



Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

HUAI PRA THAO RESERVOIR BOUNDARY ROAD PROJECT AMPHOE KAENG KHRO, CHANGWAT CHAIYAPHUM

CIVIL WORKS

VOLUME 4

DRAWINGS



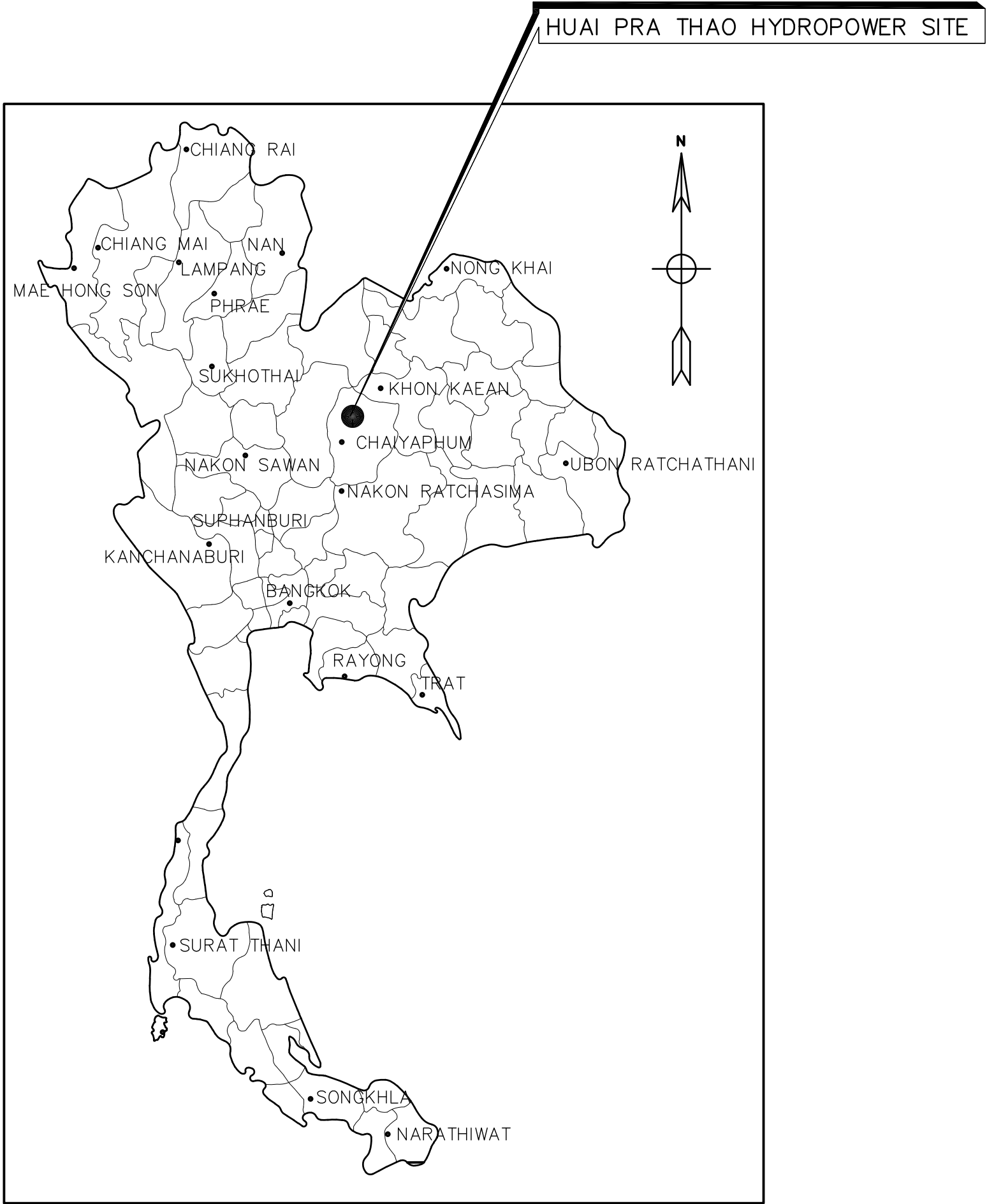
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HUAI PRA THAO RESERVOIR BOUNDARY ROAD PROJECT

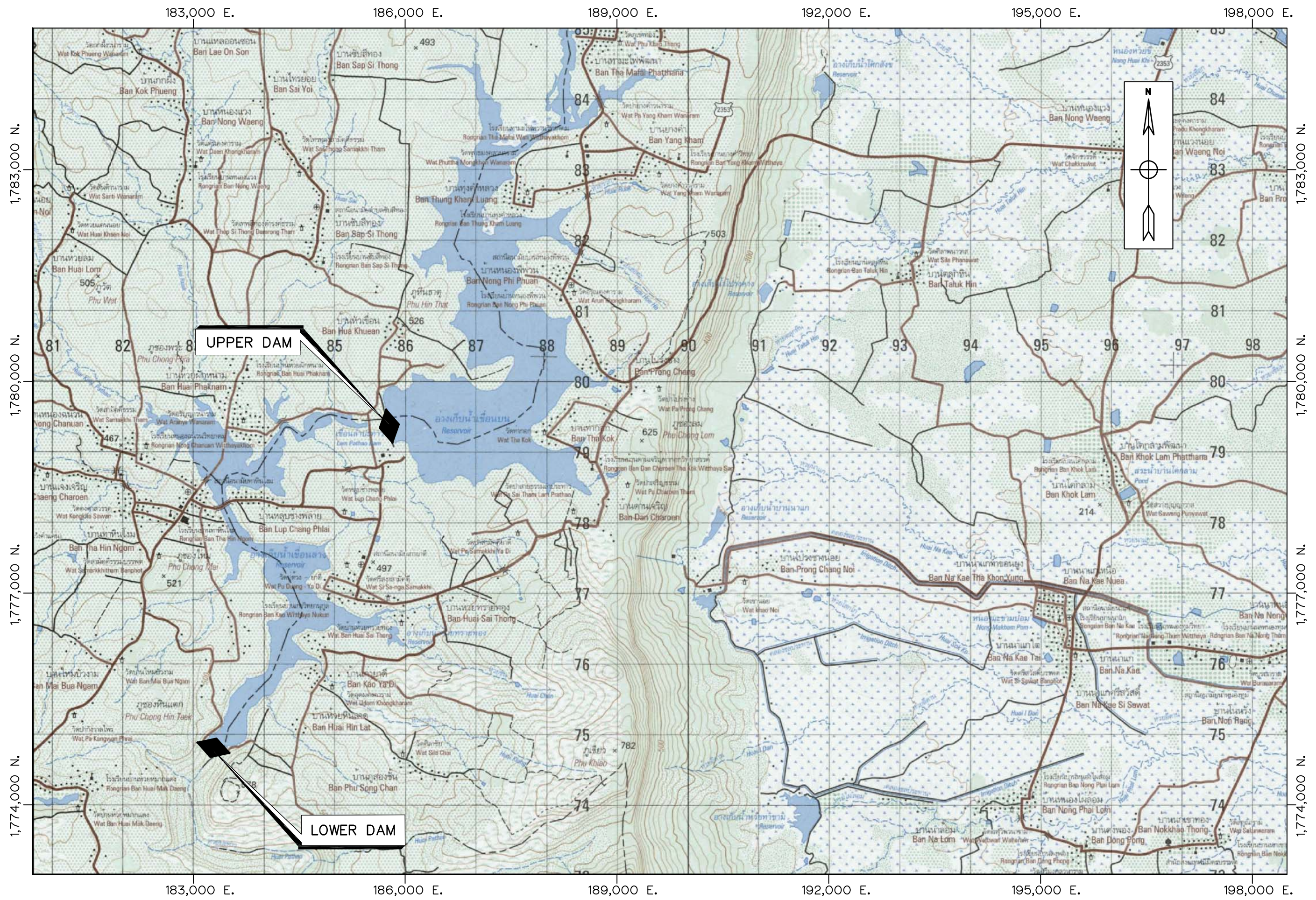
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SHEET NO.	DWG. NO.	DRAWING LISTS
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2	HRR-GN-02	GENERAL LAYOUT
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7	HRR-BR-U04	PLAN AND PROFILE, KM. 4+000 TO KM. 6+000
8	HRR-BR-U05	PLAN AND PROFILE, KM. 6+000 TO KM. 8+000
9	HRR-BR-U06	PLAN AND PROFILE, KM. 8+000 TO KM. 10+000
10	HRR-BR-U07	PLAN AND PROFILE, KM. 10+000 TO KM. 12+000
11	HRR-BR-U08	PLAN AND PROFILE, KM. 12+000 TO KM. 13+500
12	HRR-BR-U09	PLAN AND PROFILE, KM. 13+500 TO KM. 15+500
13	HRR-BR-U10	PLAN AND PROFILE, KM. 15+500 TO KM. 17+000
14	HRR-BR-U11	PLAN AND PROFILE, KM. 17+000 TO KM. 19+000
15	HRR-BR-U12	PLAN AND PROFILE, KM. 19+000 TO KM. 20+500
16	HRR-BR-U13	PLAN AND PROFILE, KM. 20+500 TO KM. 22+500
17	HRR-BR-U14	PLAN AND PROFILE, KM. 22+500 TO KM. 24+500
18	HRR-BR-U15	PLAN AND PROFILE, KM. 24+500 TO KM. 26+500
19	HRR-BR-U16	PLAN AND PROFILE, KM. 26+500 TO KM. 28+500
20	HRR-BR-U17	PLAN AND PROFILE, KM. 28+500 TO KM. 30+500
21	HRR-BR-U18	PLAN AND PROFILE, KM. 30+500 TO KM. 32+500
22	HRR-BR-U19	PLAN AND PROFILE, KM. 32+500 TO KM. 34+500
23	HRR-BR-U20	PLAN AND PROFILE, KM. 34+500 TO KM. 36+500
24	HRR-BR-U21	PLAN AND PROFILE, KM. 36+500 TO KM. 38+500
25	HRR-BR-U22	PLAN AND PROFILE, KM. 38+500 TO KM. 40+000
26	HRR-BR-U23	PLAN AND PROFILE, KM. 40+000 TO KM. 41+500
27	HRR-BR-U24	PLAN AND PROFILE, KM. 41+500 TO KM. 43+000
28	HRR-BR-U25	PLAN AND PROFILE, KM. 43+000 TO KM. 44+500
29	HRR-BR-U26	PLAN AND PROFILE, KM. 44+500 TO KM. 46+000
30	HRR-BR-U27	PLAN AND PROFILE, KM. 46+000 TO KM. 47+500
31	HRR-BR-U28	PLAN AND PROFILE, KM. 47+500 TO KM. 49+000
32	HRR-BR-U29	PLAN AND PROFILE, KM. 49+000 TO KM. 50+500
33	HRR-BR-U30	PLAN AND PROFILE, KM. 50+500 TO KM. 52+000
34	HRR-BR-U31	PLAN AND PROFILE, KM. 52+000 TO KM. 53+500
35	HRR-BR-U32	PLAN AND PROFILE, KM. 53+500 TO KM. 55+000
36	HRR-BR-U33	PLAN AND PROFILE, KM. 55+000 TO KM. 57+000
37	HRR-BR-U34	PLAN AND PROFILE, KM. 57+000 TO KM. 58+248.175
38	HRR-BR-U35	TYPICAL CROSS SECTION AND GUIDE POST DETAIL
39	HRR-BR-U36	DRAIN CULVERT TYPE OF BOUNDARY ROAD

SHEET NO.	DWG. NO.	DRAWING LISTS
CIVIL WORKS		
LOWER RESERVOIR BOUNDARY ROAD		
40	HRR-BR-L01	LAYOUT
41	HRR-BR-L02	PLAN, KM. 0+000 TO KM. 1+500
42	HRR-BR-L03	PLAN, KM. 1+500 TO KM. 3+000
43	HRR-BR-L04	PLAN, KM. 3+000 TO KM. 5+000
44	HRR-BR-L05	PLAN, KM. 5+000 TO KM. 6+500
45	HRR-BR-L06	PLAN, KM. 6+500 TO KM. 8+500
46	HRR-BR-L07	PLAN, KM. 8+500 TO KM. 10+000
47	HRR-BR-L08	PLAN, KM. 10+000 TO KM. 12+000
48	HRR-BR-L09	PLAN, KM. 12+000 TO KM. 14+000
49	HRR-BR-L10	PLAN, KM. 14+000 TO KM. 16+000
50	HRR-BR-L11	PLAN, KM. 16+000 TO KM. 17+500
51	HRR-BR-L12	PLAN, KM. 17+500 TO KM. 19+500
52	HRR-BR-L13	PLAN, KM. 19+500 TO KM. 21+500
53	HRR-BR-L14	PLAN, KM. 21+500 TO KM. 23+500
54	HRR-BR-L15	PLAN, KM. 23+500 TO KM. 25+500
55	HRR-BR-L16	PLAN, KM. 25+500 TO KM. 27+000
56	HRR-BR-L17	PLAN, KM. 27+000 TO KM. 29+000
57	HRR-BR-L18	PLAN, KM. 29+000 TO KM. 31+000
58	HRR-BR-L19	PLAN, KM. 31+000 TO KM. 33+000
59	HRR-BR-L20	PLAN, KM. 33+000 TO KM. 35+000
60	HRR-BR-L21	PLAN, KM. 35+000 TO KM. 36+500
61	HRR-BR-L22	PLAN, KM. 36+500 TO KM. 38+000
62	HRR-BR-L23	PLAN, KM. 38+000 TO KM. 39+500
63	HRR-BR-L24	PLAN, KM. 39+500 TO KM. 41+000
64	HRR-BR-L25	PLAN, KM. 41+000 TO KM. 42+500
65	HRR-BR-L26	PLAN, KM. 42+500 TO KM. 44+000
66	HRR-BR-L27	PLAN, KM. 44+000 TO KM. 45+500
67	HRR-BR-L28	PLAN, KM. 45+500 TO KM. 47+000
68	HRR-BR-L29	PLAN, KM. 47+000 TO KM. 48+138.837
69	HRR-BR-L30	TYPICAL CROSS SECTION AND GUIDE POST DETAIL
70	HRR-BR-L31	DRAIN CULVERT TYPE OF BOUNDARY ROAD
STANDARD		
71	HRR-SD-01	DRAIN CULVERT TYPE "1", PLAN SECTION AND DETAILS
72	HRR-SD-02	DRAIN CULVERT TYPE "2", PLAN SECTION AND DETAILS
73	HRR-SD-03	DRAIN CULVERT TYPE "3", PLAN SECTION AND DETAILS
74	HRR-SD-04	STANDARD REINFORCED AND INSTALLATION CONCRETE PIPE
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76	HRR-SD-06	TYPICAL RC PIPE INSTALLATION AND REINFORCEMENT
77	HRR-SD-07	BOX CULVERT, SECTIONS AND REINFORCEMENT DETAILS
78	HRR-SD-08	RIGID FRAME RC BOX CULVERT PLAN, ELEVATION AND SECTIONS
79	HRR-SD-09	RIGID FRAME RC BOX CULVERT, TABLE OF REINFORCEMENT
80	HRR-SD-10	DIMENSIONS, REINFORCEMENT AND DETAILS

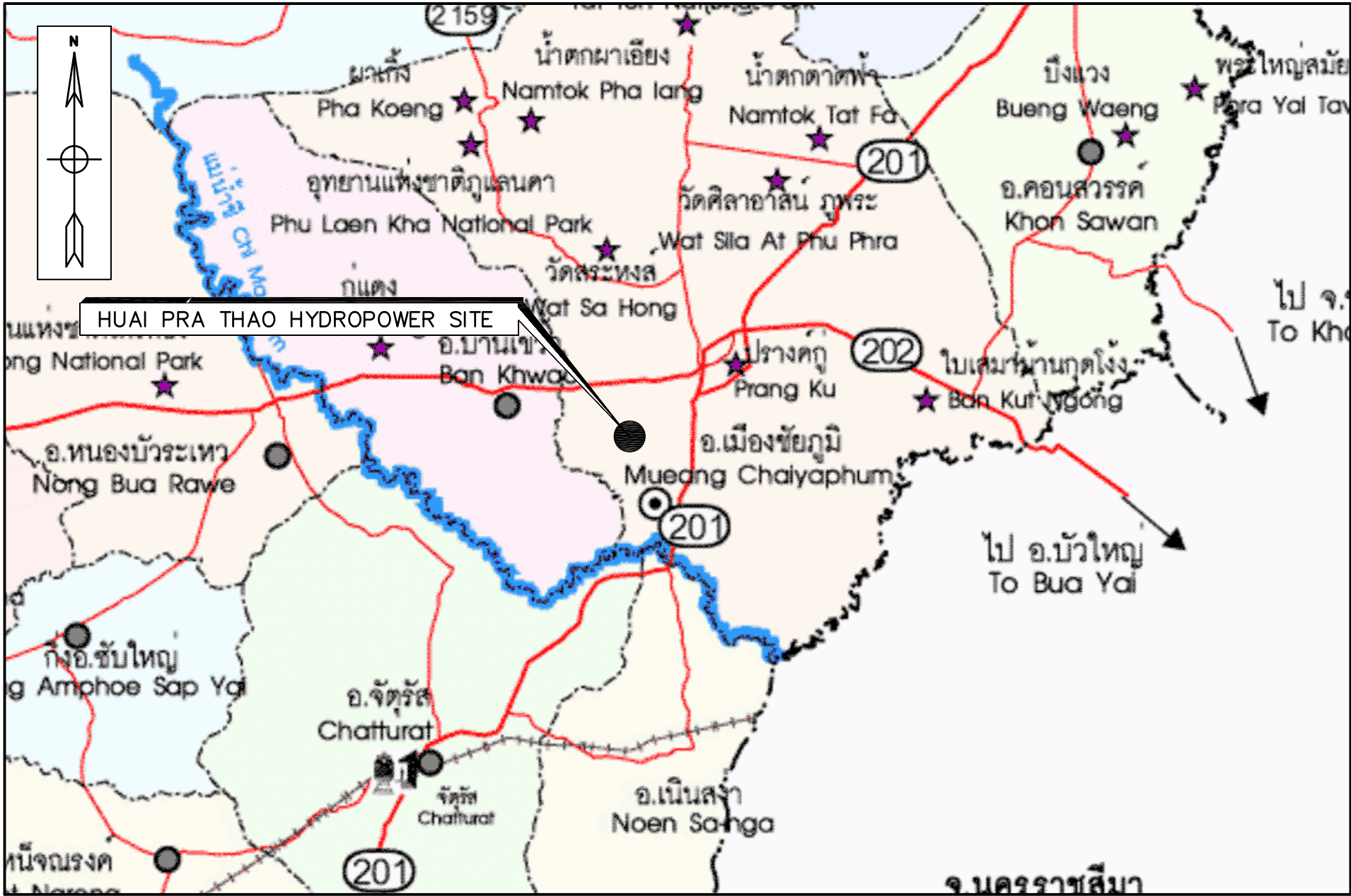
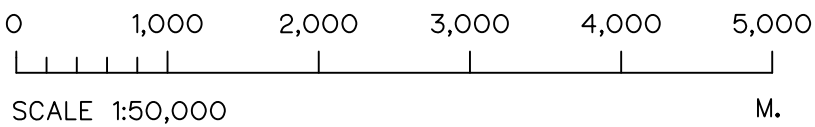


LOCATION MAP
NOT TO SCALE



PROJECT AREA MAP
SCALE 1:20,000

- NOTES :
- ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METRES, DISTANCES ARE IN KILOMETRES, UNLESS OTHERWISE SHOWN.
 - THE MAP OF HUAI PRA THAO DAM ON TOPOGRAPHIC MAPS, SCALE 1:50,000 (SHEET 5441 III WGS 84) PUBLISHED BY THE ROYAL THAI SURVEY DEPARTMENT, 1999.

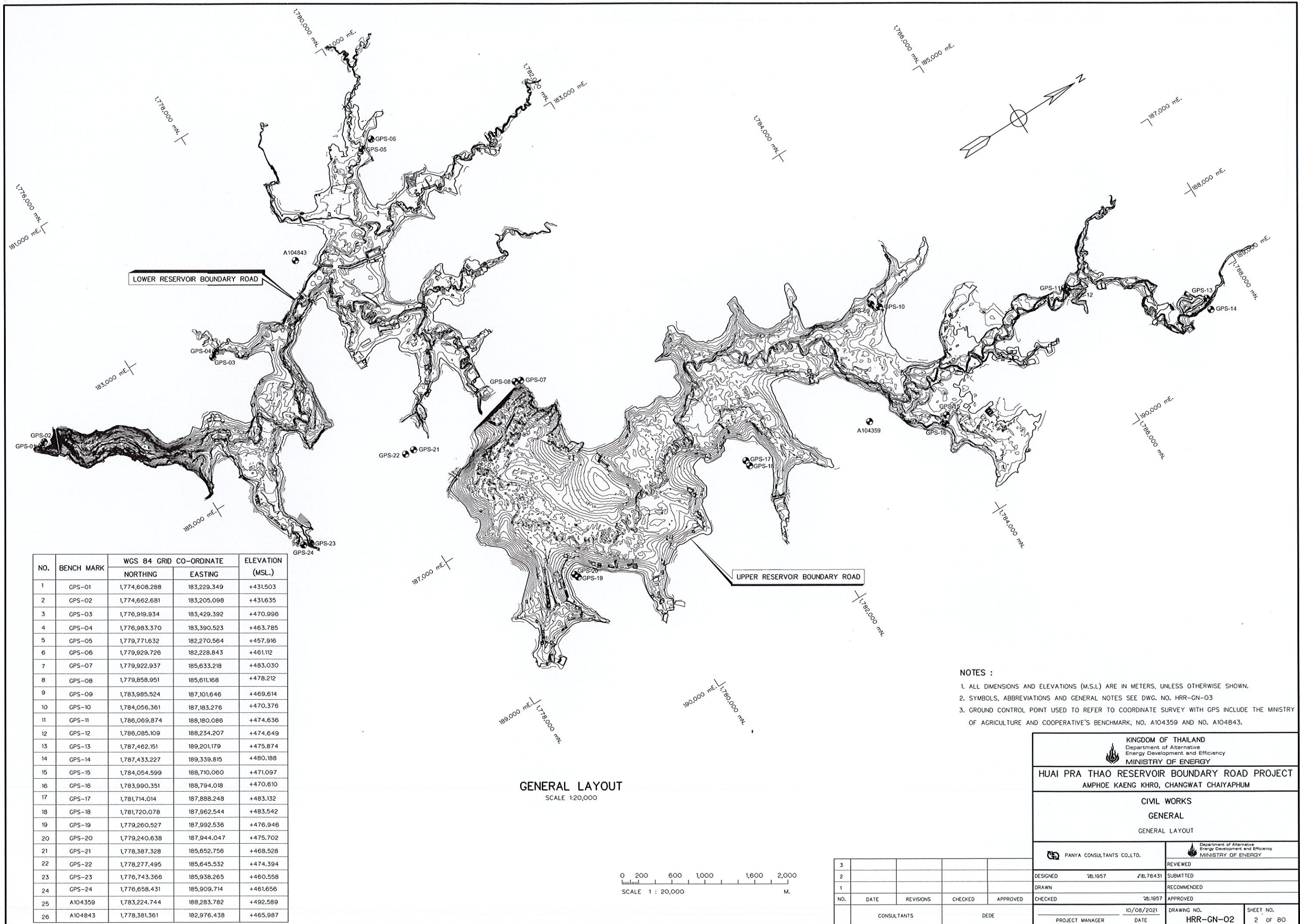


HUAI PRA THAO HYDROPOWER SITE LOCATION
NOT TO SCALE

- SYMBOLS :
- NATIONAL HIGHWAYS
 - HIGHWAY DISTRICT OFFICE
 - SUB-DIVISION, HIGHWAYS POLICE STATION
 - HOSPITAL
 - RIVER, CANAL
 - DISTRICT

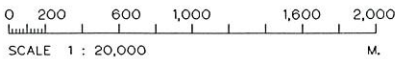
3				
2				
1				
NO.	DATE	REVISIONS	CHECKED	APPROVED
CONSULTANTS			DEDE	

KINGDOM OF THAILAND Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY			
HUAI PRA THAO RESERVOIR BOUNDARY ROAD PROJECT AMPHOE KAENG KHRO, CHANGWAT CHAIYAPHUM			
CIVIL WORKS GENERAL LOCATION MAP AND PROJECT AREA MAP			
PANYA CONSULTANTS CO.,LTD.		REVIEWED	
DESIGNED	28.1957	28.76431	SUBMITTED
DRAWN			RECOMMENDED
CHECKED	28.1957		APPROVED
PROJECT MANAGER		10/08/2021 DATE	DRAWING NO. HRR-GN-01
			SHEET NO. 1 OF 80



NO.	BENCH MARK	WGS 84 GRID CO-ORDINATE		ELEVATION (MSL.)
		NORTHING	EASTING	
1	GPS-01	1,774,608.288	183,229.349	+431.503
2	GPS-02	1,774,662.681	183,205.098	+431.635
3	GPS-03	1,776,919.934	183,429.392	+470.996
4	GPS-04	1,776,983.370	183,390.523	+463.785
5	GPS-05	1,779,771.632	182,270.564	+457.916
6	GPS-06	1,779,929.726	182,228.843	+461.112
7	GPS-07	1,779,922.937	185,633.218	+483.030
8	GPS-08	1,779,858.951	185,611.168	+478.212
9	GPS-09	1,783,985.524	187,101.646	+469.614
10	GPS-10	1,784,056.361	187,183.276	+470.376
11	GPS-11	1,786,069.874	188,180.086	+474.636
12	GPS-12	1,786,085.109	188,234.207	+474.649
13	GPS-13	1,787,462.151	189,201.179	+475.874
14	GPS-14	1,787,433.227	189,339.815	+480.188
15	GPS-15	1,784,054.599	188,710.060	+471.097
16	GPS-16	1,783,990.351	188,794.018	+470.610
17	GPS-17	1,781,714.014	187,888.248	+483.132
18	GPS-18	1,781,720.078	187,962.544	+483.542
19	GPS-19	1,779,260.527	187,992.536	+476.946
20	GPS-20	1,779,240.638	187,944.047	+475.702
21	GPS-21	1,778,387.328	185,652.756	+468.528
22	GPS-22	1,778,277.495	185,645.532	+474.394
23	GPS-23	1,776,743.366	185,938.265	+460.558
24	GPS-24	1,776,658.431	185,909.714	+461.656
25	A104359	1,783,224.744	188,283.782	+492.589
26	A104843	1,778,381.361	182,976.438	+465.987

GENERAL LAYOUT
SCALE 1:20,000



- NOTES :
1. ALL DIMENSIONS AND ELEVATIONS (M.S.L) ARE IN METERS, UNLESS OTHERWISE SHOWN.
 2. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. HRR-GN-03
 3. GROUND CONTROL POINT USED TO REFER TO COORDINATE SURVEY WITH GPS INCLUDE THE MINISTRY OF AGRICULTURE AND COOPERATIVE'S BENCHMARK, NO. A104359 AND NO. A104843.

 KINGDOM OF THAILAND Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY			
HUI PRA THAO RESERVOIR BOUNDARY ROAD PROJECT AMPHOE KAENG KHRO, CHANGWAT CHAIYAPHUM			
CIVIL WORKS GENERAL GENERAL LAYOUT			
 PANYA CONSULTANTS CO.,LTD.		 Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY	
DESIGNED 26.1957 26.76431		REVIEWED	
DRAWN		SUBMITTED	
CHECKED 26.1957		RECOMMENDED	
APPROVED		APPROVED	
10/08/2021		DRAWING NO.	
PROJECT MANAGER		DATE	
HRR-GN-02		SHEET NO.	
2 OF 80			

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
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
CMS. OR cms.	CUBIC METER PER SECOND
COL.	COLUMN
CONC.	CONCRETE
D	DEGREE OF CURVE
DB.	DEFORM BAR
d.	DEPTH OF WATER
DIA. OR ∅	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.I.T.	THE ENGINEERING INSTITUTE OF THAILAND UNDER H.M. THE KINGS PATRONAGE
E.F.	END OF FACE
EL. OR ELEV.	ELEVATION
EXIST.	EXISTING
EXP.	EXPANSION
EXT.	EXTERIOR
EX.	EXTERNAL DISTANCE OF CURVE
f	FREE BOARD , FINISH
F.F.	FAR FACE
F.S.L.	FULL SUPPLY LEVEL
FTG.	FOOTING
HD.	HEAD
HEX.	HEXAGONAL
HOR.	HORIZONTAL
I.D.	INSIDE DIAMETER
I.F.	INSIDE FACE
IN. OR "	INCH
INT.	INTERIOR
INV.	INVERT
Kg.	KILOGRAM
Km.	KILOMETER
KPH.	KILOMETER PER HOUR
KSC.	KILOGRAM PER SQUARE CENTIMETER
L	LENGTH OF CURVE
LC.	LENGTH OF HORIZONTAL CURVE
LONG.	LONGITUDINAL
LT.	LEFT
L.W.L.	LOW WATER LEVEL
M. OR m.	METER
M. ² OR m. ²	SQUARE METER
M. ³ OR m. ³	CUBIC METER
MM. OR mm.	MILLIMETER
M./S OR m./s	METER PER SECOND
MIN.	MINIMUM

MAX.	MAXIMUM
M.S.L.	MEAN SEA LEVEL
MISC.	MISCELLANEOUS
N.	NORTH
n.	MANNING'S 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
RB.	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 BOREHOLES
	BOREHOLES
	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 AND MASONRY
	SECTION OF DUMPED RIPRAP
	SECTION OF MASONRY
	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 CONSTRUCTION PERIOD, IT IS THE CONTRACTOR'S OBLIGATION TO CHECK THE CORRECTION OF ALL RELEVANT LOCATIONS, DIMENSIONS, ELEVATIONS AND OTHER DATA AS PROVIDED BY THE DRAWINGS AND TECHNICAL SPECIFICATIONS BEFORE IMPLEMENTATION OF THE WORKS.
- IN CASE OF ANY DETAILS NOT MENTIONED OR NOT SHOWN IN THE DRAWINGS 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 CHAMFERED 2 cm. UNLESS OTHERWISE SHOWN.
- SODDING ON 0.10 M TOP SOIL SHALL BE PROVIDED ON EMBANKMENT SLOPES AND BERMS, OR THE PLACES DIRECTED BY THE ENGINEER.
- IN CASE SILTSTONE OR SHALE OR MUDSTONE FOUNDATION; AS SOON AS FINISHED EXCAVATION TO FOUNDATION ELEVATION, SHOTCRETE OR LEAN CONCRETE MUST BE APPLIED IMMEDIATELY.
- SLOPE IN CUT AND FILL SECTIONS, UNLESS OTHERWISE SHOWN, SHALL BE CONFORMED TO THE FOLLOWING TABLE OR AS DIRECTED BY FIELD ENGINEER.

TYPE OF GROUND	CUT SLOPE 1:H	FILL SLOPE 1:H
EARTH	1:1	1:1.5
MODERATELY WEATHERED ROCK	1:0.5	1:1
FRESH ROCK	1:0.25	1:1

STRUCTURAL DESIGN NOTES :

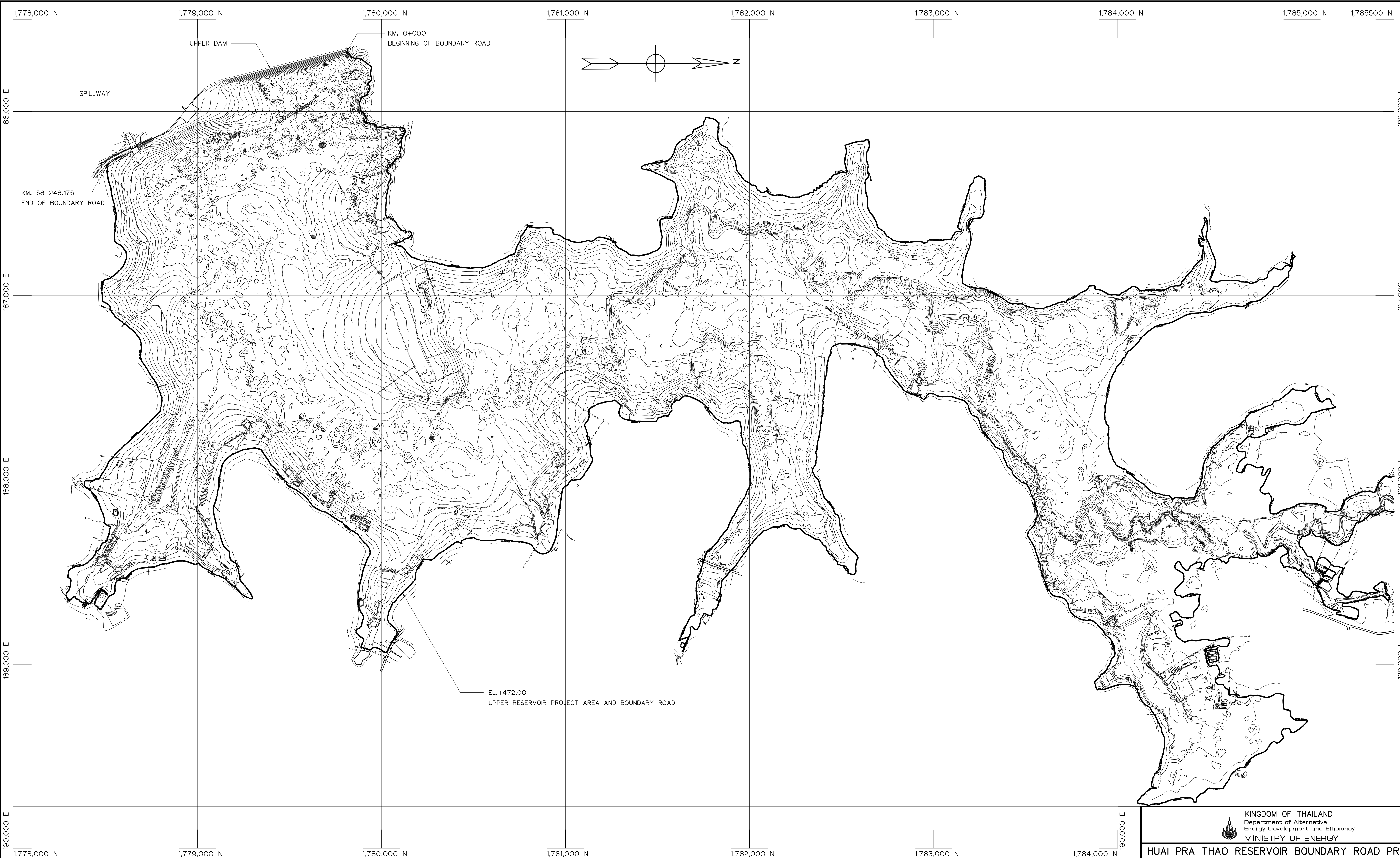
- THE ULTIMATE COMPRESSIVE STRENGTH OF CONCRETE OF STANDARD CYLINDER (∅0.15x0.30 m.) TEST AT AGE 28 DAYS SHALL BE AS THE FOLLOWING, UNLESS OTHERWISE SHOWN.

fc' (ksc)	DESCRIPTION
210	REINFORCED CONCRETE AND SECONDARY CONCRETE
140	LEAN CONCRETE

- UNLESS OTHERWISE SHOWN, THE FOLLOWING CLEAR COVERING OF CONCRETE OVER REINFORCEMENT SHALL BE USED :
 - CONCRETE CAST AGAINST AND PERMANENTLY EXPOSED TO EARTH 7.5 cm.
 - CONCRETE EXPOSED TO EARTH OR WEATHER 5.0 cm.
 - CONCRETE NOT EXPOSED TO EARTH OR WEATHER 2.5 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 SHALL BE TREATED AS DIRECTED IN ORDER TO ASSUME THE BEST BOND.
- A 5 cm. (MIN.) LAYER OF LEAN CONCRETE SHALL BE PLACED BELOW CONCRETE STRUCTURES.
- THE STRUCTURES SHALL BE PLACED ON UNDISTURBED SOILS AND BACKFILL AROUND THE STRUCTURES SHALL BE WELL 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 STRUCTURE STEELS SHALL BE CONFORMED TO T.I.S. 1227-2558
- REINFORCED STEEL BARS SHALL BE CONFORMED TO T.I.S. AS FOLLOW :
 - DEFORMED BARS (SD30) - T.I.S. 24-2559
 - ROUND BARS (SR24) - T.I.S. 20-2559
- THE E.I.T. STANDARDS SHALL BE APPLIED FOR ALL STRUCTURES WHICH ARE NOT SPECIFIED IN STRUCTURAL DESIGN NOTE 1 TO 11.
- ALLOWABLE BEARING CAPACITY OF FOUNDATION SHALL NOT BE LESS THAN AS FOLLOW
 - DRAIN CULVERT $Q_a = 15 \text{ T/M}^2$

3				
2				
1				
NO.	DATE	REVISIONS	CHECKED	APPROVED
	CONSULTANTS		DEDE	

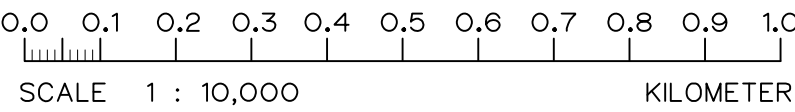
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HUAI PRA THAO RESERVOIR BOUNDARY ROAD PROJECT AMPHOE KAENG KHRO, CHANGWAT CHAIYAPHUM			
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PANYA CONSULTANTS CO.,LTD.		Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY	
DESIGNED 28.1957 48.76431		REVIEWED	
DRAWN		RECOMMENDED	
CHECKED 28.1957		APPROVED	
PROJECT MANAGER		10/08/2021 DATE	DRAWING NO. HRR-GN-O3
			SHEET NO. 3 OF 80



NOTES :

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

LAYOUT
SCALE 1:10,000



3				
2				
1				
NO.	DATE	REVISIONS	CHECKED	APPROVED
	CONSULTANTS		DEDE	



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

HUAI PRA THAO RESERVOIR BOUNDARY ROAD PROJECT
AMPHOE KAENG KHRO, CHANGWAT CHAIYAPHUM

CIVIL WORKS
UPPER RESERVOIR BOUNDARY ROAD
LAYOUT



PANYA CONSULTANTS CO.,LTD.



Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

REVIEWED

DESIGNED28.1957J81.76431

DRAWN

CHECKED28.1957

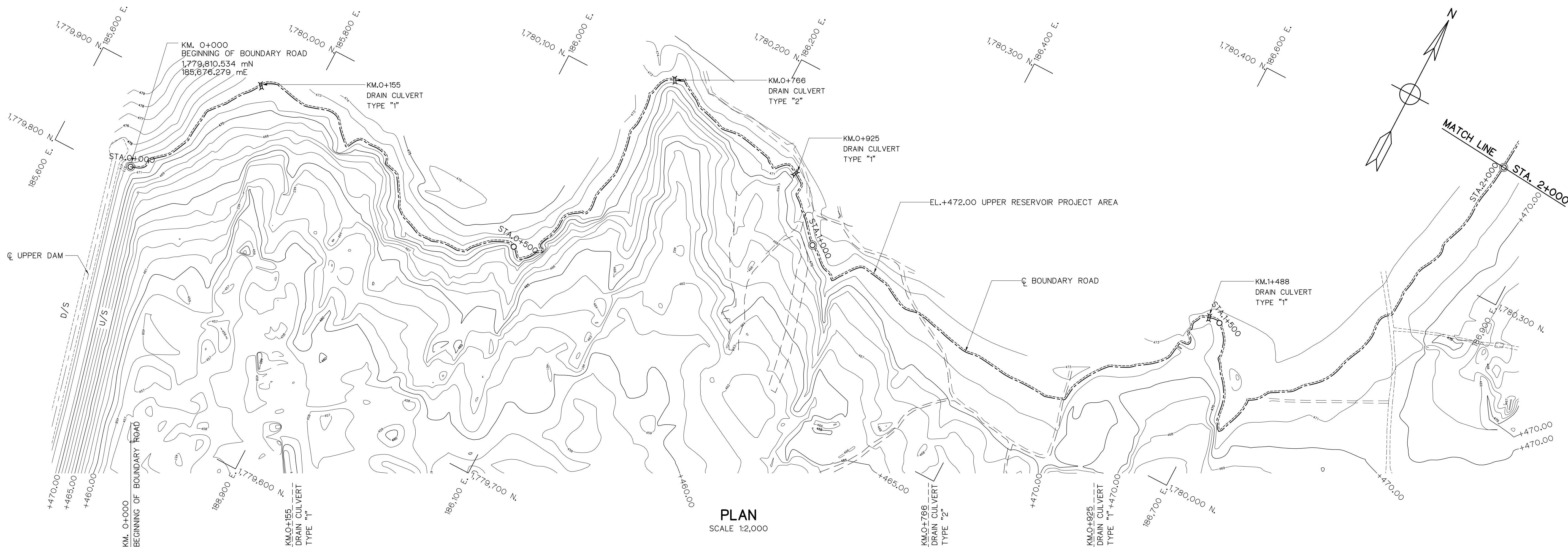
APPROVED

PROJECT MANAGER

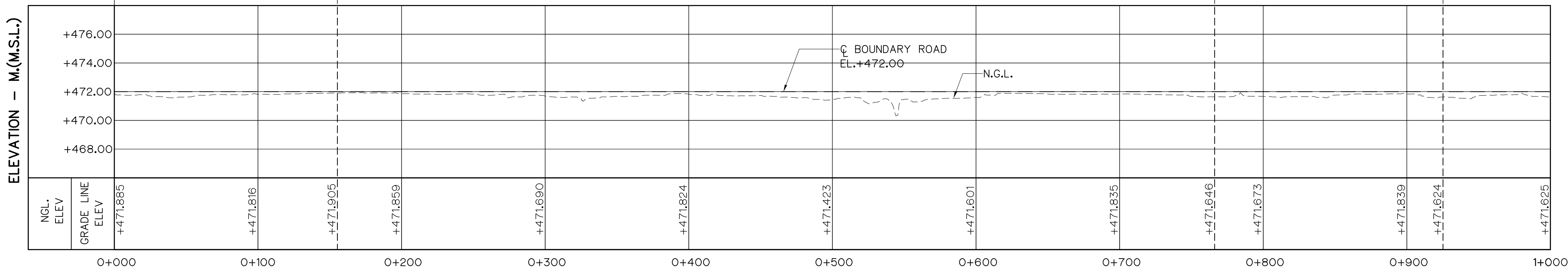
10/08/2021
DATE

DRAWING NO.
HRR-BR-U01

SHEET NO.
4 OF 80

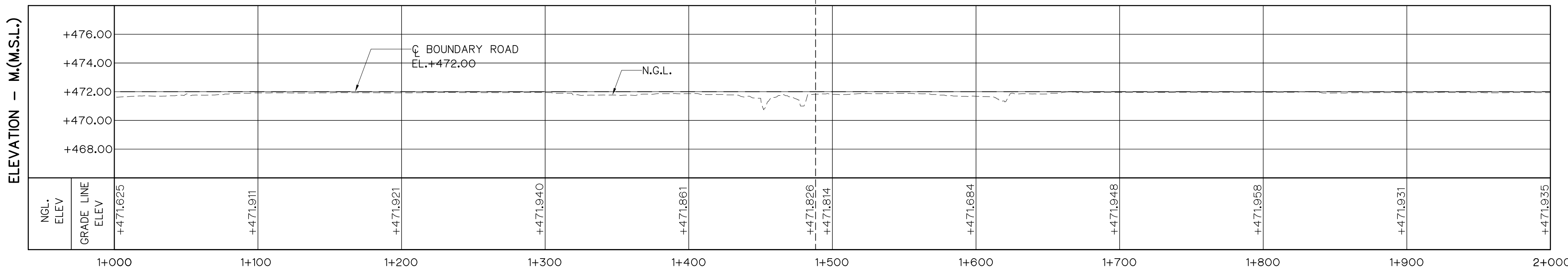


PLAN
SCALE 1:2,000



PROFILE

HORIZONTAL SCALE 1:2,000
VERTICAL SCALE 1:200



PROFILE

HORIZONTAL SCALE 1:2,000
VERTICAL SCALE 1:200

LEGEND

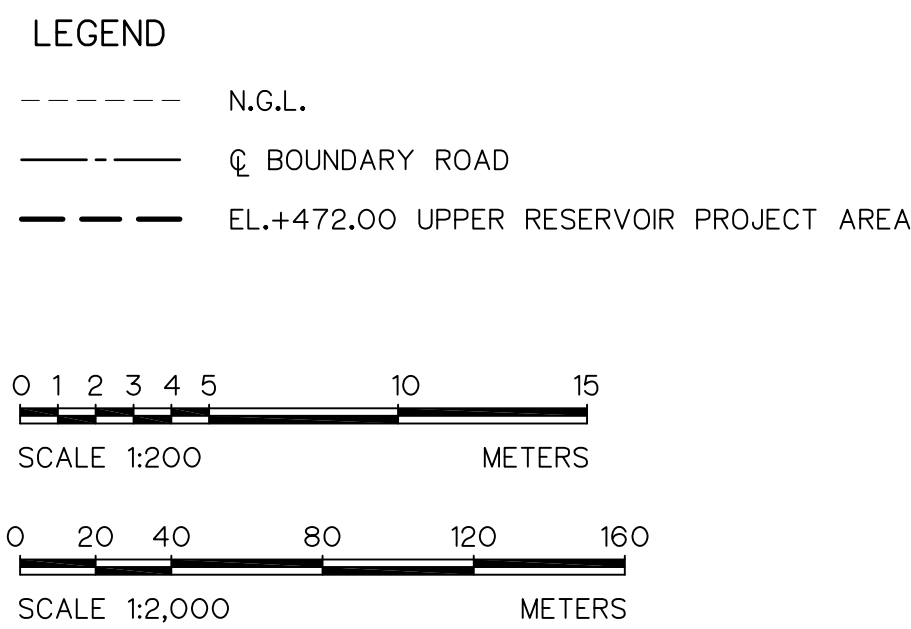
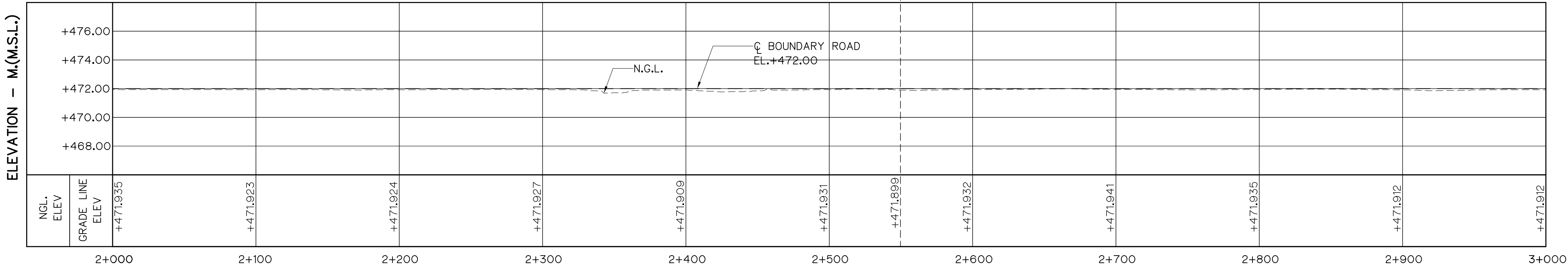
- N.G.L.
- - - BOUNDARY ROAD
- - - EL.+472.00 UPPER RESERVOIR PROJECT AREA

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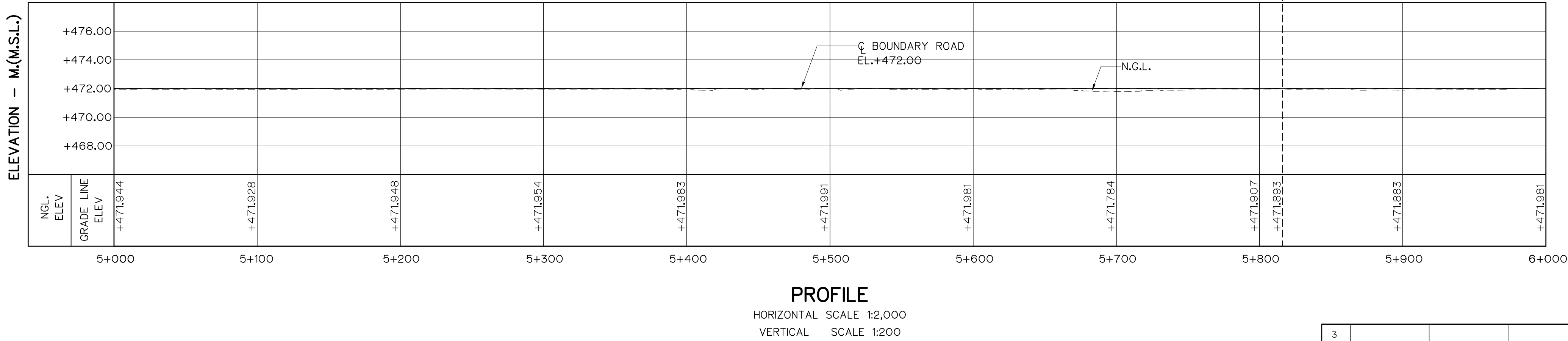
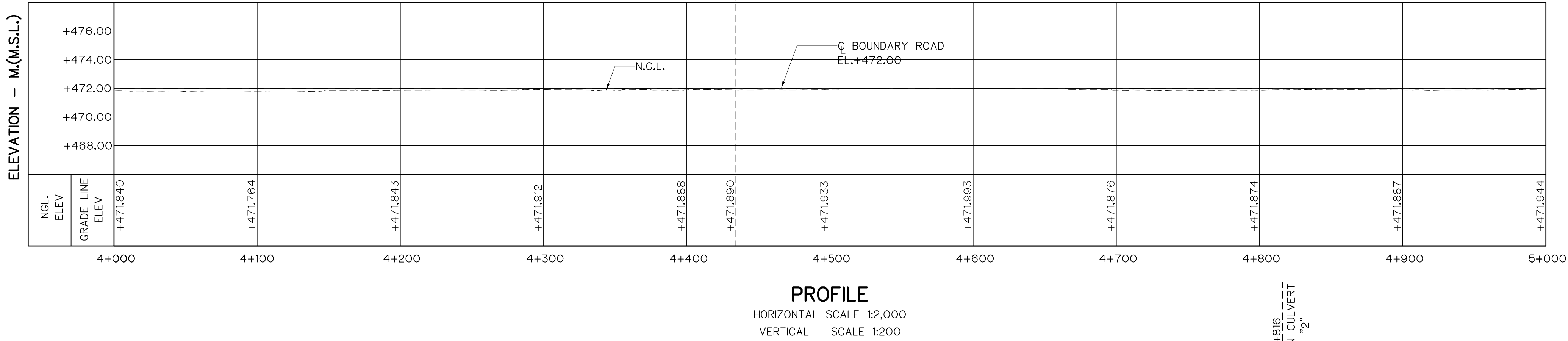
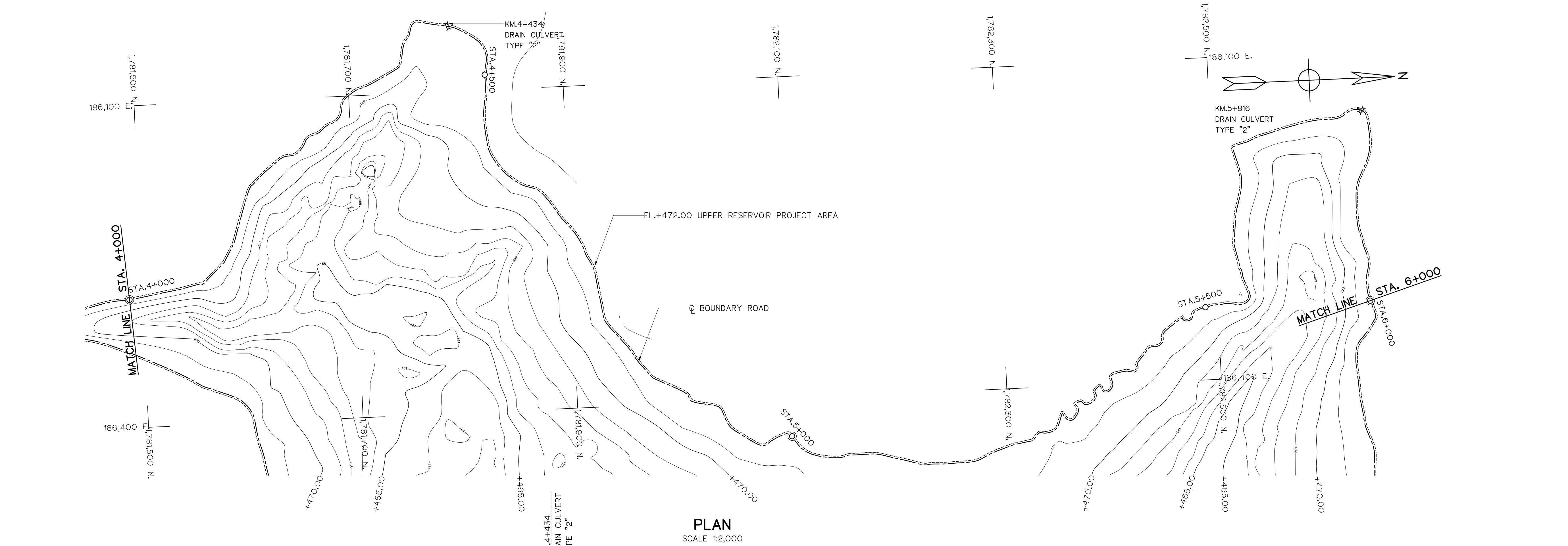
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 KINGDOM OF THAILAND Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY			
HUAI PRA THAO RESERVOIR BOUNDARY ROAD PROJECT AMPHOE KAENG KHRO, CHANGWAT CHAIYAPHUM			
CIVIL WORKS UPPER RESERVOIR BOUNDARY ROAD PLAN AND PROFILE, KM. 0+000 TO KM. 2+000			
 PANYA CONSULTANTS CO.,LTD.		 Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY	
DESIGNED 28.1957 28.76431		REVIEWED	
DRAWN		RECOMMENDED	
CHECKED 28.1957		APPROVED	
PROJECT MANAGER 10/08/2021 DATE		DRAWING NO. HRR-BR-U02	
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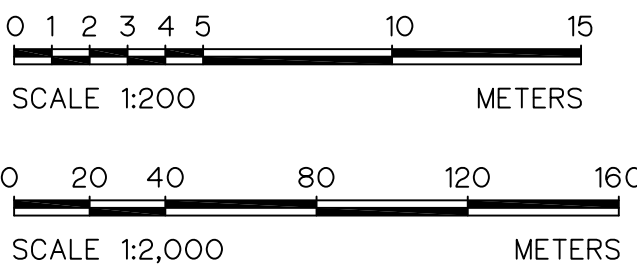
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NO.	DATE	REVISIONS	CHECKED	APPROVED
		CONSULTANTS		DEDE



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2						DRAWN			RECOMMENDED	
1						CHECKED	28.1957		APPROVED	
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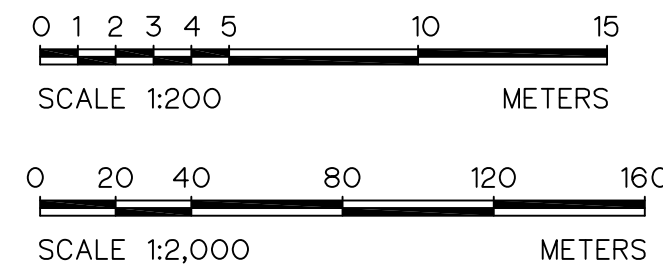
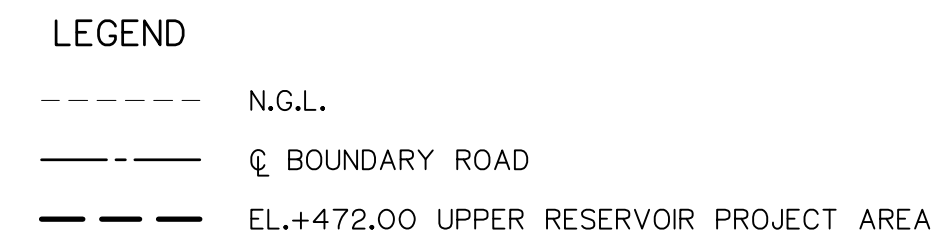
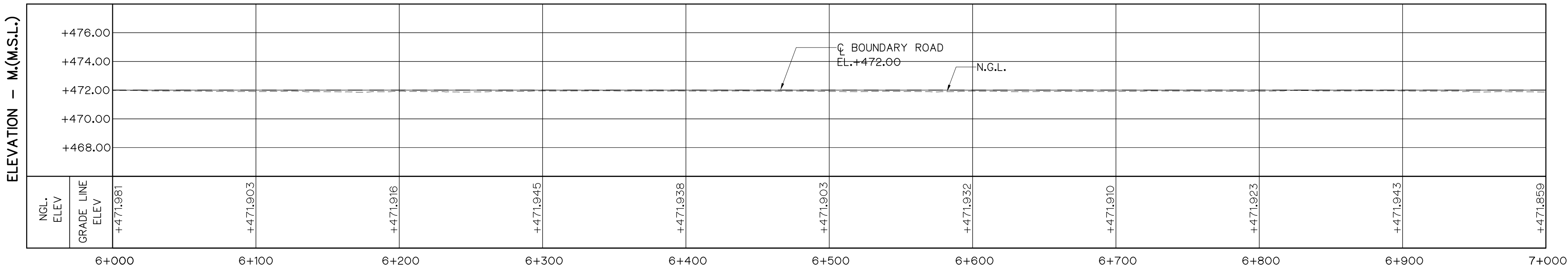


- LEGEND
- N.G.L.
 - BOUNDARY ROAD
 - EL.+472.00 UPPER RESERVOIR PROJECT AREA



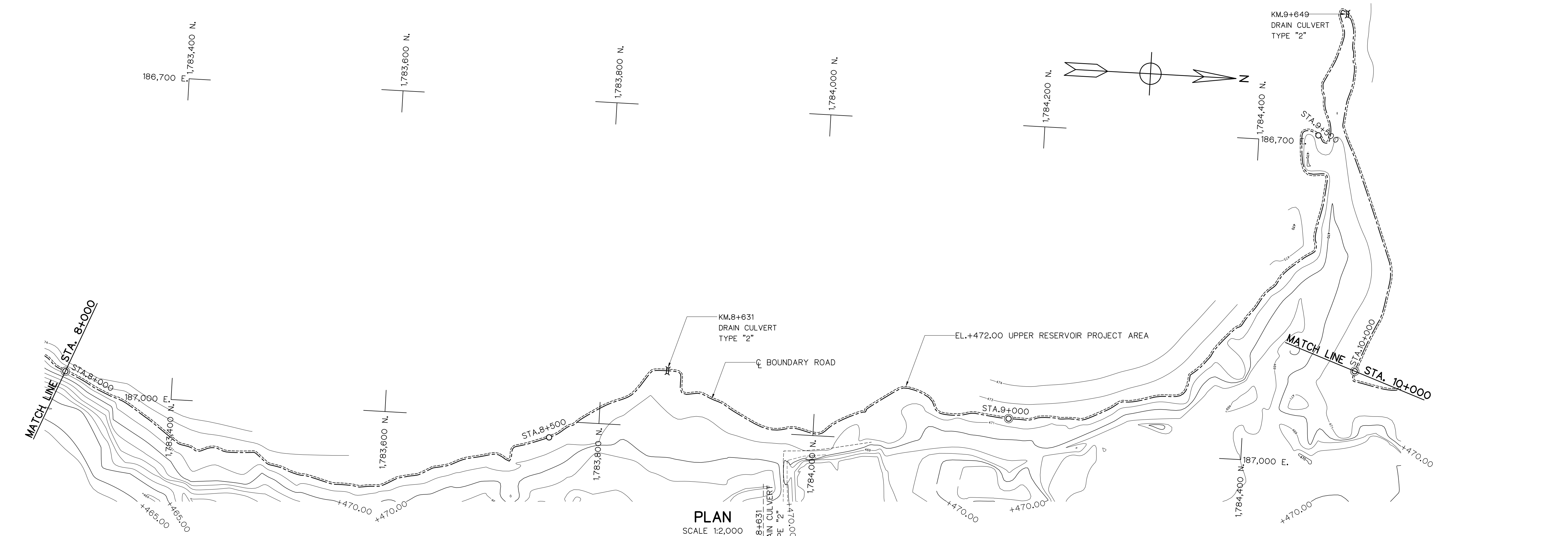
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HUAI PRA THAO RESERVOIR BOUNDARY ROAD PROJECT AMPHOE KAENG KHRO, CHANGWAT CHAIYAPHUM			
CIVIL WORKS UPPER RESERVOIR BOUNDARY ROAD PLAN AND PROFILE, KM. 4+000 TO KM. 6+000			
 PANYA CONSULTANTS CO.,LTD.		 Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY	
REVIEWED		REVIEWED	
DESIGNED	28.1957	28.76431	SUBMITTED
DRAWN		RECOMMENDED	
CHECKED	28.1957		APPROVED
PROJECT MANAGER		10/08/2021 DATE	DRAWING NO. HRR-BR-U04
CONSULTANTS		DEDE	SHEET NO. 7 OF 80

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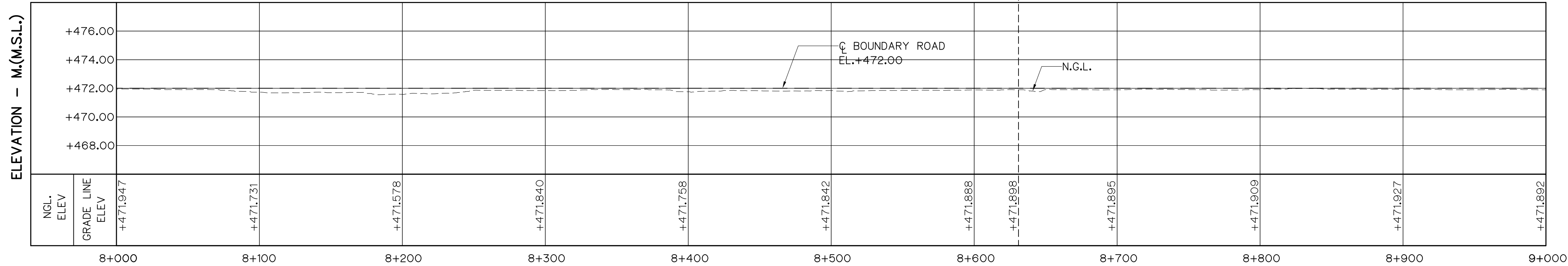


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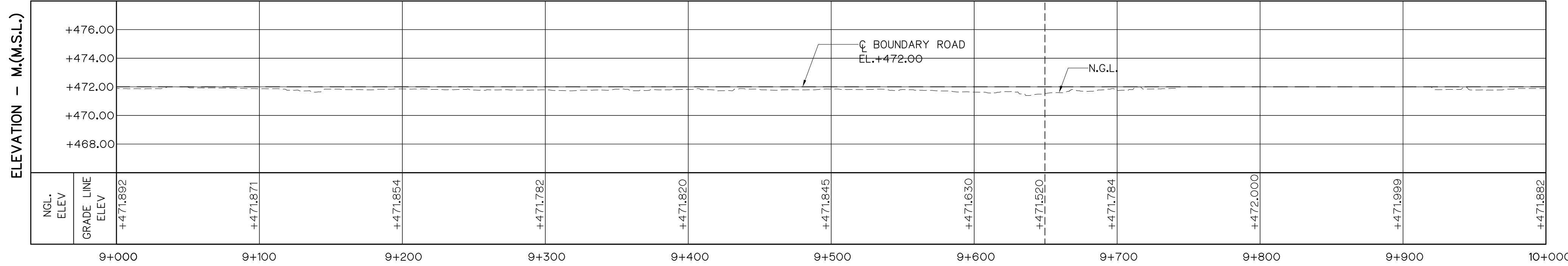
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HUAI PRA THAO RESERVOIR BOUNDARY ROAD PROJECT AMPHOE KAENG KHRO, CHANGWAT CHAIYAPHUM			
CIVIL WORKS UPPER RESERVOIR BOUNDARY ROAD PLAN AND PROFILE, KM. 6+000 TO KM. 8+000			
 PANYA CONSULTANTS CO.,LTD.		 Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY	
DESIGNED		REVIEWED	
๒๕19/57		SUBMITTED	
DRAWN		RECOMMENDED	
CHECKED		APPROVED	
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PROJECT MANAGER DATE		DRAWING NO. HRR-BR-U05	
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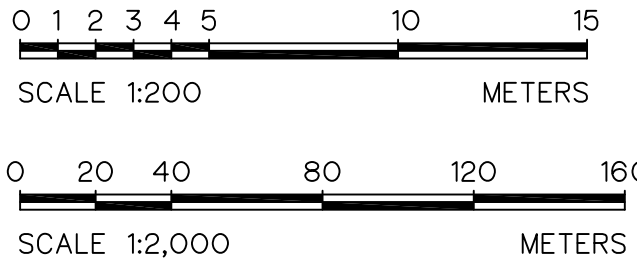


PROFILE
HORIZONTAL SCALE 1:2,000
VERTICAL SCALE 1:200



PROFILE
HORIZONTAL SCALE 1:2,000
VERTICAL SCALE 1:200

- LEGEND
- N.G.L.
 - ☒ BOUNDARY ROAD
 - EL.+472.00 UPPER RESERVOIR PROJECT AREA



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

HUAI PRA THAO RESERVOIR BOUNDARY ROAD PROJECT
AMPHOE KAENG KHRO, CHANGWAT CHAIYAPHUM

CIVIL WORKS
UPPER RESERVOIR BOUNDARY ROAD
PLAN AND PROFILE, KM. 8+000 TO KM. 10+000

PANYA CONSULTANTS CO.,LTD.

Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

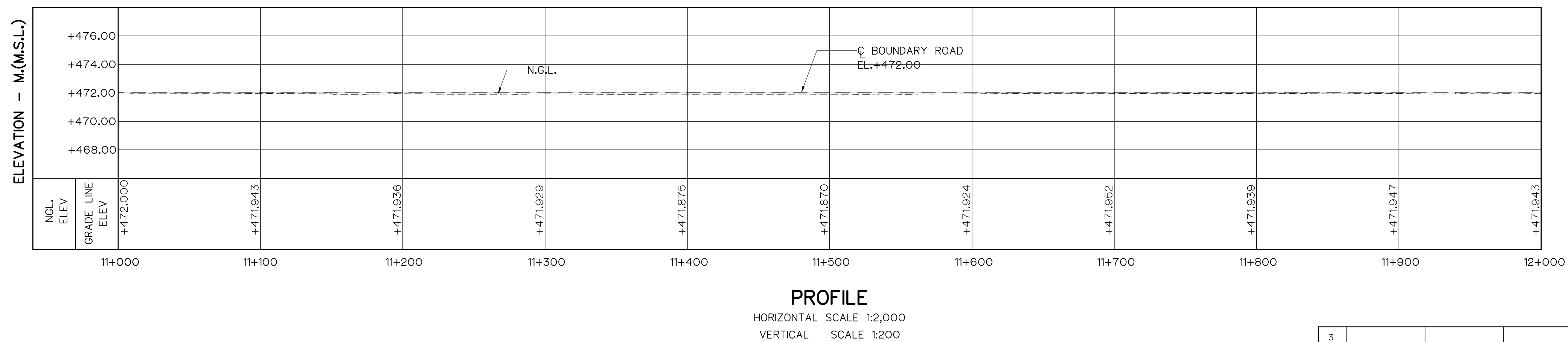
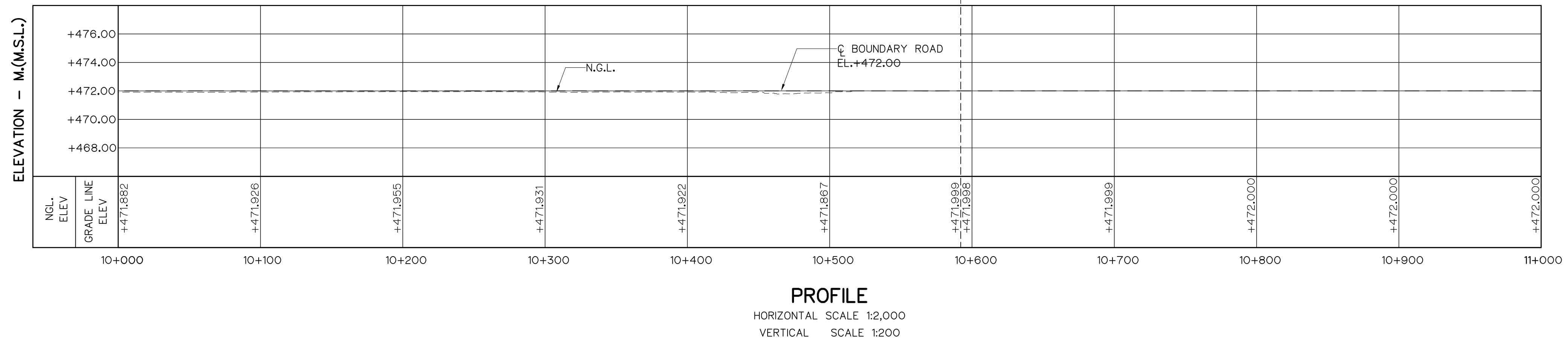
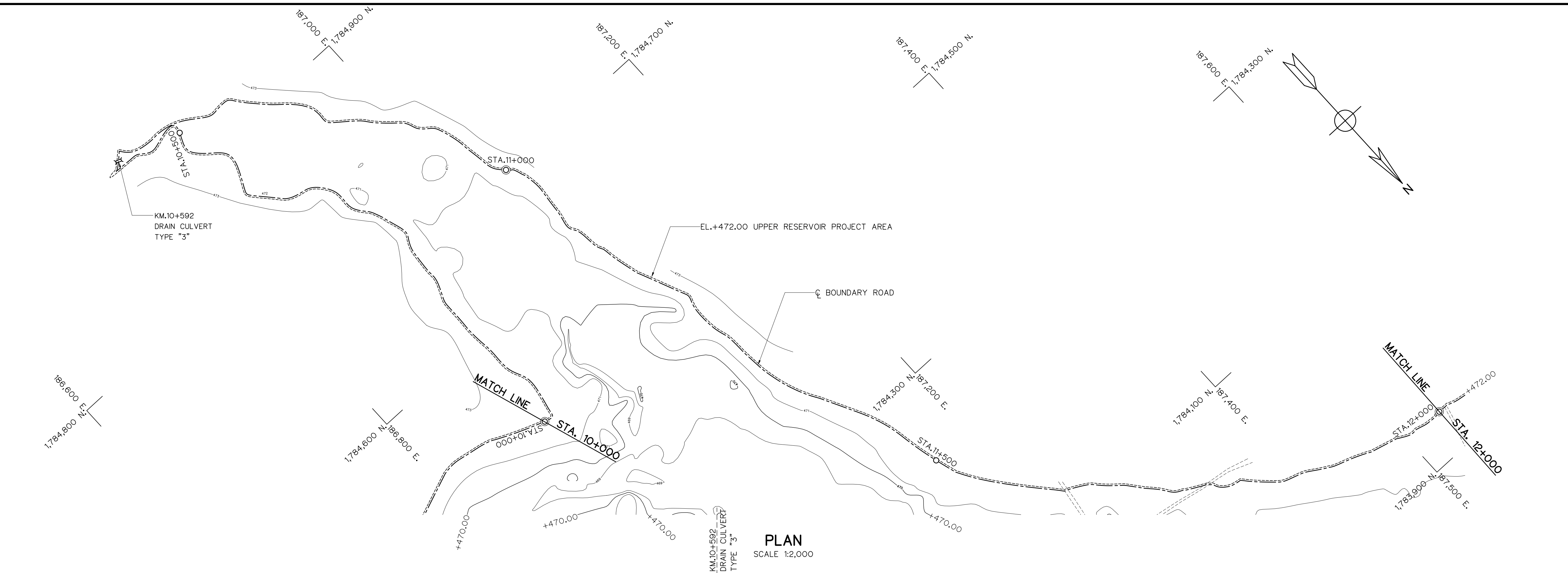
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NO.	DATE	REVISIONS	CHECKED	APPROVED		

PROJECT MANAGER

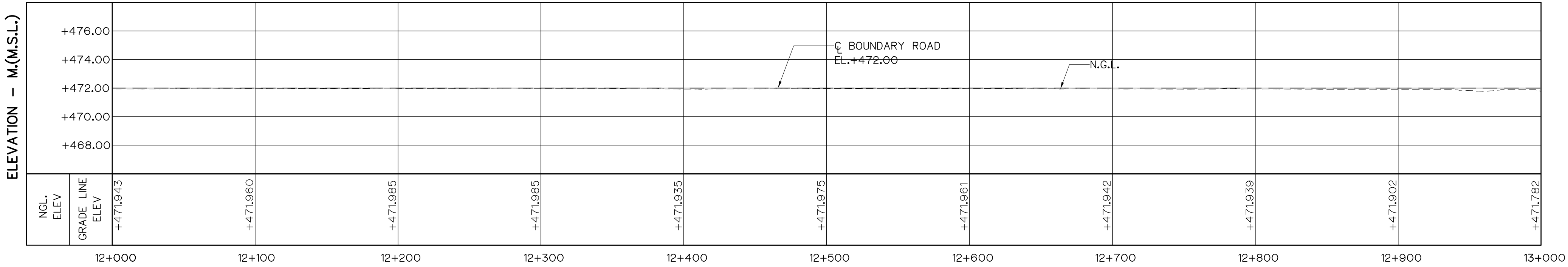
10/08/2021
DATE

DRAWING NO.
HRR-BR-U06

SHEET NO.
9 OF 80



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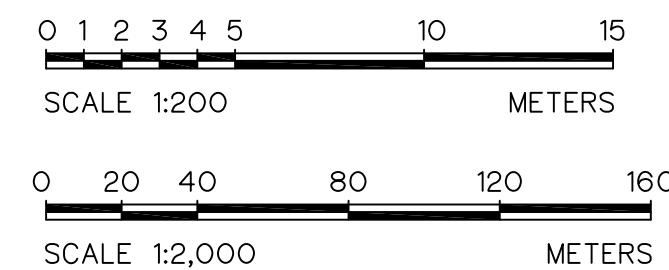
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NGL. ELEV.	
GRADE LINE ELEV.	
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+471.356	13+100
+471.884	13+200
+471.878	13+300
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LEGEND

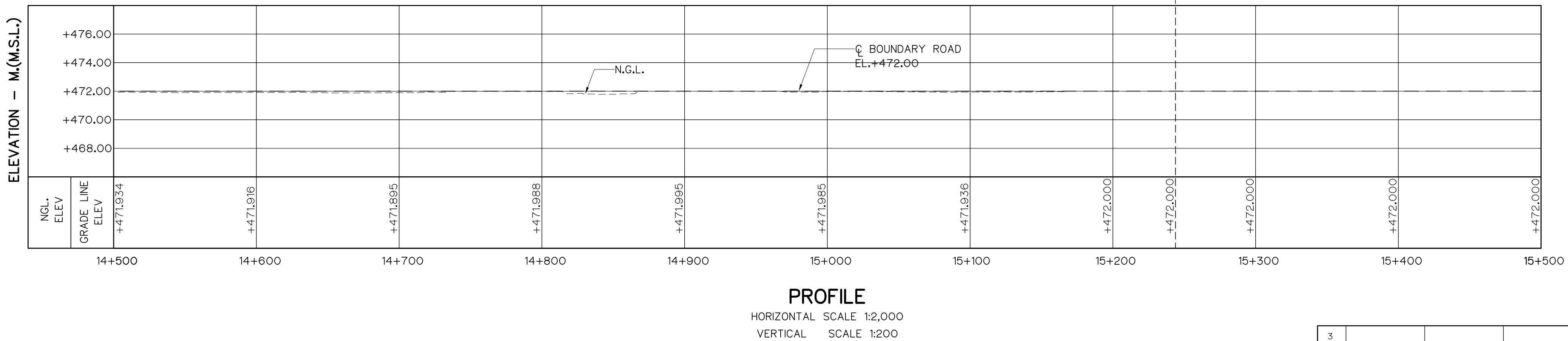
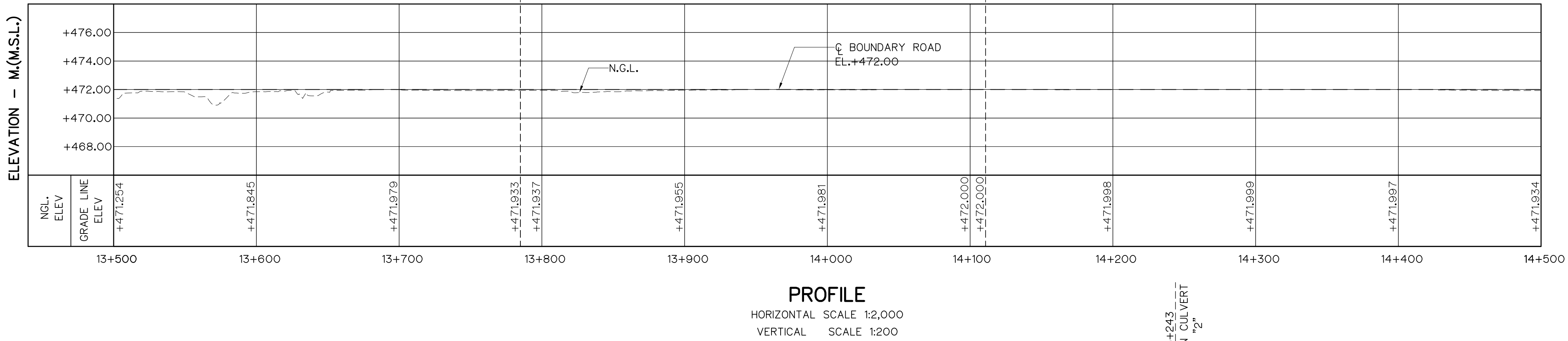
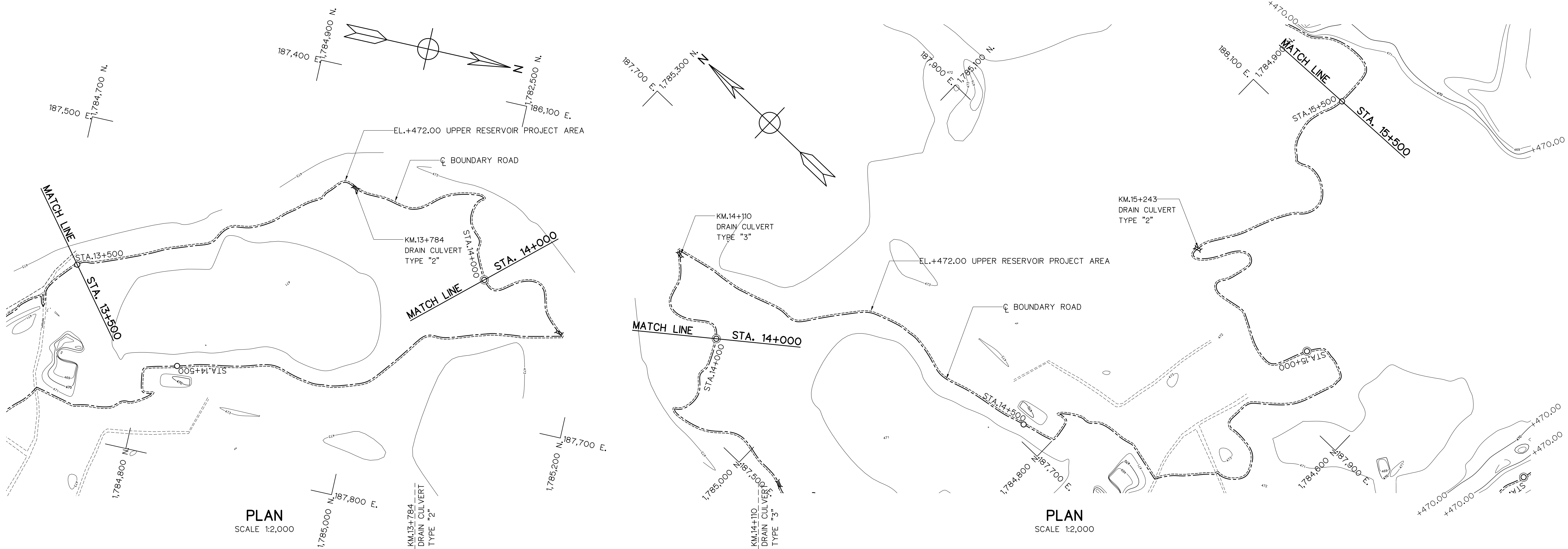
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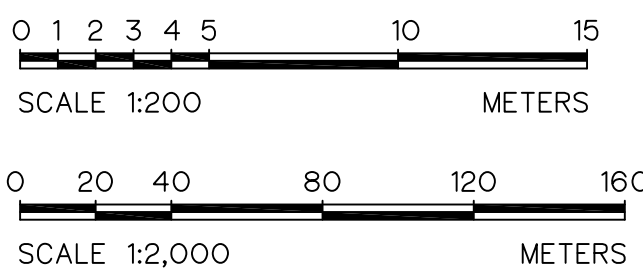
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NO.	DATE	REVISIONS	CHECKED	APPROVED	CHECKED	28.10.57		APPROVED	
CONSULTANTS					DEDE				
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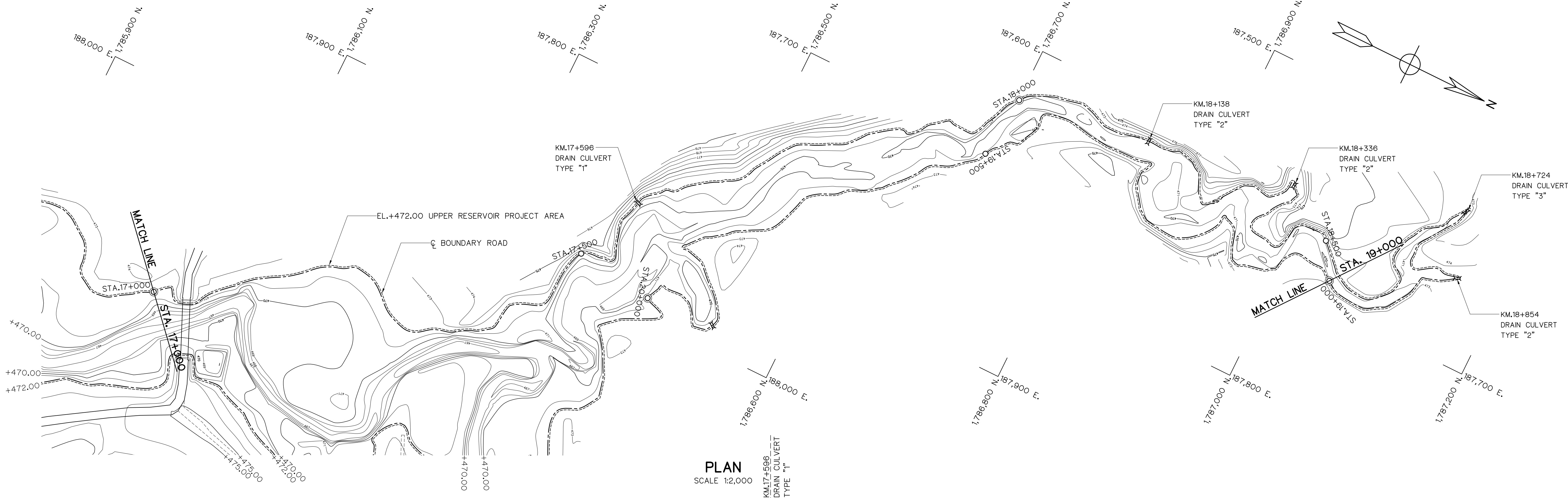


- LEGEND**
- N.G.L.
 - - - BOUNDARY ROAD
 - - - EL.+472.00 UPPER RESERVOIR PROJECT AREA

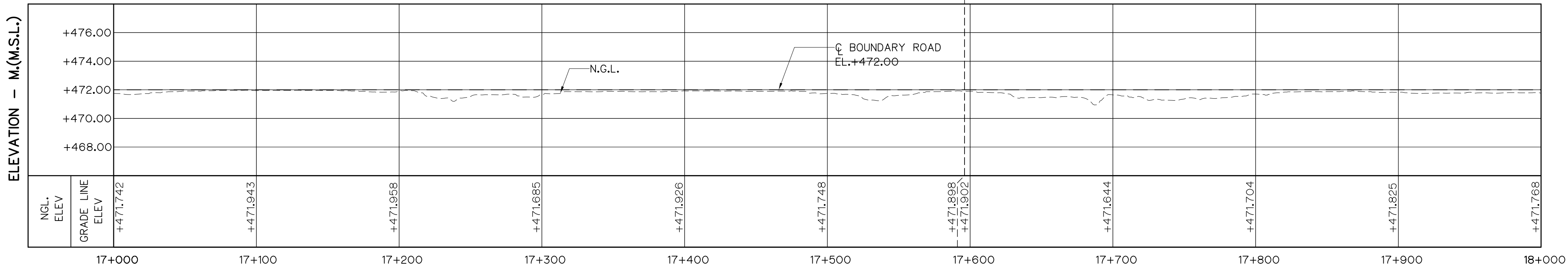


 KINGDOM OF THAILAND Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY			
HUI PRA THAO RESERVOIR BOUNDARY ROAD PROJECT AMPHOE KAENG KHRO, CHANGWAT CHAIYAPHUM			
CIVIL WORKS UPPER RESERVOIR BOUNDARY ROAD PLAN AND PROFILE, KM. 13+500 TO KM. 15+500			
 PANYA CONSULTANTS CO.,LTD.		 Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY	
DESIGNED 28.1957 28.76431		REVIEWED	
DRAWN		RECOMMENDED	
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PROJECT MANAGER 10/08/2021 DATE		DRAWING NO. HRR-BR-U09	
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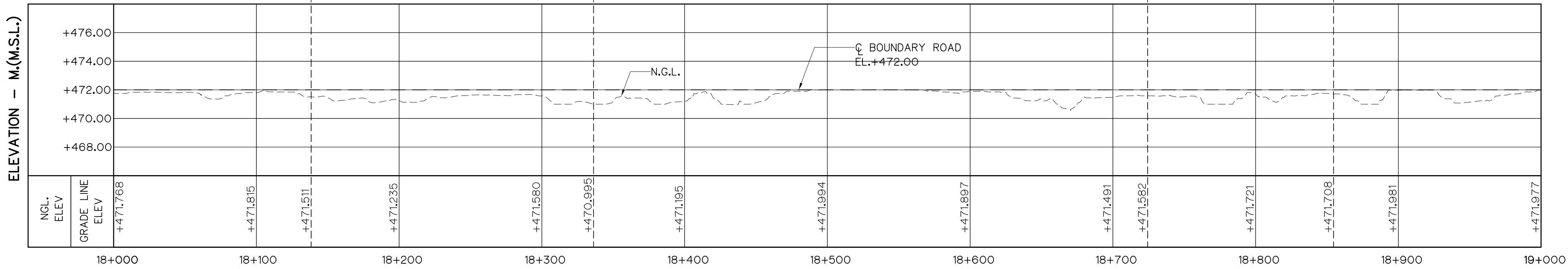
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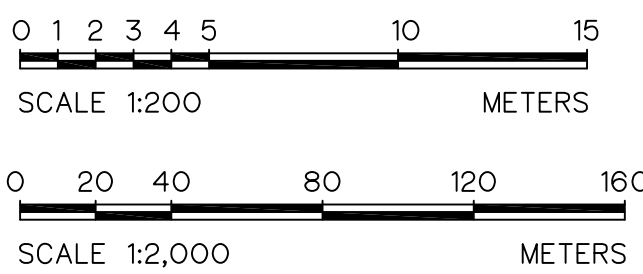


PROFILE
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VERTICAL SCALE 1:200



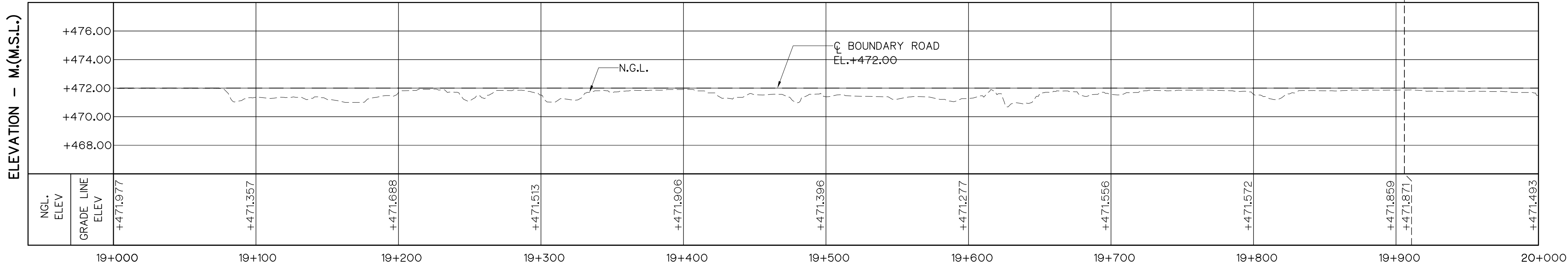
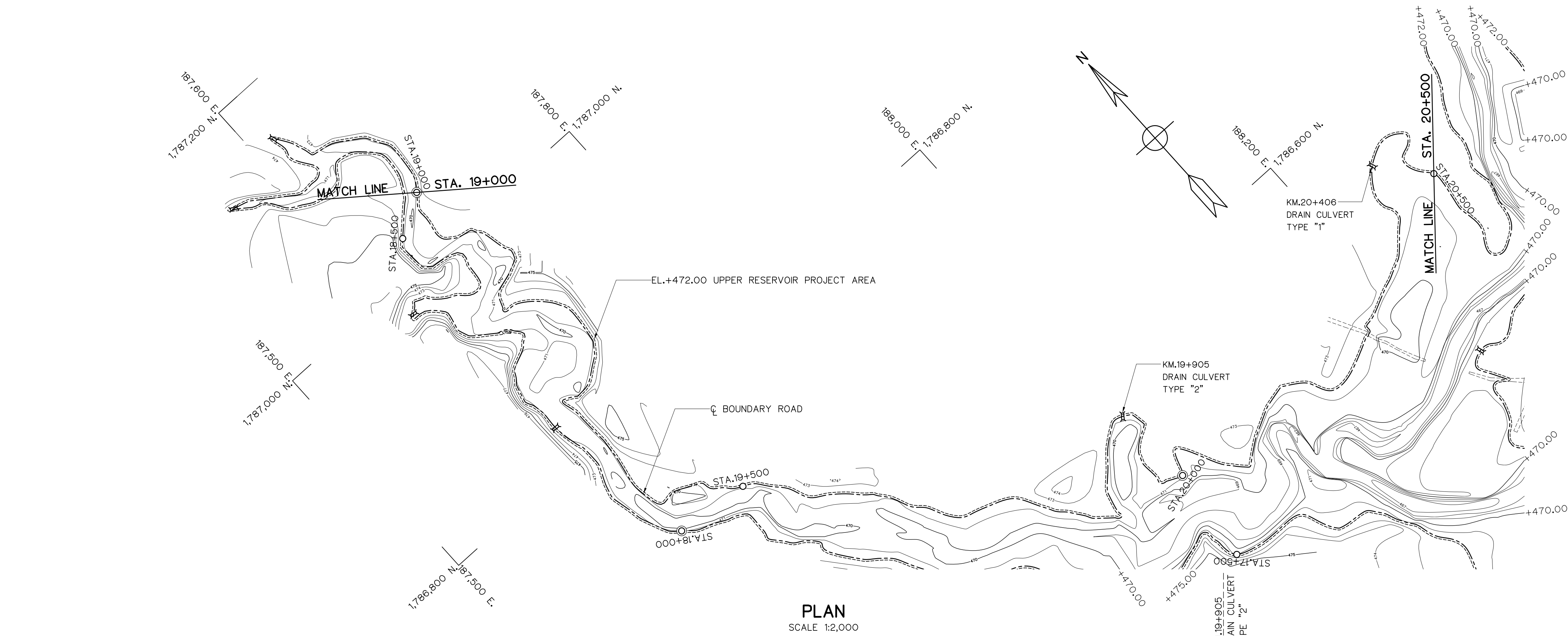
PROFILE
HORIZONTAL SCALE 1:2,000
VERTICAL SCALE 1:200

- LEGEND
- N.G.L.
 - - - BOUNDARY ROAD
 - - - EL.+472.00 UPPER RESERVOIR PROJECT AREA

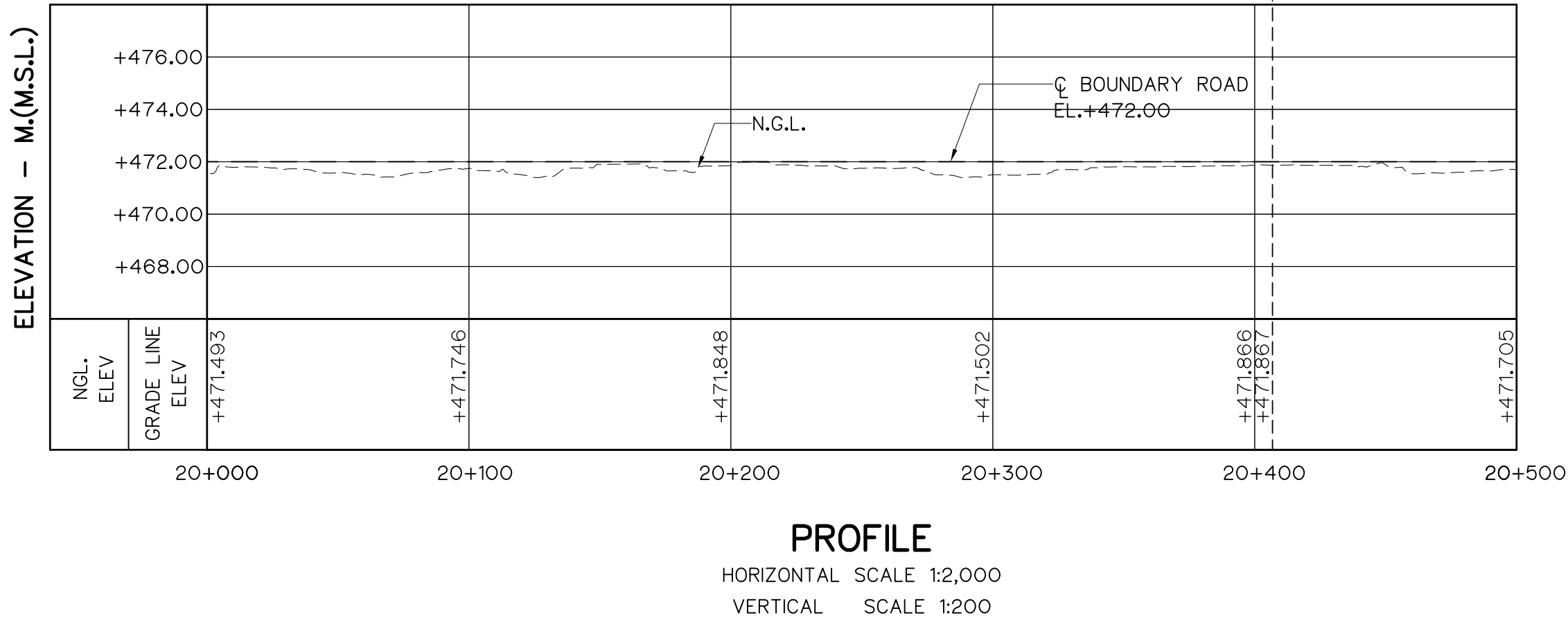


 KINGDOM OF THAILAND Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY			
HUAI PRA THAO RESERVOIR BOUNDARY ROAD PROJECT AMPHOE KAENG KHRO, CHANGWAT CHAIYAPHUM			
CIVIL WORKS UPPER RESERVOIR BOUNDARY ROAD PLAN AND PROFILE, KM. 17+000 TO KM. 19+000			
 PANYA CONSULTANTS CO.,LTD.		 Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY	
DESIGNED 28.1957 28.76431		REVIEWED	
DRAWN		RECOMMENDED	
CHECKED 28.1957		APPROVED	
PROJECT MANAGER 10/08/2021 DATE		DRAWING NO. HRR-BR-U11	
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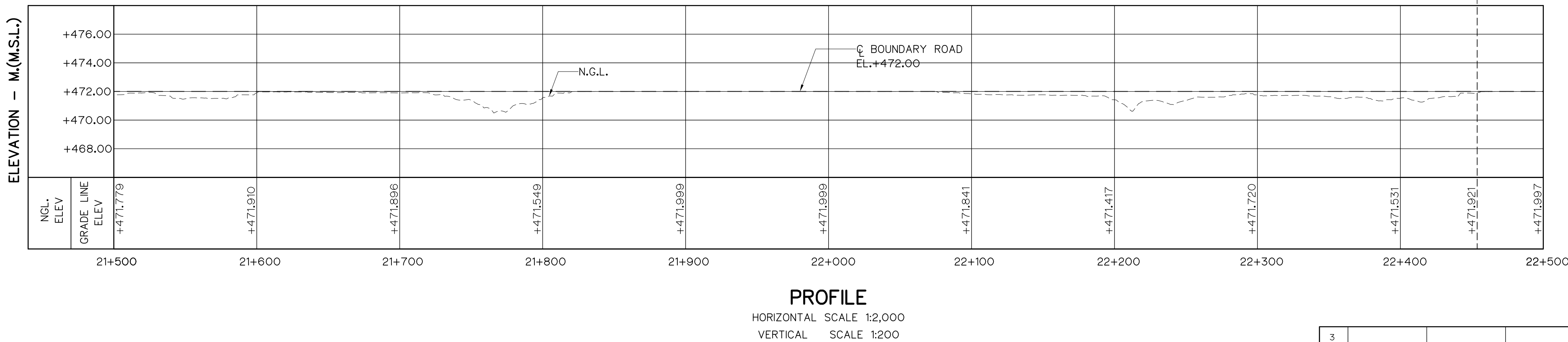
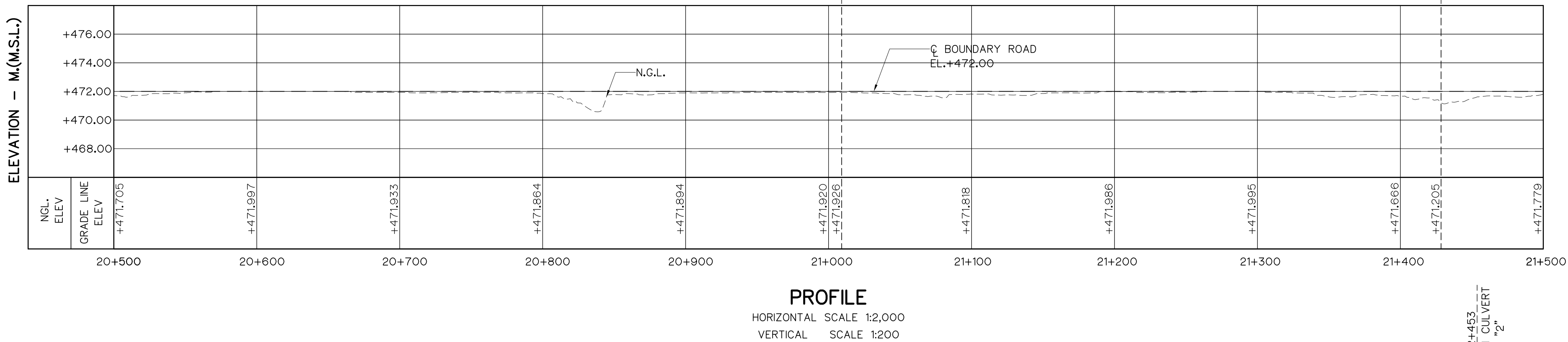
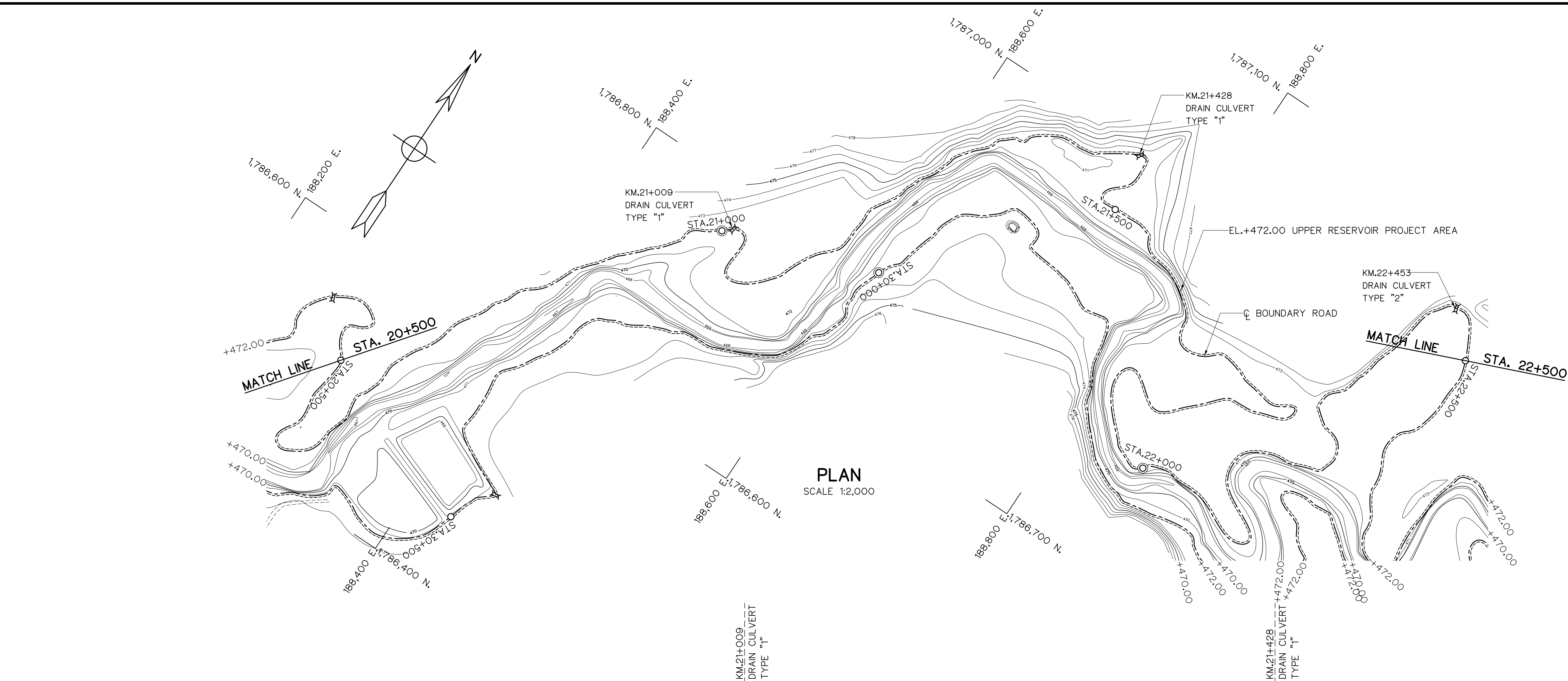


- LEGEND
- N.G.L.
 - BOUNDARY ROAD
 - EL.+472.00 UPPER RESERVOIR PROJECT AREA

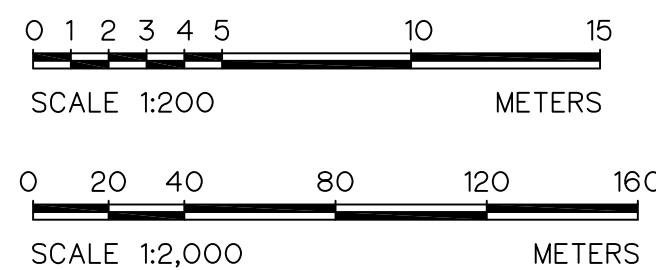


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NO.	DATE	REVISIONS	CHECKED	APPROVED					
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KINGDOM OF THAILAND Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY	
HUI PRA THAO RESERVOIR BOUNDARY ROAD PROJECT AMPHOE KAENG KHRO, CHANGWAT CHAIYAPHUM	
CIVIL WORKS UPPER RESERVOIR BOUNDARY ROAD PLAN AND PROFILE, KM. 19+000 TO KM. 20+500	
PANYA CONSULTANTS CO.,LTD.	Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY
DESIGNED 28.1957 28.76431	REVIEWED
DRAWN	RECOMMENDED
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PROJECT MANAGER 10/08/2021	DRAWING NO. HRR-BR-U12
DATE	SHEET NO. 15 OF 80

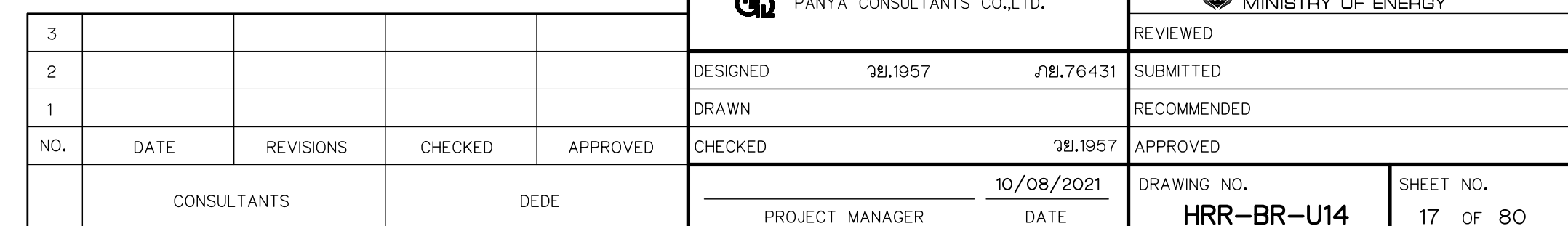
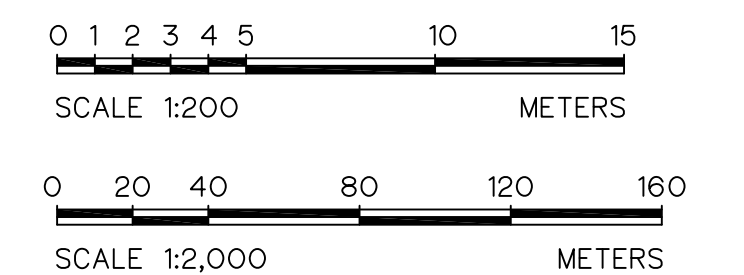
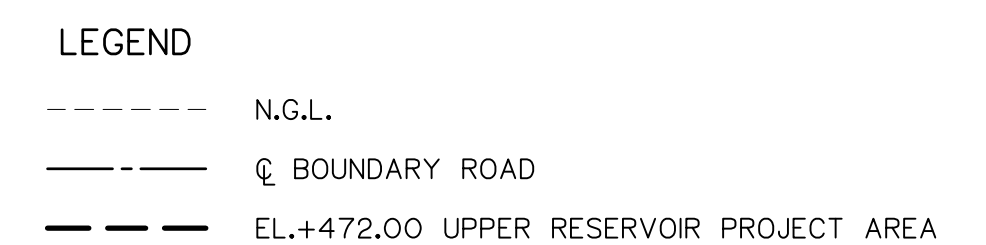
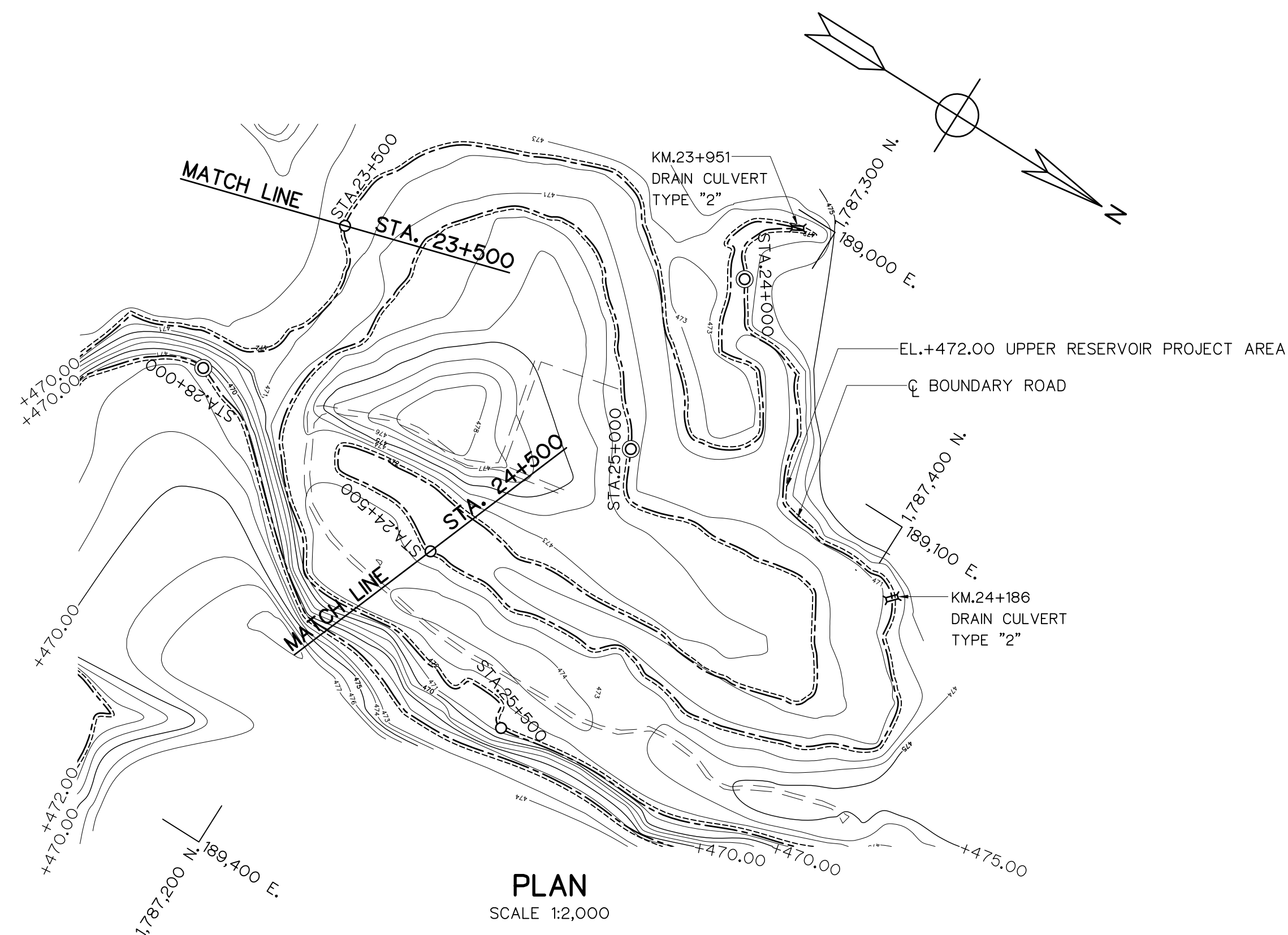


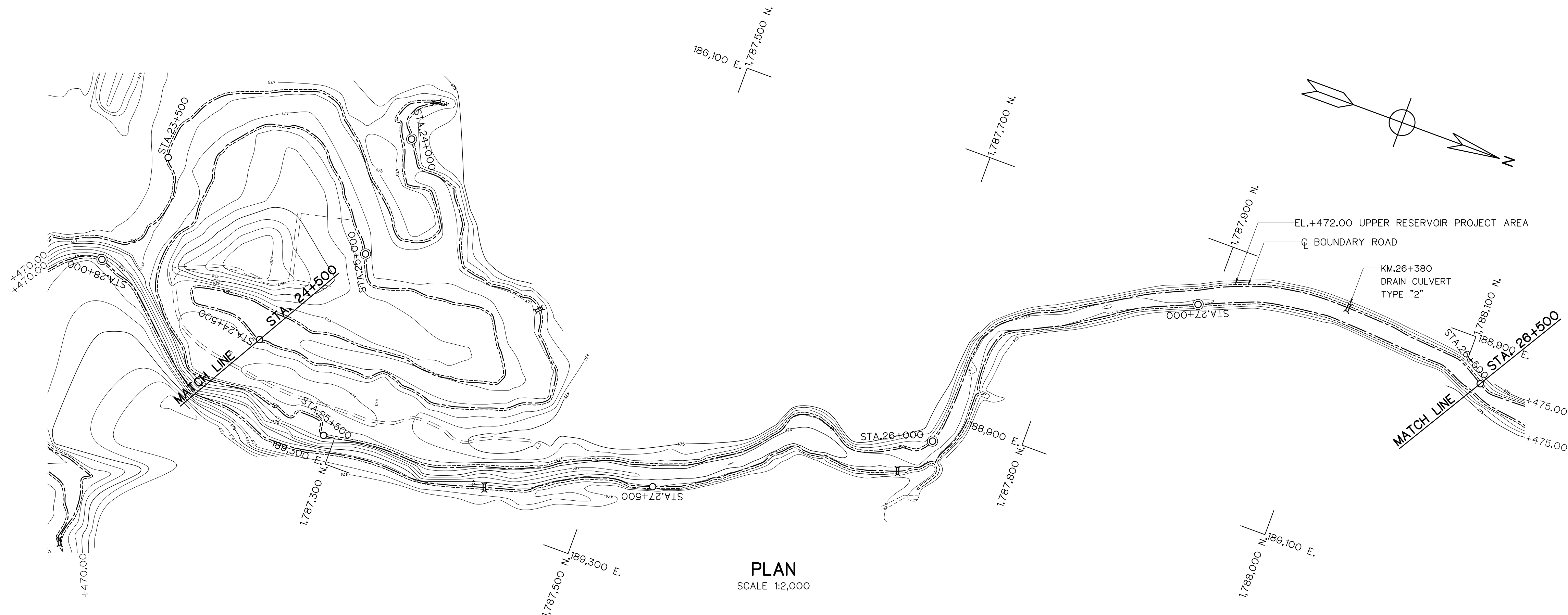
- LEGEND**
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 - - - EL.+472.00 UPPER RESERVOIR PROJECT AREA



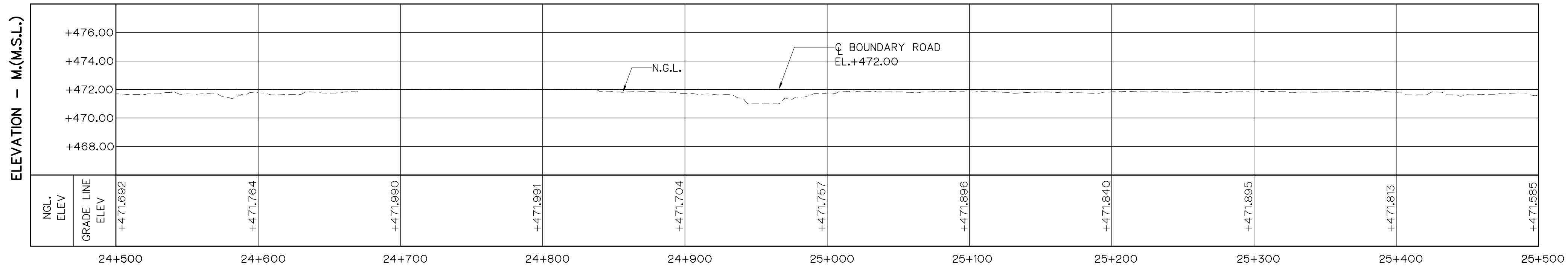
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HUI PRA THAO RESERVOIR BOUNDARY ROAD PROJECT AMPHOE KAENG KHRO, CHANGWAT CHAIYAPHUM			
CIVIL WORKS UPPER RESERVOIR BOUNDARY ROAD PLAN AND PROFILE, KM. 20+500 TO KM. 22+500			
 PANYA CONSULTANTS CO.,LTD.		 Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY	
REVIEWED		REVIEWED	
DESIGNED	28.1957	28.76431	SUBMITTED
DRAWN		RECOMMENDED	
CHECKED	28.1957		APPROVED
PROJECT MANAGER		10/08/2021 DATE	DRAWING NO. HRR-BR-U13
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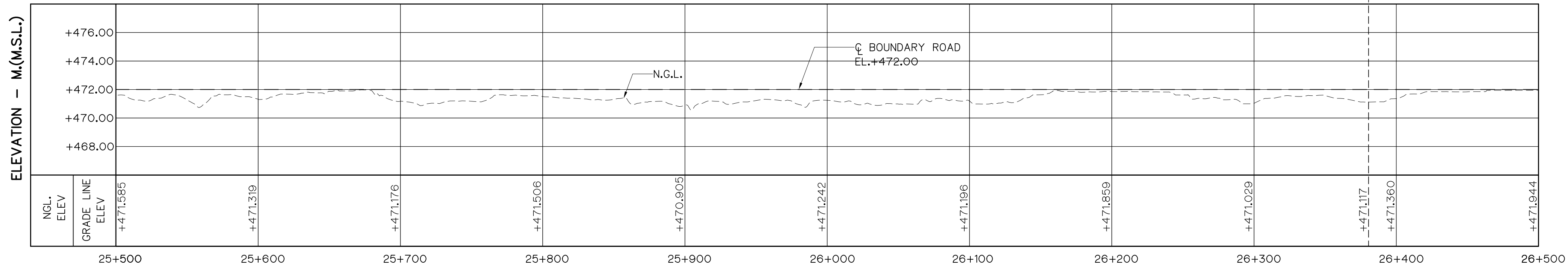




PLAN
SCALE 1:2,000



PROFILE
HORIZONTAL SCALE 1:2,000
VERTICAL SCALE 1:200



PROFILE
HORIZONTAL SCALE 1:2,000
VERTICAL SCALE 1:200

- LEGEND
- N.G.L.
 - - - BOUNDARY ROAD
 - - - EL.+472.00 UPPER RESERVOIR PROJECT AREA



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

HUAI PRA THAO RESERVOIR BOUNDARY ROAD PROJECT
AMPHOE KAENG KHRO, CHANGWAT CHAIYAPHUM

CIVIL WORKS
UPPER RESERVOIR BOUNDARY ROAD
PLAN AND PROFILE, KM. 24+500 TO KM. 26+500

PANYA CONSULTANTS CO.,LTD.

Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

REVIEWED

DESIGNED 28.1957 28.176431 SUBMITTED

DRAWN

CHECKED 28.1957 RECOMMENDED

APPROVED

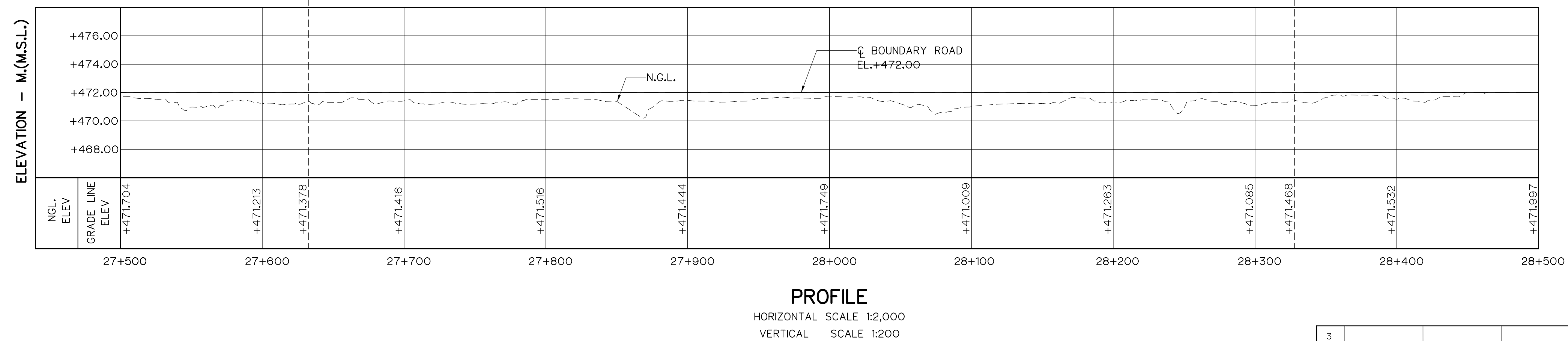
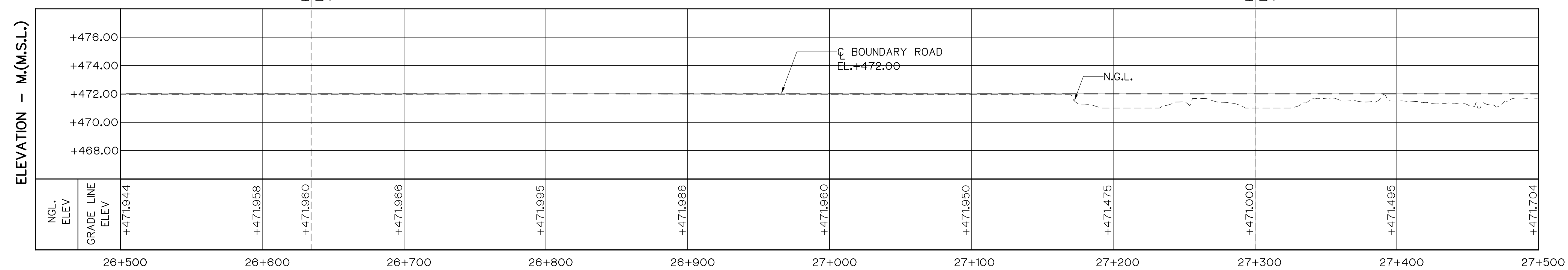
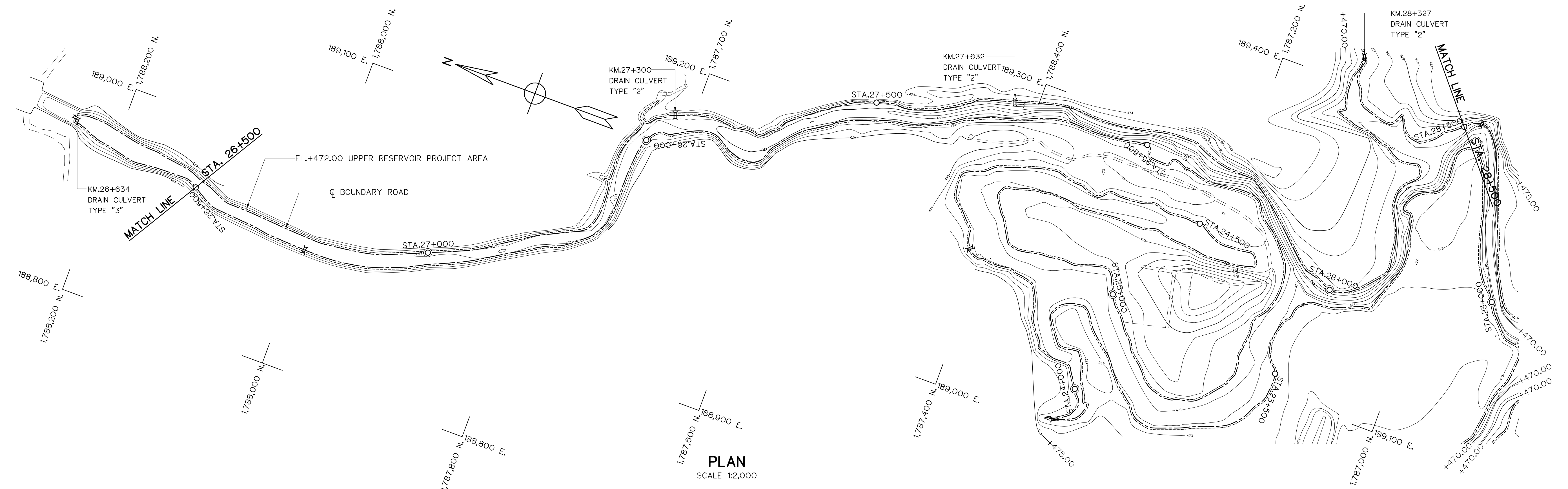
10/08/2021
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PROJECT MANAGER

DRAWING NO.
HRR-BR-U15

SHEET NO.
18 OF 80

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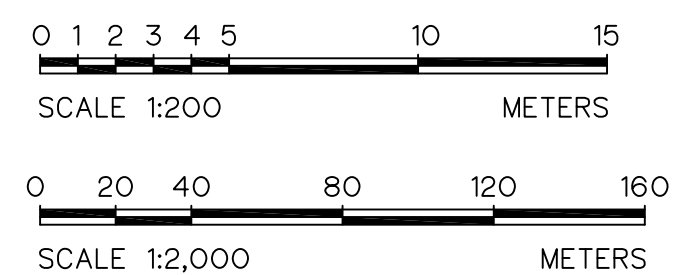


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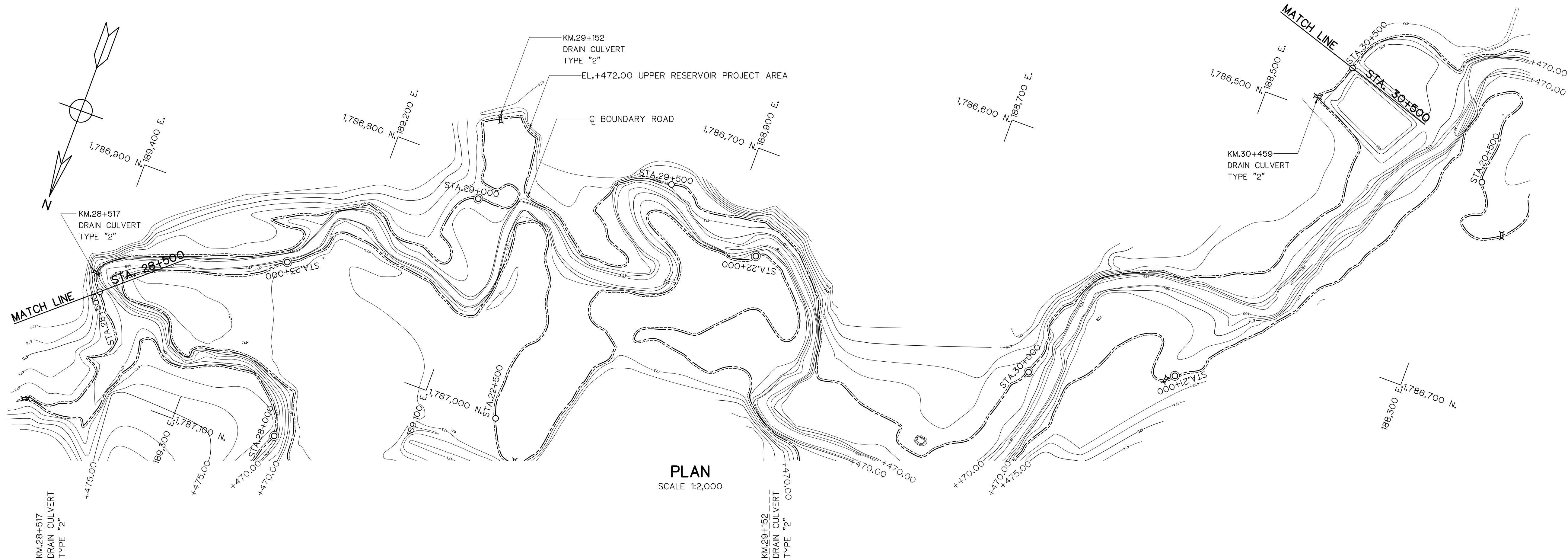
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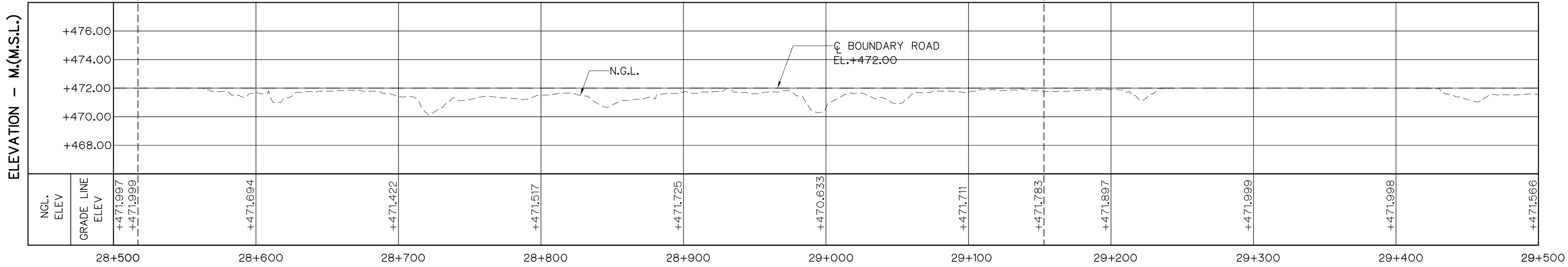
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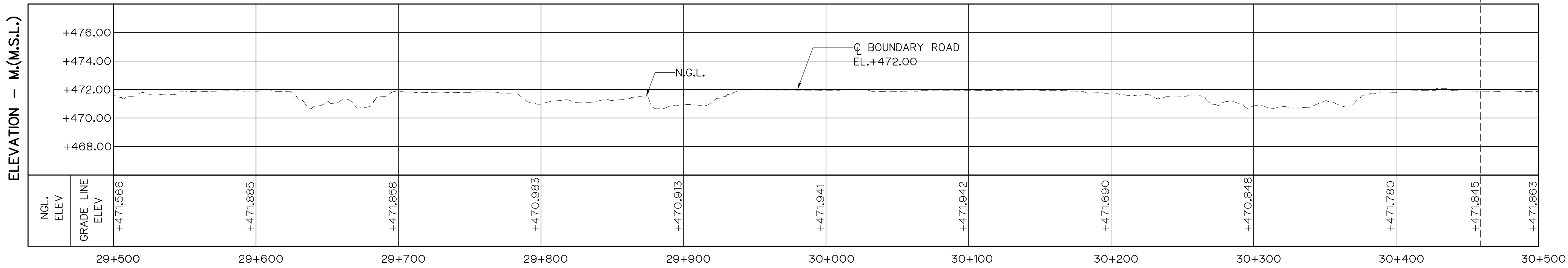
 KINGDOM OF THAILAND Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY			
HUAI PRA THAO RESERVOIR BOUNDARY ROAD PROJECT AMPHOE KAENG KHRO, CHANGWAT CHAIYAPHUM			
CIVIL WORKS UPPER RESERVOIR BOUNDARY ROAD PLAN AND PROFILE, KM. 26+500 TO KM. 28+500			
 PANYA CONSULTANTS CO.,LTD.		 Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY	
DESIGNED	28.1957	18.76431	REVIEWED
DRAWN			SUBMITTED
CHECKED	28.1957		APPROVED
PROJECT MANAGER _____ DATE 10/08/2021		DRAWING NO. HRR-BR-U16 SHEET NO. 19 OF 80	



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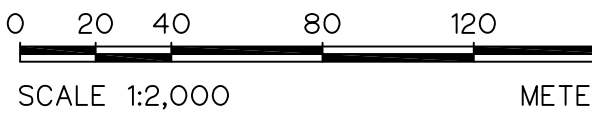


PROFILE
HORIZONTAL SCALE 1:2,000
VERTICAL SCALE 1:200



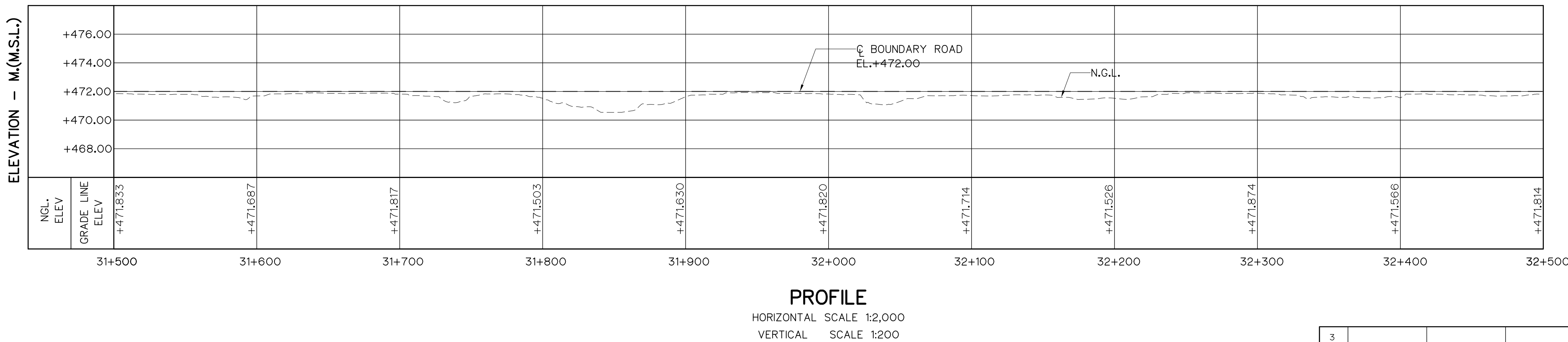
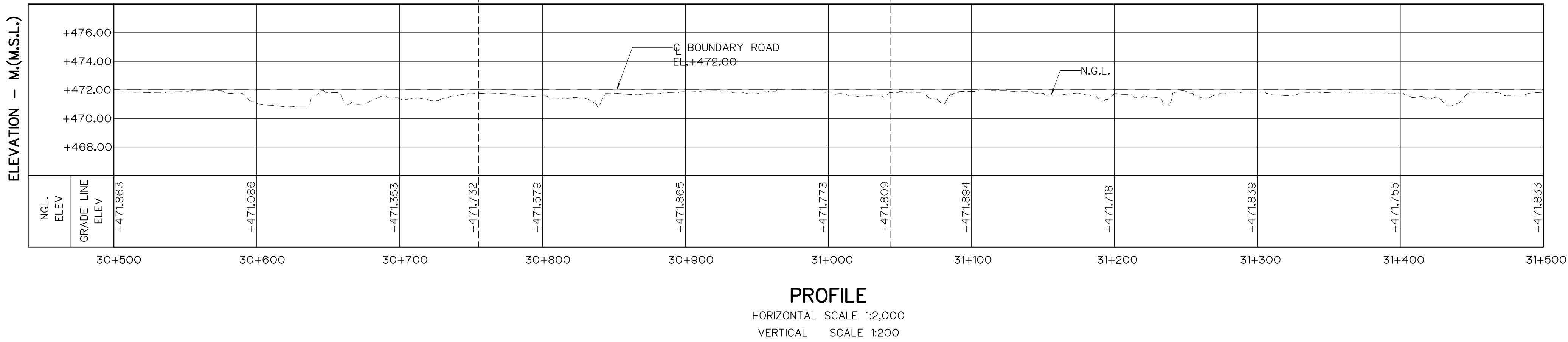
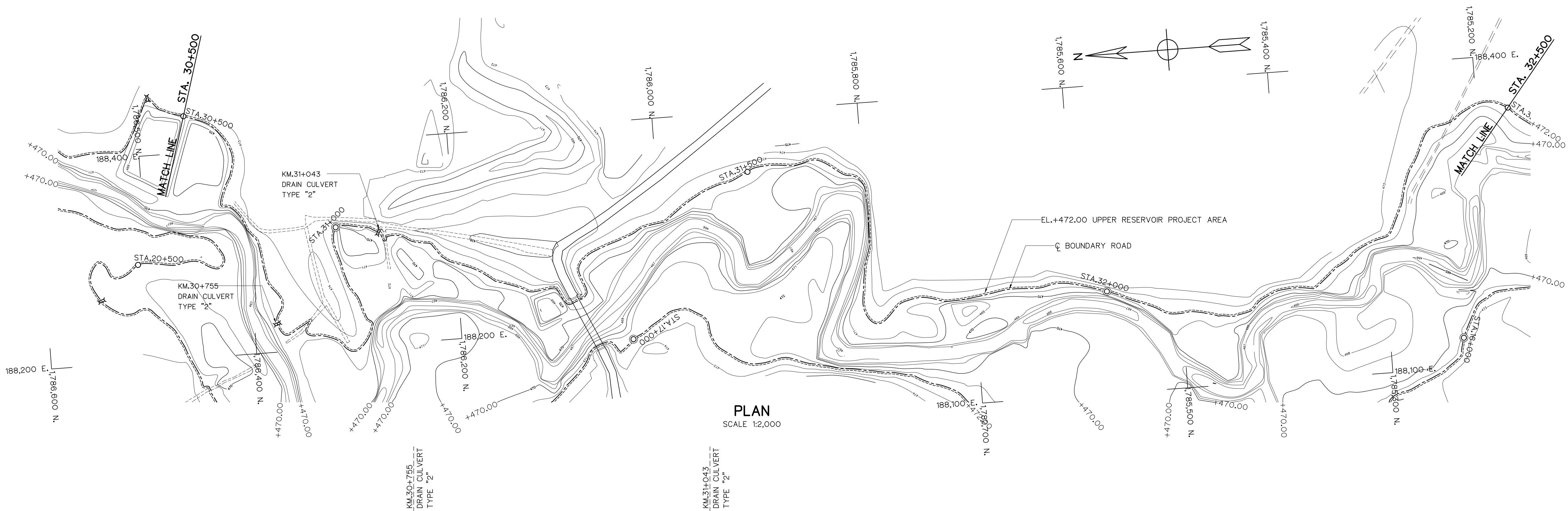
PROFILE
HORIZONTAL SCALE 1:2,000
VERTICAL SCALE 1:200

- LEGEND
- N.G.L.
 - BOUNDARY ROAD
 - EL.+472.00 UPPER RESERVOIR PROJECT AREA

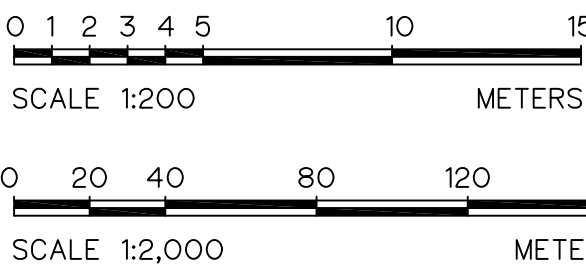


KINGDOM OF THAILAND Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY			
HUI PRA THAO RESERVOIR BOUNDARY ROAD PROJECT AMPHOE KAENG KHRO, CHANGWAT CHAIYAPHUM			
CIVIL WORKS UPPER RESERVOIR BOUNDARY ROAD PLAN AND PROFILE, KM. 28+500 TO KM. 30+500			
PANYA CONSULTANTS CO.,LTD.		REVIEWED	
DESIGNED 28.1957 28.76431		SUBMITTED	
DRAWN		RECOMMENDED	
CHECKED 28.1957		APPROVED	
PROJECT MANAGER 10/08/2021		DRAWING NO. HRR-BR-U17	
DATE		SHEET NO. 20 OF 80	

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NO.	DATE	REVISIONS	CHECKED	APPROVED
		CONSULTANTS		DEDE

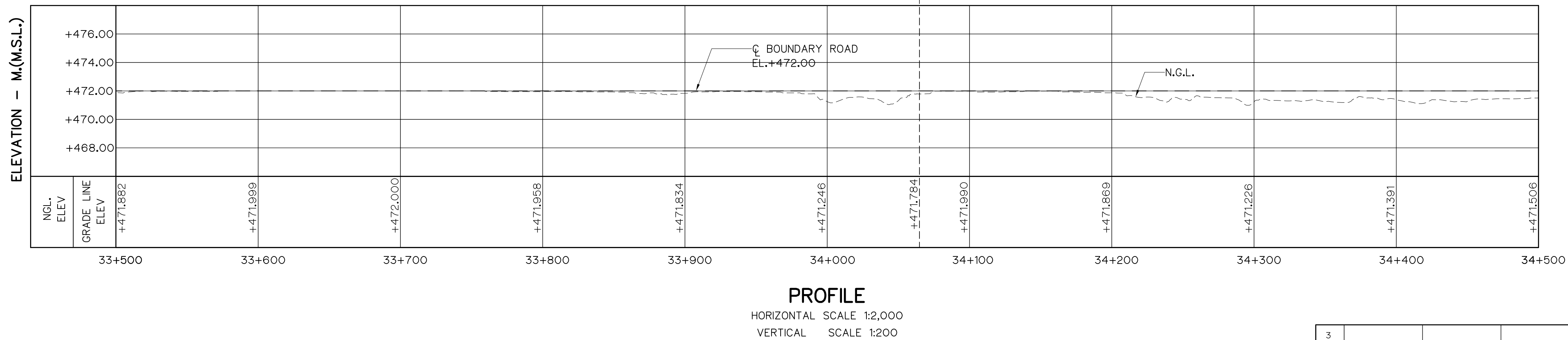
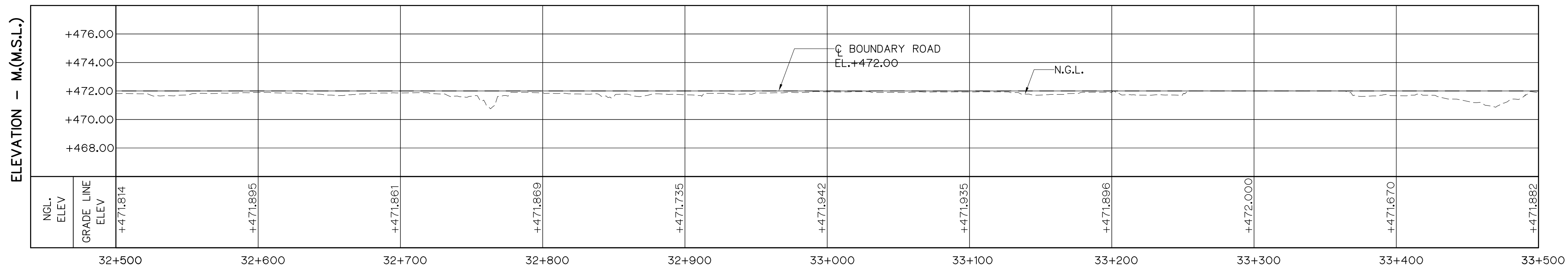
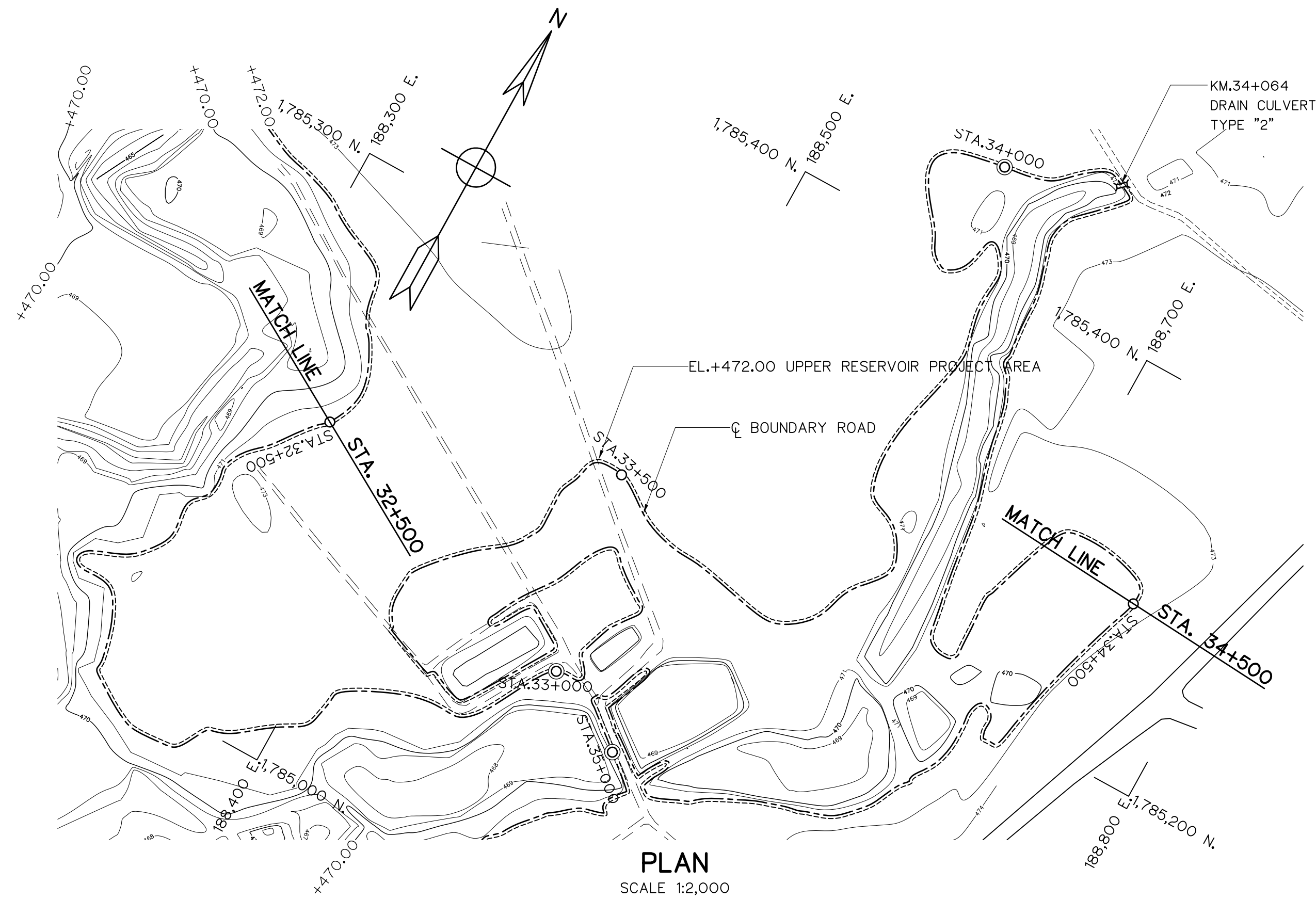


- LEGEND
- N.G.L.
 - BOUNDARY ROAD
 - EL.+472.00 UPPER RESERVOIR PROJECT AREA

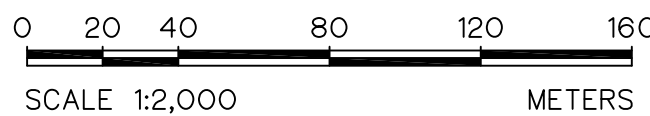


 KINGDOM OF THAILAND Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY			
HUAI PRA THAO RESERVOIR BOUNDARY ROAD PROJECT AMPHOE KAENG KHRO, CHANGWAT CHAIYAPHUM			
CIVIL WORKS UPPER RESERVOIR BOUNDARY ROAD PLAN AND PROFILE, KM. 30+500 TO KM. 32+500			
 PANYA CONSULTANTS CO.,LTD.		 Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY	
DESIGNED 28.1957 28.76431		REVIEWED	
DRAWN		RECOMMENDED	
CHECKED 28.1957		APPROVED	
PROJECT MANAGER 10/08/2021		DRAWING NO.	SHEET NO.
DATE		HRR-BR-U18	21 OF 80

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NO.	DATE	REVISIONS	CHECKED	APPROVED
CONSULTANTS		DEDE		

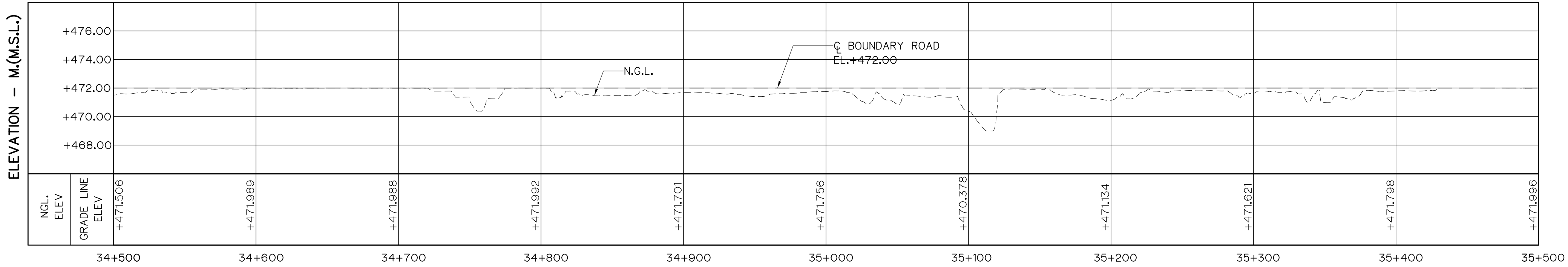
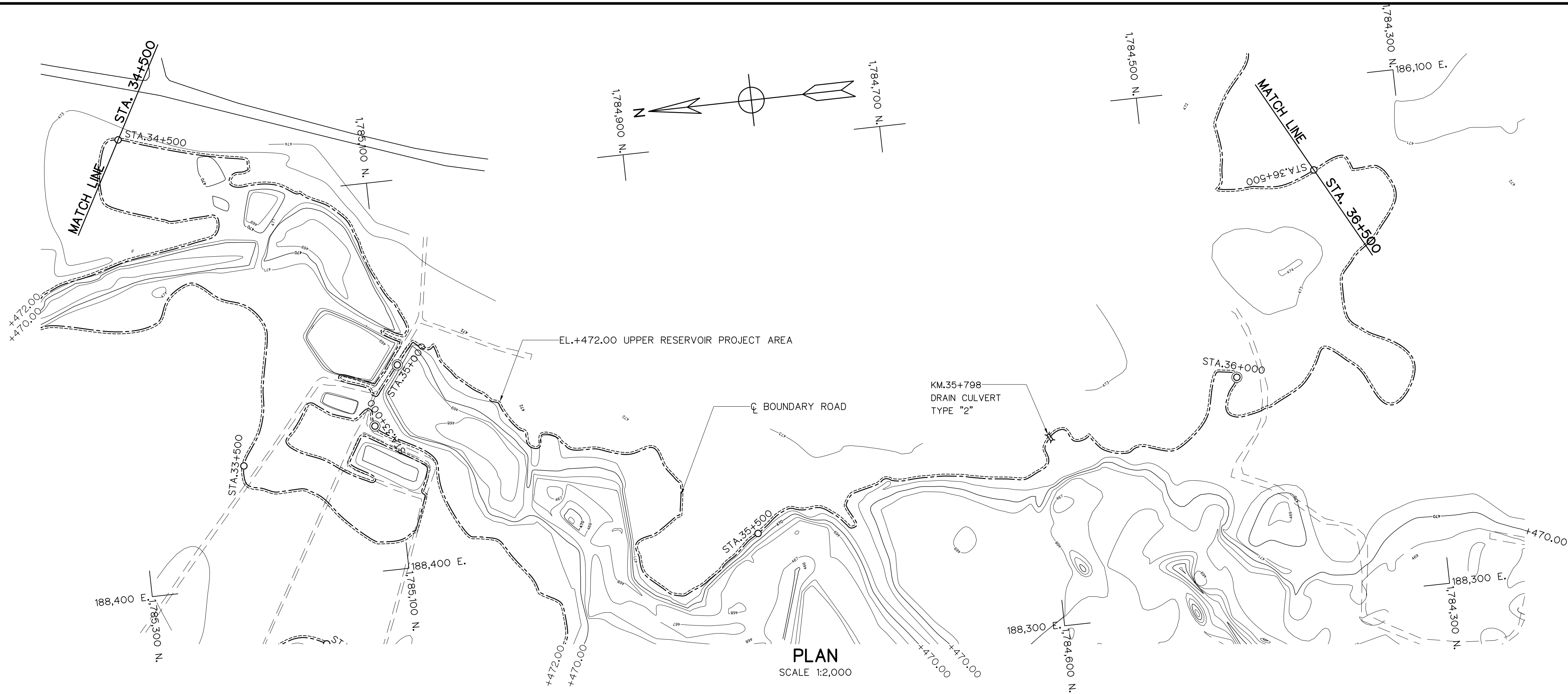


- LEGEND
- N.G.L.
 - BOUNDARY ROAD
 - EL.+472.00 UPPER RESERVOIR PROJECT AREA

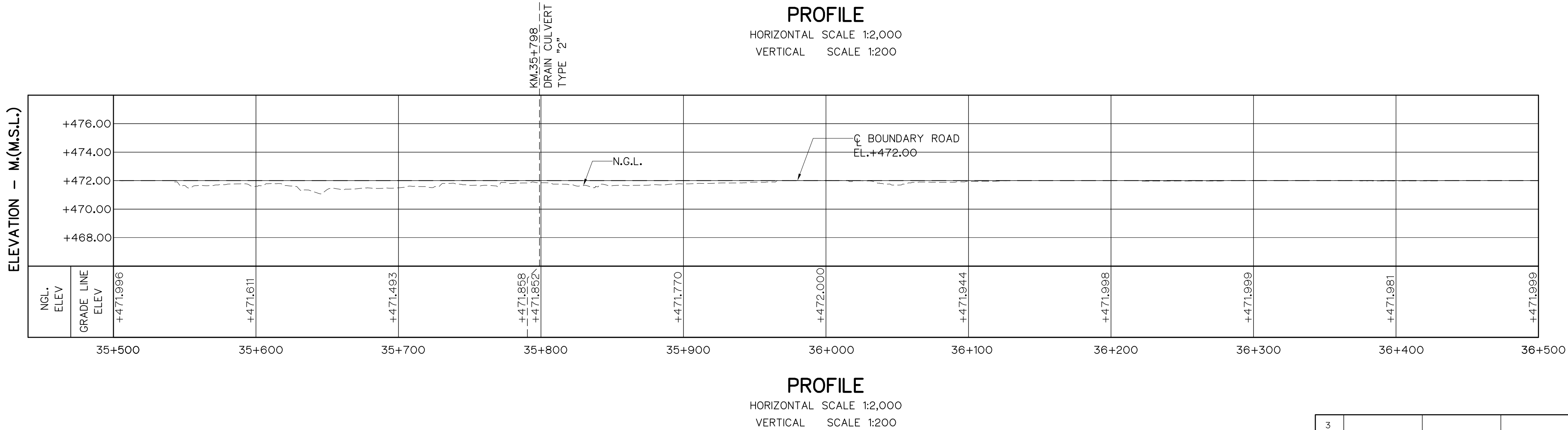
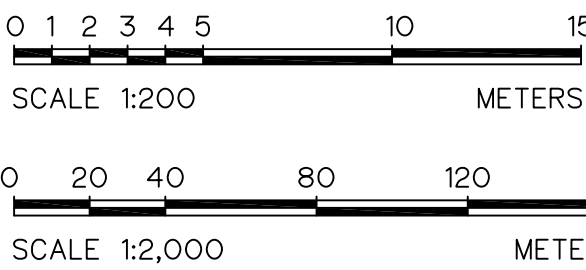


 KINGDOM OF THAILAND Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY			
HUAI PRA THAO RESERVOIR BOUNDARY ROAD PROJECT AMPHOE KAENG KHRO, CHANGWAT CHAIYAPHUM			
CIVIL WORKS UPPER RESERVOIR BOUNDARY ROAD PLAN AND PROFILE, KM. 32+500 TO KM. 34+500			
 PANYA CONSULTANTS CO.,LTD.		 Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY	
3		REVIEWED	
2		DESIGNED 28.1957 28.76431 SUBMITTED	
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NO.		CHECKED 28.1957 APPROVED	
CONSULTANTS		DEDE	
PROJECT MANAGER		DRAWING NO. HRR-BR-U19	
DATE 10/08/2021		SHEET NO. 22 OF 80	

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NO.	DATE	REVISIONS	CHECKED	APPROVED
		CONSULTANTS	DEDE	



- LEGEND
- N.G.L.
 - BOUNDARY ROAD
 - EL.+472.00 UPPER RESERVOIR PROJECT AREA



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

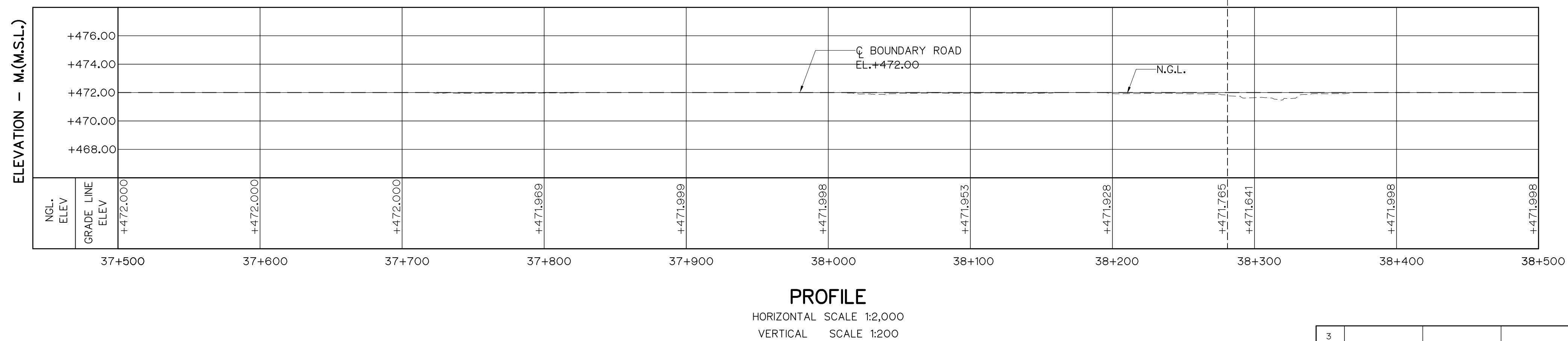
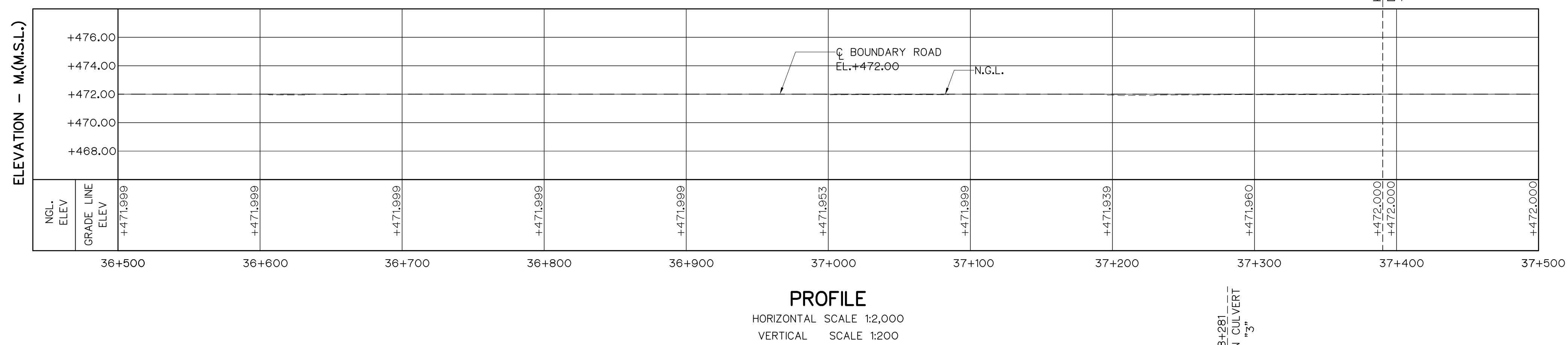
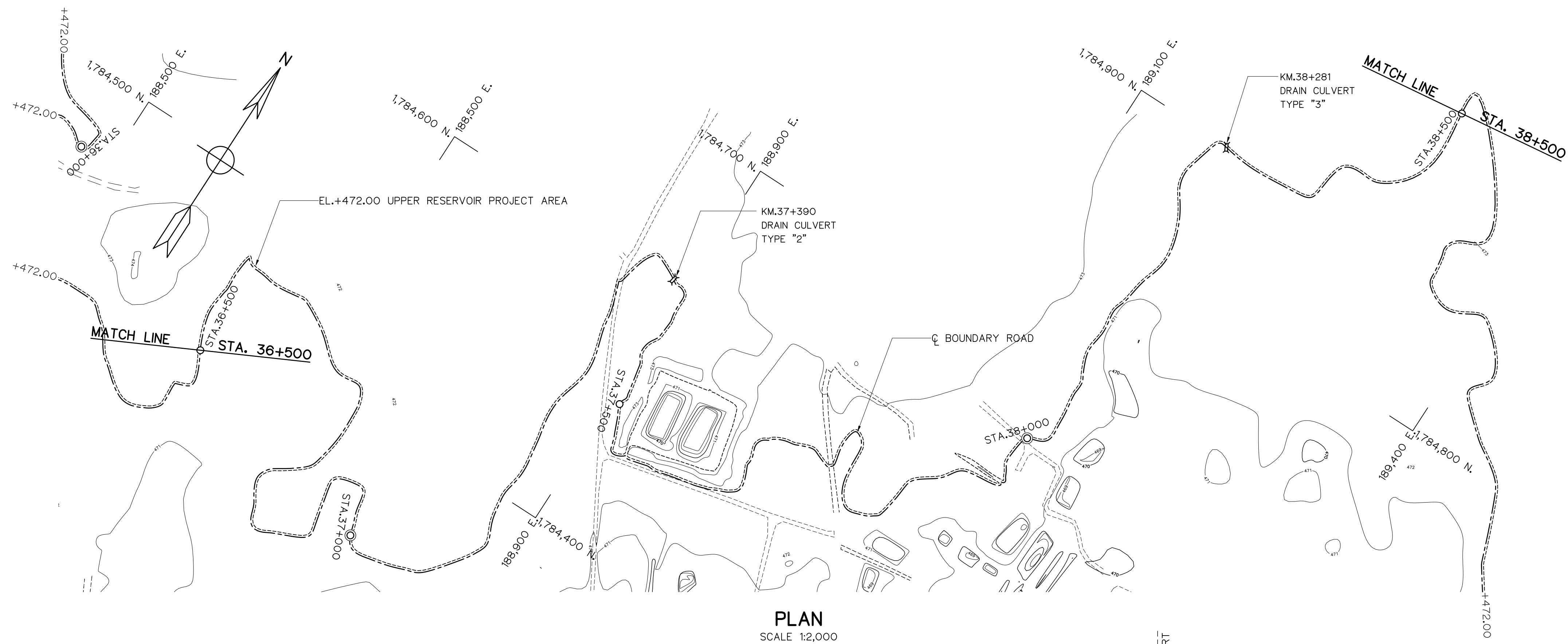
HUAI PRA THAO RESERVOIR BOUNDARY ROAD PROJECT
AMPHOE KAENG KHRO, CHANGWAT CHAIYAPHUM

CIVIL WORKS
UPPER RESERVOIR BOUNDARY ROAD
PLAN AND PROFILE, KM. 34+500 TO KM. 36+500

PANYA CONSULTANTS CO.,LTD.

Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

3						DESIGNED	28.1957	28.76431	SUBMITTED
2						DRAWN			RECOMMENDED
1						CHECKED	28.1957		APPROVED
NO.	DATE	REVISIONS	CHECKED	APPROVED		10/08/2021		DRAWING NO.	SHEET NO.
CONSULTANTS					DEDE	PROJECT MANAGER DATE		HRR-BR-U20	23 OF 80

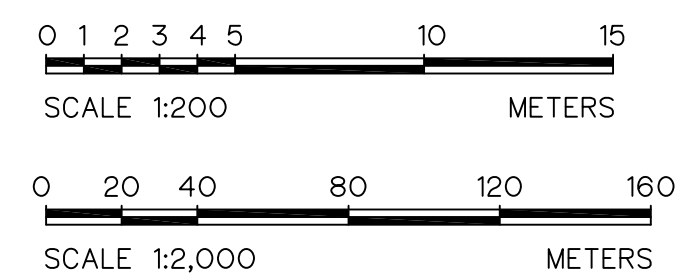


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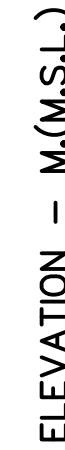
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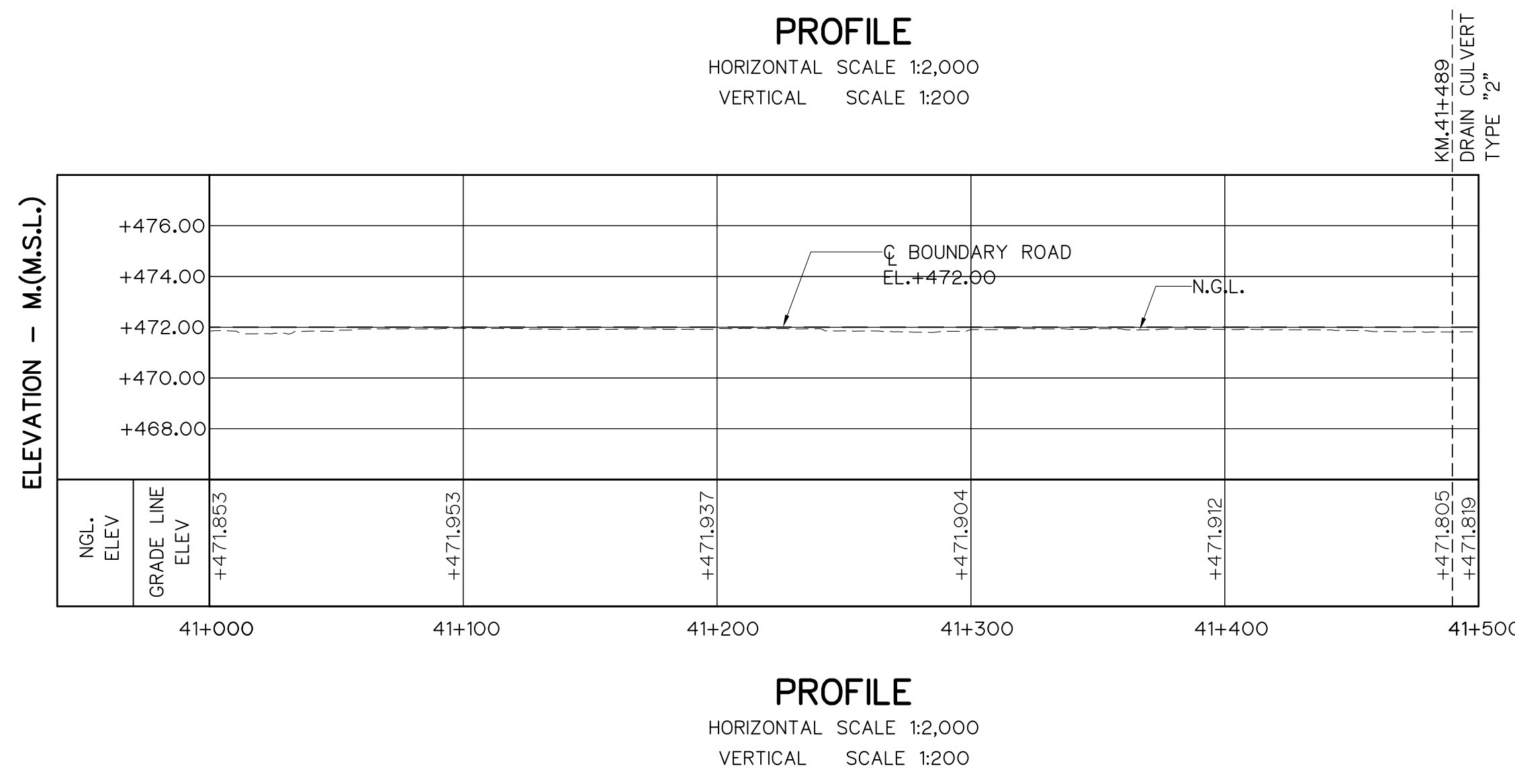
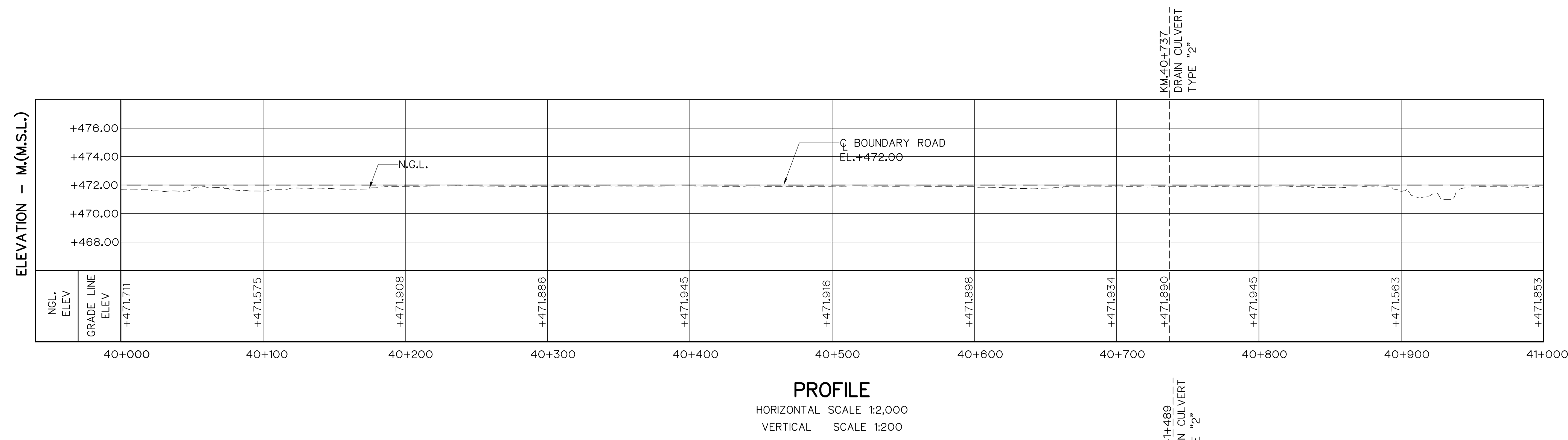
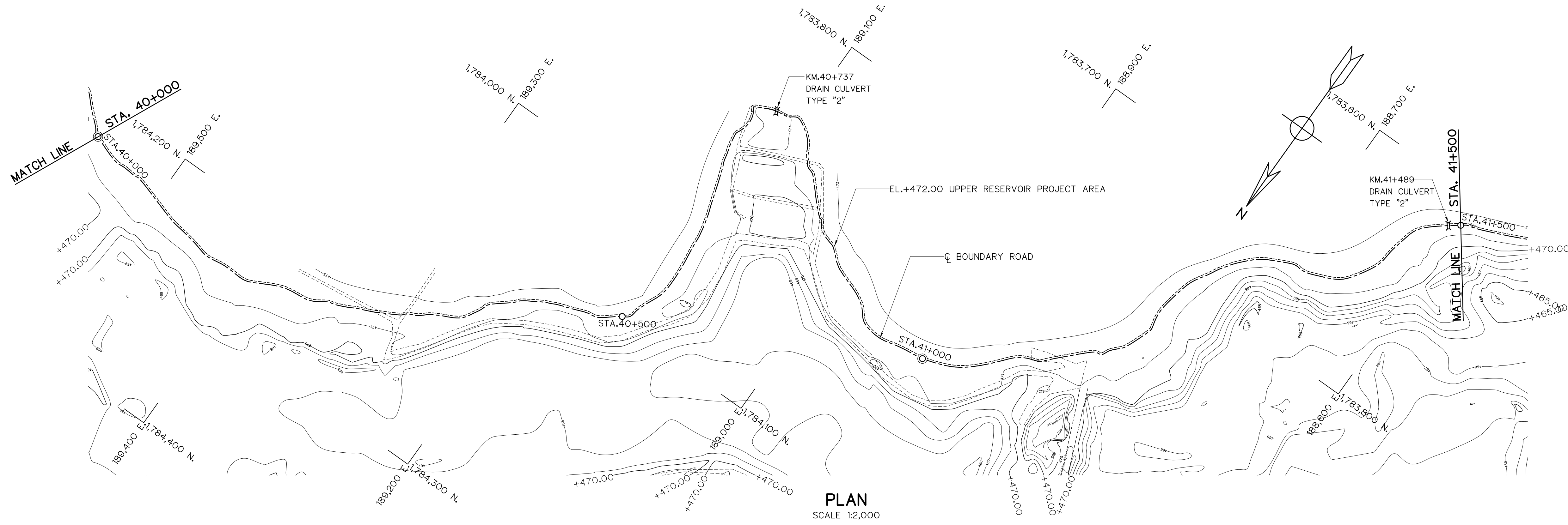
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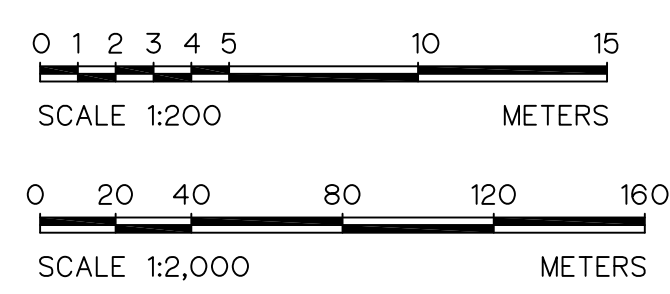


 KINGDOM OF THAILAND Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY			
HUAI PRA THAO RESERVOIR BOUNDARY ROAD PROJECT AMPHOE KAENG KHRO, CHANGWAT CHAIYAPHUM			
CIVIL WORKS UPPER RESERVOIR BOUNDARY ROAD PLAN AND PROFILE, KM. 36+500 TO KM. 38+500			
 PANYA CONSULTANTS CO.,LTD.		 Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY	
DESIGNED	28.1957	18.76431	REVIEWED
DRAWN			SUBMITTED
CHECKED	28.1957		APPROVED
10/08/2021 PROJECT MANAGER		DRAWING NO. HRR-BR-021	
DATE		SHEET NO. 24 OF 80	

25 OF 80



- LEGEND**
- N.G.L.
 - - - BOUNDARY ROAD
 - - - EL.+472.00 UPPER RESERVOIR PROJECT AREA



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

HUAI PRA THAO RESERVOIR BOUNDARY ROAD PROJECT
AMPHOE KAENG KHRO, CHANGWAT CHAIYAPHUM

CIVIL WORKS
UPPER RESERVOIR BOUNDARY ROAD
PLAN AND PROFILE, KM. 40+000 TO KM. 41+500

PANYA CONSULTANTS CO.,LTD.

REVIEWED

DESIGNED

28.1957

28.76431

SUBMITTED

DRAWN

CHECKED

28.1957

APPROVED

PROJECT MANAGER

DATE

10/08/2021

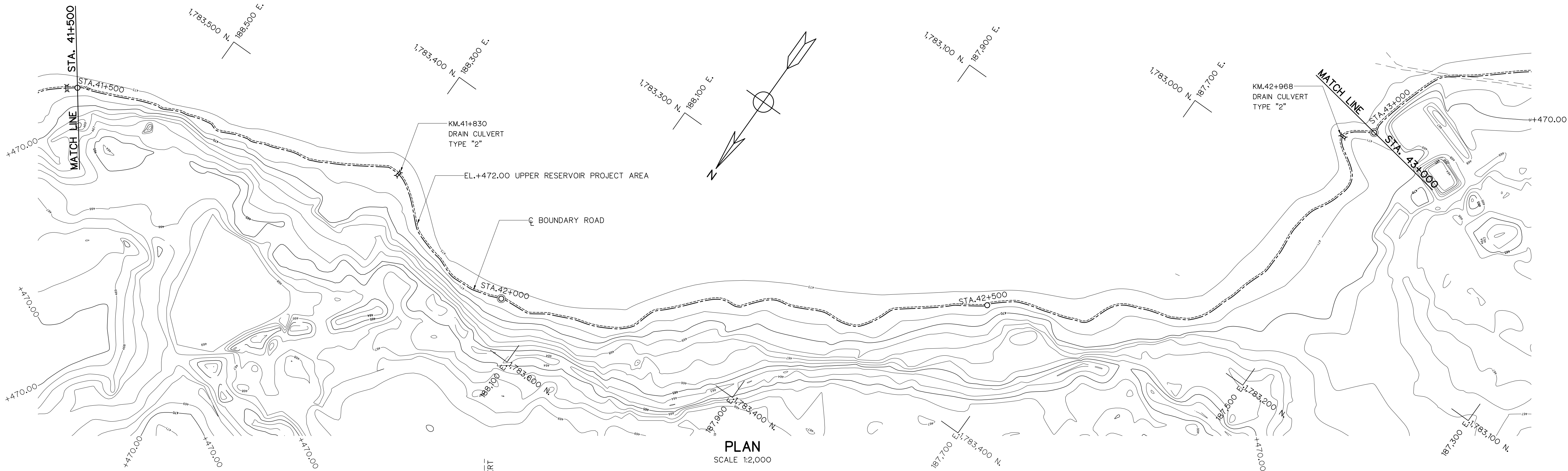
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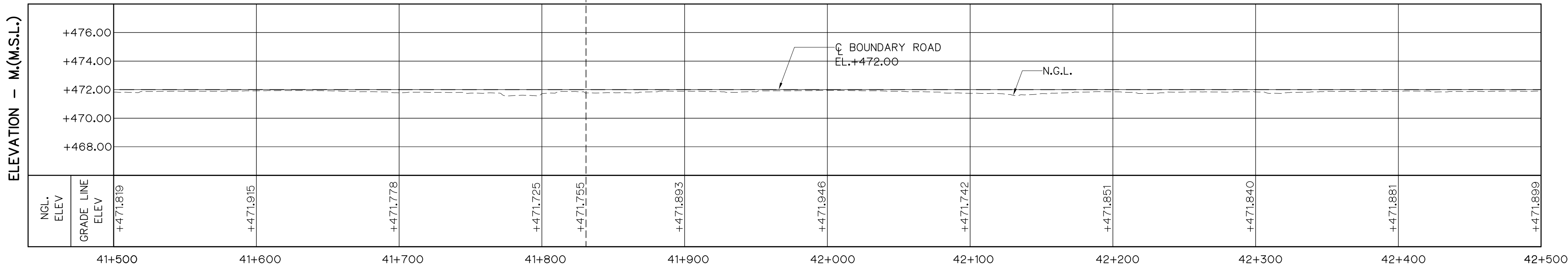
SHEET NO.

26 OF 80

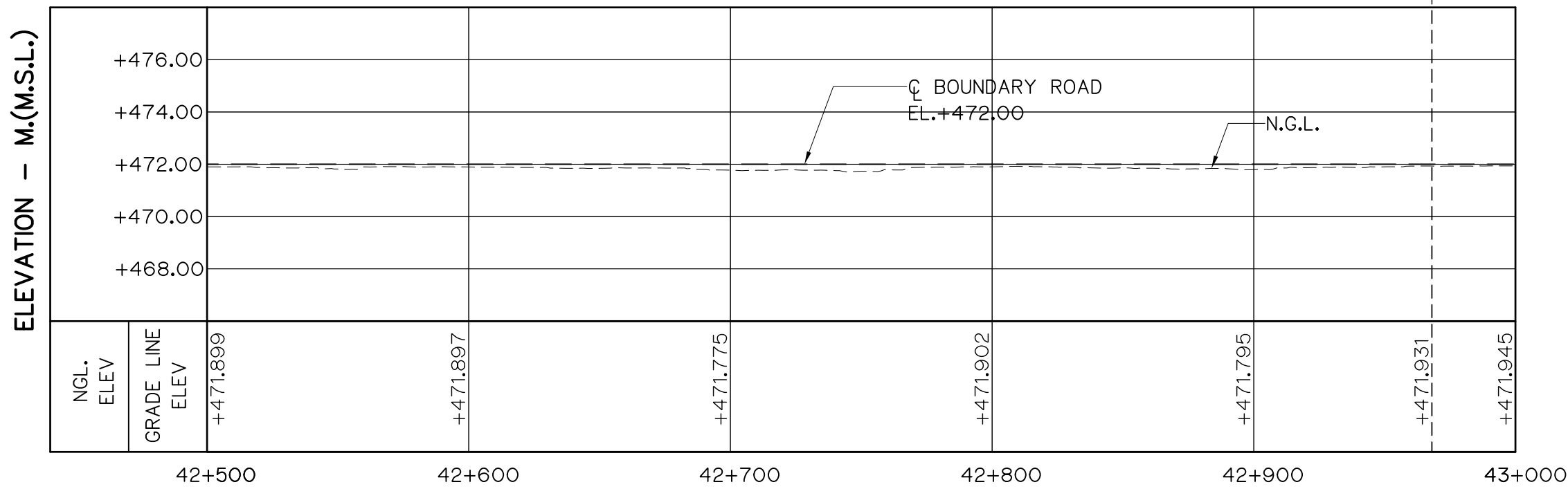
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NO.	DATE	REVISIONS	CHECKED	APPROVED
	CONSULTANTS		DEDE	



PLAN
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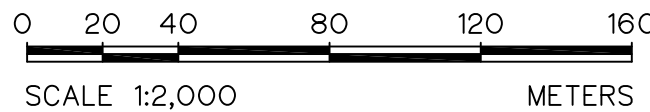


PROFILE
HORIZONTAL SCALE 1:2,000
VERTICAL SCALE 1:200



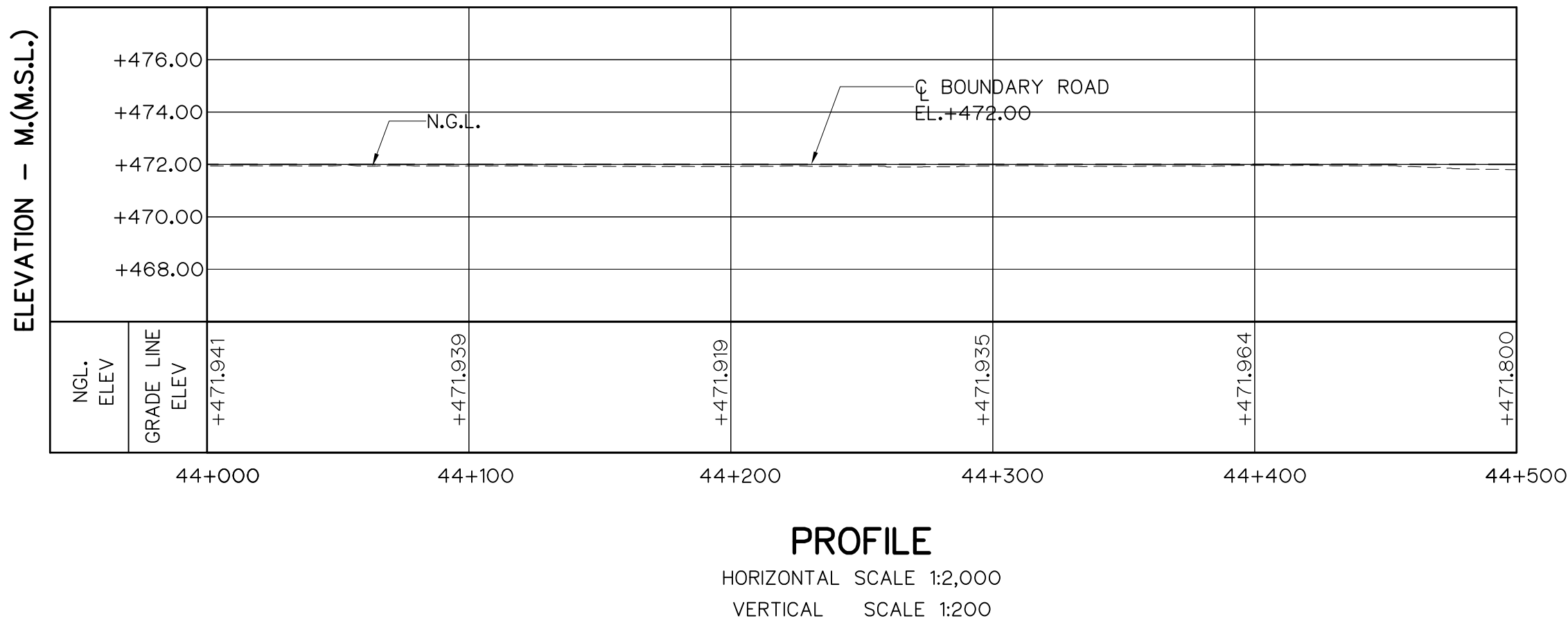
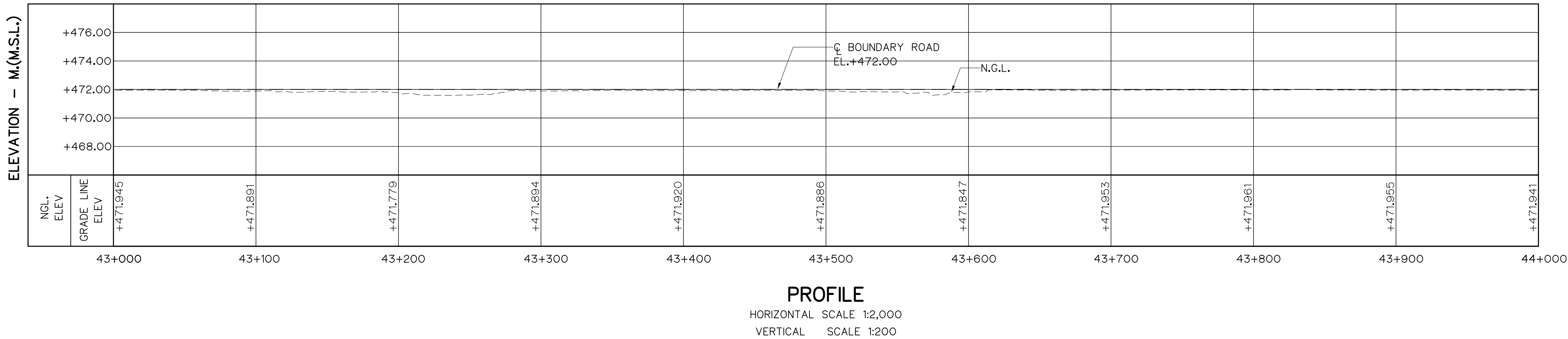
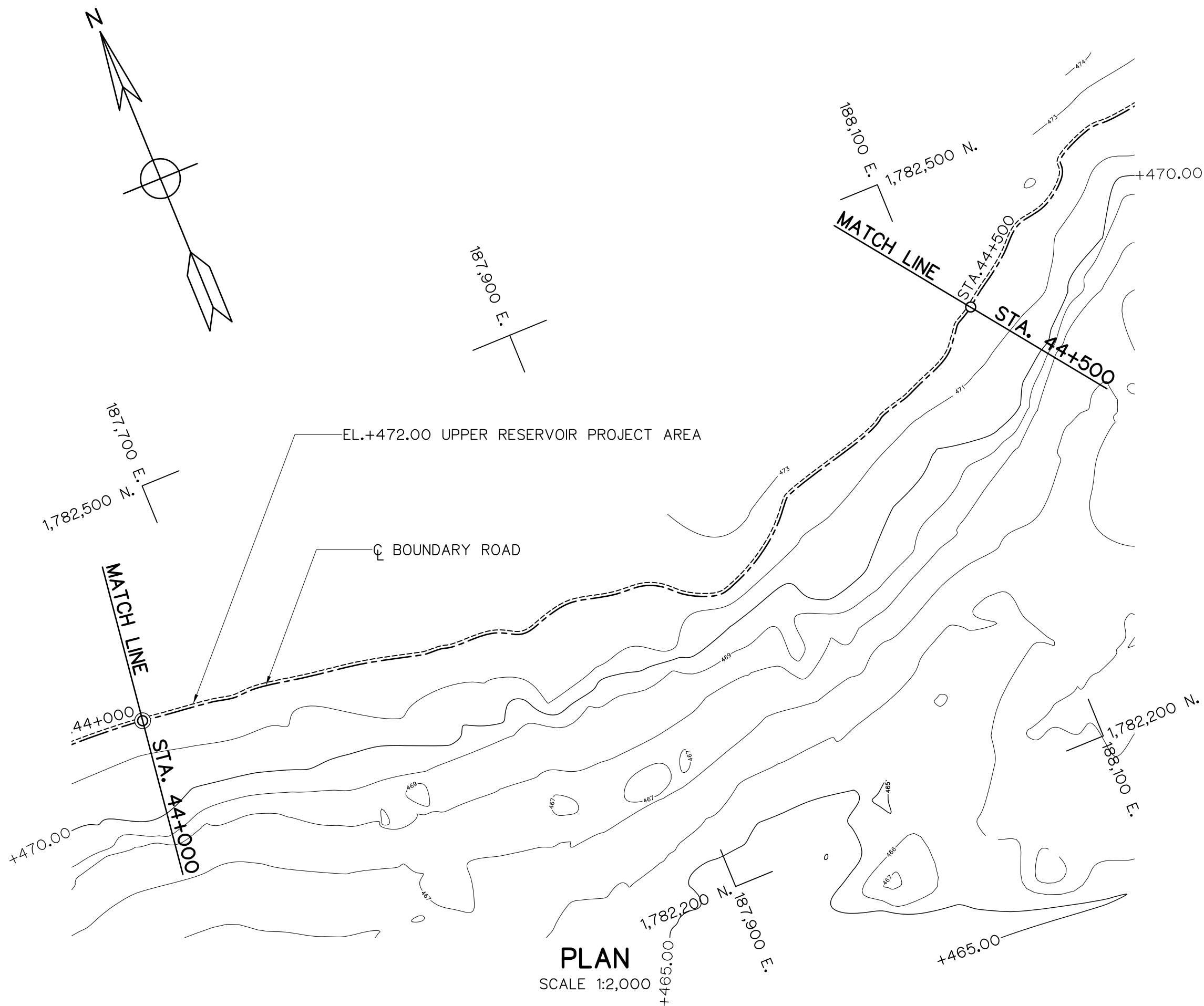
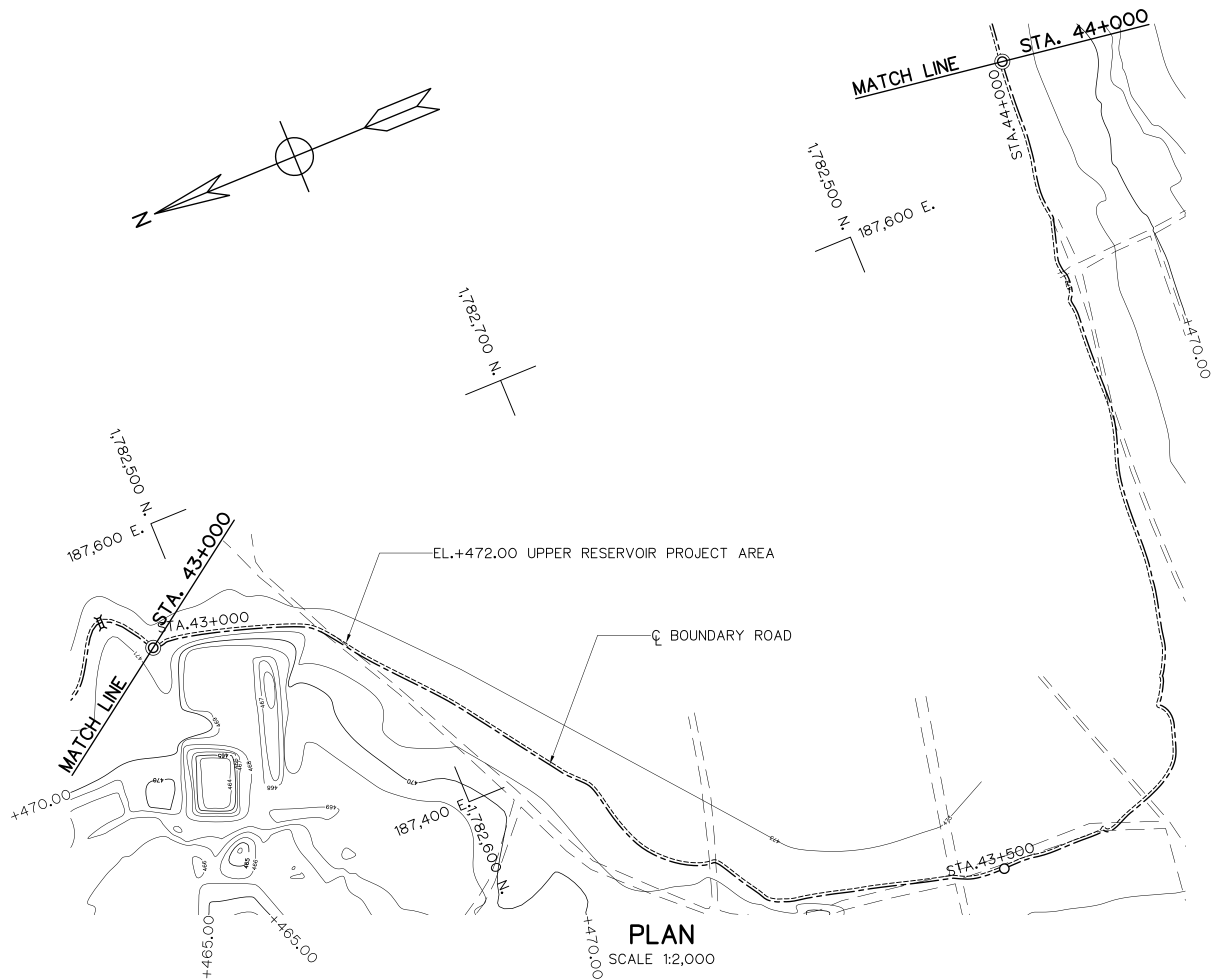
PROFILE
HORIZONTAL SCALE 1:2,000
VERTICAL SCALE 1:200

- LEGEND
- N.G.L.
 - BOUNDARY ROAD
 - EL.+472.00 UPPER RESERVOIR PROJECT AREA

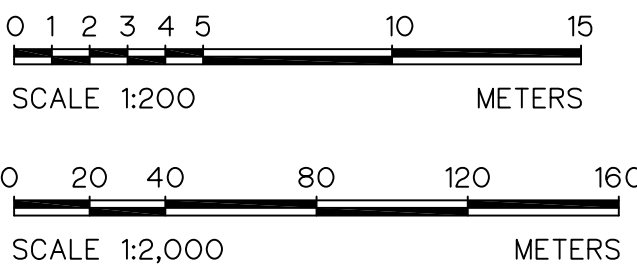


 KINGDOM OF THAILAND Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY			
HUI PRA THAO RESERVOIR BOUNDARY ROAD PROJECT AMPHOE KAENG KHRO, CHANGWAT CHAIYAPHUM			
CIVIL WORKS UPPER RESERVOIR BOUNDARY ROAD PLAN AND PROFILE, KM. 41+500 TO KM. 43+000			
 PANYA CONSULTANTS CO.,LTD.		 Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY	
DESIGNED		REVIEWED	
28.1957		28.76431	
SUBMITTED		RECOMMENDED	
DRAWN		APPROVED	
CHECKED		28.1957	
PROJECT MANAGER		DRAWING NO.	
10/08/2021		HRR-BR-U24	
DATE		SHEET NO.	
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NO.	DATE	REVISIONS	CHECKED	APPROVED
CONSULTANTS		DEDE		

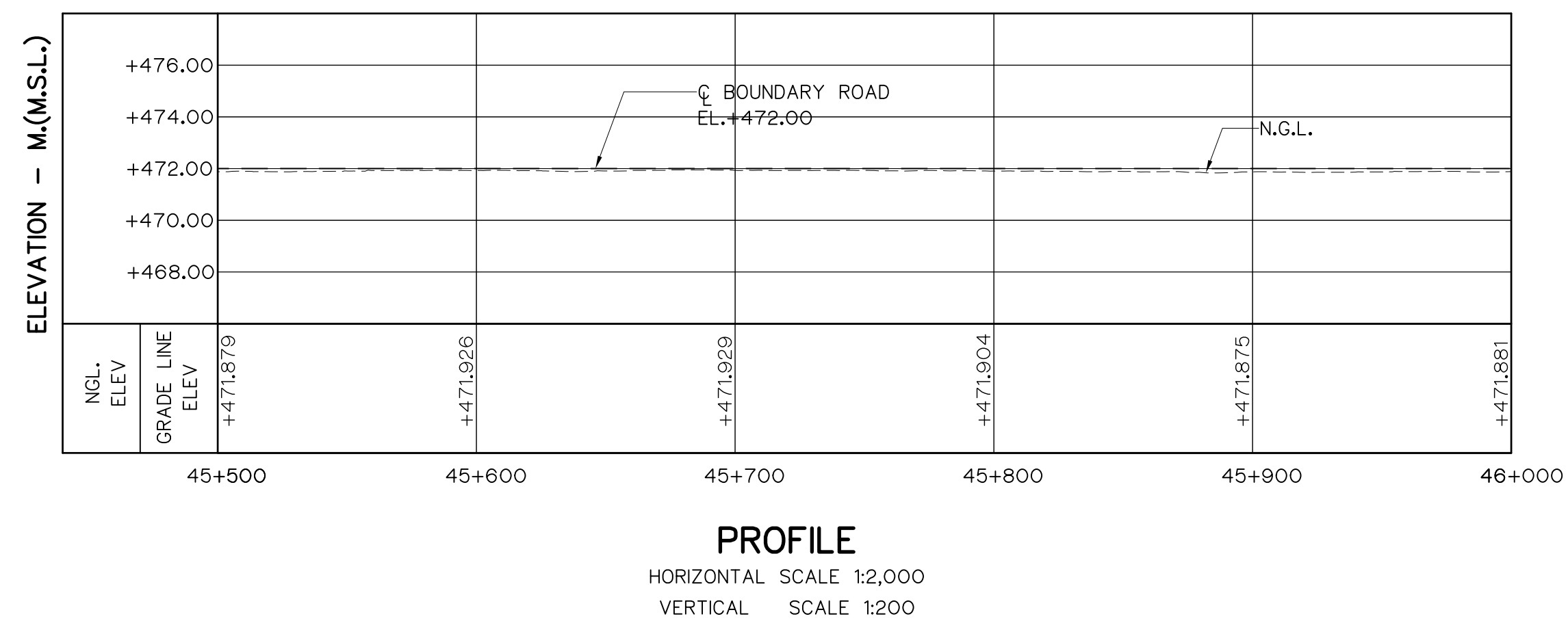
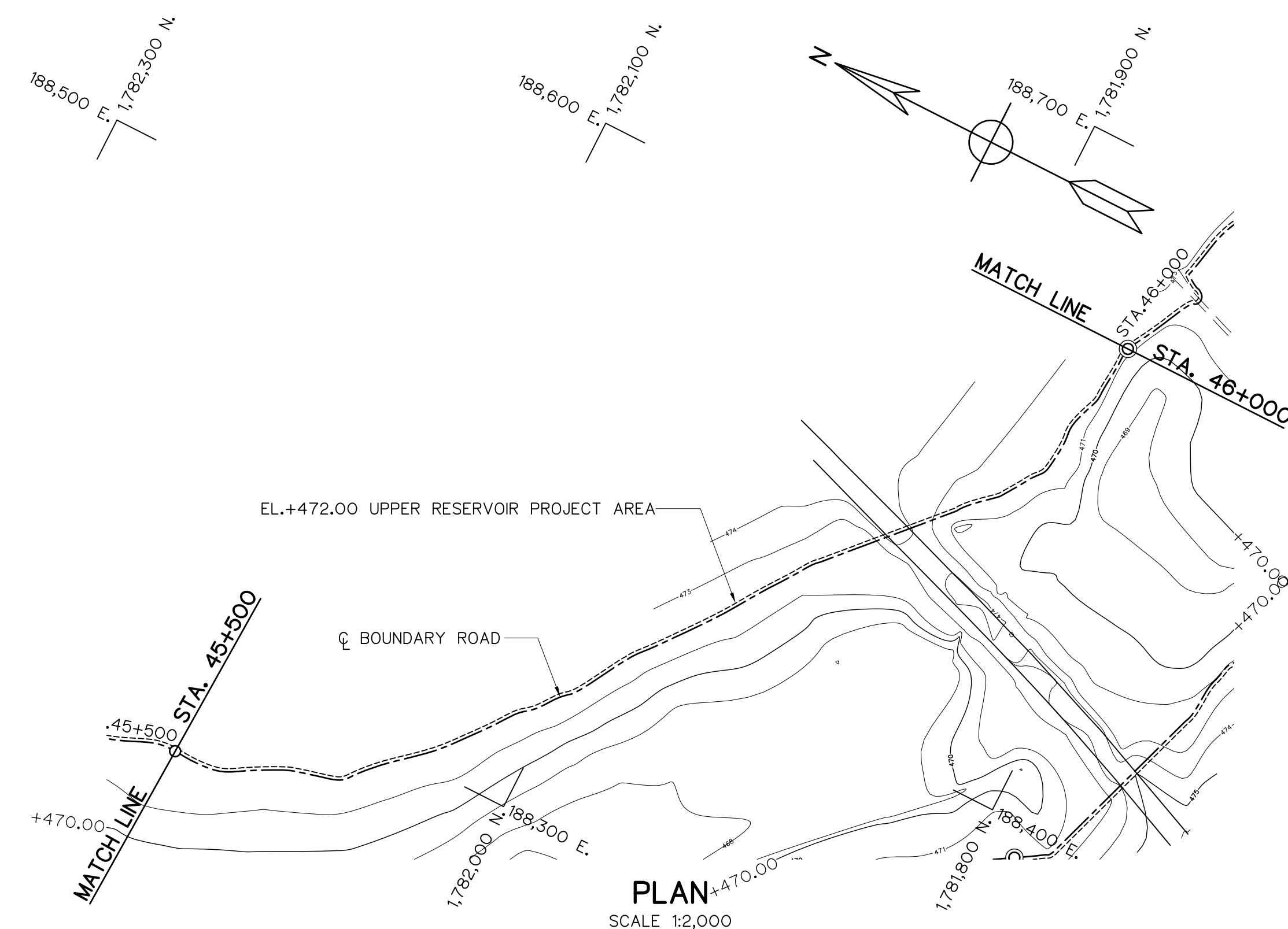


- LEGEND**
- N.G.L.
 - - - BOUNDARY ROAD
 - - - EL.+472.00 UPPER RESERVOIR PROJECT AREA

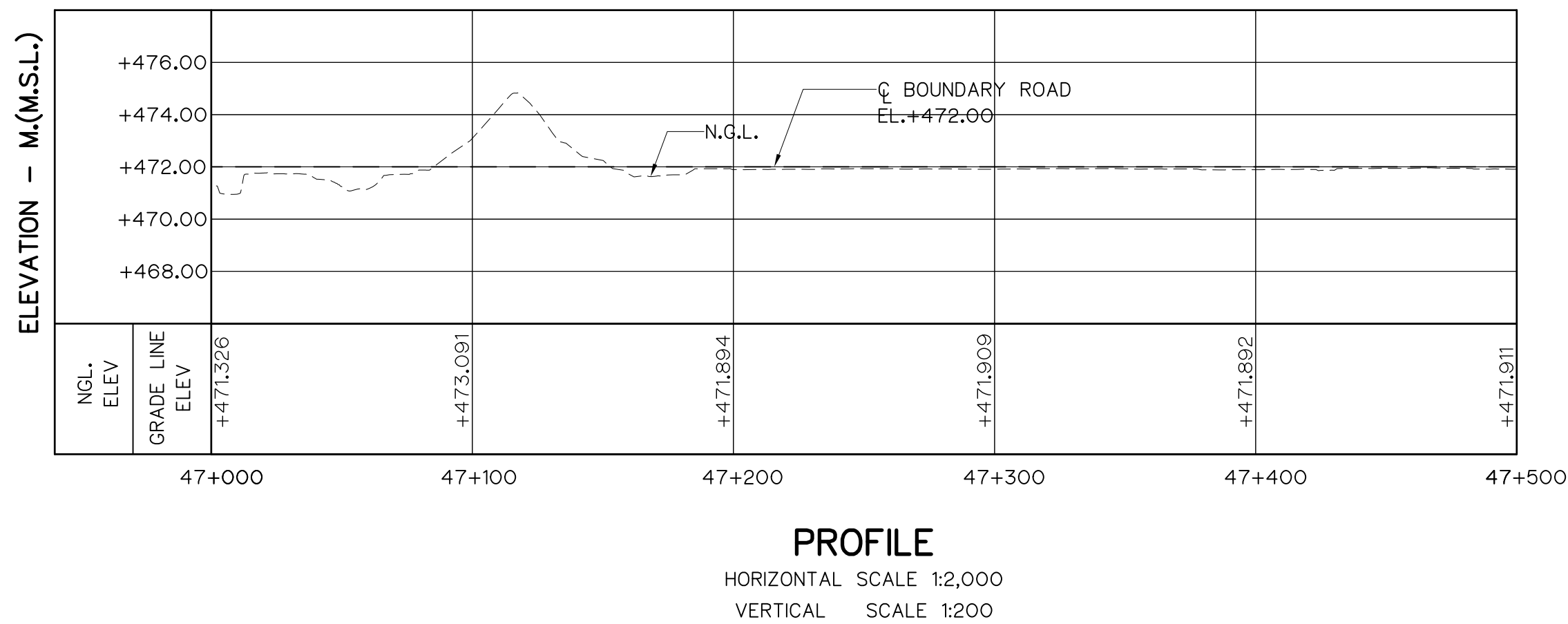
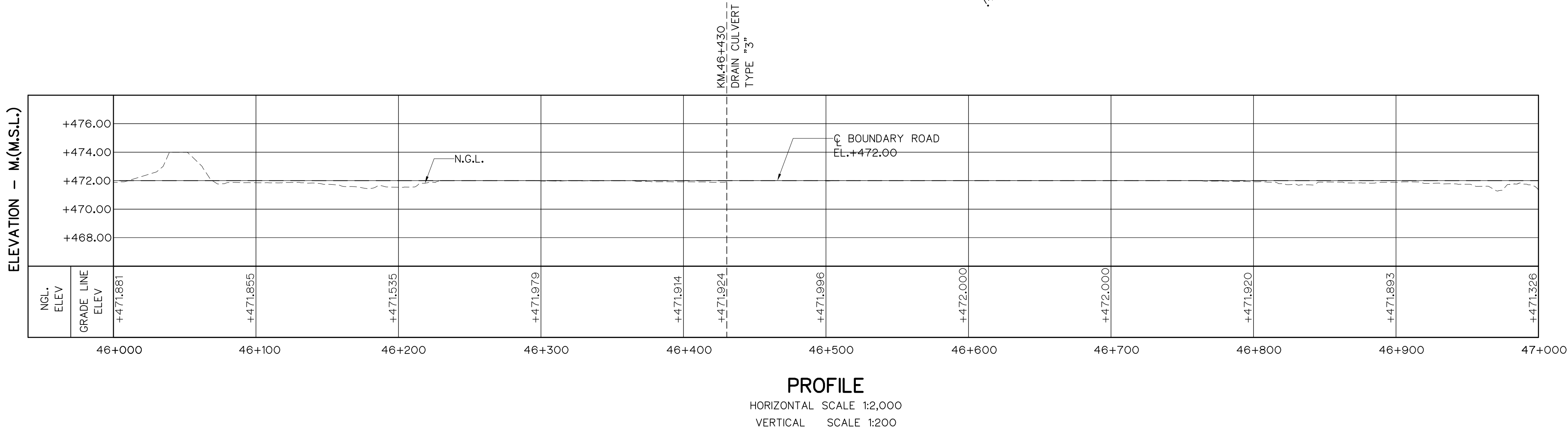
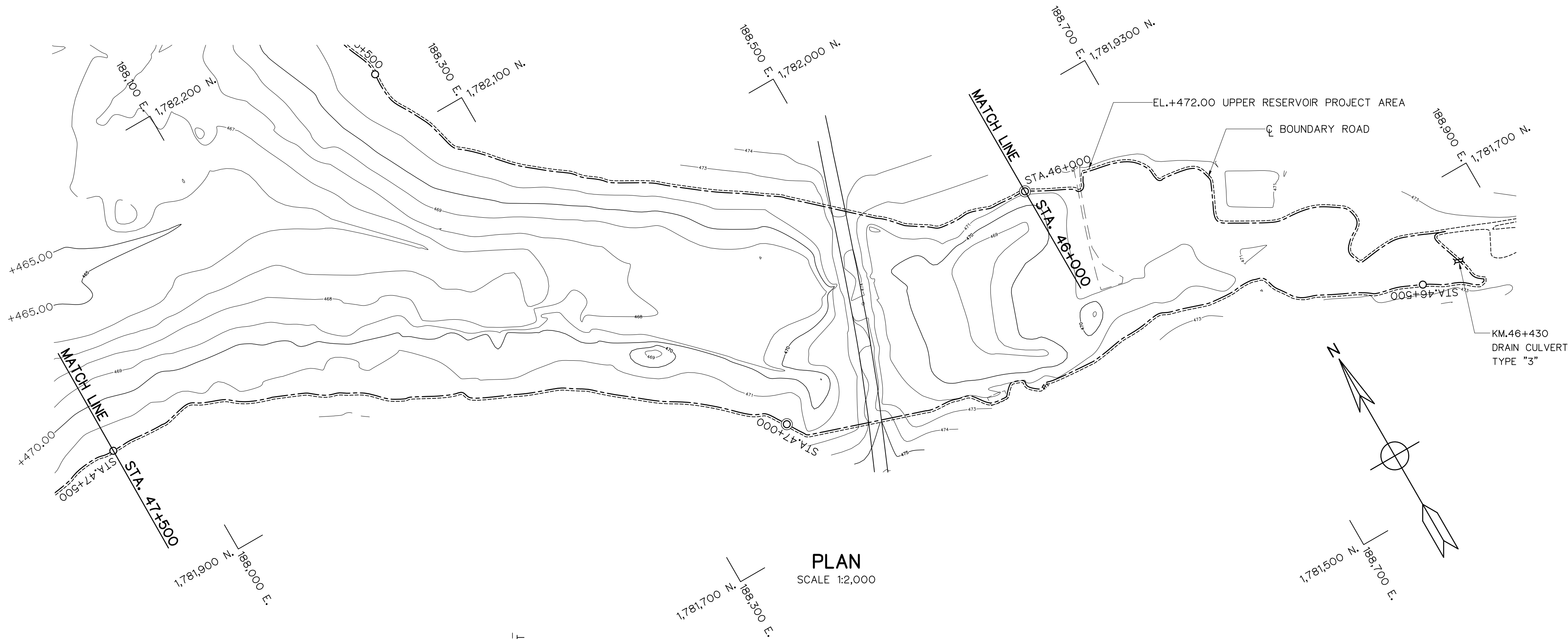


 KINGDOM OF THAILAND Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY			
HUI PRA THAO RESERVOIR BOUNDARY ROAD PROJECT AMPHOE KAENG KHRO, CHANGWAT CHAIYAPHUM			
CIVIL WORKS UPPER RESERVOIR BOUNDARY ROAD PLAN AND PROFILE, KM. 43+000 TO KM. 44+500			
 PANYA CONSULTANTS CO.,LTD.		 Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY	
DESIGNED 28.1957 28.76431		REVIEWED	
DRAWN		RECOMMENDED	
CHECKED 28.1957		APPROVED	
PROJECT MANAGER 10/08/2021 DATE		DRAWING NO. HRR-BR-U25 SHEET NO. 28 OF 80	

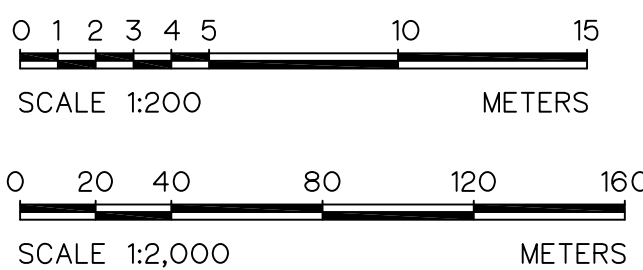
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NO.	DATE	REVISIONS	CHECKED	APPROVED
	CONSULTANTS		DEDE	



3					 PANTA CONSULTANTS CO., LTD.	 MINISTRY OF ENERGY	REVIEWED			
2							DESIGNED	28.1.1957	28.1.76.431	SUBMITTED
1							DRAWN			RECOMMENDED
NO.	DATE	REVISIONS	CHECKED	APPROVED			CHECKED	28.1.1957	APPROVED	
CONSULTANTS					DEDE		10/08/2021		DRAWING NO.	SHEET NO.
							PROJECT MANAGER _____ DATE _____		HRR-BR-UT6	29 OF 80

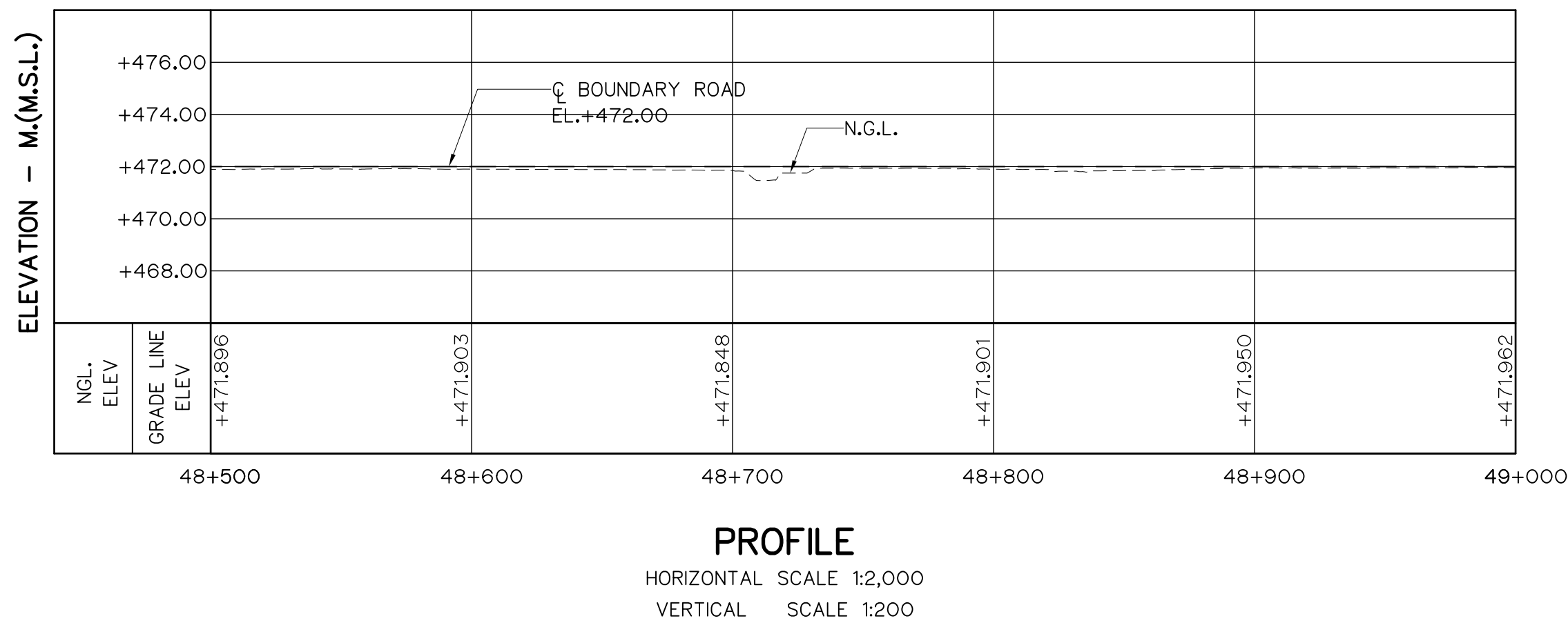
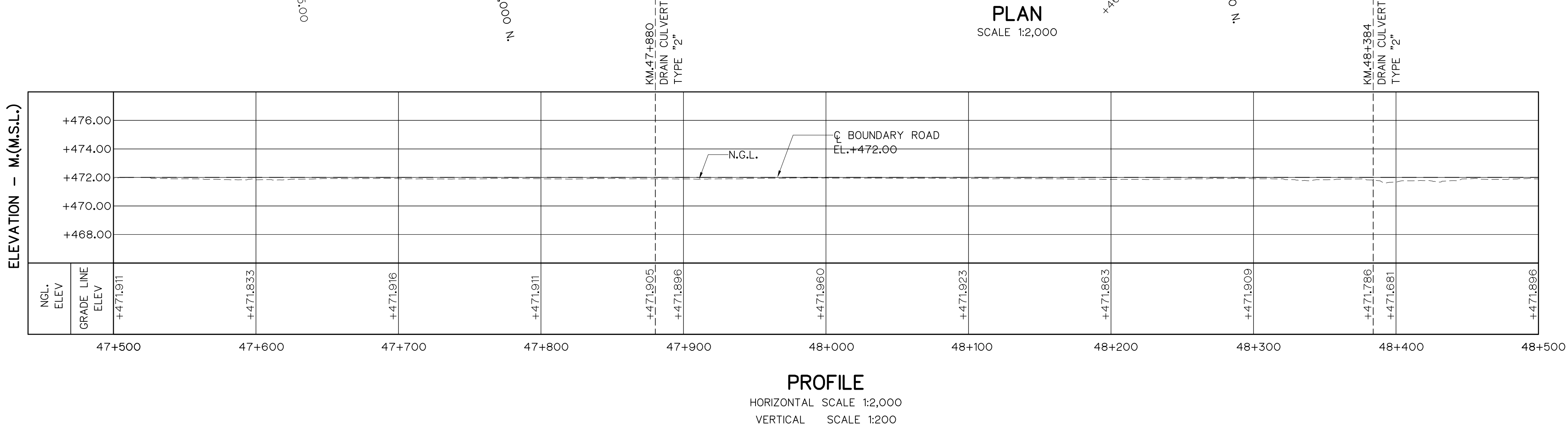
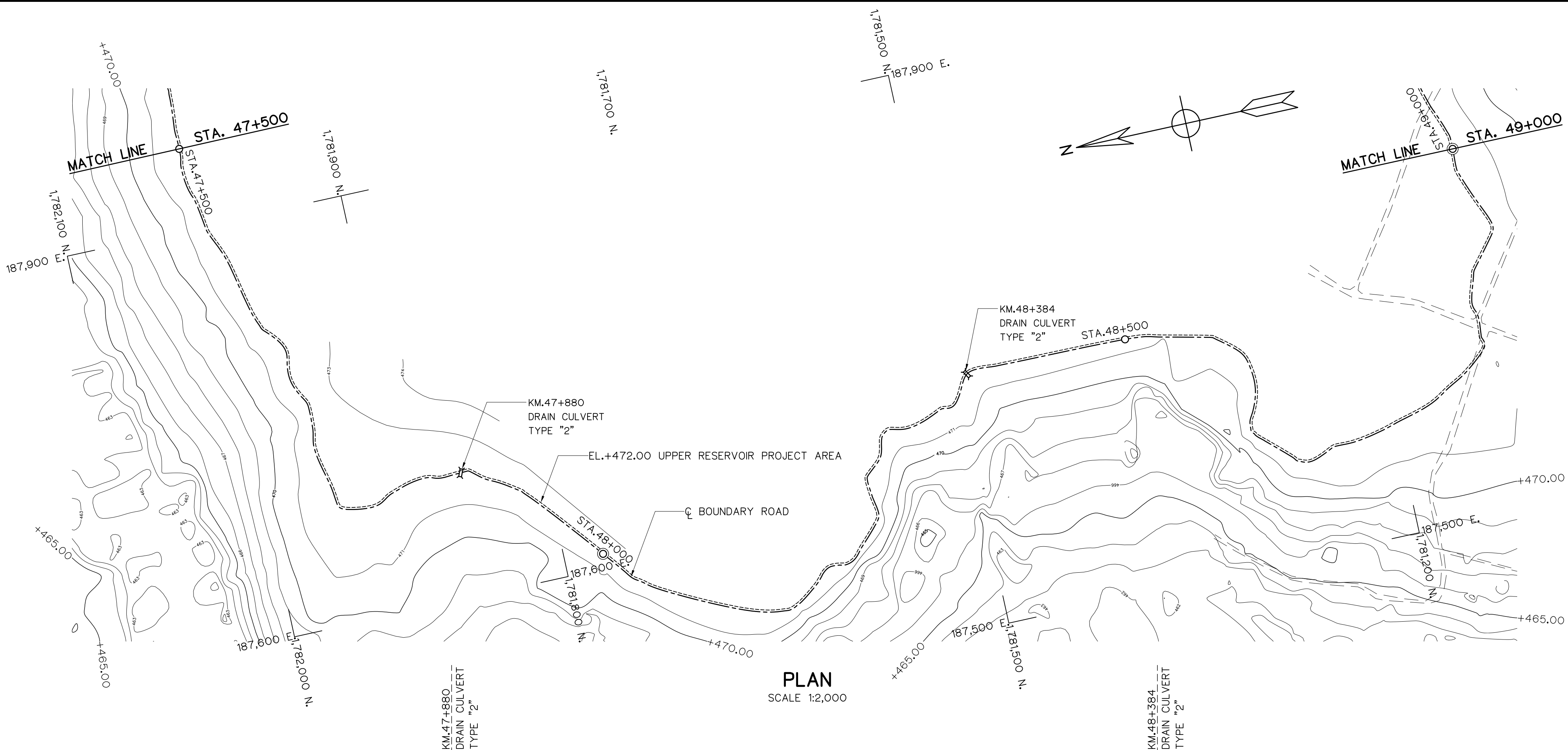


- LEGEND**
- N.G.L.
 - - - BOUNDARY ROAD
 - - - EL.+472.00 UPPER RESERVOIR PROJECT AREA

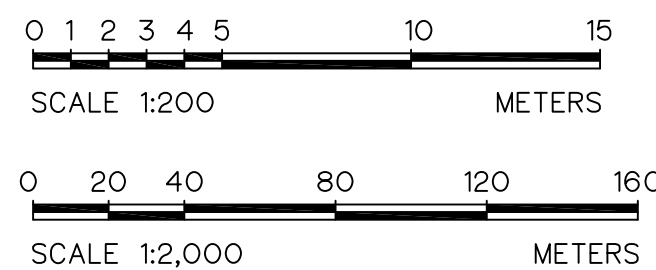


 KINGDOM OF THAILAND Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY			
HUI PRA THAO RESERVOIR BOUNDARY ROAD PROJECT AMPHOE KAENG KHRO, CHANGWAT CHAIYAPHUM			
CIVIL WORKS UPPER RESERVOIR BOUNDARY ROAD PLAN AND PROFILE, KM. 46+000 TO KM. 47+500			
 PANYA CONSULTANTS CO.,LTD.		 Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY	
DESIGNED 28.1957 28.76431		REVIEWED	
DRAWN		RECOMMENDED	
CHECKED 28.1957		APPROVED	
PROJECT MANAGER 10/08/2021 DATE		DRAWING NO. HRR-BR-U27	
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NO.	DATE	REVISIONS	CHECKED	APPROVED
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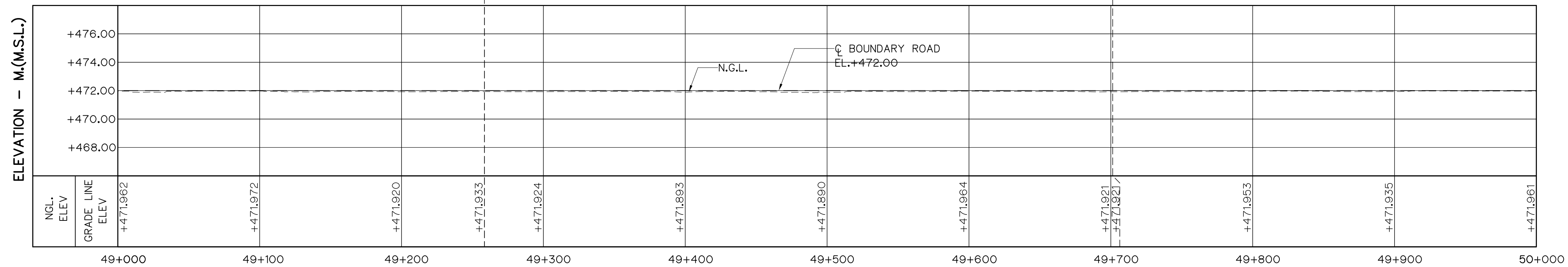


- LEGEND**
- N.G.L.
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 - - - EL.+472.00 UPPER RESERVOIR PROJECT AREA

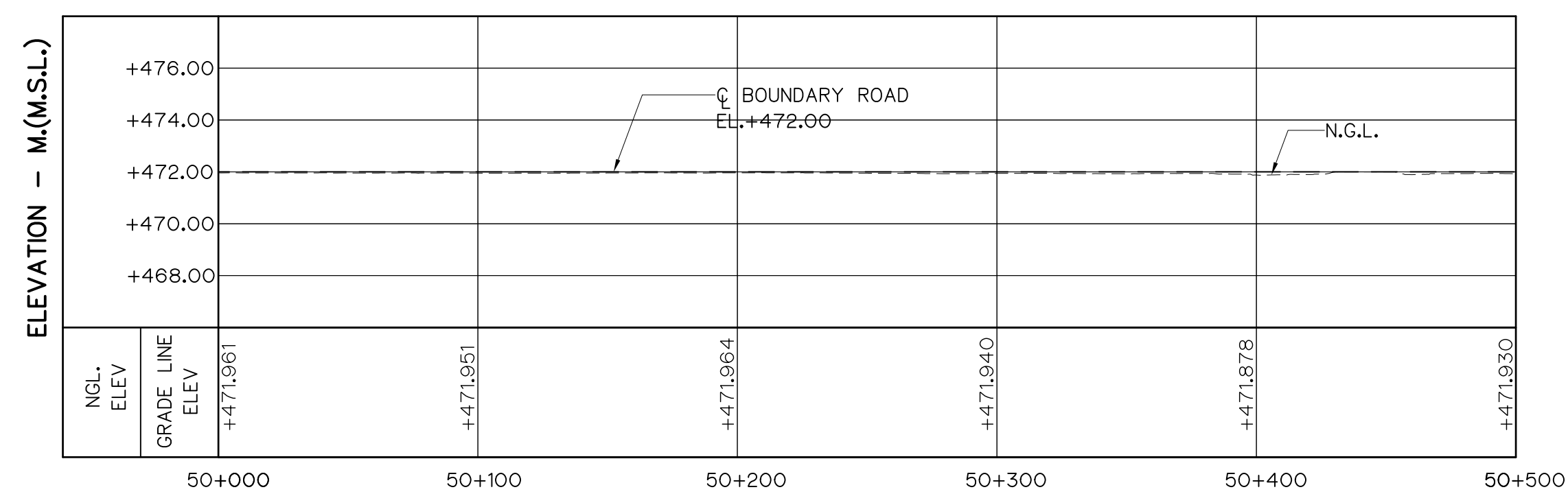


 KINGDOM OF THAILAND Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY			
HUA I PRA THAO RESERVOIR BOUNDARY ROAD PROJECT AMPHOE KAENG KHRO, CHANGWAT CHAIYAPHUM			
CIVIL WORKS UPPER RESERVOIR BOUNDARY ROAD PLAN AND PROFILE, KM. 47+500 TO KM. 49+000			
 PANYA CONSULTANTS CO.,LTD.		 Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY	
DESIGNED 28.1957 28.176431		REVIEWED	
DRAWN		RECOMMENDED	
CHECKED 28.1957		APPROVED	
PROJECT MANAGER 10/08/2021 DATE		DRAWING NO. HRR-BR-U28	
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NO.	DATE	REVISIONS	CHECKED	APPROVED
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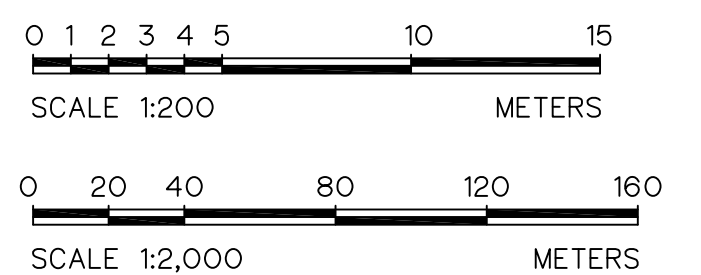


HORIZONTAL SCALE 1:2,000
VERTICAL SCALE 1:200

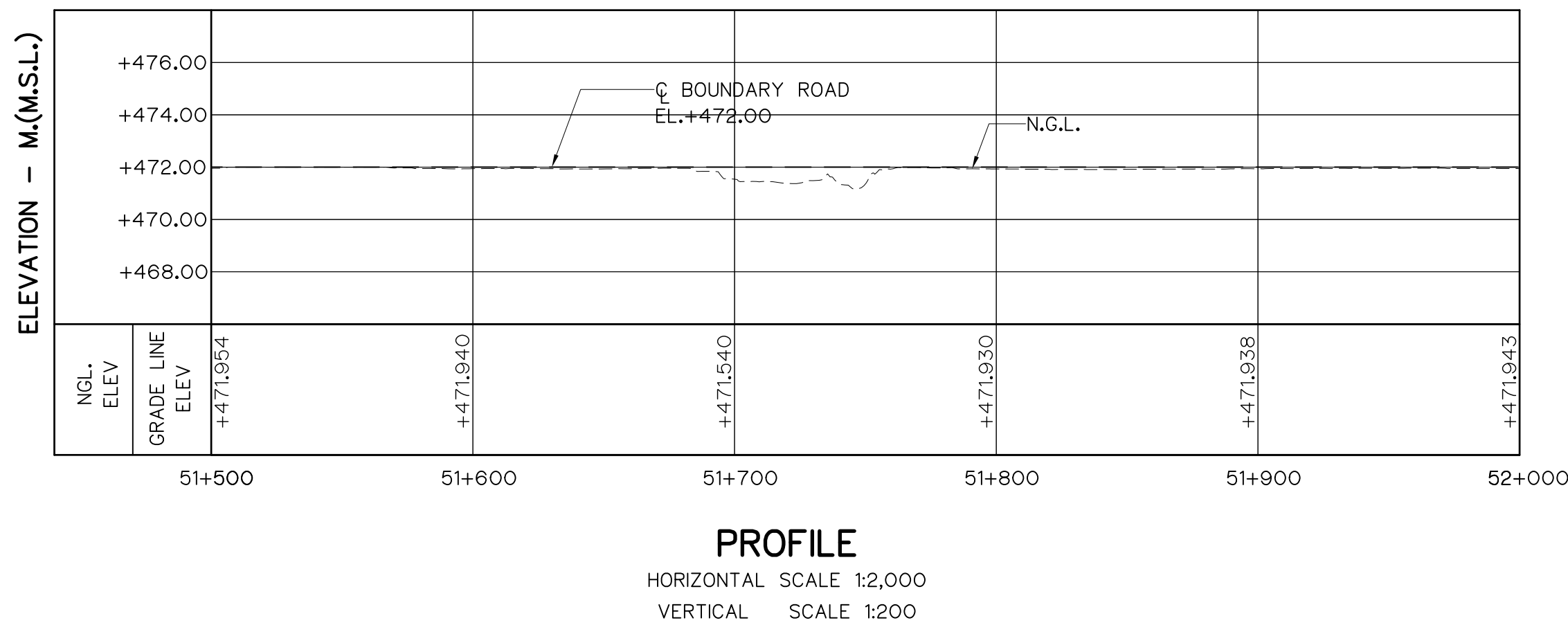
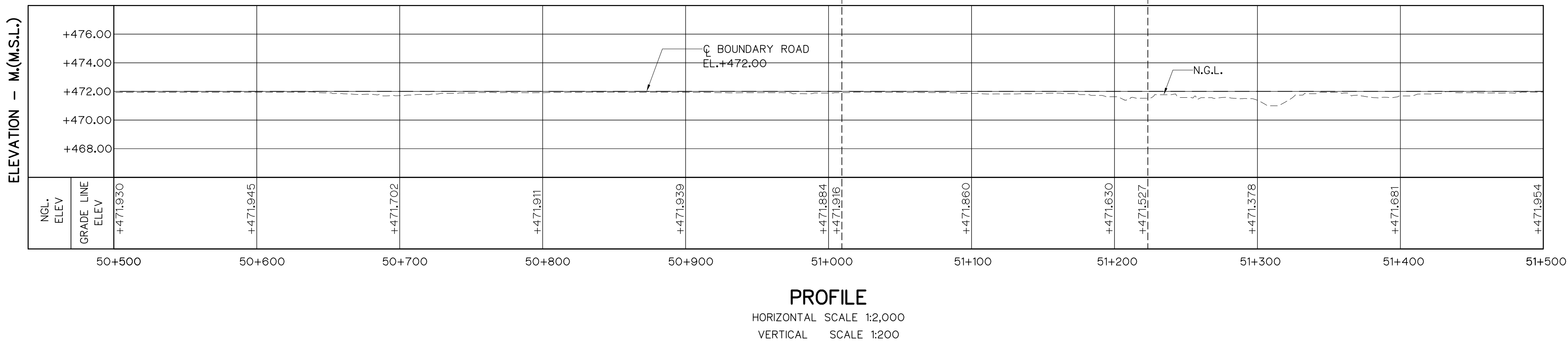
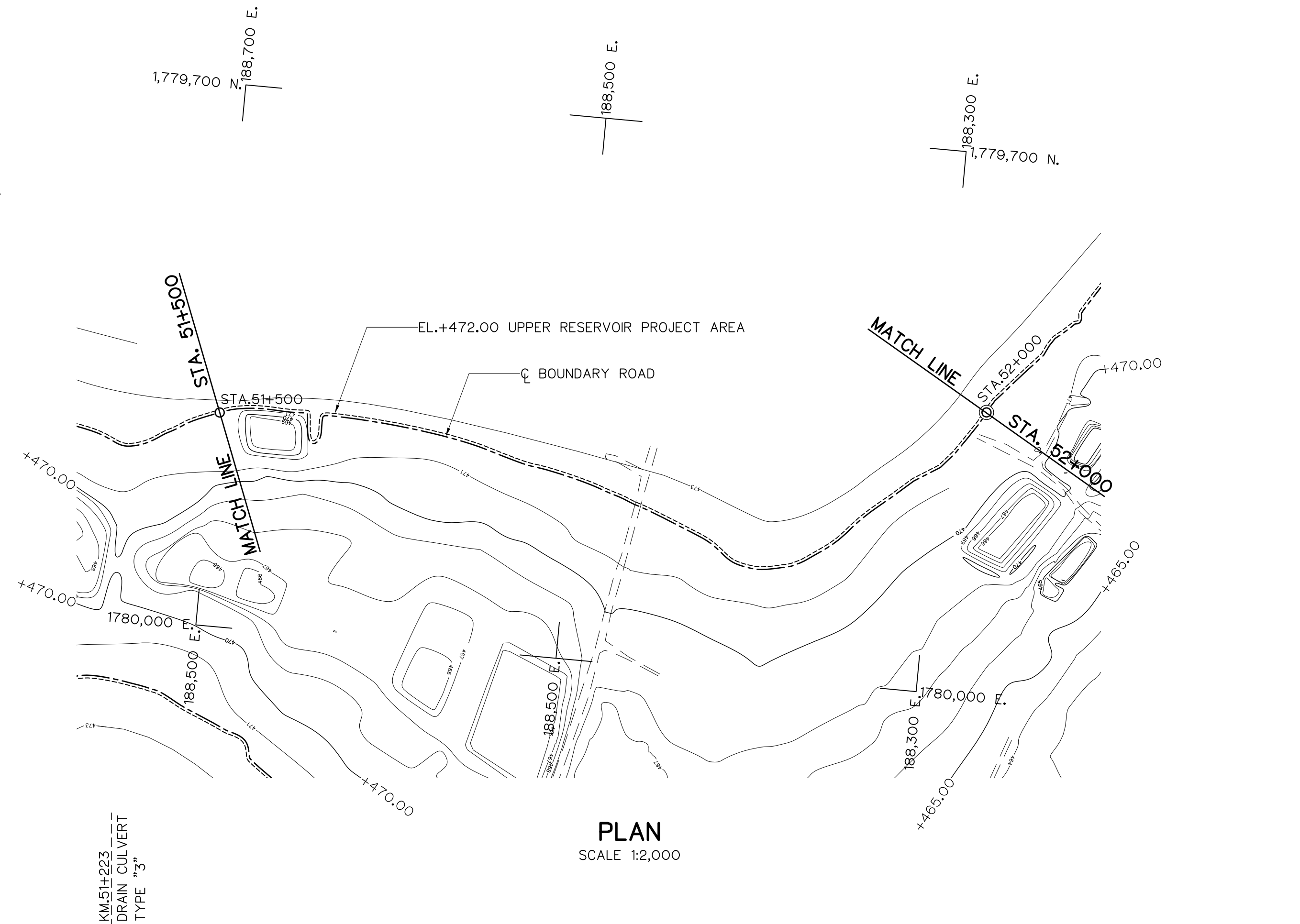
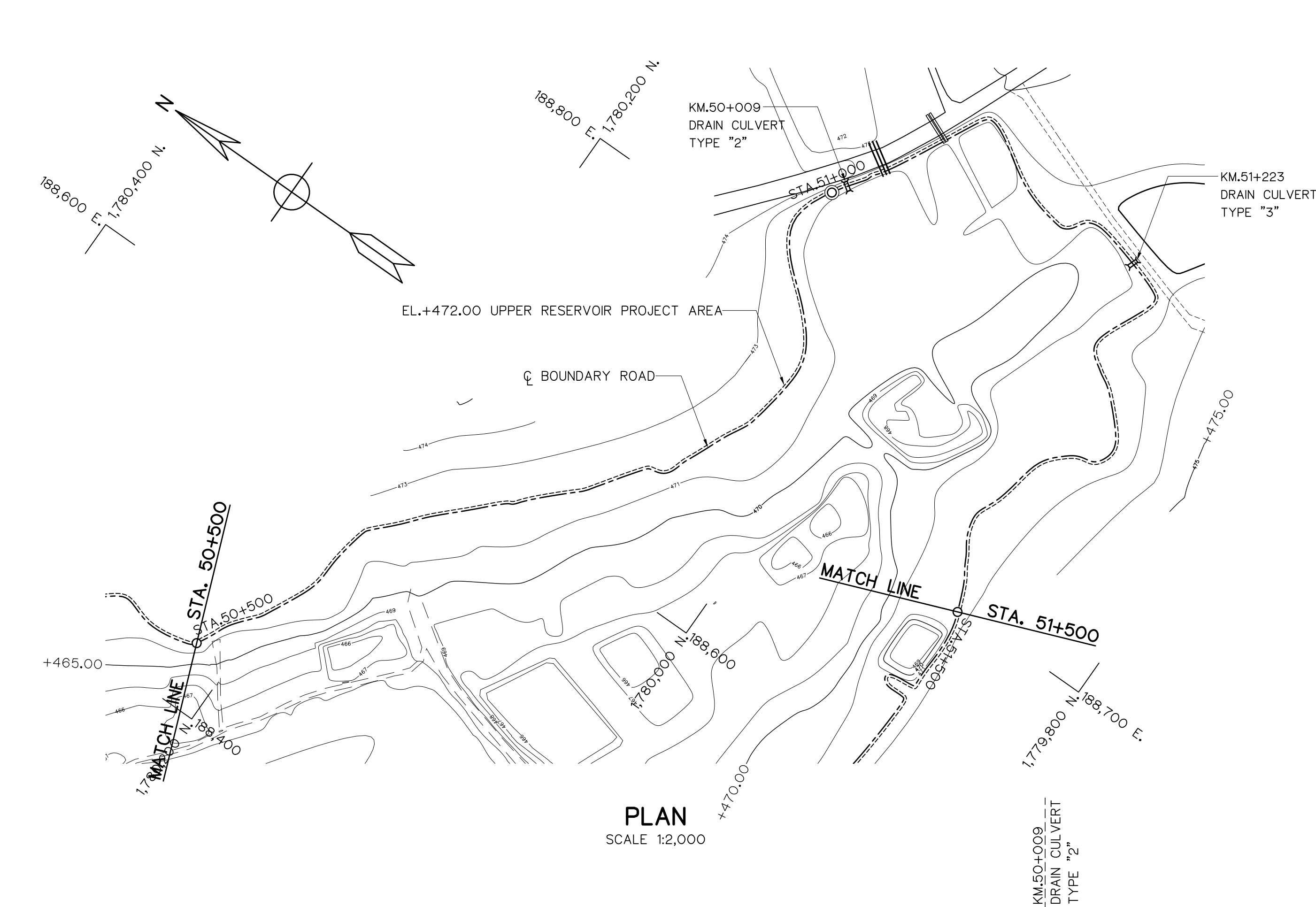


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VERTICAL SCALE 1:200

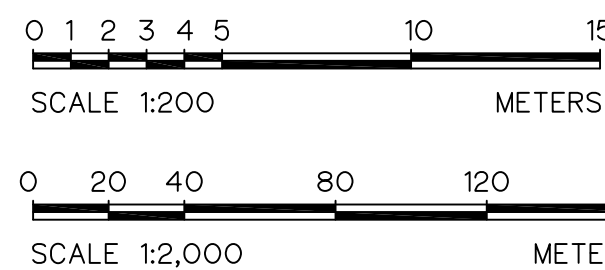
- - - - - N.G.L.
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 — — — — — EL.+472.00 UPPER RESERVOIR PROJECT AREA



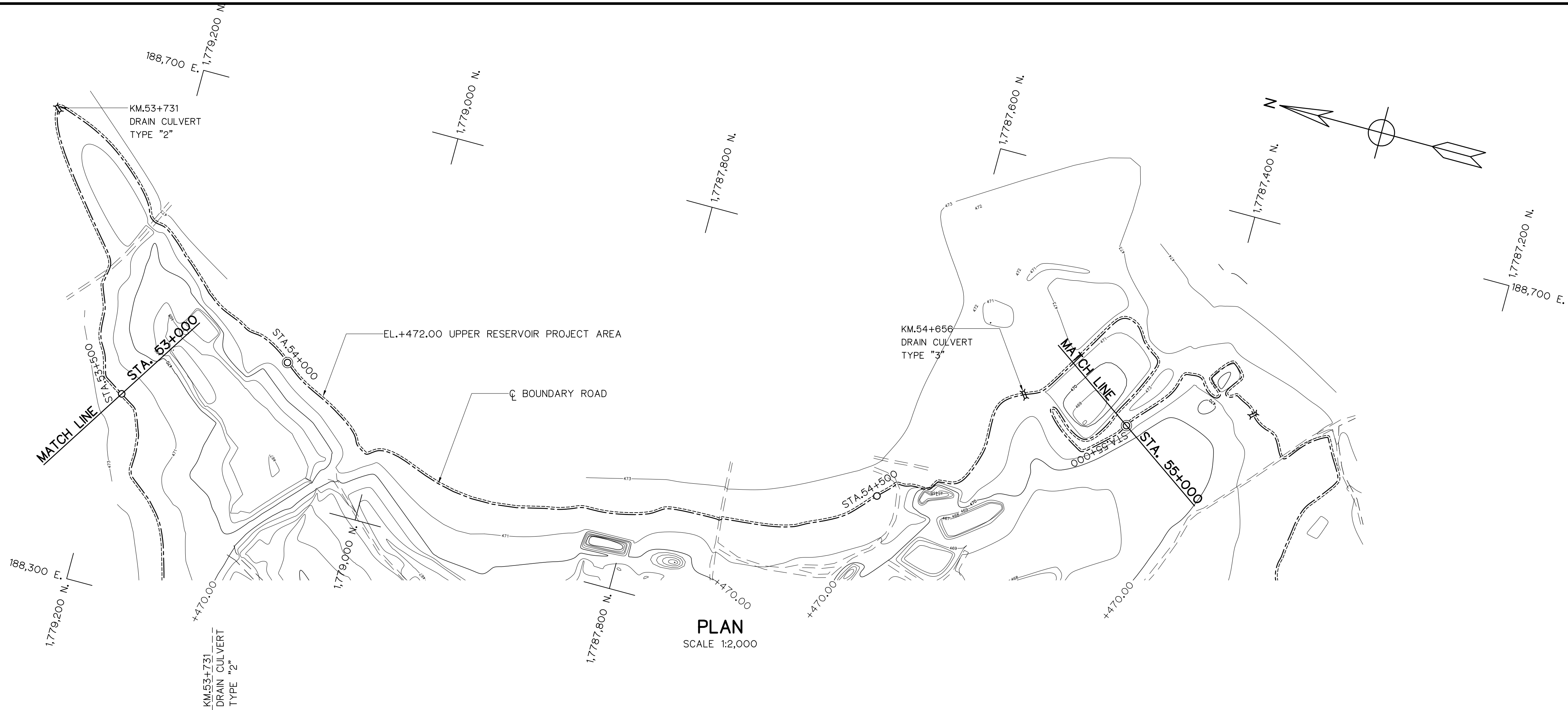
 KINGDOM OF THAILAND Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY			
HUAI PRA THAO RESERVOIR BOUNDARY ROAD PROJECT AMPHOE KAENG KHRO, CHANGWAT CHAIYAPHUM			
CIVIL WORKS UPPER RESERVOIR BOUNDARY ROAD PLAN AND PROFILE, KM. 49+000 TO KM. 50+500			
 PANYA CONSULTANTS CO., LTD.		 Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY	
3			
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NO.	DATE	REVISIONS	CHECKED APPROVED
		CONSULTANTS	DEDE
DESIGNED 28.10.57 18.76431		REVIEWED SUBMITTED	
DRAWN		RECOMMENDED	
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_____ 10/08/2021 PROJECT MANAGER DATE		DRAWING NO. SHEET NO. HRR-BR-U29 32 OF 80	



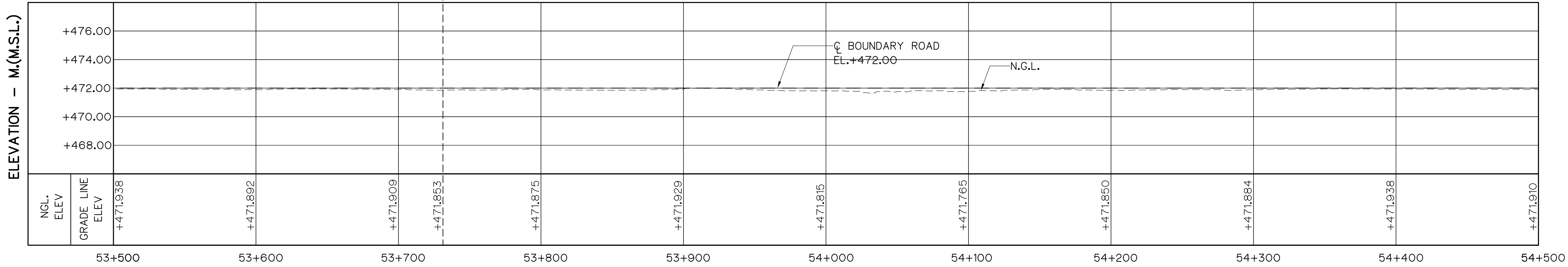
- LEGEND
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 - - - Q BOUNDARY ROAD
 - - - EL.+472.00 UPPER RESERVOIR PROJECT AREA



 KINGDOM OF THAILAND Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY					HUAI PRA THAO RESERVOIR BOUNDARY ROAD PROJECT AMPHOE KAENG KHRO, CHANGWAT CHAIYAPHUM				
CIVIL WORKS UPPER RESERVOIR BOUNDARY ROAD PLAN AND PROFILE, KM. 50+500 TO KM. 52+000									
 PANYA CONSULTANTS CO.,LTD.					 Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY				
3					REVIEWED				
2					DESIGNED 28.1957 28.76431 SUBMITTED				
1					DRAWN RECOMMENDED				
NO. DATE REVISIONS CHECKED APPROVED					CHECKED 28.1957 APPROVED				
CONSULTANTS DEDE					PROJECT MANAGER 10/08/2021 DATE		DRAWING NO. HRR-BR-U30		SHEET NO. 33 OF 80

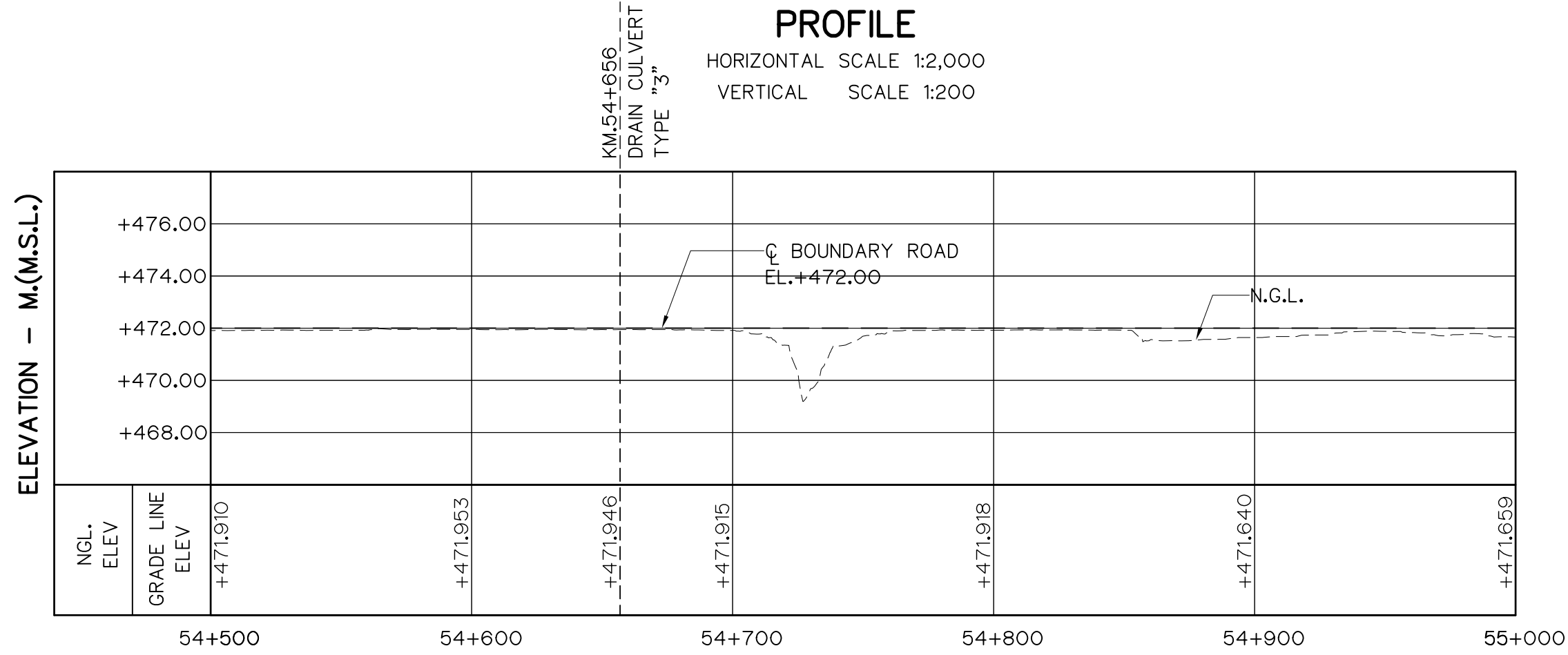


PLAN
SCALE 1:2,000



PROFILE

HORIZONTAL SCALE 1:2,000
VERTICAL SCALE 1:200

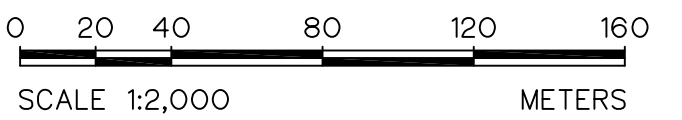


PROFILE

HORIZONTAL SCALE 1:2,000
VERTICAL SCALE 1:200

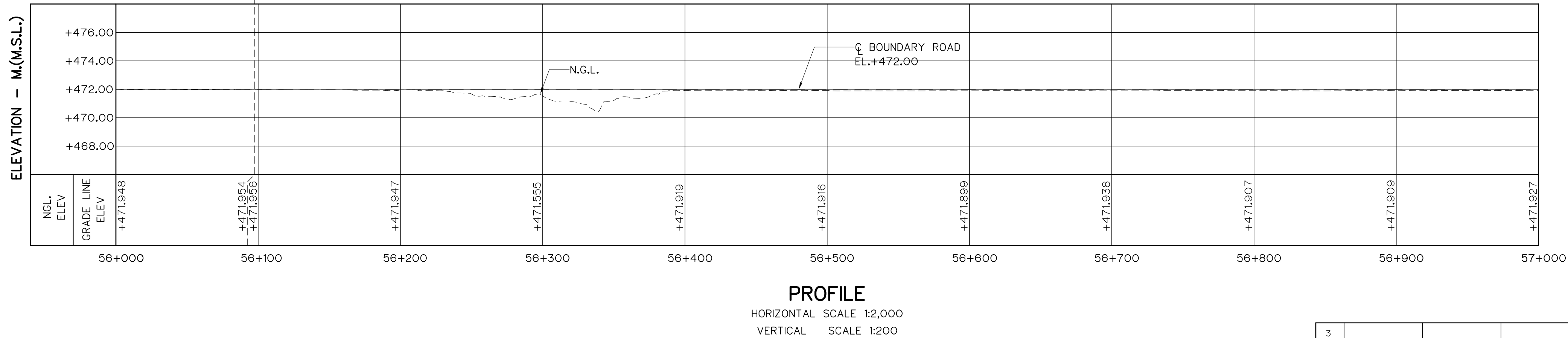
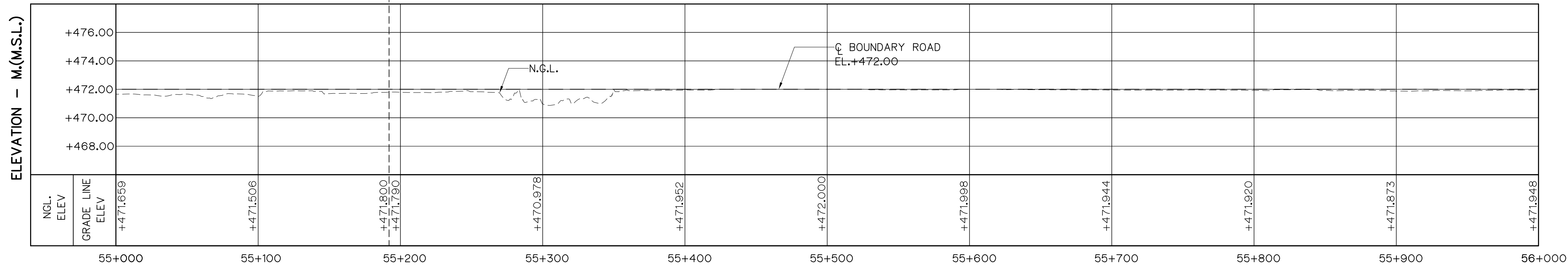
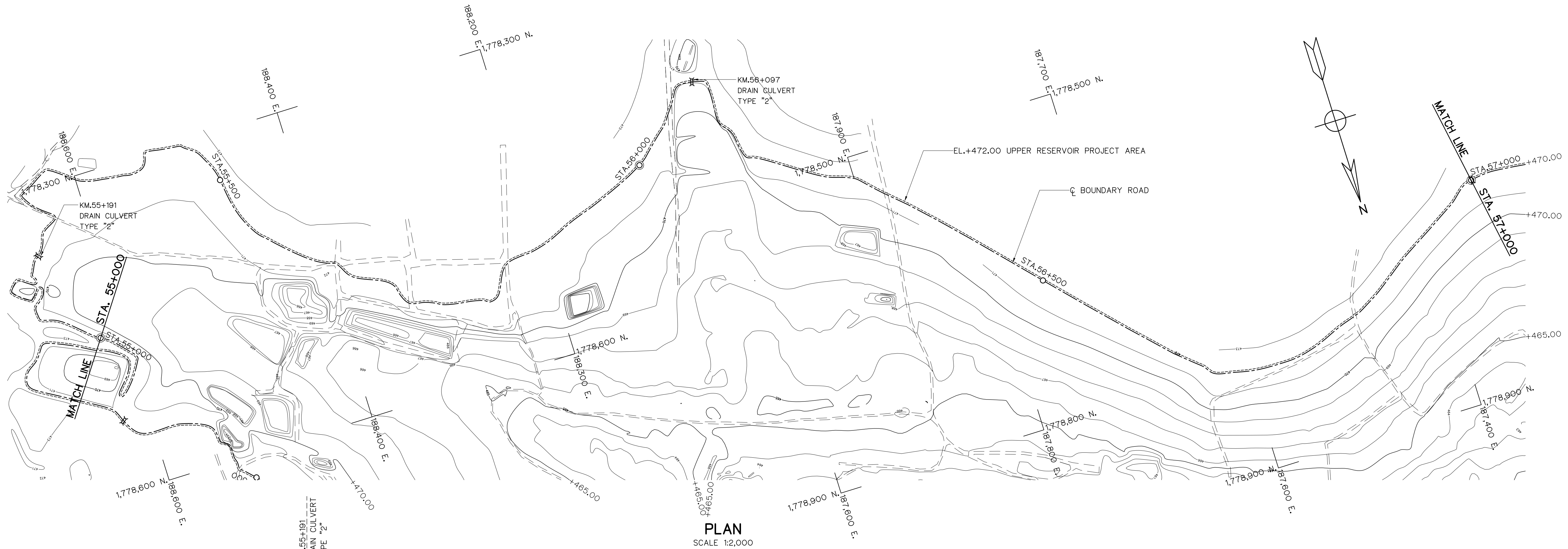
LEGEND

- N.G.L.
- BOUNDARY ROAD
- EL.+472.00 UPPER RESERVOIR PROJECT AREA

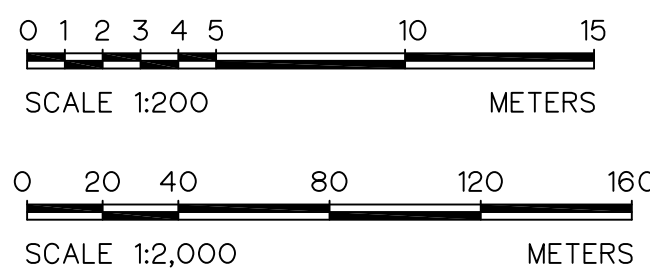


 KINGDOM OF THAILAND Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY			
HUAI PRA THAO RESERVOIR BOUNDARY ROAD PROJECT AMPHOE KAENG KHRO, CHANGWAT CHAIYAPHUM			
CIVIL WORKS UPPER RESERVOIR BOUNDARY ROAD PLAN AND PROFILE, KM. 53+500 TO KM. 55+000			
 PANYA CONSULTANTS CO.,LTD.		 Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY	
DESIGNED		28.1957	28.76431
DRAWN		RECOMMENDED	
CHECKED		28.1957	
PROJECT MANAGER		10/08/2021	DRAWING NO.
		DATE	HRR-BR-U32
			SHEET NO.
			35 OF 80

3				
2				
1				
NO.	DATE	REVISIONS	CHECKED	APPROVED
CONSULTANTS		DEDE		



- LEGEND
- N.G.L.
 - - - BOUNDARY ROAD
 - - - EL.+472.00 UPPER RESERVOIR PROJECT AREA



 KINGDOM OF THAILAND Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY			
HUI PRA THAO RESERVOIR BOUNDARY ROAD PROJECT AMPHOE KAENG KHRO, CHANGWAT CHAIYAPHUM			
CIVIL WORKS UPPER RESERVOIR BOUNDARY ROAD PLAN AND PROFILE, KM. 55+000 TO KM. 57+000			
 PANYA CONSULTANTS CO.,LTD.		 Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY	
DESIGNED 28.1957 28.76431		REVIEWED	
DRAWN		RECOMMENDED	
CHECKED 28.1957		APPROVED	
PROJECT MANAGER 10/08/2021 DATE		DRAWING NO. HRR-BR-U33	
		SHEET NO. 36 OF 80	

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NO.	DATE	REVISIONS	CHECKED	APPROVED
	CONSULTANTS		DEDE	

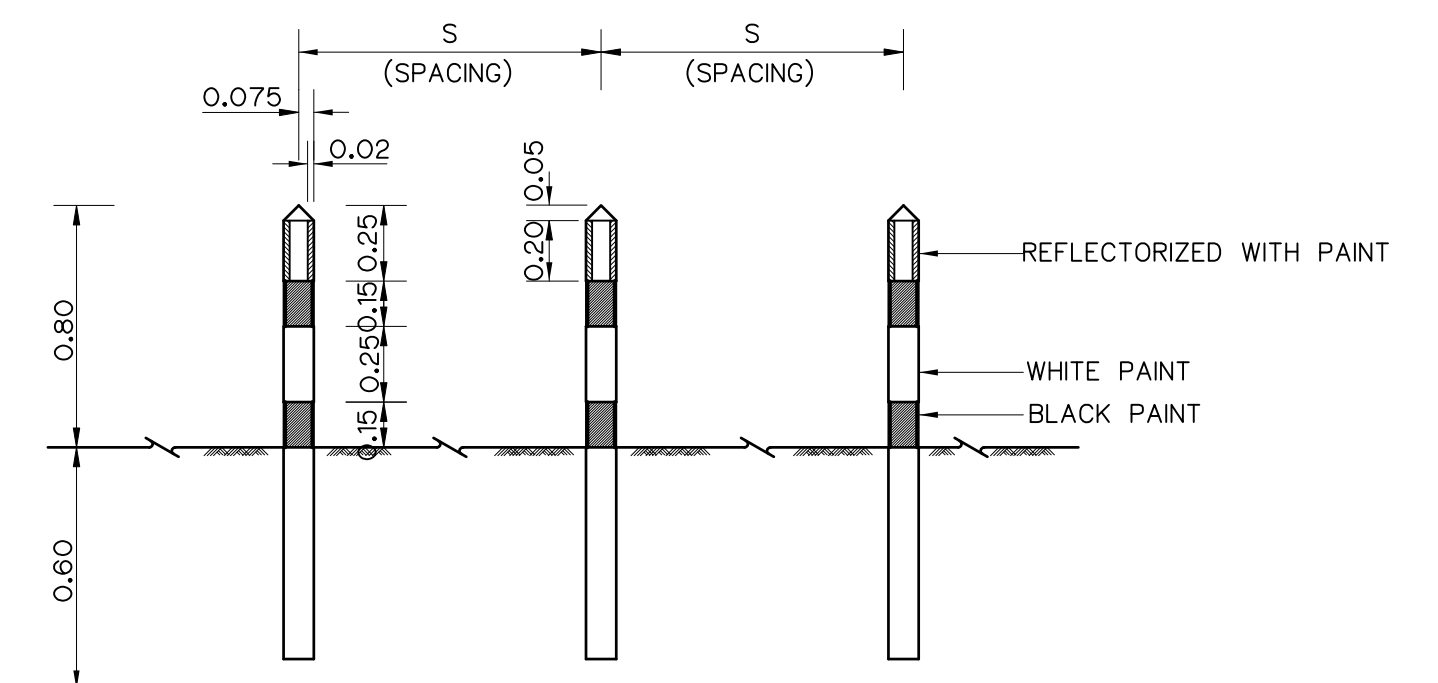


3					DESIGNED	28/10/57	18.76431	REVIEWED	MINISTRY OF ENERGY	
2					DRAWN			SUBMITTED		
1					CHECKED	28/10/57		APPROVED		
NO.	DATE	REVISIONS	CHECKED	APPROVED						
CONSULTANTS			DEDE		10/08/2021			DRAWING NO.		SHEET NO.
					PROJECT MANAGER DATE			HRR-BR-U34		37 OF 80

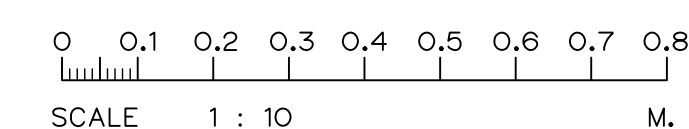


SPACING OF GUIDE POSTS				
RADIUS M.	S M.	S1 M.	S2 M.	S3 M.
15 - 74	4	8	12	24
75 - 99	6	12	18	36
LARGER THAN 100	NO GUIDE POSTS INSTALLED			

1. ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS, UNLESS OTHERWISE SHOWN.
2. SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. HRR-GN-03.
3. GUIDE POSTS ARE REQUIRED AT EVERY BENDS AND BETWEEN
BENDS WITH MAXIMUM 10.00 M. SPACING.



SECTION A-A
NOT TO SCALE
GUIDE POSTS



					 PANYA CONSULTANTS CO., LTD.		 MINISTRY OF ENERGY		
3					DESIGNED	28.1957	18.76431	REVIEWED	
2					DRAWN			SUBMITTED	
1								RECOMMENDED	
NO.	DATE	REVISIONS	CHECKED	APPROVED	CHECKED	28.1957		APPROVED	
CONSULTANTS			DEDE		10/08/2021 PROJECT MANAGER DATE			DRAWING NO. HRR-BR-U35	SHEET NO. 38 OF 80

DRAIN CULVERT TYPE 1 OF UPPER RESERVOIR BOUNDARY ROAD

KM	N.G.L. EL.	FLOW	ELEVATION			DIMENSIONS						REMARKS
			EL.1	EL.2	EL.3	L _U	L _D	H	L	B	D	
0+155	+471.905	LEFT TO RIGHT	+472.000	+469.500	+469.700	3.80	3.20	1.70	2.40	3.00	1.00	
0+925	+471.624	LEFT TO RIGHT	+472.000	+469.500	+469.700	3.50	3.20	1.90	2.90	3.60	1.20	
1+488	+471.826	LEFT TO RIGHT	+472.000	+469.500	+469.700	3.80	3.20	1.70	2.40	3.00	1.00	
17+596	+471.898	LEFT TO RIGHT	+472.000	+469.500	+469.700	3.80	3.20	1.70	2.40	3.00	1.00	
20+406	+471.867	LEFT TO RIGHT	+472.000	+469.500	+469.700	3.80	3.20	1.70	2.40	3.00	1.00	
21+009	+471.928	LEFT TO RIGHT	+472.000	+469.500	+469.700	3.80	3.20	1.70	2.40	3.00	1.00	
21+428	+471.205	LEFT TO RIGHT	+472.000	+469.500	+469.700	3.50	3.20	1.90	2.90	3.60	1.20	
57+007	+471.925	LEFT TO RIGHT	+472.000	+469.500	+469.700	3.80	3.20	1.70	2.40	3.00	1.00	
57+475	+471.890	LEFT TO RIGHT	+472.000	+469.500	+469.700	3.50	3.20	1.90	2.90	3.60	1.20	
57+836	+471.911	LEFT TO RIGHT	+472.000	+469.500	+469.700	3.80	3.20	1.70	2.40	3.00	1.00	

DRAIN CULVERT TYPE 2 OF UPPER RESERVOIR BOUNDARY ROAD

KM	N.G.L EL.	FLOW	α (DEGREE)	DIMENSIONS																ELEVATIONS								
				L	H	ROW	bu	bd	Bu	Bd	Hbu	Hbd	Lu	Ltu	Lcu	Lcd	Ltd	Ld	EL.1	EL.2	EL.3	EL.4	EL.5	EL.6	EL.7	EL.8	EL.9	
0+766	+471.646	LEFT TO RIGHT	90	1.50	1.50	1	5.00	5.00	5.00	5.00	2.50	2.50	3.00	3.00	3.50	3.80	3.00	3.00	+468.900	+471.300	+468.700	+471.100	+468.900	+468.700	+468.900	+468.700	+472.000	
2+549	+471.899	LEFT TO RIGHT	90	1.20	1.20	1	4.00	4.00	4.00	4.00	2.20	2.20	3.00	3.00	3.50	3.80	3.00	3.00	+469.200	+471.300	+469.000	+471.100	+469.200	+469.000	+469.200	+469.000	+472.000	
3+438	+471.897	LEFT TO RIGHT	90	1.20	1.20	1	4.00	4.00	4.00	4.00	2.20	2.20	3.00	3.00	3.50	3.80	3.00	3.00	+469.200	+471.300	+469.000	+471.100	+469.200	+469.000	+469.200	+469.000	+472.000	
3+917	+471.772	LEFT TO RIGHT	90	1.50	1.50	1	5.00	5.00	5.00	5.00	2.50	2.50	3.00	3.00	3.50	3.80	3.00	3.00	+468.900	+471.300	+468.700	+471.100	+468.900	+468.700	+468.900	+468.700	+472.000	
4+434	+471.890	LEFT TO RIGHT	90	1.20	1.20	1	4.00	4.00	4.00	4.00	2.20	2.20	3.00	3.00	3.50	3.80	3.00	3.00	+469.200	+471.300	+469.000	+471.100	+469.200	+469.000	+469.200	+469.000	+472.000	
5+816	+471.893	LEFT TO RIGHT	90	1.20	1.20	1	4.00	4.00	4.00	4.00	2.20	2.20	3.00	3.00	3.50	3.80	3.00	3.00	+469.200	+471.300	+469.000	+471.100	+469.200	+469.000	+469.200	+469.000	+472.000	
7+182	+471.862	LEFT TO RIGHT	90	1.20	1.20	1	4.00	4.00	4.00	4.00	2.20	2.20	3.00	3.00	3.50	3.80	3.00	3.00	+469.200	+471.300	+469.000	+471.100	+469.200	+469.000	+469.200	+469.000	+472.000	
8+631	+471.898	LEFT TO RIGHT	90	1.20	1.20	1	4.00	4.00	4.00	4.00	2.20	2.20	3.00	3.00	3.50	3.80	3.00	3.00	+469.200	+471.300	+469.000	+471.100	+469.200	+469.000	+469.200	+469.000	+472.000	
9+649	+471.520	LEFT TO RIGHT	90	1.50	1.50	1	5.00	5.00	5.00	5.00	2.50	2.50	3.00	3.00	3.50	3.80	3.00	3.00	+468.900	+471.300	+468.700	+471.100	+468.900	+468.700	+468.900	+468.700	+472.000	
13+784	+471.933	LEFT TO RIGHT	90	1.20	1.20	1	4.00	4.00	4.00	4.00	2.20	2.20	3.00	3.00	3.50	3.80	3.00	3.00	+469.200	+471.300	+469.000	+471.100	+469.200	+469.000	+469.200	+469.000	+472.000	
15+243	+472.000	LEFT TO RIGHT	90	1.20	1.20	1	4.00	4.00	4.00	4.00	2.20	2.20	3.00	3.00	3.50	3.80	3.00	3.00	+469.200	+471.300	+469.000	+471.100	+469.200	+469.000	+469.200	+469.000	+472.000	
16+453	+471.011	LEFT TO RIGHT	90	1.50	1.50	1	5.00	5.00	5.00	5.00	2.50	2.50	3.00	3.00	3.50	3.80	3.00	3.00	+468.900	+471.300	+468.700	+471.100	+468.900	+468.700	+468.900	+468.700	+472.000	
18+138	+471.511	LEFT TO RIGHT	90	1.20	1.20	1	4.00	4.00	4.00	4.00	2.20	2.20	3.00	3.00	3.50	3.80	3.00	3.00	+469.200	+471.300	+469.000	+471.100	+469.200	+469.000	+469.200	+469.000	+472.000	
18+336	+470.995	LEFT TO RIGHT	90	1.50	1.50	1	5.00	5.00	5.00	5.00	2.50	2.50	3.00	3.00	3.50	3.80	3.00	3.00	+468.900	+471.300	+468.700	+471.100	+468.900	+468.700	+468.900	+468.700	+472.000	
18+854	+471.708	LEFT TO RIGHT	90	1.20	1.20	1	4.00	4.00	4.00	4.00	2.20	2.20	3.00	3.00	3.50	3.80	3.00	3.00	+469.200	+471.300	+469.000	+471.100	+469.200	+469.000	+469.200	+469.000	+472.000	
19+905	+471.871	LEFT TO RIGHT	90	1.20	1.20	1	4.00	4.00	4.00	4.00	2.20	2.20	3.00	3.00	3.50	3.80	3.00	3.00	+469.200	+471.300	+469.000	+471.100	+469.200	+469.000	+469.200	+469.000	+472.000	
22+453	+471.921	LEFT TO RIGHT	90	1.20	1.20	1	4.00	4.00	4.00	4.00	2.20	2.20	3.00	3.00	3.50	3.80	3.00	3.00	+469.200	+471.300	+469.000	+471.100	+469.200	+469.000	+469.200	+469.000	+472.000	
23+951	+471.740	LEFT TO RIGHT	90	1.20	1.20	1	4.00	4.00	4.00	4.00	2.20	2.20	3.00	3.00	3.50	3.80	3.00	3.00	+469.200	+471.300	+469.000	+471.100	+469.200	+469.000	+469.200	+469.000	+472.000	
24+186	+471.966	LEFT TO RIGHT	90	1.20	1.20	1	4.00	4.00	4.00	4.00	2.20	2.20	3.00	3.00	3.50	3.80	3.00	3.00	+469.200	+471.300	+469.000	+471.100	+469.200	+469.000	+469.200	+469.000	+472.000	
26+380	+471.117	LEFT TO RIGHT	90	1.20	1.20	1	4.00	4.00	4.00	4.00	2.20	2.20	3.00	3.00	3.50	3.80	3.00	3.00	+469.200	+471.300	+469.000	+471.100	+469.200	+469.000	+469.200	+469.000	+472.000	
27+300	+471.000	LEFT TO RIGHT	90	1.20	1.20	1	4.00	4.00	4.00	4.00	2.20	2.20	3.00	3.00	3.50	3.80	3.00	3.00	+469.200	+471.300	+469.000	+471.100	+469.200	+469.000	+469.200	+469.000	+472.000	
27+632	+471.378	LEFT TO RIGHT	90	1.20	1.20	1	4.00	4.00	4.00	4.00	2.20	2.20	3.00	3.00	3.50	3.80	3.00	3.00	+469.200	+471.300	+469.000	+471.100	+469.200	+469.000	+469.200	+469.000	+472.000	
28+327	+471.688	LEFT TO RIGHT	90	1.50	1.50	1	5.00	5.00	5.00	5.00	2.50	2.50	3.00	3.00	3.50	3.80	3.00	3.00	+468.900	+471.300	+468.700	+471.100	+468.900	+468.700	+468.900	+468.700	+472.000	
28+517	+471.999	LEFT TO RIGHT	90	1.50	1.50	1	5.00	5.00	5.00	5.00	2.50	2.50	3.00	3.00	3.50	3.80	3.00	3.00	+468.900	+471.300	+468.700	+471.100	+468.900	+468.700	+468.900	+468.700	+472.000	
29+152	+471.783	LEFT TO RIGHT	90	1.20	1.20	1	4.00	4.00	4.00	4.00	2.20	2.20	3.00	3.00	3.50	3.80	3.00	3.00	+469.200	+471.300	+469.000	+471.100	+469.200	+469.000	+469.200	+469.000	+472.000	
30+459	+471.845	LEFT TO RIGHT	90	1.20	1.20	1	4.00	4.00	4.00	4.00	2.20	2.20	3.00	3.00	3.50	3.80	3.00	3.00	+469.200	+471.300	+469.000	+471.100	+469.200	+469.000	+469.200	+469.000	+472.000	
30+755	+471.732	LEFT TO RIGHT	90	1.20	1.20	1	4.00	4.00	4.00	4.00	2.20	2.20	3.00	3.00	3.50	3.80	3.00	3.00	+469.200	+471.300	+469.000	+471.100	+469.200	+469.000	+469.200	+469.000	+472.000	
31+043	+471.809	LEFT TO RIGHT	90	1.20	1.20	1	4.00	4.00	4.00	4.00	2.20	2.20	3.00	3.00	3.50	3.80	3.00	3.00	+469.200	+471.300	+469.000	+471.100	+469.200	+469.000	+469.200	+469.000	+472.000	
34+064	+471.784	LEFT TO RIGHT	90	1.20	1.20	1	4.00	4.00	4.00	4.00	2.20	2.20	3.00	3.00	3.50	3.80	3.00	3.00	+469.200	+471.300	+469.000	+471.100	+469.200	+469.000	+469.200	+469.000	+472.000	
35+798	+471.858	LEFT TO RIGHT	90	1.20	1.20	1	4.00	4.00	4.00	4.00	2.20	2.20	3.00	3.00	3.50	3.80	3.00	3.00	+469.200	+471.300	+469.000	+471.100	+469.200	+469.000	+469.200	+469.000	+472.000	
37+390	+472.000	LEFT TO RIGHT	90	1.20	1.20	1	4.00	4.00	4.00	4.00	2.20	2.20	3.00	3.00	3.50	3.80	3.00	3.00	+469.200	+471.300	+469.000	+471.100	+469.200	+469.000	+469.200	+469.000	+472.000	
39+706	+471.954	LEFT TO RIGHT	90	1.20	1.20	1	4.00	4.00	4.00	4.00	2.20	2.20	3.00	3.00	3.50	3.80	3.00	3.00	+469.200	+471.300	+469.000	+471.100	+469.200	+469.000	+469.200	+469.000	+472.000	
40+737	+471.890	LEFT TO RIGHT	90	1.20	1.20	1	4.00	4.00	4.00	4.00	2.20	2.20	3.00	3.00	3.50	3.80	3.00	3.00	+469.200	+471.300	+469.000	+471.100	+469.200	+469.000	+469.200	+469.000	+472.000	
41+489	+471.805	LEFT TO RIGHT	90	1.20	1.20	1	4.00	4.00	4.00	4.00	2.20	2.20	3.00	3.00	3.50	3.80	3.00	3.00	+469.200	+471.300	+469.000	+471.100	+469.200	+469.000	+469.200	+469.000	+472.000	
41+830	+471.755	LEFT TO RIGHT	90	1.20	1.20	1	4.00	4.00	4.00	4.00	2.20	2.20	3.00	3.00	3.50	3.80	3.00	3.00	+469.200	+471.300	+469.000	+471.100	+469.200	+469.000	+469.200	+469.000	+472.000	
42+968	+471.931	LEFT TO RIGHT	90	1.20	1.20	1	4.00	4.00	4.00	4.00	2.20	2.20	3.00	3.00	3.50	3.80	3.00	3.00	+469.200	+471.300	+469.000	+471.100	+469.200	+469.000	+469.200	+469.000	+472.000	
47+880	+471.905	LEFT TO RIGHT	90	1.20	1.20	1	4.00	4.00	4.00	4.00	2.20	2.20	3.00	3.00	3.50	3.80	3.00	3.00	+469.200	+471.300	+469.000	+471.100	+469.200	+469.000	+469.200	+469.000	+472.000	
48+384	+471.786	LEFT TO RIGHT	90	1.20	1.20	1	4.00	4.00	4.00	4.00	2.20	2.20	3.00	3.00	3.50	3.80	3.00	3.00	+469.200	+471.300	+469.000	+471.100	+469.200	+469.000	+469.200	+469.000	+472.000	
49+258	+471.933	LEFT TO RIGHT	90	1.20	1.20	1	4.00	4.00	4.00	4.00	2.20	2.20	3.00	3.00	3.50	3.80	3.00	3.00	+469.200	+471.300	+469.000	+471.100	+469.200	+469.000	+469.200	+469.000	+472.000	
49+701	+471.921	LEFT TO RIGHT	90	1.20	1.20	1	4.00	4.00	4.00	4.00	2.20	2.20	3.00	3.00	3.50	3.80	3.00	3.00	+469.200	+471.300	+469.000	+471.100	+469.200	+469.000	+469.200	+469.000	+472.000	
50+009	+471.916	LEFT TO RIGHT	90	1.20	1.20	1	4.00	4.00	4.00	4.00	2.20	2.20	3.00	3.00	3.50	3.80	3.00	3.00	+469.200	+471.300	+469.000	+471.100	+469.200	+469.000	+469.200	+469.000	+472.000	
52+262	+471.923	LEFT TO RIGHT	90	1.20	1.20	1	4.00	4.00	4.00	4.00	2.20	2.20	3.00	3.00	3.50	3.80	3.00	3.00	+469.200	+471.300	+469.000	+471.100	+469.200	+469.000	+469.200	+469.000	+472.000	
53+731	+471.853	LEFT TO RIGHT	90	1.20	1.20	1	4.00	4.00	4.00	4.00	2.20	2.20	3.00	3.00	3.50	3.80	3.00	3.00	+469.200	+471.300	+469.000	+471.100	+469.200	+469.000	+469.200	+469.000	+472.000	
55+191	+471.800	LEFT TO RIGHT</																										

NOTES :

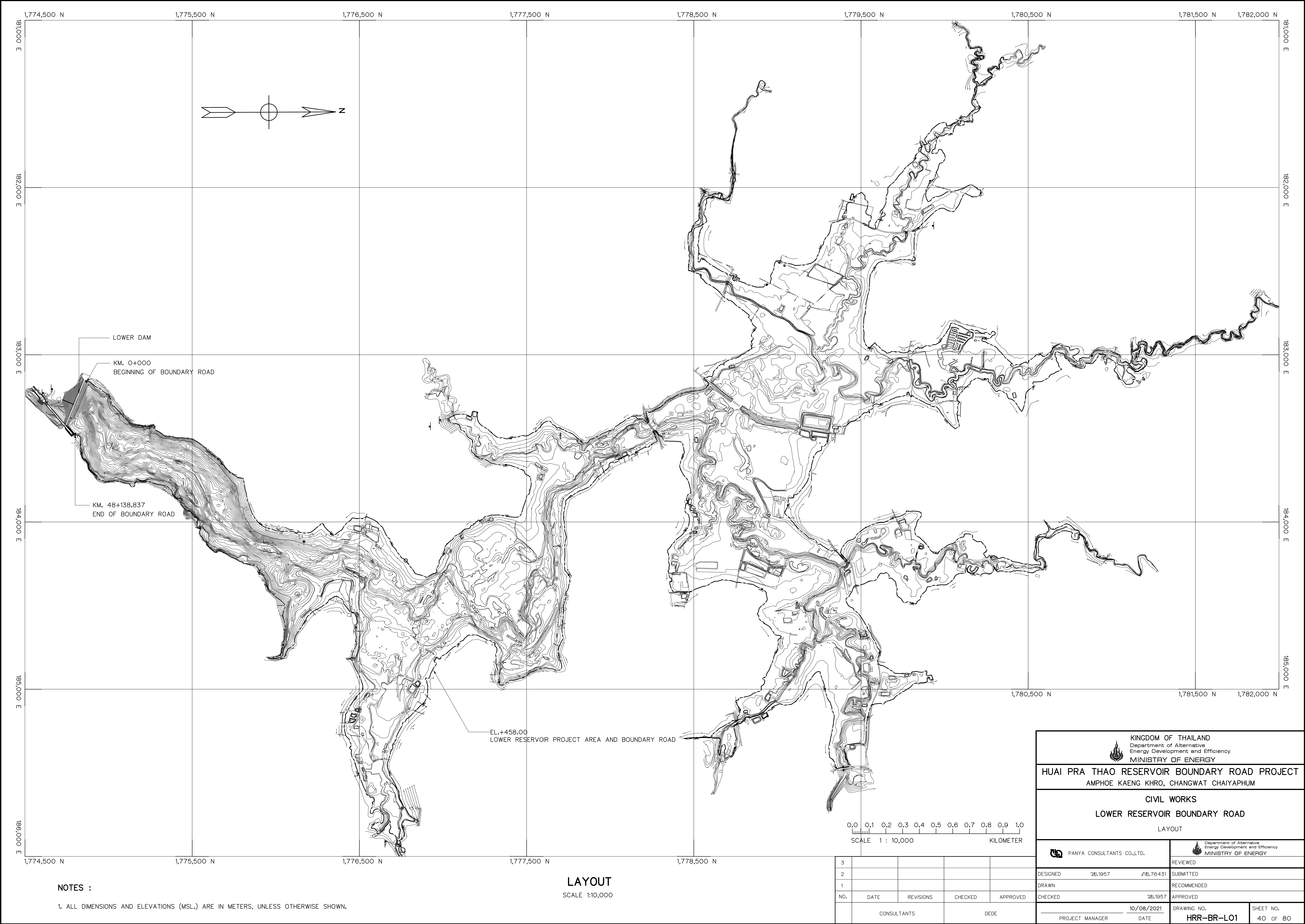
1. ALL DIMENSIONS AND ELEVATIONS (ABOVE M.S.L.) ARE IN METERS, UNLESS OTHERWISE SHOWN.
2. THE CONTRACTOR MUST SURVEY AND PROPOSE THE QUANTITIES OF WORK TO BE SENT TO THE DEDE APPROVAL BEFORE PROCEEDING.

DRAIN CULVERT TYPE 3 OF UPPER RESERVOIR BOUNDARY ROAD

KM	N.G.L. EL.	FLOW	α (DEGREE)	DIMENSIONS																ELEVATIONS								
				L	H	ROW	bu	bd	Bu	Bd	H _{bu}	H _{bd}	L _u	L _{TU}	T _w	L _{cu}	L _{cd}	L _{TD}	L _{DO}	EL.1	EL.2	EL.3	EL.4	EL.5	EL.6	EL.7	EL.8	EL.9
10+592	+471.999	LEFT TO RIGHT	90	1.20	1.20	2	6.00	6.00	6.00	6.00	2.20	2.20	3.00	3.00	0.50	3.50	3.80	3.00	3.00	+469.200	+471.300	+469.000	+471.100	+469.200	+469.000	+469.200	+469.000	+472.000
14+110	+472.000	LEFT TO RIGHT	90	1.20	1.20	2	6.00	6.00	6.00	6.00	2.20	2.20	3.00	3.00	0.50	3.50	3.80	3.00	3.00	+469.200	+471.300	+469.000	+471.100	+469.200	+469.000	+469.200	+469.000	+472.000
18+724	+471.582	LEFT TO RIGHT	90	1.20	1.20	2	6.00	6.00	6.00	6.00	2.20	2.20	3.00	3.00	0.50	3.50	3.80	3.00	3.00	+469.200	+471.300	+469.000	+471.100	+469.200	+469.000	+469.200	+469.000	+472.000
26+634	+471.960	LEFT TO RIGHT	90	1.20	1.20	2	6.00	6.00	6.00	6.00	2.20	2.20	3.00	3.00	0.50	3.50	3.80	3.00	3.00	+469.200	+471.300	+469.000	+471.100	+469.200	+469.000	+469.200	+469.000	+472.000
38+281	+471.765	LEFT TO RIGHT	90	1.20	1.20	2	6.00	6.00	6.00	6.00	2.20	2.20	3.00	3.00	0.50	3.50	3.80	3.00	3.00	+469.200	+471.300	+469.000	+471.100	+469.200	+469.000	+469.200	+469.000	+472.000
39+388	+471.985	LEFT TO RIGHT	90	1.20	1.20	2	6.00	6.00	6.00	6.00	2.20	2.20	3.00	3.00	0.50	3.50	3.80	3.00	3.00	+469.200	+471.300	+469.000	+471.100	+469.200	+469.000	+469.200	+469.000	+472.000
44+945	+471.908	LEFT TO RIGHT	90	1.50	1.50	2	7.00	7.00	7.00	7.00	2.50	2.50	3.00	3.00	0.50	3.50	3.80	3.00	3.00	+468.900	+471.300	+468.700	+471.100	+468.900	+468.700	+468.900	+468.700	+472.000
46+430	+471.924	LEFT TO RIGHT	90	1.50	1.50	2	7.00	7.00	7.00	7.00	2.50	2.50	3.00	3.00	0.50	3.50	3.80	3.00	3.00	+468.900	+471.300	+468.700	+471.100	+468.900	+468.700	+468.900	+468.700	+472.000
51+223	+471.527	LEFT TO RIGHT	90	1.20	1.20	2	6.00	6.00	6.00	6.00	2.20	2.20	3.00	3.00	0.50	3.50	3.80	3.00	3.00	+469.200	+471.300	+469.000	+471.100	+469.200	+469.000	+469.200	+469.000	+472.000
54+656	+471.946	LEFT TO RIGHT	90	1.20	1.20	2	6.00	6.00	6.00	6.00	2.20	2.20	3.00	3.00	0.50	3.50	3.80	3.00	3.00	+469.200	+471.300	+469.000	+471.100	+469.200	+469.000	+469.200	+469.000	+472.000

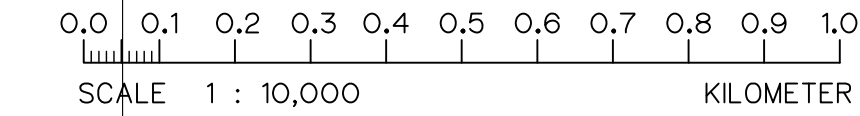
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NO.	DATE	REVISIONS	CHECKED	APPROVED
	CONSULTANTS		DEDE	

 KINGDOM OF THAILAND Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY			
HUAI PRA THAO RESERVOIR BOUNDARY ROAD PROJECT AMPHOE KAENG KHRO, CHANGWAT CHAIYAPHUM			
CIVIL WORKS UPPER RESERVOIR BOUNDARY ROAD DRAIN CULVERT TYPE OF BOUNDARY ROAD			
 PANYA CONSULTANTS CO.,LTD.		 Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY	
		REVIEWED	
DESIGNED	28/1/957	181.76431	SUBMITTED
DRAWN			RECOMMENDED
CHECKED	28/1/957		APPROVED
PROJECT MANAGER DATE		DRAIVING NO. HRR-BR-U36	SHEET NO. 39 OF 80

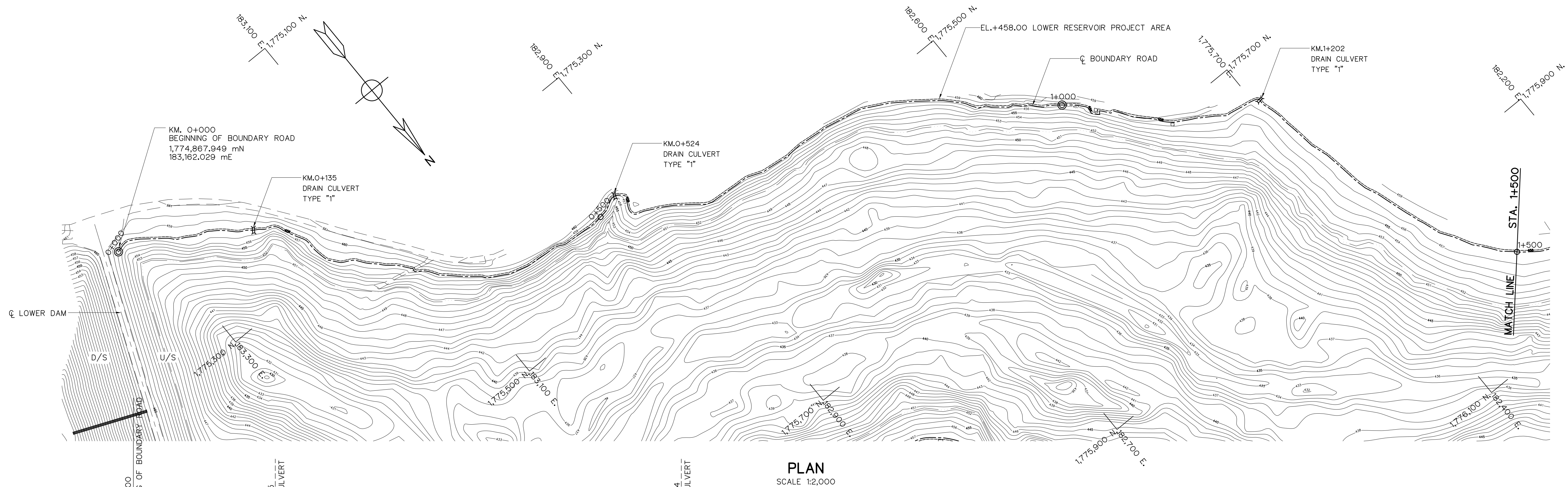


NOTES :
1. ALL DIMENSIONS AND ELEVATIONS (MSL.) ARE IN METERS, UNLESS OTHERWISE SHOWN.

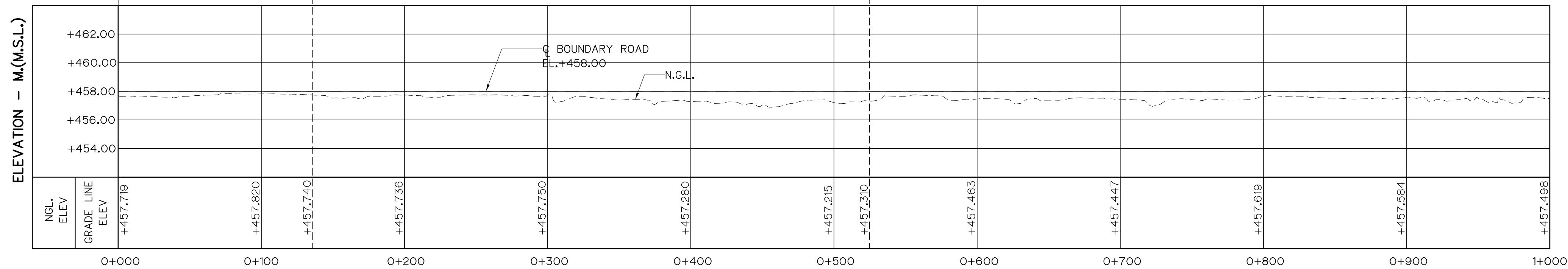
LAYOUT
SCALE 1:10,000



 KINGDOM OF THAILAND Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY			
HUA I PRA THAO RESERVOIR BOUNDARY ROAD PROJECT AMPHOE KAENG KHRO, CHANGWAT CHAIYAPHUM			
CIVIL WORKS LOWER RESERVOIR BOUNDARY ROAD LAYOUT			
 PANYA CONSULTANTS CO.,LTD.		 Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY	
DESIGNED 28.1957 48.76431		REVIEWED	
DRAWN		RECOMMENDED	
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PROJECT MANAGER 10/08/2021		DRAWING NO. HRR-BR-L01	
DATE		SHEET NO. 40 OF 80	

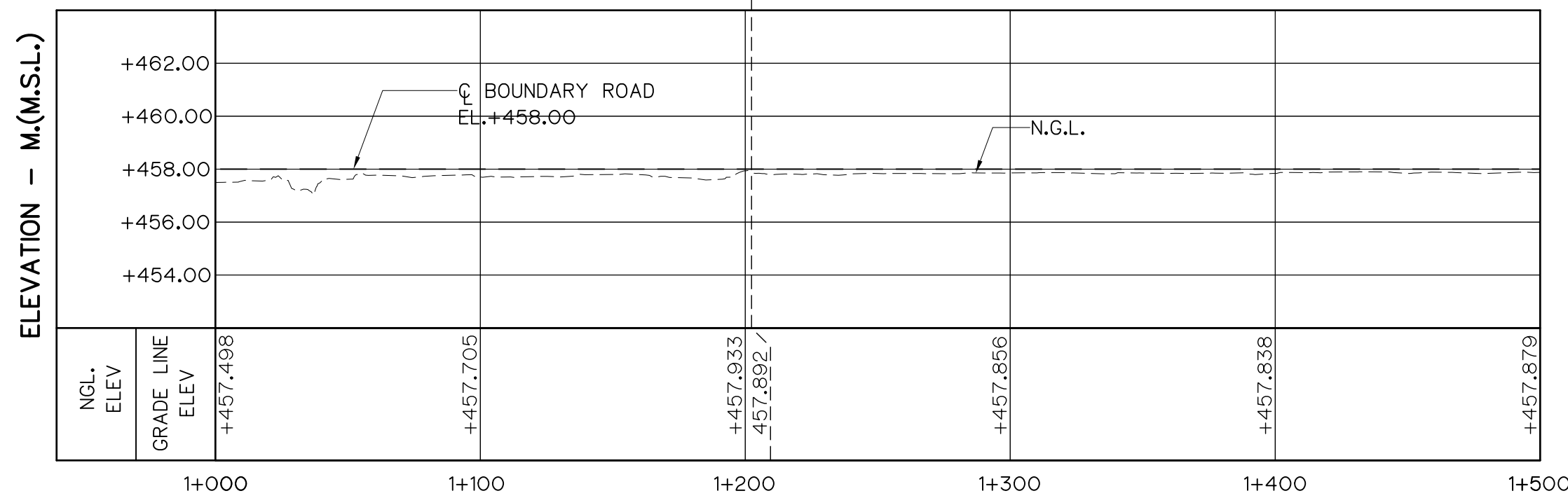


PLAN
SCALE 1:2,000



PROFILE

HORIZONTAL SCALE 1:2,000
VERTICAL SCALE 1:200

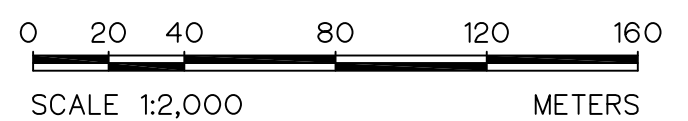


PROFILE

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VERTICAL SCALE 1:200

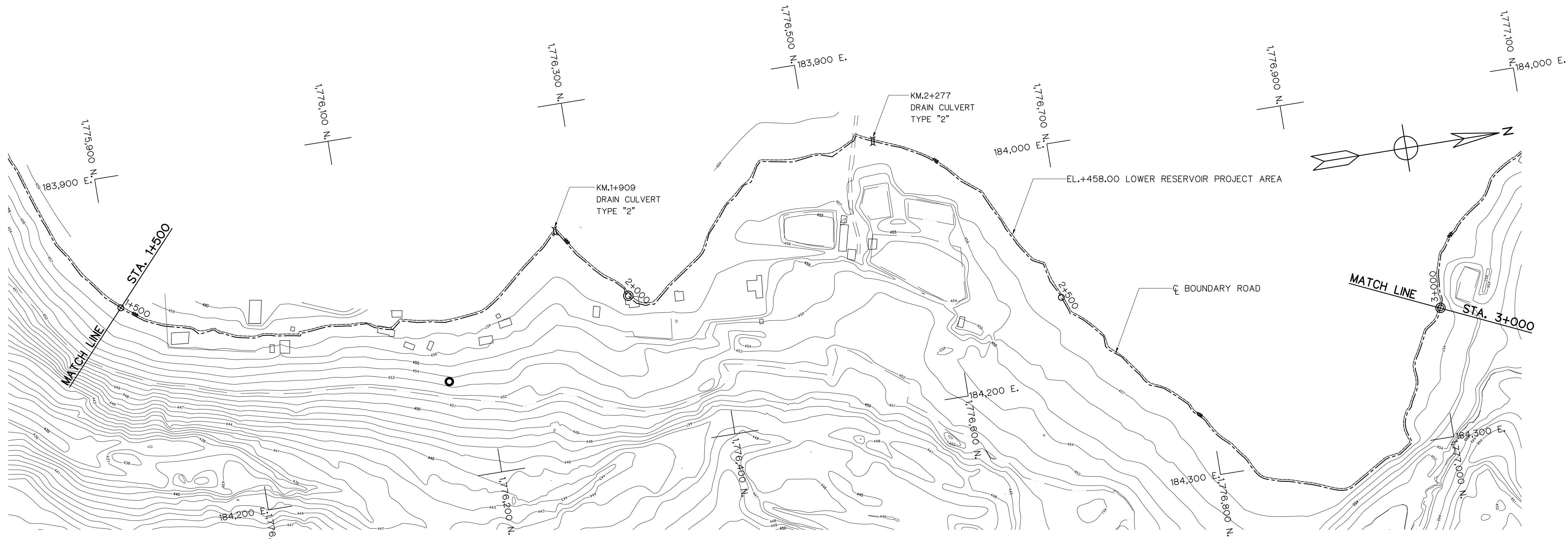
LEGEND

- N.G.L.
- BOUNDARY ROAD
- EL. +458.00 LOWER RESERVOIR PROJECT AREA

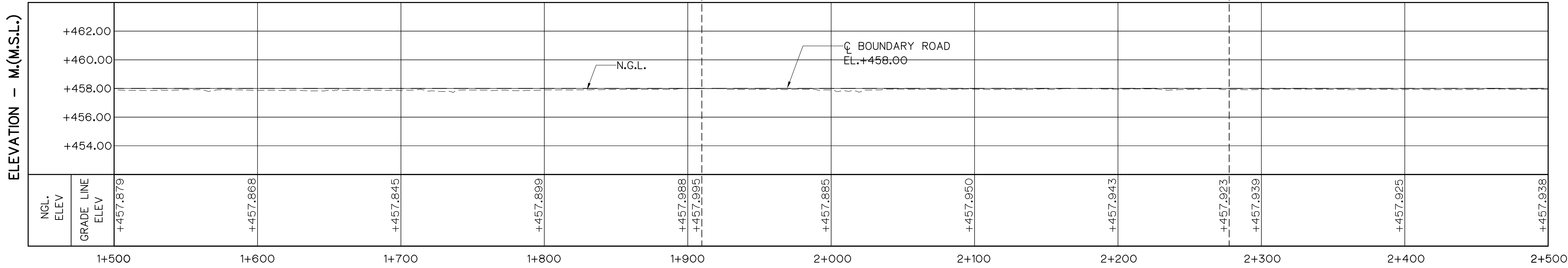


 KINGDOM OF THAILAND Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY			
HUI PRA THAO RESERVOIR BOUNDARY ROAD PROJECT AMPHOE KAENG KHRO, CHANGWAT CHAIYAPHUM			
CIVIL WORKS LOWER RESERVOIR BOUNDARY ROAD PLAN, KM. 0+000 TO KM. 1+500			
 PANYA CONSULTANTS CO.,LTD.		 Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY	
DESIGNED 28.1957 28.76431		REVIEWED	
DRAWN		RECOMMENDED	
CHECKED 28.1957		APPROVED	
PROJECT MANAGER 10/08/2021		DRAWING NO.	SHEET NO.
DATE		HRR-BR-LO2	41 OF 80

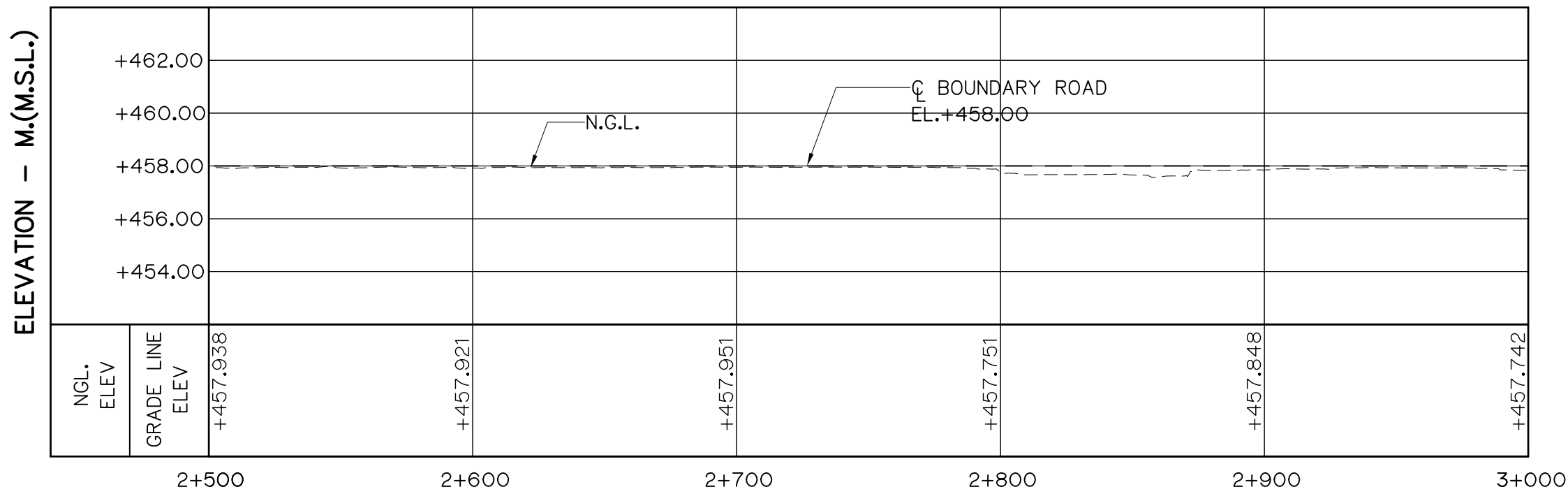
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CONSULTANTS		DEDE		



PLAN
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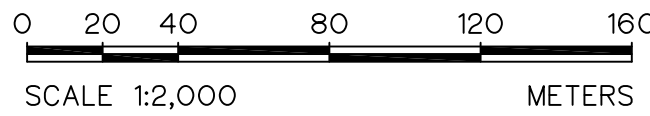


PROFILE
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VERTICAL SCALE 1:200



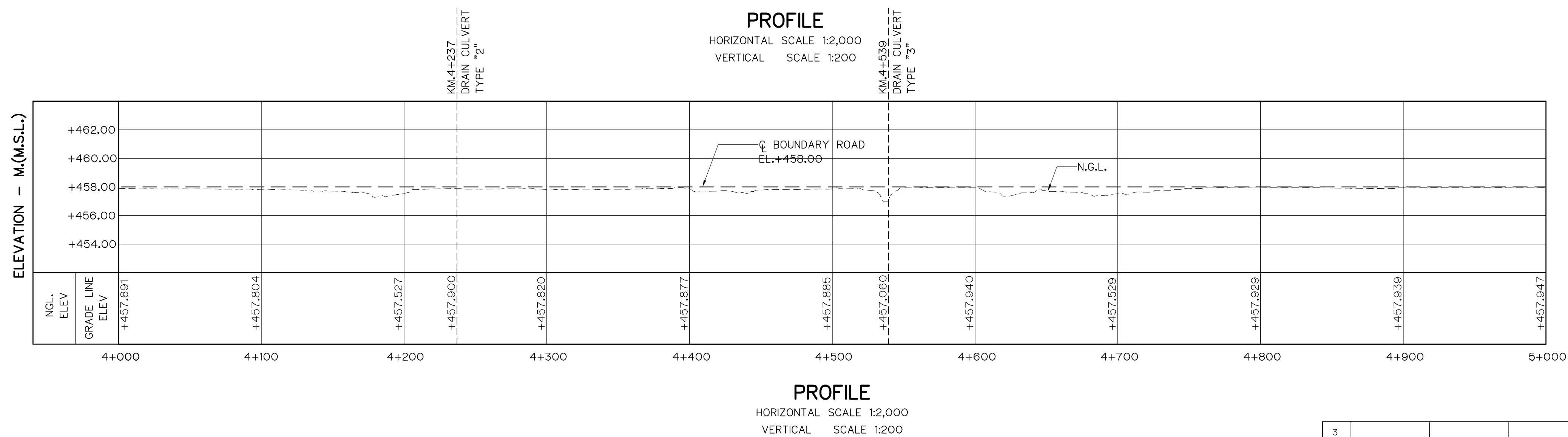
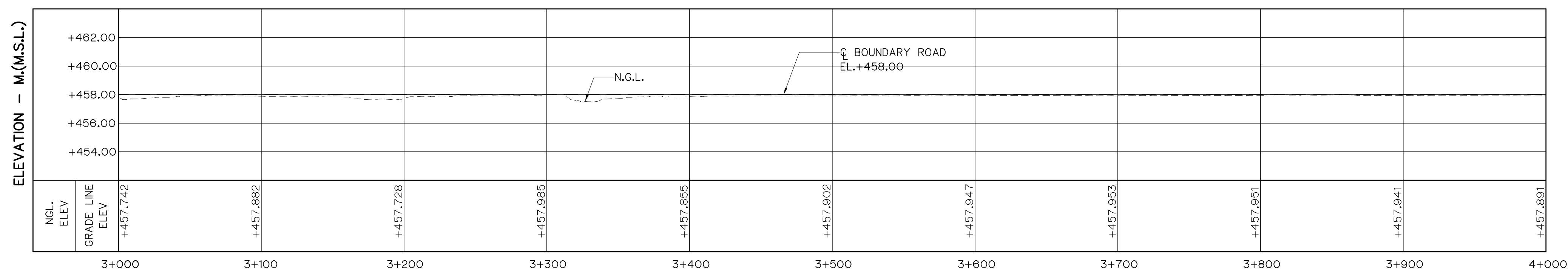
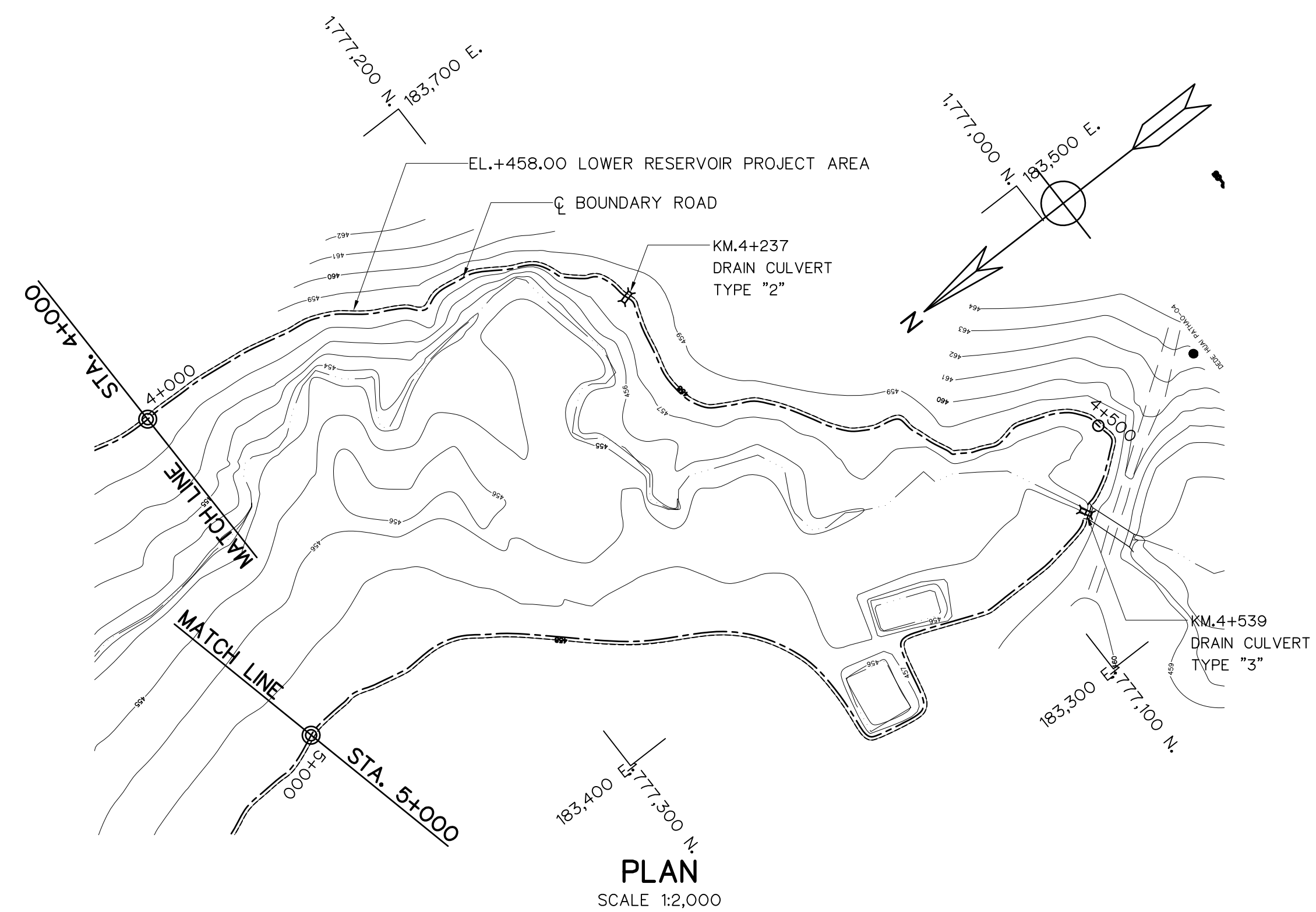
PROFILE
HORIZONTAL SCALE 1:2,000
VERTICAL SCALE 1:200

- LEGEND
- N.G.L.
 - BOUNDARY ROAD
 - EL.+458.00 LOWER RESERVOIR PROJECT AREA



 KINGDOM OF THAILAND Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY			
HUI PRA THAO RESERVOIR BOUNDARY ROAD PROJECT AMPHOE KAENG KHRO, CHANGWAT CHAIYAPHUM			
CIVIL WORKS LOWER RESERVOIR BOUNDARY ROAD PLAN, KM. 1+500 TO KM. 3+000			
 PANYA CONSULTANTS CO.,LTD.		 Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY	
DESIGNED 28.1957 28.76431		REVIEWED	
DRAWN		RECOMMENDED	
CHECKED 28.1957		APPROVED	
PROJECT MANAGER 10/08/2021		DRAWING NO.	SHEET NO.
DATE		HRR-BR-L03	42 OF 80

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NO.	DATE	REVISIONS	CHECKED	APPROVED
CONSULTANTS		DEDE		



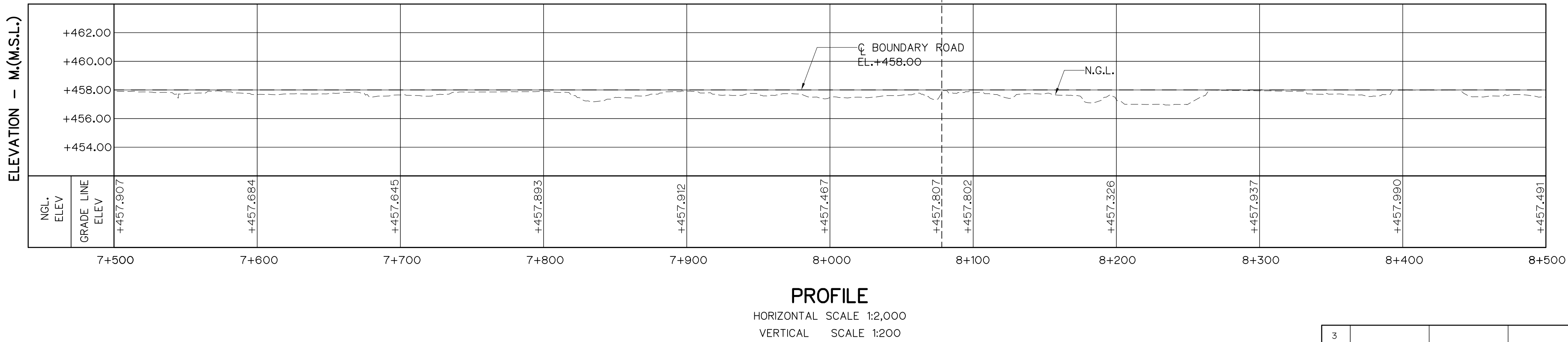
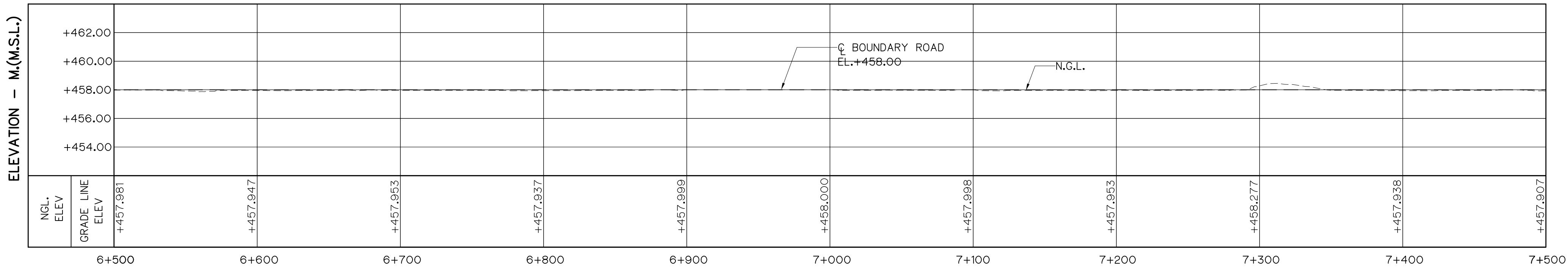
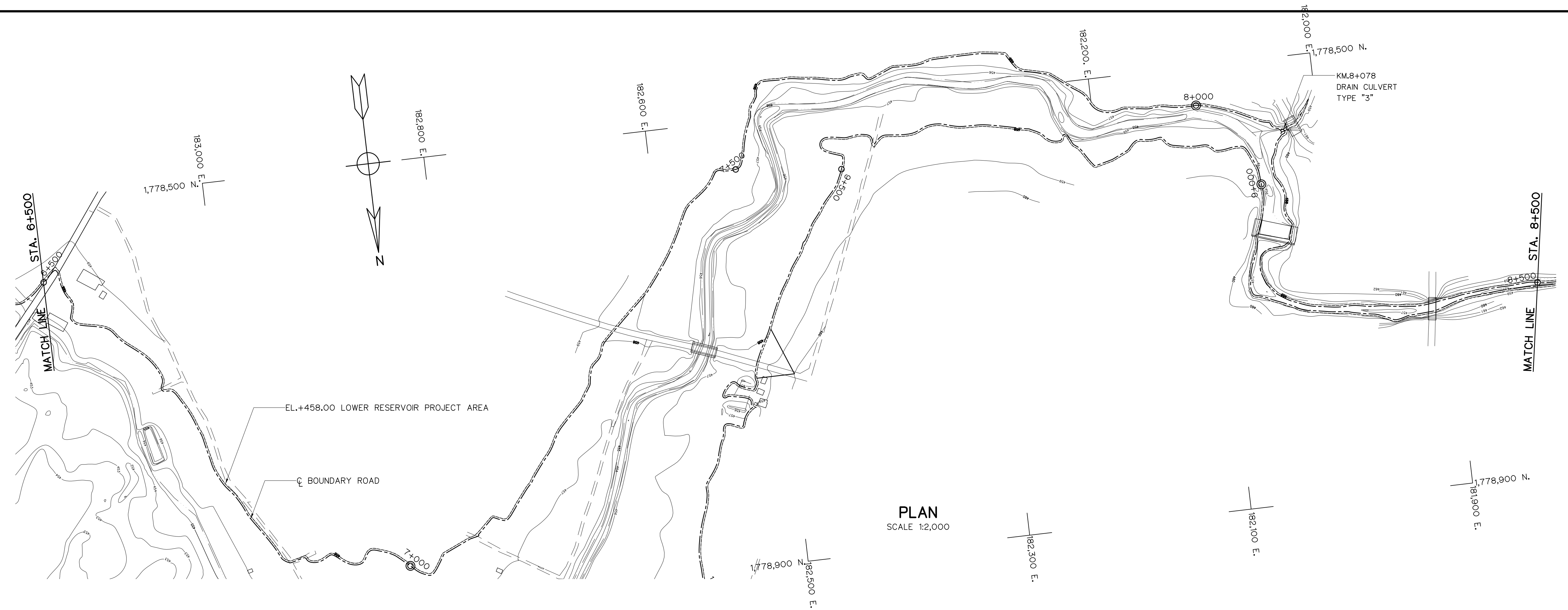
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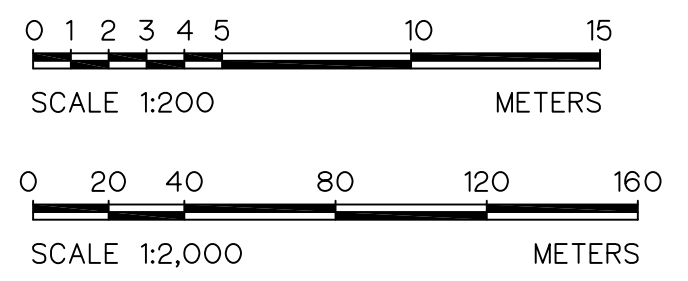
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					CIVIL WORKS LOWER RESERVOIR BOUNDARY ROAD PLAN, KM. 5+000 TO KM. 6+500		
					 PANYA CONSULTANTS CO.,LTD.	 Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY	
3					DESIGNED	28/1957 181,76431	REVIEWED
2					DRAWN		SUBMITTED
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NO.	DATE	REVISIONS	CHECKED	APPROVED	CHECKED	28/1957	APPROVED
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							SHEET NO. 44 OF 80

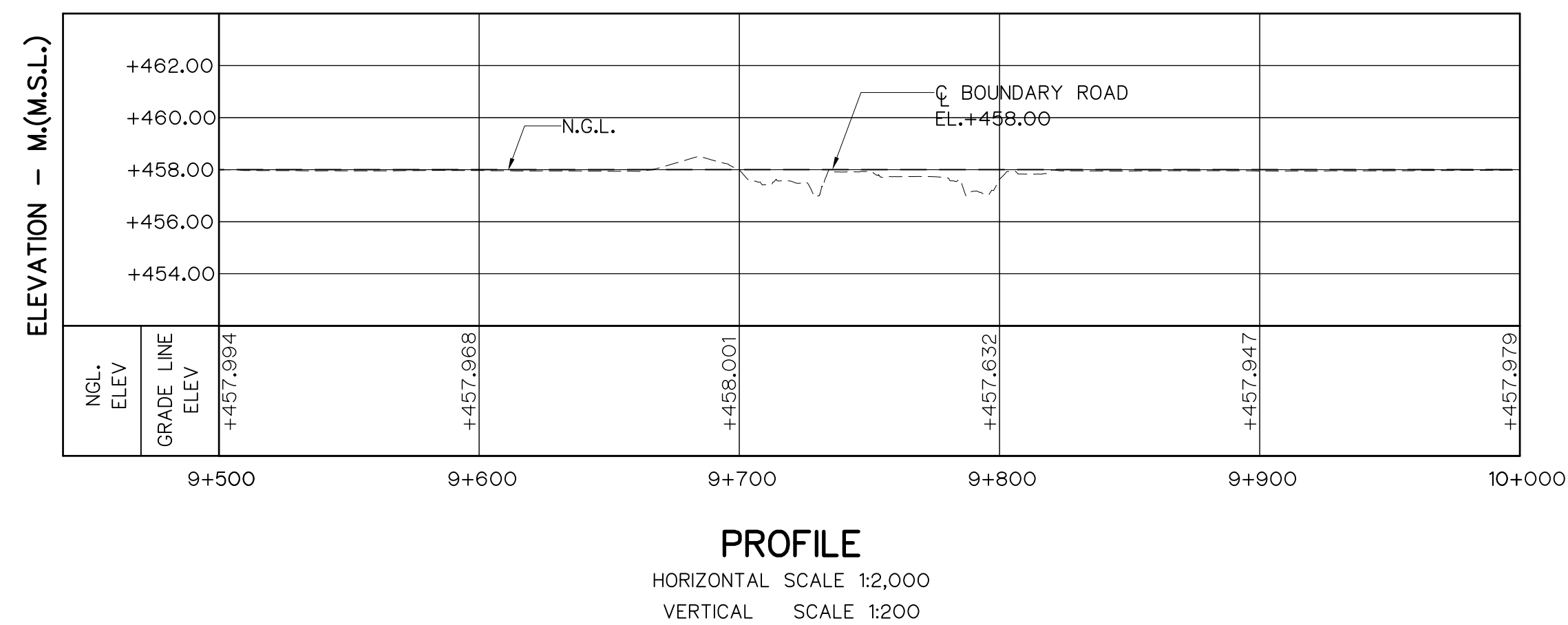
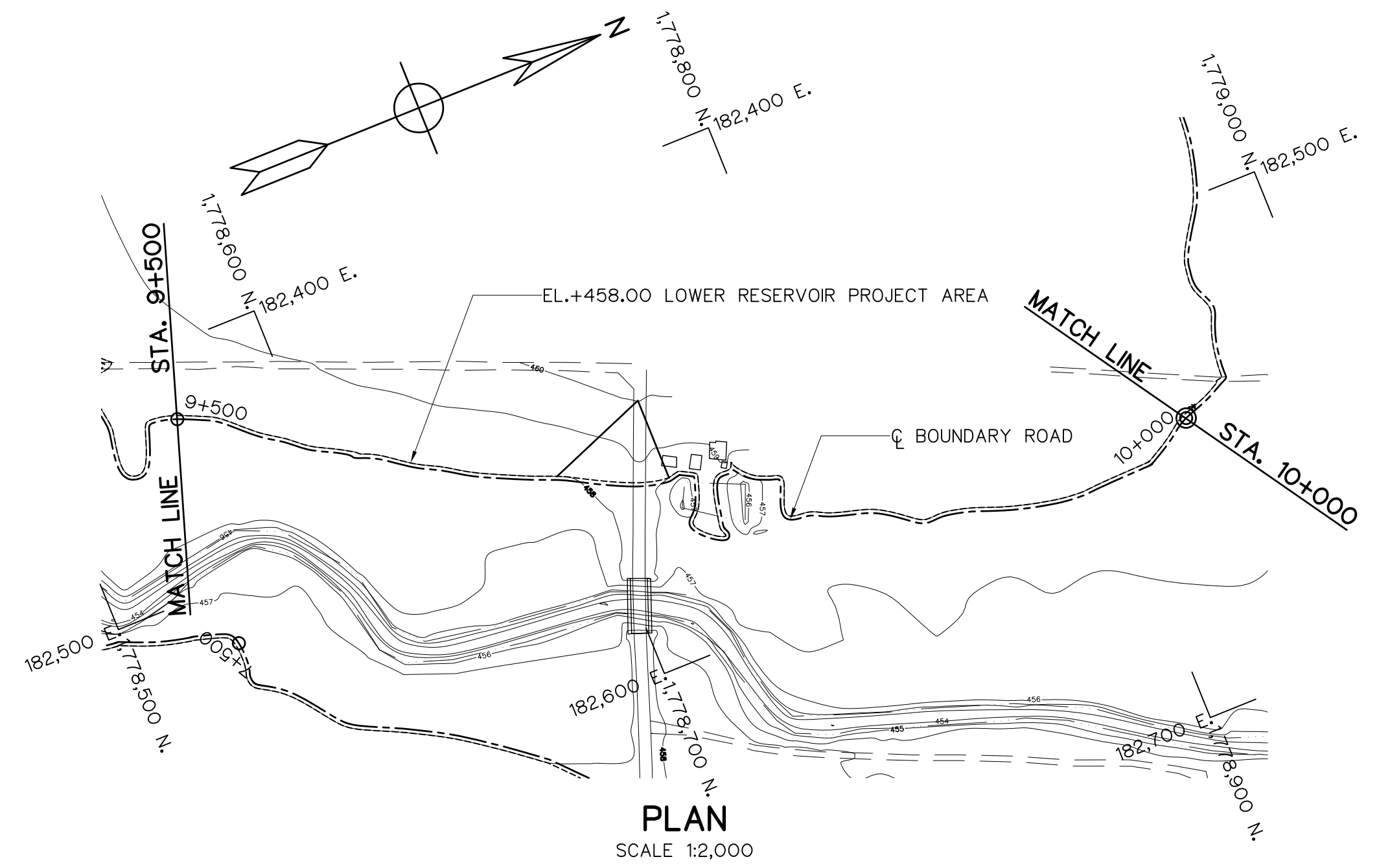


- LEGEND
- N.G.L.
 - CL BOUNDARY ROAD
 - EL.+458.00 LOWER RESERVOIR PROJECT AREA

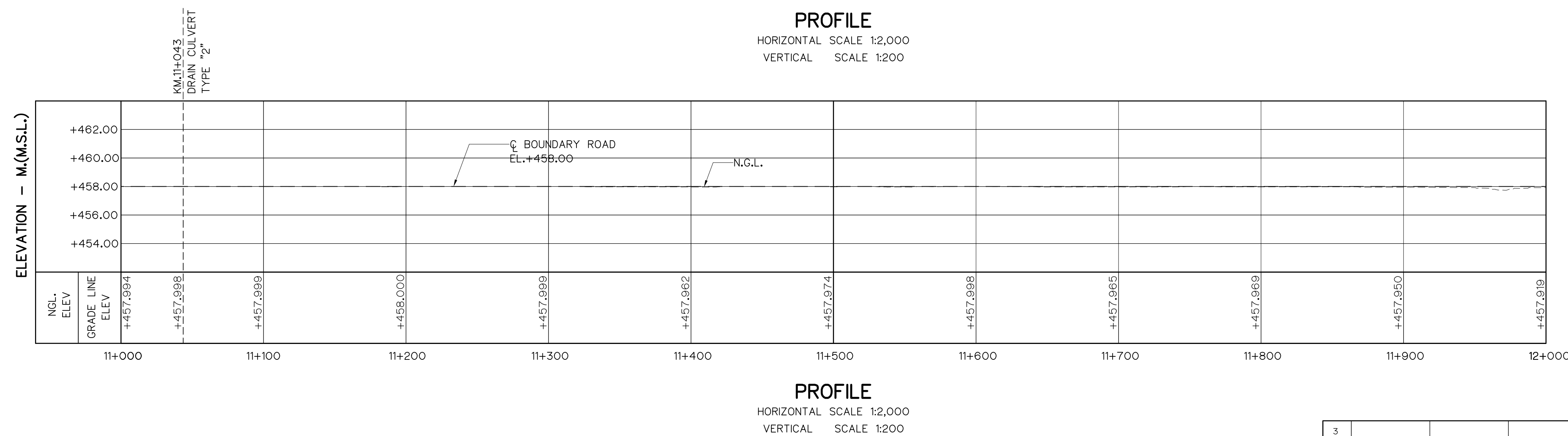
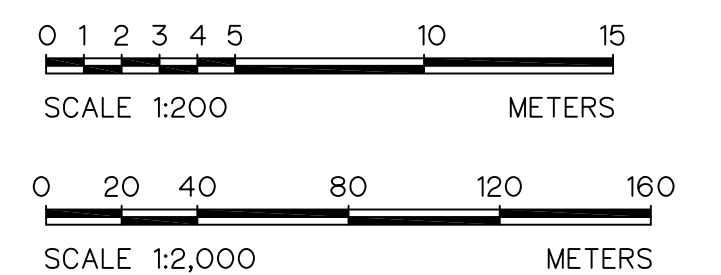
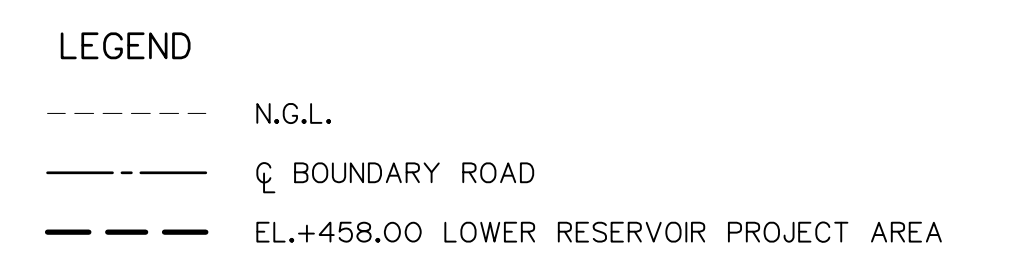
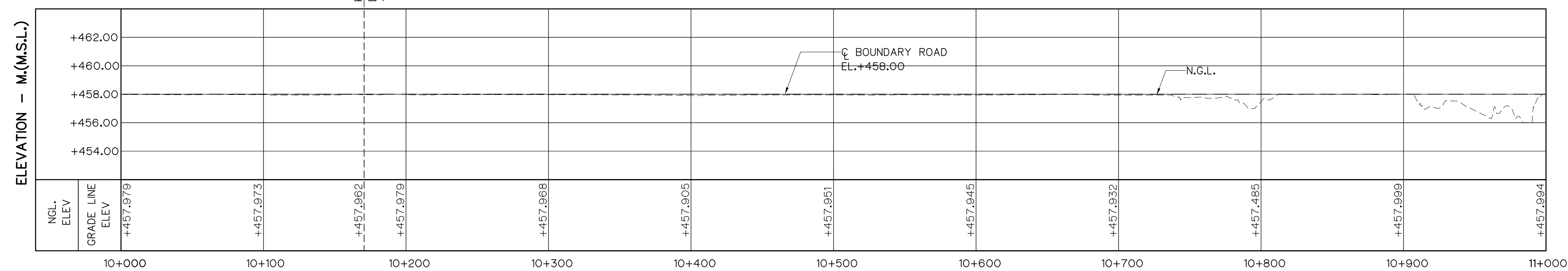
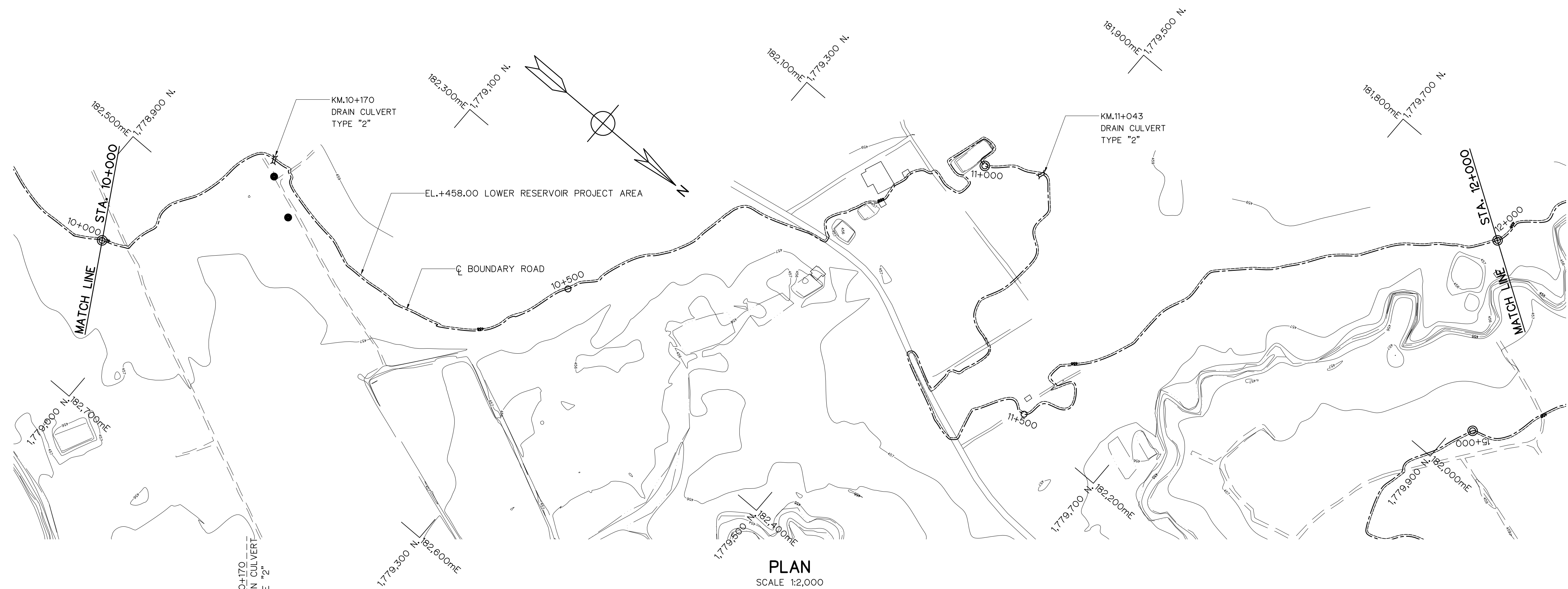


KINGDOM OF THAILAND Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY			
HUI PRA THAO RESERVOIR BOUNDARY ROAD PROJECT AMPHOE KAENG KHRO, CHANGWAT CHAIYAPHUM			
CIVIL WORKS LOWER RESERVOIR BOUNDARY ROAD PLAN, KM. 6+500 TO KM. 8+500			
PANYA CONSULTANTS CO.,LTD.		Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY	
REVIEWED		REVIEWED	
DESIGNED 28.1957 28.76431		SUBMITTED	
DRAWN		RECOMMENDED	
CHECKED 28.1957		APPROVED	
PROJECT MANAGER 10/08/2021 DATE		DRAWING NO. HRR-BR-L06 SHEET NO. 45 OF 80	

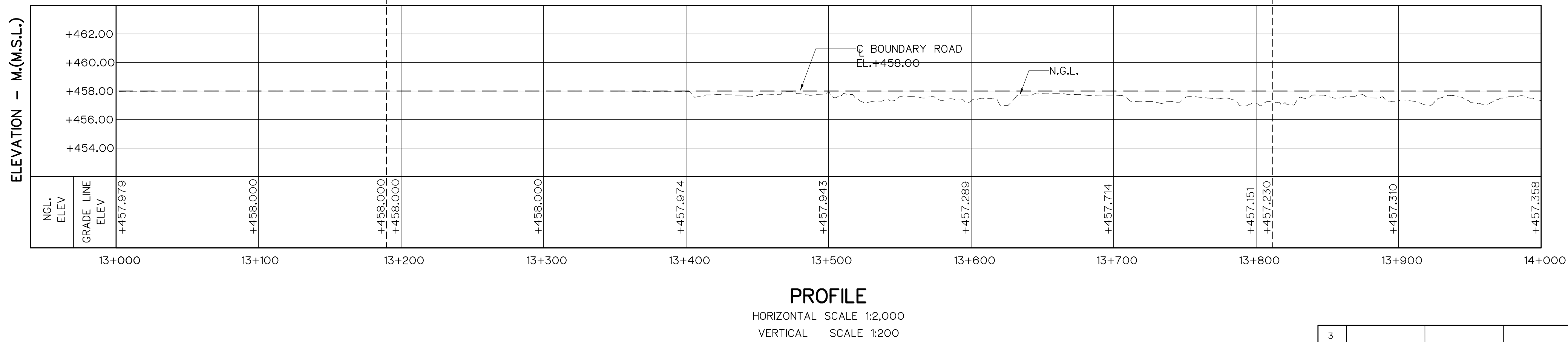
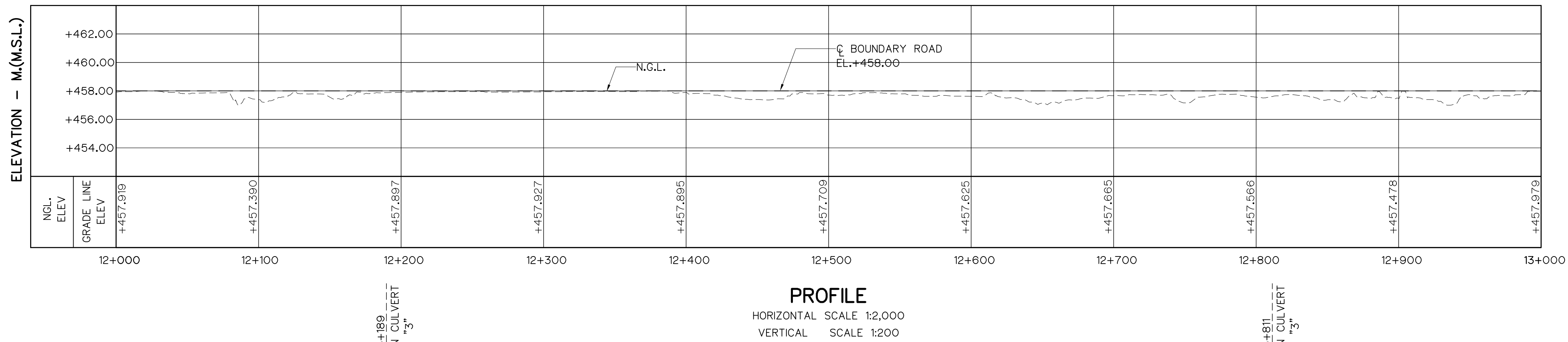
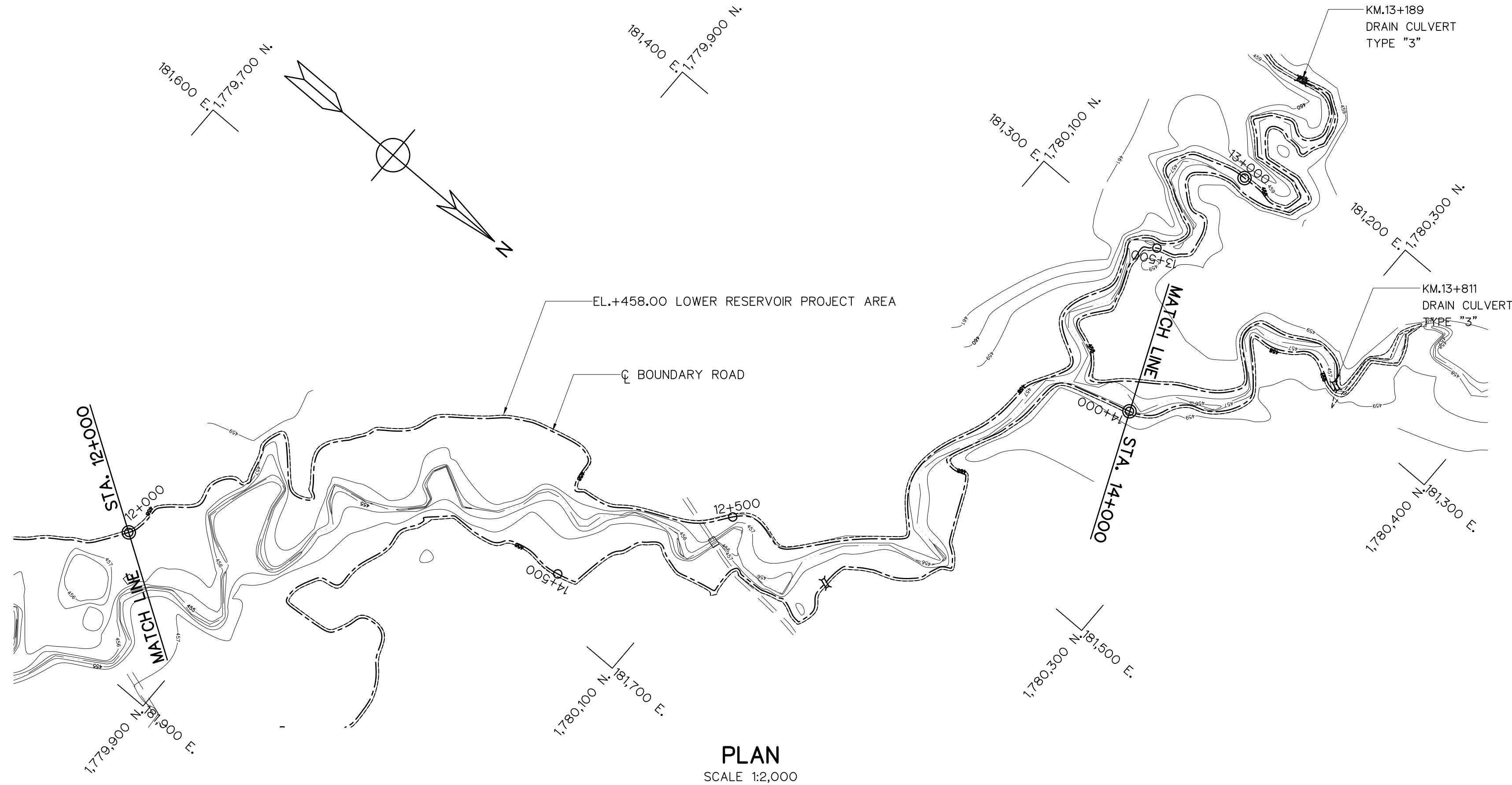
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NO.	DATE	REVISIONS	CHECKED	APPROVED
	CONSULTANTS		DEDE	



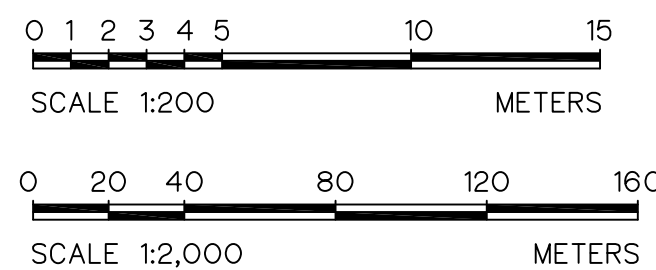
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CONSULTANTS					DEDE	10/08/2021 PROJECT MANAGER DATE			DRAWING NO. HRR-BR-LO7	SHEET NO. 46 OF 80



3					DESIGNED	28.1957	28.76431	REVIEWED	
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NO.	DATE	REVISIONS	CHECKED	APPROVED				APPROVED	
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								47 OF 80	

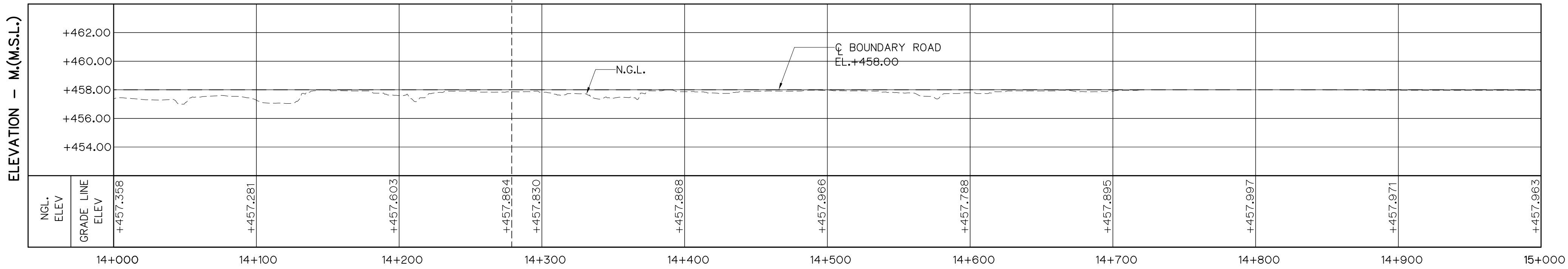
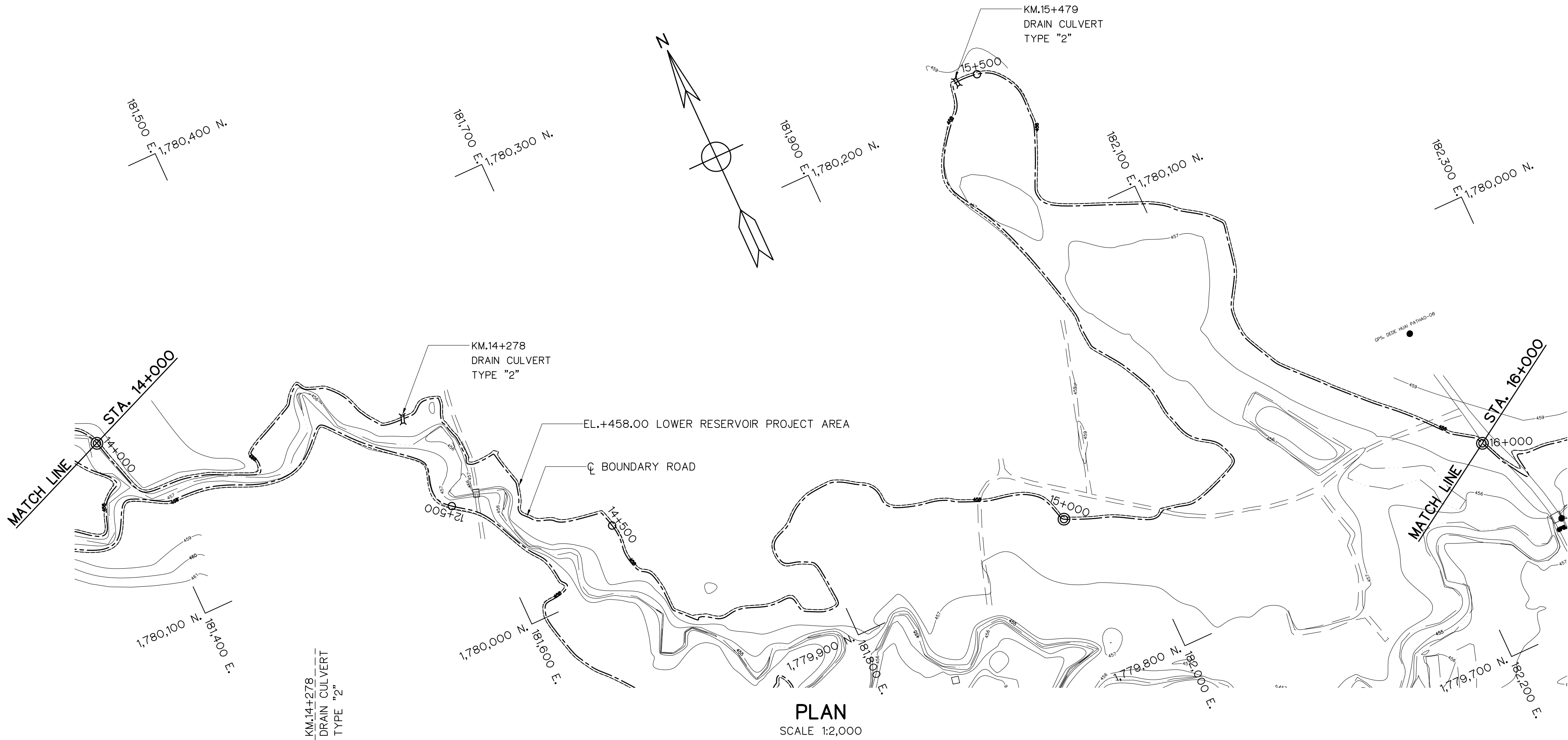


- LEGEND
- N.G.L.
 - BOUNDARY ROAD
 - EL.+458.00 LOWER RESERVOIR PROJECT AREA



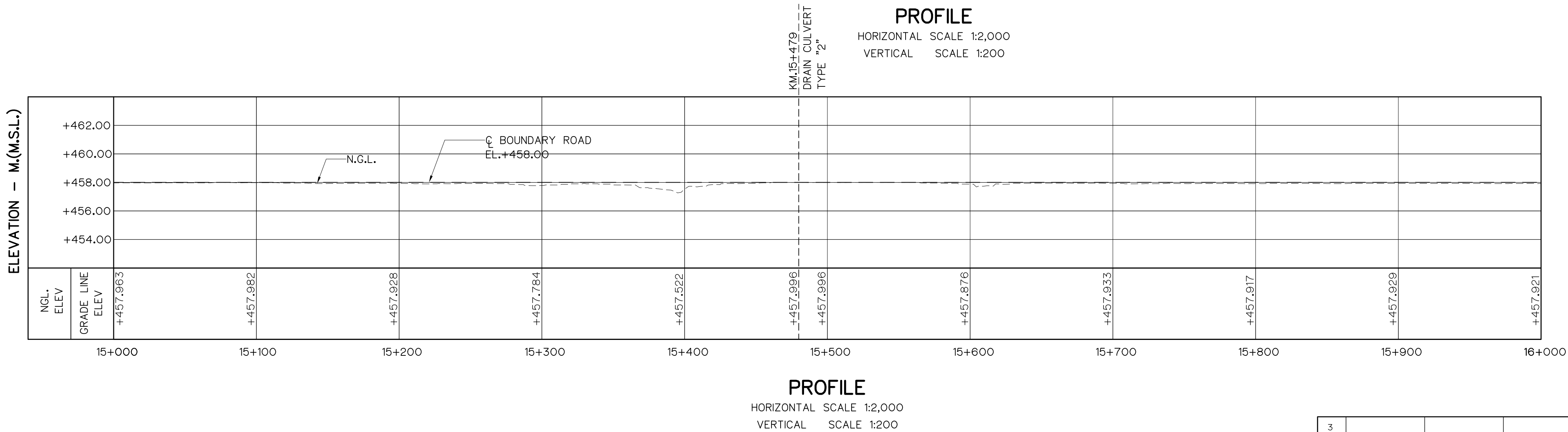
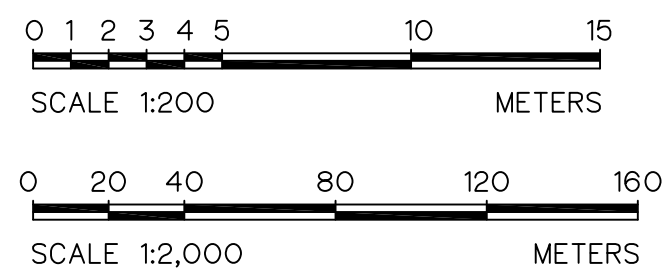
 KINGDOM OF THAILAND Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY			
HUA I PRA THAO RESERVOIR BOUNDARY ROAD PROJECT AMPHOE KAENG KHRO, CHANGWAT CHAIYAPHUM			
CIVIL WORKS LOWER RESERVOIR BOUNDARY ROAD PLAN, KM. 12+000 TO KM. 14+000			
 PANYA CONSULTANTS CO.,LTD.		 Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY	
REVIEWED		REVIEWED	
DESIGNED	28.1957	28.176431	SUBMITTED
DRAWN		RECOMMENDED	
CHECKED	28.1957		APPROVED
PROJECT MANAGER		10/08/2021 DATE	DRAWING NO. HRR-BR-L09
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NO.	DATE	REVISIONS	CHECKED	APPROVED
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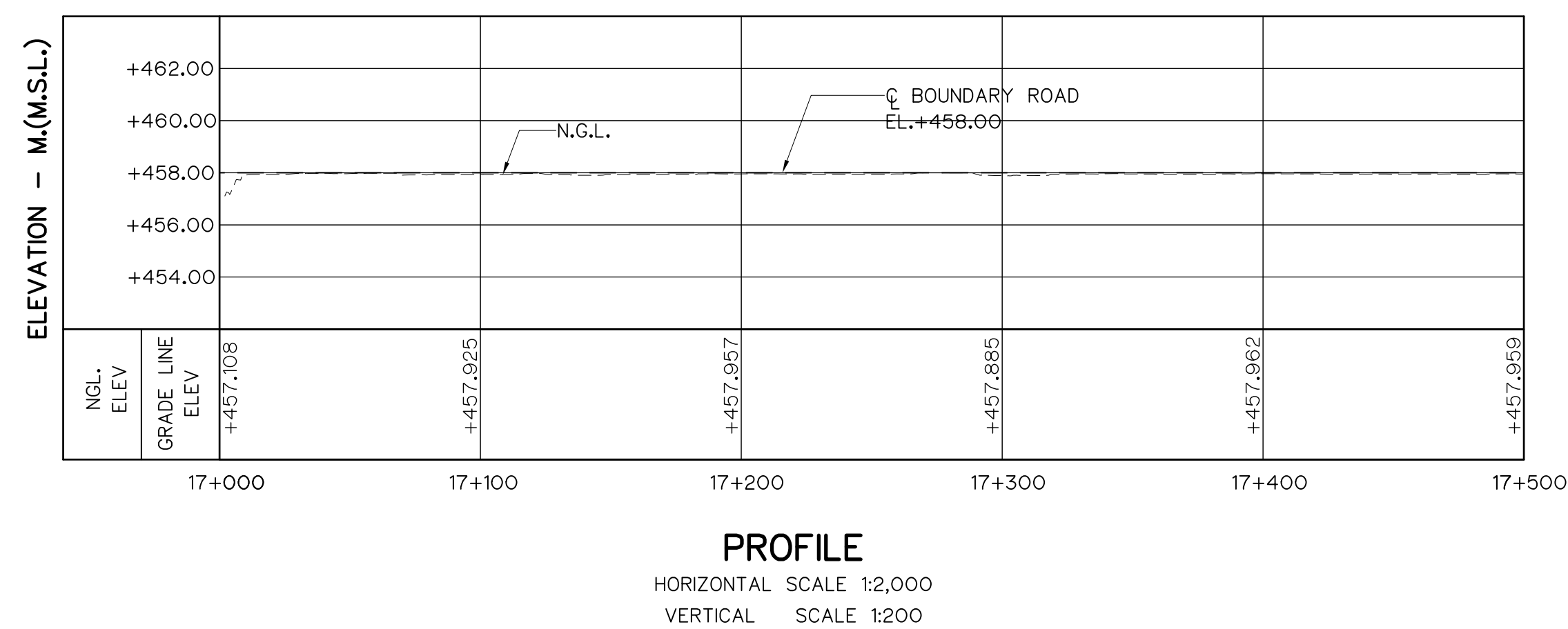
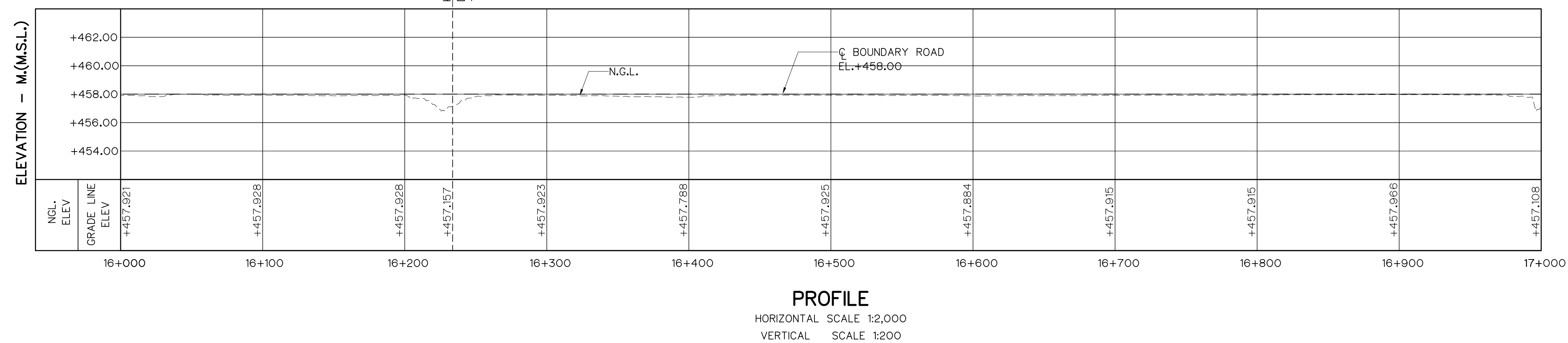
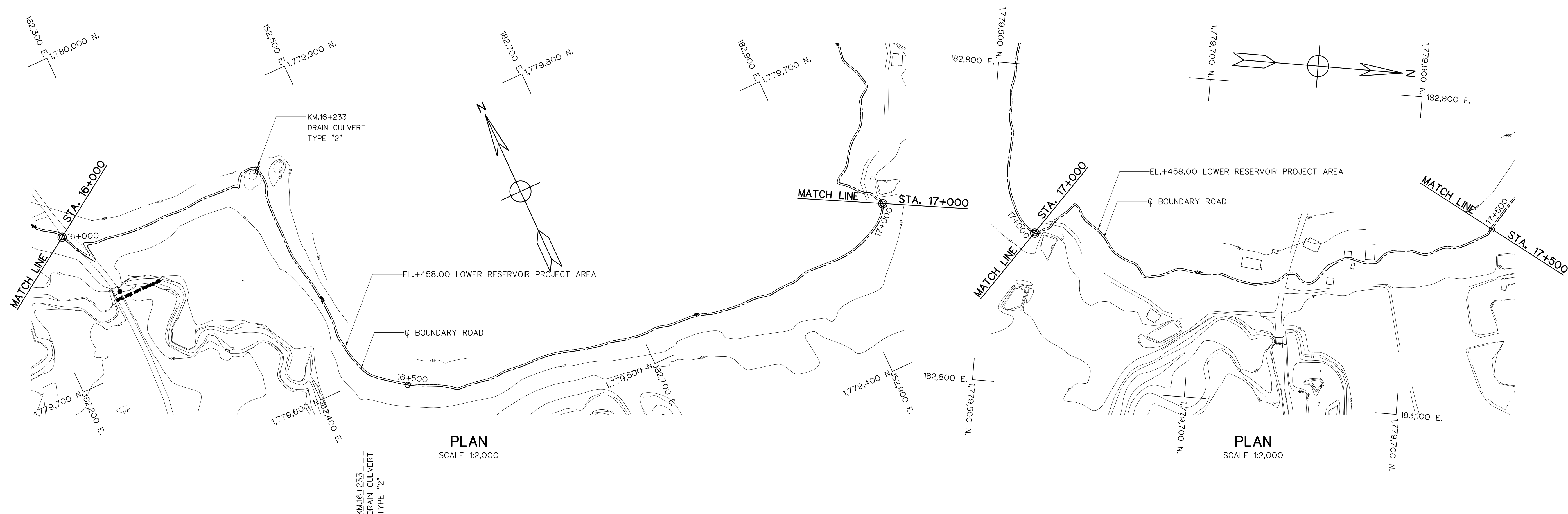


LEGEND

- N.G.L.
- CL BOUNDARY ROAD
- EL.+458.00 LOWER RESERVOIR PROJECT AREA



KINGDOM OF THAILAND Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY			
HUA PRA THAO RESERVOIR BOUNDARY ROAD PROJECT AMPHOE KAENG KHRO, CHANGWAT CHAIYAPHUM			
CIVIL WORKS LOWER RESERVOIR BOUNDARY ROAD PLAN, KM. 14+000 TO KM. 16+000			
PANYA CONSULTANTS CO.,LTD.		Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY	
REVIEWED		REVIEWED	
DESIGNED 28.1957 28.176431		SUBMITTED	
DRAWN		RECOMMENDED	
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PROJECT MANAGER 10/08/2021 DATE		DRAWING NO. HRR-BR-L10 SHEET NO. 49 OF 80	

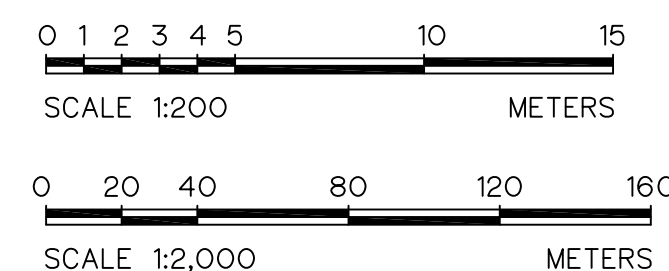


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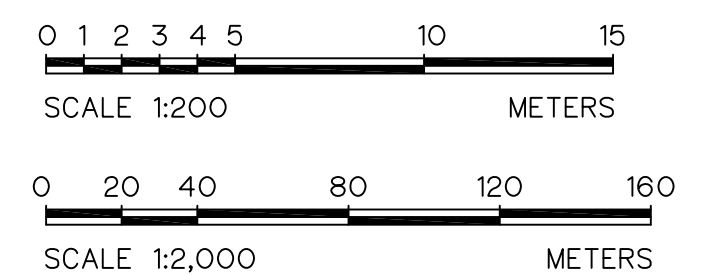
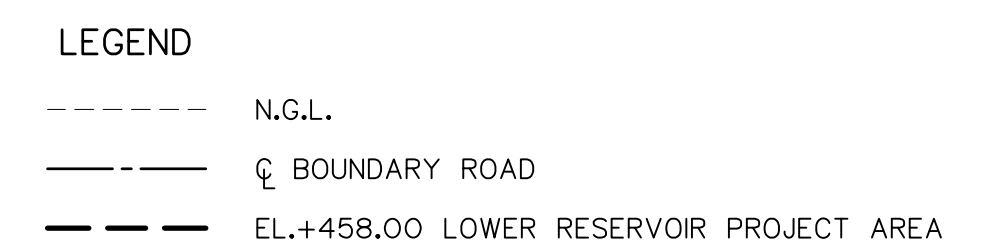
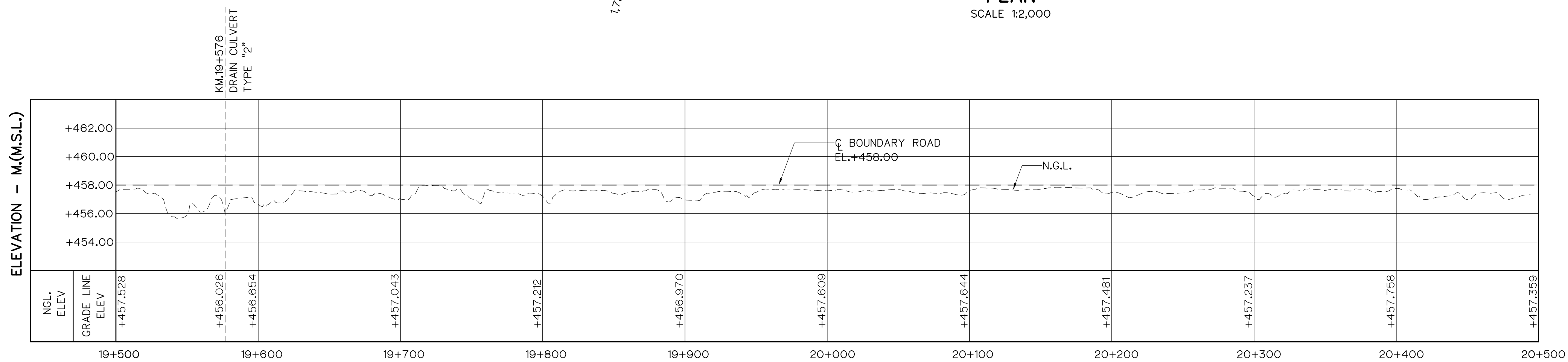
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——— Q BOUNDARY ROAD

———— EL.+458.00 LOWER RESERVOIR PROJECT AREA

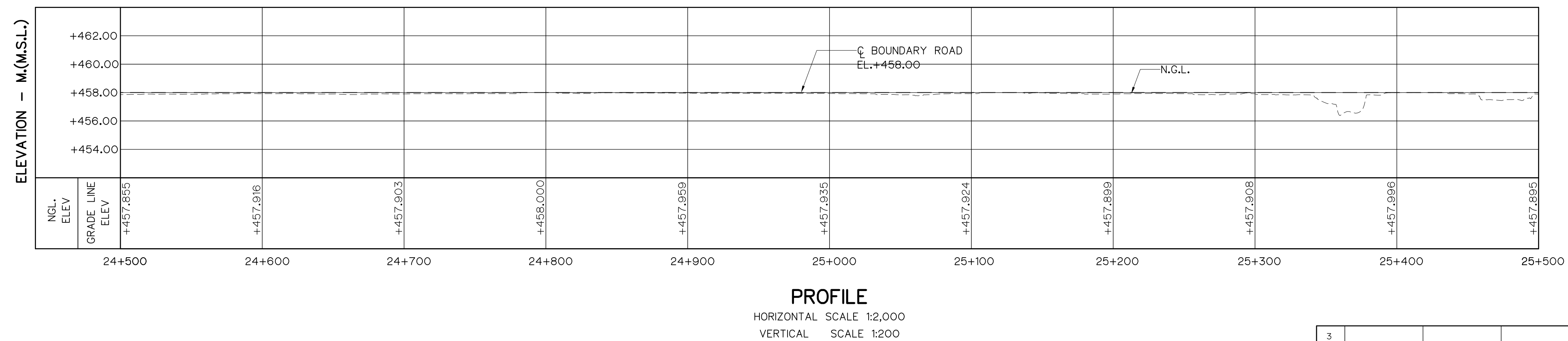
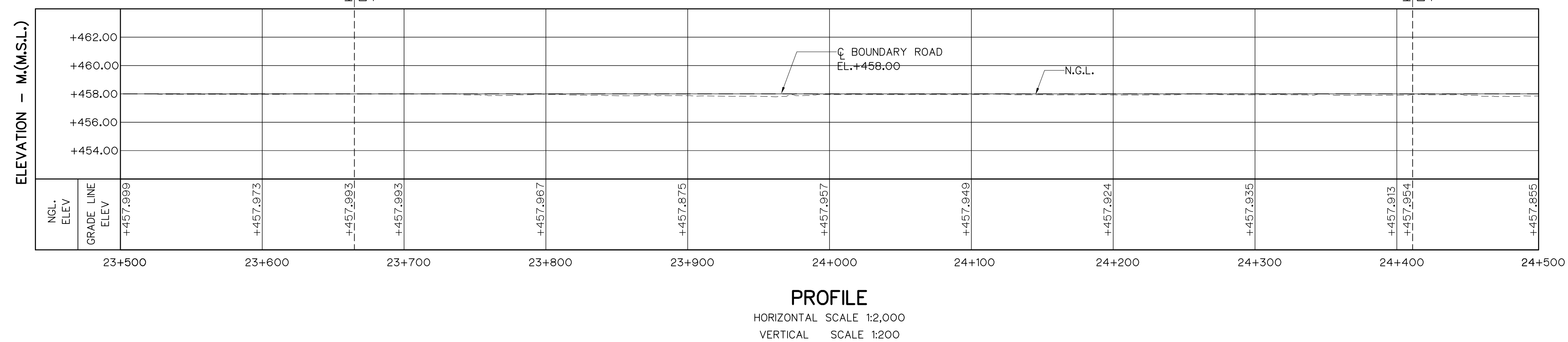
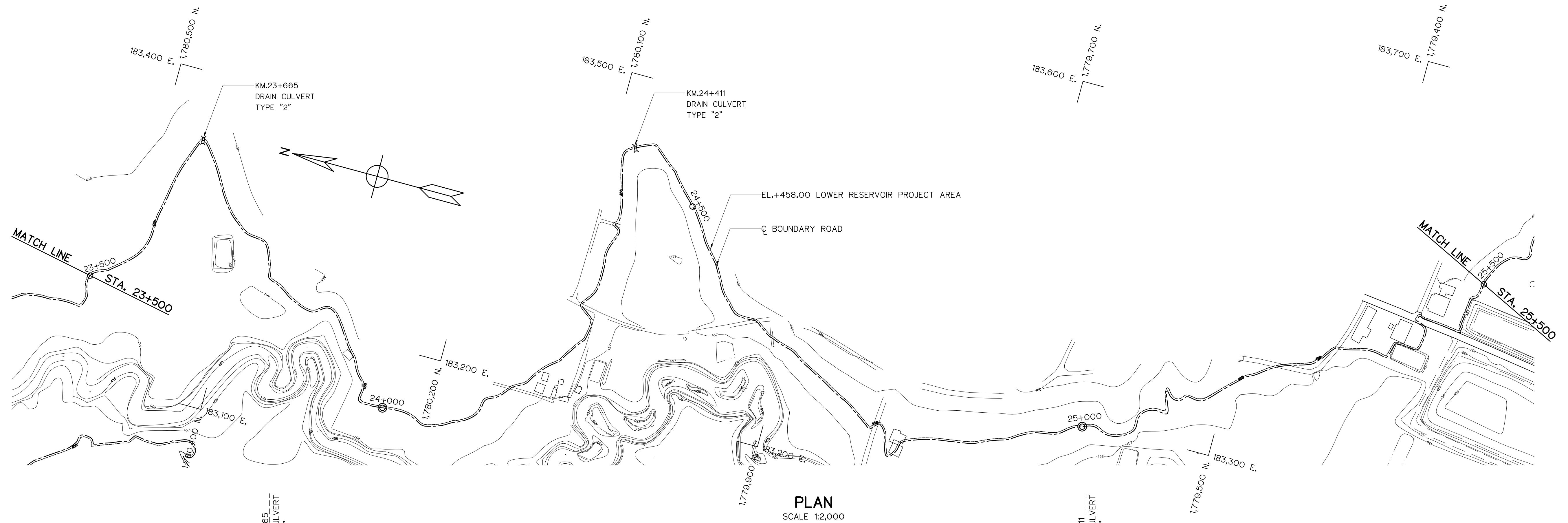


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					HUAI PRA THAO RESERVOIR BOUNDARY ROAD PROJECT AMPHOE KAENG KHRO, CHANGWAT CHAIYAPHUM			
					CIVIL WORKS LOWER RESERVOIR BOUNDARY ROAD PLAN, KM. 16+000 TO KM. 17+500			
					 PANYA CONSULTANTS CO.,LTD.			
3					 Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY			
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1					DRAWN			SUBMITTED
NO.	DATE	REVISIONS	CHECKED	APPROVED	CHECKED		28/1/957	RECOMMENDED
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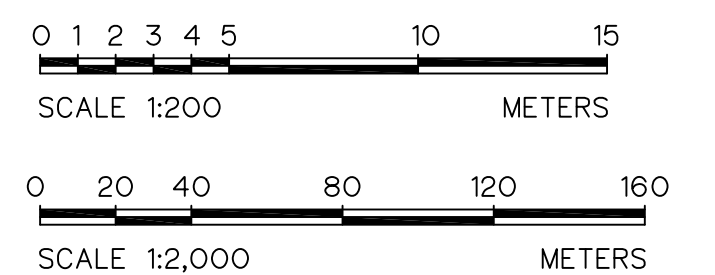
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2						DESIGNED	28.19.57	#18.76431	SUBMITTED
1						DRAWN			RECOMMENDED
NO.	DATE	REVISIONS	CHECKED	APPROVED		CHECKED	28.19.57		APPROVED
CONSULTANTS			DEDE		10/08/2021 PROJECT MANAGER _____ DATE _____			DRAWING NO. HRR-BR-L13	SHEET NO. 52 OF 80

 KINGDOM OF THAILAND Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY			
HUAI PRA THAO RESERVOIR BOUNDARY ROAD PROJECT AMPHOE KAENG KHRO, CHANGWAT CHAIYAPHUM			
CIVIL WORKS LOWER RESERVOIR BOUNDARY ROAD PLAN, KM. 19+500 TO KM. 21+500			
 PANYA CONSULTANTS CO.,LTD.		 Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY	
DESIGNED 28.1.1957 28.1.76.4.31		REVIEWED	
DRAWN		RECOMMENDED	
CHECKED 28.1.1957		APPROVED	
10/08/2021		DRAWING NO.	
PROJECT MANAGER		DATE	
		HRR-BR-L13	
		SHEET NO.	
		52 OF 80	

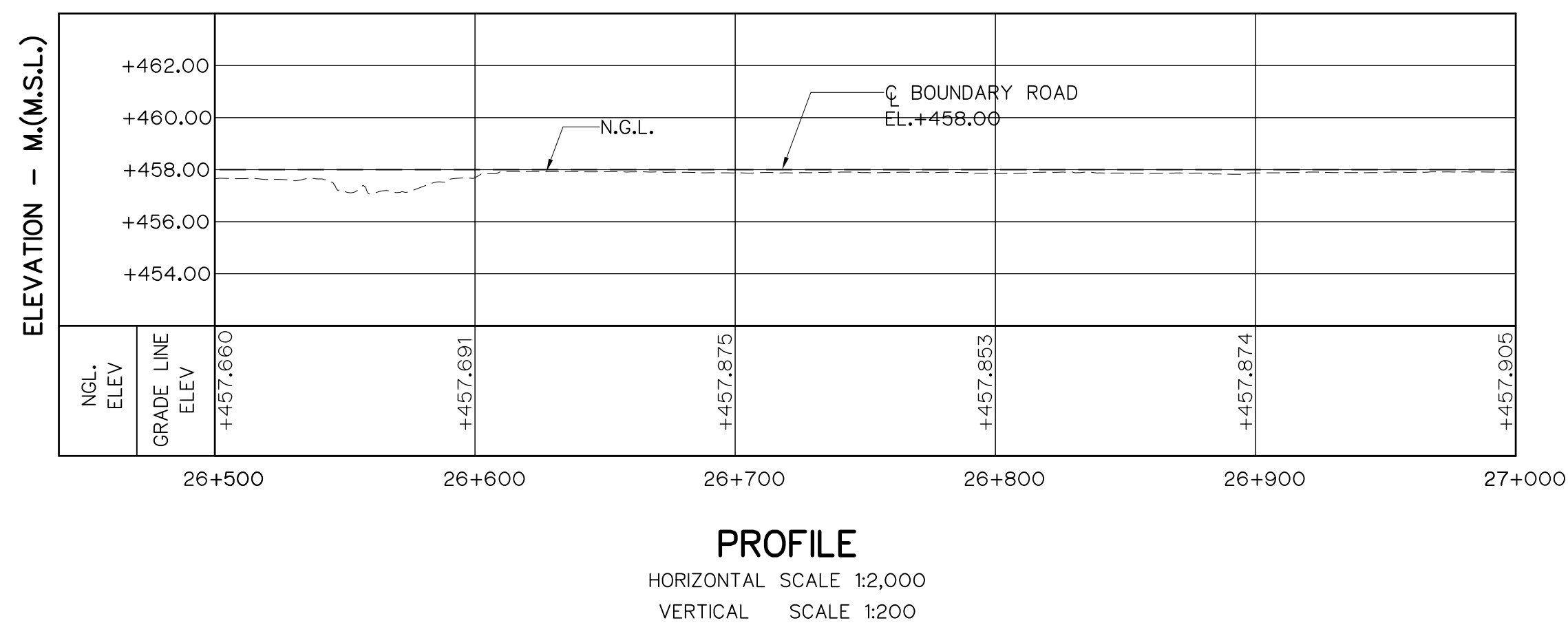
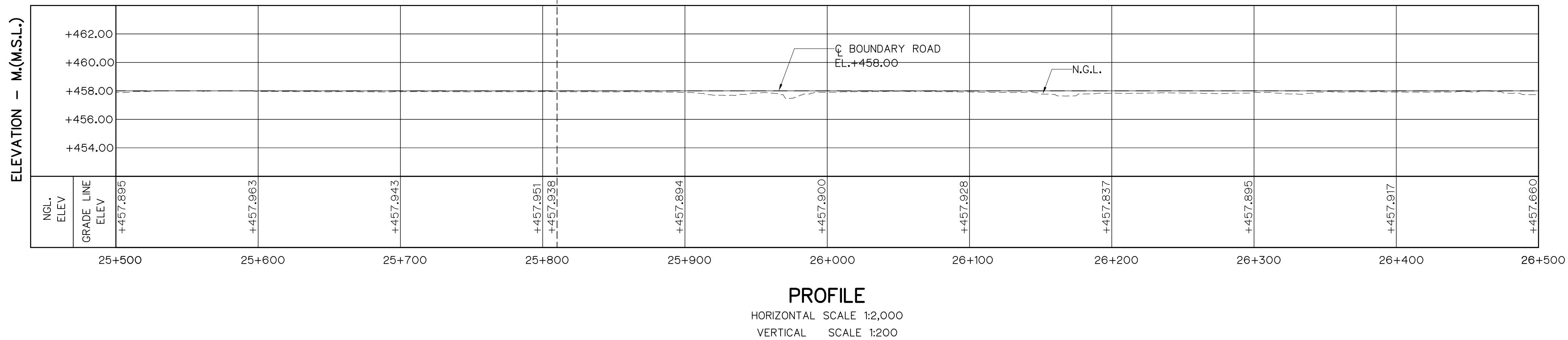
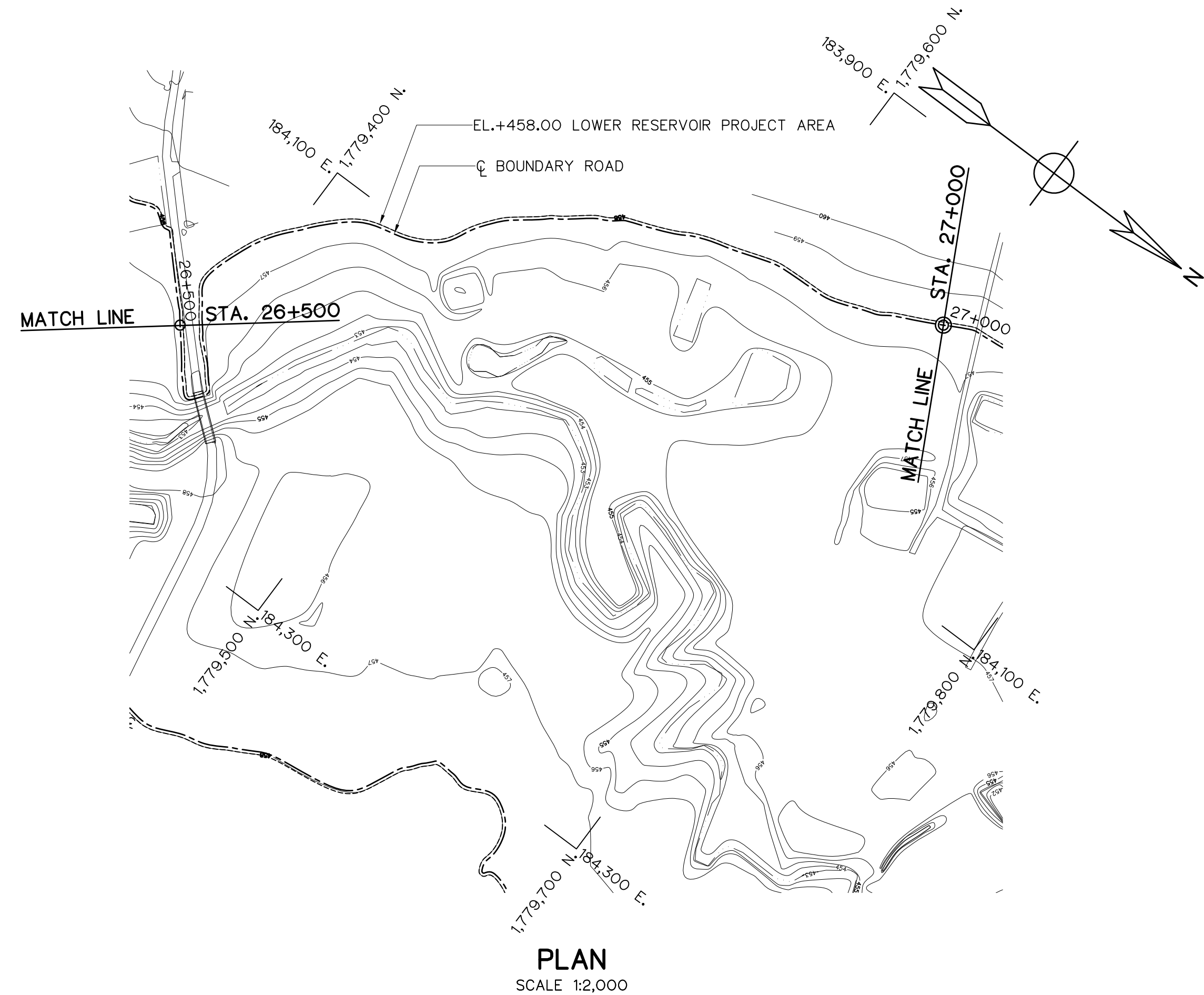
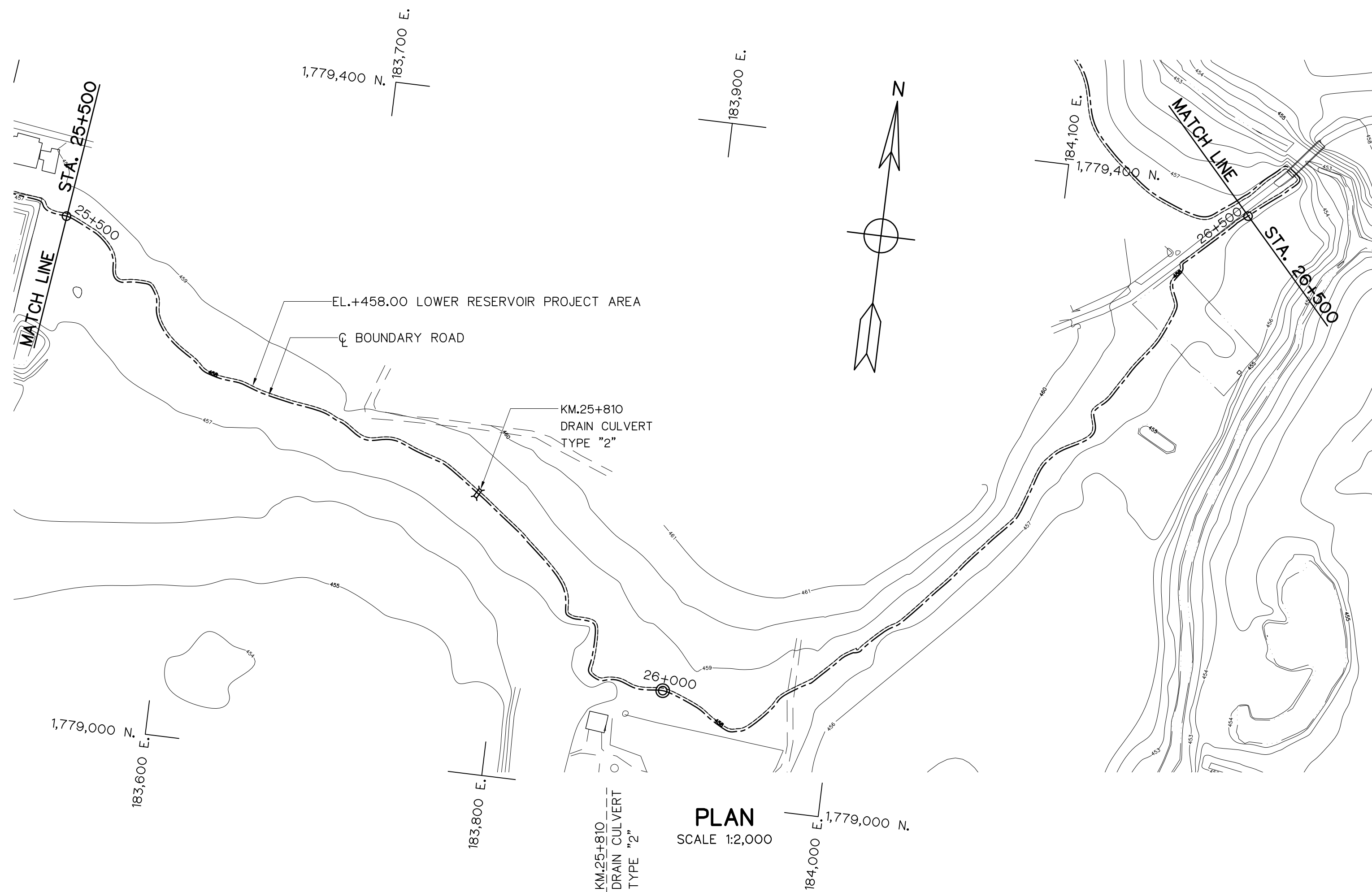


LEGEND

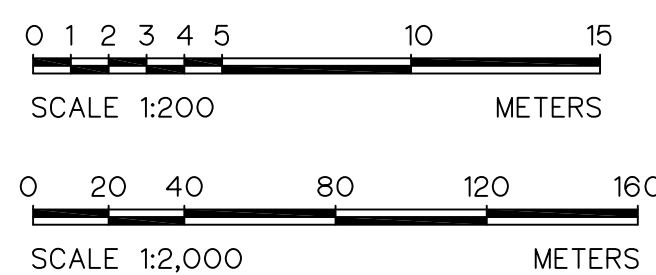
- - - - - N.G.L.
 — — — — — C₂ BOUNDARY ROAD
 — — — — — EL.+458.00 LOWER RESERVOIR PROJECT AREA



 KINGDOM OF THAILAND Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY			
HUAI PRA THAO RESERVOIR BOUNDARY ROAD PROJECT AMPHOE KAENG KHRO, CHANGWAT CHAIYAPHUM			
CIVIL WORKS LOWER RESERVOIR BOUNDARY ROAD PLAN, KM. 23+500 TO KM. 25+500			
 PANYA CONSULTANTS CO.,LTD.		 Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY	
DESIGNED ๒๒.1957 ๙๒.76431		REVIEWED	
DRAWN		SUBMITTED	
CHECKED ๒๒.1957		RECOMMENDED	
10/08/2021		APPROVED	
PROJECT MANAGER		DRAWING NO.	
DATE		HRR-BR-L15	
		SHEET NO.	
		54 OF 80	

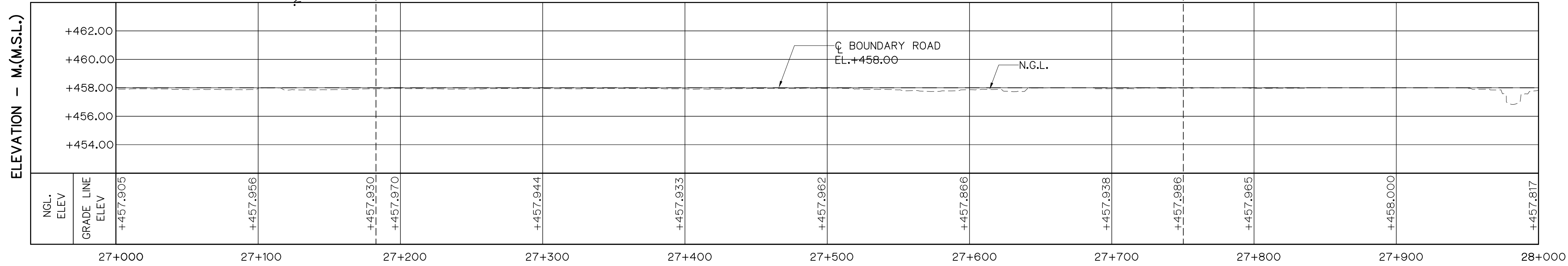
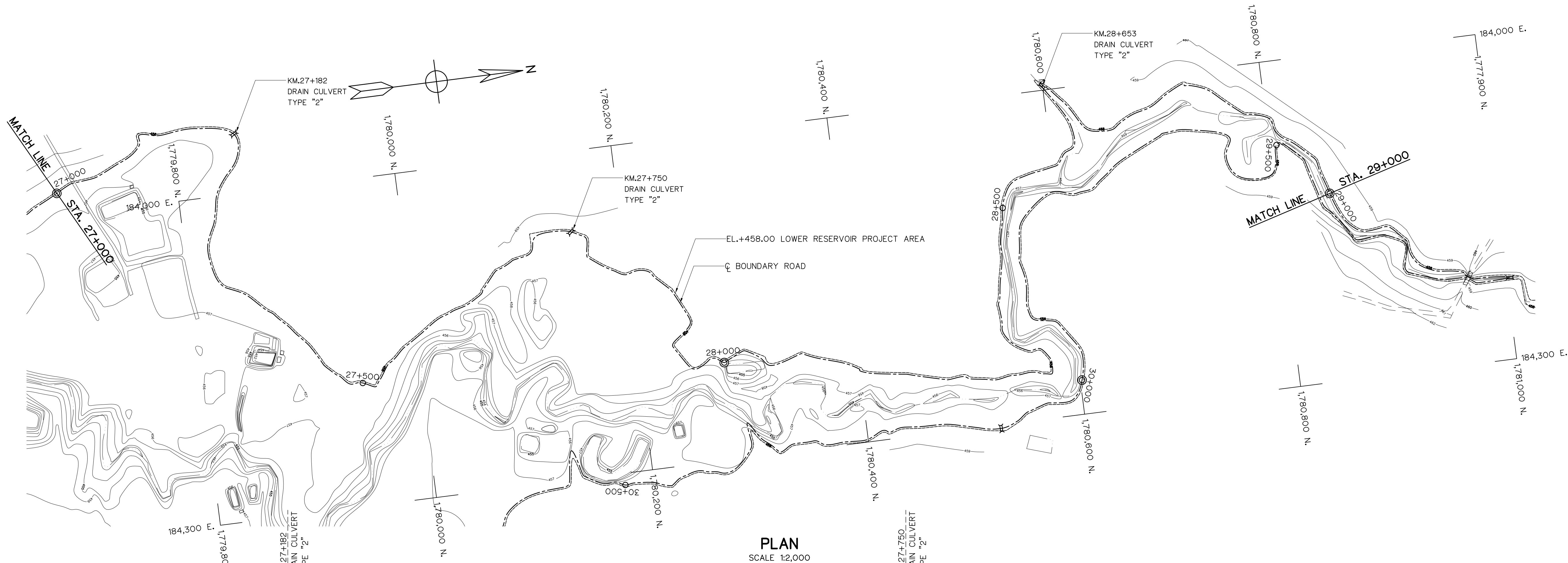


- LEGEND
- N.G.L.
 - - - BOUNDARY ROAD
 - - - EL.+458.00 LOWER RESERVOIR PROJECT AREA

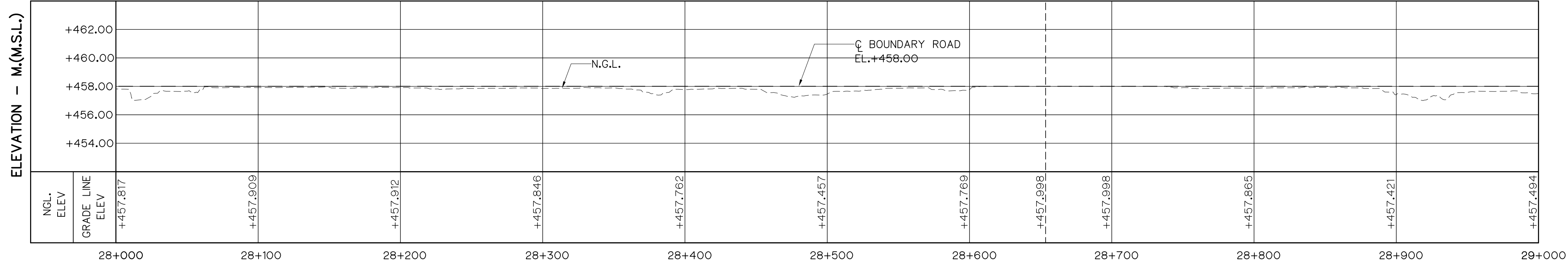


 KINGDOM OF THAILAND Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY			
HUI PRA THAO RESERVOIR BOUNDARY ROAD PROJECT AMPHOE KAENG KHRO, CHANGWAT CHAIYAPHUM			
CIVIL WORKS LOWER RESERVOIR BOUNDARY ROAD PLAN, KM. 25+500 TO KM. 27+000			
 PANYA CONSULTANTS CO.,LTD.		 Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY	
DESIGNED 28.1957 28.76431		REVIEWED	
DRAWN		RECOMMENDED	
CHECKED 28.1957		APPROVED	
PROJECT MANAGER 10/08/2021 DATE		DRAWING NO. HRR-BR-L16	
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NO.	DATE	REVISIONS	CHECKED	APPROVED
	CONSULTANTS		DEDE	

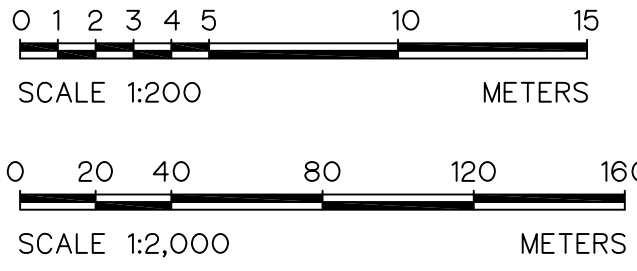


PROFILE
HORIZONTAL SCALE 1:2,000
VERTICAL SCALE 1:200



PROFILE
HORIZONTAL SCALE 1:2,000
VERTICAL SCALE 1:200

- LEGEND
- N.G.L.
 - Q BOUNDARY ROAD
 - EL.+458.00 LOWER RESERVOIR PROJECT AREA



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

HUAI PRA THAO RESERVOIR BOUNDARY ROAD PROJECT
AMPHOE KAENG KHRO, CHANGWAT CHAIYAPHUM

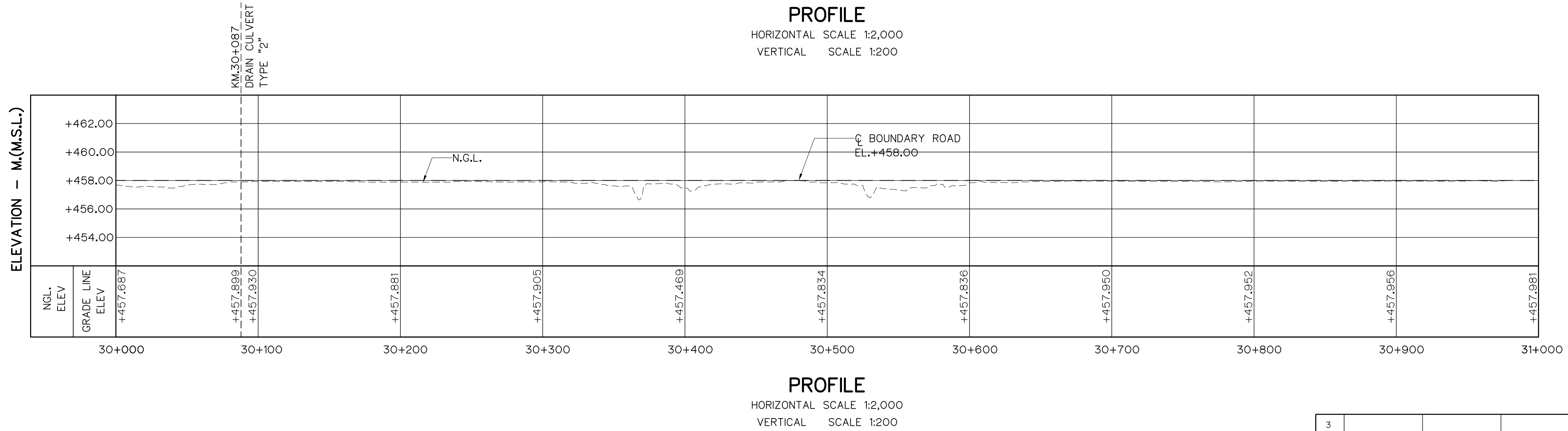
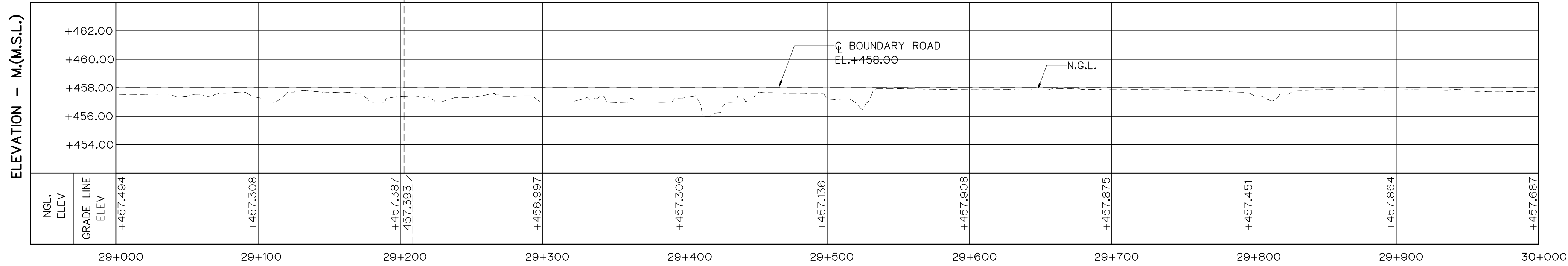
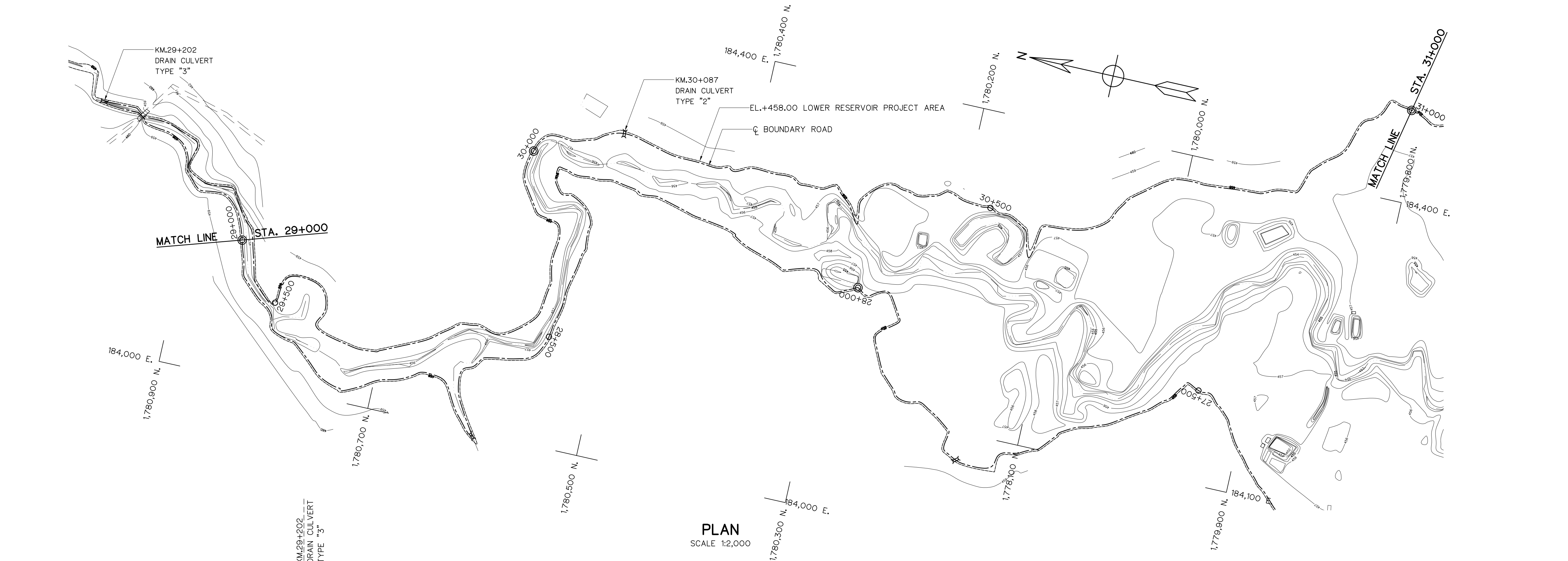
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PLAN, KM. 27+000 TO KM. 29+000

PANYA CONSULTANTS CO.,LTD.

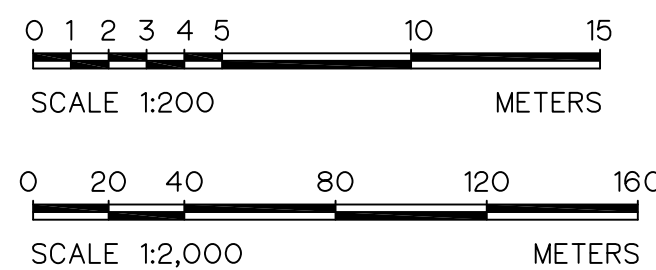
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

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NO.	DATE	REVISIONS	CHECKED	APPROVED		CHECKED	28.1957
	CONSULTANTS		DEDE			PROJECT MANAGER	10/08/2021
						DATE	

REVIEWED	SUBMITTED
RECOMMENDED	APPROVED
DRAWING NO. HRR-BR-L17	SHEET NO. 56 OF 80

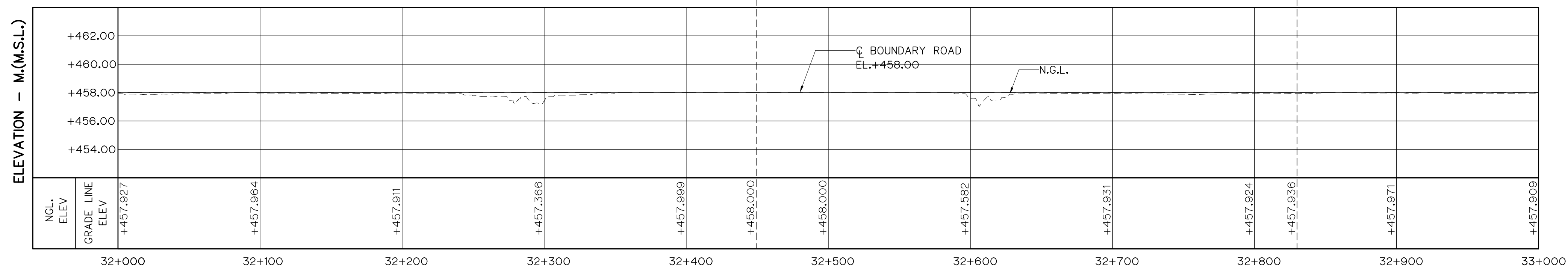
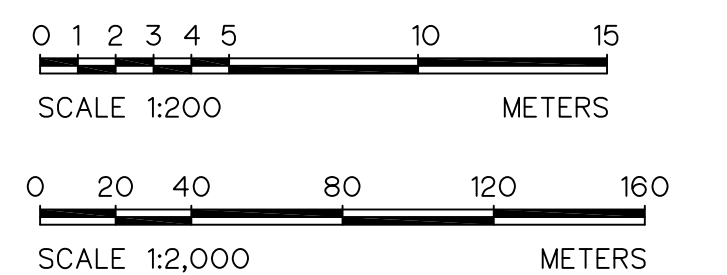
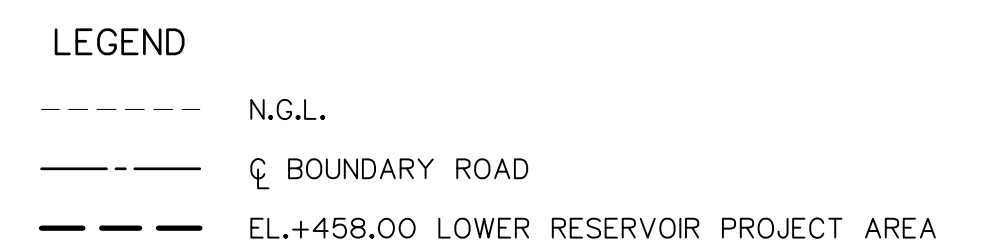
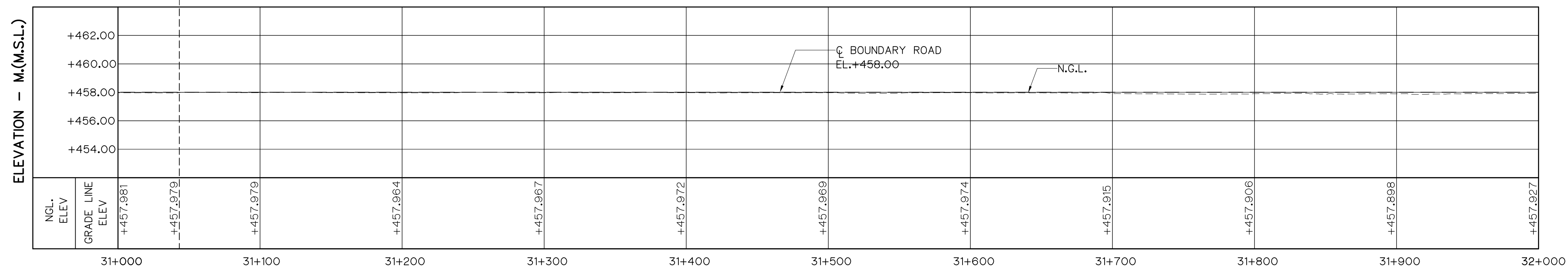
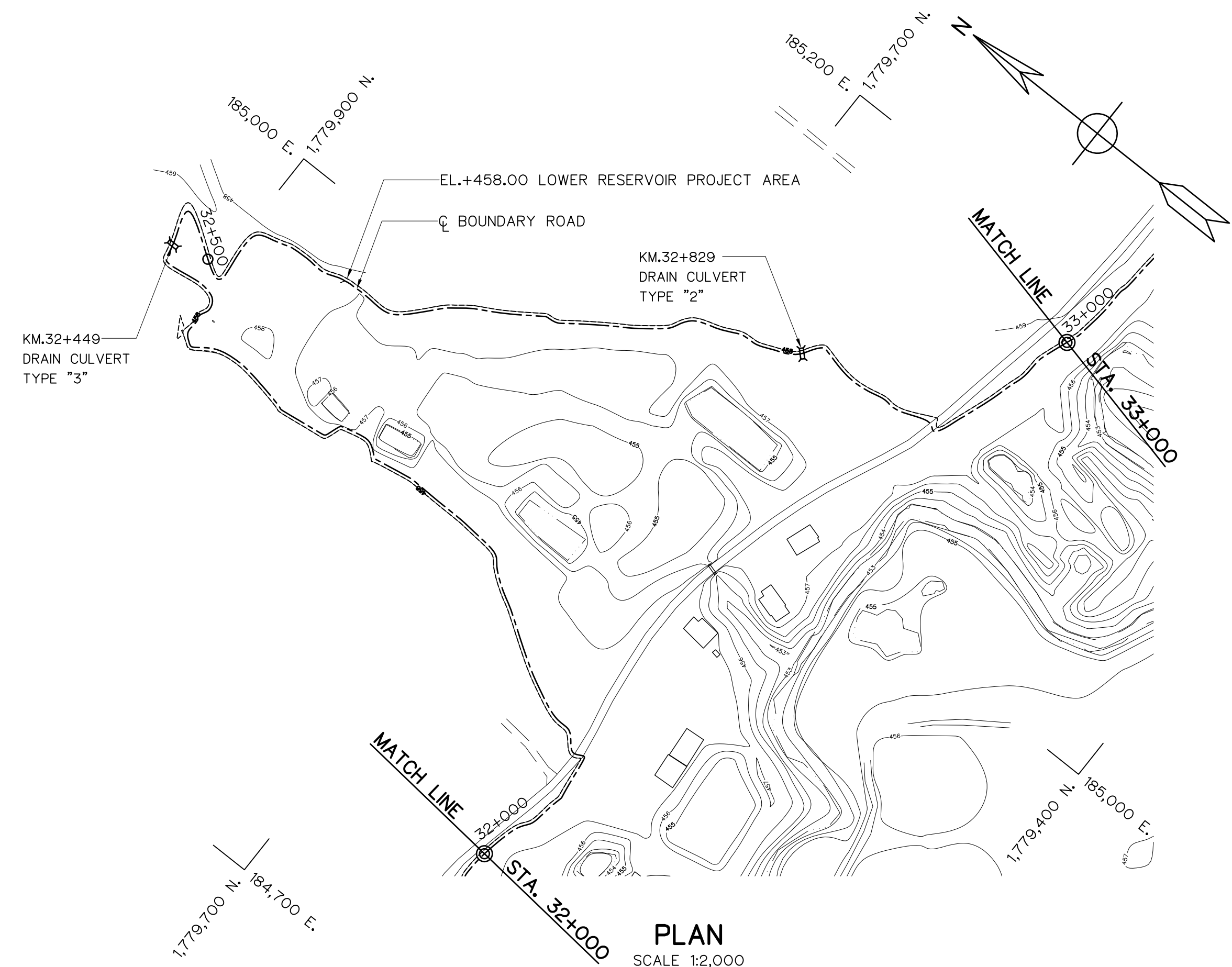
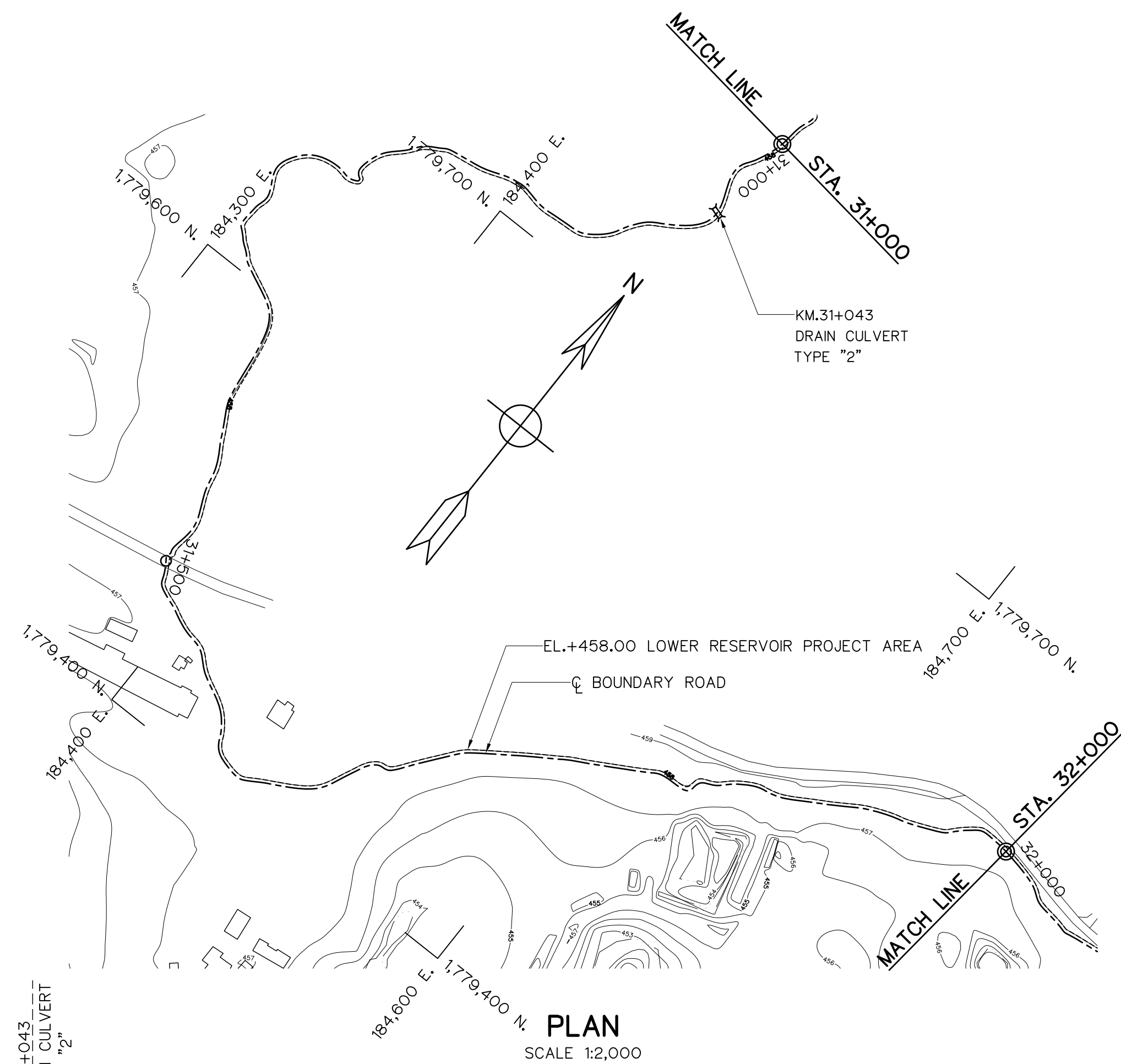


- LEGEND**
- N.G.L.
 - - - BOUNDARY ROAD
 - - - EL.+458.00 LOWER RESERVOIR PROJECT AREA



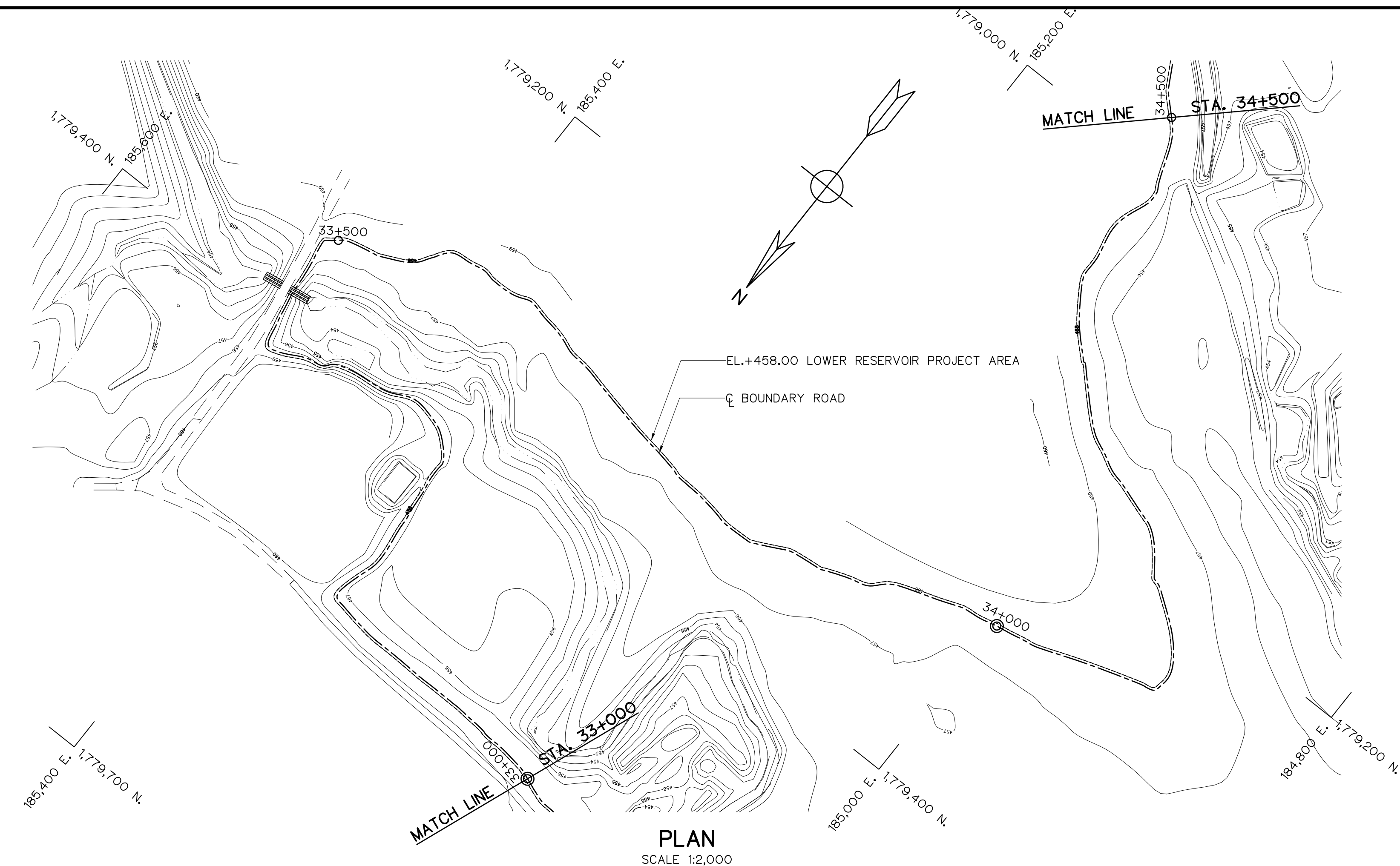
KINGDOM OF THAILAND Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY			
HUA PRA THAO RESERVOIR BOUNDARY ROAD PROJECT AMPHOE KAENG KHRO, CHANGWAT CHAIYAPHUM			
CIVIL WORKS LOWER RESERVOIR BOUNDARY ROAD PLAN, KM. 29+000 TO KM. 31+000			
PANYA CONSULTANTS CO.,LTD.		REVIEWED	
DESIGNED	28.1957	28.76431	SUBMITTED
DRAWN			RECOMMENDED
CHECKED	28.1957		APPROVED
PROJECT MANAGER		10/08/2021 DATE	DRAWING NO. HRR-BR-L18
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NO.	DATE	REVISIONS	CHECKED	APPROVED
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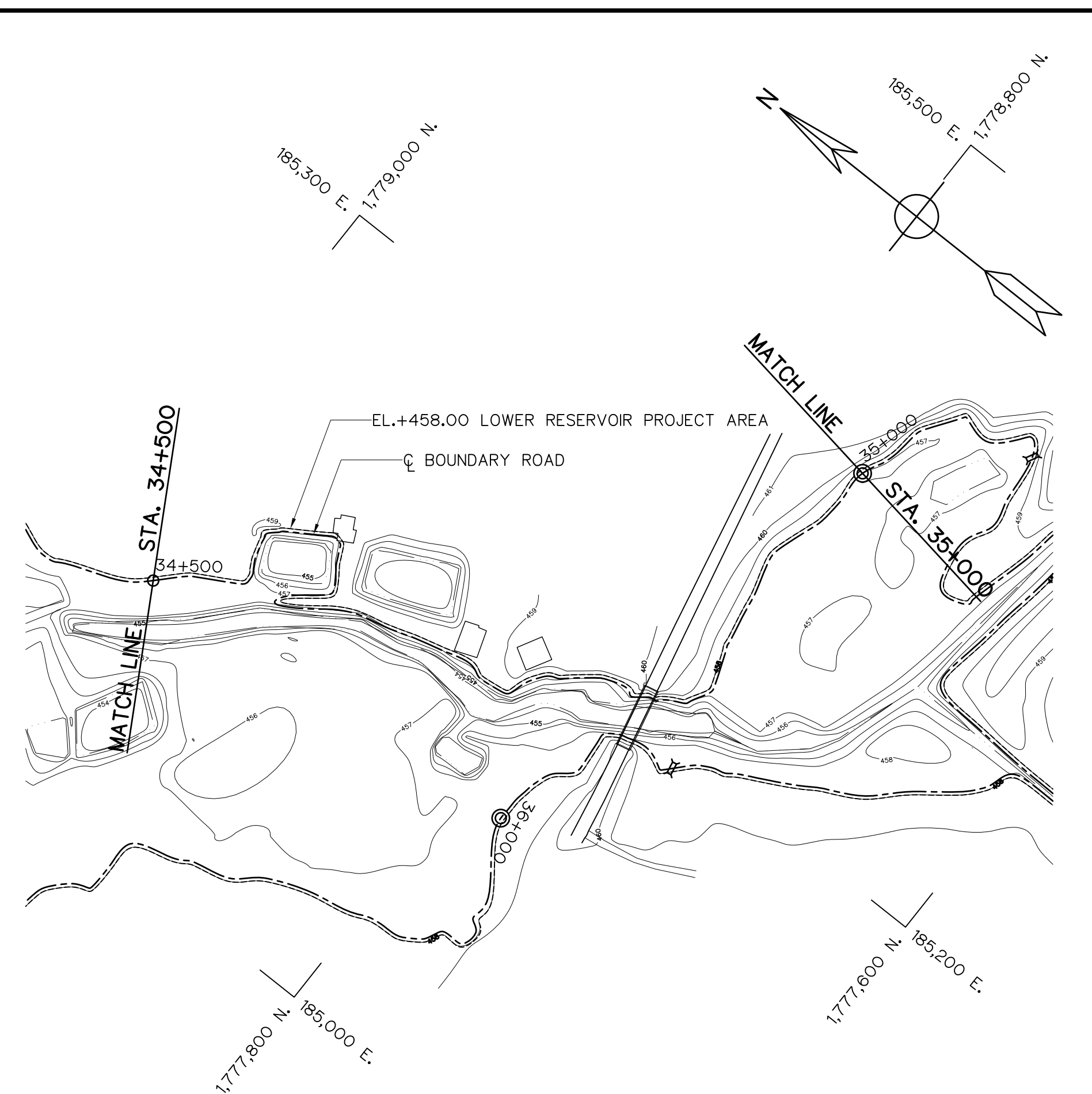


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	CONSULTANTS		DEDE	

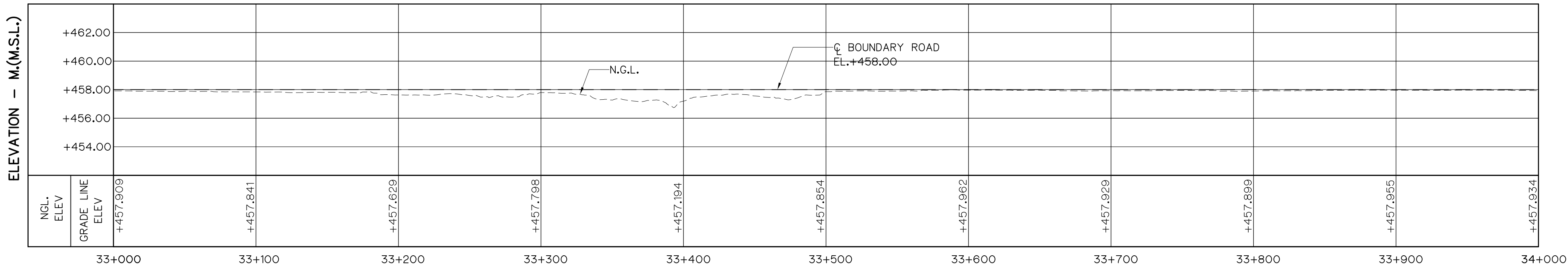
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HUAI PRA THAO RESERVOIR BOUNDARY ROAD PROJECT AMPHOE KAENG KHRO, CHANGWAT CHAIYAPHUM			
CIVIL WORKS LOWER RESERVOIR BOUNDARY ROAD PLAN, KM. 31+000 TO KM. 33+000			
 PANYA CONSULTANTS CO.,LTD.		 Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY	
DESIGNED 28.1957 48.76431		REVIEWED	
DRAWN		SUBMITTED	
CHECKED 28.1957		RECOMMENDED	
_____ 10/08/2021 PROJECT MANAGER DATE		DRAWING NO. HRR-BR-L19	
		SHEET NO. 58 OF 80	



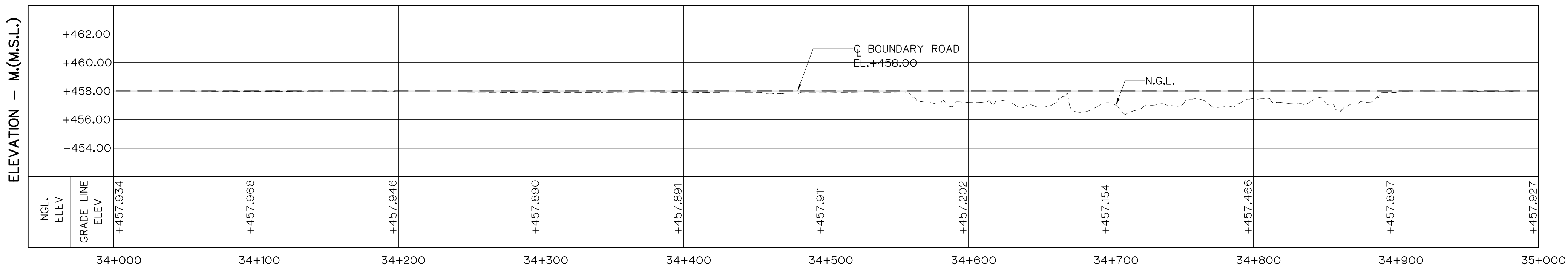
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PLAN
SCALE 1:2,000

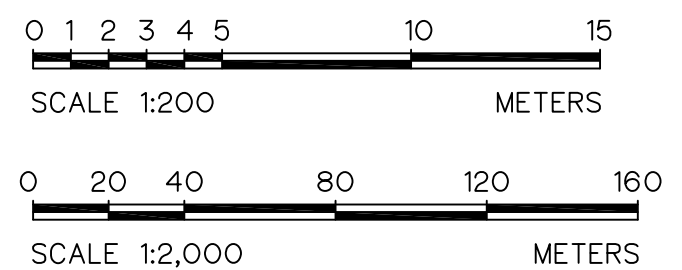


PROFILE
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VERTICAL SCALE 1:200



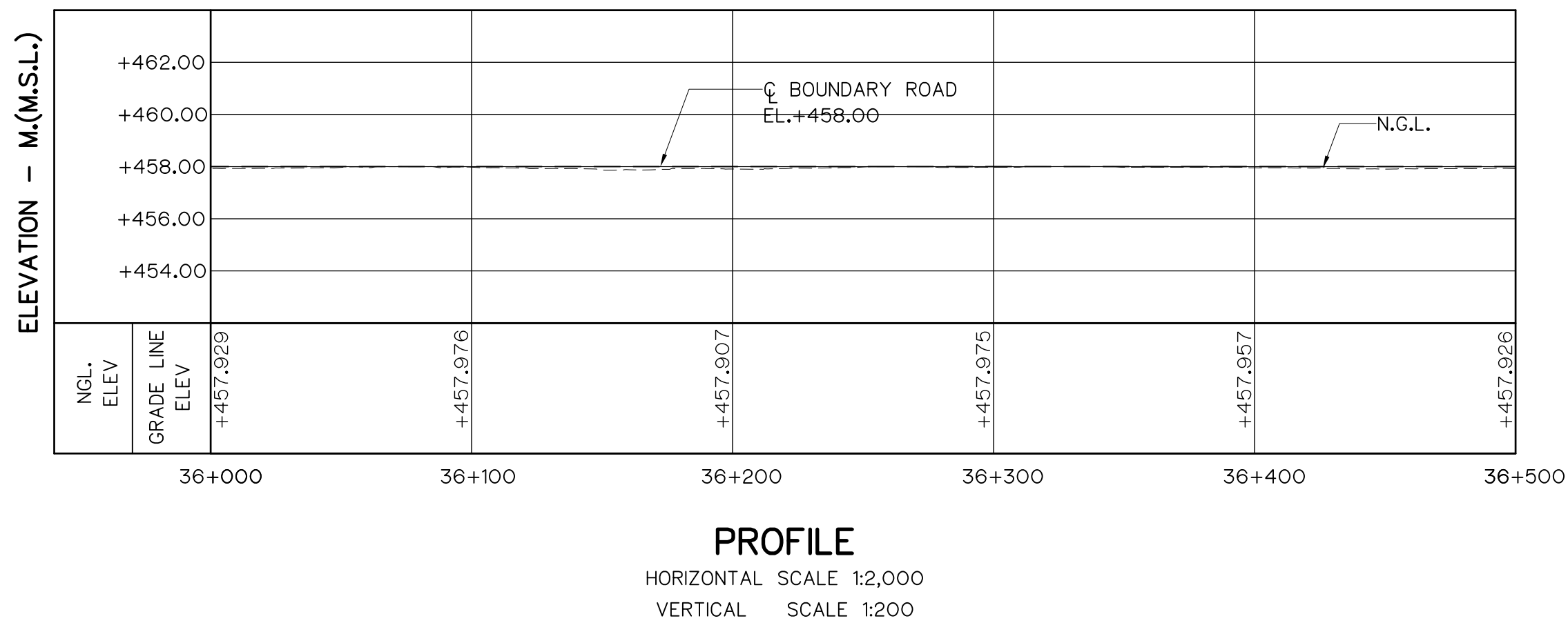
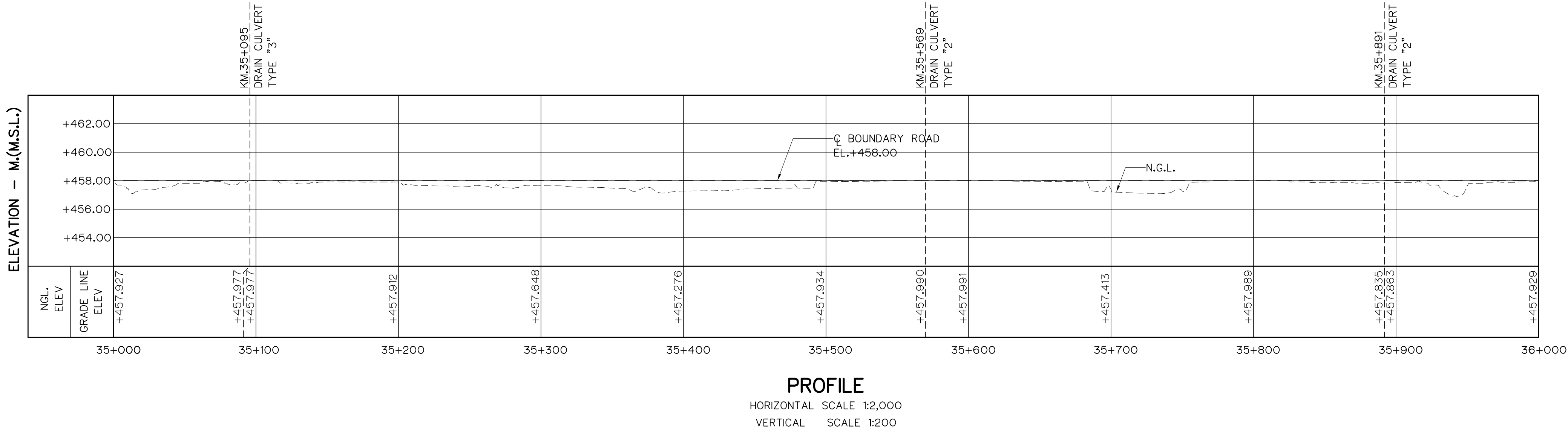
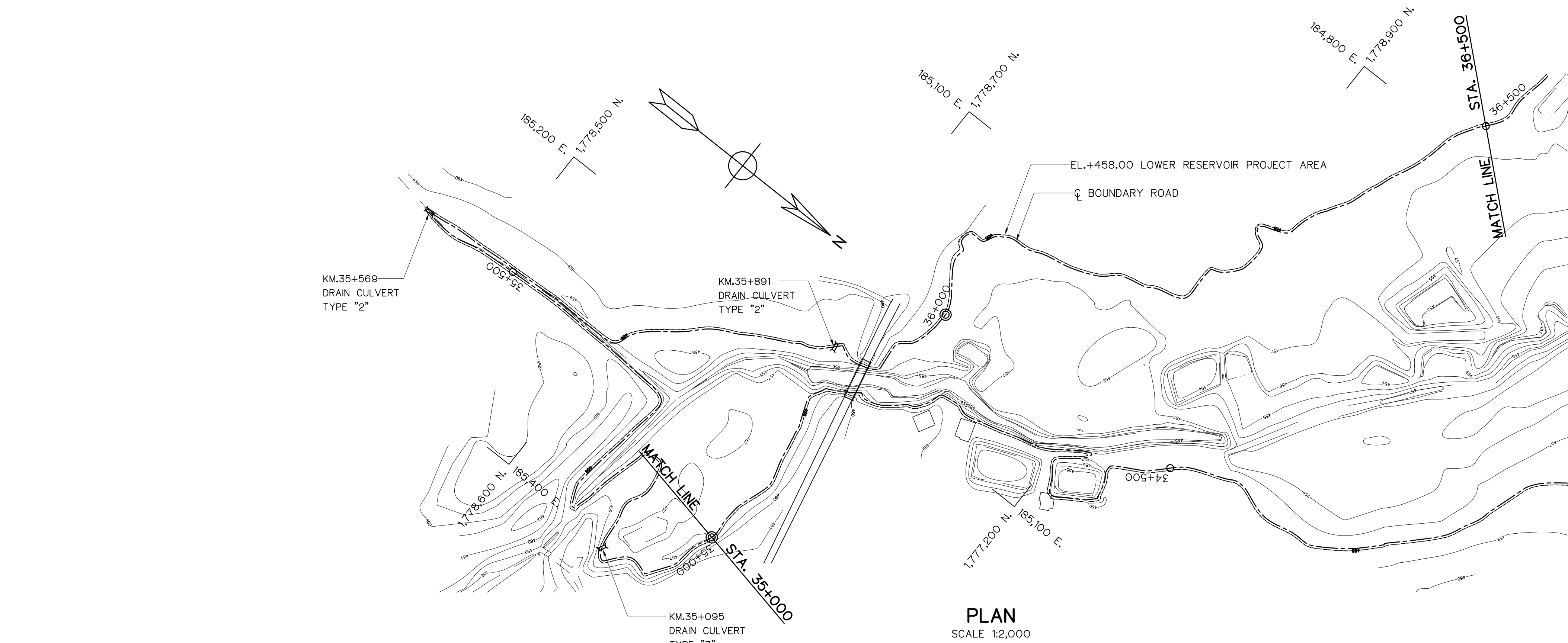
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VERTICAL SCALE 1:200

- LEGEND
- N.G.L.
 - BOUNDARY ROAD
 - EL.+458.00 LOWER RESERVOIR PROJECT AREA

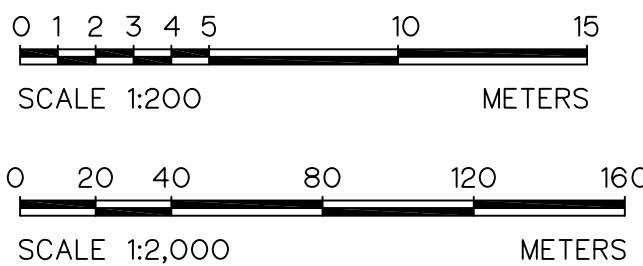


 KINGDOM OF THAILAND Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY			
HUI PRA THAO RESERVOIR BOUNDARY ROAD PROJECT AMPHOE KAENG KHRO, CHANGWAT CHAIYAPHUM			
CIVIL WORKS LOWER RESERVOIR BOUNDARY ROAD PLAN, KM. 33+000 TO KM. 35+000			
 PANYA CONSULTANTS CO.,LTD.		 Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY	
DESIGNED 28.1957 28.76431		REVIEWED	
DRAWN		RECOMMENDED	
CHECKED 28.1957		APPROVED	
PROJECT MANAGER 10/08/2021 DATE		DRAWING NO. HRR-BR-L20 SHEET NO. 59 OF 80	

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NO.	DATE	REVISIONS	CHECKED	APPROVED
	CONSULTANTS		DEDE	

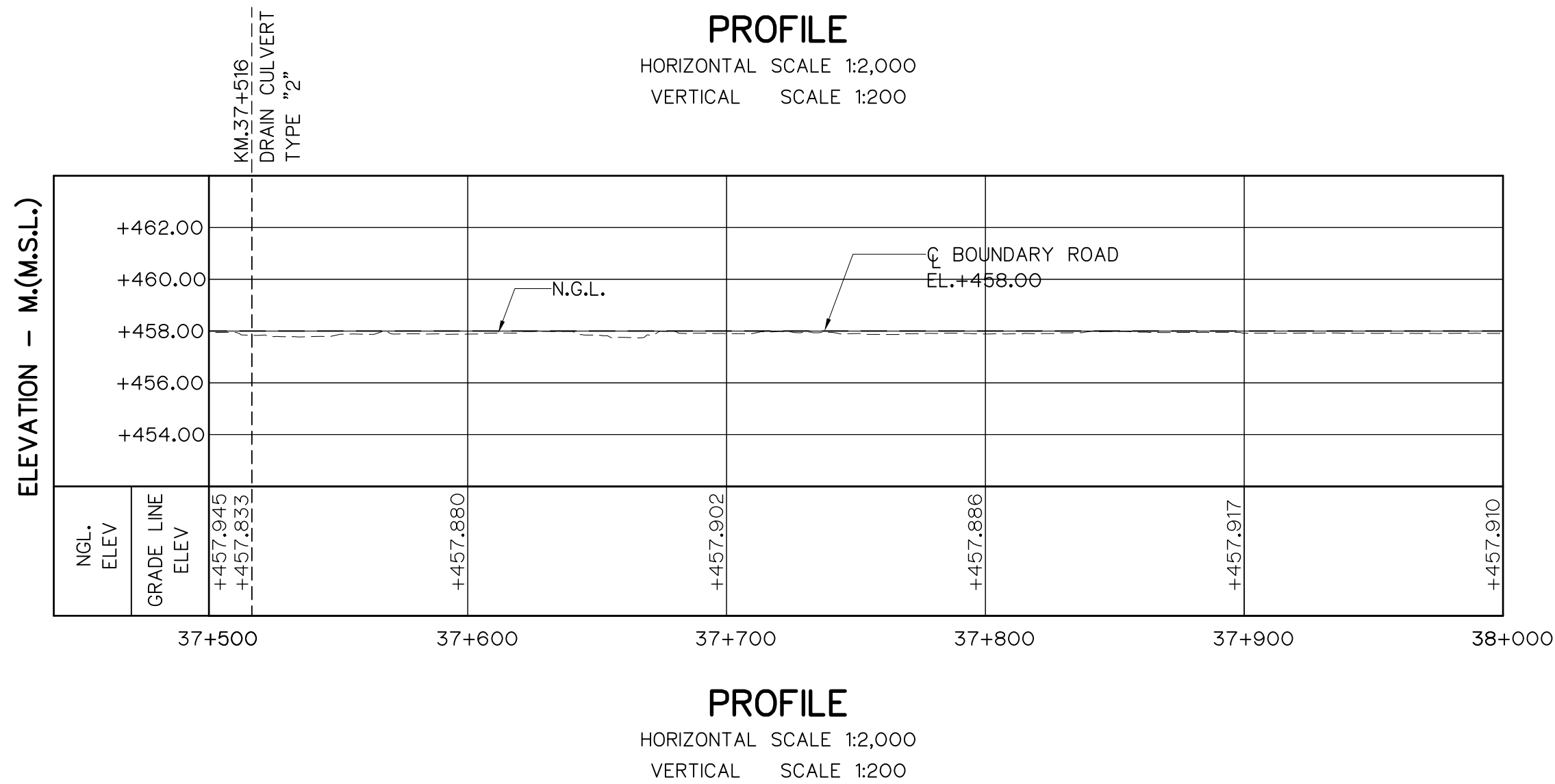
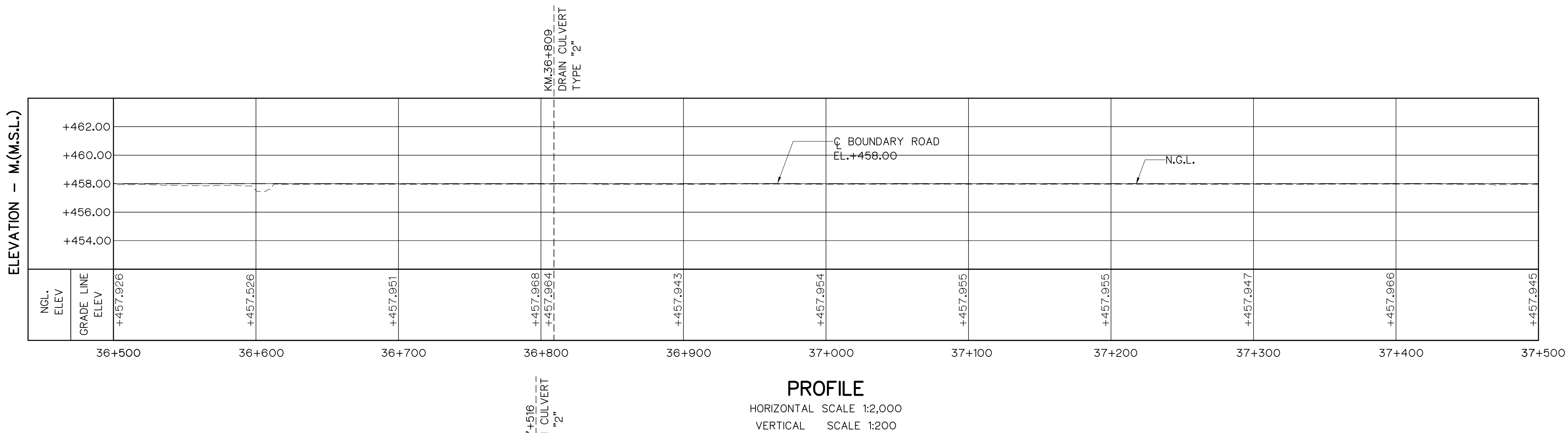
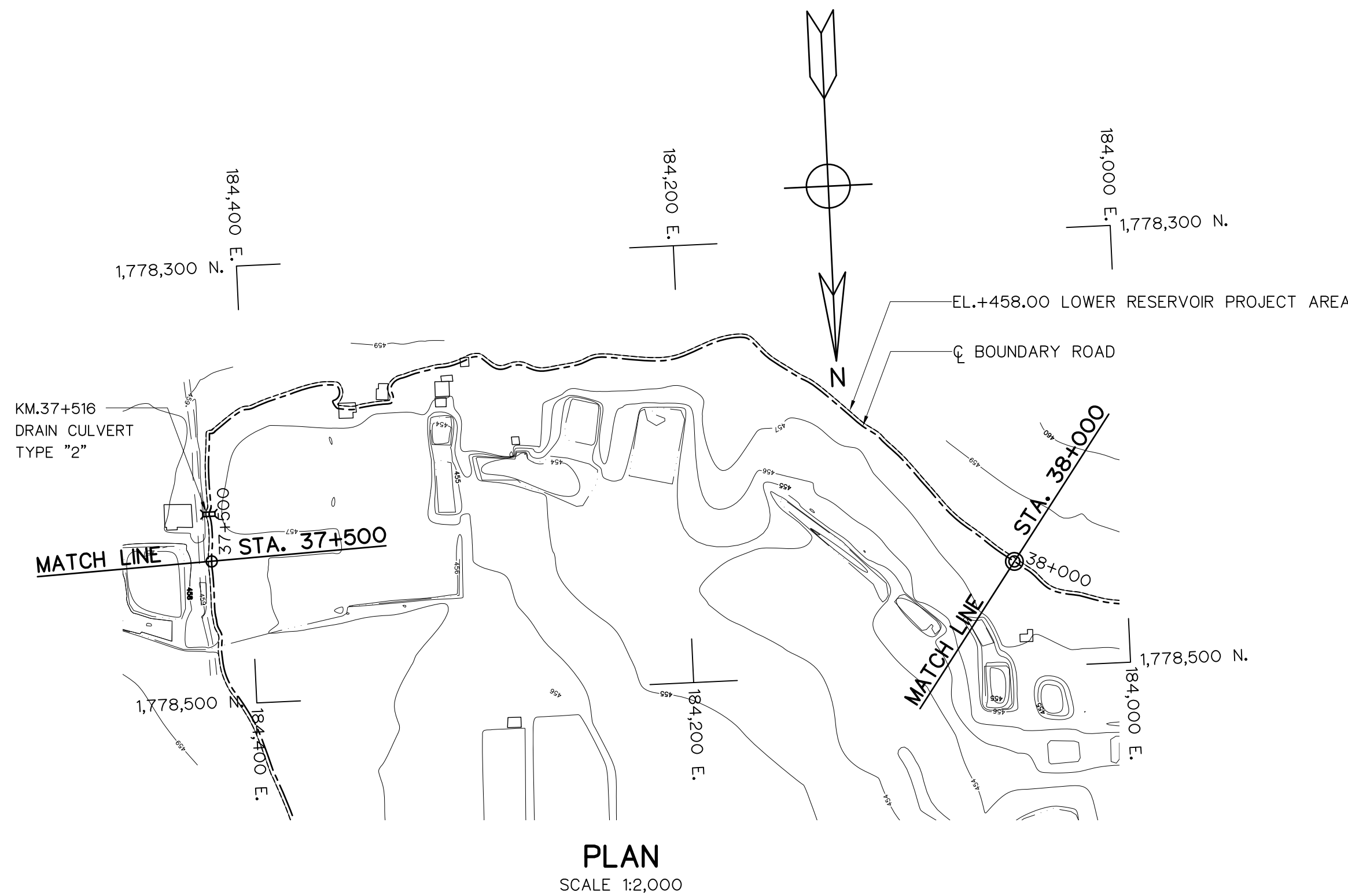
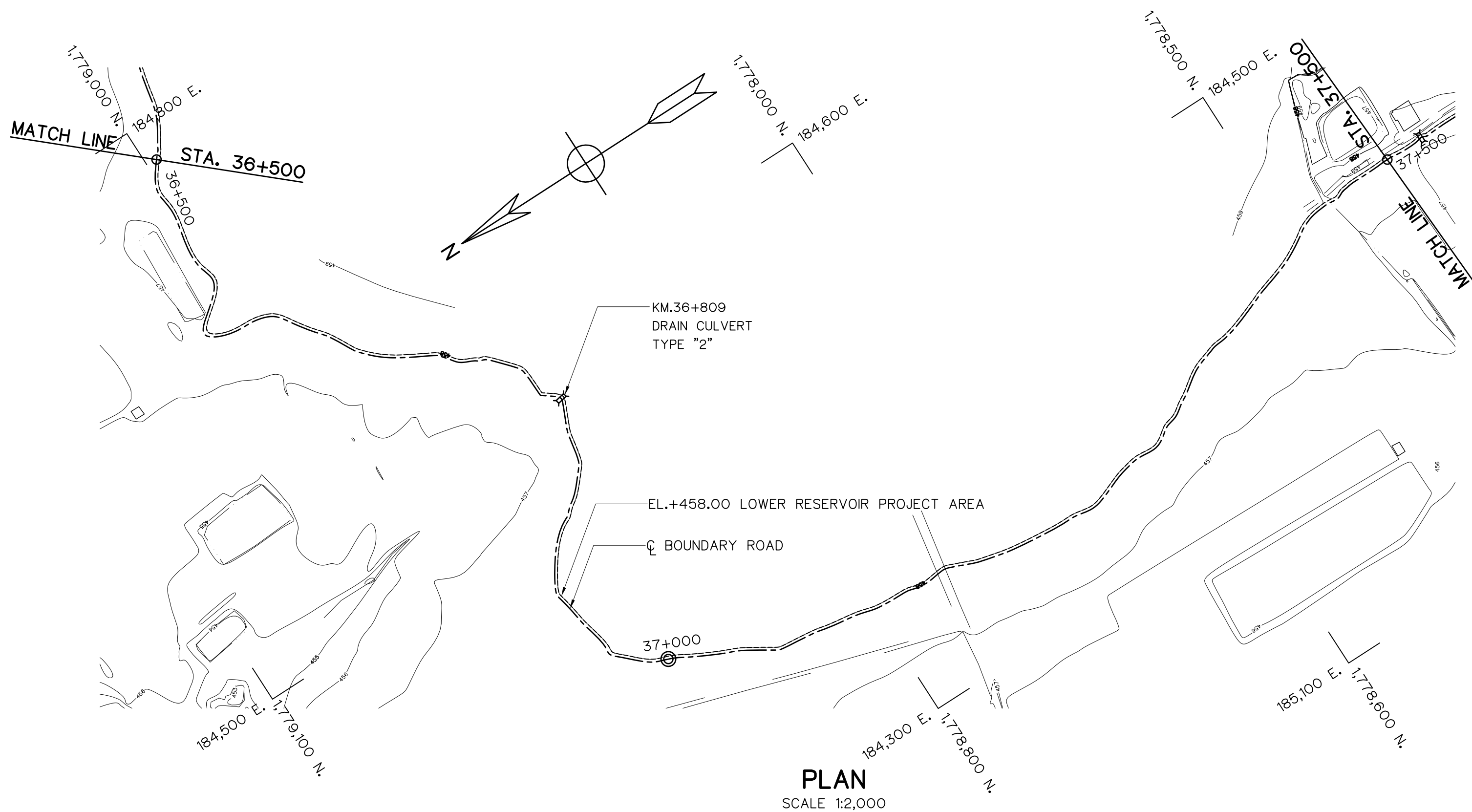


- LEGEND
- N.G.L.
 - Q BOUNDARY ROAD
 - EL.+458.00 LOWER RESERVOIR PROJECT AREA

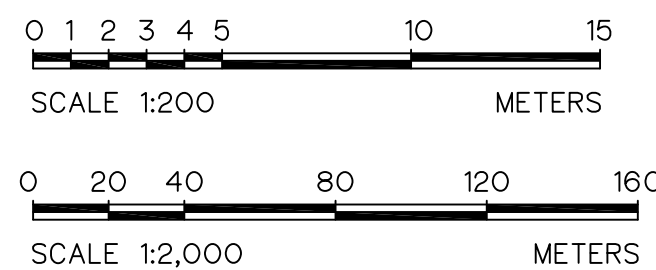


 KINGDOM OF THAILAND Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY			
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CIVIL WORKS LOWER RESERVOIR BOUNDARY ROAD PLAN, KM. 35+000 TO KM. 36+500			
 PANYA CONSULTANTS CO.,LTD.		 Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY	
REVIEWED		SUBMITTED	
DESIGNED 28.1957 28.176431		RECOMMENDED	
DRAWN		APPROVED	
CHECKED 28.1957		APPROVED	
PROJECT MANAGER		DRAWING NO. HRR-BR-L21	SHEET NO. 60 OF 80

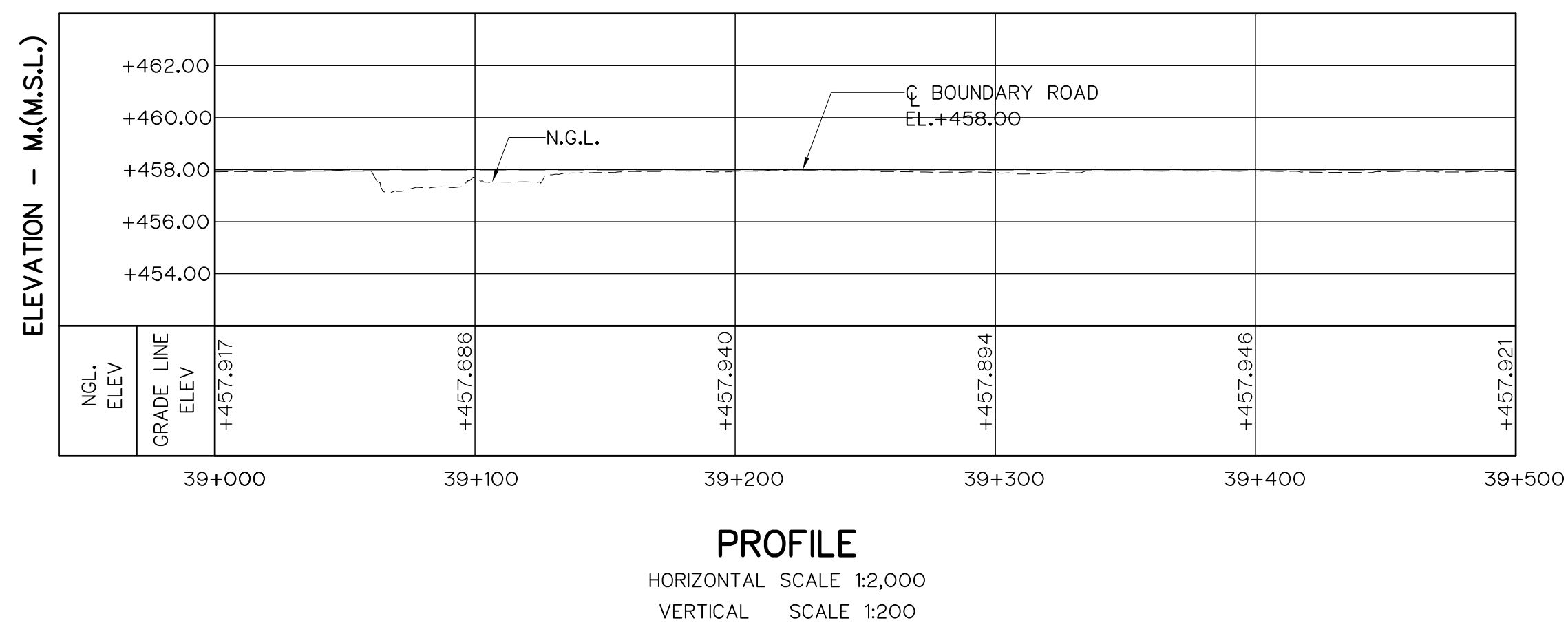
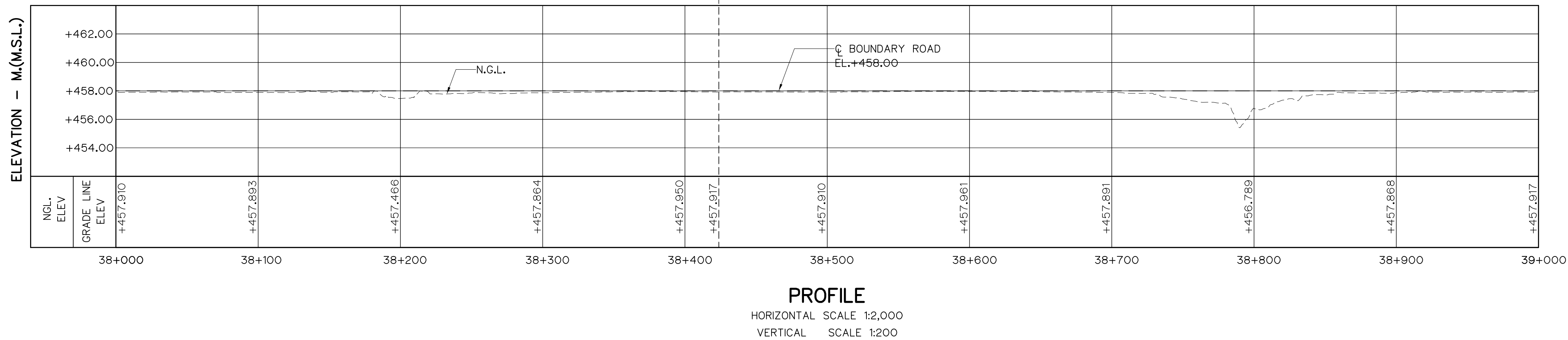
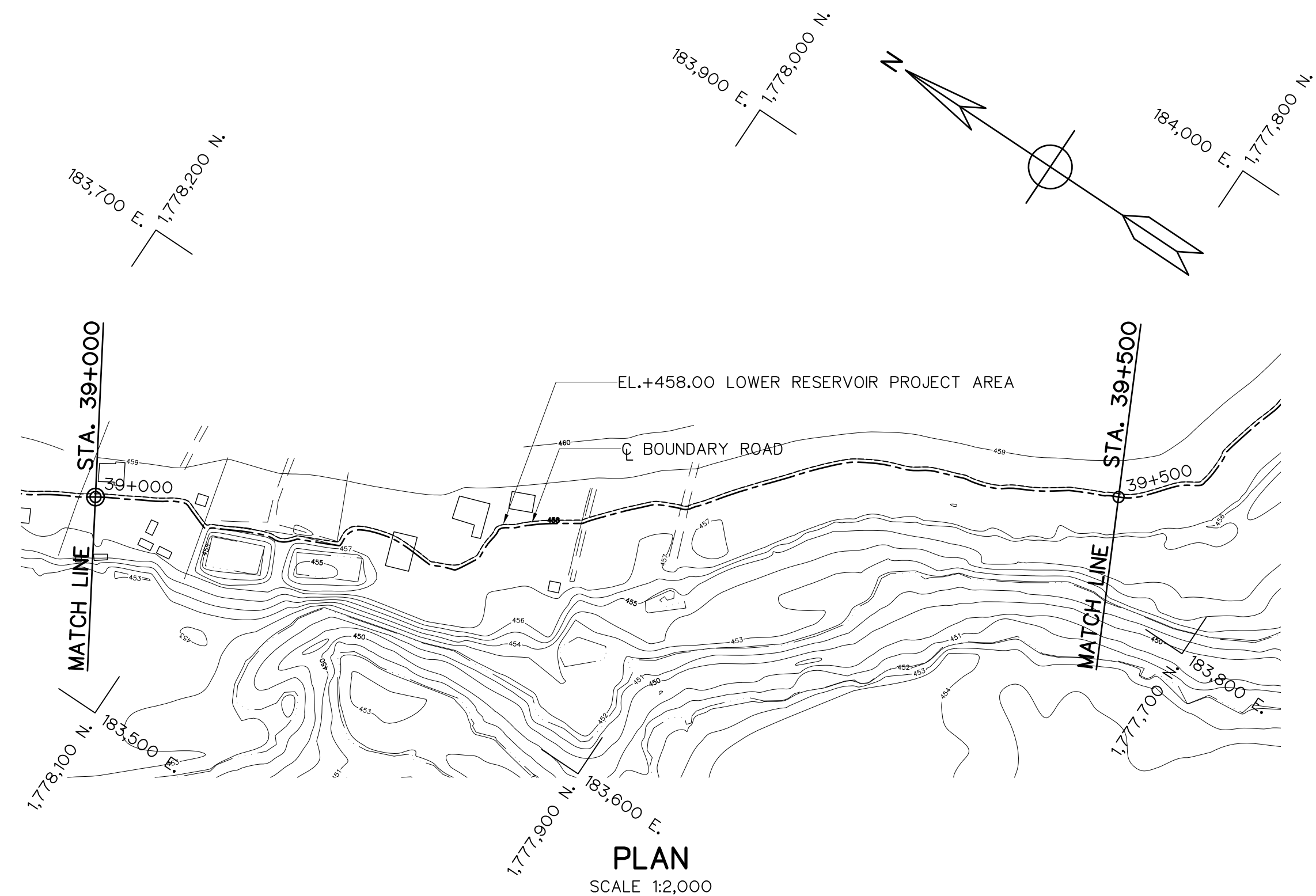
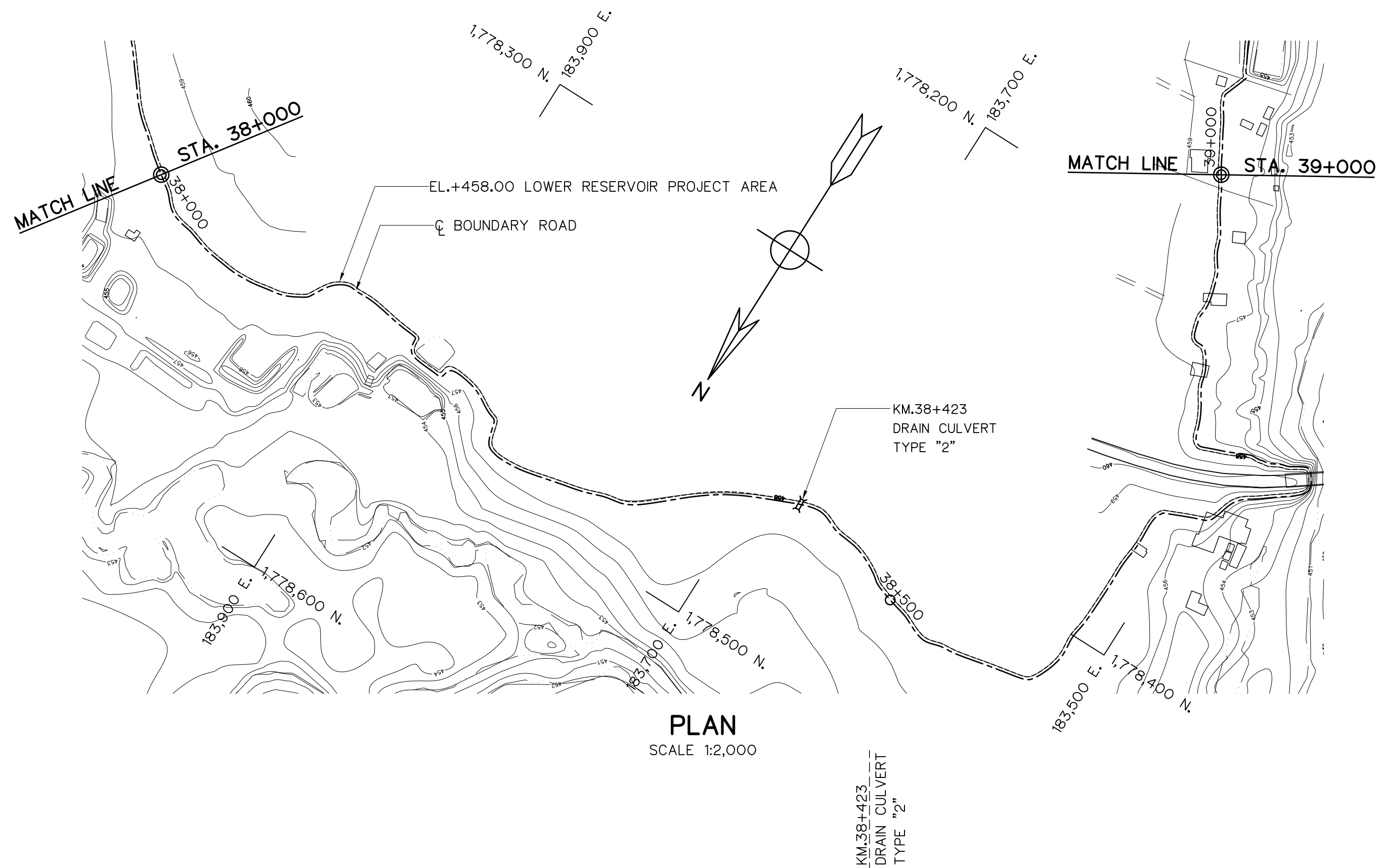
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NO.	DATE	REVISIONS	CHECKED	APPROVED
CONSULTANTS		DEDE		



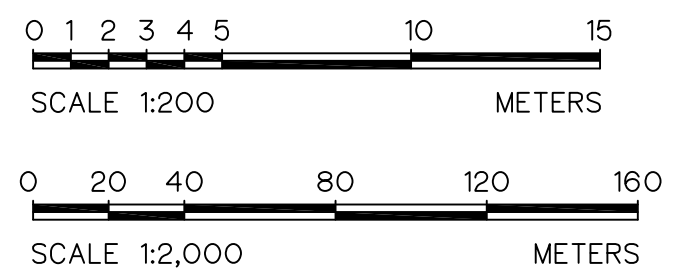
- LEGEND
- N.G.L.
 - BOUNDARY ROAD
 - EL.+458.00 LOWER RESERVOIR PROJECT AREA



 KINGDOM OF THAILAND Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY					HUAI PRA THAO RESERVOIR BOUNDARY ROAD PROJECT AMPHOE KAENG KHRO, CHANGWAT CHAIYAPHUM				
CIVIL WORKS LOWER RESERVOIR BOUNDARY ROAD PLAN, KM. 36+500 TO KM. 38+000									
 PANYA CONSULTANTS CO.,LTD.					 Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY				
					REVIEWED				
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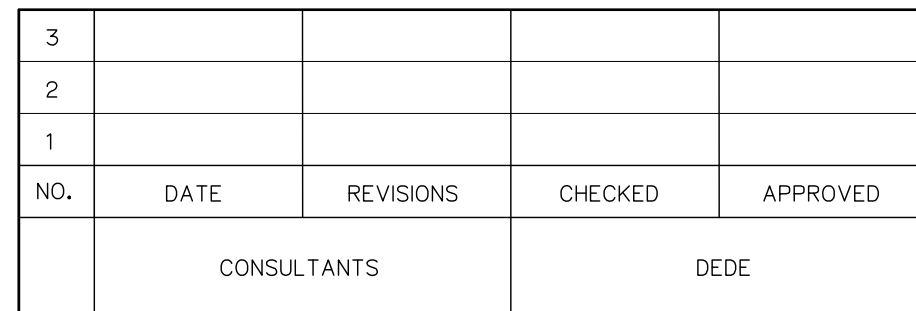
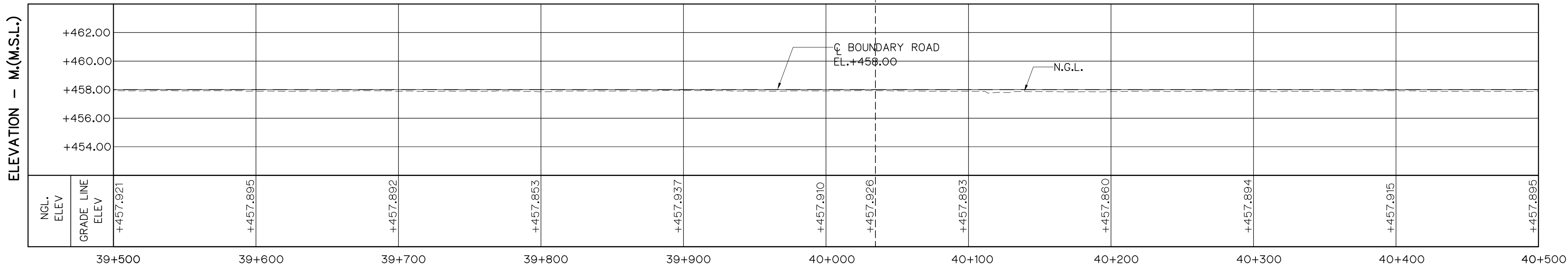


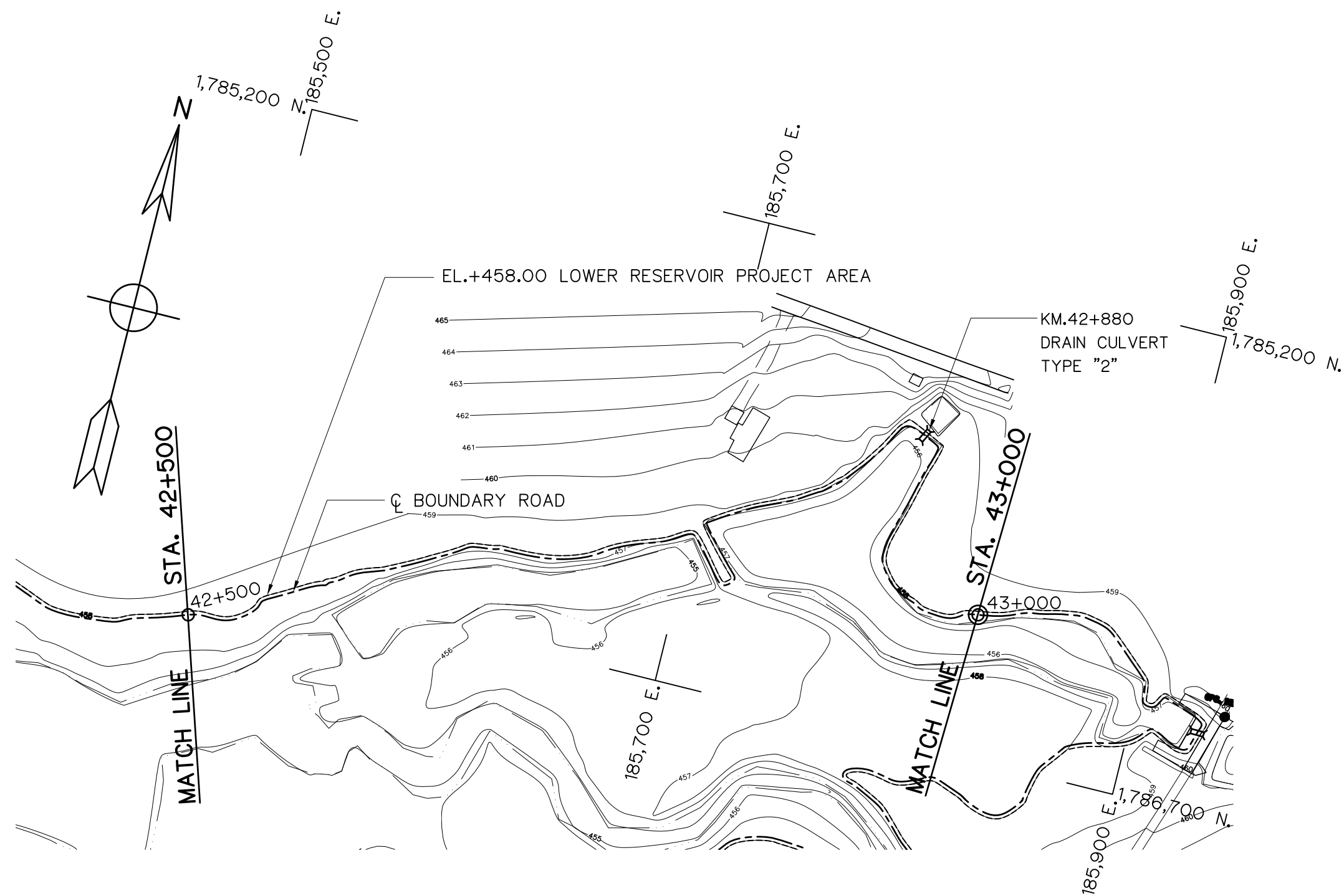
- LEGEND
- N.G.L.
 - BOUNDARY ROAD
 - EL.+458.00 LOWER RESERVOIR PROJECT AREA



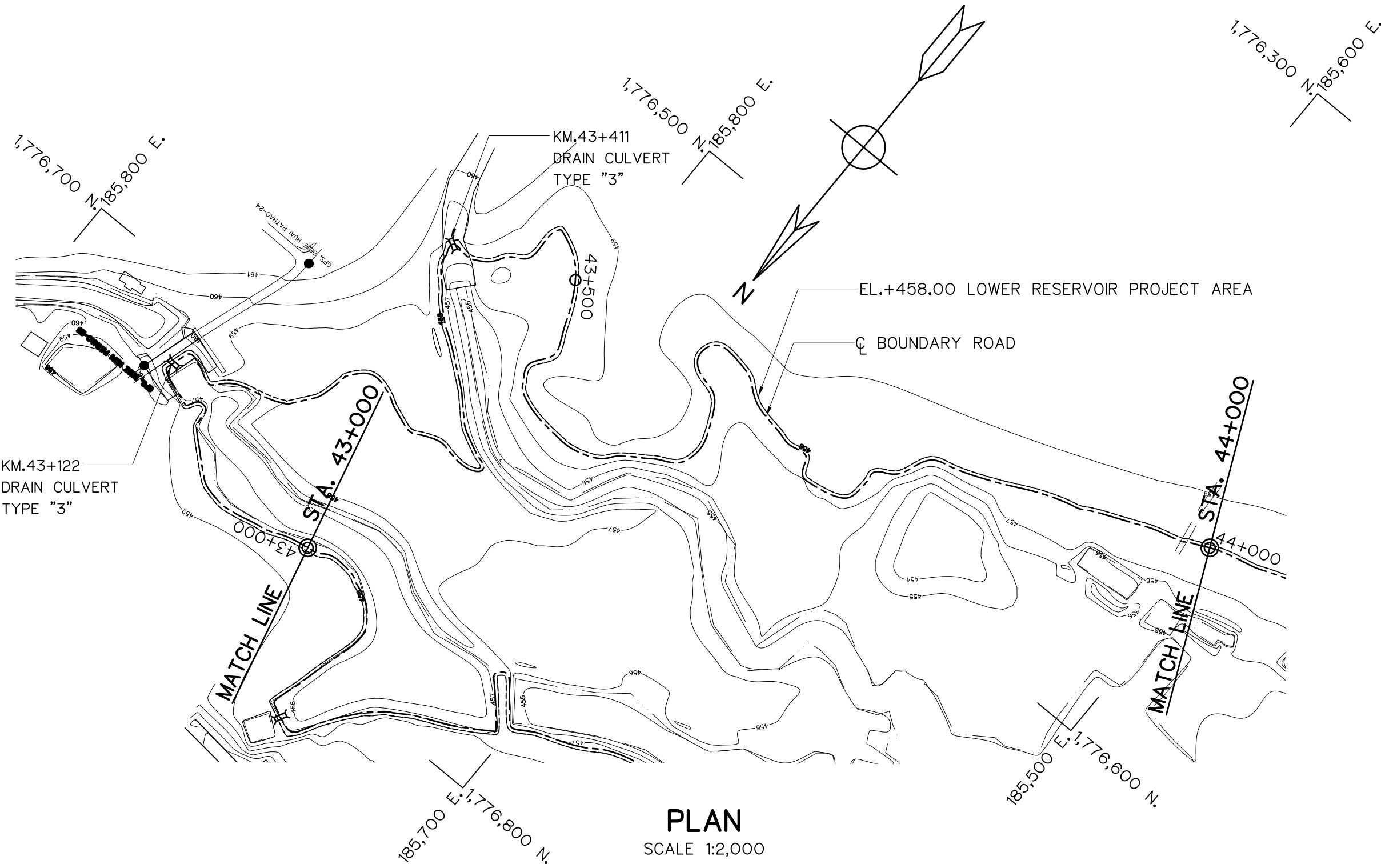
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HUA PRA THAO RESERVOIR BOUNDARY ROAD PROJECT AMPHOE KAENG KHRO, CHANGWAT CHAIYAPHUM			
CIVIL WORKS LOWER RESERVOIR BOUNDARY ROAD PLAN, KM. 38+000 TO KM. 39+500			
PANYA CONSULTANTS CO.,LTD.		REVIEWED	
DESIGNED 28.1957 28.76431		SUBMITTED	
DRAWN		RECOMMENDED	
CHECKED 28.1957		APPROVED	
PROJECT MANAGER 10/08/2021		DRAWING NO. HRR-BR-L23	
DATE		SHEET NO. 62 OF 80	

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NO.	DATE	REVISIONS	CHECKED	APPROVED
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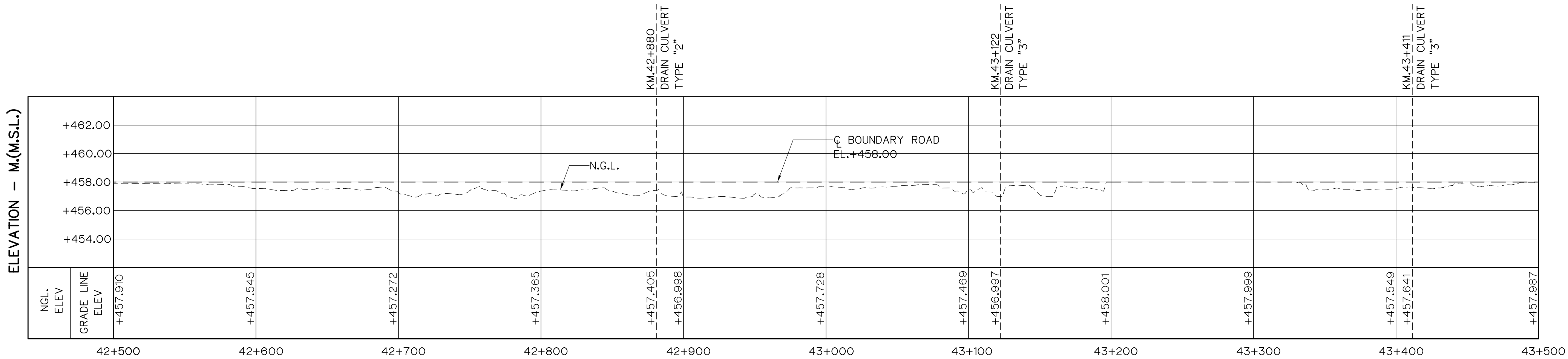




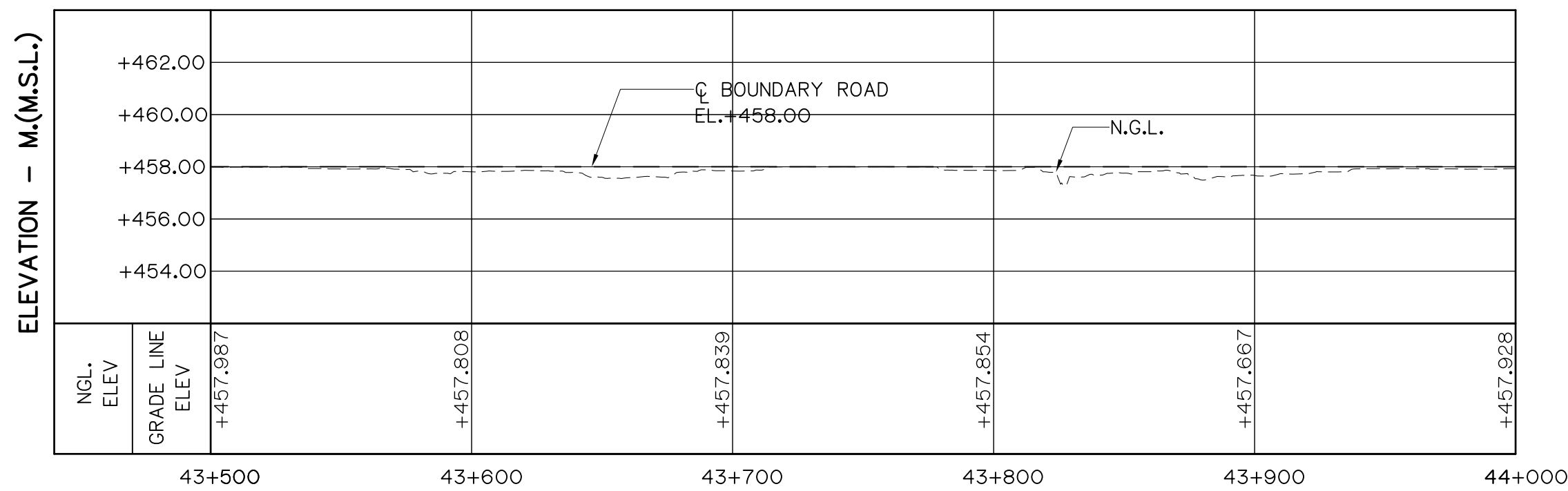
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PLAN
SCALE 1:2,000

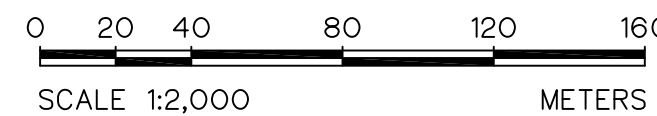


PROFILE
HORIZONTAL SCALE 1:2,000
VERTICAL SCALE 1:200



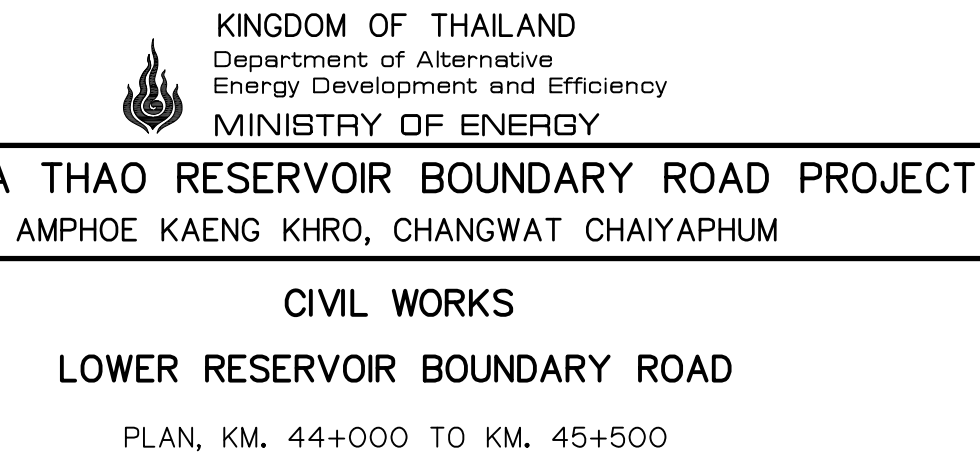
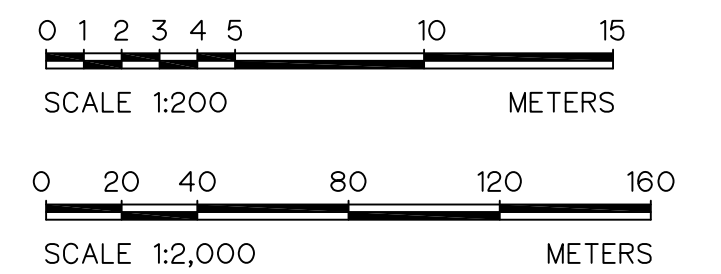
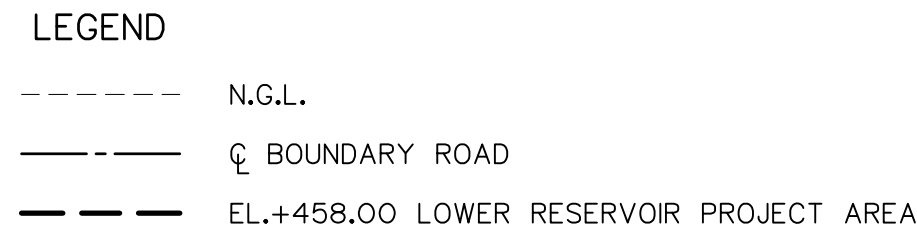
PROFILE
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- LEGEND
- N.G.L.
 - BOUNDARY ROAD
 - EL.+458.00 LOWER RESERVOIR PROJECT AREA

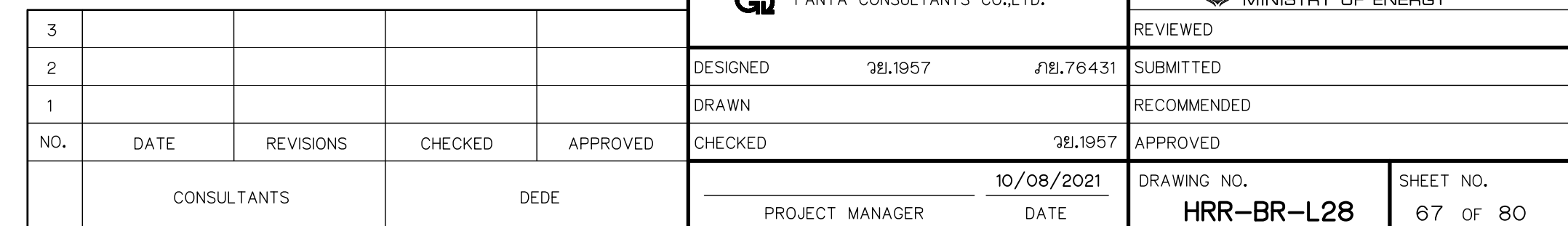
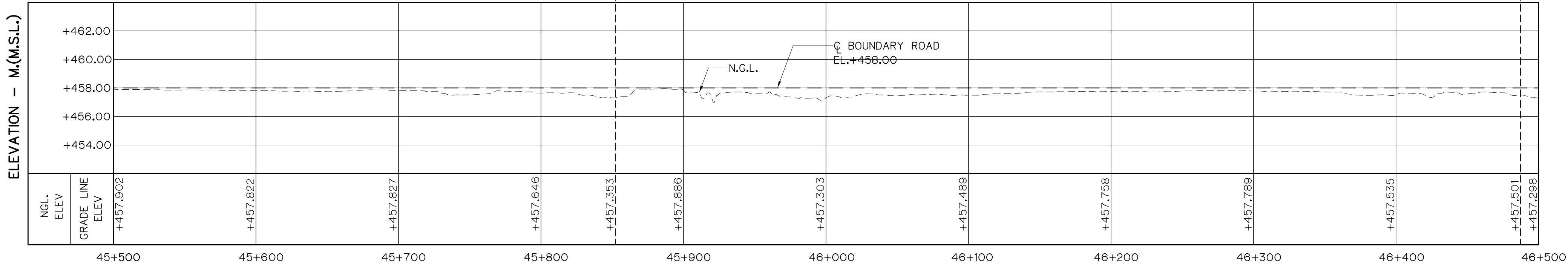


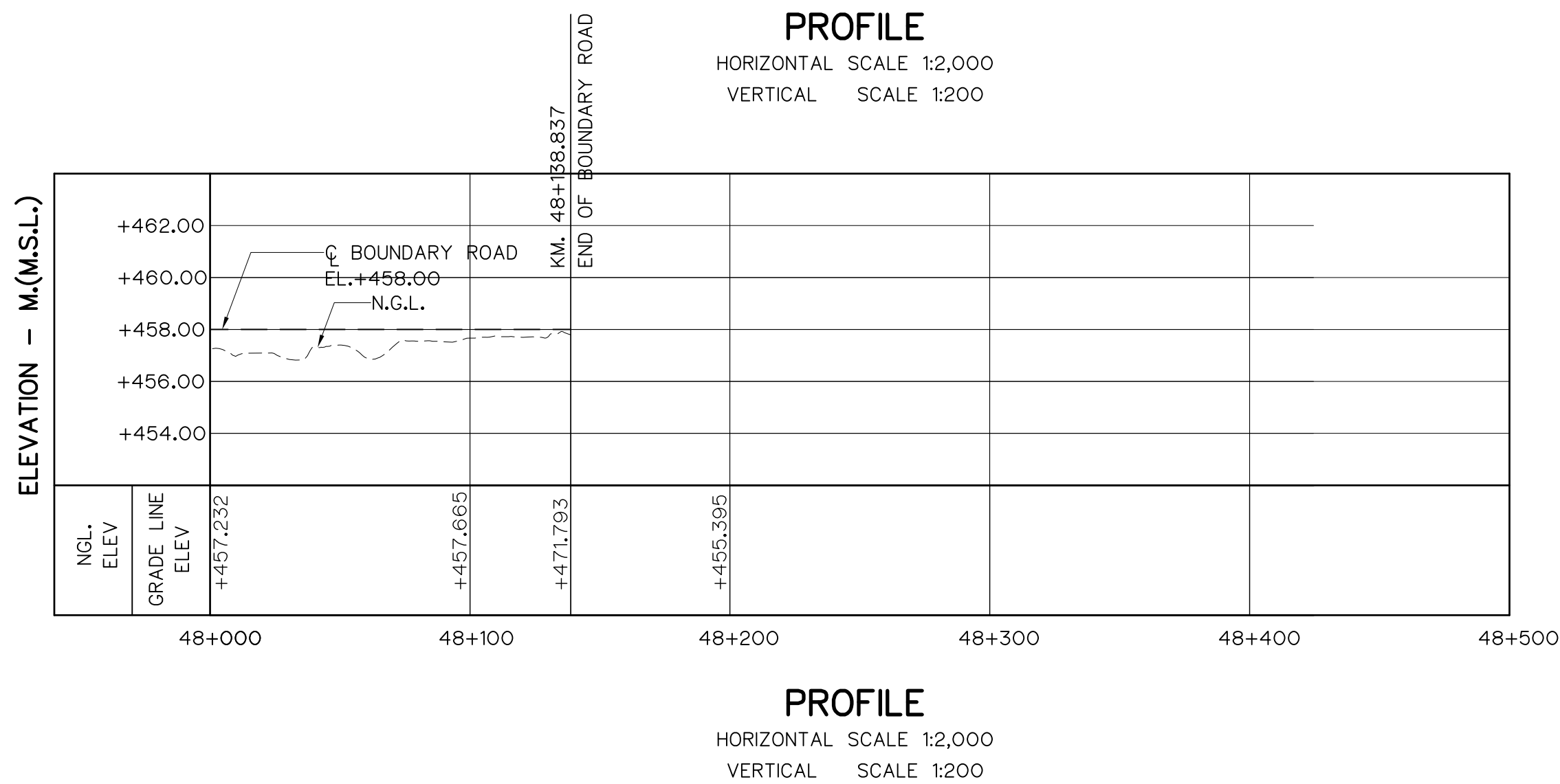
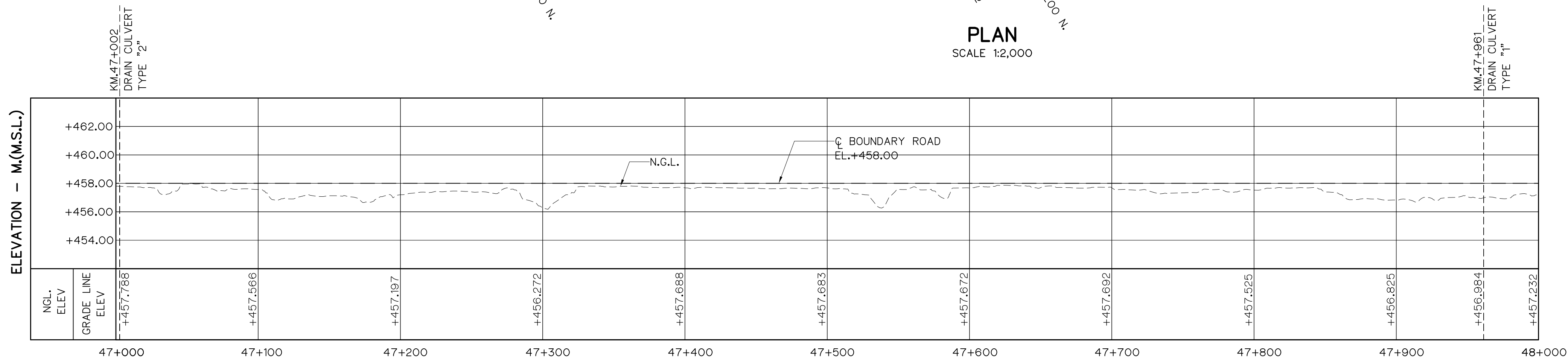
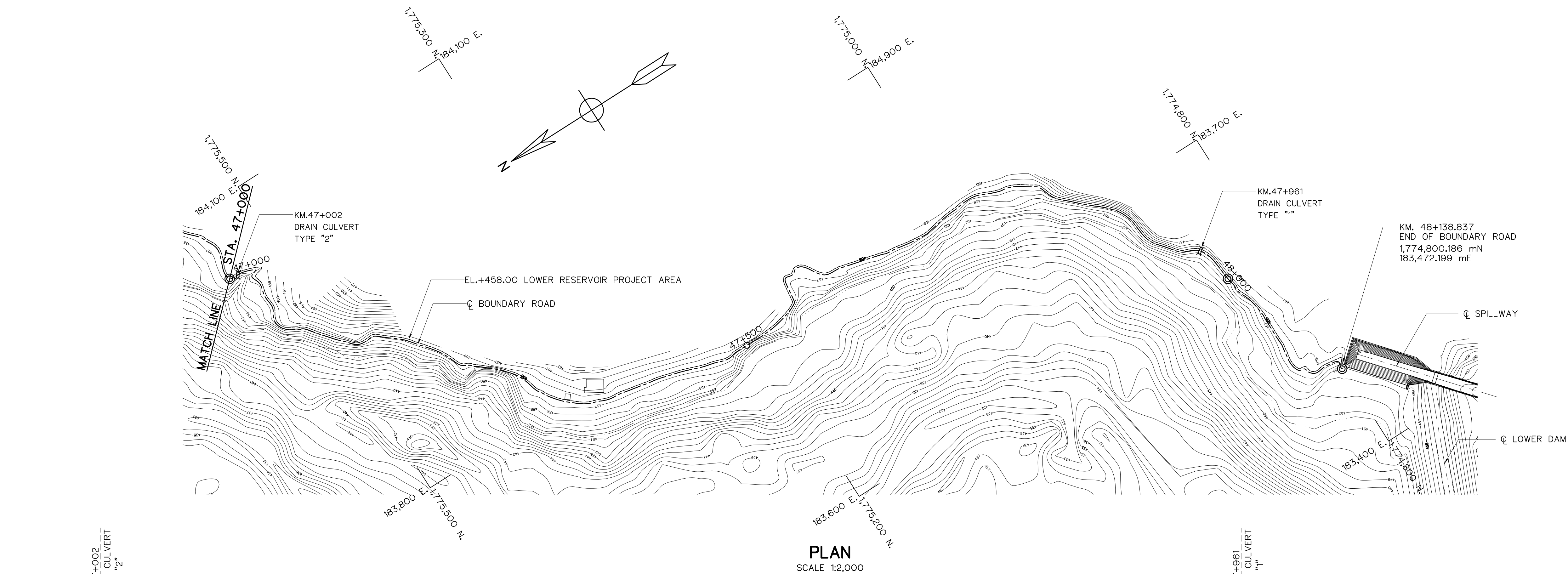
KINGDOM OF THAILAND Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY			
HUA I PRA THAO RESERVOIR BOUNDARY ROAD PROJECT AMPHOE KAENG KHRO, CHANGWAT CHAIYAPHUM			
CIVIL WORKS LOWER RESERVOIR BOUNDARY ROAD PLAN, KM. 42+500 TO KM. 44+000			
PANYA CONSULTANTS CO.,LTD.		REVIEWED	
DESIGNED 28.1957 28.176431		SUBMITTED	
DRAWN		RECOMMENDED	
CHECKED 28.1957		APPROVED	
PROJECT MANAGER 10/08/2021		DRAWING NO. HRR-BR-L26	
DATE		SHEET NO. 65 OF 80	

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NO.	DATE	REVISIONS	CHECKED	APPROVED
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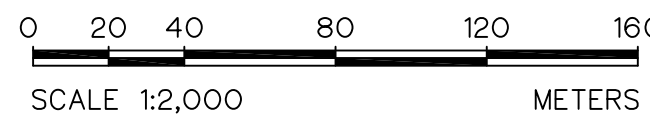


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NO.	DATE	REVISIONS	CHECKED	APPROVED	CHECKED	28.1.1957		APPROVED	
CONSULTANTS			DEDE		PROJECT MANAGER		10/08/2021	DRAWING NO.	SHEET NO.
							DATE	HRR-BR-L27	66 OF 80





- LEGEND
- N.G.L.
 - BOUNDARY ROAD
 - EL.+458.00 LOWER RESERVOIR PROJECT AREA

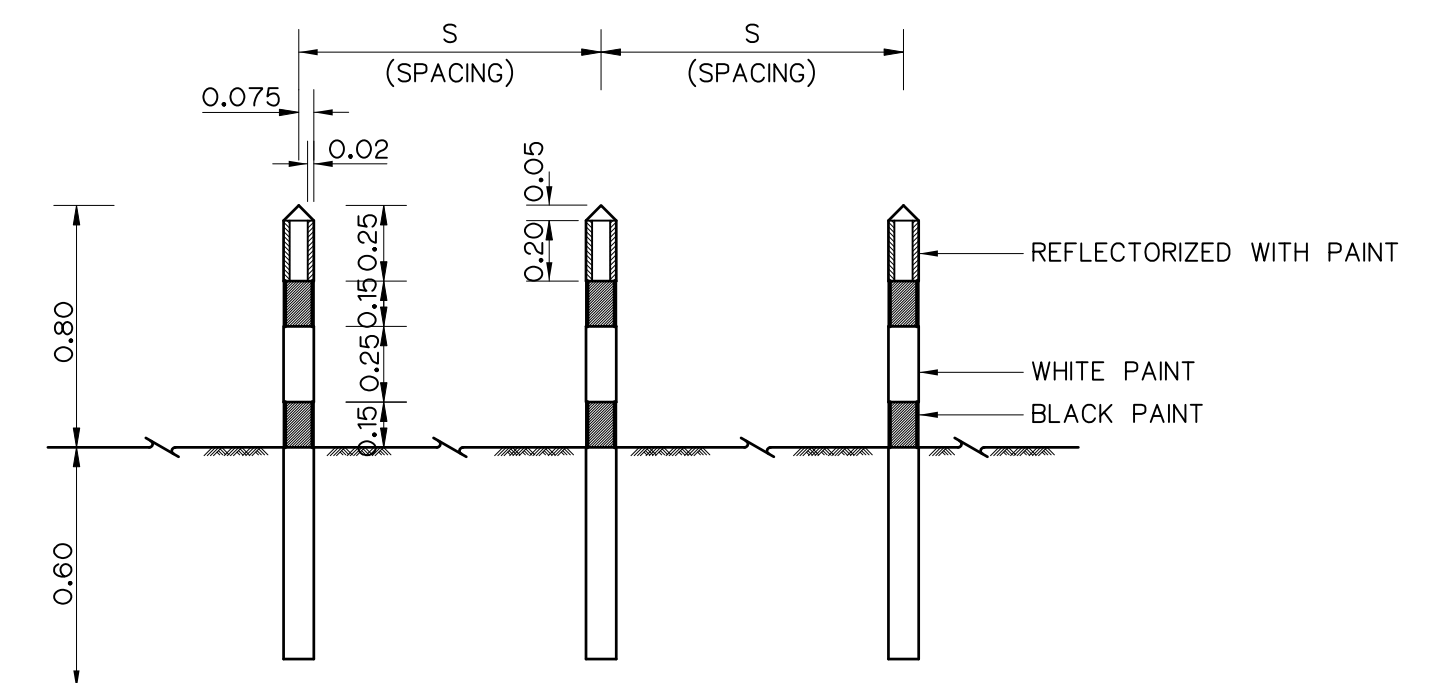


 KINGDOM OF THAILAND Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY			
HUI PRA THAO RESERVOIR BOUNDARY ROAD PROJECT AMPHOE KAENG KHRO, CHANGWAT CHAIYAPHUM			
CIVIL WORKS LOWER RESERVOIR BOUNDARY ROAD PLAN, KM. 47+000 TO KM. 48+138.837			
 PANYA CONSULTANTS CO.,LTD.		 Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY	
DESIGNED 28.1957 28.176431		REVIEWED	
DRAWN		RECOMMENDED	
CHECKED 28.1957		APPROVED	
PROJECT MANAGER 10/08/2021 DATE		DRAWING NO. HRR-BR-L29	
		SHEET NO. 68 OF 80	

3				
2				
1				
NO.	DATE	REVISIONS	CHECKED	APPROVED
	CONSULTANTS		DEDE	



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			



SECTION A-A
NOT TO SCALE
GUIDE POSTS

					 PANYA CONSULTANTS CO., LTD.		 MINISTRY OF ENERGY		
3					DESIGNED	28.1957	18.76431	REVIEWED	
2					DRAWN			SUBMITTED	
1					CHECKED	28.1957		RECOMMENDED	
NO.	DATE	REVISIONS	CHECKED	APPROVED	CHECKED	28.1957		APPROVED	
CONSULTANTS			DEDE		10/08/2021 PROJECT MANAGER DATE			DRAWING NO. HRR-BR-L30	SHEET NO. 69 OF 80

DRAIN CULVERT TYPE 1 OF LOWER RESERVOIR BOUNDARY ROAD

KM	N.G.L EL.	FLOW	ELEVATION			DIMENSIONS						REMARKS
			EL.1	EL.2	EL.3	L _U	L _D	H	L	B	D	
0+135	+457.740	LEFT TO RIGHT	+458.000	+455.500	+455.700	3.80	3.20	1.70	2.40	3.00	1.00	
0+524	+457.310	LEFT TO RIGHT	+458.000	+455.500	+455.700	3.50	3.20	1.90	2.90	3.60	1.20	
1+202	+457.892	LEFT TO RIGHT	+458.000	+455.500	+455.700	3.80	3.20	1.70	2.40	3.00	1.00	
46+809	+457.279	LEFT TO RIGHT	+458.000	+455.500	+455.700	3.50	3.20	1.90	2.90	3.60	1.20	
47+961	+456.984	LEFT TO RIGHT	+458.000	+455.500	+455.700	3.50	3.20	1.90	2.90	3.60	1.20	

DRAIN CULVERT TYPE 2 OF LOWER RESERVOIR BOUNDARY ROAD

KM	N.G.L. EL.	FLOW	α (DEGREE)	DIMENSIONS																ELEVATIONS								
				L	H	ROW	bu	bd	B _U	B _D	H _{HU}	H _{HD}	L _U	L _{TU}	L _{CU}	L _{CD}	L _{TD}	L _D	EL.1	EL.2	EL.3	EL.4	EL.5	EL.6	EL.7	EL.8	EL.9	
1+909	+457.995	LEFT TO RIGHT	90	1.20	1.20	1	4.00	4.00	4.00	4.00	2.20	2.20	3.00	3.00	3.50	3.80	3.00	3.00	+455.200	+457.300	+455.000	+457.100	+455.200	+455.000	+455.200	+455.000	+458.000	
2+277	+457.923	LEFT TO RIGHT	90	1.20	1.20	1	4.00	4.00	4.00	4.00	2.20	2.20	3.00	3.00	3.50	3.80	3.00	3.00	+455.200	+457.300	+455.000	+457.100	+455.200	+455.000	+455.200	+455.000	+458.000	
4+237	+457.900	LEFT TO RIGHT	90	1.20	1.20	1	4.00	4.00	4.00	4.00	2.20	2.20	3.00	3.00	3.50	3.80	3.00	3.00	+455.200	+457.300	+455.000	+457.100	+455.200	+455.000	+455.200	+455.000	+458.000	
5+259	+457.985	LEFT TO RIGHT	90	1.20	1.20	1	4.00	4.00	4.00	4.00	2.20	2.20	3.00	3.00	3.50	3.80	3.00	3.00	+455.200	+457.300	+455.000	+457.100	+455.200	+455.000	+455.200	+455.000	+458.000	
10+170	+457.962	LEFT TO RIGHT	90	1.20	1.20	1	4.00	4.00	4.00	4.00	2.20	2.20	3.00	3.00	3.50	3.80	3.00	3.00	+455.200	+457.300	+455.000	+457.100	+455.200	+455.000	+455.200	+455.000	+458.000	
11+043	+457.998	LEFT TO RIGHT	90	1.20	1.20	1	4.00	4.00	4.00	4.00	2.20	2.20	3.00	3.00	3.50	3.80	3.00	3.00	+455.200	+457.300	+455.000	+457.100	+455.200	+455.000	+455.200	+455.000	+458.000	
14+278	+457.864	LEFT TO RIGHT	90	1.20	1.20	1	4.00	4.00	4.00	4.00	2.20	2.20	3.00	3.00	3.50	3.80	3.00	3.00	+455.200	+457.300	+455.000	+457.100	+455.200	+455.000	+455.200	+455.000	+458.000	
15+479	+457.996	LEFT TO RIGHT	90	1.20	1.20	1	4.00	4.00	4.00	4.00	2.20	2.20	3.00	3.00	3.50	3.80	3.00	3.00	+455.200	+457.300	+455.000	+457.100	+455.200	+455.000	+455.200	+455.000	+458.000	
16+233	+457.157	LEFT TO RIGHT	90	1.50	1.50	1	5.00	5.00	5.00	5.00	2.50	2.50	3.00	3.00	3.50	3.80	3.00	3.00	+454.900	+457.300	+454.700	+457.100	+454.900	+454.700	+454.900	+454.700	+458.000	
17+912	+457.996	LEFT TO RIGHT	90	1.20	1.20	1	4.00	4.00	4.00	4.00	2.20	2.20	3.00	3.00	3.50	3.80	3.00	3.00	+455.200	+457.300	+455.000	+457.100	+455.200	+455.000	+455.200	+455.000	+458.000	
18+779	+457.999	LEFT TO RIGHT	90	1.20	1.20	1	4.00	4.00	4.00	4.00	2.20	2.20	3.00	3.00	3.50	3.80	3.00	3.00	+455.200	+457.300	+455.000	+457.100	+455.200	+455.000	+455.200	+455.000	+458.000	
19+576	+456.026	LEFT TO RIGHT	90	1.20	1.20	1	4.00	4.00	4.00	4.00	2.20	2.20	3.00	3.00	3.50	3.80	3.00	3.00	+455.200	+457.300	+455.000	+457.100	+455.200	+455.000	+455.200	+455.000	+458.000	
21+082	+457.587	LEFT TO RIGHT	90	1.20	1.20	1	4.00	4.00	4.00	4.00	2.20	2.20	3.00	3.00	3.50	3.80	3.00	3.00	+455.200	+457.300	+455.000	+457.100	+455.200	+455.000	+455.200	+455.000	+458.000	
22+149	+457.273	LEFT TO RIGHT	90	1.20	1.20	1	4.00	4.00	4.00	4.00	2.20	2.20	3.00	3.00	3.50	3.80	3.00	3.00	+455.200	+457.300	+455.000	+457.100	+455.200	+455.000	+455.200	+455.000	+458.000	
23+665	+457.993	LEFT TO RIGHT	90	1.20	1.20	1	4.00	4.00	4.00	4.00	2.20	2.20	3.00	3.00	3.50	3.80	3.00	3.00	+455.200	+457.300	+455.000	+457.100	+455.200	+455.000	+455.200	+455.000	+458.000	
24+411	+457.913	LEFT TO RIGHT	90	1.20	1.20	1	4.00	4.00	4.00	4.00	2.20	2.20	3.00	3.00	3.50	3.80	3.00	3.00	+455.200	+457.300	+455.000	+457.100	+455.200	+455.000	+455.200	+455.000	+458.000	
25+810	+457.938	LEFT TO RIGHT	90	1.20	1.20	1	4.00	4.00	4.00	4.00	2.20	2.20	3.00	3.00	3.50	3.80	3.00	3.00	+455.200	+457.300	+455.000	+457.100	+455.200	+455.000	+455.200	+455.000	+458.000	
27+182	+457.930	LEFT TO RIGHT	90	1.20	1.20	1	4.00	4.00	4.00	4.00	2.20	2.20	3.00	3.00	3.50	3.80	3.00	3.00	+455.200	+457.300	+455.000	+457.100	+455.200	+455.000	+455.200	+455.000	+458.000	
27+750	+457.938	LEFT TO RIGHT	90	1.20	1.20	1	4.00	4.00	4.00	4.00	2.20	2.20	3.00	3.00	3.50	3.80	3.00	3.00	+455.200	+457.300	+455.000	+457.100	+455.200	+455.000	+455.200	+455.000	+458.000	
28+653	+457.998	LEFT TO RIGHT	90	1.50	1.50	1	5.00	5.00	5.00	5.00	2.50	2.50	3.00	3.00	3.50	3.80	3.00	3.00	+454.900	+457.300	+454.700	+457.100	+454.900	+454.700	+454.900	+454.700	+458.000	
30+087	+457.899	LEFT TO RIGHT	90	1.20	1.20	1	4.00	4.00	4.00	4.00	2.20	2.20	3.00	3.00	3.50	3.80	3.00	3.00	+455.200	+457.300	+455.000	+457.100	+455.200	+455.000	+455.200	+455.000	+458.000	
31+043	+457.979	LEFT TO RIGHT	90	1.20	1.20	1	4.00	4.00	4.00	4.00	2.20	2.20	3.00	3.00	3.50	3.80	3.00	3.00	+455.200	+457.300	+455.000	+457.100	+455.200	+455.000	+455.200	+455.000	+458.000	
32+829	+457.936	LEFT TO RIGHT	90	1.20	1.20	1	4.00	4.00	4.00	4.00	2.20	2.20	3.00	3.00	3.50	3.80	3.00	3.00	+455.200	+457.300	+455.000	+457.100	+455.200	+455.000	+455.200	+455.000	+458.000	
35+569	+457.990	LEFT TO RIGHT	90	1.20	1.20	1	4.00	4.00	4.00	4.00	2.20	2.20	3.00	3.00	3.50	3.80	3.00	3.00	+455.200	+457.300	+455.000	+457.100	+455.200	+455.000	+455.200	+455.000	+458.000	
35+891	+457.835	LEFT TO RIGHT	90	1.20	1.20	1	4.00	4.00	4.00	4.00	2.20	2.20	3.00	3.00	3.50	3.80	3.00	3.00	+455.200	+457.300	+455.000	+457.100	+455.200	+455.000	+455.200	+455.000	+458.000	
36+809	+457.964	LEFT TO RIGHT	90	1.20	1.20	1	4.00	4.00	4.00	4.00	2.20	2.20	3.00	3.00	3.50	3.80	3.00	3.00	+455.200	+457.300	+455.000	+457.100	+455.200	+455.000	+455.200	+455.000	+458.000	
37+516	+457.833	LEFT TO RIGHT	90	1.20	1.20	1	4.00	4.00	4.00	4.00	2.20	2.20	3.00	3.00	3.50	3.80	3.00	3.00	+455.200	+457.300	+455.000	+457.100	+455.200	+455.000	+455.200	+455.000	+458.000	
38+423	+457.917	LEFT TO RIGHT	90	1.20	1.20	1	4.00	4.00	4.00	4.00	2.20	2.20	3.00	3.00	3.50	3.80	3.00	3.00	+455.200	+457.300	+455.000	+457.100	+455.200	+455.000	+455.200	+455.000	+458.000	
40+034	+457.926	LEFT TO RIGHT	90	1.20	1.20	1	4.00	4.00	4.00	4.00	2.20	2.20	3.00	3.00	3.50	3.80	3.00	3.00	+455.200	+457.300	+455.000	+457.100	+455.200	+455.000	+455.200	+455.000	+458.000	
40+578	+457.925	LEFT TO RIGHT	90	1.20	1.20	1	4.00	4.00	4.00	4.00	2.20	2.20	3.00	3.00	3.50	3.80	3.00	3.00	+455.200	+457.300	+455.000	+457.100	+455.200	+455.000	+455.200	+455.000	+458.000	
40+972	+457.750	LEFT TO RIGHT	90	1.50	1.50	1	5.00	5.00	5.00	5.00	2.50	2.50	3.00	3.00	3.50	3.80	3.00	3.00	+454.900	+457.300	+454.700	+457.100	+454.900	+454.700	+454.900	+454.700	+458.000	
41+955	+457.967	LEFT TO RIGHT	90	1.20	1.20	1	4.00	4.00	4.00	4.00	2.20	2.20	3.00	3.00	3.50	3.80	3.00	3.00	+455.200	+457.300	+455.000	+457.100	+455.200	+455.000	+455.200	+455.000	+458.000	
42+880	+457.405	LEFT TO RIGHT	90	1.50	1.50	1	5.00	5.00	5.00	5.00	2.50	2.50	3.00	3.00	3.50	3.80	3.00	3.00	+454.900	+457.300	+454.700	+457.100	+454.900	+454.700	+454.900	+454.700	+458.000	
44+163	+457.927	LEFT TO RIGHT	90	1.20	1.20	1	4.00	4.00	4.00	4.00	2.20	2.20	3.00	3.00	3.50	3.80	3.00	3.00	+455.200	+457.300	+455.000	+457.100	+455.200	+455.000	+455.200	+455.000	+458.000	
44+781	+457.851	LEFT TO RIGHT	90	1.50	1.50	1	5.00	5.00	5.00	5.00	2.50	2.50	3.00	3.00	3.50	3.80	3.00	3.00	+454.900	+457.300	+454.700	+457.100	+454.900	+454.700	+454.900	+454.700	+458.000	
45+852	+457.353	LEFT TO RIGHT	90	1.50	1.50	1	5.00	5.00	5.00	5.00	2.50	2.50	3.00	3.00	3.50	3.80	3.00	3.00	+454.900	+457.300	+454.700	+457.100	+454.900	+454.700	+454.900	+454.700	+458.000	
46+487	+457.501	LEFT TO RIGHT	90	1.20	1.20	1	4.00	4.00	4.00	4.00	2.20	2.20	3.00	3.00	3.50	3.80	3.00	3.00	+455.200	+457.300	+455.000	+457.100	+455.200	+455.000	+455.200	+455.000	+458.000	
47+002	+457.788	LEFT TO RIGHT	90	1.20	1.20	1	4.00	4.00	4.00	4.00	2.20	2.20	3.00	3.00	3.50	3.80	3.00	3.00	+455.200	+457.300	+455.000	+457.100	+455.200	+455.000	+455.200	+455.000	+458.000	

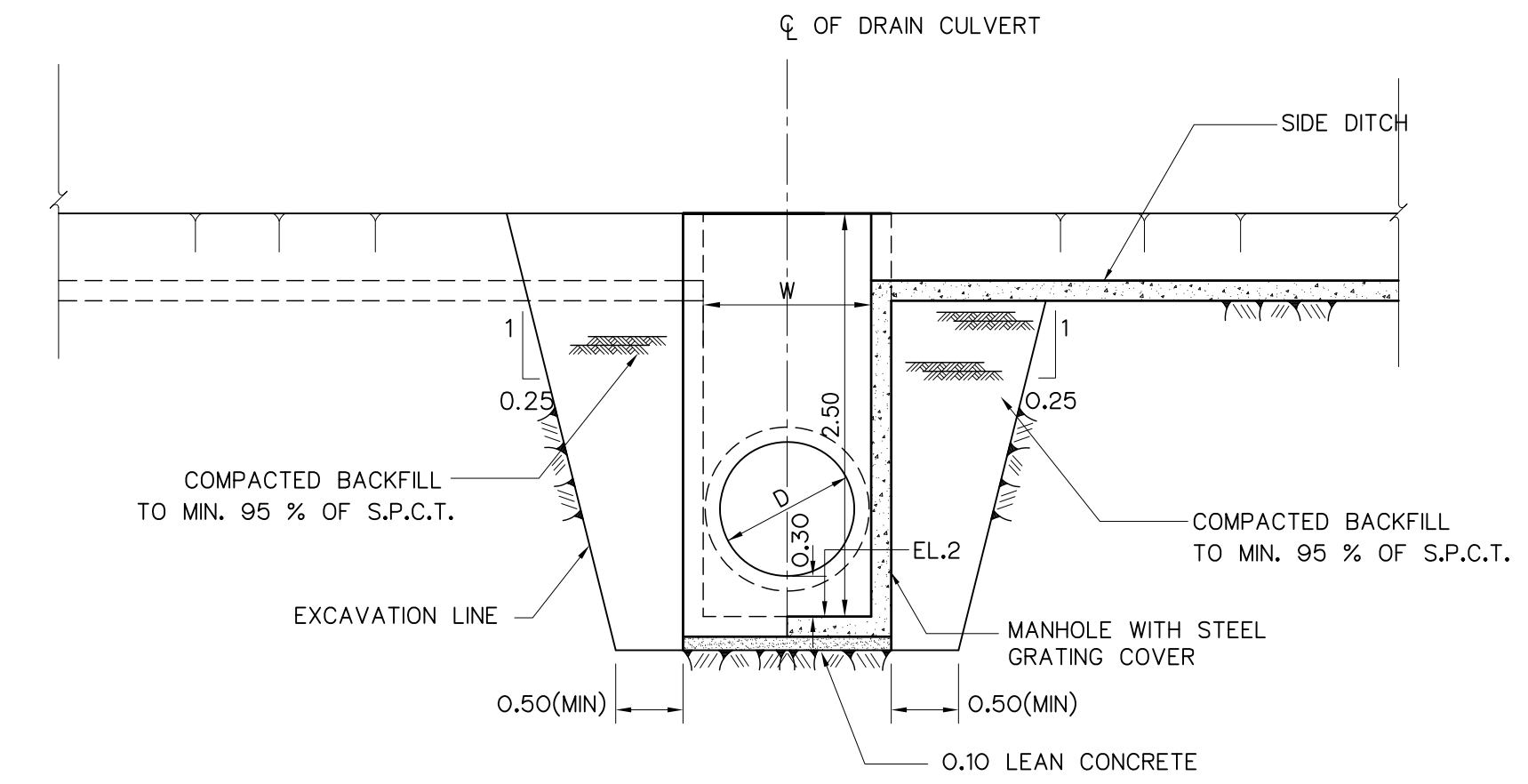
DRAIN CULVERT TYPE 3 OF LOWER RESERVOIR BOUNDARY ROAD

KM	N.G.L. EL.	FLOW	α (DEGREE)	DIMENSIONS																ELEVATIONS								
				L	H	ROW	bu	bd	B _U	B _D	H _{KU}	H _{HD}	L _U	L _{TU}	T _W	L _{CU}	L _{CD}	L _{TD}	L _D	EL.1	EL.2	EL.3	EL.4	EL.5	EL.6	EL.7	EL.8	EL.9
4+539	+457.060	LEFT TO RIGHT	90	1.50	1.50	2	7.00	7.00	7.00	7.00	2.50	2.50	3.00	3.00	0.50	3.50	3.80	3.00	3.00	+468.900	+471.300	+468.700	+471.100	+468.900	+468.700	+468.900	+468.700	+472.000
8+078	+457.807	LEFT TO RIGHT	90	1.50	1.50	2	7.00	7.00	7.00	7.00	2.50	2.50	3.00	3.00	0.50	3.50	3.80	3.00	3.00	+468.900	+471.300	+468.700	+471.100	+468.900	+468.700	+468.900	+468.700	+472.000
8+563	+457.982	LEFT TO RIGHT	90	1.20	1.20	2	6.00	6.00	6.00	6.00	2.20	2.20	3.00	3.00	0.50	3.50	3.80	3.00	3.00	+469.200	+471.300	+469.000	+471.100	+469.200	+469.000	+469.200	+469.000	+472.000
13+189	+458.000	LEFT TO RIGHT	90	1.20	1.20	2	6.00	6.00	6.00	6.00	2.20	2.20	3.00	3.00	0.50	3.50	3.80	3.00	3.00	+469.200	+471.300	+469.000	+471.100	+469.200	+469.000	+469.200	+469.000	+472.000
13+811	+457.230	LEFT TO RIGHT	90	1.50	1.50	2	7.00	7.00	7.00	7.00	2.50	2.50	3.00	3.00	0.50	3.50	3.80	3.00	3.00	+468.900	+471.300	+468.700	+471.100	+468.900	+468.700	+468.900	+468.700	+472.000
20+744	+457.993	LEFT TO RIGHT	90	1.20	1.20	2	6.00	6.00	6.00	6.00	2.20	2.20	3.00	3.00	0.50	3.50	3.80	3.00	3.00	+469.200	+471.300	+469.000	+471.100	+469.200	+469.000	+469.200	+469.000	+472.000
29+202	+457.393	LEFT TO RIGHT	90	1.20	1.20	2	6.00	6.00	6.00	6.00	2.20	2.20	3.00	3.00	0.50	3.50	3.80	3.00	3.00	+469.200	+471.300	+469.000	+471.100	+469.200	+469.000	+469.200	+469.000	+472.000
32+448	+458.000	LEFT TO RIGHT	90	1.20	1.20	2	6.00	6.00	6.00	6.00	2.20	2.20	3.00	3.00	0.50	3.50	3.80	3.00	3.00	+469.200	+471.300	+469.000	+471.100	+469.200	+469.000	+469.200	+469.000	+472.000
35+095	+457.977	LEFT TO RIGHT	90	1.20	1.20	2	6.00	6.00	6.00	6.00	2.20	2.20	3.00	3.00	0.50	3.50	3.80	3.00	3.00	+469.200	+471.300	+469.000	+471.100	+469.200	+469.000	+469.200	+469.000	+472.000
43+122	+456.997	LEFT TO RIGHT	90	1.50	1.50	2	7.00	7.00	7.00	7.00	2.50	2.50	3.00	3.00	0.50	3.50	3.80	3.00	3.00	+468.900	+471.300	+468.700	+471.100	+468.900	+468.700	+468.900	+468.700	+472.000
43+411	+457.641	LEFT TO RIGHT	90	1.50	1.50	3	9.00	9.00	9.00	9.00	2.50	2.50	3.00	3.00	1.50	3.50	3.80	3.00	3.00	+468.900	+471.300	+468.700	+471.100	+468.900	+468.700	+468.900	+468.700	+472.000

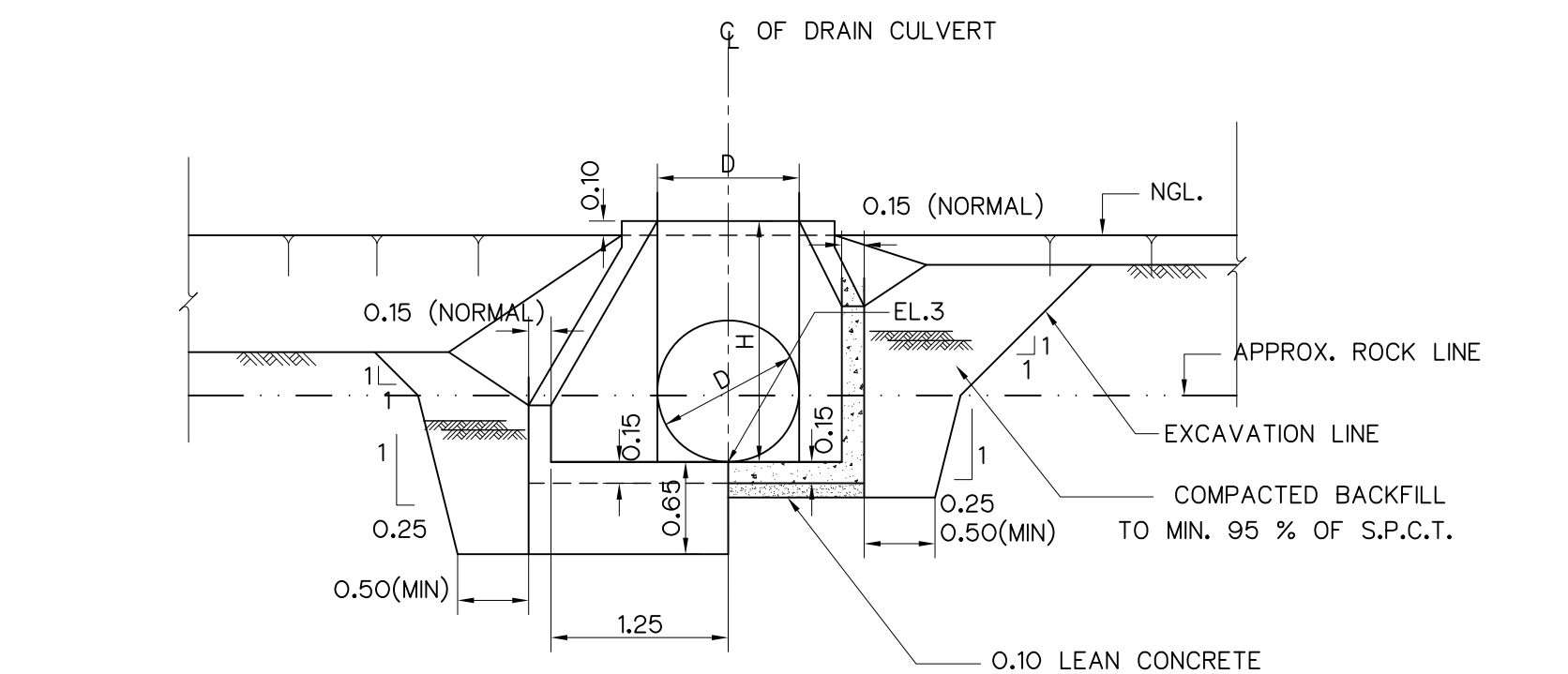
NOTES :

1. ALL DIMENSIONS AND ELEVATIONS (ABOVE M.S.L.) ARE IN METERS, UNLESS OTHERWISE SHOWN.
2. THE CONTRACTOR MUST SURVEY AND PROPOSE THE QUANTITIES OF WORK TO BE SENT TO THE DEDE APPROVAL BEFORE PROCEEDING.

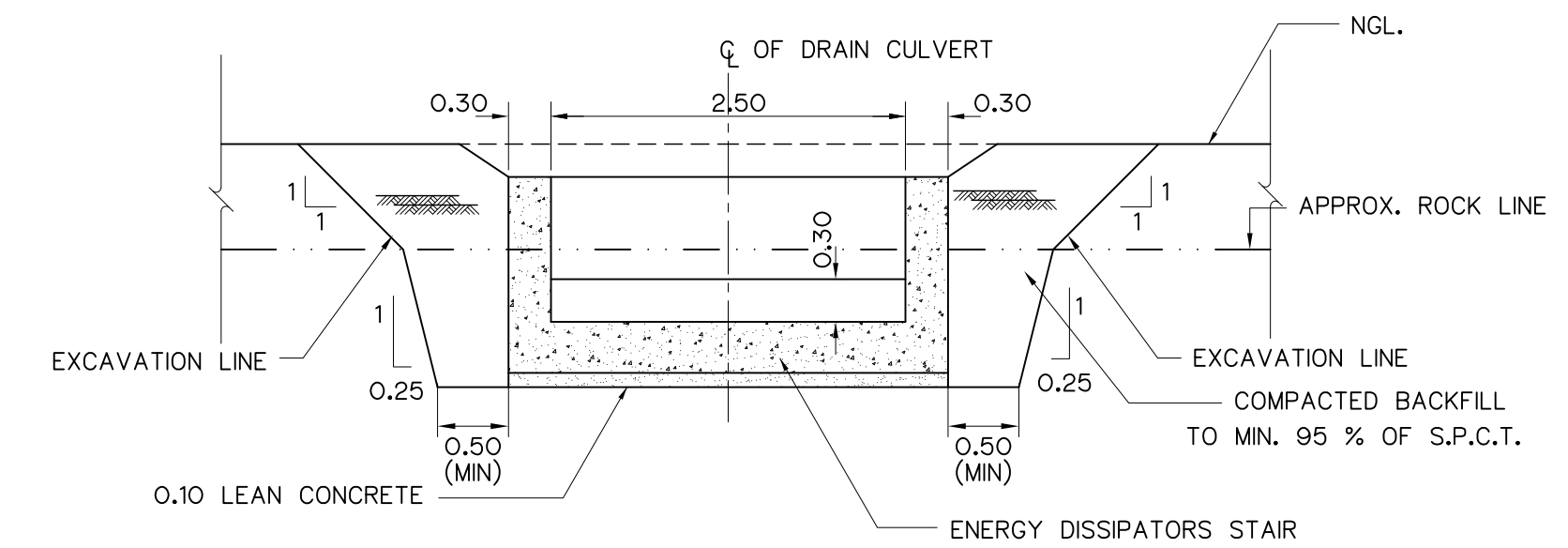
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HUAI PRA THAO RESERVOIR BOUNDARY ROAD PROJECT AMPHOE KAENG KHRO, CHANGWAT CHAIYAPHUM			
CIVIL WORKS LOWER RESERVOIR BOUNDARY ROAD DRAIN CULVERT TYPE OF BOUNDARY ROAD			
 PANYA CONSULTANTS CO.,LTD.		 Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY	
DESIGNED ๒๕.1957 ๙๒1.76431		REVIEWED	
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		APPROVED	
PROJECT MANAGER DATE		DRAWING NO. HRR-BR-L31	SHEET NO. 70 OF 80



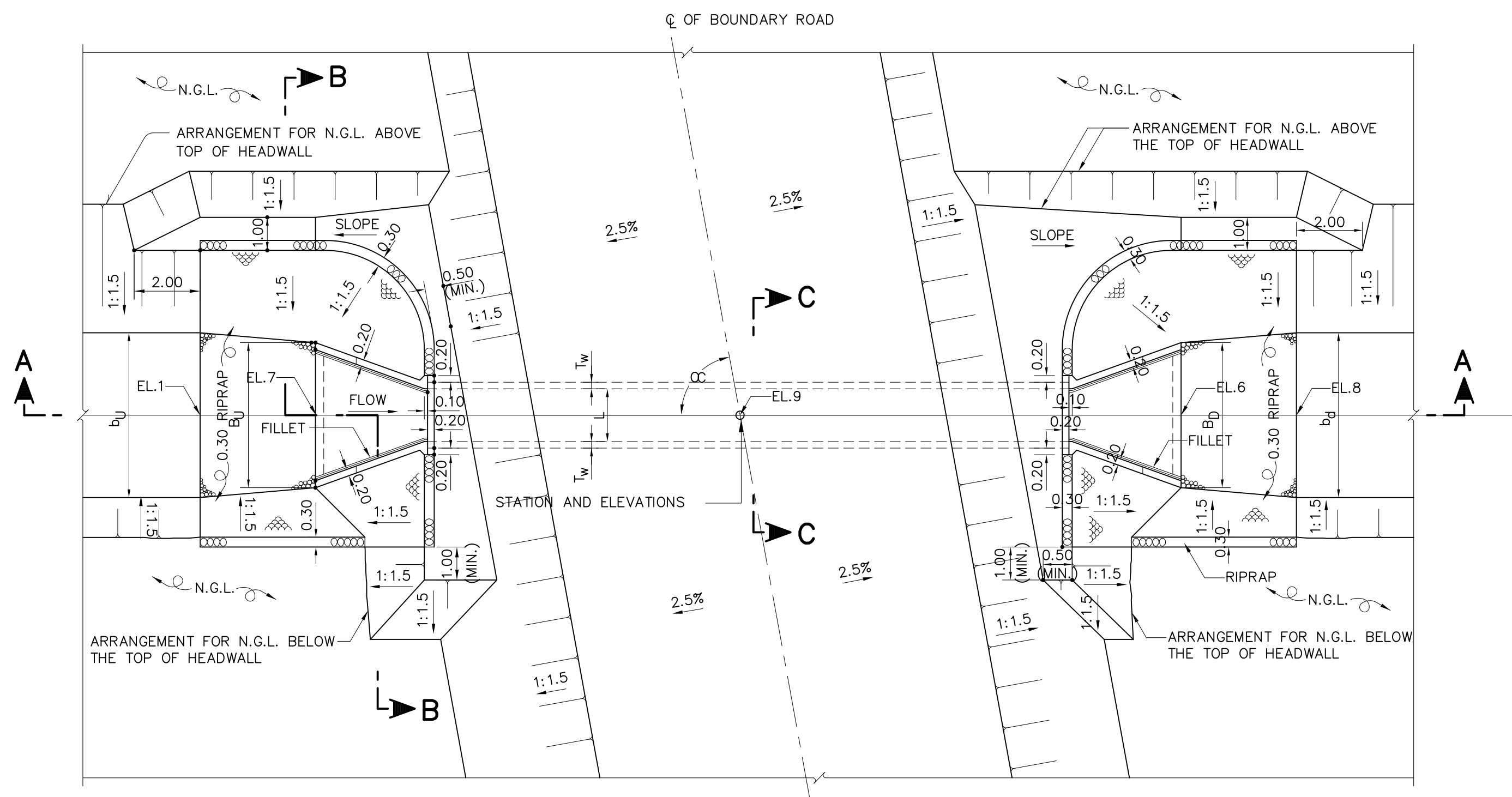
SECTION C-C
NOT TO SCALE



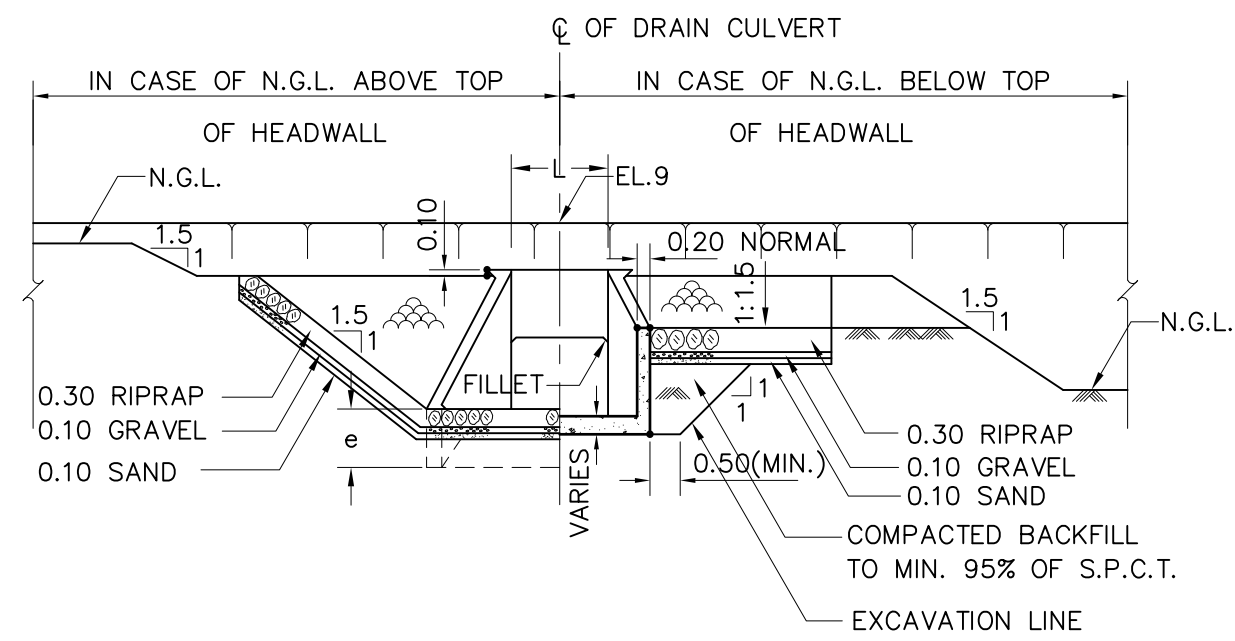
SECTION D-D
NOT TO SCALE



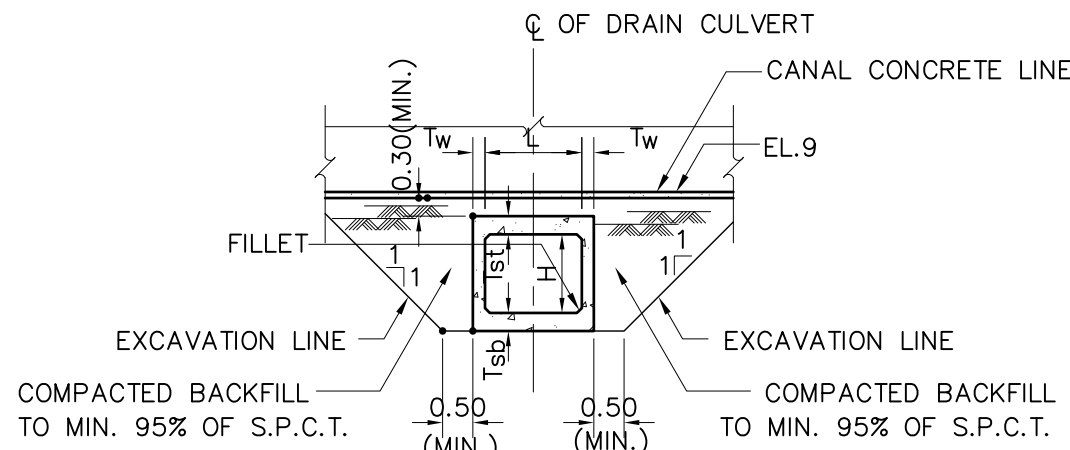
 KINGDOM OF THAILAND Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY			
HUAI PRA THAO RESERVOIR BOUNDARY ROAD PROJECT AMPHOE KAENG KHRO, CHANGWAT CHAIYAPHUM			
CIVIL WORKS STANDARD DRAIN CULVERT TYPE "1", PLAN SECTION AND DETAILS			
 PANYA CONSULTANTS CO.,LTD.		 Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY	
		REVIEWED	
DESIGNED	๒๕.1957	๕1.76431	SUBMITTED
DRAWN			RECOMMENDED
CHECKED	๒๕.1957		APPROVED
10/08/2021 PROJECT MANAGER DATE		DRAWING NO. HRR-SD-01	SHEET NO. 71 OF 80



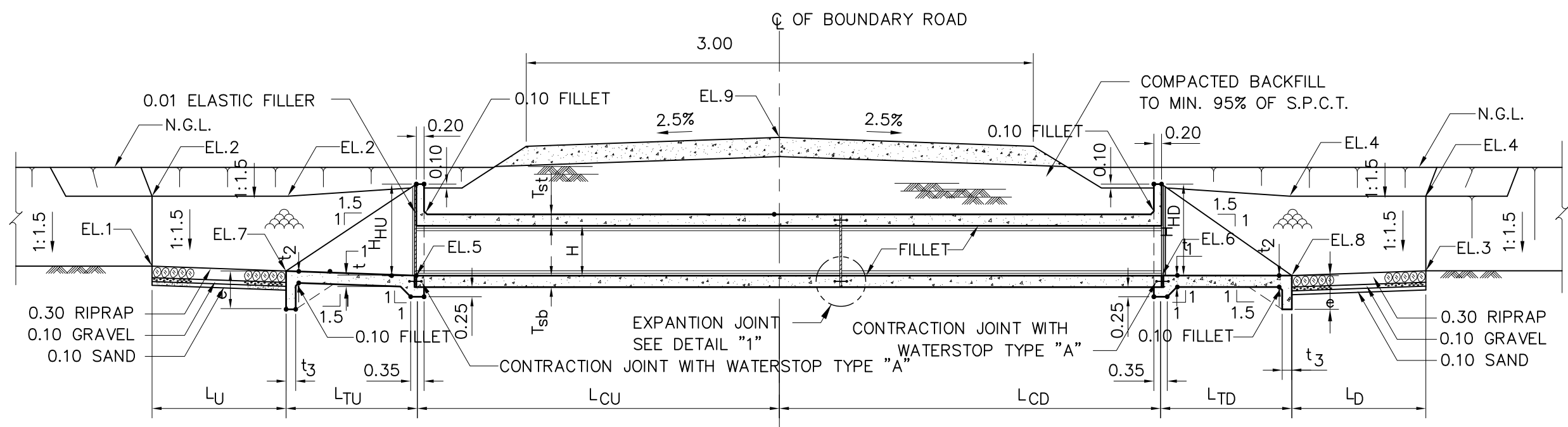
SINGLE BOX CULVERT
NOT TO SCALE



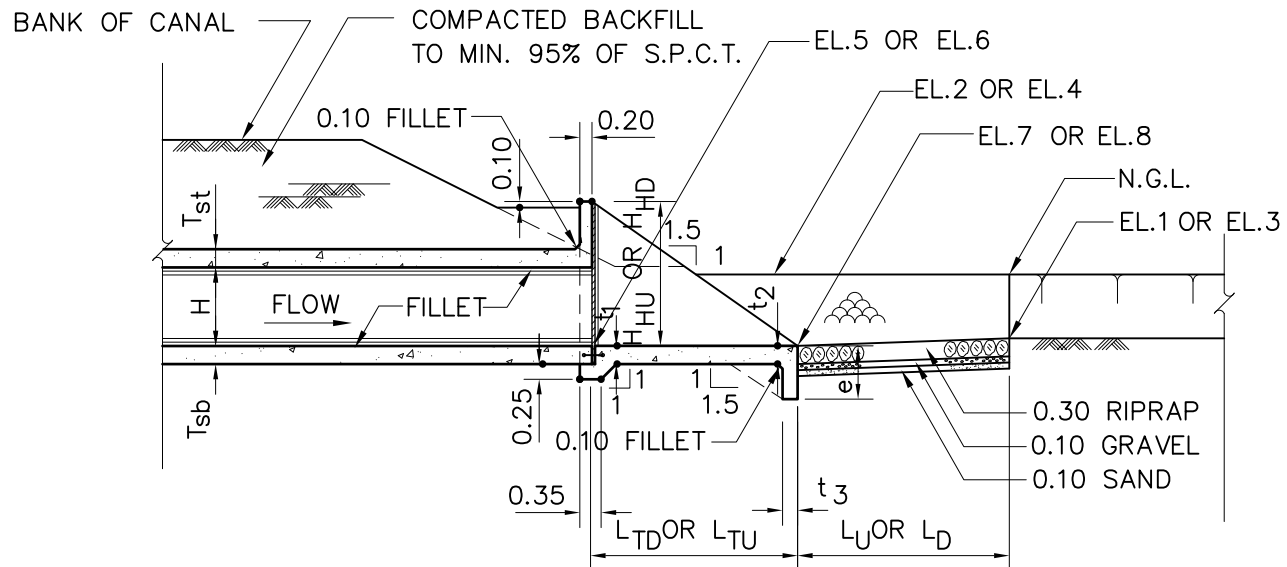
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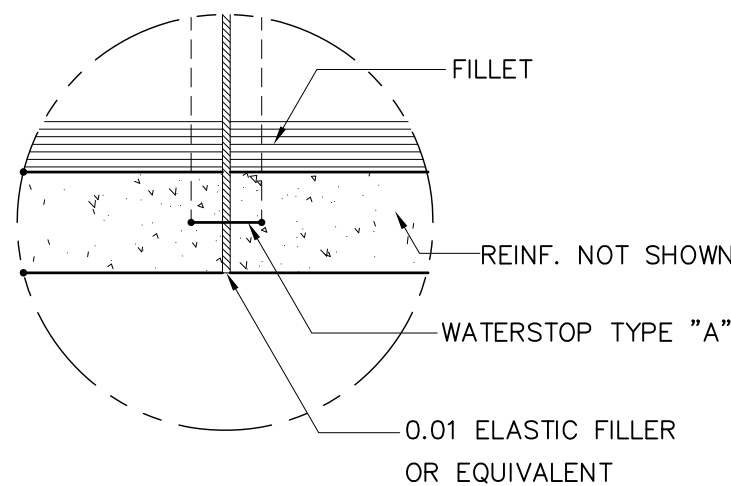
SECTION C – C
NOT TO SCALE



SECTION A – A
NOT TO SCALE



**GENERAL LONG SECTION
IN CASE OF N.G.L. BELOW THE TOP OF HEADWALL**
NOT TO SCALE



**DETAIL "1"
EXPANSION JOINT**
NOT TO SCALE

DRAIN CULVERT TYPE "2"

NOTES :

- ALL DIMENSIONS AND ELEVATIONS (ABOVE M.S.L.) ARE IN METERS, UNLESS OTHERWISE SHOWN.
- SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DRAWING NO. HRR-GN-03
- ALLOWABLE BEARING CAPACITIES OF SOIL IS AT LEAST 10 TONS/M².
- DRESSING OF GROUND TO SUIT THE STRUCTURE TO BE DETERMINED IN THE FIELD.
- VARIATION OF α BETWEEN 45° AND 135°
- STRUCTURE TO BE CONNECTED TO EXISTING AND, OR DESIGNED DRAINAGE CHANNELS OR DITCHES (UPSTREAM AND DOWNSTREAM) AS DIRECTED.
- THE DIMENSION OF DRAIN CULVERT TYPE "2" (LxH) IS 1.50 X 1.50 METER.
- THE CONTRACTOR MUST SURVEY AND PROPOSE THE QUANTITIES OF WORK TO BE SENT TO THE DEDE APPROVAL BEFORE PROCEEDING.

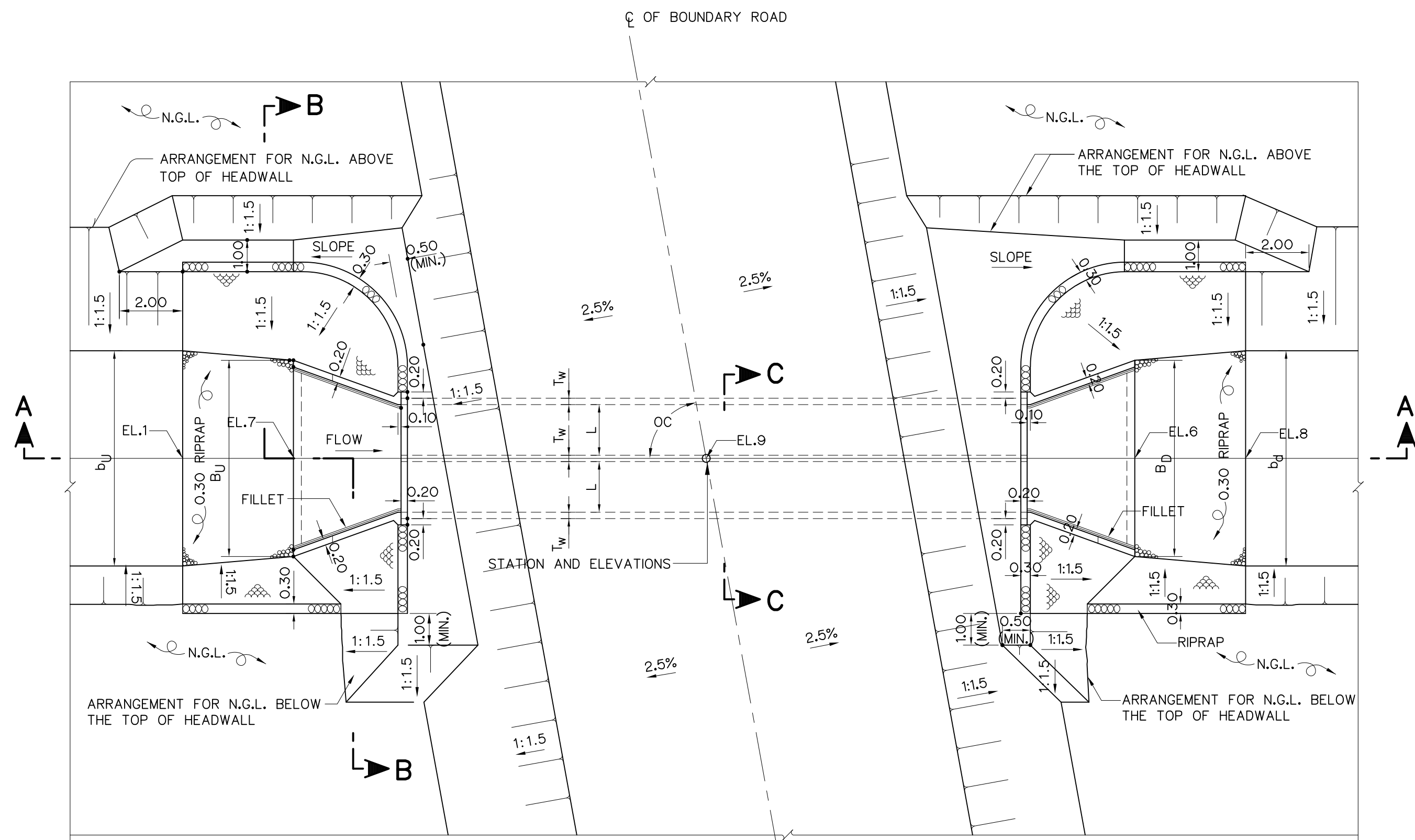
REFERENCE DRAWING :

- STANDARD, INLET AND OUTLET TRANSITIONS
- STANDARD, BOX CULVERT, SECTIONS AND REINFORCEMENT DETAILS
- STANDARD, RIGID FRAME RC BOX CULVERT PLAN, ELEVATION AND SECTIONS
- STANDARD, RIGID FRAME RC BOX CULVERT, TABLE OF REINFORCEMENT
- STANDARD, DIMENSIONS, REINFORCEMENT AND DETAILS

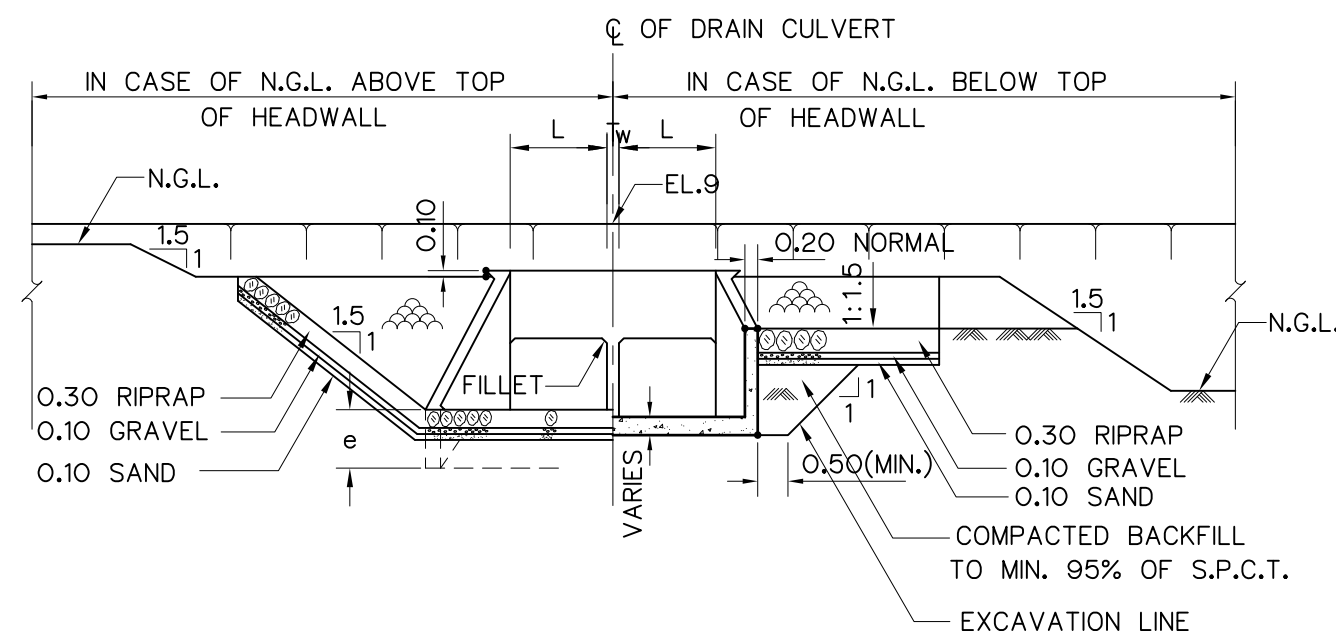
HRR-SD-05
HRR-SD-07
HRR-SD-08
HRR-SD-09
HRR-SD-10

3					
2					
1					
NO.	DATE	REVISIONS	CHECKED	APPROVED	
CONSULTANTS			DEDE		

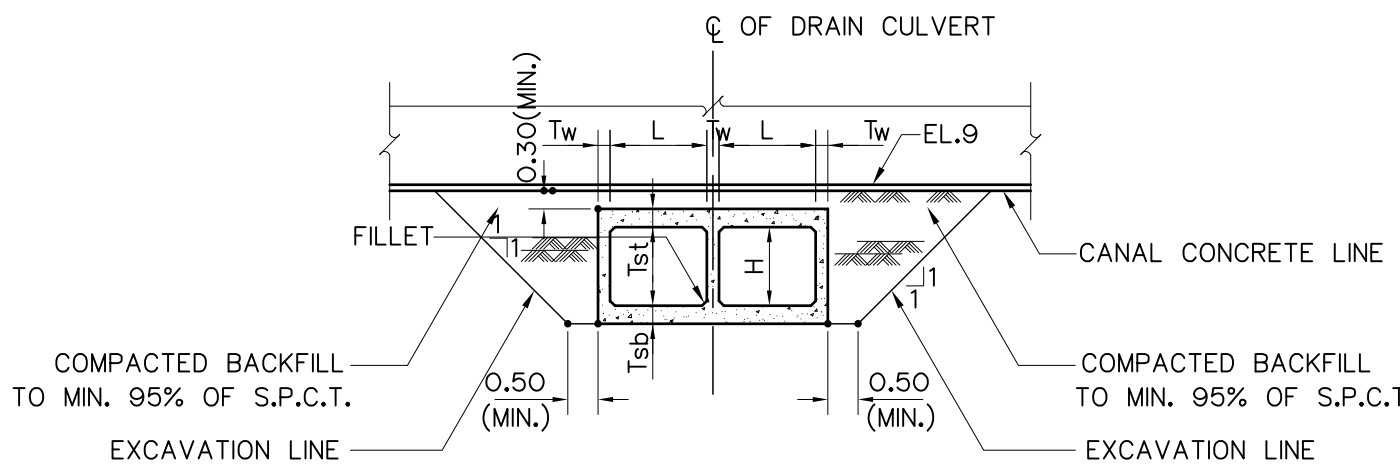
KINGDOM OF THAILAND Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY					
HUAI PRA THAO RESERVOIR BOUNDARY ROAD PROJECT AMPHOE KAENG KHRO, CHANGWAT CHAIYAPHUM					
CIVIL WORKS STANDARD DRAIN CULVERT TYPE "2", PLAN SECTION AND DETAILS					
PANYA CONSULTANTS CO.,LTD.			Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY		
DESIGNED			REVIEWED		
DRAWN			RECOMMENDED		
CHECKED			APPROVED		
PROJECT MANAGER			DRAWING NO.		
DATE			SHEET NO.		
10/08/2021			HRR-SD-02		
			72 OF 80		



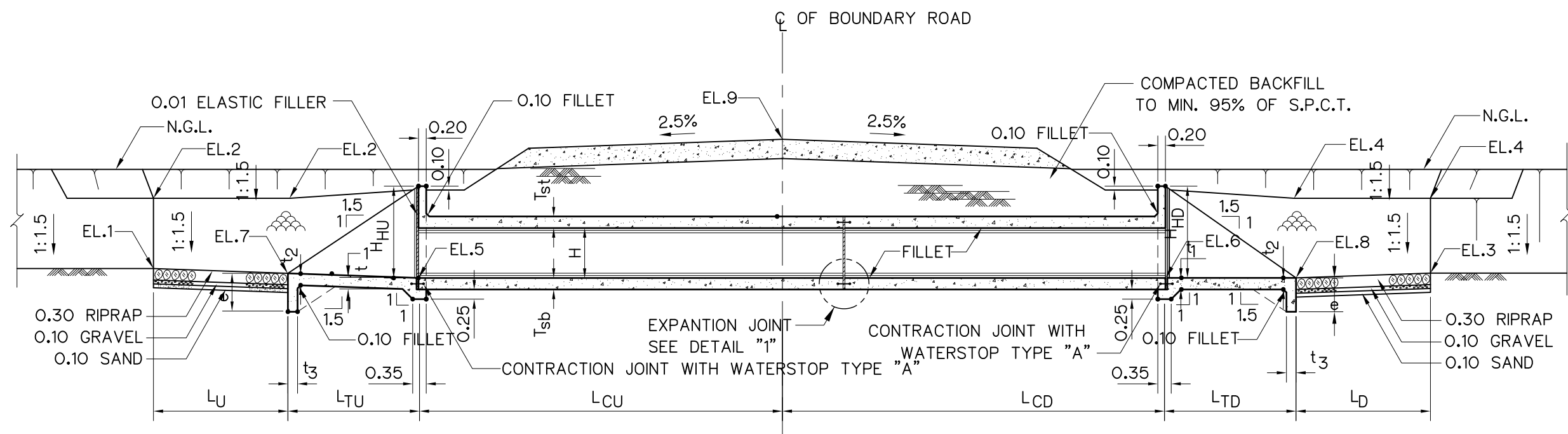
SINGLE BOX CULVERT
NOT TO SCALE



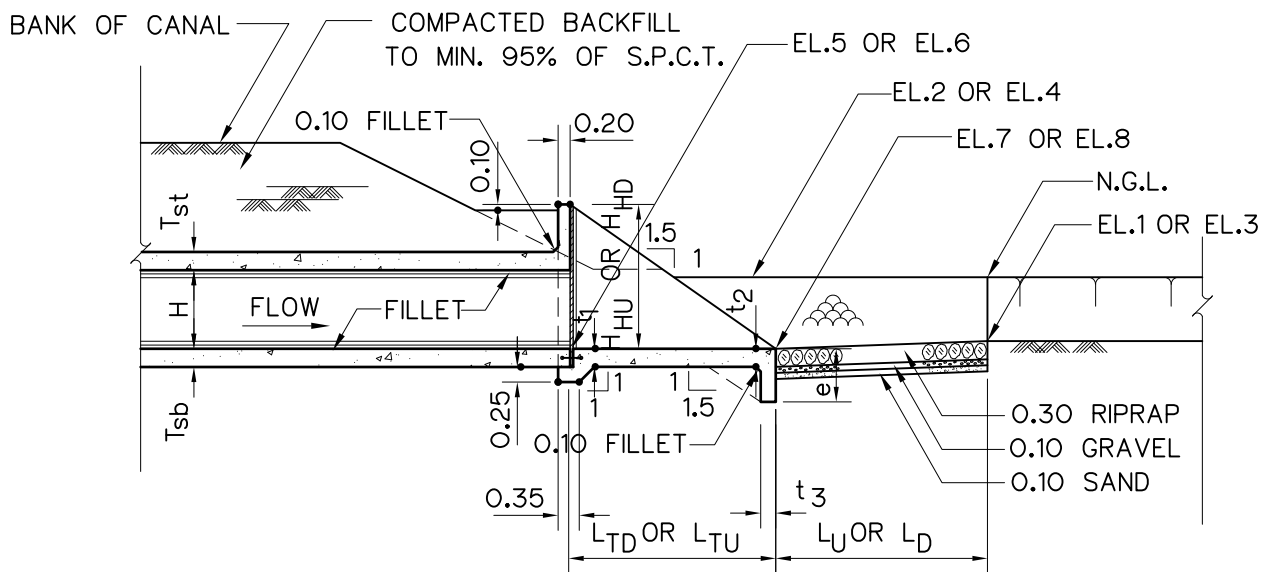
SECTION B - B
NOT TO SCALE



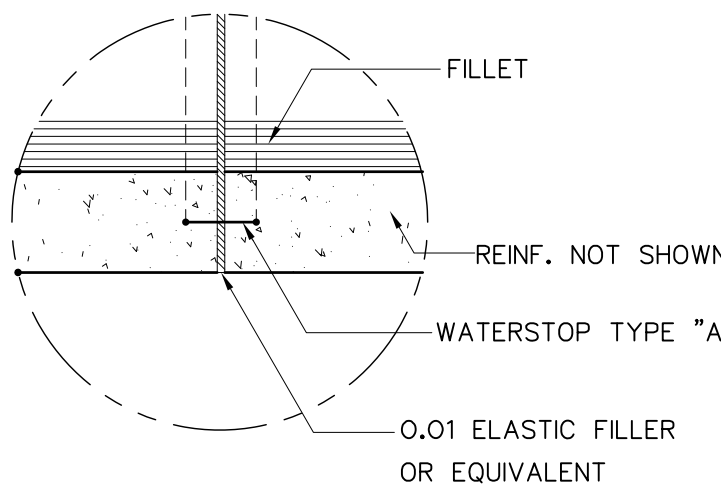
SECTION C - C
NOT TO SCALE



SECTION A - A
NOT TO SCALE



**GENERAL LONG SECTION
IN CASE OF N.G.L. BELOW THE TOP OF HEADWALL**
NOT TO SCALE



**DETAIL "1"
EXPANSION JOINT**
NOT TO SCALE

DRAIN CULVERT TYPE "3"

NOTES :

- ALL DIMENSIONS AND ELEVATIONS (ABOVE M.S.L.) ARE IN METERS, UNLESS OTHERWISE SHOWN.
- SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DRAWING NO. HRR-GN-03
- ALLOWABLE BEARING CAPACITIES OF SOIL IS AT LEAST 10 TONS/M².
- DRESSING OF GROUND TO SUIT THE STRUCTURE TO BE DETERMINED IN THE FIELD.
- VARIATION OF θ BETWEEN 45° AND 135°
- STRUCTURE TO BE CONNECTED TO EXISTING AND, OR DESIGNED DRAINAGE CHANNELS OR DITCHES (UPSTREAM AND DOWNSTREAM) AS DIRECTED.
- THE DIMENSION OF DRAIN CULVERT TYPE "3" (LXH) IS 1.50 X 1.50 METER.
- THE CONTRACTOR MUST SURVEY AND PROPOSE THE QUANTITIES OF WORK TO BE SENT TO THE DEDE APPROVAL BEFORE PROCEEDING.

REFERENCE DRAWING :

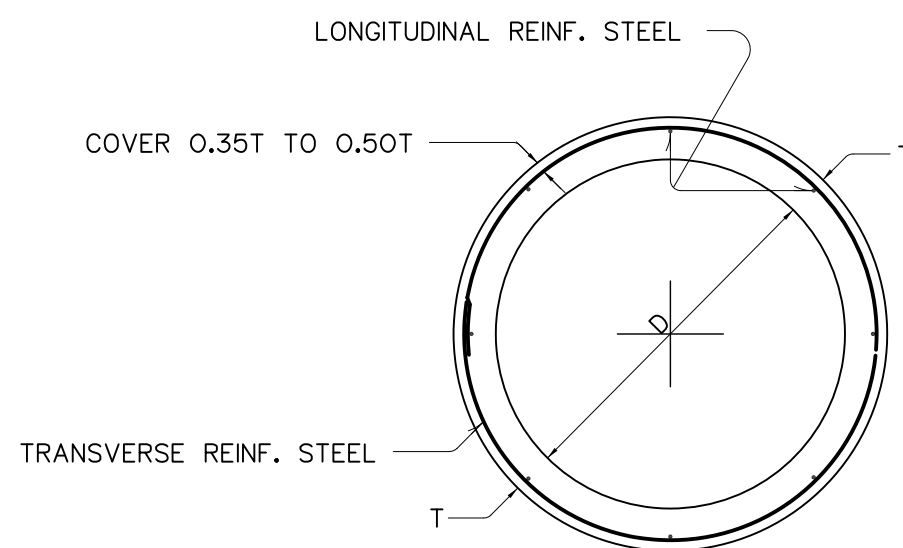
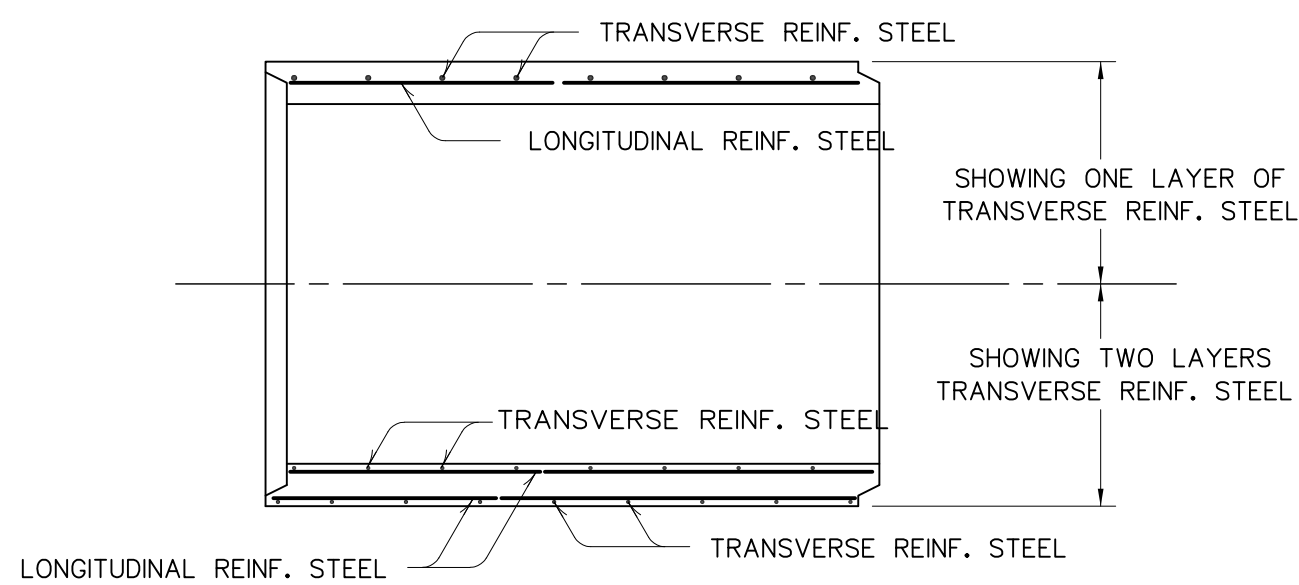
- STANDARD, INLET AND OUTLET TRANSITIONS
- STANDARD, BOX CULVERT, SECTIONS AND REINFORCEMENT DETAILS
- STANDARD, RIGID FRAME RC BOX CULVERT PLAN, ELEVATION AND SECTIONS
- STANDARD, RIGID FRAME RC BOX CULVERT, TABLE OF REINFORCEMENT
- STANDARD, DIMENSIONS, REINFORCEMENT AND DETAILS

HRR-SD-05
HRR-SD-07
HRR-SD-08
HRR-SD-09
HRR-SD-10

3					
2					
1					
NO.	DATE	REVISIONS	CHECKED	APPROVED	

KINGDOM OF THAILAND Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY					
HUAI PRA THAO RESERVOIR BOUNDARY ROAD PROJECT AMPHOE KAENG KHRO, CHANGWAT CHAIYAPHUM					
CIVIL WORKS STANDARD DRAIN CULVERT TYPE "3", PLAN SECTION AND DETAILS					
PANYA CONSULTANTS CO.,LTD.			Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY		
DESIGNED			REVIEWED		
DRAWN			SUBMITTED		
CHECKED			RECOMMENDED		
APPROVED			APPROVED		
PROJECT MANAGER			DRAWING NO.		SHEET NO.
			HRR-SD-03		73 OF 80

Technical drawing of a rectangular box. The length is labeled L (1.00 m STANDARD LENGTH). The height is labeled H . The diameter of the circular ends is labeled D . The thickness of the box is labeled t . The drawing shows a perspective view of the box with a dashed line indicating the internal structure.



TABLE

PIPE DIA. D (cm)	WALL THICKNESS T (cm)	DIMENSIONS (cm)			
		t	a	b	c
30	5.00	3.00	1.90	0.80	2.30
40	6.00	3.00	2.30	1.00	2.70
50	7.00	4.00	2.80	1.00	3.20
60	7.50	4.00	2.80	1.50	3.20
80	9.50	4.50	3.80	1.50	4.20
100	11.00	4.50	4.30	2.00	4.70
120	12.50	5.00	4.80	2.50	5.20

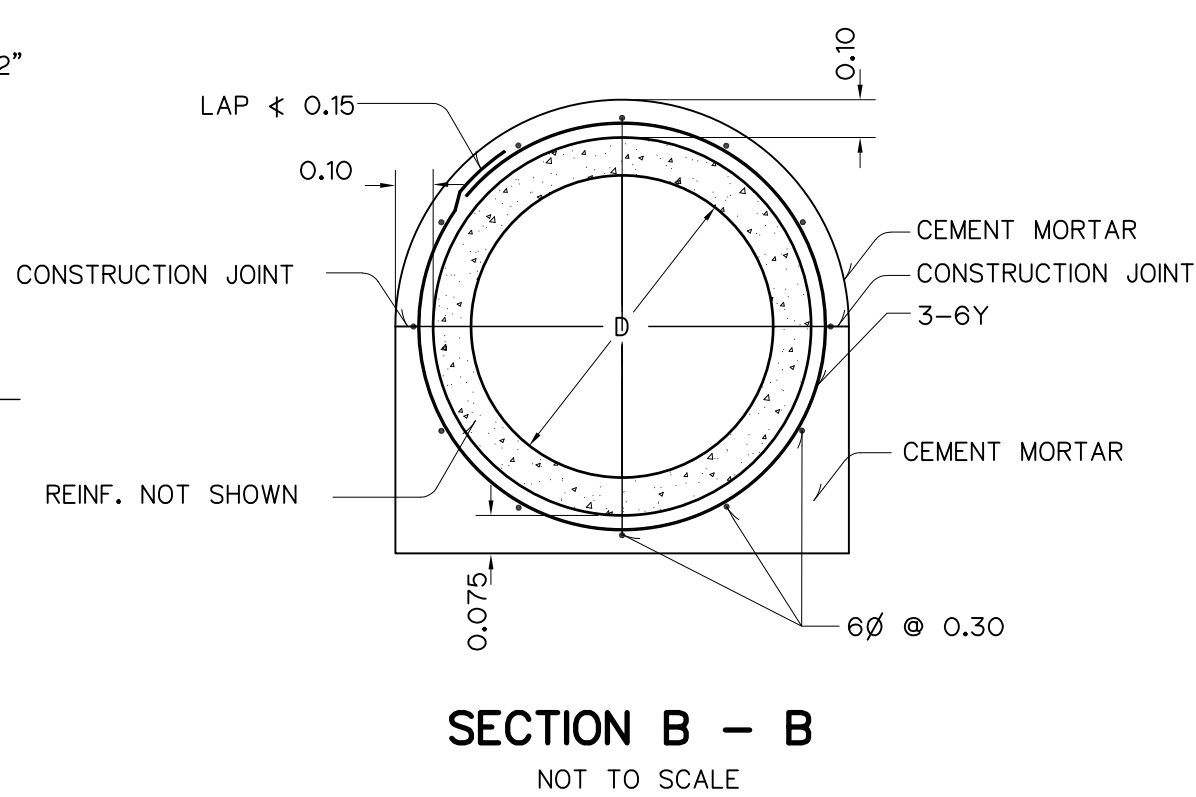
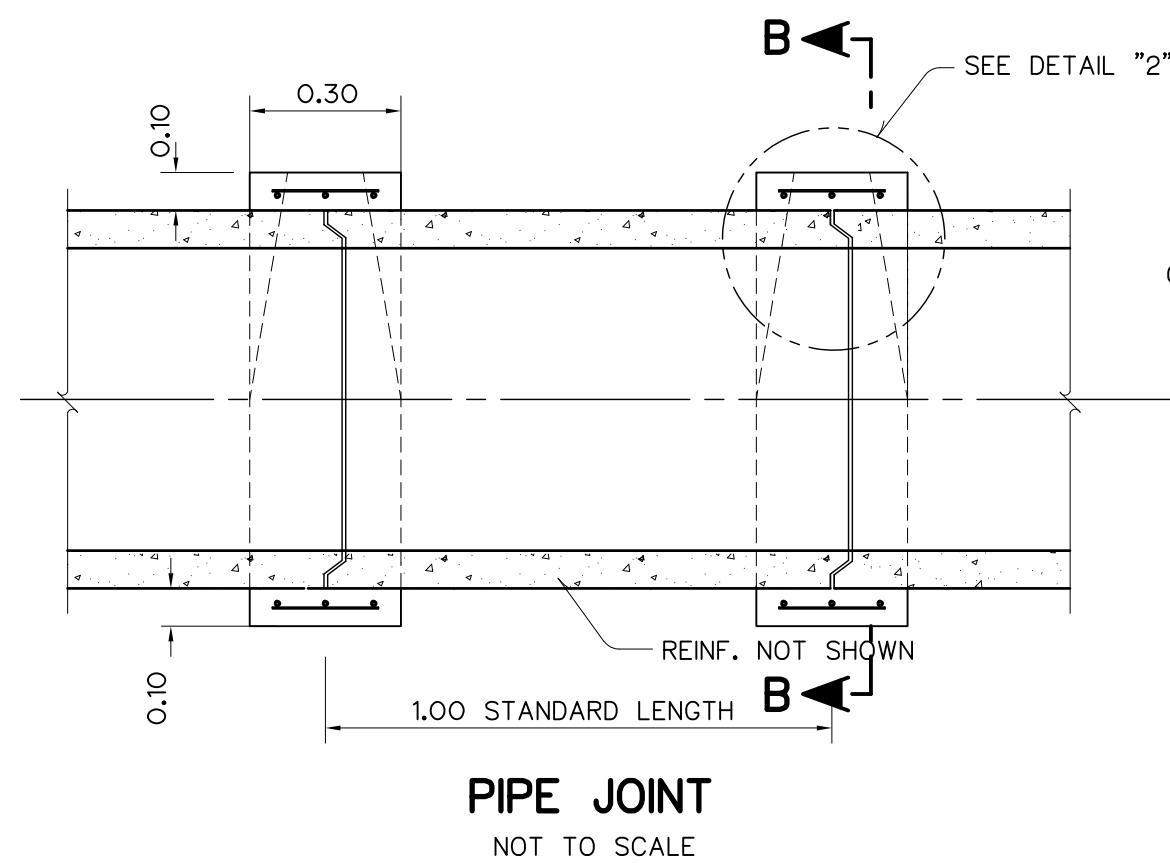
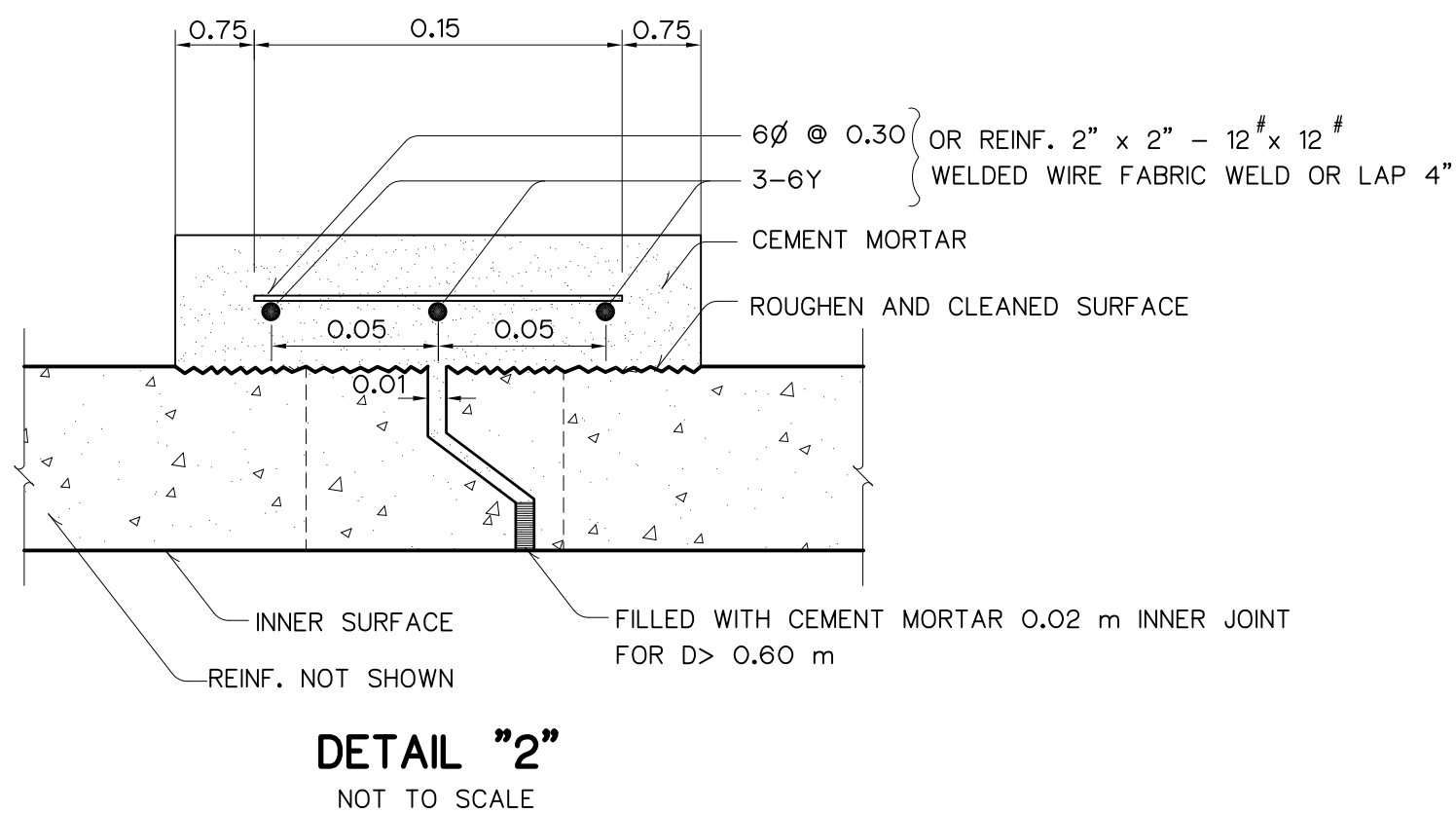
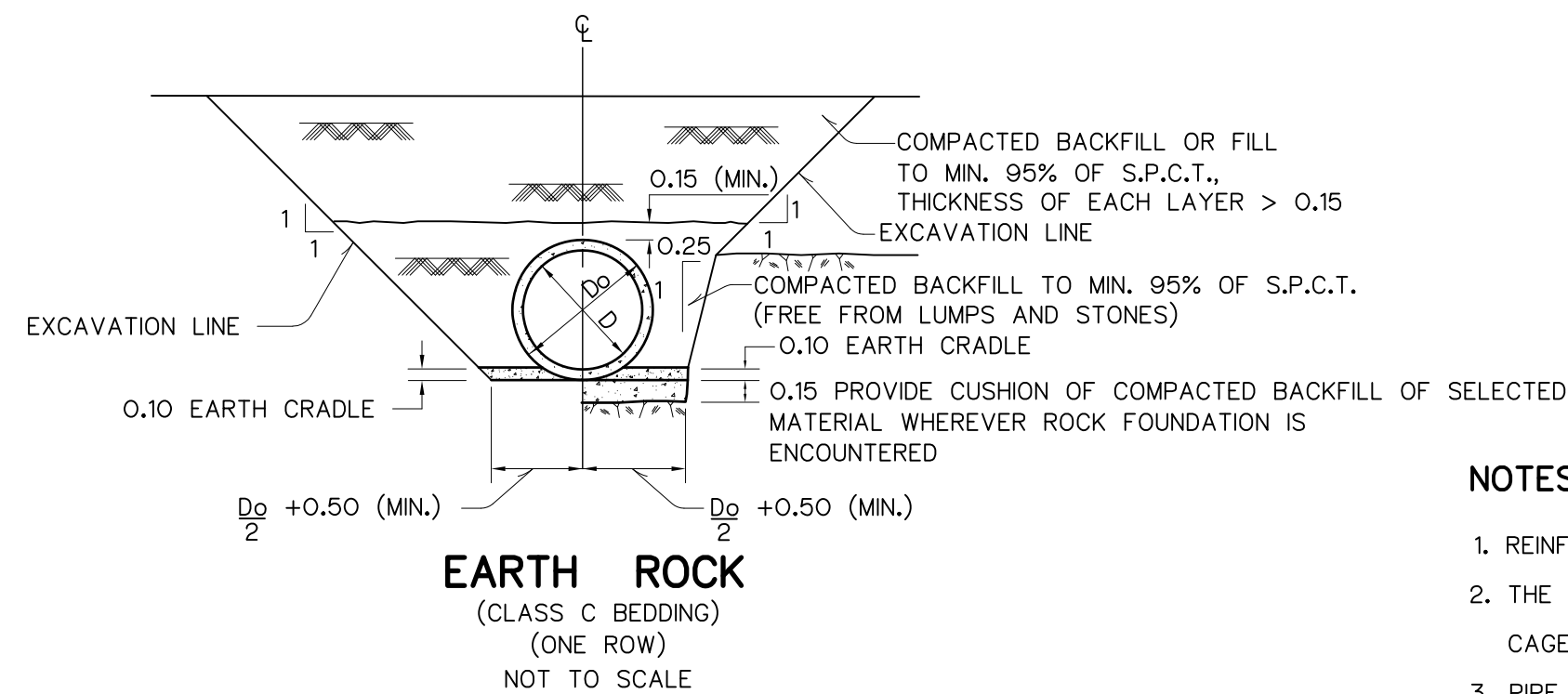


TABLE OF REINFORCEMENT

PIPE DIA. D	AS _T	AS _L
0.30	5-9Y	8-9D
0.40	5-9Y	8-9D
0.50	5-9Y	8-9D
0.60	5-12Y	10-12D
0.80	5-12Y	12-12D
1.00	5-15Y	12-12D
1.20	5-15Y	12-12D



TYPICAL CROSS SECTIONS

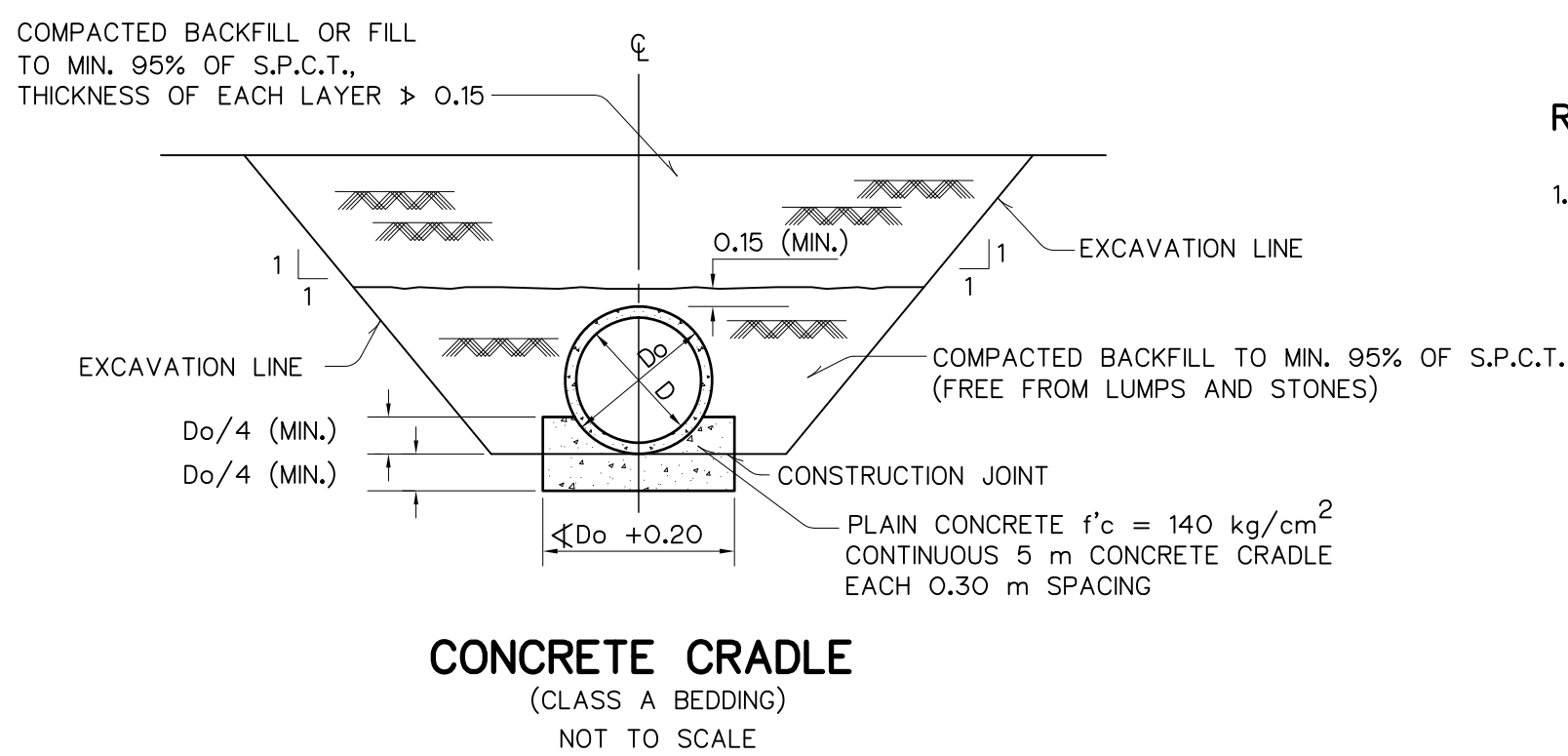


NOTES :

1. REINFORCED CONCRETE PIPE CONFORM TO TIS. 128-2549.
2. THE CULVERT HAVING TRANSVERSE REINFORCEMENT IN ELLIPTICAL CAGE AS SPECIFIED IN THE TIS. 128-2549 SHALL NOT BE USED.
3. PIPE MAY BE EITHER BELL AND SPIGOT TYPE OR TONGUE AND GROOVE TYPE AS DIRECTED BY THE ENGINEER.
4. EACH JOINT SHALL BE SEALED WITH 1:2 MORTAR.
METHOD OF SEALING SHALL BE AS DIRECTED BY THE ENGINEER.

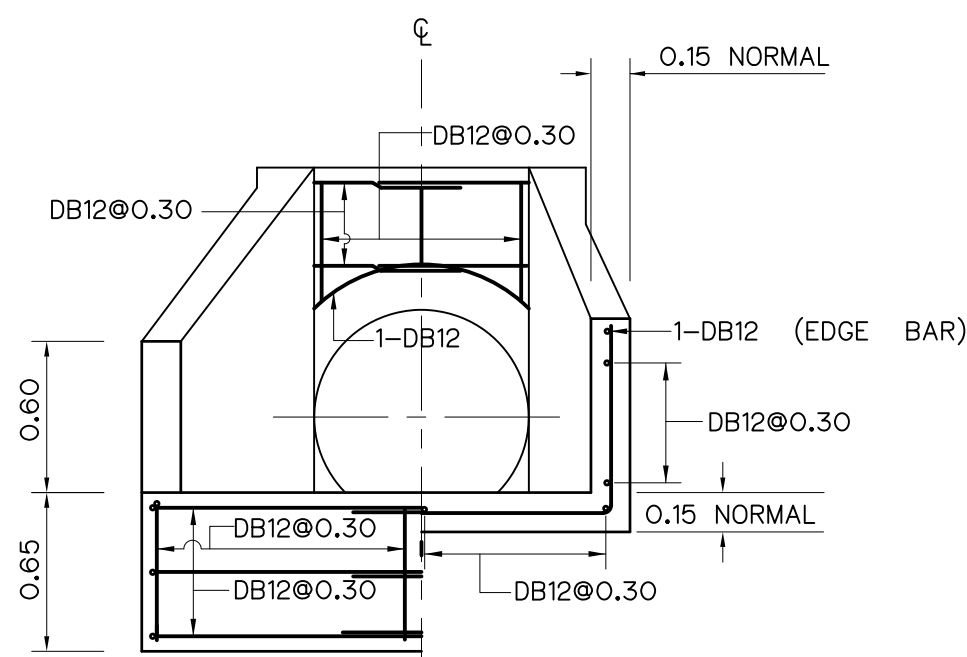
REFERENCE DRAWINGS :

1. STANDARD, DRAIN CULVERT TYPE "1", PLAN SECTION AND DETAILS HRR-SD-01

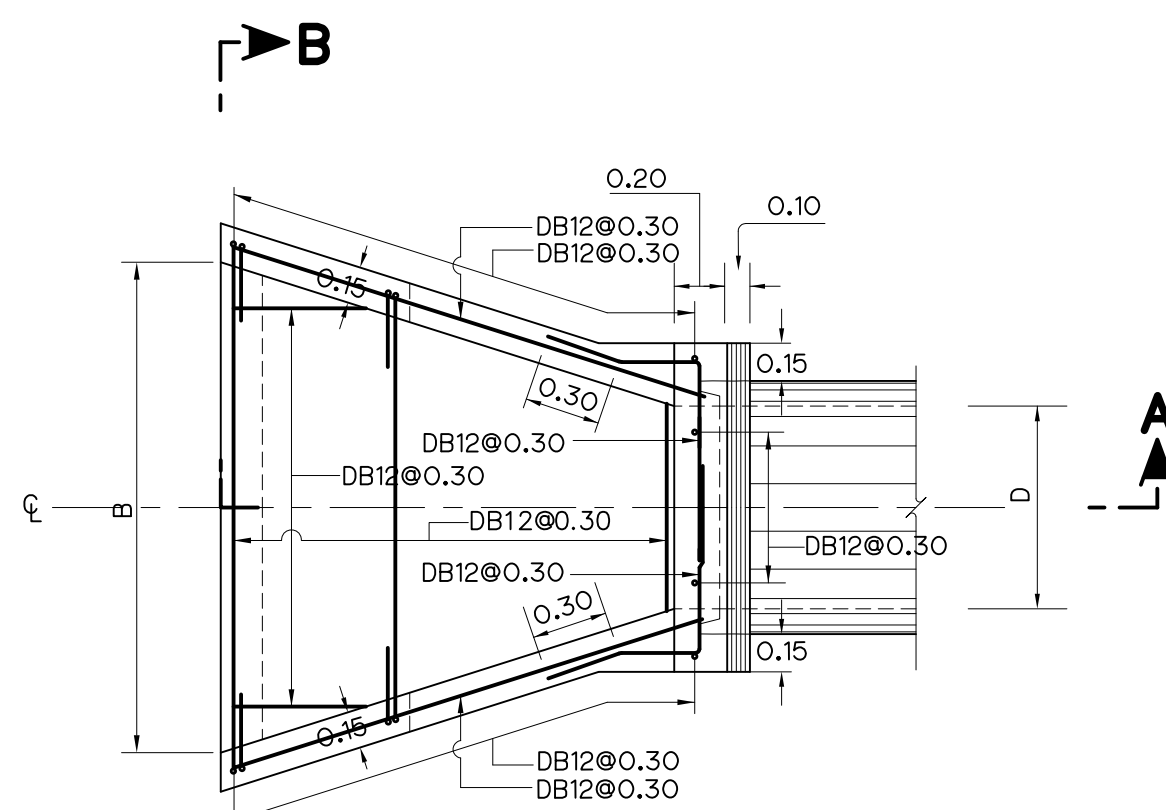


3				
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1				
NO.	DATE	REVISIONS	CHECKED	APPROVED
	CONSULTANTS		DEDE	

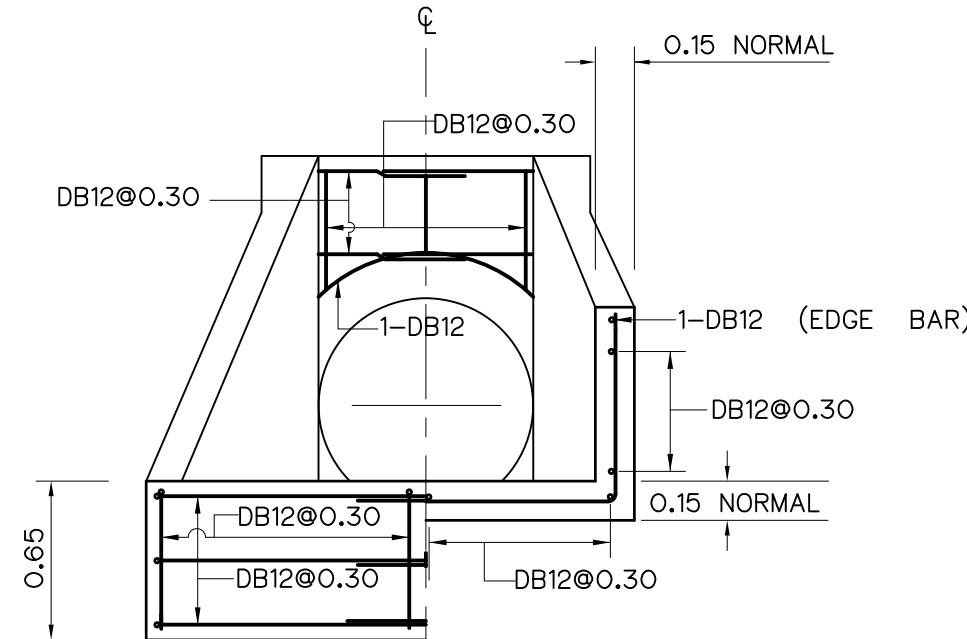
 KINGDOM OF THAILAND Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY			
HUAI PRA THAO RESERVOIR BOUNDARY ROAD PROJECT AMPHOE KAENG KHRO, CHANGWAT CHAIYAPHUM			
CIVIL WORKS STANDARD			
STANDARD REINFORCED AND INSTALLATION CONCRETE PIPE			
 PANYA CONSULTANTS CO.,LTD.		 Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY	
		REVIEWED	
DESIGNED	๒๕.1957	๙๒1.76431	SUBMITTED
DRAWN			RECOMMENDED
CHECKED	๒๕.1957		APPROVED
		10/08/2021	DRAWING NO.
PROJECT MANAGER		DATE	HRR-SD-04
			SHEET NO. 74 OF 80



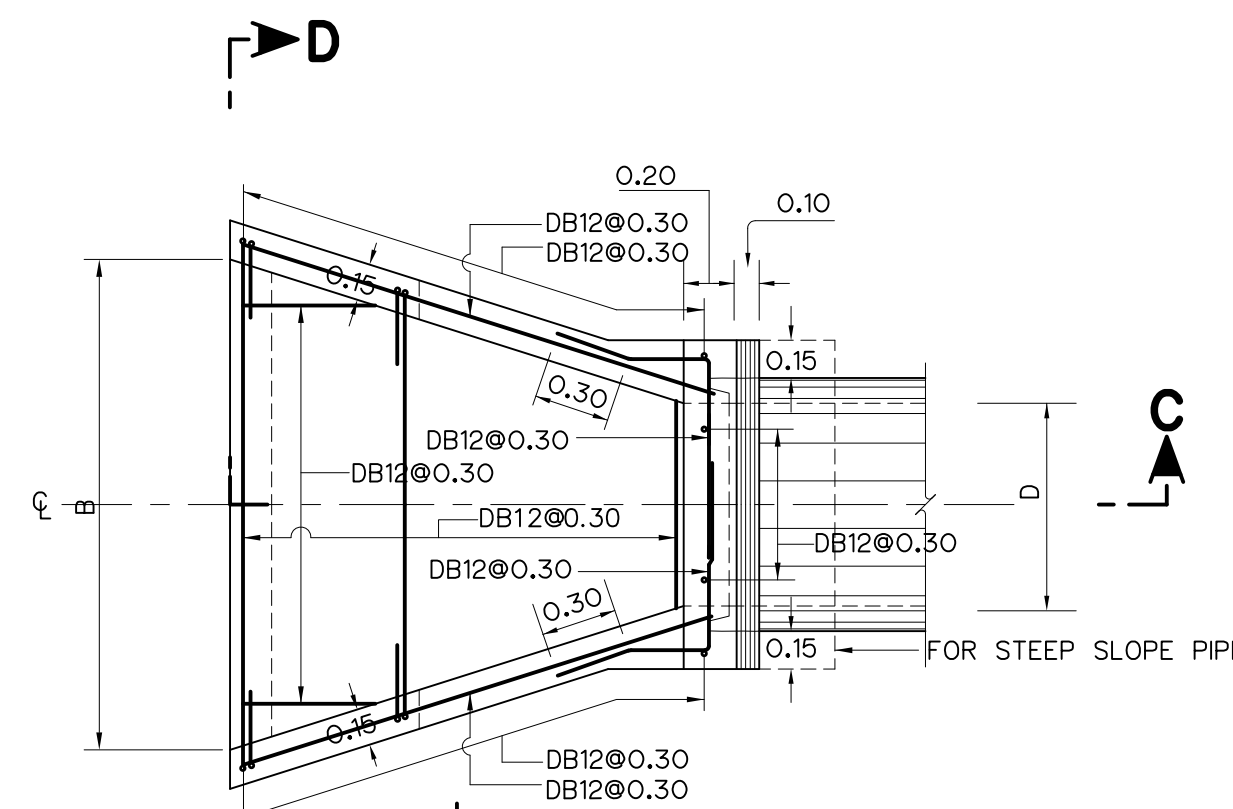
SECTION B-B
NOT TO SCALE



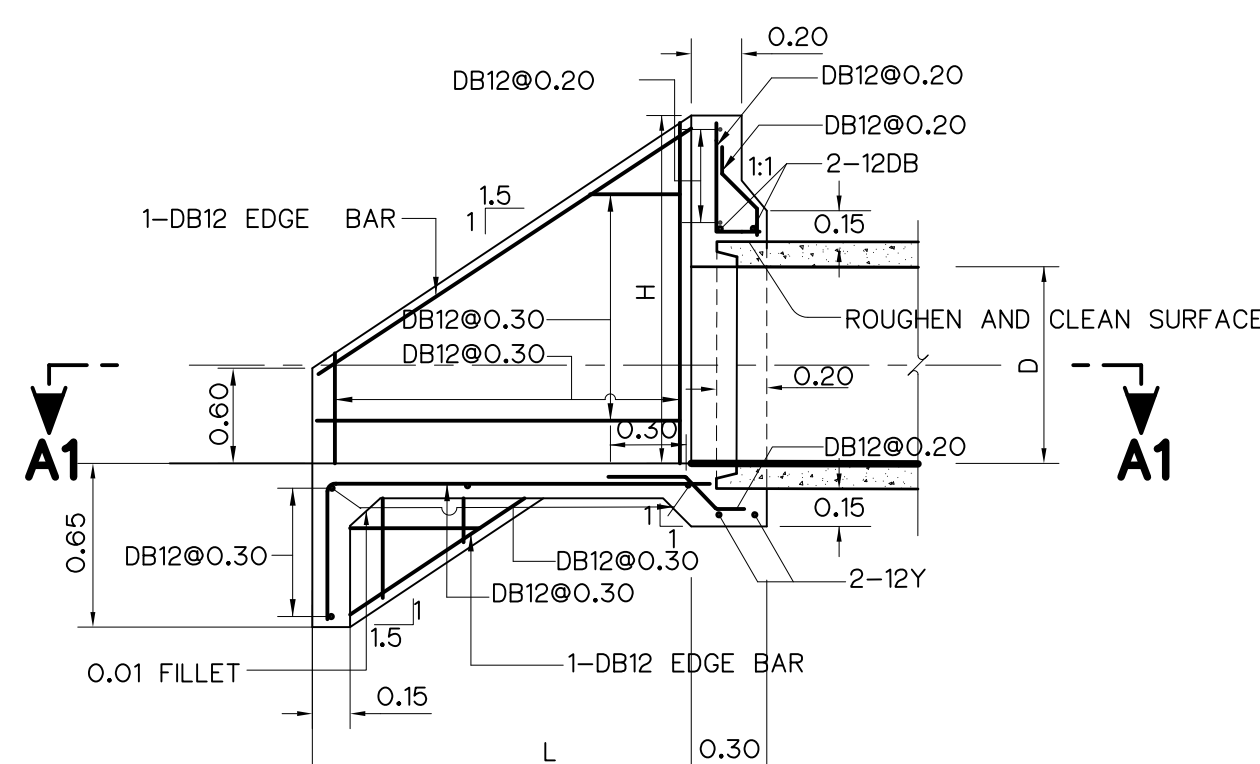
PLAN
NOT TO SCALE



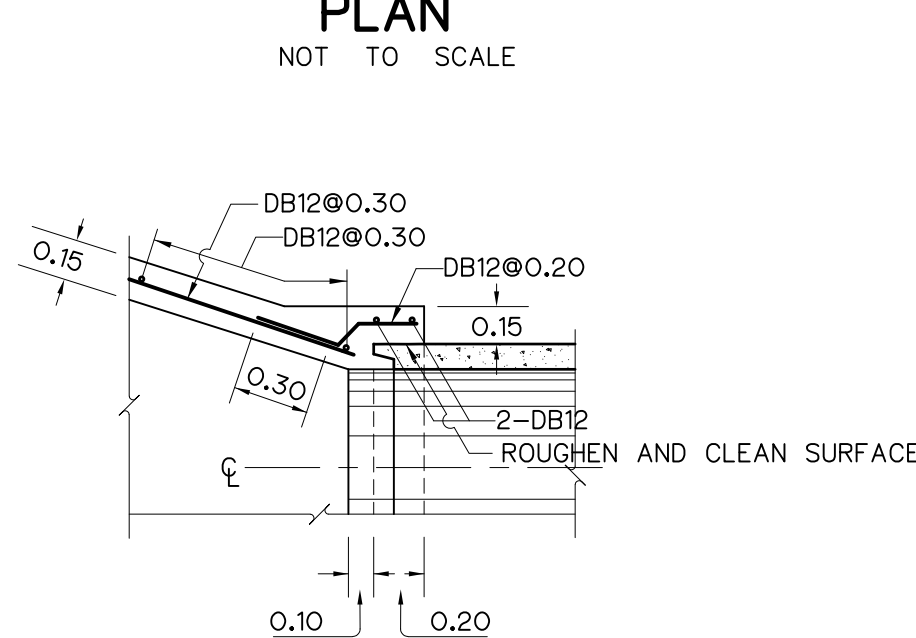
SECTION D-D
NOT TO SCALE



PLAN
NOT TO SCALE



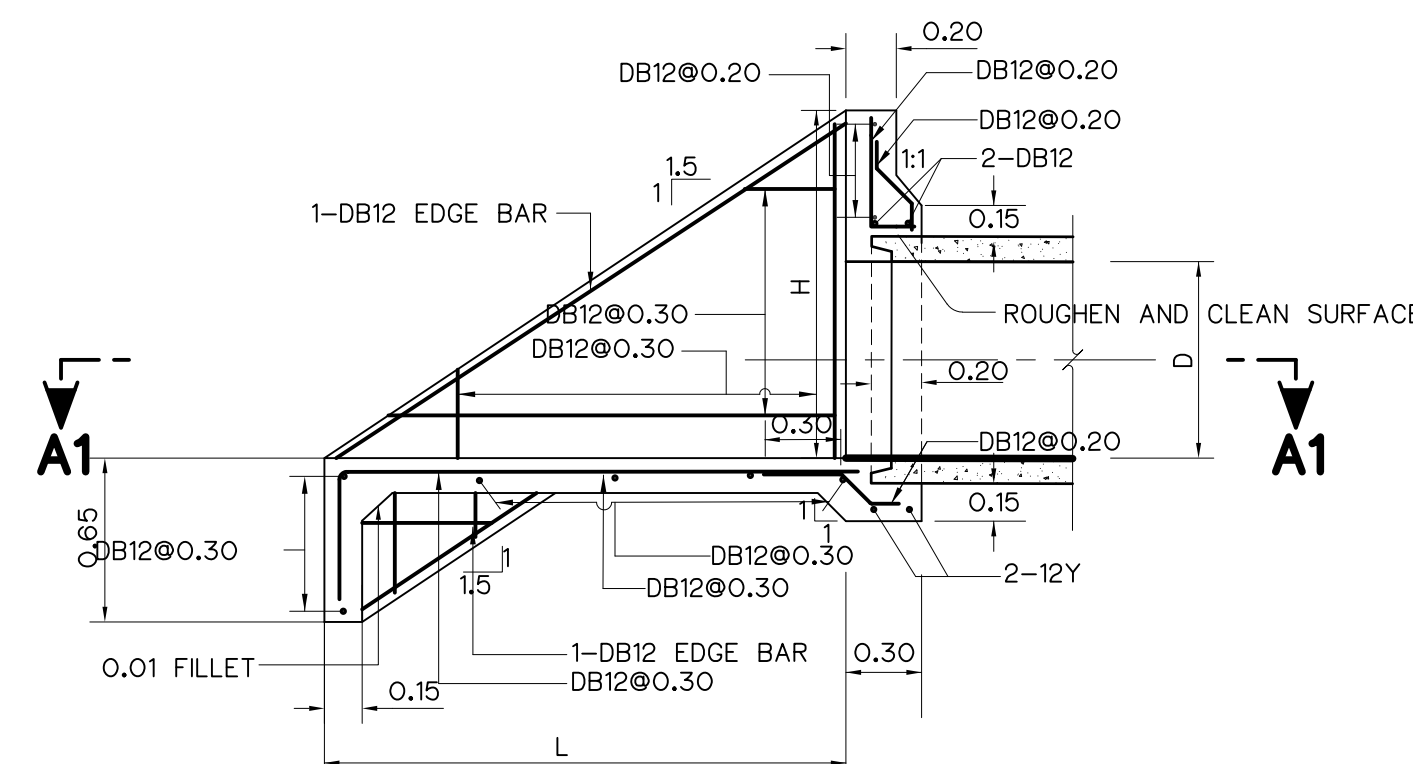
SECTION A-A
NOT TO SCALE



SECTION A1 - A1
NOT TO SCALE

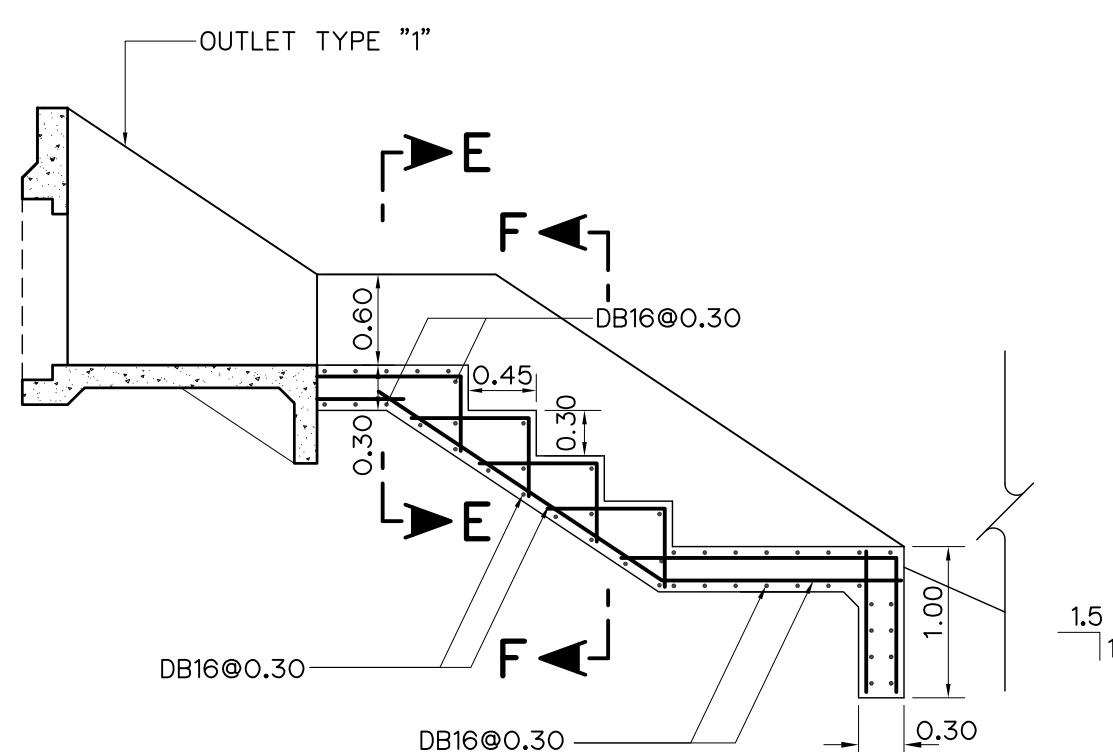
INLET AND OUTLET TYPE "1"
NOT TO SCALE

D	TYPE "1"			TYPE "2"		
	H	L	B	H	L	B
0.80	1.50	1.35	2.50	1.50	2.25	2.40
1.00	1.70	1.65	2.50	1.70	2.55	3.00
1.20	1.90	1.95	2.50	1.90	2.85	3.20

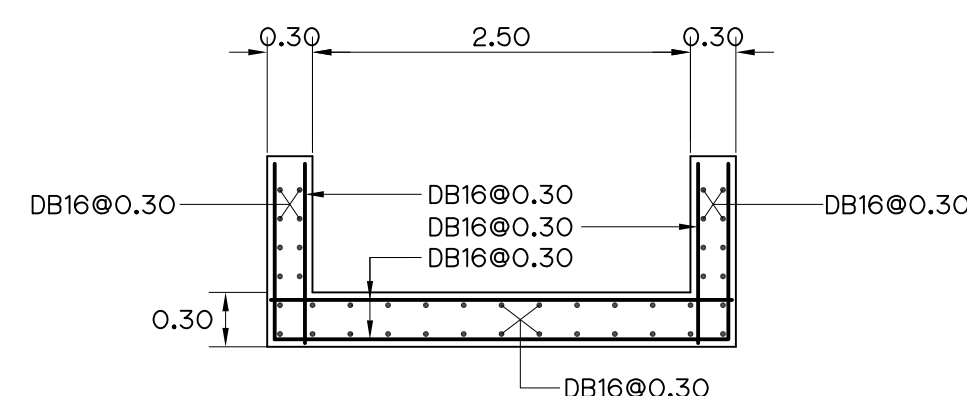


SECTION C - C
NOT TO SCALE

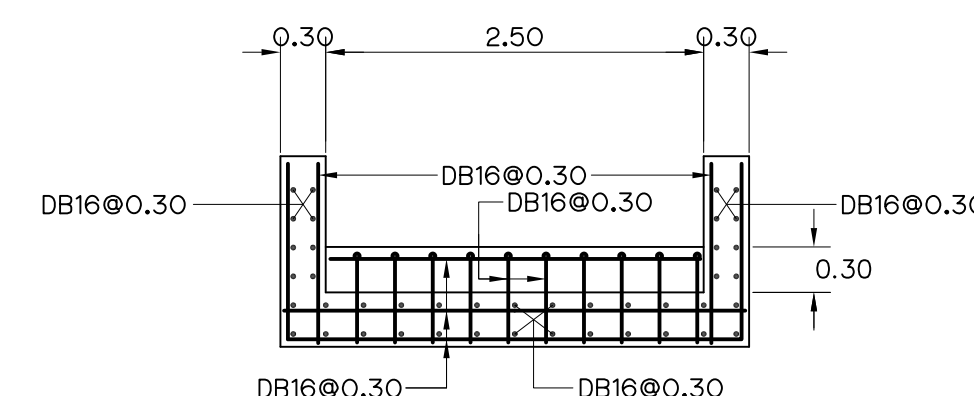
INLET AND OUTLET TYPE "2"
NOT TO SCALE



SECTION
NOT TO SCALE



SECTION E-E
NOT TO SCALE



SECTION F-F
NOT TO SCALE

ENERGY DISSIPATORS STAIR
NOT TO SCALE

- NOTES :
- ALL DIMENSIONS AND ELEVATIONS (M.S.L.) ARE IN METERS
REINFORCEMENT BARS ARE IN MILLIMETERS, UNLESS OTHERWISE SHOWN.
 - SYMBOLS, ABBREVIATIONS AND GENERAL NOTES SEE DWG. NO. HRR-GN-03.
 - INLET AND OUTLET SHALL VARY ACCORDING TO THE SIZE OF R.C. PIPE
CULVERT (SEE TABLE).

REFERENCE DRAWINGS :

1. STANDARD, DRAIN CULVERT TYPE "1", PLAN SECTION AND DETAILS

HRR-SD-01

3				
2				
1				
NO.	DATE	REVISIONS	CHECKED	APPROVED

CONSULTANTS
DEDE

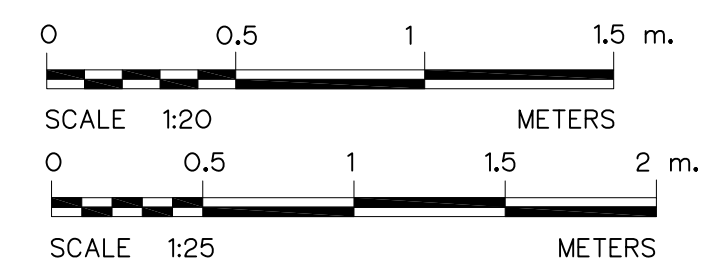
KINGDOM OF THAILAND Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY	
HUAI PRA THAO RESERVOIR BOUNDARY ROAD PROJECT AMPHOE KAENG KHRO, CHANGWAT CHAIYAPHUM	
CIVIL WORKS STANDARD INLET AND OUTLET TRANSITIONS	
PANYA CONSULTANTS CO.,LTD.	Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY
DESIGNED 28.1957 28.1.76431	REVIEWED
DRAWN	SUBMITTED
CHECKED 28.1957	RECOMMENDED
APPROVED	APPROVED
PROJECT MANAGER 10/08/2021 DATE	DRAWING NO. HRR-SD-05
	SHEET NO. 75 OF 80



NOT TO SCALE



1. STANDARD, DRAIN CULVERT TYPE "1", PLAN SECTION AND DETAILS HRR-SD-01

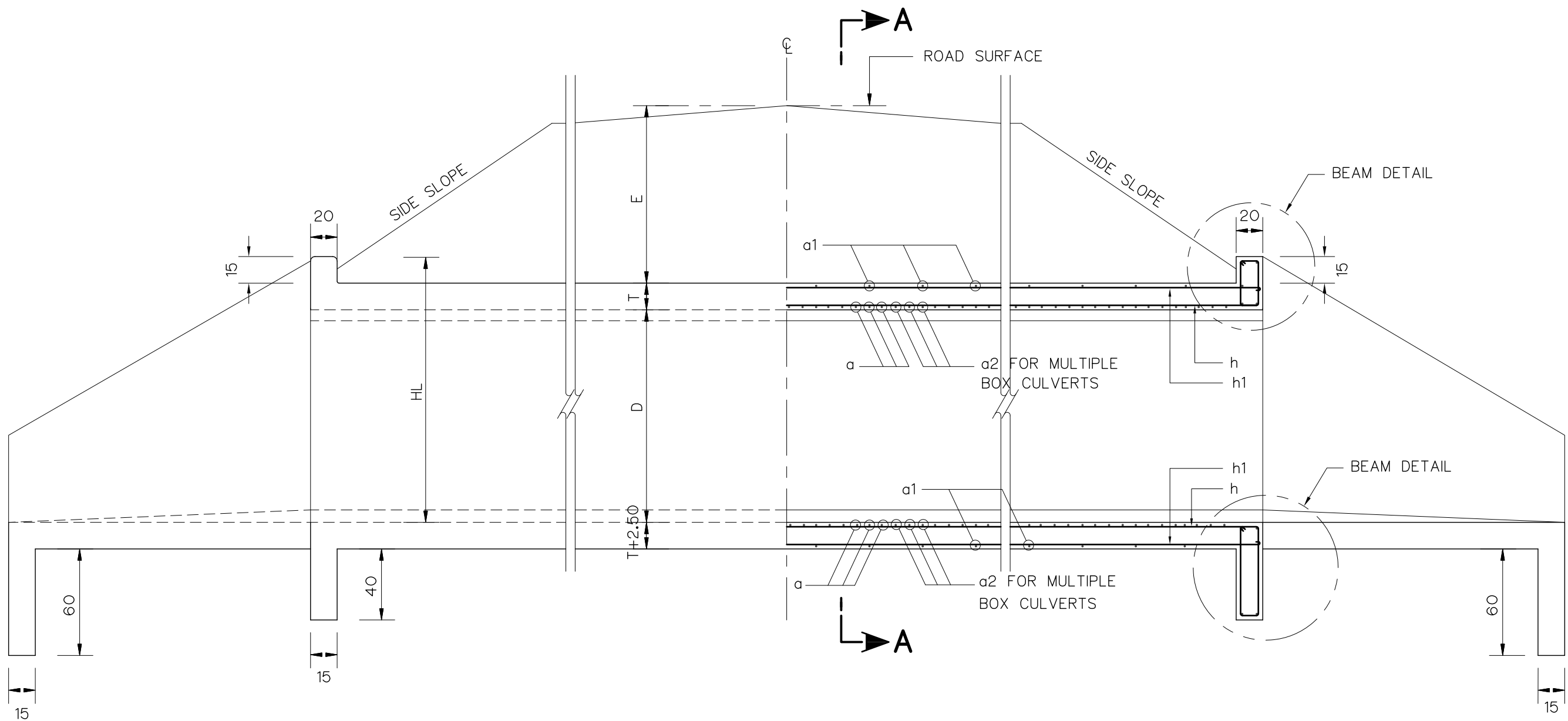


3						PANTA CONSULTANTS CO., LTD.	MINISTRY OF ENERGY
2						DESIGNED 28.1957	78.76-431
1						DRAWN	
NO.	DATE	REVISIONS	CHECKED	APPROVED	CHECKED	28.1957	APPROVED
CONSULTANTS					DEDE		
					PROJECT MANAGER		DRAWING NO.
					DATE		SHEET NO.
					10/08/2021		76 OF 80
					HRR-SD-06		



HALF LONGITUDINAL PLAN

NOT TO SCALE

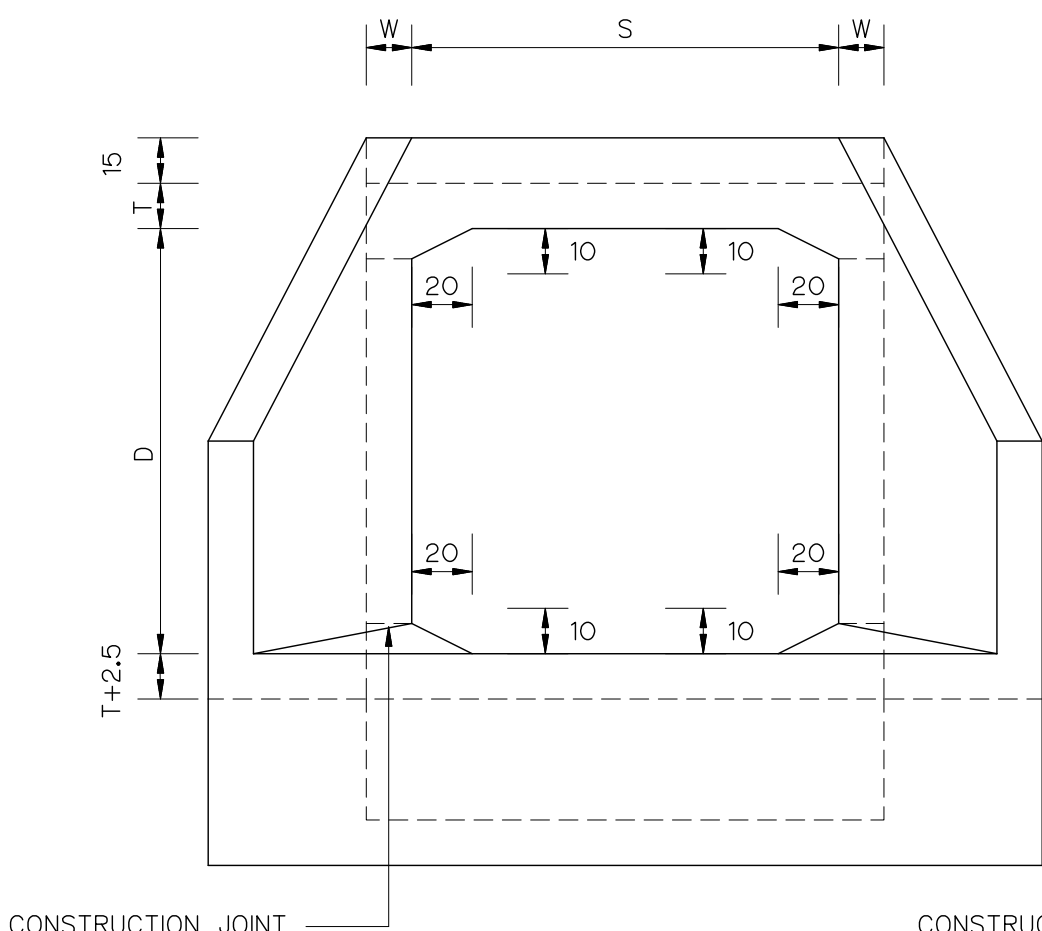


HALF LONGITUDINAL ELEVATION

NOT TO SCALE

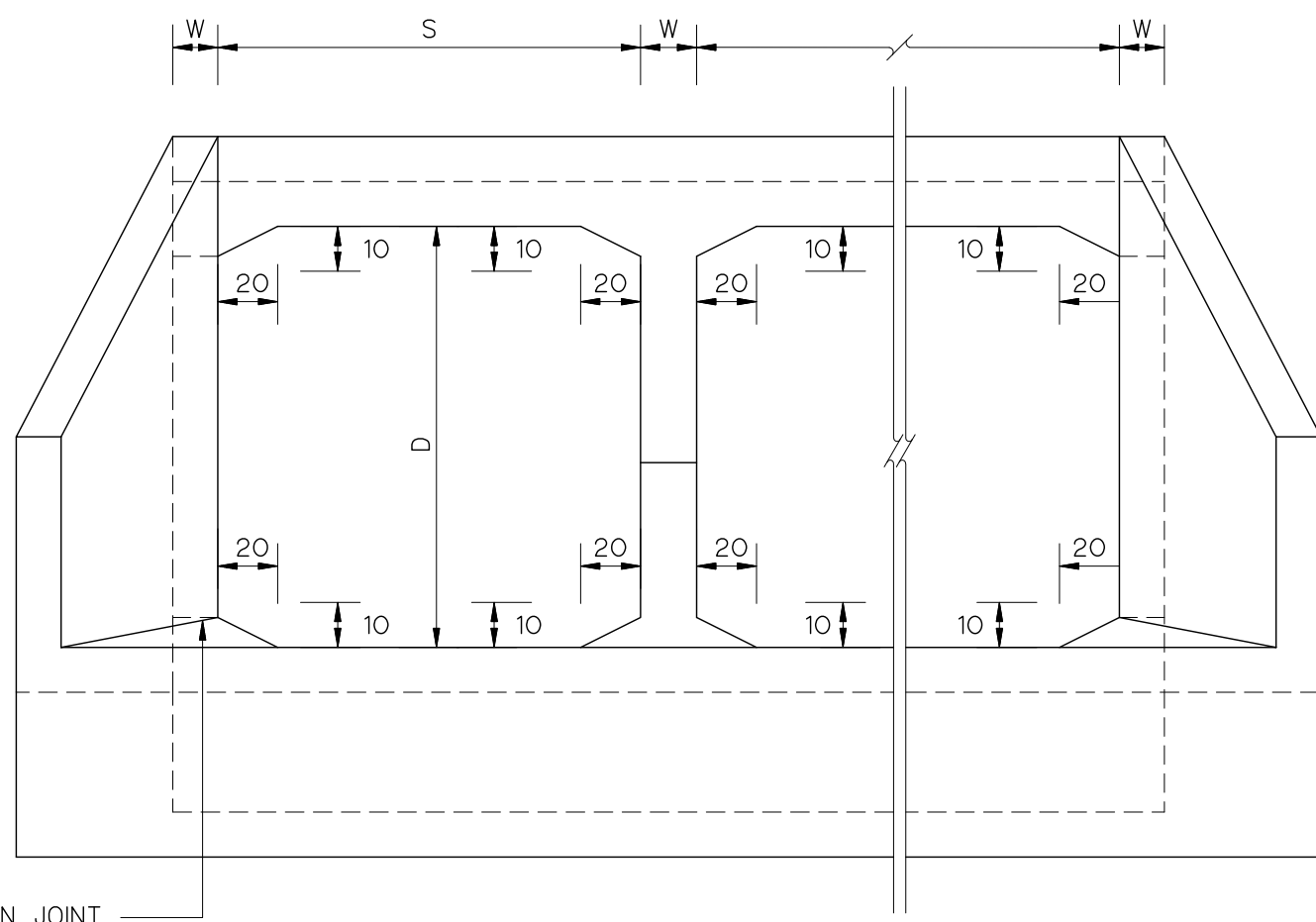
HALF LONGITUDINAL SECTION

NOT TO SCALE



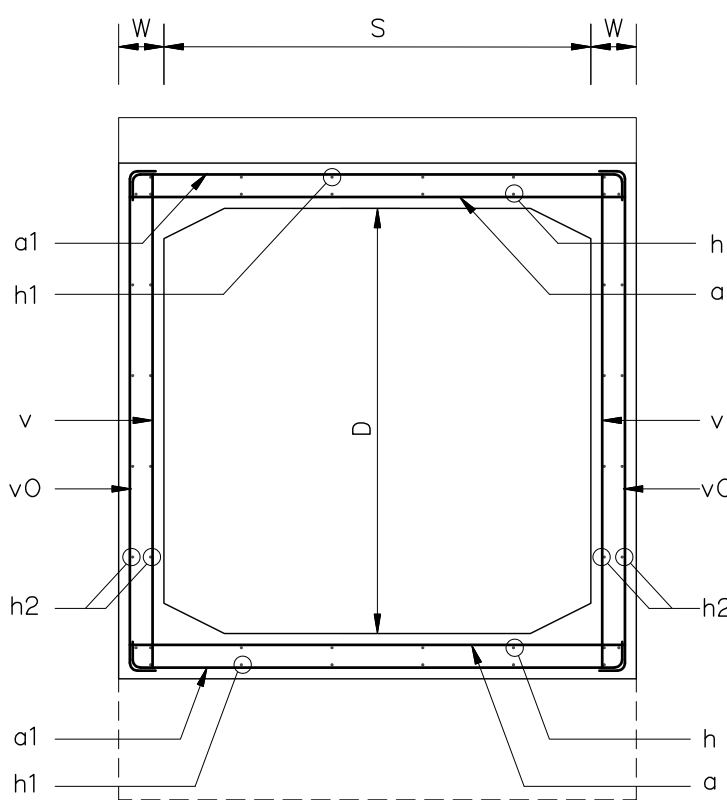
ELEVATION

NOT TO SCALE



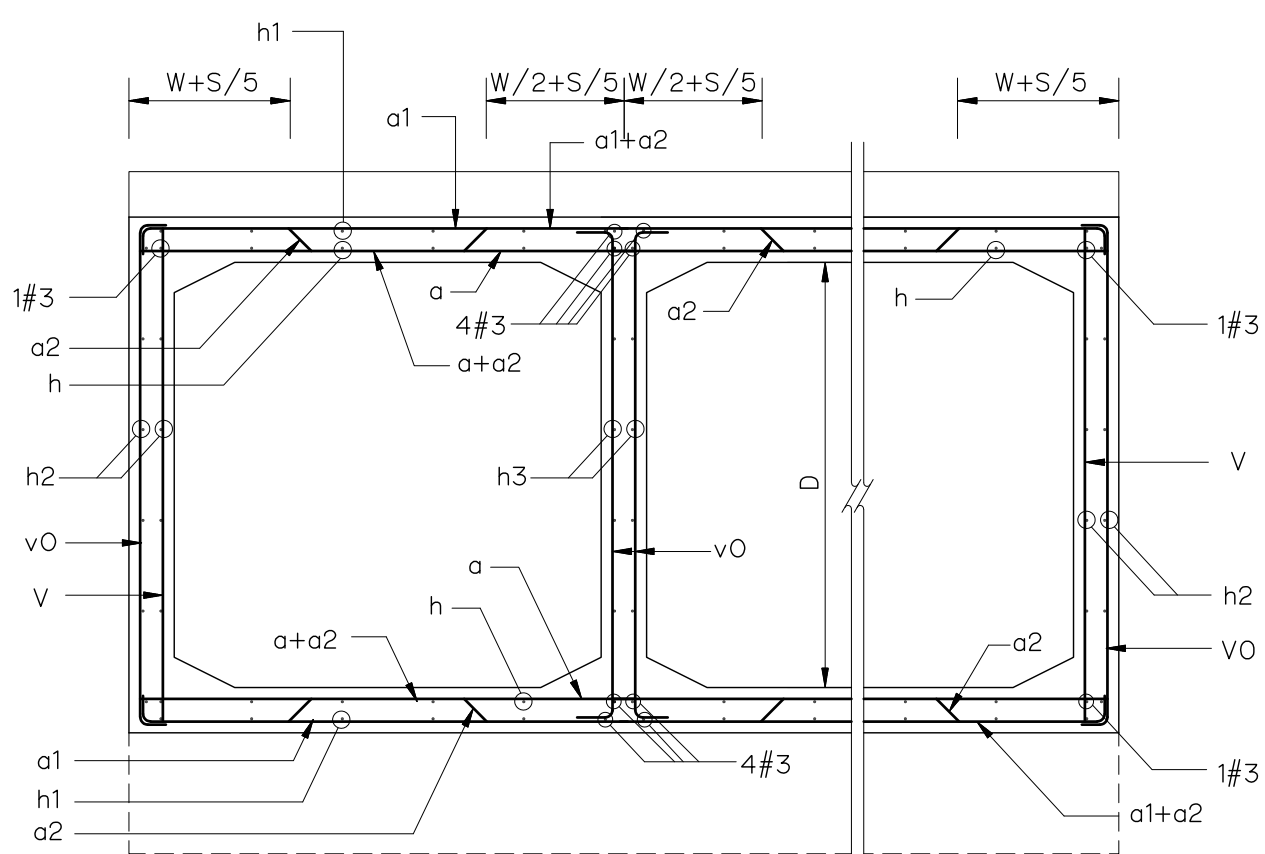
ELEVATION

NOT TO SCALE



SECTION A - A

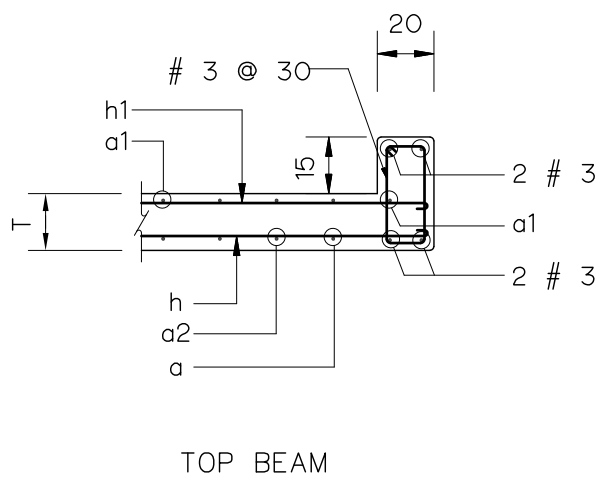
NOT TO SCALE



SECTION A - A

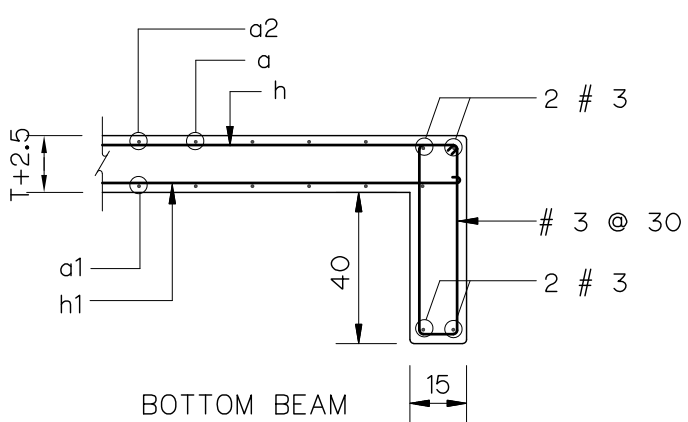
NOT TO SCALE

TABLE OF TOP AND BOTTOM SLAB REINFORCEMENTS																								
CLEAR SPAN (S)	DEPTH OF FILL (E) cm.	T cm.	SINGLE BOX CULVERT												MULTIPLE BOX CULVERTS									
			a			a1			h			h1			a		a1		a2		h		h1	
			#	cm.	L cm.	#	cm.	L cm.	#	cm.	NO.	#	cm.	NO.	#	cm.	#	cm.	#	cm.	#	cm.	#	cm.
50 cm.	0 – 30	20	5	16	113	3	45	113	4	30	8	3	45	6	5	32	3	45	5	32	4	30	3	45
	31 – 60	20	4	22	113	3	60	113	4	30	8	3	45	6	4	44	3	60	4	44	4	30	3	45
	61 – 150	20	4	22	113	3	60	113	4	30	8	3	45	6	4	44	3	60	4	44	4	30	3	45
	151 – 225	20	4	22	113	3	60	113	4	30	8	3	45	6	4	44	3	60	4	44	4	30	3	45
90 cm.	0 – 30	22.5	5	15	143	3	45	143	4	25	12	3	40	8	5	30	3	45	5	30	4	25	3	40
	31 – 60	20	4	15	143	3	60	143	4	40	8	3	40	8	4	30	3	60	4	30	4	40	3	40
	61 – 150	20	4	22	143	3	60	143	4	40	8	3	40	8	4	44	3	60	4	44	4	40	3	40
	151 – 225	20	4	22	143	3	60	143	4	40	8	3	40	8	4	44	3	60	4	44	4	40	3	40
120 cm.	0 – 30	22.5	5	13	173	3	45	173	4	25	14	3	36	10	5	26	3	45	5	26	4	25	3	40
	31 – 60	20	5	16	173	3	60	173	4	30	12	3	36	10	5	32	3	60	5	32	4	30	3	40
	61 – 150	20	4	15	173	3	60	173	4	36	10	3	36	10	4	30	3	60	4	30	4	40	3	40
	151 – 225	20	4	15	173	3	60	173	4	36	10	3	36	10	4	30	3	60	4	30	4	40	3	40
150 cm.	0 – 30	24	6	18	210	3	45	210	4	25	16	3	45	10	6	36	3	45	6	30	4	25	3	45
	31 – 60	22.5	6	22	210	3	60	210	4	30	14	3	45	10	6	44	3	60	6	44	4	30	3	45
	61 – 150	20	5	16	203	3	60	203	4	45	10	3	45	10	5	32	3	60	5	32	4	45	3	45
	151 – 225	22.5	5	16	203	3	60	203	4	45	10	3	45	10	5	32	3	60	5	32	4	45	3	45
180 cm.	0 – 30	25	5	12	233	3	45	233	4	21	22	3	45	12	5	24	3	45	5	24	4	21	3	45
	31 – 60	24	5	14	233	3	60	233	4	30	16	3	45	12	5	28	3	60	5	28	4	30	3	45
	61 – 150	22.5	5	15	233	3	60	233	4	45	12	3	45	12	5	30	3	60	5	30	4	45	3	45
	151 – 225	22.5	5	14	233	3	60	233	4	45	12	3	45	12	5	28	3	60	5	28	4	45	3	45
# 3 = Ø 3/8" OR 9 MM. # 4 = Ø 1/2" OR 12 MM. NO. = TOTAL AMOUNT OF BARS																								
# 5 = Ø 5/8" OR 16 MM. # 6 = Ø 3/4" OR 20 MM. L = TOTAL LENGTH OF EACH BAR																								



END BEAM DETAILS

NOT TO SCALE



BAR BENDING DIAGRAMS

NOT TO SCALE

TABLE OF VERTICAL WALL REINFORCEMENT													
DEPTH D cm.	SINGLE BOX CULVERT							MULTIPLE BOX CULVERTS					
	DEPTH OF FILL (E) O – 255 CM.							DEPTH OF FILL (E) O – 225 CM.					
	WIDTH W cm.	REINFORCING BAR		REINFORCING BAR		REINFORCING BAR		EXTERIOR WALL			INTERIOR WALL		
		V	VO	h2	REINFORCING BAR VO	TOTAL AMOUNT OF	REINFORCING BAR VO	TOTAL AMOUNT OF	h ₂ (#3)EACH WALL	h ₃ (#3)EACH WALL			
#	⊙ , cm.	#	⊙ , cm.	#	⊙ , cm.	#	⊙ , cm.	#	⊙ , cm.	#	⊙ , cm.	#	⊙ , cm.
60	20	4	30	3	30	3	30	4	30	8	3	40	4
90	20	4	30	3	30	3	30	4	30	12	3	40	6
120	20	4	30	3	30	3	30	4	30	12	3	40	6
150	22.5	4	30	3	30	3	30	4	30	12	3	40	8
180	25	4	30	3	30	3	30	4	30	20	3	40	10

REFERENCE DRAWINGS :

- STANDARD, DRAIN CULVERT TYPE "2", PLAN SECTION AND DETAILS
- STANDARD, DRAIN CULVERT TYPE "3", PLAN SECTION AND DETAILS

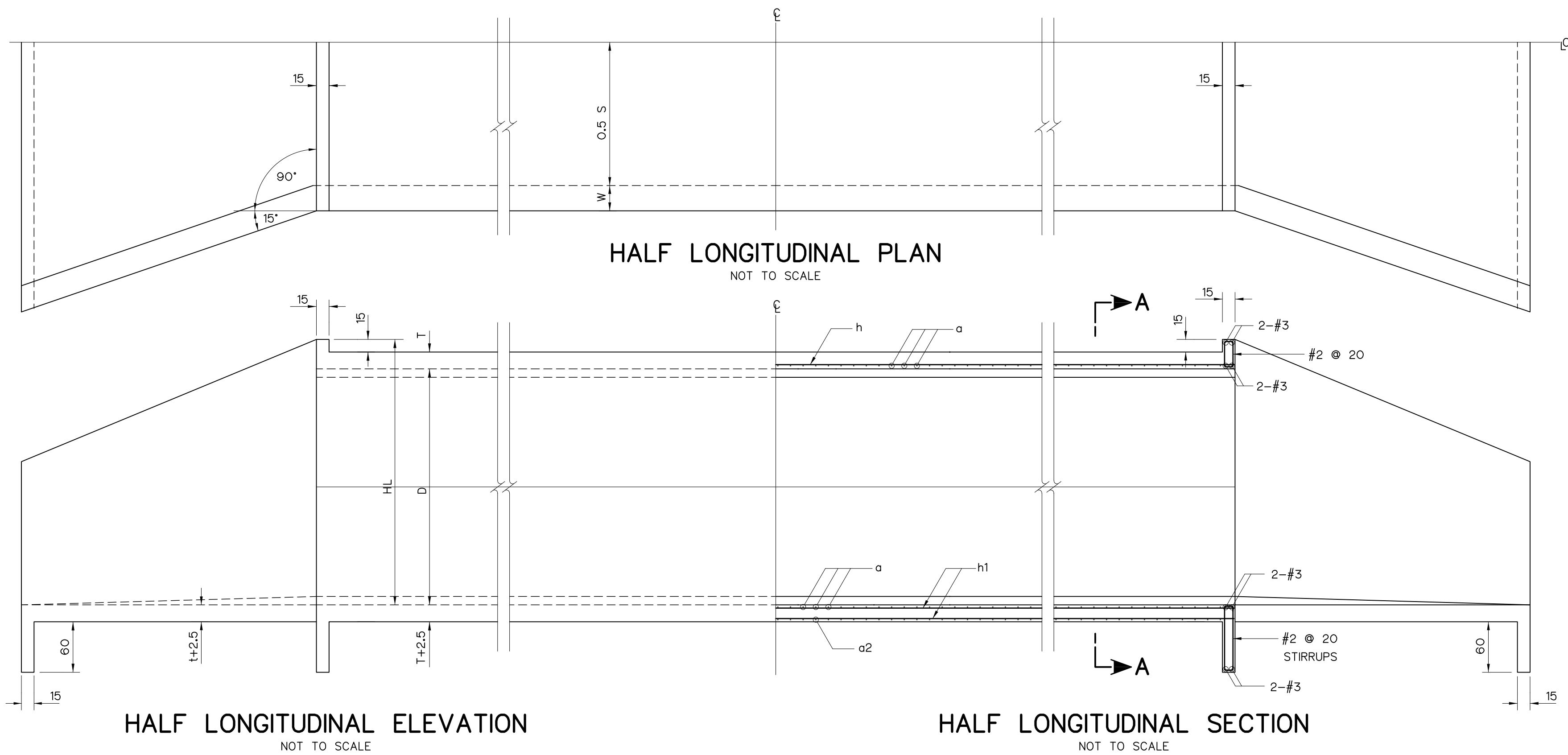
HRR-SD-02

HRR-SD-03

3					
2					
1					
NO.	DATE	REVISIONS	CHECKED	APPROVED	
CONSULTANTS			DEDE		

- NOTES :**
- DESIGN PARAMETERS ARE
 - LIVE LOADING : HS 20-44
 - WORKING STEEL STRESSES :
PLAN BARS, $f_s = 1,200 \text{ KG/CM}^2$
DEFORMED, $f_s = 1,400 \text{ KG/CM}^2$
 - REBARS # 4 OR LARGER SHALL BE TIS 24-2548 GRADE SD 30 DEFORMED BARS, OTHERS SHALL BE TIS 20-2543 GRADE SR 24 PLAIN BARS UNLESS OTHERWISE INDICATED.
 - LOCATIONS OF LAP SPLICE OF REBARS SHALL BE APPROVED BY THE ENGINEER.
 - LAP LENGTH SHALL NOT BE LESS THAN 40 DIAMETERS OF BIGGER BAR FOR PLAIN BARS AND 24 DIAMETERS OF BIGGER BAR FOR DEFORMED BARS.
 - IN CASE OF SALINE PROTECTION, HIGH SULPHATE RESISTANT PORTLAND CEMENT TYPE 5 CONFORMING TO TIS 15-2532 SPECIFICATIONS SHALL BE USED INSTEAD OF TYPE 1 PORTLAND CEMENT.
 - CLEAR CONCRETE COVER SHALL BE 5.0 CM. EXCEPT THE BOTTOM OF BOTTOM SLABS AND OUTSIDE FACES OF THE EXTERIOR WALLS WHERE A CLEAR COVER OF 7.5 CM. SHALL BE PROVIDED.
 - ALL DIMENSIONS SHOWN ARE IN CENTIMETERS UNLESS OTHERWISE INDICATED.
 - THIS DRAWING IS ADAPTED FROM DOH DWG. NO. BC-103.

 KINGDOM OF THAILAND Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY			
HUAI PRA THAO RESERVOIR BOUNDARY ROAD PROJECT AMPHOE KAENG KHRO, CHANGWAT CHAIYAPHUM			
CIVIL WORKS STANDARD			
BOX CULVERT, SECTIONS AND REINFORCEMENT DETAILS			
 PANYA CONSULTANTS CO.,LTD.		 Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY	
DESIGNED 28.1957		REVIEWED 28.176431	
DRAWN		RECOMMENDED	
CHECKED 28.1957		APPROVED	
PROJECT MANAGER 10/08/2021		DRAWING NO. HRR-SD-07	
DATE		SHEET NO. 77 OF 80	



HALF LONGITUDINAL PLAN

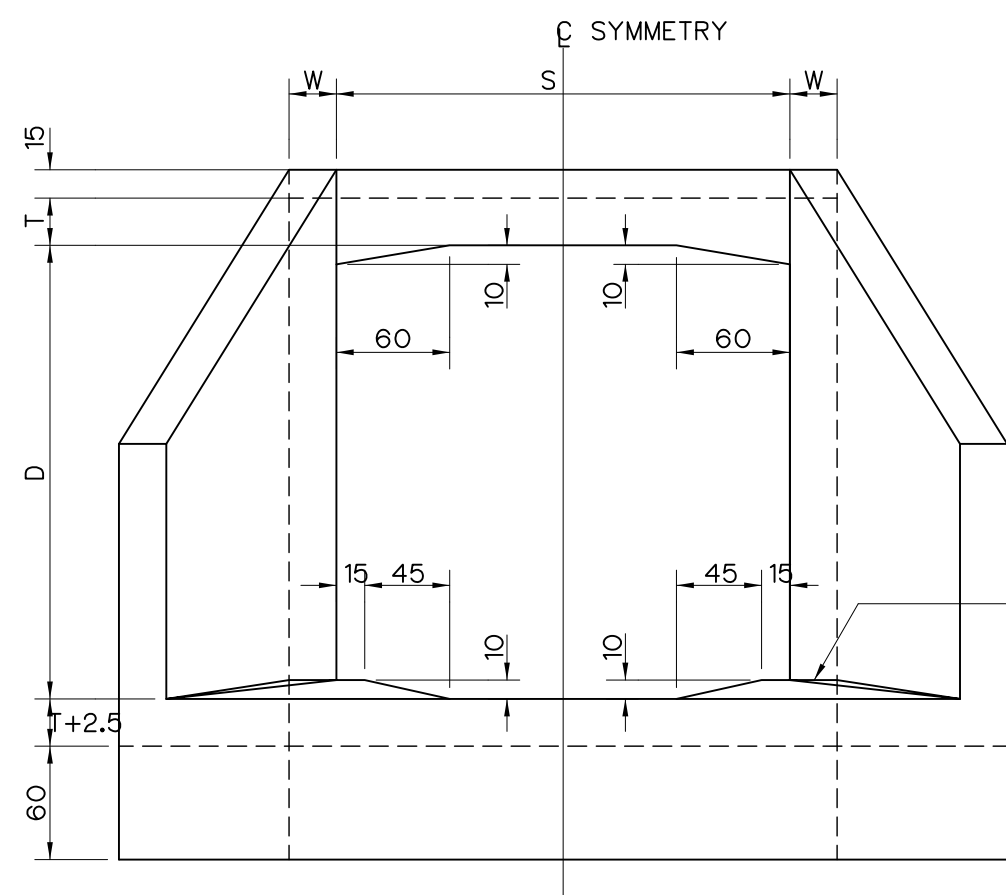
NOT TO SCALE

HALF LONGITUDINAL ELEVATION

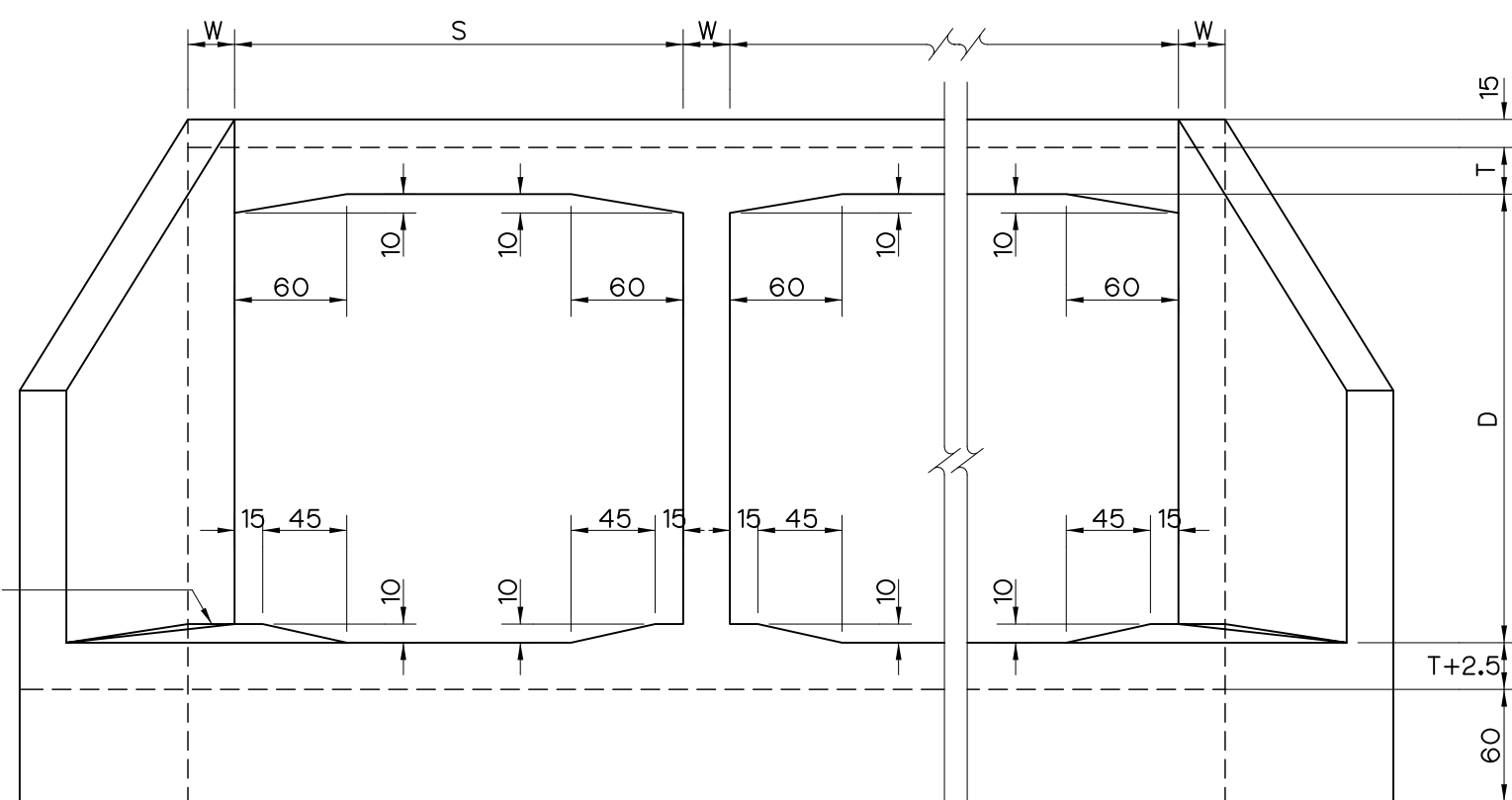
NOT TO SCALE

HALF LONGITUDINAL SECTION

NOT TO SCALE



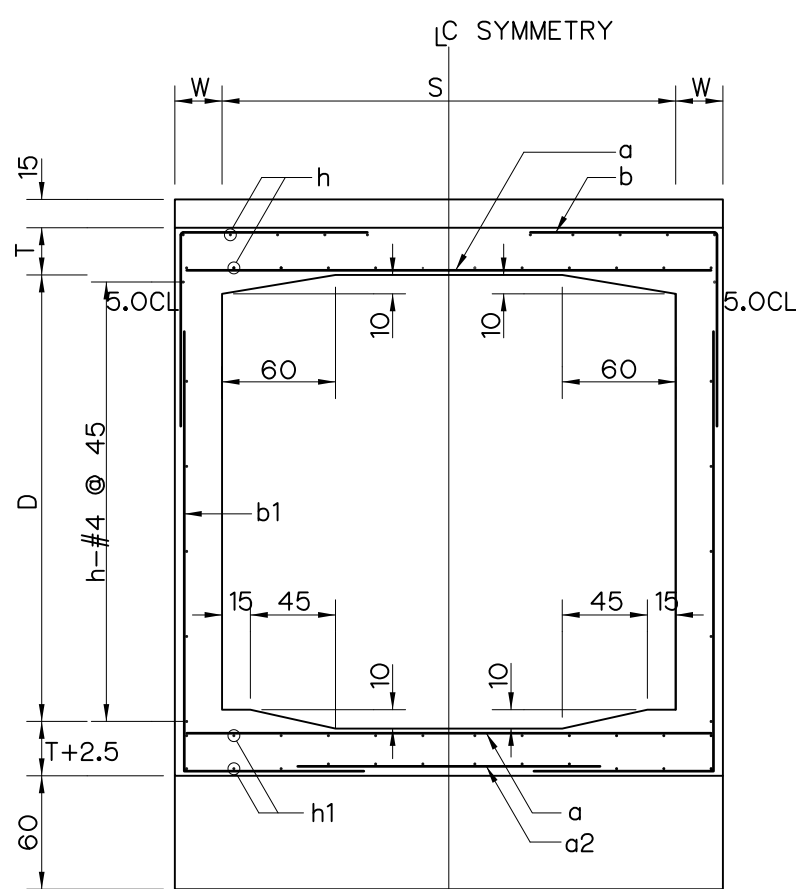
SINGLE BOX



MULTIPLE BOXES

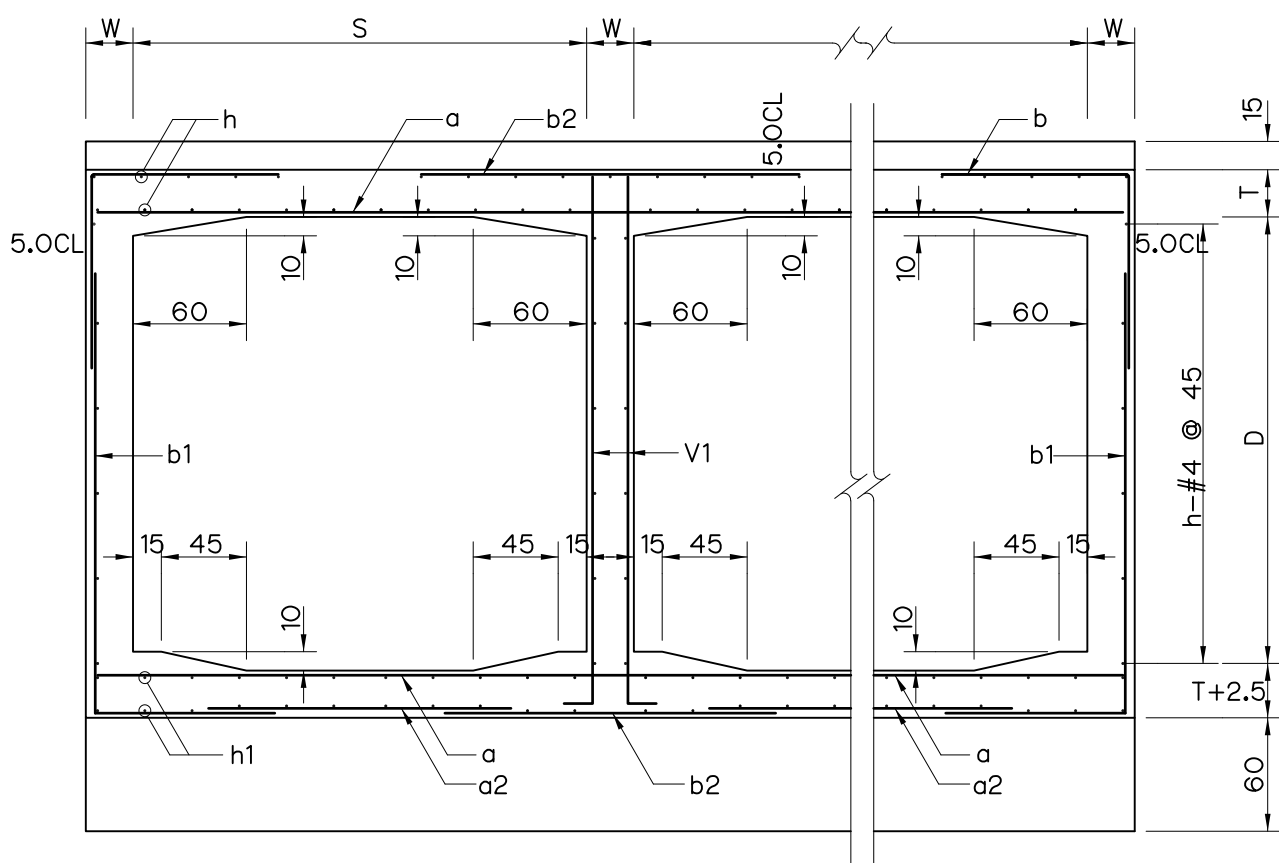
TRANSVERSE ELEVATION

NOT TO SCALE



SINGLE BOX TYPE A

(FOR $D \leq 245$ CM. AND $W < 30$ CM.)

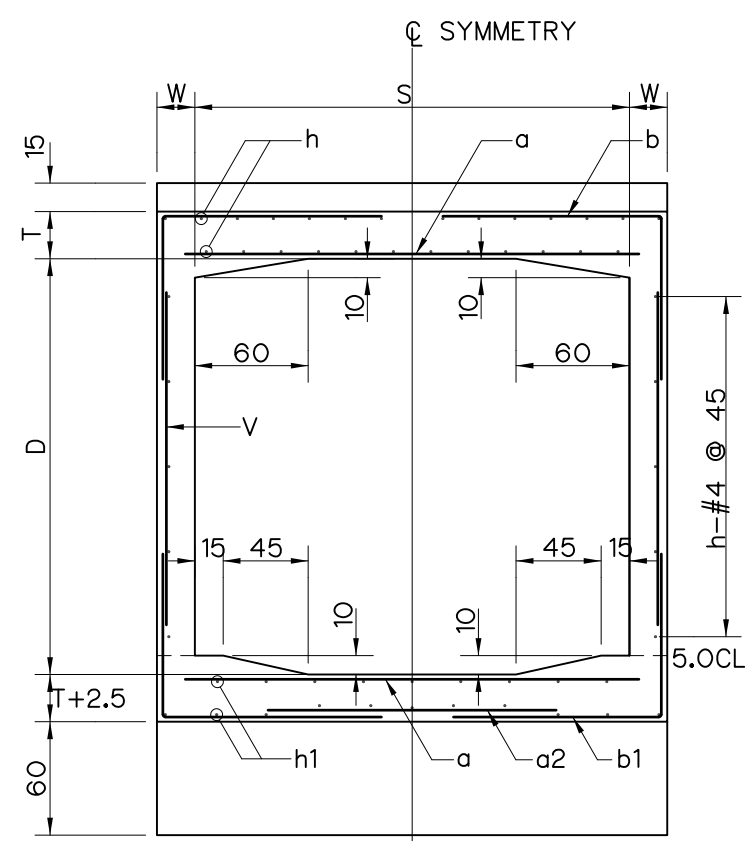


MULTIPLE BOXES TYPE A

(FOR $D < 245$ CM. AND $W < 30$ CM.)

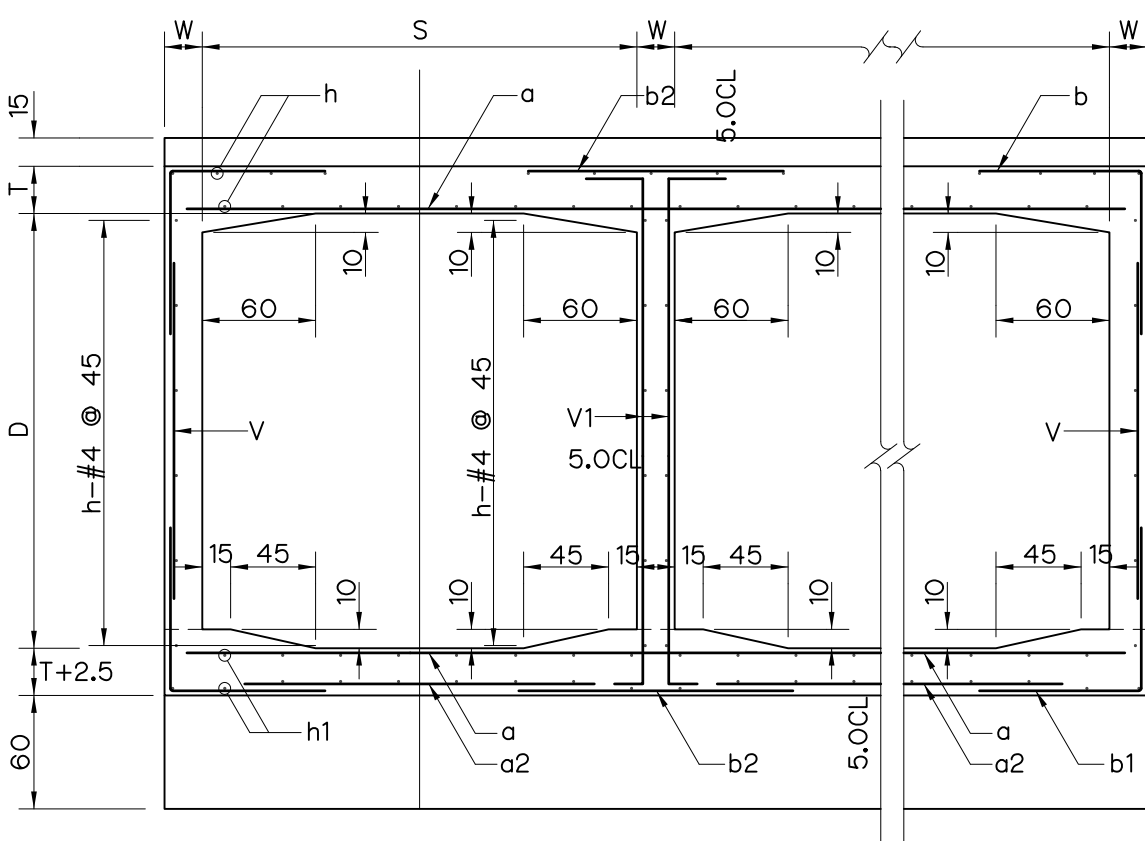
SECTION A — A

NOT TO SCALE



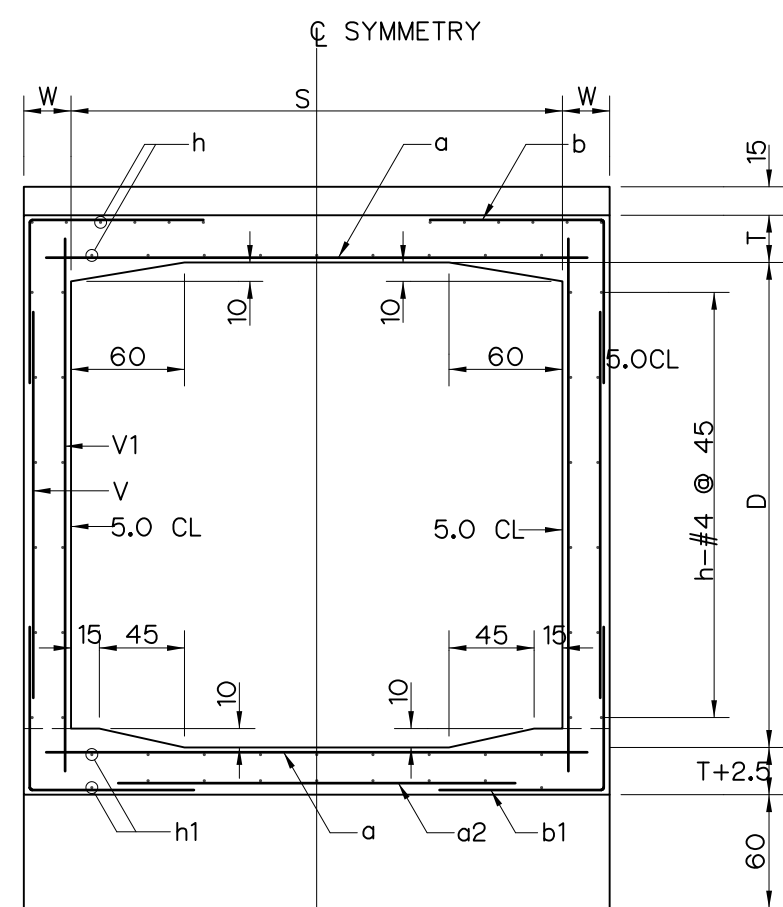
SINGLE BOX TYPE B

(FOR $D > 245$ CM. AND $W < 30$ CM.)



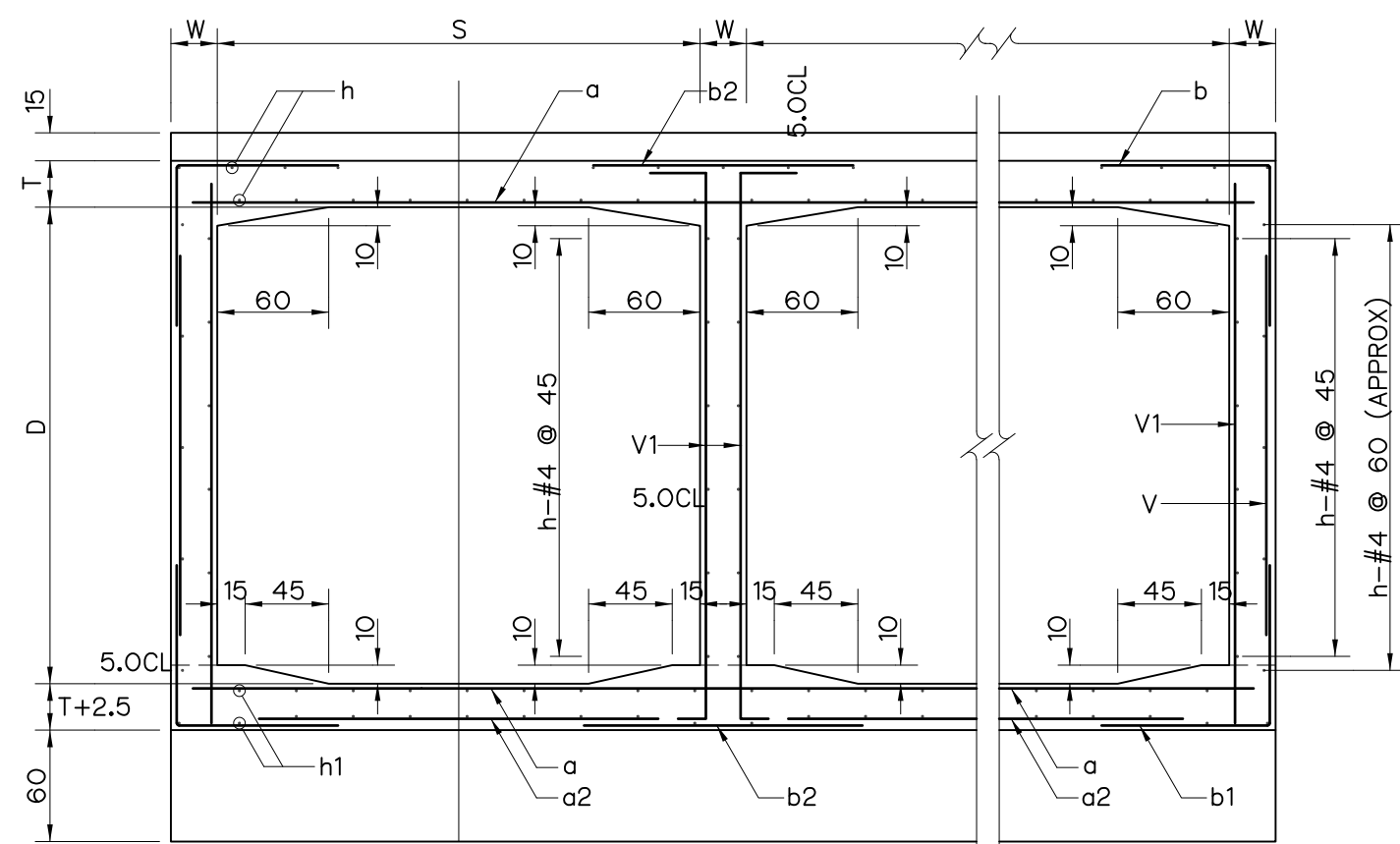
MULTIPLE BOXES TYPE B

(FOR $D > 240$ CM. AND $W < 30$ CM.)



SINGLE BOX TYPE C

(FOR $D > 245$ CM. AND $W \geq 30$ CM.)



MULTIPLE BOXES TYPE C

(FOR $D > 240$ CM. AND $W \geq 30$ CM.)

NOTES :

1. FOR GENERAL NOTES NOT MENTIONED IN THIS DRAWING SEE HRR-SD-09.
2. CLEAR CONCRETE COVER SHALL BE 5.0CM. EXCEPT THE BOTTOM OF BOTTOM SLABS OR WALL WHERE CLEAR.
3. ALL DIMENSIONS SHOWN ARE IN CENTIMETERS UNLESS OTHERWISE INDICATED.
4. THIS DRAWING IS ADAPTED FROM DOH DRAWING NO. 7B/7.

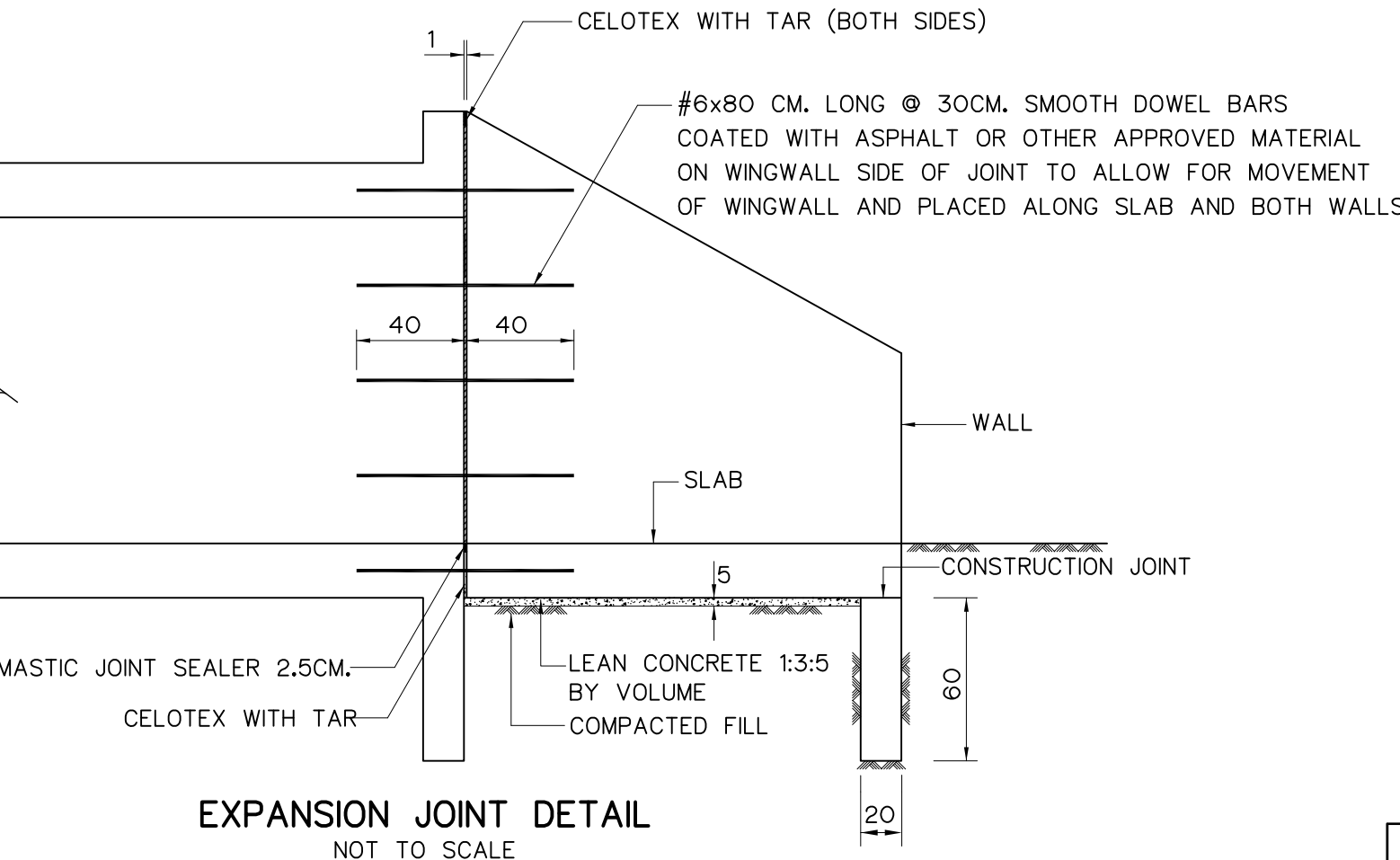
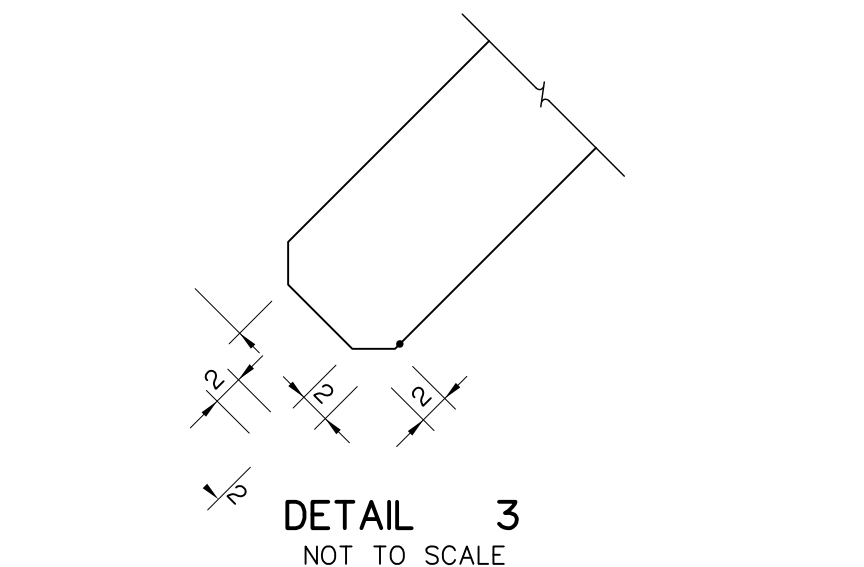
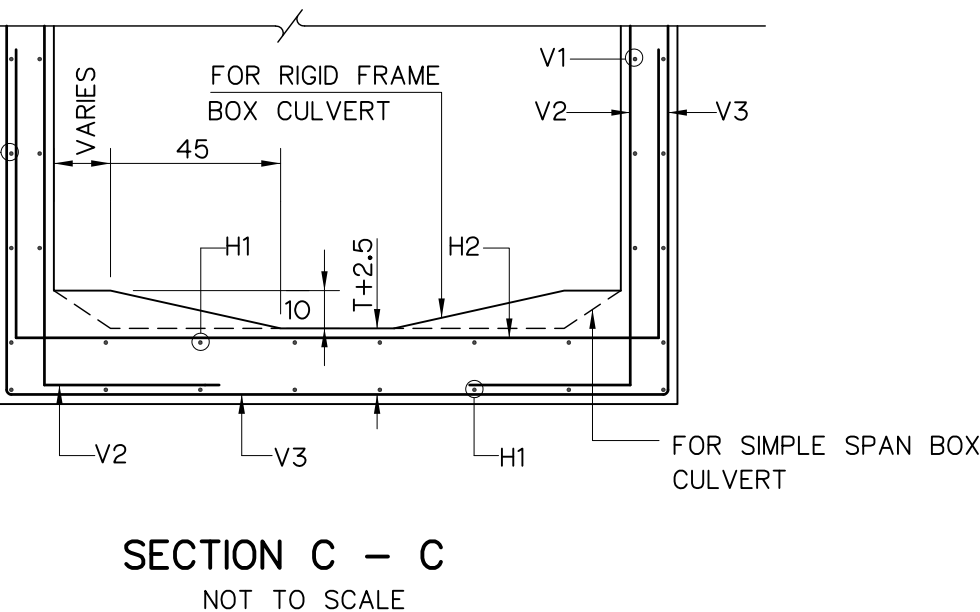
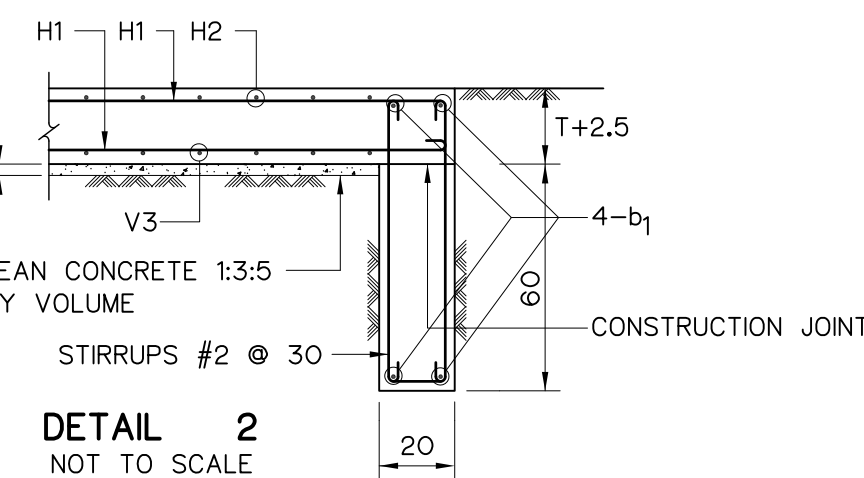
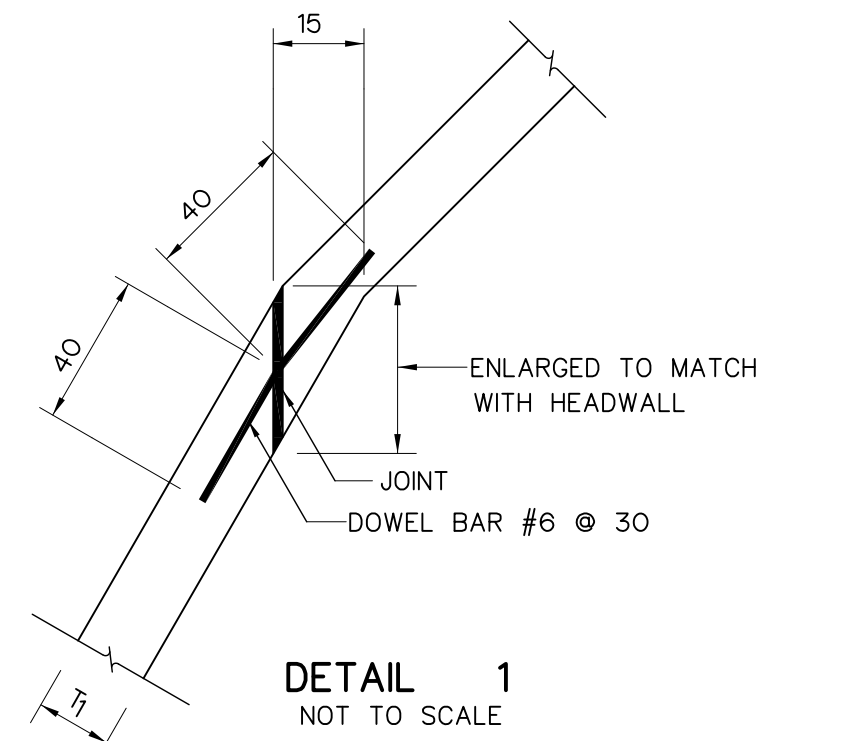
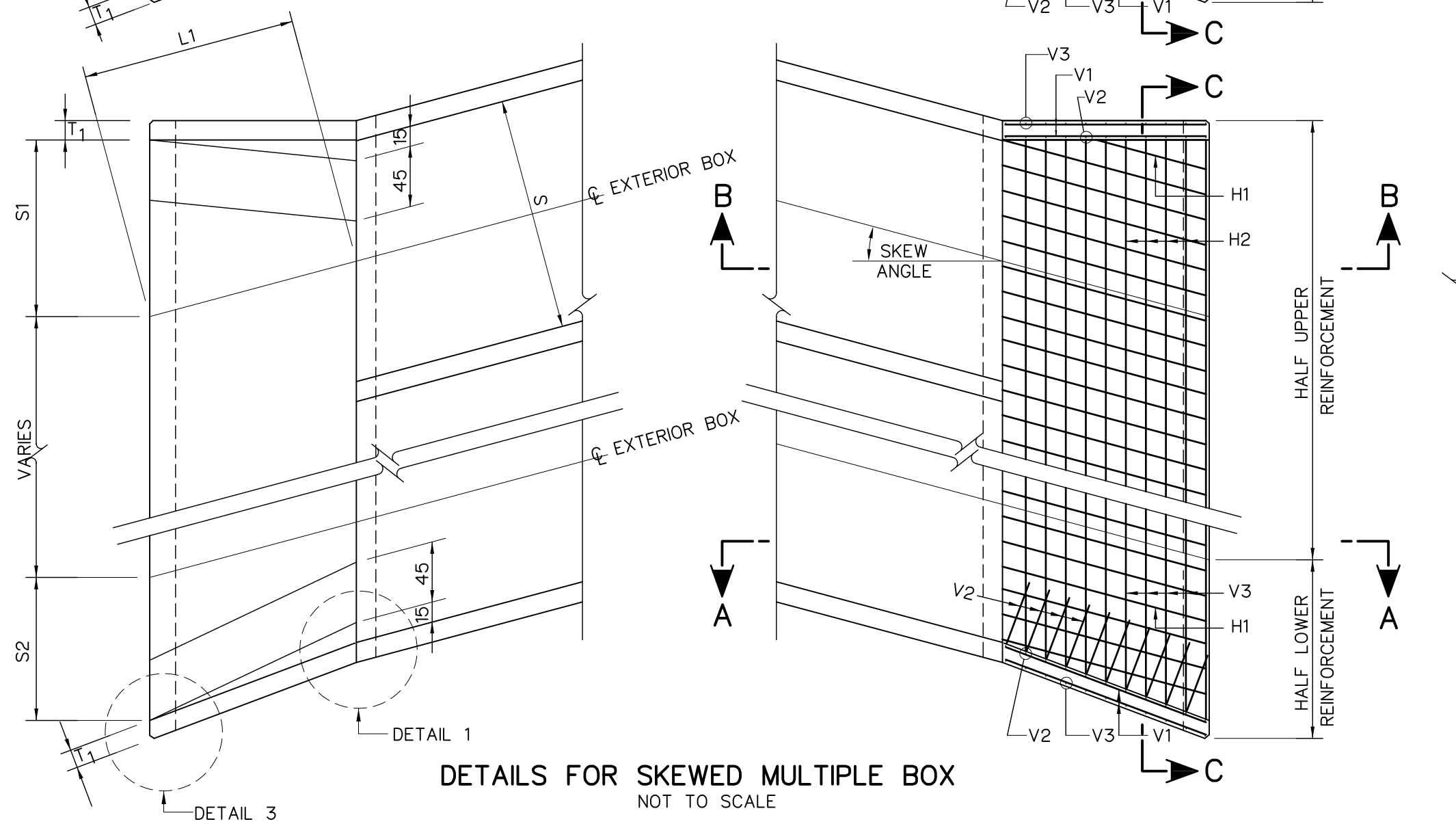
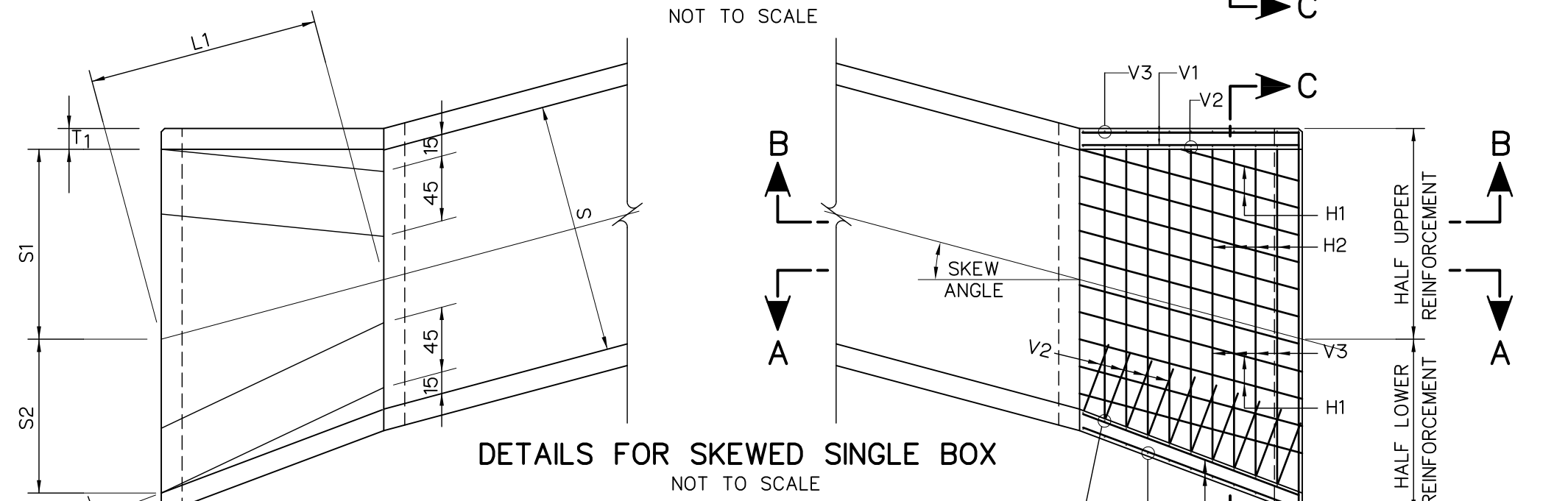
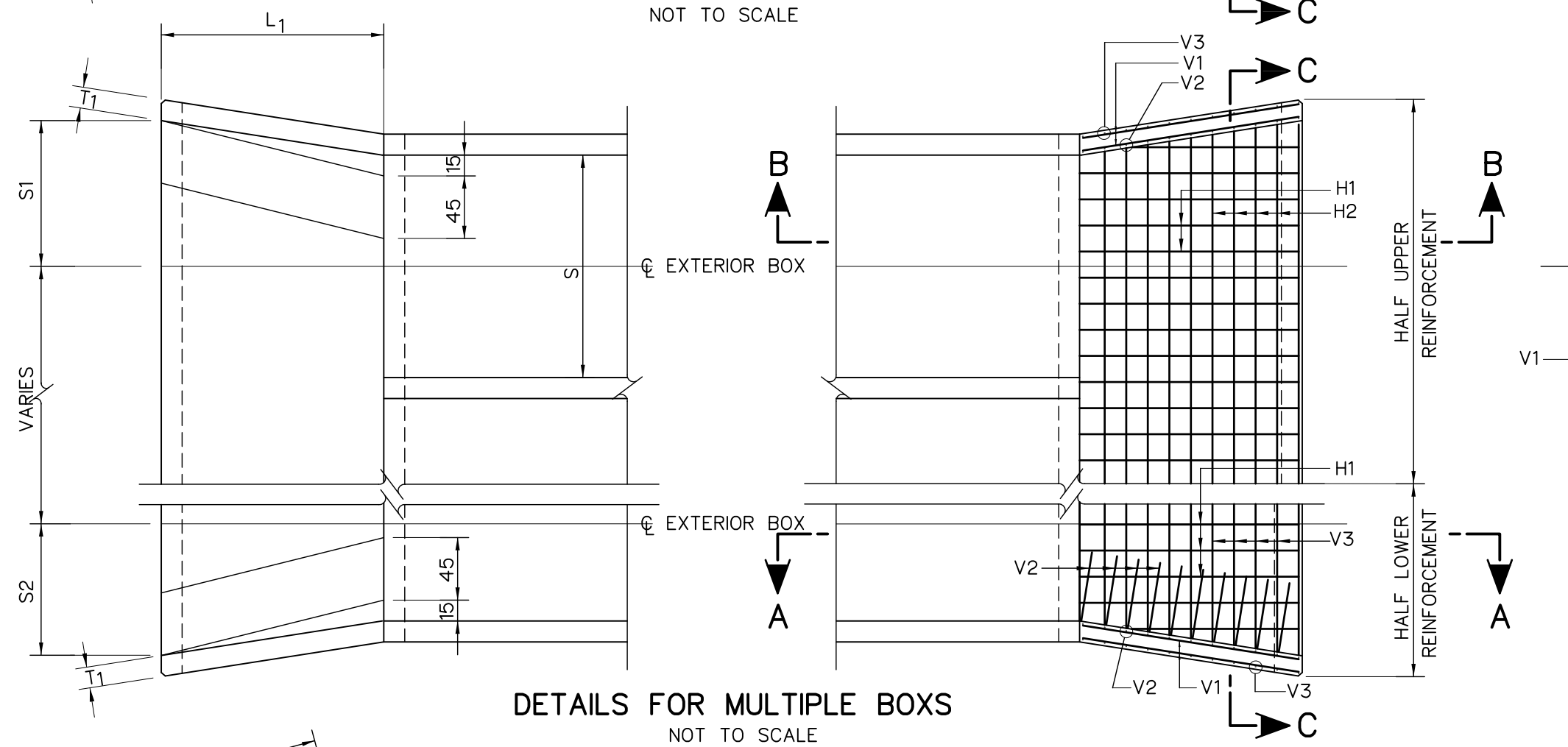
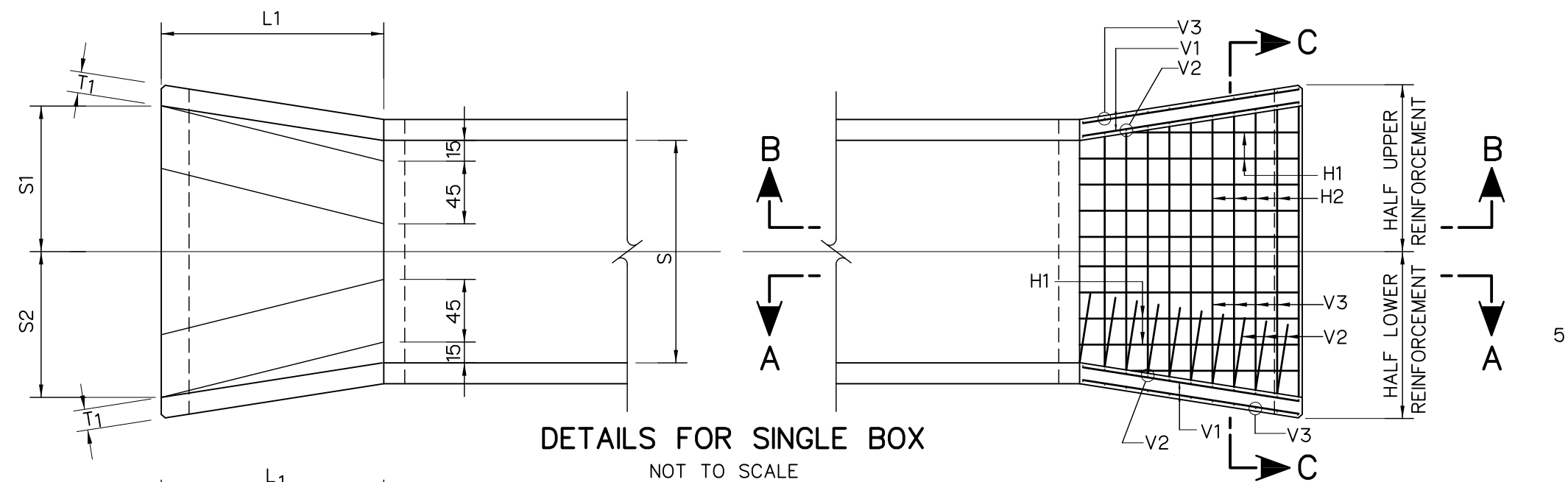
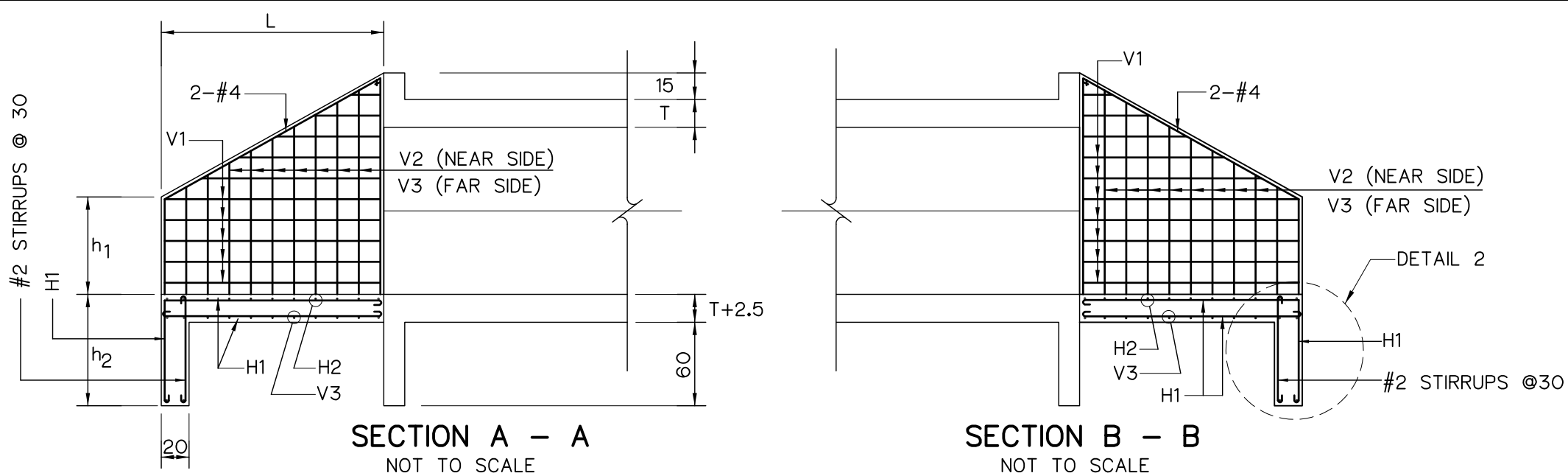
REFERENCE DRAWINGS :

- | | |
|---|-----------|
| 1. STANDARD, DRAIN CULVERT TYPE "2", PLAN SECTION AND DETAILS | HRR-SD-02 |
| 2. STANDARD, DRAIN CULVERT TYPE "3", PLAN SECTION AND DETAILS | HRR-SD-03 |

 KINGDOM OF THAILAND Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY			
HUAI PRA THAO RESERVOIR BOUNDARY ROAD PROJECT AMPHOE KAENG KHRO, CHANGWAT CHAIYAPHUM			
CIVIL WORKS STANDARD RIGID FRAME RC BOX CULVERT PLAN, ELEVATION AND SECTIONS			
 PANYA CONSULTANTS CO.,LTD.		 Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY	
REVIEWED		SUBMITTED	
DESIGNED	28.1957	28.176431	RECOMMENDED
DRAWN	28.1957		APPROVED
CHECKED	28.1957		APPROVED
PROJECT MANAGER		DATE	DRAWING NO.
		10/08/2021	HRR-SD-08
			SHEET NO.
			78 OF 80

3				
2				
1				
NO.	DATE	REVISIONS	CHECKED	APPROVED
CONSULTANTS		DEDE		

S	D	FILL HEIGHT CM.	T CM.	W CM.	BAR MARK α			BAR MARK α2			BAR MARK b&b1			BAR MARK b			BAR MARK b1			BAR MARK h			BAR MARK h1			BAR MARK v			BAR MARK v1			BAR MARK b2		
					#	CM.	L. CM.	#	CM.	L. CM.	#	CM.	F. CM.	G. CM.	L. CM.	G1. CM.	L1. CM.	#	CM.	L. CM.	#	CM.	L. CM.	#	CM.	L. CM.	#	CM.	L. CM.	#	CM.	L. CM.		
CLEAR SPAN	180	CM.	0-30	19	20	5	14	265	4	±120	190	4	16.5	100	100	215	180	295	4	25	20	4	45	11	-	-	-	4	30	230	4	16.5	195	
			31-60	16.5	20	5	16.5	265	4	±120	190	4	16.5	100	100	215	180	295	4	30	19	4	45	11	-	-	-	4	30	230	4	16.5	195	
			61-150	15	20	5	20	265	4	±120	190	4	15	100	100	215	180	295	4	38	18	4	45	11	-	-	-	4	30	230	4	15	195	
			151-225	15	20	5	17.5	265	4	±120	190	4	12.5	100	100	215	180	295	4	45	17	4	45	11	-	-	-	4	30	230	4	12.5	195	
			226-300	16.5	20	5	16.5	265	4	±120	190	4	12.5	100	100	215	180	295	4	45	17	4	38	13	-	-	-	4	30	230	4	12.5	195	
			301-375	17.5	20	5	14	265	4	±120	190	4	11.5	100	100	215	180	295	4	45	17	4	30	15	-	-	-	4	30	230	4	11.5	195	
			376-450	19	20	6	17.5	270	4	±120	190	4	11	100	100	215	180	300	4	45	17	5	30	15	-	-	-	4	30	230	4	11	195	
			451-600	22.5	20	6	15	270	4	±120	190	5	12.5	102.5	102.5	220	182.5	300	4	45	17	5	30	15	-	-	-	4	30	230	5	12.5	195	
			601-750	26	20	6	13	270	4	±120	190	5	12.5	102.5	102.5	220	182.5	300	4	45	17	6	30	15	-	-	-	4	30	230	5	12.5	195	
			751-900	31	20	6	13	270	4	±120	190	5	12.5	102.5	102.5	220	182.5	300	4	45	17	6	30	15	-	-	-	4	30	230	5	12.5	195	
			901-1050	34	20	6	12	270	4	±120	190	5	12.5	102.5	102.5	220	182.5	300	4	45	17	6	30	15	-	-	-	4	30	230	5	12	195	
			1051-1200	37	20	6	10	270	4	±120	190	5	12.5	102.5	102.5	220	182.5	300	4	45	17	6	30	15	-	-	-	4	30	230	5	12	195	
			1201-1500	41	20	6	16.5	270	4	±120	190	5	12.5	102.5	102.5	220	182.5	300	4	45	17	6	30	15	-	-	-	4	30	230	5	12	195	
								*												*				*										
210	CM.	CM.	0-30	19	20	5	14	265	4	±120	190	4	16.5	100	100	215	210	325	4	25	22	4	45	11	-	-	-	4	30	260	4	16.5	195	
			31-60	16.5	20	5	16.5	265	4	±120	190	4	16.5	100	100	215	210	325	4	30	21	4	45	11	-	-	-	4	30	260	4	16.5	195	
			61-150	15	20	5	20	265	4	±120	190	4	15	100	100	215	210	325	4	38	20	4	45	11	-	-	-	4	30	260	4	15	195	
			151-225	15	20	5	17.5	265	4	±120	190	4	12.5	100	100	215	210	325	4	45	19	4	45	11	-	-	-	4	30	260	4	12.5	195	
			226-300	16.5	20	5	16.5	265	4	±120	190	4	12.5	100	100	215	210	325	4	45	19	4	38	13	-	-	-	4	30	260	4	12.5	195	
			301-375	17.5	20	5	14	265	4	±120	190	4	11.5	100	100	215	210	325	4	45	19	4	30	15	-	-	-	4	30	260	4	11.5	195	
			376-450	19	20	6	17.5	270	4	±120	190	4	11.5	100	100	215	210	325	4	45	19	5	30	15	-	-	-	4	30	260	4	11.5	195	
			451-600	22.5	20	6	15	270	4	±120	190	5	12.5	102.5	102.5	220	212.5	330	4	45	19	5	30	15	-	-	-	4	30	260	5	12.5	195	
			601-750	26	20	6	14	270	4	±120	190	5	12.5	102.5	102.5	220	212.5	330	4	45	19	6	30	15	-	-	-	4	30	260	5	12.5	195	
			751-900	31	20	6	13	270	4	±120	190	5	12.5	102.5	102.5	220	212.5	330	4	45	19	6	30	15	-	-	-	4	30	260	5	12.5	195	
			901-1050	34	20	6	12	270	4	±120	190	5	12.5	102.5	102.5	220	212.5	330	4	45	19	6	30	15	-	-	-	4	30	260	5	12	195	
			1051-1200	37	20	6	10	270	4	±120	190	5	12.5	102.5	102.5	220	212.5	330	4	45	19	6	30	15	-	-	-	4	30	260	5	12	195	
			1201-1500	41	20	6	16.5	270	4	±120	190	5	12.5	102.5	102.5	220	212.5	330	4	45	19	6	30	15	-	-	-	4	30	260	5	12	195	
								*												*				*										
CLEAR SPAN	210	CM.	0-30	19	20	5	12.5	295	4	±120	220	4	17.5	110	110	235	210	335	4	23	25	4	45	13	-	-	-	4	30	260	4	17.5	215	
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			61-150	17.5	20	5	17.5	295	4	±120	220	4	16.5	110	110	235	210	335	4	38	21	4	45	13	-	-	-	4	30	260	4	16.5	215	
			151-225	17.5	20	5	15	295	4	±120	220	4	14	110	110	235	210	335	4	45	20	4	45	13	-	-	-	4	30	260	4	14	215	
			226-300	17.5	20	5	19	300	4	±120	220	4	12.5	110	110	235	210	335	4	45	20	4	38	15	-	-	-	4	30	260	4	12.5	215	
			301-375	20	20	6	16.5	300	4	±120	220	4	12.5	110	110	235	210	335	4	45	20	4	30	17	-	-	-	4	30	260	4	12.5	215	
			376-450	21	20	6	15	300	4	±120	220	4	12.5	110	110	235	210	335	4	45	20	5	30	17	-	-	-	4	30	260	4	11	215	
			451-600	25	20	6	12.5	300	4	±120	220	5	12.5	112.5	112.5	240	212.5	340	4	45	20	5	30	17	-	-	-	4	30	260	5	12.5	215	
			601-750	29	20	6	11	300	4	±120	220	5	12.5	112.5	112.5	240	212.5	340	4	45	20	6	30	17	-	-	-	4	30	260	5	12.5	215	
			751-900	33	20	6	10	300	4	±120	220	5	12.5	112.5	112.5	240	212.5	340	4	45	20	6	30	17	-	-	-	4	30	260	5	12.5	215	
			901-1050	38	20	6	17	300	4	±120	220	5	12.5	112.5	112.5	240	212.5	340	4	45	20	6	30	17	-	-	-	4	30	260	5	12	215	
			1051-1200	41	20	8	15	300	4	±120	220	5	12.5	112.5	112.5	240	212.5	340	4	45	20	8	30	17	-	-	-	4	30	260	5	12	215	
			1201-1500	47	20	8	13	300	4	±120	220	5	12.5	112.5	112.5	240	212.5	340	4	45	20	8	30	17	-	-	-	4	30	260	5	12	215	
								*												*				*										
240	CM.	CM.	0-30	19	20	5	12.5	295	4	±120	220	4	16.5	110	110	235	240	365	4	23	25	4	45	13	-	-	-	4	30	290	4	16.5	215	
			31-60	17.5	20	5	15	295	4	±120	220	4	16.5	110	110	235	240	365	4	25	24	4	45	13	-	-	-	4	30	290	4	16.5	215	
			61-150	17.5	20	5	17.5	295	4	±120	220	4	15	110	110	235	240	365	4	38	21	4	45	13	-	-	-	4	30	290	4	15	215	
			151-225	17.5	20	5	15	295	4	±120	220	4	12.5	110	110	235	240	365	4	45	20	4	45	13	-	-	-	4	30	290	4	12.5	215	
			226-300	17.5	20	5	19	300	4	±120	220	4	12.5	110	110	235	240	365	4	45	20	4	38	15	-	-	-	4	30	290	4	12.5	215	
			301-375	20	20	6	16.5	300	4	±120	220	4	12.5	110	110	235	240	365	4	45	20	4	30	17	-	-	-	4	30	290	4	12.5	215	
			376-450	21	20	6	15	300	4	±120	220	4	12.5	110	110	235	240	365	4	45	20	5	30	17	-	-	-	4	30	290	4	11	215	
			451-600	25	20	6	12.5	300	4	±120	220	5	12.5	112.5	112.5	240	242.5	370	4	45	20	5	30	17	-	-	-	4	30	290	5	12.5	215	
			601-																															

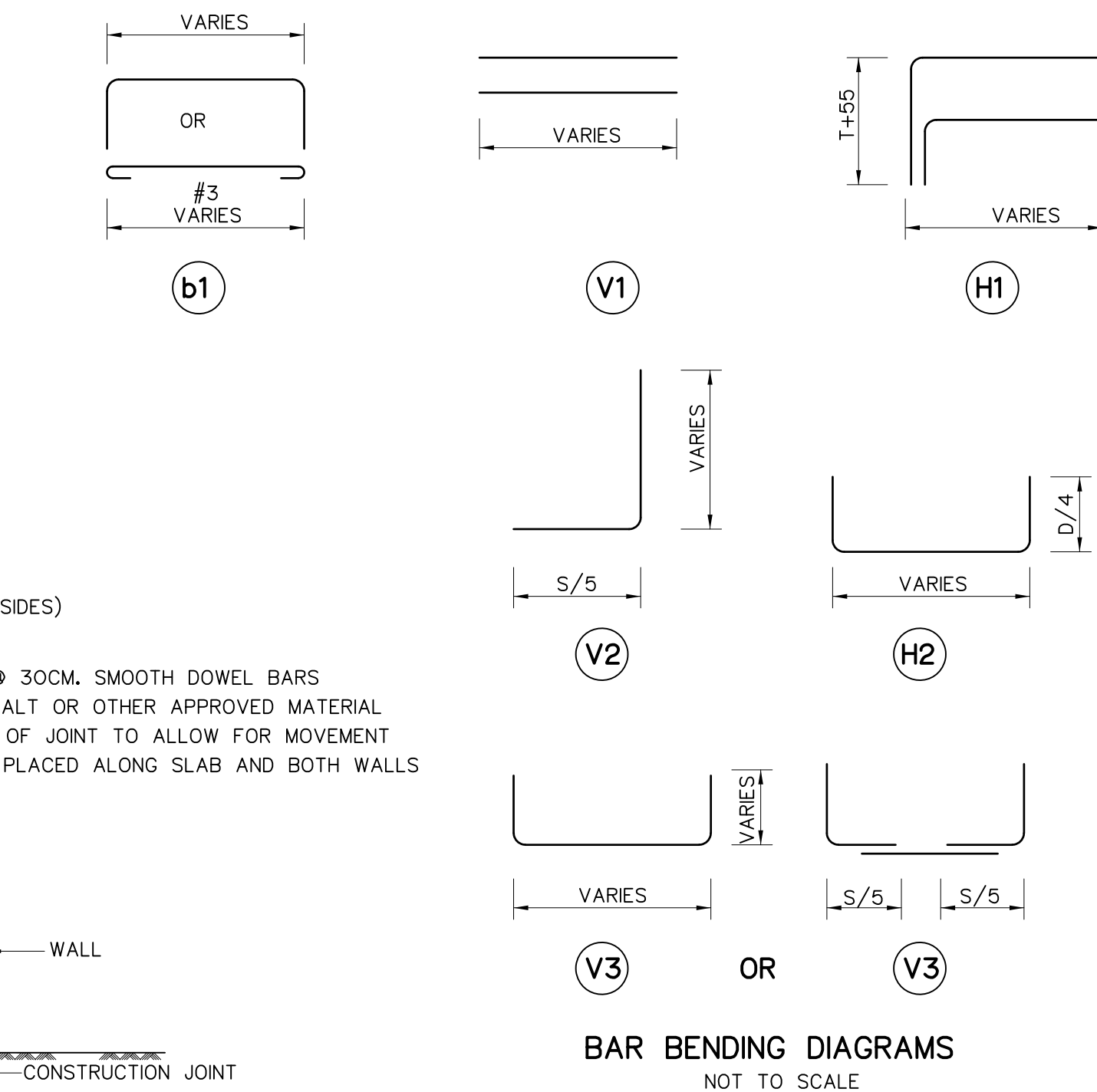
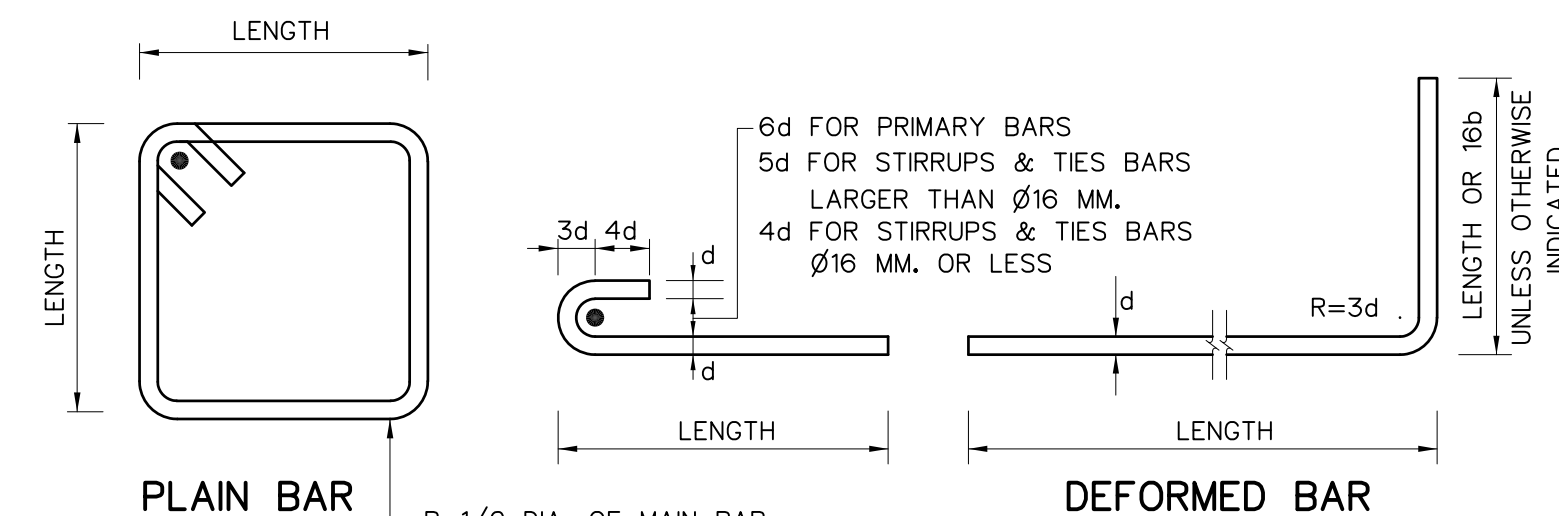


- REFERENCE DRAWINGS :
1. STANDARD, DRAIN CULVERT TYPE "2", PLAN SECTION AND DETAILS HRR-SD-02
 2. STANDARD, DRAIN CULVERT TYPE "3", PLAN SECTION AND DETAILS HRR-SD-03

TABLE OF REINFORCEMENT FOR HEADWALL OF SINGLE BOX CULVERT																																
SIDE OF CULVERT		L	h ₁	t ₁	CULVERTS																V ₁		V ₂		V ₃		H ₁		H ₁		b ₁	
					SKEW 0°				SKEW 15°				SKEW 30°				SKEW 45°															
					S	D	L ₁	S ₁	S ₂	L ₁	S ₁	S ₂	L ₁	S ₁	S ₂	L ₁	S ₁	S ₂	L ₁	S ₁	S ₂	#	⊙	#	⊙	#	⊙	#	⊙	#	⊙	#
60	60	95	50	20	90	54	54	93	54	57	104	57	68	127	68	95	3	30	3	30	3	20	3	20	3	20	3	20	3	4		
90	60	95	50	20	90	69	69	93	69	73	104	73	83	127	83	111	3	30	3	30	3	20	3	20	3	20	3	20	3	4		
90	90	145	55	20	140	82	82	145	82	88	161	88	104	198	104	147	3	30	3	30	3	20	3	20	3	20	3	20	3	4		
120	90	145	55	20	140	96	69	145	96	103	161	103	119	198	119	162	3	30	3	30	3	20	3	20	3	20	3	20	3	4		
120	120	185	65	20	180	108	108	186	108	115	207	115	135	254	135	192	3	30	3	30	3	20	3	20	3	20	3	20	3	4		
150	90	145	55	20	140	112	112	145	112	118	161	118	134	198	134	177	3	30	3	30	3	20	3	20	3	20	3	20	3	4		
150	120	185	65	20	180	123	123	186	123	131	207	131	151	254	151	207	3	30	3	30	3	20	3	20	3	20	3	20	3	4		
150	150	235	70	22.5	230	136	136	236	136	146	265	146	172	325	172	243	3	30	3	30	3	15	3	15	3	15	3	15	3	4		
180	120	185	65	20	180	136	136	186	136	146	265	146	166	254	166	222	3	30	3	30	3	15	3	15	3	15	3	15	3	4		
180	150	235	70	22.5	230	152	152	236	152	161	265	161	187	325	187	258	3	30	3	30	3	15	3	15	3	15	3	15	3	4		
180	180	275	80	25	270	162	162	279	162	173	311	173	204	382	204	287	3	30	3	30	3	10	3	10	3	10	3	10	3	4		
210	180	275	80	25	270	177	177	279	177	186	311	186	219	382	219	302	3	30	4	20	4	20	4	20	4	20	4	20	4	4		
210	210	320	85	25	315	189	189	326	189	202	363	202	236	445	236	335	3	30	4	16	4	16	4	16	4	16	4	16	4	4		
240	210	320	85	25	315	204	204	326	204	217	363	217	253	445	253	350	3	30	4	16	4	16	4	16	4	16	4	16	4	4		
240	240	365	95	25	360	216	216	372	216	231	415	231	272	508	272	383	3	30	4	12	4	12	4	12	4	12	4	12	4	4		
270	240	365	95	25	360	231	231	372	231	246	415	246	287	508	287	396	3	30	4	12	4	12	4	12	4	12	4	12	4	4		
270	270	405	100	27.5	400	242	242	414	242	259	461	259	303	565	303	428	3	30	4	10	4	10	4	10	4	10	4	10	4	4		
300	270	405	100	27.5	400	257	257	414	257	274	416	274	318	565	318	443	3	30	4	10	4	10	4	10	4	10	4	10	4	4		
300	300	455	115	30	450	270	270	466	270	299	519	299	340	636	340	479	4	30	5	12	5	12	5	12	5	12	5	12	5	4		
330	300	455	115	30	450	285	285	466	285	304	519	304	355	636	355	494	4	30	5	12	5	12	5	12	5	12	5	12	5	4		
330	330	505	120	32.5	500	299	299	517	299	320	576	320	376	707	376	531	4	30	5	10	5	10	5	10	5	10	5	10	5	4		
360	330	505	120	32.5	500	314	314	517	314	335	576	335	391	707	391	546	4	30	5	10	5	10	5	10	5	10	5	10	5	4		
360	360	545	130	35	540	324	324	558	324	347	632	347	408	763	408	575	4	30	6	12	6	12	6	12	6	12	6	12	6	4		
#3=Ø3/8" OR 9 MM. #4=Ø1/2" OR 12 MM. #5=Ø5/8" OR 16 MM. #6=Ø3/4" OR 20 MM. NO. = TOTAL AMOUNT OF BARS																																

#3=Ø3/8" OR 9 MM. #4=Ø1/2" OR 12 MM. #5=Ø5/8" OR 16 MM. #6=Ø3/4" OR 20 MM.

NO. = TOTAL AMOUNT OF BARS



- NOTES :
1. DESIGN PARAMETERS ARE
 - 1.1 LIVE LOADING : HS 20-44
 - 1.2 WORKING STEEL STRESSES :

PLAN BARS, $f_s = 1,200 \text{ KG./CM.}^2$

DEFORMED BARS, $f_s = 1,400 \text{ KG./CM.}^2$
 2. CLEAR CONCRETE COVER SHALL BE 5.0 CM. EXCEPT THE BOTTOM SLABS OR WALLS AT WHICH CLEAR COVER OF 7.5 CM. SHALL BE PROVIDED.
 3. ALL DIMENSIONS SHOWN ARE IN CENTIMETERS UNLESS OTHERWISE INDICATED.
 4. REBARS # 4 OR LARGER SHALL BE TIS 24 GRADE SD 30 DEFORMED BARS, OTHERS SHALL BE TIS 20 GRADE SR 24 PLAIN BARS UNLESS OTHERWISE INDICATED.
 5. LOCATIONS OF LAP SPLICE OF REBARS SHALL BE APPROVED BY THE ENGINEER.
 6. LAP LENGTH SHALL NOT BE LESS THAN 40 DIAMETERS OF BIGGER BAR FOR PLAIN BARS AND 24 DIAMETERS OF BIGGER BAR FOR DEFORMED BARS.
 7. IN CASE OF SALINE PROTECTION, HIGH SULPHATE RESISTANT PORTLAND CEMENT TYPE 5 CONFORMING TO TIS 15 SHALL BE USED INSTEAD OF TYPE 1 PORTLAND CEMENT.
 8. THIS DRAWING IS ADAPTED FROM DOH DWG.NO.7B/9.

KINGDOM OF THAILAND Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY			
HUAI PRA THAO RESERVOIR BOUNDARY ROAD PROJECT AMPHOE KAENG KHRO, CHANGWAT CHAIYAPHUM			
CIVIL WORKS STANDARD DIMENSIONS, REINFORCEMENT AND DETAILS			
PANYA CONSULTANTS CO.,LTD.		Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY	
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DRAWN		RECOMMENDED	
CHECKED 28.1957		APPROVED	
PROJECT MANAGER		DRAWING NO. HRR-SD-10	
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