



Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

HUAI MAE SOT HYDROPOWER PROJECT

TAK PROVINCE

CONTRACT C2

ELECTRO – MECHANICAL EQUIPMENT

VOLUME 4

DRAWINGS



MAHA NAKORN CONSULTANTS CO.,LTD.

MARCH 2009



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Energy Development and Efficiency
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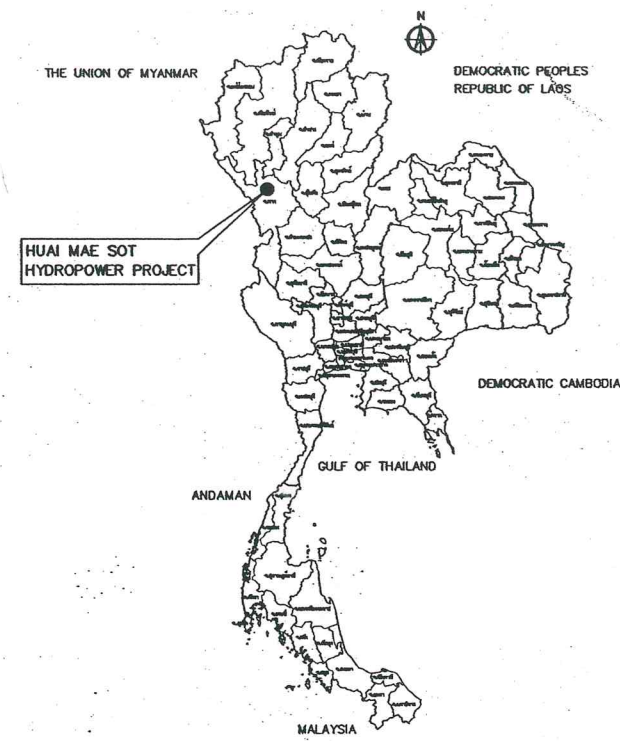
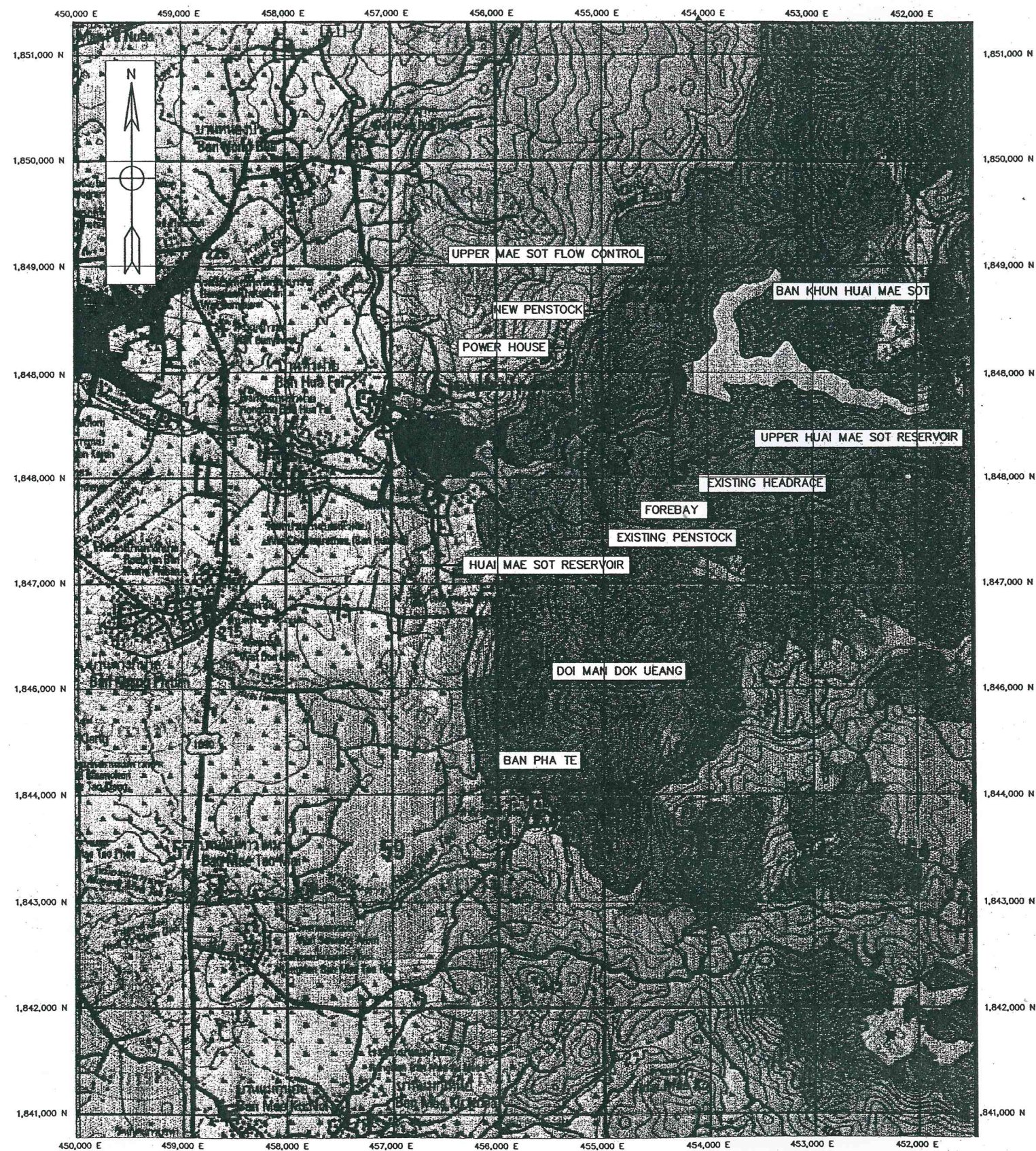


MAHA NAKORN CONSULTANTS CO.,LTD.

MARCH 2009

LIST OF DRAWINGS
 HUAI MAE SOT HYDROPOWER PROJECT
 CONTRACT C2:ELECTRO – MECHANICAL EQUIPMENT

SHEET NO.	DRAWING NO.	DRAWING DETAILS
GENERAL		
1	HMS-GN-01	LOCATION MAP
2	HMS-GN-02	SITE PLAN
3	HMS-GN-03	SYMBOLS, ABBREVIATIONS AND GENERAL NOTES
PENSTOCK		
4	HMS-PS-01	NO.1 PLAN AND PROFILE, STA.0+000.000 TO STA.0+600.000
5	HMS-PS-02	NO.2 PLAN AND PROFILE, STA.0+600.000 TO STA.1+200.000
6	HMS-PS-03	NO.3 PLAN AND PROFILE, STA.1+200.000 TO STA.1+602.081
POWERHOUSE		
7	HMS-PH-01	IMPROVEMENT EQUIPMENTS LAYOUT & MACHINE HALL FLOOR DETAILS
E & M EQUIPMENT		
8	HMS-EM-01	LEGEND & EXPLANATION
9	HMS-EM-02	EXISTING MAIN POWER SINGLE LINE DIAGRAM
10	HMS-EM-03	EXISTING MAIN POWER SINGLE LINE DIAGRAM
11	HMS-EM-04	MAIN CONTROL SWITCH BOARD
12	HMS-EM-05	NEUTRAL GROUNDING CUBICLE
13	HMS-EM-06	LOW VOLTAGE GENERATOR CUBICLE
14	HMS-EM-07	LOW VOLTAGE GENERATOR CUBICLE
15	HMS-EM-08	IMPROVEMENT SWITCHYARD
16	HMS-EM-09	WATER SUPPLY AND DRAINAGE SCHEMATIC DIAGRAM
17	HMS-EM-10	COMPRESS AIR SYSTEM SCHEMATIC DIAGRAM



LOCATION MAP
NOT TO SCALE

LEGENDS :

- HIGHWAY
- STREAM
- DAM
- HEADRACE
- FOREBAY
- PENSTOCK
- POWERHOUSE
- EXISTING ROAD
- ACCESS ROAD
- BRIDGE



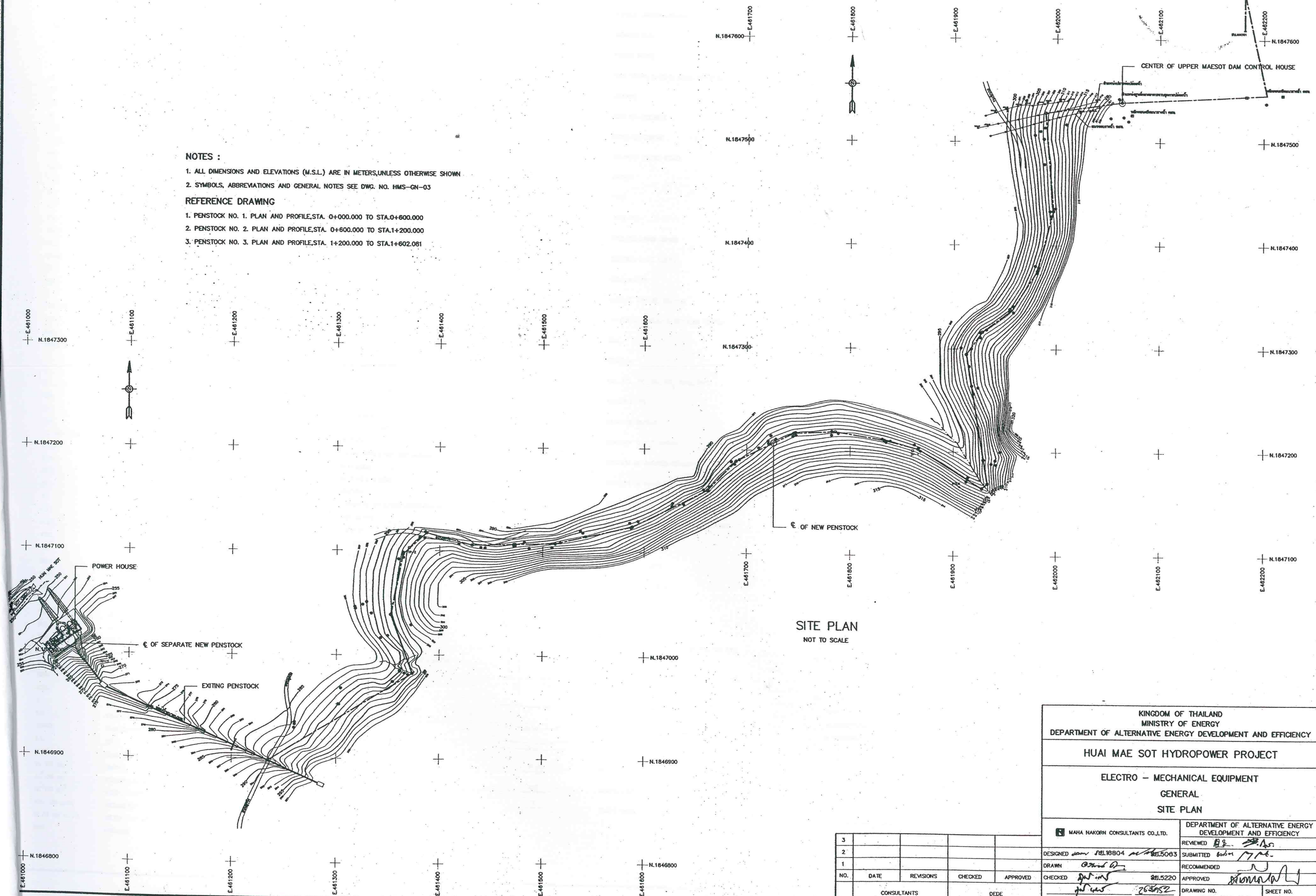
KINGDOM OF THAILAND MINISTRY OF ENERGY DEPARTMENT OF ALTERNATIVE ENERGY DEVELOPMENT AND EFFICIENCY			
HUAI MAE SOT HYDROPOWER PROJECT			
ELECTRO - MECHANICAL EQUIPMENT GENERAL LOCATION MAP			
MAHA NAKORN CONSULTANTS CO., LTD.		DEPARTMENT OF ALTERNATIVE ENERGY DEVELOPMENT AND EFFICIENCY	
DESIGNED	18.10.04	18.5.063	REVIEWED
DRAWN			RECOMMENDED
CHECKED		18.5.220	APPROVED
CONSULTANTS	DEDE	PROJECT MANAGER	DATE
DRAWING NO. HMS-GN-01		SHEET NO. 1 of 17	

NOTES :

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

REFERENCE DRAWING

1. PENSTOCK NO. 1. PLAN AND PROFILE, STA. 0+000.000 TO STA. 0+600.000
2. PENSTOCK NO. 2. PLAN AND PROFILE, STA. 0+600.000 TO STA. 1+200.000
3. PENSTOCK NO. 3. PLAN AND PROFILE, STA. 1+200.000 TO STA. 1+602.081



KINGDOM OF THAILAND MINISTRY OF ENERGY DEPARTMENT OF ALTERNATIVE ENERGY DEVELOPMENT AND EFFICIENCY	
HUI MAE SOT HYDROPOWER PROJECT	
ELECTRO - MECHANICAL EQUIPMENT GENERAL SITE PLAN	
MAHA NAKORN CONSULTANTS CO., LTD.	
DESIGNED BY: 1818804	REVIEWED: 1815083
DRAWN: 1815220	SUBMITTED: 1815220
CHECKED: 1815220	RECOMMENDED: 1815220
APPROVED: 1815220	APPROVED: 1815220
PROJECT MANAGER: 1815220	DRAWING NO. HMS-GN-02
DATE: 1815220	SHEET NO. 2 OF 17

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
BF.	BOTTOM FACE
B	BEAM
B.M.	BENCH MARK
BOTT.	BOTTOM
BRG.	BEARING
C.B.R.	CALIFORNIA BEARING RATIO
C/C	CENTER TO CENTER
C	CENTER LINE
CL.	CLEARANCE
M. OR cm.	CENTIMETER
M./S OR cm./s.	CENTIMETER PER SECOND
COL.	COLUMN
CONC.	CONCRETE
	DEGREE OF CURVE
D.	DEFORM BAR
	DEPTH OF WATER
A. OR Ø	DIAMETER
DH.	DEPARTMENT OF HIGHWAY
DG.	DRAWING
DE.	DEPARTMENT OF ALTERNATIVE ENERGY
	DEVELOPMENT AND EFFICIENCY
	EAST
	END OF SURVEY
	EACH
	END OF CURVE
	END OF FACE
OR ELEV.	ELEVATION
ST.	EXISTING
	EXPANSION
	EXTERIOR
	EXTERNAL DISTANCE OF CURVE
	FREE BOARD , FINISH
	FAR FACE
	FULL SUPPLY LEVEL
	FOOTING
	HEAD
	HEXAGONAL
	HORIZONTAL
	INSIDE DIAMETER
	INSIDE FACE
R "	INCH
	INTERIOR
	INVERT
	KILOGRAM
	KILOMETER
	KILOMETER PER HOUR
	KILOGRAM PER SQUARE CENTIMETER
	LENGTH OF CURVE
	LENGTH OF HORIZONTAL CURVE
	LONGITUDINAL
	LEFT
	LOW WATER LEVEL
m.	METER
m. ²	SQUARE METER
m. ³	CUBIC METER
mm.	MILLIMETER
R m./s	METER PER SECOND
	MINIMUM

	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, PL, 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

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS UNLESS OTHERWISE SHOWN.
2. DURING THE CONSTRUCTION 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 AMBIGUITY BETWEEN OR IN ANY OF THE DRAWINGS, IT IS THE CONTRACTOR'S RESPONSIBILITY TO CORRECT AND/OR ADJUST THE RELEVANT 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 CHAMFERED 2 cm. UNLESS OTHERWISE SHOWN.
7. SLOPE IN CUT AND FILL SECTIONS, UNLESS OTHERWISE SHOWN, SHALL BE CONFORM TO THE FOLLOWING TABLE OR AS DIRECTED BY FIELD ENGINEER.

EXISTING GROUND SLOPE 1:S	EARTH		HARD ROCK	
	1:S	1:S	1:S	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

2 = FILL SHOULD BE AVOIDED

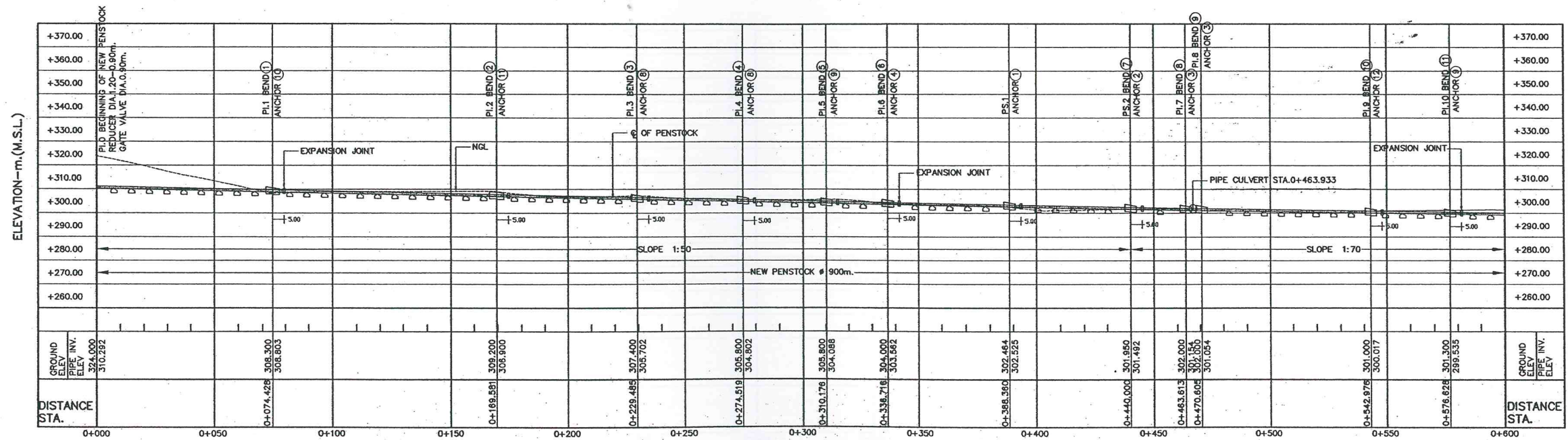
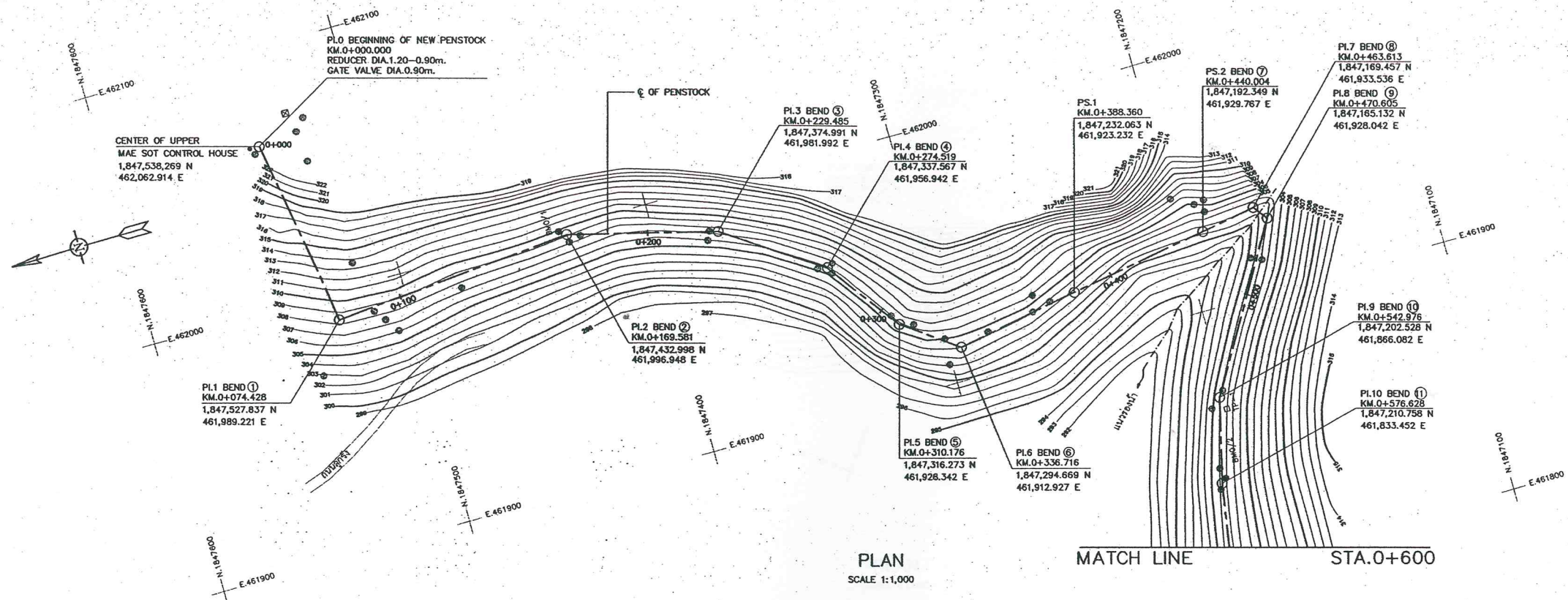
1 / = FOR DOUBTFUL CASES CONSULT FIELD ENGINEER

1. THE ULTIMATE COMPRESSIVE STRENGTH OF CONCRETE OF STANDARD CYLINDER (#0.15x0.30 m.) TEST AT AGE 28 DAYS SHALL BE AS THE FOLLOWING, UNLESS OTHERWISE SHOWN.

fc' (ksc)	DESCRIPTION
350	PRESTRESS CONCRETE
210	1. POWER HOUSE
	2. TAILRACE
175	1. ANCHOR
140	1. LEAN CONCRETE

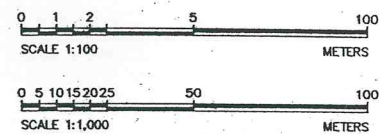
4. UNLESS OTHERWISE SHOWN, THE FOLLOWING CLEAR COVER OF CONCRETE OVER OF THE REINFORCEMENT SHALL BE USED :
 - FACE EXPOSED TO SOOUR 5.0 cm.
 - FACE EXPOSED TO EARTH OR WEATHER 5.0 cm.
 - FACE UNEXPOSED TO EARTH OR WEATHER 3.0 cm.
 5. THE REINFORCEMENT LAP, SPLICES SHALL NOT BE LESS THAN 50 DIAMETERS OF BIGGER THAN BAR WITH HOOKS, UNLESS OTHERWISE SHOWN.
 6. EMBEDDED METALWORK SHALL BE SECURELY FASTENED IN POSITION BEFORE PLACING CONCRETE.
 7. ALL CONSTRUCTION JOINT SHOULD BE TREATED AS DIRECTED IN ORDER TO ASSURE THE BEST BOND.
 8. A 5 cm. (MIN.) LAYER OF LEAN CONCRETE (1:3:5 BY VOLUME) SHOULD BE PLACED BELOW CONCRETE STRUCTURES.
 9. THE STRUCTURES SHOULD BE PLACED ON UNDISTURBED SOILS OR COMPACTED FILL AND BACKFILL AROUND THE STRUCTURES SHOULD BE COMPACTED.
 10. 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 :
 - POWERHOUSE $Q_0 = 15 \text{ T/M}^2$
 - PENSTOCK $Q_0 = 20 \text{ T/M}^2$
- KINGDOM OF THAILAND
MINISTRY OF ENERGY
DEPARTMENT OF ALTERNATIVE ENERGY DEVELOPMENT

3						MAHA NAKORN CONSULTANTS CO., LTD. DESIGNED <i>Sam</i> <i>SEL18804</i> <i>SEL5063</i> DRAWN <i>Chansak</i> CHECKED <i>Sam</i> <i>SEL5220</i> PROJECT MANAGER <i>Sam</i> <i>18/08/92</i>	DEPARTMENT OF ALTERNATIVE ENERGY DEVELOPMENT AND EFFICIENCY	
2							REVIEWED <i>19/8</i> <i>SA</i>	
1							SUBMITTED <i>6/8/91</i> <i>SA</i>	
NO.	DATE	REVISIONS	CHECKED	APPROVED			RECOMMENDED	
CONSULTANTS					DEDE		APPROVED <i>Sam</i> <i>6/8/91</i>	
						DRAWING NO.	HMS-GN-03	SHEET NO.
						DATE	3	OF 17



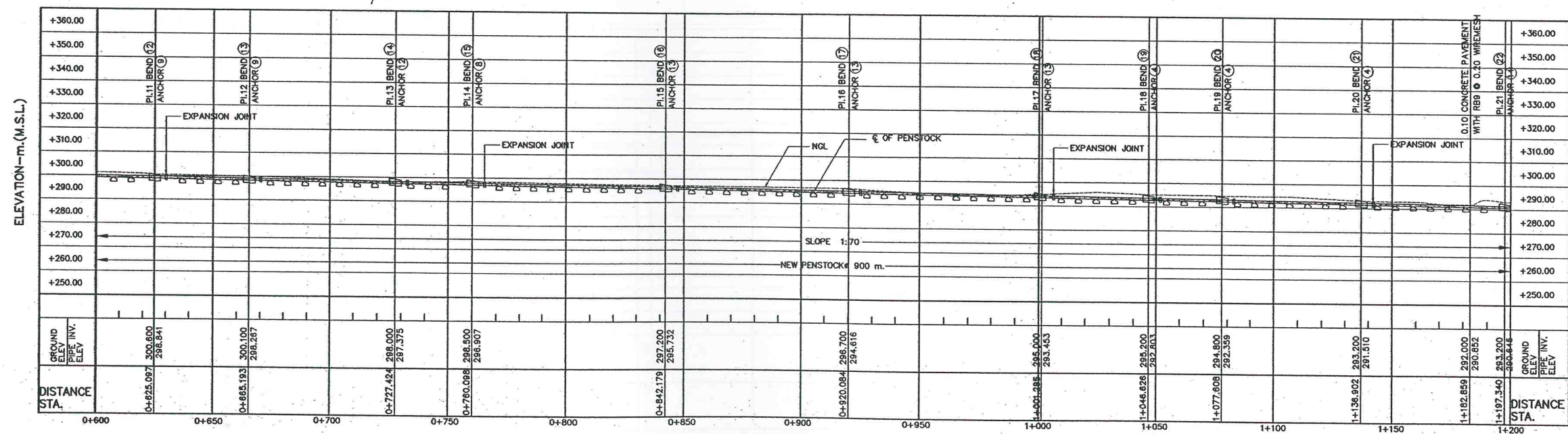
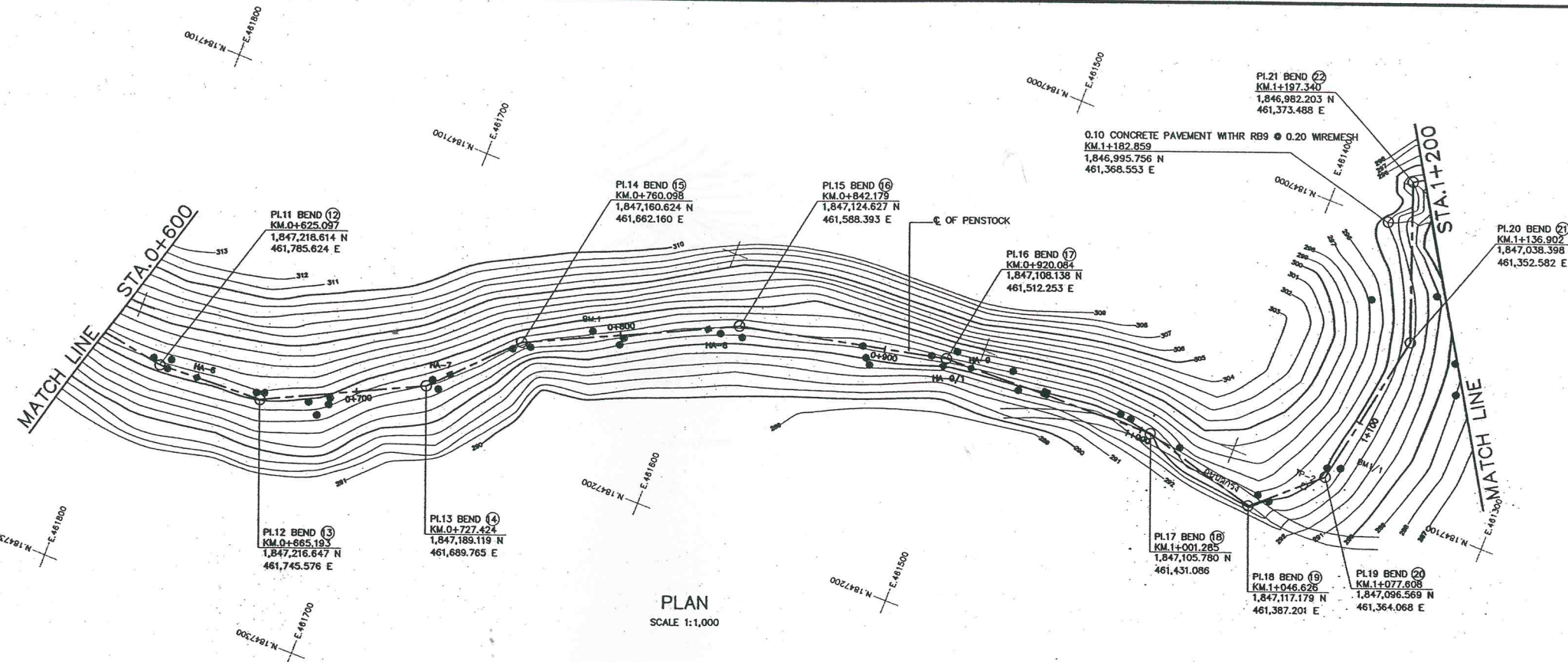
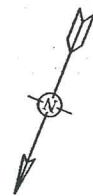
- REFERENCE DRAWINGS :**
1. ABBREVIATION SYMBOLS AND GENERAL NOTES
 2. PENSTOCK NO.2 PLAN AND PROFILE, STA.0+600.000 TO STA.1+200.000
 3. PENSTOCK NO.3 PLAN AND PROFILE, STA.1+200.000 TO STA.1+602.081

HMS-GN-03
HMS-PS-02
HMS-PS-03



NO.	DATE	REVISIONS	CHECKED	APPROVED
1				
2				
3				

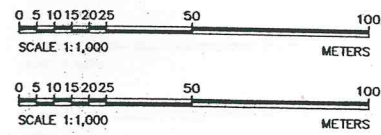
KINGDOM OF THAILAND MINISTRY OF ENERGY DEPARTMENT OF ALTERNATIVE ENERGY DEVELOPMENT AND EFFICIENCY			
HUI MAE SOT HYDROPOWER PROJECT			
ELECTRO - MECHANICAL EQUIPMENT PENSTOCK NO.1, PLAN AND PROFILE, STA.0+000.000 TO STA.0+600.000			
MAHA NAKORN CONSULTANTS CO.,LTD.		DEPARTMENT OF ALTERNATIVE ENERGY DEVELOPMENT AND EFFICIENCY	
DESIGNED	REVIEWED	SUBMITTED	RECOMMENDED
DRAWN	CHECKED	APPROVED	DRAWING NO.
PROJECT MANAGER	DATE	HMS-PS-01	SHEET NO. 4 OF 17



- REFERENCE DRAWINGS :
1. ABBREVIATION SYMBOLS AND GENERAL NOTES
 2. PENSTOCK NO.1 PLAN AND PROFILE, STA.0+000.000 TO STA.0+600.000
 3. PENSTOCK NO.3 PLAN AND PROFILE, STA.1+200.000 TO STA.1+602.081

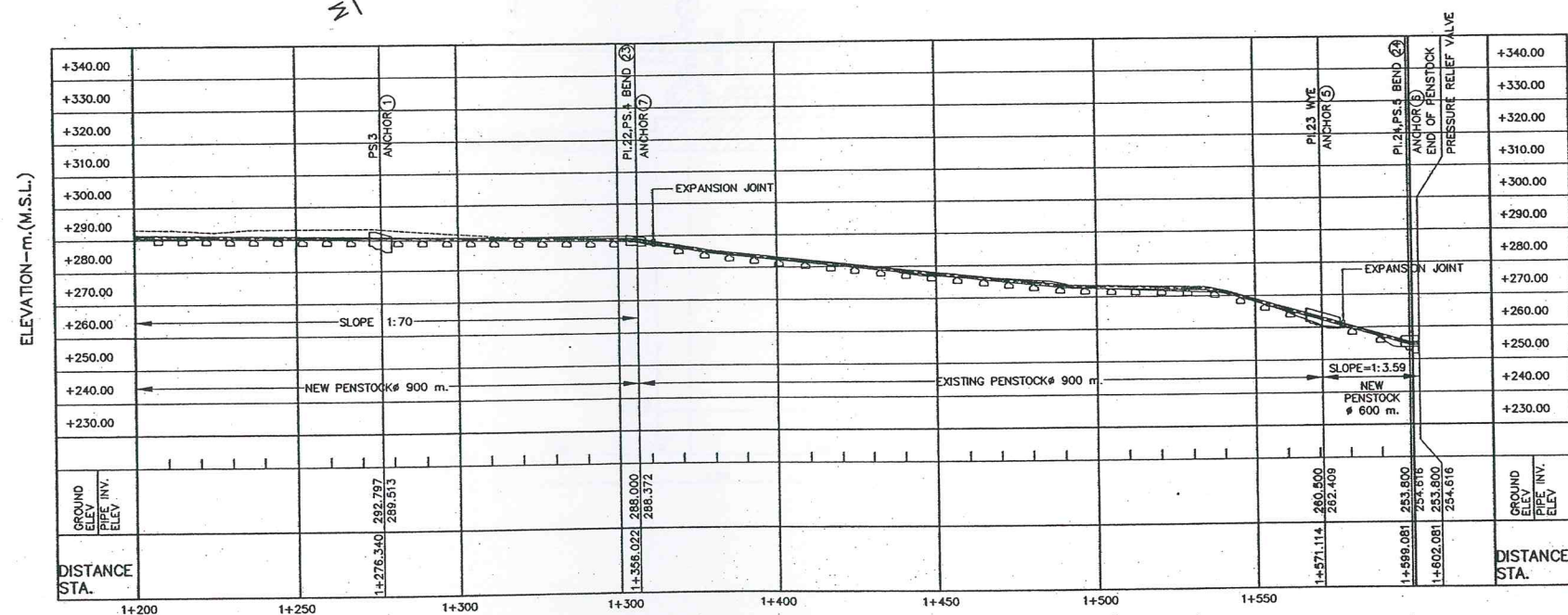
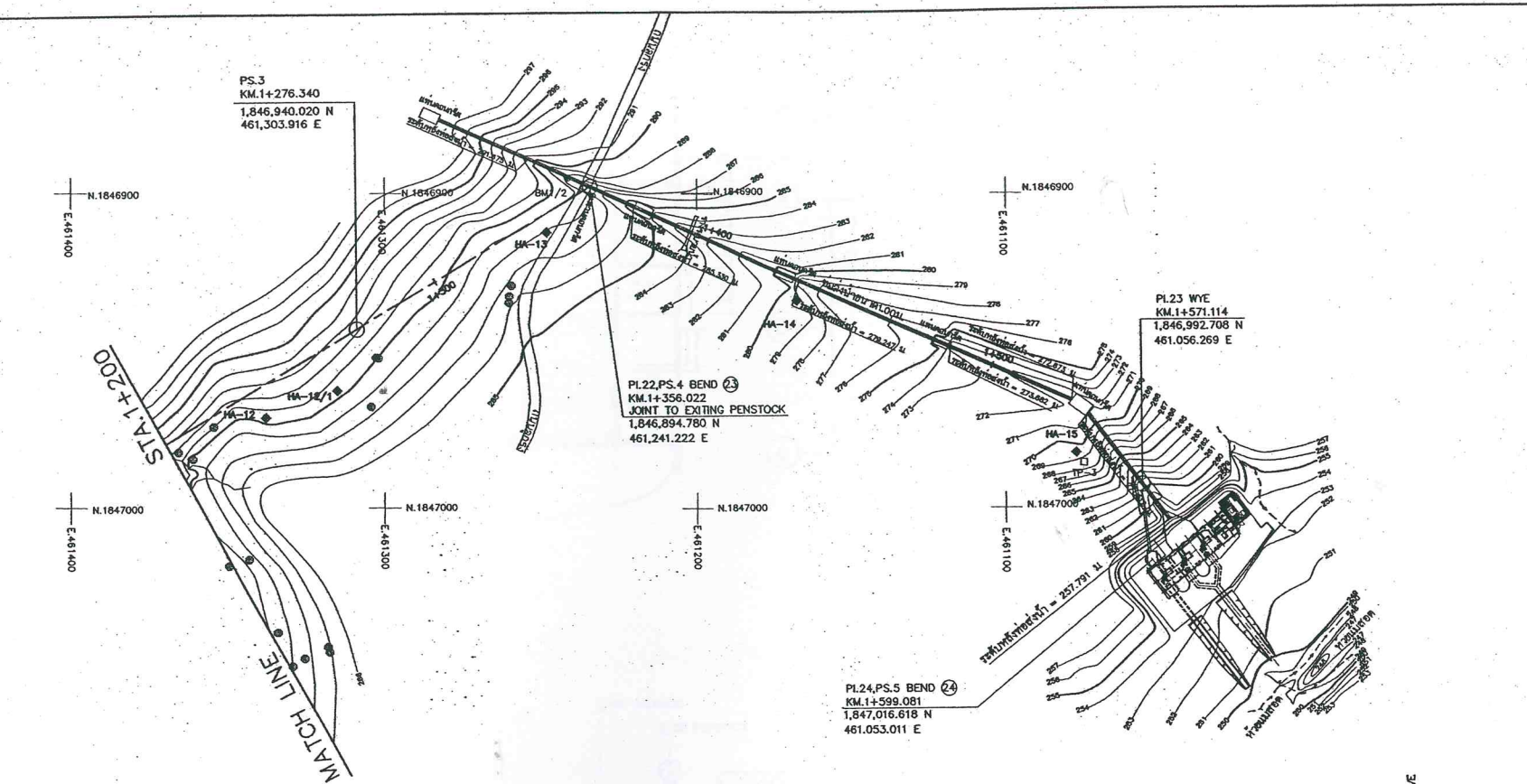
HMS-CN-03
HMS-PS-01
HMS-PS-03

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



NO.	DATE	REVISIONS	CHECKED	APPROVED
3				
2				
1				

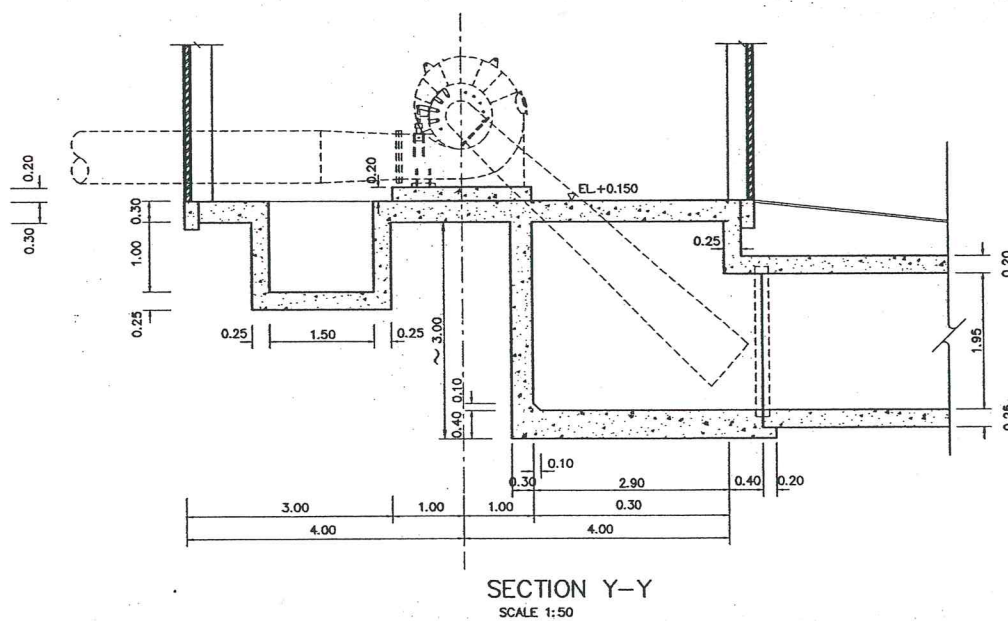
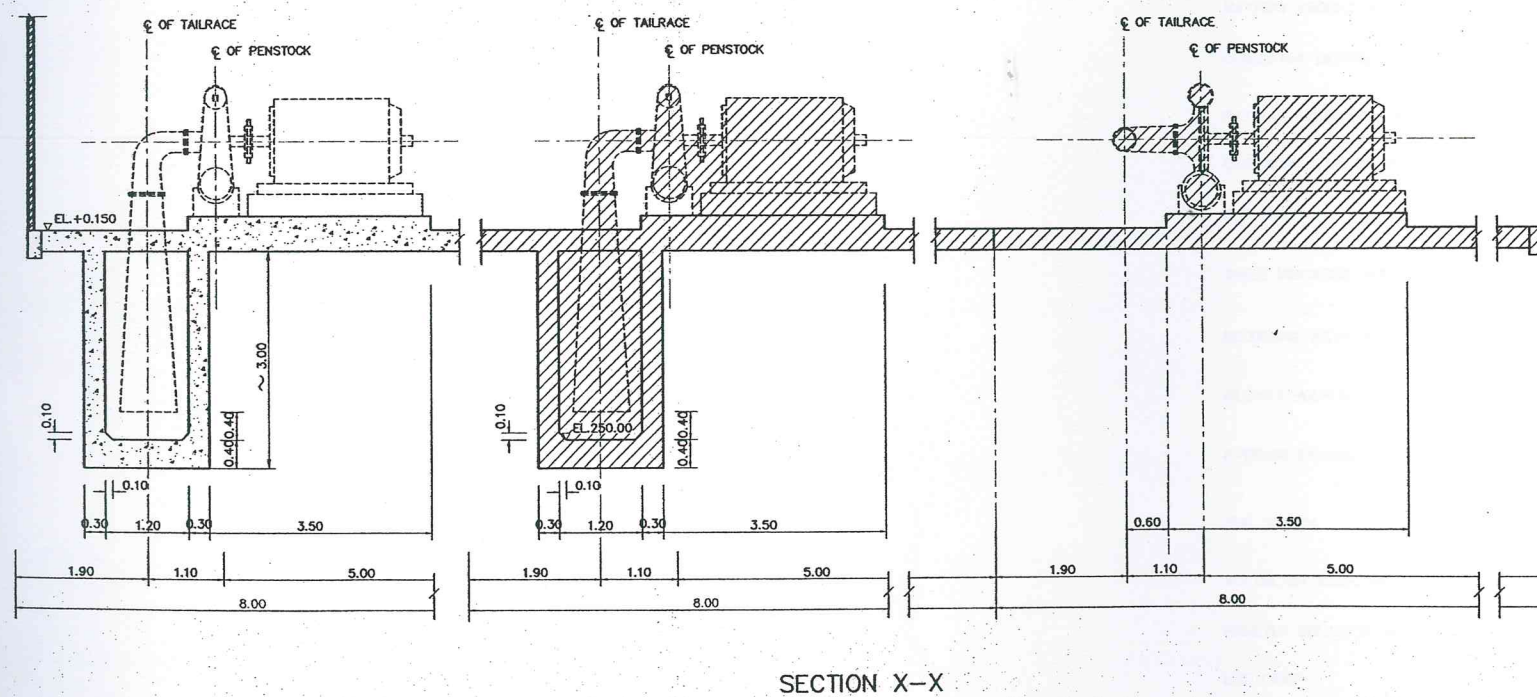
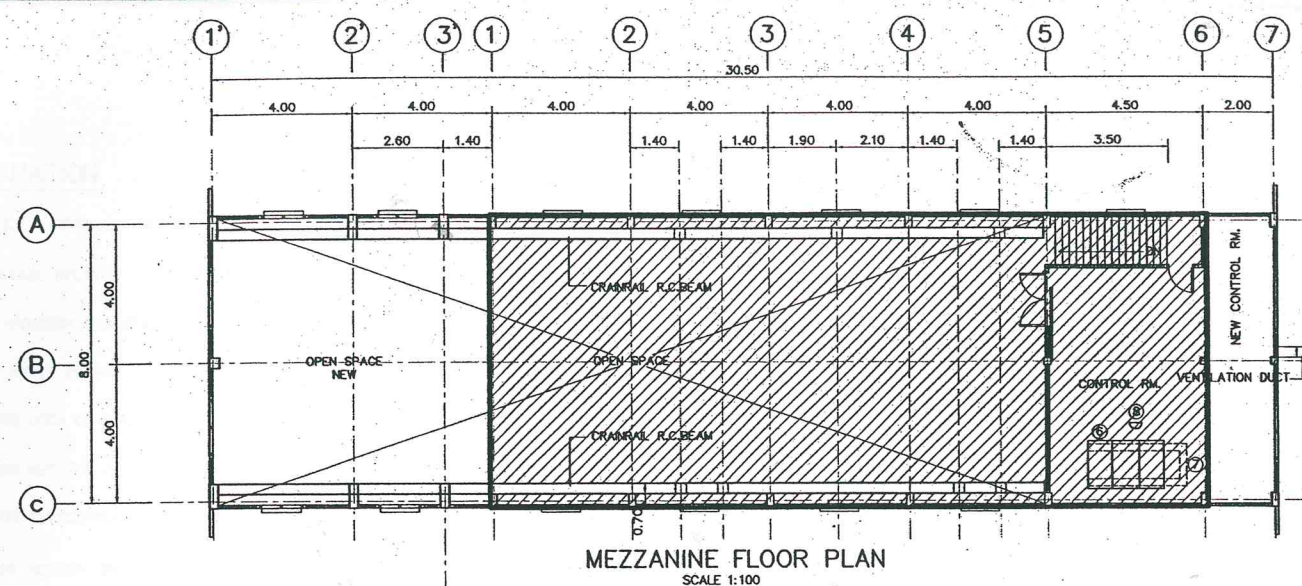
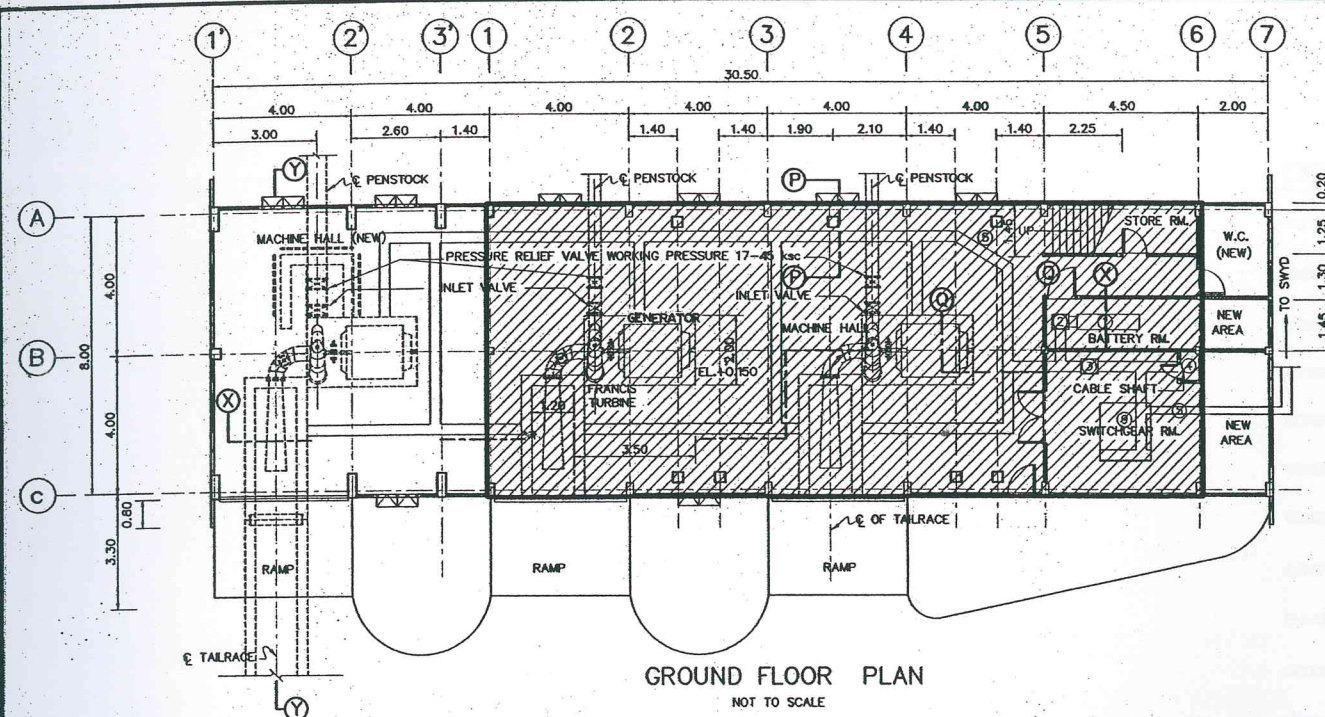
KINGDOM OF THAILAND MINISTRY OF ENERGY DEPARTMENT OF ALTERNATIVE ENERGY DEVELOPMENT AND EFFICIENCY			
HUAI MAE SOT HYDROPOWER PROJECT			
ELECTRO - MECHANICAL EQUIPMENT PENSTOCK			
NO.2, PLAN AND PROFILE, STA.0+600.000 TO STA.1+200.000			
MAHA NAKORN CONSULTANTS CO., LTD.		DEPARTMENT OF ALTERNATIVE ENERGY DEVELOPMENT AND EFFICIENCY	
DESIGNED	28.10.04	28.10.03	REVIEWED
DRAWN	28.10.04	28.10.03	SUBMITTED
CHECKED	28.10.04	28.10.03	RECOMMENDED
PROJECT MANAGER	DATE	DRAWING NO.	SHEET NO.
		HMS-PS-02	5 OF 17



HMS-GN-03
HMS-PS-01
HMS-PS-02

3				
2				
1				
NO.	DATE	REVISIONS	CHECKED	APPROVED
	CONSULTANTS		DEDE	

KINGDOM OF THAILAND MINISTRY OF ENERGY DEPARTMENT OF ALTERNATIVE ENERGY DEVELOPMENT AND EFFICIENCY			
HUAI MAE SOT HYDROPOWER PROJECT			
ELECTRO-MECHANICAL EQUIPMENT PENSTOCK			
NO.3, PLAN AND PROFILE, STA.1+200.000 TO STA.1+602.081			
MAHA NAKORN CONSULTANTS CO.,LTD.		DEPARTMENT OF ALTERNATIVE ENERGY DEVELOPMENT AND EFFICIENCY	
DESIGNED	SEL.18804	REVIEWED	
DRAWN		SUBMITTED	
CHECKED		RECOMMENDED	
	SEL.5220	APPROVED	
PROJECT MANAGER		DRAWING NO.	SHEET NO.
DATE		HMS-PS-03	6 OF 17



- NOTES :**

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS, UNLESS OTHERWISE SHOWN.
2. TURBINE & GENERATOR FOUNDATIONS, TRENCH AND BLOCKOUT SIZES AND LOCATIONS ARE ONLY APPROXIMATE THE E&M CONTRACTOR IS REQUIRED TO SUBMIT THE SHOP DRAWINGS INDICATED ALL FINAL SIZES AND LOCATIONS TO DEED FOR APPROVAL
3. DARK SHADE SHOWN EXISTING STRUCTURES & EQUIPMENT

					Maha Nakorn Consultants Co., Ltd.		DEVELOPMENT		02/04/2015	
3					DESIGNED	02/04/2015	REVIEWED	02/04/2015		
2					DRAWN	02/04/2015	SUBMITTED	02/04/2015		
1					CHECKED	02/04/2015	RECOMMENDED	02/04/2015		
NO.	DATE	REVISIONS	CHECKED	APPROVED	CHECKED	02/04/2015	APPROVED	02/04/2015		
CONSULTANTS					DEDE		DRAWING NO.		SHEET NO.	
					PROJECT MANAGER		HMS-PH-01		7 OF 17	
					DATE					