Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

WIANG HAENG DISTRICT CHIANG MAI PROVINCE

CONTRACT C1

CIVIL WORKS AND TRANSMISSION LINE

VOLUME 4

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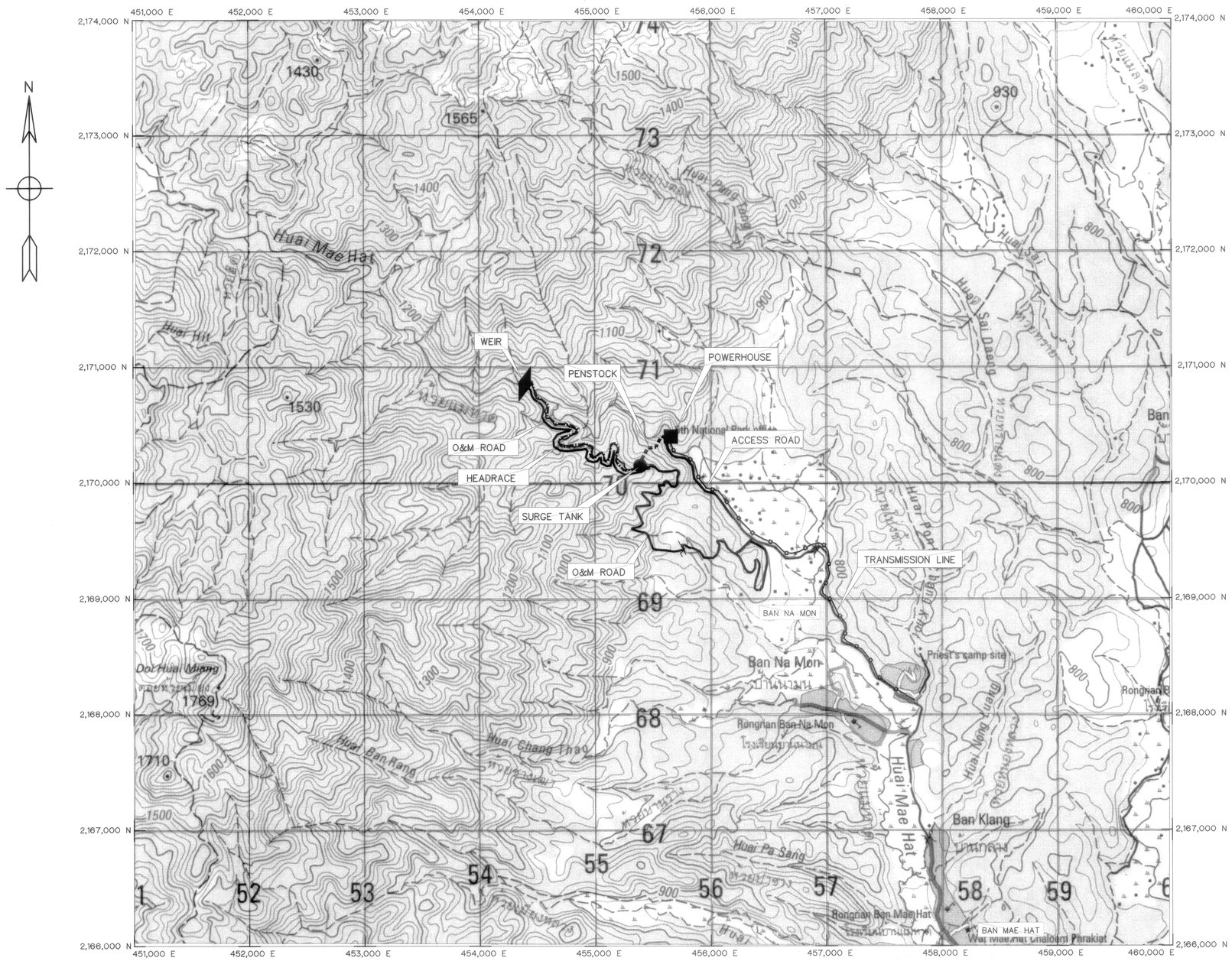
MAE HAT HYDROPOWER PROJECT

CONTRACT C1 : LIST OF DRAWINGS

SHEET NO.	DRAWING NO.	DRAWING DETAILS
		GENERAL DRAWING
1	MH-GN-01	PROJECT LOCATION MAP
2	MH-GN-02	PROJECT LAYOUT
3	MH-GN-03	SYMBOLS, ABBREVIATIONS, AND GENERAL NOTES
4	MH-GN-04	PROJECT INFORMATION HYDROLOGY DATA
5	MH-GN-05	POWER WATERWAY HYDRAULIC ARRANGEMENT
6	MH-GN-06	GEOLOGICAL, PLAN
7	MH-GN-07	GEOLOGICAL, PROFILE (1/2)
8	MH-GN-08	GEOLOGICAL, PROFILE (2/2)
		ACCESS ROAD
9	MH-AR-01	PLAN AND PROFILE, STA. 0+000 TO STA. 0+600
10	MH-AR-02	PLAN AND PROFILE, STA. 0+600 TO STA. 1+200
11	MH-AR-03	PLAN AND PROFILE, STA. 1+200 TO STA. 1+489.351
12	MH-AR-04	TYPICAL SECTIONS, STOPPING AND PASSING PLACES
13	MH-AR-05	TYPICAL SECTION AND DETAILS
		WEIR
14	MH-WE-01	GENERAL LAYOUT PLAN
15	MH-WE-02	PLAN AND SECTIONS
16	MH-WE-03	REINFORCEMENT DETAILS (SHEET 1/2)
17	MH-WE-04	REINFORCEMENT DETAILS (SHEET 2/2)
18	MH-WE-05	MISCELLANEOUS DETAILS
19	MH-WE-06	1.50x1.50 m. VERTICAL GATE (GATE INSTALLATION)
20	MH-WE-07	1.50x1.50 m. VERTICAL GATE (GATE DETAIL)
21	MH-WE-08	DIA. 1.20 m. VERTICAL GATE
22	MH-WE-09	PEDESTAL SCREW LIFT CAPACITY 6.5 TONS
23	MH-WE-10	GATE-LIFT PEDESTAL AND HAND WHEEL
24	MH-WE-11	VERTICAL SCREW-LIFT CAPACITY 1,750 KG.
		HEADRACE
25	MH-HR-01	PLAN AND PROFILE, STA. 0+000 TO STA. 0+500
26	MH-HR-02	PLAN AND PROFILE, STA. 0+500 TO STA. 1+000
27	MH-HR-03	PLAN AND PROFILE, STA. 1+000 TO STA. 1+500
28	MH-HR-04	PLAN AND PROFILE, STA. 1+500 TO STA. 2+000
29	MH-HR-05	PLAN AND PROFILE, STA. 2+000 TO STA. 2+097.998
30	MH-HR-06	TYPICAL SECTIONS
31	MH-HR-07	CONCRETE PIER
32	MH-HR-08	JOINT DETAILS FOR STEEL PIPE
33	MH-HR-09	FITTINGS FOR STEEL PIPE
34	MH-HR-10	DRAIN CULVERT STA. 0+413.534 PLAN AND SECTION
35	MH-HR-11	DRAIN CULVERT STA. 0+413.534 REINFORCEMENT DETAILS
36	MH-HR-12	DRAIN CULVERT STA. 0+515.748 PLAN AND SECTION
37	MH-HR-13	DRAIN CULVERT STA. 0+515.748 REINFORCEMENT DETAILS
38	MH-HR-14	DRAIN CULVERT STA. 0+651.663 PLAN AND SECTION
39	MH-HR-15	DRAIN CULVERT STA. 0+651.663 REINFORCEMENT DETAILS
40	MH-HR-16	DRAIN CULVERT STA. 0+948.448 PLAN AND SECTION
41	MH-HR-17	DRAIN CULVERT STA. 0+948.448 REINFORCEMENT DETAILS
42	MH-HR-18	DRAIN CULVERT STA. 1+320.961 PLAN AND SECTION
43	MH-HR-19	DRAIN CULVERT STA. 1+320.961 REINFORCEMENT DETAILS
44	MH-HR-20	DRAIN CULVERT STA. 1+508.437 PLAN AND SECTION
45	MH-HR-21	DRAIN CULVERT STA. 1+508.437 REINFORCEMENT DETAILS
46	MH-HR-22	DRAIN CULVERT STA. 1+903.095 PLAN AND SECTION
47	MH-HR-23	DRAIN CULVERT STA. 1+903.095 REINFORCEMENT DETAILS
48	MH-HR-24	DRAIN CULVERT STA. 1+944.718 PLAN AND SECTION
49	MH-HR-25	DRAIN CULVERT STA. 1+944.718 REINFORCEMENT DETAILS

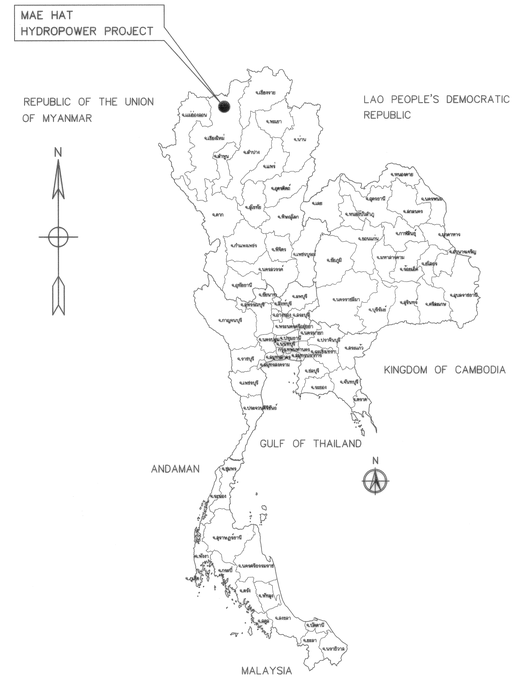
SHEET NO.	DRAWING NO.	DRAWING DETAILS
		O&M ROAD
50	MH-OM-01	O&M ROAD PART 2 PLAN AND PROFILE, STA. 0+000 TO STA. 0+600
51	MH-OM-02	O&M ROAD PART 2 PLAN AND PROFILE, STA. 0+600 TO STA. 1+200
52	MH-OM-03	O&M ROAD PART 2 PLAN AND PROFILE, STA. 1+200 TO STA. 1+800
53	MH-OM-04	O&M ROAD PART 2 PLAN AND PROFILE, STA. 1+800 TO STA. 2+400
54	MH-OM-05	O&M ROAD PART 2 PLAN AND PROFILE, STA. 2+400 TO STA. 3+000
55	MH-OM-06	O&M ROAD PART 2 PLAN AND PROFILE, STA. 3+000 TO STA. 3+600
56	MH-OM-07	O&M ROAD PART 2 PLAN AND PROFILE, STA. 3+600 TO STA. 4+149.212
57	MH-OM-08	O&M ROAD PART 2 HORIZONTAL CURVE
58	MH-OM-09	O&M ROAD PART 3 PLAN AND PROFILE, STA. 0+000 TO STA. 0+182.719
59	MH-OM-10	TYPICAL SECTION AND DETAILS
60	MH-OM-11	DRAIN CULVERT, PLAN AND SECTION
61	MH-OM-12	DRAIN CULVERT REINFORCEMENT DETAILS
		SURGE TANK
62	MH-ST-01	GENERAL LAY-OUT
63	MH-ST-02	SECTIONS
64	MH-ST-03	LADDER RUNG DETAILS
65	MH-ST-04	PLATFORM DETAILS
66	MH-ST-05	RING GRIDER AND HANDRAIL
67	MH-ST-06	REINFORCEMENT DETAILS
68	MH-ST-07	EMERGENCY VALVE CHAMBER PLAN SECTIONS AND DETAILS
69	MH-ST-08	EMERGENCY VALVE CHAMBER REINFORCEMENT DETAILS
70	MH-ST-09	SEDIMENT VALVE CHAMBER PLAN SECTIONS AND DETAILS
71	MH-ST-10	SEDIMENT VALVE CHAMBER REINFORCEMENT DETAILS
72	MH-ST-11	PLAN, SEDIMENT STA. 0+000 TO STA. 0+272.800
73	MH-ST-12	SEDIMENT OUTLET PLAN SECTION AND DETAILS
		PENSTOCK
74	MH-PS-01	PLAN AND PROFILE, STA. 0+000 TO STA. 0+387.659
75	MH-PS-02	THRUST BLOCK PLAN, SECTIONS REINFORCEMENT DETAILS 1/4
76	MH-PS-03	THRUST BLOCK PLAN, SECTIONS REINFORCEMENT DETAILS 2/4
77	MH-PS-04	THRUST BLOCK PLAN, SECTIONS REINFORCEMENT DETAILS 3/4
78	MH-PS-05	THRUST BLOCK PLAN, SECTIONS REINFORCEMENT DETAILS 4/4
79	MH-PS-06	PIPE SUPPORT SECTIONS AND DETAILS
80	MH-PS-07	WYE, PLAN, SECTIONS AND DETAILS
81	MH-PS-08	EXPANSION JOINT, PLAN, SECTIONS AND DETAILS
82	MH-PS-09	BEND DETAILS
83	MH-PS-10	WELDING DETAILS
		POWERHOUSE
84	MH-PH-01	GENERAL LAYOUT
85	MH-PH-02	PLAN 1st FLOOR AND PLAN 2nd FLOOR
86	MH-PH-03	ROOF PLAN
87	MH-PH-04	ELEVATIONS
88	MH-PH-05	SECTIONS (SHEET 1/2)
89	MH-PH-06	SECTIONS (SHEET 2/2)
90	MH-PH-07	DETAILS OF TOILET, SEPTIC AND SEEPAGE TANK
91	MH-PH-08	DETAIL OF DOORS, WINDOWS AND NAME PLATE
92	MH-PH-09	PLAN OF FOOTING AND DETAILS
93	MH-PH-10	PLAN OF SLAB AND DETAILS (1/2)
94	MH-PH-11	PLAN OF SLAB AND DETAILS (2/2)
95	MH-PH-12	BEAMS DETAILS (1/2)
96	MH-PH-13	BEAMS DETAILS (2/2)
97	MH-PH-14	COLUMN, BRACKET AND STAIR DETAILS
98	MH-PH-15	PLAN OF TRUSS AND TRUSS T1 DETAILS

SHEET NO.	DRAWING NO.	DRAWING DETAILS
		POWERHOUSE
99	MH-PH-16	TRUSS T2 AND DETAILS
100	MH-PH-17	TRUSS T3 AND DETAILS
101	MH-PH-18	CABLE TRENCH DETAILS
102	MH-PH-19	DITCH AND MANHOLE DETAILS
103	MH-PH-20	RETAININGWALL REINFORCEMENT DETAILS
104	MH-PH-21	ELECTRIC AND LIGHTING SYSTEMS (SHEET 1/4)
105	MH-PH-22	ELECTRIC AND LIGHTING SYSTEMS (SHEET 2/4)
106	MH-PH-23	ELECTRIC AND LIGHTING SYSTEMS (SHEET 3/4)
107	MH-PH-24	ELECTRIC AND LIGHTING SYSTEMS (SHEET 4/4)
108	MH-PH-25	GROUNDING SYSTEM
		TAILRACE
109	MH-TR-01	PLAN
110	MH-TR-02	SECTION AND DETAILS
111	MH-TR-03	REINFORCEMENT DETAILS
		TRANSMISSION LINE
112	MH-TS-01	GENERAL PLAN
113	MH-TS-02	PLAN AND PROFILE, STA. 0+000 TO 0+600
114	MH-TS-03	PLAN AND PROFILE, STA. 0+600 TO 1+200
115	MH-TS-04	PLAN AND PROFILE, STA. 1+200 TO 1+800
116	MH-TS-05	PLAN AND PROFILE, STA. 1+800 TO 2+400
117	MH-TS-06	PLAN AND PROFILE, STA. 2+400 TO 3+000
118	MH-TS-07	PLAN AND PROFILE, STA. 3+000 TO 3+600
119	MH-TS-08	PLAN AND PROFILE, STA. 3+600 TO 4+200
120	MH-TS-09	PLAN AND PROFILE, STA. 4+200 TO 4+800
121	MH-TS-10	PLAN AND PROFILE, STA. 4+800 TO 5+400
122	MH-TS-11	PLAN AND PROFILE, STA. 5+400 TO 6+000
123	MH-TS-12	PLAN AND PROFILE, STA. 6+000 TO 6+600
124	MH-TS-13	PLAN AND PROFILE, STA. 6+600 TO 7+200
125	MH-TS-14	PLAN AND PROFILE, STA. 7+200 TO 7+800
126	MH-TS-15	PLAN AND PROFILE, STA. 7+800 TO 8+086
127	MH-TS-16	POLE TYPE "A" AND "B"
128	MH-TS-17	POLE TYPE "C" AND "D"
129	MH-TS-18	POLE TYPE "E"
130	MH-TS-19	TYPE OF ANCHOR GUY



PROJECT AREA MAP

SCALE 1:20,000



LOCATION MAP

NOT TO SCALE

LEGENDS :

- STREAM
- WEIR
- HEADRACE
- SURGE TANK
- PENSTOCK
- POWERHOUSE
- ACCESS ROAD / O&M ROAD
- TRANSMISSION LINE

NOTES :

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

0 500 1,000 1,500

SCALE 1:20,000 METERS

NO.	DATE	REVISIONS	CHECKED	APPROVED
3				
2				
1				

CONSULTANTS | DEDE

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

MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
GENERAL DRAWING
PROJECT LOCATION MAP

P&C MANAGEMENT CO.,LTD.

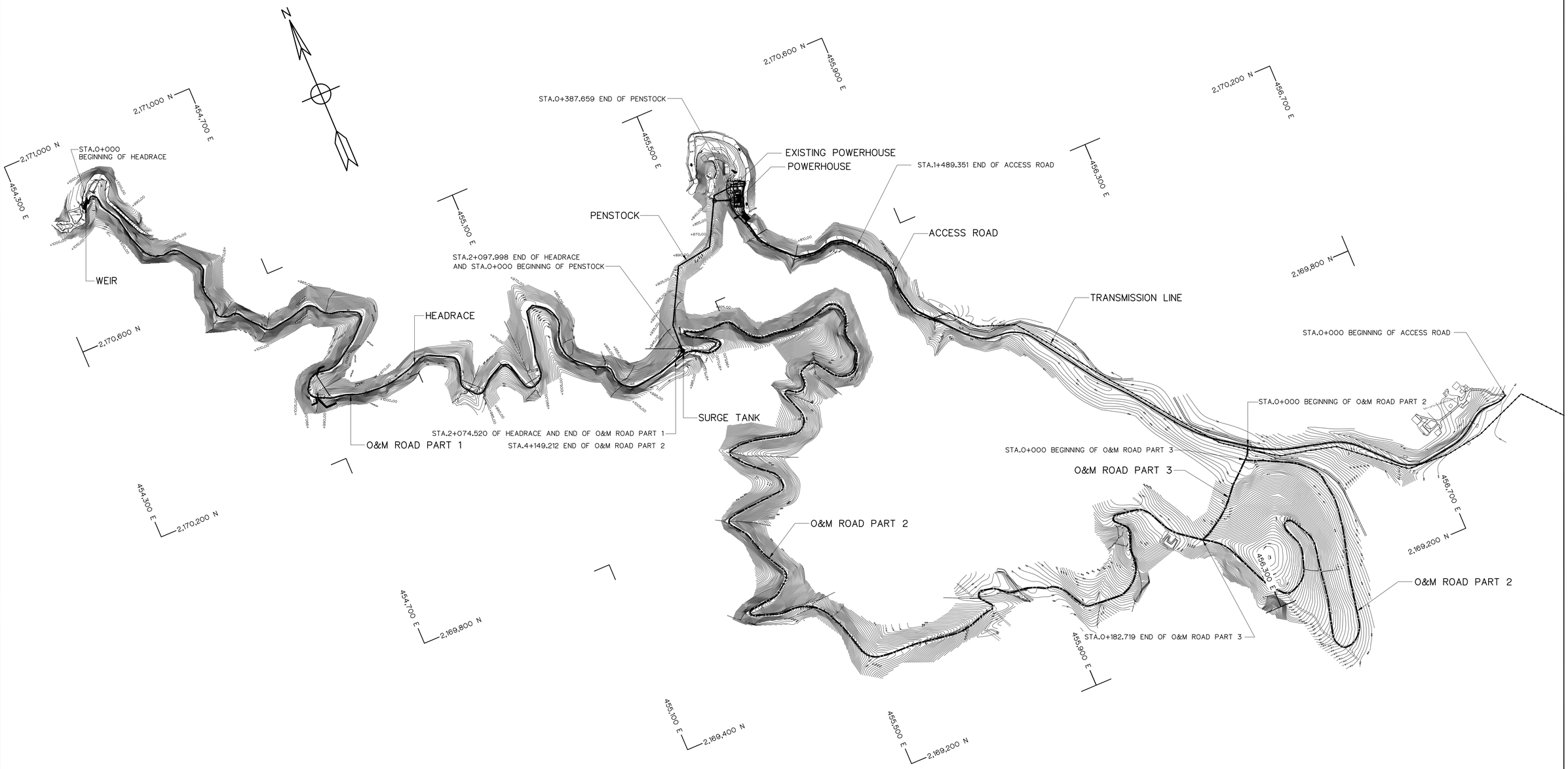
Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY

DESIGNED	วิชิต.64624	REVIEWED	
DRAWN		SUBMITTED	
CHECKED	สมิต.6226	RECOMMENDED	
CHECKED	สมิต.6226	APPROVED	

PROJECT MANAGER — 08/03/2559 DATE

DRAWING NO. MH-GN-01

SHEET NO. 1 OF 130



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

MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
GENERAL DRAWING
PROJECT LAYOUT

P&C MANAGEMENT CO.,LTD.

Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY

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

DRAWING NO. MH-GN-02
SHEET NO. 2 OF 130

ABBREVIATIONS :

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

SYMBOLS :

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
1 2	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				
	CONSULTANTS		DEDE	

KINGDOM OF THAILAND
Department of Alternative Energy Development and Efficiency
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MAE HAT HYDROPOWER PROJECT

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

P&C MANAGEMENT CO.,LTD.

Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY

DESIGNED	สมิต.64624	REVIEWED	
DRAWN		SUBMITTED	
CHECKED	สมิต.6226	RECOMMENDED	
PROJECT MANAGER	07/08/2559 DATE	APPROVED	

DRAWING NO. MH–GN–03

SHEET NO. 3 OF 130

FIGURE 1 RELATIONSHIP BETWEEN MEAN ANNUAL RUNOFF AND CATCHMENT AREA

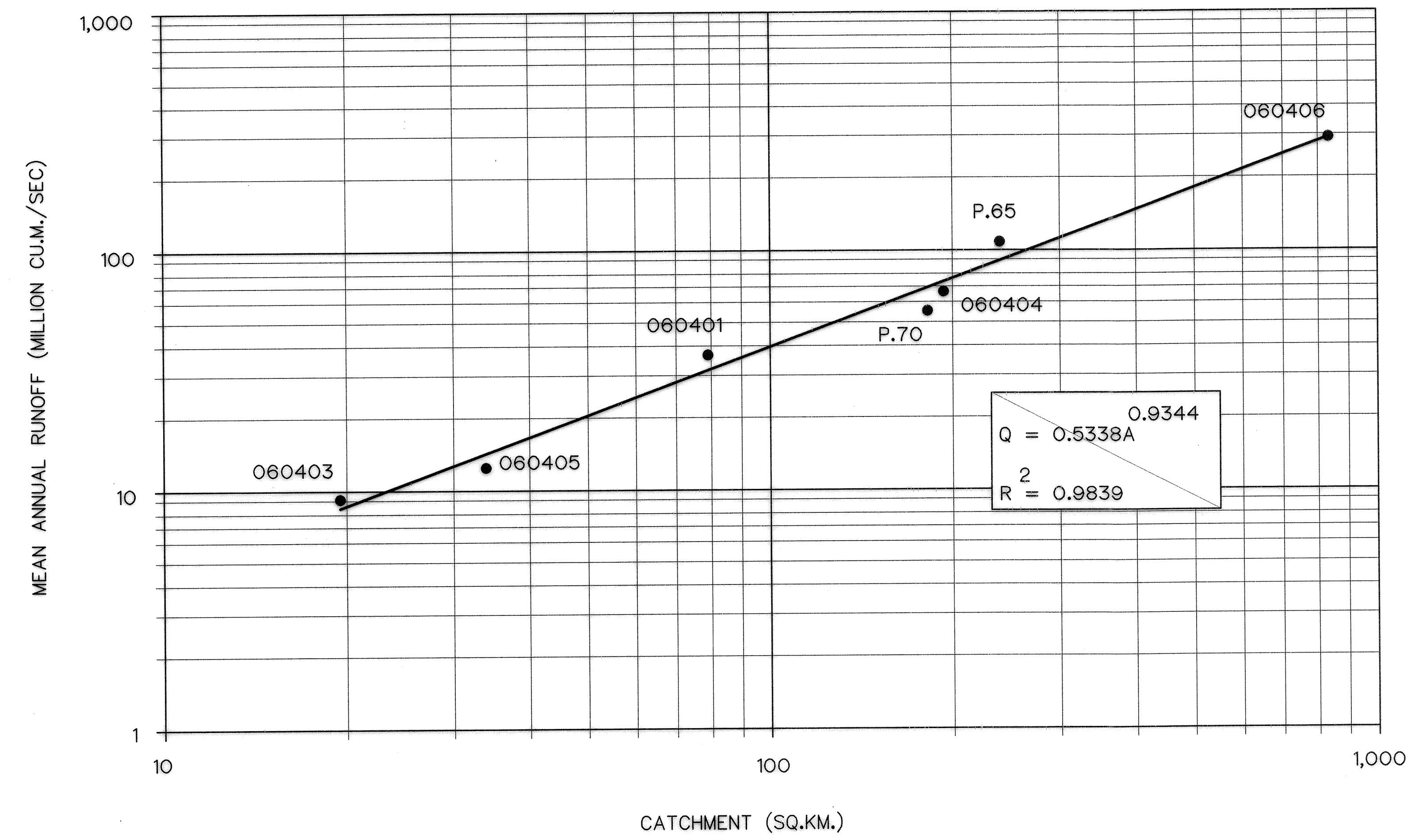


FIGURE 2 RELATIONSHIP BETWEEN ELEVATION AND DISCHARGE AT POWERHOUSE

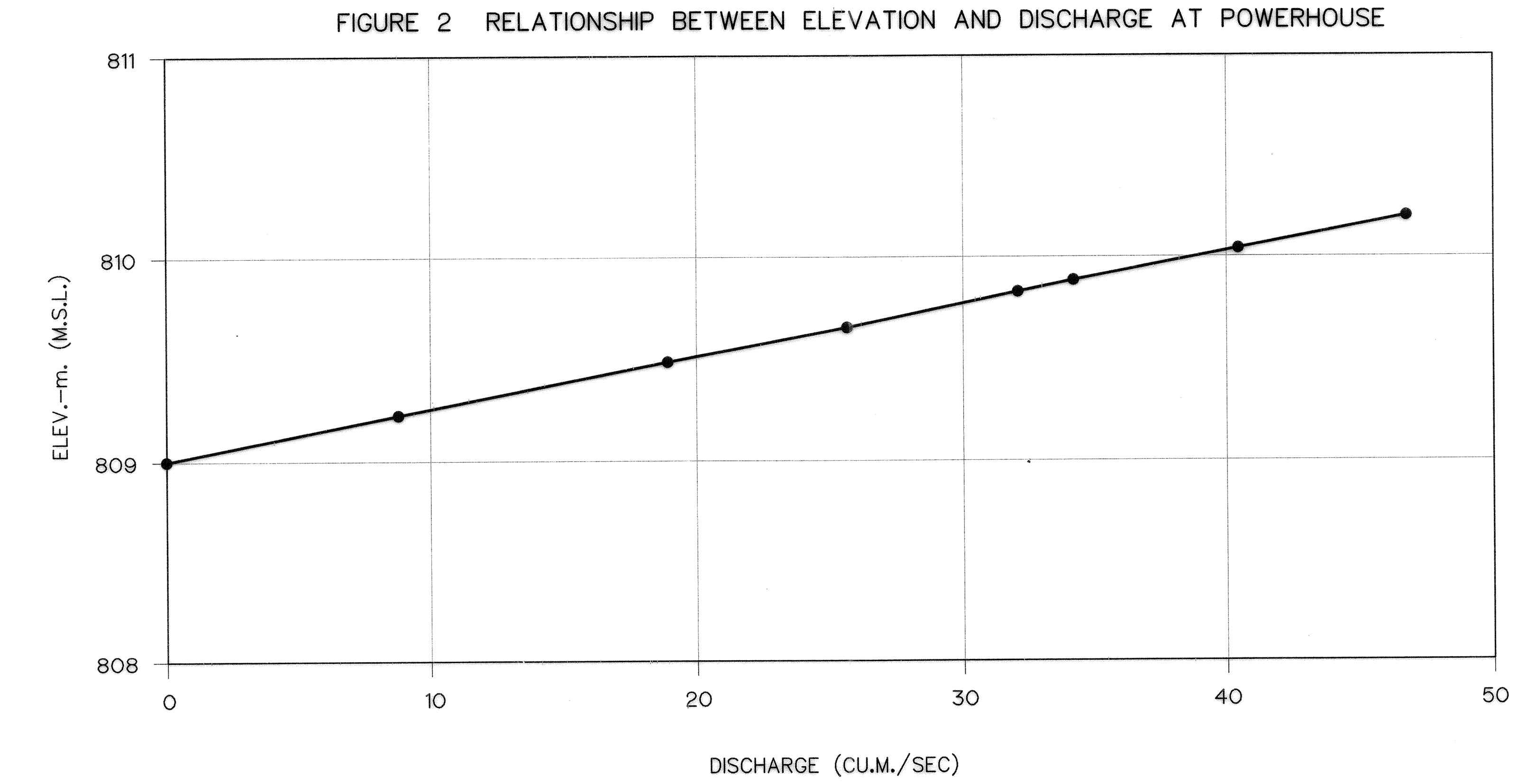


FIGURE 3 RELATIONSHIP BETWEEN ELEVATION AND DISCHARGE AT WEIR

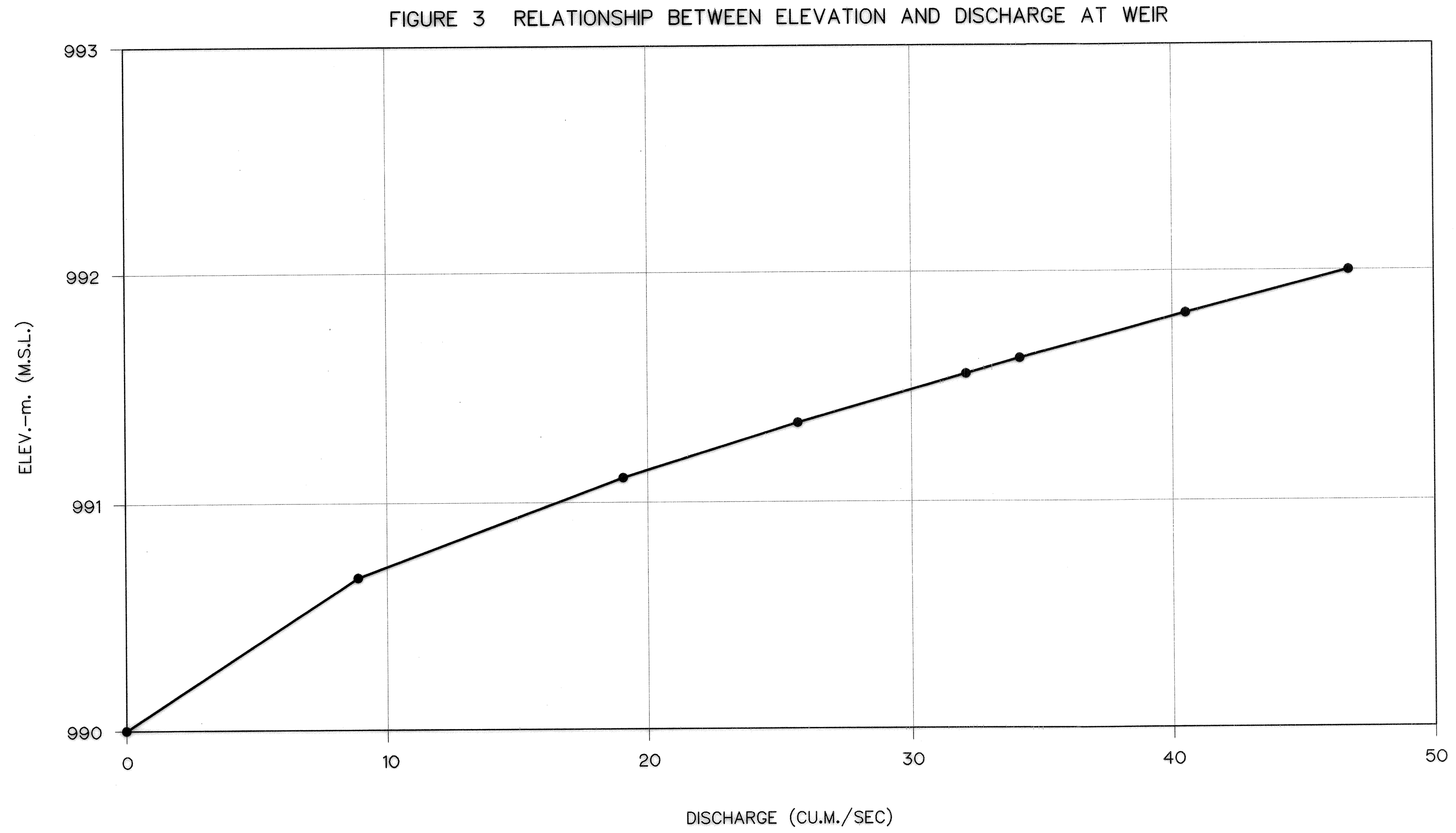
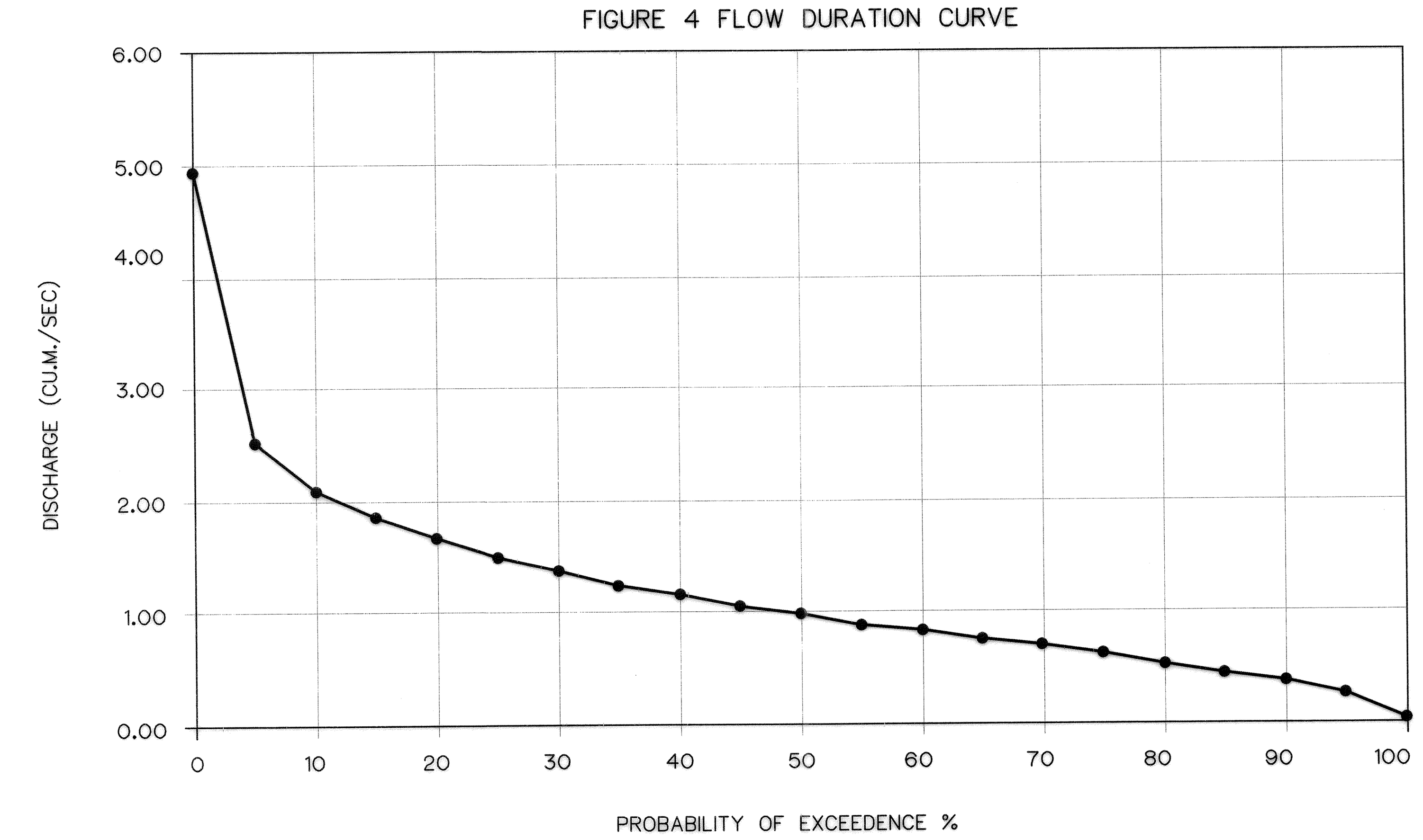


FIGURE 4 FLOW DURATION CURVE



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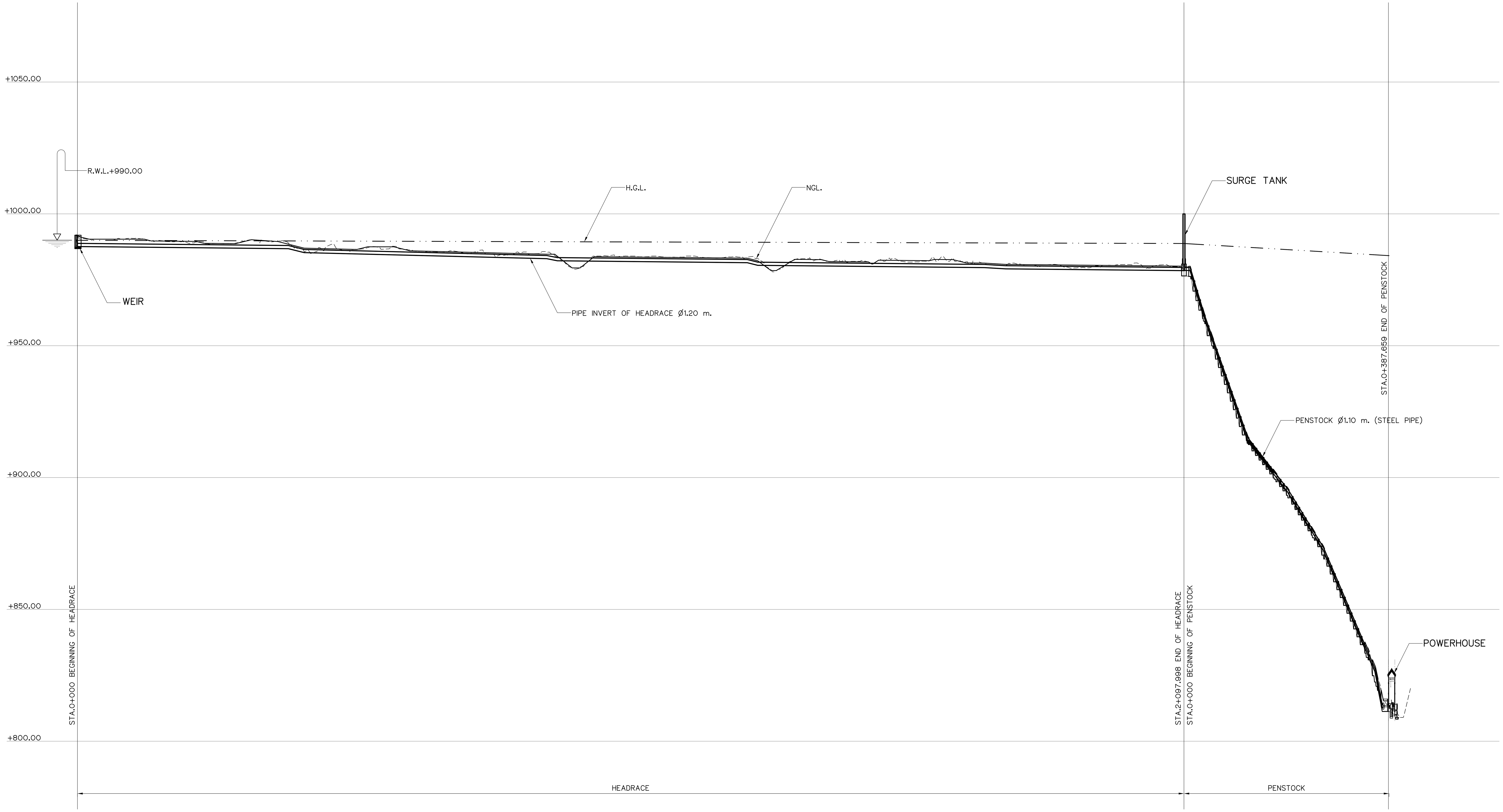
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KINGDOM OF THAILAND
Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
GENERAL DRAWING
PROJECT INFORMATION HYDROLOGY DATA

P&C MANAGEMENT CO.,LTD.	Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY
	REVIEWED
DESIGNED . ภย.64624 สย.6226	SUBMITTED Chamnit
DRAWN	RECOMMENDED
CHECKED สย.6226	APPROVED P. Hansell.
PROJECT MANAGER / DATE 08/03/2559	DRAWING NO. MH-GN-04 / SHEET NO. 4 OF 130



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

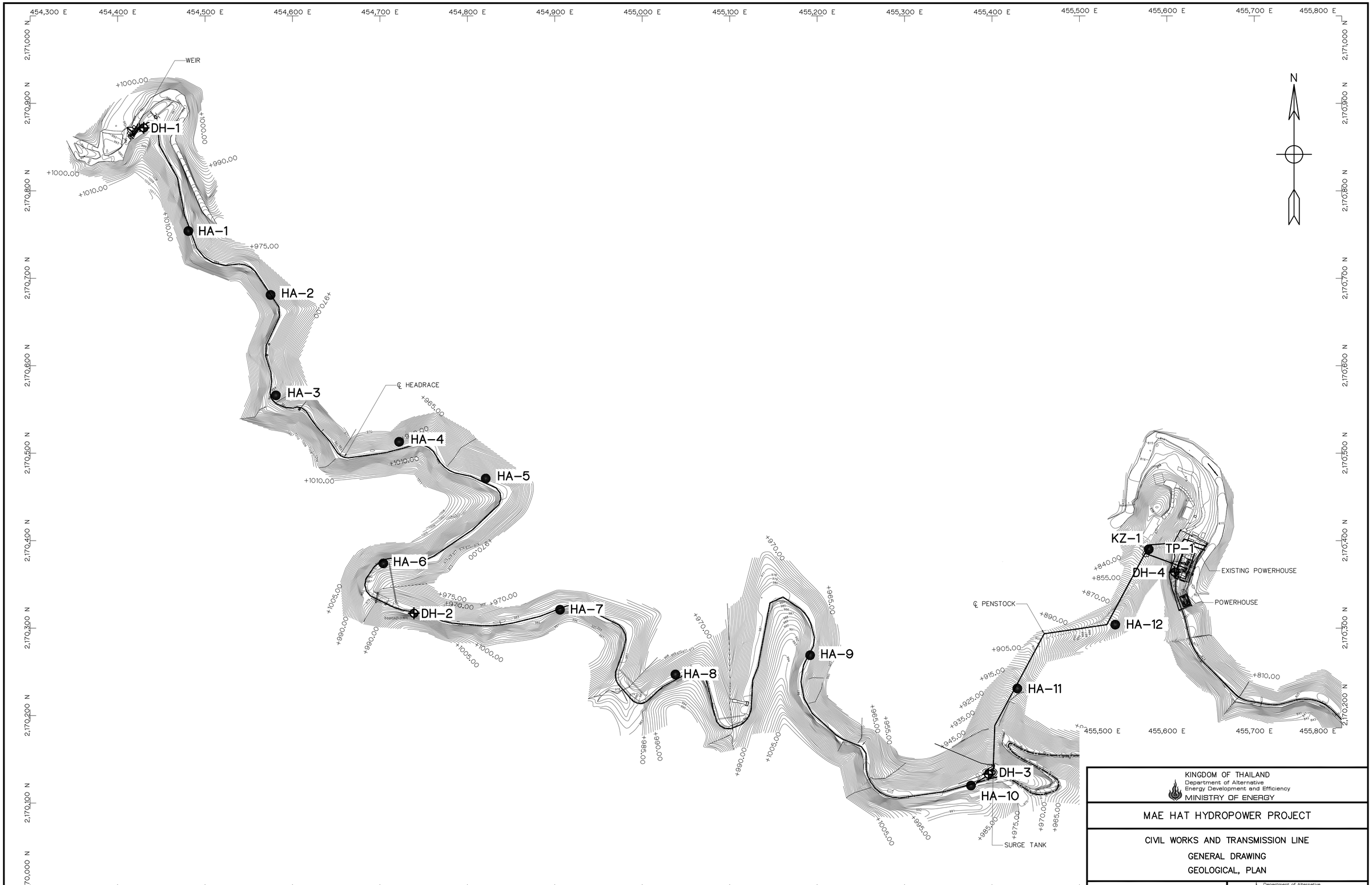
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	CONSULTANTS		DEDE	

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

MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
GENERAL DRAWING
POWER WATERWAY HYDRAULIC ARRANGEMENT

P&C MANAGEMENT CO.,LTD.	Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY
	REVIEWED
DESIGNED ภย.64624 ลย.6226	SUBMITTED
DRAWN	RECOMMENDED
CHECKED ลย.6226	APPROVED P. Hansell.
PROJECT MANAGER — DATE 08/03/2559	DRAWING NO. MH-GN-05 — SHEET NO. 5 OF 130



PLAN

SCALE 1:2,000

0 25 50 75 100 125 150

SCALE 1:2,000 METERS

NOTES :

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

NO.	DATE	REVISIONS	CHECKED	APPROVED
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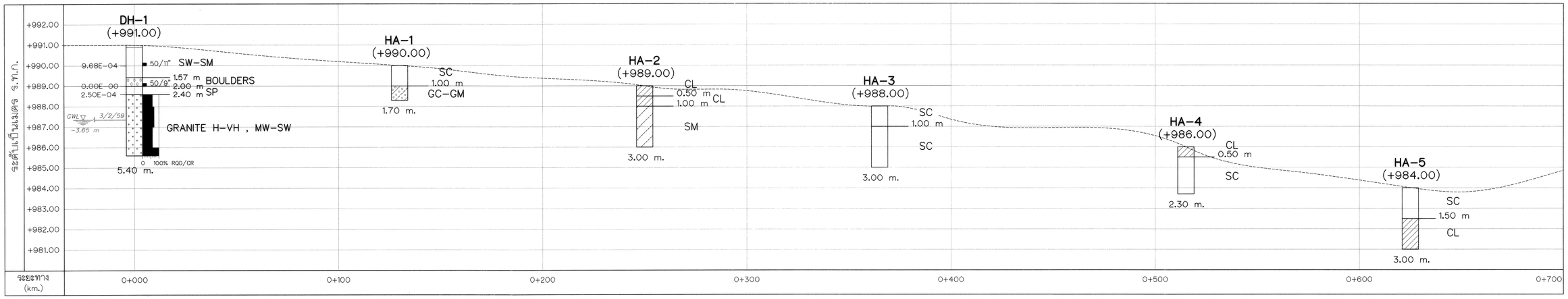
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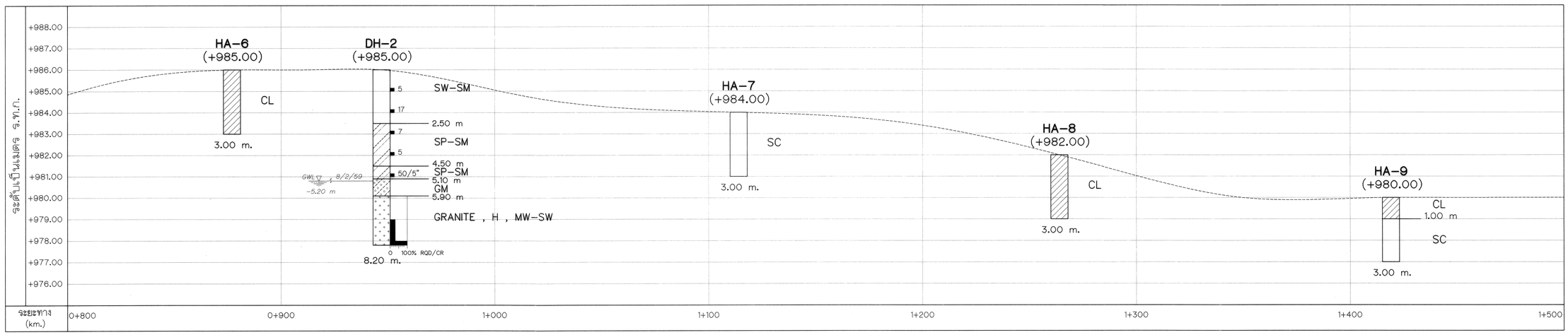
CIVIL WORKS AND TRANSMISSION LINE
GENERAL DRAWING
GEOLOGICAL, PLAN

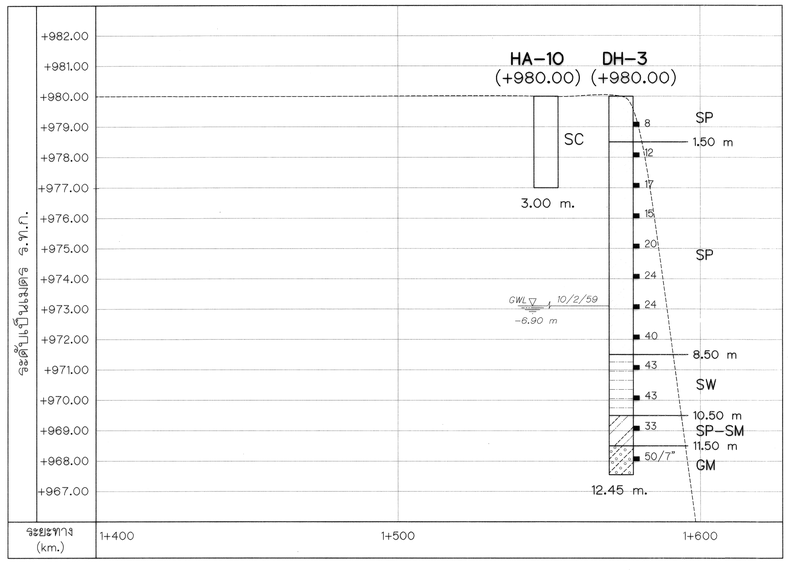
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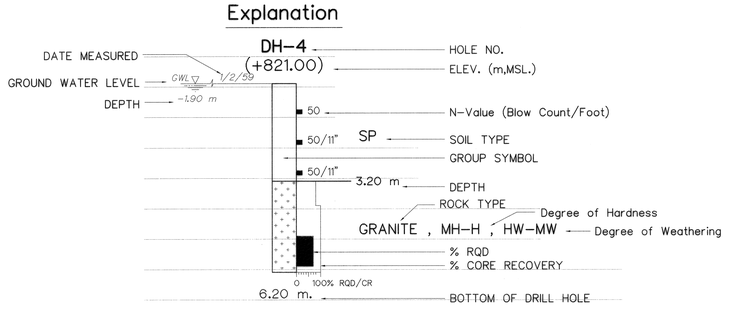
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PROJECT MANAGER		APPROVED	
	08/03/2559 DATE	DRAWING NO.	MH-GN-06
		SHEET NO.	6 OF 130







Explanation



Degree of Weathering

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

Degree of Hardness

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

% RQD

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

Degree of Permeability

1 = < 1 Lugeon or $<10^{-5}$ cm/sec = Impervious
2 = 1-5 Lugeon or 10^{-5} - $5x10^{-5}$ cm/sec = Semi - Impervious
3 = 5-10 Lugeon or $5x10^{-5}$ - 10^{-4} cm/sec = Semi - Pervious
4 = 10-50 Lugeon or 10^{-4} - $5x10^{-4}$ cm/sec = Rather - Pervious
5 = > 50 Lugeon or $>5x10^{-4}$ cm/sec = Pervious

Legend

CL = Lean Clay with Sand
SC = Clayey Sand
SP = Poorly Graded Sand
GRANITE

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

0 10 20 30 40 50 60 70 80
HORIZONTAL SCALE 1:1,000 METERS

NO.	DATE	REVISIONS	CHECKED	APPROVED
3				
2				
1				
	CONSULTANTS		DEDE	

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Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

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

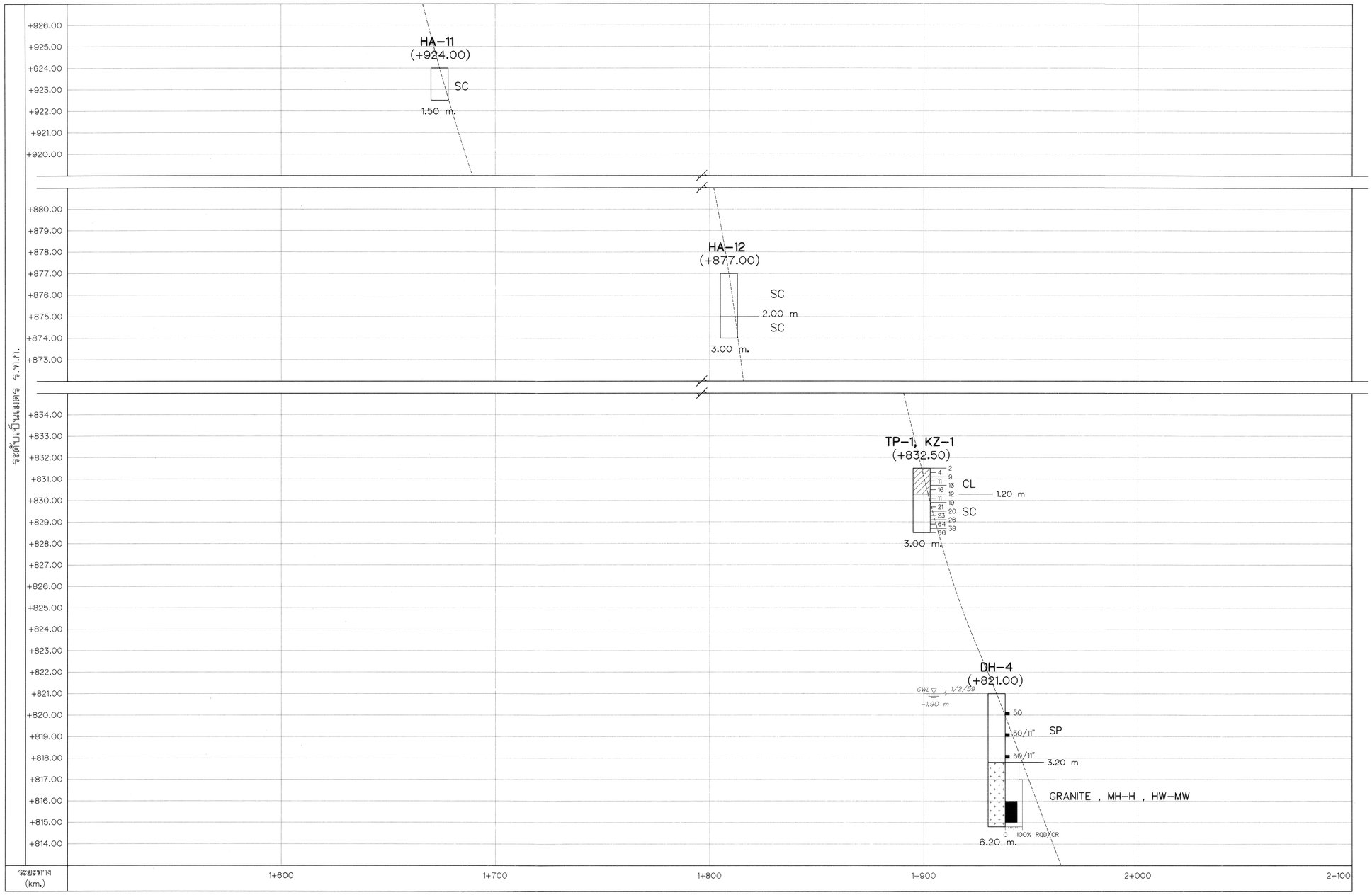
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PROJECT MANAGER		02/03/2559 DATE	APPROVED

DRAWING NO. MH-GN-07

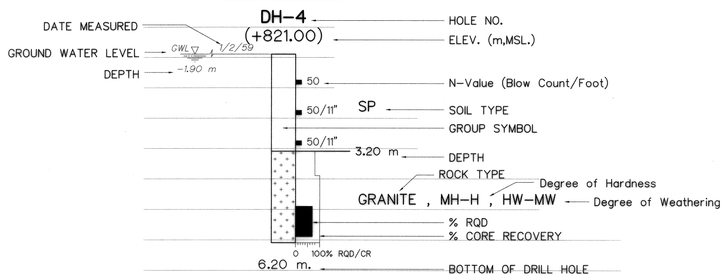
SHEET NO. 7 OF 130



Legend

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

Explanation



Degree of Weathering

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

Degree of Hardness

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

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3 = 5–10 Lugeon or 5×10^{-5} – 10^{-4} cm/sec = Semi – Pervious

4 = 10–50 Lugeon or 10^{-4} – 5×10^{-4} cm/sec = Rather – Pervious

5 = > 50 Lugeon or $>5\times10^{-4}$ cm/sec = Pervious

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

0 10 20 30 40 50 60 70 80
HORIZONTAL SCALE 1:1,000 METERS

NO.	DATE	REVISIONS	CHECKED	APPROVED
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	CONSULTANTS		DEDE	

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Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

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

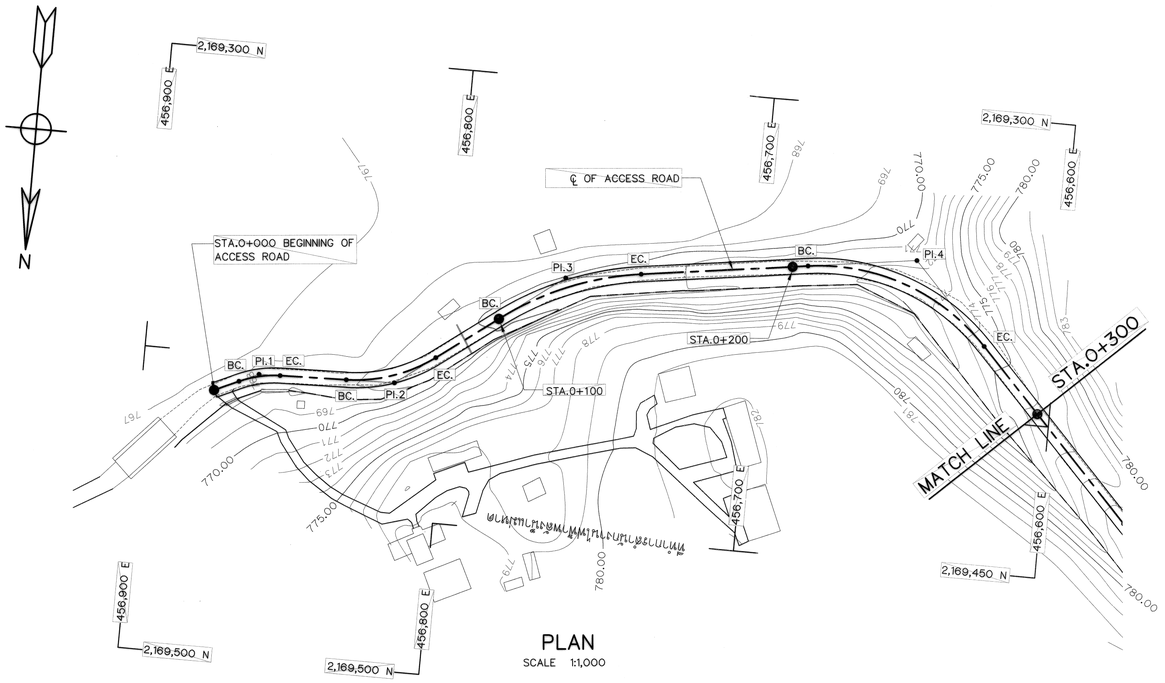
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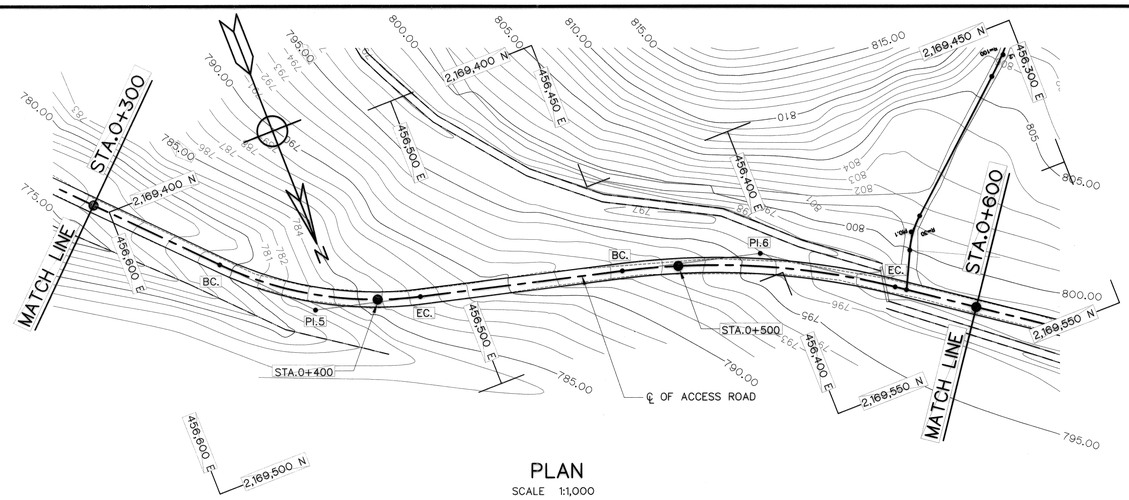
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PROJECT MANAGER 08/03/2559 DATE

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SUBMITTED
RECOMMENDED
APPROVED P. Hansuti

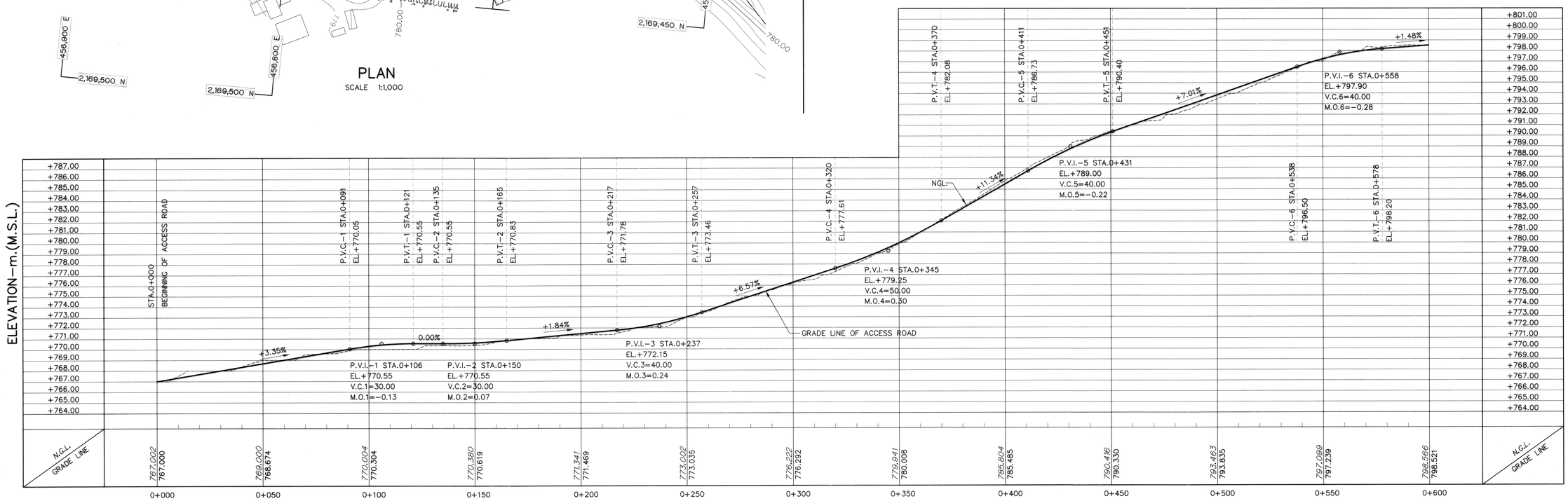
DRAWING NO. MH-GN-08
SHEET NO. 8 OF 130



PLAN
SCALE 1:1,000



PLAN
SCALE 1:1,000



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

HORIZONTAL CURVE OF O&M ROAD PART 1

NO. PI.	COORDINATE 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.

REFERENCE DRAWINGS :

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

0 5 10 15
SCALE 1:200 METERS

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

NO.	DATE	REVISIONS	CHECKED	APPROVED
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

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

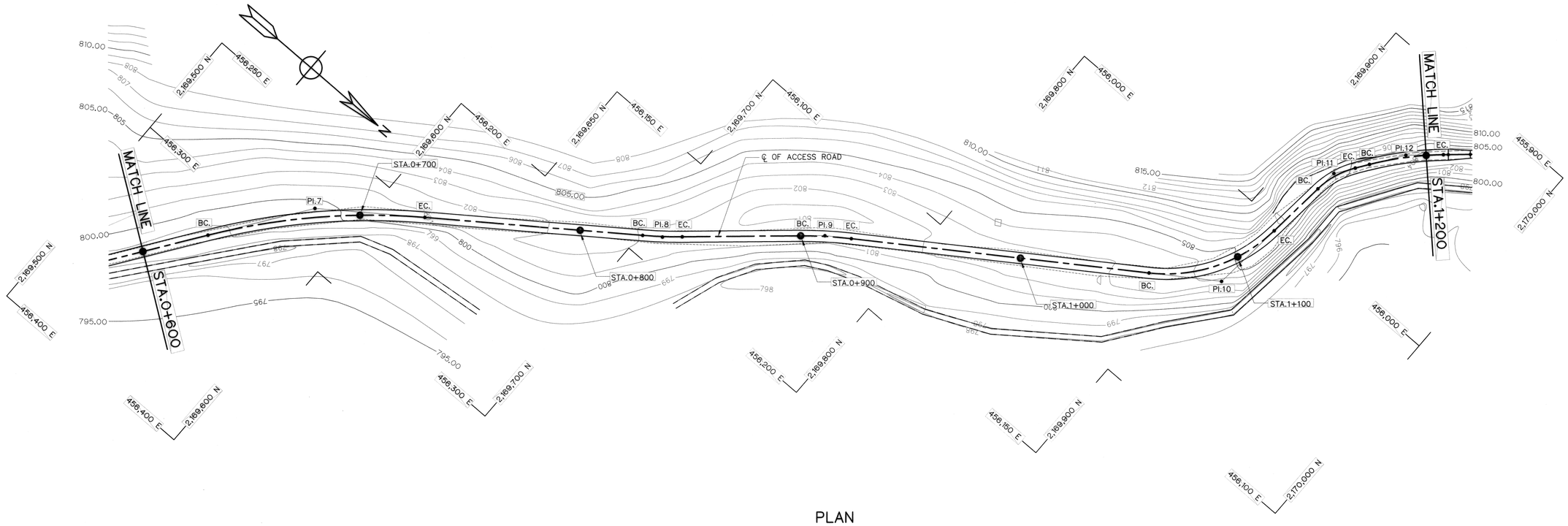
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CHECKED สมิต.6226
PROJECT MANAGER 01/03/2564 DATE

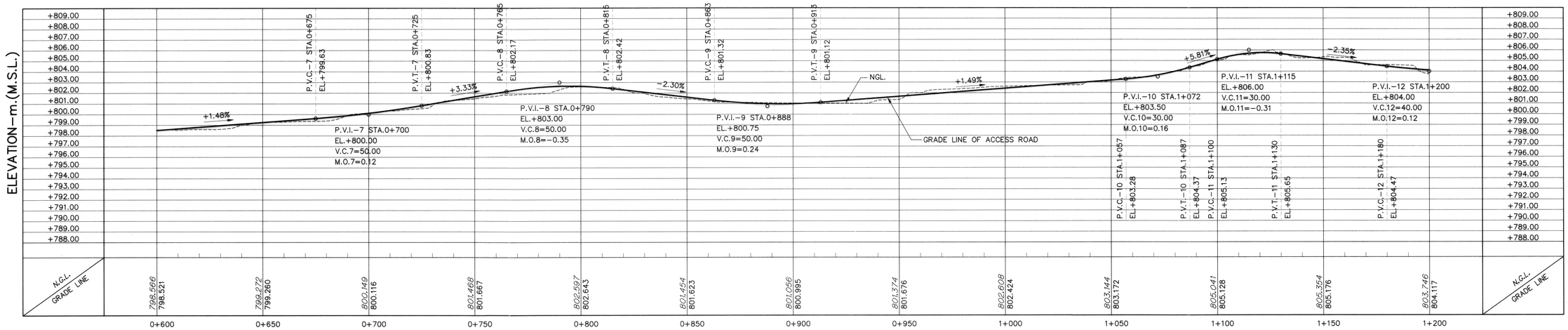
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SUBMITTED
RECOMMENDED
APPROVED

DRAWING NO. MH-AR-01
SHEET NO. 9 OF 130



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)
7	2,169,580.540	456,279.094	153.994	18°–37'–54.99"	50.000	304.799	99.117	0+630.359	0+680.359	0+729.477	N54°–37'–31.37"W
8	2,169,708.299	456,186.294	157.906	05°–08'–18.84"	9.000	200.568	17.988	0+828.382	0+837.382	0+846.370	N35°–59'–36.38"W
9	2,169,763.715	456,137.897	73.574	06°–56'–51.31"	12.000	197.682	23.971	0+898.945	0+910.945	0+922.915	N41°–07'–55.23"W
10	2,169,913.214	456,036.357	180.722	50°–16'–22.20"	33.000	70.331	61.710	1+058.637	1+091.637	1+120.347	N34°–11'–03.91"W
11	2,169,920.015	455,966.274	70.412	29°–32'–13.19"	10.000	37.933	19.555	1+147.760	1+157.760	1+167.315	N84°–27'–26.11"W
12	2,169,939.358	455,938.731	33.657	13°–22'–53.30"	17.000	144.916	33.845	1+173.971	1+190.971	1+207.817	N54°–55'–12.93"W

NOTES :

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

0 5 10 15
SCALE 1:200 METERS

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

REFERENCE DRAWINGS :

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

NO.	DATE	REVISIONS	CHECKED	APPROVED
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	CONSULTANTS		DEDE	

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

MAE HAT HYDROPOWER PROJECT

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

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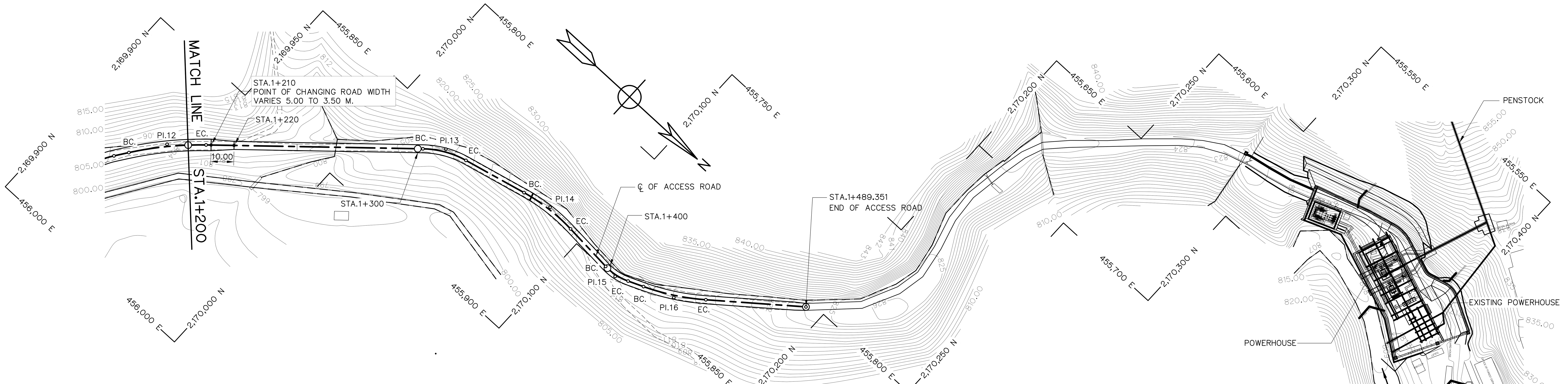
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MINISTRY OF ENERGY

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DESIGNED	วิชัย.64624	วิชัย.6226	SUBMITTED
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PROJECT MANAGER 08/03/2564 DATE

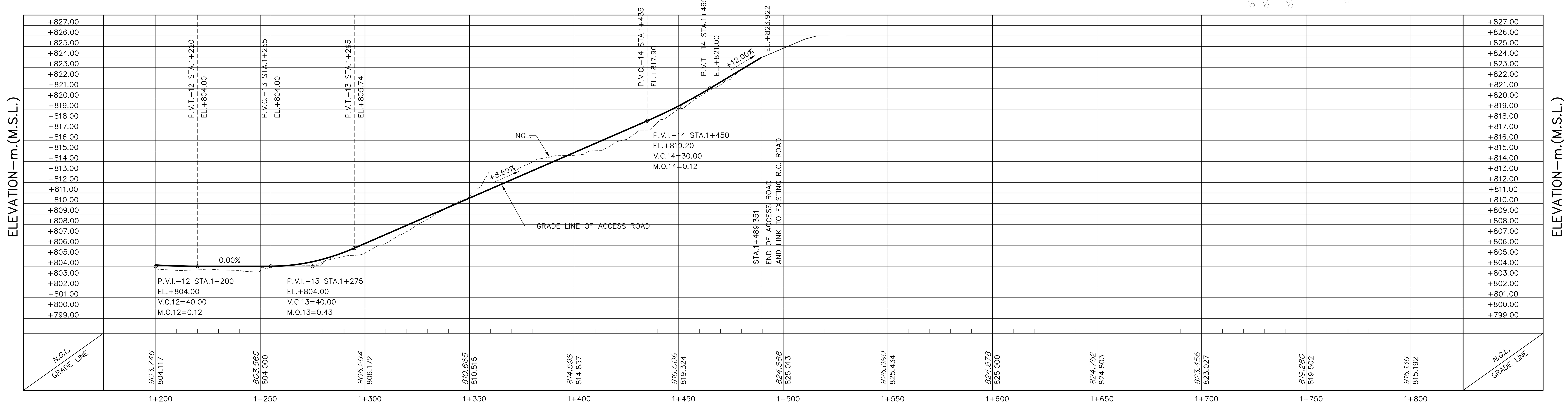
DRAWING NO. MH–AR–02

SHEET NO. 10 OF 130



PLAN

SCALE 1:1,000



DISTANCE – Km.

PROFILE

VERTICAL SCALE 1:200

HORIZONTAL SCALE 1:1,000

HORIZONTAL CURVE OF ACCESS ROAD

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)
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 AND DETAILS — MH–AR–05

NO.	DATE	REVISIONS	CHECKED	APPROVED
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	CONSULTANTS		DEDE	

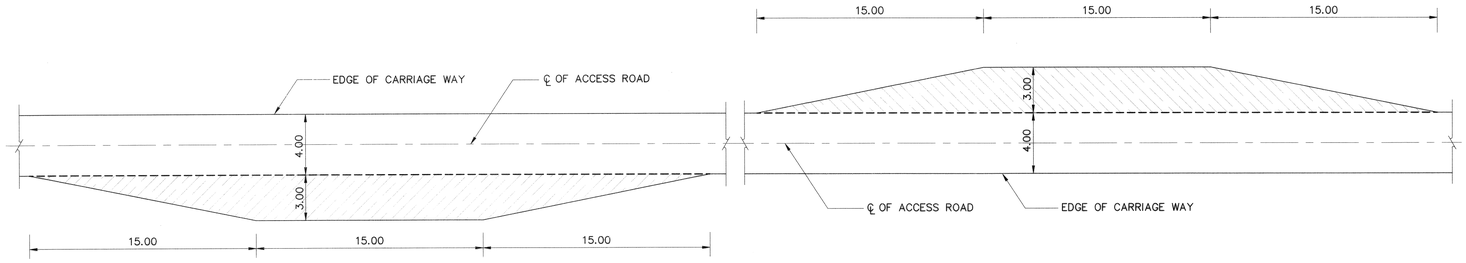
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Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

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

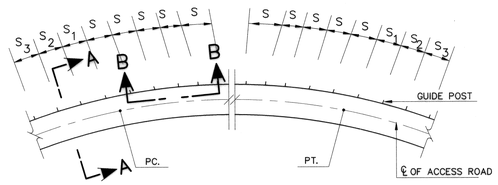
P&C MANAGEMENT CO.,LTD.
Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY

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SUBMITTED [signature]
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APPROVED [signature]
[signature] PROJECT MANAGER — 08/03/2559 DATE
DRAWING NO. MH–AR–03
SHEET NO. 11 OF 130



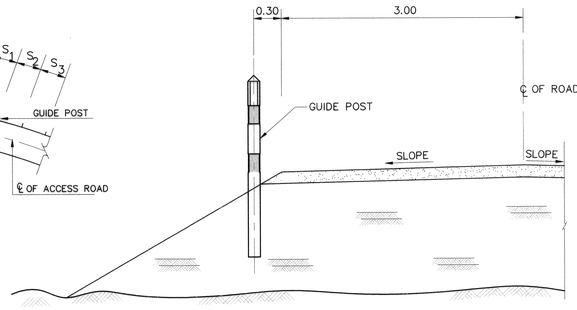
PLAN SHOWING DETAIL OF STOPPING AND PASSING PLACES IN GENERAL

NOT TO SCALE



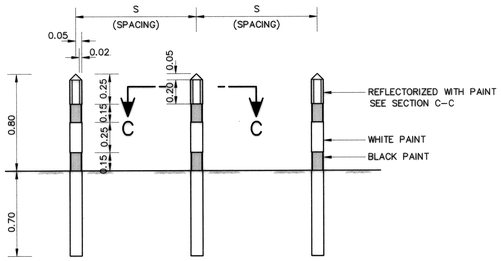
PLAN

NOT TO SCALE



SECTION A–A

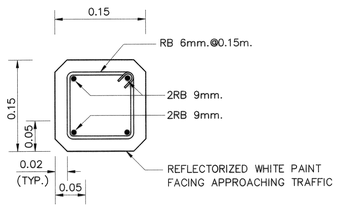
NOT TO SCALE



SECTION B–B

NOT TO SCALE

GUIDE POSTS



SECTION C–C

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

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

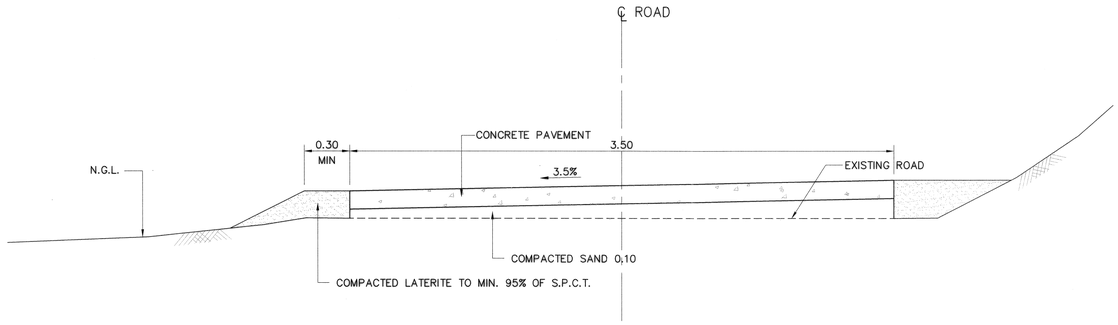
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MINISTRY OF ENERGY

MAE HAT HYDROPOWER PROJECT

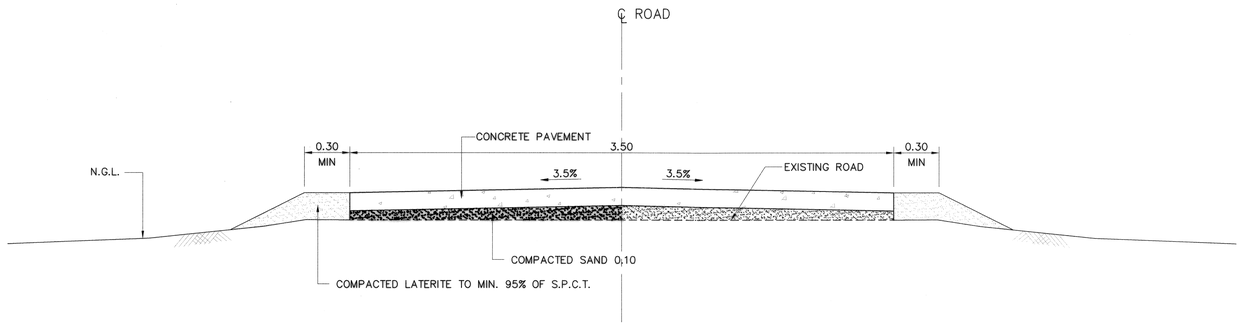
CIVIL WORKS AND TRANSMISSION LINE
ACCESS ROAD
TYPICAL SECTIONS, STOPPING AND PASSING PLACES

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PROJECT MANAGER	APPROVED
DATE 01/03/2564	DRAWING NO. MH–AR–04
	SHEET NO. 12 OF 130



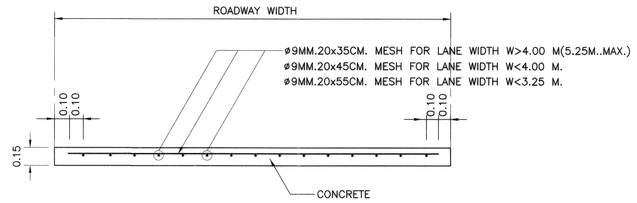
TYPICAL SECTION FOR HILLSIDE

NOT TO SCALE



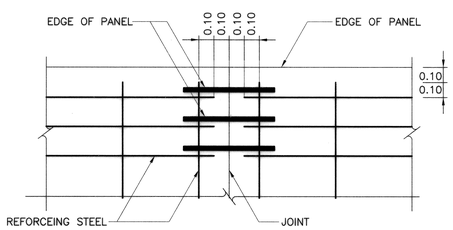
TYPICAL SECTION FOR FLAT AREA

NOT TO SCALE



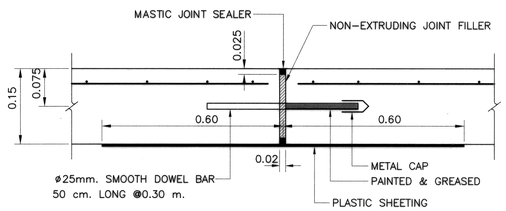
REINFORCEMENT DETAIL OF CONCRETE PAVEMENT CROSS-SECTION

NOT TO SCALE



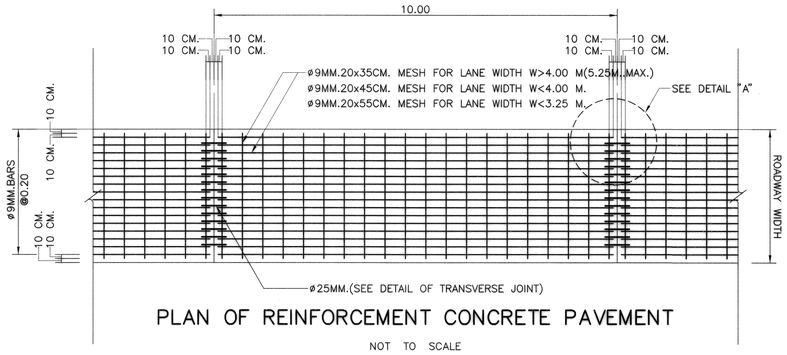
DETAIL "A"

NOT TO SCALE



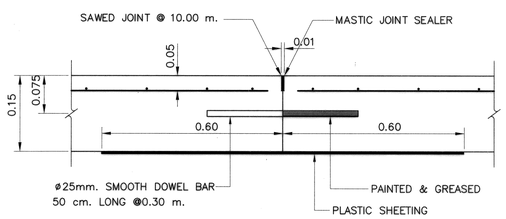
DETAIL OF EXPANSION JOINT

NOT TO SCALE



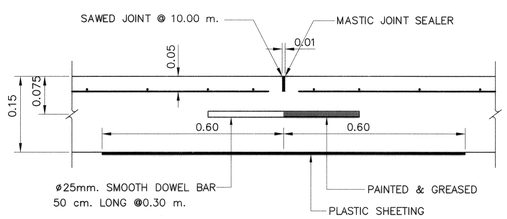
PLAN OF REINFORCEMENT CONCRETE PAVEMENT

NOT TO SCALE



DETAIL OF CONSTRUCTION JOINT

NOT TO SCALE



DETAIL OF CONTRACTION JOINT

NOT TO SCALE

REFERENCE DRAWING :

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

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.

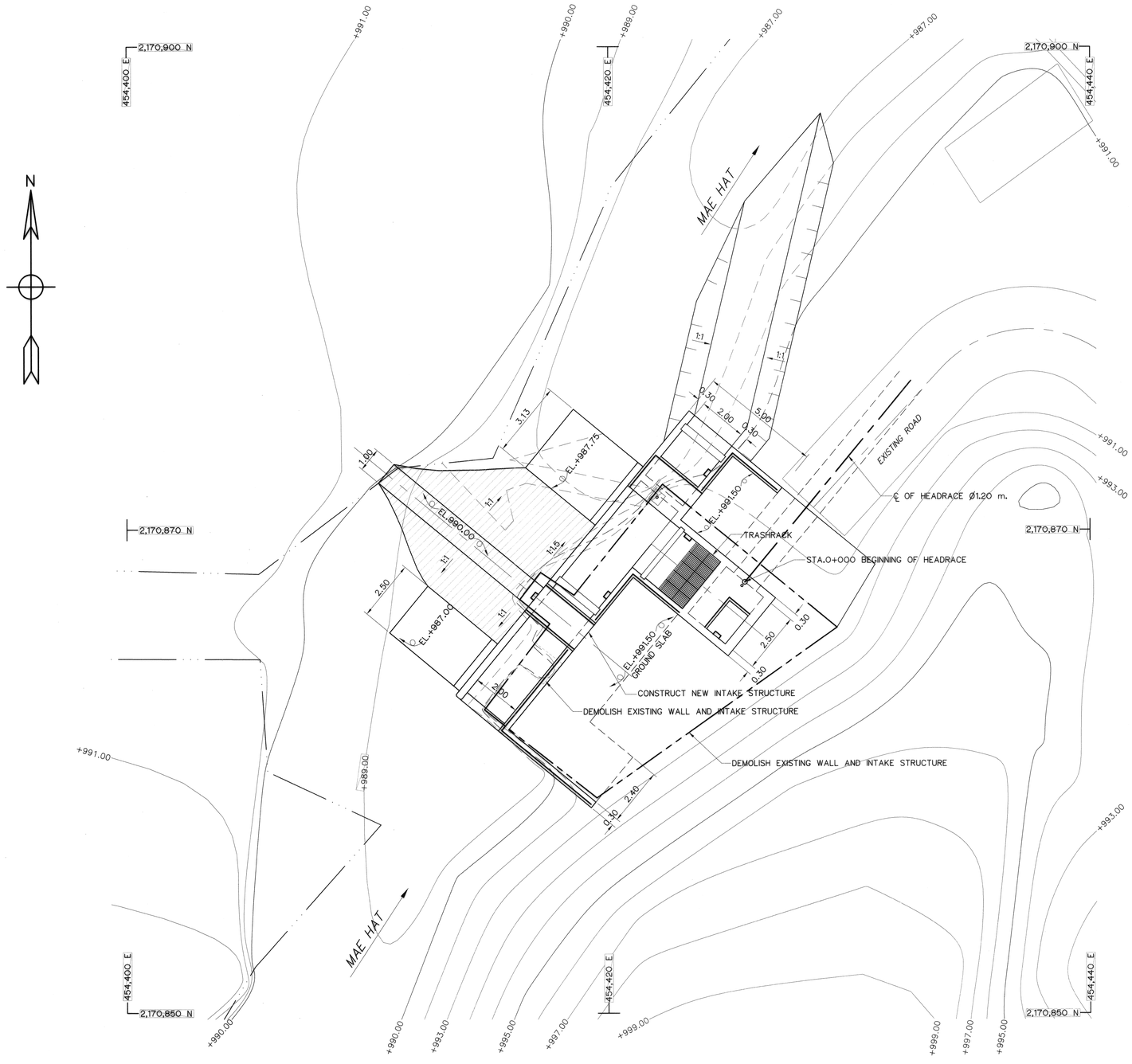
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MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
ACCESS ROAD
TYPICAL SECTION AND DETAILS

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



GENERAL LAY-OUT

SCALE 1:100

LEGEND :

WEIR REHABILITATION

NOTES :

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

REFERENCE DRAWINGS :

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

0 1 2 3 4 5 6 7 8

SCALE 1:100 METERS

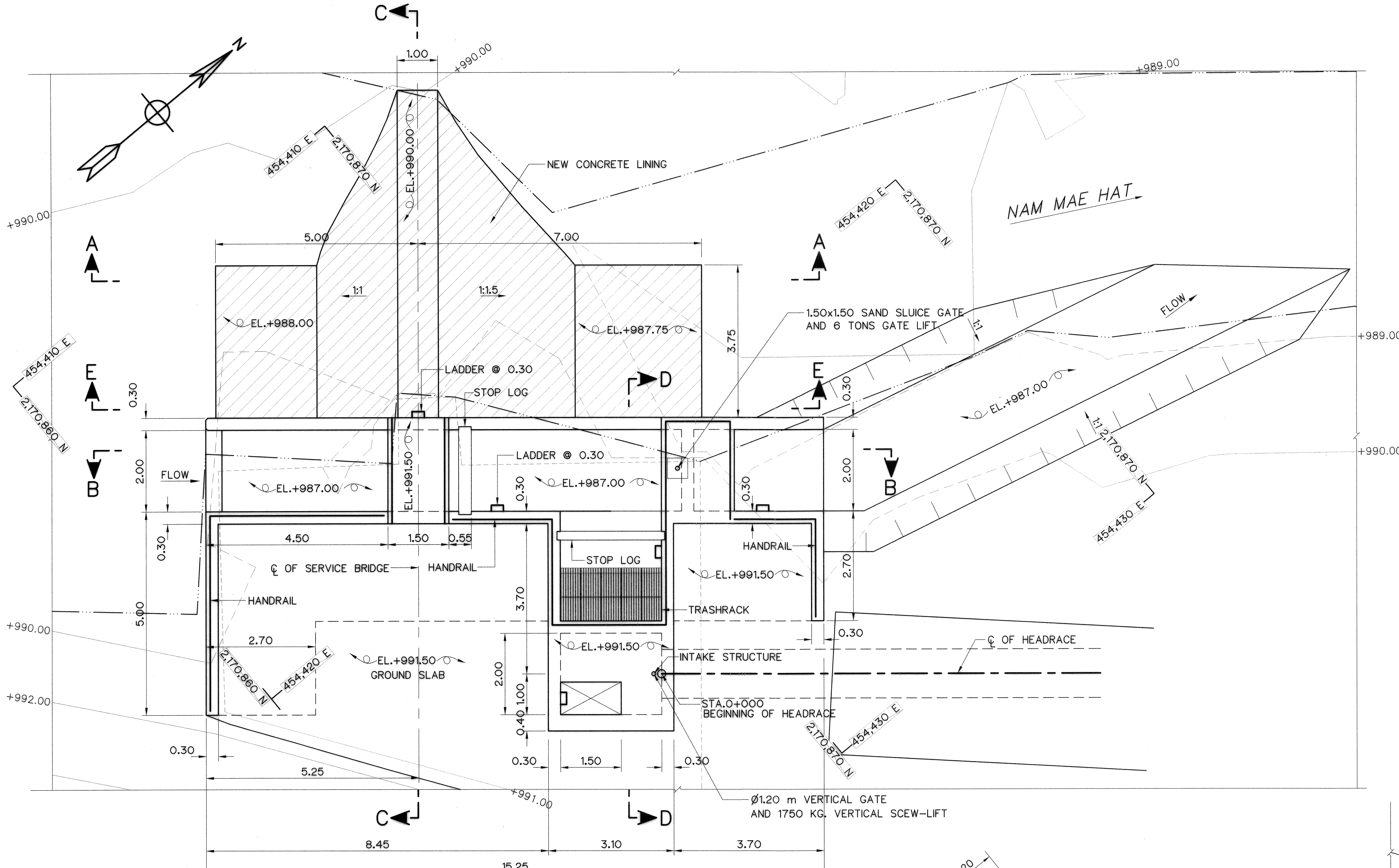
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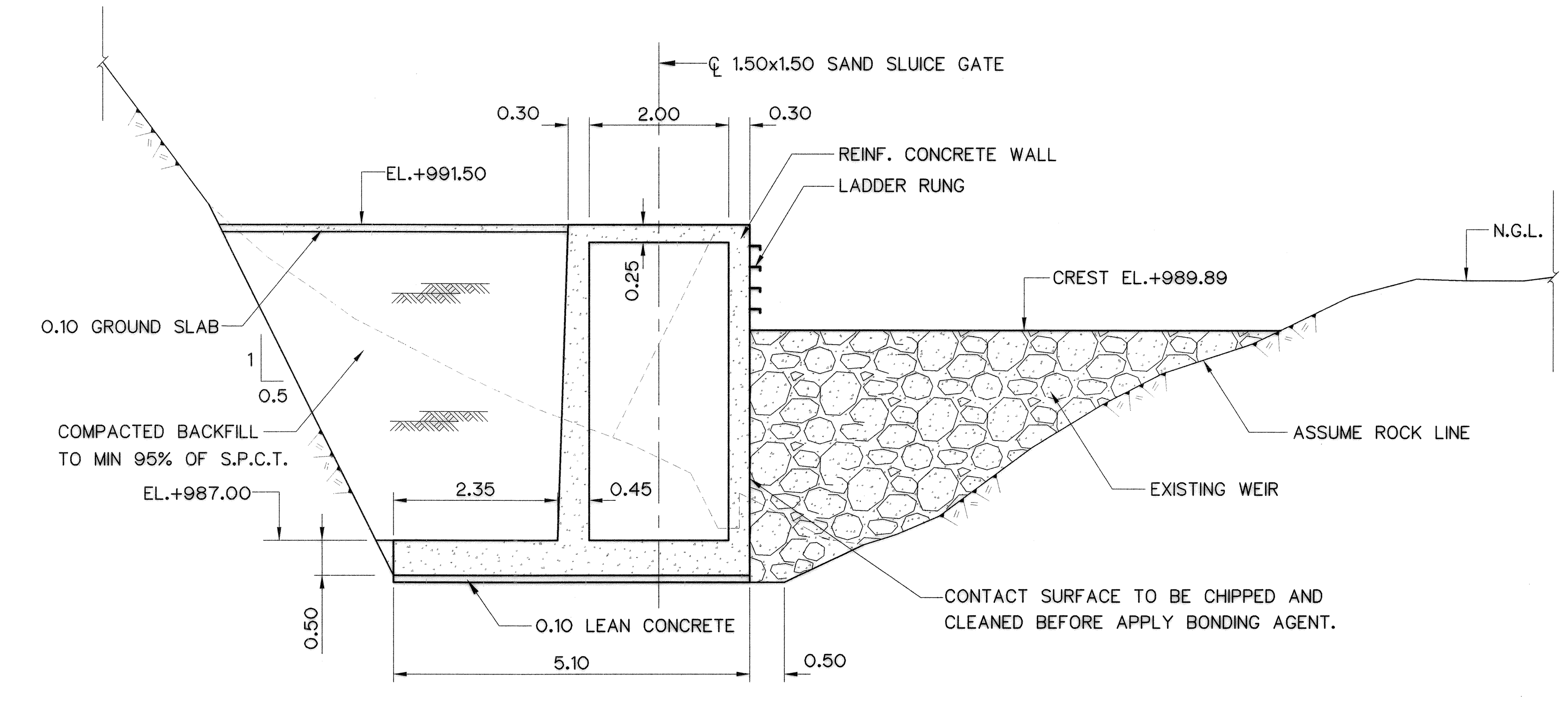
CIVIL WORKS AND TRANSMISSION LINE
WEIR
GENERAL LAYOUT PLAN

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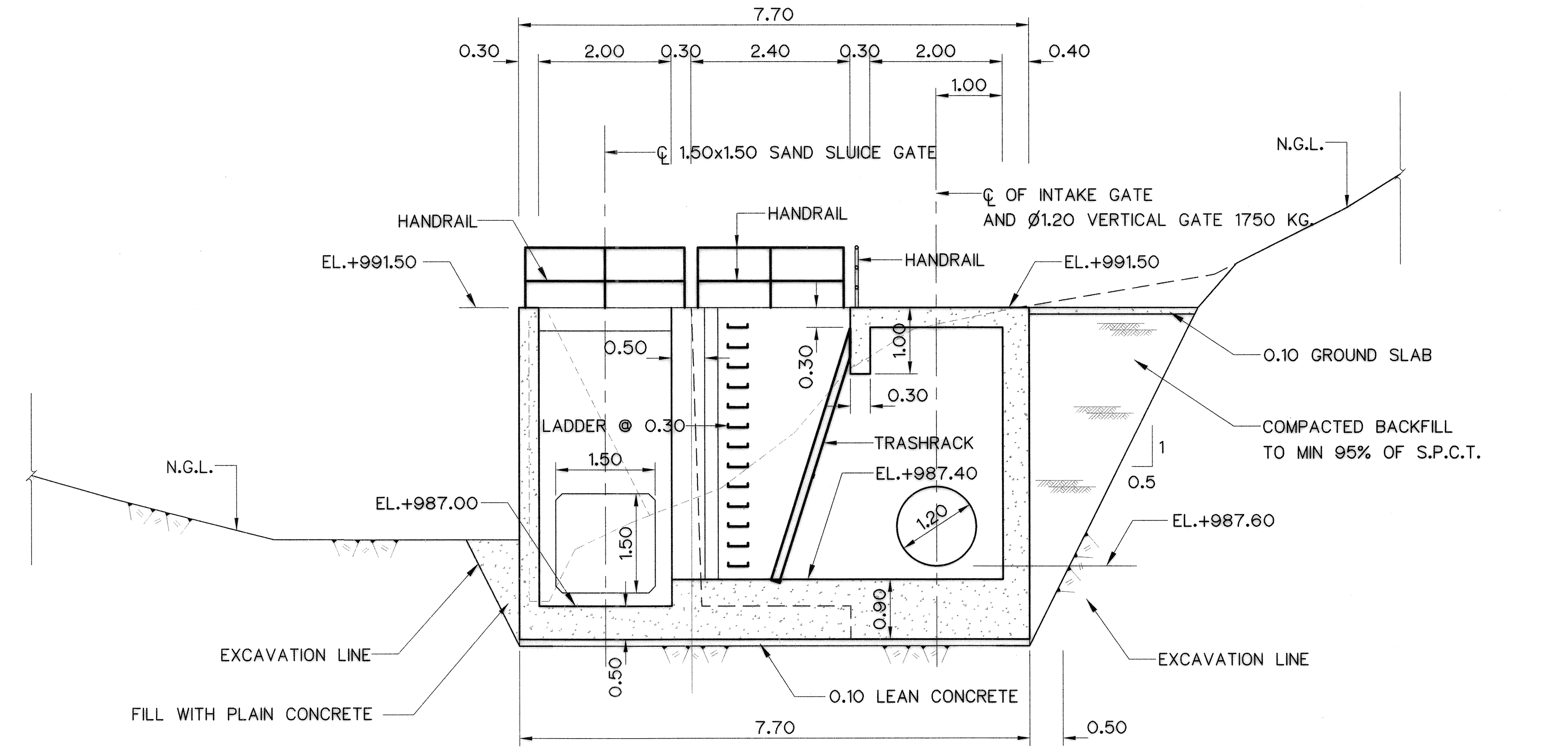
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DRAWING NO. MH-WE-01	SHEET NO. 14 OF 130



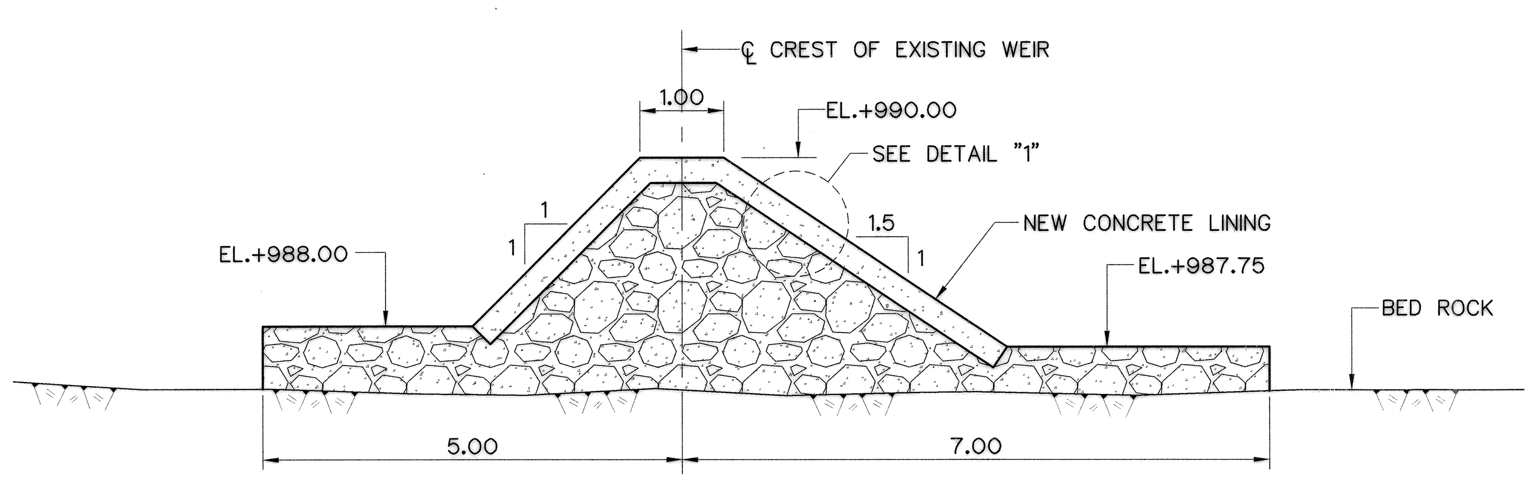
PLAN
SCALE 1:75



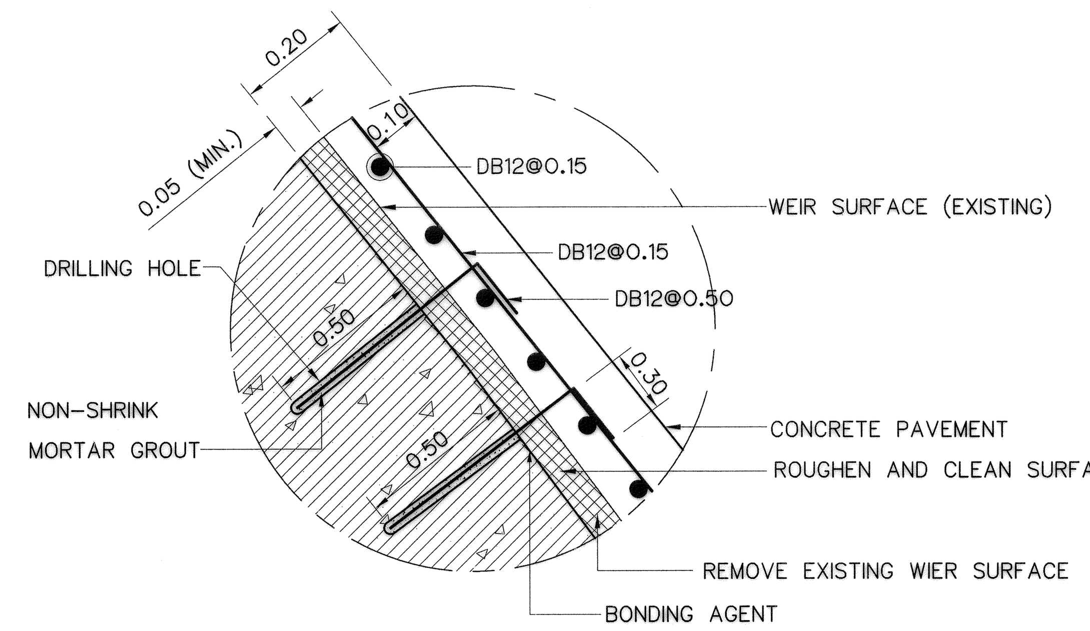
SECTION C–C
SCALE 1:75



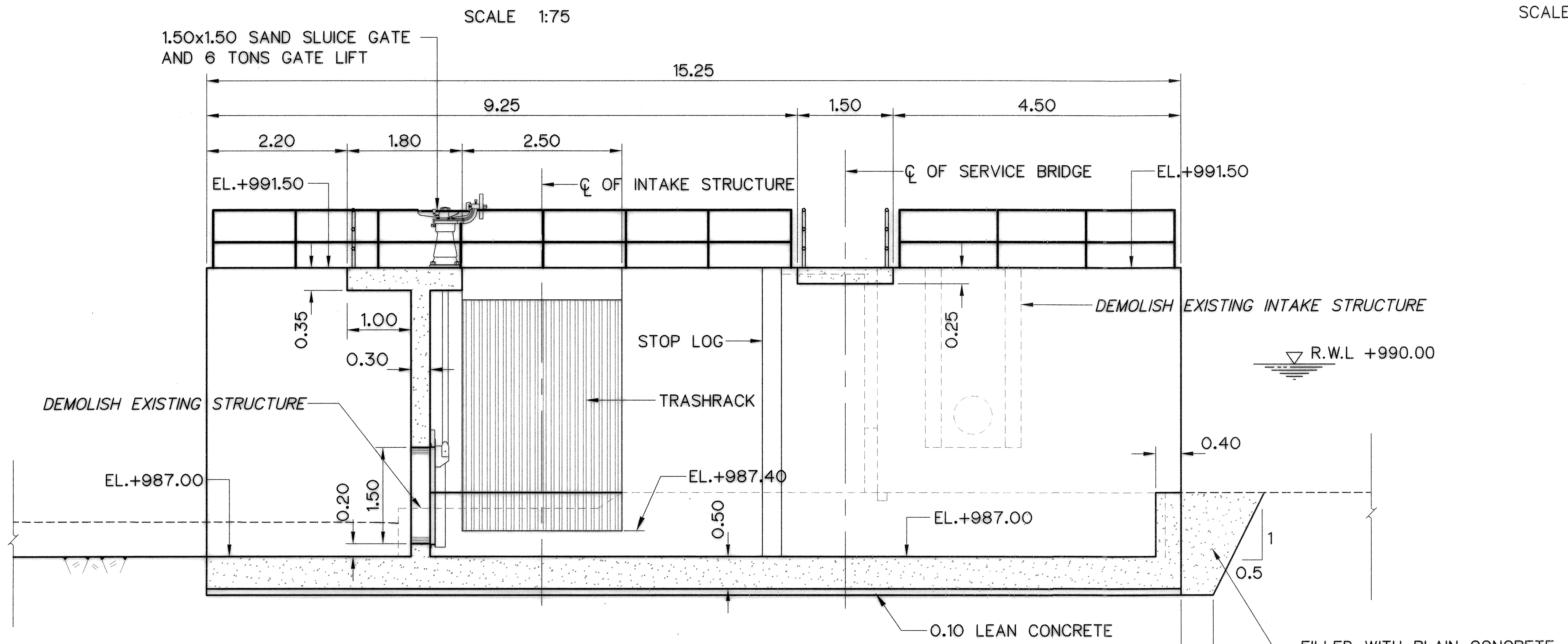
SECTION D–D
SCALE 1:75



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

NOTES :

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

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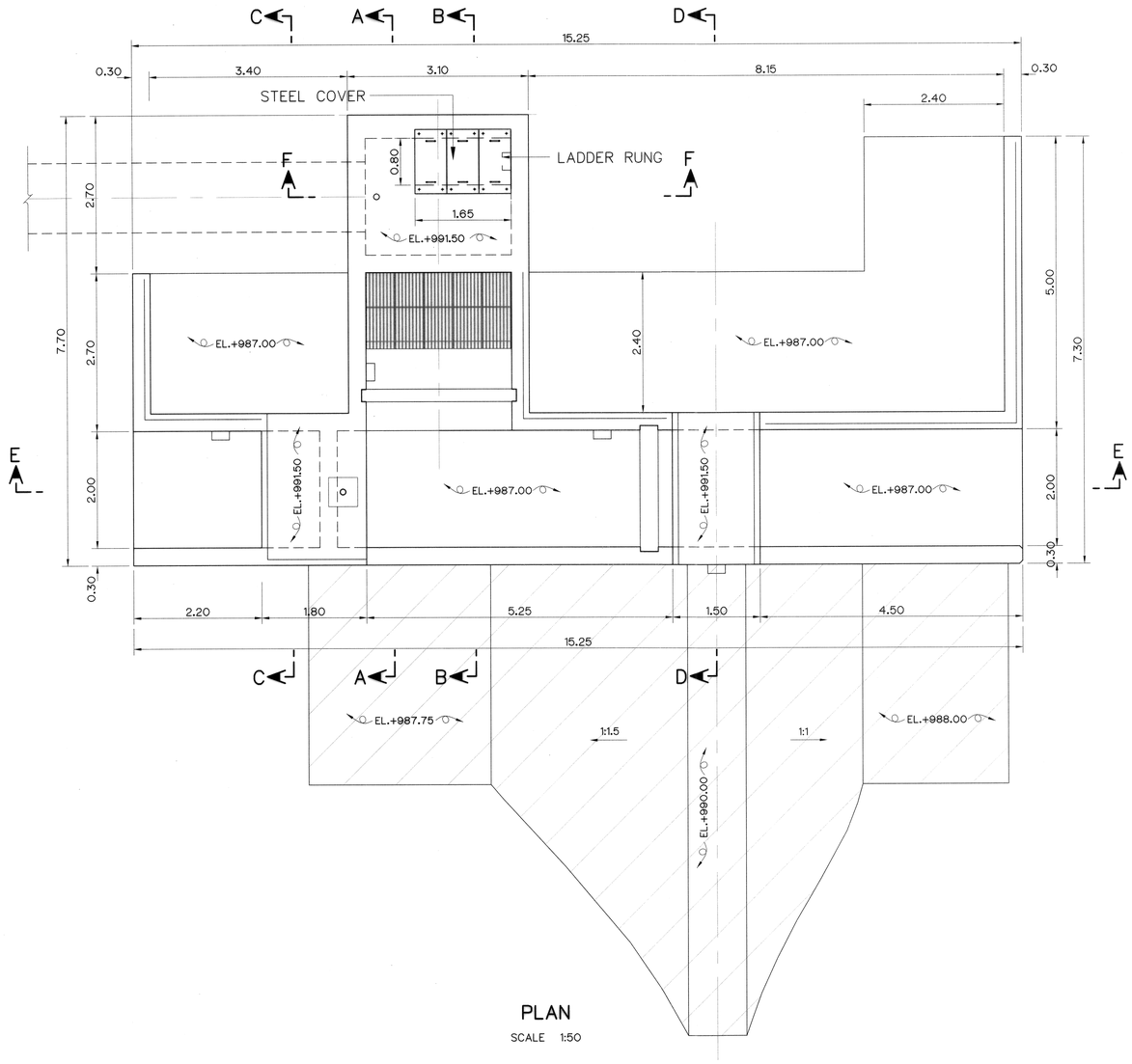
MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
WEIR
PLAN AND SECTIONS

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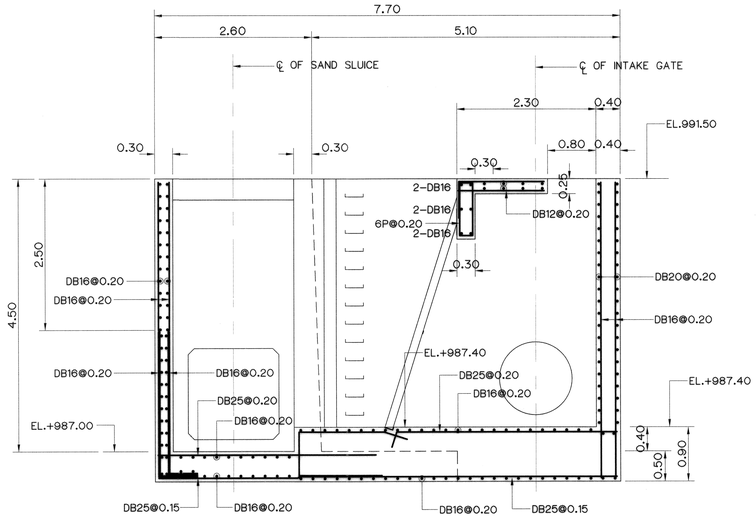
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PROJECT MANAGER — DATE 08/03/2559	DRAWING NO. MH-WE-02 — SHEET NO. 15 OF 130



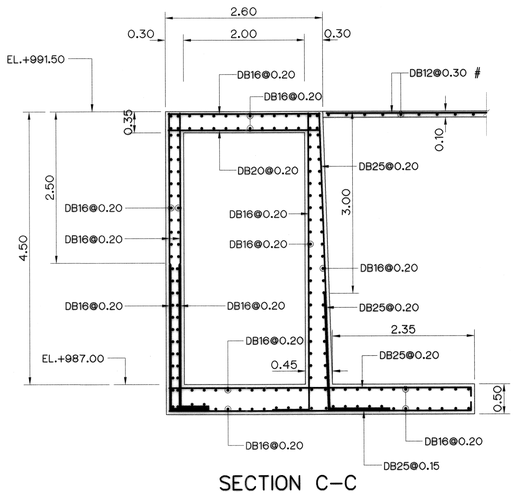
PLAN

SCALE 1:50



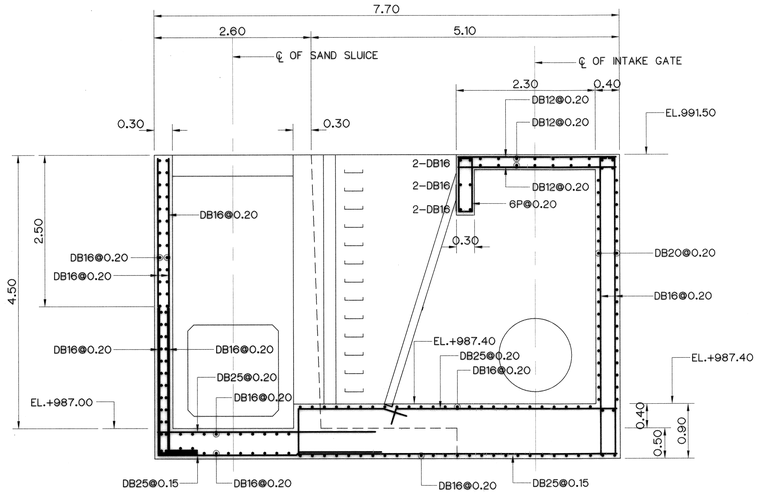
SECTION B–B

SCALE 1:50



SECTION C–C

SCALE 1:50



SECTION A–A

SCALE 1:50

NOTES :

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

REFERENCE DRAWINGS :

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

0 0.5 1 2 3 4

SCALE 1:50 METERS

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MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE

WEIR

REINFORCEMENT DETAILS (SHEET 1/2)

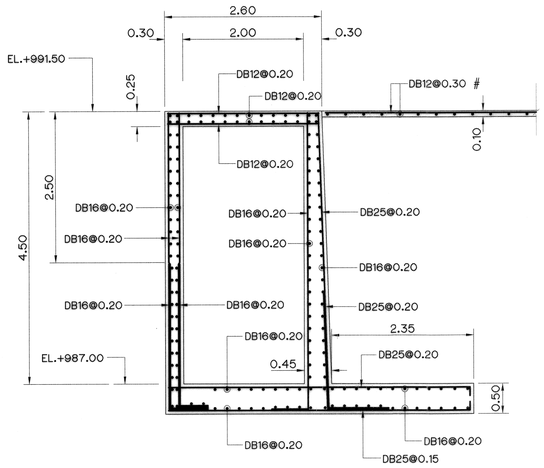
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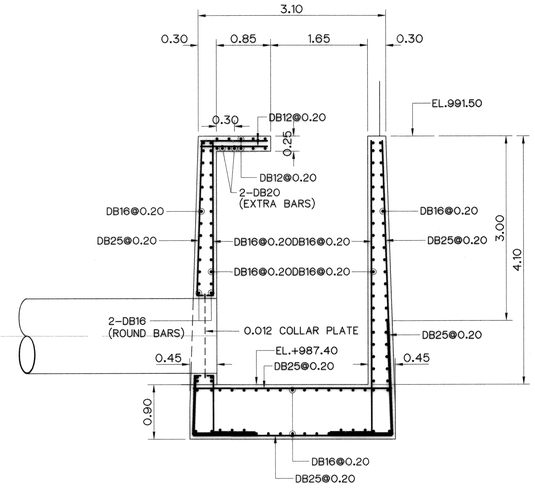
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SHEET NO. 16 OF 130



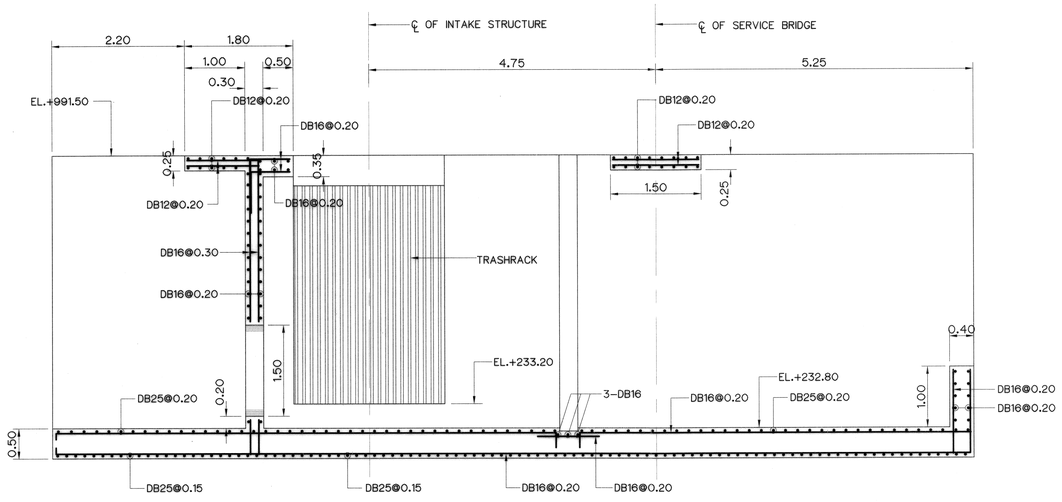
SECTION D–D

SCALE 1:50



SECTION F–F

SCALE 1:50



SECTION E–E

SCALE 1:50

NOTES :

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

REFERENCE DRAWINGS :

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

0 0.5 1 2 3 4

SCALE 1:50 METERS

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

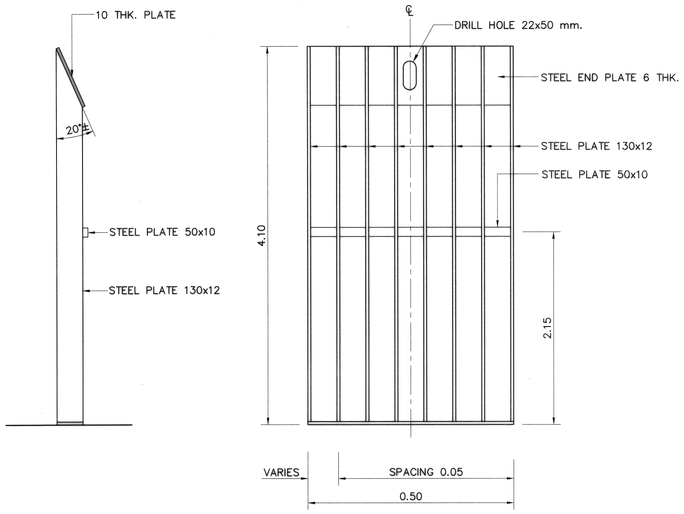
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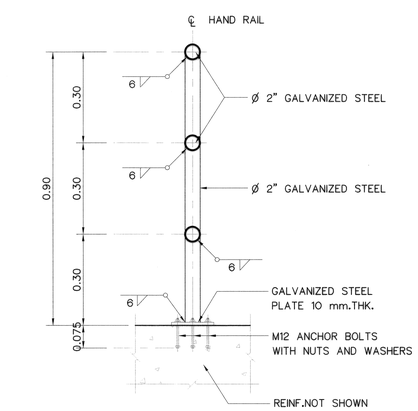
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RECOMMENDED
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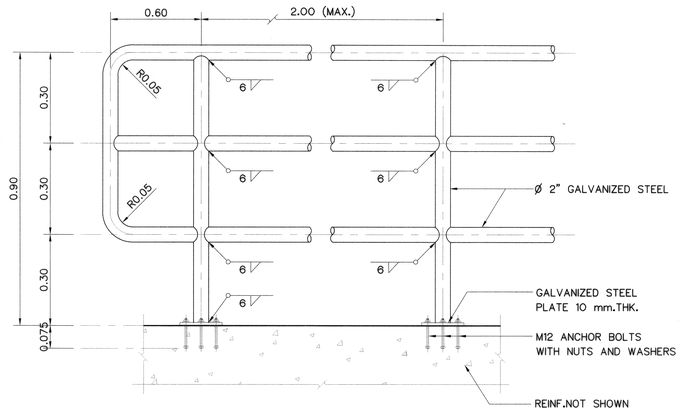
DRAWING NO. MH–WE–04
SHEET NO. 17 OF 130



TRASHRACK DETAILS

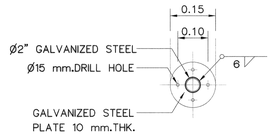
NOT TO SCALE

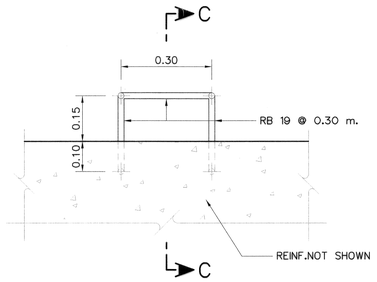




DETAIL OF HANDRAIL

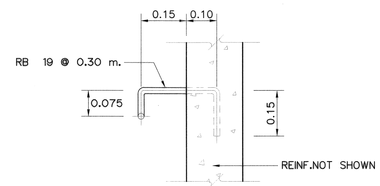
SCALE 1:20





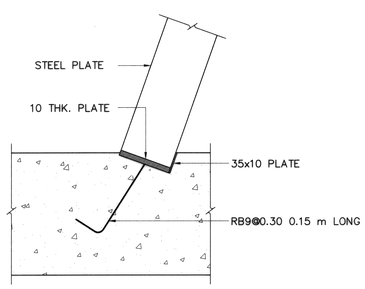
DETAIL OF LADDER RUNG

SCALE 1:20



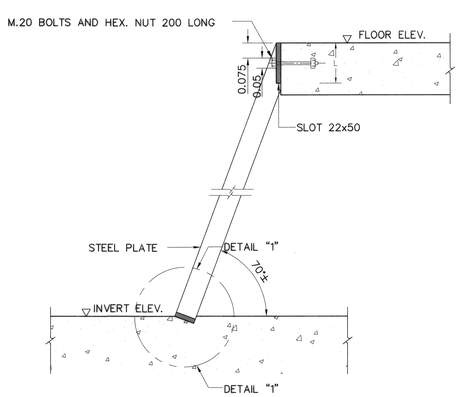
SECTION C – C

SCALE 1:20



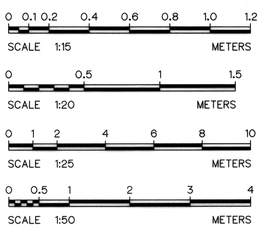
DETAIL "1"

NOT TO SCALE



TRASHRACK INSTALLATION

NOT TO SCALE



NOTES :

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

NO.	DATE	REVISIONS	CHECKED	APPROVED
3				
2				
1				
	CONSULTANTS		DEDE	

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

MAE HAT HYDROPOWER PROJECT

CIVIL WORKS AND TRANSMISSION LINE
WEIR
MISCELLANEOUS DETAILS

P&C MANAGEMENT CO.,LTD.

Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY

DESIGNED	วิศ.64624	วิศ.6226	REVIEWED
DRAWN			SUBMITTED
CHECKED		วิศ.6226	RECOMMENDED
PROJECT MANAGER		01/03/2559 DATE	APPROVED
			DRAWING NO. MH-WE-05
			SHEET NO. 18 OF 130