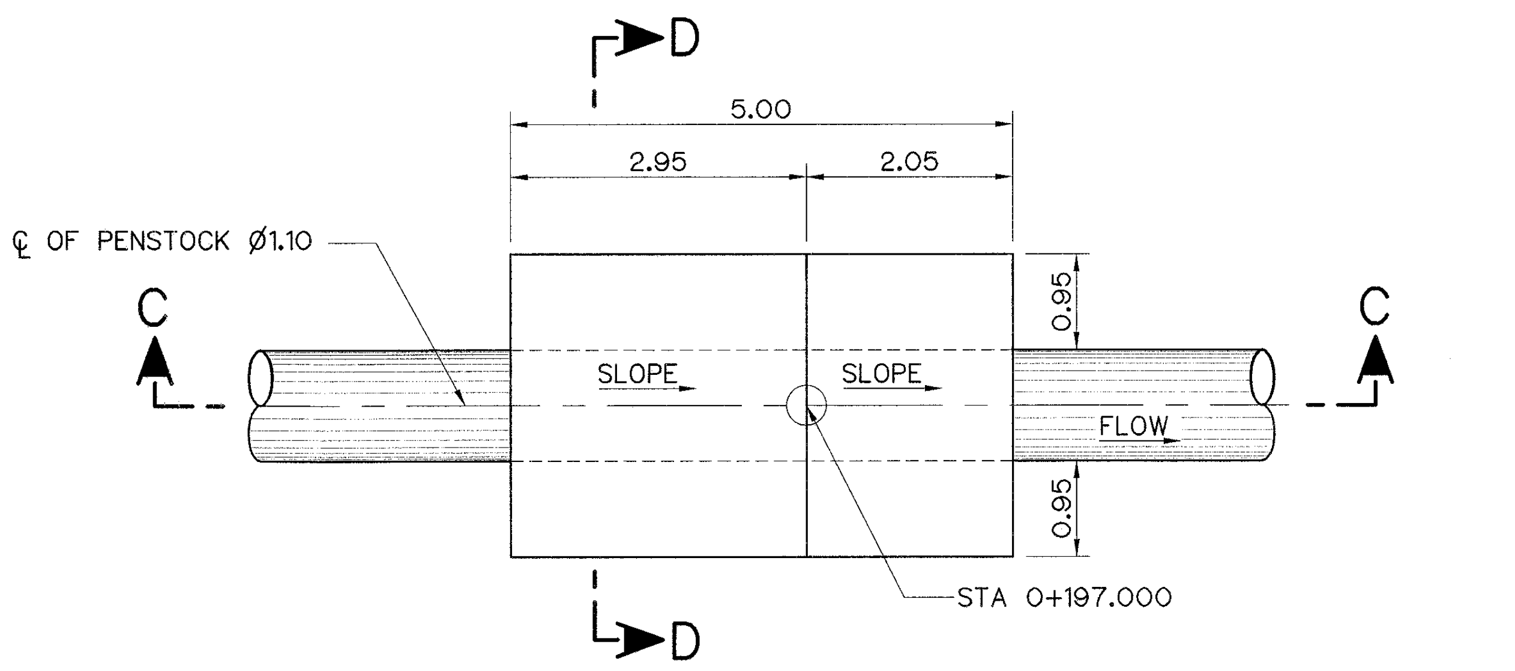
DESIGNED ก.ค.64624 ธ.ค.6226
DRAWN
CHECKED ธ.ค.6226
08/03/2559
PROJECT MANAGER DATE

Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY
REVIEWED
SUBMITTED Chanit
RECOMMENDED
APPROVED P. Han...

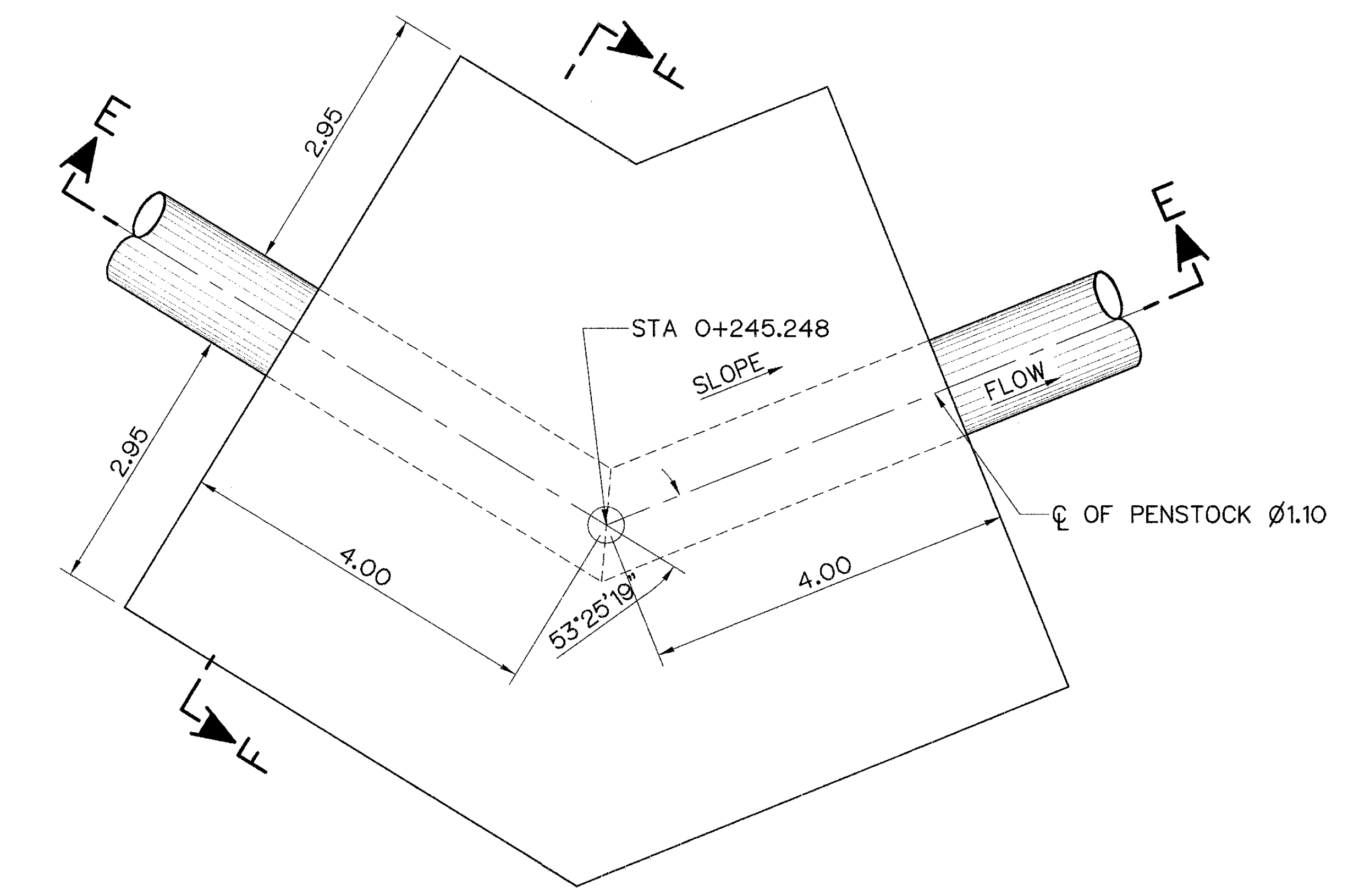
DRAWING NO. MH–PS–02
SHEET NO. 75 OF 130



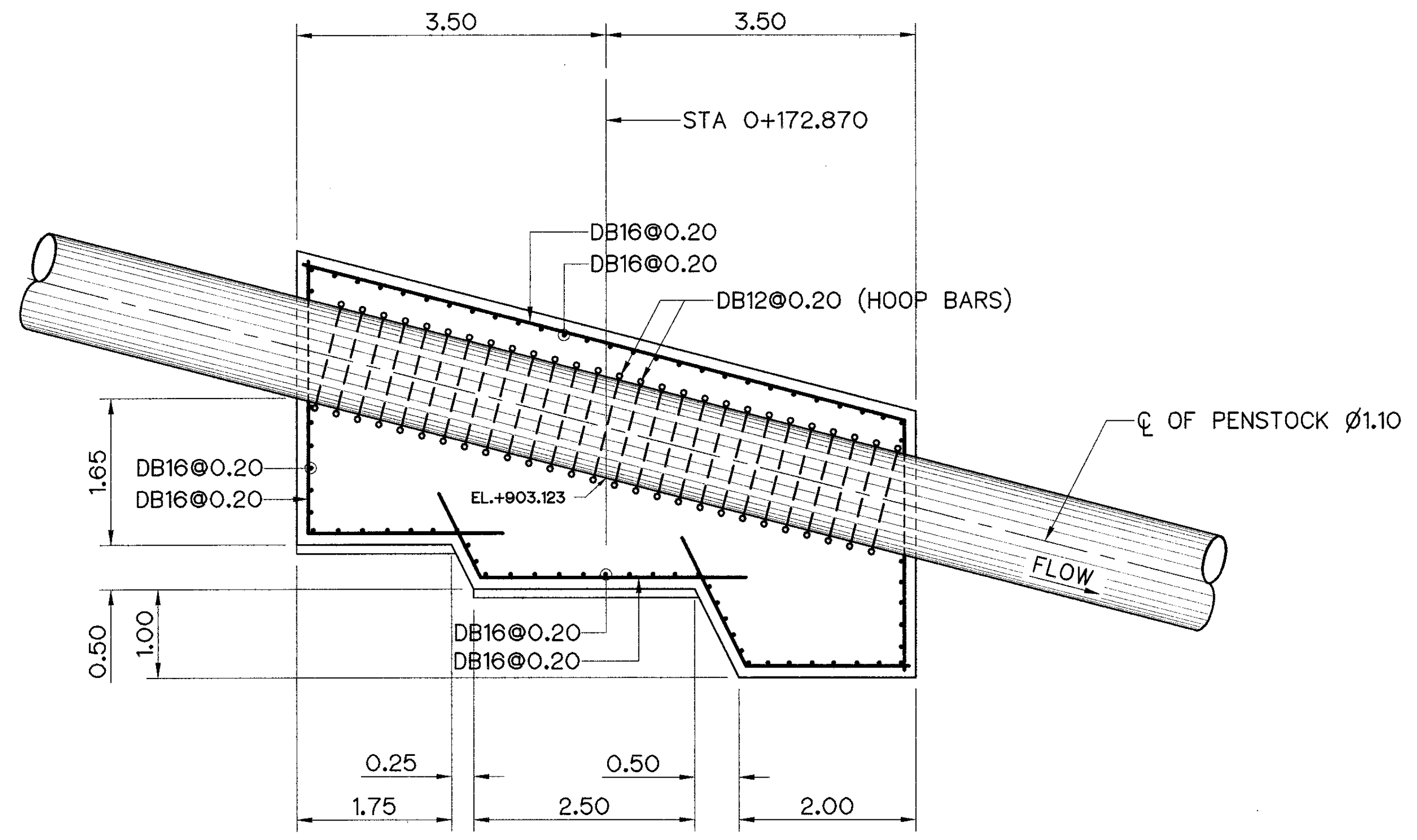
PLAN (THRUST BLOCK ⑤)
SCALE 1:75



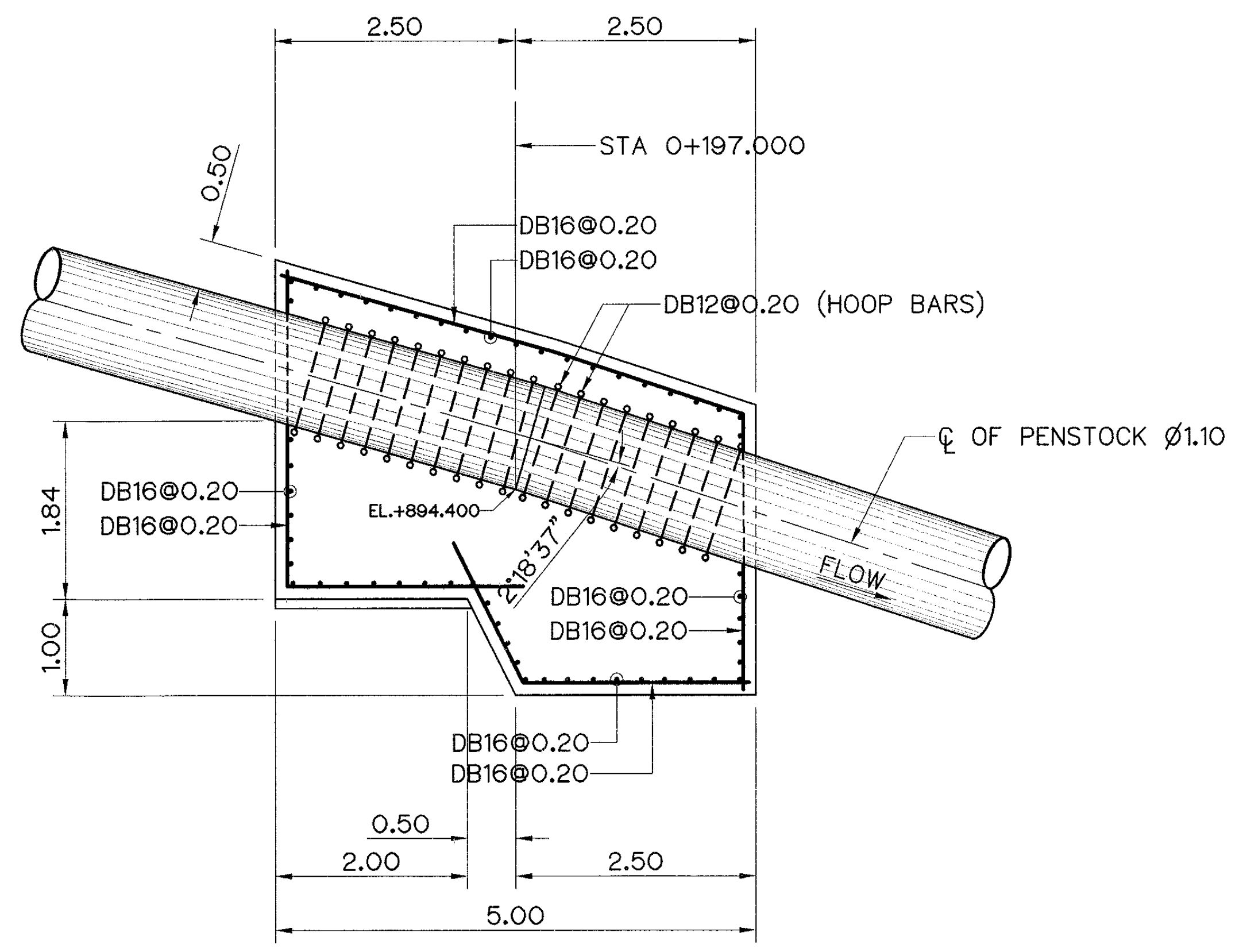
PLAN (THRUST BLOCK ⑥)
SCALE 1:75



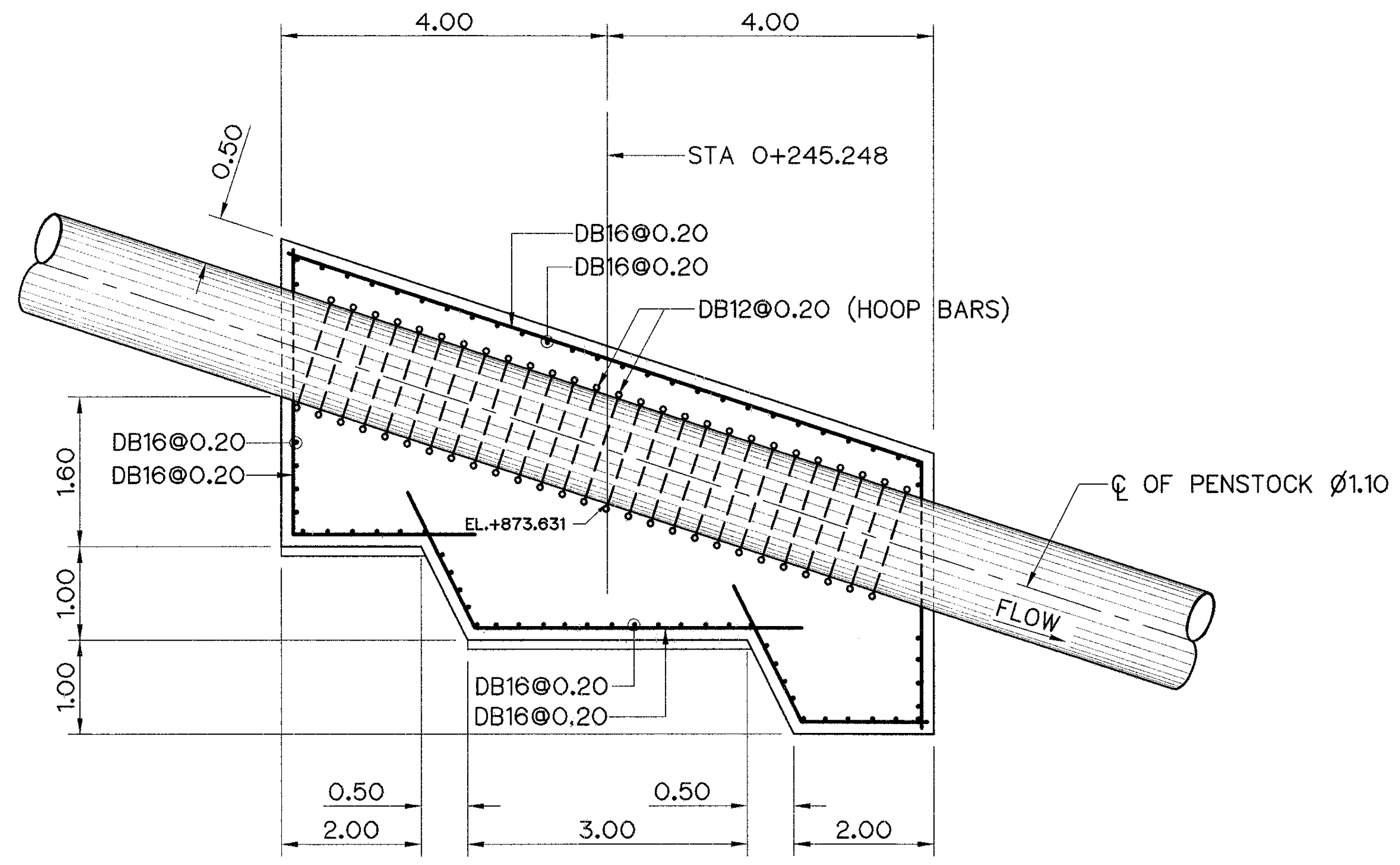
PLAN (THRUST BLOCK ⑦)
SCALE 1:75



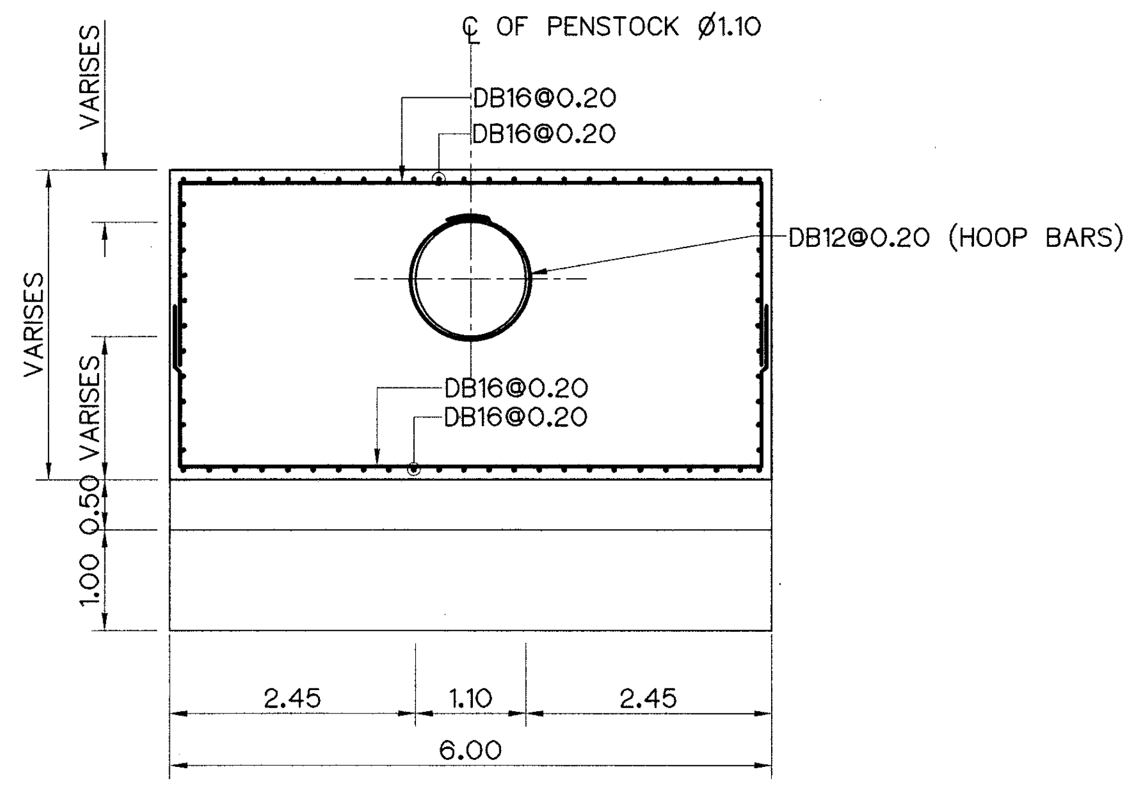
SECTION A–A
SCALE 1:75



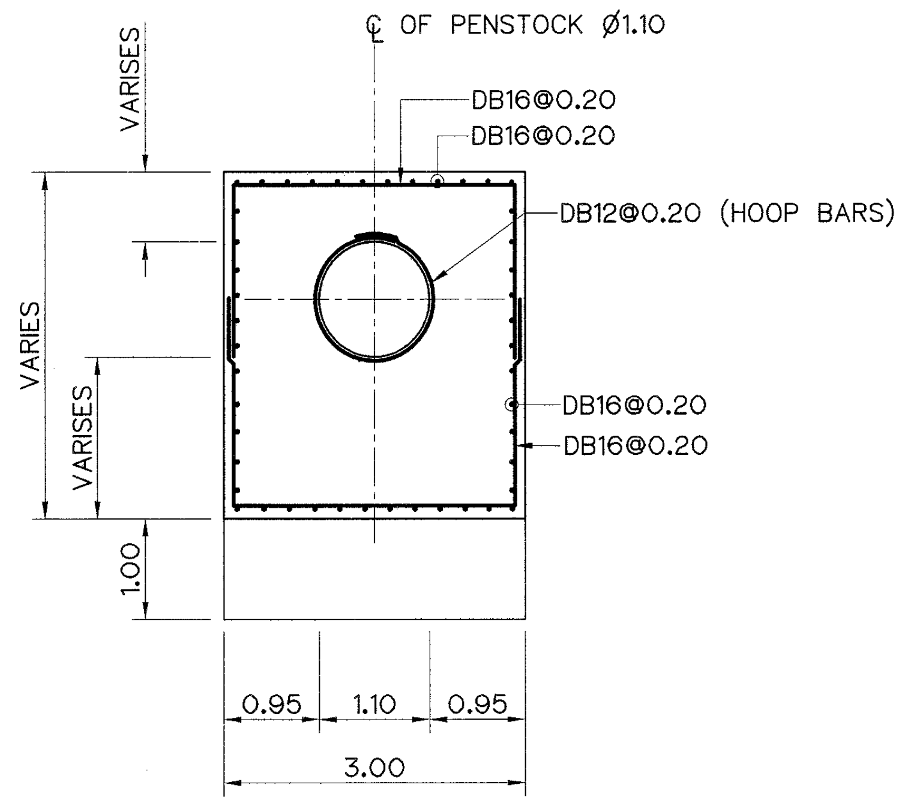
SECTION C–C
SCALE 1:75



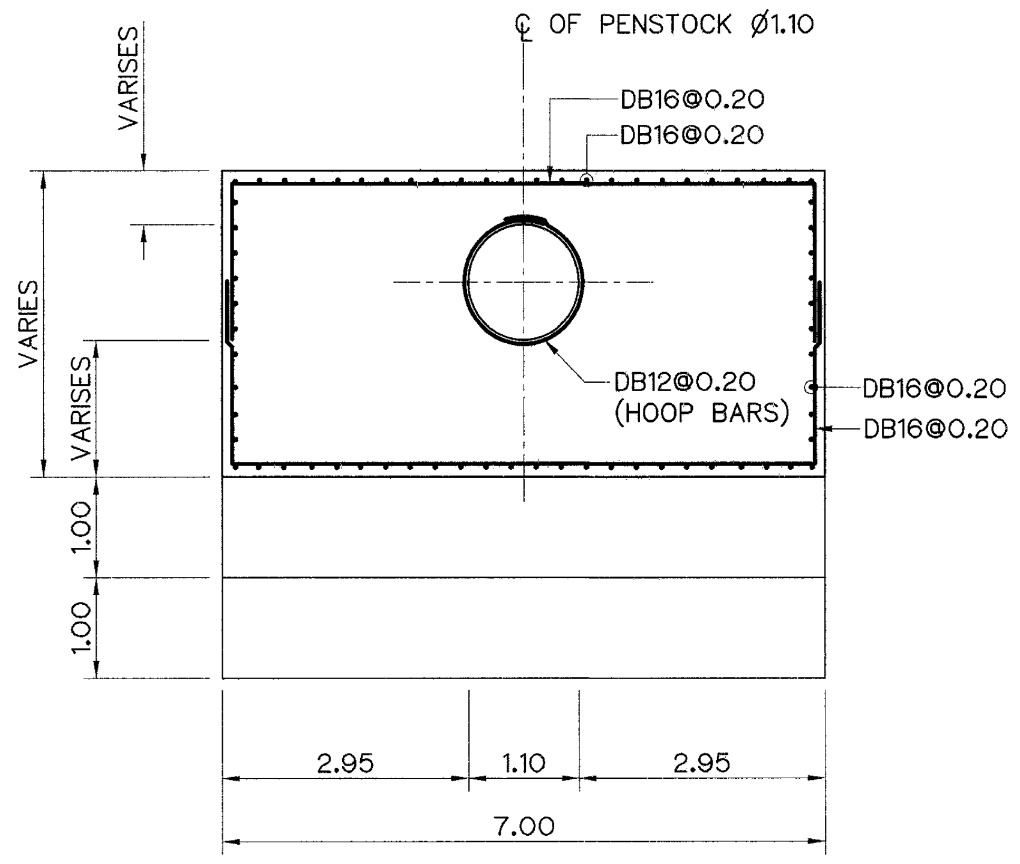
SECTION E–E
SCALE 1:75



SECTION B–B
SCALE 1:75



SECTION D–D
SCALE 1:75



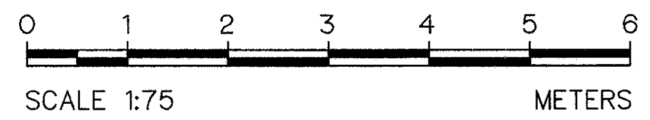
SECTION E–E
SCALE 1:75

NOTES :

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS. UNLESS OTHERWISE SHOWN.
2. SYMBOLE, ABBREVIATIONS AND CENERAL NOTES SEE DWG. NO. MH–GN–03
3. THE ALIGNMENT OF THE HEADRACE AND RELATED STRUCTURES SHALL BE CHECK AND CORRECTED BY THE CONTRACTOR TO SUIT THE FIELD CONDITIONS AND SHALL BE SUBMITTED TO DEDE'S FIELD ENGINEER FOR APPROVAL

REFERENCE DRAWINGS :

1. PENSTOCK PLAN AND PROFILE, STA. 0+000 TO STA. 0+389.376 MH–PS–01



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| | CONSULTANTS | | DEDE | |

KINGDOM OF THAILAND
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

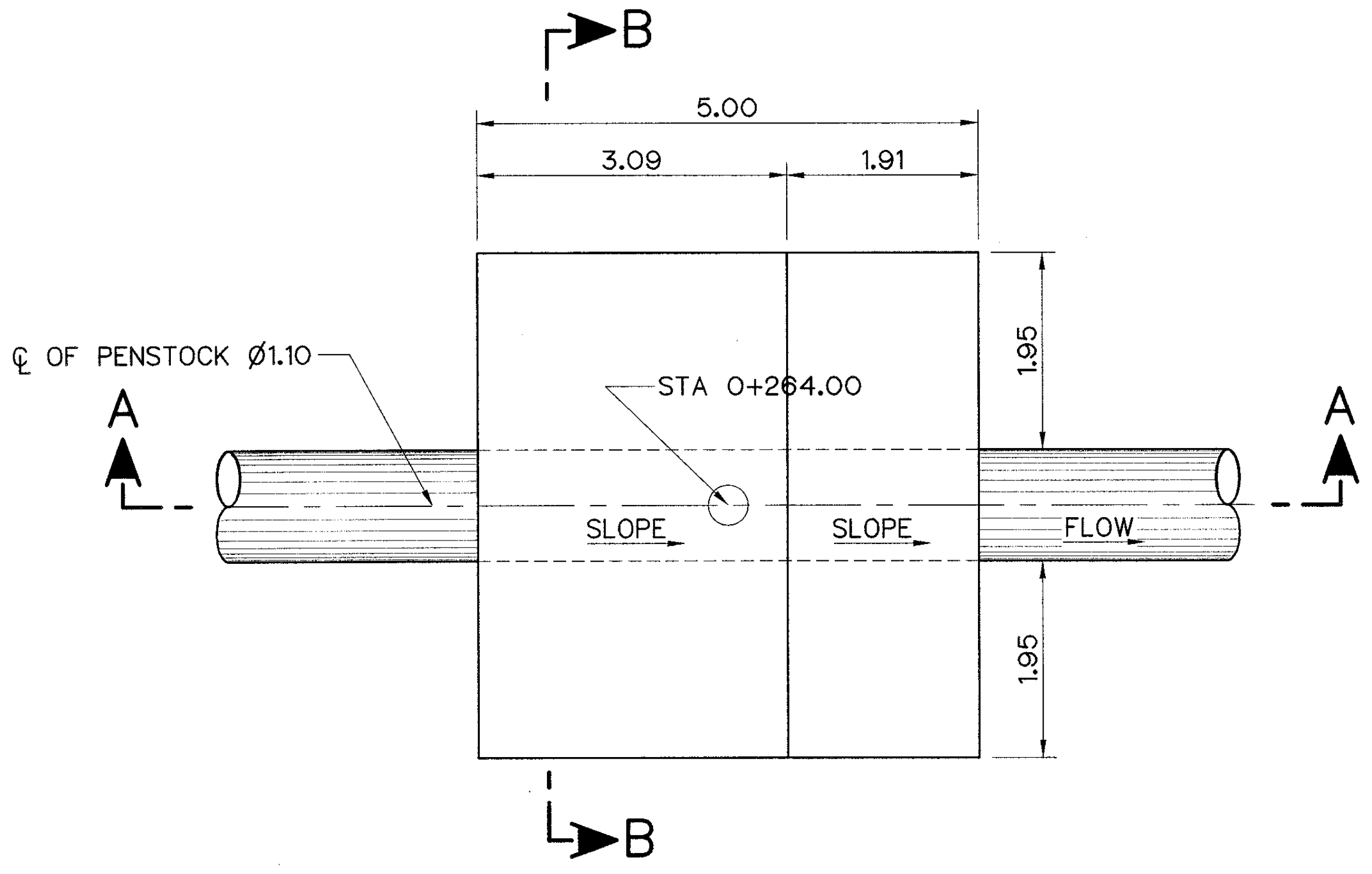
MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
PENSTOCK
THRUST BLOCK PLAN, SECTIONS REINFORCEMENT DETAILS 2/4

P&C MANAGEMENT CO.,LTD.
DESIGNED ภย.64624 สย.6226
DRAWN
CHECKED สย.6226
PROJECT MANAGER 08/03/2559 DATE

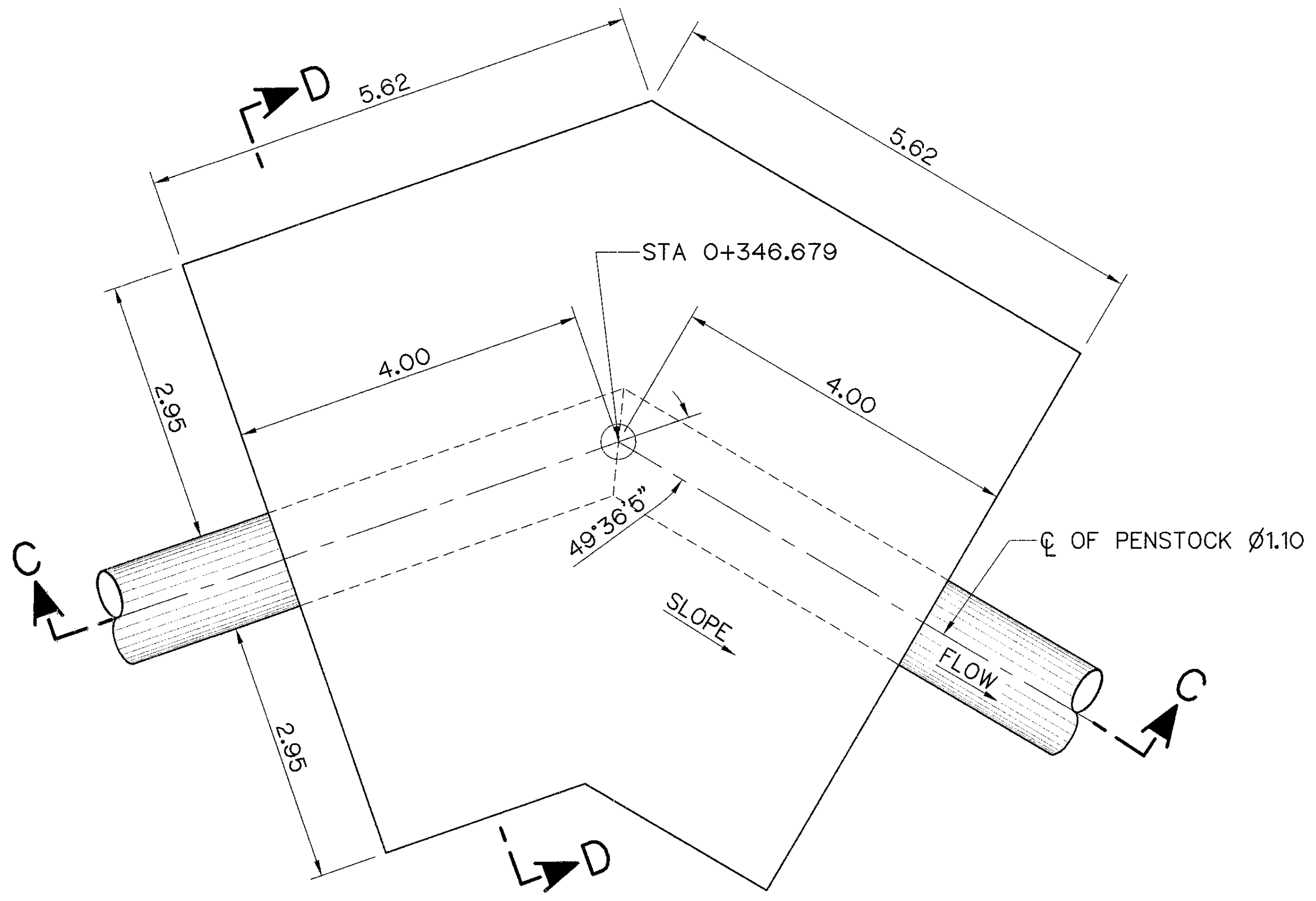
Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY
REVIEWED
SUBMITTED Chait
RECOMMENDED
APPROVED P. Ham..M.

DRAWING NO. MH–PS–03
SHEET NO. 76 OF 130



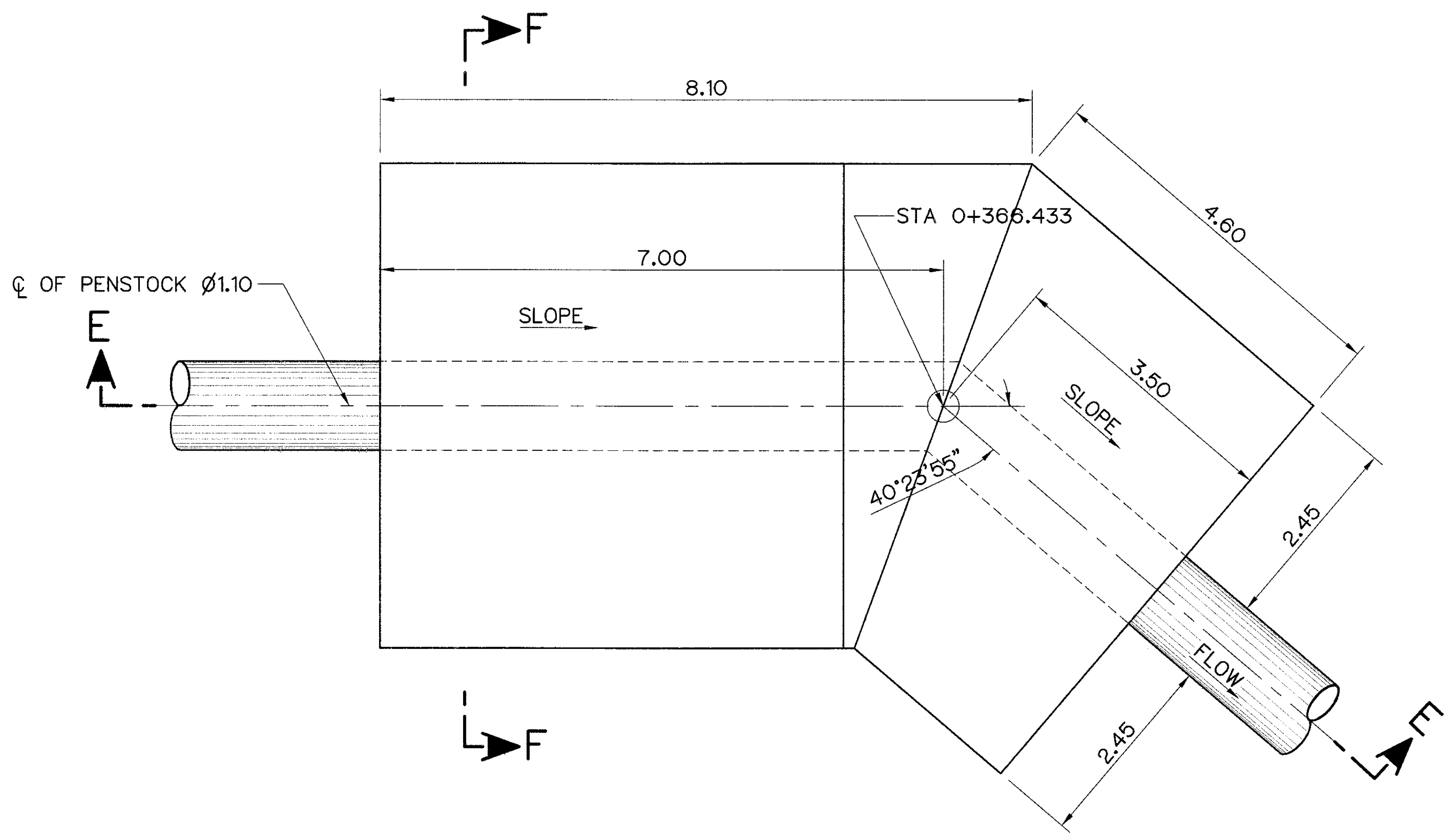
PLAN (THRUST BLOCK ⑧ )

SCALE 1:75



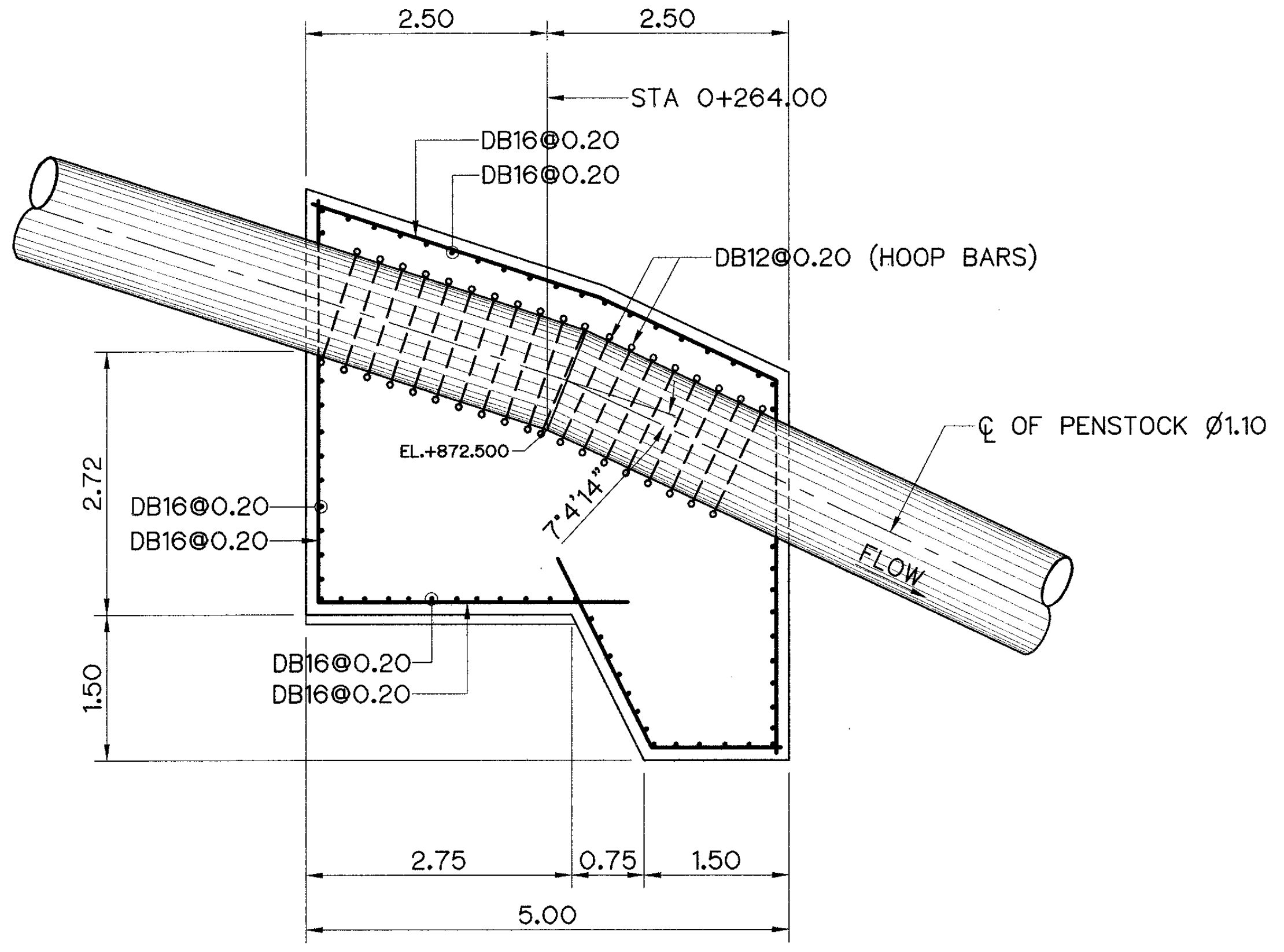
PLAN (THRUST BLOCK ⑨ )

SCALE 1:75



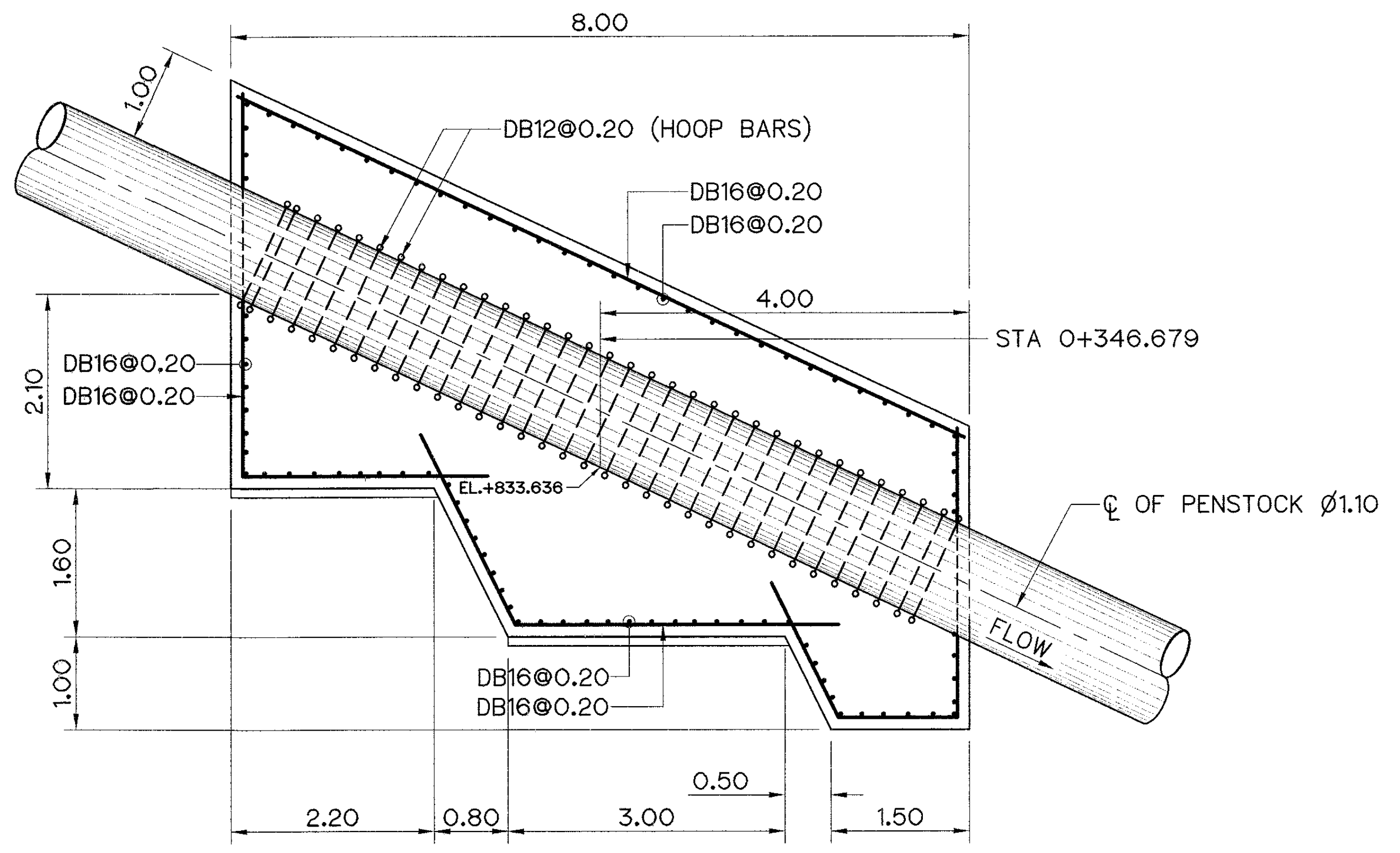
PLAN (THRUST BLOCK ⑩ )

SCALE 1:75



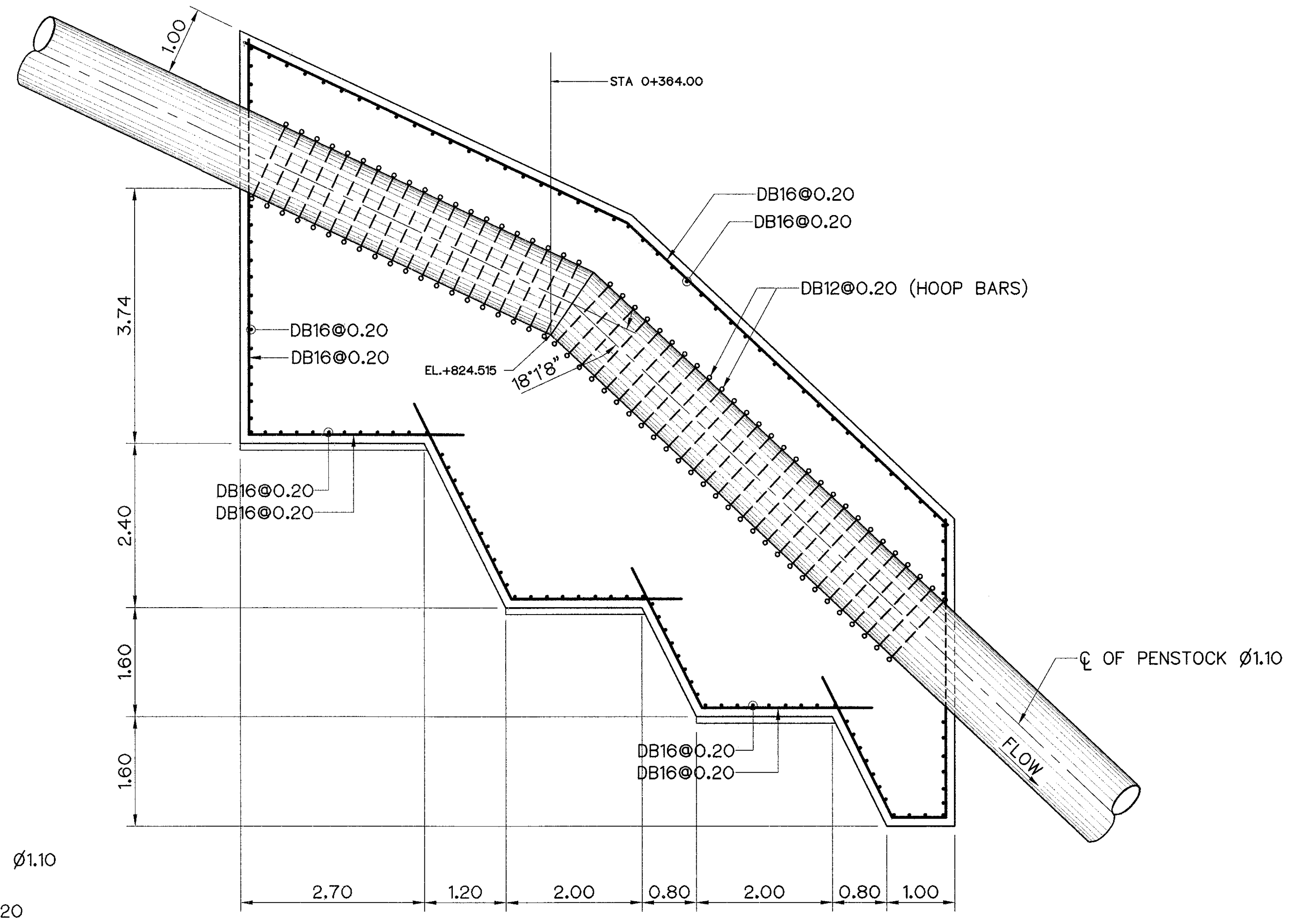
SECTION B–B

SCALE 1:75



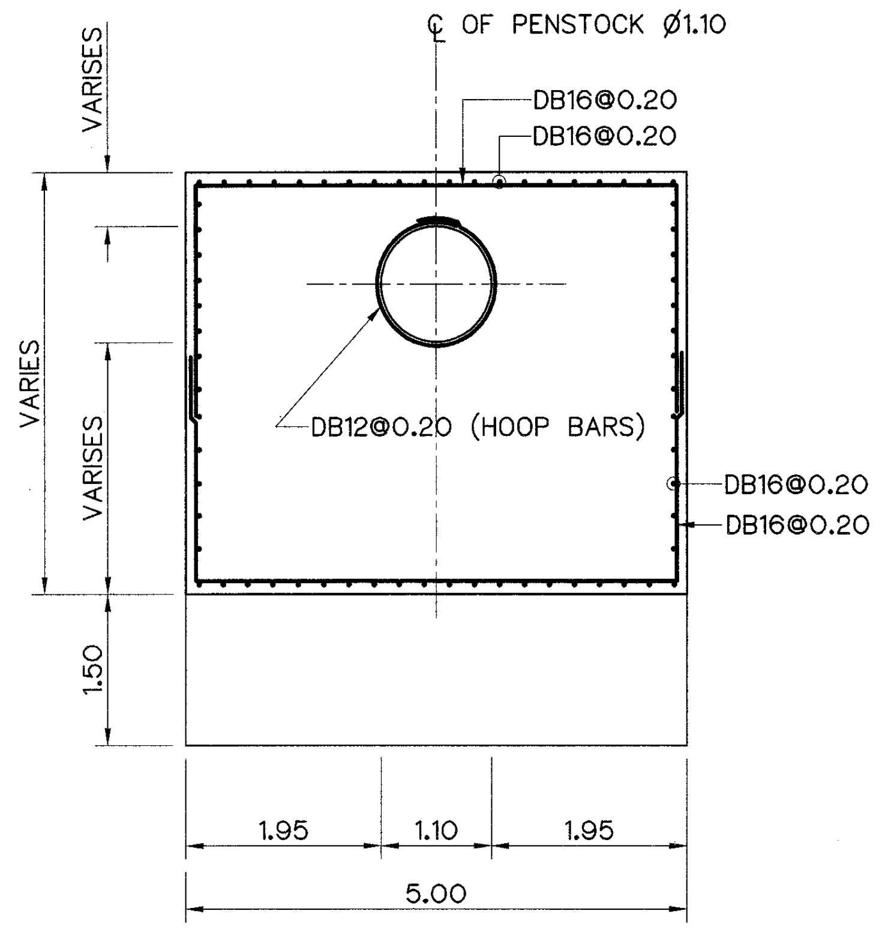
SECTION C–C

SCALE 1:75



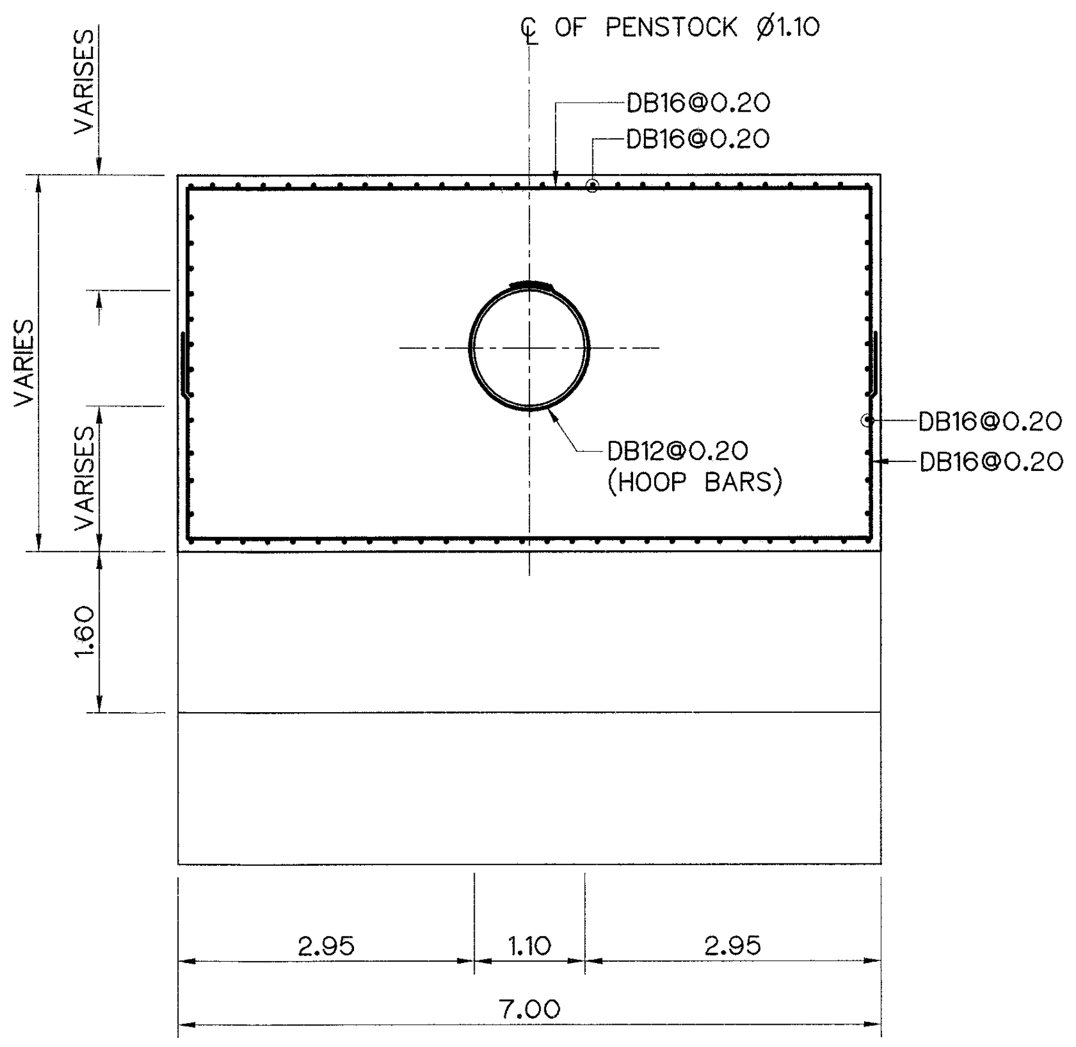
SECTION E–E

SCALE 1:75



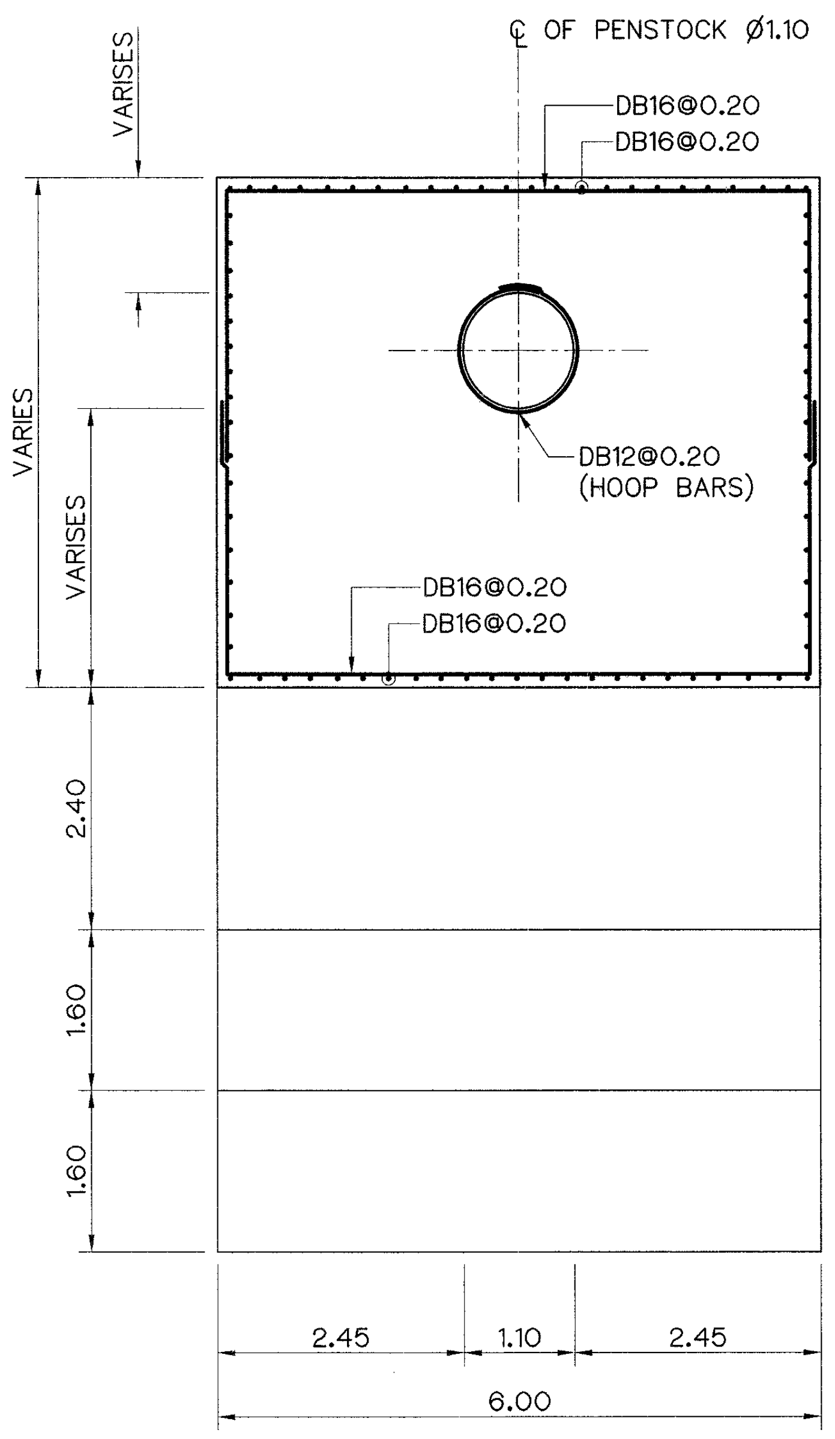
SECTION C–C

SCALE 1:75



SECTION D–D

SCALE 1:75



SECTION F–F

SCALE 1:75

NOTES :

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS. UNLESS OTHERWISE SHOWN.
2. SYMBOLE, ABBREVIATIONS AND CENERAL NOTES SEE DWG. NO. MH–GN–03
3. THE ALIGNMENT OF THE HEADRACE AND RELATED STRUCTURES SHALL BE CHECK AND CORRECTED BY THE CONTRACTOR TO SUIT THE FIELD CONDITIONS AND SHALL BE SUBMITTED TO DEDE'S FIELD ENGINEER FOR APPROVAL

REFERENCE DRAWINGS :

1. PENSTOCK PLAN AND PROFILE, STA. 0+000 TO STA. 0+389.376 MH–PS–01

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
|---|---|---|---|---|
| 3 | | | | |
| 2 | | | | |
| 1 | | | | |
| | CONSULTANTS | | DEDE | |

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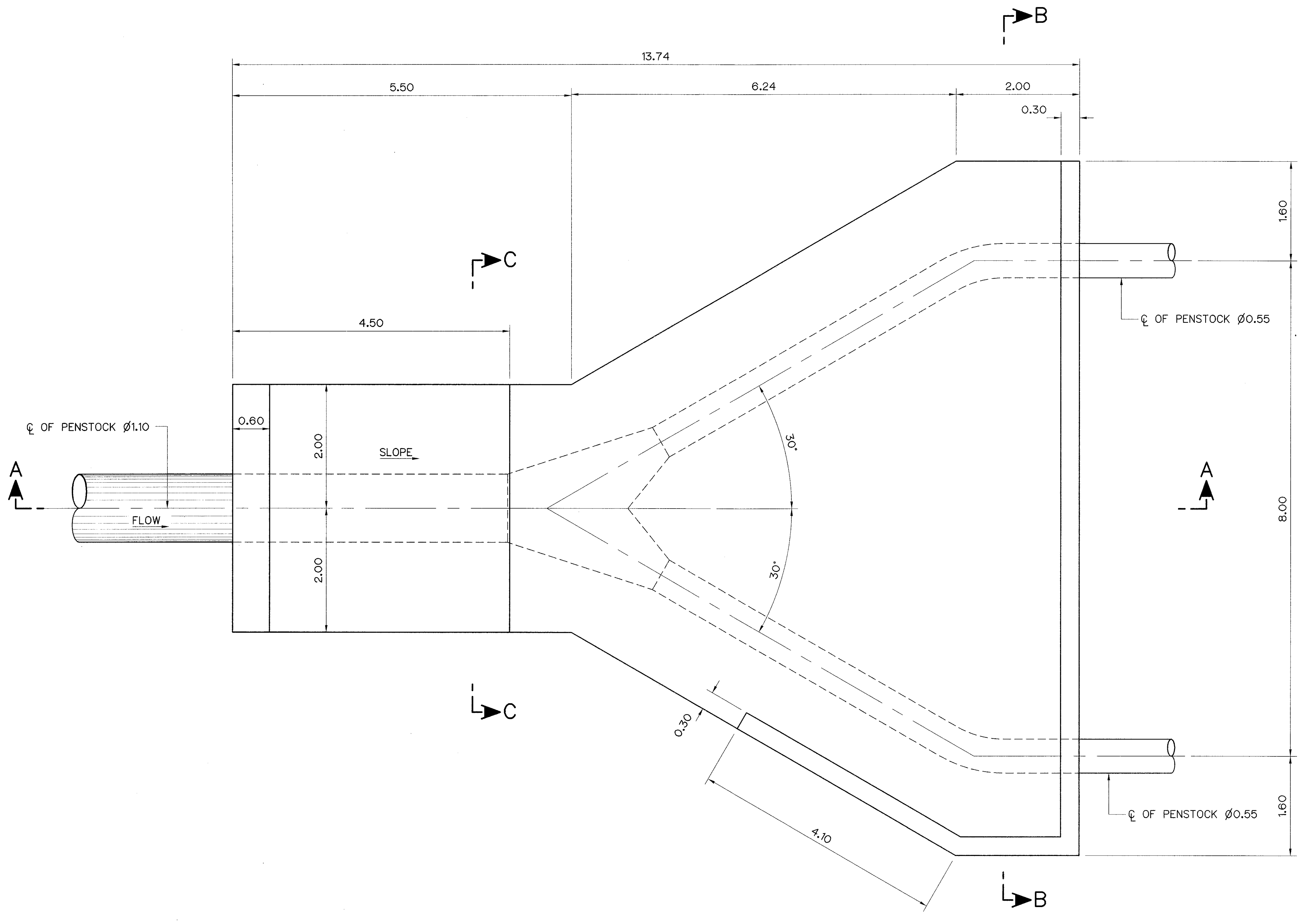
Energy Development and Efficiency
MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

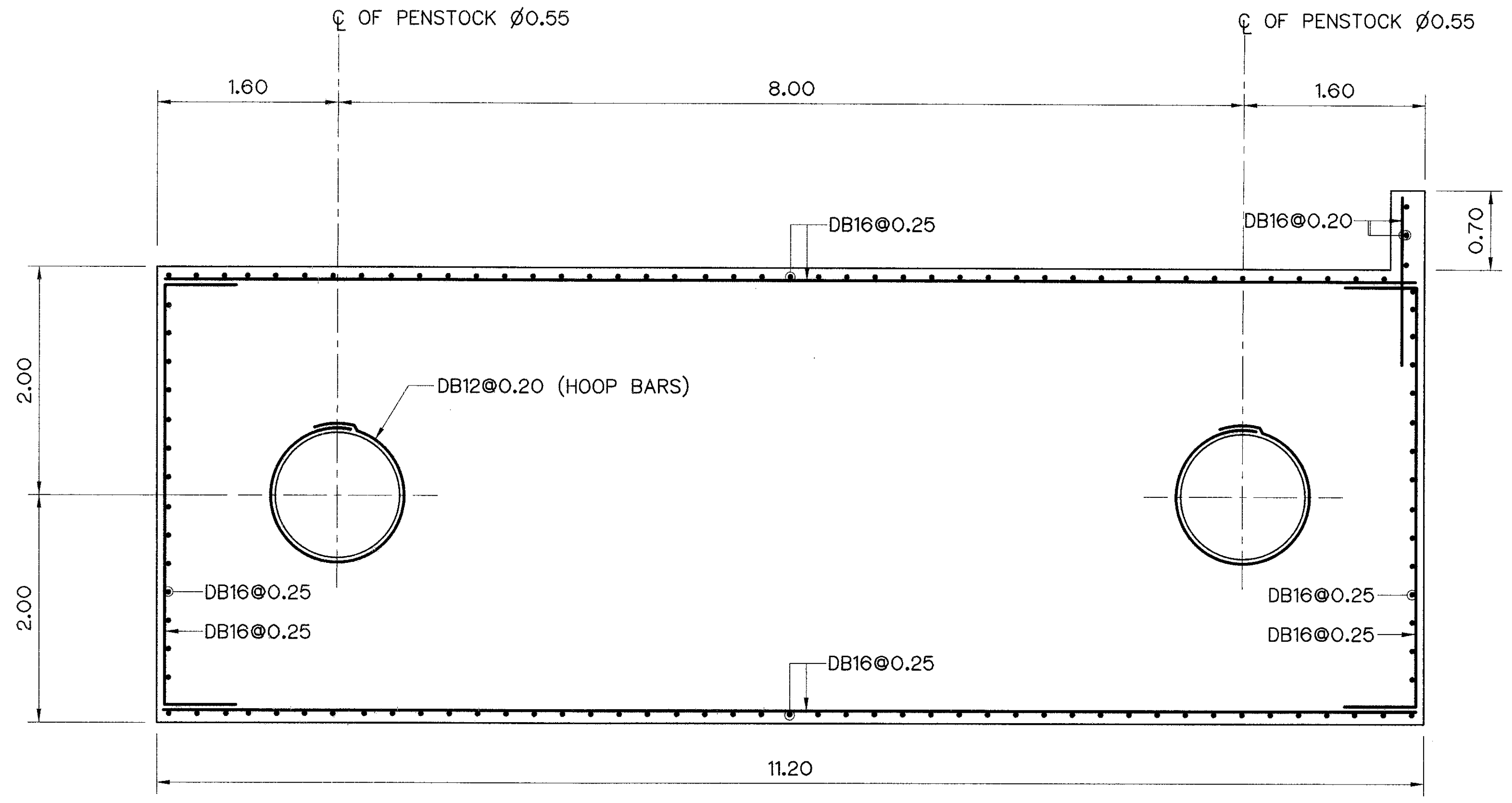
CIVIL WORKS AND TRANSMISSION LINE
PENSTOCK
THRUST BLOCK PLAN, SECTIONS REINFORCEMENT DETAILS 3/4

| P&C MANAGEMENT CO.,LTD. | Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY |
|---|---|
| | REVIEWED |
| DESIGNED ภย.64624 สย.6226 | SUBMITTED Chait |
| DRAWN | RECOMMENDED |
| CHECKED สย.6226 | APPROVED P. Hannell |
| PROJECT MANAGER DATE 08/03/2559 | DRAWING NO. MH–PS–04 / SHEET NO. 77 OF 130 |



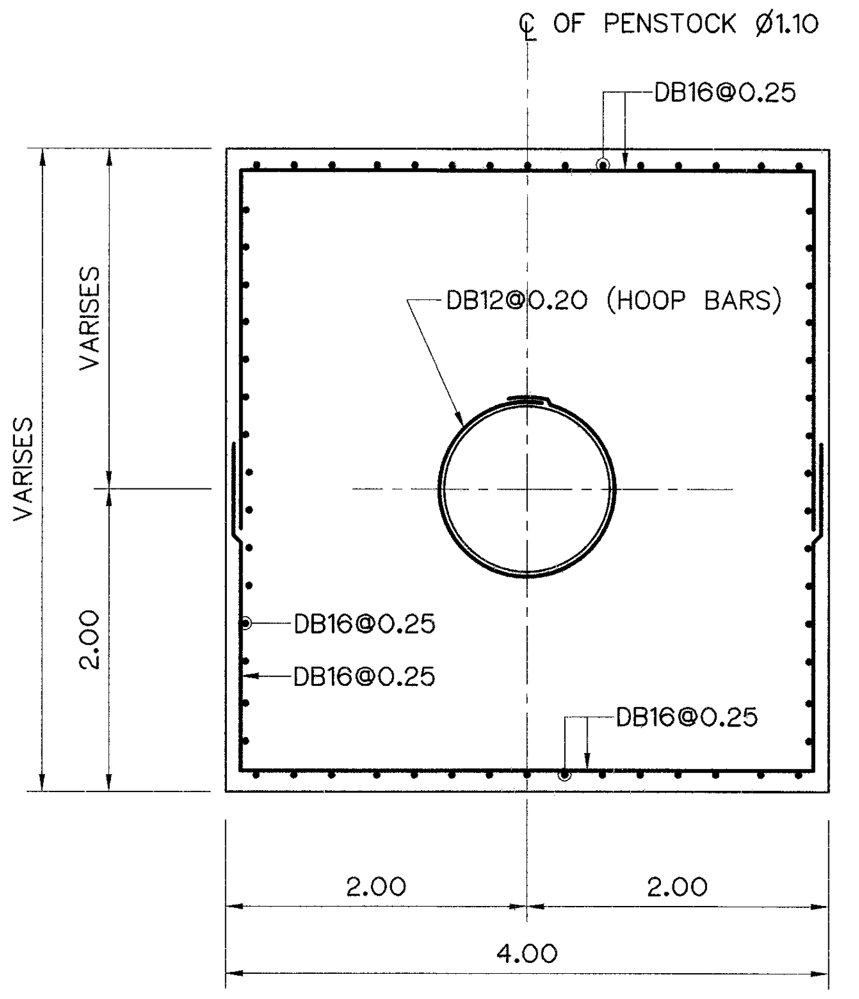
## PLAN (THRUST BLOCK ⑪)

SCALE 1:50



## SECTION B–B

SCALE 1:50



## SECTION C–C

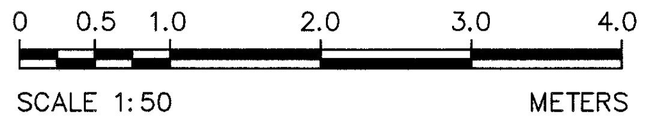
SCALE 1:50

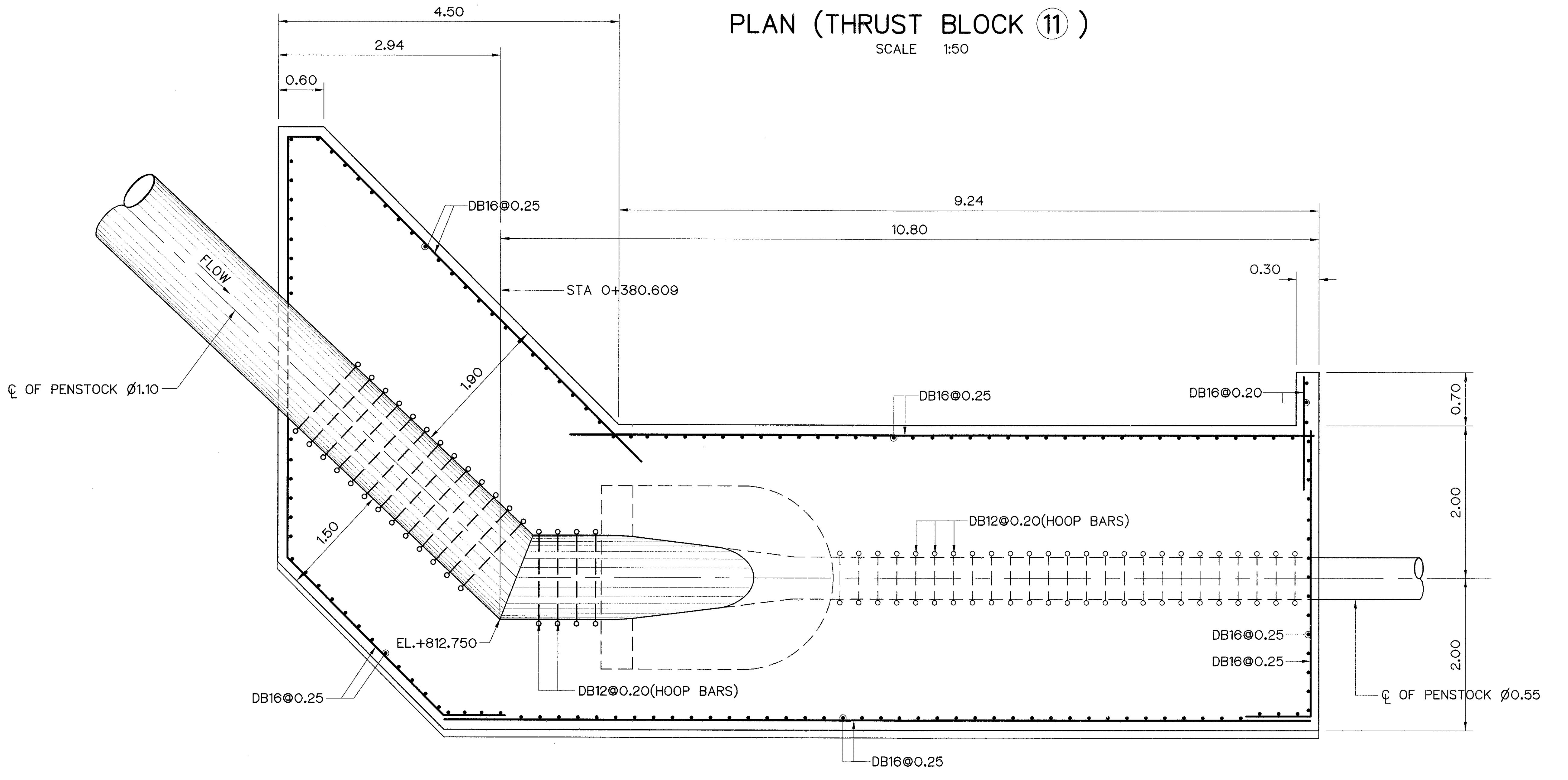
NOTES :

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS. UNLESS OTHERWISE SHOWN.
2. SYMBOLE, ABBREVIATIONS AND CENERAL NOTES SEE DWG. NO. MH–GN–03
3. THE ALIGNMENT OF THE HEADRACE AND RELATED STRUCTURES SHALL BE CHECK AND CORRECTED BY THE CONTRACTOR TO SUIT THE FIELD CONDITIONS AND SHALL BE SUBMITTED TO DEDE'S FIELD ENGINEER FOR APPROVAL

REFERENCE DRAWINGS :

| | |
|---|---|
| 1. PENSTOCK PLAN AND PROFILE, STA. 0+000 TO STA. 0+389.376 | MH–PS–01 |
| 2. PENSTOCK WYE PLAN, SECTIONS AND DETAILS | MH–PS–07 |





## SECTION A–A

SCALE 1:50

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CIVIL WORKS AND TRANSMISSION LINE
PENSTOCK
THRUST BLOCK PLAN, SECTIONS REINFORCEMENT DETAILS 4/4

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| NO. | DATE | REVISIONS | CHECKED | APPROVED |
|---|---|---|---|---|
| 3 | | | | |
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| | CONSULTANTS | | DEDE | |

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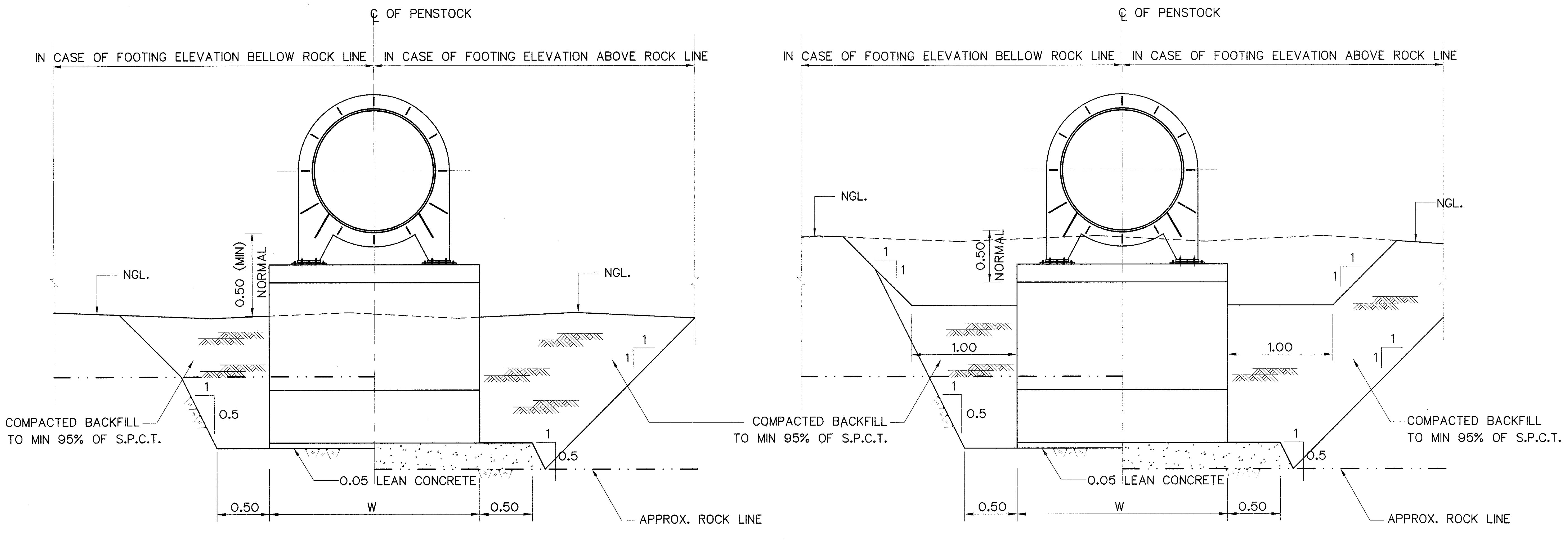
| DESIGNED ภย.64624 สย.6226 | REVIEWED |
| DRAWN | SUBMITTED Chant |
| CHECKED สย.6226 | RECOMMENDED |
| | APPROVED P. Hon |
| PROJECT MANAGER 08/03/2559 DATE | DRAWING NO. MH–PS–05 |
| | SHEET NO. 78 OF 130 |

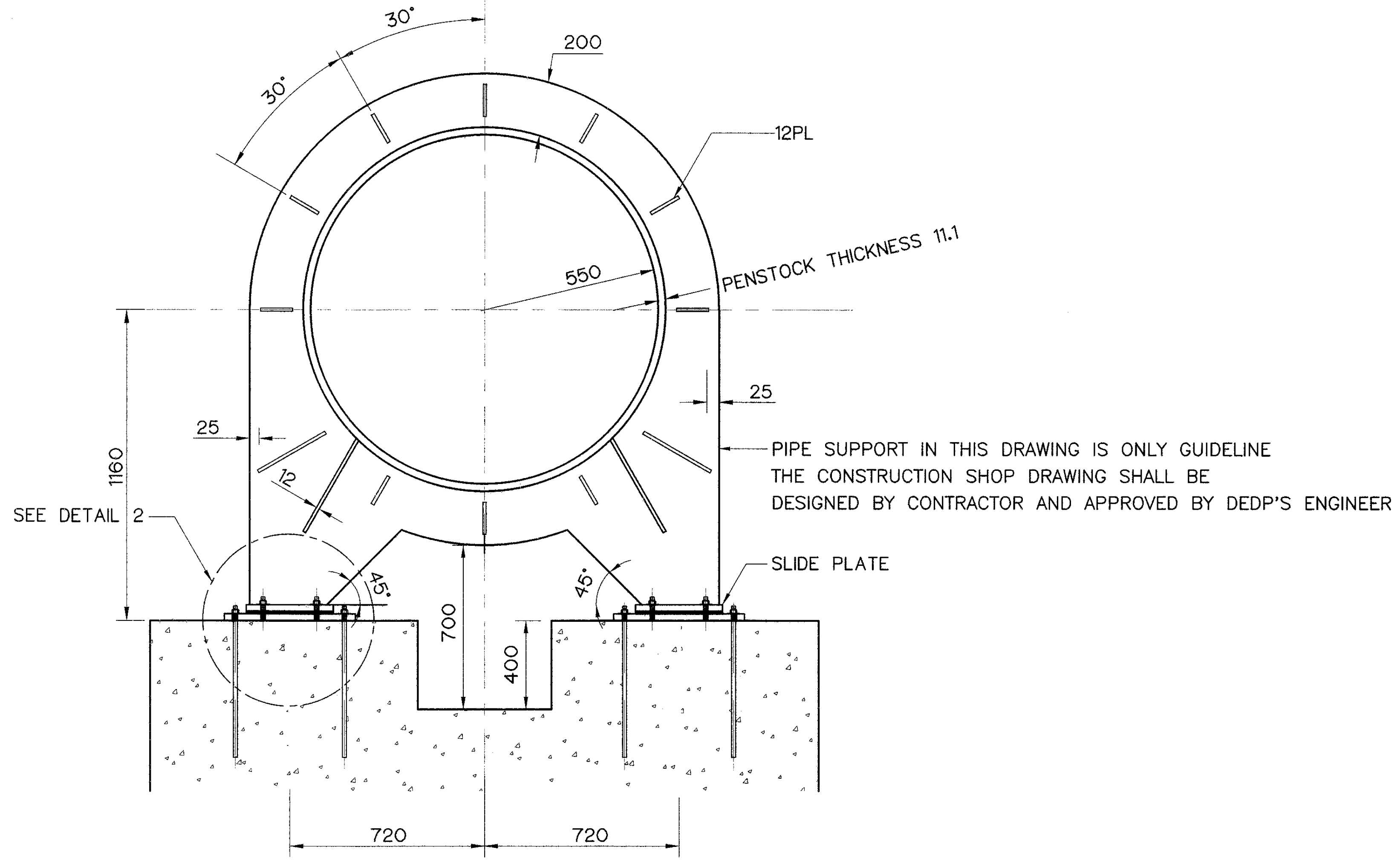

℄ OF PENSTOCK
IN CASE OF FOOTING ELEVATION BELLOW ROCK LINE
IN CASE OF FOOTING ELEVATION ABOVE ROCK LINE
NGL.
0.50 (MIN) NORMAL
0.50 NORMAL
1.00
0.5
COMPACTED BACKFILL TO MIN 95% OF S.P.C.T.
0.05 LEAN CONCRETE
APPROX. ROCK LINE
0.50
W

N.G.L. BELLOW INVERT ELEVATION

N.G.L. ABOVE INVERT ELEVATION

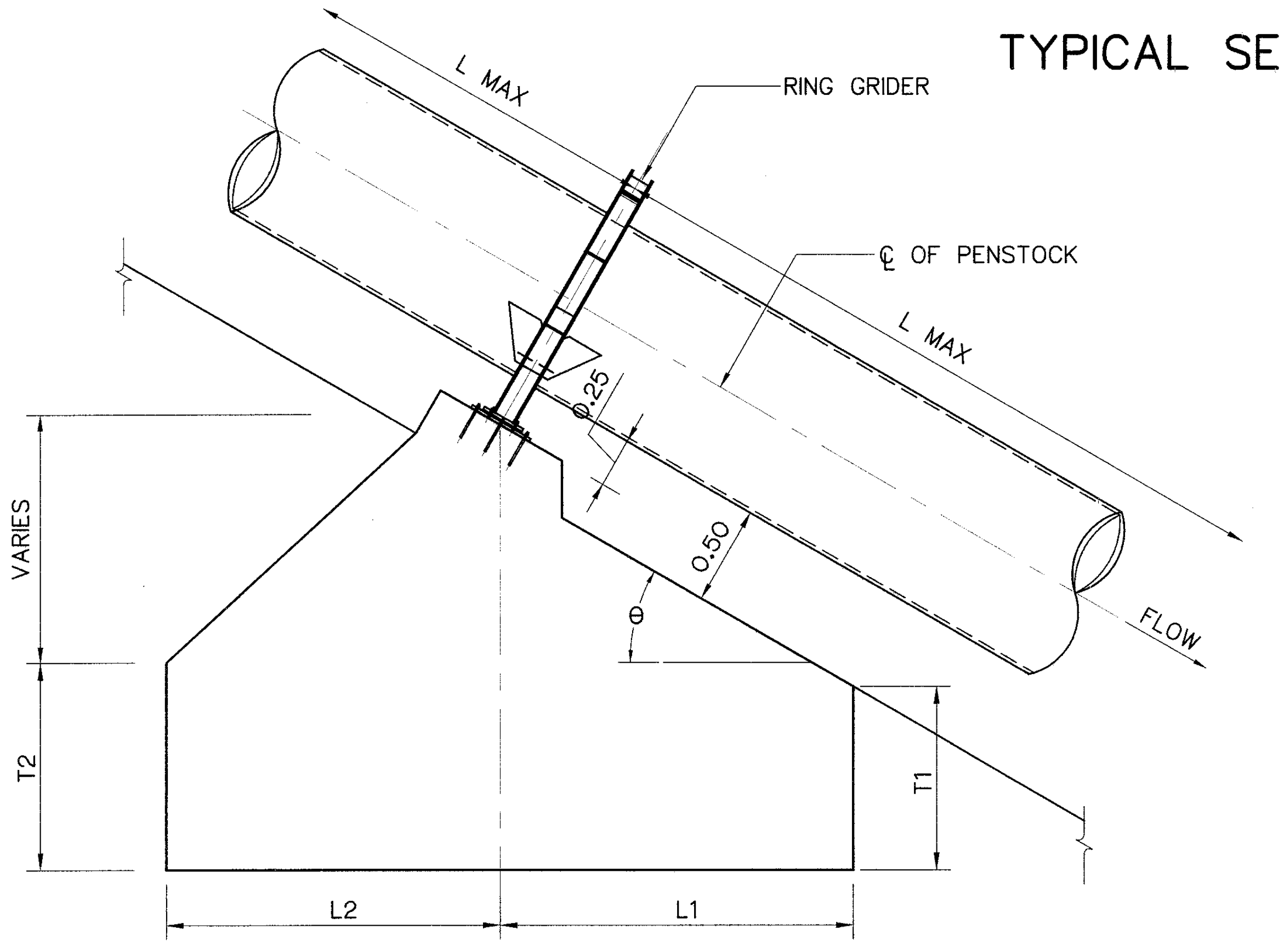
## TYPICAL SECTION OF PENSTOCK

NOT TO SCALE


30°
200
12PL
550
PENSTOCK THICKNESS 11.1
25
1160
SEE DETAIL 2
12
45°
700
400
PIPE SUPPORT IN THIS DRAWING IS ONLY GUIDELINE
THE CONSTRUCTION SHOP DRAWING SHALL BE
DESIGNED BY CONTRACTOR AND APPROVED BY DEDP'S ENGINEER
SLIDE PLATE
720

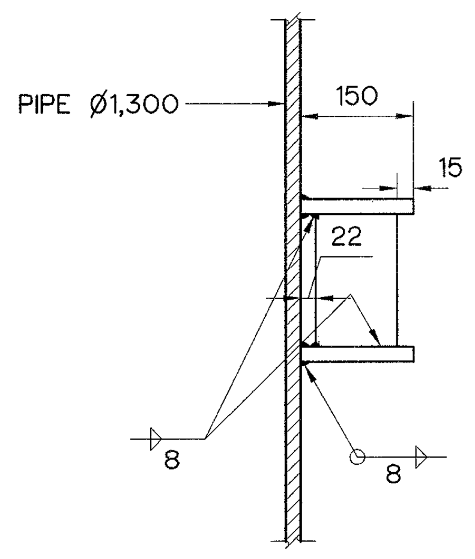
## SECTION A – A

SCALE 1:20



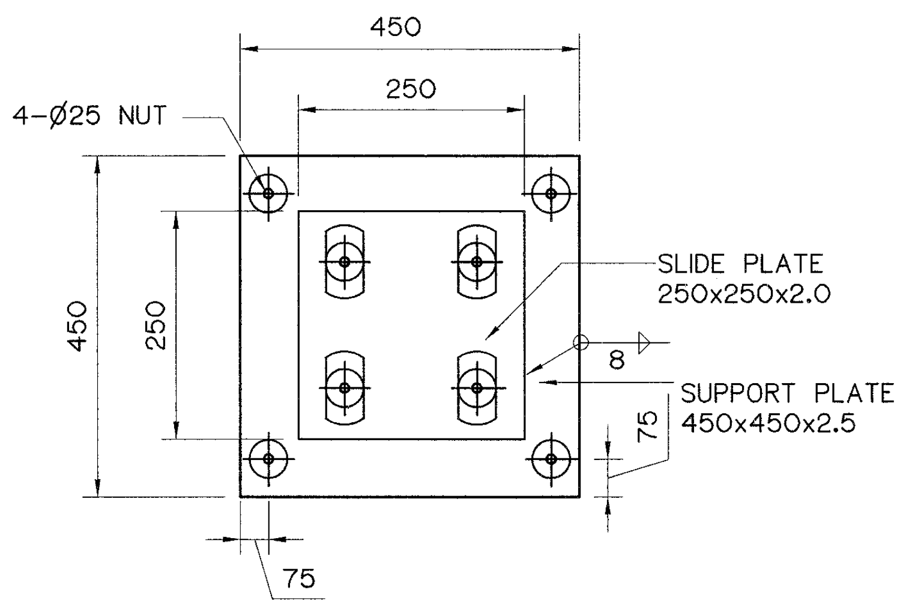
## PIER

NOT TO SCALE



## DETAIL "1"

SCALE 1:20



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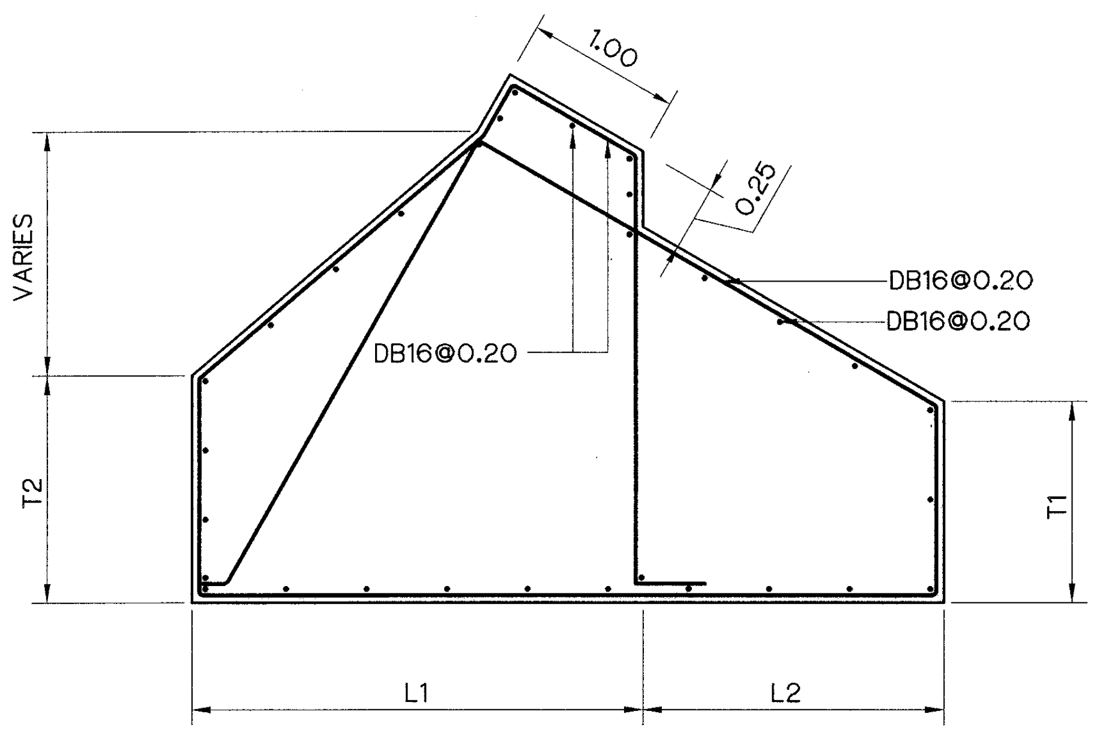
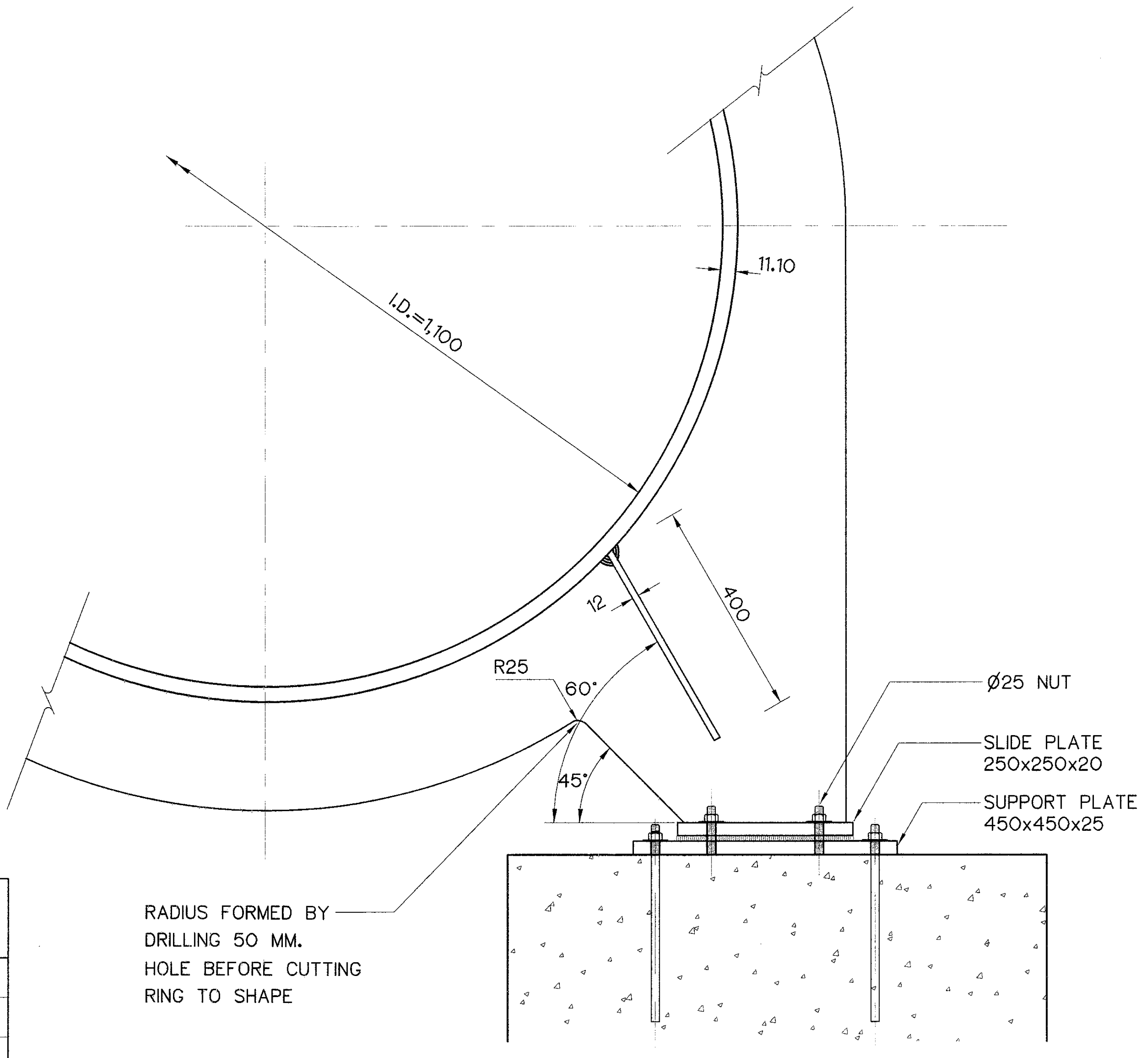
SCALE 1:10



## PIER (REINFORCEMENT DETAIL)

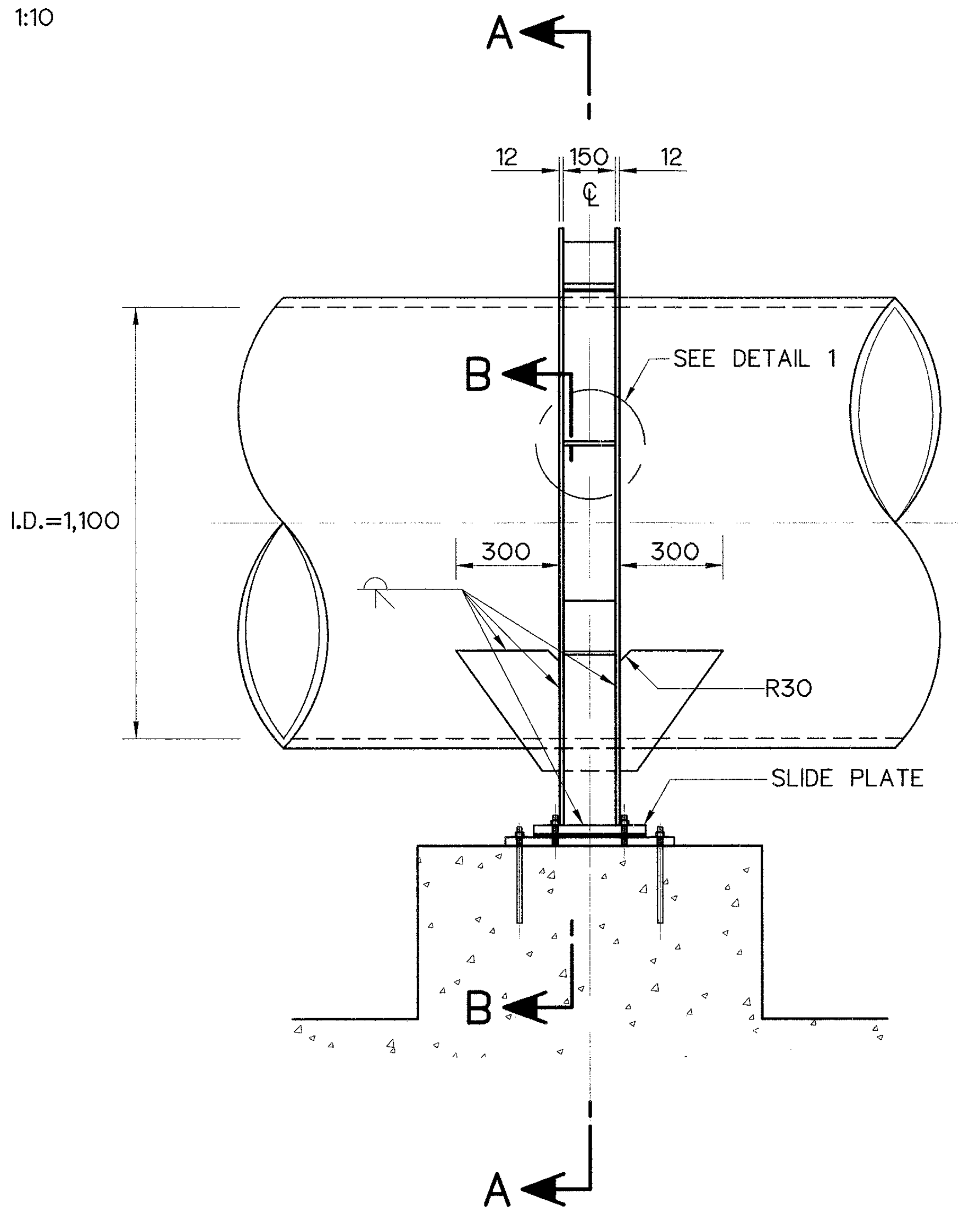
NOT TO SCALE



## SECTION B – B

0 0.5 1.0 1.5

SCALE 1:20 METERS



## RING GIRDER FOR 1,100 I.D. PIPE

### DIMENSIONS FOR PIER

| STA. | | SLOPE ( θ ) | L1 | L2 | T1 | T2 | W | LMAX |
|---|---|---|---|---|---|---|---|---|
| FROM | TO | DEGREE | (m.) | (m.) | (m.) | (m.) | (m.) | (m.) |
| 0+011.500 | 0+038.000 | 33.69 | 2.00 | 1.50 | 1.00 | 1.40 | 3.00 | 8.00 |
| 0+038.000 | 0+121.000 | 29.47 | 2.00 | 1.50 | 1.00 | 1.50 | 3.00 | 8.00 |
| 0+121.000 | 0+197.000 | 14.46 | 2.00 | 1.00 | 0.50 | 0.90 | 3.00 | 8.00 |
| 0+197.000 | 0+264.000 | 18.10 | 2.00 | 1.00 | 0.50 | 1.05 | 3.00 | 8.00 |
| 0+264.000 | 0+362.000 | 25.17 | 2.00 | 1.00 | 0.50 | 0.90 | 3.00 | 8.00 |

**NOTES :**

1. ALL DIMENSIONS ARE IN METERS, UNLESS OTHERWISE SHOWN.
2. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH–GN–03
3. CORROSIVE PROTECTION IS WARNED TO STRICTLY FLOW PAINTING SPECIFICATION

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
|---|---|---|---|---|
| 3 | | | | |
| 2 | | | | |
| 1 | | | | |
| | CONSULTANTS | | DEDE | |

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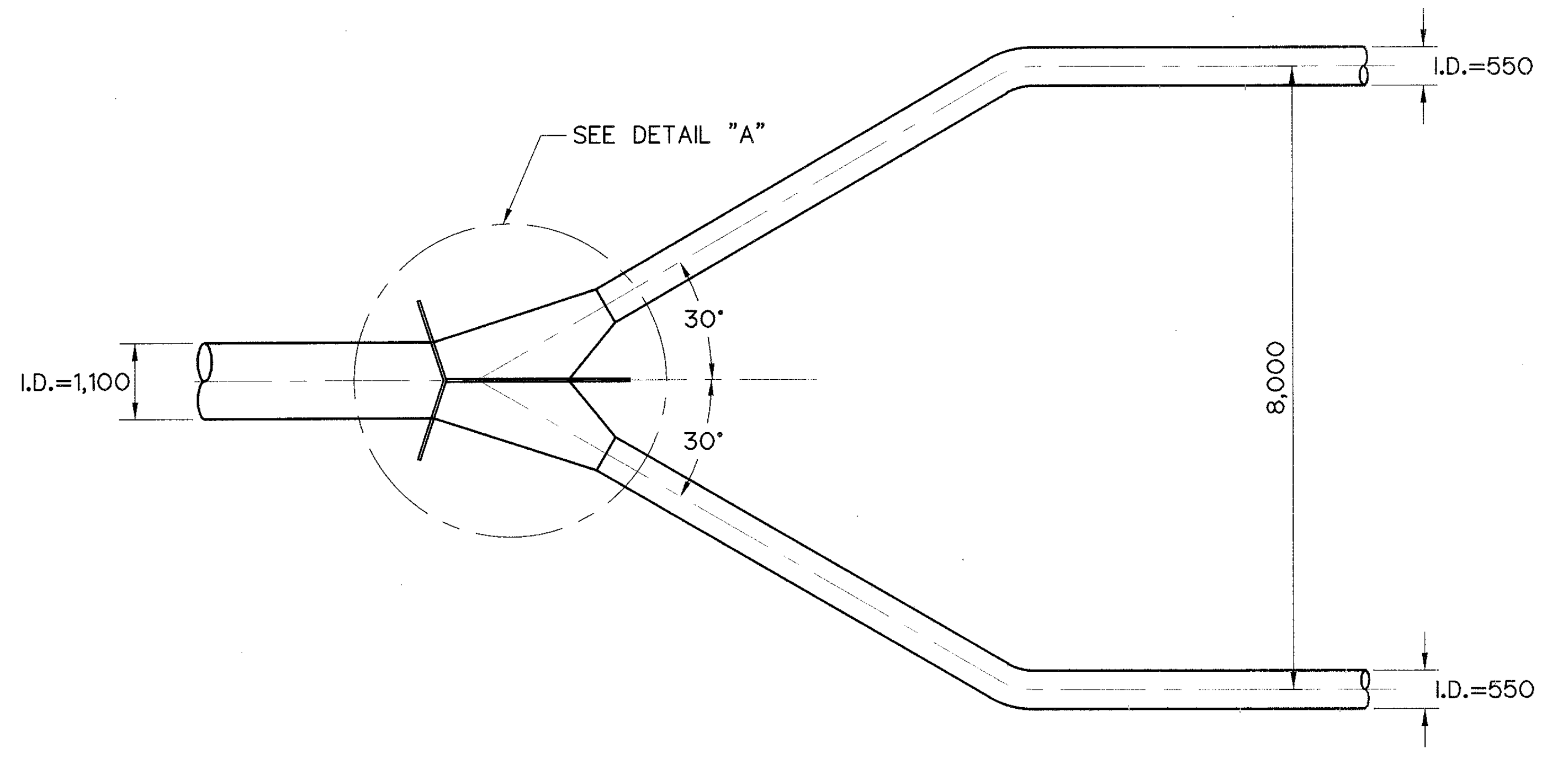
MAE HAT HYDROPOWER PROJECT

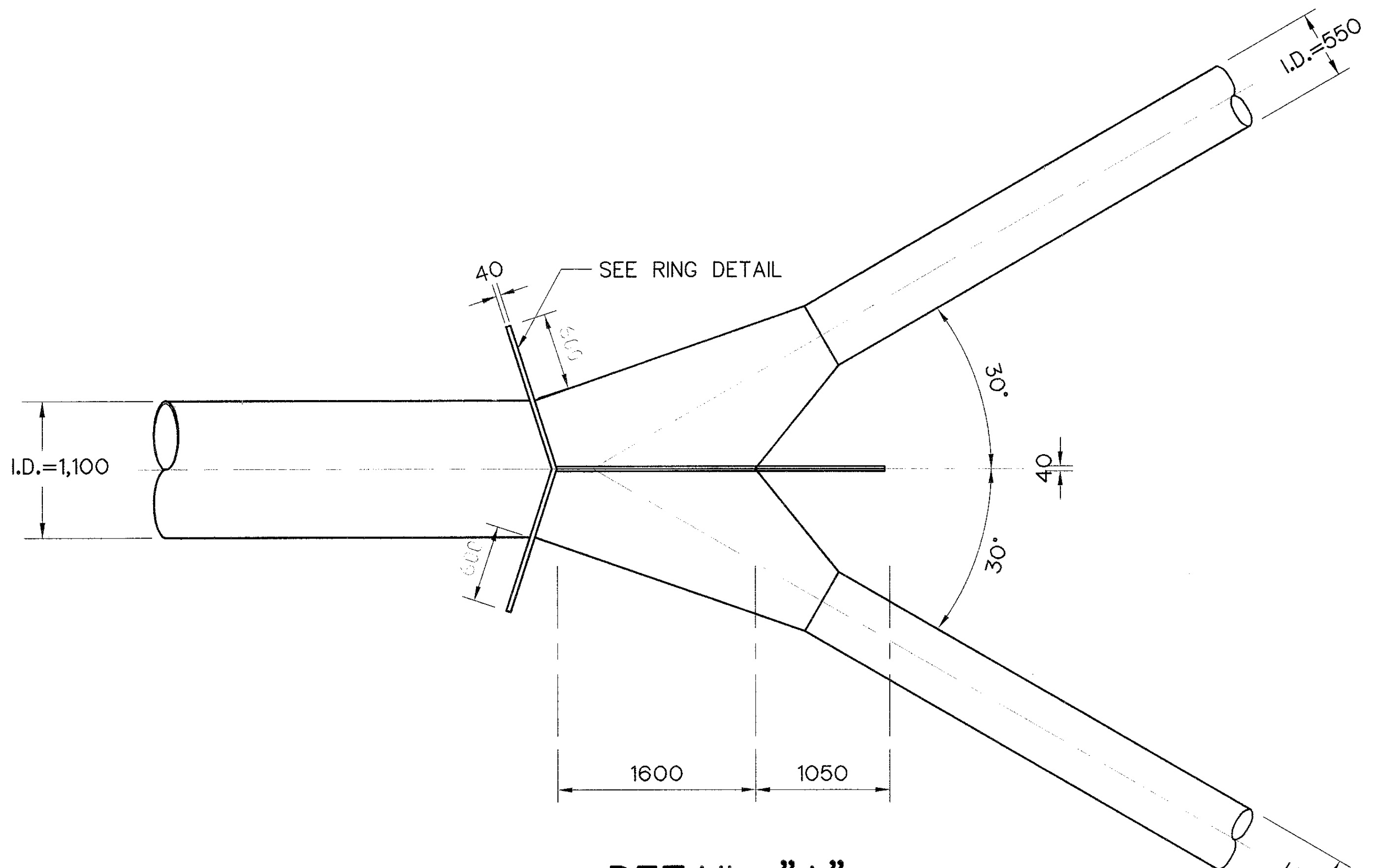
CIVIL WORKS AND TRANSMISSION LINE
PENSTOCK
PIPE SUPPORT SECTIONS AND DETAILS

| | |
|---|---|
| P&C MANAGEMENT CO.,LTD. | Department of Alternative Energy Development and Efficiency<br>MINISTRY OF ENERGY |
| DESIGNED ภย.64624 สย.6226 | REVIEWED |
| DRAWN | SUBMITTED Chai |
| CHECKED สย.6226 | RECOMMENDED |
| PROJECT MANAGER | APPROVED P. Hansell |
| DATE 08/03/2559 | DRAWING NO. MH–PS–06 |
| | SHEET NO. 79 OF 130 |



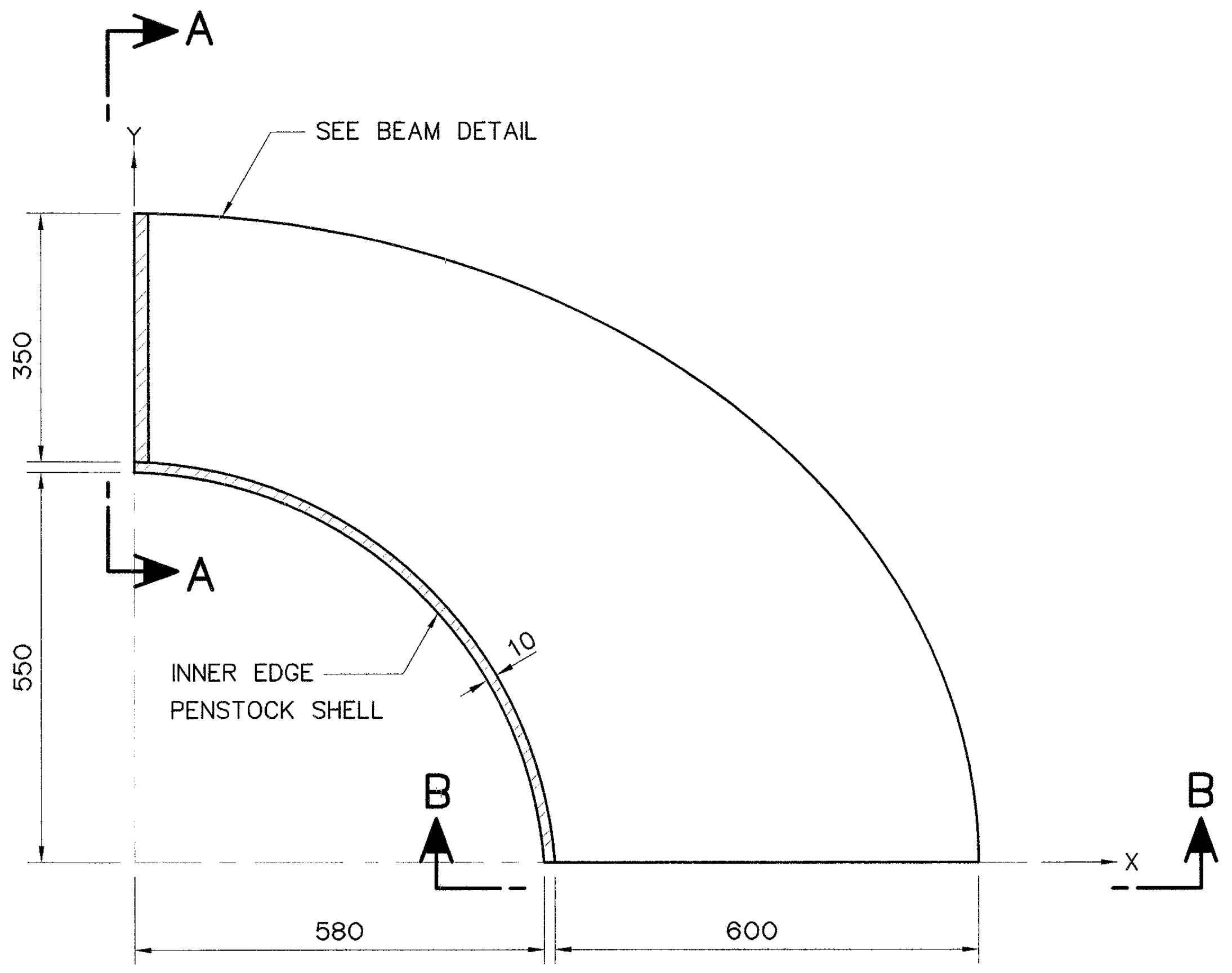
## PLAN

SCALE 1:100



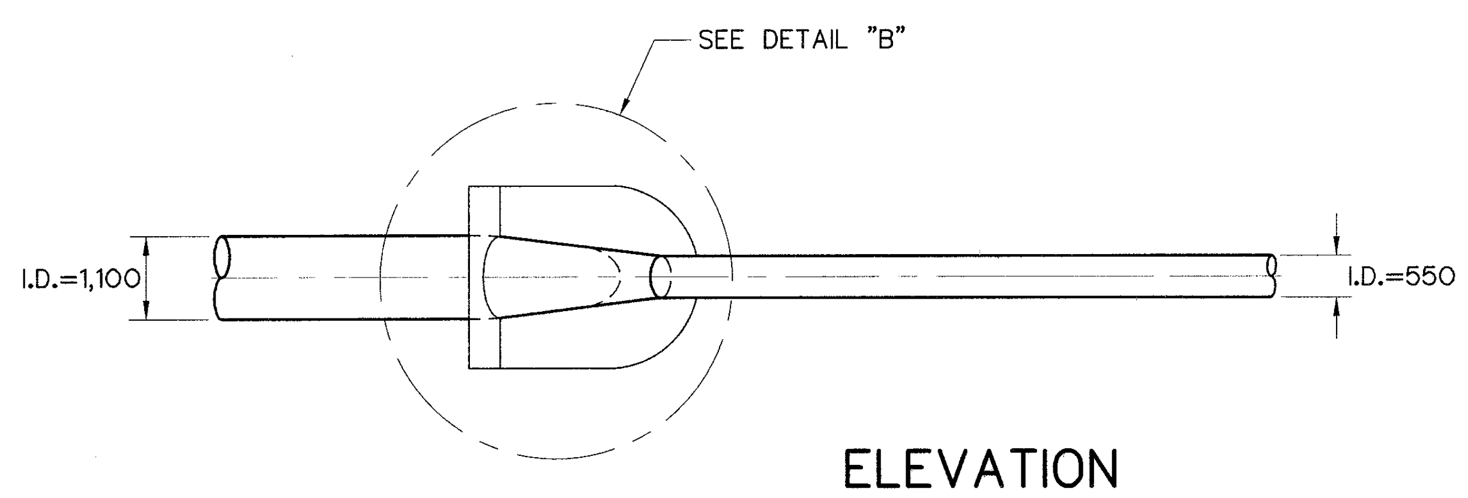
## DETAIL "A"

SCALE 1:50



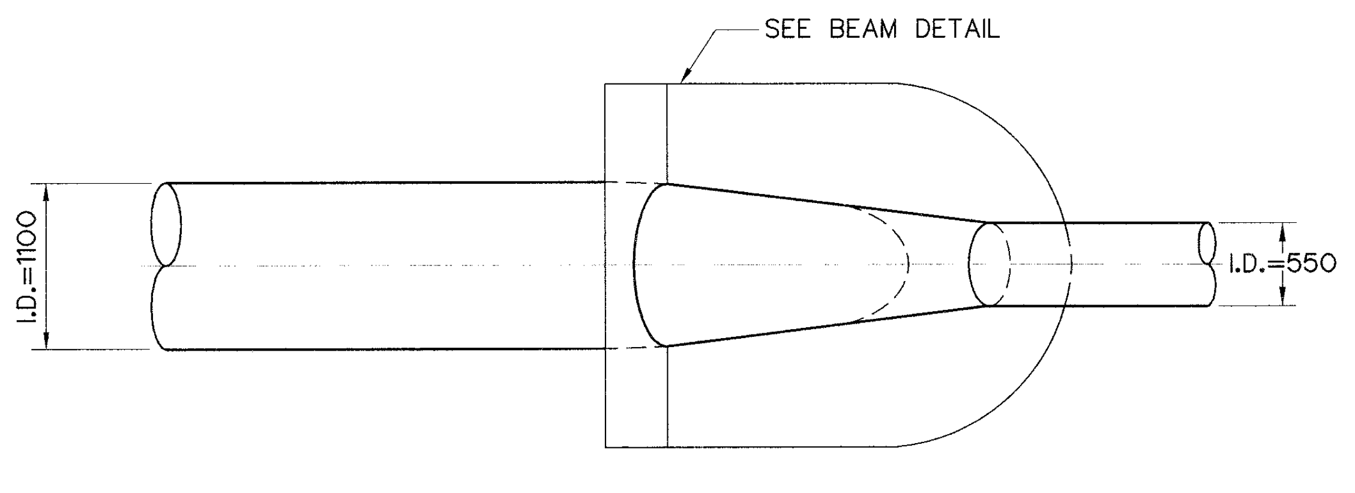
## RING DETAIL

SCALE 1:10



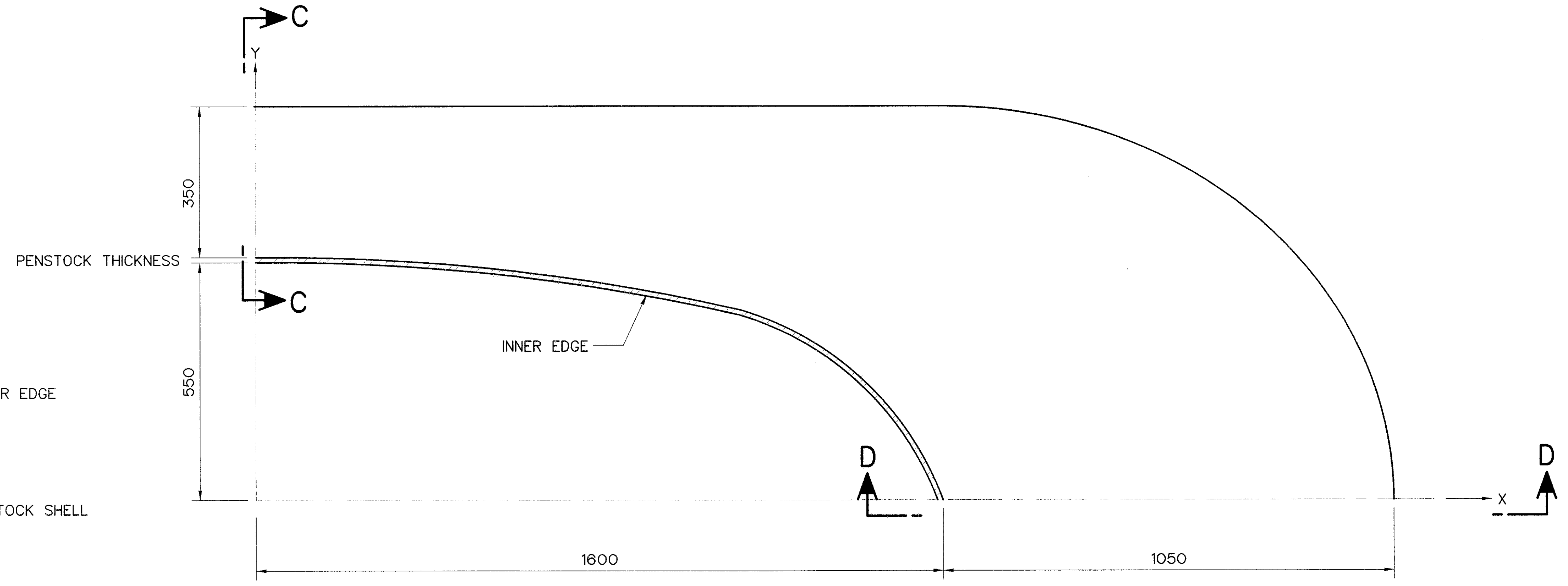
## ELEVATION

SCALE 1:100



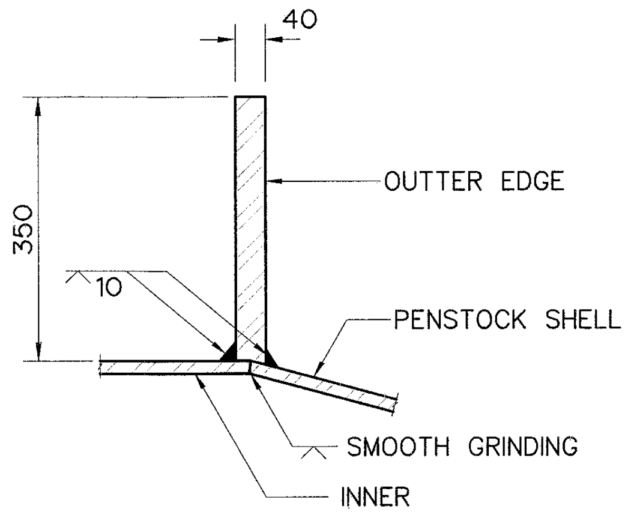
## DETAIL "B"

SCALE 1:50



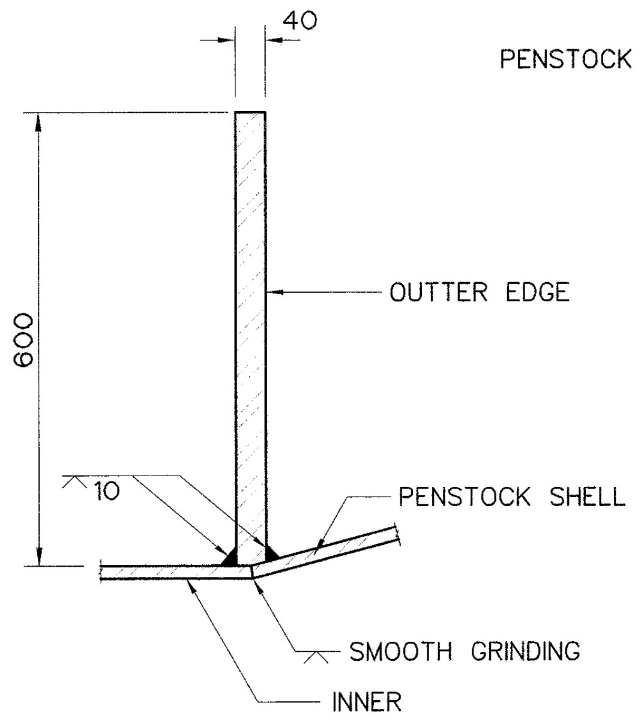
## BEAM DETAIL

SCALE 1:10



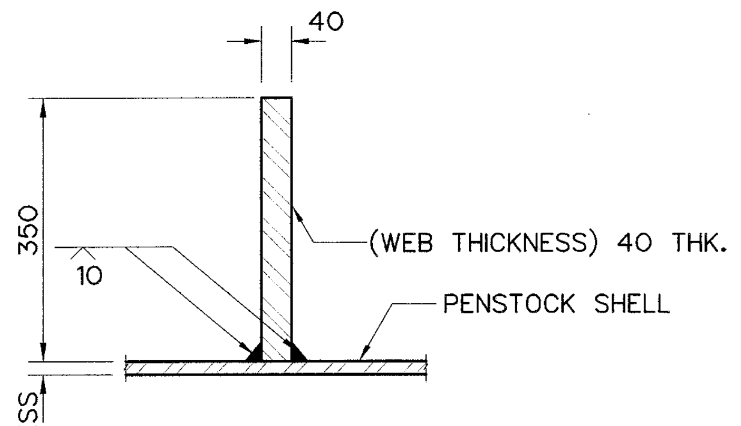
## SECTION A–A

SCALE 1:10



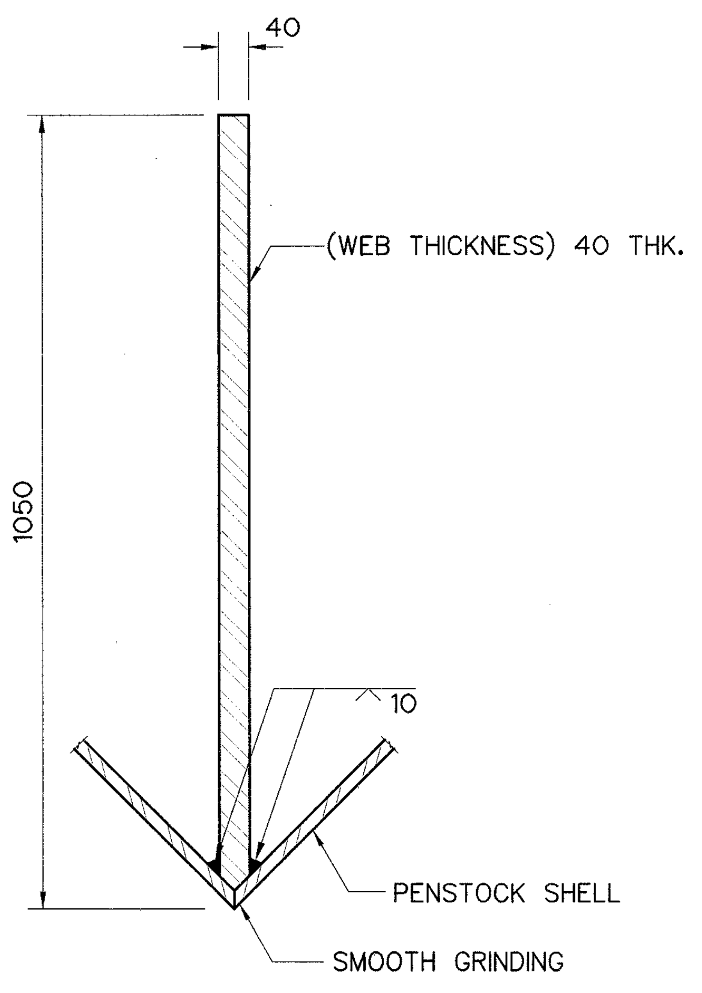
## SECTION B–B

SCALE 1:10



## SECTION C–C

SCALE 1:10

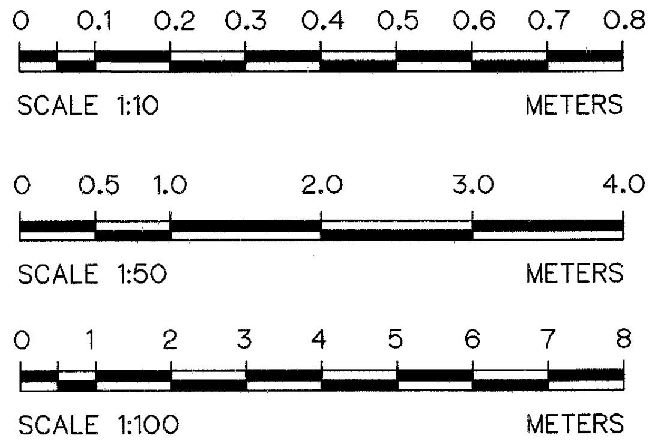


## SECTION D–D

SCALE 1:10

NOTES :

1. ALL DIMENSIONS ARE IN MILLIMETERS, UNLESS OTHERWISE SHOWN.
2. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH-GN-03



KINGDOM OF THAILAND
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MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
PENSTOCK
WYE, PLAN, SECTIONS AND DETAILS

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
|---|---|---|---|---|
| 3 | | | | |
| 2 | | | | |
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| | |
|---|---|
| CONSULTANTS | DEDE |

P&C MANAGEMENT CO.,LTD.

DESIGNED ภย.64624 สย.6226
DRAWN
CHECKED สย.6226

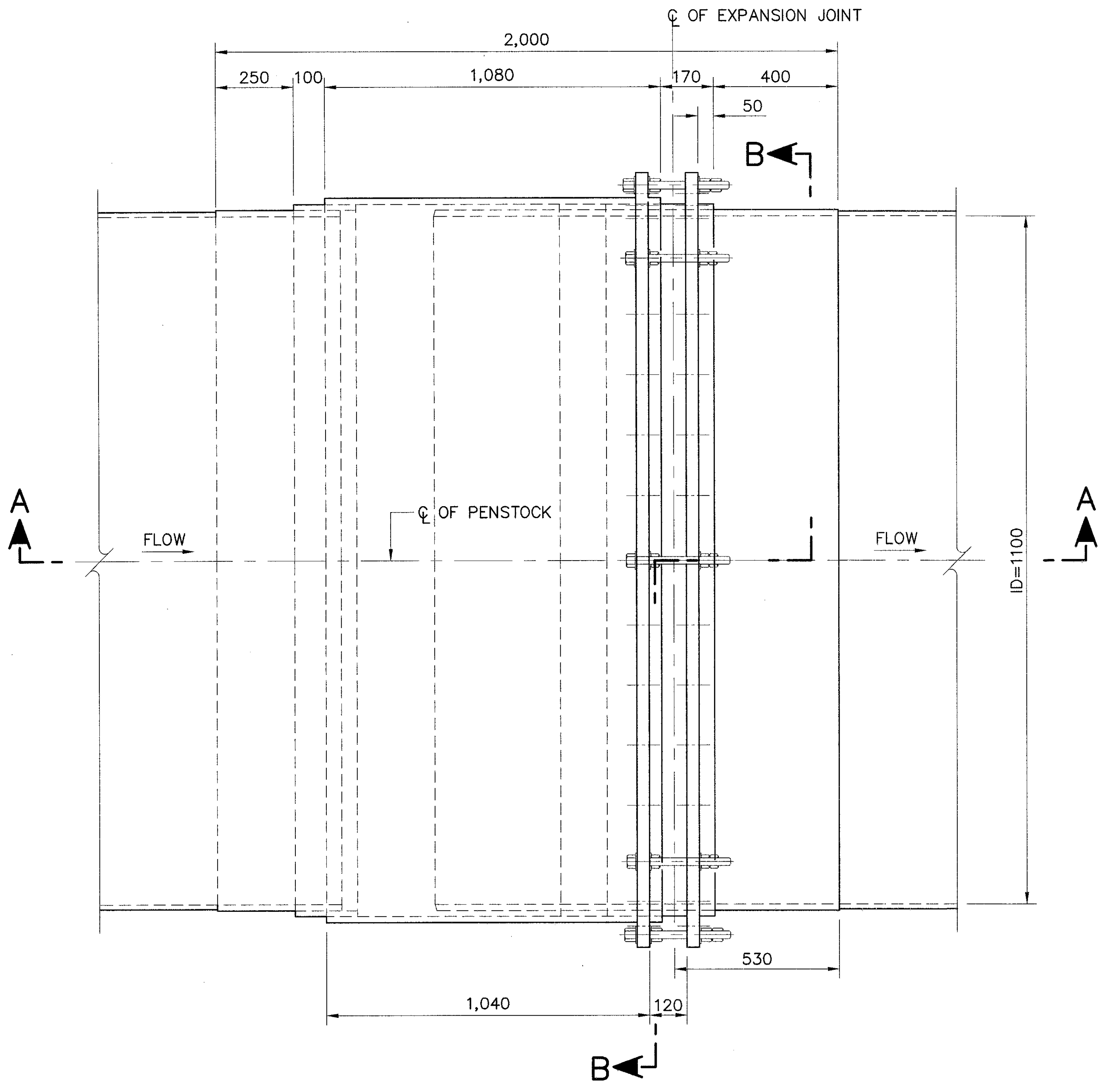
PROJECT MANAGER
DATE 08|03|2559

Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

REVIEWED
SUBMITTED Chaut
RECOMMENDED
APPROVED P. Hansell.

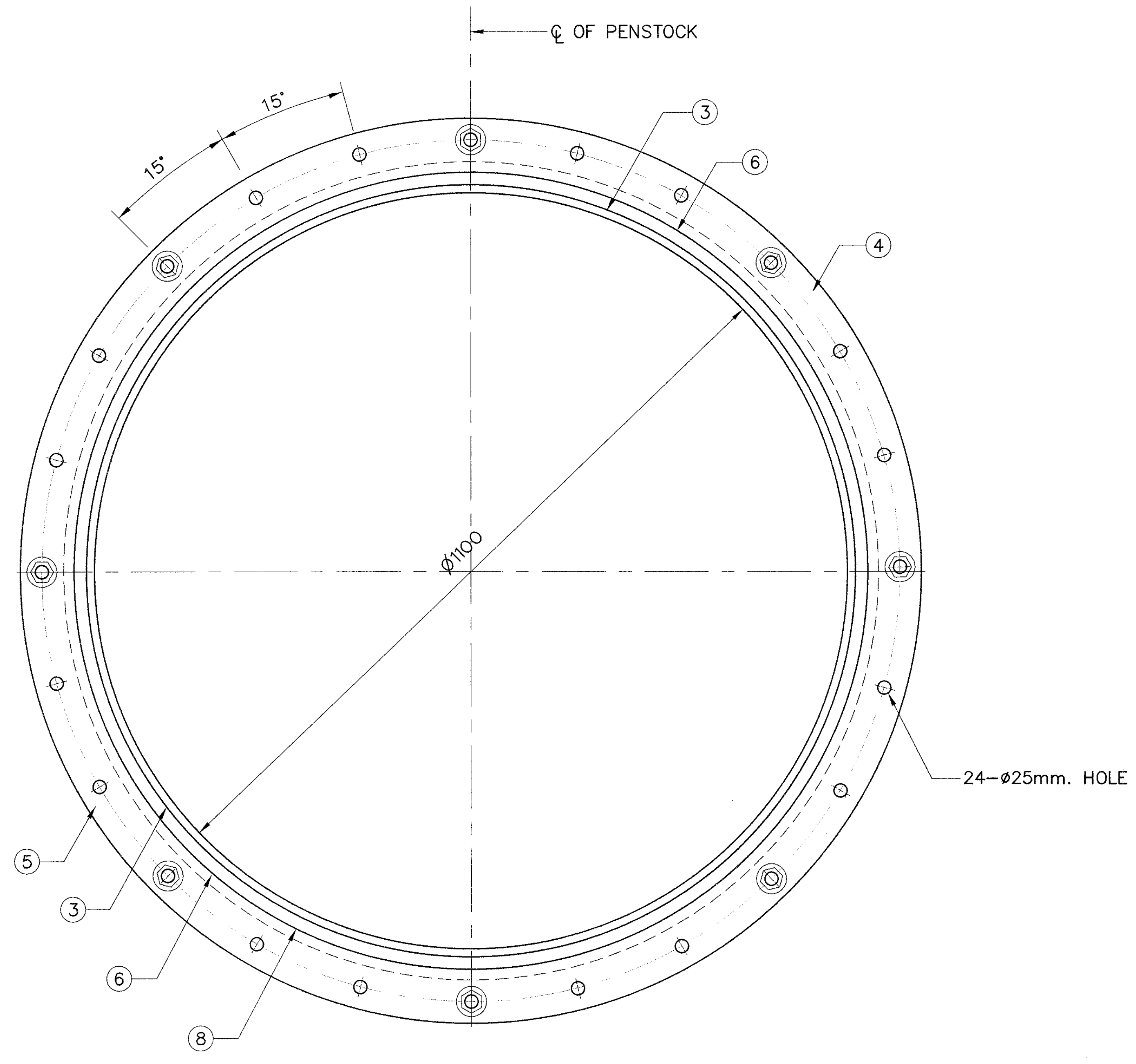
DRAWING NO. MH–PS–07

SHEET NO. 80 OF 130



## ELEVATION

SCALE 1:7.5



## SECTION B–B

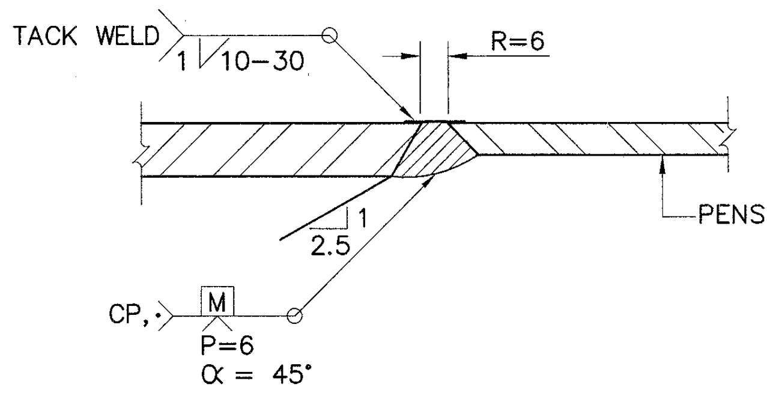
SCALE 1:7.5

| ITEM | DESCRIPTION | MATERIAL | QUANT. | REMARKS |
|---|---|---|---|---|
| 1 | PENSTOCK | ASTM A-283, GRADE D | – | -- |
| 2 | PENSTOCK | ASTM A-283, GRADE D | 1 | NOTE 2 & 3 |
| 3 | INNER SLEEVE | ASTM A-283, GRADE D | 1 | NOTE 2 & 4 |
| 4 | GRAND RING | ASTM A-283, GRADE D | 1 | SEAMLESS, NOTE 3 |
| 5 | OUTER RING | ASTM A-283, GRADE D | 1 | SEAMLESS, NOTE 3 |
| 6 | STUFFING BOX | ASTM A-283, GRADE D | 1 | NOTE 2 & 3 |
| 7 | DOUBLING PLATE | ASTM A-283, GRADE D | 1 | NOTE 2 & 3 |
| 8 | OUTER SLEEVE | ASTM A-283, GRADE D | 1 | NOTE 2 & 3 |
| 9 | PACKING STOPPER | ASTM A-283, GRADE D | 1 | NOTE 2 & 3 |
| 10 | ø25 mm. BOLTS | ASTM A-325 | 24 | -- |
| 11 | ø25 mm. NUT | ASTM A-325 | 72 | -- |
| 12 | ø25 mm. WASHER | ASTM A-325 | 48 | -- |
| 13 | PACKING RINGS (16 mm. S.Q. RING) | ASBESTOS-GRAPHITE | 6 | NOTE 5 |
|  |  |  |  |  |

TABLE OF DETAIL 1 SQUARE – GROOVE WELD , BUTT JOINT

## NOTES :

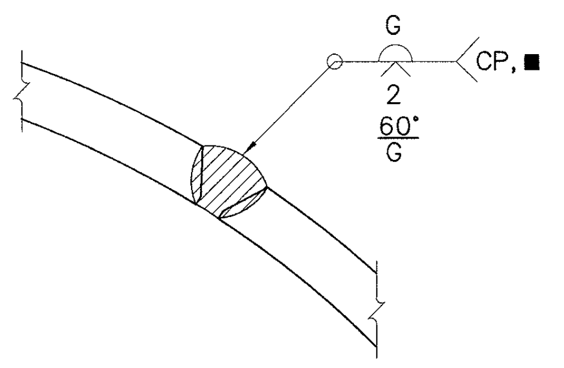
1. LONGITUDINAL SEAMS HAVE TO BE COMPLETE JOINT PENETRATION WELDS BY COMBINING SINGLE–V–GROOVE WITH BACKING WELDS AND GROUND FLUSH WELDING WITH BASE MATAL AS REQUIRED (SEE DETAIL "2")
2. GALVANIZED ALL SURFACES WITH 0.10 mm. THK.
3. NICKEL CLADDING ON OUTER SURFACE WITH 0.50 mm. THK. AND GALVANIZED INNER SURFACE WITH 0.10 mm. THK.
4. EACH JOINT OF EACH PACKING RING SHALL BE MIN. 25 cm. APART DO NOT LINE UP JOINTS
5. ALL DIMENSION ARE IN MILIMETER UNLESS OTHERWISE SHOWN
6. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH–GN–03



TRANSITION THICKNESS OF BUTT JOINT IN PARTS OF UNEQUAL THICKNESS

## DETAIL "1"

NOT TO SCALE

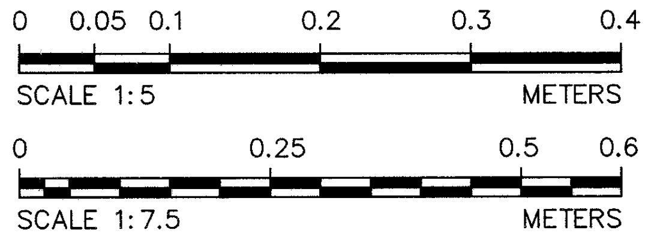


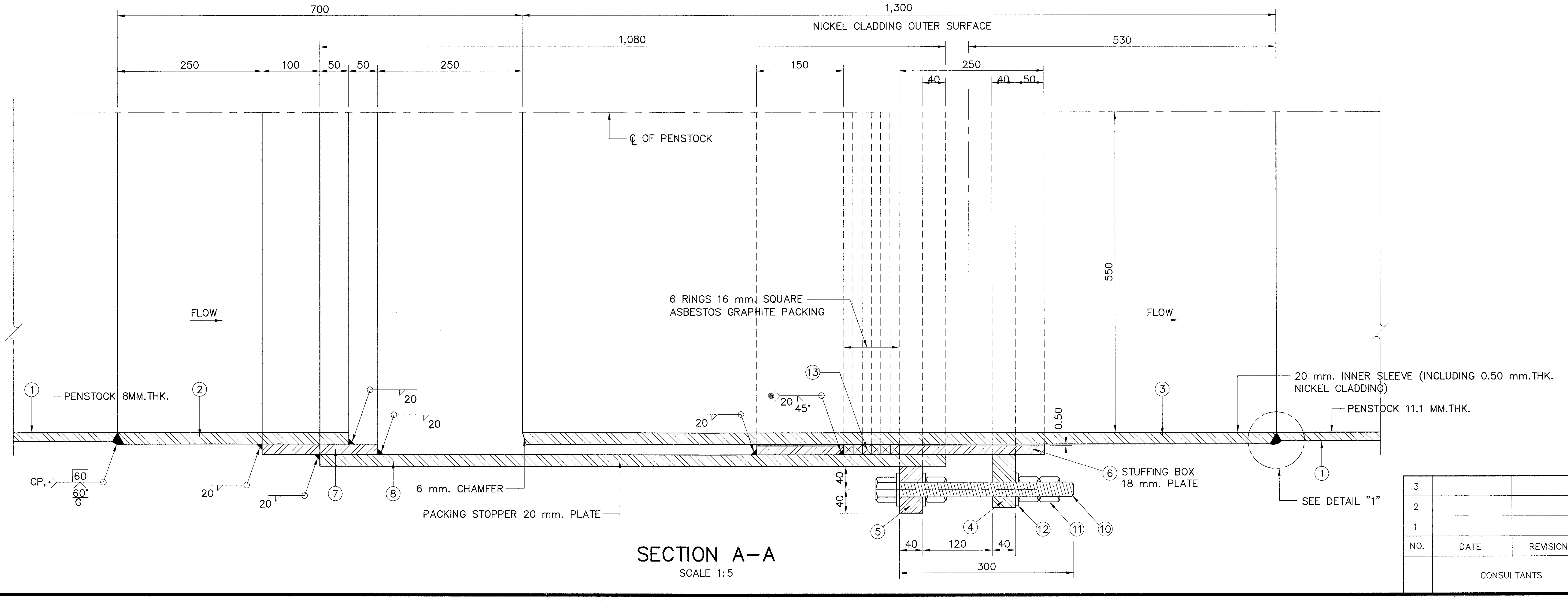
## LONGITUDINAL WELD

NOT TO SCALE

## WELDING NOTATION :

CP = COMPLETE JOINT PENETRATION GROOVE WELD
G = GRINDING WELD DEPOSITE FLUSH WITH BASE METAL
• = BACKING PLATE SIZE 0.10x1.50 mm. AND SAME METERIAL AS PENSTOCK
● = BEVEL PLATE 9 mm. BEFORE ROLLING CHIP SQUARE AFTER WELDING
▲ = ROOT OPENING R = 2.0 mm.
ROOT FACE t = 3.0 mm.
GROOVE ANGLE = 45°
■ = ROOT OPENING R = 2.0 mm.
ROOT FACE t = 2.0 mm.
GROOVE ANGLE = 60°




700
1,300
NICKEL CLADDING OUTER SURFACE
1,080
530
250
100
50
50
250
150
250
40
40
50
℄ OF PENSTOCK
550
FLOW
6 RINGS 16 mm. SQUARE ASBESTOS GRAPHITE PACKING
FLOW
1
PENSTOCK 8MM.THK.
2
20
20
20
13
20
45°
0.50
3
20 mm. INNER SLEEVE (INCLUDING 0.50 mm.THK. NICKEL CLADDING)
PENSTOCK 11.1 MM.THK.
CP.
60
60°
G
20
20
7
8
6 mm. CHAMFER
PACKING STOPPER 20 mm. PLATE
40
40
6
STUFFING BOX 18 mm. PLATE
1
SEE DETAIL "1"
5
4
12
11
10
40
120
40
300

## SECTION A–A

SCALE 1:5

| 3 |  |  |  |  |
|---|---|---|---|---|
| 2 |  |  |  |  |
| 1 |  |  |  |  |
| NO. | DATE | REVISIONS | CHECKED | APPROVED |
|  | CONSULTANTS |  | DEDE |  |

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MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
PENSTOCK
EXPANSION JOINT, PLAN, SECTIONS AND DETAILS

P&C MANAGEMENT CO.,LTD.

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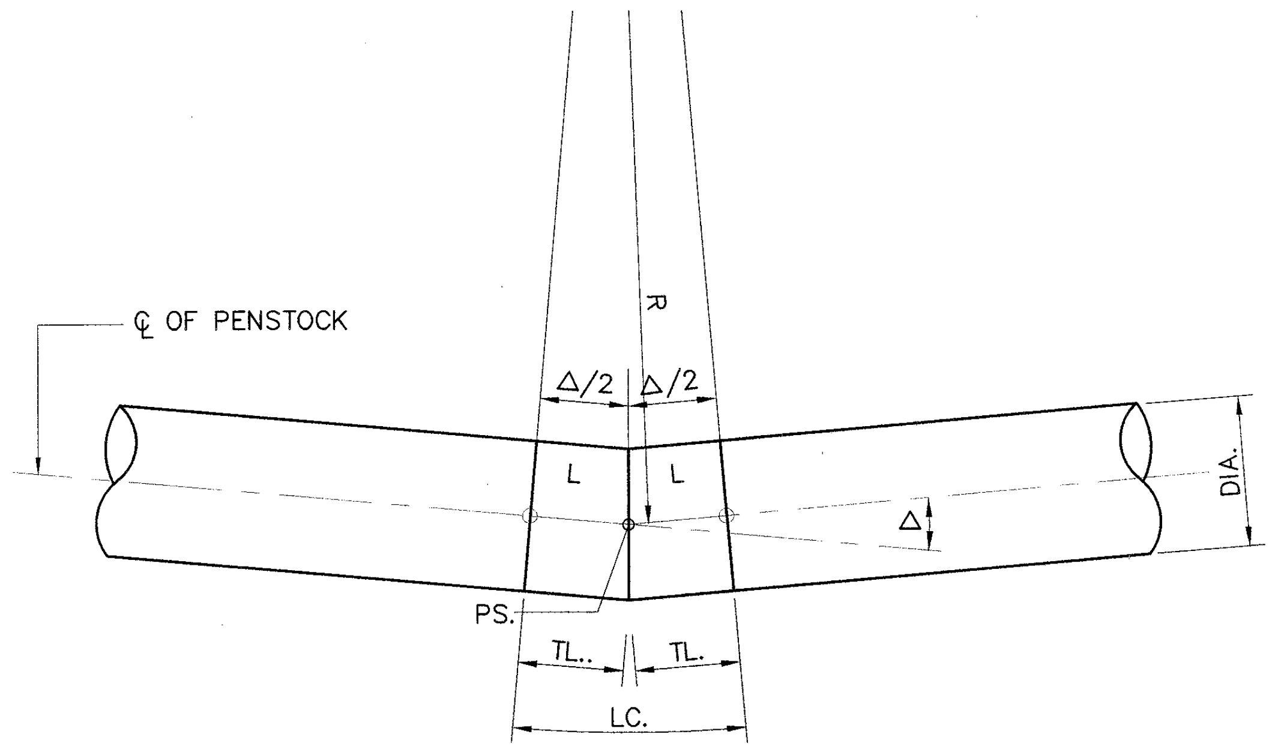
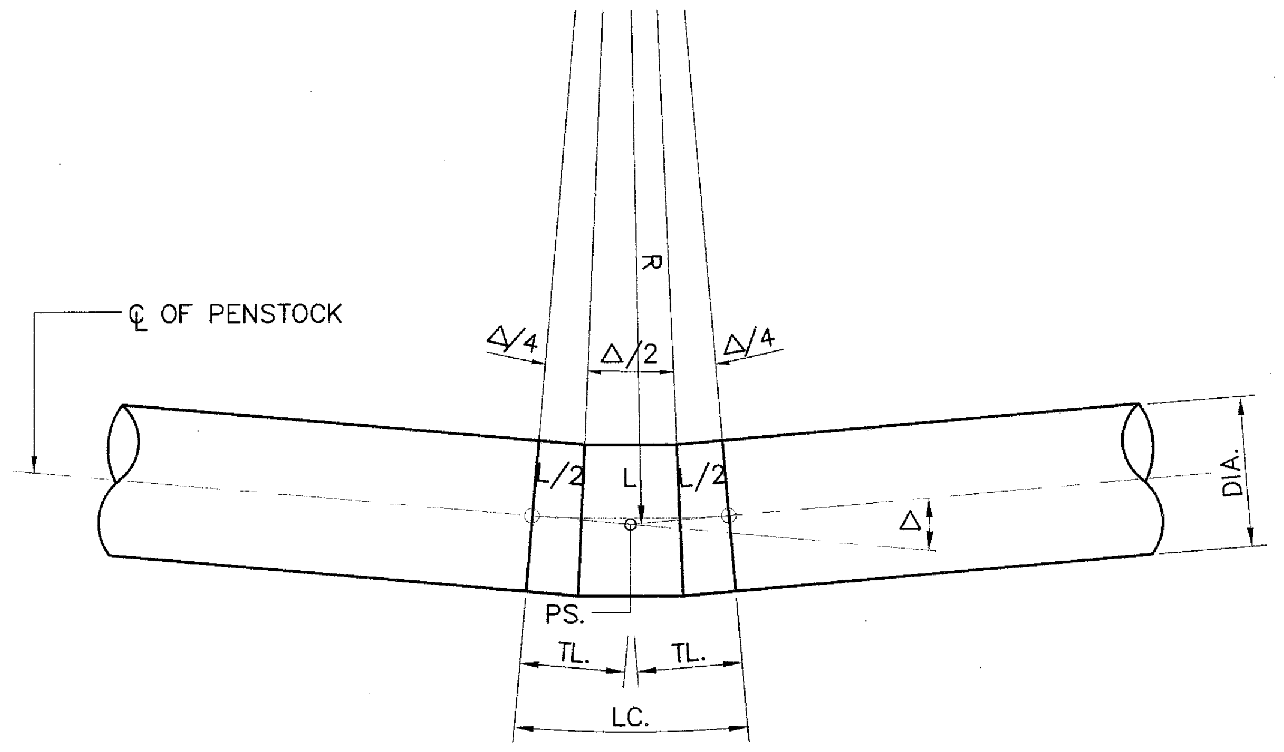
|  |  |  |  |
|---|---|---|---|
| DESIGNED ภย.64624 สย.6226 |  | REVIEWED |  |
| DRAWN |  | SUBMITTED |  |
| CHECKED สย.6226 |  | RECOMMENDED |  |
| PROJECT MANAGER | DATE 08/03/2559 | APPROVED P. Hansell. |  |
|  |  | DRAWING NO. MH–PS–08 | SHEET NO. 81 OF 130 |



## BEND TYPE "1"

DELTA(Δ) 0°–5°

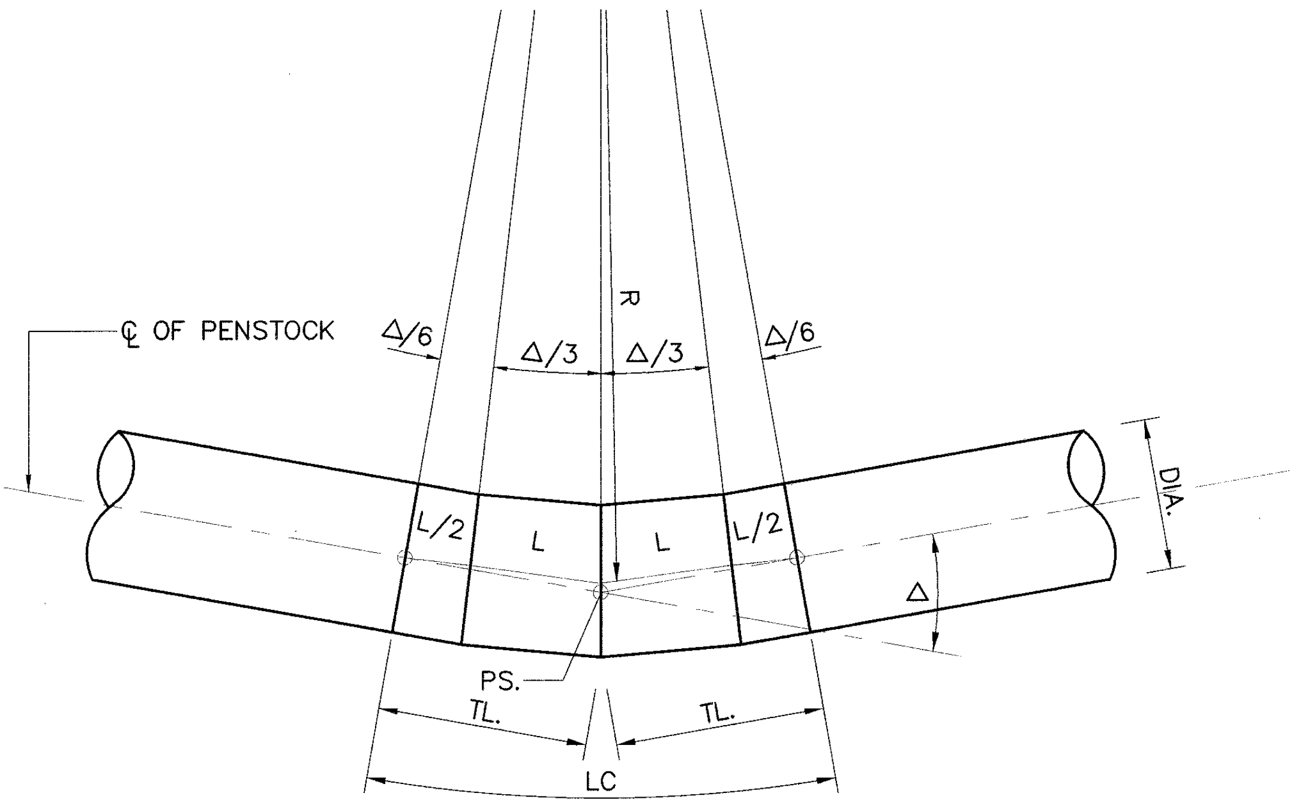
NOT TO SCALE



## BEND TYPE "2"

DELTA(Δ) 5°–15°

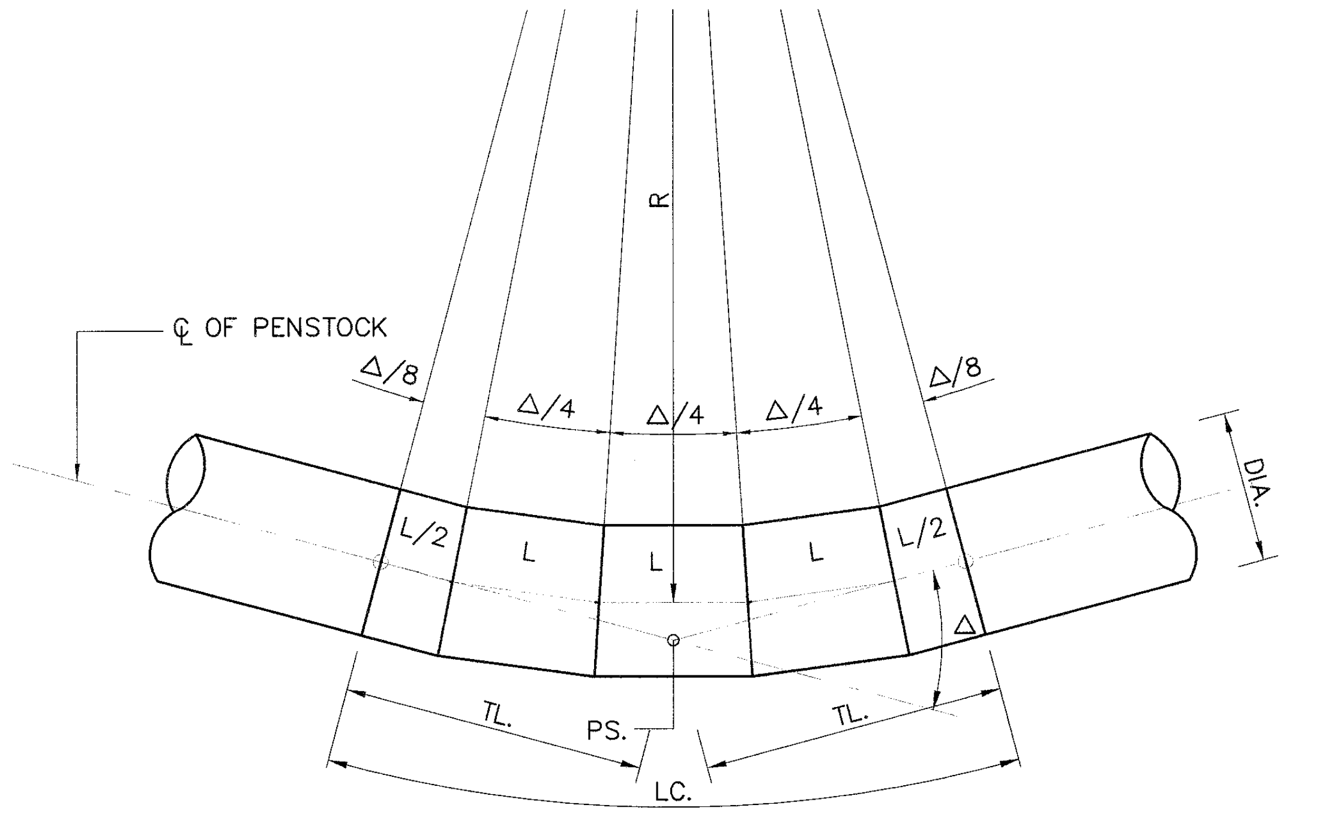
NOT TO SCALE



## BEND TYPE "3"

DELTA(Δ) 15°–25°

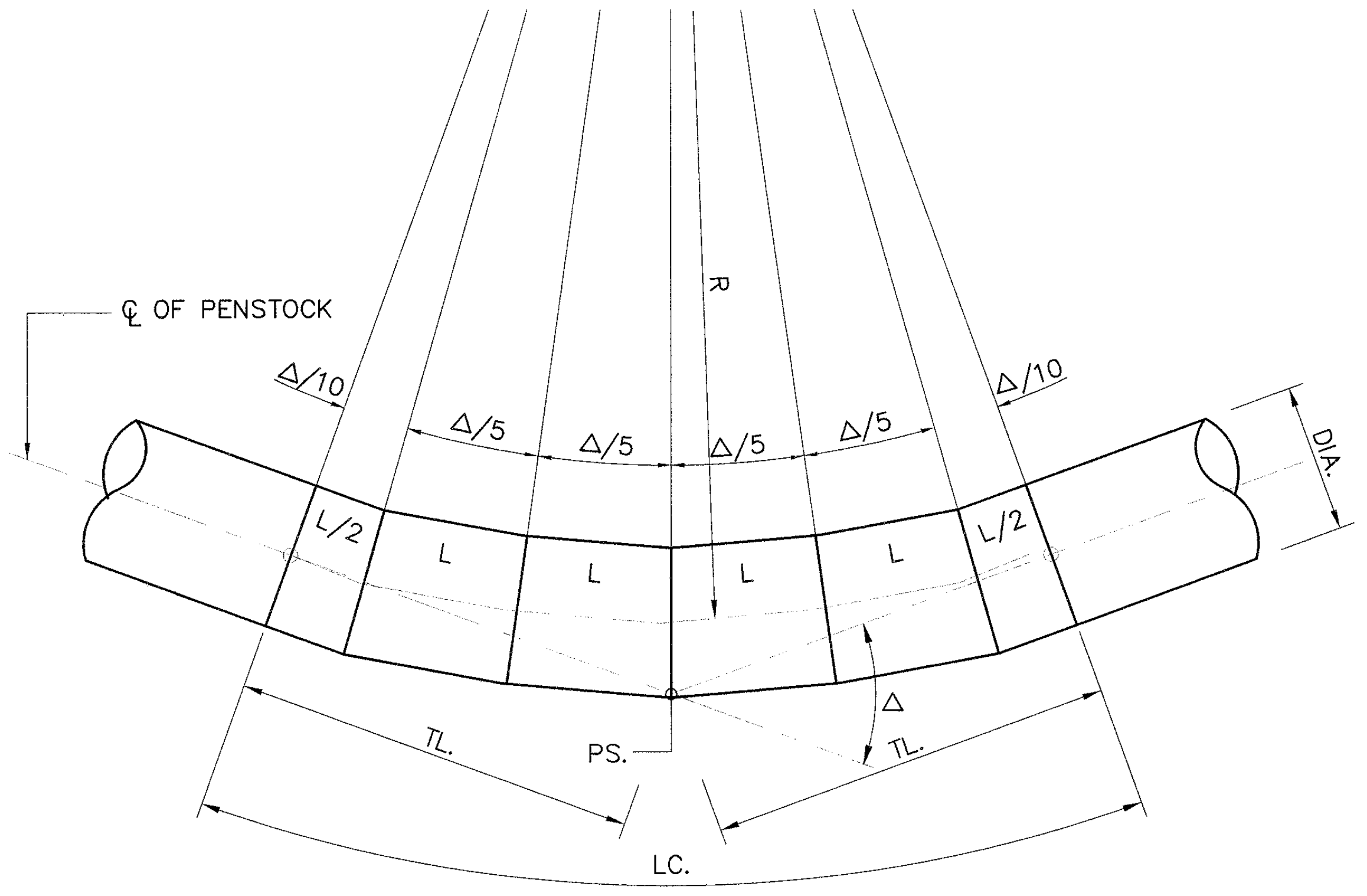
NOT TO SCALE



## BEND TYPE "4"

DELTA(Δ) 25°–35°

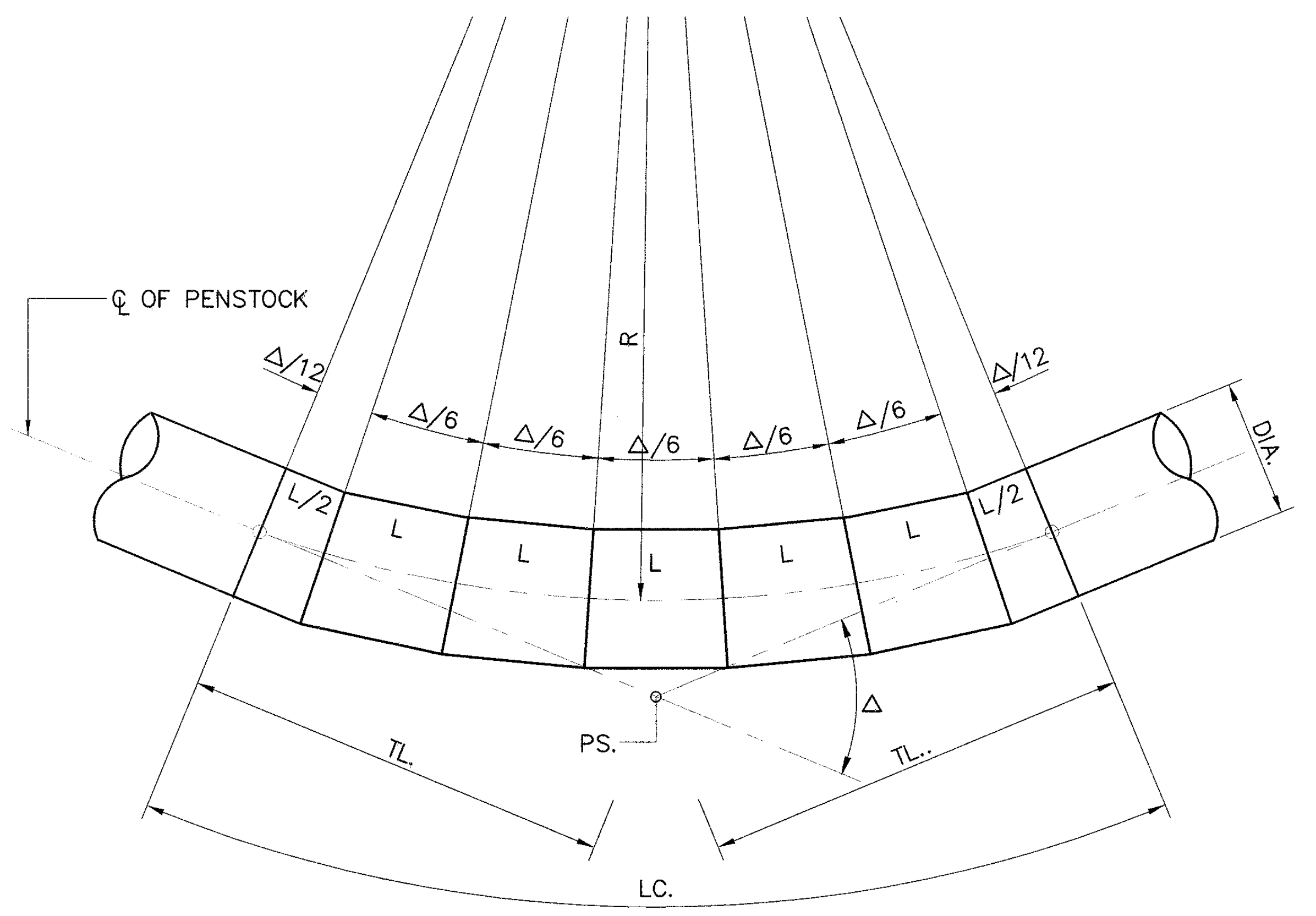
NOT TO SCALE



## BEND TYPE "5"

DELTA(Δ) 35°–45°

NOT TO SCALE



## BEND TYPE "6"

DELTA(Δ) 55°–OVER

NOT TO SCALE

| D | ELBOW | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 2–PIECE<br>θ = 11.25° | | 3–PIECE<br>θ = 22.25° | | 4–PIECE<br>θ = 45° | | 5–PIECE<br>θ = 45° | |
| | M | a | N | b | P | c | Q | d |
| 150 | 100 | 250 | 175 | 225 | 275 | 225 | 375 | 250 |
| 200 | 100 | 250 | 200 | 225 | 300 | 225 | 450 | 250 |
| 250 | 100 | 250 | 225 | 200 | 350 | 225 | 500 | 250 |
| 300 | 125 | 275 | 250 | 275 | 400 | 275 | 575 | 300 |
| 400 | 150 | 350 | 300 | 325 | 500 | 325 | 700 | 350 |
| 500 | 175 | 350 | 350 | 325 | 550 | 325 | 825 | 350 |
| 600 | 200 | 350 | 400 | 350 | 650 | 350 | 650 | 350 |
| 700 | 225 | 400 | 450 | 400 | 725 | 400 | 950 | 375 |
| 800 | 225 | 475 | 500 | 450 | 800 | 450 | 1075 | 425 |
| 900 | 250 | 450 | 525 | 450 | 850 | 425 | 1175 | 475 |
| 1,000 | 250 | 525 | 550 | 500 | 875 | 500 | 1250 | 450 |
| 1,200 | 275 | 400 | 575 | 400 | 950 | 375 | 1300 | 525 |
| 1,500 | 300 | 475 | 675 | 475 | 1050 | 450 | 1375 | 400 |
| 1,800 | 325 | 450 | 700 | 425 | 1150 | 425 | 1575 | 550 |

**NOTE :**

1. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH–GN–03

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
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| 3 | | | | |
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| | CONSULTANTS | | DEDE | |

KINGDOM OF THAILAND
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

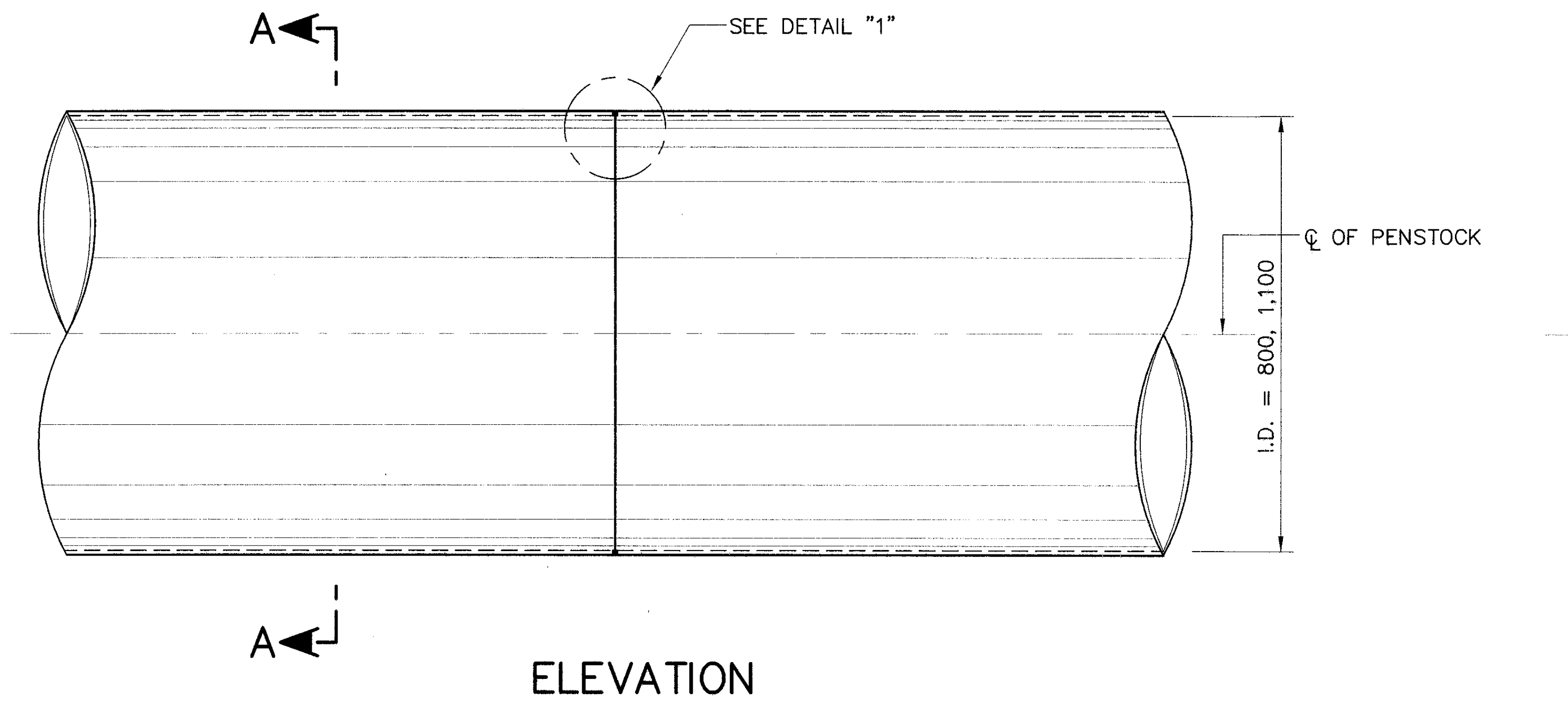
CIVIL WORKS AND TRANSMISSION LINE
PENSTOCK
BEND DETAILS

P&C MANAGEMENT CO.,LTD.

DESIGNED ภย.64624 สย.6226
DRAWN
CHECKED สย.6226
08/03/2559
PROJECT MANAGER DATE

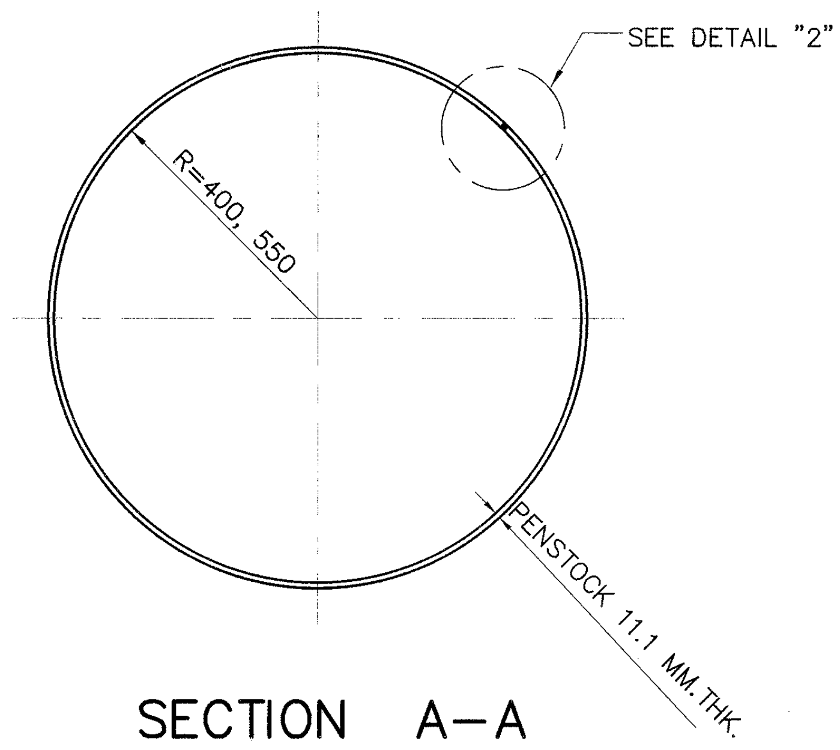
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY
REVIEWED
SUBMITTED Chant
RECOMMENDED
APPROVED P. Hansell

DRAWING NO. MH–PS–09
SHEET NO. 82 OF 130



ELEVATION

SCALE 1:10



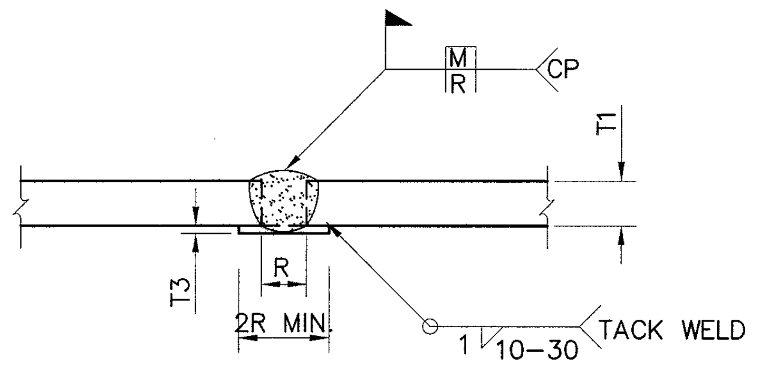
SECTION A–A

SCALE 1:10

### TABLE OF DETAIL "1" SQUARE–GROOVE WELD, BUTT JOINT

| WELDING PROCESS | DESIGNATION | BASE METAL THICKNESS | | GROOVE PREPARATION | | TOLERANCES | | REMARKS |
|---|---|---|---|---|---|---|---|---|
| | | T1 | T3 | ROOT OPENING | GROOVE ANGLE | ROOT OPENING | GROOVE ANGLE | |
| SMAW | B–L1a | 11.1 | 1.0 | R = T1 | – | +1.5,–0 | – | SINGLE–PASS WELD |
| GMAW<br>FCAW | B–L1a–GF | 11.1 | 1.0 | R = T | – | +1.5,–0 | – | SINGLE–PASS WELD |
| | | | | | | | | |

SMAW = SHIELD METAL ARC WELDING
GMAW = GAS METAL ARC WELDING
FCAW = FLUX CORED ARC WELDING

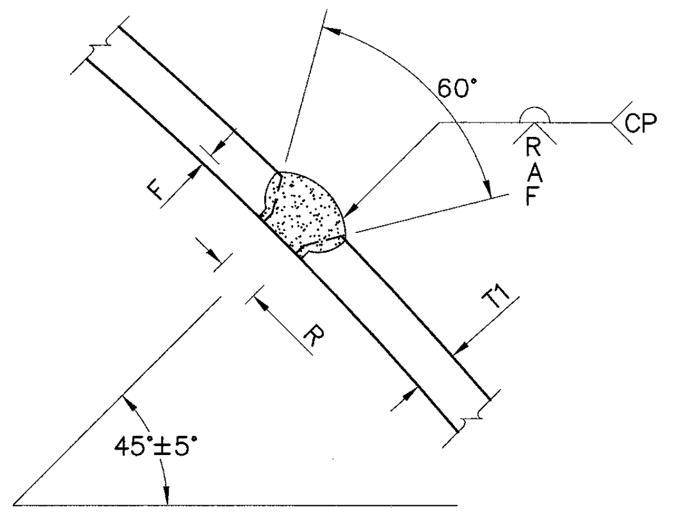


CIRCULAR BUTT JOINT

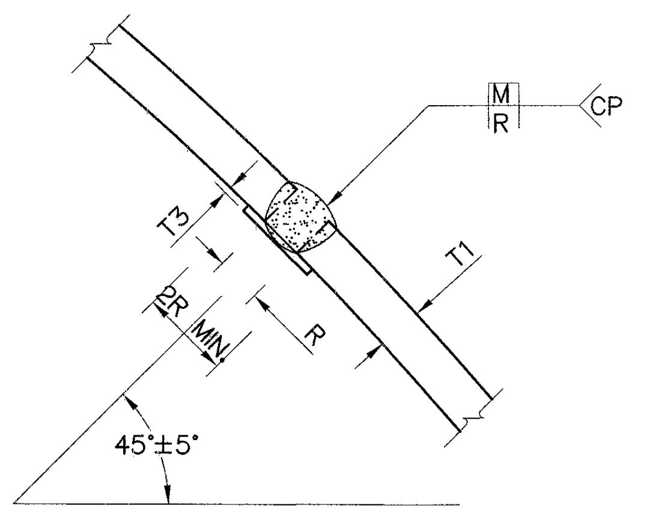
## DETAIL "1"

### TABLE OF DETAIL "2" SINGLE–V–GROOVE WELD, BUTT JOINT

| TYPE | WELDING PROCESS | DESIGNATION | BASE METAL THICKNESS | | GROOVE PREPARATION | | | TOLERANCES | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | T1 | T3 | ROOT OPENING | GROOVE ANGLE | ROOT FACE | R | A | F | |
| A | SMAW | B–U2 | 11.1 | – | R = 2.0 | A = 60° | F = 1.5 | +15,–0 | +10°,–0° | +15,–0 | SINGLE–PASS WELD |
| | SMAW | B–U2 | 11.1 | – | R = 2.0 | A = 60° | F = 2.0 | +15,–0 | +10°,–0° | +15,–0 | SINGLE–PASS WELD |
| B | SMAW | B–L1a–GF | 11.1 | 1.0 | R = 6.0 | – | – | +15,–0 | – | – | SINGLE–PASS WELD |
| | GMAW<br>FCAW | B–L1a–GF | 11.1 | 1.0 | R = 9.0 | – | – | +15,–0 | – | – | SINGLE–PASS WELD |



LONGITUDINAL BUTT JOINT
TYPE "A"



LONGITUDINAL BUTT JOINT (ALTERNATIVE)
TYPE "B"

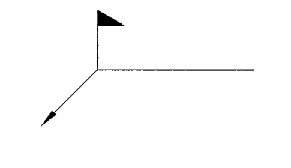
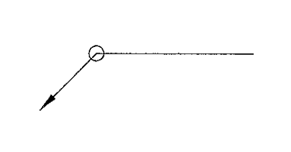
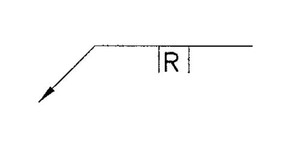
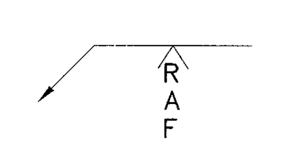
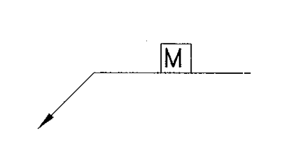
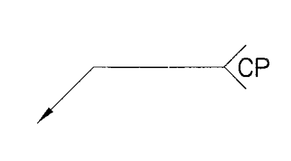
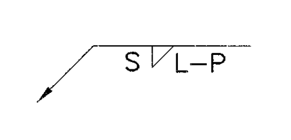
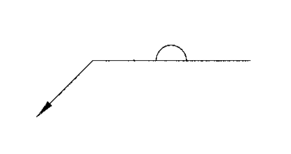
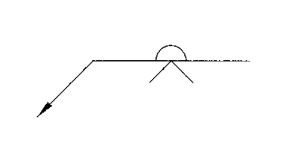
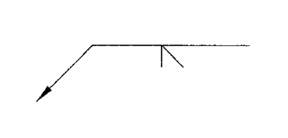
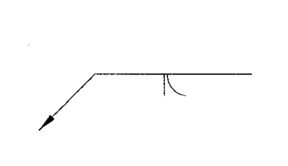
## DETAIL "2"

NOTES :

1. ALL DIMENSION ARE IN MILLIMETER, UNLESS OTHERWISE SHOWN.
2. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH–GN–03
3. GROOVE WELD MADE AFTER WELDING OTHER SIDE
4. USE WELDING ELECTRODE TYPE "E" 70XX
5. MATERIAL OF BACKING IS THE SAME AS OF PIPE

0 0.1 0.2 0.4 0.6 0.8
SCALE 1:10 METERS

WELDING SYMBOLS

|  |  |  |  |  |  |  |  |  |  |  |
|---|---|---|---|---|---|---|---|---|---|---|
| FIELDWELD SYMBOL | WELD – ALL – AROUND SYMBOL | SQUARE GROOVE WELDING SYMBOL<br>R=ROOT OPENING | V–GROOVE WELDING SYMBOL<br>R=ROOT OPENING<br>A=GROOVE ANGLE<br>F=ROOT FACE | BACKING SYMBOL (MATERIAL OF BACKING THE SAME AS OF PIPE) | COMPLETE JOINT PENETRATION WELD | FILLET WELD<br>S=WELDING SIZE<br>L=LENGTH OF WELD<br>P=PITCH (CENTER TO CENTER OF WELD) | BACK OR BACKING WELD SYMBOL | COMBINED WELDS. BACKING WELD ON FAR SIDE AND V–GROOVE WELD ON NEAR SIDE | BEVEL GROOVE WELDING SYMBOL | FLARE–BEVEL GROOVE WELDING SYMBOL |

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
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KINGDOM OF THAILAND
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

# MAE HAT HYDROPOWER PROJECT

## CIVIL WORKS AND TRANSMISSION LINE
## PENSTOCK
## WELDING DETAILS

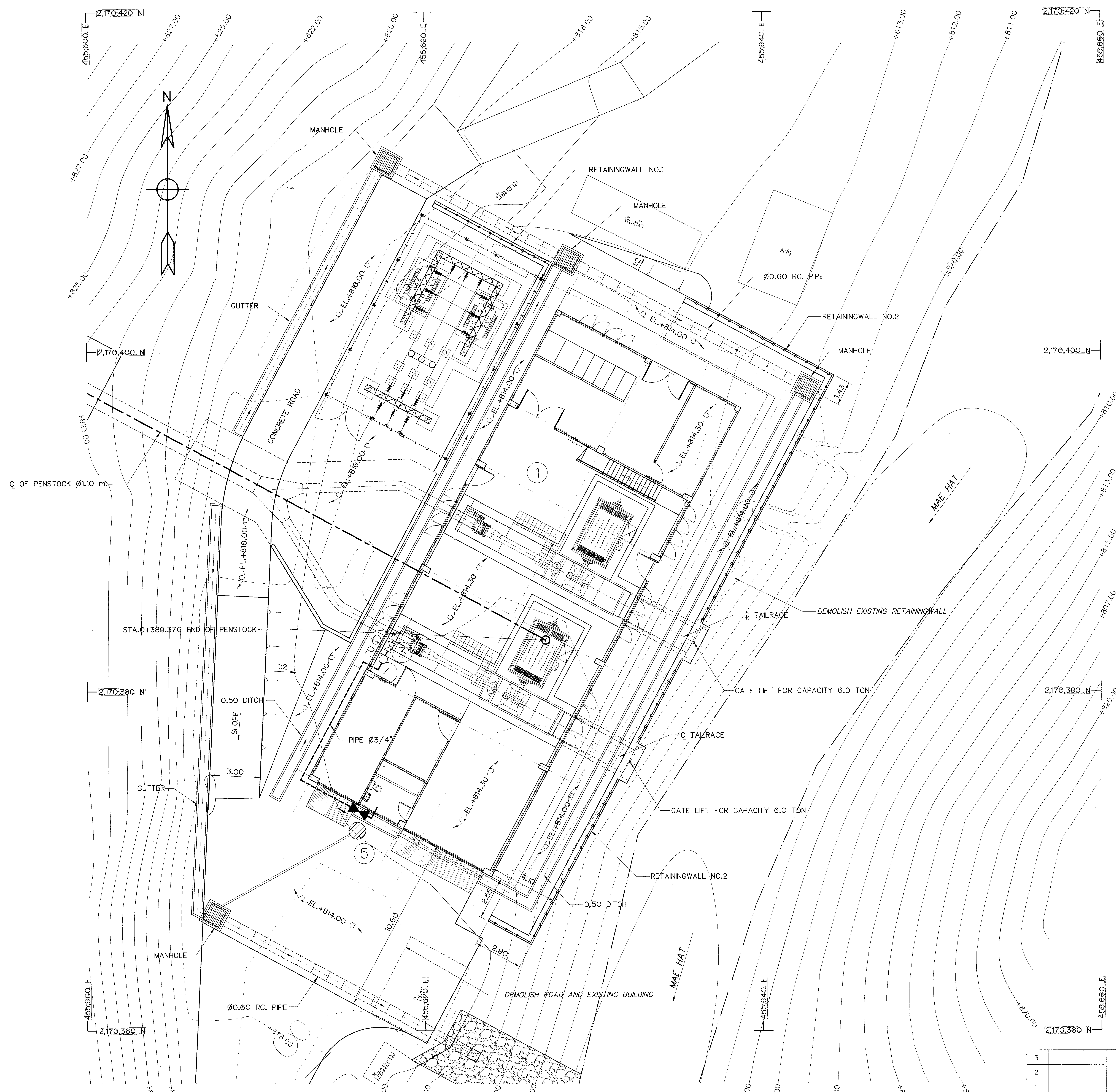
P&C MANAGEMENT CO.,LTD.

DESIGNED ภย.64624 สย.6226
DRAWN
CHECKED สย.6226
08/03/2559
PROJECT MANAGER DATE

Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

REVIEWED
SUBMITTED Chant
RECOMMENDED
APPROVED P.Hansell.

DRAWING NO. MH–PS–10
SHEET NO. 83 OF 130



## GENERAL LAY-OUT

SCALE 1:125

## LISTS :

① POWER HOUSE
② SWITCHYARD
③ GATE VALVE Ø 3/4"
④ PRESSURE REDUCING VALVE
⑤ SEPTICK TANK

## NOTES :

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS, UNLESS OTHERWISE SHOWN.
2. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH-GN-03
3. THE CONTRACTOR (C1) HAS TO SUBMIT THE SHOP DRAWINGS OF ALL HOUSING, GUARD HOUSE, ELEVATED TANK FLAG POLE, ENTRANCE GATE WITH, NAME BOARD AND GATE WIDTH 6.00 M. TO FIELD ENGINEER FOR APPROVAL, BEFORE CONSTRUCTION.

## REFERENCE DRAWINGS :

| | |
|---|---|
| 1. POWERHOUSE, PLAN 1st FLOOR AND PLAN 2nd FLOOR | MH-PH-02 |
| 2. POWERHOUSE, ELEVATIONS | MH-PH-04 |
| 3. POWERHOUSE, SECTIONS (SHEET 1/2) | MH-PH-05 |
| 4. POWERHOUSE, SECTIONS (SHEET 2/2) | MH-PH-06 |
| 5. POWERHOUSE, DITCH AND MANHOLE DETAILS | MH-PH-19 |
| 6. POWERHOUSE, RETAININGWALL REINFORCEMENT DETAILS | MH-PH-20 |

0 1 2 4 6 8 10
SCALE 1:125 METERS

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KINGDOM OF THAILAND
Department of Alternative
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MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
POWERHOUSE
GENERAL LAY-OUT

P&C MANAGEMENT CO.,LTD.

Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

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| DESIGNED . ภย.64624 สย.6226 | REVIEWED |
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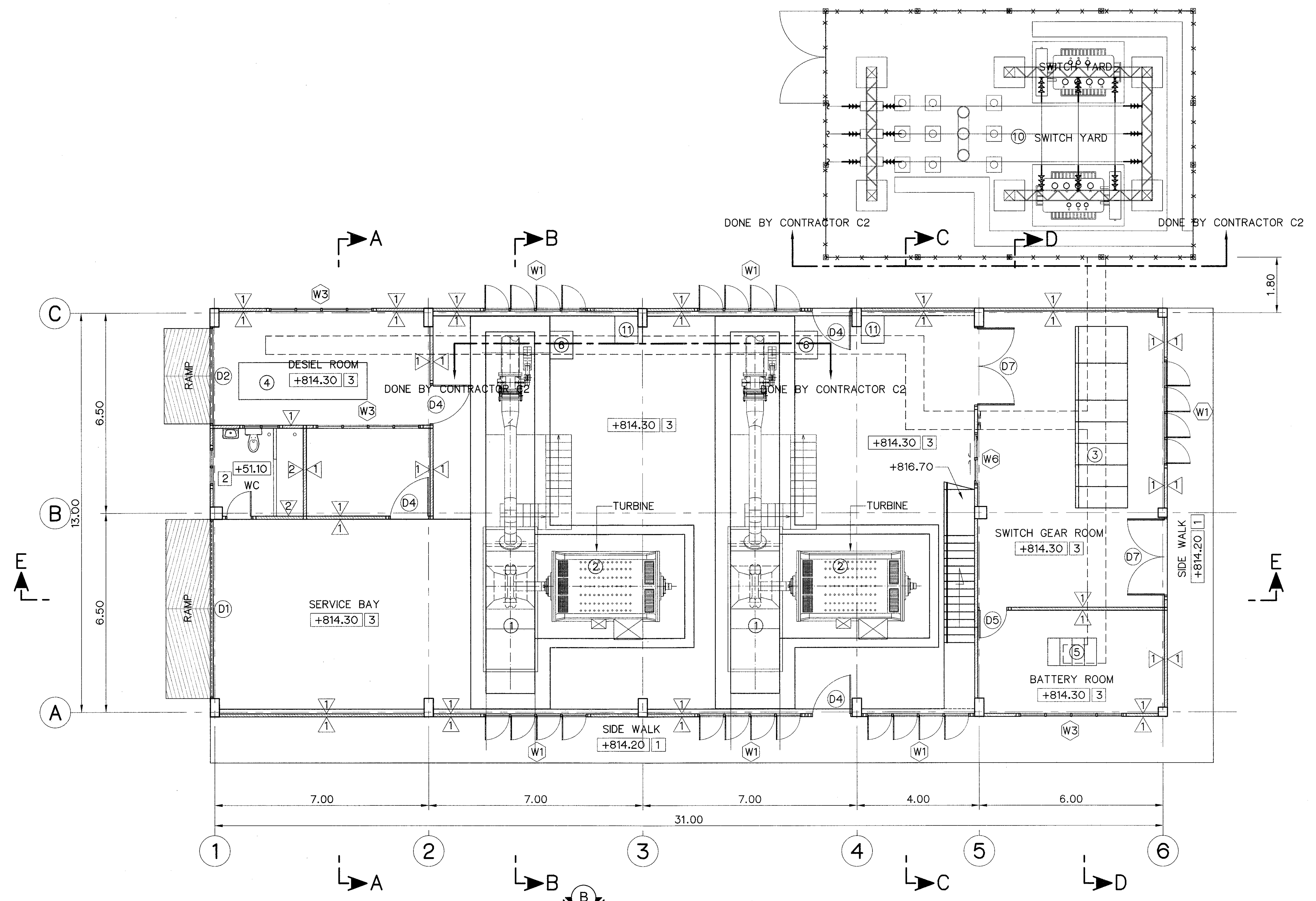
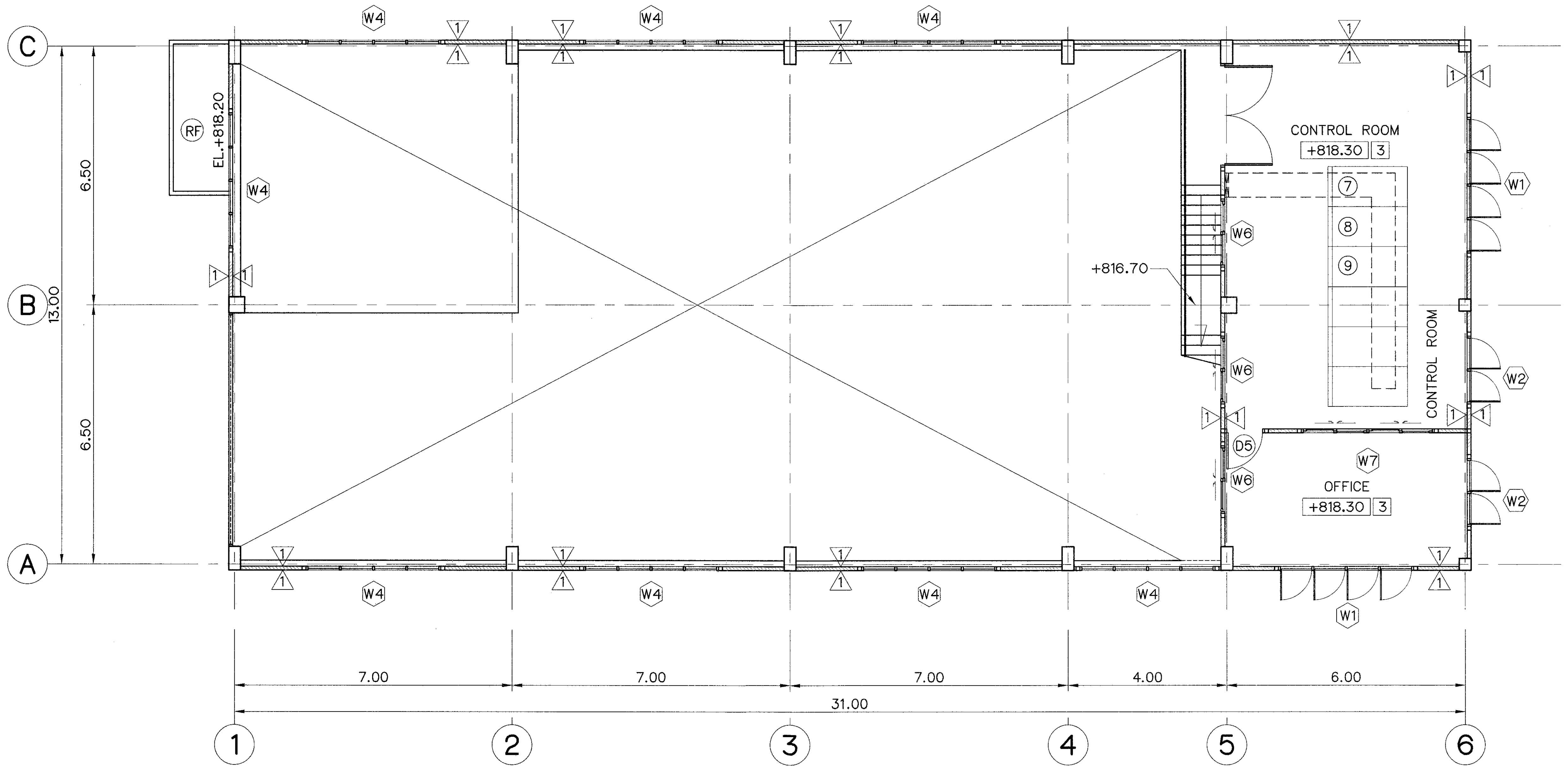
| CHECKED สย.6226 | RECOMMENDED |
| | APPROVED P. Hansa |
| PROJECT MANAGER — DATE 08/03/2559 | DRAWING NO. MH-PH-01 — SHEET NO. 84 OF 130 |



## PLAN 1st FLOOR

SCALE 1:100



## PLAN 2nd FLOOR

SCALE 1:100

### DESCRIPTIONS :

① HORIZONTAL SHAFT KAPLAN TURBINE
② GENERATOR
③ SWITCH GEAR CUBICLES
④ DIESEL GENERATOR SET
⑤ BATTERY AND RACK
⑥ OIL PRESSURE TANK
⑦ AC AND DC SWITCHBOARD AND
⑧ BATTERY CHAGER CUBICLE
⑨ MAIN CONTROL SWITCHBOARD
⑩ SWITCHYARD
⑪ NEUTRAL GROUNDING CUBICLE

### FLOOR FINISH SYMBOLS :

[1] COARSE FINISHED
[2] 12"x12" CERAMIC FLOOR TILES
[3] COATED WITH EPOXY RESIN

### WALL FINISH SYMBOLS :

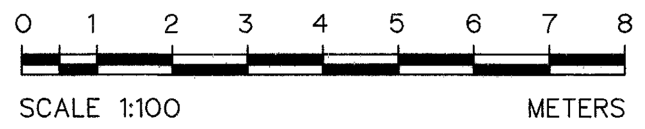
△1 CEMENT PLASTER
△2 8"x8" CERAMIC WALL TILES
△3 GLASS BLOCK

### NOTES :

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS, UNLESS OTHERWISE SHOWN.
2. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH-GN-03
3. CONTRACT C1 OF INCLUDE PENSTOCK BEYOND POWERHOUSE WALL 1.00 M. (INCLUDE FLANGE)

### REFERENCE DRAWINGS :

| | |
|---|---|
| 1. POWERHOUSE, GENERAL LAY-OUT | MH-PH-01 |
| 2. POWERHOUSE, ELEVATIONS | MH-PH-04 |
| 3. POWERHOUSE, SECTIONS (SHEET 1/2) | MH-PH-05 |
| 4. POWERHOUSE, SECTIONS (SHEET 2/2) | MH-PH-06 |
| 5. POWERHOUSE, DETAILS OF TOILET, SEPTIC AND SEEPAGE TANK | MH-PH-07 |
| 6. POWERHOUSE, DETAIL OF DOORS, WINDOWS AND NAMEPLATE | MH-PH-08 |



SCALE 1:100 METERS

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KINGDOM OF THAILAND
Department of Alternative
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MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

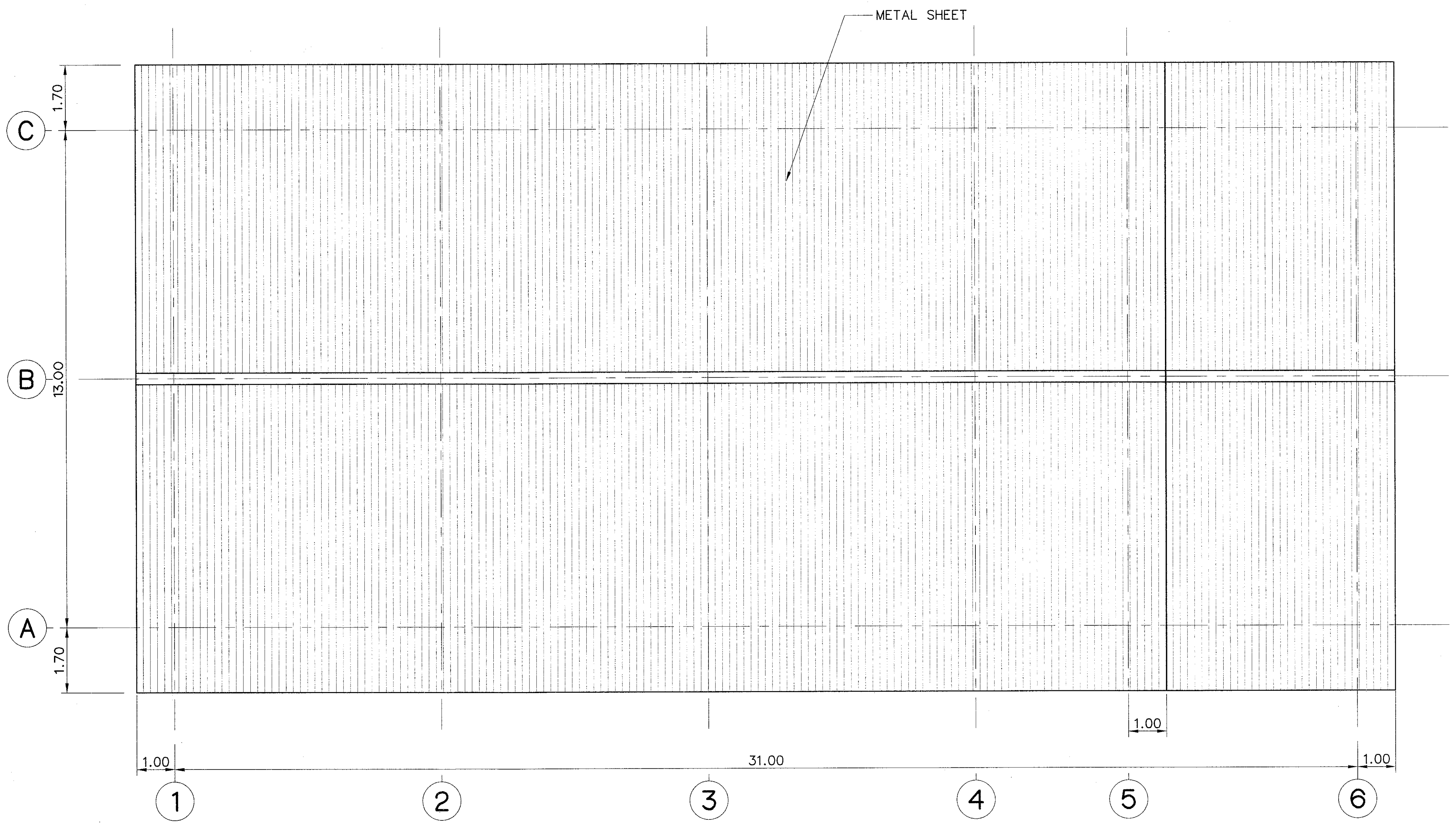
CIVIL WORKS AND TRANSMISSION LINE
POWERHOUSE
PLAN 1st FLOOR AND PLAN 2nd FLOOR

P&C MANAGEMENT CO.,LTD.

DESIGNED . ภย.64624 สย.6226
DRAWN
CHECKED สย.6226
PROJECT MANAGER DATE 08/03/2559

Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY
REVIEWED
SUBMITTED Ohanit
RECOMMENDED
APPROVED P.Hansell

DRAWING NO. MH-PH-02
SHEET NO. 85 OF 130



## ROOF PLAN

SCALE 1:100

NOTES :

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS, UNLESS OTHERWISE SHOWN.
2. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH-GN-03

REFERENCE DRAWINGS :

| | |
|---|---|
| 1. POWERHOUSE, GENERAL LAY-OUT | MH-PH-01 |
| 2. POWERHOUSE, PLAN 1st FLOOR AND PLAN 2nd FLOOR | MH-PH-02 |
| 3. POWERHOUSE, ELEVATIONS | MH-PH-04 |

0 1 2 3 4 5 6 7 8

SCALE 1:100 METERS

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| | CONSULTANTS | | DEDE | |

KINGDOM OF THAILAND
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MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
POWERHOUSE
ROOF PLAN

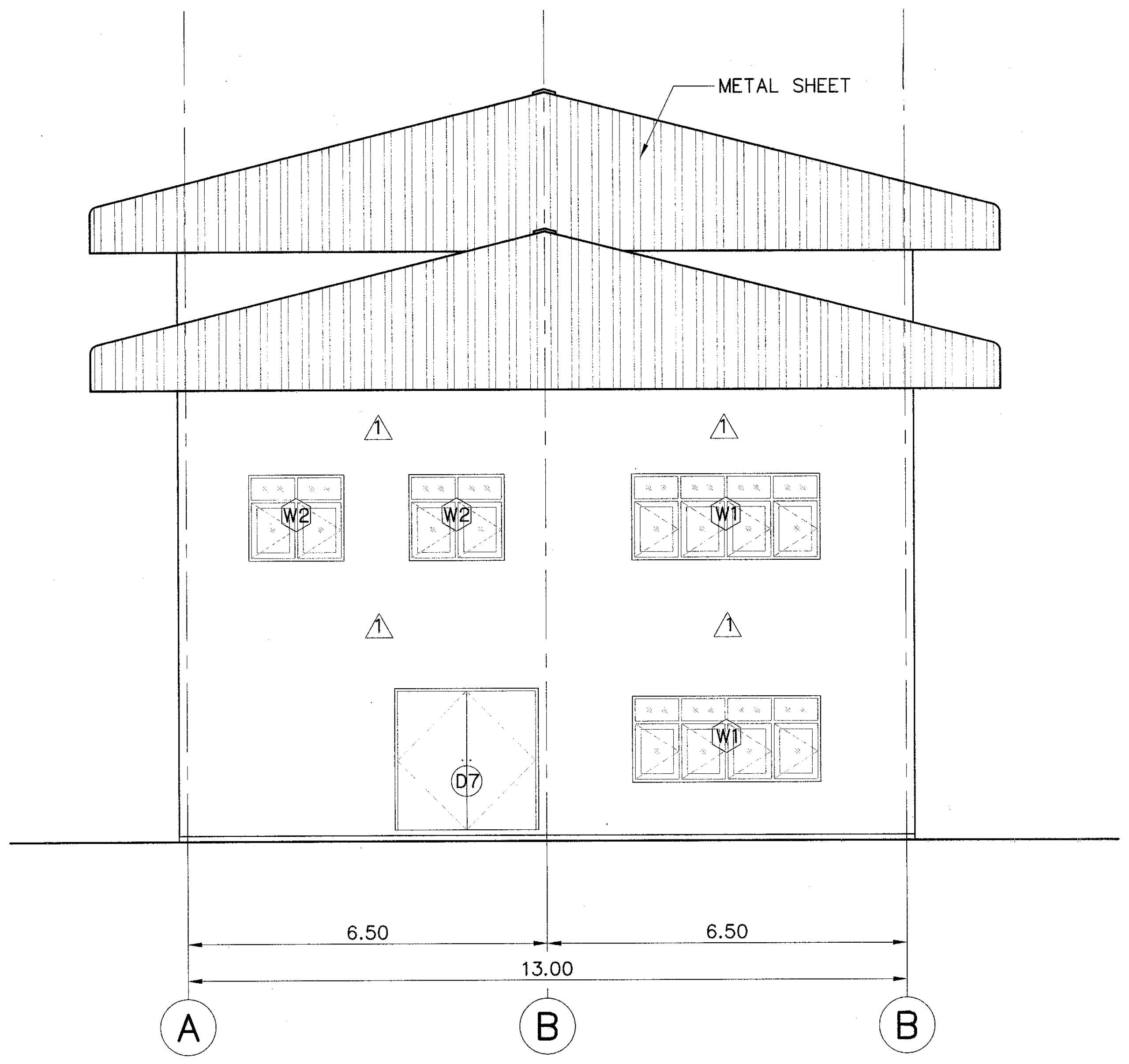
P&C MANAGEMENT CO.,LTD.

DESIGNED ภย.64624 สย.6226
DRAWN
CHECKED สย.6226
PROJECT MANAGER
DATE 08/03/2559

Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY
REVIEWED
SUBMITTED Chanit
RECOMMENDED
APPROVED P.Hansell.

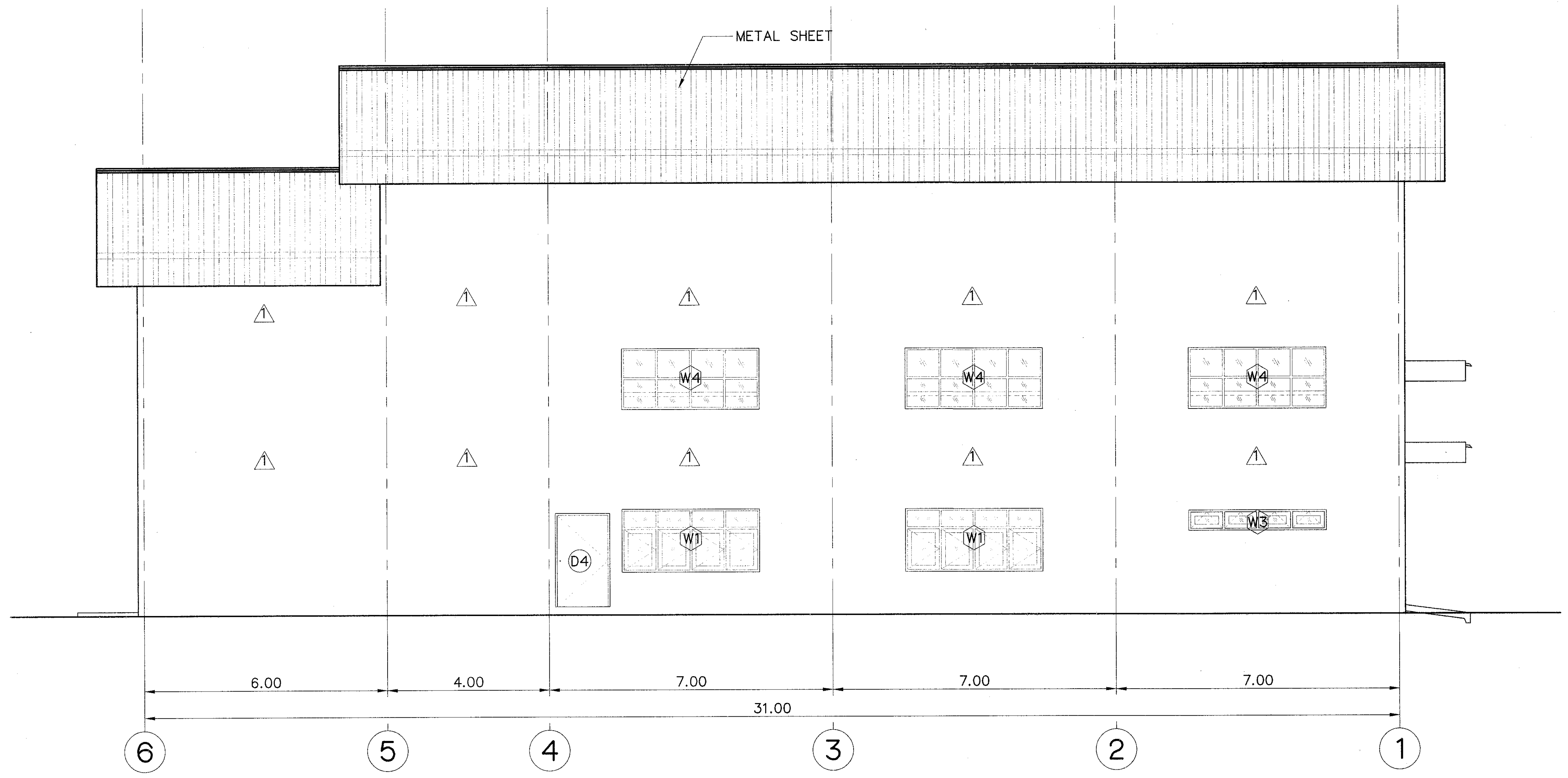
DRAWING NO. MH-PH-03

SHEET NO. 86 OF 130



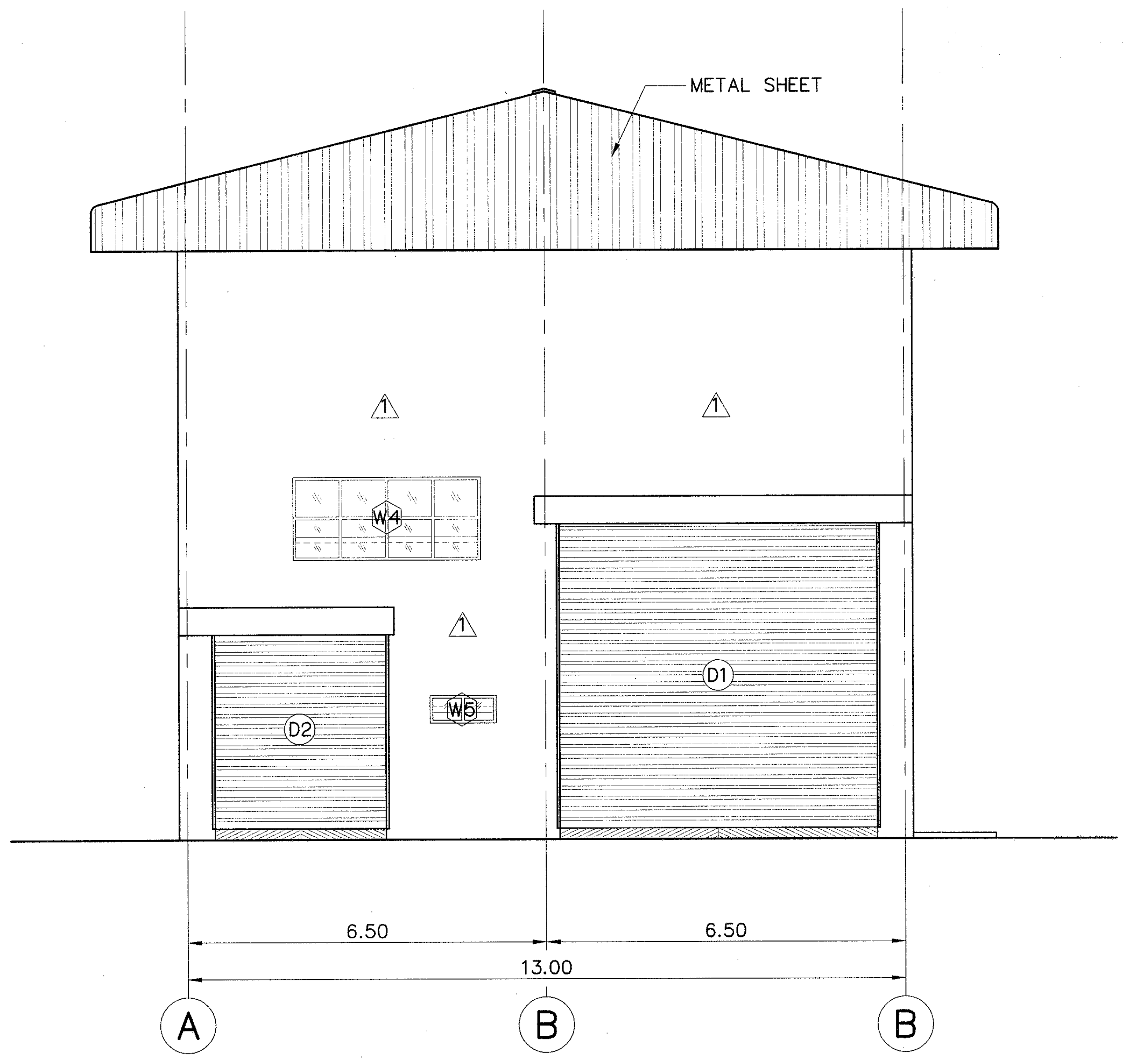
## ELEVATION “A”

SCALE 1:100



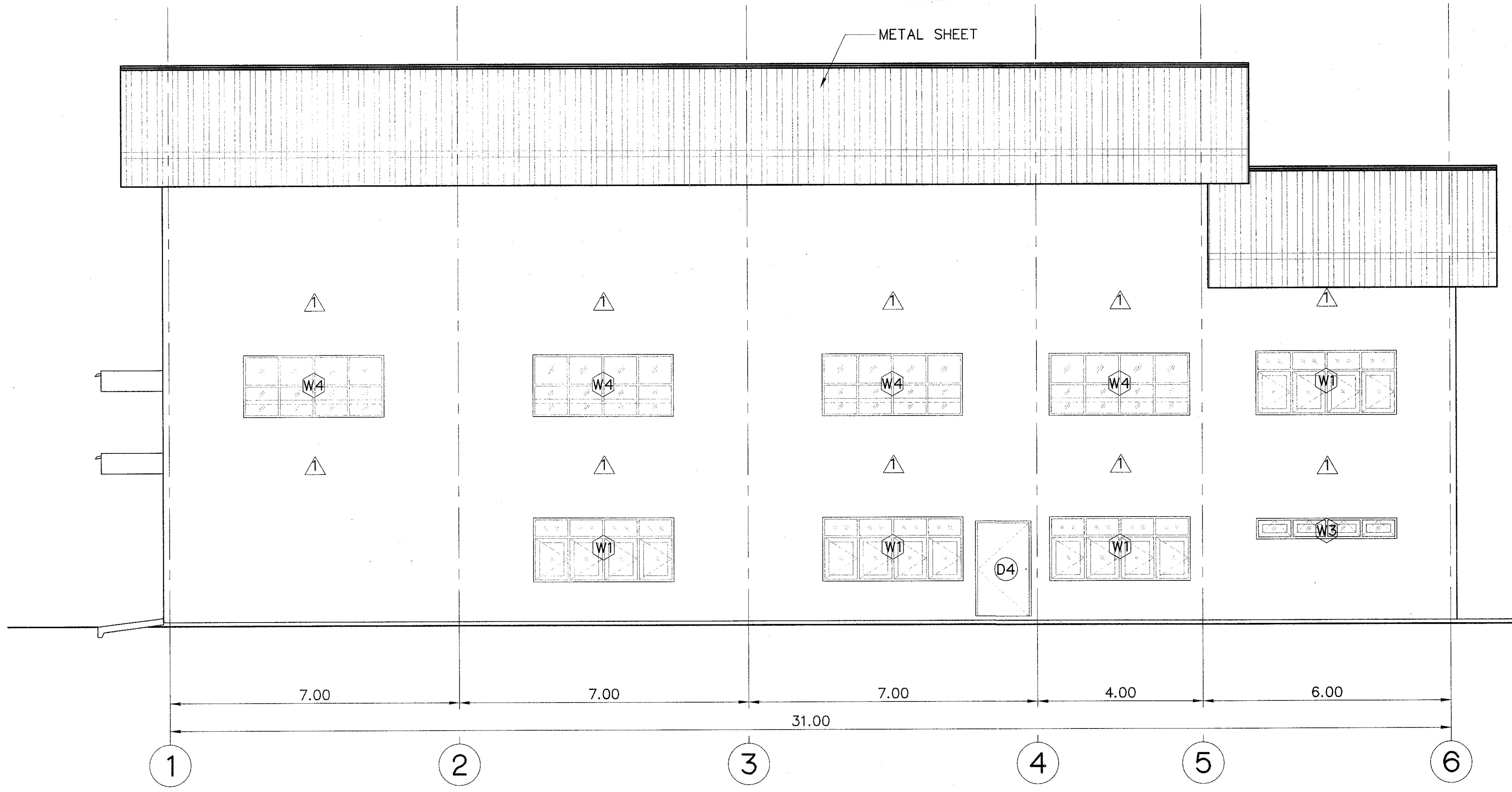
## ELEVATION “B”

SCALE 1:100



## ELEVATION “C”

SCALE 1:100



## ELEVATION “D”

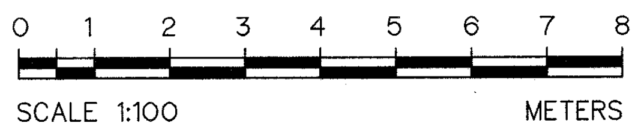
SCALE 1:100

## NOTES :

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS, UNLESS OTHERWISE SHOWN.
2. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH-GN-03

## REFERENCE DRAWINGS :

| | |
|---|---|
| 1. POWERHOUSE, PLAN 1st FLOOR AND PLAN 2nd FLOOR | MH-PH-02 |
| 2. POWERHOUSE, SECTIONS (SHEET 1/2) | MH-PH-05 |
| 3. POWERHOUSE, SECTIONS (SHEET 2/2) | MH-PH-06 |



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| | CONSULTANTS | | DEDE | |

KINGDOM OF THAILAND
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MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
POWERHOUSE
ELEVATIONS

P&C MANAGEMENT CO.,LTD.

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| DESIGNED | ภย.64624 สย.6226 |
| DRAWN | |
| CHECKED | สย.6226 |
| PROJECT MANAGER | DATE 08/03/2559 |

Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

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| RECOMMENDED | |
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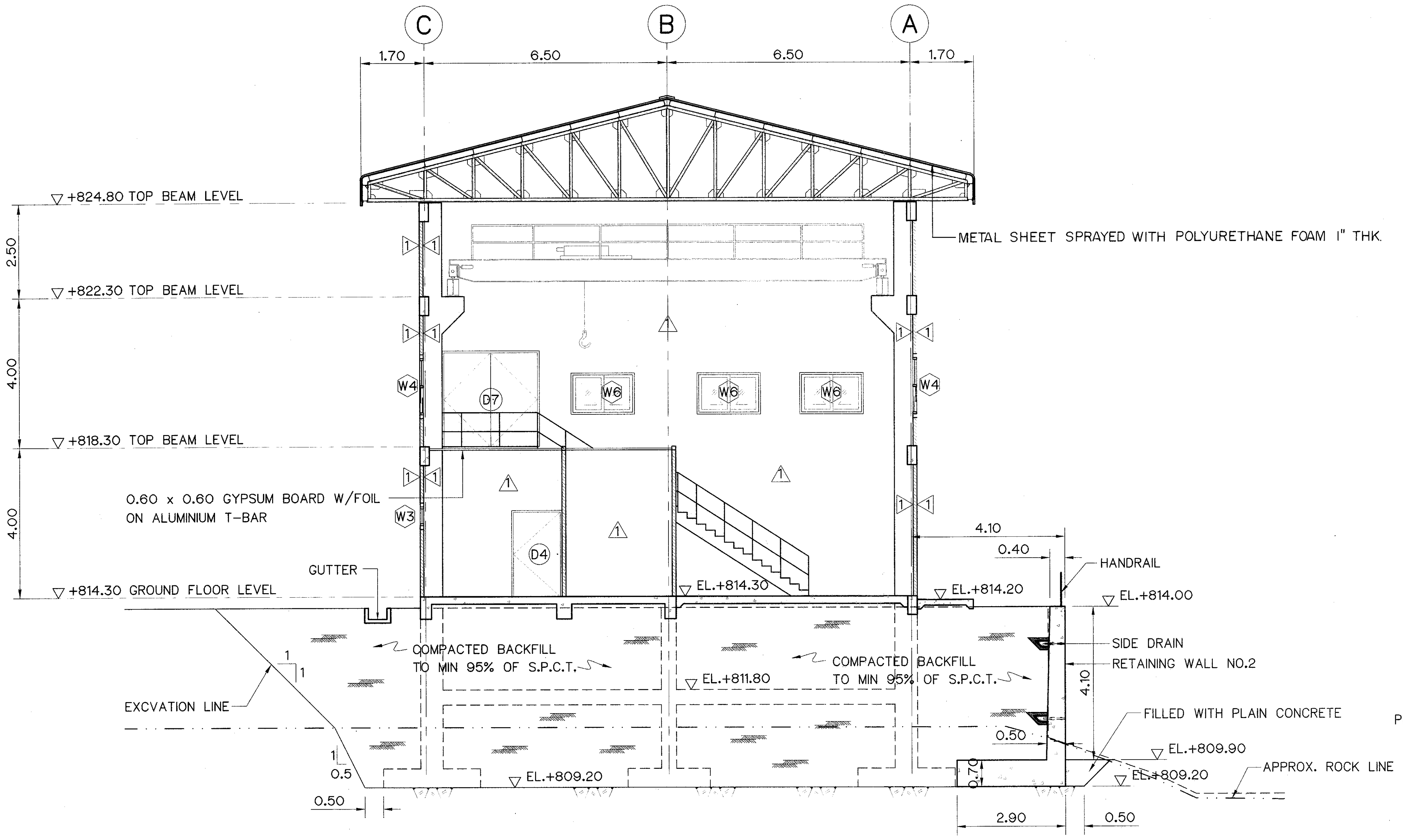
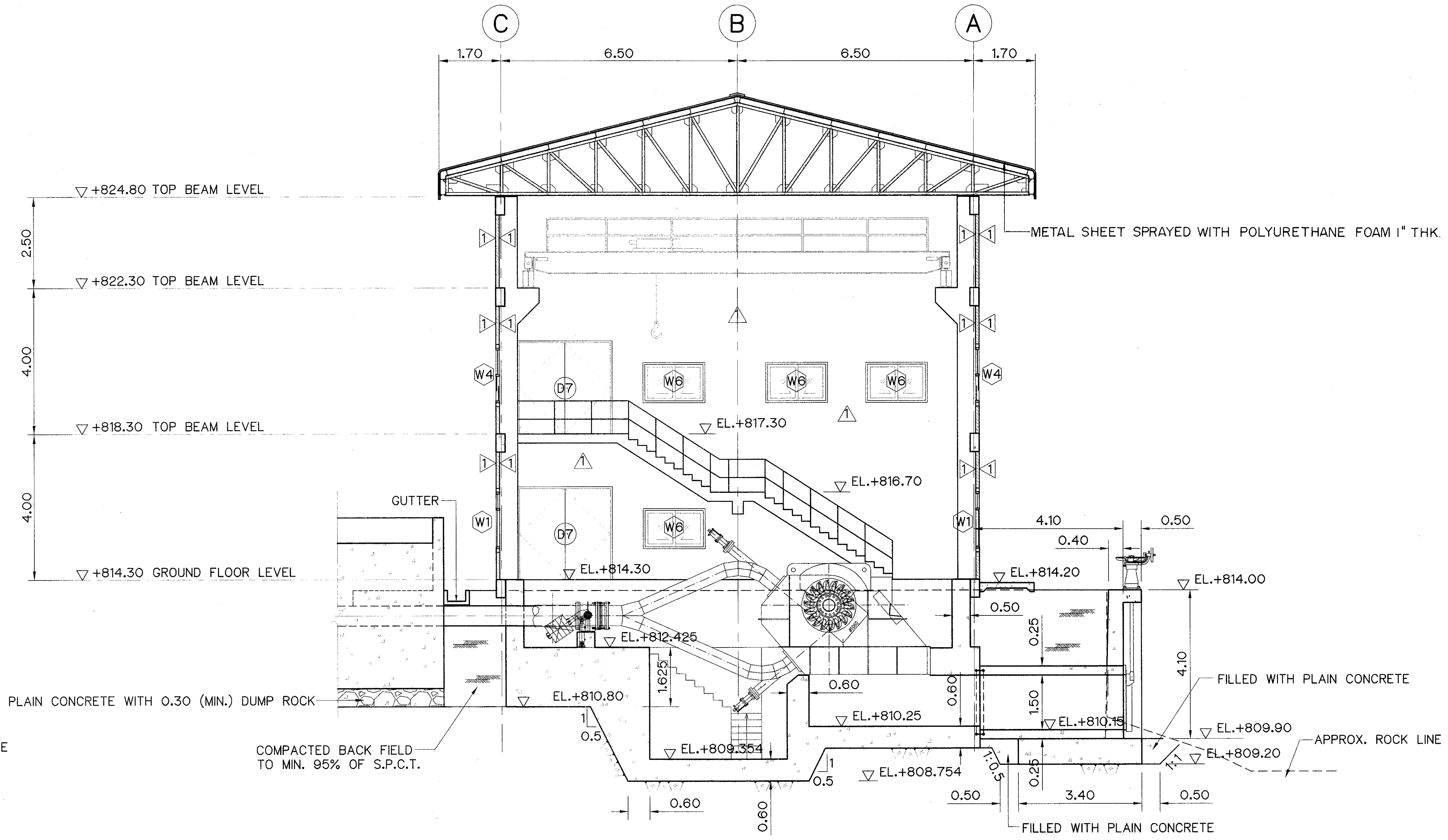
| DRAWING NO. MH-PH-04 | SHEET NO. 87 OF 130 |



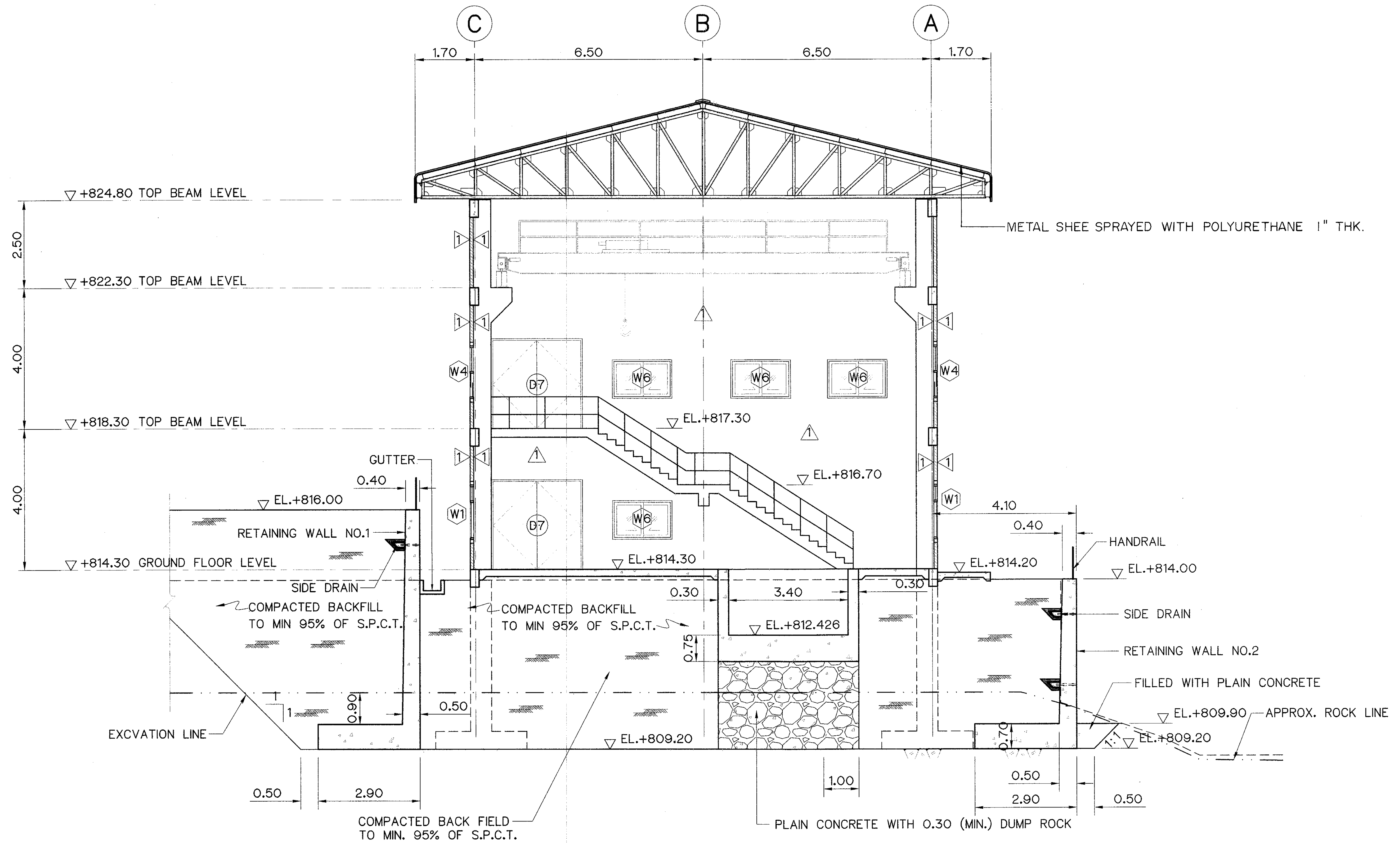
## SECTION A–A

SCALE 1:100



## SECTION B–B

SCALE 1:100



## SECTION C–C

SCALE 1:100

## NOTES :

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS, UNLESS OTHERWISE SHOWN.
2. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH–GN–03

0 1 2 3 4 5 6 7 8
SCALE 1:100 METERS

## REFERENCE DRAWINGS :

| | |
|---|---|
| 1. PLAN 1st FLOOR AND PLAN 2st FLOOR | MH–PH–02 |
| 2. ELEVATIONS | MH–PH–04 |
| 3. RETAININGWALL REINFORCEMENT DETAILS | MH–PH–18 |

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
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| | CONSULTANTS | | DEDE | |

KINGDOM OF THAILAND
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
POWERHOUSE
SECTIONS (SHEET 1/2)

P&C MANAGEMENT CO.,LTD.

| | |
|---|---|
| DESIGNED | ภย.64624 สย.6226 |
| DRAWN | |
| CHECKED | สย.6226 |
| PROJECT MANAGER | 08/03/2559 DATE |

Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

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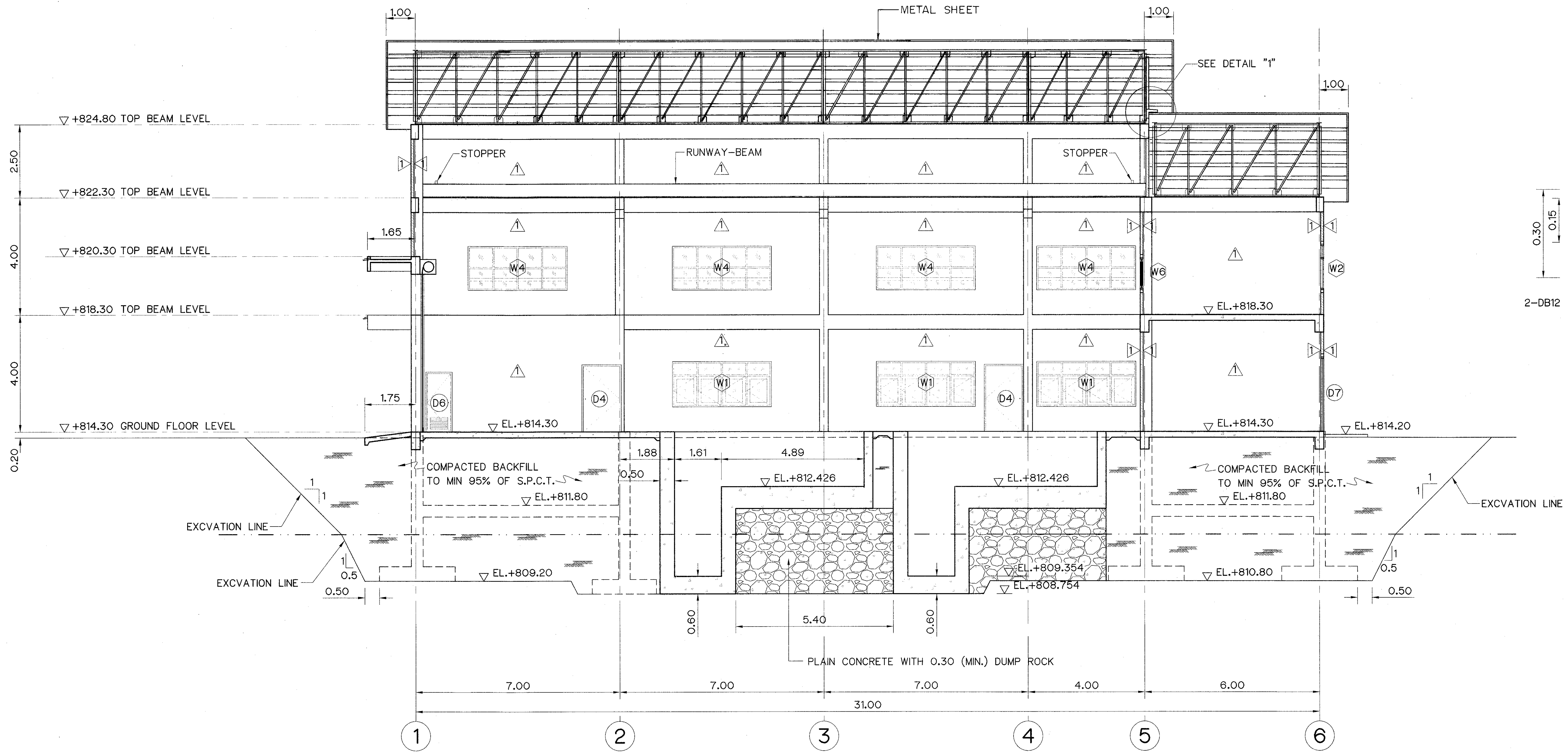
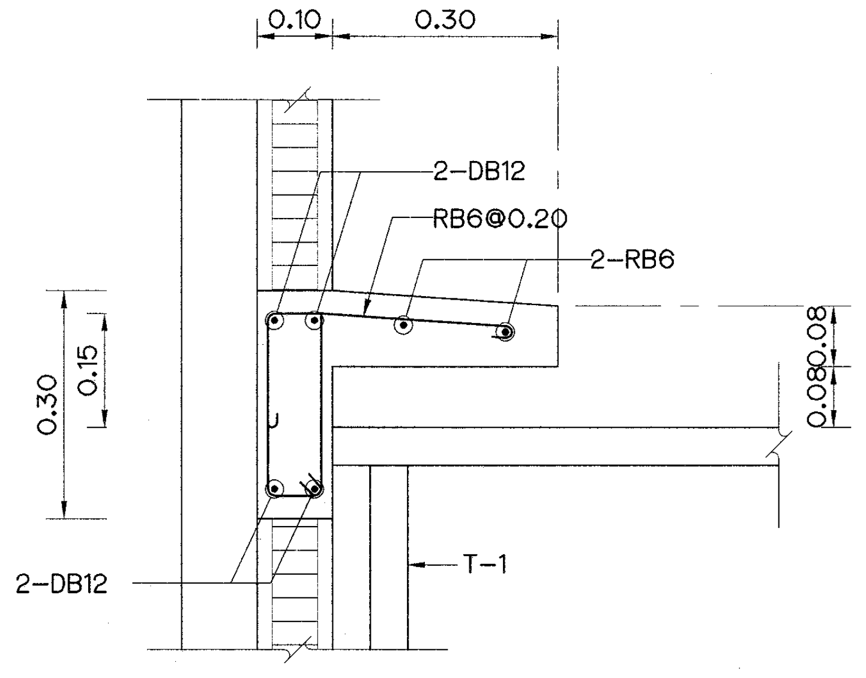
| REVIEWED | |
| SUBMITTED | Chant |
| RECOMMENDED | |
| APPROVED | P. Hom |

DRAWING NO. MH–PH–05
SHEET NO. 88 OF 130



## SECTION E–E

SCALE 1:100



DETAIL "1"

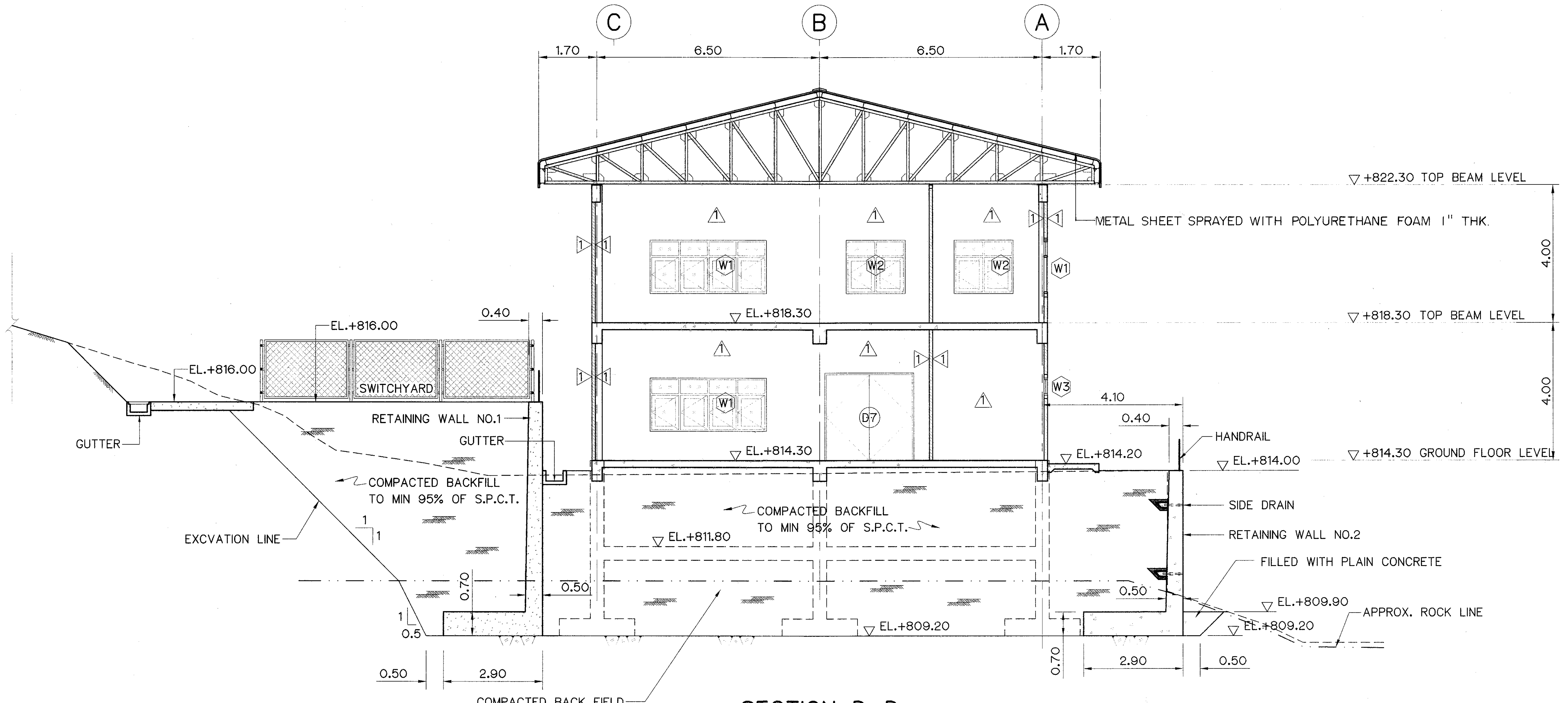
SCALE 1:10

**NOTES :**

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS, UNLESS OTHERWISE SHOWN.
2. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH-GN-03

**REFERENCE DRAWINGS :**

| | |
|---|---|
| 1. PLAN 1st FLOOR AND PLAN 2st FLOOR | MH-PH-02 |
| 2. ELEVATIONS | MH-PH-04 |
| 3. RETAININGWALL REINFORCEMENT DETAILS | MH-PH-18 |



## SECTION D–D

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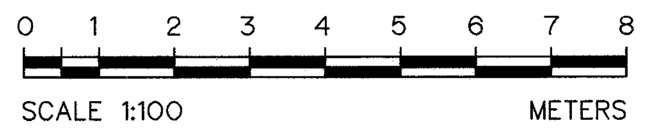

| | | | | |
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| NO. | DATE | REVISIONS | CHECKED | APPROVED |
| | CONSULTANTS | | DEDE | |

KINGDOM OF THAILAND
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

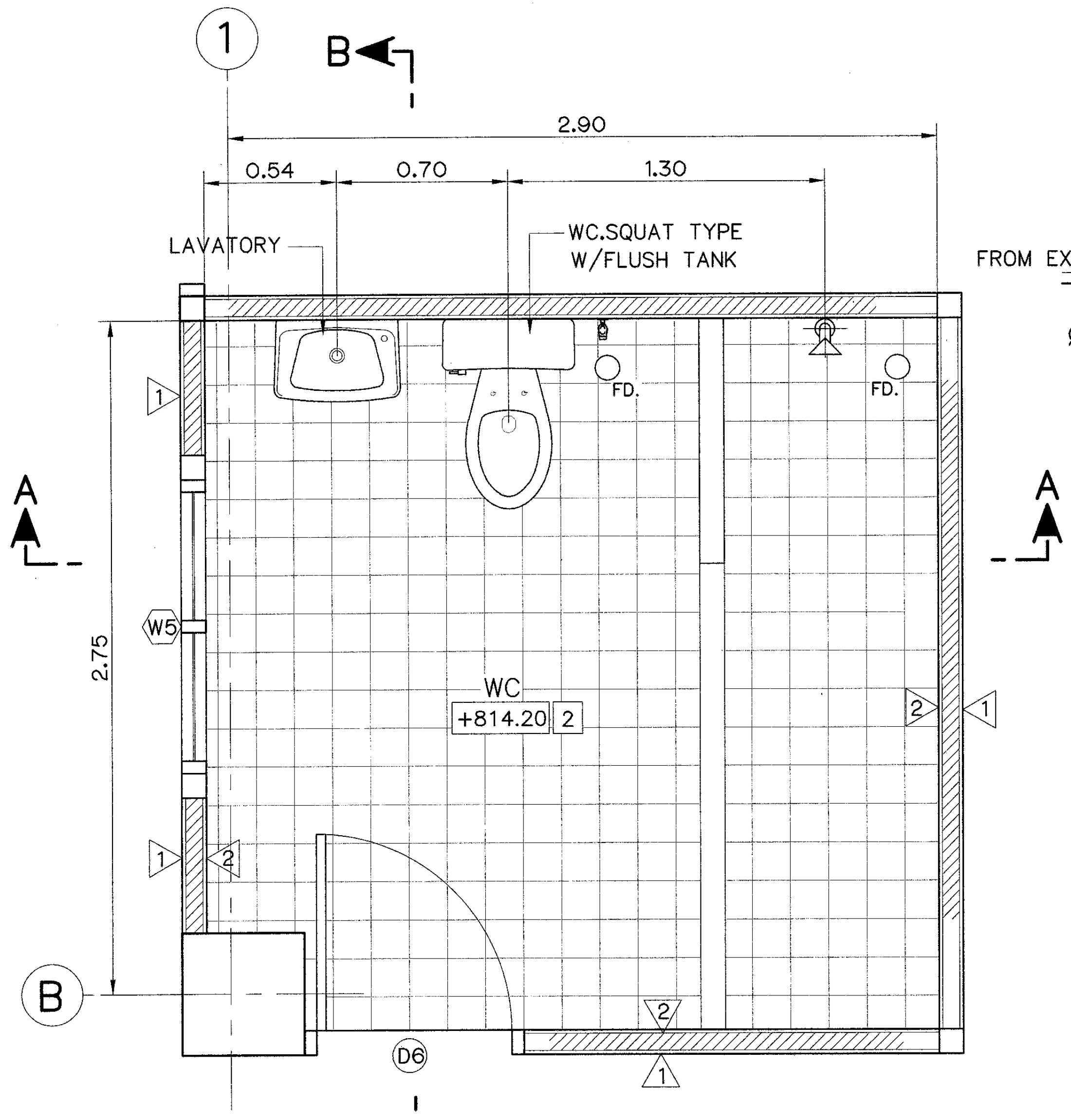
CIVIL WORKS AND TRANSMISSION LINE
POWERHOUSE
SECTIONS (SHEET 2/2)

P&C MANAGEMENT CO.,LTD.

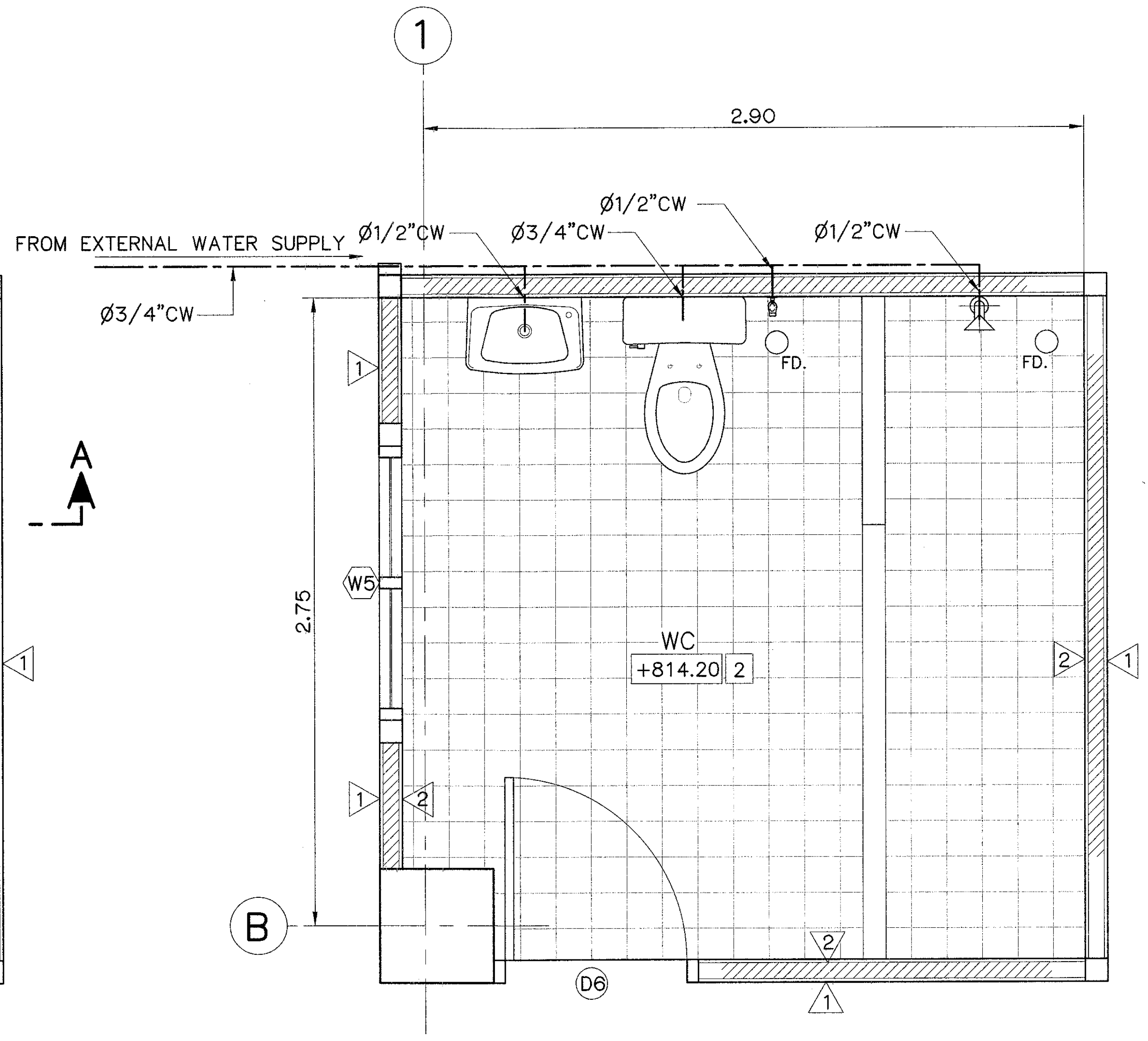
DESIGNED ภย.64624 สย.6226
DRAWN
CHECKED สย.6226
PROJECT MANAGER
DATE 08/03/2559

Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY
REVIEWED
SUBMITTED Chanit
RECOMMENDED
APPROVED P.Hansell

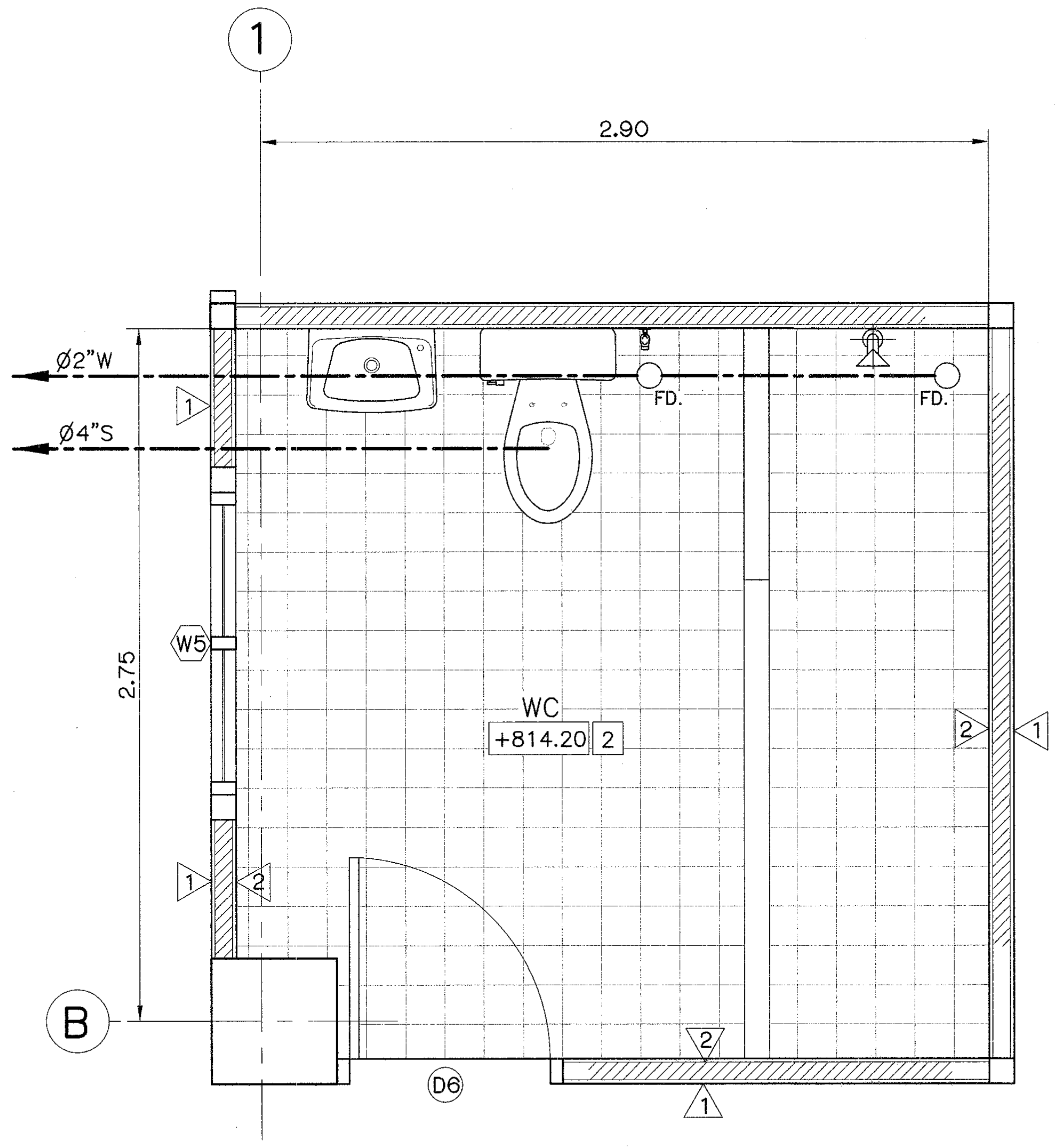
DRAWING NO. MH-PH-06
SHEET NO. 89 OF 130



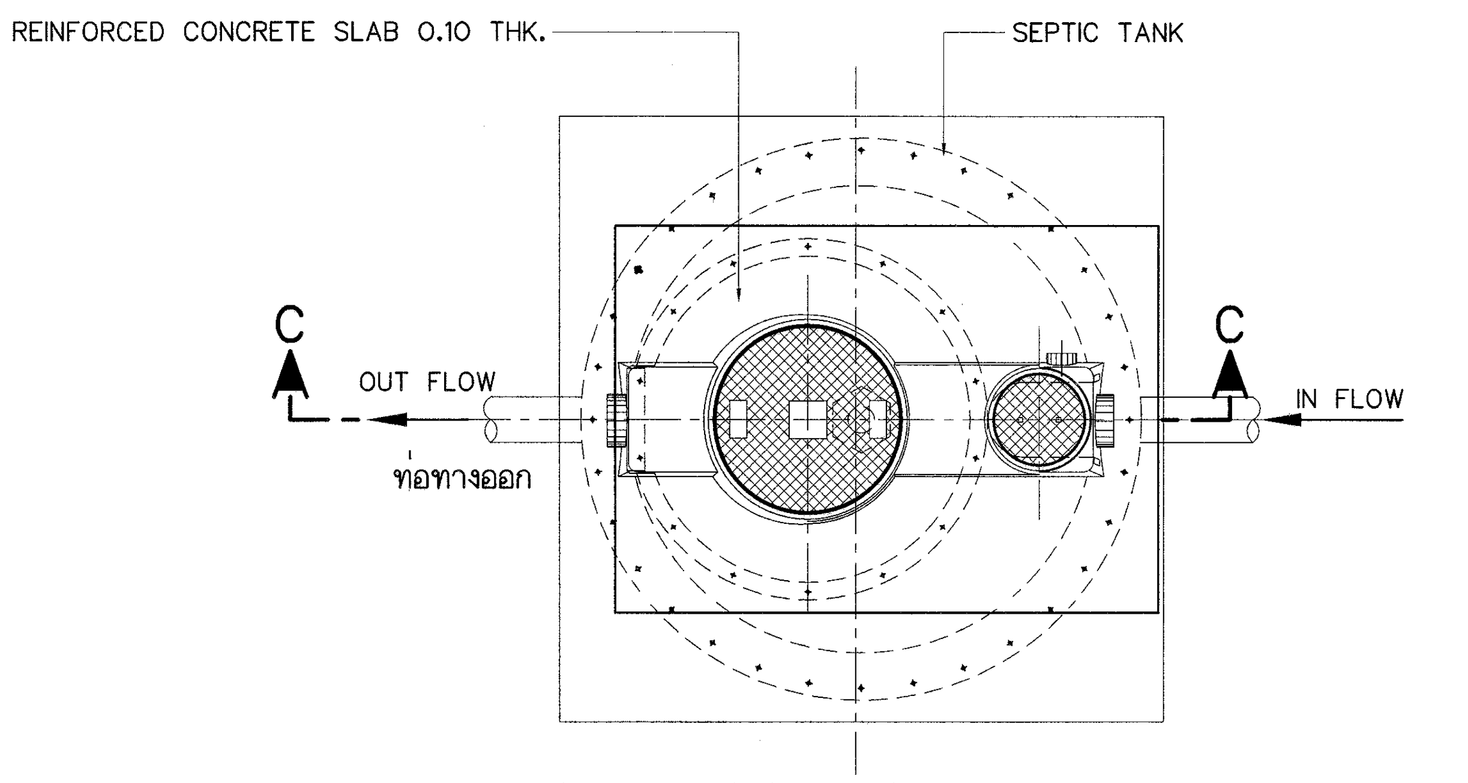
## PLAN WC
SCALE 1:25



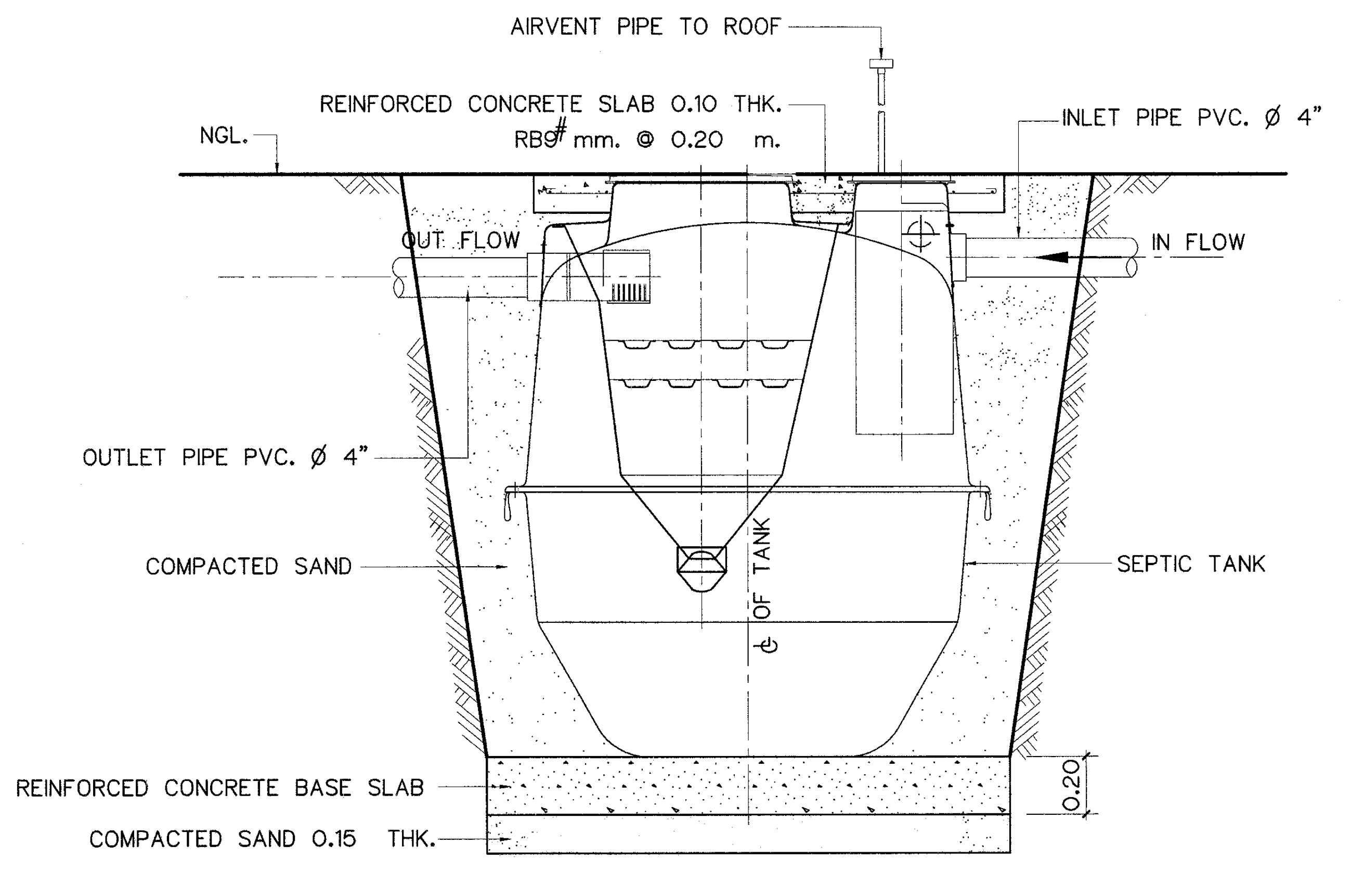
## COLD WATER PIPING
SCALE 1:25



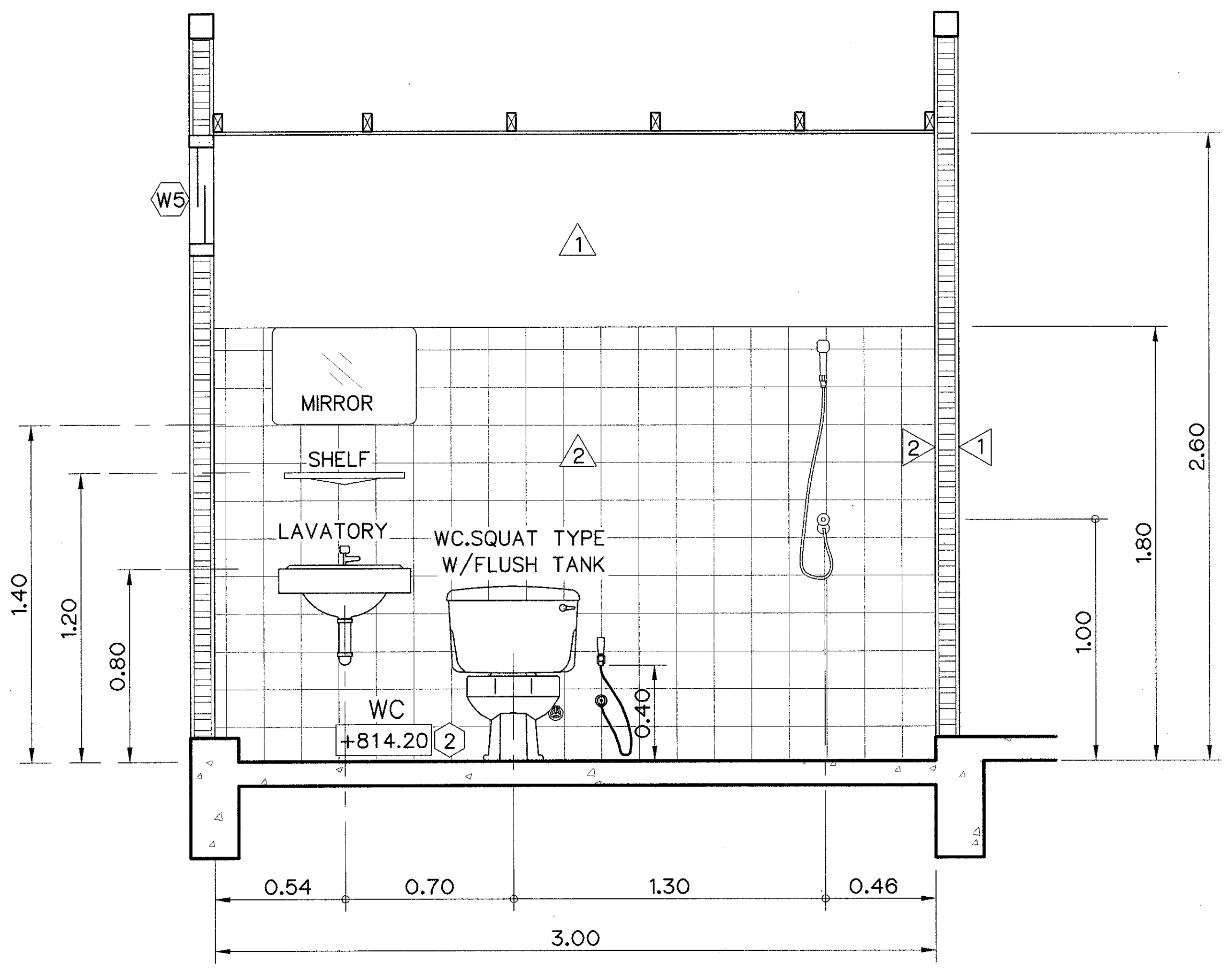
## SOIL, WASTE AND VENT PIPING
SCALE 1:25



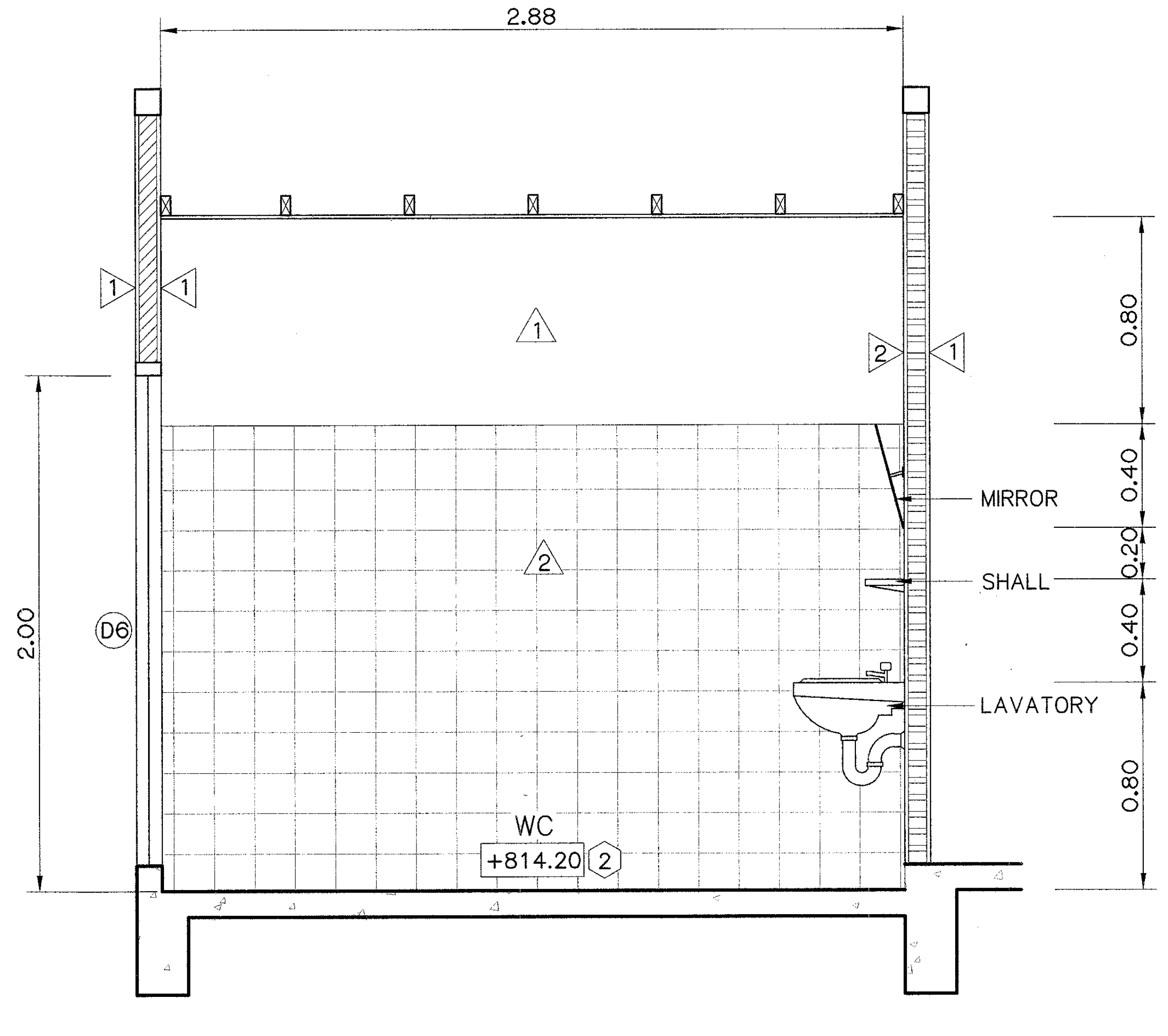
## PLAN OF SEPTIC TANK
NOT TO SCALE



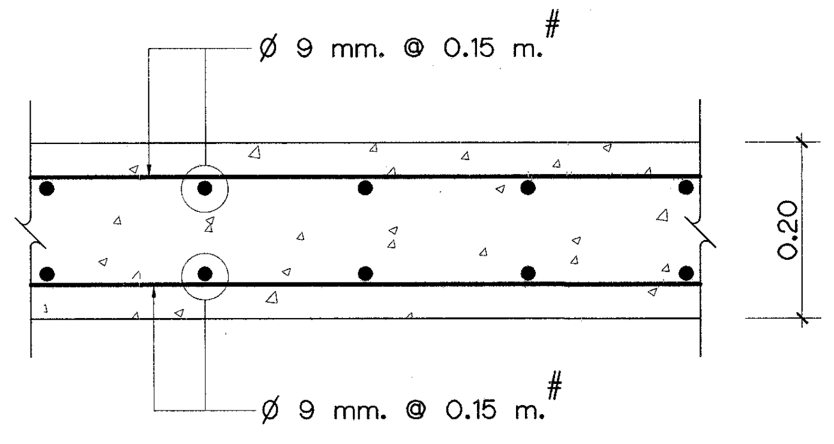
## SECTION C–C
NOT TO SCALE



## SECTION A–A
SCALE 1:25



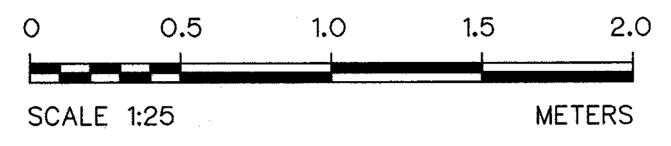
## SECTION B–B
SCALE 1:25



## REINFORCEMENT OF BASE SLAB
NOT TO SCALE

**SYMBOLS :**

| | |
|---|---|
| —←—←— | SOIL PIPE |
| — — — | WASTE PIPE |
| —·—·— | COLD WATER PIPE |
| - - - - - - - | VENT PIPE |



APPLICATION AND DIMENSION OF SEPTIC TANK

| NO. OF USER | VOLUMN | | CONDITION |
|---|---|---|---|
| | RESIDENTIAL | SOIL ONLY 60 LPCD | 16 |
| | | TOTAL WASTE 200 LPCD | 5 |

REMARK:LPCD = LITER PER CAPITAL PER DAY

MATERIAL AND APPLICATION OF SEPTIC TANK

| COMPONENTS | MATERIAL |
|---|---|
| 1. TANK BODY | LLDEL (LINER LOW TYPE MEDIUM DENSITY) |
| 2. MANHOLE COVER | ABS (ACRYLONITRILE–BUTADIENCE–STYRENE), IRON CAST |
| 3. INLET, OUTLET PIPES | POLYETHYLENE |
| 4. FLEX | FLEXIBLE FITTING ABS Ø 100 MM. |
| 5. MEDIA | HDPE |

**NOTES :**

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS, UNLESS OTHERWISE SHOWN.
2. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH–GN–03

**REFERENCE DRAWING :**

1. POWERHOUSE, PLAN 1st FLOOR AND PLAN 2nd FLOOR MH–PH–02

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
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| | CONSULTANTS | | DEDE | |

KINGDOM OF THAILAND
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

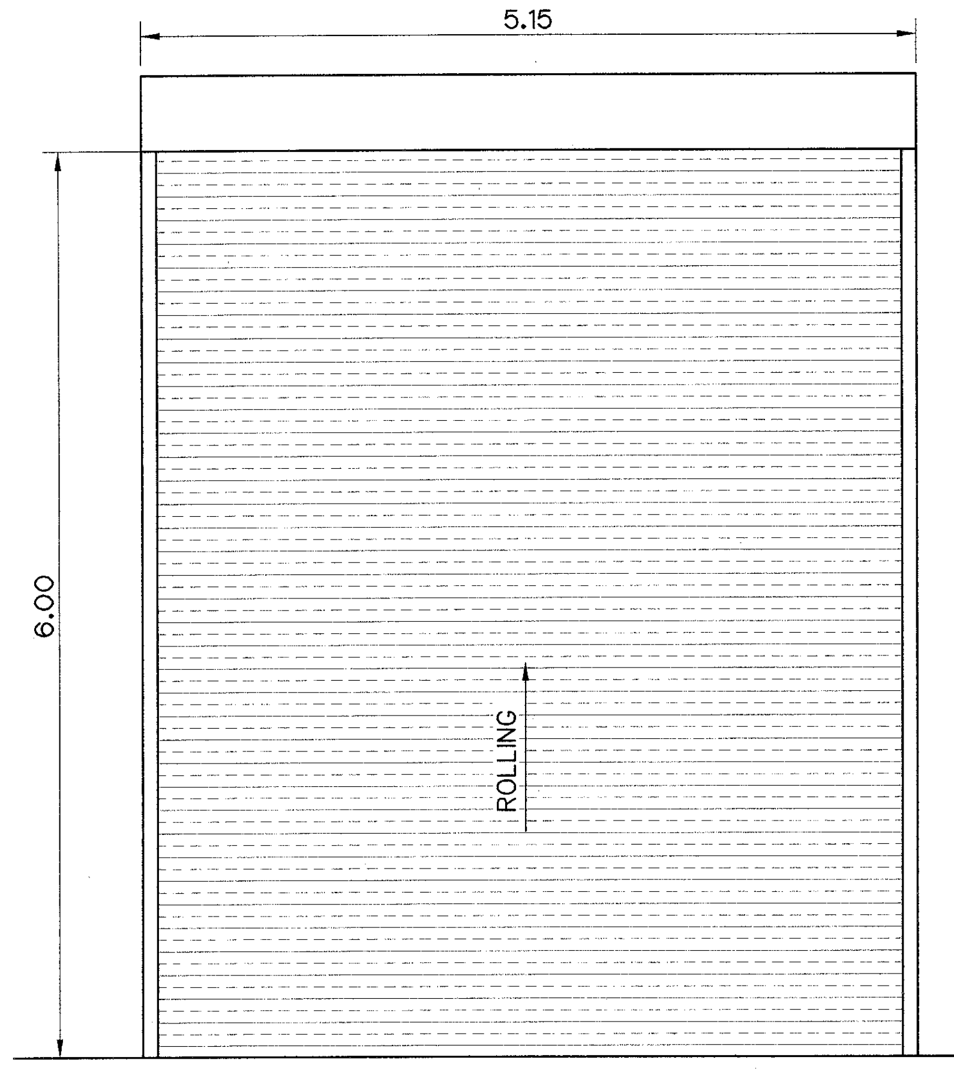
MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
POWERHOUSE
DETAILS OF TOILET, AND BUCKET TREATS

P&C MANAGEMENT CO.,LTD.
DESIGNED ภย.64624 สย.6226
DRAWN
CHECKED สย.6226
08/03/2559
PROJECT MANAGER DATE

Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY
REVIEWED
SUBMITTED Chanit
RECOMMENDED
APPROVED P. Hansoll.

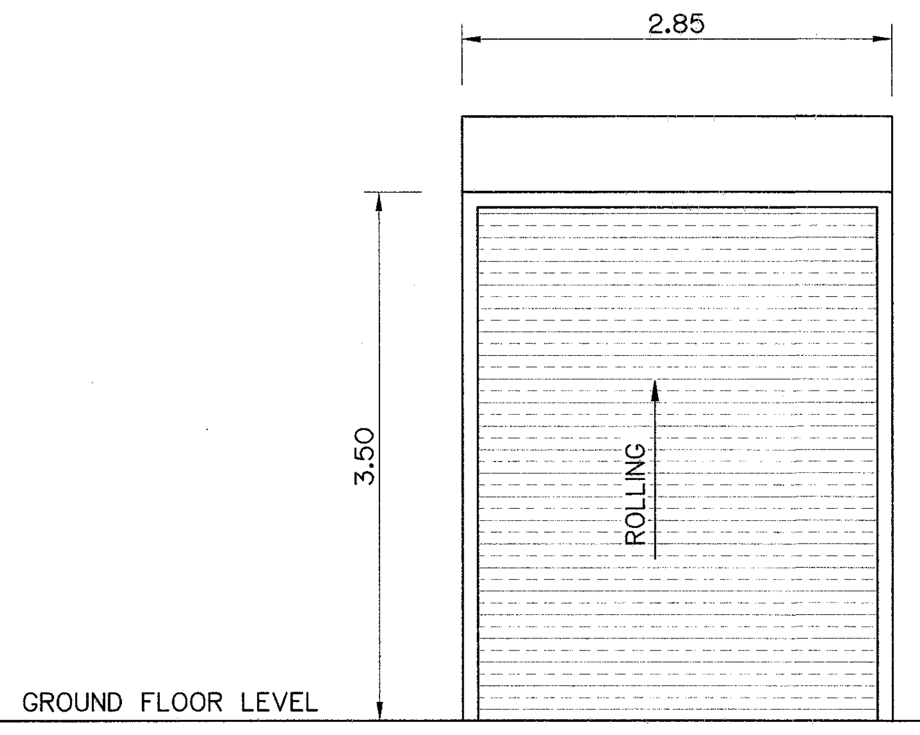
DRAWING NO. MH–PH–07
SHEET NO. 90 OF 130



D1

**ROLLING DOOR**

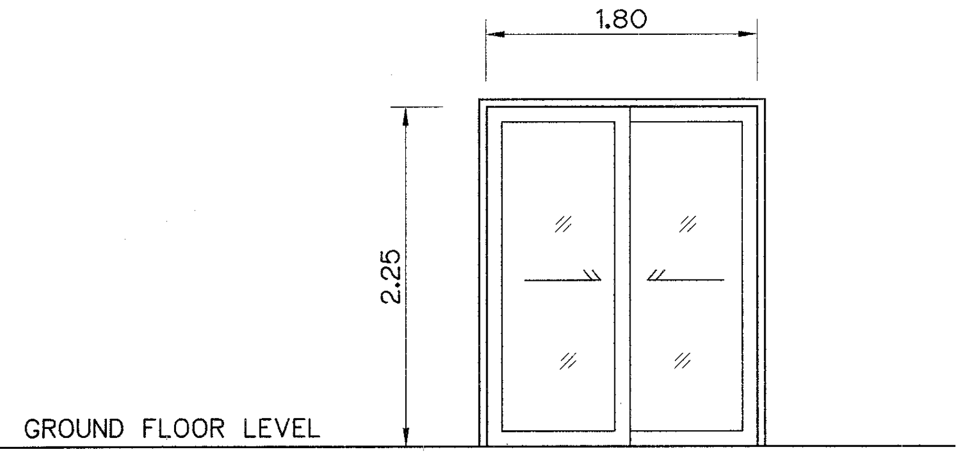
SCALE 1:50



D2

**ROLLING DOOR**

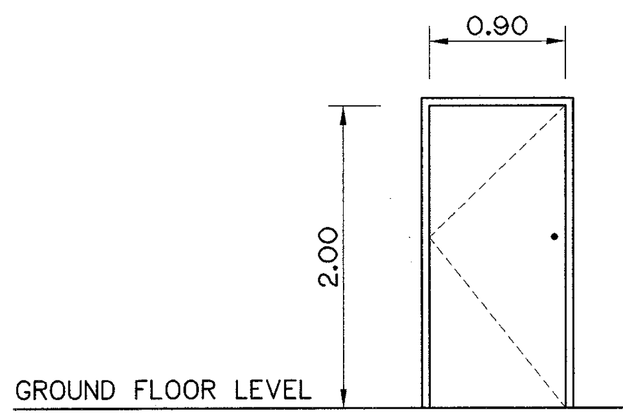
SCALE 1:50



D3

**SLIDE DOOR**

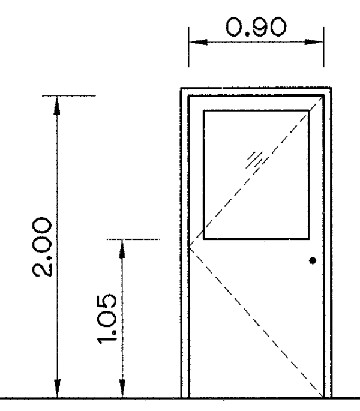
SCALE 1:50



D4

**OPENING DOOR**

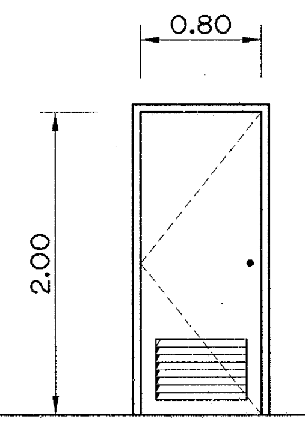
SCALE 1:50



D5

**OPENING DOOR**

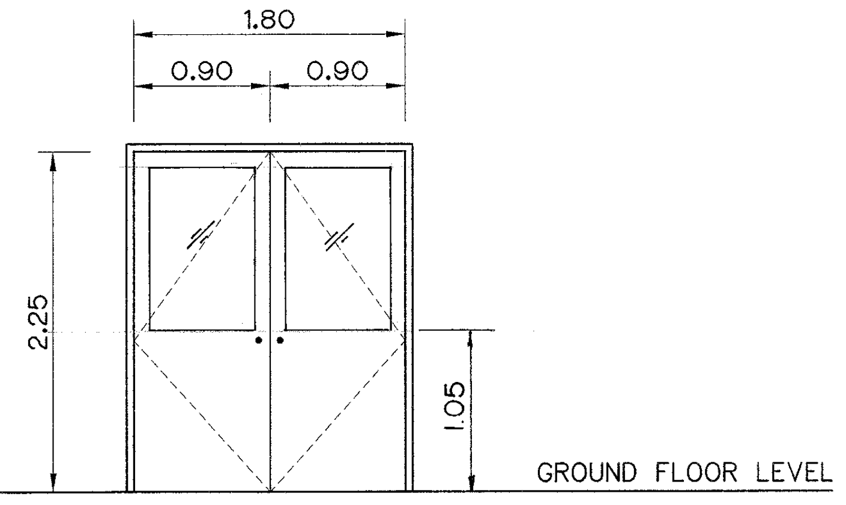
SCALE 1:50



D6

**OPENING DOOR**

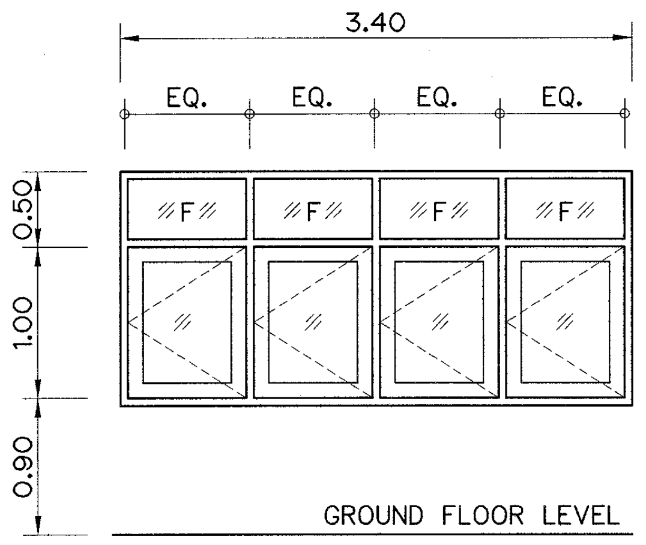
SCALE 1:50



D7

**OPENING DOOR**

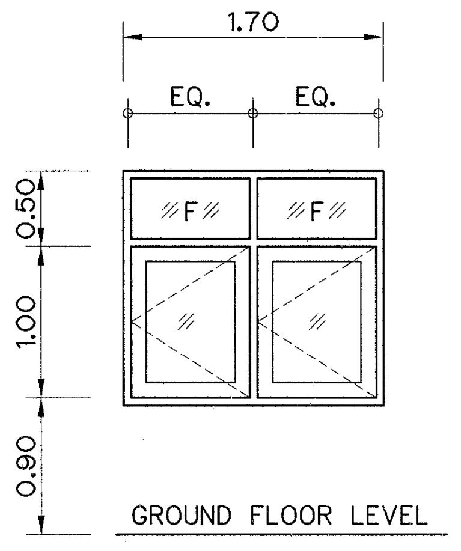
SCALE 1:50



W1

**OPENING WINDOW**

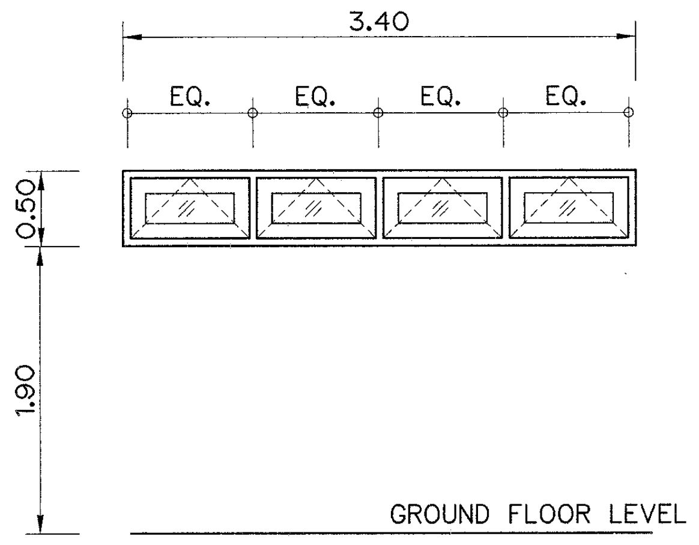
SCALE 1:50



W2

**OPENING WINDOW**

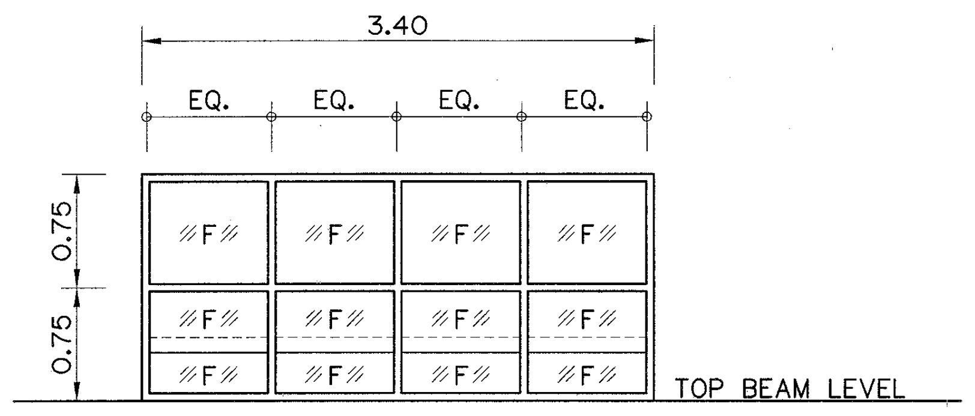
SCALE 1:50



W3

**OPENING WINDOW**

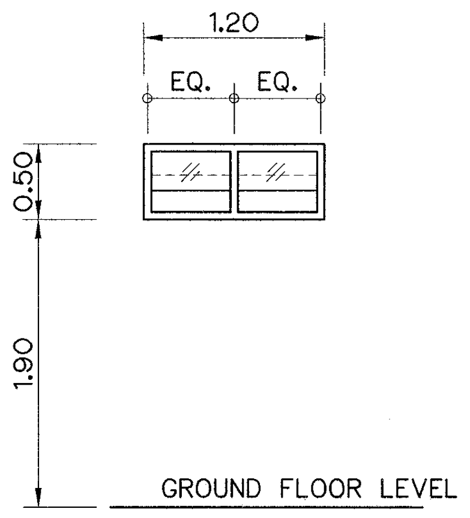
SCALE 1:50



W4

**FIX GRASS WINDOW**

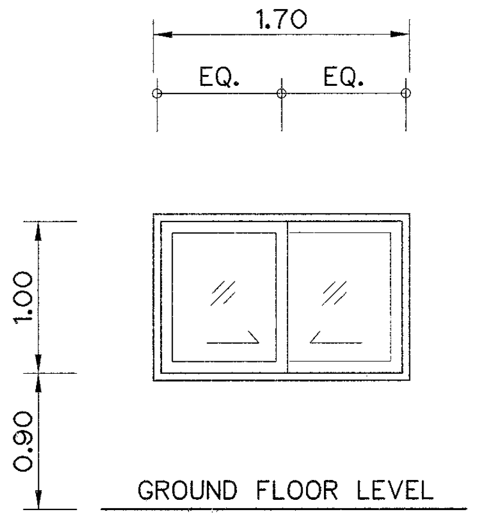
SCALE 1:50



W5

**FIX GRASS WINDOW**

SCALE 1:50



W6

**SLIDING WINDOW**

SCALE 1:50

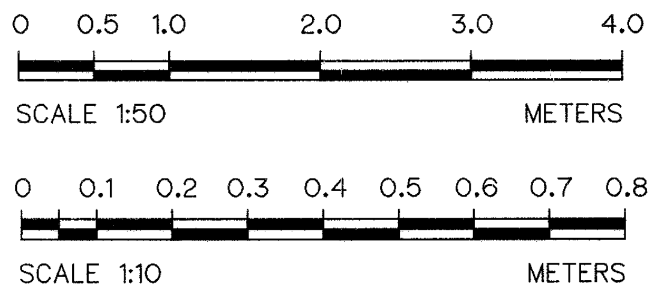
| SYMBOL | DESCRIPTIONS | SIZE | | FRAME | PANEL | HINGE | LOCKSET | HANDLE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| | | WIDTH | HEIGHT | | | | | | |
| D1 | ROLLING DOOR ( STEEL NO.18,1.2 mm. Thk.) | 5.15 | 6.00 | GALVANIZED STEEL | — | — | NORMAL KEY | — | MOTOR OPERATING |
| D2 | ROLLING DOOR ( STEEL NO.18,1.2 mm. Thk.) | 2.85 | 3.50 | GALVANIZED STEEL | — | — | NORMAL KEY | — | MOTOR OPERATING |
| D3 | SLIDE DOOR | 1.80 | 2.25 | ALUMINIUM(NA) 2"x 4" | GLASS 5 mm.thk. | — | CYINDER LOCK | — | |
| D4 | OPENING DOOR | 0.90 | 2.00 | HARDWOOD 2"x 4" | TEAK PLYWOOD | STAINLESS STEEL 4"x3"x2.5mm. | CYINDER LOCK | — | |
| D5 | OPENING DOOR | 0.90 | 2.00 | HARDWOOD 2"x 4" | TEAK PLYWOOD & GLASS 5 mm.thk. | STAINLESS STEEL 4"x3"x2.5mm. | CYINDER LOCK | — | |
| D6 | OPENING DOOR | 0.80 | 2.00 | P.V.C. 2"x 4" | P.V.C. | STAINLESS STEEL 4"x3"x2.5mm. | CYINDER LOCK | — | |
| D7 | OPENING DOOR | 1.80 | 2.25 | HARDWOOD 2"x 4" | TEAK PLYWOOD & GLASS 5 mm.thk | STAINLESS STEEL 4"x3"x2.5mm. | CYINDER LOCK | — | |
| | | | | | | | | | |
| W1 | OPENING WINDOW | 3.40 | 1.50 | ALUMINIUM(NA) 2"x 4" | GLASS 5 mm.thk. | ● | ● | ● | FULL SET OF ACCESSORIES FROM MANUFACTURER |
| W2 | OPENING WINDOW | 1.70 | 1.50 | ALUMINIUM(NA) 2"x 4" | GLASS 5 mm.thk. | — | — | — | |
| W3 | OPENING WINDOW | 3.40 | 0.50 | ALUMINIUM(NA) 2"x 4" | GLASS 5 mm.thk. | — | — | — | |
| W4 | FIXED GLASS WINDOW | 3.40 | 1.50 | ALUMINIUM(NA) 2"x 4" | GLASS 5 mm.thk. | — | — | — | |
| W5 | FIXED GLASS WINDOW | 1.20 | 0.50 | ALUMINIUM(NA) 2"x 4" | GLASS 5 mm.thk. | — | — | — | |
| W6 | SLIDING WINDOW | 1.70 | 1.00 | ALUMINIUM(NA) 2"x 4" | GLASS 5 mm.thk. | — | — | — | |
| | | | | | | | | | |
| ● | SHALL BE USED SPACIFIED ACCESSORIES | | | | | | | | |

## NOTES :

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS, UNLESS OTHERWISE SHOWN.
2. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH-GN-03
3. FOR PAINTING WORKS SEE TECHNICAL SPECIFICATION

## REFERENCE DRAWINGS :

| | |
|---|---|
| 1. POWERHOUSE, PLAN 1st FLOOR AND PLAN 2nd FLOOR | MH-PH-02 |
| 2. POWERHOUSE, ELEVATIONS | MH-PH-04 |
| 3. POWERHOUSE, SECTIONS | MH-PH-05 TO PH-06 |



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| | CONSULTANTS | | DEDE | |

KINGDOM OF THAILAND
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

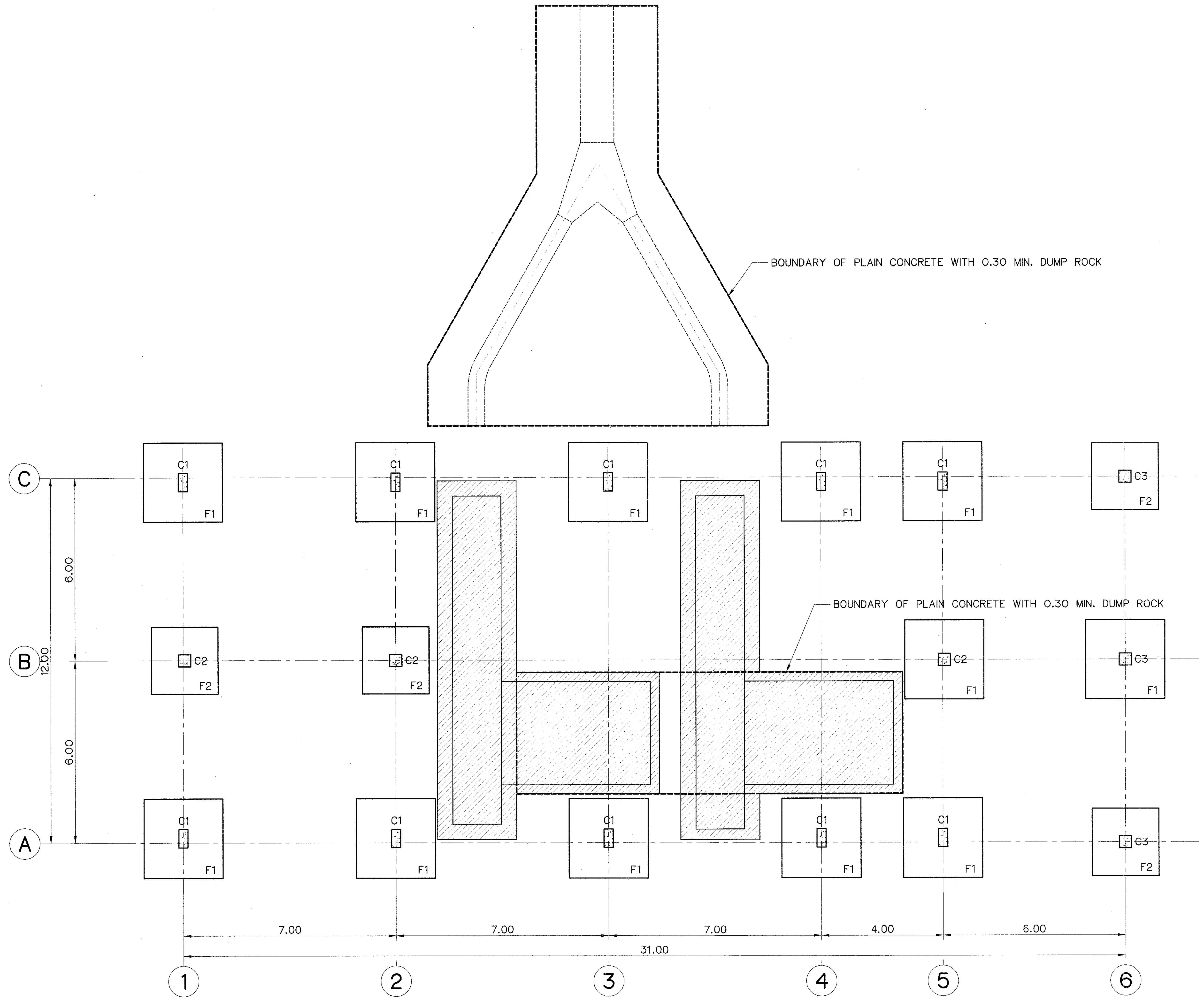
# MAE HAT HYDROPOWER PROJECT

## CIVIL WORKS AND TRANSMISSION LINE
## POWERHOUSE
## DETAIL OF DOORS, WINDOWS AND NAME PLATE

P&C MANAGEMENT CO.,LTD.

Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

| | |
|---|---|
| DESIGNED ภย.64624 สย.6226 | REVIEWED |
| DRAWN | SUBMITTED Chant |
| CHECKED สย.6226 | RECOMMENDED |
| | APPROVED P. Hansell |
| PROJECT MANAGER | DATE 08/03/2559 |
| DRAWING NO. MH-PH-08 | SHEET NO. 91 OF 130 |


BOUNDARY OF PLAIN CONCRETE WITH 0.30 MIN. DUMP ROCK
BOUNDARY OF PLAIN CONCRETE WITH 0.30 MIN. DUMP ROCK
C
B
A
C1
C2
C3
F1
F2
6.00
12.00
6.00
7.00
7.00
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2
3
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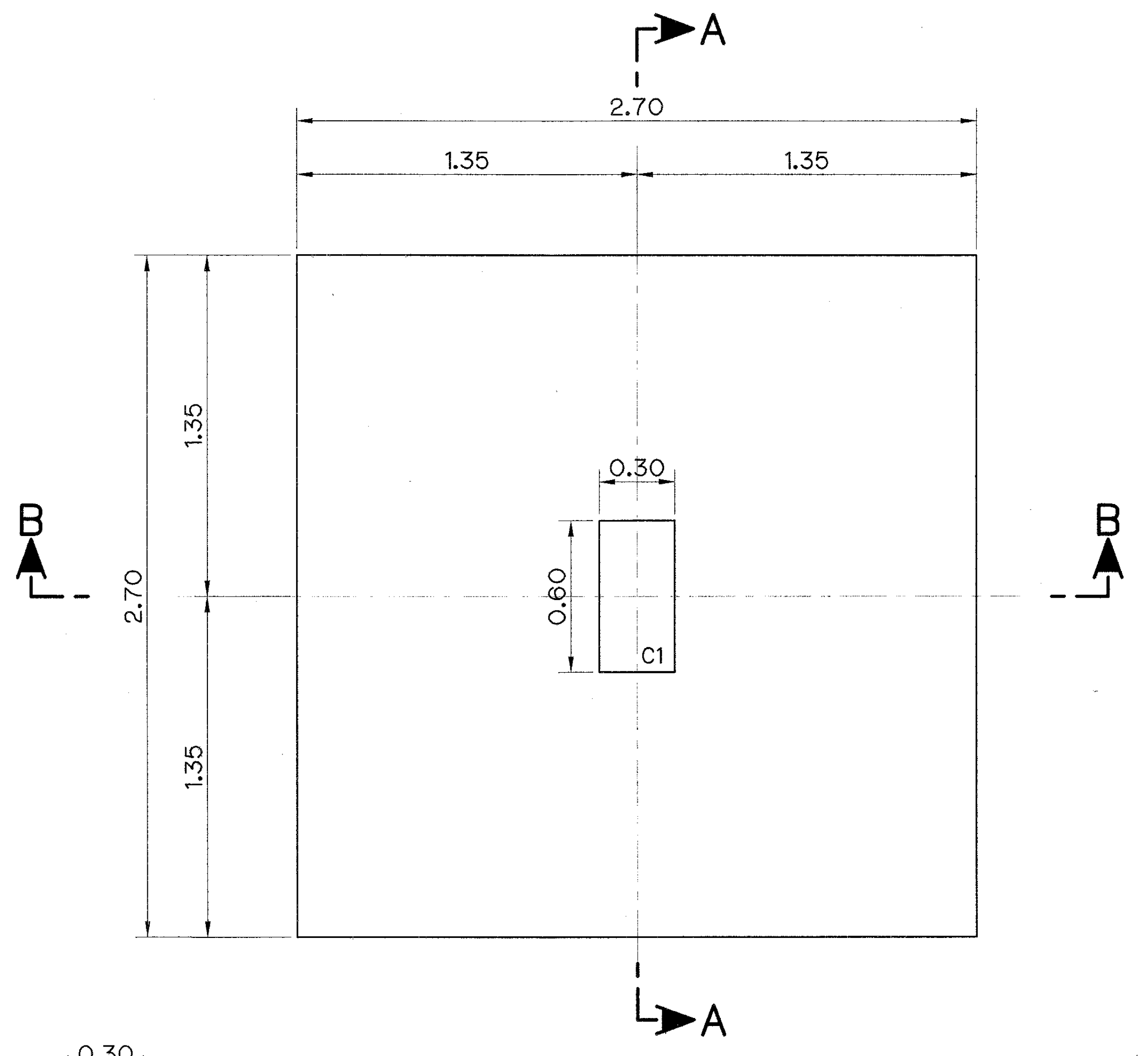
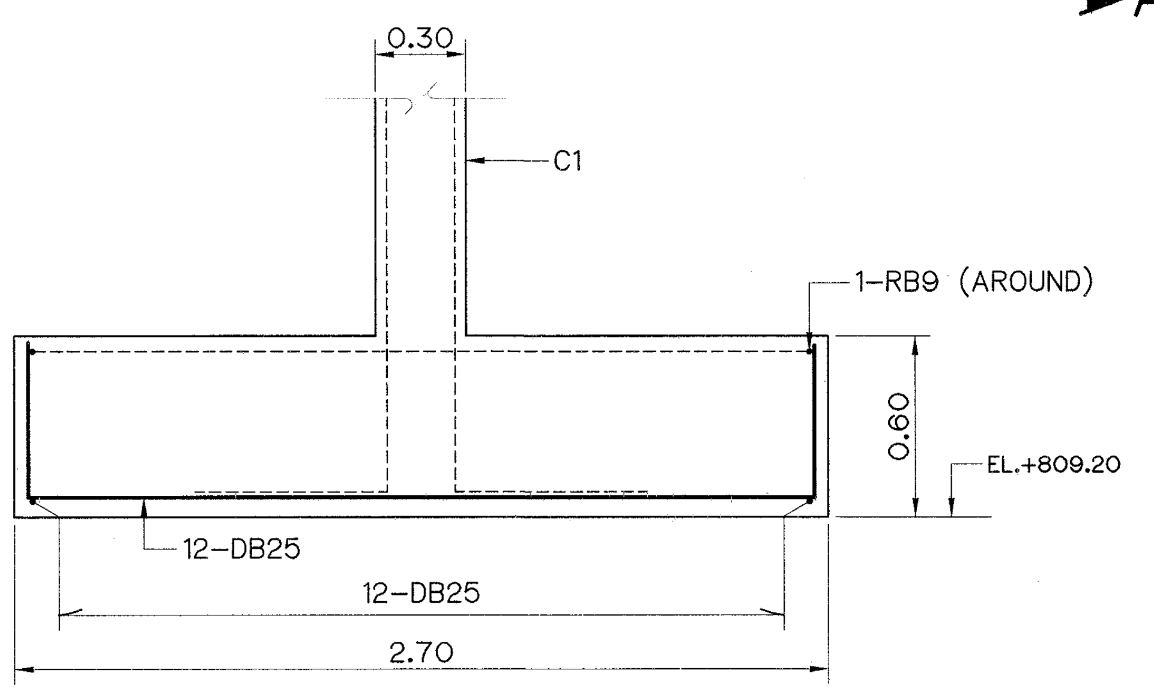
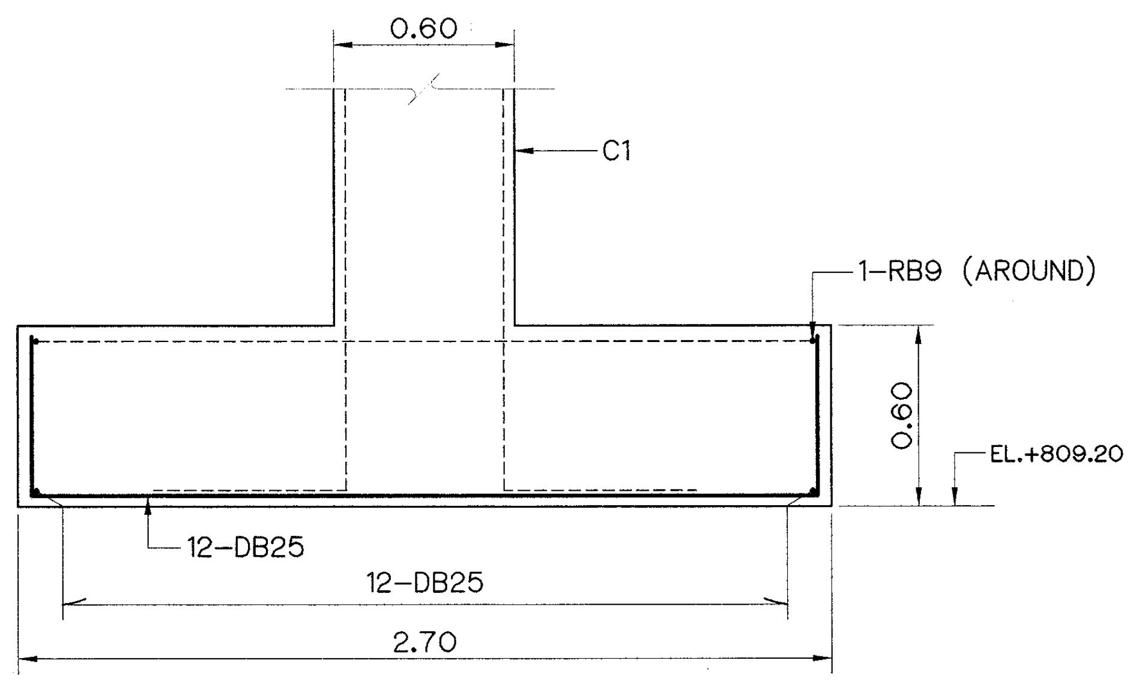
5
6





SECTION B–B



SECTION A–A

FOOTING (F1)

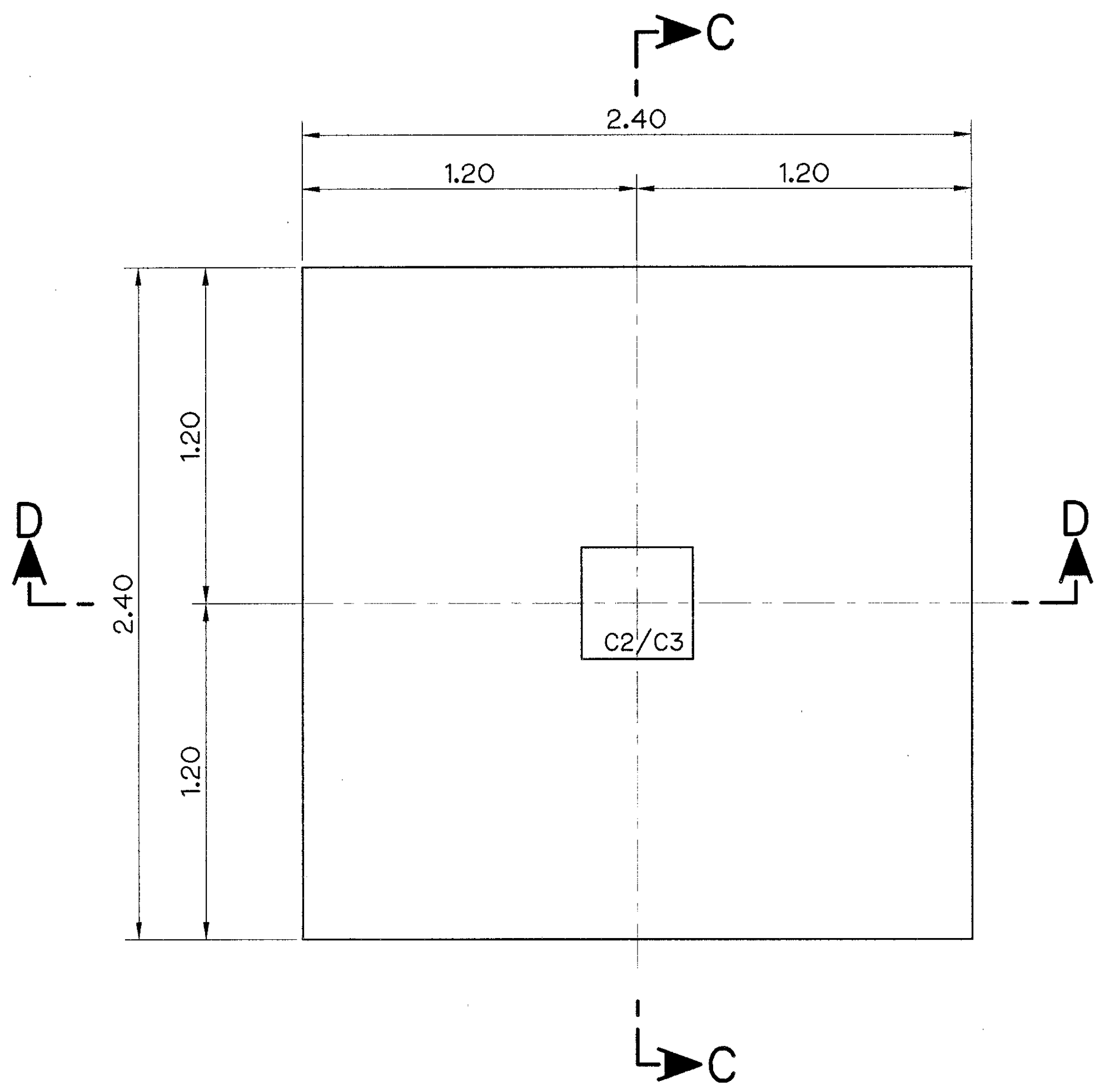
SCALE 1:25

NOTES :

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS, UNLESS OTHERWISE SHOWN.
2. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH-GN-03
3. CONCRETE DESIGN BASED ON THE COMPRESSIVE STRENGTH OF 210 KSC, STANDARD CYLINDER Ø0.15x0.30 m. TEST AT AGE 28 DAYS. UNLESS OTHERWISE INDICATED IN SPECIFIC DRAWINGS.

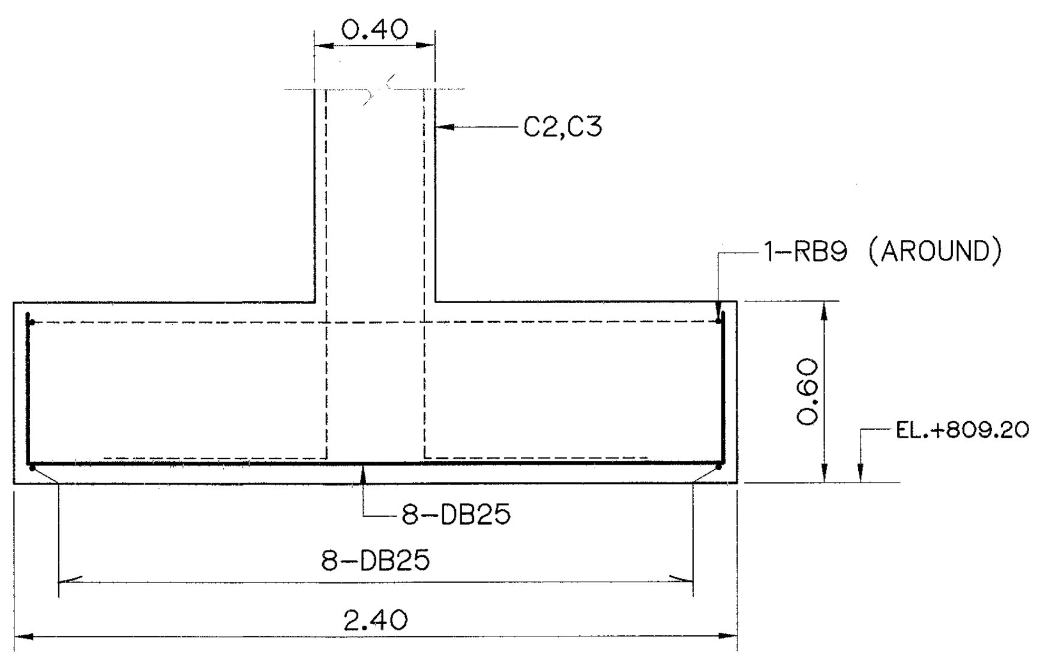
REFERENCE DRAWINGS :

| | |
|---|---|
| 1. POWERHOUSE, PLAN 1st FLOOR AND PLAN 2nd FLOOR | MH-PH-02 |
| 2. POWERHOUSE, COLUMN, BRACKET AND STAIR DETAILS | MH-PH-14 |

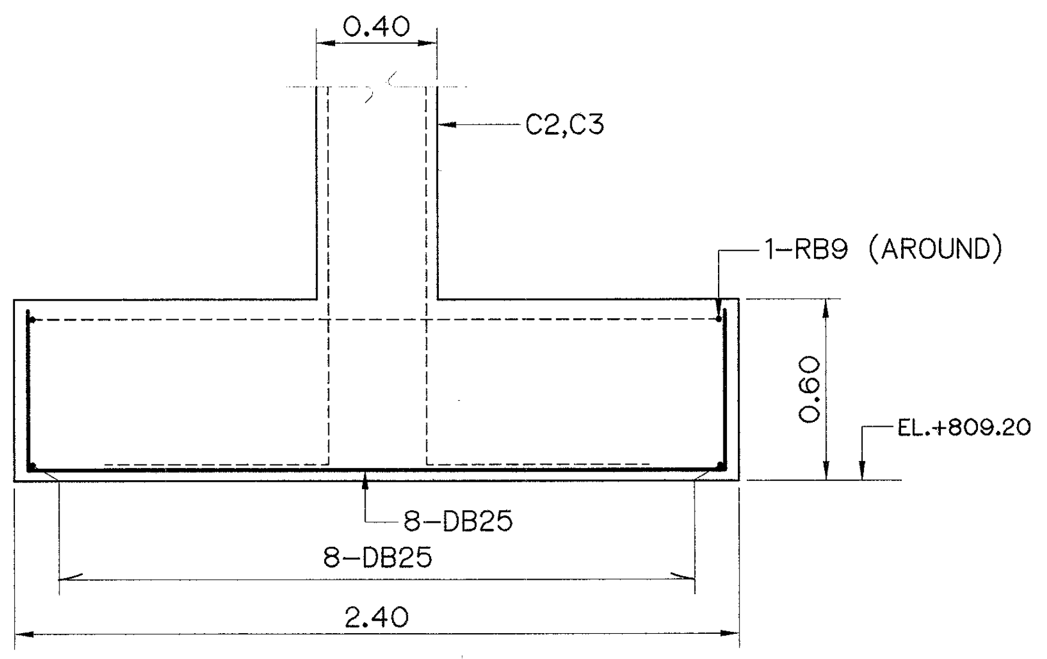


FOOTING (F2)

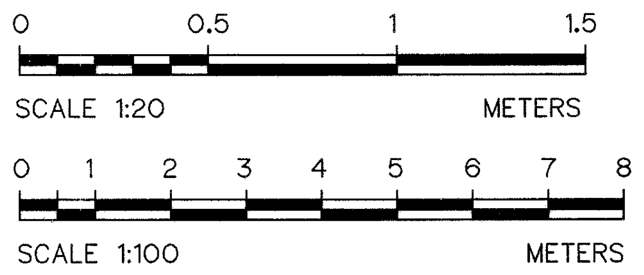
SCALE 1:25



SECTION C–C



SECTION D–D



| NO. | DATE | REVISIONS | CHECKED | APPROVED |
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CONSULTANTS

DEDE

KINGDOM OF THAILAND
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
POWERHOUSE
PLAN OF FOOTING AND DETAILS

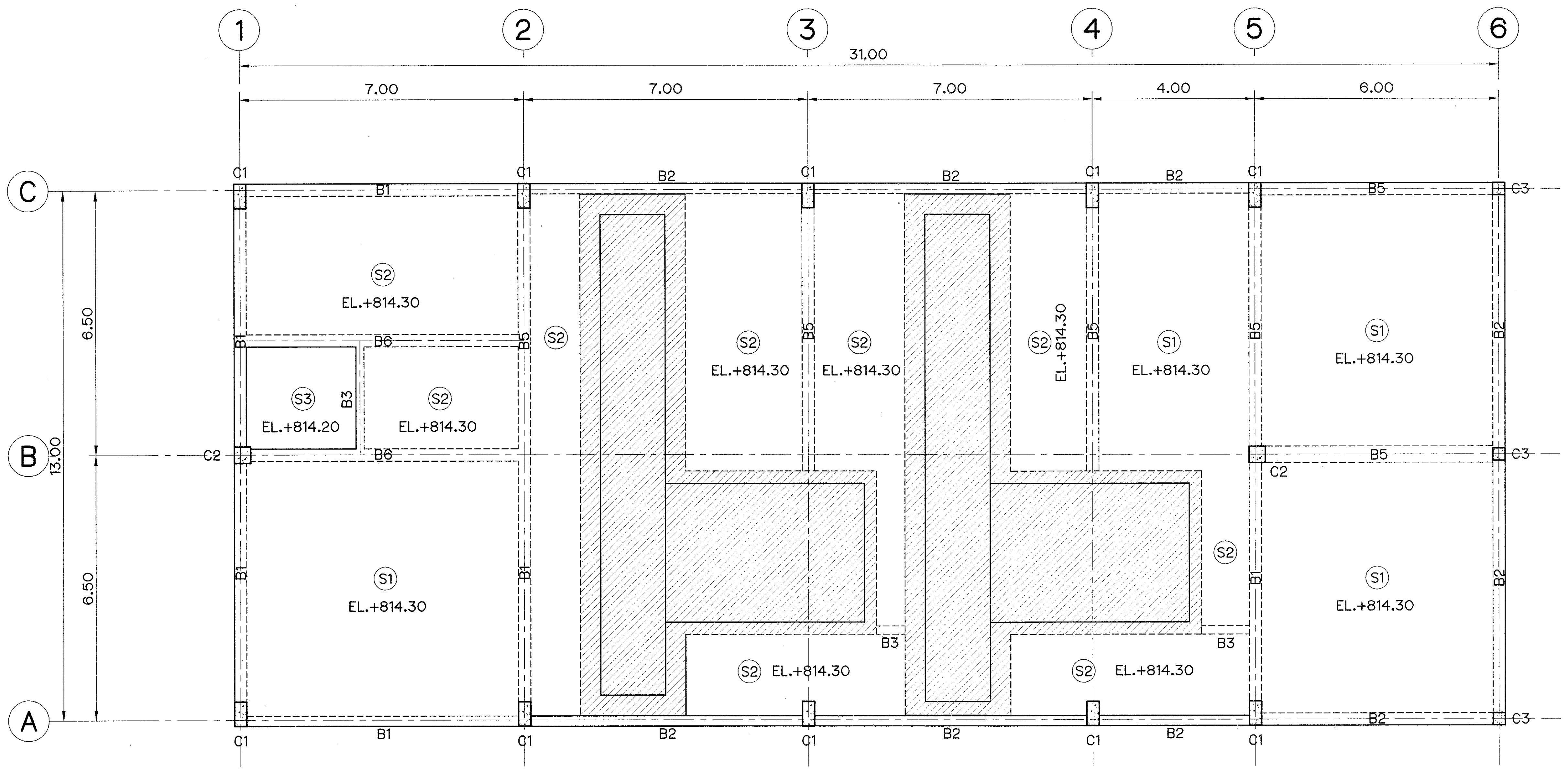
P&C MANAGEMENT CO.,LTD.

Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

| | |
|---|---|
| DESIGNED ภย.64624 สย.6226 | REVIEWED |
| DRAWN | SUBMITTED Chait |
| CHECKED สย.6226 | RECOMMENDED |
| PROJECT MANAGER / DATE 08/03/2559 | APPROVED P. Hans |

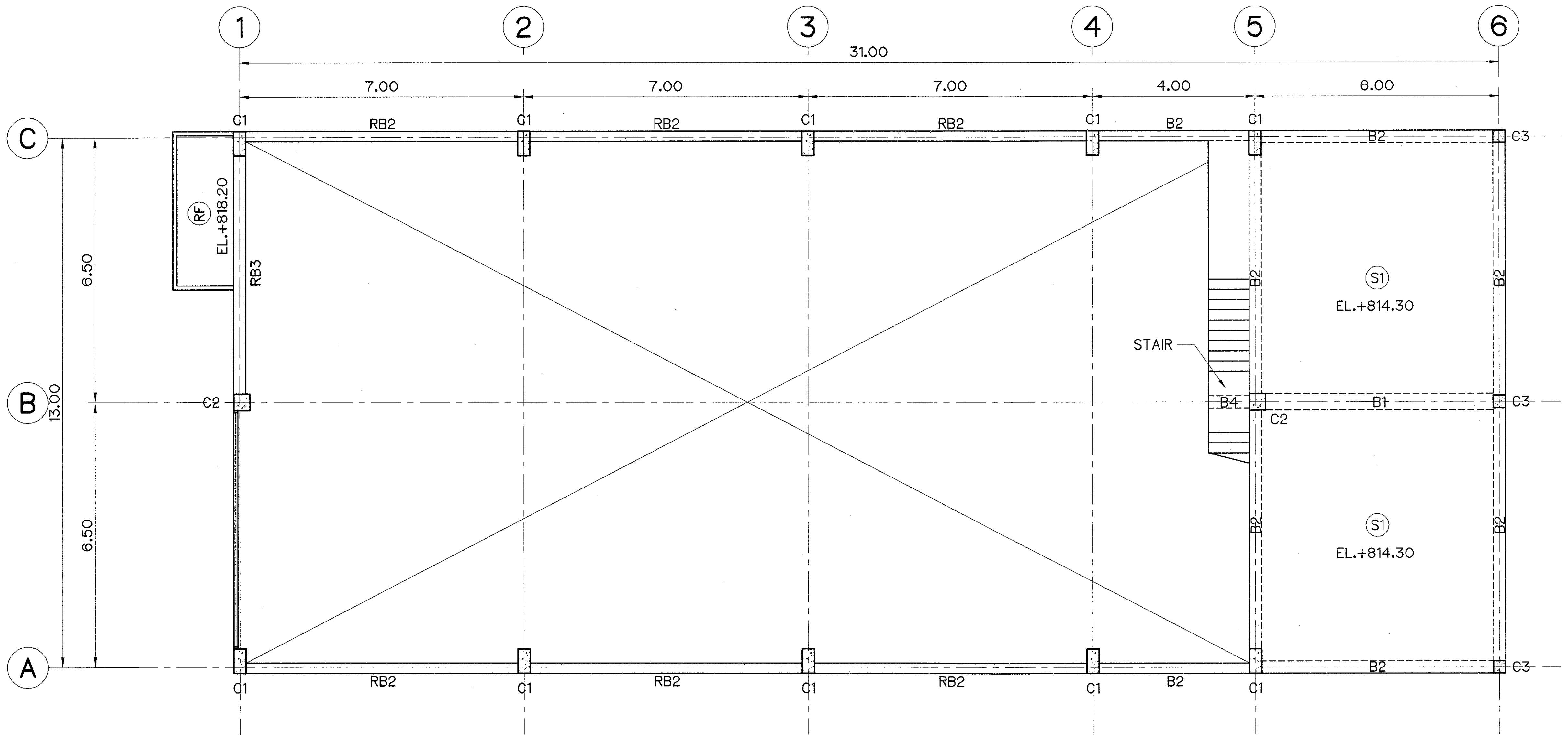
DRAWING NO. MH–PH–09

SHEET NO. 92 OF 130



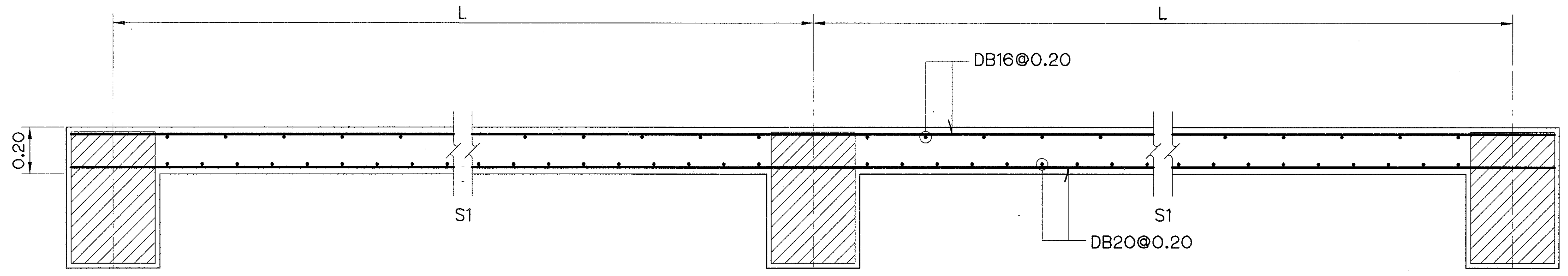
## PLAN OF 1st FLOOR

SCALE 1:100



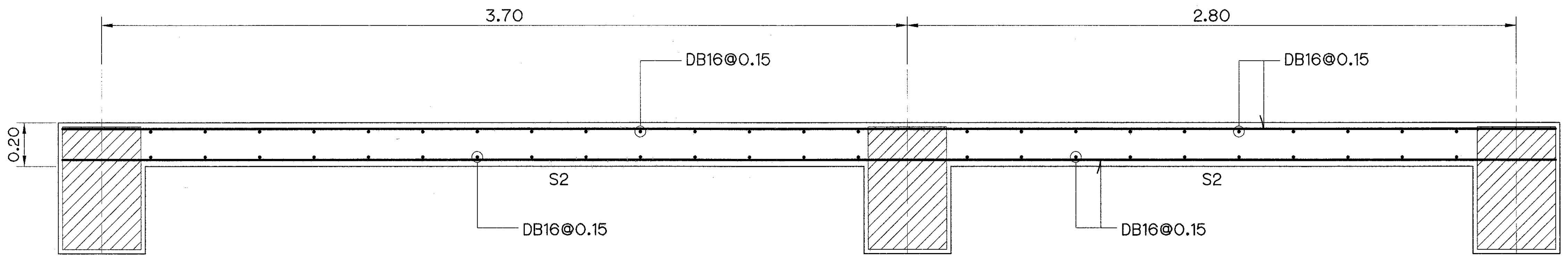
## PLAN OF 2nd FLOOR

SCALE 1:100



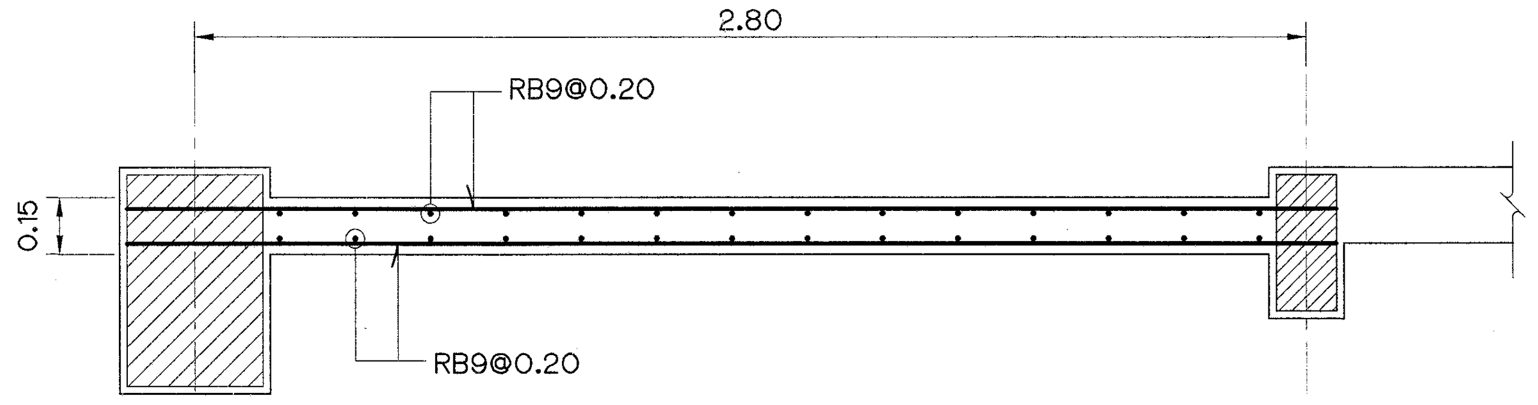
## S1

SCALE 1:20



## S2

SCALE 1:20



## S3

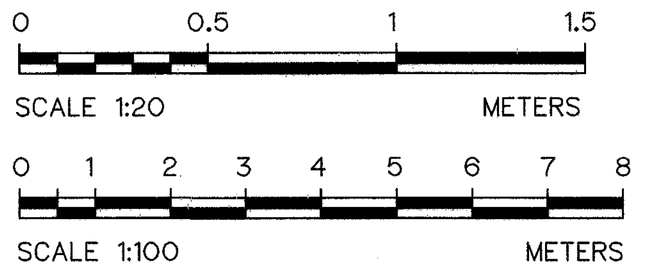
SCALE 1:20

## NOTES :

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS, UNLESS OTHERWISE SHOWN.
2. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH-GN-03
3. CONCRETE DESIGN BASED ON THE COMPRESSIVE STRENGTH OF 210 KSC, STANDARD CYLINDER Ø0.15x0.30 m. TEST AT AGE 28 DAYS. UNLESS OTHERWISE INDICATED IN SPECIFIC DRAWINGS.

## REFERENCE DRAWINGS :

| | |
|---|---|
| 1. POWERHOUSE, PLAN 1st FLOOR AND PLAN 2nd FLOOR | MH-PH-02 |
| 2. POWERHOUSE, PLAN OF FOOTING AND DETAILS | MH-PH-09 |
| 3. COLUMN, BRACKET AND STAIR DETAILS | MH-PH-14 |



| NO. | DATE | REVISIONS | CHECKED | APPROVED |
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KINGDOM OF THAILAND
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MAE HAT HYDROPOWER PROJECT

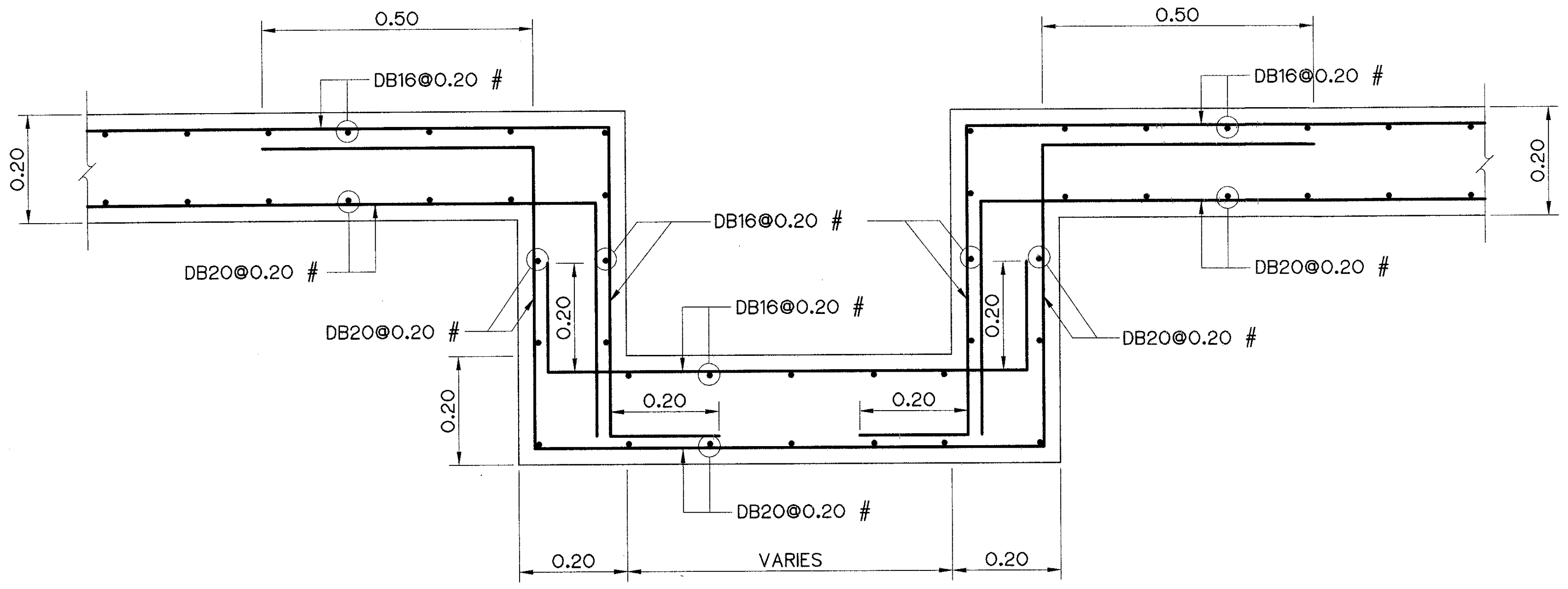
CIVIL WORKS AND TRANSMISSION LINE
POWERHOUSE
PLAN OF SLAB AND DETAILS (1/2)

P&C MANAGEMENT CO.,LTD.

DESIGNED ภย.64624 สย.6226
DRAWN
CHECKED สย.6226
PROJECT MANAGER 08/03/2559 DATE

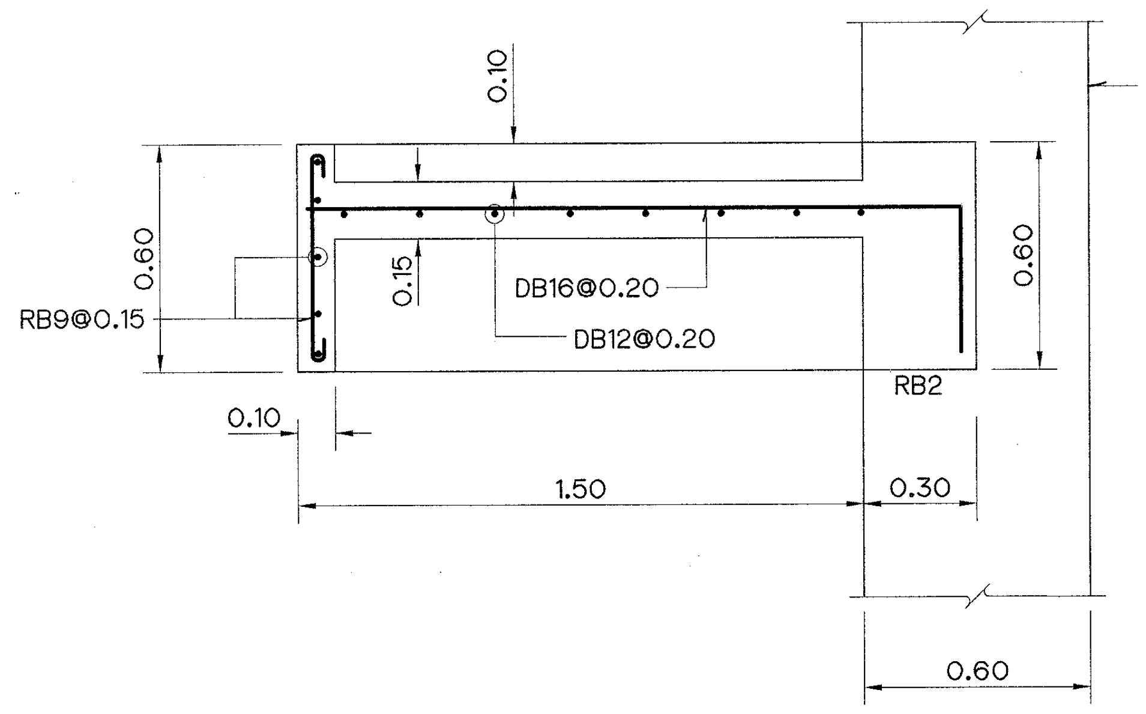
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY
REVIEWED
SUBMITTED Chanit
RECOMMENDED
APPROVED P. Hansell

DRAWING NO. MH-PH-10
SHEET NO. 93 OF 130



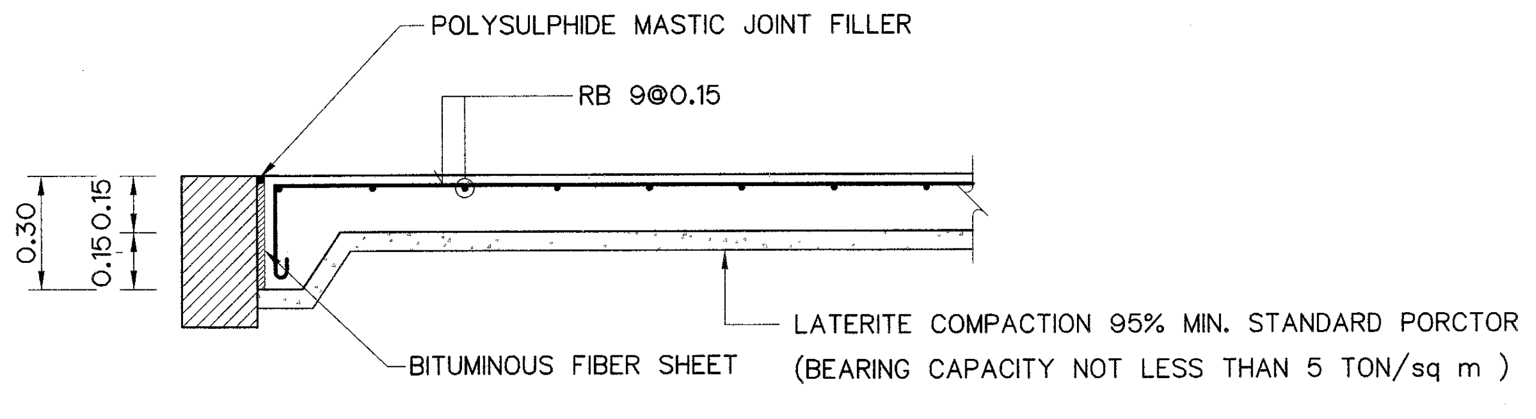
REINFORCEMENT DETAILS OF CABLE TRENCH AT SLAB S1

SCALE 1:10



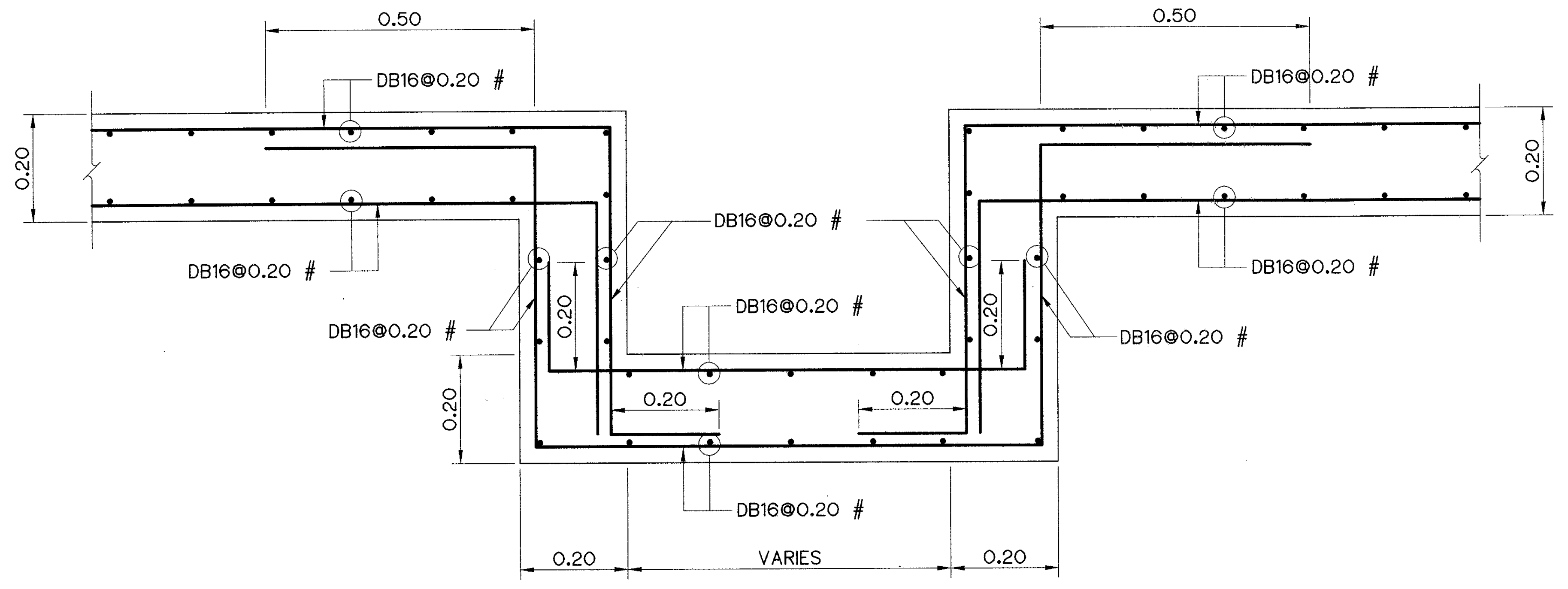
RF

SCALE 1:20


POLYSULPHIDE MASTIC JOINT FILLER
RB 9@0.15
0.30
0.15
0.15
LATERITE COMPACTION 95% MIN. STANDARD PORCTOR
(BEARING CAPACITY NOT LESS THAN 5 TON/sq m )
BITUMINOUS FIBER SHEET

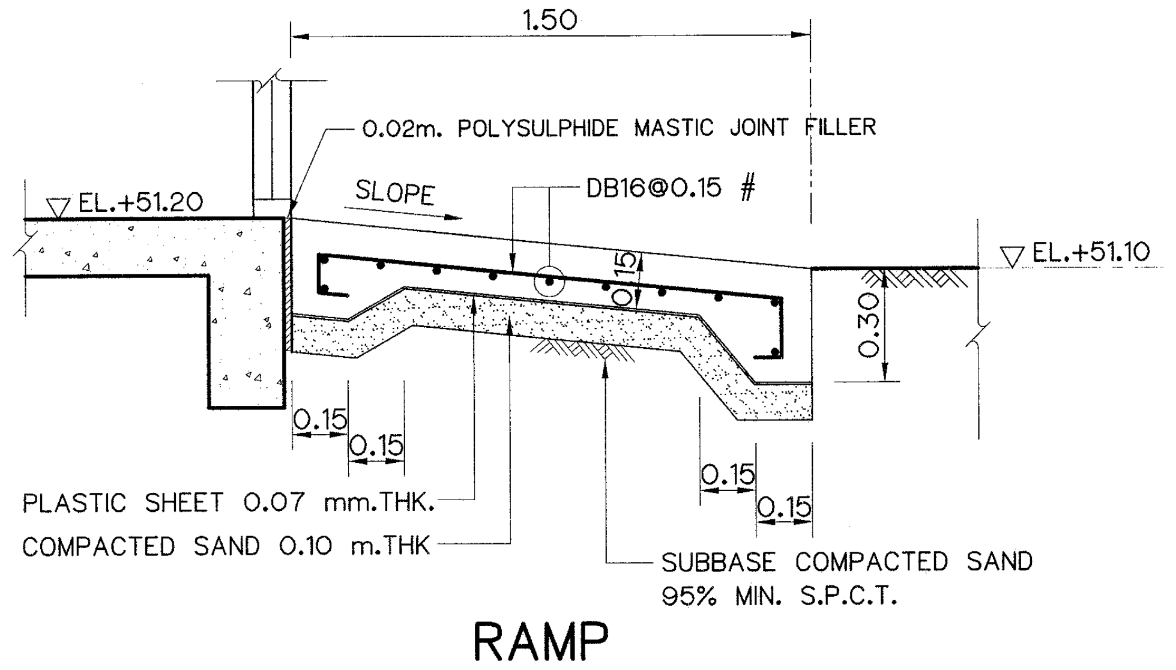
GS

SCALE 1:20



REINFORCEMENT DETAILS OF CABLE TRENCH AT SLAB S2

SCALE 1:10



RAMP

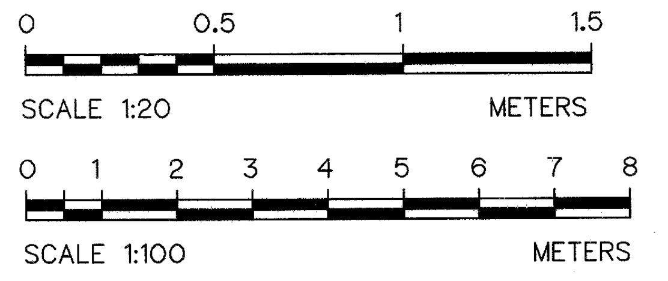
SCALE 1:20

**NOTES :**

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS, UNLESS OTHERWISE SHOWN.
2. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH-GN-03
3. CONCRETE DESIGN BASED ON THE COMPRESSIVE STRENGTH OF 210 KSC, STANDARD CYLINDER Ø0.15x0.30 m. TEST AT AGE 28 DAYS. UNLESS OTHERWISE INDICATED IN SPECIFIC DRAWINGS.

**REFERENCE DRAWINGS :**

1. POWERHOUSE, PLAN MH-PH-02



| NO. | DATE | REVISIONS | CHECKED | APPROVED |
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MAE HAT HYDROPOWER PROJECT

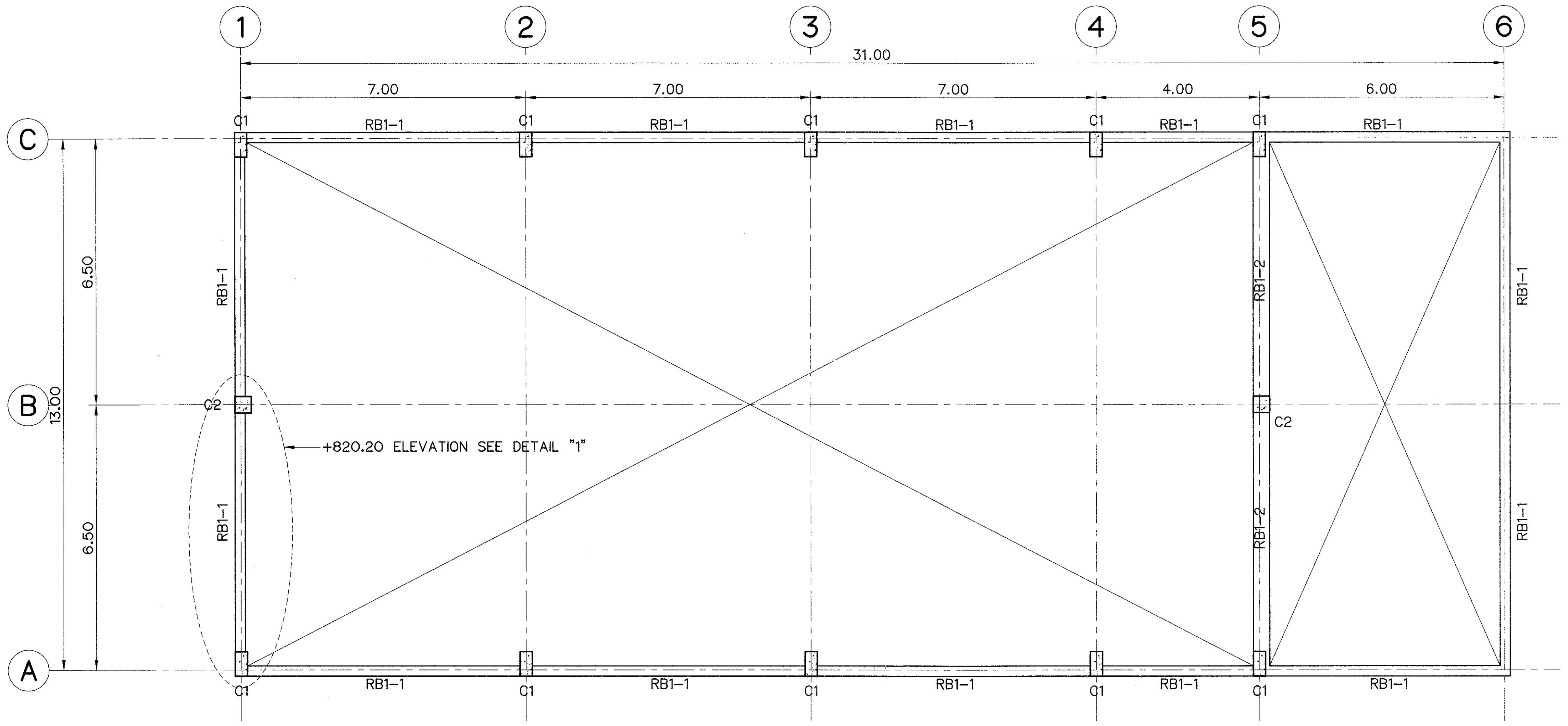
CIVIL WORKS AND TRANSMISSION LINE
POWERHOUSE
PLAN OF SLAB AND DETAILS (2/2)

P&C MANAGEMENT CO.,LTD.

DESIGNED ภย.64624 สย.6226
DRAWN
CHECKED สย.6226
PROJECT MANAGER
DATE 08/03/2559

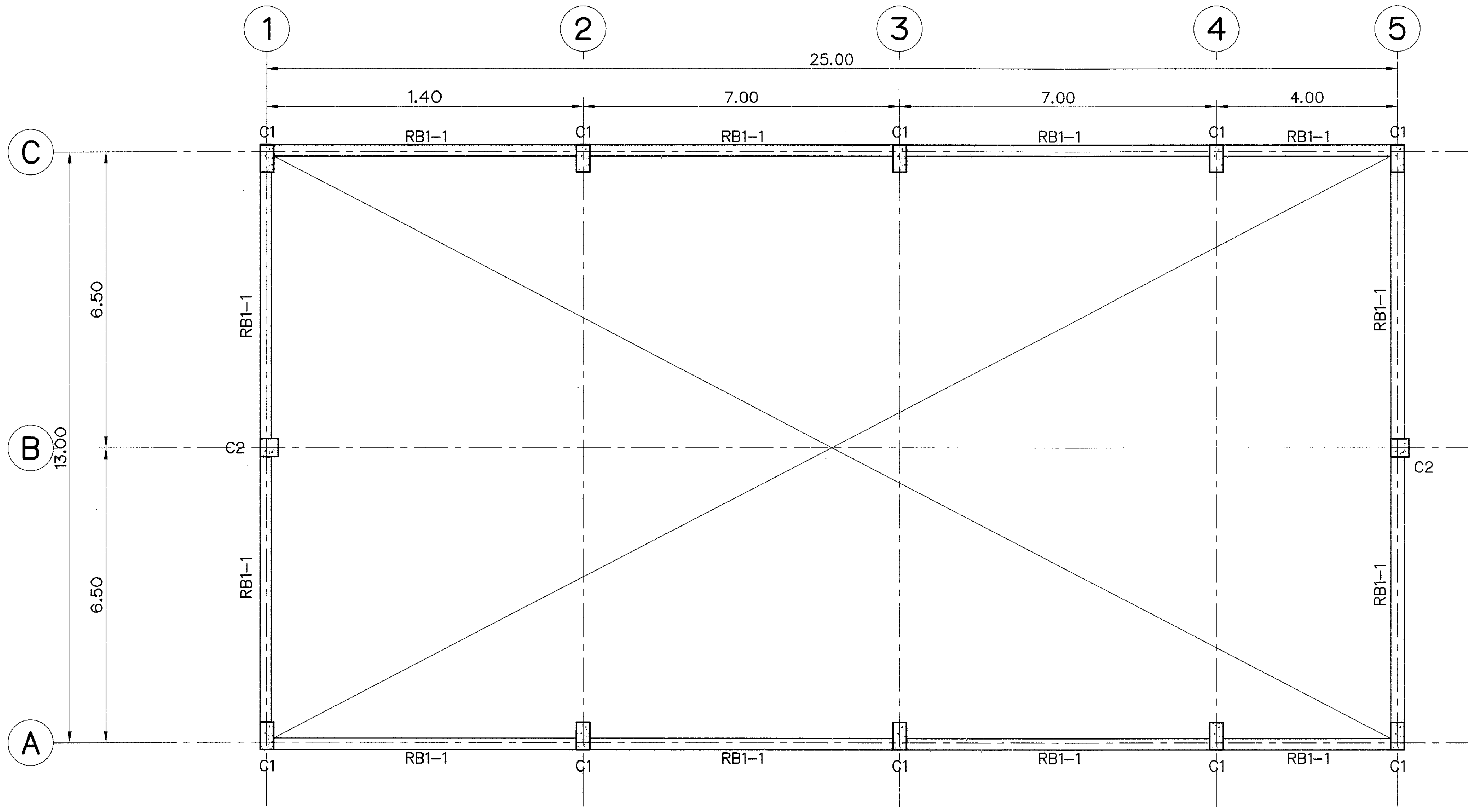
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY
REVIEWED
SUBMITTED Chanit
RECOMMENDED
APPROVED P. Hanson

DRAWING NO. MH-PH-11
SHEET NO. 94 OF 130



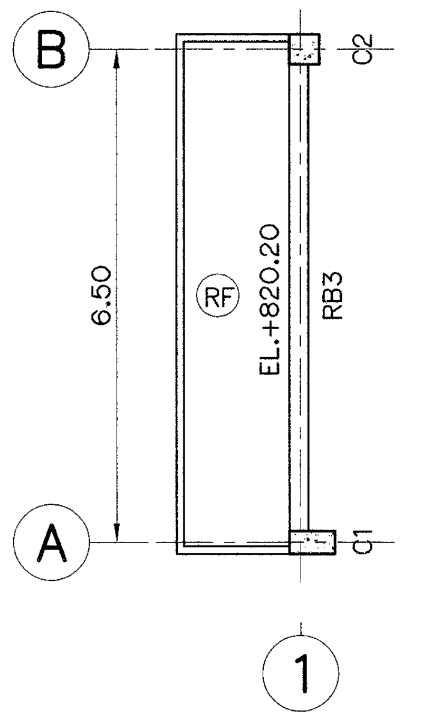
**+822.30 ELEVATION PLAN**

SCALE 1:100



**+824.80 ELEVATION PLAN**

SCALE 1:100



**DETAIL "1"**

SCALE 1:100

**NOTES :**

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS, UNLESS OTHERWISE SHOWN.
2. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH-GN-03
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**REFERENCE DRAWINGS :**

| | |
|---|---|
| 1. POWERHOUSE, PLAN 1st FLOOR AND PLAN 2nd FLOOR | MH-PH-02 |
| 2. POWERHOUSE, PLAN OF SLAB AND DETAILS | MH-PH-10 |
| 3. POWERHOUSE, COLUMN, BRACKET AND STAIR DETAILS | MH-PH-14 |

0 0.5 1 1.5
SCALE 1:20 METERS

0 1 2 3 4 5 6 7 8
SCALE 1:100 METERS

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MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
POWERHOUSE
BEAMS DETAILS (1/2)

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
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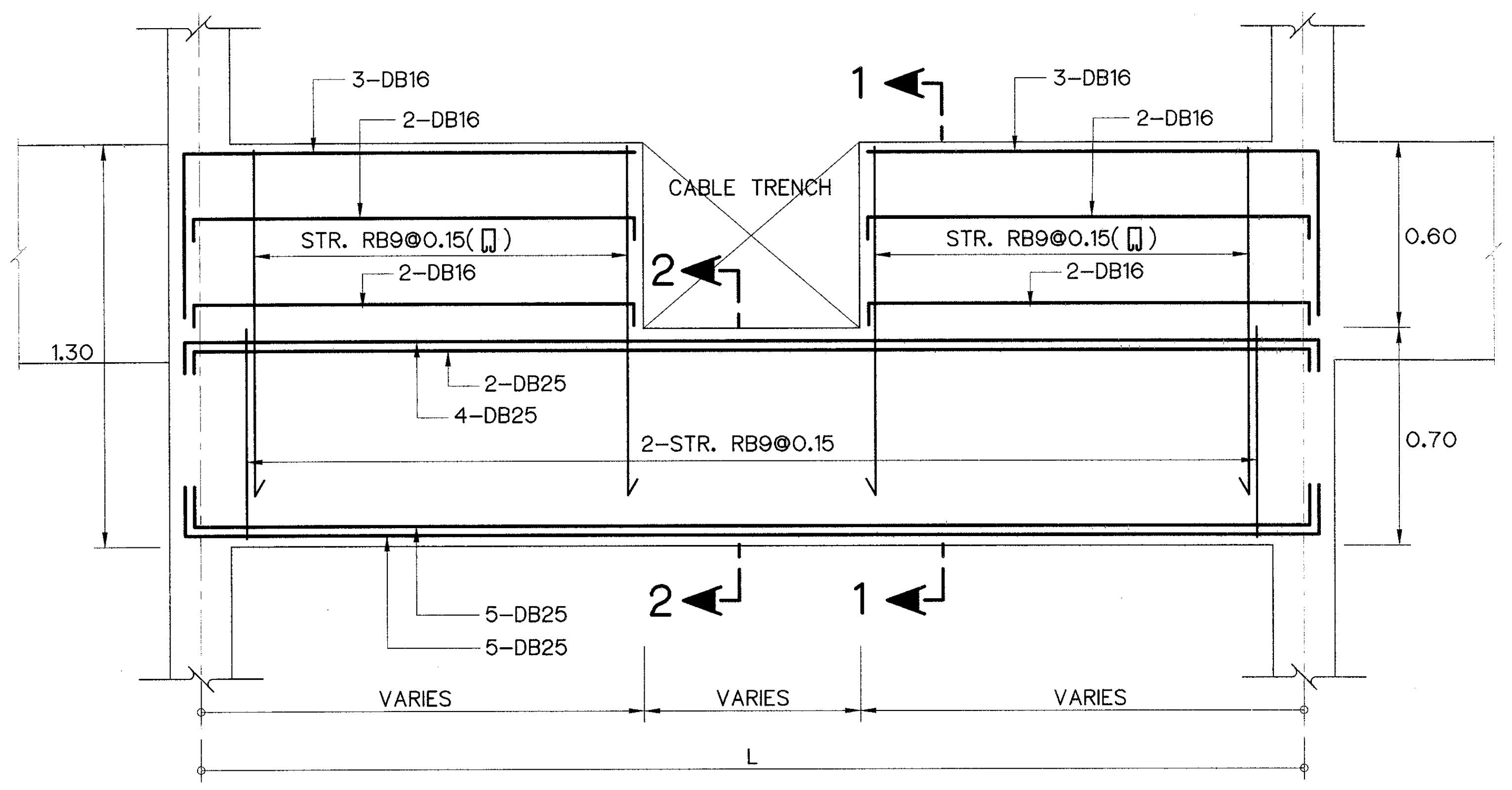
| CHECKED สย.6226 | RECOMMENDED |
| PROJECT MANAGER | DATE 08/03/2559 |
| APPROVED | |

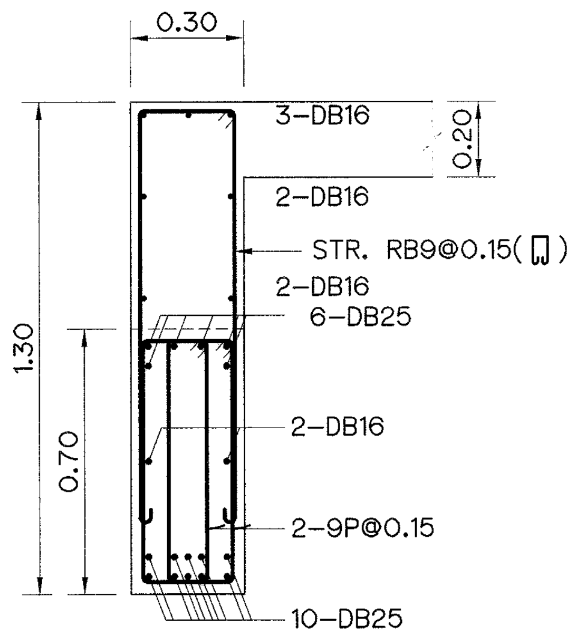
DRAWING NO. MH-PH-12

SHEET NO. 95 OF 130



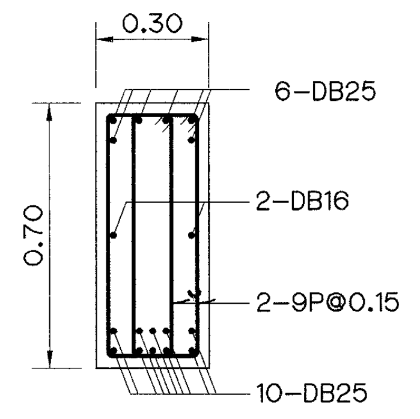
REINFORCEMENT DETAILS OF CABLE TRENCH AT BEAM B5

SCALE 1:20



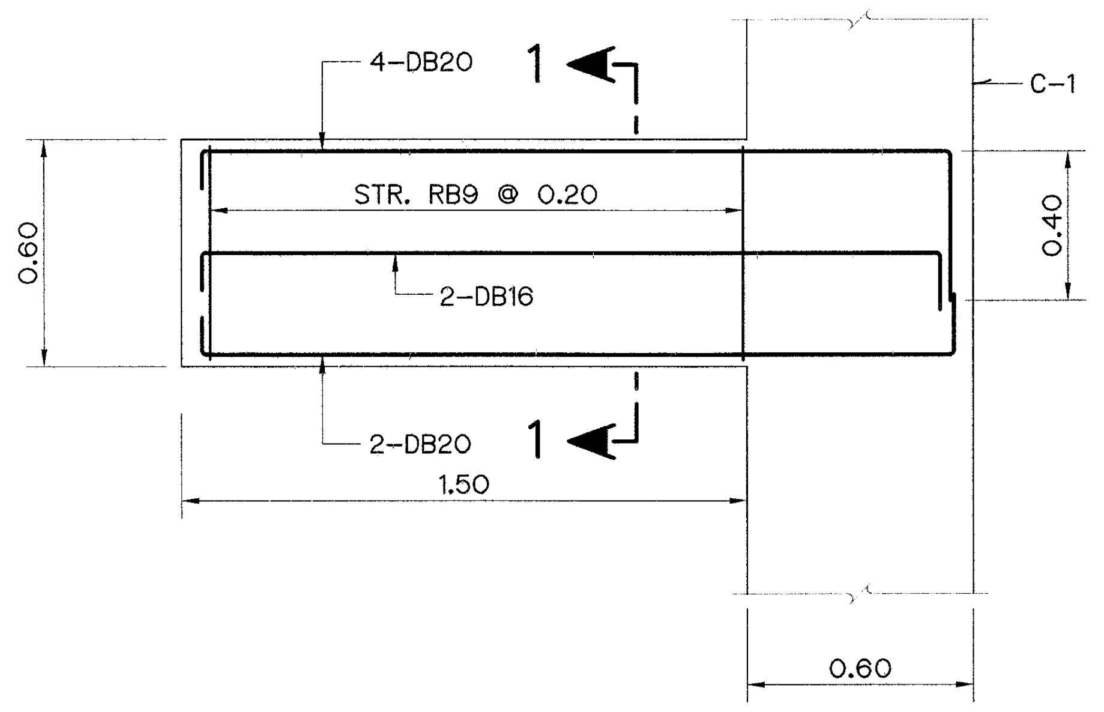
SECTION 1-1

SCALE 1:20



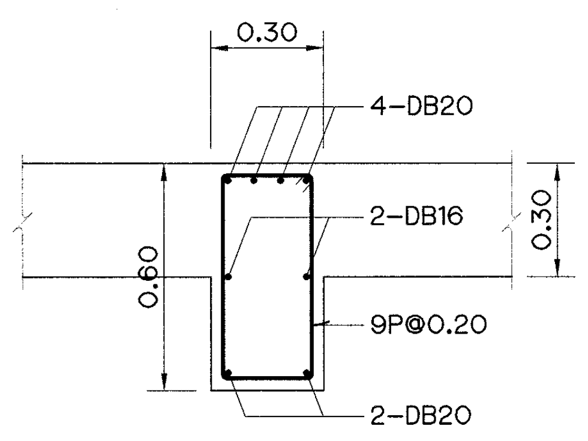
SECTION 2-2

SCALE 1:20



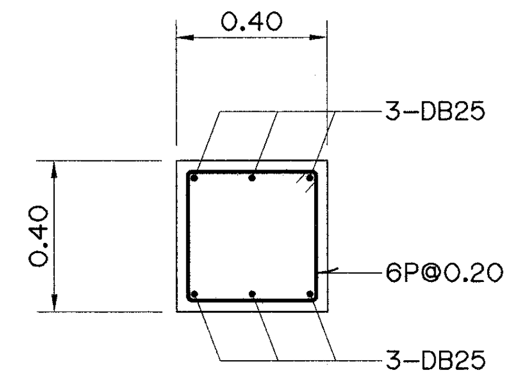
REINFORCEMENT DETAILS BEAM B4

SCALE 1:20



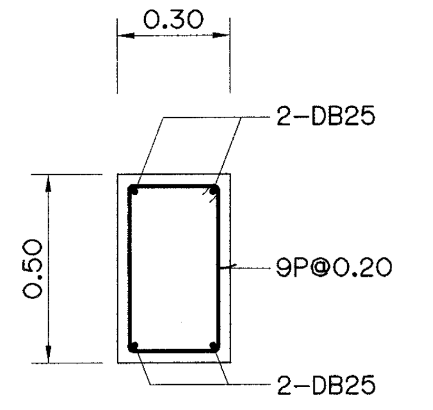
SECTION 1-1

SCALE 1:20



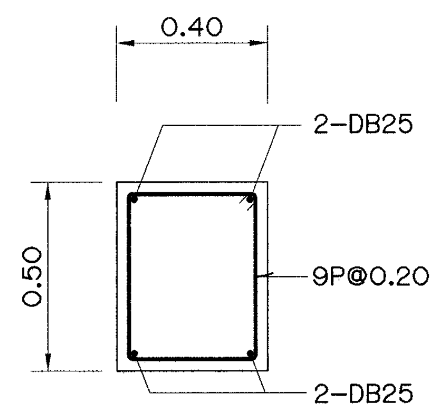
BRACING

SCALE 1:20



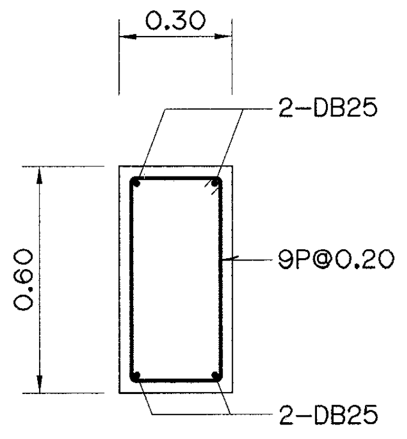
RB1-1

SCALE 1:20



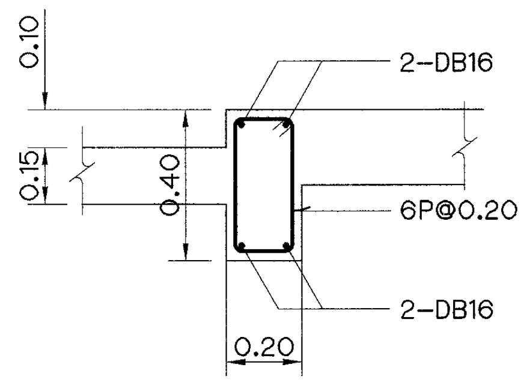
RB1-2

SCALE 1:20



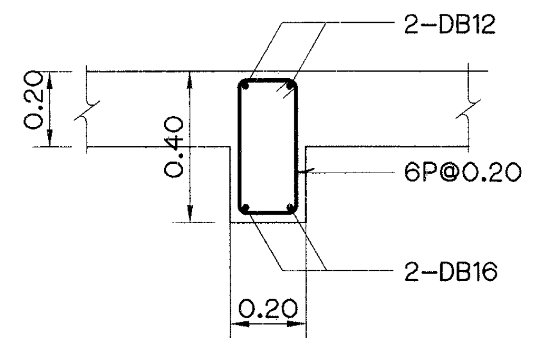
RB2

SCALE 1:20



B3

SCALE 1:20



B3

SCALE 1:20

**NOTES :**

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS, UNLESS OTHERWISE SHOWN.
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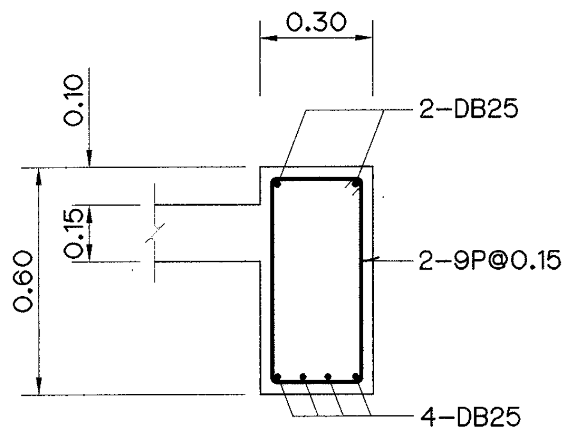
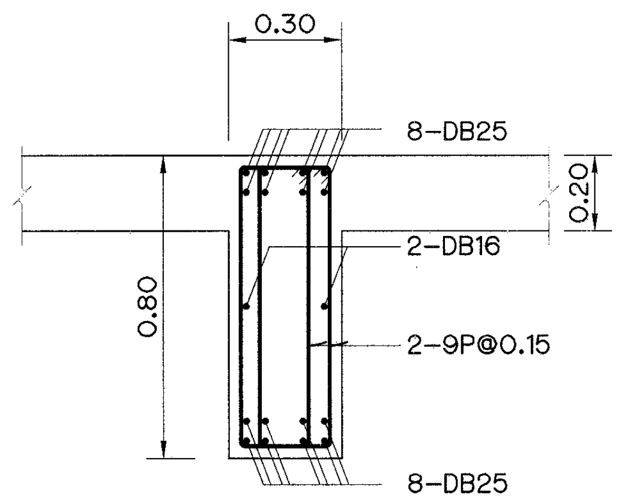
3. CONCRETE DESIGN BASED ON THE COMPRESSIVE STRENGTH OF 210 KSC, STANDARD CYLINDER Ø0.15x0.30 m. TEST AT AGE 28 DAYS. UNLESS OTHERWISE INDICATED IN SPECIFIC DRAWINGS.



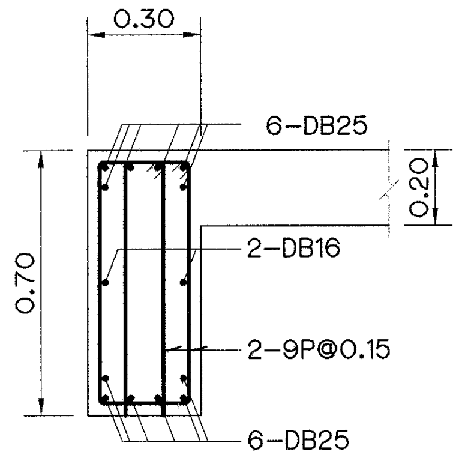
RB3

SCALE 1:20



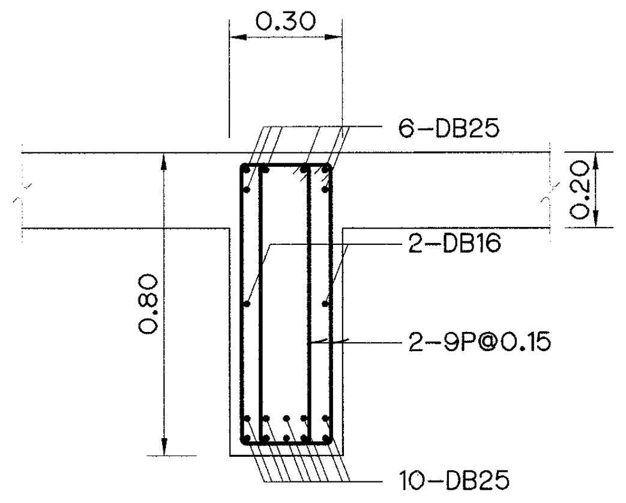
B1

SCALE 1:20



B2

SCALE 1:20

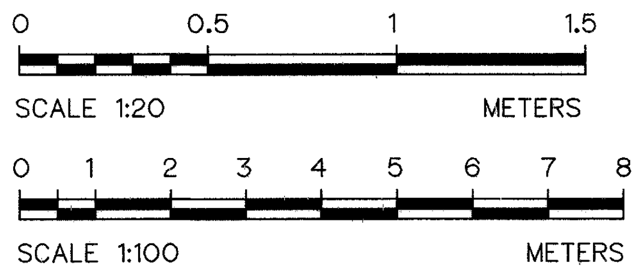


B6

SCALE 1:20

**REFERENCE DRAWINGS :**

| | |
|---|---|
| 1. POWERHOUSE, PLAN 1st FLOOR AND PLAN 2st FLOOR | MH-PH-02 |
| 2. POWERHOUSE, PLAN OF SLAB AND DETAILS | MH-PH-10 |
| 3. POWERHOUSE, COLUMN, BRACKET AND STAIR DETAILS | MH-PH-14 |



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| | CONSULTANTS | | DEDE | |

KINGDOM OF THAILAND
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Energy Development and Efficiency
MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
POWERHOUSE
BEAMS DETAILS (2/2)

P&C MANAGEMENT CO.,LTD.

Department of Alternative
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MINISTRY OF ENERGY

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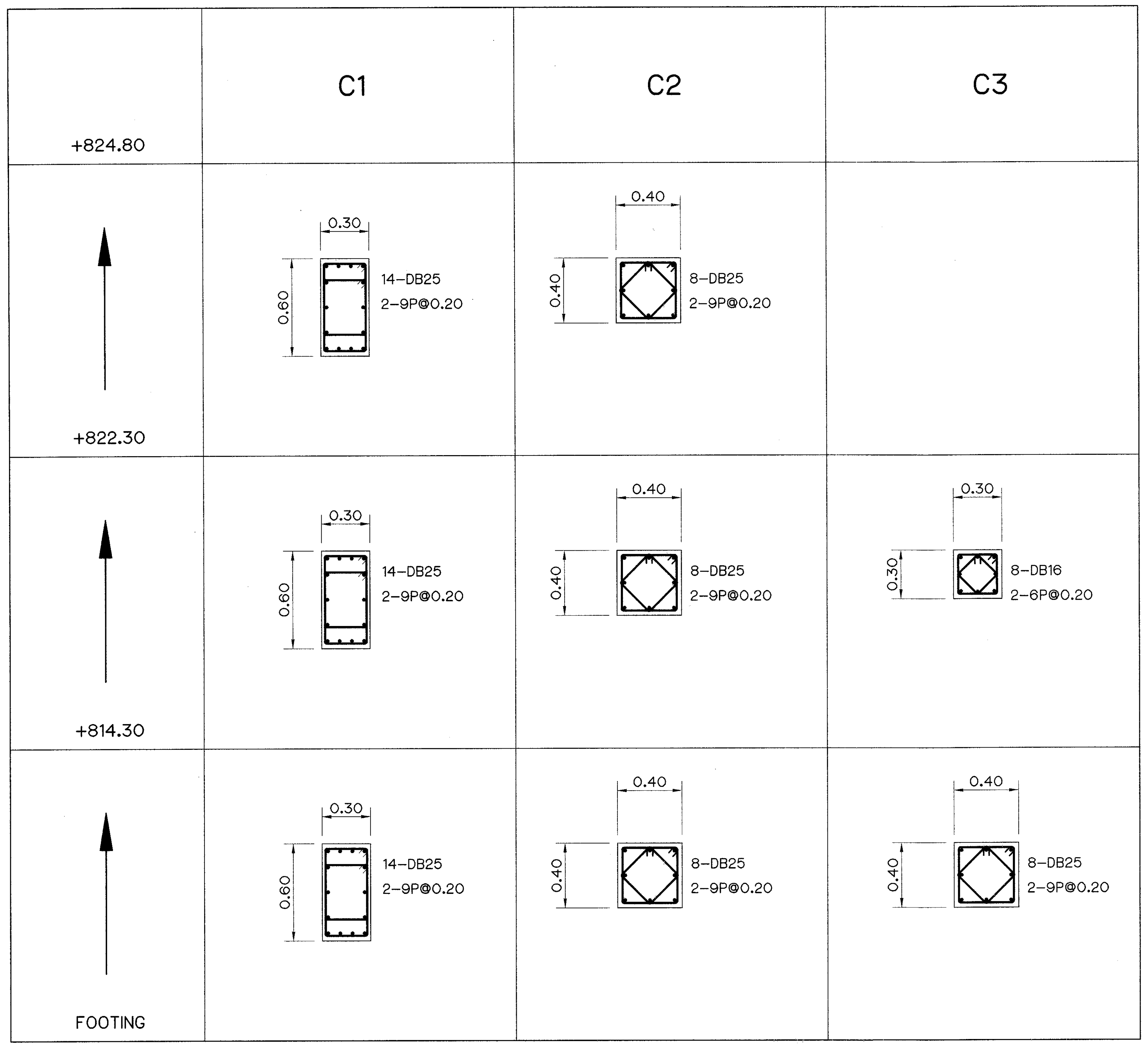
| DRAWN | SUBMITTED Chanit |
| CHECKED สย.6226 | RECOMMENDED |
| | APPROVED P.Hans.V. |

08/03/2559
PROJECT MANAGER — DATE

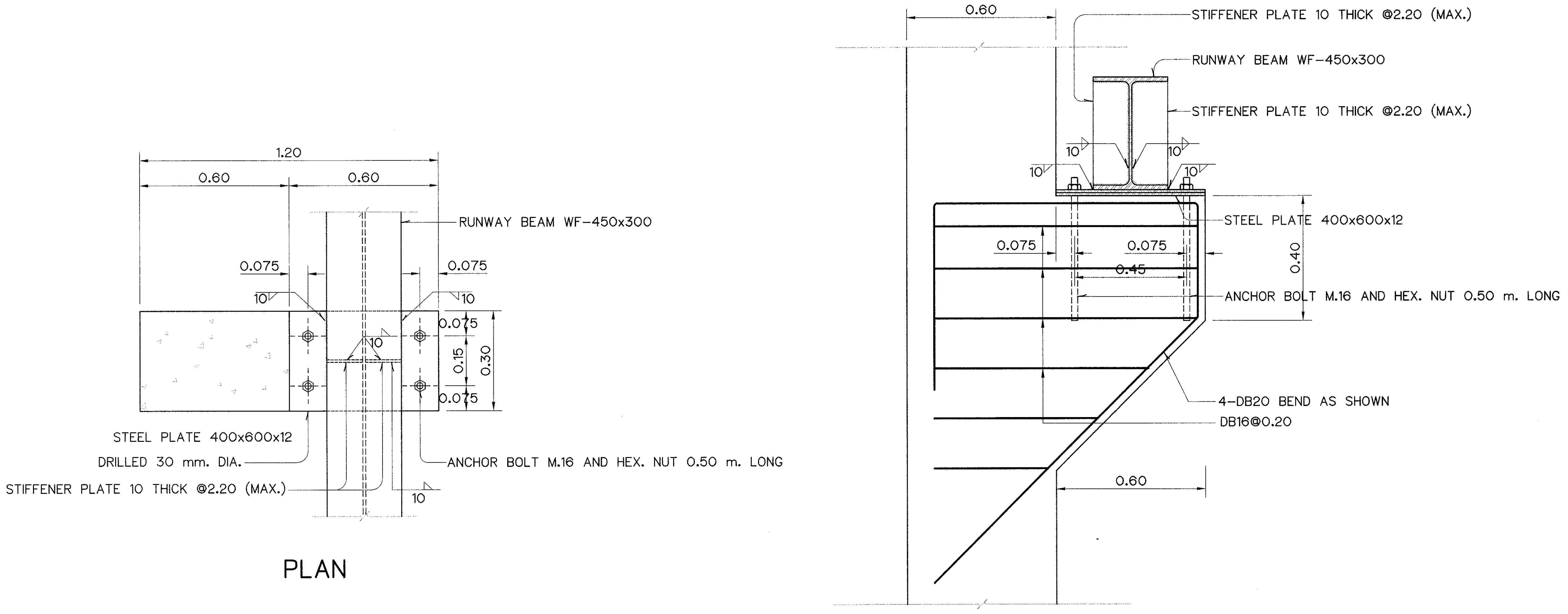
DRAWING NO. MH-PH-13

SHEET NO. 96 OF 130



## COLUMN DETAIL

SCALE 1:25

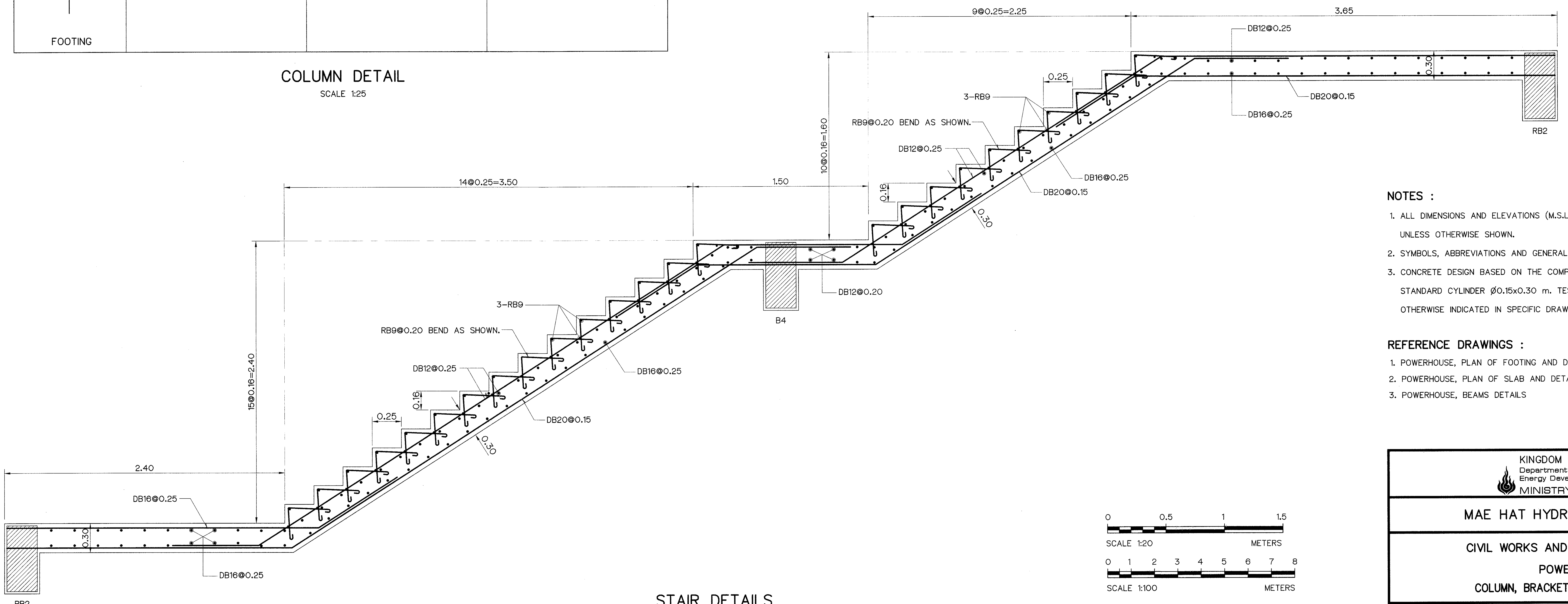


PLAN

SECTION

## RUNWAY BEAM AND BRACKET

SCALE 1:15



## STAIR DETAILS

SCALE 1:20

**NOTES :**

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS, UNLESS OTHERWISE SHOWN.
2. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. NMH-GN-03
3. CONCRETE DESIGN BASED ON THE COMPRESSIVE STRENGTH OF 210 KSC, STANDARD CYLINDER Ø0.15x0.30 m. TEST AT AGE 28 DAYS. UNLESS OTHERWISE INDICATED IN SPECIFIC DRAWINGS.

**REFERENCE DRAWINGS :**

| | |
|---|---|
| 1. POWERHOUSE, PLAN OF FOOTING AND DETAILS | MH-PH-09 |
| 2. POWERHOUSE, PLAN OF SLAB AND DETAILS | MH-PH-10 |
| 3. POWERHOUSE, BEAMS DETAILS | MH-PH-11 |

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
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CONSULTANTS | DEDE

KINGDOM OF THAILAND
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Energy Development and Efficiency
MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
POWERHOUSE
COLUMN, BRACKET AND STAIR DETAILS

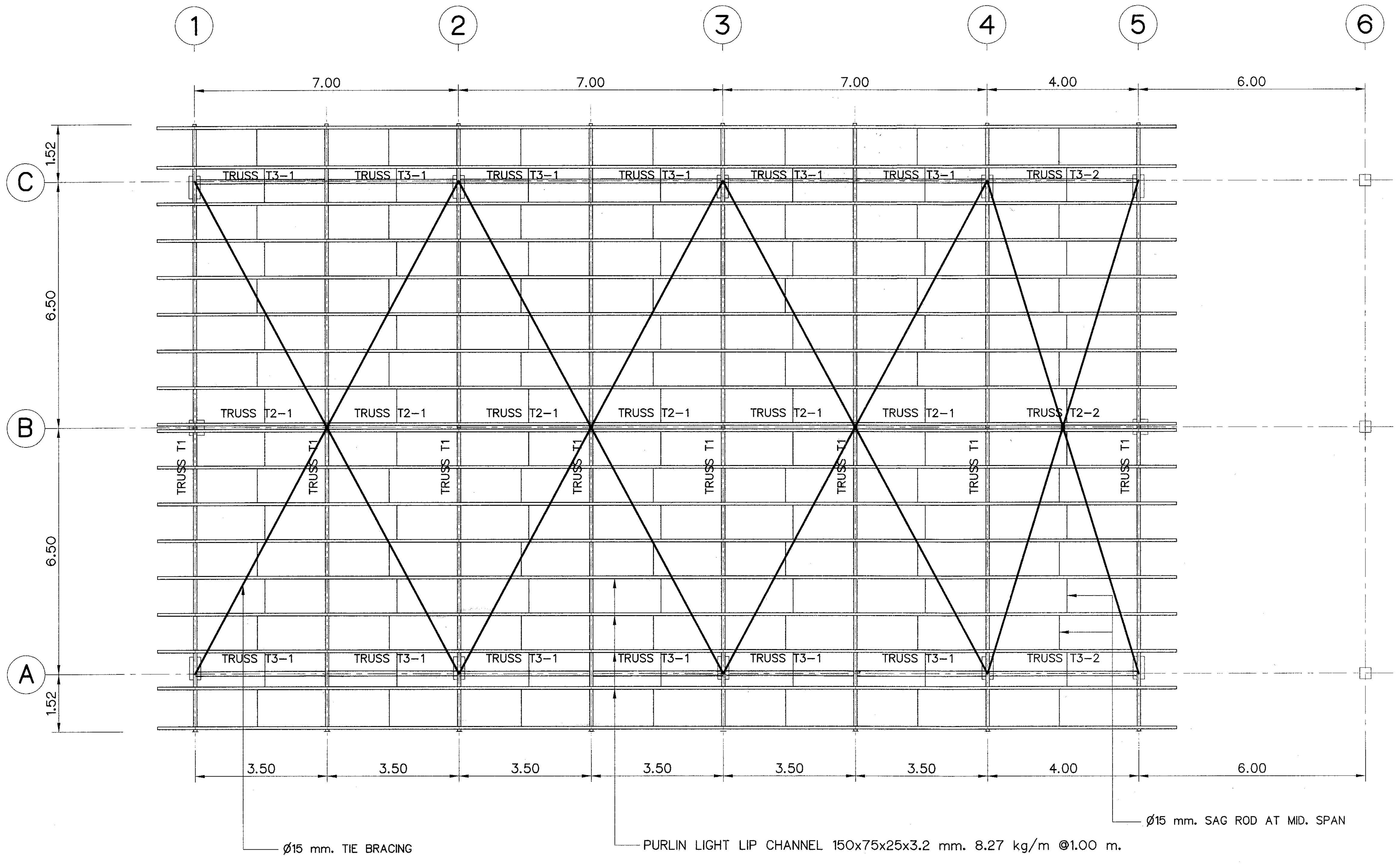
P&C MANAGEMENT CO.,LTD.

Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

DESIGNED ภย.64624 ลย.6226
DRAWN
CHECKED ลย.6226
PROJECT MANAGER
DATE 08/03/2559

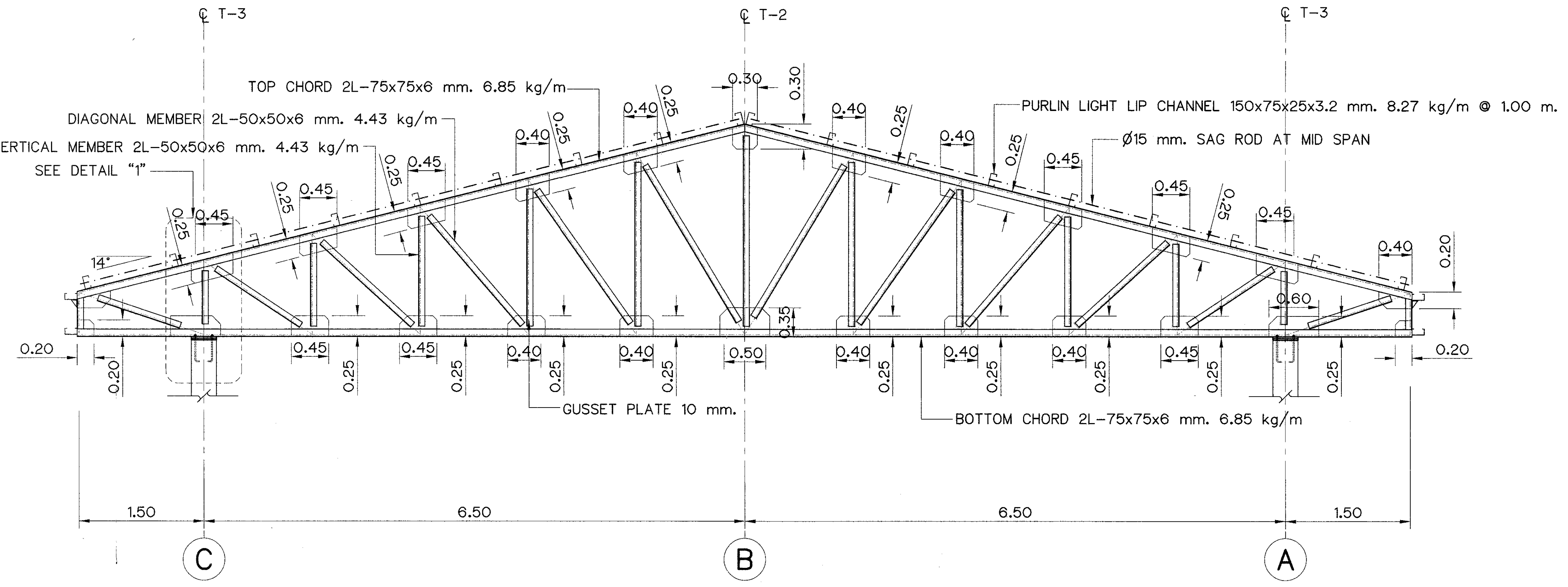
REVIEWED
SUBMITTED Chant
RECOMMENDED
APPROVED P.Hansell

DRAWING NO. MH-PH-14
SHEET NO. 97 OF 130



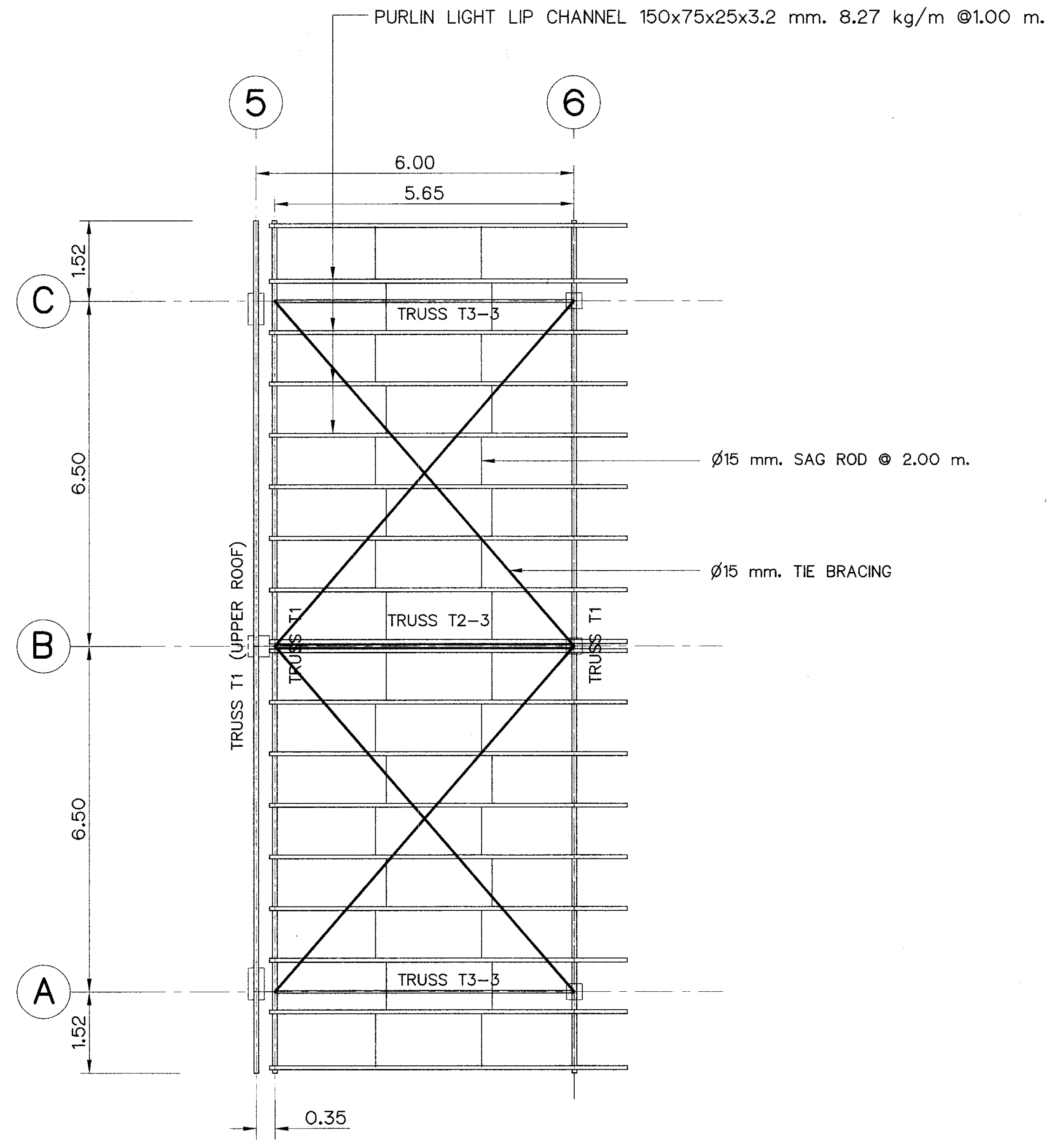
## PLAN OF UPPER ROOF TRUSSES

SCALE 1:100


℄ T-3
℄ T-2
℄ T-3
TOP CHORD 2L-75x75x6 mm. 6.85 kg/m
DIAGONAL MEMBER 2L-50x50x6 mm. 4.43 kg/m
VERTICAL MEMBER 2L-50x50x6 mm. 4.43 kg/m
SEE DETAIL "1"
PURLIN LIGHT LIP CHANNEL 150x75x25x3.2 mm. 8.27 kg/m @ 1.00 m.
Ø15 mm. SAG ROD AT MID SPAN
14°
0.30
0.40
0.45
0.25
0.20
0.35
0.50
0.60
GUSSET PLATE 10 mm.
BOTTOM CHORD 2L-75x75x6 mm. 6.85 kg/m
1.50
6.50
6.50
1.50
C
B
A

## TRUSS T1

SCALE 1:50



## PLAN OF LOWER ROOF TRUSSES

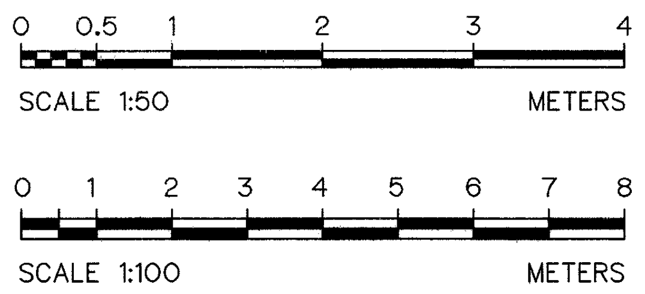
SCALE 1:100

**NOTES :**

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS, UNLESS OTHERWISE SHOWN.
2. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH-GN-03

**REFERENCE DRAWINGS :**

| | |
|---|---|
| 1. POWERHOUSE, PLAN 1st FLOOR AND PLAN 2nd FLOOR | MH-PH-02 |
| 2. POWERHOUSE, SECTIONS (SHEET 1/2) | MH-PH-05 |
| 3. POWERHOUSE, SECTIONS (SHEET 2/2) | MH-PH-06 |
| 4. POWERHOUSE, DETAILS TRUSS T-2 AND DETAIL | MH-PH-16 |
| 5. POWERHOUSE, DETAILS TRUSS T-3 AND DETAIL | MH-PH-17 |



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| | CONSULTANTS | | DEDE | |

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MAE HAT HYDROPOWER PROJECT

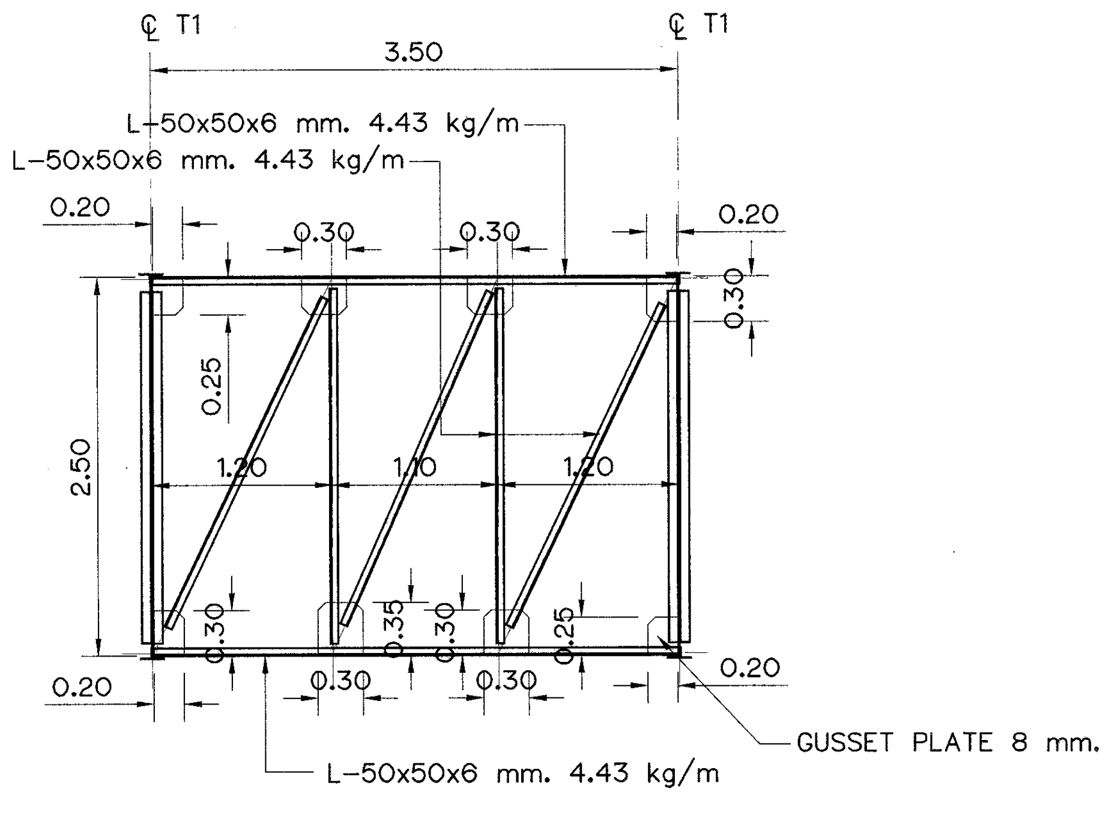
CIVIL WORKS AND TRANSMISSION LINE
POWERHOUSE
PLAN OF TRUSS AND TRUSS T1 DETAILS

P&C MANAGEMENT CO.,LTD.

DESIGNED ภย.64624 สย.6226
DRAWN
CHECKED สย.6226
PROJECT MANAGER
DATE 08/03/2559

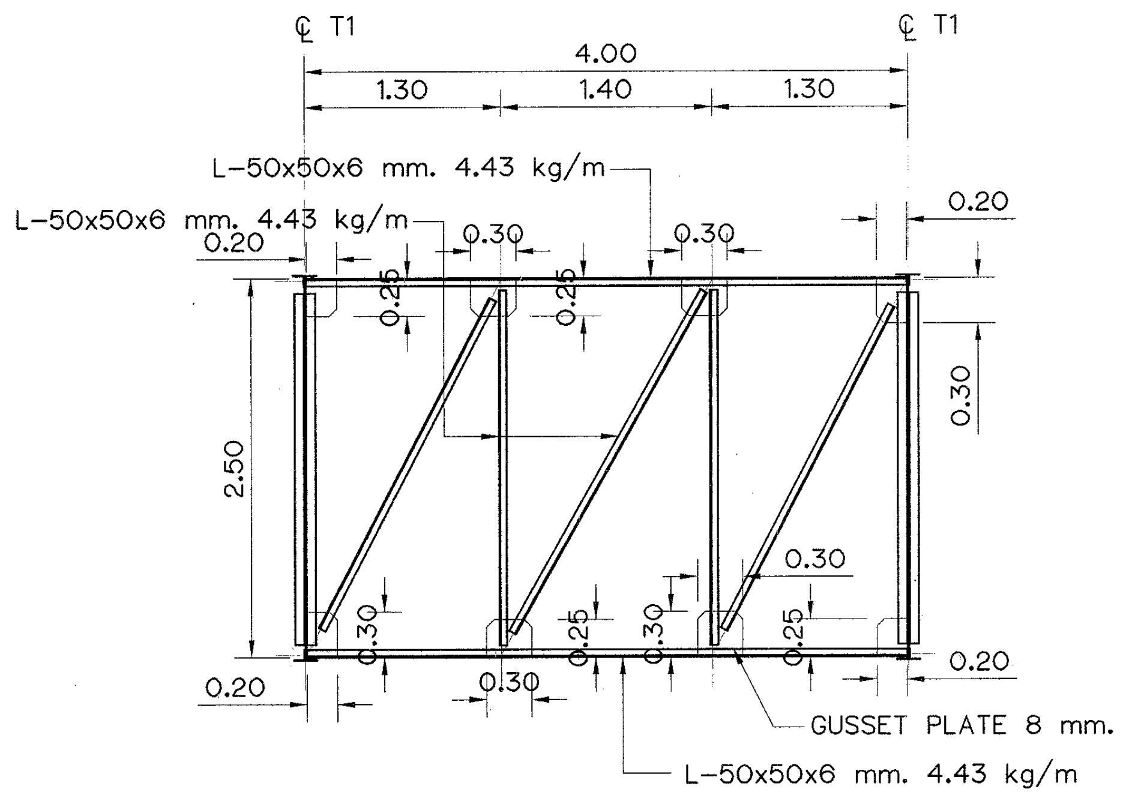
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY
REVIEWED
SUBMITTED Chanit
RECOMMENDED
APPROVED P. Hansell

DRAWING NO. MH-PH-15
SHEET NO. 98 OF 130



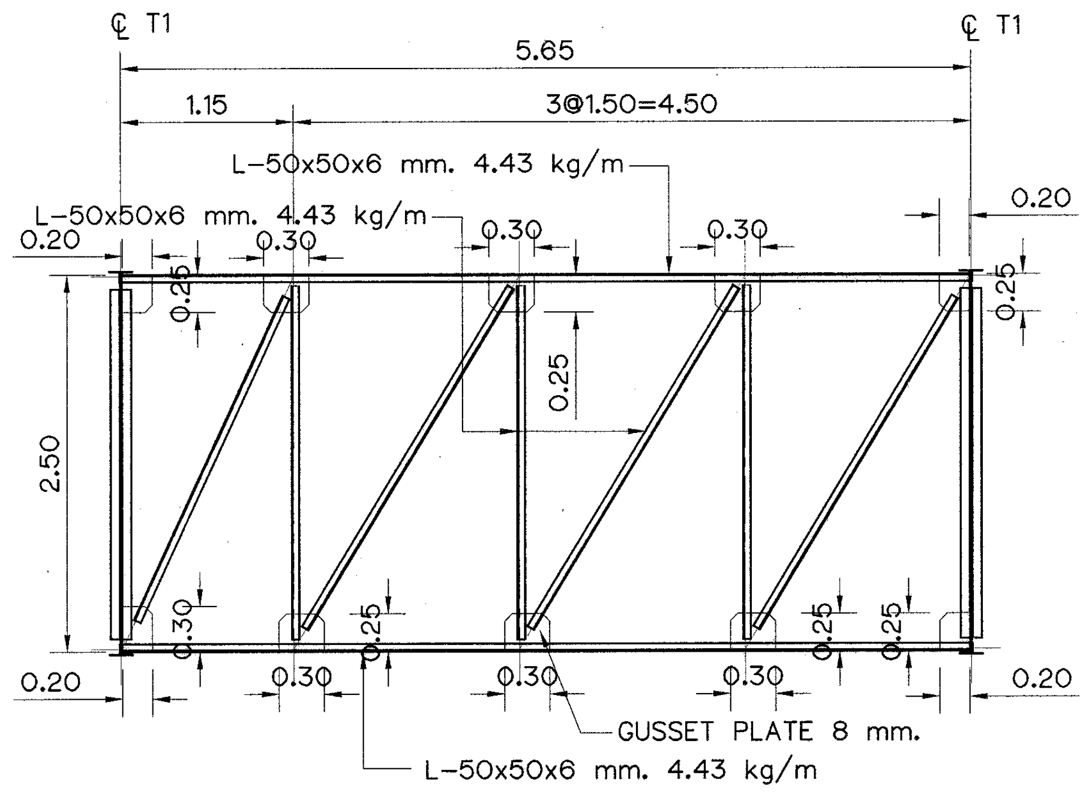
## TRUSS T2–1

SCALE 1:50



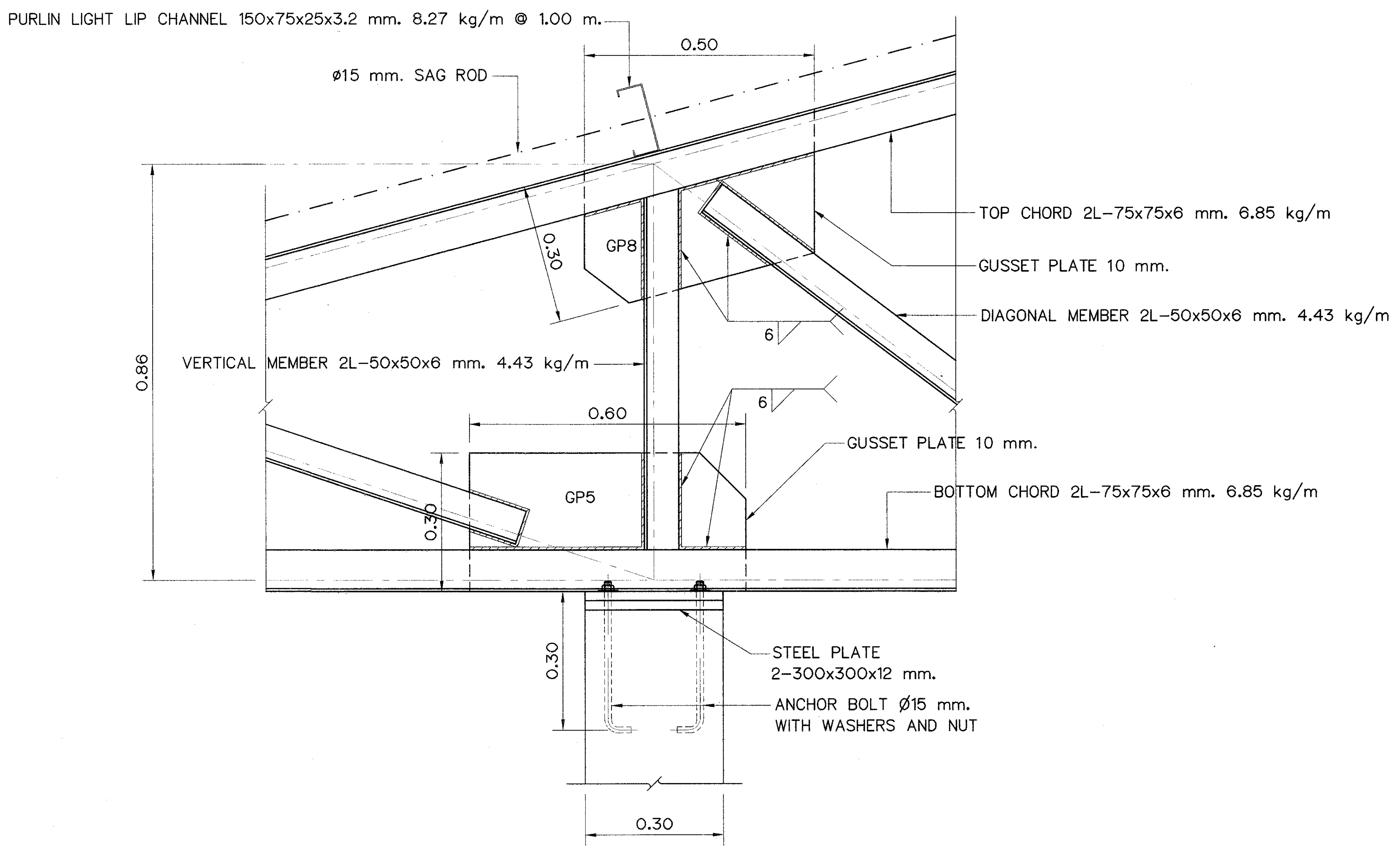
## TRUSS T2–2

SCALE 1:50



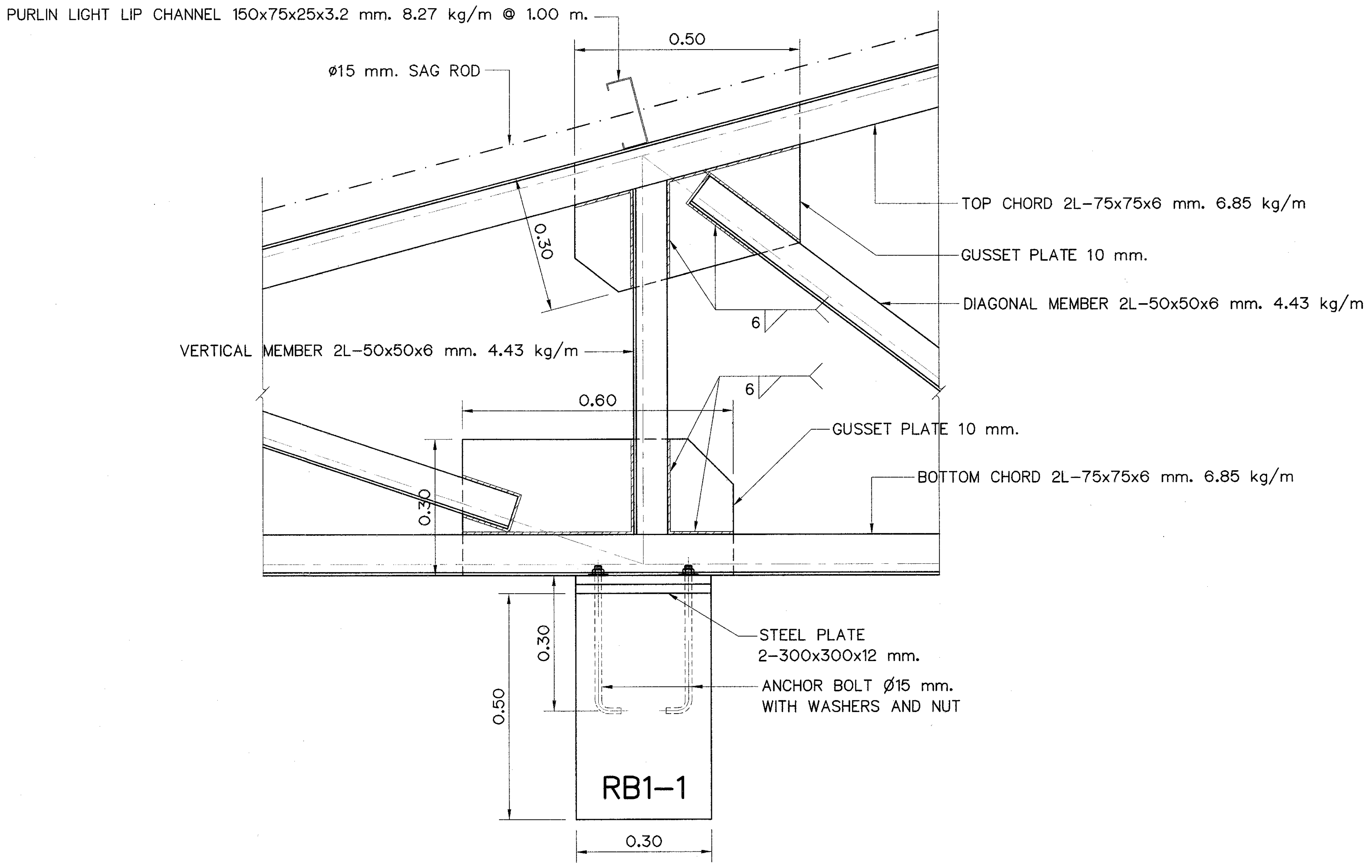
## TRUSS T2–3

SCALE 1:50


PURLIN LIGHT LIP CHANNEL 150x75x25x3.2 mm. 8.27 kg/m @ 1.00 m.
0.50
ø15 mm. SAG ROD
TOP CHORD 2L-75x75x6 mm. 6.85 kg/m
GP8
0.30
GUSSET PLATE 10 mm.
DIAGONAL MEMBER 2L-50x50x6 mm. 4.43 kg/m
6
0.86
VERTICAL MEMBER 2L-50x50x6 mm. 4.43 kg/m
6
0.60
GUSSET PLATE 10 mm.
GP5
BOTTOM CHORD 2L-75x75x6 mm. 6.85 kg/m
0.30
0.30
STEEL PLATE
2-300x300x12 mm.
ANCHOR BOLT ø15 mm.
WITH WASHERS AND NUT
0.30

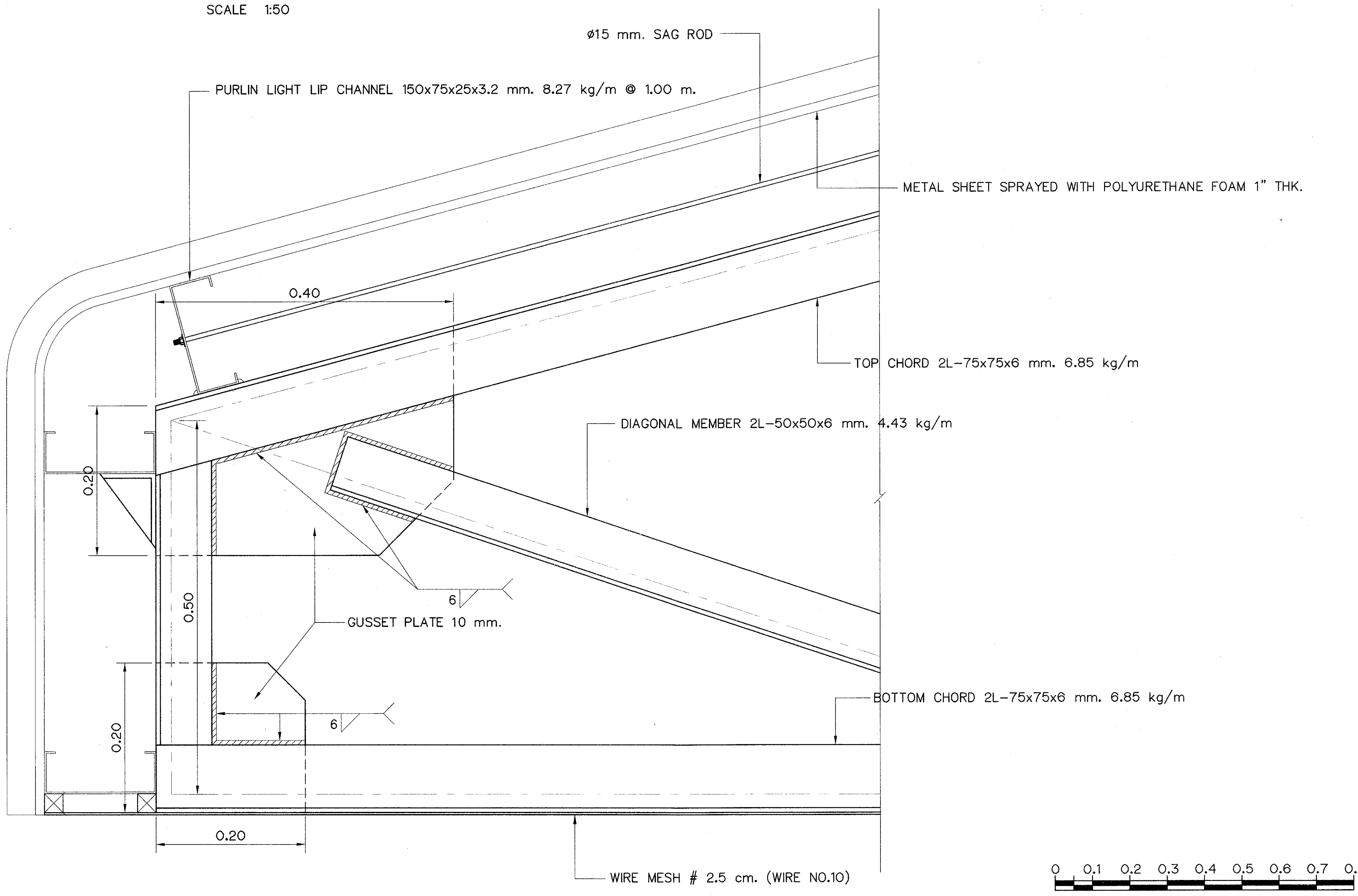
## DETAILS “1” (Supported on Column)

SCALE 1:20


PURLIN LIGHT LIP CHANNEL 150x75x25x3.2 mm. 8.27 kg/m @ 1.00 m.
0.50
ø15 mm. SAG ROD
TOP CHORD 2L-75x75x6 mm. 6.85 kg/m
0.30
GUSSET PLATE 10 mm.
DIAGONAL MEMBER 2L-50x50x6 mm. 4.43 kg/m
6
VERTICAL MEMBER 2L-50x50x6 mm. 4.43 kg/m
6
0.60
GUSSET PLATE 10 mm.
BOTTOM CHORD 2L-75x75x6 mm. 6.85 kg/m
0.30
STEEL PLATE
2-300x300x12 mm.
0.30
ANCHOR BOLT ø15 mm.
WITH WASHERS AND NUT
0.50
RB1-1
0.30

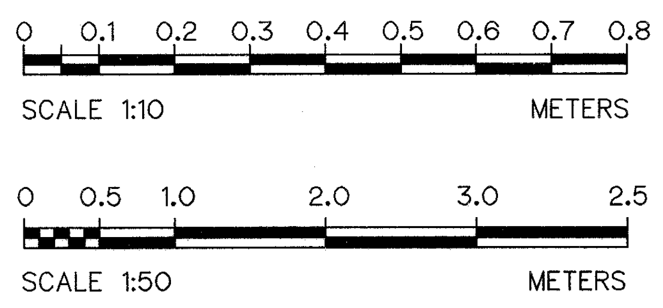
## DETAILS “1” (Supported on Beam)

SCALE 1:20


ø15 mm. SAG ROD
PURLIN LIGHT LIP CHANNEL 150x75x25x3.2 mm. 8.27 kg/m @ 1.00 m.
METAL SHEET SPRAYED WITH POLYURETHANE FOAM 1" THK.
0.40
TOP CHORD 2L-75x75x6 mm. 6.85 kg/m
DIAGONAL MEMBER 2L-50x50x6 mm. 4.43 kg/m
0.20
6
0.50
GUSSET PLATE 10 mm.
BOTTOM CHORD 2L-75x75x6 mm. 6.85 kg/m
6
0.20
0.20
WIRE MESH # 2.5 cm. (WIRE NO.10)

## EAVES DETAIL

SCALE 1:10



### NOTES :

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS, UNLESS OTHERWISE SHOWN.
2. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH-GN-03
3. WELDING CONNECTION USE 6 MM.,UNLESS OTHERWISE SHOWN

### REFERENCE DRAWINGS :

1. PLAN OF TRUSS MH-PH-15

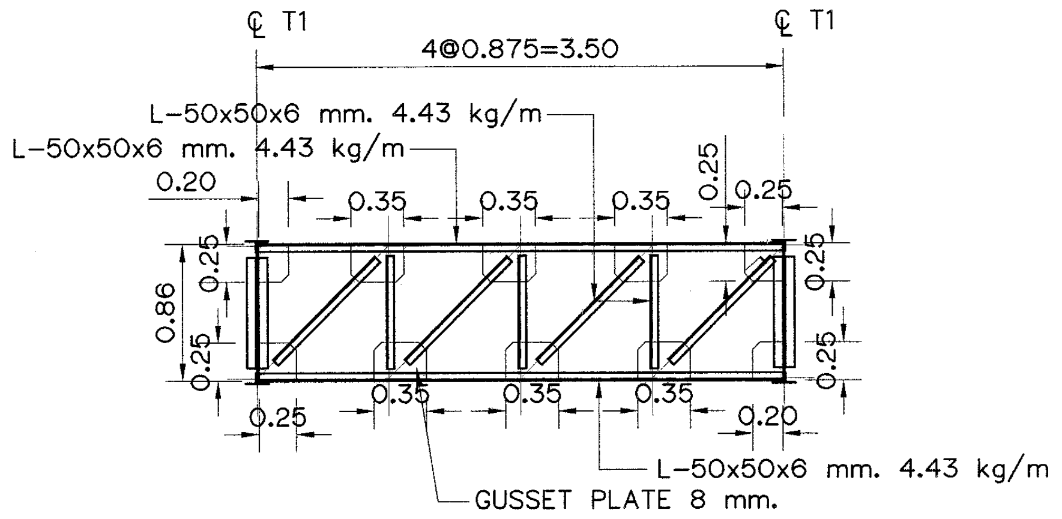
| | | | | |
|---|---|---|---|---|
| 3 | | | | |
| 2 | | | | |
| 1 | | | | |
| NO. | DATE | REVISIONS | CHECKED | APPROVED |
| | CONSULTANTS | | DEDE | |

KINGDOM OF THAILAND
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

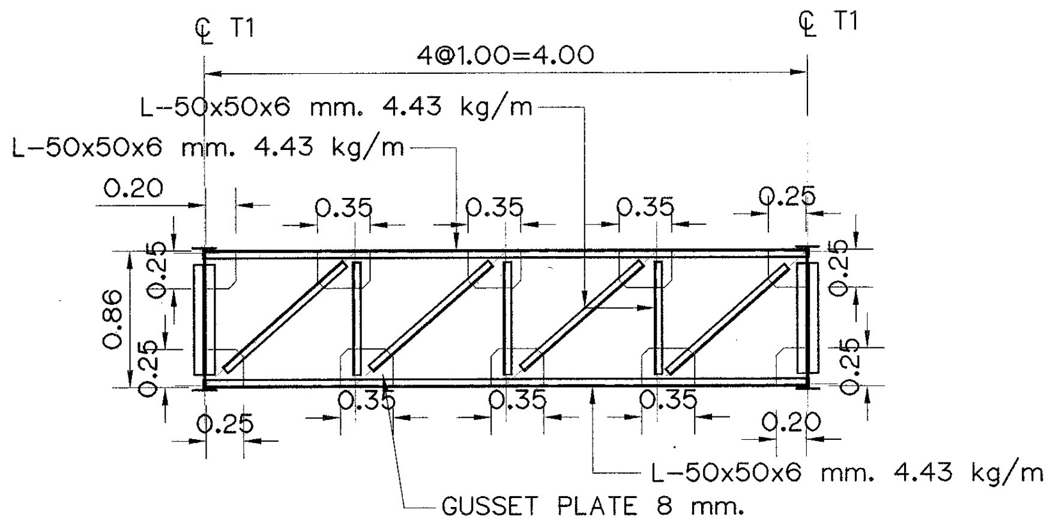
CIVIL WORKS AND TRANSMISSION LINE
POWERHOUSE
TRUSS T2 AND DETAILS

| | |
|---|---|
| P&C MANAGEMENT CO.,LTD. | Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY |
| DESIGNED ภย.64624 สย.6226 | REVIEWED |
| DRAWN | SUBMITTED Chait |
| CHECKED สย.6226 | RECOMMENDED |
| PROJECT MANAGER — DATE 08/03/2559 | APPROVED P. Hang |
| DRAWING NO. MH-PH-16 | SHEET NO. 99 OF 130 |



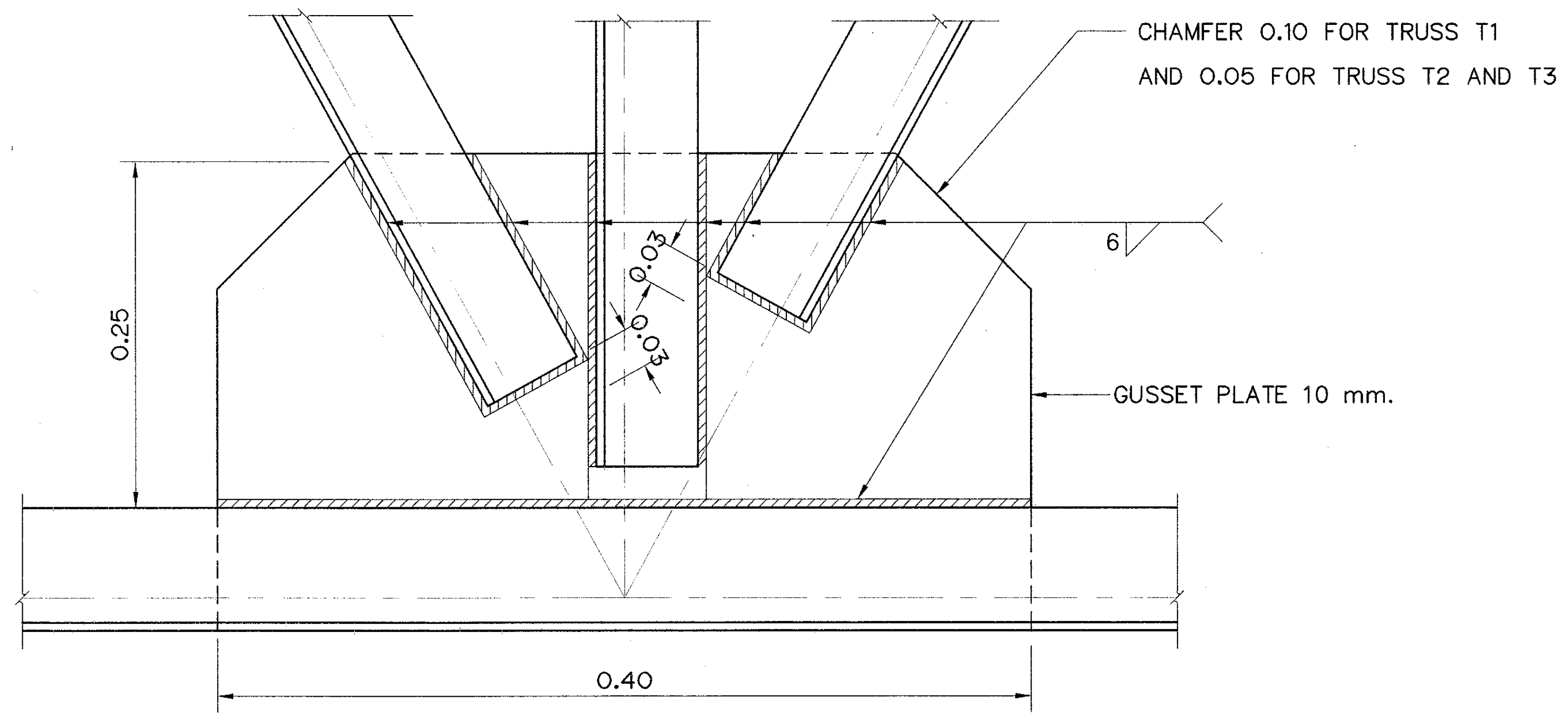
## TRUSS T3–1

SCALE 1:50



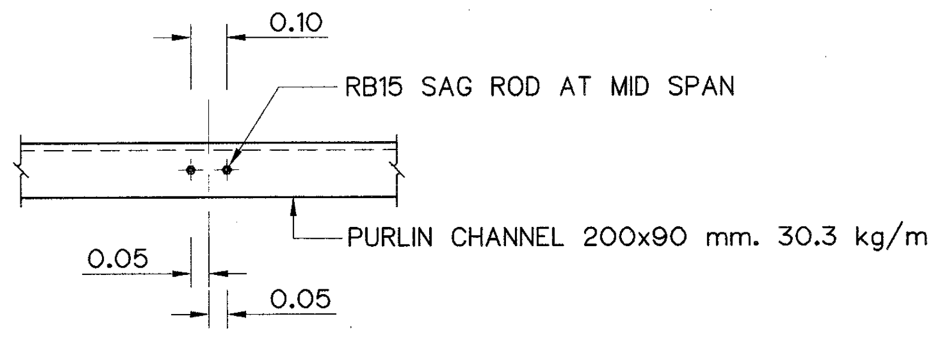
## TRUSS T3–2

SCALE 1:50

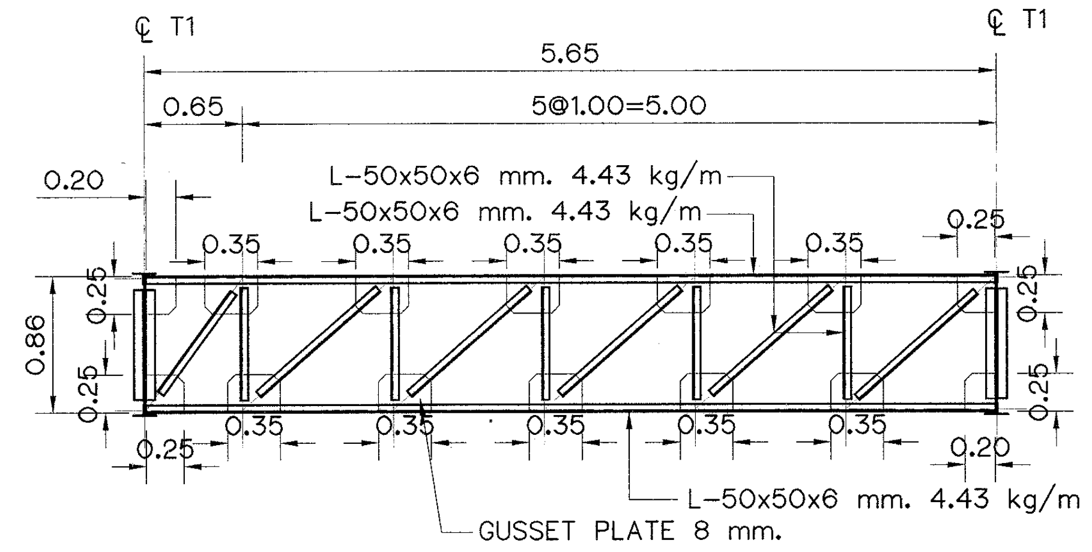


## TYPICAL OF WELD DETAIL

SCALE 1:5

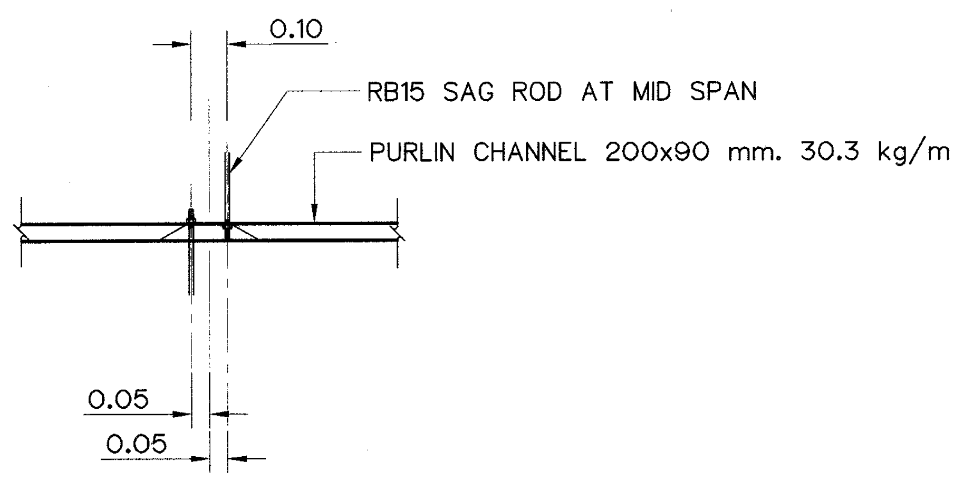


**ELEVATION**



## TRUSS T3–3

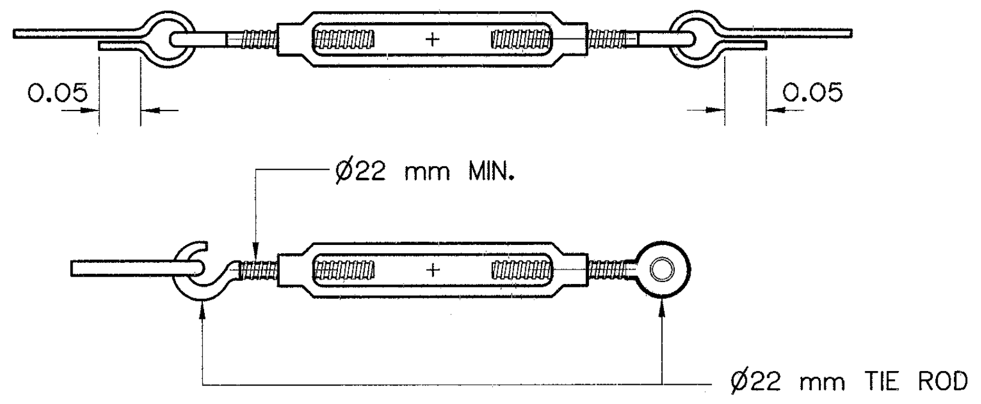
SCALE 1:50



**PLAN**

## SAG ROD DETAILS

SCALE 1:20



## TURNBUCKLE

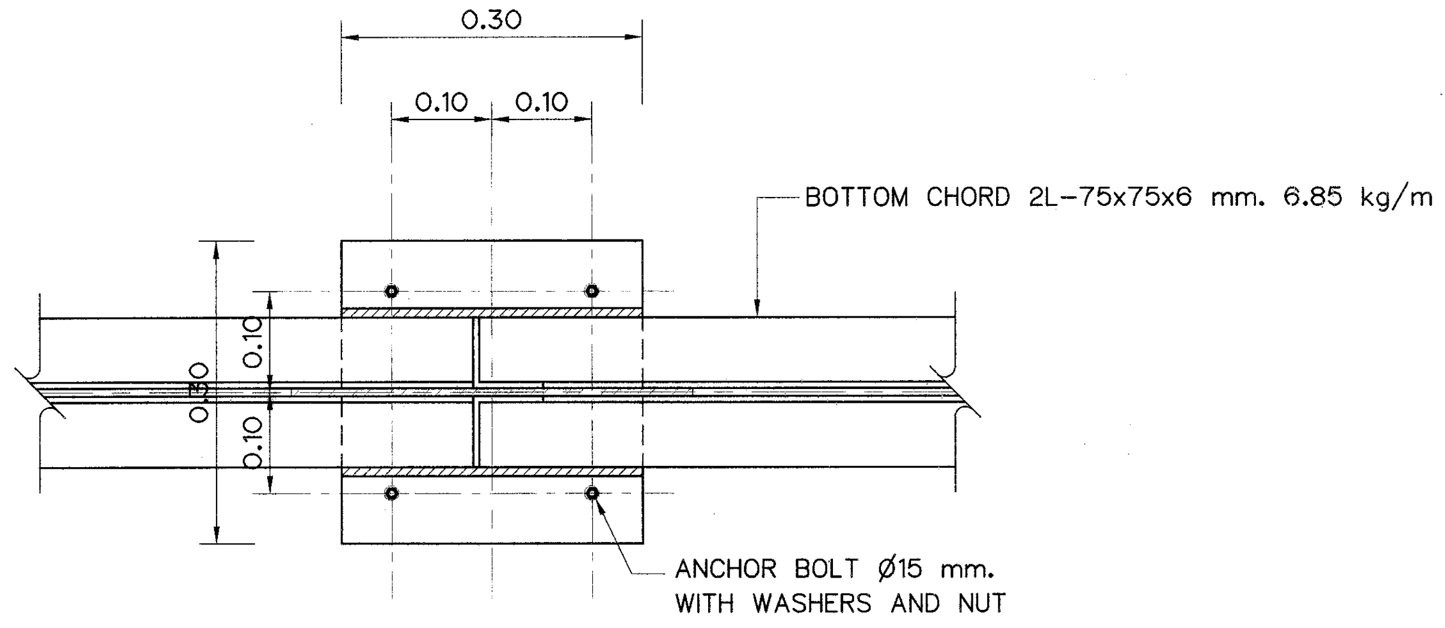
NOT TO SCALE

**NOTES :**

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS, UNLESS OTHERWISE SHOWN.
2. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH–GN–03
3. WELDING CONNECTION USE 6 MM.,UNLESS OTHERWISE SHOWN

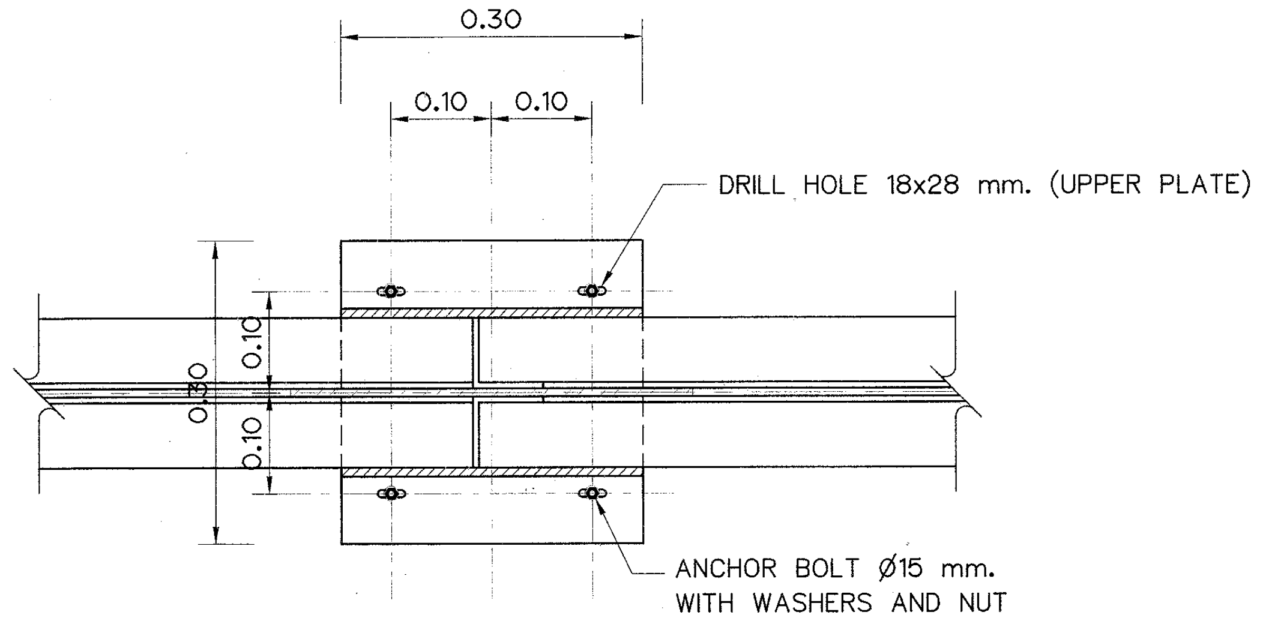
**REFERENCE DRAWINGS :**

1. PLAN OF TRUSS MH–PH–15



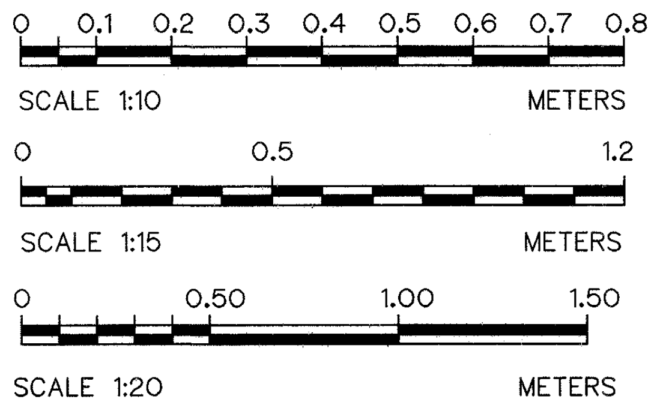
## HINGE SUPPORT DETAIL

SCALE 1:15



## ROLLER SUPPORT DETAIL

SCALE 1:15



| NO. | DATE | REVISIONS | CHECKED | APPROVED |
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DEDE

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MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
POWERHOUSE
TRUST T3 AND DETAILS

P&C MANAGEMENT CO.,LTD.

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Energy Development and Efficiency
MINISTRY OF ENERGY

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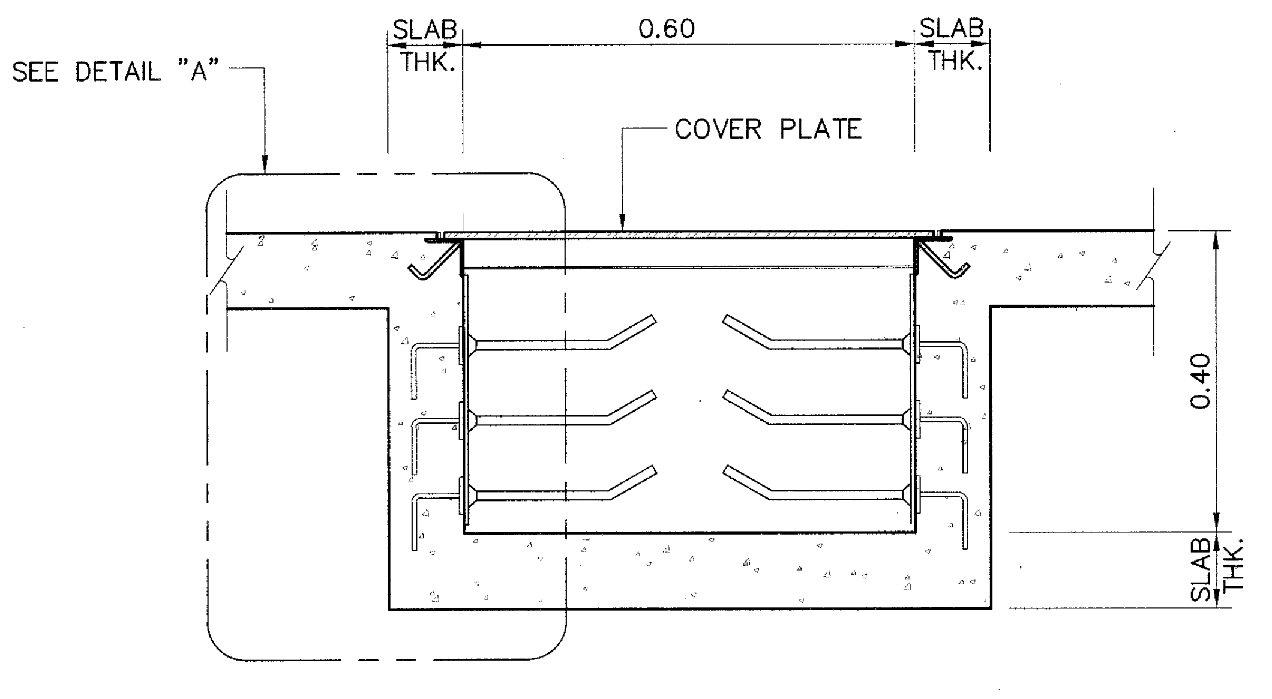
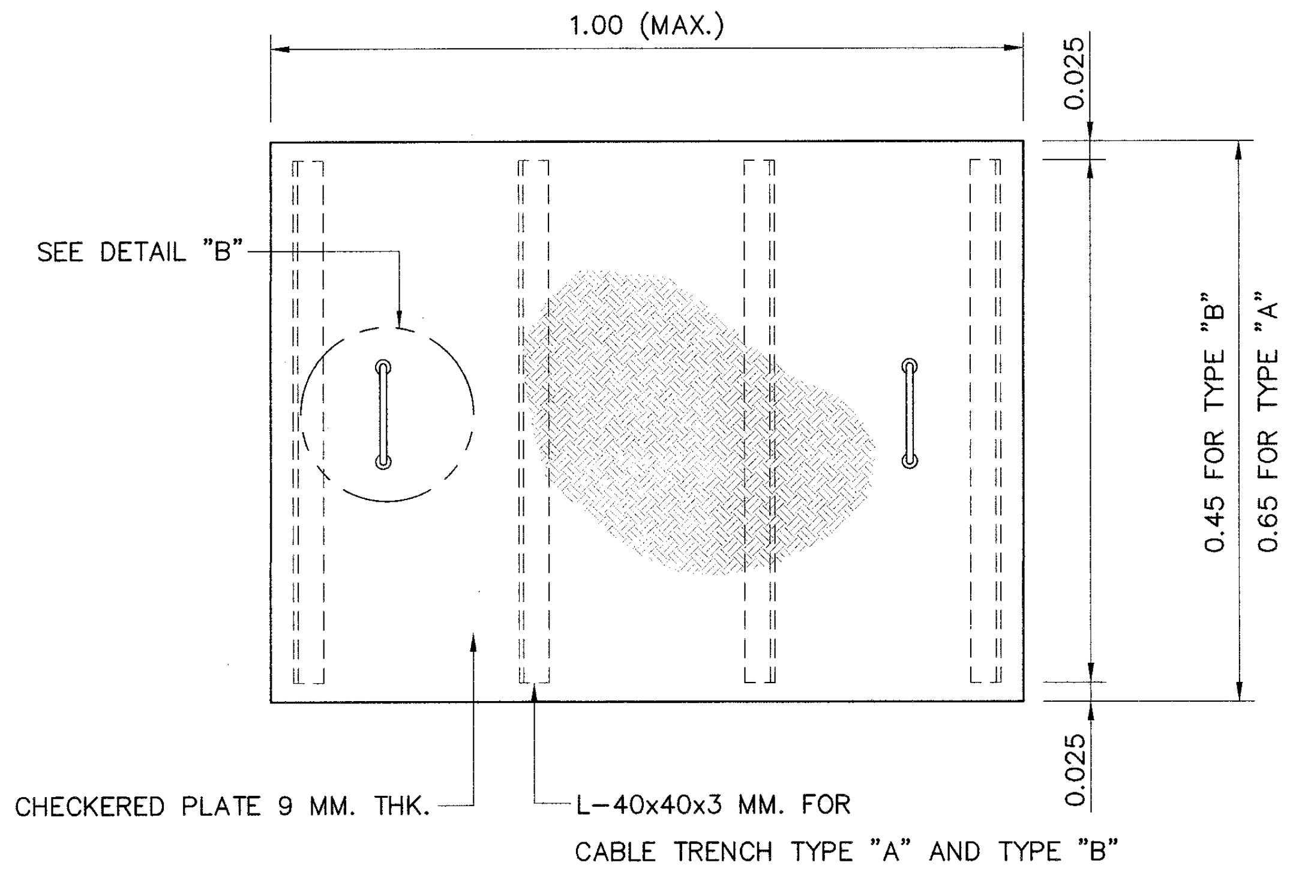
| DESIGNED ภย.64624 ลย.6226 | REVIEWED |
| DRAWN | SUBMITTED Chant |
| CHECKED ลย.6226 | RECOMMENDED |
| | APPROVED P. Howell. |
| PROJECT MANAGER / DATE 08/03/2559 | DRAWING NO. MH–PH–17 / SHEET NO. 100 OF 130 |



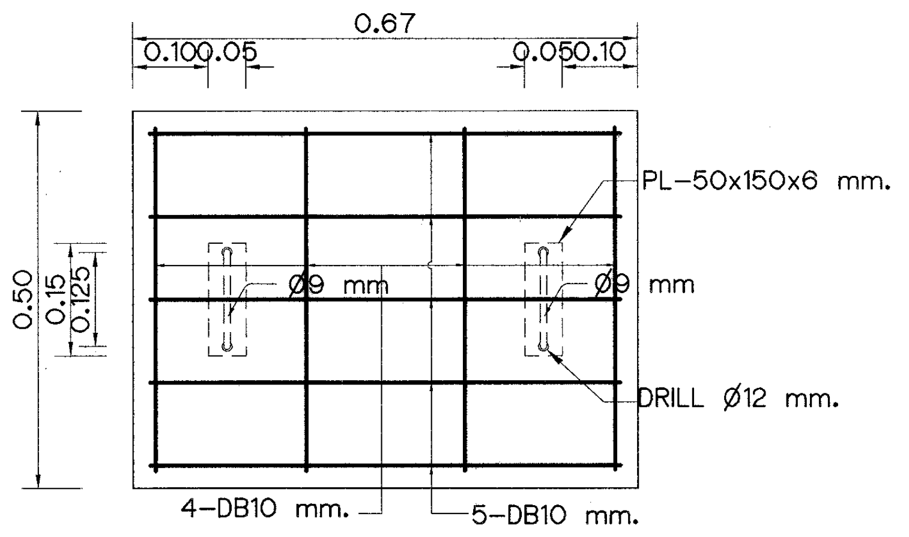
## IN DOOR CABLE TRENCH

SCALE 1:10



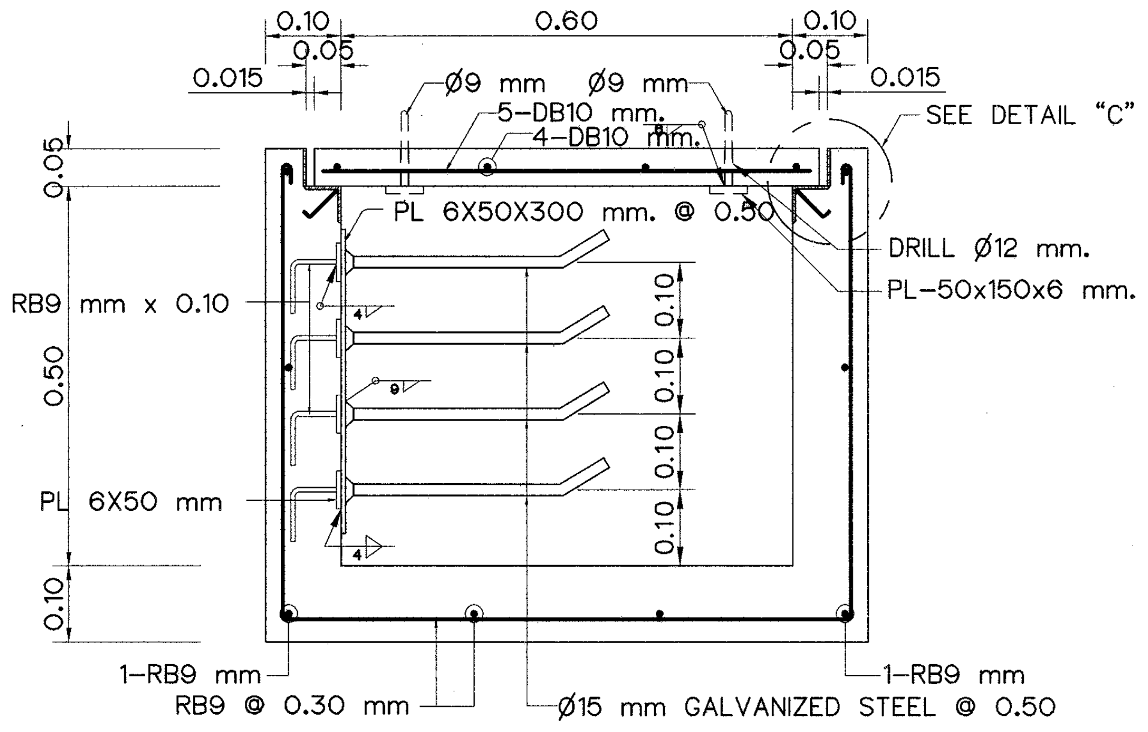
## COVER PLATE FOR IN DOOR

SCALE 1:10



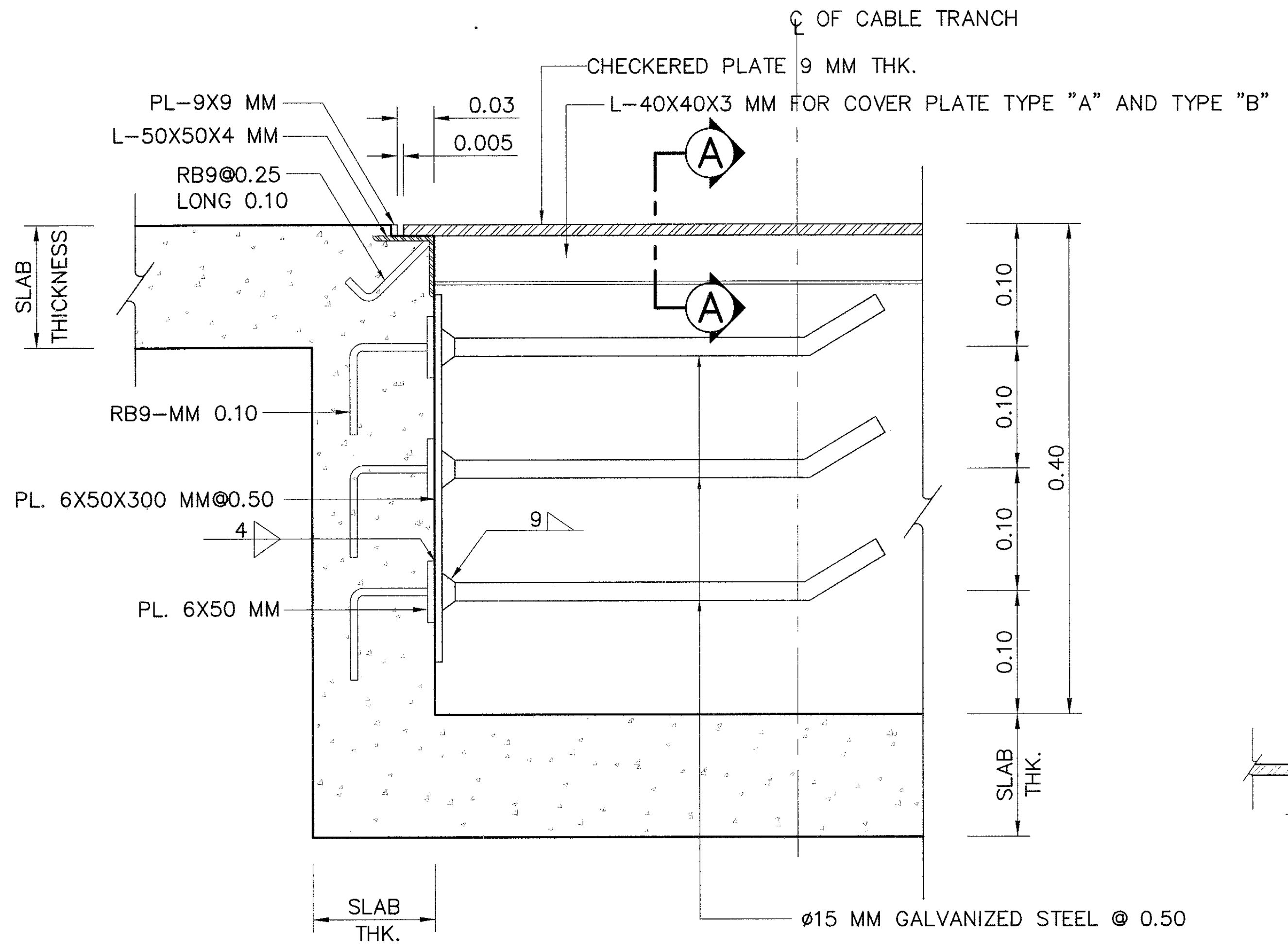
## OUT DOOR COVER CABLE TRENCH

SCALE 1:5



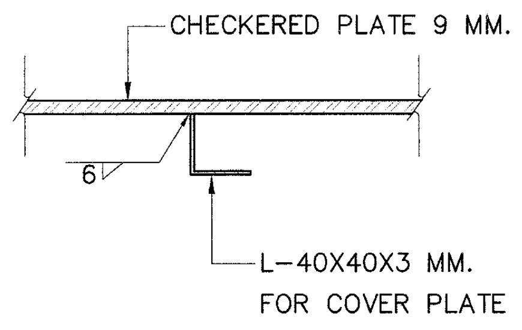
## OUT DOOR CABLE TRENCH

SCALE 1:10



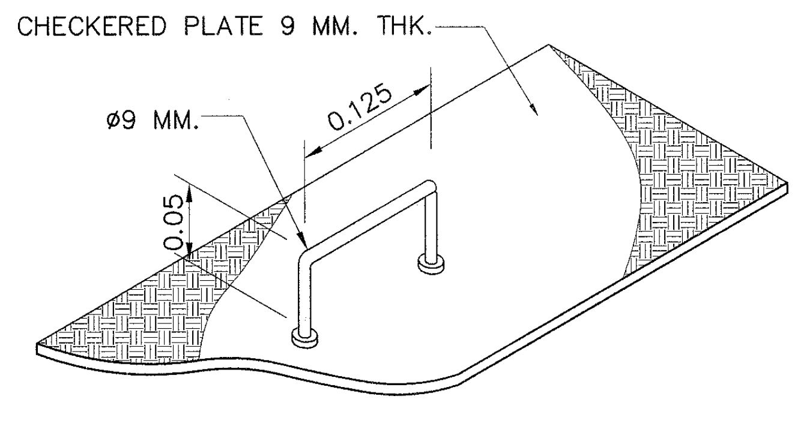
## DETAIL "A"

SCALE 1:5



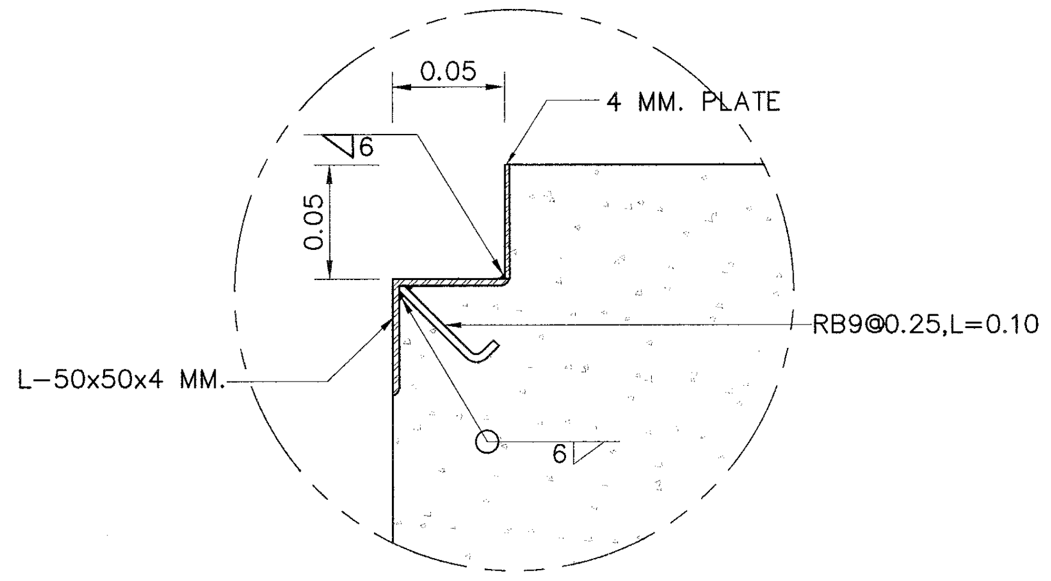
## SECTION A–A

NOT TO SCALE



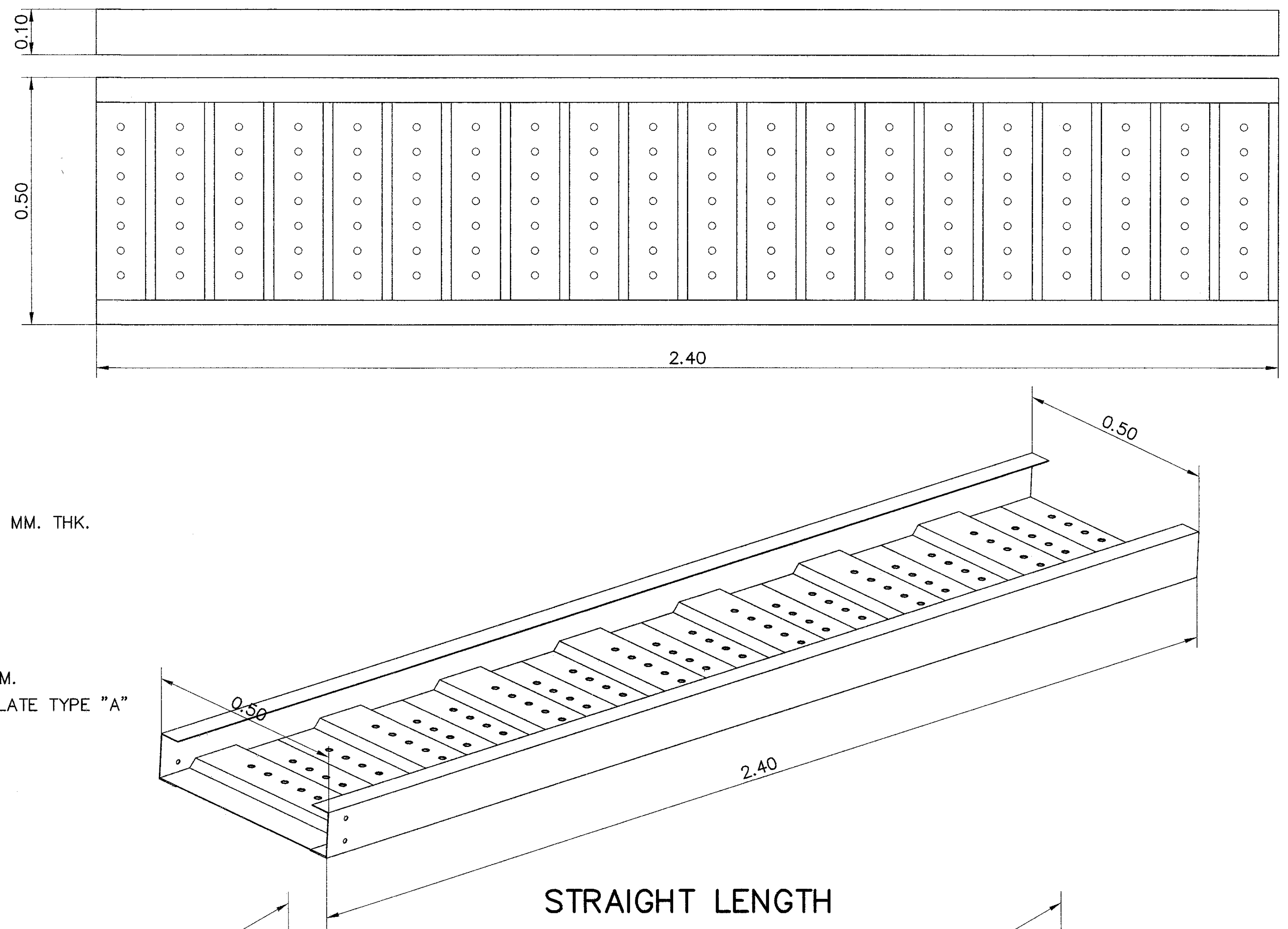
## DETAIL "B"

NOT TO SCALE



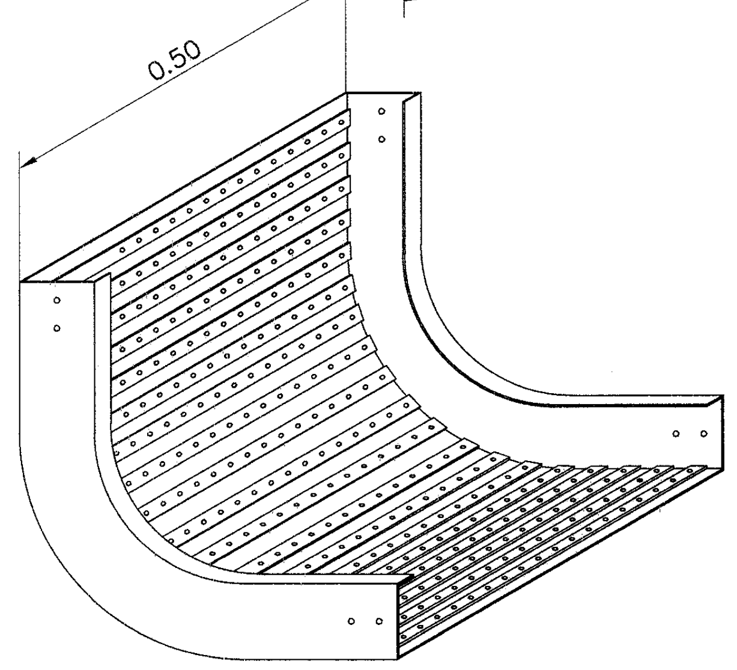
## DETAIL "C"

NOT TO SCALE



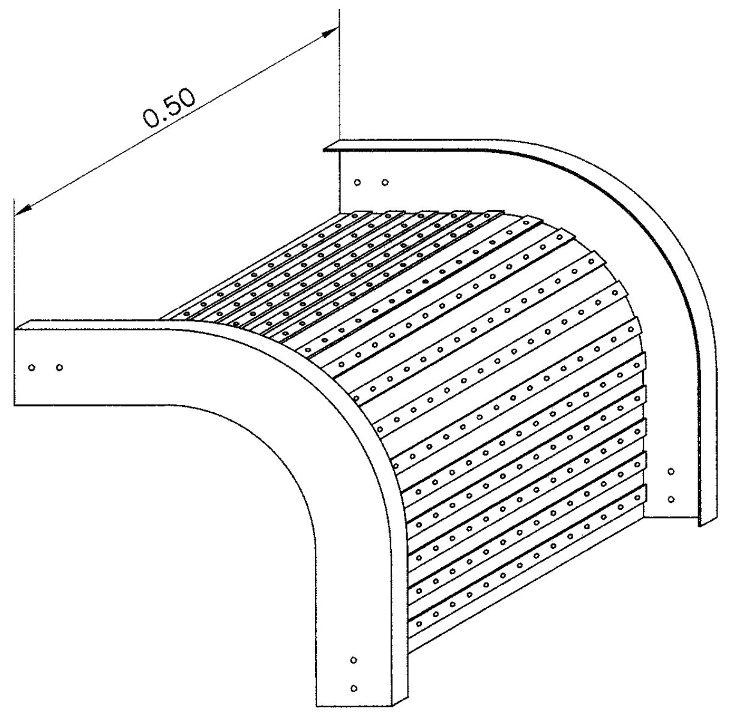
## STRAIGHT LENGTH

NOT TO SCALE



## OUTSIDE VERTICAL RISERS

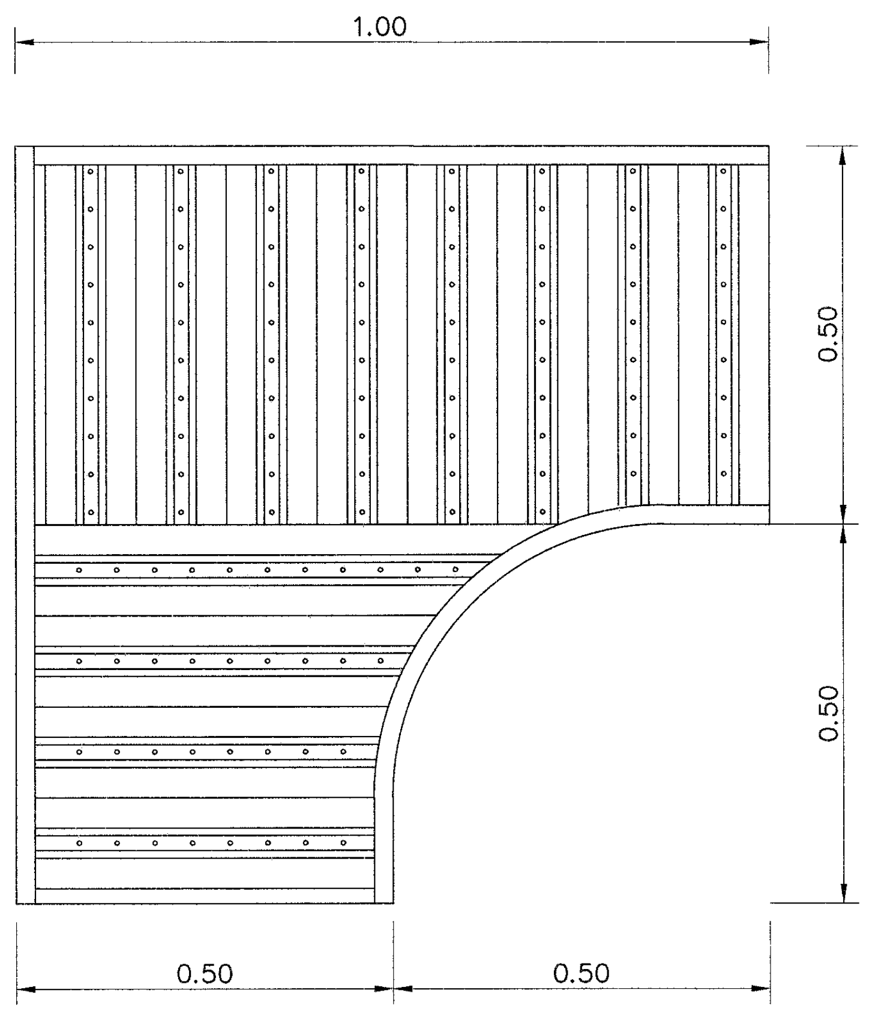
NOT TO SCALE



## INSIDE VERTICAL RISERS

NOT TO SCALE

MATERIALS : SHEET STEEL 1.5MM.
SURFACE FINISH : POWDER
COATED IN TEXTURED RAL
7032 OR HOT-DIP GALVANIZED
(UPON YOU REQUIREMENTS)
ASSEMBLY : WELDING METHOD
APPLICATION : USING FOR INDOOR & OUTDOOR INSTALLATION WORK



## HORIZONTAL 90 ELBOWS

NOT TO SCALE

### NOTES :

1. ALL DIMENSIONS ARE IN METERS, UNLESS OTHERWISE SHOWN
2. SYMBOLS, ABBREVIATION AND GENERAL NOTES SEE DWG. No. MH-GN-03
3. STEEL COVER FOR IN DOOR TRENCH SHALL BE COATED WITH NON BLEEDING TYPE COAL TAR EPOXY

### REFERENCE DRAWINGS :

1. POWERHOUSE, PLAN 1st FLOOR AND PLAN 2nd FLOOR MH-PH-02

| | | | | |
|---|---|---|---|---|
| 3 | | | | |
| 2 | | | | |
| 1 | | | | |
| NO. | DATE | REVISIONS | CHECKED | APPROVED |
| | CONSULTANTS | | DEDE | |

KINGDOM OF THAILAND
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
POWERHOUSE
CABLE TRENCH DETAILS

P&C MANAGEMENT CO.,LTD.

Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

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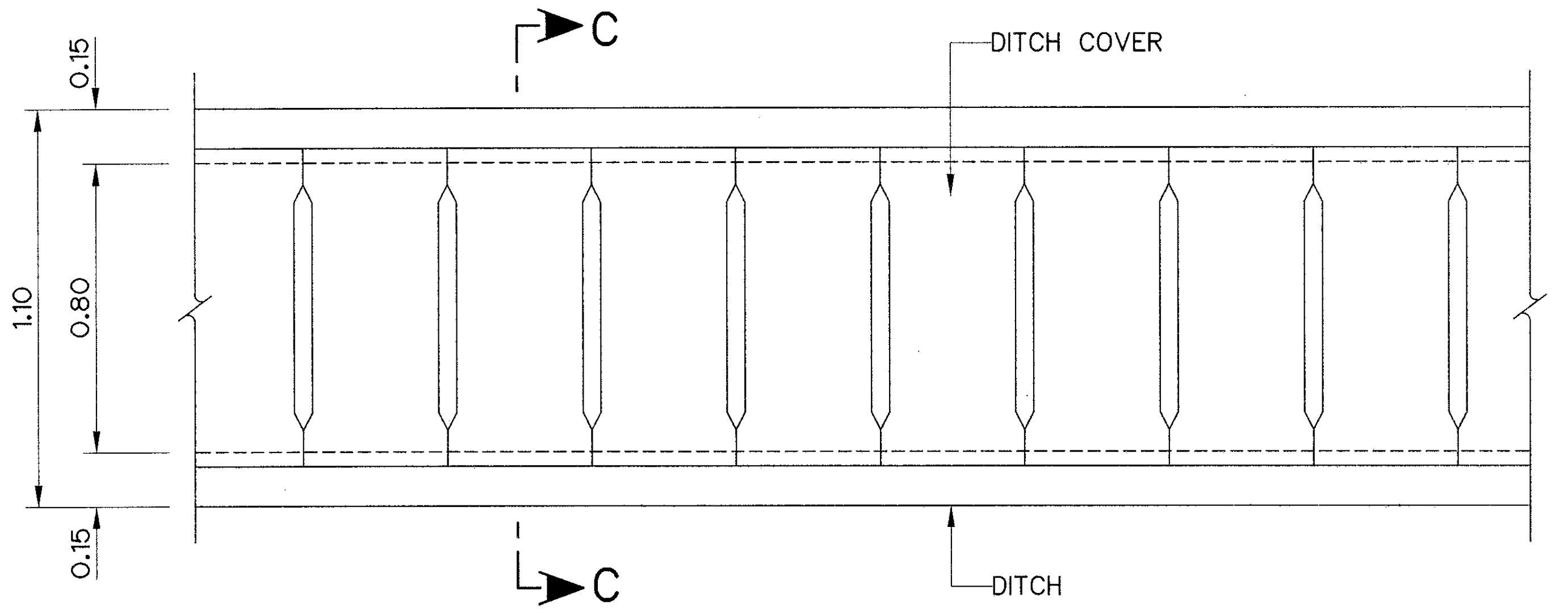
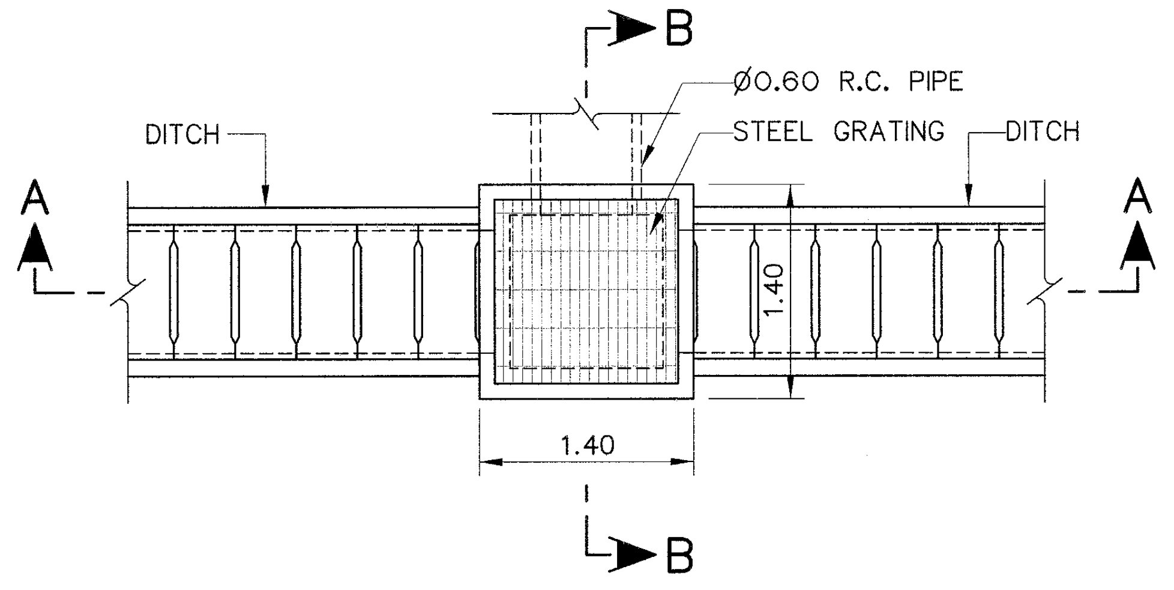
| DESIGNED | ภย.64624 | สย.6226 | REVIEWED |
| DRAWN | | | SUBMITTED Chanit |
| CHECKED | | สย.6226 | RECOMMENDED |
| PROJECT MANAGER | DATE 08/03/2559 | | APPROVED P. Hansell |

DRAWING NO. MH-PH-18
SHEET NO. 101 OF 130



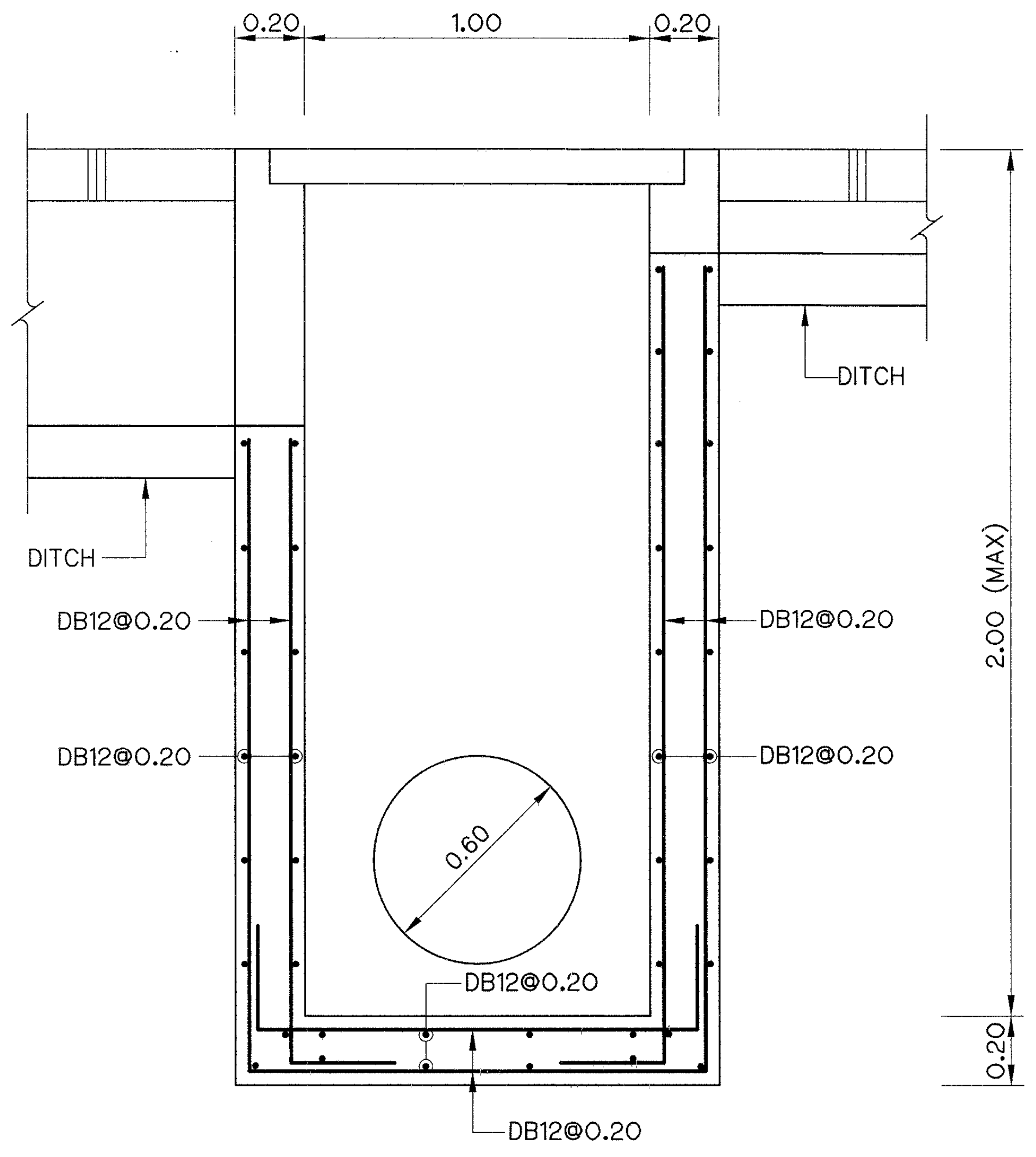
## DITCH PLAN

NOT TO SCALE



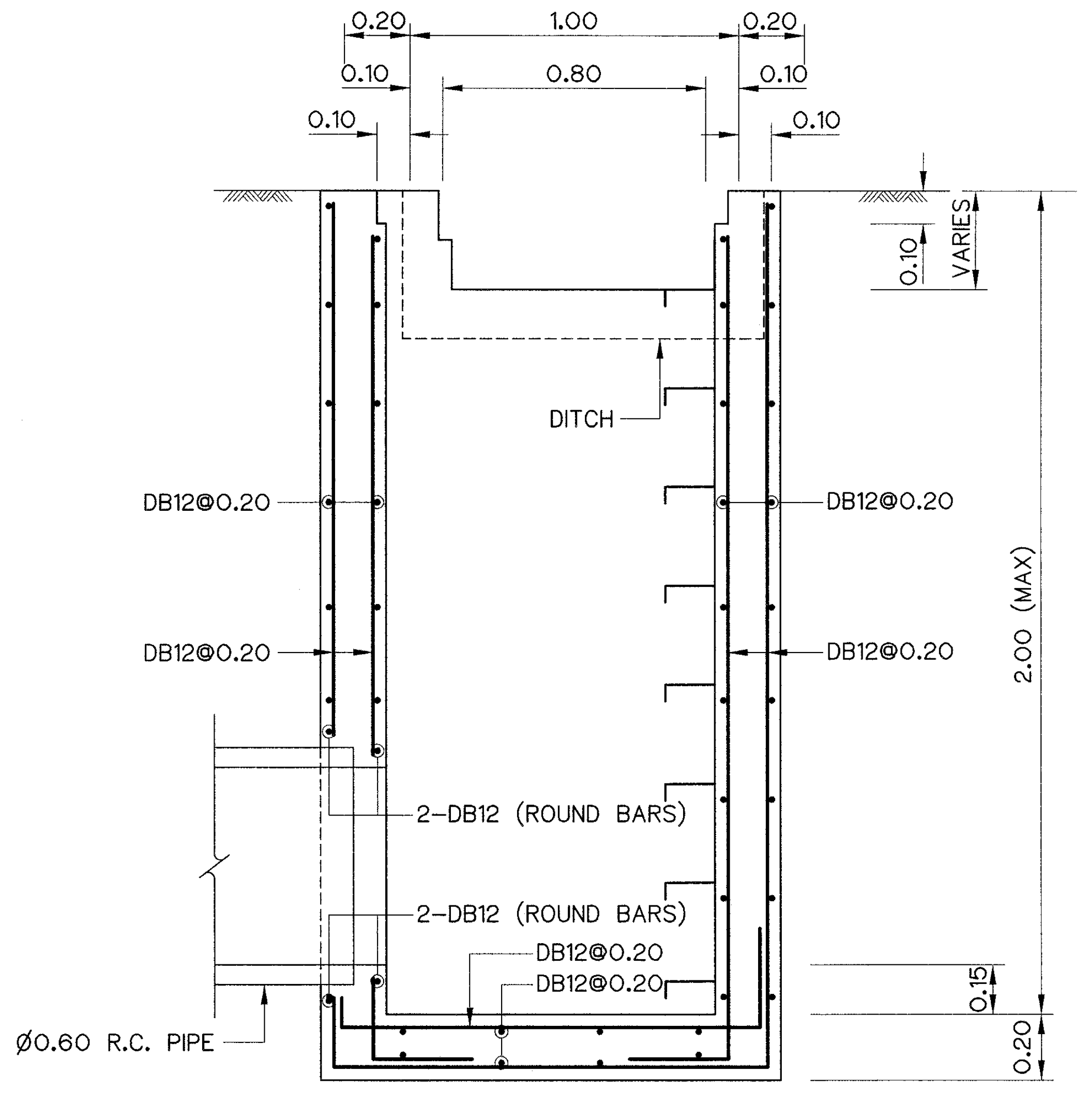
## MANHOLE PLAN

NOT TO SCALE



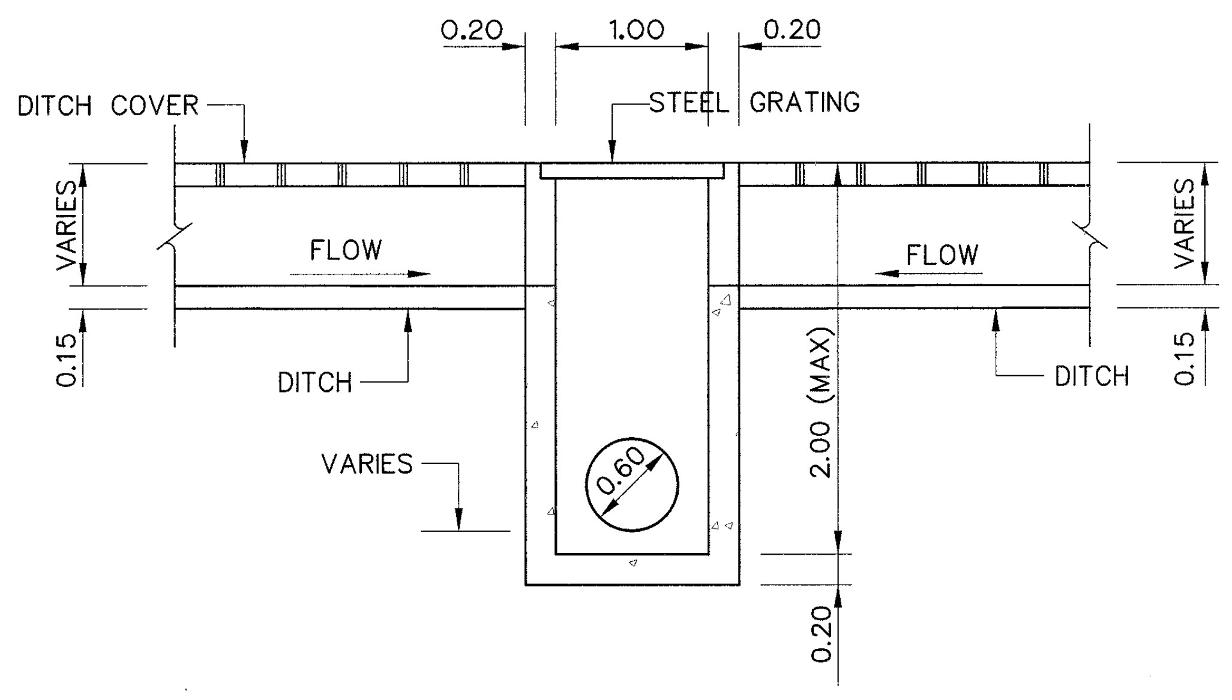
## SECTION A–A (REINFORCEMENT DETAIL)

NOT TO SCALE



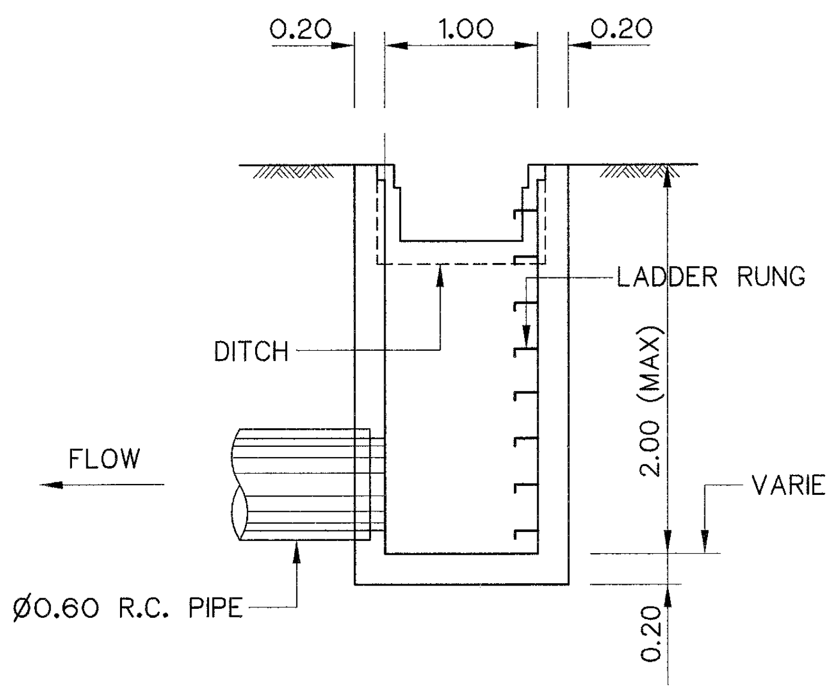
## SECTION B–B (REINFORCEMENT DETAIL)

NOT TO SCALE



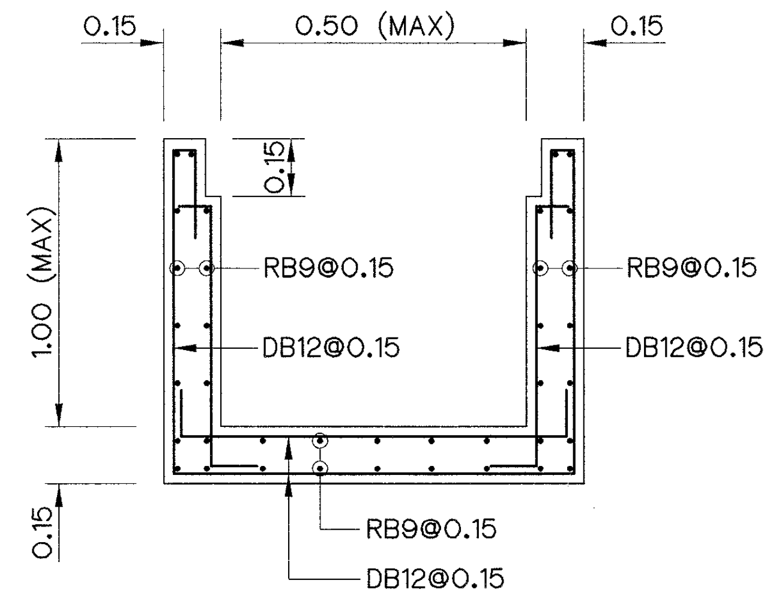
## SECTION A–A

NOT TO SCALE



## SECTION B–B

NOT TO SCALE



## SECTION C–C

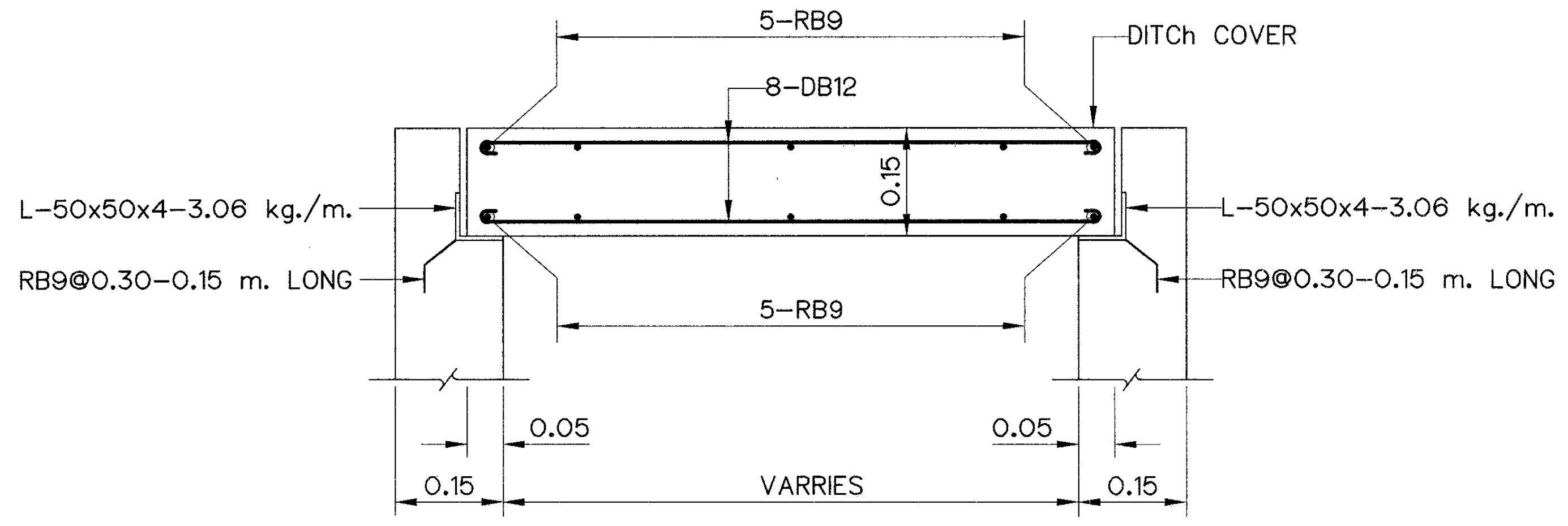
NOT TO SCALE

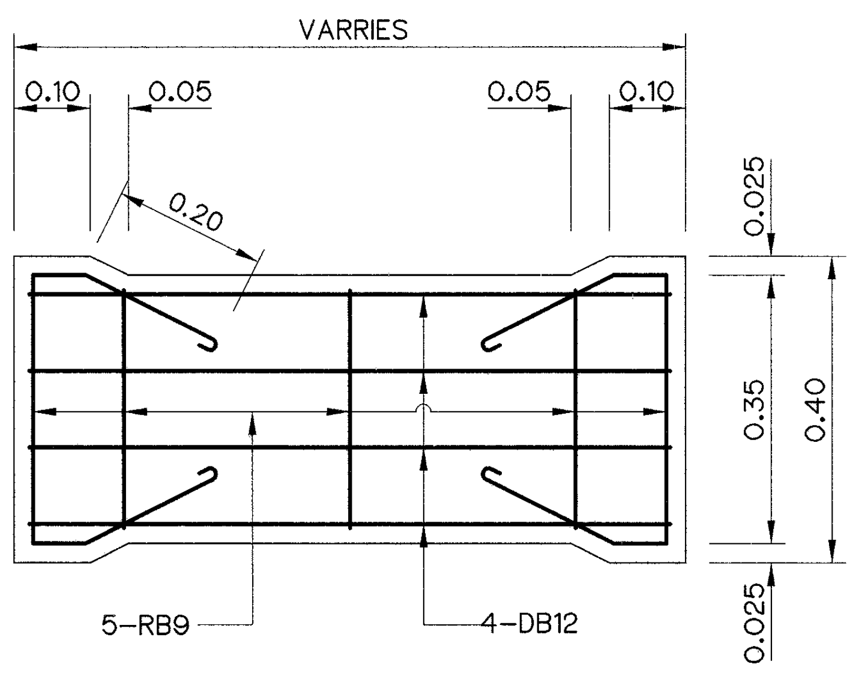
## NOTES :

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS, UNLESS OTHERWISE SHOWN.
2. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH-GN-03

## REFERENCE DRAWINGS :

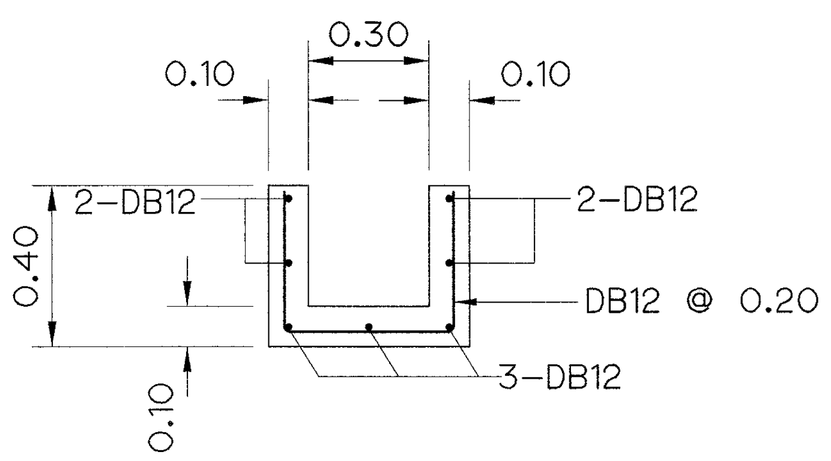
| | |
|---|---|
| 1. POWERHOUSE, GENERAL LAY-OUT | MH-PH-01 |
| 2. TAILRACE, SECTIONS AND DETAILS | MH-TR-02 |





## DITCH COVER DETAILS

NOT TO SCALE



## 0.30 WIDTH DITCH DETAIL

NOT TO SCALE

KINGDOM OF THAILAND
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MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
POWERHOUSE
DITCH AND MANHOLE DETAILS

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
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| 3 | | | | |
| 2 | | | | |
| 1 | | | | |
| | CONSULTANTS | | DEDE | |

P&C MANAGEMENT CO.,LTD.

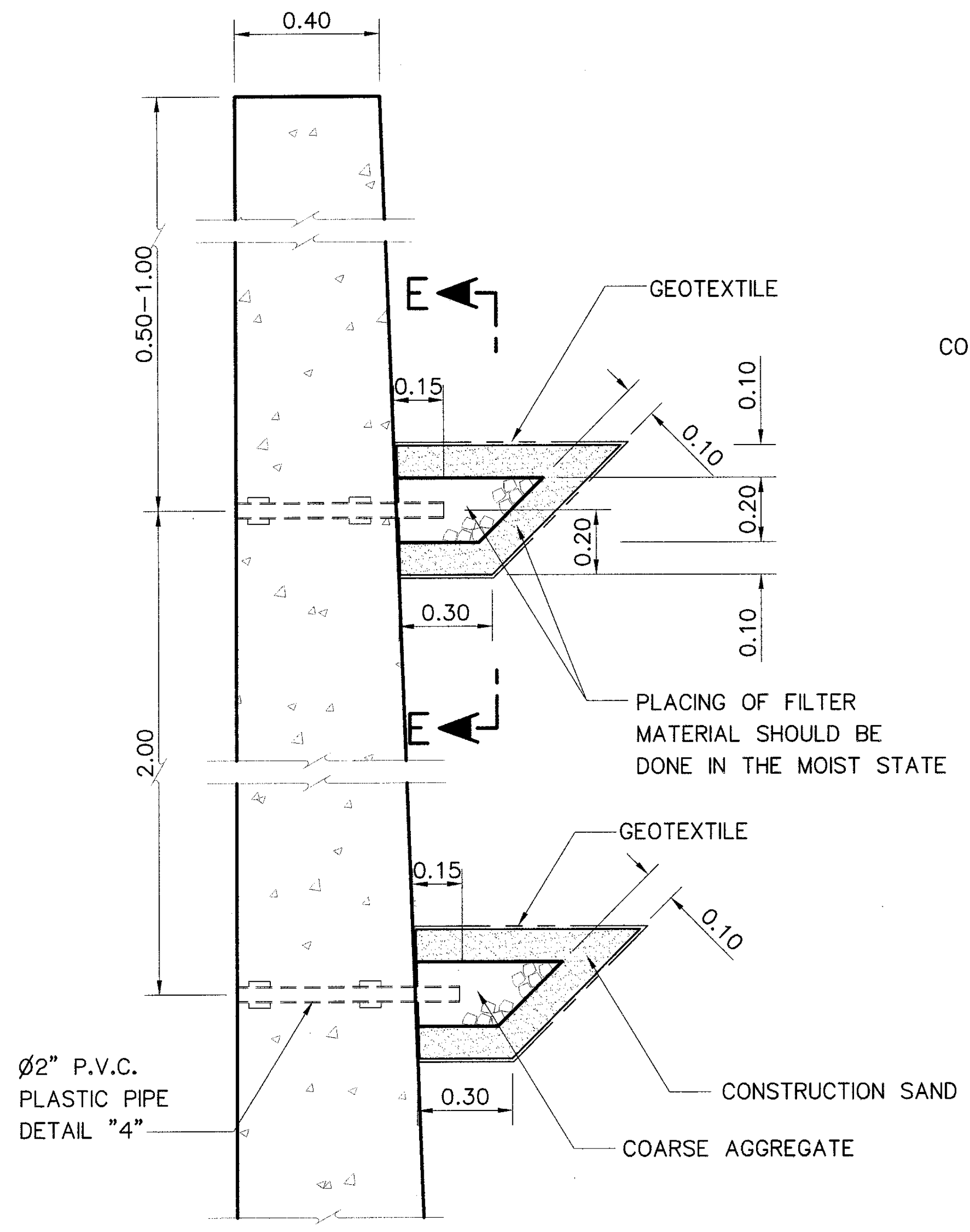
DESIGNED ภย.64624 สย.6226
DRAWN
CHECKED สย.6226
PROJECT MANAGER 08/03/2559 DATE

Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

REVIEWED
SUBMITTED Chait
RECOMMENDED
APPROVED P. Hom...

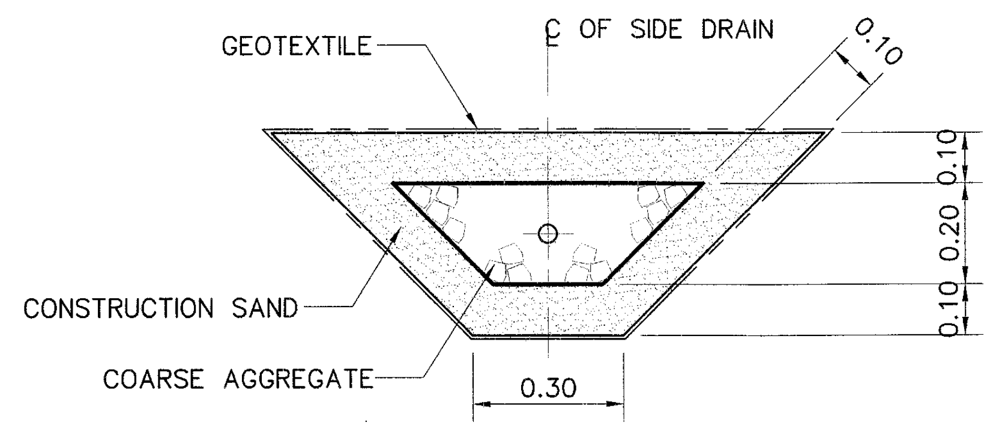
DRAWING NO. MH–PH–19

SHEET NO. 102 OF 130



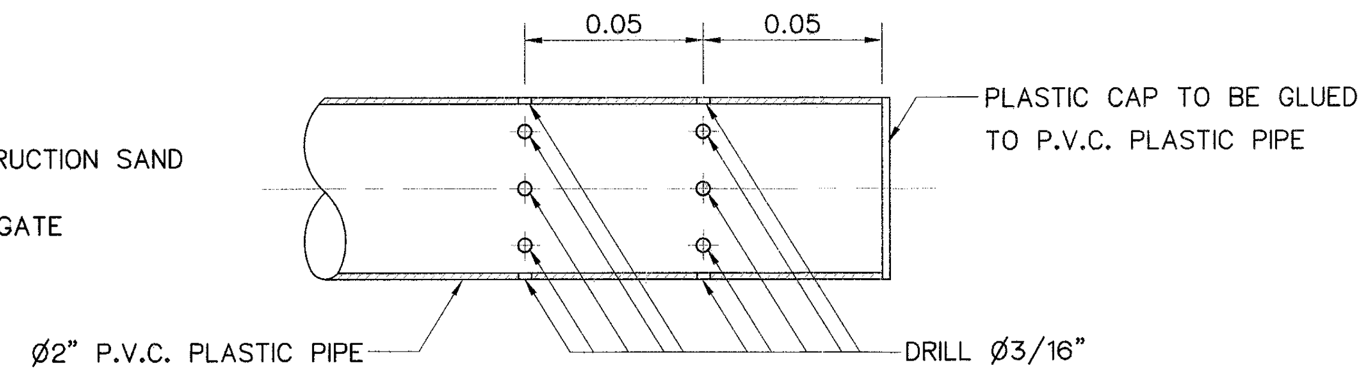
## DETAIL OF SIDE DRAIN

NOT TO SCALE



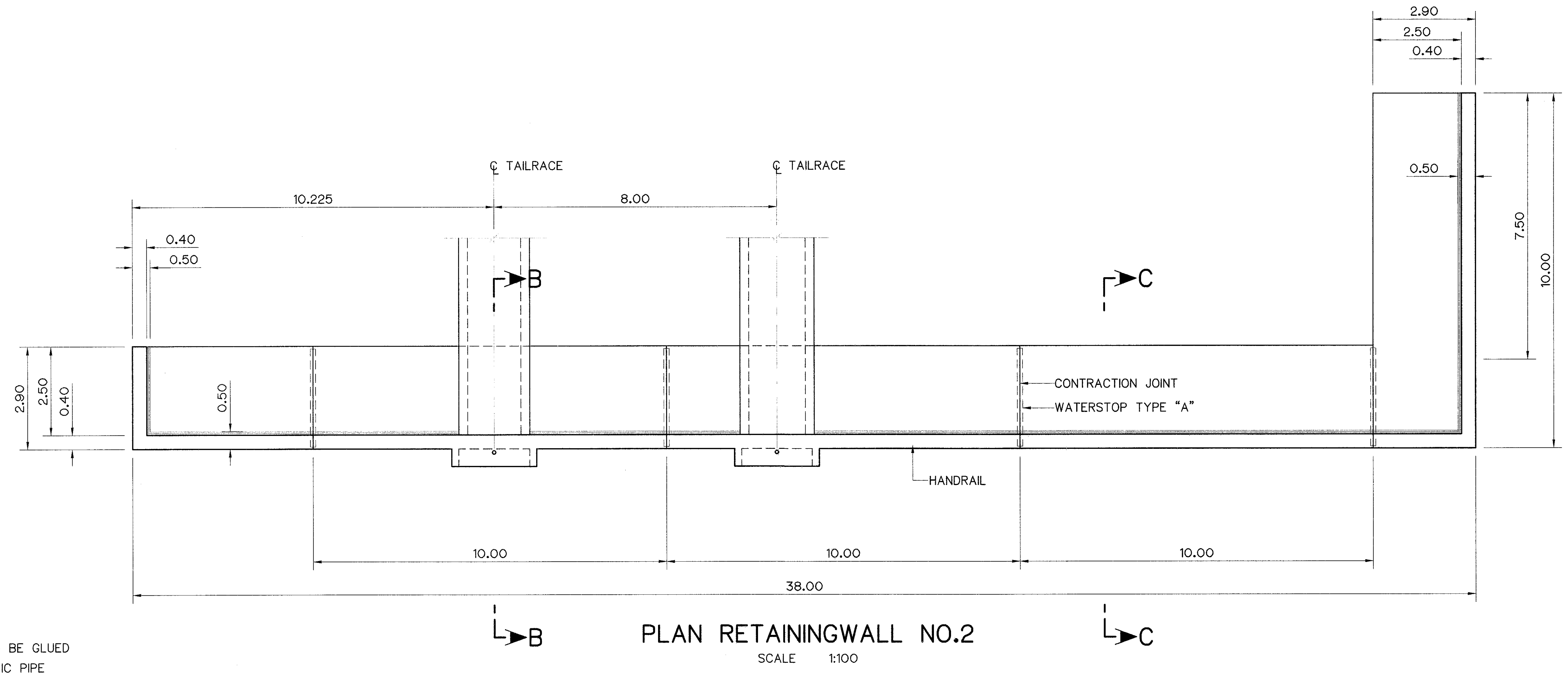
## SECTION E – E

SCALE 1:15



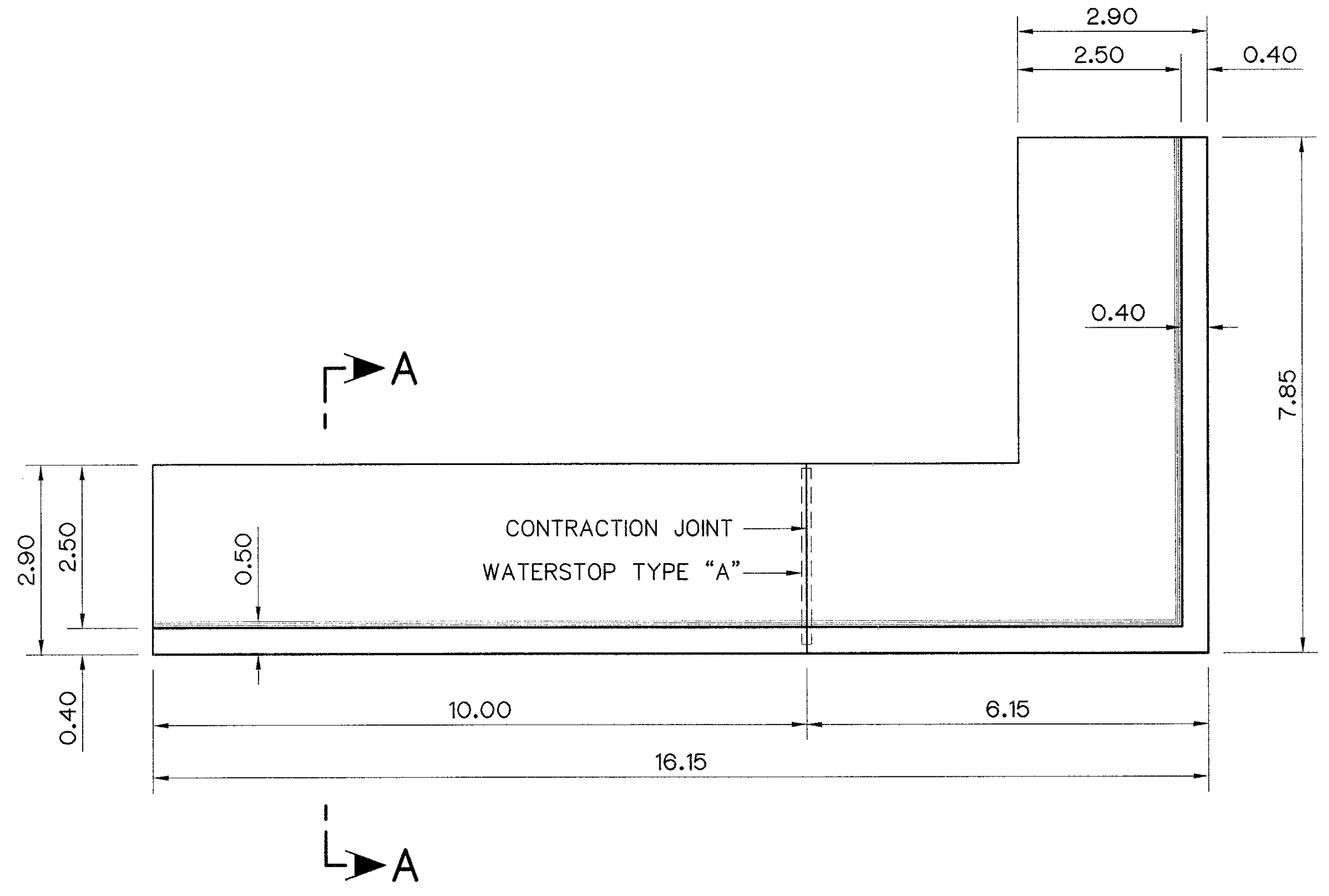
## DETAIL "4"

NOT TO SCALE



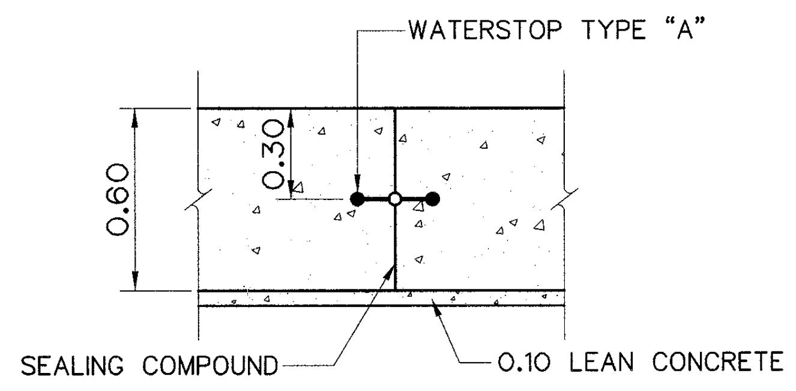
## PLAN RETAININGWALL NO.2

SCALE 1:100



## PLAN RETAININGWALL NO.1

SCALE 1:100



## CONTRACTION JOINT AT FLOOR (NON GROOVE)

(FLOOR THK. CONSTANT)

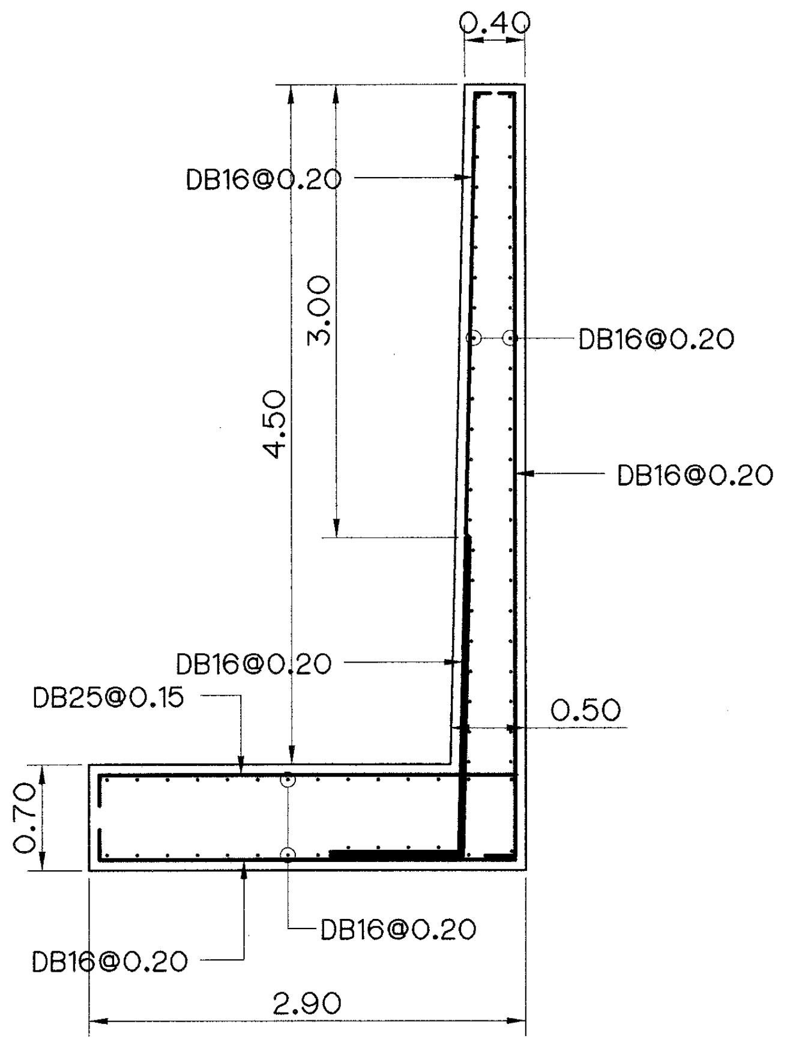
SCALE 1:25

**NOTES :**

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS, UNLESS OTHERWISE SHOWN.
2. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH–GN–03

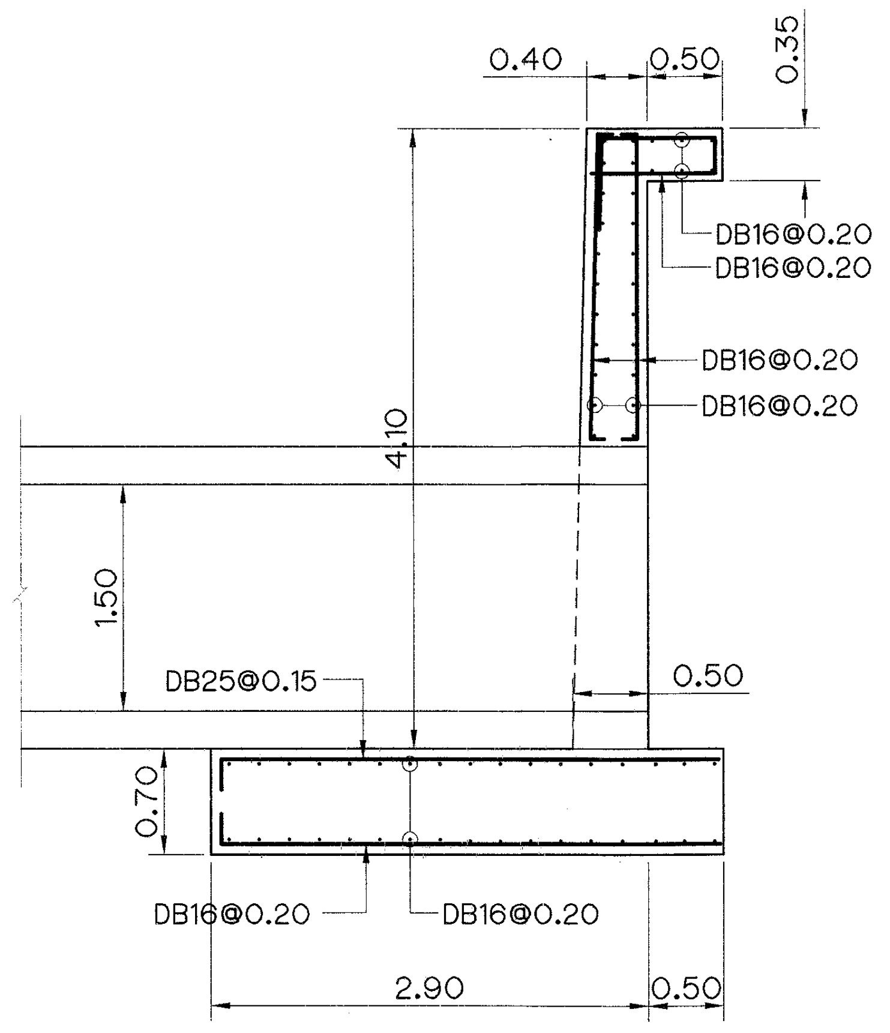
**REFERENCE DRAWINGS :**

| | |
|---|---|
| 1. GENERAL LAY–OUT | MH–PH–01 |



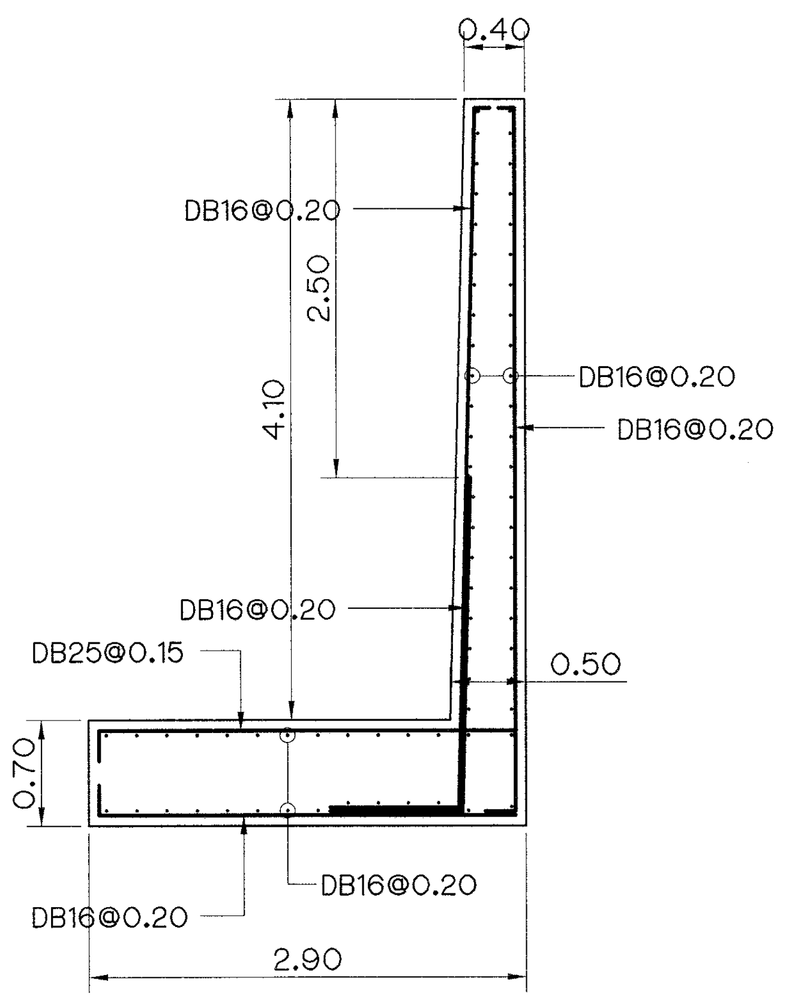
## RETAINING WALL NO.1 SECTION A–A

SCALE 1:50



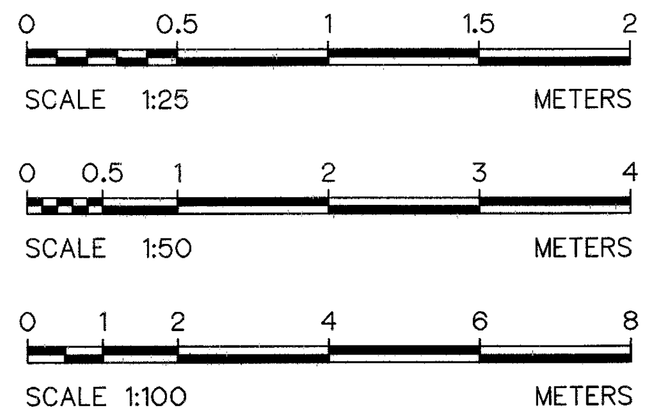
## RETAINING WALL NO.2 SECTION B–B

SCALE 1:50



## RETAINING WALL NO.2 SECTION C–C

SCALE 1:50



KINGDOM OF THAILAND
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
TAILRACE
RETAININGWALL REINFORCEMENT DETAILS

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
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P&C MANAGEMENT CO.,LTD.

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| DESIGNED | ภย.64624 | สย.6226 |
| DRAWN | | |
| CHECKED | | สย.6226 |
| PROJECT MANAGER | 08/03/2559 DATE | |

Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

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RECOMMENDED
APPROVED P. Houn

| DRAWING NO. | SHEET NO. |
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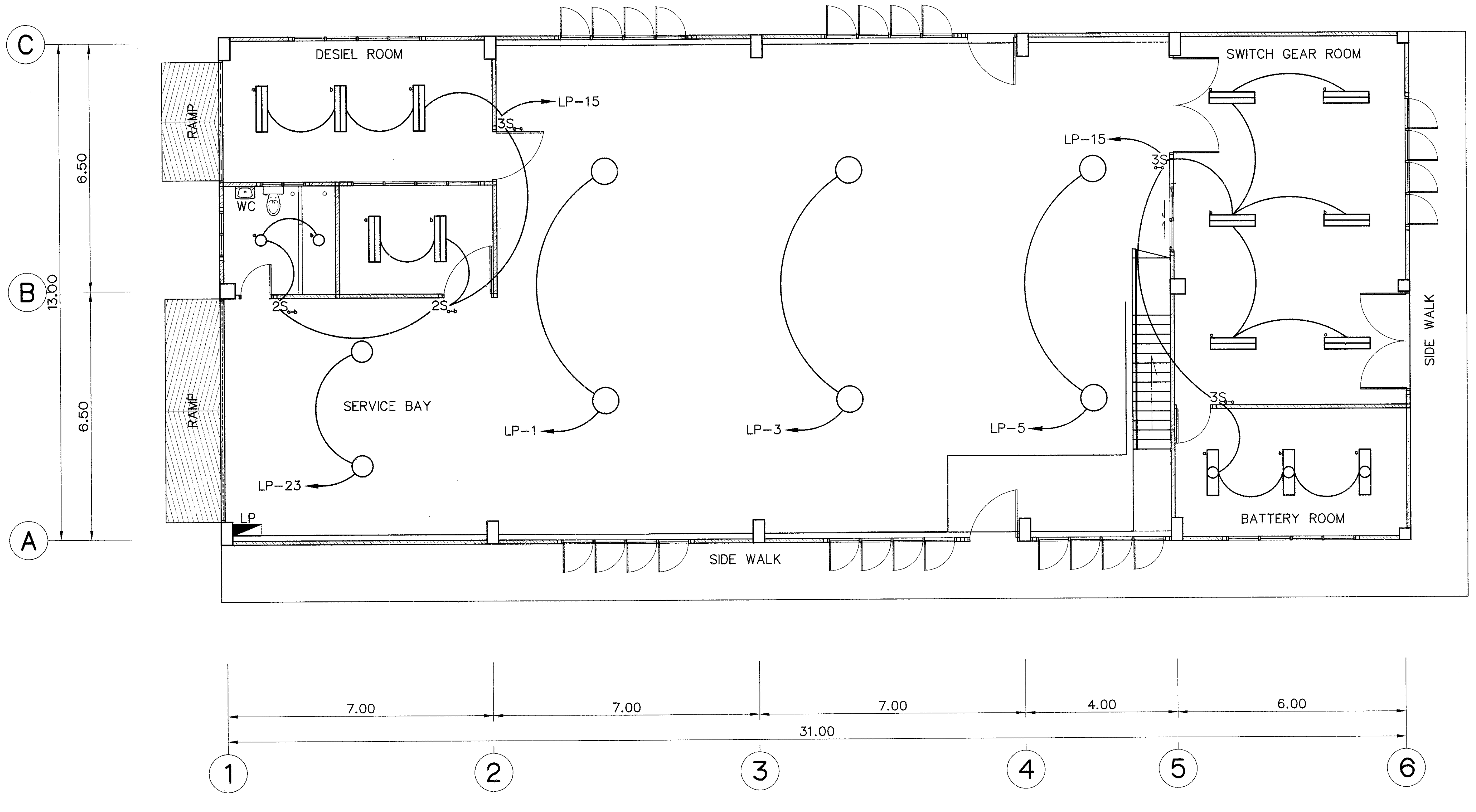
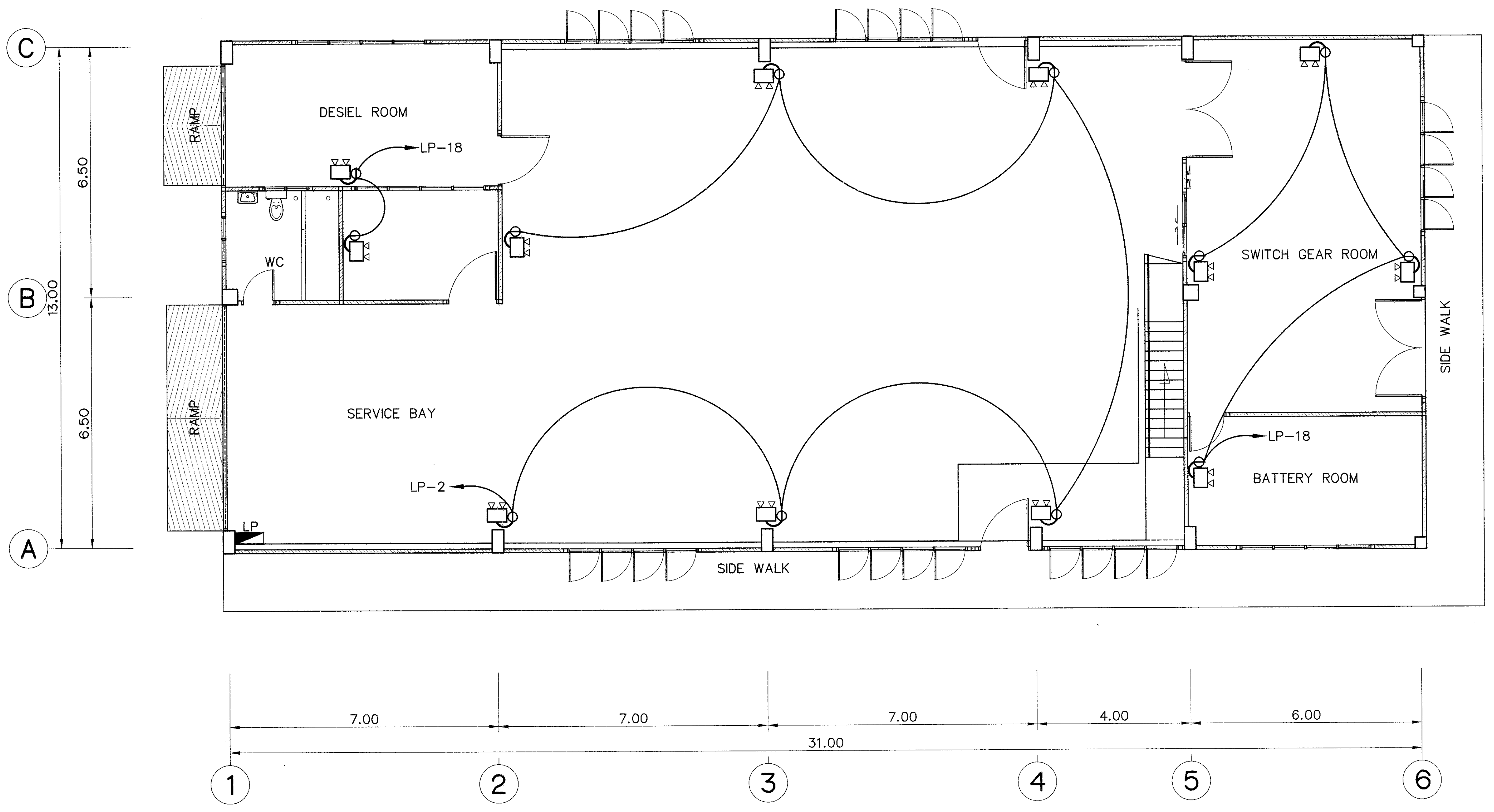
| MH–PH–20 | 103 OF 130 |



B C A D

## PLAN 1st FLOOR

SCALE 1:100



B C A D

## PLAN 1st FLOOR

SCALE 1:100

## LEGENDS :

| | |
|---|---|
| a ▭ | 2x36 W. FLUORESCENT LAMP (HANGING OR CEILING TYPE) WITH BALLAST LOW LOSS, CAPACITOR AND STARTOR AT SWITCH "a" |
| ▭○▭ | 2x36 W. FLUORESCENT LAMP (CORROSION PROOF) WITH BALLAST LOW LOSS, CAPACITOR AND STARTOR |
| a ▭ | 1x36 W. FLUORESCENT LAMP (HANGING CEILING TYPE) WITH BALLAST LOW LOSS, CAPACITOR AND STARTOR, AT SWITCH "a" |
| ♀ | 1x20 W. COMPACT FLUORESCENT (WALL TYPE, OUTDOOR IP54) |
| $3S_{a-c}$ | SWITCH "3" SETS FOR SWITCH "a" TO "c" |
| S" | TWO-WAYS SWITCH |
| ⊖ | SIMPLEX RECEPTACLE WITH GROUND, 10 A. 220 VAC. |
| ○ | 20 W. COMPACT FLUORESCENT |
| Ⓕ | EXHAUST FAN 12" |
| ◎ | OUTDOOR BOLLARD TYPE WITH 20 W. COMPACT FLUORESCENT |
| ⊜ | DUPLEX RECEPTACLE WITH GROUND, 10 A. 220 VAC. |
| ▲ | POWER RECEPCTACLE 3P+N+E 32 A. 400 VAC. |
| ◯ | HIGH BAY FIXTURE 1x400 W. HIGH PRESSURE SODIUM |
| ⊗ | HIGH BAY FIXTURE 1x250 W. HIGH PRESSURE SODIUM |
| □ △△ | EMERGENCY LIGHTING 2x55 W. HALOGEN W/SEALED LEAD ACID BATTERY BACKUP 2 HOURS |
| A/C | AIR CONDITIONING, SPLIT TYPE |
| ◣LP | LOAD PANEL 3 PHASE (18 CIRCUITS) WITH MAIN CIRCUIT BREAKER |
| LCP1 | LIGHTING CONTROL PANEL |
| – – – | SECONDARY LINES, 380/220 V 50 MM THW OVERHEAD INSULATED CABLES, 3Ø 4 WIRE |
| —— | UNDERGROUND WIRING IN CONDUIT |

KINGDOM OF THAILAND
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
POWERHOUSE
ELECTRIC AND LIGHTING SYSTEMS (SHEET 1/4)

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
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P&C MANAGEMENT CO.,LTD.

DESIGNED วฟก.604
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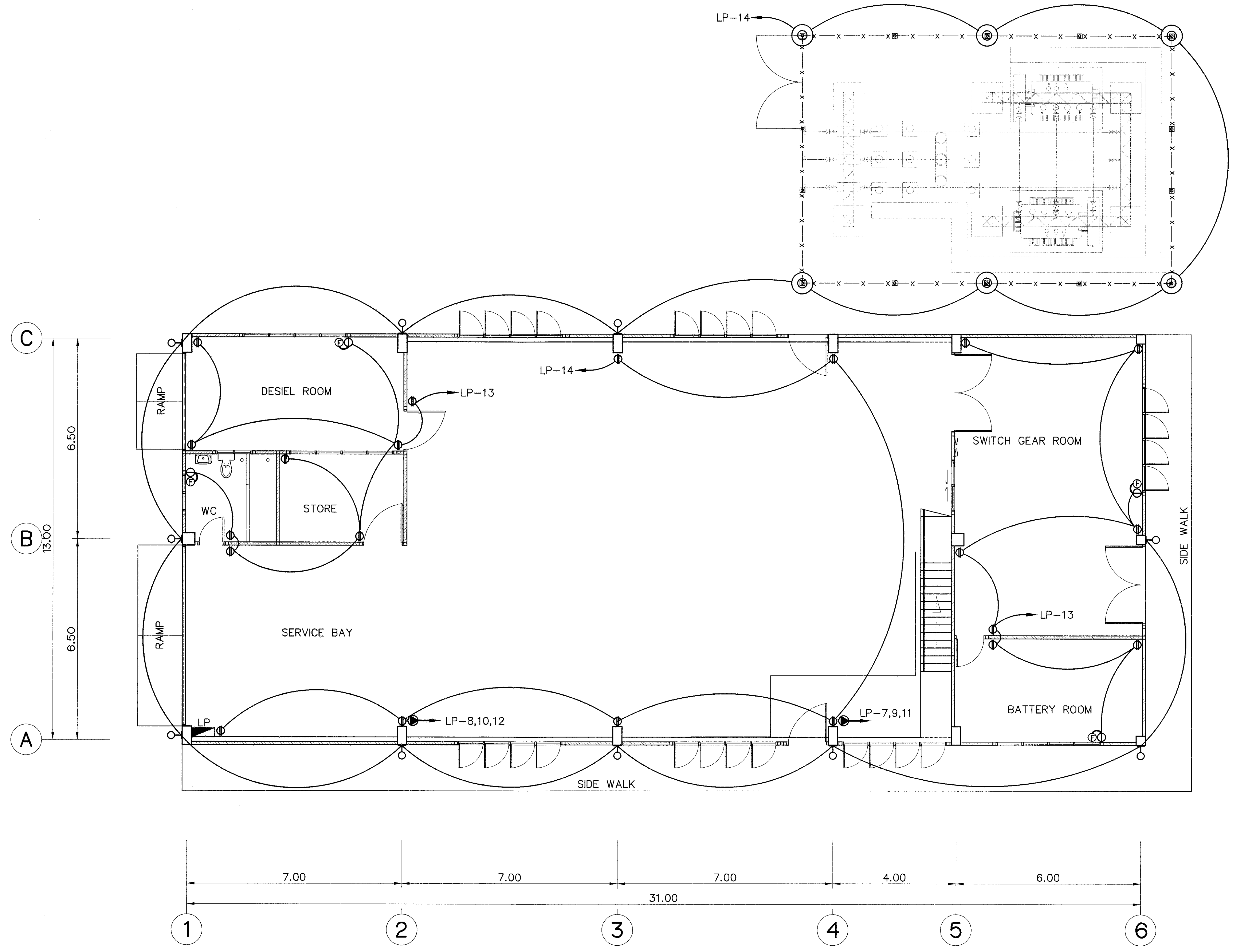
CHECKED วฟก.604
PROJECT MANAGER
DATE 08/03/2559

Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

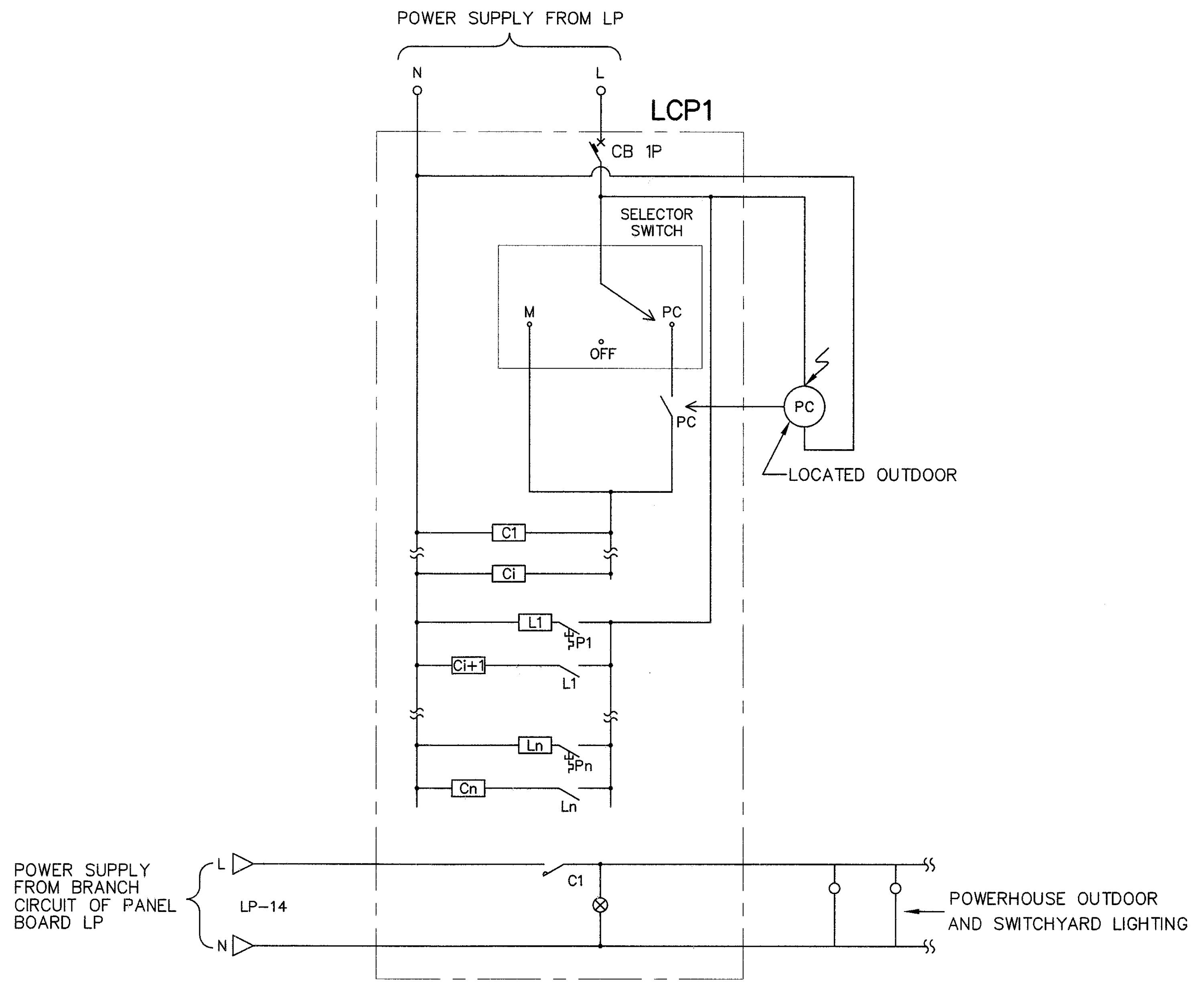
REVIEWED
SUBMITTED Chawit
RECOMMENDED
APPROVED P. Hansell

DRAWING NO. MH-PH-21
SHEET NO. 104 OF 130



## PLAN 1st FLOOR

SCALE 1:100



## LIGHTING CONTROL PANEL(LCP1) DIAGRAM

**LEGEND :**

- (PC) = PHOTO CELL
- PC = PHOTO CELL SWITCH CONTACT
- Cn = MAGNETIC CONTACTOR n : 1, 2, 3...
- Ln = LATCHING CONTACTOR n : 1, 2, 3...
- Pn = PUSH BUTTON SWITCH, NON-LATCHED TYPE
- [Cn] = MAGNETIC RELAY n : 1, 2, 3...
- [Ln] = LATCHING RELAY n : 1, 2, 3...

## LEGENDS :

| | |
|---|---|
| a ▭ | 2x36 W. FLUORESCENT LAMP (HANGING OR CEILING TYPE) WITH BALLAST LOW LOSS, CAPACITOR AND STARTOR AT SWITCH "a" |
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| a ▭ | 1x36 W. FLUORESCENT LAMP (HANGING CEILING TYPE) WITH BALLAST LOW LOSS, CAPACITOR AND STARTOR, AT SWITCH "a" |
| ♀ | 1x20 W. COMPACT FLUORESCENT (WALL TYPE, OUTDOOR IP54) |
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| Ⓕ | EXHAUST FAN 12" |
| ◎ | OUTDOOR BOLLARD TYPE WITH 20 W. COMPACT FLUORESCENT |
| ⊖ | DUPLEX RECEPTACLE WITH GROUND, 10 A. 220 VAC. |
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| A/C | AIR CONDITIONING, SPLIT TYPE |
| ◣LP | LOAD PANEL 3 PHASE (18 CIRCUITS) WITH MAIN CIRCUIT BREAKER |
| LCP1 | LIGHTING CONTROL PANEL |
| - - - | SECONDARY LINES, 380/220 V 50 MM THW OVERHEAD INSULATED CABLES, 3Ø 4 WIRE |
| —— | UNDERGROUND WIRING IN CONDUIT |

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
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CONSULTANTS

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KINGDOM OF THAILAND
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
POWERHOUSE
ELECTRIC AND LIGHTING SYSTEMS (SHEET 2/4)

P&C MANAGEMENT CO.,LTD.

DESIGNED วฟก.604
DRAWN
CHECKED วฟก.604

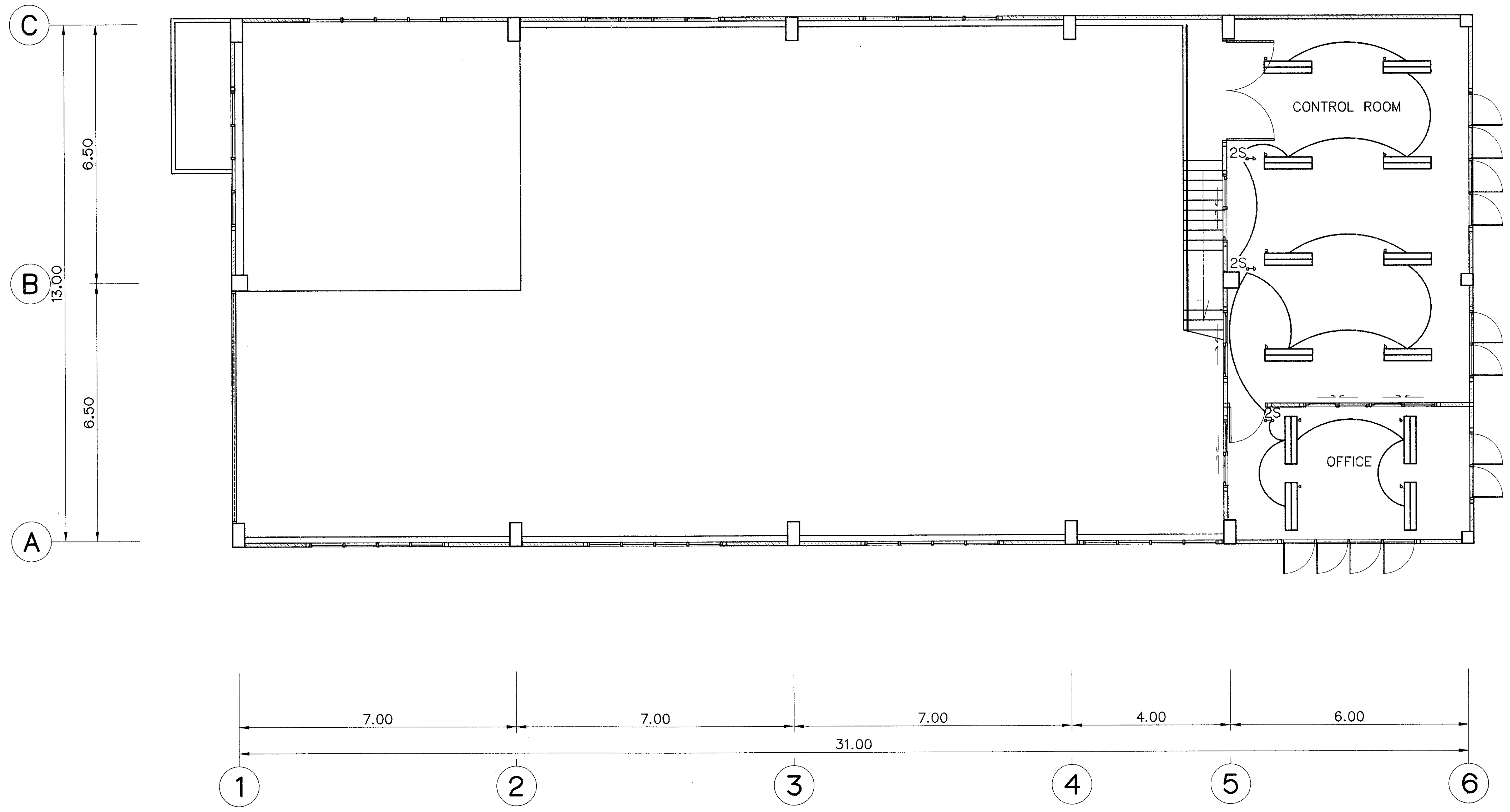
08/03/2559
PROJECT MANAGER DATE

Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

REVIEWED
SUBMITTED
RECOMMENDED
APPROVED

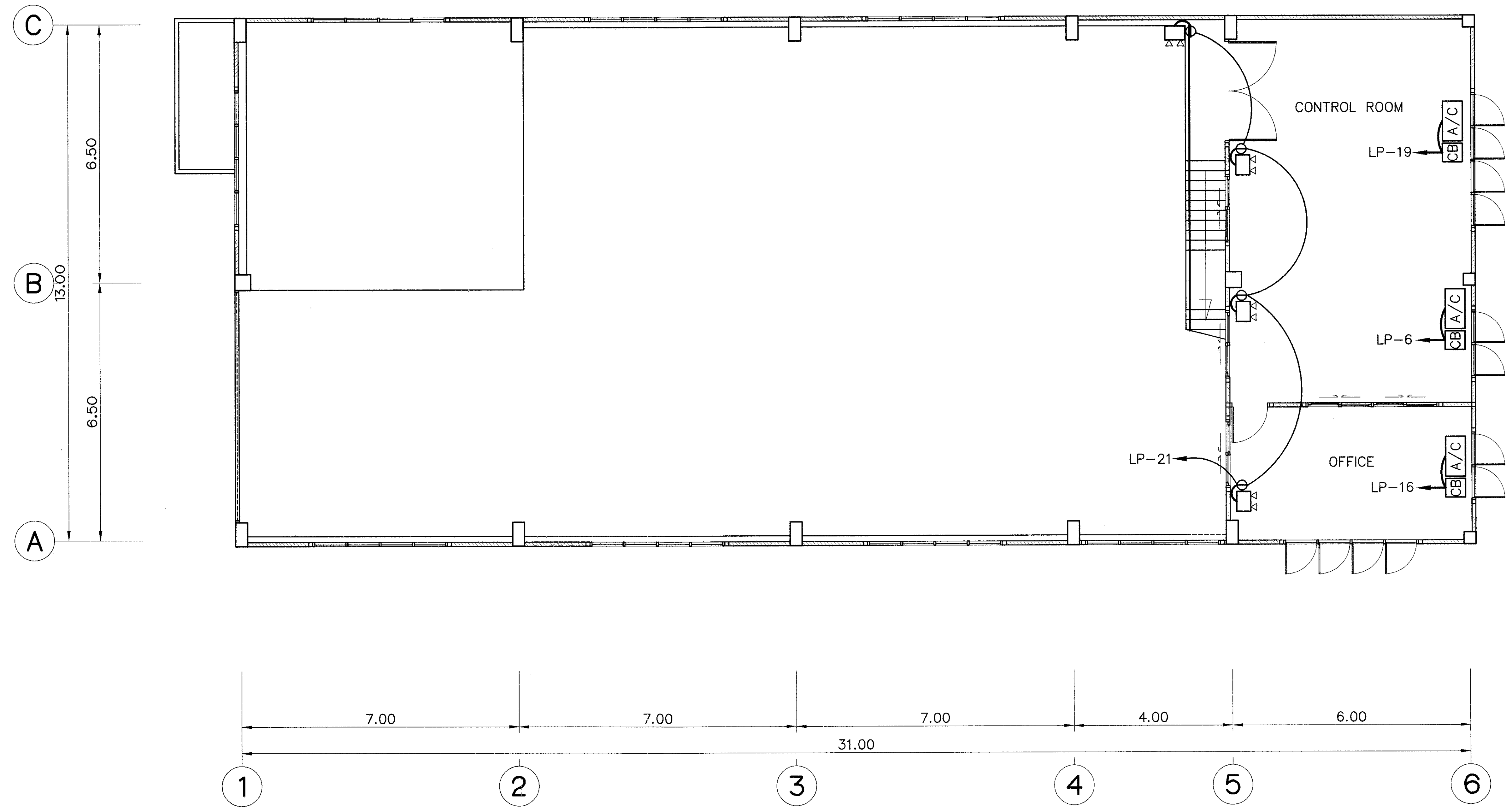
DRAWING NO.
MH-PH-22

SHEET NO.
105 OF 130



PLAN 2nd FLOOR

SCALE 1:100



PLAN 2nd FLOOR

SCALE 1:100

## LEGENDS :

| | |
|---|---|
| ▭ a | 2x36 W. FLUORESCENT LAMP (HANGING OR CEILING TYPE) WITH BALLAST LOW LOSS, CAPACITOR AND STARTOR AT SWITCH "a" |
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| ♀ | 1x20 W. COMPACT FLUORESCENT (WALL TYPE, OUTDOOR IP54) |
| $3S_{a-c}$ | SWITCH "3" SETS FOR SWITCH "a" TO "c" |
| S" | TWO–WAYS SWITCH |
| ⊖ | SIMPLEX RECEPTACLE WITH GROUND, 10 A. 220 VAC. |
| ○ | 20 W. COMPACT FLUORESCENT |
| Ⓕ | EXHAUST FAN 12" |
| ◎ | OUTDOOR BOLLARD TYPE WITH 20 W. COMPACT FLUORESCENT |
| ⊜ | DUPLEX RECEPTACLE WITH GROUND, 10 A. 220 VAC. |
| ▲ | POWER RECEPCTACLE 3P+N+E 32 A. 400 VAC. |
| ○ | HIGH BAY FIXTURE 1x400 W. HIGH PRESSURE SODIUM |
| ⊗ | HIGH BAY FIXTURE 1x250 W. HIGH PRESSURE SODIUM |
| ☐ | EMERGENCY LIGHTING 2x55 W. HALOGEN W/SEALED LEAD ACID BATTERY BACKUP 2 HOURS |
| A/C | AIR CONDITIONING, SPLIT TYPE |
| ◣ LP | LOAD PANEL 3 PHASE (18 CIRCUITS) WITH MAIN CIRCUIT BREAKER |
| LCP1 | LIGHTING CONTROL PANEL |
| – – – | SECONDARY LINES, 380/220 V 50 MM THW OVERHEAD INSULATED CABLES, 3Ø 4 WIRE |
| —— | UNDERGROUND WIRING IN CONDUIT |

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
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CONSULTANTS

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KINGDOM OF THAILAND
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

# MAE HAT HYDROPOWER PROJECT

## CIVIL WORKS AND TRANSMISSION LINE
## POWERHOUSE
## ELECTRIC AND LIGHTING SYSTEMS (SHEET 3/4)

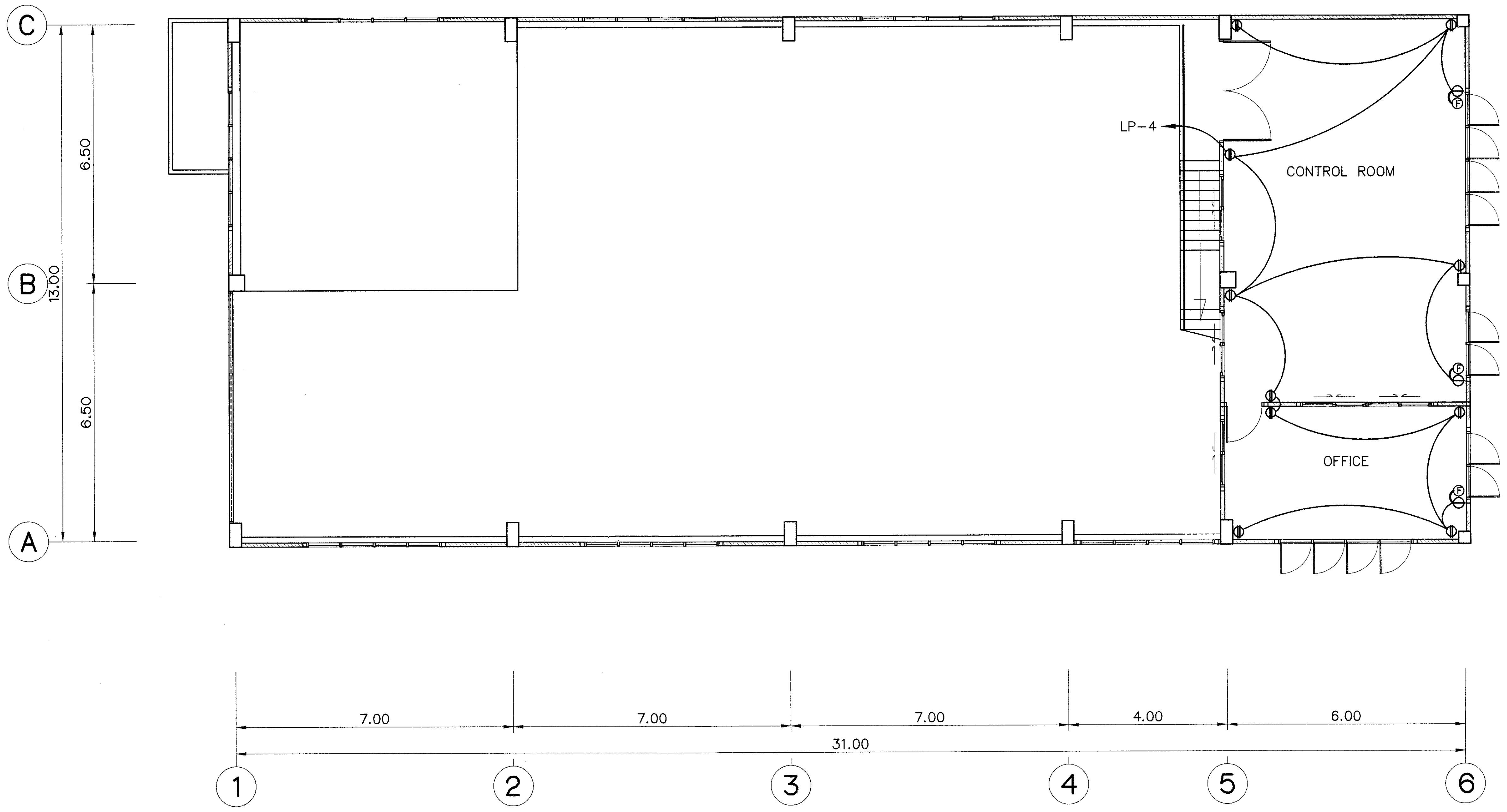
P&C MANAGEMENT CO.,LTD.

DESIGNED วฟก.604
DRAWN
CHECKED วฟก.604
PROJECT MANAGER
DATE 08/03/2559

Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

REVIEWED
SUBMITTED Chanit
RECOMMENDED
APPROVED P. Hong

DRAWING NO. MH–PH–23
SHEET NO. 106 OF 130



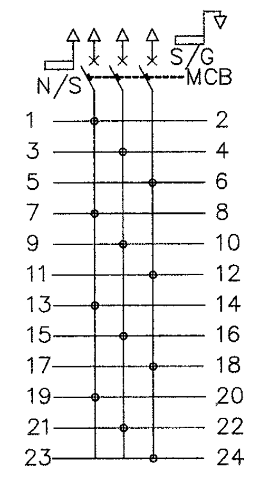
## PLAN 2nd FLOOR

SCALE 1:100

## LOAD SCHEDULE OF PANEL BOARD 3Ph 400V 50Hz

PANEL NO.LP — LOCATION : POWERHOUSE

| CCT No. | DESCRIPTION | LOAD IN VA |  |  | CIRCUIT BREAKER |  |  |  |
|---|---|---|---|---|---|---|---|---|
|  |  | R | S | T | P | AT | AF | kA. |
| LP-1 | MACHINE HALL LIGHTING 1 (250W HIGHBAY LUMINAIRE) | 600 |  |  | 1 | 10 | 60 | 10 |
| LP-3 | MACHINE HALL LIGHTING 2 (250W HIGHBAY LUMINAIRE) |  | 600 |  | 1 | 10 | 60 | 10 |
| LP-5 | MACHINE HALL LIGHTING 3 (250W HIGHBAY LUMINAIRE) |  |  | 600 | 1 | 10 | 60 | 10 |
| LP-7 | MACHINE HALL POWER RECEPTACLE 1 | 2,309 |  |  |  |  |  |  |
| LP-9 |  |  | 2,309 |  | 3 | 16 | 60 | 10 |
| LP-11 |  |  |  | 2,309 |  |  |  |  |
| LP-13 | THE FIRST FLOOR RECEPTACLE | 3,800 |  |  | 1 | 25 | 60 | 10 |
| LP-15 | THE FIRST FLOOR LIGHTING |  | 1,410 |  | 1 | 10 | 60 | 10 |
| LP-17 | THE SECOND FLOOR LIGHTING |  |  | 1,120 | 1 | 10 | 60 | 10 |
| LP-19 | CONTROL ROOM AIR CONDITION NO.2 36,000 BTU/HR | 4,250 |  |  | 1 | 25 | 60 | 10 |
| LP-21 | THE SECOND FLOOR EMERGENCY LIGHTING |  | 800 |  | 1 | 10 | 60 | 10 |
| LP-23 | SERVICE BAY LIGHTING (150W HIGHBAY LUMINAIRE) |  |  | 400 | 1 | 10 | 60 | 10 |
| LP-2 | MACHINE HALL EMERGENCY LIGHTING | 1,200 |  |  | 1 | 10 | 60 | 10 |
| LP-4 | THE SECOND FLOOR RECEPTACLE |  | 2,800 |  | 1 | 16 | 60 | 10 |
| LP-6 | CONTROL ROOM AIR CONDITION NO.1 36,000 BTU/HR |  |  | 4,250 | 1 | 25 | 60 | 10 |
| LP-8 | MACHINE HALL POWER RECEPTACLE 2 | 2,309 |  |  |  |  |  |  |
| LP-10 |  |  | 2,309 |  | 3 | 16 | 60 | 10 |
| LP-12 |  |  |  | 2,309 |  |  |  |  |
| LP-14 | OUTDOOR LIGHTING | 400 |  |  | 1 | 10 | 60 | 10 |
| LP-16 | OFFICE ROOM AIR CONDITION 24,000 BTU/HR |  | 2,295 |  | 1 | 16 | 60 | 10 |
| LP-18 | THE FIRST FLOOR EMERGENCY LIGHTING |  |  | 1,200 | 1 | 10 | 60 | 10 |
| LP-20 | MACHINE HALL RECEPTACLE | 1,200 |  |  | 1 | 10 | 60 | 10 |
| LP-22 | SPARE |  | 4,600 |  | 1 | 25 | 60 | 10 |
| LP-24 | SPARE |  |  | 4,600 | 1 | 25 | 60 | 10 |
|  | TOTAL LOAD IN VA | 16,668 | 16,443<br>49,979 | 16,868 | 3 | 100 | 250 | 25 |



## LEGENDS :

|  |  |
|---|---|
| a ▭ | 2x36 W. FLUORESCENT LAMP (HANGING OR CEILING TYPE) WITH BALLAST LOW LOSS, CAPACITOR AND STARTOR AT SWITCH "a" |
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| a ▭ | 1x36 W. FLUORESCENT LAMP (HANGING CEILING TYPE) WITH BALLAST LOW LOSS, CAPACITOR AND STARTOR, AT SWITCH "a" |
| ♀ | 1x20 W. COMPACT FLUORESCENT (WALL TYPE, OUTDOOR IP54) |
| $3S_{a-c}$ | SWITCH "3" SETS FOR SWITCH "a" TO "c" |
| S" | TWO-WAYS SWITCH |
| ⊖ | SIMPLEX RECEPTACLE WITH GROUND, 10 A. 220 VAC. |
| ○ | 20 W. COMPACT FLUORESCENT |
| Ⓕ | EXHAUST FAN 12" |
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| ▲ | POWER RECEPCTACLE 3P+N+E 32 A. 400 VAC. |
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| ⊗ | HIGH BAY FIXTURE 1x250 W. HIGH PRESSURE SODIUM |
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| A/C | AIR CONDITIONING, SPLIT TYPE |
| ◣ LP | LOAD PANEL 3 PHASE (18 CIRCUITS) WITH MAIN CIRCUIT BREAKER |
| LCP1 | LIGHTING CONTROL PANEL |
| - - - | SECONDARY LINES, 380/220 V 50 MM THW OVERHEAD INSULATED CABLES, 3Ø 4 WIRE |
| ——— | UNDERGROUND WIRING IN CONDUIT |

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KINGDOM OF THAILAND
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
POWERHOUSE
ELECTRIC AND LIGHTING SYSTEMS (SHEET 4/4)

P&C MANAGEMENT CO.,LTD.

DESIGNED วฟก.604
DRAWN
CHECKED วฟก.604
PROJECT MANAGER
DATE 08|03|2559

Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY
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SUBMITTED Chant
RECOMMENDED
APPROVED P. Hansell

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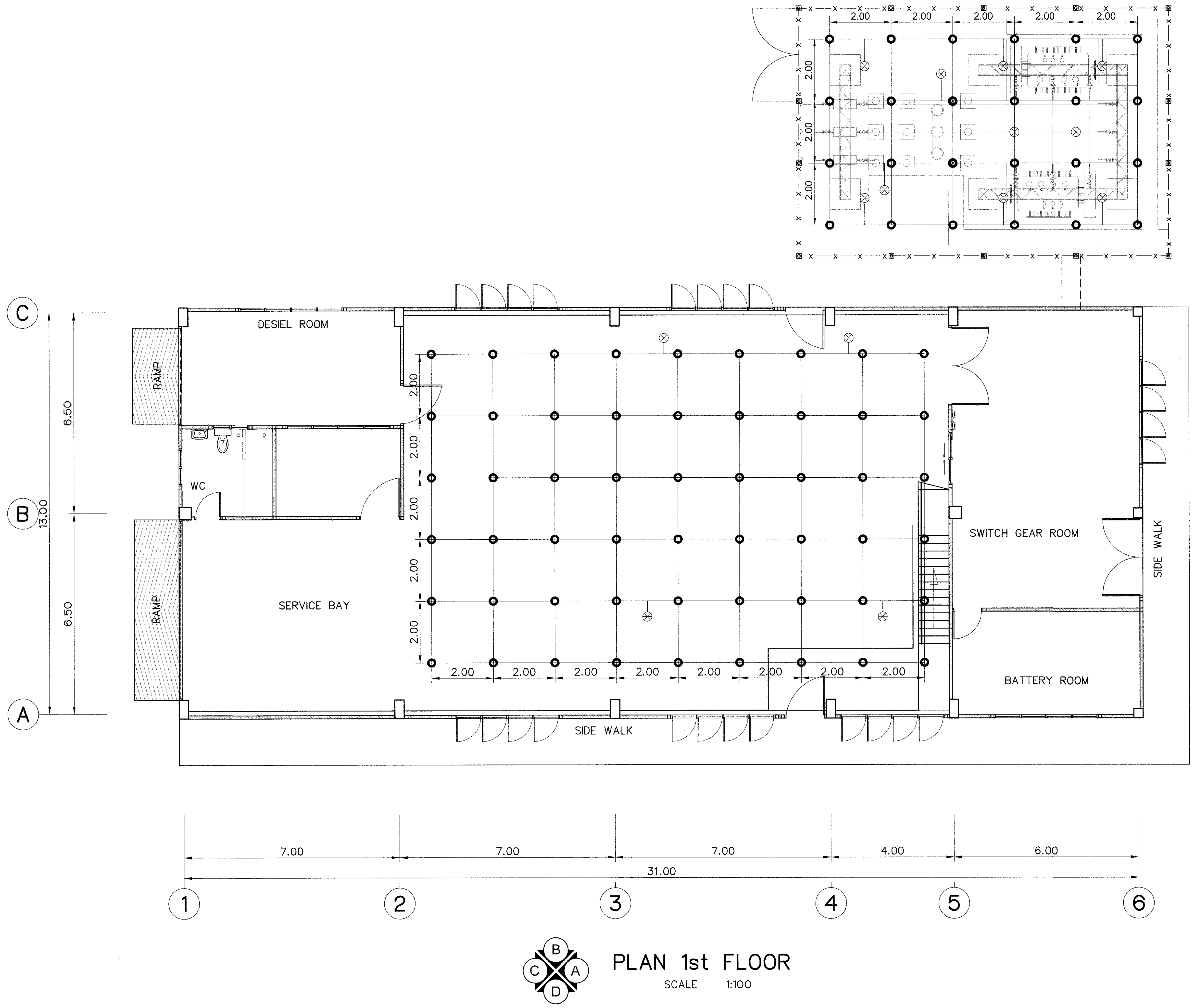

## PLAN 1st FLOOR

SCALE 1:100

## LEGENDS :

| | |
|---|---|
| ○ | GROUND ROD |
| ⊗ | GROUND POINT FOR POWER PLANT EQUIPMENT GROUNDING |
| —— | BARE CUPPER CONDUCTOR |

## NOTE

1. GROUNDING SYSTEM DONE BY CONTRACTOR C2
2. GROUNDING CONDUCTOR, TAP AND RISER FROM GROUNDING NETWORK TO POWER EQUIPMENT SHALL BE FORMED BY BARE COPPER CONDUCTOR NOT LESS THAN 95 SQ.MM.
3. GROUNDING SYSTEM RESISTANCE WILL NOT EXCEED 5 OHM.
4. CONNECTOR TO WITH IN & BETWEEN THE GROUNDING NETWORK TO POWER PLANT EQUIPMENT WILL BE MADE BY THERMAL CADWELD
5. GROUND ROD WILL BE COPPER COVER STEEL DIAMETER 15.87 MM. 2,400 MM. LONG
6. THIS DRAWING USE FOR GUIDE ONLY

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
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KINGDOM OF THAILAND
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
POWERHOUSE
GROUNDING SYSTEMS

P&C MANAGEMENT CO.,LTD.

Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

DESIGNED วฟก.604
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CHECKED วฟก.604
08/03/2559
PROJECT MANAGER DATE

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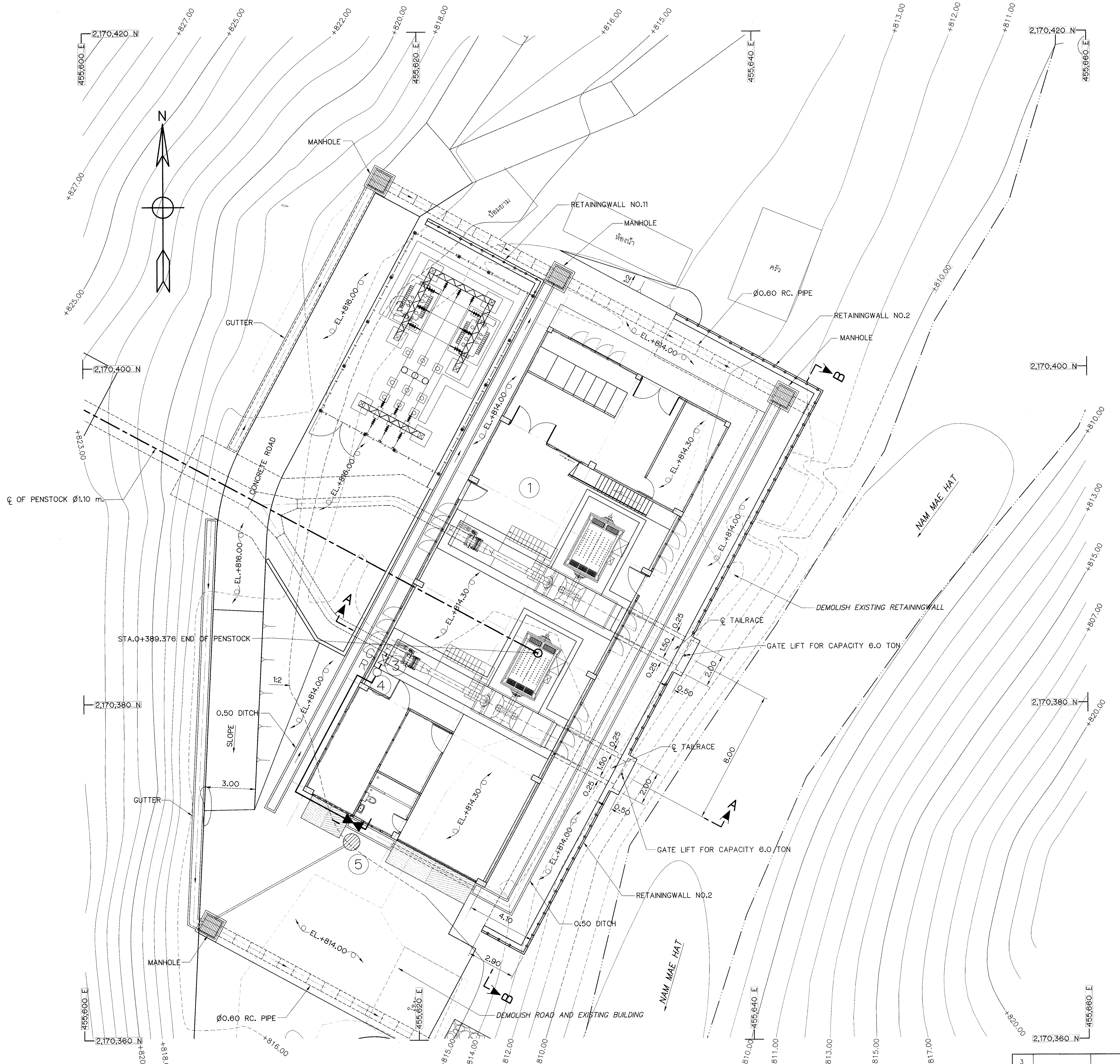
RECOMMENDED
APPROVED P. Hansell.

DRAWING NO. MH-PH-25
SHEET NO. 108 OF 130



## PLAN

SCALE 1:125

## LISTS :

1. POWER HOUSE
2. SWITCHYARD
3. GATE VALVE Ø3/4"
4. PRESSURE REDUCING VALVE
5. SEPTICK TANK

## NOTES :

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS, UNLESS OTHERWISE SHOWN.
2. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. NMH–GN–03
3. THE CONTRACTOR (C1) HAS TO SUBMIT THE SHOP DRAWINGS OF ALL HOUSING, GUARD HOUSE, ELEVATED TANK FLAG POLE, ENTRANCE GATE WITH, NAME BOARD AND GATE WIDTH 6.00 M. TO FIELD ENGINEER FOR APPROVAL, BEFORE CONSTRUCTION.

## REFERENCE DRAWINGS :

| | |
|---|---|
| 1. TAILRACE, SECTION AND DETAILS | NMH–TR–02 |

0 1 2 4 6 8 10
SCALE 1:125 METERS

KINGDOM OF THAILAND
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

# MAE HAT HYDROPOWER PROJECT

## CIVIL WORKS AND TRANSMISSION LINE
## TAILRACE
## PLAN

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
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| | CONSULTANTS | | DEDE | |

P&C MANAGEMENT CO.,LTD.

DESIGNED ภย.64624 สย.6226
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PROJECT MANAGER
DATE 08/03/2559

Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

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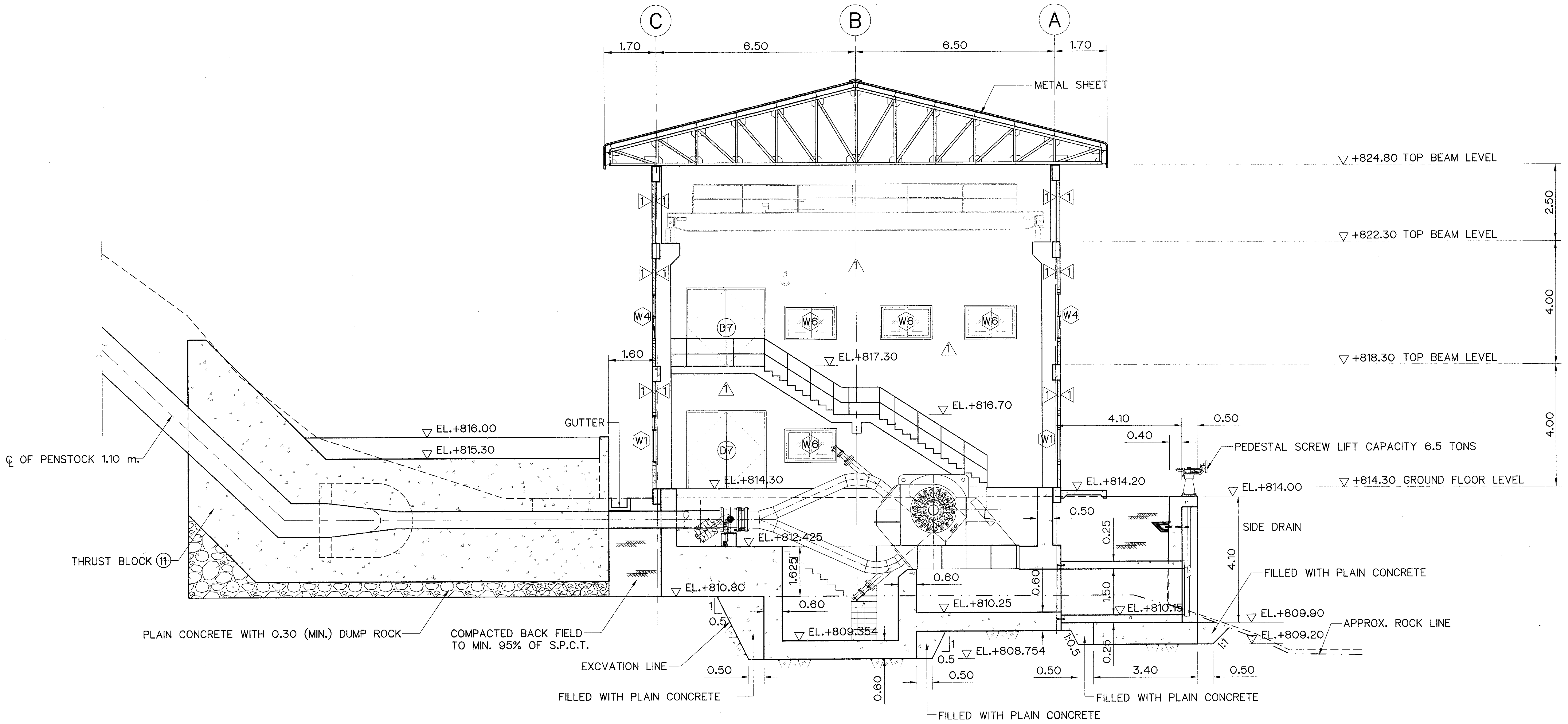
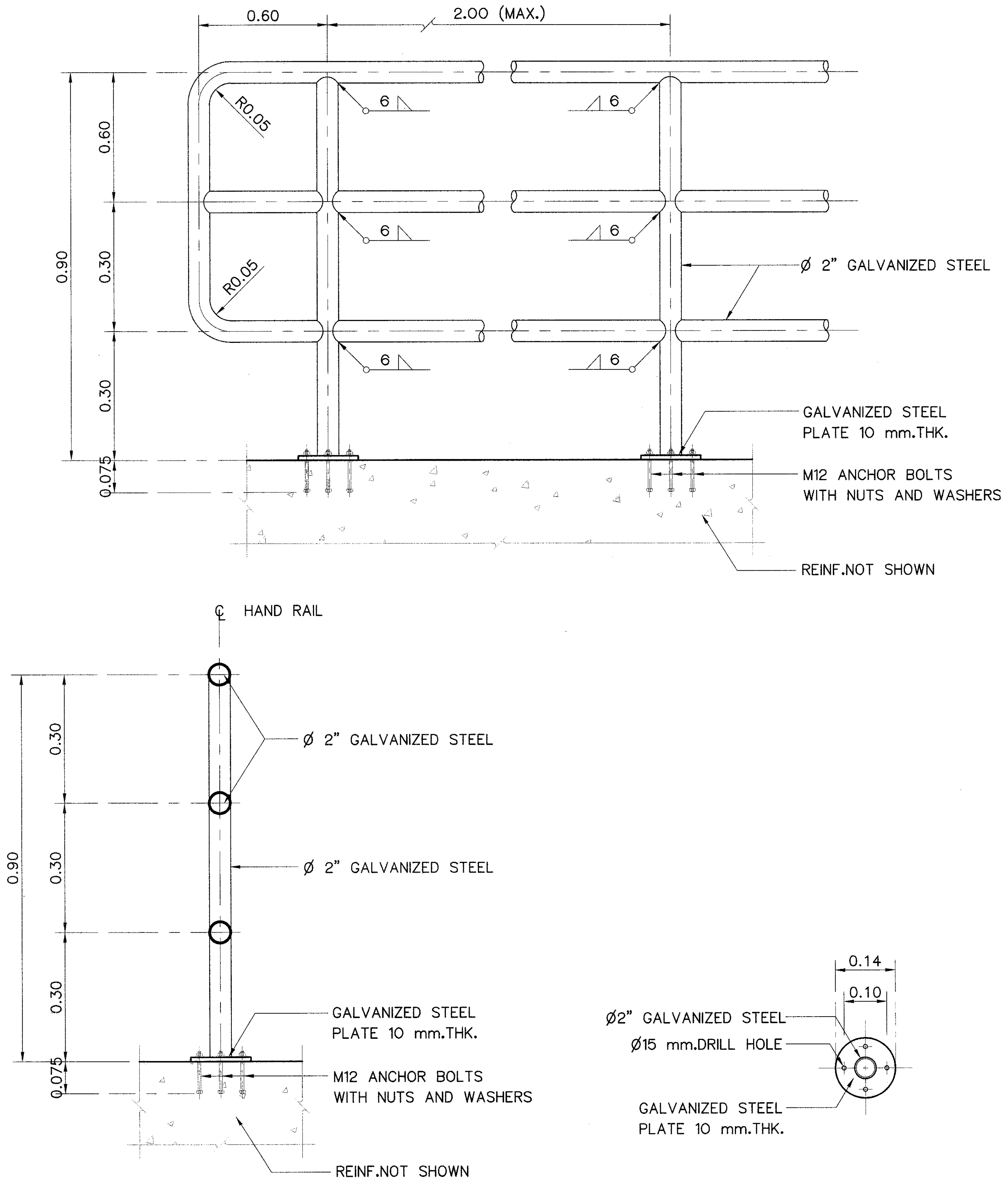
APPROVED P. Hansell.

DRAWING NO. MH–TR–01
SHEET NO. 109 OF 130



## SECTION A–A

SCALE 1:100



## DETAIL OF HANDRAIL

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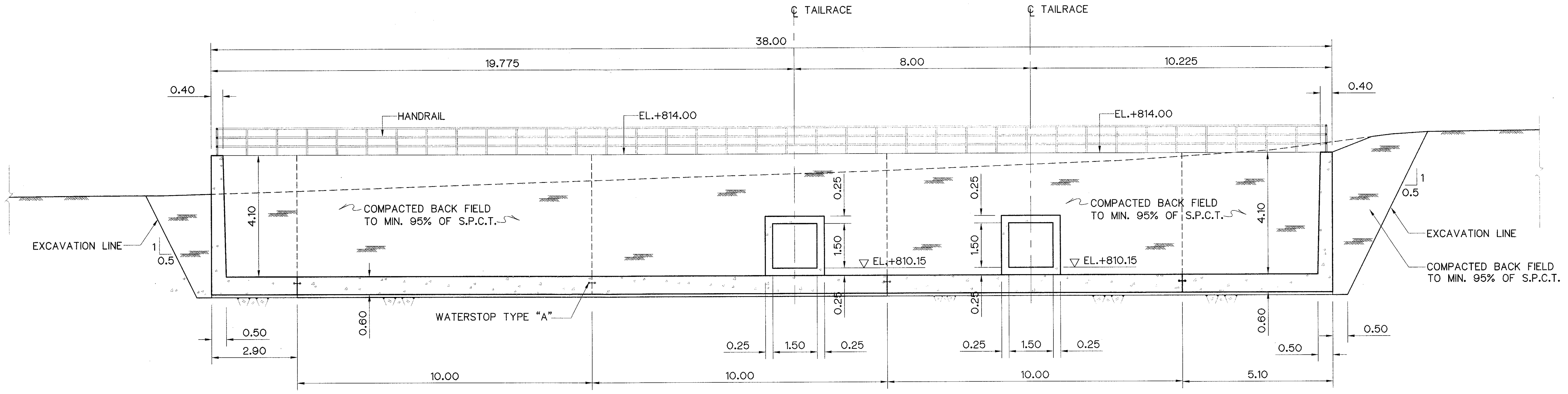

## SECTION B–B

SCALE 1:100

0 1 2 3 4 5 6 7 8

SCALE 1:100 METERS

## NOTES :

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS, UNLESS OTHERWISE SHOWN.
2. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH-GN-03

## REFERENCE DRAWINGS :

| | |
|---|---|
| 1. TAILRACE PLAN | MH-TR-01 |
| 2. TAILRACE REINFORCEMENT DETAILS | MH-TR-03 |
| 3. WEIR 1.50x1.50 m. VERTICAL GATE (GATE INSTALLATION) | MH-WE-06 |
| 4. WEIR PEDESTAL SCREW LIFT CAPACITY 6.5 TONS | MH-WE-09 |
| 4. PENSTOCK THRUST BLOCK PLAN, SECTIONS REINFORCEMENT DETAILS 4/4 | MH-PS-05 |

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
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CONSULTANTS | DEDE

KINGDOM OF THAILAND
Department of Alternative
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MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
TAILRACE
SECTIONS AND DETAIL

P&C MANAGEMENT CO.,LTD.

Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY

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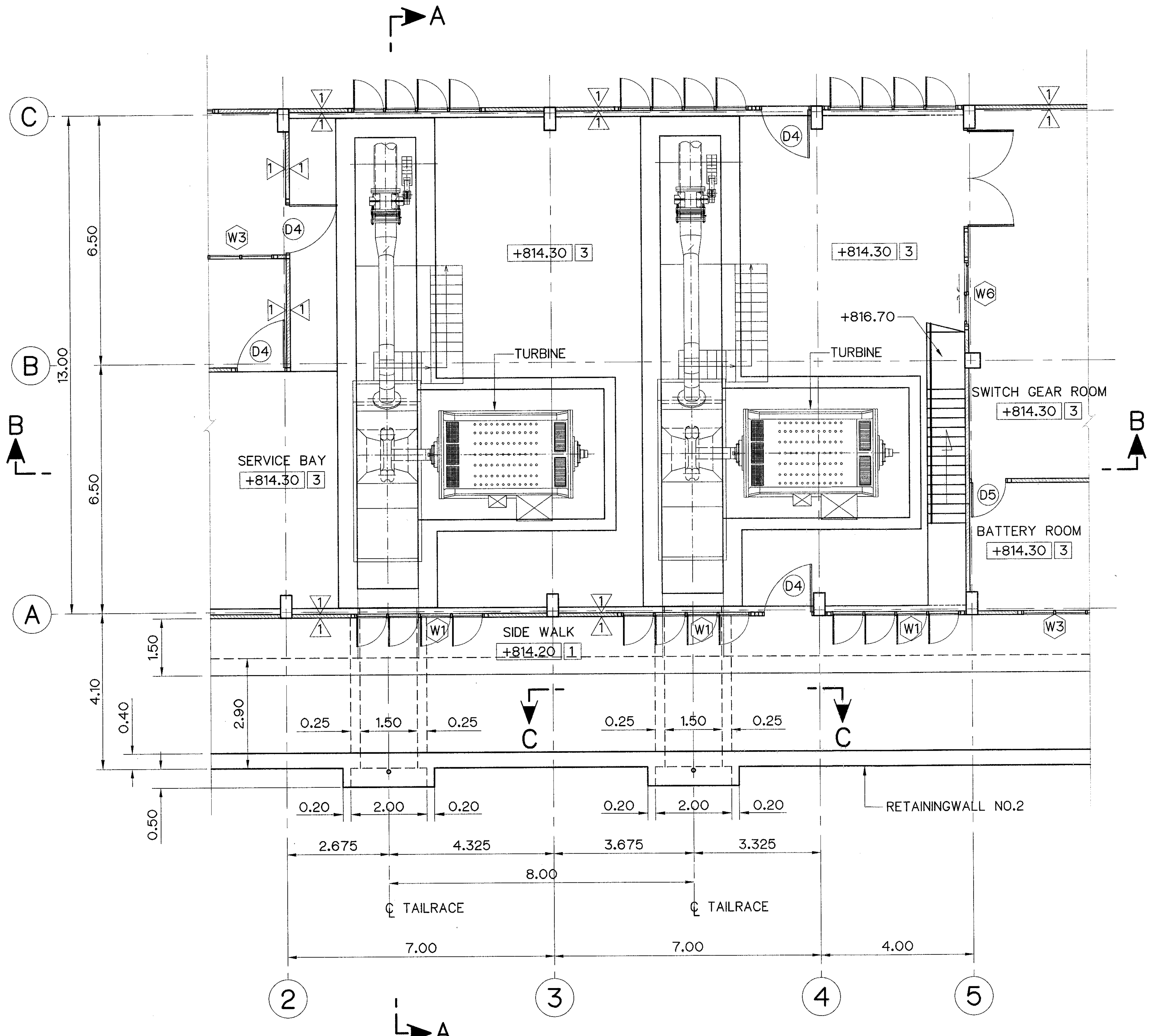
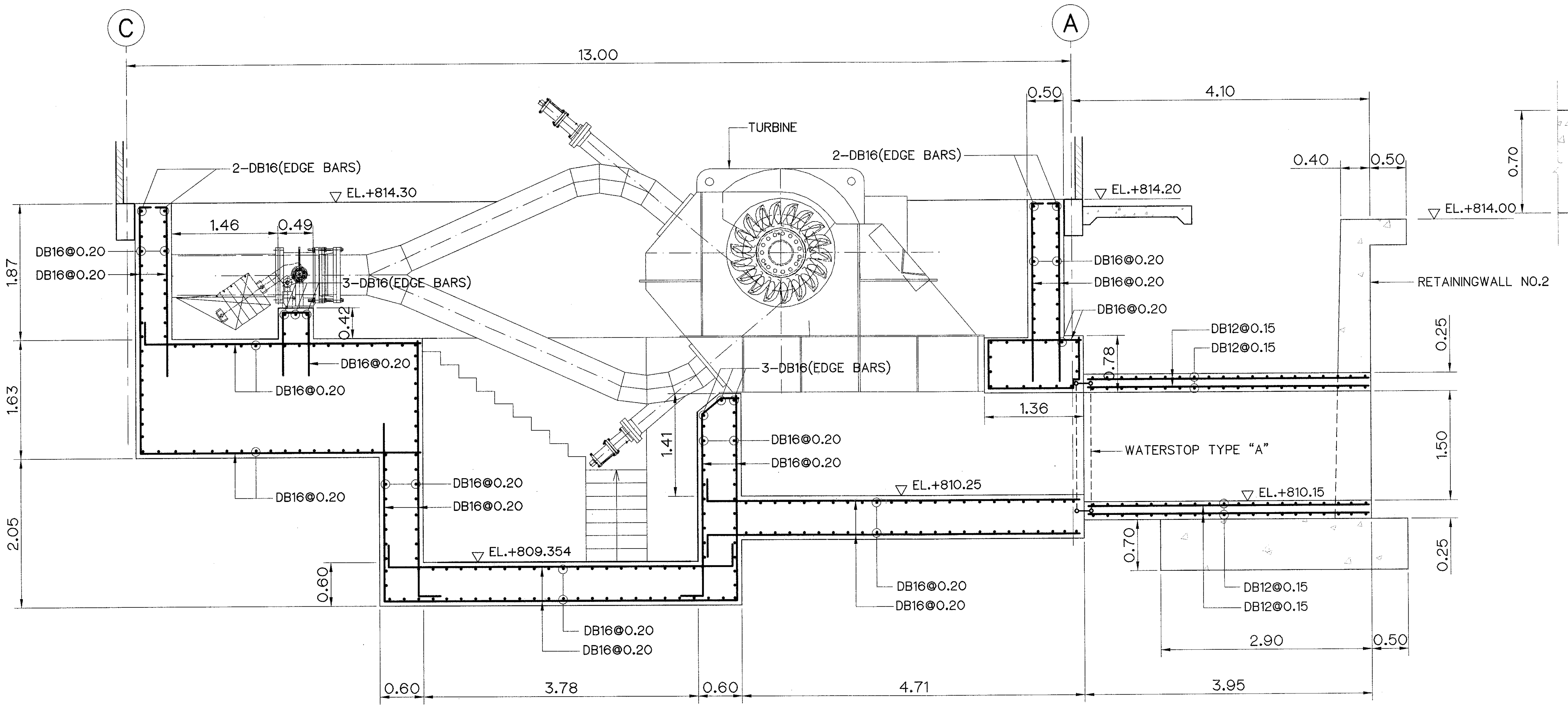
| DESIGNED ภย.64624 สย.6226 | REVIEWED |
| DRAWN | SUBMITTED |
| CHECKED สย.6226 | RECOMMENDED |
| PROJECT MANAGER 08/03/2559 DATE | APPROVED |

DRAWING NO. MH-TR-02

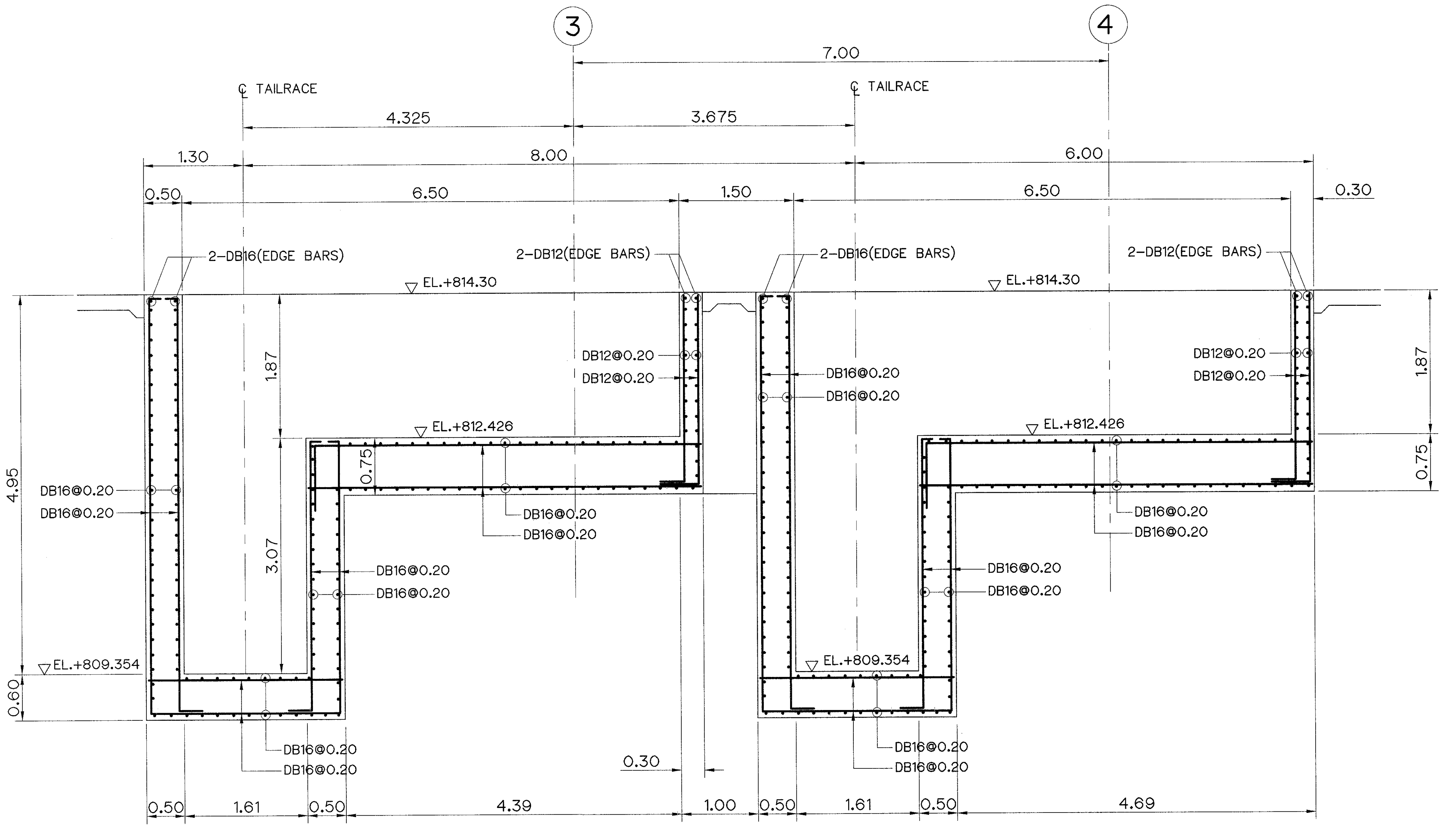
SHEET NO. 110 OF 130



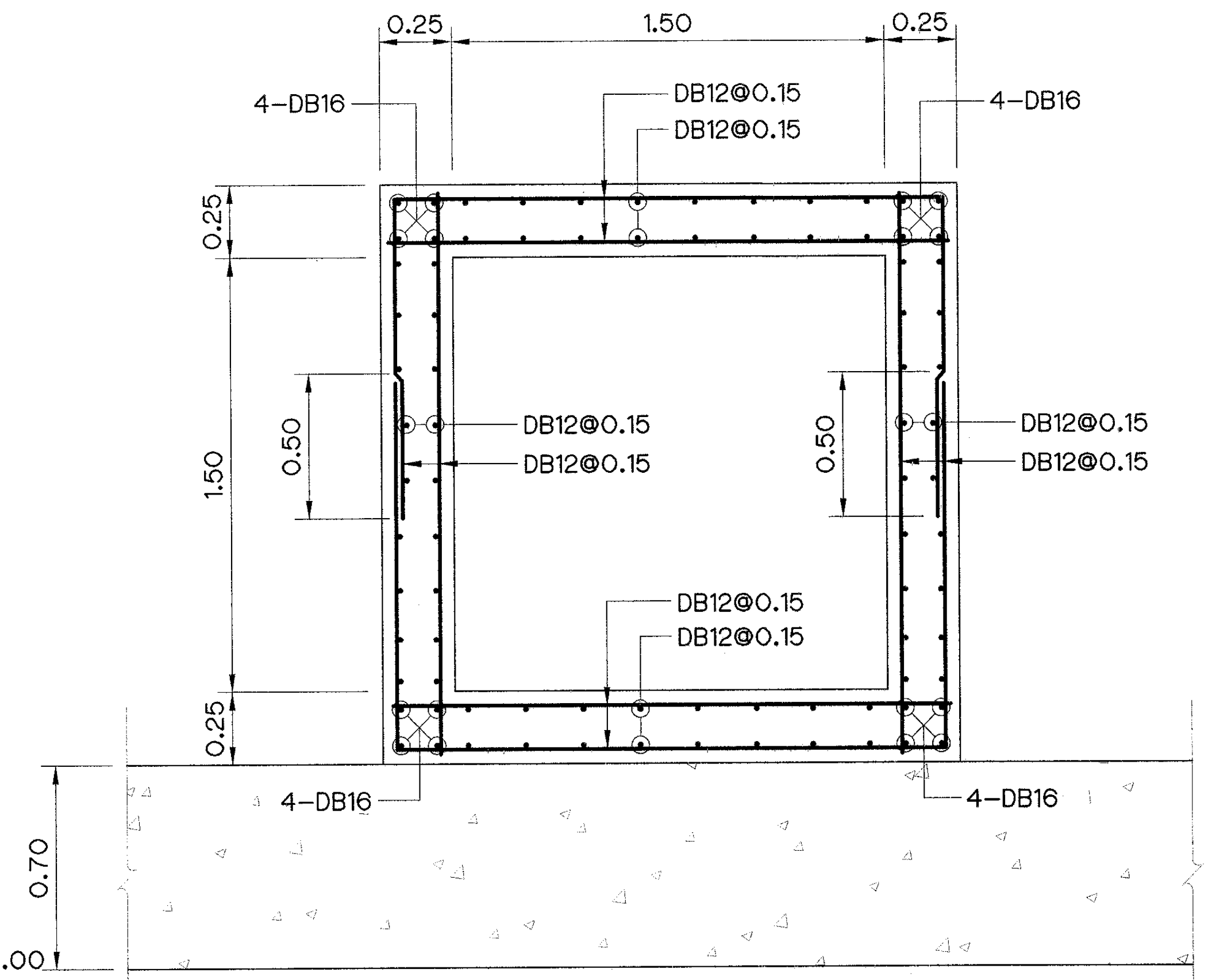
## PLAN
SCALE 1:100



## SECTION A–A
SCALE 1:50



## SECTION B–B
SCALE 1:50



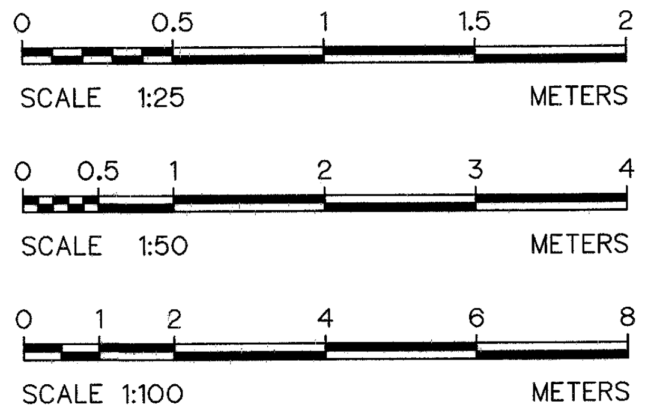
## SECTION C–C
SCALE 1:25

**NOTES :**

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS, UNLESS OTHERWISE SHOWN.
2. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH–GN–03

**REFERENCE DRAWINGS :**

| | |
|---|---|
| 1. TAILRACE PLAN | MH–TR–01 |



| NO. | DATE | REVISIONS | CHECKED | APPROVED |
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KINGDOM OF THAILAND
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

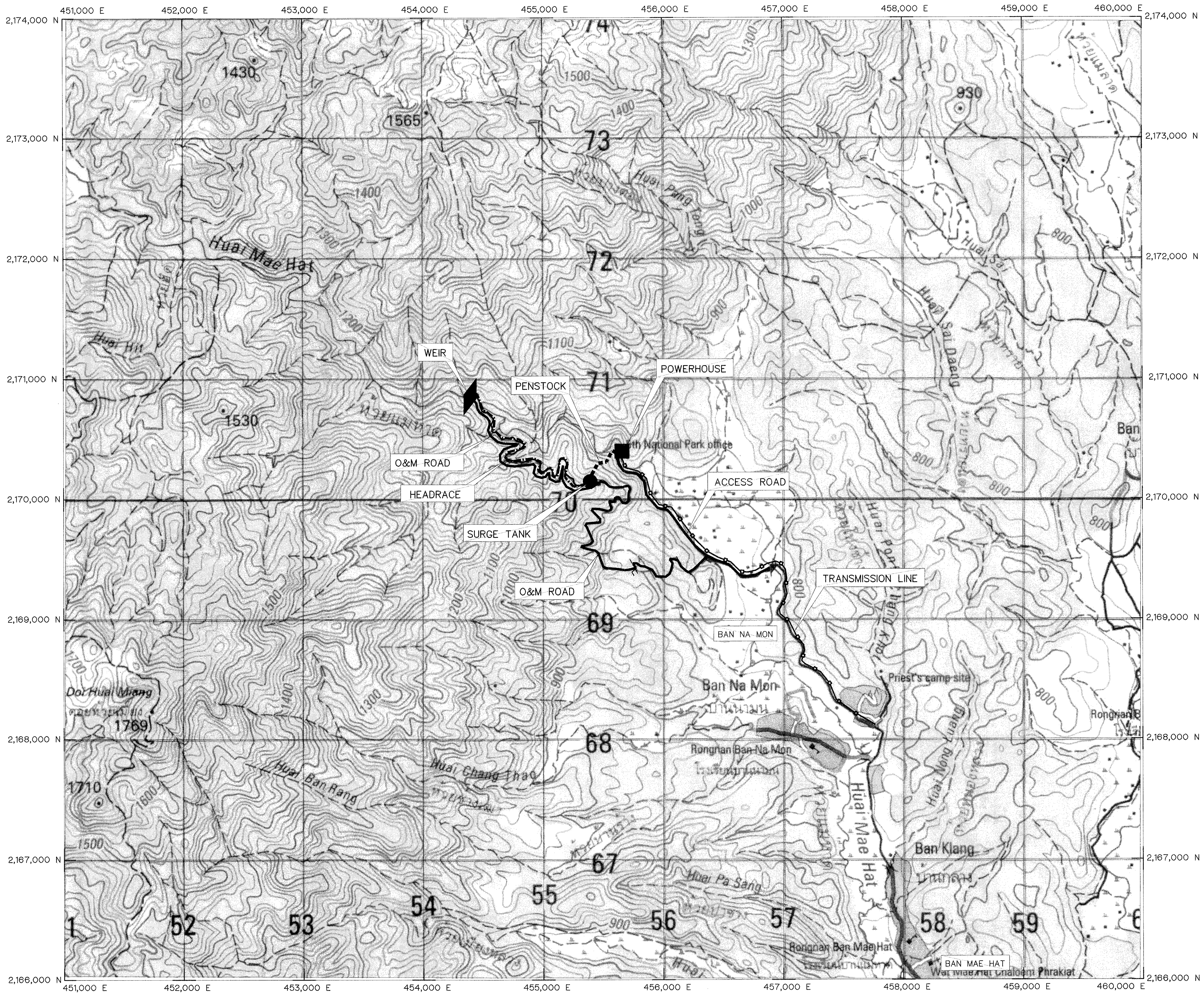
CIVIL WORKS AND TRANSMISSION LINE
TAILRACE
REINFORCEMENT DETAILS

P&C MANAGEMENT CO.,LTD.

DESIGNED ภย.64624 ลย.6226
DRAWN
CHECKED ลย.6226
PROJECT MANAGER
DATE 08/03/2559

Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY
REVIEWED
SUBMITTED Chanit
RECOMMENDED
APPROVED P. Hamzell

DRAWING NO. MH–TR–03
SHEET NO. 111 OF 130



## PROJECT AREA MAP

SCALE 1:20,000

0 500 1,000 1,500

SCALE 1:20,000 METERS

## NOTES :

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS, UNLESS OTHERWISE SHOWN
2. THE POLE OF TRANSMISSION LINE IS PRESTRESSED CONCRETE WITH 12.00 METERS HIGH

## LEGENDS :

| | |
|---|---|
| 〰 | STREAM |
| ◆ | WEIR |
| —·— | HEADRACE |
| ● | SURGE TANK |
| - - - - | PENSTOCK |
| ■ | POWERHOUSE |
| — | ACCESS ROAD |
| —▫—▫— | TRANSMISSION LINE |

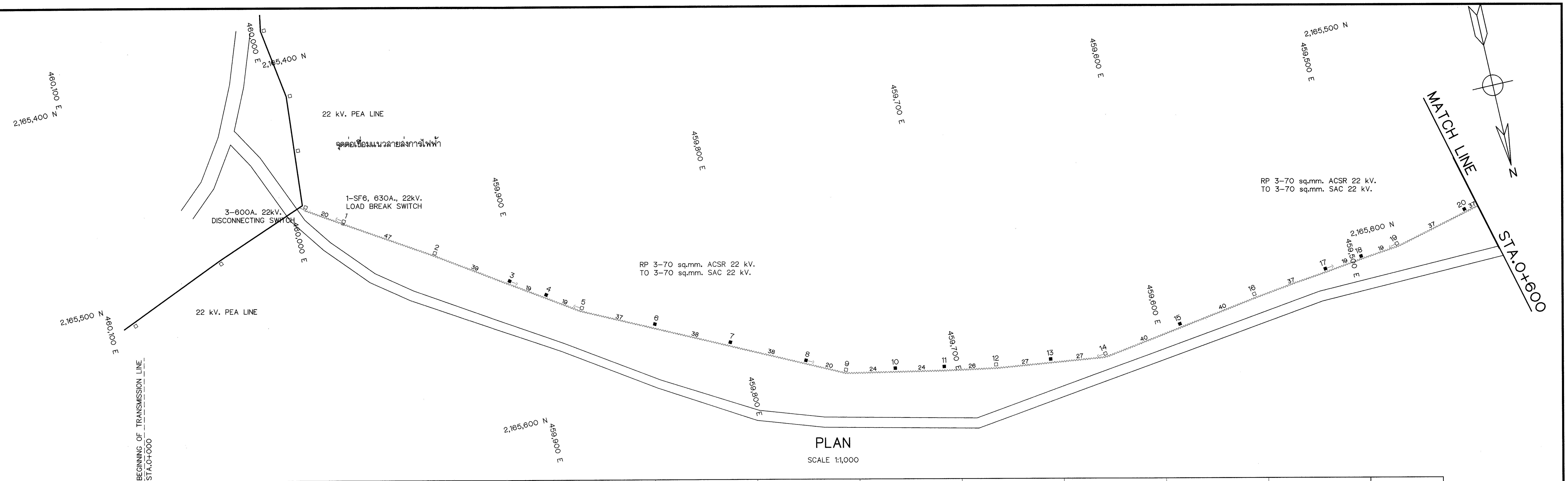
| NO. | DATE | REVISIONS | CHECKED | APPROVED |
|---|---|---|---|---|
| 3 | | | | |
| 2 | | | | |
| 1 | | | | |
| | CONSULTANTS | | DEDE | |

KINGDOM OF THAILAND
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

## MAE HAT HYDROPOWER PROJECT

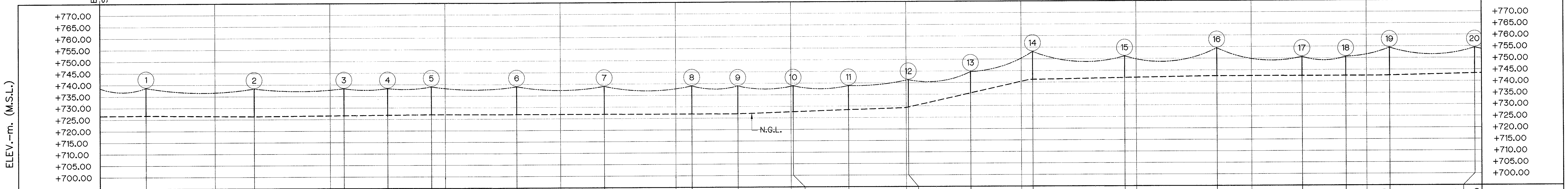
## CIVIL WORKS AND TRANSMISSION LINE
## TRANSMISSION LINE
## GENERAL PLAN

| | |
|---|---|
| P&C MANAGEMENT CO.,LTD. | Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY |
| | REVIEWED |
| DESIGNED ภย.64624 สย.6226 | SUBMITTED Chaut |
| DRAWN | RECOMMENDED |
| CHECKED สย.6226 | APPROVED P. |
| PROJECT MANAGER 08/03/2559 DATE | DRAWING NO. MH-TS-01 |
| | SHEET NO. 112 OF 130 |



## PLAN

SCALE 1:1,000



| DISTANCE (KM.) | ELEV.-m. (M.S.L.) |
|---|---|
| 0+000 | +726.577 |
| 0+020 | +726.703 |
| 0+050 | +726.468 |
| 0+067 | +726.335 |
| 0+100 | +726.612 |
| 0+106 | +726.663 |
| 0+125 | +726.824 |
| 0+144 | +726.982 |
| 0+150 | +726.976 |
| 0+181 | +726.945 |
| 0+200 | +726.926 |
| 0+219 | +726.907 |
| 0+250 | +726.876 |
| 0+257 | +726.868 |
| 0+277 | +726.867 |
| 0+300 | +727.624 |
| 0+301 | +727.657 |
| 0+325 | +728.448 |
| 0+350 | +729.291 |
| 0+351 | +729.512 |
| 0+378 | +735.500 |
| 0+400 | +740.378 |
| 0+405 | +741.216 |
| 0+445 | +741.871 |
| 0+450 | +741.954 |
| 0+485 | +742.480 |
| 0+500 | +742.473 |
| 0+522 | +742.464 |
| 0+541 | +742.456 |
| 0+550 | +742.452 |
| 0+560 | +742.533 |
| 0+597 | +743.351 |
| 0+600 | +743.414 |

## PROFILE

HORIZONTAL SCALE 1:1,000
VERTICAL SCALE 1:1,000

## TRANSMISSION LINE PROPERTIES

| POLE NO. | DISTANCE (M.) | ACCUMULATIVE DISTANCE (M.) | QUANTITY | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | POLE TYPE | | | | | GUY TYPE | | | | | |
| | | | A | B | C | D | E | G1 | G2 | G3 | G4 | G5 | G6 |
| EXISTING POLE | 0 | 0 | | | | 1 | | | | | | | |
| 1 | 20 | 20 | | | | | 1 | | | | 1 | | |
| 2 | 47 | 67 | 1 | | | | | | | | | | |
| 3 | 39 | 106 | | | 1 | | | | | | 1 | | |
| 4 | 19 | 125 | | 1 | | | | 1 | | | | | |
| 5 | 19 | 144 | | | 1 | | | | | | 1 | | |
| 6 | 37 | 181 | 1 | | | | | | | | | | |
| 7 | 38 | 219 | 1 | | | | | | | | | | |
| 8 | 38 | 257 | | | 1 | | | | | | 1 | | |
| 9 | 20 | 277 | | 1 | | | | | | | | | |
| 10 | 24 | 301 | | 1 | | | | | | | | | |
| 11 | 24 | 325 | | 1 | | | | | | | | | |
| 12 | 26 | 351 | | 1 | | | | | | | | | |
| 13 | 27 | 378 | | 1 | | | | | | | | | |
| 14 | 27 | 405 | | | 1 | | | | | | 1 | | |
| 15 | 40 | 445 | 1 | | | | | | | | | | |
| 16 | 40 | 485 | 1 | | | | | | | | | | |
| 17 | 37 | 522 | | | 1 | | | | | | 1 | | |
| 18 | 19 | 541 | | 1 | | | | | | | | | |
| 19 | 19 | 560 | | | 1 | | | | | | 1 | | |
| 20 | 37 | 597 | 1 | | | | | | | | | | |

## REFERENCE DRAWINGS :-

| | |
|---|---|
| 1. TRANSMISSION LINE, PLAN AND PROFILE, STA. 0+600 TO STA. 1+200 | MH-TS-03 |
| 2. TRANSMISSION LINE, POLE TYPE "A" AND "B" | MH-TS-16 |
| 3. TRANSMISSION LINE, POLE TYPE "C" AND "D" | MH-TS-17 |
| 4. TRANSMISSION LINE, POLE TYPE "E" | MH-TS-18 |
| 5. TRANSMISSION LINE, TYPE OF ANCHOR GUY | MH-TS-19 |

## NOTES:

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS, UNLESS OTHERWISE SHOWN
2. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH-GN-03

## LEGENDS :

| | | |
|---|---|---|
| 1. | ∿∿∿∿ | 22 kV. SPACE AERIAL CABLE |
| 2. | — — — | EXISTING 22 kV. PEA. OVERHEAD TRANSMISSION LINE |
| 3. | ■ | NEW 12M. CONCRETE POLE |
| 4. | □ | EXISTING 12M. CONCRETE POLE |
| 5. | RM 12M □ | REMOVE 12M. CONCRETE POLE |
| 6. | | 3 - 100A. FUSE CUTOUT 33 kV. |
| 7. | → | GUY |
| 8. | | LOAD BREAK SWITCH, SF6, 630A, 33KV. WITH AUTOMATIC REMOTE CONTORLLED |
| 9. | | DISCONNECTING SWITCH 600A, 33KV. |

0 5 10 15 20 25 50 100
SCALE 1:1,000 METERS

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
|---|---|---|---|---|
| 3 | | | | |
| 2 | | | | |
| 1 | | | | |

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KINGDOM OF THAILAND
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

# MAE HAT HYDROPOWER PROJECT

## CIVIL WORKS AND TRANSMISSION LINE

## TRANSMISSION LINE

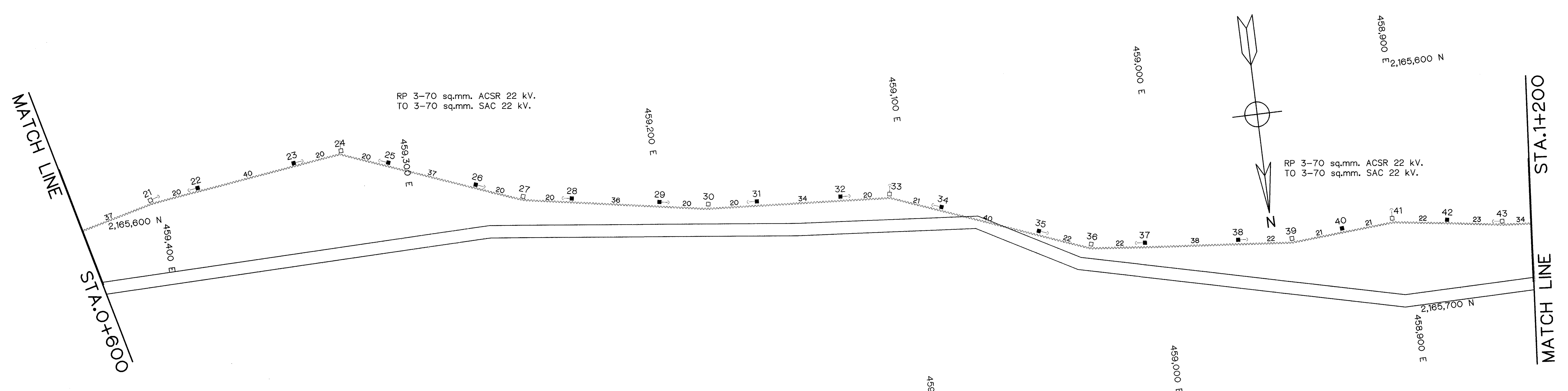
## PLAN AND PROFILE, STA. 0+000 TO 0+600

P&C MANAGEMENT CO.,LTD.

DESIGNED ภย.64624 สย.6226
DRAWN
CHECKED สย.6226
PROJECT MANAGER
DATE 08/08/2559

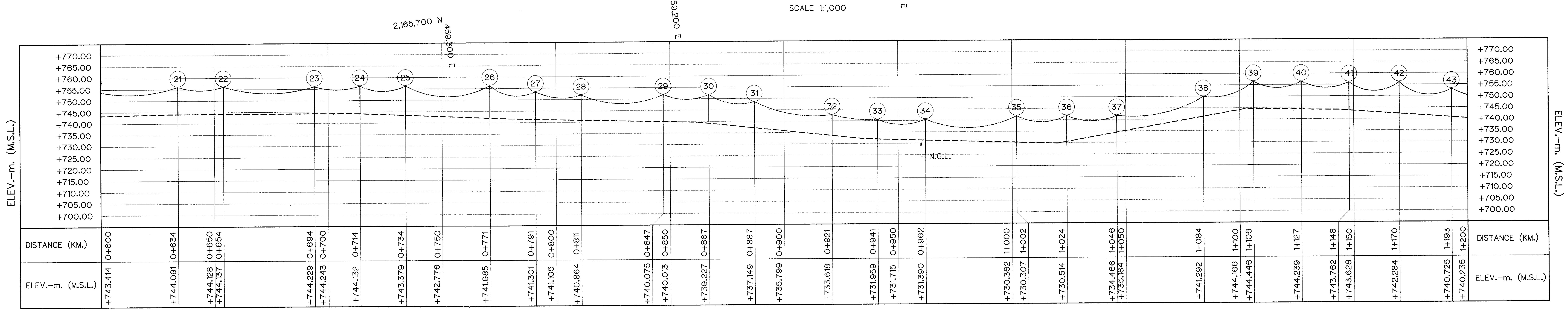
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY
REVIEWED
SUBMITTED Chawit
RECOMMENDED
APPROVED P. Hansol

DRAWING NO. MH-TS-02
SHEET NO. 113 OF 130



## PLAN

SCALE 1:1,000



## PROFILE

HORIZONTAL SCALE 1:1,000
VERTICAL SCALE 1:1,000

### TRANSMISSION LINE PROPERTIES

| POLE NO. | DISTANCE (M.) | ACCUMULATIVE DISTANCE (M.) | QUANTITY | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | POLE TYPE | | | | | GUY TYPE | | | | | |
| | | | A | B | C | D | E | G1 | G2 | G3 | G4 | G5 | G6 |
| 20 | 37 | 597 | 1 | | | | | | | | | | |
| 21 | 37 | 634 | | | 1 | | | | | | 1 | | |
| 22 | 20 | 654 | | | 1 | | | | | | 1 | | |
| 23 | 40 | 694 | | | 1 | | | | | | 1 | | |
| 24 | 20 | 714 | | 1 | | | | 1 | | | | | |
| 25 | 20 | 734 | | | 1 | | | | | | 1 | | |
| 26 | 37 | 771 | | | 1 | | | | | | 1 | | |
| 27 | 20 | 791 | | 1 | | | | | | | | | |
| 28 | 20 | 811 | | | 1 | | | | | | 1 | | |
| 29 | 36 | 847 | | | 1 | | | | | | 1 | | |
| 30 | 20 | 867 | | 1 | | | | | | | | | |
| 31 | 20 | 887 | | | 1 | | | | | | 1 | | |
| 32 | 34 | 921 | | | 1 | | | | | | 1 | | |
| 33 | 20 | 941 | | 1 | | | | 1 | | | | | |
| 34 | 21 | 962 | | | 1 | | | | | | 1 | | |
| 35 | 40 | 1,002 | | | 1 | | | | | | 1 | | |
| 36 | 22 | 1,024 | | 1 | | | | | | | | | |
| 37 | 22 | 1,046 | | | 1 | | | | | | 1 | | |
| 38 | 38 | 1,084 | | | 1 | | | | | | 1 | | |
| 39 | 22 | 1,106 | | 1 | | | | | | | | | |
| 40 | 21 | 1,127 | | 1 | | | | | | | | | |
| 41 | 21 | 1,148 | | 1 | | | | 1 | | | | | |
| 42 | 22 | 1,170 | | 1 | | | | | | | | | |
| 43 | 23 | 1,193 | | | 1 | | | | | | 1 | | |

### REFERENCE DRAWINGS :-

| | |
|---|---|
| 1. TRANSMISSION LINE, PLAN AND PROFILE, STA. 0+000 TO STA. 0+600 | MH-TS-02 |
| 2. TRANSMISSION LINE, PLAN AND PROFILE, STA. 1+200 TO STA. 1+366 | MH-TS-04 |
| 3. TRANSMISSION LINE, POLE TYPE "A" AND "B" | MH-TS-16 |
| 4. TRANSMISSION LINE, POLE TYPE "C" AND "D" | MH-TS-17 |
| 5. TRANSMISSION LINE, POLE TYPE "E" | MH-TS-18 |
| 6. TRANSMISSION LINE, TYPE OF ANCHOR GUY | MH-TS-19 |

### NOTES:

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS, UNLESS OTHERWISE SHOWN
2. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH-GN-03

### LEGENDS :

| | | |
|---|---|---|
| 1. | ∿∿∿∿ | 22 kV. SPACE AERIAL CABLE |
| 2. | — - — - — | EXISTING 22 kV. PEA. OVERHEAD TRANSMISSION LINE |
| 3. | ■ | NEW 12M. CONCRETE POLE |
| 4. | □ | EXISTING 12M. CONCRETE POLE |
| 5. | RM 12M □ | REMOVE 12M. CONCRETE POLE |
| 6. | –⁄– | 3 - 100A. FUSE CUTOUT 33 kV. |
| 7. | → | GUY |
| 8. | –⊡– | LOAD BREAK SWITCH, SF6, 630A, 33KV. WITH AUTOMATIC REMOTE CONTORLLED |
| 9. | –⁄– | DISCONNECTING SWITCH 600A, 33KV. |

0 5 10 15 20 25 50 100
SCALE 1:1,000 METERS

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
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| 3 | | | | |
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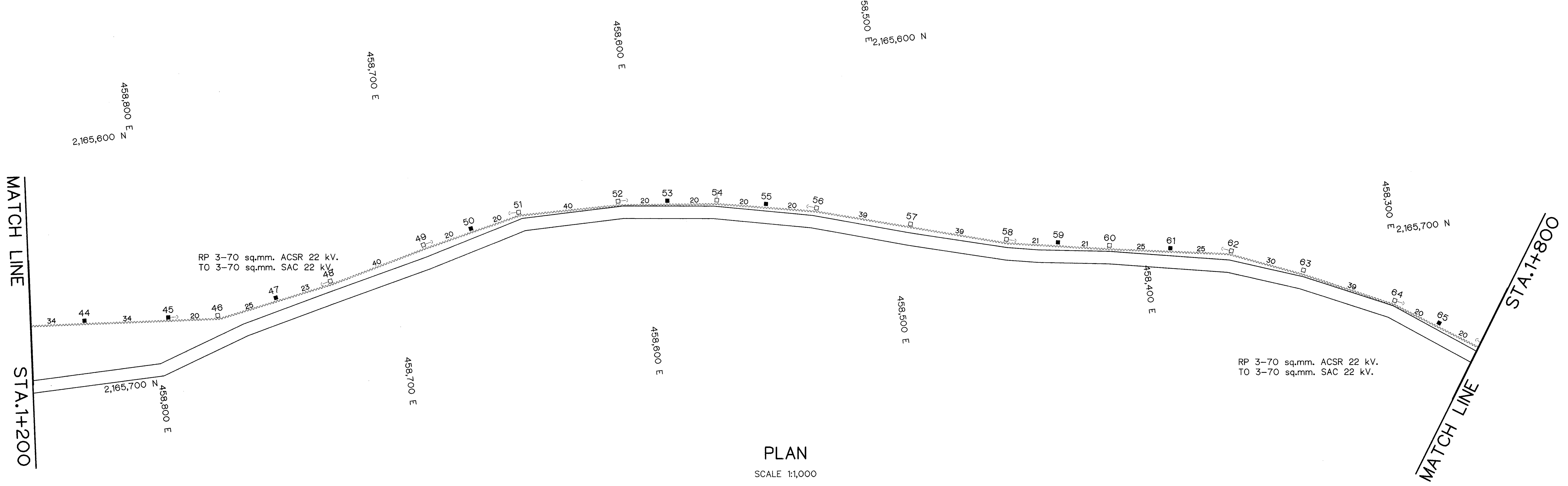
KINGDOM OF THAILAND
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

## MAE HAT HYDROPOWER PROJECT

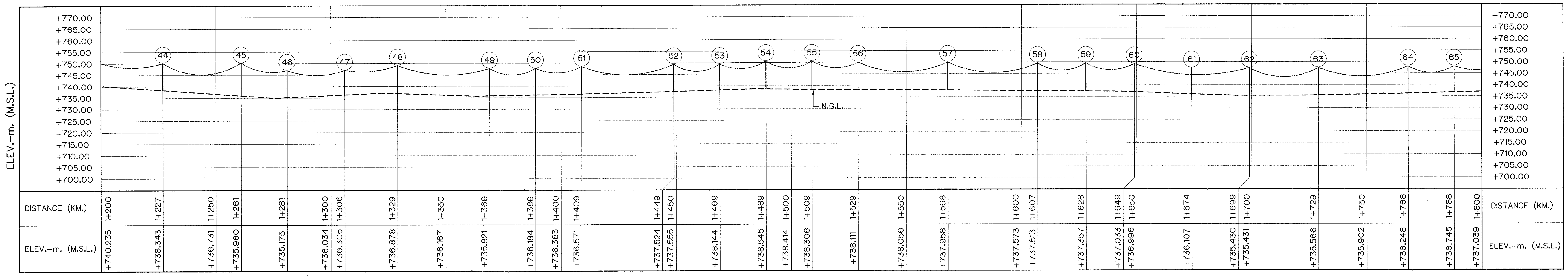
## CIVIL WORKS AND TRANSMISSION LINE
## TRANSMISSION LINE
## PLAN AND PROFILE, STA. 0+600 TO 1+200

| | |
|---|---|
| P&C MANAGEMENT CO.,LTD. | Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY |
| DESIGNED ภย.64624 ลย.6226 | REVIEWED |
| DRAWN | SUBMITTED Chaiï |
| CHECKED ลย.6226 | RECOMMENDED |
| | APPROVED P. Hous.U. |
| PROJECT MANAGER DATE 08/03/2559 | DRAWING NO. MH-TS-03 |
| | SHEET NO. 114 OF 130 |



## PLAN

SCALE 1:1,000



| DISTANCE (KM.) | ELEV.-m. (M.S.L.) |
|---|---|
| 1+200 | +740.235 |
| 1+227 | +738.343 |
| 1+250 | +736.731 |
| 1+261 | +735.960 |
| 1+281 | +735.175 |
| 1+300 | +736.034 |
| 1+306 | +736.305 |
| 1+329 | +736.878 |
| 1+350 | +736.167 |
| 1+369 | +735.821 |
| 1+389 | +736.184 |
| 1+400 | +736.383 |
| 1+409 | +736.571 |
| 1+449 | +737.524 |
| 1+450 | +737.555 |
| 1+469 | +738.144 |
| 1+489 | +738.545 |
| 1+500 | +738.414 |
| 1+509 | +738.306 |
| 1+529 | +738.111 |
| 1+550 | +738.056 |
| 1+568 | +737.958 |
| 1+600 | +737.573 |
| 1+607 | +737.513 |
| 1+628 | +737.357 |
| 1+649 | +737.033 |
| 1+650 | +736.996 |
| 1+674 | +736.107 |
| 1+699 | +735.430 |
| 1+700 | +735.431 |
| 1+729 | +735.566 |
| 1+750 | +735.902 |
| 1+768 | +736.248 |
| 1+788 | +736.745 |
| 1+800 | +737.039 |

## PROFILE

HORIZONTAL SCALE 1:1,000
VERTICAL SCALE 1:1,000

## TRANSMISSION LINE PROPERTIES

| POLE NO. | DISTANCE (M.) | ACCUMULATIVE DISTANCE (M.) | QUANTITY |  |  |  |  |  |  |  |  |  |  |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  |  |  | POLE TYPE |  |  |  |  | GUY TYPE |  |  |  |  |  |
|  |  |  | A | B | C | D | E | G1 | G2 | G3 | G4 | G5 | G6 |
| 43 | 23 | 1,193 |  |  | 1 |  |  |  |  |  | 1 |  |  |
| 44 | 34 | 1,227 | 1 |  |  |  |  |  |  |  |  |  |  |
| 45 | 34 | 1,261 |  |  | 1 |  |  |  |  |  | 1 |  |  |
| 46 | 20 | 1,281 |  | 1 |  |  |  |  |  |  |  |  |  |
| 47 | 25 | 1,306 |  | 1 |  |  |  |  |  |  |  |  |  |
| 48 | 23 | 1,329 |  |  | 1 |  |  |  |  |  | 1 |  |  |
| 49 | 40 | 1,369 |  |  | 1 |  |  |  |  |  | 1 |  |  |
| 50 | 20 | 1,389 |  | 1 |  |  |  |  |  |  |  |  |  |
| 51 | 20 | 1,409 |  |  | 1 |  |  |  |  |  | 1 |  |  |
| 52 | 40 | 1,449 |  |  | 1 |  |  |  |  |  | 1 |  |  |
| 53 | 20 | 1,469 |  | 1 |  |  |  |  |  |  |  |  |  |
| 54 | 20 | 1,489 |  | 1 |  |  |  | 1 |  |  |  |  |  |
| 55 | 20 | 1,509 |  | 1 |  |  |  |  |  |  |  |  |  |
| 56 | 20 | 1,529 |  |  | 1 |  |  |  |  |  | 1 |  |  |
| 57 | 39 | 1,568 | 1 |  |  |  |  |  |  |  |  |  |  |
| 58 | 39 | 1,607 |  |  | 1 |  |  |  |  |  | 1 |  |  |
| 59 | 21 | 1,628 |  | 1 |  |  |  |  |  |  |  |  |  |
| 60 | 21 | 1,649 |  | 1 |  |  |  |  |  |  |  |  |  |
| 61 | 25 | 1,674 |  | 1 |  |  |  |  |  |  |  |  |  |
| 62 | 25 | 1,699 |  |  | 1 |  |  |  |  |  | 1 |  |  |
| 63 | 30 | 1,729 | 1 |  |  |  |  |  |  |  |  |  |  |
| 64 | 39 | 1,768 |  |  | 1 |  |  |  |  |  | 1 |  |  |
| 65 | 20 | 1,788 |  | 1 |  |  |  |  |  |  |  |  |  |

## REFERENCE DRAWINGS :-

| | |
|---|---|
| 1. TRANSMISSION LINE, PLAN AND PROFILE, STA. 0+600 TO STA. 1+200 | MH-TS-03 |
| 2. TRANSMISSION LINE, PLAN AND PROFILE, STA. 1+800 TO STA. 2+400 | MH-TS-06 |
| 3. TRANSMISSION LINE, POLE TYPE "A" AND "B" | MH-TS-16 |
| 4. TRANSMISSION LINE, POLE TYPE "C" AND "D" | MH-TS-17 |
| 5. TRANSMISSION LINE, POLE TYPE "E" | MH-TS-18 |
| 6. TRANSMISSION LINE, TYPE OF ANCHOR GUY | MH-TS-19 |

## NOTES:

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS, UNLESS OTHERWISE SHOWN
2. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH-GN-03

## LEGENDS :

| | | |
|---|---|---|
| 1. | ∿∿∿ | 22 kV. SPACE AERIAL CABLE |
| 2. | — — — | EXISTING 22 kV. PEA. OVERHEAD TRANSMISSION LINE |
| 3. | ■ | NEW 12M. CONCRETE POLE |
| 4. | □ | EXISTING 12M. CONCRETE POLE |
| 5. | RM 12M □ | REMOVE 12M. CONCRETE POLE |
| 6. | ⟋ | 3 - 100A. FUSE CUTOUT 33 kV. |
| 7. | → | GUY |
| 8. | ⊟ | LOAD BREAK SWITCH, SF6, 630A, 33KV. WITH AUTOMATIC REMOTE CONTORLLED |
| 9. | ⟋ | DISCONNECTING SWITCH 600A, 33KV. |

0 5 10 15 20 25 50 100
SCALE 1:1,000 METERS

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
|---|---|---|---|---|
| 3 |  |  |  |  |
| 2 |  |  |  |  |
| 1 |  |  |  |  |

CONSULTANTS
DEDE

KINGDOM OF THAILAND
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

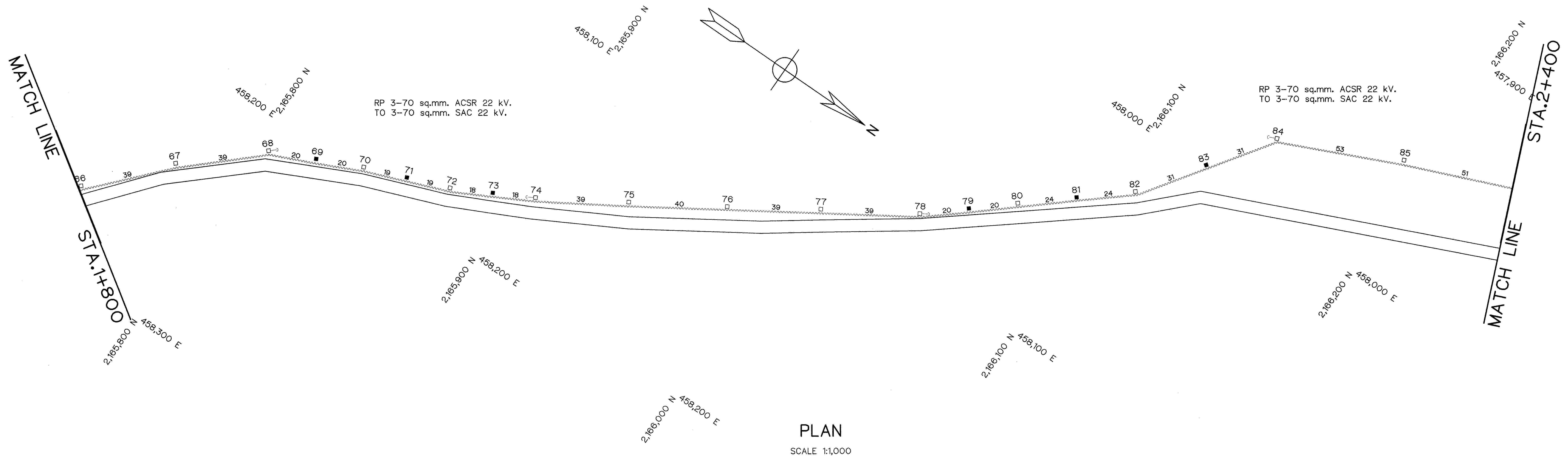
# MAE HAT HYDROPOWER PROJECT

## CIVIL WORKS AND TRANSMISSION LINE
## TRANSMISSION LINE
## PLAN AND PROFILE, STA. 1+200 TO 1+800

P&C MANAGEMENT CO.,LTD.

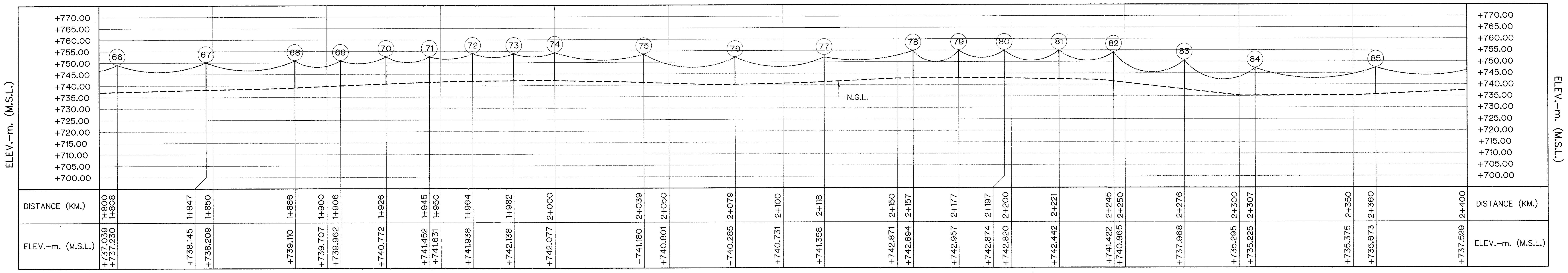
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

| | |
|---|---|
| DESIGNED | ภย.64624 ลย.6226 |
| DRAWN |  |
| CHECKED | ลย.6226 |
| PROJECT MANAGER | DATE 08/03/2559 |
| REVIEWED |  |
| SUBMITTED | Chanit |
| RECOMMENDED |  |
| APPROVED | P. Hansell |
| DRAWING NO. | MH-TS-04 |
| SHEET NO. | 115 OF 130 |



## PLAN

SCALE 1:1,000



| DISTANCE (KM.) | ELEV.–m. (M.S.L.) |
|---|---|
| 1+800 | +737.039 |
| 1+808 | +737.230 |
| 1+847 | +738.145 |
| 1+850 | +738.209 |
| 1+886 | +739.110 |
| 1+900 | +739.707 |
| 1+906 | +739.962 |
| 1+926 | +740.772 |
| 1+945 | +741.452 |
| 1+950 | +741.631 |
| 1+964 | +741.938 |
| 1+982 | +742.138 |
| 2+000 | +742.077 |
| 2+039 | +741.180 |
| 2+050 | +740.801 |
| 2+079 | +740.285 |
| 2+100 | +740.731 |
| 2+118 | +741.358 |
| 2+150 | +742.871 |
| 2+157 | +742.894 |
| 2+177 | +742.957 |
| 2+197 | +742.874 |
| 2+200 | +742.820 |
| 2+221 | +742.442 |
| 2+245 | +741.422 |
| 2+250 | +740.865 |
| 2+276 | +737.968 |
| 2+300 | +735.295 |
| 2+307 | +735.225 |
| 2+350 | +735.375 |
| 2+360 | +735.673 |
| 2+400 | +737.529 |

## PROFILE

HORIZONTAL SCALE 1:1,000
VERTICAL SCALE 1:1,000

### TRANSMISSION LINE PROPERTIES

| POLE NO. | DISTANCE (M.) | ACCUMULATIVE DISTANCE (M.) | QUANTITY |  |  |  |  |  |  |  |  |  |  |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  |  |  | POLE TYPE |  |  |  |  | GUY TYPE |  |  |  |  |  |
|  |  |  | A | B | C | D | E | G1 | G2 | G3 | G4 | G5 | G6 |
| 65 | 20 | 1,788 |  | 1 |  |  |  |  |  |  |  |  |  |
| 66 | 20 | 1,808 |  |  | 1 |  |  |  |  |  | 1 |  |  |
| 67 | 39 | 1,847 | 1 |  |  |  |  |  |  |  |  |  |  |
| 68 | 39 | 1,886 |  |  | 1 |  |  |  |  |  | 1 |  |  |
| 69 | 20 | 1,906 |  | 1 |  |  |  |  |  |  |  |  |  |
| 70 | 20 | 1,926 |  | 1 |  |  |  |  |  |  |  |  |  |
| 71 | 19 | 1,945 |  | 1 |  |  |  |  |  |  |  |  |  |
| 72 | 19 | 1,964 |  | 1 |  |  |  |  |  |  |  |  |  |
| 73 | 18 | 1,982 |  | 1 |  |  |  |  |  |  |  |  |  |
| 74 | 18 | 2,000 |  |  | 1 |  |  |  |  |  | 1 |  |  |
| 75 | 39 | 2,039 | 1 |  |  |  |  |  |  |  |  |  |  |
| 76 | 40 | 2,079 | 1 |  |  |  |  |  |  |  |  |  |  |
| 77 | 39 | 2,118 | 1 |  |  |  |  |  |  |  |  |  |  |
| 78 | 39 | 2,157 |  |  | 1 |  |  |  |  |  | 1 |  |  |
| 79 | 20 | 2,177 |  | 1 |  |  |  |  |  |  |  |  |  |
| 80 | 20 | 2,197 |  | 1 |  |  |  |  |  |  |  |  |  |
| 81 | 24 | 2,221 |  | 1 |  |  |  |  |  |  |  |  |  |
| 82 | 24 | 2,245 |  | 1 |  |  |  |  |  |  |  |  |  |
| 83 | 31 | 2,276 |  | 1 |  |  |  |  |  |  |  |  |  |
| 84 | 31 | 2,307 |  |  | 1 |  |  |  |  |  | 1 |  |  |
| 85 | 53 | 2,360 | 1 |  |  |  |  |  |  |  |  |  |  |

### REFERENCE DRAWINGS :–

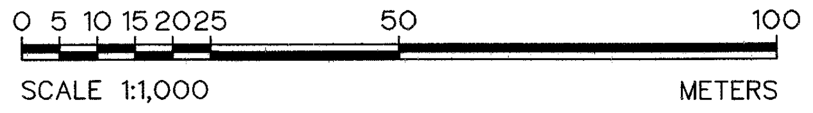
| | |
|---|---|
| 1. TRANSMISSION LINE, PLAN AND PROFILE, STA. 1+200 TO STA. 1+800 | MH–TS–04 |
| 2. TRANSMISSION LINE, PLAN AND PROFILE, STA. 2+400 TO STA. 3+000 | MH–TS–06 |
| 3. TRANSMISSION LINE, POLE TYPE "A" AND "B" | MH–TS–16 |
| 4. TRANSMISSION LINE, POLE TYPE "C" AND "D" | MH–TS–17 |
| 5. TRANSMISSION LINE, POLE TYPE "E" | MH–TS–18 |
| 6. TRANSMISSION LINE, TYPE OF ANCHOR GUY | MH–TS–19 |

### NOTES:

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS, UNLESS OTHERWISE SHOWN
2. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH–GN–03

### LEGENDS :

| | | |
|---|---|---|
| 1. | ∿∿∿∿ | 22 kV. SPACE AERIAL CABLE |
| 2. | — — — — | EXISTING 22 kV. PEA. OVERHEAD TRANSMISSION LINE |
| 3. | ■ | NEW 12M. CONCRETE POLE |
| 4. | □ | EXISTING 12M. CONCRETE POLE |
| 5. | RM 12M □ | REMOVE 12M. CONCRETE POLE |
| 6. | ⇀ | 3 – 100A. FUSE CUTOUT 33 kV. |
| 7. | → | GUY |
| 8. | ⊡ | LOAD BREAK SWITCH, SF6, 630A, 33KV. WITH AUTOMATIC REMOTE CONTORLLED |
| 9. | ⇀ | DISCONNECTING SWITCH 600A, 33KV. |



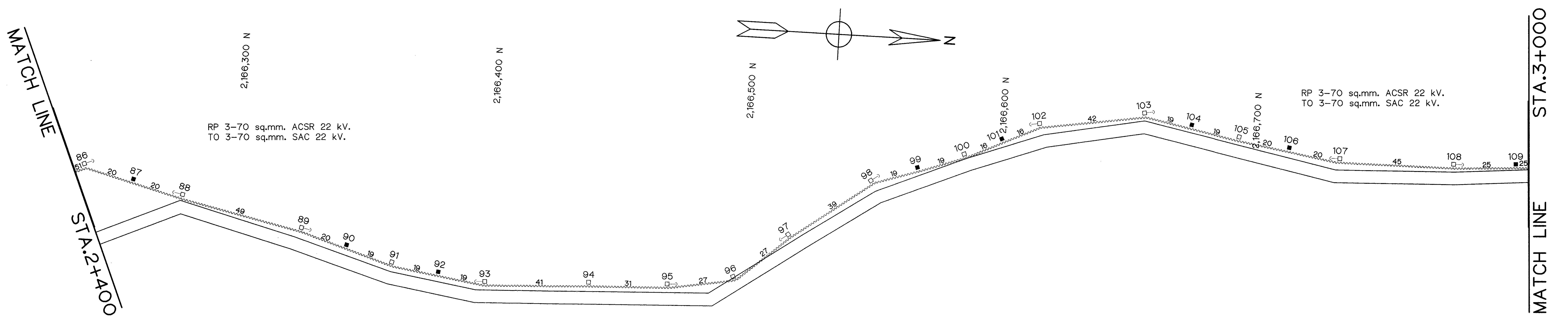
| NO. | DATE | REVISIONS | CHECKED | APPROVED |
|---|---|---|---|---|
| 3 | | | | |
| 2 | | | | |
| 1 | | | | |
| | CONSULTANTS | | DEDE | |

KINGDOM OF THAILAND
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

## MAE HAT HYDROPOWER PROJECT

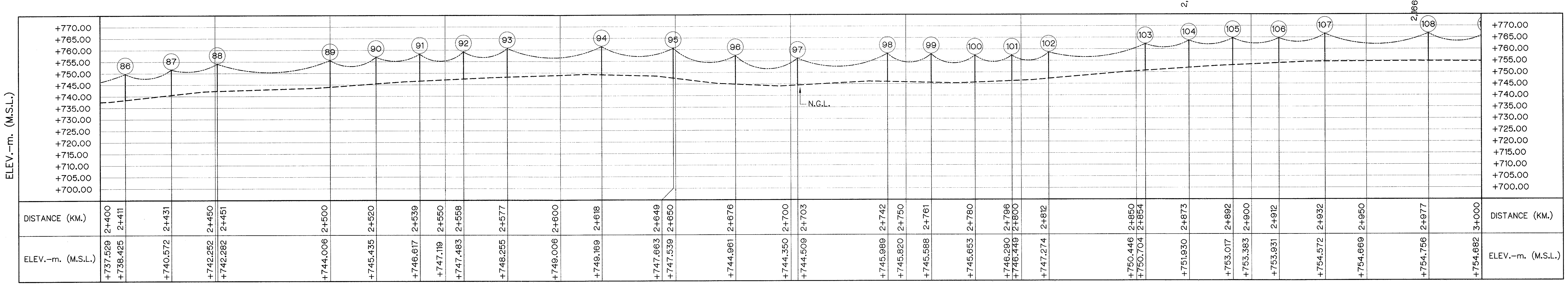
### CIVIL WORKS AND TRANSMISSION LINE
### TRANSMISSION LINE
### PLAN AND PROFILE, STA. 1+800 TO 2+400

| | |
|---|---|
| P&C MANAGEMENT CO.,LTD. | Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY |
| | REVIEWED |
| DESIGNED ภย.64624 สย.6226 | SUBMITTED Chanit |
| DRAWN | RECOMMENDED |
| CHECKED สย.6226 | APPROVED P.Hous.. |
| PROJECT MANAGER 08/03/2559 DATE | DRAWING NO. MH–TS–05 |
| | SHEET NO. 116 OF 130 |



## PLAN

SCALE 1:1,000



## PROFILE

HORIZONTAL SCALE 1:1,000
VERTICAL SCALE 1:1,000

### TRANSMISSION LINE PROPERTIES

| POLE NO. | DISTANCE (M.) | ACCUMULATIVE DISTANCE (M.) | QUANTITY | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | POLE TYPE | | | | | GUY TYPE | | | | | |
| | | | A | B | C | D | E | G1 | G2 | G3 | G4 | G5 | G6 |
| 85 | 53 | 2,360 | 1 | | | | | | | | | | |
| 86 | 51 | 2,411 | | | 1 | | | | | | 1 | | |
| 87 | 20 | 2,431 | | 1 | | | | | | | | | |
| 88 | 20 | 2,451 | | | 1 | | | | | | 1 | | |
| 89 | 49 | 2,500 | | 1 | | | | | | | | | |
| 90 | 20 | 2,520 | | 1 | | | | | | | | | |
| 91 | 19 | 2,539 | | 1 | | | | | | | | | |
| 92 | 19 | 2,558 | | 1 | | | | | | | | | |
| 93 | 19 | 2,577 | | | 1 | | | | | | 1 | | |
| 94 | 41 | 2,618 | 1 | | | | | | | | | | |
| 95 | 31 | 2,649 | | | 1 | | | | | | 1 | | |
| 96 | 27 | 2,676 | | 1 | | | | | | | | | |
| 97 | 27 | 2,703 | | | 1 | | | | | | 1 | | |
| 98 | 39 | 2,742 | | | 1 | | | | | | 1 | | |
| 99 | 19 | 2,761 | | 1 | | | | | | | | | |
| 100 | 19 | 2,780 | | 1 | | | | | | | | | |
| 101 | 16 | 2,796 | | | | | | | | | | | |
| 102 | 16 | 2,812 | | | 1 | | | | | | 1 | | |
| 103 | 42 | 2,854 | | | 1 | | | | | | 1 | | |
| 104 | 19 | 2,873 | | 1 | | | | | | | | | |
| 105 | 19 | 2,892 | | 1 | | | | | | | | | |
| 106 | 20 | 2,912 | | 1 | | | | | | | | | |
| 107 | 20 | 2,932 | | | 1 | | | | | | 1 | | |
| 108 | 45 | 2,977 | | | 1 | | | | | | 1 | | |

### REFERENCE DRAWINGS :-

| | |
|---|---|
| 1. TRANSMISSION LINE, PLAN AND PROFILE, STA. 1+800 TO STA. 2+400 | MH-TS-05 |
| 2. TRANSMISSION LINE, PLAN AND PROFILE, STA. 3+000 TO STA. 3+600 | MH-TS-07 |
| 3. TRANSMISSION LINE, POLE TYPE "A" AND "B" | MH-TS-16 |
| 4. TRANSMISSION LINE, POLE TYPE "C" AND "D" | MH-TS-17 |
| 5. TRANSMISSION LINE, POLE TYPE "E" | MH-TS-18 |
| 6. TRANSMISSION LINE, TYPE OF ANCHOR GUY | MH-TS-19 |

### NOTES:

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS, UNLESS OTHERWISE SHOWN
2. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH-GN-03

### LEGENDS :

| | | |
|---|---|---|
| 1. | ∿∿∿ | 22 kV. SPACE AERIAL CABLE |
| 2. | — — — | EXISTING 22 kV. PEA. OVERHEAD TRANSMISSION LINE |
| 3. | ■ | NEW 12M. CONCRETE POLE |
| 4. | □ | EXISTING 12M. CONCRETE POLE |
| 5. | RM 12M □ | REMOVE 12M. CONCRETE POLE |
| 6. | | 3 - 100A. FUSE CUTOUT 33 kV. |
| 7. | → | GUY |
| 8. | | LOAD BREAK SWITCH, SF6, 630A, 33KV. WITH AUTOMATIC REMOTE CONTORLLED |
| 9. | | DISCONNECTING SWITCH 600A, 33KV. |

0 5 10 15 20 25 50 100
SCALE 1:1,000 METERS

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
|---|---|---|---|---|
| 3 | | | | |
| 2 | | | | |
| 1 | | | | |
| | CONSULTANTS | | DEDE | |

KINGDOM OF THAILAND
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

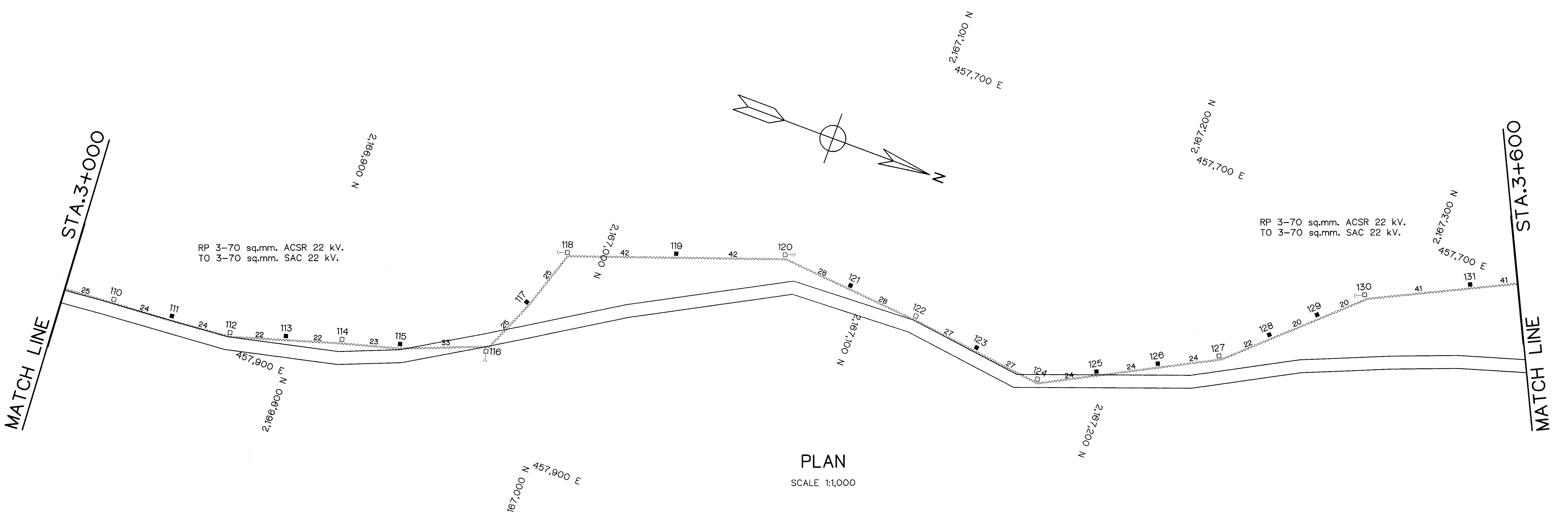
CIVIL WORKS AND TRANSMISSION LINE
TRANSMISSION LINE
PLAN AND PROFILE, STA. 2+400 TO 3+000

P&C MANAGEMENT CO.,LTD.

Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

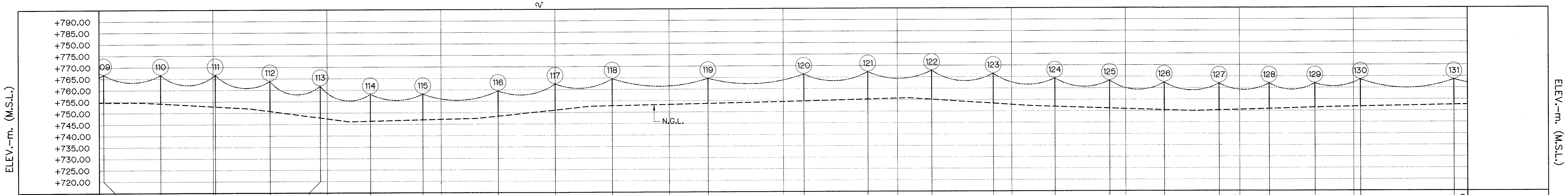
| | |
|---|---|
| DESIGNED ภย.64624 สย.6226 | REVIEWED |
| DRAWN | SUBMITTED Chant |
| CHECKED สย.6226 | RECOMMENDED |
| 08/03/2559 PROJECT MANAGER DATE | APPROVED P. Hauns |

DRAWING NO. MH-TS-06
SHEET NO. 117 OF 130



## PLAN

SCALE 1:1,000



| DISTANCE (KM.) | ELEV.-m. (M.S.L.) |
|---|---|
| 3+000 | +754.682 |
| 3+002 | +754.675 |
| 3+027 | +754.184 |
| 3+050 | +752.856 |
| 3+051 | +752.799 |
| 3+075 | +750.763 |
| 3+097 | +747.849 |
| 3+100 | +747.451 |
| 3+119 | +746.379 |
| 3+142 | +746.931 |
| 3+150 | +747.122 |
| 3+175 | +748.465 |
| 3+200 | +751.075 |
| 3+225 | +752.852 |
| 3+250 | +753.357 |
| 3+267 | +753.701 |
| 3+300 | +754.371 |
| 3+309 | +754.610 |
| 3+337 | +755.351 |
| 3+350 | +755.696 |
| 3+365 | +755.194 |
| 3+392 | +753.410 |
| 3+400 | +752.881 |
| 3+419 | +751.974 |
| 3+443 | +751.167 |
| 3+450 | +750.931 |
| 3+467 | +750.359 |
| 3+491 | +750.259 |
| 3+500 | +750.499 |
| 3+513 | +750.845 |
| 3+533 | +751.379 |
| 3+550 | +751.745 |
| 3+553 | +751.798 |
| 3+594 | +752.519 |
| 3+600 | +752.624 |

## PROFILE

HORIZONTAL SCALE 1:1,000
VERTICAL SCALE 1:1,000

### TRANSMISSION LINE PROPERTIES

| POLE NO. | DISTANCE (M.) | ACCUMULATIVE DISTANCE (M.) | QUANTITY | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | POLE TYPE | | | | | GUY TYPE | | | | | |
| | | | A | B | C | D | E | G1 | G2 | G3 | G4 | G5 | G6 |
| 108 | 45 | 2,977 | | | 1 | | | | | | 1 | | |
| 109 | 25 | 3,002 | | 1 | | | | | | | | | |
| 110 | 25 | 3,027 | | 1 | | | | | | | | | |
| 111 | 24 | 3,051 | | 1 | | | | | | | | | |
| 112 | 24 | 3,075 | | 1 | | | | | | | | | |
| 113 | 22 | 3,097 | | 1 | | | | | | | | | |
| 114 | 22 | 3,119 | | 1 | | | | | | | | | |
| 115 | 23 | 3,142 | | 1 | | | | | | | | | |
| 116 | 33 | 3,175 | | | | 1 | | 1 | | | | | |
| 117 | 25 | 3,200 | | 1 | | | | | | | | | |
| 118 | 25 | 3,225 | | | | 1 | | 1 | | | | | |
| 119 | 42 | 3,267 | 1 | | | | | | | | | | |
| 120 | 42 | 3,309 | | | 1 | | | | | | 1 | | |
| 121 | 28 | 3,337 | | 1 | | | | | | | | | |
| 122 | 28 | 3,365 | | 1 | | | | | | | | | |
| 123 | 27 | 3,392 | | 1 | | | | | | | | | |
| 124 | 27 | 3,419 | | 1 | | | | | | | | | |
| 125 | 24 | 3,443 | | 1 | | | | | | | | | |
| 126 | 24 | 3,467 | | 1 | | | | | | | | | |
| 127 | 24 | 3,491 | | 1 | | | | | | | | | |
| 128 | 22 | 3,513 | | 1 | | | | | | | | | |
| 129 | 20 | 3,533 | | 1 | | | | | | | | | |
| 130 | 20 | 3,553 | | | 1 | | | | | | 1 | | |
| 131 | 41 | 3,594 | 1 | | | | | | | | | | |

### REFERENCE DRAWINGS :-

| | |
|---|---|
| 1. TRANSMISSION LINE, PLAN AND PROFILE, STA. 2+400 TO STA. 3+000 | MH-TS-06 |
| 2. TRANSMISSION LINE, PLAN AND PROFILE, STA. 3+600 TO STA. 4+200 | MH-TS-08 |
| 3. TRANSMISSION LINE, POLE TYPE "A" AND "B" | MH-TS-16 |
| 4. TRANSMISSION LINE, POLE TYPE "C" AND "D" | MH-TS-17 |
| 5. TRANSMISSION LINE, POLE TYPE "E" | MH-TS-18 |
| 6. TRANSMISSION LINE, TYPE OF ANCHOR GUY | MH-TS-19 |

### NOTES:

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS, UNLESS OTHERWISE SHOWN
2. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH-GN-03

### LEGENDS :

| | | |
|---|---|---|
| 1. | 〰 | 22 kV. SPACE AERIAL CABLE |
| 2. | — — — | EXISTING 22 kV. PEA. OVERHEAD TRANSMISSION LINE |
| 3. | ■ | NEW 12M. CONCRETE POLE |
| 4. | □ | EXISTING 12M. CONCRETE POLE |
| 5. | RM 12M □ | REMOVE 12M. CONCRETE POLE |
| 6. | -/- | 3 - 100A. FUSE CUTOUT 33 kV. |
| 7. | → | GUY |
| 8. | -⊡- | LOAD BREAK SWITCH, SF6, 630A, 33KV. WITH AUTOMATIC REMOTE CONTORLLED |
| 9. | -/- | DISCONNECTING SWITCH 600A, 33KV. |

0 5 10 15 2025 50 100
SCALE 1:1,000 METERS

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
|---|---|---|---|---|
| 3 | | | | |
| 2 | | | | |
| 1 | | | | |

CONSULTANTS
DEDE

KINGDOM OF THAILAND
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

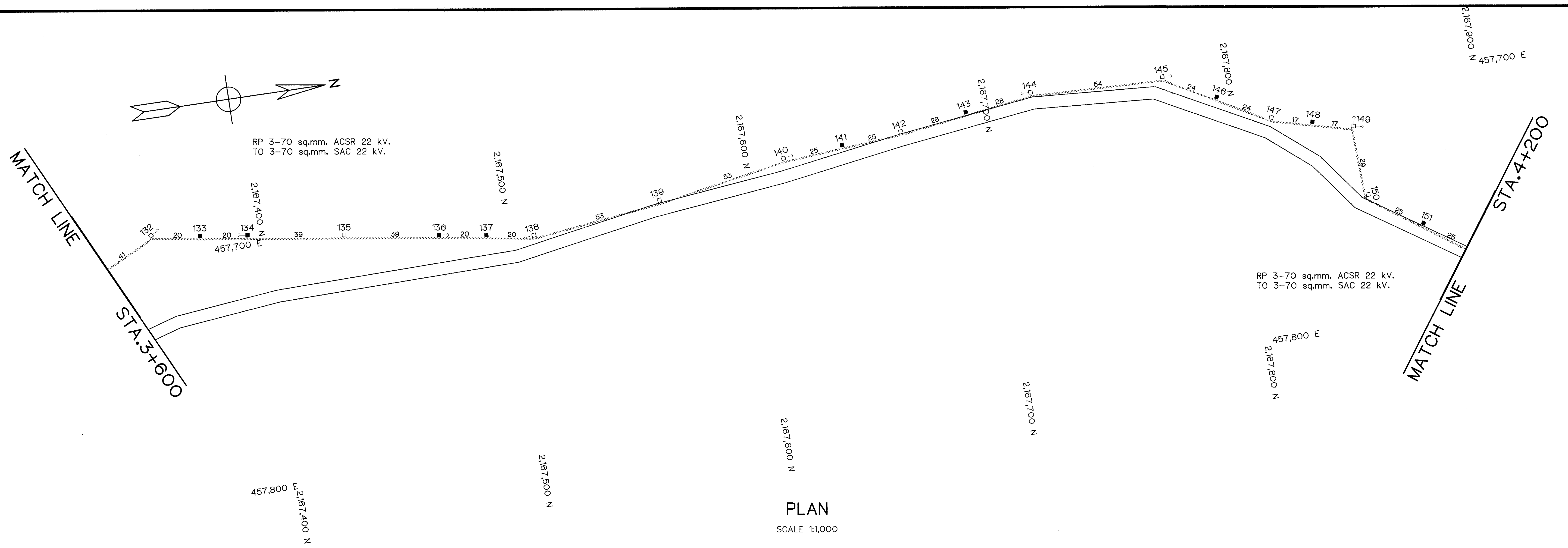
CIVIL WORKS AND TRANSMISSION LINE
TRANSMISSION LINE
PLAN AND PROFILE, STA. 3+000 TO 3+600

P&C MANAGEMENT CO.,LTD.

Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

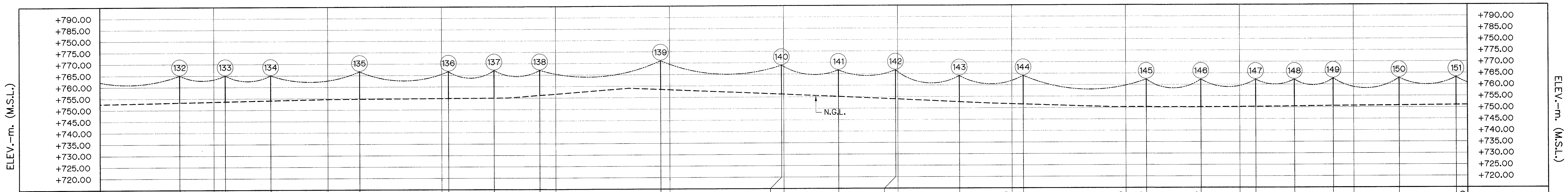
| | |
|---|---|
| DESIGNED ภย.64624 สย.6226 | REVIEWED |
| DRAWN | SUBMITTED Chait |
| CHECKED สย.6226 | RECOMMENDED |
| PROJECT MANAGER / DATE 08/03/2559 | APPROVED P. Hansell |

DRAWING NO. MH-TS-07
SHEET NO. 118 OF 130



## PLAN

SCALE 1:1,000



| DISTANCE (KM.) | ELEV.–m. (M.S.L.) |
|---|---|
| 3+600 | +752.624 |
| 3+635 | +753.279 |
| 3+650 | +753.590 |
| 3+655 | +753.694 |
| 3+675 | +754.109 |
| 3+700 | +754.627 |
| 3+714 | +754.728 |
| 3+750 | +754.926 |
| 3+753 | +754.943 |
| 3+773 | +755.053 |
| 3+793 | +756.132 |
| 3+800 | +756.658 |
| 3+846 | +758.512 |
| 3+850 | +758.345 |
| 3+899 | +756.267 |
| 3+900 | +756.223 |
| 3+924 | +755.160 |
| 3+949 | +754.015 |
| 3+950 | +753.968 |
| 3+977 | +752.702 |
| 4+000 | +751.765 |
| 4+005 | +751.603 |
| 4+050 | +750.309 |
| 4+059 | +750.285 |
| 4+083 | +750.218 |
| 4+100 | +750.270 |
| 4+107 | +750.335 |
| 4+124 | +750.493 |
| 4+141 | +750.645 |
| 4+150 | +750.693 |
| 4+170 | +750.804 |
| 4+195 | +750.989 |
| 4+200 | +751.026 |

## PROFILE

HORIZONTAL SCALE 1:1,000
VERTICAL SCALE 1:1,000

### TRANSMISSION LINE PROPERTIES

| POLE NO. | DISTANCE (M.) | ACCUMULATIVE DISTANCE (M.) | QUANTITY | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | POLE TYPE | | | | | GUY TYPE | | | | | |
| | | | A | B | C | D | E | G1 | G2 | G3 | G4 | G5 | G6 |
| 131 | 41 | 3,594 | 1 | | | | | | | | | | |
| 132 | 41 | 3,635 | | | 1 | | | | | | 1 | | |
| 133 | 20 | 3,655 | | 1 | | | | | | | | | |
| 134 | 20 | 3,675 | | | 1 | | | | | | 1 | | |
| 135 | 39 | 3,714 | 1 | | | | | | | | | | |
| 136 | 39 | 3,753 | | | 1 | | | | | | 1 | | |
| 137 | 20 | 3,773 | | 1 | | | | | | | | | |
| 138 | 20 | 3,793 | | | 1 | | | | | | 1 | | |
| 139 | 53 | 3,846 | 1 | | | | | | | | | | |
| 140 | 53 | 3,899 | | | 1 | | | | | | 1 | | |
| 141 | 25 | 3,924 | | 1 | | | | | | | | | |
| 142 | 25 | 3,949 | | 1 | | | | | | | | | |
| 143 | 28 | 3,977 | | 1 | | | | | | | | | |
| 144 | 28 | 4,005 | | | 1 | | | | | | 1 | | |
| 145 | 54 | 4,059 | | | 1 | | | | | | 1 | | |
| 146 | 24 | 4,083 | | 1 | | | | | | | | | |
| 147 | 24 | 4,107 | | 1 | | | | | | | | | |
| 148 | 17 | 4,124 | | 1 | | | | | | | | | |
| 149 | 17 | 4,141 | | | | 1 | | | | | | 1 | |
| 150 | 29 | 4,170 | | | | 1 | | | | | | | |
| 151 | 25 | 4,195 | | 1 | | | | | | | | | |

### REFERENCE DRAWINGS :–

| | |
|---|---|
| 1. TRANSMISSION LINE, PLAN AND PROFILE, STA. 3+000 TO STA. 3+600 | MH–TS–07 |
| 2. TRANSMISSION LINE, PLAN AND PROFILE, STA. 4+200 TO STA. 4+800 | MH–TS–09 |
| 3. TRANSMISSION LINE, POLE TYPE "A" AND "B" | MH–TS–16 |
| 4. TRANSMISSION LINE, POLE TYPE "C" AND "D" | MH–TS–17 |
| 5. TRANSMISSION LINE, POLE TYPE "E" | MH–TS–18 |
| 6. TRANSMISSION LINE, TYPE OF ANCHOR GUY | MH–TS–19 |

### NOTES:

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS, UNLESS OTHERWISE SHOWN
2. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH–GN–03

### LEGENDS :

| | | |
|---|---|---|
| 1. | 〰 | 22 kV. SPACE AERIAL CABLE |
| 2. | — — — | EXISTING 22 kV. PEA. OVERHEAD TRANSMISSION LINE |
| 3. | ■ | NEW 12M. CONCRETE POLE |
| 4. | □ | EXISTING 12M. CONCRETE POLE |
| 5. | RM 12M □ | REMOVE 12M. CONCRETE POLE |
| 6. | | 3 – 100A. FUSE CUTOUT 33 kV. |
| 7. | | GUY |
| 8. | | LOAD BREAK SWITCH, SF6, 630A, 33KV. WITH AUTOMATIC REMOTE CONTORLLED |
| 9. | | DISCONNECTING SWITCH 600A, 33KV. |

0 5 10 15 20 25 50 100
SCALE 1:1,000 METERS

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
|---|---|---|---|---|
| 3 | | | | |
| 2 | | | | |
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| | CONSULTANTS | | DEDE | |

KINGDOM OF THAILAND
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
TRANSMISSION LINE
PLAN AND PROFILE, STA. 3+600 TO 4+200

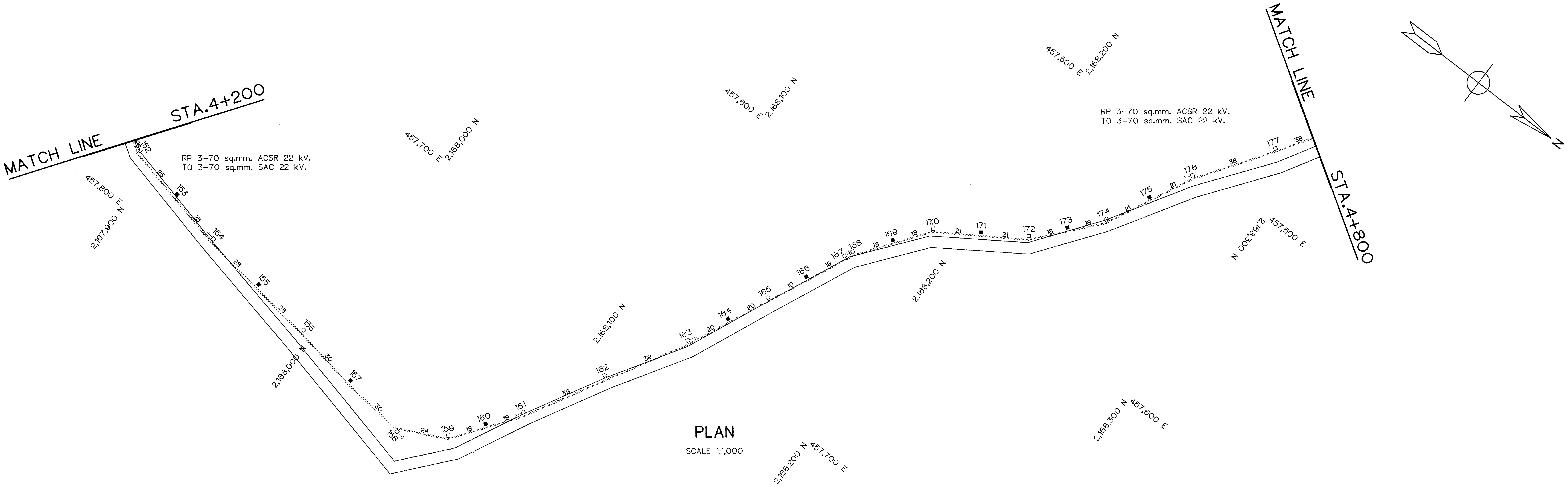
P&C MANAGEMENT CO.,LTD.

| | |
|---|---|
| DESIGNED | ภย.64624 ลย.6226 |
| DRAWN | |
| CHECKED | ลย.6226 |
| PROJECT MANAGER | DATE 08/03/2559 |

Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

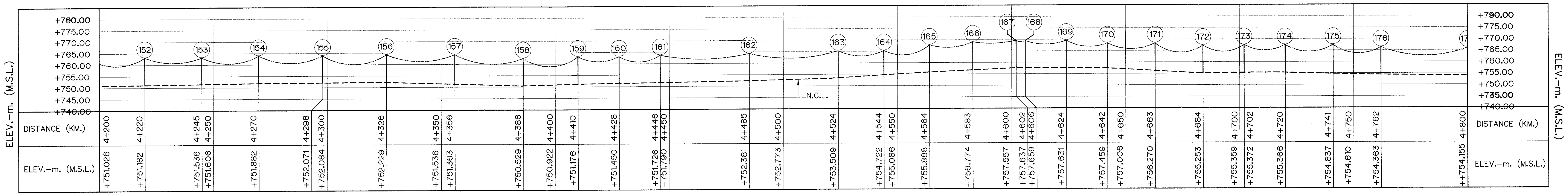
| | |
|---|---|
| REVIEWED | |
| SUBMITTED | Chavit |
| RECOMMENDED | |
| APPROVED | P. Hans, II |

| DRAWING NO. | SHEET NO. |
|---|---|
| MH–TS–08 | 119 OF 130 |



## PLAN

SCALE 1:1,000



| DISTANCE (KM.) | ELEV.-m. (M.S.L.) |
|---|---|
| 4+200 | +751.026 |
| 4+220 | +751.182 |
| 4+245 | +751.536 |
| 4+250 | +751.606 |
| 4+270 | +751.882 |
| 4+298 | +752.071 |
| 4+300 | +752.084 |
| 4+326 | +752.229 |
| 4+350 | +751.536 |
| 4+356 | +751.363 |
| 4+386 | +750.529 |
| 4+400 | +750.922 |
| 4+410 | +751.176 |
| 4+428 | +751.450 |
| 4+446 | +751.726 |
| 4+450 | +751.790 |
| 4+485 | +752.381 |
| 4+500 | +752.773 |
| 4+524 | +753.509 |
| 4+544 | +754.722 |
| 4+550 | +755.086 |
| 4+564 | +755.888 |
| 4+583 | +756.774 |
| 4+600 | +757.557 |
| 4+602 | +757.637 |
| 4+606 | +757.659 |
| 4+624 | +757.631 |
| 4+642 | +757.459 |
| 4+650 | +757.006 |
| 4+663 | +756.270 |
| 4+684 | +755.253 |
| 4+700 | +755.359 |
| 4+702 | +755.372 |
| 4+720 | +755.366 |
| 4+741 | +754.837 |
| 4+750 | +754.610 |
| 4+762 | +754.363 |
| 4+800 | ++754.155 |

## PROFILE

HORIZONTAL SCALE 1:1,000
VERTICAL SCALE 1:1,000

## TRANSMISSION LINE PROPERTIES

| POLE NO. | DISTANCE (M.) | ACCUMULATIVE DISTANCE (M.) | QUANTITY | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | POLE TYPE | | | | | GUY TYPE | | | | | |
| | | | A | B | C | D | E | G1 | G2 | G3 | G4 | G5 | G6 |
| 151 | 25 | 4,195 | | 1 | | | | | | | | | |
| 152 | 25 | 4,220 | | 1 | | | | | | | | | |
| 153 | 25 | 4,245 | | 1 | | | | | | | | | |
| 154 | 25 | 4,270 | | | | 1 | | | | | 1 | | |
| 155 | 28 | 4,298 | 1 | | | | | | | | | | |
| 156 | 28 | 4,326 | 1 | | | | | | | | | | |
| 157 | 30 | 4,356 | 1 | | | | | | | | | | |
| 158 | 30 | 4,386 | | | 1 | | | | | | 1 | | |
| 159 | 24 | 4,410 | | 1 | | | | | | | | | |
| 160 | 18 | 4,428 | | 1 | | | | | | | | | |
| 161 | 18 | 4,446 | | | 1 | | | | | | 1 | | |
| 162 | 39 | 4,485 | 1 | | | | | | | | | | |
| 163 | 39 | 4,524 | | | 1 | | | | | | 1 | | |
| 164 | 20 | 4,544 | | 1 | | | | | | | | | |
| 165 | 20 | 4,564 | | 1 | | | | | | | | | |
| 166 | 19 | 4,583 | | 1 | | | | | | | | | |
| 167 | 19 | 4,602 | | 1 | | | | | | | | | |
| 168 | 4 | 4,606 | | 1 | | | | | | | | | |
| 169 | 18 | 4,624 | | 1 | | | | | | | | | |
| 170 | 18 | 4,642 | | 1 | | | | 1 | | | | | |
| 171 | 21 | 4,663 | | 1 | | | | | | | | | |
| 172 | 21 | 4,684 | | 1 | | | | | | | | | |
| 173 | 18 | 4,702 | | 1 | | | | | | | | | |
| 174 | 18 | 4,720 | | 1 | | | | | | | | | |
| 175 | 21 | 4,741 | | 1 | | | | | | | | | |
| 176 | 21 | 4,762 | | | | | | 1 | | | | | |
| 177 | 38 | 4,800 | 1 | | | | | | | | | | |

## REFERENCE DRAWINGS :-

| | |
|---|---|
| 1. TRANSMISSION LINE, PLAN AND PROFILE, STA. 3+600 TO STA. 4+200 | MH-TS-08 |
| 2. TRANSMISSION LINE, PLAN AND PROFILE, STA. 4+800 TO STA. 5+400 | MH-TS-10 |
| 3. TRANSMISSION LINE, POLE TYPE "A" AND "B" | MH-TS-16 |
| 4. TRANSMISSION LINE, POLE TYPE "C" AND "D" | MH-TS-17 |
| 5. TRANSMISSION LINE, POLE TYPE "E" | MH-TS-18 |
| 6. TRANSMISSION LINE, TYPE OF ANCHOR GUY | MH-TS-19 |

## NOTES:

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS, UNLESS OTHERWISE SHOWN
2. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH-GN-03

## LEGENDS :

| | | |
|---|---|---|
| 1. | ∿∿∿∿ | 22 kV. SPACE AERIAL CABLE |
| 2. | — — — — | EXISTING 22 kV. PEA. OVERHEAD TRANSMISSION LINE |
| 3. | ■ | NEW 12M. CONCRETE POLE |
| 4. | □ | EXISTING 12M. CONCRETE POLE |
| 5. | RM 12M<br>□ | REMOVE 12M. CONCRETE POLE |
| 6. | -⁄•- | 3 - 100A. FUSE CUTOUT 33 kV. |
| 7. | —) | GUY |
| 8. | -R- | LOAD BREAK SWITCH, SF6, 630A, 33KV. WITH AUTOMATIC REMOTE CONTORLLED |
| 9. | -⁄•- | DISCONNECTING SWITCH 600A, 33KV. |

0 5 10 15 20 25 50 100
SCALE 1:1,000 METERS

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
|---|---|---|---|---|
| 3 | | | | |
| 2 | | | | |
| 1 | | | | |
| | CONSULTANTS | | DEDE | |

KINGDOM OF THAILAND
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

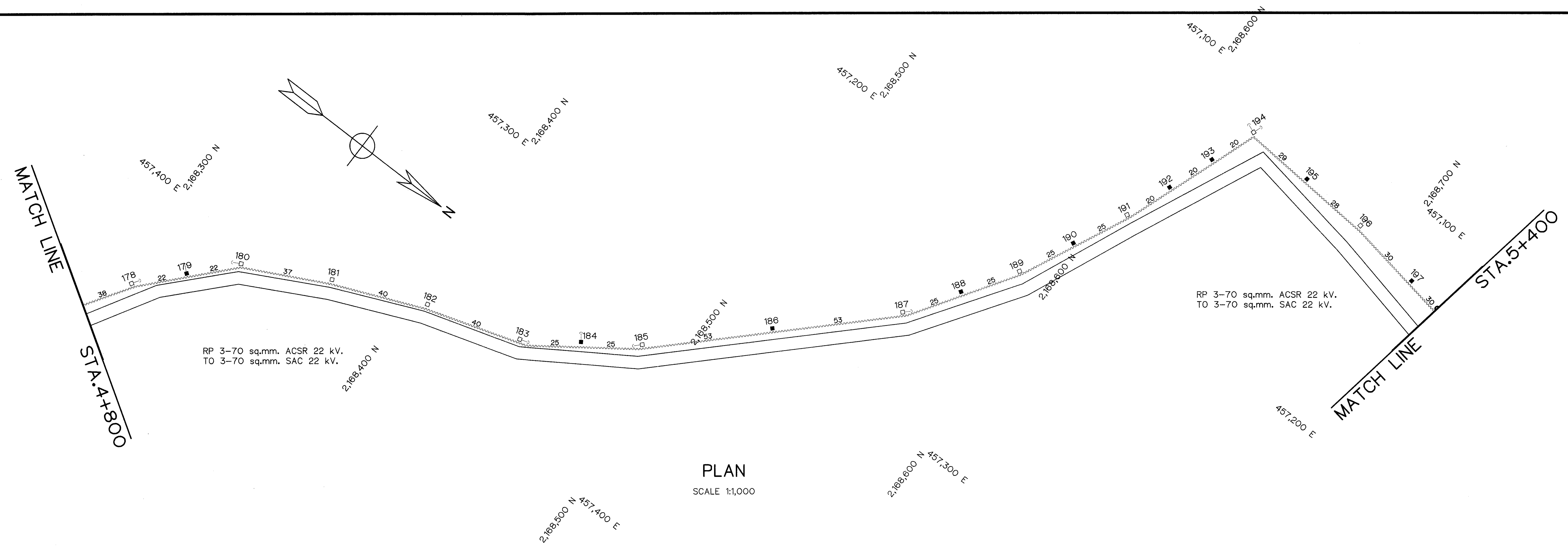
CIVIL WORKS AND TRANSMISSION LINE
TRANSMISSION LINE
PLAN AND PROFILE, STA. 4+200 TO 4+800

P&C MANAGEMENT CO.,LTD.

DESIGNED ภย.64624 ลย.6226
DRAWN
CHECKED ลย.6226
PROJECT MANAGER
DATE 08/03/2559

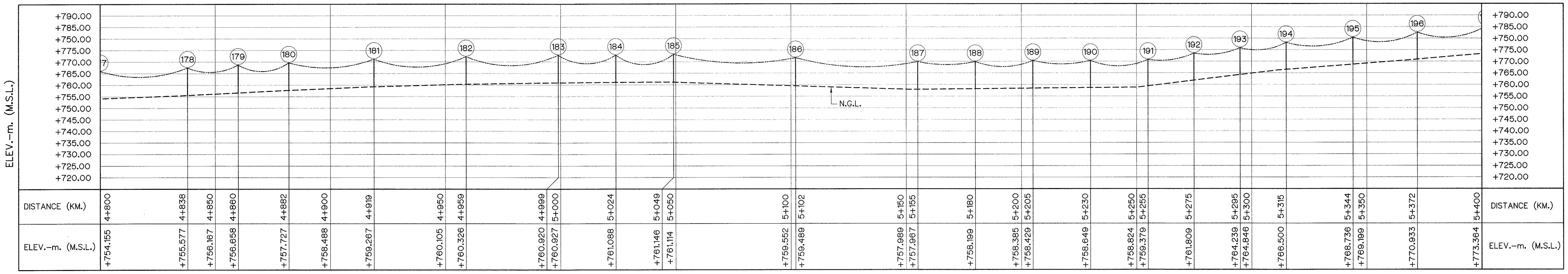
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY
REVIEWED
SUBMITTED Chart
RECOMMENDED
APPROVED P. Hanuff

DRAWING NO. MH-TS-09
SHEET NO. 120 OF 130



## PLAN

SCALE 1:1,000



## PROFILE

HORIZONTAL SCALE 1:1,000
VERTICAL SCALE 1:1,000

### TRANSMISSION LINE PROPERTIES

| POLE NO. | DISTANCE (M.) | ACCUMULATIVE DISTANCE (M.) | QUANTITY |  |  |  |  |  |  |  |  |  |  |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  |  |  | POLE TYPE |  |  |  |  | GUY TYPE |  |  |  |  |  |
|  |  |  | A | B | C | D | E | G1 | G2 | G3 | G4 | G5 | G6 |
| 177 | 38 | 4,800 | 1 |  |  |  |  |  |  |  |  |  |  |
| 178 | 38 | 4,838 |  |  | 1 |  |  |  |  |  | 1 |  |  |
| 179 | 22 | 4,860 |  | 1 |  |  |  | 1 |  |  |  |  |  |
| 180 | 22 | 4,882 |  |  | 1 |  |  |  |  |  | 1 |  |  |
| 181 | 37 | 4,919 | 1 |  |  |  |  |  |  |  |  |  |  |
| 182 | 40 | 4,959 |  | 1 |  |  |  |  |  |  |  |  |  |
| 183 | 40 | 4,999 |  |  | 1 |  |  |  |  |  | 1 |  |  |
| 184 | 25 | 5,024 |  | 1 |  |  |  | 1 |  |  |  |  |  |
| 185 | 25 | 5,049 |  |  | 1 |  |  |  |  |  | 1 |  |  |
| 186 | 53 | 5,102 | 1 |  |  |  |  |  |  |  |  |  |  |
| 187 | 53 | 5,155 |  |  | 1 |  |  |  |  |  | 1 |  |  |
| 188 | 25 | 5,180 |  | 1 |  |  |  |  |  |  |  |  |  |
| 189 | 25 | 5,205 |  | 1 |  |  |  |  |  |  |  |  |  |
| 190 | 25 | 5,230 |  | 1 |  |  |  |  |  |  |  |  |  |
| 191 | 25 | 5,255 |  | 1 |  |  |  |  |  |  |  |  |  |
| 192 | 20 | 5,275 |  | 1 |  |  |  |  |  |  |  |  |  |
| 193 | 20 | 5,295 |  | 1 |  |  |  |  |  |  |  |  |  |
| 194 | 20 | 5,315 |  |  |  | 1 |  |  |  |  |  | 1 |  |
| 195 | 29 | 5,344 |  | 1 |  |  |  |  |  |  |  |  |  |
| 196 | 28 | 5,372 |  | 1 |  |  |  | 1 |  |  |  |  |  |
| 197 | 30 | 5,402 |  | 1 |  |  |  |  |  |  |  |  |  |

### NOTES:

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS, UNLESS OTHERWISE SHOWN
2. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH-GN-03

### LEGENDS :

| | | |
|---|---|---|
| 1. | ∿∿∿ | 22 kV. SPACE AERIAL CABLE |
| 2. | — — — | EXISTING 22 kV. PEA. OVERHEAD TRANSMISSION LINE |
| 3. | ■ | NEW 12M. CONCRETE POLE |
| 4. | □ | EXISTING 12M. CONCRETE POLE |
| 5. | RM. 12M □ | REMOVE 12M. CONCRETE POLE |
| 6. | ⁄ | 3 - 100A. FUSE CUTOUT 33 kV. |
| 7. | → | GUY |
| 8. | -⊠- | LOAD BREAK SWITCH, SF6, 630A, 33KV. WITH AUTOMATIC REMOTE CONTORLLED |
| 9. | ⁄ | DISCONNECTING SWITCH 600A, 33KV. |

### REFERENCE DRAWINGS :-

| | |
|---|---|
| 1. TRANSMISSION LINE, PLAN AND PROFILE, STA. 4+200 TO STA. 4+800 | MH-TS-09 |
| 2. TRANSMISSION LINE, PLAN AND PROFILE, STA. 5+400 TO STA. 6+000 | MH-TS-11 |
| 3. TRANSMISSION LINE, POLE TYPE "A" AND "B" | MH-TS-16 |
| 4. TRANSMISSION LINE, POLE TYPE "C" AND "D" | MH-TS-17 |
| 5. TRANSMISSION LINE, POLE TYPE "E" | MH-TS-18 |
| 6. TRANSMISSION LINE, TYPE OF ANCHOR GUY | MH-TS-19 |

0 5 10 15 20 25 50 100
SCALE 1:1,000 METERS

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
|---|---|---|---|---|
| 3 |  |  |  |  |
| 2 |  |  |  |  |
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|  | CONSULTANTS |  | DEDE |  |

KINGDOM OF THAILAND
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

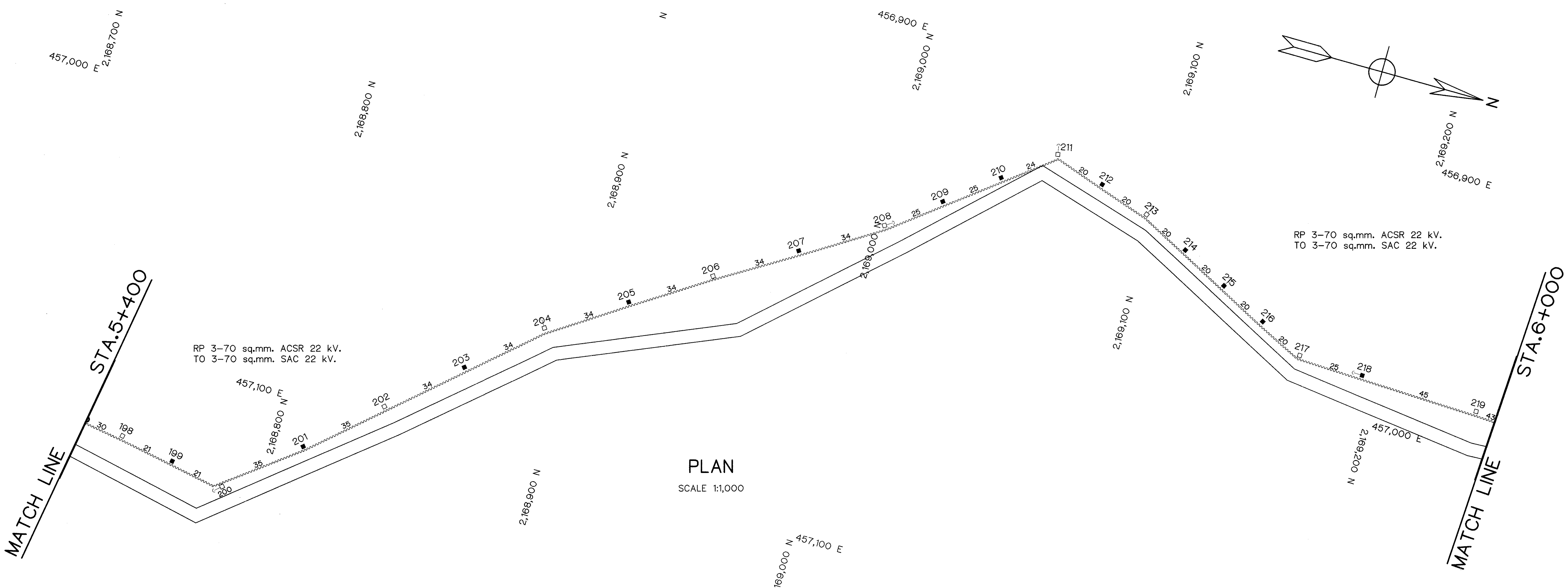
CIVIL WORKS AND TRANSMISSION LINE
TRANSMISSION LINE
PLAN AND PROFILE, STA. 4+800 TO 5+400

P&C MANAGEMENT CO.,LTD.

DESIGNED ภย.64624 สย.6226
DRAWN
CHECKED สย.6226
PROJECT MANAGER
DATE 08/03/2559

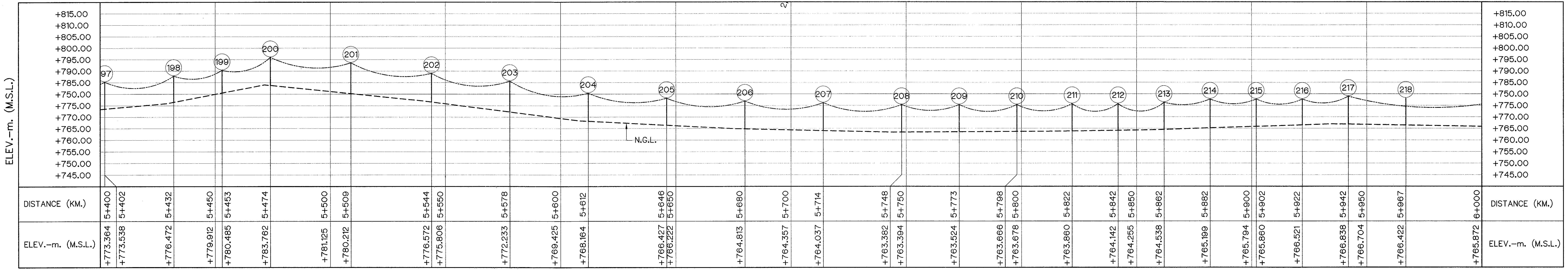
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY
REVIEWED
SUBMITTED Chanit
RECOMMENDED
APPROVED P. Hans

DRAWING NO. MH-TS-10
SHEET NO. 121 OF 130



## PLAN

SCALE 1:1,000



## TRANSMISSION LINE PROPERTIES

| POLE NO. | DISTANCE (M.) | ACCUMULATIVE DISTANCE (M.) | QUANTITY | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | POLE TYPE | | | | | GUY TYPE | | | | | |
| | | | A | B | C | D | E | G1 | G2 | G3 | G4 | G5 | G6 |
| 197 | 30 | 5,402 | | 1 | | | | | | | | | |
| 198 | 30 | 5,432 | | 1 | | | | | | | | | |
| 199 | 21 | 5,453 | | 1 | | | | | | | | | |
| 200 | 21 | 5,474 | | | | 1 | | 1 | | | | | |
| 201 | 35 | 5,509 | 1 | | | | | | | | | | |
| 202 | 35 | 5,544 | 1 | | | | | | | | | | |
| 203 | 34 | 5,578 | 1 | | | | | | | | | | |
| 204 | 34 | 5,612 | | 1 | | | | 1 | | | | | |
| 205 | 34 | 5,646 | 1 | | | | | | | | | | |
| 206 | 34 | 5,680 | 1 | | | | | | | | | | |
| 207 | 34 | 5,714 | 1 | | | | | | | | | | |
| 208 | 34 | 5,748 | | | 1 | | | | | | 1 | | |
| 209 | 25 | 5,773 | | 1 | | | | | | | | | |
| 210 | 25 | 5,798 | | 1 | | | | | | | | | |
| 211 | 24 | 5,822 | | | | 1 | | | | | | 1 | |
| 212 | 20 | 5,842 | | 1 | | | | | | | | | |
| 213 | 20 | 5,862 | | 1 | | | | 1 | | | | | |
| 214 | 20 | 5,882 | | 1 | | | | | | | | | |
| 215 | 20 | 5,902 | | 1 | | | | 1 | | | | | |
| 216 | 20 | 5,922 | | 1 | | | | | | | | | |
| 217 | 20 | 5,942 | | 1 | | | | | | | | | |
| 218 | 25 | 5,967 | | | 1 | | | | | | 1 | | |

## PROFILE

HORIZONTAL SCALE 1:1,000
VERTICAL SCALE 1:1,000

## REFERENCE DRAWINGS :-

| | |
|---|---|
| 1. TRANSMISSION LINE, PLAN AND PROFILE, STA. 4+800 TO STA. 5+400 | MH-TS-10 |
| 2. TRANSMISSION LINE, PLAN AND PROFILE, STA. 6+000 TO STA. 6+600 | MH-TS-12 |
| 3. TRANSMISSION LINE, POLE TYPE "A" AND "B" | MH-TS-16 |
| 4. TRANSMISSION LINE, POLE TYPE "C" AND "D" | MH-TS-17 |
| 5. TRANSMISSION LINE, POLE TYPE "E" | MH-TS-18 |
| 6. TRANSMISSION LINE, TYPE OF ANCHOR GUY | MH-TS-19 |

## NOTES:

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS, UNLESS OTHERWISE SHOWN
2. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH-GN-03

## LEGENDS :

| | | |
|---|---|---|
| 1. | ∿∿∿∿ | 22 kV. SPACE AERIAL CABLE |
| 2. | — — — | EXISTING 22 kV. PEA. OVERHEAD TRANSMISSION LINE |
| 3. | ■ | NEW 12M. CONCRETE POLE |
| 4. | □ | EXISTING 12M. CONCRETE POLE |
| 5. | RM 12M □ | REMOVE 12M. CONCRETE POLE |
| 6. | ⁄• | 3 - 100A. FUSE CUTOUT 33 kV. |
| 7. | → | GUY |
| 8. | ⊡ | LOAD BREAK SWITCH, SF6, 630A, 33KV. WITH AUTOMATIC REMOTE CONTORLLED |
| 9. | ⁄• | DISCONNECTING SWITCH 600A, 33KV. |

0 5 10 15 20 25 50 100
SCALE 1:1,000 METERS

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
|---|---|---|---|---|
| 3 | | | | |
| 2 | | | | |
| 1 | | | | |
| | CONSULTANTS | | DEDE | |

KINGDOM OF THAILAND
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

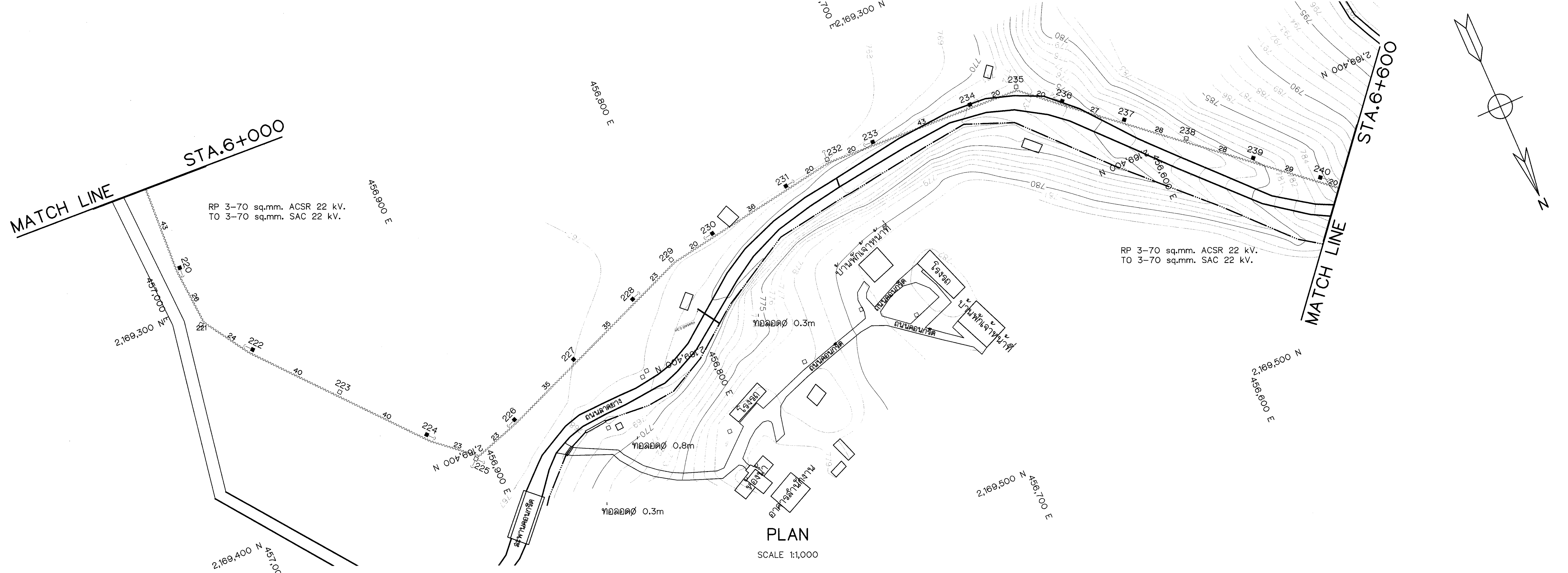
### MAE HAT HYDROPOWER PROJECT

### CIVIL WORKS AND TRANSMISSION LINE
### TRANSMISSION LINE
### PLAN AND PROFILE, STA. 5+400 TO 6+000

P&C MANAGEMENT CO.,LTD.

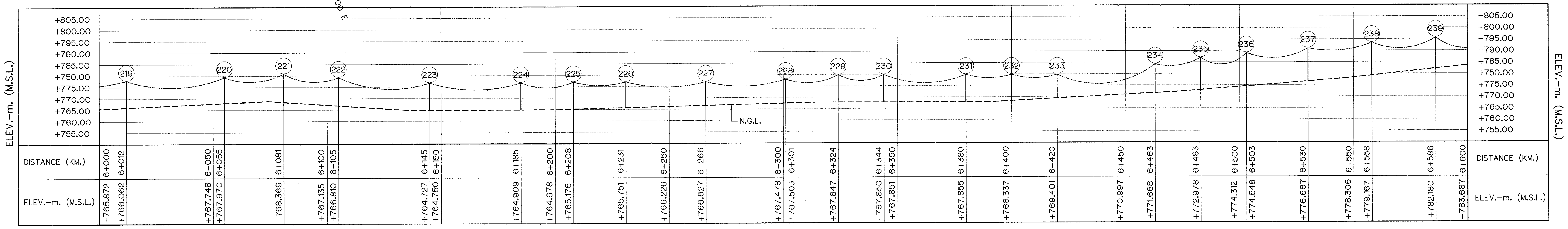
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

| | |
|---|---|
| DESIGNED ภย.64624 สย.6226 | REVIEWED |
| DRAWN | SUBMITTED |
| CHECKED สย.6226 | RECOMMENDED |
| PROJECT MANAGER — DATE 08/08/2559 | APPROVED P. Hounsell |
| DRAWING NO. MH-TS-11 | SHEET NO. 122 OF 130 |



## PLAN

SCALE 1:1,000



| DISTANCE (KM.) | ELEV.-m. (M.S.L.) |
|---|---|
| 6+000 | +765.872 |
| 6+012 | +766.062 |
| 6+050 | +767.748 |
| 6+055 | +767.970 |
| 6+081 | +768.369 |
| 6+100 | +767.135 |
| 6+105 | +766.810 |
| 6+145 | +764.727 |
| 6+150 | +764.750 |
| 6+185 | +764.909 |
| 6+200 | +764.978 |
| 6+208 | +765.175 |
| 6+231 | +765.751 |
| 6+250 | +766.226 |
| 6+266 | +766.627 |
| 6+300 | +767.478 |
| 6+301 | +767.503 |
| 6+324 | +767.847 |
| 6+344 | +767.850 |
| 6+350 | +767.851 |
| 6+380 | +767.855 |
| 6+400 | +768.337 |
| 6+420 | +769.401 |
| 6+450 | +770.997 |
| 6+463 | +771.688 |
| 6+483 | +772.978 |
| 6+500 | +774.312 |
| 6+503 | +774.548 |
| 6+530 | +776.667 |
| 6+550 | +778.306 |
| 6+558 | +779.167 |
| 6+586 | +782.180 |
| 6+600 | +783.687 |

## PROFILE

HORIZONTAL SCALE 1:1,000
VERTICAL SCALE 1:1,000

## TRANSMISSION LINE PROPERTIES

| POLE NO. | DISTANCE (M.) | ACCUMULATIVE DISTANCE (M.) | QUANTITY | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | POLE TYPE | | | | | GUY TYPE | | | | | |
| | | | A | B | C | D | E | G1 | G2 | G3 | G4 | G5 | G6 |
| 218 | 25 | 5,967 | | | 1 | | | | | | 1 | | |
| 219 | 45 | 6,012 | 1 | | | | | | | | | | |
| 220 | 43 | 6,055 | | | 1 | | | | | | 1 | | |
| 221 | 26 | 6,081 | | 1 | | | | | | | | | |
| 222 | 24 | 6,105 | | | 1 | | | | | | 1 | | |
| 223 | 40 | 6,145 | 1 | | | | | | | | | | |
| 224 | 40 | 6,185 | | | 1 | | | | | | 1 | | |
| 225 | 23 | 6,208 | | | | 1 | | | | | | 1 | |
| 226 | 23 | 6,231 | | | 1 | | | | | | 1 | | |
| 227 | 35 | 6,266 | 1 | | | | | | | | | | |
| 228 | 35 | 6,301 | | | 1 | | | | | | 1 | | |
| 229 | 23 | 6,324 | | 1 | | | | 1 | | | | | |
| 230 | 20 | 6,344 | | | 1 | | | | | | 1 | | |
| 231 | 36 | 6,380 | | | 1 | | | | | | 1 | | |
| 232 | 20 | 6,400 | | 1 | | | | 1 | | | | | |
| 233 | 20 | 6,420 | | | 1 | | | | | | 1 | | |
| 234 | 43 | 6,463 | | | 1 | | | | | | 1 | | |
| 235 | 20 | 6,483 | | 1 | | | | 1 | | | | | |
| 236 | 20 | 6,503 | | | 1 | | | | | | 1 | | |
| 237 | 27 | 6,530 | 1 | | | | | | | | | | |
| 238 | 28 | 6,558 | 1 | | | | | | | | | | |
| 239 | 28 | 6,586 | 1 | | | | | | | | | | |

## NOTES:

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS, UNLESS OTHERWISE SHOWN
2. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH-GN-03

## LEGENDS :

| | | |
|---|---|---|
| 1. | ∿∿∿∿ | 22 kV. SPACE AERIAL CABLE |
| 2. | — — — — | EXISTING 22 kV. PEA. OVERHEAD TRANSMISSION LINE |
| 3. | ■ | NEW 12M. CONCRETE POLE |
| 4. | □ | EXISTING 12M. CONCRETE POLE |
| 5. | RM 12M □ | REMOVE 12M. CONCRETE POLE |
| 6. | ⁄ | 3 - 100A. FUSE CUTOUT 33 kV. |
| 7. | —) | GUY |
| 8. | ⊡ | LOAD BREAK SWITCH, SF6, 630A, 33KV. WITH AUTOMATIC REMOTE CONTORLLED |
| 9. | ⁄ | DISCONNECTING SWITCH 600A, 33KV. |

## REFERENCE DRAWINGS :-

| | |
|---|---|
| 1. TRANSMISSION LINE, PLAN AND PROFILE, STA. 5+400 TO STA. 6+000 | MH-TS-11 |
| 2. TRANSMISSION LINE, PLAN AND PROFILE, STA. 6+600 TO STA. 7+200 | MH-TS-13 |
| 3. TRANSMISSION LINE, POLE TYPE "A" AND "B" | MH-TS-16 |
| 4. TRANSMISSION LINE, POLE TYPE "C" AND "D" | MH-TS-17 |
| 5. TRANSMISSION LINE, POLE TYPE "E" | MH-TS-18 |
| 6. TRANSMISSION LINE, TYPE OF ANCHOR GUY | MH-TS-19 |

0 5 10 15 20 25 50 100
SCALE 1:1,000 METERS

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
|---|---|---|---|---|
| 3 | | | | |
| 2 | | | | |
| 1 | | | | |
| | CONSULTANTS | | DEDE | |

KINGDOM OF THAILAND
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

# MAE HAT HYDROPOWER PROJECT

## CIVIL WORKS AND TRANSMISSION LINE
## TRANSMISSION LINE
## PLAN AND PROFILE, STA. 6+000 TO 6+600

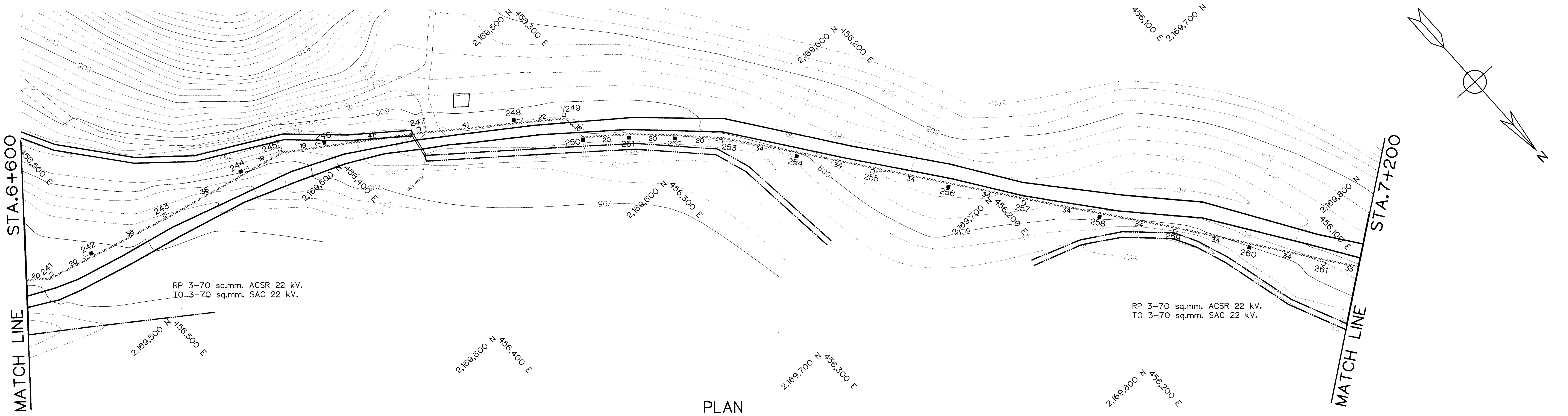
P&C MANAGEMENT CO.,LTD.

DESIGNED ภย.64624 ลย.6226
DRAWN
CHECKED ลย.6226
PROJECT MANAGER
DATE 08/03/2559

Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

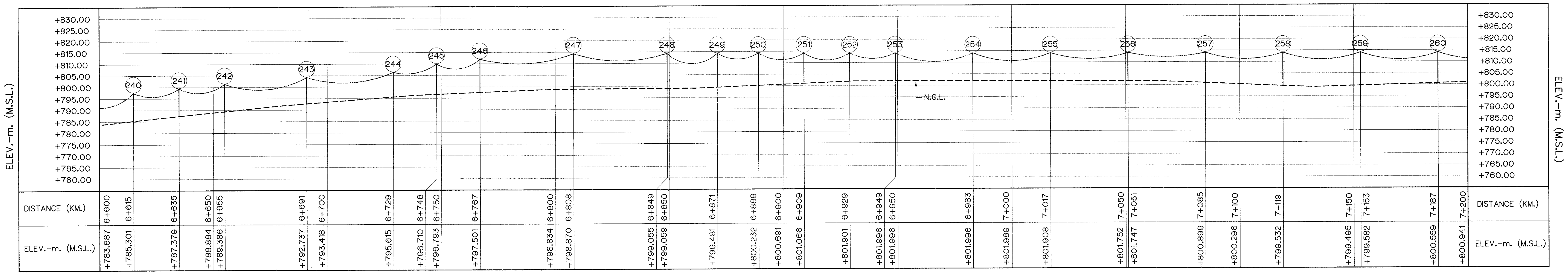
REVIEWED
SUBMITTED Chanit
RECOMMENDED
APPROVED P. Hansell

DRAWING NO. MH-TS-12
SHEET NO. 123 OF 130



## PLAN

SCALE 1:1,000



| DISTANCE (KM.) | ELEV.-m. (M.S.L.) |
|---|---|
| 6+600 | +783.687 |
| 6+615 | +785.301 |
| 6+635 | +787.379 |
| 6+650 | +788.884 |
| 6+655 | +789.386 |
| 6+691 | +792.737 |
| 6+700 | +793.418 |
| 6+729 | +795.615 |
| 6+748 | +796.710 |
| 6+750 | +796.793 |
| 6+767 | +797.501 |
| 6+800 | +798.834 |
| 6+808 | +798.870 |
| 6+849 | +799.055 |
| 6+850 | +799.059 |
| 6+871 | +799.481 |
| 6+889 | +800.232 |
| 6+900 | +800.691 |
| 6+909 | +801.066 |
| 6+929 | +801.901 |
| 6+949 | +801.996 |
| 6+950 | +801.996 |
| 6+983 | +801.996 |
| 7+000 | +801.989 |
| 7+017 | +801.908 |
| 7+050 | +801.752 |
| 7+051 | +801.747 |
| 7+085 | +800.899 |
| 7+100 | +800.296 |
| 7+119 | +799.532 |
| 7+150 | +799.495 |
| 7+153 | +799.582 |
| 7+187 | +800.559 |
| 7+200 | +800.941 |

## PROFILE

HORIZONTAL SCALE 1:1,000
VERTICAL SCALE 1:1,000

## TRANSMISSION LINE PROPERTIES

| POLE NO. | DISTANCE (M.) | ACCUMULATIVE DISTANCE (M.) | QUANTITY | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | POLE TYPE | | | | | GUY TYPE | | | | | |
| | | | A | B | C | D | E | G1 | G2 | G3 | G4 | G5 | G6 |
| 239 | 28 | 6,586 | 1 | | | | | | | | | | |
| 240 | 29 | 6,615 | | | 1 | | | | | | 1 | | |
| 241 | 20 | 6,635 | | 1 | | | | | | | | | |
| 242 | 20 | 6,655 | | | 1 | | | | | | 1 | | |
| 243 | 36 | 6,691 | 1 | | | | | | | | | | |
| 244 | 38 | 6,729 | | | 1 | | | | | | 1 | | |
| 245 | 19 | 6,748 | | 1 | | | | 1 | | | | | |
| 246 | 19 | 6,767 | | | 1 | | | | | | 1 | | |
| 247 | 41 | 6,808 | 1 | | | | | | | | | | |
| 248 | 41 | 6,849 | | | 1 | | | | | | 1 | | |
| 249 | 22 | 6,871 | | | | 1 | | 1 | | | | | |
| 250 | 18 | 6,889 | | | | 1 | | 1 | | | | | |
| 251 | 20 | 6,909 | | 1 | | | | | | | | | |
| 252 | 20 | 6,929 | | 1 | | | | | | | | | |
| 253 | 20 | 6,949 | | | 1 | | | | | | 1 | | |
| 254 | 34 | 6,983 | 1 | | | | | | | | | | |
| 255 | 34 | 7,017 | 1 | | | | | | | | | | |
| 256 | 34 | 7,051 | 1 | | | | | | | | | | |
| 257 | 34 | 7,085 | 1 | | | | | | | | | | |
| 258 | 34 | 7,119 | 1 | | | | | | | | | | |
| 259 | 34 | 7,153 | 1 | | | | | | | | | | |
| 260 | 34 | 7,187 | 1 | | | | | | | | | | |

## REFERENCE DRAWINGS :-

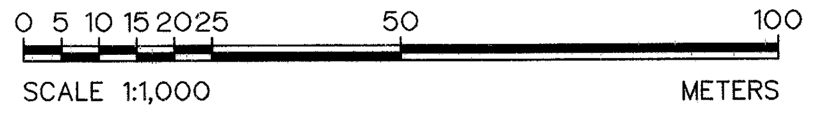
| | |
|---|---|
| 1. TRANSMISSION LINE, PLAN AND PROFILE, STA. 6+000 TO STA. 6+600 | MH-TS-12 |
| 2. TRANSMISSION LINE, PLAN AND PROFILE, STA. 7+200 TO STA. 7+800 | MH-TS-14 |
| 3. TRANSMISSION LINE, POLE TYPE "A" AND "B" | MH-TS-16 |
| 4. TRANSMISSION LINE, POLE TYPE "C" AND "D" | MH-TS-17 |
| 5. TRANSMISSION LINE, POLE TYPE "E" | MH-TS-18 |
| 6. TRANSMISSION LINE, TYPE OF ANCHOR GUY | MH-TS-19 |

## NOTES:

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS, UNLESS OTHERWISE SHOWN
2. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH-GN-03

## LEGENDS :

| | | |
|---|---|---|
| 1. | ∿∿∿∿ | 22 kV. SPACE AERIAL CABLE |
| 2. | —— – – —— | EXISTING 22 kV. PEA. OVERHEAD TRANSMISSION LINE |
| 3. | ■ | NEW 12M. CONCRETE POLE |
| 4. | □ | EXISTING 12M. CONCRETE POLE |
| 5. | RM 12M<br>□ | REMOVE 12M. CONCRETE POLE |
| 6. | ─╱─ | 3 - 100A. FUSE CUTOUT 33 kV. |
| 7. | ─) | GUY |
| 8. | ─[R]─ | LOAD BREAK SWITCH, SF6, 630A, 33KV. WITH AUTOMATIC REMOTE CONTORLLED |
| 9. | ─╱─ | DISCONNECTING SWITCH 600A, 33KV. |



| NO. | DATE | REVISIONS | CHECKED | APPROVED |
|---|---|---|---|---|
| 3 | | | | |
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| 1 | | | | |

CONSULTANTS | DEDE

KINGDOM OF THAILAND
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
TRANSMISSION LINE
PLAN AND PROFILE, STA. 6+600 TO 7+200

P&C MANAGEMENT CO.,LTD.

Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

| | | |
|---|---|---|
| DESIGNED | ภย.64624 | สย.6226 |
| DRAWN | | |
| CHECKED | | สย.6226 |

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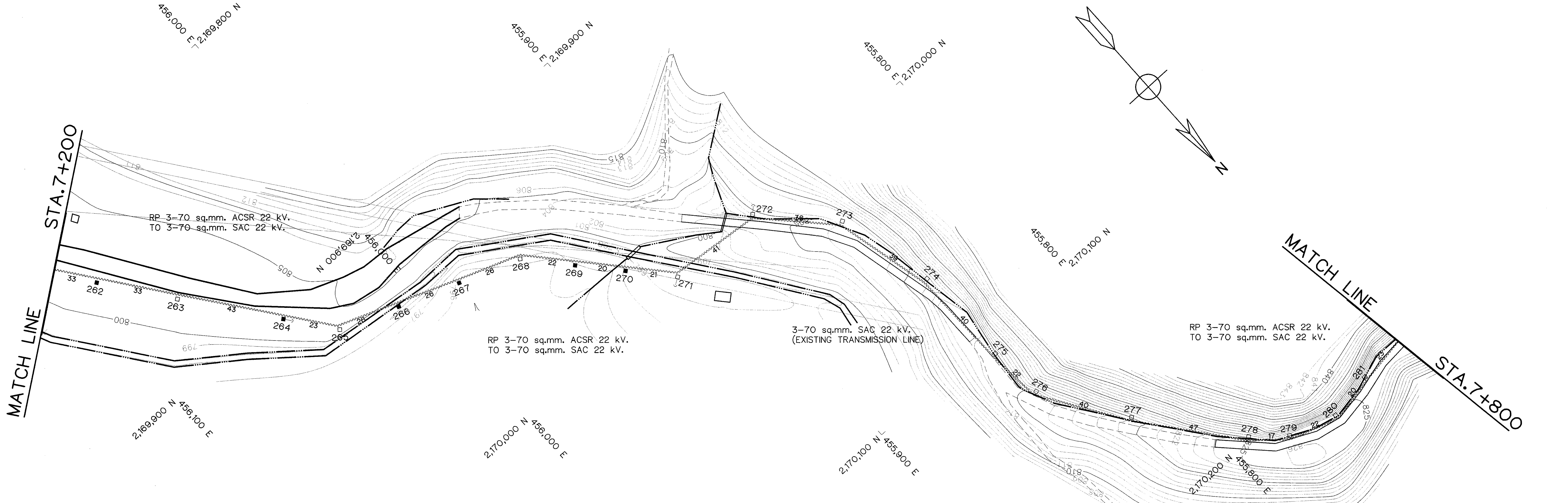
| REVIEWED | |
| SUBMITTED | Chanit |
| RECOMMENDED | |
| APPROVED | P. Hansell |

PROJECT MANAGER | DATE 08|03|2559

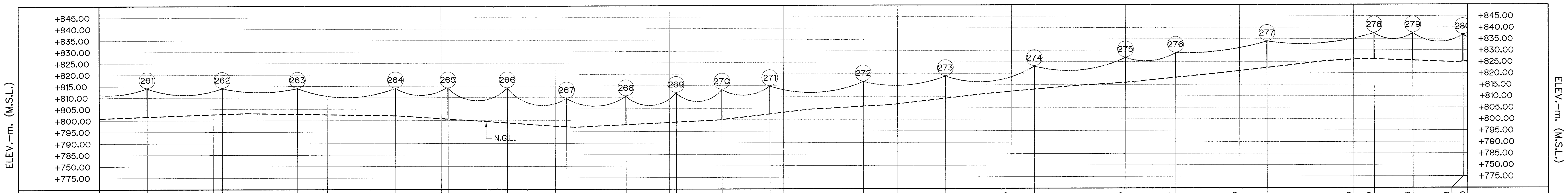
DRAWING NO. MH-TS-13

SHEET NO. 124 OF 130



## PLAN

SCALE 1:1,000



| DISTANCE (KM.) | 7+200 | 7+221 | 7+250 | 7+254 | 7+287 | 7+300 | 7+330 | 7+350 |
|---|---|---|---|---|---|---|---|---|
| ELEV.-m. (M.S.L.) | +800.941 | +801.662 | +802.657 | +802.794 | +802.784 | +802.564 | +802.057 | +800.788 |

| DISTANCE (KM.) | 7+353 | 7+379 | 7+400 | 7+405 | 7+431 | 7+450 | 7+453 | 7+473 |
|---|---|---|---|---|---|---|---|---|
| ELEV.-m. (M.S.L.) | +800.591 | +798.886 | +797.508 | +797.180 | +798.021 | +798.923 | +799.065 | +800.120 |

| DISTANCE (KM.) | 7+494 | 7+500 | 7+535 | 7+550 | 7+571 | 7+600 | 7+610 | 7+650 |
|---|---|---|---|---|---|---|---|---|
| ELEV.-m. (M.S.L.) | +802.548 | +803.242 | +805.827 | +806.815 | +809.214 | +812.196 | +813.060 | +815.994 |

| DISTANCE (KM.) | 7+672 | 7+700 | 7+712 | 7+750 | 7+759 | 7+776 | 7+798 | 7+800 |
|---|---|---|---|---|---|---|---|---|
| ELEV.-m. (M.S.L.) | +818.135 | +821.042 | +822.403 | +825.994 | +826.100 | +825.545 | +825.008 | +825.103 |

## PROFILE

HORIZONTAL SCALE 1:1,000
VERTICAL SCALE 1:1,000

### TRANSMISSION LINE PROPERTIES

| POLE NO. | DISTANCE | ACCUMULATIVE DISTANCE | QUANTITY | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | POLE TYPE | | | | | GUY TYPE | | | | | |
| | (M.) | (M.) | A | B | C | D | E | G1 | G2 | G3 | G4 | G5 | G6 |
| 260 | 34 | 7,187 | 1 | | | | | | | | | | |
| 261 | 34 | 7,221 | 1 | | | | | | | | | | |
| 262 | 33 | 7,254 | 1 | | | | | | | | | | |
| 263 | 33 | 7,287 | 1 | | | | | | | | | | |
| 264 | 43 | 7,330 | | | 1 | | | | | | 1 | | |
| 265 | 23 | 7,353 | | 1 | | | | | | | | | |
| 266 | 26 | 7,379 | | 1 | | | | | | | | | |
| 267 | 26 | 7,405 | | 1 | | | | | | | | | |
| 268 | 26 | 7,431 | | 1 | | | | | | | | | |
| 269 | 22 | 7,453 | | 1 | | | | | | | | | |
| 270 | 20 | 7,473 | | 1 | | | | | | | | | |
| 271 | 21 | 7,494 | 3 - 70 sq.mm. SAC 22KV. EXISTING TRANSMISSION LINE | | | | | | | | | | |
| 272 | 41 | 7,535 | | | | | | | | | | | |
| 273 | 36 | 7,571 | | | | | | | | | | | |
| 274 | 39 | 7,610 | | | | | | | | | | | |
| 275 | 40 | 7,650 | | | | | | | | | | | |
| 276 | 22 | 7,672 | | | | | | | | | | | |
| 277 | 40 | 7,712 | | | | | | | | | | | |
| 278 | 47 | 7,759 | | | | | | | | | | | |
| 279 | 17 | 7,776 | | | | | | | | | | | |
| 280 | 22 | 7,798 | | | | | | | | | | | |

### NOTES:

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS, UNLESS OTHERWISE SHOWN
2. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH-GN-03

### LEGENDS :

| | | |
|---|---|---|
| 1. | ∿∿∿∿ | 22 kV. SPACE AERIAL CABLE |
| 2. | — — — | EXISTING 22 kV. PEA. OVERHEAD TRANSMISSION LINE |
| 3. | ■ | NEW 12M. CONCRETE POLE |
| 4. | □ | EXISTING 12M. CONCRETE POLE |
| 5. | RM 12M □ | REMOVE 12M. CONCRETE POLE |
| 6. | ⌿ | 3 - 100A. FUSE CUTOUT 33 kV. |
| 7. | → | GUY |
| 8. | ⊞ | LOAD BREAK SWITCH, SF6, 630A, 33KV. WITH AUTOMATIC REMOTE CONTORLLED |
| 9. | ⌿ | DISCONNECTING SWITCH 600A, 33KV. |

### REFERENCE DRAWINGS :–

| | |
|---|---|
| 1. TRANSMISSION LINE, PLAN AND PROFILE, STA. 6+600 TO STA. 7+200 | MH-TS-13 |
| 2. TRANSMISSION LINE, PLAN AND PROFILE, STA. 7+800 TO STA. 8+086 | MH-TS-15 |
| 3. TRANSMISSION LINE, POLE TYPE "A" AND "B" | MH-TS-16 |
| 4. TRANSMISSION LINE, POLE TYPE "C" AND "D" | MH-TS-17 |
| 5. TRANSMISSION LINE, POLE TYPE "E" | MH-TS-18 |
| 6. TRANSMISSION LINE, TYPE OF ANCHOR GUY | MH-TS-19 |

0 5 10 15 20 25 50 100
SCALE 1:1,000 METERS

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
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| | CONSULTANTS | | DEDE | |

KINGDOM OF THAILAND
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
TRANSMISSION LINE
PLAN AND PROFILE, STA. 7+200 TO 7+800

| | |
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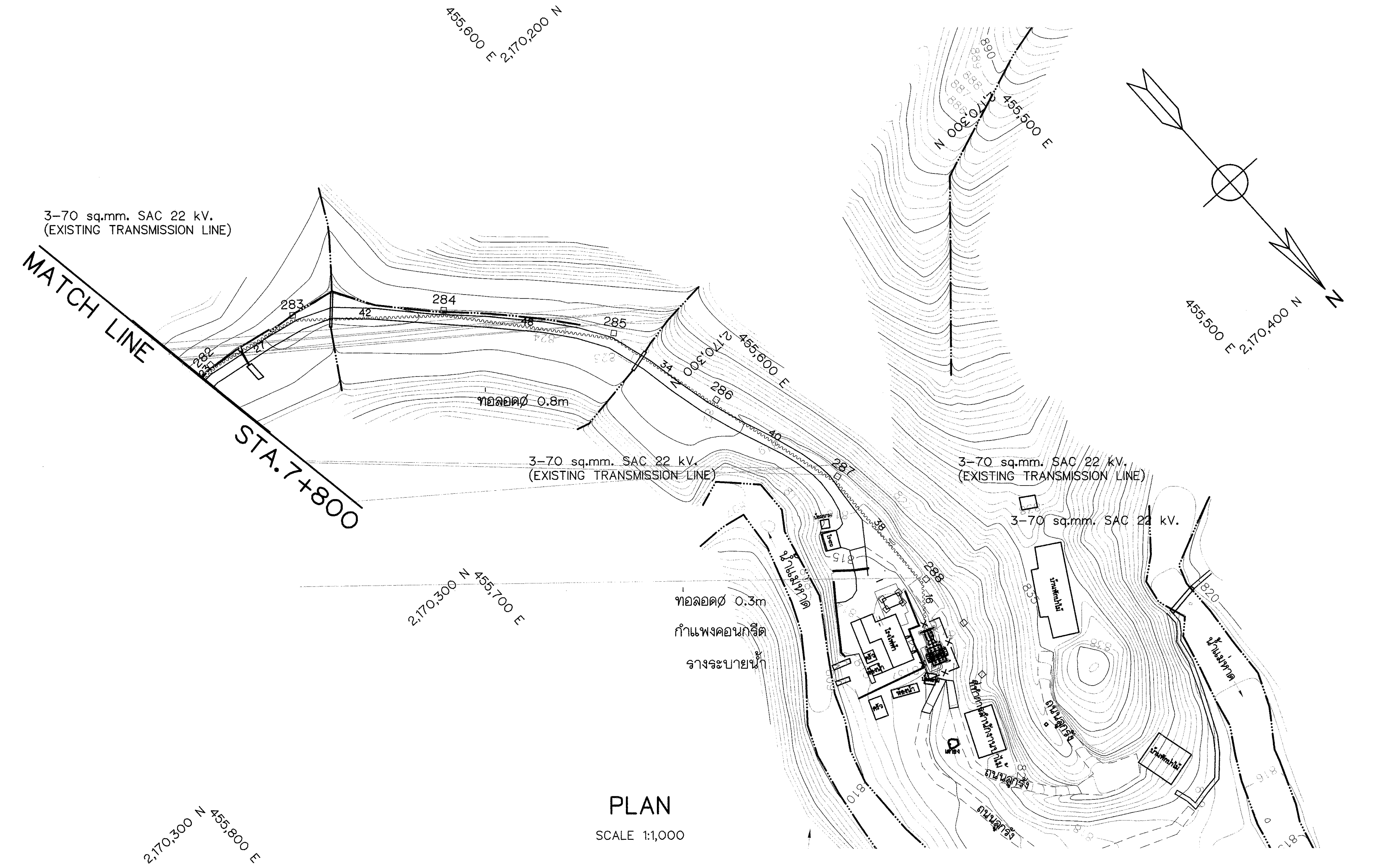
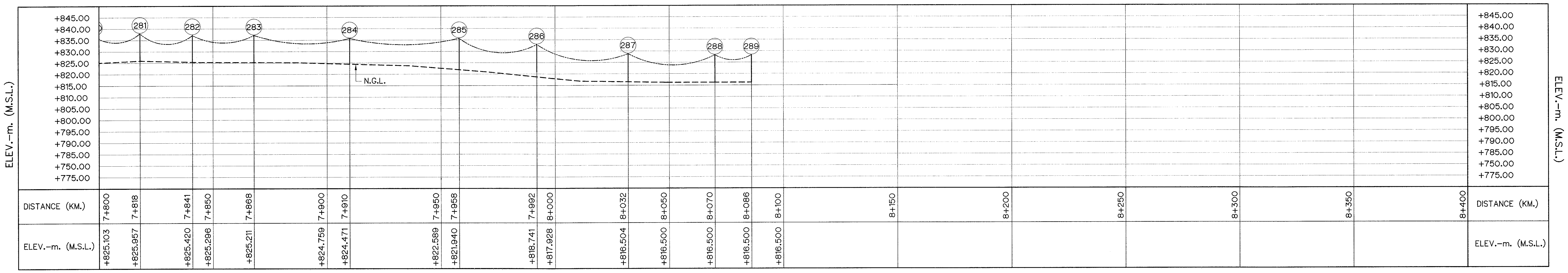
| P&C MANAGEMENT CO.,LTD. | Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY |
| DESIGNED ภย.64624 สย.6226 | REVIEWED |
| DRAWN | SUBMITTED Chanit |
| CHECKED สย.6226 | RECOMMENDED |
| PROJECT MANAGER 08/03/2559 DATE | APPROVED P. Hanwa |
| | DRAWING NO. MH-TS-14 |
| | SHEET NO. 125 OF 130 |



## PLAN

SCALE 1:1,000



## PROFILE

HORIZONTAL SCALE 1:1,000
VERTICAL SCALE 1:1,000

## REFERENCE DRAWINGS :-

| | |
|---|---|
| 1. TRANSMISSION LINE, PLAN AND PROFILE, STA. 7+200 TO STA. 7+800 | MH-TS-14 |
| 2. TRANSMISSION LINE, POLE TYPE "A" AND "B" | MH-TS-16 |
| 3. TRANSMISSION LINE, POLE TYPE "C" AND "D" | MH-TS-17 |
| 4. TRANSMISSION LINE, POLE TYPE "E" | MH-TS-18 |
| 5. TRANSMISSION LINE, TYPE OF ANCHOR GUY | MH-TS-19 |

## TRANSMISSION LINE PROPERTIES

| POLE NO. | DISTANCE (M.) | ACCUMULATIVE DISTANCE (M.) | QUANTITY | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | POLE TYPE | | | | | GUY TYPE | | | | | |
| | | | A | B | C | D | E | G1 | G2 | G3 | G4 | G5 | G6 |
| 280 | 22 | 7,798 | 3 - 70 sq.mm. SAC 22KV. EXISTING TRANSMISSION LINE | | | | | | | | | | |
| 281 | 20 | 7,818 | | | | | | | | | | | |
| 282 | 23 | 7,841 | | | | | | | | | | | |
| 283 | 27 | 7,868 | | | | | | | | | | | |
| 284 | 42 | 7,910 | | | | | | | | | | | |
| 285 | 48 | 7,958 | | | | | | | | | | | |
| 286 | 34 | 7,992 | | | | | | | | | | | |
| 287 | 40 | 8,032 | | | | | | | | | | | |
| 288 | 38 | 8,070 | | | | | | | | | | | |
| TEAK OFF STRUCTURE | 16 | 8,086 | | | | | | | | | | | |
| TOTAL | | 8,086 | 0 | 6 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| GRAND TOTAL CABLE REPLACE | | 7,489 | 35 | 82 | 40 | 0 | 0 | 17 | 0 | 0 | 41 | 4 | 0 |

## NOTES:

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS, UNLESS OTHERWISE SHOWN
2. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. MH-GN-03

## LEGENDS :

| | | |
|---|---|---|
| 1. | ∿∿∿∿ | 22 kV. SPACE AERIAL CABLE |
| 2. | — — — — | EXISTING 22 kV. PEA. OVERHEAD TRANSMISSION LINE |
| 3. | ■ | NEW 12M. CONCRETE POLE |
| 4. | □ | EXISTING 12M. CONCRETE POLE |
| 5. | RM 12M □ | REMOVE 12M. CONCRETE POLE |
| 6. | -⁄•- | 3 - 100A. FUSE CUTOUT 33 kV. |
| 7. | —) | GUY |
| 8. | -[R]- | LOAD BREAK SWITCH, SF6, 630A, 33KV. WITH AUTOMATIC REMOTE CONTORLLED |
| 9. | -⁄- | DISCONNECTING SWITCH 600A, 33KV. |

0 5 10 15 20 25 50 100
SCALE 1:1,000 METERS

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
|---|---|---|---|---|
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| 2 | | | | |
| 1 | | | | |
| | CONSULTANTS | | DEDE | |

KINGDOM OF THAILAND
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
TRANSMISSION LINE
PLAN AND PROFILE, STA. 7+800 TO 8+086

P&C MANAGEMENT CO.,LTD.

Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

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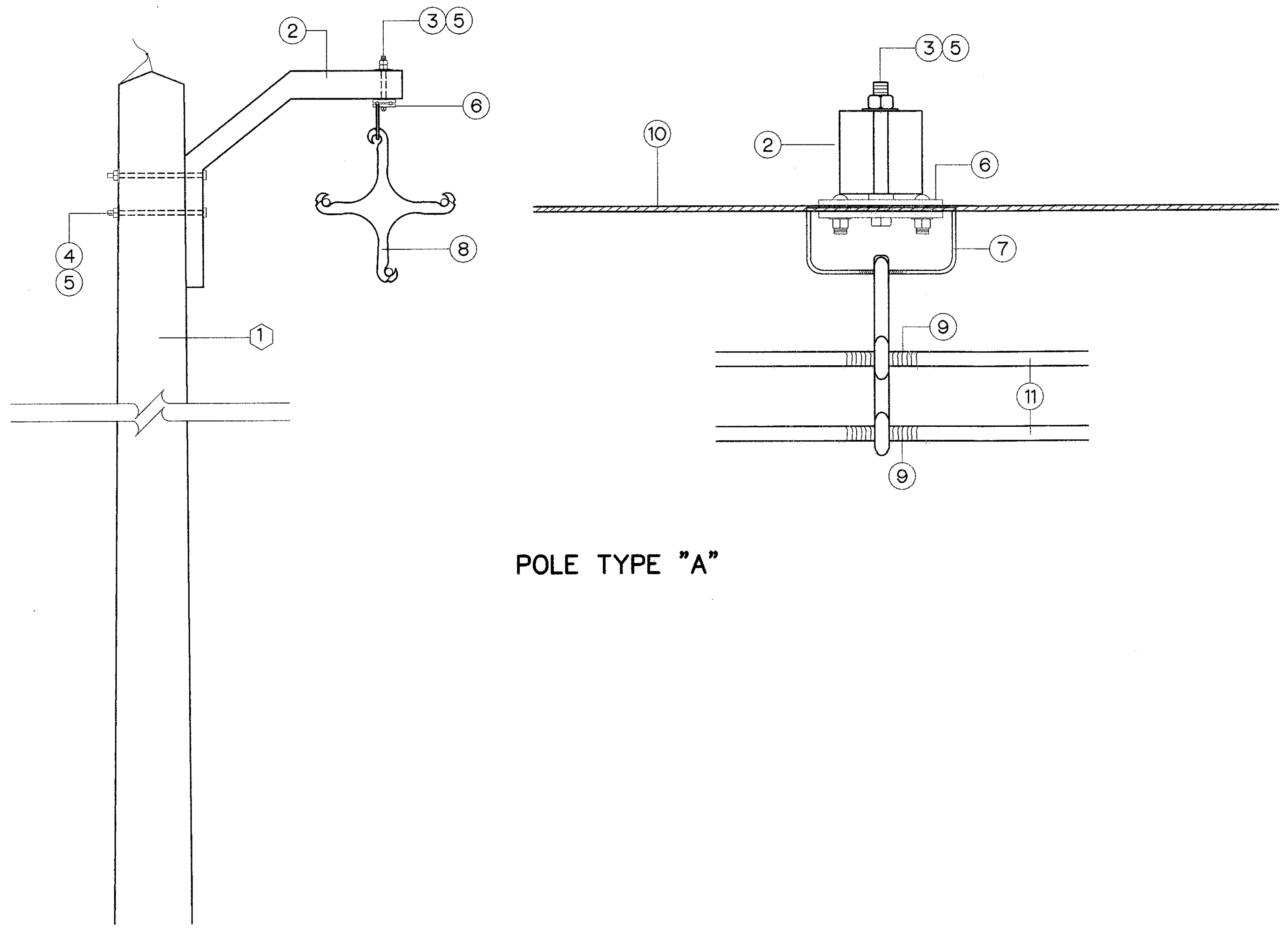
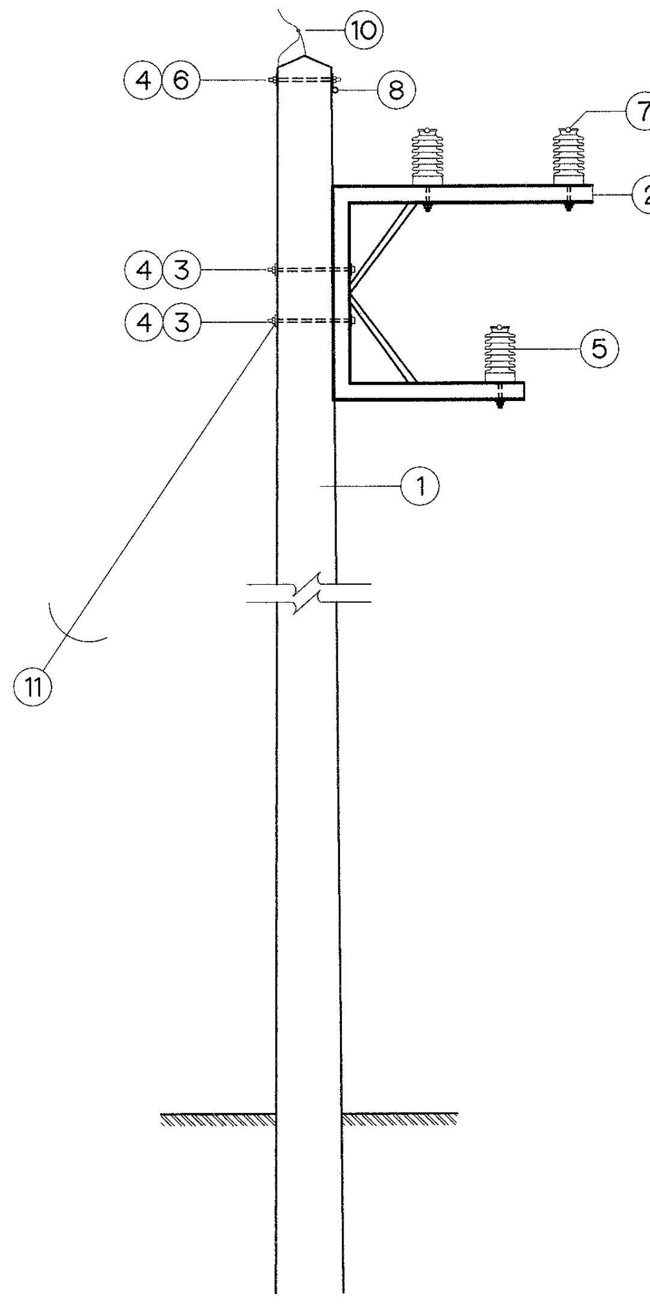
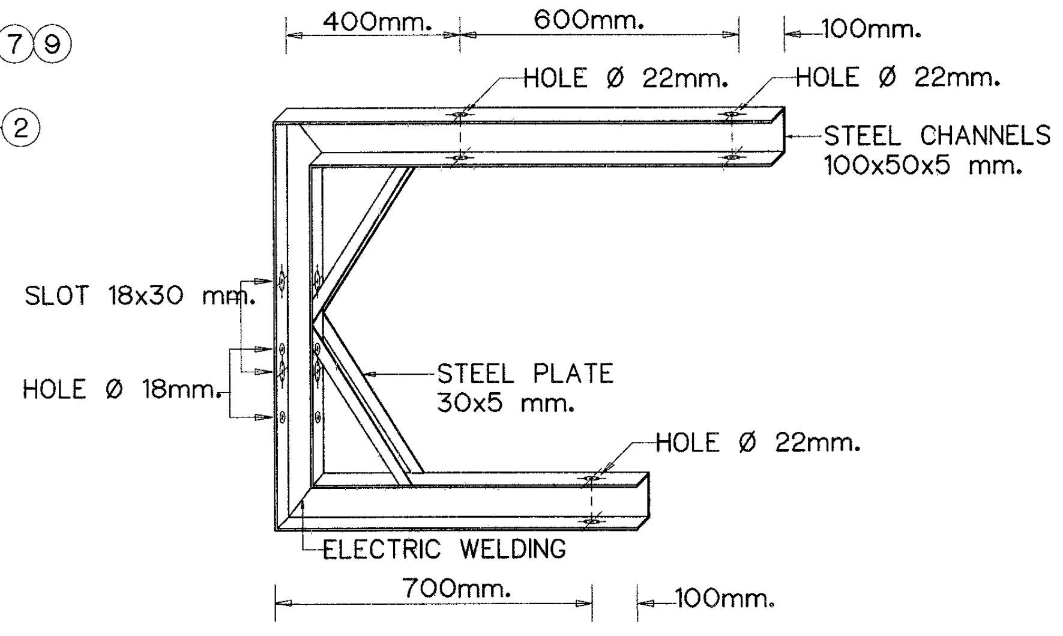
| CHECKED สย.6226 | RECOMMENDED |
| PROJECT MANAGER 08/03/2559 DATE | APPROVED P.Hom |

DRAWING NO. MH-TS-15
SHEET NO. 126 OF 130

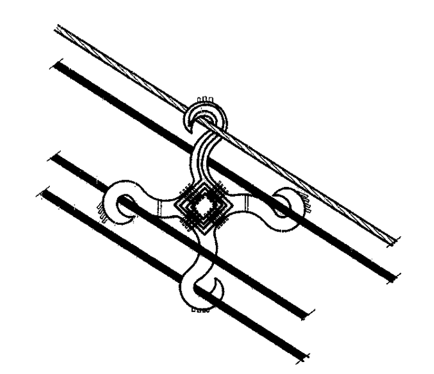


POLE TYPE "A"





POLE TYPE "B"



CABLE SPACER INSTALLATION PVC

BILL OF MATERIAL POLE TYPE "B"

| ITEM | DESCRIPTION |
|---|---|
| 1 | POLE CONCRETE 12 M. LONG |
| 2 | BRACKET AERIAL CABLE FOR CORNER TYPE |
| 3 | BOLT MACHINE M16x350 mm. |
| 4 | WASHER SQUARE FLAT 52x52x4.5 mm. HOLE Dia. 18 mm. TIS 258 |
| 5 | INSULATOR LINE POST TYPE ANSI C 29.7 CLASS 57-2L |
| 6 | GROUND WIRE SUPPORT AND CLAMP FOR CONCRETE POLE |
| 7 | AERIAL CABLE 70 sq.mm. 25 kV. |
| 8 | GROUND WIRE SUPPORT AND STEEL STRANDED 50/7 DIN 48201 |
| 9 | TIE WIRE 4.0 sq.mm. |
| 10 | CLAMP SINGLE U-BOLT M8 |
| 11 | GUY (STEEL STARNDARD WIRE 95 Sq.mm.) |

BILL OF MATERIAL POLE TYPE "A"

| ITEM | DESCRIPTION |
|---|---|
| 1 | POLE CONCRETE 12 M. LONG |
| 2 | BRACKET AERIAL CABLE FOR STRAIGHT TYPE |
| 3 | BOLT MACHINE M16x170 mm. |
| 4 | BOLT MACHINE M16x250 mm. |
| 5 | WASHER SQUARE FLAT 52x52x4.5 mm. HOLE Dia.18 mm. TIS 258 |
| 6 | CLAMP GUY TRIPLE BOLT |
| 7 | LINK CABLE SPACER ( MADE OF GALV. STEEL Dia. 9 mm. ) |
| 8 | CABLE SPEACER 22 KV. |
| 9 | TIE WIRE 4.0 sq.mm. |
| 10 | WIRE STEEL STRANDED 50/7 DIN 48201 |
| 11 | AERIAL CABLE 70 sq.mm. 25 KV. |

NOTES :

1. THIS DRAWING IS DESIGNED FOR GUIDE LINE ONLY, THE CONSTRUCTION DRAWING SHALL CONFORM TO PEA'S STANDARD AND REGULATIONS.

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
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CONSULTANTS
DEDE

KINGDOM OF THAILAND
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

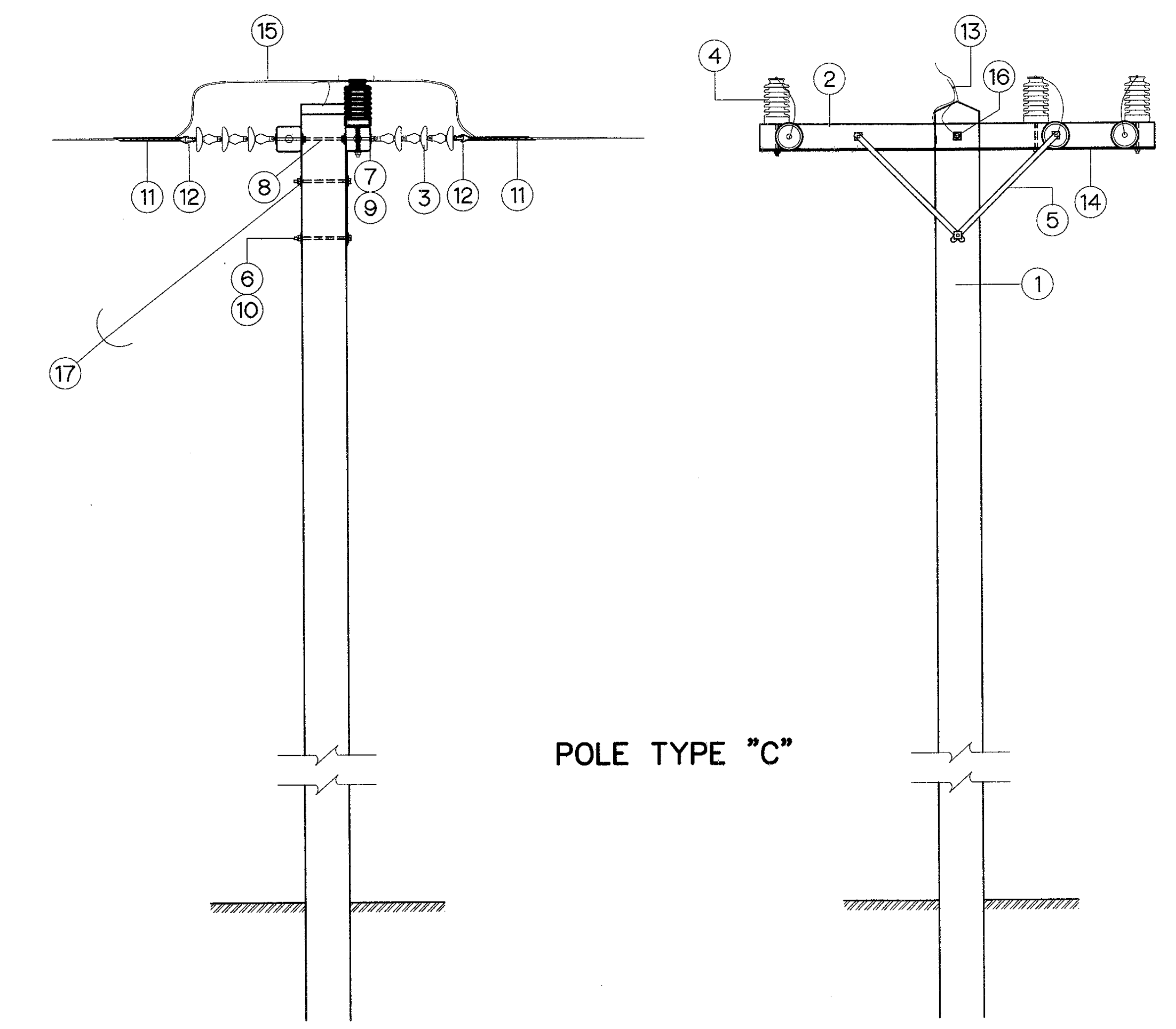
MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
TRANSMISSION LINE
POLE TYPE "A" AND "B"

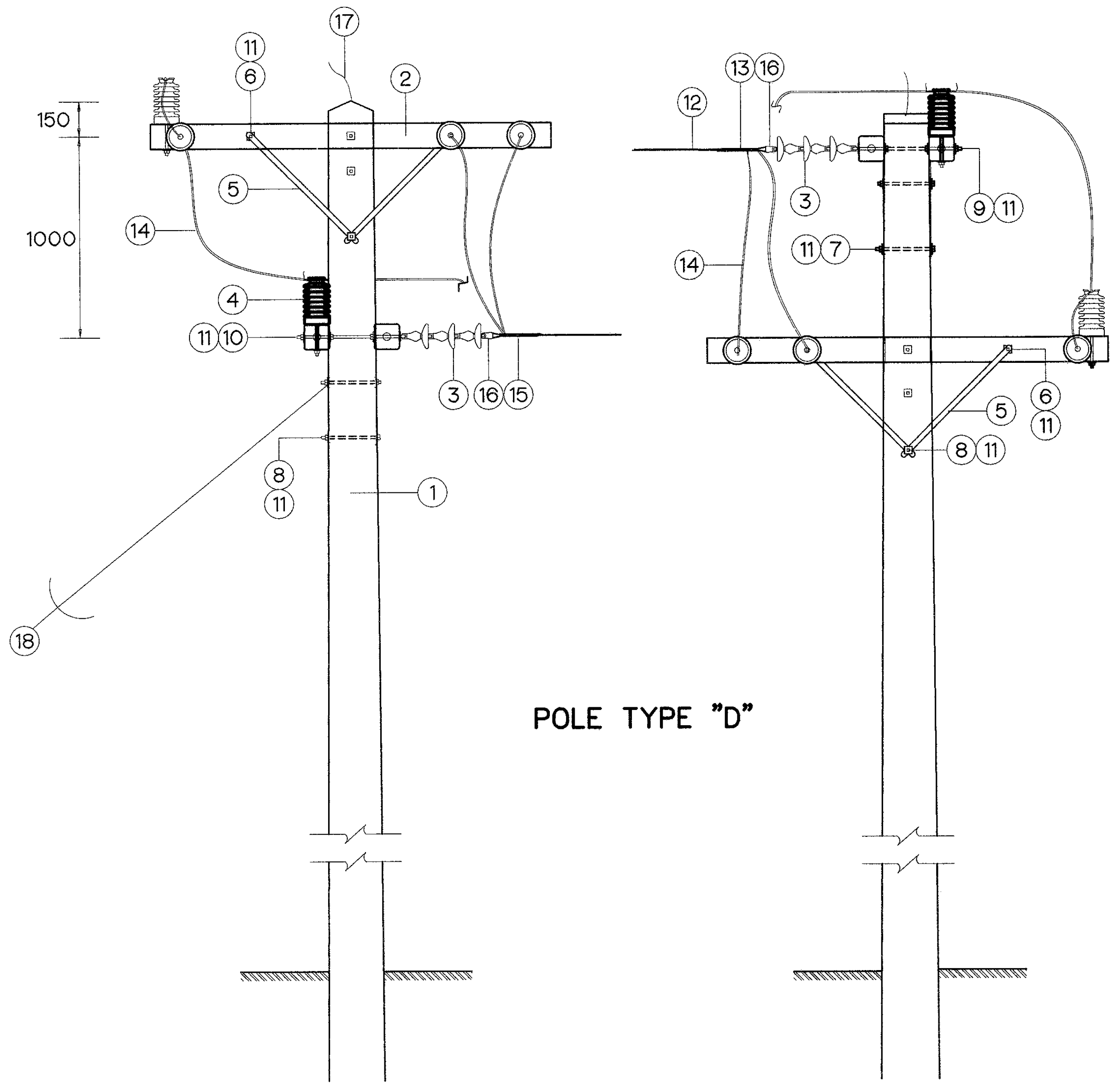
P&C MANAGEMENT CO.,LTD.

Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

REVIEWED
DESIGNED วฟก.604
SUBMITTED Chaint
DRAWN
RECOMMENDED
CHECKED วฟก.604
APPROVED P. Hansell.
PROJECT MANAGER
DATE 08/03/2559
DRAWING NO. MH-TS-16
SHEET NO. 127 OF 130



POLE TYPE "C"



POLE TYPE "D"

| BILL OF MATERIAL POLE TYPE "C" | |
|---|---|
| ITEM | DESCRIPTION |
| 1 | POLE CONCRETE 12.0 M. LONG |
| 2 | CROSSARM,SPUN PRESTERSSED CONCRETE,120X120X2,000mm. |
| 3 | INSULATOR,SUSPENSION TYPE,TIS 354, TYPE A (CLASS 52-1) |
| 4 | INSULATOR,LINE POST TYPE,ANSI C 29.7 CLASS 57-2L |
| 5 | BRACE,FLAT,FOR CROSSARM,30X6X760mm. |
| 6 | BOLT,MACHINE, M16X170mm. |
| 7 | BOLT,MACHINE, M16X200mm. |
| 8 | BOLT,DOUBLE ARMING,ROUND EYE, M16X450mm. |
| 9 | NUT, EYE, M16, DIN 582 |
| 10 | WASHER,SQUARE,FLAT,52X52X4.5mm.HOLE Dia.18mm.TIS 258 |
| 11 | PREFORMED DEAD-END FOR AERIAL CABLE 70sq.mm. |
| 12 | CLEVIS,THIMBLE,FOR PREFORM DEAD-END |
| 13 | CLAMP,SINGLE U-BOLT,M8 |
| 14 | WIRE STEEL SOLID Dia.4mm. |
| 15 | AERIAL CABLE 70sq.mm. 25kV. |
| 16 | WIRE STEEL STRANDED 50/7 DIN 48201 |
| 17 | GUY (STEEL STARNDARD WIRE 95 Sq.mm.) |

| BILL OF MATERIAL POLE TYPE "D" | |
|---|---|
| ITEM | DESCRIPTION |
| 1 | POLE CONCRETE 12 M. LONG |
| 2 | CROSSARM SPUN PRESTERSSED CONCRETE 120x120x2,000 mm. |
| 3 | INSULATOR SUSPENSION TYPE TIS 354 TYPE A (CLASS 52-1) |
| 4 | INSULATOR LINE POST TYPE ANSI C 29.7 CLASS 57-2L |
| 5 | BRACE FLAT FOR CROSSARM 30x6x760 mm. |
| 6 | BOLT MACHINE M16x170 mm. |
| 7 | BOLT MACHINE M16x200 mm. |
| 8 | BOLT MACHINE M16x250 mm. |
| 9 | BOLT DOUBLE ARMING ROUND EYE M16x450 mm. |
| 10 | BOLT DOUBLE ARMING ROUND EYE M16x500 mm. |
| 11 | WASHER SQUARE FLAT 52x52x4.5 mm. HOLE Dia.18 mm. TIS 258 |
| 12 | AERIAL CABLE 70 sq.mm. 25 kV. |
| 13 | PERFOR DEAD-END FOR AERIAL CABLE 70 sq.mm. |
| 14 | AERIAL CABLE 70 sq.mm. 25 kV. |
| 15 | PERFOR DEAD-END FOR AERIAL CABLE 70 sq.mm. |
| 16 | CLEVIS THIMBLE FOR PERFORMED DEAD-END |
| 17 | CLAMP SINGLE U-BOLT M 8 |
| 18 | GUY (STEEL STARNDARD WIRE 95 Sq.mm.) |

NOTES :

1. THIS DRAWING IS DESIGNED FOR GUIDE LINE ONLY, THE CONSTRUCTION DRAWING SHALL CONFORM TO PEA'S STANDARD AND REGULATIONS.

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| NO. | DATE | REVISIONS | CHECKED | APPROVED |
| | CONSULTANTS | | DEDE | |

KINGDOM OF THAILAND
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
TRANSMISSION LINE
POLE TYPE "C" AND "D"

P&C MANAGEMENT CO.,LTD.

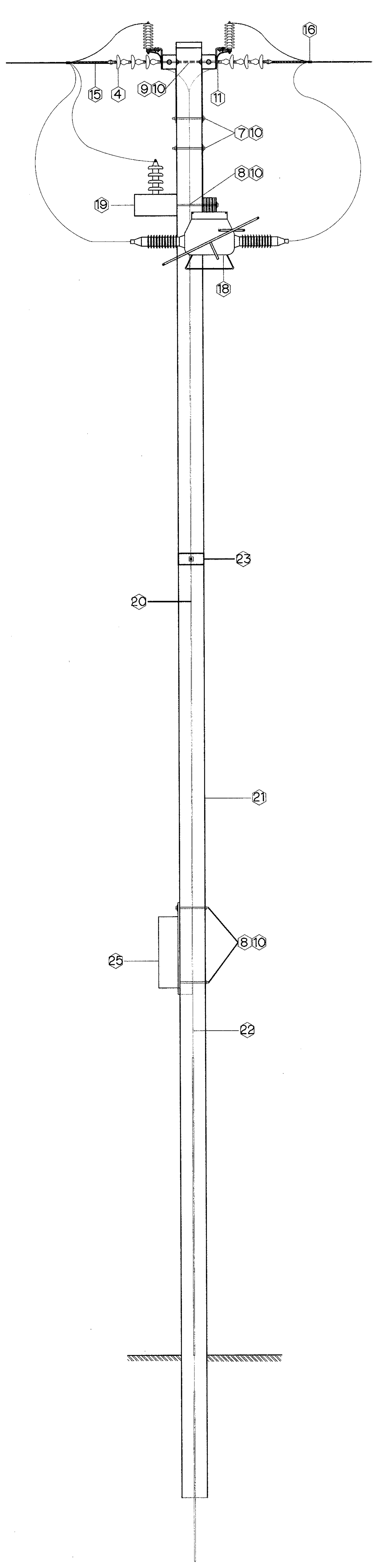
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

REVIEWED
DESIGNED วฟก.604
SUBMITTED Chan T
DRAWN
RECOMMENDED
CHECKED วฟก.604
APPROVED P. Hansell.

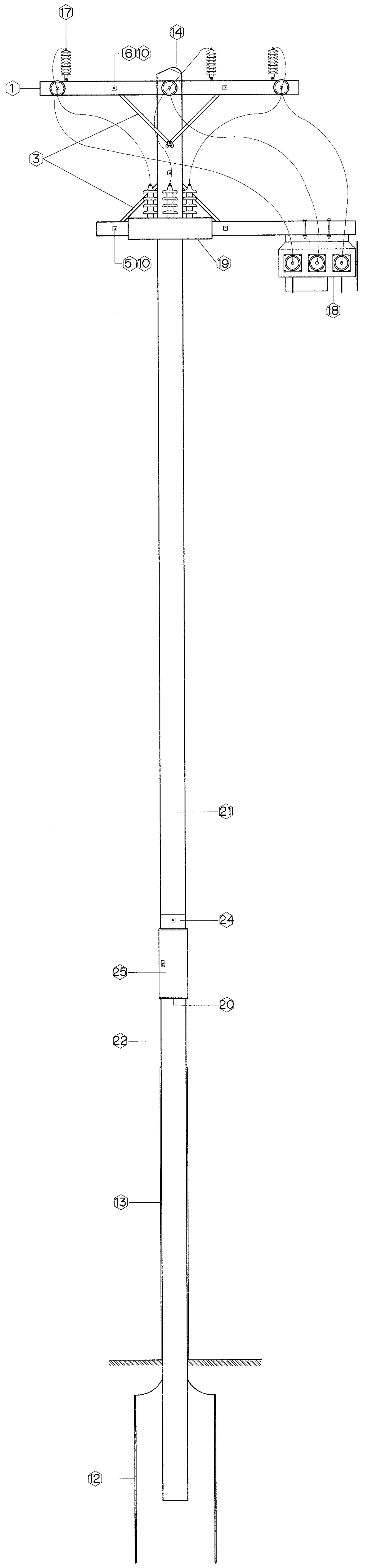
PROJECT MANAGER
DATE 08|03|2559

DRAWING NO. MH-TS-17
SHEET NO. 128 OF 130

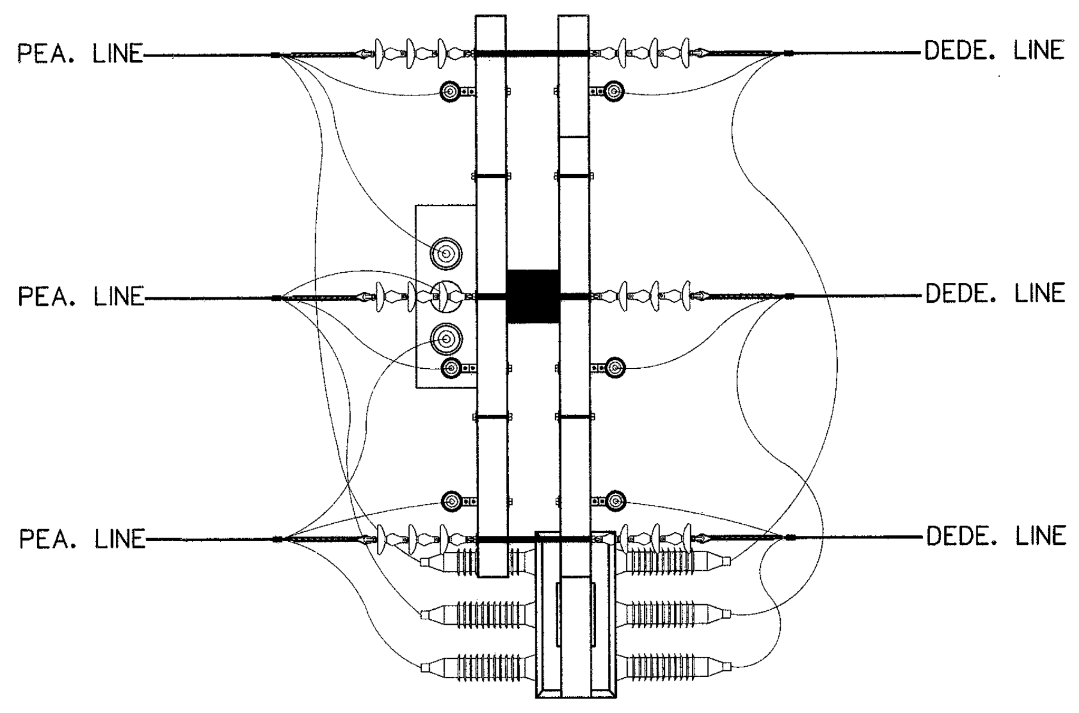
## POLE TYPE "E"



SIDE VIEW



FRONT VIEW



TOP VIEW

### BILL OF MATERIAL POLE TYPE "E"

| ITEM | DESCRIPTION |
|---|---|
| 1 | CROSS ARM, SPUN, PRESTRESSED CONCRETE 120X120x2,000mm. |
| 2 | STEEL, SQUARE, 100 x 3.2 mm., 2,000mm. LONG |
| 3 | BRACE,FLAT FOR CROSS ARM 30X6X760mm. |
| 4 | INSULATOR,SUSPENSION (TYPE D TIS.354) TYPE (CLASS 52–1) |
| 5 | BOLT,MACHINE M.16X130mm. COMPLETE WITH SQUARE NUT |
| 6 | BOLT,MACHINE M.16X170mm. COMPLETE WITH SQUARE NUT |
| 7 | BOLT,MACHINE M.16X250mm. COMPLETE WITH SQUARE NUT |
| 8 | BOLT,MACHINE M.16X300mm. COMPLETE WITH SQUARE NUT |
| 9 | BOLT,DOUBLE ARMING,ROUND EYE M.16X450mm. COMPLETE WITH SQUARE NUT |
| 10 | WASHER,SQUARE,FLAT 50X50X5mm.HOLE Dia.18mm. |
| 11 | NUT,EYE M.16 DIN 582 |
| 12 | ROD,GROUND, 60X60X5mm. LONG |
| 13 | CONDUIT,PVC,RIGID,DIA 20X2,500mm. TIS.216 |
| 14 | CLAMP,SINGLE U–BOLT,M.8 (WIRE ROPE CLIP) |
| 15 | PREFORMED DEAD–END, FOR AERIAL CABLE 25 KV. 70 sq.mm. |
| 16 | CONNECTOR,PARALLEL GROOVE,TRIPLE BOLT,AL, 70–185 sq.mm. |
| 17 | LIGHTING ARRESTER 21 KV. 10 KA. |
| 18 | LOAD BREAK SWITCH, SF6, 630A, 24KV. |
| 19 | TRANSFORMER,VOLTAGE 3PHASE, OUTDOOR,RATIO 22,000/100 V., 10 VA. |
| 20 | CONTROL CABLE |
| 21 | POLE, CONCRETE, 12 m. LONG |
| 22 | WIRE, STEEL STRANDED 50/7 sq.mm. TIS.404 |
| 23 | PLATE,WOOD, SIZE 2X20X30 cm. |
| 24 | PLATE,WOOD, SIZE 2X20X60 cm. |
| 25 | CONTROL UNIT, AUTOMATIC REMOTE CONTORLLED, FOR SF6 |

NOTES :

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| NO. | DATE | REVISIONS | CHECKED | APPROVED |
| | CONSULTANTS | | DEDE | |

KINGDOM OF THAILAND
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
TRANSMISSION LINE
POLE TYPE "E"

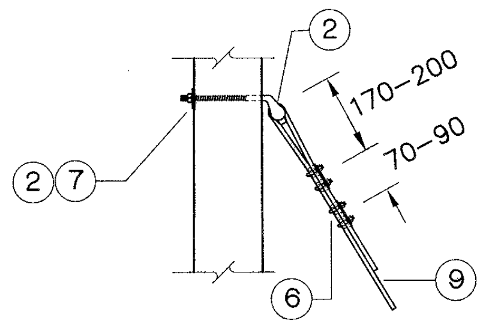
P&C MANAGEMENT CO.,LTD.

Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

DESIGNED วฟก.604
DRAWN
CHECKED วฟก.604
PROJECT MANAGER
DATE 08/03/2559

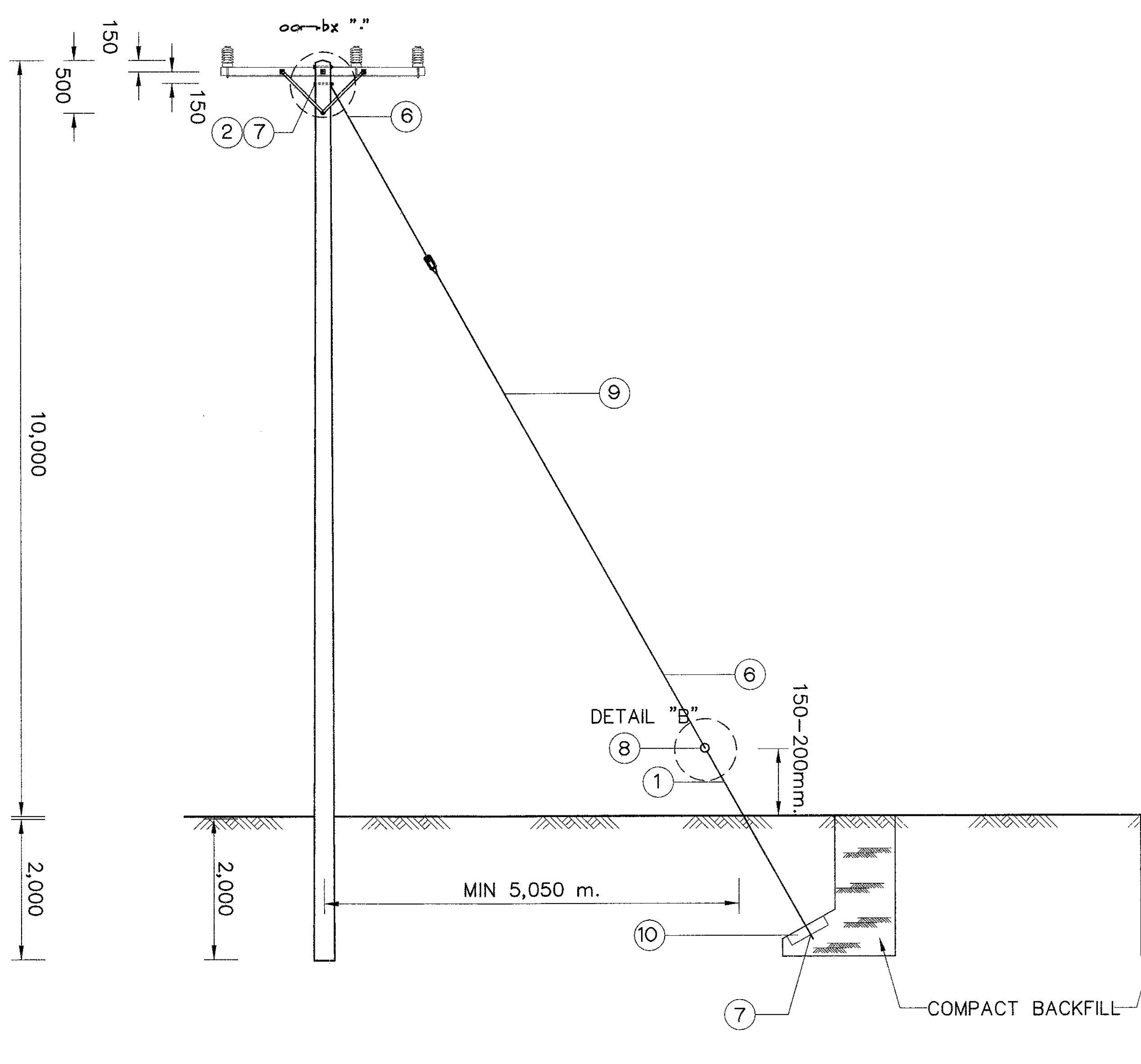
REVIEWED
SUBMITTED
RECOMMENDED
APPROVED

DRAWING NO. MH–TS–18
SHEET NO. 129 OF 130

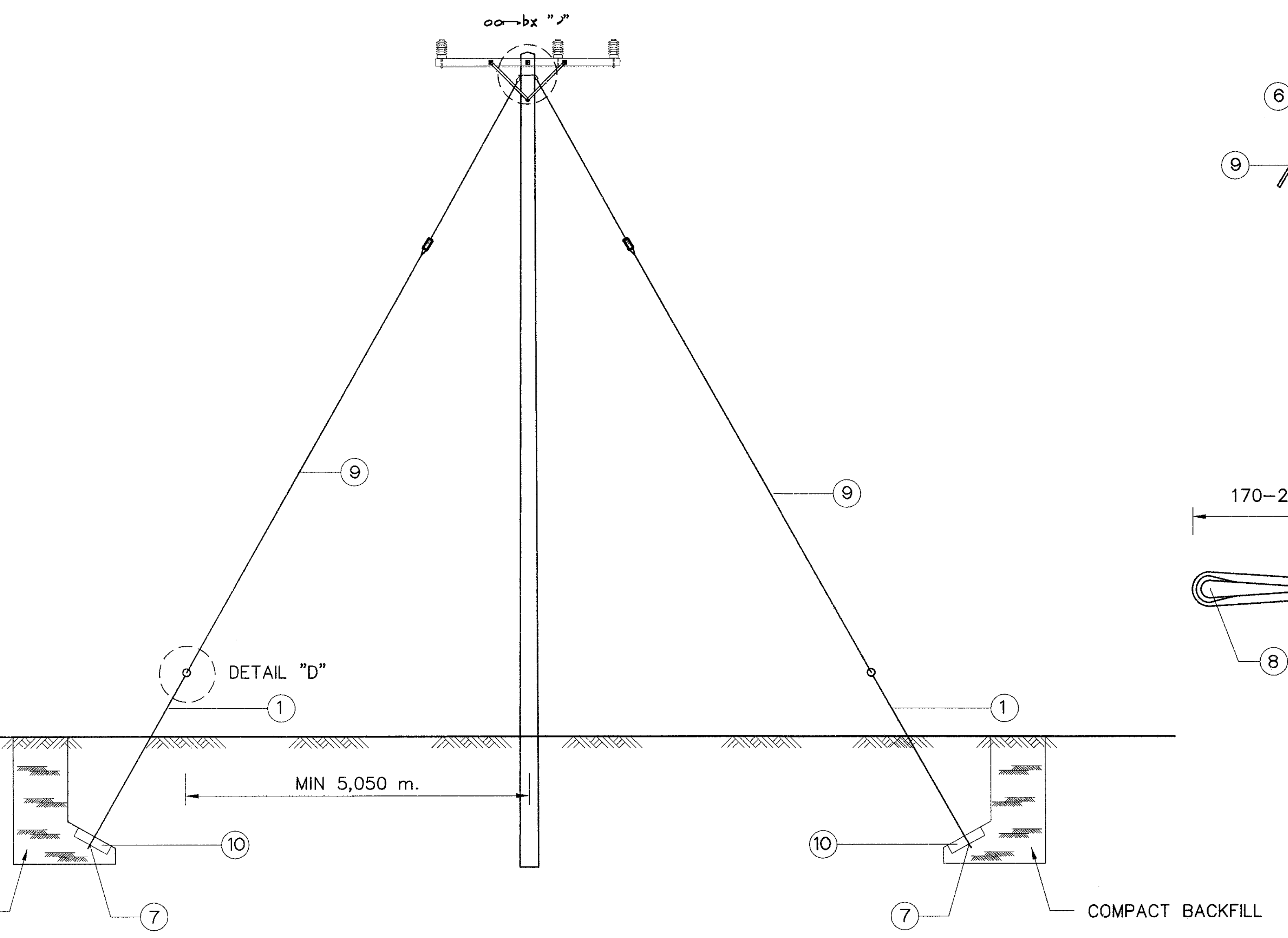


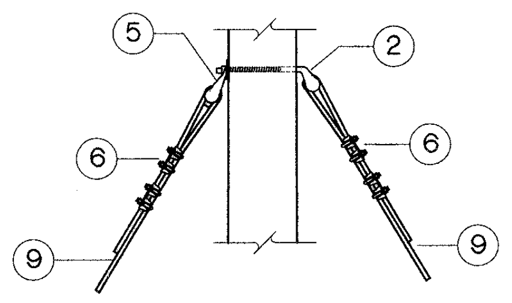
DETAIL "A"

METHOD OF SINGLE ANCHOR GUY

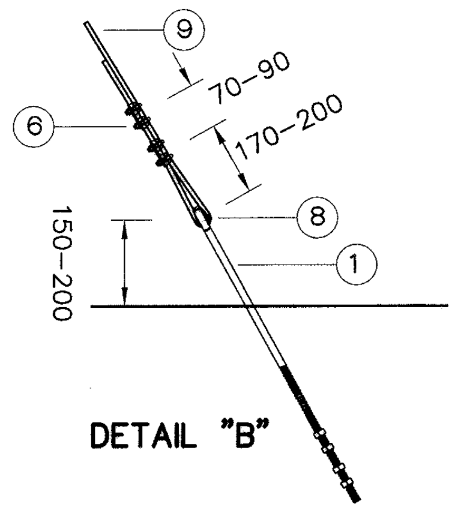


METHOD OF DOUBLE ANCHOR GUY

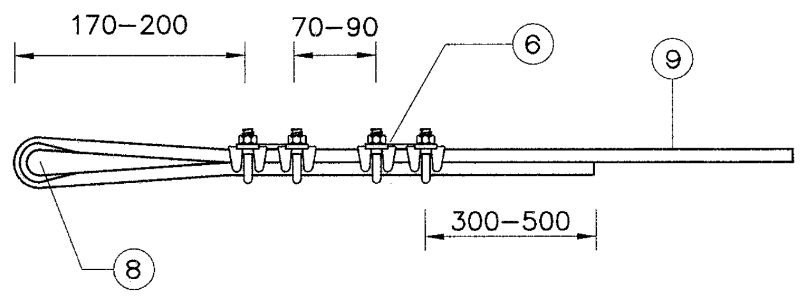




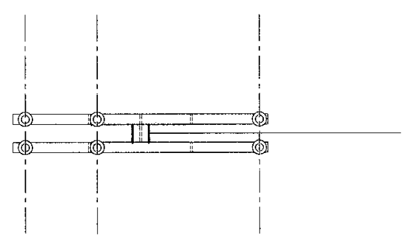
DETAIL "C"



DETAIL "B"

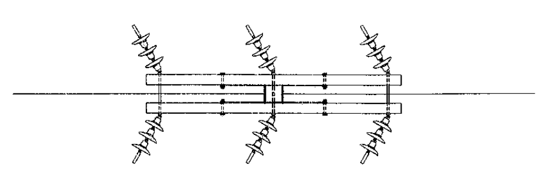


DETAIL "D"



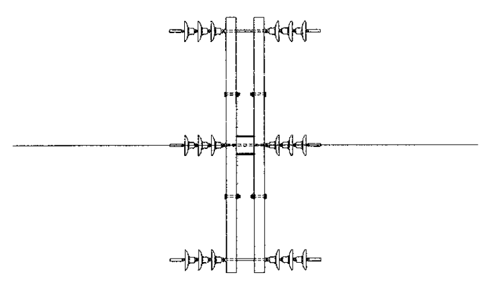
G1

SIDE GUY 5°- 30°



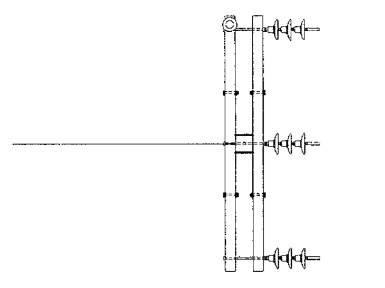
G2

SIDE GUY 30°- 60°



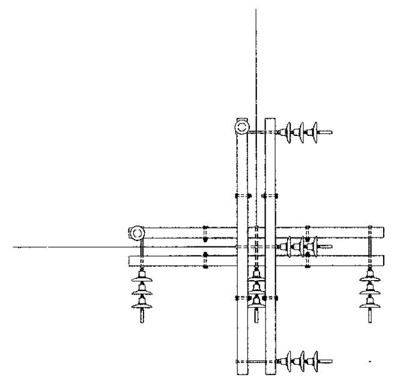
G3

LINE GUY



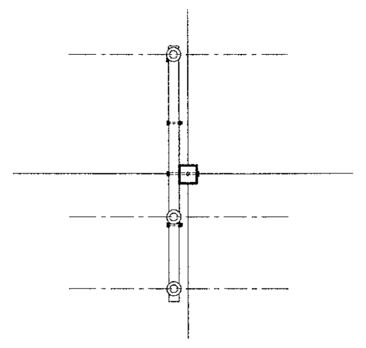
G4

DEAD END GUY



G5

BUCK ARM, 60°- 90°
DEAD END GUY



G6

FIXED OR STORM GUY

NOTES :

1. THIS DRAWING IS DESIGNED FOR GUIDE LINE ONLY, THE CONSTRUCTION DRAWING SHALL CONFORM TO PEA'S STANDARD AND REGULATIONS.

BILL OF MATERIAL FOR ANCHOR GUY

| ITEM | DESCRIPTION | REQ'D | | | | | |
|---|---|---|---|---|---|---|---|
| | | G1 | G2 | G3 | G4 | G5 | G6 |
| 1 | ANCHOR ROD, M. 16 x 2,000 mm. COMPLETE WITH SQUARE NUT | 1 | 1 | 2 | 1 | 2 | 4 |
| 2 | BOLT, SINGLE STRANDED EYE 45° M. 16 x 250 mm. COMPLETE WITH SQUARE NUT | 1 | 1 | 1 | 1 | 2 | 2 |
| 3 | BOLT, SINGLE STRANDED EYE 30° M. 16 x 250 mm. COMPLETE WITH SQUARE NUT | – | 1 | – | 1 | 2 | – |
| 4 | BOLT, DOUBLE ARMING, ROUND EYE, M. 16 x 200 mm. COMPLETE WITH SQUARE NUT | – | – | – | – | – | – |
| 5 | STRAND EYE SINGLE ANGLE 45° | – | – | 1 | – | – | 2 |
| 6 | CLAMP, DOUBLE U-BOLT, M. 16 mm. | 4 | 8 | 8 | 8 | 16 | 16 |
| 7 | WASHER, SQUARE FLAT 50 x 50 x 5 mm. HOLE Ø18 mm. | 2 | 2 | 2 | 4 | 6 | 4 |
| 8 | GUY, THIMBLE, FOR STEEL STRANDED WIRE 50 Sq.mm. | 1 | 2 | 2 | 2 | 4 | 4 |
| 9 | STEEL STRANDED WIRE 50 Sq.mm. | 15 m. | 35 m. | 30 m. | 35 m. | 70 m. | 60 m. |
| 10 | CONCRETE ANCHOR 550 x 550 x 180 mm. | 1 | 1 | 2 | 2 | 2 | 4 |
| 11 | STRAIN INSULATOR CLASS 54-4 | 1 | 1 | 2 | 2 | 2 | 4 |

| NO. | DATE | REVISIONS | CHECKED | APPROVED |
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| | CONSULTANTS | | DEDE | |

KINGDOM OF THAILAND
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
TRANSMISSION LINE
TYPE OF ANCHOR GUY

P&C MANAGEMENT CO.,LTD.
DESIGNED วฟก.604
DRAWN
CHECKED วฟก.604
PROJECT MANAGER 08/03/2559 DATE

Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY
REVIEWED
SUBMITTED Chait
RECOMMENDED
APPROVED P. Hansell.

DRAWING NO. MH-TS-19
SHEET NO. 130 OF 130