new

GOVERNMENT OF NEPAL
MINISTRY OF PHYSICAL INFRASTRUCTURE AND TRANSPORT

DEPARTMENT OF ROADS

DEVELOPMENT COOPERATION IMPLEMENTATION DIVISION

NEPAL INDIA REGIONAL TRADE AND TRANSPORT PROJECT (NIRTTP)
(IDA CREDIT NO. 5273 - NEP)

Detailed Design of Improvement of
Kathmandu (Nagdhunga)-Naubise-Mugling Road and Bridges

Final Design Report

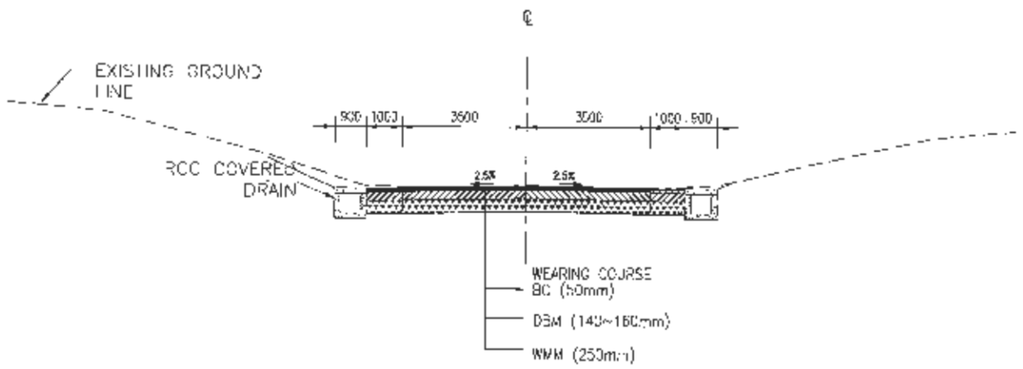
Modified Volume-V(D) : TYPICAL DRAWINGS

AUGUST 2020

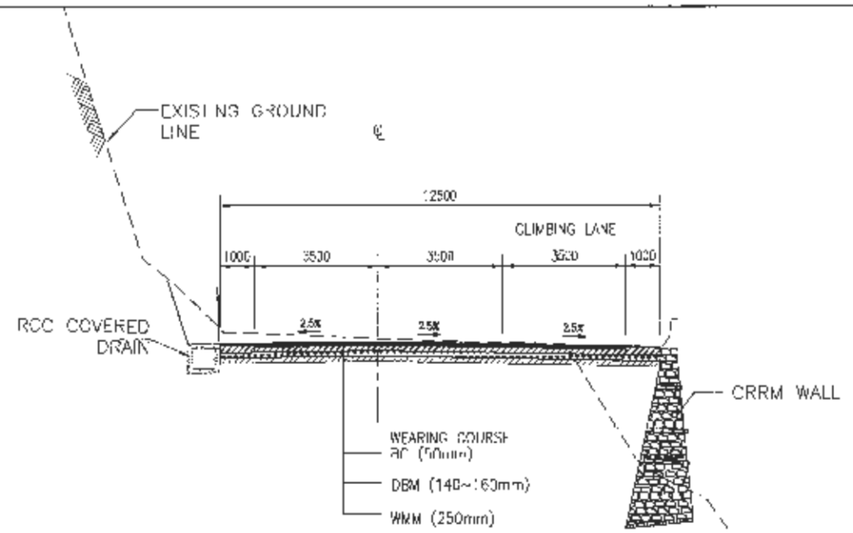
DESIGN CONSULTANT:	Intercontinental Consultants and Technocrats Pvt. Ltd. A-8, Green Park, New Delhi - 110016, INDIA	*in Joint Venture with*	Soosung Engineering Co. Ltd., South Korea	*in association with*	FBC	Full Bright Consultancy (Pvt.) Ltd., Kathmandu, Nepal

TYPICAL DRAWINGS

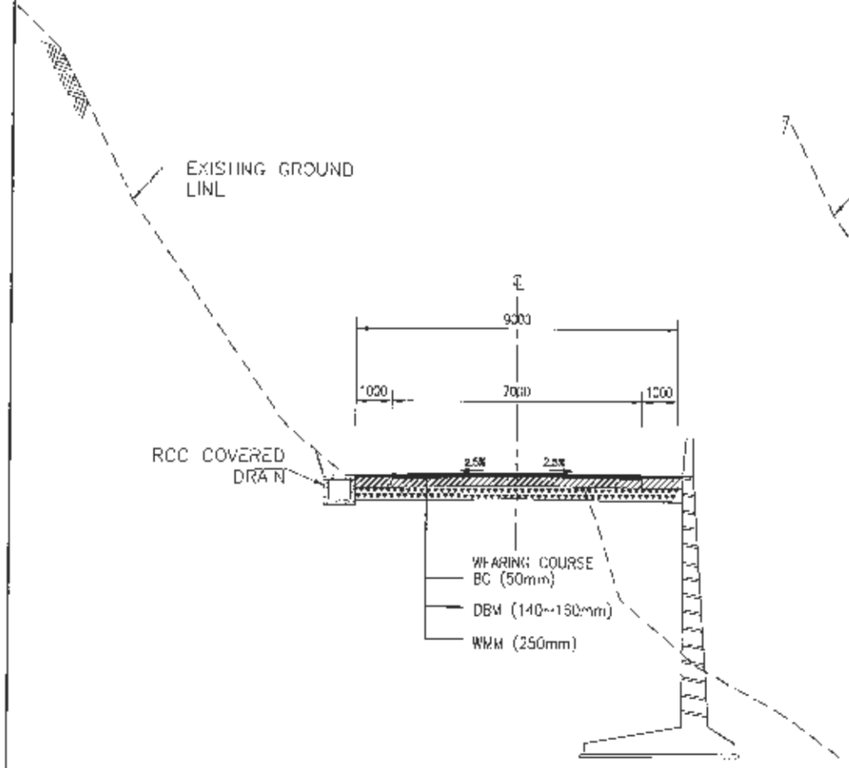
TYPICAL ROAD CROSS SECTION



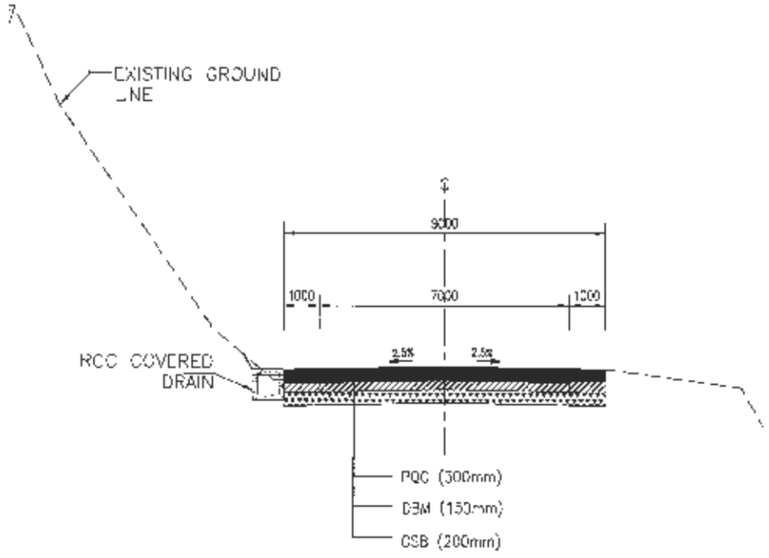
TCS TYPE - 1 : IMPROVEMENT OF EXISTING ROAD TO 2 LANE CARRIAGEWAY



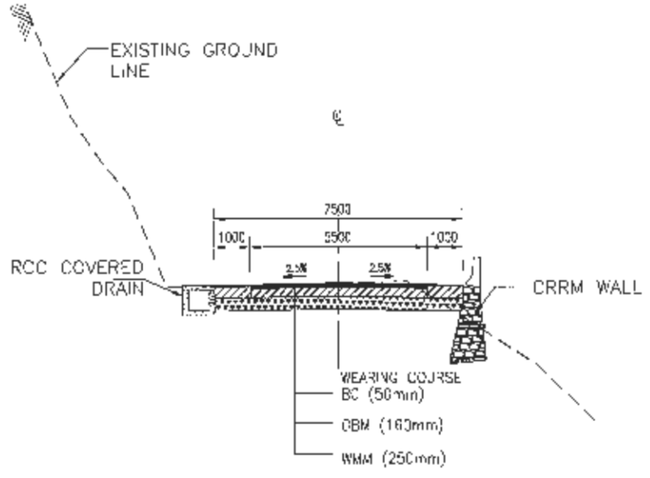
TCS TYPE - 2 : IMPROVEMENT OF EXISTING ROAD TO 2 LANE CARRIAGEWAY WITH CLIMBING LANE (LEFT)



TCS TYPE - 3 : IMPROVEMENT OF EXISTING ROAD TO 2 LANE CARRIAGEWAY



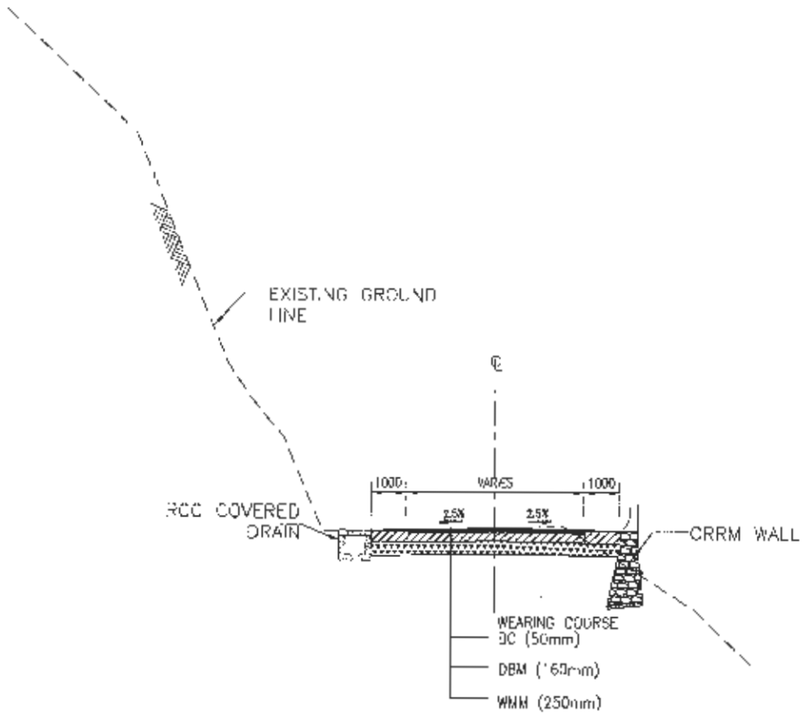
TCS TYPE - 3a : RIGID PAVEMENT DETAILS



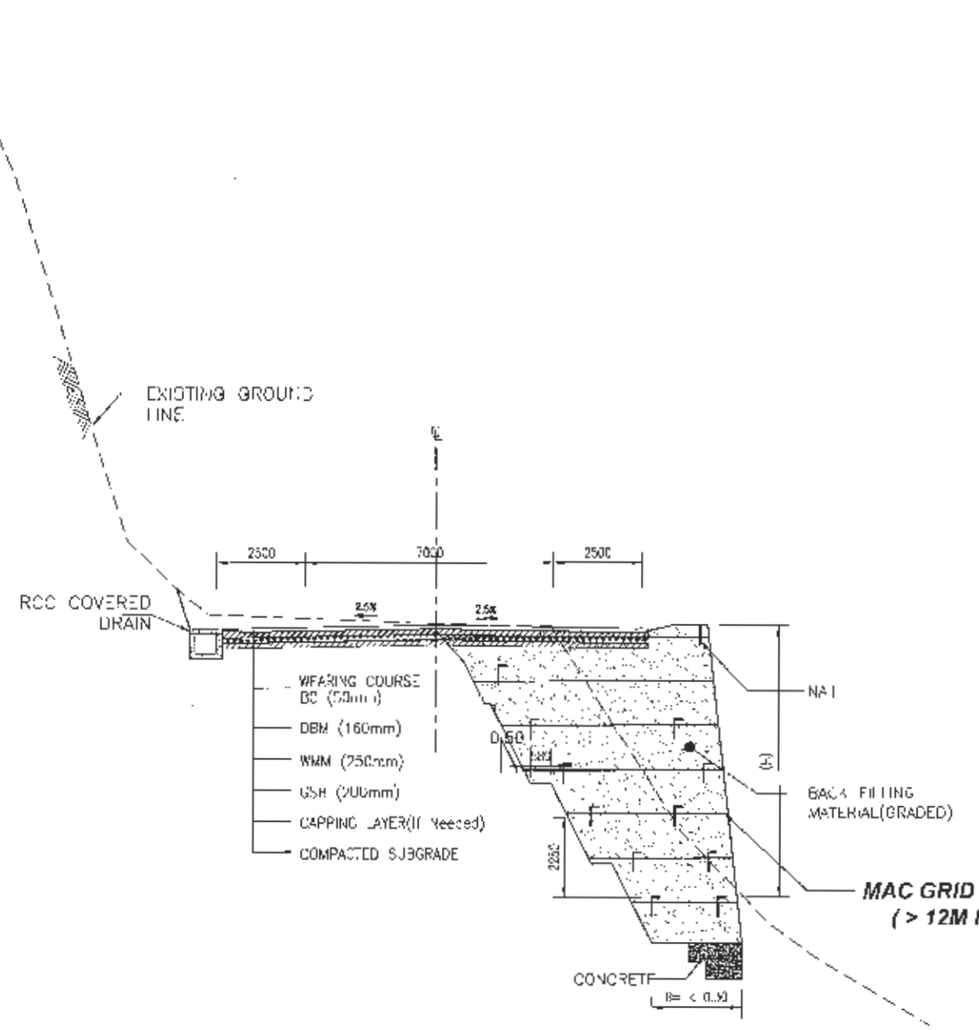
TCS TYPE - 4 : TYPICAL CROSS SECTION AT NAGDHUNGA SISNE SECTION

NOTE :
SIDE DRAIN TYPE SHALL BE AS PER SITE REQUIREMENTS.

EMPLOYER	PROJECT	DESIGN CONSULTANT				DRAWING NAME:	Scale:	Date:
Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kathmandu (Naydhunga) - Naubise - Mugling Road and Bridges	Intercontinental Consultants & Technocrats Pvt. Ltd. A-8, Green Park, New Delhi - 110016 Ph : 4056-3000, Fax 2686-5252 In Joint Venture With Soosung Engineering Co, Ltd , South Korea FEC In Association With Full Bright Consultancy (Pvt.) Ltd. 316,Basuram Acharya Sadak Sinamangal, Kathmandu, GPO Box: 4970, Kathmandu, Nepal				TYPICAL CROSS SECTION	NOT TO SCALE	August 2019 Drawing No.: NNMR-TYP 01-01
			Designed By	SB				
			Checked By	PMS				
			Approved By	BNS				



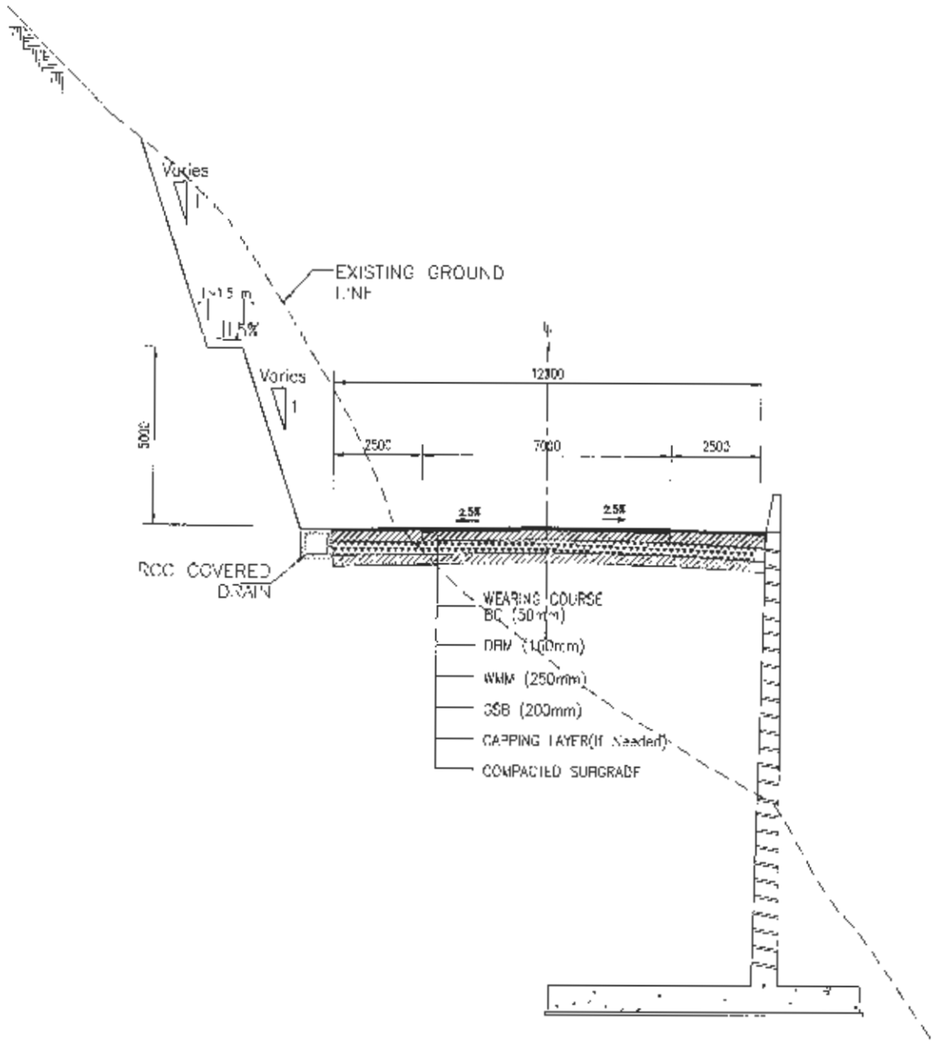
TCS TYPE - 5 : TYPICAL CROSS SECTION AT KRISHNA BHIR SECTION



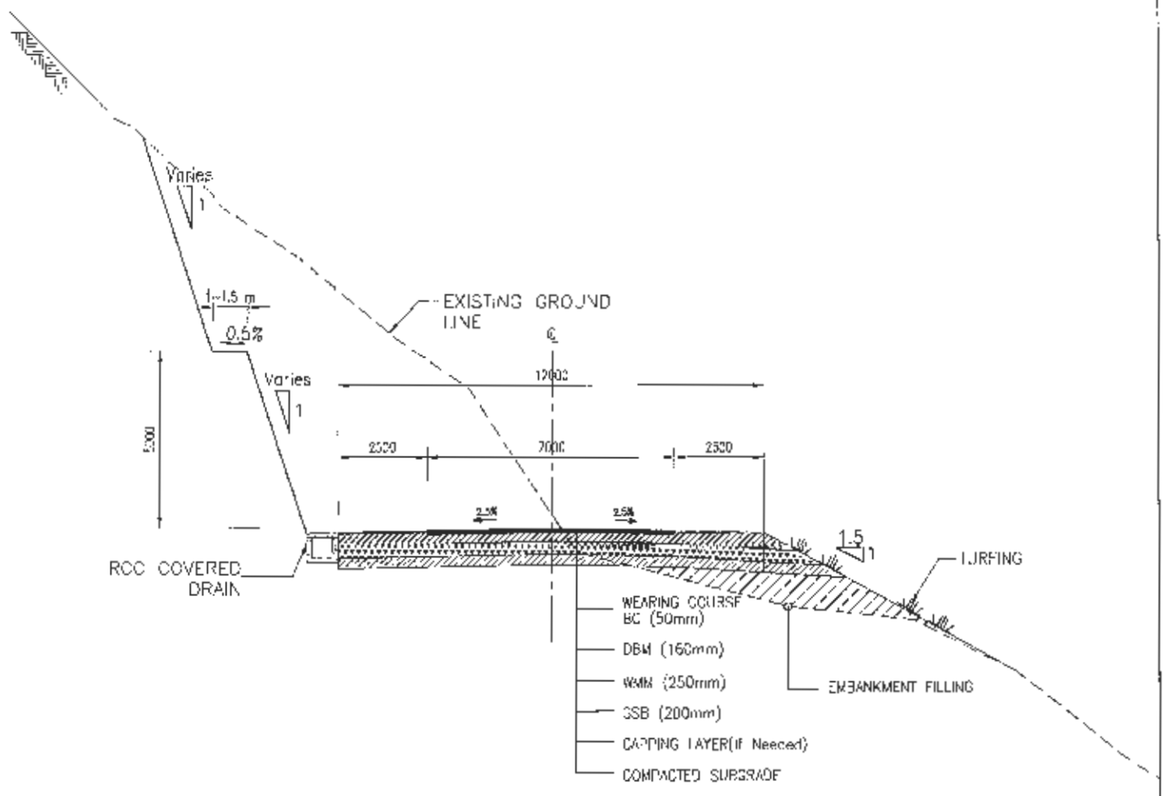
TCS TYPE - 6 : 2 LANE CARRIAGEWAY WITH GEO GRID WALL
(NEW CONSTRUCTION - 12.0 m WIDE)

NOTE :
SIDE DRAIN TYPE SHALL BE AS PER SITE REQUIREMENTS.

EMPLOYER	PROJECT	DESIGN CONSULTANT				DRAWING NAME:	Scale:	Date:
Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kathmandu (Nagdhunga) - Naubise - Mugling Road and Bridges	Intercontinental Consultants & Technocrats Pvt. Ltd. A-8, Green Park, New Delhi - 110016 Ph : 4686-3000, Fax 2565-5252 In Joint Venture With Soosung Engineering Co. Ltd., South Korea In Association With Full Singh Consultancy (Pvt.) Ltd. 316,Baburam Acharya Sadak Sinamangal, Kathmandu, GPO Box: 4970, Kathmandu, Nepal		Designed By	SB	TYPICAL CROSS SECTION	NOT TO SCALE	August 2019
				Checked By	PMS			Drawing No.: NNMR-TYP 01-02
				Approved By	BNS			



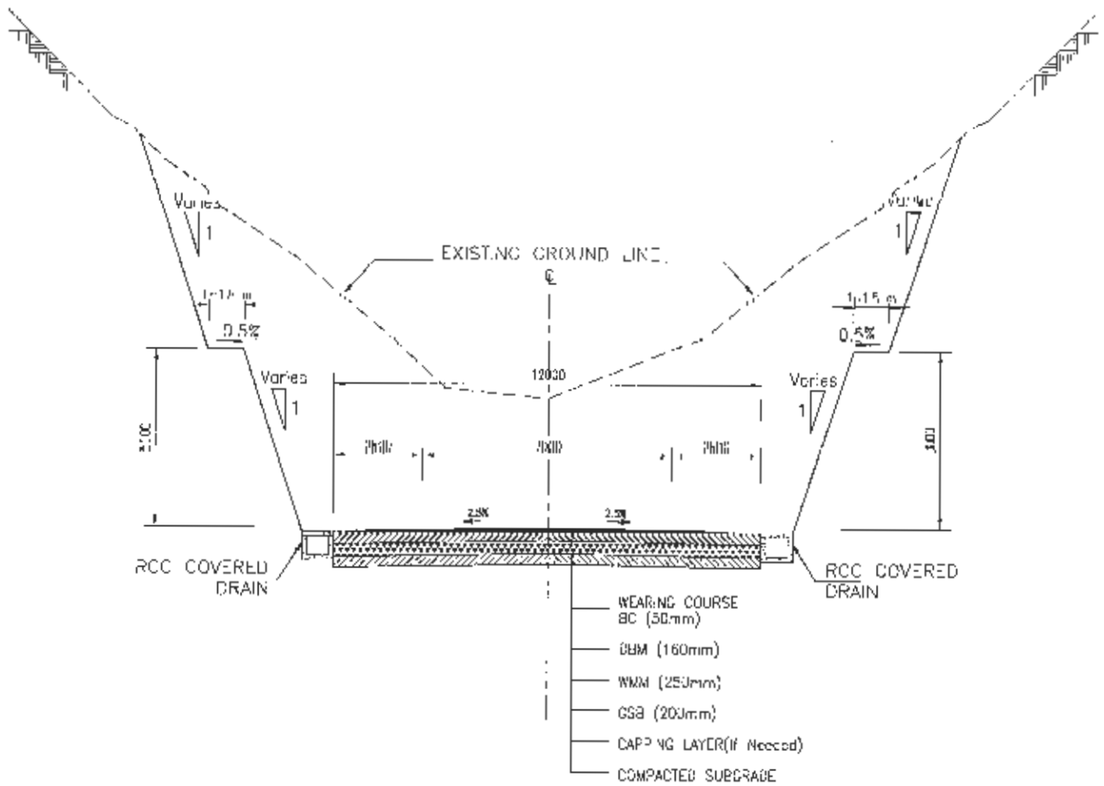
TCS TYPE -7: 2 LANE CARRIAGEWAY PARTLY CUT WITH RETAINING WALL
(NEW CONSTRUCTION - 12.0 m WIDE)



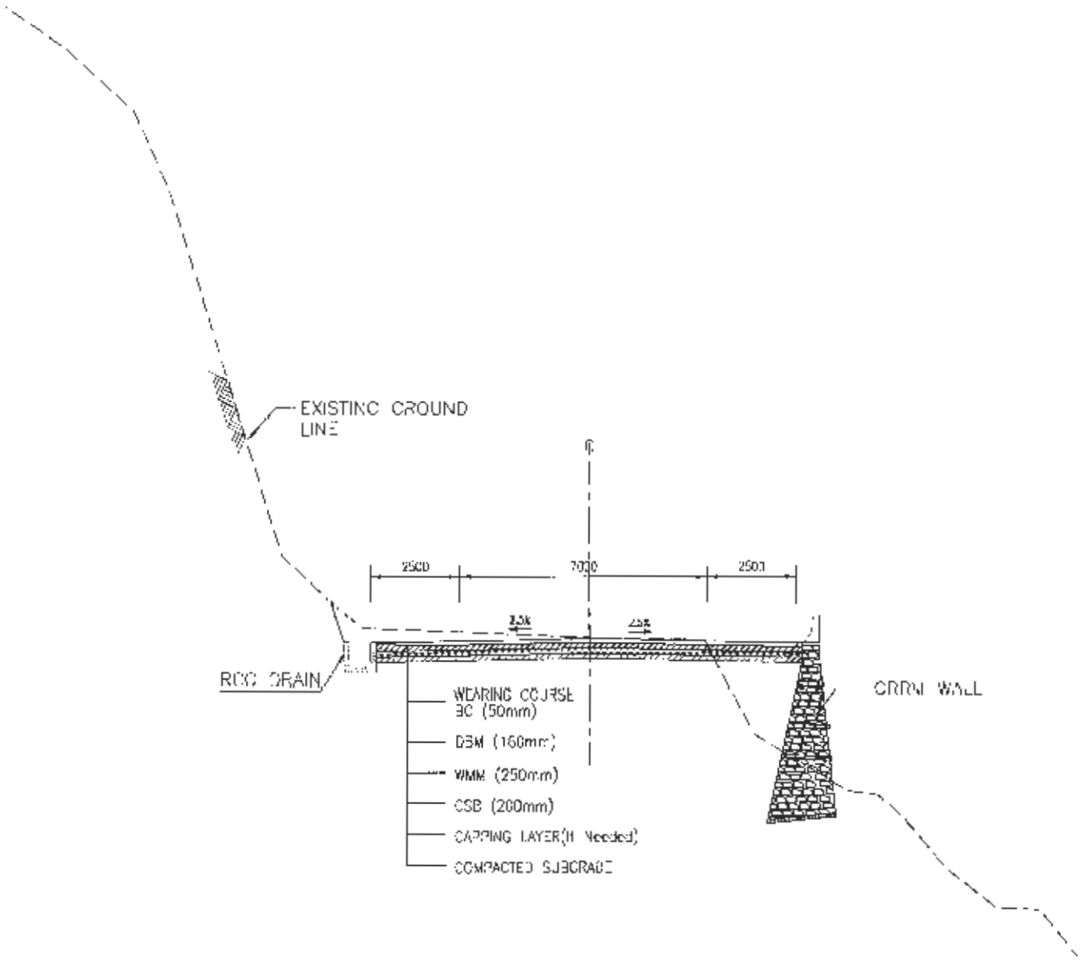
TCS TYPE -8: 2 LANE CARRIAGEWAY PARTLY CUT AND PARTLY FILL
(NEW CONSTRUCTION - 12.0 m WIDE)

NOTE :
SIDE DRAIN TYPE SHALL BE AS PER SITE REQUIREMENTS.

EMPLOYER	PROJECT	DESIGN CONSULTANT					
Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kathmandu (Nagdhunga) - Naubise - Mugling Road and Bridges	Intercontinental Consultants & Technocrats Pvt. Ltd. A-8, Green Park, New Delhi - 110016 Ph : 4066-3000, Fax 3665-5252 In Joint Venture With Seosung Engineering Co. Ltd., South Korea In Association With Full Bright Consultancy (Pvt.) Ltd. 316, Baburam Acharya Sadak Sinamangal, Kathmandu. GPO Box 4979, Kathmandu, Nepal				DRAWING NAME: TYPICAL CROSS SECTION	Scale: NOT TO SCALE
			Designed By	SB			Date: August 2019
			Checked By	PMS			Drawing No.: NNMR-TYP 01-03
			Approved By	DNS			



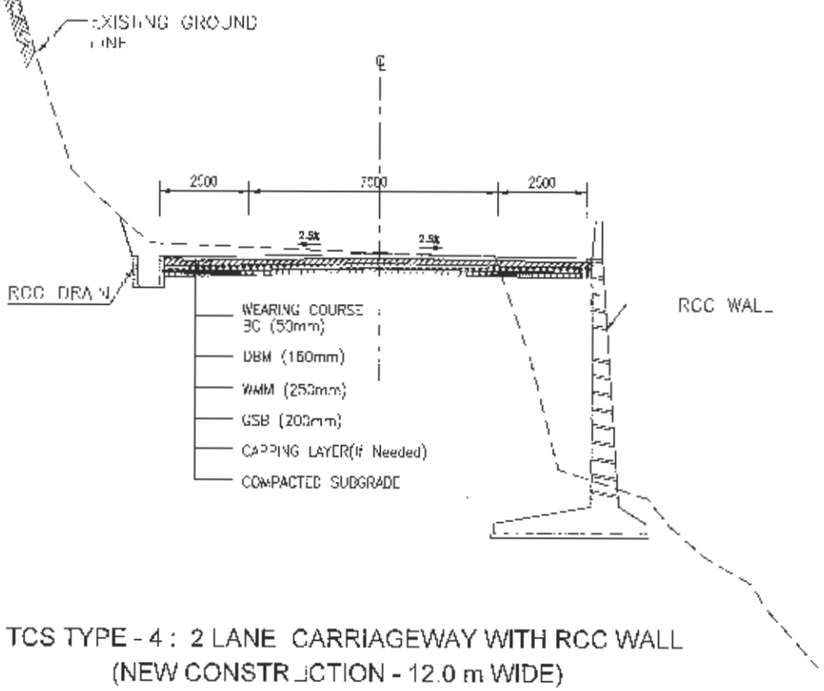
TCS TYPE - 9: 2 LANE CARRIAGEWAY (BOX CULT SECTION)
(NEW CONSTRUCTION - 12.0 m WIDE)



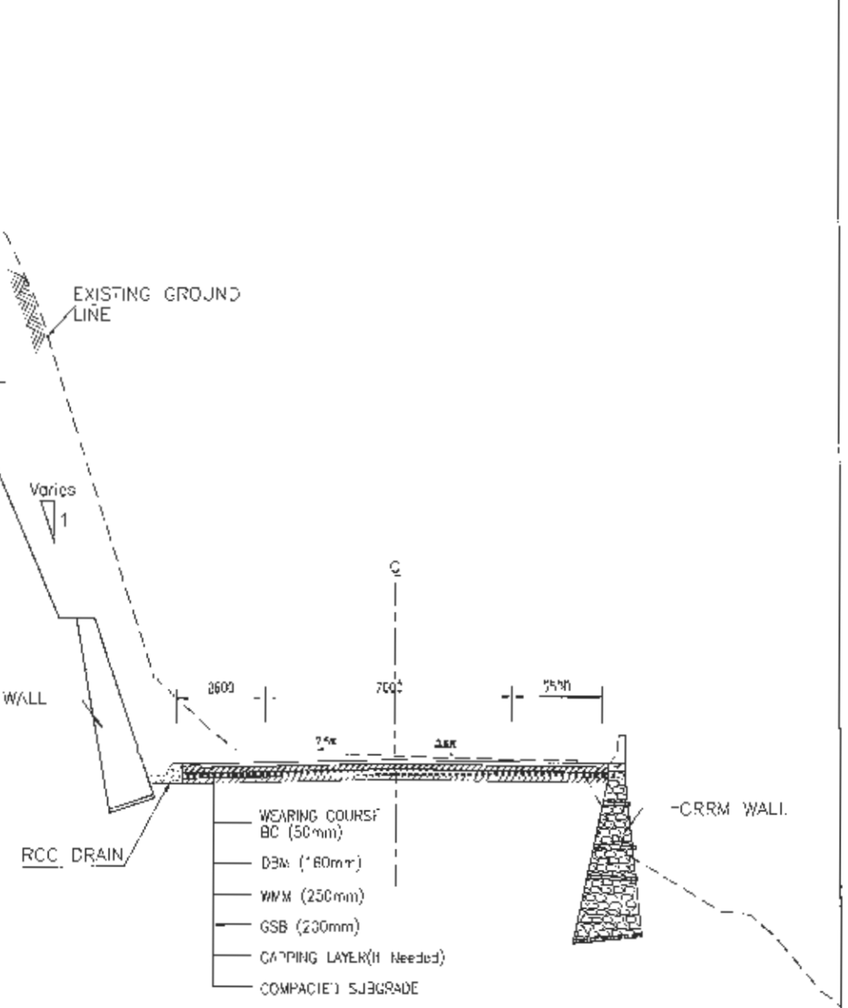
TCS TYPE - 3 : 2 LANE CARRIAGEWAY WITH CRRM WALL
(NEW CONSTRUCTION - 12.0 m WIDE)

NOTE :
SIDE DRAIN TYPE SHALL BE AS PER SITE REQUIREMENTS.

EMPLOYER	PROJECT	DESIGN CONSULTANT				DRAWING NAME:	Scale:	Date:
Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kalimandu (Nagdhunga) - Naubise - Mugling Road and Bridges	Intercontinental Consultants & Technocrats Pvt. Ltd. A-8, Green Park, New Delhi - 110016 Ph : 4056-3000, Fax 2685-5252 In Joint Venture With Soosung Engineering Co. Ltd., South Korea In Association With Full Bright Consultancy (Pvt.) Ltd. 316,Baburam Acherya Sadak Sinamangal, Kalimandu, GPO Box: 4970, Kalimandu, Nepal	Designed By	SB		TYPICAL CROSS SECTION	NOT TO SCALE	August 2018
			Checked By	PMS				Drawing No.: NNMR-TYP 01-04
			Approved By	BNS				



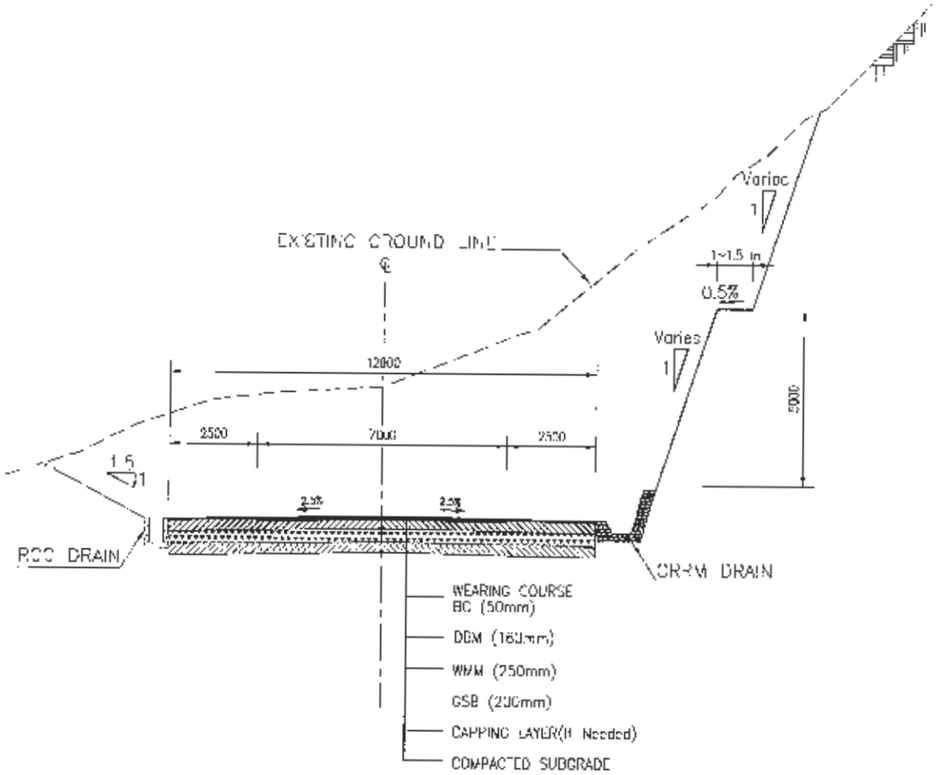
TCS TYPE - 4 : 2 LANE CARRIAGEWAY WITH RCC WALL
(NEW CONSTRUCTION - 12.0 m WIDE)



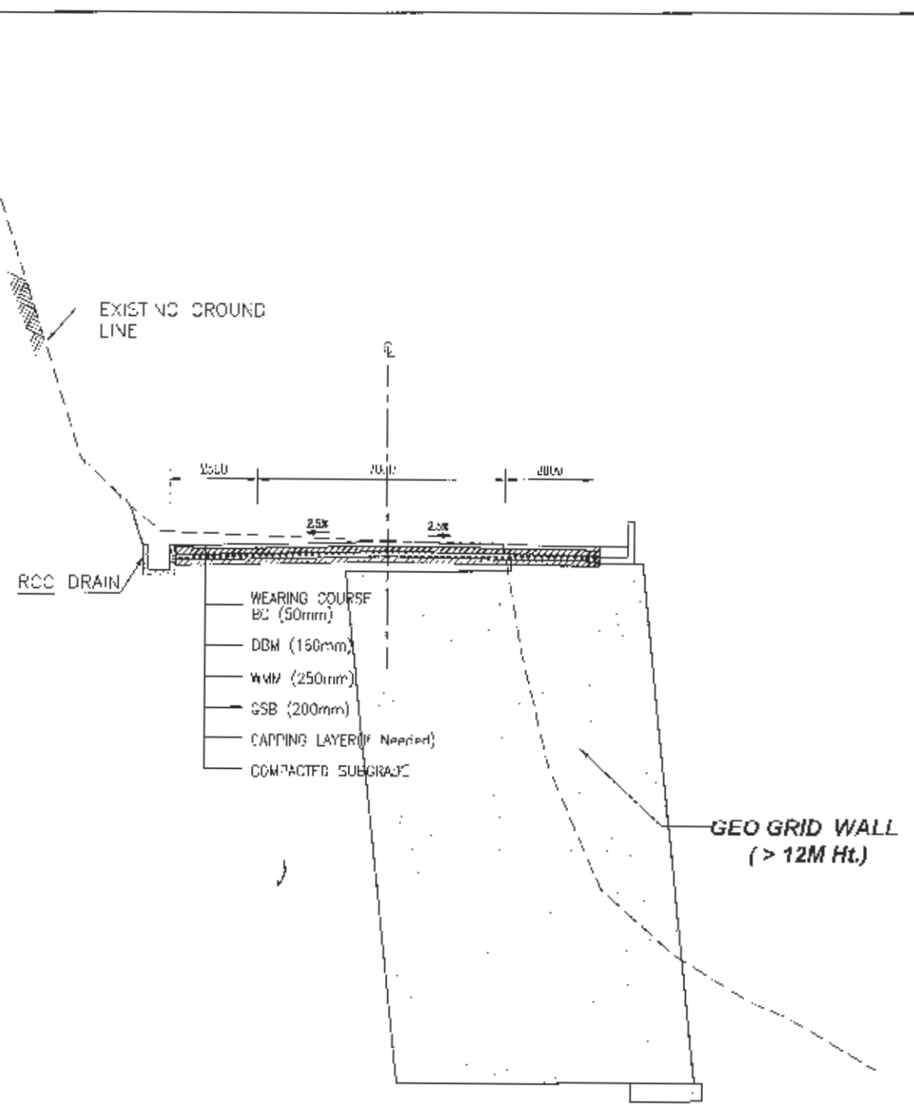
TCS TYPE - 5 : 2 LANE CARRIAGEWAY WITH CRRM WALL
(NEW CONSTRUCTION - 12.0 m WIDE)

NOTE :
SIDE DRAIN TYPE SHALL BE AS PER SITE REQUIREMENTS.

EMPLOYER	PROJECT	DESIGN CONSULTANT				DRAWING NAME:	Scale:	Date:
Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kathmandu (Nagdhunga) - Naubise - Mugling Road and Bridges	Intercontinental Consultants & Technocrats Pvt. Ltd. A-8, Green Park, New Delhi - 110016 Ph : 4086-3000, Fax 2685-5252 In Joint Venture With Soosung Engineering Co. Ltd., South Korea In Association With Full Bright Consultancy (Pvt.) Ltd. 316,Saburam Acharya Sadak Sinamangal, Kathmandu GPO Box. 4970, Kathmandu. Nepal	Designed By	SB		TYPICAL CROSS SECTION	NOT TO SCALE	August 2019
			Checked By	PMS				Drawing No.: NNMR-TYP 01-05
			Approved By	BNS				

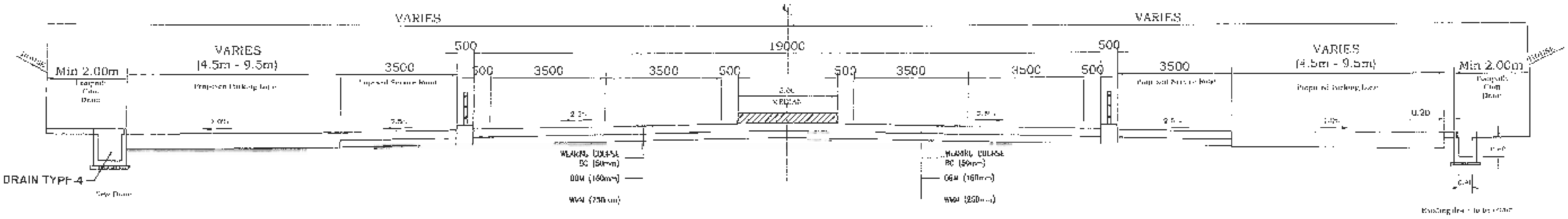


TCS TYPE - 6: 2 LANE CARRIAGEWAY (BOX CUT SECTION)
(NEW CONSTRUCTION - 12.0 m WIDE)

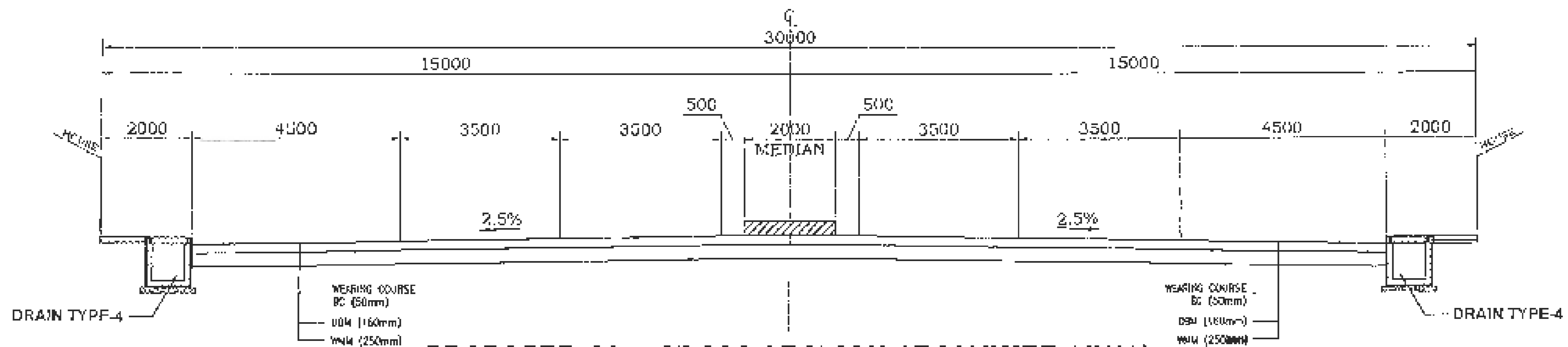


TCS TYPE - 8 : 2 LANE CARRIAGEWAY WITH GEO GRID WALL
(NEW CONSTRUCTION - 12.0 m WIDE)

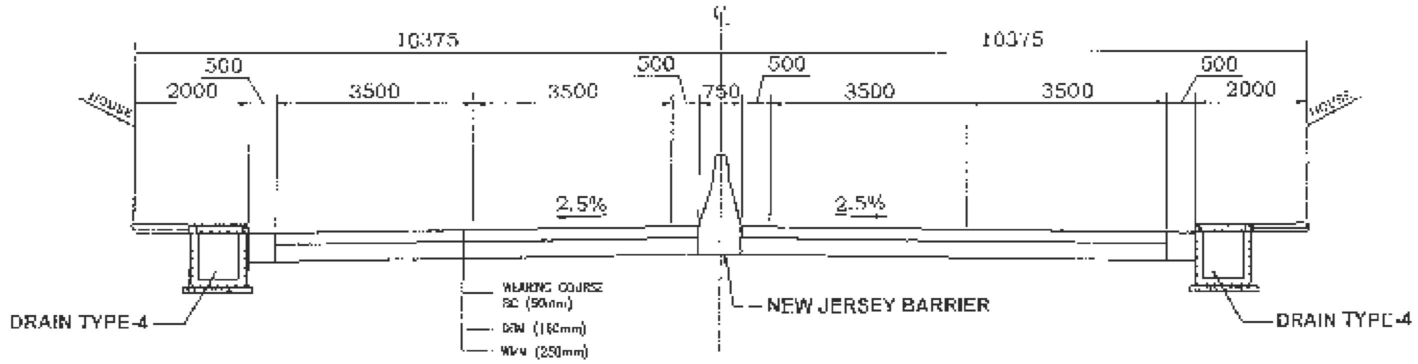
EMPLOYER	PROJECT	DESIGN CONSULTANT					
Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kathmandu (Nagdhunga) - Naubise - Mugling Road and Bridges	Intercontinental Consultants & Technocrats Pvt. Ltd. A-5, Green Park, New Delhi - 110016 PH.: 4058 3000, Fax 2685-5252 In Joint Venture With Soosung Engineering Co. Ltd., South Korea In Association With Full Bright Consultancy (Pvt.) Ltd. 316, Baburam Acharya Sadak Sinamangal, Kathmandu, GPO Box 4975, Kathmandu, Nepal	Designed By	SB		DRAWING NAME: TYPICAL CROSS SECTION	Scale: NOT TO SCALE
			Checked By	PMS			Date: August 2019
			Approved By	BNS			Drawing No.: NNMR-TYP 01-03



PROPOSED CROSS SECTION AT MARKET AREA AT MUGLING AREA (40-50M WIDE)

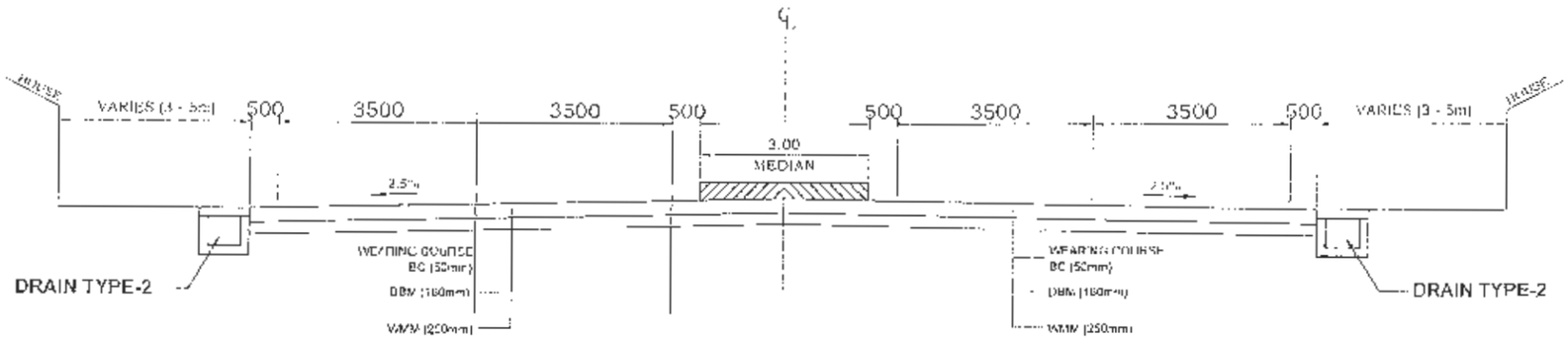


PROPOSED 30m CROSS SECTION AT MARKET AREA)

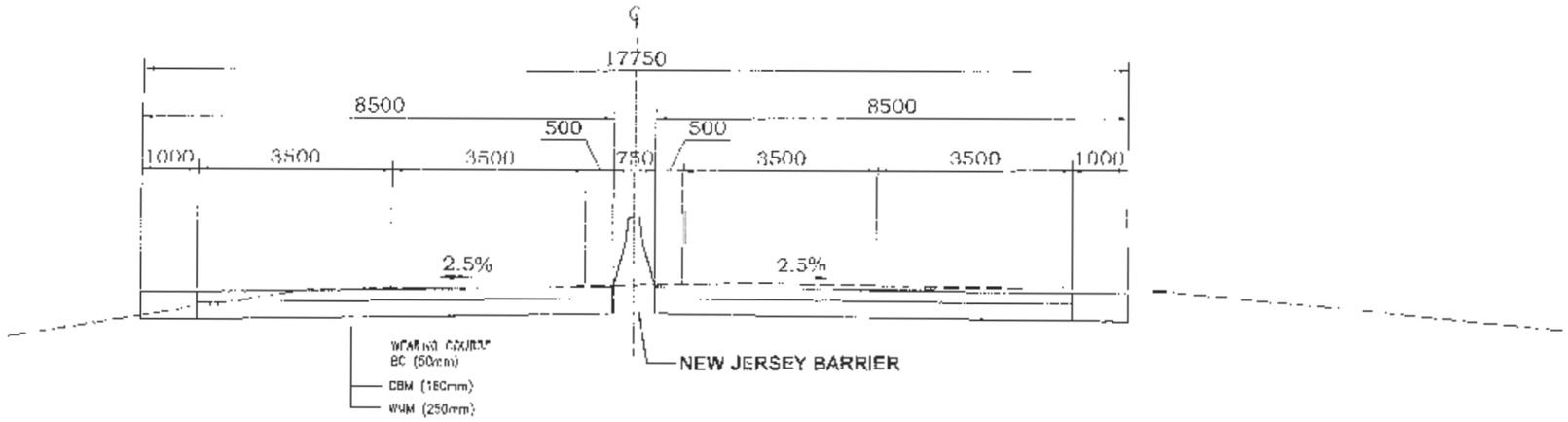


PROPOSED 21m CROSS SECTION AT MARKET AREA

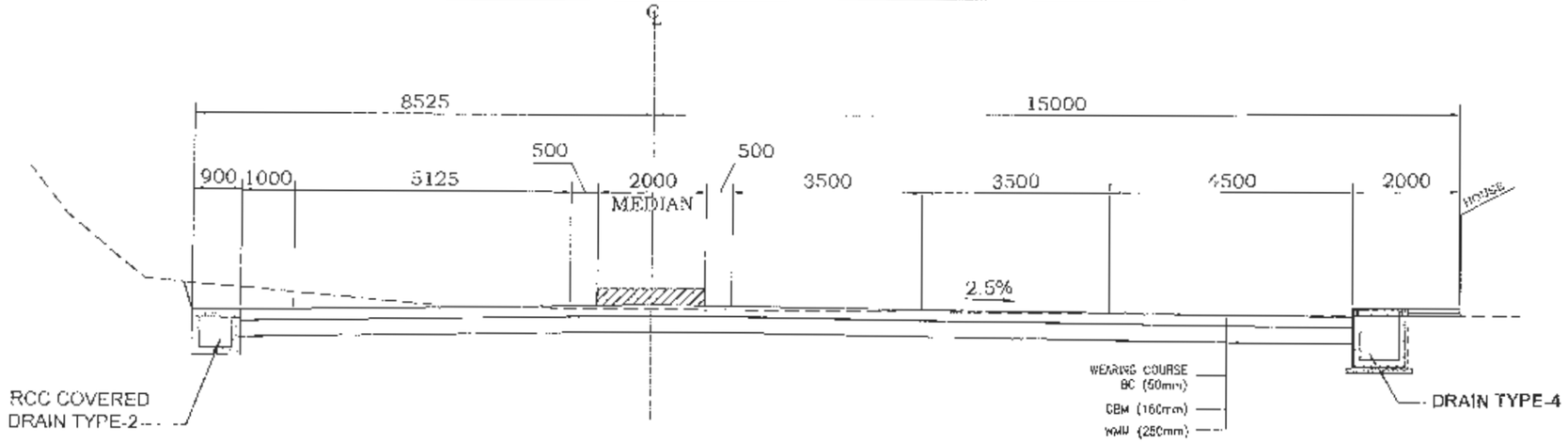
EMPLOYER	PROJECT	DESIGN CONSULTANT					DRAWING NAME:	Scale:	Date:
Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kathmandu (Nagdhunga) - Naubise - Mugling Road and Bridges	Intercontinental Consultants & Technocrats Pvt. Ltd. A-8, Green Park, New Delhi - 110016 Ph: 4086-3000, Fax 2685-5252 In Joint Venture With Sosaing Engineering Co. Ltd., South Korea	In Association With Full Bright Consultancy (Pvt.) Ltd. 316,Baburam Acharya Sadak Sinamangal, Kathmandu, GPO Box: 4970, Kathmandu, Nepal	Designed By Checked By Approved By	SB PMS BNS		TYPICAL CROSS SECTION AT MARKET AREA		August 2019 **Drawing No.:** NNMR-TYP 01-07



PROPOSED CROSS SECTION AT LEWATAR TO RAMAILO DANDA

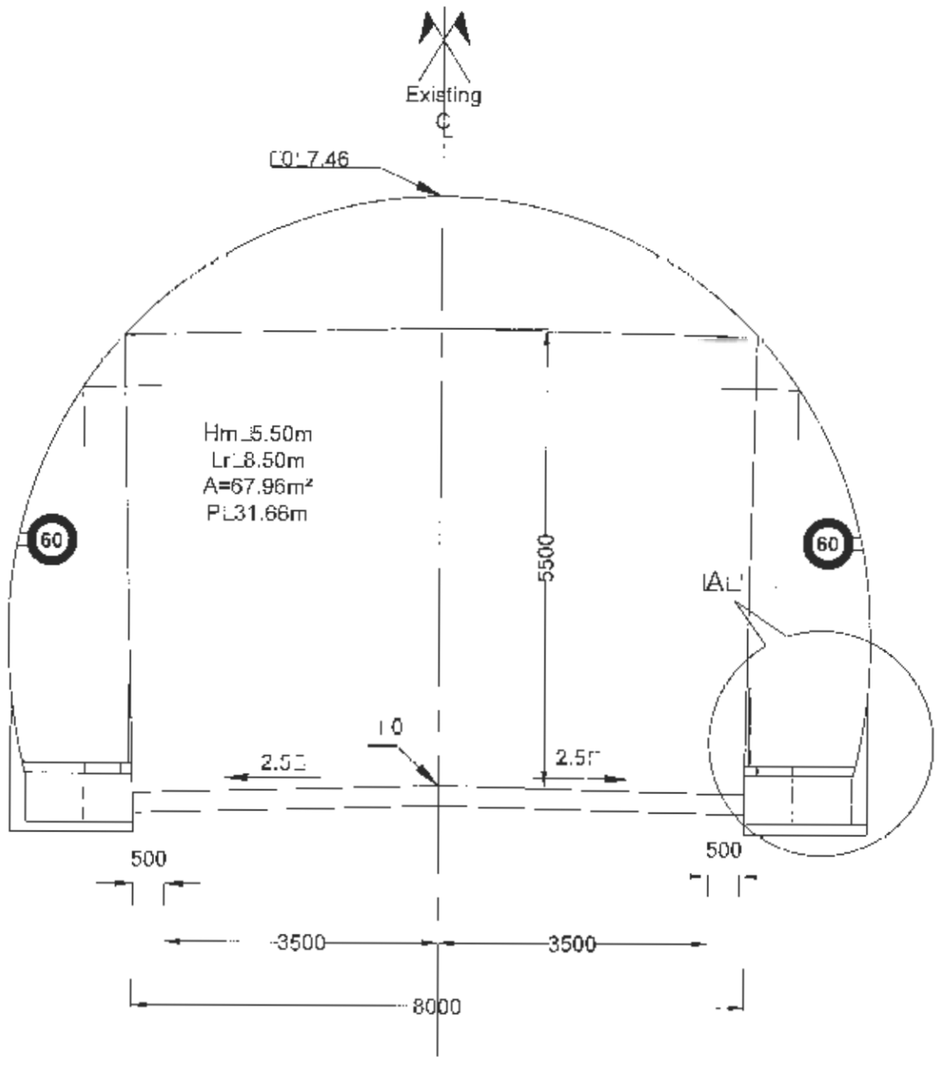


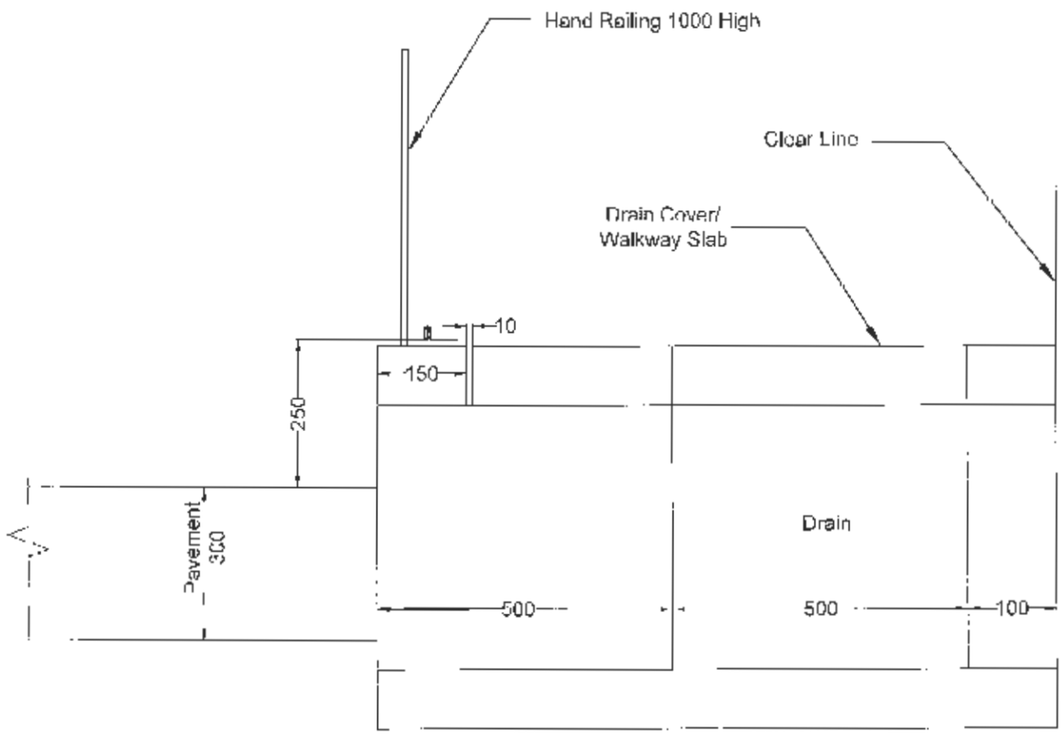
AREAS WHERE EXTRA LANE IS ADDED ON BOTH SIDES-CROSS SECTION



SETTLEMENTS ON ONE SIDES OF THE HIGHWAY-CROSS SECTION

EMPLOYER Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	**PROJECT** Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kathmandu (Naggchunga) - Naubise - Mugling Road and Bridges	**DESIGN CONSULTANT** Intercontinental Consultants & Technocrats Pvt. Ltd. A-8, Green Park, New Delhi - 110016 Ph : 4056-3000, Fax 2685-5252 In Joint Venture With Soosung Engineering Co. Ltd., South Korea In Association With Full Bright Consultancy (Pvt.) Ltd 316,Hakuram Acharya Sadak Sinamangal, Kathmandu, GPO Box. 4570, Kathmandu, Nepal	Designed By	SS		**DRAWING NAME:** TYPICAL CROSS SECTION AT MARKET AREA	**Scale:**	**Date:** August 2019
			Checked By	PMS				**Drawing No.:** NNMR-TYS-01-06
			Approved By	RNS				

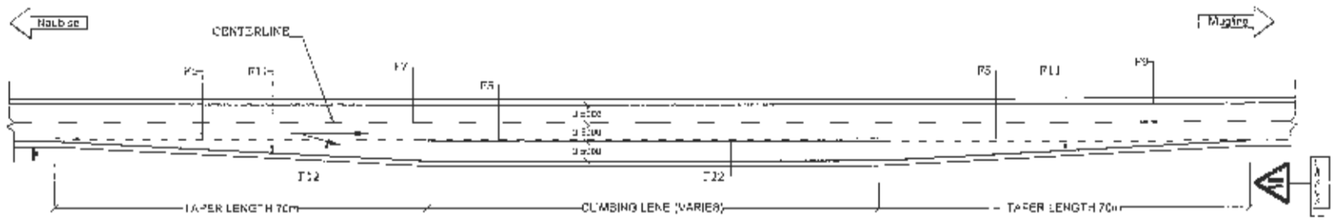




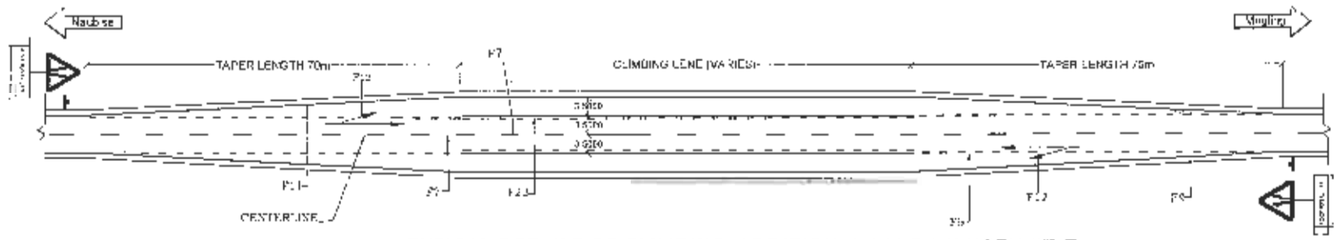
DETAILS 'A' : FOOTPATH WITH DRAIN

2 LANE CARRIAGEWAY TUNNEL (SHORT TUNNEL SECTION)

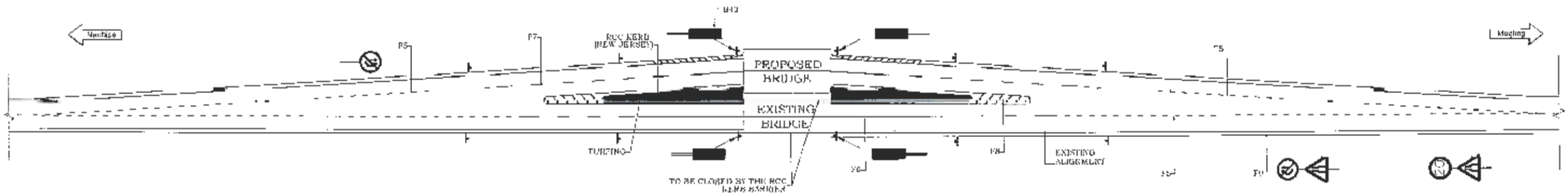
EMPLOYER	PROJECT	DESIGN CONSULTANT					
Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kathmandu (Nagdhunga) - Naubise - Mugling Road and Bridges	Intercontinental Consultants & Technocrats Pvt. Ltd. A-6, Green Park, New Delhi - 110016 Ph : 4068-3000, Fax 2685-5252 In Joint Venture With Soosung Engineering Co, Ltd , South Korea In Association With Full Bright Consultancy (Pvt.) Ltd. 316,Rubutarm Acharya Sadak Sinamangal, Kathmandu, GPO Box: 4970, Kathmandu, Nepal			DRAWING NAME: TYPICAL CROSS SECTION	Scale: 1:100	Date: August 2019 Drawing No.: NNMR-TCS-09
			Designed By	SB			
			Checked By	PMS			
			Approved By	BNS			



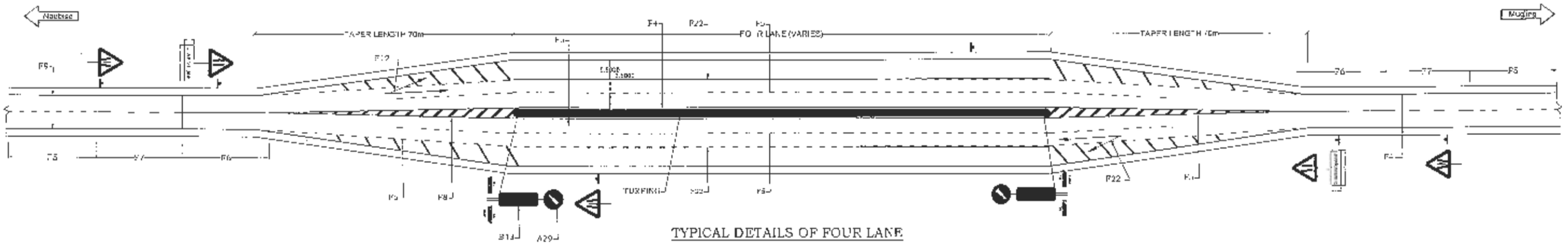
TYPICAL DETAILS OF CLIMBING/ADDITIONAL LANE ON ONE SIDE



TYPICAL DETAILS OF CLIMBING/ADDITIONAL LANE ON BOTH SIDE



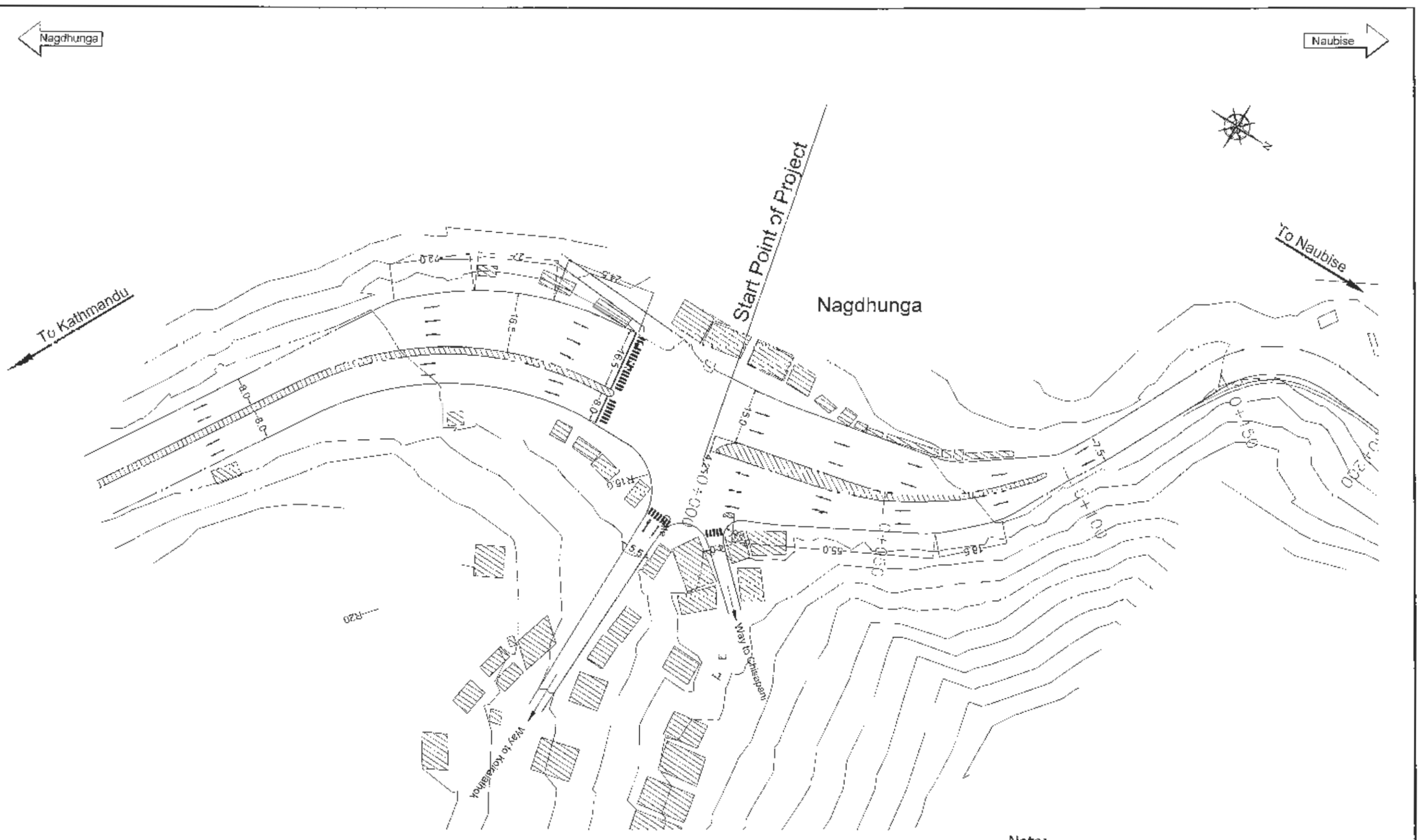
TYPICAL BRIDGE APPROACH



TYPICAL DETAILS OF FOUR LANE

EMPLOYER Government of Nepal Ministry of Physical Infrastructure and Transport **Department of Roads** **Development Cooperation Implementation Division**	**PROJECT** Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kalimandu (Nagdhunga) - Naubise - Mugling Road and Bridges	**DESIGN CONSULTANT** Intercontinental Consultants & Technocrats Pvt. Ltd. A-8, Green Park, New Delhi - 110016 Ph.: 4060-3000, Fax 2685-5252 In Joint Venture With Sinosunn Engineering Co. Ltd., South Korea In Association With Full Bright Consultancy (Pvt.) Ltd. 316,Bibutram Acharya Sadak Sinamangal, Kathmandu, GPO Box: 4970, Kathmandu, Nepal	Designed By: SB Checked By: PMS Approved By: BNS	**DRAWING NAME:** TYPICAL PLAN AT MARKET AREA, BRIDGE APPROACH & EXTRA LANE	**Scale:** 0 5 10 15 20 **Date:** August 2019 **Drawing No.:** NNMR-TYP 02-10

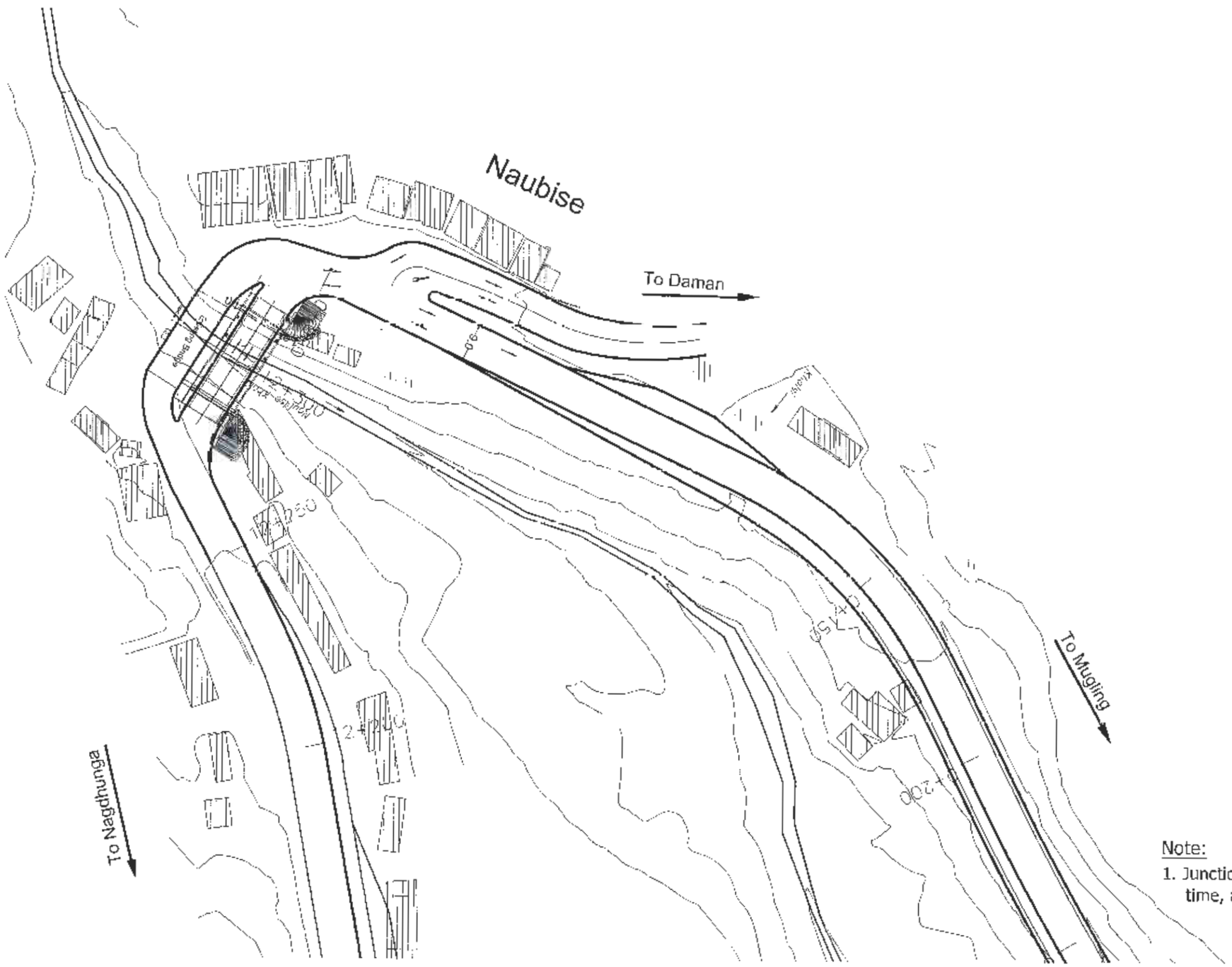
JUNCTION DETAILS



Note:

1. Junction plan to be modified during the construction time, as per site condition.

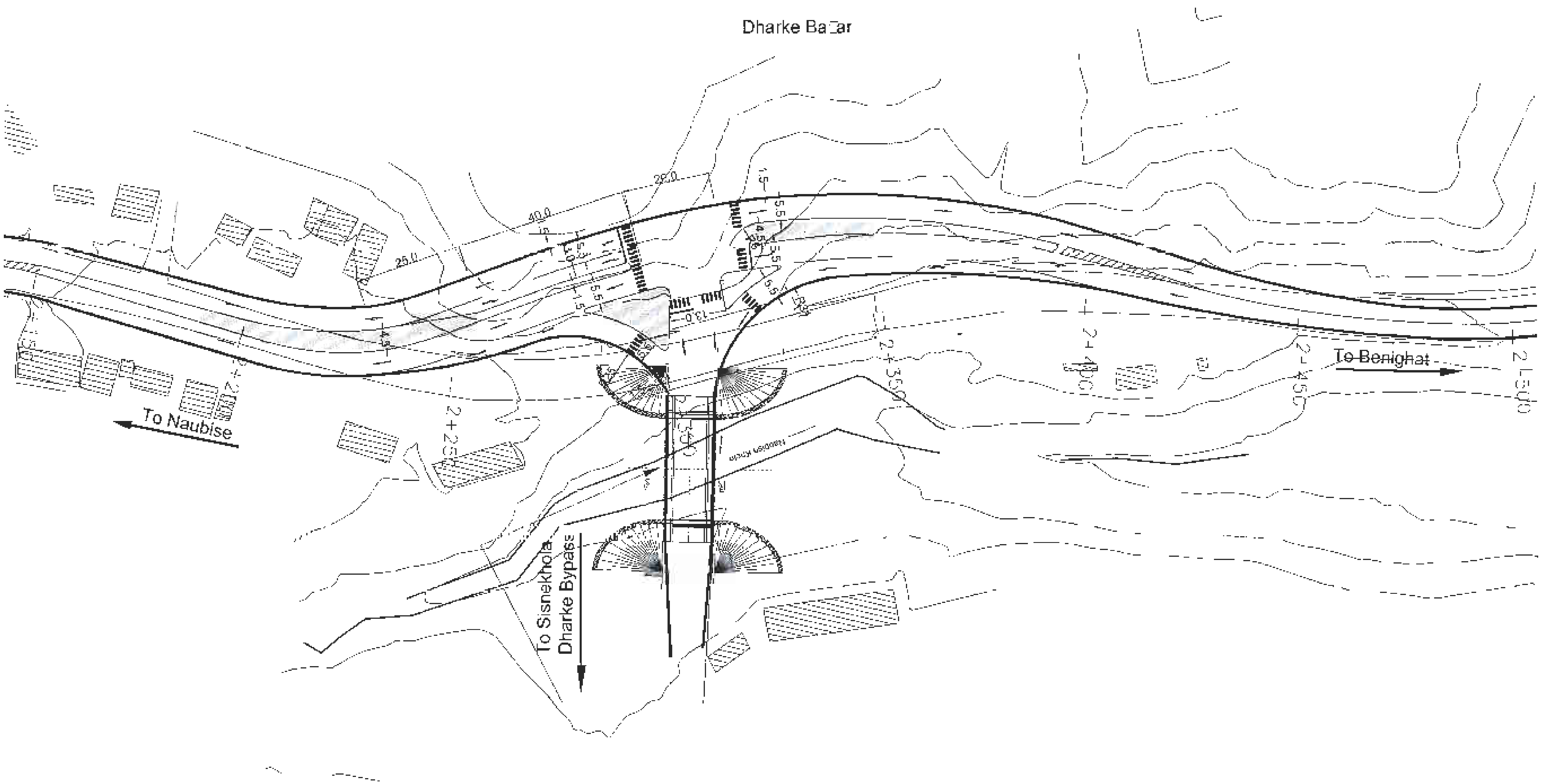
EMPLOYER	PROJECT	DESIGN CONSULTANT				
Government of Nepal Ministry of Physical Infrastructure and Transport **Department of Roads** **Development Cooperation Implementation Division**	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5279 - NEP) Detailed Design of Kathmandu (Nagbhunga) - Naubise - Mugling Road and Bridges	Intercontinental Consultants & Technocrats Pvt.Ltd., A-8, Green Park, New Delhi - 110016 PH : 4686-3000 Fax 2685-6252 In Joint Venture With Soosung Engineering Co. Ltd., South Korea In Association With Full Bright Consultancy (Pvt.) Ltd. 316,Basundara Acharya Sadak Sinamangal, Kathmandu, GPO Box 4870 Kathmandu, Nepal	Designed By	SB	DRAWING NAME: NAGDHUNGA JUNCTION AT Km.0.000	Scale:	Date: August 2019
			Checked By	PMS			Drawing No. NNMR-JUNC-001
			Approved By	BNS			



Note:

1. Junction plan to be modified during the construction time, as per site condition.

EMPLOYER Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	PROJECT Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design of Kathmandu (Nagdhunga) -Naubise - Mugling Road and Bridges	DESIGN CONSULTANT International Consultants & Technocrats Pvt.Ltd. A-8, Green Park, New Delhi - 110016 Ph: 4066-3000, Fax 2686-5252 In Joint Venture With Soosung Engineering Co. Ltd., South Korea In Association With Fulbright Consultancy (Pvt.) Ltd. 316,Basuram Acharya Sadak Bhimsengal, Kathmandu, GPO Box. 4970 Kathmandu, Nepal	Designed By: SB Checked By: PMS Approved By: BNS	DRAWING NAME: NAUBISE JUNCTION AT Km. 0 000	Scale	Date: August 2019 Drawing No.: NNMR-JUNC-002



Note:

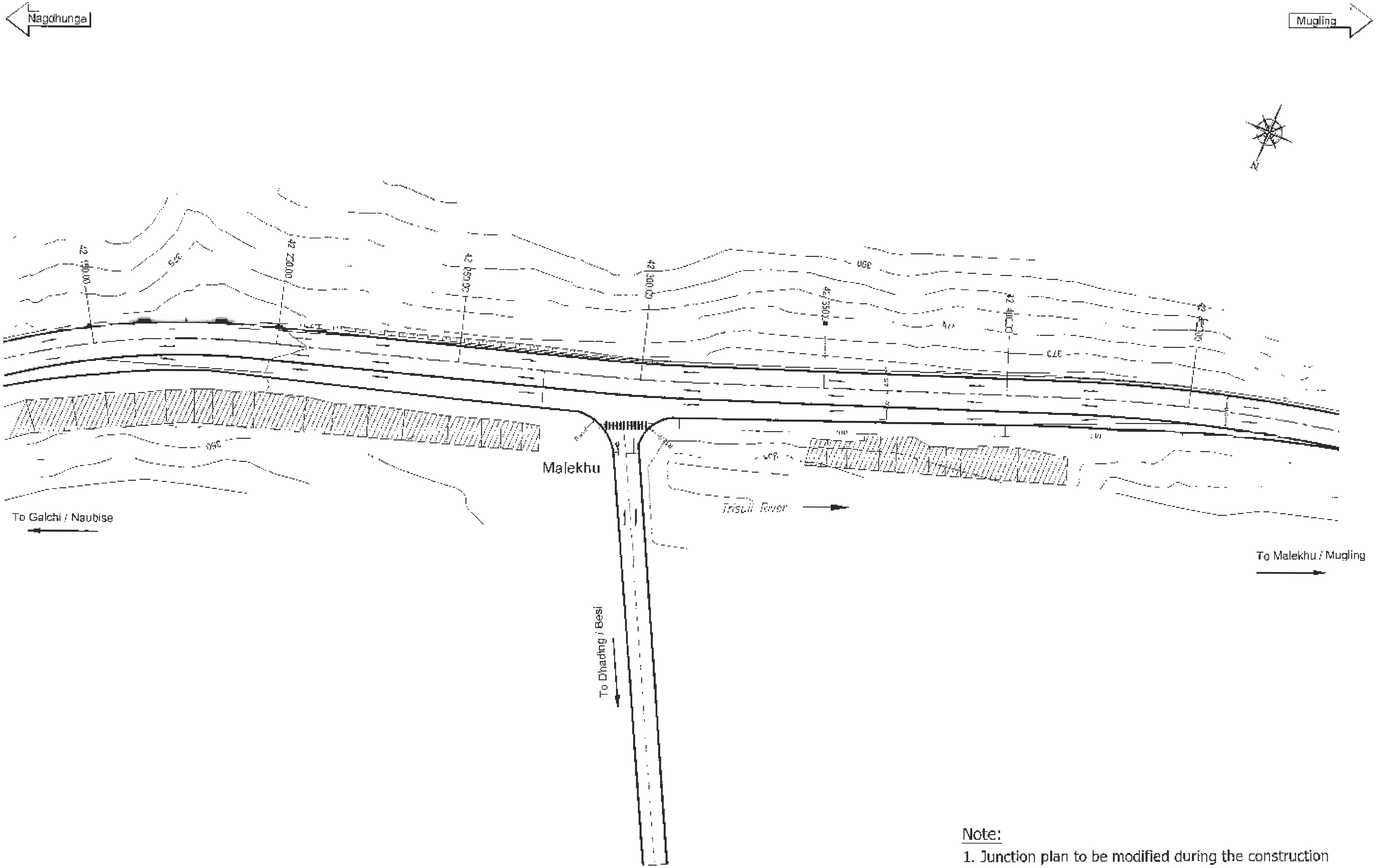
1. Junction plan to be modified during the construction time, as per site condition.

EMPLOYER	PROJECT	DESIGN CONSULTANT				DRAWING NAME:	Scale	Date:
Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design of Kathmandu (Nagdhunga) -Naubise - Mugling Road and Bridges	Intercontinental Consultants & Technocrats Pvt.Ltd. A-8, Green Park, New Delhi - 110016 Ph : 4080-3000 Fax 2685-5252 In Joint Venture With Soosung Engineering Co. Ltd., South Korea In Association With Full Bright Consultancy (Pvt.) Ltd. 316, Baburam Acharya Sadak Sinamangal, Kathmandu, GPO Box 4073, Kathmandu, Nepal	Designed By	SB		SISNEKHOLA - DHARKE JUNCTION AT Km. 27300 (OPTION 2)		August 2019
			Checked By	PMS				Drawing No.:
			Approved By	BNS				NNMR-JUNC-003

Note:

1. Junction plan to be modified during the construction time, as per site condition.

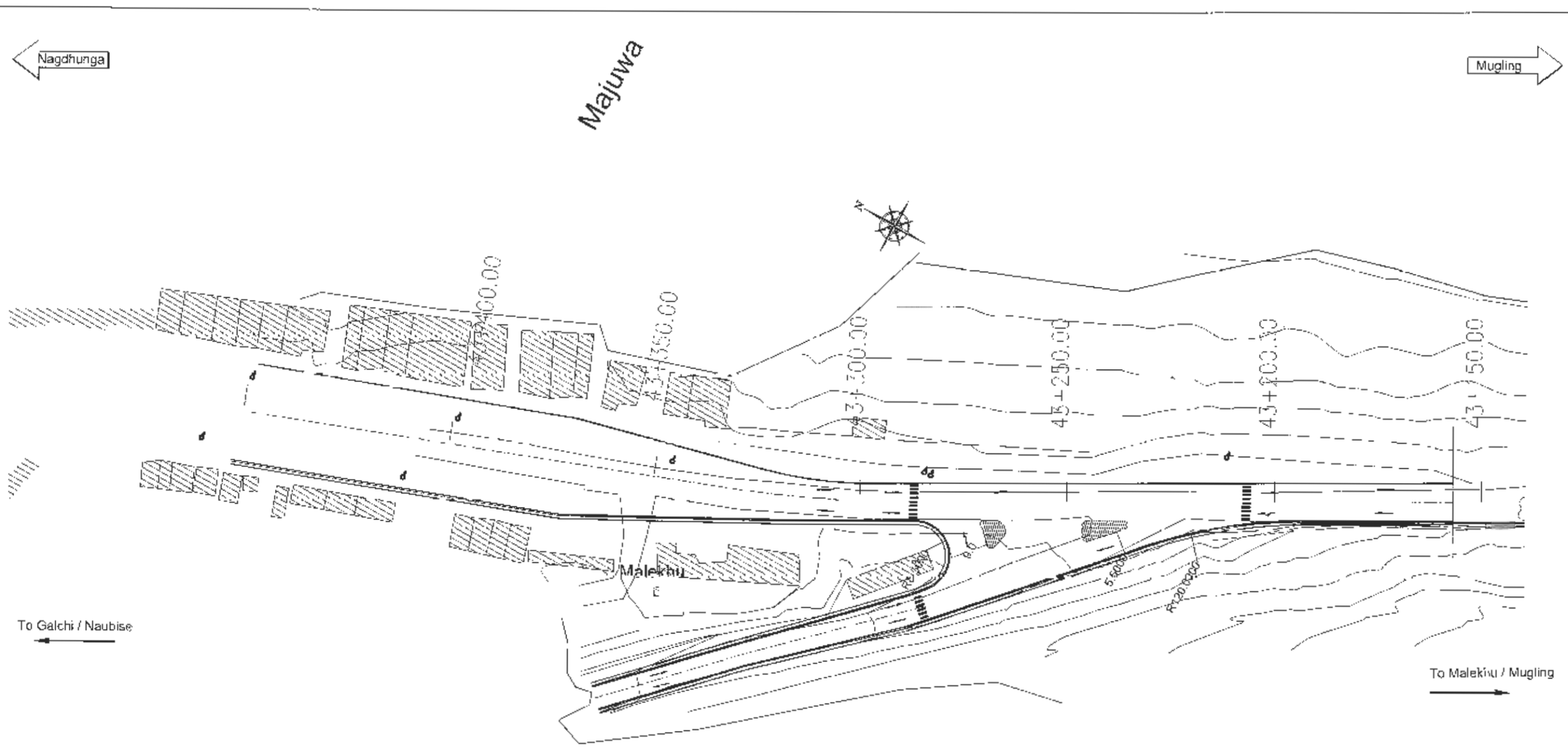
EMPLOYER	PROJECT	DESIGN CONSULTANT			
Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Nepal India Regional Trade and Transport Project (NIRTTP) IDA CREDIT No. 5273 - NEP) Detailed Design of Kathmandu (Nagdhunga) - Naubise - Mugling Road and Bridges	Intercontinental Consultants & Technocrats Pvt.Ltd, A-8, Green Park, New Delhi - 110016 Ph : 4066-3000 Fax 2685-5252 In Joint Venture With Sensing Engineering Co., Ltd., South Korea In Association With Full Bright Consultancy (Pvt.) Ltd. 316,Bibhuti Acharya Sadak, Shankhamul, Kathmandu, GPO Box 4670 Kathmandu, Nepal	Designed By	SB	DRAWING NAME: GALCHI-NAUWAKOT JUNCTION AT Km. 22+420
			Checked By	PMS	Scale:
			Approved By	BNS	Date: August 2019 Drawing No.: NNMR-JUNC-004



Note:

1. Junction plan to be modified during the construction time, as per site condition.

EMPLOYER	PROJECT	DESIGN CONSULTANT					DRAWING NAME:	Scale:	Date:
Government of Nepal Ministry of Physical Infrastructure and Transport **Department of Roads** **Development Cooperation Implementation Division**	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kathmandu (Nagdhunga) - Naubise - Mugling Road and Bridges	Intercontinental Consultants & Technocrats Pvt. Ltd. A-8, Green Park, New Delhi - 110016 Ph: 4086-3000, Fax 2685-5252 In Joint Venture With Soosung Engineering Co. Ltd., South Korea	In Association With Full Bright Consultancy (Pvt.) Ltd. 316, Baburam Acharya Sadak Sinamangal, Kathmandu, GPO Box: 4670, Kathmandu, Nepal	Designed By Checked By Approved By	SB PMS BNS		MALEKHU DHADING BRIDGE JUNCTION AT Km. 42+300		August 2018 **Drawing No.:** NNMR-JUNC-005



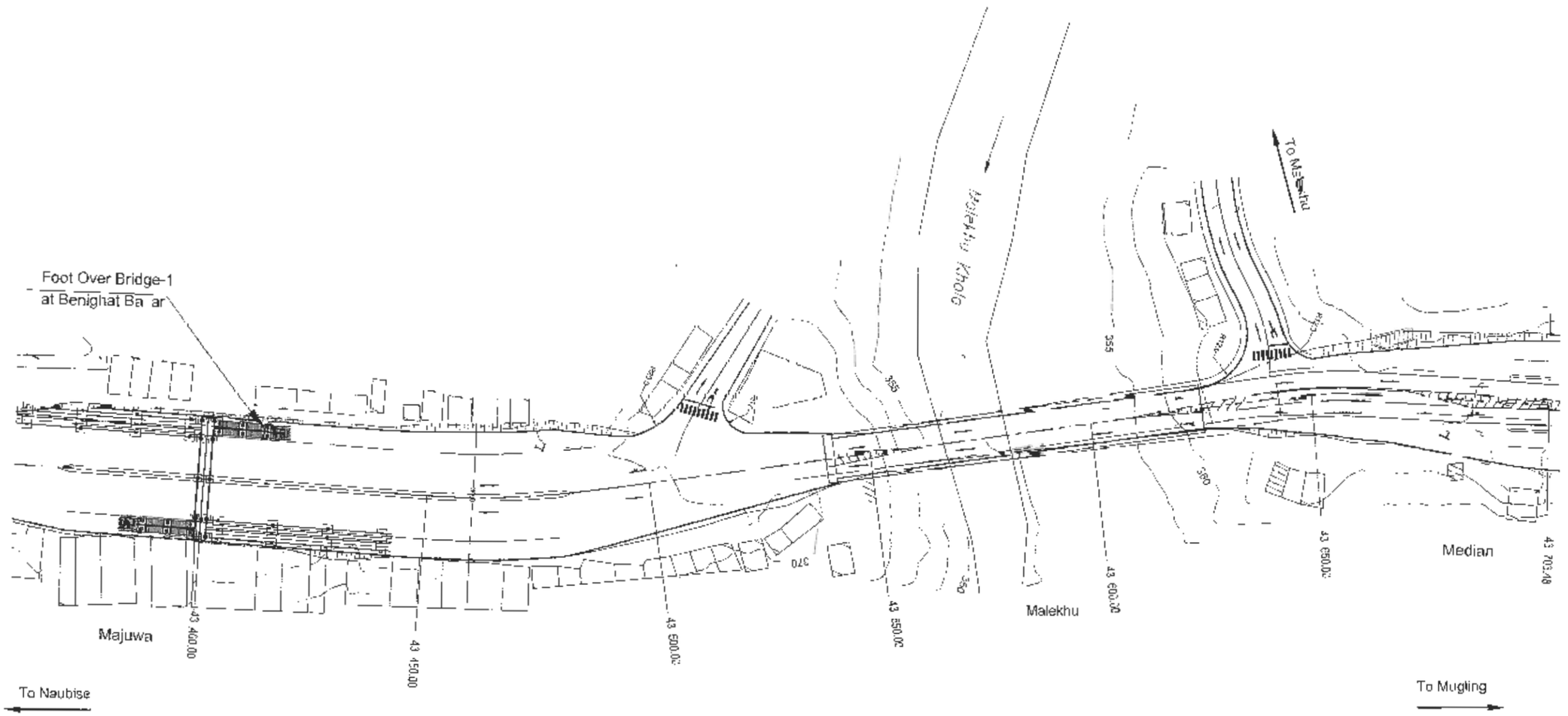
Note:

1. Junction plan to be modified during the construction time, as per site condition.

EMPLOYER	PROJECT	DESIGN CONSULTANT					
Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CRHDIT No. 5273 - NEP) Detailed Design for Improvement of Kathmandu (Nagdhunga) - Naubise - Mugling Road and Bridges	Intercontinental Consultants & Technocrats Pvt. Ltd. A 8, Green Park, New Delhi - 110016 Ph : 4086-3000, Fax 2685 5252 In Joint Venture With Seosung Engineering Co, Ltd , South Korea In Association With Full Bright Consultancy (Pvt.) Ltd, 316,Baburam Acharya Sadak Sinamangal, Kathmandu, GPO Box: 4970, Kathmandu, Nepal					
			Designed By	SB		DRAWING NAME: MALEKHU BHANDARA CHEPANG MARG JUNCTION AT Km. 43 250	Scale:
			Checked By	PMS			Date: August 2019
			Approved By	BNS			Drawing No.: NNMR-J_NC-006

Nagdhunga

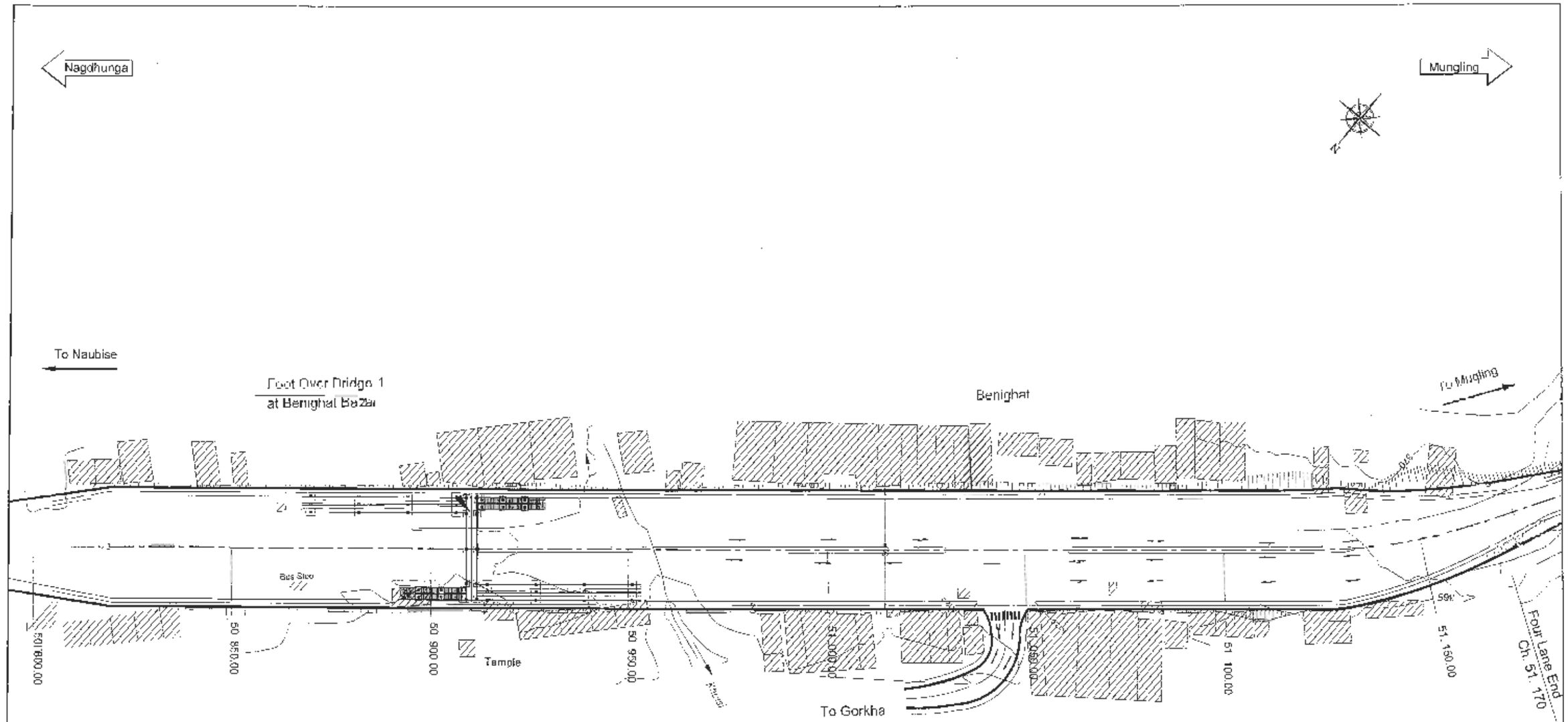
Mugling



Note:

1. Junction plan to be modified during the construction time, as per site condition.

EMPLOYER	PROJECT	DESIGN CONSULTANT					
Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5275 - NEP) Detailed Design for Improvement of Kathmandu (Nagdhunga) - Naubise - Mugling Road and Bridges	Intercontinental Consultants & Technocrats Pvt. Ltd. A-8, Green Park, New Delhi - 110016 Ph : 4085-3000, Fax 2686-0252 In Joint Venture With Soosung Engineering Co. Ltd. South Korea In Association With Full Bright Consultancy (Pvt.) Ltd. 316,Basuram Acharya Sadak Sinamangal, Kathmandu GPO Box: 4970, Kathmandu, Nepal					
			Designed By	SB		DRAWING NAME: MALEKHU BAZAR JUNCTIONS AT Km. 43+500 AND 43+640	Scale:
			Checked By	PMS			Date: August 2019
			Approved By	BNS			Drawing No.: NNMR-JUNC-007



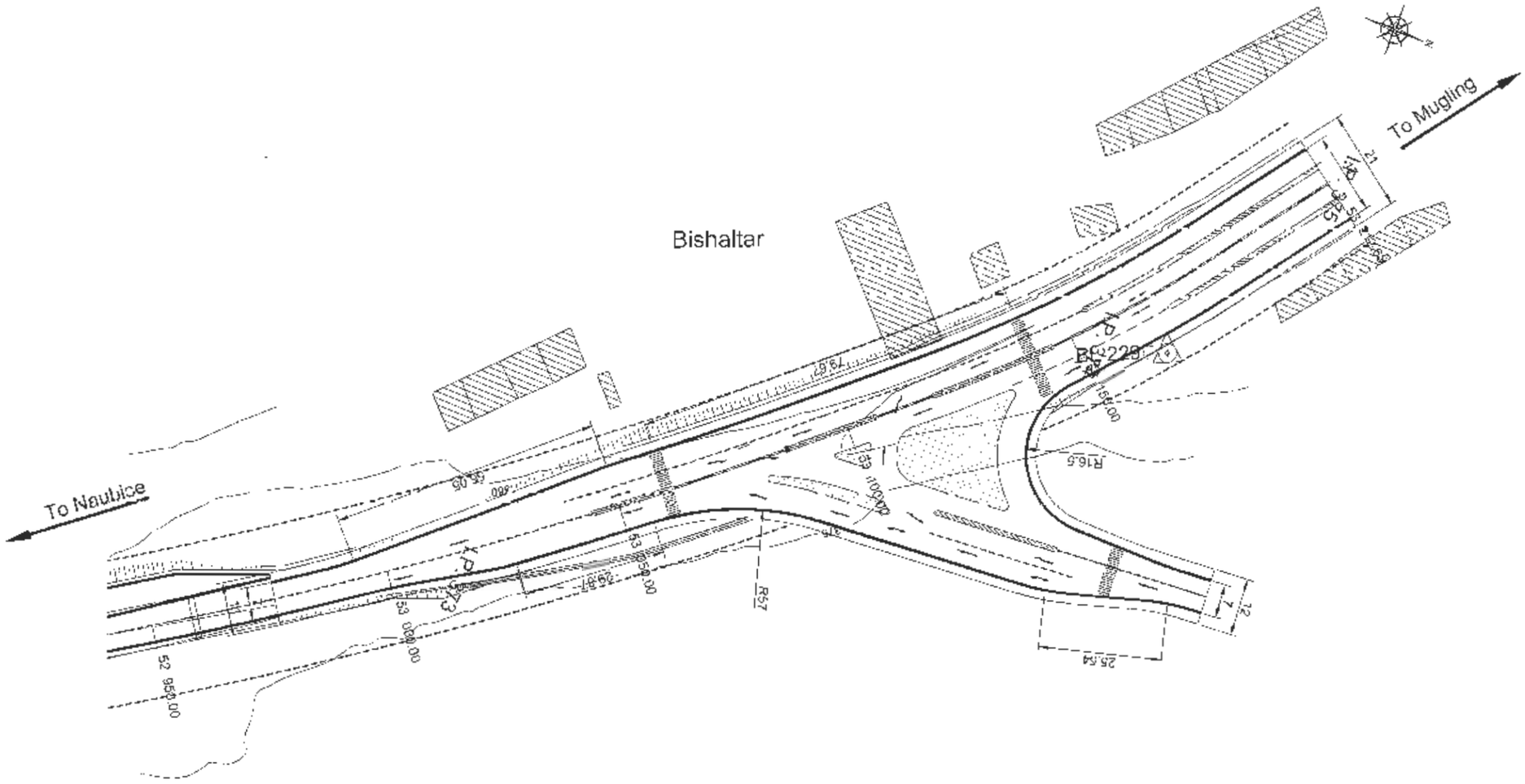
Note:

1. Junction plan to be modified during the construction time, as per site condition.

EMPLOYER	PROJECT	DESIGN CONSULTANT				DRAWING NAME:	Scale:	Date:
Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kathmandu (Nagdhunga) - Naubise - Mugling Road and Bridges	Intercontinental Consultants & Technocrats Pvt. Ltd. A-9, Green Park, New Delhi - 110016 Ph : 4086-3000, Fax 2685-5252 In Joint Venture With Soosung Engineering Co. Ltd., South Korea In Association With Full Bright Consultancy (Pvt.) Ltd. 316,Baburam Acharya Sadak Sinamangal, Kathmandu. GPO Box 4870, Kathmandu, Nepal		Designed By	SB		BENIGHAT WAY TO GORKHA JUNCTION AT Km. 51_050	0 20 40 60	August 2019
				Checked By	PMS				Drawing No.:
				Approved By	BNS				NNMR-JUNC-008

Nagdhunga

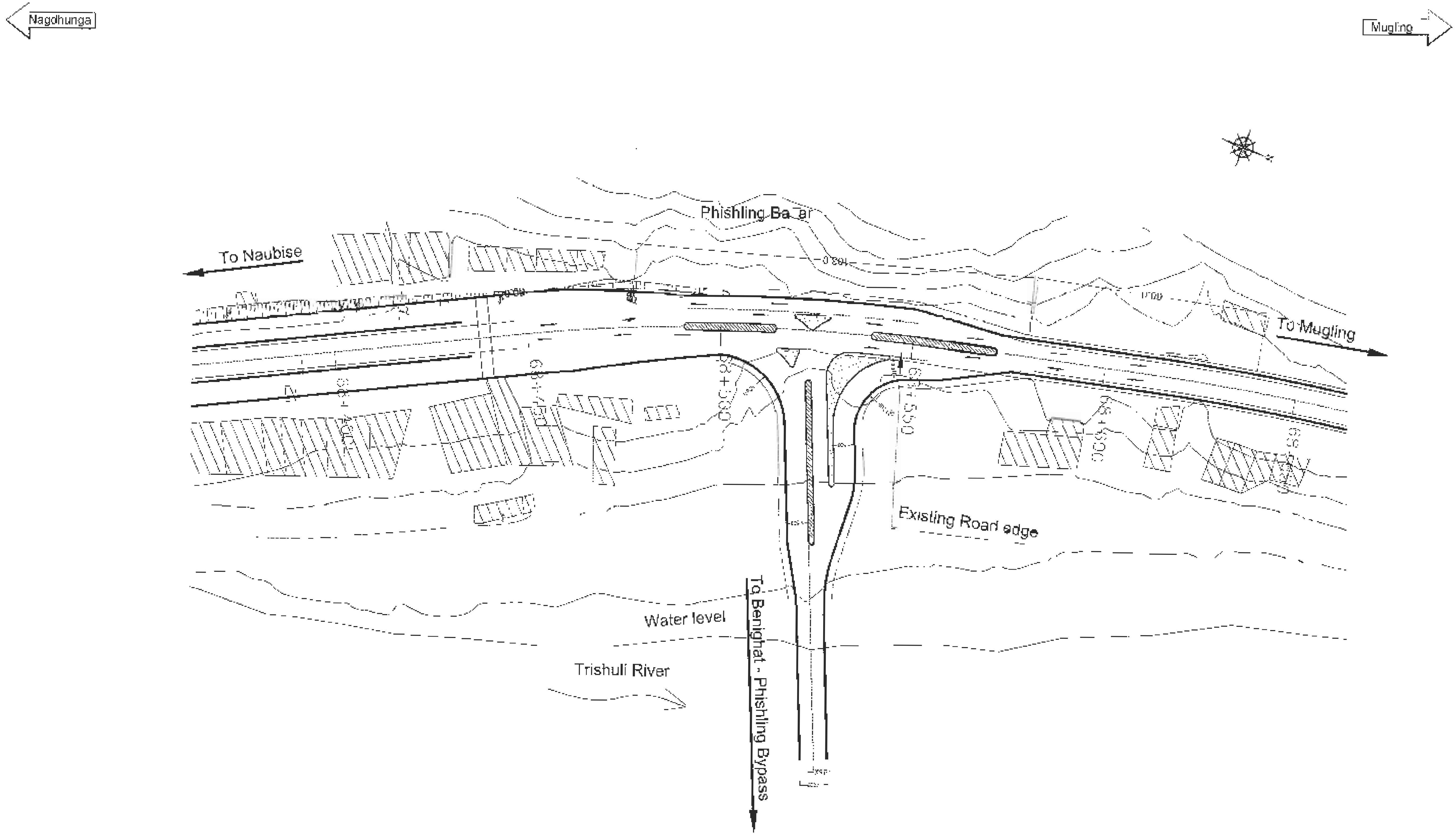
Mugling



Note:

1. Junction plan to be modified during the construction time, as per site condition.

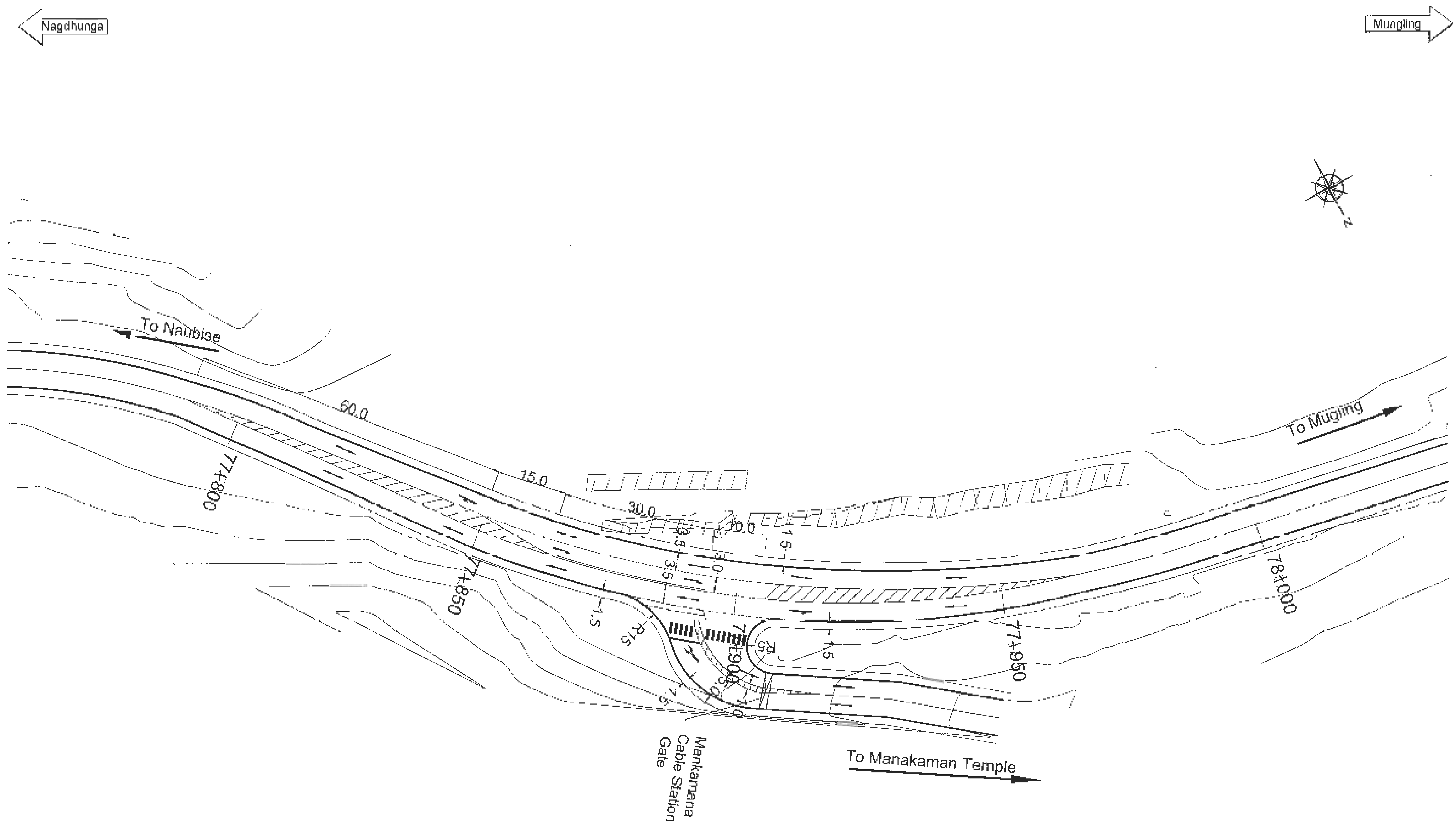
EMPLOYER Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	PROJECT Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design of Kathmandu (Nagdhunga) - Naubise - Mugling Road and Bridges	DESIGN CONSULTANT Intercontinental Consultants & Technocrats Pvt.Ltd A-8, Green Park, New Delhi - 110016 Ph : 4066 3000, Fax 2665-5252 In Joint Venture With Soosung Engineering Co. Ltd., South Korea In Association With Full Bright Consultancy (Pvt.) Ltd. 316,dabaram Acharya Sadak, Sinamangal, Kathmandu GPO Box. 4975, Kathmandu, Nepal	Designed By	SB	DRAWING NAME. BISHALTAR -PHISHLING JUNCTION 1 AT Km.5380100	Scale:	Date: August 2019
			Checked By	PMS			Drawing No : NNMR-JUNC-009
			Approved By	BNS			



Note:

1. Junction plan to be modified during the construction time, as per site condition.

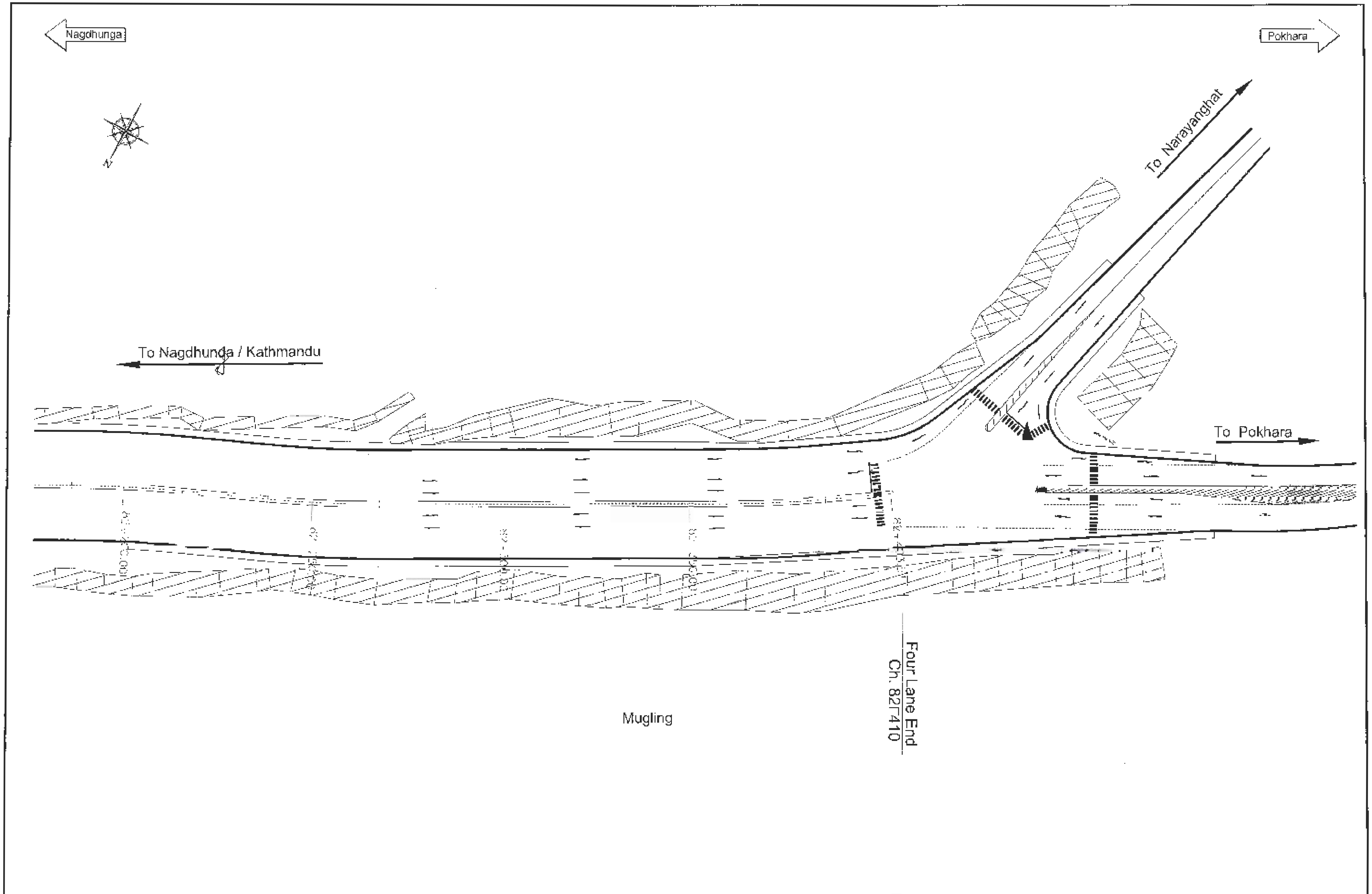
EMPLOYER Government of Nepal Ministry of Physical Infrastructure and Transport **Department of Roads** **Development Cooperation Implementation Division**	PROJECT Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design of Kathmandu (Nagdhunga) -Naubise - Mugling Road and Bridges	DESIGN CONSULTANT Intercontinental Consultants & Technocrats Pvt.Ltd. A-8, Green Park, New Delhi - 110016 Ph: 4086-3000, Fax 2685-5252 In Joint Venture With Soosung Engineering Co. Ltd., South Korea In Association With Full Bright Consultancy (Pvt.) Ltd. 515,Baburam Acharya Sadak, Sinamangal, Kathmandu, GPO Box 4970, Kathmandu, Nepal	Designed By: SB Checked By: PMS Approved By: BNS
DRAWING NAME. BISHALTAR -PHISHLING JUNCTION 2 AT Km.68+525	Scale:	Date: August 2019	Drawing No.: NNMR-JCNC-010



Note:

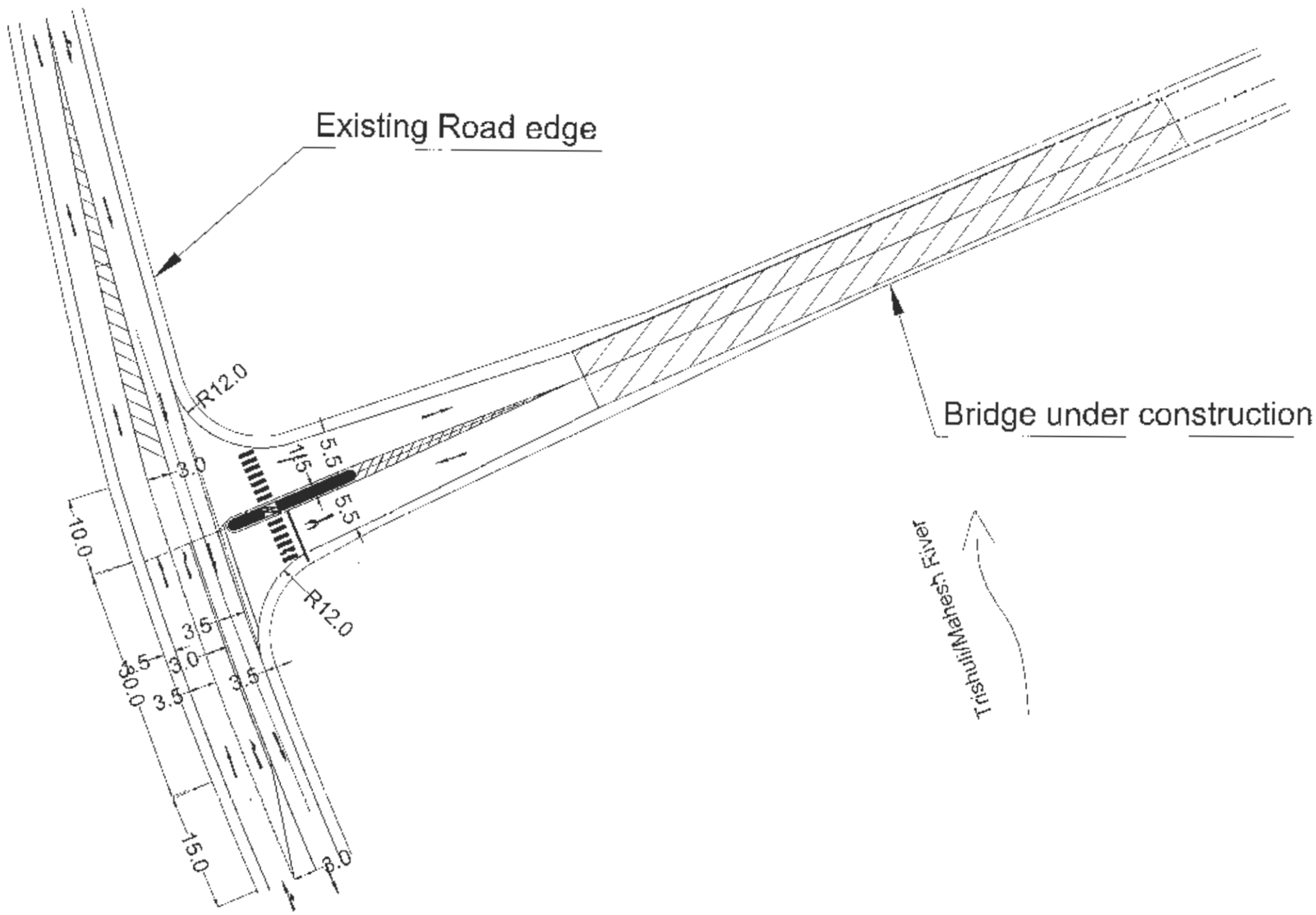
1. Junction plan to be modified during the construction time, as per site condition.

EMPLOYER	PROJECT	DESIGN CONSULTANT				
Government of Nepal Ministry of Physical Infrastructure and Transport **Department of Roads** **Development Cooperation Implementation Division**	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design of Kathmandu (Nagdhunga) -Naubise - Mugling Road and Bridges	Intercontinental Consultants & Technocrats Pvt. Ltd. A-8, Green Park, New Delhi - 110016 Ph.: 4086-3000, Fax 2665 5252 In Joint Venture With Soosung Engineering Co. Ltd., SouthKorea In Association With Full Bright Consultancy (Pvt.) Ltd 316, Baburam Acharya Sadak, Sinamangal, Kathmandu, GPO Box 4973, Kathmandu, Nepal	Designed By: SB Checked By: PMS Approved By: BNS	DRAWING NAME: MANAKAMANA TEMPLE GATE JUNCTION AT Km.79+900	Scale.	Date. August 2019 Drawing No.: NNMR-J-NC-011



EMPLOYER	PROJECT	DESIGN CONSULTANT				DRAWING NAME:	Scale:	Date: August 2019
Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design of Kathmandu (Nagdhunga) -Naubise - Mugling Road and Bridges	Intercontinental Consultants & Technocrats Pvt.Ltd A-8, Green Park, New Delhi - 110016 Ph : 4086-3000, Fax 2685-5252 In Joint Venture With Soosung Engineering Co. Ltd., South Korea In Association With Full Bright Consultancy (Pvt.) Ltd. 316,Baburam Acharya Sadak Sinamangal, Kathmandu, GPO Box 4270, Kathmandu, Nepal	Designed By	SB		MUGLING BAZAAR JUNCTION AT Km.82+405		Drawing No.: NNMR-JTNC-012
			Checked By	PMS				
			Approved By	BNS				

DESIGN OF TYPICAL JUNCTION WITH BRIDGE APPROACH

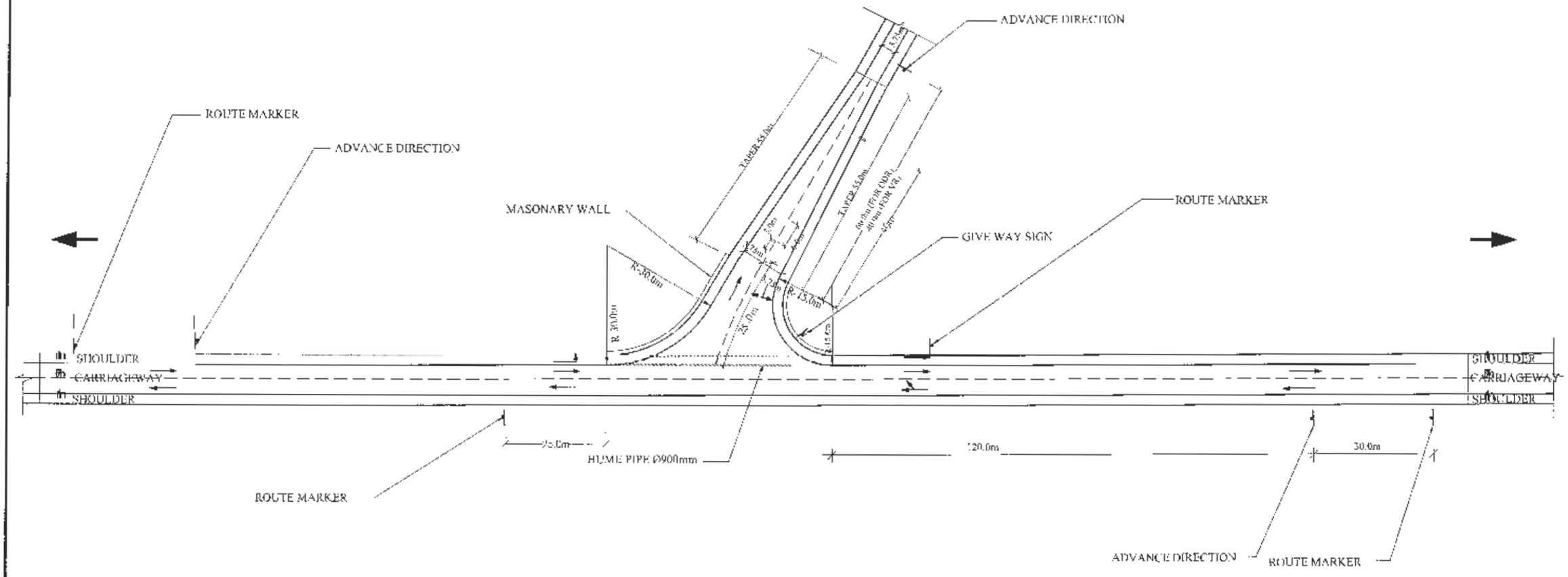


Note:

1. Junction plan to be modified during the construction time, as per site condition.

EMPLOYER Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	PROJECT Nepal-India Regional Trade and Transport Project (NRTTP) (IDA CREDIT No. 5275 - NEP) Detailed Design of Kathmandu (Kapdhunga) - Naubise - Mugling Road and Bridges	DESIGN CONSULTANT Intercontinental Consultants & Technocrats Pvt Ltd. A-8, Green Park, New Delhi - 110016 Ph : 2665 3000, Fax 2665-5252 In Joint Venture With Samsung Engineering Co. Ltd., South-Korea In Association With Full Bright Consultancy (Pvt.) Ltd. 316,Baburam Acharya Sadak Putalisadak, Kathmandu, GPO Box: 4570 Kathmandu, Nepal	Designed By	SB	DRAWING NAME: TYPICAL BRIDGE JUNCTION	Scale:	Date: August 2010
			Checked By	PMS			Drawing No.: NNMR-TYP-J NC-13
			Approved By	BNS			

DESIGN OF TYPICAL Y-JUNCTION (RURAL ROAD)

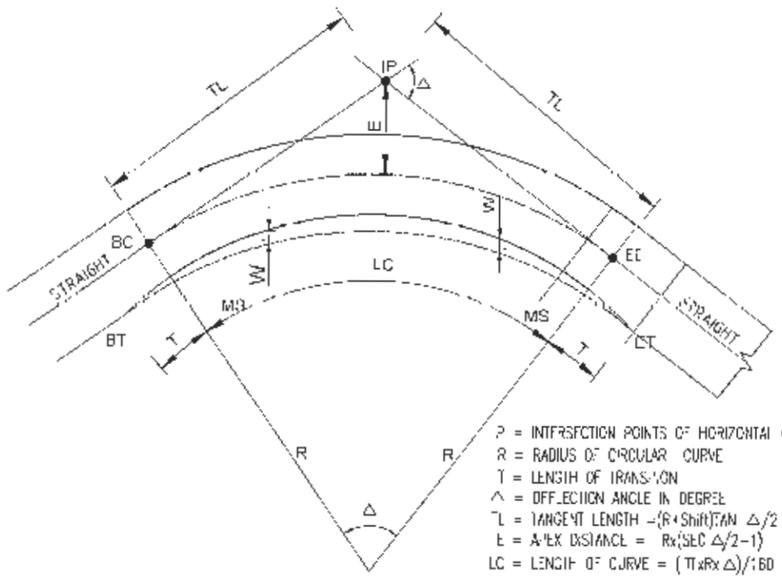


Note:

1. Junction plan to be modified during the construction time, as per site condition.

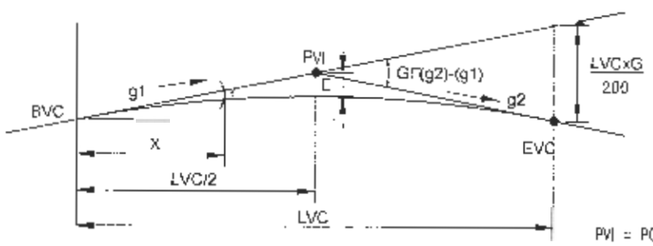
EMPLOYER Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	PROJECT Nepal India Regional Trade and Transport Project (h RTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design of Kathmandu (Ragdhunga) -Naubise - Mugling Road and Bridges	DESIGN CONSULTANT Intercontinental Consultants & Technocrats Pvt.Ltd. A-8, Green Park, New Delhi - 110016 Ph: 4066 3000, Fax 2685-5252 In Joint Venture With Sinosang Engineering Co. Ltd., South Korea In Association With Full Bright Consultancy (Pvt.) Ltd 316,Baburam Acharya Sanak, Sinamangal, Kathmandu GPO Box: 4970, Kathmandu, Nepal	Designed By: SB Checked By: PMS Approved By: BNS	DRAWING NAME: TYPICAL MINOR JUNCTION	Scale Date: August 2019 Drawing No.: NNMR-TYP-J NC-14

CURVE DETAILS, ROAD MARKINGS, ROAD SIGNS, KM POST, GUARD POST AND SAFETY BARRIER



P = INTERSECTION POINTS OF HORIZONTAL CURVES
R = RADIUS OF CIRCULAR CURVE
T = LENGTH OF TRANSITION
Δ = DEFLECTION ANGLE IN DEGREE
TL = TANGENT LENGTH =(R+Shift)TAN Δ/2
E = APEX DISTANCE = Rx(SEC Δ/2−1)
LC = LENGTH OF CURVE = (πxRxΔ)/180
BT = BEGINING OF TRANSITION (JUNCTION OF TRANSITION START)
ET = END OF TRANSITION CURVE (JUNCTION OF TRANSITION END)
e_{max} = LIMIT OF MAXIMUM SUPER ELEVATION
BC&EC = BEGINING AND END OF THE CURVE
W = EXTRA WIDENING
NC = NO CURVE SECTION
MS = MAXIMUM SUPER ELEVATION

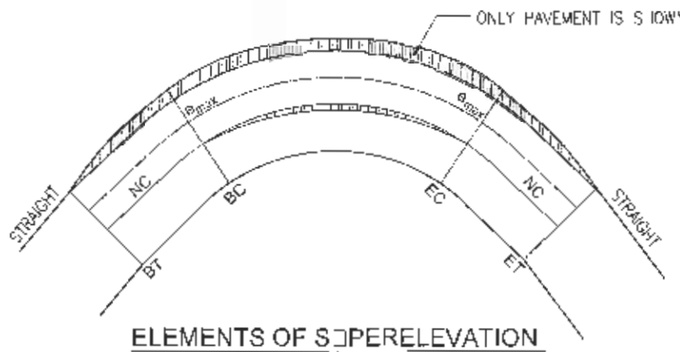
ELEMENTS OF HORIZONTAL CURVE



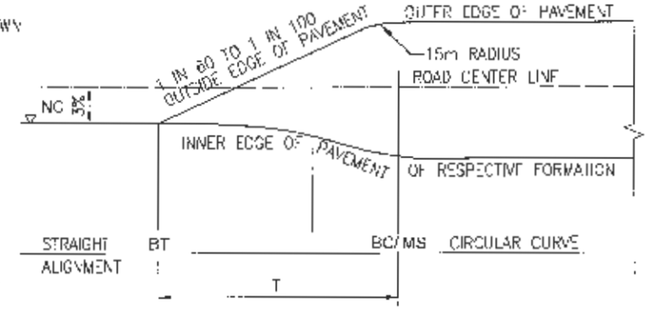
PVI = POINT OF VERTICAL INTERSECTIONS
LVC = LENGTH OF VERTICAL CURVE
BVC = BEGINING OF VERTICAL CURVE
EVC = END OF VERTICAL CURVE
g1&g2 = GRADES IN %
G = (g2)−(g1)
Y = GxX²/(200xLVC)
E = GxLVC/800
Vertical Curve = 20m Minimum in Length.

ELEMENTS OF VERTICAL CURVE

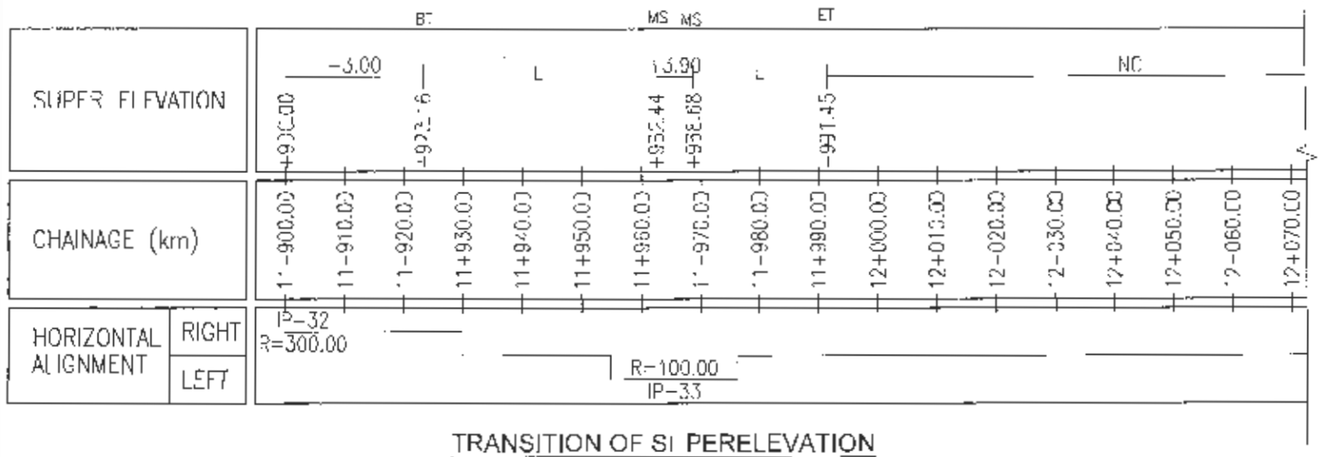
P.No	CO-ORDINATES(m) EASTING	CO-ORDINATES(m) NORTHING	WCB (D-M-S)	DIST (m)	DEF. ANG (D-M-S)	IAN. LEN. (m)	SIMPLE CURVE DATA R (m)	E (m)	LC (m)	CHAINAGE BC OF SPIRAL CURVE	BC OF SIMPLE CURVE	MC	EC OF SIMPLE CURVE	EC OF SPIRAL CURVE	D
32	545424.062	3073130.000	311-22-19	93.247	07-00-16	18.624	300.000	0.578	37.230	11+892.56	11+892.56	11+911.18	11+929.76	11+929.76	11+911.18
33	545383.188	3073166.000	299-03-57	54.467	12-18-21	10.751	100.000	0.576	21.423	11+954.85	11+954.85	11+965.60	11+978.27	11+978.27	11+965.60
34	545193.188	3073271.750	301-23-58	217.447	02-17-51	9.024	450.000	0.060	18.045	12+173.54	12+173.54	12+182.56	12+191.58	12+191.58	12+182.56
35	545027.312	3073373.000	300-15-40	194.136	01-09-24	7.960	800.000	0.040	15.920	12+389.33	12+389.33	12+397.29	12+405.25	12+405.25	12+397.29
35-1	544984.625	3073454.500	293-34-15	181.724	06-41-31	11.693	200.000	0.342	23.280	12+527.32	12+527.32	12+539.00	12+550.68	12+550.68	12+539.01
36-1	544829.750	3073479.750	284-33-38	62.143	28-06-31	12.336	125.000	4.115	63.288	12+569.79	12+569.79	12+601.44	12+633.08	12+633.08	12+632.13



ELEMENTS OF SUPERELEVATION

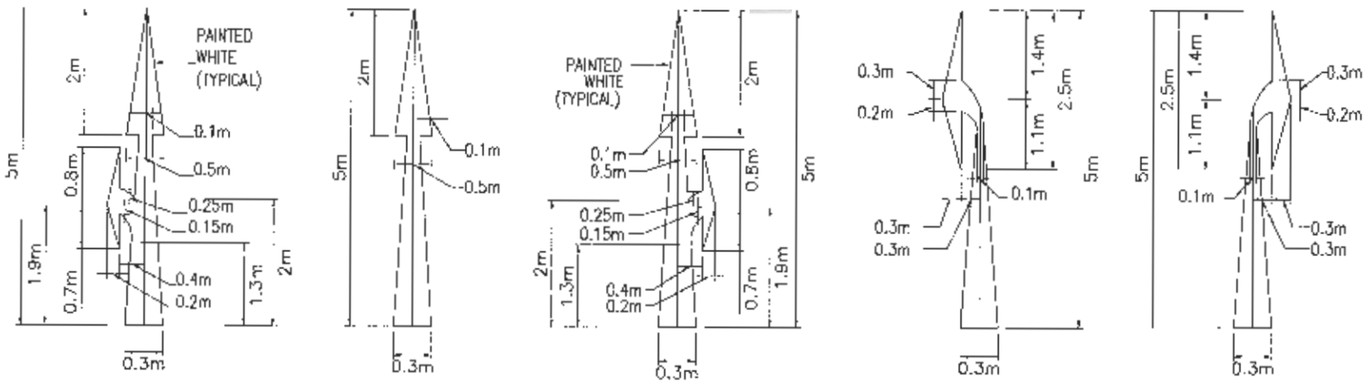


ELEVATION OF SUPERELEVATION

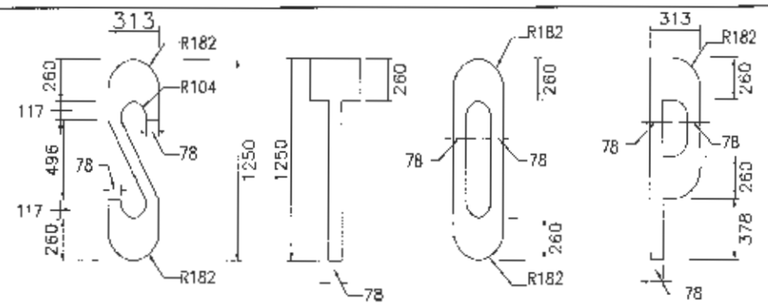


TRANSITION OF SUPERELEVATION

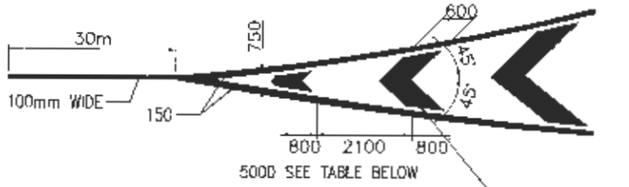
EMPLOYER	PROJECT	DESIGN CONSULTANT				DRAWING NAME:	Scale:	Date:
Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kathmandu (Nagdhunga) - Naubise - Mugling Road and Bridges	Intercontinental Consultants & Technocrats Pvt. Ltd. A 8, Green Park, New Delhi - 110016 Ph : 4066-3000, Fax 2655-5252 In Joint Venture With Seosung Engineering Co. Ltd., South Korea In Association With Full Bright Consultancy (Pvt.) Ltd. 316,Basuram Acharya Sadak Sinamangal, Kathmandu, GPO Box: 4970, Kathmandu, Nepal	Designed By	SB		CURVE DETAILS		August 2019
			Checked By	PMS				Drawing No.: NNMR-TYP 03-01
			Approved By	BNS				



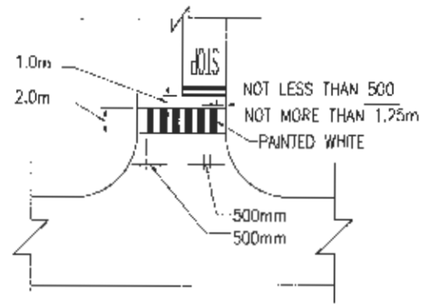
DIRECTIONAL ARROWS



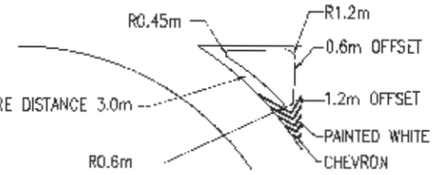
SIZE OF LETTERS



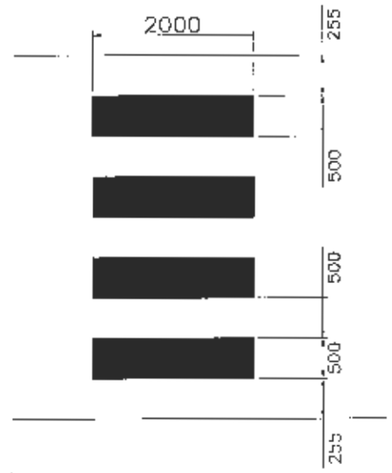
DIAGONAL MARKINGS



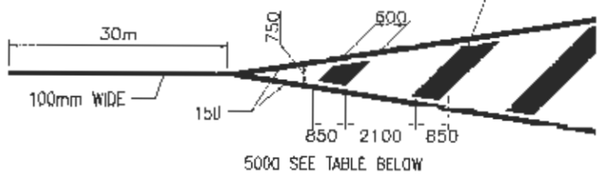
PEDESTRIAN CROSSING



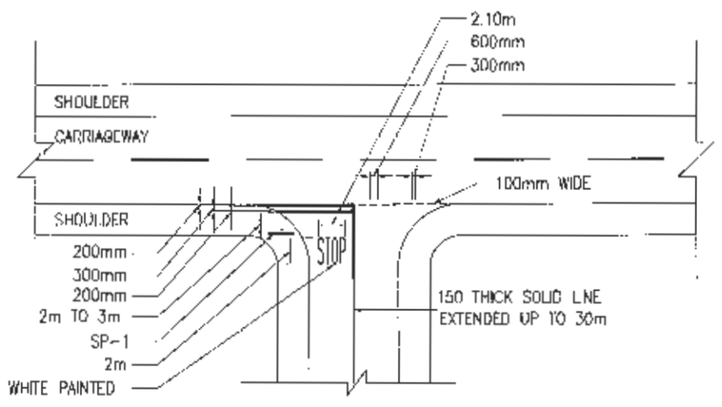
CHANELISING ISLAND



PEDESTRIAN CROSSING



CHEVRON MARKINGS



STOP LINE

TABLE : SPACING BETWEEN DIAGONALS/CHEVRONS		
TOTAL LENGTH OF MARKING (m)	CLEAR SPACING BETWEEN DIAGONALS OR CHEVRONS (mm)	
	SPEED (<75 km/h)	SPEED (>75 km/h)
<6	2100	–
6 TO 22	3500	–
>22	5000	–
<10	–	4000
>10	–	6000

NOTE:

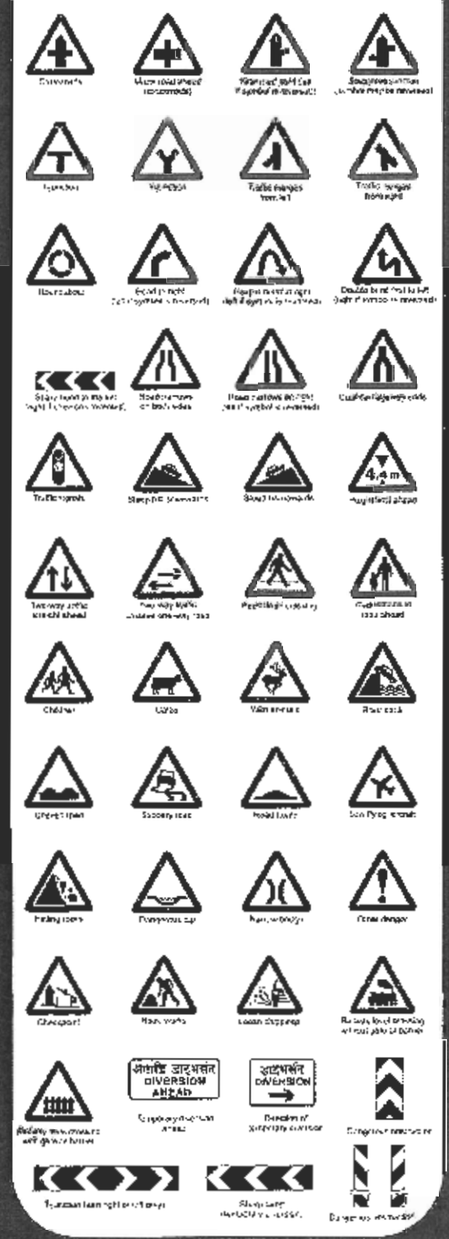
1. ALL LENGTHS AND SPACINGS IN THE TABLE ARE MEASURED PARALLEL TO ROAD CENTRE LANE.
2. FIRST DIAGONAL OR CHEVRON IS TO BE SO LOCATED THAT ITS LENGTH IS ATLEAST EQUAL TO ITS WIDTH.
3. WIDTH OF ALL DIAGONALS/CHEVRONS MEASURED AT RIGHT ANGLES TO THE DIAGONALS OR CHEVRONS IS 600mm.
4. ROAD MARKING SHOULD BE DONE WITH THERMOPLASTIC PAINT.

EMPLOYER	PROJECT	DESIGN CONSULTANT				DRAWING NAME:	Scale:	Date:
Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kathmandu (Nagdhunga) - Naubise - Mugling Road and Bridges	Intercontinental Consultants & Technocrats Pvt. Ltd. A-8, Green Park, New Delhi - 110016 Ph.: 4066-3000, Fax 2686-5252 In Joint Venture With Seosung Engineering Co. Ltd., South Korea	In Association With Full Bright Consultancy (Pvt.) Ltd. 316,Bhrikuti Acharya Sadak Sinamangal, Kathmandu, GPO Box: 4970, Kathmandu, Nepal	Designed By	SB		TYPICAL ROAD MARKING DETAILS		August 2019
				Checked By	PMS				Drawing No.: NNMR-TYP 03-02
				Approved By	RNS				

TRAFFIC SIGNS

REGULATORY SIGNS

WARNING SIGNS



DIRECTION SIGNS

Signs on national highways - green backgrounds

On approaches to junctions

Route confirmation sign - after junctions

On approaches to junctions - alternative style

At the junction

Temporary diversion signs - yellow background

Signs on feeder roads and town roads - black borders

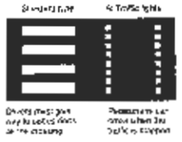
At the junction

On approaches to junctions

ROAD MARKINGS

Across the carriageway

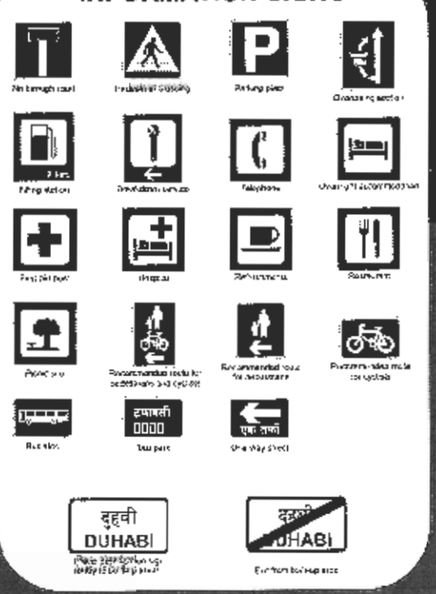
Pedestrian crossings



Along the carriageway

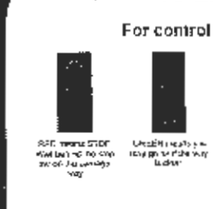
Along the edge of the carriageway

INFORMATION SIGNS



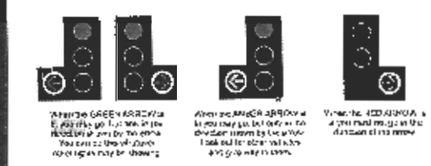
TRAFFIC LIGHT SIGNALS

For control of vehicles

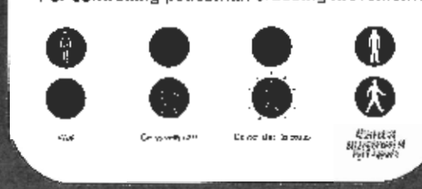


The signal sequence is:

RED
GREEN
AMBER
then back to RED

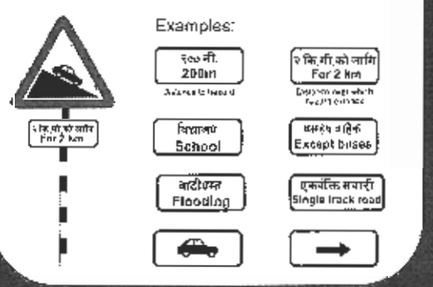


For controlling pedestrian crossing movements



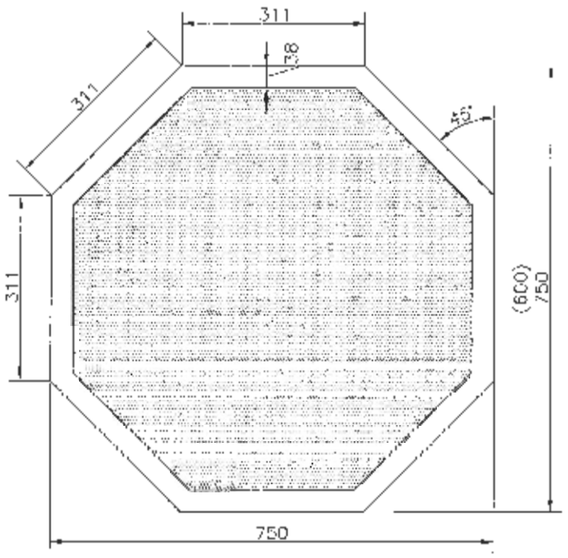
SUPPLEMENTARY PLATES

Examples:

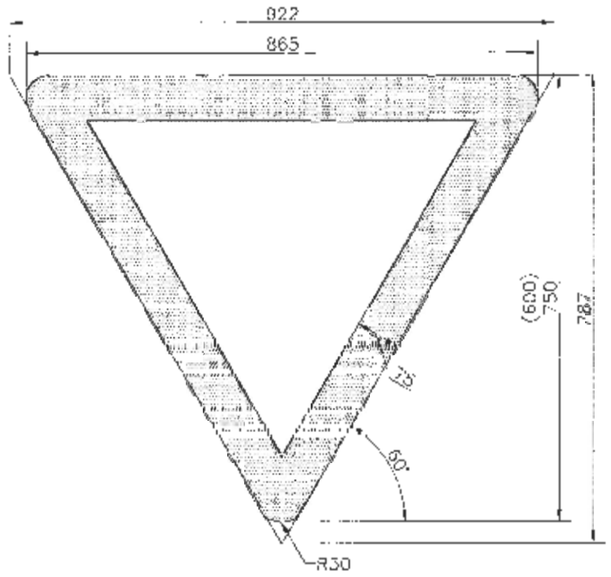


EMPLOYER	PROJECT	DESIGN CONSULTANT	
Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kathmandu (Naggbhunga) - Naubise - Mugling Road and Bridges	Intercontinental Consultants & Technocrats Pvt. Ltd. A-9, Green Park, New Delhi - 110016 Ph : 4066-3000, Fax 2685 5252 In Joint Venture With Soosung Engineering Co. Ltd., South Korea In Association With Full Bright Consultancy (Pvt.) Ltd. 316,Baburam Acharya Sridak Sinamangal, Kathmandu. GPO Box 4975, Kathmandu Nepal	Designed By: SB Checked By: PMS Approved By: BNS

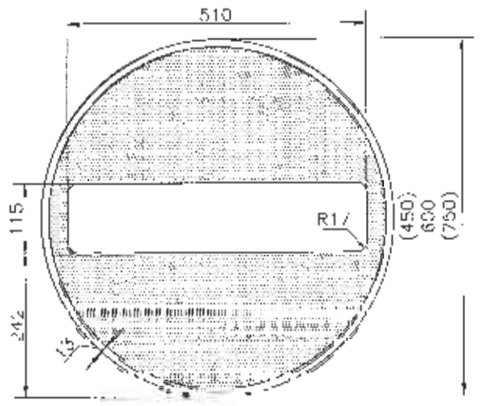
DRAWING NAME:	Scale:	Date:	Drawing No.:
TRAFFIC SAFETY SIGN AND SYMBOL	NOT TO SCALE	August 2019	NMMR-TYP 03-03



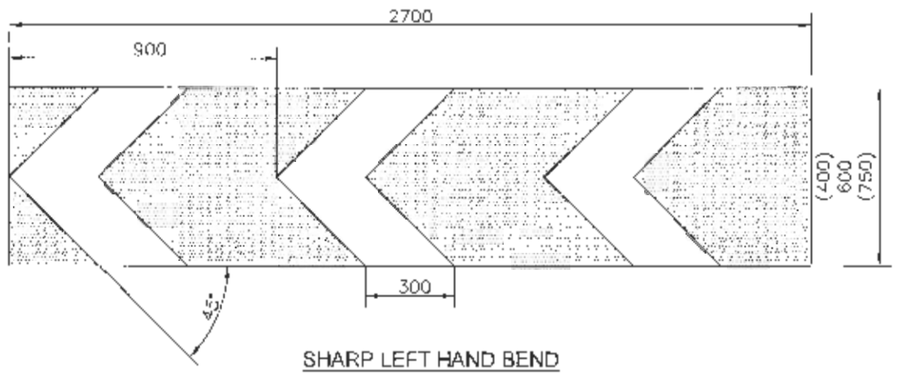
STOP AND GIVE WAY
(SCALE A)



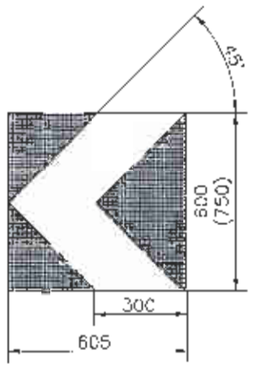
GIVE WAY TO TRAFFIC ON
MAJOR ROAD/ROUNDABOUT
(SCALE A)



NO ENTRY FOR VEHICLES
(SCALE A)



SHARP LEFT HAND BEND
(RIGHT IF SIGN REVERSED)
(SCALE B)



SINGLE CHEVRON VARIATION
(SCALE B)

NOTES :-

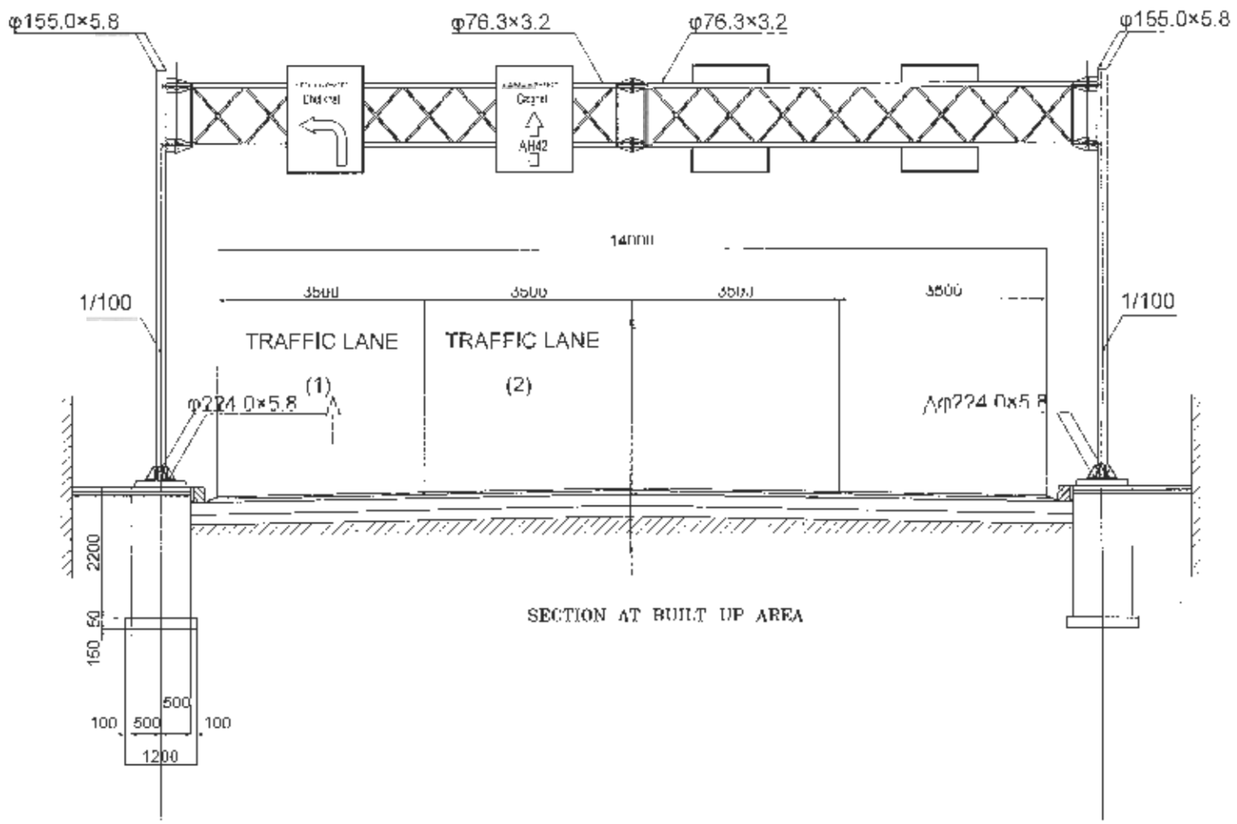
- ALL DIMENSIONS SHOWN IN MILLIMETRES
- IF USING ALTERNATIVE OVERALL SIGNS DIMENSIONS, SHOWN IN BRACKETS, THE OTHER SIGN DIMENSIONS

RED

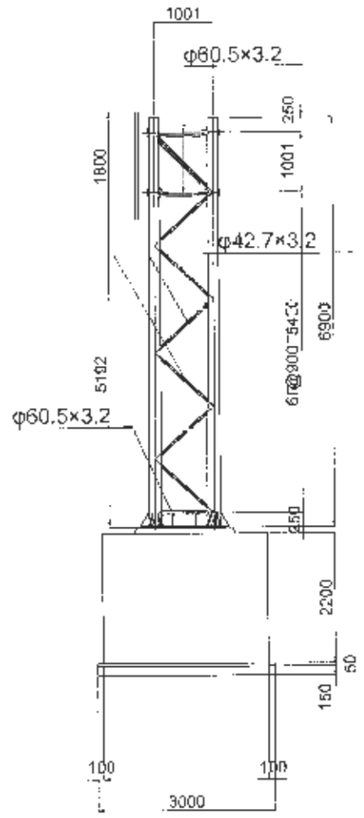
WHITE

EMPLOYER	PROJECT	DESIGN CONSULTANT					DRAWING NAME:	Scale:	Date:
Government of Nepal Ministry of Physical Infrastructure and Transport **Department of Roads** **Development Cooperation Implementation Division**	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kathmandu (Nagdhunga) - Naubise - Mugling Road and Bridges	Intercontinental Consultants & Technocrats Pvt. Ltd. A-5, Green Park, New Delhi - 110016 Ph.: 4066-3000, Fax 2665 5252 In Joint Venture With Seoeung Engineering Co. Ltd., South Korea FBC In Association With Full Bright Consultancy (Pvt.) Ltd. 316,Bibidanra Acharya Sadak Sinamangal, Kathmandu, GPO Box: 4970, Kathmandu, Nepal					TRAFFIC SAFETY SIGN AND SYMBOL	NOT TO SCALE	August 2019
			Designed By	SB					**Drawing No.:** NNMR-TYP 03-04
			Checked By	PMS					
			Approved By	BNS					

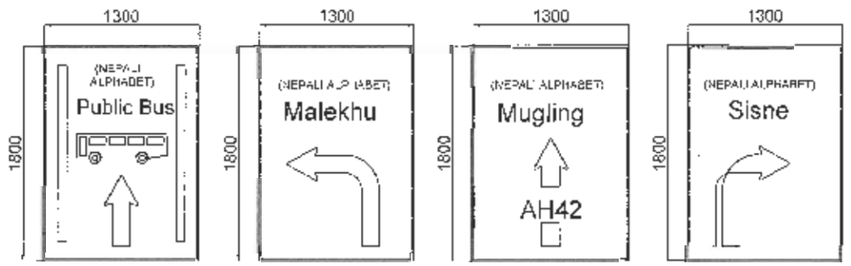
FRONT ELEVATION



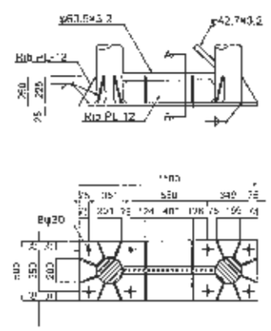
SECTION AT BUILT UP AREA



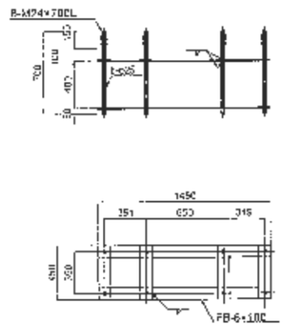
SIGN BOARD S 1:50



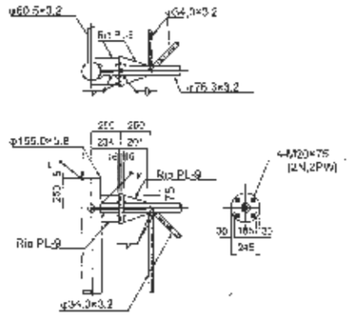
BASE PLATE S 1:50



ANCHOR BOLT S 1:50

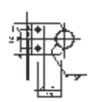


ATTACHMENT OF BEAM S 1:50



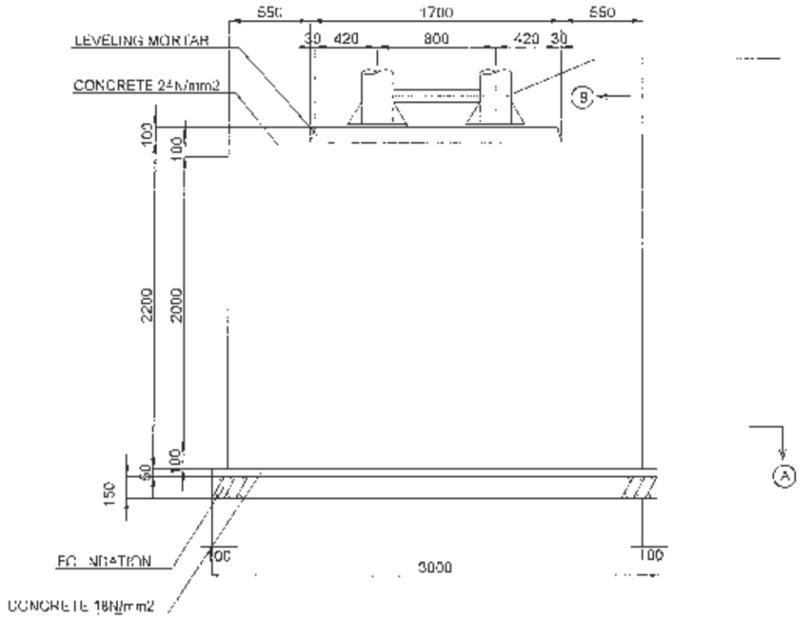
A-A SECTION S 1:50

ATTACHMENT OF SIGN BOARD S 1:50

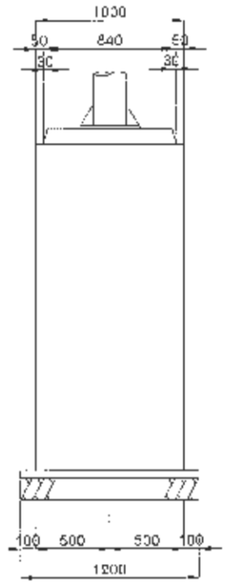


EMPLOYER	PROJECT	DESIGN CONSULTANT				
Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Nepal Ind a Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kathmandu (Nagdhunga) - Naubise - Mugling Road and Bridges	Intercontinental Consultants & Technocrats Pvt. Ltd. A-8, Green Park, New Delhi - 110016 Ph: 4066-3000 Fax 2665 5252 In Joint Venture With Seoshin Engineering Co., Ltd., South Korea In Association With Full Bright Consultancy (Pvt.) Ltd. 316,Baburam Acharya Sadak Sinamangal, Kathmandu, GPO Box 4870, Kathmandu, Nepal			DRAWING NAME: TYPICAL DRAWINGS OF OVERHEAD TYPED TRAFFIC SIGN	Scale:
			Designed By	SB		Date: August 2019
			Checked By	PMS		Drawing No.: NNMR-TYP 03-05
			Approved By	BNS		

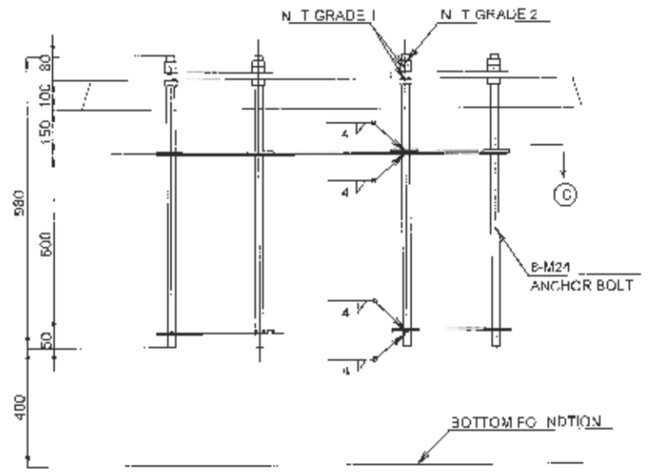
FOUNDATION DETAIL SCALE 1:20



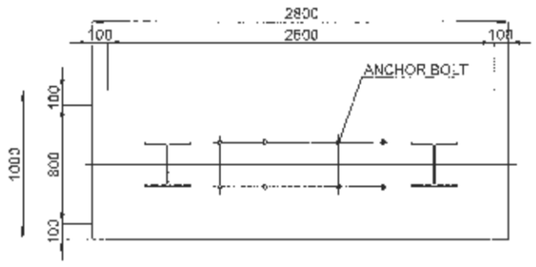
SECTION-B SCALE 1:20



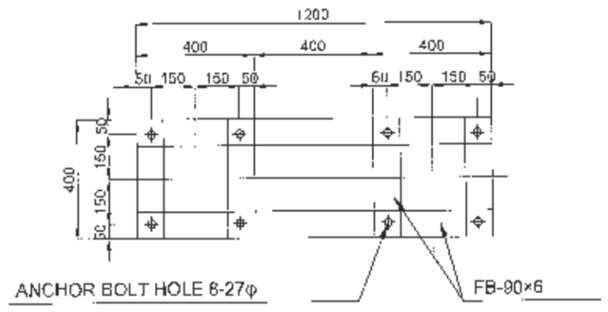
ANCHOR DETAIL SCALE 1:10



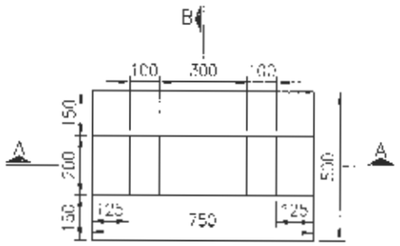
SECTION-A SCALE 1:20



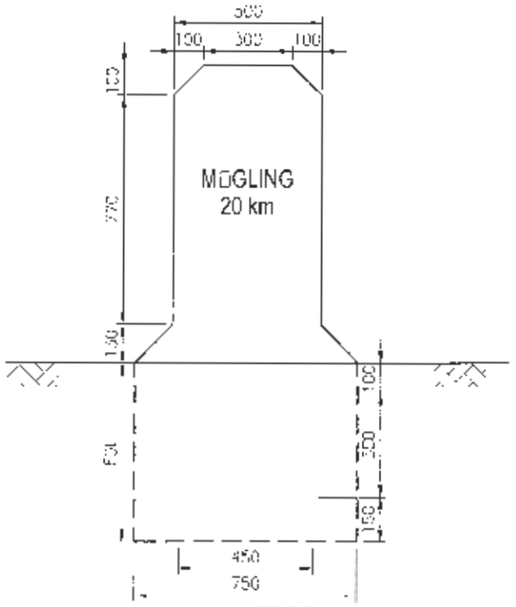
SECTION-C SCALE 1:10



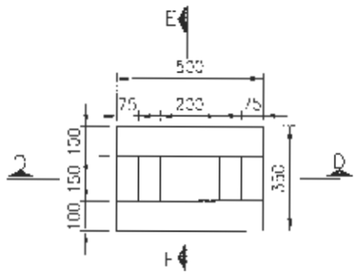
EMPLOYER Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	**PROJECT** Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kathmandu (Nagdhunga) - Naubise - Mugling Road and Bridges	**DESIGN CONSULTANT** Intercontinental Consultants & Technocrats Pvt. Ltd. A-5, Green Park New Delhi - 110016 Ph.: 4065-3000, Fax 2685-5252 In Joint Venture With Seosung Engineering Co. Ltd., South Korea In Association With Full Bright Consultancy (Pvt.) Ltd. 316,Basuram Acharya Sadak Sinamangal Kathmandu, GPO Box: 4570 Kathmandu, Nepal	Designed By	SB		**DRAWING NAME:** TYPICAL DRAWINGS OF OVERHEAD TYPED TRAFFIC SIGN	**Scale:**	**Date:** August 2019 **Drawing No.:** NNMR-TYP 03-08
			Checked By	PMS				
			Approved By	BNS				



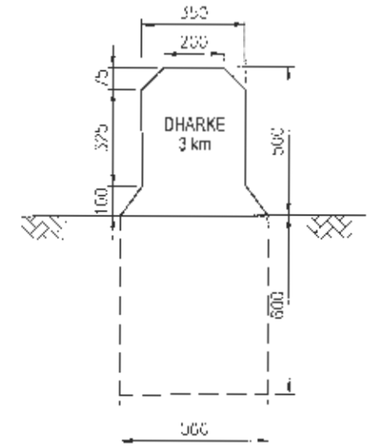
PLAN



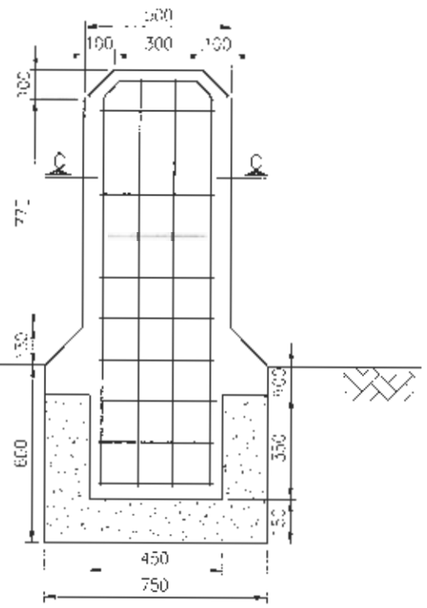
ELEVATION



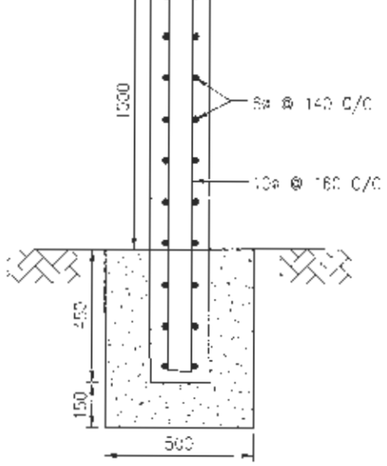
PLAN



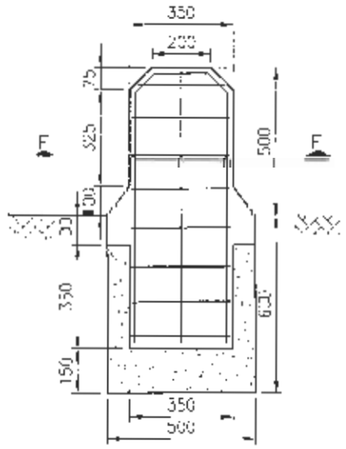
ELEVATION



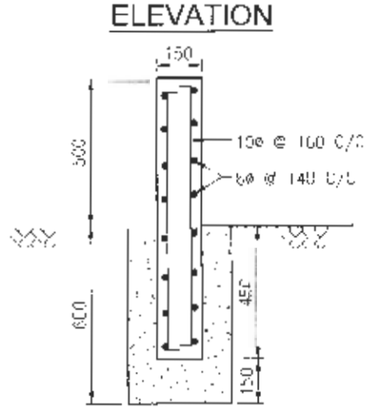
SECTION A - A



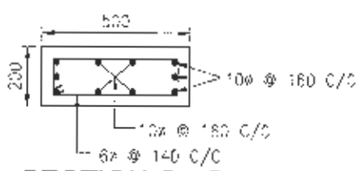
SECTION B - B



SECTION D - D

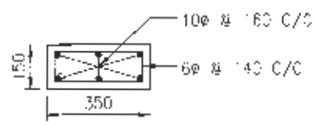


SECTION E - E



SECTION C - C

5 KILOMETER POST



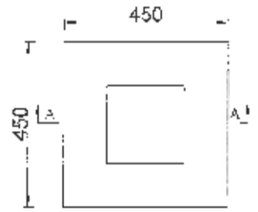
SECTION F - F

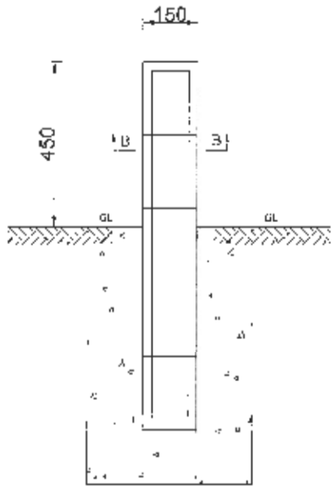
KILOMETER POST

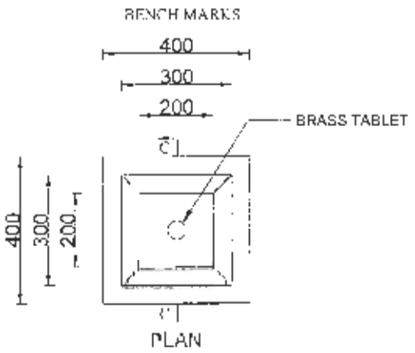
NOTES:

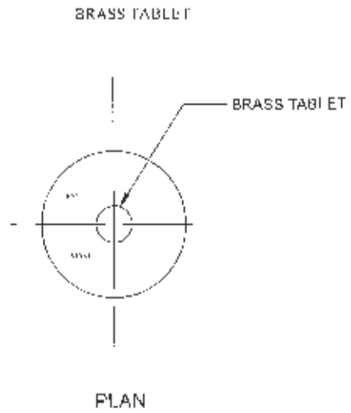
1. ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE STATED.
2. ALTERNATE km AND 5 km POST WILL BE IN NEPALI AND ENGLISH LANGUAGE.
3. LETTERING SIZE WILL BE AS RECOMMENDED IN TRAFFIC SIGN MANUAL OR AS DIRECTED BY THE ENGINEER.
4. THE BACK GROUND OF THE POST WILL BE PAINTED IN WHITE AND DEEP BLACK PAINTS WILL BE USED FOR LETTERS AND NUMERALS.
5. IN HILLY TERRAIN THE POST WILL BE LOCATED IN THE VALLEY SIDE OF THE ROAD AND IN PLAIN AREA IT WILL BE LOCATED ON THE LEFT SIDE AS ONE PROCEEDS FROM THE STARTING STATION TOWARDS THE TERMINAL STATION.

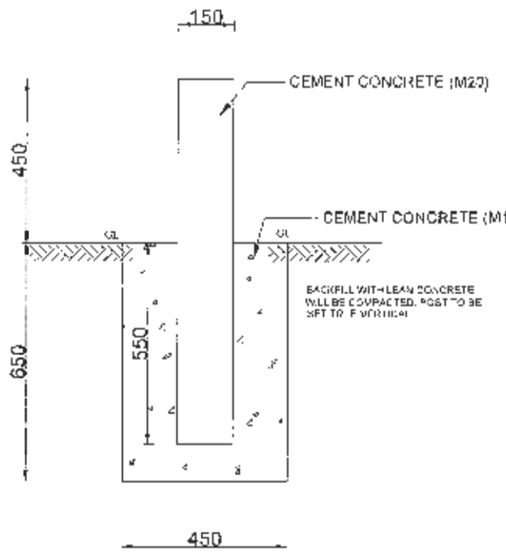
EMPLOYER	PROJECT	DESIGN CONSULTANT				DRAWING NAME:	Scale:	Date:
Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5278 - NEP) Detailed Design for Improvement of Kathmandu (Nagdhunga) - Naubise - Mugling Road and Bridges	Intercontinental Consultants & Technocrats Pvt. Ltd A-6, Green Park, New Delhi - 110016 Ph 4066 3000, Fax 2585-5252 In Joint Venture With Seoaung Engineering Co. Ltd., South Korea In Association With Full Bright Consultancy (Pvt.) Ltd. 315,Babu ram Acharya Sadak Sinamangal, Kathmandu, GPO Box: 4970, Kathmandu, Nepal		Designed By	SB	TYPICAL KILOMETER POST	SCALE 1:20	August 2019
				Checked By	PMS			Drawing No.: NNMR-TYP 03-07
				Approved By	BNS			

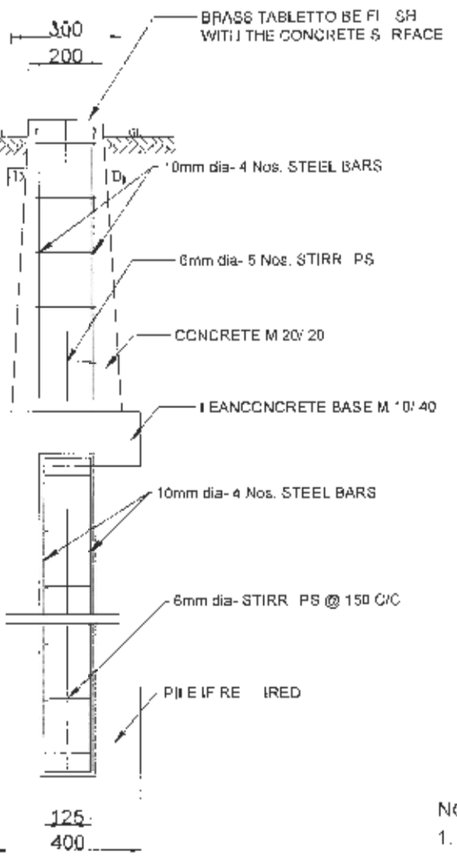


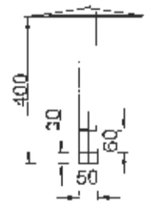


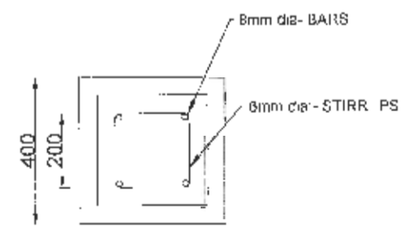


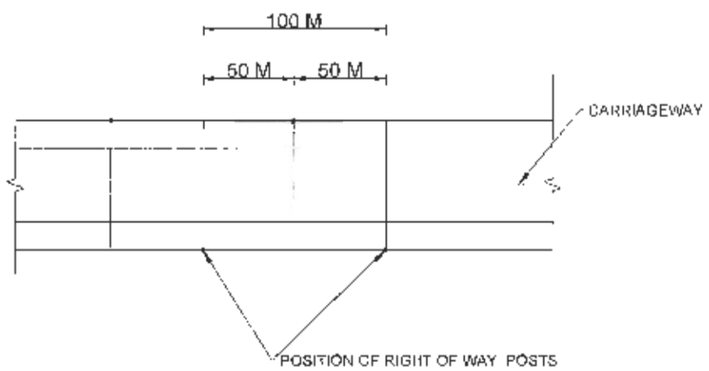








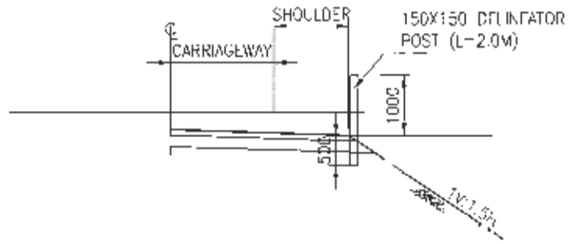




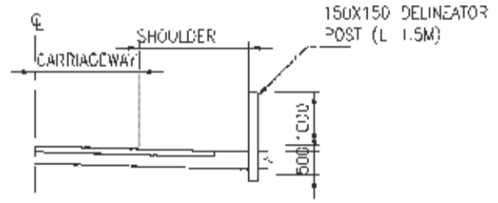
RIGHT OF WAY MON: MENTS

NOTE:
1. All dimensions are in mm unless otherwise stated.

EMPLOYER	PROJECT	DESIGN CONSULTANT			DRAWING NAME:	Scale:	Date:
Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kathmandu (Nagdhunga) - Naubise - Mugling Road and Bridges	Intercontinental Consultants & Technocrats Pvt. Ltd. A-8, Green Park, New Delhi - 110016 Ph : 4060-3300, Fax 2665-5252 In Joint Venture With Soosung Engineering Co. Ltd., South Korea In Association With Full Bright Consultancy (Pvt.) Ltd. 315,Baburam Acharya Sadak Sinamangal, Kathmandu, GPO Box: 4970, Kathmandu, Nepal	Designed By	SB	BENCHMARK & ROW MON UMENT	NOT TO SCALE	August 2016
			Checked By	PMS			Drawing No.: NNMR-TYP 03-09
			Approved By	RNS			



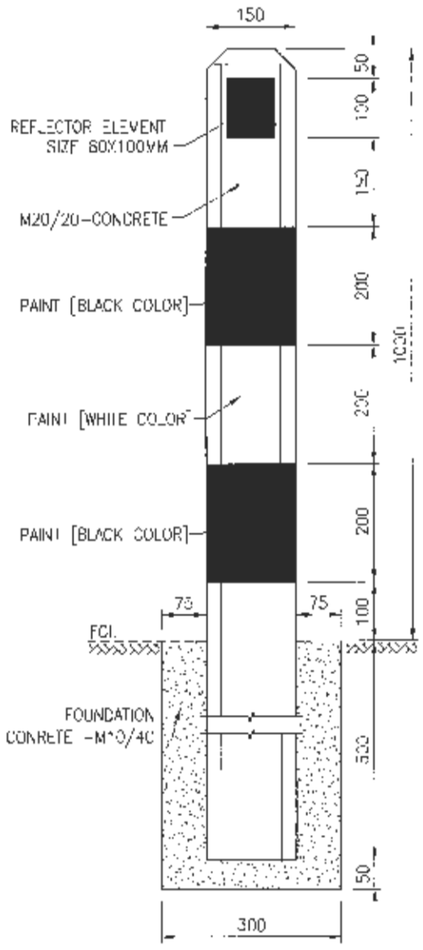
DELINEATOR FOR EMBANKMENT
(EMBANKMENT HEIGHT<3.0 m)



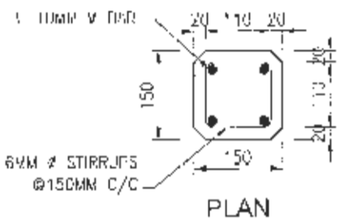
DELINEATOR FOR PLAIN AREA

RECOMMENDED SPACING FOR DELINEATOR.

RADIUS OF Horizontal Curve(M)	SPACING OF POST DELINEATOR(M)	PURPOSE OF DELINEATION(M)
30	6.0	Horizontal Curve
50	8.0	Horizontal Curve
100	12.0	Horizontal Curve
200	20.0	Horizontal Curve
300	25.0	Horizontal Curve
400	30.0	Horizontal Curve
500	35.0	Horizontal Curve
600	36.0	Other Purpose
700	42.0	Other Purpose
800	45.0	Other Purpose
900	48.0	Other Purpose
1000	50.0	Other Purpose
>1000 AND STRAIGHTS	70.0	Other Purpose



SECTIONAL ELEVATION



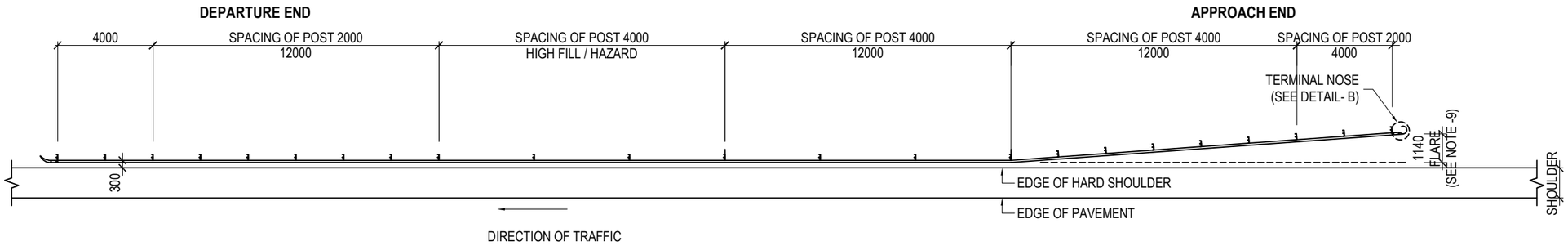
PLAN

DETAILING OF DELINEATOR POST

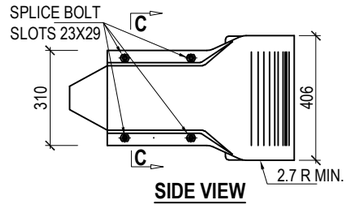
WORK QUANTITIES

ITEM NO	Description	UNIT	QUANTITY
	EARTH WORK EXACAVATION	m3	0.03
	M20/20 – CONCRETE	m3	0.033
	M10/40 – CONCRETE	m3	0.02
	FORMWORK (F2)	m2	0.735
	10MM ø BAR	Kg.	3.72
	6MM ø STIRRUPS	Kg.	1.20

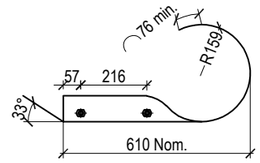
EMPLOYER	PROJECT	DESIGN CONSULTANT					
Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kathmandu (Nagdhunga) - Naubise - Mugling Road and Bridges	Intercontinental Consultants & Technocrats Pvt. Ltd. A-8, Green Park, New Delhi - 110016 Ph: 4086-3000, Fax 2686-6202 In Joint Venture With Seosung Engineering Co. Ltd., South Korea FRC In Association With Full Bright Consultancy (Pvt.) Ltd 316,Baburam Acharya Sadak Sinamangal, Kathmandu, GPO Box: 4970, Kathmandu, Nepal				DRAWING NAME: TYPICAL ROAD DELINEATOR	Scale: 0 100 200
			Designed By	SB			Date: August 2019
			Checked By	PMS			Drawing No.: NNMR-TYP 03-09
			Approved By	BNS			



GUARD RAIL FOR HIGH FILL (3m) OR HAZARD
SCALE A

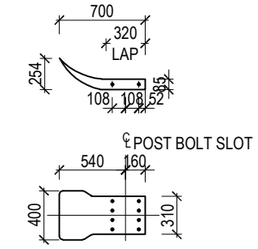


SIDE VIEW

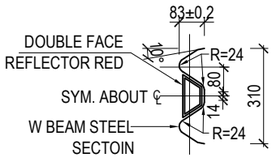


TOP VIEW

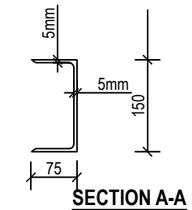
TERMINAL NOSE
DETAIL B
SCALE B



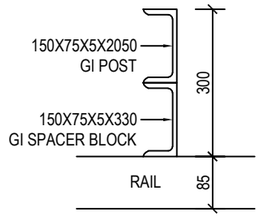
W-BEAM TERMINAL SECION
(AT RESTRICTED LOCATIONS)
SCALE D



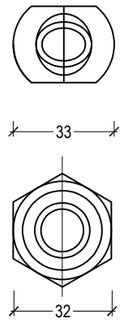
SECTION B-B
W BEAM RAIL
(TYPE -1, CLASS B)
SCALE B



SECTION A-A
SCALE E



DETAIL - A
PLAN
SCALE E



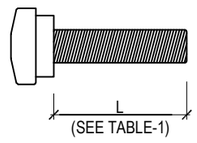
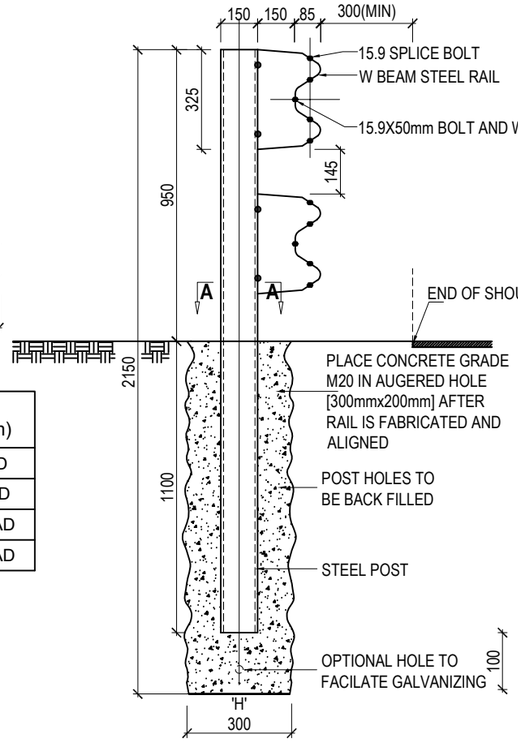


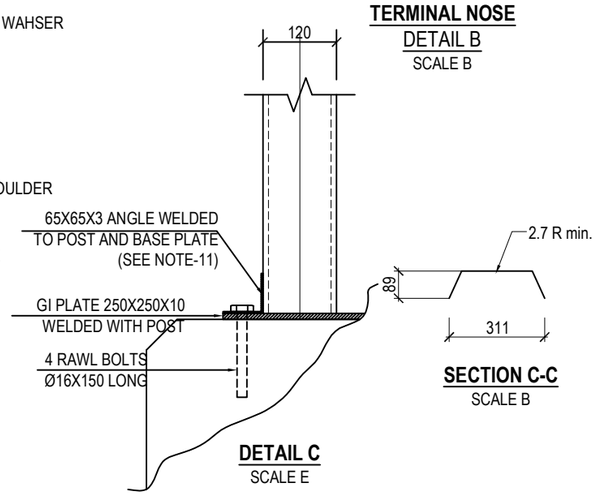
TABLE NO.1

L (mm)	THREAD LENGTH (mm)
35	FULL THREAD
50	45mm THREAD
255	100mm THREAD
460	150mm THREAD

POST OR SPLICE BOLT AND NUT
SCALE C

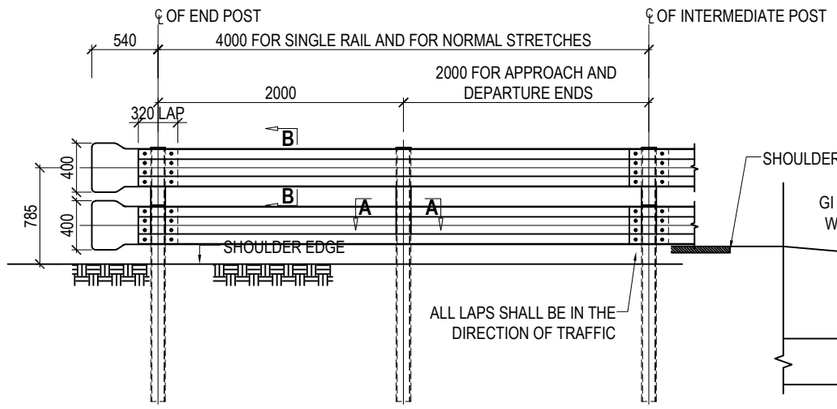


STEEL POST DETAIL
(FOR SINGLE GUARD RAIL)
SCALE B

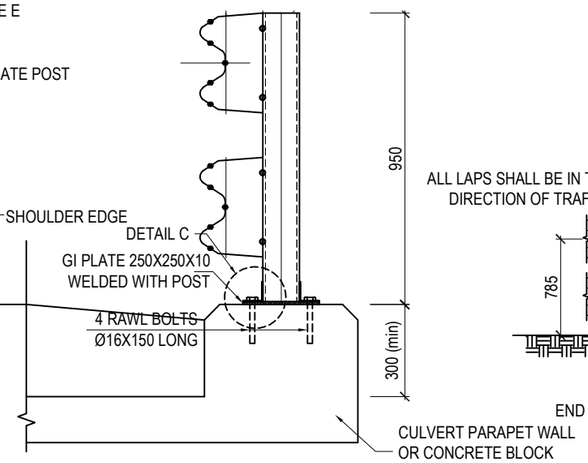


DETAIL C
SCALE E

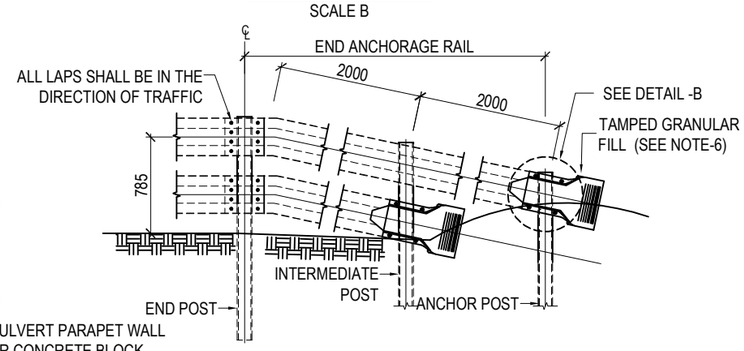
SECTION C-C
SCALE B



TYPICAL ELEVATION
(WHERE FISH TAIL IS USED)
SCALE D



STEEL POST FIXATION
(AT STRUCTURES/CONCRETE BLOCK)
SCALE B

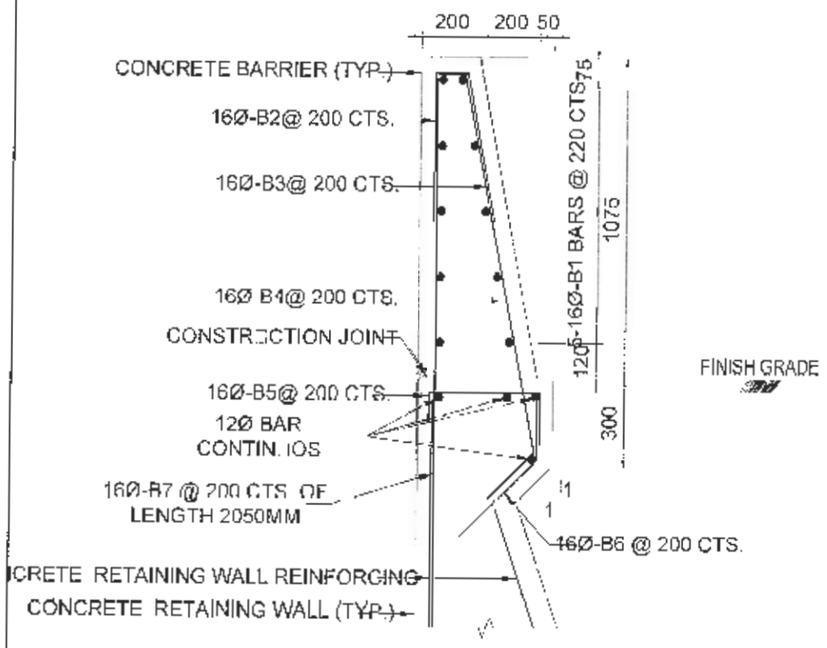


TYPICAL END RAIL ANCHORAGE
(RAMP DOWN SECTION)
SCALE D

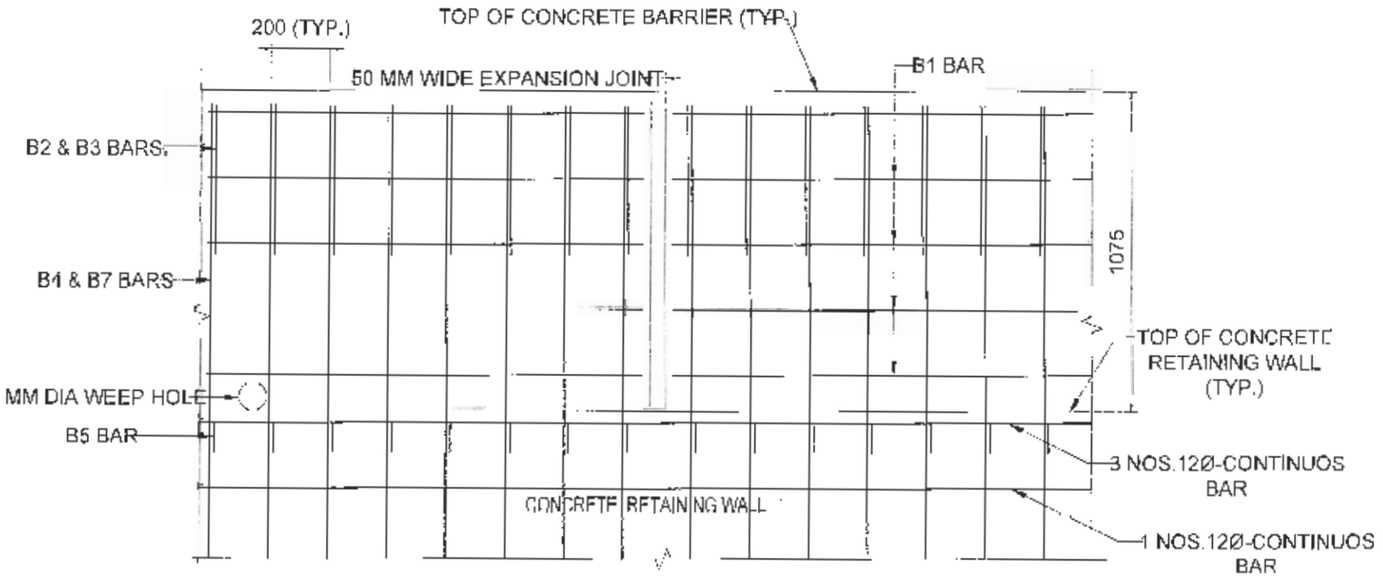
NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS SHOWN OTHERWISE.
2. ALL LAPS SHALL BE IN THE DIRECTION OF TRAFFIC.
3. W-BEAM TERMINAL SECTIONS SHALL BE USED IN PLACE OF END RAIL ANCHORAGE AT RESTRICTED LOCATIONS AS APPROVED BY THE ENGINEER.
4. W-BEAM RAIL SECTIONS SHALL CONFORM TO IRC.
5. WHERE THE GUARDRAIL HAS TO FOLLOW A CURVE OF LESS THAN 45m RADIUS, THE BEAM SHALL BE CURVED TO SUIT, BY THE BEAM MANUFACTURER.
6. CONTRACTOR SHALL PREPARE DRAWINGS SHOWING LOCATION, ELEVATIONS AND SPACING OF POSTS EACH CULVERTS/HIGH FILL LOCATION AND SHALL OBTAIN ENGINEER'S APPROVAL. THE LOCATION AND EXTENT OF GUARD RAIL CAN BE REDUCED DEPENDING UPON SITE CONDITIONS OF AS DIRECTED BUY THE ENGINEER.
7. BACKFILLING OF THE POST HOLES WILL BE CARRIED OUT AS FOLLOWS:
   - IN CASE OF ROCK, CORED HOLES-250 DIA (AS MADE) WILL BE BACK FILLED WITH LEAN CONCRETE.
   - IN CASE OF STRATA OTHER THAN ROCK, HOLES-300 DIA (AS MADE) WILL BE BACK FILLED WITH LEAN CONCRETE OR THEPOSTS MAY BE HAMMERED IN PLACE AS APPROVED BY THE ENIGEER. NO EXTRA PAYMET SHALL BE MADE TO THE CONTRACTOR FOR CORING AND OR CONCETING FOR POST FIXATION.
9. EMBANKMENT MAY BE WIDENED, WHERE NECESSARY, TO ACCOMODATE GUARD RAIL FLARE AT APPROACH END.
10. POSTS DAMAGED DURING HAMMERING SHALL BE REPLACED BY THE CONTRACTOR AT NO EXTRA COST TO THE EMPLOYER.
11. ALL WELDING OPERATIONS TO BE CARRIED OUT PRIOR TO GALVANIZING.

EMPLOYER	PROJECT	DESIGN CONSULTANT				DRAWING NAME:	Scale:	Date:
Government of Nepal Ministry of Physical Infrastructure and Transport **Department of Roads** **Development Cooperation Implementation Division**	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kathmandu (Nagdhunga) - Naubise - Mugling Road and Bridges	Intercontinental Consultants & Technocrats Pvt. Ltd. A-8, Green Park, New Delhi - 110016 Ph : 4086-3000, Fax 2685-5252 In Joint Venture With Soosung Engineering Co. Ltd., South Korea In Association With Full Bright Consultancy (Pvt.) Ltd. 316,Baburam Acharya Sadak Sinamangal, Kathmandu, GPO Box: 4970, Kathmandu, Nepal				STEEL SAFETY BARRIER / CRASH BARRIER	NOT TO SCALE	August 2019 **Drawing No.:** NNMR-TYP 03-10
			Designed By	SB				
			Checked By	PMS				
			Approved By	BNS				

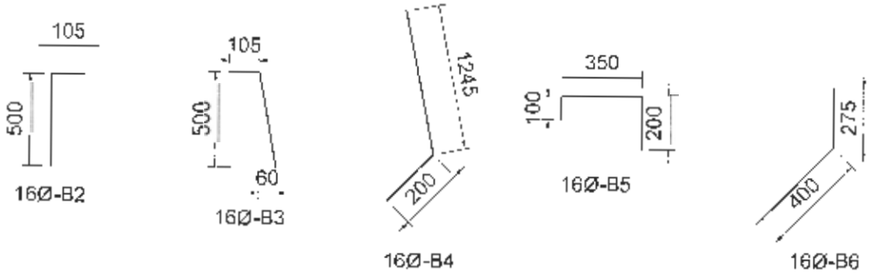


TYPICAL SECTION



RETAINING WALL REINFORCING NOT SHOWN FOR CLARITY.

ELEVATION

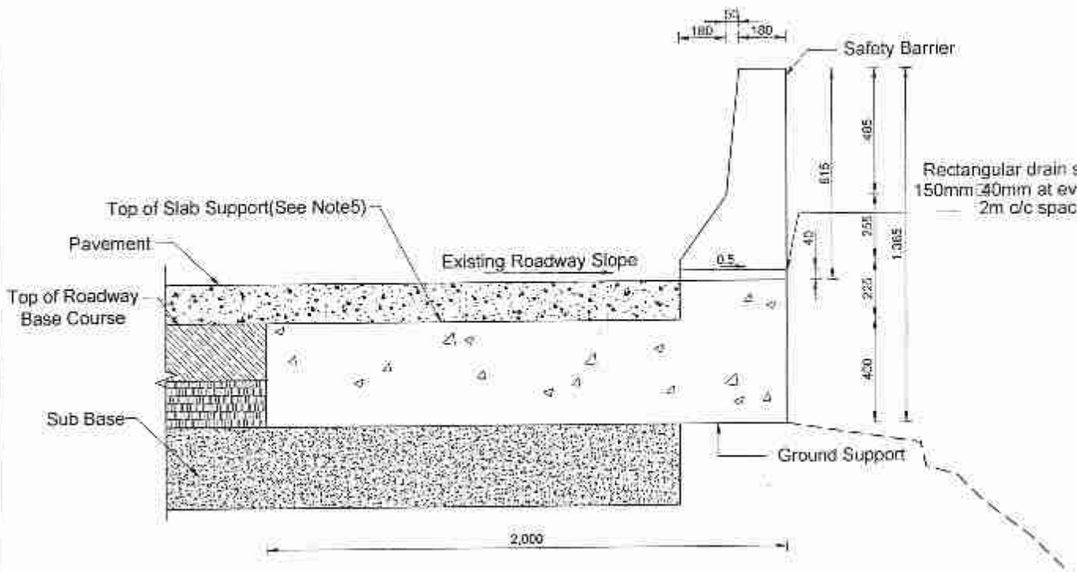


REBAR SCHEDULE

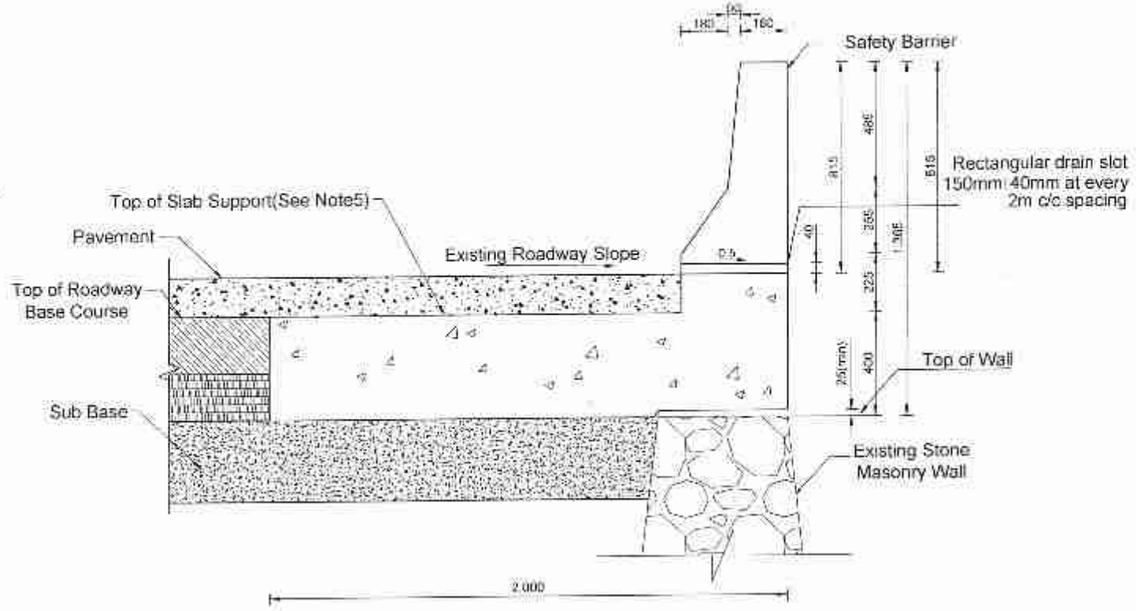
NOTE:

1. ALL BARRIER SHALL BE CAST IN PLACE.
2. WALLS SHALL BE BACKFILLED BEFORE BARRIER IS PLACED.
3. ALL EXPOSED EDGES OF BARRIER CURB SHALL HAVE EITHER A 12MM RADIUS OR 10MM BEVEL UNLESS OTHERWISE NOTED.
4. USE A MINIMUM LAP OF 95MM FOR 16Ø HORIZONTAL BARRIER CURB REBAR.
5. CONCRETE IN THE BARRIER CURB SHALL BE OF 25 MPA. REINFORCING STEEL SHALL BE OF 415 MPA.
6. THIS BARRIER MEETS THE CRASH TEST REQUIREMENTS OF NCHRP REPORT 350 FOR TEST LEVEL 4 (TL-4).
7. CLEARANCE TO REINFORCING STEEL IN BARRIER TO BE 25MM, EXCEPT AS NOTED. MINIMUM CONCRETE EDGE DISTANCE TO THE REINFORCING SHOWN, SHALL BE MAINTAINED.
8. THE 50MM OPEN EXPANSION JOINTS SHALL BE PLACED ON THE BARRIER AT A MAXIMUM SPACING NOT EXCEEDING 90 METERS. CONTRACTION JOINTS SHALL BE PLACED AT EVERY 6 TO 8 METERS INTERVALS. PREFORMED EXPANSION JOINT FILLER MATERIAL SHALL BE USED.
9. 8MM DIAMETER WEEP HOLES AT A MAXIMUM SPACING OF 3 METERS SHALL BE PROVIDED AT THE LOWEST POINT POSSIBLE. WEEP HOLES SHALL ALIGN WITH THE RETAINING WALL IF EXIST. WEEP HOLES MAY BE FORMED WITH ANY PRACTICAL METHOD.

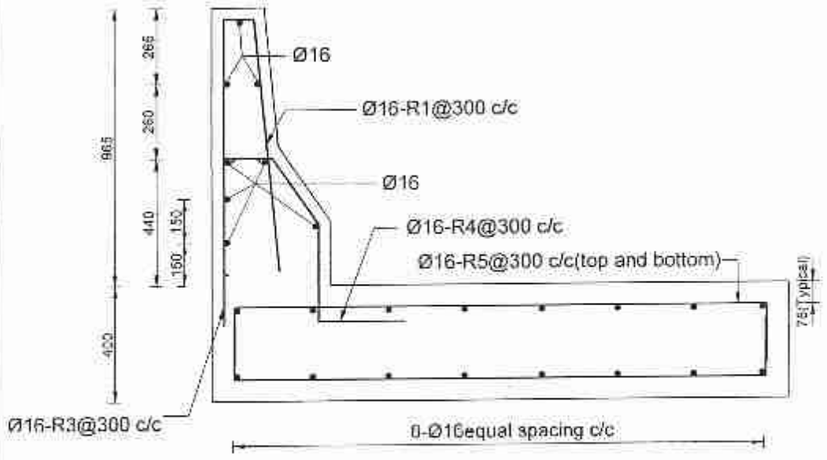
EMPLOYER	PROJECT	DESIGN CONSULTANT			DRAWING NAME:	Scale:	Date:
Government of Nepal Ministry of Physical Infrastructure and Transport **Department of Roads** **Development Cooperation Implementation Division**	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kathmandu (Nagdhunga) - Naubise - Mugling Road and Bridges	Intercontinental Consultants & Technocrats Pvt. Ltd. A-9 Green Park, New Delhi - 110016 Ph : 4060-0000, Fax 2685-5252 In Joint Venture With Soosung Engineering Co. Ltd., South Korea In Associat on With Full Bright Consultancy (Pvt.) Ltd. 315,Gebu am Acharya Sadak Sinamangal, Kathmandu, GPO Box: 4970 Kathmandu, Nepal	Designed By	SB		BARRIER DETAIL ON TOP OF REINFORCED CONCRETE RETAINING WALL	1 : 200	August 2019
			Checked By	PMS				Drawing No.: NNMR-TYP 03-11
			Approved By	BNS				



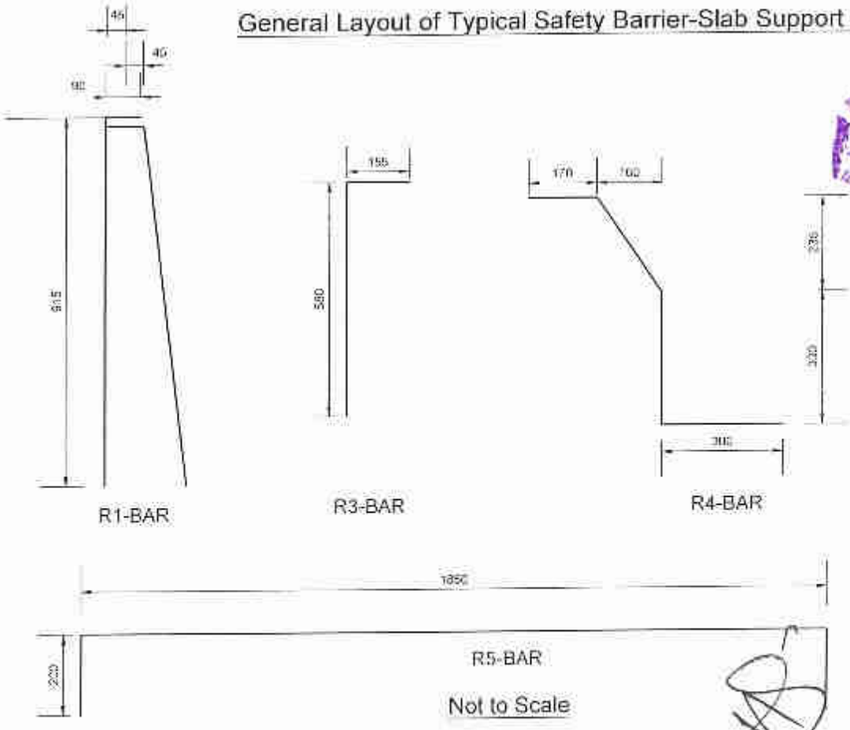
General Layout of Typical Safety Barrier-Ground Support System



General Layout of Typical Safety Barrier-Slab Support System



Reinforcing Detail Section



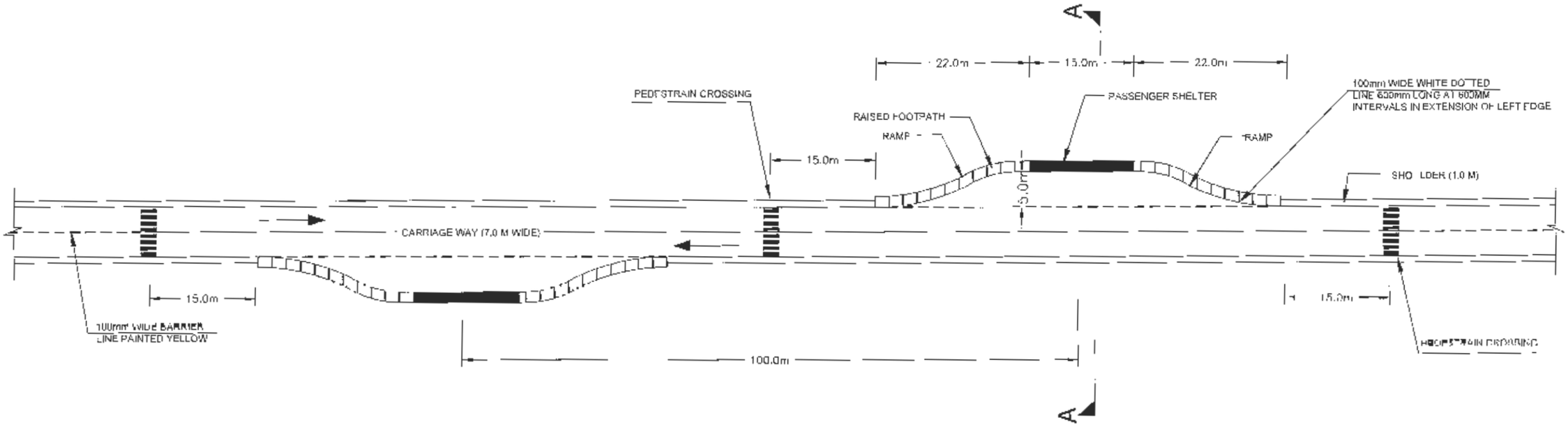
Not to Scale

Notes:

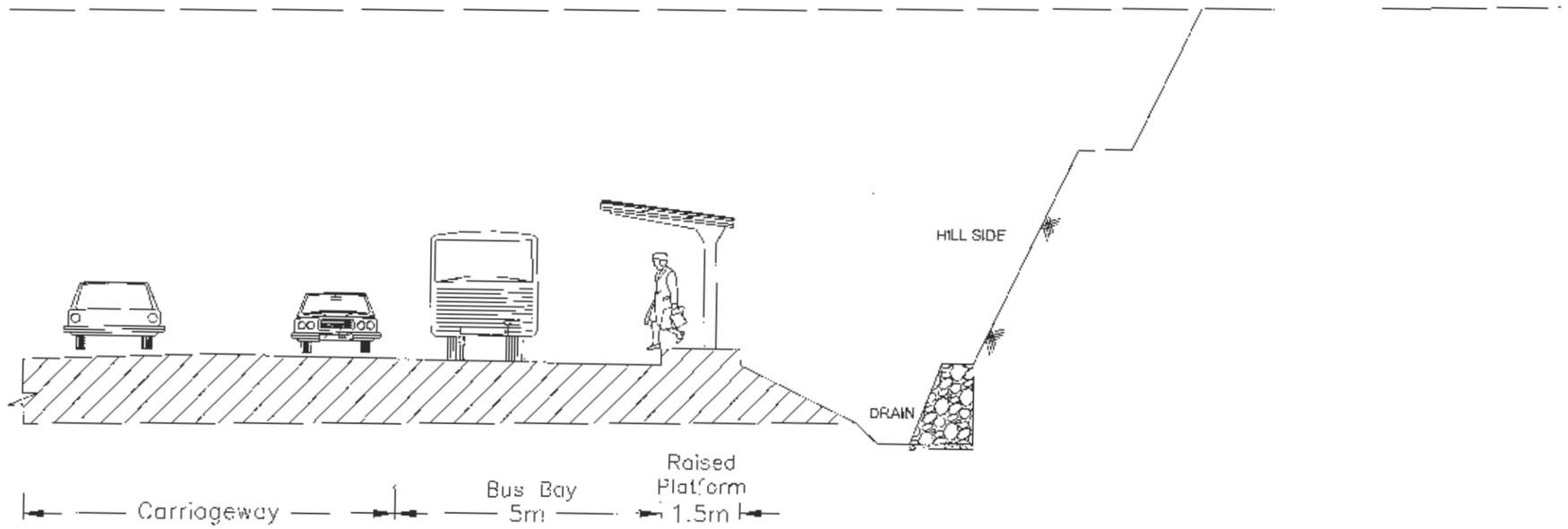
1. All Concrete shall be M40 (M40)
2. All reinforcing steel shall be Fe500.
3. Each Segment of the barrier slab support system shall not be less than 8m.
4. All minimum clearance shall be 40mm unless otherwise noted.
5. Top of slab shall be flushed with top of roadway base course.
6. h assumed 150mm. Contractor shall verify thickness of the pavement before safety barrier slab support system is placed.
7. All dimensions are in mm.

EMPLOYER	PROJECT	DESIGN CONSULTANT					
Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kathmandu (Nagdhunga) - Naubise - Mugling Road and Bridges	Intercontinental Consultants & Technocrats Pvt. Ltd. A-3, Green Park, New Delhi - 110016 Ph: 4585-3000, Fax 2685-5252 In Joint Venture With Soosung Engineering Co. Ltd., South Korea In Association With Full Bright Consultancy (Pvt.) Ltd. 316,Baburam Acharya Sadak Sinamangal, Kathmandu, GPO Box: 4970, Kathmandu, Nepal					
			Designed By	SR		DRAWING NAME: SAFETY BARRIER SLAB SUPPORT SYSTEM	Scale: 1 : 200
			Checked By	PMS			Date: August 2019
			Approved By	BNS			Drawing No.: NIMR-TYP 03-12

ROAD SIDE FURNITURE DETAILS

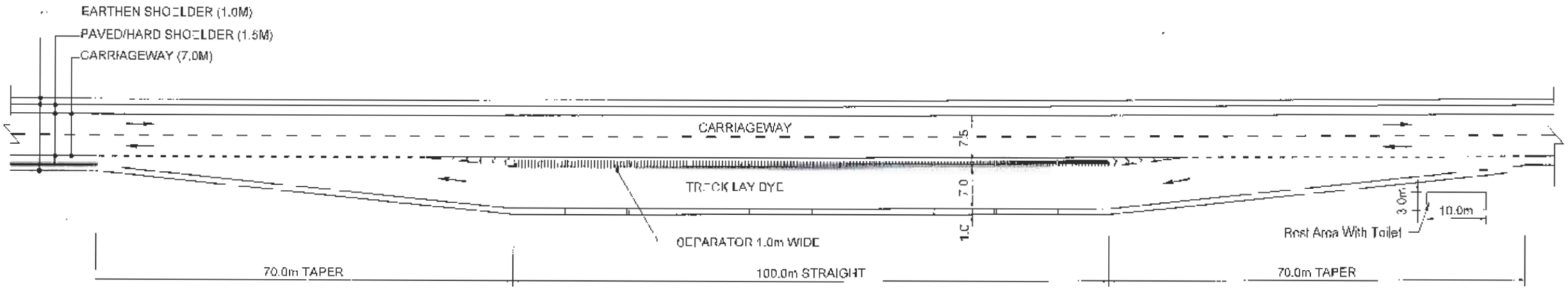


TYPICAL LAYOUT - PICK UP BUS STOP (IN HILLY SECTION)

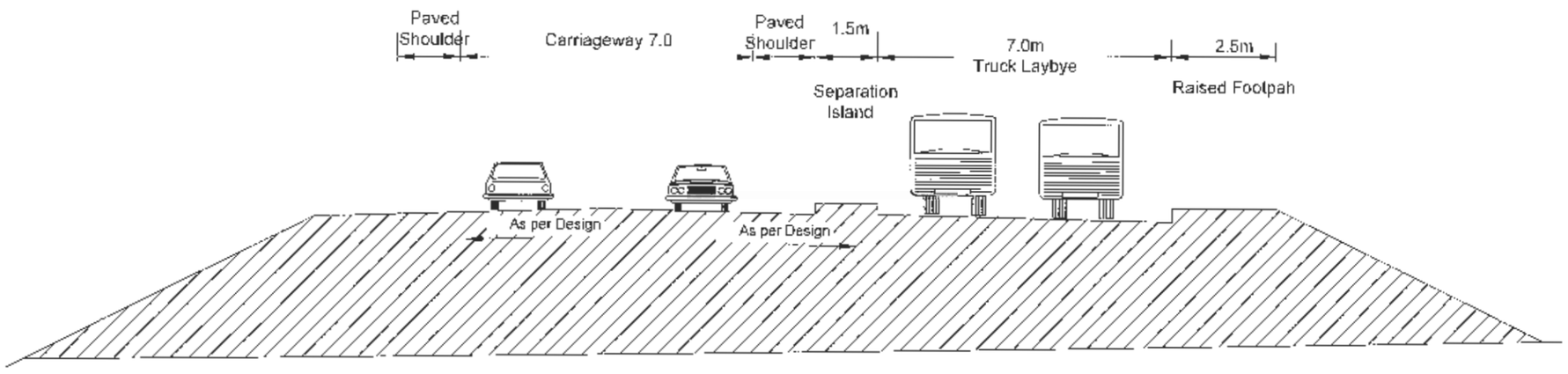


SECTION AT AA

EMPLOYER Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	**PROJECT** Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kathmandu (Nagdhunga) - Naubise - Mugling Road and Bridges	**DESIGN CONSULTANT** Intercontinental Consultants & Technocrats Pvt. Ltd. A-8 Green Park, New Delhi - 110016 Ph : 4286-3000 Fax 2685-5202 In Joint Venture With Seosung Engineering Co. Ltd., South Korea In Association With Full Bright Consultancy (Pvt.) Ltd. 316,Baburam Acharya Sadak Sinamangal, Kathmandu, GPO Box. 4970, Kathmandu, Nepal	Designed By	SR		**DRAWING NAME:** TYPICAL BUS BAY (HILLY SECTION)	**Scale:** NOT TO SCALE	**Date:** August 2019 **Drawing No.:** NNMR-TYP 04-01
			Checked By	PMS				
			Approved By	BNS				



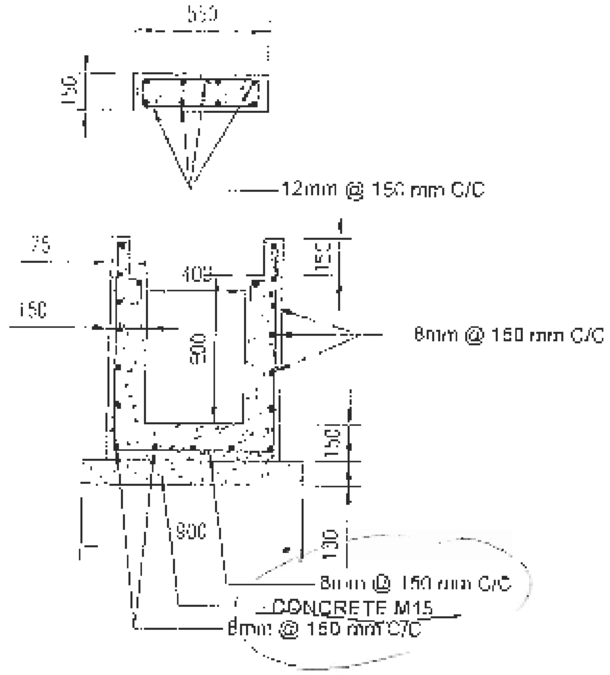
TYPICAL LAYOUT OF TRUCK LAY BYE



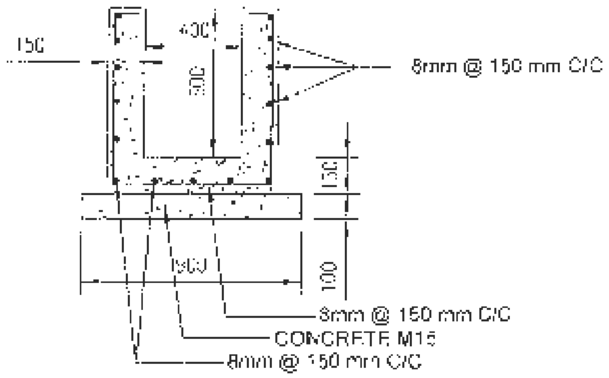
SECTION AT AA

EMPLOYER	PROJECT	DESIGN CONSULTANT					
Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kathmandu (Nagdhunga) - Naubise - Mugling Road and Bridges	Intercontinental Consultants & Technocrats Pvt. Ltd. A-8, Green Park, New Delhi - 110016 Ph. 4066-3000, Fax 2685-5252 In Joint Venture With Seosung Engineering Co. Ltd., South Korea In Association With Full Bright Consultancy (Pvt.) Ltd. 916,Saburam Acharya Sadak Sinamangal, Kathmandu, GPO Box 4970, Kathmandu, Nepal				DRAWING NAME: TYPICAL TRUCK BAY	Scale:
			Designed By	SB			Date: August 2019
			Checked By	PMS			Drawing No.: NNMR-TYP 04-02
			Approved By	BNS			

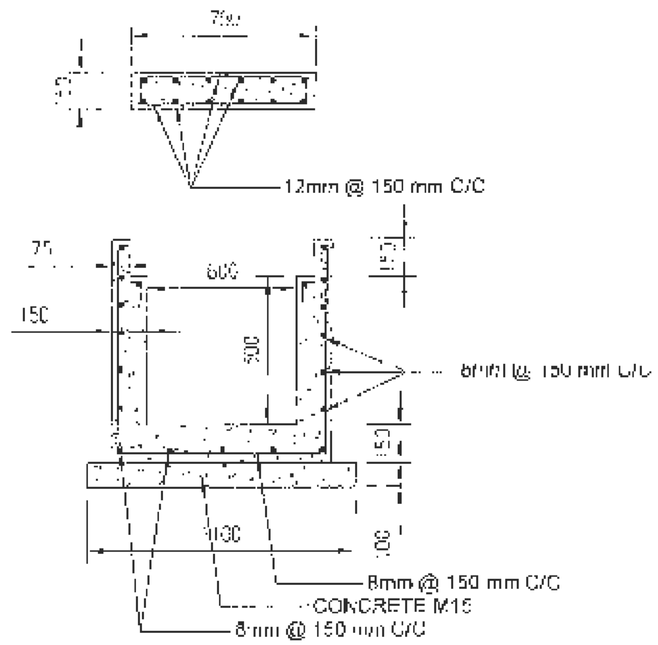
TYPICAL SIDE DRAIN AND CROSS DRAINAGE STRUCTURES



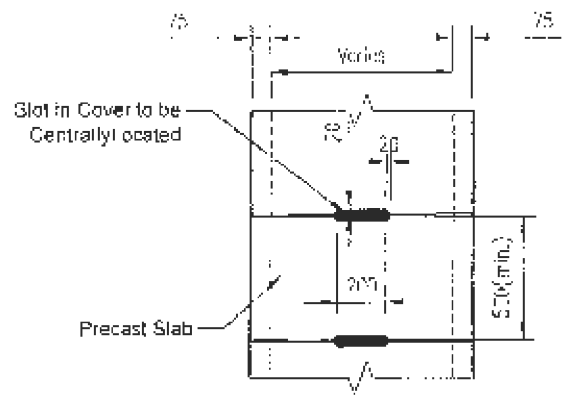
Precast Type-1



Precast Type-1(A)

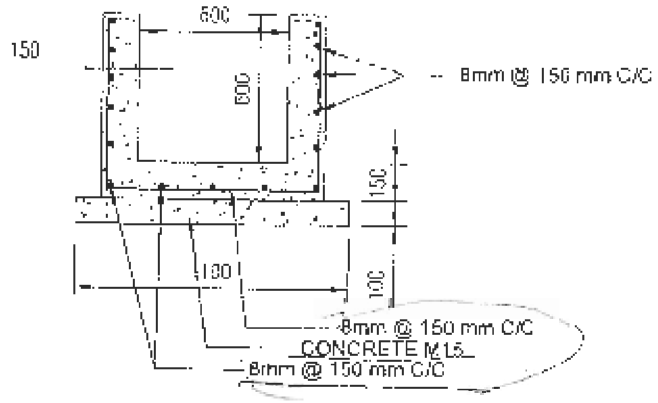


Precast Type-2

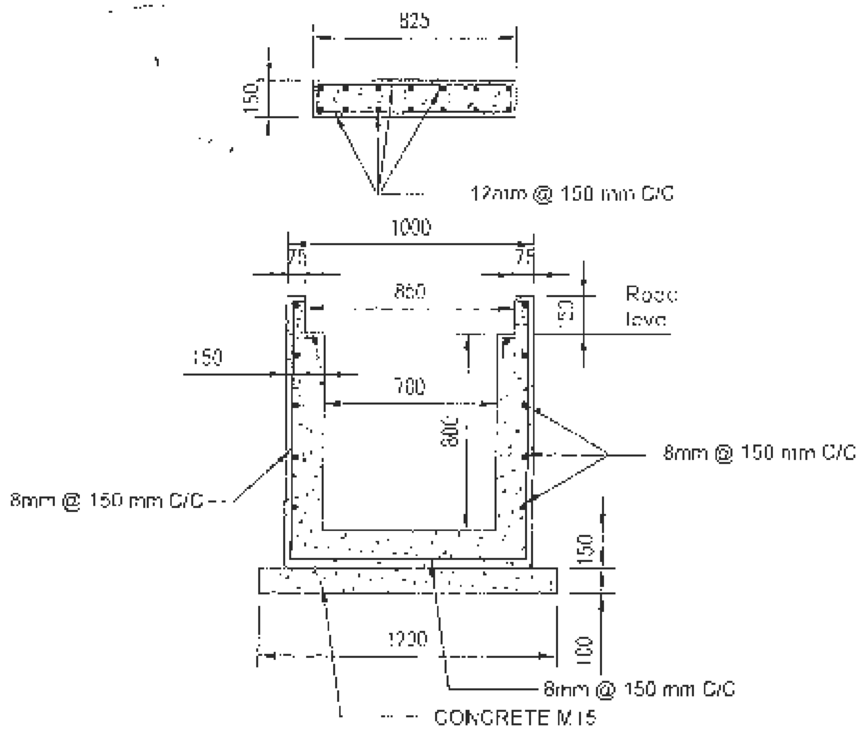


PLAN

Precast RCC Drain Covered



Precast Type-3

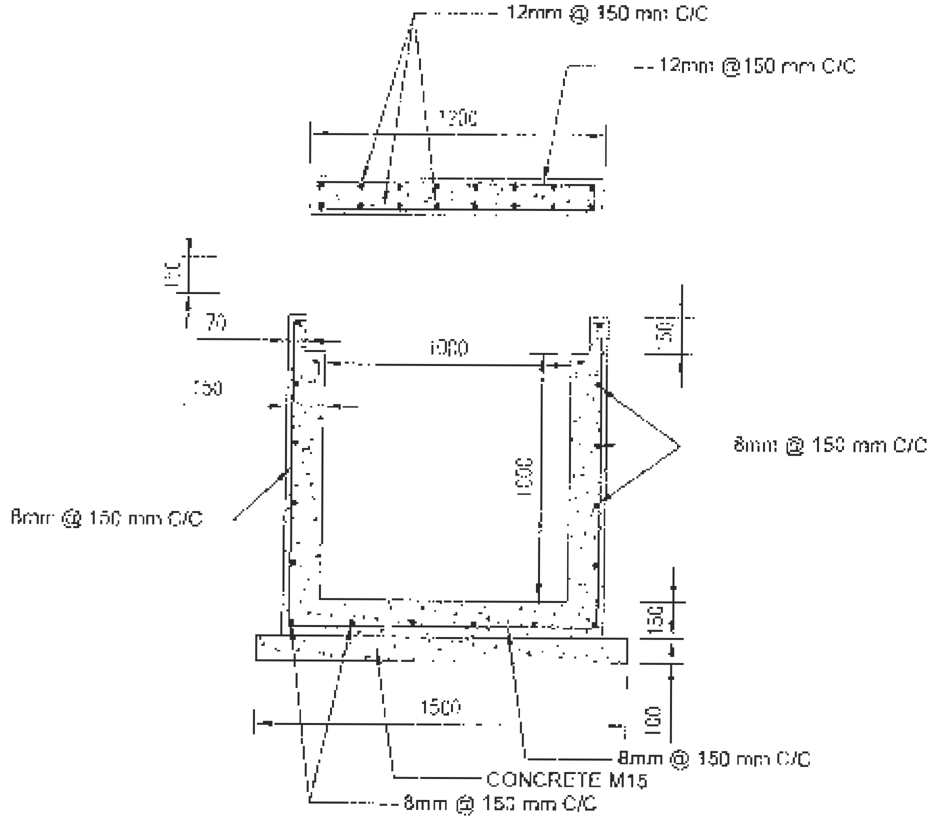


Precast Type-4

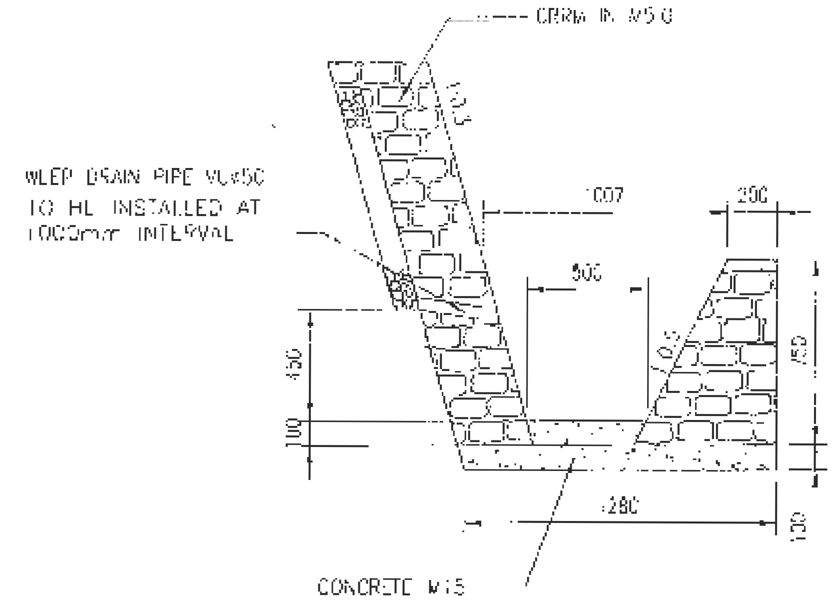
NOTES:

1. M25/20-CONCRETE WILL BE PLACED TO MAINTAIN FLOW DEPTH OF Min 300mm
2. GRADIENT GREATER THAN 7% DROP WILL BE PROVIDED OR AS DIRECTED.
3. MIN 5% SLOPE BE PROVIDED FOR THE DRAIN WITH DROPS
4. CONCRETE M25 FOR COVER SLAB
5. CONCRETE M15 IN BED.
6. MIN COVER TO REINFORCEMENT IS 25mm.
7. REINFORCEMENT TO BE HIGH YIELD DEFORMED BARS GRADE 415
8. ALL SURFACE DRAIN/SUB SURFACE DRAIN TO BE CONNECTED TO NEAREST PROPOSED OR EXISTING WATER-COURSE
9. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE MENTIONED.
10. FOR Type-1, Type-2, and Type 3 ALL REINFORCEMENT OF 8mm DIA AT 150mm C/C SPACING

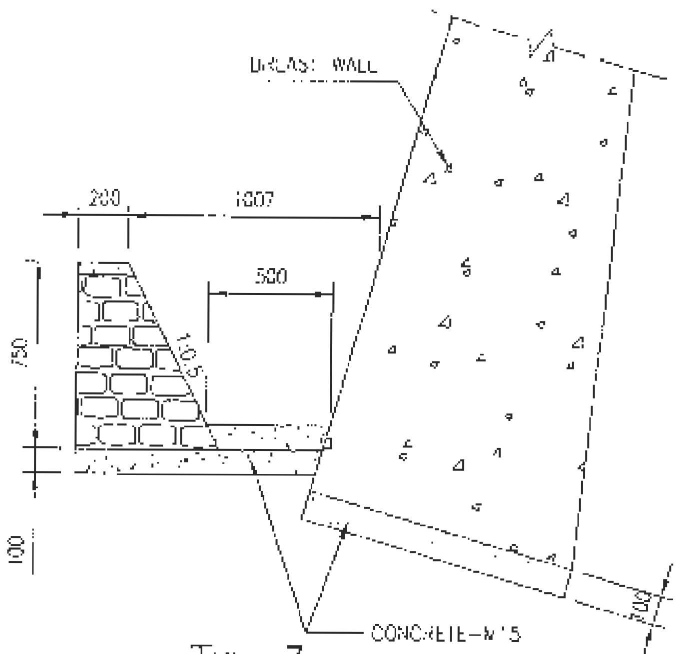
EMPLOYER	PROJECT	DESIGN CONSULTANT					DRAWING NAME:	Scale:	Date:
Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Nepal India Regional Trade and Transport Project (NIRTTP) IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kathmandu (Naghdhunga) - Naubise - Mugling Road and Bridges	Intercontinental Consultants & Technocrats Pvt. Ltd A-8, Green Park, New Delhi - 110016 Ph: 4086-3000 Fax 3595 5252 In Joint Venture With Soosung Engineering Co. Ltd., South Korea	In Association With Full Bright Consultancy (Pvt.) Ltd. 316 Baburam Acharya Sadak Shamangal, Kathmandu, GPO Box 4970, Kathmandu, Nepal	Designed By Checked By Approved By	SB PMS BNS		TYPICAL SIDE DRAINS	NOT TO SCALE	August 2019 Drawing No.: NNMR-TYP 03-01A



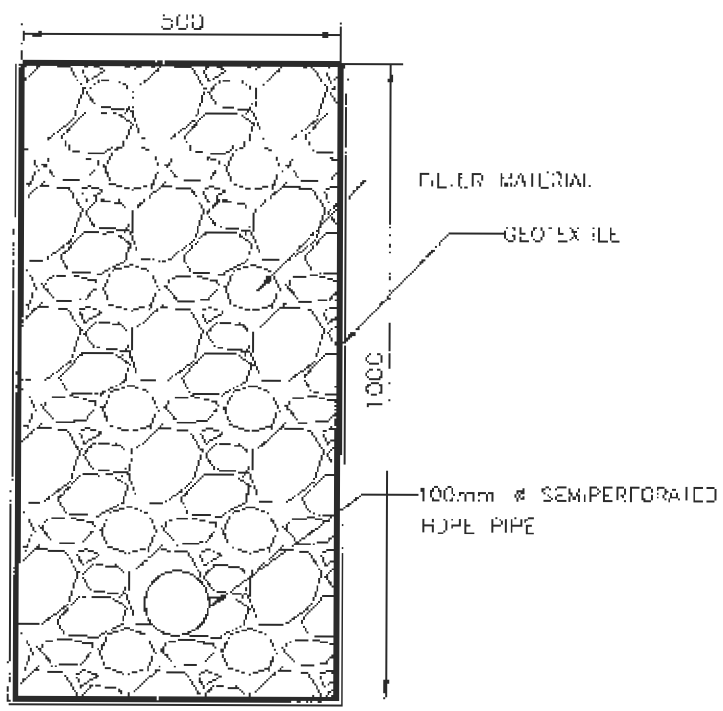
Precast Type-5



Type-6



Type-7

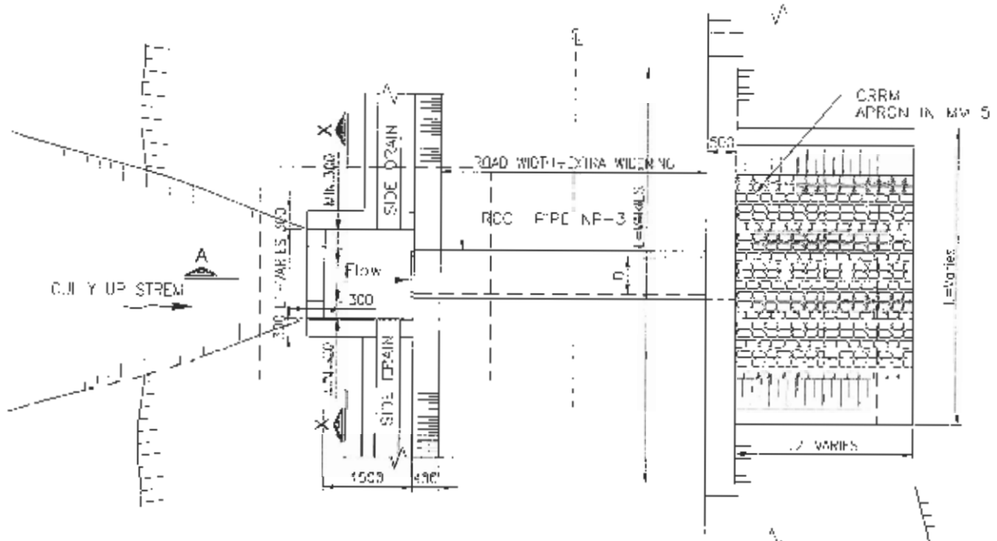


SUB-SURFACE DRAIN BELOW SIDE DRAIN
AT SEEPAGE AREA

NOTES.

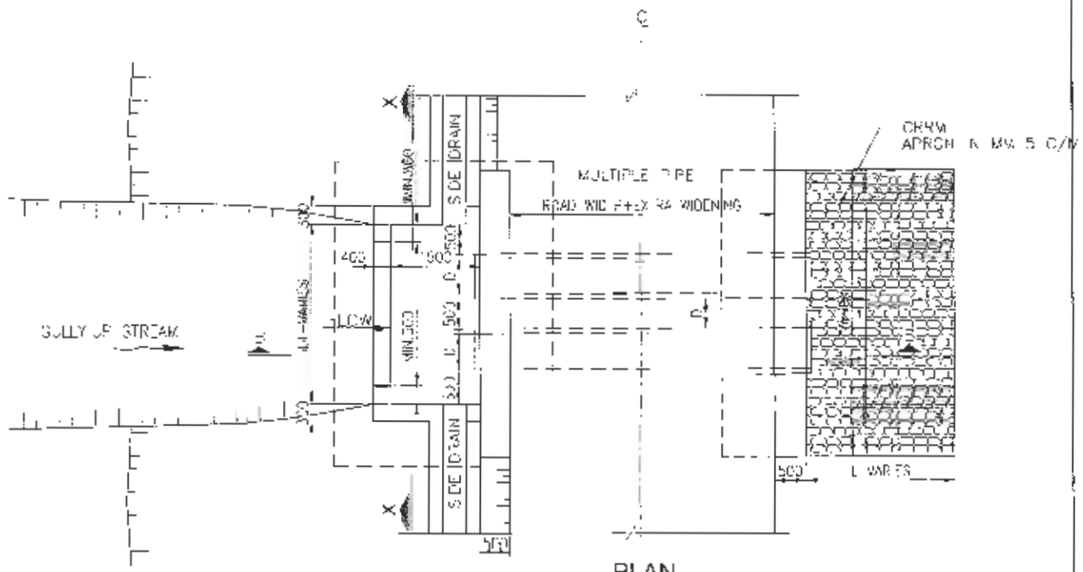
1. M25/20-CONCRETE WILL BE PLACED TO MAINTAIN FLOW DEPTH OF Min 300mm.
2. GRADIENT GREATER THAN 7% DROP WILL BE PROVIDED OR AS DIRECTED.
3. MIN 5% SLOPE BE PROVIDED FOR THE DRAIN WITH DROPS.
4. CONCRETE : M25 FOR COVER SLAB
5. CONCRETE : M15 IN BED.
6. MIN COVER TO REINFORCEMENT IS 25mm.
7. REINFORCEMENT TO BE HIGH YIELD DEFORME BARS GRADE 415.
8. ALL SURFACE DRAIN/SUB SURFACE DRAIN TO BE CONNECTED TO NEAREST PROPOSED OR EXISTING WATER-COURSE
9. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE MENTIONED.
10. FOR Type-1, Type-2 and Type-3 ALL REINFORCEMENT OF 8mm DIA. AT 150mm C/C SPACING

EMPLOYER	PROJECT	DESIGN CONSULTANT					DRAWING NAME:	Scale:	Date:
Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kathmandu (Naguhunga) - Naubise - Mugling Road and Bridges	Intercontinental Consultants & Technocrats Pvt. Ltd A-8, Green Park, New Delhi - 110016 Ph: 4086-3000, Fax 2685-5252 In Joint Venture With Soosung Engineering Co. Ltd., South Korea	In Association With Full Bright Consultancy (Pvt.) Ltd 316,Bahuram Acharya Sadak Sinamangal, Kathmandu, GPO Box 4970, Kathmandu, Nepal	Designed By Checked By Approved By	SD PMS RNS		TYPICAL SIDE DRAINS	NOT TO SCALE	August 2019 **Drawing No.:** KNMR-TYP 05 01D



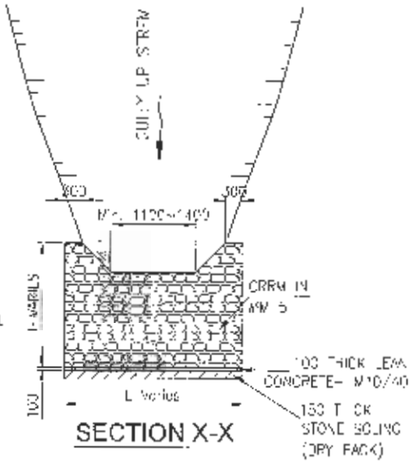
PLAN

INLET TYPE- B (SINGLE CELL WITH CATCHPIT)

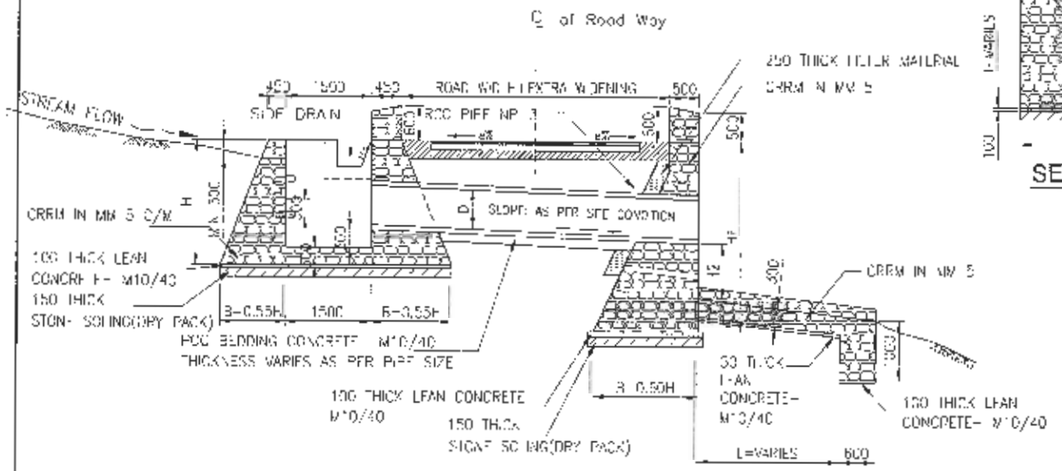


PLAN

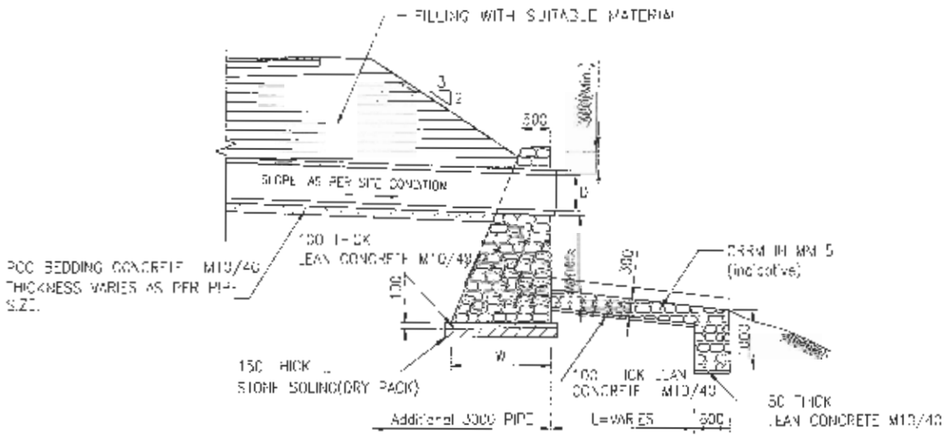
INLET TYPE- B (DOUBLE CELL WITH CATCHPIT)



SECTION X-X



SECTION A-A

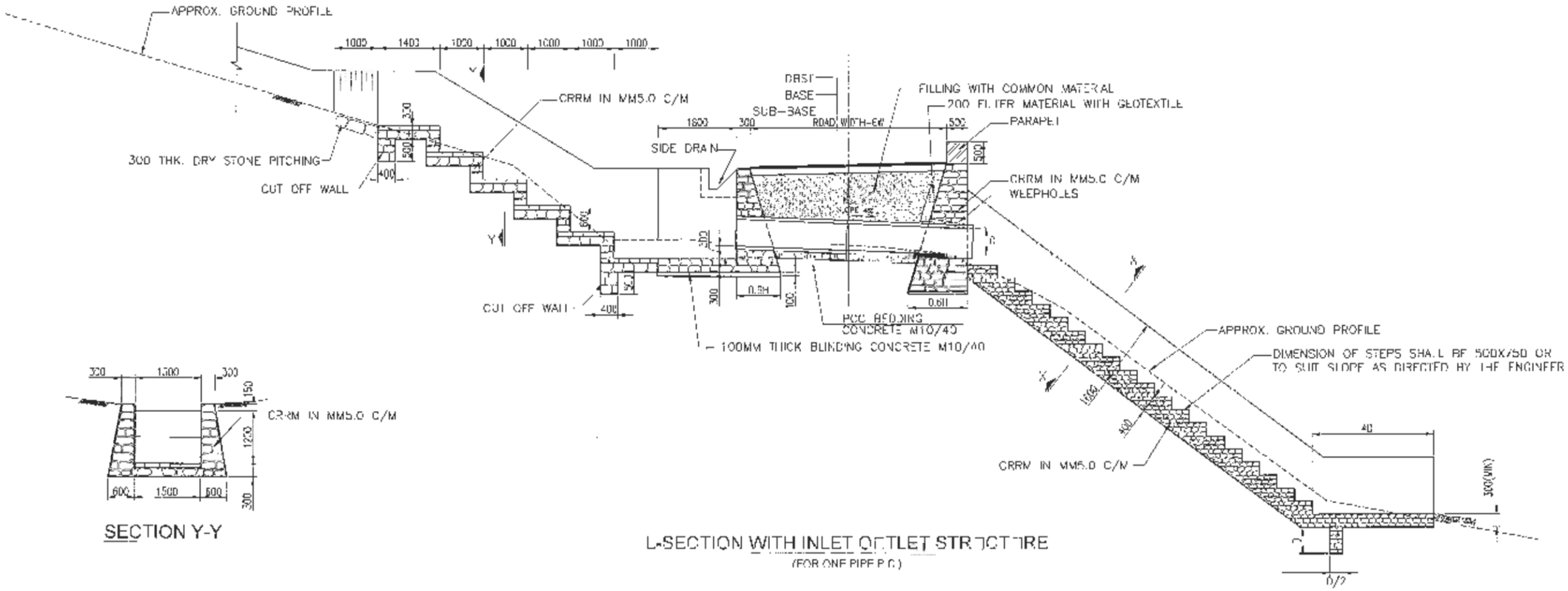


ALTERNATIVE OUTLET IN EMBANKMENT FILLING

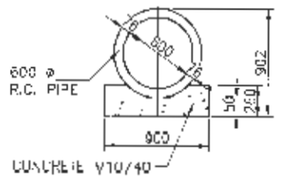
NOTES:

1. D=Inside diameter of pipe.
2. Use RCC pipe NP-3, D=Varies
3. Height of structures H, H1 & H2 varies as per site condition.
4. Stone masonry Apron slope varies as per site condition.
5. All the dimensions are in millimetres unless otherwise mentioned.

EMPLOYER	PROJECT	DESIGN CONSULTANT					
Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kathmandu (Nagdhunga) - Naubise - Mugling Road and Bridges	Intercontinental Consultants & Technocrats Pvt. Ltd. A-8, Green Park, New Delhi - 110016 Ph : 4088-3000, Fax 2685-5252 In Joint Venture With Soosung Engineering Co. Ltd., South Korea	In Association With Full Bright Consultancy (Pvt.) Ltd. 316,Baburam Acharya Sadak Sinamangal, Kathmandu, GPO Box: 4970, Kathmandu, Nepal	Designed By	SB		DRAWING NAME: TYPICAL PIPE CULVERT
				Checked By	PMS		Scale: NOT TO SCALE
				Approved By	BNS		Date: August 2019 Drawing No.: NNMR-TYP 05-02



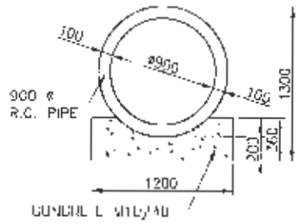
EMPLOYER Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	**PROJECT** Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kathmandu (Naubise) - Mugling Road and Bridges	**DESIGN CONSULTANT** Intercontinental Consultants & Technocrats Pvt. Ltd. A-8 Green Park, New Delhi - 110016 Ph : 4060-3000, Fax 2665-5252 In Joint Venture With Soosung Engineering Co. Ltd., South Korea In Association With Full Bright Consultancy (Pvt.) Ltd. 316,Basuram Acharya Sadak Sinamangal, Kathmandu, GPO Box: 1970, Kathmandu, Nepal	Designed By	SB		**DRAWING NAME:** TYPICAL PIPE CELVERT	**Scale:**	**Date:** August 2018
			Checked By	PMS				**Drawing No.:** NNMR-TYP 05-03
			Approved By	BNS				



PIPE CULVERT (Ø600)

WORK QUANTITIES (PER 10.0m)

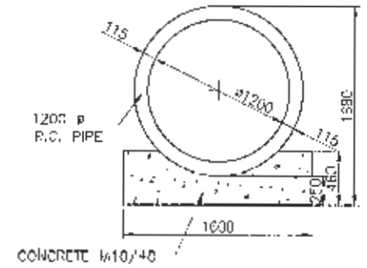
ITEM	UNIT	QUANTITY	REMARKS
R.C. PIPE (ø900)	m	10.00	NP3
CONCRETE M10/40	m3	1.82	
FORM WORK	m2	5.2	
EXCAVATION	m3	2.34	



PIPE CULVERT (Ø900)

WORK QUANTITIES (PER 10.0m)

ITEM	UNIT	QUANTITY	REMARKS
R.C. PIPE (ø900)	m	10.00	NP3
CONCRETE M10/40	m3	3.45	
FORM WORK	m2	7.20	
EXCAVATION	m3	4.32	

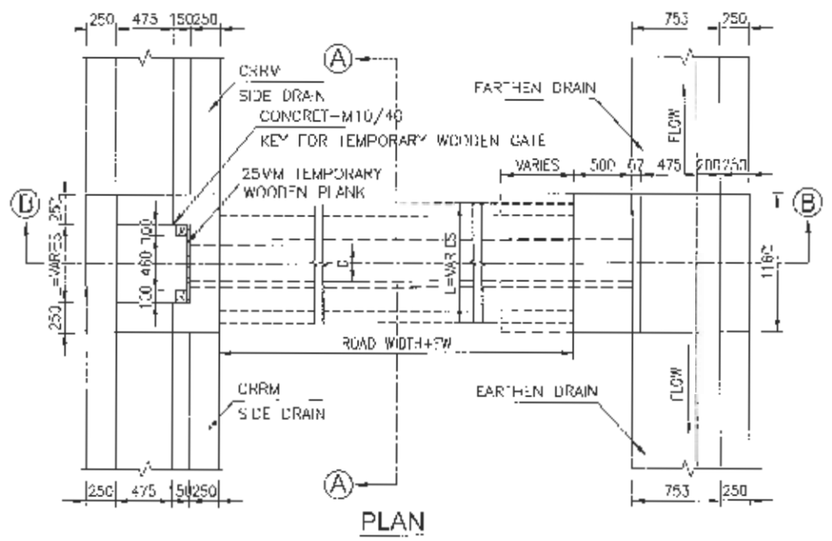


PIPE CULVERT (Ø1200)

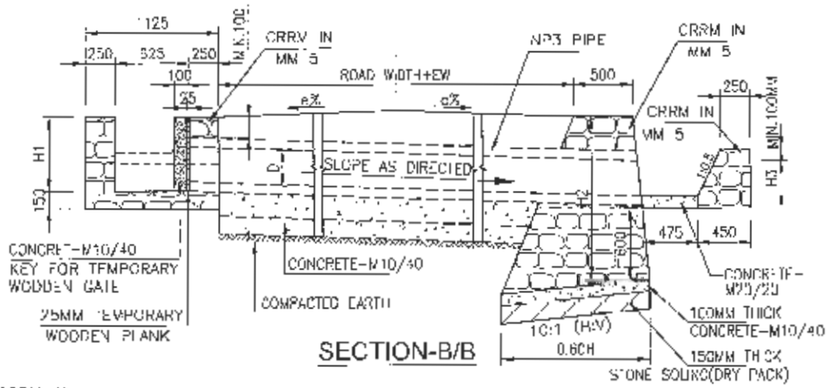
WORK QUANTITIES (PER 10.0m)

ITEM	UNIT	QUANTITY	REMARKS
R.C. PIPE (ø1200)	m	10.00	NP3
CONCRETE M10/40	m3	5.89	
FORM WORK	m2	9.20	
EXCAVATION	m3	7.36	

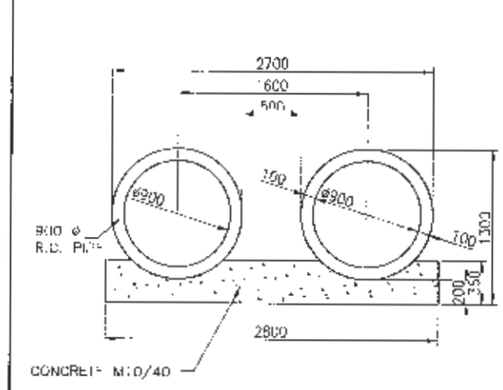
IRRIGATION CROSSING/LOOP DRAIN CROSSING



PLAN



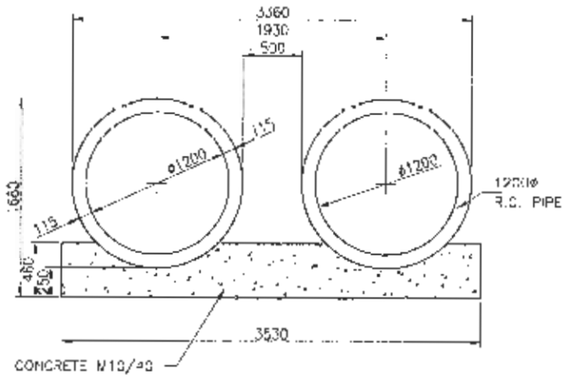
SECTION-B/B



PIPE CULVERT (2X900Ø)

WORK QUANTITIES (PER 10.0m)

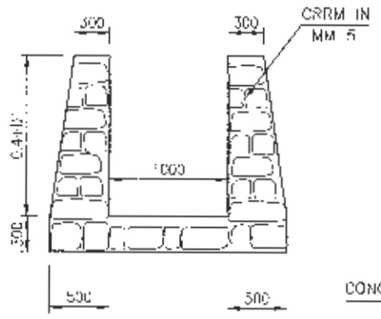
ITEM	UNIT	QUANTITY	REMARKS
R.C. PIPE (ø900)	m	20.00	NP3
CONCRETE M10/40	m3	8.36	
FORM WORK	m2	7.20	
EXCAVATION	m3	10.08	



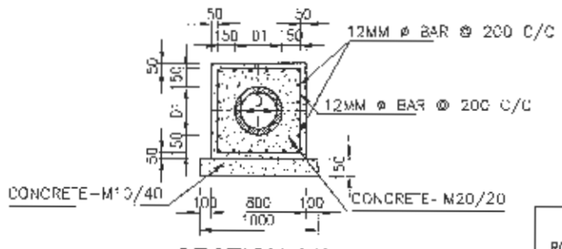
PIPE CULVERT (2X1200Ø)

WORK QUANTITIES (PER 10.0m)

ITEM	UNIT	QUANTITY	REMARKS
R.C. PIPE (ø1200)	m	20.00	NP3
CONCRETE M10/40	m3	13.62	
FORM WORK	m2	9.20	
EXCAVATION	m3	16.24	



OUTLET GUIDE CHANNEL



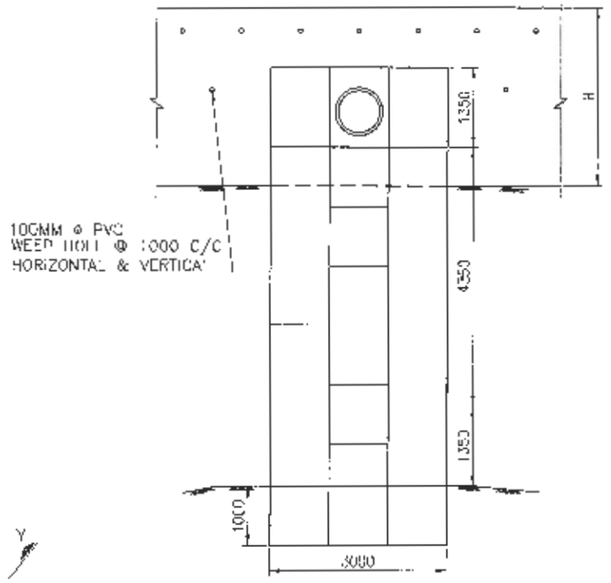
SECTION-A/A

ITEM	UNIT	DIAMETRE	REMARKS
RCC PIPE (D)	mm	300	NP3
RCC PIPE (D)	mm	600	NP3
RCC PIPE (D)	mm	450	NP3

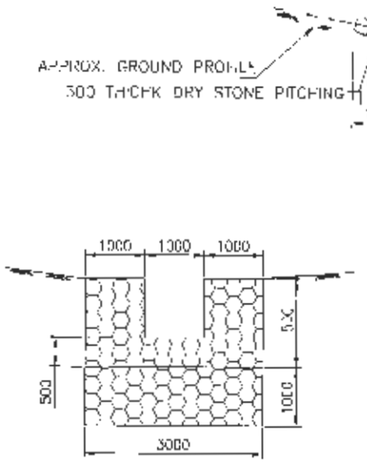
NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE MENTIONED.
1. D & D1 = INNER & OUTER DIAMETRE OF PIPE

EMPLOYER	PROJECT	DESIGN CONSULTANT				
Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kathmandu (Nagdhunga) - Naubise - Mugling Road and Bridges	Intercontinental Consultants & Technocrats Pvt. Ltd. A-8, Green Park, New Delhi - 110016 Ph.: 4066-3000, Fax 2665-5252 In Joint Venture With Seosung Engineering Co. Ltd., South Korea In Association With Full Bright Consultancy (Pvt.) Ltd. 316,Baburam Acharya Sadak Sinamangal, Kathmandu, GPO Box: 4970, Kathmandu Nepal	Designed By	SB	DRAWING NAME: TYPICAL PIPE CULVERT	Scale:	Date: August 2019 Drawing No.: NNMR-TYP 05-04
			Checked By	PMS			
			Approved By	BNS			

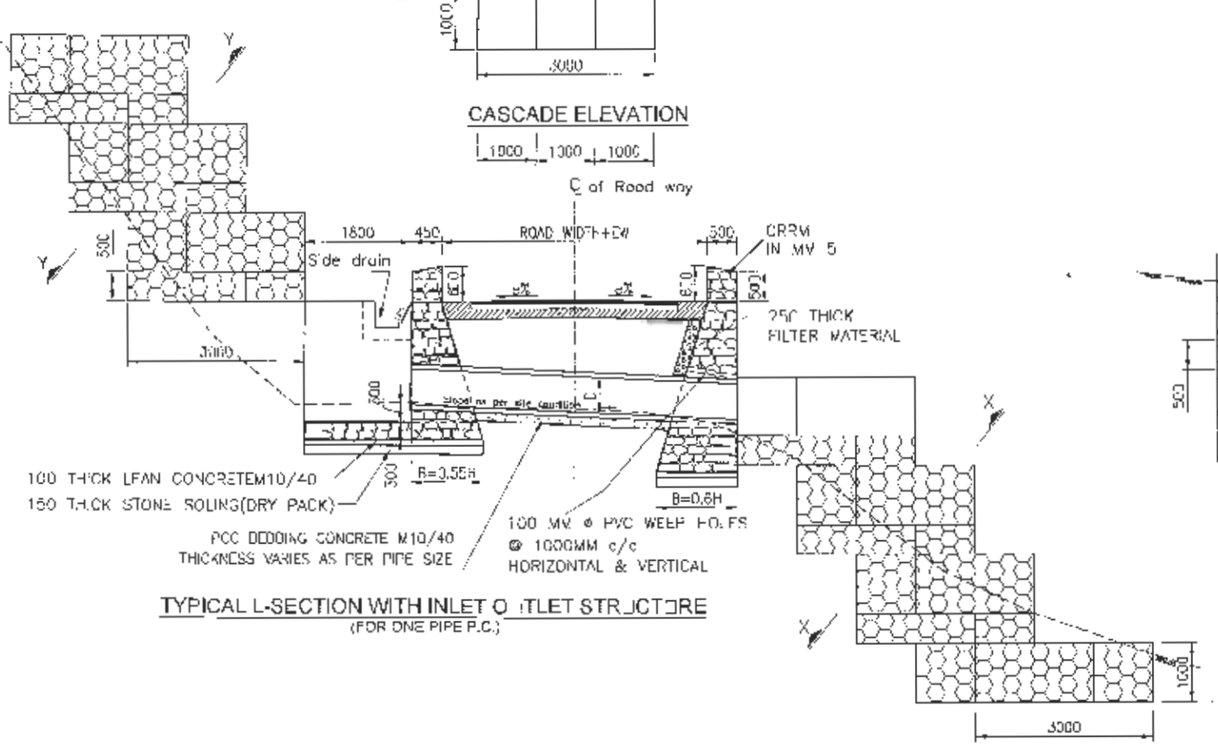


CASCADE ELEVATION



SECTION X-X

SECTION Y-Y

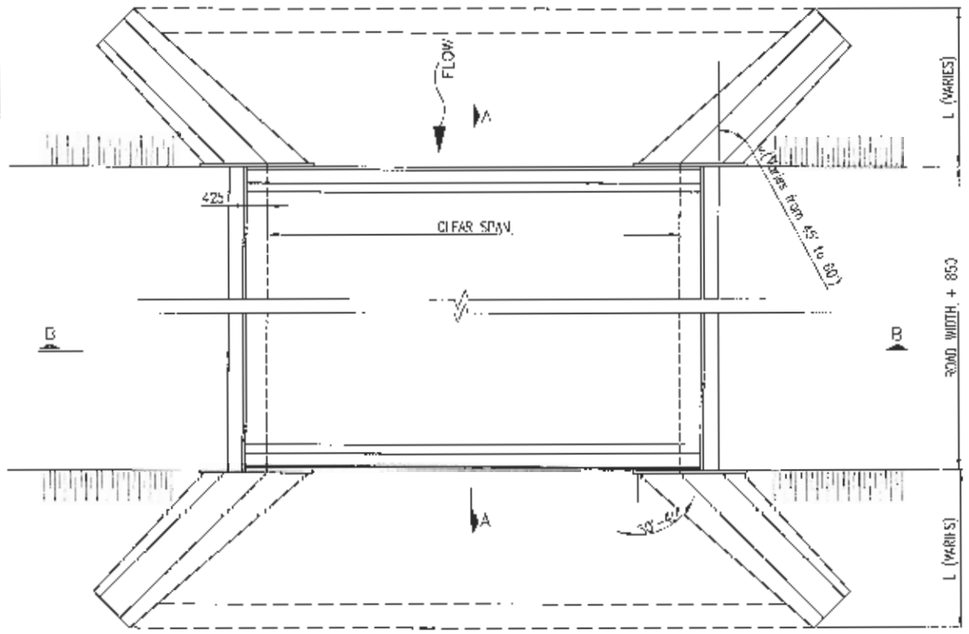


TYPICAL L-SECTION WITH INLET O UTLET STRUCTURE
(FOR ONE PIPE P.C.)

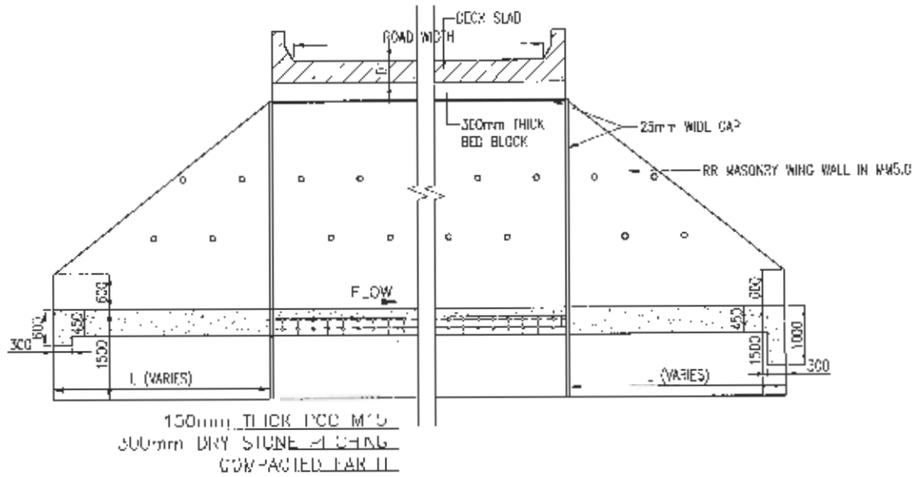
NOTES:

1. D Inside diametre of pipe.
2. Sizes of various components of sections X-X and Y-Y depends on discharge at site.
3. Cascades are used for direct flow over short stretches of very steep erodible gully slope
4. Height of structures H, H1 & H2 varies as per site condition.
5. All the dimensions are in millimetres unless otherwise mentioned.

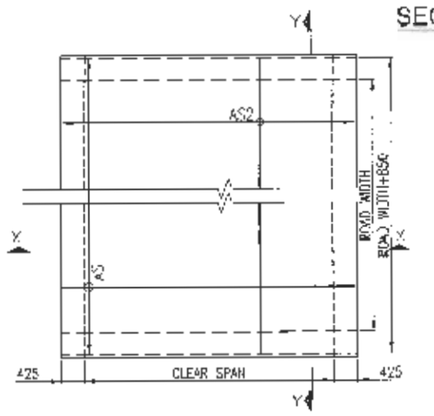
EMPLOYER	PROJECT	DESIGN CONSULTANT				DRAWING NAME:	Scale:	Date:
Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No 5273 - NEP) Detailed Design for Improvement of Kathmandu (Nagdhunga) - Naubise - Mugling Road and Bridges	Intercontinental Consultants & Technocrats Pvt. Ltd. A-8, Green Park, New Delhi - 110016 Ph : 4066-3000 Fax 2665-5262 In Joint Venture With Soosung Engineering Co, Ltd., South Korea FBC In Association With Full Bright Consultancy (Pvt.) Ltd, 316,Dabu ram Acharya Sadak Sinamangal, Kathmandu, GPO Box. 4970, Kathmandu, Nepal				GABION CASCADE	NOT TO SCALE	August 2019 Drawing No.: NIMR-TYP 05 -05
			Designed By	SB				
			Checked By	PMS				
			Approved By	BNS				



PLAN



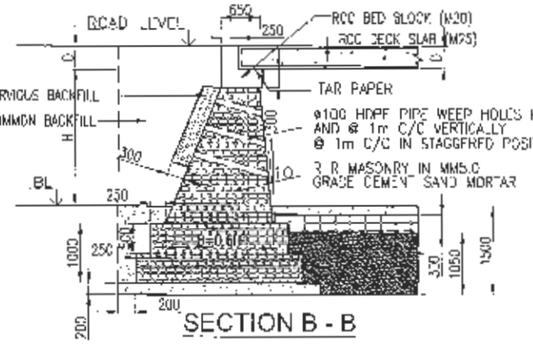
SECTION A - A



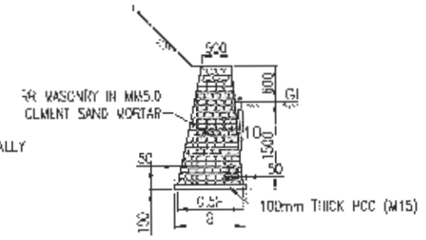
REINFORCEMENT PLAN

DETAILS OF SLAB CULVERT (WITHOUT FOOT PATH)

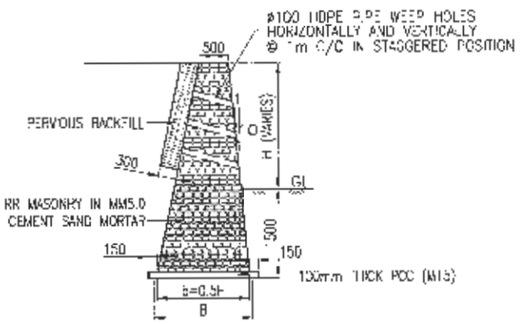
CLEAR SPAN (mm)	OVERALL DEPTH (D) (mm)	MIN. OVERALL LENGTH (m)	REINFORCEMENT				REMARKS
			ALONG SPAN (AS1)	ACROSS SPAN (AS2)	ALONG SPAN (AS3)	ACROSS SPAN (AS4)	
1.50	250	2.15	15ø @ 200 C/C	8ø @ 75 C/C	8ø @ 150 C/C	8ø @ 150 C/C	MIN. WIDTH OF EXPANSION JOINT - 15mm
2.00	290	2.65	16ø @ 175 C/C	8ø @ 75 C/C	8ø @ 150 C/C	8ø @ 150 C/C	
3.00	310	4.05	16ø @ 150 C/C	8ø @ 75 C/C	8ø @ 150 C/C	8ø @ 150 C/C	
4.00	380	4.65	20ø @ 175 C/C	8ø @ 75 C/C	8ø @ 150 C/C	8ø @ 150 C/C	
5.00	440	5.85	20ø @ 150 C/C	8ø @ 75 C/C	8ø @ 150 C/C	8ø @ 150 C/C	
6.00	500	6.85	20ø @ 120 C/C	8ø @ 75 C/C	8ø @ 150 C/C	8ø @ 150 C/C	



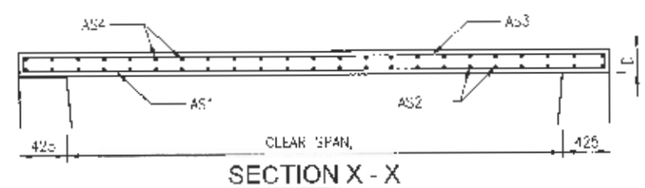
SECTION B - B



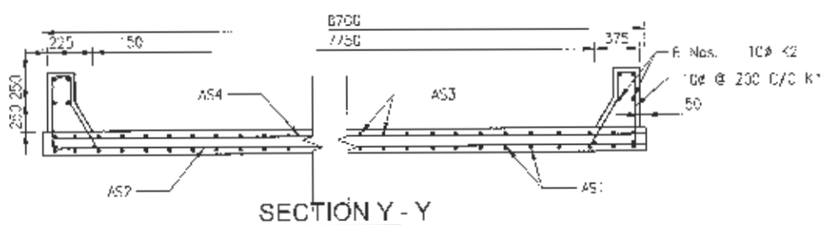
SECTION OF WING WALL AT LOW END



SECTION OF WING WALL AT HIGH END



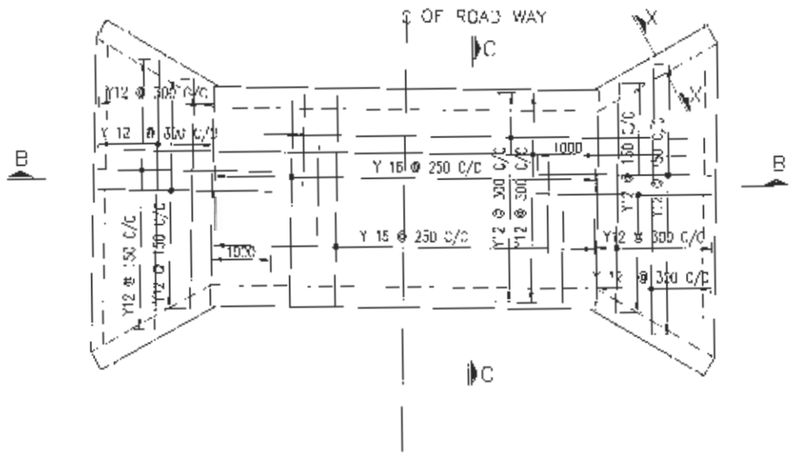
SECTION X - X



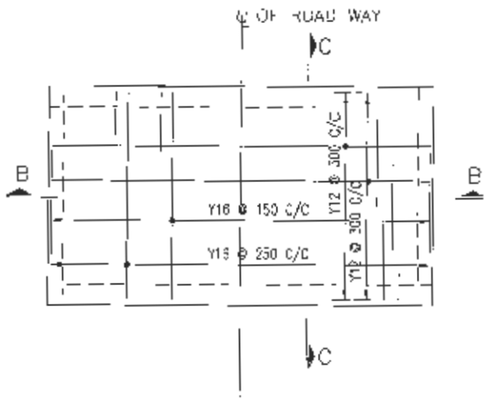
SECTION Y - Y

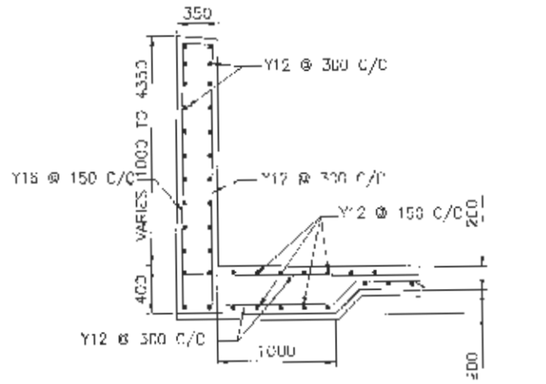
NOTE:
1. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH OTHER RELEVANT DRAWINGS.
2. CONCRETE GRADE IS M25 IN DECK SLAB.
3. STEEL REINFORCEMENT IS HYSD, GRADE Fe415 CONFIRMING TO IS:1786 OR IS:1139.
4. MINIMUM LAP SHOULD BE 40ø OF BAR.
5. CLEAR COVER, TOP AND BOTTOM: 25mm, AT THE END OF REINFORCEMENT: 50mm.
6. ALL DIMENSIONS ARE IN MILLIMETER UNLESS OTHERWISE STATED.
7. WIDTH OF BEARING IS 425mm FOR L>=5m, 325mm FOR L<5m.

EMPLOYER	PROJECT	DESIGN CONSULTANT					
Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kathmandu (Nagdhunga) - Naubise - Mugling Road and Bridges	Intercontinental Consultants & Technocrats Pvt. Ltd. A 8, Green Park, New Delhi - 110016 Ph: 4066-3000, Fax 2685-5252 In Joint Venture With Seosung Engineering Co. Ltd., South Korea In Association With Full Bright Consultancy (Pvt.) Ltd. 310,Baburam Acharya Sadak Sinamangal, Kathmandu, GPO Box: 4970, Kathmandu, Nepal					
			Designed By	SB		DRAWING NAME: TYPICAL SLAB CULVERT	Scale: 0.00 1.00 2.00
			Checked By	PMS			Date: August 2019
			Approved By	BNS			Drawing No.: NNMR-TYP 05-08



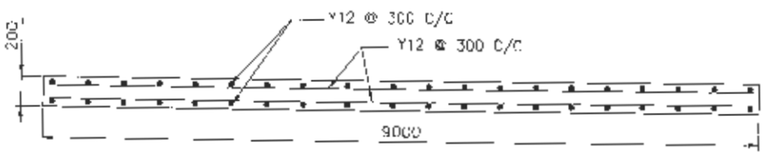
PLAN OF CULVERT BASE
SCALE 1:100



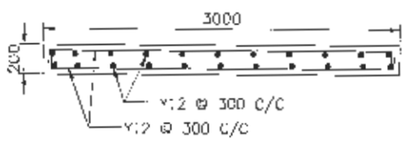


REINFORCEMENT DETAILS–WING WALLS
(SECTION AT X–X)
SCALE 1:50

NOTES:
1. All Reinforcement to be High Yield Deformed steel bars Grade 415 to IS 1786.
2. Minimum reinforcement cover is 50mm except to surfaces exposed to ground or fill where cover is 75mm.
3. Location and length of spliced laps to be
4. All dimensions in millimeters unless noted otherwise.

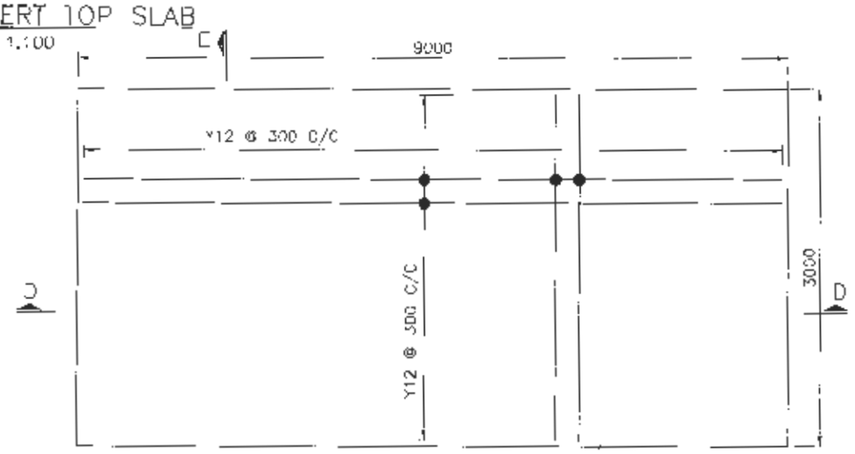


SECTION D–D
SCALE 1:50



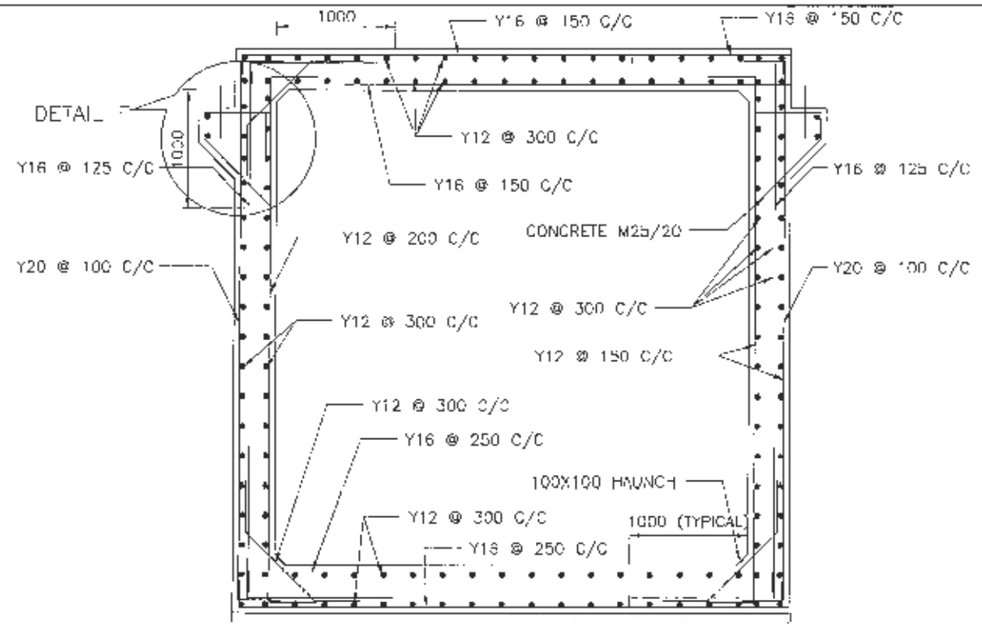
SECTION E–E
SCALE 1:50

PLAN OF CULVERT TOP SLAB
SCALE 1:100

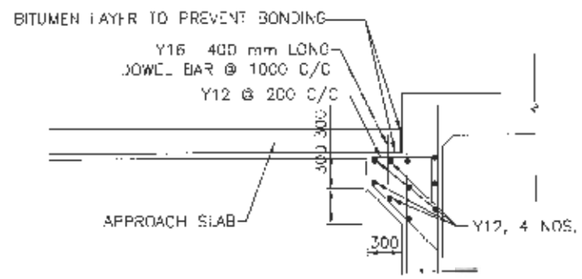


APPROACH SLAB
(REINFORCEMENT DETAILS)
SCALE 1:50

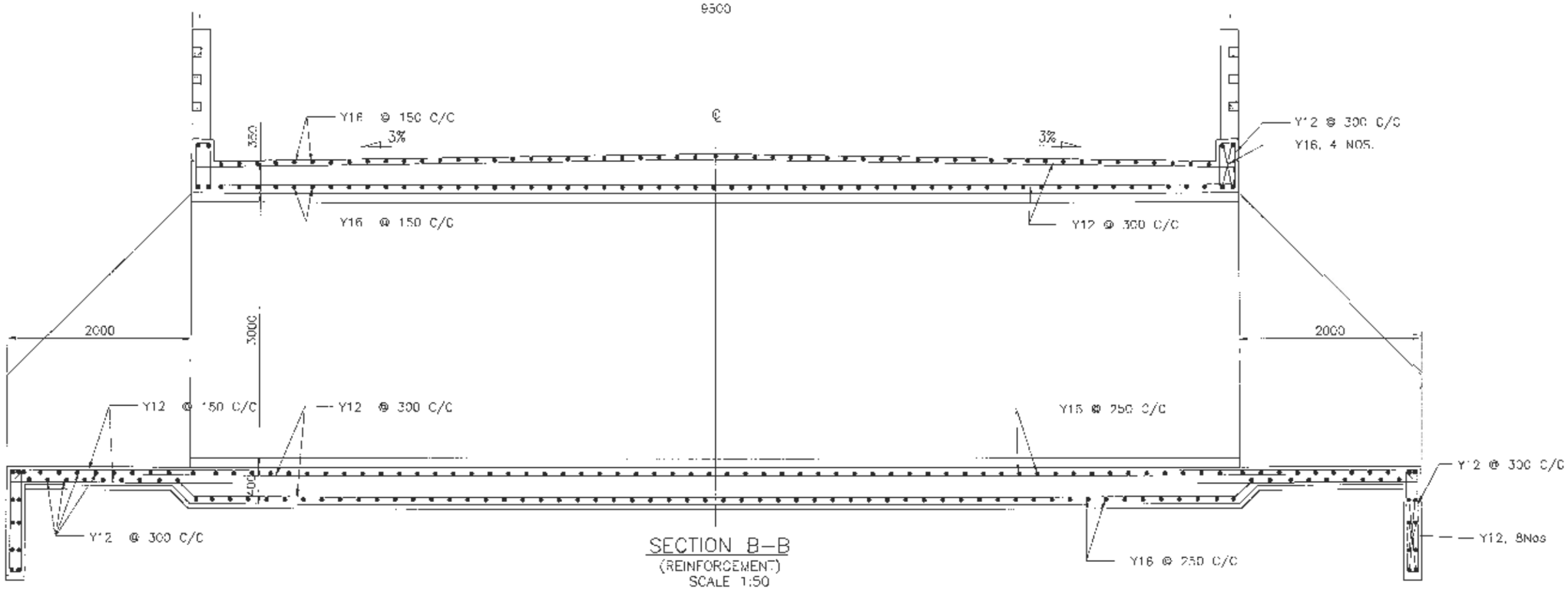
EMPLOYER	PROJECT	DESIGN CONSULTANT				DRAWING NAME:	Scale:	Date:
Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No 5273 - NEP) Detailed Design for Improvement of Kathmandu (Nagdhunga) - Naubise - Mugling Road and Bridges	Intercontinental Consultants & Technocrats Pvt. Ltd. A-8, Green Park, New Delhi - 110016 Ph : 4065-3000, Fax 2685-5202 In Joint Venture With Soosung Engineering Co. Ltd., South Korea	In Association With Full Bright Consultancy (Pvt.) Ltd. 316,Dabu ram Acharya Sadak Sinamangal Kathmandu, GPO Box: 4970, Kathmandu, Nepal	Designed By	SR		SINGLE CELL BOX CELVERT REINFORCEMENT DETAILS (3.0mX3.0mX1)	AS SHOWN	August 2019
				Checked By	PMS				Drawing No.: NNMR-TYP 05-09
				Approved By	BNS				



SECTIONAL ELEVATION AT C–C
RCC BOX CULVERT
SCALE 1:50

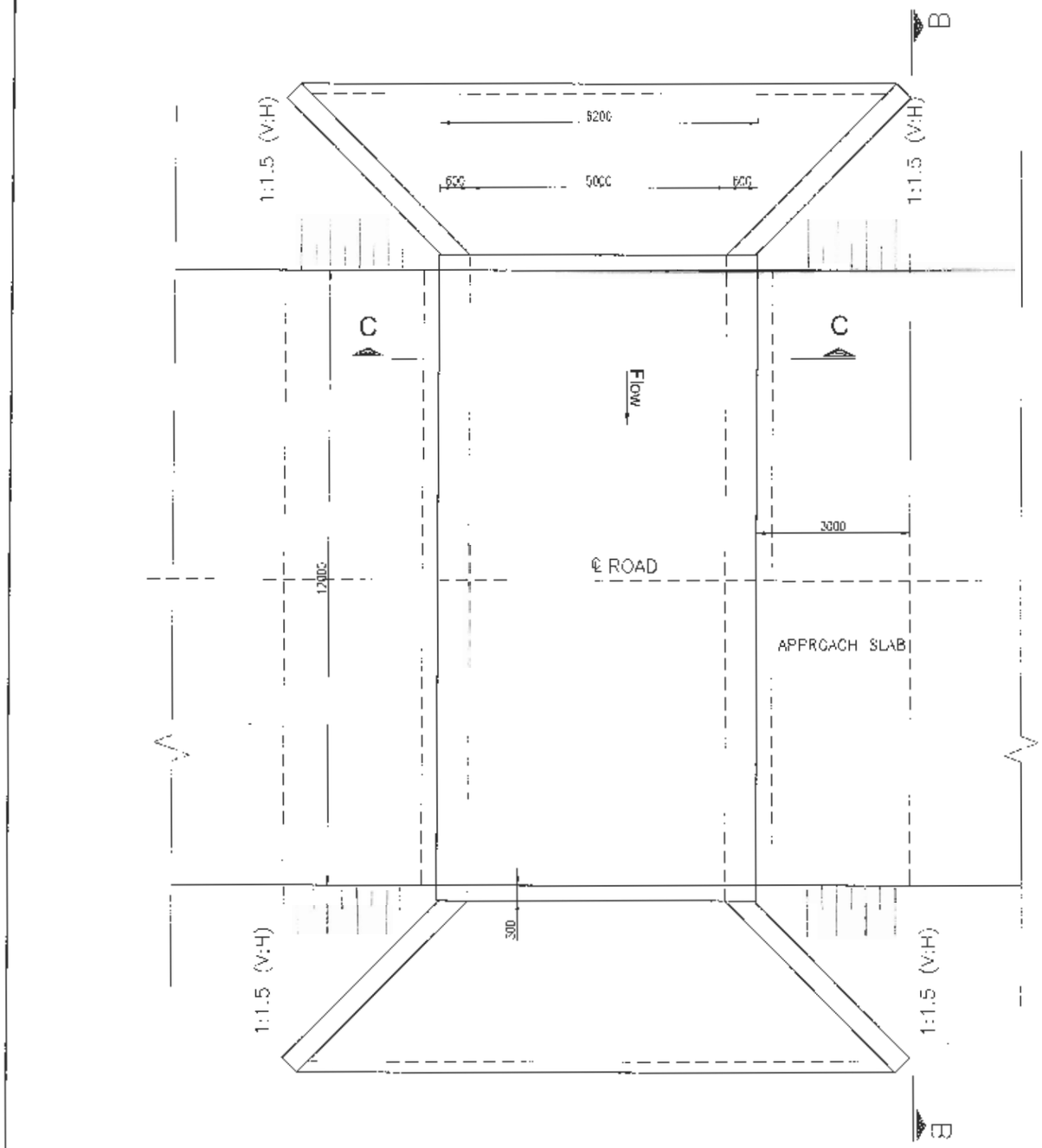


DETAIL F
SCALE 1:50



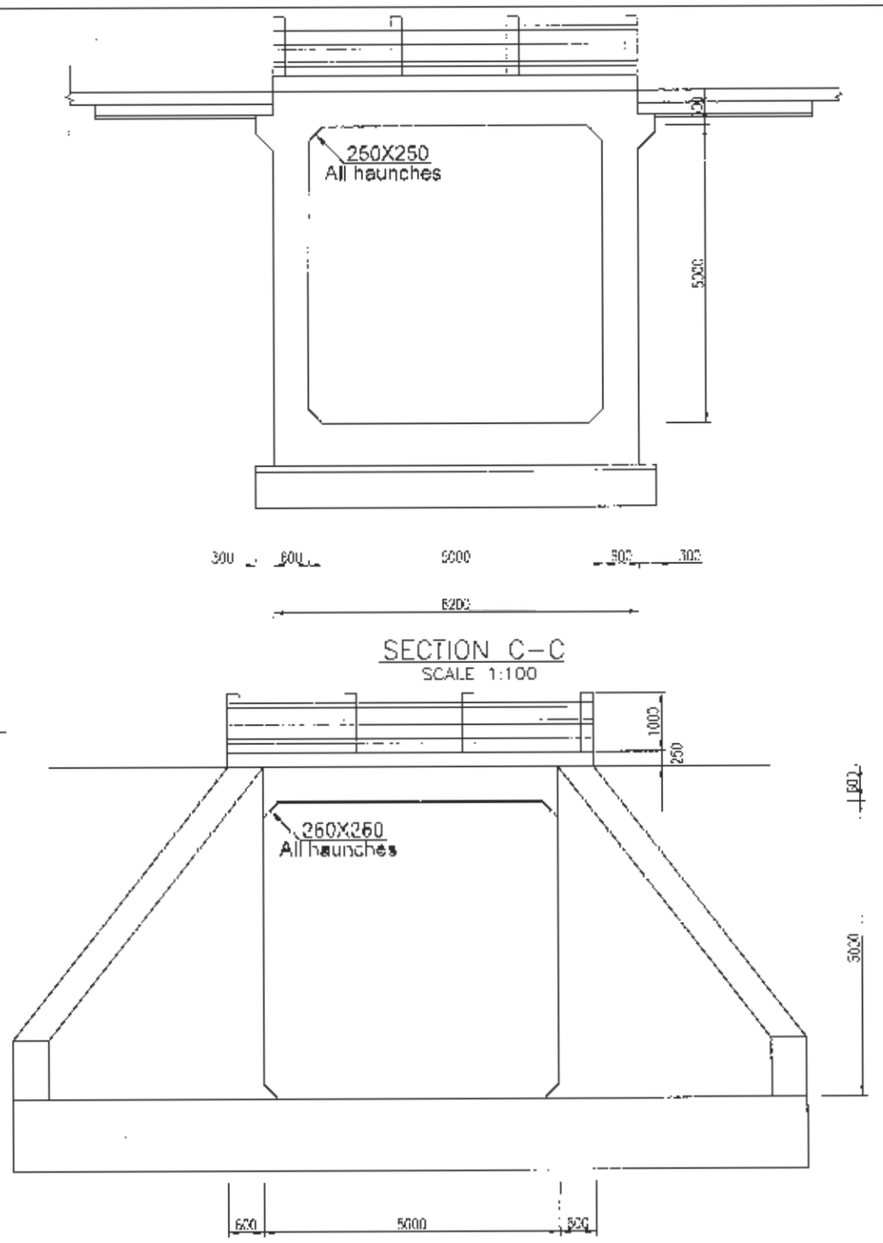
SECTION B–B
(REINFORCEMENT)
SCALE 1:50

EMPLOYER Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	**PROJECT** Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kathmandu (Nagdhunga) - Naubise - Mugling Road and Bridges	**DESIGN CONSULTANT** Interconlinental Consultants & Technocrats Pvt. Ltd. A-8, Green Park, New Delhi - 110016 Ph : 4066-3000, Fax 2655-5252 In Joint Venture With Soosung Engineering Co. Ltd., South Korea In Association With Full Bright Consultancy (Pvt.) Ltd. 316,Baburam Acharya Sadak Sinamangal, Kathmandu, GPO Box: 4970, Kathmandu, Nepal	Designed By	SB		**DRAWING NAME:** SINGLE CELL BOX CULVERT REINFORCEMENT DETAILS (3.0mX3.0mX1)	**Scale:** AS SHOWN	**Date:** August 2019 **Drawing No.:** NNMR-TYP 05-10
			Checked By	PMS				
			Approved By	BNS				



PLAN

SCALE 1:100



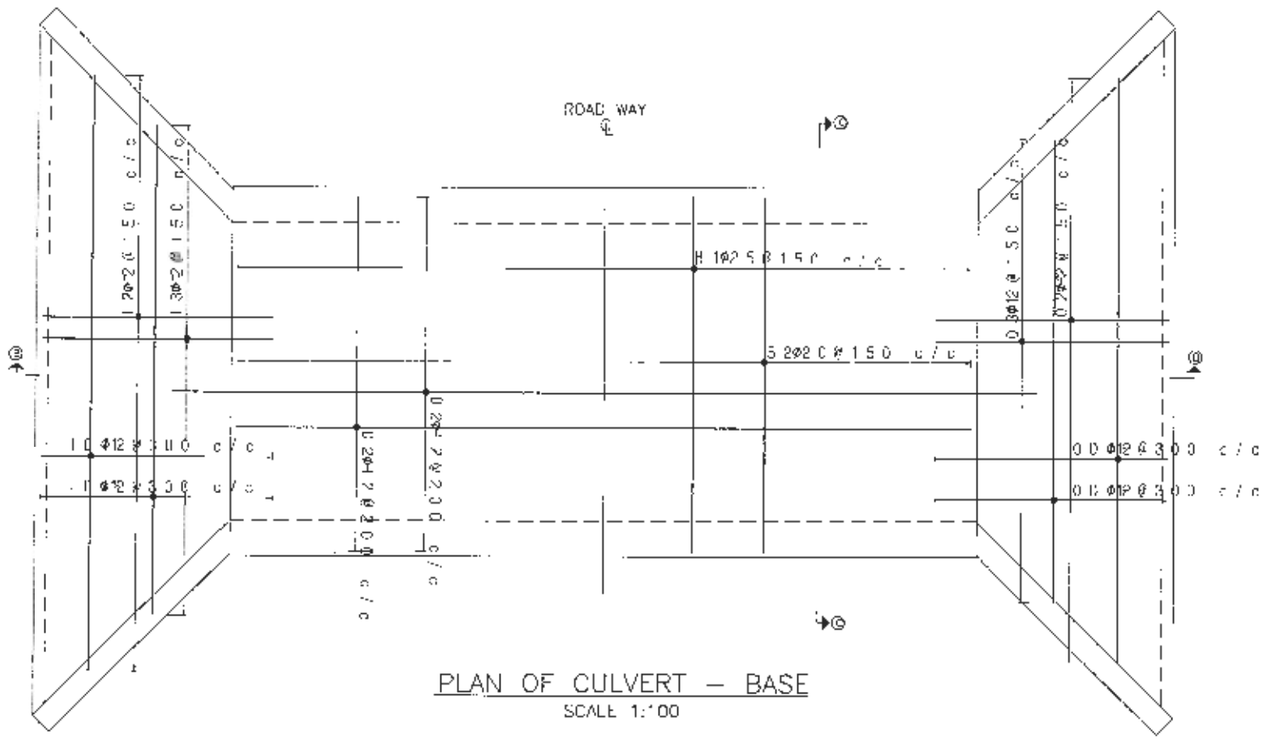
FRONT ELEVATION

SCALE 1:100

NOTES:

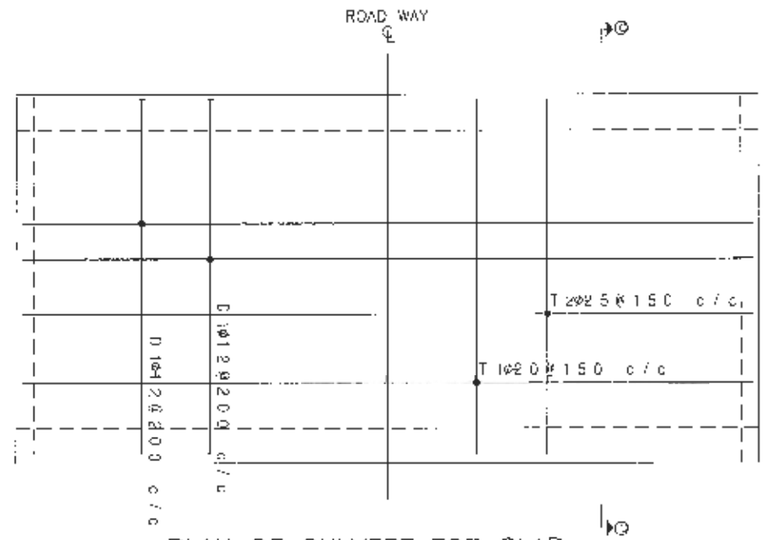
1. All Concrete is Grade M25/20 except M15/20 in Approach Slab and Blinding.
2. Proposed construction joints to be submitted for Engineers approval.
3. Wing Walls and Apron Slab to be cast monolithic with Box Culvert.
4. Setting out of Culvert to be checked and approved by Engineer.
5. Any adjustments to suit field conditions to be as directed by Engineer.
6. All exposed corners to be chamfered at 25x25mm.
7. All dimensions in millimeters unless noted otherwise.
8. Railing provided should be according to typical drawing of culvert & bridge RC guardrail. Spacing of railing must be adjusted to suit total length of Box Culvert .

EMPLOYER	PROJECT	DESIGN CONSULTANT				DRAWING NAME:	Scale:	Date:
Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kathmandu (Nagdhunga) - Naubise - Mugling Road and Bridges	Intercontinental Consultants & Technocrats Pvt. Ltd. A-8, Green Park, New Delhi - 110016 Ph : 4086-3500, Fax 2565-5252 In Joint Venture With Seosung Engineering Co. Ltd. South Korea In Association With Full Bright Consultancy (Pvt.) Ltd. 316,Bahuram Acharya Sadak Sinamangal, Kathmandu, GPO Box: 4970, Kathmandu, Nepal	Designed By	SB		SINGLE CELL BOX CELVERT GENERAL ARRANGEMENT (5.0mX5.0mX1)	AS SHOWN	August 2019
			Checked By	PMS				Drawing No.: NNMR-TYP 05-11
			Approved By	BNS				



PLAN OF CULVERT – BASE

SCALE 1:100

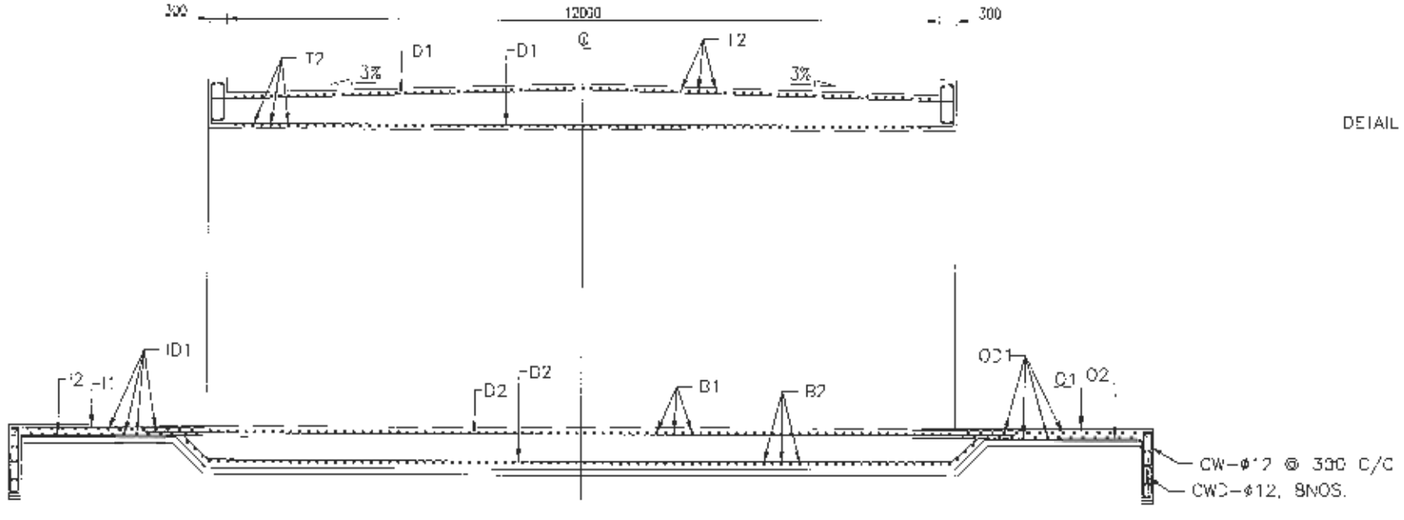


PLAN OF CULVERT TOP SLAB

SCALE 1:100

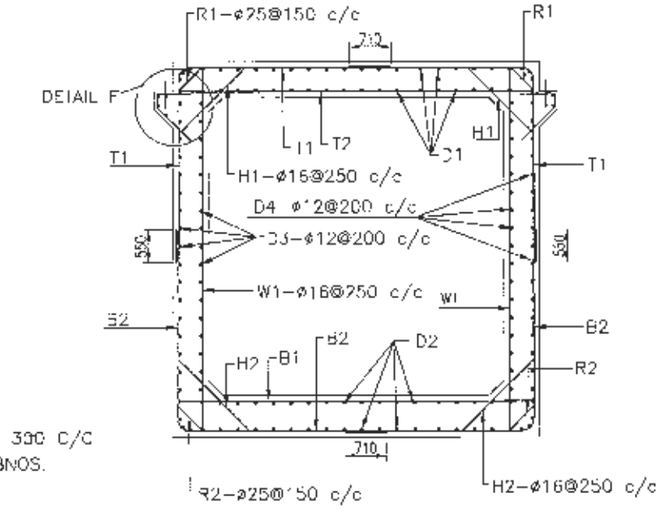
NOTES:

1. All Reinforcement to be High Yield Deformed steel bars Grade 415 to IS 1786.
2. Minimum reinforcement cover is 50mm except to surfaces exposed to ground or fill where cover is 75mm
3. Location and length of spliced laps to be
4. All dimensions in millimeters unless noted otherwise.



SECTIONAL ELEVATION AT B–B

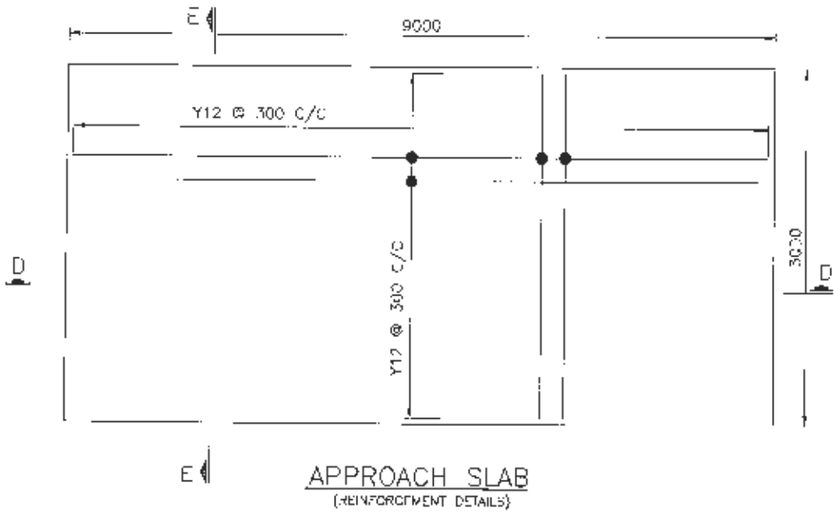
SCALE 1:100



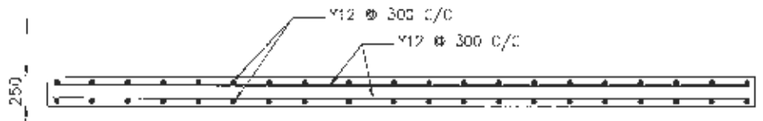
SECTIONAL ELEVATION AT C–C

SCALE 1:100

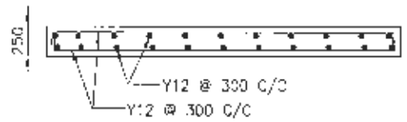
EMPLOYER	PROJECT	DESIGN CONSULTANT					
Government of Nepal Ministry of Physical Infrastructure and Transport **Department of Roads** **Development Cooperation Implementation Division**	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kathmandu (Nagdhunga) - Naubise - Mugling Road and Bridges	Intercontinental Consultants & Technocrats Pvt. Ltd. A-8, Green Park, New Delhi -110016 Ph : 4086-3000, Fax 2665-5252 In Joint Venture With Seoyung Engineering Co. Ltd., South Korea In Association With Full Bright Consultancy (Pvt.) Ltd. 316 Baburam Acharya Sadak Sitalmangal, Kathmandu GPO Box: 4970, Kathmandu, Nepal					
			Designed By	SB		**DRAWING NAME:** SINGLE CELL BOX CULVERT REINFORCEMENT DETAILS (5.0mX5.0mX1)	**Scale:** AS SHOWN
			Checked By	PMS			**Date:** August 2019
			Approved By	BNS			**Drawing No.:** NNMR-TYP C5-12



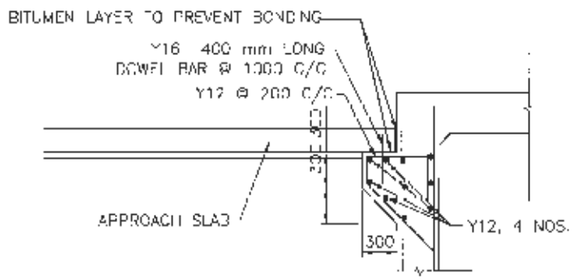
APPROACH SLAB
(REINFORCEMENT DETAILS)



SECTION D–D



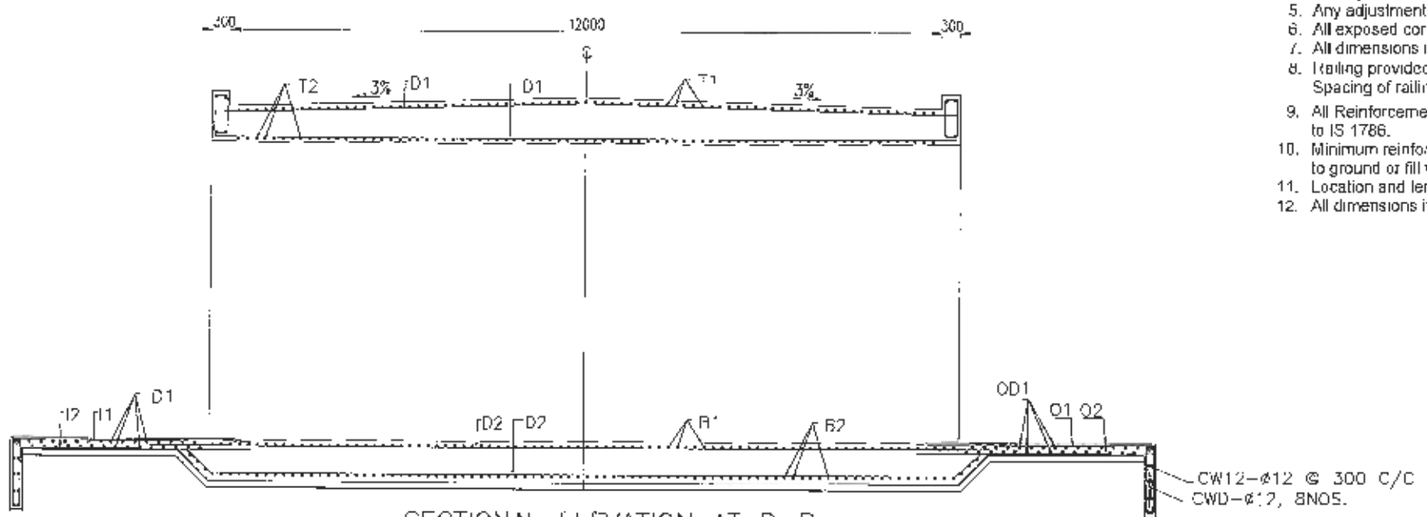
SECTION E–E



DETAIL F

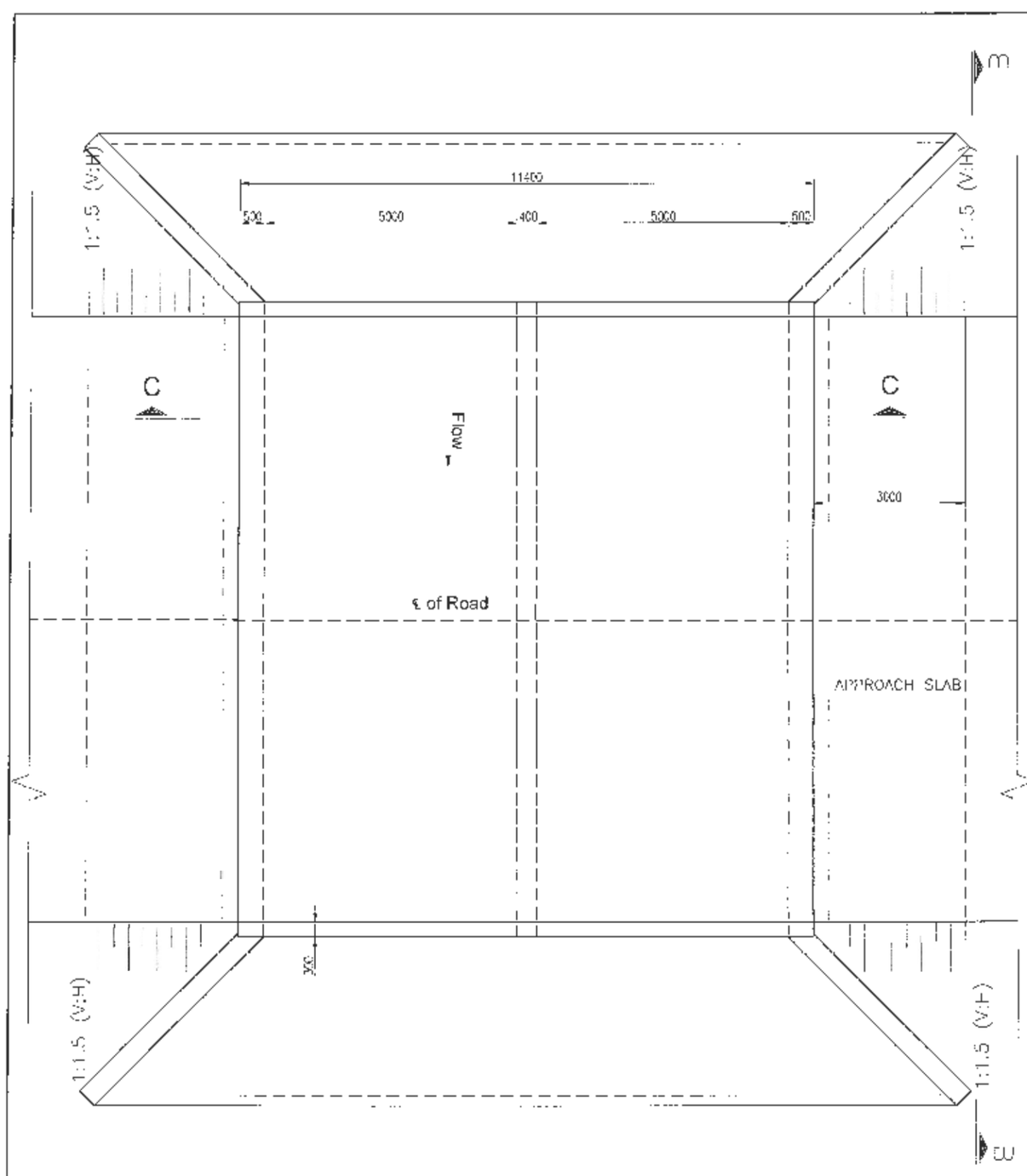
NOTES:

1. All Concrete is Grade M30/20 except M15/20 to Approach Slab and Blinding.
2. Proposed construction joints to be submitted for Engineers approval.
3. Wing Walls and Apron Slab to be cast monolithic with Box Culvert.
4. Setting out of Culvert to be checked and approved by Engineer.
5. Any adjustments to suit field conditions to be as directed by Engineer.
6. All exposed corners to be chamfered at 25x25mm.
7. All dimensions in millimeters unless noted otherwise
8. Railing provided should be according to typical drawing of culvert & bridge RC guardrail. Spacing of railing must be adjusted to suit total length of Box Culvert .
9. All Reinforcement to be High Yield Deformed steel bars Grade 415 to IS 1786.
10. Minimum reinforcement cover is 50mm except to surfaces exposed to ground or fill where cover is 75mm.
11. Location and length of spliced laps to be
12. All dimensions in millimeters unless noted otherwise.



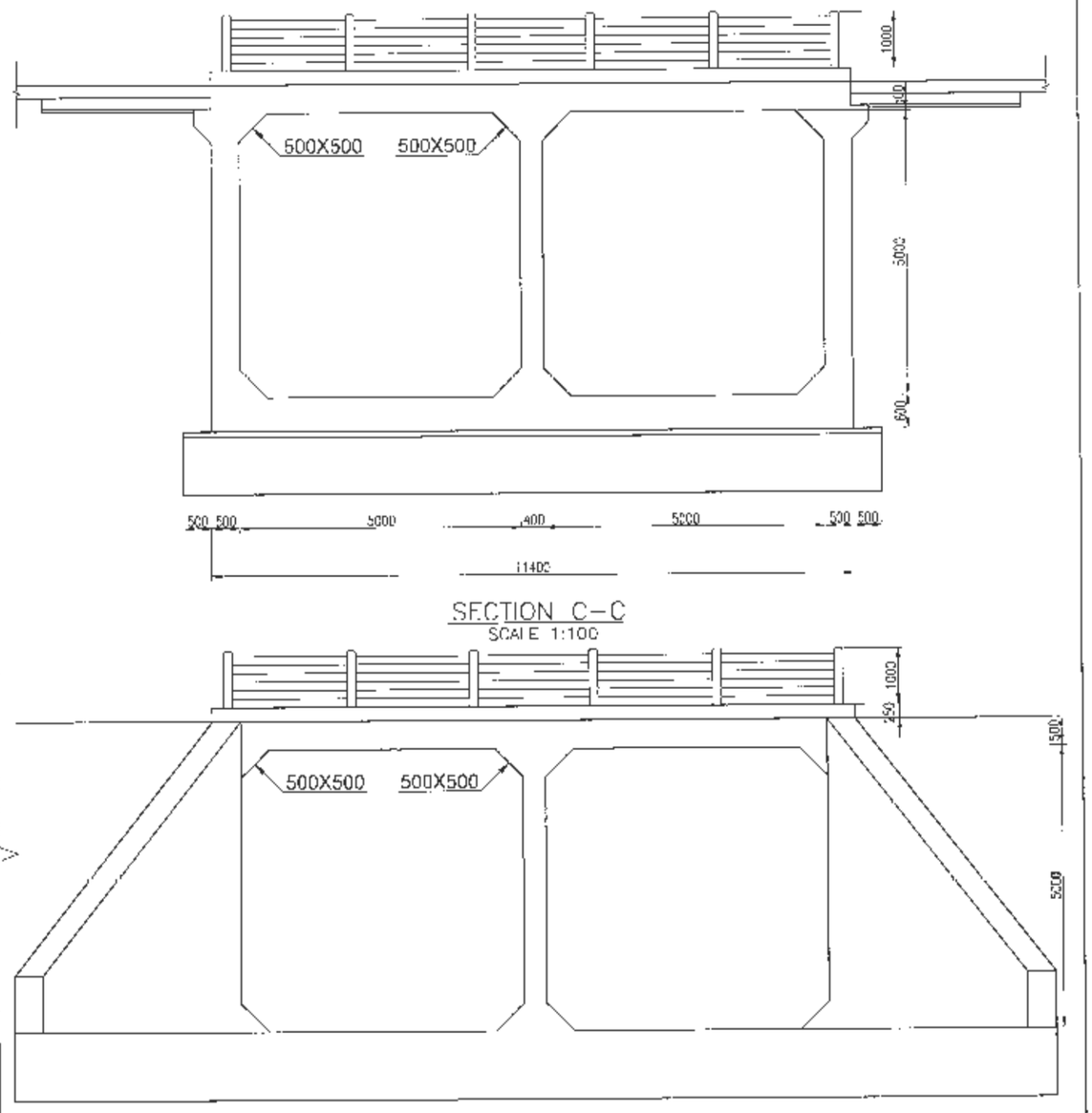
SECTIONAL ELEVATION AT B–B
SCALE 1:100

EMPLOYER	PROJECT	DESIGN CONSULTANT						
Government of Nepal Ministry of Physical Infrastructure and Transport **Department of Roads** **Development Cooperation Implementation Division**	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kathmandu (Nagdhunga) - Naubise - Mugling Road and Bridges	Intercontinental Consultants & Technocrats Pvt. Ltd. A-8, Green Park, New Delhi - 110016 Ph.: 4066-3000, Fax 2665-5252 In Joint Venture With Soosung Engineering Co. Ltd., South Korea In Association With Full Bright Consultancy (Pvt.) Ltd. 316,Babu ram Acharya Sadak Sinamangal, Kathmandu, GPO Box: 4870, Kathmandu, Nepal	Designed By	SB		**DRAWING NAME:** SINGLE CELL BOX CULVERT REINFORCEMENT DETAILS (5.0mX5.0mX1)	**Scale:** AS SHOWN	**Date:** August 2019 **Drawing No.:** NNMR-TYP 05-13
			Checked By	PMS				
			Approved By	BNS				



PLAN

SCALE 1:100



SECTION C–C

SCALE 1:100

FRONT ELEVATION

SCALE 1:100

NOTES:

1. All Concrete is Grade M25/20 except M15/20 to Approach Slab and Blinding.
2. Proposed construction joints to be submitted for Engineers approval.
3. Wing Walls and Apron Slab to be cast monolithic with Box Culvert.
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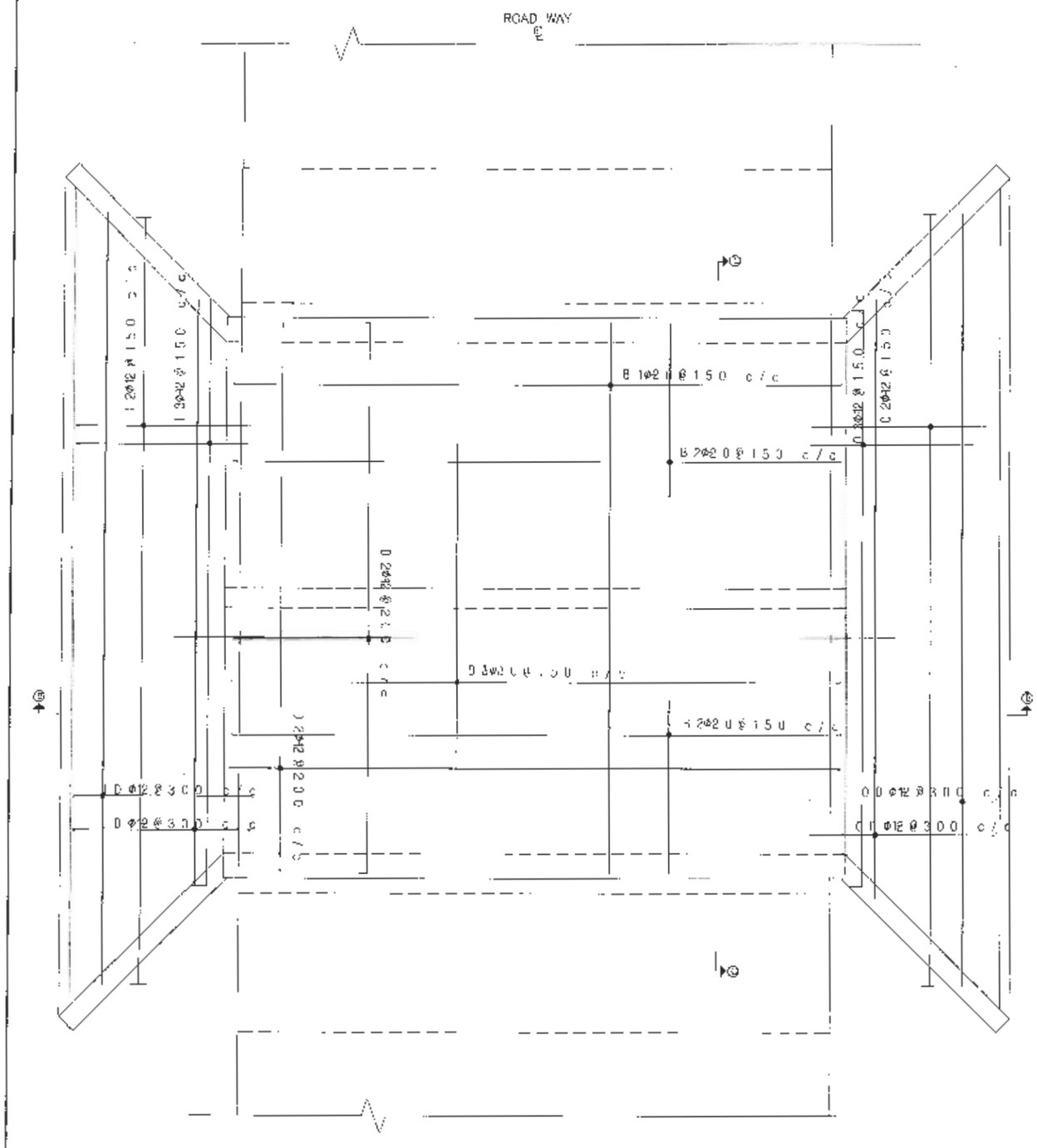
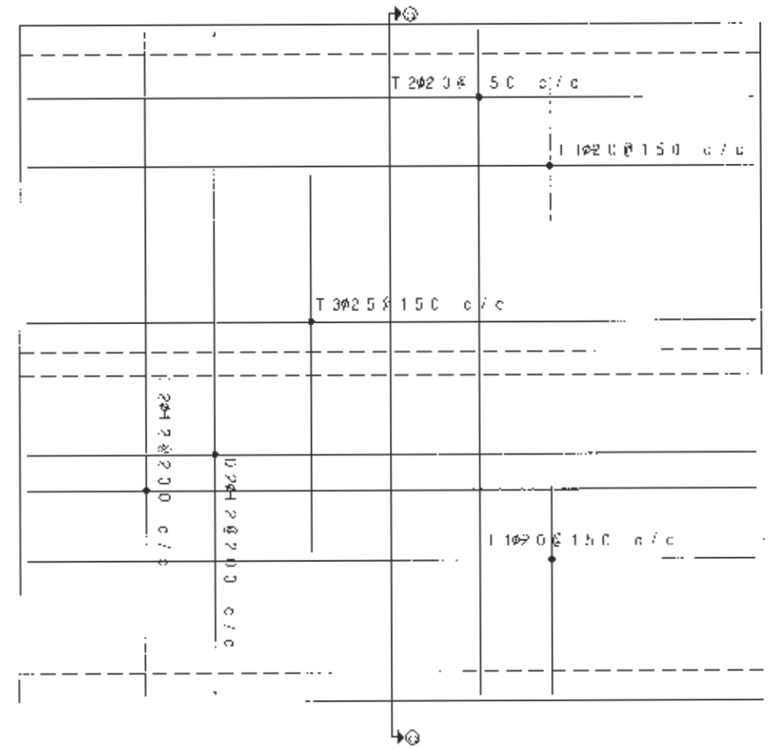
5. Any adjustments to suit field conditions to be as directed by Engineer.
6. All exposed corners to be chamfered at 25x25mm.
7. All dimensions in millimeters unless noted otherwise.
8. Railing provided should be according to typical drawing of culvert & bridge RC guardrail. Spacing of railing must be adjusted to suit total length of Box Culvert .

EMPLOYER	PROJECT	DESIGN CONSULTANT				DRAWING NAME:	Scale:	Date:
Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Nepal India Regional Trade and Transport Project (NRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kathmandu (Nagdhunga) - Naubise - Mugling Road and Bridges	Intercontinental Consultants & Technocrats Pvt. Ltd. A-8, Green Park, New Delhi - 110016 Ph : 4086-2000, Fax 2685-5252 In Joint Venture With Seosung Engineering Co. Ltd., South Korea In Association With Full Bright Consultancy (Pvt.) Ltd. 316,Baburam Acharya Sadak Sinamangal, Kathmandu GPO Box: 4870, Kathmandu Nepal	Designed By	SB		DOUBLE CELL BOX CULVERT GENERAL ARRANGEMENT (5.0mX5.0mX2)	NOT TO SCALE AS SHOWN	August 2019
			Checked By	PMS				Drawing No.: NNMR-TYP 05-14
			Approved By	BNS				



PLAN OF CULVERT – BASE

SCALE 1:100

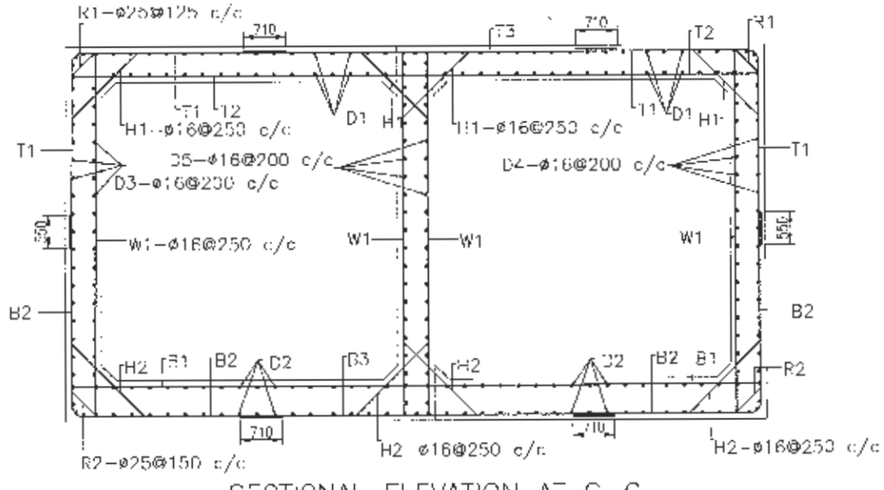


PLAN OF CULVERT TOP SLAB

SCALE 1:100

NOTES:

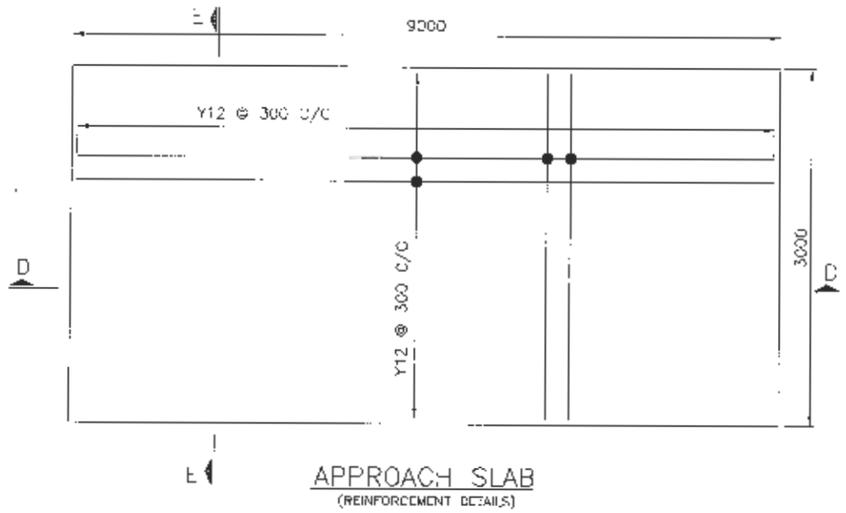
1. All Reinforcement to be High Yield Deformed steel bars Grade 415 to IS 1786.
2. Minimum reinforcement cover is 50mm except to surfaces exposed to ground or fill where cover is 75mm.
3. Location and length of spliced laps to be
4. All dimensions in millimeters unless noted otherwise.



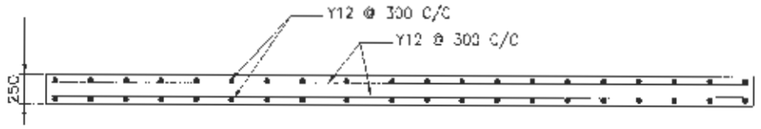
SECTIONAL ELEVATION AT C–C

SCALE 1:100

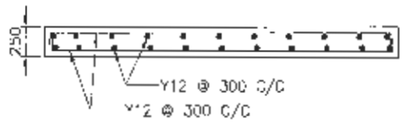
EMPLOYER	PROJECT	DESIGN CONSULTANT						
Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kathmandu (Nagdhunga) - Naubise - Mugling Road and Bridges	Intercontinental Consultants & Technocrats Pvt. Ltd. A-8, Green Park, New Delhi - 110016 Ph: 4060-3000, Fax 2685-5252 In Joint Venture With Seosung Engineering Co. Ltd., South Korea In Association With Full Bright Consultancy (Pvt.) Ltd. 310,Baburam Acharya Sadak, Sinamangal, Kathmandu, GPO Box: 4070, Kathmandu, Nepal						
			Designed By	SB		DRAWING NAME: DOUBLE CELL BOX CULVERT REINFORCEMENT DETAILS (5.0mX5.0mX2)	Scale: AS SHOWN	Date: August 2019
			Checked By	PMS				Drawing No.: NNMR-TYP 05-15
			Approved By	BNS				



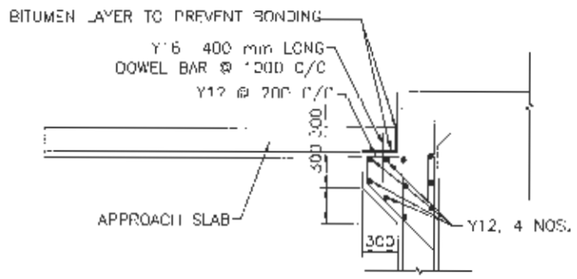
APPROACH SLAB
(REINFORCEMENT DETAILS)



SECTION D–D



SECTION E–E



DETAIL F

NOTES-

1. All Concrete is Grade M30/20 except M15/20 to Approach Slab and Blinding.
2. Proposed construction joints to be submitted for Engineers approval.
3. Wing Walls and Apron Slab to be cast monolithic with Box Culvert.
4. Setting out of Culvert to be checked and approved by Engineer.
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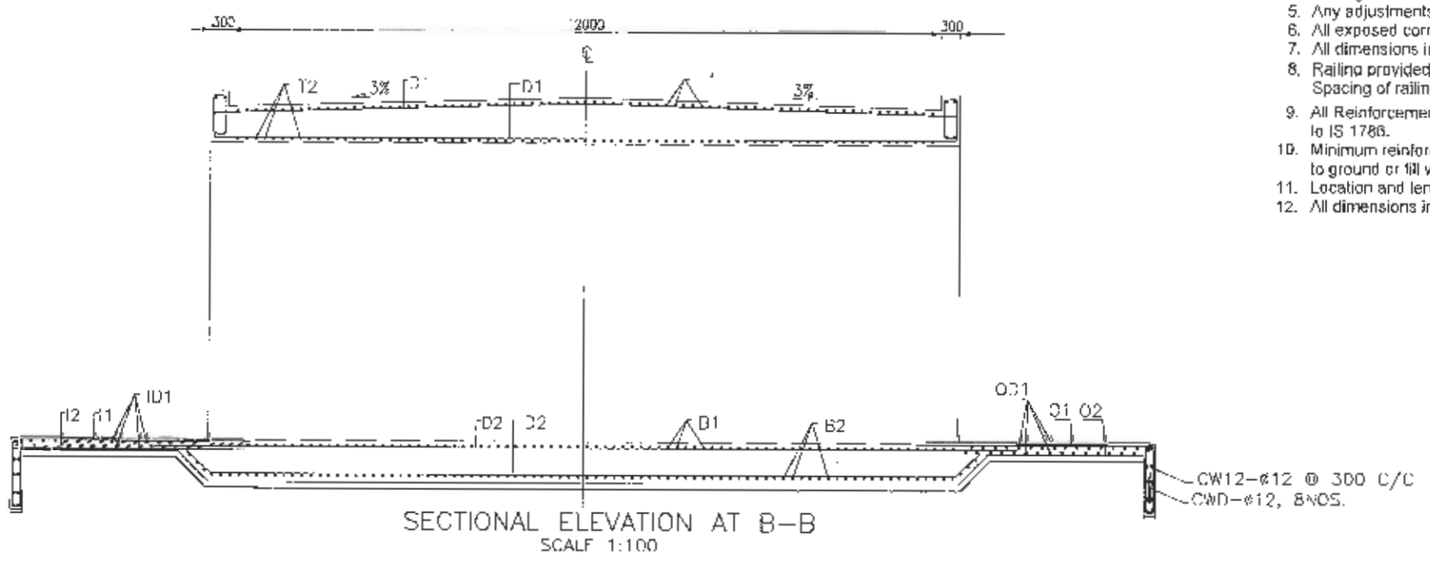
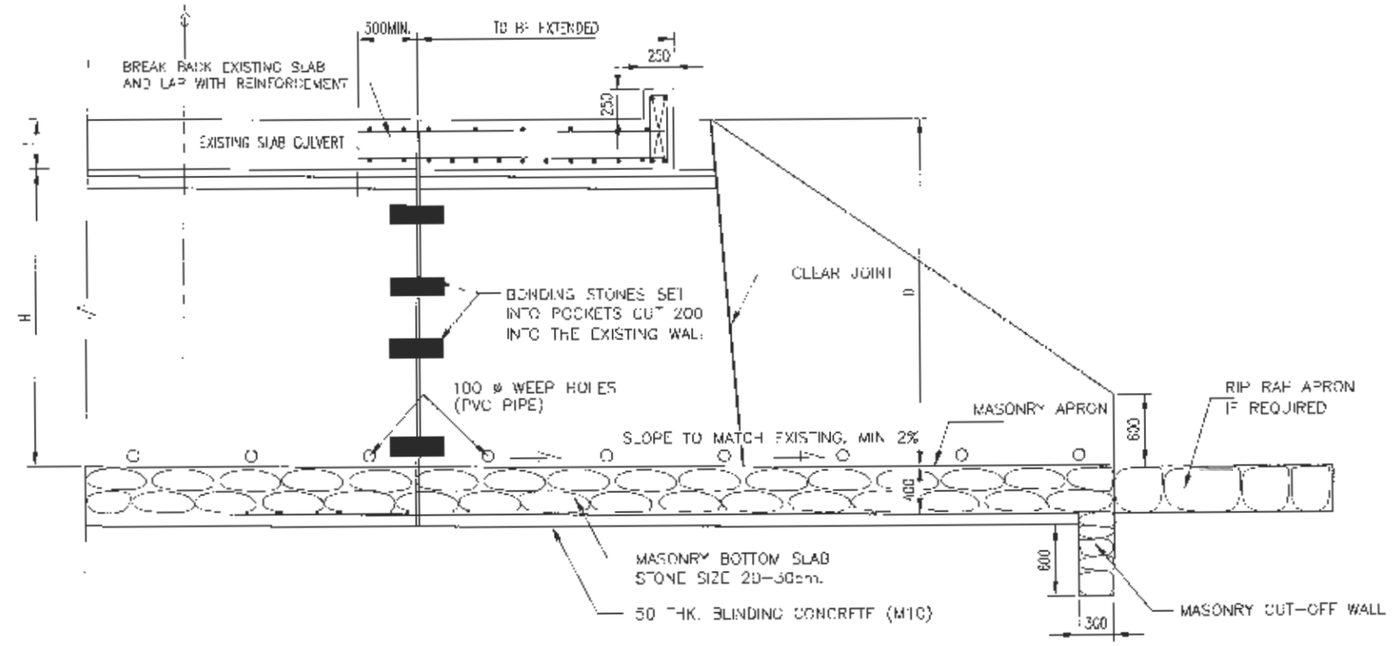
12. All dimensions in millimeters unless noted otherwise.



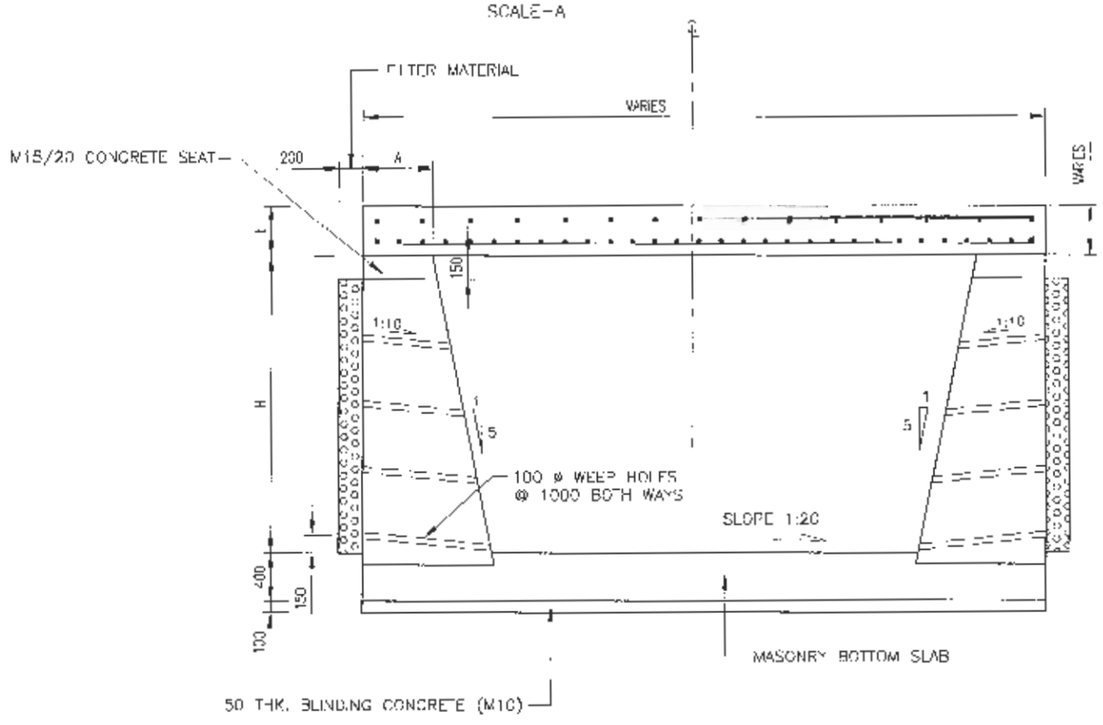
SECTIONAL ELEVATION AT B–B
SCALE 1:100

EMPLOYER	PROJECT	DESIGN CONSULTANT				DRAWING NAME:	Scale:	Date:
Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kathmandu (Nagdhunga) - Naubise - Mugling Road and Bridges	Intercontinental Consultants & Technocrats Pvt. Ltd. A 8, Green Park, New Delhi - 110016 Ph : 4086-3500, Fax 2565-5252 In Joint Venture With Soosung Engineering Co, Ltd, South Korea In Association With Full Bright Consultancy (Pvt.) Ltd. 310,Baburam Acharya Sadak Sinamangal, Kathmandu. GPO Box 4970, Kathmandu Nepal	Designed By	SB		DOUBLE CELL BOX CULVERT REINFORCEMENT DETAILS (5.0mX5.0mX2)	AS SHOWN	August 2019
			Checked By	PMS				Drawing No.: NNMR-TYP 05-16
			Approved By	BNS				



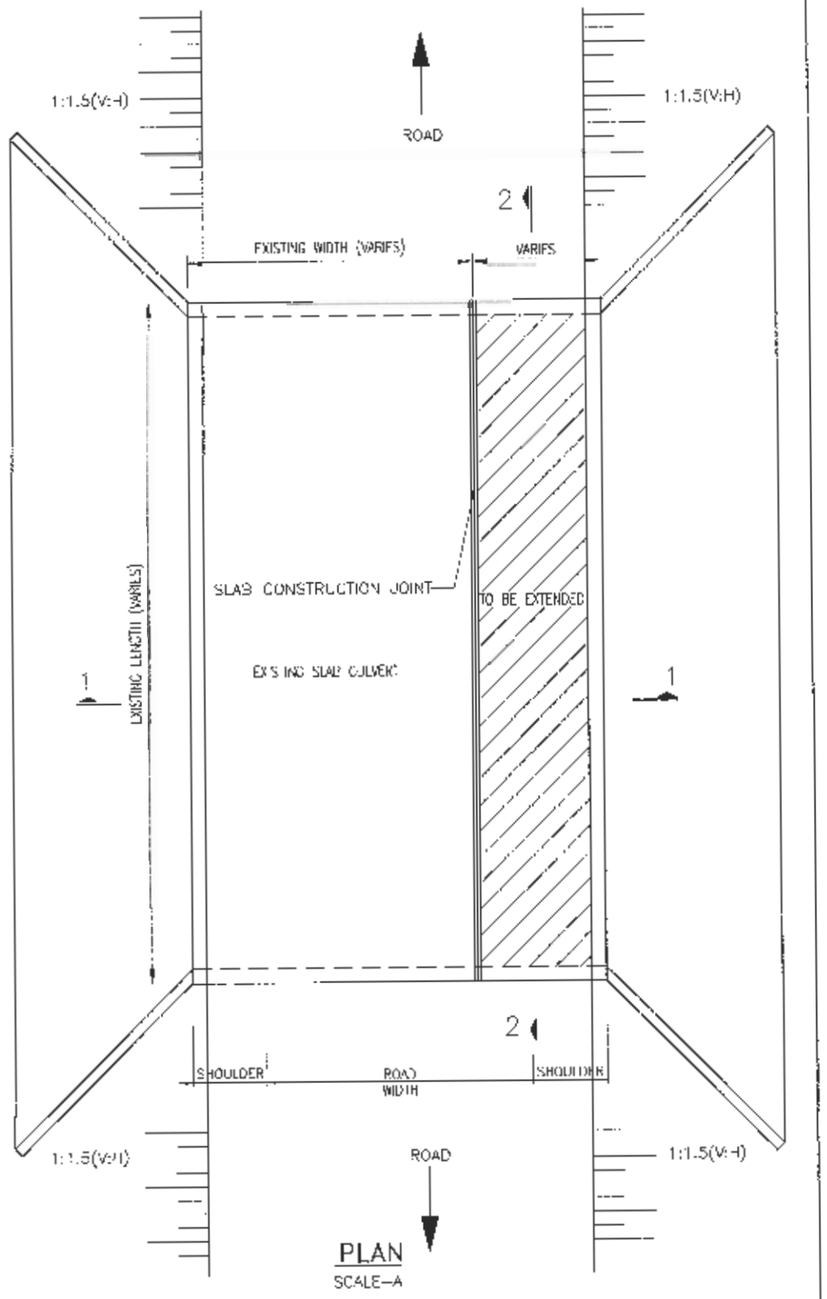
SECTION 1–1

SCALE–A



SECTION 2–2

SCALE–A

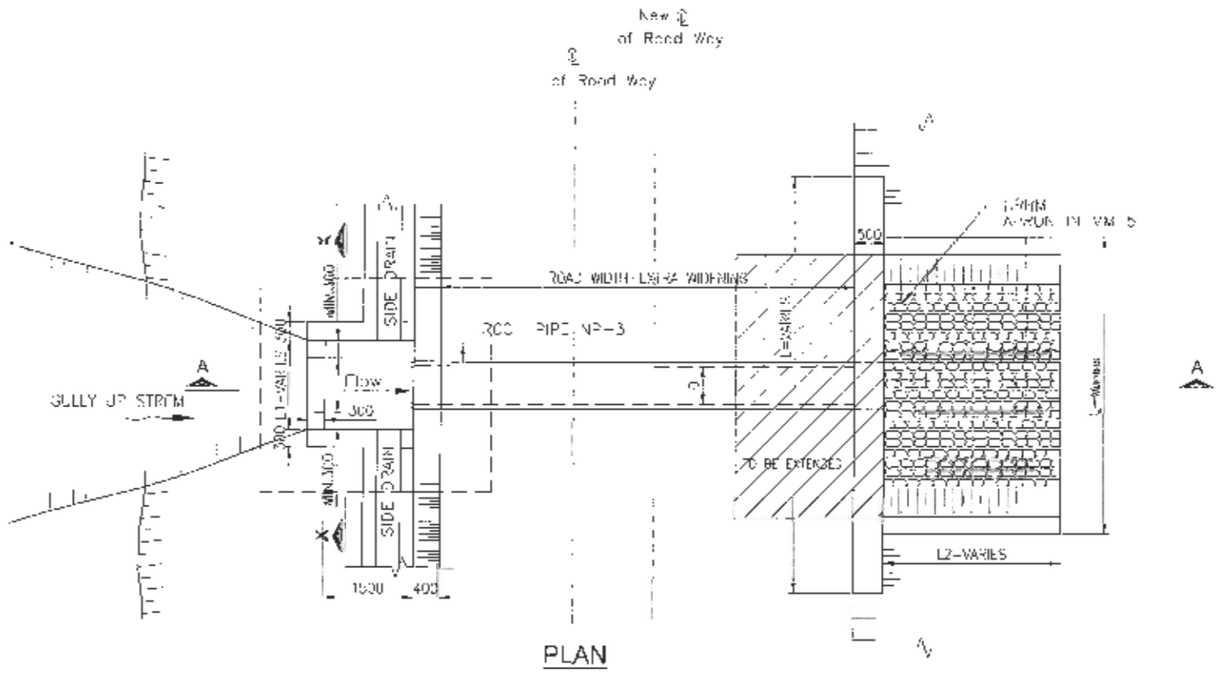


PLAN

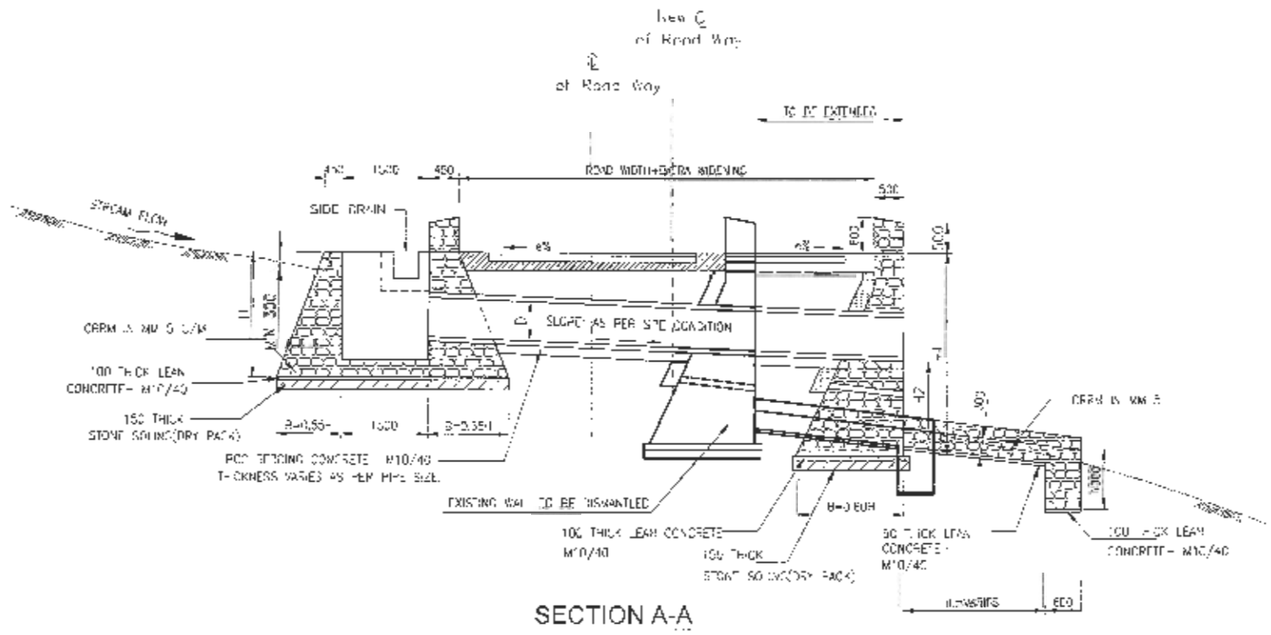
SCALE–A

NOTE: FOR SLAB THICKNESS, ABUTMENT SIZE AND REINFORCEMENT REFER DRAWING OF SLAB CULVERT

EMPLOYER	PROJECT	DESIGN CONSULTANT			DRAWING NAME:	Scale:	Date:
Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kathmandu (Nagdhunga) - Naubise - Mugling Road and Bridges	Intercontinental Consultants & Technocrats Pvt. Ltd. A-5, Green Park, New Delhi - 110016 Ph: 4066-3000, Fax 2685 5252 In Joint Venture With Soosung Engineering Co. Ltd., South Korea In Association With Full Bright Consultancy (Pvt.) Ltd. 316,Baburam Acharya Sadak Sinamangal, Kathmandu, GPO Box: 4970, Kathmandu, Nepal	Designed By: SB Checked By: PMS Approved By: BNS	EXTENSION OF OLD STRUCTURE (SLAB CULVERT)	NOT TO SCALE	August 2019 Drawing No.: NNMR-TYP 05-17



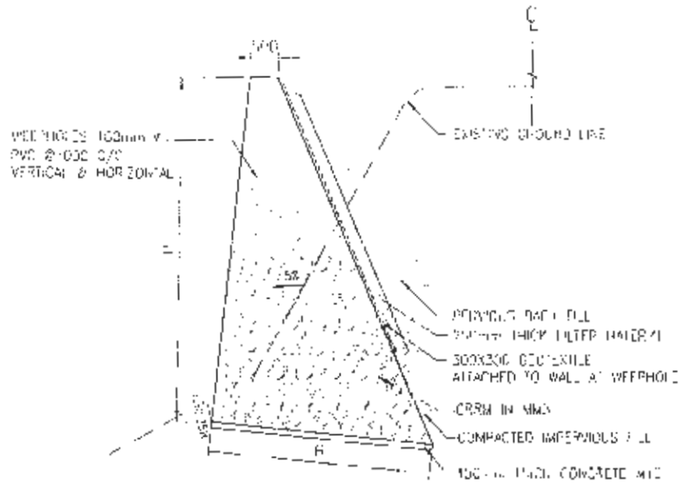
PLAN



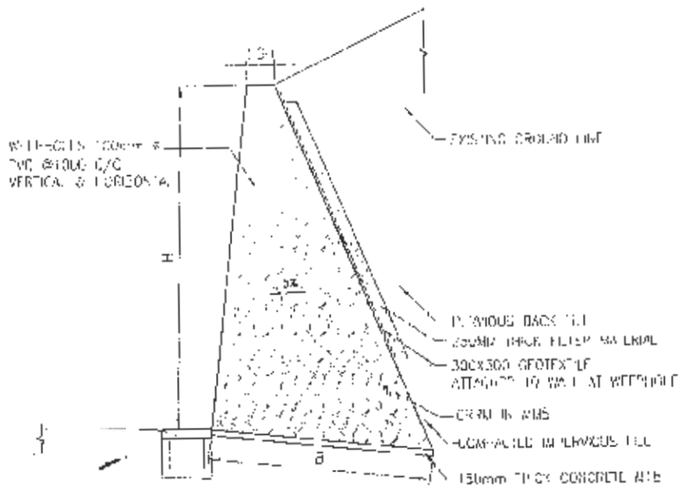
SECTION A-A

EMPLOYER Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	**PROJECT** Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kathmandu (Nagdhunga) - Naubise - Mugling Road and Bridges	**DESIGN CONSULTANT** Intercontinental Consultants & Technocrats Pvt. Ltd. A-8, Green Park, New Delhi - 110016 Ph : 4086-3000, Fax 2685-5252 In Joint Venture With Soosung Engineering Co. Ltd., Seule Korea In Association With Full Bright Consultancy (Pvt.) Ltd. 316,Baburam Acharya Sadak Sinamangal, Kathmandu, GPO Box: 4970, Kathmandu, Nepal	Designed By	SB		**DRAWING NAME:** EXTENSION OF OLD STRUCTURE (PIPE CULVERT)	**Scale:** NOT TO SCALE	**Date:** August 2015 **Drawing No.:** NNMR-TYP 05-18
			Checked By	PMS				
			Approved By	BNS				

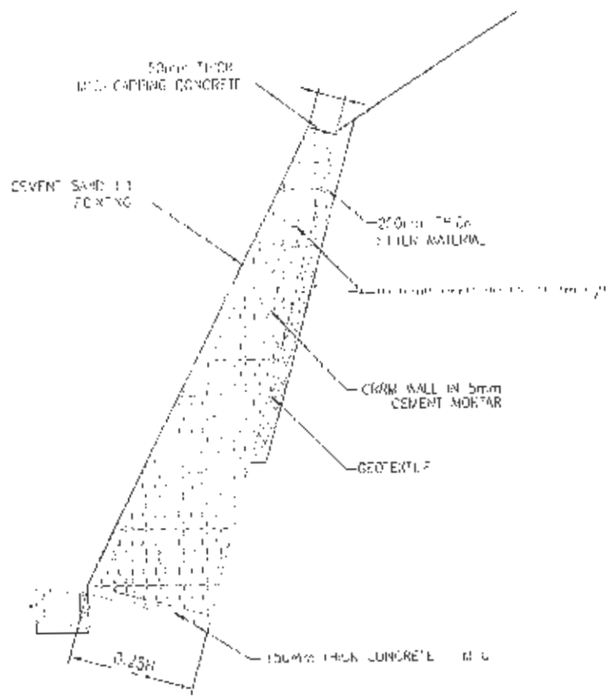
RETAINING STRUCTURES



STONE MASONRY RETAINING WALL
(VALLEY SIDE)



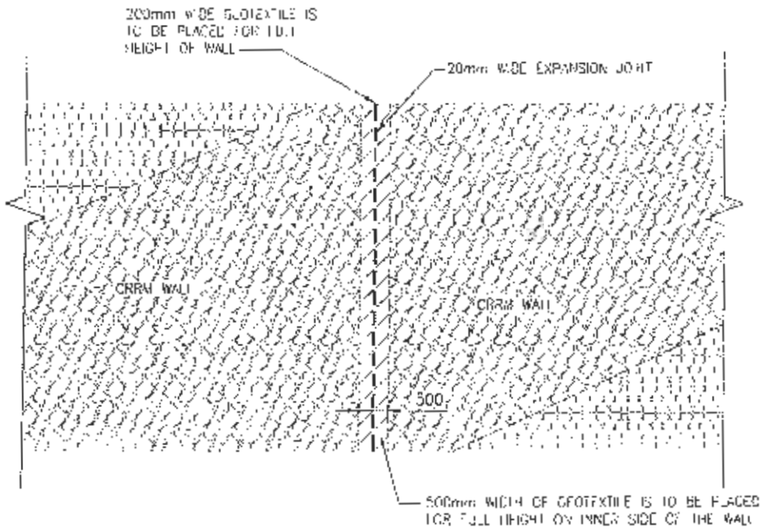
STONE MASONRY RETAINING WALL
(HILLSIDE)



CEMENT MASONRY
BREAST WALL
Units are mentioned in meter

NOTES :

1. Wall Height is to be modified as per actual site condition or as directed by the Engineer
2. For Toe Pressure>25 Ton/m2 weather rock or rock foundation is envisized. In case of soil investigation will be required.
3. Expansion Joint is to be provided at a maximum distance of 10.0 m C/C or as directed by the Engineer
4. FSS means factor of safety against sliding and FSO means factor of safety against overturning.
5. All dimensions are in mm except otherwise mentioned.
6. Safety Blocks to be provided where the wall height is more than 7.0 m



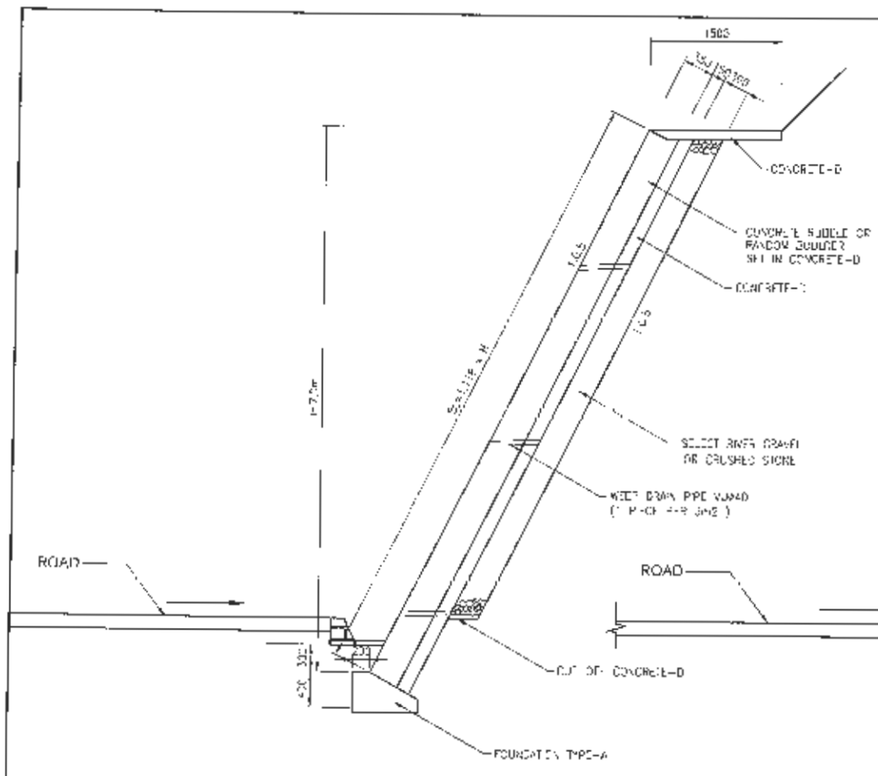
EXPANSION JOINT DETAILS

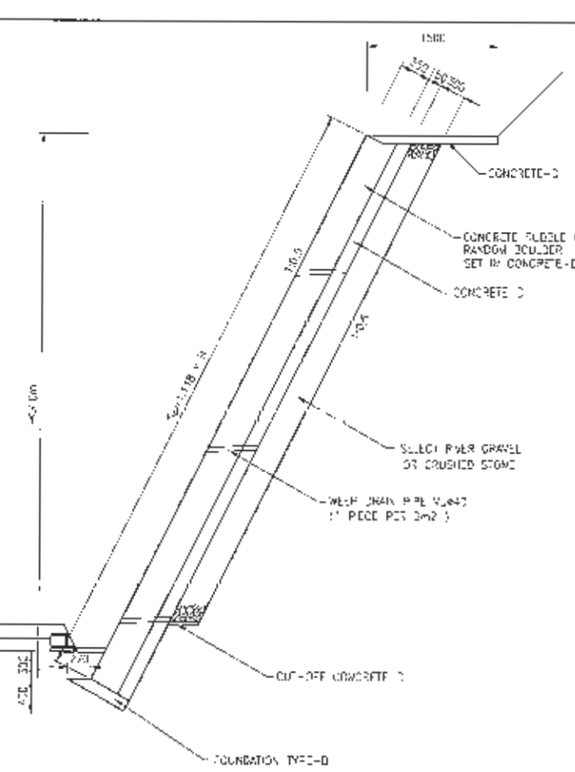
Types	Cement Masonry
Top Width (m)	0.5
Base Width	0.25H
Front Batter (V:H)	Vertical
Back Batter (V:H)	3:1
Foundation Dip (V:H)	1:3
Foundation Depth (V:H)	0.5
Height Range (m)	1.0 - 8.0
Hill Slope Angle °	35° - 70°

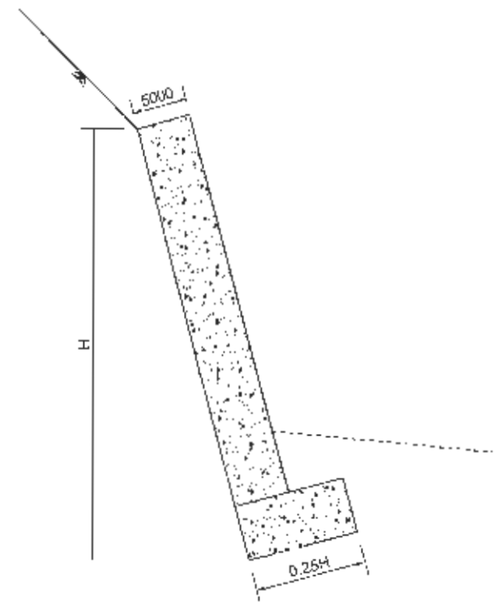
TYPE - SMW

H (m)	Φ=40°				Φ=30°				Φ=24°			
	B (m)	FSS	FSO	Max. Toe Pressure (kN/m2)	B (m)	FSS	FSO	Max. Toe Pressure (kN/M2)	B (m)	FSS	FSO	Max. Toe Pressure (kN/m2)
2	1.36	2.03	2.56	92.00	1.50	1.65	2.46	100.00				
3	2.00	2.23	2.66	129.90	2.18	1.84	2.58	140.00	2.36	1.69	2.58	144.20
4	2.61	2.37	2.74	165.30	2.83	1.95	2.63	178.50	3.08	1.73	2.62	183.80
5	3.20	2.44	2.76	200.50	3.47	2.02	2.66	220.50	2.78	1.79	2.65	221.90

EMPLOYER	PROJECT	DESIGN CONSULTANT			DRAWING NAME:	Scale:	Date:
Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kathmandu (Nagdhunga) - Naubise - Mugling Road and Bridges	Intercontinental Consultants & Technocrats Pvt. Ltd A-8, Green Park, New Delhi 110016 Ph: 4000-3000, Fax 2665-5252 In Joint Venture With Soosung Engineering Co. Ltd., South Korea In Association With Full Bright Consultancy (Pvt.) Ltd 316,Basuram Acharya Sadak Shankhamul, Kathmandu GPO Box: 4970, Kathmandu, Nepal	Designed By	SB	MASONRY RETAINING WALL	NOT TO SCALE	August 2019
			Checked By	PMS			Drawing No.: NNMR-TYP 05 -01
			Approved By	SNS			







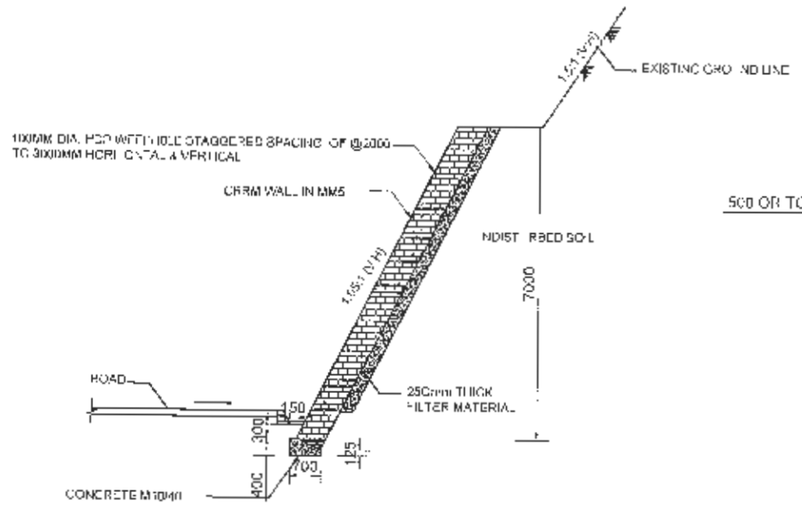
CONCRETE

BREAST WALL

Units are mentioned in meter

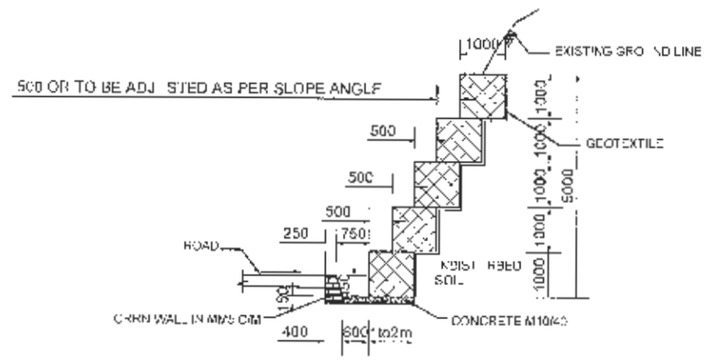
Types	Concrete
Top Width (m)	0.5
Base Width	0.25H
Front Batter (V:H)	Varies
Back Batter (V:H)	3:1
Foundation Dept (V:H)	1:3
Foundation Depth (V:H)	0.5
Height Range (m)	1.0 - 12.0
Hill Slope Angle°	35° - 70°

WET MASONRY TYPE-A



CRRM REVETMENT
5.00 - 7.00m HEIGHT

WET MASONRY TYPE-B



GABION TYPE
UPTO 5.00m HEIGHT

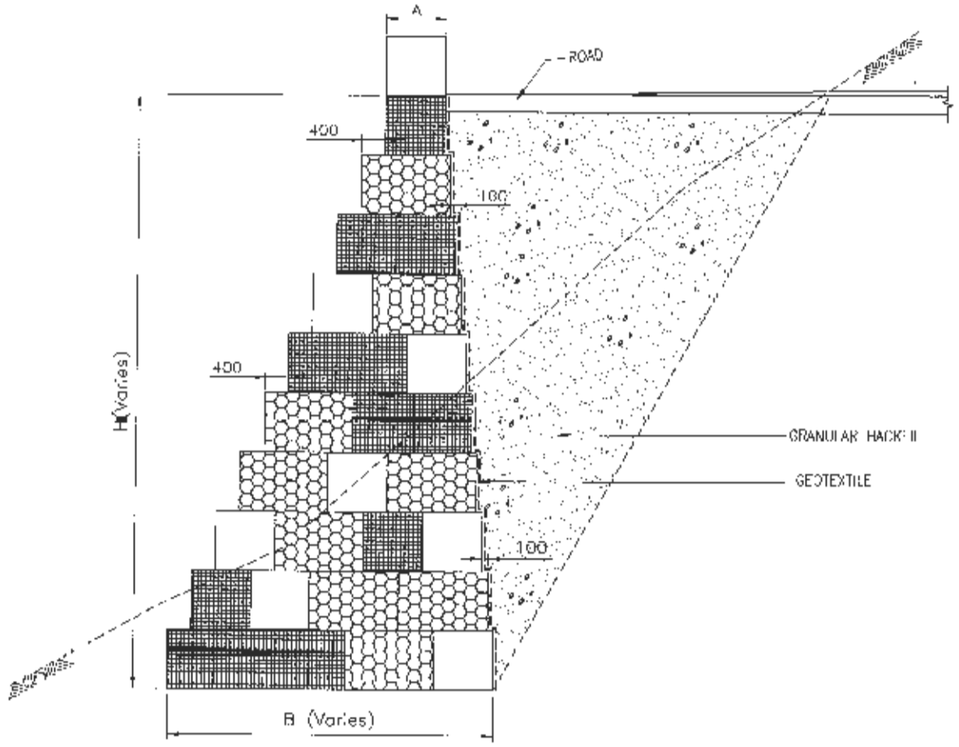
REVETMENTS

Units are mentioned in meter

NOTES:

1. All dimensions are in mm except otherwise mentioned.
2. Revetment structures should be used for protection works only, ie for Zero earth pressure case.

EMPLOYER	PROJECT	DESIGN CONSULTANT				DRAWING NAME:	Scale:	Date:
Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kathmandu (Nagdhunga) - Naubise - Mugling Road and Bridges	Intercontinental Consultants & Technocrats Pvt. Ltd. A-8 Green Park New Delhi - 110016 Ph : 4060-3000, Fax 2685-5252 In Joint Venture With Samsung Engineering Co. Ltd., South Korea In Association With Full Bright Consultancy (Pvt.) Ltd. 316,Baburam Acaarya Sadak Sitalmangal, Kalanmandu GPO Box: 4970 Kalamandu, Nepal	Designed By	SB		Standard Drawings of Revetment and Breast Walls		August 2019
			Checked By	PMS				Drawing No.: NNMR-TYP 00 -02
			Approved By	BNS				



GRAVITY GABION WALL (FRONT BATTER)

GRAVITY GABION WALL (BACK BATTER)

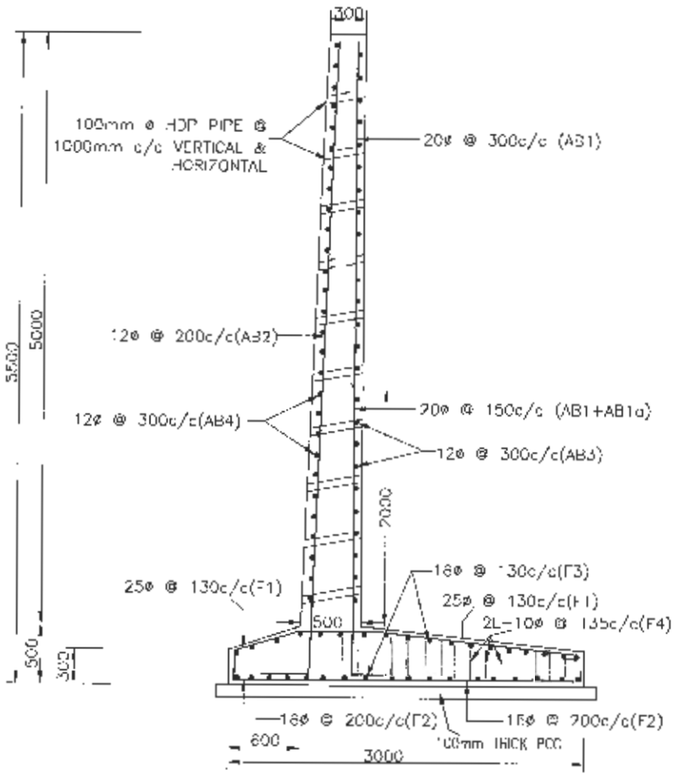
Detail for semi gravity gabion walls

BASE WIDTHS AND TYPICAL GROUND PRESSURES(T/M²)								
Wall Height(m)		2	3	4	6	8	10	12
Front Batter	Base width, m	1.5	2.0	2.5	3.5	4.5	5.5	6.5
	Ground pressure(T/M²)	50	70	90	120	150	190	230
Back Batter	Base width, m	1.5	2.0	2.55	3.5	4.5	5.5	6.5
	Ground pressure(T/M²)	70	110	150	220	290	360	420

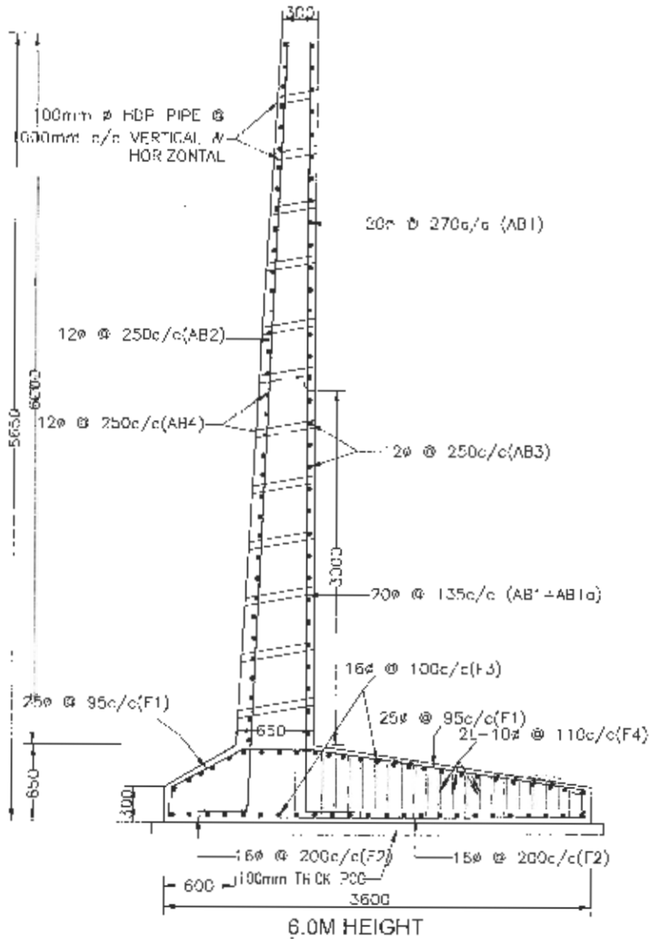
NOTES:

1. All dimensions are in mm except otherwise mentioned.
2. For wall height more than 6.0m and backfil slope angle greater than 20, cetcil designed with soil investigation is to be done or as directed by the engineer
3. If space is available, sloping outside is preferred for valley side of the road.

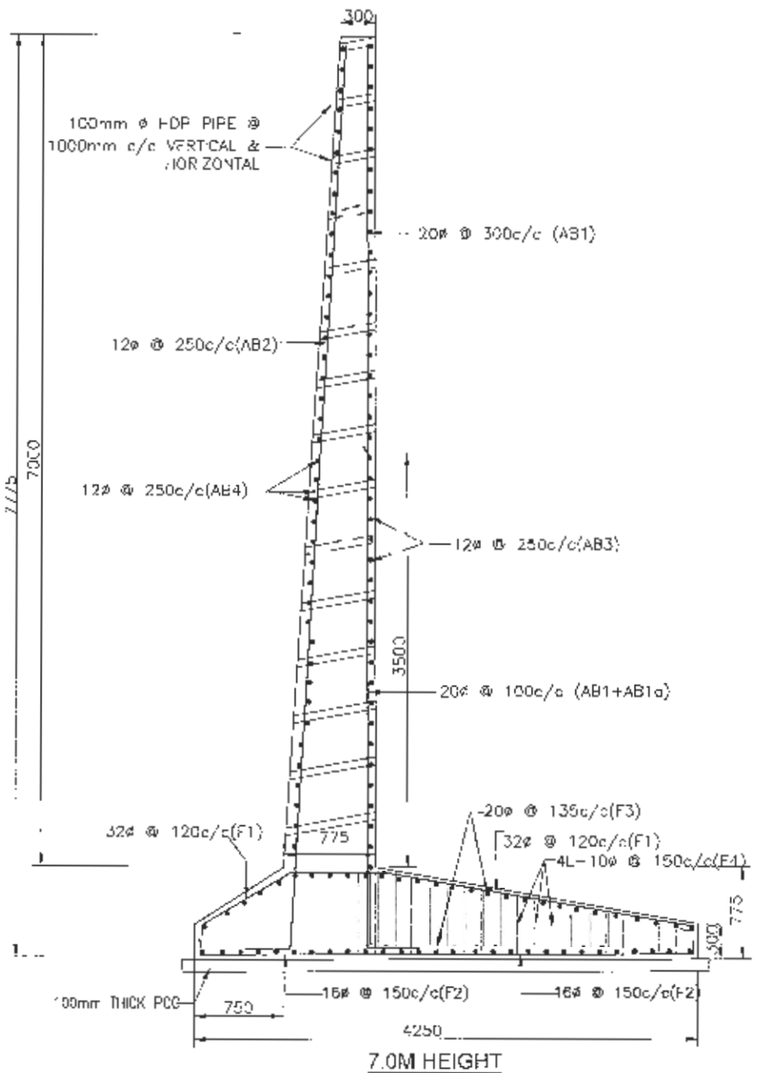
EMPLOYER	PROJECT	DESIGN CONSULTANT					
Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kathmandu (Nagdhunga) - Naubise - Mugling Road and Bridges	Intercontinental Consultants & Technocrats Pvt. Ltd. A-8, Green Park, New Delhi - 110016 Ph : 4686-3000, Fax 2565-6252 In Joint Venture With Soosung Engineering Co. Ltd., South Korea In Association With Full Bright Consultancy (Pvt.) Ltd. 316,Babu ram Acharya Sadak Sinamangal, Kathmandu, GPO Box. 4970 Kathmandu, Nepal					
			Designed By	SB		DRAWING NAME: GABION RETAINING WALL	Scale: NOT TO SCALE
			Checked By	PMS			Date: August 2019
			Approved By	BNS			Drawing No.: NNMR-TYP 08 -03



5.0M HEIGHT
(SCALE -1:50)



6.0M HEIGHT
(SCALE -1:50)



7.0M HEIGHT
(SCALE -1:50)

EMPLOYER Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	**PROJECT** Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kathmandu (Nagdhunga) - Naubise - Mugling Road and Bridges	**DESIGN CONSULTANT** Intercontinental Consultants & Technocrats Pvt. Ltd. A-8, Green Park New Delhi 110016 Ph: 4088-3000, Fax 2685-5252 In Joint Venture With Seosung Engineering Co. Ltd. South Korea In Association With Full Bright Consultancy (Pvt.) Ltd. 316,Tribhuvan Acharya Sadak Sinamangal, Kathmandu GPO Box 4978, Kathmandu Nepal	Designed By	SR		**DRAWING NAME:** RCC RETAINING WALL (5,6 & 7m HEIGHT)	**Scale:** AS SHOWN	**Date:** August 2019
			Checked By	PMS				**Drawing No.:** NNMR-TYP 06 -04
			Approved By	BNS				

SCHEDULE OF REINFORCEMENT

TYPE OF BAR	SHAPE OF BAR (NOT TO SCALE) (DIMENSIONS ARE IN MILIMETERS)	Ø OF BARS (mm)	NO. OF BARS	LENGTH (m)	TOTAL LENGTH (m)	TOTAL WEIGHT (kg)
RCC RETAINING WALL (5m HEIGHT/ 10m LENGTH)						
AB1	5543 / 600	20	34	5.943	707.06	499.1
AB1a	2393 / 600	20	33	2.993	98.769	244.0
AB2	5347 / 600	12	51	5.947	303.278	269.9
AB3	400 [9900] 400 — LAP LENGTH=50ø	12	18	11.30	203.40	181.0
AB4	400 [9900] 400 — LAP LENGTH=50ø	12	18	11.30	203.40	181.0
[illegible]	200 [557500 1855] 200	25	77	3.293	253.56	978.70
F2	200 [2650] 200	16	50	3.250	162.50	256.80
F3	400 [9850] 400 — LAP LENGTH=50ø	16	34	11.45	389.30	615.10
F4	935 / 75 / 75 160–360	10	180	2.54	457.20	283.50
					TOTAL= 3509.10 Kg	

SCHEDULE OF REINFORCEMENT

TYPE OF BAR	SHAPE OF BAR (NOT TO SCALE) (DIMENSIONS ARE IN MILIMETERS)	Ø OF BARS (mm)	NO. OF BARS	LENGTH (m)	TOTAL LENGTH (m)	TOTAL WEIGHT (kg)
RCC RETAINING WALL (6m HEIGHT/ 10m LENGTH)						
AB1	6493 / 600	20	38	7.093	269.53	665.70
AB1a	3543 / 600	20	37	4.143	153.291	378.60
AB2	6502 / 600	12	41	7.102	291.190	259.20
AB3	400 [9900] 400 — LAP LENGTH=30ø	12	25	11.30	282.50	251.40
AB4	400 [9900] 400 — LAP LENGTH=50ø	12	25	11.30	282.50	251.40
[illegible]	200 [620650 2301] 200	25	105	3.971	416.91	1609.30
F2	200 [3450] 200	16	50	3.850	192.50	304.20
F3	400 [9850] 400 — LAP LENGTH=50ø	16	73	11.45	835.85	1320.60
F4	975 / 75 / 75 160–510	10	242	2.77	670.34	415.60
					TOTAL= 5456.10 Kg	

SCHEDULE OF REINFORCEMENT

TYPE OF BAR	SHAPE OF BAR (NOT TO SCALE) (DIMENSIONS ARE IN MILIMETERS)	Ø OF BARS (mm)	NO. OF BARS	LENGTH (m)	TOTAL LENGTH (m)	TOTAL WEIGHT (kg)
RCC RETAINING WALL (7m HEIGHT/ 10m LENGTH)						
AB1	7614 / 600	20	34	8.214	279.28	689.80
AB1a	4164 / 600	20	65	4.764	309.66	764.90
AB2	7628 / 600	12	41	8.228	337.348	300.30
AB3	400 [9900] 400 — LAP LENGTH=50ø	12	29	11.30	327.70	291.70
AB4	400 [9900] 400 — LAP LENGTH=50ø	12	29	11.30	327.70	291.70
[illegible]	200 [813775 2691] 200	32	83	4.879	388.31	2438.20
F2	200 [4100] 200	16	67	4.50	301.50	476.40
F3	400 [9850] 400 — LAP LENGTH=50ø	20	64	11.65	745.60	1841.60
F4	512 / 75 / 75 160–635	10	478	1.989	823.04	510.30
					TOTAL= 7624.70 Kg	

EMPLOYER
Government of Nepal
Ministry of Physical Infrastructure and Transport
Department of Roads
Development Cooperation Implementation Division

PROJECT
Nepal Ind a Regional Trade and Transport Project (NIRTTP)
(IDA CREDIT No. 5273 - NEP)
Detailed Design for Improvement of Kathmandu (Nagdhunga) - Naubise - Mugling Road and Bridges

DESIGN CONSULTANT
Intercontinental Consultants & Technocrats Pvt. Ltd.
A-8, Green Park, New Delhi - 110016
Ph 4085-3000, Fax 2685-5252
In Joint Venture With
Seosung Engineering Co. Ltd., South Korea
In Association With
Full Bright Consultancy (Pvt.) Ltd.
316, Baburam Acharya Sadak
Sinamangal, Kathmandu GPO
Box. 4970, Kathmandu, Nepal

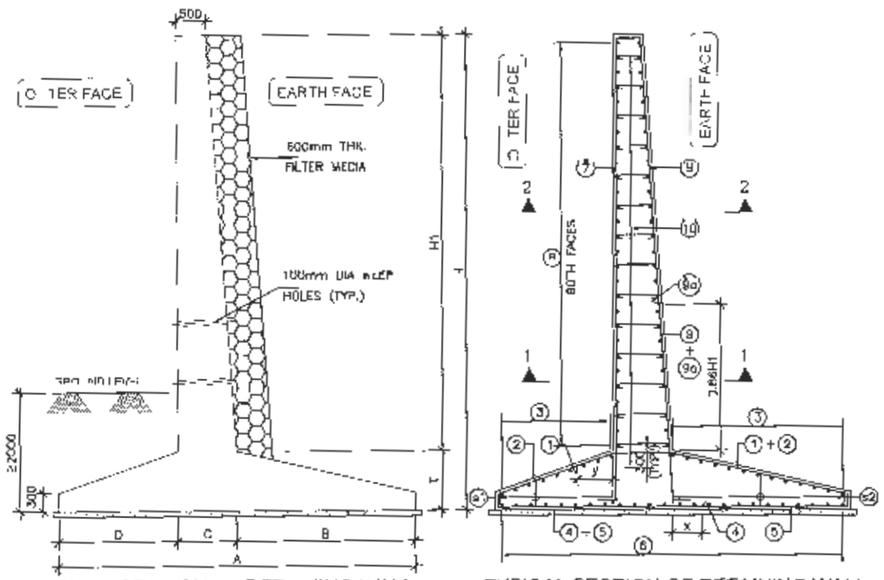
Designed By	SB	
Checked By	PMS	
Approved By	BNS	

DRAWING NAME: RCC RETAINING WALL (5,6 & 7m HEIGHT) BAR BENDING SCHEDULE

Scale: AS SHOWN

Date: August 2019

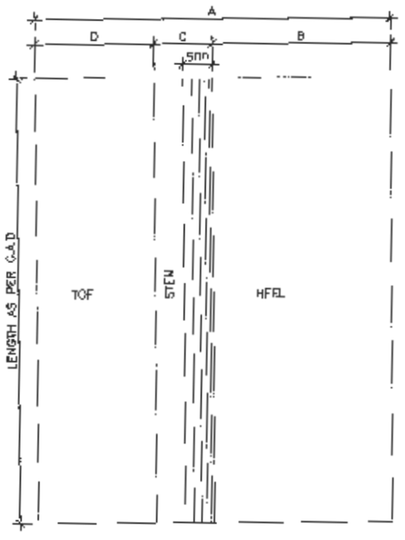
Drawing No.: NNMR-TYP 06 -05



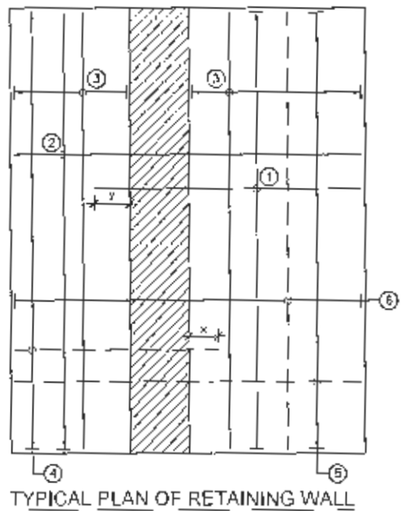
TYPICAL SECTION OF RETAINING WALL
(DIMENSIONAL DETAILS)
(SCALE 1:60)

TYPICAL SECTION OF RETAINING WALL
(REINFORCEMENT DETAILS)
(SCALE 1:60)

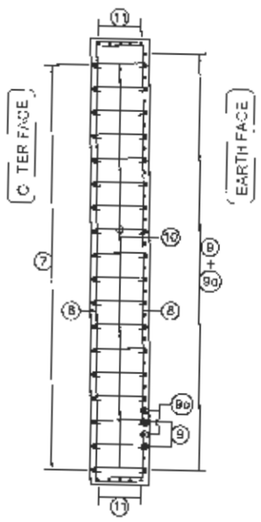
x=Ld or B/3 WHICHEVER IS MAXIMUM
y=Ld or D/3 WHICHEVER IS MAXIMUM



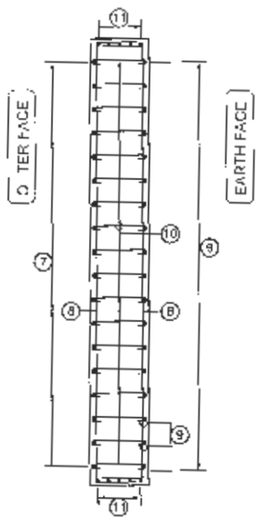
TYPICAL PLAN OF RETAINING WALL
(DIMENSIONAL DETAILS)
(SCALE 1:60)



TYPICAL PLAN OF RETAINING WALL
(REINFORCEMENT DETAILS)
(SCALE 1:60)



SECTION 1-1
(SCALE 1:60)



SECTION 2-2
(SCALE 1:60)

REINFORCEMENT SCHEDULE

BAR MRKD.	SHAPE	TOTAL 8.0m HEIGHT	TOTAL 9.0m HEIGHT	TOTAL 10.0m HEIGHT	TOTAL 11.0m HEIGHT	TOTAL 12.0m HEIGHT	TOTAL 13.0m HEIGHT	TOTAL 14.0m HEIGHT	TOTAL 15.0m HEIGHT
①		20 ø@200c/c	25 ø@200c/c	25 ø@180c/c	25 ø@250c/c	25 ø@250c/c	25 ø@200c/c	25 ø@200c/c	25 ø@200c/c
②		20 ø@200c/c	20 ø@200c/c	20 ø@180c/c	20 ø@250c/c	20 ø@250c/c	20 ø@200c/c	20 ø@200c/c	20 ø@200c/c
③		12 ø@150c/c	16 ø@150c/c	16 ø@150c/c	16 ø@200c/c	16 ø@200c/c	16 ø@200c/c	16 ø@200c/c	16 ø@200c/c
④		25 ø@200c/c	32 ø@200c/c	32 ø@180c/c	32 ø@200c/c	32 ø@200c/c	32 ø@200c/c	32 ø@170c/c	32 ø@170c/c
⑤		25 ø@200c/c	25 ø@200c/c	25 ø@180c/c	25 ø@200c/c	25 ø@200c/c	25 ø@200c/c	25 ø@170c/c	25 ø@170c/c
⑥		16 ø@150c/c	16 ø@150c/c	16 ø@100c/c	16 ø@100c/c	16 ø@100c/c	16 ø@100c/c	16 ø@100c/c	16 ø@100c/c
⑦		16 ø@200c/c	16 ø@200c/c	20 ø@200c/c	20 ø@200c/c	20 ø@180c/c	25 ø@180c/c	25 ø@170c/c	25 ø@170c/c
⑧		16 ø@200c/c	16 ø@150c/c	16 ø@150c/c	16 ø@150c/c	16 ø@125c/c	16 ø@125c/c	16 ø@125c/c	16 ø@125c/c
⑨		25 ø@200c/c	32 ø@200c/c	32 ø@200c/c	32 ø@200c/c	32 ø@180c/c	32 ø@180c/c	32 ø@170c/c	32 ø@170c/c
⑨a		32 ø@200c/c	32 ø@200c/c	32 ø@200c/c	32 ø@200c/c	32 ø@180c/c	32 ø@180c/c	32 ø@170c/c	32 ø@170c/c
⑩		8 ø @400c/c	8 ø @300c/c	8 ø @300c/c	8 ø @300c/c	8 ø @250c/c	8 ø @250c/c	8 ø @250c/c	8 ø @250c/c
⑪		16 ø@150c/c	16 ø@150c/c	16 ø@150c/c	16 ø@150c/c	16 ø@150c/c	16 ø@150c/c	16 ø@150c/c	16 ø@150c/c
⑫		–	–	–	–	–	–	–	–
⑫		–	–	–	2L–12 ø @200c/c	2L–12 ø @200c/c	2L–12 ø @200c/c	2L–12 ø @200c/c	2L–12 ø @200c/c

SCHEDULE OF SECTIONAL DIMENSIONS OF RETAINING WALLS OF DIFFERENT HEIGHTS

SR. NO.	TOTAL HEIGHT (H)		8.0m	9.0m	10.0m	11.0m	12.0m	13.0m	14.0m	15.0m
1	BASE WIDTH	A	7.05	8.0	9.2	9.4	10	11.1	12.5	13.1
2	HEEL	B	3.5	3.9	4.3	4.3	4.7	5.1	5.5	5.7
3	STEM	C	0.75	0.8	1.0	1.2	1.3	1.5	1.7	2
4	TOE	D	2.8	3.3	3.9	3.9	4	4.5	5.3	5.4
5	BASE THK.	T	0.75	0.8	1.0	1.2	1.3	1.5	1.7	2
6	BASE PRESSURE		16T/m²				25T/m²			

(DIMENSIONS GIVEN IN THE TABLE ARE IN METRES)

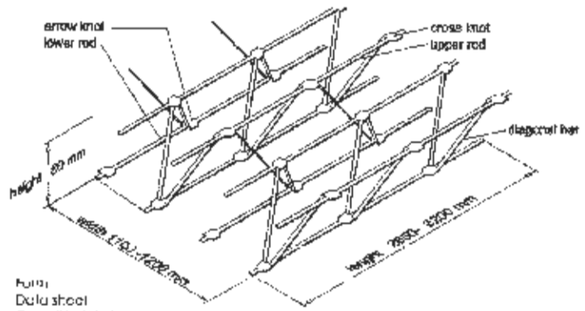
NOTES:-

1. ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE MENTIONED. ONLY WRITTEN DIMENSIONS ARE TO BE FOLLOWED. NO DIMENSION IS TO BE SCALED.
2. THE CONCRETE GRADE SHALL BE M30.
3. UNTENSIONED REINFORCEMENT SHALL BE THERMO MECHANICALLY TREATED (TMT), HYSD BARS OF GRADE DESIGNATION Fe-500D CONFORMING TO IS: 1786.
4. CLEAR COVER TO OUTER MOST STEEL SHALL BE AS UNDER:-
   i) EARTH FACE –75mm.
   ii) NON EARTH FACE –50mm.
5. 100mm DIA WEEP HOLES AT 1000mm C/C STAGGERED HORIZONTALLY AND VERTICALLY SHALL BE PROVIDED IN TWO LAYERS ABOVE G.L IN VERTICAL WALLS OF RETAINING WALLS.
6. LAYING, COMPACTION AND EXTENT OF BACKFILL BEHIND MEDIAN WALLS/ RETAINING WALLS SHALL CONSIST OF SELECTED EARTH CONFORMING TO APPENDIX.D OF IRC:78 2014 HAVING PROPERTIES C=0, ϕ= 30°, δ=22.5° & γd = 20 KN/M³.
7. LAPPING OF REINFORCEMENT SHALL BE AVOIDED AS FAR AS POSSIBLE, IN CASE LAPPING OF BARS BECOMES UNAVOIDABLE, MINIMUM LAP LENGTH OF REINFORCEMENT BARS SHALL BE CALCULATED AS FOLLOW WITH MAXIMUM ALLOWABLE LAPPING (p) OF 50% ONLY.
   (IRC:112–2011) (CLAUSE:15.2.5.1)
   LAP LENGTH lb = αd lbnet
   αd = 1.0 FOR p%≤25%
   αd = 1.15 FOR 25%≤p%≤33%
   αd = 1.4 FOR 33%≤p%≤50%
   IN THE CASE OF BUNDLED BARS
   LAP LENGTH = 1.3x lb(CLAUSE:15.2.7.3)
   (IRC:112–2011) (CLAUSE:15.2.3.3)
   DEVELOPMENT LENGTH (lbnet OR ld)
   lbnet = αlb (α = 1.0)
   lb = kø
   k = 40 FOR M30 (Fe500D)
   FOR UNFAVORABLE BOND CONDITION THE lb SHOULD BE MULTIPLIED BY FACTOR OF 1.43.
   FOR ø>32mm lb, SHOULD BE INCREASED BY MULTIPLYING FACTOR $(\frac{100}{132-\phi})$
8. SAFE BEARING CAPACITY OF SOIL AT FOUNDATION LEVEL SHALL NOT BE LESS THAN THAT GIVEN IN THE TABLE.
9. TO COUNTER FOR THE DEFLECTION RETAINING WALL SHALL BE CONSTRUCTED TILTED BACK BY 1 IN 100.
10. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH THE GENERAL ARRANGEMENT DRAWING OF THE RESPECTIVE BRIDGES.

SURFACE BAR SHALL BE PROVIDED IN FOOTING AT 12Ø@150c/c WHEREVER REQUIRED

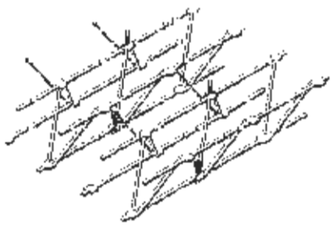
EMPLOYER	PROJECT	DESIGN CONSULTANT					
Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5278 - NEP) Detailed Design for Improvement of Kathmandu (Nagdhunga) - Naubise - Mugling Road and Bridges	Intercontinental Consultants & Technocrats Pvt. Ltd, A-8 Green Park, New Delhi - 110016 Ph : 4086-3000, Fax 2565-5252 In Joint Venture With Seosung Engineering Co. Ltd, South Korea FBC In Association With Full Bright Consultancy (Pvt.) Ltd. 316,Baburam Acharya Sadak Shamangal, Kathmandu GPO Box: 4970, Kathmandu, Nepal	Designed By	SB		DRAWING NAME: RCC RETAINING WALL	Scale: AS SHOWN
			Checked By	PMS			Date: August 2019
			Approved By	BNS			Drawing No.: NNMR-TYP 06 -03

Semi-flexible 3d galvanized mat details



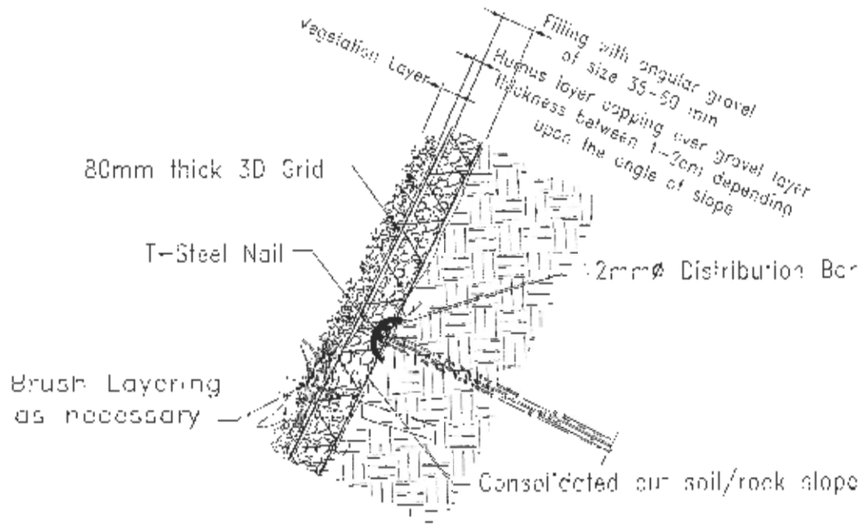
A Form
02 Data sheet
80 Overall height in mm
FE Material - steel
Z Corrosion protection - zinc

Material	at least 275 g/m² galvanized steel sheet band, thickness 1.5 – 1.6 mm
Panel size	width 1100 - 1200 mm length 2,000 - 3200 mm height 60 mm
Weight	approx. 3.6 kg/m² to 3.33 kg/m² or 10.8 kg/panel to 12.8 kg/panel corresponding to the thickness of sheet steel used (1.5 or 1.6 mm)
Approx. loading values	Steel S 350 GD model Evenly distributed load if knots are fixed: approx. 30 kN/m² Maximum tensile strength of J.K.S. lengthwise 70 kN/m

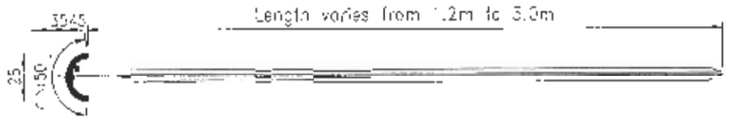


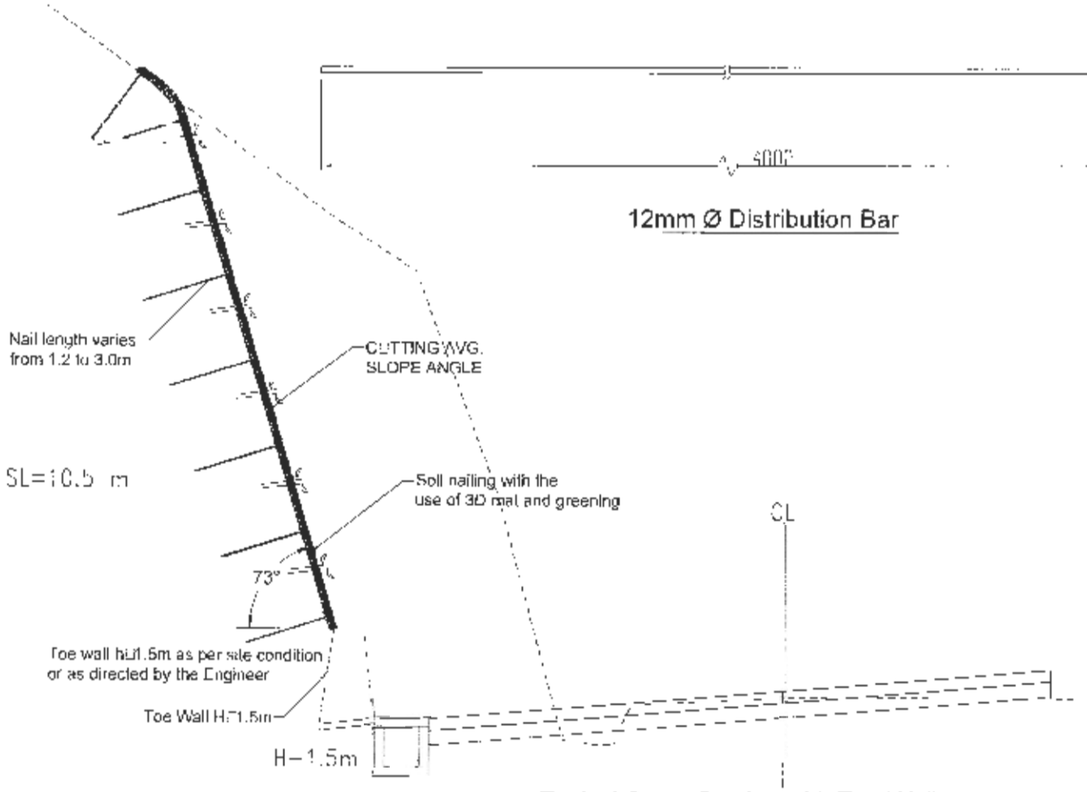
U-Clamp for Joining Distribution Bars

Details of Layer Construction of 3D Semi-Flexible Mat (Schematic)

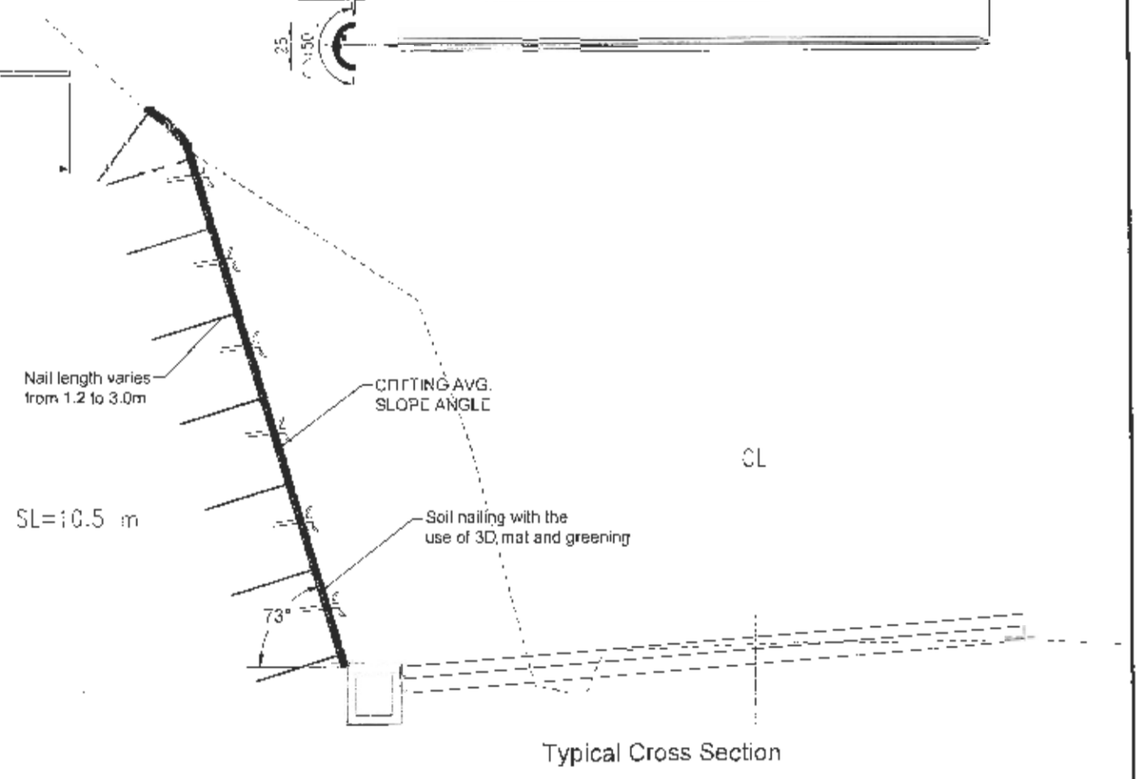


Details of T-steel Nail



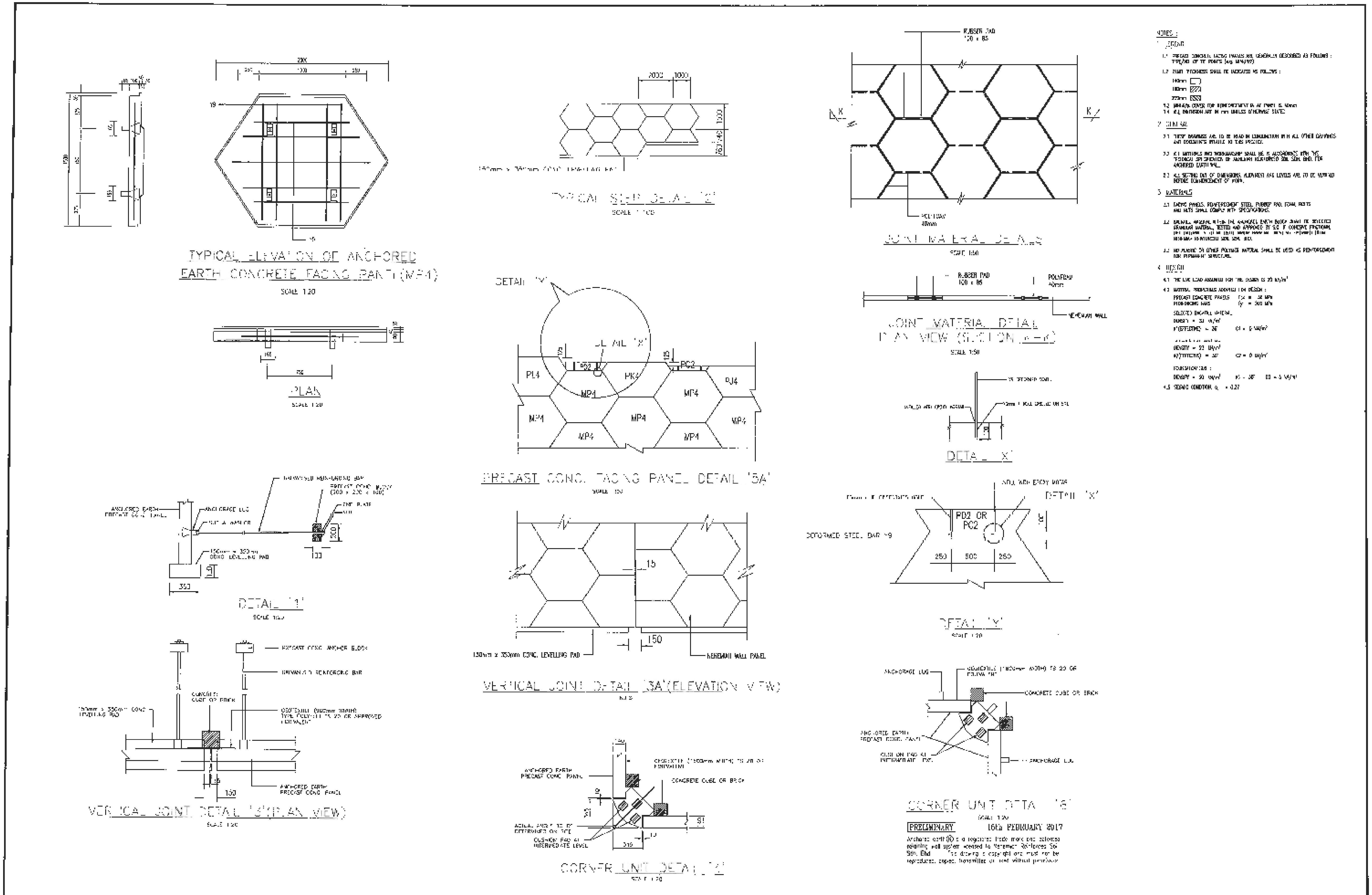


Typical Cross Section with Toe Wall

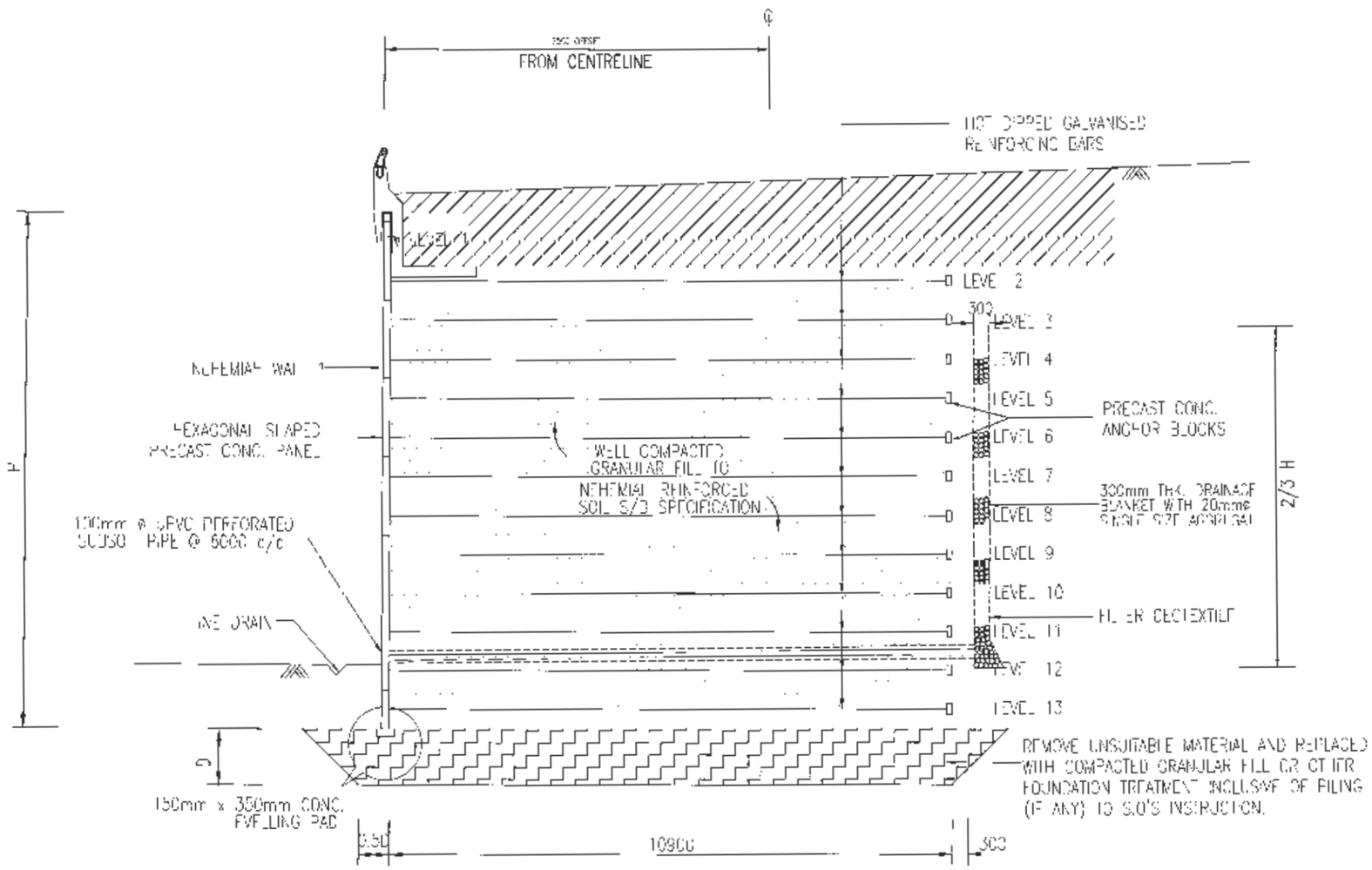


Typical Cross Section

EMPLOYER	PROJECT	DESIGN CONSULTANT				DRAWING NAME:	Scale:	Date:
Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kathmandu (Nagdhunga) - Naubise - Mugling Road and Bridges	Intercontinental Consultants & Technocrats Pvt. Ltd. A-8 Green Park, New Delhi - 110016 Ph : 4086-3000, Fax 2565-5252 In Joint Venture With Seosung Engineering Co. Ltd., South Korea In Association With Full Bright Consultancy (Pvt.) Ltd. 318,Baburam Acharya Sadak Sinamangal, Kathmandu, GPO Box 4975, Kathmandu, Nepal		Designed By	SB	NAGDHUNGA-NAUBISE SECTION SEMI-FLEXIBLE 3D GALVANIZED STEEL MAT	Not to Scale	August 2019
				Checked By	PMS			Drawing No.: NNR-TYP-08-07
				Approved By	BNS			



EMPLOYER	PROJECT	DESIGN CONSULTANT					
Government of Nepal Ministry of Physical Infrastructure and Transport **Department of Roads** **Development Cooperation Implementation Division**	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design of Kathmandu (Nagdhunga) - Naubise - Mugling Road and Bridges	Intercontinental Consultants & Technocrats Pvt.Ltd. A-8, Green Park, New Delhi - 110016 Ph : 4086-3000, Fax 2685-5252 In Joint Venture With Sampung Engineering Co. Ltd., South Korea	In Association With Full Bright Consultancy (Pvt.) Ltd. 315,Baburam Acharya Sadak Sinamangal, Kathmandu, GPO Box: 4970, Kathmandu, Nepal	Designed By: **SB** Checked By: **PMS** Approved By: **BNS**	DRAWING NAME: REINFORCED EARTH STRECTURE	Scale:	Date: August 2019 Drawing No.: NNMR-TYP-06-08

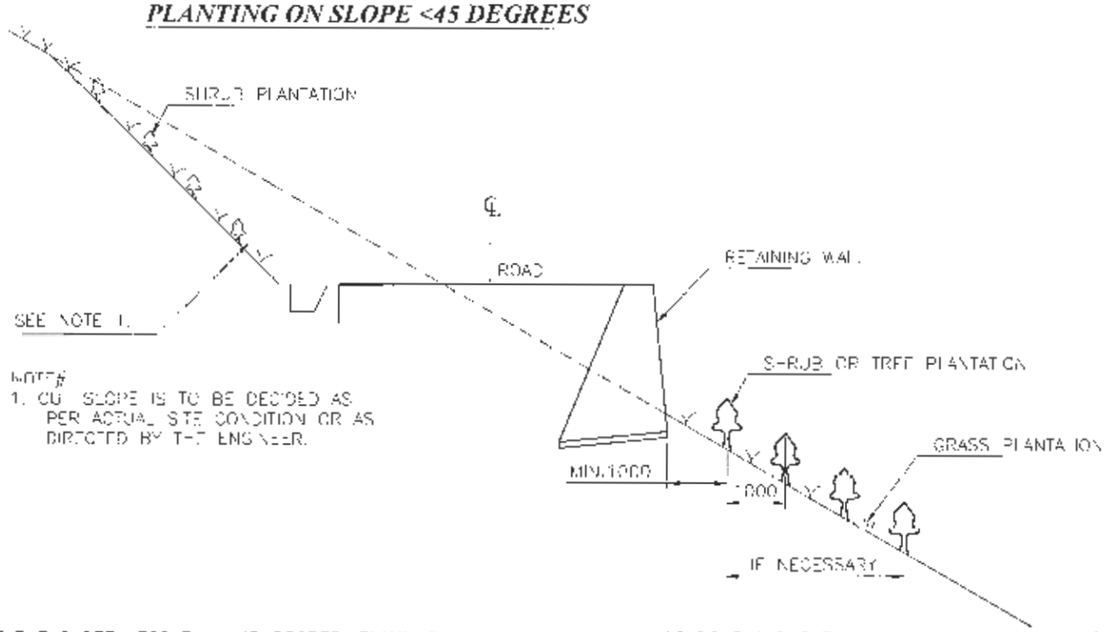


TYPICAL CROSS SECTION OF REINFORCED EARTH STRUCTURE

EMPLOYER Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	**PROJECT** Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kathmandu (Nagdhunga) - Naubise - Mugling Road and Bridges	**DESIGN CONSULTANT** Intercontinental Consultants & Technocrats Pvt. Ltd. A-8, Green Park, New Delhi - 110016 Ph.: 4086-3000, Fax 2685 5259 In Joint Venture With Sinosung Engineering Co, Ltd., South Korea In Association With Full Bright Consultancy (Pvt.) Ltd. 316,Baburam Acharya Sadak Sinamangal, Kathmandu, GPO Box: 4970, Kathmandu, Nepal	Designed By	SB		**DRAWING NAME:** TYPICAL CROSS SECTION OF REINFORCED EARTH STRUCTURE	**Scale:**	**Date:** August 2019
			Checked By	PMS				**Drawing No.:** NNMR-TYP 06-09
			Approved By	BNS				

BIO-ENGINEERING AND PROTECTION WORK

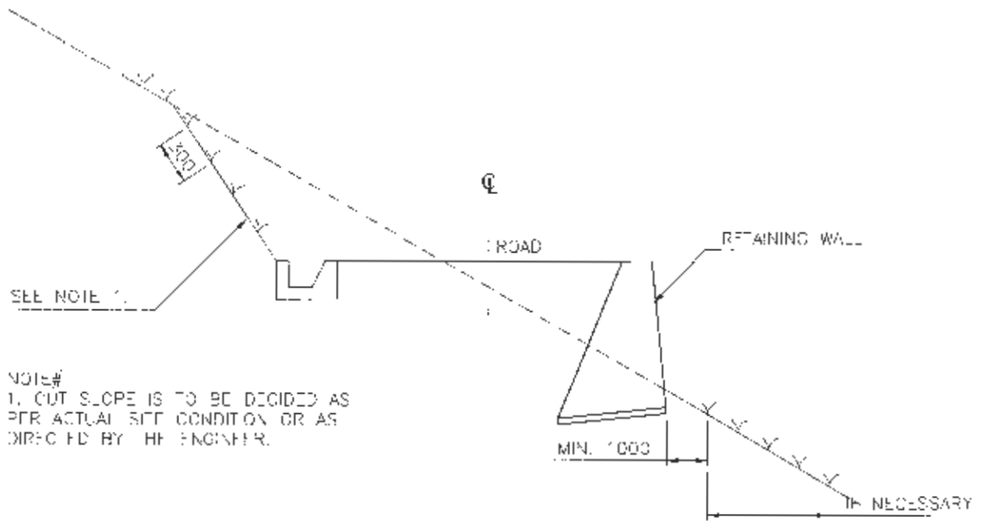
PLANTING ON SLOPE <45 DEGREES



NOTE#
1. CUT SLOPE IS TO BE DECIDED AS PER ACTUAL SITE CONDITION OR AS DIRECTED BY THE ENGINEER.

IF THE SLOPE IS LESS THAN 45 DEGREE, PLANTING TREE SEEDLINGS WILL BE DONE ALONG THE SLOPE AT AN INTERVAL OF 1M C/C. BY DIGGING PITS 300MM. DIAMETER AND 300 MM. DEPTH. MIX COMPOST WITH SOIL UPTO 1/4 OF PIT VOLUME. IN BETWEEN THE TWO TERRACES, ROOTED GRASS SLIPS WILL BE PLANTED AT THE SPACING 100x100MM BY DIGGING PLANTING HOLES TO A MAXIMUM OF 50MM. DEPTH WITH METAL ROD OR WOOD PEG.

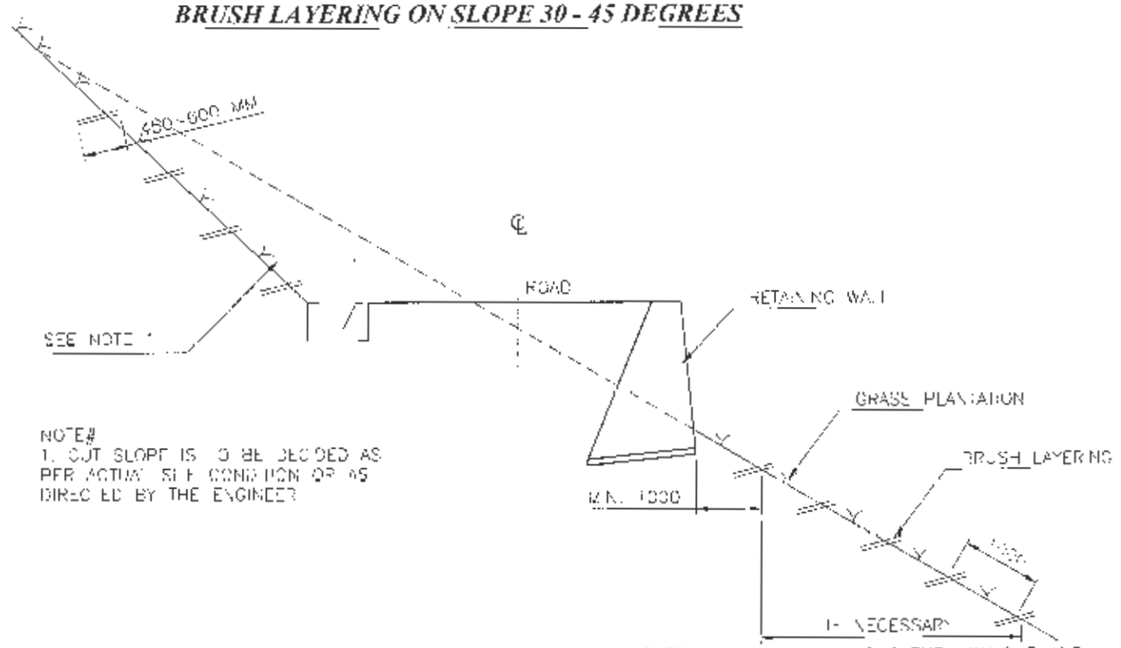
PLANTING ON SLOPE >45 DEGREES



NOTE#
1. CUT SLOPE IS TO BE DECIDED AS PER ACTUAL SITE CONDITION OR AS DIRECTED BY THE ENGINEER.

IF THE SLOPE IN BE WEEN >45 DEGREE, ROOTED GRASS SLIPS WILL BE PLANTED AT THE SPACING OF 100MM. x 100MM. BY DIGGING HOLES TO A MAXIMUM OF 50MM. DEPTH WITH METAL ROD OR WOODEN PEG.

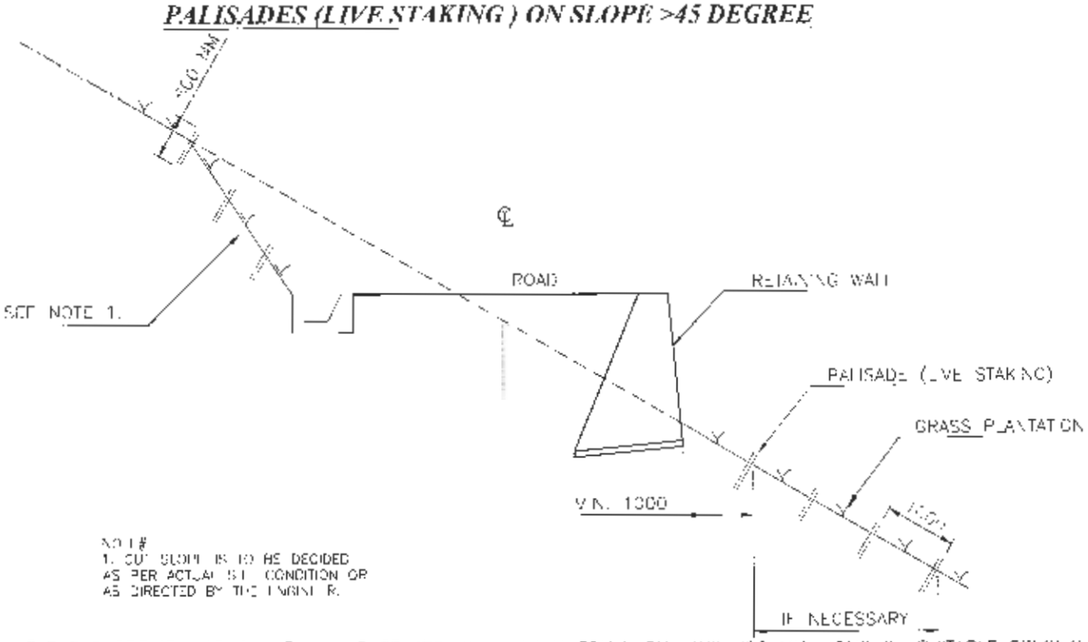
BRUSH LAYERING ON SLOPE 30 - 45 DEGREES



NOTE#
1. CUT SLOPE IS TO BE DECIDED AS PER ACTUAL SITE CONDITION OR AS DIRECTED BY THE ENGINEER.

IF THE SLOPE IN BETWEEN 30-45 DEGREE, TRENCHES ARE DUG UP TO 200MM. DEPTH ALONG THE CONTOUR AND LIVE BRANCHES OF CUTTINGS ARE PLACED WISE IN THE TRENCHES EXPOSING 1/3 OF THE TOTAL LENGTH ABOVE THE GROUND. IN THE SLOPE BETWEEN THE TWO TRENCHES, ROOTED GRASS SLIPS WILL BE PLANTED.

PALISADES (LIVE STAKING) ON SLOPE >45 DEGREE



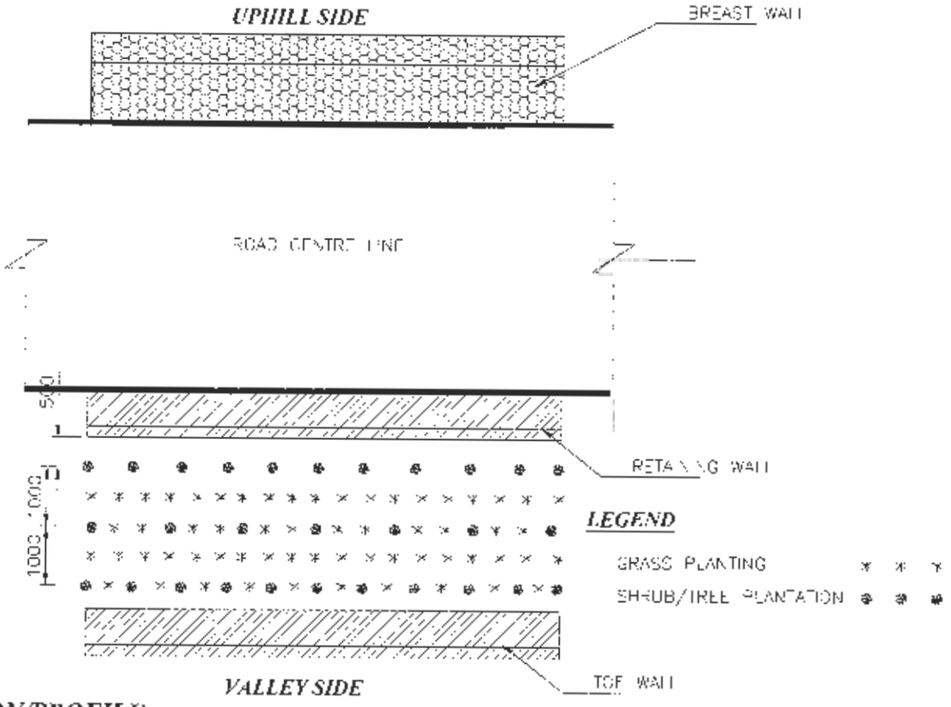
NOTE#
1. CUT SLOPE IS TO BE DECIDED AS PER ACTUAL SITE CONDITION OR AS DIRECTED BY THE ENGINEER.

IF THE SLOPE IS >45 DEGREES, LIVE STAKES OF MINIMUM 50MM. DIA. AND 600 MM. LONG OF SUITABLE SPECIES ARE DRIVED INTO THE GROUND AT RIGHT ANGLE TO THE HOLLOWED SLOPE, SO THAT MAX. 150MM. IS ALLOWED TO STICK OUT OF THE GROUND. LIVE STAKES SHOULD BE SPACED AT 50MM. ALONG THE CONTOUR AND 1M. ALONG THE SLOPES. ON SLOPE IN BETWEEN THE LIVE STAKINGS, ROOTED GRASS SLIPS WILL BE PLANTED.

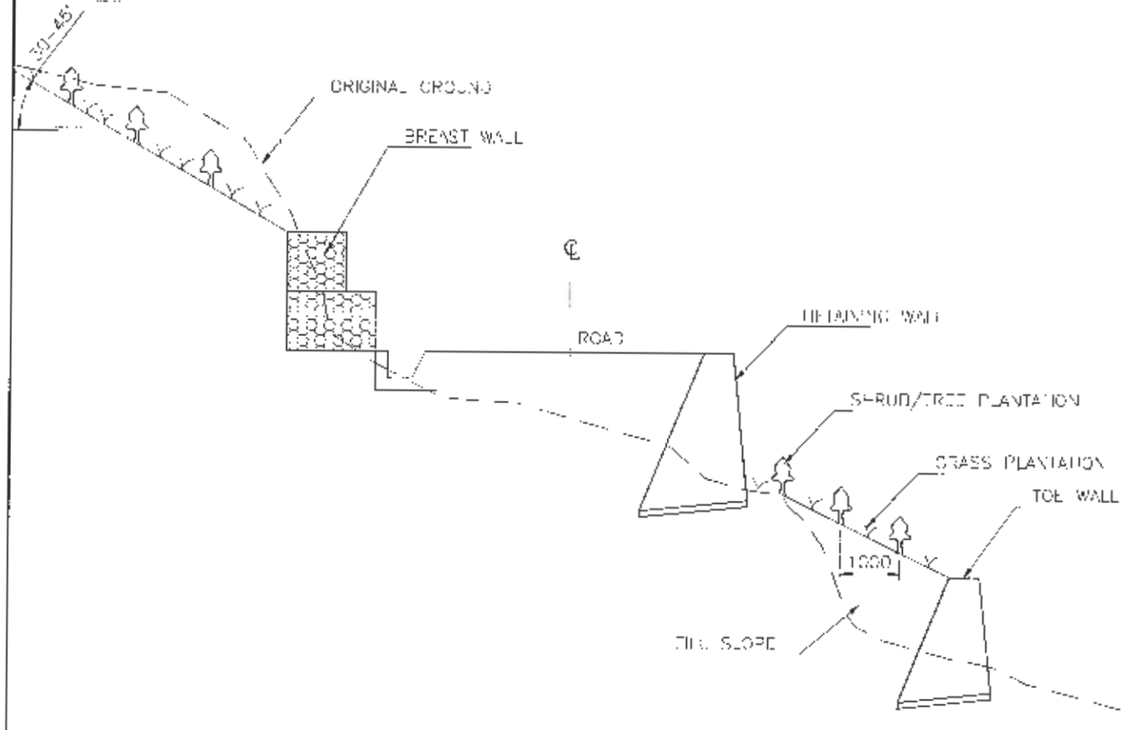
EMPLOYER	PROJECT	DESIGN CONSULTANT					
Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kathmandu (Nagdhunga) - Naubise - Mugling Road and Briges	Intercontinental Consultants & Technocrats Pvt. Ltd. A-8, Green Park, New Delhi - 110016 Ph: 4066 3000, Fax 2685-5252 In Joint Venture With Soosung Engineering Co. Ltd., South Korea In Association With Full Bright Consultancy (Pvt.) Ltd. 316,Baburam Acharya Sadak Sinamangal, Kathmandu. GPO Box: 4970, Kathmandu, Nepal				DRAWING NAME:	Scale:
			Designed By	SB		TYPICAL BIO - ENGINEERING	NOT TO SCALE
			Checked By	PMS			Date: August 2019
			Approved By	RNS			Drawing No.: NNMR-TYP 07-01

COMBINED BREASTWALL WITH BIOENGINEERING WORKS ON BACKFILL AND CUT SLOPE.

PLAN

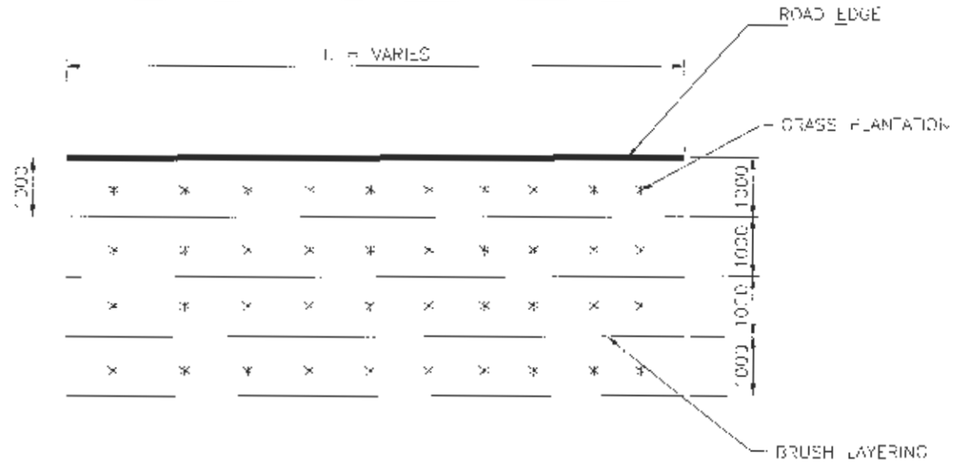


SECTION/PROFILE



BIOENGINEERING WORKS ON FILL SLOPE.

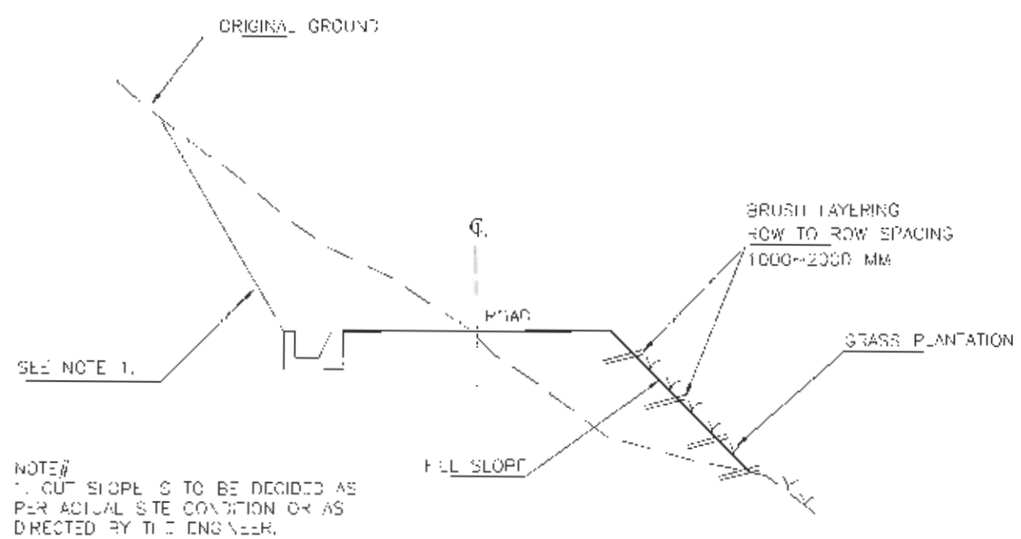
PLAN



LEGEND

GRASS PLANTATION
BRUSH LAYERING

SECTION/PROFILE

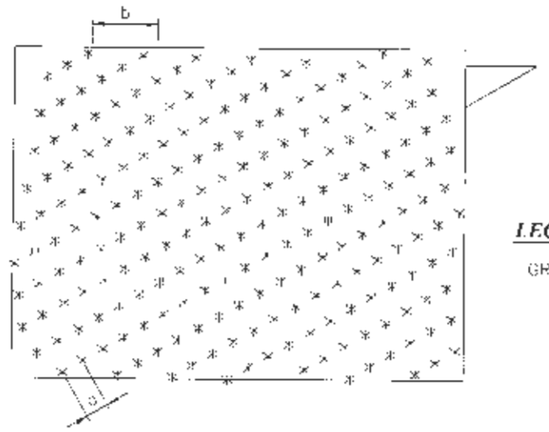


NOTE:
1. CUT SLOPE IS TO BE DECIDED AS PER ACTUAL SITE CONDITION OR AS DIRECTED BY THE ENGINEER.

EMPLOYER	PROJECT	DESIGN CONSULTANT					
Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kathmandu (Nagdhunga) - Naubise - Mugling Road and Bridges	Intercontinental Consultants & Technocrats Pvt. Ltd A-8, Green Park, New Delhi - 110016 Ph : 4086-2000, Fax 2685-5252 In Joint Venture With Seosung Engineering Co. Ltd., South Korea	In Association With Full Bright Consultancy (Pvt.) Ltd, 316,Basuram Acharya Sadak Sinamangal, Kathmandu, GPO Box: 4970, Kathmandu, Nepal	Designed By	SB		DRAWING NAME: TYPICAL BIO - ENGINEERING
				Checked By	PMS		
				Approved By	BNS		

Scale:	Date:
NOT TO SCALE	August 2019
	Drawing No.: NNMR-TYP 07-02

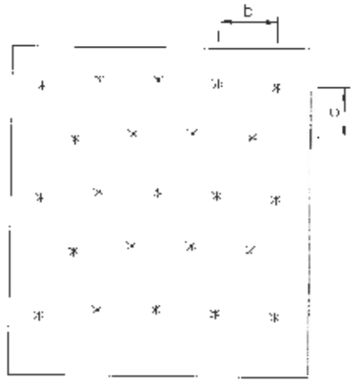
GRASS PLANTING LINES, DIAGONAL



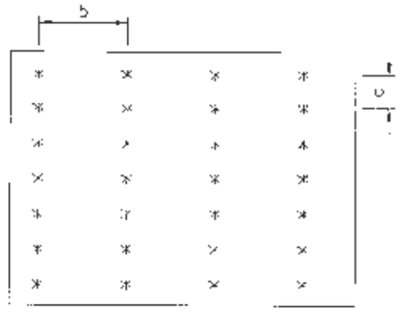
LEGEND

GRASS PLANTATION

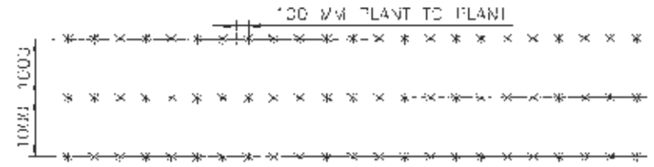
GRASS PLANTING LINES, RANDOM



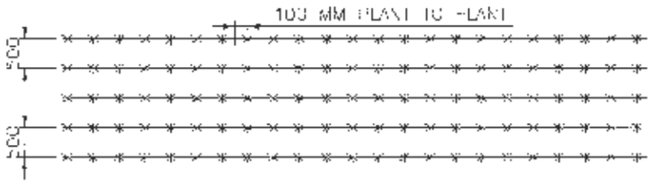
GRASS PLANTING LINES, DOWN SLOPE



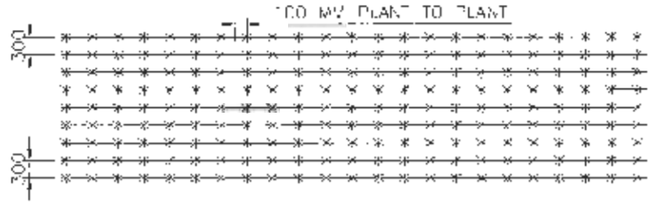
GRASS PLANTING LINES CONTOUR/ HORIZONTAL, SLOPE <30°



2. GRASS PLANTING LINES CONTOUR/ HORIZONTAL, SLOPE <30°-45°



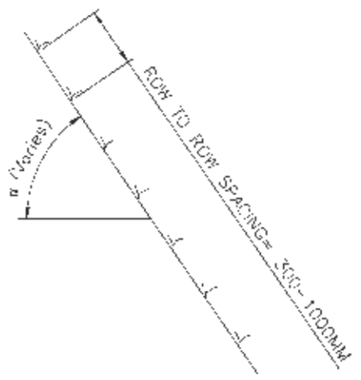
3. GRASS PLANTING LINES CONTOUR/ HORIZONTAL, SLOPE >45°



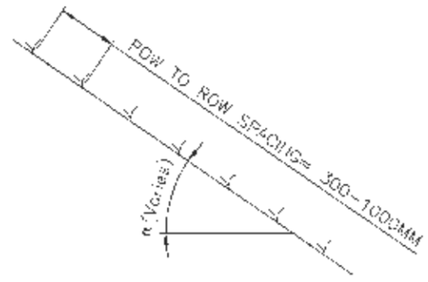
SPACING DETAIL FOR GRASS PLANTING

Planting configuration	Slope steepness	Spacing	
		Plant to Plant [a]	Row to Row [b]
Contour Lines	Slope less than 30°	100 mm	1000 mm
	Slope 30°-45°	100 mm	500 mm
	Slope more than 45°	100 mm	300 mm
Diagonal	Slopes less than 45°	100 mm	500 mm
	Slope more than 45°	100 mm	300 mm
Down slopes lines	All Slopes	100 mm	300 mm
Random lines	All Slopes	100 mm	100 mm

A) CUT SLOPES



B) VALLEY SLOPES

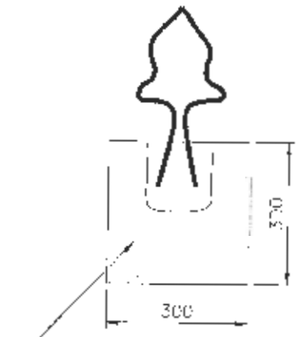


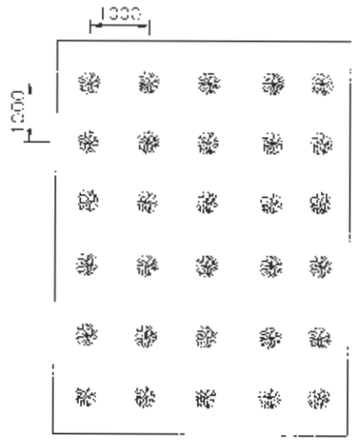
SIDE VIEW OF GRASS PLANTATION

EMPLOYER	PROJECT	DESIGN CONSULTANT					
Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kathmandu (Naubise) - Naubise - Mugling Road and Bridges	Intercontinental Consultants & Technocrats Pvt. Ltd. A-8, Green Park, New Delhi - 110016 Ph.: 4086-3000, Fax 2685-6252 In Joint Venture With Soosung Engineering Co. Ltd., South Korea In Association With Full Bright Consultancy (Pvt.) Ltd. 3*6,Baburam Acharya Sadak Shamangal, Katamandu, GPO Box: 4970, Kathmandu, Nepal					
			Designed By	SB		DRAWING NAME: TYPICAL BIO - ENGINEERING	Scale: NOT TO SCALE
			Checked By	PMS			Date: August 2019
			Approved By	BNS			Drawing No.: NNMR-TYP-07-03

SHRUB/TREE PLANTING

PIT SIZE

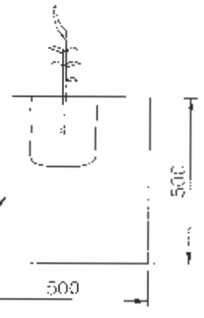


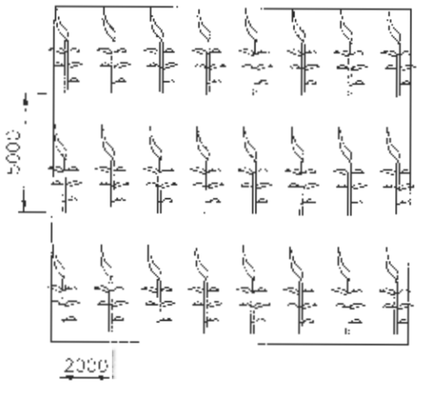


COMPOST VOLUME 1/4 OF VOLUME OF THE PIT
MIXED WITH ORIGINAL SOIL

BAMBOO RHIZOME PLANTING

PIT SIZE

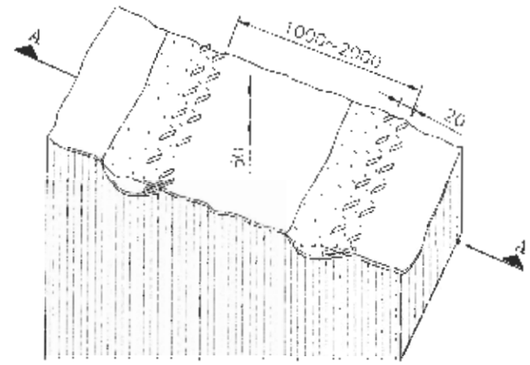




COMPOST VOLUME 1/4 OF VOLUME OF THE PIT
MIXED WITH ORIGINAL SOIL

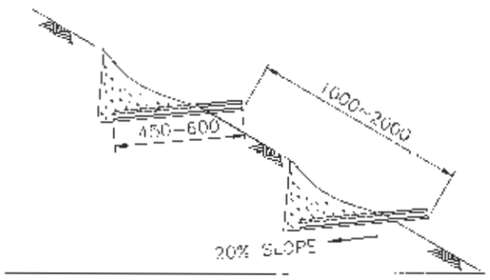
BRUSH LAYERING /PALISADE

BRUSH LAYERING



PLAN VIEW

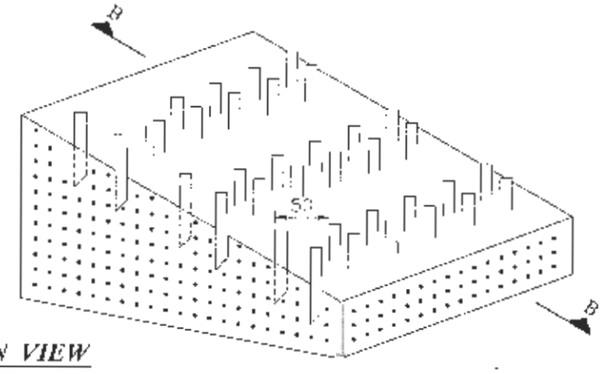
SECTION



SLOPE ANGLE	DISTANCE	
<30°	2000 MM	TO BE LAID IN A DOUBLE LAYER WITH 21 CUTTINGS PER RUNNING METRE.
30°-45°	1000 MM	
	1000 MM	PER RUNNING METRE.

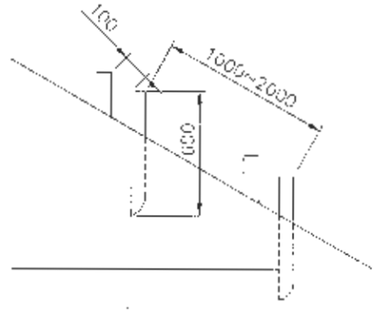
NOTE: TO BE USED IN SOFT SOIL/DEBRIS

PALISADE



PLAN VIEW

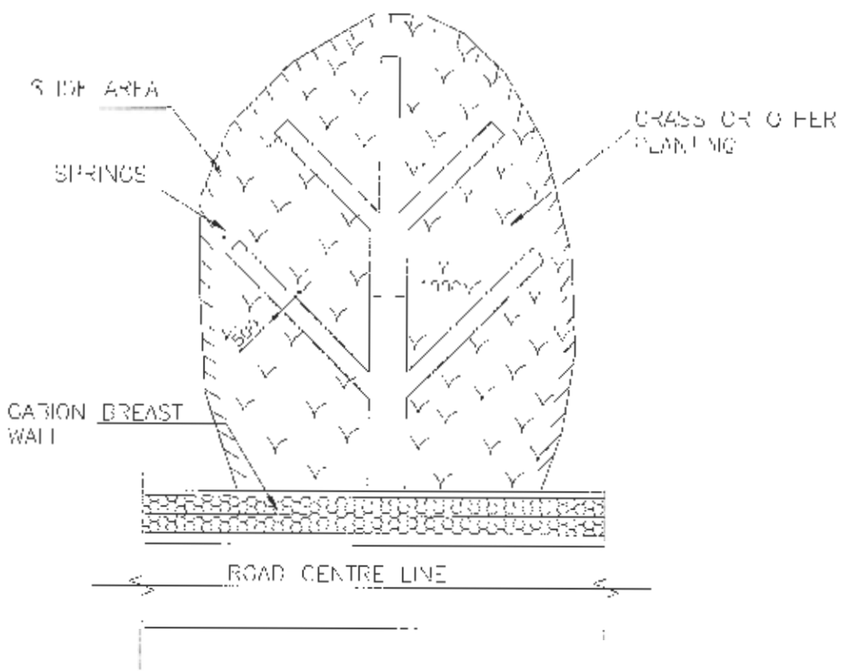
SECTION

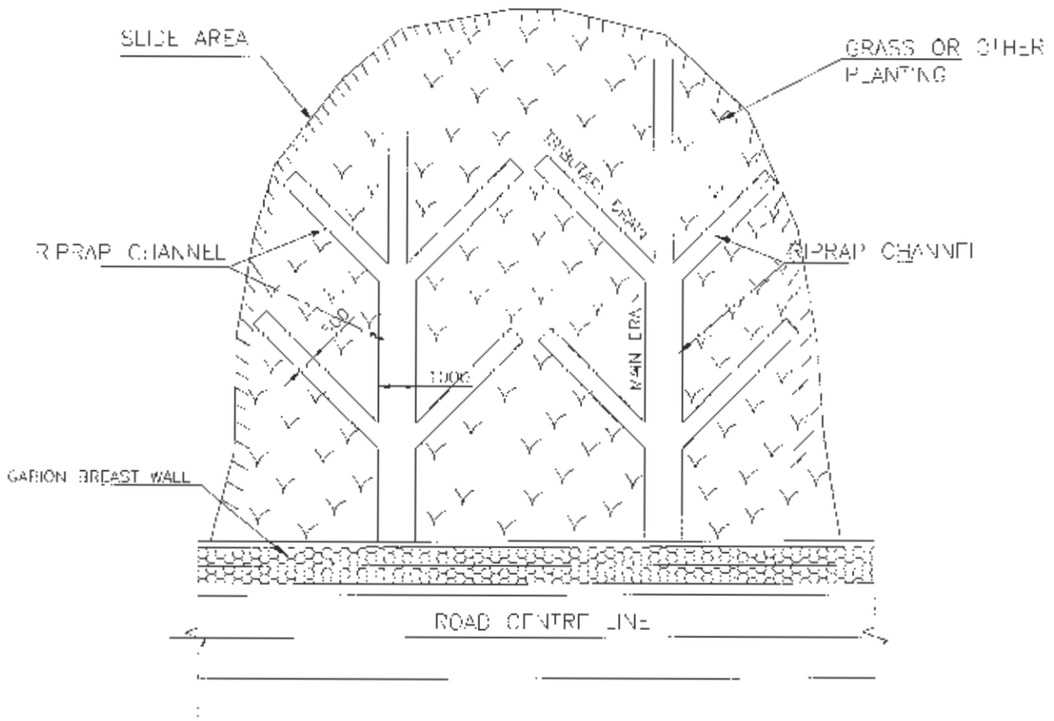


SLOPE ANGLE	DISTANCE
<30°	2000 MM
30°-60°	1000 MM

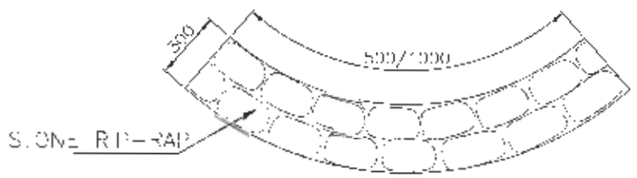
NOTE: TO BE USED IN HARD SOIL

EMPLOYER	PROJECT	DESIGN CONSULTANT				
Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kathmandu (Nagdhunga) - Naubise - Mugling Road and Bridges	Intercontinental Consultants & Technocrats Pvt. Ltd. A-3 Green Park, New Delhi - 110016 Ph : 4696 3300, Fax 2685-5252 In Joint Venture With Soosung Engineering Co. Ltd., South Korea In Association With Full Bright Consultancy (Pvt.) Ltd. 316,Baburam Acharya Sadak Sinamangal, Kathmandu, GPO Box: 4970, Kathmandu, Nepal	Designed By	SB		DRAWING NAME: TYPICAL BIO - ENGINEERING
			Checked By	PMS		Scale: NOT TO SCALE
			Approved By	BNS		Date: August 2019 Drawing No.: NNMR-TYP 07-04





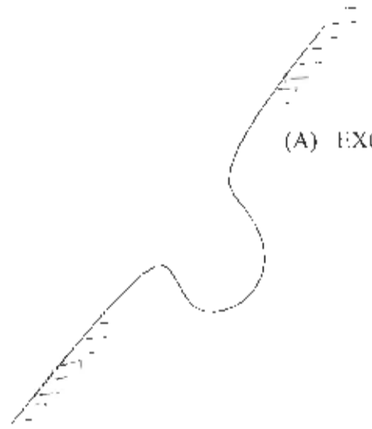
RIP-RAP CHANNEL SECTION



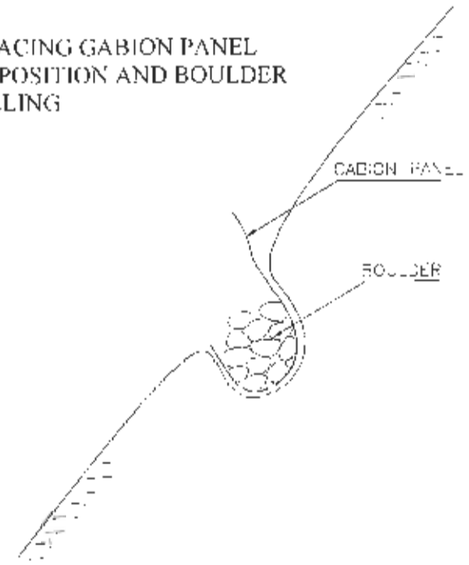
NOTE:
1. THE DETAILS OF RIP-RAP CHANNEL IS GIVEN IN BOCAL DRAWINGS OF RIP-RAP CHANNELS.

EMPLOYER	PROJECT	DESIGN CONSULTANT						
Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kathmandu (Nagdhunga) - Naubise - Mugling Road and Bridges	Intercontinental Consultants & Technocrats Pvt. Ltd A-6, Green Park, New Delhi - 110016 Ph.: 4086-3000, Fax 2665-5252 In Joint Venture With Soosung Engineering Co. Ltd., South Korea In Association With Full Bright Consultancy (Pvt.) Ltd. 316,Bebiram Acharya Sadak Sinamangal, Kathmandu, GPO Box: 4970, Kathmandu, Nepal	Designed By	SB		DRAWING NAME: TYPICAL BIO - ENGINEERING	Scale: NOT TO SCALE	Date: August 2019
			Checked By	PMS				Drawing No.: NNMR-TYP 07-07
			Approved By	BNS				

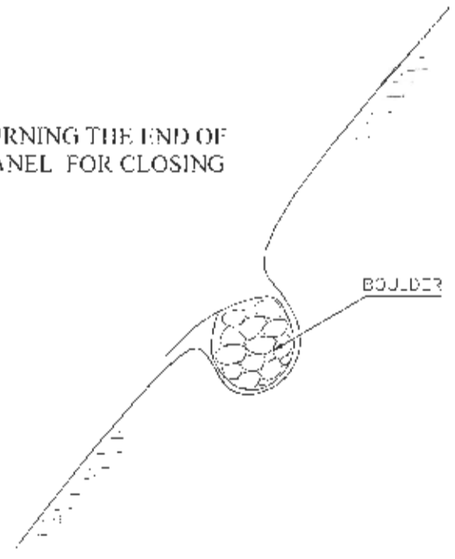
(A) EXCAVATION OF TRENCH



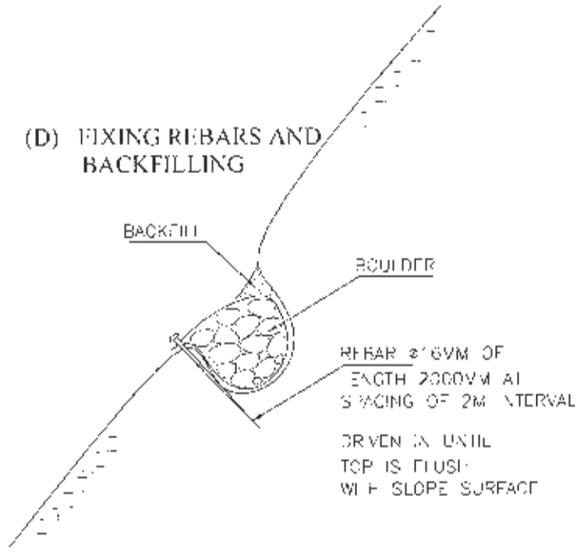
(B) PLACING GABION PANEL IN POSITION AND BOULDER FILLING



(C) TURNING THE END OF PANEL FOR CLOSING



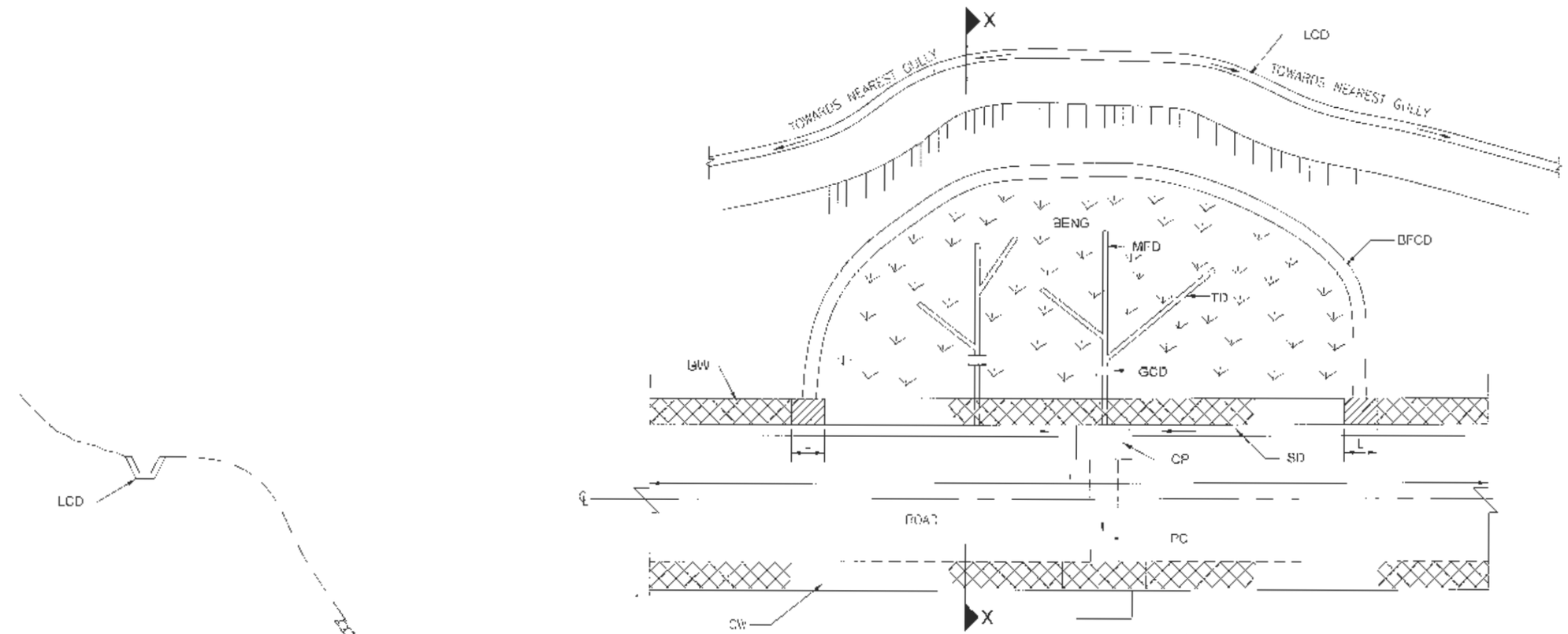
(D) FIXING REBARS AND BACKFILLING



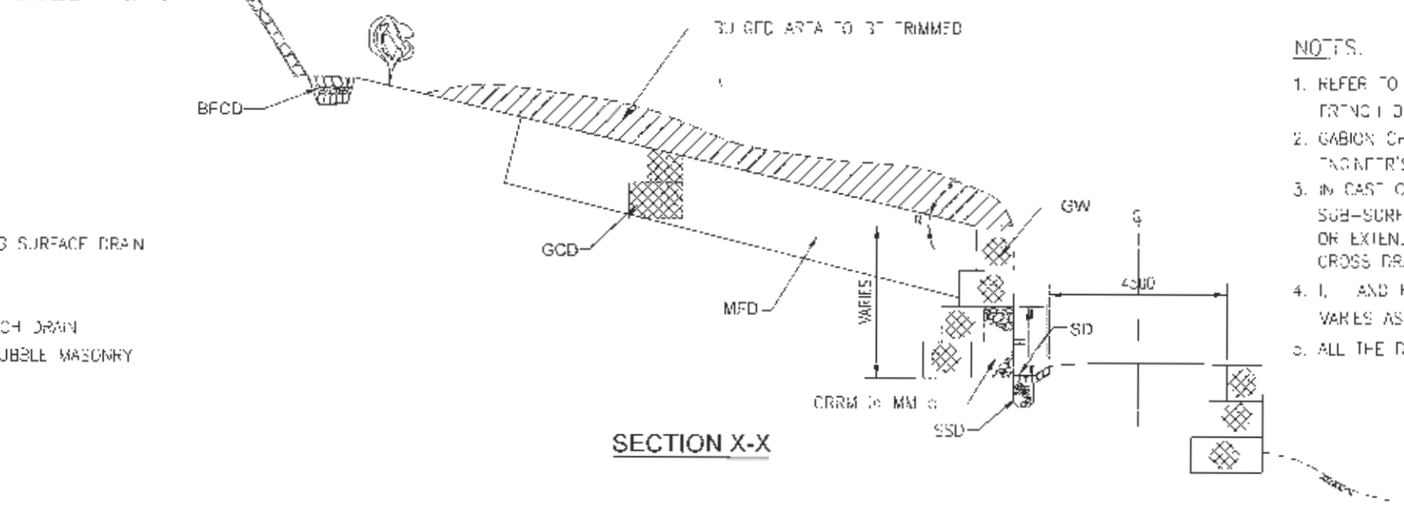
SPACING OF BOLSTER

SLOPE ANGLE	SPACING (CENTRES)
<30°	2000 MM
<30°-45°	1500 MM

EMPLOYER	PROJECT	DESIGN CONSULTANT						
Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kathmandu (Nagdhunga) - Naubise - Mugling Road and Bridges	Intercontinental Consultants & Technocrats Pvt. Ltd. A-6, Green Park, New Delhi - 110016 Ph: 4065-3000, Fax 2685-5252 In Joint Venture With Sseoung Engineering Co. Ltd., South Korea	In Association With Full Bright Consultancy (Pvt.) Ltd. 316,Bakuram Acharya Sadak Sinamangal, Kathmandu, GPO Box: 4970, Kathmandu, Nepal	Designed By	SB		DRAWING NAME: TYPICAL BIO - ENGINEERING	Scale: NOT TO SCALE	Date: August 2019 Drawing No.: NNMR-TYP 07-08
				Checked By	PMS				
				Approved By	BNS				



PLAN



SECTION X-X

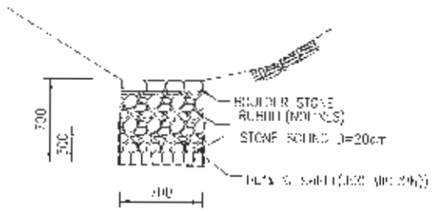
BENG — BID ENGINEERING
CP — CATCH PIT
PC — PIPE CULVER
MFD — MAIN FRENCH DRAIN
TD — TRIBUTARY DRAIN
GW — GABION WALL
GCD — GABION CHECK DAM
SD — SIDE DRAIN WITH SUB SURFACE DRAIN
SSD — SUB SURFACE DRAIN
CD — LINED CATCH DRAIN
BFCD — BOULDER FILLED CATCH DRAIN
CRRM — COURSED RANDOM RUBBLE MASONRY
α — 30° TO 35°

NOTES.

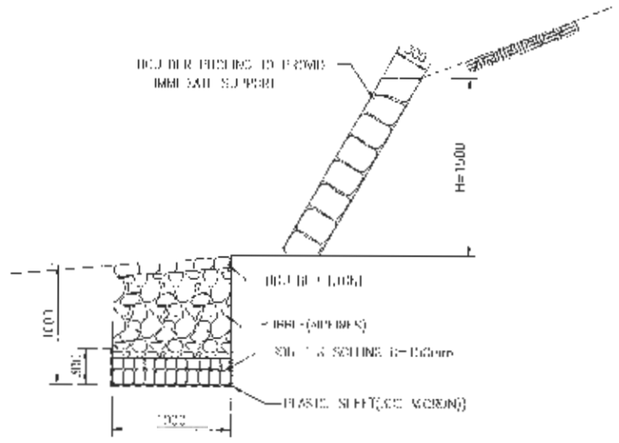
1. REFER TO STANDARD DRAWING RSDP FOR FRENCH DRAIN DETAILS DWG NO.- NM-DET & SHEET NO. 21/32
2. GABION CHECK DAM IF REQUIRED SHALL BE PROVIDED AS PER ENGINEER'S DIRECTION.
3. IN CASE CROSS DRAINAGE CAN NOT BE PROVIDED, PROVIDE SUB-SURFACE DRAINAGE ACROSS THE ROAD @ EVERY 10 m C/C, OR EXTEND SUB SOIL DRAINAGE BELOW GL TO THE NEARBY CROSS DRAINAGE.
4. L AND H OF CRRM WALL PROVIDED IN THE OUTLET OF SUB SURFACE DRAIN VARIES AS PER SITE CONDITION (L=2 TO 3 m).
5. ALL THE DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE MENTIONED.

EMPLOYER	PROJECT	DESIGN CONSULTANT					
Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kathmandu (Nagdhunga) - Naubise - Mugling Road and Bridges	Intercontinental Consultants & Technocrats Pvt. Ltd. A-8, Green Park, New Delhi - 110016 Tel : 4086-3000, Fax 2685-5262 In Joint Venture With Soosung Engineering Co. Ltd., South Korea In Association With Full Bright Consultancy (Pvt.) Ltd. 316 Baburam Acharya Sadak Sinamangal, Kathmandu, GPO Box: 4970, Kathmandu, Nepal		Designed By	SB		DRAWING NAME: LANDSLIDE STABILISATION
				Checked By	PMS		
				Approved By	BNS		

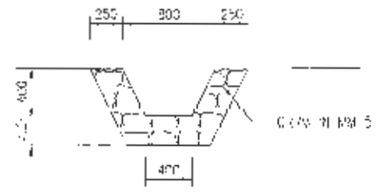
Scale:	Date:
NOT TO SCALE	August 2019
	Drawing No.: NRMR-TYP 07-09



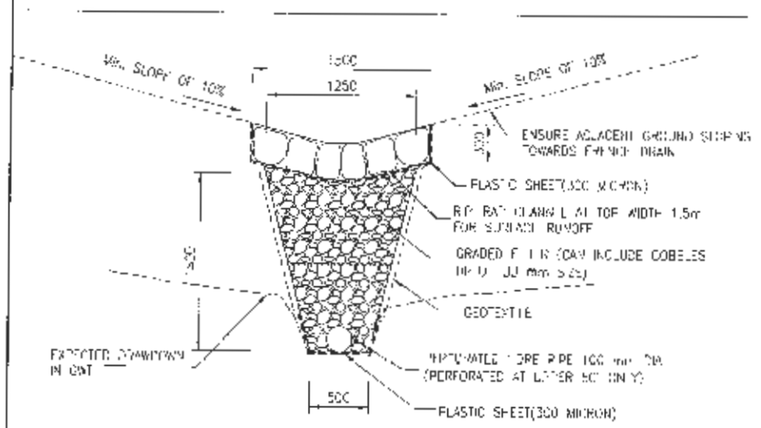
FRENCH DRAIN IN SLOPE



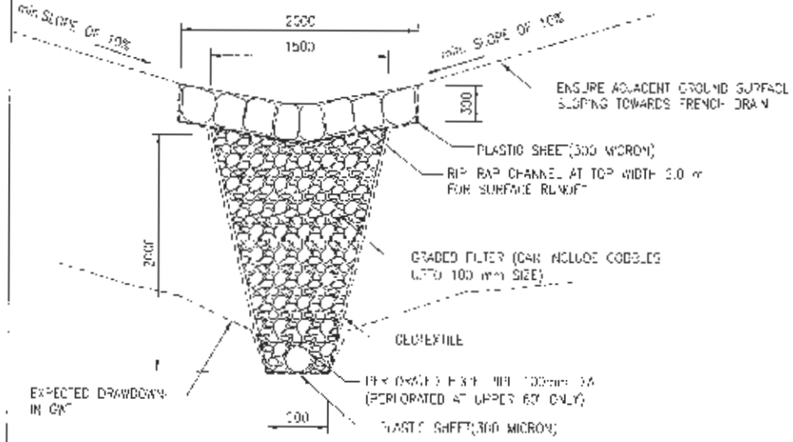
BOULDER FILLED CATCH DRAIN



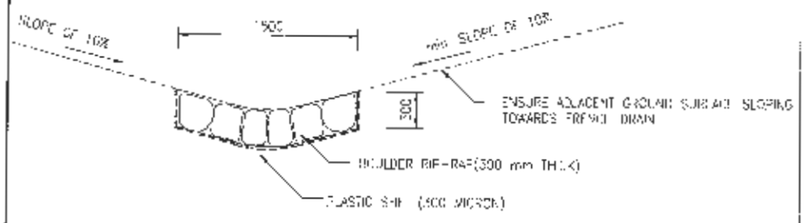
LINED CATCH DRAIN



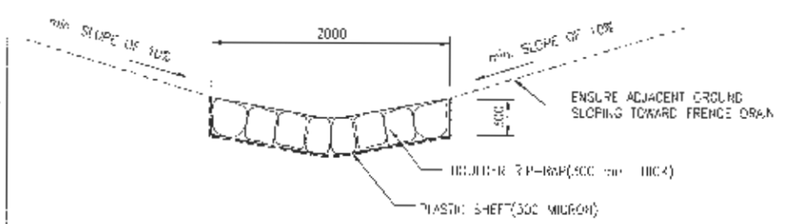
TRIBUTARY FRENCH DRAIN



MAIN FRENCH DRAIN



RIP-RAP CHANNEL WIDTH 1.5m



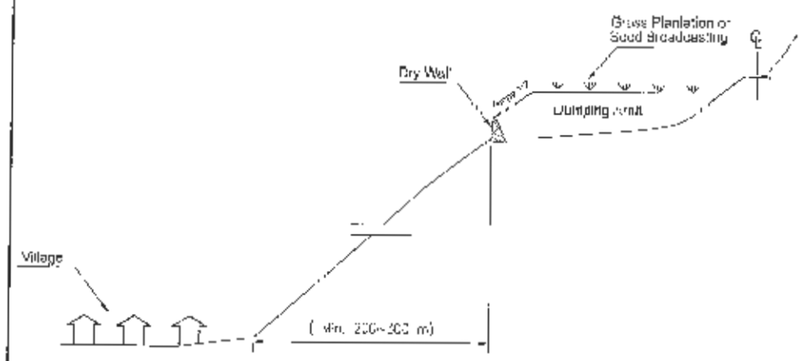
RIP-RAP CHANNEL WIDTH 2.0m

NOTE :
1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE MENTIONED.

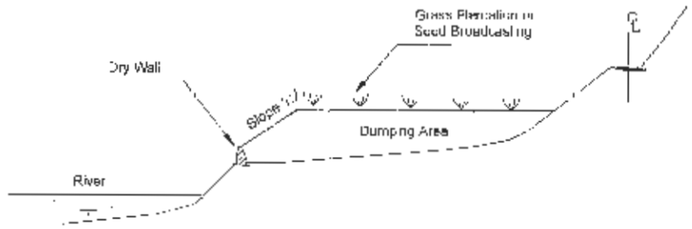
EMPLOYER	PROJECT	DESIGN CONSULTANT					
Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kathmandu (Nagdhunga) - Naubise - Mugling Road and Bridges	Intercontinental Consultants & Technocrats Pvt. Ltd. A-8, Green Park, New Delhi - 110016 Ph : 4086-3000, Fax 2685-5252 In Joint Venture With Seosung Engineering Co. Ltd., South Korea In Association With Full Bright Consultancy (Pvt.) Ltd. 316 Baburam Acharya Sadak Sinamangal, Kathmandu, GPO Box: 4970, Kathmandu, Nepal					
			Designed By	SB		DRAWING NAME: CATCH DRAIN AND RIP RAP CHANNELS	Scale: NOT TO SCALE
			Checked By	PMS			Date: August 2019
			Approved By	BNS			Drawing No.: NNMR-TYP 07-10

NOTE:

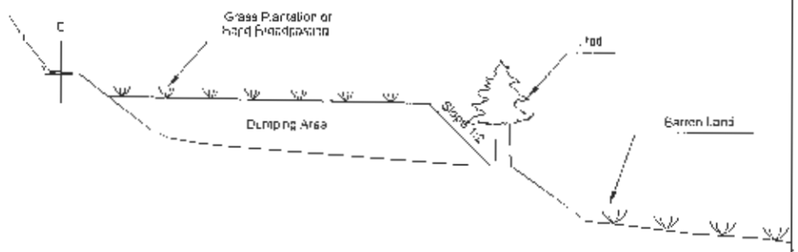
All the tipping site shall be managed as per the 'Guide to Road Slope and Protection Works'.



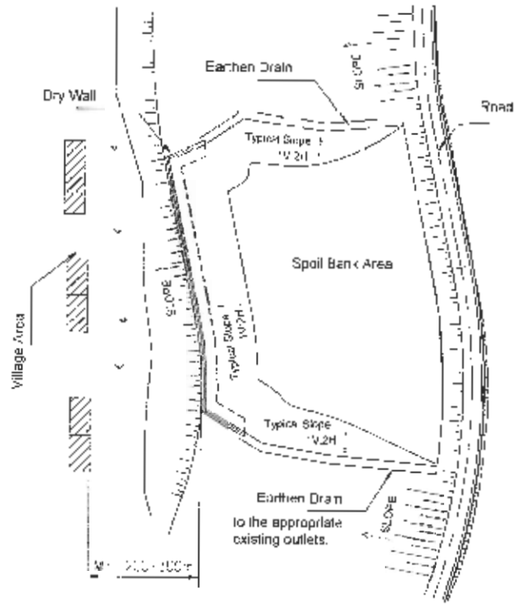
Cross Section of Type -I



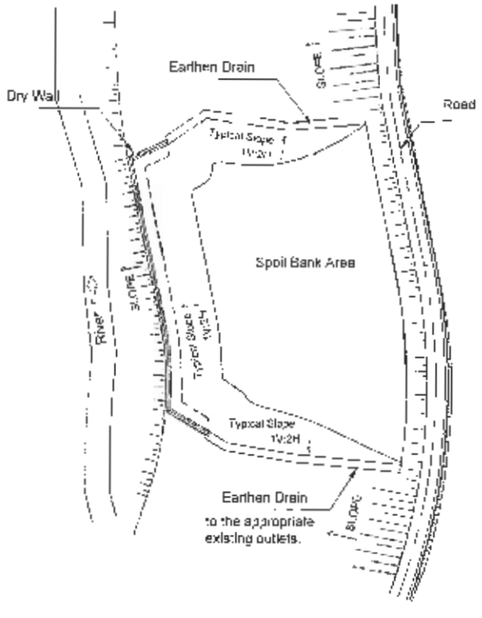
Cross Section of Type -II



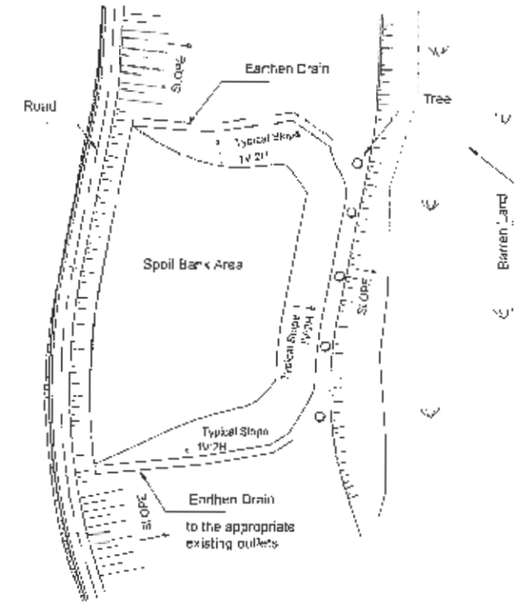
Cross Section of Type -III



Plan of Type -I



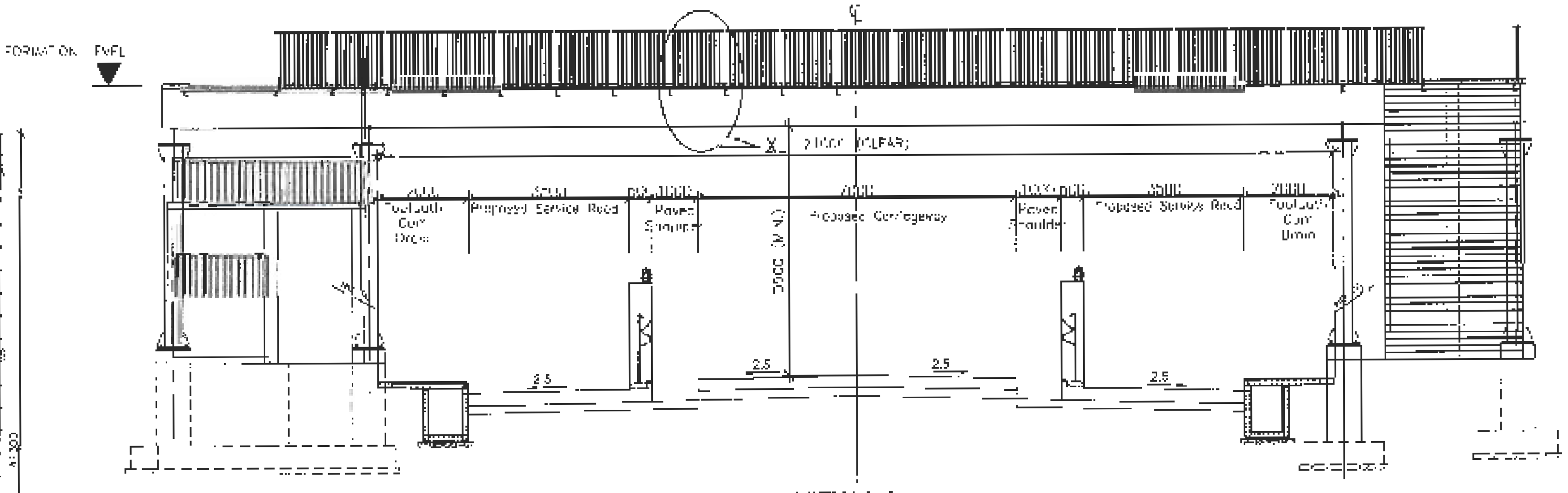
Plan of Type -II



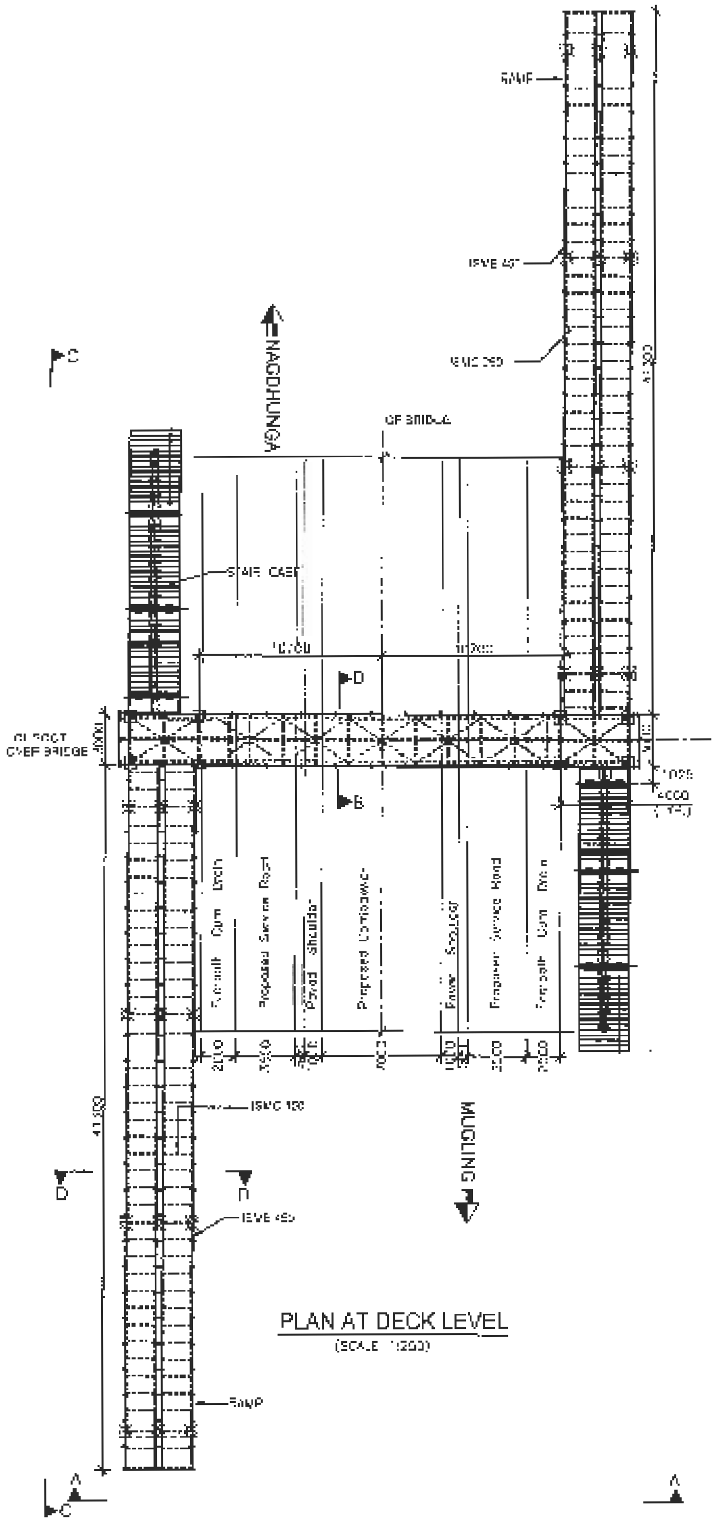
Plan of Type -III

EMPLOYER Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	**PROJECT** Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kathmandu (Nagdhunga) - Naubise - Mugling Road and Bridges	**DESIGN CONSULTANT** Intercontinental Consultants & Technocrats Pvt. Ltd. A-8, Green Park, New Delhi - 110016 Ph : 4086-3000, Fax 2666-6262 In Joint Venture With Seosung Engineering Co. Ltd., South Korea In Association With Full Bright Consultancy (Pvt.) Ltd. 316 Baburam Acharya Sadak Sinamangal, Kathmandu. GPO Box. 4970, Kathmandu. Nepal	Designed By: SB Checked By: PMS Approved By: BNS	**DRAWING NAME:** PROTECTION OF DUMPING SITE	**Scale:** NOT TO SCALE **Date:** August 2019 **Drawing No.:** NNMR-TYP 07-11

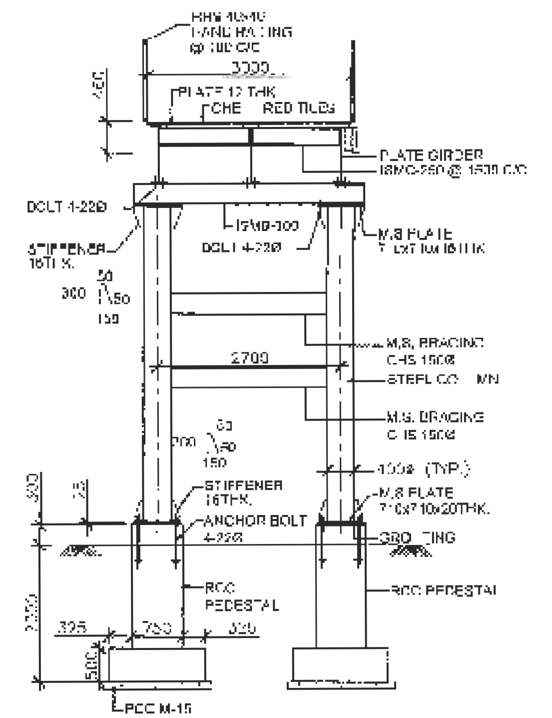
FOOT OVER BRIDGES



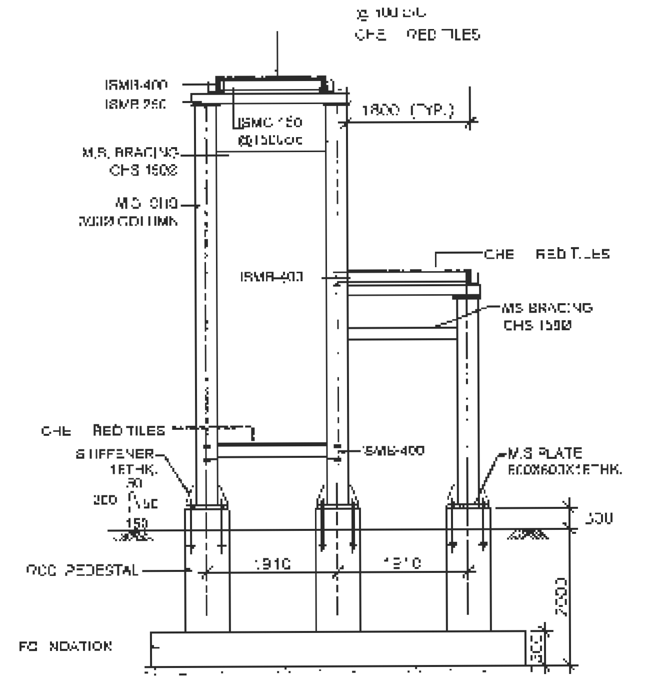
VIEW A-A
(SCALE 1:100)



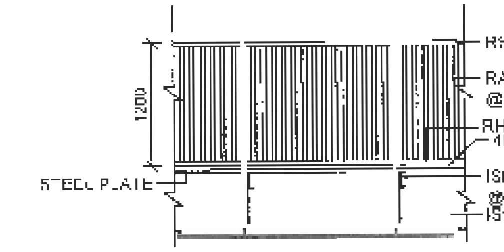
PLAN AT DECK LEVEL
(SCALE 1:200)



SECTION B-B
(SCALE 1:75)



SECTION D-D
(HAND RAILING NOT SHOWN FOR CLARITY)
(SCALE 1:75)



DETAIL X
(SCALE 1:50)

NOTES:-

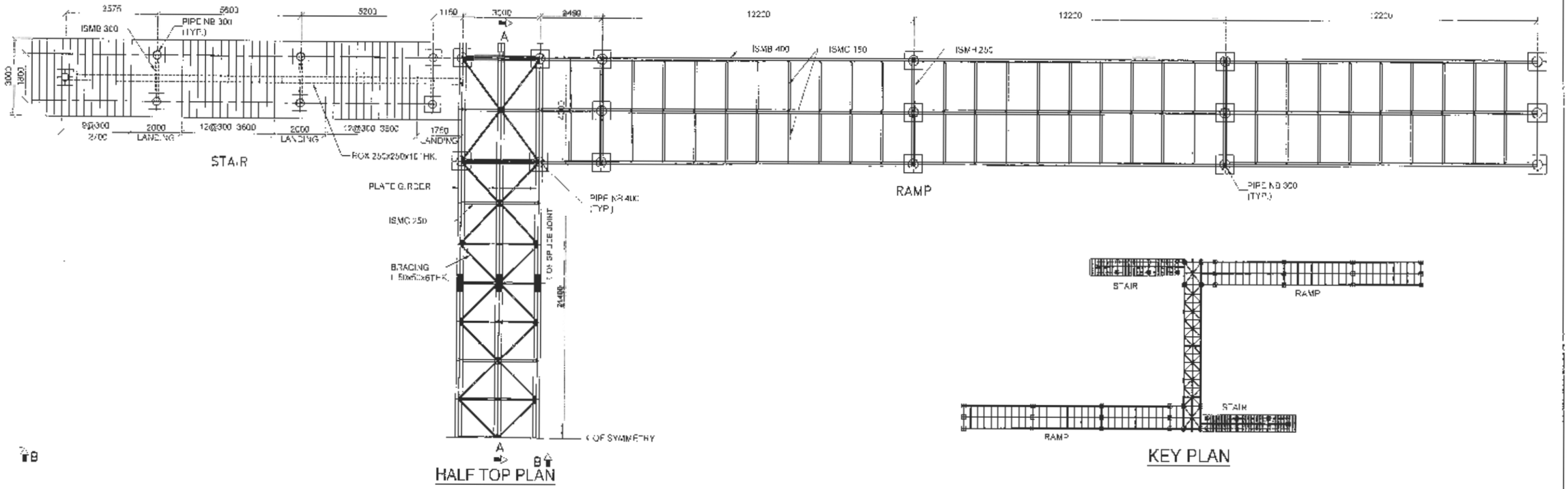
1. ALL DIMENSIONS ARE IN MM AND LEVELS ARE IN METERS.
2. ONLY WRITTEN DIMENSIONS TO BE FOLLOWED.
3. ALL STRUCTURAL STEEL SHALL CONFORM TO IS:2062-2006 GRADE Fe 410
4. ALL WELDING SHALL CONFORM TO IS:816-1969 AND IS:1323-1982.
5. ERECTION BOLTS AND NUTS SHALL CONFORM TO IS:1363-1967 AND IS:1367 (PART 3) 2002.
6. FABRICATION AND ERECTION OF STRUCTURAL STEEL WORKS SHALL CONFORM TO IRC:24-2010 (SECTION-V), IS:7205-1974 AND IS:7215-1974
7. ALL HOLES FOR HSFG BOLTS AND ERECTION BOLTS SHALL BE DRILLED.
8. ALL HOLES NECESSARY FOR ERECTION BOLTS SHALL BE PLUGGED FULLY AFTER SUCCESSFUL COMPLETION OF ERECTION WORK
9. ALL WELDS SHALL BE 6mm CONT. FILLET UNLESS NOTED OTHERWISE
10. CUTTING LENGTH OF GUSSET PLATES TO BE FINALIZED BY FULL SCALE SHOP LAYOUT.
11. FABRICATION DRAWING SHOULD BE PREPARED BY THE CONTRACTOR AND APPROVED BY THE ENGINEER BEFORE CONSTRUCTION.
12. ALL DIMENSIONS TO BE CONFIRMED AT SITE BEFORE CUTTING OF MEMBERS
13. ALL FOUNDATION DETAILS MAY BE FINALIZED ONLY AFTER HAVING GEOTECHNICAL INVESTIGATIONS REPORT. THIS MAY ALSO AFFECT THE FINAL DETAILS/LEVELS OF COLUMN BASE PLATES.
14. LOCATIONS AND DETAILS OF FIELD SPLICES FOR ERECTION OF THE STRUCTURAL SYSTEM SHALL BE PROPOSED BY THE STEEL FABRICATOR.
15. THE FOB WILL BE DESIGNED FOR FOOTWAY LIVE LOAD AS PER CLAUSE 206 OF IRC 6-2017
16. STEEL RAILINGS SHALL BE OF HOLLOW TUBULAR SECTIONS AS APPROVED BY ENGINEER-IN-CHARGE.
17. SAFE BEARING CAPACITY UNDER FOOTING OF PIER AND COLUMNS, UNDER STAIRCASE IS 20T/sqm. THIS MAY BE ENSURED AT SITE BEFORE EXECUTION OF WORK ANY DEVIATION IN SBC IN SOIL REPORT FROM CONSIDERED SBC IS DESIGN SHALL BE REPORT TO ENGINEER FOR CHANGES IN DESIGN.
18. WHILE EXCAVATING FOR FOOTING PRECAUTIONS WILL BE TAKEN TO PROTECT THE EXISTING DUCTS AND OTHER SERVICES ENCOUNTERED IN THE AREA OF EXCAVATION.

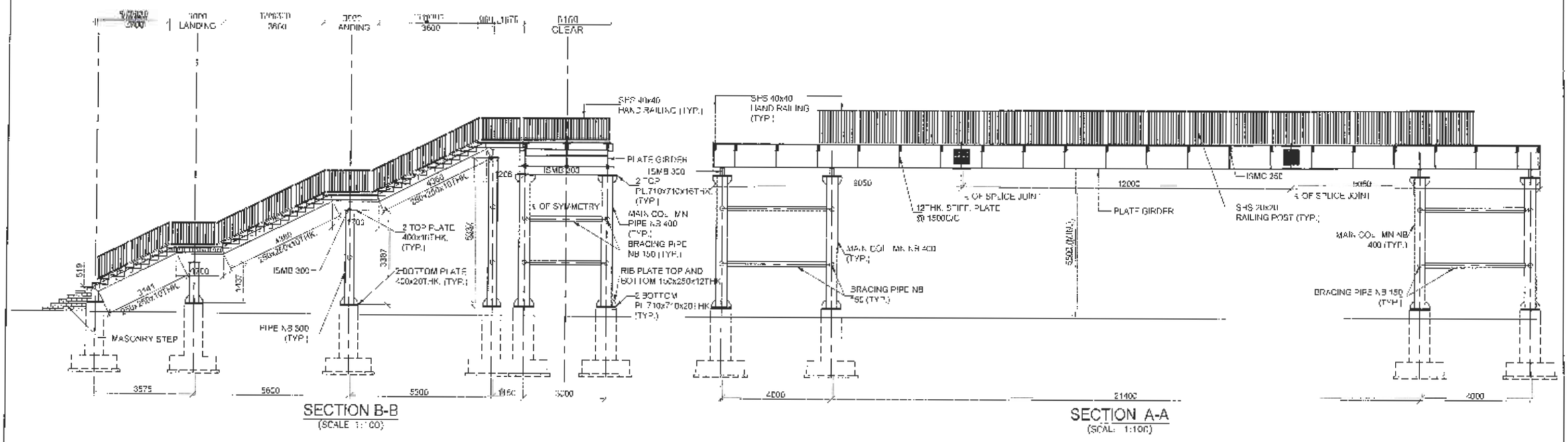
NOTES ON PROTECTIVE SURFACE COATING

1. SURFACE PREPARATION AND BLASTING TO GRADE SP 2.5 AS PER IS:9954
2. ONE COAT OF FOLLOWED BY ONE COAT OF ZINC CHROMATE OXIDE PRIMER TO IS:2074
3. TWO FINISHING COATS OF ALUMINIUM PAINT TO IS:2339 OVER PRIMER COATS ONE COAT SHALL BE APPLIED BEFORE THE FABRICATED STEEL WORK LEAVES THE SHOP

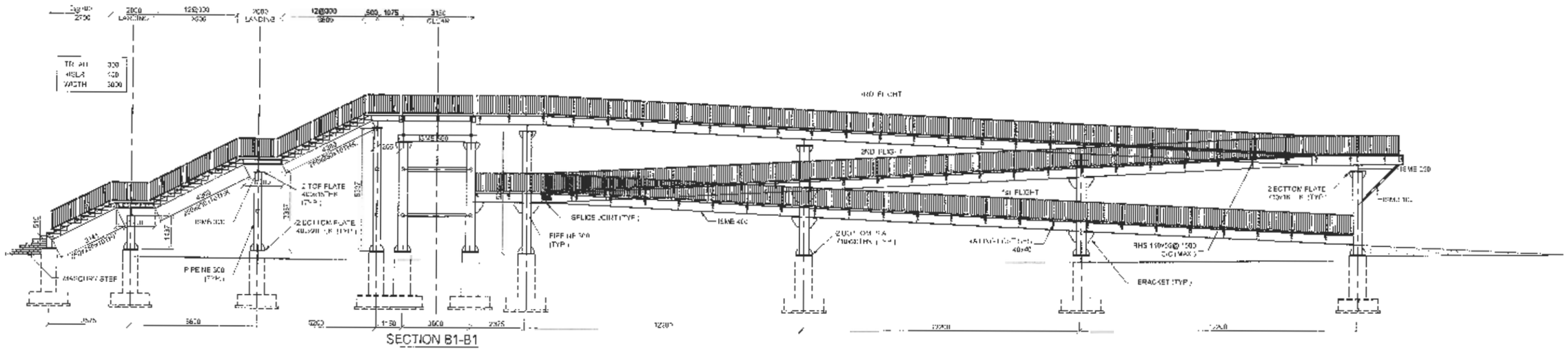
THE FOUNDATION SIZE SHALL BE REVIEWED BASED ON GEOTECHNICAL INVESTIGATION CARRIED OUT AT SITE

EMPLOYER	PROJECT	DESIGN CONSULTANT		Designed By	SB		DRAWING NAME:	Scale:	Date:
Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kathmandu (Nagdhunga) - Naubise - Mugling Road and Bridges	Intercontinental Consultants & Technocrats Pvt. Ltd. A-8, Green Park New Delhi - 110016 Ph : 4086-3000, Fax 2685 5252 In Joint Venture With Soosung Engineering Co. Ltd., South Korea	In Association With Full Bright Consultancy (Pvt.) Ltd 316,Baburam Acharya Sadak Sinamangal, Kathmandu, GPO Box: 4070, Kathmandu, Nepal	Checked By	PMS		TYPICAL GENERAL ARRANGEMENT OF FOOT OVER BRIDGE FOR 21M CARRIAGEWAY		August 2019
				Approved By	BNS				Drawing No.: NNMR-TYP 08-01

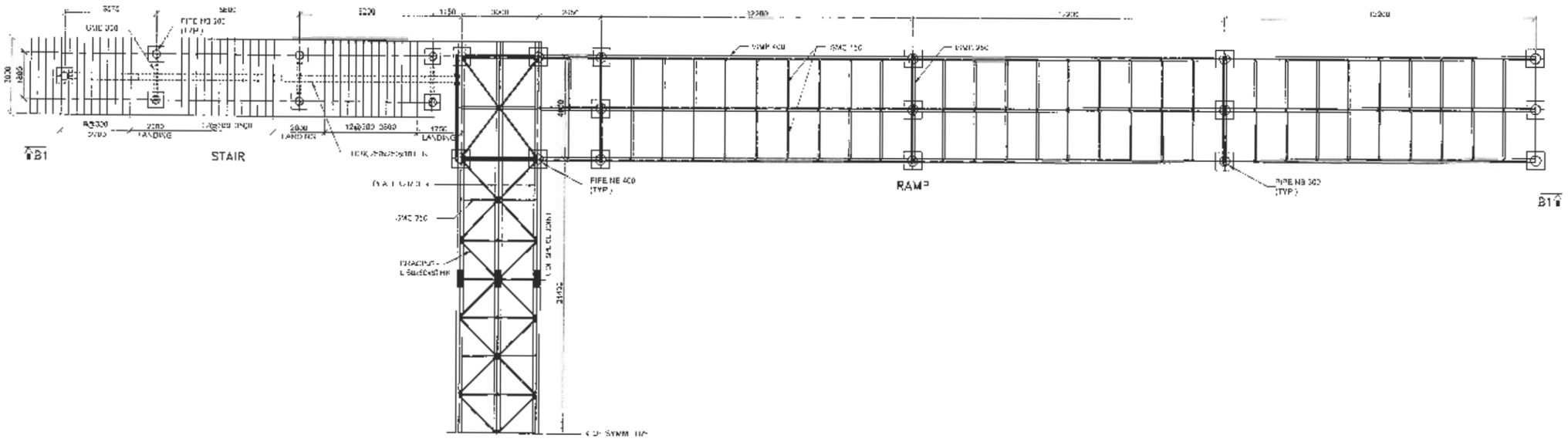




EMPLOYER Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	**PROJECT** Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kathmandu (Nagdhunga) - Naubise - Mugling Road and Bridges	**DESIGN CONSULTANT** Intercontinental Consultants & Technocrats Pvt. Ltd. A-8, Green Park, New Delhi 110016 Ph : 4066-2000, Fax 2665-5252 In Joint Venture With Soosung Engineering Co. Ltd., South Korea In Association With Full Bright Consultancy (Pvt.) Ltd., 316 Baburam Acharya Sadak Shamangal, Kathmandu, GPO Box: 4970, Kathmandu, Nepal	Designed By	SB	**DRAWING NAME:** TYPICAL GENERAL ARRANGEMENT MARKING PLAN OF FOOT OVER BRIDGE FOR 21M CARRIAGEWAY	**Scale:** AS SHOWN	**Date:** August 2019
			Checked By	PMS			**Drawing No.:** NNMR-TYP 06-02
			Approved By	BNS			

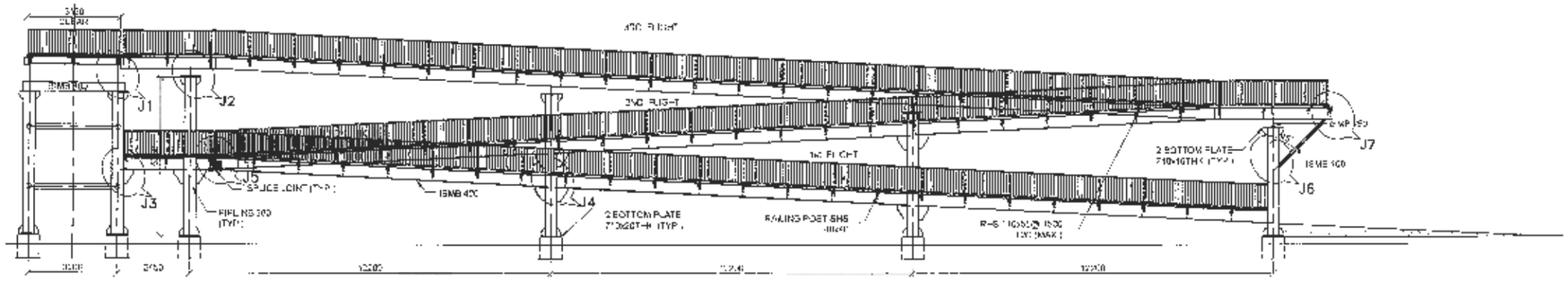


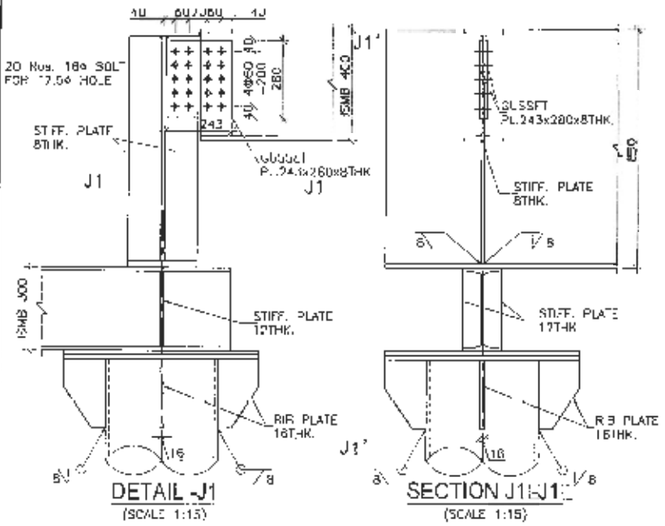
SECTION B1-B1

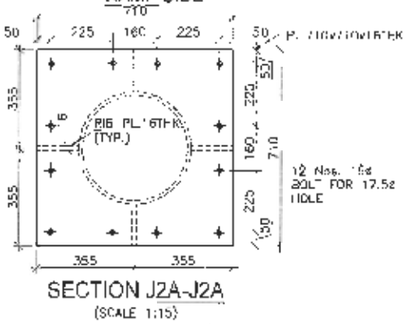


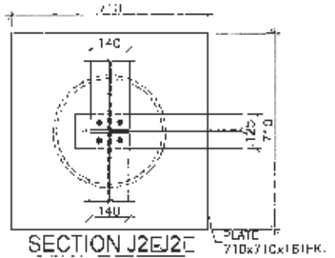
HALF TOP PLAN

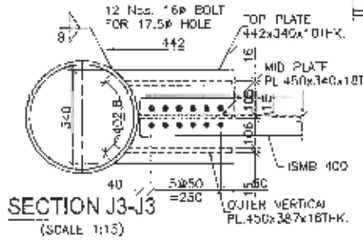
EMPLOYER	PROJECT	DESIGN CONSULTANT					DRAWING NAME:	Scale:	Date:
Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Nepal India Regional Trade and Transport Project (NIRTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kathmandu (Nagdhunga) - Naubise - Mugling Road and Bridges	Intercontinental Consultants & Technocrats Pvt. Ltd. A-8, Green Park, New Delhi - 110016 Ph : 4060-3000, Fax 2665-5252 In Joint Venture With Soosung Engineering Co. Ltd., South Korea In Association With Full Bright Consultancy (Pvt.) Ltd 356,Baburam Acharya Sadak Sinamangal, Kathmandu, GPO Box: 4970, Kathmandu, Nepal		Designed By	SB		TYPICAL GENERAL ARRANGEMENT MARKING PLAN OF FOOT OVER BRIDGE FOR 21M CARRIAGEWAY	AS SHOWN	August 2018
				Checked By	PMS				Drawing No.: NNMR-TYP 08-03
				Approved By	BNS				

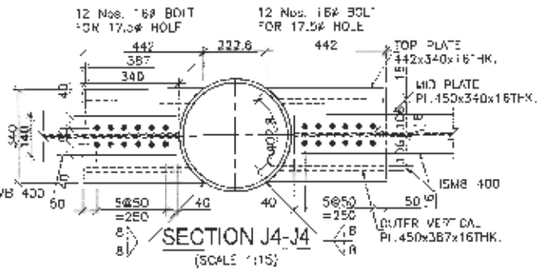


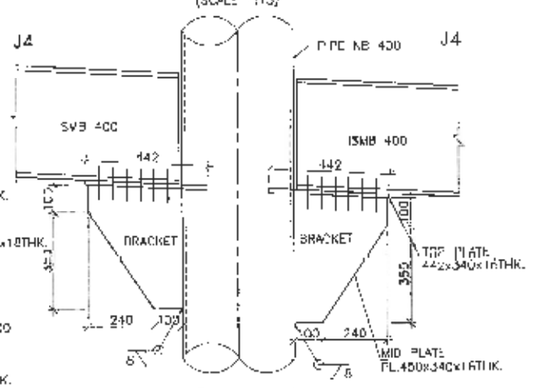


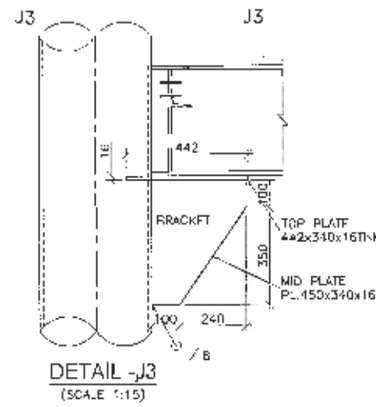


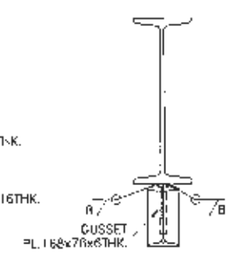


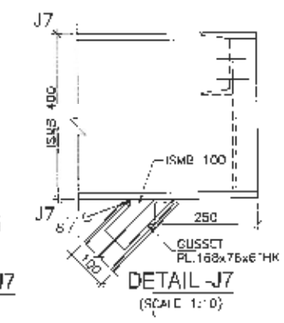


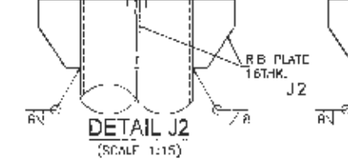


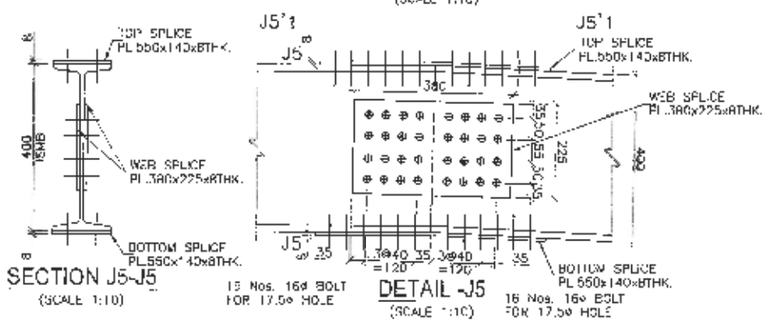


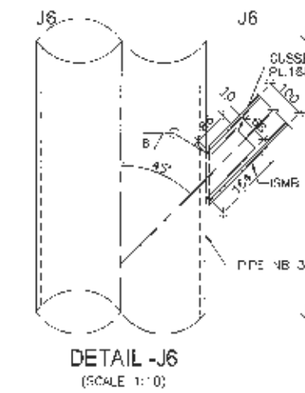


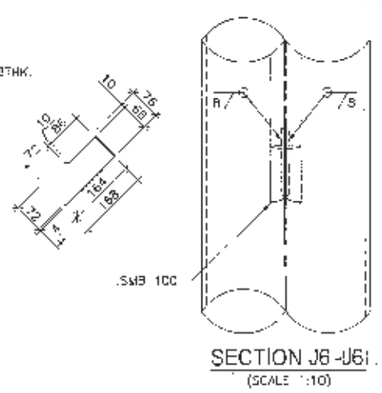


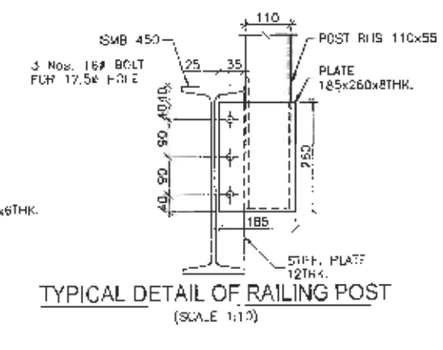




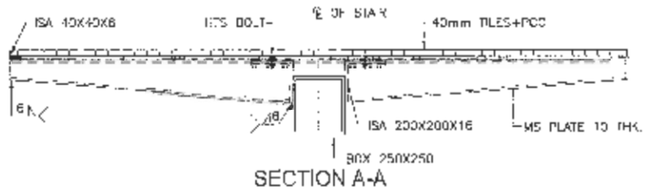




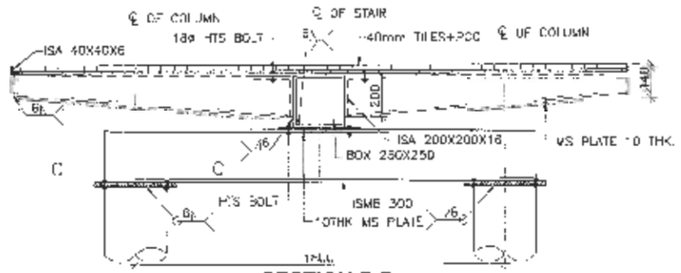




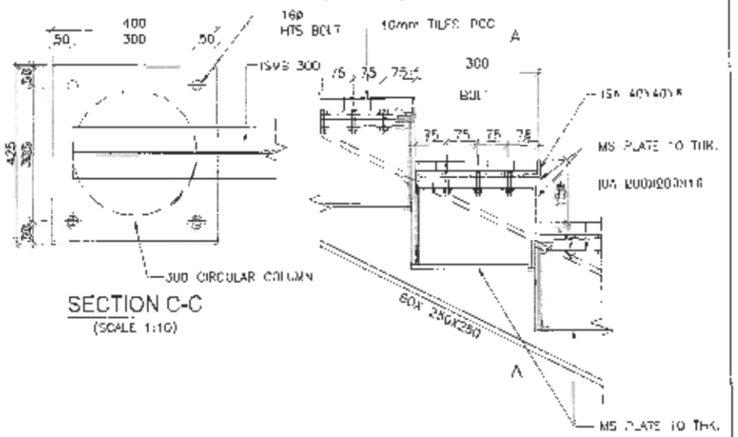
EMPLOYER Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	**PROJECT** Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kathmandu (Nagdhunga) - Naubise - Mugling Road and Bridges	**DESIGN CONSULTANT** Intercontinental Consultants & Technocrats Pvt. Ltd. A-8, Green Park, New Delhi - 110016 Ph : 4086-3000, Fax 2665-5262 In Joint Venture With Soosung Engineering Co. Ltd., South Korea In Association With Full Bright Consultancy (Pvt.) Ltd. 315,Baburam Acharya Sadak Sinamangal, Kathmandu, GPO Box: 4870, Kathmandu, Nepal	Designed By: SB Checked By: PMS Approved By: BNS	**DRAWING NAME:** TYPICAL CONNECTION DETAILS OF FOOT OVER BRIDGE FOR 21M CARRIAGEWAY	**Scale:** AS SHOWN	**Date:** August 2019 **Drawing No.:** NNMR-TYP 08-04



SECTION A-A
(SCALE 1:20)

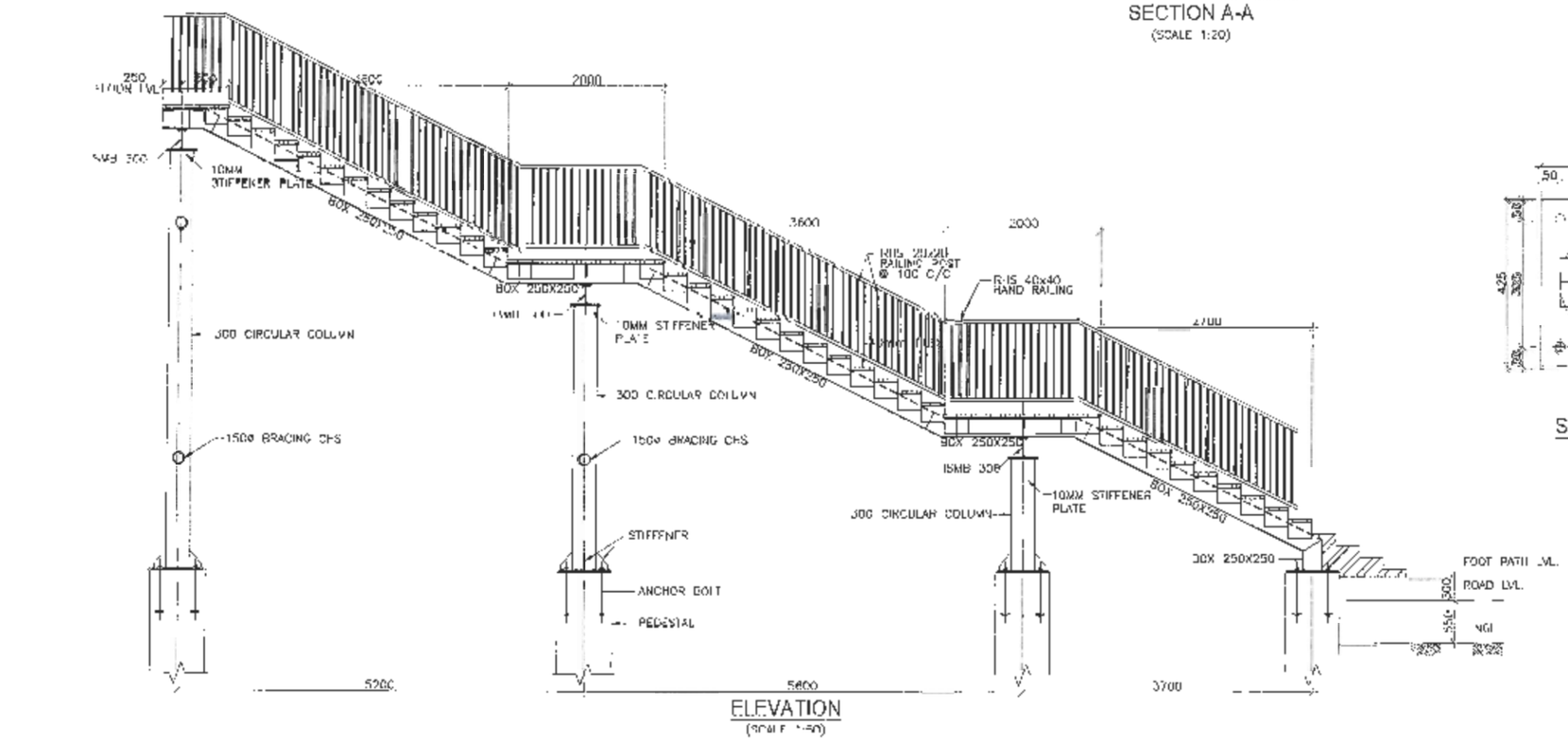


SECTION B-B
(SCALE 1:20)

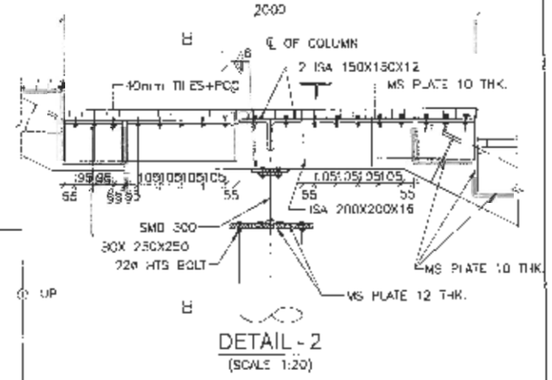


SECTION C-C
(SCALE 1:10)

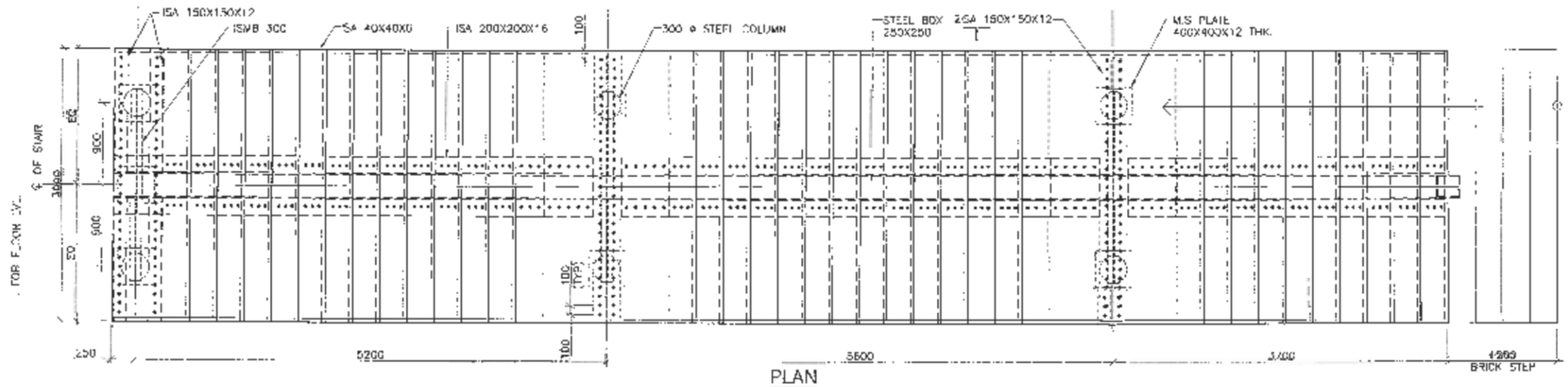
DETAIL - 1
(SCALE 1:10)



ELEVATION
(SCALE 1:50)



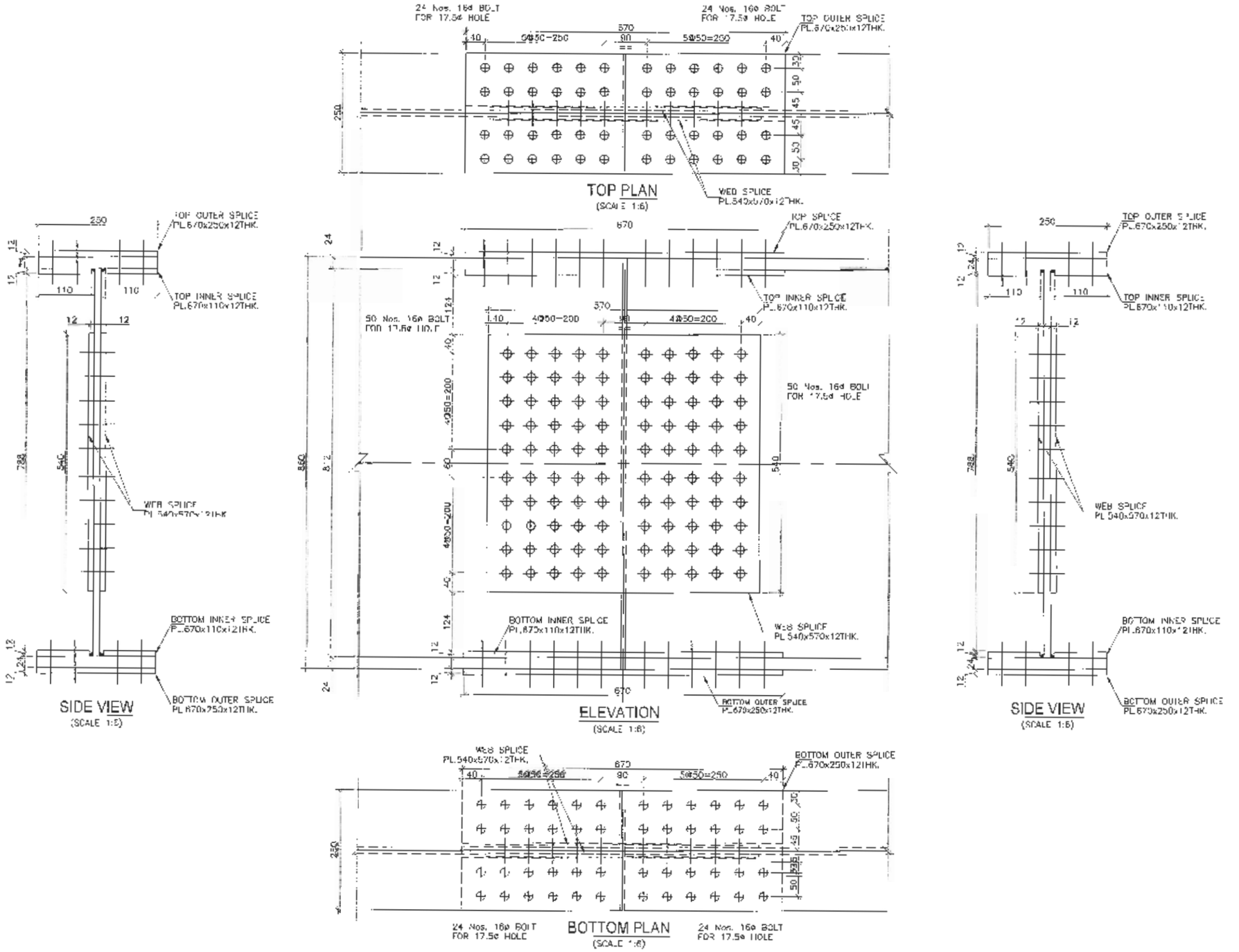
DETAIL - 2
(SCALE 1:20)



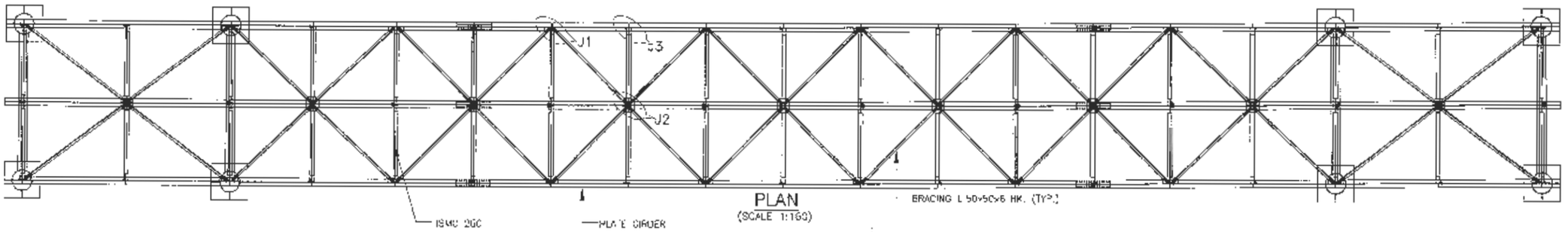
PLAN
(SCALE 1:40)

THE FOUNDATION SIZE SHALL BE REVIEWED BASED ON GEOTECHNICAL INVESTIGATION CARRIED OUT AT SITE

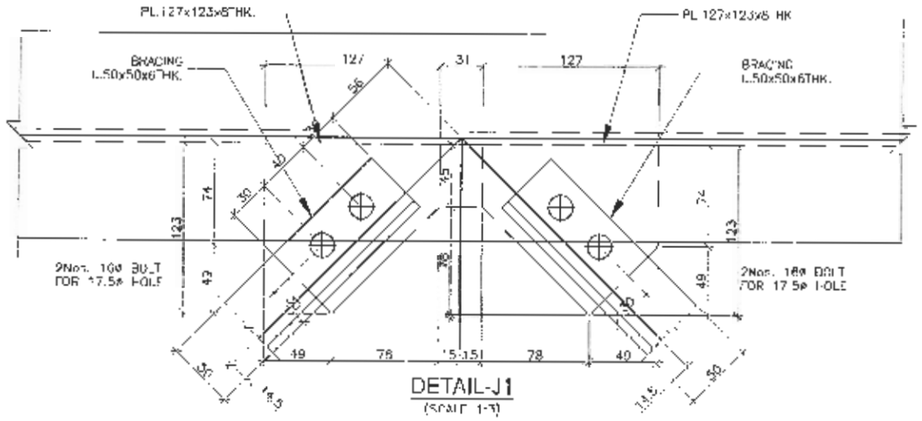
EMPLOYER	PROJECT	DESIGN CONSULTANT			DRAWING NAME:	Scale:	Date:
Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kathmandu (Nagdhunga) - Naubise - Mugling Road and Bridges	Intercontinental Consultants & Technocrats Pvt. Ltd. A-8, Green Park, New Delhi - 110016 Ph : 4086-3000, Fax 2665-5252 In Joint Venture With Soosung Engineering Co. Ltd , South Korea In Association With Full Bright Consultancy (Pvt.) Ltd 216,Baburam Acharya Sadak Shantinagal, Kathmandu, GPO Box: 4970, Kathmandu, Nepal	Designed By: SB Checked By: PMS Approved By: BNS		TYPICAL CONNECTION DETAILS OF FOOT OVER BRIDGE FOR 21M CARRIAGEWAY	AS SHOWN	August 2019 Drawing No.: NNMR-TYP 08-05



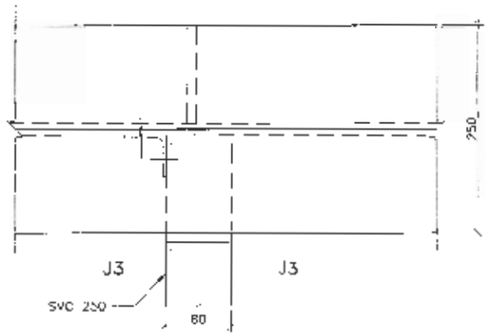
EMPLOYER	PROJECT	DESIGN CONSULTANT				DRAWING NAME:	Scale:	Date:
Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kathmandu (Nagdhunga) - Naubise - Mugling Road and Bridges	Intercontinental Consultants & Technocrats Pvt. Ltd. A-8, Green Park, New Delhi 110016 Ph : 4068-3000, Fax 2685-6252 In Joint Venture With Soosung Engineering Co. Ltd., South Korea FBC In Association With Full Bright Consultancy (Pvt.) Ltd. 316,Baburam Acharya Sadak Sinamangal, Kathmandu, CPO Box: 4570, Kathmandu, Nepal	Designed By	SB		TYPICAL SPLICE JOINT DETAILS OF FOOT OVER BRIDGE FOR 21M CARRIAGEWAY	AS SHOWN	August 2019
			Checked By	PMS				Drawing No.: NNMR-TYP 08-06
			Approved By	BNS				



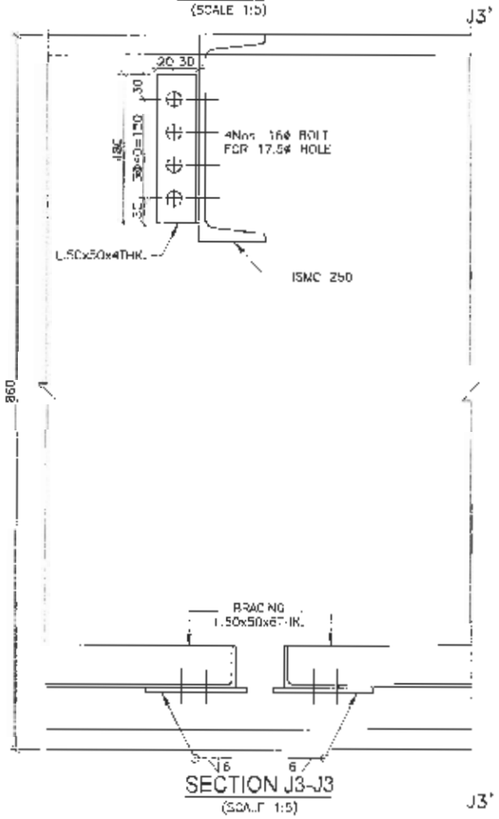
PLAN
(SCALE 1:100)



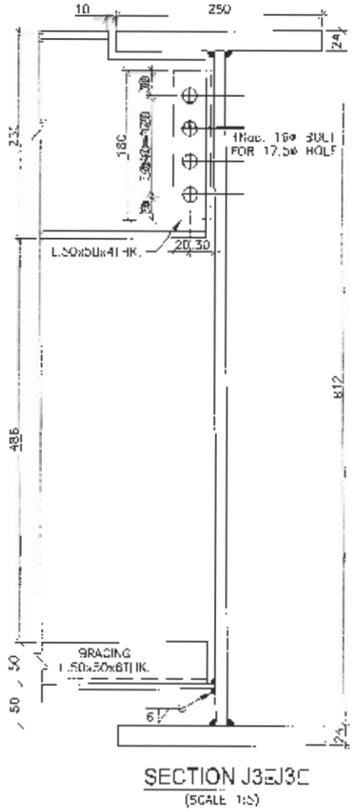
DETAIL-J1
(SCALE 1:5)



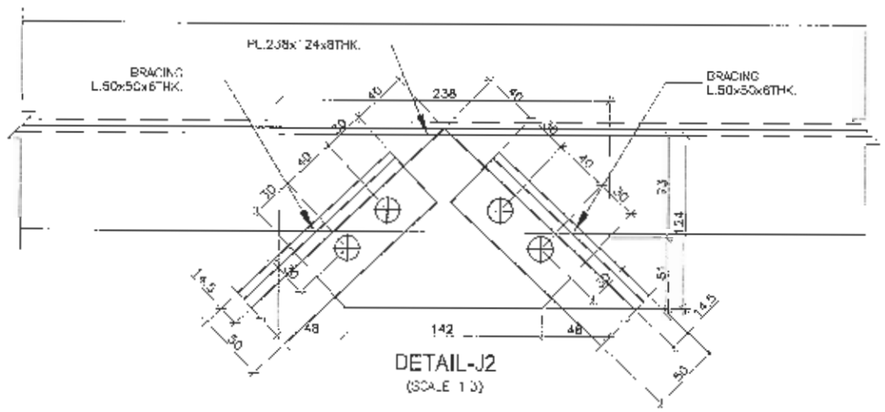
DETAIL-J3
(SCALE 1:5)



SECTION J3-J3
(SCALE 1:5)

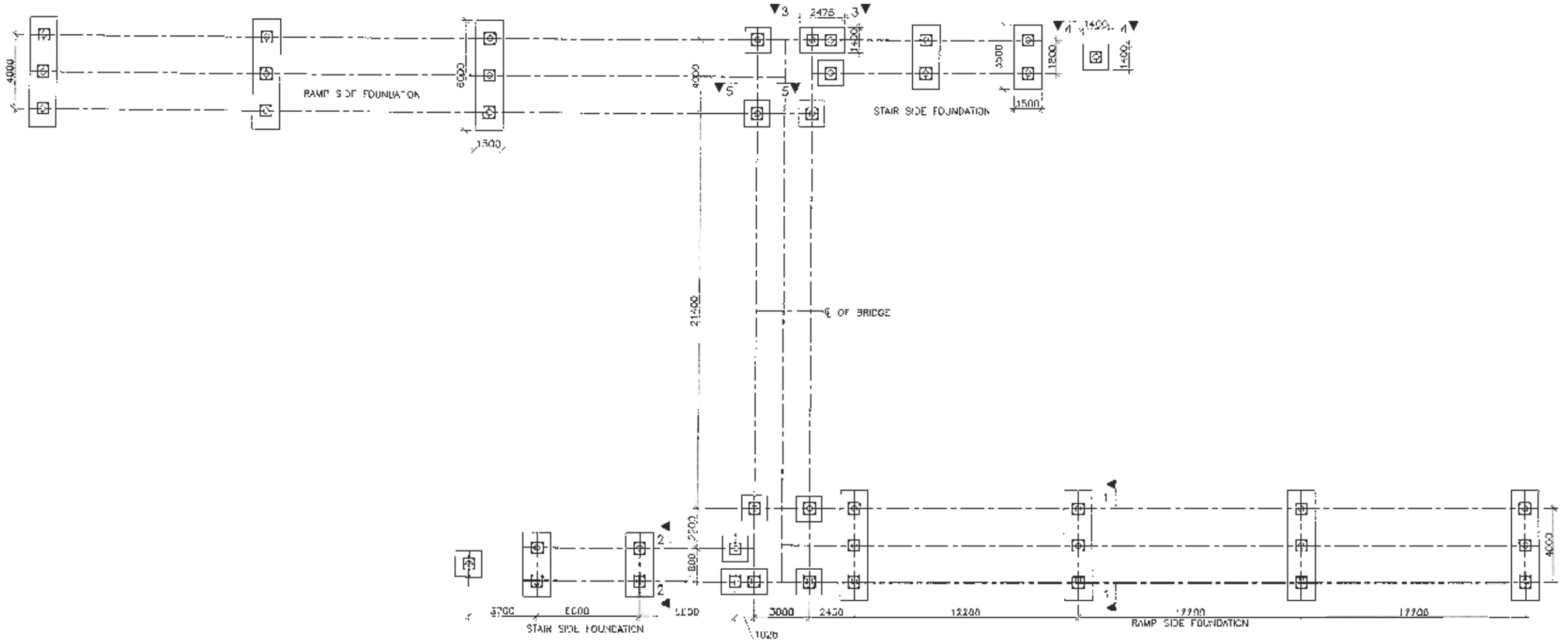


SECTION J3EJ3C
(SCALE 1:5)



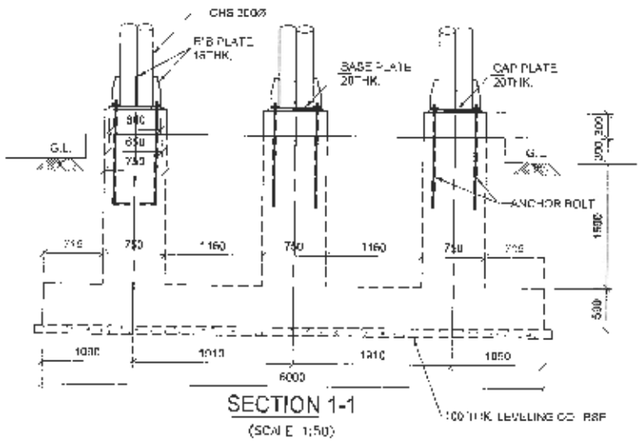
DETAIL-J2
(SCALE 1:5)

EMPLOYER	PROJECT	DESIGN CONSULTANT					
Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Dutailed Design for Improvement of Kathmandu (Nagbhunga) - Naubise - Mugling Road and Bridges	Intercontinental Consultants & Technocrats Pvt. Ltd. A 8, Green Park, New Delhi - 110016 Ph: 4086-3000, Fax 2685-5252 In Joint Venture With Sacksung Engineering Co. Ltd., South Korea FBC In Association With Full Bright Consultancy (Pvt.) Ltd. 316 Subiram Acharya Sadak Sinamangal, Kathmandu, CPO Box: 4970, Kathmandu, Nepal	Designed By	SB		DRAWING NAME: TYPICAL BRACING CONNECTION DETAILS OF FOOT OVER BRIDGE FOR 21M CARRIAGEWAY	Scale: AS SHOWN Date: August 2019 Drawing No.: NNMR-TYP 08-07
			Checked By	PMS			
			Approved By	BNS			



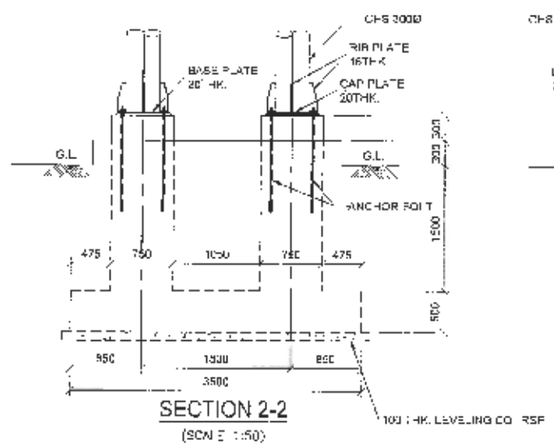
PLAN AT FOUNDATION LEVEL

(SCALE 1:175)



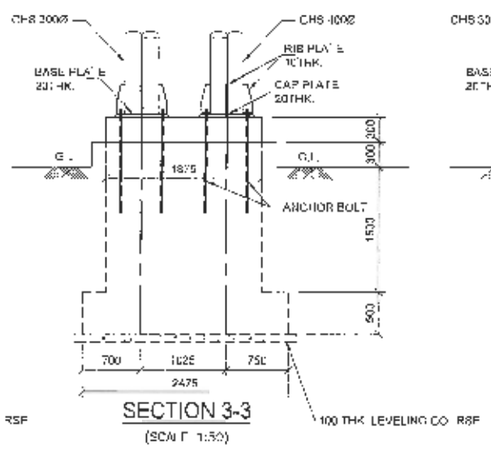
SECTION 1-1

(SCALE 1:50)



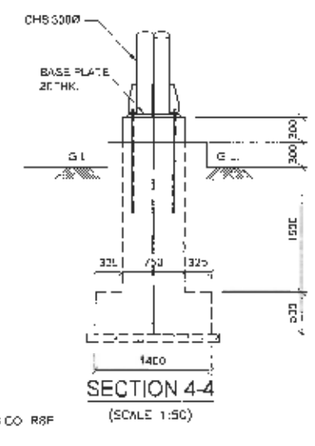
SECTION 2-2

(SCALE 1:50)



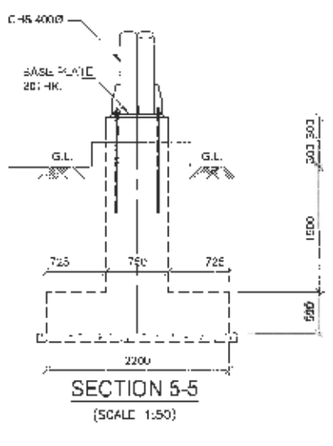
SECTION 3-3

(SCALE 1:50)



SECTION 4-4

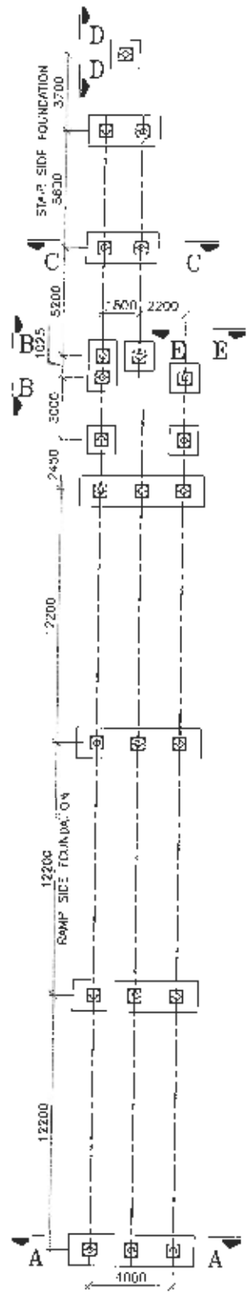
(SCALE 1:50)



SECTION 5-5

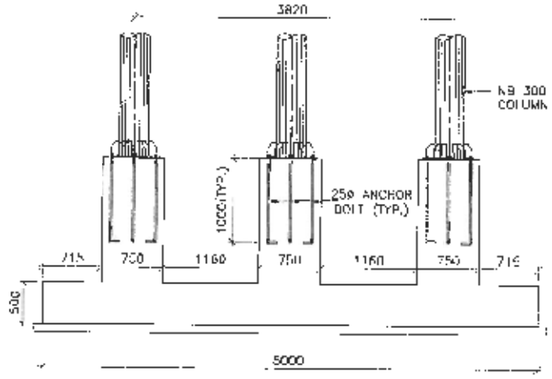
(SCALE 1:50)

EMPLOYER	PROJECT	DESIGN CONSULTANT					Scale:	Date:
Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kathmandu (Naghdhunga) - Narbise - Mugling Road and Bridges	Intercontinental Consultants & Technocrats Pvt. Ltd. A-8, Green Park, New Delhi - 110016 Ph : 4086-3000, Fax 2685-5252 In Joint Venture With Soosung Engineering Co, Ltd., South Korea FBC In Association With Full Bright Consultancy (Pvt.) Ltd., 316,Baburam Acharya Sadak Sinamangal, Kathmandu, GPO Box 4970, Kathmandu, Nepal					AS SHOWN	August 2019
			Designed By	SB		DRAWING NAME: DIMENSION DETAILS OF FOUNDATION OF FOOT OVER BRIDGE FOR 21M CARRIAGEWAY		Drawing No.: NNMR-TYP 08-08
			Checked By	PMS				
			Approved By	BNS				



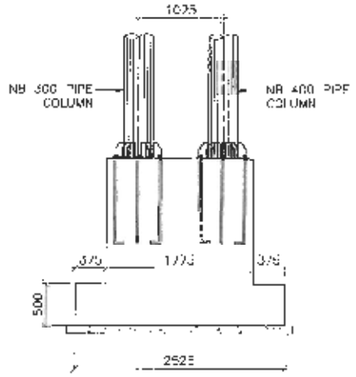
COLUMN LAYOUT PLAN

(SCALE 1:200)



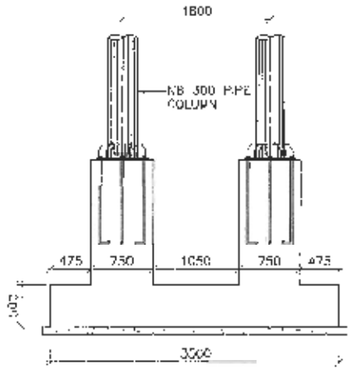
SECTION A–A

(SCALE 1:50



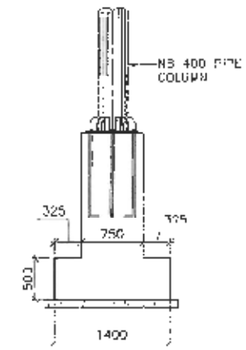
SECTION B–B

(SCALE 1:50



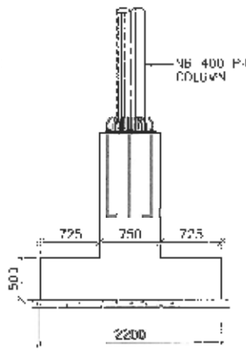
SECTION C–C

(SCALE 1:50



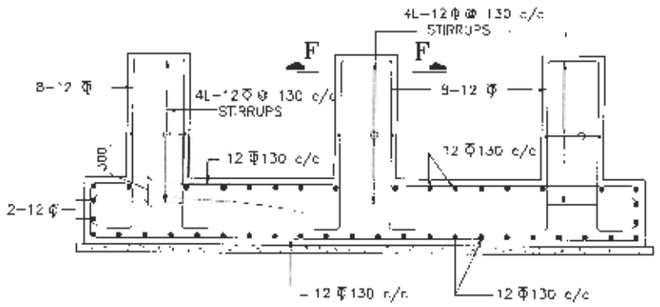
SECTION D–D

(SCALE 1:50



SECTION E–E

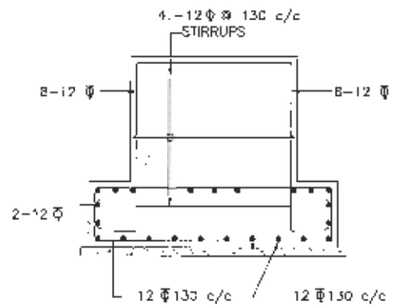
(SCALE 1:50



SECTION A A

(RENF. DETAIL)

(SCALE 1:50



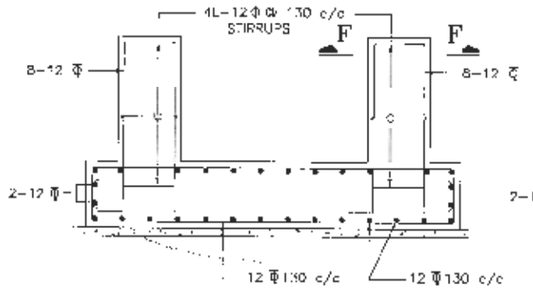
SECTION B–B

(RENF. DETAIL)

(SCALE 1:50

NOTES

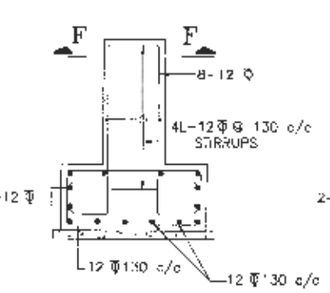
1. ALL DIMENSIONS ARE IN MILLIMETRES, UNLESS OTHERWISE MENTIONED. ONLY WRITTEN DIMENSIONS ARE TO BE FOLLOWED. NO DIMENSION IS TO BE SCALED.
2. CONCRETE SHALL BE DESIGN MIX AND SHALL HAVE MINIMUM 28 DAYS CHARACTERISTIC STRENGTH ON 150mm CUBES AS 35 MPa.
3. ALL REINFORCING STEEL SHALL BE THERMO MECHANICALLY TREATED (TMT) BARS SATISFYING REQUIREMENTS OF HIGH YIELD STRENGTH DEFORMED BARS (GRADE DESIGNATION Fe–5000) CONFORMING TO IS:1786.
4. CLEAR COVER TO OUTER MOST STEEL IS 75mm FOR FOUNDATION.
5. 'L' REPRESENTS LONGITUDINAL AXIS OF THE BRIDGE AND 'T' REPRESENTS TRANSVERSE AXIS OF THE BRIDGE.
6. REQUIRED SAFE BEARING CAPACITY UNDER FOOTING OF PIER AND COLUMNS, UNDER STAIRCASE IS 20 t/sqm. THIS MAY BE ENSURED AT SITE.



SECTION C–C

(RENF. DETAIL)

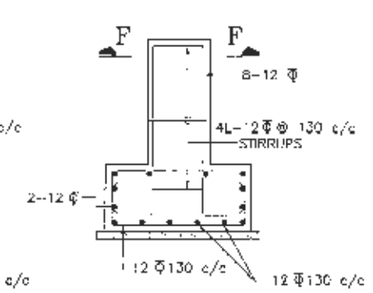
(SCALE 1:50



SECTION D–D

(RENF. DETAIL)

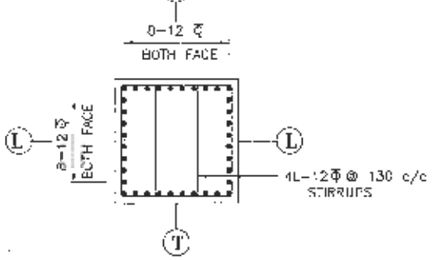
(SCALE 1:50



SECTION E–E

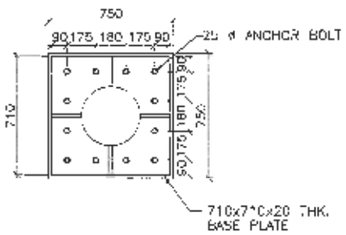
(RENF. DETAIL)

(SCALE 1:50



SECTION F–F

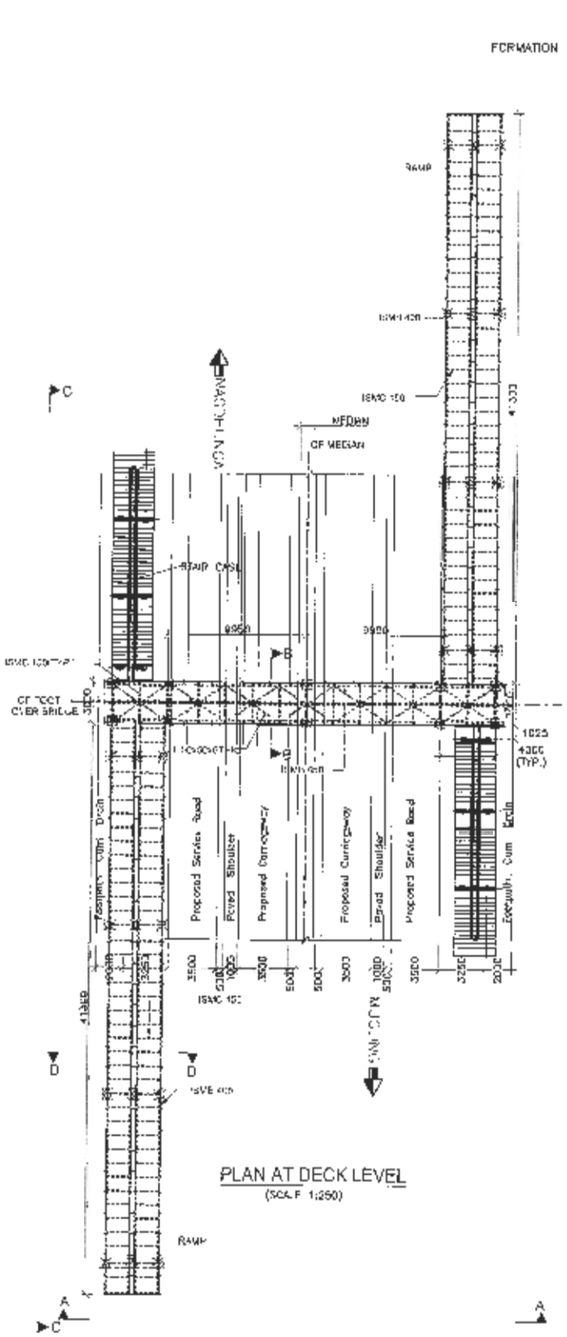
(SCALE 1:25)



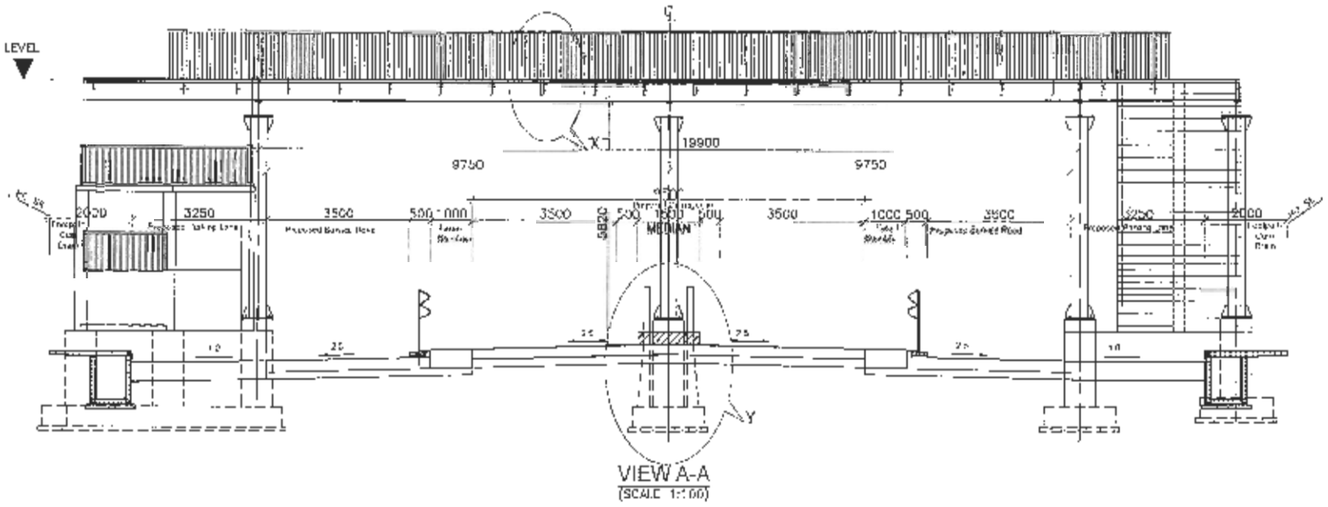
DETAIL AT COLUMN BASE

(SCALE 1:25)

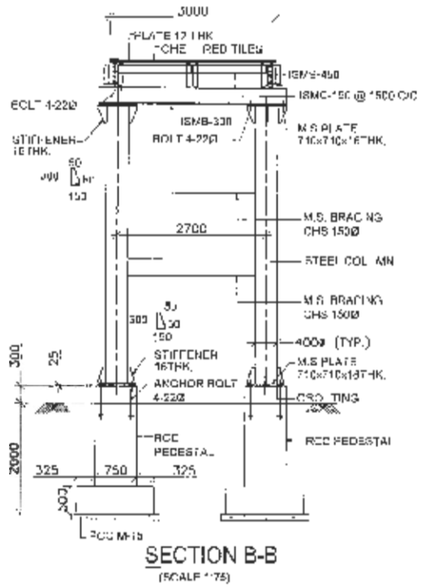
EMPLOYER	PROJECT	DESIGN CONSULTANT					
Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kathmandu (Nagdhunga) - Naubise - Mugling Road and Bridges	Intercontinental Consultants & Technocrats Pvt. Ltd. A-8, Green Park, New Delhi - 110016 Ph : 4086-3000, Fax 2685-5252 In Joint Venture With Soosung Engineering Co. Ltd., South Korea FBC In Association With Full Bright Consultancy (Pvt.) Ltd. 316,Bebsram Acharya Sadak Sinamangal Kathmandu, GPO Box. 4970, Kathmandu, Nepal	Designed By	SB		DRAWING NAME: FOUNDATION & PEDESTAL DETAILS OF STAIR & RAMP PORTION FOOT OVER BRIDGE FOR 21M CARRIAGEWAY	Scale: AS SHOWN Date: August 2019 Drawing No.: NNMR-TYP 08-09
			Checked By	PMS			
			Approved By	BNS			



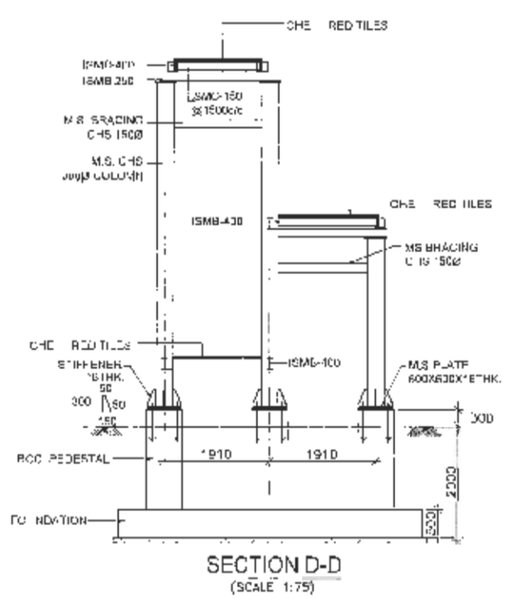
PLAN AT DECK LEVEL
(SCALE 1:250)



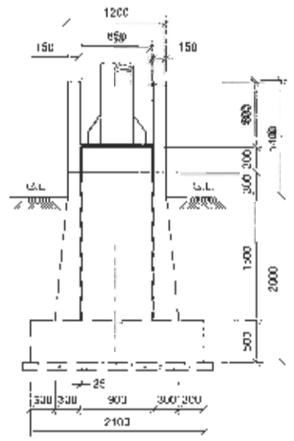
VIEW A-A
(SCALE 1:100)



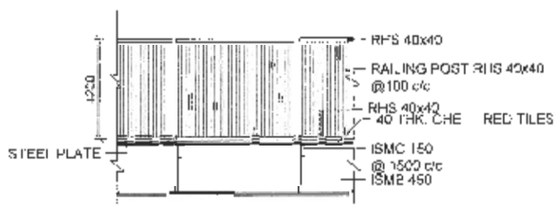
SECTION B-B
(SCALE 1:75)



SECTION D-D
(SCALE 1:75)



DETAIL Y1
(SCALE 1:25)



DETAIL X
(SCALE 1:50)

NOTES:=

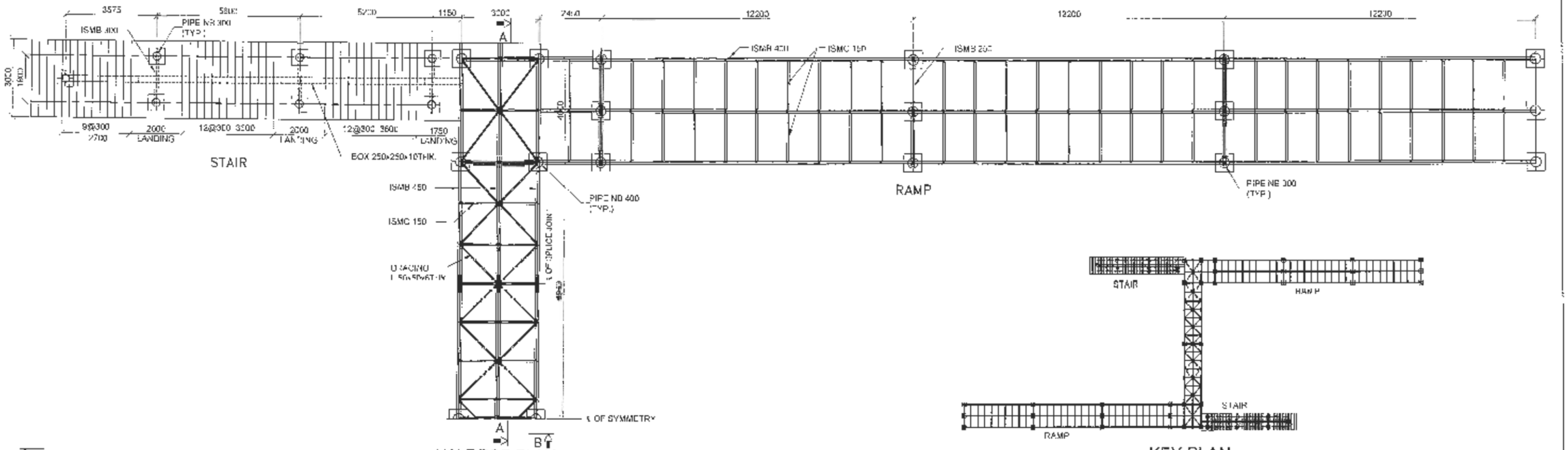
1. ALL DIMENSIONS ARE IN MM AND LEVELS ARE IN METERS.
2. ONLY WRITTEN DIMENSIONS TO BE FOLLOWED.
3. ALL STRUCTURAL STEEL SHALL CONFORM TO IS:2062-2006 GRADE Fe 410.
4. ALL WELDING SHALL CONFORM TO IS:815-1969 AND IS:1323-1982.
5. ERECTION BOLTS AND NUTS SHALL CONFORM TO IS:1363-1987 AND IS:1367-(PART-3) 2002
6. FABRICATION AND ERECTION OF STRUCTURAL STEEL WORKS SHALL CONFORM TO IRC:24-2010 (SECTION-V), IS:7205 1974 AND IS:7215-1974.
7. ALL HOLES FOR HSFG BOLTS AND ERECTION BOLTS SHALL BE DRILLED.
8. ALL HOLES NECESSARY FOR ERECTION BOLTS SHALL BE PLUGGED FULLY AFTER SUCCESSFUL COMPLETION OF ERECTION WORK.
9. ALL WELDS SHALL BE 6mm CONT. FILLET UNLESS NOTED OTHERWISE.
10. CUTTING LENGTH OF GUSSET PLATES TO BE FINALIZED BY "FULL SCALE SHOP LAYOUT".
11. FABRICATION DRAWING SHOULD BE PREPARED BY THE CONTRACTOR AND APPROVED BY THE ENGINEER BEFORE CONSTRUCTION.
12. ALL DIMENSIONS TO BE CONFIRMED AT SITE BEFORE CUTTING OF MEMBERS.
13. ALL FOUNDATION DETAILS MAY BE FINALIZED ONLY AFTER HAVING GEOTECHNICAL INVESTIGATIONS REPORT. THIS MAY ALSO AFFECT THE FINAL DETAILS/LEVELS OF COLUMN BASE PLATES
14. LOCATIONS AND DETAILS OF FIELD SPLICES FOR ERECTION OF THE STRUCTURAL SYSTEM SHALL BE PROPOSED BY THE STEEL FABRICATOR.
15. THE FOB WILL BE DESIGNED FOR FOOTWAY LIVE LOAD AS PER CLAUSE 206 OF IRC: 6-2017.
16. STEEL RAILINGS SHALL BE OF HOLLOW TUBULAR SECTIONS AS APPROVED BY ENGINEER-INCHARGE.
17. SAFE BEARING CAPACITY UNDER FOOTING OF PIER AND COLUMNS, UNDER STAIRCASE IS 20t/sqm. THIS MAY BE ENSURED AT SITE BEFORE EXECUTION OF WORK ANY DEVIATION IN SBC IN SOIL REPORT FROM CONSIDERED SBC IS DESIGN SHALL BE REPORT TO ENGINEER FOR CHANGES IN DESIGN.
18. WHILE EXCAVATING FOR FOOTING PRECAUTIONS WILL BE TAKEN TO PROTECT THE EXISTING DUCTS AND OTHER SERVICES ENCOUNTERED IN THE AREA OF EXCAVATION

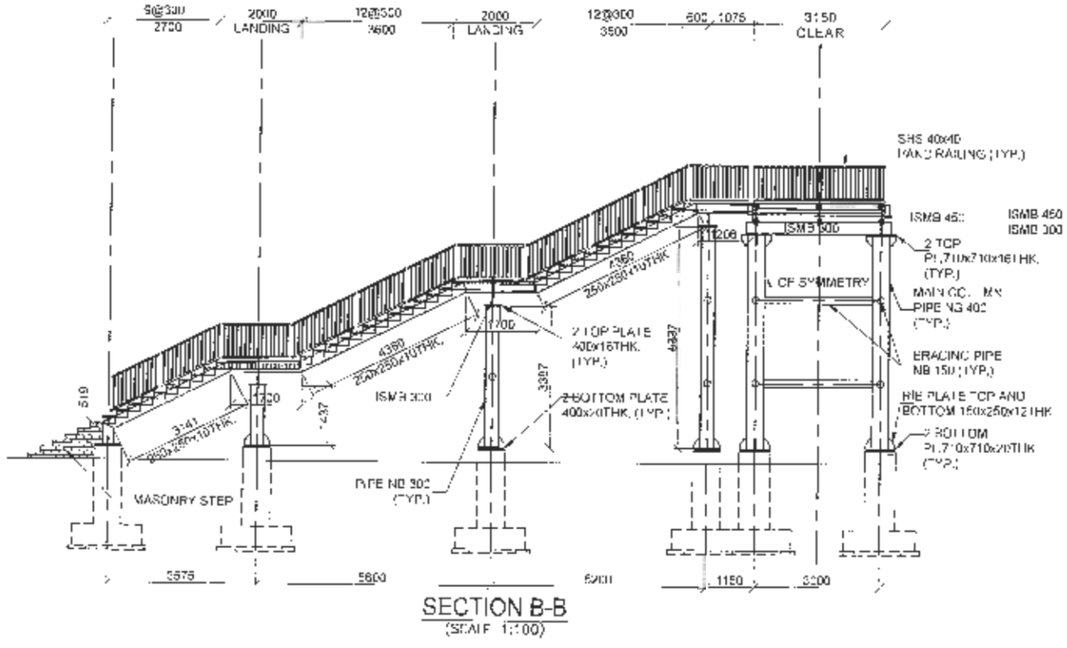
NOTES ON PROTECTIVE SURFACE COATING

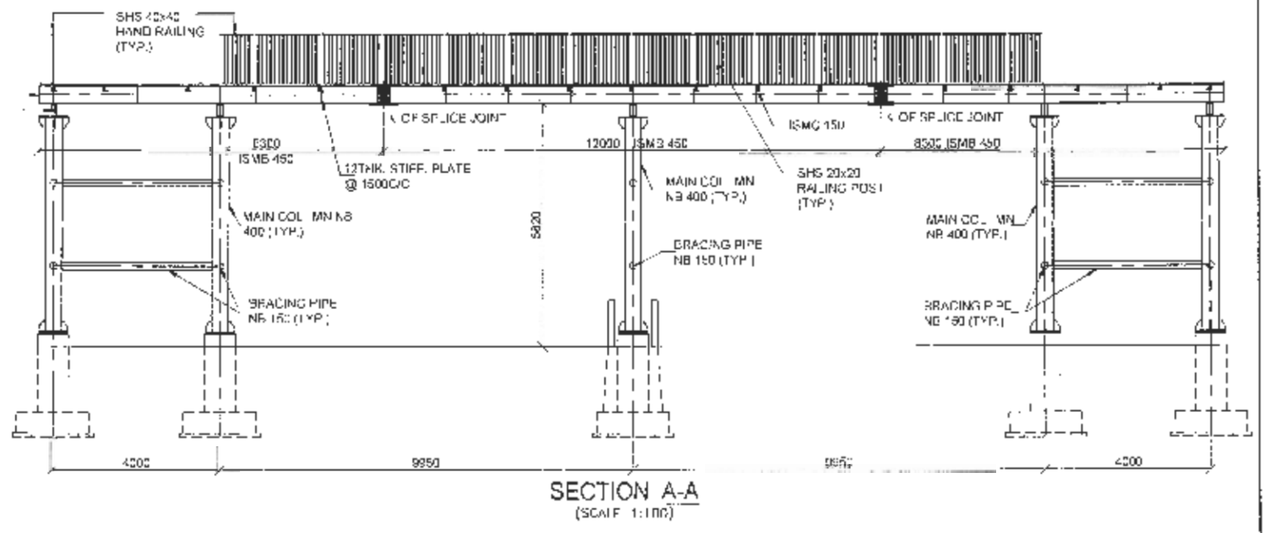
1. SURFACE PREPARATION GRIT BLASTING TO GRADE SP 2.5 AS PER IS:9954.
2. ONE COAT OF FOLLOWED BY ONE COAT OF ZINC CHROMATE OXIDE PRIMER TO IS:2074.
3. TWO FINISHING COATS OF ALUMINUM PAINT TO IS:2339 OVER PRIMER COATS ONE COAT SHALL BE APPLIED BEFORE THE FABRICATED STEEL WORK LEAVES THE SHOP.

THE FOUNDATION SIZE SHALL BE REVIEWED BASED ON GEOTECHNICAL INVESTIGATION CARRIED OUT AT SITE

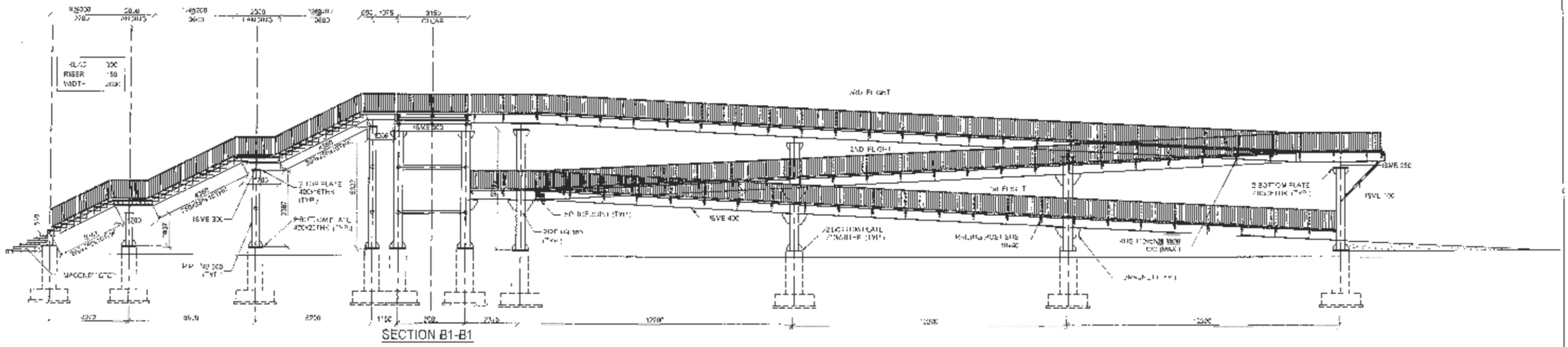
EMPLOYER Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	**PROJECT** Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kathmandu (Naubhanga) - Naubise - Mugling Road and Bridges	**DESIGN CONSULTANT** Intercontinental Consultants & Technocrats Pvt. Ltd. A-8, Green Park, New Delhi - 110016 Ph : 4066-3000, Fax 2565-5252 In Joint Venture With Soosung Engineering Co. Ltd., South Korea In Association With Full Bright Consultancy (Pvt.) Ltd. 316,Baburam Acharya Sadak Sinamangal, Kathmandu, GPO Box: 4970, Kathmandu, Nepal	Designed By: SB Checked By: PMS Approved By: BNS	**DRAWING NAME:** TYPICAL GENERAL ARRANGEMENT OF FOOT OVER BRIDGE FOR 30M CARRIAGEWAY	**Scale:** AS SHOWN **Drawing No.:** NNMR-TYP 06-10



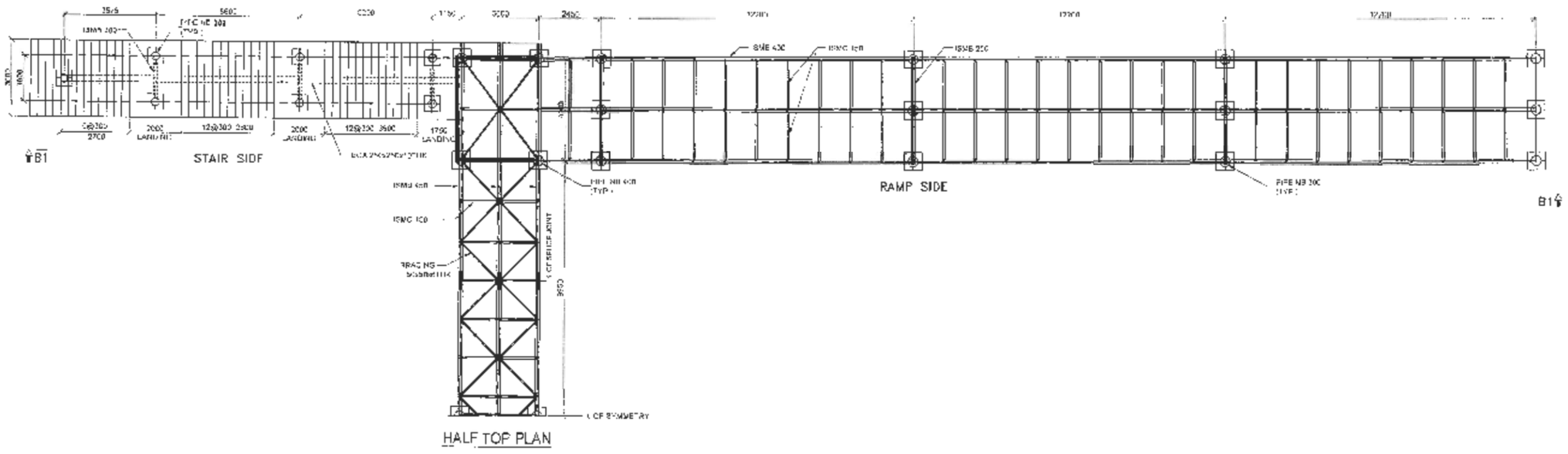




EMPLOYER	PROJECT	DESIGN CONSULTANT				
Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kathmandu (Nagdhunga) - Naubise - Mugling Road and Bridges	Intercontinental Consultants & Technocrats Pvt. Ltd. A-9, Green Park, New Delhi - 110016 Ph : 4060-3000, Fax 2665-5252 In Joint Venture With Soosung Engineering Co. Ltd., South Korea In Association With Full Bright Consultancy (Pvt.) Ltd. 316,Baburam Acharya Sadak Sinamangal, Kathmandu, GPO Box: 4070, Kathmandu, Nepal	Designed By	SB		DRAWING NAME: TYPICAL GENERAL ARRANGEMENT MARKING PLAN OF FOOT OVER BRIDGE FOR 30M CARRIAGEWAY	Scale: AS SHOWN	Date: August 2019 Drawing No.: NNMR-TYP 08-11
			Checked By	PMS				
			Approved By	BNS				

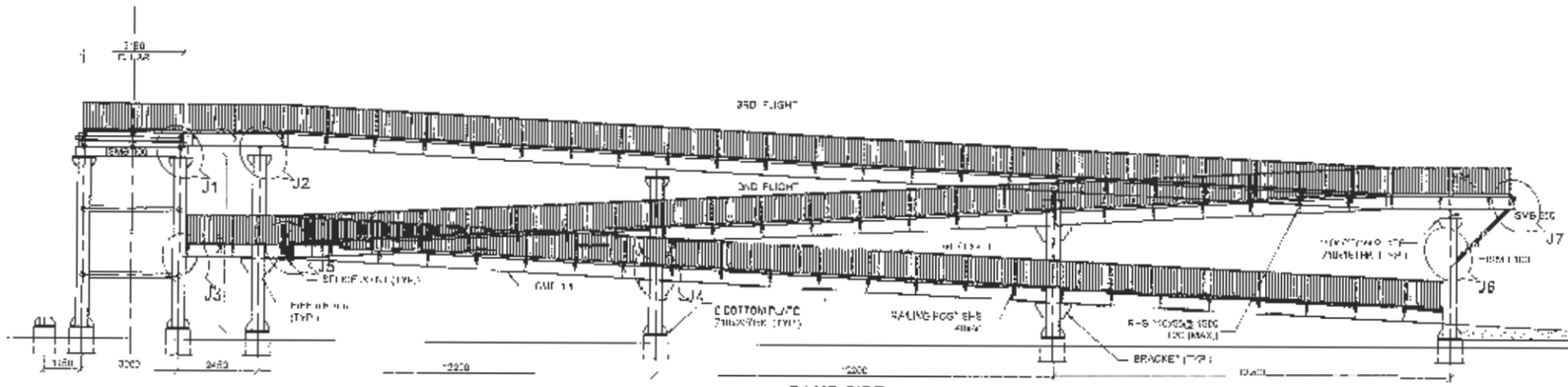


SECTION B1-B1

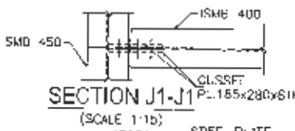


HALF TOP PLAN

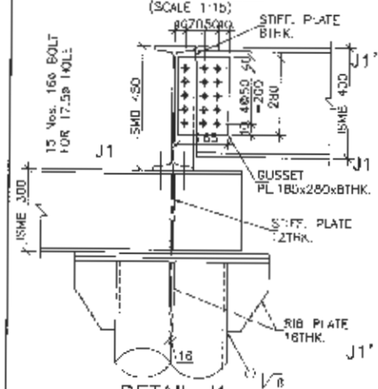
EMPLOYER Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	**PROJECT** Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kathmandu (Naubhanya) - Naubise - Mugling Road and Bridges	**DESIGN CONSULTANT** Intercontinental Consultants & Technocrats Pvt. Ltd. A 8, Green Park, New Delhi - 110016 Ph : 4086 3000, Fax 2685-5252 In Joint Venture With Soosung Engineering Co. Ltd. South Korea In Association With Full Bright Consultancy (Pvt.) Ltd. 316,Baburam Acharya Sadak Sinamangal, Kathmandu, GPO Box 4975, Kathmandu, Nepal	Designed By	SB		**DRAWING NAME:** TYPICAL GENERAL ARRANGEMENT MARKING PLAN OF FOOT OVER BRIDGE FOR 30M CARRIAGEWAY	**Scale:** AS SHOWN	**Date:** August 2019
			Checked By	PMS				**Drawing No.:** NNMR-TYP 08-12
			Approved By	DNS				



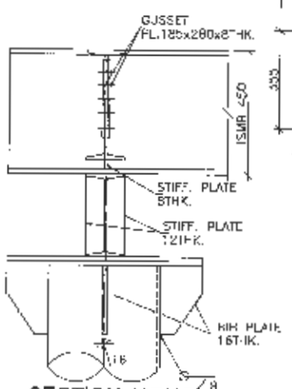
RAMP SIDE



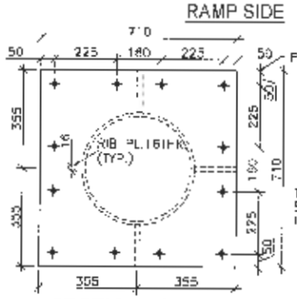
SECTION J1-J1
(SCALE 1:15)



DETAIL -J1
(SCALE 1:15)



SECTION J1'-J1'
(SCALE 1:15)



SECTION J2A-J2A
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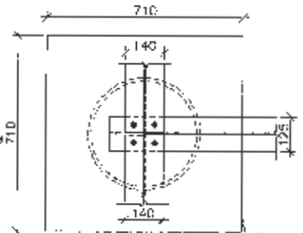
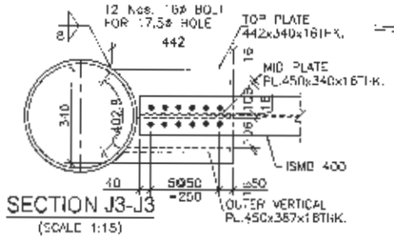


SECTION J2-J2
(SCALE 1:15)



SECTION J3-J3
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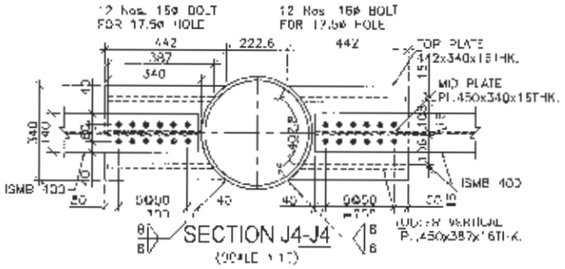

SECTION J4-J4
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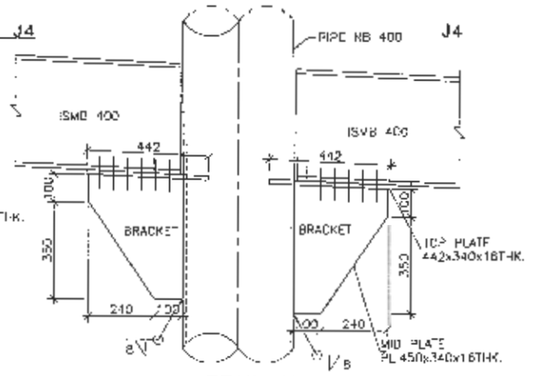
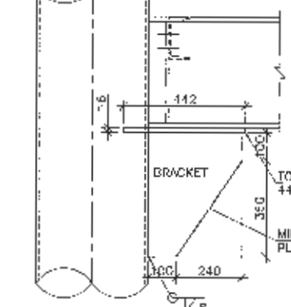


DETAIL -J4
(SCALE 1:15)



DETAIL -J3
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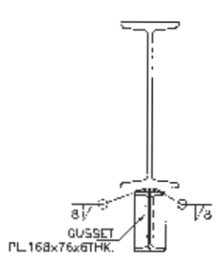
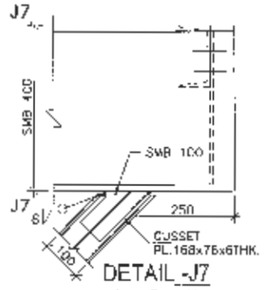
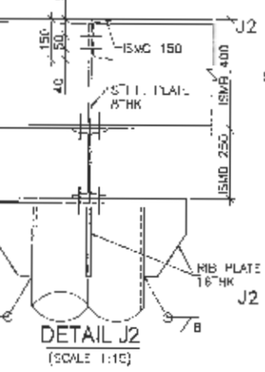


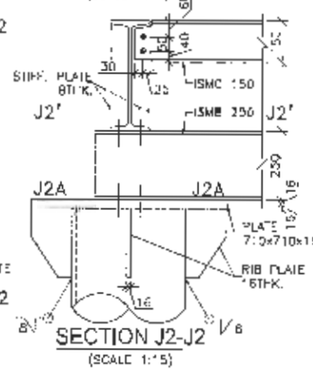
SECTION J7-J7
(SCALE 1:10)



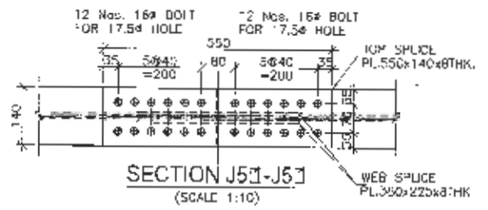
DETAIL -J7
(SCALE 1:10)



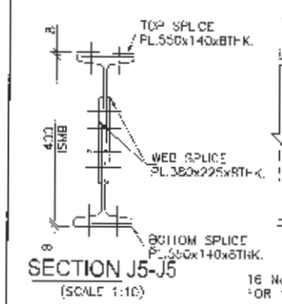
DETAIL J2
(SCALE 1:10)

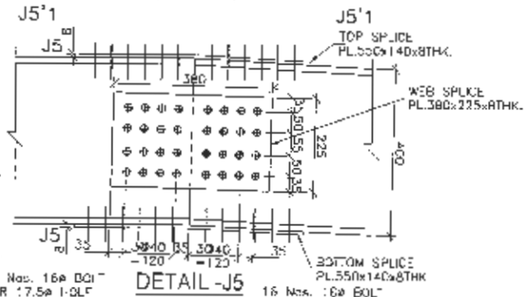


SECTION J2-J2
(SCALE 1:15)

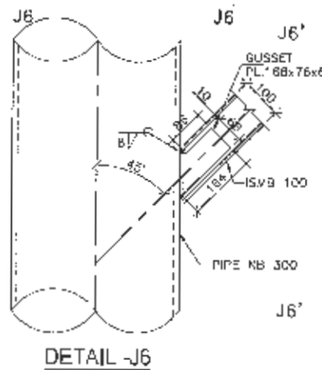


SECTION J5-J5
(SCALE 1:10)





DETAIL -J5
(SCALE 1:10)



DETAIL -J6
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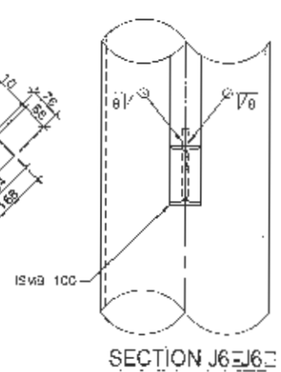
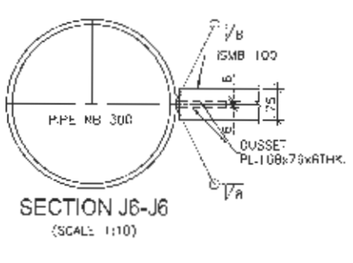
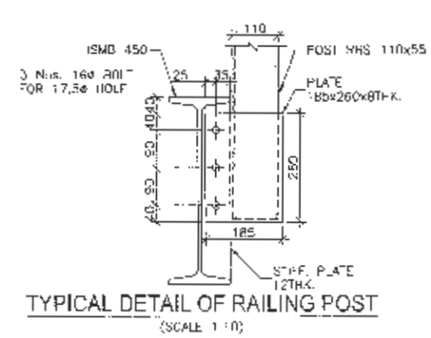


SECTION J6-J6
(SCALE 1:10)

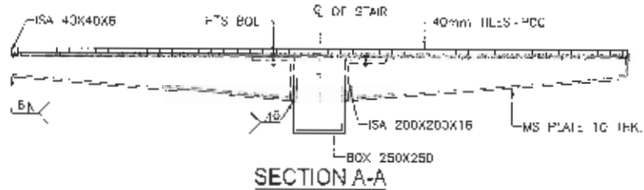


SECTION J6-J6
(SCALE 1:10)

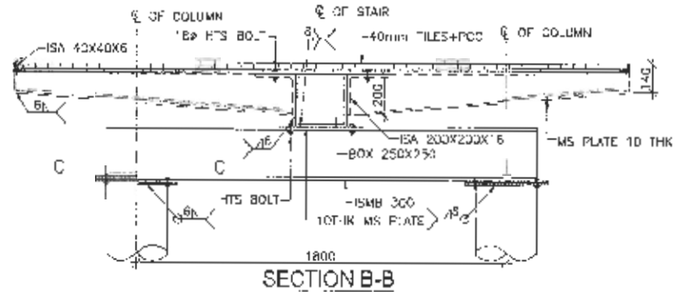


TYPICAL DETAIL OF RAILING POST
(SCALE 1:10)

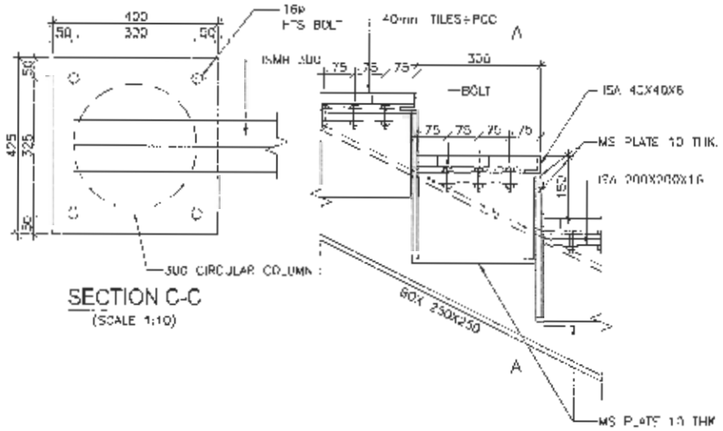
EMPLOYER Government of Nepal Ministry of Physical Infrastructure and Transport **Department of Roads** **Development Cooperation Implementation Division**	**PROJECT** Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kathmandu (Nagdhunga) - Naubise - Mugling Road and Bridges	**DESIGN CONSULTANT** Intercontinental Consultants & Technocrats Pvt. Ltd. A-8, Green Park, New Delhi - 110016 Ph: 4086-3000, Fax 2685-5252 In Joint Venture With Soosung Engineering Co. Ltd., South Korea In Association With Full Bright Consultancy (Pvt.) Ltd. 316,Basuram Acharya Sadak Sinamangal, Kathmandu, GPO Box: 4870, Kathmandu, Nepal	Designed By: SS Checked By: PMS Approved By: BNS	**DRAWING NAME:** TYPICAL CONNECTION DETAILS OF FOOT OVER BRIDGE FOR 30M CARRIAGEWAY	**Scale:** AS SHOWN	**Date:** August 2019 **Drawing No.:** NNMR-TYP 08-13



SECTION A-A
(SCALE 1:20)

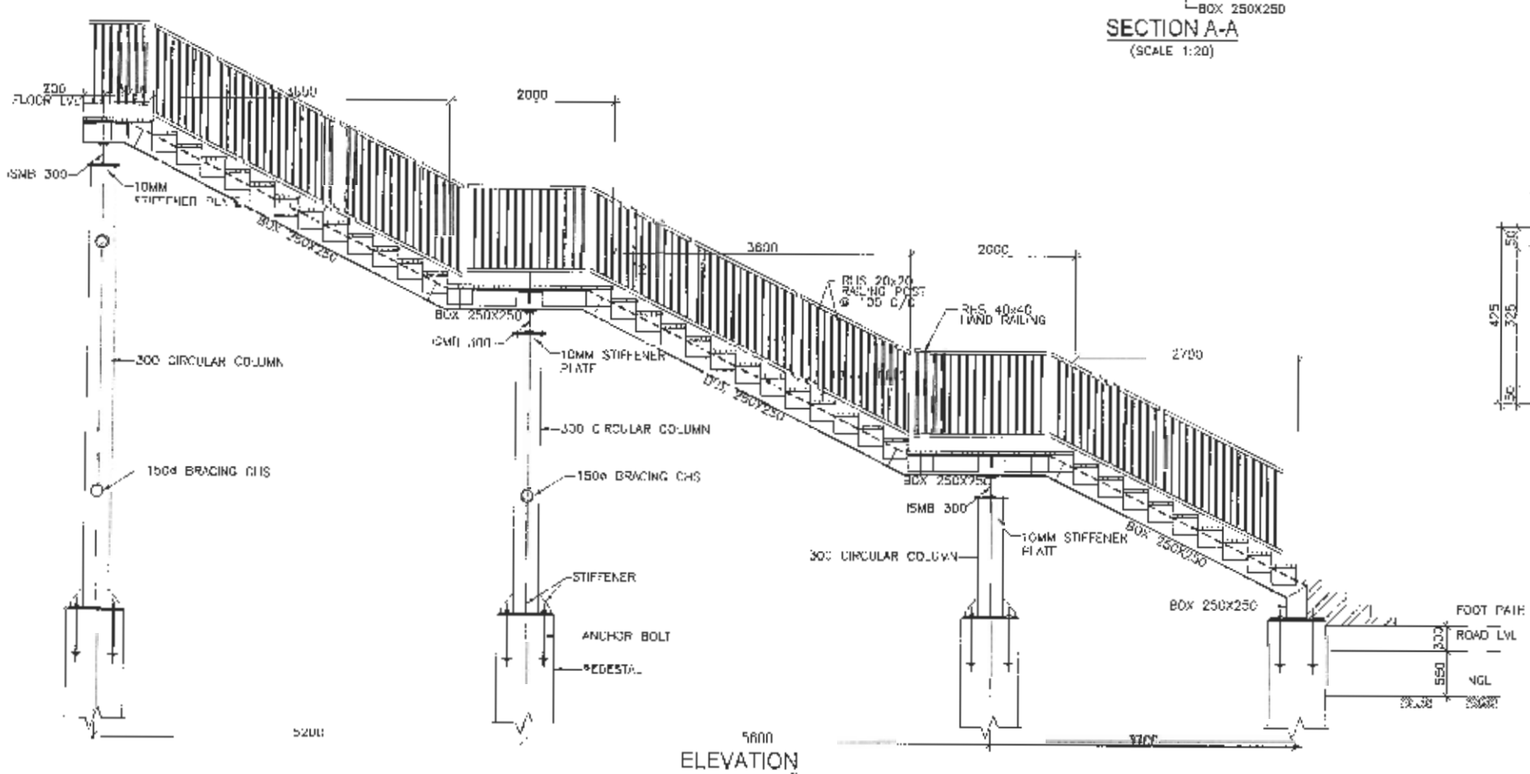


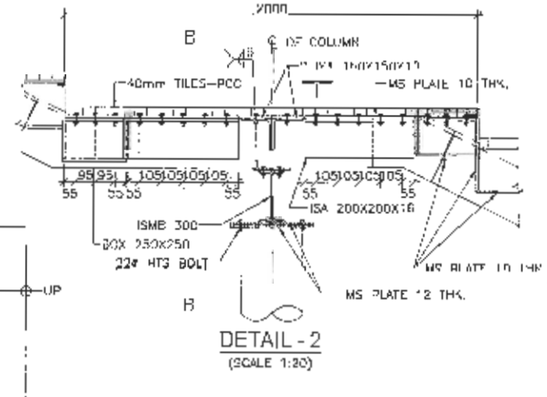
SECTION B-B
(SCALE 1:20)



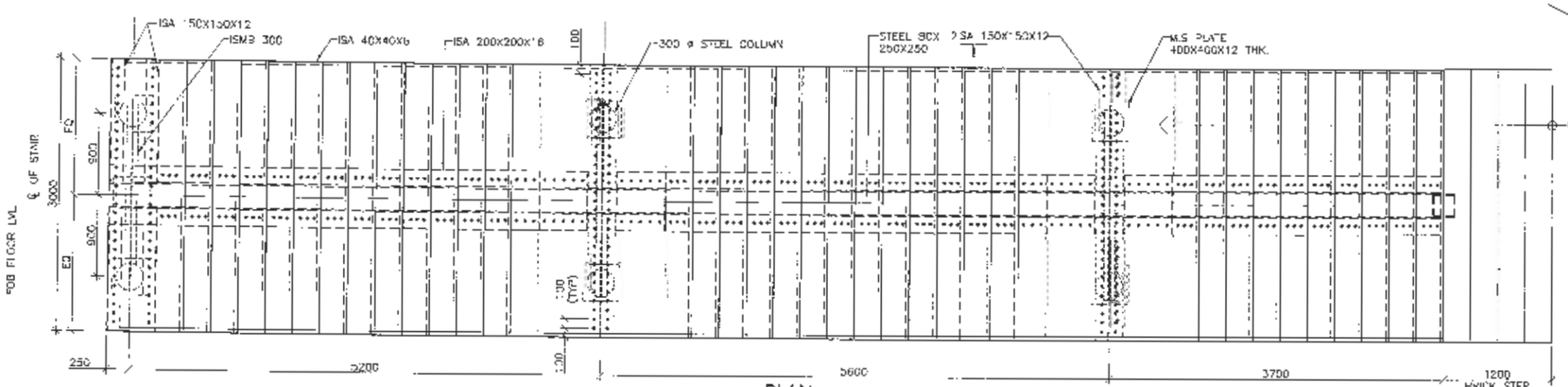
SECTION C-C
(SCALE 1:10)

DETAIL - 1
(SCALE 1:10)



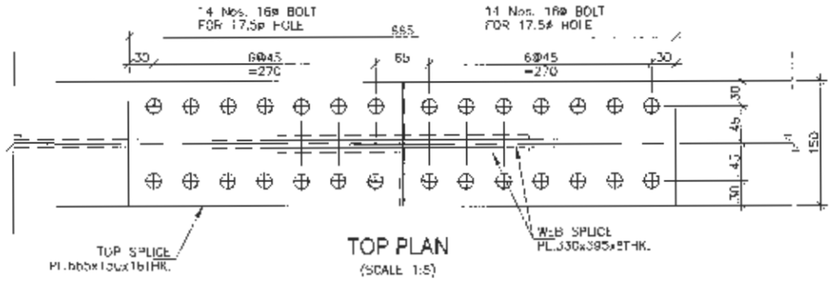


DETAIL - 2
(SCALE 1:20)

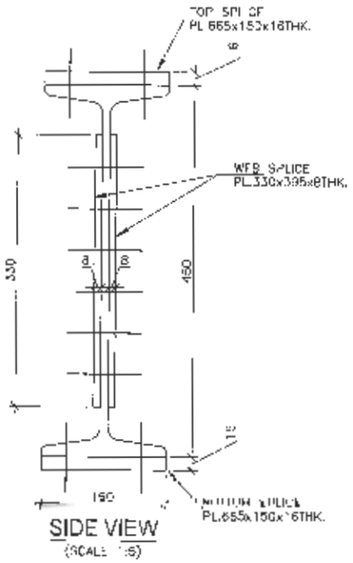


THE FOUNDATION SIZE SHALL BE REVIEWED BASED ON GEOTECHNICAL INVESTIGATION CARRIED OUT AT SITE

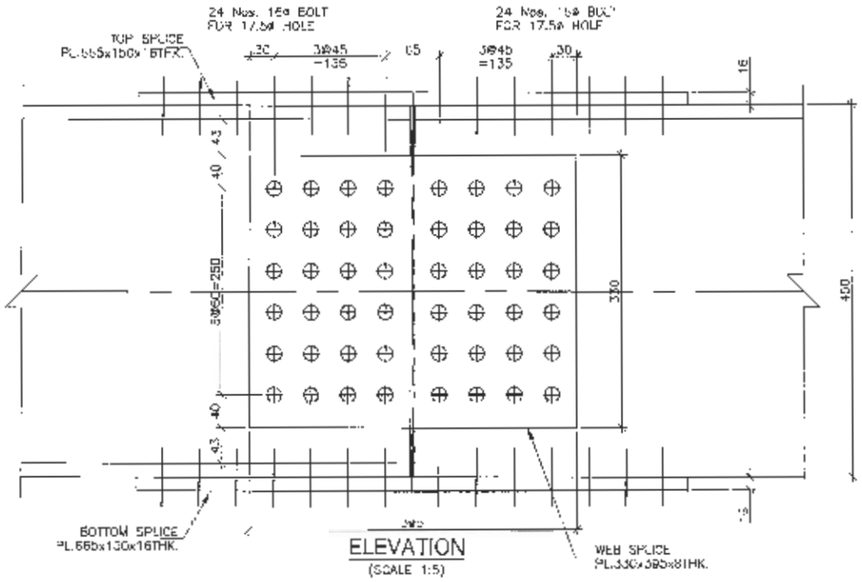
EMPLOYER	PROJECT	DESIGN CONSULTANT				
Government of Nepal Ministry of Physical Infrastructure and Transport **Department of Roads** Development Cooperation Implementation Division	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kathmandu (Nagdhunga) - Naubise - Mugling Road and Bridges	Intercontinental Consultants & Technocrats Pvt. Ltd. A-8, Green Park, New Delhi - 110016 Ph : 4086-3000, Fax 2685-5252 In Joint Venture With Soosung Engineering Co. Ltd., South Korea In Association With Full Bright Consultancy (Pvt.) Ltd. 310,Baburam Acharya Sadak Singhamgal, Kathmandu GPO Box: 4970, Kathmandu, Nepal				
			Designed By	SB		**DRAWING NAME:** TYPICAL CONNECTION DETAILS OF FOOT OVER BRIDGE FOR 30M CARRIAGEWAY
			Checked By	PMS		**Scale:** AS SHOWN
			Approved By	BNS		**Date:** August 2019 **Drawing No.:** NNMR-TYP 08-14



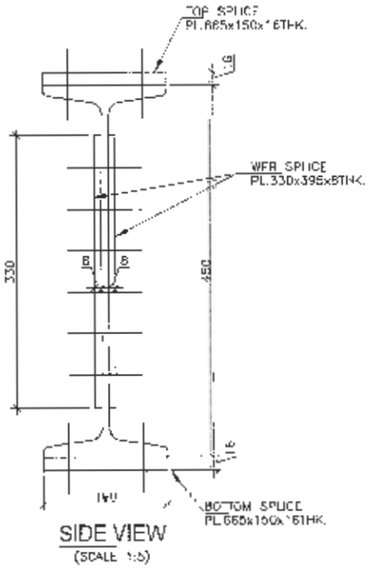
TOP PLAN
(SCALE 1:5)



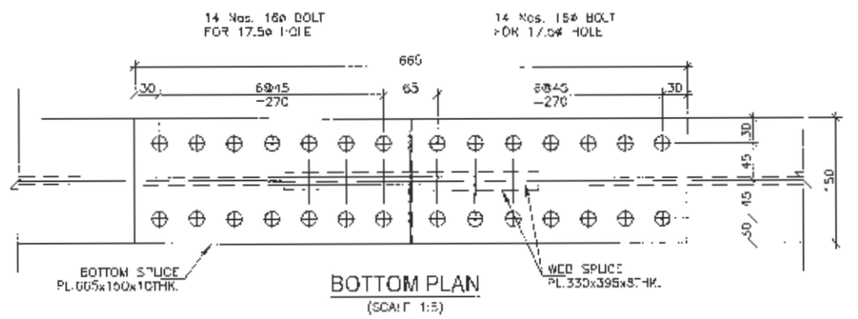
SIDE VIEW
(SCALE 1:5)



ELEVATION
(SCALE 1:5)

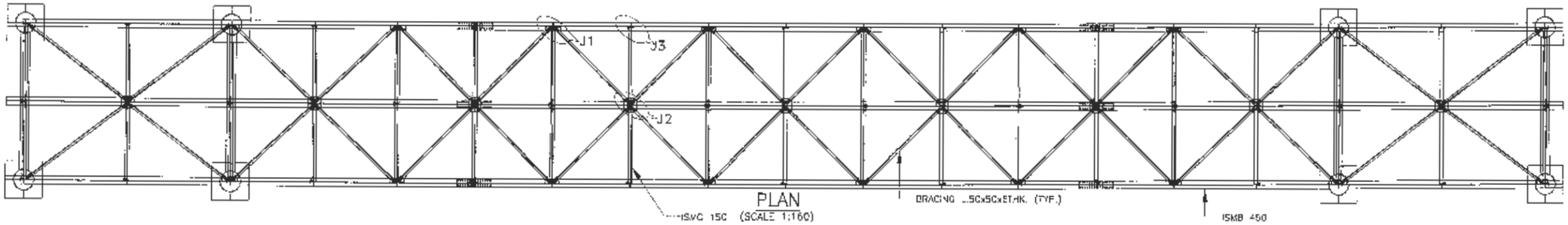


SIDE VIEW
(SCALE 1:5)

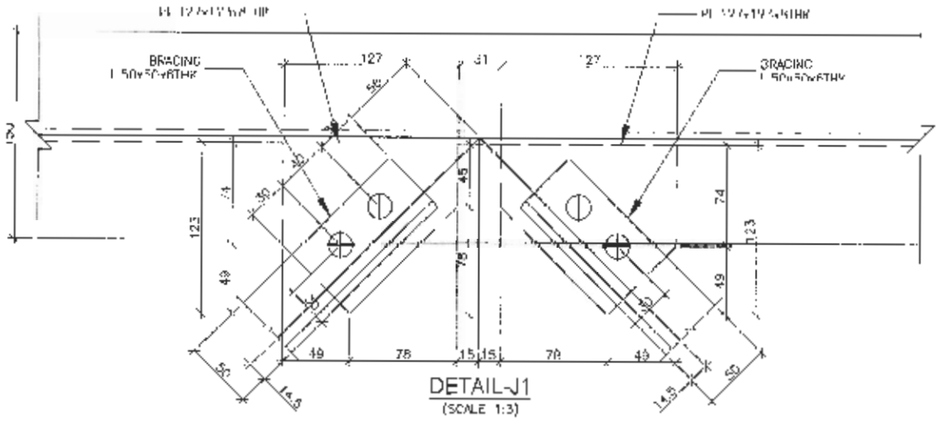


BOTTOM PLAN
(SCALE 1:5)

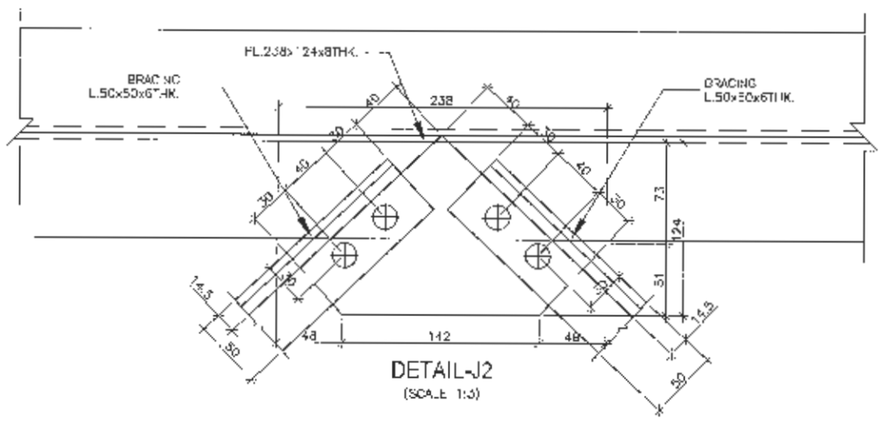
EMPLOYER	PROJECT	DESIGN CONSULTANT			DRAWING NAME:	Scale:	Date:
Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kathmandu (Nagdhunga) - Naubise - Mugling Road and Bridges	Intercontinental Consultants & Technocrats Pvt. Ltd A-8, Green Park, New Delhi - 110016 Ph : 4086-3000, Fax 2665-5252 In Joint Venture With Soosung Engineering Co. Ltd., South Korea In Association With Full Bright Consultancy (Pvt.) Ltd. 316,Bebsram Acharya Sadak Sinamangal, Kathmandu, GPO Box. 4970, Kathmandu, Nepal	Designed By	SB	TYPICAL SPLICE JOINT DETAILS OF FOOT OVER BRIDGE FOR 30M CARRIAGEWAY	AS SHOWN	August 2019
			Checked By	PMS			Drawing No.: NNMR-TYP 08-15
			Approved By	BNS			



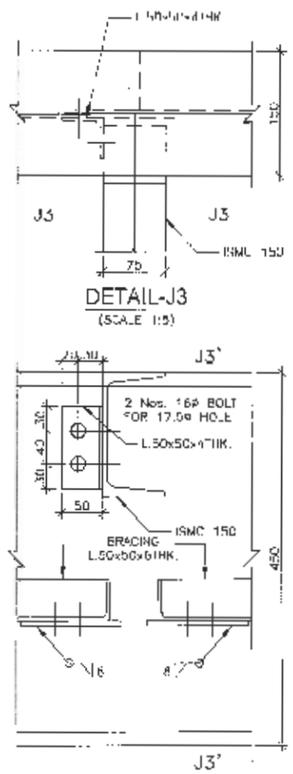
PLAN



DETAIL-J1
(SCALE 1:3)

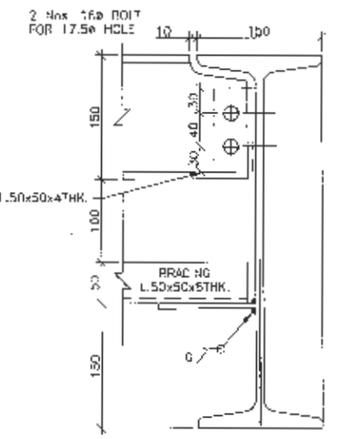


DETAIL-J2
(SCALE 1:3)



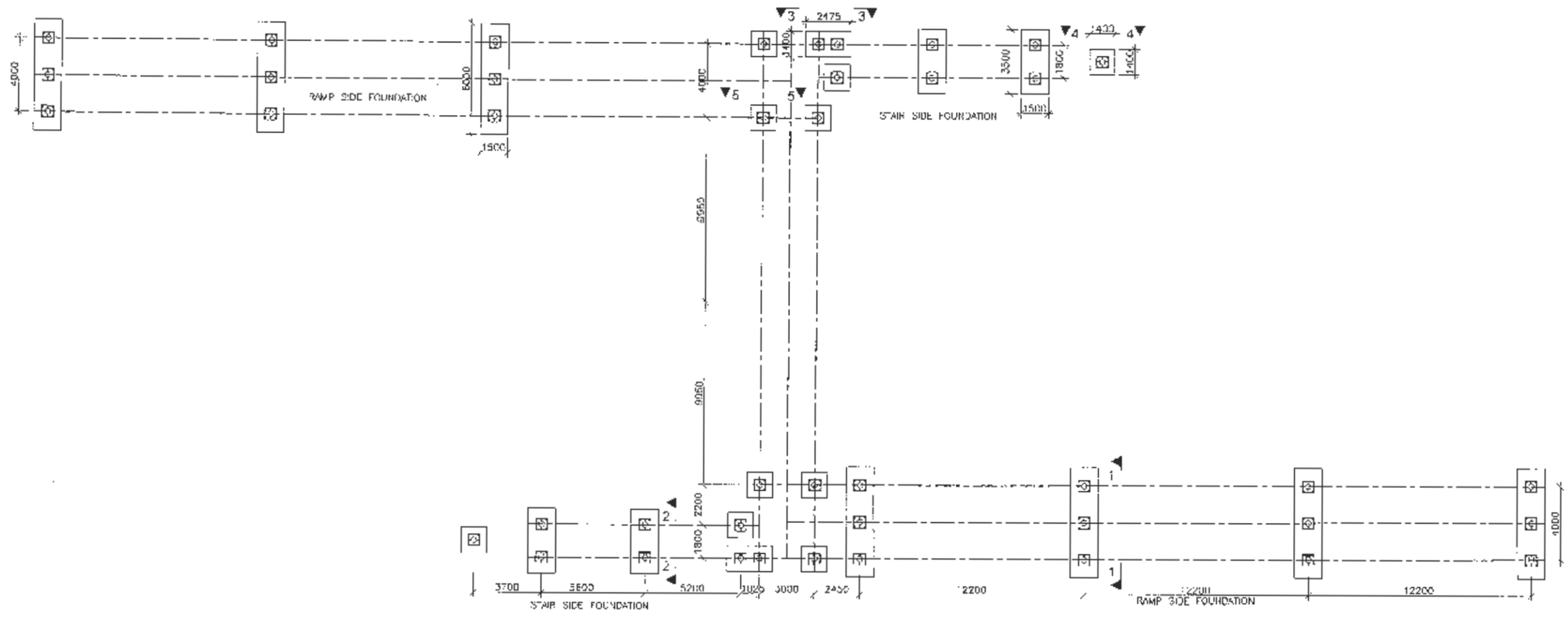
DETAIL-J3
(SCALE 1:5)

SECTION J3-J3
(SCALE 1:5)



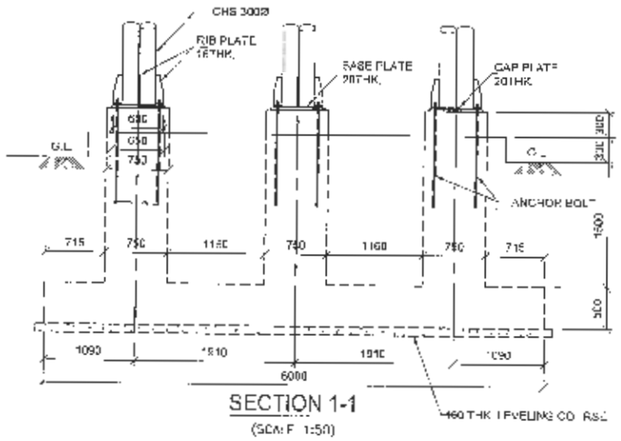
SECTION J3-J3'
(SCALE 1:5)

EMPLOYER	PROJECT	DESIGN CONSULTANT			DRAWING NAME:	Scale:	Date:
Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kathmandu (Nagdhunga) - Naubise - Mugling Road and Bridges	Intercontinental Consultants & Technocrats Pvt. Ltd. A-8, Green Park, New Delhi - 110016 Ph : 4086-3000, Fax 2685 5252 In Joint Venture With Samsung Engineering Co. Ltd., South Korea	In Association With Full Bright Consultancy (Pvt.) Ltd 316,Baburam Acharya Sadak Sinamangal Kathmandu, GPO Box: 4070 Kathmandu, Nepal	Designed By: SB Checked By: PMS Approved By: BNS	TYPICAL BRACING CONNECTION DETAILS OF FOOT OVER BRIDGE FOR 30M CARRIAGEWAY	AS SHOWN	August 2019 Drawing No.: NNMR-TYP 08-16



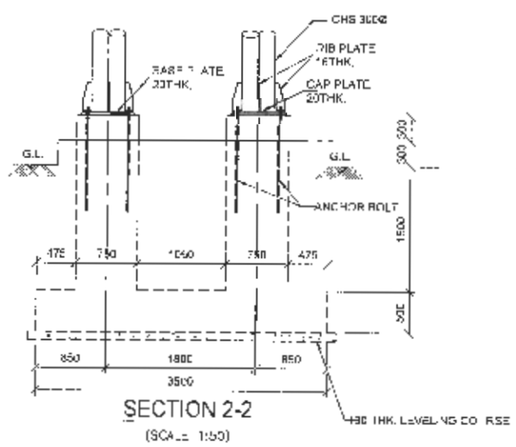
PLAN AT FOUNDATION LEVEL

(SCALE 1:175)



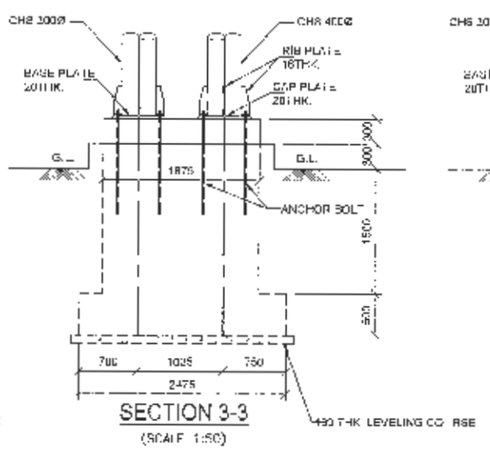
SECTION 1-1

(SCALE 1:50)



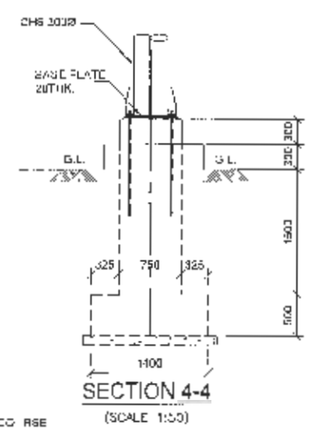
SECTION 2-2

(SCALE 1:50)



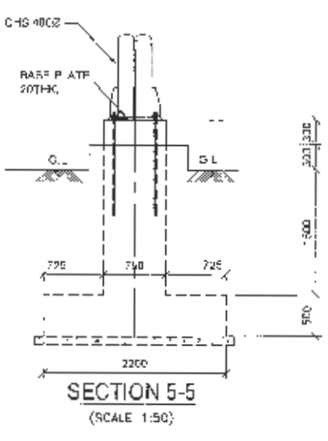
SECTION 3-3

(SCALE 1:50)



SECTION 4-4

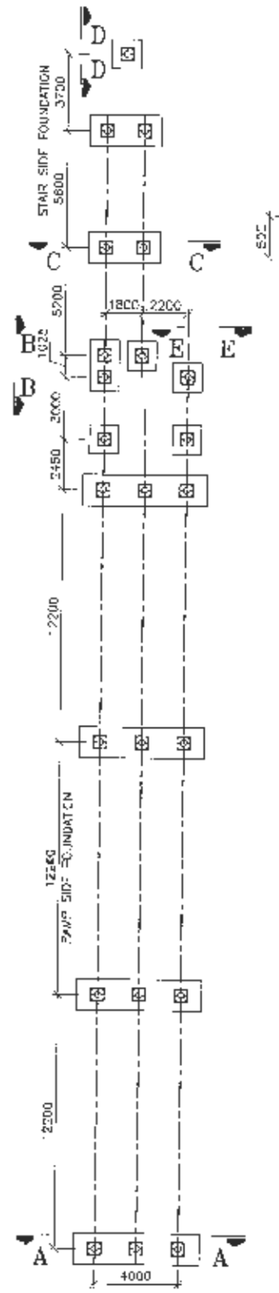
(SCALE 1:50)



SECTION 5-5

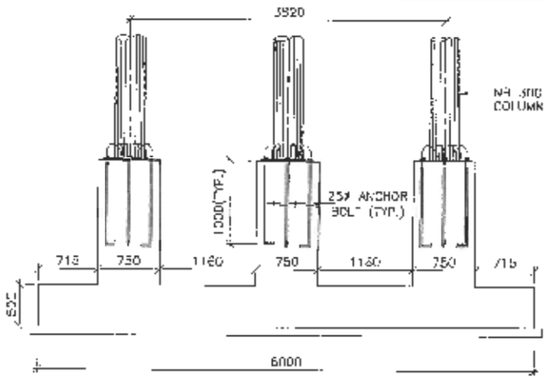
(SCALE 1:50)

EMPLOYER	PROJECT	DESIGN CONSULTANT				DRAWING NAME:	Scale:	Date:
Government of Nepal Ministry of Physical Infrastructure and Transport **Department of Roads** **Development Cooperation Implementation Division**	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kathmandu (Nagdhunga) - Naubise - Mugling Road and Bridges	Intercontinental Consultants & Technocrats Pvt. Ltd. A-8, Green Park, New Delhi 110016 Ph : 4066-3000, Fax 2585-5252 In Joint Venture With Soosung Engineering Co. Ltd., South Korea In Association With Full Bright Consultancy (Pvt.) Ltd. 316,Baburam Acharya Sadak Sinamangal, Kathmandu, GPO Box: 4970, Kathmandu, Nepal		Designed By	SB	DIMENSION DETAILS OF FOUNDATION OF FOOT OVER BRIDGE FOR 30M CARRIAGEWAY	AS SHOWN	August 2019
				Checked By	PMS			Drawing No.: NNMR-TYP 08-17
				Approved By	BNS			



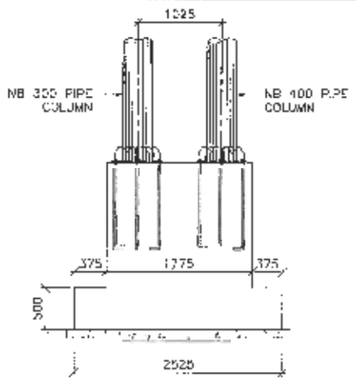
COLUMN LAYOUT PLAN

(SCALE 1:200)



SECTION A–A

(SCALE 1:50



SECTION B–B

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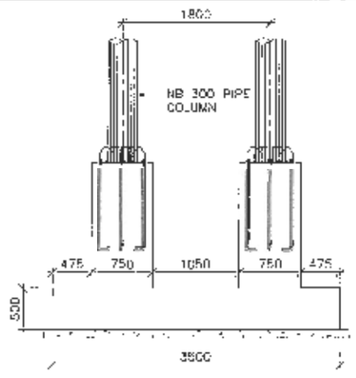

SECTION C–C

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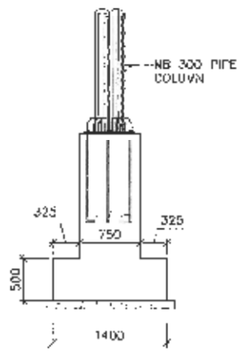

SECTION D–D

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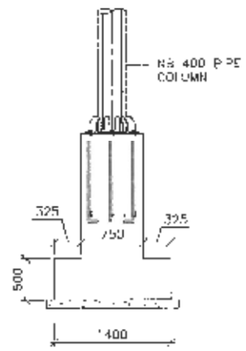

SECTION E–E

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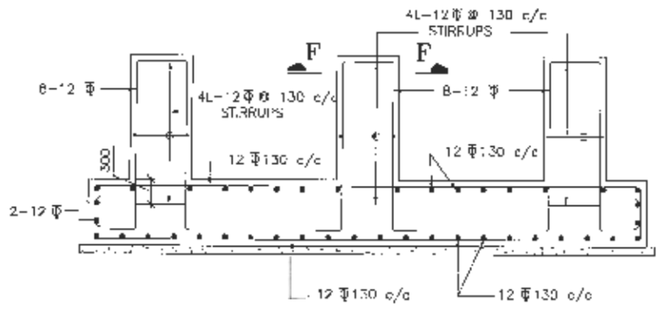
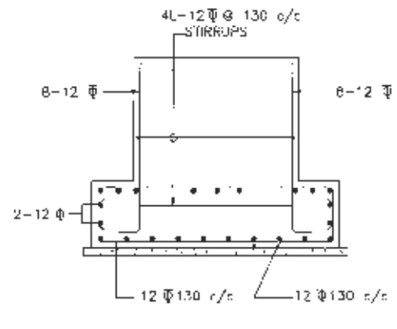


SECTION A–A

(RENF. DETAIL)

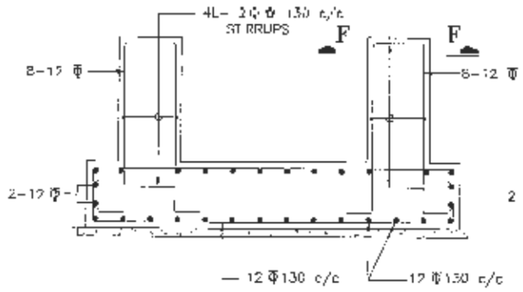
(SCALE 1:50



SECTION B–B

(RENF. DETAIL)

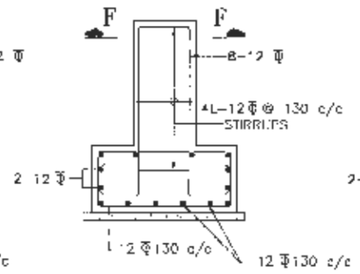
(SCALE 1:50



SECTION C–C

(RENF. DETAIL)

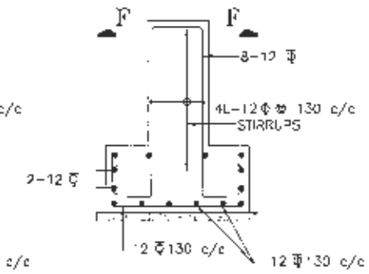
(SCALE 1:50



SECTION D–D

(RENF. DETAIL)

(SCALE 1:50



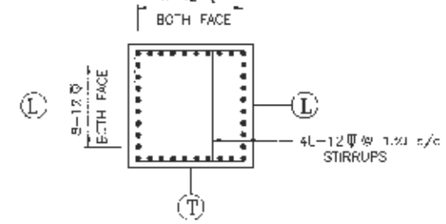
SECTION E–E

(RENF. DETAIL)

(SCALE 1:50

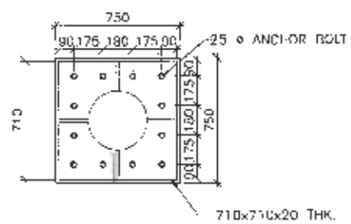
NOTES

1. ALL DIMENSIONS ARE IN MILLIMETRES, UNLESS OTHERWISE MENTIONED. ONLY WRITTEN DIMENSIONS ARE TO BE FOLLOWED. NO DIMENSION IS TO BE SCALED.
2. CONCRETE SHALL BE DESIGN MIX AND SHALL HAVE MINIMUM 28 DAYS CHARACTERISTIC STRENGTH ON 150mm CUBES AS 35 MPa.
3. ALL REINFORCING STEEL SHALL BE THERMO MECHANICALLY TREATED (TMT) BARS SATISFYING REQUIREMENTS OF HIGH YIELD STRENGTH DEFORMED BARS (GRADE DESIGNATION Fe 500D) CONFORMING TO IS:1786.
4. CLEAR COVER TO OUTER MOST STEEL IS 75mm FOR FOUNDATION.
5. LL REPRESENTS LONGITUDINAL AXIS OF THE BRIDGE AND TT REPRESENTS TRANSVERSE AXIS OF THE BRIDGE.
6. REQUIRED SAFE BEARING CAPACITY UNDER FOOTING OF PIER AND COLUMNS, UNDER STAIRCASE IS 20 t/sqm. THIS MAY BE ENSURED AT SITE.



SECTION F–F

(SCALE 1:25)

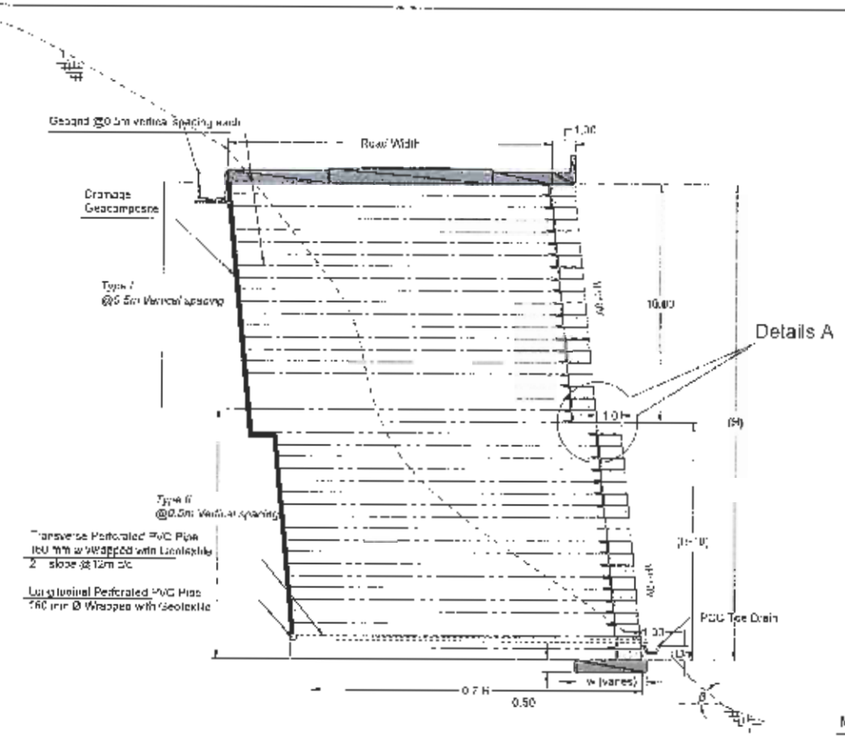


DETAIL AT COLUMN BASE

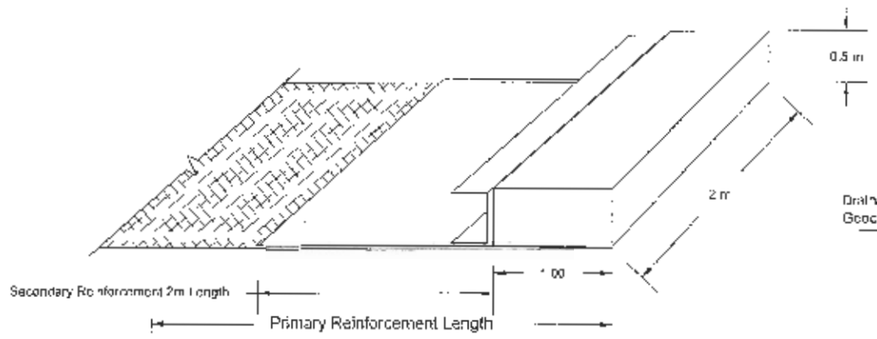
(SCALE 1:25)

EMPLOYER	PROJECT	DESIGN CONSULTANT					
Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kathmandu (Nagdhunga) - Naubise - Mugling Road and Bridges	Intercontinental Consultants & Technocrats Pvt. Ltd. A-6, Green Park, New Delhi - 110016 Ph: 4060-3000, Fax 2685-6252 In Joint Venture With Seosung Engineering Co. Ltd., South Korea In Association With Full Bright Consultancy (Pvt.) Ltd. 316 Baburam Acharya Sadak Sinamangal, Kathmandu, GPO Box: 4970, Kathmandu, Nepal					
			Designed By	SB		DRAWING NAME: FOUNDATION & PEDESTAL DETAILS OF STAIR & RAMP PORTION FOOT OVER BRIDGE FOR 30M CARRIAGEWAY	Scale: AS SHOWN
			Checked By	PMS			Date: June 2018
			Approved By	BNS			Drawing No.: NNMR-TYP 08-18

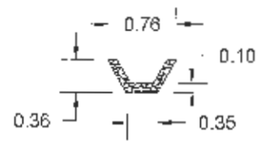
GEOGRID WALL DETAILS



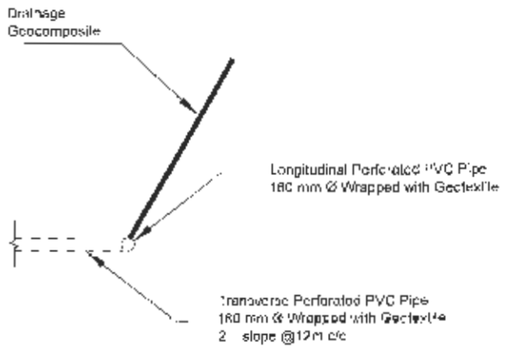
Geogrid Type I:
Typical Cross Section of Reinforced Soil Structure



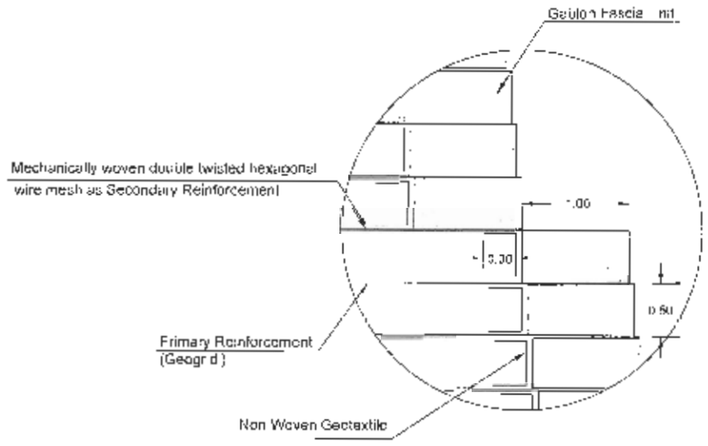
Typical Details of Reinforced soil structure facing Unit



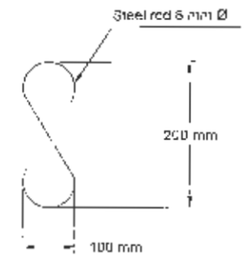
Typical Details of PCC toe drain



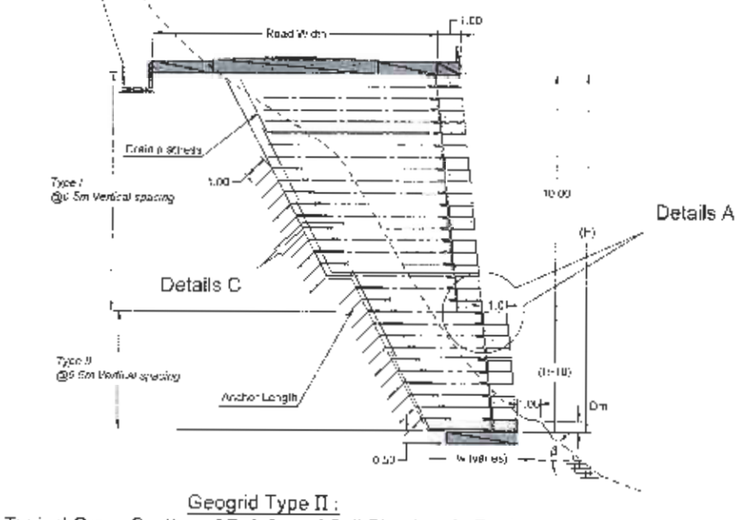
Details of Drainage Geocomposite



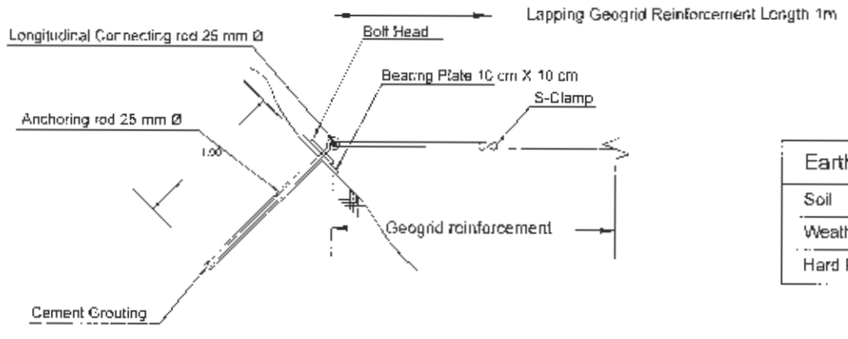
Typical Details A (Reinforced Soil Structure Facing System)



S-Clamp in Geogrid Overlap for Rock anchorage



Geogrid Type II :
Typical Cross Section of Reinforced Soil Structure in Rock

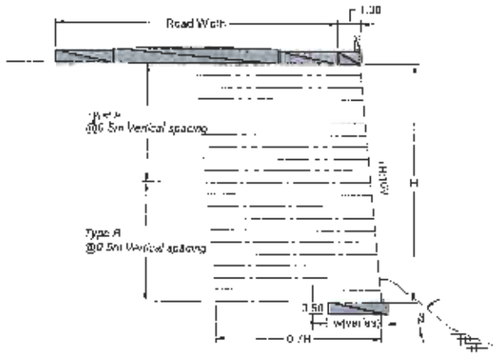


Detail at C for Rock Bolt Anchorage

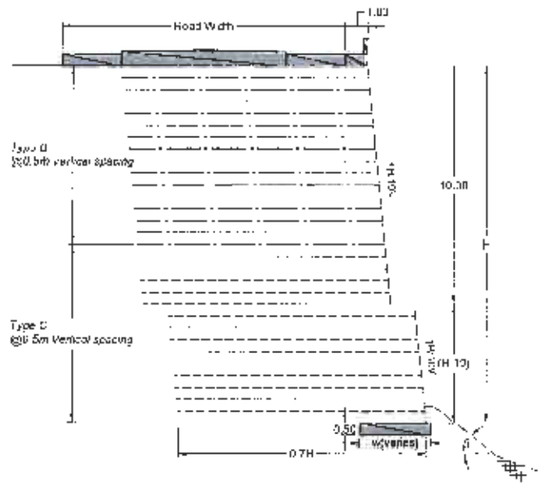
Earth Type	Geogrid Type	Drain Type
Soil	I	Chimney Drain / Drain Mattress (Mac Drain -W1071) (as per site conditions)
Weathered Rock	I / II	
Hard Rock	II	

EMPLOYER	PROJECT	DESIGN CONSULTANT					
Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of (Nagdhunga) -Naubise - Mugling Road and Bridges	InterconLinental Consultants & Technocrats Pvt. Ltd. A-8, Green Park, New Delhi 110016 Ph.: 4065-2000, Fax 2565-5252 In Joint Venture With Seosung Engineering Co. Ltd., South Korea In Association With Full Bright Consultancy (Pvt.) Ltd. 315,Baburam Acharya Sadak Sinamangal, Kathmandu. GPC Box: 4970, Kathmandu Nepal		Designed By	SR	DRAWING NAME: TYPICAL GEOGRID DETAILS	Scale:	Date: August 2019
				Checked By	PMS			Drawing No.: NNMR-TYP 08-01
				Approved By	BNS			

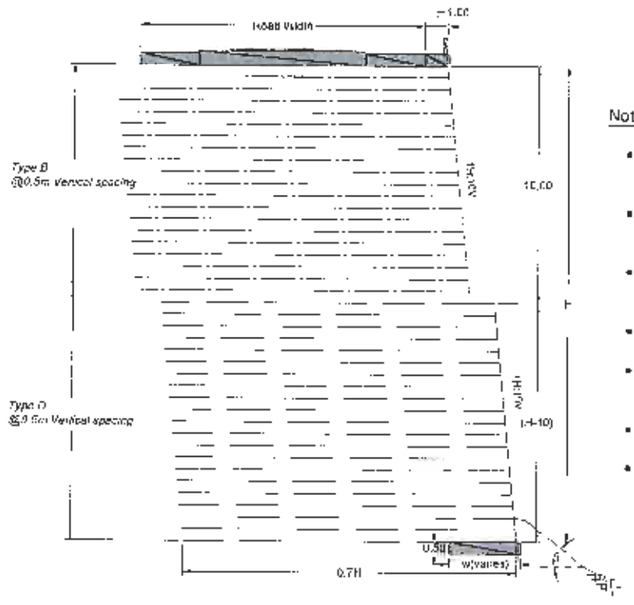
For H=8-10m



For H=11-15m



For H=16-20m



NOTE:

1. Prior to commencement of construction activities on each locations, the Contractor shall design the Geogrid reinforced earth wall considering the facing system, anchors, structural backfill material to be used and prepare working drawings showing detailed arrangements. After getting approvals for the design and working drawings from the consultant, the contractor shall commence the work.
2. This drawing is for cost estimation and information purpose only and the general design for cost estimation was done based on earth parameters.
3. No additional payment will be made for an additional changes.
4. The design tension strength of the Geogrid are as shown in the Table below.

CLASSIFICATION	TYPE-A	TYPE-B	TYPE-C
TESILSTRENGTH (kN/m)	59.00	86.00	119.00
CLASSIFICATION	TYPE-D	TYPE-E	
TESILSTRENGTH (kN/m)	192.00	256.00	

5. The minimum ultimate bearing capacity of the foundation ground shall be more than mentioned below for the different height condition.

Height (m)	Ultimate Bearing Capacity (kN/m2)
10 m	600
15 m	900
20 m	1200
25 m	1500
27 m	1600

6. For Geogrid: The minimum overlap of 10cm shall be provided between two adjacent roll of Geogrid.
7. When spring water is observed in the slope, the appropriate treatment shall be done as instructed by the engineer In-charge.
8. The Leveling Pad at the toe of wall should be of M15 mix design concrete, with constant thickness of 0.5m and varying width as shown

Wall Height H (m)	Concrete Pad width (w)
H=6 to 10	2.5 m
H=11 to 20	3.0 m
H=21 to 27	4.5 m

9. For the Embedment depth (Dm)
   - The Embedment depth refer here is the depth from ground surface to the toe of the wall excluding the 0.5m concrete footing at the base.
   - The minimum Embedment Depth (*min. Dm*) should not be less than or equal to 0.5m.
   - The minimum embedment for soil should not be less than that given in table below based on the slope angle and Depth of the wall.

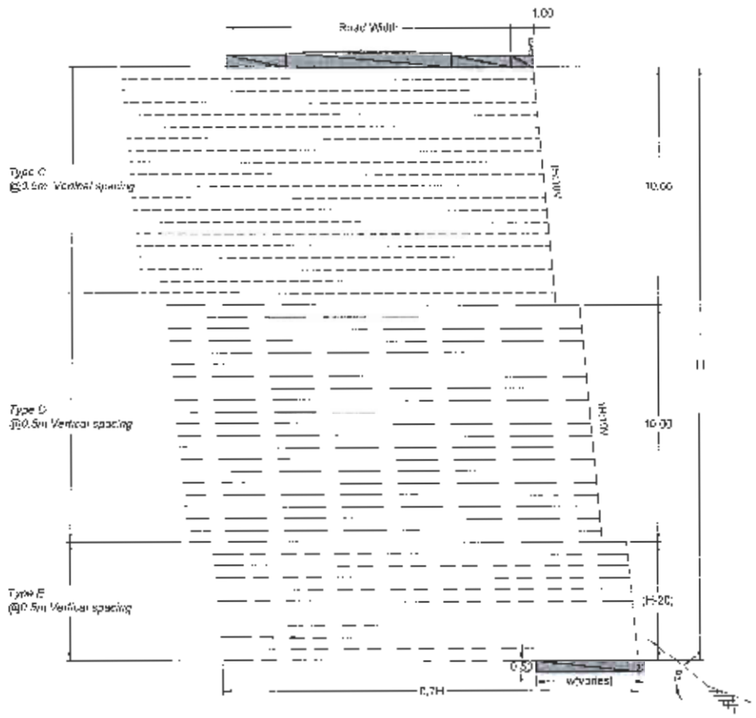
Slope of the ground at toe (β)	Minimum embedment Depth (*min. Dm*)
β= 0°	H/20
β= 18°	H/10
β= 27°	H/7
β= 34°	H/5

Notes for structural backfill:

- The structural backfill material should be of good quality free draining granular material and, should be free of organic matter and deleterious substance.
- The maximum particle size should not exceed 75mm and percentage of fines passing 75 micron sieve should not be greater than 15%.
- The plasticity index should be less than 6%. Soil containing mica, gypsum, smectite, montomorrilonite which are soft durable are not recommended.
- Similarly, recycled asphalt and recycled concrete are not recommended to use for structural backfill.
- It should be compacted on a layer of 30cm with minimum of 95% maximum density that lies within ±2% of Optimum Moisture Content. Compaction moisture contents dry of optimum are recommended.
- When compacting wall fill within 1m from the facing, a hand operated vibratory compactor is required.
- Selection and installation of Chimney Drain or Drain mattress should be done as per site condition under the supervision of site engineer.

EMPLOYER Government of Nepal Ministry of Physical Infrastructure and Transport **Department of Roads** **Development Cooperation Implementation Division**	**PROJECT** Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of (Nagdhunga) -Naubise - Mugling Road and Bridges	**DESIGN CONSULTANT** Intercontinental Consultants & Technocrats Pvt. Ltd. A-8, Green Park, New Delhi - 110016 Ph.: 4066-3000, Fax 2665 5252 In Joint Venture With Seosung Engineering Co, Ltd., South Korea In Association With Full Bright Consultancy (Pvt.) Ltd. 316,Basuram Acharya Sadak Sinamangal, Kathmandu, GPO Box: 4970 Kathmandu, Nepal	Designed By	SB		**DRAWING NAME:** TYPICAL GEOGRID DETAILS (FOR SOIL)	**Scale:**	**Date:** August 2019
			Checked By	PMS				**Drawing No.:** NNMR-TYP 08-02
			Approved By	BNS				

For H≥21-30m



Notes for structural backfill:

- The structural backfill material should be of good quality free draining granular material and, should be free of organic matter and deleterious substance.
- The maximum particle size should not exceed 75mm and percentage of fines passing 75 micron sieve should not be greater than 15%.
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- When compacting wall fill within 1m from the facing, a hand operated vibratory compactor is required.
- Selection and Installation of Chimney Drain or Drain mattress should be done as per site condition under the supervision of site engineer.

NOTE

1. Prior to commencement of construction activities on such locations, the Contractor shall design the Geogrid reinforced earth wall considering the facing system, anchors, structural backfill material to be used and prepare working drawings showing detailed arrangements. After getting approvals for the design and working drawings from the consultant the contractor shall commence the work.
2. This drawing is for cost estimation and information purpose only and the general design for cost estimation was done based on earth parameters
3. No additional payment will be made for an additional changes.
4. The design tension strength of the Geogrid are as shown in the Table below.

CLASSIFICATION	TYPE-A	TYPE-B	TYPE-C
TESIL STRENGTH (kN/m)	69.00	89.00	115.00
CLASSIFICATION	TYPE-D	TYPE-E	
TESIL STRENGTH (kN/m)	162.00	216.00	

5. The minimum ultimate bearing capacity of the foundation ground shall be more than mentioned below for the different height condition.

Height (m)	Ultimate Bearing Capacity (kN/m2)
10 m	600
15 m	900
20 m	1200
25 m	1500
27 m	1600

6. For Geogrid, The minimum overlap of 10cm shall be provided between two adjacent roll of Geogrid.
7. When spring water is observed in the slope, the appropriate treatment shall be done as instructed by the engineer in-charge.
8. The Leveling Pad at the toe of wall should be of M15 mix design concrete, with constant thickness of 0.3m and varying width as shown:

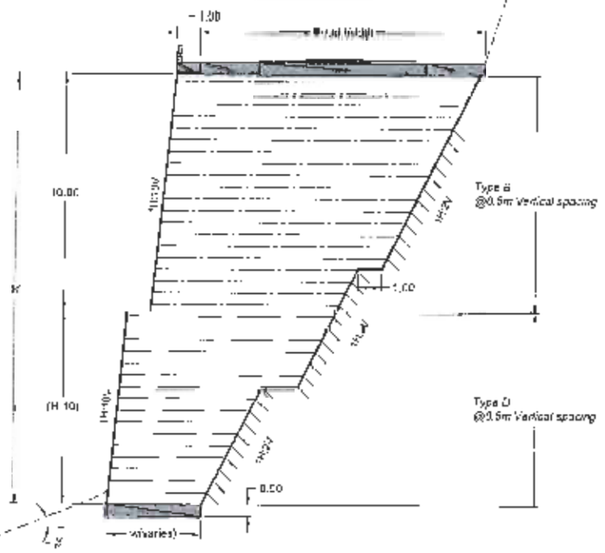
Wall Height H (m)	Concrete Pad width (w)
H=8 to 10	2.5 m
H=11 to 20	3.0 m
H=21 to 27	4.5 m

9. For the Embedment depth (Dm)
   - The Embedment depth refer here is the depth from ground surface to the toe of the wall excluding the 0.5m concrete footing at the base.
   - The minimum Embedment Depth (*min. Dm*) should not be less than or equal to 0.5m.
   - The minimum embedment for soil should not be less than that given in table below based on the slope angle and Depth of the wall.

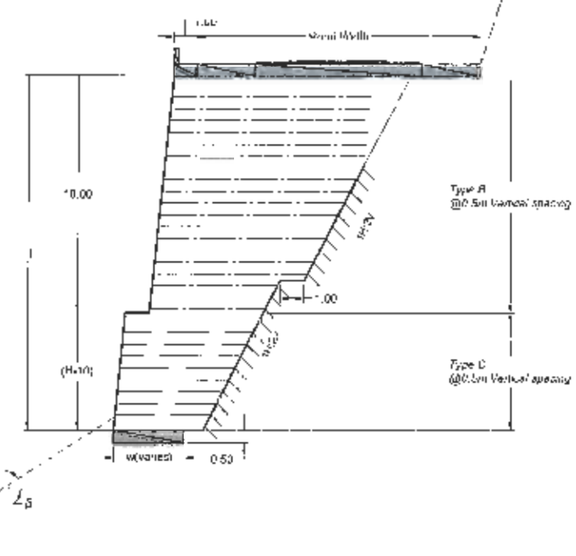
Slope of the ground at toe (β)	Minimum embedment Depth (min. Dm)
β= 0°	H/20
β= 18°	H/10
β 27°	H/7
β= 34°	H/5

EMPLOYER	PROJECT	DESIGN CONSULTANT						
Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5279 - NEP) Detailed Design for Improvement of (Nagdhunga) -Naubise - Mugling Road and Bridges	Intercontinental Consultants & Technocrats Pvt. Ltd. A-8, Green Park, New Delhi - 110016 Ph : 4086-3000, Fax 2685-5252 In Joint Venture With Soosung Engineering Co, Ltd., South Korea In Association With Full Bright Consultancy (Pvt.) Ltd. 316,Baburam Acharya Sadak Sinamangal, Kathmandu, GPO Box 4970, Kathmandu, Nepal					DRAWING NAME:	Scale:
			Designed By	SB			TYPICAL GEOGRID DETAILS (FOR SOIL)	Date: August 2019
			Checked By	PMS				Drawing No.: NNMR-TYP 09-03
			Approved By	BNS				

For HC16-20m



For H_11-15m



NOTE

1. Prior to commencement of construction activities on each locations, the Contractor shall design the Geogrid reinforced earth wall considering the facing system, anchors, structural backfill material to be used and prepare working drawings showing detailed arrangements. After getting approvals for the design and working drawings from the consultant, the contractor shall commence the work.
2. This drawing is for cost estimation and information purpose only and the general design for cost estimation was done based on earth parameters.
3. No additional payment will be made for an additional charges.
4. The design tensile strength of the Geogrid are as shown in the Table below.

CLASSIFICATION	TYPE-A	TYPE-B	TYPE-C
TESIL STRENGTH (kN/m)	59.00	89.00	119.00
CLASSIFICATION	TYPE-D	TYPE-E	
TESIL STRENGTH (kN/m)	192.00	265.00	

5. The minimum ultimate bearing capacity of the foundation ground shall be more than mentioned below for the different height condition

Height (m)	Minimum bearing capacity (kN/m²)
10 m	600
15 m	900
20 m	1200
25 m	1500
27 m	1800

6. For Geogrid: The minimum overlap of 10cm shall be provided between two adjacent roll of Geogrid.
7. When spring water is observed in the slope, the appropriate treatment shall be done as instructed by the engineer in-charge.
8. The Leveling Pad at the toe of wall should be of M15 mix design concrete, with constant thickness of 0.6m and varying width as shown:

Wall Height H (m)	Concrete Pad width (B)
H=8 to 10	3.5 m
H=11 to 20	3.0 m
H=21 to 27	4.5 m

9. For the Embedment depth (Dm)
   - The Embedment depth refer here is the depth from ground surface to the toe of the wall excluding the 0.5m concrete footing at the base.
   - The minimum Embedment Depth (*min. Dm*) should not be less than or equal to 0.5m.
   - The minimum embedment for soil should not be less than that given in table below based on the slope angle and Depth of the wall.

Slope of the ground at toe (β)	Minimum embedment Depth (min. Dm)
β= 0°	H/20
β= 18°	H/10
β= 27°	H/7
β= 34°	H/5

NOTE:

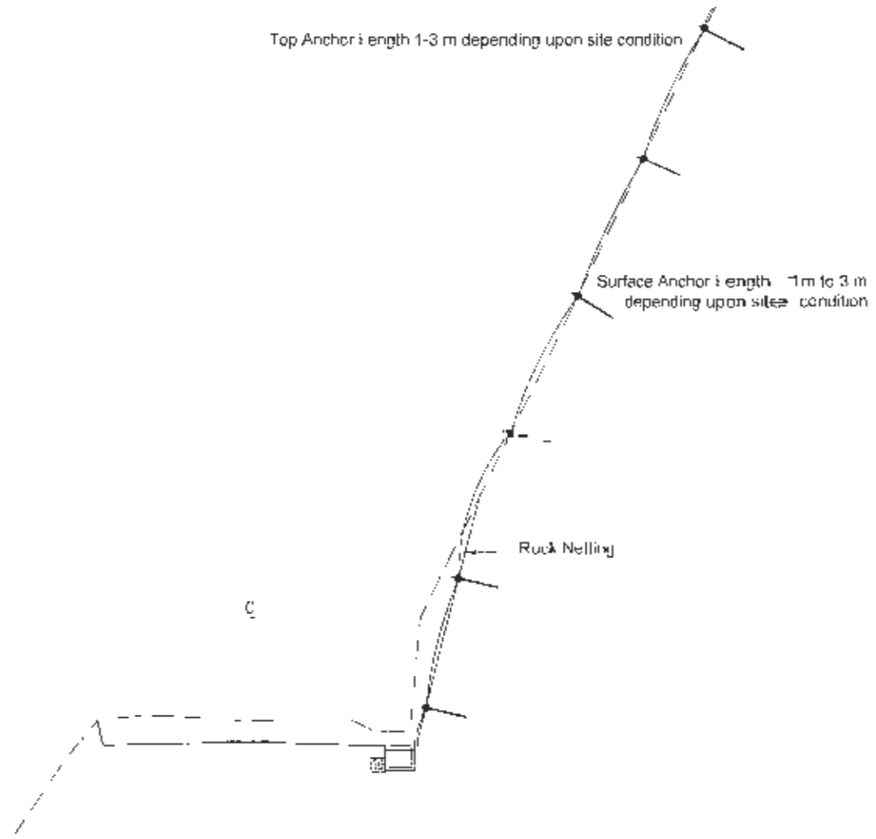
1. Rock anchors should have pull out capacity of not less than 100KN.
2. Pullout test should be conducted for rock anchors in all types of rocks. For anisotropic rock, the pullout test should be conducted in various orientation.
3. In each rock type, each orientation a sufficient number of tests should be conducted to determine the average bolt capacities.
4. For Anchor length (L), with constant Ø25mm in both Hard and Soft rock conditions where vertical and horizontal spacing of 0.5m and 1m should be varying length as per following on different height conditions :

Height (m)	Length, L (m)	
	Weather/Soft Rock	Hard Rock
8.0	1.25	0.5
9.0	1.25	0.5
10.0	1.5	0.75
11.0	1.5	0.75
12.0	1.75	0.75
13.0	1.75	0.75
14.0	2.0	0.75
15.0	2.0	0.75
16.0	2.25	0.75
17.0	2.25	1.0
18.0	2.5	1.0
19.0	2.5	1.0
20.0	2.5	1.0

Notes for structural backfill:

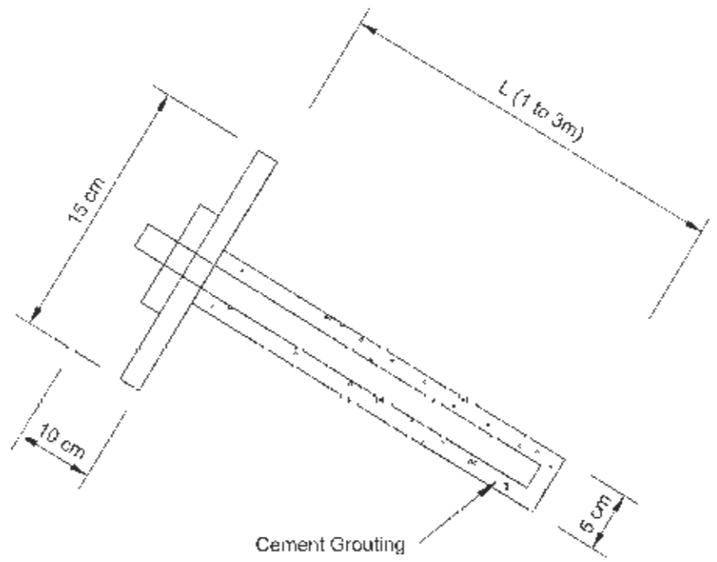
- The structural backfill material should be of good quality free draining granular material and, should be free of organic matter and deleterious substance.
- The maximum particle size should not exceed 75mm and percentage of fines passing 75 micron sieve should not be greater than 15%.
- The plasticity index should be less than 6%. Soil containing mica, gypsum, smectite, montomorrilonite which are soft durable are not recommended.
- Similarly, recycled asphalt and recycled concrete are not recommended to use for structural backfill.
- It should be compacted on a layer of 30cm with minimum of 95% maximum density that lies within ±2% of Optimum Moisture Content. Compaction moisture contents dry of optimum are recommended.
- When compacting wall fill within 1m from the facing, a hand operated vibratory compactor is required.
- Selection and Installation of Chimney Drain or Drain mattress should be done as per site condition under the supervision of site engineer.

EMPLOYER	PROJECT	DESIGN CONSULTANT				DRAWING NAME:	Scale:	Date:
Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of (Nagdhunga) -Naubise - Mugling Road and Bridges	Interconlinental Consultants & Technocrats Pvt. Ltd. A-8, Green Park, New Delhi - 110016 PH: 4066-3000, Fax 2665-5252 In Joint Venture With Soosung Engineering Co., Ltd., South Korea In Association With Full Bright Consultancy (Pvt.) Ltd. 316 Baburam Acharya Sadak Sinamangal, Kathmandu, GPO Box: 4970, Kathmandu, Nepal				TYPICAL GEOGRID DETAILS (FOR ROCK)	0 2.5 5	August 2019 Drawing No.: NNMR-TYP 09-04
			Designed By	SB				
			Checked By	PMS				
			Approved By	BNS				



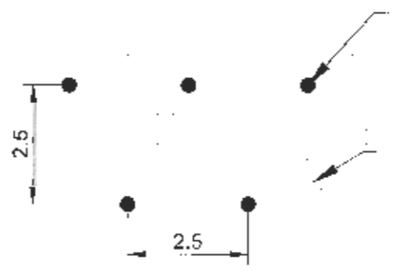
Section A-A

Scale : 1:200



Detail of Bolt

(Not to Scale)



Details of Rock net and Rock bolt

(Not to Scale)

Notes:

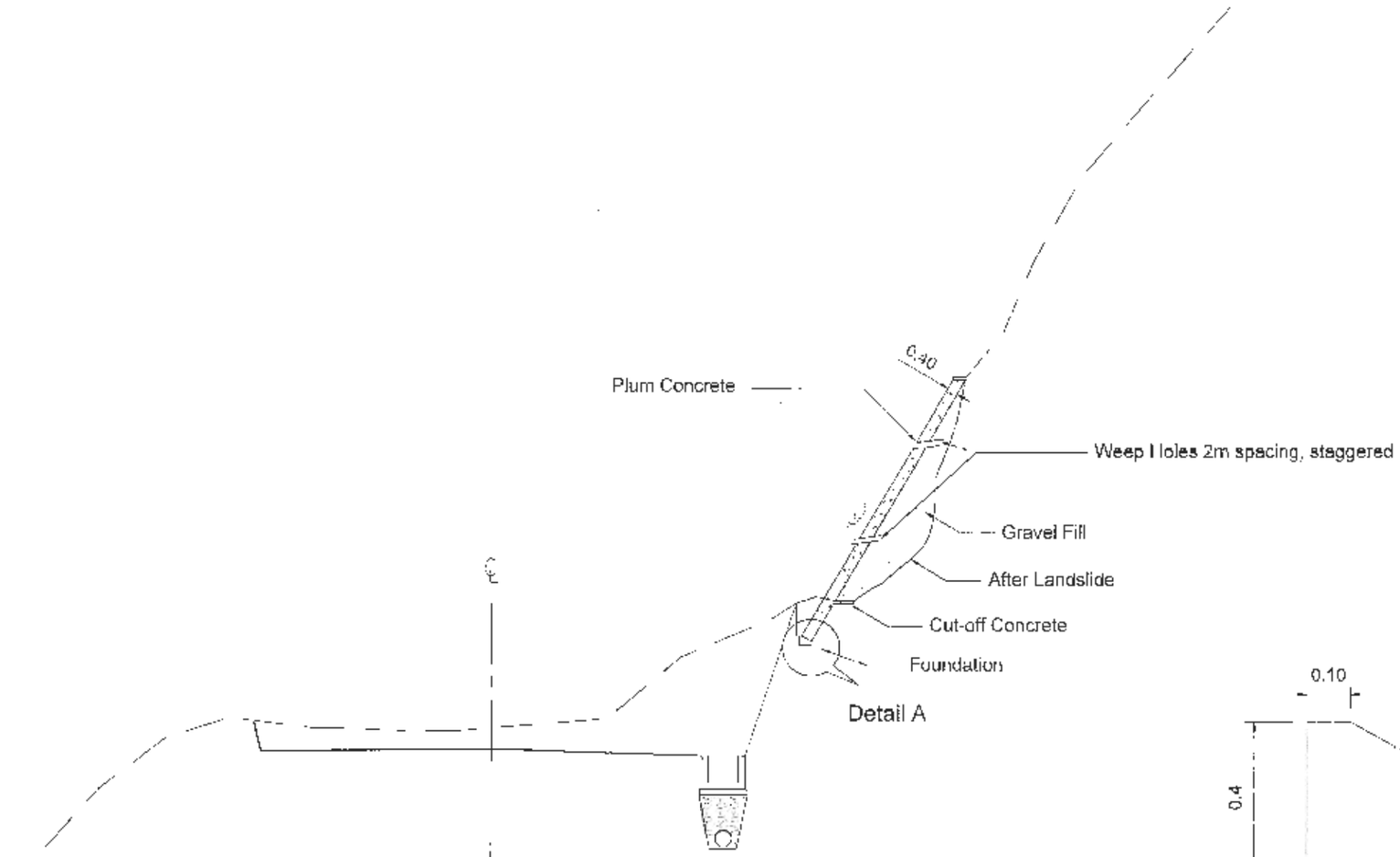
1. Rock Net Details:
   a) Gabion Net anchored by 25mm dia Fe500 bars fully grouted
   b) Bolt length 1m to 3m depending upon site condition at top and in surface
   c) Bolt spacing 2.5m both ways
   d) Drapery system at lower part to release trapped debris

2. Netting Details:
   a) Netting wire 3.1mm dia
   b) Selvege wire 3.4mm dia
   c) Binding wire 2.7mm dia

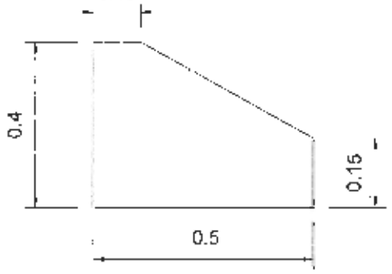
3. Support Cable Details:
   a) Diameter 8mm
   b) Horizontal and vertical spacing 2.5m
   c) Minimum tensile strength of cable= 80KN/m, junction strength 20KN, pull-apart strength = 10KN

For more details refer to: special Report 23 -State of the art: Design and construction of rockfall mitigation systems

EMPLOYER	PROJECT	DESIGN CONSULTANT				DRAWING NAME:	Scale:	Date:
Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Narayanghat - Mugling Road	Intercontinental Consultants & Technocrats Pvt. Ltd. A-8, Green Park, New Delhi - 110016 Ph: 4060-3000, Fax 2685-5252 In Joint Venture With Seosung Engineering Co. Ltd., South Korea In Association With Full Bright Consultancy (Pvt.) Ltd. 316, Baburam Acharya Sadak Sinamangal, Kathmandu, GPO Box: 4970, Kathmandu, Nepal	Designed By	SB		ROCK NETTING DETAILS	As Shown	August 2010
			Checked By	PMS				Drawing No.: NNMR-TYP 09-05
			Approved By	BNS				



Prop Wall Structure

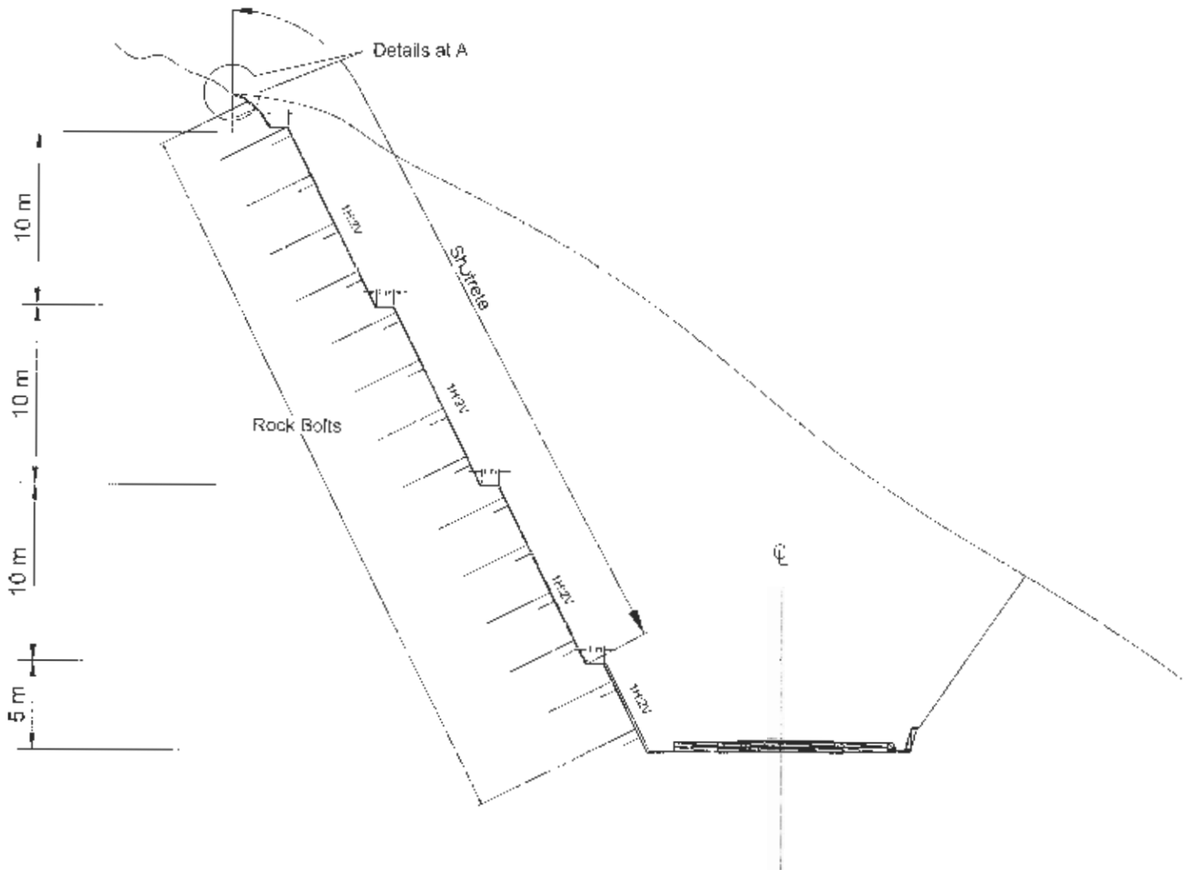


Detail A
Not to Scale

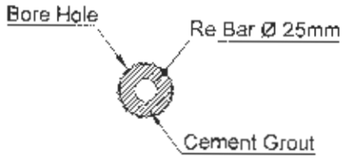
Notes

1. Work shall be executed as per site condition.

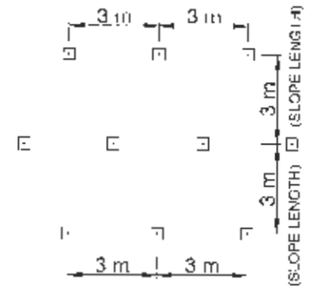
EMPLOYER	PROJECT	DESIGN CONSULTANT					
Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5270 - NEP) Detailed Design for Improvement of Narayanghat - Mugling Road	Intercontinental Consultants & Technocrats Pvt. Ltd. A-8, Green Park New Delhi - 110016 Ph : 4066-2000, Fax 2665-5252 In Joint Venture With Sousung Engineering Co. Ltd., South Korea In Association With Full Bright Consultancy (Pvt.) Ltd. 316,Baburam Acharya Sadak Sinamangal, Kathmandu, GPO Box: 4970, Kathmandu, Nepal					
			Designed By	SB		DRAWING NAME: PROP WALL DETAILS	Scale: As Shown
			Checked By	PMS			Date: August 2019
			Approved By	BNS			Drawing No.: NNMR-TYP 09-05



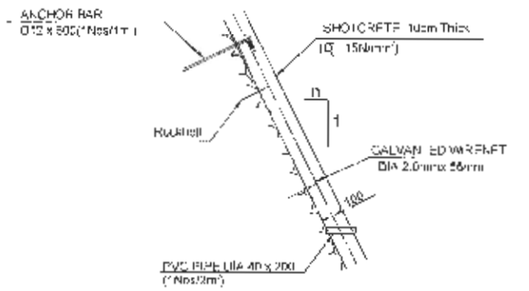
Typical Cross Section



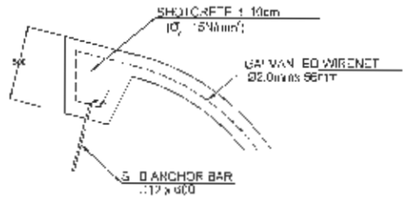
SECTION B-B



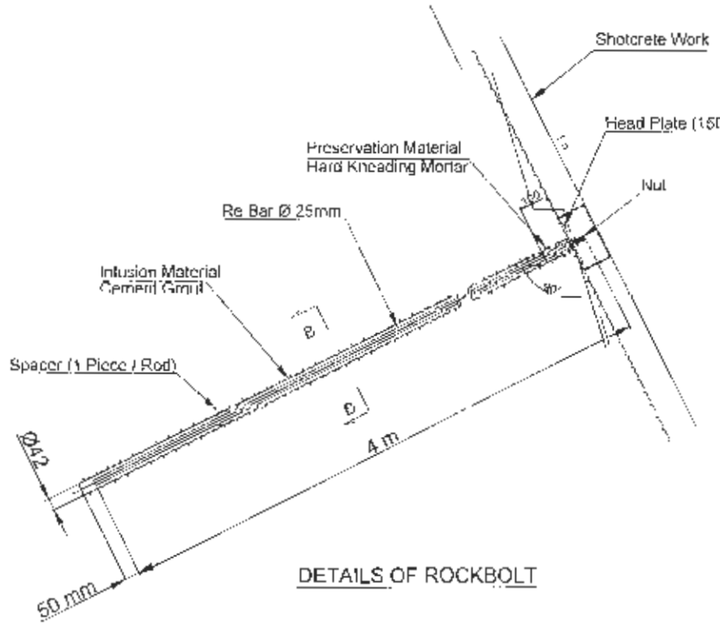
TYPICAL ARRANGEMENT OF



DETAIL OF SHOTCRETE



DETAIL OF "A"

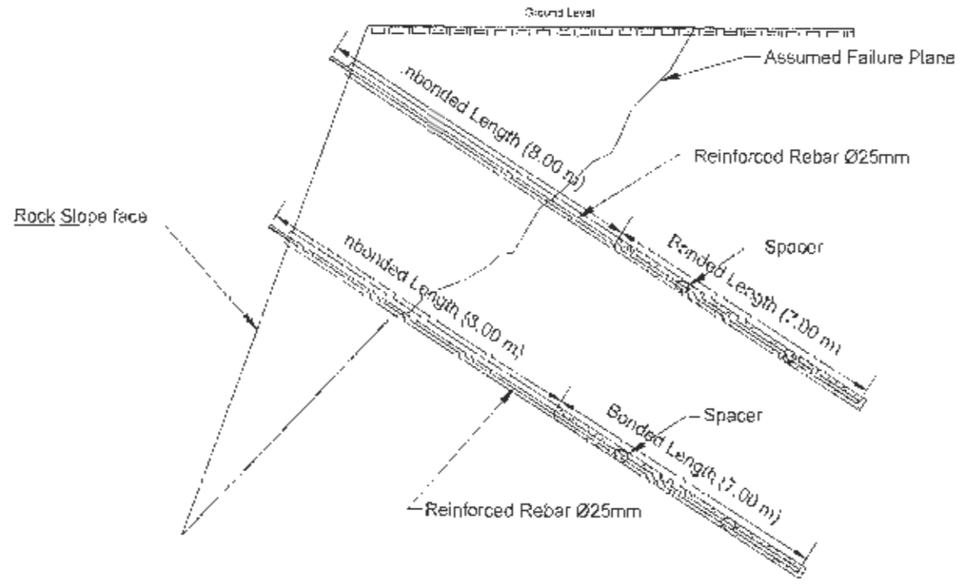


DETAILS OF ROCKBOLT

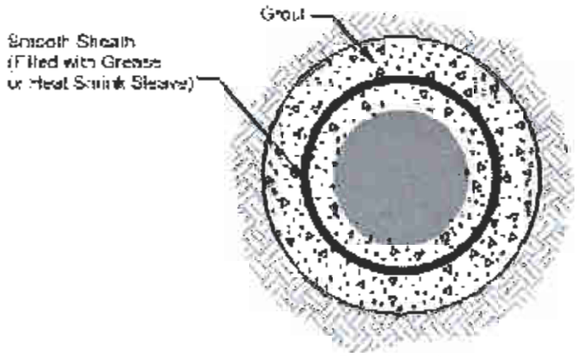
Notes:

Final work shall be executed as per site conditions.

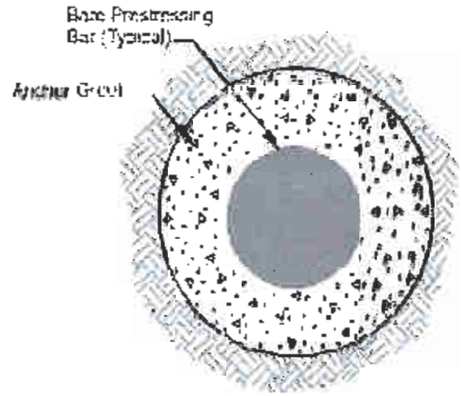
EMPLOYER	PROJECT	DESIGN CONSULTANT				DRAWING NAME:	Scale:	Date:
Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Nepal India Regional Trade and Transport Project (NRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Narayanghat - Mugling Road	Intercontinental Consultants & Technocrats Pvt. Ltd. A-8, Green Park, New Delhi 110016 Ph 4086-3000, Fax 2685-5252 In Joint Venture With Seosung Engineering Co. Ltd., South Korea In Association With Full Bright Consultancy (Pvt.) Ltd. 316,Baburam Acharya Sadak Sinamangal, Kathmandu. GPO Box 4970, Kathmandu Nepal	Designed By	SB		SHOTCRETE WITH WIREMESH AND ROCK BOLT	As Shown	August 2019
			Checked By	PMS				Drawing No.: NNMR-TYP 09-07
			Approved By	BNS				



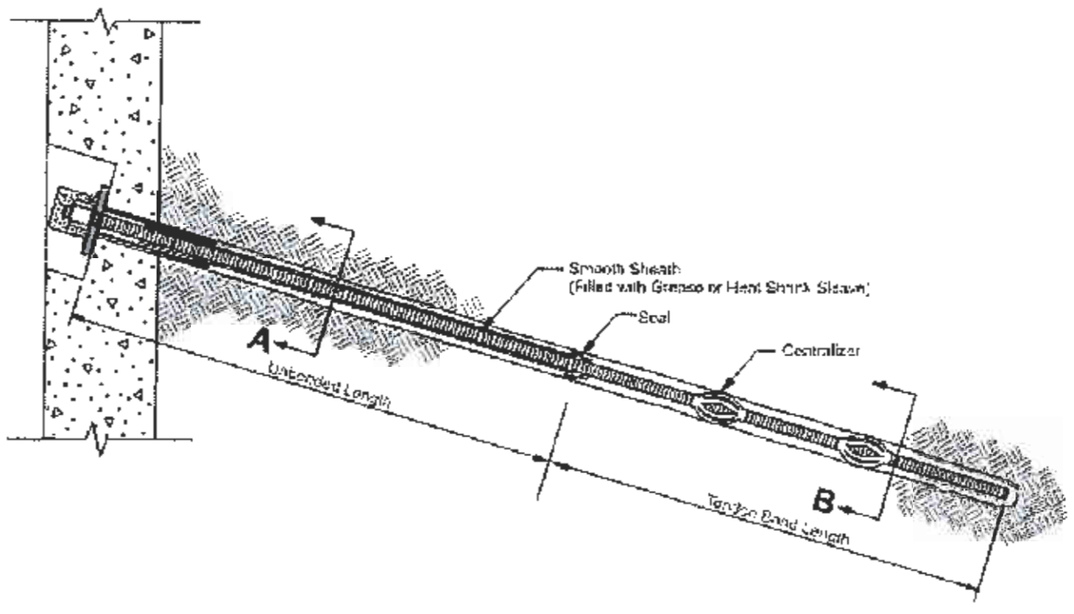
Typical Drawing for Rock Anchors to prevent Rock Wedge Movement



Section A



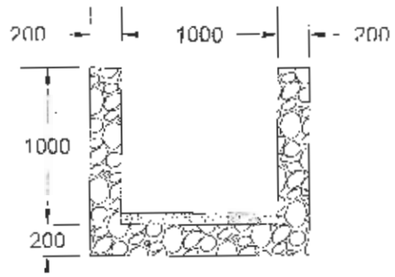
Section B



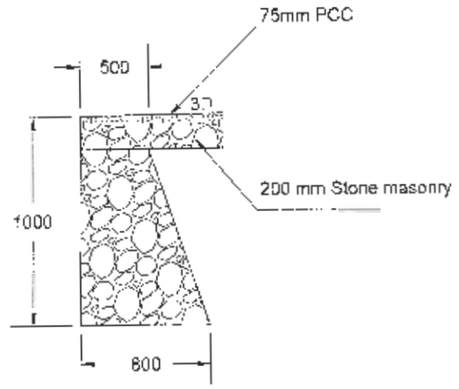
Rock Anchor

Notes:
Final work shall be executed as per site conditions.

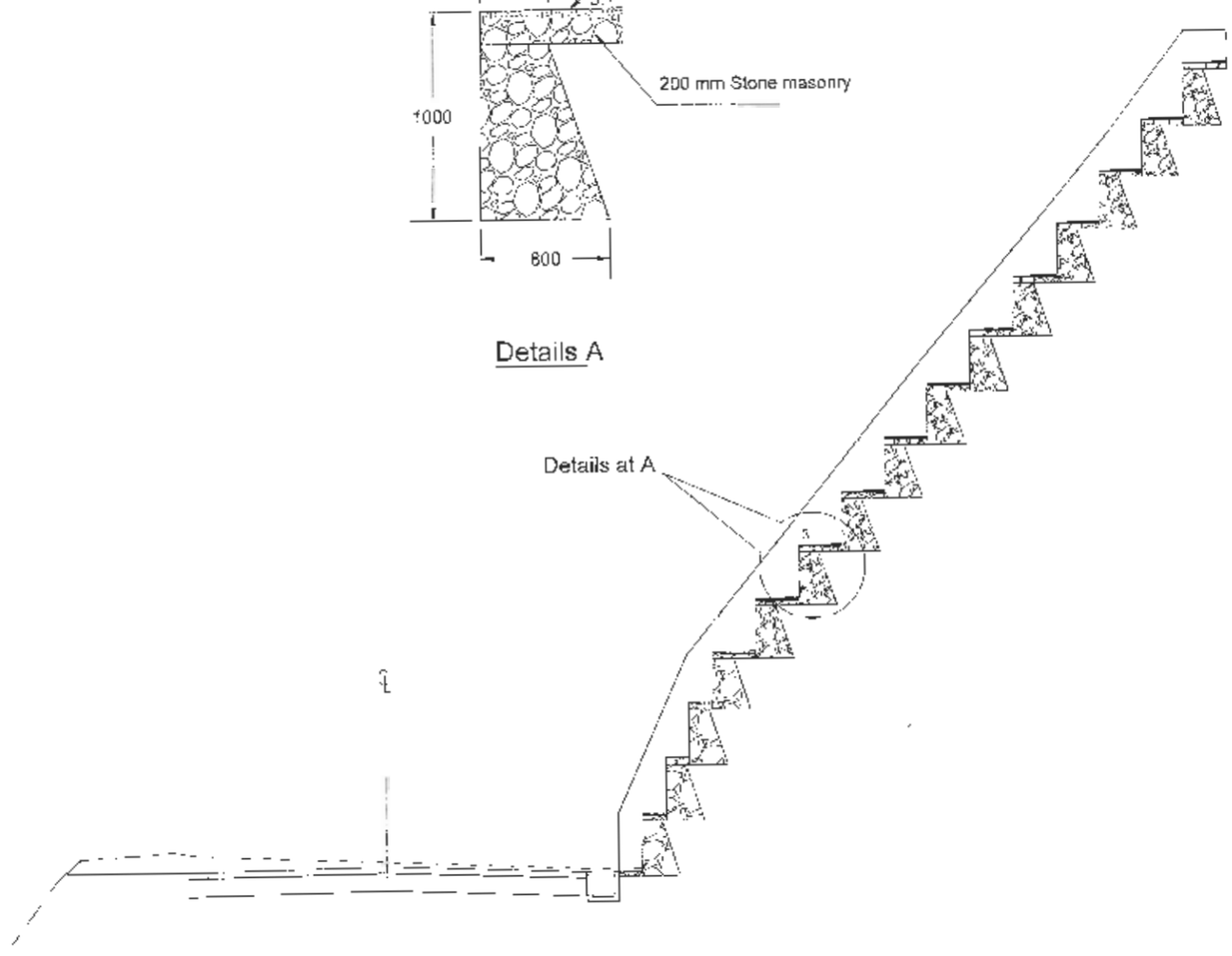
EMPLOYER	PROJECT	DESIGN CONSULTANT					
Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Narayanghat - Mugling Road	Intercontinental Consultants & Technocrats Pvt. Ltd. A-8, Green Park, New Delhi - 110016 Ph : 4046-3000 Fax 2685-5252 In Joint Venture With Soosung Engineering Co, Ltd., South Korea In Association With Full Bright Consultancy (Pvt.) Ltd 318,Baburam Acharya Sadak Shantangal, Kathmandu, GPO Box: 4970, Kathmandu, Nepal					
			Designed By	SB		DRAWING NAME: SLOPE MITIGATION MEASURE	Scale: As Shown
			Checked By	PMS			Date: August 2019
			Approved By	BNS			Drawing No.: NNMR-TYP-09-08



Front View



Details A

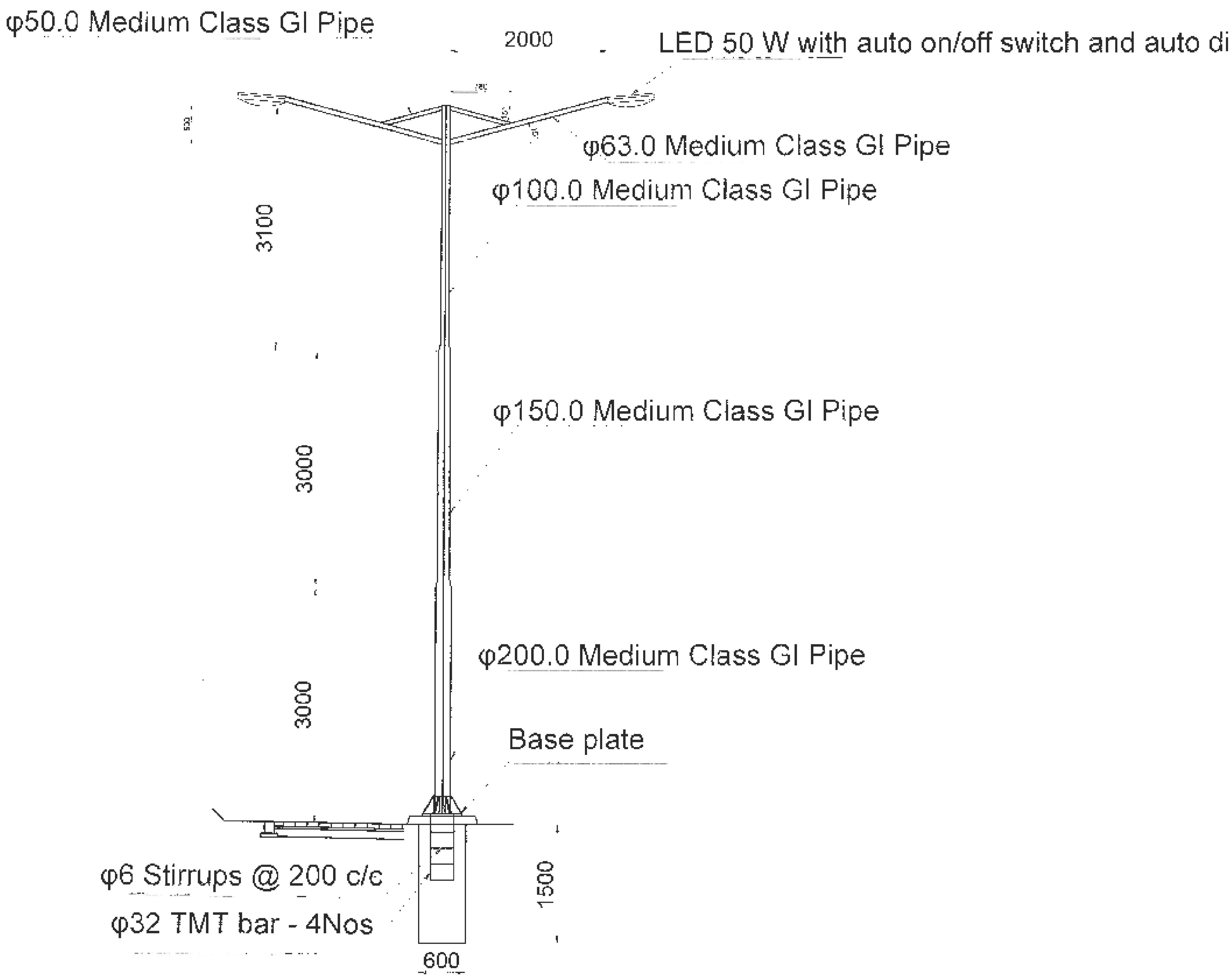


Stone Masonry Cascade Structure

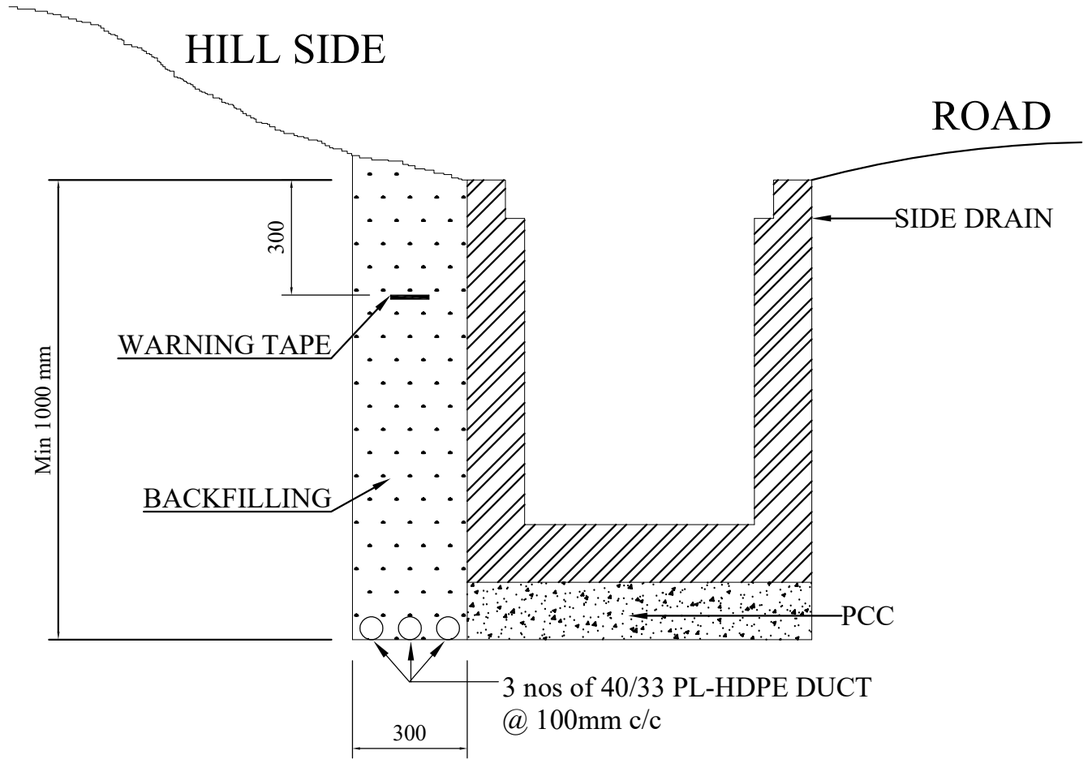
Notes:

Final work shall be executed as per site conditions.

EMPLOYER	PROJECT	DESIGN CONSULTANT				DRAWING NAME:	Scale:	Date:
Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Narayanghat - Mugling Road	Intercontinental Consultants & Technocrats Pvt. Ltd A 6, Green Park, New Delhi. - 110016 Ph.: 4068-3000, Fax 2655-5252 In Joint Venture With Soosung Engineering Co. Ltd., South Korea	In Association With Full Bright Consultancy (Pvt.) Ltd. 316,Bhairam Acharya Sadak Sinamangal, Kathmandu, GPO Box. 4970, Kathmandu, Nepal	Designed By	SB		STONE MASONRY CASCADE DETAILS	As Shown	August 2019
				Checked By	PMS				Drawing No.: NNMR-TYP 09-09
				Approved By	BNS				



EMPLOYER	PROJECT	DESIGN CONSULTANT					DRAWING NAME:	Scale:	Date:
Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Nepal India Regional Trade and Transport Project (NIRTTP) (IDA CREDIT No. 5273 - NEP) Detailed Design for Improvement of Kathmandu (Naydhunga) - Naubise - Mugling Road and Bridges	Intercontinental Consultants & Technocrats Pvt. Ltd. A-8, Green Park, New Delhi - 110016 Ph: 4086-3000 Fax 2685-5252 in Joint Venture With Soosung Engineering Co. Ltd. South Korea	In Association With Full Bright Consultancy (Pvt.) Ltd. 316 Baduram Acharya Sadak Sinamangal, Kathmandu, GPO Box 4970, Kathmandu, Nepal	Designed By Checked By Approved By	SB PMS BNS		TYPICAL DRAWINGS OF STREET LIGHT		August 2019 **Drawing No.:** NNMR-TYP 03 05



EMPLOYER	PROJECT	DESIGN CONSULTANT				DRAWING NAME:	Scale:	Date:
Government of Nepal Ministry of Physical Infrastructure and Transport **Department of Roads** **Development Cooperation Implementation Division**	Strategic Road Connectivity and Trade Improvement Project (SRCTIP) (IDA CREDIT No. 6673 - NP) Detailed Design for Improvement of Kathmandu (Nagdhunga) - Naubise - Mugling Road and Bridges					TYPICAL DRAWING OF LAYING OF PL-HDPE DUCT	NOT TO SCALE	SEPTEMBER 2021 **Drawing No.:** NNMR-TYP-NTC-01