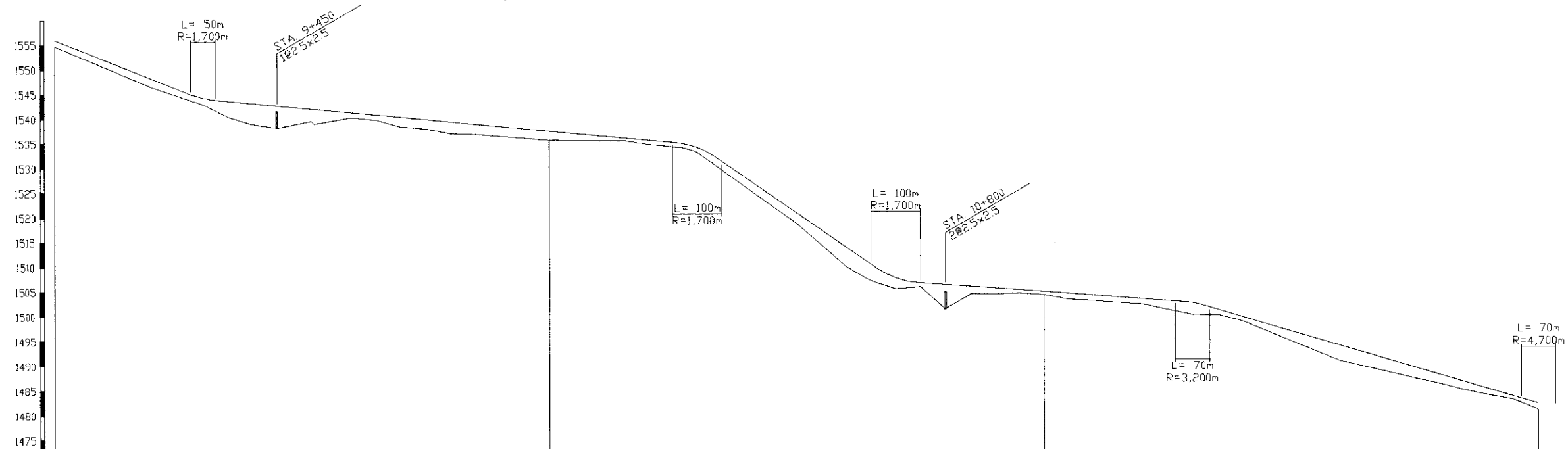
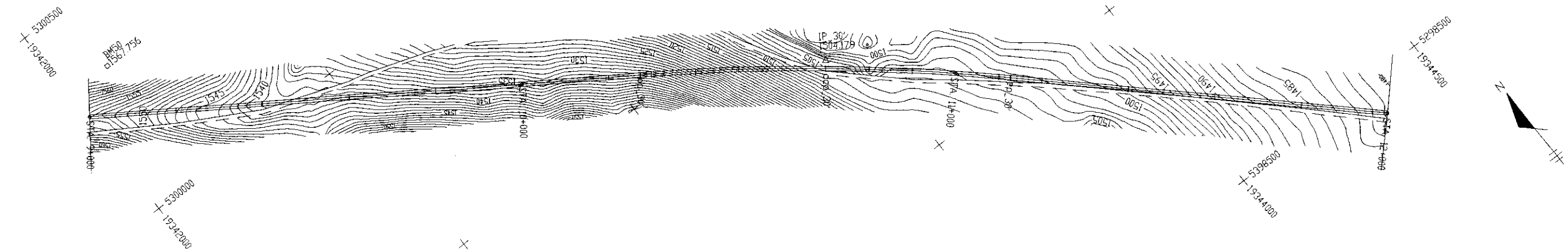


Gradient	<div><div><div><div><div></div><div>$i = 0.318 \%$</div><div>$L = 1,738.231$</div></div></div><div><div><div>1514.470</div><div>3+650</div></div></div><div><div><div>$i = 5.967 \%$</div><div>$L = 420.000$</div></div></div><div><div><div>1539.530</div><div>4+070</div></div></div><div><div><div>$i = -0.719 \%$</div><div>$L = 630.000$</div></div></div><div><div><div>1535.000</div><div>4+700</div></div></div><div><div><div>$i = -1.516 \%$</div><div>$L = 500.000$</div></div></div><div><div><div>1527.420</div><div>5+200</div></div></div><div><div><div>$i = 0.828 \%$</div><div>$L = 600.000$</div></div></div><div><div><div>1532.390</div><div>5+800</div></div></div><div><div><div>$i = 5.608 \%$</div><div>$L = 400.000$</div></div></div></div></div>																																											
Ground Height	1511.13	1510.09	1509.92	1510.49	1510.88	1511.47	1512.43	1513.52	1513.29	1518.86	1534.41	1536.44	1534.79	1536.40	1536.81	1536.40	1535.08	1535.27	1534.66	1534.35	1533.47	1531.10	1529.31	1528.67	1526.38	1525.76	1525.05	1524.80	1525.89	1525.15	1524.73	1525.07	1525.72	1527.34	1527.70	1528.02	1528.19	1528.58	1530.62	1531.97	1533.44	1535.64	1538.29	1540.83
Distance	3_000	3_200		3_400				3_600		3_800		4_000		4_200		4_400		4_500		4_600		4_700		4_800	4_878 tcp_28'	4_900	5_000		5_100		5_200		5_300		5_400		5_500		5_600	5_623 ep_28'		5_800		6_000
Horizontal Alignment	R=										R=4000										R=																							

3_000 - 6_000

THE FEASIBILITY STUDY ON CONSTRUCTION OF EASTERN ARTERIAL ROAD IN MONGOLIA			
JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)		DEPARTMENT OF ROADS, MINISTRY OF INFRASTRUCTURE, THE GOVERNMENT OF MONGOLIA	
PACIFIC CONSULTANTS INTERNATIONAL JAPAN OVERSEAS CONSULTANTS		Scale	
Drawing title		No.	
PLAN AND PROFILE (Alternative C-2)		H=1:10,000 V=1:1,000	
		E-24	



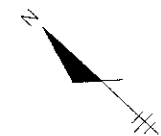
Gradient	$i = -3.950 \%$ $L = 1,000.000$		1544.050 9+300		$i = -0.945 \%$ $L = 1,000.000$		1534.600 10+300		$i = -6.935 \%$ $L = 400.000$		1506.860 10+700		$i = -0.730 \%$ $L = 600.000$		1502.480 11+300		$i = -2.964 \%$ $L = 700.000$		1481.730 12+000																			
Ground Height	1554.64	1546.23	1542.78	1540.29	1538.88	1538.14	1538.91	1536.80	1535.63	1535.46	1534.69	1533.90	1533.08	1525.67	1518.58	1507.01	1509.89	1505.67	1505.25	1501.23	1504.28	1504.16	1504.38	1504.03	1503.07	1502.82	1502.61	1502.09	1501.00	1499.97	1499.88	1498.68	1490.46	1485.81	1484.56	1483.55	1482.59	1480.53
Distance	9_000	9_200		9_400			9_600		9_800		10_000		10_200	10_273 10_300	10_400	10_500	10_600	10_700 ср_30	10_800	10_900	11_000	11_100 ср_30	11_200		11_400		11_600				11_800		12_000					
Horizontal Alignment																																						

9_000 - 12_000

THE FEASIBILITY STUDY ON CONSTRUCTION OF EASTERN ARTERIAL ROAD IN MONGOLIA		
JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)		DEPARTMENT OF ROADS, MINISTRY OF INFRASTRUCTURE, THE GOVERNMENT OF MONGOLIA
PACIFIC CONSULTANTS INTERNATIONAL JAPAN OVERSEAS CONSULTANTS		
Drawing title	Scale	No.
PLAN AND PROFILE (Alternative C-2)	H=1:10,000 V=1:1,000	E-26

5298650+19344700

5298650+19346700



5298650+19346700

5298650+19344200

L=70m
R=4,700m

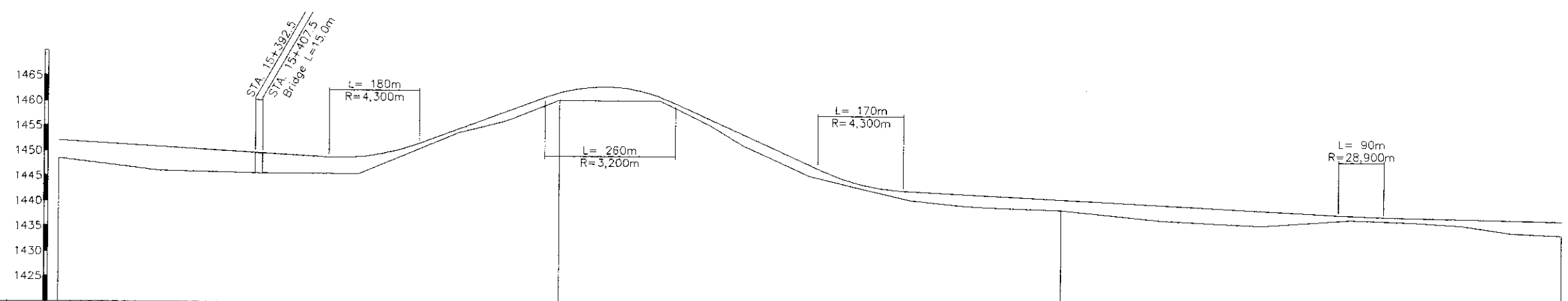
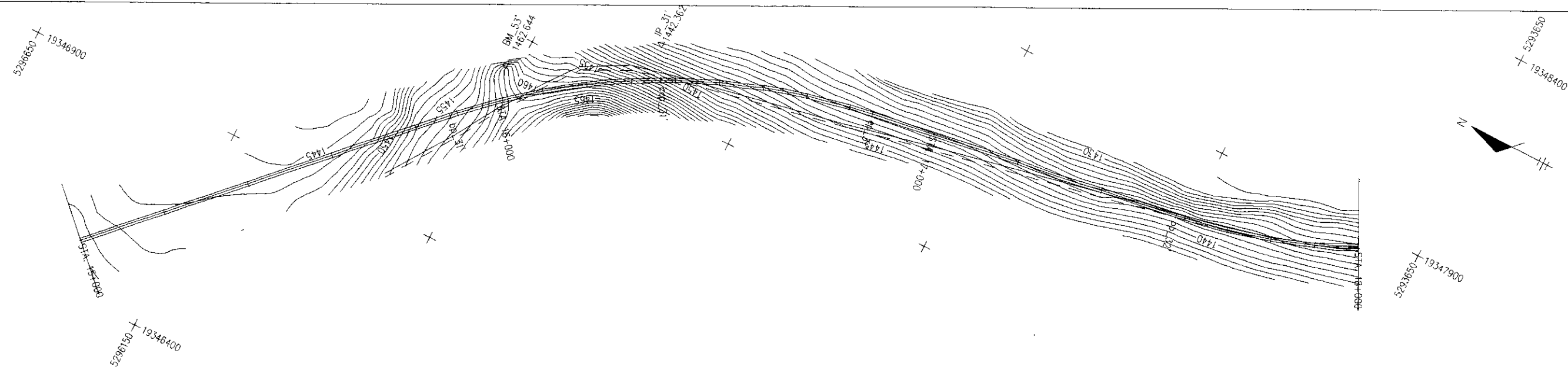
L=70m
R=5,600m

L=70m
R=18,900m

Gradient	<div><div><div>1481.730 12+000</div><div>$i = -1.465 \%$ $L = 1,800.000$</div><div><div>1453.360 13+800</div><div>$i = -0.210 \%$ $L = 1,000.000$</div><div><div>1453.260 14+800</div><div>$i = -0.581 \%$ $L = 830.000$</div></div></div></div></div>														
Ground Height	1480.53	1477.96	1473.67	1468.88	1465.16	1464.27	1462.38	1459.01	1457.3	1454.59	1452.35	1452.28	1451.66	1450.27	1448.53
Distance	12_000	12_200	12_400	12_600	12_800	13_000	13_200	13_400	13_600	13_800	14_000	14_200	14_400	14_600	15_000
Horizontal Alignment															

12_000 - 15_000

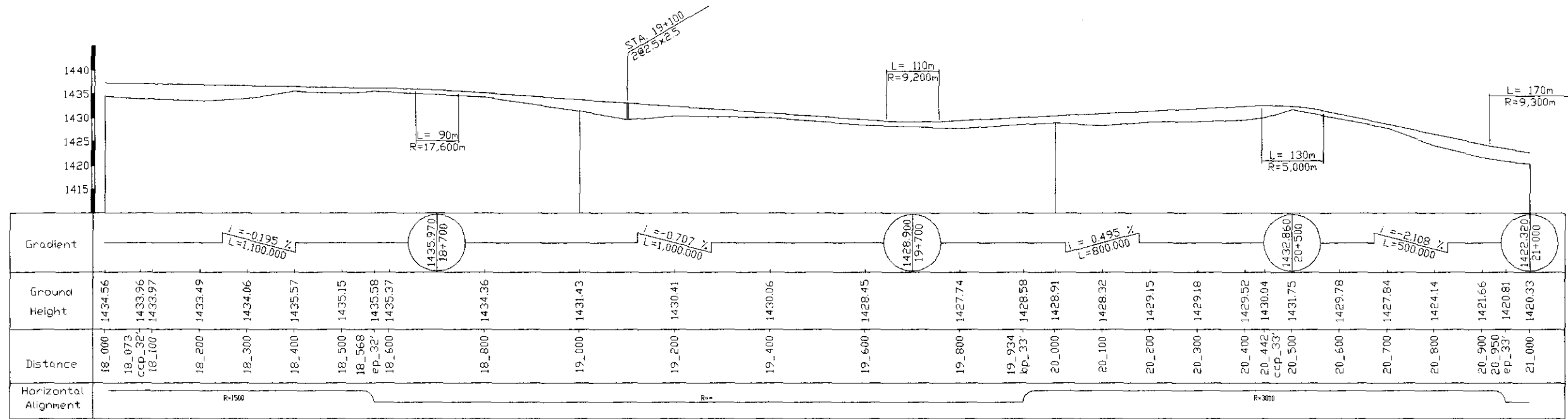
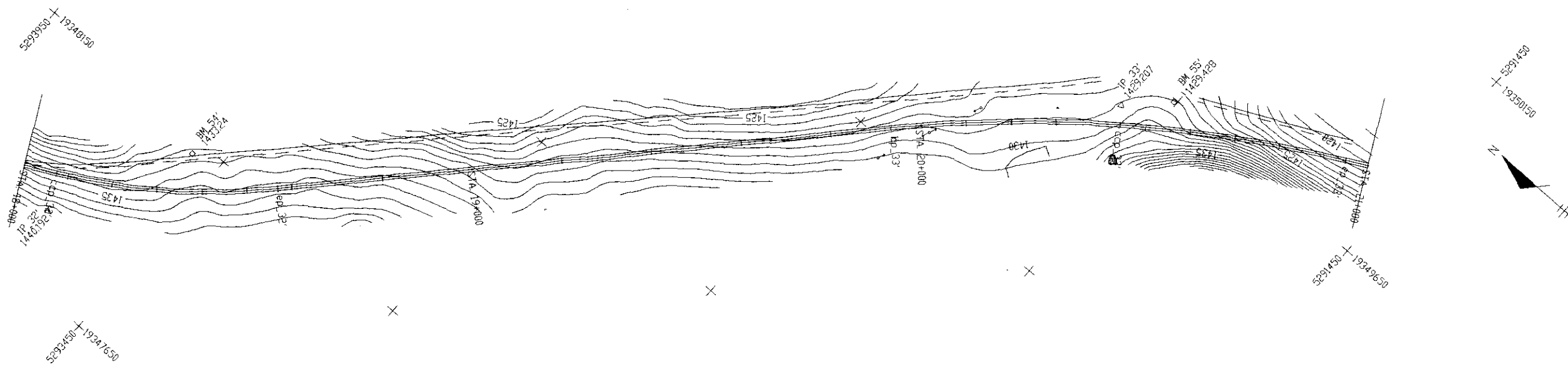
THE FEASIBILITY STUDY ON CONSTRUCTION OF EASTERN ARTERIAL ROAD IN MONGOLIA		
JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)		DEPARTMENT OF ROADS, MINISTRY OF INFRASTRUCTURE, THE GOVERNMENT OF MONGOLIA
PACIFIC CONSULTANTS INTERNATIONAL JAPAN OVERSEAS CONSULTANTS		
Drawing title	Scale	No.
PLAN AND PROFILE (Alternative C-2)	H=1:10,000 V=1:1,000	E-27



Gradient	$i = -0.581\%$ $L = 830.000$		$i = 3.696\%$ $L = 470.000$		$i = -4.528\%$ $L = 500.000$		$i = -0.506\%$ $L = 1,000.000$		$i = -0.195\%$ $L = 1,100.000$																		
Ground Height	1448.63	1446.14	1445.69	1445.62	1453.93	1456.01	1456.54	1460.51	1460.47	1460.44	1455.5	1451.44	1449.03	1445.54	1443.17	1440.87	1439.86	1439.51	1439.02	1437.07	1436.13	1437.4	1437.31	1436.95	1436.37	1434.97	1434.56
Distance	15_000	15_200	15_400	15_600	15_800	15_882 bp_31	15_900	16_000	16_100	16_200	16_300	16_367 ccp_31	16_400	16_500	16_600	16_700	16_800	16_853 ep_31	17_000	17_200	17_400	17_579 bp_32	17_600	17_700	17_800	17_900	18_000
Horizontal Alignment	R=		R=		R=1500		R=		R=		R=		R=		R=		R=		R=		R=		R=		R=1500		

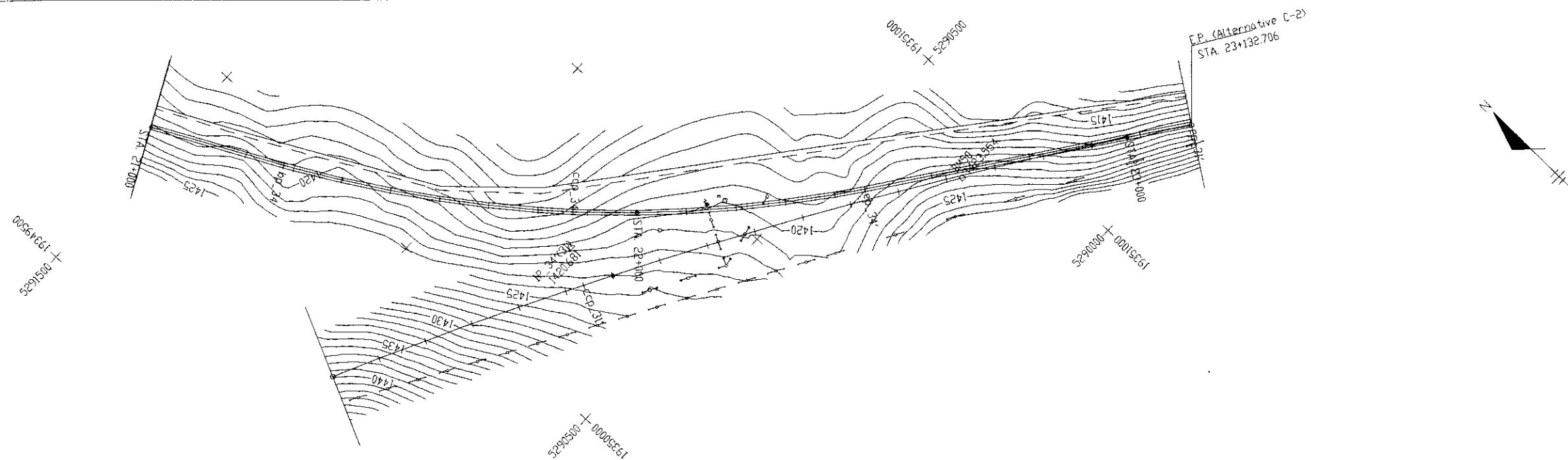
15_000 - 18_000

THE FEASIBILITY STUDY ON CONSTRUCTION OF EASTERN ARTERIAL ROAD IN MONGOLIA		
JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)		DEPARTMENT OF ROADS, MINISTRY OF INFRASTRUCTURE, THE GOVERNMENT OF MONGOLIA
PACIFIC CONSULTANTS INTERNATIONAL JAPAN OVERSEAS CONSULTANTS		
Drawing title	Scale	No
PLAN AND PROFILE (Alternative C-2)	M=1:10,000 V=1:1,000	E-28



18_000 - 21_000

THE FEASIBILITY STUDY ON CONSTRUCTION OF EASTERN ARTERIAL ROAD IN MONGOLIA		
JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)		DEPARTMENT OF ROADS, MINISTRY OF INFRASTRUCTURE, THE GOVERNMENT OF MONGOLIA
PACIFIC CONSULTANTS INTERNATIONAL JAPAN OVERSEAS CONSULTANTS		
Drawing title	Scale	No.
PLAN AND PROFILE (Alternative C-2)	H=1:10,000 V=1:1,000	E-29

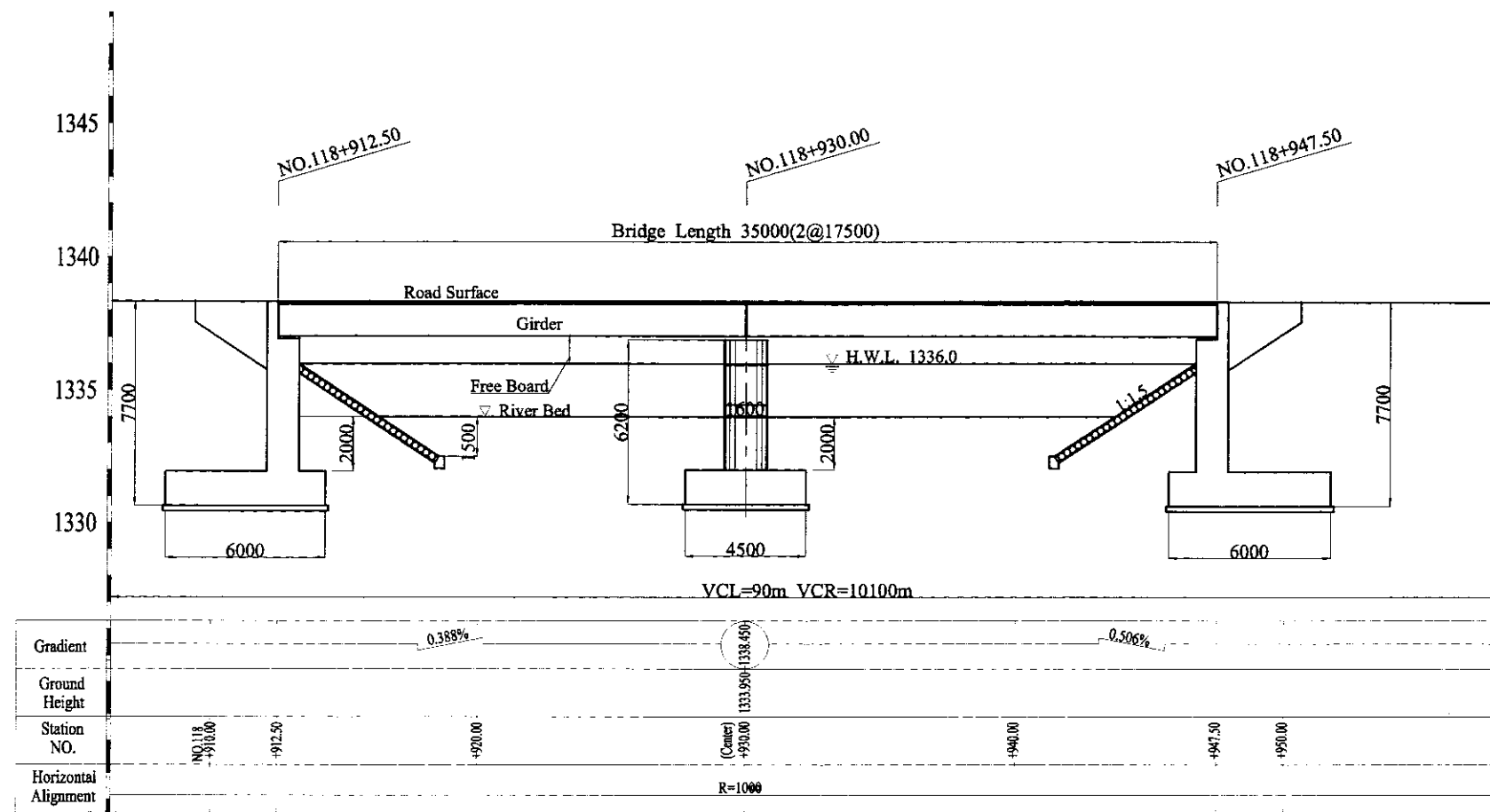


Gradient	<div> <div> <div>1422.320</div> <div>21+000</div> </div> <div> $i = -0.277 \%$ $L = 850.000$ </div> <div> <div>1419.970</div> <div>21+850</div> </div> <div> $i = 0.441 \%$ $L = 750.000$ </div> <div> <div>1423.280</div> <div>22+600</div> </div> <div> $i = -0.190 \%$ $L = 532.706$ </div> <div> <div>1422.270</div> <div>23+132.706</div> </div> </div>																
Ground Height	1420.33	1420.41	1419.12	1419.02	1420.4	1419.3	1418.56	1416.51	1416.55	1417.41	1418	1419.63	1419.94	1420.09	1419.05	1419.03	1418.97
Distance	21_000	21_200	21_278	21_300	21_400	21_500	21_600	21_700	21_800	21_870	21_900	22_000	22_100	22_200	22_300	22_400	22_452
Horizontal Alignment	<div> <div>R=</div> <div>R=2500</div> <div>R=</div> </div>																

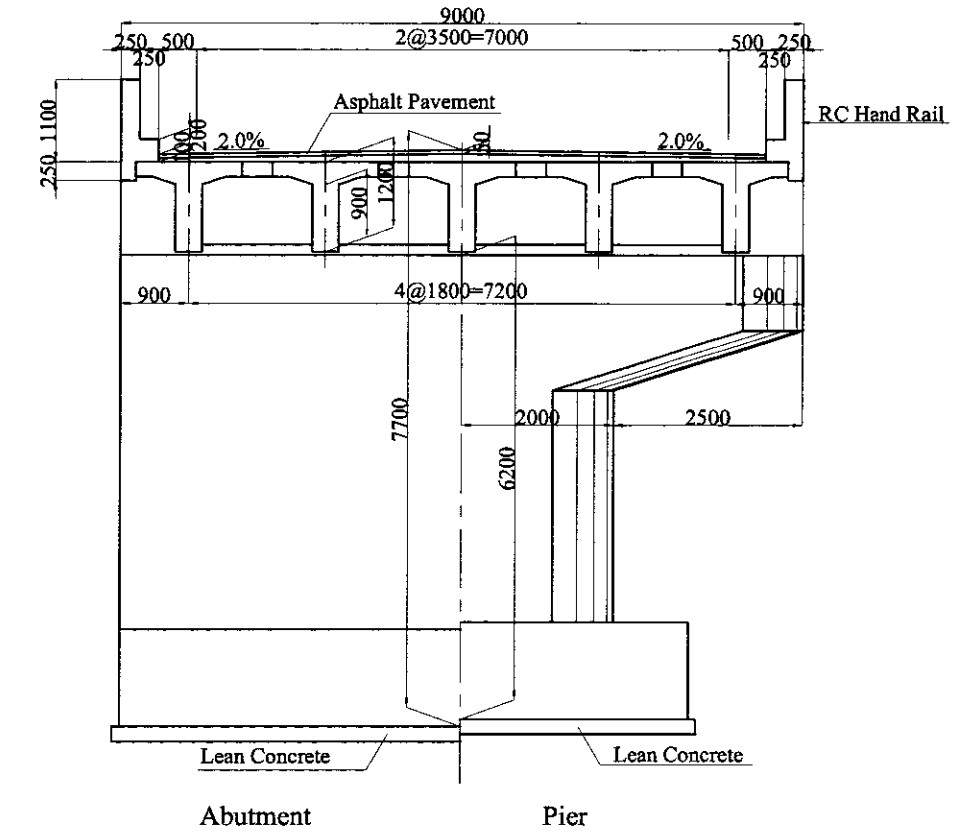
21_000 - 23_132 706

THE FEASIBILITY STUDY ON CONSTRUCTION OF EASTERN ARTERIAL ROAD IN MONGOLIA		
JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)		DEPARTMENT OF ROADS, MINISTRY OF INFRASTRUCTURE, THE GOVERNMENT OF MONGOLIA
PACIFIC CONSULTANTS INTERNATIONAL JAPAN OVERSEAS CONSULTANTS		
Drawing title	Scale	No.
PLAN AND PROFILE (Alternative C-2)	H=1:10,000 V=1:1,000	E-30

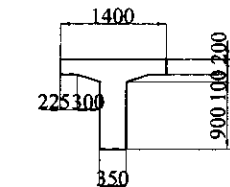
GENERAL VIEW OF TAL BULAG RIVER BRIDGE (B'-1) (ALTERNATIVE ROUTE)



PROFILE S=1:250



SECTION S=1:100



SECTION OF GIRDER S=1:100

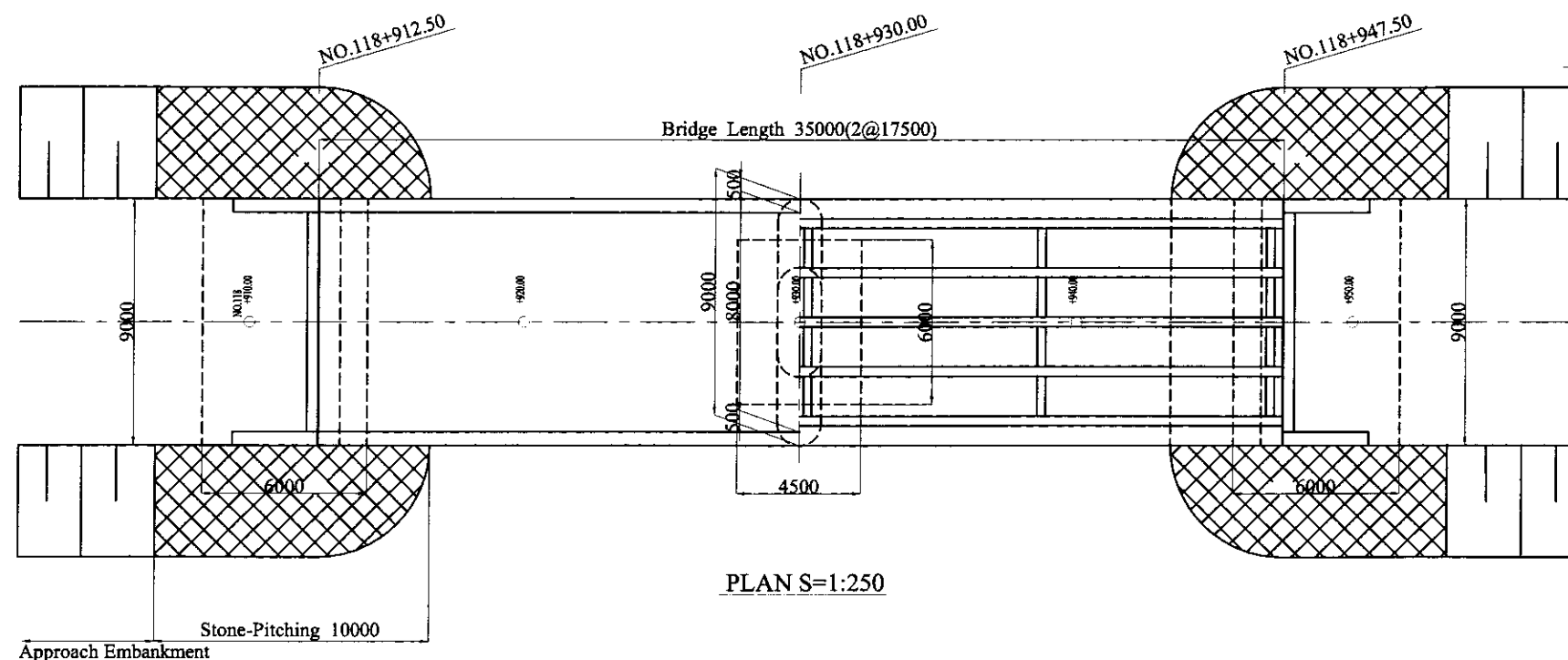
DESIGN CRITERIA GENERAL CONDITION

Design Speed	V=100km/h
Bridge Length (Span Length)	35.00m (2@17.50m)
Total Width	9.00m
Longitudinal Gradient	0.388% 0.506%
Cross-fall of Carriage way	2.0%
Superstructure Type	RC-T Shape Girder
Substructure Type	Abutment RC Reversed T-Shape Pier RC Wall (Cantilever-beam)
Foundation Type	Spread

Note: Preliminary Design (Feasibility Study) has been done for this drawing.
Detail Design is required for construction of this bridge.

LIST OF QUANTITY (FOR RC GIRDER)

Category	Material	Unit	Quantity	Specification
Super Structure	Total Concrete	m3	164	α28=240kgf/cm2
	Reinforcing Bar	ton	21.2	SD295,345,390
	Leveling Concrete	m3	25.2	α28=240kgf/cm2
	Asphalt Pavement	m2	280	t=5cm
Sub Structure	Total Concrete	m3	324	α28=210kgf/cm2
	Reinforcing Bar	ton	19.5	SD295,345,390
	Lean Concrete	m3	28.6	α28=160kgf/cm2
	Excavation	m3	2001	Gravel
Embankment	Revetment	m2	386	Stone Pitched Embankment
	Access Road	m	70	Paved Standard Section



PLAN S=1:250

THE FEASIBILITY STUDY ON CONSTRUCTION OF EASTERN ARTERIAL ROAD IN MONGOLIA

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

PACIFIC CONSULTANTS INTERNATIONAL
JAPAN OVERSEAS CONSULTANTS

Drawing title
GENERAL VIEW OF TAL BULAG RIVER BRIDGE (B'-1)
(ALTERNATIVE ROUTE)

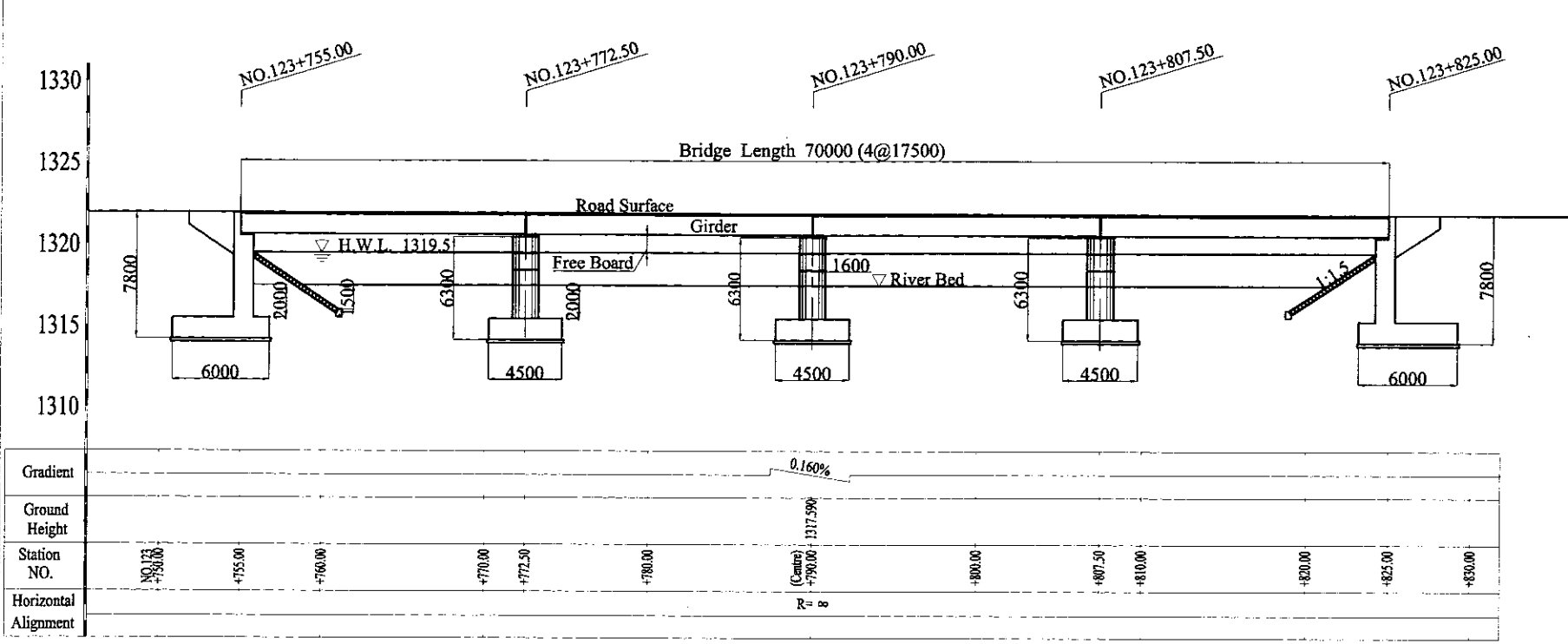
DEPARTMENT OF ROADS,
MINISTRY OF INFRASTRUCTURE,
THE GOVERNMENT OF MONGOLIA

Scale
As shown

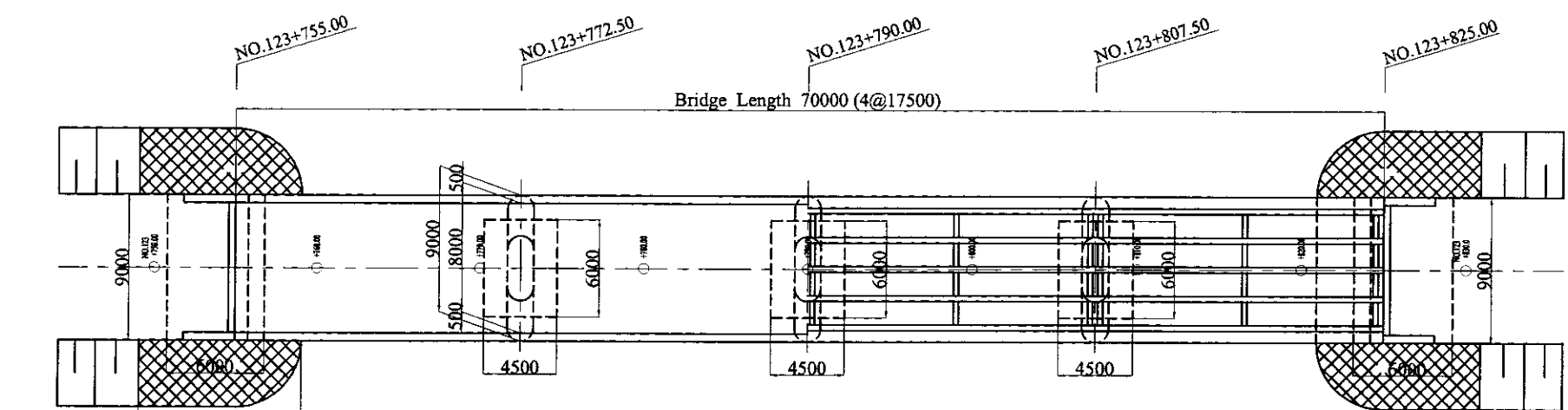
No.

E-31

GENERAL VIEW OF TAL BULAG, KHUJIRT RIVER BRIDGE (B'-2) (ALTERNATIVE ROUTE)



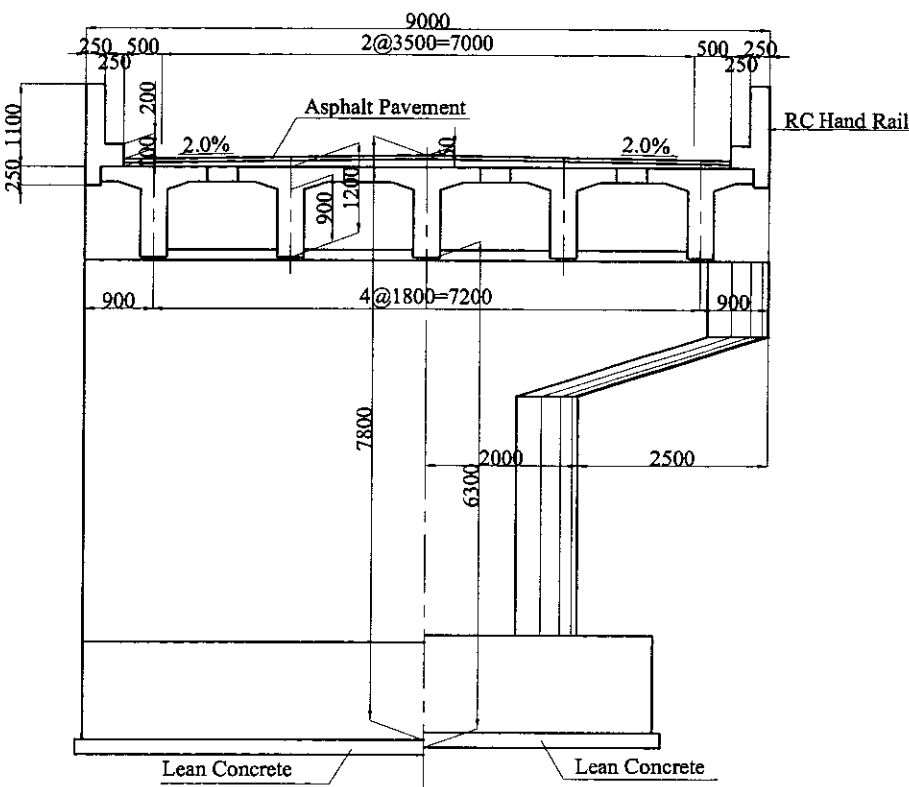
PROFILE S=1:400



PLAN S=1:400

LIST OF QUANTITY (FOR RC GIRDER)

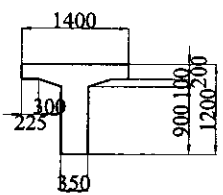
Category	Material	Unit	Quantity	Specification
Super Structure	Total Concrete	m3	328	Ø28=240kgf/cm2
	Reinforcing Bar	ton	42.5	SD295,345,390
	Leveling Concrete	m3	50.4	Ø28=240kgf/cm2
	Asphalt Pavement	m2	560	t=5cm
Sub Structure	Total Concrete	m3	473	Ø28=210kgf/cm2
	Reinforcing Bar	ton	28.4	SD295,345,390
	Lean Concrete	m3	40.3	Ø28=160kgf/cm2
	Excavation	m3	2586	Gravel
Embankment	Revetment	m2	386	Stone Pitched Embankment
	Access Road	m	140	Paved Standard Section



Abutment

Pier

SECTION S=1:100



SECTION OF GIRDER S=1:100

DESIGN CRITERIA

GENERAL CONDITION	
Design Speed	V=100km/h
Bridge Length (Span Length)	70.00m (4@17.50m)
Total Width	9.00m
Longitudinal Gradient	0.160%
Cross-fall of Carriage way	2.0%
Superstructure Type	RC-T Shape Girder
Substructure Type	Abutment RC Reversed T-Shape
	Pier RC Wall (Cantilever-beam)
Foundation Type	Spread

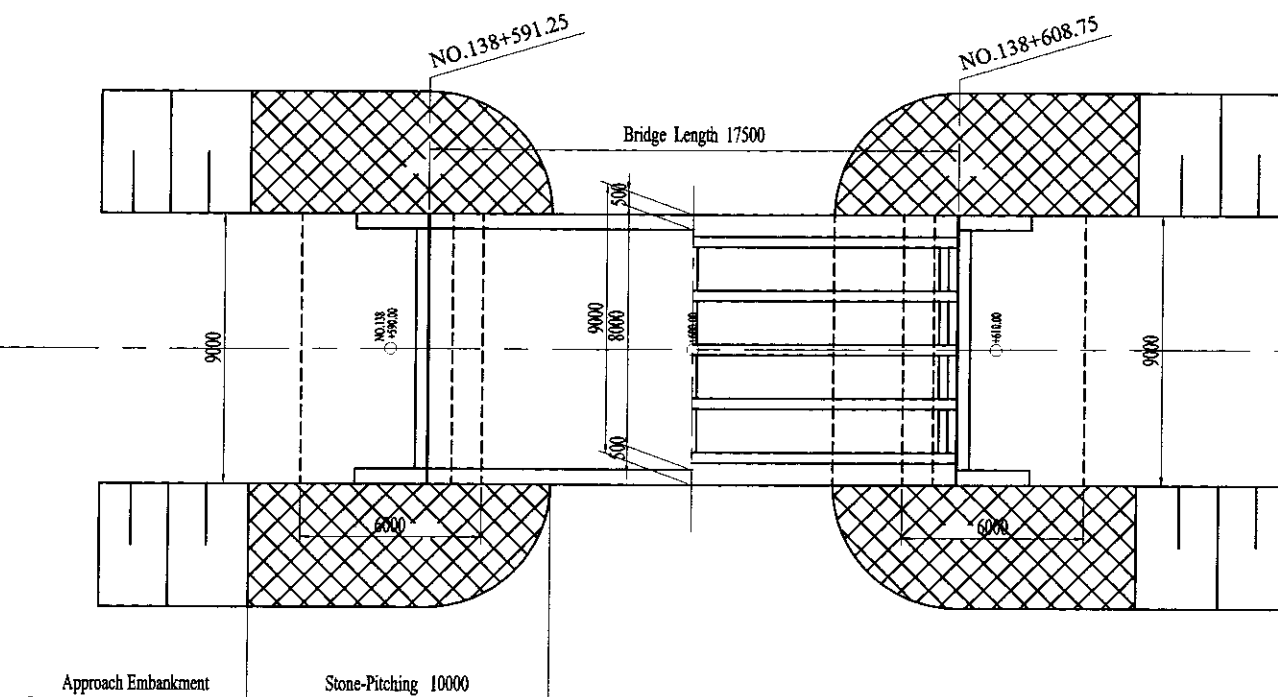
Note: Preliminary Design (Feasibility Study) has been done for this drawing.
Detail Design is required for construction of this bridge.

THE FEASIBILITY STUDY ON CONSTRUCTION OF EASTERN ARTERIAL ROAD IN MONGOLIA	
JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)	DEPARTMENT OF ROADS, MINISTRY OF INFRASTRUCTURE, THE GOVERNMENT OF MONGOLIA
PACIFIC CONSULTANTS INTERNATIONAL JAPAN OVERSEAS CONSULTANTS	
Drawing title	Scale
GENERAL VIEW OF TAL BULAG, KHUJIRT RIVER BRIDGE (B'-2) (ALTERNATIVE ROUTE)	As shown
No.	E-32

The diagram illustrates the cross-section of a bridge with a total length of 17500. The bridge features a central span supported by two large piers, each with a base width of 6000. The road surface is shown above the girders, with a height of 7500 from the river bed. The river bed is sloped at a 1:1.5 ratio. The water level (H.W.L.) is marked at 1301.2. The bridge is labeled with stationing: NO.138+591.25 and NO.138+608.75. The diagram also shows the ground surface, river bed, and various structural components like the girder and free board.

Station NO.	Ground Height	Gradient
NO.138+591.00	1295.00	0.726%
+591.25	1299.300	
(Centre) +600.00	1299.300	
+608.75		
+610.00		
+620.00		

Horizontal Alignment: R=500

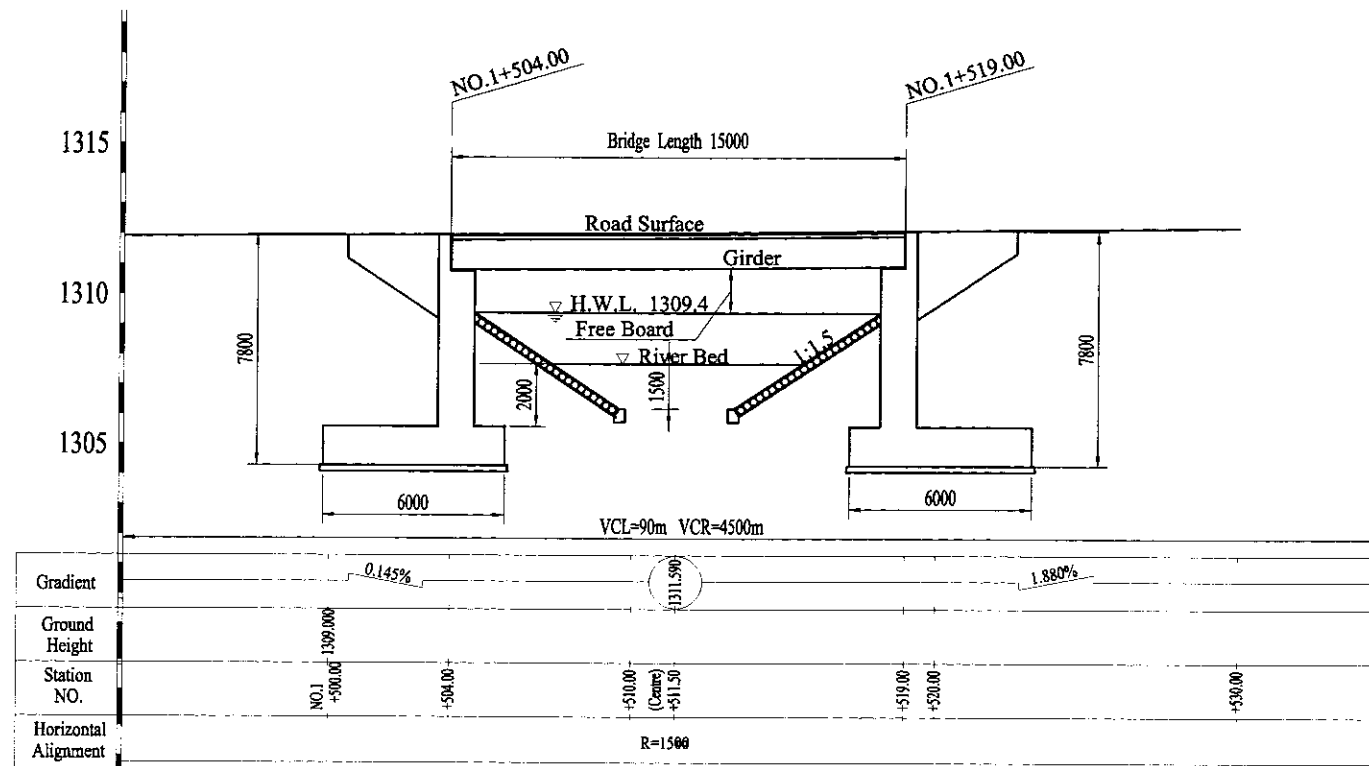


SECTION OF GIRDER S=1:100

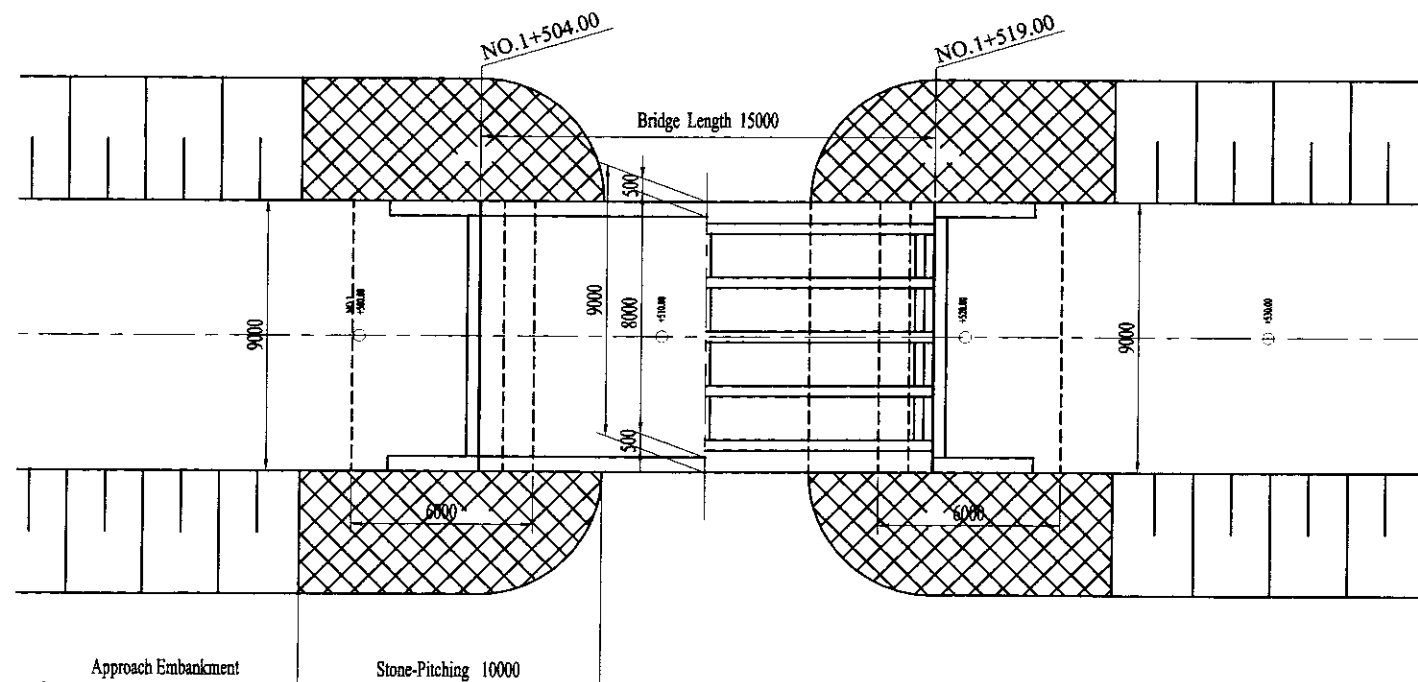
Note: Preliminary Design (Feasibility Study) has been done for this drawing.
Detail Design is required for construction of this bridge.

Category	Material	Unit	Quantity	Specification
Super Structure No. of Girder (5)	Total Concrete	m3	82	ϕ28=240kgf/cm2
	Reinforcing Bar	ton	10.6	SD295,345,390
	Leveling Concrete	m3	12.6	ϕ28=240kgf/cm2
	Asphalt Pavement	m2	140	t=5cm
Sub Structure	Total Concrete	m3	250	ϕ28=210kgf/cm2
	Reinforcing Bar	ton	15.0	SD295,345,390
	Lean Concrete	m3	22.8	ϕ28=160kgf/cm2
	Excavation	m3	1709	Gravel
Embankment	Retrvement	m2	386	Stone Pitched Embankment
	Access Road	m	35	Paved Standard Section

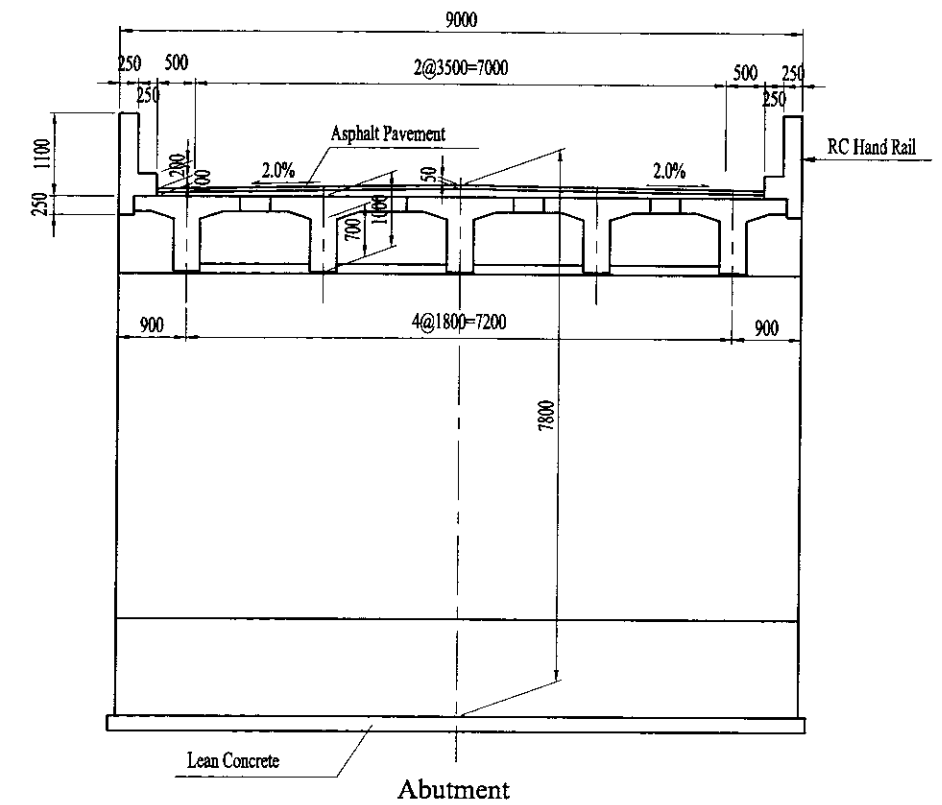
GENERAL VIEW OF UST VALLEY BRIDGE (B'-4) (ALTERNATIVE ROUTE)



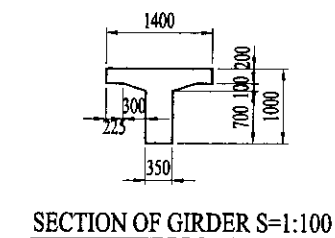
PROFILE S=1:250



PLAN S=1:250



SECTION S=1:100



SECTION OF GIRDER S=1:100

DESIGN CRITERIA	
GENERAL CONDITION	
Design Speed	V=80km/h
Bridge Length	15.00m
Total Width	9.00m
Longitudinal Gradient	0.145% 1.888%
Cross-fall of Carriage way	2.0%
Superstructure Type	RC-T Shape Girder
Substructure Type	Abutment RC Reversed T-Shape
Foundation Type	Spread

Note: Preliminary Design (Feasibility Study) has been done for this drawing.
Detail Design is required for construction of this bridge.

LIST OF QUANTITY (FOR RC GIRDER)				
Category	Material	Unit	Quantity	Specification
Super Structure No. of Girder (5)	Total Concrete	m3	65	c28=240kgf/cm2
	Reinforcing Bar	ton	8.3	SD295,345,390
	Leveling Concrete	m3	10.8	c28=240kgf/cm2
	Asphalt Pavement	m2	120	t=5cm
Sub Structure	Total Concrete	m3	248	c28=210kgf/cm2
	Reinforcing Bar	ton	14.9	SD295,345,390
	Lean Concrete	m3	22.8	c28=160kgf/cm2
	Excavation	m3	1662	Gravel
Embankment	Revetment	m2	386	Stone Pitched Embankment
	Access Road	m	30	Paved Standard Section

THE FEASIBILITY STUDY ON CONSTRUCTION OF EASTERN ARTERIAL ROAD IN MONGOLIA

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

PACIFIC CONSULTANTS INTERNATIONAL
JAPAN OVERSEAS CONSULTANTS

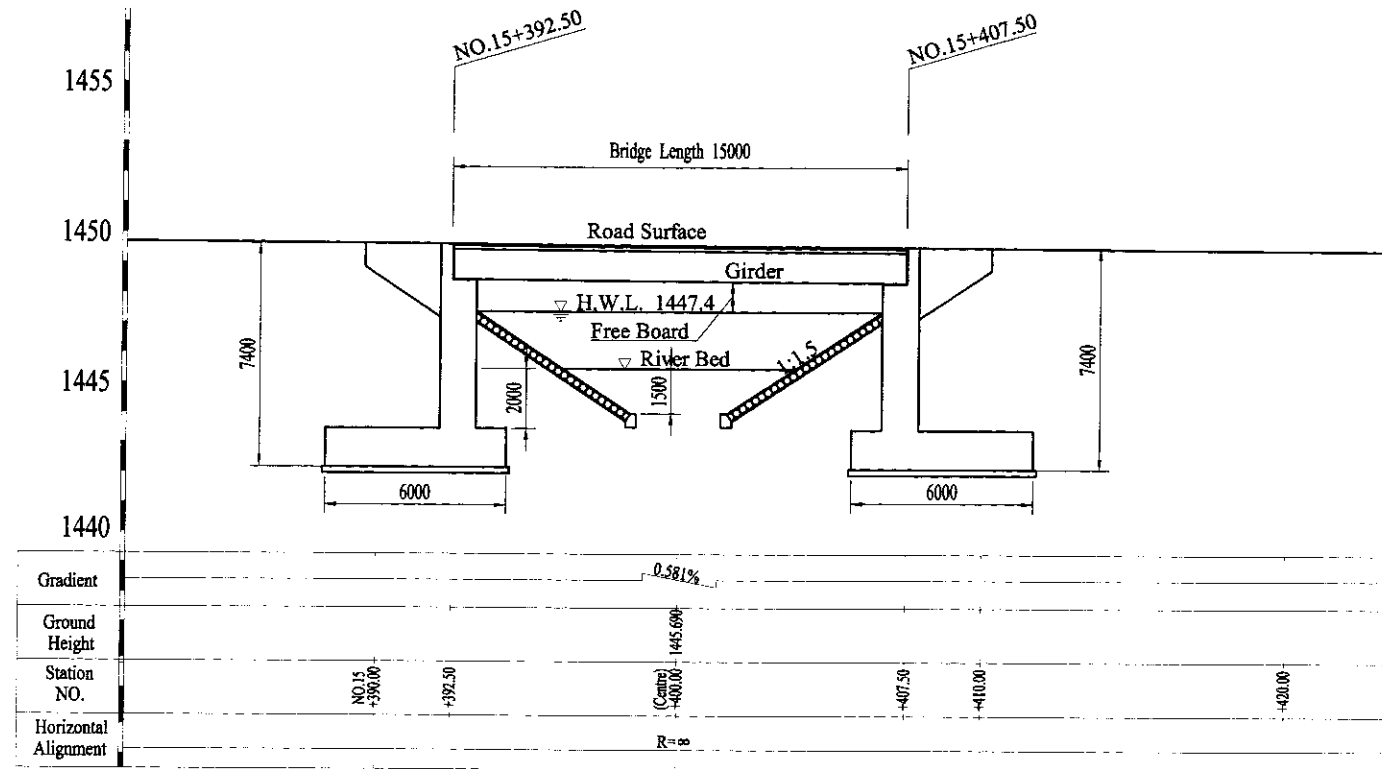
DEPARTMENT OF ROADS,
MINISTRY OF INFRASTRUCTURE,
THE GOVERNMENT OF MONGOLIA

Drawing title
GENERAL VIEW OF UST VALLEY BRIDGE (B'-4)
(ALTERNATIVE ROUTE)

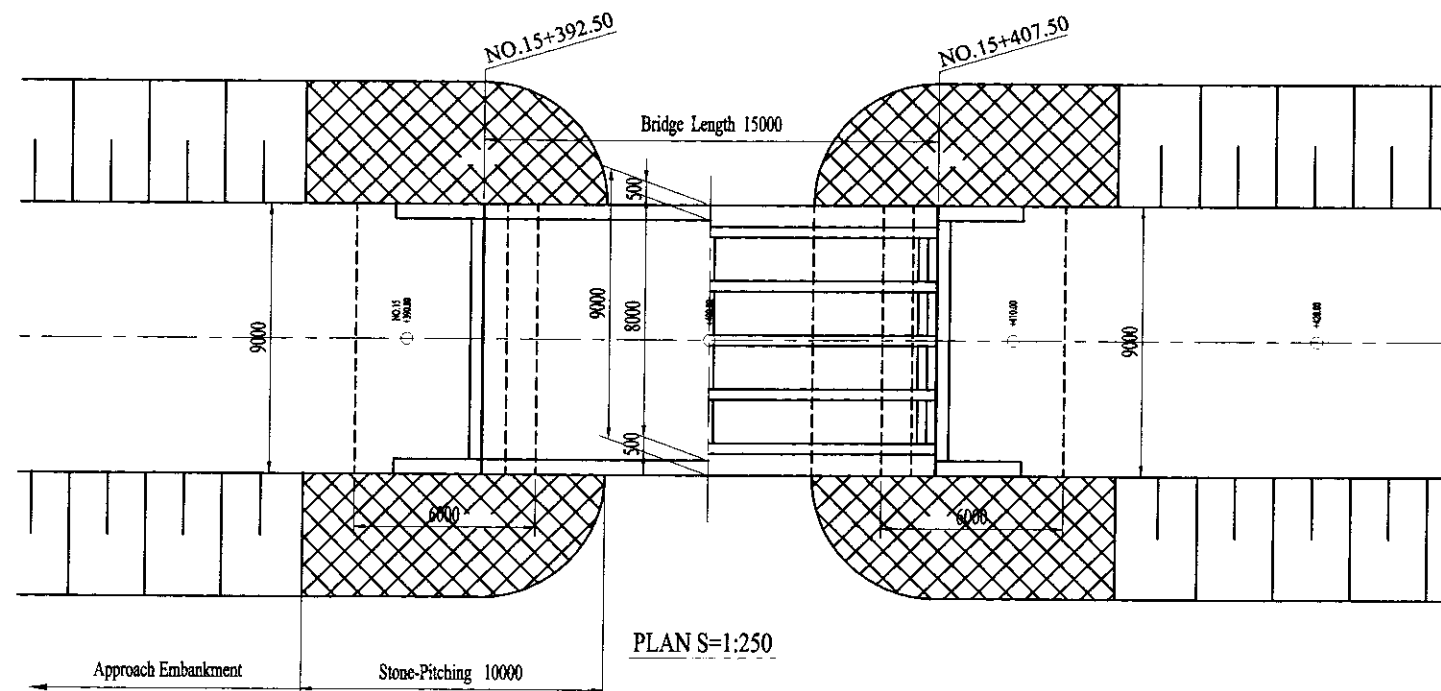
Scale
As shown

No.
E-34

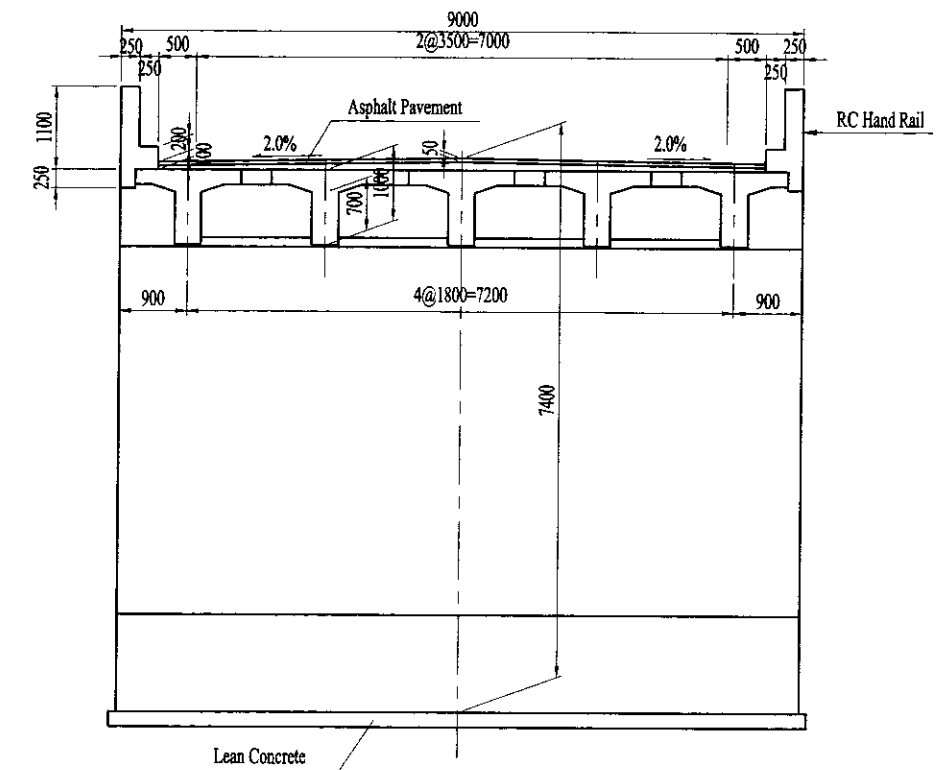
GENERAL VIEW OF BOR KHUIR VALLEY BRIDGE (B'-5) (ALTERNATIVE ROUTE)



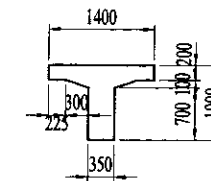
PROFILE S=1:250



PLAN S=1:250



SECTION S=1:100



SECTION OF GIRDER S=1:100

DESIGN CRITERIA GENERAL CONDITION

Design Speed	V=80km/h
Bridge Length	15.00m
Total Width	9.00m
Longitudinal Gradient	0.581%
Cross-fall of Carriage way	2.0%
Superstructure Type	RC-T Shape Girder
Substructure Type	Abutment RC Reversed T-Shape
Foundation Type	Spread

Note: Preliminary Design (Feasibility Study) has been done for this drawing.
Detail Design is required for construction of this bridge.

LIST OF QUANTITY (FOR RC GIRDER)

Category	Material	Unit	Quantity	Specification
Super Structure No. of Girder (5)	Total Concrete	m3	65	ø28=240kgf/cm2
	Reinforcing Bar	ton	8.3	SD295,345,390
	Leveling Concrete	m3	10.8	ø28=240kgf/cm2
	Asphalt Pavement	m2	120	t=5cm
Sub Structure	Total Concrete	m3	248	ø28=210kgf/cm2
	Reinforcing Bar	ton	14.9	SD295,345,390
	Lean Concrete	m3	22.8	ø28=160kgf/cm2
	Excavation	m3	1662	Gravel
Embankment	Revetment	m2	386	Stone Pitched Embankment
	Access Road	m	30	Paved Standard Section

THE FEASIBILITY STUDY ON CONSTRUCTION OF EASTERN ARTERIAL ROAD IN MONGOLIA

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

PACIFIC CONSULTANTS INTERNATIONAL
JAPAN OVERSEAS CONSULTANTS

DEPARTMENT OF ROADS,
MINISTRY OF INFRASTRUCTURE,
THE GOVERNMENT OF MONGOLIA

Drawing title

Scale

No.

GENERAL VIEW OF BOR KHUIR VALLEY BRIDGE (B'-5)
(ALTERNATIVE ROUTE)

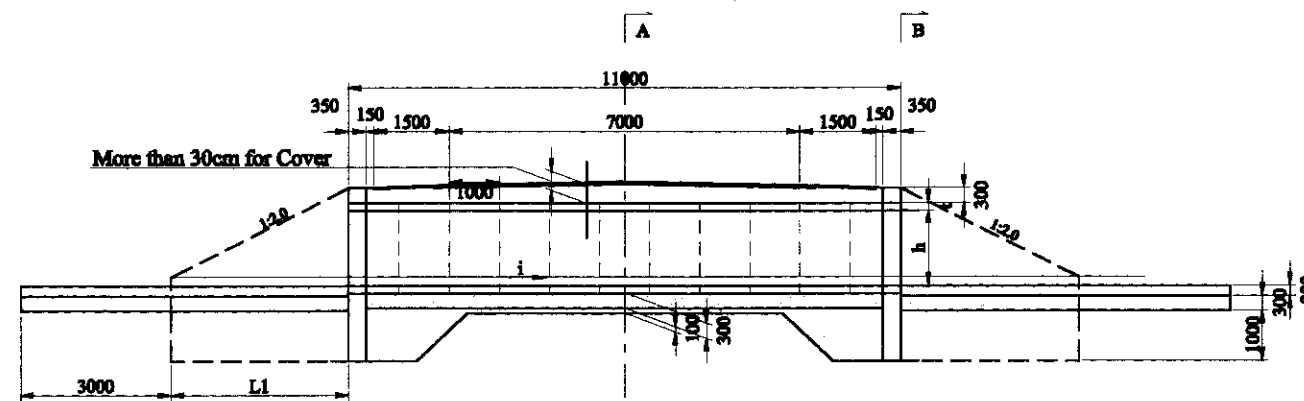
As shown

E-35

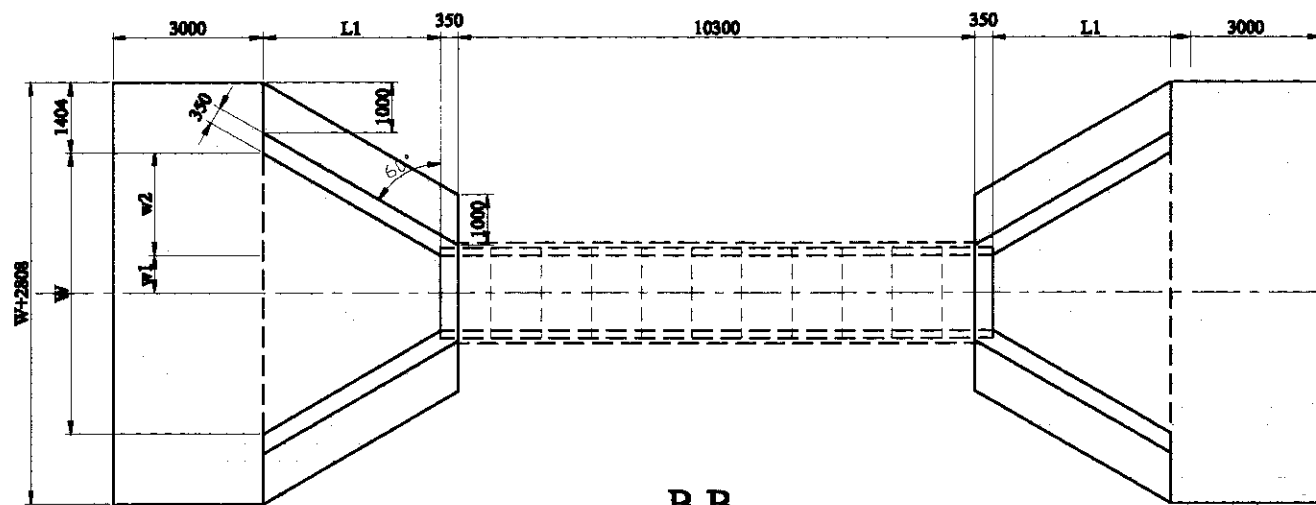
Profile 1:150

GENERAL VIEW OF PIPE CULVERTS (ALTERNATIVE ROUTE)

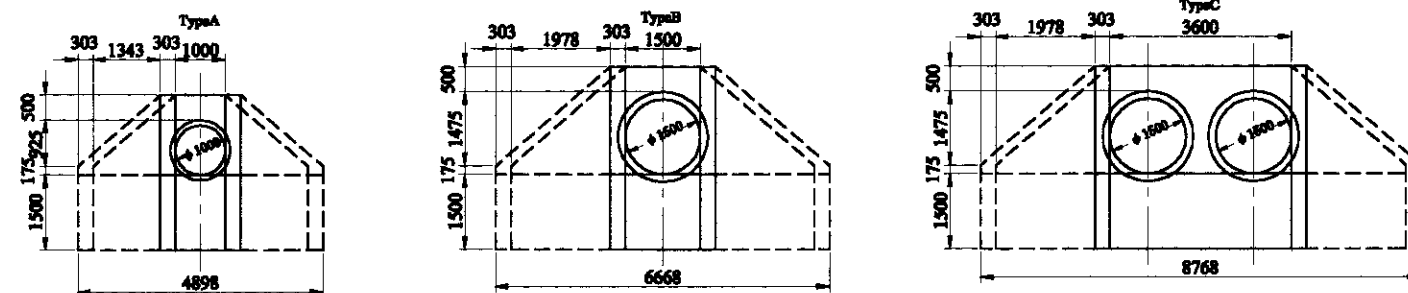
Section A-A 1:100



Plan

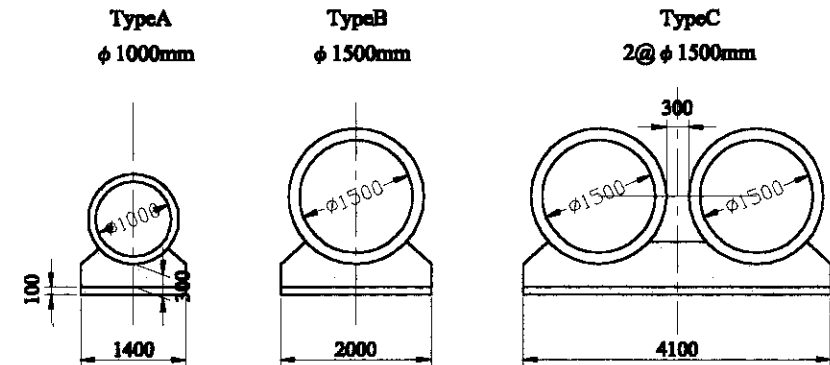


B-B



Legend

	Leveling Concrete
	Stone Pitching
	Gravel



List of Quantity

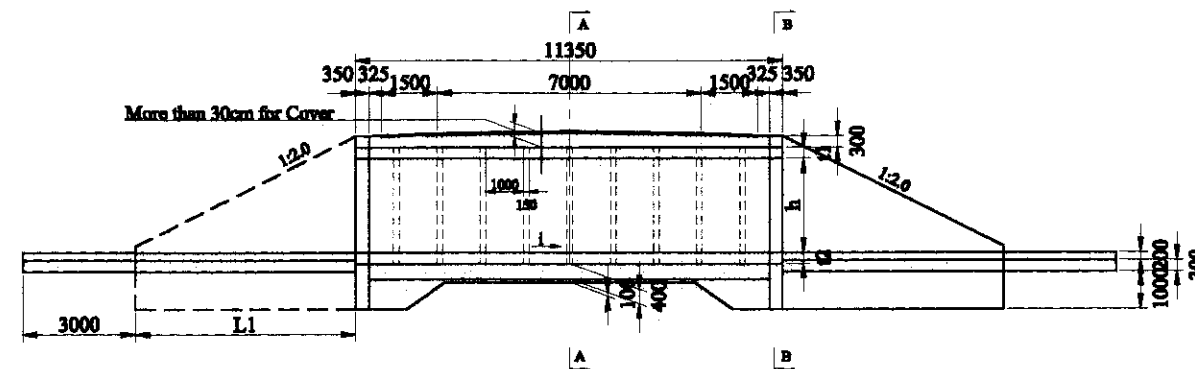
		Type-A	Type-B	Type-C
Concrete : $\sigma_{28}=210\text{kgf/cm}^2$	m ³	15.74	27.05	38.89
Reinforcing Bar : SD295($\sigma_y=3000\text{kgf/cm}^2$)	t	0.71	1.18	1.60
Leveling Concrete $\sigma_{28}=160\text{kgf/cm}^2$	m ³	8.11	13.94	27.36
Gravel	m ³	23.33	33.63	50.03
Stone Pitching	m ²	52.47	68.78	81.38
Excavation	m ³	54.10	79.34	119.71
h	m	1.000	1.500	1.500
t	m	0.100	0.150	0.150
L1	m	2.450	3.550	3.550
W	m	3.829	5.599	7.699
w1	m	0.500	0.750	1.800
w2	m	1.415	2.050	2.050

Note: Preliminary Design (Feasibility Study) has been done for this drawing.
Detail Design is required for construction of these culverts.

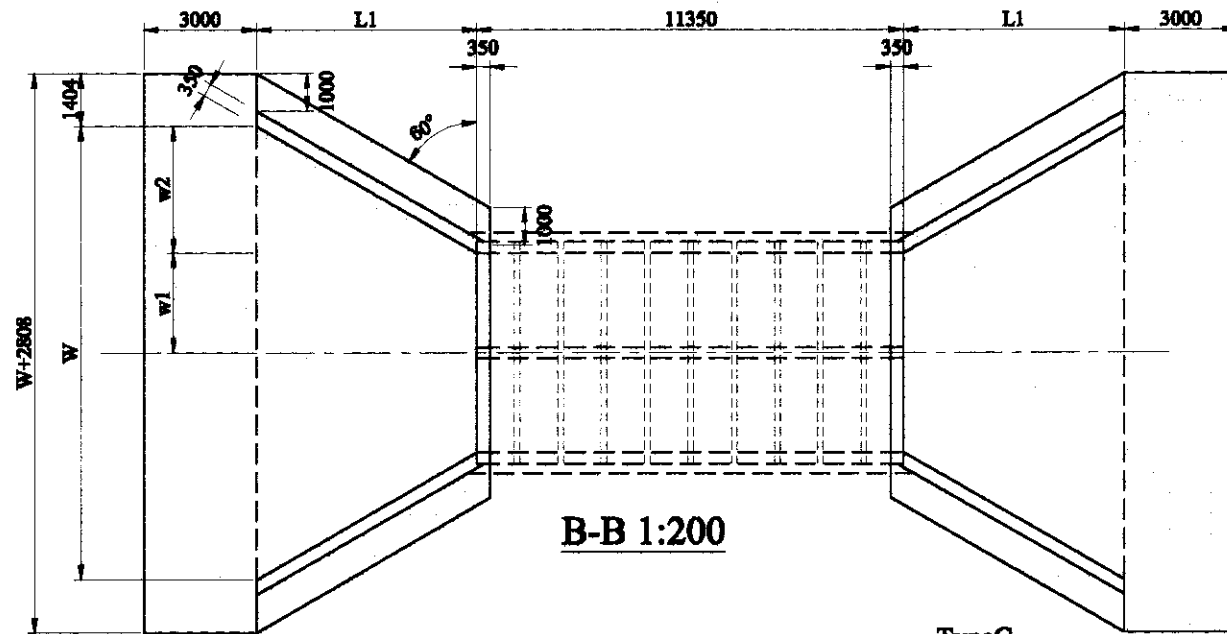
THE FEASIBILITY STUDY ON CONSTRUCTION OF EASTERN ARTERIAL ROAD IN MONGOLIA		
JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)	DEPARTMENT OF ROADS, MINISTRY OF INFRASTRUCTURE, THE GOVERNMENT OF MONGOLIA	
PACIFIC CONSULTANTS INTERNATIONAL JAPAN OVERSEAS CONSULTANTS		
Drawing title	Scale	No.
GENERAL VIEW OF PIPE CULVERTS (ALTERNATIVE ROUTE)	As Shown	E-36

GENERAL VIEW OF BOX CULVERTS (ALTERNATIVE ROUTE)

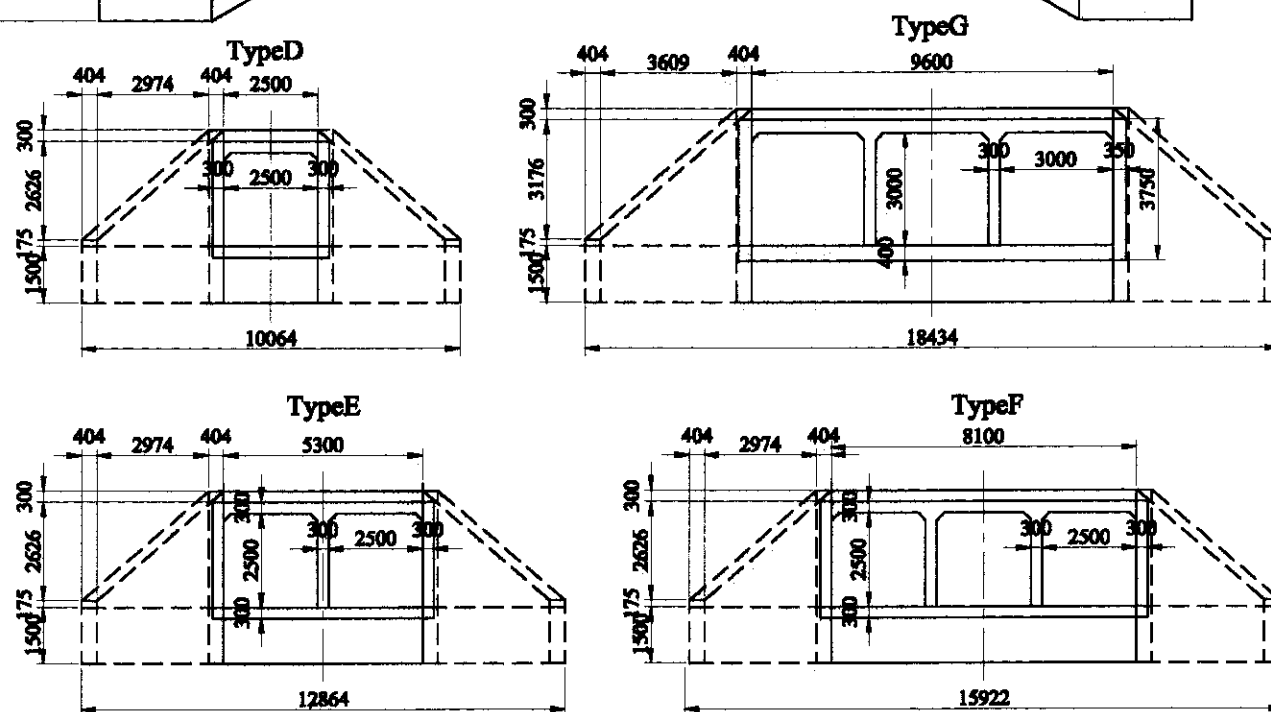
Profile 1:200



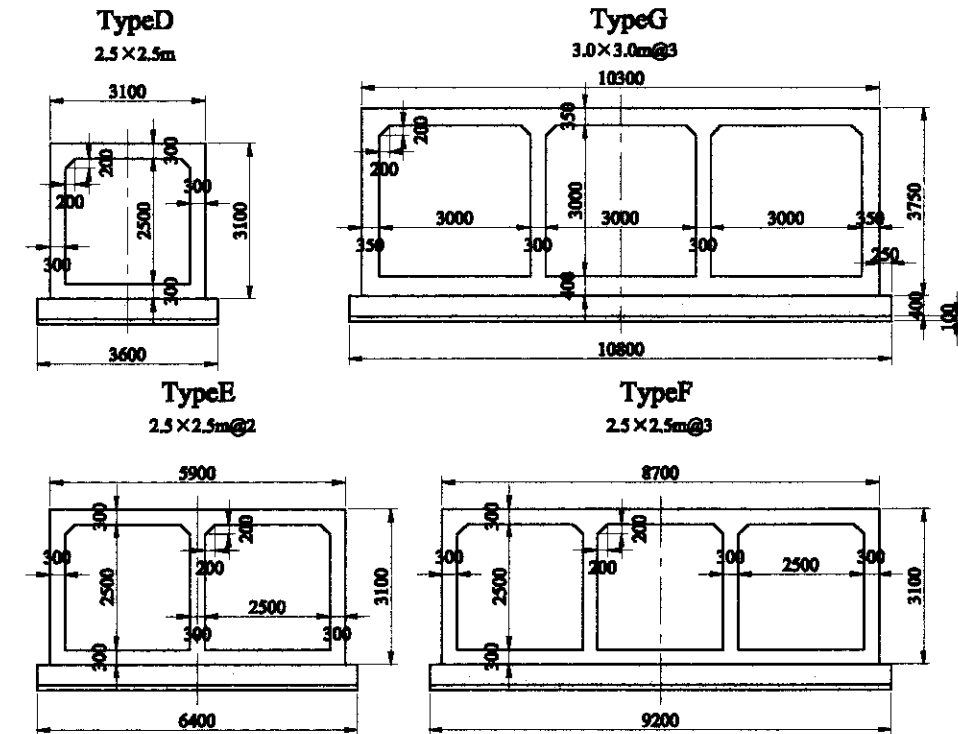
Plan 1:200



B-B 1:200



Section A-A 1:150



List of Quantity

	Type-D	Type-E	Type-F	Type-G
Concrete (Pre-cast) : $\phi 28=210\text{kg}/\text{cm}^2$	m ³ 34.00	58.70	83.40	117.45
Reinforcing Bar (Pre-cast) : SD295($\phi y=3000\text{kg}/\text{cm}^2$)	t 1.70	2.94	4.17	5.87
Concrete (Cast-in-situ) : $\phi 28=210\text{kg}/\text{cm}^2$	m ³ 37.52	43.79	50.07	64.29
Reinforcing Bar (Cast-in-situ) : SD295($\phi y=3000\text{kg}/\text{cm}^2$)	t 1.88	2.19	2.50	3.21
Leveling Concrete $\phi 28=160\text{kg}/\text{cm}^2$	m ³ 29.09	47.57	66.05	83.85
Gravel	m ³ 58.97	82.70	106.43	130.70
Stone Pitching	m ² 98.54	115.34	132.14	153.68
Excavation	m ³ 130.92	182.37	233.82	286.72
h	m 2.50	2.50	2.50	3.00
t1	m 0.30	0.30	0.30	0.35
t2	m 0.30	0.30	0.30	0.40
t3	m 0.30	0.30	0.30	0.30
L1	m 5.85	5.85	5.85	6.95
W	m 9.25	12.05	14.85	17.63
w1	m 1.25	2.65	4.05	4.80
w2	m 3.38	3.38	3.38	4.01

Note: Preliminary Design (Feasibility Study) has been done for this drawing.
Detail Design is required for construction of these culverts.

Legend
Leveling Concrete
Stone Pitching
Gravel

THE FEASIBILITY STUDY ON CONSTRUCTION OF EASTERN ARTERIAL ROAD IN MONGOLIA		
JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)		DEPARTMENT OF ROADS, MINISTRY OF INFRASTRUCTURE, THE GOVERNMENT OF MONGOLIA
PACIFIC CONSULTANTS INTERNATIONAL JAPAN OVERSEAS CONSULTANTS		
Drawing title	Scale	No.
GENERAL VIEW OF BOX CULVERTS (ALTERNATIVE ROUTE)	As Shown	E-37