Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

WIANG HAENG DISTRICT CHIANG MAI PROVINCE

CONTRACT C2

ELECTRO - MECHANICAL EQUIPMENT

VOLUME 4

P&C MANAGEMENT CO.,LTD.

MAE HAT HYDROPOWER PROJECT

CONTRACT C2 : LIST OF DRAWINGS

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3	MH-GN-03	SYMBOLS, ABBREVIATIONS, AND GENERAL NOTES
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		ACCESS ROAD
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7	MH-AR-02	PLAN AND PROFILE, STA. 0+600 TO STA. 1+200
8	MH-AR-03	PLAN AND PROFILE, STA. 1+200 TO STA. 1+489.351
9	MH-AR-04	TYPICAL SECTIONS, STOPPING AND PASSING PLACES
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15	MH-HR-03	PLAN AND PROFILE, STA. 1+000 TO STA. 1+500
16	MH-HR-04	PLAN AND PROFILE, STA. 1+500 TO STA. 2+000
17	MH-HR-05	PLAN AND PROFILE, STA. 2+000 TO STA. 2+097.998
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20	MH-OM-01	O&M ROAD PART 2 PLAN AND PROFILE, STA. 0+000 TO STA. 0+600
21	MH-OM-02	O&M ROAD PART 2 PLAN AND PROFILE, STA. 0+600 TO STA. 1+200
22	MH-OM-03	O&M ROAD PART 2 PLAN AND PROFILE, STA. 1+200 TO STA. 1+800
23	MH-OM-04	O&M ROAD PART 2 PLAN AND PROFILE, STA. 1+800 TO STA. 2+400
24	MH-OM-05	O&M ROAD PART 2 PLAN AND PROFILE, STA. 2+400 TO STA. 3+000
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26	MH-OM-07	O&M ROAD PART 2 PLAN AND PROFILE, STA. 3+600 TO STA. 4+149.212
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		PENSTOCK
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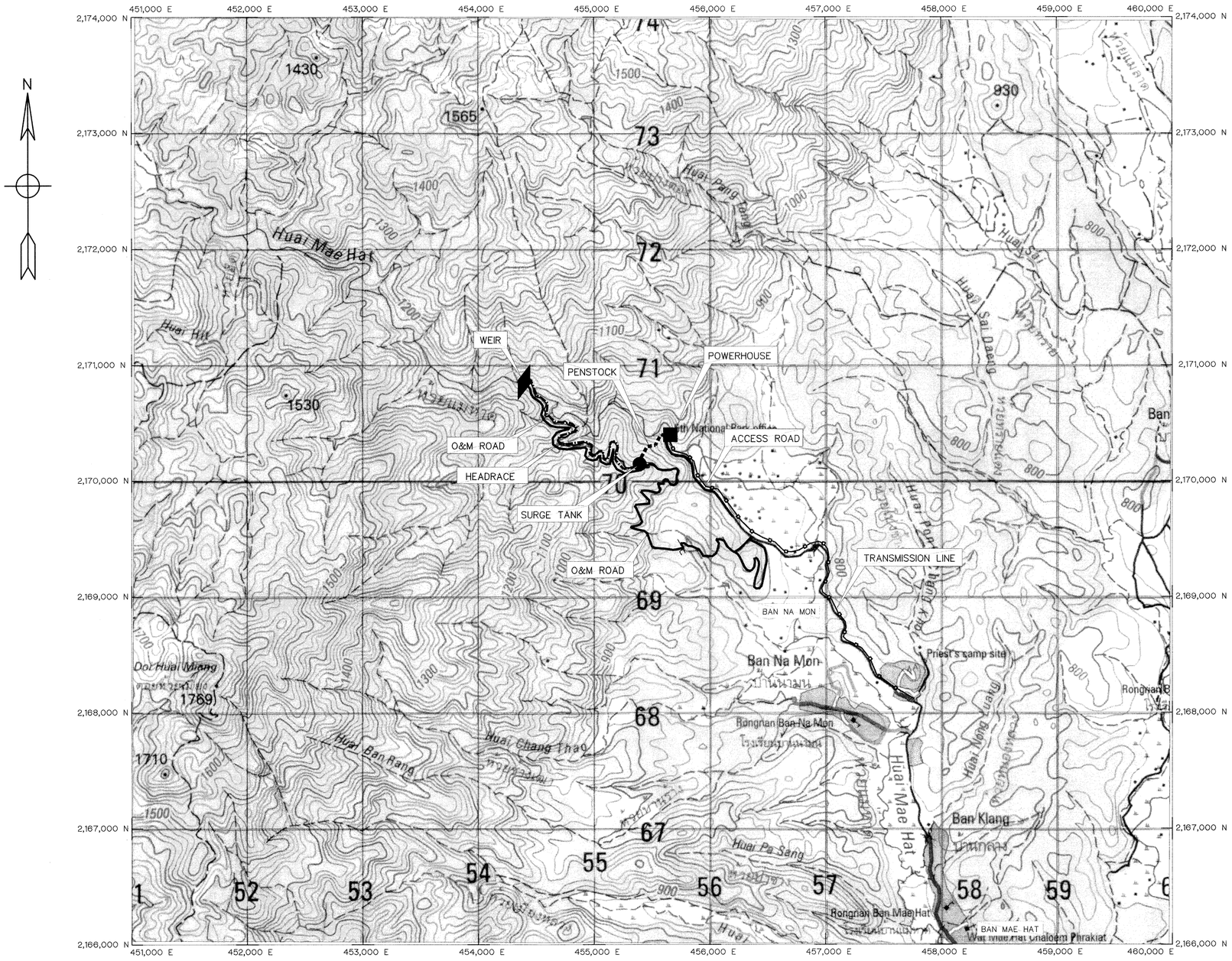
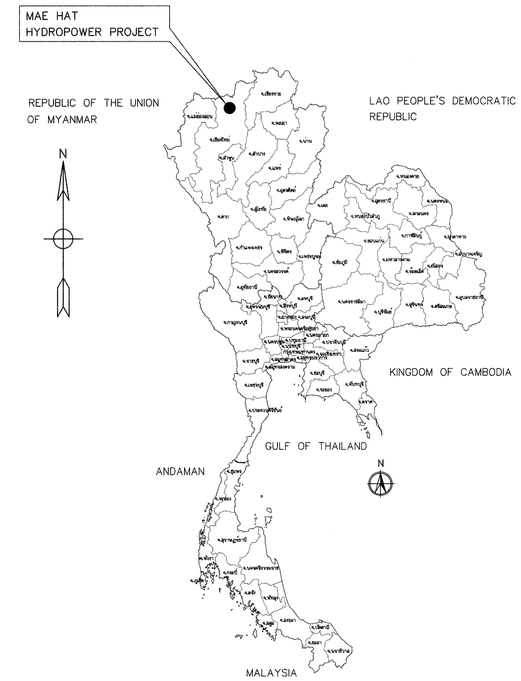


PROJECT AREA MAP

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

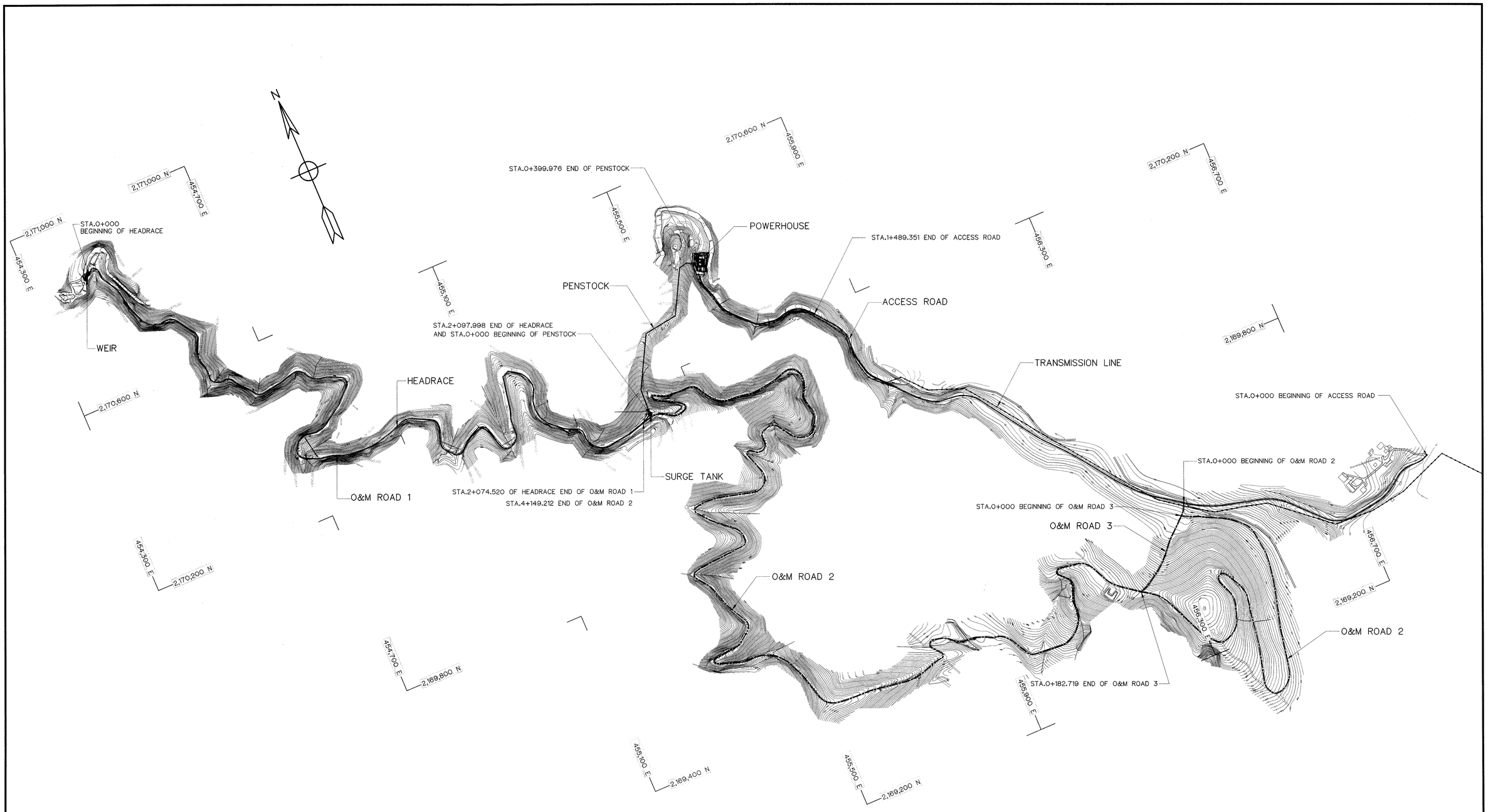
MAE HAT HYDROPOWER PROJECT

ELECTRO-MECHANICAL EQUIPMENT
GENERAL DRAWING
PROJECT LOCATION MAP

P&C MANAGEMENT CO.,LTD.

Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY

DESIGNED	ภัย.64624	REVIEWED	
DRAWN		SUBMITTED	
CHECKED	ศิล.6226	RECOMMENDED	
PROJECT MANAGER	DATE 01/03/2564	APPROVED	
DRAWING NO.	MH-GN-01	SHEET NO.	1 OF 51



PROJECT LAYOUT

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 50 100 150 200 250 300

SCALE 1:4,000 METERS

NO.	DATE	REVISIONS	CHECKED	APPROVED
3				
2				
1				
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Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

ELECTRO-MECHANICAL EQUIPMENT
GENERAL DRAWING
PROJECT LAYOUT

P&C MANAGEMENT CO.,LTD.

DESIGNED วิศ.64624 วิศ.6226
DRAWN
CHECKED วิศ.6226
PROJECT MANAGER 08/03/2564 DATE

Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY

REVIEWED
SUBMITTED
RECOMMENDED
APPROVED

DRAWING NO. MH-GN-02

SHEET NO. 2 OF 51

ABBREVIATIONS :

A	CROSS-SECTION AREA OF FLOW
AC.	ASBESTOS CEMENT PIPE
AGG.	AGGREGATE
ALT.	ALTERNATIVE
APPROX.	APPROXIMATE
AZ.	AZIMUTH
B.	BEGINNING OF SURVEY
BC.	BEGINNING OF CURVE
BEG.	BEGINNING
BF.	BOTTOM FACE
B	BEAM
B.M.	BENCH MARK
BOTT.	BOTTOM
BRG.	BEARING
C.B.R.	CALIFORNIA BEARING RATIO
C/C	CENTER TO CENTER
℄	CENTER LINE
CL.	CLEARANCE
CM. OR cm.	CENTIMETER
CM./S OR cm./s	CENTIMETER PER SECOND
COL.	COLUMN
CONC.	CONCRETE
D	DEGREE OF CURVE
DB.	DEFORM BAR
d.	DEPTH OF WATER
DIA. OR Ø	DIAMETER
DOH.	DEPARTMENT OF HIGHWAY
DWG.	DRAWING
DEDE.	DEPARTMENT OF ALTERNATIVE ENERGY
	DEVELOPMENT AND EFFICIENCY
E	EAST
E	END OF SURVEY
EA.	EACH
E.C.	END OF CURVE
E.F.	END OF FACE
EL. OR ELEV.	ELEVATION
EXIST.	EXISTING
EXP.	EXPANSION
EXT.	EXTERIOR
EX.	EXTERNAL DISTANCE OF CURVE
f	FREE BOARD , FINISH
F.F.	FAR FACE
F.S.L.	FULL SUPPLY LEVEL
FTG.	FOOTING
HD.	HEAD
HEX.	HEXAGONAL
HOR.	HORIZONTAL
I.D.	INSIDE DIAMETER
I.F.	INSIDE FACE
IN. OR "	INCH
INT.	INTERIOR
INV.	INVERT
Kg.	KILOGRAM
Km.	KILOMETER
KPH.	KILOMETER PER HOUR
KSC.	KILOGRAM PER SQUARE CENTIMETER
L	LENGTH OF CURVE
LC.	LENGTH OF HORIZONTAL CURVE
LONG.	LONGITUDINAL
LT.	LEFT
L.W.L.	LOW WATER LEVEL
M. OR m.	METER
$M.^2$ 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

MAX.	MAXIMUM
M.S.L.	MEAN SEA LEVEL
MISC.	MISCELLANEOUS
N.	NORTH
n.	MANNING'S ROUGHINESS COEFFICIENT
N.F.	NEAR FACE
NGL.	NATURAL GROUND LEVEL
NO. OR #	NUMBER
N.W.L.	NORMAL WATER LEVEL
OD.	OUTSIDE DIAMETER
O.F.	OUTSIDE FACE
O&M	OPERATION & MAINTENANCE
PC.	POINT OF HONRIZONTAL CURVATURE
PI.	POINT OF HORIZONTAL INTERSECTION
PL.	PLATE
P.O.C.	POINT ON CURVE
P.O.T.	POINT ON TANGENT
P.O.S.T.	POINT ON SUB-TANGENT
PRC.	POINT OF HORIZONTAL REVERSE CURVE
PT.	POINT OF TANGENT
PVC.	POLYVINYL CHLORIDE
PVC.	POINT OF VERTICAL CURVATURE
PVI.	POINT OF VERTICAL INTERSECTION
PVRC.	POINT OF VERTICAL REVERSE CURVE
PVT.	POINT OF VERTICAL TANGENT
Q.	DISCHARGE
QTY. QUAN.	QUANTITY
R	RADIUS OF CURVATURE
r	HYDRAULIC RADIUS
RØ , Ø	ROUND BAR
RC.	REINFORCED CONCRETE
RD.	ROAD
REF.	REFERENCE
REINF.	REINFORCEMENT
REQ'D	REQUIRED
RID.	ROYAL IRRIGATION DEPARTMENT
SCH.	SCHEDULE
SE.	SUPERELEVATION
SETC.	SECTION
S.P.C.T.	STANDARD PROCTOR COMPACTION TEST
S.S.	SIDE SLOPE
STIR.	STIRRUP
STA.	STATION
STD.	STANDARD
STR.	STRUCTURE
SYMM.	SYMMETRICAL
T.	TANGENT LENGTH , THICKNESS
T	TON
THK.	THICKNESS
T.F.	TOP FACE
T.I.S.	THAI INDUSTRIAL STANDARD
Ts.	SUPERELEVATION TRANSITION LENGTH
TYP.	TYPICAL
V.	VELOCITY OF FLOW
V.C.	VERTICAL CURVE
Vc.	LENGTH OF VERTICAL CURVE
VER.	VERTICAL
VOL.	VOLUME
W/	WITH
W.C.	WATER CLOSET
⦲	ANGLE
△	DEFLECTION ANGLE

SYMBOLS :

N	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.
KM.1+000	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
1:5 1:5	ELEVATION OR PLAN OF SLOPE
	NATURAL GROUND LEVEL
25.00	CONTOUR LINE
	RIVER, STREAM OR NATURAL DRAIN
FLOW	FLOW DIRECTION
1:5	SLOPE DIRECTION
2 / 1	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
3				
2				
1				

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Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

ELECTRO-MECHANICAL EQUIPMENT
GENERAL DRAWING
SYMBOLS, ABBREVIATIONS, AND GENERAL NOTES

P&C MANAGEMENT CO.,LTD.

Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY

DESIGNED	วิศ.64624	วิศ.6226
DRAWN		
CHECKED		วิศ.6226
PROJECT MANAGER	DATE 09/03/2559	

REVIEWED
SUBMITTED
RECOMMENDED
APPROVED

DRAWING NO. MH-GN-03

SHEET NO. 3 OF 51

FIGURE 1 RELATIONSHIP BETWEEN MEAN ANNUAL RUNOFF AND CATCHMENT AREA

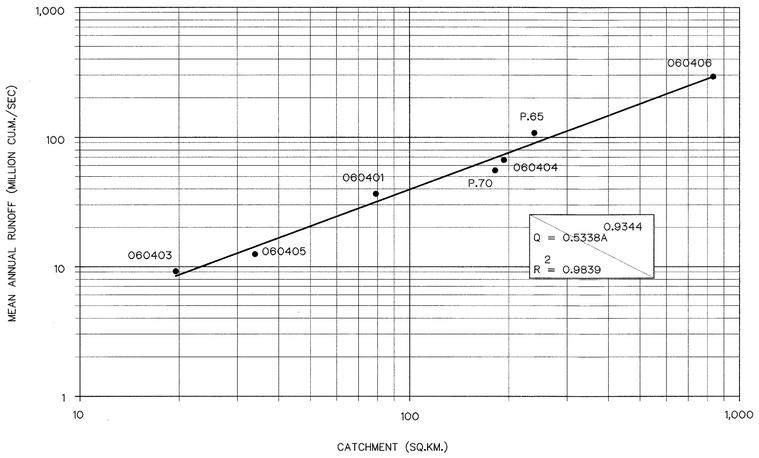


FIGURE 2 RELATIONSHIP BETWEEN ELEVATION AND DISCHARGE AT POWERHOUSE

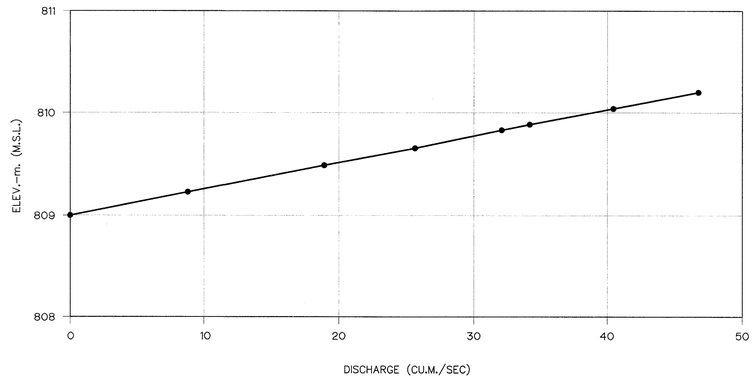


FIGURE 3 RELATIONSHIP BETWEEN ELEVATION AND DISCHARGE AT WEIR

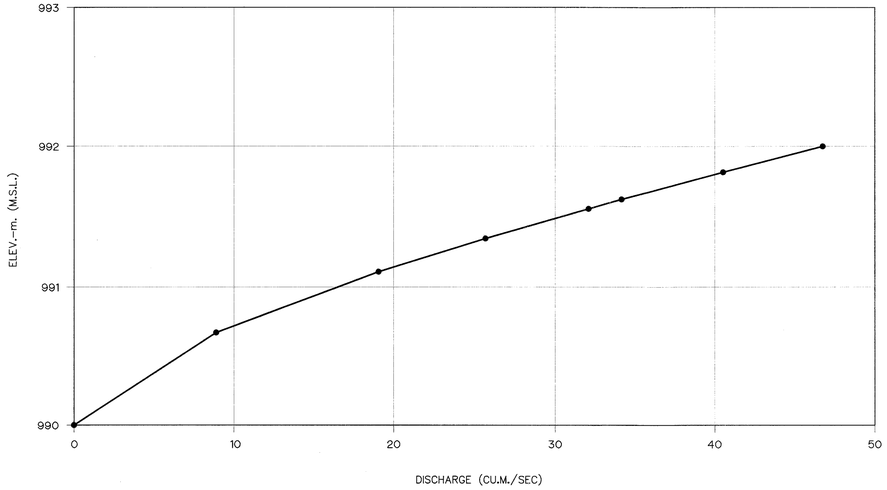
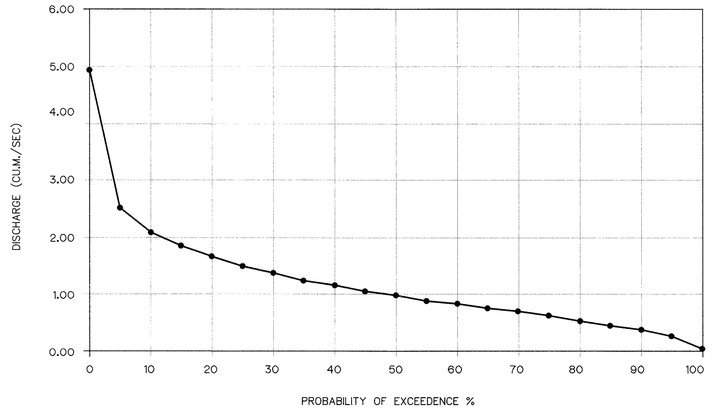


FIGURE 4 FLOW DURATION CURVE



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3				
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1				
	CONSULTANTS		DEDE	

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Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

ELECTRO-MECHANICAL EQUIPMENT
GENERAL DRAWING
PROJECT INFORMATION HYDROLOGY DATA

P&C MANAGEMENT CO.,LTD.

DESIGNED ภธ.64624 ศธ.6226
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PROJECT MANAGER 08/01/2559 DATE

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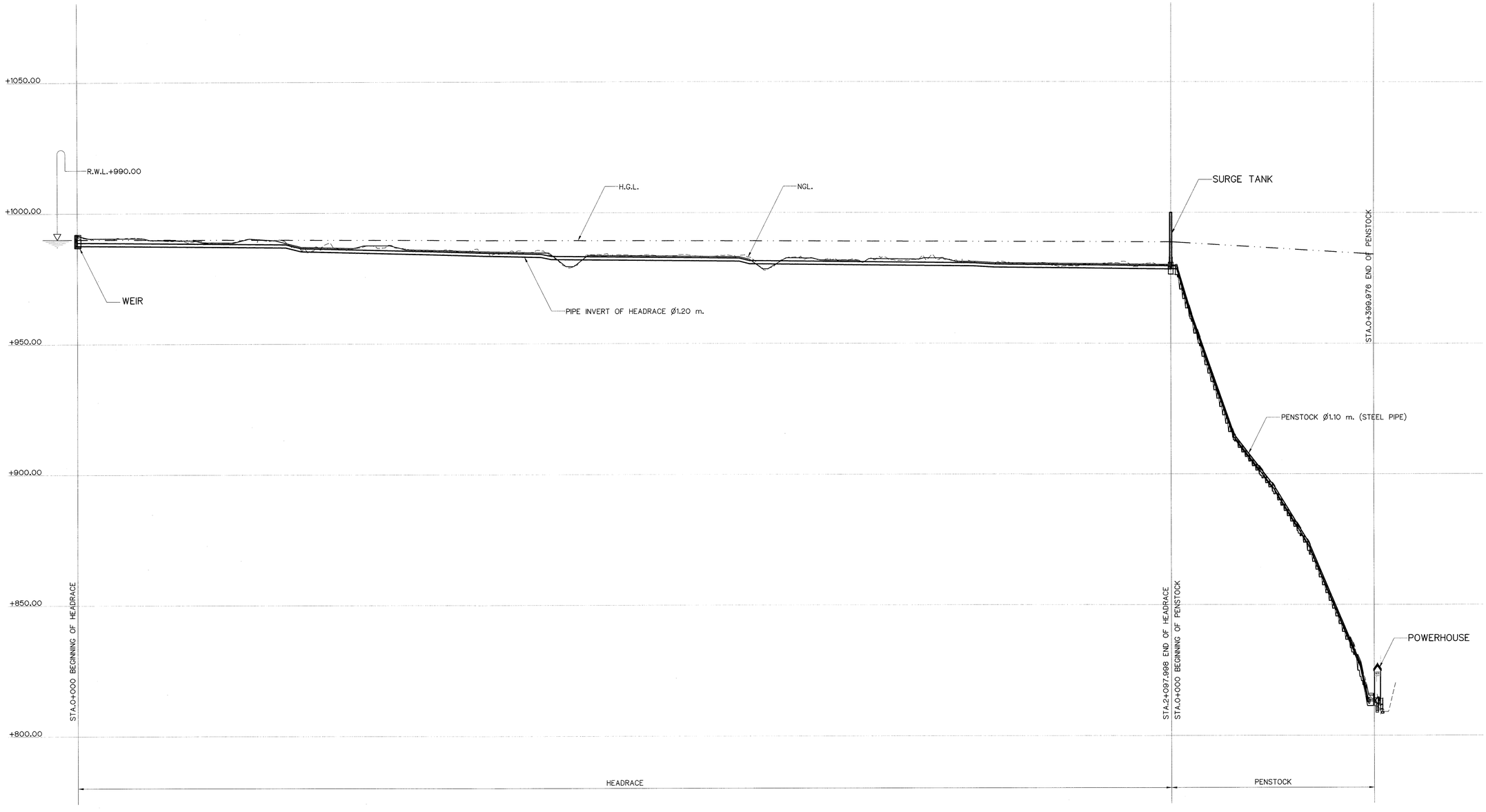
SUBMITTED
RECOMMENDED
APPROVED

DRAWING NO. MH-GN-04
SHEET NO. 4 OF 51



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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2				
1				

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

MAE HAT HYDROPOWER PROJECT

ELECTRO-MECHANICAL EQUIPMENT
GENERAL DRAWING
POWER WATERWAY HYDRAULIC ARRANGEMENT

P&C MANAGEMENT CO.,LTD.

Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY

DESIGNED	มี.ย.64624 มี.ย.6226	REVIEWED	
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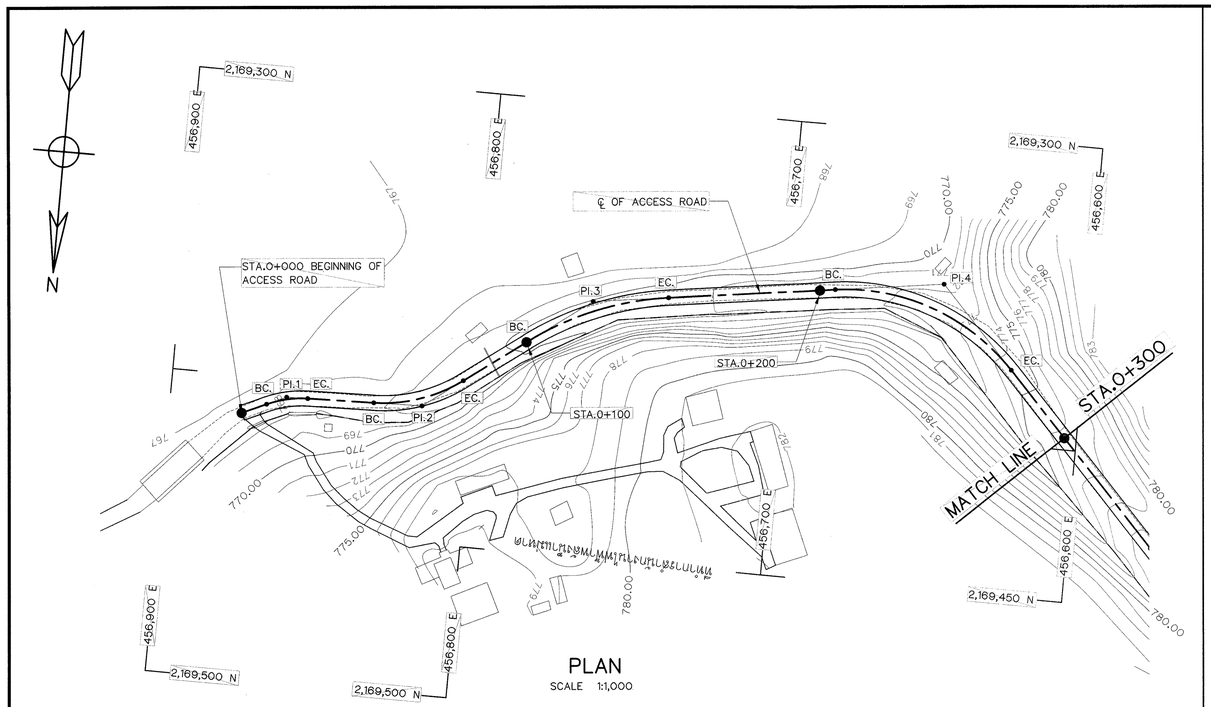
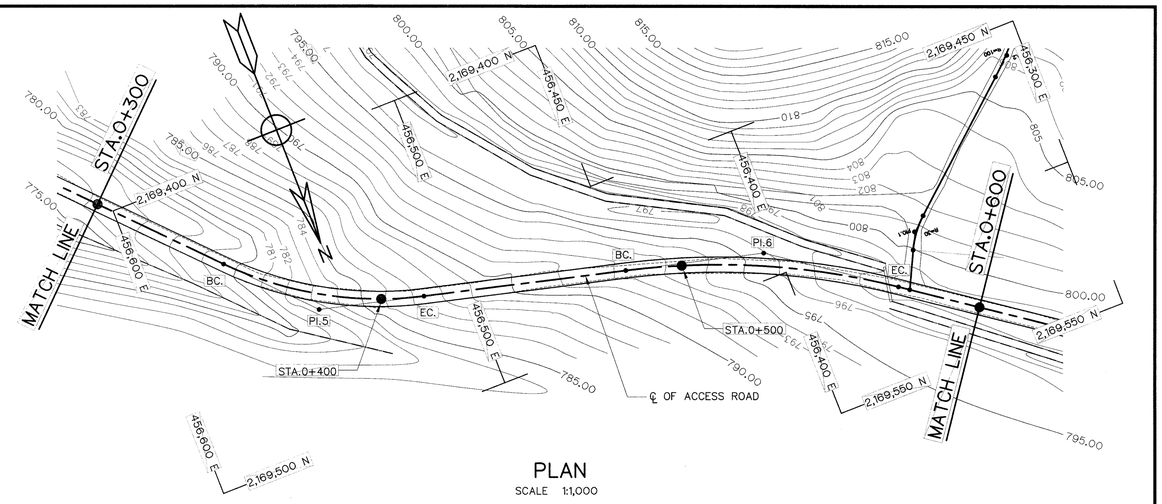
CHECKED	มี.ย.6226	RECOMMENDED	
PROJECT MANAGER	08/03/2564 DATE	APPROVED	

DRAWING NO. MH-GN-05

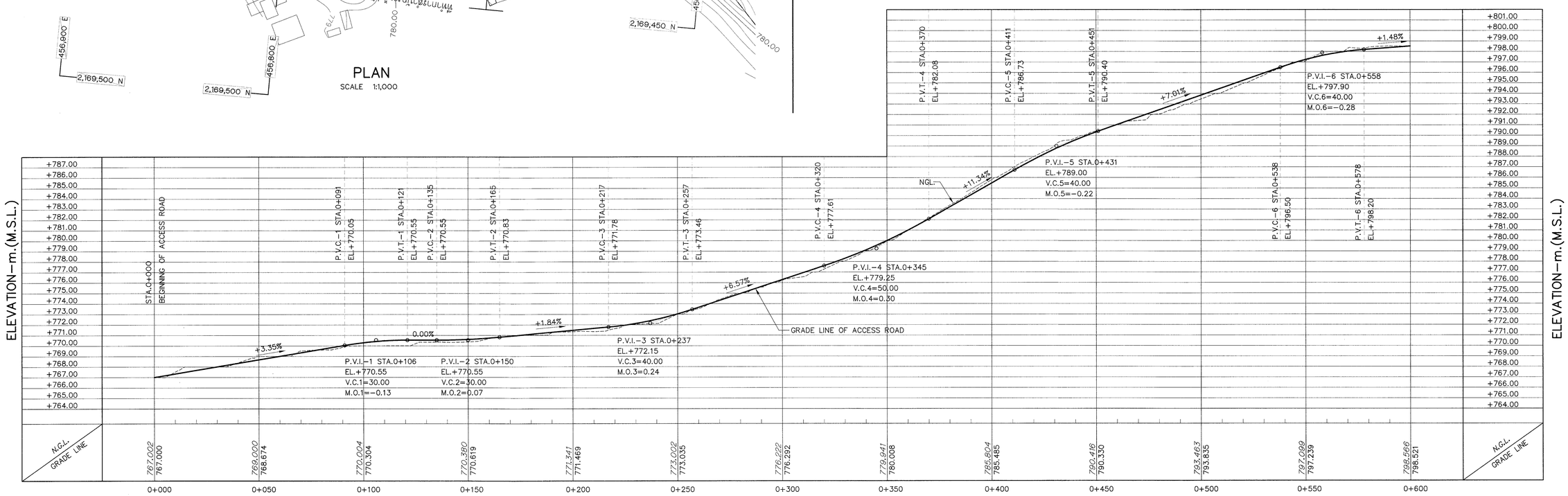
SHEET NO. 5 OF 51



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 N	COORDINATE E	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)
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.

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 AND DETAILS MH–AR–05

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

ELECTRO–MECHANICAL EQUIPMENT
ACCESS ROAD
PLAN AND PROFILE, STA. 0+000 TO STA. 0+600

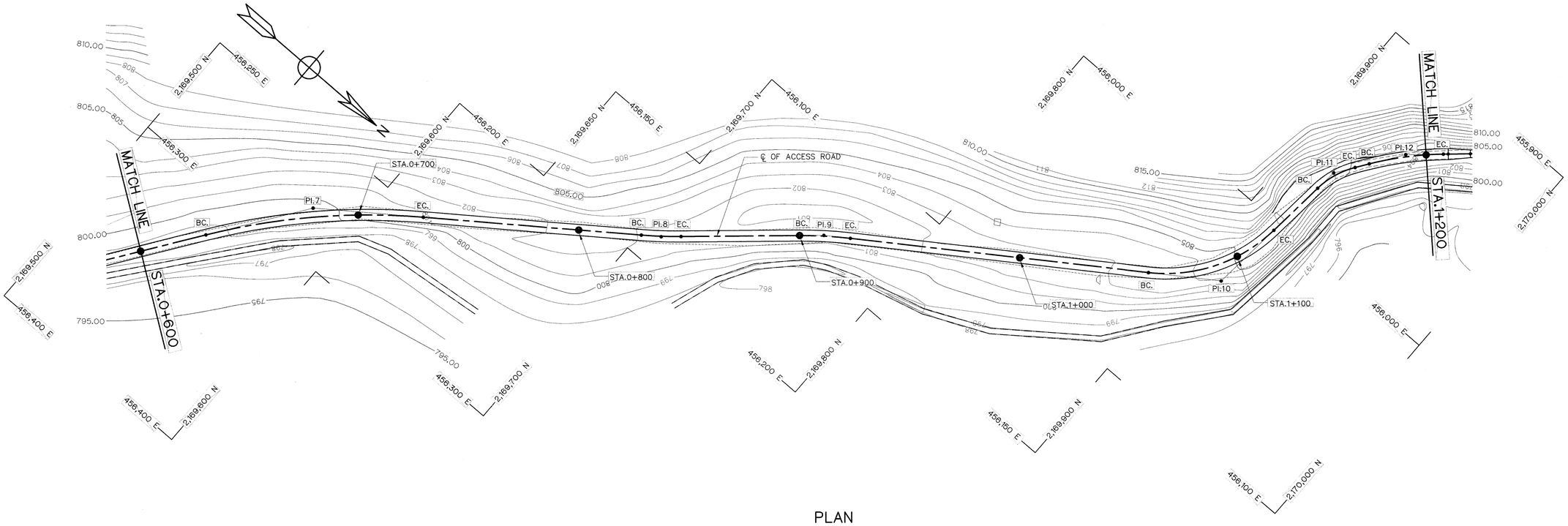
P&C MANAGEMENT CO.,LTD.

Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY

DESIGNED ส.ส.64624 ส.ส.6226
DRAWN
CHECKED ส.ส.6226
PROJECT MANAGER 08/03/2564 DATE

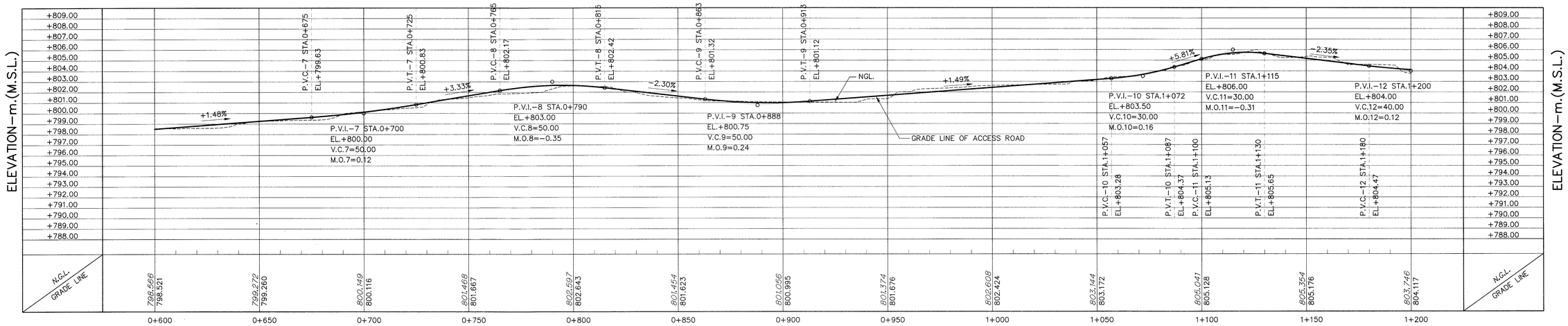
REVIEWED
SUBMITTED
RECOMMENDED
APPROVED

DRAWING NO. MH–AR–01
SHEET NO. 6 OF 51



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 (Δ)	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
3				
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1				
	CONSULTANTS		DEDE	

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MAE HAT HYDROPOWER PROJECT

ELECTRO–MECHANICAL EQUIPMENT
ACCESS ROAD
PLAN AND PROFILE, STA. 0+600 TO STA. 1+200

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Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY

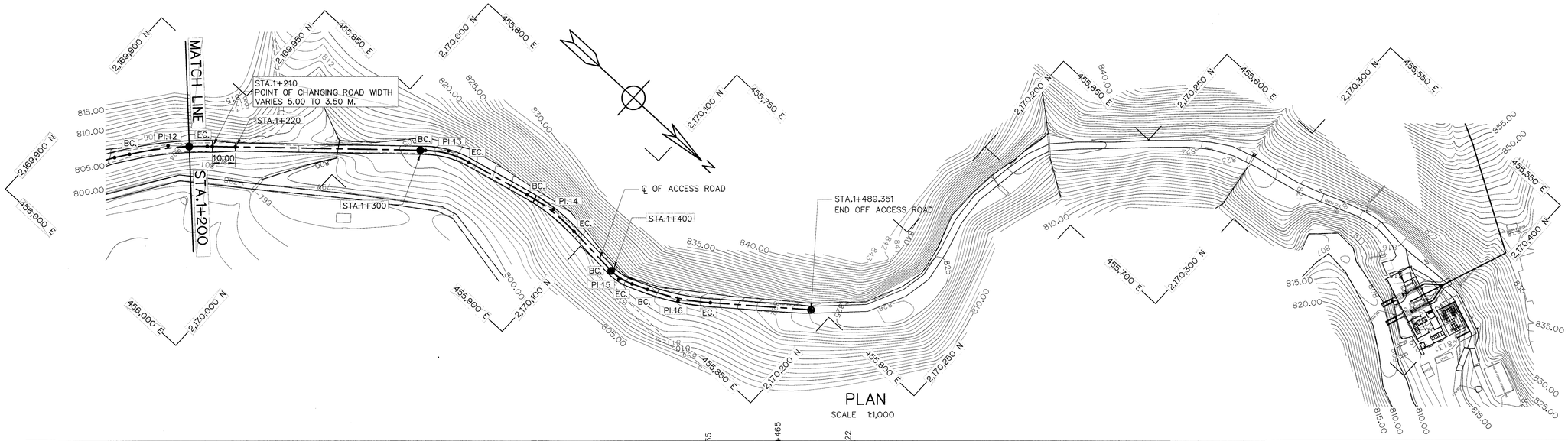
REVIEWED
SUBMITTED
RECOMMENDED
APPROVED

DESIGNED สธ.64624 สธ.6226
DRAWN
CHECKED สธ.6226

PROJECT MANAGER 08/03/2559 DATE

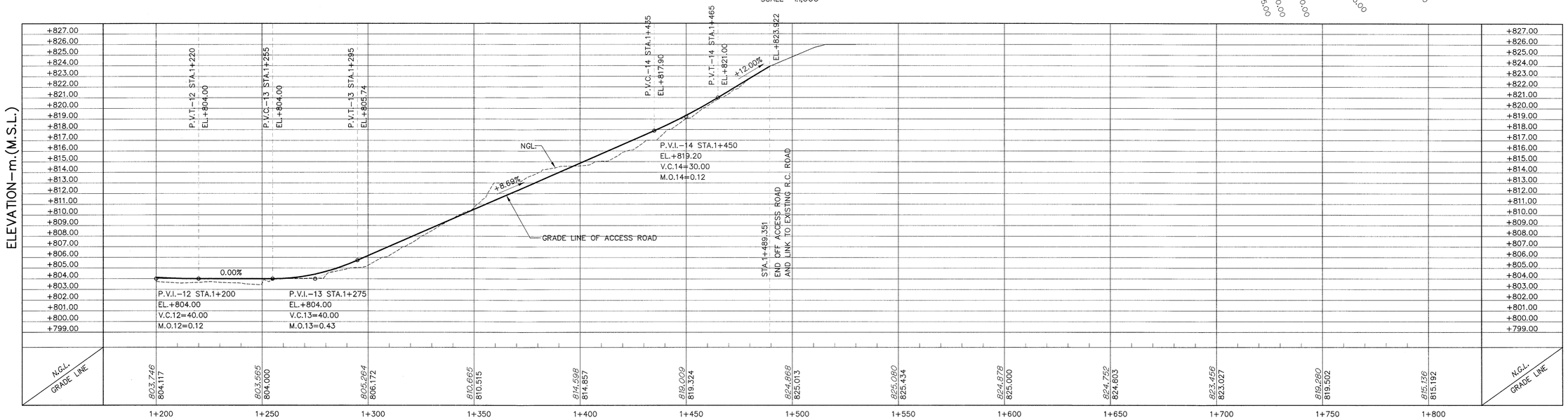
DRAWING NO. MH–AR–02

SHEET NO. 7 OF 51



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 N	COORDINATE E	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)
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–AR–05

NO.	DATE	REVISIONS	CHECKED	APPROVED
3				
2				
1				

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KINGDOM OF THAILAND
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MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

ELECTRO–MECHANICAL EQUIPMENT
ACCESS ROAD
PLAN AND PROFILE, STA. 1+200 TO STA. 1+489.351

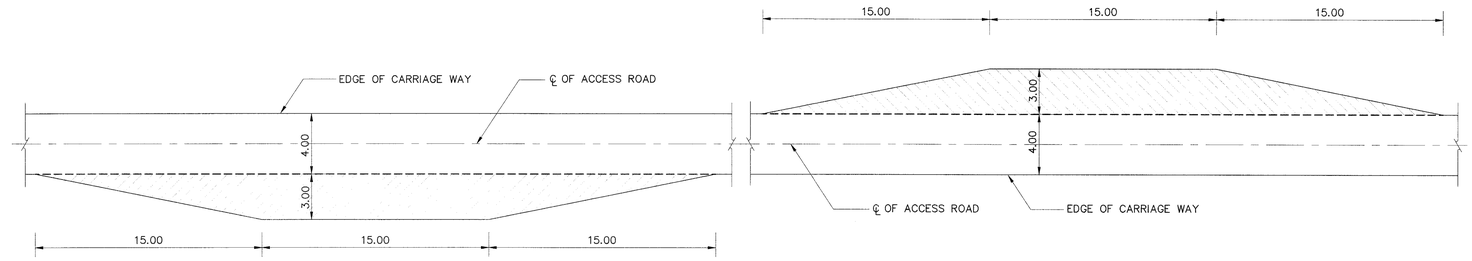
P&C MANAGEMENT CO.,LTD.

Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY

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

REVIEWED
SUBMITTED
RECOMMENDED
APPROVED P. Hanwell

DRAWING NO. MH–AR–03
SHEET NO. 8 OF 51



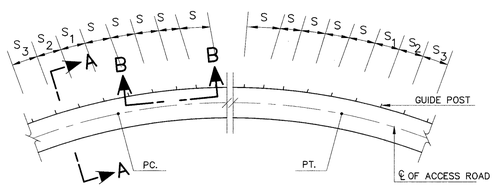
PLAN SHOWING DETAIL OF STOPPING AND PASSING PLACES IN GENERAL

NOT TO SCALE

NOTES :

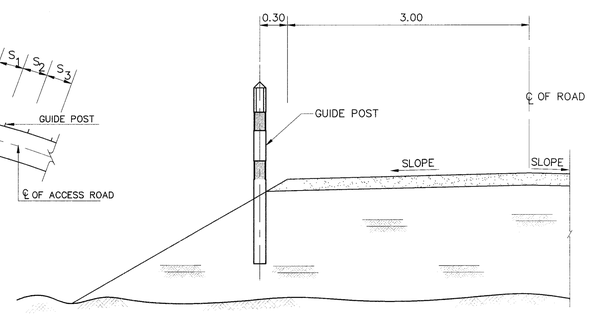
1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS, UNLESS OTHERWISE SHOWN.
2. CLEARING AND GRUBBING METHOD SHALL CONFORM TO THE REQUIREMENTS AS SPECIFILED IN THE TECHNICAL SPECIFICATIONS
3. SIDE DITCH SHALL BE PROVIDES FOR ROAD IN CUT SECTION AND IN FILL SECTION WHERE HEIGHT OF FILL FROM CARRIAGE 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



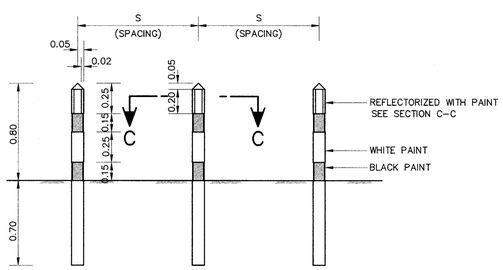
PLAN

NOT TO SCALE



SECTION A–A

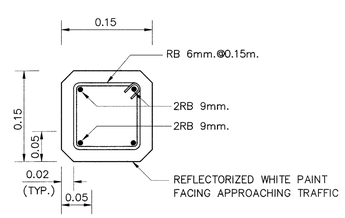
NOT TO SCALE



SECTION B–B

NOT TO SCALE

GUIDE POSTS



SECTION C–C

NOT TO SCALE

TABLE

SPACING OF GUIDE POSTS				
RADIUS M.	S M.	S1 M.	S2 M.	S3 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

NO.	DATE	REVISIONS	CHECKED	APPROVED
3				
2				
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MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

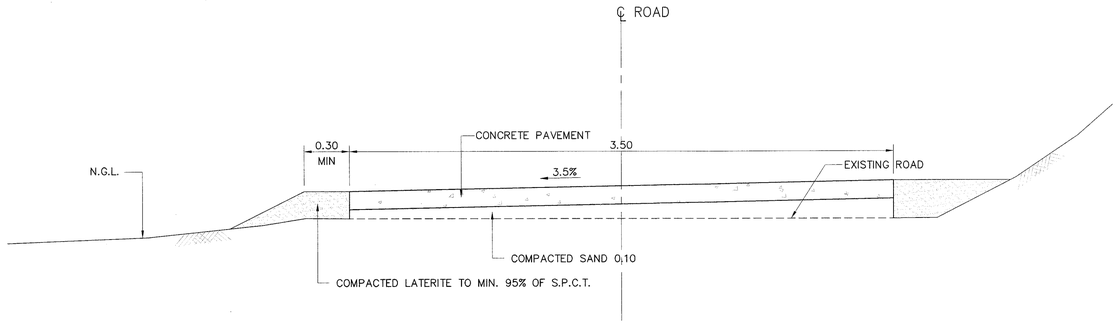
ELECTRO–MECHANICAL EQUIPMENT
ACCESS ROAD
TYPICAL SECTIONS, STOPPING AND PASSING PLACES

P&C MANAGEMENT CO.,LTD.

DESIGNED ภัณฑิต 64624 25.6.2226
DRAWN
CHECKED 25.6.2226
PROJECT MANAGER 08/03/2559 DATE

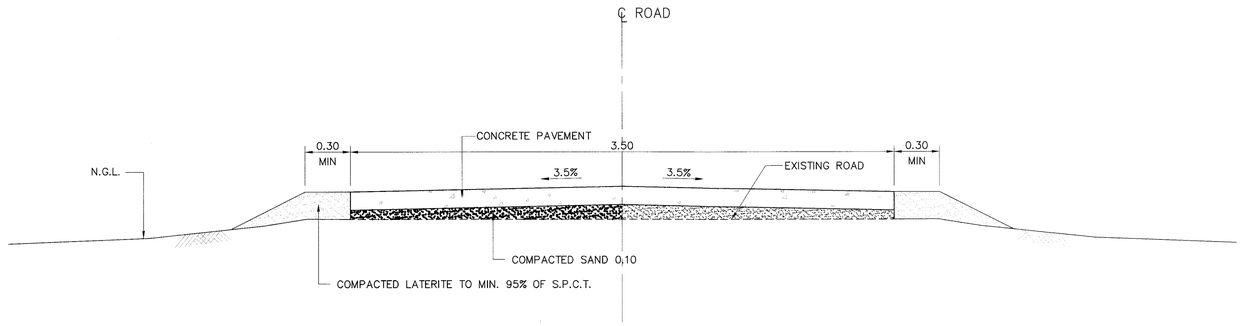
Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY
REVIEWED
SUBMITTED
RECOMMENDED
APPROVED

DRAWING NO. MH–AR–04
SHEET NO. 9 OF 51



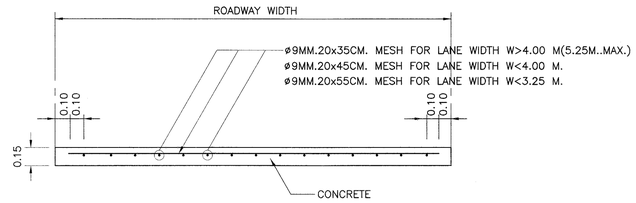
TYPICAL SECTION FOR HILLSIDE

NOT TO SCALE



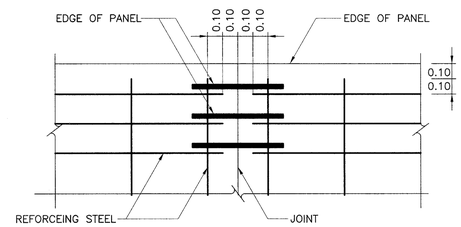
TYPICAL SECTION FOR FLAT AREA

NOT TO SCALE



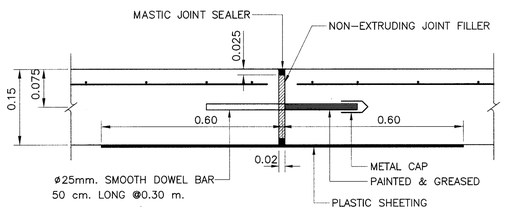
REINFORCEMENT DETAIL OF CONCRETE PAVEMENT CROSS-SECTION

NOT TO SCALE



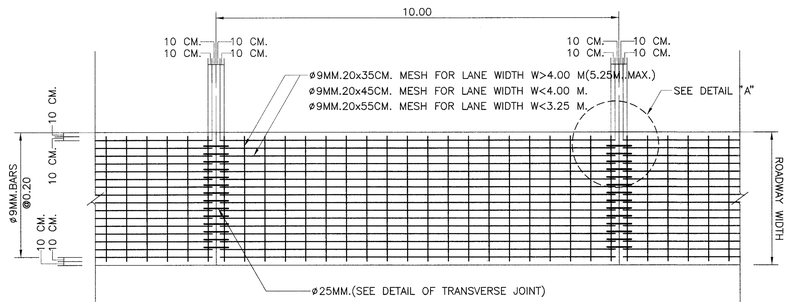
DETAIL "A"

NOT TO SCALE



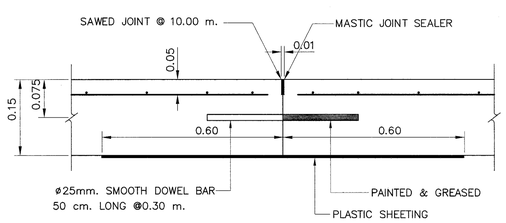
DETAIL OF EXPANSION JOINT

NOT TO SCALE



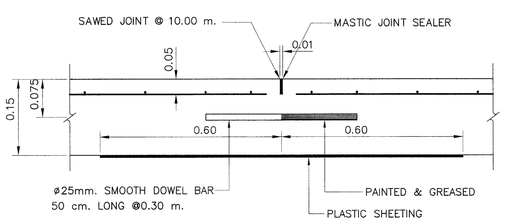
PLAN OF REINFORCEMENT CONCRETE PAVEMENT

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.

NO.	DATE	REVISIONS	CHECKED	APPROVED
3				
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MINISTRY OF ENERGY

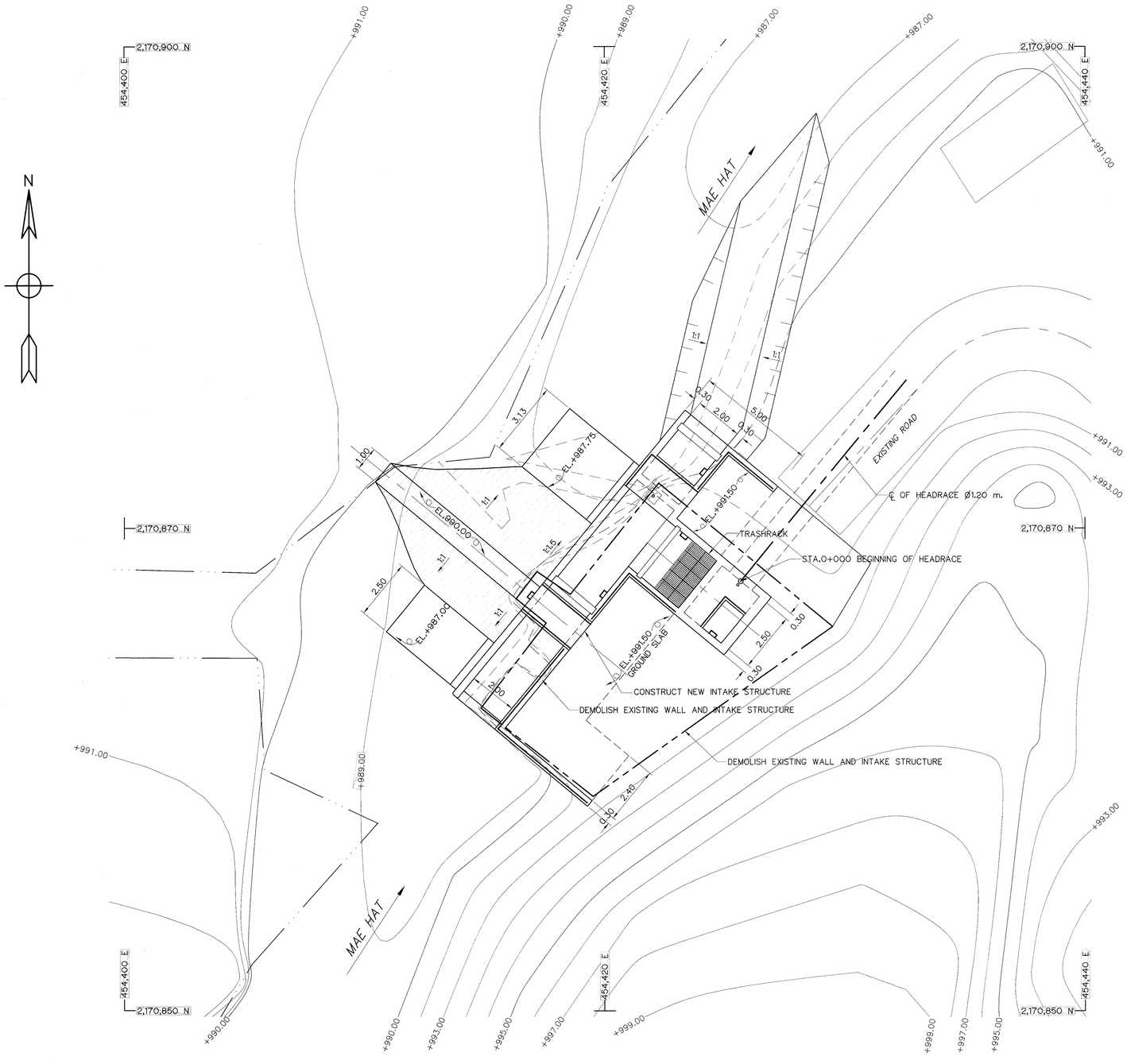
MAE HAT HYDROPOWER PROJECT

ELECTRO-MECHANICAL EQUIPMENT
ACCESS ROAD
TYPICAL SECTION AND DETAILS

P&C MANAGEMENT CO.,LTD.

Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY

REVIEWED			
DESIGNED	วิศ.64624	วิศ.6226	SUBMITTED Chanit
DRAWN			RECOMMENDED
CHECKED		วิศ.6226	APPROVED P. Hanrell
PROJECT MANAGER		08/03/2559 DATE	DRAWING NO. MH-AR-05 / SHEET NO. 10 OF 51



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

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

MAE HAT HYDROPOWER PROJECT

ELECTRO-MECHANICAL EQUIPMENT
WEIR
GENERAL LAYOUT PLAN

NO.	DATE	REVISIONS	CHECKED	APPROVED
3				
2				
1				

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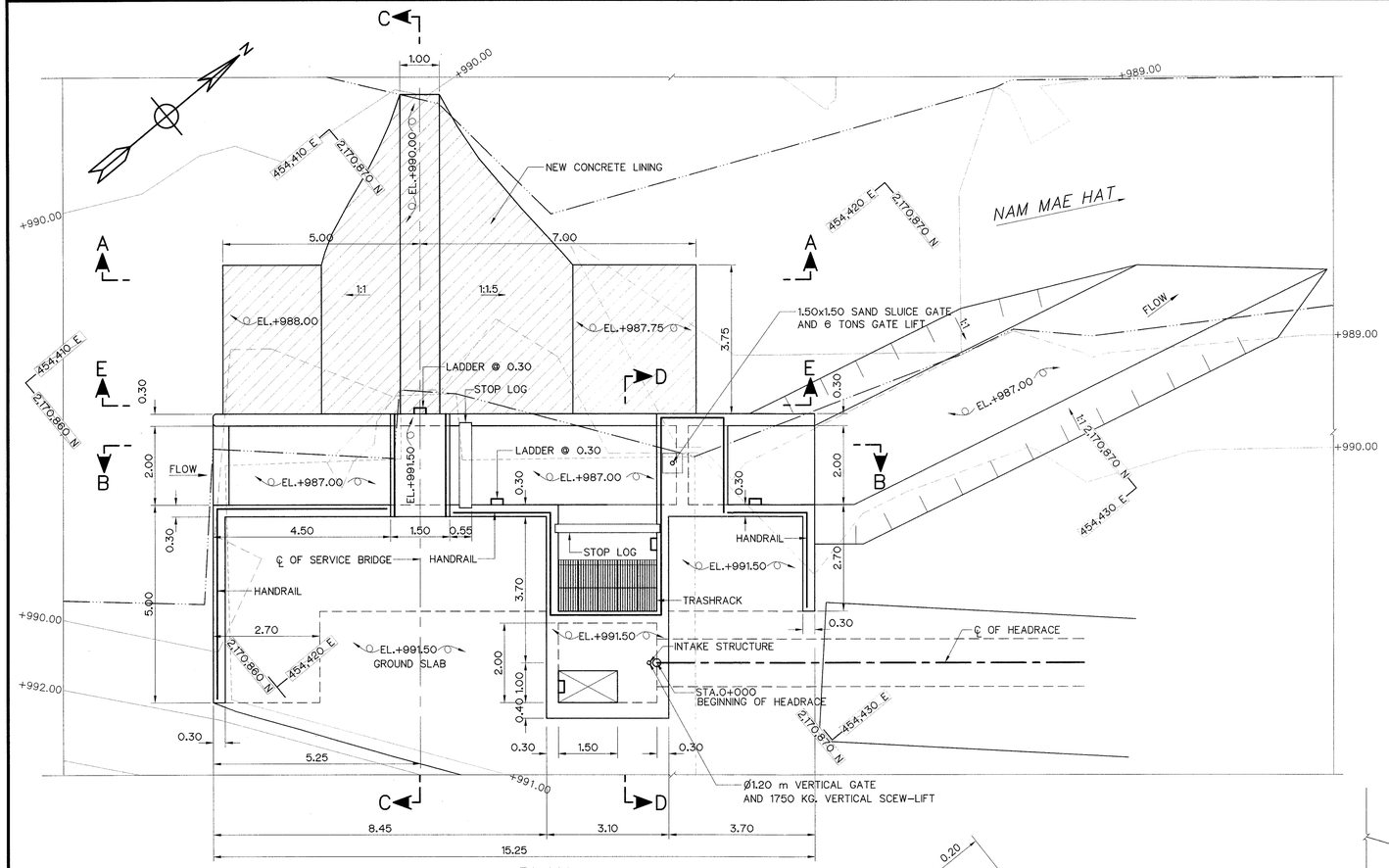
DESIGNED สธ.64624 สธ.6226
DRAWN
CHECKED สธ.6226
PROJECT MANAGER 08/03/2559 DATE

Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY

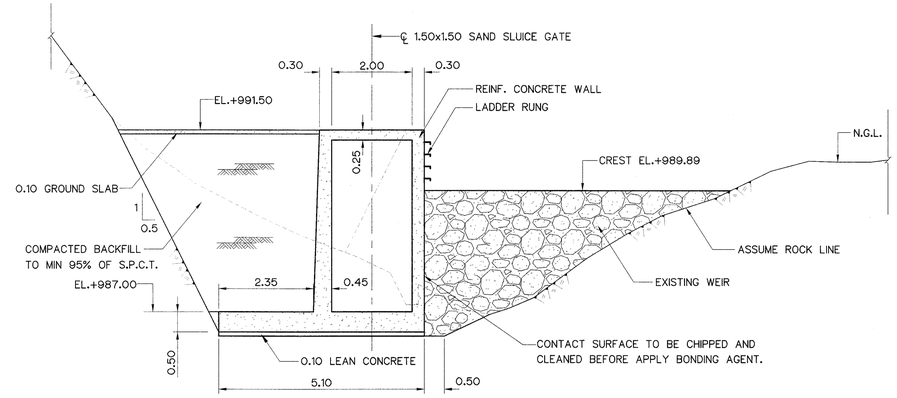
REVIEWED
SUBMITTED
RECOMMENDED
APPROVED

DRAWING NO. MH-WE-01

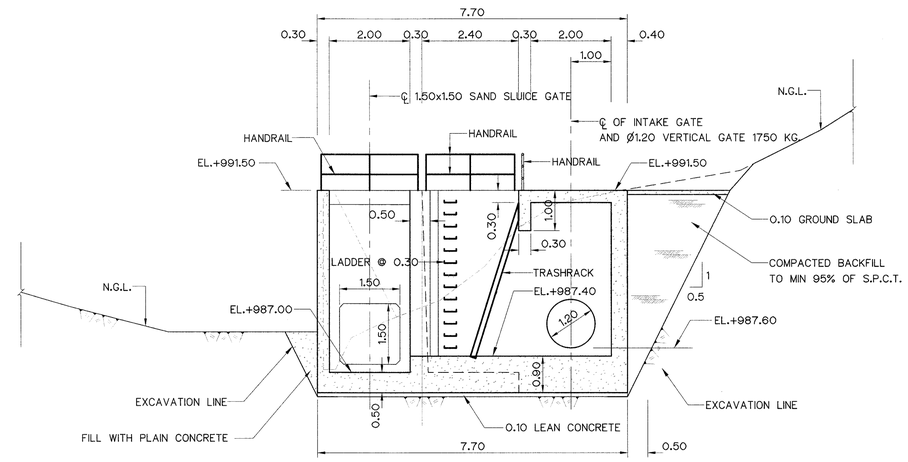
SHEET NO. 11 OF 51



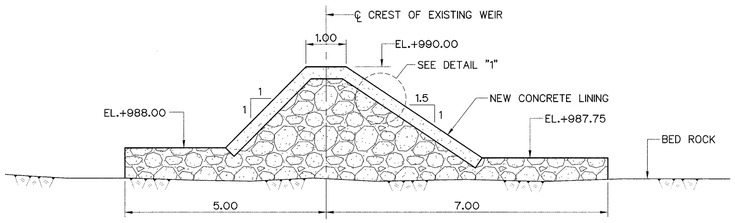
PLAN
SCALE 1:75



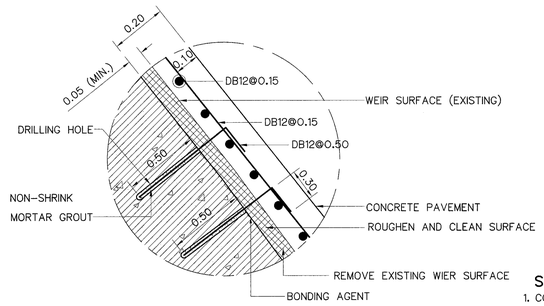
SECTION C–C
SCALE 1:75



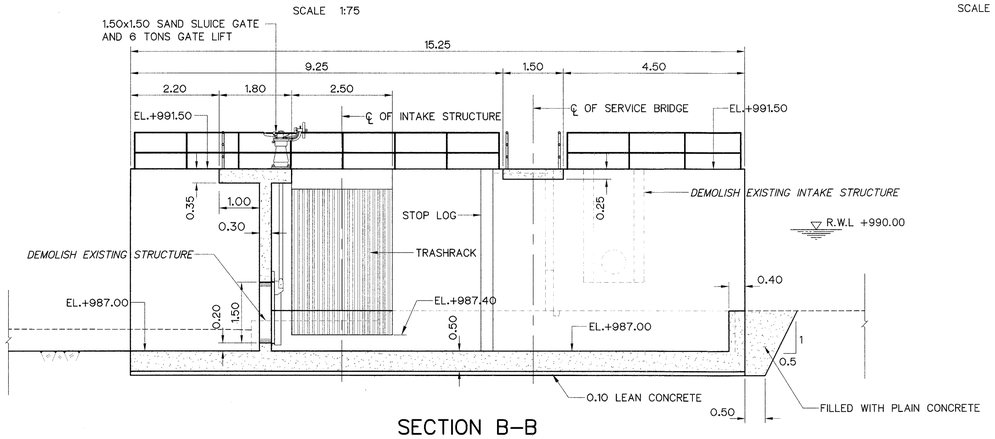
SECTION D–D
SCALE 1:75



SECTION A–A
SCALE 1:75



DETAIL "1"
SCALE 1:10



SECTION B–B
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	DETAIL OF REHABILITATION	MH-WE-03
2. WEIR	REINFORCEMENT DETAILS	MH-WE-04
3. WEIR	MISCELLANEOUS DETAILS	MH-WE-06
4. WEIR	1.50x1.50 SAND SLUICE GATE	MH-WE-07
5. WEIR	Ø1.20 VERTICAL GATE	MH-WE-09

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.

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

ELECTRO-MECHANICAL EQUIPMENT
WEIR
PLAN AND SECTIONS

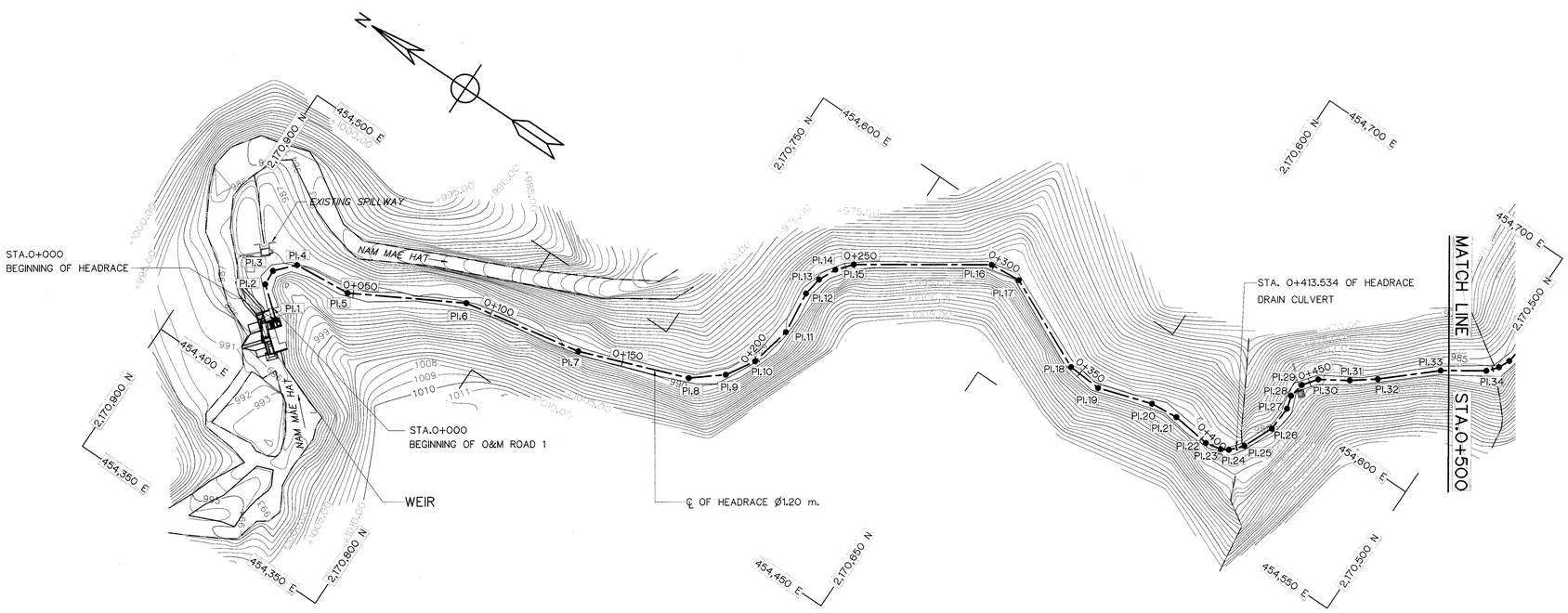
P&C MANAGEMENT CO.,LTD.

Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY

DESIGNED	วิชิต 64624	สิริ 6226	REVIEWED
DRAWN			SUBMITTED
CHECKED		สิริ 6226	RECOMMENDED
PROJECT MANAGER		03/03/2559 DATE	APPROVED

DRAWING NO. MH-WE-02

SHEET NO. 12 OF 51

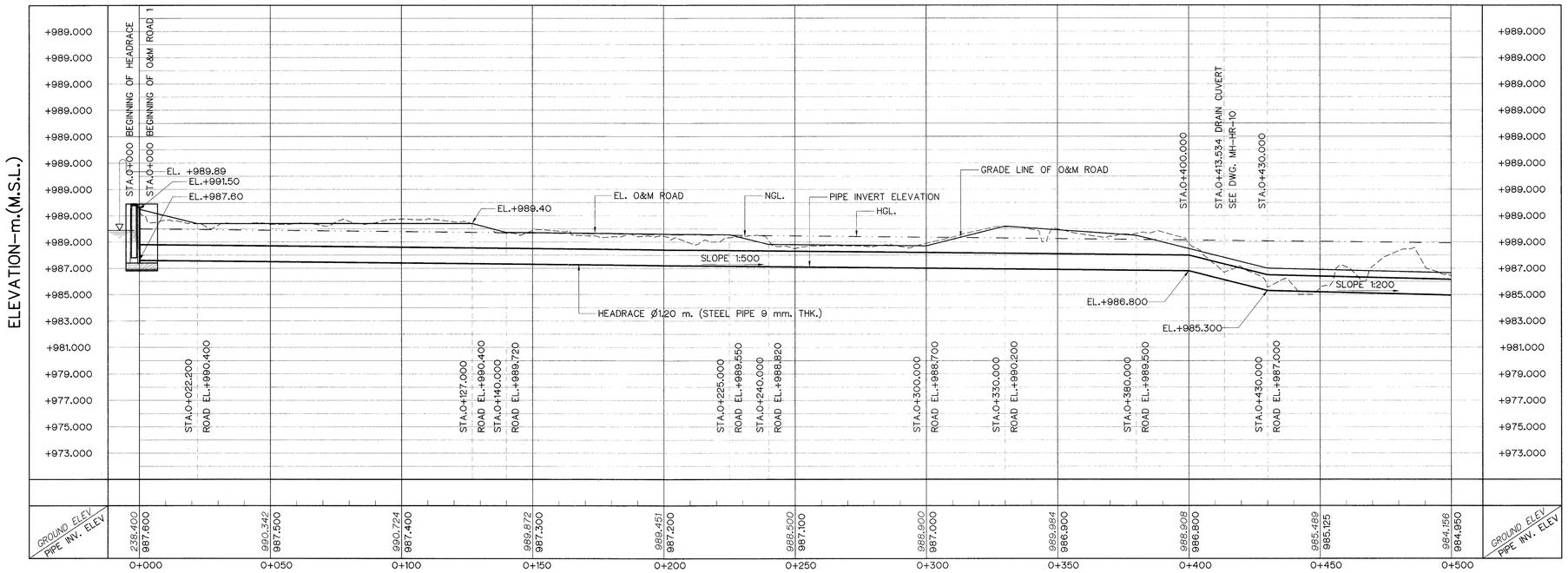


PLAN

SCALE 1:1,000

HORIZONTAL CURVE OF HEADRACE

NO. PI.	COORDINATE OF PI.		PI. TO PI.	DEFLECTION ANGLE (△)	PI. STA.	BEARING
	N	E	(m)	(° – ' – ")	(km)	(N/S ° – ' – " E/W)
PI.1	2,170,867.819	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	S 10°– 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	S 17°– 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. HEADRACE CONCRETE PIER — 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

ELECTRO–MECHANICAL EQUIPMENT
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

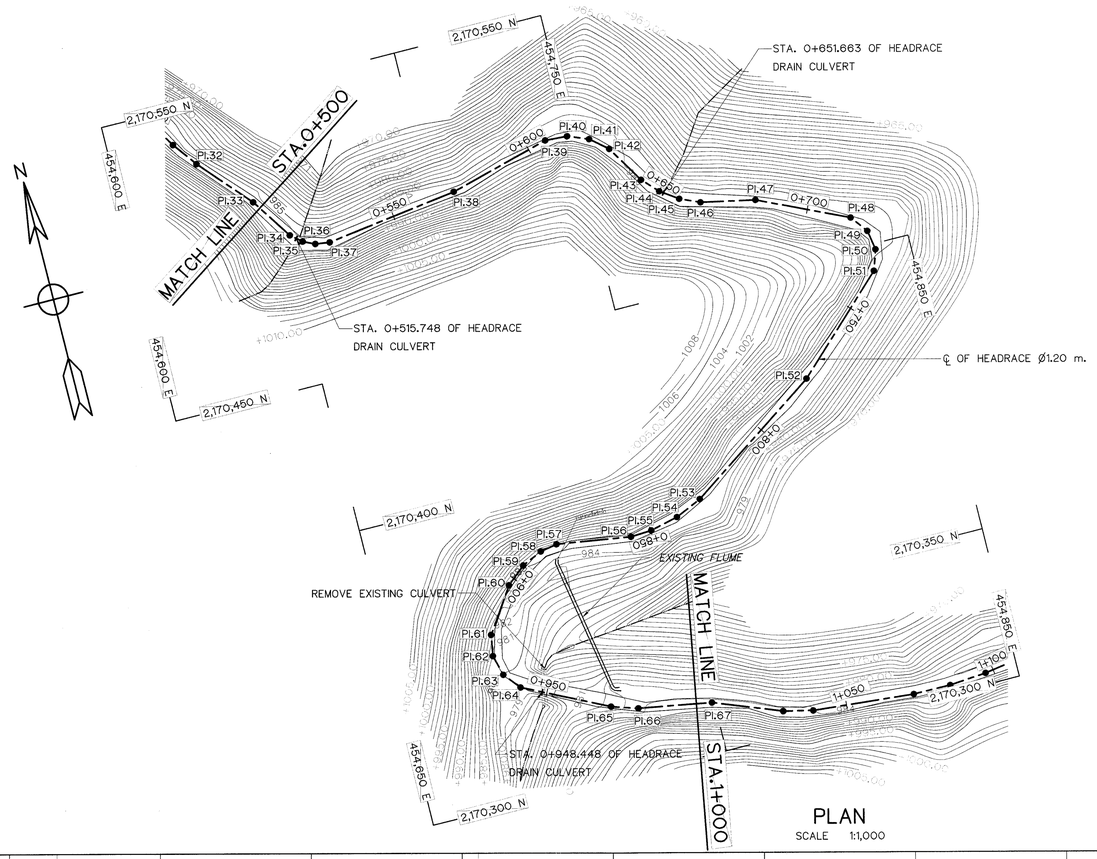
REVIEWED
SUBMITTED
RECOMMENDED
APPROVED P. Hanoff

DESIGNED นิติ.64624 วิ.6226
DRAWN
CHECKED วิ.6226

PROJECT MANAGER — DATE 08/03/2559

DRAWING NO. MH–HR–01

SHEET NO. 13 OF 51



PLAN

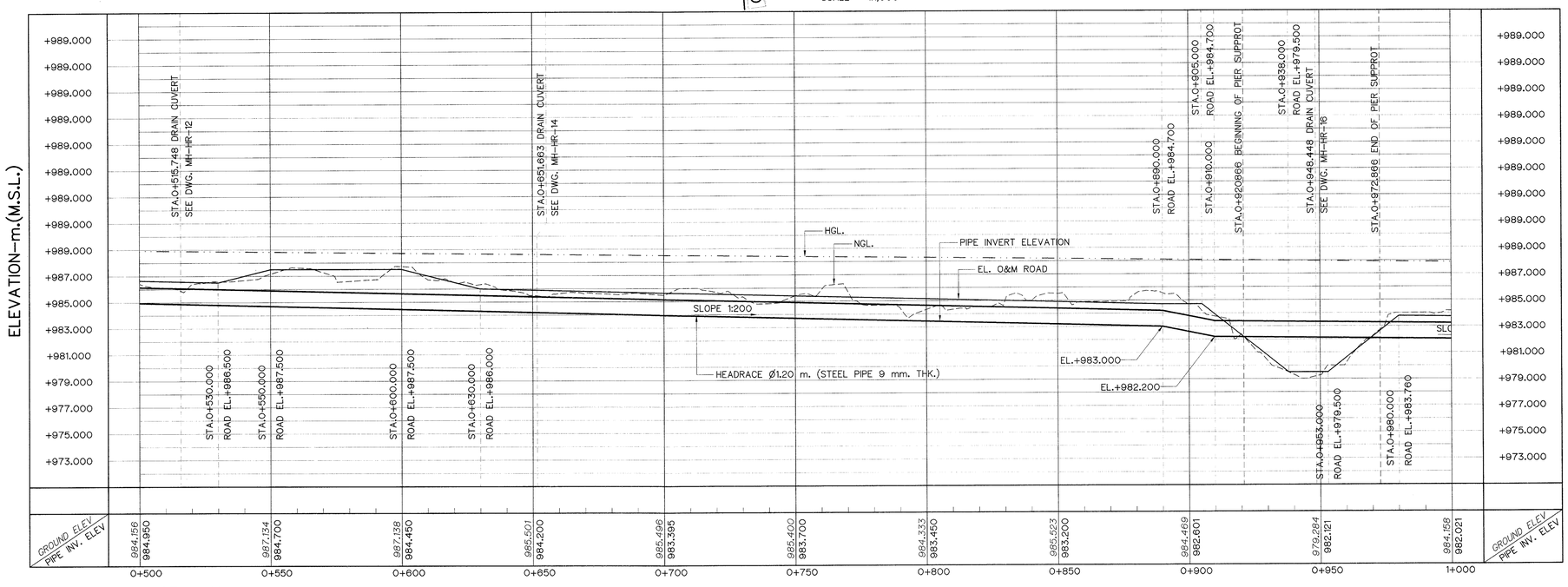
SCALE 1:1,000

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.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	S66°– 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	S66°– 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

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+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

NO.	DATE	REVISIONS	CHECKED	APPROVED
3				
2				
1				

CONSULTANTS | DEDE

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

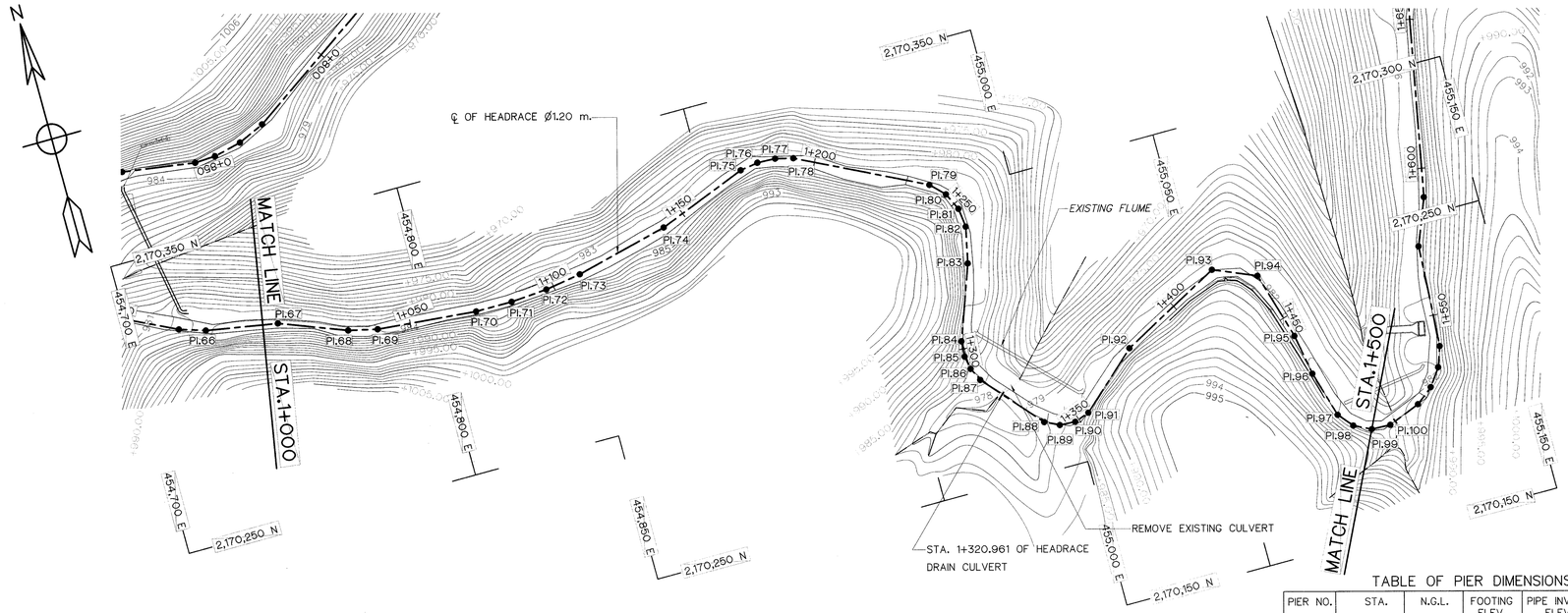
MAE HAT HYDROPOWER PROJECT

ELECTRO–MECHANICAL EQUIPMENT
HEADRACE
PLAN AND PROFILE, STA. 0+500 TO STA. 1+000

P&C MANAGEMENT CO.,LTD.

Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY

REVIEWED		
DESIGNED	สธ.64624	SUBMITTED สธ.6226
DRAWN		RECOMMENDED
CHECKED	สธ.6226	APPROVED
PROJECT MANAGER	08/03/2559 DATE	DRAWING NO. MH–HR–02
		SHEET NO. 14 OF 51



PLAN

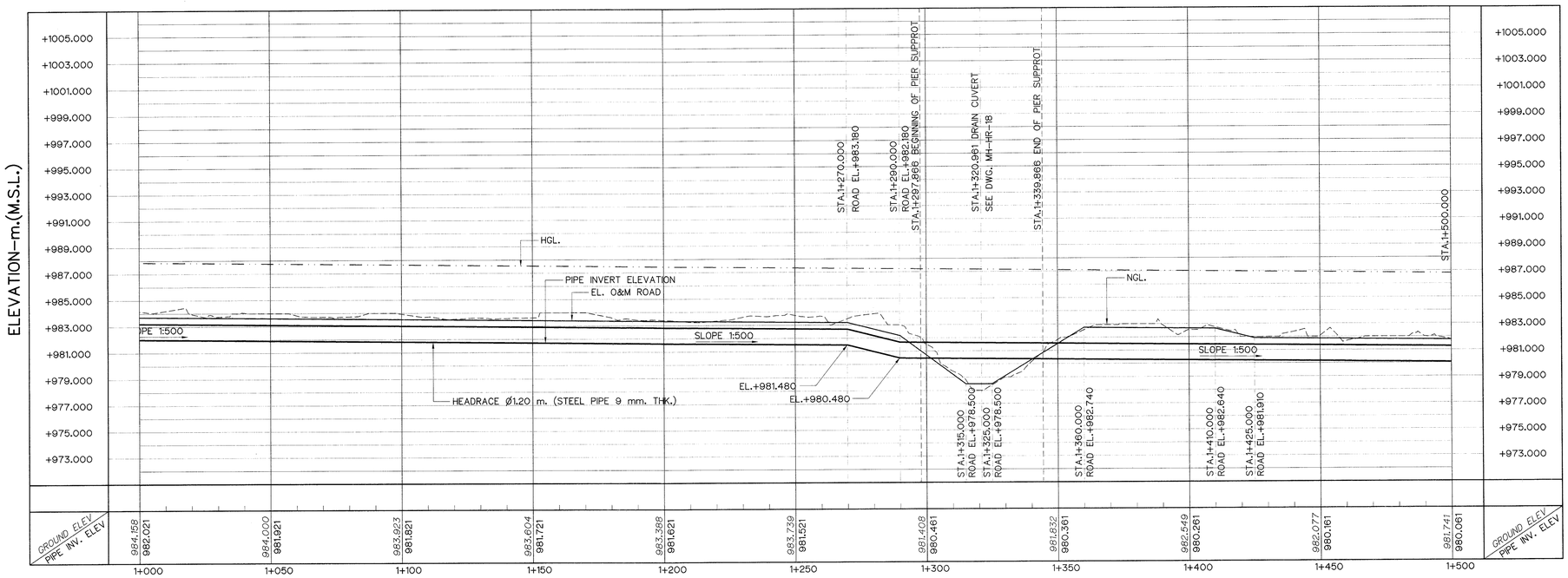
SCALE 1:1,000

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.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

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	



PROFILE

VERTICAL SCALE 1:200

HORIZONTAL SCALE 1:1,000

SCALE 1:200 METERS

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 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

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

ELECTRO–MECHANICAL EQUIPMENT
HEADRACE
PLAN AND PROFILE, STA. 1+000 TO STA. 1+500

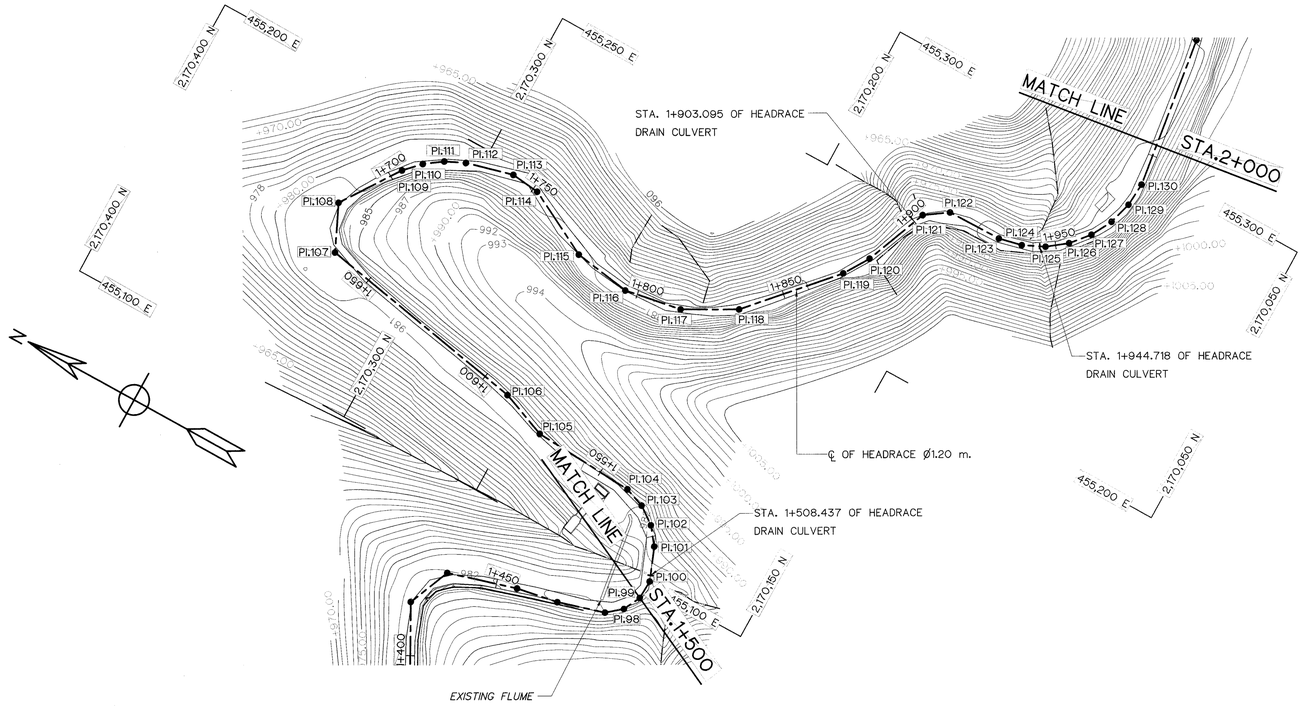
P&C MANAGEMENT CO.,LTD.

DESIGNED สิริ.64624 สิริ.6226
DRAWN
CHECKED สิริ.6226
PROJECT MANAGER — DATE 08/03/2559

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

DRAWING NO. MH–HR–03

SHEET NO. 15 OF 51

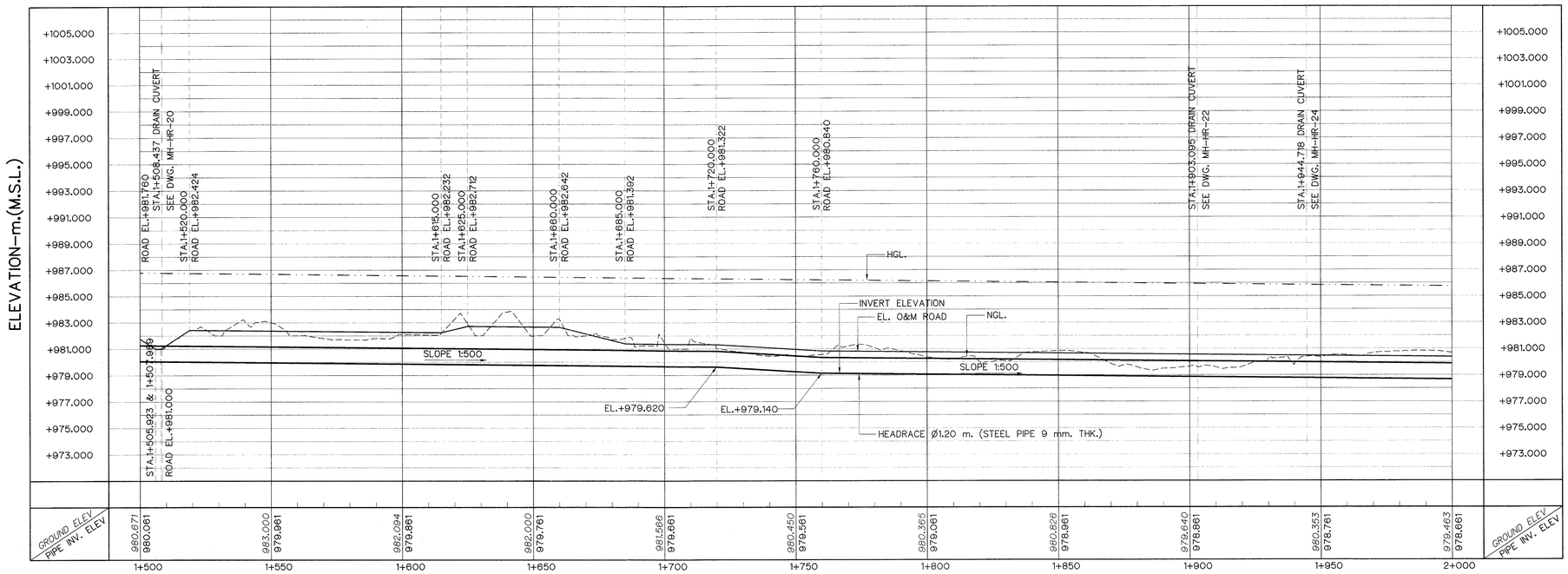


PLAN

SCALE 1:1,000

HORIZONTAL CURVE OF HEADRACE

NO. PI.	COORDINATE OF PI.		PI. TO PI.	DEFLECTION ANGLE (△)	PI. STA.	BEARING
	N	E	(m)	(° – ' – ")	(km)	(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

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. 1+000 TO STA. 1+500 — MH–HR–03
2. HEADRACE PLAN AND PROFILE, STA. 2+500 TO STA.2+097.998 — MH–HR–05
3. HEADRACE TYPICAL SECTIONS — MH–HR–06
4. HEADRACE CONCRETE PIER — 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

ELECTRO–MECHANICAL EQUIPMENT
HEADRACE
PLAN AND PROFILE, STA. 1+500 TO STA. 2+000

P&C MANAGEMENT CO.,LTD.

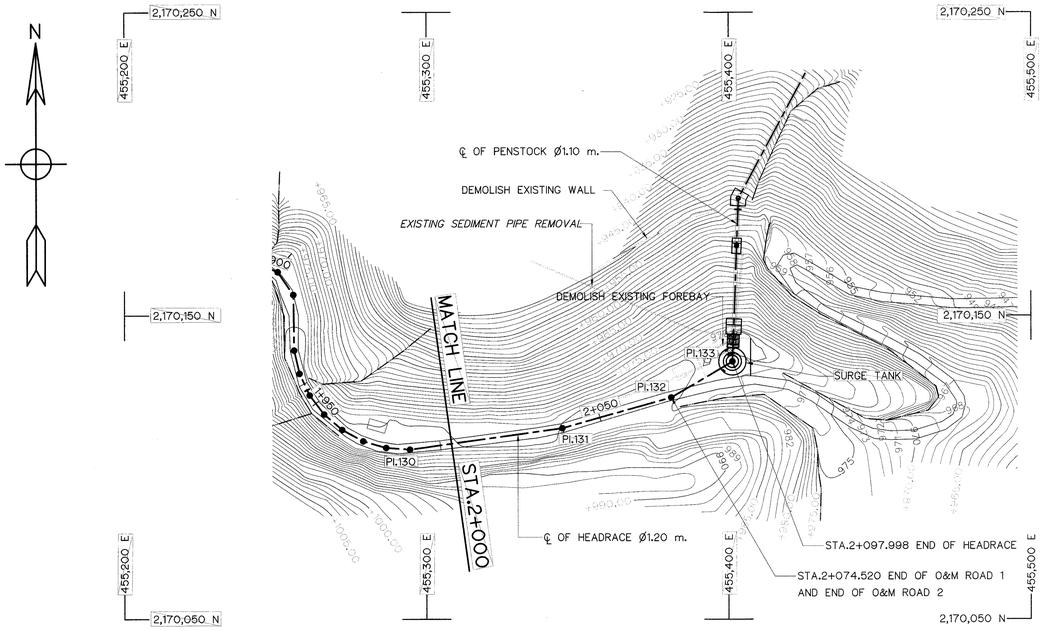
Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY

DESIGNED — REJ.64624 — REJ.6226
DRAWN
CHECKED — REJ.6226
PROJECT MANAGER — DATE 08/03/2559

REVIEWED
SUBMITTED
RECOMMENDED
APPROVED

DRAWING NO. MH–HR–04

SHEET NO. 16 OF 51

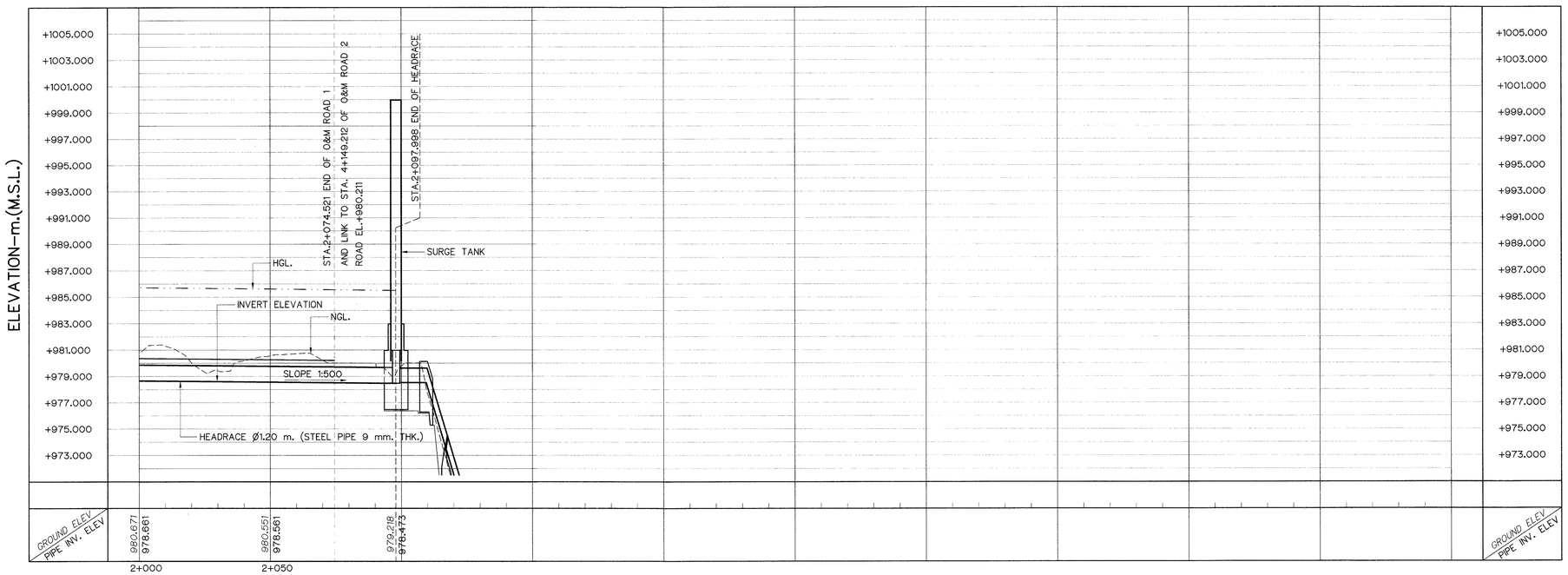


PLAN

SCALE 1:1,000

HORIZONTAL CURVE OF HEADRACE

NO. PI.	COORDINATE OF PI.		PI. TO PI.	DEFLECTION ANGLE (△)	PI. STA.	BEARING
	N	E	(m)	(° – ' – ")	(km)	(N/S ° – ' – " E/W)
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.
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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

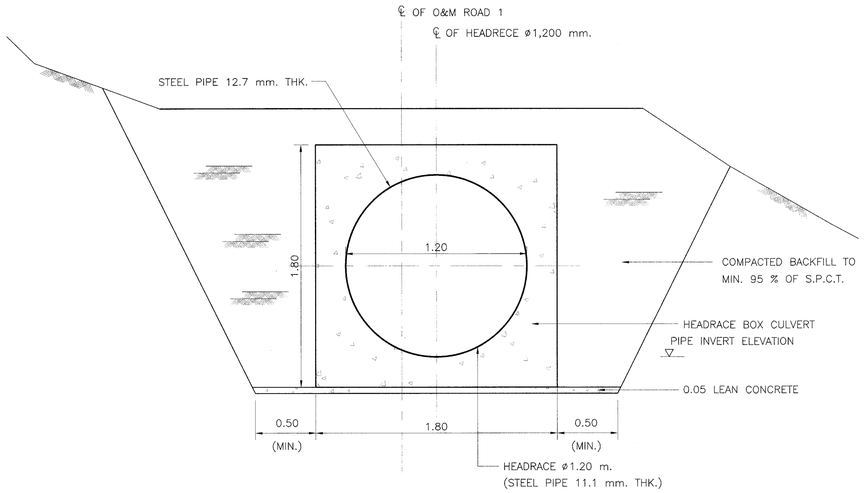
ELECTRO–MECHANICAL EQUIPMENT
HEADRACE
PLAN AND PROFILE, STA. 2+000 TO STA. 2+097.998

P&C MANAGEMENT CO.,LTD.

DESIGNED — สถ.64624 — สถ.6226
DRAWN
CHECKED — สถ.6226
PROJECT MANAGER — 01/03/2559 — DATE

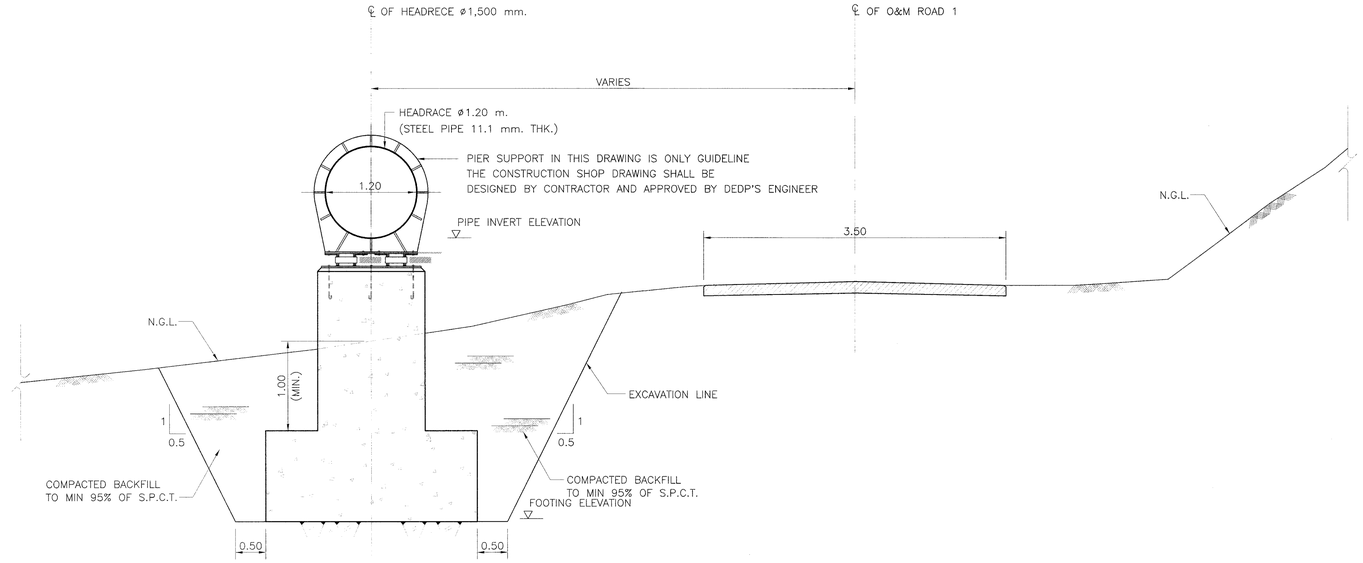
Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY
REVIEWED
SUBMITTED
RECOMMENDED
APPROVED

DRAWING NO. MH–HR–05
SHEET NO. 17 OF 51



EARTH EXCAVATION

NOT TO SCALE

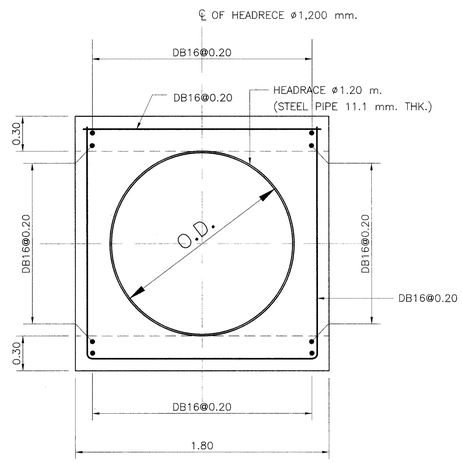


CONCRETE PIER

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 CONCRETE PIER 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

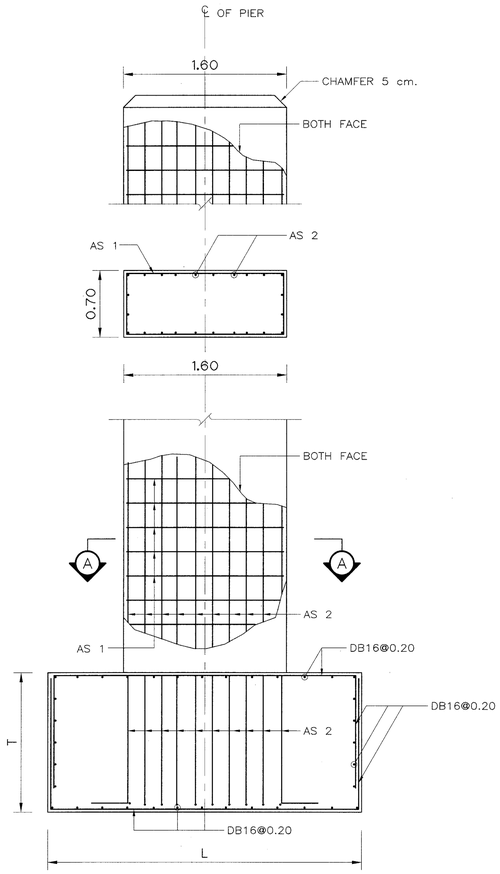
ELECTRO-MECHANICAL EQUIPMENT
HEADRACE
TYPICAL SECTIONS

P&C MANAGEMENT CO.,LTD.

DESIGNED ..., 21.64624 ..., 21.6226
DRAWN ...
CHECKED ..., 21.6226
PROJECT MANAGER — DATE 08/03/2559

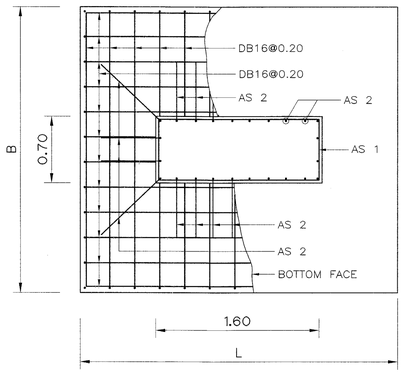
Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY
REVIEWED ...
SUBMITTED ...
RECOMMENDED ...
APPROVED P. Hanroll

DRAWING NO. MH-HR-06
SHEET NO. 18 OF 51



RC. PIER DETAILS

SCALE 1:30

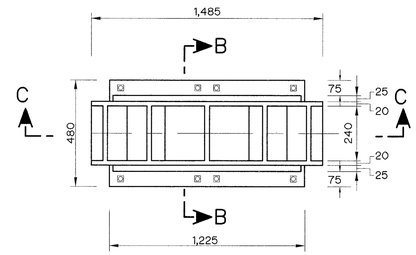


SECTION A–A

SCALE 1:30

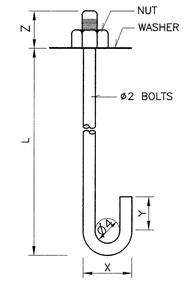
PIER DATA

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



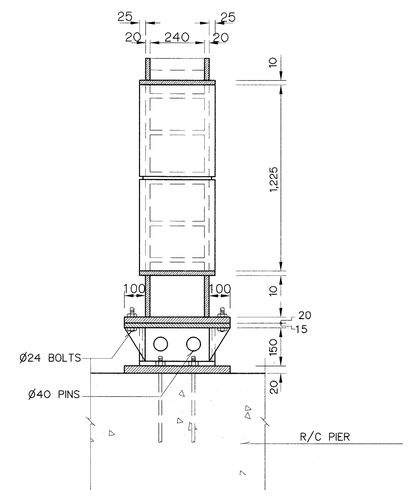
PLAN

NOT TO SCALE



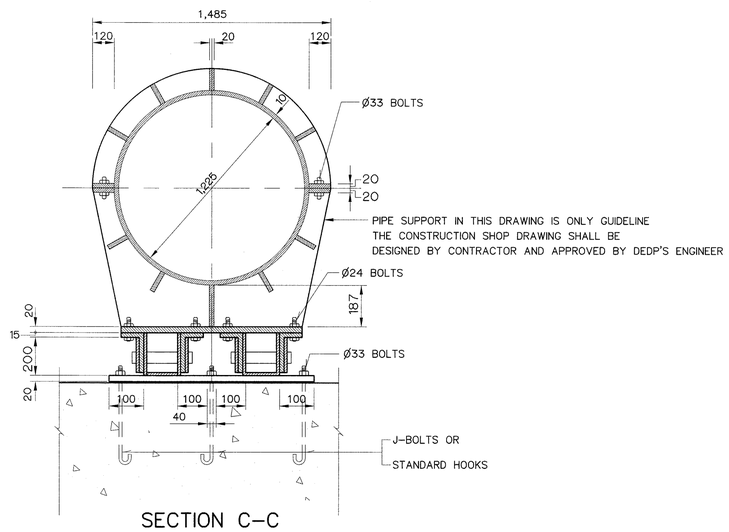
HOOKED BOLT

NOT TO SCALE



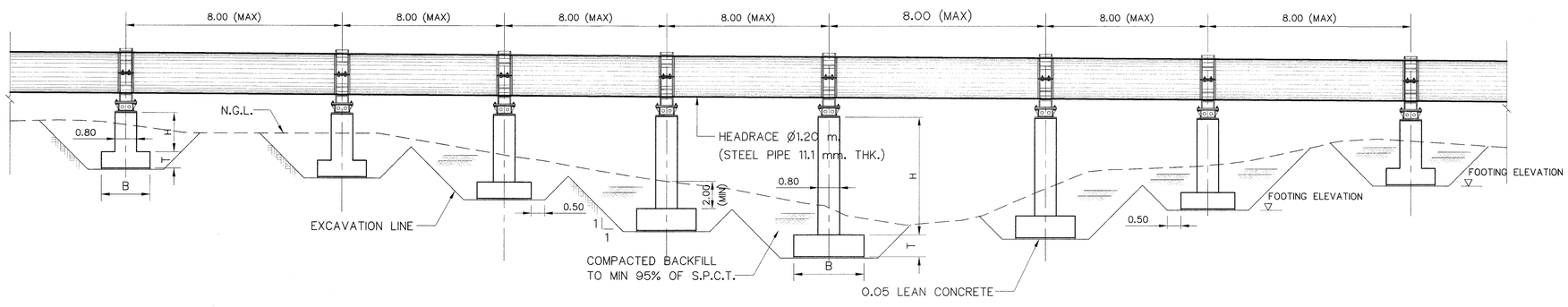
SECTION B–B

NOT TO SCALE



SECTION C–C

NOT TO SCALE



PROFILE OF CONCRETE PIER

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.

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

ELECTRO–MECHANICAL EQUIPMENT
HEADRACE
CONCRETE PIER

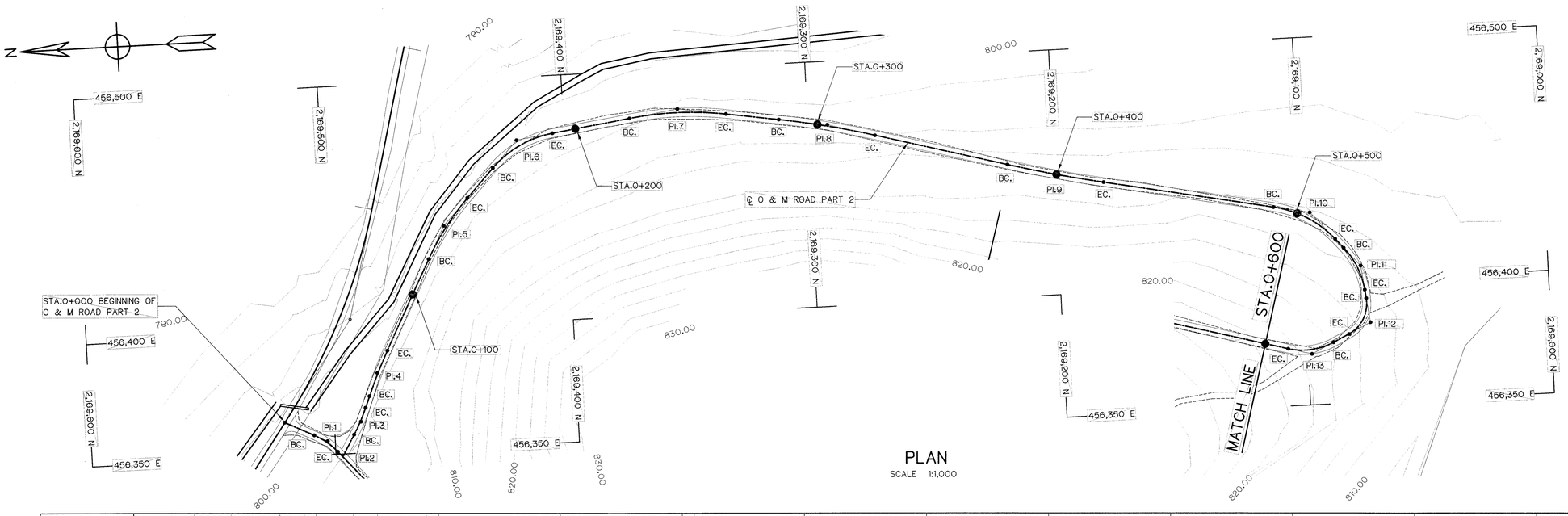
P&C MANAGEMENT CO.,LTD.

Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY

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

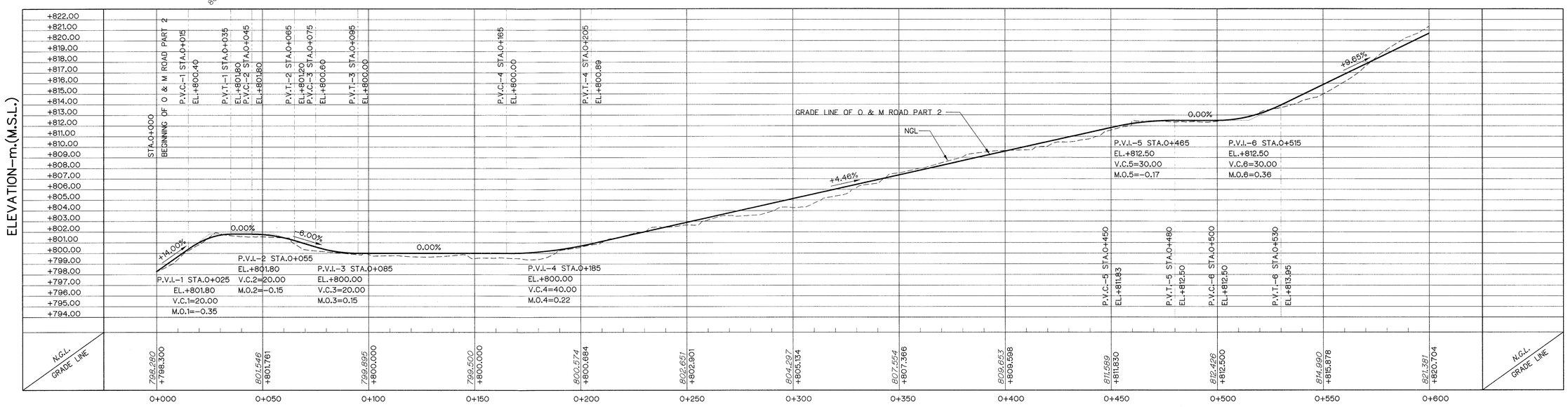
DRAWING NO. MH–HR–07

SHEET NO. 19 OF 51



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

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

ELECTRO–MECHANICAL EQUIPMENT
O&M ROAD PART 2
PLAN AND PROFILE, STA. 0+000 TO STA. 0+600

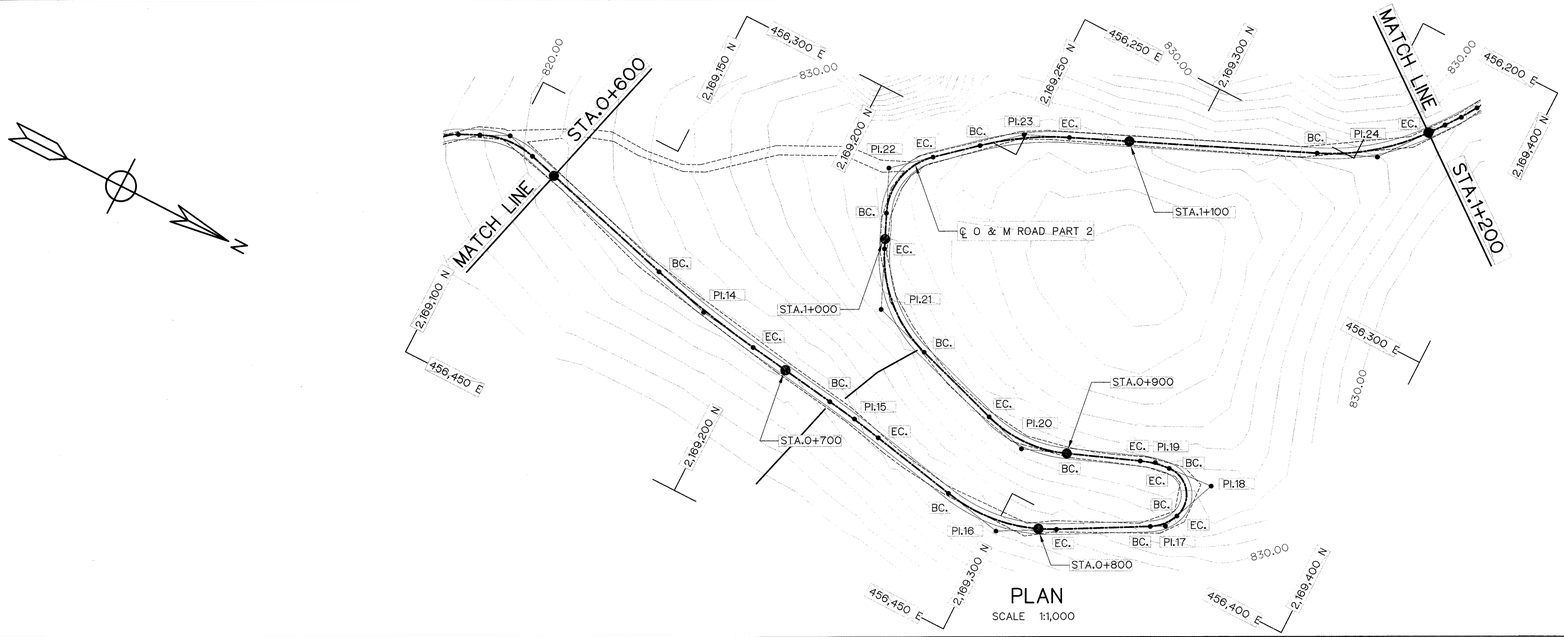
P&C MANAGEMENT CO.,LTD.

Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY

DESIGNED	มี.ค.64624	REVIEWED	
DRAWN		SUBMITTED	
CHECKED	มี.ค.6226	RECOMMENDED	
PROJECT MANAGER	08/03/2559 DATE	APPROVED	

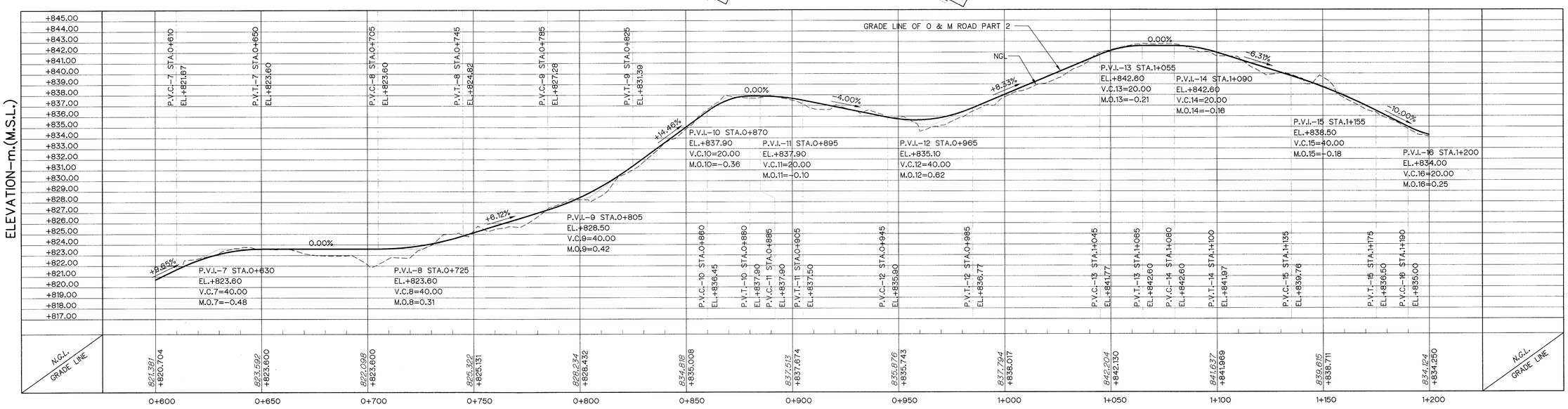
DRAWING NO. MH–OM–01

SHEET NO. 20 OF 51



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

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

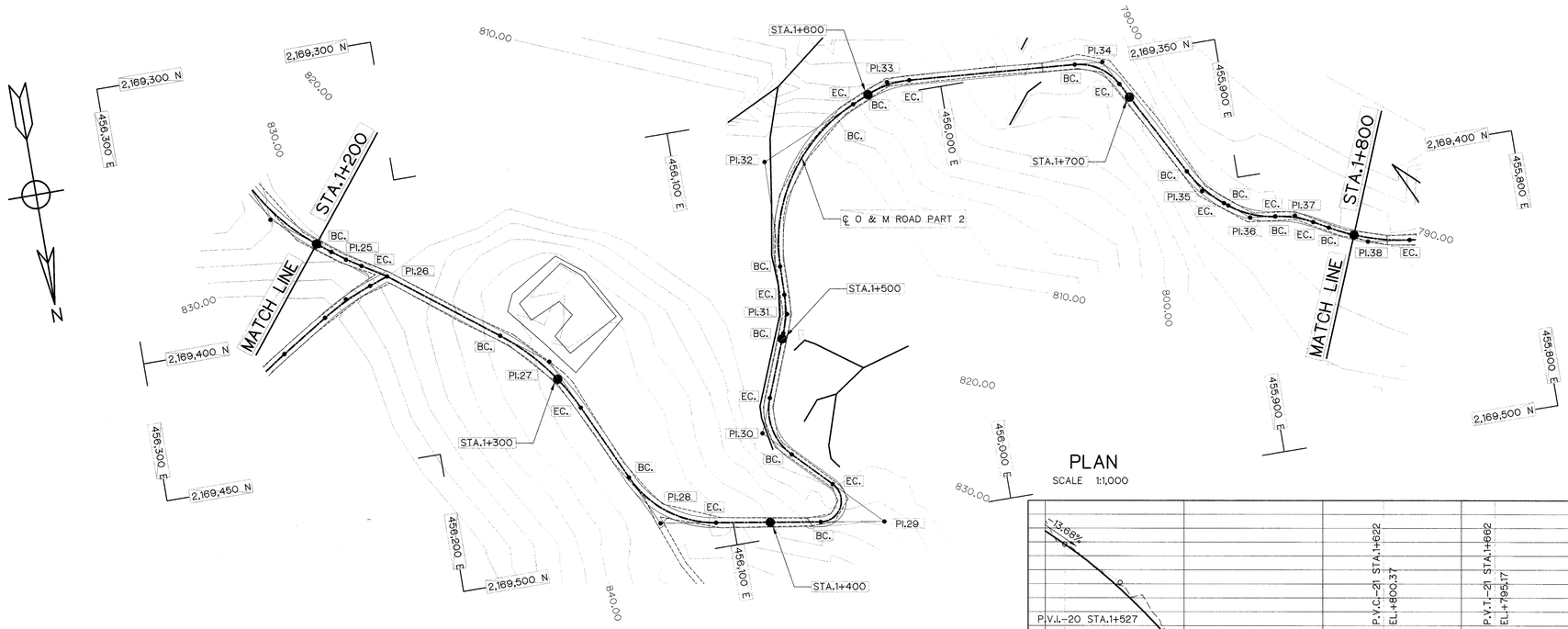
MAE HAT HYDROPOWER PROJECT

ELECTRO–MECHANICAL EQUIPMENT
O&M ROAD PART 2
PLAN AND PROFILE, STA. 0+600 TO STA. 1+200

P&C MANAGEMENT CO.,LTD.

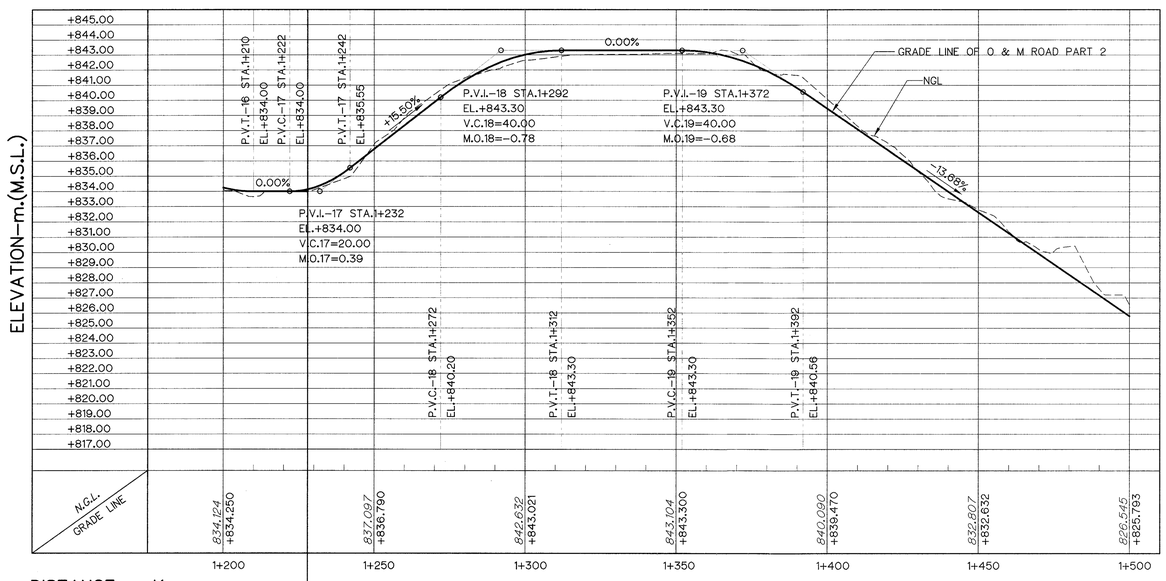
Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY

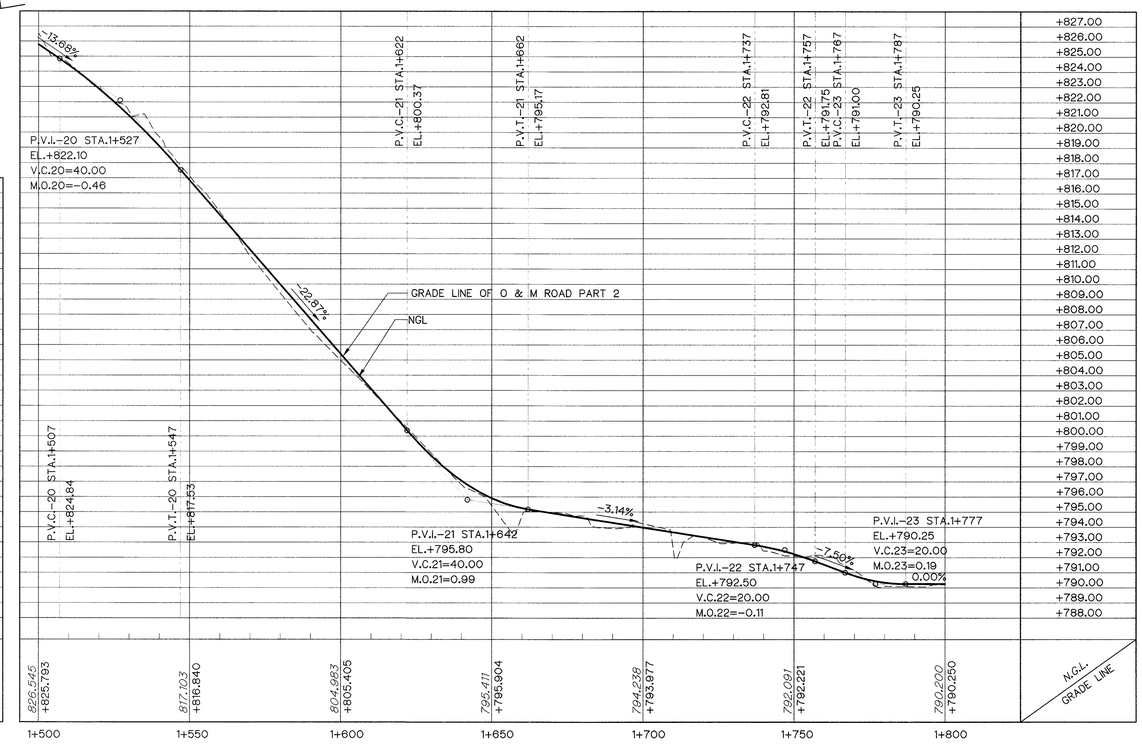
REVIEWED		
DESIGNED	สิริ.64624 สิริ.6226	SUBMITTED
DRAWN		RECOMMENDED
CHECKED	สิริ.6226	APPROVED
PROJECT MANAGER	02/03/2559 DATE	DRAWING NO. MH–OM–02 / SHEET NO. 21 OF 51



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+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

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

ELECTRO–MECHANICAL EQUIPMENT
O&M ROAD PART 2
PLAN AND PROFILE, STA. 1+200 TO STA. 1+800

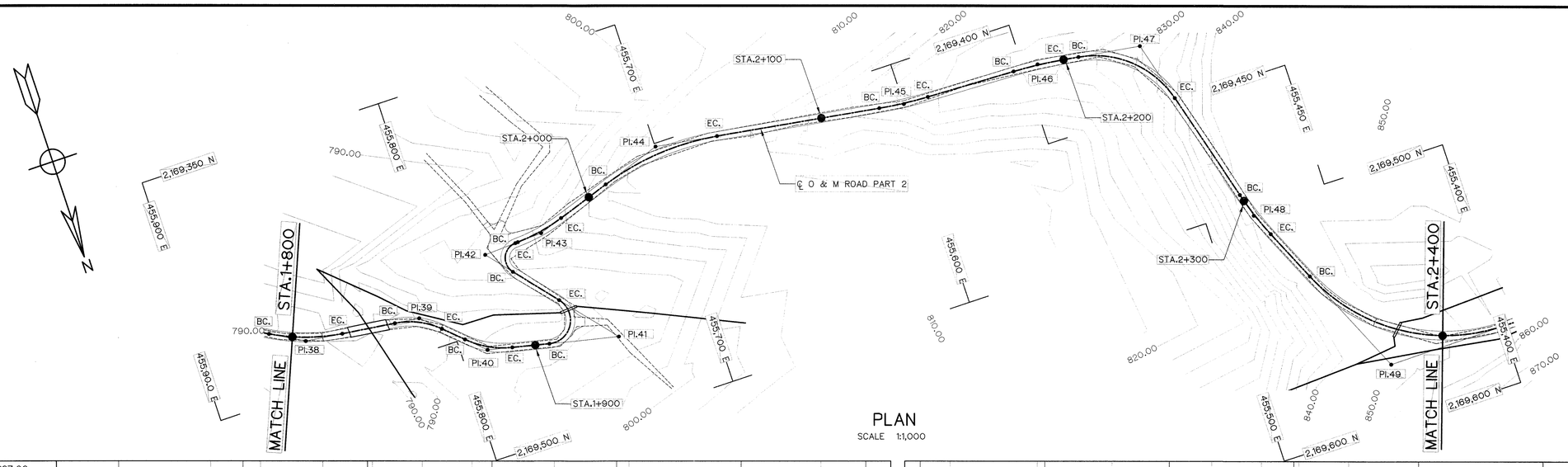
P&C MANAGEMENT CO.,LTD.

Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY

DESIGNED	ภัย.64624	ส.6226	REVIEWED
DRAWN			SUBMITTED
CHECKED		ส.6226	RECOMMENDED
PROJECT MANAGER		DATE 02/03/2559	APPROVED

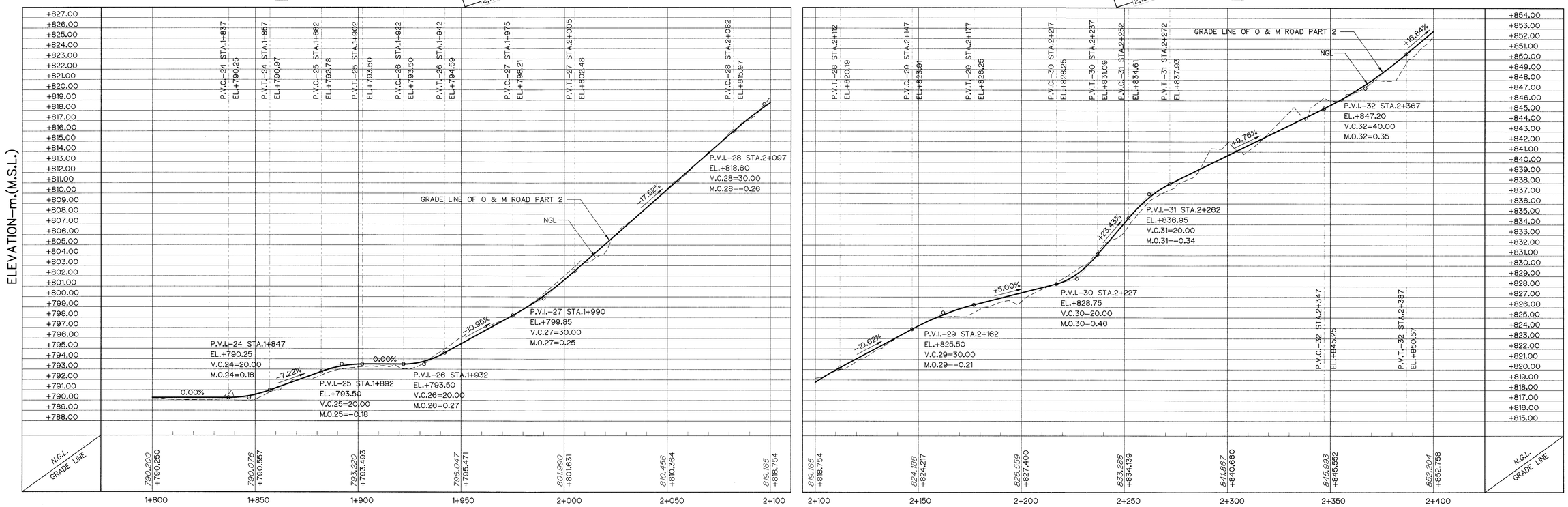
DRAWING NO. MH–OM–03

SHEET NO. 22 OF 51



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

0 5 10 15 METERS — SCALE 1:200

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

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

ELECTRO–MECHANICAL EQUIPMENT
O&M ROAD PART 2
PLAN AND PROFILE, STA. 1+800 TO STA. 2+400

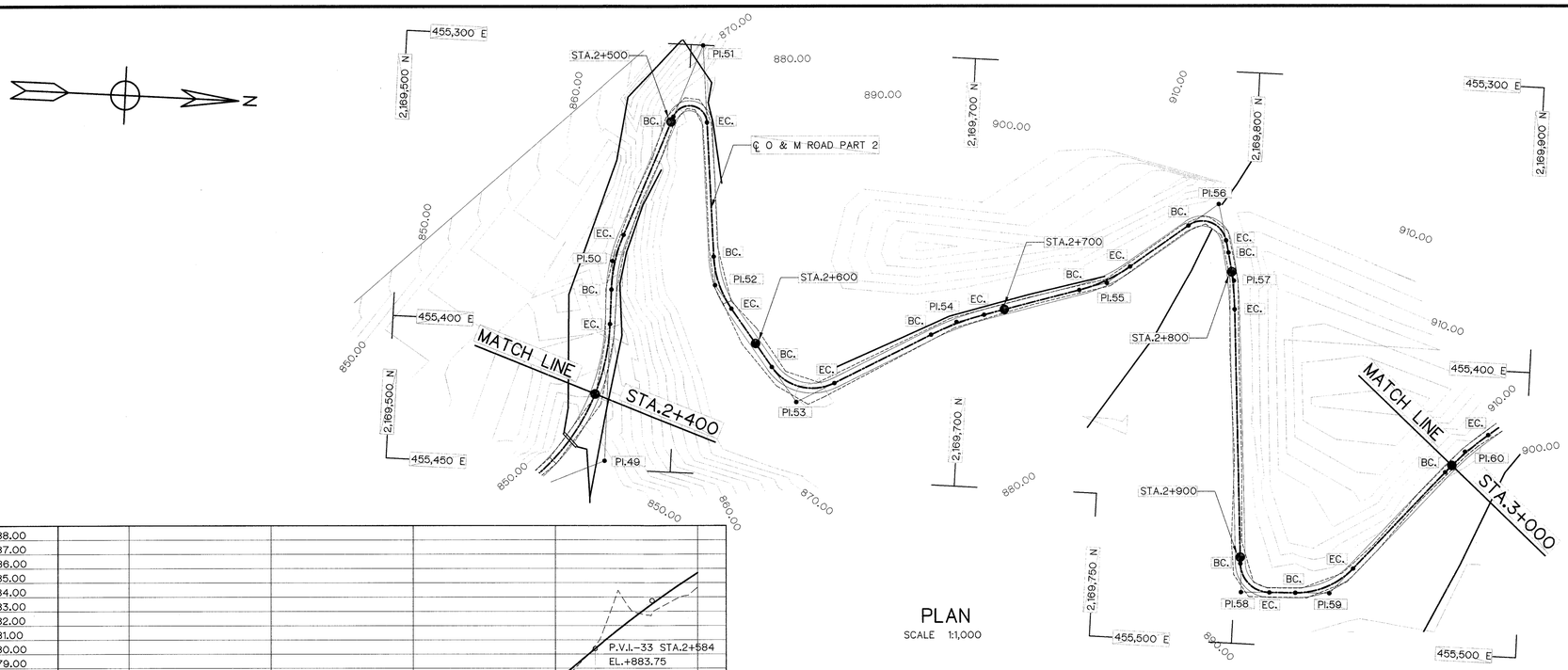
P&C MANAGEMENT CO.,LTD.

Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY

DESIGNED	วิศ.64624	REVIEWED	
DRAWN		SUBMITTED	
CHECKED	วิศ.6226	RECOMMENDED	
PROJECT MANAGER	DATE 08/08/2559	APPROVED	

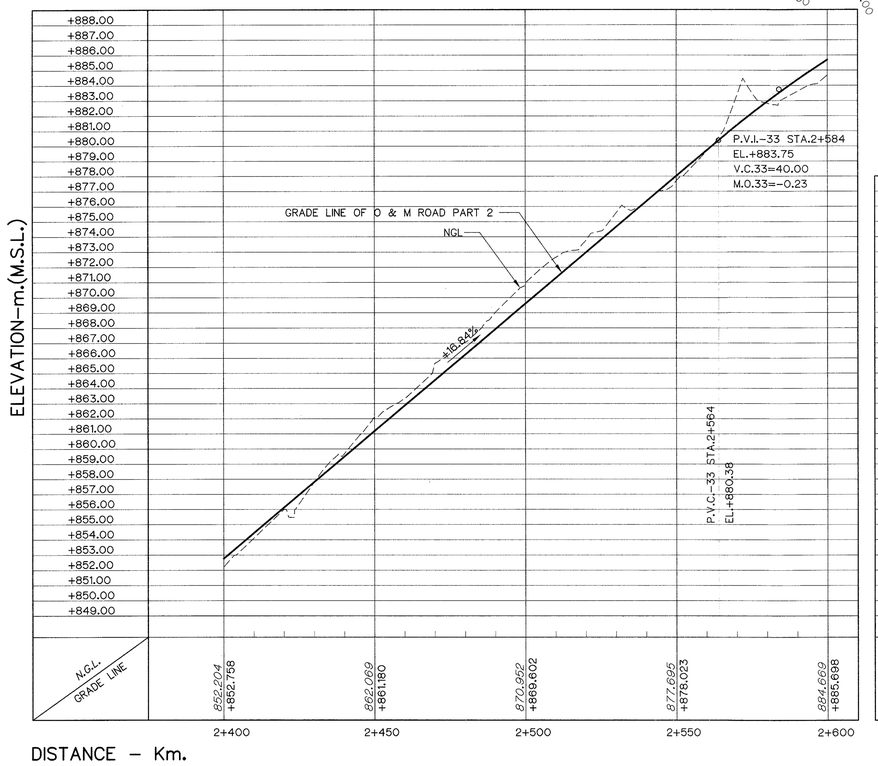
DRAWING NO. MH–OM–04

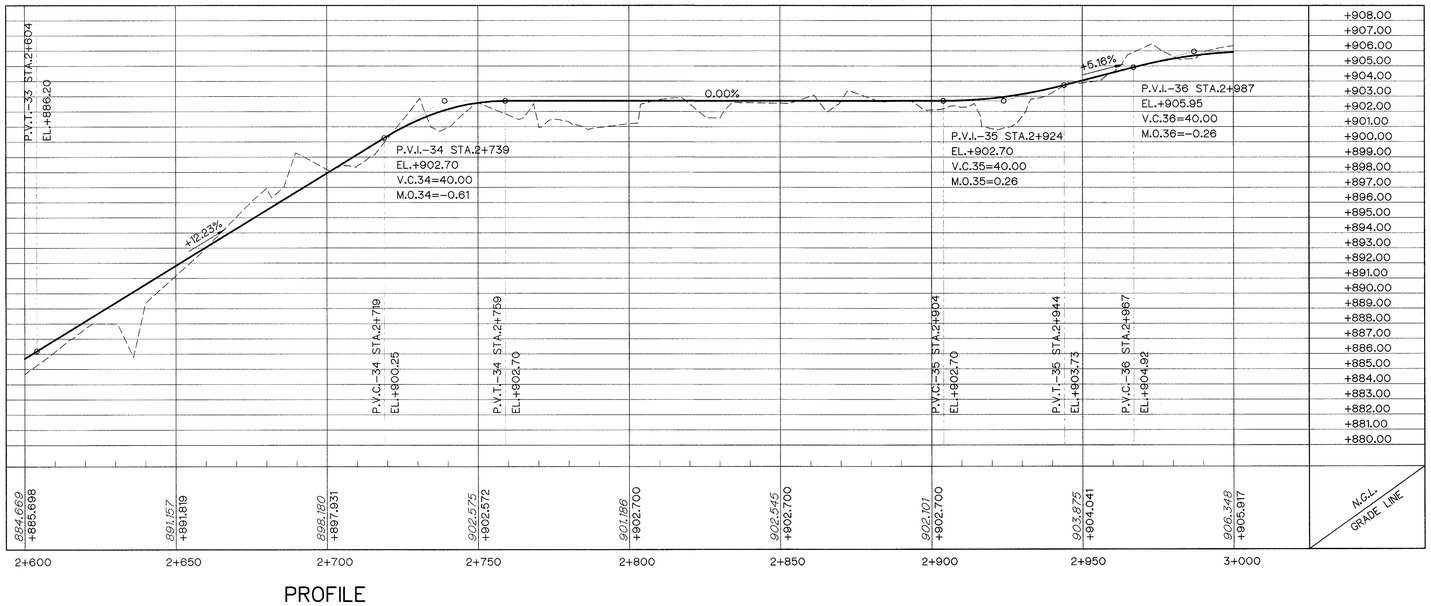
SHEET NO. 23 OF 51



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+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

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

ELECTRO–MECHANICAL EQUIPMENT

O&M ROAD PART 2

PLAN AND PROFILE, STA. 2+400 TO STA. 3+000

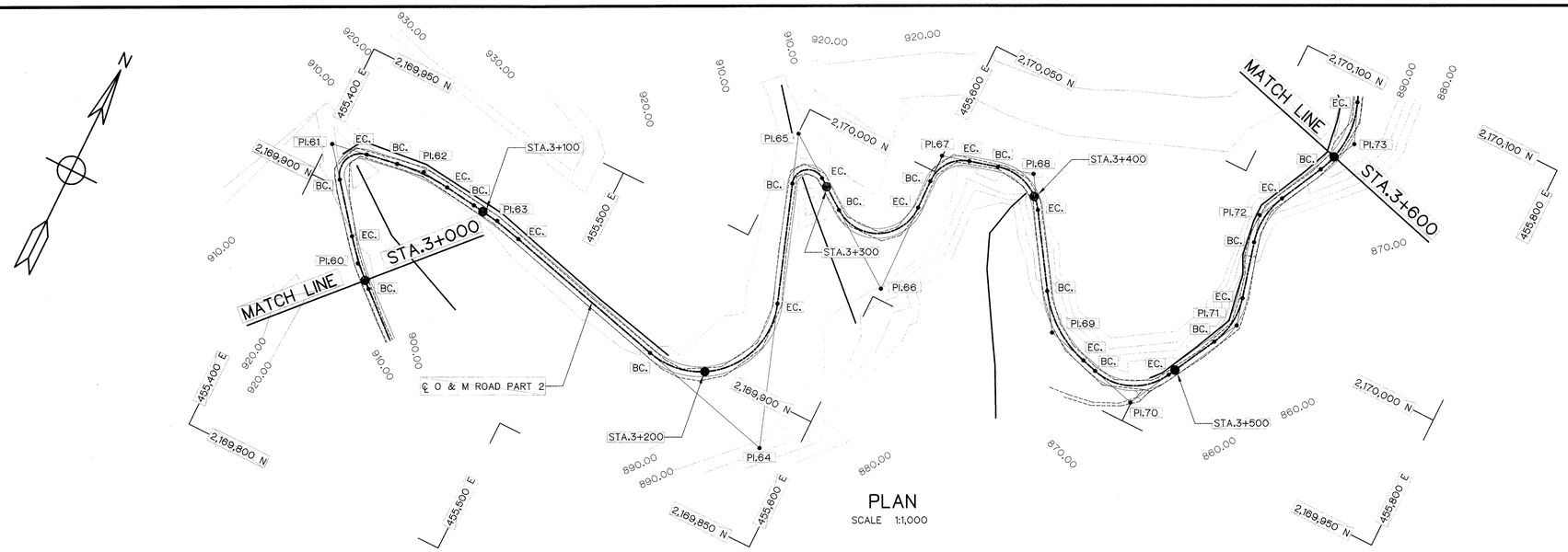
P&C MANAGEMENT CO.,LTD.

Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY

DESIGNED	ส.ค.64624	ส.ค.6226	REVIEWED
DRAWN			SUBMITTED
CHECKED		ส.ค.6226	RECOMMENDED
PROJECT MANAGER	08/03/2564 DATE		APPROVED

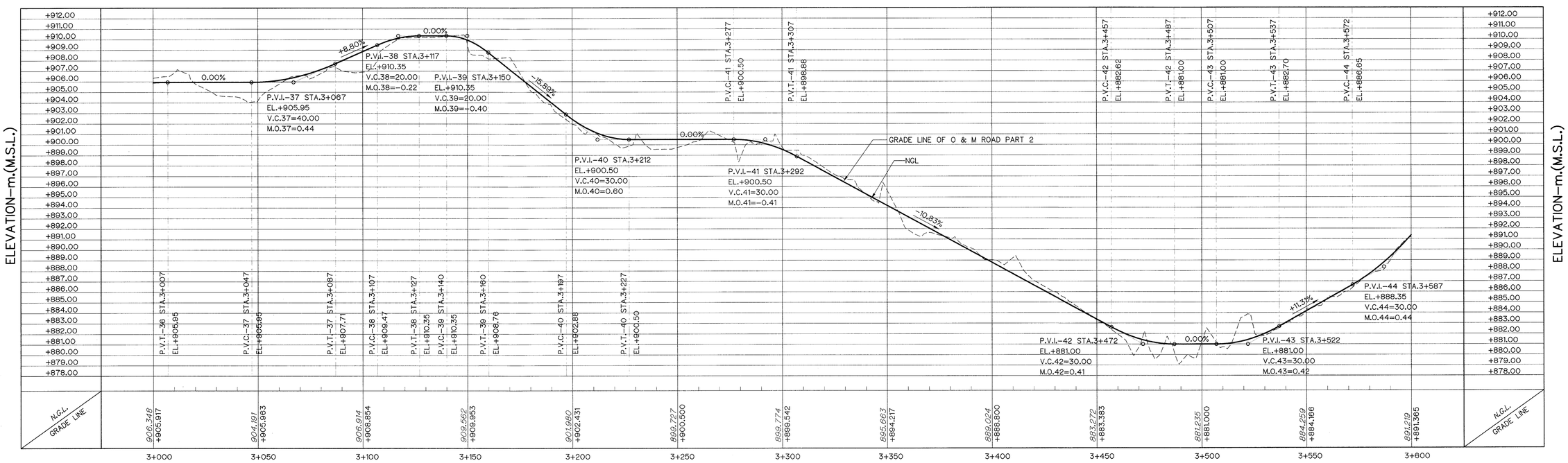
DRAWING NO. MH-OM-05

SHEET NO. 24 OF 51



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

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

ELECTRO–MECHANICAL EQUIPMENT
O&M ROAD PART 2
PLAN AND PROFILE, STA. 3+000 TO STA. 3+600

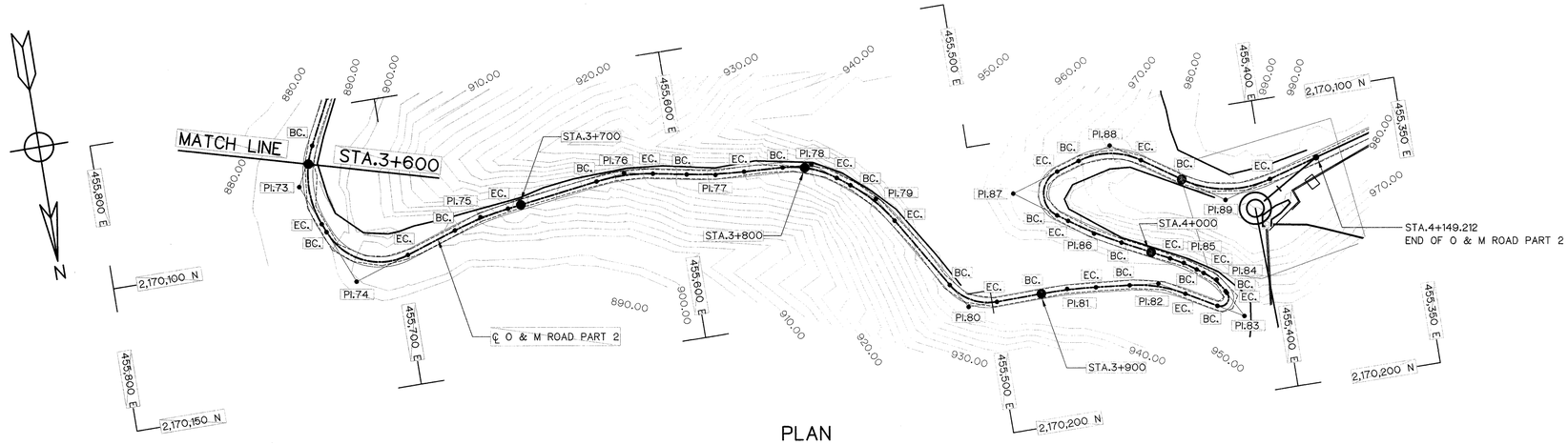
P&C MANAGEMENT CO.,LTD.

Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY

DESIGNED	สธ.64624	REVIEWED	
DRAWN		SUBMITTED	
CHECKED	สธ.6226	RECOMMENDED	
PROJECT MANAGER	08/03/2559 DATE	APPROVED	P. Howell

DRAWING NO. MH–OM–06

SHEET NO. 25 OF 51



PLAN

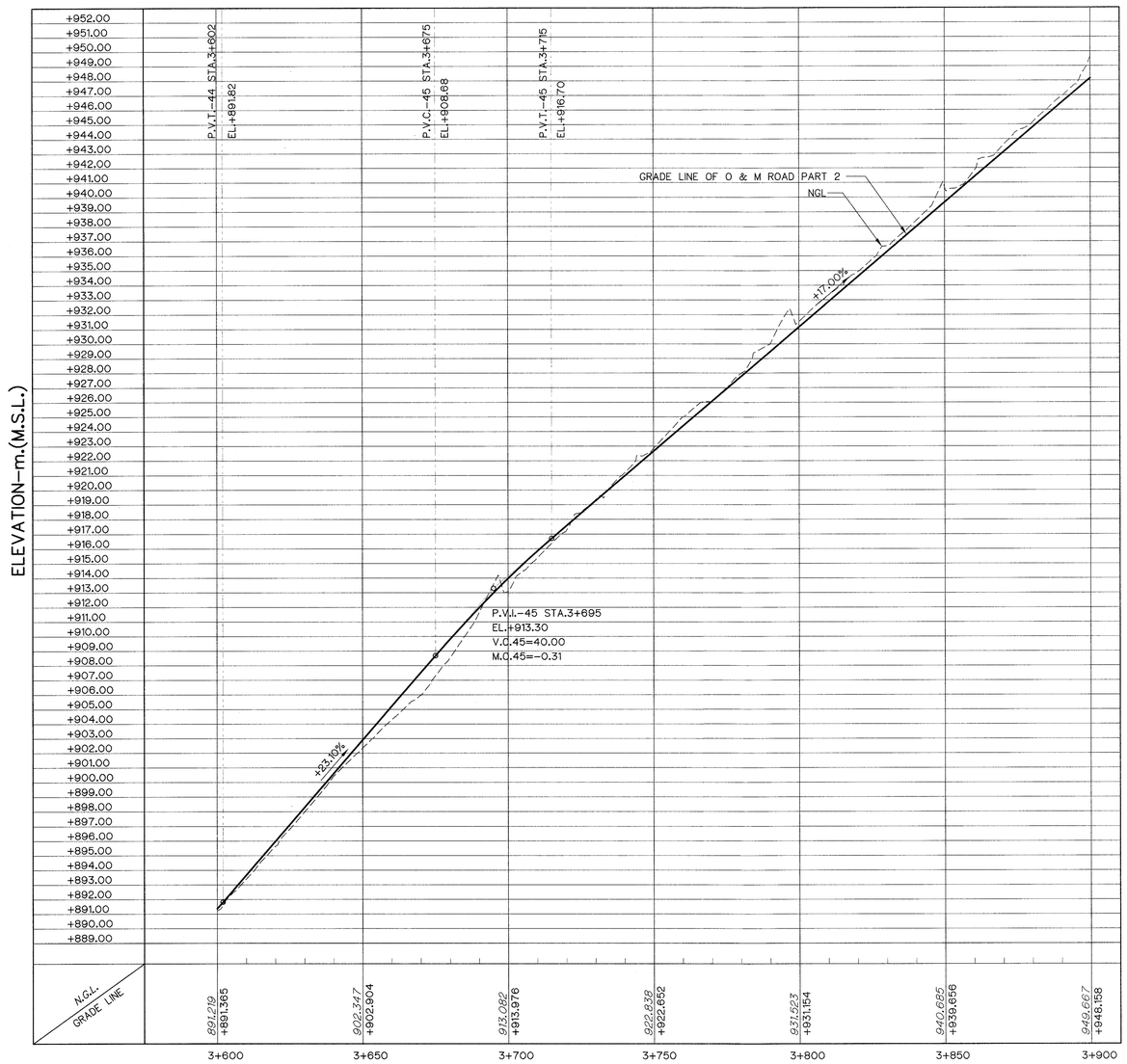
SCALE 1:1,000

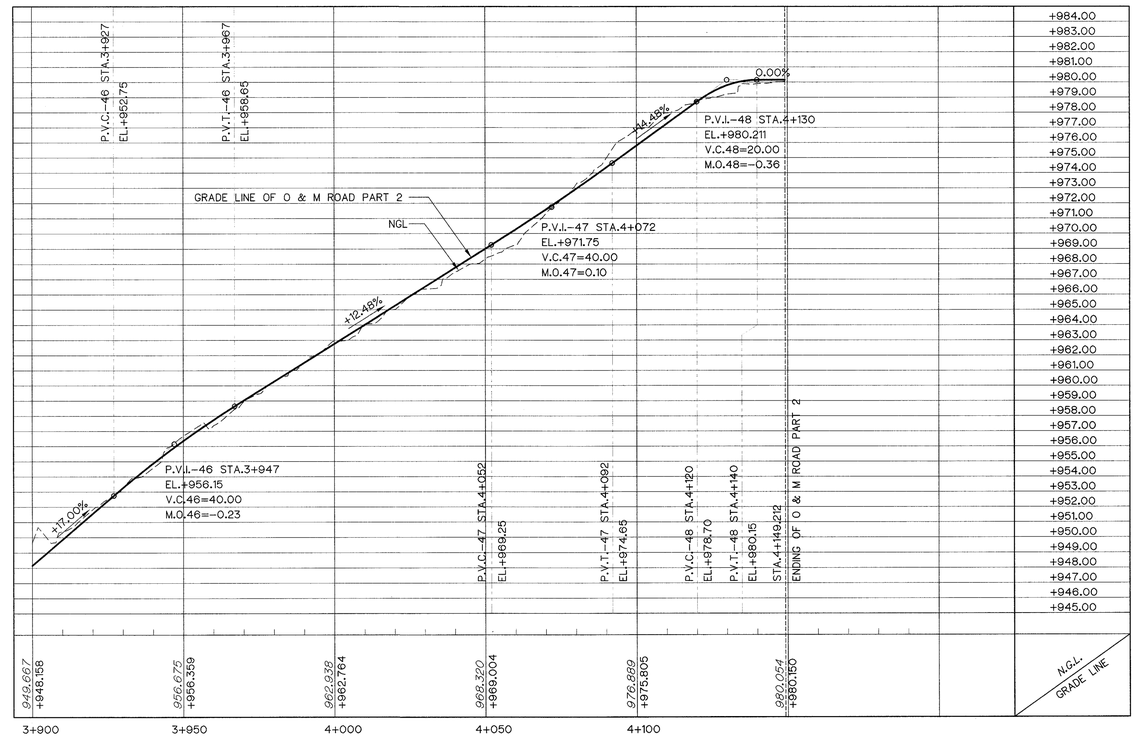
NOTES :

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





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

ELECTRO-MECHANICAL EQUIPMENT
O&M ROAD PART 2
PLAN AND PROFILE, STA. 3+600 TO STA. 4+149.212

P&C MANAGEMENT CO.,LTD.

DESIGNED — สิน.64624 — สิน.6226
DRAWN
CHECKED — สิน.6226
PROJECT MANAGER — 08/03/2559 — DATE

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

DRAWING NO. MH-OM-07
SHEET NO. 26 OF 51

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
3				
2				
1				

CONSULTANTS | DEDE

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

MAE HAT HYDROPOWER PROJECT

ELECTRO–MECHANICAL EQUIPMENT
O&M ROAD PART 2
HORIZONTAL CURVE

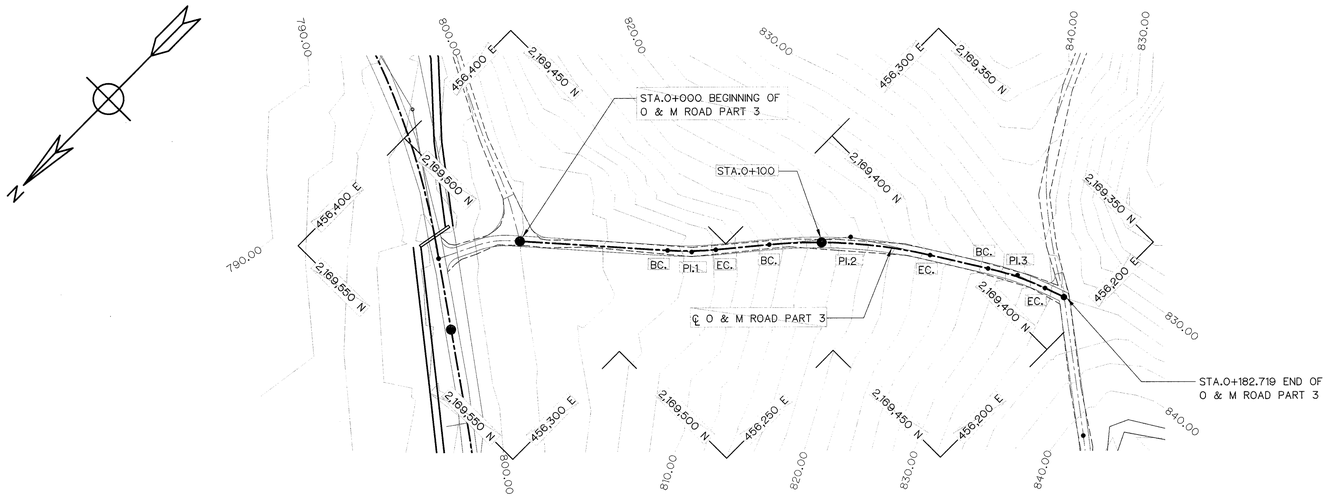
P&C MANAGEMENT CO.,LTD.

Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY

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

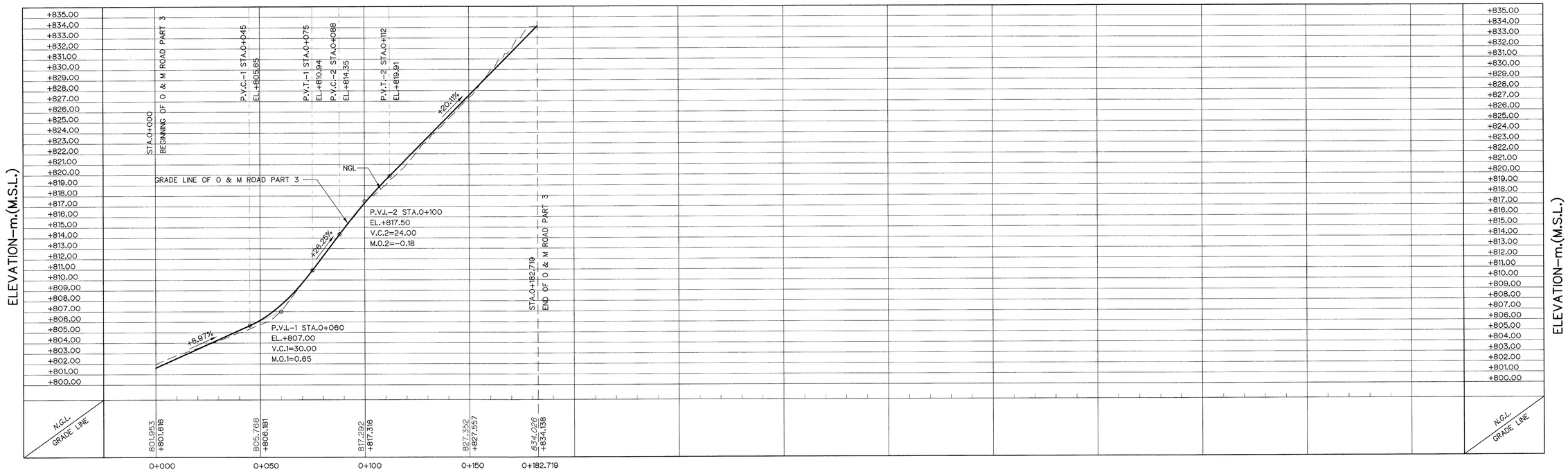
REVIEWED
SUBMITTED
RECOMMENDED
APPROVED P. Hansud

DRAWING NO. MH–OM–08
SHEET NO. 27 OF 51



PLAN

SCALE 1:1,000



HORIZONTAL CURVE OF O&M ROAD PART 3

NO. PI.	COORDINATE N	COORDINATE E	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)
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

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 TYPICAL SECTION AND DETAILS MH–OM–10

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				

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

MAE HAT HYDROPOWER PROJECT

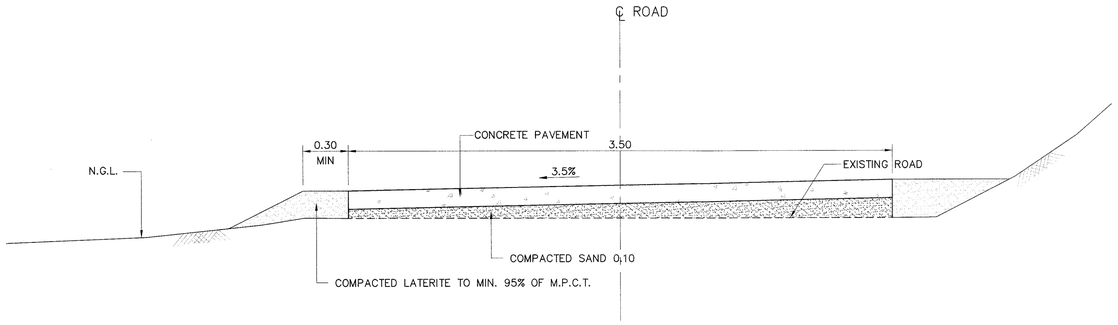
ELECTRO–MECHANICAL EQUIPMENT
O&M ROAD PART 3
PLAN AND PROFILE, STA. 0+000 TO STA. 0+182.719

P&C MANAGEMENT CO.,LTD.

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

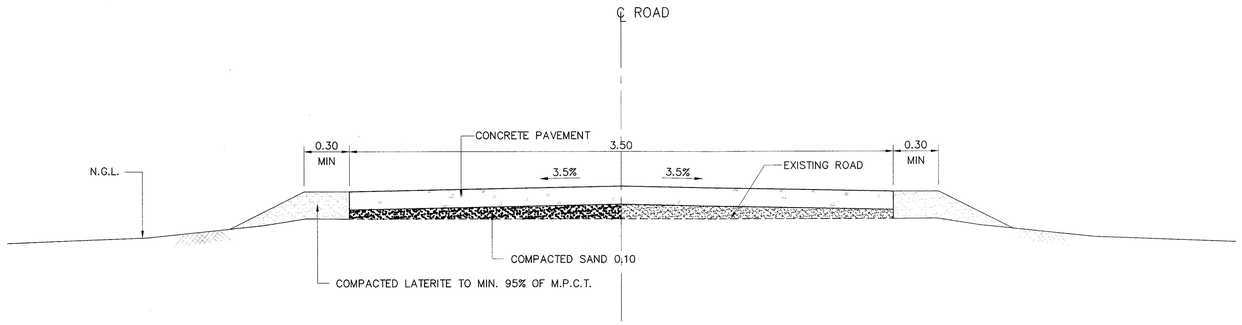
Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY
REVIEWED
SUBMITTED
RECOMMENDED
APPROVED P. Hanwil

DRAWING NO. MH–OM–09
SHEET NO. 28 OF 51



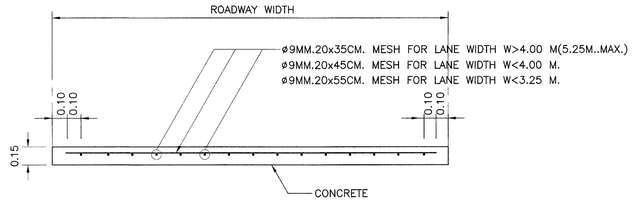
TYPICAL SECTION FOR HILLSIDE

NOT TO SCALE



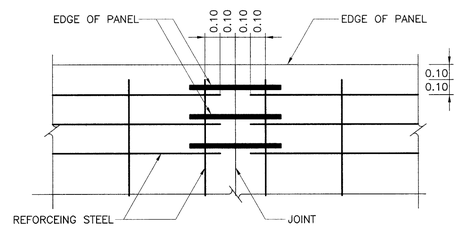
TYPICAL SECTION FOR FLAT AREA

NOT TO SCALE



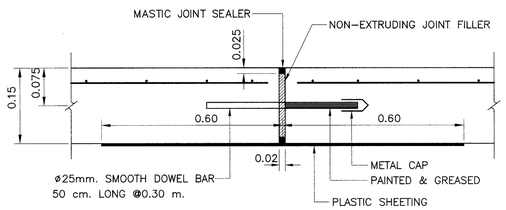
REINFORCEMENT DETAIL OF CONCRETE PAVEMENT CROSS-SECTION

NOT TO SCALE



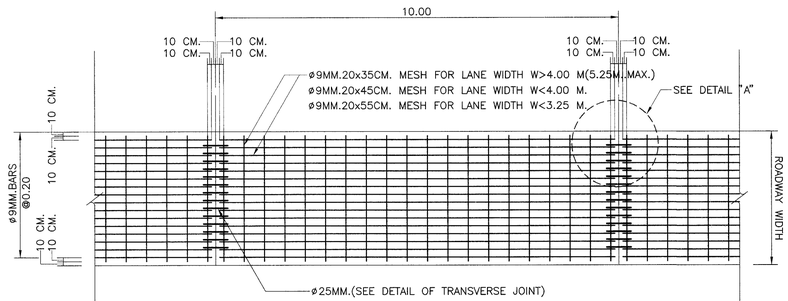
DETAIL "A"

NOT TO SCALE



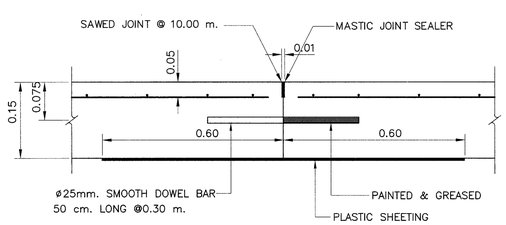
DETAIL OF EXPANSION JOINT

NOT TO SCALE



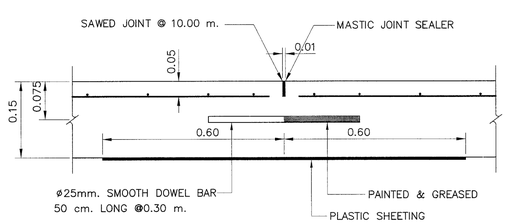
PLAN OF REINFORCEMENT CONCRETE PAVEMENT

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.

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

ELECTRO-MECHANICAL EQUIPMENT

O&M ROAD

TYPICAL SECTION AND DETAILS

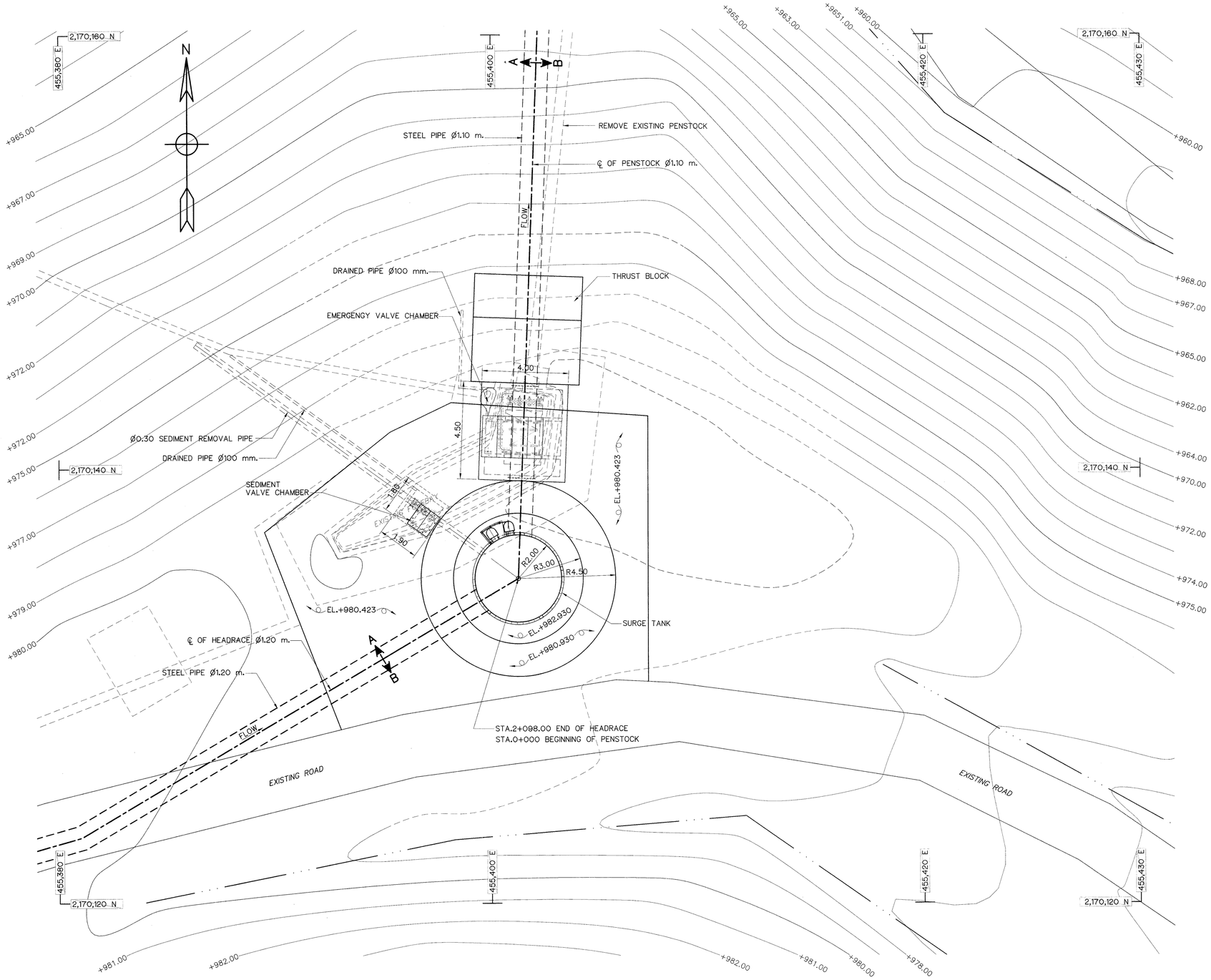
P&C MANAGEMENT CO.,LTD.

Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY

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

DRAWING NO. MH-OM-10

SHEET NO. 29 OF 51



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

0 1 2 3 4 5 6 7 8

SCALE 1:100 METERS

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

MAE HAT HYDROPOWER PROJECT

ELECTRO-MECHANICAL EQUIPMENT
SURGE TANK
GENERAL LAY-OUT

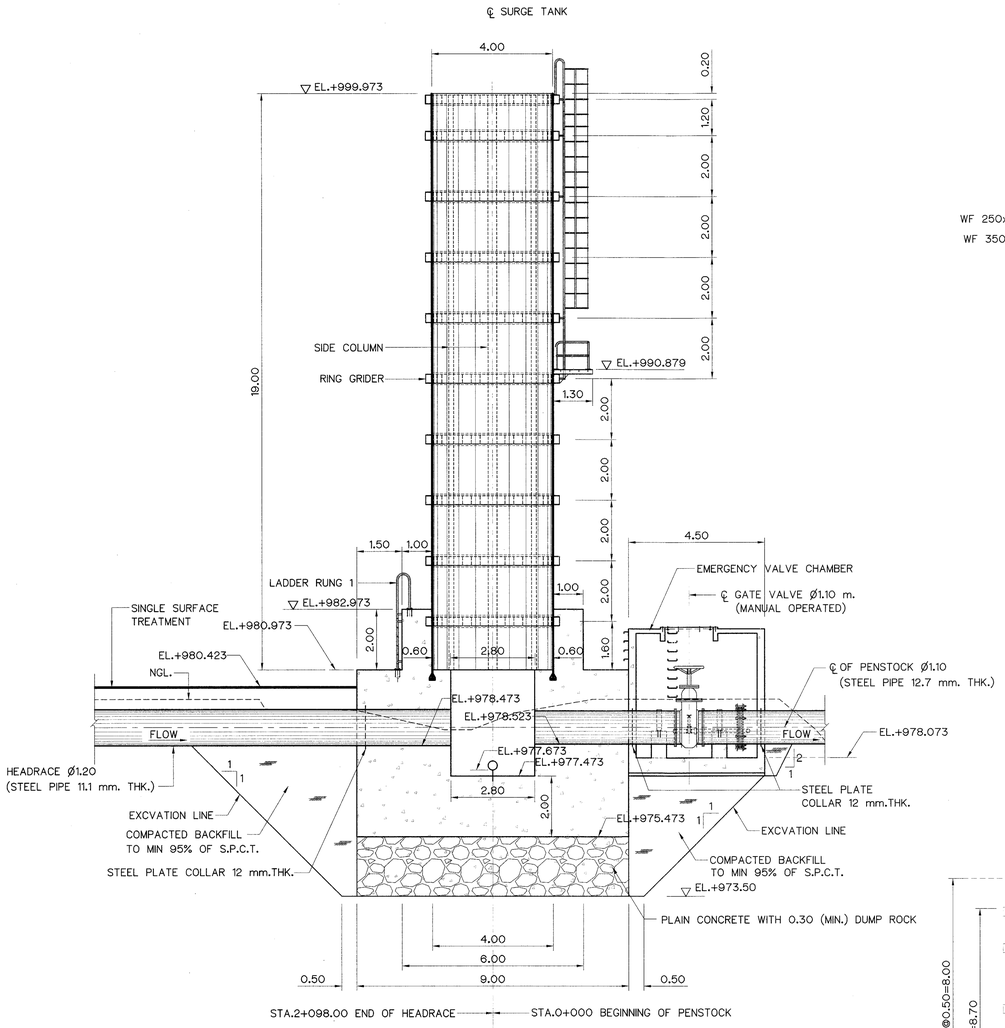
P&C MANAGEMENT CO.,LTD.

Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY

REVIEWED	
DESIGNED	วิศ.64624 วิศ.6226
SUBMITTED	
DRAWN	
RECOMMENDED	
CHECKED	วิศ.6226
APPROVED	
PROJECT MANAGER	DATE 08/03/2559
DRAWING NO.	MH-ST-01
SHEET NO.	30 OF 51

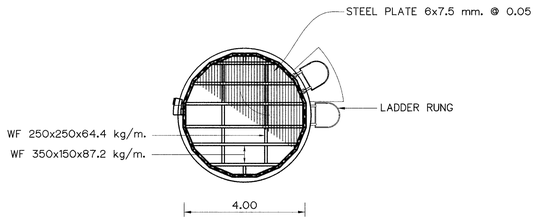
NO.	DATE	REVISIONS	CHECKED	APPROVED
3				
2				
1				

CONSULTANTS — DEDE



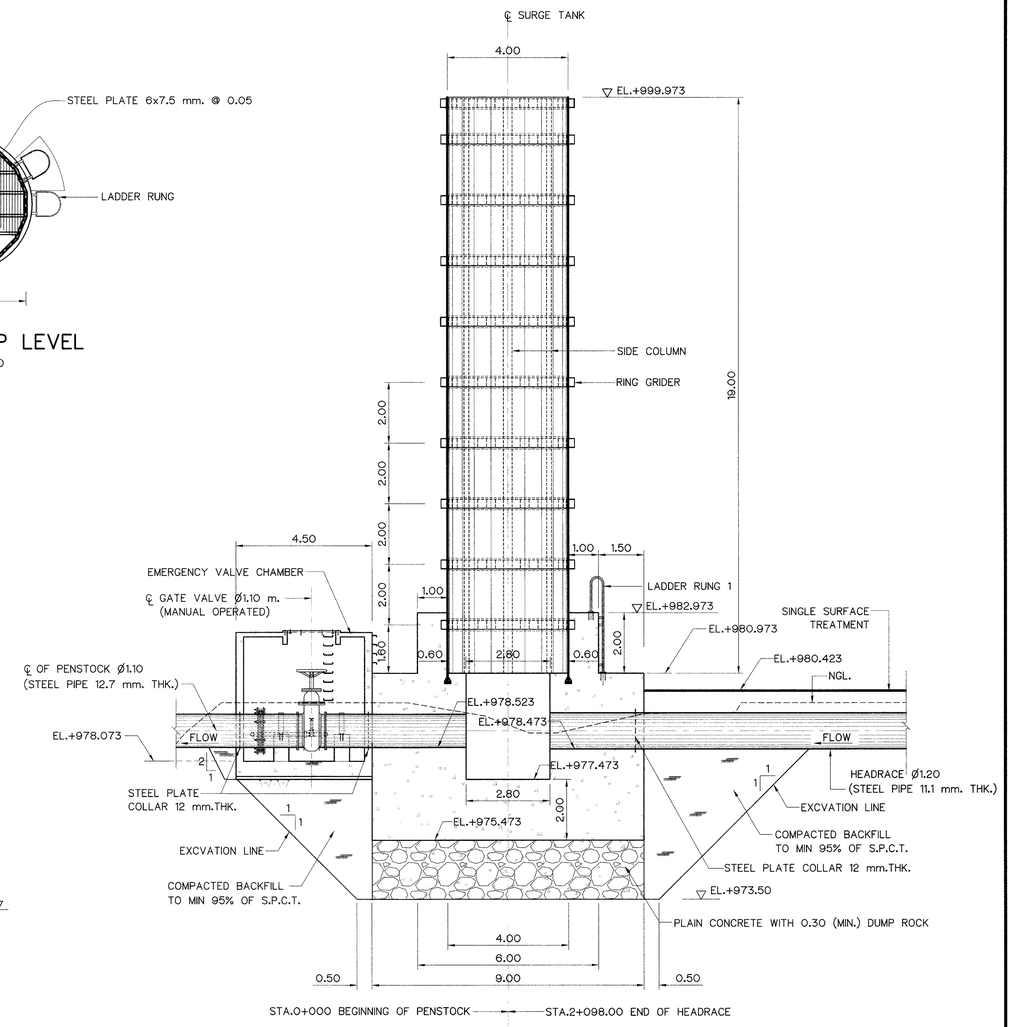
SECTION A–A

SCALE 1:100



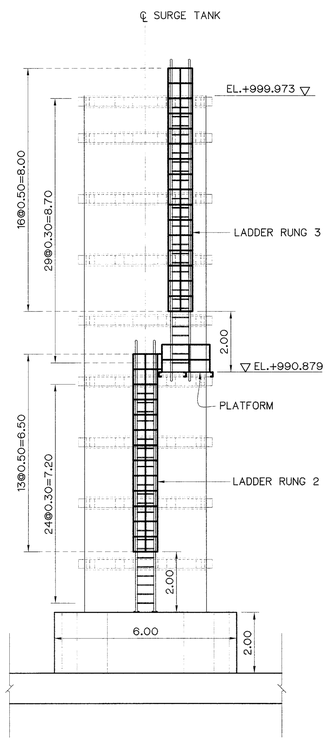
PLAN ON TOP LEVEL

SCALE 1:100



SECTION B–B

SCALE 1:100



LADDER RUNG 2&3 ELEVATION

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

0 1 2 3 4 5 6 7 8

SCALE 1:100 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

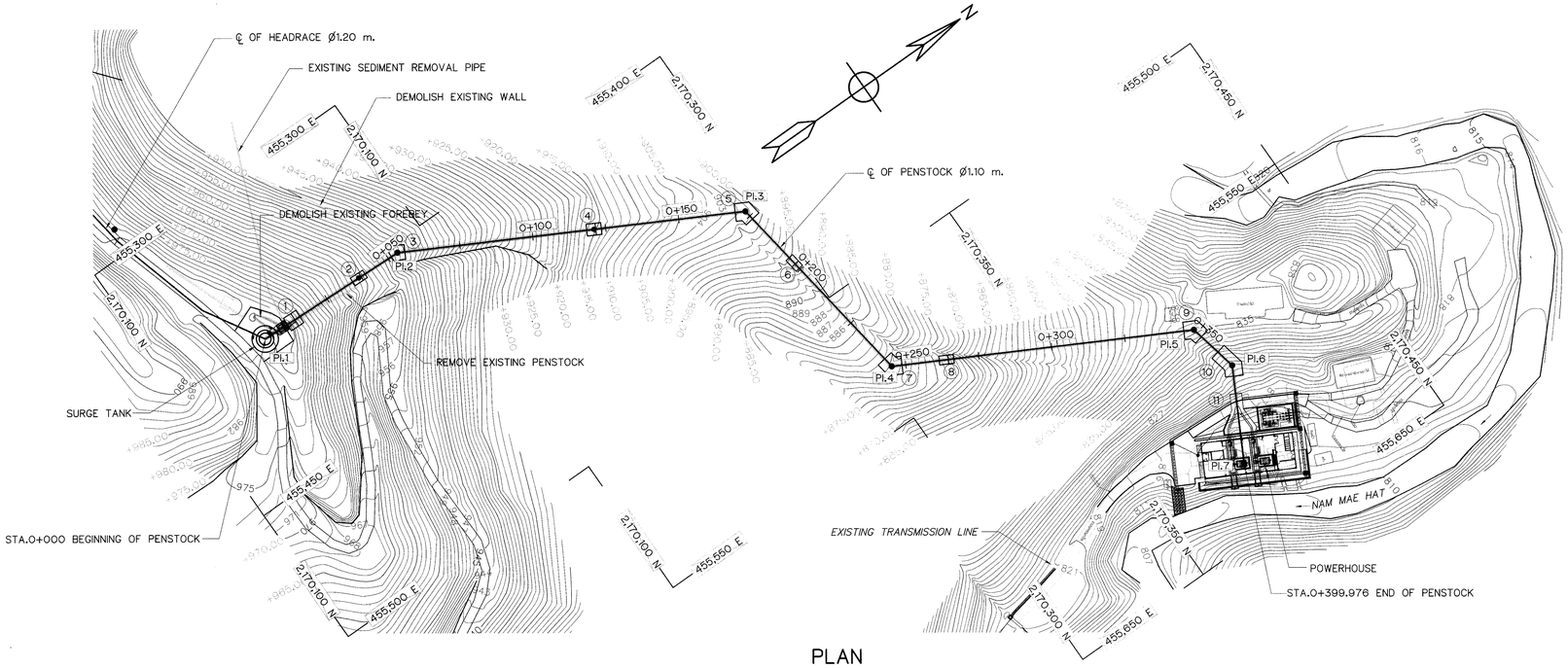
ELECTRO–MECHANICAL EQUIPMENT
SURGE TANK
SECTIONS

P&C MANAGEMENT CO.,LTD.

DESIGNED ภัสฐ.64624 สัย.6226
DRAWN
CHECKED สัย.6226
PROJECT MANAGER 03/05/2559 DATE

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

DRAWING NO. MH-ST-02
SHEET NO. 31 OF 51

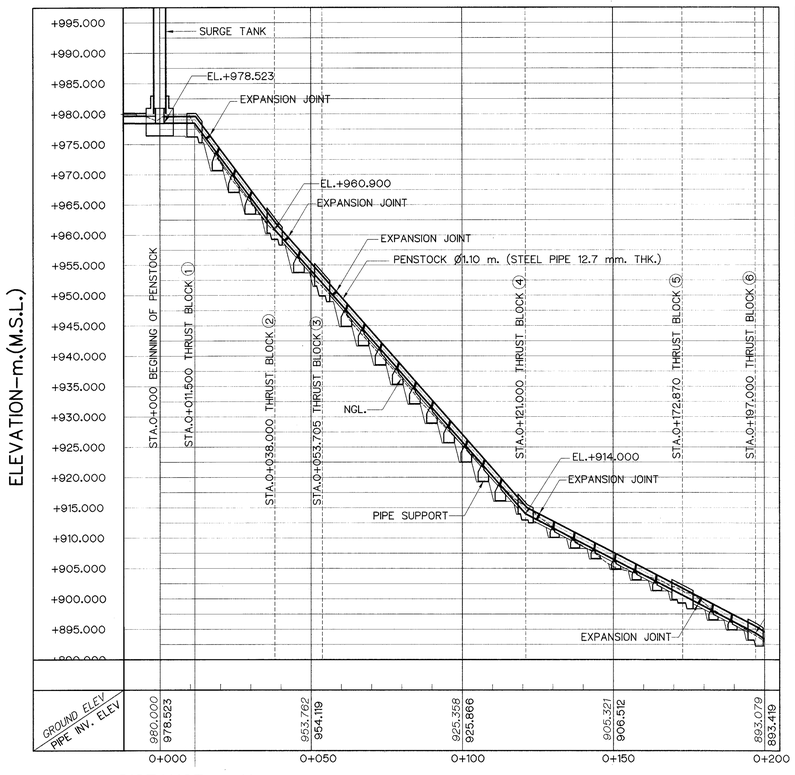


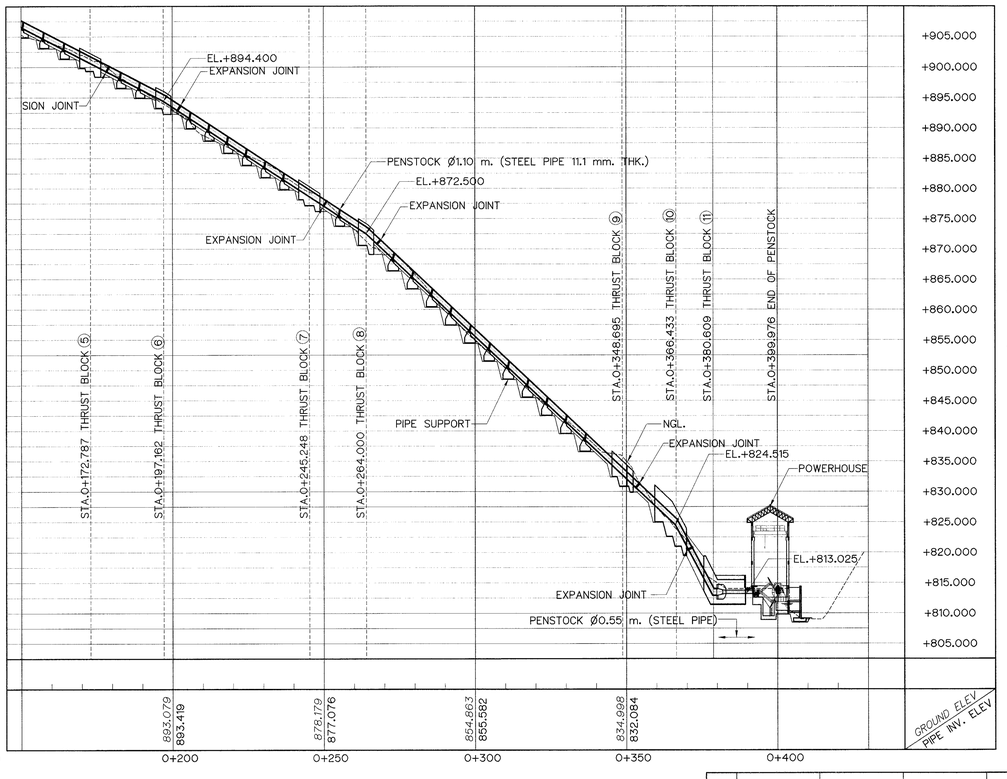
PLAN

SCALE 1:1,000

HORIZONTAL CURVE OF PENSTOCK

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

0 5 10 20 30 40
SCALE 1:500 METERS

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

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

MAE HAT HYDROPOWER PROJECT

ELECTRO–MECHANICAL EQUIPMENT
PENSTOCK
PLAN AND PROFILE, STA. 0+000 TO STA. 0+389.376

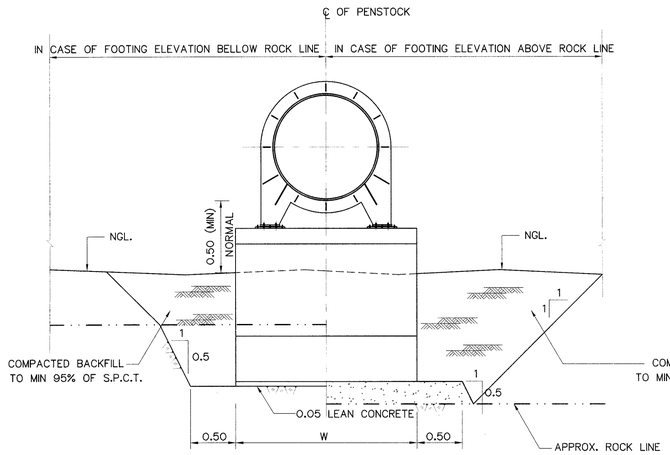
NO.	DATE	REVISIONS	CHECKED	APPROVED
3				
2				
1				

CONSULTANTS — DEDE

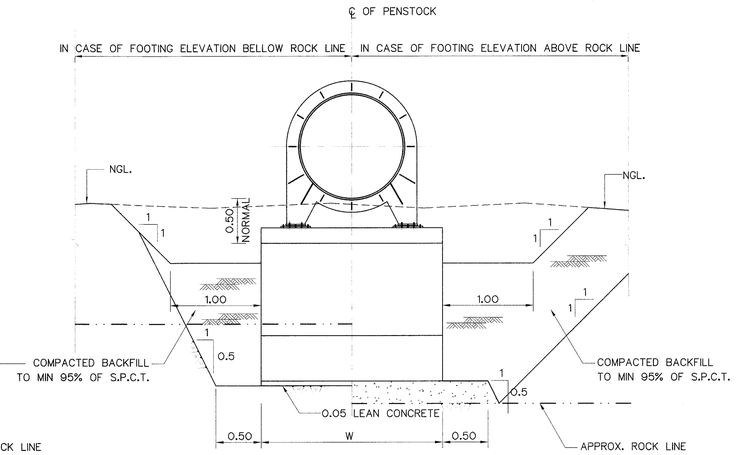
P&C MANAGEMENT CO.,LTD.

Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY

DESIGNED	สิริ.64624 สิริ.6226	REVIEWED	
DRAWN		SUBMITTED	
CHECKED	สิริ.6226	RECOMMENDED	
PROJECT MANAGER	08/03/2554 DATE	APPROVED	P. Hanagull.
		DRAWING NO. MH–PS–01	SHEET NO. 32 OF 51



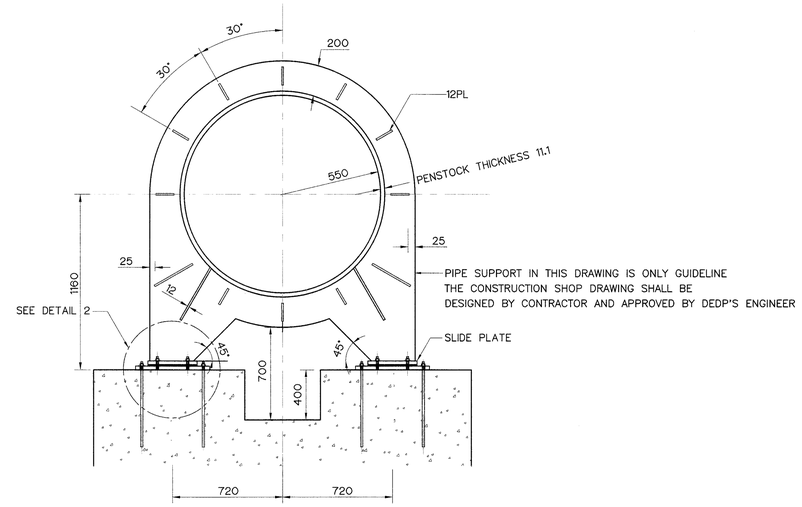
N.G.L. BELLOW INVERT ELEVATION



N.G.L. ABOVE INVERT ELEVATION

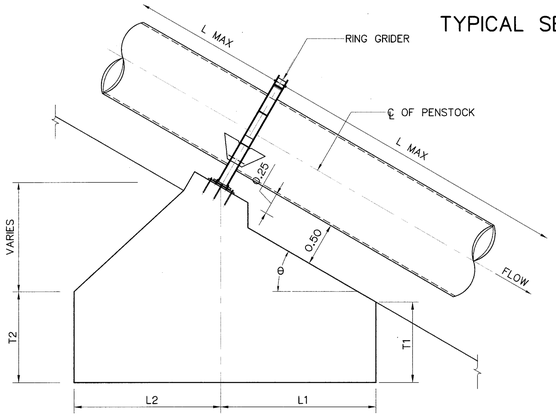
TYPICAL SECTION OF PENSTOCK

NOT TO SCALE



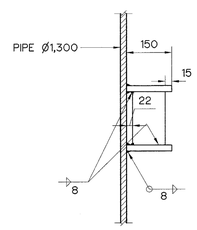
SECTION A – A

SCALE 1:20



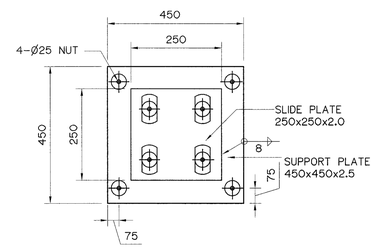
PIER

NOT TO SCALE



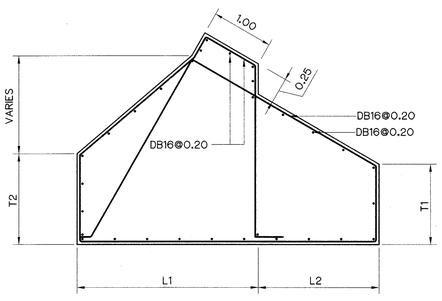
DETAIL "1"

SCALE 1:20



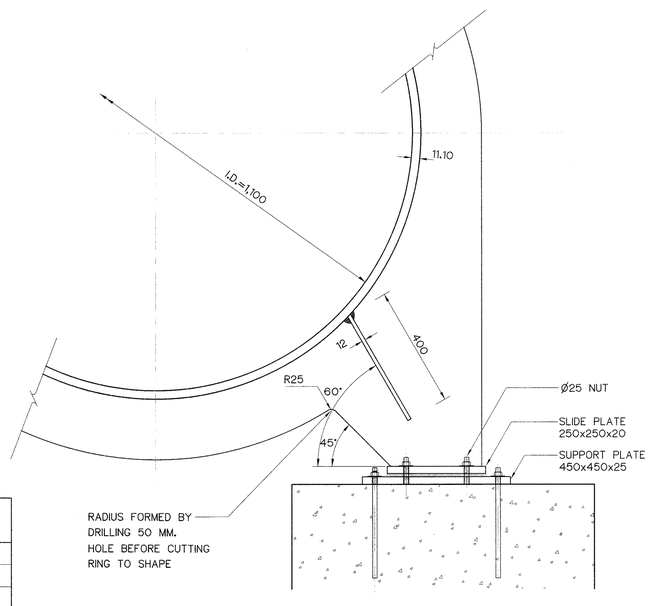
DETAIL "2"

SCALE 1:10

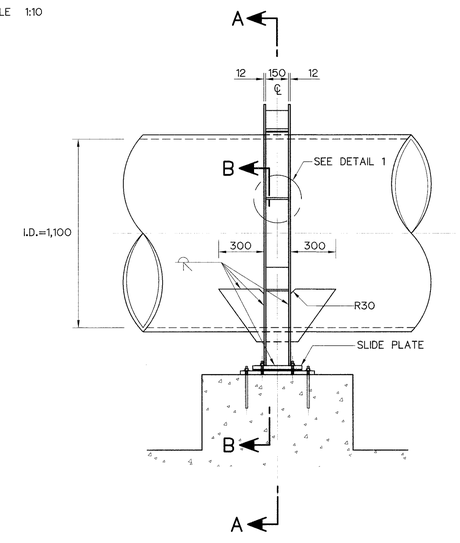


PIER (REINFORCEMENT DETAIL)

NOT TO SCALE



SECTION B – B



RING GIRDER FOR 1,100 I.D. PIPE

0 0.5 1.0 1.5

SCALE 1:20 METERS

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

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

MAE HAT HYDROPOWER PROJECT

ELECTRO-MECHANICAL EQUIPMENT
PENSTOCK
PIPE SUPPORT SECTIONS AND DETAILS

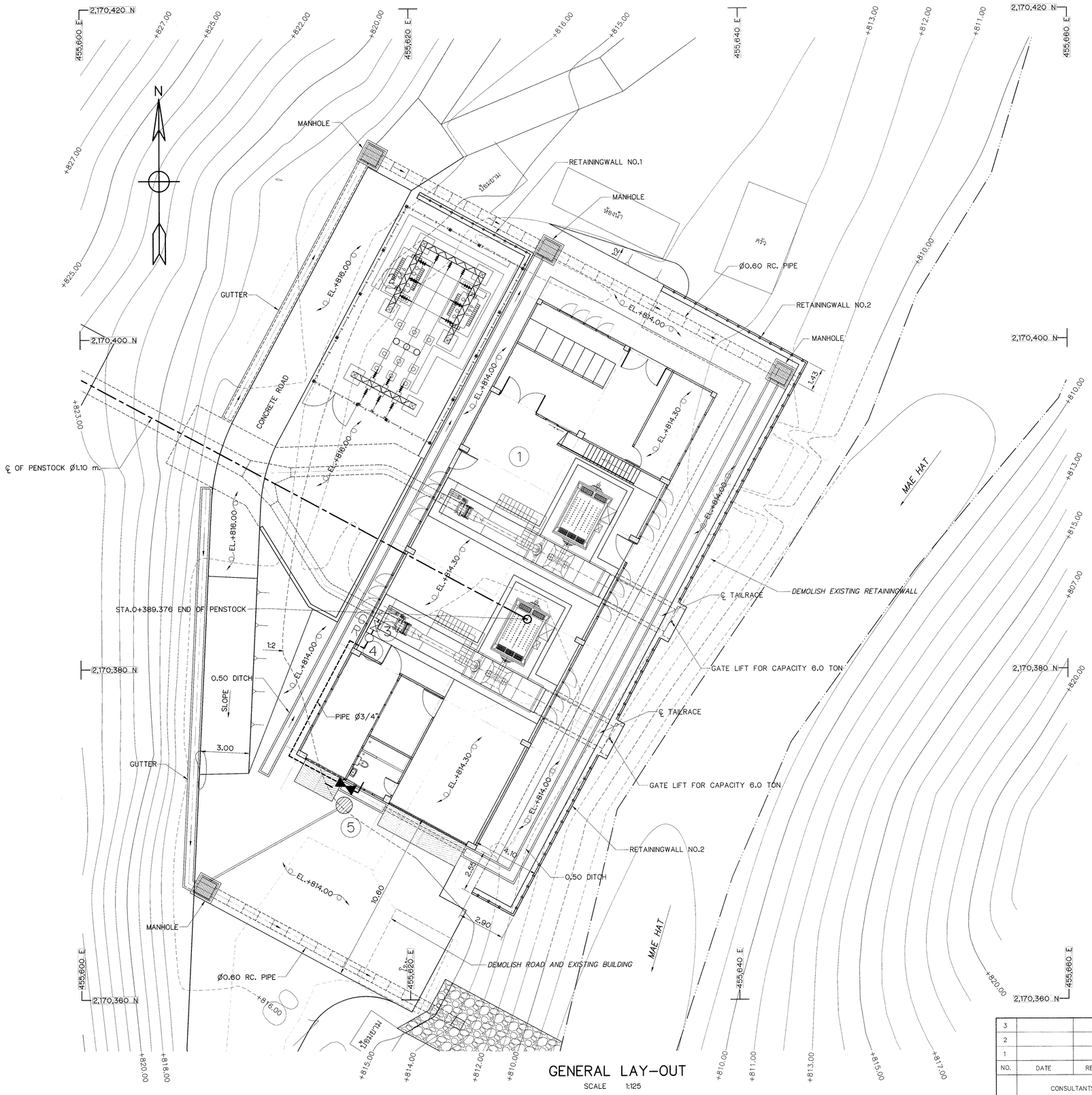
P&C MANAGEMENT CO.,LTD.

Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY

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

DRAWING NO. MH-PS-02

SHEET NO. 33 OF 51



GENERAL LAY-OUT

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. 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

0 1 2 4 6 8 10

SCALE 1:125 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

ELECTRO-MECHANICAL EQUIPMENT
POWERHOUSE
GENERAL LAY-OUT

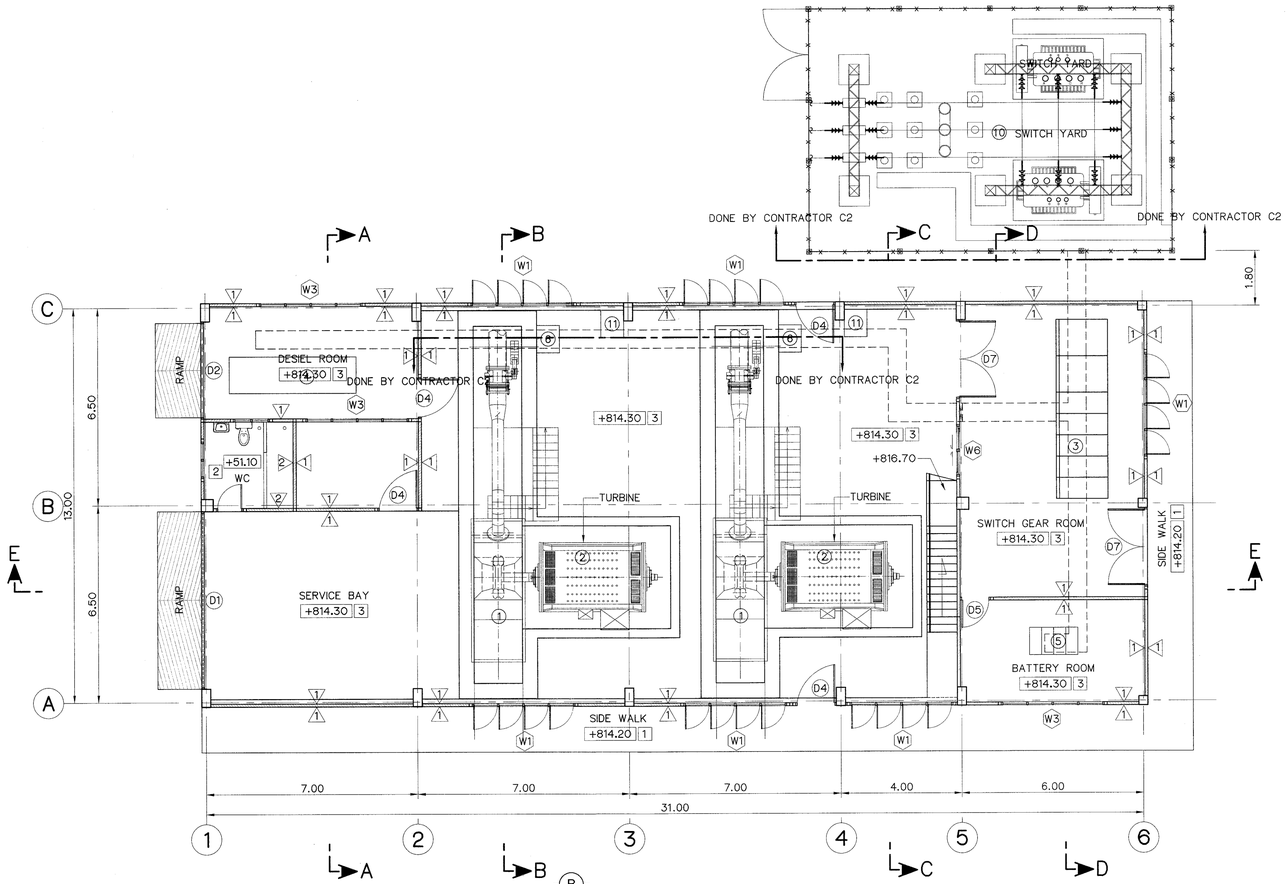
P&C MANAGEMENT CO.,LTD.

Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY

DESIGNED	ส.ค.64624	ส.ค.6226	REVIEWED
DRAWN			SUBMITTED
CHECKED		ส.ค.6226	RECOMMENDED
PROJECT MANAGER		DATE	APPROVED

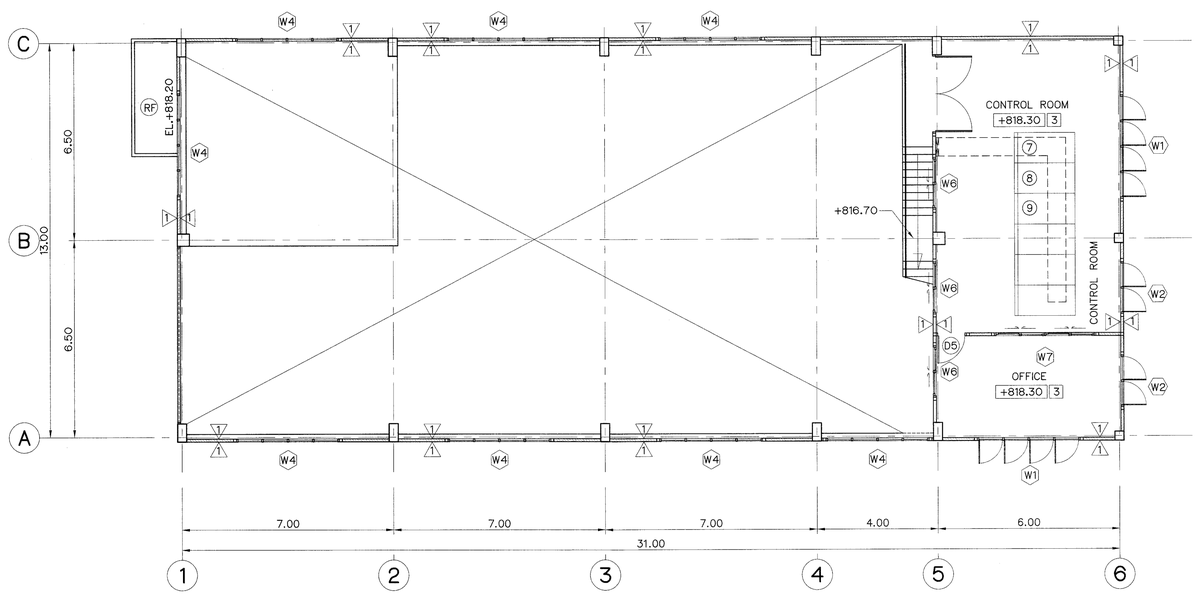
DRAWING NO. MH-PH-01

SHEET NO. 34 OF 51



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

0 1 2 3 4 5 6 7 8

SCALE 1:100 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

ELECTRO-MECHANICAL EQUIPMENT
POWERHOUSE
PLAN 1st FLOOR AND PLAN 2nd FLOOR

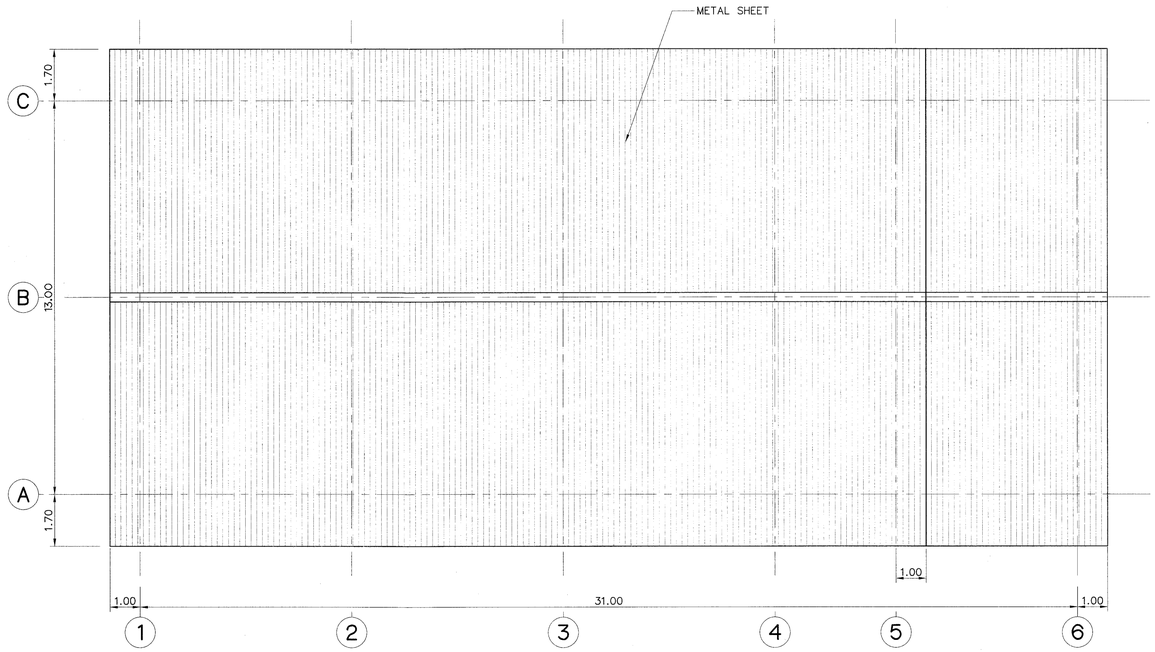
P&C MANAGEMENT CO.,LTD.

Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY

DESIGNED	181.64624	281.6226	REVIEWED
DRAWN			SUBMITTED
CHECKED		281.6226	RECOMMENDED
PROJECT MANAGER	08/05/2559 DATE		APPROVED P. Haussil

DRAWING NO. MH-PH-02

SHEET NO. 35 OF 51



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

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

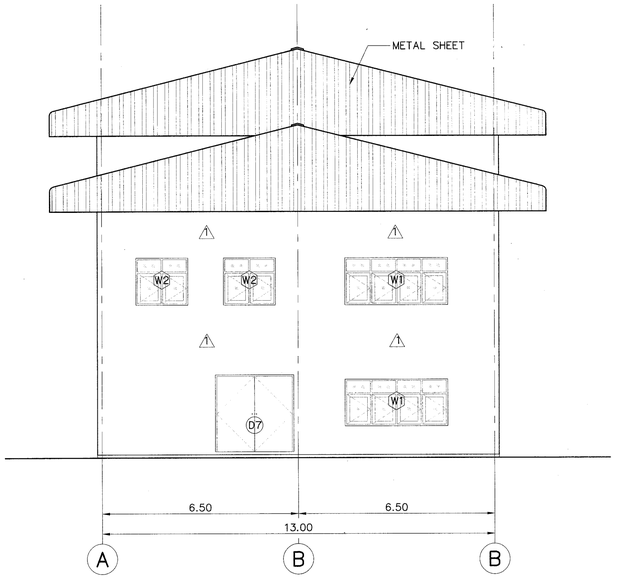
ELECTRO-MECHANICAL EQUIPMENT
POWERHOUSE
ROOF PLAN

P&C MANAGEMENT CO.,LTD.

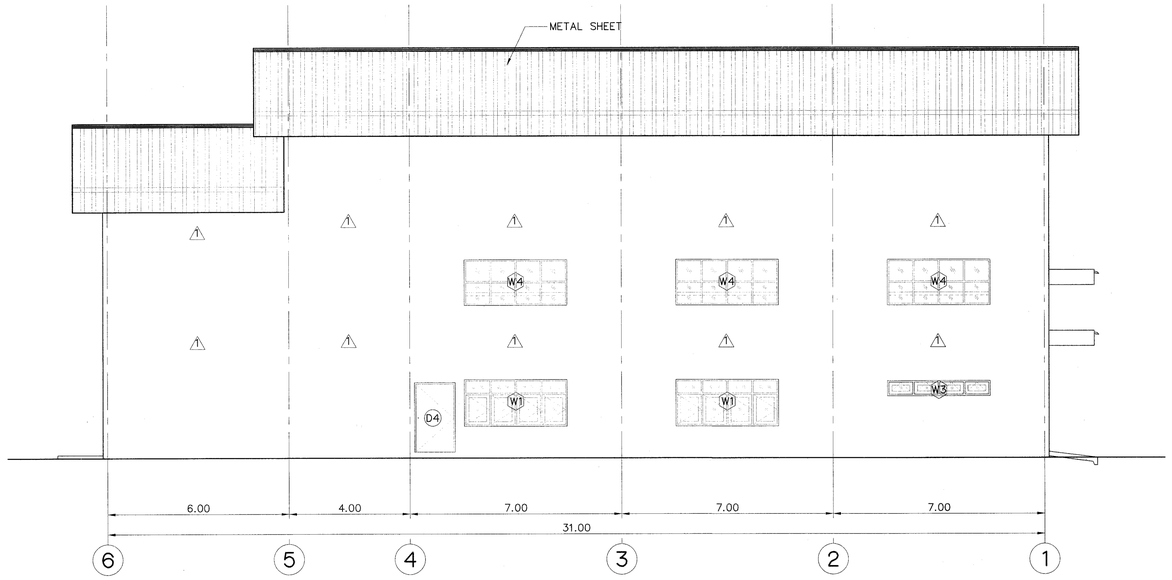
Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY

DESIGNED	สิน.64624	สิน.6226	REVIEWED
DRAWN			SUBMITTED
CHECKED		สิน.6226	RECOMMENDED
PROJECT MANAGER		01/03/2559 DATE	APPROVED

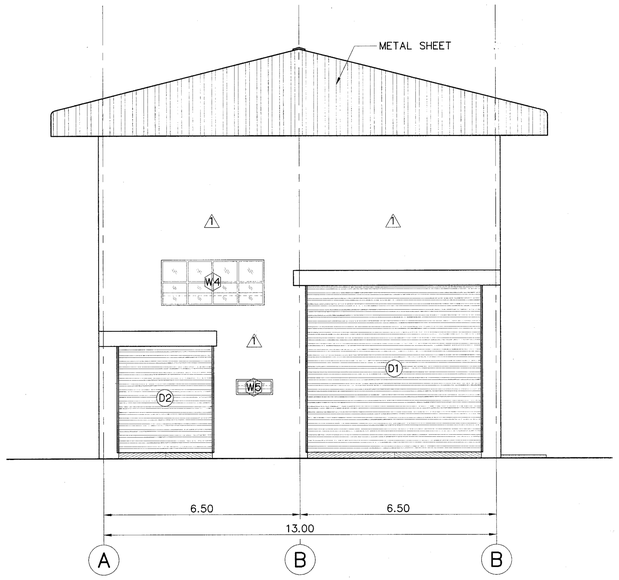
DRAWING NO. MH-PH-03
SHEET NO. 36 OF 51



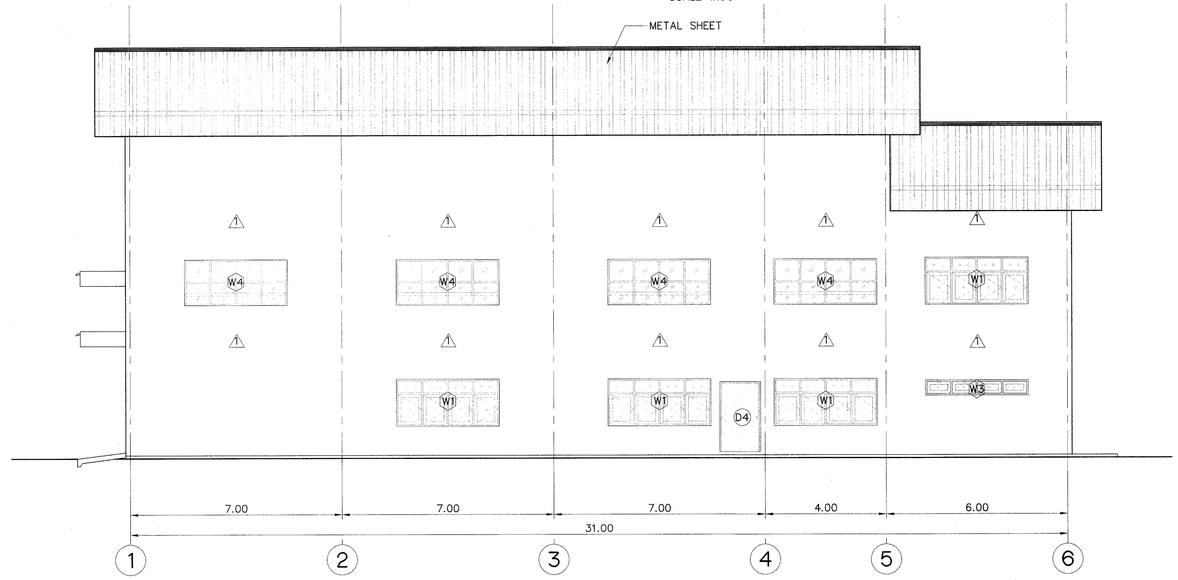
ELEVATION "A"
SCALE 1:100



ELEVATION "B"
SCALE 1:100



ELEVATION "C"
SCALE 1:100



ELEVATION "D"
SCALE 1:100

UNLESS OTHERWISE SHOWN.

2. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. NMH-GN-03

REFERENCE DRAWINGS :

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

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

NO.	DATE	REVISIONS	CHECKED	APPROVED
3				
2				
1				
	CONSULTANTS		DEDE	

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

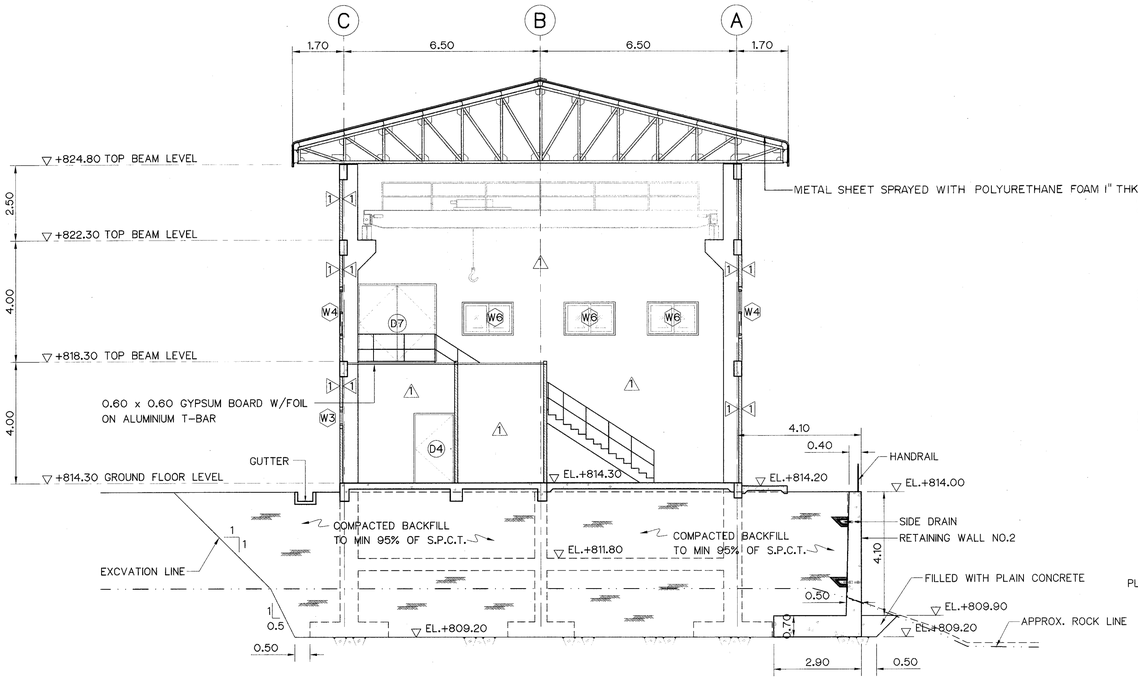
MAE HAT HYDROPOWER PROJECT

ELECTRO-MECHANICAL EQUIPMENT
POWERHOUSE
ELEVATIONS

P&C MANAGEMENT CO.,LTD.

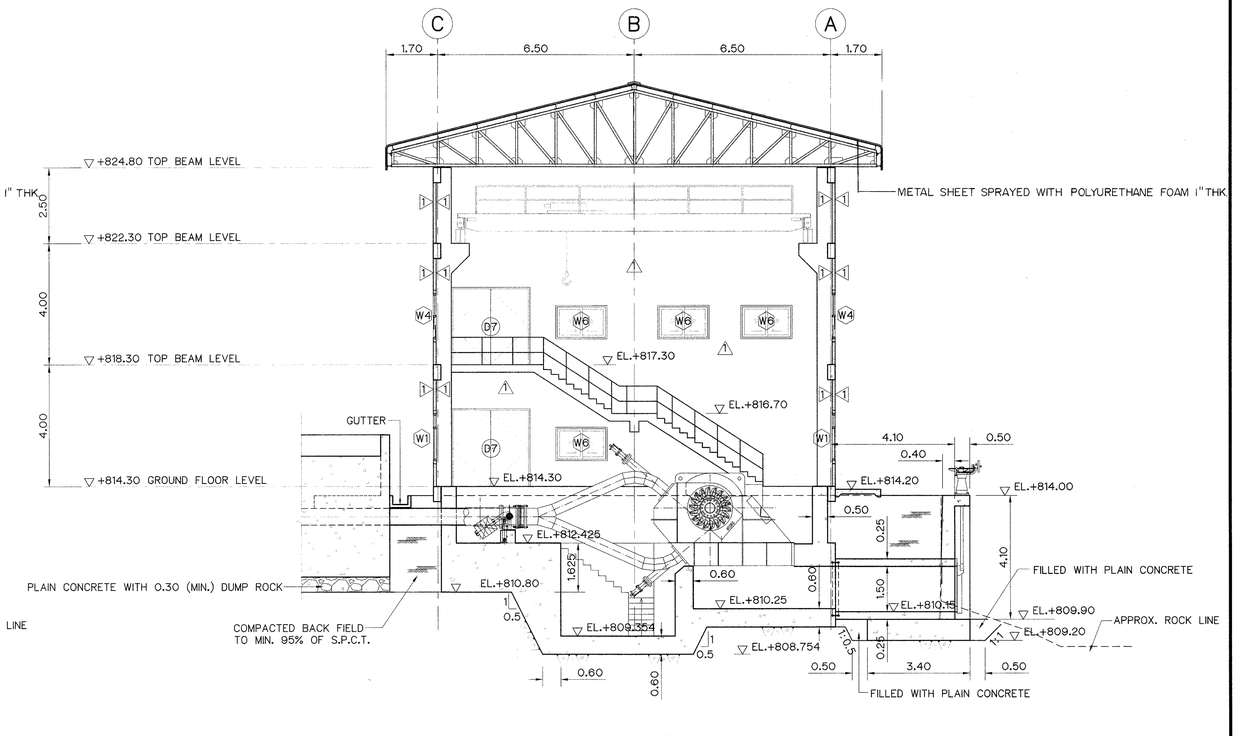
Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY

DESIGNED	วิชิต 64624	SUBMITTED	สชิต 6226
DRAWN		RECOMMENDED	
CHECKED	วิชิต 6226	APPROVED	P. Hanwell
PROJECT MANAGER	02/03/2559 DATE	DRAWING NO.	MH-PH-04
		SHEET NO.	37 OF 51



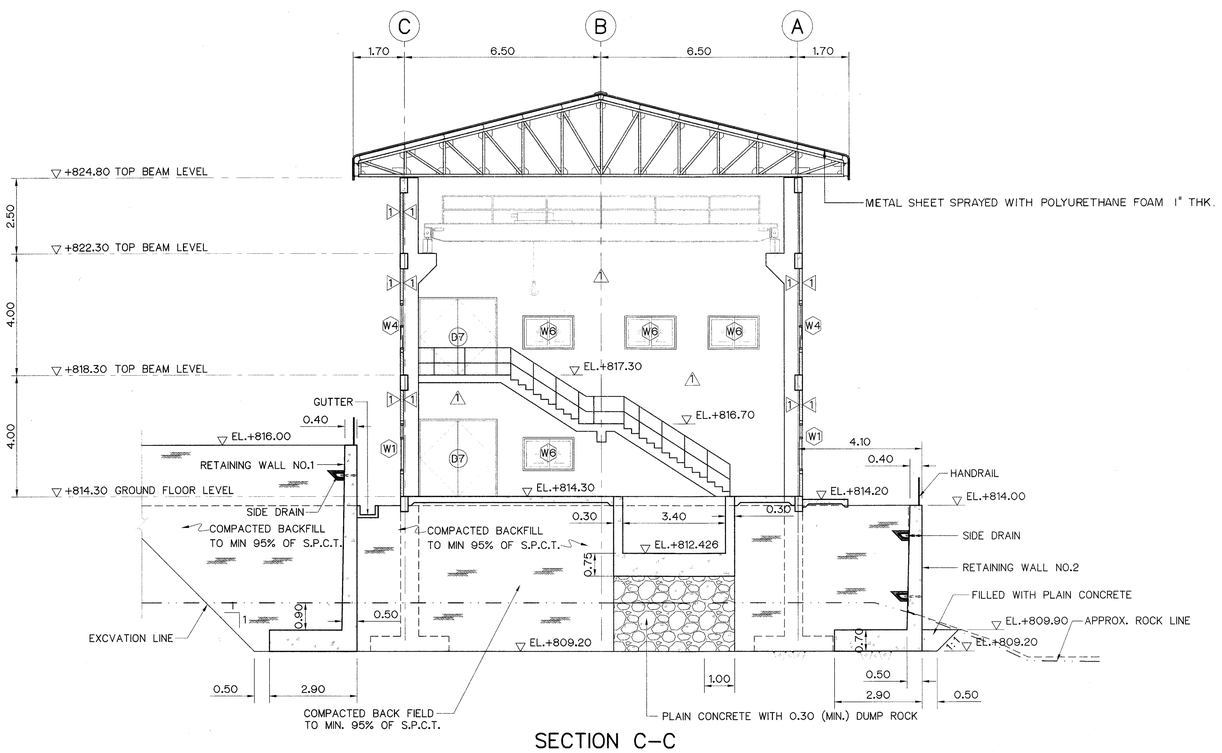
SECTION A–A

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 2nd FLOOR	MH-PH-02
2. ELEVATIONS	MH-PH-04

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

ELECTRO–MECHANICAL EQUIPMENT
POWERHOUSE
SECTIONS (SHEET 1/2)

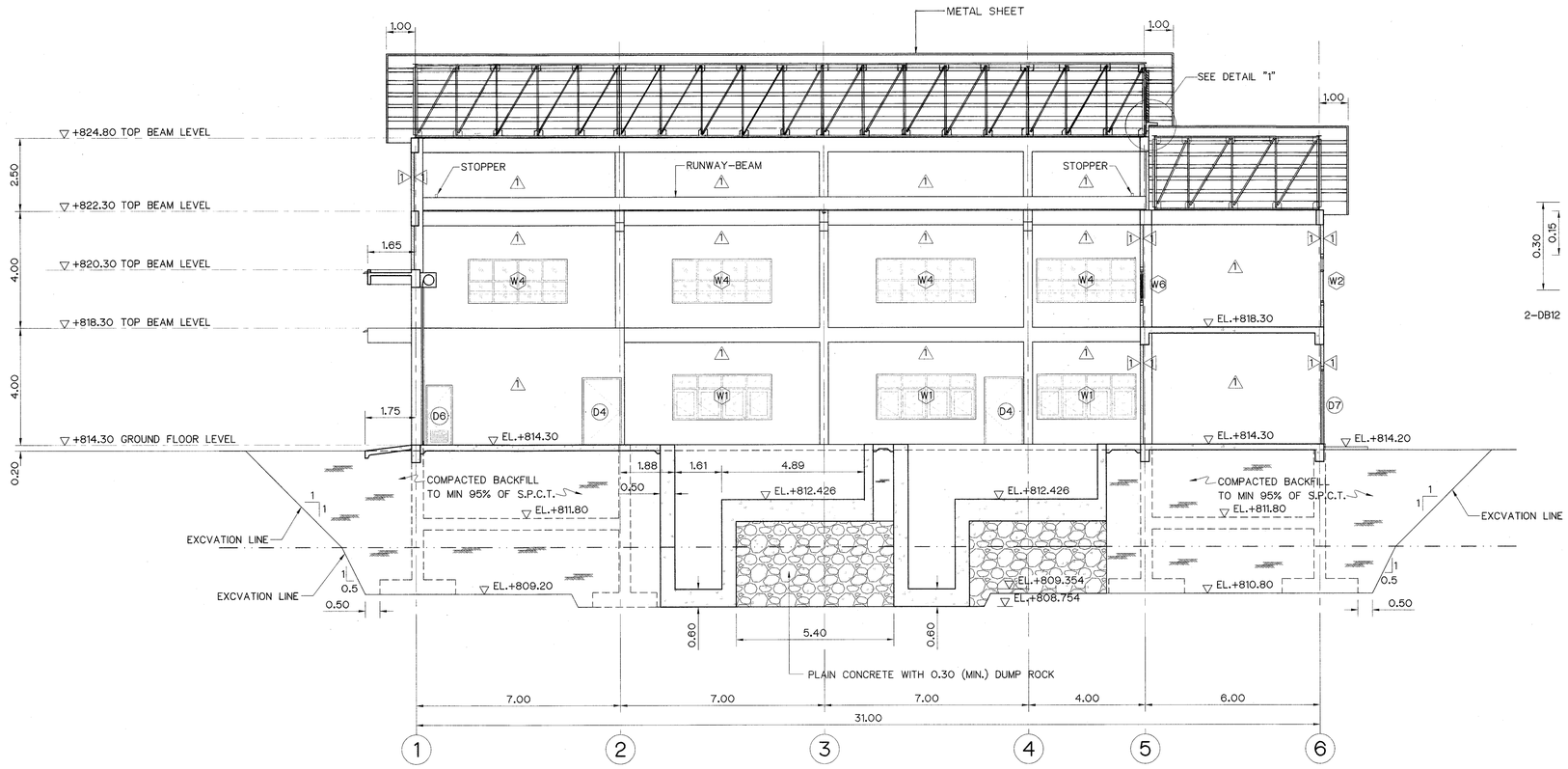
P&C MANAGEMENT CO.,LTD.

Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY

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

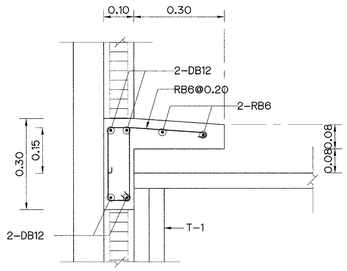
DRAWING NO. MH-PH-05

SHEET NO. 38 OF 51



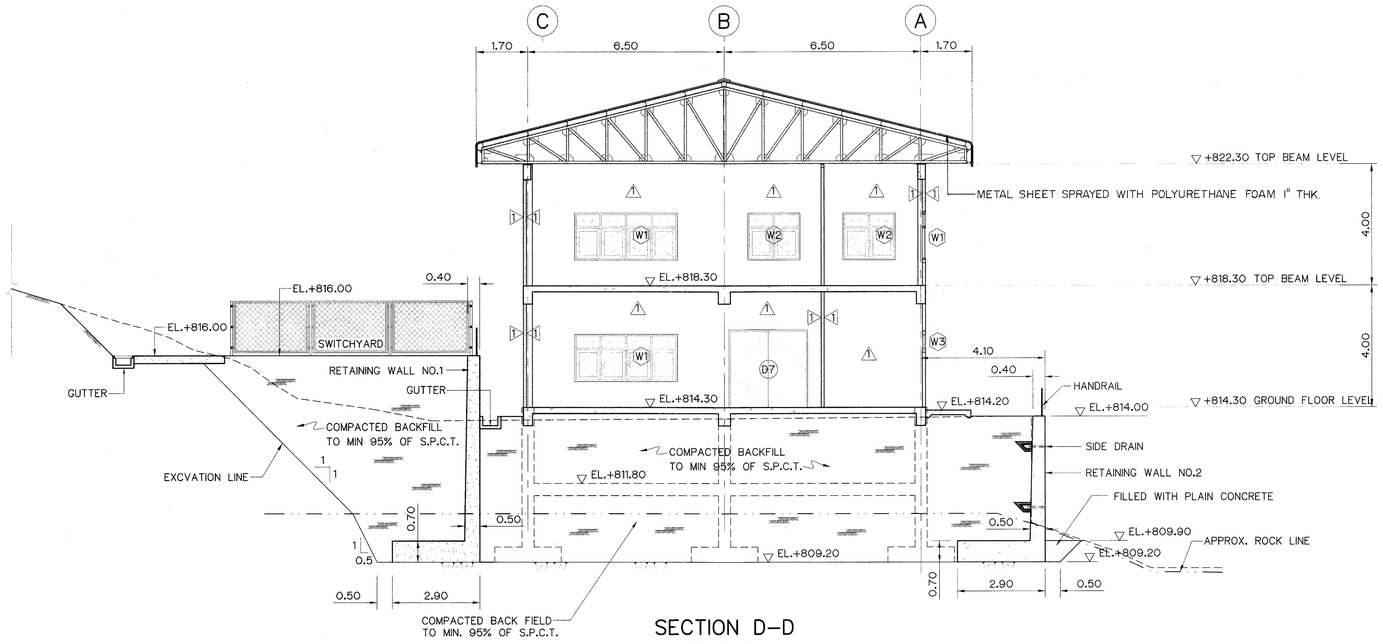
SECTION E-E

SCALE 1:100



DETAIL "1"

SCALE 1:10



SECTION D-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. PLAN 1st FLOOR AND PLAN 2nd FLOOR	MH-PH-02
2. ELEVATIONS	MH-PH-04

0 1 2 3 4 5 6 7 8

SCALE 1:100 METERS

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

MAE HAT HYDROPOWER PROJECT

ELECTRO-MECHANICAL EQUIPMENT
POWERHOUSE
SECTIONS (SHEET 2/2)

NO.	DATE	REVISIONS	CHECKED	APPROVED
3				
2				
1				

CONSULTANTS — DEDE

P&C MANAGEMENT CO.,LTD.

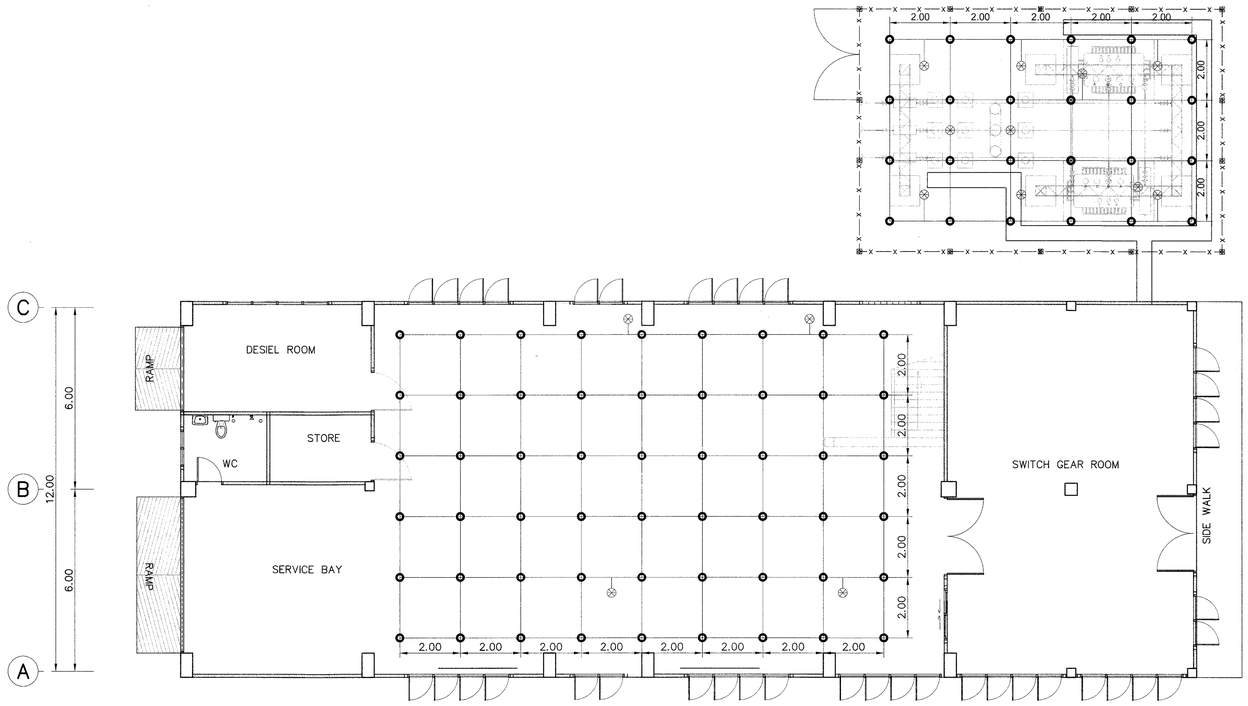
DESIGNED — DRAWN — CHECKED — PROJECT MANAGER — DATE 02/03/2559

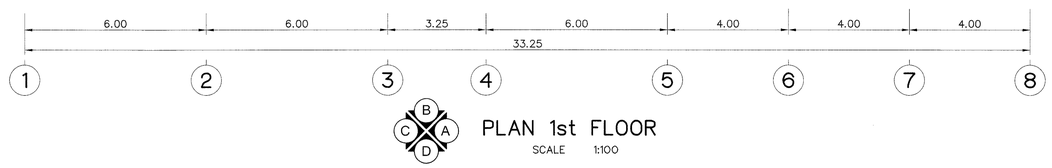
Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY

REVIEWED — SUBMITTED — RECOMMENDED — APPROVED

DRAWING NO. MH-PH-06

SHEET NO. 39 OF 51





PLAN 1st FLOOR

SCALE 1:100

LEGENDS :

- GROUND ROD
- GROUND POINT FOR POWER PLANT EQUIPMENT GROUNDING
- BARE CUPPER CONDUCTOR

NOTE

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

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

ELECTRO–MECHANICAL EQUIPMENT
POWERHOUSE
GROUNDING SYSTEMS

P&C MANAGEMENT CO.,LTD.

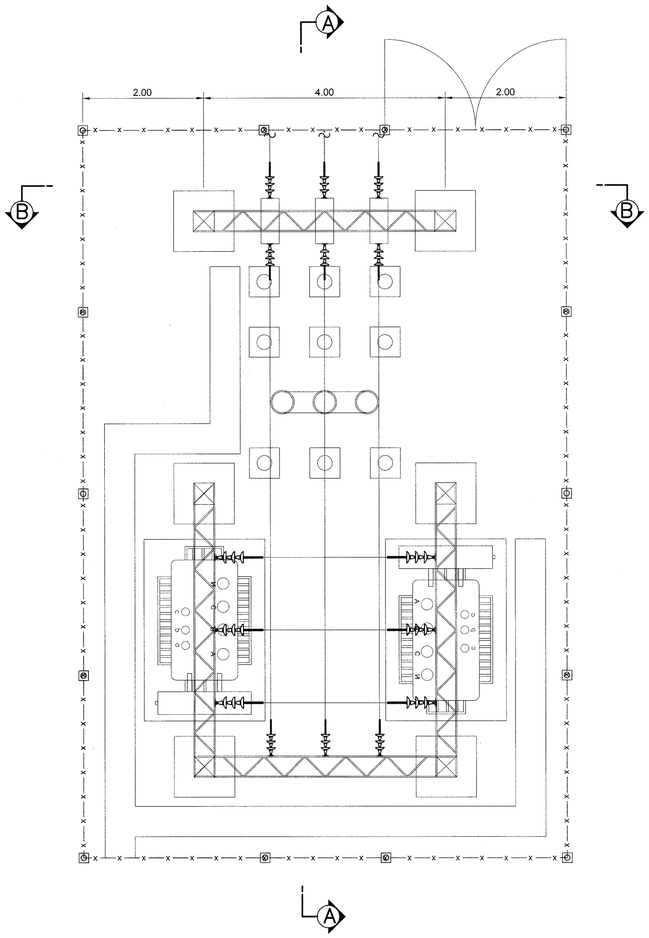
Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY

DESIGNED — วิศว.604
DRAWN
CHECKED — วิศว.604
PROJECT MANAGER — DATE 08/05/2551

REVIEWED
SUBMITTED
RECOMMENDED
APPROVED

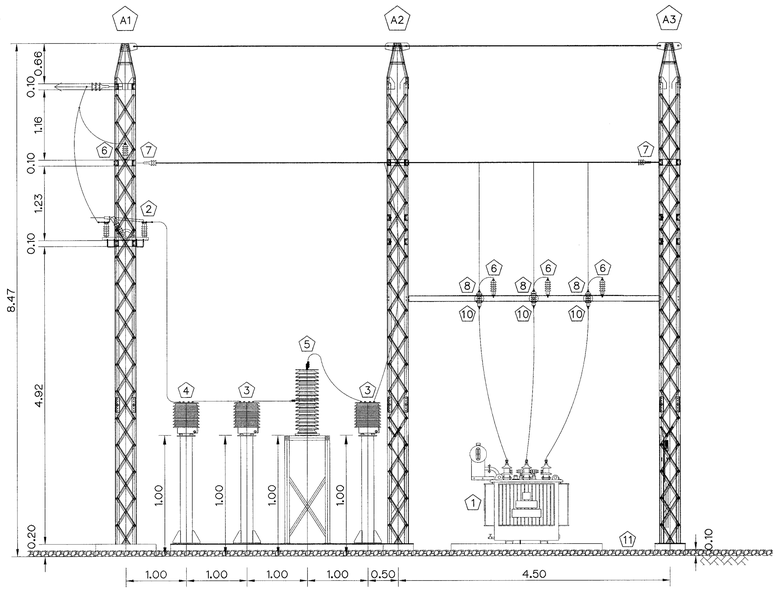
DRAWING NO. MH–PH–07

SHEET NO. 40 OF 51



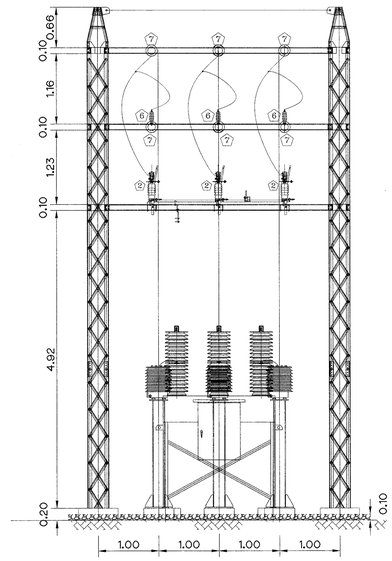
SWITCHYARD PLAN LAYOUT

SCALE 1:50



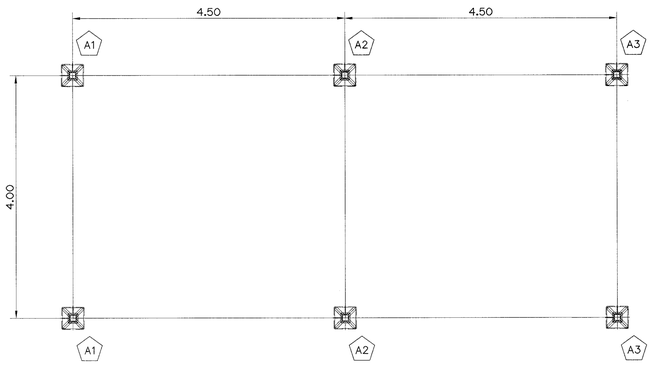
SECTION A–A

SCALE 1:50



SECTION B–B

SCALE 1:50



OVERHEAD GROUND WIRE PLAN

SCALE 1:50

ITEM.	DESCRIPTION	Q'TY.	REMARK.
1	MAIN TRANSFORMER 22000/3300 V.	2	
2	DISCONNECTING SWITCH	1	
3	OUTDOOR CURRENT TRANSFORMERS RATIO	6	
4	OUTDOOR VOLTGE TRANSFORMER RATIO	3	
5	SF6 CIRCUIT–BREAKER	1	
6	SURGE ARRESTERS	9	
7	SUSPENSION INSULATORS	45	
8	LINE POST INSULATORS	6	
9	LINE GROUND SWITCH	2	
10	22 KV. DROP OUT FUSE	6	
11	GRAVEL	1	

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

MAE HAT HYDROPOWER PROJECT

ELECTRO–MECHANICAL EQUIPMENT

POWERHOUSE

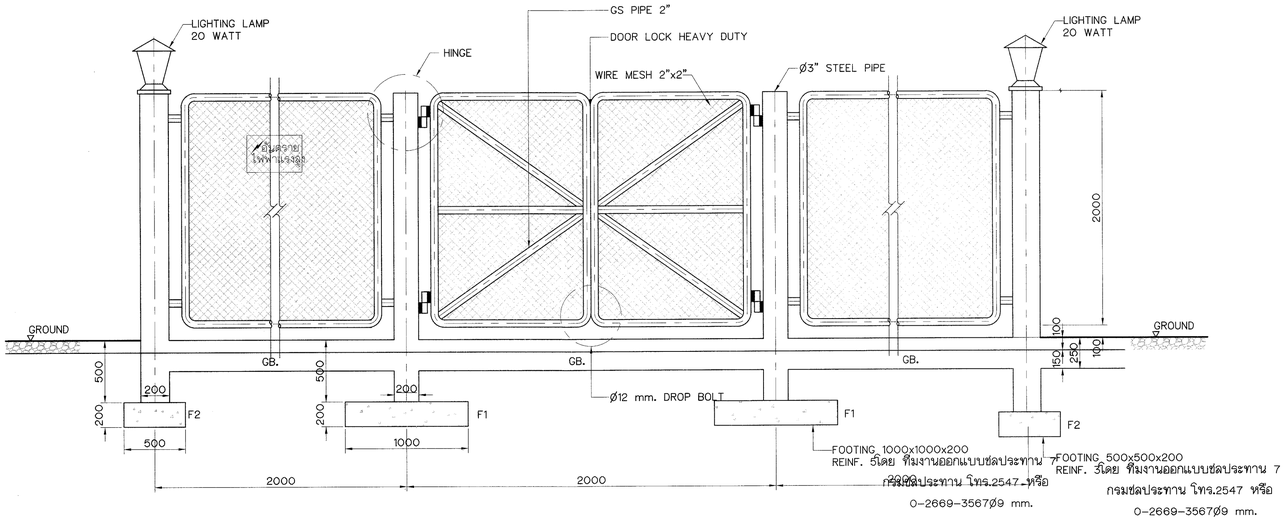
SWITCHYARD PLAN LAYOUT SECTIONS AND GROUND SYSTEM

NO.	DATE	REVISIONS	CHECKED	APPROVED
3				
2				
1				
	CONSULTANTS		DEDE	

P&C MANAGEMENT CO.,LTD.

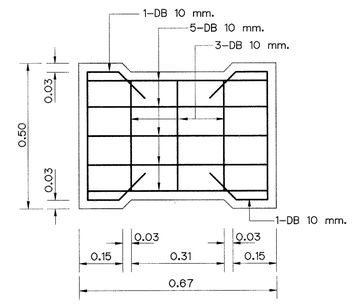
Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY

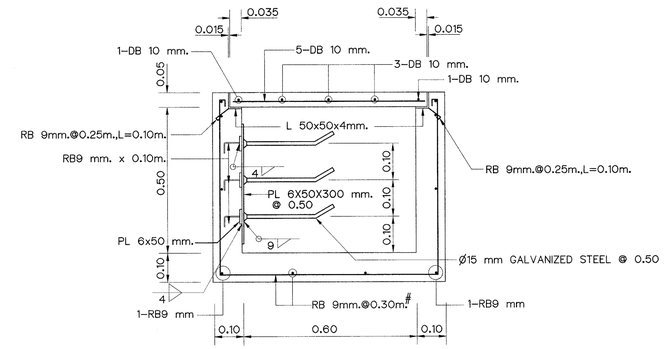
DESIGNED	ชวน.804	REVIEWED	
DRAWN		SUBMITTED	
CHECKED	ชวน.804	RECOMMENDED	
PROJECT MANAGER	08/03/2559 DATE	APPROVED	P. Hanwell.
DRAWING NO.	MH–PH–08	SHEET NO.	41 OF 51



FENCE DETAIL

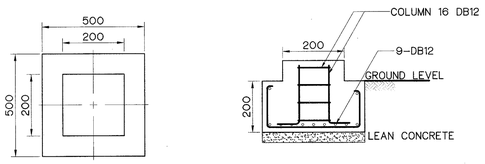
NOT TO SCALE





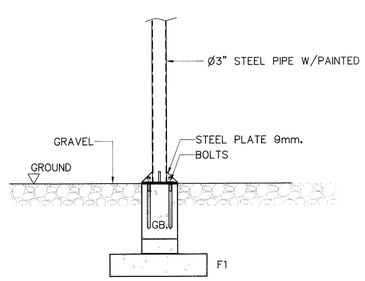
DETAIL CABLE TRENCH IN SWITCHYARD

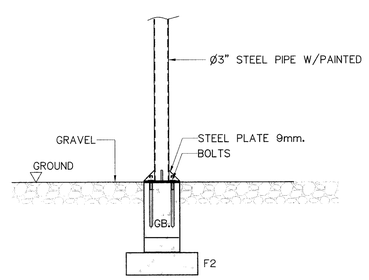
SCALE 1:10

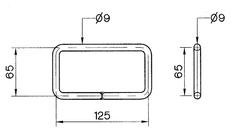


DETAIL COLUMN F2

NOT TO SCALE

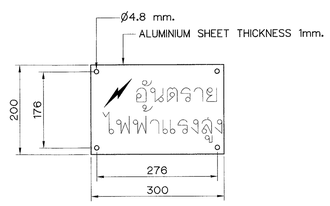






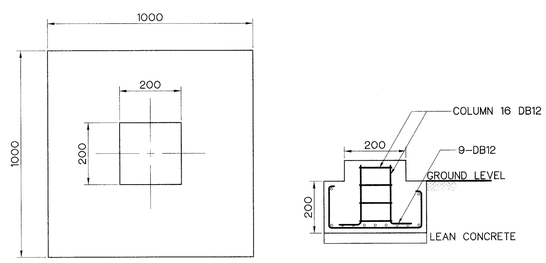
DETAIL "A"

NOT TO SCALE



WARNING SIGN

NOT TO SCALE



DETAIL COLUMN F1

NOT TO SCALE

0 0.05 0.1 0.2 0.3 0.4
SCALE 1:5 METERS

0 0.1 0.2 0.4 0.6 0.8
SCALE 1:10 METERS

NOTES :

1. ALL DIMENSIONS ARE IN MILLIMETERS, UNLESS OTHERWISE SHOWN.
2. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. HMP-GN-03
3. THE TRANSFORMER YARD WILL BE ACCORDING TO PEA STANDARD.

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

ELECTRO-MECHANICAL EQUIPMENT
POWERHOUSE
SWITCHYARD FENCE AND CABLE TRENCH

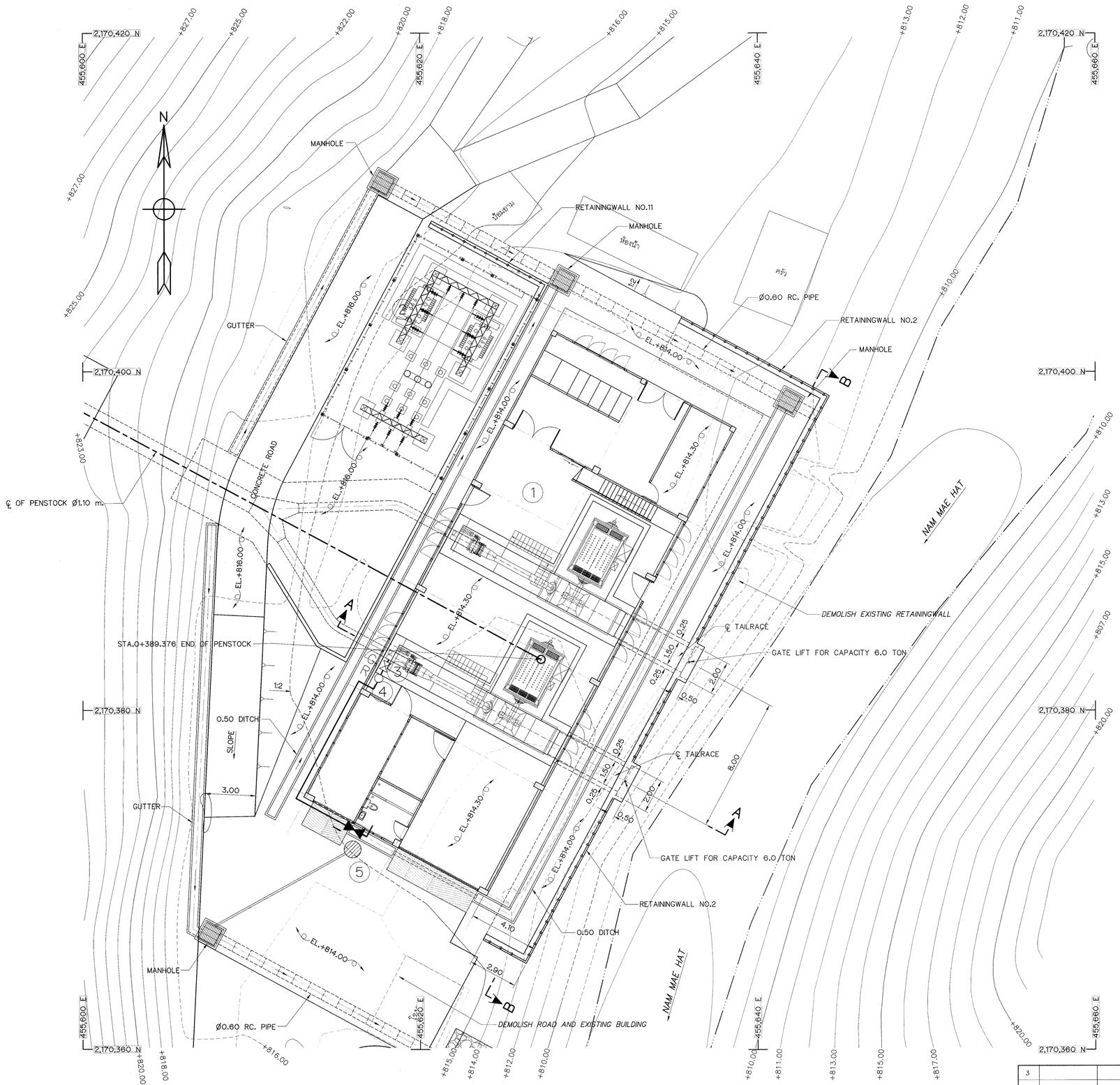
P&C MANAGEMENT CO.,LTD.

Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY

DESIGNED	ส.ค.64624	ส.ค.6226	REVIEWED
DRAWN			SUBMITTED
CHECKED		ส.ค.6226	RECOMMENDED
PROJECT MANAGER		08/03/2559 DATE	APPROVED

DRAWING NO. MH-PH-09

SHEET NO. 42 OF 51



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. 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. TAILRACE, SECTION AND DETAILS MH-TR-02

0 1 2 4 6 8 10

SCALE 1:125 METERS

NO.	DATE	REVISIONS	CHECKED	APPROVED
3				
2				
1				

CONSULTANTS DEDE

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

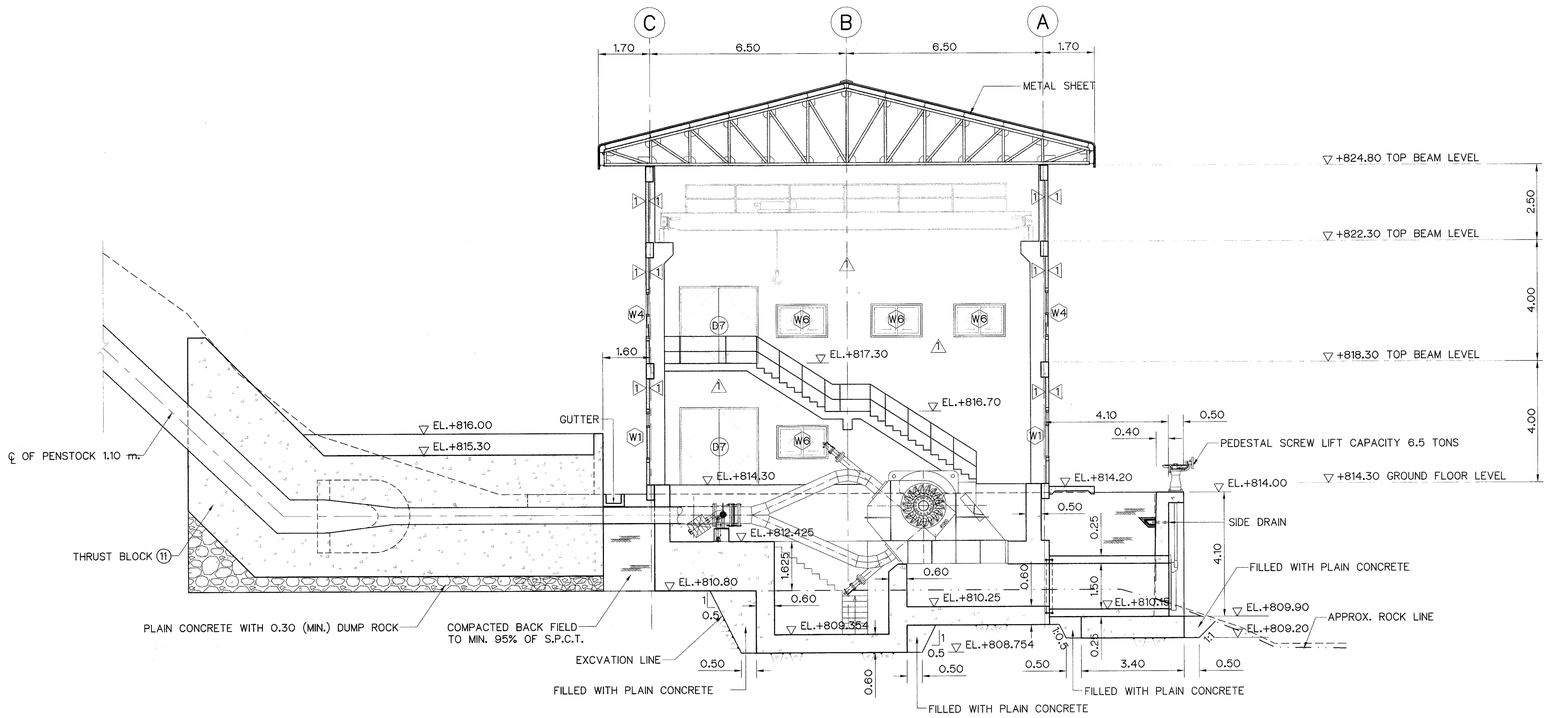
MAE HAT HYDROPOWER PROJECT

ELECTRO-MECHANICAL EQUIPMENT
TAILRACE
PLAN

P&C MANAGEMENT CO.,LTD.

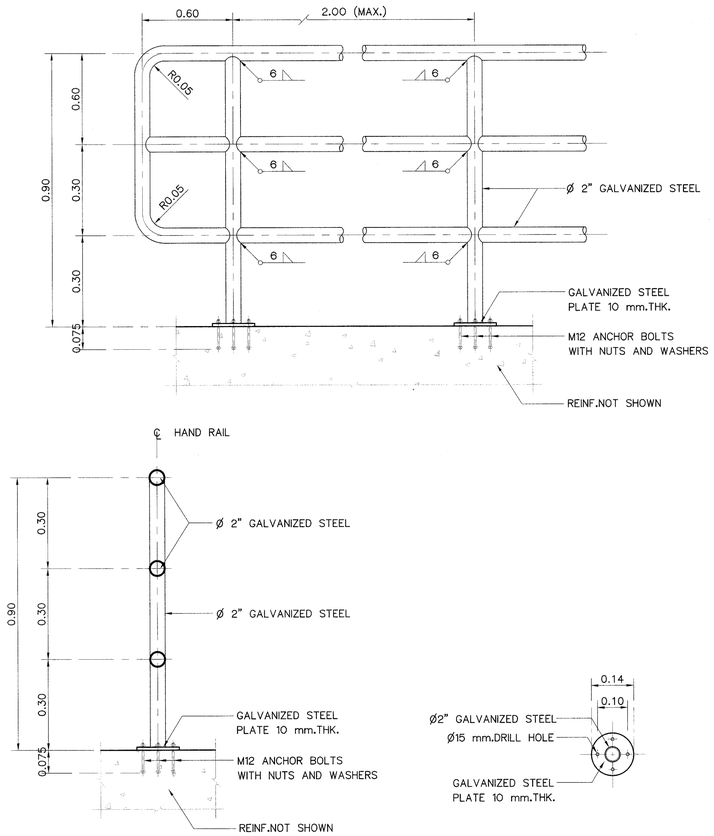
Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY

REVIEWED			
DESIGNED			SUBMITTED
DRAWN			RECOMMENDED
CHECKED			APPROVED
PROJECT MANAGER	08/03/2559 DATE	DRAWING NO. MH-TR-01	SHEET NO. 43 OF 51



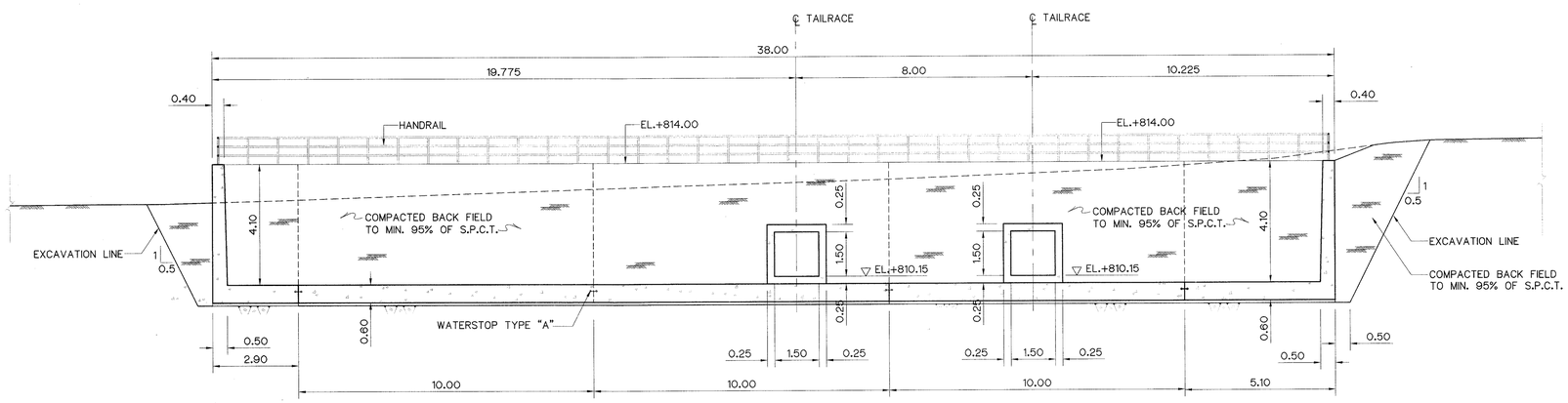
SECTION A–A

SCALE 1:100



DETAIL OF HANDRAIL

SCALE 1:20



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. NMH-GN-03

REFERENCE DRAWINGS :

1. TAILRACE PLAN NMH-TR-01

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

ELECTRO–MECHANICAL EQUIPMENT

TAILRACE

SECTIONS

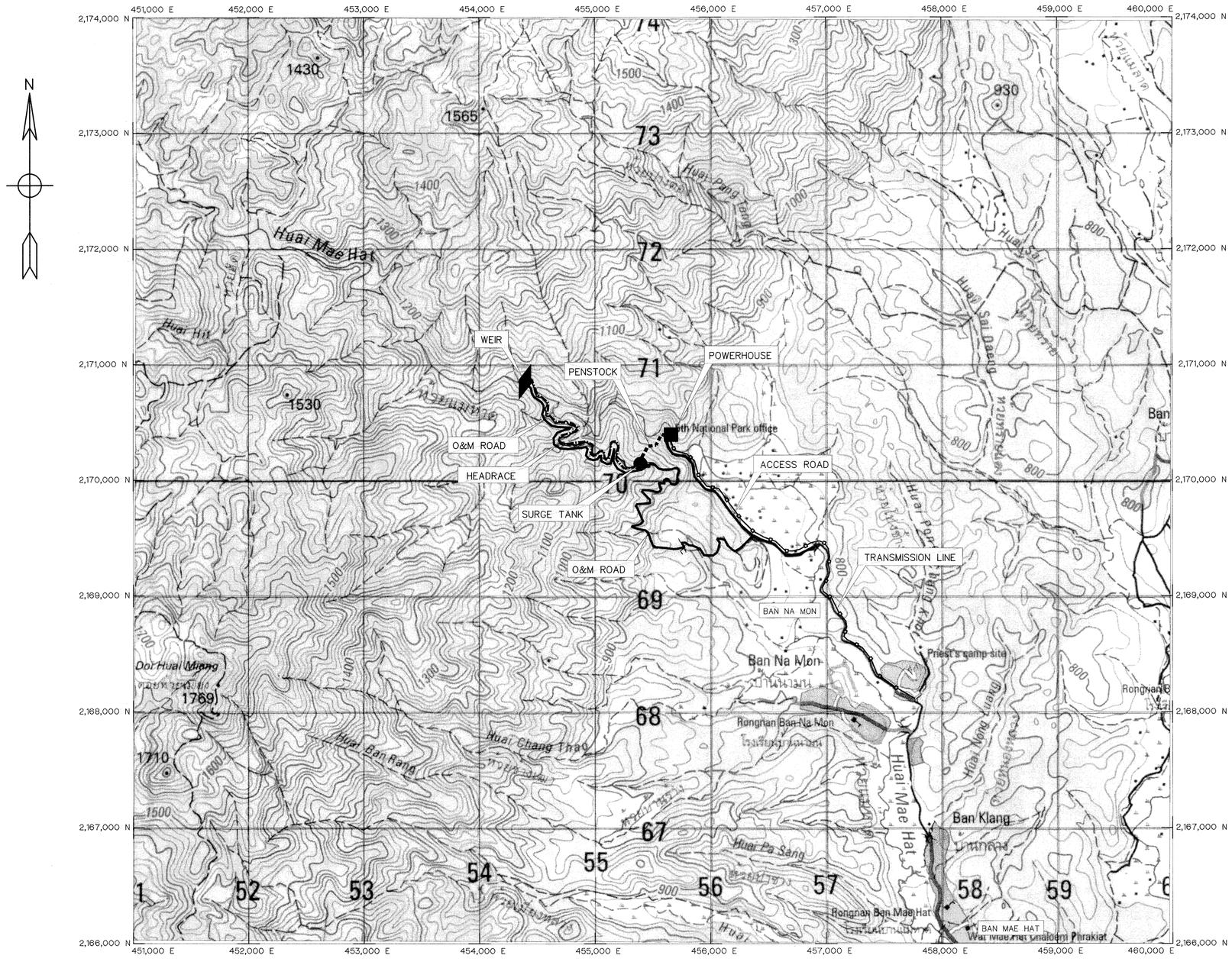
P&C MANAGEMENT CO.,LTD.

Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY

DESIGNED	28.6.64624	28.6.2226	REVIEWED
DRAWN			SUBMITTED
CHECKED		28.6.2226	RECOMMENDED
PROJECT MANAGER	08/03/2559 DATE		APPROVED

DRAWING NO. MH–TR–02

SHEET NO. 44 OF 51



PROJECT AREA MAP

SCALE 1:20,000

N

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

0 500 1,000 1,500

SCALE 1:20,000 METERS

NO.	DATE	REVISIONS	CHECKED	APPROVED
3				
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MINISTRY OF ENERGY

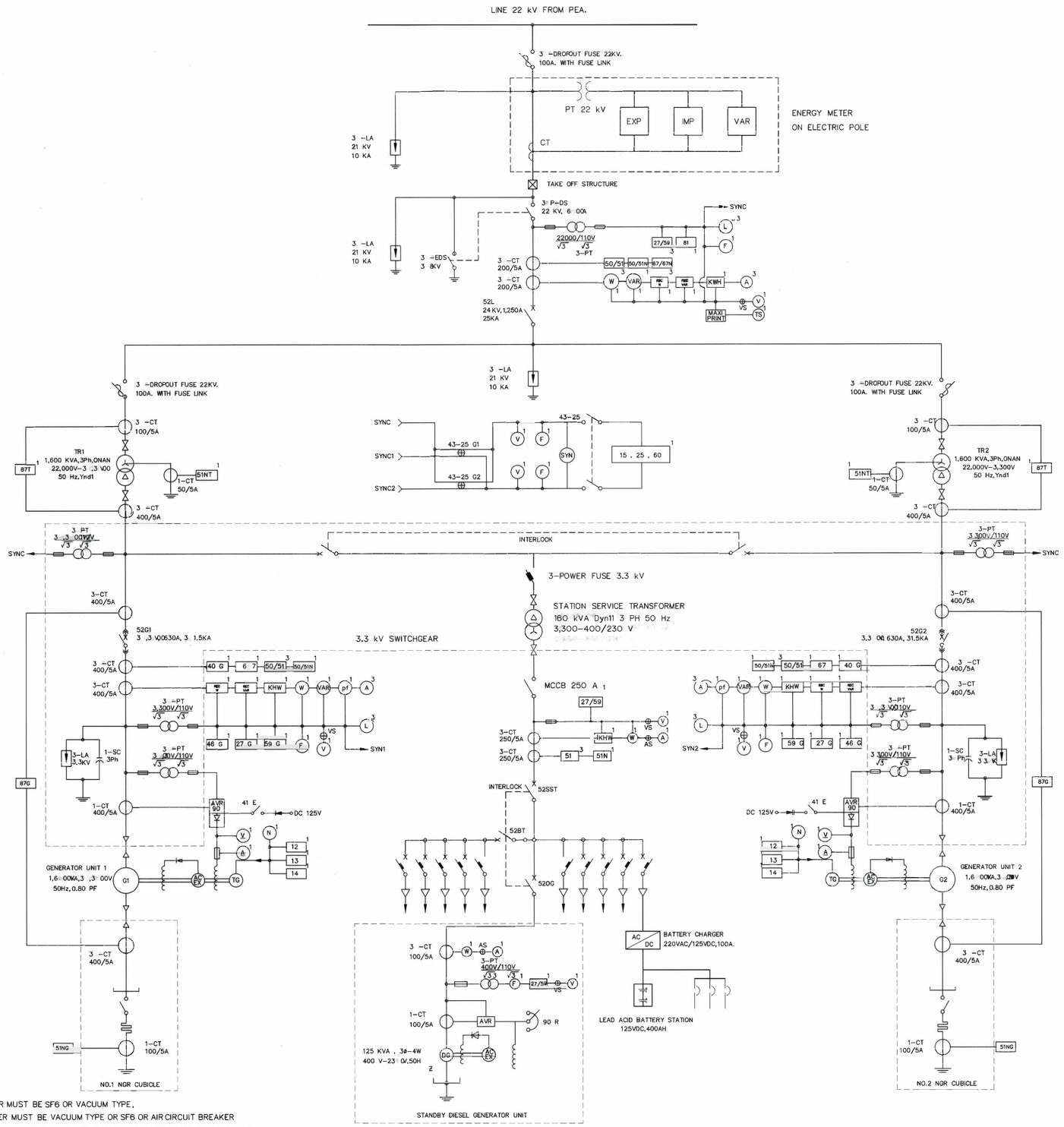
MAE HAT HYDROPOWER PROJECT

ELECTRO–MECHANICAL EQUIPMENT
TRANSMISSION LINE
GENERAL PLAN

P&C MANAGEMENT CO.,LTD.

Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY

DESIGNED	ส.ย.64624	REVIEWED	
DRAWN		SUBMITTED	
CHECKED	ส.ย.6226	RECOMMENDED	
PROJECT MANAGER	DATE 01/03/2564	APPROVED	
DRAWING NO.	MH–TS–01	SHEET NO.	45 OF 51



LEGEND :

12	OVERSPEED RELAY	43	MANUAL TRANSFER SWITCH
13	SYNCRONOUS SPEED RELAY	L	INDICATING LAMP
14	UNDERSPEED RELAY	F	FREQUENCY METER
15	SPEED OR FREQUENCY MATCHING RELAY	V	VOLT. METER
25	SYNCHRONING RELAY	A	AMP. METER
27	UNDERVOLTAGE RELAY	W	WATT. METER
32	REVERSE POWER RELAY	VAR	VAR METER
40	FIELD RELAY	pf	POWER FACTOR METER
46	REVERSE PHASE RELAY	N	RPN. SPEED METER
50	INSTANTANEOUS OVERCURRENT	V	DC. VOLT METER
51	TIME OVERCURRENT RELAY	A	DC. AMP. METER
59	OVERVOLTAGE RELAY	TG	TACHO-GENERATOR
60	VOLTAGE OR CURRENT BALANCE RELAY	AC EX	AC. EXCITOR
64	GROUND PROTECTIVE RELAY	G1	GENERATOR NO.1
67	DIRECTIONAL OVERCURRENT RELAY	3 P-DP	3-PHASE DROP-OUT FUSE
81	FREQUENCY RELAY	3P-DS	3 -PHASEDISCONNECTING SWITCH
87	DEFFERENTIAL PROTECTIVE RELAY	3 -LA	3-PHASE LIGHTNING ARRESTER
	SELECTOR SWITCH	3P-PF	3 -PHASEPOWER FUSE
	WATT RECORDER		CIRCUIT BREAKER
	VAR RECORDER	VCB OR ACB	VACUUM CIRCUIT BREAKER OR AIR CIRCUIT BREAKER (DRAW OUT TYPE)
kwh	KELOWATT HOUR METER		
	3 -CT3 -PHASEPOTENTIAL TRANSFORMER		
3-CT	3 -PHASECURRENT TRANSFORMER		
SYNC	SYNCRONISING SIGNAL		
	CONTROL FUSE		
	LAMP		
SYM	SYNCHRONOSCOPE		

NOTES :

1. 22 KV CIRCUIT BREAKER MUST BE SF6 OR VACUUM TYPE,
   3.3 KV CIRCUIT BREAKER MUST BE VACUUM TYPE OR SF6 OR AIR CIRCUIT BREAKER
2. 3.3 KV CURRENT TRANSFORMER AND POTENTIAL TRANFORMER MUST BE DRY TYPE
3. 22 KV CURRENT TRANSFORMER AND POTENTIAL TRANFORMER MUST BE EPOXY RESIN MOLD
4. ALL POTENTIAL TRANSFORMER : ACCURACY CLASS 0.5
5. ALL CURRENT TRANSFORMER : FOR METERING ACCURACY CLASS 0.5
   : FOR RELAY ACCURACY CLASS 5P 20
6. THIS DRAWING IS DESIGNED FOR GUIDE LINE ONLY, IT SHALL BE DESIGNED AND SPECIFIED BY CONTRACTOR FOR SUBMITTED TO FIELD ENGINEER APPROVAL LATER
7. ACCORDING TO PEA'S REGULATION ON THE POWER NETWORK SYSTEM INTERCONNECTION CODE

NO.	DATE	REVISIONS	CHECKED	APPROVED
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MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

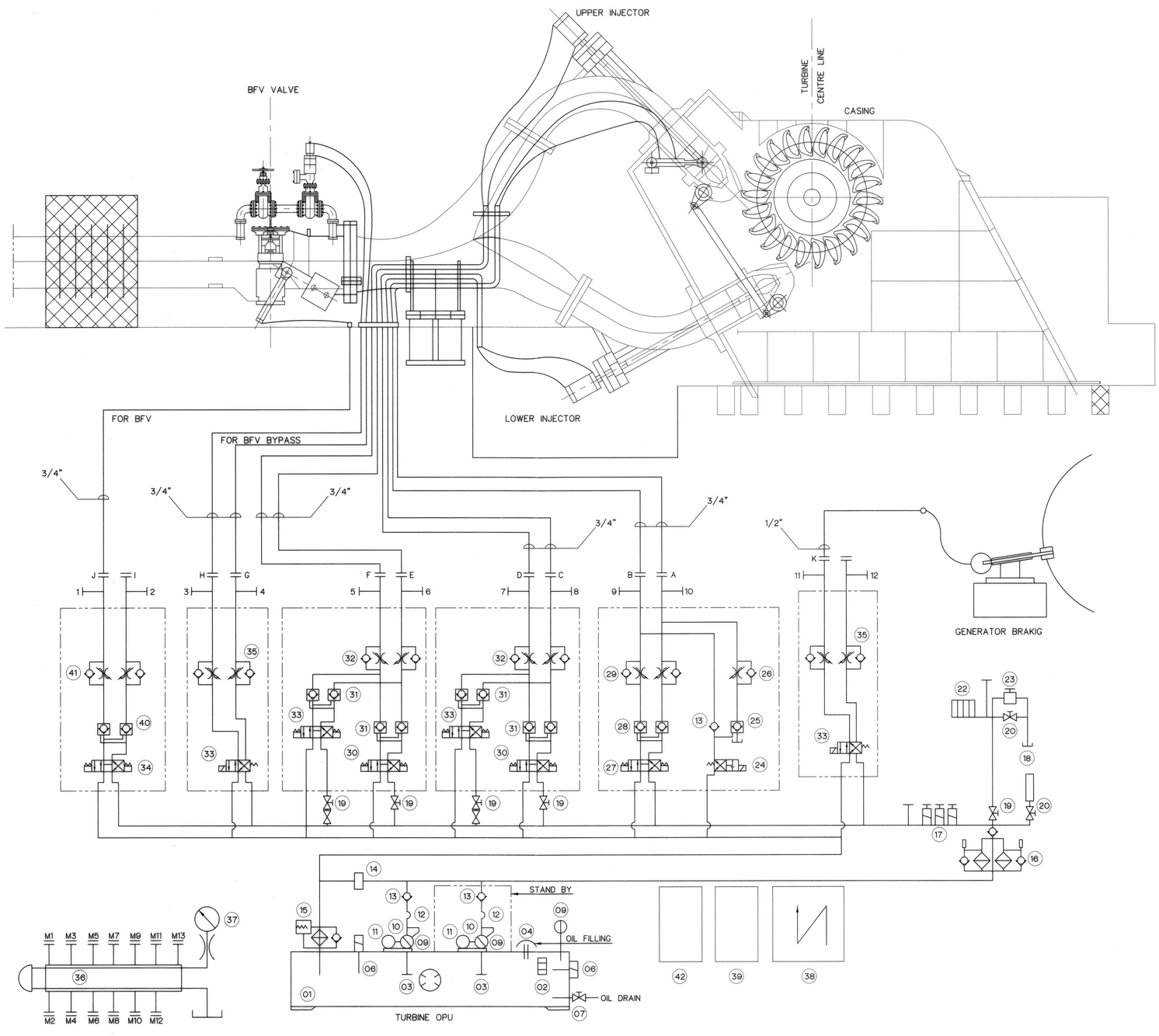
ELECTRO-MECHANICAL EQUIPMENT
MAIN POWER SINGLE LINE DIAGRAM

P&C MANAGEMENT CO.,LTD.

Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY

DESIGNED	2พ.ค.04	SUBMITTED	
DRAWN		RECOMMENDED	
CHECKED	2พ.ค.04	APPROVED	
PROJECT MANAGER	08/05/2554 DATE	DRAWING NO. MH-EM-01	SHEET NO. 46 OF 51

REVIEWED



SERVO SPECIFICATIONS							
DESCRIPTION		DEFLECTOR	NEEDLE-1	NEEDLE-2	BFY Bypass	BUTTER FLY VALVE CYLINDERS	*GENERATOR BRAKING CYLINDERS
NO. OF CYLINDERS		1	1	1	1	1	1
BORE x ROD (mm)		80X45	160X70	160X70	80X45	160X70	90
STROKE (mm)		96	180	180	80	460	100
TIME (sec)	OPEN	20	20	20	20	80	30
	CLOSE	2	30	30	20	40	30
OP PRESSURE (Bar)		30-100	30-100	30-100	30-100	30-100	30-100

NOTES:

1. THE 5NOS. DEFLECTORS ON THE TURBINE (1NO EACH FOR EACH NOZZLE) BOTH TOP AND BOTTOM DEFLECTORS ARE CONNECTED WITH LINK ARRANGEMENT TO A COMMON HYDRAULIC CYLINDER.
2. PUMP SETTING-50 LPM @ 100 BAR.
3. PRESSURE TRANDUCER/SWITCH SETTING.
   P>100 BAR PUMP OFF.
   P>70 BAR PUMP ON.
   P>60 BAR ALARM
   P>50 BAR TRIP.
4. PUMP SETTING-50 LPM @ 100 BAR.
   PR. RELIFT VALVE SETTING = 110 BAR (ITEM No. 14)
   SAFETY REUEF VALVE SETTING + 120 BAR (ITEM No. 22)
5. THIS DRAWING IS DESIGNED FOR GUIDE LINE ONLY, IT SHALL BE DESIGNED AND SPECIFIED BY CONTRACTOR FOR SUBMITTED TO FIELD ENGINEER APPROVAL LATER

QTY	SLNO	DESCRPTION	SPEC'N	REF/DWG
01	01	OIL RESERVOIR	750 Liters	-
01	02	OIL LEVEL INDICATOR	-	-
02	03	SUCTION STRAINER	-	-
01	04	OIL FILLER/BREATHER	10 Microns	-
01	05	TEMPERATURE GAUGE	-	-
01	06	OIL LEVEL SENSOR	-	-
01	07	GATE VALVE	-	-
01	08	RTD	-	-
02	09	VARIABLE DISPLACEMENT PUMP	23 LPM	-
02	10	FLEXIBLE DRIVE COUPLING	-	-
02	11	ELECTRIC MOTOR 3 PHASE	3.7 kW (5 hp) 1500 RPM B5 50 Hz 400v IP 55 Closs F Insulation	-
02	12	FLEXIBLEHOSE	-	-
02	13	INLINE TYPE CHECK VALVE	-	-
01	14	PILOT OPERATED RELIEF VALVE	-	-
01	15	RETURN LINE FILTER	-	-
01	16	OUPLEX PRESSURE LINE FILLTER	-	-
02	17	PRESSURE SWITCH	-	-
01	18	PRESSURE TRANSDUCER	-	-
01	19	SHUT OFF VALVE	3/4" Gosket mounted type	-
01	20	SHUT OFF VALVE	1/2" Gosket mounted type	-
01	21	SHUT OFF VALVE	3/4" Gosket mounted type	-
04	22	ACCUMULATOR (PISTON TYPE)	2 x 55 Ltrs	-
01	23	DIRET TYPE RELIEF VALVE	-	-
01	24	PILOT-OPERATED CHECK VALVE	-	-
01	25	MODULAR PILOT OPERATED CHECK VALVE	-	-
01	26	MODULAR THROTTLE & CHECK VALVE	-	-
01	27	SOLENOID OPERATED DIRECTION CONTROL VALVE	-	-
01	28	MODULAR PILOT OPERATED CHECK VALVE	-	-
01	29	MODULAR THROTTLE & CHECK VALVE	-	-
02	30	PROPOTIONAL VALVE	Diff P<5bar, command + 10 VDC	-
04	31	MODULAR PILOT OPERATED CHECK VALVE	-	-
03	32	MODULAR THROTTLE & CHECK VALVE	-	-
04	33	DIRECTION CONTROL CHECK VALVE	220V D.C	-
01	34	DIRECTION CONTROL CHECK VALVE	220V D.C	-
02	35	MODULAR THROTTLE & CHECK VALVE	-	-
01	36	MULTISTATION PRESSURE GAUGE ISOLATOR	SPECIAL	-
01	37	PRESSURE GAUGE	100 mm dia (4") 0-210 bars FB mounting glycerine filled	-
01	38	TERMINAL BOX	Retail make	-
01-each	39	ACCUMULATOR CHARGING KIT	-	-
01	40	MODULAR PILOT OPERATED CHECK VALVE	-	-
01	41	MODULAR THROTTLE & CHECK VALVE	-	-

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

MAE HAT HYDROPOWER PROJECT

ELECTRO-MECHANICAL EQUIPMENT

OIL PUMPING UNIT DIAGRAM (UNIT 1 AND 2) DETAIL

NO.	DATE	REVISIONS	CHECKED	APPROVED
3				
2				
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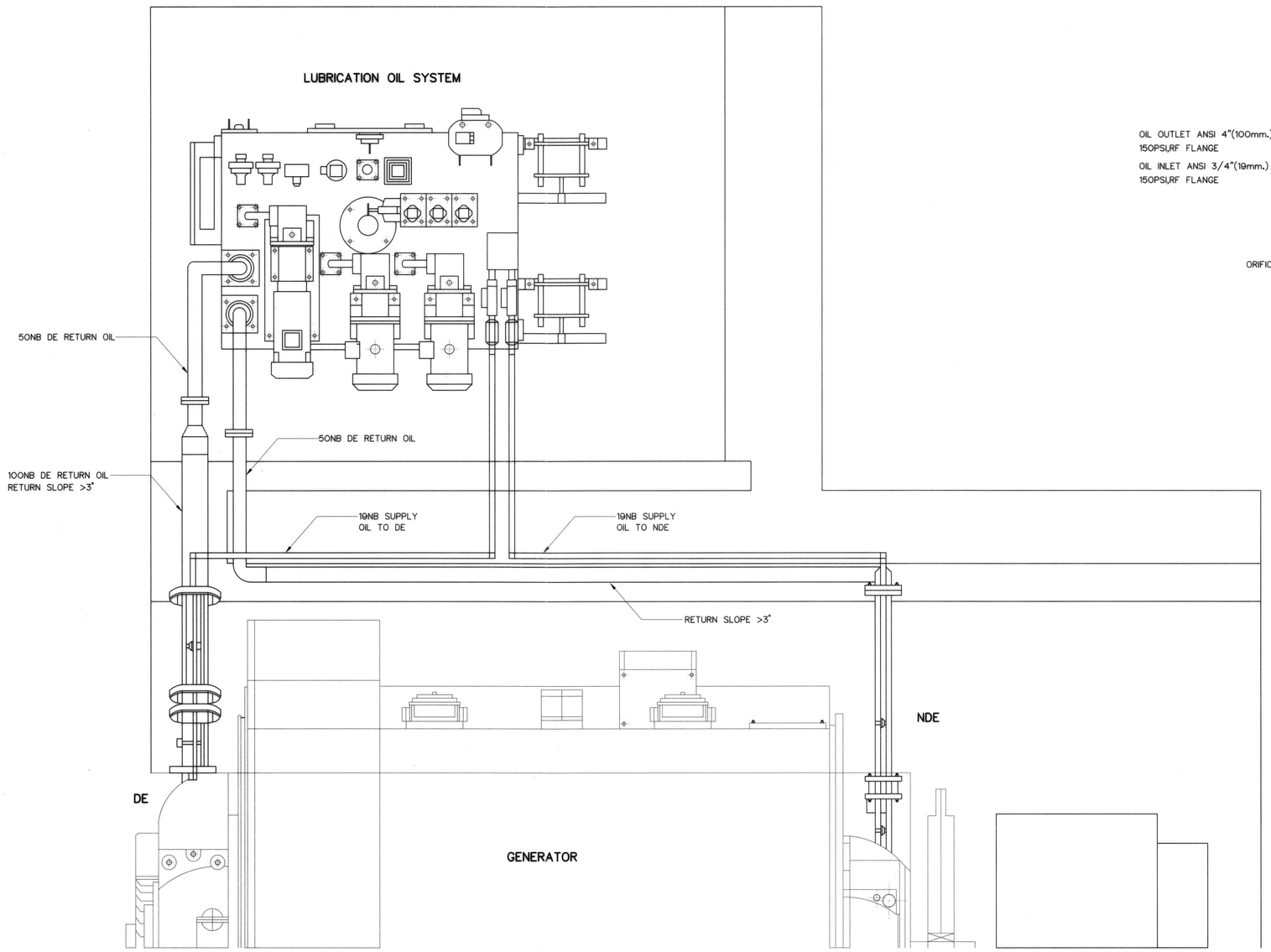
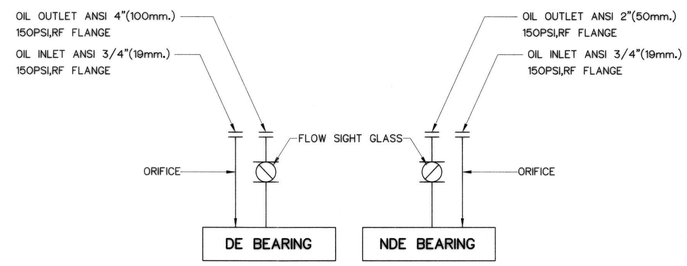
DESIGNED	20.1.1950	REVIEWED	
DRAWN		SUBMITTED	
CHECKED	20.1.1950	RECOMMENDED	
*PROJECT MANAGER	08/03/2559 DATE	APPROVED	

DRAWING NO. MH-EM-02

SHEET NO. 47 OF 51





PIPING FOR LUB.OIL

NOTE

1. ALL DIMENSION ARE IN MILLIMETER UNLESS OTHERWISE SHOW.
2. 3° MINIMUM SLOPE REQUIRED ON OIL OUTLET (RETURN) PIPING FROM BEARING TO TANK TO ENSURE GRAVITY FLOW OF OIL BACK TO TANK.
3. THIS DRAWING IS DESIGNED FOR GUIDE LINE ONLY, IT SHALL BE DESIGNED AND SPECIFIED BY CONTRACTOR FOR SUBMITTED TO FIELD ENGINEER APPROVAL LATER

NO.	DATE	REVISIONS	CHECKED	APPROVED
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MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

ELECTRO-MECHANICAL EQUIPMENT
PIPE LINE OF LUBRICATION OIL SYSTEM
(UNIT 1 AND 2) DETAIL

P&C MANAGEMENT CO.,LTD.

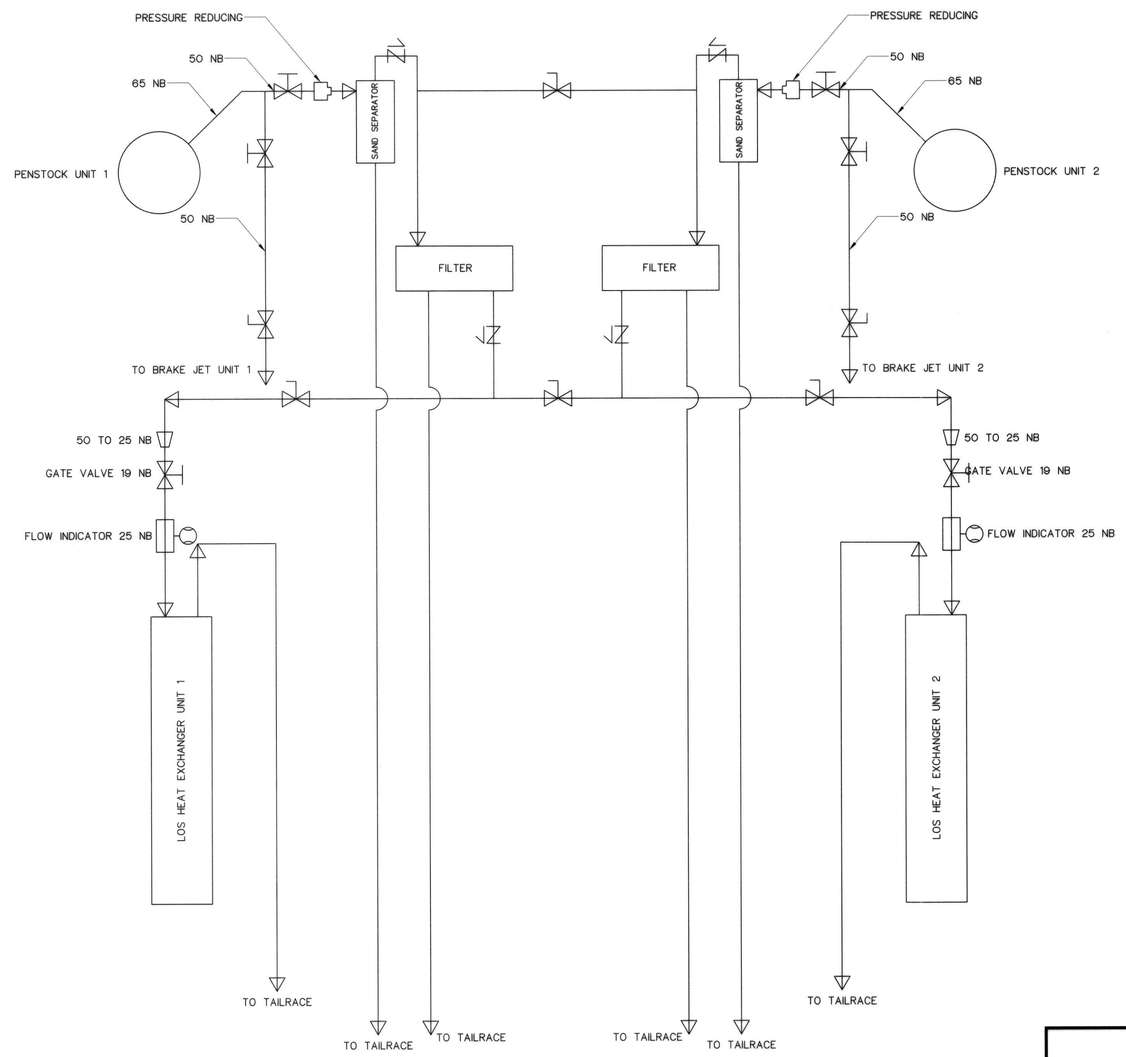
Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY

DESIGNED	ส.ค.1950	REVIEWED	
DRAWN		SUBMITTED	Chou
CHECKED	ส.ค.1950	RECOMMENDED	
PROJECT MANAGER	01/03/2551 DATE	APPROVED	P. Hanna

DRAWING NO. MH-EM-03

SHEET NO. 48 OF 51

No.	SYMBOL	DESCRIPTION
1		GATE VALVE
2		BALL VALVE
3		CHECK VALVE
4		PRESSURE REDUCING
5		REDUCE
6		FLOW INDICATOR



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

MAE HAT HYDROPOWER PROJECT

ELECTRO-MECHANICAL EQUIPMENT
COOLING WATER DIAGRAM
(UNIT 1 AND 2) DETAIL

P&C MANAGEMENT CO.,LTD.

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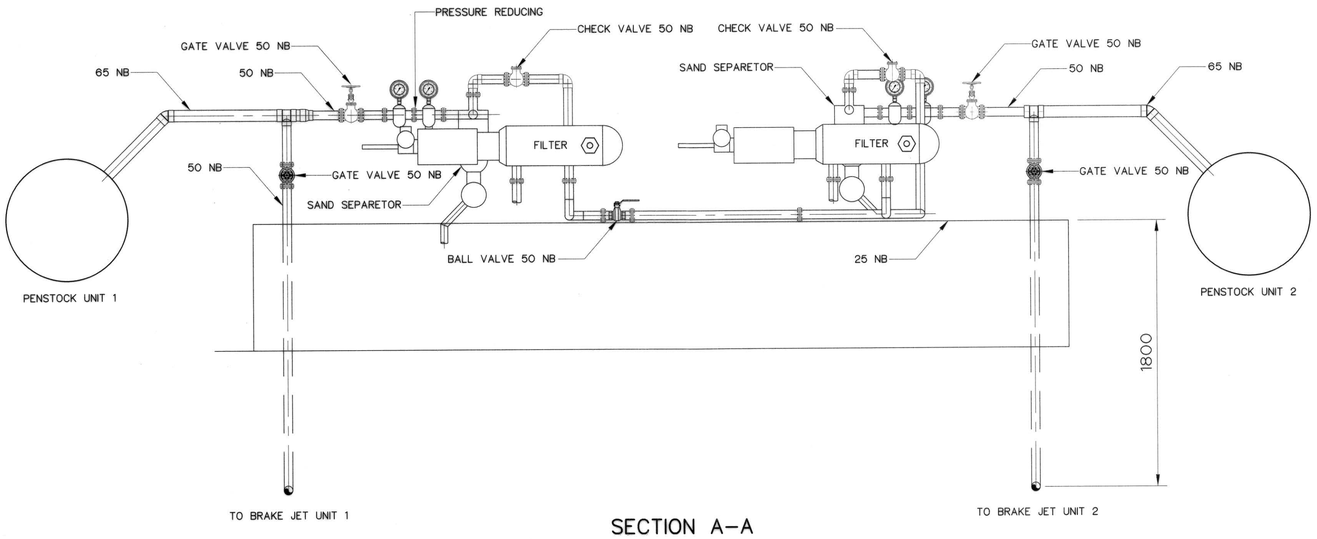
MINISTRY OF ENERGY

DESIGNED	ม.ค.1950	REVIEWED	
DRAWN		SUBMITTED	
CHECKED	ม.ค.1950	RECOMMENDED	
PROJECT MANAGER	DATE 08/02/2559	APPROVED	P. Hanuth

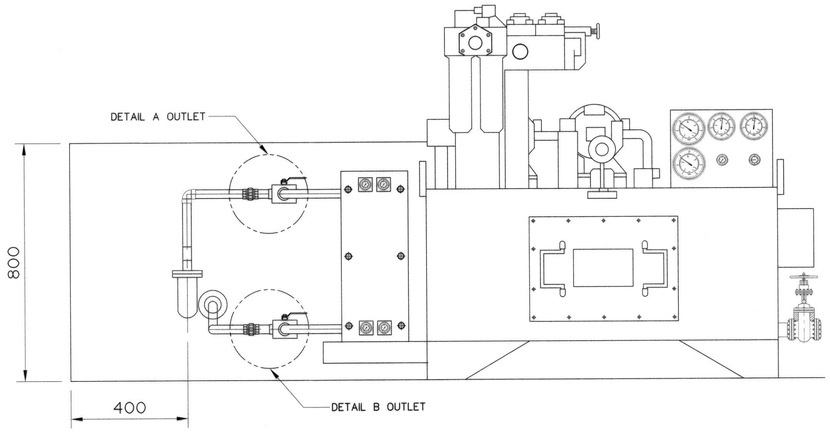
DRAWING NO. MH-EM-04

SHEET NO. 49 OF 51



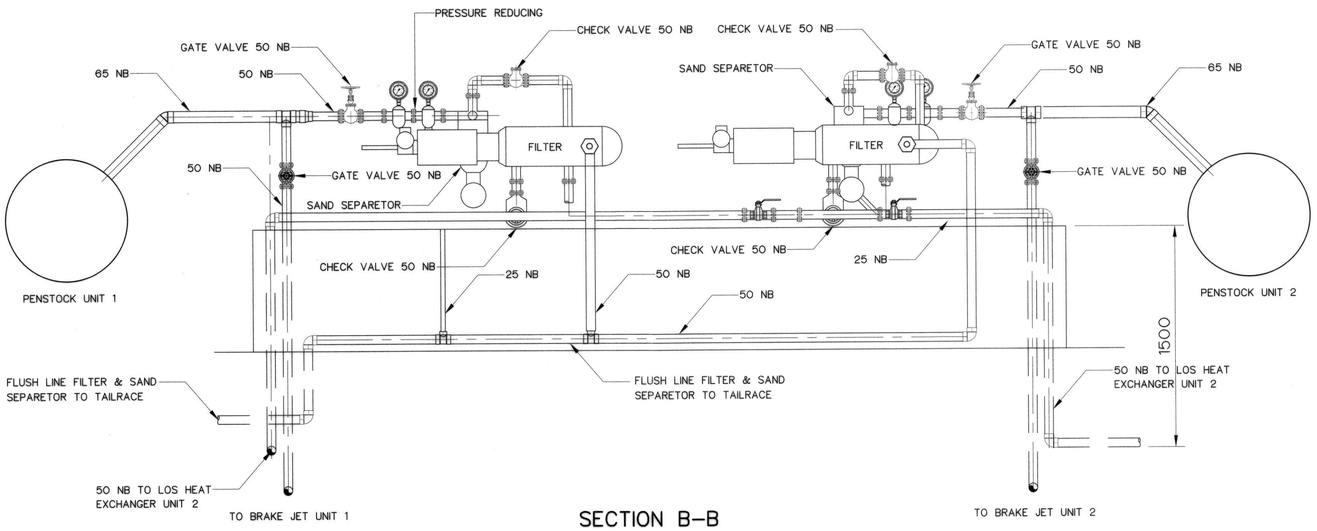
SECTION A–A

DETAILS WATER FROM PENSTOCK TO FILTER



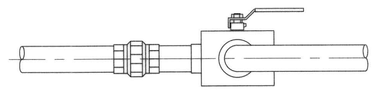
SECTION C–C

WATER INLET & OUTLET LOS HEAT EXCHANGER

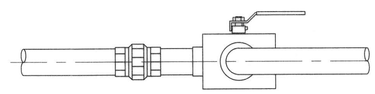


SECTION B–B

DETAILS WATER FROM FILTER TO LOS HEAT EXCHANGER



DETAIL A



DETAIL B

NOTE :

1. THIS DRAWING IS DESIGNED FOR GUIDE LINE ONLY, IT SHALL BE DESIGNED AND SPECIFIED BY CONTRACTOR FOR SUBMITTED TO FIELD ENGINEER APPROVAL LATER

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

MAE HAT HYDROPOWER PROJECT

ELECTRO–MECHANICAL EQUIPMENT
COOLING WATER SYSTEM SECTION
(UNIT 1 AND 2) DETAIL

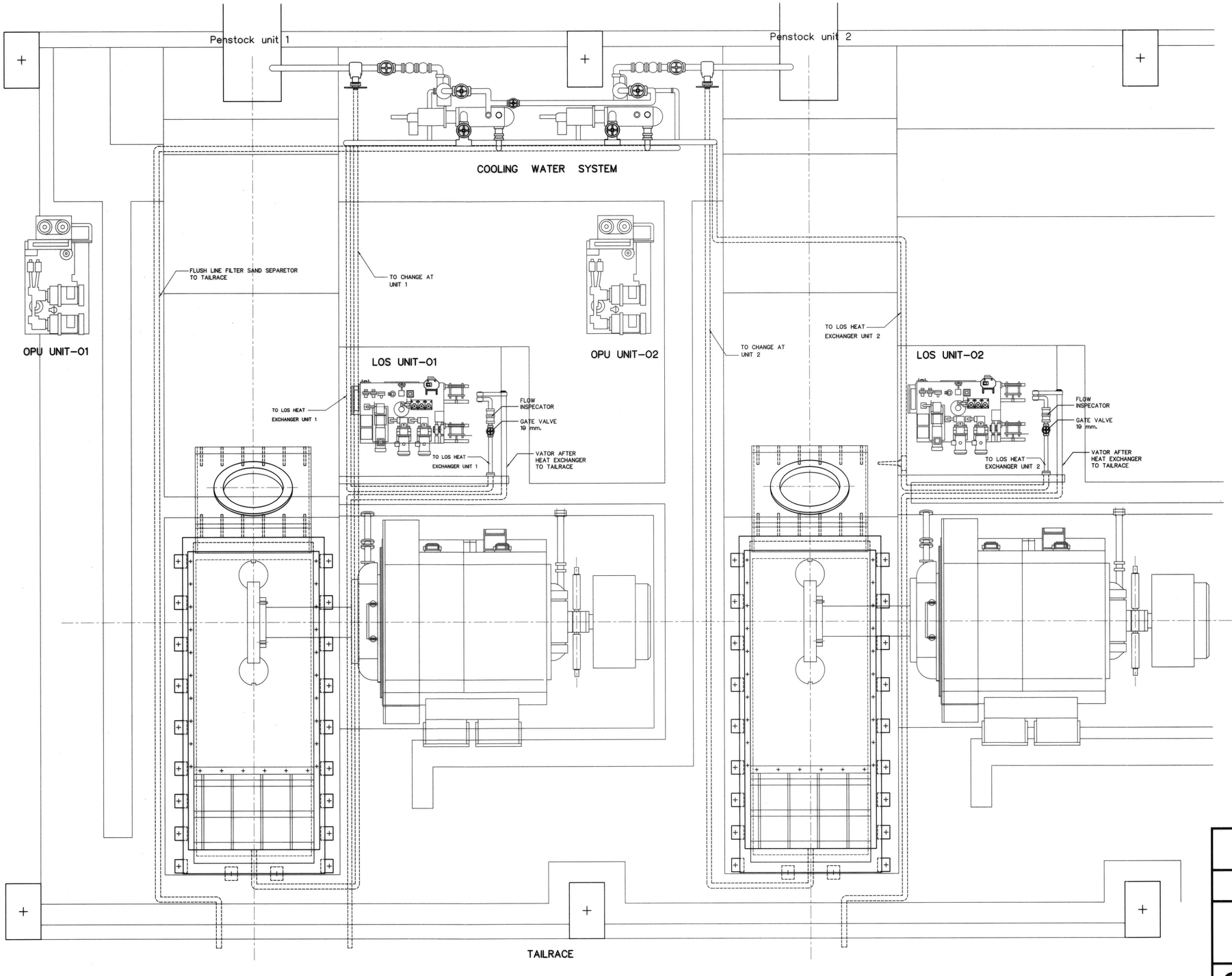
P&C MANAGEMENT CO.,LTD.

Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY

DESIGNED	2ก.1950	REVIEWED	
DRAWN		SUBMITTED	
CHECKED	2ก.1950	RECOMMENDED	
PROJECT MANAGER	02/03/2559 DATE	APPROVED	P. Hanwell

DRAWING NO. MH–EM–05

SHEET NO. 50 OF 51



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

MAE HAT HYDROPOWER PROJECT

ELECTRO-MECHANICAL EQUIPMENT
PLAN PIPE LINE OF COOLING WATER SYSTEM
(UNIT 1 AND 2) DETAIL

NO.	DATE	REVISIONS	CHECKED	APPROVED
3				
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DESIGNED	ส.ค.1950	REVIEWED	
DRAWN		SUBMITTED	Chanit
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PROJECT MANAGER	08/05/2539 DATE	APPROVED	P. Hanna
DRAWING NO.	MH-EM-06	SHEET NO.	51 OF 51