



Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

HUAI LAM SIN HYDROPOWER PROJECT

AMPHOE KONGRA CHANGWAT PHATTHALUNG

CONTRACT C2

ELECTRO – MECHANICAL EQUIPMENT

VOLUME 4 DRAWINGS

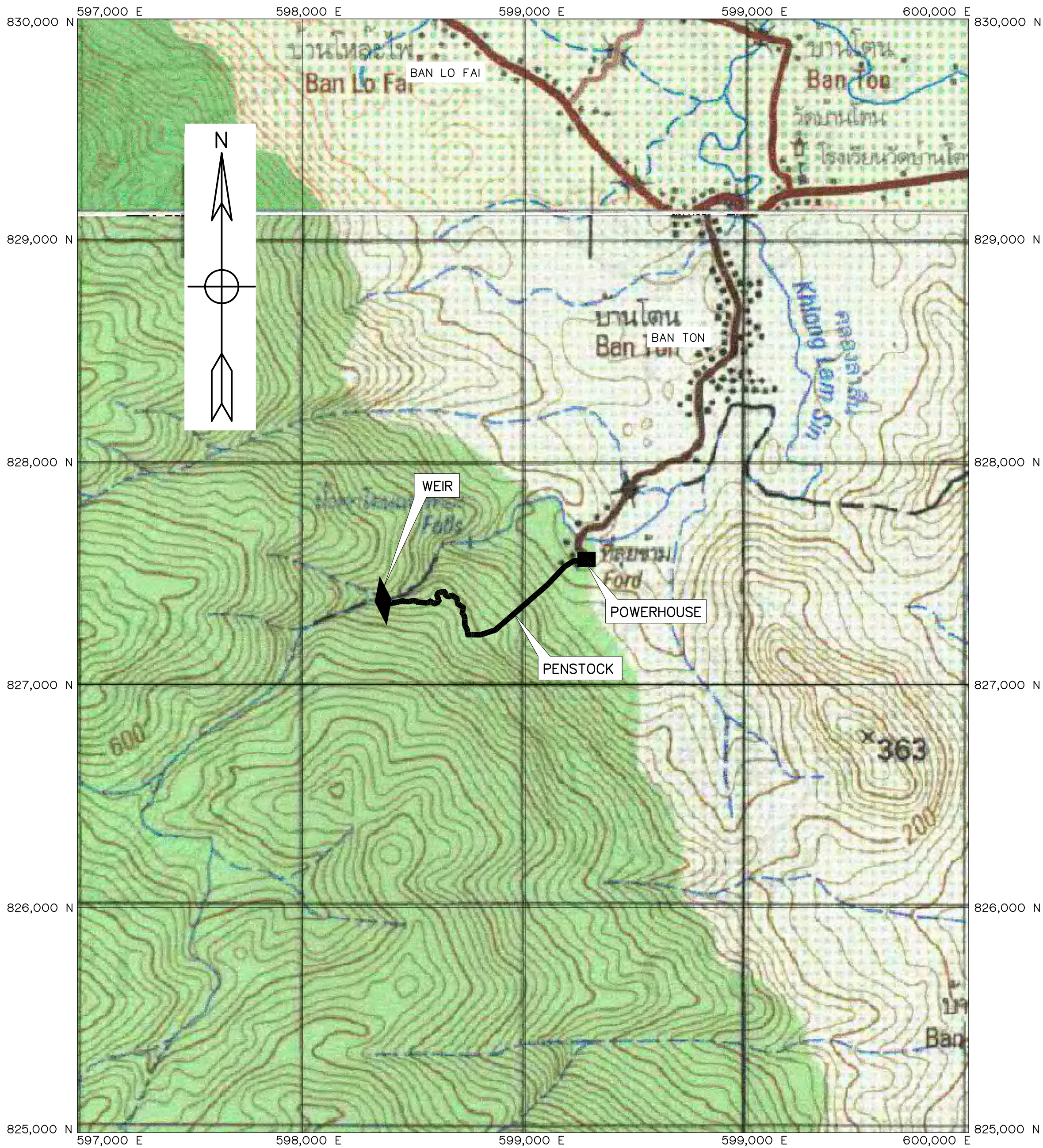


FRONTIER ENGINEERING CONSULTANTS CO.,LTD.

HUAI LAM SIN HYDROPOWER PROJECT
CONTRACT C2 : LIST OF DRAWINGS

SHEET NO.	DRAWING NO.	DRAWING DETAILS
GENERAL		
1	HLS-GN-01	LOCATION MAP AND PROJECT AREA MAP
2	HLS-GN-02	PROJECT MAP
3	HLS-GN-03	SYMBOLS, ABBREVIATIONS, AND GENERAL NOTES
4	HLS-GN-04	HYDROLOGY DATA
5	HLS-GN-05	HYDRAULIC GRADE LINE
INTAKE STRUCTURE		
6	HLS-IS-01	GENERAL LAY-OUT
7	HLS-IS-02	PLAN AND SECTION A-A
8	HLS-IS-03	SECTION B-B, C-C, D-D AND E-E
PENSTOCK		
9	HLS-PS-01	PLAN AND PROFILE, STA. 0+000 TO STA. 0+400
10	HLS-PS-02	PLAN AND PROFILE, STA. 0+400 TO STA. 0+800
11	HLS-PS-03	PLAN AND PROFILE, STA. 0+800 TO STA. 1+000
12	HLS-PS-04	PLAN AND PROFILE, STA. 1+000 TO STA. 1+171.00

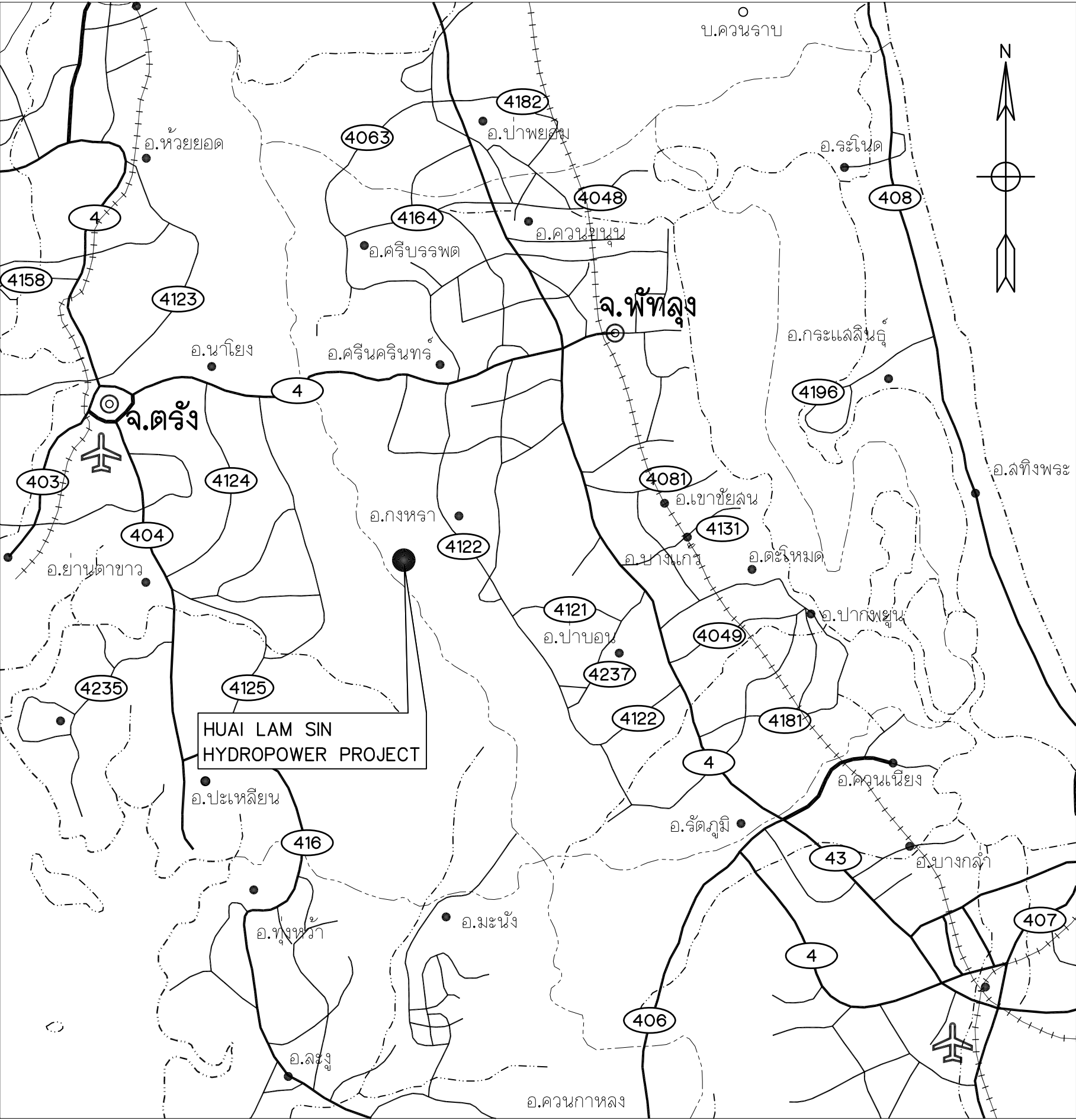
SHEET NO.	DRAWING NO.	DRAWING DETAILS
POWER HOUSE		
13	HLS-PH-01	GENERAL LAY-OUT
14	HLS-PH-02	PLAN AND ROOF PLAN
15	HLS-PH-03	ELEVATIONS
16	HLS-PH-04	SECTIONS
17	HLS-PH-05	TRANSFORMER, SWITCHYARD AND GROUNDING SYSTEM
18	HLS-PH-06	TRANSFORMER AND SWITCHYARD, SECTIONS
19	HLS-PH-07	TRANSFORMER AND SWITCHYARD, DETAILS
TAILRACE		
20	HLS-TR-01	PLAN AND SECTION A-A
21	HLS-TR-02	SECTIONS B-B, C-C AND D-D
ELECTRO – MECHANICAL EQUIPMENT		
22	HLS-EM-01	MAIN POWER SINGLE LINE DIAGRAM
23	HLS-EM-02	MAIN CONTROL SWITCH BOARD
24	HLS-EM-03	0.4 kV AIR CIRCUIT BREAKER CUBICLE
25	HLS-EM-04	COMPRESS AIR SYSTEM SCHEMATIC DIAGRAM



PROJECT AREA MAP
SCALE 1:15,000

LEGENDS :

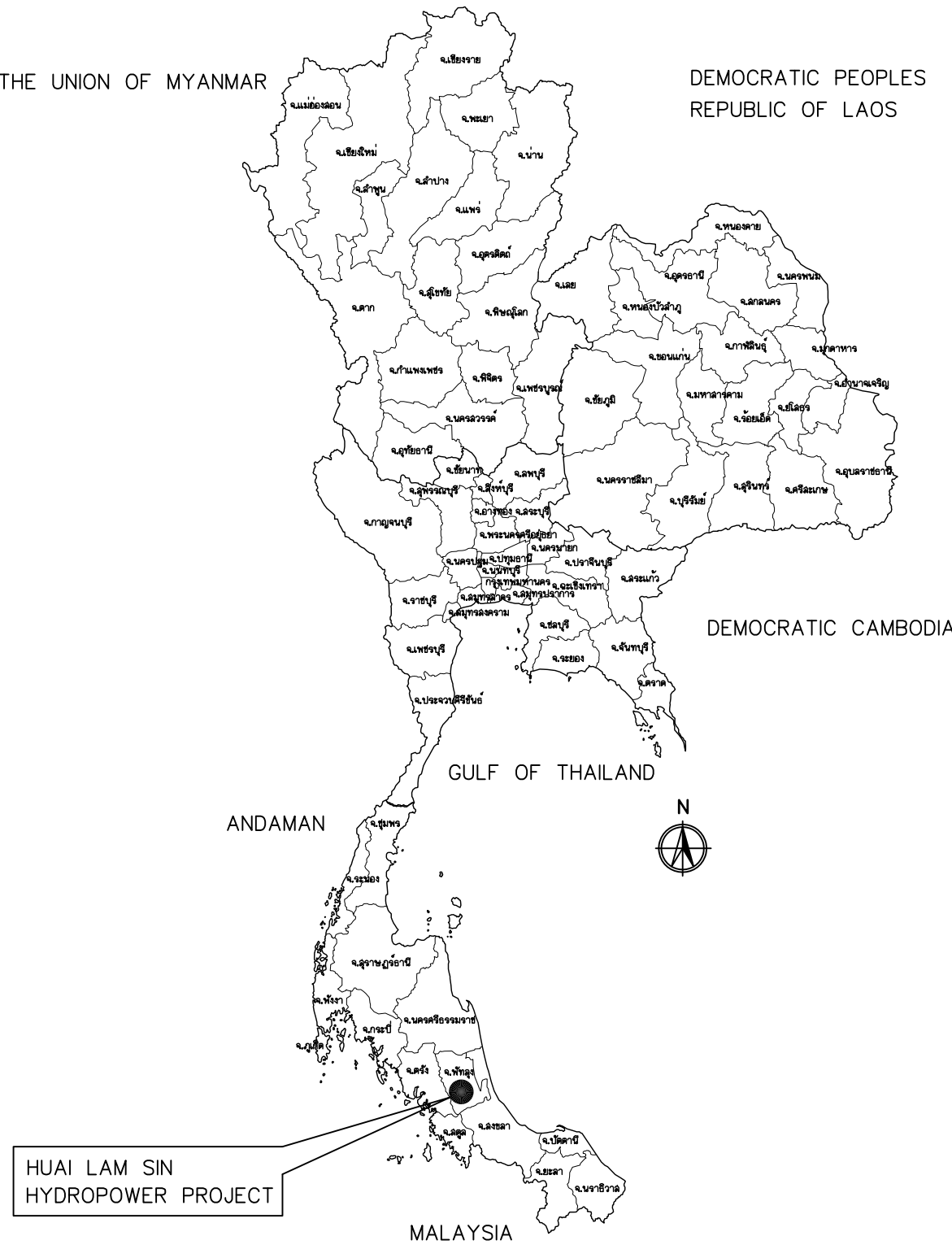
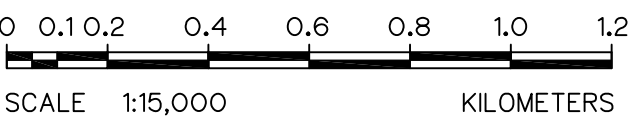
- STREAM
- WEIR
- PENSTOCK
- POWERHOUSE



LOCATION MAP
NOT TO SCALE

NOTES :

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



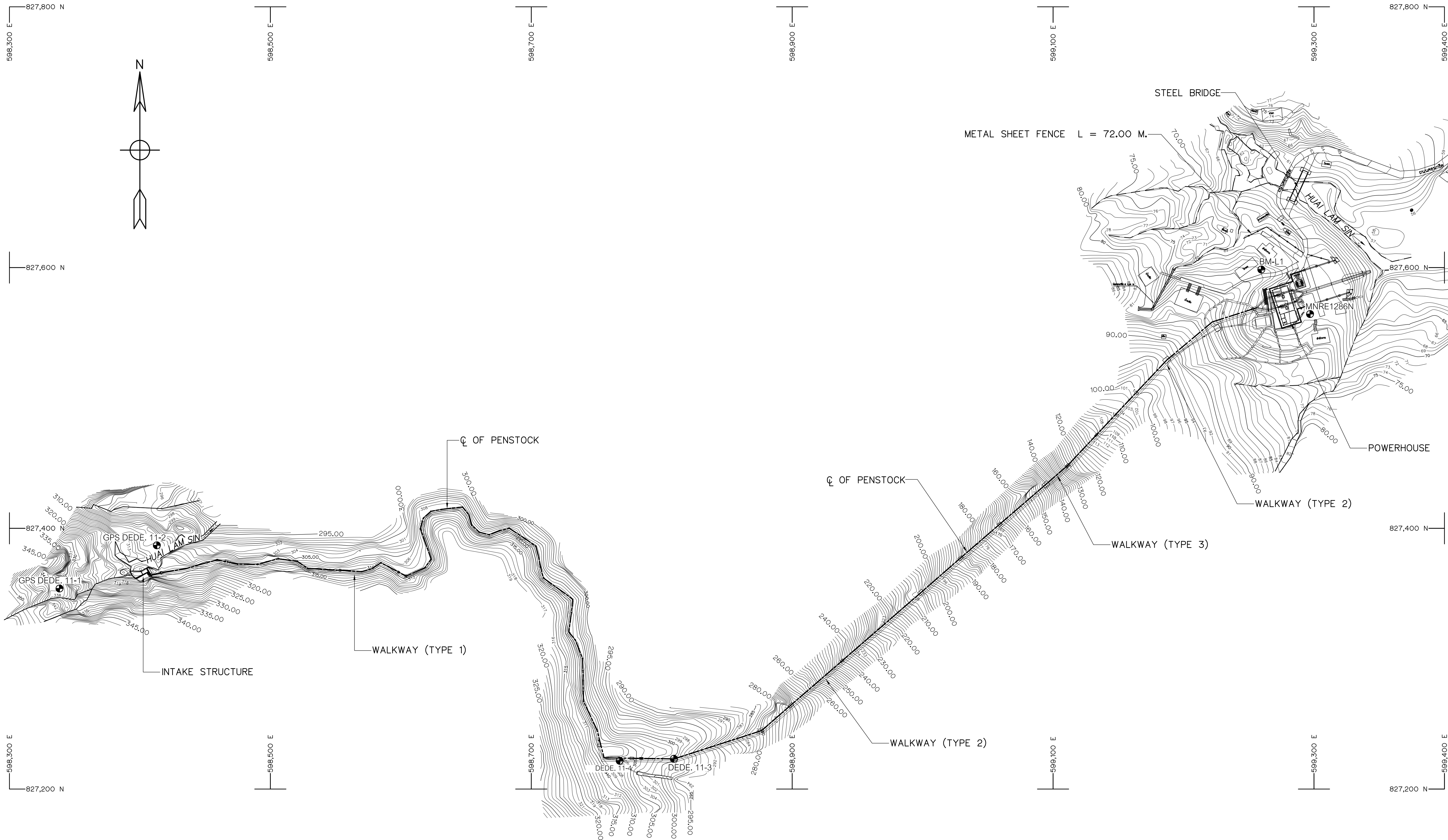
LOCATION MAP
NOT TO SCALE

NO.	DATE	REVISIONS	CHECKED	APPROVED
3				
2				
1				

CONSULTANTS

DEDE

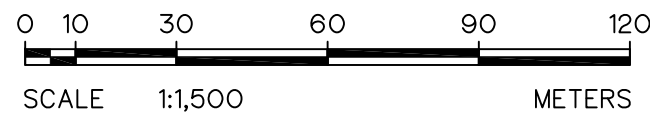
KINGDOM OF THAILAND Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY		
HUAI LAM SIN HYDROPOWER PROJECT		
ELECTRO – MECHANICAL EQUIPMENT GENERAL LOCATION MAP AND PROJECT AREA MAP		
FRONTIER ENGINEERING CONSULTANTS CO.,LTD.	REVIEWED S.KTICHAJ	DATE 14/01/62
DESIGNED	DATE 14/01/62	SUBMITTED
DRAWN	DATE 14/01/62	RECOMMENDED
CHECKED	DATE 14/01/62	APPROVED
PROJECT MANAGER	DATE 14/01/62	DRAWING NO. HLS-GN-01
		SHEET NO. 1 OF 25



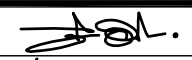
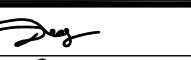
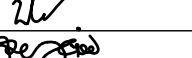
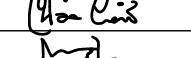
BM. DESCRIPTIONS			
BM NO.	COORDINATE		ELEVATION M. (MSL.)
	N	E	
GPS DEDE. 11-1	827,354.129	598,338.669	+339.199
GPS DEDE. 11-2	827,387.233	598,413.286	+308.463
DEDE. 11-3	827,223.464	598,809.441	+301.019
DEDE. 11-4	827,221.905	598,767.983	+307.643
BM-L1	827,598.487	599,259.619	+73.947
MNRE1286N	827,564.329	599,296.961	+68.789

PROJECT MAP
SCALE 1:1,500

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



3				
2				
1				
NO.	DATE	REVISIONS	CHECKED	APPROVED
		CONSULTANTS	DEDE	

 KINGDOM OF THAILAND Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY			
HUA I LAM SIN HYDROPOWER PROJECT			
ELECTRO – MECHANICAL EQUIPMENT GENERAL PROJECT MAP			
FRONTIER ENGINEERING CONSULTANTS CO.,LTD.		 Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY	
DESIGNED  ๑๒1.6651		SUBMITTED 	
DRAWN 		RECOMMENDED 	
CHECKED  ๑๒1.7324		APPROVED 	
 14/01/62 PROJECT MANAGER DATE		DRAWING NO. HLS-GN-02	SHEET NO. 2 OF 25

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
L.T.	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 ROUGHNESS 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 :

	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
	EXISTING HAND AUGER
	EXISTING DRILL HOLES
	DRILL HOLES
	DEGREE, MINUTE, SECOND
	AT EQUAL DISTANCE BETWEEN CENTER TO CENTER
	B.M.
	STATION
	BC., EC., PC., PI., PT., PCV., PVT.
	WATER LEVEL
	PLAN OF RIPRAP
	PLAN OF SLOPE RIPRAP
	SECTION OF DUMPED RIPRAP
	SECTION OF HAND PLACED RIPRAP
	SECTION OF SAND
	SECTION OF GRAVEL OR COARSE AGGREGATE
	SECTION OF ROCK
	SECTION OF EARTH
	SECTION OF BACKFILL
	SECTION OF CONCRETE
	STEEL SECTION
	ELEVATION OR PLAN OF EARTH CUT OR FILL
	ELEVATION OR PLAN OF ROCK CUT
	ELEVATION OR PLAN OF SLOPE
	NATURAL GROUND LEVEL
	CONTOUR LINE
	RIVER, STREAM OR NATURAL DRAIN
	FLOW DIRECTION
	SLOPE DIRECTION
	SLOPE RATIO

GENERAL NOTES :

- ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS UNLESS OTHERWISE SHOWN.
- 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.
- 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 AMBIGUITY 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
- ADDITIONAL SYMBOLS, IF REQUIRED, ARE DEFINED IN THE RESPECTIVE DRAWINGS.
- THE SPECIFICATIONS AND THE QUANTITIES OF MATERIALS ARE SPECIFIED IN THE TECHNICAL SPECIFICATIONS.
- ALL PLAIN CONCRETE CORNERS ARE TO BE CHEMFERED 2 cm. UNLESS OTHERWISE SHOWN.
- SLOPE IN CUT AND FILL SECTIONS, UNLESS OTHERWISE SHOWN, SHALL BE CONFORMED TO THE FOLLOWING TABLE OR AS DIRECTED BY FIELD ENGINEER.

EXISTING GROUND SLOPE 1:S	EARTH		HARD ROCK	
	CUT 1:S	FILL 1:S	CUT 1:S	FILL 1:S
OVER 1:1	OVER 1:0.5 $\frac{2}{1}$	$\frac{1}{1}$	1:0	$\frac{1}{1}$
1:1 – 1:1.5	1:0.5	1	1:0	$\frac{1}{1}$
1:1.5 – 1:2	1:1	1:1	1:0	1:1
1:2 – 1:3	1:1	1:1.5	1:0	1:1.5
LOWER 1:3	1:1	1:2	1:0	1:2

$\frac{2}{1}$ = FILL SHOULD BE AVOIDED

$\frac{1}{1}$ = FOR DOUBTFUL CASES CONSULT FIELD ENGINEER

STRUCTURAL DESIGN NOTES :

- 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 / INTAKE STRUCTURE
	2. POWERHOUSE, TAILRACE
	3. TAILRACE
	4. MANHOLE
	5. ANCHOR BLOCK, PIPE SUPPORT
	6. BOX CULVERT
240	BRIDGE
140	LEAN CONCRETE
- 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.
- THE REINFORCEMENT LAP SPLICES SHALL NOT BE LESS THAN 50 DIAMETERS OF BIGGER THAN BAR WITH HOOKS, UNLESS OTHERWISE SHOWN.
- EMBEDDED METALWORK SHALL BE SECURELY FASTENED IN POSITION BEFORE PLACING CONCRETE.
- ALL CONSTRUCTION JOINT SHOULD BE TREATED AS DIRECTED IN ORDER TO ASSURE THE BEST BOND.
- A 5 cm. (MIN.) LAYER OF LEAN CONCRETE (1:3:5 BY VOLUME) SHOULD BE PLACED BELOW CONCRETE STRUCTURES.
- THE STRUCTURES SHOULD BE PLACED ON UNDISTURBED SOILS OR COMPACTED FILL AND BACKFILL AROUND THE STRUCTURES SHOULD BE COMPACTED.
- THE FOUNDATION ELEVATIONS ARE SUBJECT TO CHANGE AS DIRECTED ACCORDING TO THE SOIL CONDITIONS.
- ALL SIZES OF REINFORCING BARS AND STRUCTURAL STEELS ARE IN MILLIMETERS.
- ALL STRUCTURAL STEELS ARE THOSE OF T.I.S. DESIGNATION Fe24.
- REINFORCED STEEL BARS SHALL BE CONFORM TO T.I.S. AS FOLLOW :

– DEFORMED BARS (SD30) – T.I.S. 24–2559
– ROUND BARS (SR24) – T.I.S. 20–2559
- ALLOWABLE BEARING CAPACITY OF FOUNDATION
SHALL NOT BE LESS THAN AS FOLLOW :

– INTAKE STRUCTURE	$Q_0 = 25 \text{ T/M.}^2$
– POWERHOUSE	$Q_0 = 10 \text{ T/M.}^2$
– PENSTOCK	$Q_0 = 15 \text{ T/M.}^2$
– WALKWAY	$Q_0 = 10 \text{ T/M.}^2$
– BRIDGE	$Q_0 = 15 \text{ T/M.}^2$

3				
2				
1				
NO.	DATE	REVISIONS	CHECKED	APPROVED
	CONSULTANTS		DEDE	

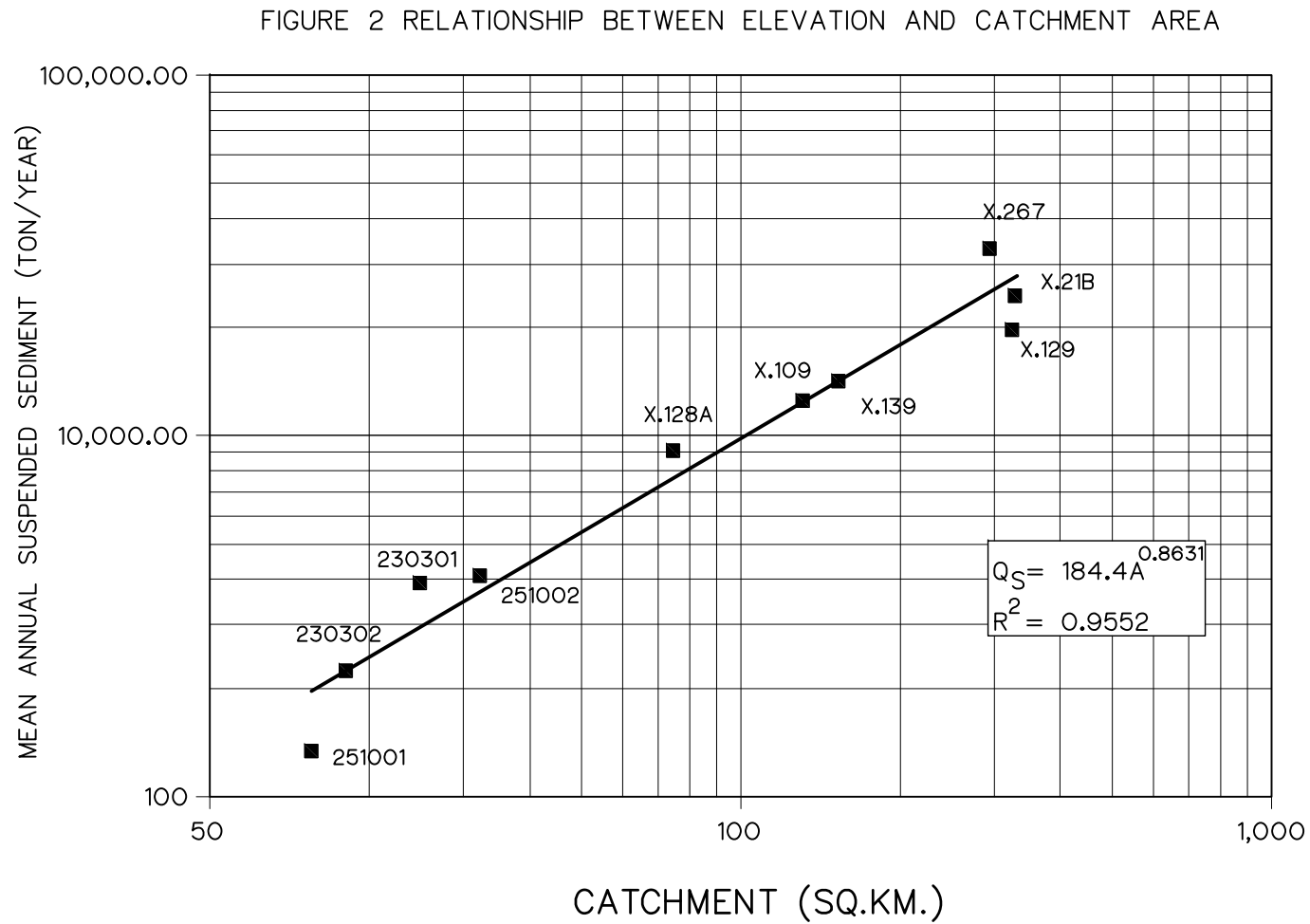
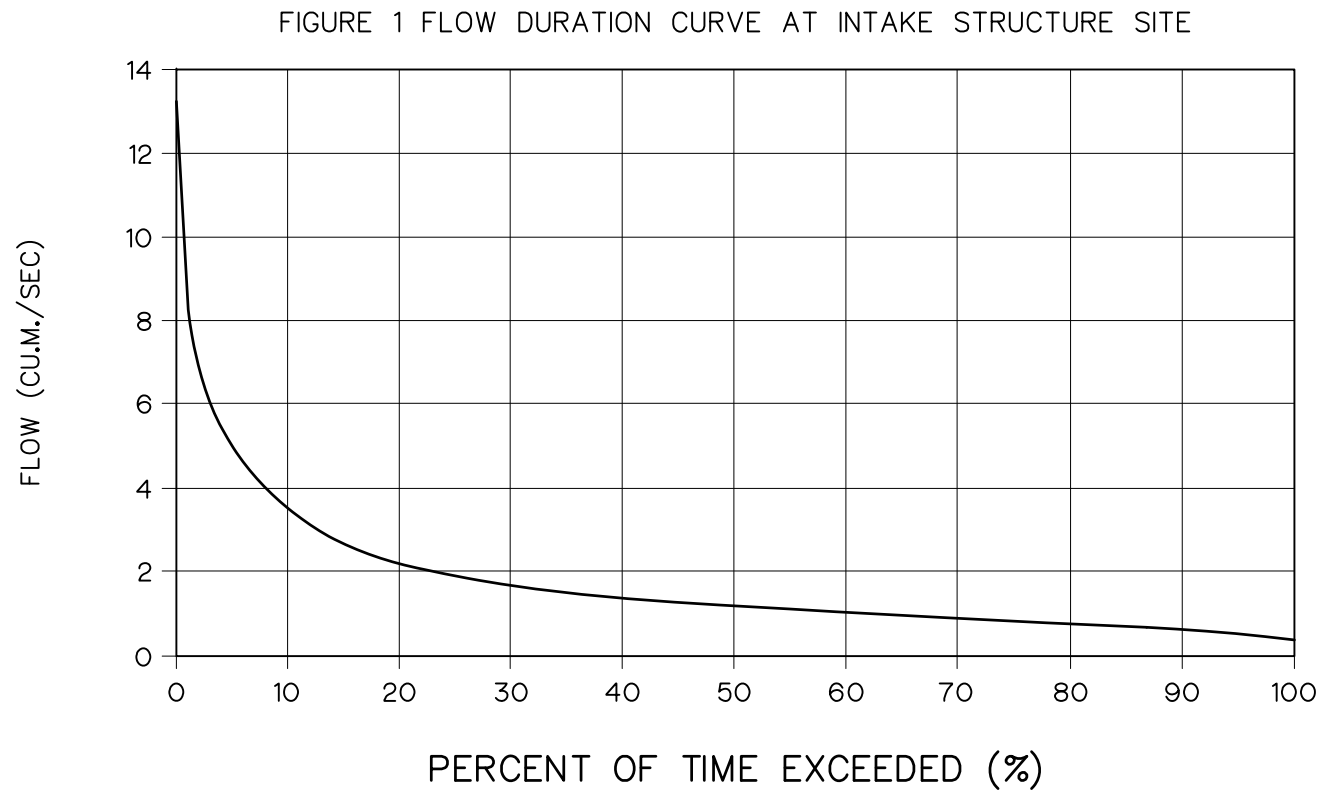
 KINGDOM OF THAILAND Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY	
HUA I LAM SIN HYDROPOWER PROJECT	
ELECTRO – MECHANICAL EQUIPMENT GENERAL SYMBOLS, ABBREVIATIONS, AND GENERAL NOTES	
 FRONTIER ENGINEERING CONSULTANTS CO.,LTD.	Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY REVIEWED S.KTICHAI <i>S.KTICHAI</i>
DESIGNED <i>[Signature]</i> ๑๒1.6651	SUBMITTED <i>[Signature]</i>
DRAWN <i>[Signature]</i>	RECOMMENDED <i>[Signature]</i>
CHECKED <i>[Signature]</i> ๑๒1.7324	APPROVED <i>[Signature]</i>
<i>[Signature]</i> 14/01/62 PROJECT MANAGER DATE	DRAWING NO. HLS–GN–03
	SHEET NO. 3 OF 25

TABLE 1 CLIMATOLOGICAL DATA FOR THE PERIOD 1980–2009

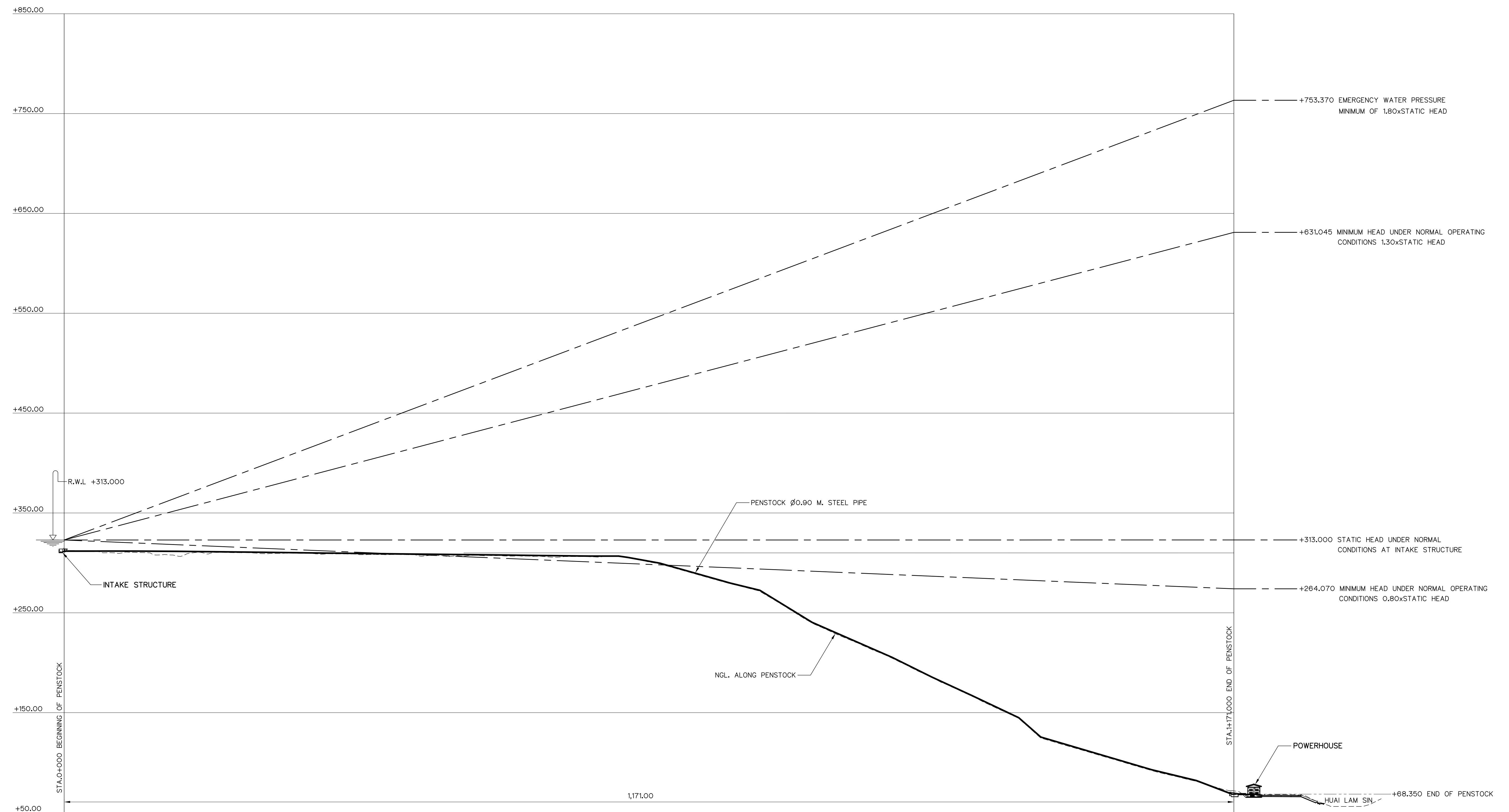
Station	KASETPHATTHALUNG												Elevation of station above M.S.L.	2.00	Meters
Index station	48560														
Latitude	7° 35' 0.0" N														
Longitude	100° 10' 0.0" E														
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL		
Pressure (Hectopascal)															
Mean	1011.5	1010.9	1010.1	1009.1	1008.4	1008.0	1008.4	1008.7	1009.3	1009.8	1009.6	1010.4	1009.5		
Ext. max.	1019.3	1018.6	1016.5	1015.6	1013.7	1015.1	1013.8	1013.7	1014.9	1015.9	1015.7	1017.1	1019.3		
Ext. min.	1003.9	1004.4	1003.4	1002.8	1002.6	1002.3	1003.2	1003.6	1004.1	1003.4	1001.6	1004.0	1001.6		
Mean daily range	3.6	3.8	4.2	4.2	3.8	3.4	3.4	3.7	4.0	4.1	3.9	3.7	3.8		
Temperature (Celsius)															
Mean	26.8	27.4	28.1	28.7	28.5	28.3	27.9	27.9	27.6	27.2	26.8	26.6	27.7		
Mean max.	30.4	31.6	32.6	33.6	33.9	33.5	33.3	33.3	32.9	31.9	30.3	29.8	32.3		
Mean min.	23.7	23.6	24.2	25.0	25.0	24.6	24.4	24.3	24.3	24.2	24.4	24.2	24.3		
Ext. max.	32.6	34.5	35.6	37.0	37.3	36.5	36.7	37.7	36.6	36.1	34.4	32.8	37.7		
Ext. min.	20.3	18.5	20.3	23.0	23.0	22.5	22.0	21.9	22.5	21.2	19.8	21.8	18.5		
Dew Point (Celsius)															
Mean	23.7	23.5	24.2	24.8	24.7	24.2	23.8	23.7	23.8	24.1	24.4	24.2	24.1		
Relative Humidity (%)															
Mean	84	80	80	81	81	80	80	80	81	84	88	87	82		
Mean max.	94	93	93	94	94	94	94	94	94	95	96	95	94		
Mean min.	72	66	65	65	63	62	61	60	63	68	76	77	66		
Ext. min.	55	47	49	47	44	42	38	34	40	43	52	61	34		
Visibility (km.)															
07.00 LST	8.5	9.0	9.2	9.2	9.1	9.0	8.9	9.1	8.8	8.5	7.9	8.1	8.8		
Cloudiness (0–10)															
Mean	6.3	4.7	5.1	5.7	6.6	6.8	7.2	6.8	7.2	7.4	7.3	7.1	6.5		
Wind (knots)															
Mean wind speed	1.9	2.1	2.0	1.9	1.8	2.1	2.3	2.4	2.5	1.9	1.4	1.7	2.0		
Max. wind speed	21	20	25	25	30	25	30	30	32	31	40	22	40		
Evaporation (mm.)															
Mean–pan	87.6	105.0	120.1	120.3	122.7	116.0	121.9	125.2	108.5	93.6	69.3	71.2	1261.4		
Rainfall (mm.)															
Mean	119.6	70.5	118.7	113.0	103.7	80.6	80.4	98.5	115.7	250.5	549.3	448.2	2148.7		
Mean rainy day	12	5	7	10	13	10	12	13	14	20	22	21	158		
Daily maximum	176.1	312.8	199.1	128.2	120.3	68.2	76.2	134.4	84.5	111.6	312.7	253.8	312.8		
Number of days with															
Haze	1	0	0	0	0	0	0	0	0	1	0	0	3		
Fog	1	3	3	4	4	7	6	5	6	2	1	0	41		
Hail	0	0	0	0	0	0	0	0	0	0	0	0	0		
Thunderstorm	1	1	4	7	10	6	5	6	6	8	8	3	66		
Squall	0	0	0	1	1	1	1	1	1	0	0	0	5		

TABLE 2 FLOOD PEAK DISCHARGE FOR VARIOUS RETURN PERIODS

RETURN PERIOD (YEAR)	FLOOD PEAK DISCHARGE (M. ³ /SEC.)	
	REGIONAL FLOOD FREQUENCY ANALYSIS	UNIT HYDROGRAPH
10	70.6	58.8
25	90.5	81.5
50	105.3	100.6
100	119.9	121.6
200	134.5	144.4
500	153.8	177.5
1,000	168.3	204.6



3						FRONTIER ENGINEERING CONSULTANTS CO.,LTD.	REVIEWED S.KTIKHAJ <i>S.K.</i>
2						DESIGNED <i>[Signature]</i> ๑๒1.6651	SUBMITTED <i>[Signature]</i>
1						DRAWN <i>[Signature]</i>	RECOMMENDED <i>[Signature]</i>
NO.	DATE	REVISIONS	CHECKED	APPROVED		CHECKED <i>[Signature]</i> ๑๒1.7324	APPROVED <i>[Signature]</i>
		CONSULTANTS		DEDE		<i>[Signature]</i> 14/01/62 PROJECT MANAGER DATE	DRAWING NO. HLS-GN-04 SHEET NO. 4 OF 25



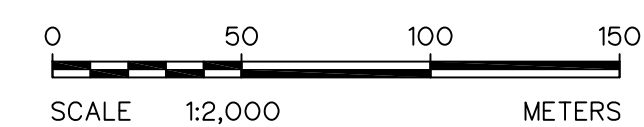
NOTES :

1. THE DATA SHOWN ON THIS DRAWING IS PROVISIONAL AND WILL BE REVIEWED WHEN THE ACTUAL TURBINE CHARACTERISTICS ARE KNOWN.
2. IT HAS BEEN ASSUMED THAT STEEL FOR THE PRESSURE PIPELINE CONFORMS TO STEEL TYPE SS41 OF THE JAPANESE INDUSTRIAL STANDARD JIS G 3101
3. THE THICKNESS OF THE PIPE SHELL SHALL INCLUDE A TOLERANCE OF 2 MM. FOR CORROSION AND SHALL BE DESIGNED FOR THE LOAD CASES SHOWN IN THE TABLE BELOW
4. WELD EFFICIENCY ON THE PRESSURE PIPELINE SHALL BE AT LEAST 90%
5. THE LOADING CASES MAY BE MORE FULLY DEFINED AS BELOW
 - NORMAL - INCLUDES NORMAL WATER PRESSURE AND NORMAL LONGITUDINAL LOADS SUCH AS WEIGHT OF PIPELINE, ANCHOR BLOCK, EXTERNAL SOIL AND WATER PRESSURE
 - EMERGENCY - INCLUDES LOSS OF A SUPPORT OR LOADING DUE TO TEST PRESSURE OR IMPOSITION OF DESIGN EARTHQUAKE ON NORMAL CASE
 - EXTREME - INCLUDES EXTREME WATER PRESSURES IN PIPELINE OR INCIDENCE OF MAXIMUM CREDIBLE EARTHQUAKE PLUS NORMAL WATER PRESSURE
6. THICKNESS OF PENSTOCK DESIGNED BASE ON PRESSURE RISE HEAD (WATER HAMMER) TURBINE PERFORMANCE, CLOSING TIME (6 SECONDS APPROXIMATELY) WILL BE SPECIFIED IN THE BIDDING DOCUMENTS.

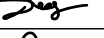
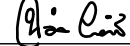
PROFILE ALONG PENSTOCK C

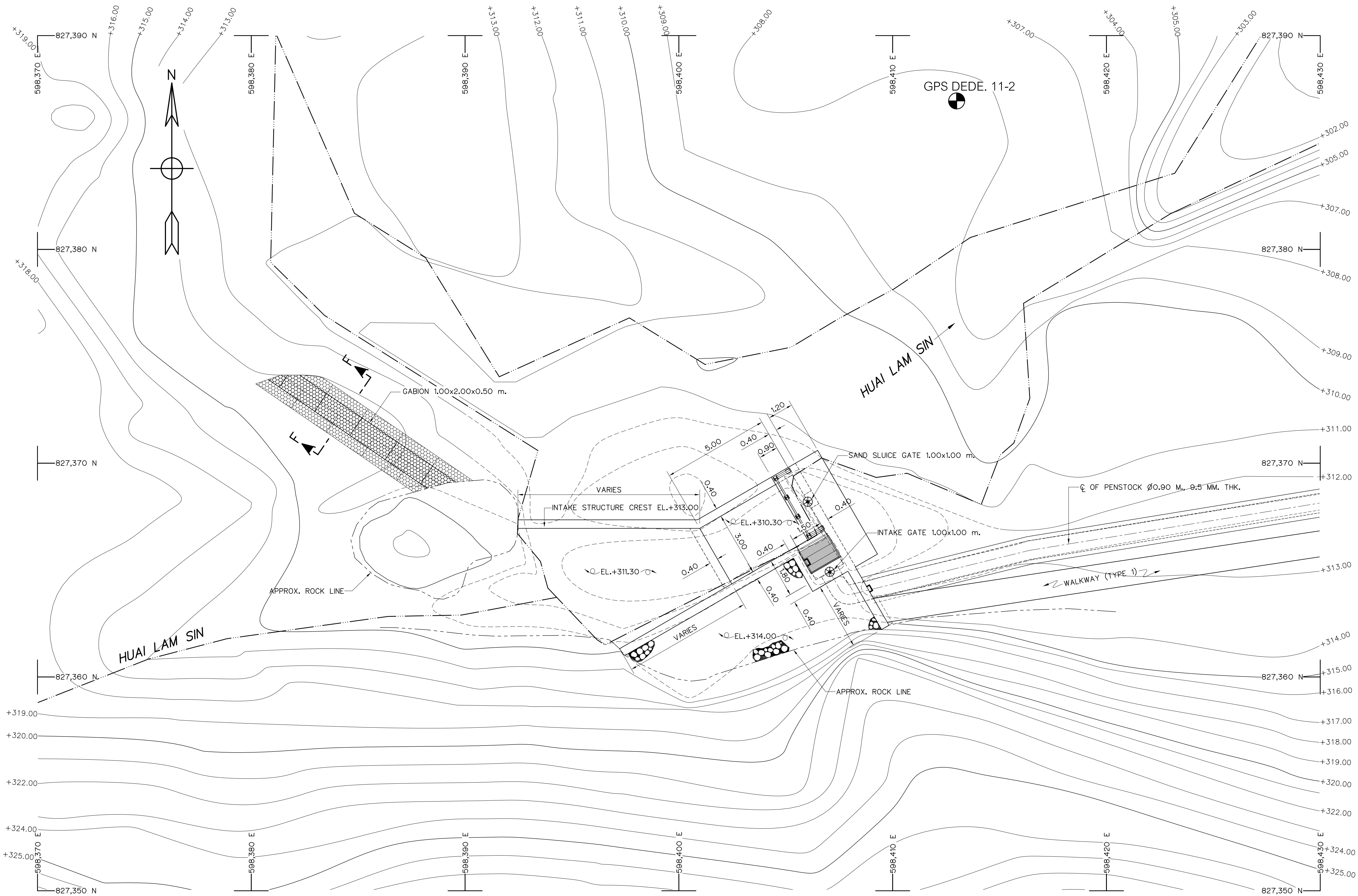
SCALE { VERTICAL 1 : 2,000
HORIZONTAL 1 : 2,000

LOAD CASES	ALLOWABLE TENSILE STRESS
EXTREME WATER PRESSURE RESULTING FROM SLOWDOWN CLOSURE OF THE TABLE VALVE	1.00 x MINIMUM YIELD STRESS
EMERGENCY WATER PRESSURE AND ALL OTHER NORMAL LONGITUDINAL LOADS	0.75 x MINIMUM YIELD STRESS
NORMAL WATER PRESSURE AND ALL OTHER NORMAL LONGITUDINAL LOADS	0.60 x MINIMUM YIELD STRESS



3				
2				
1				
NO.	DATE	REVISIONS	CHECKED	APPROVED
	CONSULTANTS		DEDE	

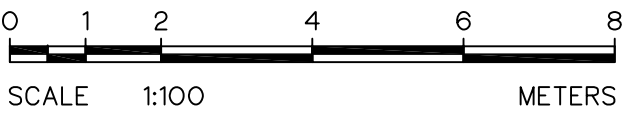
 KINGDOM OF THAILAND Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY			
HUAI LAM SIN HYDROPOWER PROJECT			
ELECTRO – MECHANICAL EQUIPMENT			
GENERAL			
HYDRAULIC GRADE LINE			
 FRONTIER ENGINEERING CONSULTANTS CO.,LTD		 Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY	
DESIGNED 		REVIEWED S.KITCHAI 	
DATE 22.1.6551		SUBMITTED 	
DRAWN 		RECOMMENDED 	
CHECKED 		APPROVED 	
PROJECT MANAGER 		DRAWING NO.	
DATE 14/01/62		HLS-GN-05	
		SHEET NO.	
		5 OF 25	



GENERAL LAY-OUT
SCALE 1:100

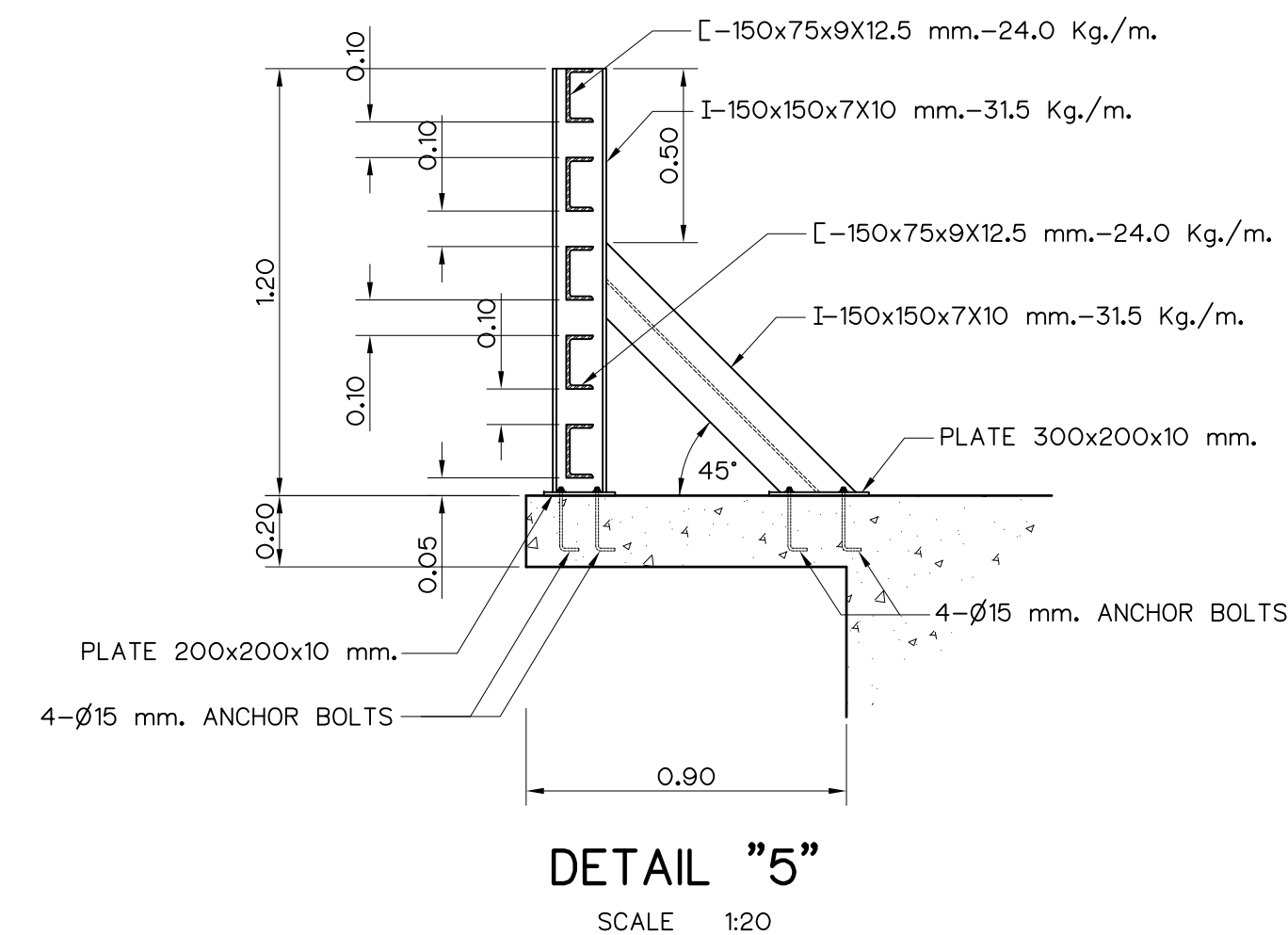
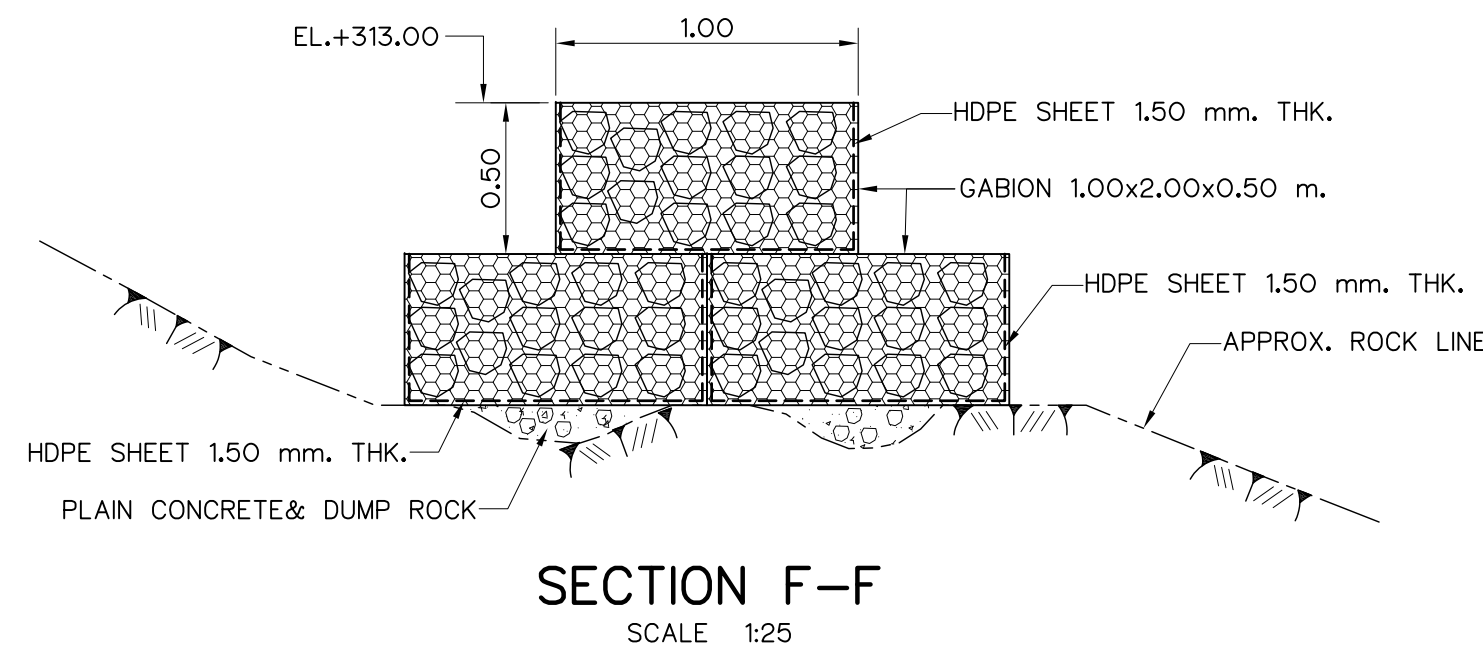
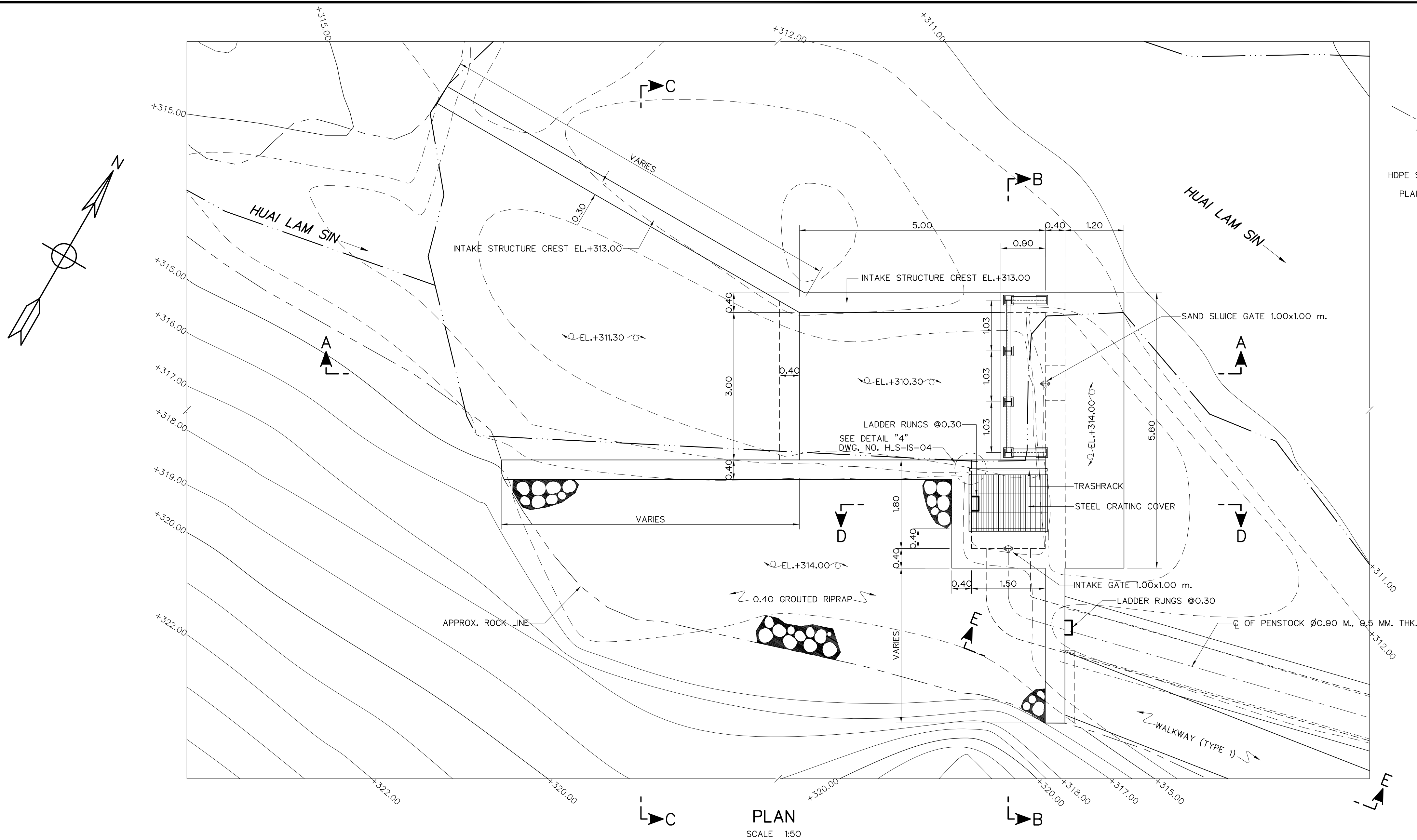
- NOTES :
- ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS, UNLESS OTHERWISE SHOWN.
 - SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. HLS-GN-03

- REFERENCE DRAWINGS :
- | | |
|---|-----------|
| 1. INTAKE STRUCTURE, PLAN AND SECTION A-A | HLS-IS-02 |
|---|-----------|



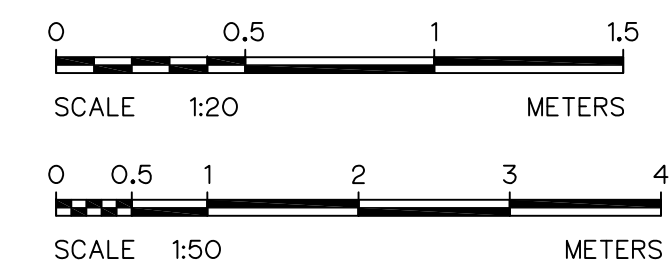
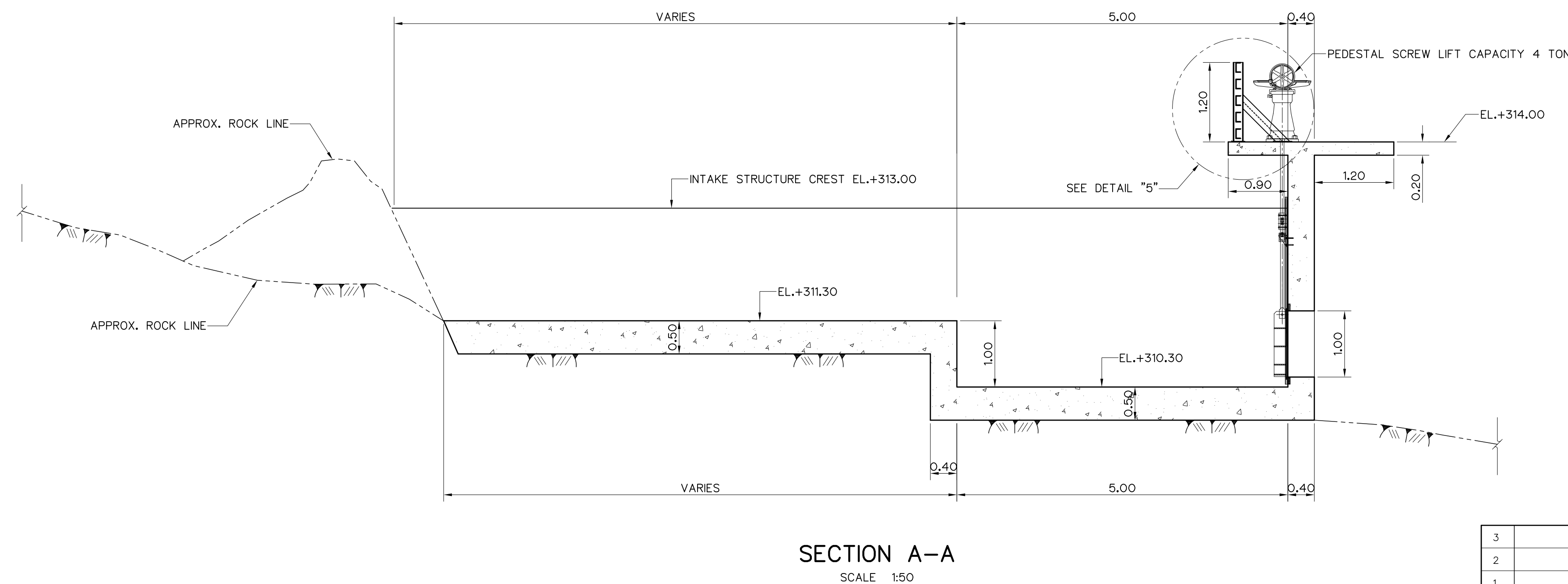
3				
2				
1				
NO.	DATE	REVISIONS	CHECKED	APPROVED
CONSULTANTS			DEDE	

KINGDOM OF THAILAND Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY			
HUI LAM SIN HYDROPOWER PROJECT			
ELECTRO – MECHANICAL EQUIPMENT INTAKE STRUCTURE GENERAL LAY-OUT			
FRONTIER ENGINEERING CONSULTANTS CO.,LTD.		Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY	
REVIEWED S.KITIKHAJ		REVIEWED S.KITIKHAJ	
DESIGNED		SUBMITTED	
DRAWN		RECOMMENDED	
CHECKED		APPROVED	
PROJECT MANAGER		14/01/62 DATE	DRAWING NO. HLS-IS-01
			SHEET NO. 6 OF 25



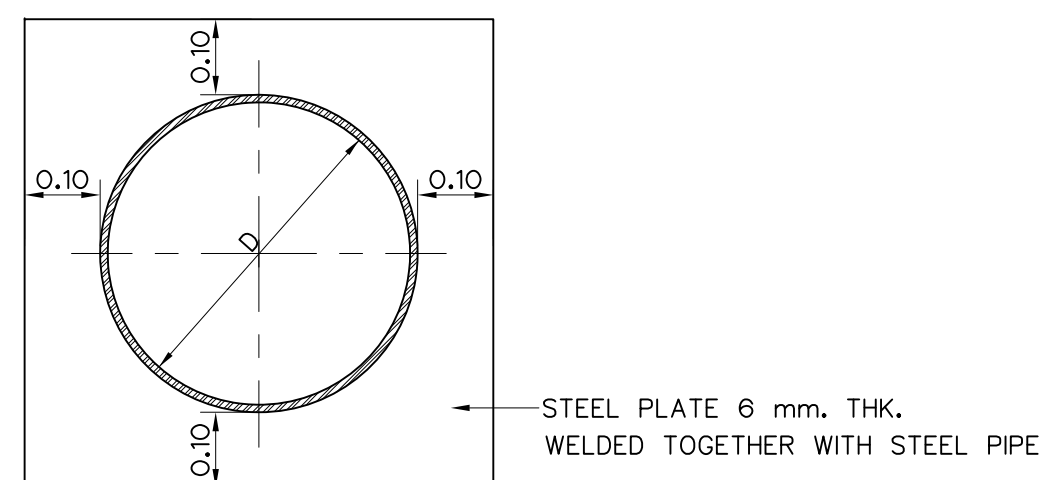
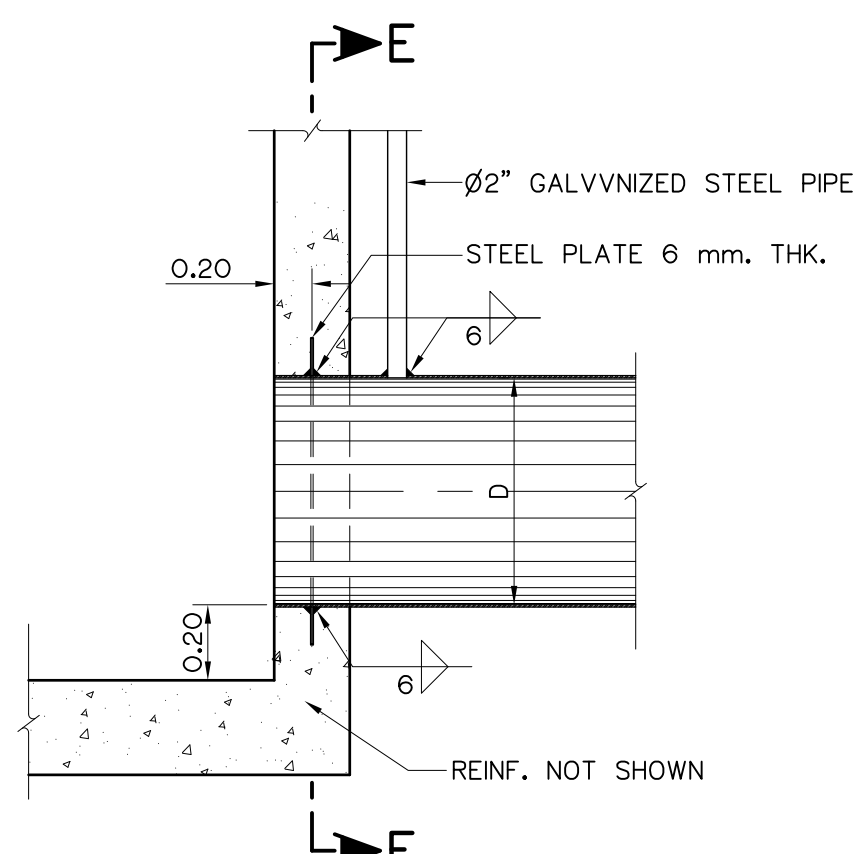
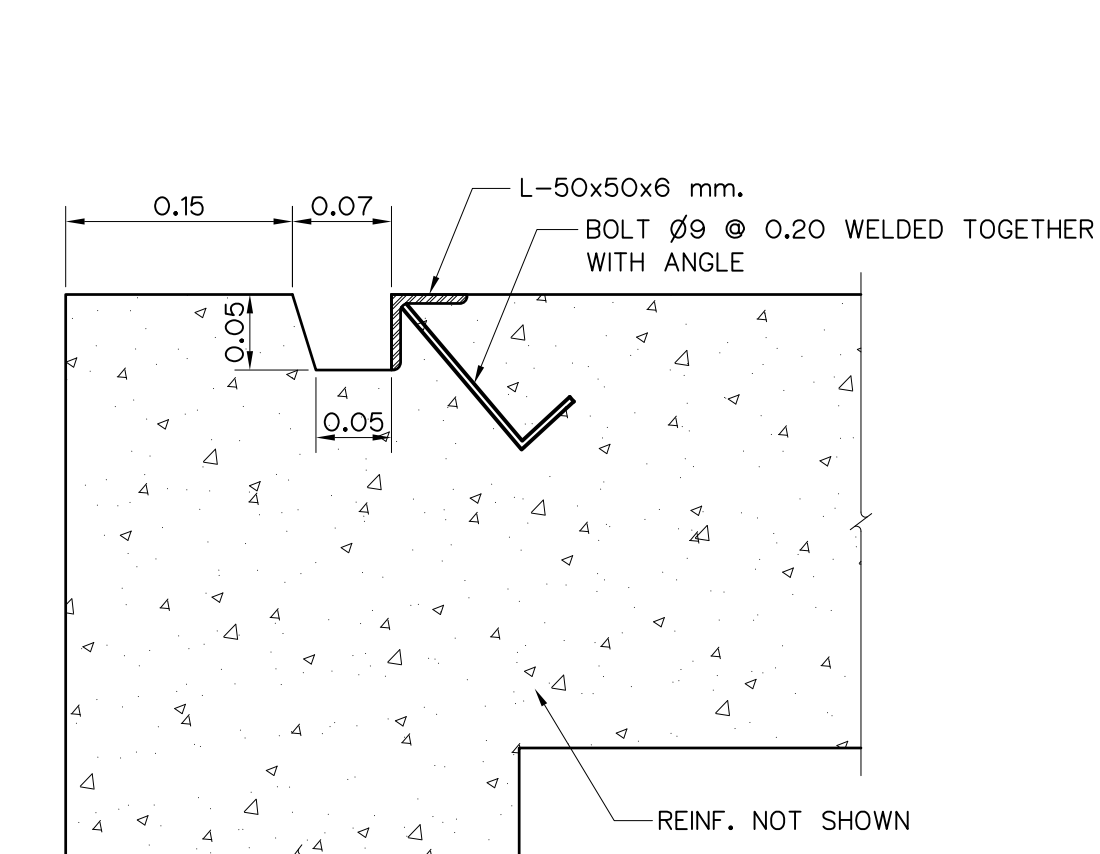
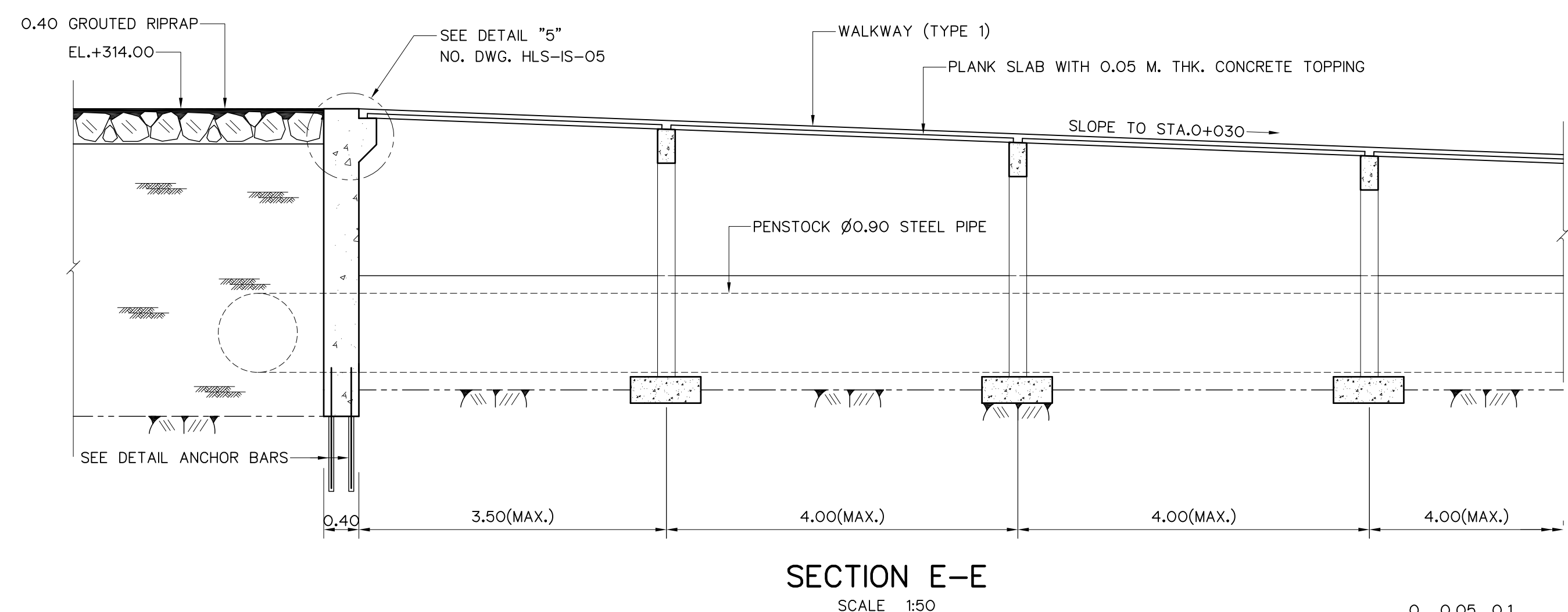
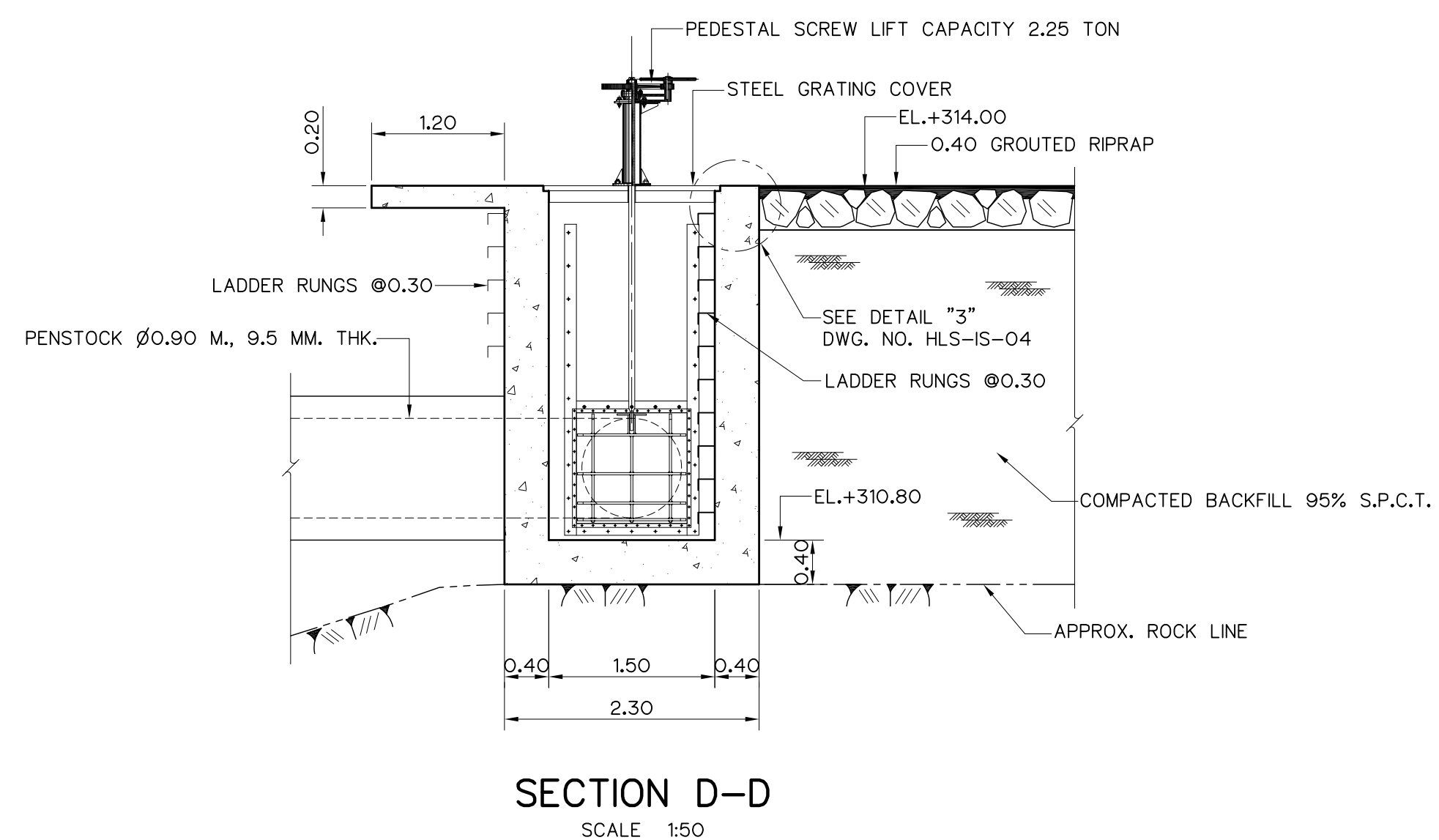
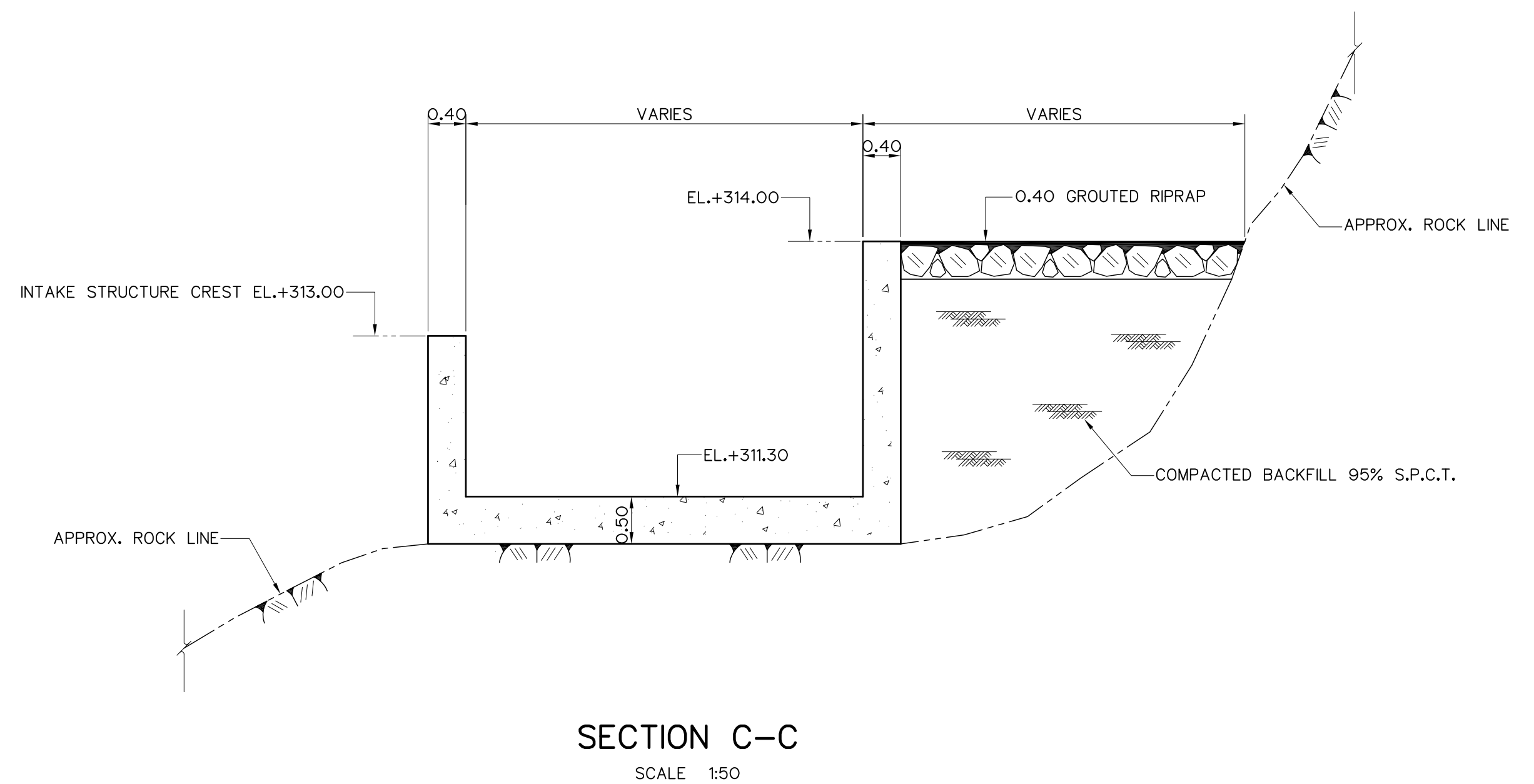
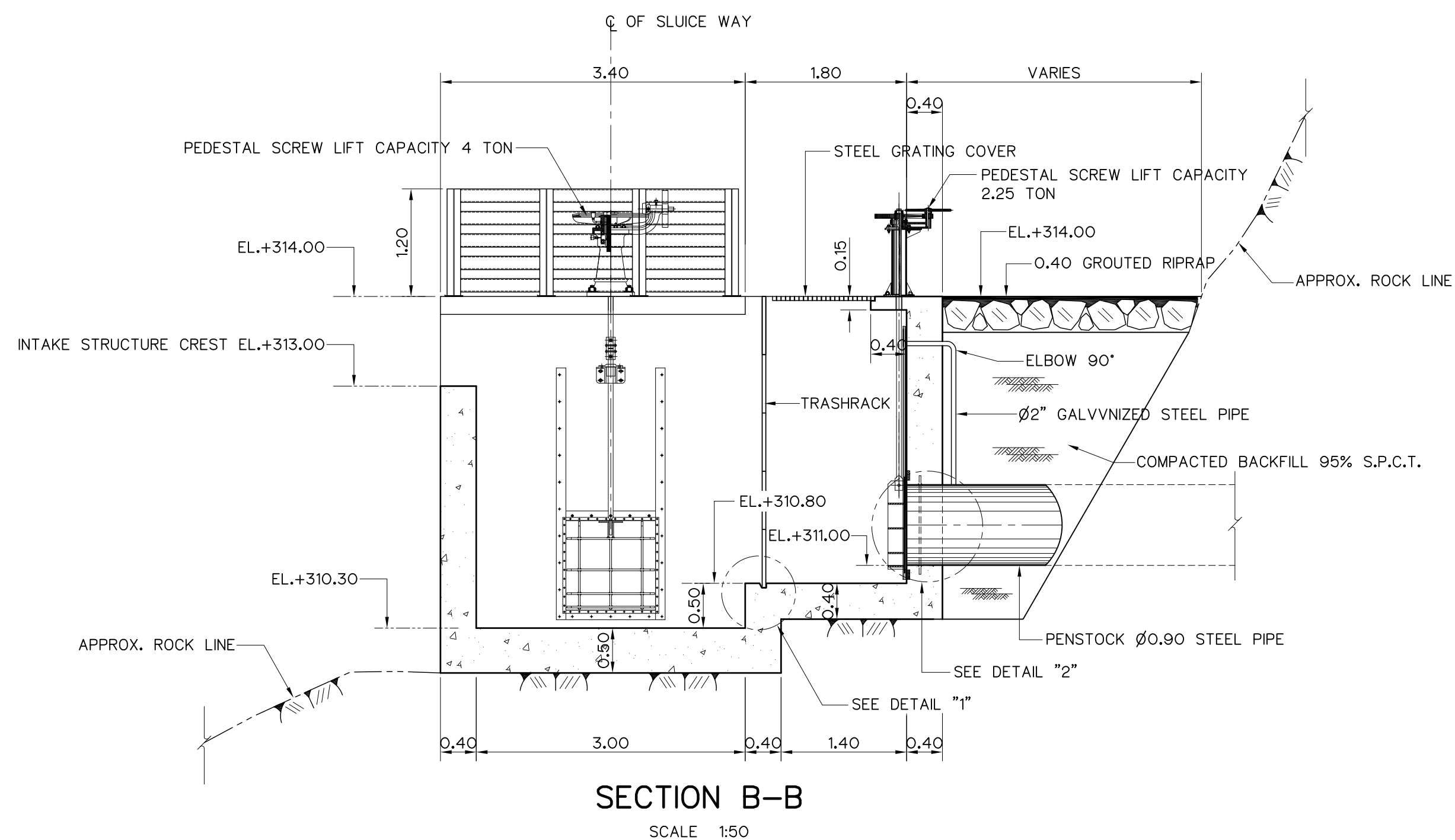
- NOTES :
- ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS, UNLESS OTHERWISE SHOWN.
 - SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. HLS-GN-03

- REFERENCE DRAWINGS :
- INTAKE STRUCTURE, GENERAL LAY-OUT HLS-IS-01
 - INTAKE STRUCTURE, SECTION B-B, C-C, D-D AND E-E HLS-IS-03



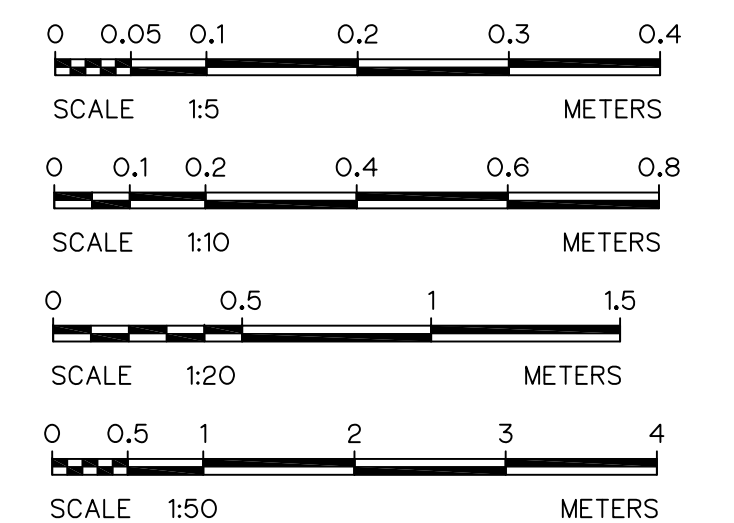
KINGDOM OF THAILAND Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY			HUIAI LAM SIN HYDROPOWER PROJECT		
ELECTRO – MECHANICAL EQUIPMENT			INTAKE STRUCTURE		
PLAN AND SECTION A-A					
FRONTIER ENGINEERING CONSULTANTS CO.,LTD.			Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY		
REVIEWED S.KITIKHAJ			SUBMITTED		
DESIGNED			RECOMMENDED		
DRAWN			APPROVED		
CHECKED			DRAWING NO.		
PROJECT MANAGER			SHEET NO.		
14/01/62			7 OF 25		

3				
2				
1				
NO.	DATE	REVISIONS	CHECKED	APPROVED
CONSULTANTS		DEDE		



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

- REFERENCE DRAWINGS :**
1. INTAKE STRUCTURE, PLAN AND SECTION A-A HLS-IS-02



KINGDOM OF THAILAND Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY			
HUAI LAM SIN HYDROPOWER PROJECT			
ELECTRO – MECHANICAL EQUIPMENT INTAKE STRUCTURE SECTION B-B, C-C, D-D, E-E AND DETAILS			
FRONTIER ENGINEERING CONSULTANTS CO.,LTD.		Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY	
DESIGNED <i>[Signature]</i> ๑๒.6651		REVIEWED S.KITIKHAJ <i>[Signature]</i>	
DRAWN <i>[Signature]</i>		SUBMITTED <i>[Signature]</i>	
CHECKED <i>[Signature]</i> ๑๒.7324		RECOMMENDED <i>[Signature]</i>	
APPROVED <i>[Signature]</i> 14/01/62		APPROVED <i>[Signature]</i>	
CONSULTANTS		DEDE	
PROJECT MANAGER		DRAWING NO. HLS-IS-03	
DATE		SHEET NO. 8 OF 25	

HORIZONTAL ALINEMENT OF HEADRACE

NO. PI.	COORDINATE		PI. - PI. (m)	DEFLECTION ANGLE (° - ' - ")	PI. STA. (km)	BEARING (N/S ° - ' - " E/W)
	N	E				
PI.1	827,364.921	598,407.056	-	-	0+000.000	-
PI.2	827,363.779	598,407.716	1.319	73°-50'-36.53"	0+001.319	S 30°-01'-30.19" E
PI.3	827,365.924	598,416.404	8.949	04°-36'-56.57"	0+010.268	N 76°-07'-53.27" E
PI.4	827,368.982	598,435.175	19.018	07°-21'-54.54"	0+029.286	N 80°-44'-49.85" E
PI.5	827,371.589	598,443.910	9.116	01°-21'-56.49"	0+038.402	N 73°-22'-55.31" E
PI.6	827,375.777	598,459.269	15.920	26°-49'-05.66"	0+054.322	N 74°-44'-51.80" E
PI.7	827,372.486	598,475.350	16.414	10°-50'-26.65"	0+070.736	S 78°-26'-02.54" E
PI.8	827,372.294	598,490.518	15.169	17°-26'-27.05"	0+085.905	S 89°-16'-29.19" E
PI.9	827,374.125	598,496.615	6.366	01°-56'-08.77"	0+092.271	N 73°-17'-03.76" E
PI.10	827,376.585	598,505.939	9.643	21°-59'-29.86"	0+101.914	N 75°-13'-12.53" E
PI.11	827,374.734	598,520.567	14.745	26°-48'-52.82"	0+116.659	S 82°-47'-17.62" E
PI.12	827,369.209	598,528.750	9.874	30°-37'-32.44"	0+126.533	S 55°-58'-24.80" E
PI.13	827,366.754	598,570.063	41.386	19°-15'-35.63"	0+167.919	S 86°-35'-57.24" E
PI.14	827,368.923	598,577.698	7.937	17°-13'-19.48"	0+175.856	N 74°-08'-27.13" E
PI.15	827,373.496	598,584.718	8.378	59°-23'-15.56"	0+184.234	N 56°-55'-07.66" E
PI.16	827,370.510	598,590.758	6.738	03°-01'-30.56"	0+190.972	S 63°-41'-36.78" E
PI.17	827,366.534	598,597.834	8.117	01°-33'-36.43"	0+199.089	S 60°-40'-06.22" E
PI.18	827,363.268	598,604.036	7.009	51°-58'-30.04"	0+206.098	S 62°-13'-42.66" E
PI.19	827,369.769	598,618.499	15.857	29°-59'-56.85"	0+221.955	N 65°-47'-47.30" E
PI.20	827,376.364	598,623.255	8.131	54°-59'-35.88"	0+230.086	N 35°-47'-50.45" E
PI.21	827,399.839	598,615.082	24.857	34°-12'-43.18"	0+254.943	N 19°-11'-45.42" W
PI.22	827,407.716	598,617.195	8.155	33°-09'-39.47"	0+263.098	N 15°-00'-57.76" E
PI.23	827,413.025	598,623.128	7.962	31°-40'-04.90"	0+271.060	N 48°-10'-37.23" E
PI.24	827,414.514	598,631.441	8.445	03°-10'-09.96"	0+279.505	N 79°-50'-42.13" E
PI.25	827,415.524	598,639.684	8.305	01°-17'-36.30"	0+287.810	N 83°-00'-52.09" E
PI.26	827,416.289	598,647.359	7.713	57°-09'-07.01"	0+295.523	N 84°-18'-28.39" E
PI.27	827,410.439	598,652.019	7.479	22°-53'-14.41"	0+303.002	S 38°-32'-24.60" E
PI.28	827,402.409	598,654.269	8.339	31°-18'-32.43"	0+311.341	S 15°-39'-10.20" E
PI.29	827,397.024	598,660.036	7.890	28°-44'-10.09"	0+319.231	S 46°-57'-42.62" E
PI.30	827,395.022	598,667.889	8.104	35°-40'-17.48"	0+327.335	S 75°-41'-52.71" E
PI.31	827,398.029	598,675.574	8.252	06°-50'-20.35"	0+335.587	N 68°-37'-49.81" E
PI.32	827,399.990	598,683.140	7.816	47°-38'-41.80"	0+343.403	N 75°-28'-10.15" E
PI.33	827,391.876	598,695.580	14.852	02°-36'-23.54"	0+358.255	S 56°-53'-08.04" E
PI.34	827,386.169	598,703.516	9.775	39°-38'-12.15"	0+368.030	S 54°-16'-44.51" E
PI.35	827,378.449	598,705.533	7.979	03°-27'-21.96"	0+376.009	S 14°-38'-32.36" E
PI.36	827,369.984	598,707.207	8.629	03°-02'-35.55"	0+384.638	S 11°-11'-10.40" E
PI.37	827,361.896	598,709.258	8.344	40°-12'-02.48"	0+392.982	S 14°-13'-45.96" E
PI.38	827,349.984	598,725.915	20.478	01°-52'-20.66"	0+413.460	S 54°-25'-48.44" E

NOTES :

- ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS, UNLESS OTHERWISE SHOWN.
- SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. HLS-GN-03
- THE ALIGNMENT OF THE PENSTOCK 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 :

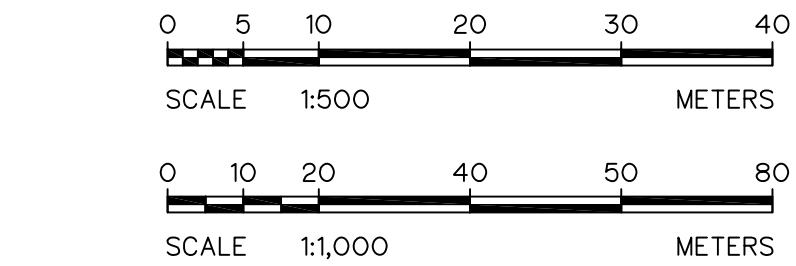
- PLAN AND PROFILE, STA. 0+400 TO STA. 0+800 HLS-PS-02

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

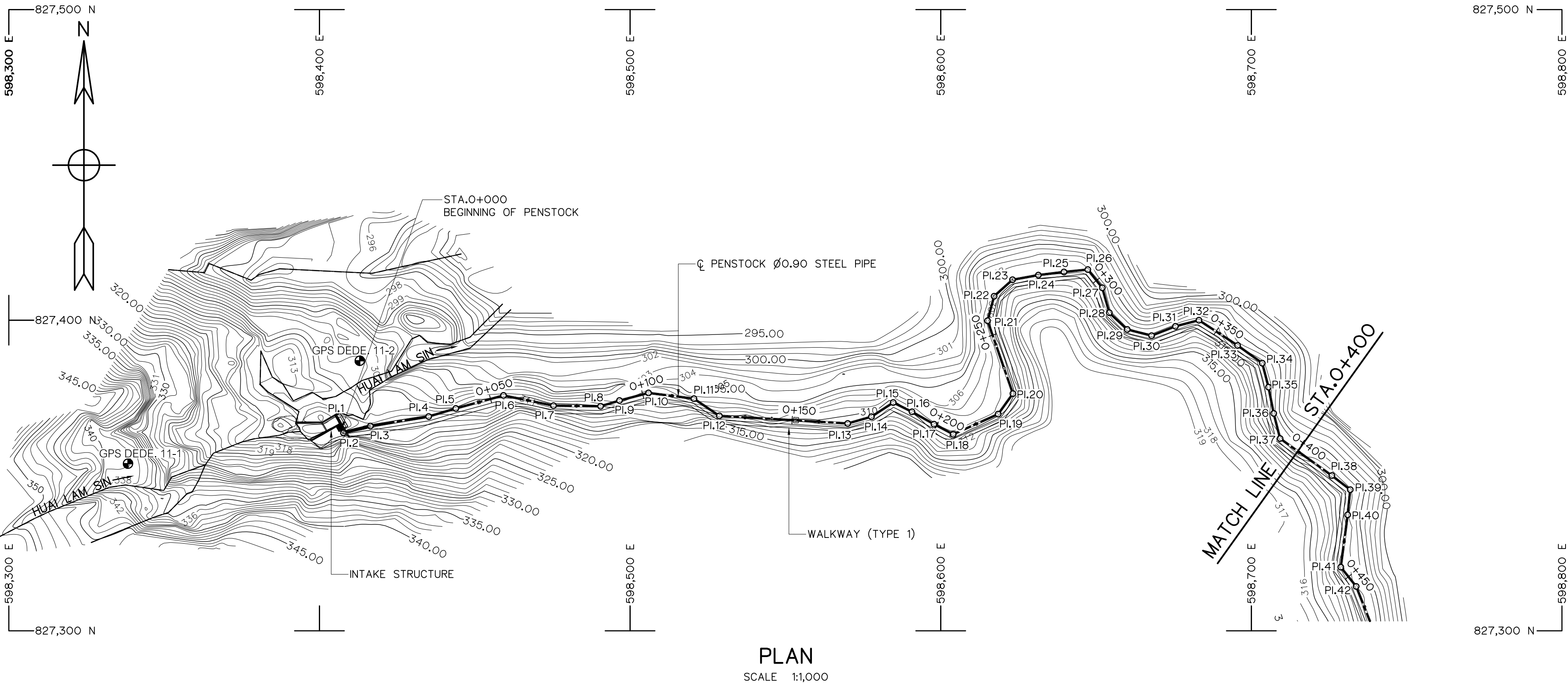
HUAI LAM SIN HYDROPOWER PROJECT

ELECTRO – MECHANICAL EQUIPMENT
PENSTOCK
PLAN AND PROFILE, STA. 0+000 TO STA. 0+400

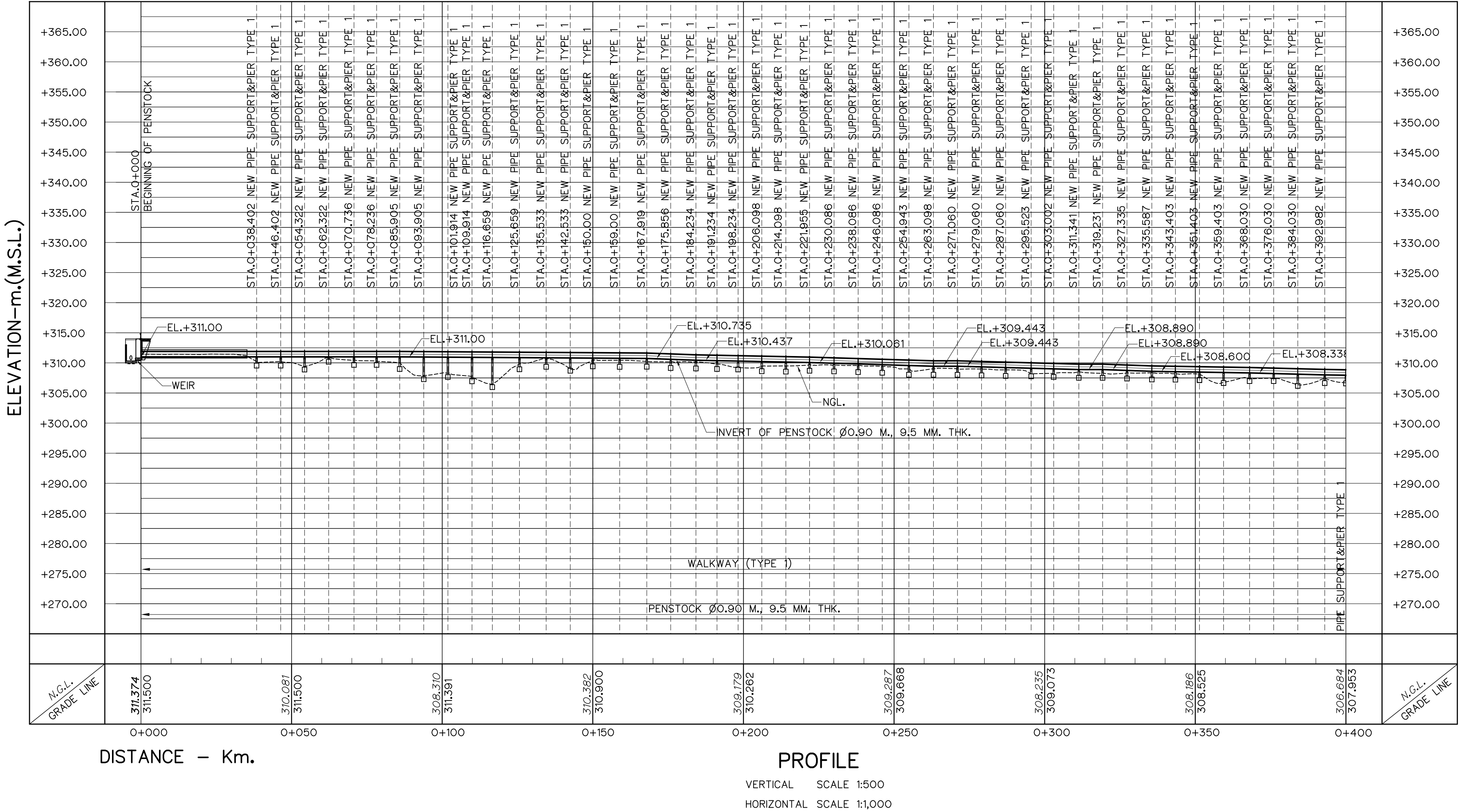
FRONTIER ENGINEERING CONSULTANTS CO.,LTD.		Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY	
DESIGNED		REVIEWED	SUBMITTED
DRAWN		RECOMMENDED	
CHECKED		APPROVED	
PROJECT MANAGER		DRAWING NO.	SHEET NO.
		HLS-PS-01	9 OF 25



3				
2				
1				
NO.	DATE	REVISIONS	CHECKED	APPROVED
CONSULTANTS		DEDE		



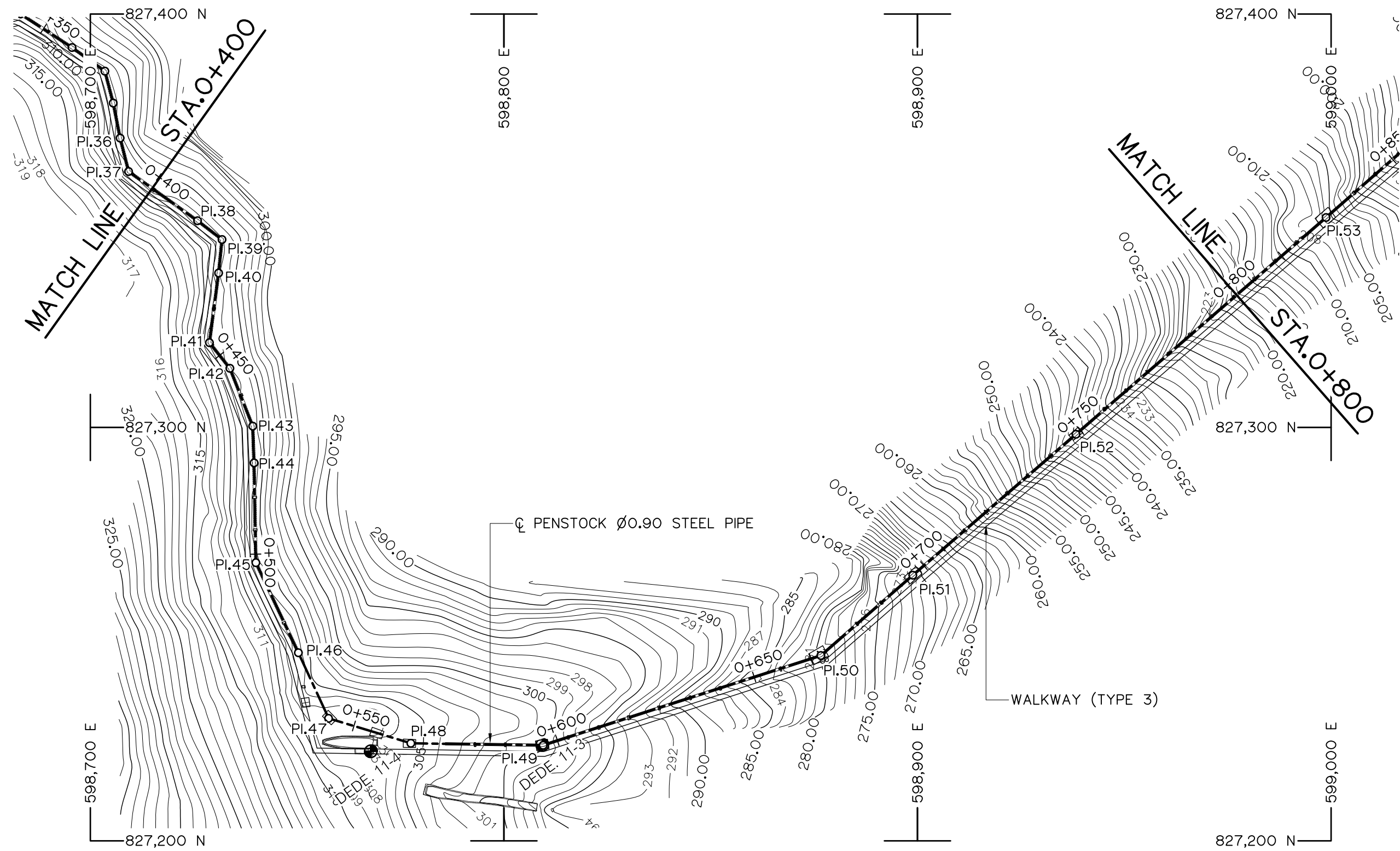
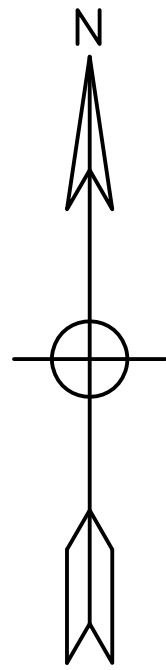
PLAN
SCALE 1:1,000



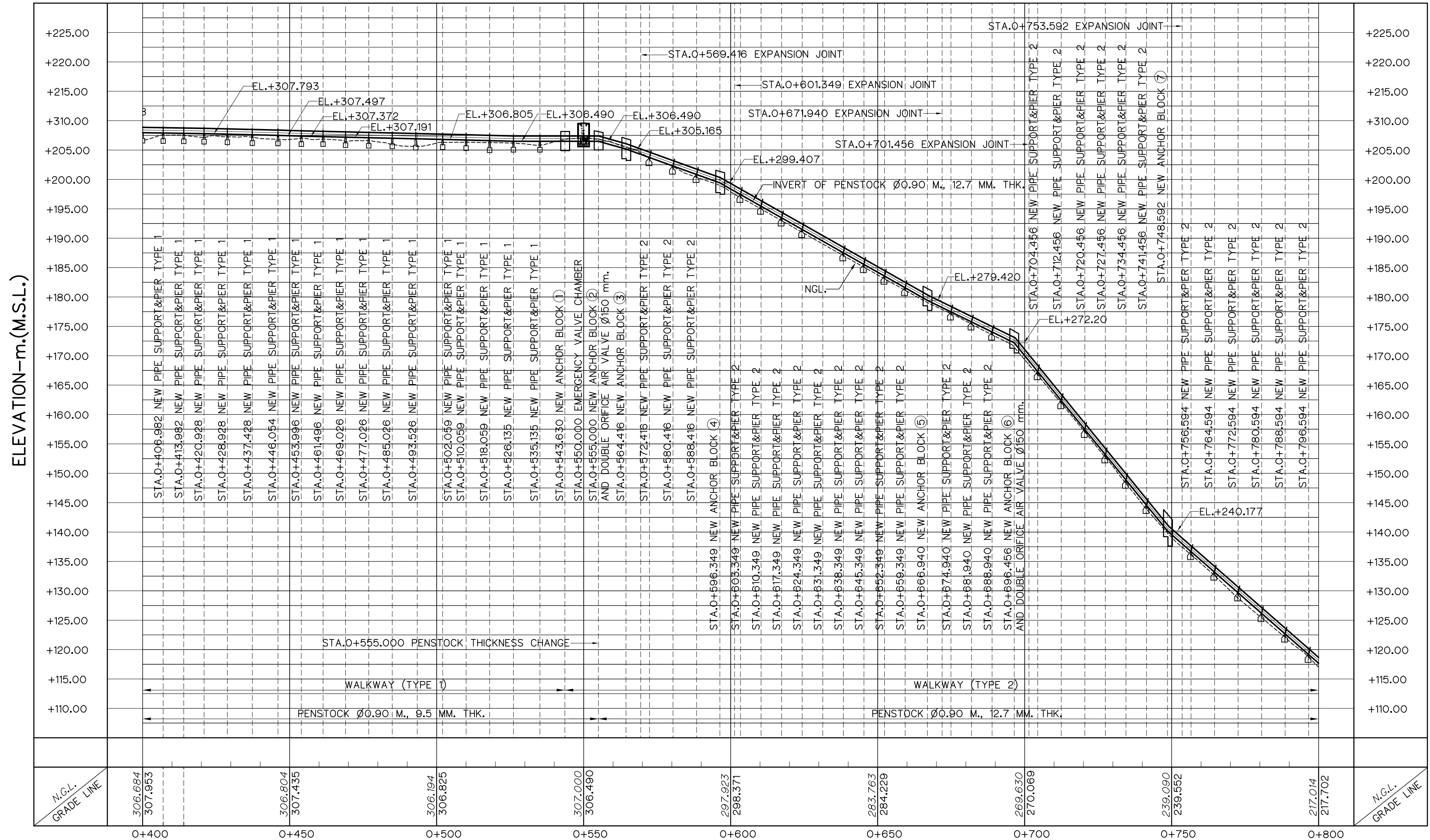
DISTANCE – Km.

PROFILE

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



PLAN
SCALE 1:1,000



DISTANCE -- Km.

PROFILE

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

HORIZONTAL ALINEMENT OF PENSTOCK

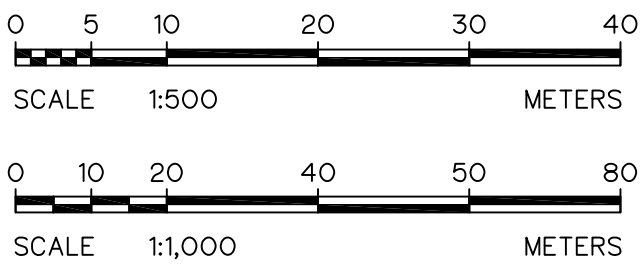
NO. PL.	COORDINATE		PI. - PI. (m)	DEFLECTION ANGLE (° - ' - ")	PI. STA. (km)	BEARING (N/S ° - ' - " E/W)
	N	E				
PI.37	827,361.896	598,709.258	8.344	40°-12'-02.48"	0+392.982	S 14°-13'-45.96"E
PI.38	827,349.984	598,725.915	20.478	01°-52'-20.66"	0+413.460	S 54°-25'-48.44"E
PI.39	827,345.444	598,731.844	7.468	58°-24'-15.16"	0+420.928	S 52°-33'-27.78"E
PI.40	827,337.348	598,731.015	8.138	01°-39'-19.56"	0+429.066	S 5°-50'-47.39"W
PI.41	827,320.505	598,728.797	16.988	46°-05'-46.96"	0+446.054	S 7°-30'-06.95"W
PI.42	827,314.298	598,733.751	7.942	17°-04'-06.28"	0+453.998	S 38°-35'-40.05"E
PI.43	827,300.316	598,739.266	15.030	19°-34'-47.91"	0+469.026	S 21°-31'-33.77"E
PI.44	827,291.428	598,739.568	8.893	00°-50'-58.11"	0+477.919	S 1°-56'-45.85"E
PI.45	827,267.292	598,740.030	24.140	24°-10'-00.20"	0+502.059	S 1°-05'-47.74"E
PI.46	827,245.519	598,750.305	24.076	10°-56'-35.31"	0+526.135	S 25°-15'-47.94"E
PI.47	827,229.638	598,757.645	17.495	48°-21'-22.88"	0+543.630	S 24°-48'-20.85"E
PI.48	827,223.617	598,777.540	20.786	15°-59'-07.95"	0+564.416	S 73°-09'-43.72"E
PI.47	827,229.638	598,757.645	17.495	48°-21'-22.88"	0+543.630	S 24°-48'-20.85"E
PI.48	827,223.617	598,777.540	20.786	15°-59'-07.95"	0+564.416	S 73°-09'-43.72"E
PI.49	827,223.142	598,809.469	31.933	18°-45'-26.90"	0+596.349	S 89°-08'-51.67"E
PI.50	827,244.844	598,876.639	70.589	23°-14'-41.26"	0+666.938	N 72°-05'-41.42"E
PI.51	827,264.268	598,898.866	29.518	00°-19'-38.72"	0+696.456	N 48°-51'-00.17"E
PI.52	827,298.350	598,938.319	52.136	00°-06'-01.70"	0+748.592	N 49°-10'-38.89"E
PI.53	827,350.775	598,998.791	80.033	00°-15'-03.29"	0+828.625	N 49°-04'-37.19"E

NOTES :

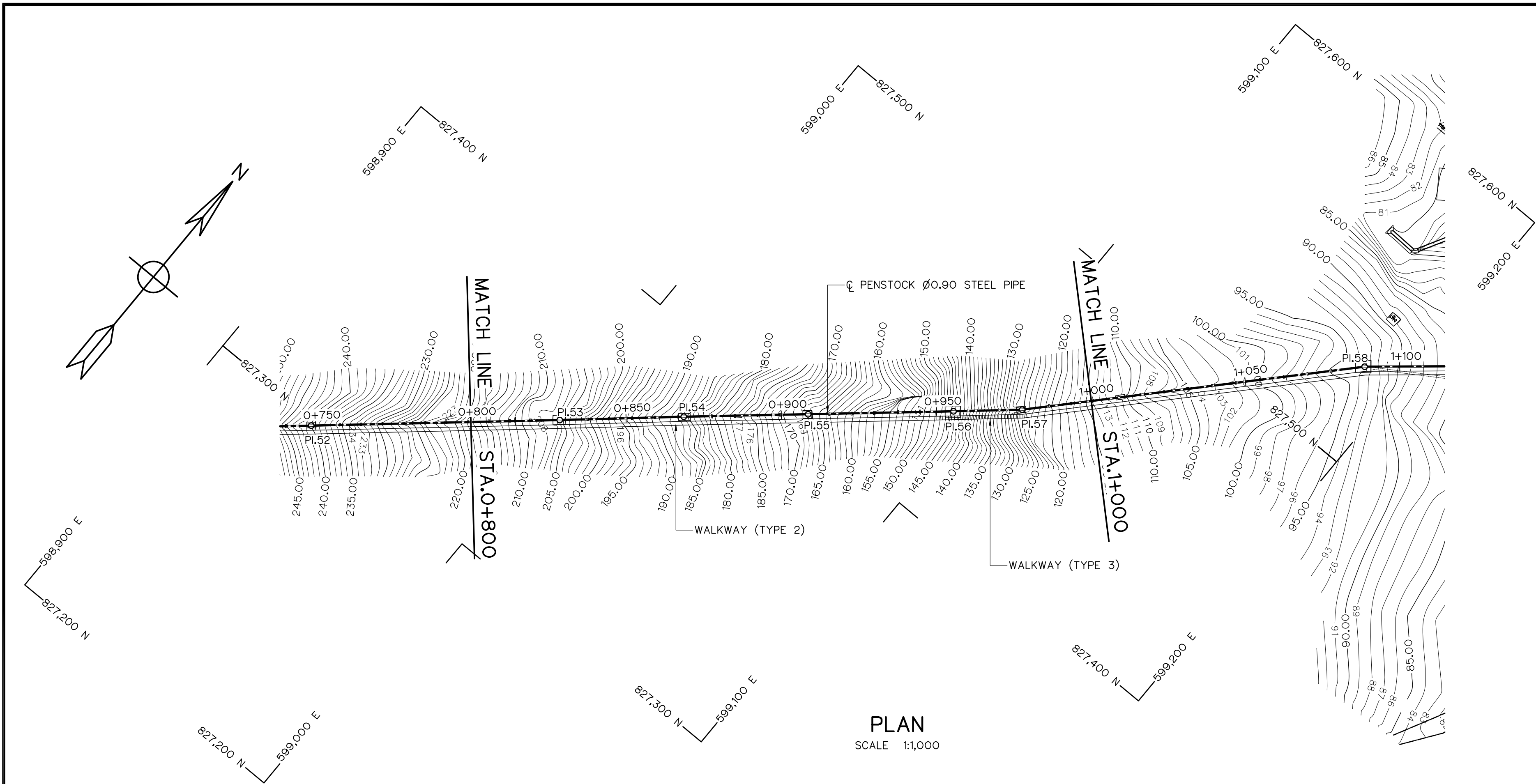
- ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS, UNLESS OTHERWISE SHOWN.
- SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. HLS-GN-03
- THE ALIGNMENT OF THE PENSTOCK AND RELATED STRUCTURES SHALL BE CHECK AND CORRECTED BY THE CONTRACTOR TO SUIT THE FIELD CONDITIONS AND SHALL BE SUBMITTED TO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

REFERENCE DRAWINGS :

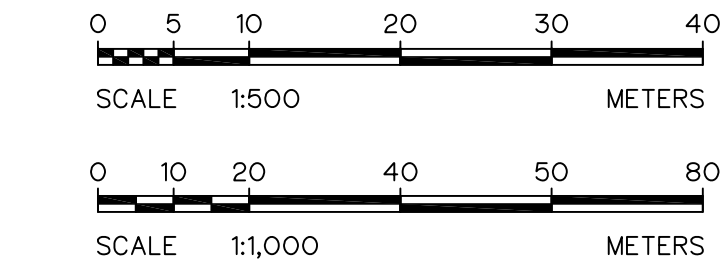
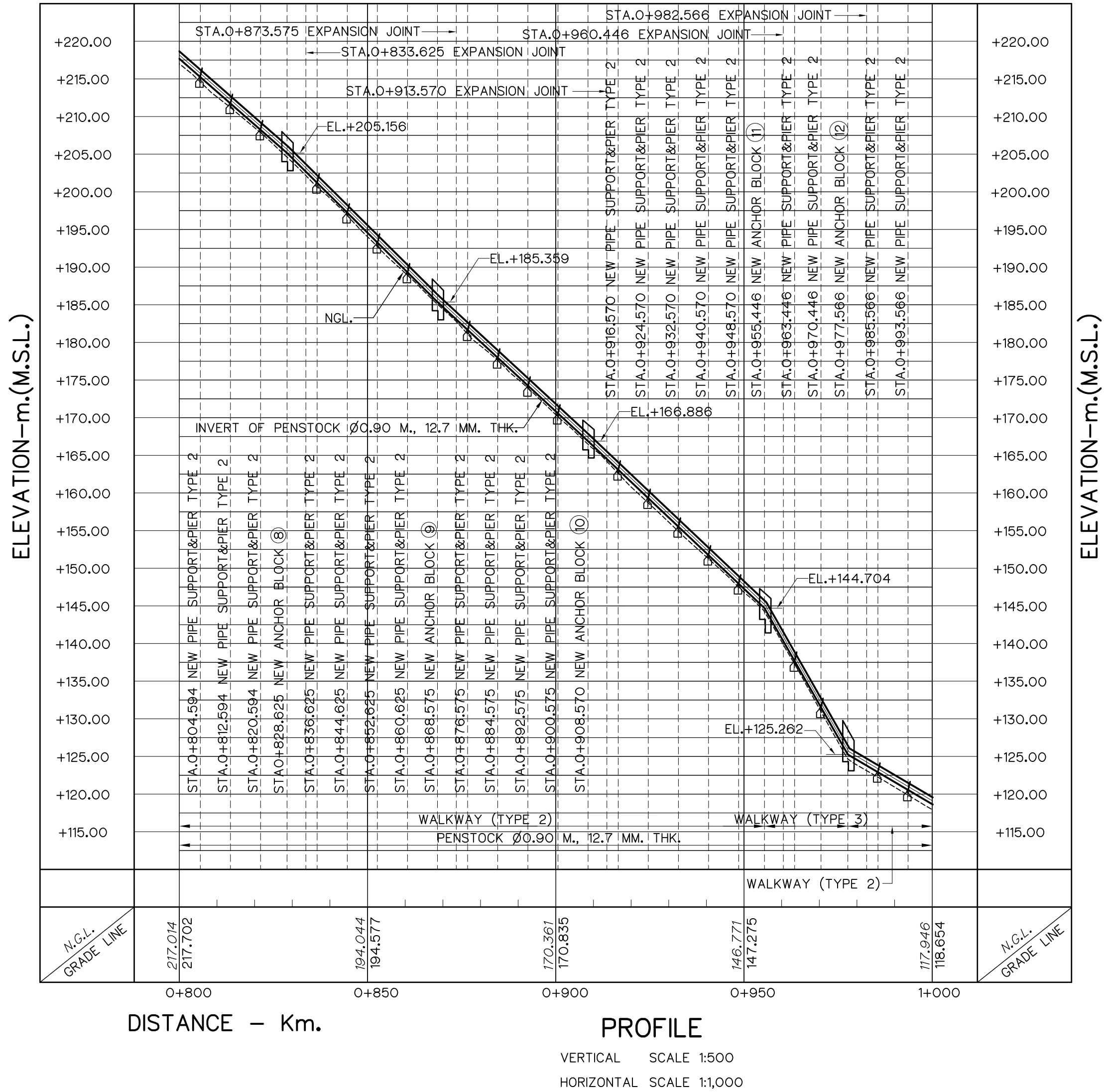
- PLAN AND PROFILE, STA. 0+000 TO STA. 0+400 HLS-PS-01
- PLAN AND PROFILE, STA. 0+800 TO STA. 1+000 HLS-PS-03



KINGDOM OF THAILAND Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY			
HUIAI LAM SIN HYDROPOWER PROJECT			
ELECTRO - MECHANICAL EQUIPMENT PENSTOCK PLAN AND PROFILE, STA. 0+400 TO STA. 0+800			
FRONTIER ENGINEERING CONSULTANTS CO.,LTD.		Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY	
DESIGNED		SUBMITTED	
DRAWN		RECOMMENDED	
CHECKED		APPROVED	
CONSULTANTS		DEDE	
PROJECT MANAGER		DATE	
14/01/62		DRAWING NO.	
		HLS-PS-02	
		SHEET NO.	
		10 OF 25	



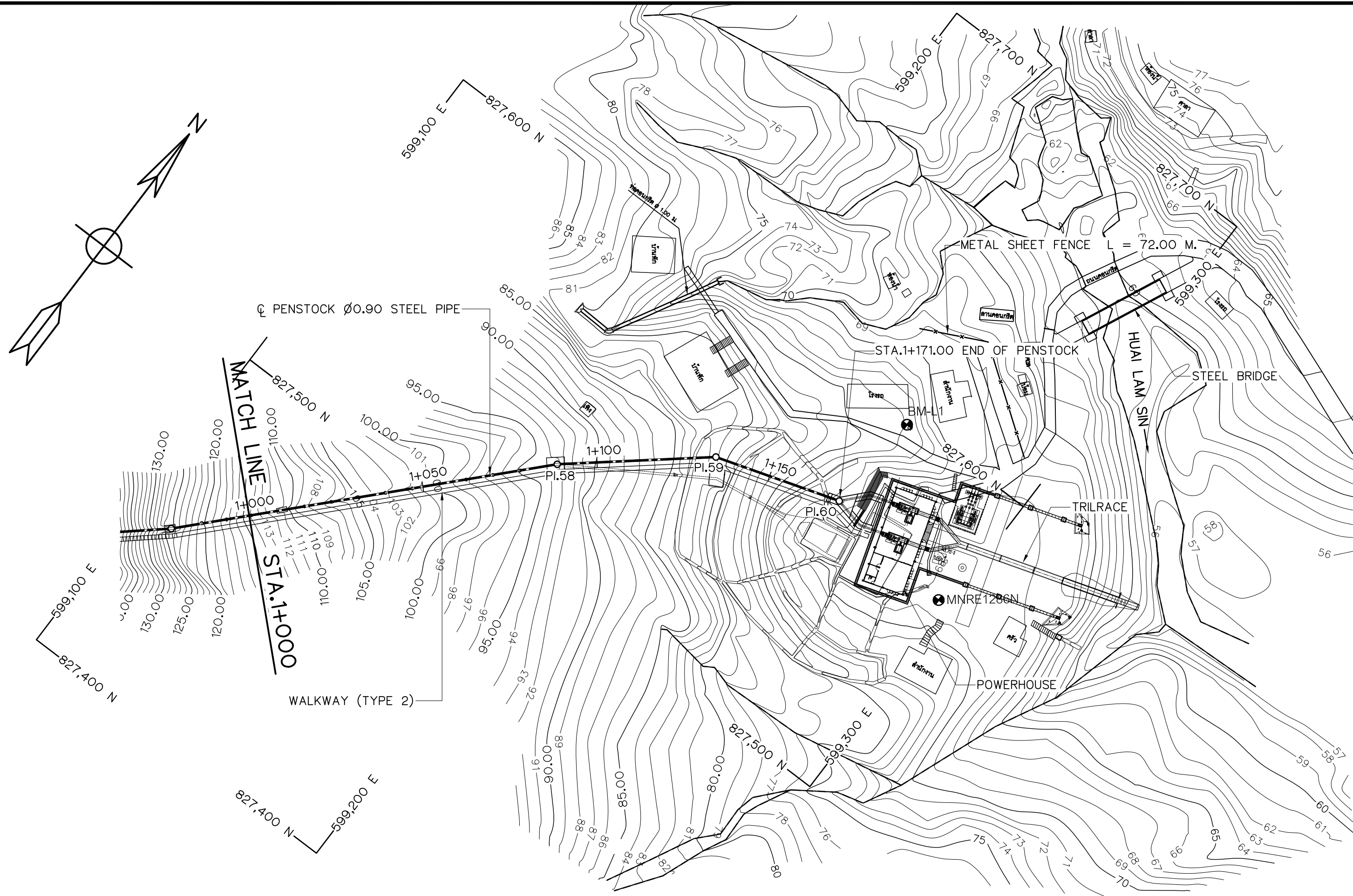
NO. PI.	COORDINATE		PI. - PI. (m)	DEFLECTION ANGLE (° - ' - ")	PI. STA. (km)	BEARING (N/S ° - ' - " E/W)
	N	E				
PI.52	827,298.350	598,938.319	52.136	00°-06'-01.70"	0+564.416	N 49°-10'-38.89" E
PI.53	827,350.775	598,998.791	80.033	00°-15'-03.29"	0+828.625	N 49°-04'-37.19" E
PI.54	827,377.076	599,028.862	39.950	00°-23'-19.14"	0+868.575	N 48°-49'-33.90" E
PI.55	827,403.202	599,059.145	39.995	00°-00'-09.70"	0+908.570	N 49°-12'-53.03" E
PI.56	827,433.824	599,094.636	46.876	00°-11'-25.30"	0+955.446	N 49°-12'-43.33" E
PI.57	827,448.330	599,111.336	22.120	05°-48'-44.46"	0+977.566	N 49°-01'-18.03" E
PI.58	827,529.328	599,187.423	111.130	06°-51'-24.99"	1+088.696	N 43°-12'-33.58" E
PI.59	827,558.281	599,222.009	45.105	22°-14'-02.16"	1+133.801	N 50°-03'-58.56" E



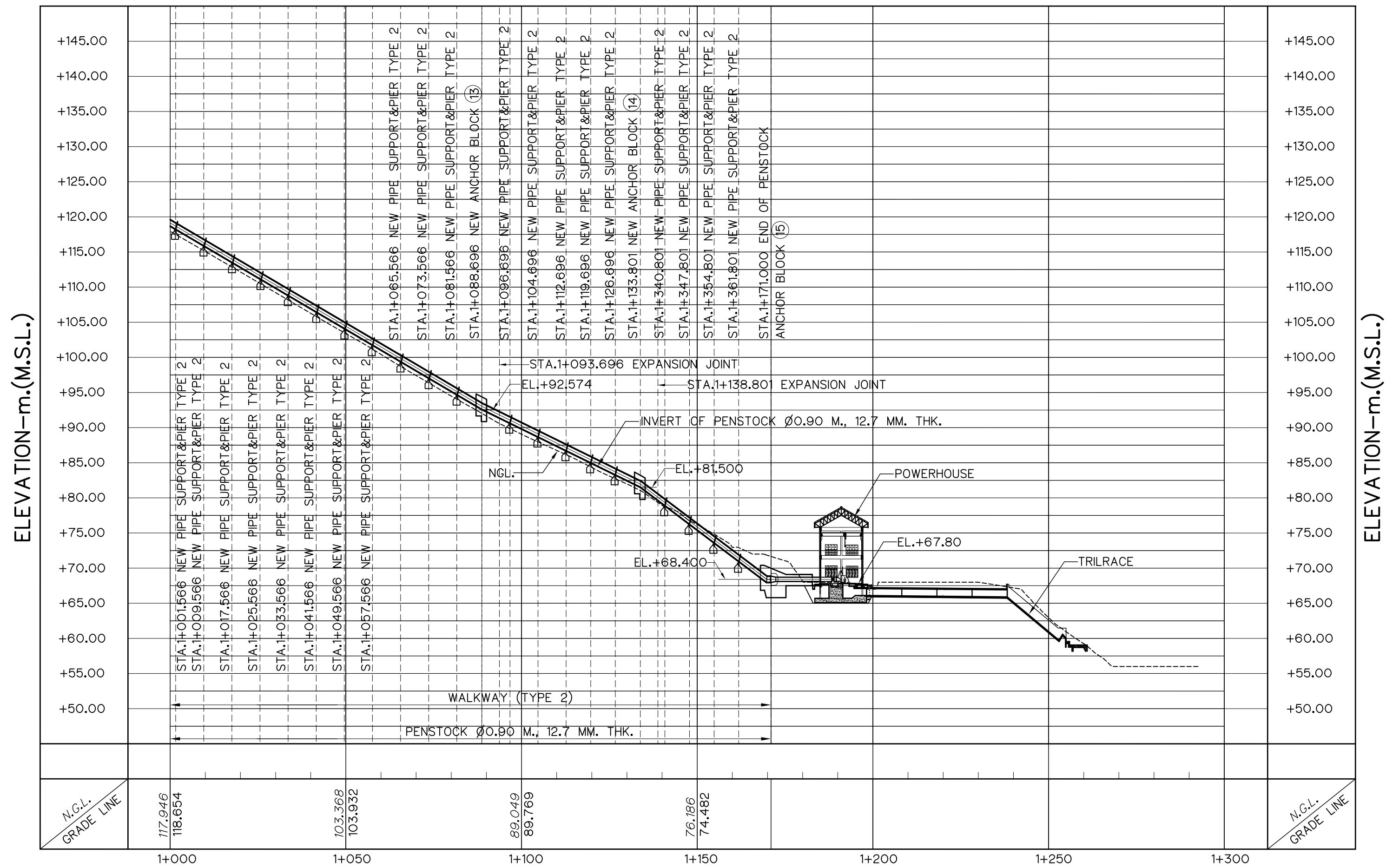
- NOTES :
- ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS. UNLESS OTHERWISE SHOWN.
 - SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. HLS-GN-03
 - THE ALIGNMENT OF THE PENSTOCK AND RELATED STRUCTURES SHALL BE CHECK AND CORRECTED BY THE CONTRACTOR TO SUIT THE FIELD CONDITIONS AND SHALL BE SUBMITTED TO DEDE'S FIELD ENGINEER FOR APPROVAL

- REFERENCE DRAWINGS :
- PLAN AND PROFILE, STA. 0+400 TO STA. 0+800 HLS-PS-02
 - PLAN AND PROFILE, STA. 1+000 TO STA. 1+171.00 HLS-PS-04

KINGDOM OF THAILAND Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY	
HUAI LAM SIN HYDROPOWER PROJECT	
ELECTRO - MECHANICAL EQUIPMENT PENSTOCK PLAN AND PROFILE, STA. 0+800 TO STA. 1+000	
FRONTIER ENGINEERING CONSULTANTS CO.,LTD.	Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY
REVIEWED S.KITIKHAJ	REVIEWED S.KITIKHAJ
DESIGNED	SUBMITTED
DRAWN	RECOMMENDED
CHECKED	APPROVED
PROJECT MANAGER	DRAWING NO. HLS-PS-03
DATE 14/01/62	SHEET NO. 11 OF 25



PLAN
SCALE 1:1,000



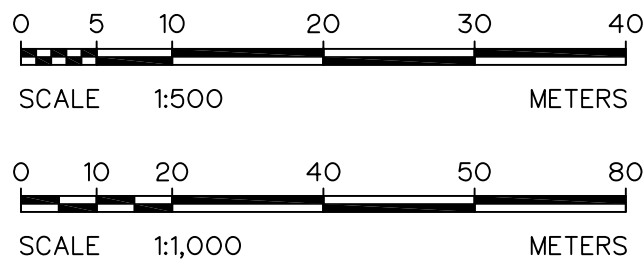
PROFILE
VERTICAL SCALE 1:500
HORIZONTAL SCALE 1:1,000

HORIZONTAL ALINEMENT OF PENSTOCK

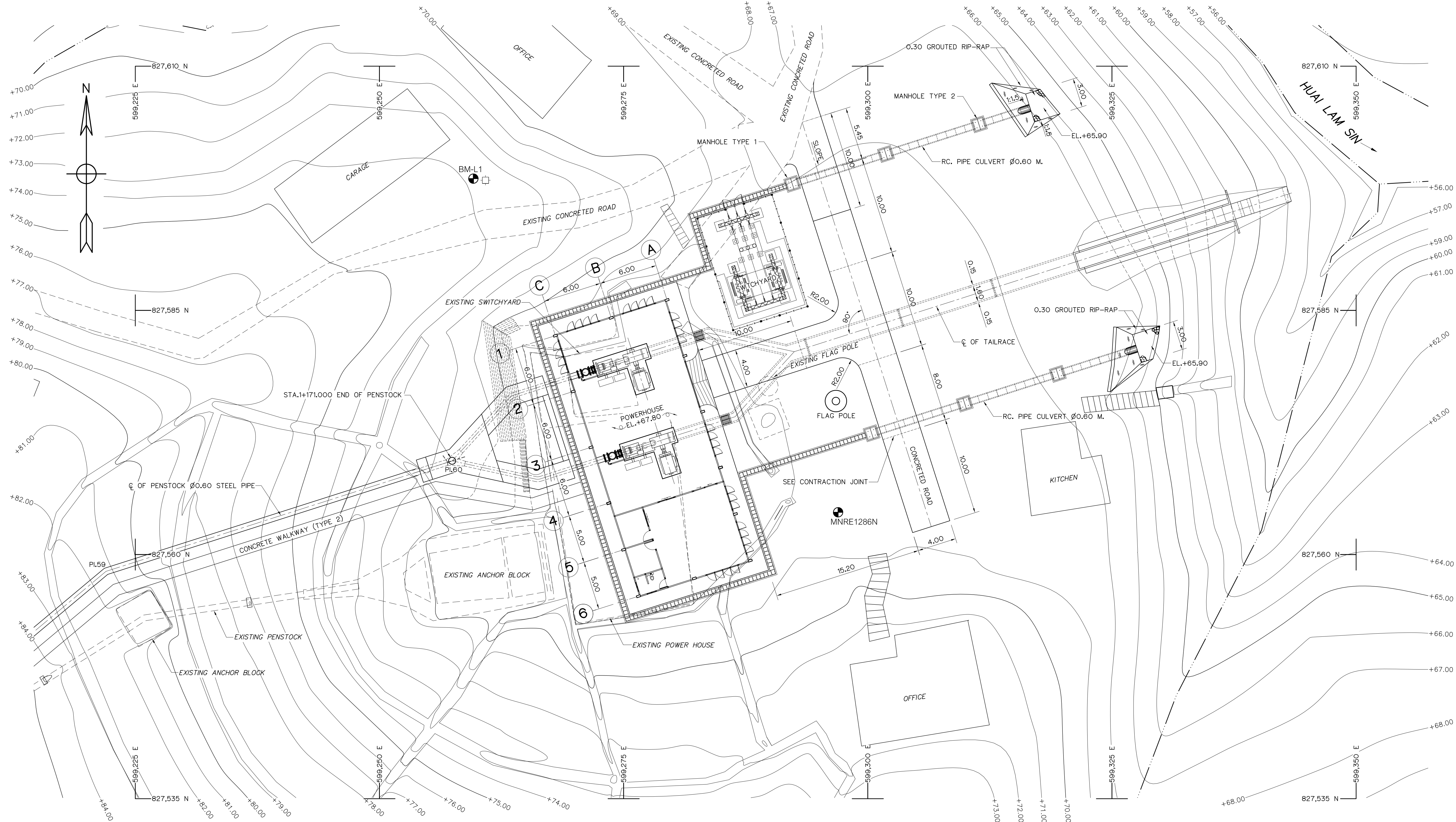
NO. PL	COORDINATE		PL. - PL. (m)	DEFLECTION ANGLE (° - ' - ")	PL. STA. (km)	BEARING (N/S ° - ' - " E/W)
	N	E				
PL57	827,448.330	599,111.336	22.120	05°-48'-44.46"	0+977.566	N 49°-01'-18.03" E
PL58	827,529.328	599,187.423	111.130	06°-51'-24.99"	1+088.696	N 43°-12'-33.58" E
PL59	827,558.281	599,222.009	45.105	22°-14'-02.16"	1+133.801	N 50°-03'-58.56" E
PL60	827,569.591	599,257.447	37.199	-	1+171.000	N 72°-17'-58.46" E

- NOTES :
- ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS, UNLESS OTHERWISE SHOWN.
 - SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. HLS-GN-03
 - THE ALIGNMENT OF THE PENSTOCK 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 :
- PLAN AND PROFILE, STA. 0+800 TO STA. 1+000 HLS-PS-03



3						FRONTIER ENGINEERING CONSULTANTS CO.,LTD.	Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY
2						DESIGNED	REVIEWED S.KITIKHAJ
1						DRAWN	SUBMITTED
NO.	DATE	REVISIONS	CHECKED	APPROVED		CHECKED	RECOMMENDED
						APPROVED	
						PROJECT MANAGER	DRAWING NO.
							SHEET NO.



GENERAL LAY-OUT
SCALE 1:200

NOTES :

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS, UNLESS OTHERWISE SHOWN
2. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. HLS-GN-03
3. THE CONTRACTOR SHALL CHECK THE STABILITY OF THE EXCAVATION LINE. IF IT IS NOT SUFFICIENTLY STABLE, THE CONTRACTOR SHALL SUBMIT A REPORT TO THE PROJECT ENGINEER FOR CONSIDERING THE WAY TO IMPROVE ITS STABILITY.
4. FOR THE DETAILS OF THE STABILITY OF THE EXCAVATION LINE, SEE DWG. NO. HLS-PH-02

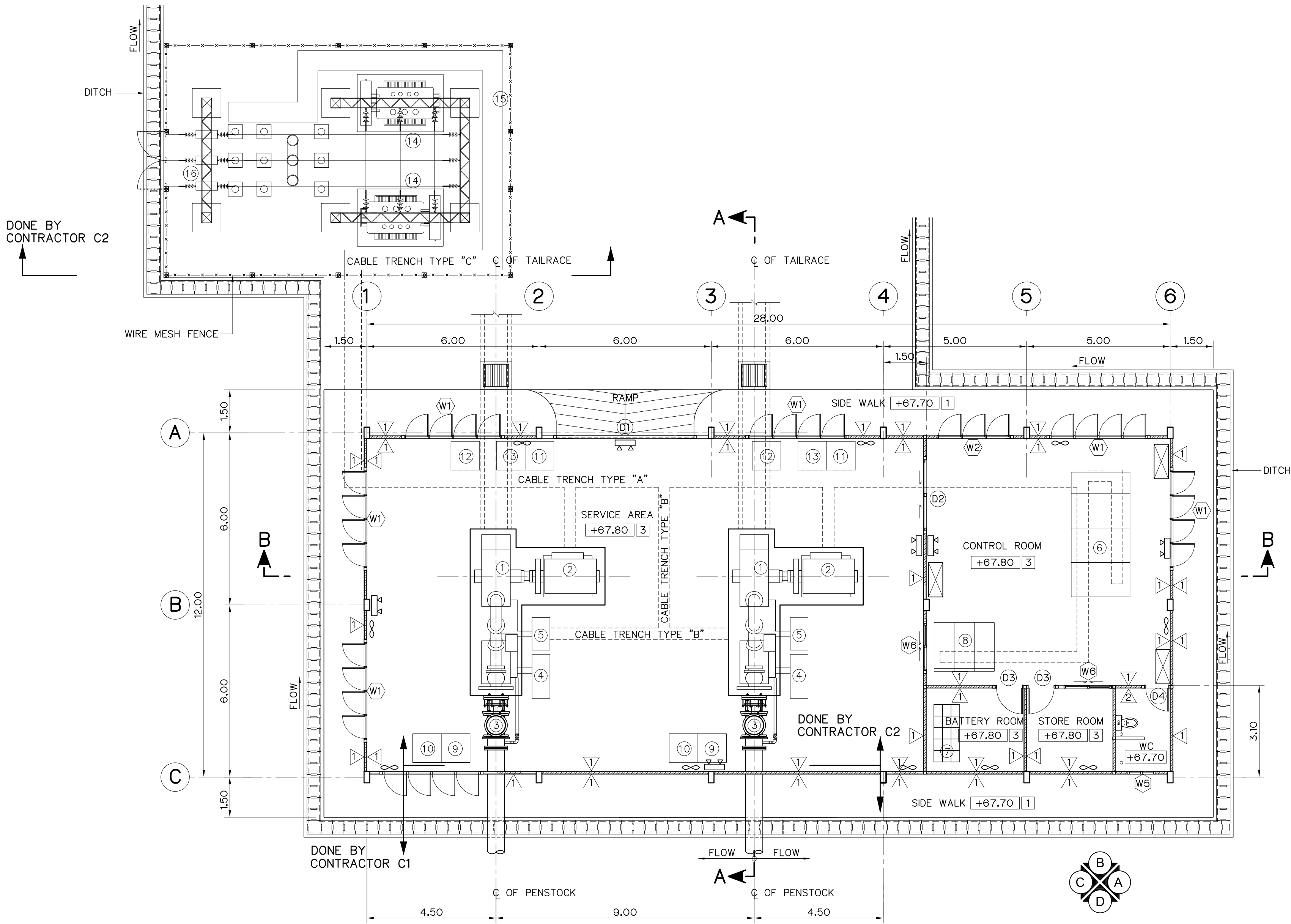
REFERENCE DRAWINGS :

- | | |
|-----------------------------------|-----------|
| 1. POWERHOUSE, PLAN AND ROOF PLAN | HLS-PH-02 |
| 2. POWERHOUSE, ELEVATIONS | HLS-PH-03 |
| 3. POWERHOUSE, SECTIONS | HLS-PH-04 |

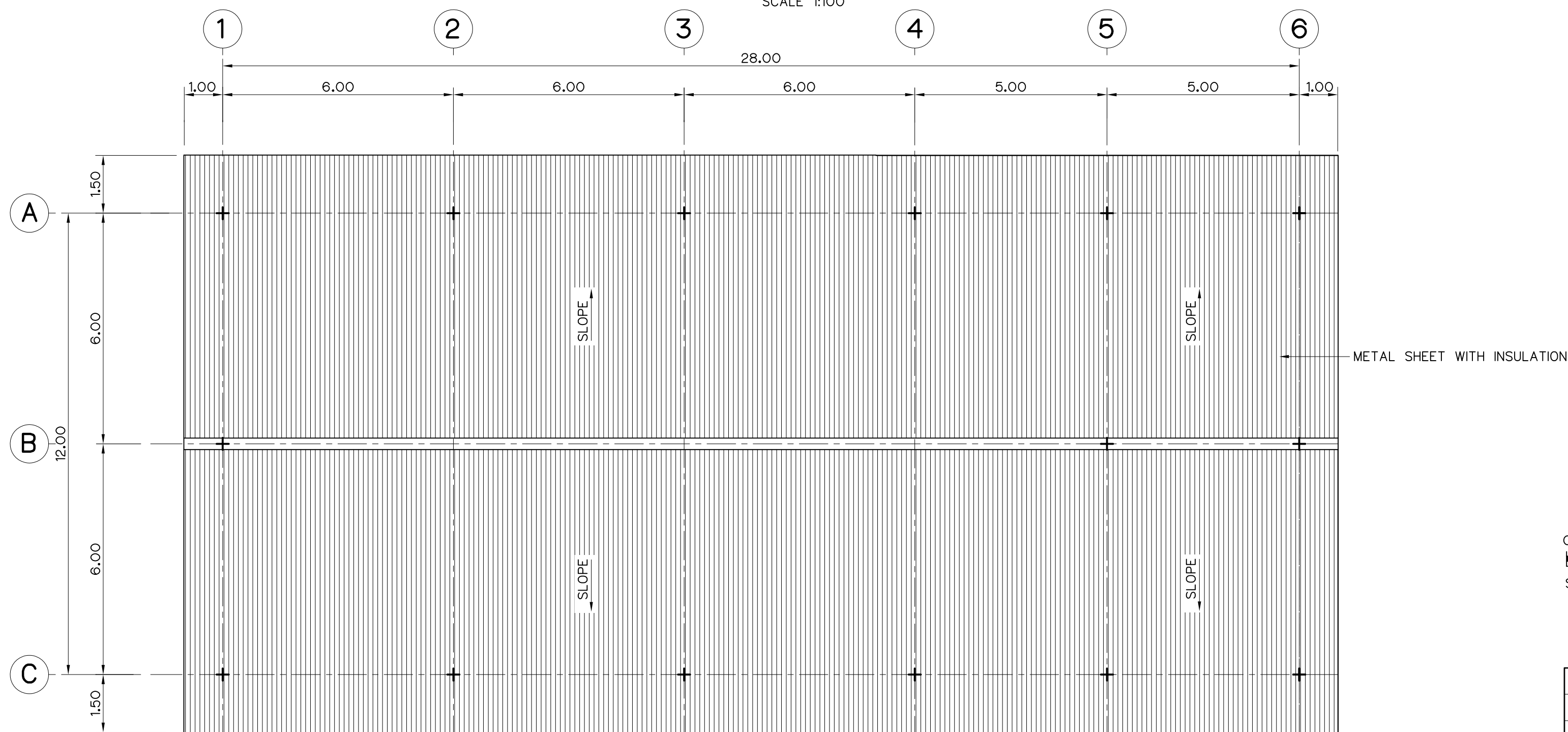


3				
2				
1				
NO.	DATE	REVISIONS	CHECKED	APPROVED
		CONSULTANTS	DEDE	

 KINGDOM OF THAILAND Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY	
HUA I LAM SIN HYDROPOWER PROJECT	
ELECTRO – MECHANICAL EQUIPMENT POWERHOUSE GENERAL LAY-OUT	
FRONTIER ENGINEERING CONSULTANTS CO., LTD.	Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY
REVIEWED S.KITIKHAJ	REVIEWED S.KITIKHAJ
DESIGNED	SUBMITTED
DRAWN	RECOMMENDED
CHECKED	APPROVED
PROJECT MANAGER	DATE 14/01/62
DRAWING NO. HLS-PH-01	SHEET NO. 13 OF 25



PLAN
SCALE 1:100



ROOF PLAN
SCALE 1:100

DESCRIPTION :

- 1 PELTON TURBINE
- 2 SYNCHRONOUSE GENERATOR
- 3 INLET VALVE AND BYBASS VALVE
- 4 PRESSURE OIL EQUIPMENT
- 5 GOVERNOR AND TURBINE CONTROL PANEL
- 6 MAIN CONTROL SWITCHBOARD
- 7 BATTERRIES AND RACKS
- 8 AC AND DC SWITCHBOARD AND BATTERY CHARGER CUBICLE
- 9 OIL PRESSURE TANK
- 10 OIL SUMP TANK WITH OIL PUMP SETS
- 11 NGR CUBICLE
- 12 AVR CUBICLE
- 13 GENERATOR DISCONNECTING SWITCH CUBICLE
- 14 MAIN TRANSFORMER
- 15 SWICTHYARD FENCE
- 16 TAKE OFF STRUCTURE

SYMBOLS :

- ∞ EXHAUST FAN Ø10"
- ⊠ AIR CONDITIONING
- ⌞ EMERGENCY LAMP

FLOOR FINISH SYMBOLS :

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

WALL FINISH SYMBOLS :

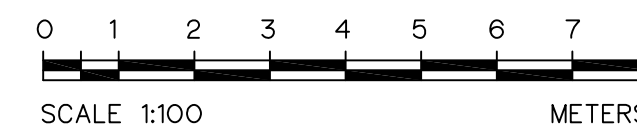
- 1 CEMENT PLASTER
- 2 8"x8" CERAMIC WALL TILES

NOTES :

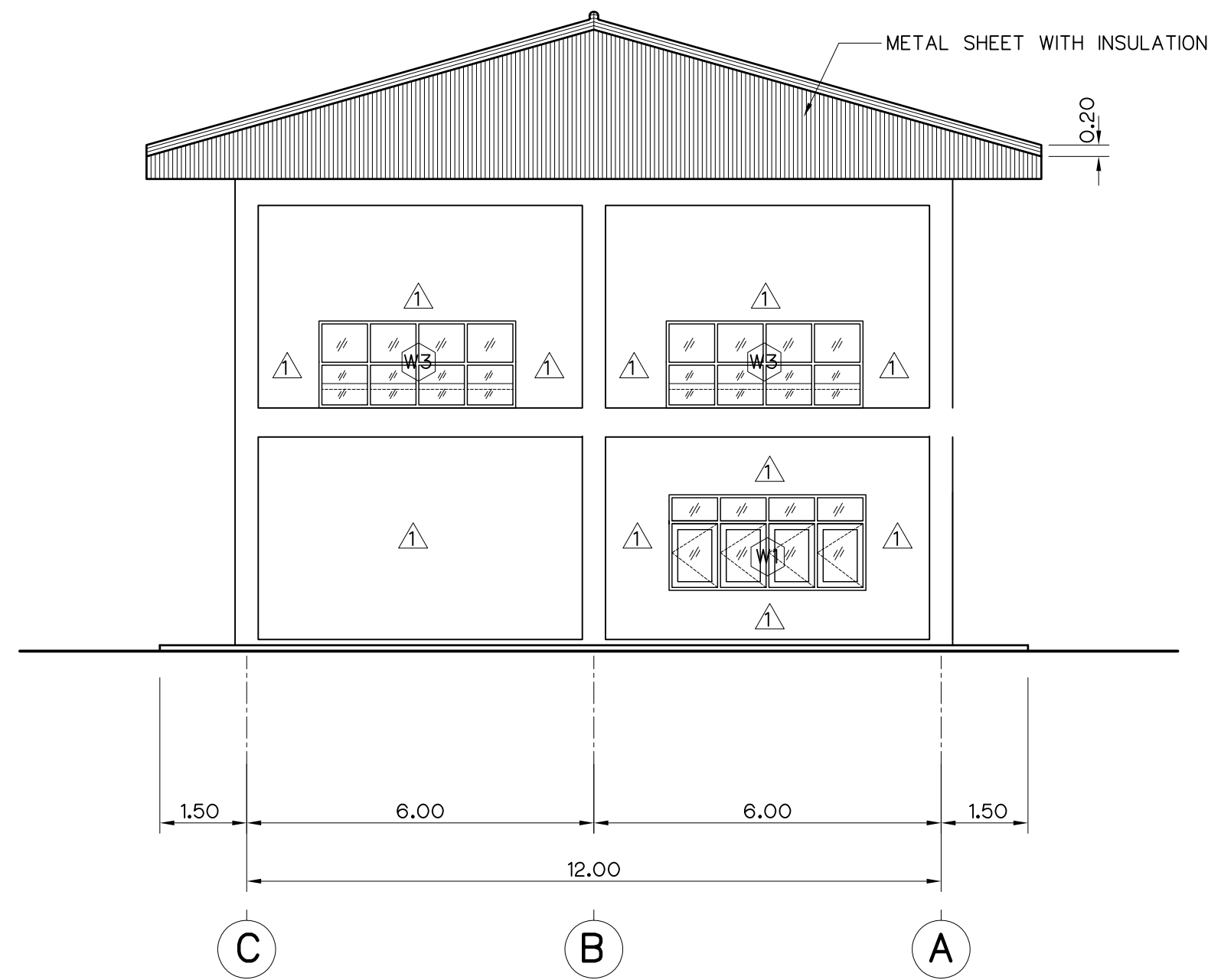
1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS, UNLESS OTHERWISE SHOWN.
2. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. HLS-GN-03
3. CONTRACT C1 OF INCLUDE PENSTOCK BEYOND POWERHOUSE WALL 1.00 M. (INCLUDE FLANGE)
4. ALL OF CABLE TRENCH TYPE "C" (INCLUDE INSIDE SWITCHYARD FENCE) SHALL BE DONE BY CONTRACT C1.

REFERENCE DRAWINGS :

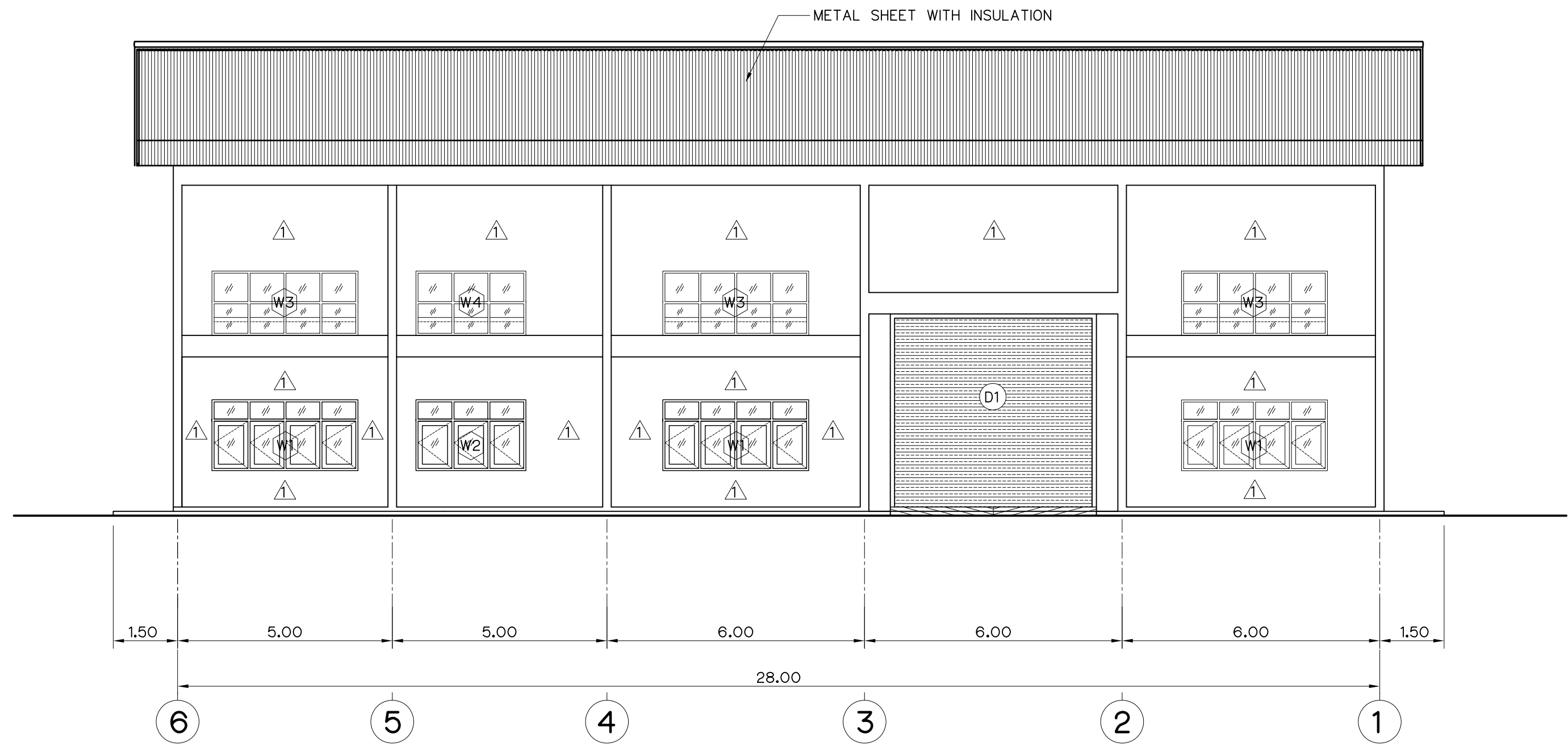
- | | |
|--------------------------------|-----------|
| 1. POWERHOUSE, GENERAL LAY-OUT | HLS-PH-01 |
| 2. POWERHOUSE, ELEVATIONS | HLS-PH-03 |
| 3. POWERHOUSE, SECTIONS | HLS-PH-04 |



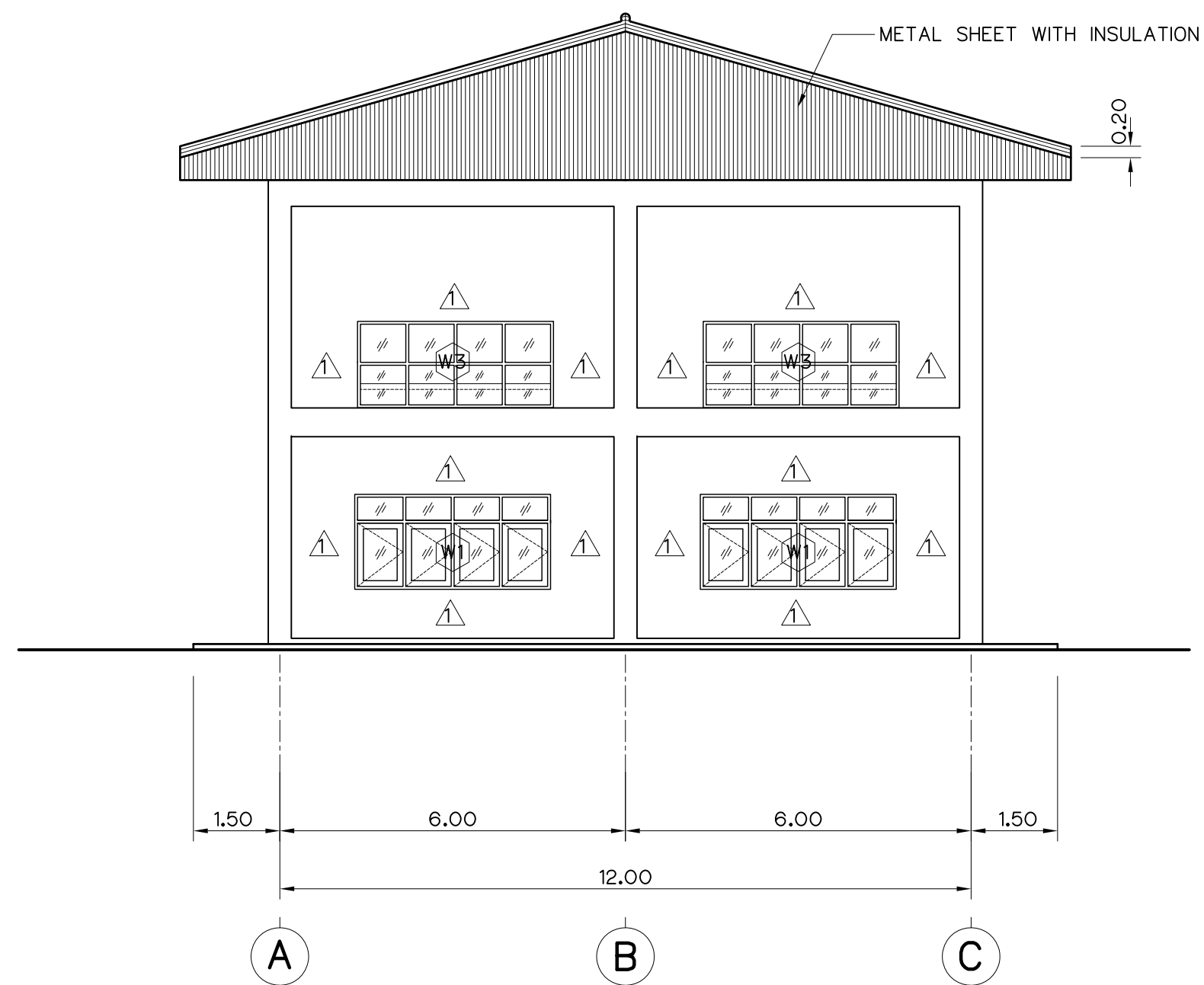
3						FRONTIER ENGINEERING CONSULTANTS CO.,LTD.	REVIEWED S.KITIKHAJ <i>S.K.</i>
2						DESIGNED <i>[Signature]</i> 22.6651	SUBMITTED <i>[Signature]</i>
1						DRAWN <i>[Signature]</i>	RECOMMENDED <i>[Signature]</i>
NO.	DATE	REVISIONS	CHECKED	APPROVED		CHECKED <i>[Signature]</i> 22.7324	APPROVED <i>[Signature]</i>
CONSULTANTS			DEDE		<i>[Signature]</i> 14/01/62	DRAWING NO. HLS-PH-02	SHEET NO. 14 OF 25
					PROJECT MANAGER	DATE	



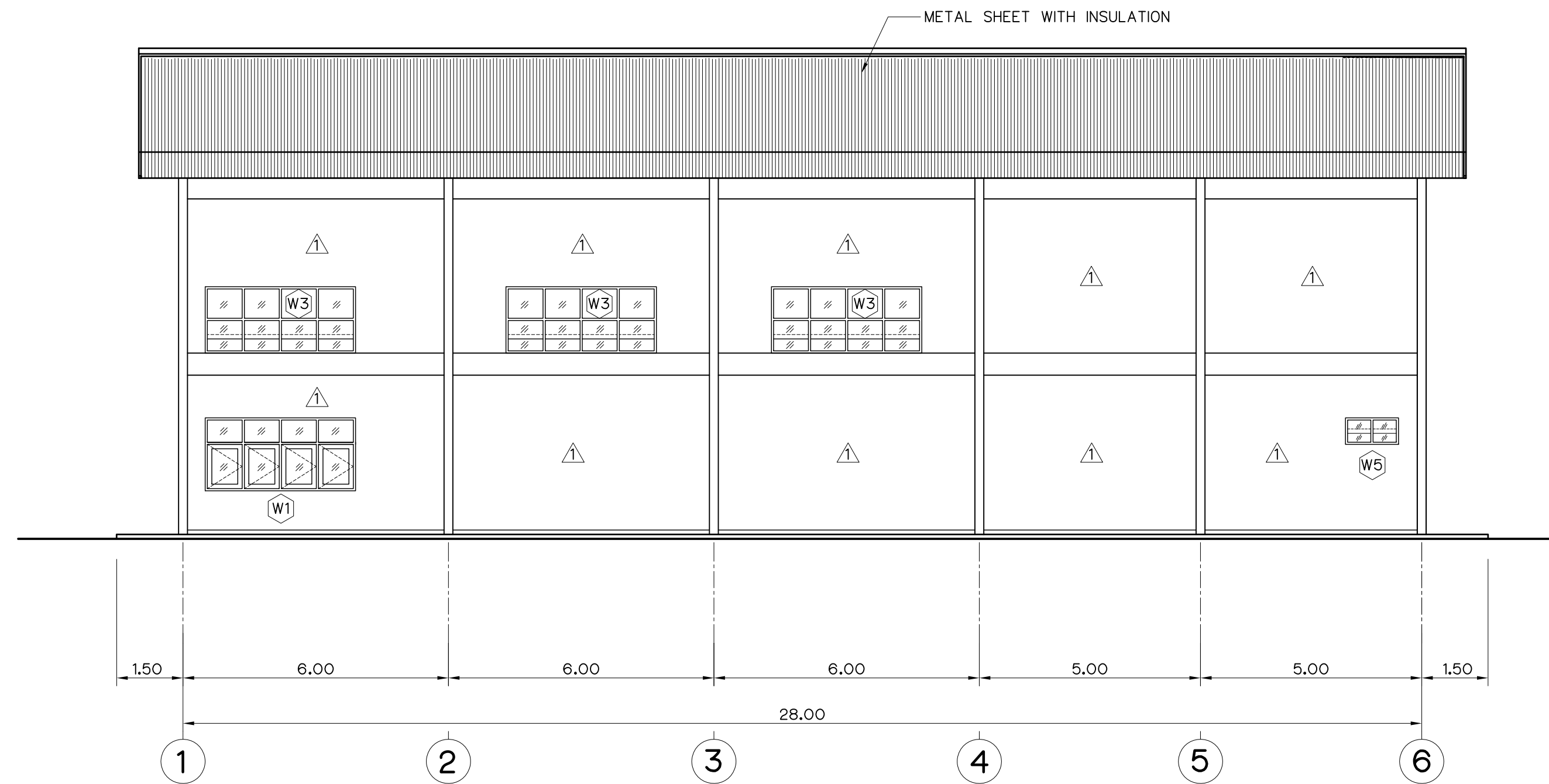
ELEVATION "A"
SCALE 1:100



ELEVATION "B"
SCALE 1:100



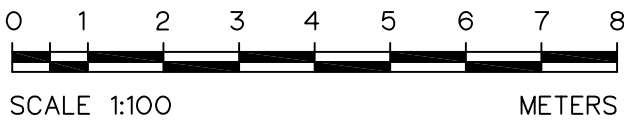
ELEVATION "C"
SCALE 1:100



ELEVATION "D"
SCALE 1:100

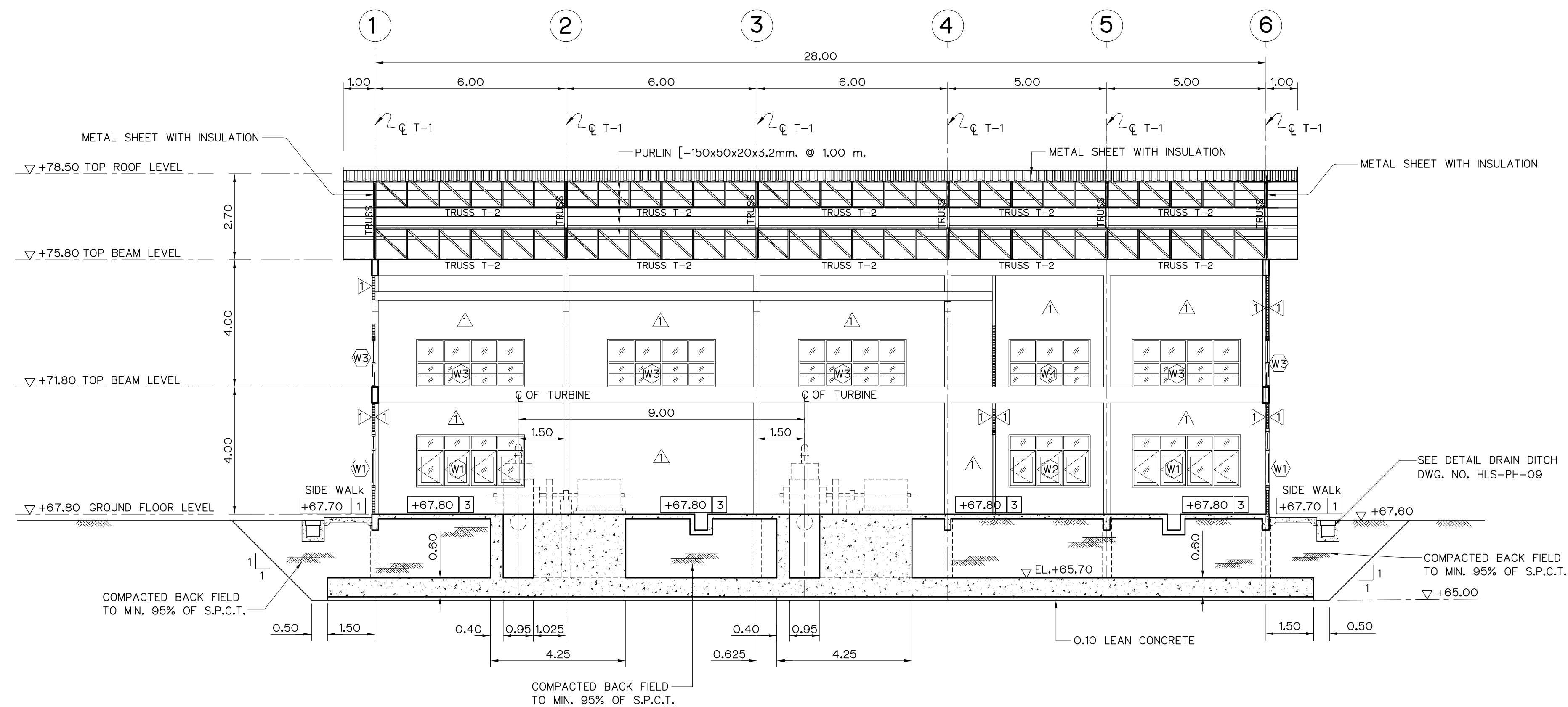
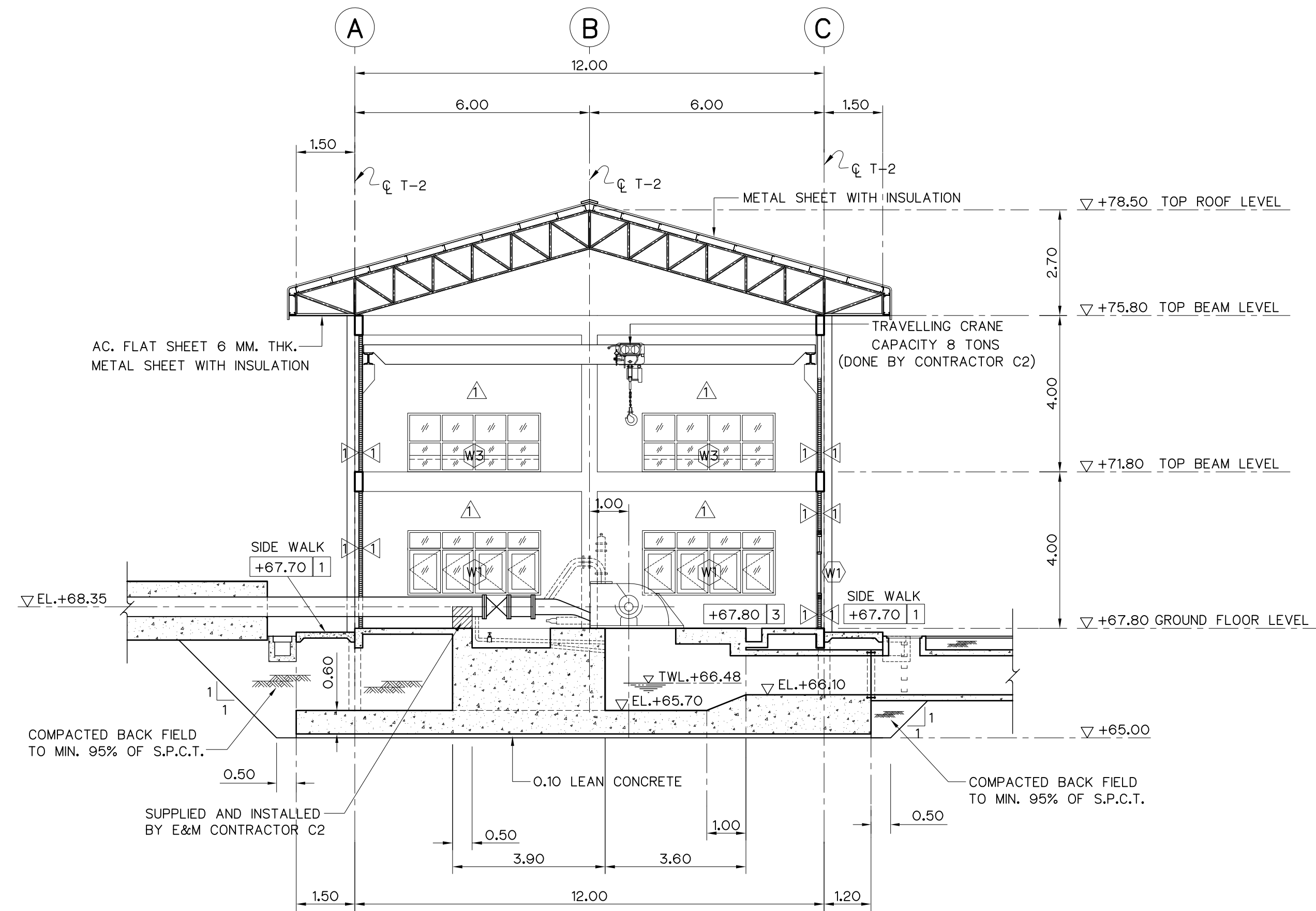
- NOTES :
- ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS, UNLESS OTHERWISE SHOWN.
 - SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. HLS-GN-03

- REFERENCE DRAWINGS :
- | | |
|-----------------------------------|-----------|
| 1. POWERHOUSE, PLAN ANG ROOF PLAN | HLS-PH-02 |
| 2. POWERHOUSE, SECTIONS | HLS-PH-04 |



3				
2				
1				
NO.	DATE	REVISIONS	CHECKED	APPROVED
CONSULTANTS			DEDE	

KINGDOM OF THAILAND Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY			
HUAI LAM SIN HYDROPOWER PROJECT			
ELECTRO – MECHANICAL EQUIPMENT POWERHOUSE ELEVATIONS			
FRONTIER ENGINEERING CONSULTANTS CO.,LTD.		Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY	
DESIGNED		REVIEWED S.KITIKHAJ	
DRAWN		SUBMITTED	
CHECKED		RECOMMENDED	
PROJECT MANAGER		APPROVED	
DATE		DRAWING NO.	
14/01/62		HLS-PH-03	
		SHEET NO.	
		15 OF 25	

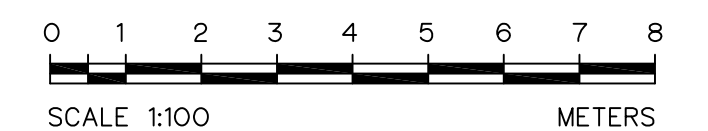


NOTES :

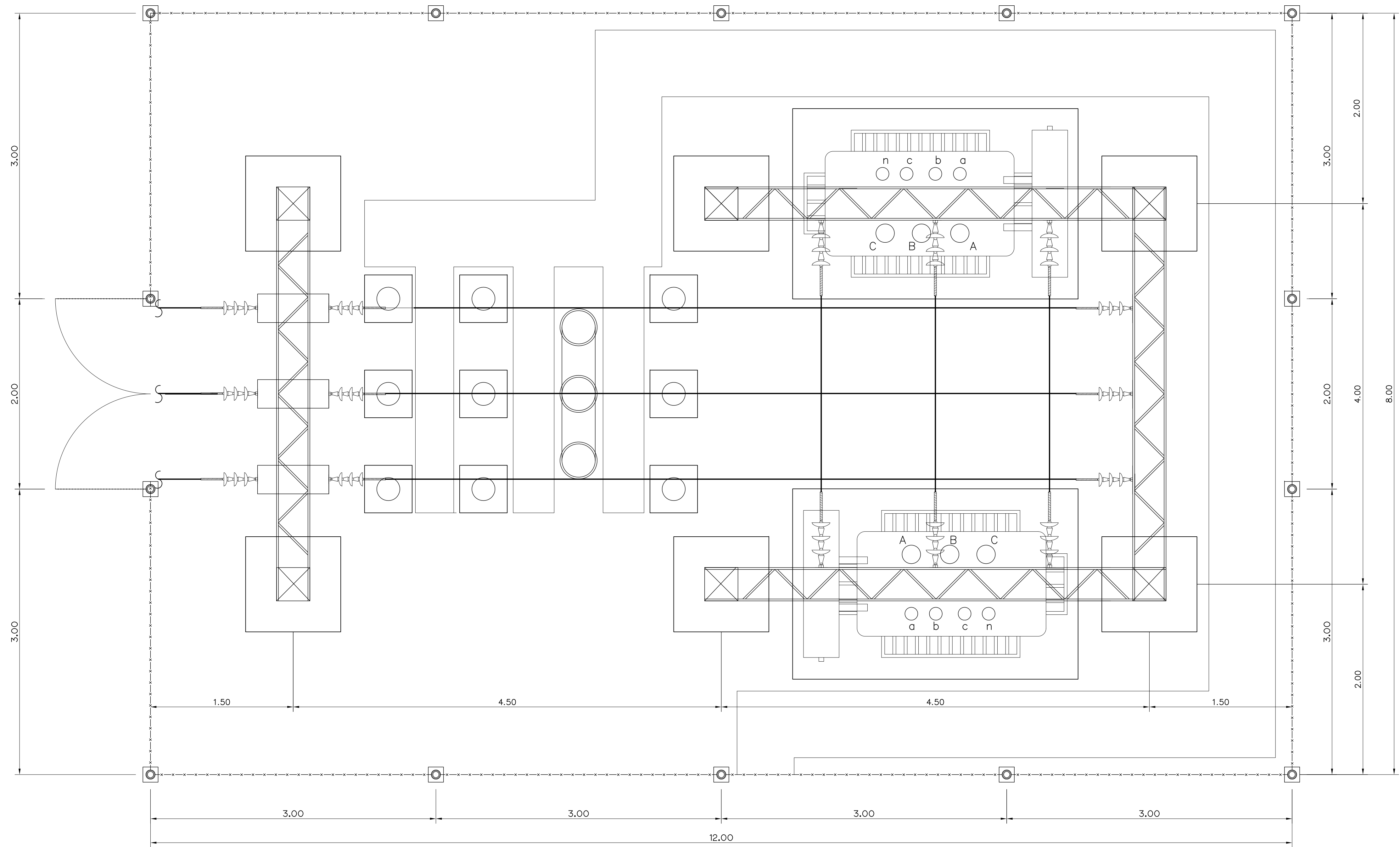
1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS, UNLESS OTHERWISE SHOWN.
2. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. HLS-GN-03

REFERENCE DRAWINGS :

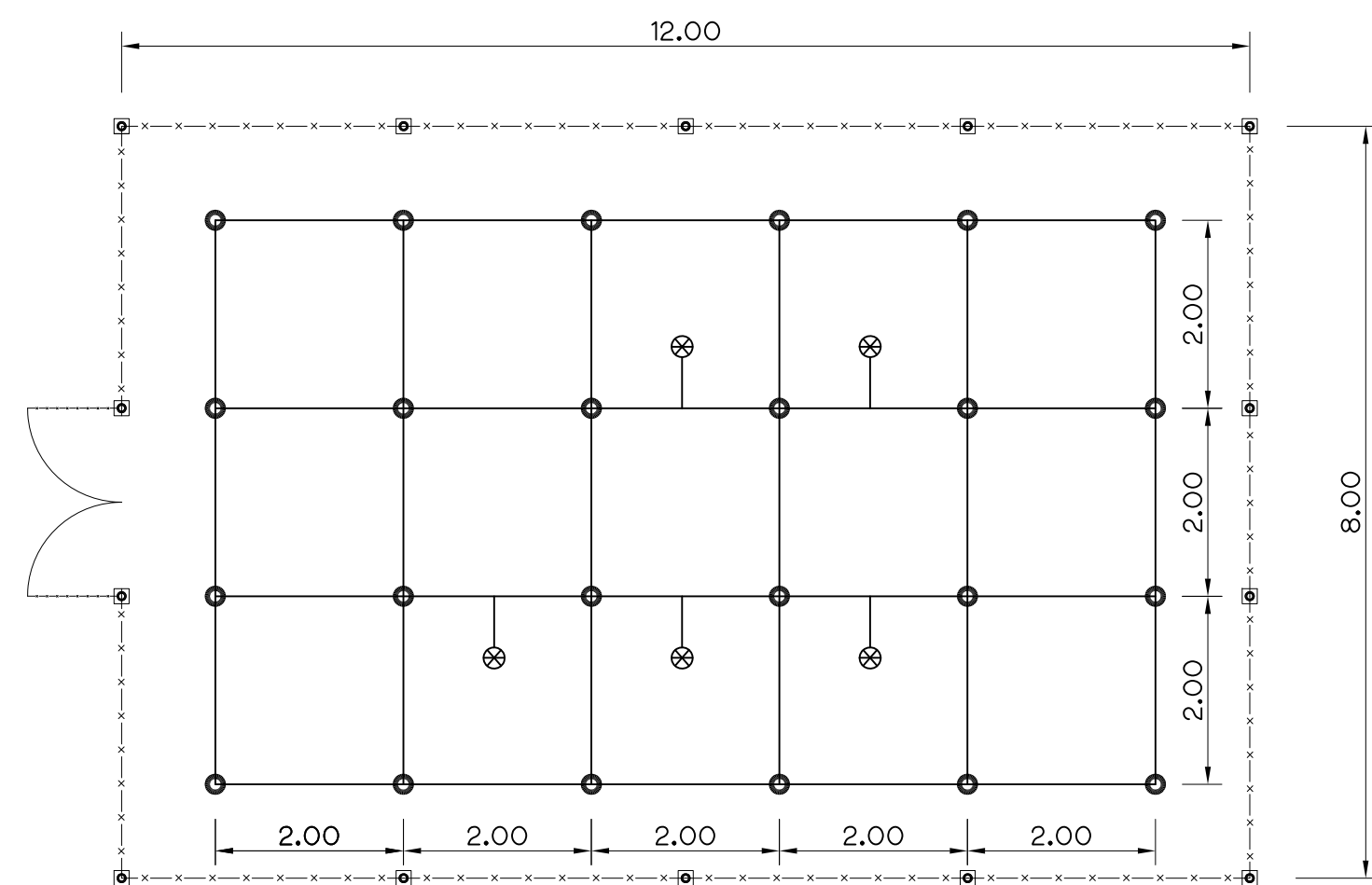
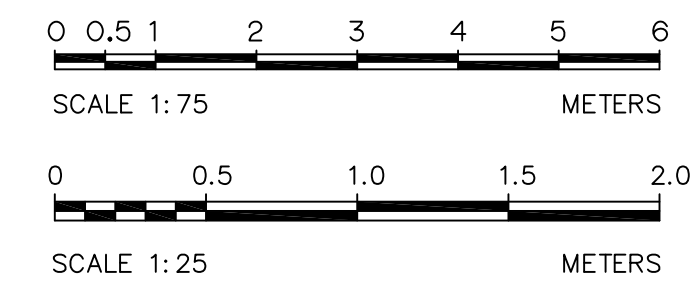
1. POWERHOUSE, PLAN AND ROOF PLAN HLS-PH-02
2. POWERHOUSE, ELEVATIONS HLS-PH-03



KINGDOM OF THAILAND Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY			
HUAI LAM SIN HYDROPOWER PROJECT			
ELECTRO – MECHANICAL EQUIPMENT POWERHOUSE SECTIONS			
FRONTIER ENGINEERING CONSULTANTS CO.,LTD.		Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY	
DESIGNED <i>[Signature]</i> ๑๕.6651		REVIEWED S.KITIKHAJ <i>[Signature]</i>	
DRAWN <i>[Signature]</i>		SUBMITTED <i>[Signature]</i>	
CHECKED <i>[Signature]</i> ๑๕.7324		RECOMMENDED <i>[Signature]</i>	
NO. DATE REVISIONS CHECKED APPROVED		APPROVED <i>[Signature]</i>	
CONSULTANTS		DEDE	
PROJECT MANAGER 14/01/62 DATE		DRAWING NO. SHEET NO.	
HLS-PH-04		16 OF 25	



PLAN
SCALE 1:25



GROUNDING SYSTEM
SCALE 1:75

NOTES :

1. ALL DIMENSIONS ARE IN METERS, UNLESS OTHERWISE SHOWN.
2. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. HLS-GN-03
3. THE TRANSFORMER YARD WILL BE ACCORDING TO PEA STANDARD.
4. GROUNDING CONDUCTOR, TAP AND RISER FROM GROUNDING NETWORK TO POWER EQUIPMENT SHALL BE FORMED BY BARE COPPER CONDUCTOR NOT LESS THAN 95 SQ.MM.
5. GROUNDING SYSTEM RESISTANCE WILL NOT EXCEED 5 OHM.
6. CONNECTOR TO WITH IN & BETWEEN THE GROUNDING NETWORK TO POWER PLANT EQUIPMENT WILL BE MADE BY THERMAL CADWELD
7. GROUND ROD WILL BE COPPER COVER STEEL DIAMETER 15.87 MM. 2,400 MM. LONG
8. THIS DRAWING USE FOR GUIDE ONLY

REFERENCE DRAWINGS :

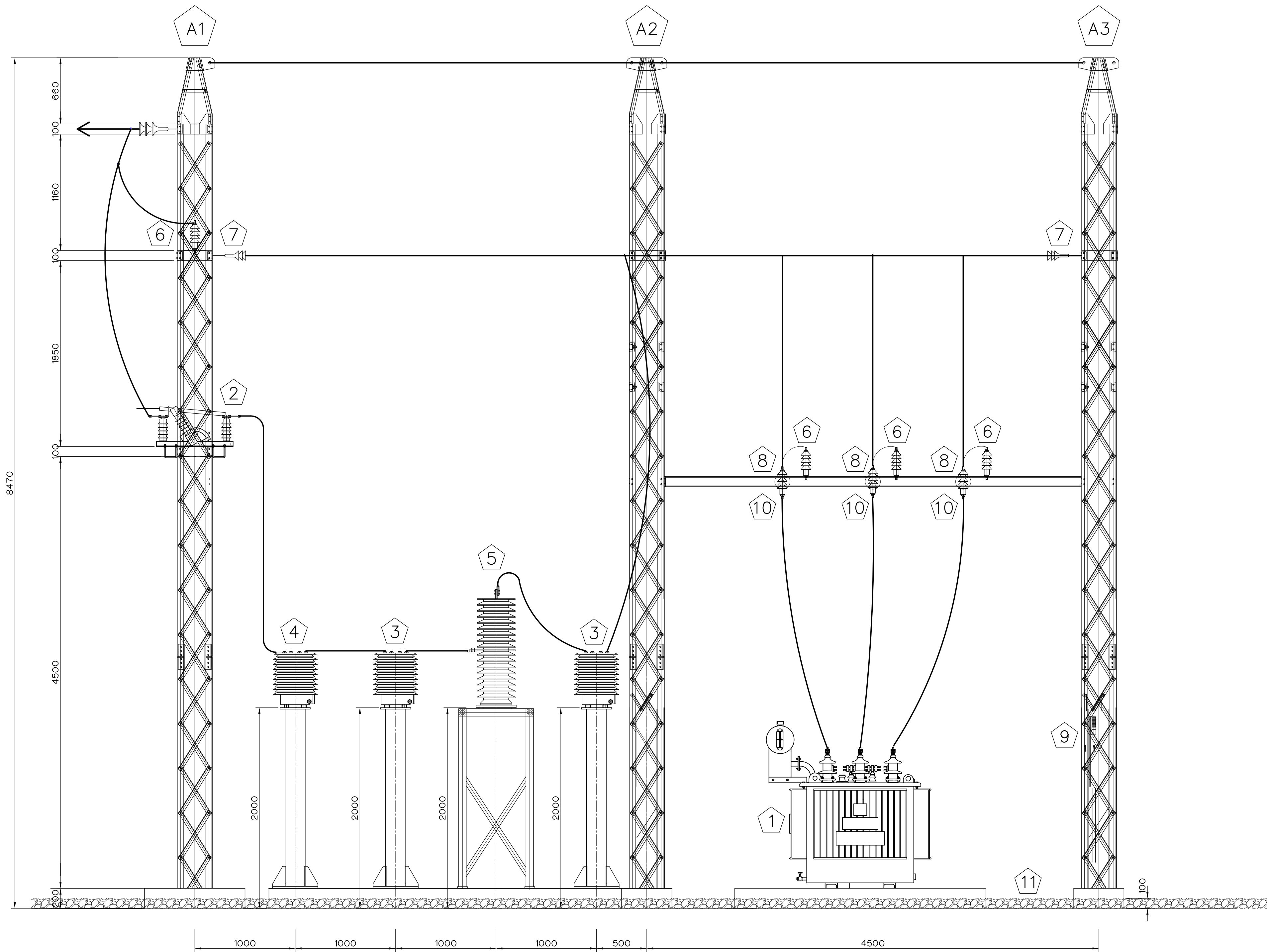
1. POWERHOUSE, TRANSFORMER AND SWITCHYARD, SECTIONS HLS-PH-06
2. POWERHOUSE, TRANSFORMER AND SWITCHYARD, DETAILS HLS-PH-07

LEGENDS :

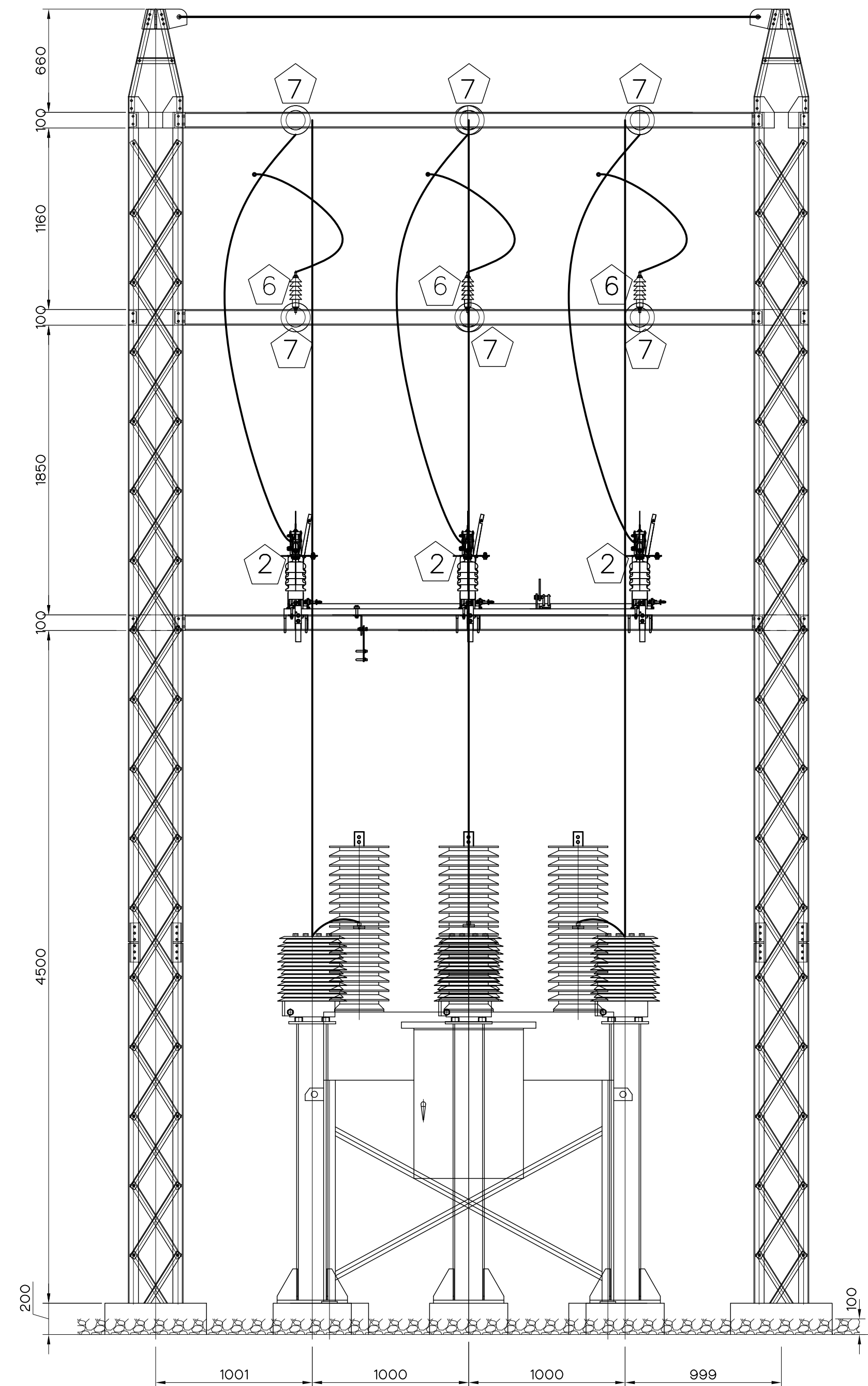
- GROUND ROD
- ⊗ GROUND POINT FOR POWER PLANT EQUIPMENT GROUNDING
- BARE CUPPER CONDUCTOR

3				
2				
1				
NO.	DATE	REVISIONS	CHECKED	APPROVED

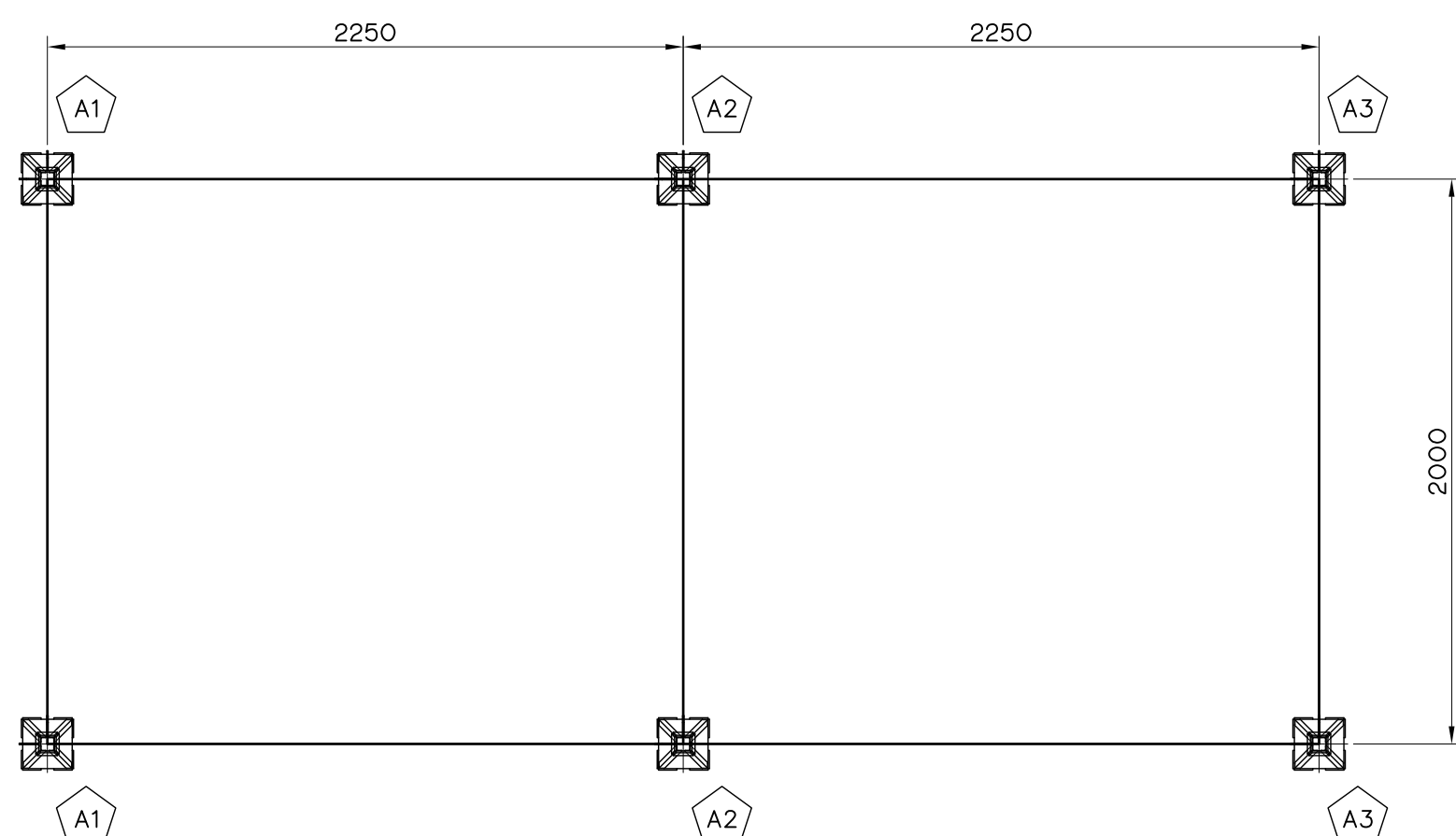
KINGDOM OF THAILAND Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY	
HUA I LAM SIN HYDROPOWER PROJECT	
ELECTRO – MECHANICAL EQUIPMENT POWERHOUSE TRANSFORMER, SWITCHYARD AND GROUNDING SYSTEM	
FRONTIER ENGINEERING CONSULTANTS CO.,LTD.	Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY
REVIEWED S.KITIKHAJ	REVIEWED S.KITIKHAJ
DESIGNED	SUBMITTED
DRAWN	RECOMMENDED
CHECKED	APPROVED
PROJECT MANAGER	DRAWING NO. HLS-PH-05
DATE 14/01/62	SHEET NO. 17 OF 25



SIDE VIEW
SCALE 1:25



FRONT VIEW
SCALE 1:25

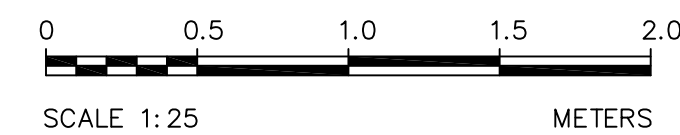


OVERHEAD GROUND WIRE PLAN
SCALE 1:50

ITEM.	DESCRIPTION	Q'TY.	REMARK.
1	MAIN TRANSFORMER 33000/400 V.	2	
2	DISCONNECTING SWITCH	1	
3	OUTDOOR CURRENT TRANSFORMERS RATIO	6	
4	OUTDOOR VOLTGE TRANSFORMER RATIO	3	
5	SF6 CIRCUIT-BREAKER (VCB1)	1	
6	SURGE ARRESTERS	9	
7	SUSPENSION INSULATORS	45	
8	LINE POST INSULATORS	6	
9	LINE GROUND SWITCH	2	
10	33 KV. DROP OUT FUSE	6	
11	GRAVEL	1	

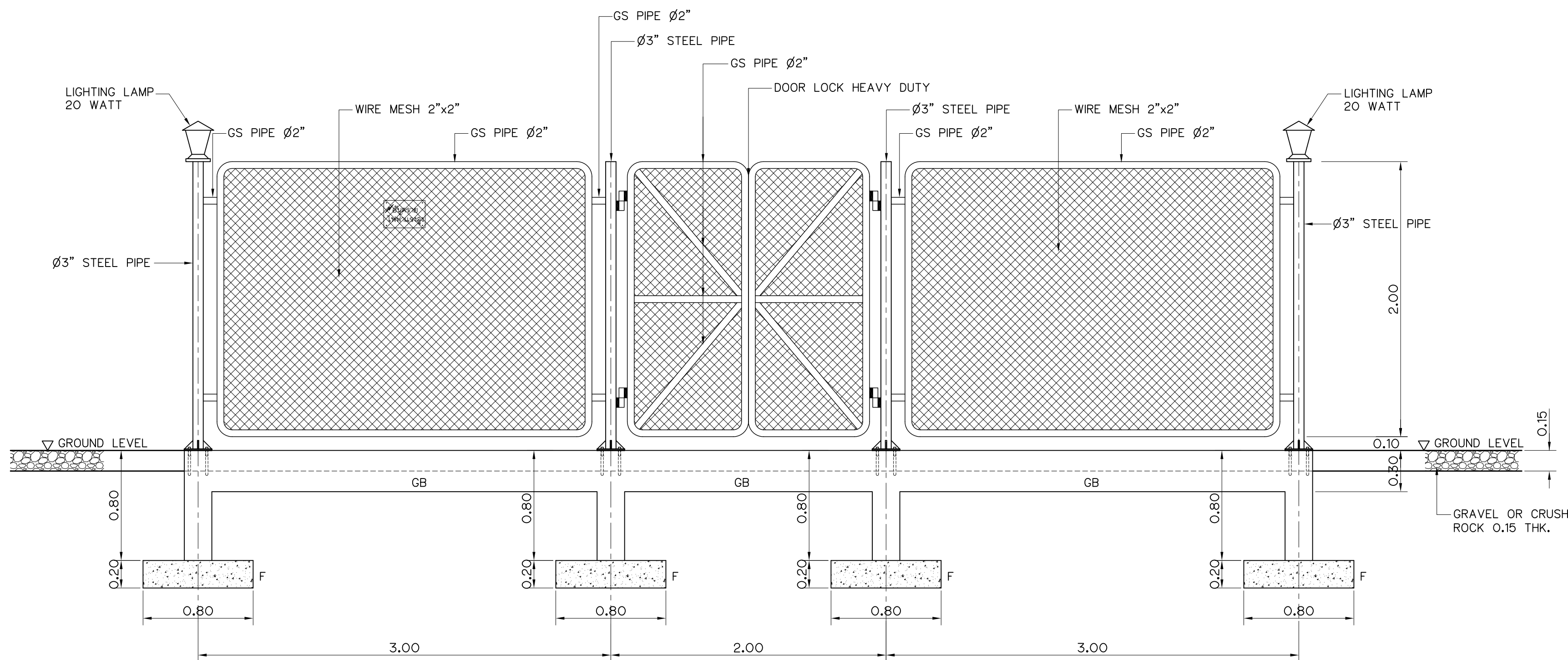
- NOTES :
- ALL DIMENSIONS ARE IN MILLIMETERS, UNLESS OTHERWISE SHOWN.
 - SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. HLS-GN-03
 - THE TRANSFORMER YARD WILL BE ACCORDING TO PEA STANDARD.

- REFERENCE DRAWINGS :
- POWERHOUSE, TRANSFORMER, SWITCHYARD AND GROUNDING SYSTEM HLS-PH-05
 - POWERHOUSE, TRANSFORMER AND SWITCHYARD, DETAILS HLS-PH-07

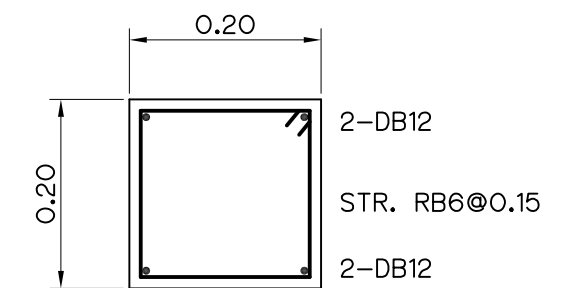
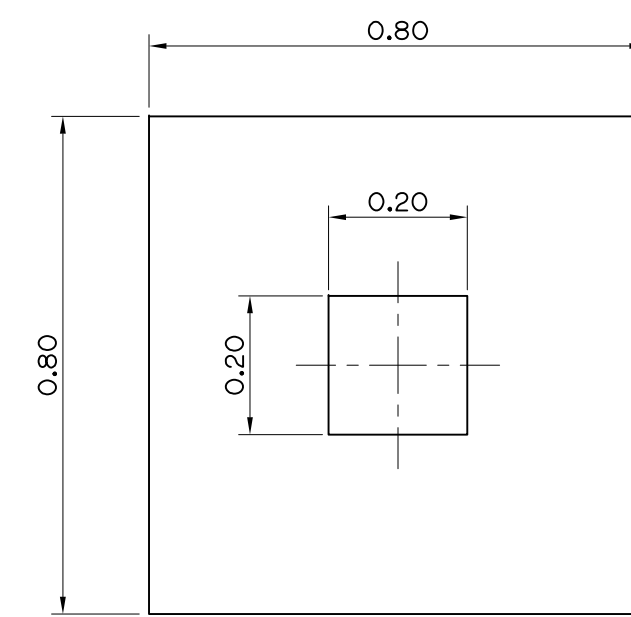


3				
2				
1				
NO.	DATE	REVISIONS	CHECKED	APPROVED
CONSULTANTS		DEDE		

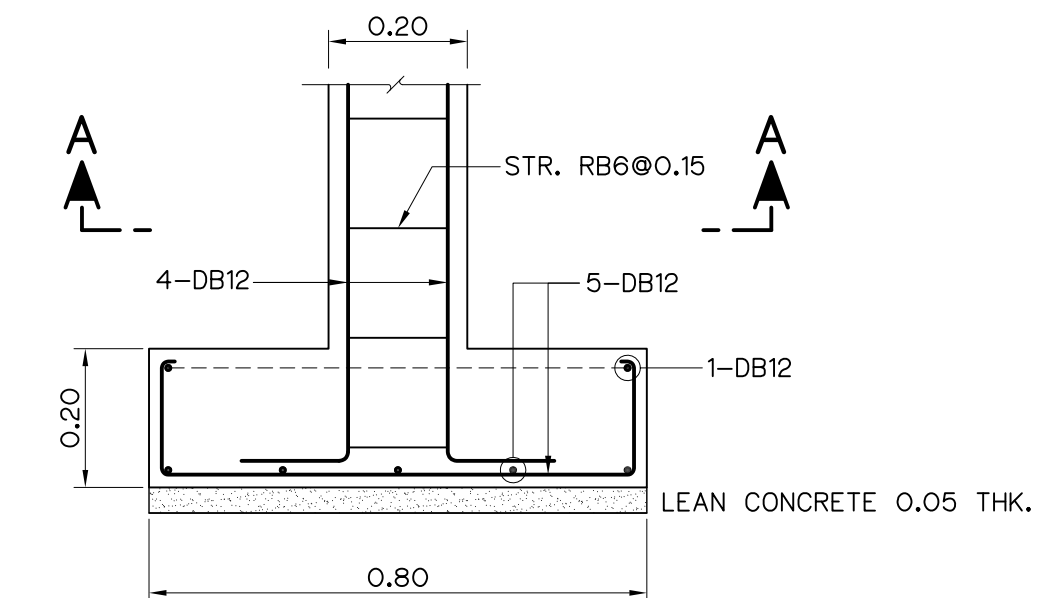
KINGDOM OF THAILAND Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY	
HUAI LAM SIN HYDROPOWER PROJECT	
ELECTRO – MECHANICAL EQUIPMENT POWERHOUSE TRANSFORMER AND SWITCHYARD, SECTIONS	
FRONTIER ENGINEERING CONSULTANTS CO.,LTD.	REVIEWED S.KITIKHAJ
DESIGNED	SUBMITTED
DRAWN	RECOMMENDED
CHECKED	APPROVED
PROJECT MANAGER	DATE 14/01/62
DRAWING NO. HLS-PH-06	SHEET NO. 18 OF 25



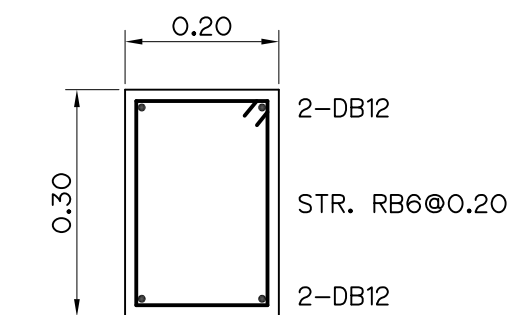
FENCE DETAIL
NOT TO SCALE



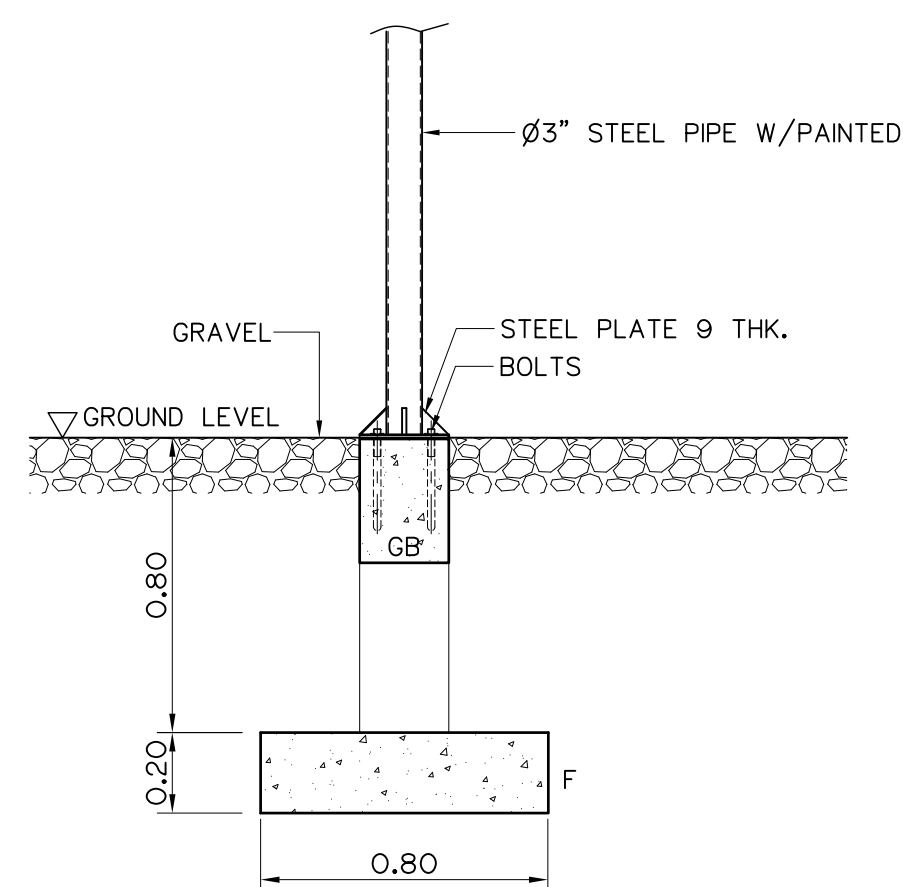
SECTION A-A
NOT TO SCALE



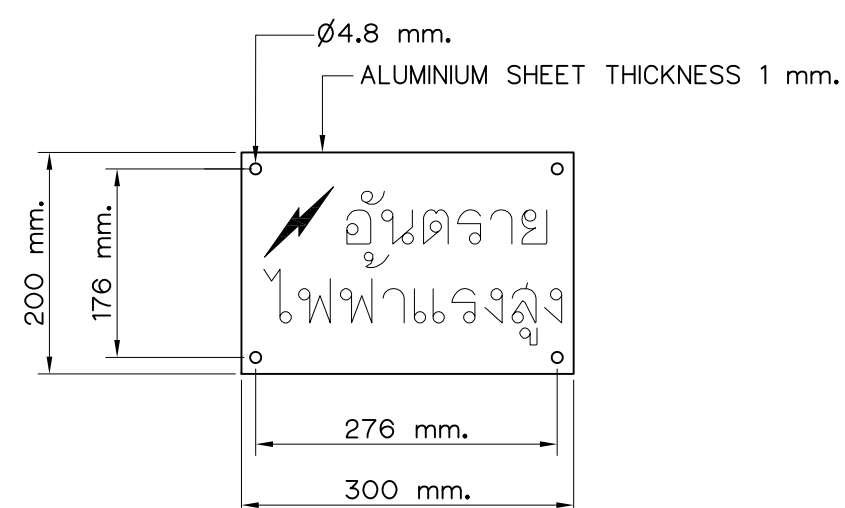
REINFORCEMENT OF FOOTING (F)
NOT TO SCALE



REINFORCEMENT OF BEAM (GB)
NOT TO SCALE



DETAIL OF FOOTING (F)
NOT TO SCALE



WARNING SIGN
NOT TO SCALE

NOTES :

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

REFERENCE DRAWINGS :

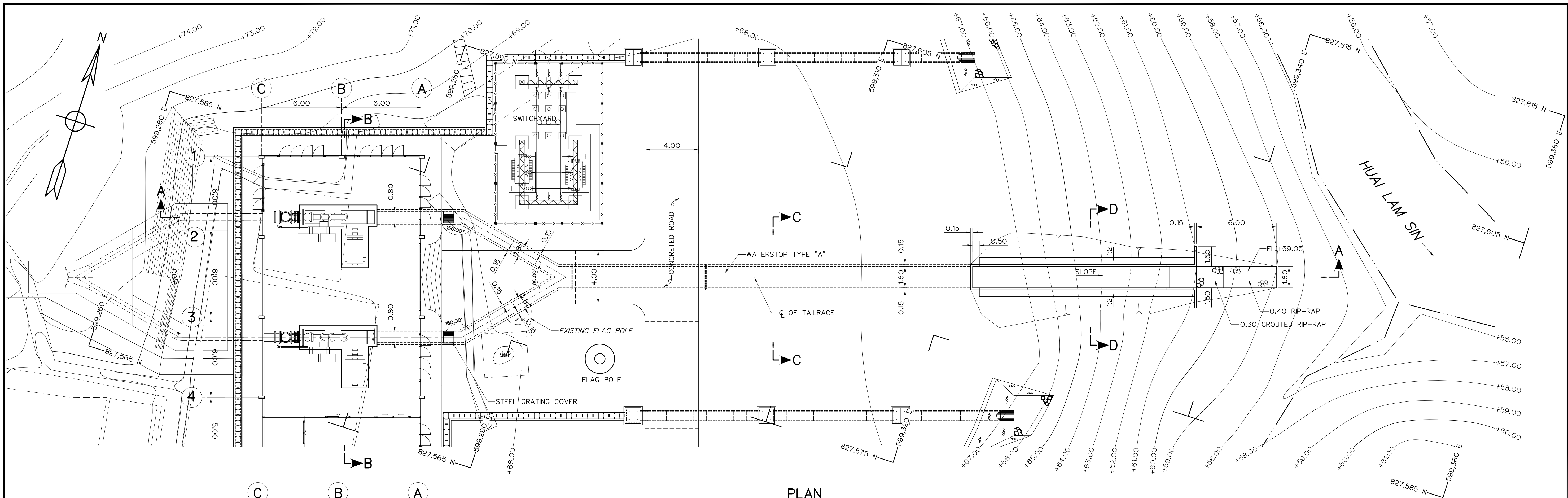
1. POWERHOUSE, TRANSFORMER, SWITCHYARD AND GROUNDING SYSTEM HLS-PH-05
2. POWERHOUSE, TRANSFORMER AND SWITCHYARD, SECTIONS HLS-PH-06

3				
2				
1				
NO.	DATE	REVISIONS	CHECKED	APPROVED

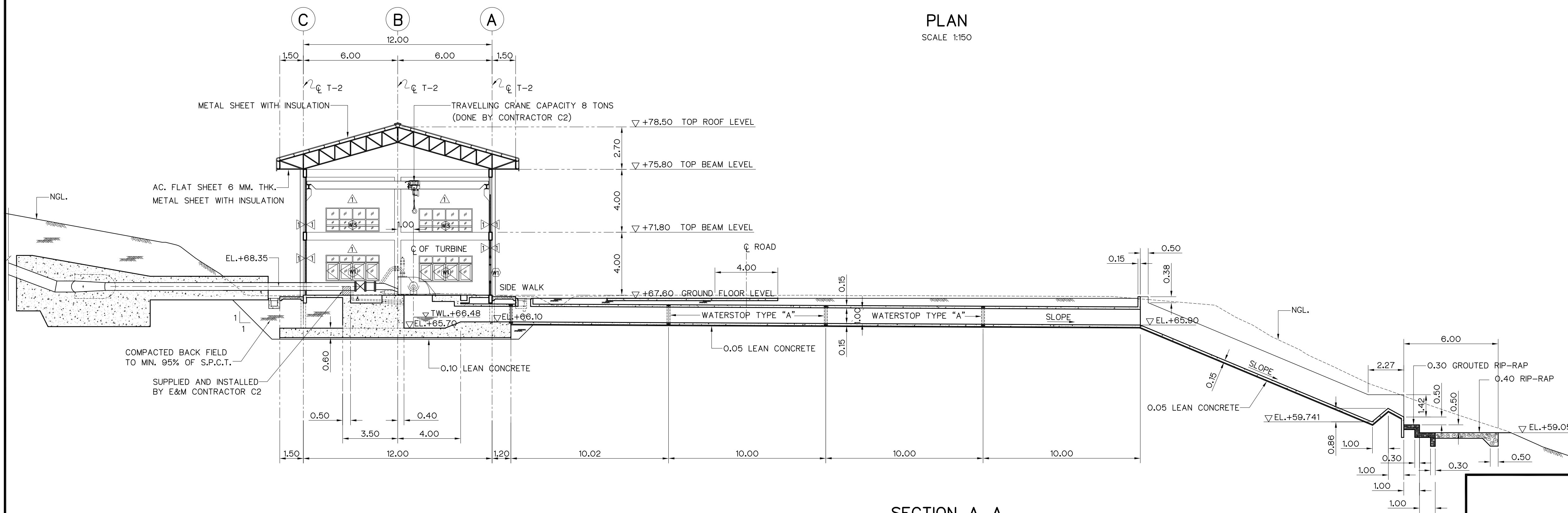
CONSULTANTS

DEDE

KINGDOM OF THAILAND Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY	
HUAI LAM SIN HYDROPOWER PROJECT	
ELECTRO – MECHANICAL EQUIPMENT POWERHOUSE TRANSFORMER AND SWITCHYARD, DETAILS	
FRONTIER ENGINEERING CONSULTANTS CO.,LTD.	Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY
DESIGNED <i>[Signature]</i> ๑๒.6651	REVIEWED S.KITIKHAJ <i>[Signature]</i>
DRAWN <i>[Signature]</i>	SUBMITTED <i>[Signature]</i>
CHECKED <i>[Signature]</i> ๑๒.7324	RECOMMENDED <i>[Signature]</i>
APPROVED <i>[Signature]</i>	APPROVED <i>[Signature]</i>
PROJECT MANAGER 14/01/62 DATE	DRAWING NO. HLS-PH-07 SHEET NO. 19 OF 25



PLAN
SCALE 1:150



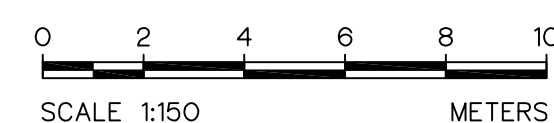
SECTION A-A
SCALE 1:150

NOTES :

- ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS, UNLESS OTHERWISE SHOWN.
- SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. HLS-GN-03
- TURBINE & GENERATOR FOUNDATIONS, TRENCH AND BLOCKOUT SIZES AND LOCATIONS ARE ONLY APPROXIMATE. THE ELECTRO-MECHANICAL CONTRACTOR IS REQUIRED TO SUBMIT THE SHOP DRAWINGS INDICATED ALL FINAL SIZES AND LOCATIONS TO FIELD ENGINEER

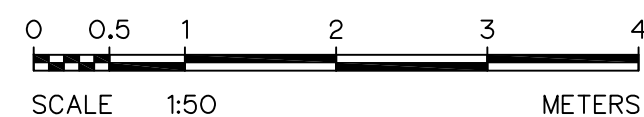
REFERENCE DRAWINGS :

- TAILRACE, SECTIONS B-B, C-C AND D-D HLS-TR-02



3				
2				
1				
NO.	DATE	REVISIONS	CHECKED	APPROVED
CONSULTANTS			DEDE	

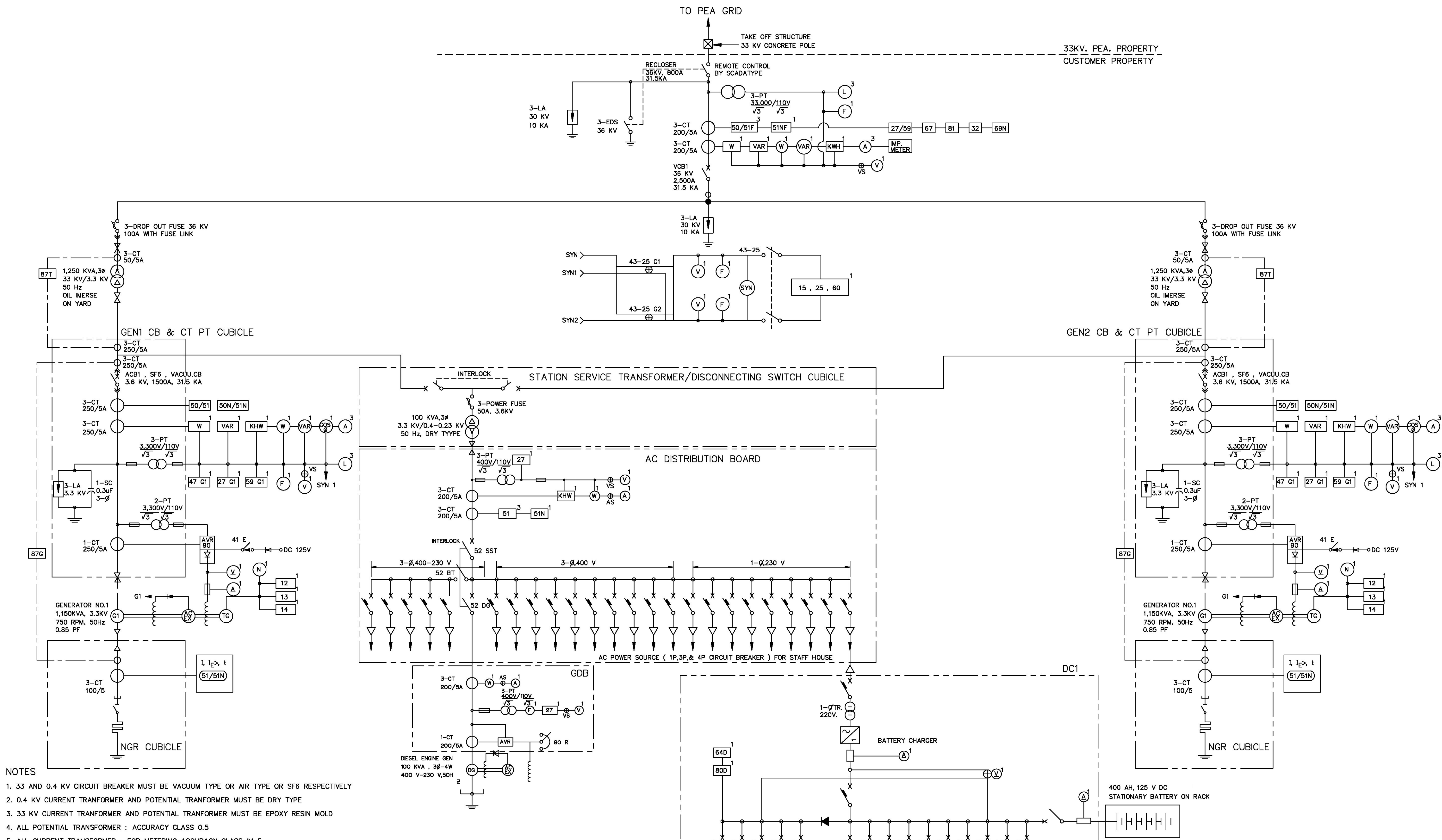
KINGDOM OF THAILAND Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY			
HUA I LAM SIN HYDROPOWER PROJECT			
ELECTRO – MECHANICAL EQUIPMENT TAILRACE PLAN AND SECTION A-A			
FRONTIER ENGINEERING CONSULTANTS CO.,LTD.		Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY	
DESIGNED		REVIEWED S.KITIKHAJ	APPROVED
DRAWN		RECOMMENDED	APPROVED
CHECKED		APPROVED	APPROVED
PROJECT MANAGER		14/01/62 DATE	DRAWING NO. HLS-TR-01
			SHEET NO. 20 OF 25



- NOTES :**
1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS, UNLESS OTHERWISE SHOWN.
 2. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. HLS-GN-03
 3. TURBINE & GENERATOR FOUNDATIONS, TRENCH AND BLOCKOUT SIZES AND LOCATIONS ARE ONLY APPROXIMATE. THE ELECTRO-MECHANICAL CONTRACTOR IS REQUIRED TO SUBMIT THE SHOP DRAWINGS INDICATED ALL FINAL SIZES AND LOCATIONS TO FIELD ENGINEER

- REFERENCE DRAWINGS :
- | | |
|-------------------------------|-----------|
| 1. TAILRACE, PLAN AND SECTION | HLS-TR-01 |
|-------------------------------|-----------|

 KINGDOM OF THAILAND Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY			
HUAI LAM SIN HYDROPOWER PROJECT			
ELECTRO – MECHANICAL EQUIPMENT			
TAILRACE			
SECTIONS B-B, C-C AND D-D			
 Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY		REVIEWED & APPROVED <i>[Signature]</i>	
FRONTIER ENGINEERING CONSULTANTS CO., LTD.		DESIGNED <i>[Signature]</i> अप्र. 6.651	
DRAWN <i>[Signature]</i>		RECOMMENDED <i>[Signature]</i>	
CHECKED <i>[Signature]</i> अप्र. 7.324		APPROVED <i>[Signature]</i>	
		DRAWING NO. HLS-TR-02	
PROJECT MANAGER		SHEET NO. 21 OF 25	
DATE			



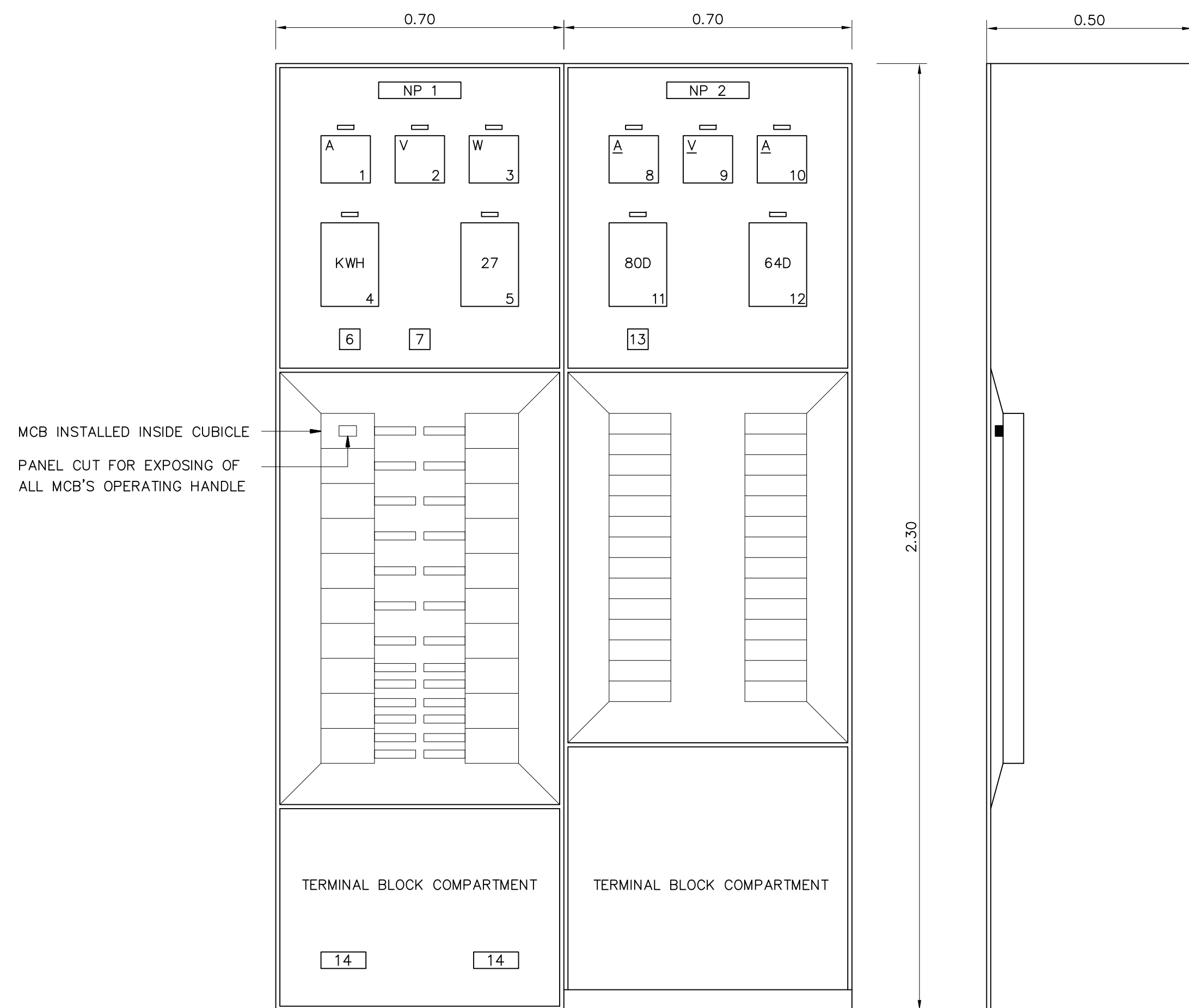
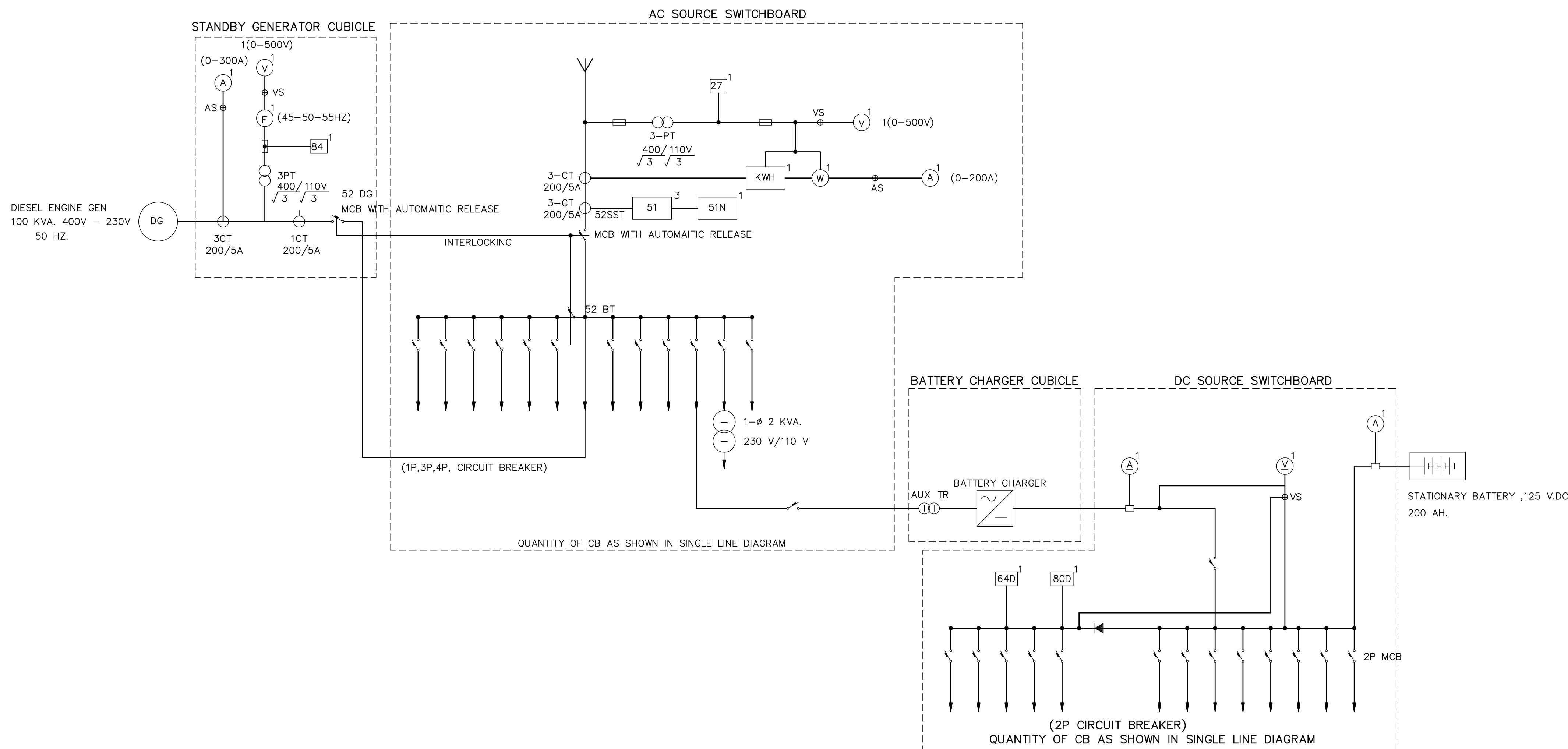
- NOTES
- 33 AND 0.4 KV CIRCUIT BREAKER MUST BE VACUUM TYPE OR AIR TYPE OR SF6 RESPECTIVELY
 - 0.4 KV CURRENT TRANSFORMER AND POTENTIAL TRANSFORMER MUST BE DRY TYPE
 - 33 KV CURRENT TRANSFORMER AND POTENTIAL TRANSFORMER MUST BE EPOXY RESIN MOLD
 - ALL POTENTIAL TRANSFORMER : ACCURACY CLASS 0.5
 - ALL CURRENT TRANSFORMER : FOR METERING ACCURACY CLASS IM 5
: FOR RELAY ACCURACY CLASS 5P20

RELAY TAPLE

RELAY CODE	DESCRIPTION	COMMAND
25	RELAY SYNCHRONIZE	CLOSE CIRCUIT CHECKING OF VCB 1, ACB 1, ACB 2
27/39	UNDER VOLTAGE PROTECTION RELAY/OVER VOLTAGE PROTECTION RELAY	TRIP COMMAND FOR VCB 1
50/51	OVER CURRENT PROTECTION RELAY	TRIP COMMAND FOR VCB 1
59N	OVER VOLTAGE PROTECTION RELAY-NEUTRAL VOLTAGE TYPE	TRIP COMMAND FOR VCB 1
67	OVER CURRENT PROTECTION RELAY-DIRECTION PHASE TYPE	TRIP COMMAND FOR VCB 1
81	UNDER FREQUENCY PROTECTION RELAY/OVER FREQUENCY PROTECTION RELAY	TRIP COMMAND FOR VCB 1
27R	TRANSIENT UNDER VOLTAGE PROTECTION RELAY	CLOSE CIRCUIT PROTECTION FOR VCB 1
87T	DIFFERENTIAL PROTECTION RELAY FOR TRANSFORMER	TRIP COMMAND FOR VCB 1 AND ACB 1&2
87G	DIFFERENTIAL PROTECTION RELAY FOR GENERATOR	TRIP COMMAND FOR ACB 1&2
78&81R	ISLANDING POWER SUPPLY PROTECTION RELAY	TRIP COMMAND FOR VCB 1
32	POWER PROTECTION RELAY-DIRECTION TYPE	TRIP COMMAND FOR VCB 1

3				
2				
1				
NO.	DATE	REVISIONS	CHECKED	APPROVED
CONSULTANTS			DEDE	

KINGDOM OF THAILAND Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY	
HUAI LAM SIN HYDROPOWER PROJECT	
ELECTRO – MECHANICAL EQUIPMENT	
MAIN POWER SINGLE LINE DIAGRAM	
FRONTIER ENGINEERING CONSULTANTS CO.,LTD.	
DESIGNED	21/11/029
DRAWN	
CHECKED	21/11/029
APPROVED	14/01/02
PROJECT MANAGER	DATE
REVIEWED S.KITICHAJ	
SUBMITTED	
RECOMMENDED	
DRAWING NO.	SHEET NO.
HLS-EM-01	22 OF 25



AC AND DC SOURCE SWITCHBOARD

LIST OF EQUIPMENT ON CONTROL BOARD

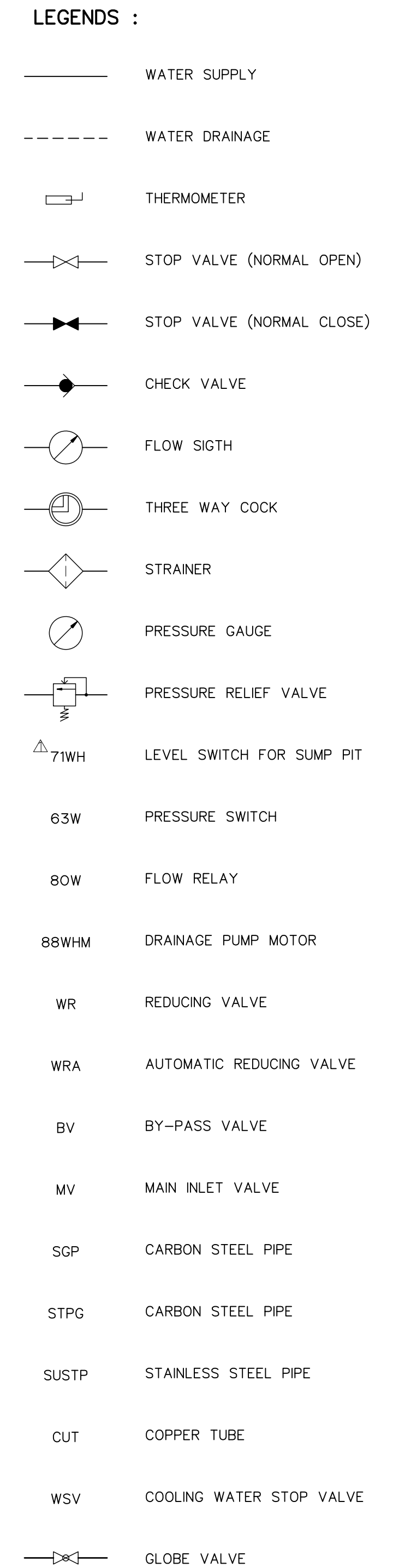
1. AC AMMETER
2. AC VOLTMETER
3. AC WATTMETER
4. WATT HOUR METER
5. UNDER VOLTAGE RELAY
6. AMMETER SELECTOR SWITCH
7. VOLTMETER SELECTOR SWITCH
8. DC AMMETER
9. DC VOLTMETER
10. DC AMMETER
11. DC UNDER VOLTAGE RELAY
12. DC GROUND FAULT RELAY
13. DC VOLTMETER SELECTOR SWITCH
14. TEST TERMINAL
15. MS1 } 3 PHASE MOTOR STARTER , TWO DIRECTIONS , FORWARD AND REVERSE
16. MS2 } WITH FORWARD AND REVERSE PUSH BUTTON , SUITABLE FOR
3 ø , 380 V. GATE MOTORS.

NOTES :

1. ALL DIMENSIONS ARE IN METERS, UNLESS OTHERWISE SHOWN
2. THIS DRAWING IS DESIGNED FOR GUIDE LINE ONLY, IT SHALL BE
BE DESIGNED AND SPECIFIED LATER BY CONTRACTOR C2
AND SUBMITTED TO FIELD ENGINEER FOR APPROVAL

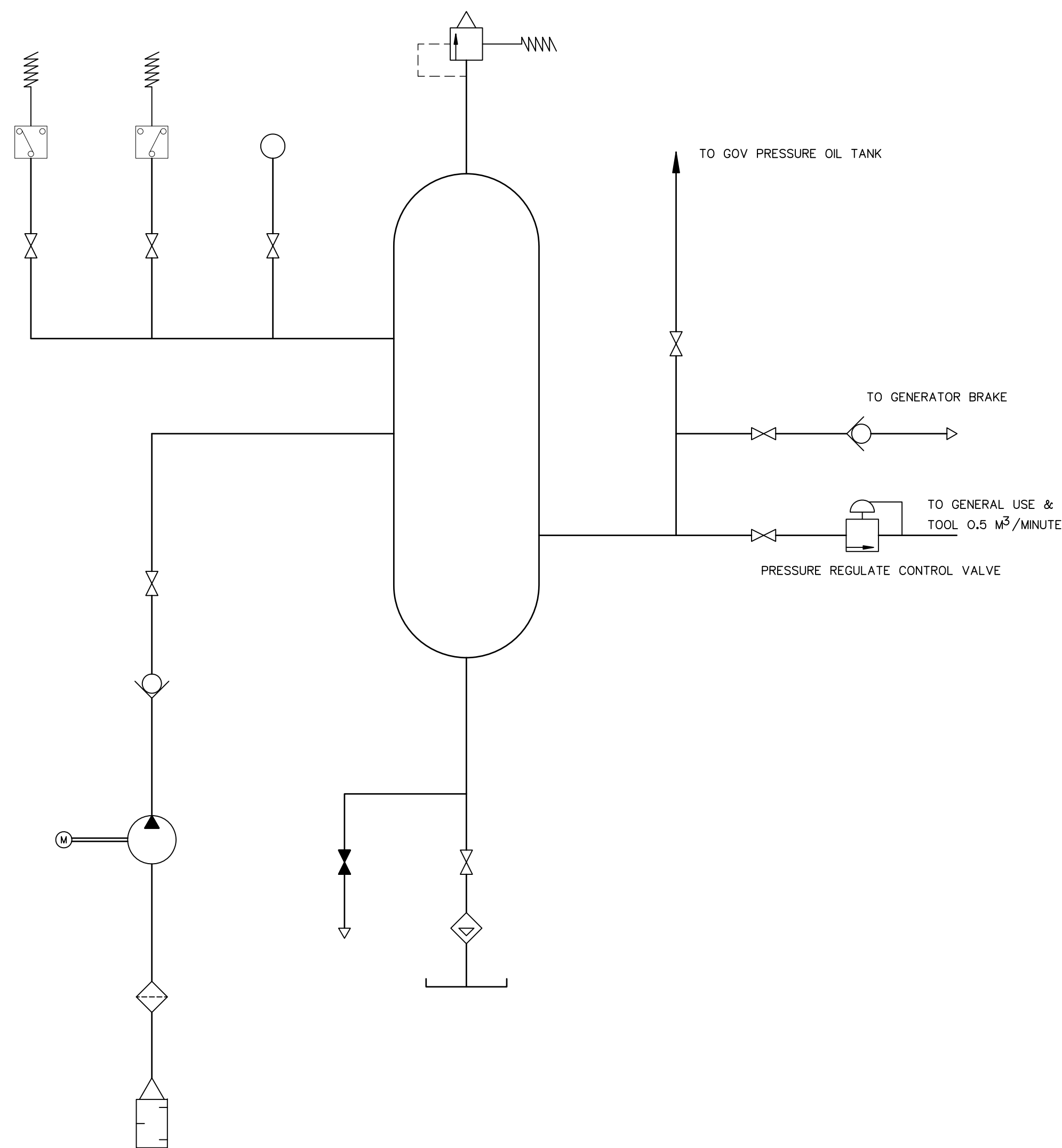
3				
2				
1				
NO.	DATE	REVISIONS	CHECKED	APPROVED
CONSULTANTS		DEDE		

KINGDOM OF THAILAND Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY			
HUAI LAM SIN HYDROPOWER PROJECT			
ELECTRO – MECHANICAL EQUIPMENT			
MAIN CONTROL SWITCH BOARD			
FRONTIER ENGINEERING CONSULTANTS CO.,LTD.		REVIEWED S.KITIKHAJ	
DESIGNED		SUBMITTED	
DRAWN		RECOMMENDED	
CHECKED		APPROVED	
PROJECT MANAGER		14/01/62 DATE	DRAWING NO. HLS-EM-02
			SHEET NO. 23 OF 25



1. THIS DRAWING IS DESIGNED FOR GUIDE LINE ONLY, IT SHALL BE DESIGNED AND SPECIFIED LATER BY CONTRACTOR C2 AND SUBMITTED TO FIELD ENGINEER FOR APPROVAL

3					FRONTIER ENGINEERING CONSULTANTS CO.,LTD.	MINISTRY OF ENERGY
2					DESIGNED <i>Shweta</i> 21/01/2022	REVIEWED & RECOMMENDED <i>Shweta</i>
1					DRAWN <i>Shweta</i>	SUBMITTED <i>Shweta</i>
NO.	DATE	REVISIONS	CHECKED	APPROVED	CHECKED <i>Shweta</i> 21/01/2022	RECOMMENDED <i>Shweta</i>
CONSULTANTS			DEDE		PROJECT MANAGER <i>Shweta</i> 14/01/2022	DRAWING NO. HLS-EM-03
					DATE	SHEET NO. 24 of 25



COMPRESSED AIR SYSTEM SCHEMATIC

LEGENDS :

	AUTOMATIC CONDENSATE TRAP		VALVE-NON RETURN
	FILTER OR STRAINER - MANUAL - AUTOMATIC HAS ADDITIONAL DRAIN LINE AND VALVE		PRESSURE SWITCH
	VALVE-NORMALLY OPEN		AIR VENT
	VALVE-NORMALLY CLOSED		HEAD EXCHANGER
	NEEDLE VALVE		FLOW RELAY
	ORIFICE		FLOW METER
	VALVE-THERMOSTATICALLY CONTROLLED		PRESSURE GRUGE
	VALVE-PRESSURE REGULATING		RECEIVER
	VALVE-PRESSURE RELIEF (WATER)		PUMP OR COMPRESSOR
	VALVE-SOLENOID OPERATED PRESSURE REDUCING		SILENCER
	VALVE-PRESSURE RELIEF (AIR)		DIRECTION OF FLOW
	VALVE-SOLENOID OPERATED OIL PRESSURE ACTUATED		MOTORIZED VALVE

NOTES :

1. PIPING & FITTING TO WORK SHOP ROOM AND MACHINE
HALL FOR UNIT 1 & UNIT 2 SHALL BE PROVIDED BY
THE CONTRACTOR
2. THIS DRAWING IS DESIGNED FOR GUIDE LINE ONLY, IT SHALL BE DESIGNED AND SPECIFIED LATER
BY CONTRACTOR C2 AND SUBMITTED TO FIELD ENGINEER FOR APPROVAL

3						FRONTIER ENGINEERING CONSULTANTS CO.,LTD.	REVIEWED S.KITIKHAJ
2						DESIGNED 20/11/2017	SUBMITTED
1						DRAWN	RECOMMENDED
NO.	DATE	REVISIONS	CHECKED	APPROVED		CHECKED 20/11/2017	APPROVED
CONSULTANTS			DEDE			14/01/62 PROJECT MANAGER DATE	DRAWING NO. HLS-EM-04 SHEET NO. 25 OF 25