



GOVERNMENT OF INDIA  
MINISTRY OF ROAD TRANSPORT AND HIGHWAYS

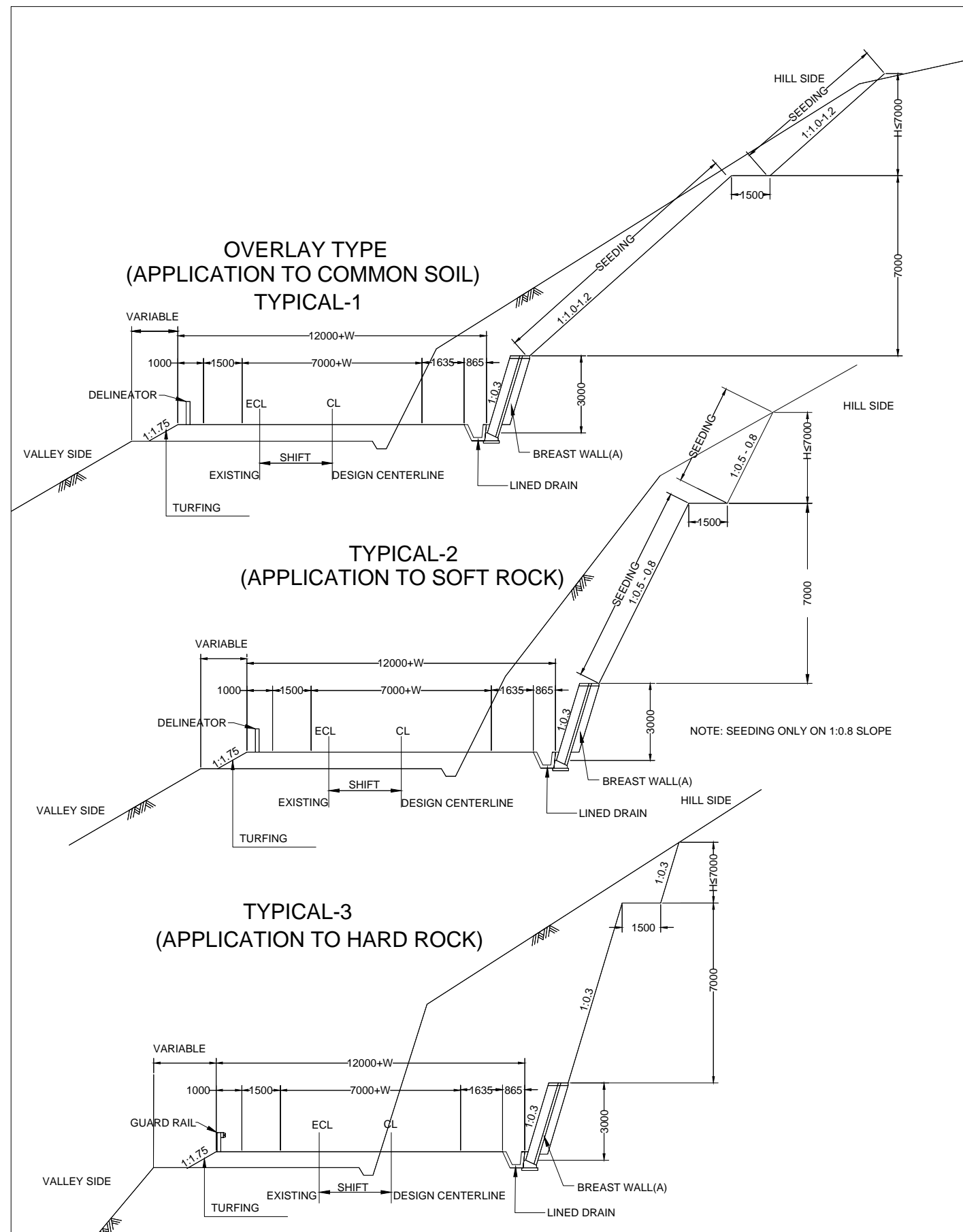
# WIDENING AND UPGRADATION TO 2 LANE WITH PAVED SHOULDER CONFIGURATION AND GEOMETRIC IMPROVEMENTS IN THE STATE OF MIZORAM

## DRAWINGS

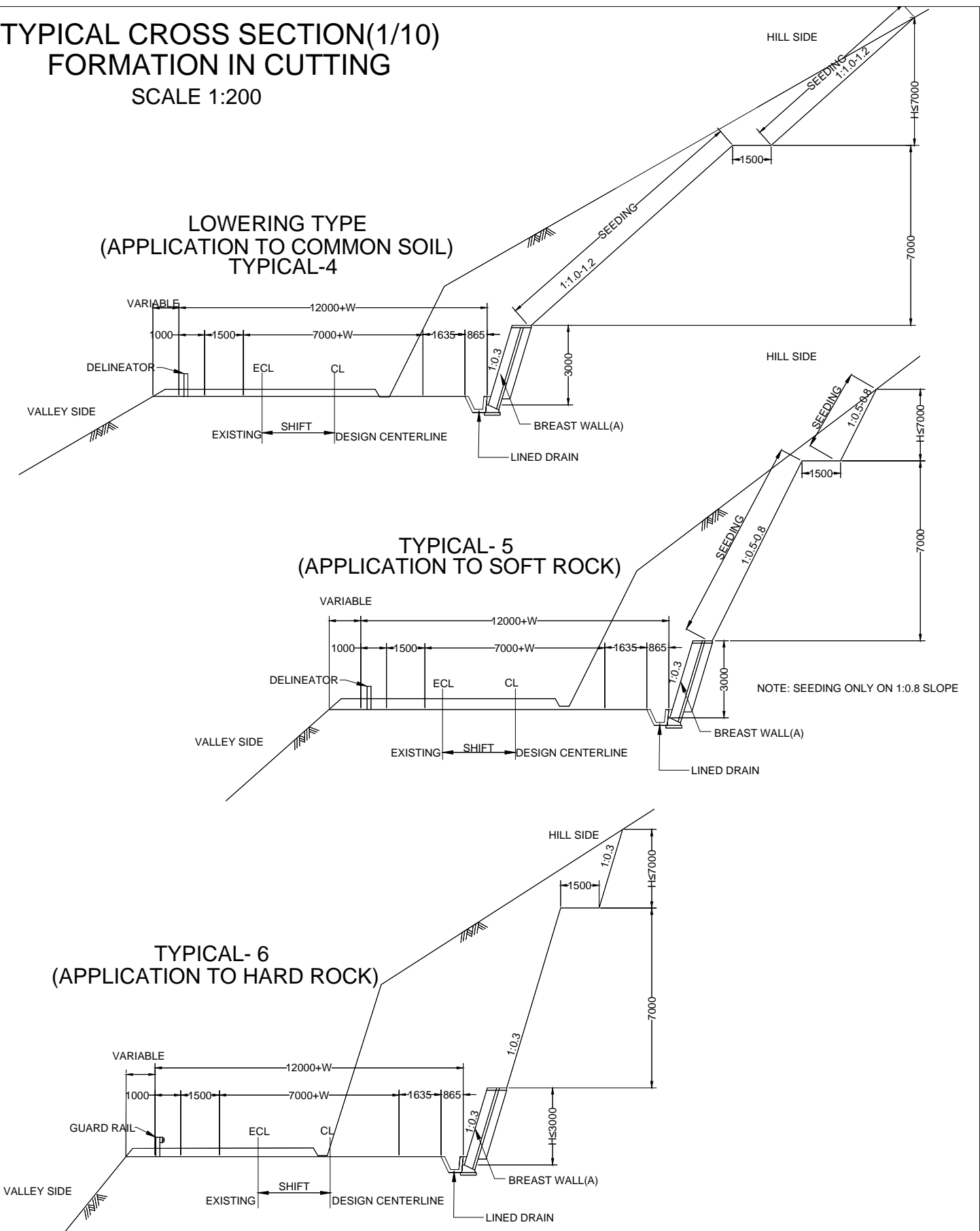
PACKAGE - 7 : NH-54-Miz-2017-18-158/3\_2

# DRAWING LIST

No	DRAWING TITLE	DRAWING No.
1	Cover Page	
2	Drawing List	
A	GENERAL	
1	Typical Cross Section (1/10 -10/10)	A1 -A10
2	Typical Drawing for Pavement Detail	A-11
3	General Details of Plan & Profile Curve	A-12
4	Typical Details for Extra Widening	A-13
B	DRAINAGE WORK	
1	Typical Details of Sideditch	B-1
2	Typical Details of Pipe Culvert (1/2) (φ1200)	B-2
3	Typical Details of Pipe Culvert (2/2) (φ1200)	B-3
4	Typical Details of Box Culvert (2mx2m, 3mx3m, 4mx4m,4mx6m)	B-4
C	RETAINING WALL WORK	
1	Typical Details of Retaining Wall (1/3) Breast Type Wet Masonry Walls	C-1
2	Typical Details of Retaining Wall (2/3) Gabion & Gravity Wet Masonry Walls	C-2
3	Typical Details of Retaining Wall (3/3) Reinforced Earth Walls	C-3
D	BRIDGE WORK	
1	Bridge Location Map for NH54	D-1
E	SLOPE PROTECTION WORK	
1	Schedule of Slope Protection Work	E-1
2	Typical Details of Slope Protection Work - Vegetation Works 1	E-2
3	Typical Details of Slope Protection Work - Vegetation Works 2	E-3
4	Typical Details of Slope Protection Work - Crib Work	E-4
5	Typical Details of Slope Protection Work - Wire Rope Crib Work (None-Frame)	E-5
6	Typical Details of Slope Protection Work - Rockwall Prevention Wall	E-6
7	Typical Details of Slope Protection Work - Ground Water Drainage Work	E-7
8	Typical Details of Slope Protection Work - Anchor Work	E-8
9	Typical Details of Slope Protection Work - Rock Bolt Work	E-9
F	TRAFFIC SAFETY FACILITIES WORK	
1	Typical Detail for Traffic Sign (1/3) Mandatory/ Regulatory Signs	F-1
2	Typical Detail for Traffic Sign (2/3) Cautionary/ Warning Signs	F-2
3	Typical Detail for Traffic Sign (3/3) Informatory/ Signs	F-3
4	Typical Detail for Road Marking	F-4
5	Typical Detail for Kilometer Stone	F-5
6	Typical Detail for Boundary Stone & Guard Post	F-6
7	Typical Detail for Road Delineator	F-7
8	Typical Detail for Guard Rail	F-8
G	ROAD APPURTENANCES	
1	Typical Detail for Bus Bay and Road Amenity (1/4) Layout of Bus Bay	G-1
2	Typical Detail for Bus Bay and Road Amenity (2/4) Bus Waiting Shed	G-2
3	Typical Detail for Bus Bay and Road Amenity (3/4) Public Toilet	G-3
4	Typical Detail for Bus Bay and Road Amenity (4/4) Market Shed	G-4



**TYPICAL CROSS SECTION(1/10)  
FORMATION IN CUTTING**  
SCALE 1:200



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**WIDENING AND UPGRADATION TO 2 LANE WITH PAVED  
SHOULDER CONFIGURATION AND GEOMETRIC  
IMPROVEMENTS IN THE STATE OF MIZORAM**

Designed.

Drawn.

Checked

Scale.

Approved.

Date.

1 : 200

Drawing Title :-

**NH-54 P-7**

**TYPICAL CROSS SECTION**

Drawing No:-

**NH-54-A-1**

Sheet No:-

**1 OF 10**

Rev.

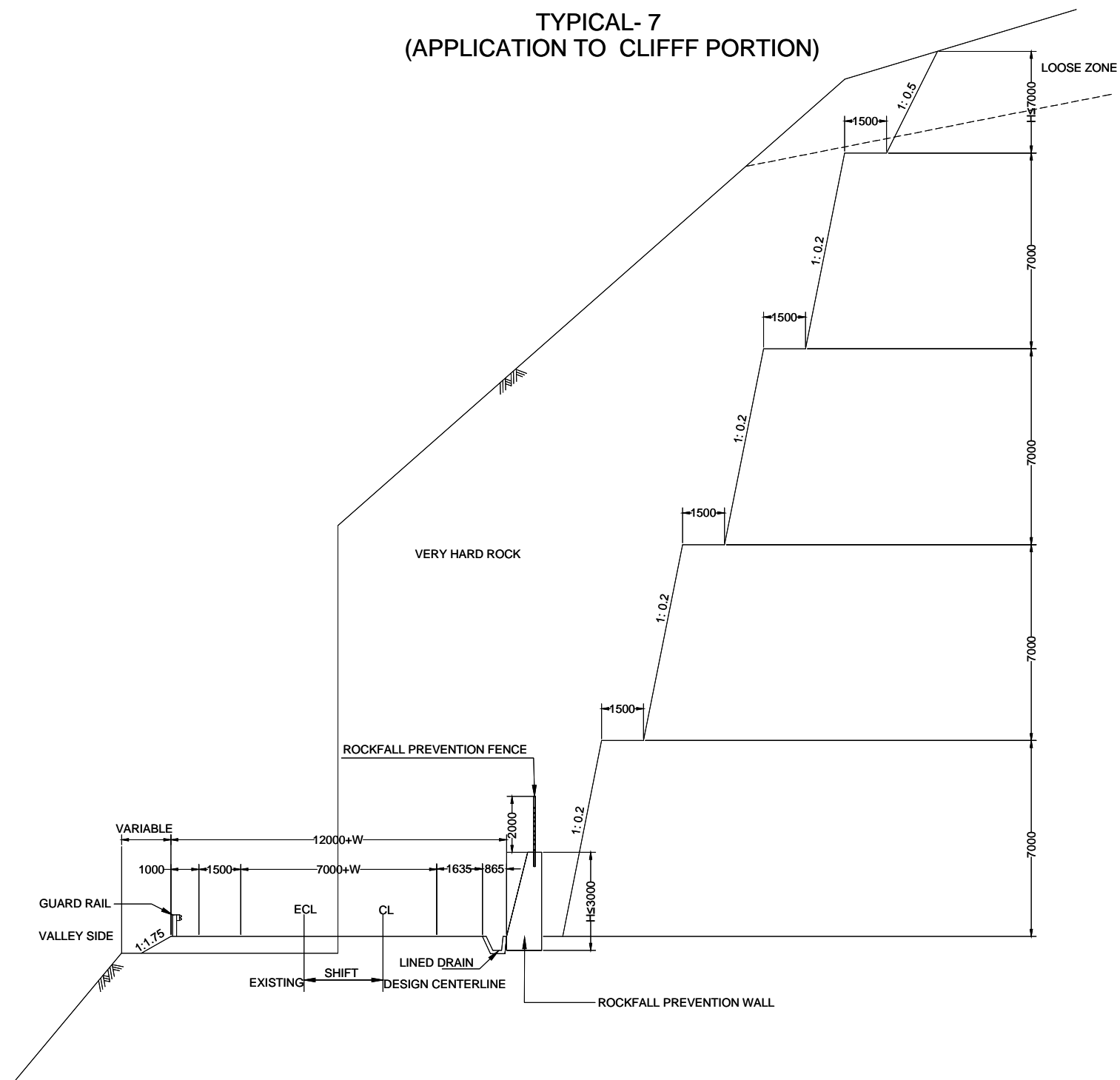
Date.

Drawn.

Checked.

Approved.

# TYPICAL CROSS SECTION (02/10) FORMATION IN CUTTING SCALE 1:200



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Rev.	Date.		Drawn.	Checked.	Approved.	

**WIDENING AND UPGRADATION TO 2 LANE WITH PAVED  
SHOULDER CONFIGURATION AND GEOMETRIC  
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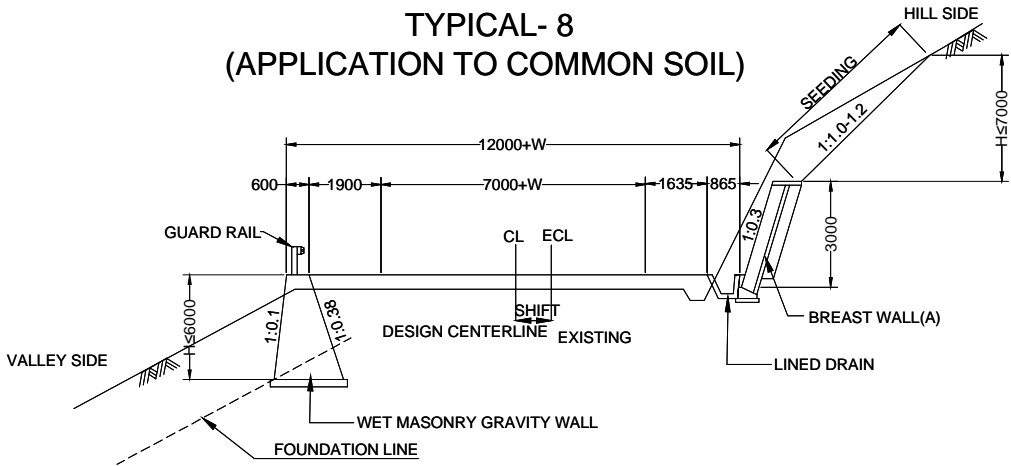
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Drawing No:- <b>NH-54-A-2</b>
Sheet No:- <b>2 OF 10</b>

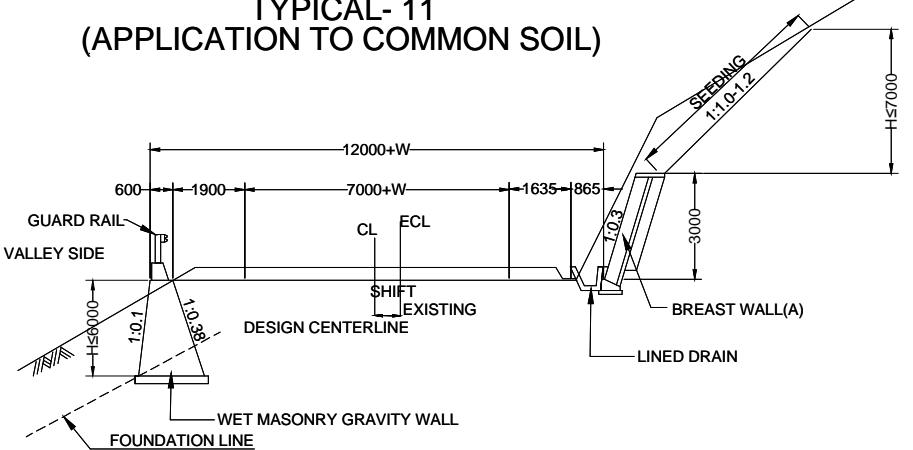


TYPICAL CROSS SECTION (03/10)  
FORMATION IN CUTTING AND EMBANKMENT  
SCALE 1:200

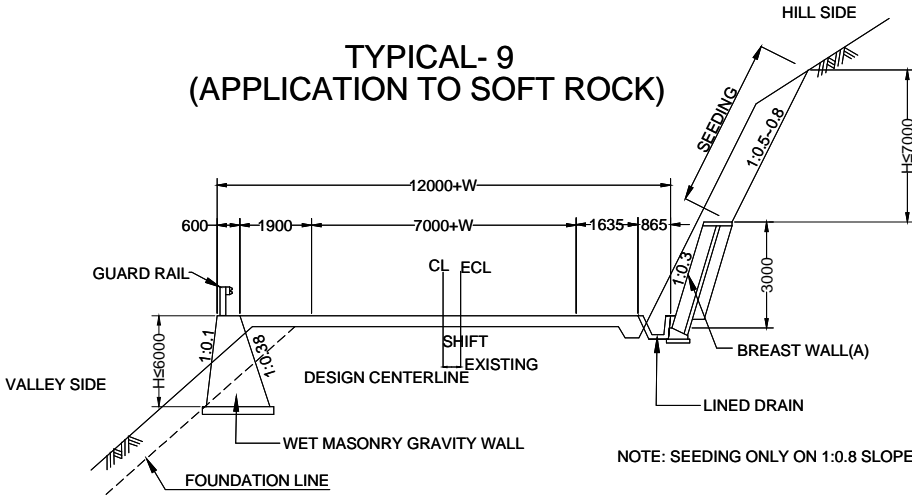
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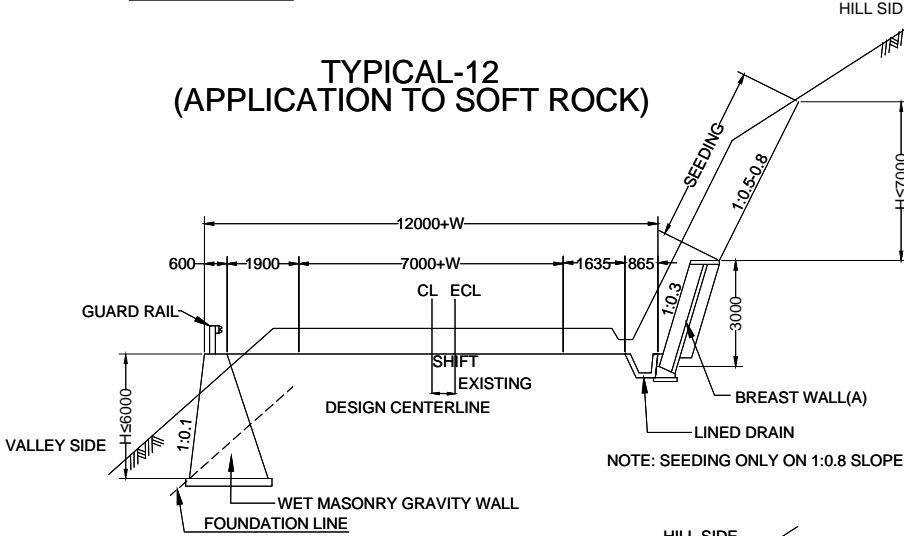
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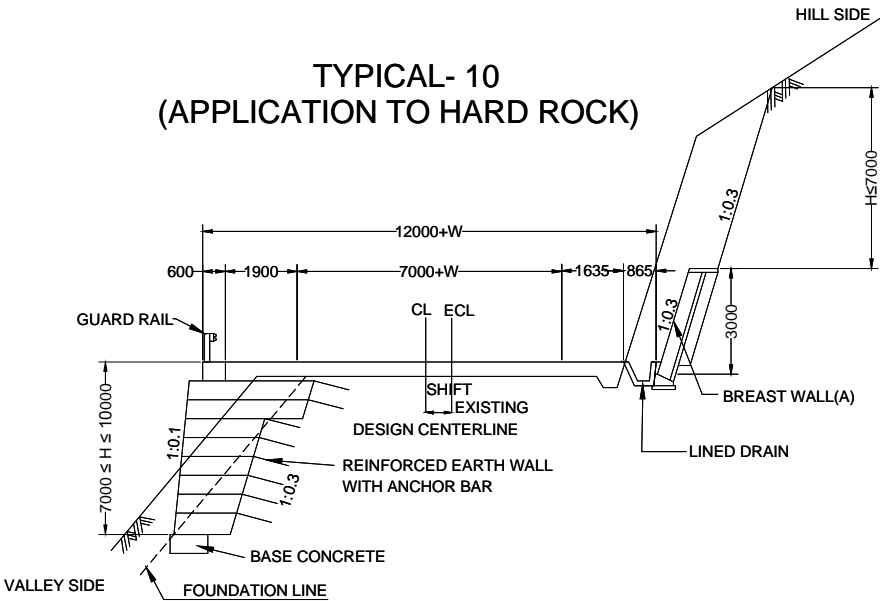
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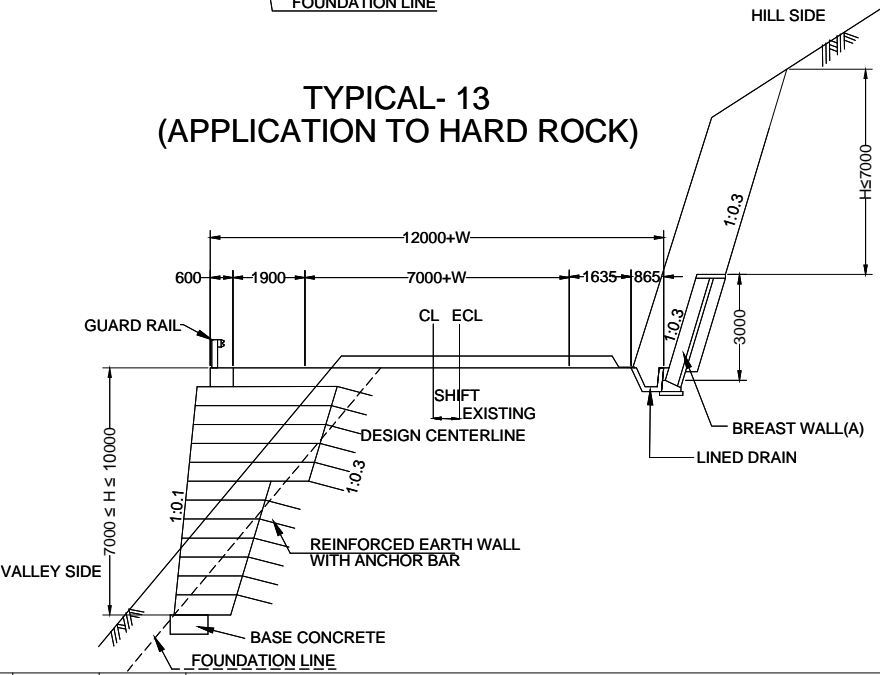
TYPICAL-12  
(APPLICATION TO SOFT ROCK)



TYPICAL- 10  
(APPLICATION TO HARD ROCK)



TYPICAL- 13  
(APPLICATION TO HARD ROCK)



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WIDENING AND UPGRADATION TO 2 LANE WITH PAVED  
SHOULDER CONFIGURATION AND GEOMETRIC  
IMPROVEMENTS IN THE STATE OF MIZORAM

Drawing Title :-

NH-54 P-7

TYPICAL CROSS SECTION

Designed.

Checked

Approved.

Drawing No:-

NH-54-A-3

Drawn.

Scale.

Date.

Sheet No:-

3 OF 10

Rev.

Date.

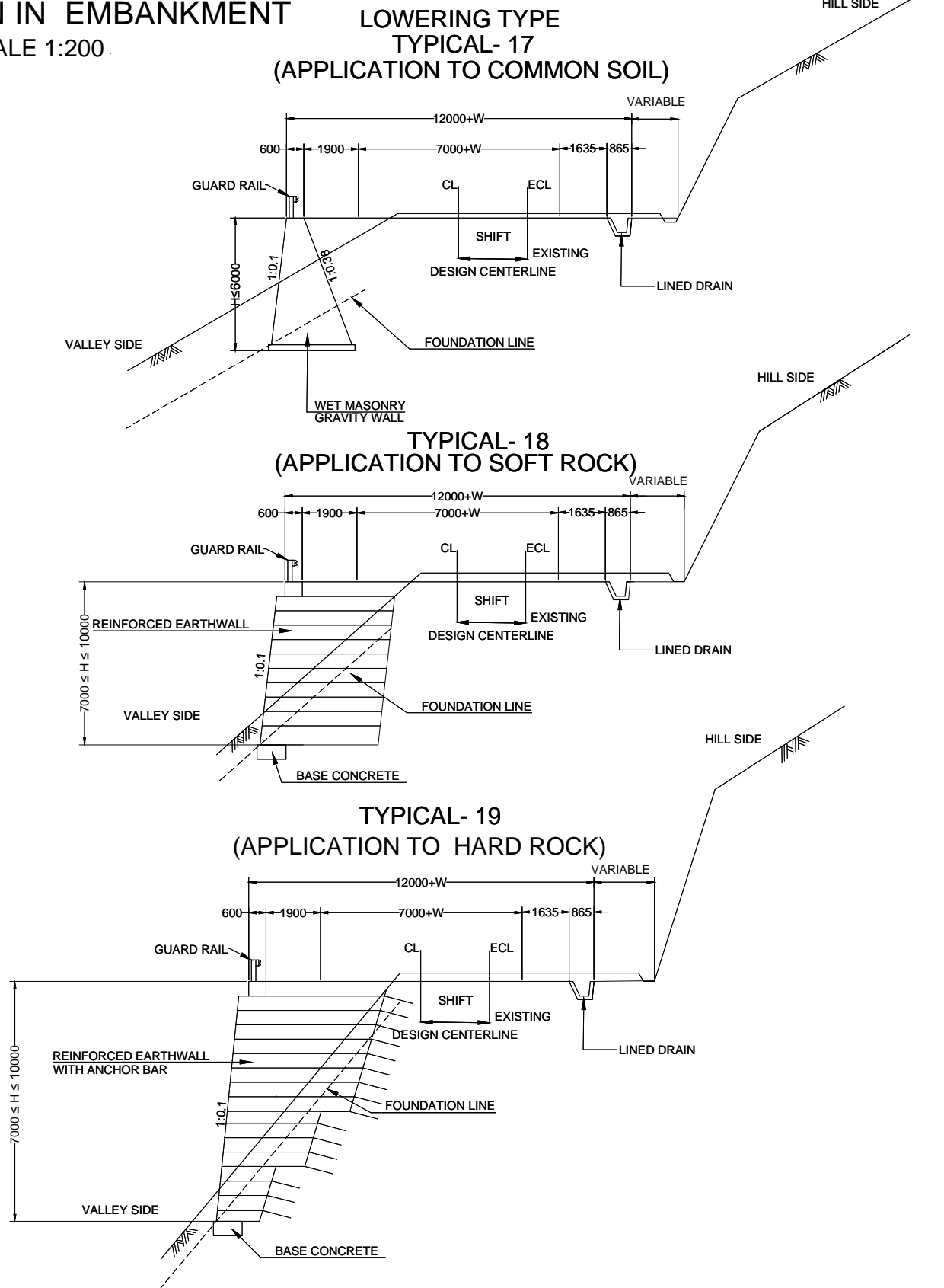
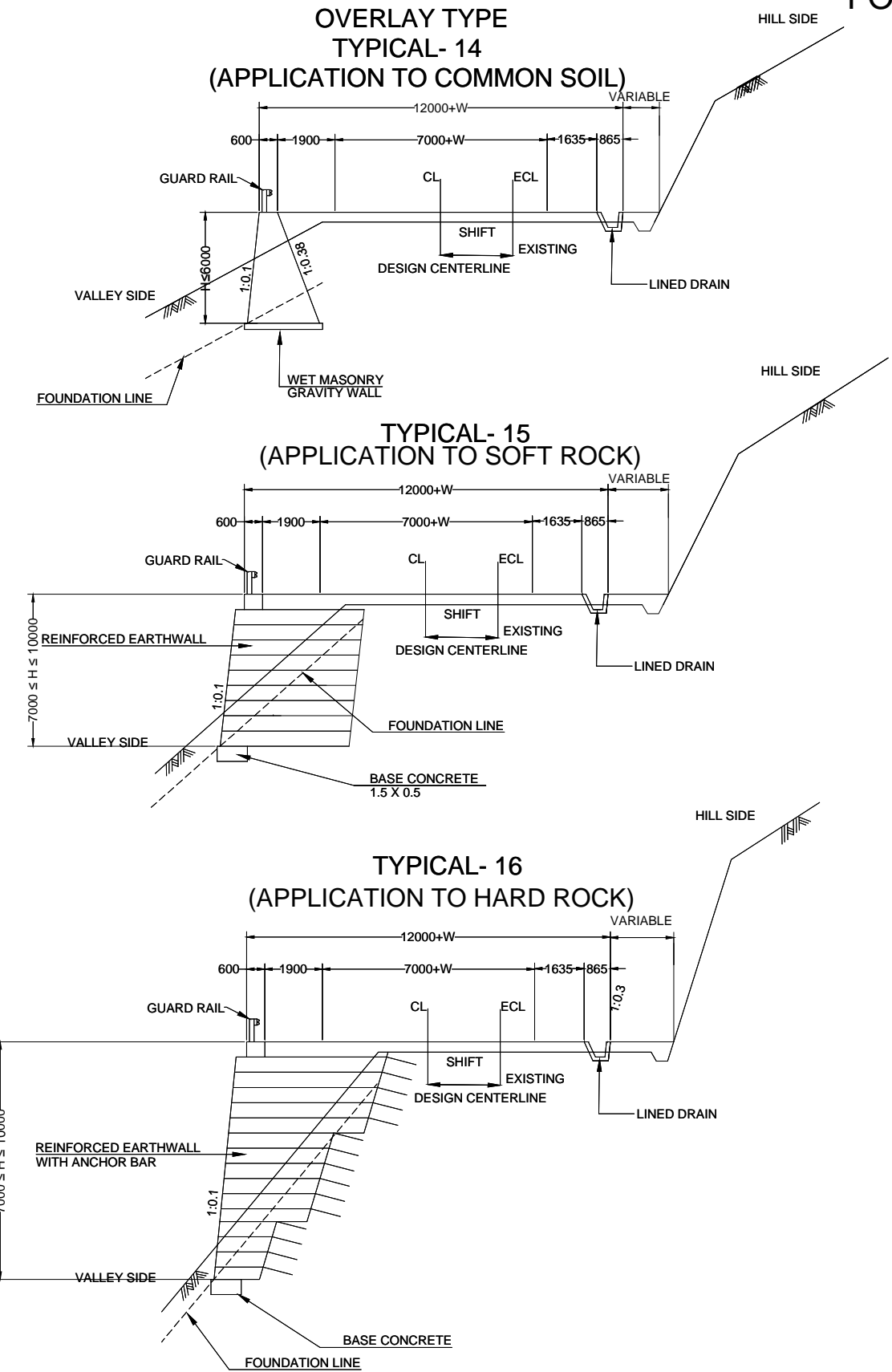
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Approved.

1 : 200

# TYPICAL CROSS SECTION (04/10) FORMATION IN EMBANKMENT SCALE 1:200



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WIDENING AND UPGRADATION TO 2 LANE WITH PAVED  
SHOULDER CONFIGURATION AND GEOMETRIC  
IMPROVEMENTS IN THE STATE OF MIZORAM

Drawing Title :-

NH-54 P-7

TYPICAL CROSS SECTION

Designed.

Checked

Approved.

Drawing No:-

NH-54-A-4

Drawn.

Scale.

Date.

Sheet No:-

4 OF 10

1 : 200

Rev.

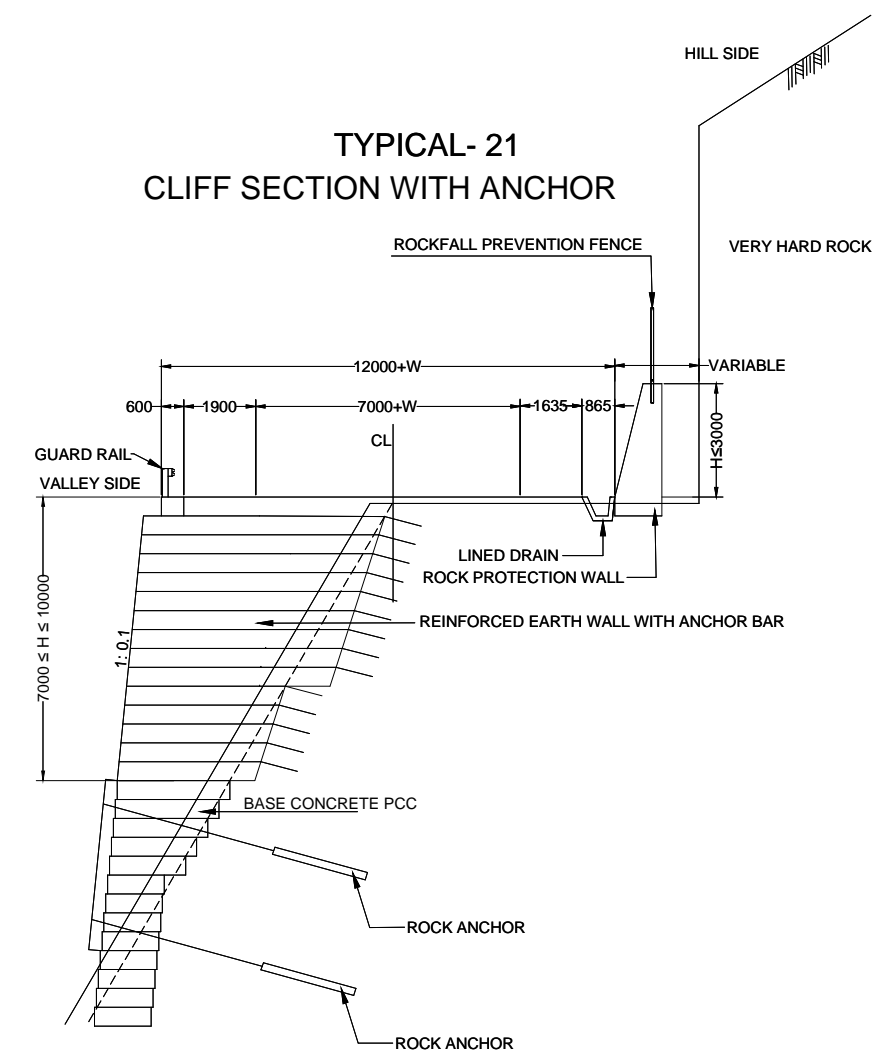
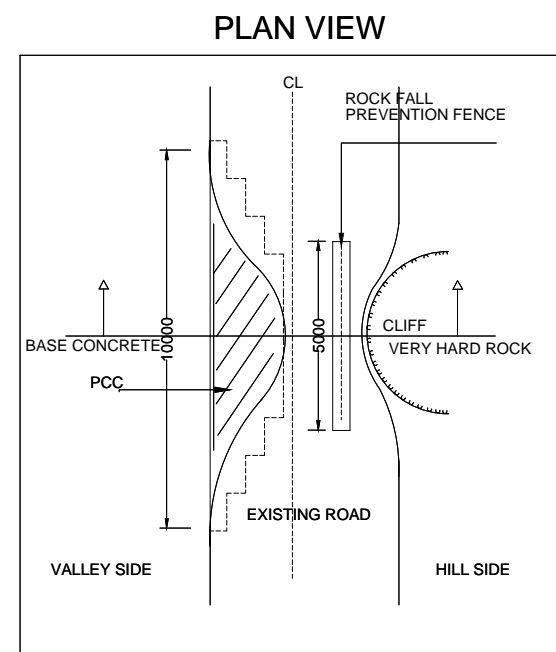
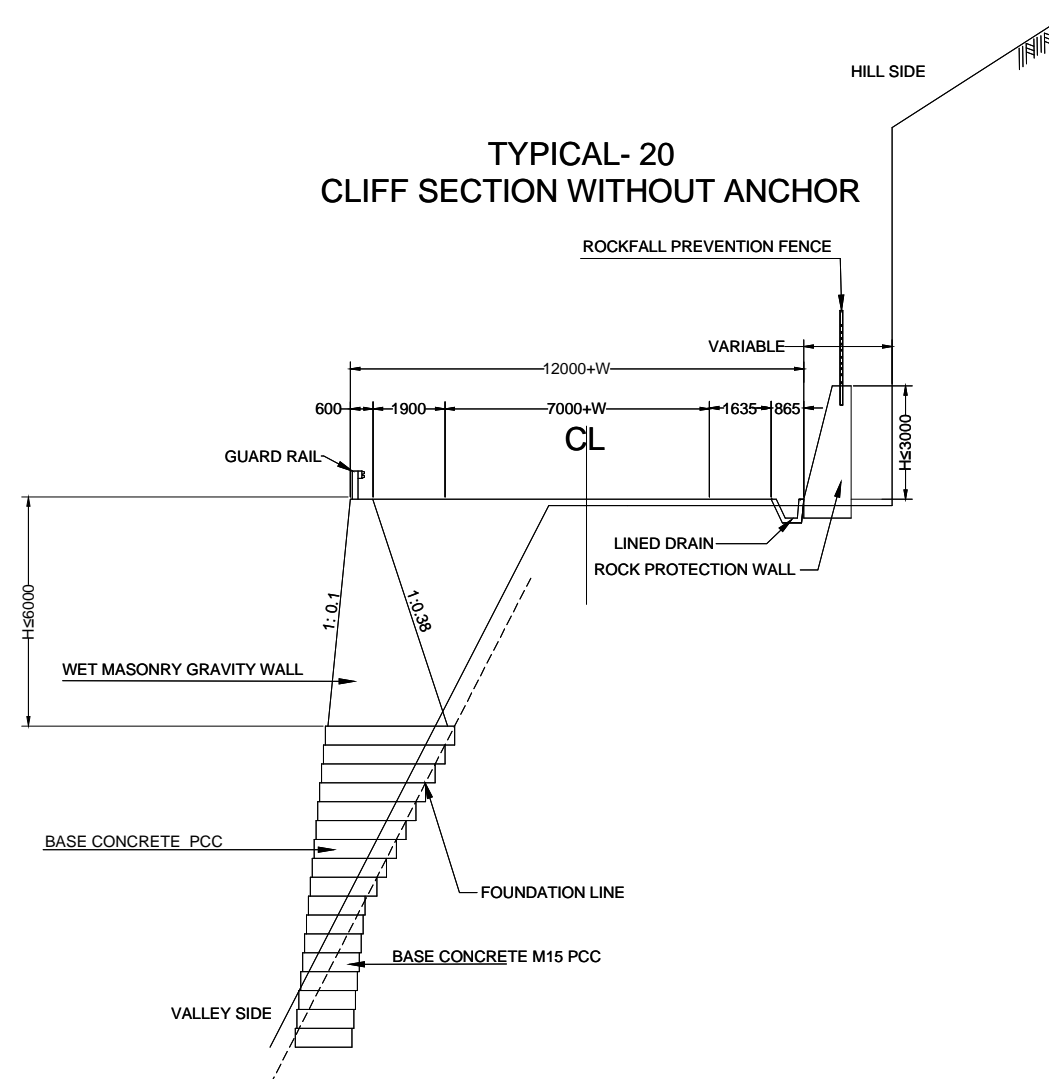
Date.

Drawn.

Checked.

Approved.

# TYPICAL CROSS SECTION (05/10) FORMATION IN EMBANKMENT AT CLIFF SECTION SCALE 1:200



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WIDENING AND UPGRADATION TO 2 LANE WITH PAVED  
SHOULDER CONFIGURATION AND GEOMETRIC  
IMPROVEMENTS IN THE STATE OF MIZORAM

Designed.	Checked	Approved.
Drawn.	Scale. 1 : 200	Date.

Drawing Title :-

NH-54 P-7

TYPICAL CROSS SECTION

Drawing No:-

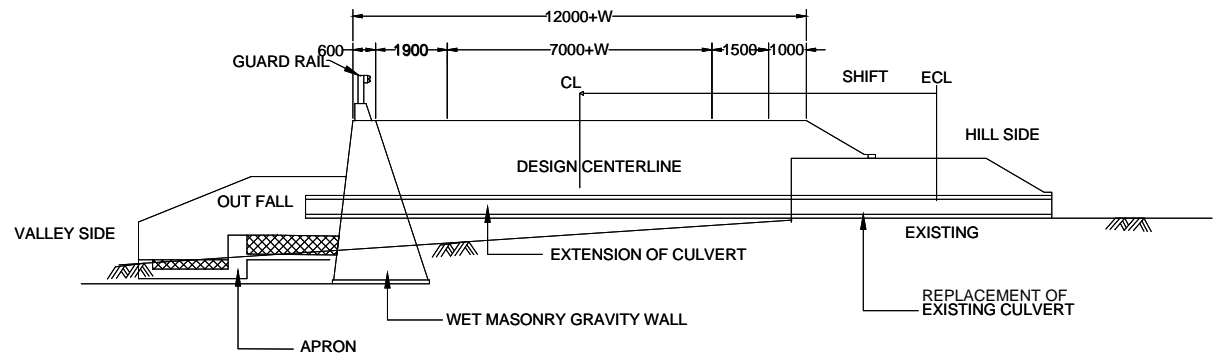
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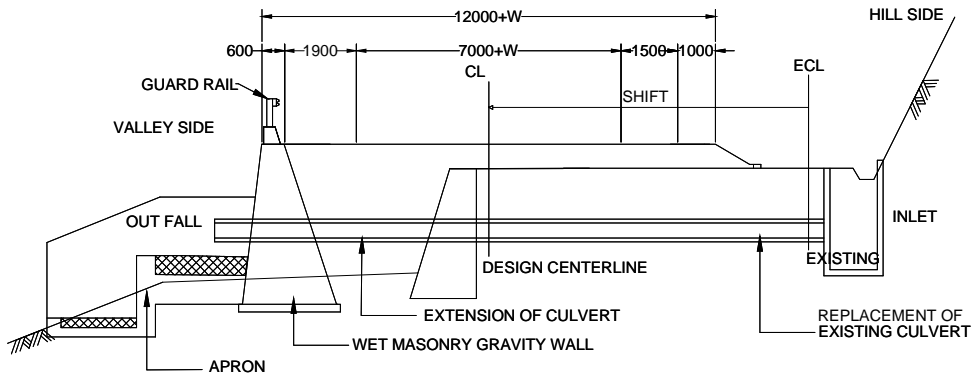
5 OF 10

**TYPICAL CROSS SECTION (06/10)**  
**FORMATION IN EMBANKMENT AT HAIRPIN BEND WITH CULVERT**  
SCALE 1:200

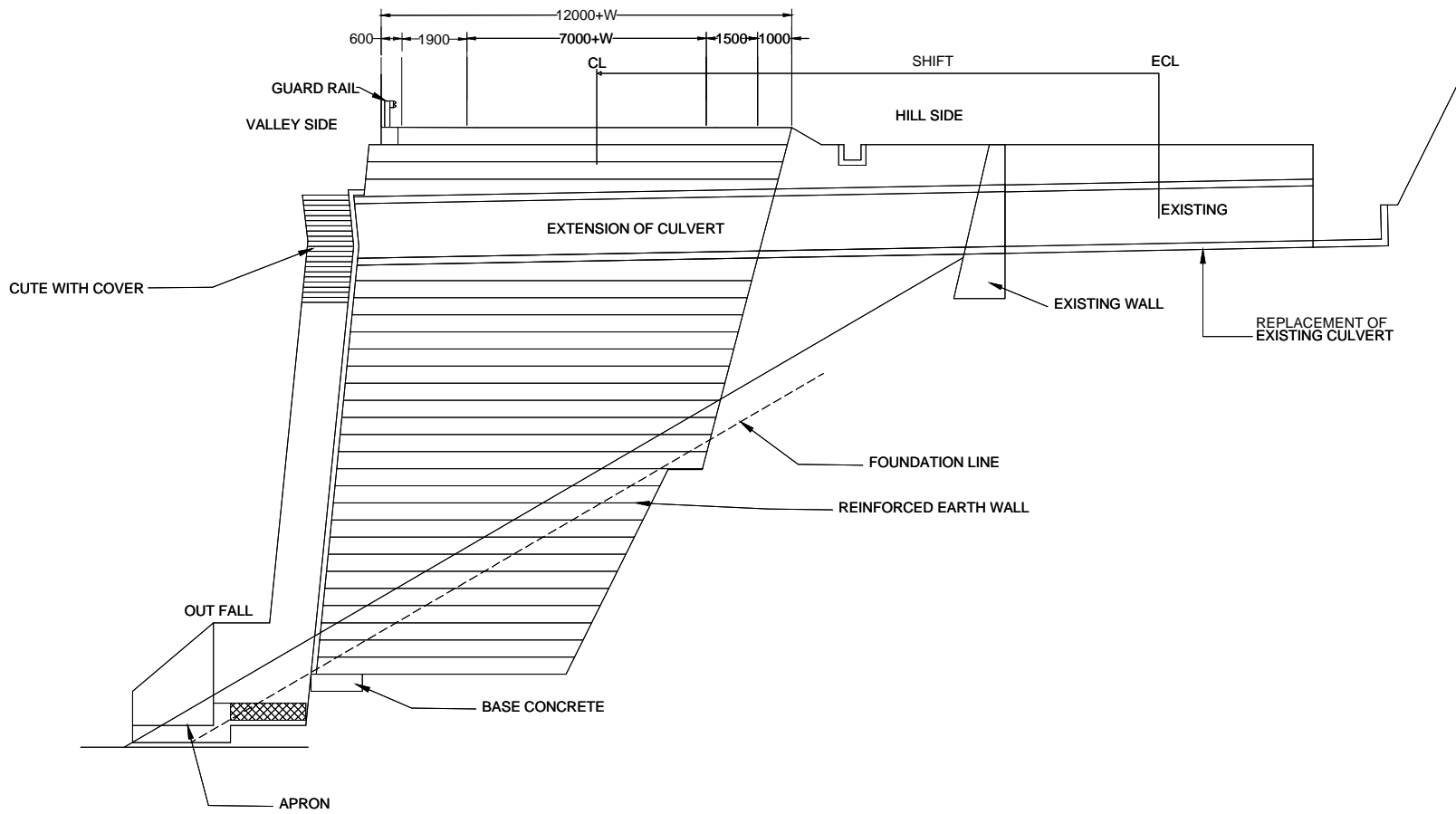
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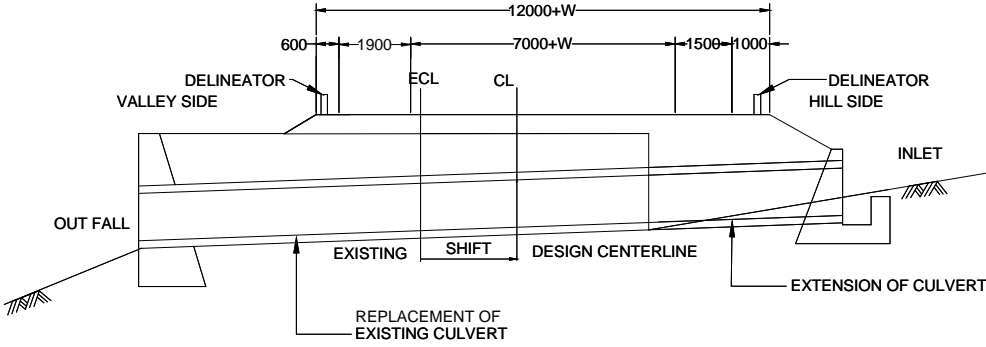
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**(RECONSTRUCTION)**



**TYPICAL- 23**  
**(RECONSTRUCTION)**



**TYPICAL-25**  
**(RECONSTRUCTION)**



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Rev.	Date.		Drawn.	Checked.	Approved.

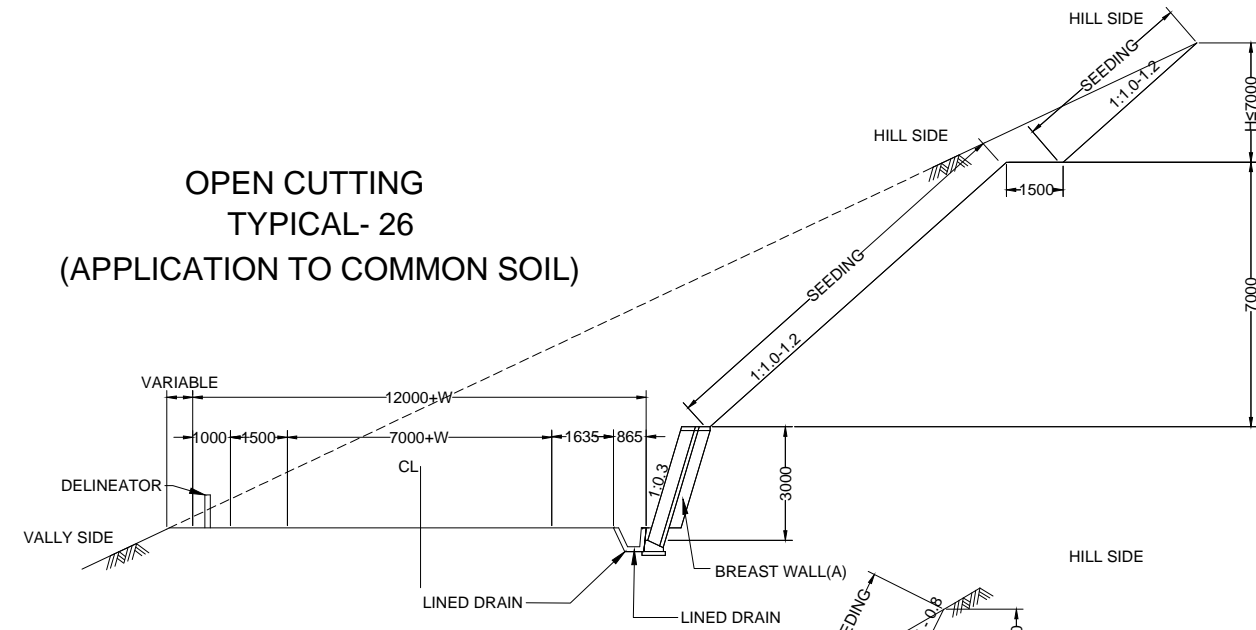
**WIDENING AND UPGRADATION TO 2 LANE WITH PAVED  
SHOULDER CONFIGURATION AND GEOMETRIC  
IMPROVEMENTS IN THE STATE OF MIZORAM**

Designed.	Checked	Approved.
Drawn.	Scale. 1 : 200	Date.

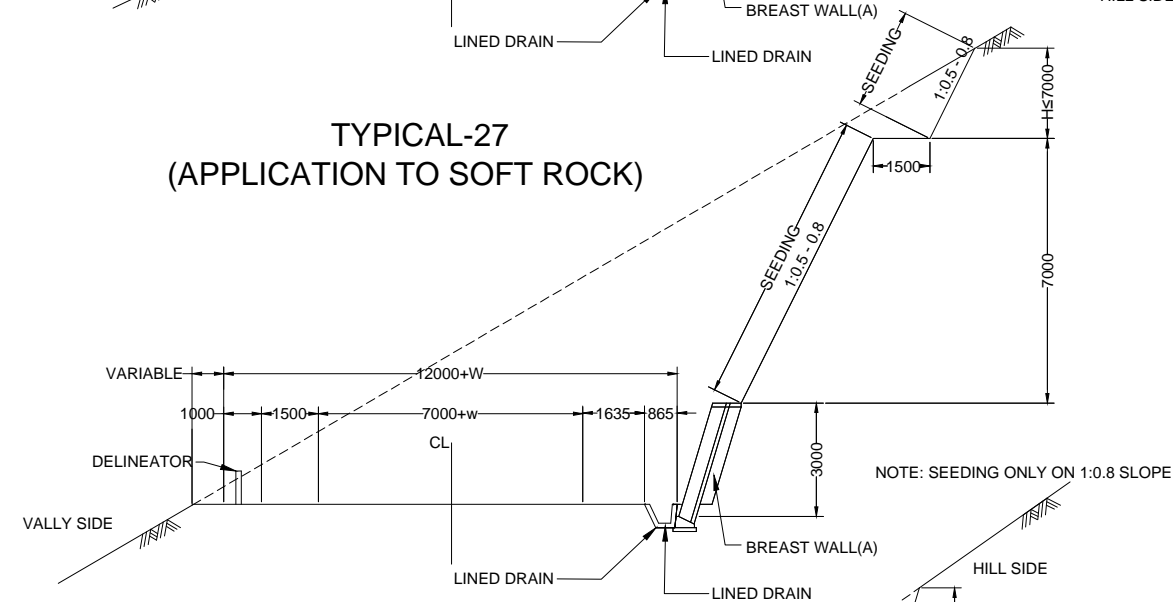
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Drawing No:- <b>NH-54-A-6</b>
Sheet No:- <b>6 OF 10</b>

TYPICAL CROSS SECTION (07/10)  
FORMATION IN CUTTING AT SHORT-CUT  
SCALE 1:200

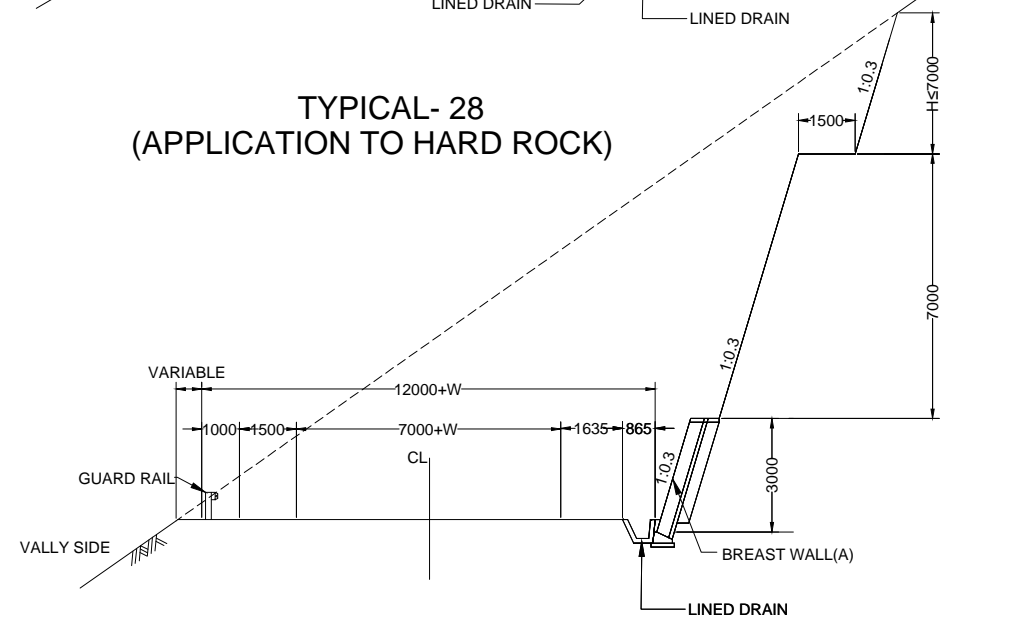
OPEN CUTTING  
TYPICAL- 26  
(APPLICATION TO COMMON SOIL)



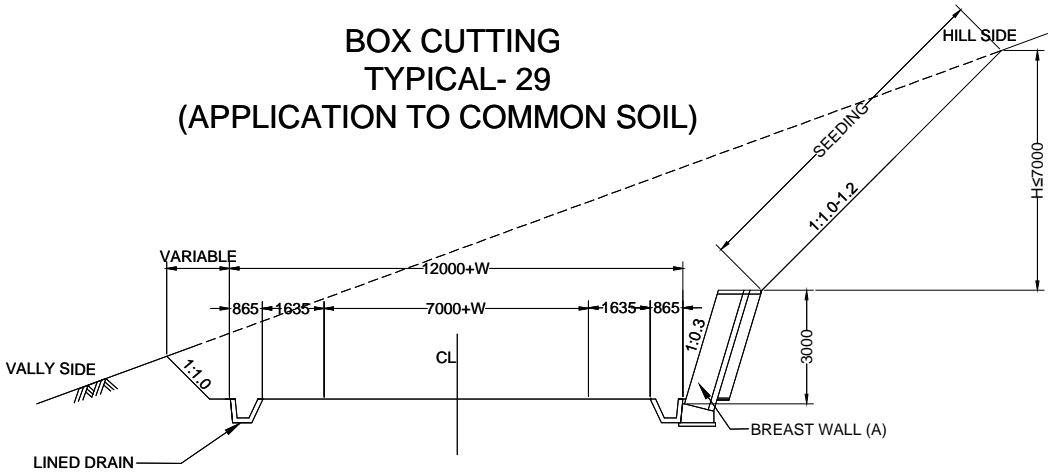
TYPICAL-27  
(APPLICATION TO SOFT ROCK)



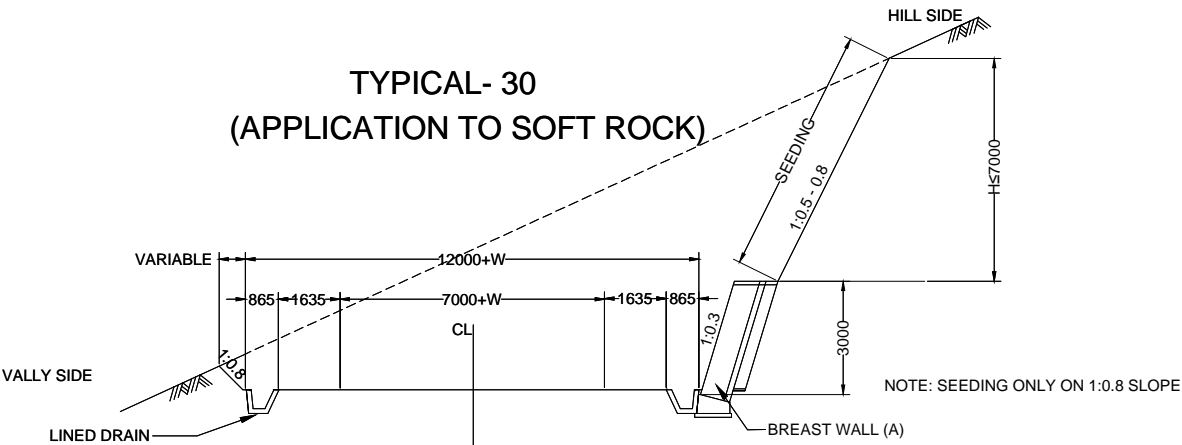
TYPICAL- 28  
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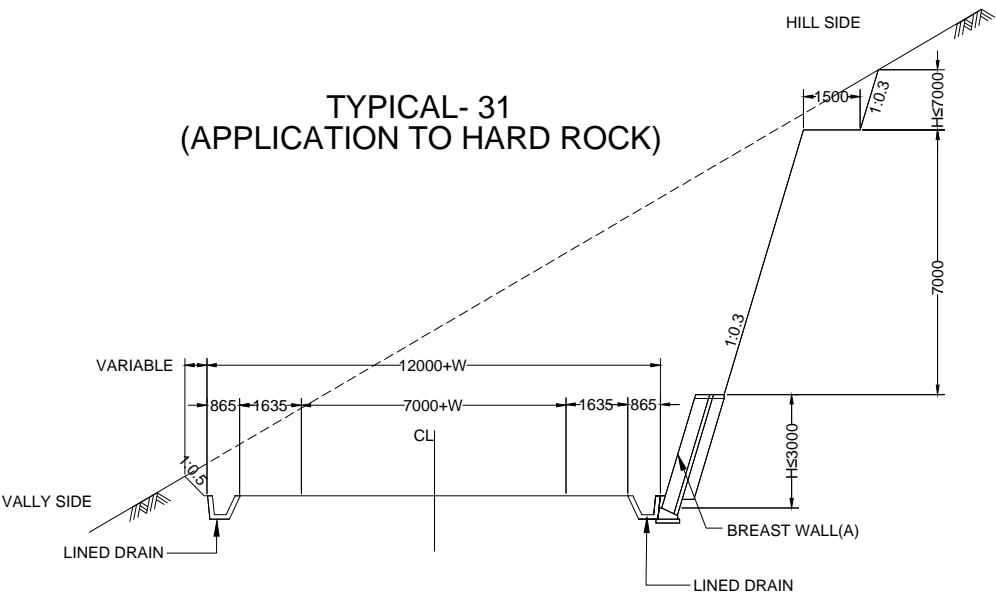
BOX CUTTING  
TYPICAL- 29  
(APPLICATION TO COMMON SOIL)



TYPICAL- 30  
(APPLICATION TO SOFT ROCK)



TYPICAL- 31  
(APPLICATION TO HARD ROCK)



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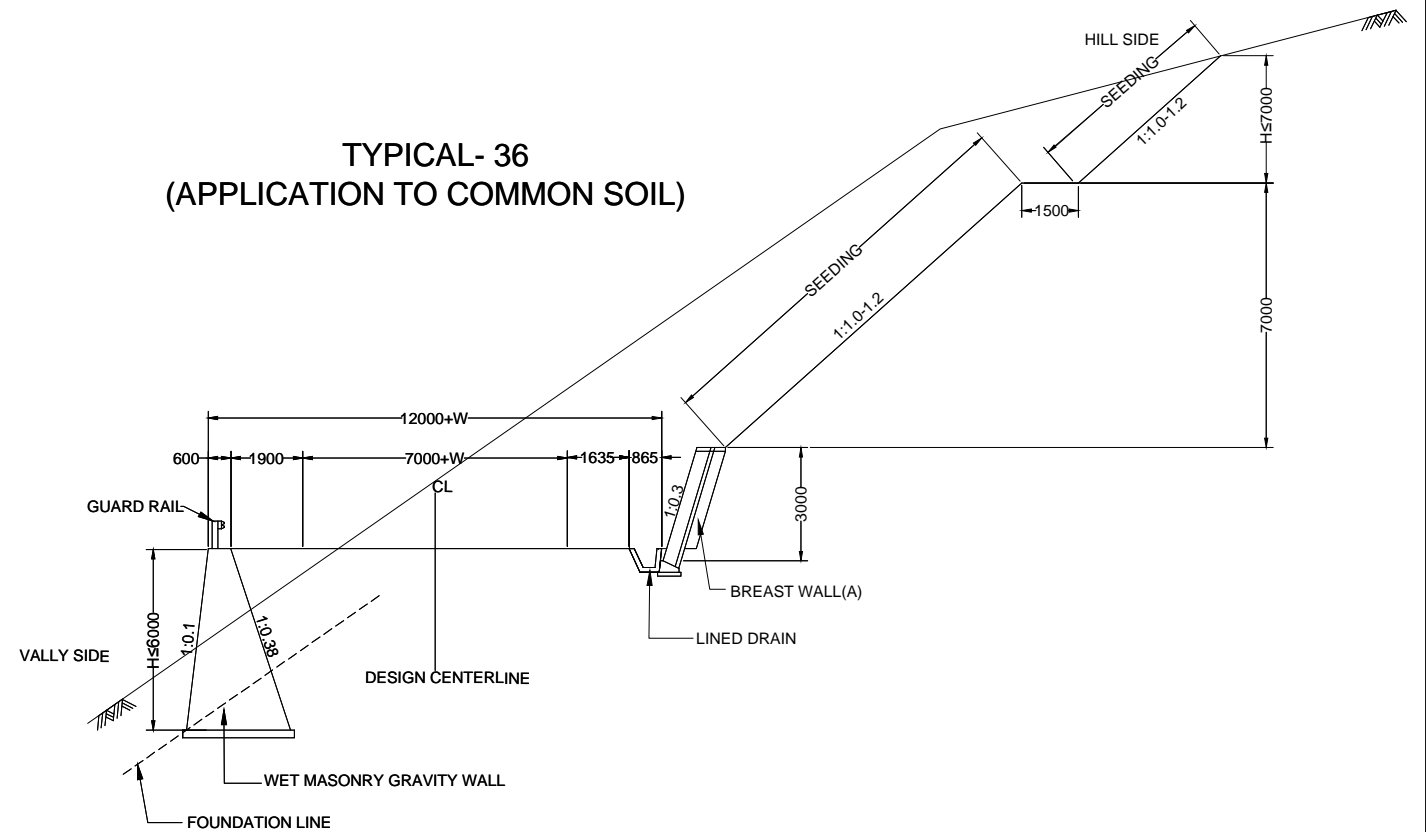
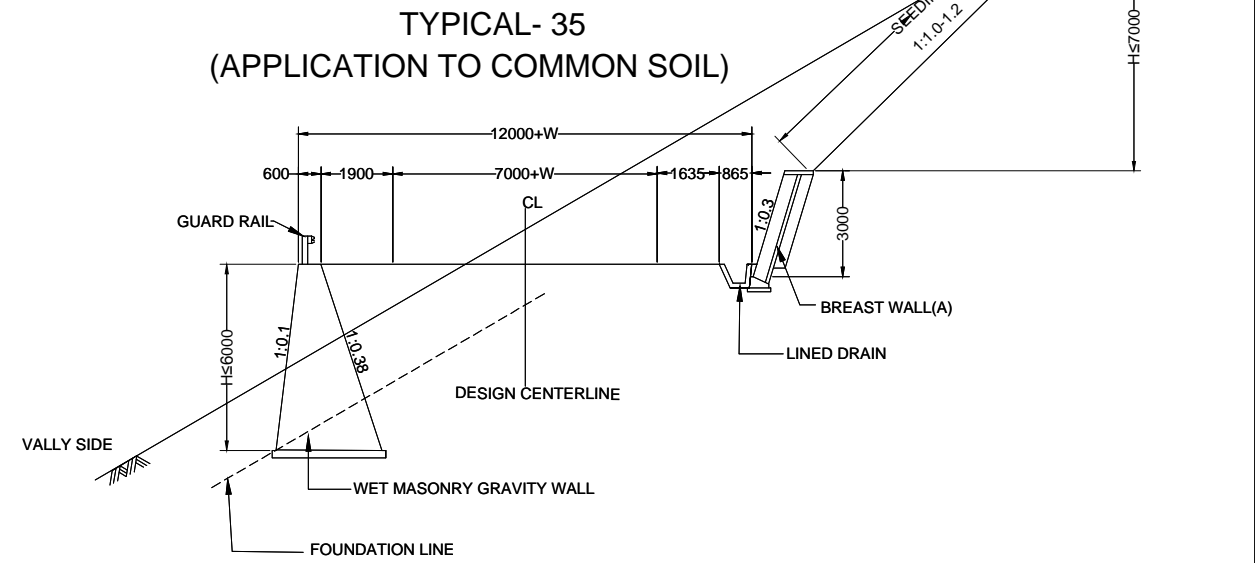
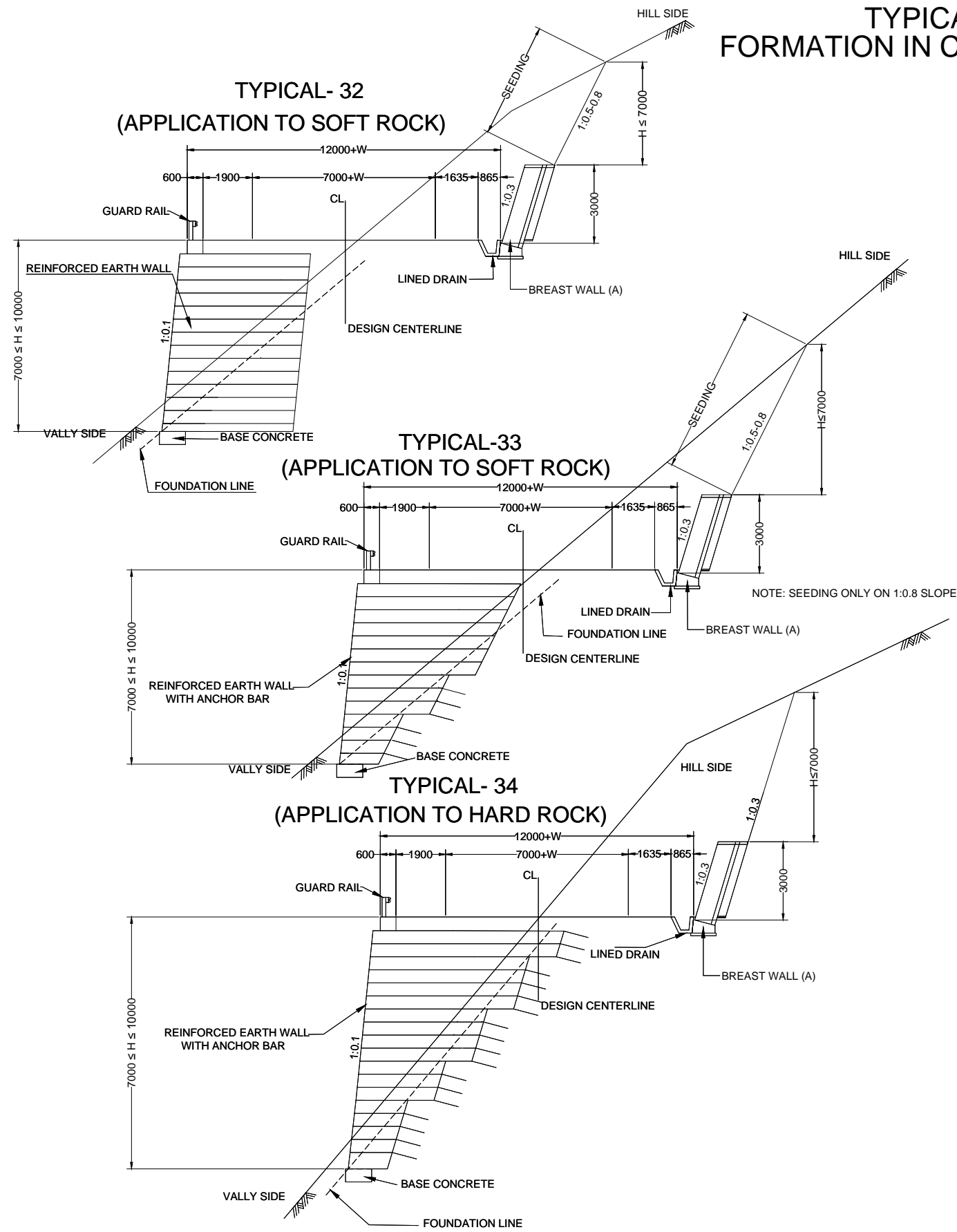
Rev.	Date.		Drawn.	Checked.	Approved.	

WIDENING AND UPGRADATION TO 2 LANE WITH PAVED  
SHOULDER CONFIGURATION AND GEOMETRIC  
IMPROVEMENTS IN THE STATE OF MIZORAM

Designed.	Checked	Approved.
Drawn.	Scale. 1 : 200	Date.

Drawing Title :- <b>NH-54 P-7</b> TYPICAL CROSS SECTION
Drawing No:- <b>NH-54-A-7</b>
Sheet No:- <b>7 OF 10</b>

TYPICAL CROSS SECTION (08/10)  
FORMATION IN CUTTING AND EMBANKMENT FOR BYPASS  
SCALE 1:200

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WIDENING AND UPGRADATION TO 2 LANE WITH PAVED  
SHOULDER CONFIGURATION AND GEOMETRIC  
IMPROVEMENTS IN THE STATE OF MIZORAM

Designed.
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Drawn.
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Checked
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	Scale.
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Approved.
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Date.	
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Drawing Title :-
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NH-54 P-7

TYPICAL CROSS SECTION

Drawing No:-
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NH-54-A-8

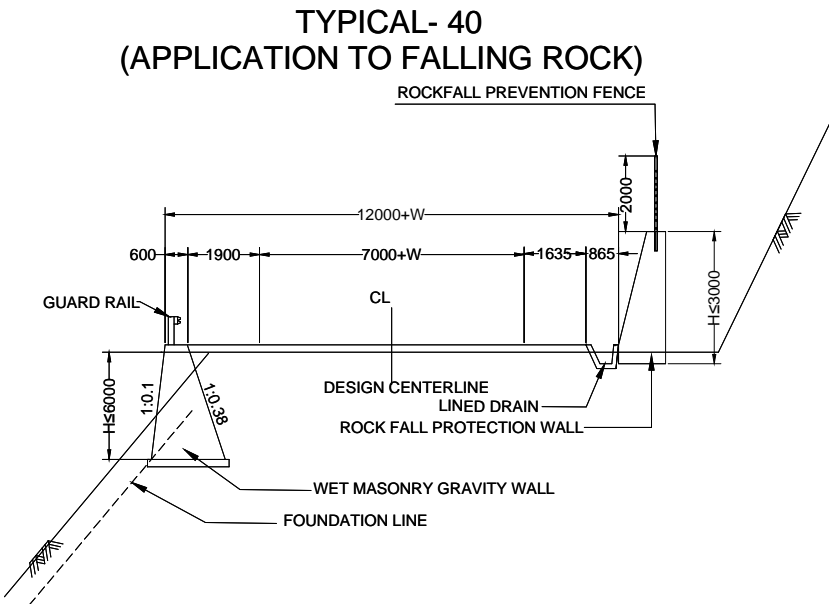
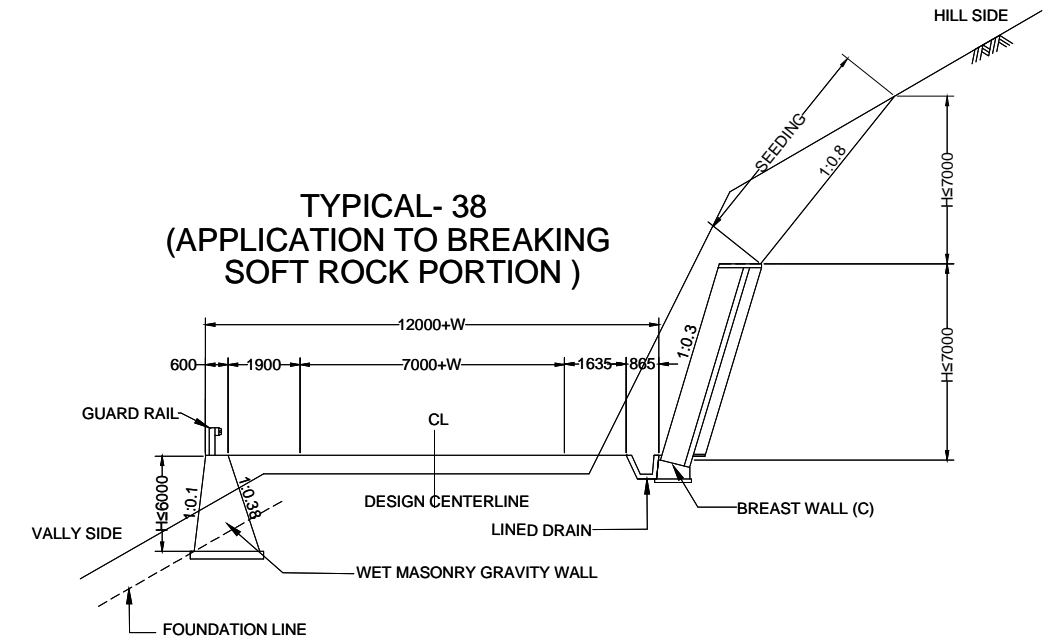
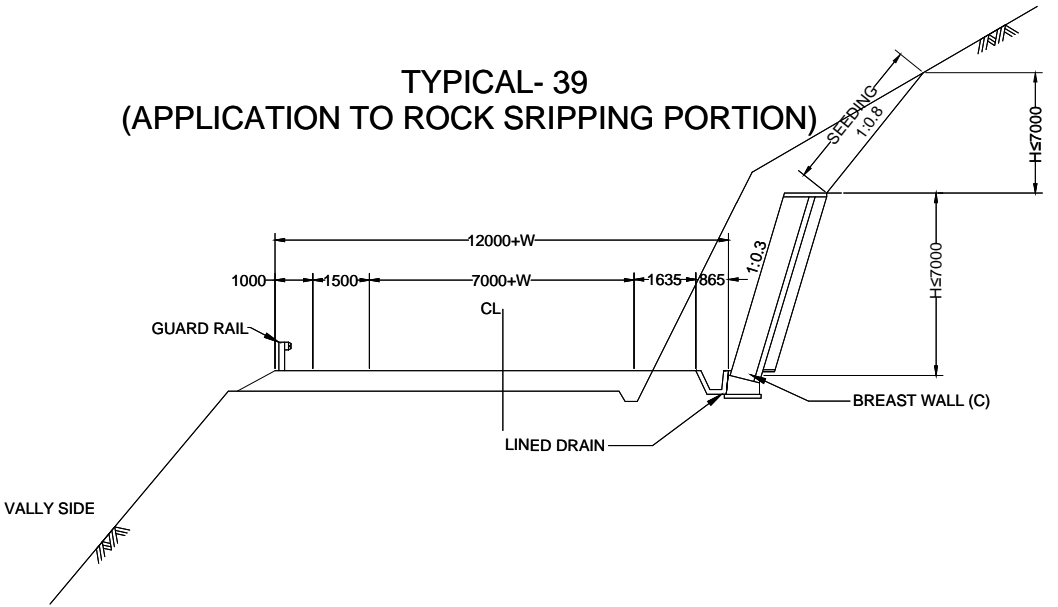
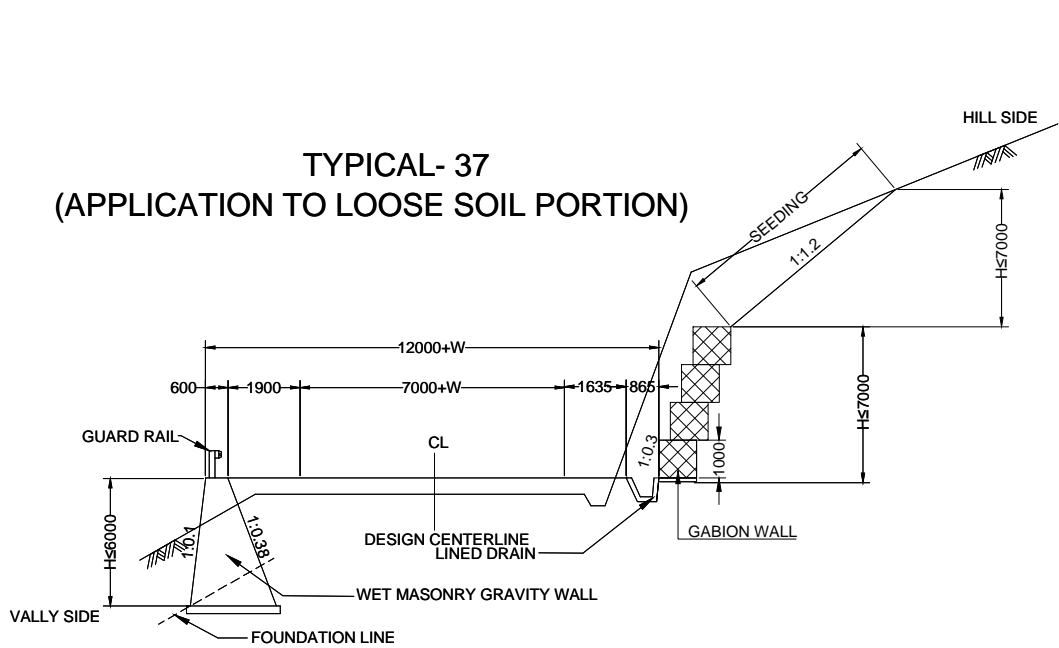
Sheet No:-

8 OF 10



TYPICAL CROSS SECTION (09/10)  
FORMATION IN UNSTABLE SLOPE

SCALE 1:200



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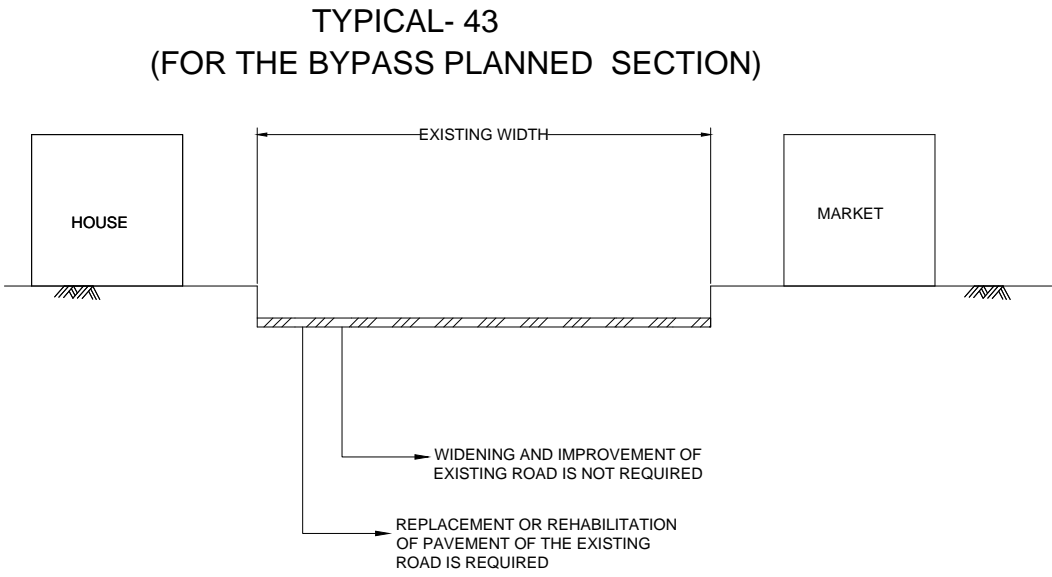
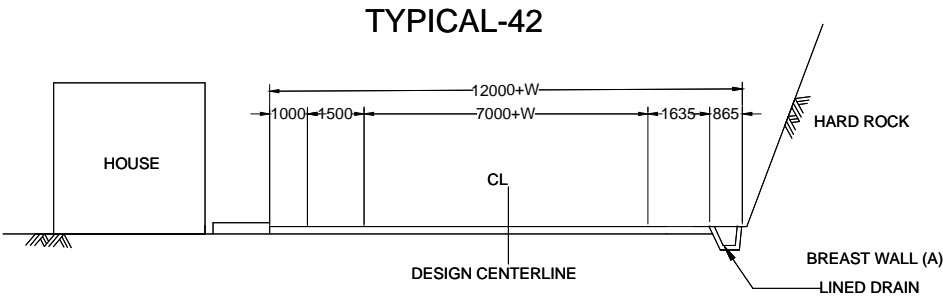
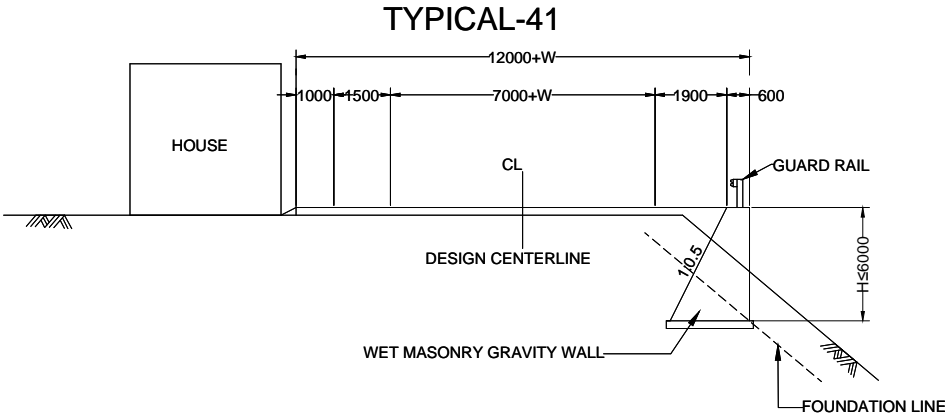
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WIDENING AND UPGRADATION TO 2 LANE WITH PAVED  
SHOULDER CONFIGURATION AND GEOMETRIC  
IMPROVEMENTS IN THE STATE OF MIZORAM

Designed.	Checked	Approved.
Drawn.	Scale. 1 : 200	Date.

Drawing Title :- <b>NH-54 P-7</b> TYPICAL CROSS SECTION
Drawing No:- <b>NH-54-A-9</b>
Sheet No:- <b>9 OF 10</b>

TYPICAL CROSS SECTION (10/10)  
FORMATION IN SETTLEMENT AREA  
SCALE 1:200



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IMPROVEMENTS IN THE STATE OF MIZORAM

Digned.	Checked	Approved.
Drawn.	Scale. 1 : 200	Date.

Drawing Title :-  
**NH-54 P-7**  
TYPICAL CROSS SECTION

Drawing No:-  
**NH-54-A-10**

Sheet No:-  
**10 OF 10**



# TYPICAL PAVEMENT DETAIL

SCALE 1:100

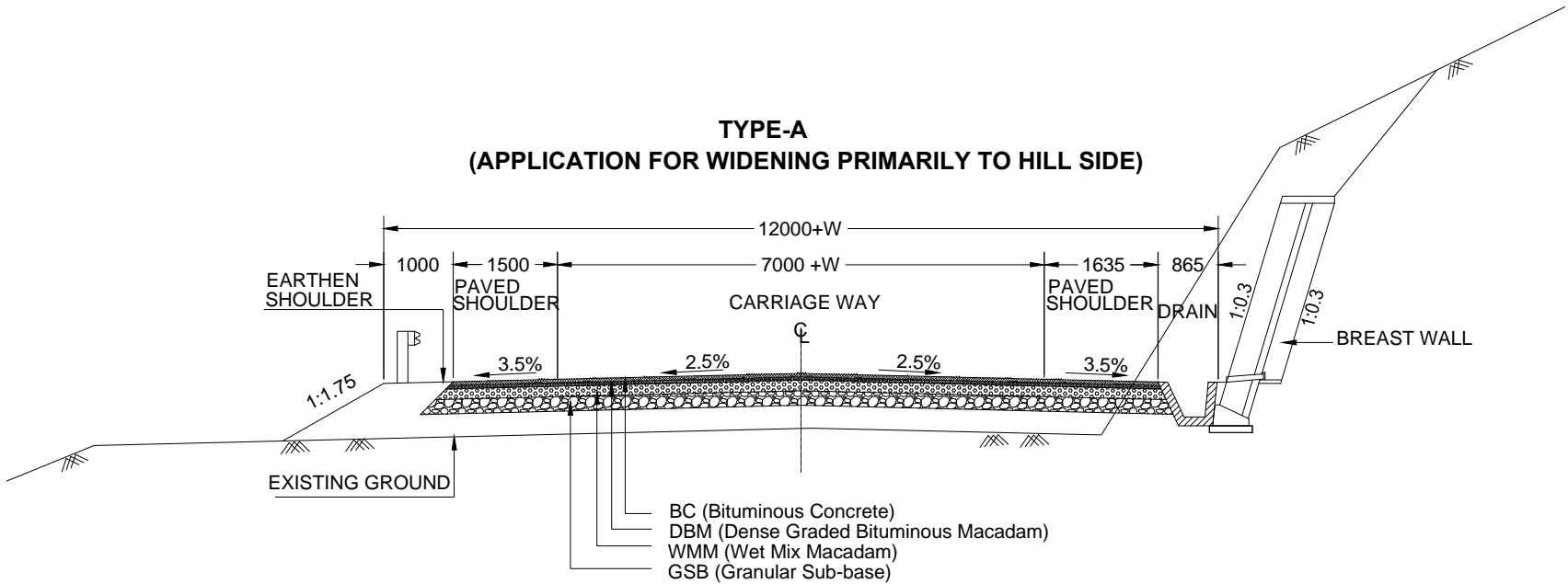
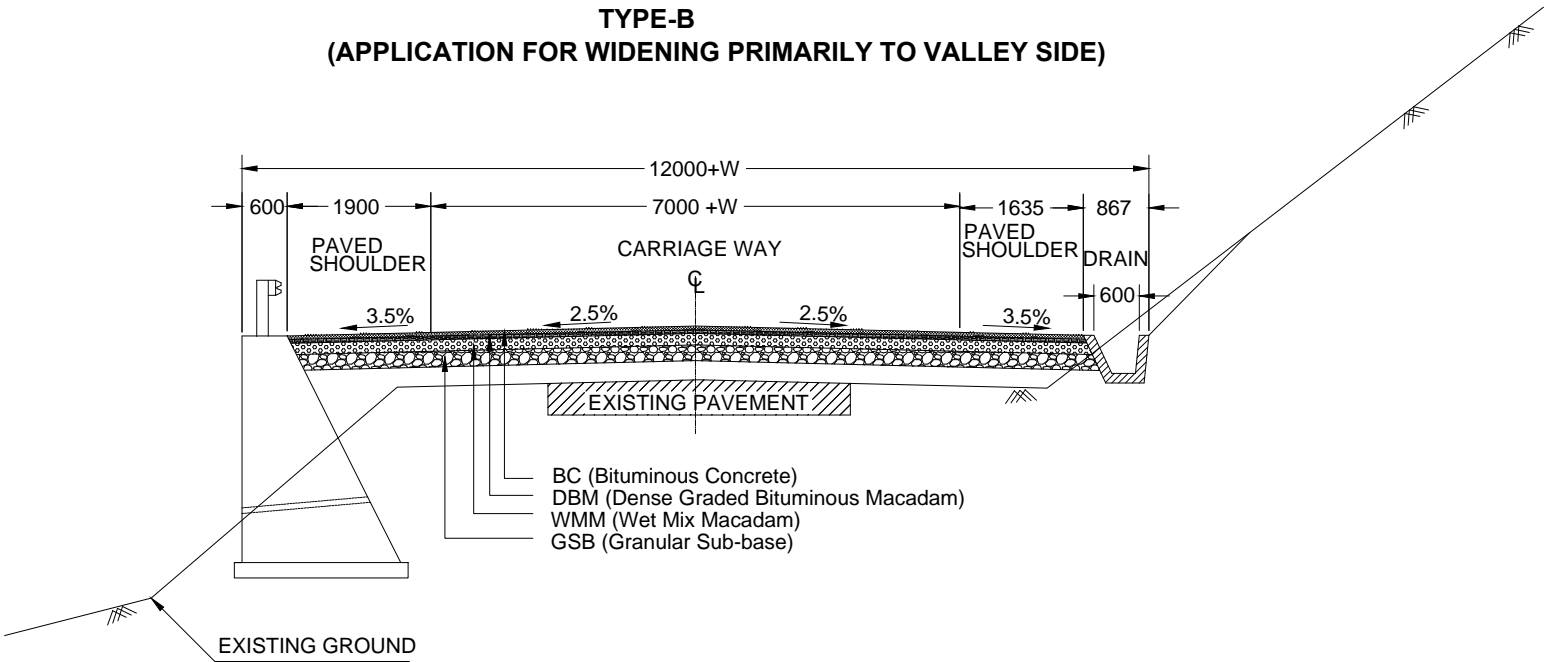


TABLE SECTION OF PAVEMENT DESIGN	
TYPE	THICKNESS (mm)
	KM0+000:- End
BC	40
DBM	100
WMM	250
GSB	300



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WIDENING AND UPGRADATION TO 2 LANE WITH PAVED  
SHOULDER CONFIGURATION AND GEOMETRIC  
IMPROVEMENTS IN THE STATE OF MIZORAM

Designed.

Checked

Approved.

Drawn.

Scale.

Date.

Rev.

Date.

Drawn.

Checked.

Approved.

1 : 100

Drawing Title :-

NH-54 P-7  
TYPICAL DRAWING FOR  
PAVEMENT DETAILS

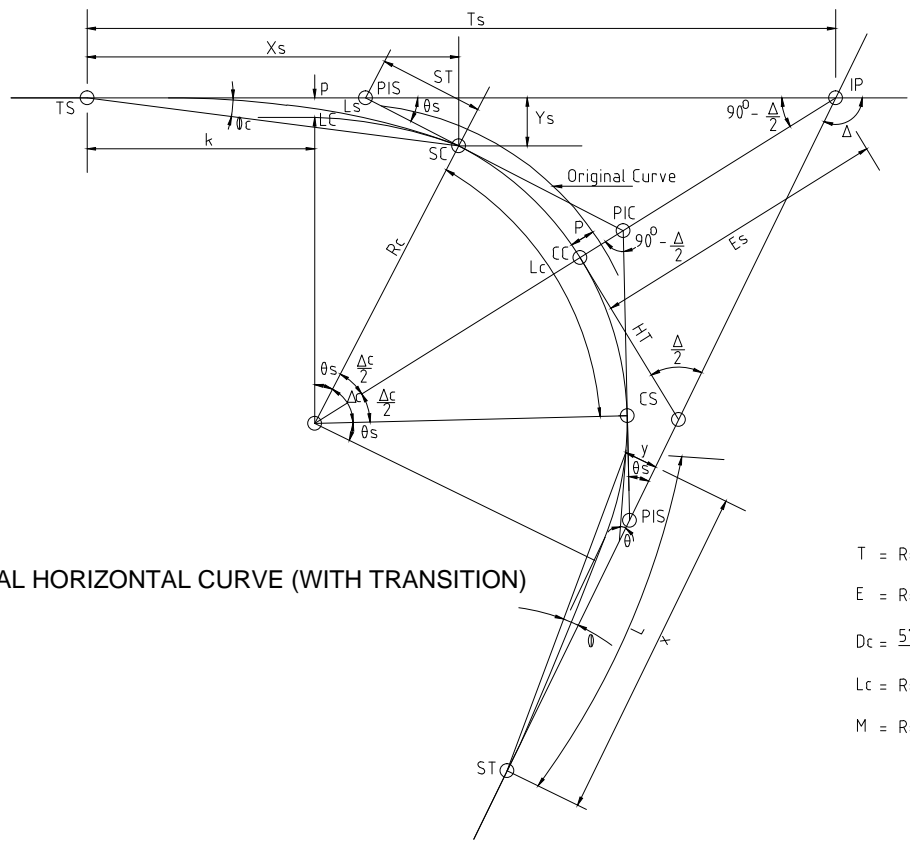
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NH-54-A - 11

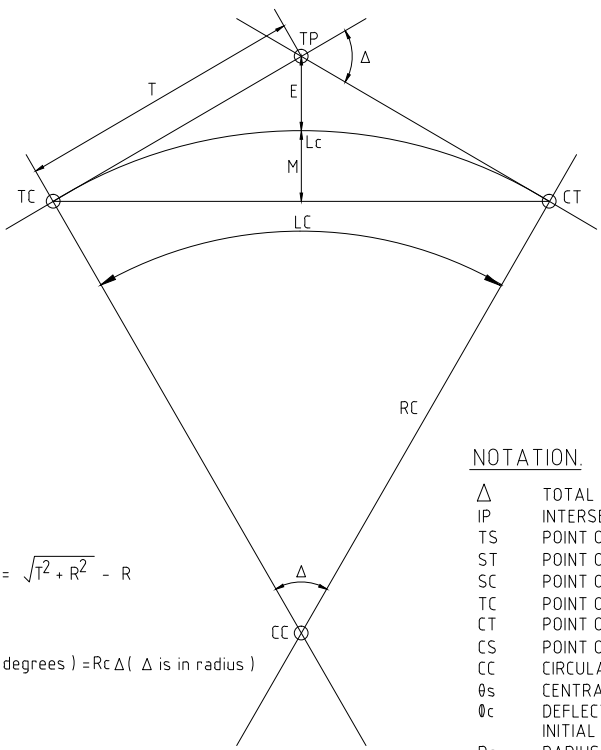
Sheet No:-

1 OF 1

GENERAL DETAILS OF PLAN & PROFILE CURVE



TYPICAL HORIZONTAL CURVE (WITH TRANSITION)



TYPICAL HORIZONTAL CIRCULAR CURVE

FORMULAE :

$\theta_s = \frac{L_s \times D_c}{200}$  OR  $\frac{L_s}{2R_c}$  (radians)

$\theta = \left(\frac{L}{L_s}\right)^2 \times \theta_s$

$\theta_c = \frac{\theta_s}{3} - C$

$C = 0.0031 \times \theta_s^3$  (seconds)

$\theta = \left(\frac{L}{L_s}\right)^2 \times \theta_s$

$\Delta_c = \Delta - 2\theta_s$

$X_s = L_s \left( \frac{1-\theta_s^2}{10} + \frac{\theta_s^4}{216} - \frac{\theta_s^6}{9360} + \frac{\theta_s^8}{685440} \right)$   $\theta_s$  in radians

$Y_s = L_s \left( \frac{\theta_s}{3} - \frac{\theta_s^3}{42} + \frac{\theta_s^5}{1320} - \frac{\theta_s^7}{75600} + \frac{\theta_s^9}{6894720} \right)$   $\theta_s$  in radians

$ST = \frac{Y_s}{\sin \theta_s}$

$LT = X_s - Y_s \cot \theta_s$

$L_c = \frac{X_s}{\cot \theta_c}$  OR  $\sqrt{X_s^2 + Y_s^2}$

$p = Y_s - Rc(1 - \cos \theta_s) = \frac{L_s^2}{24R_c}$  (approx)

$P = \frac{p}{\cos \frac{\Delta}{2}}$

$E_s = (R_c + p) \sec \frac{\Delta}{2} - R_c$

$T_s = (R_c + p) \tan \frac{\Delta}{2} + k$

$k = X_s - Rc \sin \theta_s$

$L_c = \Delta_c$  (Radians)  $R_c$   
Radius on any point on spiral  $R = \frac{R_c L_s}{L}$

$D_c = \frac{5729.578}{2}$  (in degrees)

$HT = E_c \cot \frac{\Delta}{2}$

Defination Of A 1° Curve  
An Arc 100m in Length whose radii subtend an angle of 1°.  
 $R_c = 5729.578m$

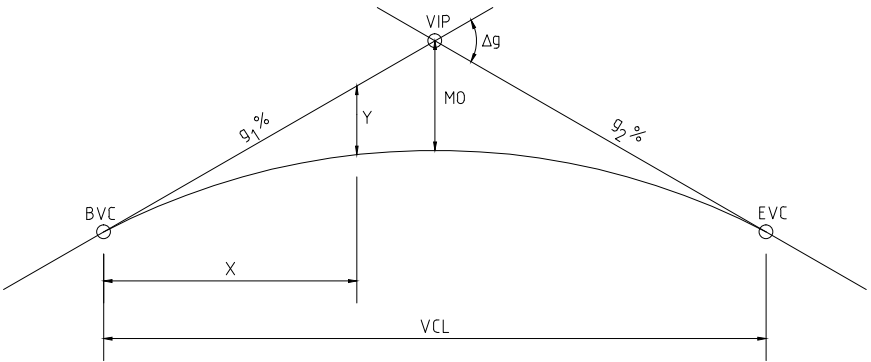
$T = Rc \tan \frac{\Delta}{2}$

$E = Rc \left( \sec \frac{\Delta}{2} - 1 \right) = \sqrt{T^2 + R^2} - R$

$D_c = \frac{5729.578}{R_c}$

$L_c = Rc \frac{\Delta \pi}{180}$  ( $\Delta$  is in degrees)  $= Rc \Delta$  ( $\Delta$  is in radius)

$M = Rc \left( 1 - \cos \frac{\Delta}{2} \right)$



TYPICAL VERTICAL CURVE  
PARABOLIC CURVE

$\Delta g = g_1\% - g_2\%$   
 $Y = \frac{\Delta g}{200 VCL} \times X^2$   
 $MO = \frac{\Delta g VCL}{800}$   
 $K = \frac{VCL}{\Delta g}$

NOTATION.

- $\Delta$  TOTAL DEFLECTION ANGLE  
IP INTERSECTION POINT OF TANGENTS (HORIZONTAL POINT OF INTERSECTION)  
TS POINT OF CHANGE FROM TANGENT TO SPIRAL  
ST POINT OF CHANGE FROM SPIRAL TO TANGENT  
SC POINT OF CHANGE FROM SPIRAL TO CIRCULAR CURVE  
TC POINT OF CHANGE FROM TANGENT TO CIRCULAR CURVE  
CT POINT OF CHANGE FROM CIRCULAR CURVE TO TANGENT  
CS POINT OF CHANGE FROM CIRCULAR CURVE TO SPIRAL  
CC CIRCULAR CURVE CENTER  
 $\theta_s$  CENTRAL ANGLE OF SPIRAL ARC  $L_s$  (SPIRAL ANGLE)  
 $\theta_c$  DEFLECTION ANGLE AT TS FROM INITIAL TANGENT TO SC OR AT ST FROM INITIAL TANGENT TO CS  
 $R_c$  RADIUS OF CIRCULAR CURVE.  
 $L_s$  LENGTH OF SPIRAL CURVE FROM TS TO SC OR ST TO CS.  
 $L_c$  LENGTH OF CIRCULAR CURVE  
 $L$  TOTAL LENGTH OF CURVE FROM TS TO ST.  
 $\Delta_c$  CENTRAL ANGLE OF CIRCULAR CURVE.  
 $X_s$  TANGENT DISTANCE FOR SC/CS WITH REFERENCE TO TS/ST.  
 $Y_s$  TANGENT OFFSET AT SC/CS WITH REFERENCE TO TS /ST.  
ST SHORT TANGENT.  
LT LONG TANGENT.  
 $k$  TANGENT DISTANCE FROM TS TO PC OF THE SHIFTED CIRCULAR CURVE.  
 $T_s$  TOTAL TANGENT DISTANCE (IP TO TS OR ST)  
 $E_s$  EXTERNAL DISTANCE (OFFSET FROM IP TO MIDDLE OF THE CURVE) FOR HORIZONTAL CURVE WITH TRANSITION.  
LR LENGTH OF RUN OFF.  
SE SUPERELEVATION IN PERCENTAGE.  
LC LONG CHORD (TS TO SC OR ST TO CS).  
 $p$  OFFSET FROM THE INITIAL TANGENT TO A PARALLEL TANGENT OF SHIFTED CURVE.  
 $P$  CENTRAL SHIFT OF CIRCULAR CURVE.  
HT HALF TANGENT DISTANCE.  
 $D_c$  DEGREE OF CIRCULAR CURVE.  
PIS INTERSECTION OF LONG TANGENT AND SHORT TANGENT OF SPIRAL.  
 $A$  PARAMETER OF CLOTHOID.  
 $T$  TANGENT LENGTH (CIRCULAR CURVE).  
 $C$  CORRECTION FACTOR FOR SPIRAL DEFLECTION ANGLE.  
 $E$  OFFSET FROM IP TO MIDDLE OF THE CURVE FOR HORIZONTAL CURVE WITHOUT TRANSITION.  
 $\Delta g$  ALGEBRAIC DIFFERENCE IN GRADES (PERCENT) OF THE GRADES TANGENTS.  
VIP VERTICAL POINT OF INTERSECTION.  
BVC BEGINNING OF VERTICAL CURVE (POINT OF TANGENT TO CURVE).  
EVC END OF VERTICAL CURVE (POINT OF CURVE TO TANGENT).  
 $g$  GRADIENT.  
 $MO$  MID-ORDINATE (VERTICAL OFFSET FROM VIP TO THE MIDDLE OF CURVE).  
 $VCL$  VERTICAL CURVE LENGTH MEASURED HORIZONTALLY.  
 $I$  SPIRAL ARC FROM TS OR ST TO ANY POINT ON SPIRAL.  
 $\theta$  SPIRAL ANGLE AT ANY POINT ON THE SPIRAL I.E THE ANGLE BETWEEN THE TANGENT AT THE SPIRAL AND TANGENT DISTANCE.  
 $\phi$  DEFLECTION FROM TANGENT AT TS TO ANY POINT ON THE SPIRAL.  
 $K$  HORIZONTAL DISTANCE REQUIRED TO EFFECT A ONE PERCENT CHANGE IN GRADIENT.



National Highways & Infrastructure  
Development Corporation Limited



JAPAN INTERNATIONAL  
COOPERATION AGENCY

REMARKS:

Rev.	Date.			Drawn.	Checked.	Approved.

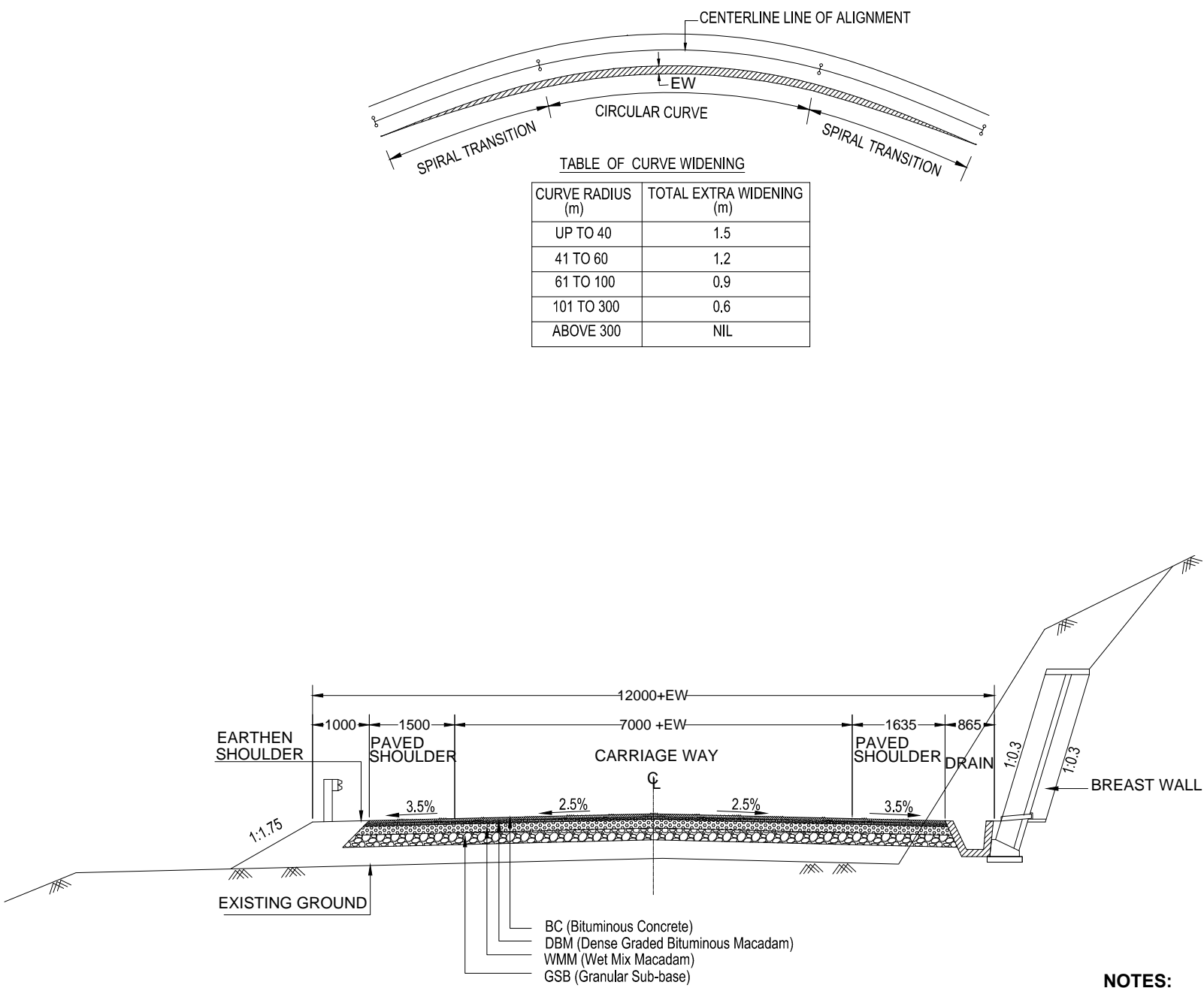
WIDENING AND UPGRADATION TO 2 LANE WITH PAVED  
SHOULDER CONFIGURATION AND GEOMETRIC  
IMPROVEMENTS IN THE STATE OF MIZORAM

Designed.	Checked	Approved.
Drawn.	Scale. NOT TO SCALE	Date.

Drawing Title :-  
**NH-54 P-7**  
GENERAL DETAILS OF  
PLAN & PROFILE CURVE



Drawing No:-  
NH-54-A - 12  
Sheet No:-  
1 OF 1

TYPICAL DETAILS FOR EXTRA WIDENING



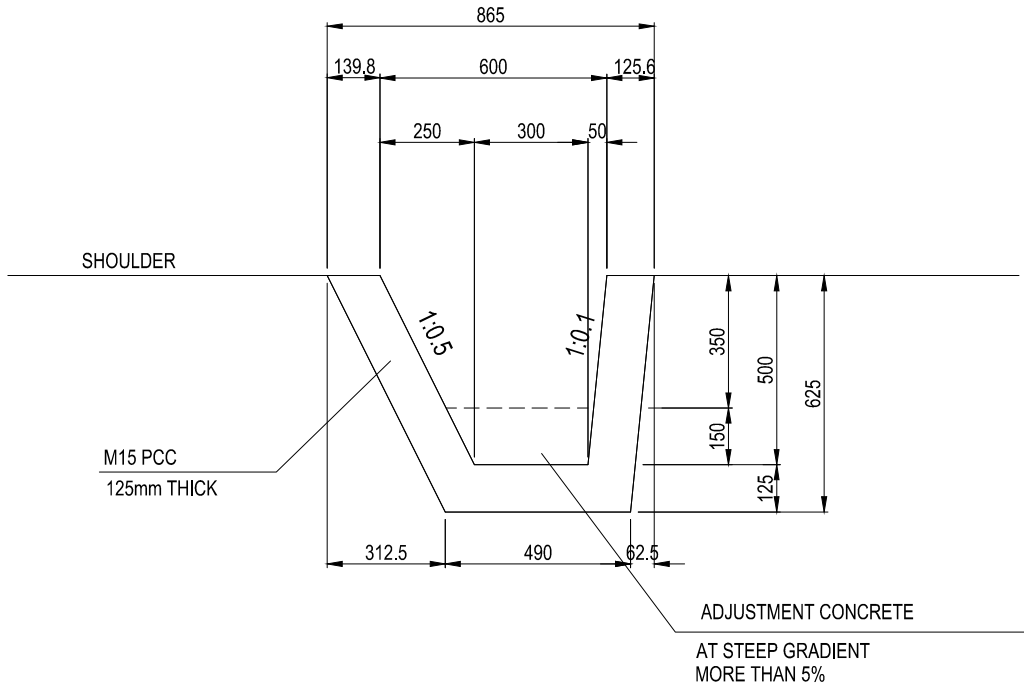
NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS SHOWN OTHERWISE
2. WIDENING SHALL BE APPLIED UNIFORMLY TO THE CIRCULAR CURVE AND SHALL TAPER OFF AT AN EVEN RATE OVER THE SPIRAL TRANSITION LENGTH IN ORDER TO AVOID KINKS IN THE PAVEMENT EDGE
3. FOR CURVES HAVING NO TRANSITION, TWO-THIRD BEING ATTAINED ON THE STRAIGHT SECTION BEFORE START OF THE CURVE AND ONE-THIRD ON THE CURVE
4. EW= EXTRA WIDTH

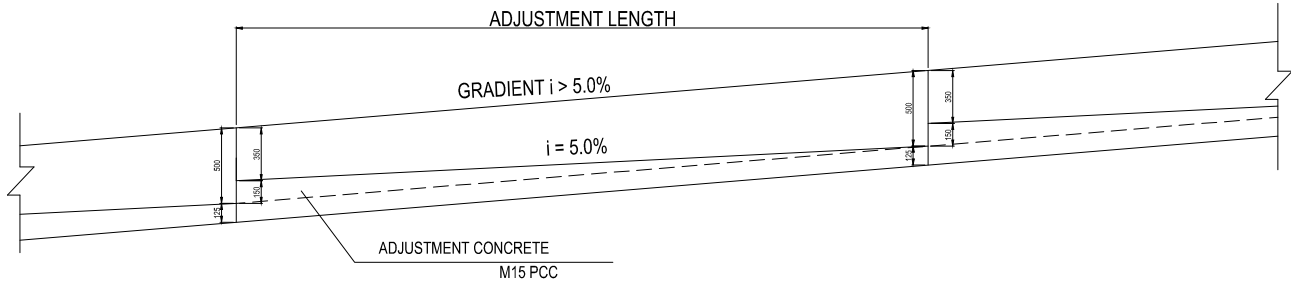
<div><div>National Highways &amp; Infrastructure Development Corporation Limited</div></div> <div><div>JAPAN INTERNATIONAL COOPERATION AGENCY</div></div>	REMARKS:							WIDENING AND UPGRADATION TO 2 LANE WITH PAVED SHOULDER CONFIGURATION AND GEOMETRIC IMPROVEMENTS IN THE STATE OF MIZORAM			Drawing Title :- NH-54 P-7 TYPICAL DETAILS FOR CURVE WIDENING		
												Drawing No:- NH-54-A - 13	
									Designed.	Checked	Approved.	Sheet No:- 1 OF 1	
		Rev.	Date.			Drawn.	Checked.	Approved.	Drawn.	Scale.	Date.		


## TYPICAL DETAIL OF SIDE DITCH

DETAILS OF LINED DRAIN  
SCALE 1:20

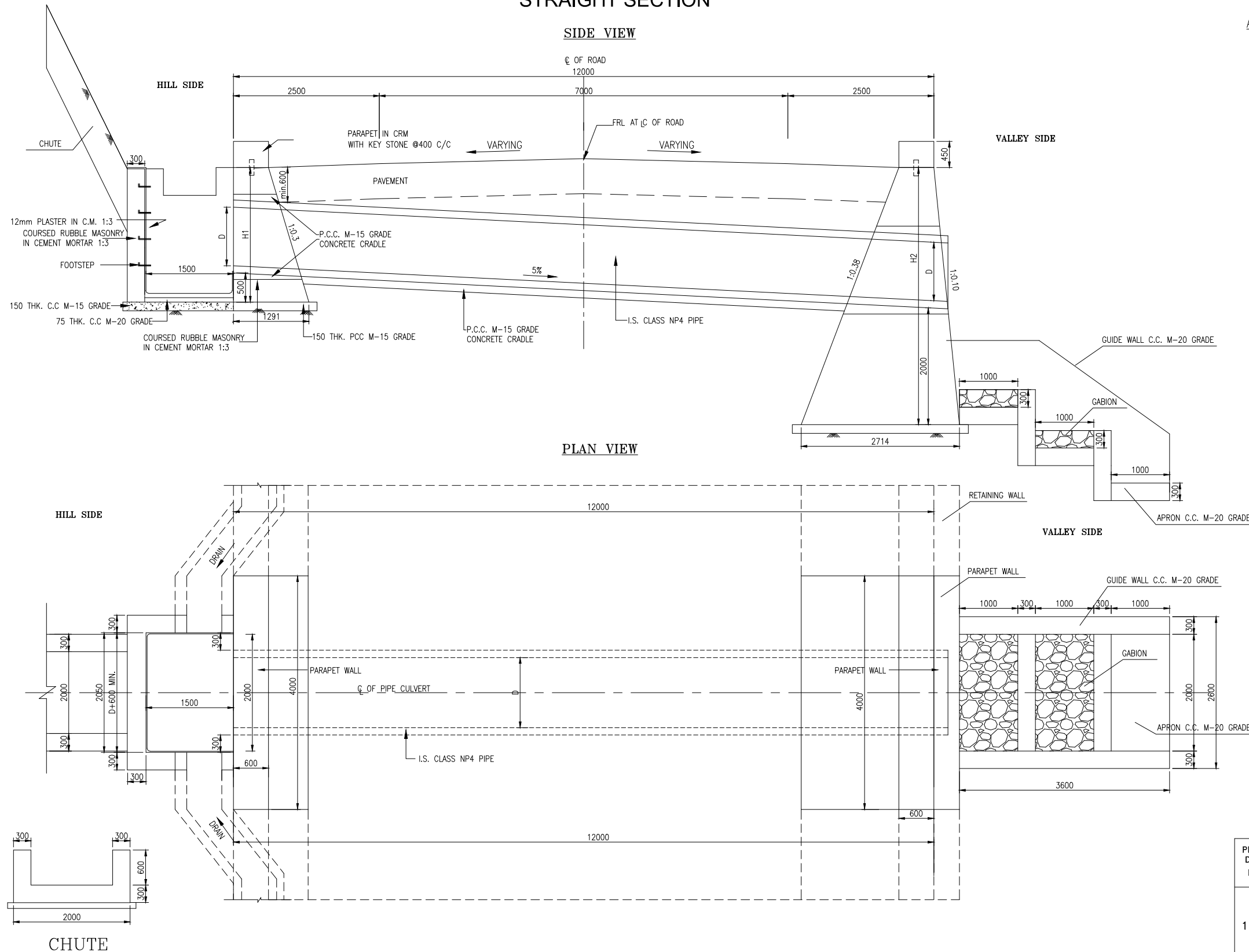


DETAILS OF LINED DRAIN AT STEEP SECTION  
SCALE 1 : 50  
SIDE ELEVATION



<div><div>National Highways &amp; Infrastructure Development Corporation Limited</div></div>	<div>REMARKS:</div> <div>1. All DIMENSION IN MM.</div>							WIDENING AND UPGRADATION TO 2 LANE WITH PAVED SHOULDER CONFIGURATION AND GEOMETRIC IMPROVEMENTS IN THE STATE OF MIZORAM			Drawing Title :- NH-54 P-7 TYPICAL DETAIL OF SIDE DITCH		
									Designed.	Checked	Approved.	Drawing No:- NH-54-B-1	
									Drawn.	Scale. AS SHOWN	Date.	Sheet No:- 1 OF 4	
		Rev.	Date.			Drawn.	Checked.	Approved.					

## TYPICAL DETAILS OF PIPE CULVERT ( 1/2 ) STRAIGHT SECTION



### ADDITIONAL SPECIFICATIONS

- ALL DIMENSIONS ARE IN MM EXCEPT WHERE OTHERWISE MENTIONED.
- HUME PIPE SHALL BE NP4CLASS CONFORMING TO I.S.458 – 1988.
- PRIOR TO CULVERT CONSTRUCTION, THE CONTRACTOR SHALL SET OUT THE LOCATION OF CATCH PIT, CULVERT AND OUTLET STRUCTURE ACCURATELY, DETERMINE THE SUPERELEVATION AND EXTRA WIDENING AT CURVE, DETERMINE THE INVERT LEVELS AND THE DIMENSIONS OF OUTLET STRUCTURE. THE STRUCTURE IN INLET AND OUTLET SHALL BE DETERMINED WITH HYDROLOGICAL AND GEOGRAPHICAL CONDITON AT EACH SITE. AND PREPARE WORKING DRAWING ACCORDINGLY.THE DRAWING SHALL BE APPROVED BY THE ENGINEER AND SHALL FORM THE BASIS OF MEASUREMENTS.
- THE SAFE BEARING CAPACITY OF SOIL AT PROPOSED FOUNDATION LVL.OF HEAD WALL SHALL NOT BE LESS THAN 15MT/Sqm. THE CONTRACTOR SHALL BE REQD. TO CARRYOUT DYNAMIC CONE PENETRATION TESTS TO ASCERTAIN THE SOIL BEARING CAPACITY IF DIRECTED BY THE ENGINEER. THIS IS DEEMED INCIDENTAL TO THE WORK AND SHALL NOT BE PAID SEPARATELY
- BACKFILLING TO SIDES OF PIPE CULVERT AND BEHIND HEADWALLS SHALL BE PROVIDED WITH SELECTED FREE DRAINING MATERIAL CONFORMING TO APPENDIX 6 OF IRC 78-2000 HAVING PROPERTIES. C=0,  $\phi = 30$ .BACKFILLING SHALL BE CARRIED OUT IN ACCORDANCE WITH SUB-SECTION304.3.7 AND 305.4.4 OF THE TECHNICAL SPECIFICATIONS.
- THE CUSHION BETWEEN THE TOP OF THE PIPE AND THE ROAD LEVEL SHALL NOT BE LESS THAN 600mm.

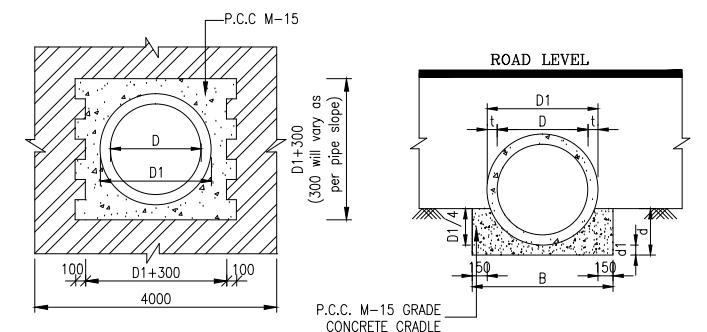


TABLE-1 : DIMENSIONS OF CULVERT, CONCRETE CRADLE, HEADWALLS AND PARAPETS

PIPE DIA. D	PIPE WALL THK. t	WIDTH OF BEDDING B	DEPTH OF BEDDING d	CRADLE BASE THK. d1	HEIGHT OF HEAD WALL		LENGTH OF HEAD WALL	
					U/S SIDE 'H1'	D/S SIDE 'H2'	U/S SIDE 'W1'	D/S SIDE 'W2'
1200	125	1750	400	100	2500	4600	4000	4000

REMARKS:

**WIDENING AND UPGRADATION TO 2 LANE WITH PAVED  
SHOULDER CONFIGURATION AND GEOMETRIC  
IMPROVEMENTS IN THE STATE OF MIZORAM**

Drawing Title :-

NH-54 P-7  
TYPICAL DETAILS  
OF PIPE CULVERT ( 1/2 )

Designed.

Checked

Approved.

Drawing No:-

NH-54-B-2

Drawn.

Scale.

AS SHOWN

Date.

Sheet No:-

2 OF 4

Rev.

Date.

Drawn.

Checked.

Approved

**SIDE VIEW**

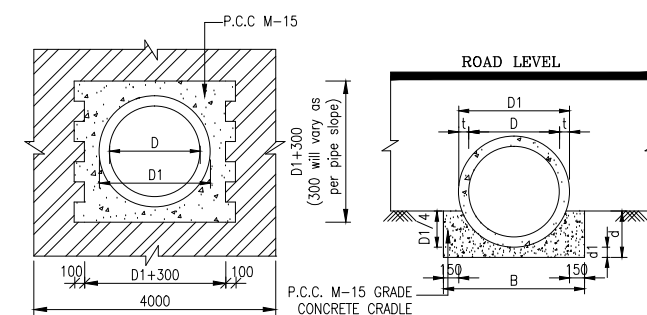


TABLE-1 : DIMENSIONS OF CULVERT, CONCRETE CRADLE, HEADWALLS AND PARAPETS

PIPE DIA. D	PIPE WALL THK. t	WIDTH OF BEDDING B	DEPTH OF BEDDING d	CRADLE BASE THK. d1	HEIGHT OF HEAD WALL		LENGTH OF HEAD WALL	
					U/S SIDE 'H1'	D/S SIDE 'H2'	U/S SIDE 'W1'	D/S SIDE 'W2'
1200	125	1750	400	100	2700	3000	4000	4000

### ADDITIONAL SPECIFICATIONS

1. ALL DIMENSIONS ARE IN MM EXCEPT WHERE OTHERWISE MENTIONED.
2. HUME PIPE SHALL BE NP4CLASS CONFORMING TO I.S.458 - 1988.
3. PRIOR TO CULVERT CONSTRUCTION, THE CONTRACTOR SHALL SET OUT THE LOCATION OF CATCH PIT, CULVERT AND OUTLET STRUCTURE ACCURATELY, DETERMINE THE SUPERELEVATION AND EXTRA WIDENING AT CURVE, DETERMINE THE INVERT LEVELS AND THE DIMENSIONS OF OUTLET STRUCTURE. THE STRUCTURE IN INLET AND OUTLET SHALL BE DETERMINED WITH HYDROLOGICAL AND GEOGRAPHICAL CONDITION AT EACH SITE. AND PREPARE WORKING DRAWING ACCORDINGLY. THE DRAWING SHALL BE APPROVED BY THE ENGINEER AND SHALL FORM THE BASIS OF MEASUREMENTS.
4. THE SAFE BEARING CAPACITY OF SOIL AT PROPOSED FOUNDATION LVL. OF HEAD WALL SHALL NOT BE LESS THAN 15MT/Sqm. THE CONTRACTOR SHALL BE REQUIRED TO CARRY OUT DYNAMIC CONE PENETRATION TESTS TO ASCERTAIN THE SOIL BEARING CAPACITY IF DIRECTED BY THE ENGINEER. THIS IS DEEMED INCIDENTAL TO THE WORK AND SHALL NOT BE PAID SEPARATELY
5. BACKFILLING TO SIDES OF PIPE CULVERT AND BEHIND HEADWALLS SHALL BE PROVIDED WITH SELECTED FREE DRAINING MATERIAL CONFORMING TO APPENDIX 6 OF IRC 78-2000 HAVING PROPERTIES:  $C=0$ ,  $\phi=30$ . BACKFILLING SHALL BE CARRIED OUT IN ACCORDANCE WITH SUB-SECTION 304.3.7 AND 305.4.4 OF THE TECHNICAL SPECIFICATIONS.
6. THE CUSHION BETWEEN THE TOP OF THE PIPE AND THE ROAD LEVEL SHALL NOT BE LESS THAN 600mm.

REMARKS:

Rev.	Date.		Drawn.	Checked.	Approved

# WIDENING AND UPGRADATION TO 2 LANE WITH PAVED SHOULDER CONFIGURATION AND GEOMETRIC IMPROVEMENTS IN THE STATE OF MIZORAM

Designed.	Checked	Approved.
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Drawn.	Scale.
	AS SHOWN

Drawing Title :-
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NH-54 P-7  
TYPICAL DETAILS  
OF PIPE CULVERT ( 2/2)

Drawing No:-  
NH-54-B-3

Sheet No:- 3 OF 4



## TYPICAL DETAILS OF BOX CULVERT

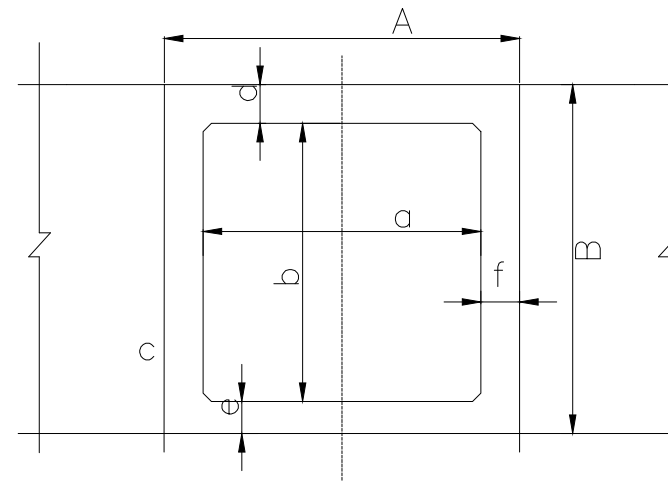
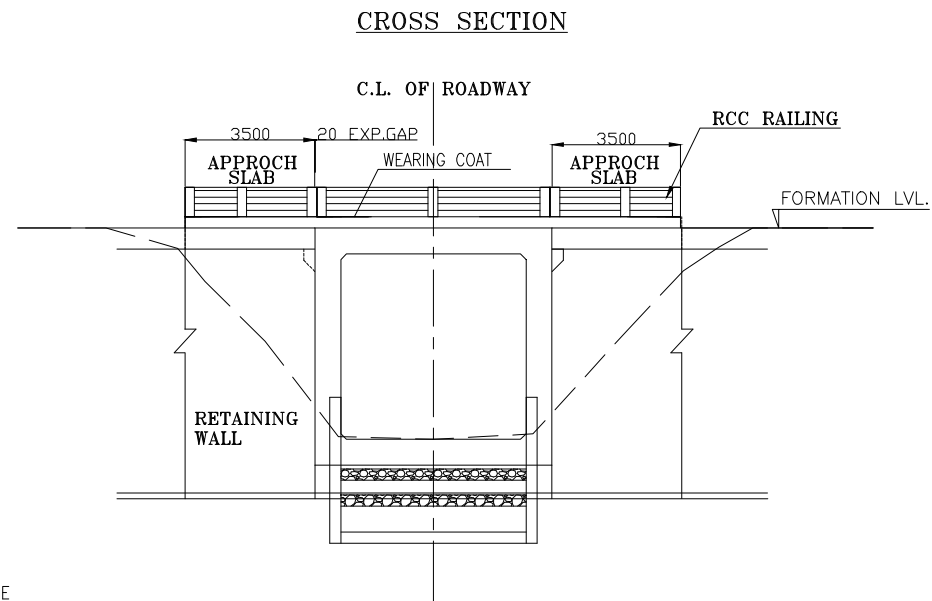
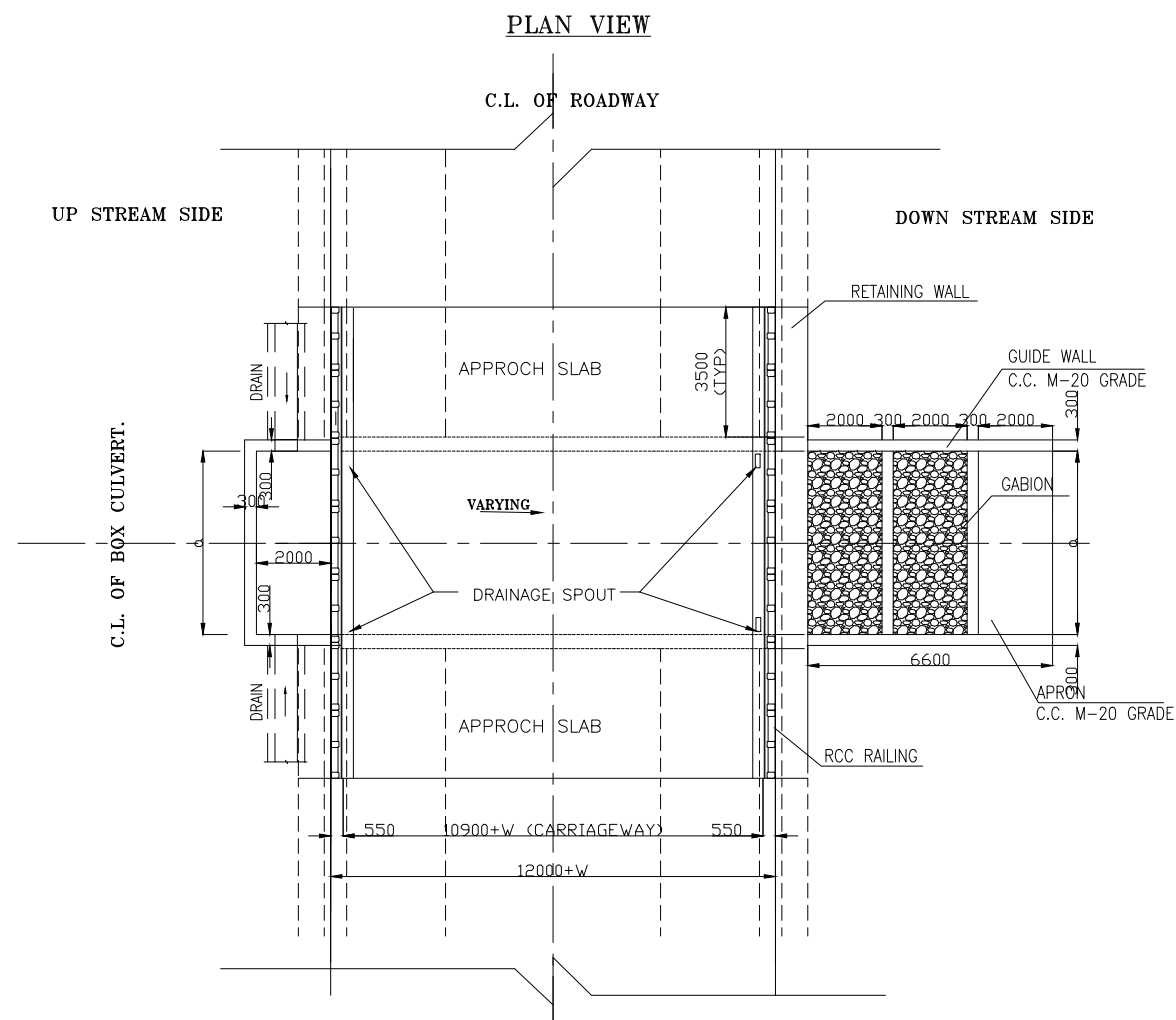
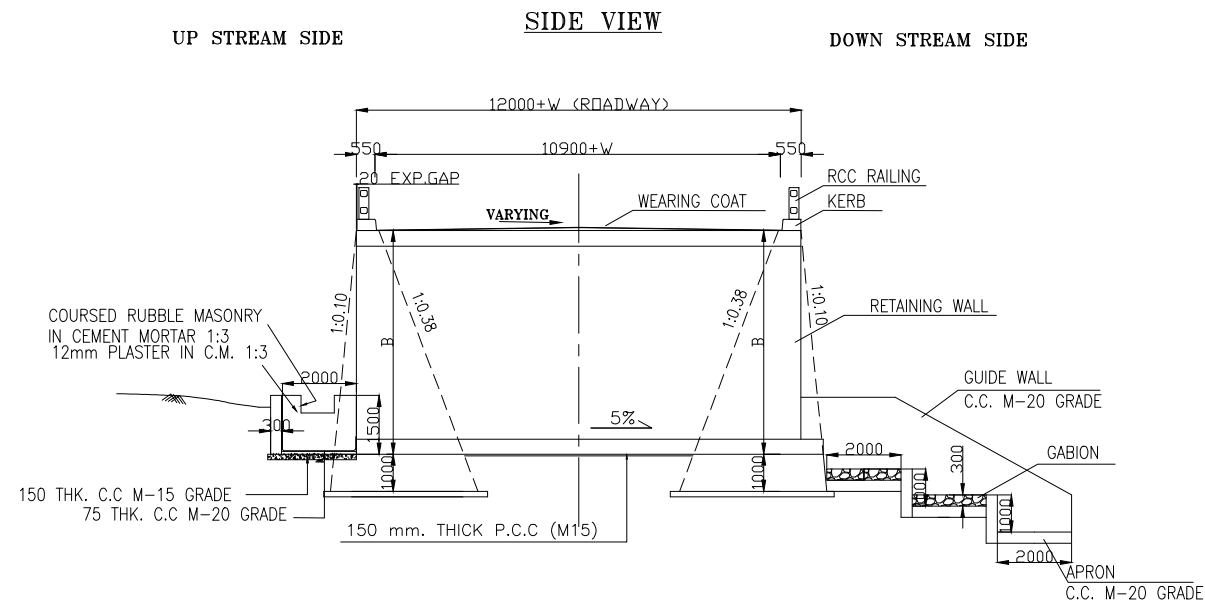




TABLE SHOWING SALIENT DIMENSIONS

BOX TYPE	a (mm)	b (mm)	c (mm)	d (mm)	e (mm)	f (mm)	A (mm)	B (mm)
2mx2m	2000	2000	500	350	380	300	2600	2730
3mx3m	3000	3000	900	420	420	420	3840	3840
4mx4m	4000	4000	1200	480	550	550	5100	5030
4mx6m	6000	4000	300	680	720	750	7500	5400

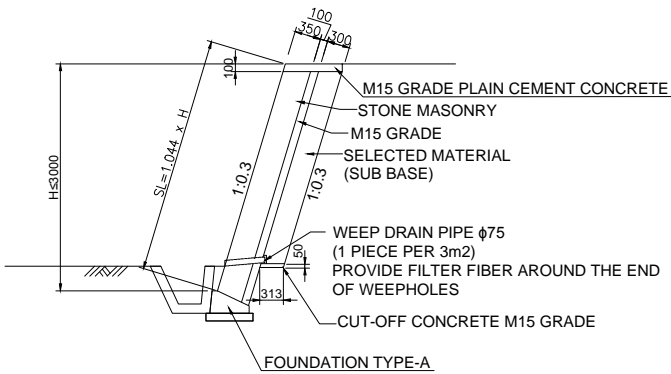
ADDITIONAL SPECIFICATIONS:

1. ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE MENTIONED
2. EACH CARRIAGEWAY IS SAFE FOR ONE LANE OF CLASS 70R (WHEELED OR TRACKED) OR TWO LANES OF CLASS A LOADING WHICHEVER IS GREATER.
3. PRIOR TO CULVERT CONSTRUCTION, THE CONTRACTOR SHALL SET OUT THE LOCATION OF CATCH PIT, CULVERT AND OUTLET STRUCTURE ACCURATELY, DETERMINE THE SUPERELEVATION AND EXTRA WIDENING AT CURVE, DETERMINE THE INVERT LEVELS AND THE DIMENSIONS OF OUTLET STRUCTURE. THE STRUCTURE IN INLET AND OUTLET SHALL BE DETERMINED WITH HYDROLOGICAL AND GEOGRAPHICAL CONDITION AT EACH SITE. AND PREPARE WORKING DRAWING ACCORDINGLY. THE DRAWING SHALL BE APPROVED BY THE ENGINEER AND SHALL FORM THE BASIS OF MEASUREMENTS.
4. THE SAFE BEARING CAPACITY OF SOIL AT PROPOSED FOUNDATION LVL. SHALL NOT BE LESS THAN 15MT/Sqm. THE CONTRACTOR SHALL BE REQD. TO CARRY OUT DYNAMIC CONE PENETRATION TESTS TO ASCERTAIN THE SOIL BEARING CAPACITY IF DIRECTED BY THE ENGINEER. THIS DEEMED INCIDENTAL TO THE WORK AND SHALL NOT BE PAID SEPARATELY.
5. BACKFILLING TO SIDES OF BOX CULVERT SHALL BE PROVIDED WITH SELECTED FREE DRAINING MATERIAL CONFORMING TO APPENDIX 6 OF IRC 78-2000 HAVING PROPERTIES.  $C=0$ ,  $\phi = 30$ . BACKFILLING SHALL BE CARRIED OUT IN ACCORDANCE WITH SUB-SECTION 304.3.7 AND 305.4.4 OF THE TECHNICAL SPECIFICATIONS.
6. INTERNAL HEIGHT OF BOX CULVERT VARIES DUE TO ROAD SUPERELEVATION. TOP SLAB LEVELS SHALL MATCH THAT OF DESIGNED SUPERELEVATION.
7. WEEP HOLES AT 1000 c/c (WITH SLOPE OF 1 IN 20) HORIZONTALLY SHALL BE PROVIDED IN THE BOX AND WING.

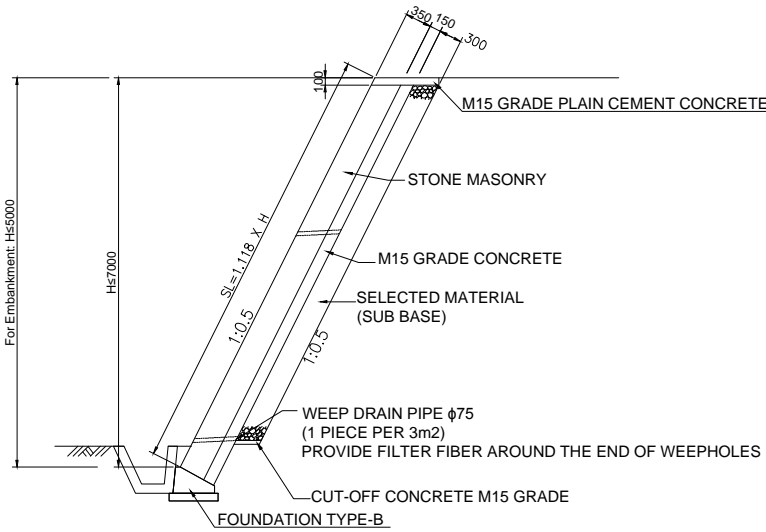
 <b>National Highways &amp; Infrastructure Development Corporation Limited</b>	<b>REMARKS:</b>							<b>WIDENING AND UPGRADATION TO 2 LANE WITH PAVED SHOULDER CONFIGURATION AND GEOMETRIC IMPROVEMENTS IN THE STATE OF MIZORAM</b>	<b>Drawing Title :-</b> NH-54 P-7 TYPICAL DETAILS OF BOX CULVERT		
 <b>JAPAN INTERNATIONAL COOPERATION AGENCY</b>								Designed.	Checked	Approved.	<b>Drawing No:-</b> NH-54-B-4
								Drawn.	Scale. AS SHOWN	Date.	<b>Sheet No:-</b> 4 OF 4
		Rev.	Date.			Drawn.	Checked.	Approved			

TYPICAL DETAILS OF RETAINING WALL (1/3)  
BREAST-TYPE WET MASONRY WALLS  
( SCALE 1:100)

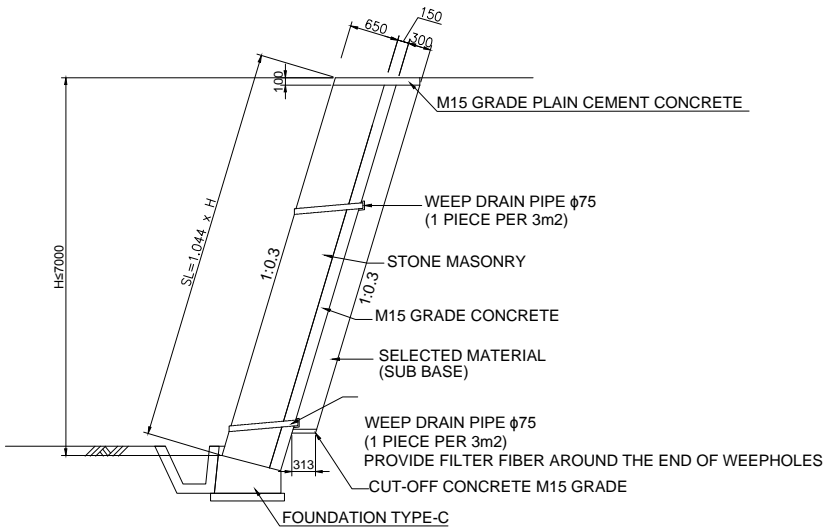
TYPE-A1 (LW-A)  
FOR CUT SLOPE



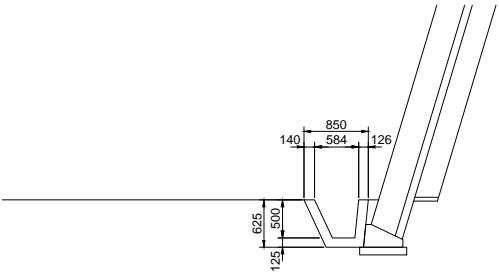
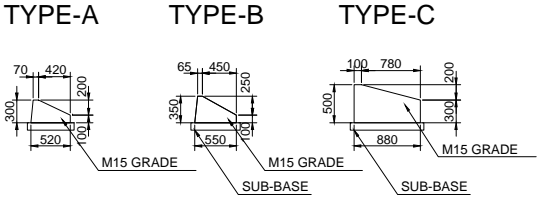
TYPE-B1 (LW-B)  
FOR CUT SLOPE/EMBANKMENT SLOPE



TYPE-C (LW-C)  
FOR CUT SLOPE



FOUNDATION OF WET MASONRY WALL  
SCALE 1:100



WET MASONRY WALL WITH SIDE DRAIN  
SCALE 1:100



National Highways & Infrastructure  
Development Corporation Limited



JAPAN INTERNATIONAL  
COOPERATION AGENCY

REMARKS:

1: ALL DIMENSION IN MM.

WIDENING AND UPGRADATION TO 2 LANE WITH PAVED  
SHOULDER CONFIGURATION AND GEOMETRIC  
IMPROVEMENTS IN THE STATE OF MIZORAM

Drawing Title :-

NH-54 P-7  
TYPICAL DETAILS OF RETAINING WALL

Designed.

Checked

Approved.

Drawing No:-

NH-54-C-1

Drawn.

Scale.

Date.

Sheet No:-

1 OF 3

Rev.

Date.

Drawn.

Checked.

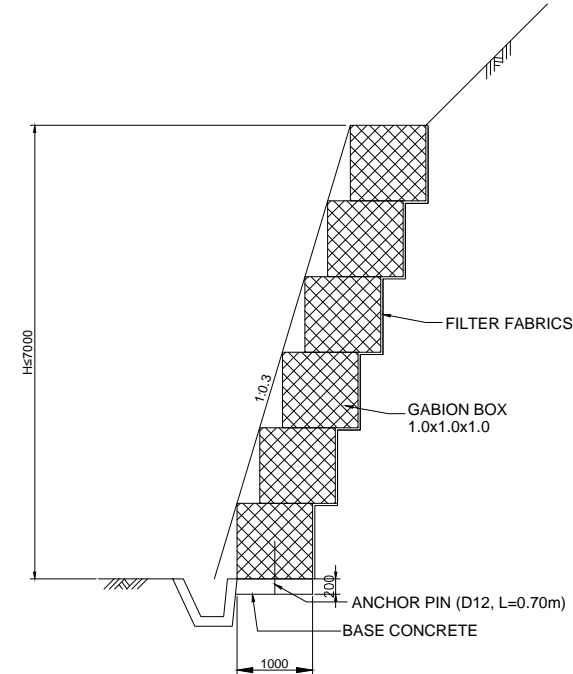
Approved.

1 : 100

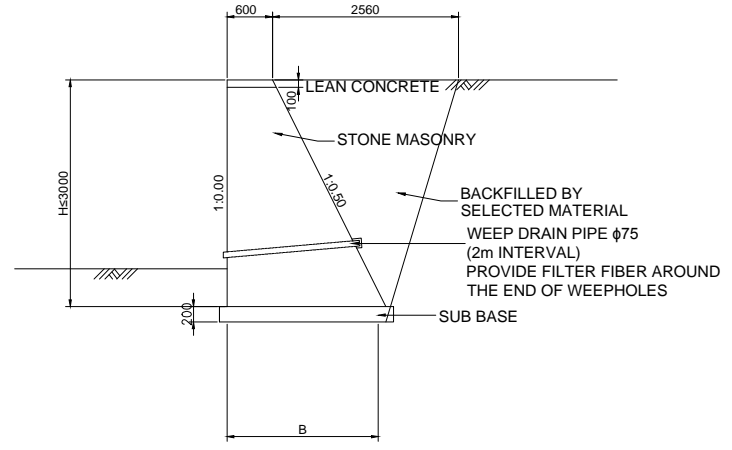


TYPICAL DETAILS OF RETAINING WALL (2/3)  
GABION & GRAVITY WET MASONRY WALLS  
SCALE 1:100

TYPE-A (GB-A)  
FRONT GRADES 1:0.3  
FOR CUT SLOPE

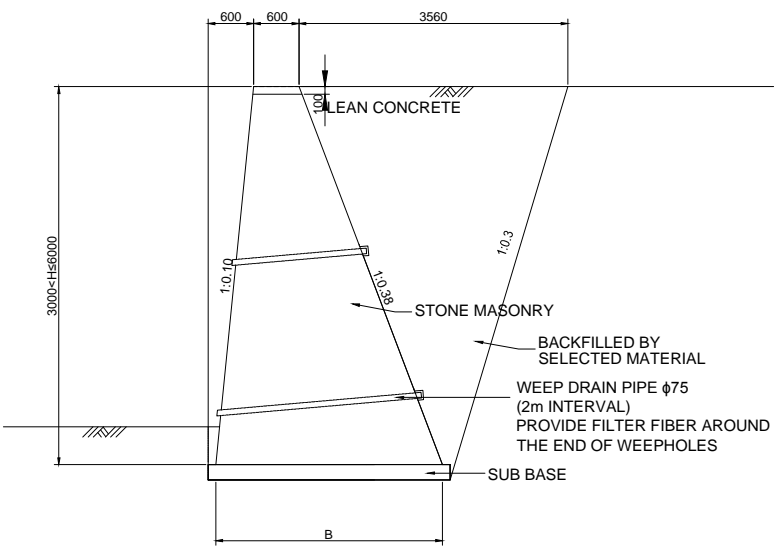


TYPE-A (GW-A)  
FRONT GRADES 1:0.00  
FOR EMBANKMENT SLOPE



H (m)	B (m)
1.0	1.10
2.0	1.60
3.0	2.10

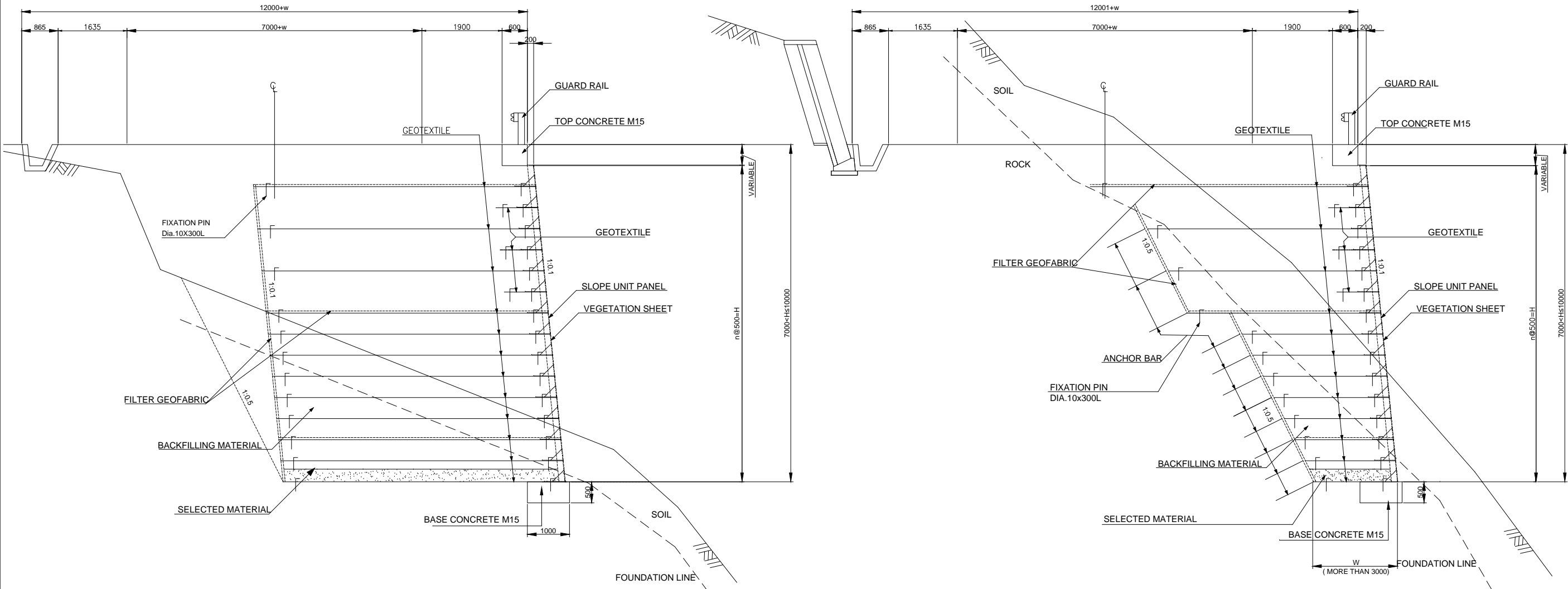
TYPE-B (GW-B)  
FRONT GRADES 1:0.10  
FOR EMBANKMENT SLOPE




H (m)	B (m)
3.0	2.04
4.0	2.52
5.0	3.00
6.0	3.48

TYPICAL DETAILS OF RETAINING WALL (3/3)  
REINFORCED EARTH WALLS

SCALE 1:100



 <div>National Highways &amp; Infrastructure Development Corporation Limited</div>	<div>REMARKS:</div> <div>1: ALL DIMENSION IN MM.</div>						WIDENING AND UPGRADATION TO 2 LANE WITH PAVED SHOULDER CONFIGURATION AND GEOMETRIC IMPROVEMENTS IN THE STATE OF MIZORAM			Drawing Title :- NH-54 P-7 TYPICAL DETAILS OF RETAINING WALL	
										Drawing No:- NH-54-C-3	
							Designed.	Checked	Approved.	Sheet No:- 3 OF 3	
		Rev.	Date.		Drawn.	Checked.	Approved.	Scale. 1 : 100	Date.		

BRIDGE LOCATION MAP FOR NH54

PACKAGE -1  
NH-54-Miz-2017-18-158/1\_1

PACKAGE -2  
NH-54-Miz-2017-18-158/1\_2

PACKAGE -3  
NH-54-Miz-2017-18-158/2\_1

PACKAGE -4  
NH-54-Miz-2017-18-158/2\_2

PACKAGE -5  
NH-54-Miz-2017-18-158/2\_3

PACKAGE -6  
NH-54-Miz-2017-18-158/3\_1

PACKAGE -7  
NH-54-Miz-2017-18-158/3\_2

PACKAGE -8  
NH-54-Miz-2017-18-158/3\_3

SECTION -1  
NH-54-Miz-2017-18-158/AE/1

SECTION -2  
NH-54-Miz-2017-18-158/AE/2

SECTION -3  
NH-54-Miz-2017-18-158/AE/3

Bridge at 216+450  
(Re-construction : RC slab L=8.0m)

Bridge at 190+260  
(Re-construction : RC T-beam L=12.0m)

Mat Bridge at 193+460



National Highways & Infrastructure  
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REMARKS:

WIDENING AND UPGRADATION TO 2 LANE WITH PAVED  
SHOULDER CONFIGURATION AND GEOMETRIC  
IMPROVEMENTS IN THE STATE OF MIZORAM

Drawing Title :-

NH-54 P-7

BRIDGE LOCATION MAP FOR NH54

Designed.

Checked

Approved.

Drawing No:-

NH54-D-1

Drawn.

Scale.

NTS

Date.

Sheet No:-

1 OF 1

Rev. Date.

Drawn. Checked. Approved.

SCHEDULE OF SLOPE PROTECTION WORK

Package 7

Chainage							Approximate construction length	Countermeasure	Unit	Total Qty
Start			~	End						
295	+	760	~	295	+	880	120	Gabion wall	m <sup>3</sup>	660
296	+	640	~	301	+	600	4960	Crib work (F300)	m <sup>2</sup>	9,134
								Rock bolt	m	6,851
302	+	000	~	302	+	300	270	Rockfall prevention wall (H=3m)	m <sup>3</sup>	1,175
								Rockfall prevention fence (H=2m)	m	270
305	+	400	~	305	+	440	40	Gabion wall	m <sup>3</sup>	240
305	+	980	~	306	+	010	30	Rockfall prevention wall (H=3m)	m <sup>3</sup>	131
								Rockfall prevention fence (H=2m)	m	30
306	+	240	~	306	+	330	90	Gabion wall	m <sup>3</sup>	800
309	+	710	~	309	+	770	60	Gabion wall	m <sup>3</sup>	350
311	+	000	~	311	+	120	120	Gabion wall	m <sup>3</sup>	600
313	+	980	~	314	+	60	80	Gabion wall	m <sup>3</sup>	560
314	+	210	~	314	+	260	50	Gabion wall	m <sup>3</sup>	300
								Hydroseeding	m <sup>2</sup>	1,000
315	+	330	~	315	+	440	110	Gabion wall	m <sup>3</sup>	400
321	+	50	~	321	+	300	250	Gabion wall	m <sup>3</sup>	2,080
322	+	850	~	322	+	880	30	Gabion wall	m <sup>3</sup>	180
								Hydroseeding	m <sup>2</sup>	600
324	+	810	~	325	+	870	60	Gabion wall	m <sup>3</sup>	240
325	+	280	~	325	+	320	40	Gabion wall	m <sup>3</sup>	200
327	+	010	~	327	+	090	80	Crib work (F300)	m <sup>2</sup>	523
								Rock bolt	m	392
								Vegetation mat	m <sup>2</sup>	357
327	+	230	~	327	+	320	90	Gabion wall	m <sup>3</sup>	360
								Hydroseeding	m <sup>2</sup>	2,700
328	+	300	~	328	+	330	30	Rockfall prevention wall (H=3m)	m <sup>3</sup>	131
								Rockfall prevention fence (H=2m)	m	30
331	+	480	~	331	+	560	80	Gabion wall	m <sup>3</sup>	300
331	+	990	~	332	+	030	40	Gabion wall	m <sup>3</sup>	160
								Groundwater Drainage	m	100

Total	Gabion wall	m <sup>3</sup>	7,430
	Groundwater Drainage	m	100
	Hydroseeding	m <sup>2</sup>	4,300
	Vegetation mat	m <sup>2</sup>	357
	Rockfall prevention wall (H=3m)	m <sup>3</sup>	1,436
	Rockfall prevention fence (H=2m)	m	330
	Crib work (F300)	m <sup>2</sup>	9,657
	Rock bolt	m	7,243



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JAPAN INTERNATIONAL  
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REMARKS:

Rev.	Date.









WIDENING AND UPGRADATION TO 2 LANE WITH PAVED  
SHOULDER CONFIGURATION AND GEOMETRIC  
IMPROVEMENTS IN THE STATE OF MIZORAM

Designed.

Drawn.

Checked

Scale.

Approved.

Date.

Drawing Title :-

NH-54 P-7  
SCHEDULE OF  
SLOPE PROTECTION WORK

Drawing No:-

NH-54-E-1

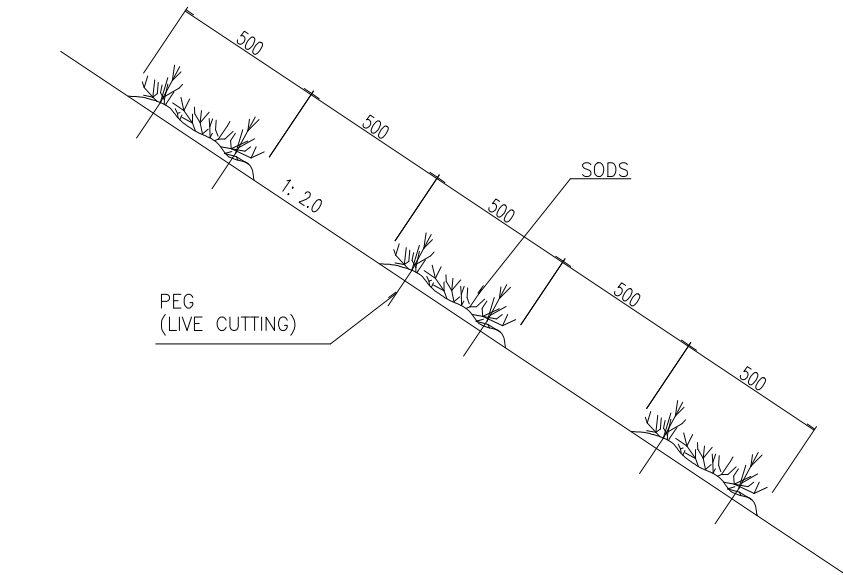
Sheet No:-

1 OF 1

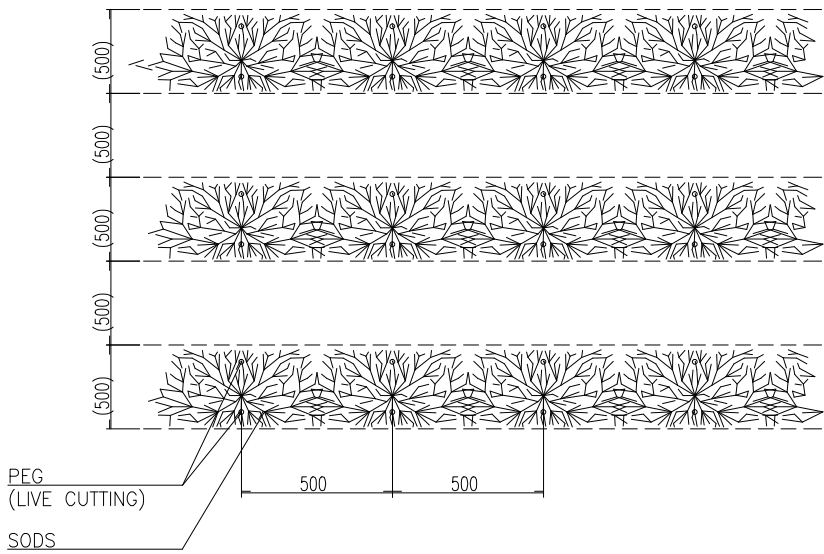


TYPICAL DETAILS OF SLOPE PROTECTION WORK (1/8)  
VEGETATION WORKS 1  
( SCALE 1:25)

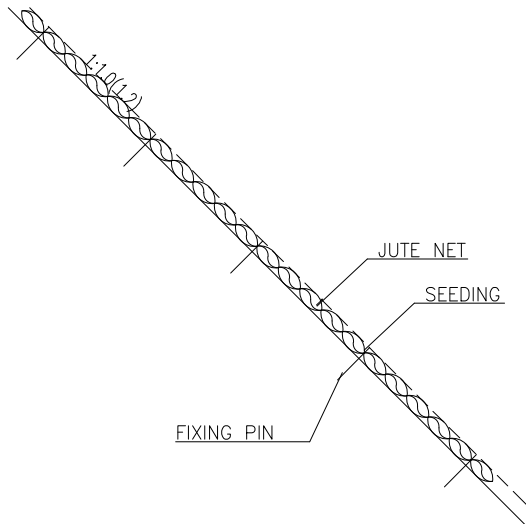
TURFING WITH SODS  
FOR EMBANKMENT SLOPE



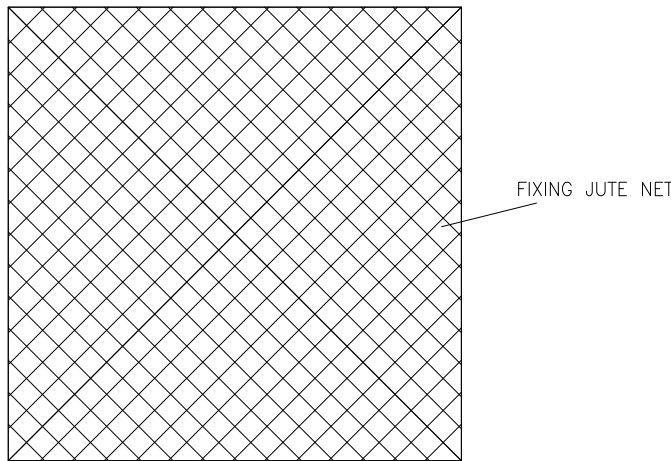
ELEVATION



SEEDING AND MULCHING  
FOR CUTTING SOIL SLOPE



ELEVATION



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REMARKS:

1 : ALL DIMENSION IN MM .

Rev.	Date.		Drawn.	Checked.	Approved.	

WIDENING AND UPGRADATION TO 2 LANE WITH PAVED  
SHOULDER CONFIGURATION AND GEOMETRIC  
IMPROVEMENTS IN THE STATE OF MIZORAM

Designed.	Checked	Approved.
Drawn.	Scale. 1 : 25	Date.

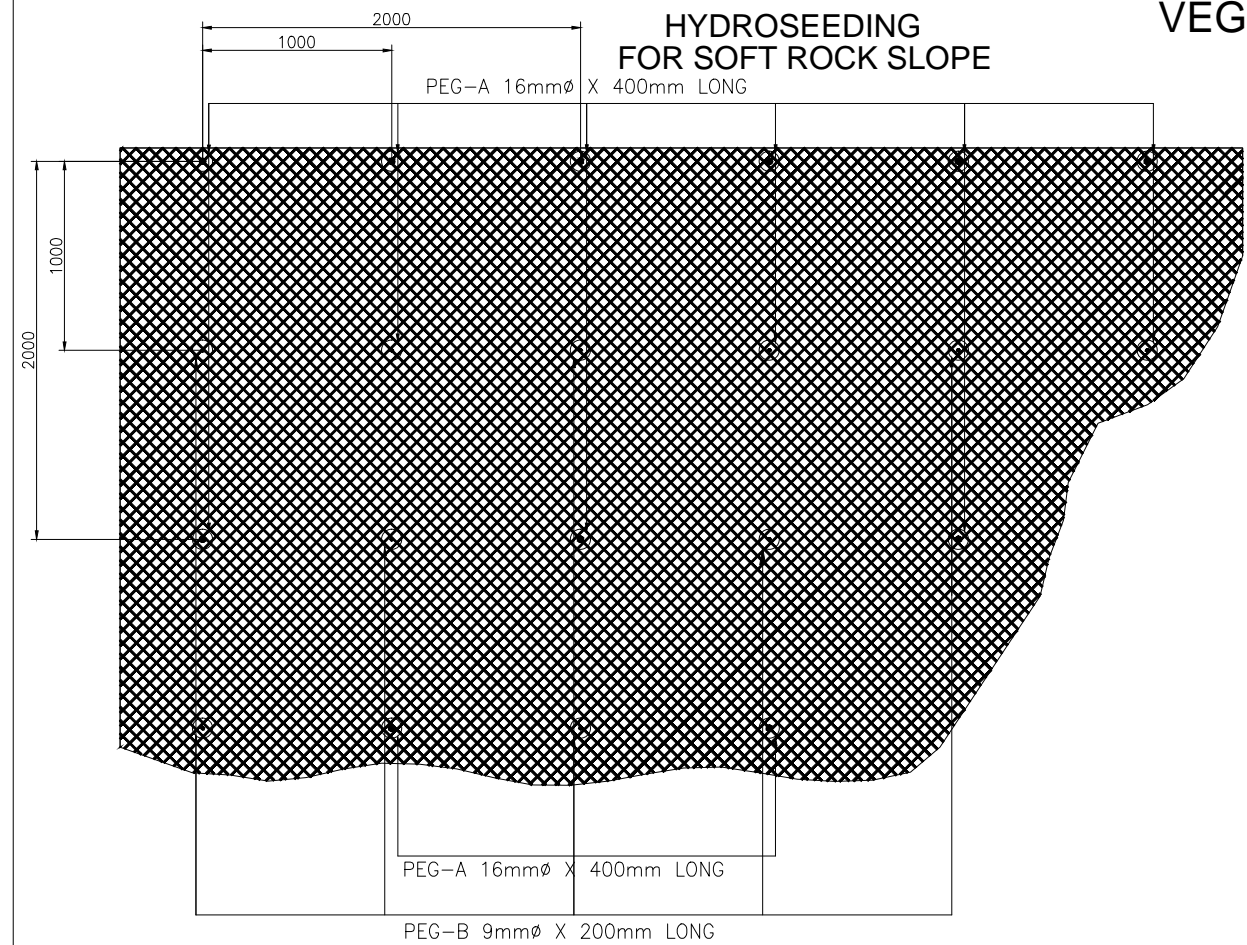
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NH-54 P-7

TYPICAL DETAILS OF SLOPE PROTECTION WORK

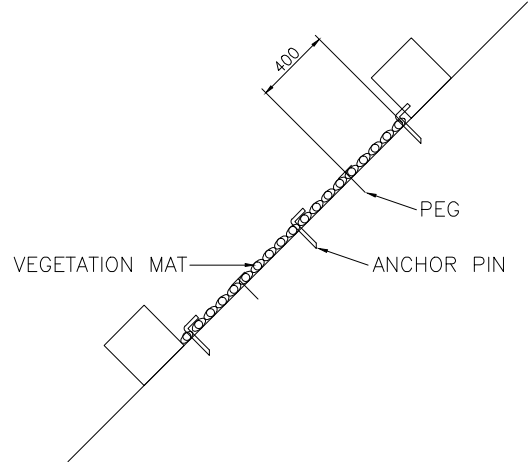
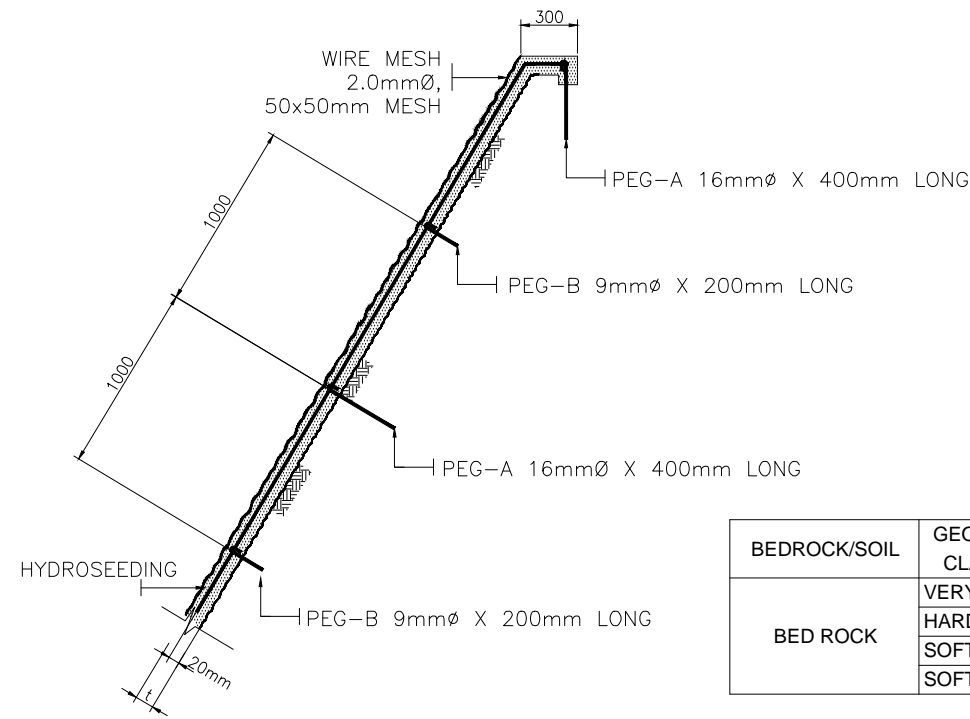
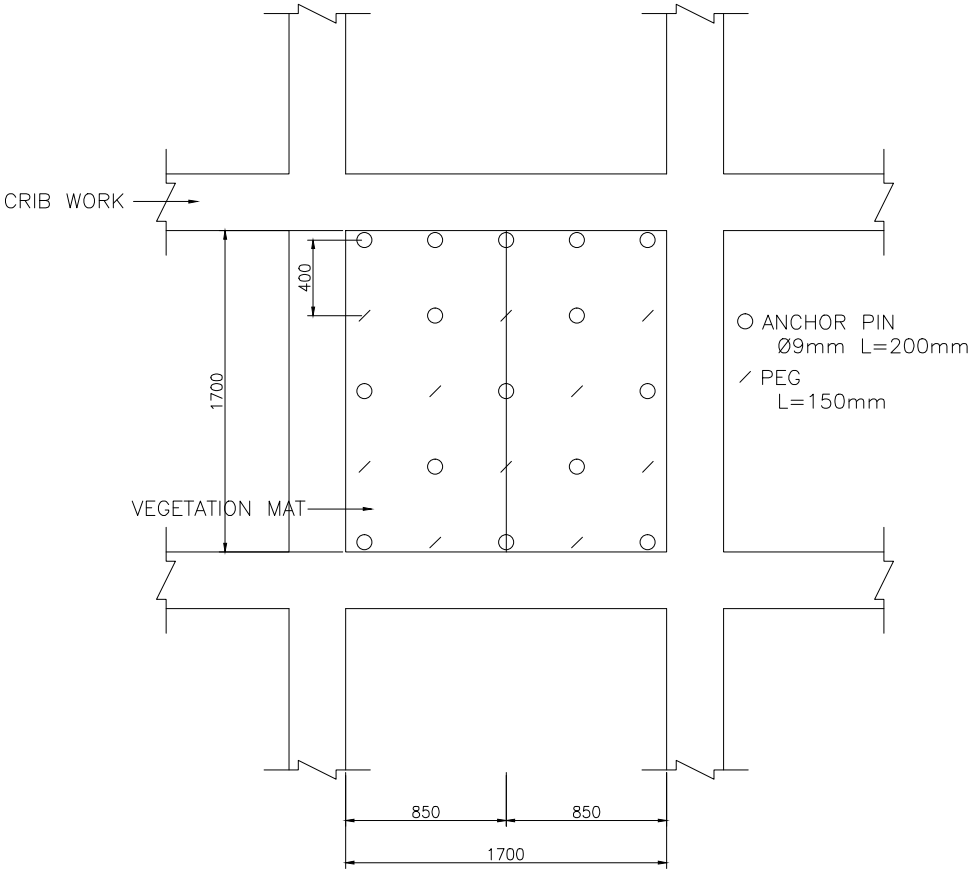
Drawing No:-  
NH-54-E-2

Sheet No:-  
1 OF 8

TYPICAL DETAILS OF SLOPE PROTECTION WORK (2/8)  
VEGETATION WORKS 2  
( SCALE 1:40)

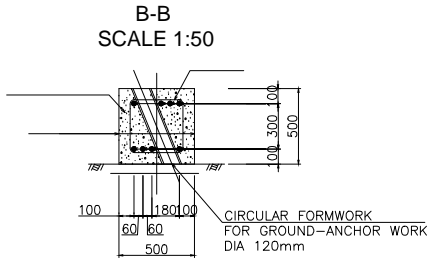
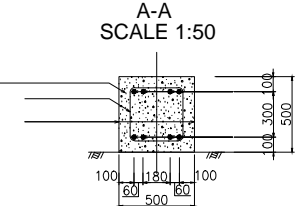
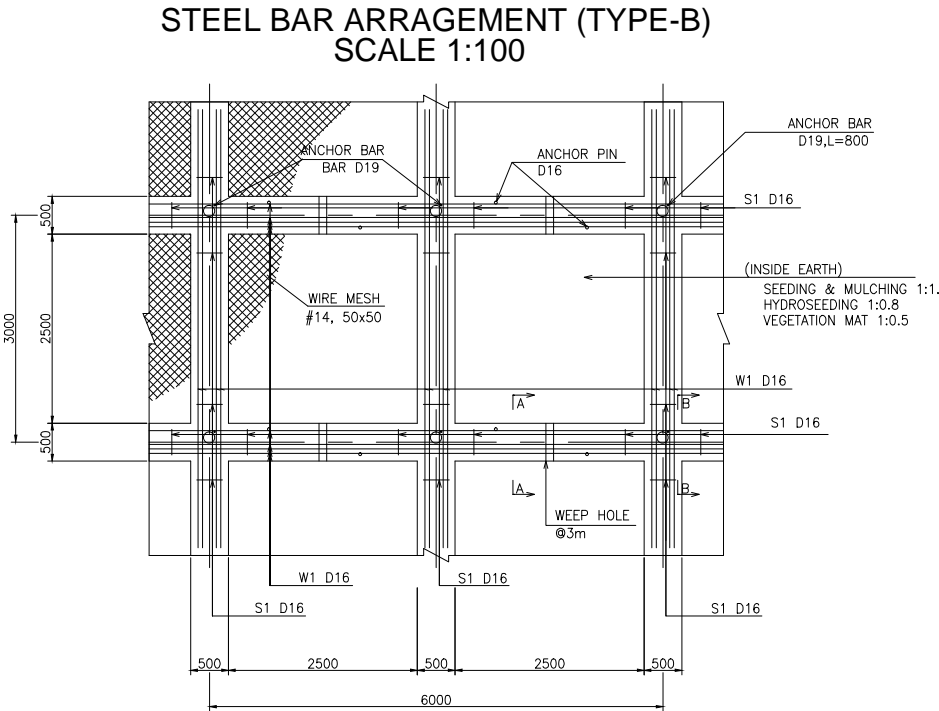
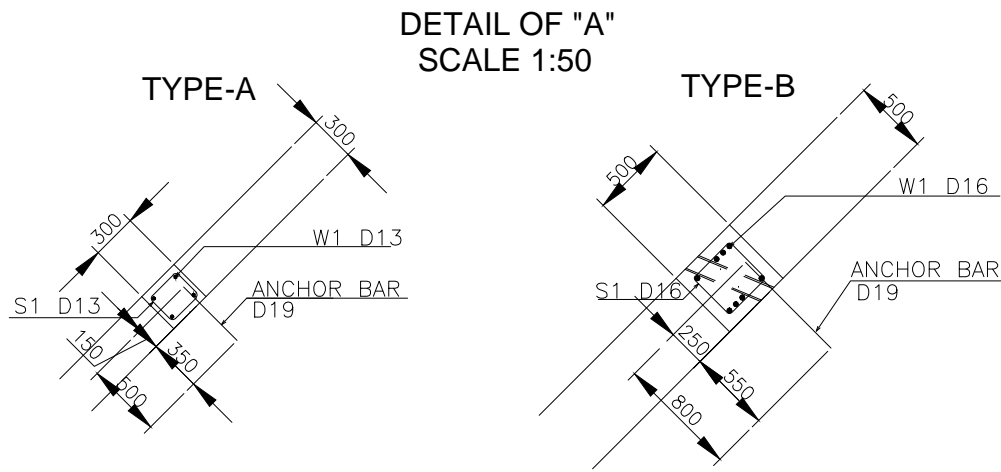
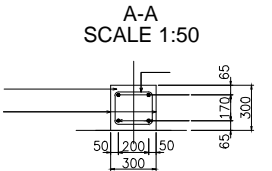
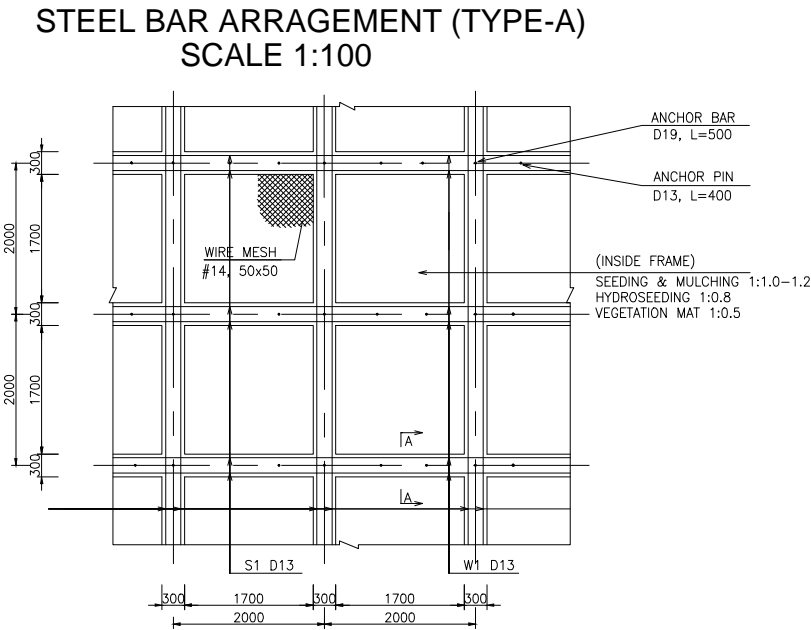
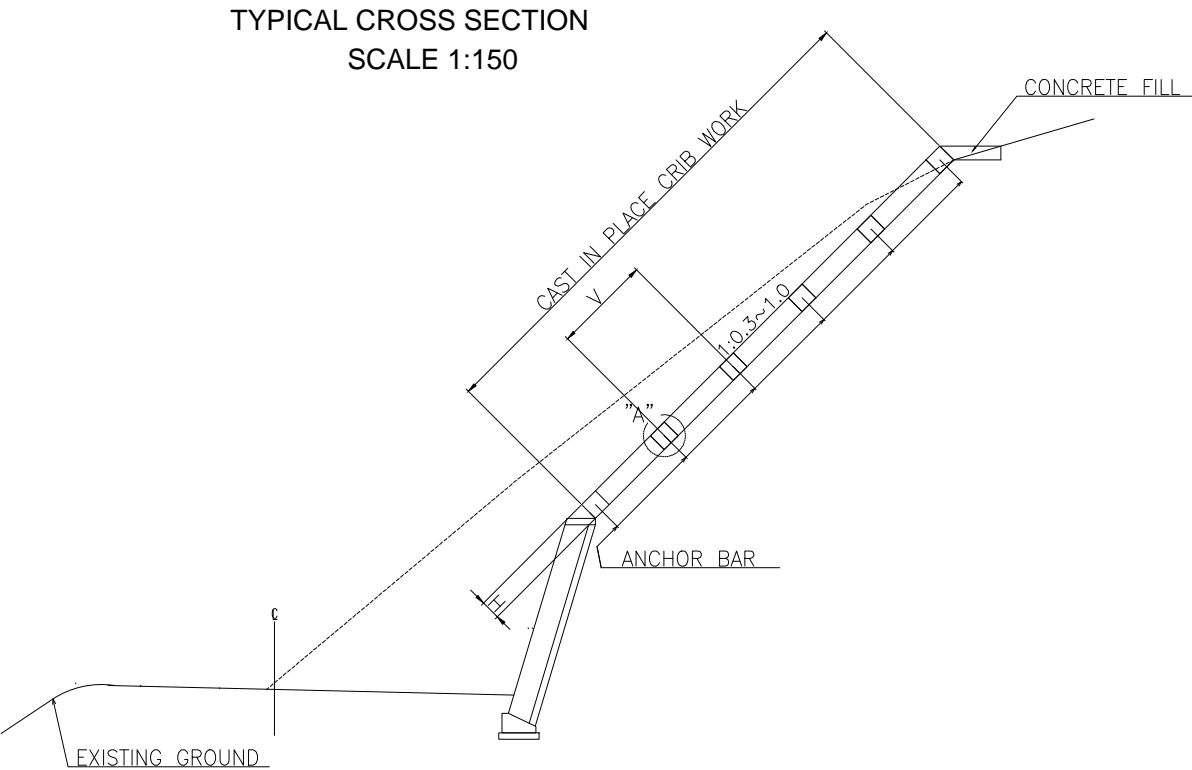


VEGETATION MAT  
FOR INSIDE FRAME OF CRIB WORKS



BEDROCK/SOIL	GEOTECHTONICAL CLASSIFICATION	t (mm)
BED ROCK	VERY HARD	N/A
	HARD	N/A
	SOFT (GRADE 1:0.5)	N/A
	SOFT (GRADE 1:0.8)	50

TYPICAL DETAILS OF SLOPE PROTECTION WORK (3/8)  
CRIB WORK



TYPE	SECTION H x V	INTERVAL OF CRIB H x V	STEEL BAR		
			CRIB	ANCHOR BAR	ANCHOR PIN
TYPE-A	300 x 300	2000 x 2000	4 x D13	D19, L=500	D13, L=400
TYPE-B	500 x 500	3000 x 3000	8 x D16	D19, L=800	D16, L=600

REMARKS:  
1 : ALL DIMENSION IN MM .

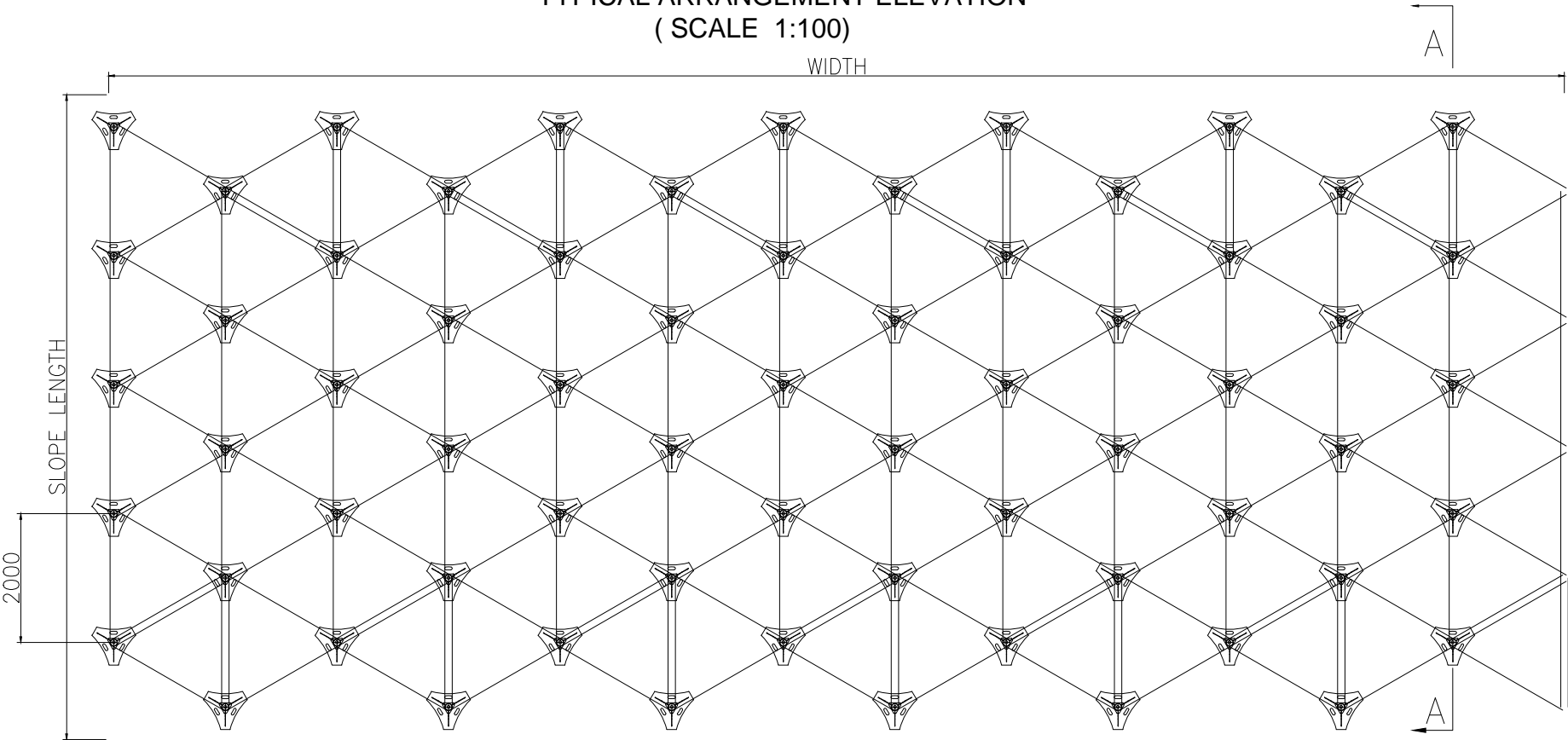
Rev.	Date.		Drawn.	Checked.	Approved.	

WIDENING AND UPGRADATION TO 2 LANE WITH PAVED  
SHOULDER CONFIGURATION AND GEOMETRIC  
IMPROVEMENTS IN THE STATE OF MIZORAM

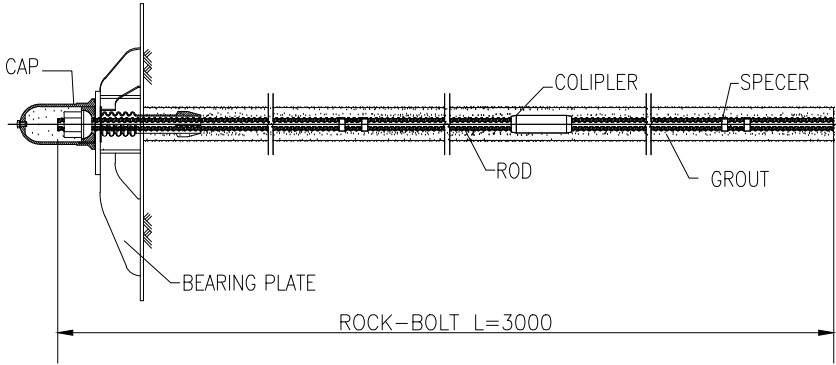
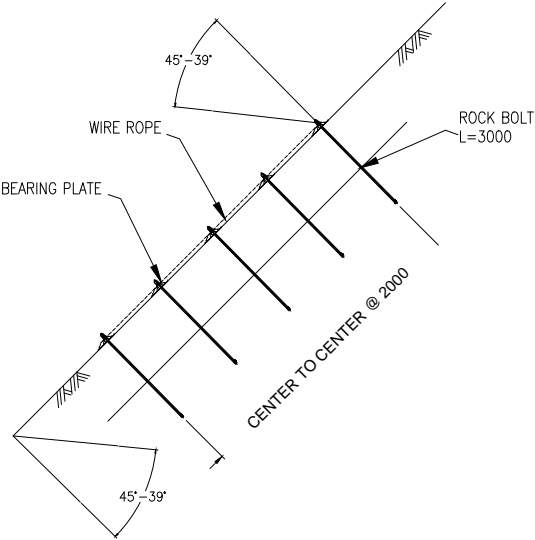
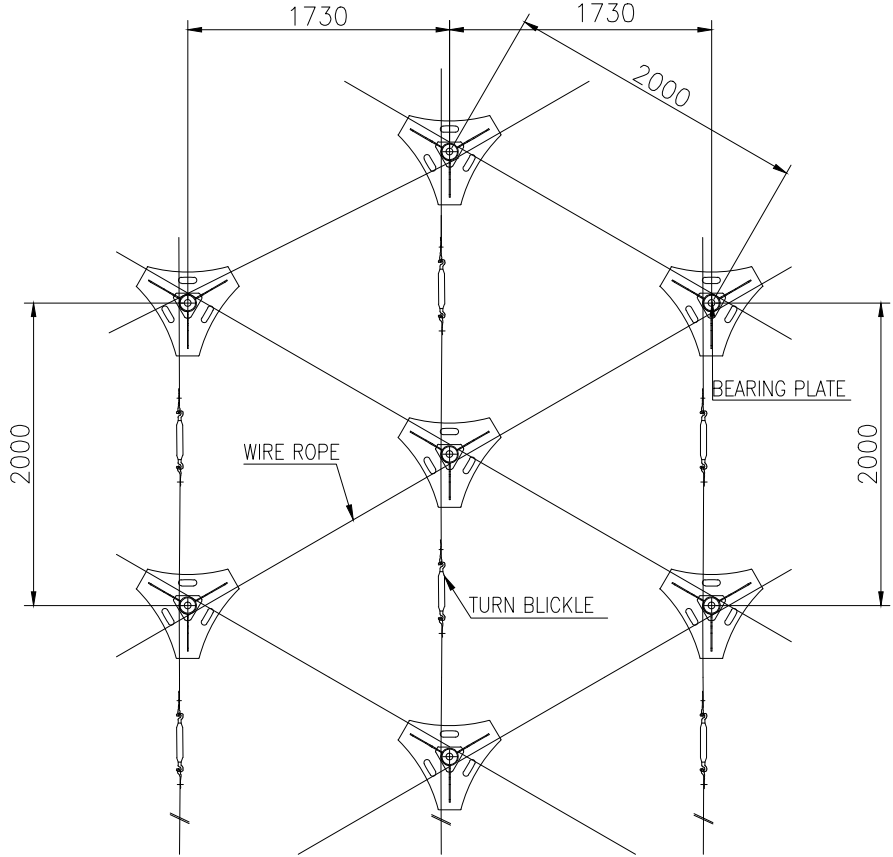
Designed.	Checked	Approved.
Drawn.	Scale. AS SHOWN	Date.

TYPICAL DETAILS OF SLOPE PROTECTION WORK (4/8)  
WIRE ROPE CRIB WORK (NON-FRAME)

TYPICAL ARRANGEMENT ELEVATION  
( SCALE 1:100)



DETAIL OF ARRANGEMENT ELEVATION  
( SCALE 1:50)



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REMARKS:  
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Rev.	Date.		Drawn.	Checked.	Approved.

WIDENING AND UPGRADATION TO 2 LANE WITH PAVED  
SHOULDER CONFIGURATION AND GEOMETRIC  
IMPROVEMENTS IN THE STATE OF MIZORAM

Designed.	Checked	Approved.
Drawn.	Scale. AS SHOWN	Date.

Drawing Title :-  
**NH-54 P-7**  
TYPICAL DETAILS OF SLOPE PROTECTION WORK

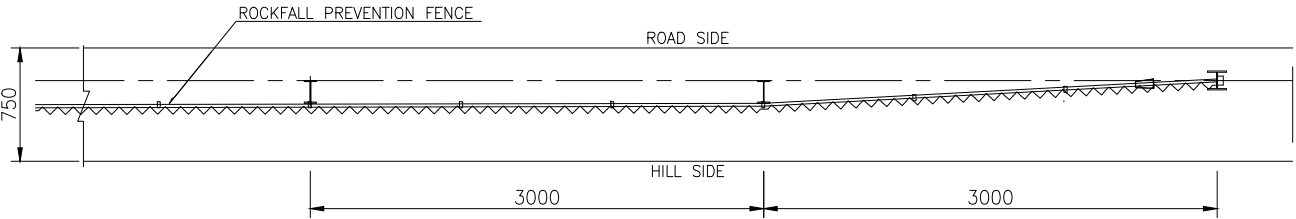
Drawing No:-  
**NH-54-E-5**

Sheet No:-  
**4 OF 8**

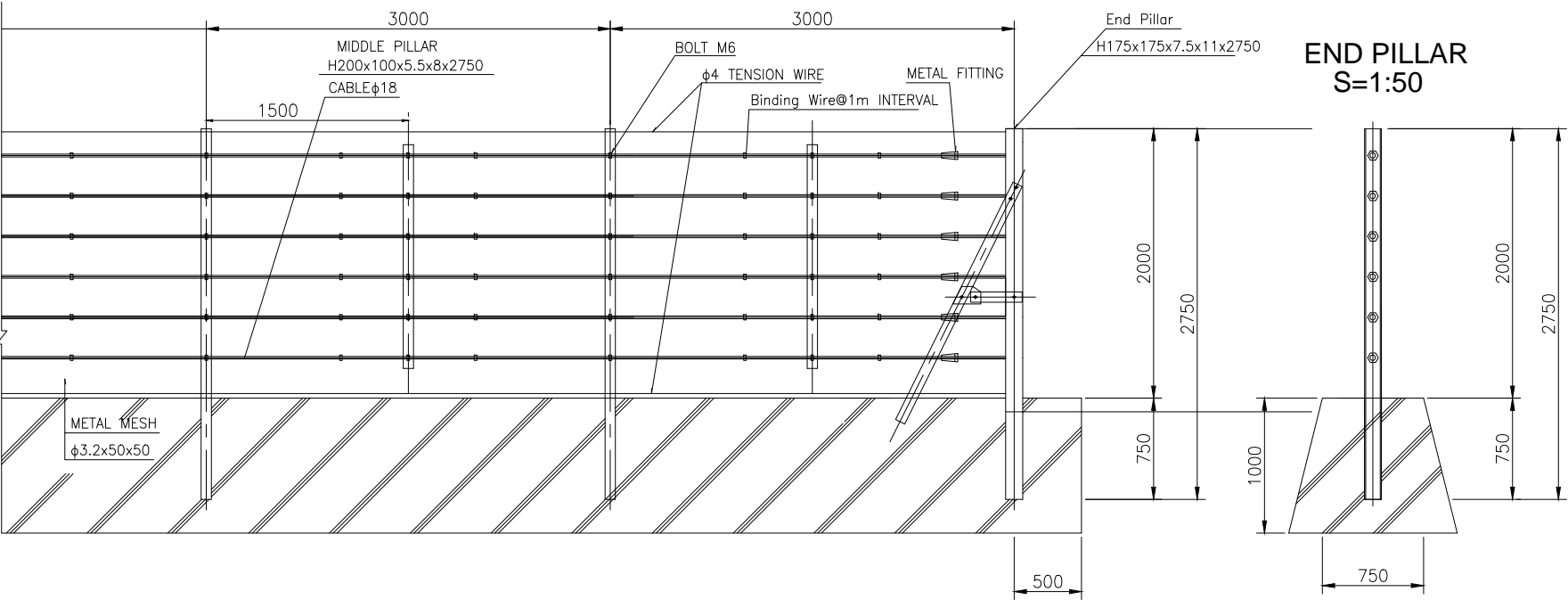


TYPICAL DETAILS OF SLOPE PROTECTION WORK (5/8)  
ROCKFALL PREVENTION WALL

PLAN VIEW  
S=1:50

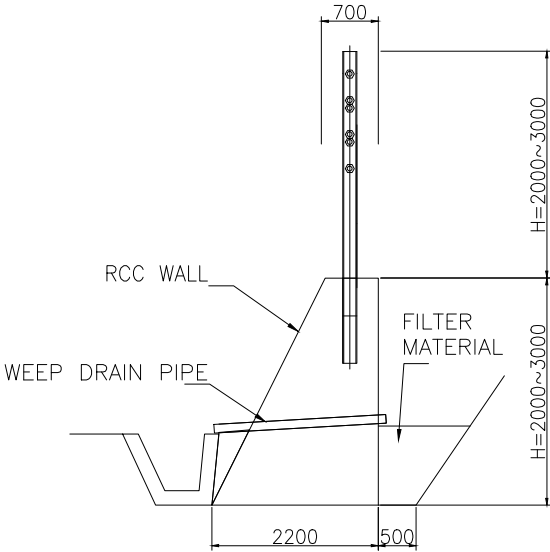


ELEVATION VIEW  
S=1:50

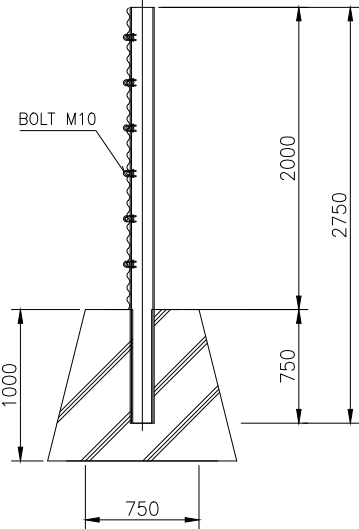


ROCKFALL PREVENTION WALL

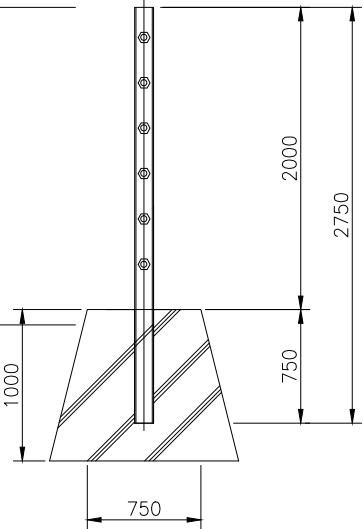
SCALE 1:100



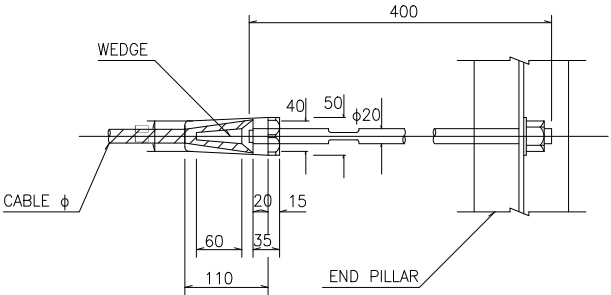
MIDDLE PILLAR  
S=1:50



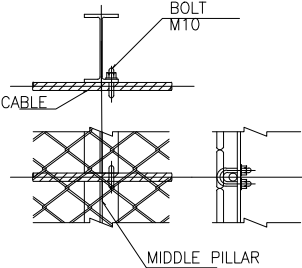
END PILLAR  
S=1:50



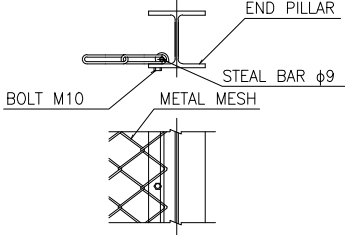
METAL FITTING ATTACHMENT  
S=1:10



CABLE ATTACHMENT  
S=1:100



METAL MESH ATTACHMENT  
S=1:100



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REMARKS:  
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Rev.	Date.		Drawn.	Checked.	Approved.

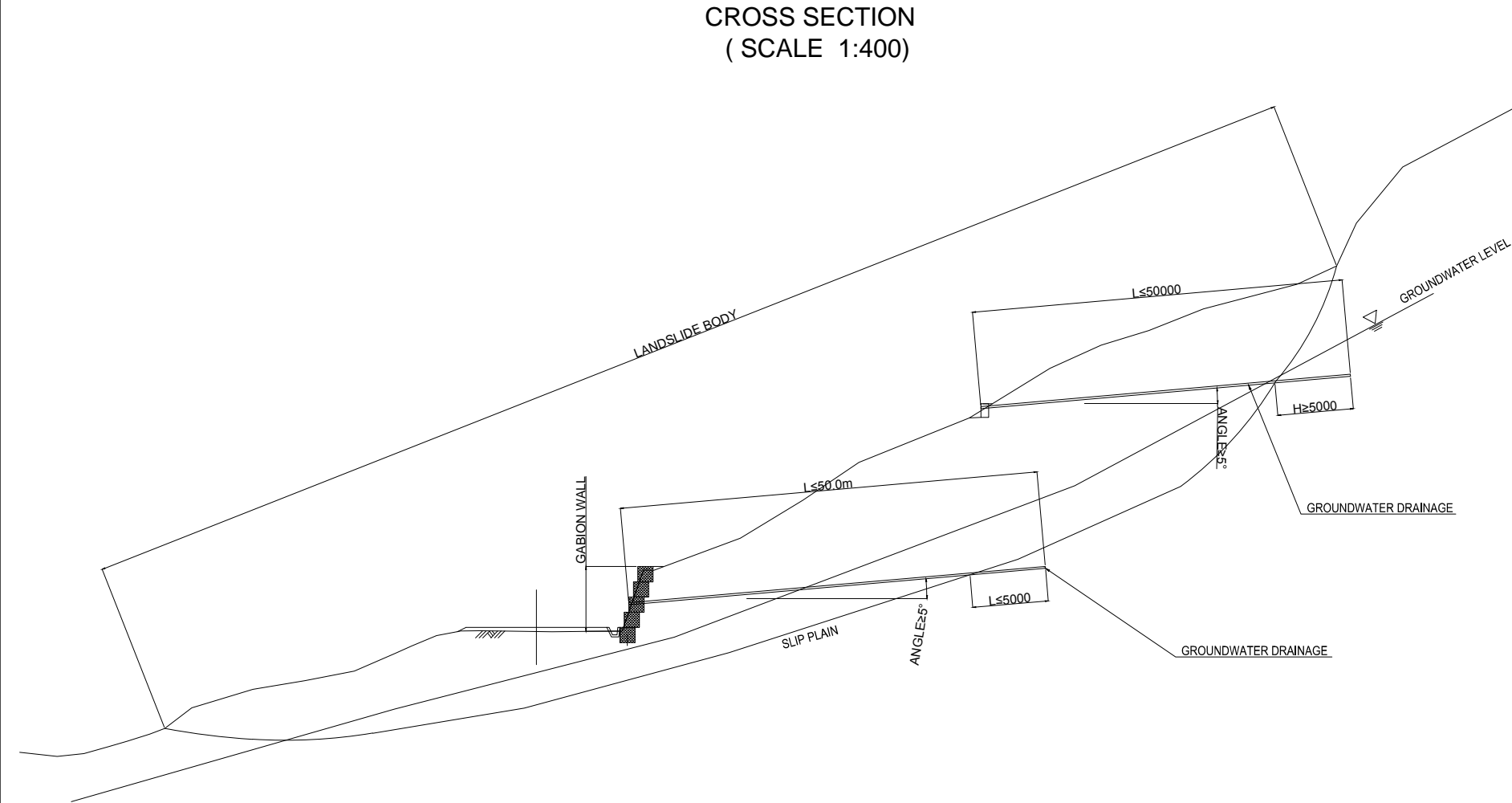
WIDENING AND UPGRADATION TO 2 LANE WITH PAVED  
SHOULDER CONFIGURATION AND GEOMETRIC  
IMPROVEMENTS IN THE STATE OF MIZORAM

Designed.	Checked	Approved.
Drawn.	Scale. AS SHOWN	Date.

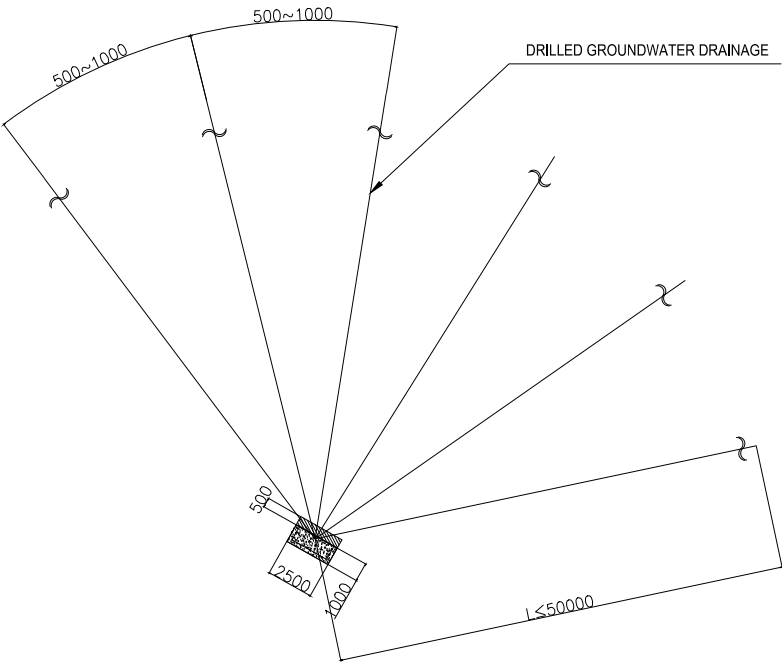
Drawing Title :- <b>NH-54 P-7</b> TYPICAL DETAILS OF SLOPE PROTECTION WORK
Drawing No:- <b>NH-54-E-6</b>
Sheet No:- <b>5 OF 8</b>

TYPICAL DETAILS OF SLOPE PROTECTION WORK (6/8)  
GROUNDWATER DRAINAGE WORK

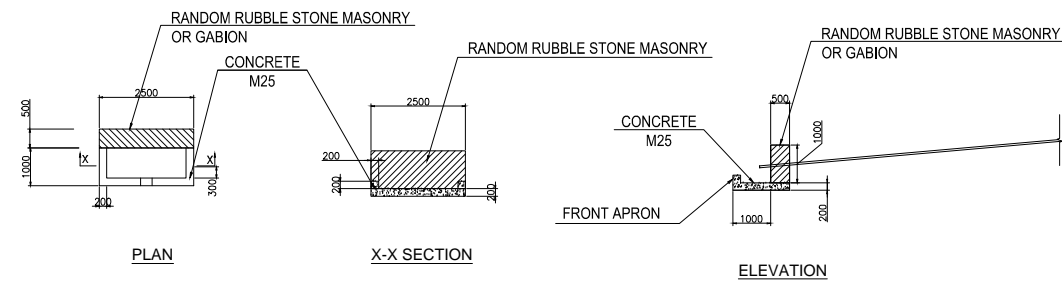
CROSS SECTION  
( SCALE 1:400)



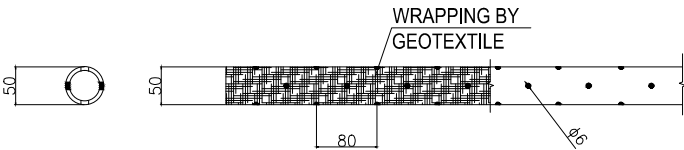
TYPICAL PLAN OF DRILLED GROUNDWATER DRAINAGE  
( SCALE 1:400)





TYPICAL DETAILS OF OUTLET  
( SCALE 1:200)



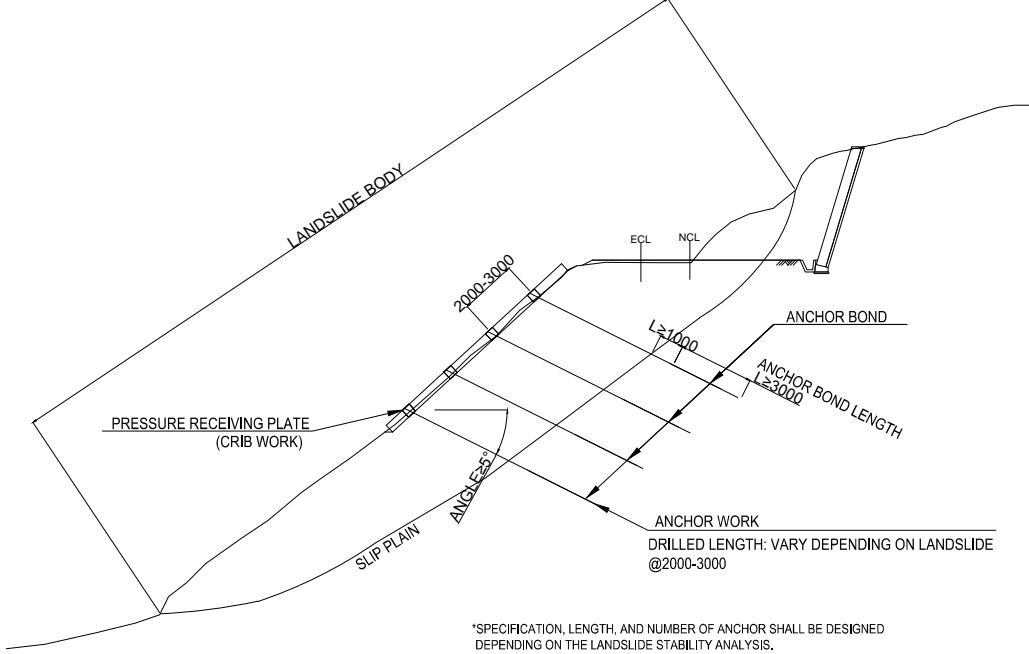
TYPICAL DETAILS OF GROUNDWATER DRAINAGE  
( SCALE 1:200)



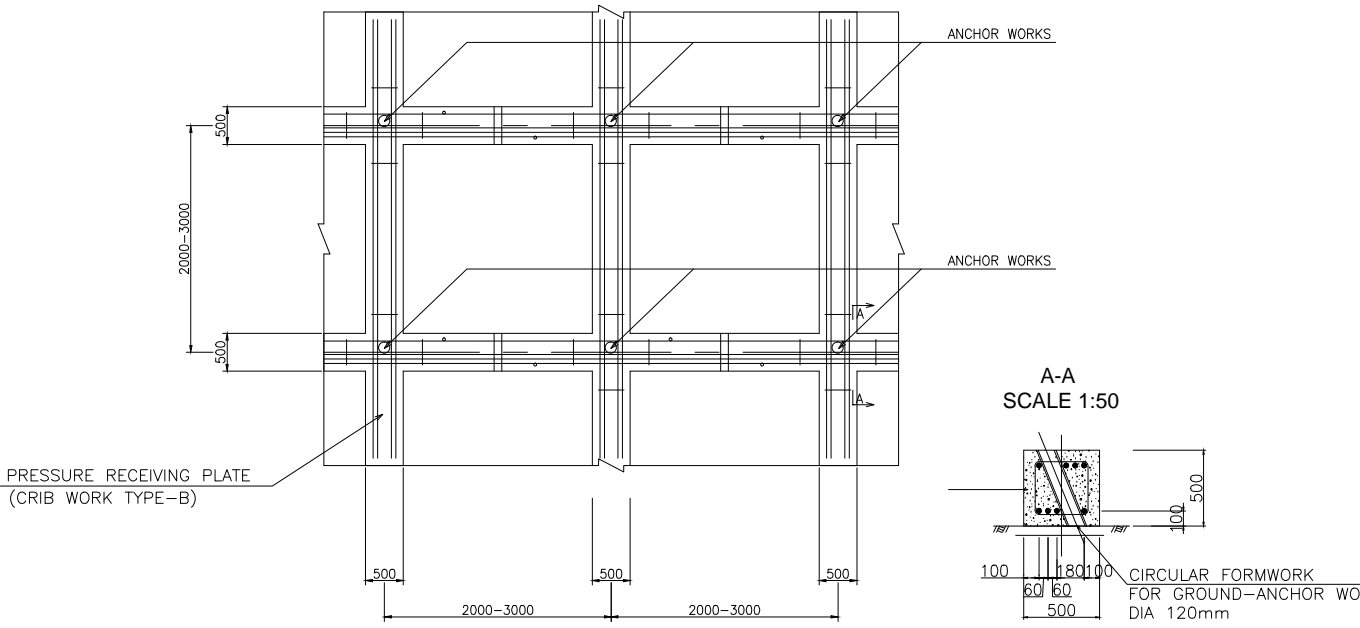
 <b>National Highways &amp; Infrastructure Development Corporation Limited</b>	<b>REMARKS:</b> 1 : ALL DIMENSION IN MM .						<b>WIDENING AND UPGRADATION TO 2 LANE WITH PAVED SHOULDER CONFIGURATION AND GEOMETRIC IMPROVEMENTS IN THE STATE OF MIZORAM</b>			Drawing Title :- <b>NH-54 P-7</b>	
										TYPICAL DETAILS OF SLOPE PROTECTION WORK	
							Designed.	Checked	Approved.	Drawing No:- <b>NH-54-E-7</b>	
							Drawn.	Scale. AS SHOWN	Date.	Sheet No:- <b>6 OF 8</b>	
 <b>JAPAN INTERNATIONAL COOPERATION AGENCY</b>		Rev.	Date.		Drawn.	Checked.	Approved.				

TYPICAL DETAILS OF SLOPE PROTECTION WORK (7/8)  
ANCHOR WORK

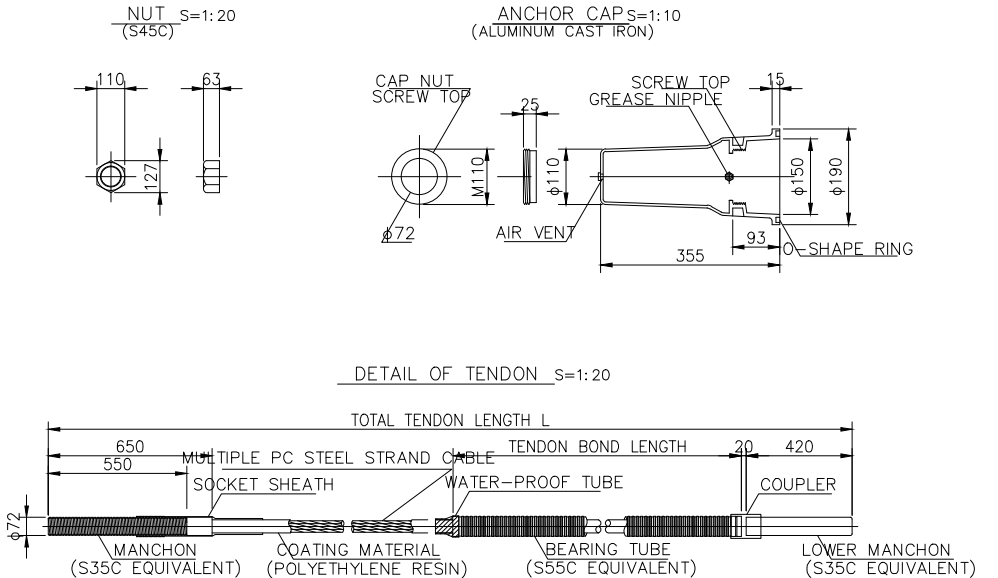
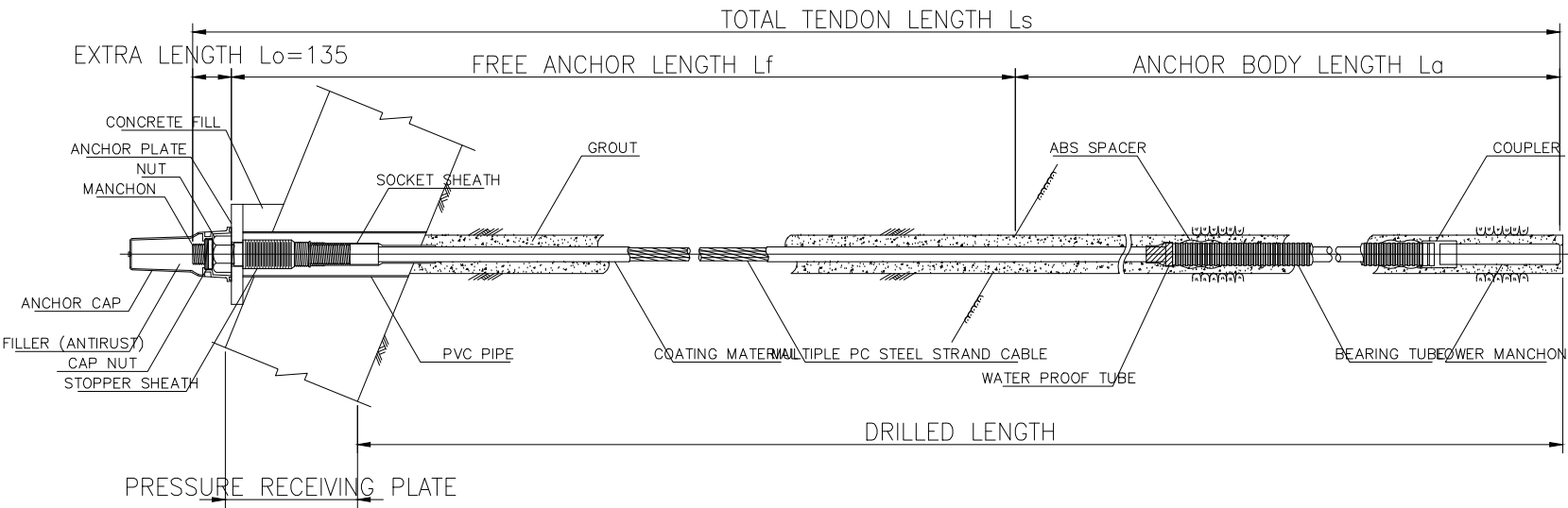
CROSS SECTION  
( SCALE 1:400)



ELEVATION  
( SCALE 1:100)



CROSS SECTION OF THE STRUCTURE  
(SCALE 1:30)



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REMARKS:  
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Rev.	Date.		Drawn.	Checked.	Approved.	

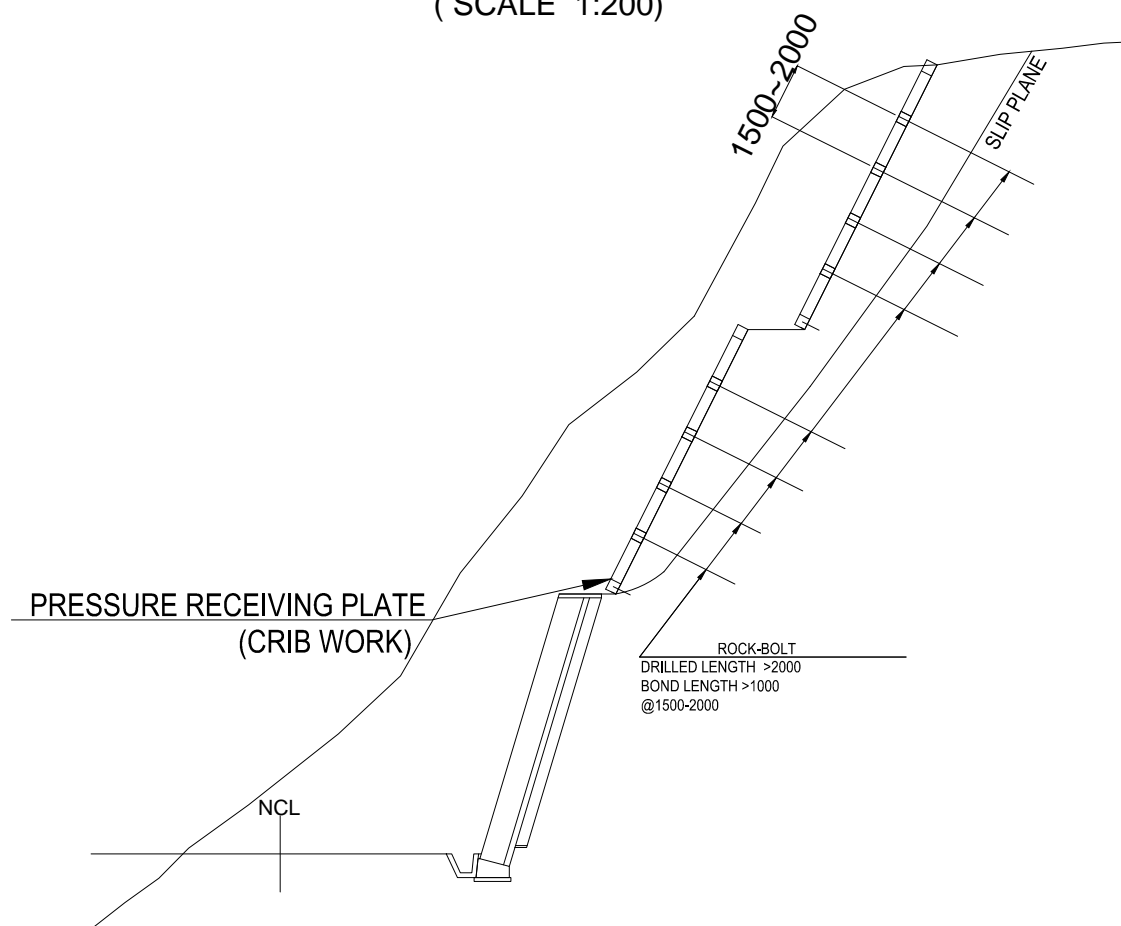
WIDENING AND UPGRADATION TO 2 LANE WITH PAVED  
SHOULDER CONFIGURATION AND GEOMETRIC  
IMPROVEMENTS IN THE STATE OF MIZORAM

Designed.	Checked	Approved.
Drawn.	Scale. AS SHOWN	Date.

Drawing Title :-  
**NH-54 P-7**  
TYPICAL DETAILS OF SLOPE PROTECTION WORK  
Drawing No:-  
**NH-54-E-8**  
Sheet No:-  
**7 OF 8**

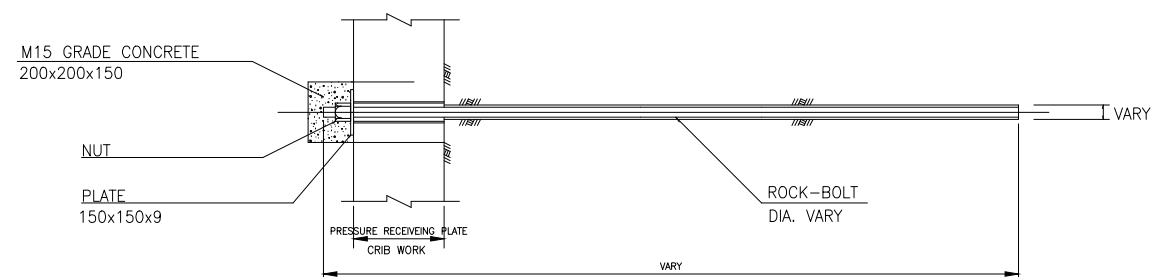
## TYPICAL DETAILS OF SLOPE PROTECTION WORK (8/8)

CROSS SECTION  
( SCALE 1:200)

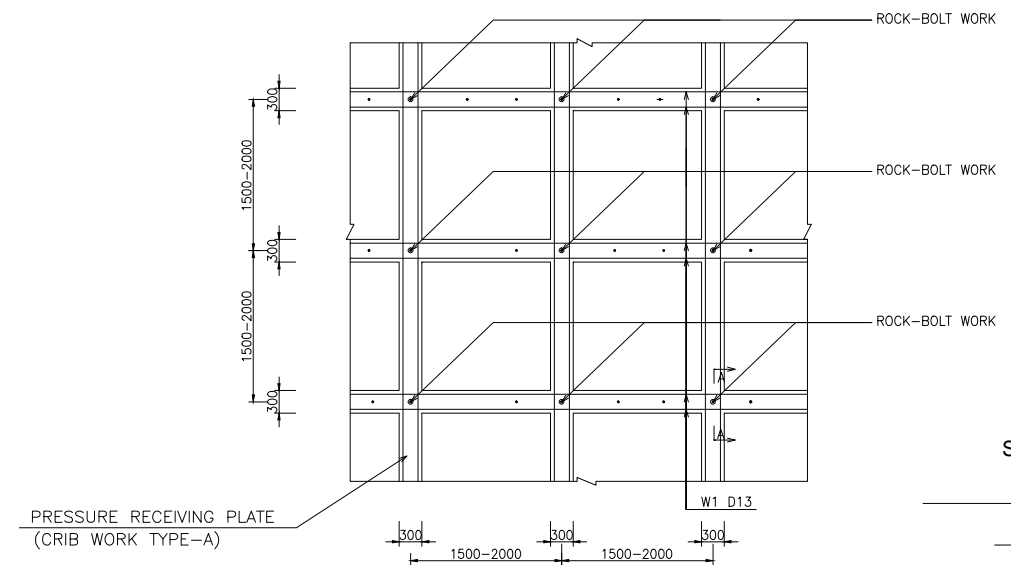


\*SPECIFICATION, LENGTH, AND NUMBER OF ROCK-BOLT SHALL BE DESIGNED DEPENDING ON THE LANDSLIDE STABILITY ANALYSIS.

ROCK-BOLT  
( SCALE 1:50)



ELEVATION  
(SCALE 1:100)



A-A  
SCALE 1:50

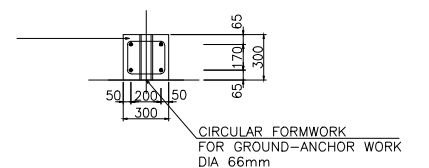
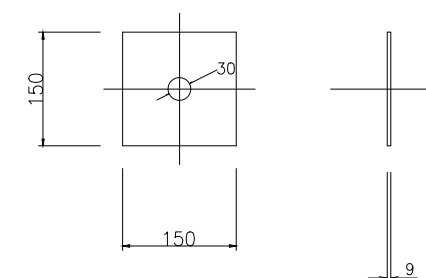
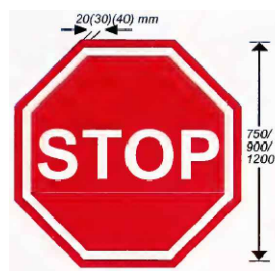


PLATE  
(SCALE 1:10)





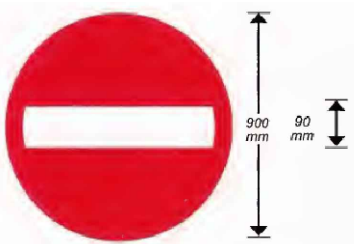
TYPICAL DETAIL FOR TREFFIC SIGN(1/3)  
MANDATORY/REGULATORY SIGNS



Stop



Give Way



No Entry



One Way



Left Turn Prohibited



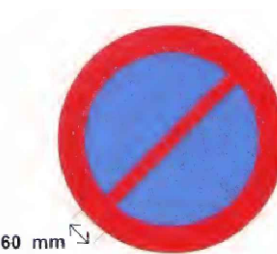
Right Turn Prohibited



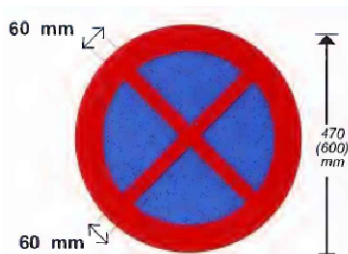
Overtaking Prohibited



U-Turn Prohibited



No Standing



No Stopping and No Standing



No Parking



Height Limit



Load Limit



Maximum Speed Limit



Restriction Ends



Compulsory Ahead



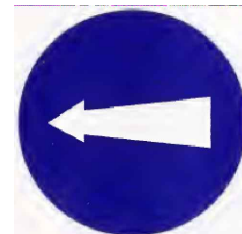
Compulsory Ahead or Right Turn



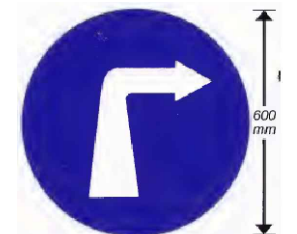
Compulsory Ahead or Left Turn



Compulsory Turn Right



Compulsory Turn Left



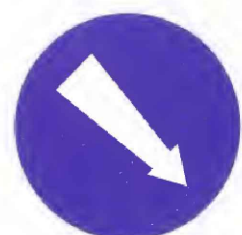
Compulsory Turn Right  
(In advance of Junction)



Compulsory Turn Left  
(In advance of Junction)



Compulsory Keep Left



Compulsory Keep Right



Minimum Speed Limit



Pedestrian Only



Bus Way / Buses Only



Compulsory Sound Horn



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REMARKS:

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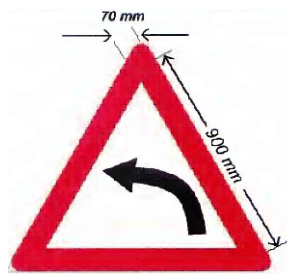
Rev.	Date.		Drawn.	Checked.	Approved.	

WIDENING AND UPGRADATION TO 2 LANE WITH PAVED  
SHOULDER CONFIGURATION AND GEOMETRIC  
IMPROVEMENTS IN THE STATE OF MIZORAM

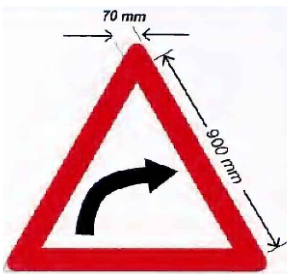
Designed.	Checked	Approved.
Drawn.	Scale. NTS	Date.

Drawing Title :- NH-54 P-7 TYPICAL DETAIL FOR TREFFIC SIGN(1/3)
Drawing No:- NH-54-F-1
Sheet No:- 1 OF 8

TYPICAL DETAIL FOR TREFFIC SIGN(2/3)  
CAUTIONARY/WARNING SIGNS



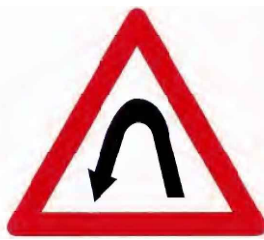
Left Hand Curve



Right Hand Curve



Right Hairpin Bend



Left Hairpin Bend



Right Reverse Bend



Left Reverse Bend



Series of Bends



Side Road Right



Side Road Left



Y-Intersection



Y-Intersection



Y-Intersection



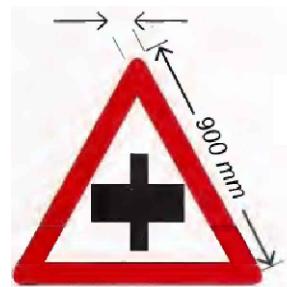
Cross Road



T-Intersection



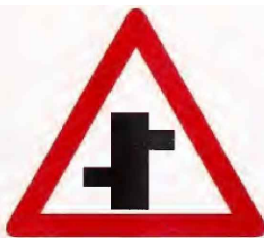
T-Intersection Major Road Ahead



Major Road Ahead



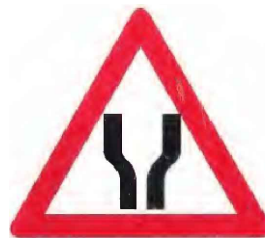
Staggered Intersection



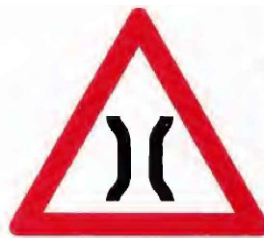
Staggered Intersection



Narrow Road Ahead



Road Widens



Narrow Bridge Ahead



Steep Ascent



Steep Descent



Reduced Carriageway  
Left Lane(s) Reduced



Reduced Carriageway  
Right Lane(s) Reduced



Pedestrian Crossing



School Ahead



Built-up Area



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Rev.	Date.		Drawn.	Checked.	Approved.	

WIDENING AND UPGRADATION TO 2 LANE WITH PAVED  
SHOULDER CONFIGURATION AND GEOMETRIC  
IMPROVEMENTS IN THE STATE OF MIZORAM

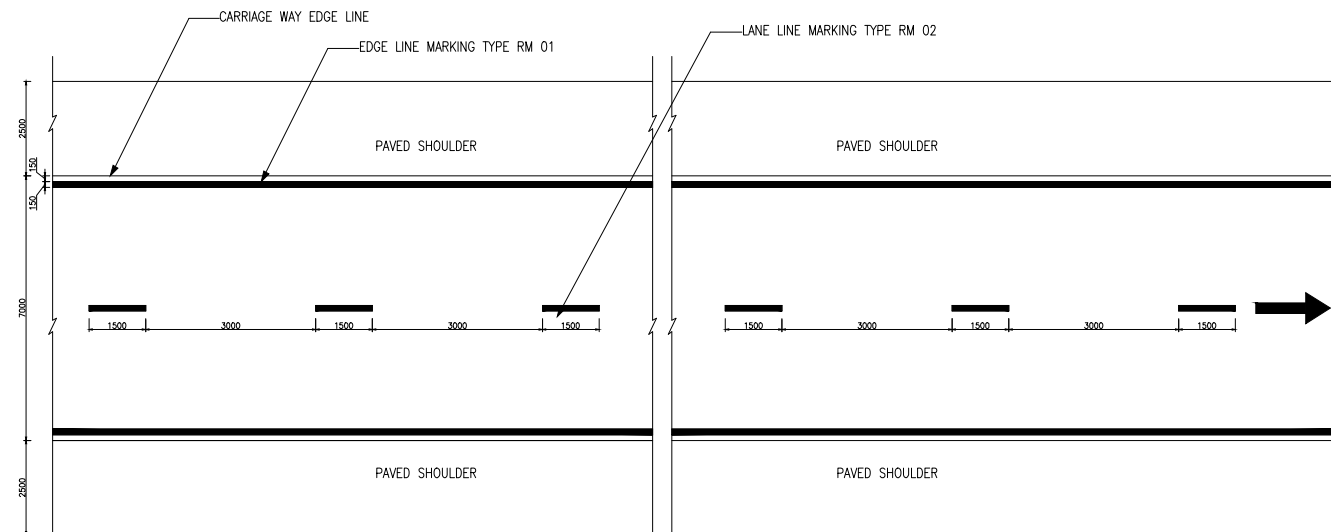
Designed.	Checked	Approved.
Drawn.	Scale. NTS	Date.

Drawing Title :- NH-54 P-7 TYPICAL DETAIL FOR TREFFIC SIGN(2/3)
Drawing No:- NH-54-F-2
Sheet No:- 2 OF 8



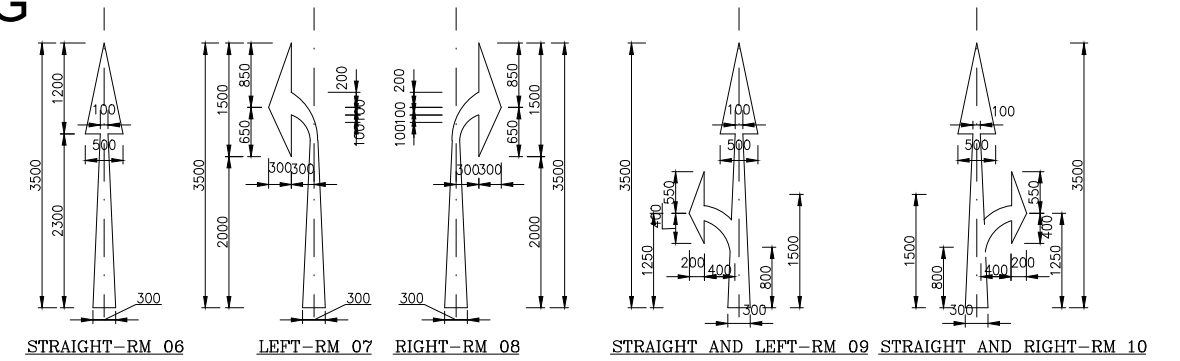
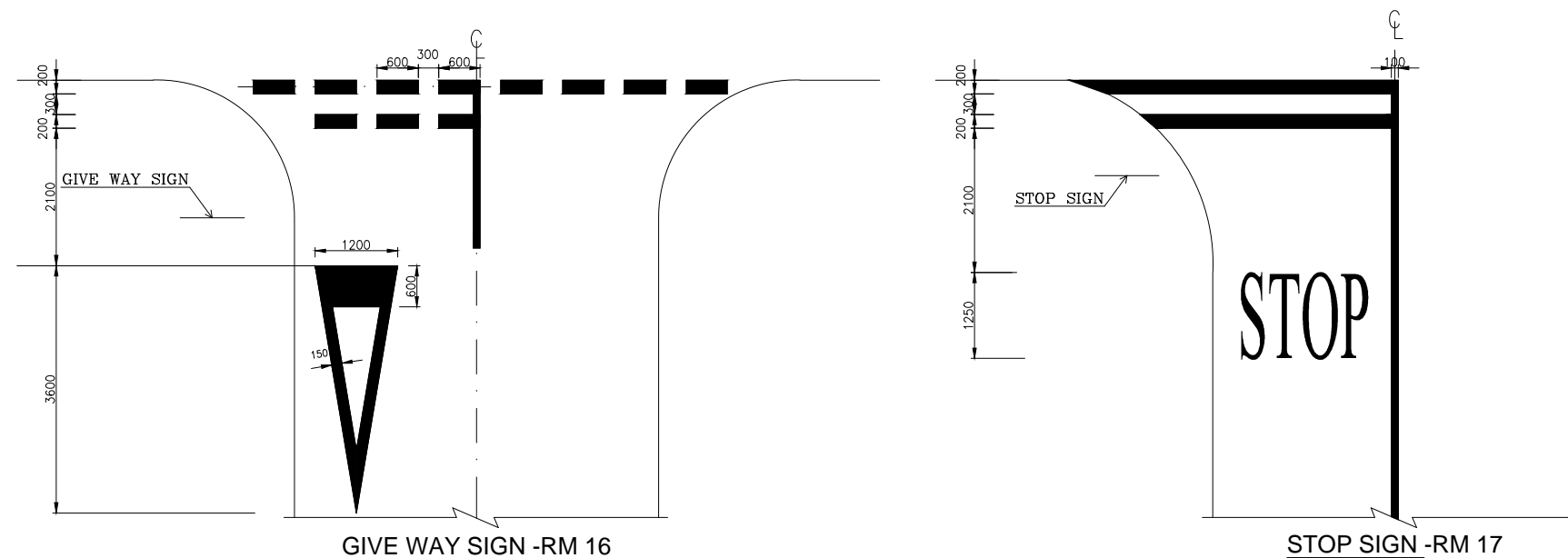


## TYPICAL DETAIL FOR ROAD MARKING

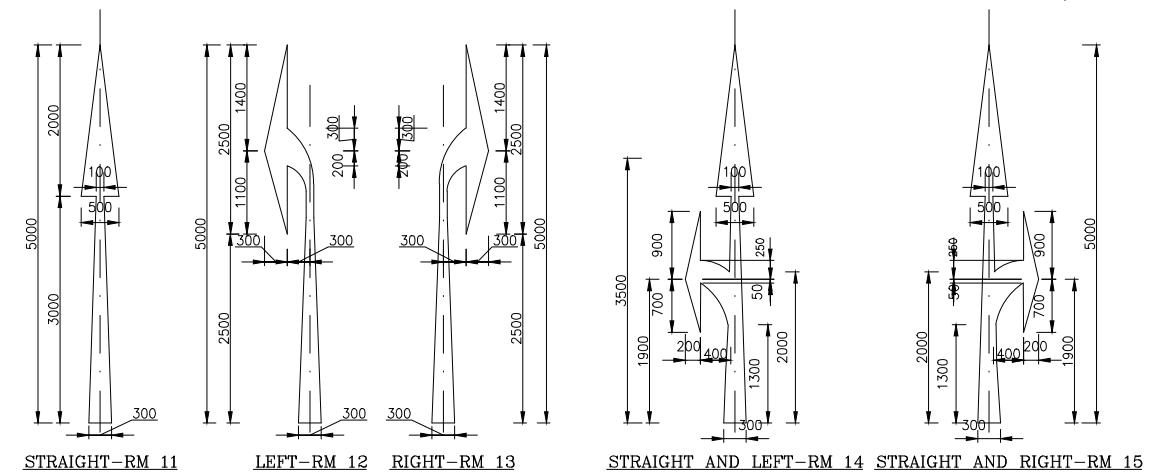


The diagram illustrates the typical layout of road markings for two types of road sections:

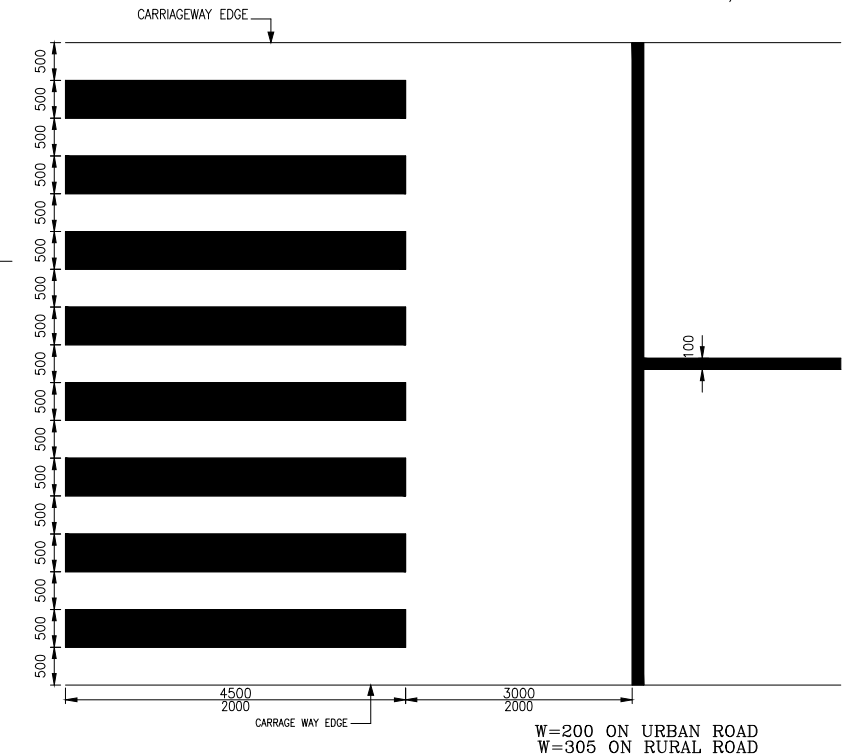
- SECTION TYPE-1**: Shows a straight reach with a carriage way edge and a centre line. The edge line marking (RM 01) is 150 units wide, and the centre line marking (RM 02) is 100 units wide.
- SECTION TYPE-2**: Shows a curve reach with a centre line. The lane line marking (RM 03) is 1500 units wide.



ROUTE DIRECTIONAL ARROWS FOR ROADS WITH DESIGN SPEED UP TO 50 km/hr



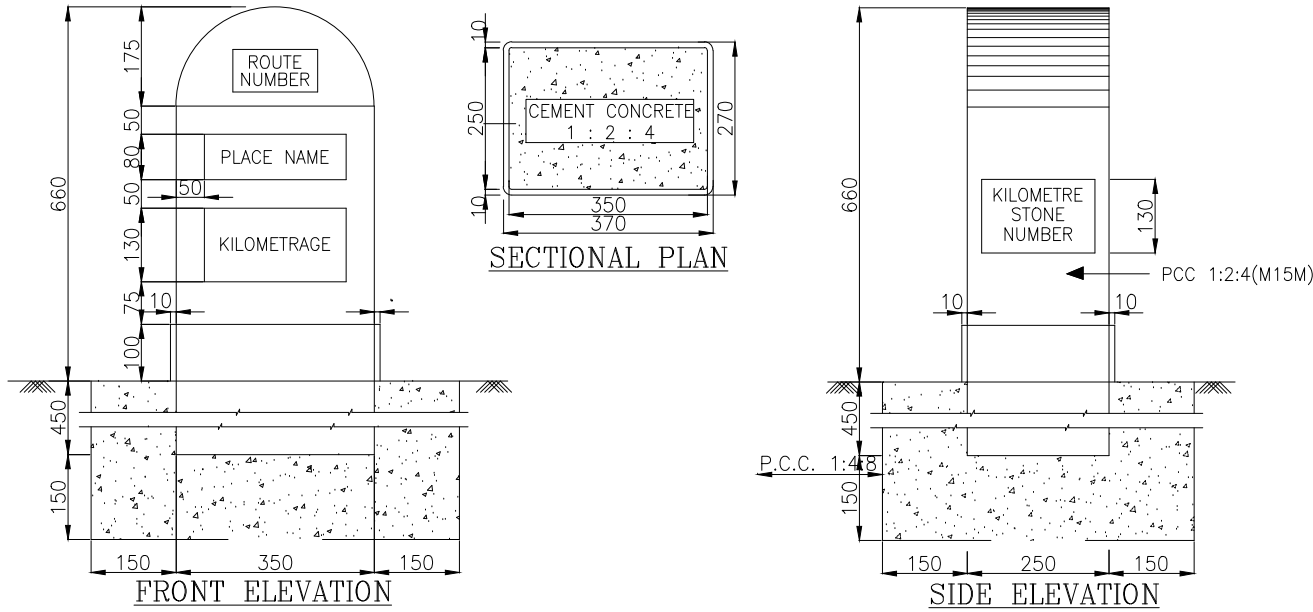
ROUTE DIRECTIONAL ARROWS FOR ROADS WITH DESIGN SPEED MORE THAN 50 km/hr



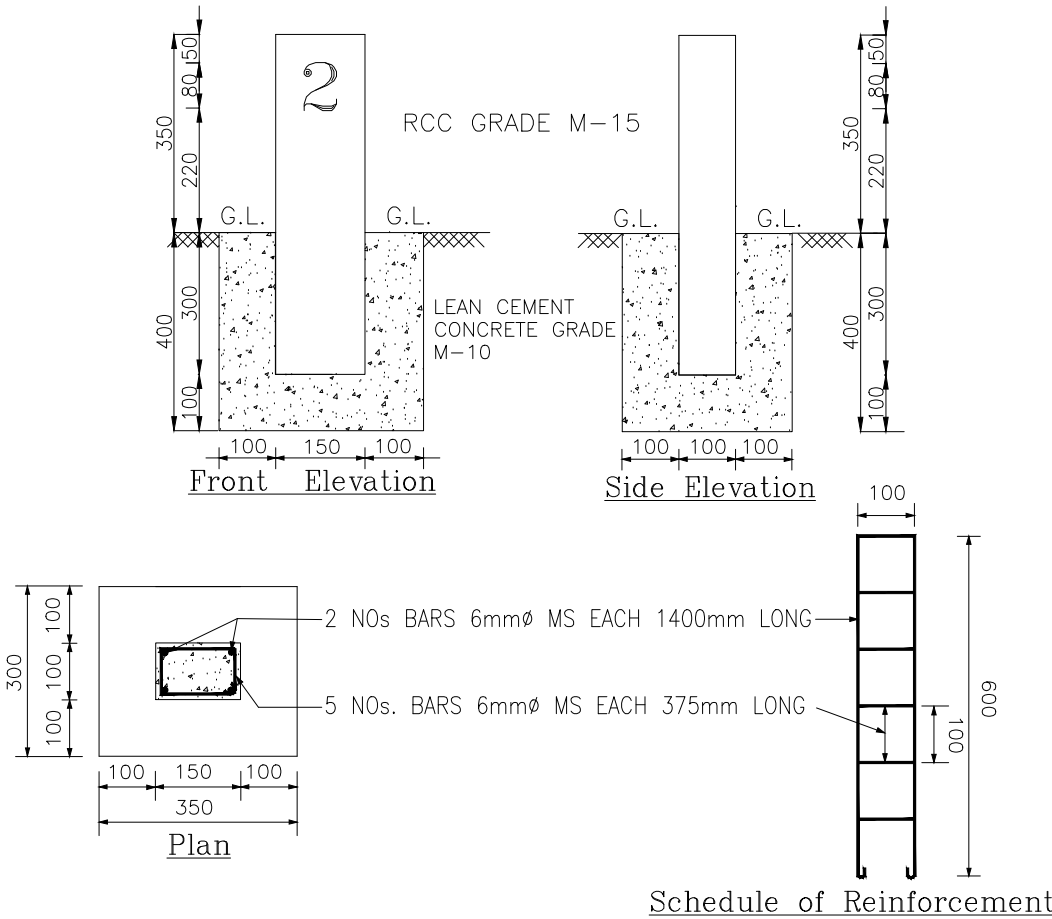
PEDESTRIAN CROSSING-RM 04 &amp; STOP LINE-RM 05



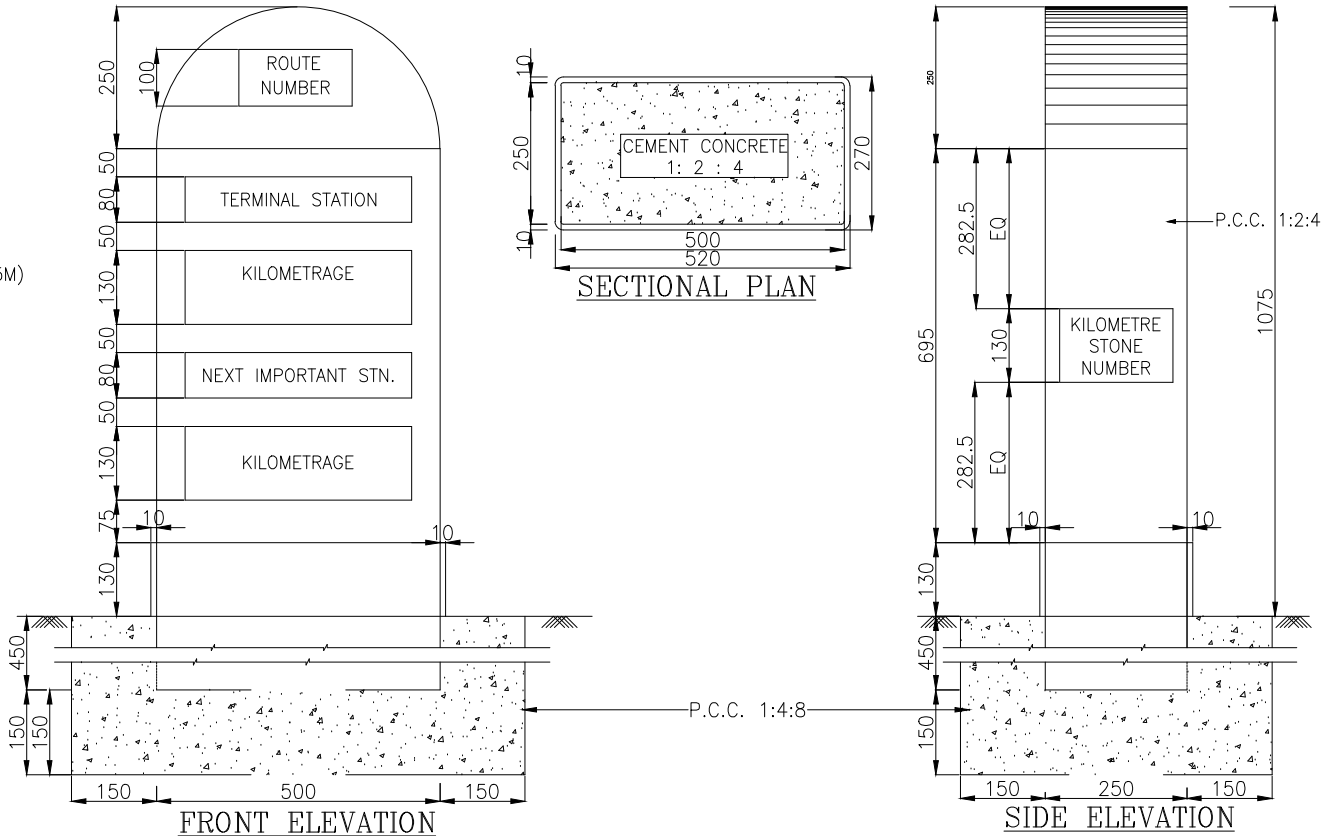
TYPICAL DETAIL FOR K/M STONE



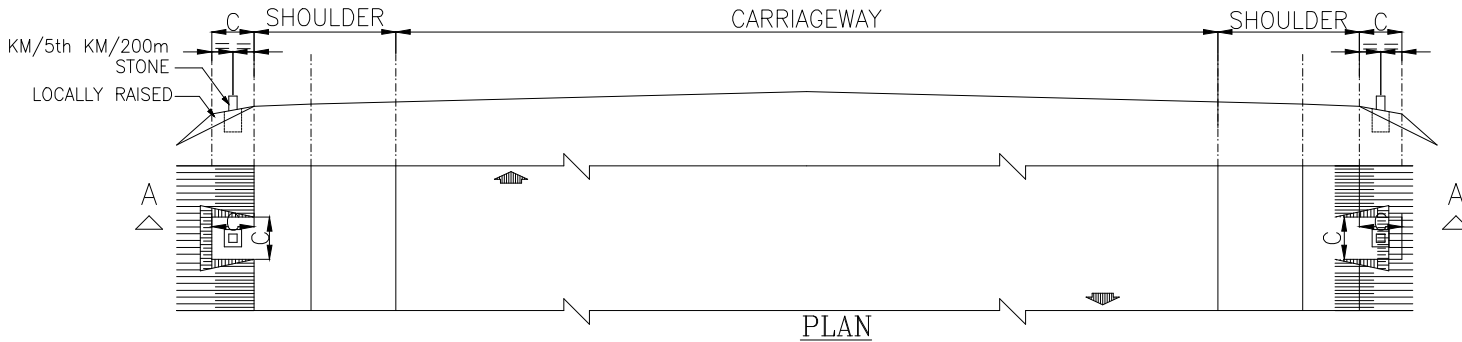
TYPICAL DETAILS OF ORDINARY KILOMETRE STONE



Typical Design For 200 - Metre Stones





TYPICAL DETAILS OF FIFTH (5th) KILOMETRE STONE

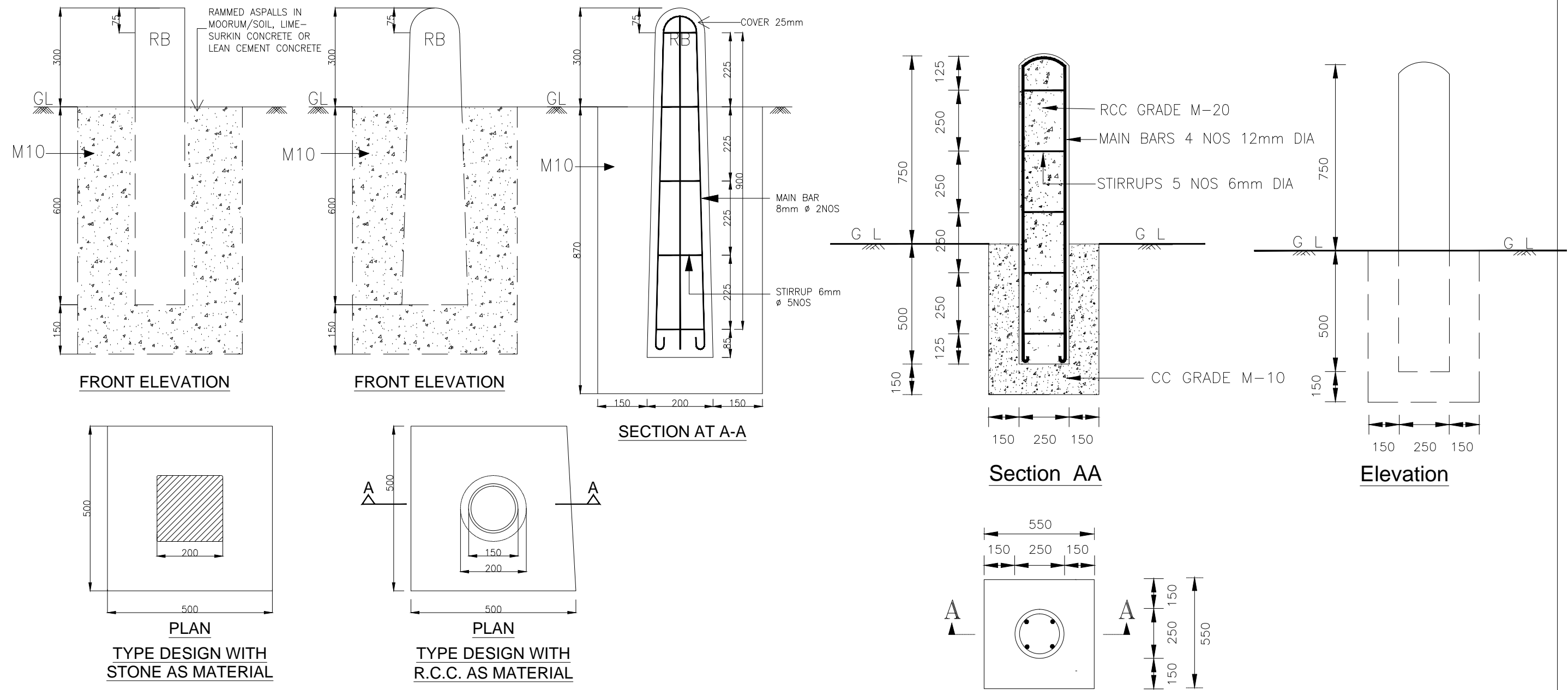


LOCATION OF KILOMETRE & 200 METRE STONE

- NOTES:**
1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS SHOWN OTHERWISE
  2. DIMENSIONS SHALL NOT BE SCALED FROM DRAWING. ONLY WRITTEN DIMENSIONS SHALL BE FOLLOWED.
  3. DETAILS OF ORDINARY KM STONE AND 5th KM STONE ARE GENERALLY BASED ON IRC: 8-1980
  4. DETAILS OF 200m STONE ARE GENERALLY BASED ON IRC: 26-1967
  5. VALUE OF 'C' IS 1500mm FOR KM/5th KM STONE & 1000mm FOR 200m STONE

<div><div>National Highways &amp; Infrastructure Development Corporation Limited</div></div> <div><div>JAPAN INTERNATIONAL COOPERATION AGENCY</div></div>	<div>REMARKS:</div> <div>1 : ALL DIMENSION IN MM.</div> <div>2 : REFER TO IRC:67-2012 FOR MORE DETAILS.</div>							WIDENING AND UPGRADATION TO 2 LANE WITH PAVED SHOULDER CONFIGURATION AND GEOMETRIC IMPROVEMENTS IN THE STATE OF MIZORAM			Drawing Title :- NH-54 P-7 TYPICAL DETAIL FOR K/M STONE
								Designed.	Checked	Approved.	Drawing No:- NH-54-F-5
								Drawn.	Scale. NTS	Date.	Sheet No:- 5 OF 8
		Rev.	Date.		Drawn.	Checked.	Approved.				

# TYPICAL DETAIL FOR BOUNDARY STONE & GUARD POST



TYPE DESIGN WITH  
STONE AS MATERIAL

TYPE DESIGN WITH  
R.C.C. AS MATERIAL

## BAR BENDING SCHEDULE

S.NO.	TYPE OF M.S BAR	NO. OF BARS	SHAPE OF BARS	DIA IN mm	LENTH OF BAR INCLUDING HOOKS
1	MAIN BARS	2		8mm	1.84m
2	TOPMOST STIRRUP	1		6mm	370mm
3	STIRRUP (FIRST FSOM TOP)	1		6mm	405mm
4	STIRRUP (SECOND FSOM TOP)	1		6mm	440mm
5	STIRRUP (THIRD FSOM TOP)	1		6mm	475mm
6	BOTTOM STIRRUP	1		6mm	810mm

## TYPICAL DETAILS OF BOUNDARY STONE

## Plan

## TYPICAL DETAILS OF GUARD POST

### Notes

1. All Dimensions Are In mm Except Where Otherwise Mentioned
2. Reinforcement – Mild Steel Bars Conforming To I.S.432/1966 Grade 1 Tested Steel
3. Concrete Mix –  
Rcc : Grade M-20  
Cc : Grade M-10



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REMARKS:  
1 : ALL DIMENSION IN MM.  
2 : REFER TO IRC:67-2012 FOR MORE DETAILS.

WIDENING AND UPGRADATION TO 2 LANE WITH PAVED  
SHOULDER CONFIGURATION AND GEOMETRIC  
IMPROVEMENTS IN THE STATE OF MIZORAM

Drawing Title :-  
**NH-54 P-7**  
TYPICAL DETAIL FOR BOUNDARY  
STONE & GUARD POST

Designed.

Checked

Approved.

Drawing No:-

NH-54-F-6

Drawn.

Scale.

NTS

Date.

Sheet No:-

6 OF 8

Rev.

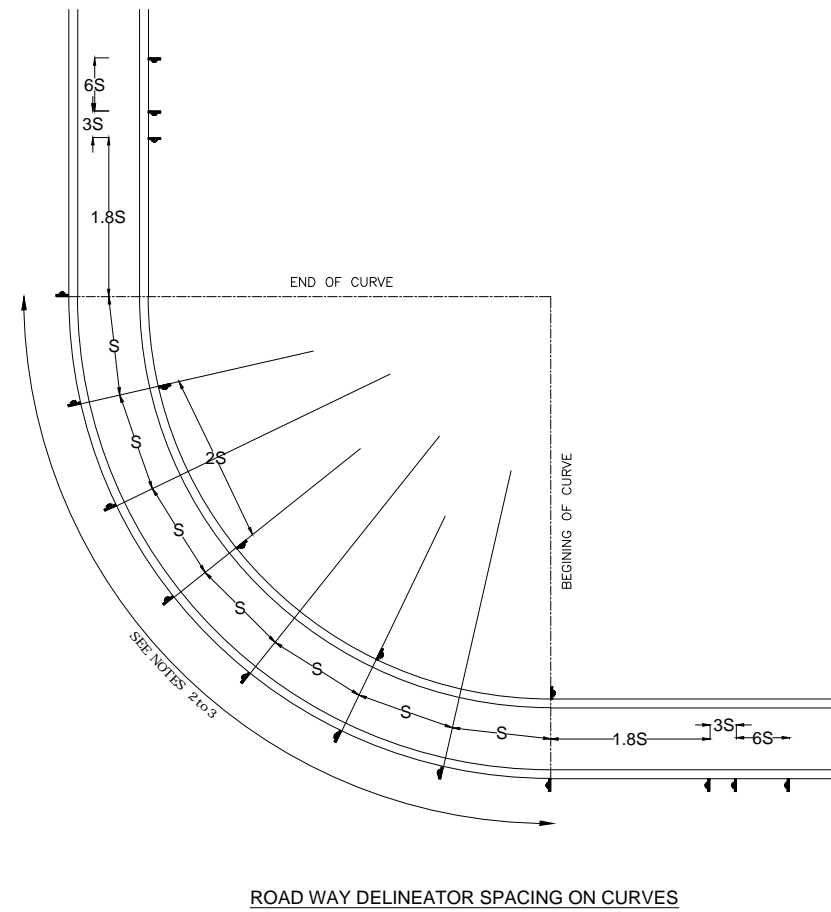
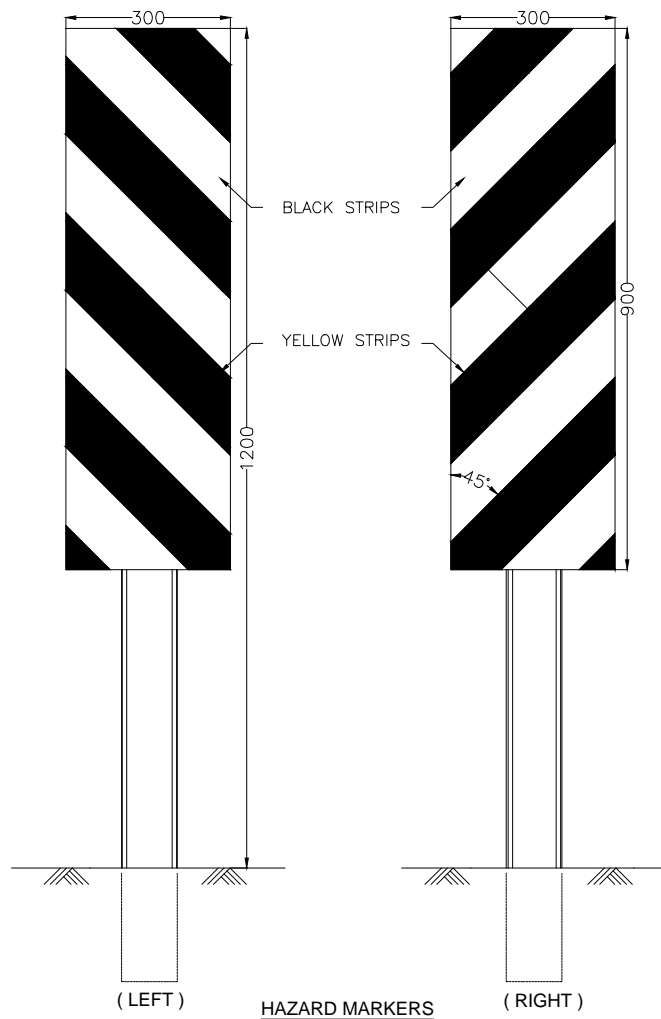
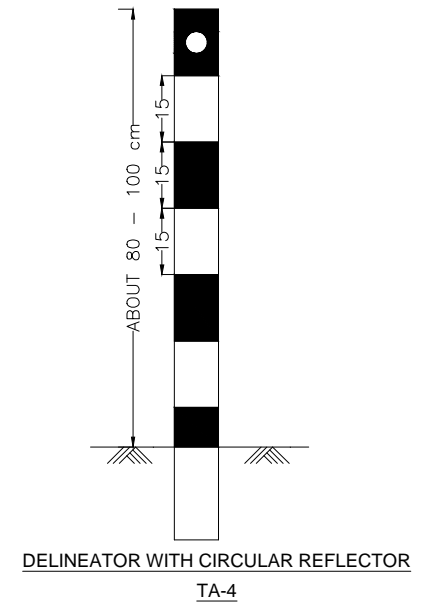
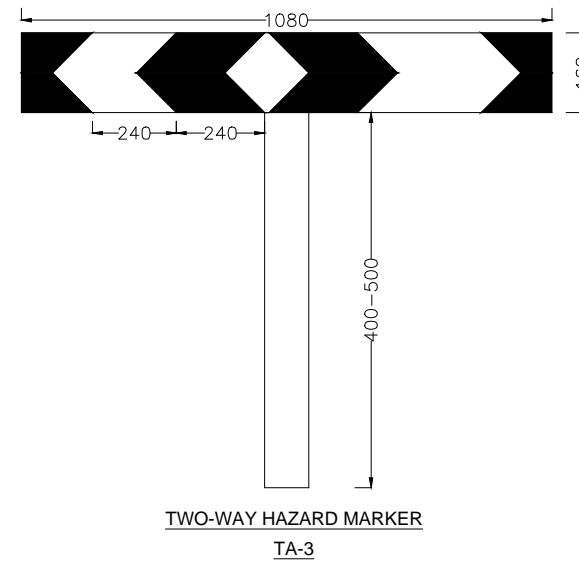
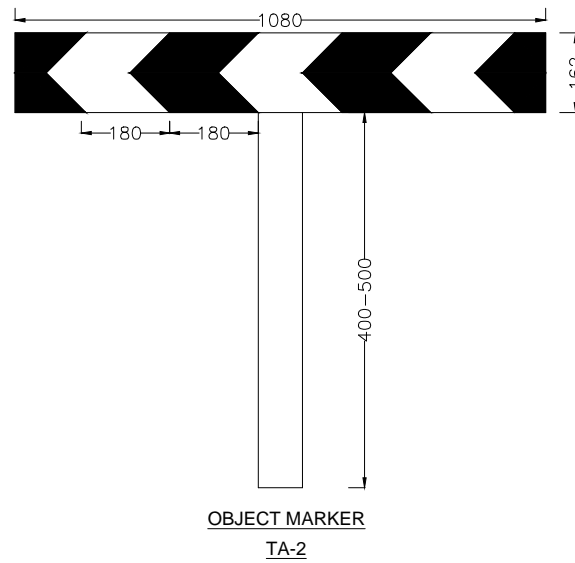
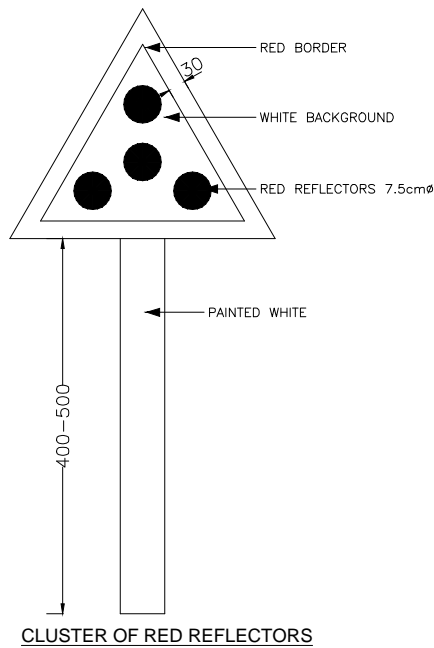
Date.

Drawn.

Checked.

Approved.

TYPICAL DETAIL FOR ROAD DELINEATOR



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REMARKS:

- 1 : ALL DIMENSION IN MM.
- 2 : REFER TO IRC:67-2012 FOR MORE DETAILS.

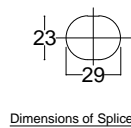
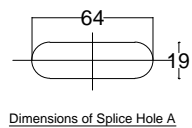
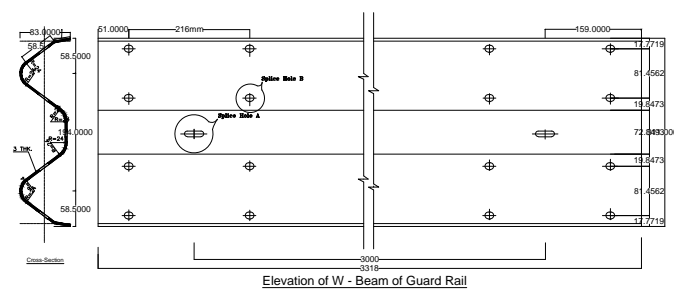
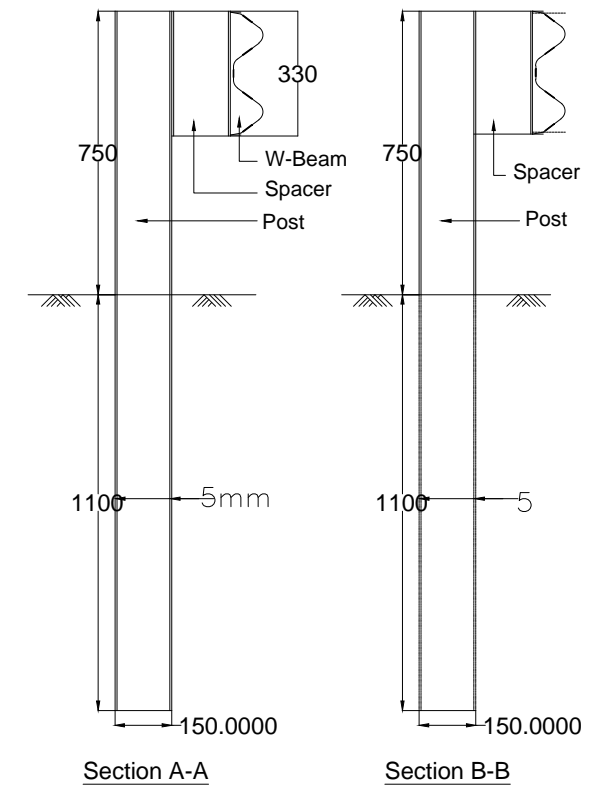
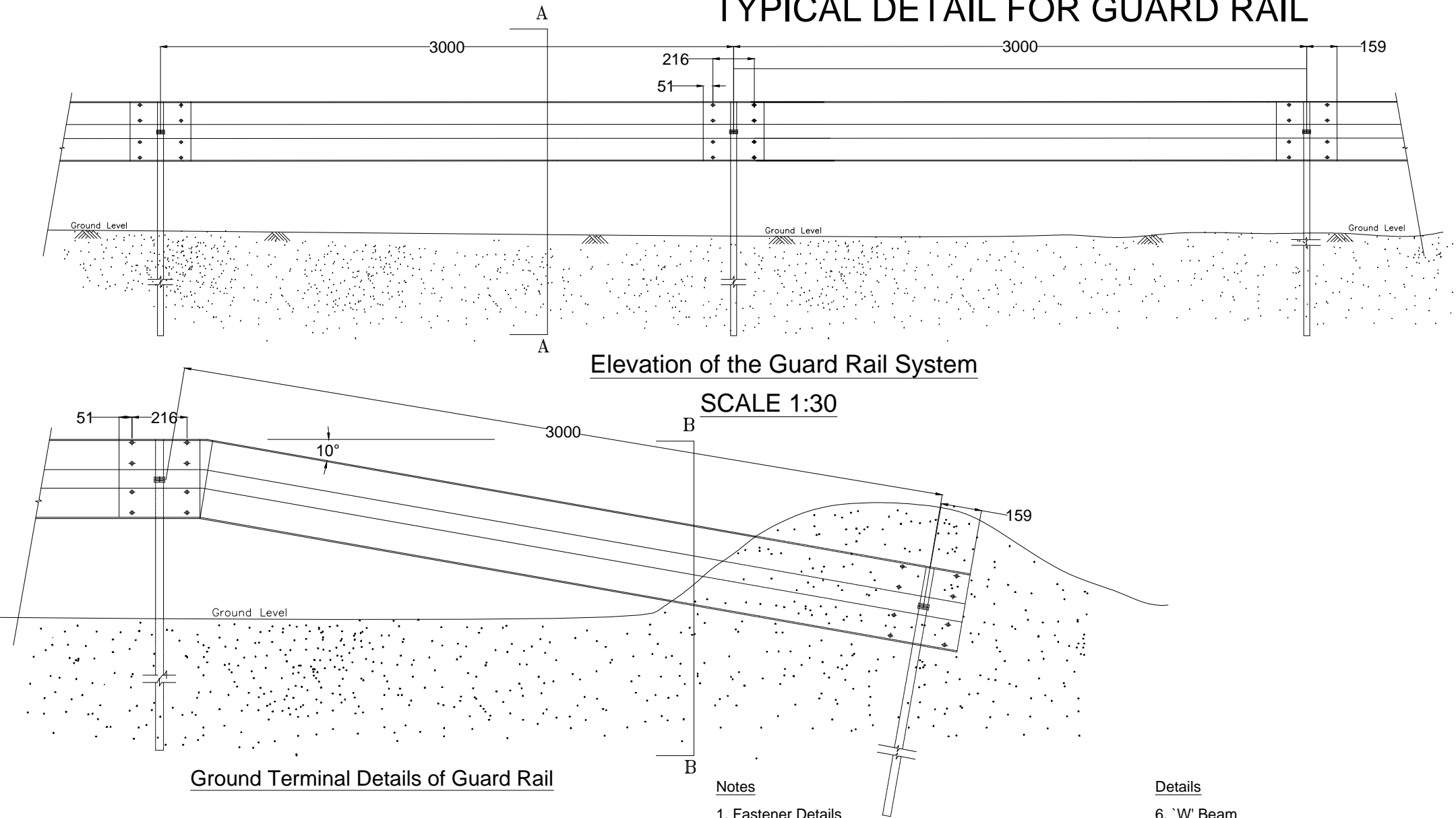
Rev.	Date.		Drawn.	Checked.	Approved.

WIDENING AND UPGRADATION TO 2 LANE WITH PAVED  
SHOULDER CONFIGURATION AND GEOMETRIC  
IMPROVEMENTS IN THE STATE OF MIZORAM

Designed.	Checked	Approved.
Drawn.	Scale. NTS	Date.

Drawing Title :- NH-54 P-7 TYPICAL DETAIL FOR ROAD DELINEATOR
Drawing No:- NH-54-F-7
Sheet No:- 7 OF 8

# TYPICAL DETAIL FOR GUARD RAIL



## Notes

- Fastener Details
  - Bottom head bolts, M16 -30 long with nut and washer at each splice location. 8 nos.
  - Bottom head bolts, M16 -30 long with nut and washer
    - 1no. for connecting 'W' beam to spacer
    - 2nos. for connecting spacer to post.
- All members i.e. Post/Bolts/ Spacer/ 'W' Beam, shall be hot dipped galvanised and Zinc coated @ 550 g/Msq (min.), single spot.
- Base material for 'W' Guard Rails' should have
  - Ultimate Tensile Strength (min.) 483 MPa
  - Yield Strength (min.) 345MPa
  - Elongation (min.) 12%
- Beams to be erected on a radius of 45m or less shall be Shop Curved to appropriate curvature of installation.
- 'W' Beam elements shall be formed from sheets having nominal width of 483.

## Details

- 'W' Beam
 

311mm x 83mm x 3mm W Section  
Length: 3318mm  
Cold Formed, Galvanised.
- Spacer Block
 

150mm x 75mm x 5mm Channel Section  
Length: 330mm  
Cold Formed, Galvanised.
- Post Block
 

150mm x 75mm x 5mm Channel Section  
Length: 1850mm  
Cold Formed, Galvanised.

## 9. 'W' Beam Details

Thickness =3mm  
Size = 311mm x 83mm

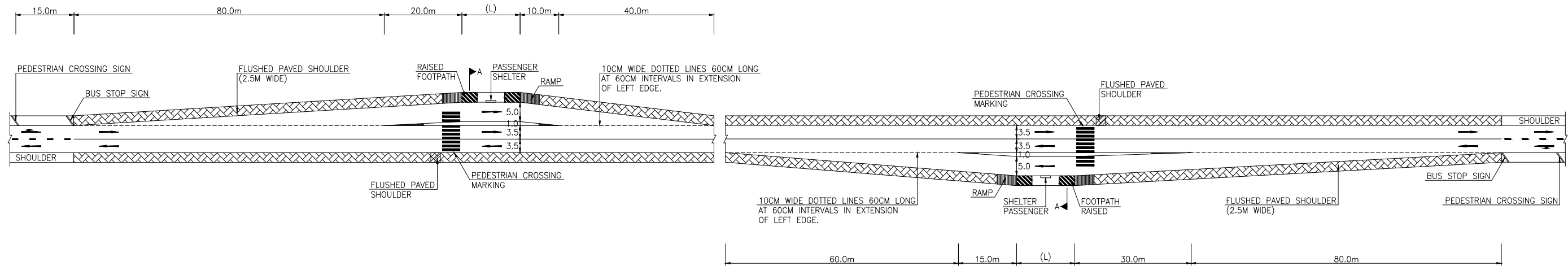
## 10. Spacer Details

150x75x5 Channel section, Cold Formed.

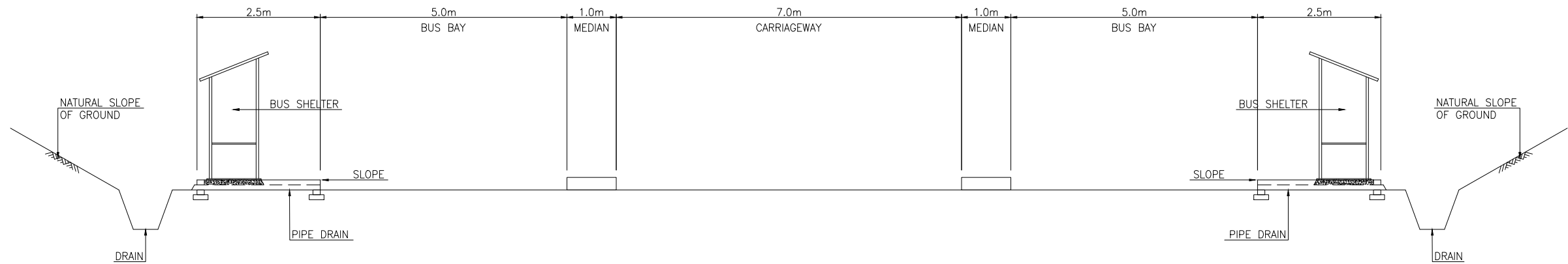
## 11. Post Details

150x75x5 Channel section, Cold Formed and Galanised.  
Length =1850mm  
Refer also Drg. No.

# TYPICAL DETAIL FOR BUS BAY AND ROAD AMENITY (1/4) LAYOUT OF BUS BAY



TYPICAL BUS BAY  
SCALE 1:1100



SECTION THROUGH ROAD ON 'A A'  
SCALE 1:100



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REMARKS:

- 1) ALL DIMENSIONS ARE IN METER UNLESS OTHERWISE SPECIFIED.
- 2) "L"=15 M ONLY ONE BUS IS EXPECTED AT A TIME. IT MAY BE INCREASE BY 15 M FOR ADDITIONAL BUS EXPECTED TO STOP.
- 3) ALL TRAFFIC SIGNS SHALL CONFIRM TO IRC:67-2001

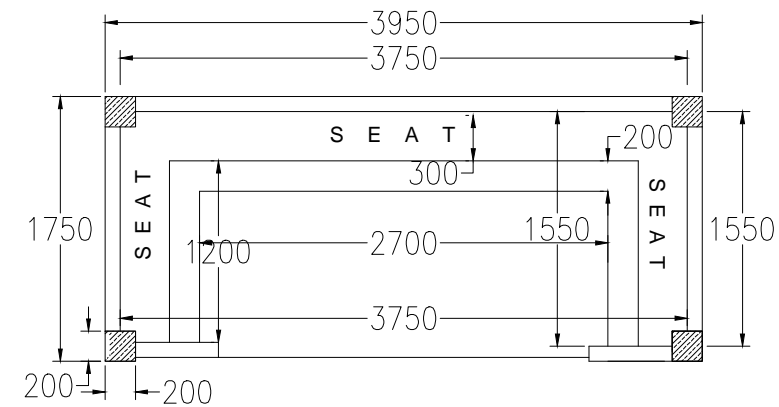
Rev.	Date.		Drawn.	Checked.	Approved.	

WIDENING AND UPGRADATION TO 2 LANE WITH PAVED  
SHOULDER CONFIGURATION AND GEOMETRIC  
IMPROVEMENTS IN THE STATE OF MIZORAM

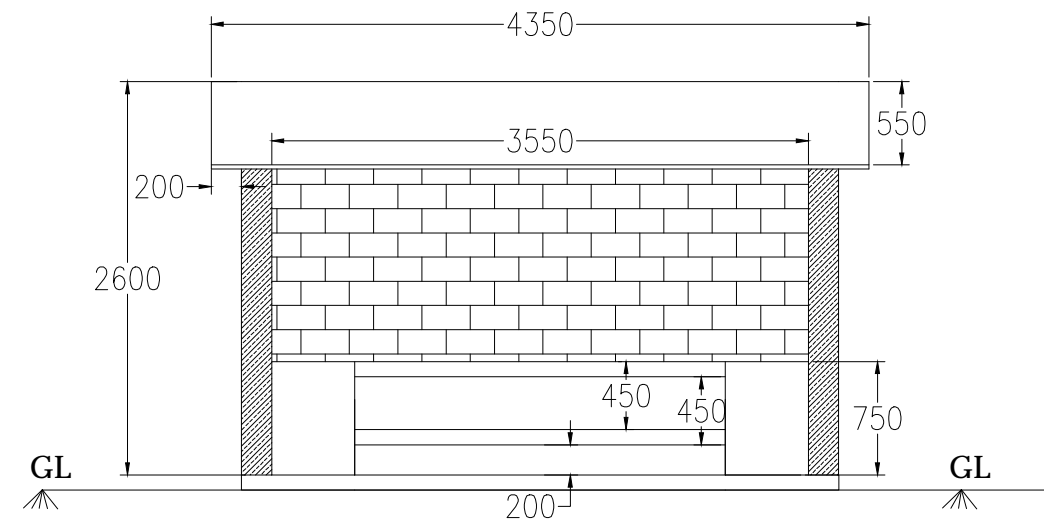
Designed.	Checked	Approved.
Drawn.	Scale. AS SHOWN	Date.

Drawing Title :- NH-54 P-7 TYPICAL DETAIL FOR BUS BAY AND ROAD AMENITY
Drawing No:- NH-54-G-1
Sheet No:- 1 OF 4

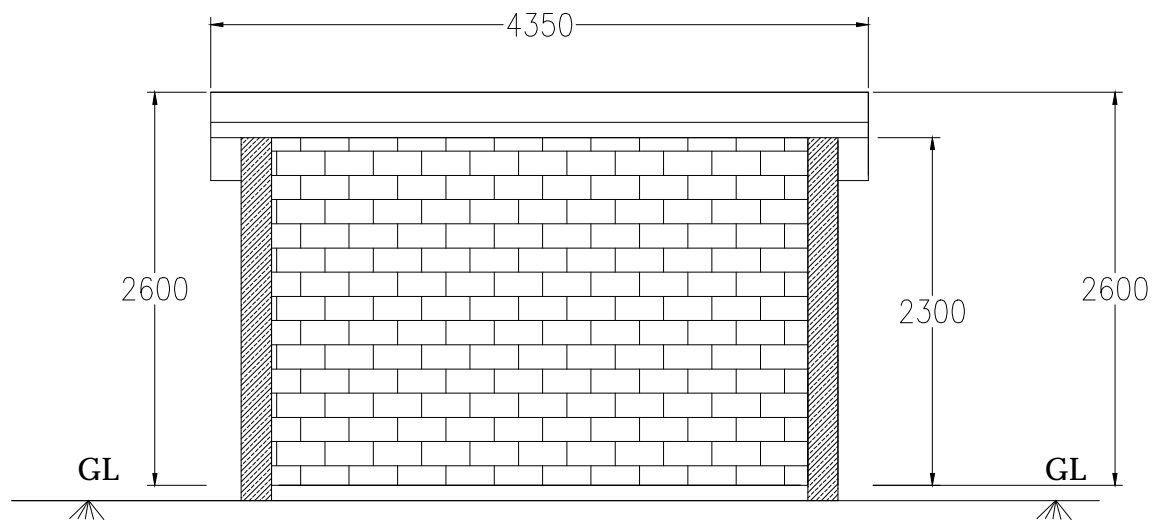
TYPICAL DETAIL FOR BUS BAY AND ROAD AMENITY (2/4)  
BUS WAITING SHED



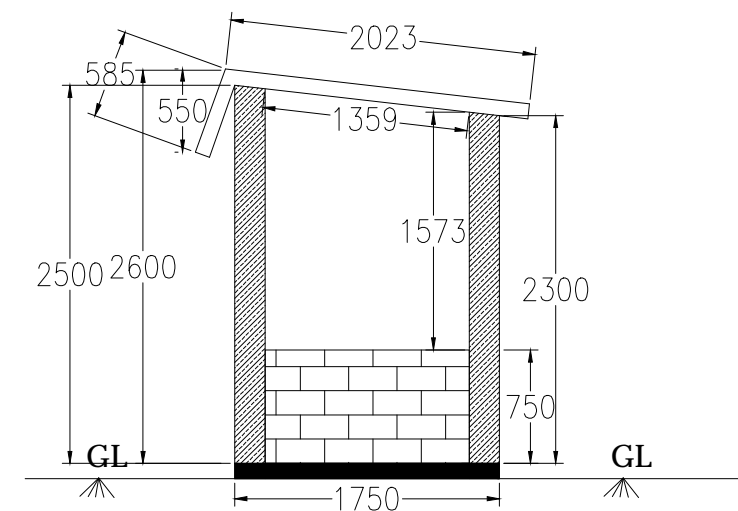
## PLAN



FRONT ELEVATION



## BACK ELEVATION



SIDE ELEVATION

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REMARKS:

Rev.	Date.		Drawn.	Checked.	Approved

WIDENING AND UPGRADATION TO 2 LANE WITH PAVED  
SHOULDER CONFIGURATION AND GEOMETRIC  
IMPROVEMENTS IN THE STATE OF MIZORAM

	Designed.
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	Checked
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Approved.
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Drawn.
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	Scale.
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	Date.
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NTS

Drawing Title :-
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NH-54 P-7

### TYPICAL DETAIL FOR BUS BAY AND ROAD AMENITY

	Drawing No:-
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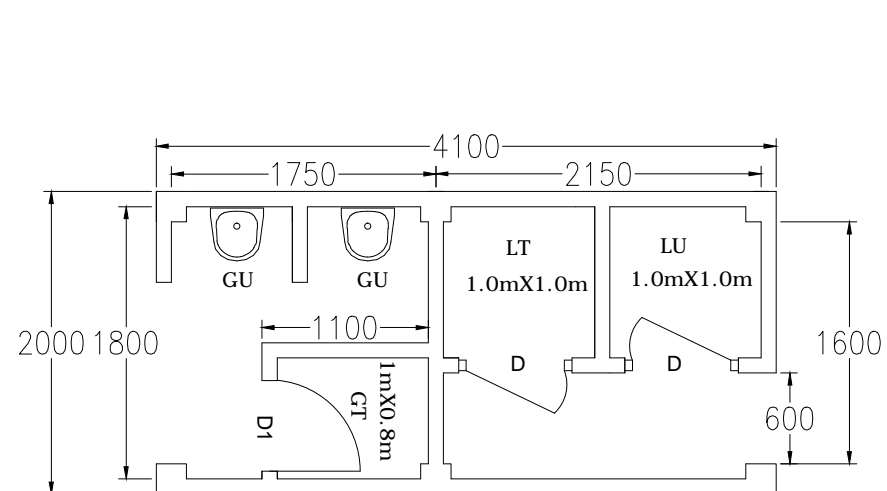
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Sheet No:-

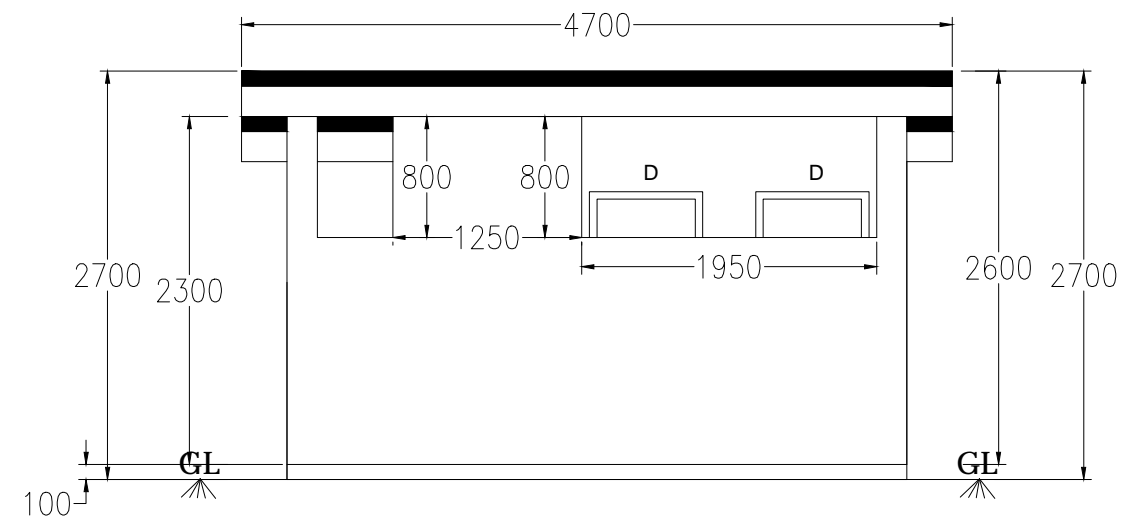
2 OF 4



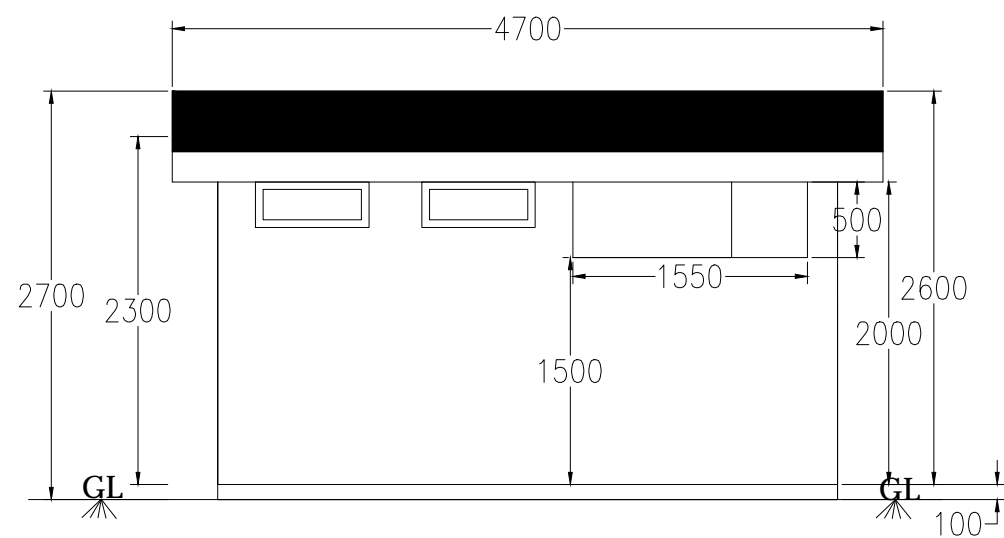
TYPICAL DETAIL FOR BUS BAY AND ROAD AMENITY (3/4)  
PUBLIC TOILET



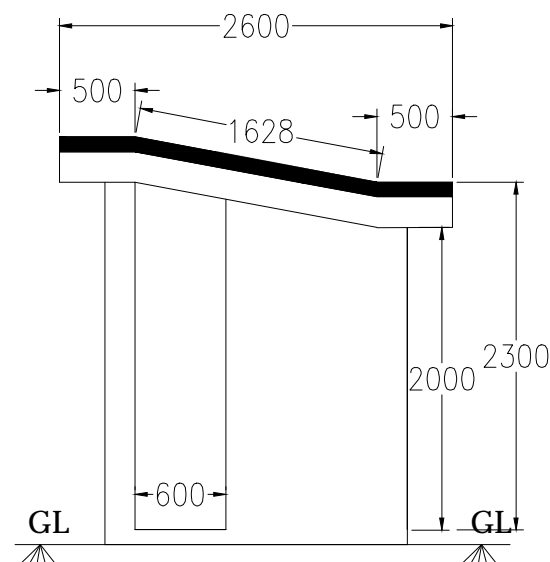
## PLAN



FRONT ELEVATION



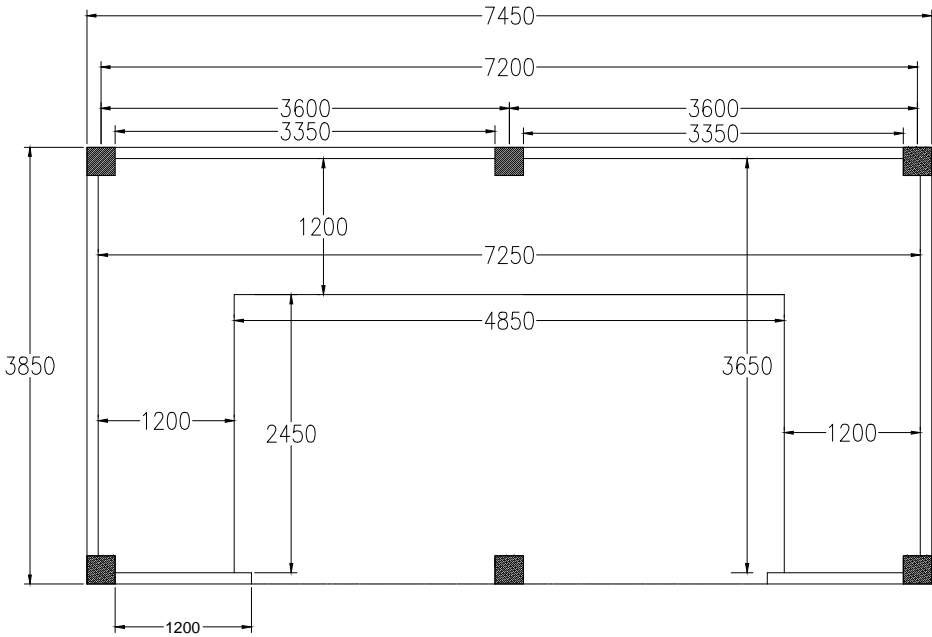
### BACK ELEVATION



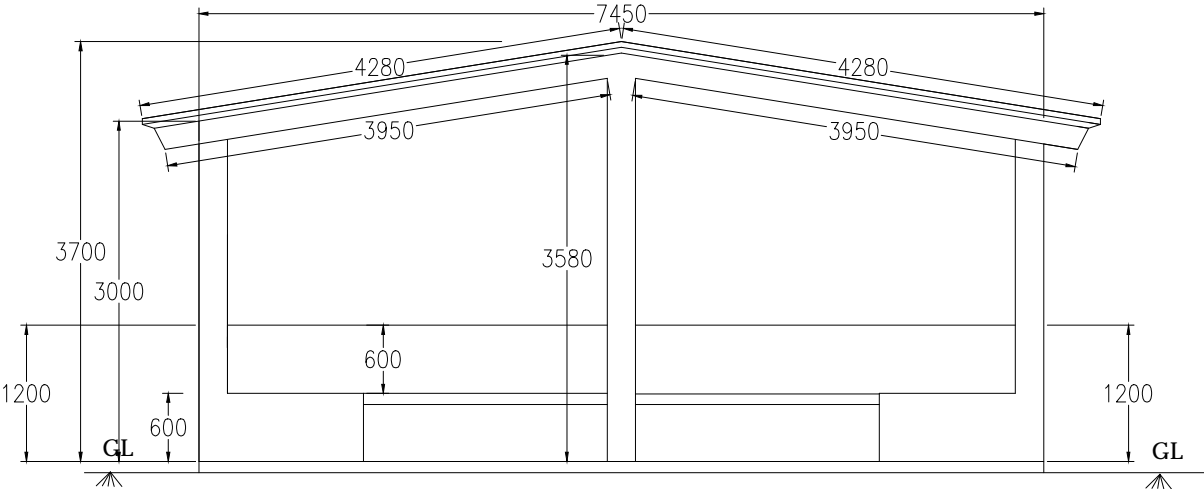
SIDE ELEVATION

SCHEDULED OF OPENINGS				
Sl. No.	Items	Symbol	Sizes in mm	Nos.
1	DOOR	D	750X1800	2
2	DOOR	D1	600X1800	1
3	VENTILATION	V	750X300	2
4	GENTS URINARY	GU	800X500	2
5	LADIES TOILET	LT	1000X1000	1
6	LADIES URINARY	LU	1000X1000	1
7	GENTS TOILET	GT	1000X800	1

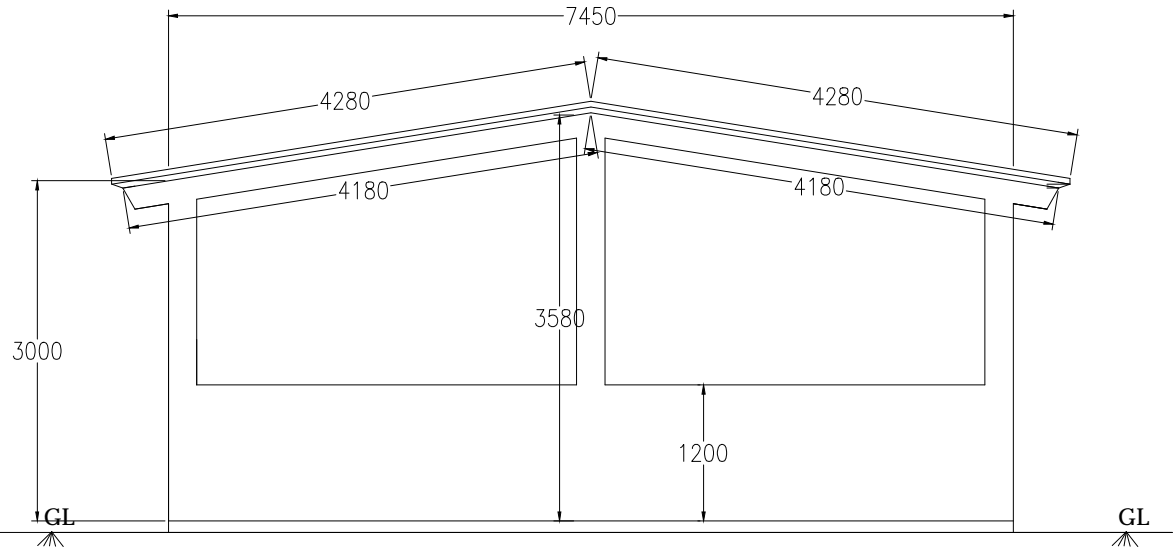
TYPICAL DETAIL FOR BUS BAY AND ROAD AMENITY (4/4)  
MARKET SHED



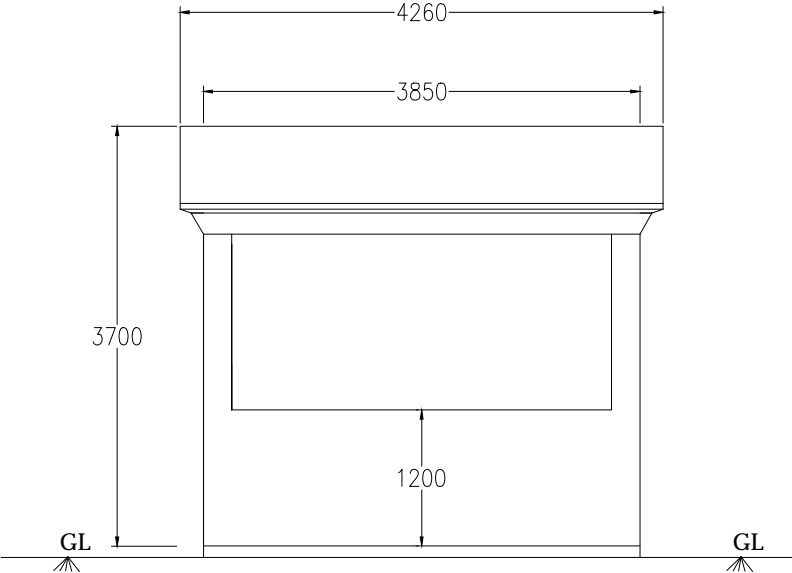
PLAN



FRONT ELEVATION



BACK ELEVATION



SIDE ELEVATION



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REMARKS:

Rev.	Date.		Drawn.	Checked.	Approved.

WIDENING AND UPGRADATION TO 2 LANE WITH PAVED  
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Designed.	Checked	Approved.
Drawn.	Scale. NTS	Date.

Drawing Title :- <b>NH-54 P-7</b> TYPICAL DETAIL FOR BUS BAY AND ROAD AMENITY
Drawing No:- <b>NH54-G-4</b>
Sheet No:- <b>4 OF 4</b>