

APPENDIX 1.

DESCRIPTION OF BENCHMARK

**PROJECT NAME:PREPARATORY SURVEY ON INTERSECTION
IMPROVEMENT PROJECT IN KATHMANDU.
DESCRIPTION CARD OF CONTROL POINTS.**

Station :GCP-1
ProvinceNo:3
Location:Shantinagar,Kathmandu

Municipality:Kathmandu
Monumentation Date : 20/11/2076

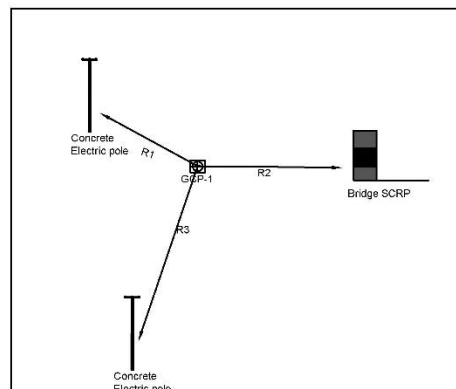
Station Type :Stable concrete structure with 150mm iron nut bolt drilled.

Description : This point is monumented on a RCC concrete slab by drilling and hammering 150mm iron Nut bolt and marked by a red enamel paint. This point is located about 10m away from the Shantinagar Bagmati bridge. It is located at the right side of the main road while moving ahead from New Baneshwor to Tinkune. Point GCP-2 is visible from this point.

SCHEMATIC DIAGRAM



DIMENSIONAL DESCRIPTION



PHOTOGRAPH



Refrence Point Mesurements:-

R1	5.488 m
R2	12.310 m
R3	13.591 m

STATION :GCP-1

E	336627.166
N	3063561.851
Z	1294.401

VISIBLE POINT :GCP-2

E	336740.872
N	3063533.175
Z	1294.392

**PROJECT NAME:PREPARATORY SURVEY ON INTERSECTION
IMPROVEMENT PROJECT IN KATHMANDU.
DESCRIPTION CARD OF CONTROL POINTS.**

Station :GCP-2
Province No: 3
Location :Shantinagar, Kathmandu

Municipality:Kathmandu
Monumentation Date :20/11/2076

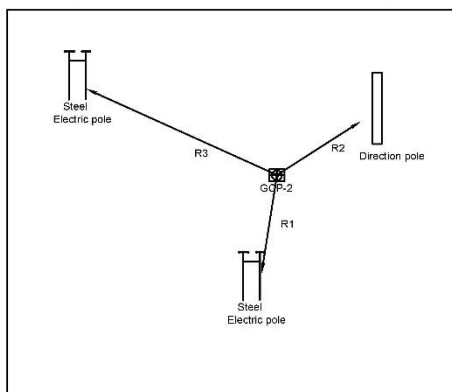
Station Type :Stable concrete structure with 150mm iron rod drilled.

Description :This point is monument on a RCC concrete slab by drilling and hammering a 150mm Nut bolt and marked by a red enamel paint. This point is located about 15m away from right side of the Shantinagar bridge. This point is located at the left side of the main road while moving from Tinkune to New Baneshwor.GCP-1 is visible from this point.

SCHEMATIC DIAGRAM



DIMENSIONAL DESCRIPTION



PHOTOGRAPH



Refrence Point Mesurements:-

R1	3.532 m
R2	3.196 m
R3	15.671m

STATION :GCP-2

E	336740.872
N	3063533.175
Z	1294.392

VISIBLE POINT :GCP-1

E	336627.166
N	3063561.851
Z	1294.401

**PROJECT NAME:PREPARATORY SURVEY ON INTERSECTION
IMPROVEMENT PROJECT IN KATHMANDU.
DESCRIPTION CARD OF CONTROL POINTS.**

Station :GCP-3
Province No:3
Location :Sinamangal,Kathmandu

Municipality:Kathmandu
Monumentation Date :20/11/2076

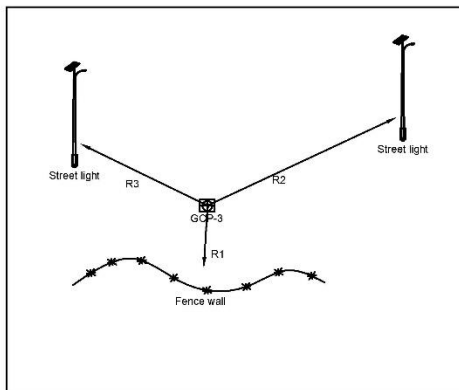
Station Type :Stable concrete structure with 150mm iron rod drilled.

Description : This point is monumented on a RCC concrete slab by drilling and hammering a 150mm Nut bolt and marked by red enamel paint. This point is located at the left side of the ringroad while moving from Tinkune from Sinamangal.GCP-4 is visible from this point.

SCHEMATIC DIAGRAM



DIMENSIONAL DESCRIPTION



PHOTOGRAPH



Refrence Point Mesurements:-

R1	7.882 m
R2	15.11 m
R3	1.75 m

STATION :GCP-3

E	337600.872
N	3064108.052
Z	1306.877

VISIBLE POINT :GCP-4

E	337651.091
N	3064214.252
Z	1312.297

**PROJECT NAME:PREPARATORY SURVEY ON INTERSECTION
IMPROVEMENT PROJECT IN KATHMANDU.
DESCRIPTION CARD OF CONTROL POINTS.**

Station :GCP-4
Province No: 3
Location :Sinamangal,Kathmandu

Municipality:Kathmandu
Monumentation Date : 20/11/2076

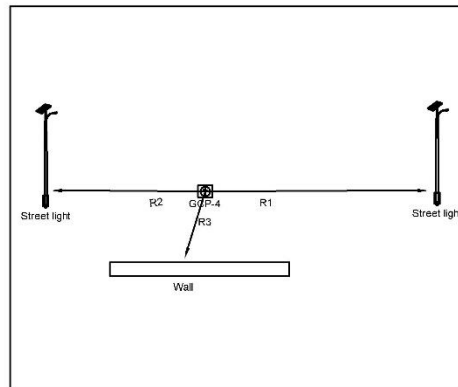
Station Type :Stable concrete structure with 150mm iron rod drilled.

Description :This point is monumented on a RCC concrete slab by drilling and hammering a 150mm Nut Bolt and marked by a red enamel paint. It is located at the left side of the ring road footpath which moving towards Sinamangal to Tinkune. GCP-3 is visible from this point.

SCHEMATIC DIAGRAM



DIMENSIONAL DESCRIPTION



PHOTOGRAPH



Refrence Point Mesurements:-

R1	8.10 m
R2	11.73m
R3	5.95 m

STATION :GCP-4

E	337651.091
N	3064214.252
Z	1312.297

VISIBLE POINT :GCP-3

E	337600.872
N	3064108.052
Z	1306.877

**PROJECT NAME:PREPARATORY SURVEY ON INTERSECTION
IMPROVEMENT PROJECT IN KATHMANDU**
DESCRIPTION CARD OF CONTROL POINTS

Station :GCP-5
ProvinceNo:3
Location:Jadibuti Bridge,Bhaktapur

Municipality:Madyapur Thimi
Monumentation Date : 20/11/2076

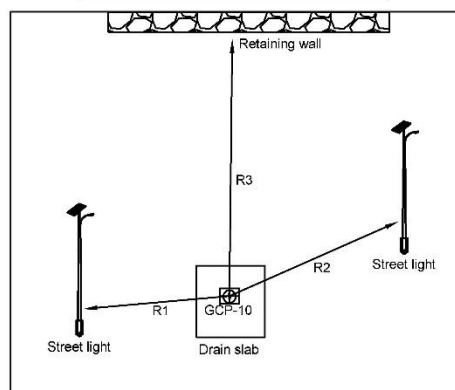
Station Type :Manhole Stable concrete structure with 150mm iron rod drilled.

Description : This point is monumented on a manhole concrete slab by Drilling and hammering of 150mm Nut bolt and marked by red enamel paint. It is located at the left side of the road going towards Bhaktapur. And the point is visible from GCP-6.

SCHEMATIC DIAGRAM



DIMENSIONAL DESCRIPTION



PHOTOGRAPH



Refrence Point Mesurements:-

R1	5.703 m
R2	15.518m
R3	8.650 m

STATION :GCP-5

E	337841.5797
N	3062300.356
Z	1297.594

VISIBLE POINT:GCP-6

E	337868.0387
N	3062354.01
Z	1296.704

PROJECT NAME:PREPARATORY SURVEY ON INTERSECTION IMPROVEMENT PROJECT IN KATHMANDU.

DESCRIPTION CARD OF CONTROL POINTS.

Station :GCP-6
Province No:3
Location :Judibuti Bridge,Bhaktapur

Municipality:Madyapur Thimi
Monumentation Date : 20/11/2076

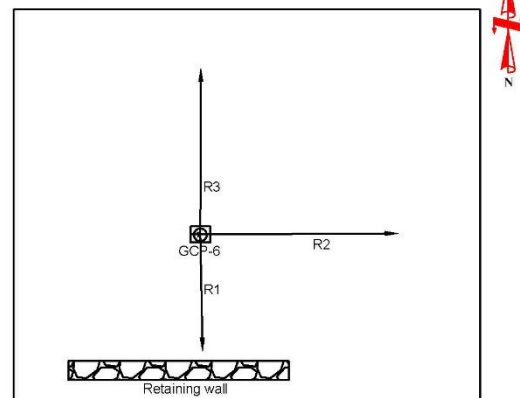
Station Type :Stable concrete structure with 150mm iron rod drilled.

Description : This point is monumented on road retaining wall by drilling with Nut bolt of 150mm iron nail and marked by red enamel paint. It is located at Jadibuti, Bhaktapur and tentatively 70m away from highway going towards Bhaktapur. It is clearly visible from GCP-5.

SCHEMATIC DIAGRAM



DIMENSIONAL DESCRIPTION



PHOTOGRAPH



Reference Point Measurements:-

R1	6.76 m
R2	8.723 m
R3	6.623 m

STATION:GCP-6

E	337868.0387
N	3062354.01
Z	1296.704

VISIBLE POINT :GCP-5

E	337841.5797
N	3062300.356
Z	1297.594

**PROJECT NAME:PREPARATORY SURVEY ON INTERSECTION
IMPROVEMENT PROJECT IN KATHMANDU.
DESCRIPTION CARD OF CONTROL POINTS.**

Station :GCP-7
ProvinceNo:3
Location:Hanumante Bridge,Bhaktapur

Municipality:Madyapur Thimi
Monumentation Date :20/11/2076

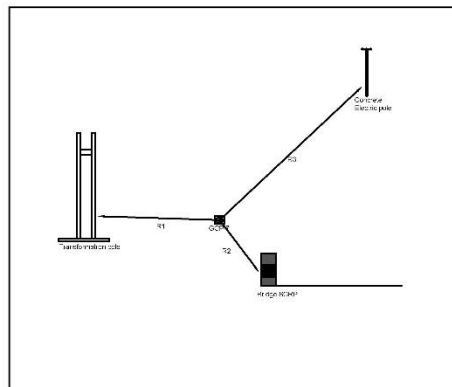
Station Type :Stable concrete structure with 150mm iron rod drilled.

Description :This point is monumented on a RCC concrete slab by drilling and hammering 150mm Nut bolt and marked by red enamel paint. This point is located at the right side of the Hanumante bridge while moving ahead from Lokanthali to Tikathali.It is located at the right side of the Hanumante river.GCP-8 is clearly visible from this point.

SCHEMATIC DIAGRAM



DIMENSIONAL DESCRIPTION



PHOTOGRAPH



Reference Point Measurements:-

R1	8.312 m
R2	3.818 m
R3	18.722m

ATATION :GCP-7

E	337565.2749
N	3061523.419
Z	1291.909

VISIBLE POINT :GCP-8

E	337433.1219
N	3061488.318
Z	1289.138

**PROJECT NAME:PREPARATORY SURVEY ON INTERSECTION
IMPROVEMENT PROJECT IN KATHMANDU
DESCRIPTION CARD OF CONTROL POINTS**

Station :GCP-8
Province No: 3
Location : Lalitpur

Municipality:Mahalaxmasthan
Monumentation Date : 20/11/2076

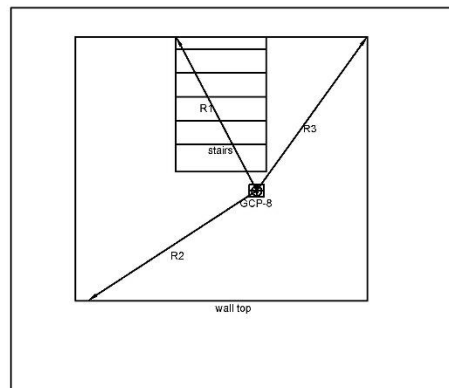
Station Type :Stable concrete structure with 150mm iron rod drilled.

Description : This point is monumented on a concrete slab by drilling and hammering a 150mm Nut bolt and marked by a red enamel paint. This point is located at the left side of the junction of Hanumante and Manohara river.It is located at the Stair top on left bank of Hanumante river.GCP-7 is visible from this pont.

SCHEMATIC DIAGRAM



DIMENSIONAL DESCRIPTION



PHOTOGRAPH



Refrence Point Mesurements:-

R1	8.076 m
R2	7.922 m
R3	5.172 m

STATION :GCP-8

E	337433.1219
N	3061488.318
Z	1289.138

VISIBLE POINT :GCP-7

E	337565.2749
N	3061523.419
Z	1291.909

**PROJECT NAME:PREPARATORY SURVEY ON INTERSECTION
IMPROVEMENT PROJECT IN KATHMANDU.
DESCRIPTION CARD OF CONTROL POINTS.**

Station:GCP-9
ProvinceNo:3
Location :Phulbarimark,Koteshwor

Municipality:Kathmandu
Monumentation Date : 20/11/2076

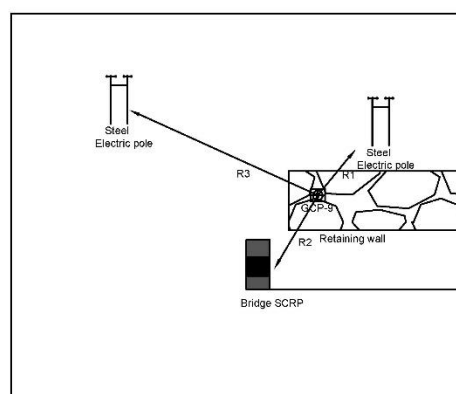
Station Type :Stable concrete structure with 150mm iron rod drilled.

Description : This point is monumented on top of Retaining wall with drilling and hammering 150mm nut bolt inside the stable concrete slab and marked by red enamel paint. This point is near to Hillside college of Engineering .GCP-10 is clearly visible from this point.

SCHEMATIC DIAGRAM



DIMENSIONAL DESCRIPTION



PHOTOGRAPH



Refrence Point Mesurements:-

R1	2.361 m
R2	3.824 m
R3	10.712 m

STATION: GCP-9

E	336566.883
N	3062233.608
Z	1304.651

VISIBLE POINT :GCP-10

E	336413.8174
N	3062075.868
Z	1287.216

**PROJECT NAME:PREPARATORY SURVEY ON INTERSECTION
IMPROVEMENT PROJECT IN KATHMANDU.
DESCRIPTION CARD OF CONTROL POINTS.**

Station :GCP-10
Province No: 3
Location :Balkumari,Lalitpur

Municipality:Kathmandu
Monumentation Date : 20/11/2076

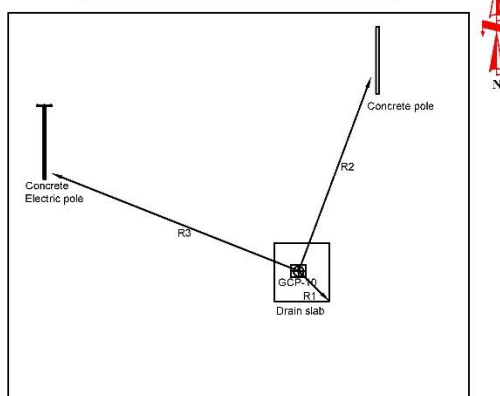
Station Type :Stable concrete structure with 150mm iron rod drilled.

Description :This point is monumented on a RCC concrete drain slab by drilling and hammering a 150mm Nut bolt and marked by red enamel paint. This point is located at the left side of the Monohara river and tentatively 15m away from Monohara river. It is located at Right side of the Balkumari bridge while moving from Koteswor to Satdobato.GCP-9 is clearly visible from this point.

SCHEMATIC DIAGRAM



DIMENSIONAL DESCRIPTION



PHOTOGRAPH



Reference Point Measurements:-

R1	1.742 m
R2	12.862 m
R3	14.184 m

STATION: GCP-10

E	336413.8174
N	3062075.868
Z	1287.216

VISIBLE POINT :GCP-9

E	336566.883
N	3062233.608
Z	1304.651

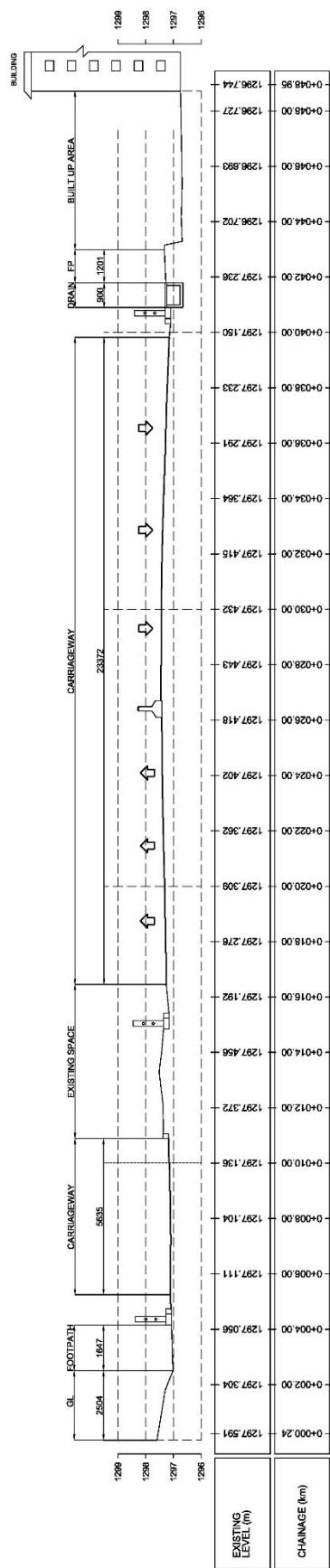
APPENDIX 2.

CROSS-SECTION

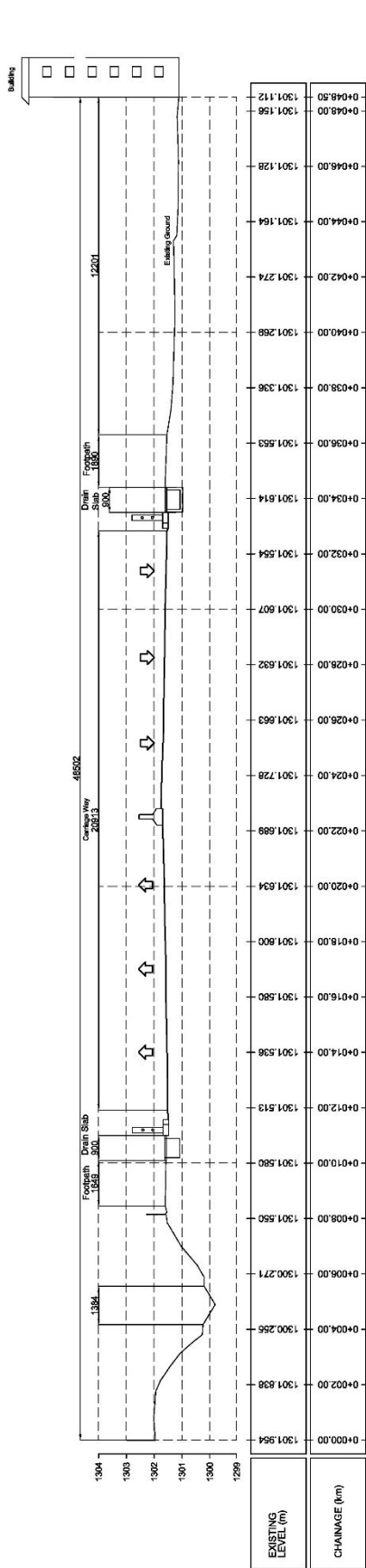
AND

UNDERGROUND UTILITY SURVEY

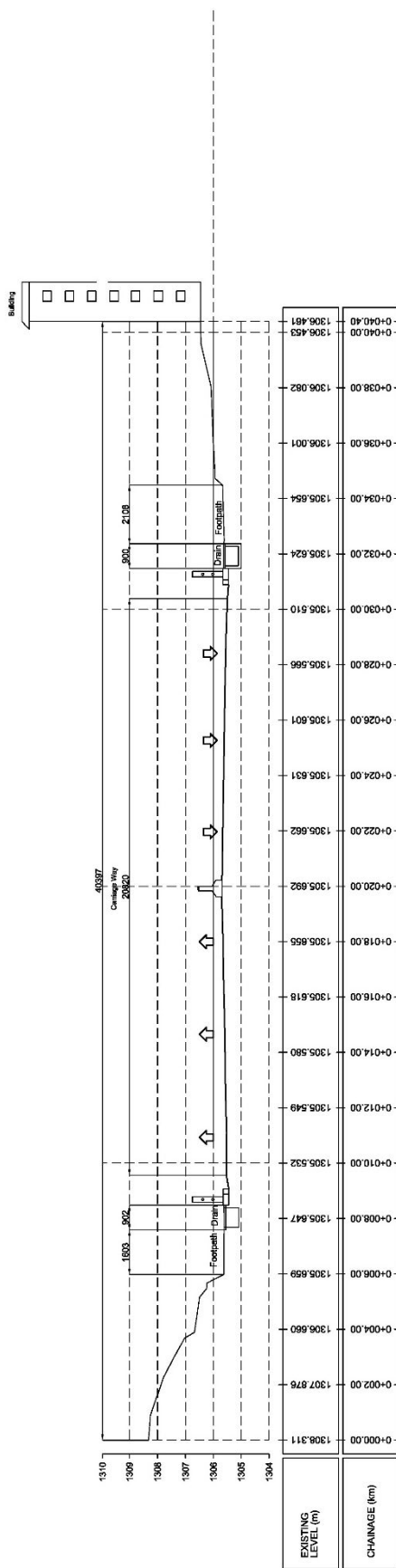
A-A



B-B

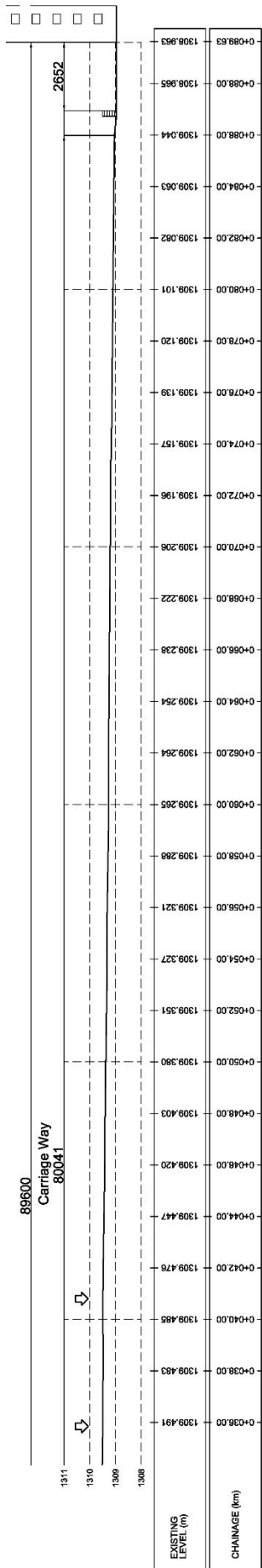


C-C

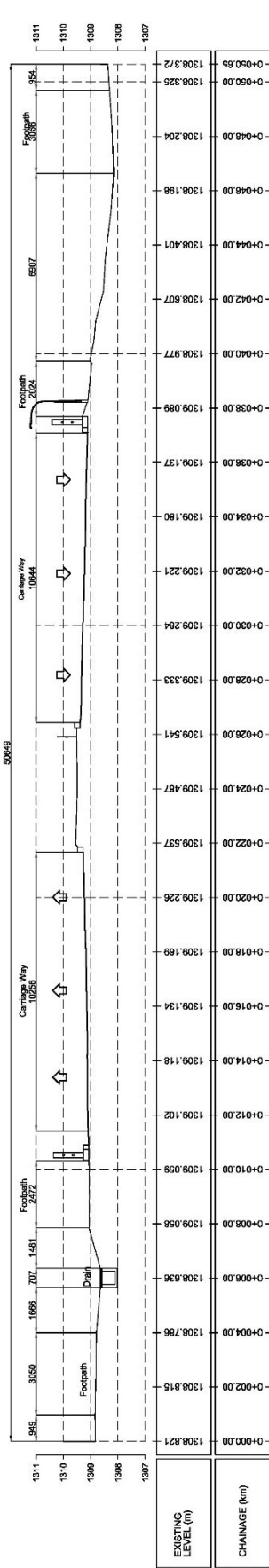


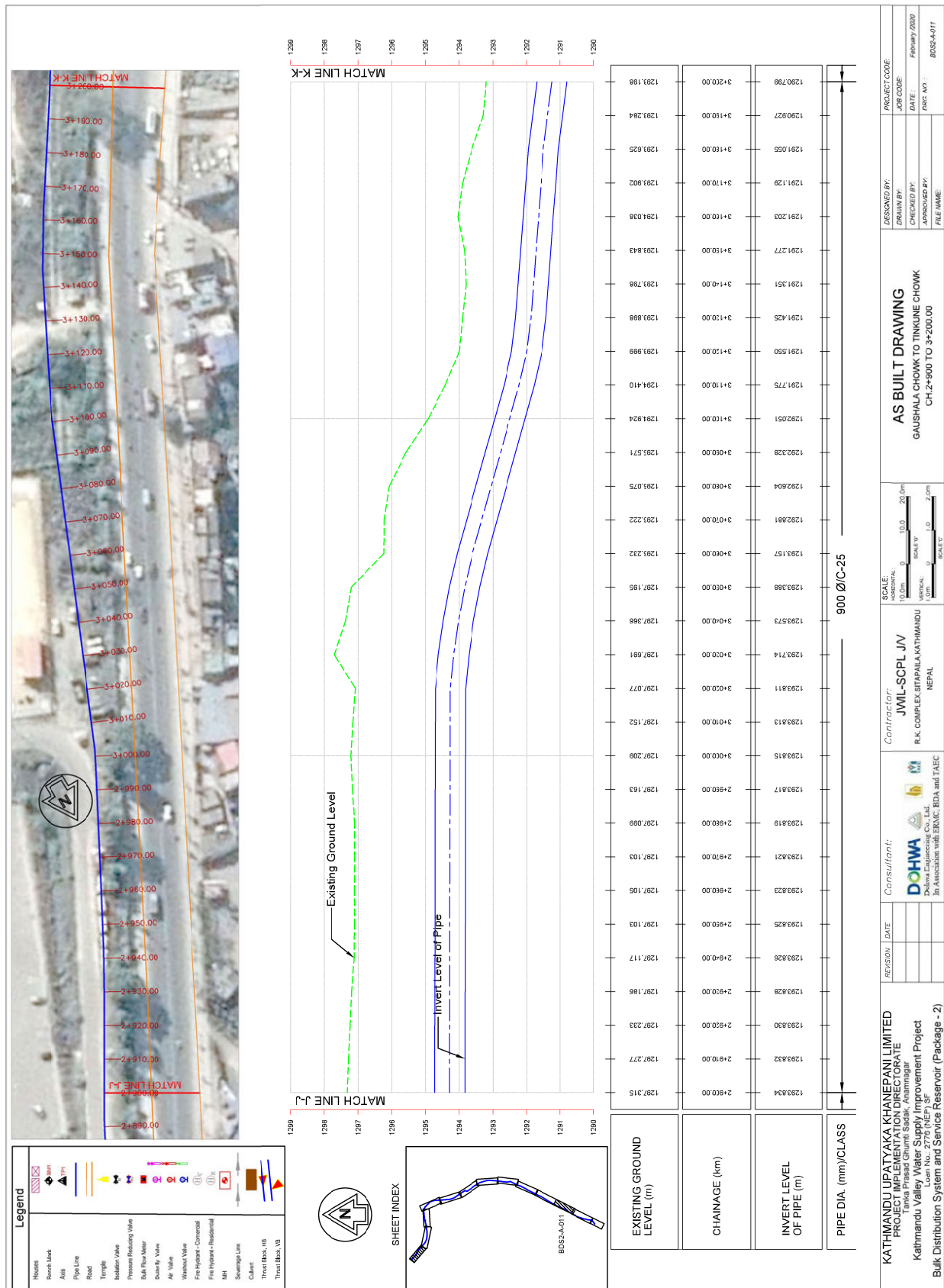


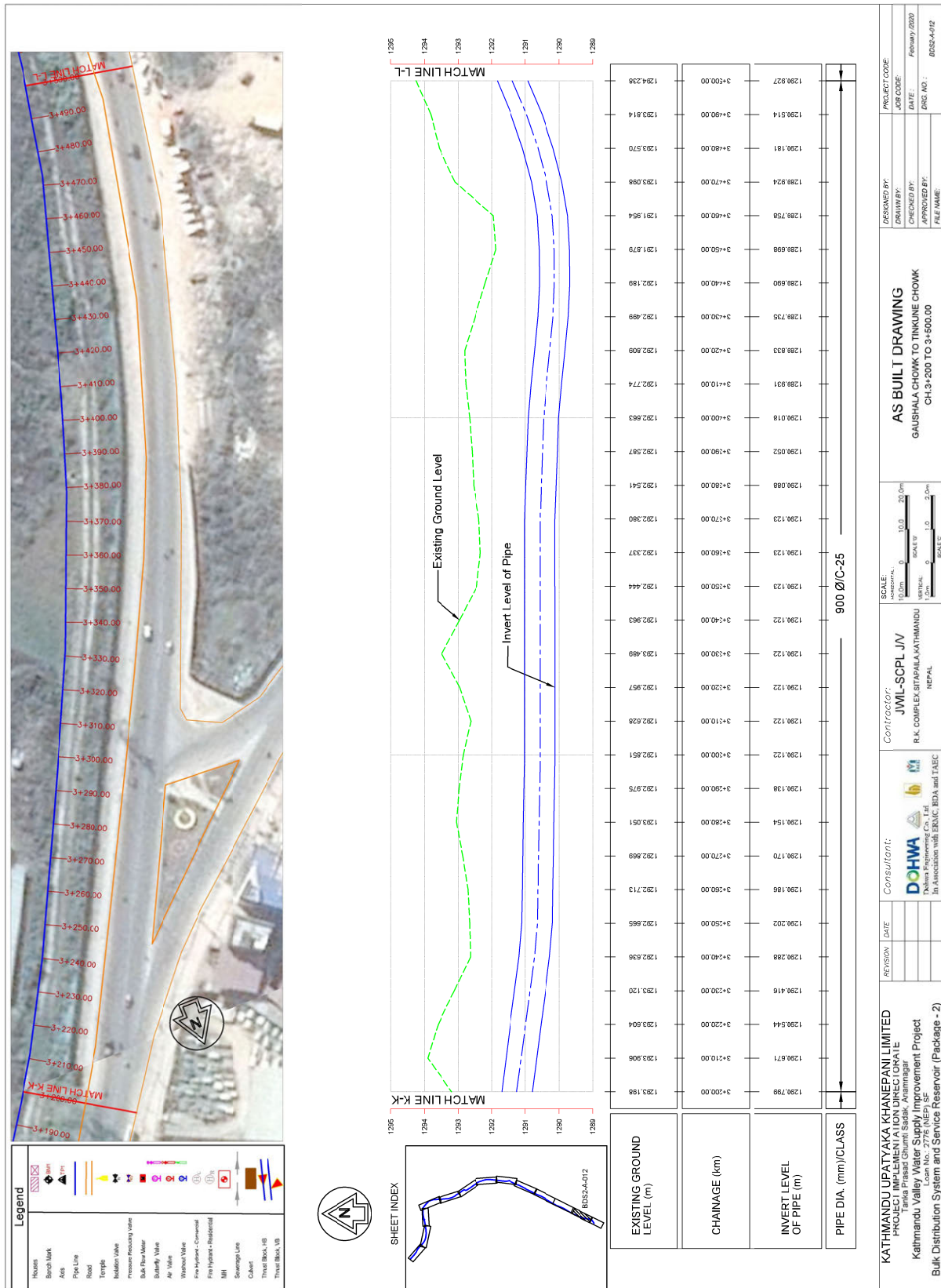
F-F(2/2)

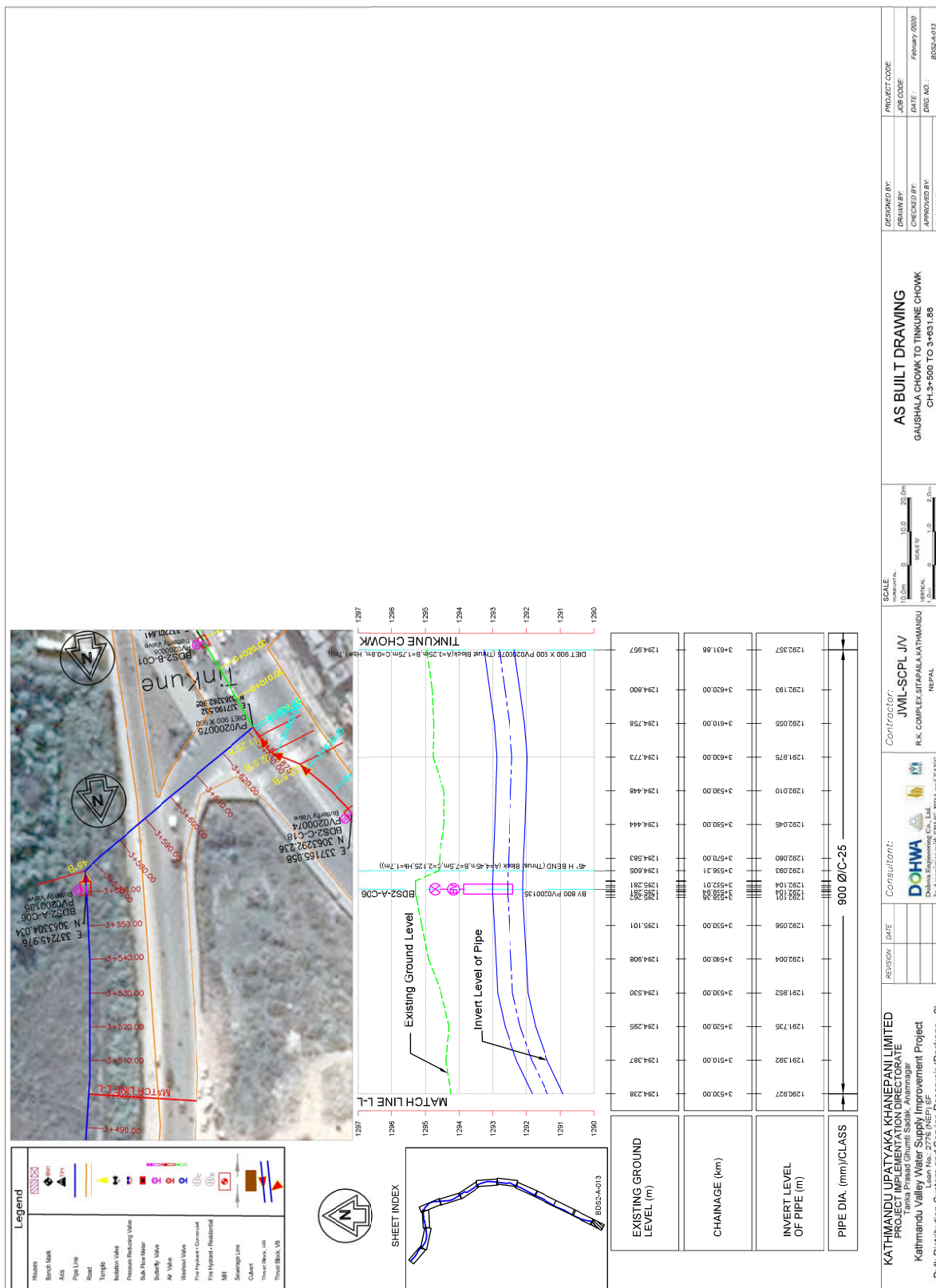


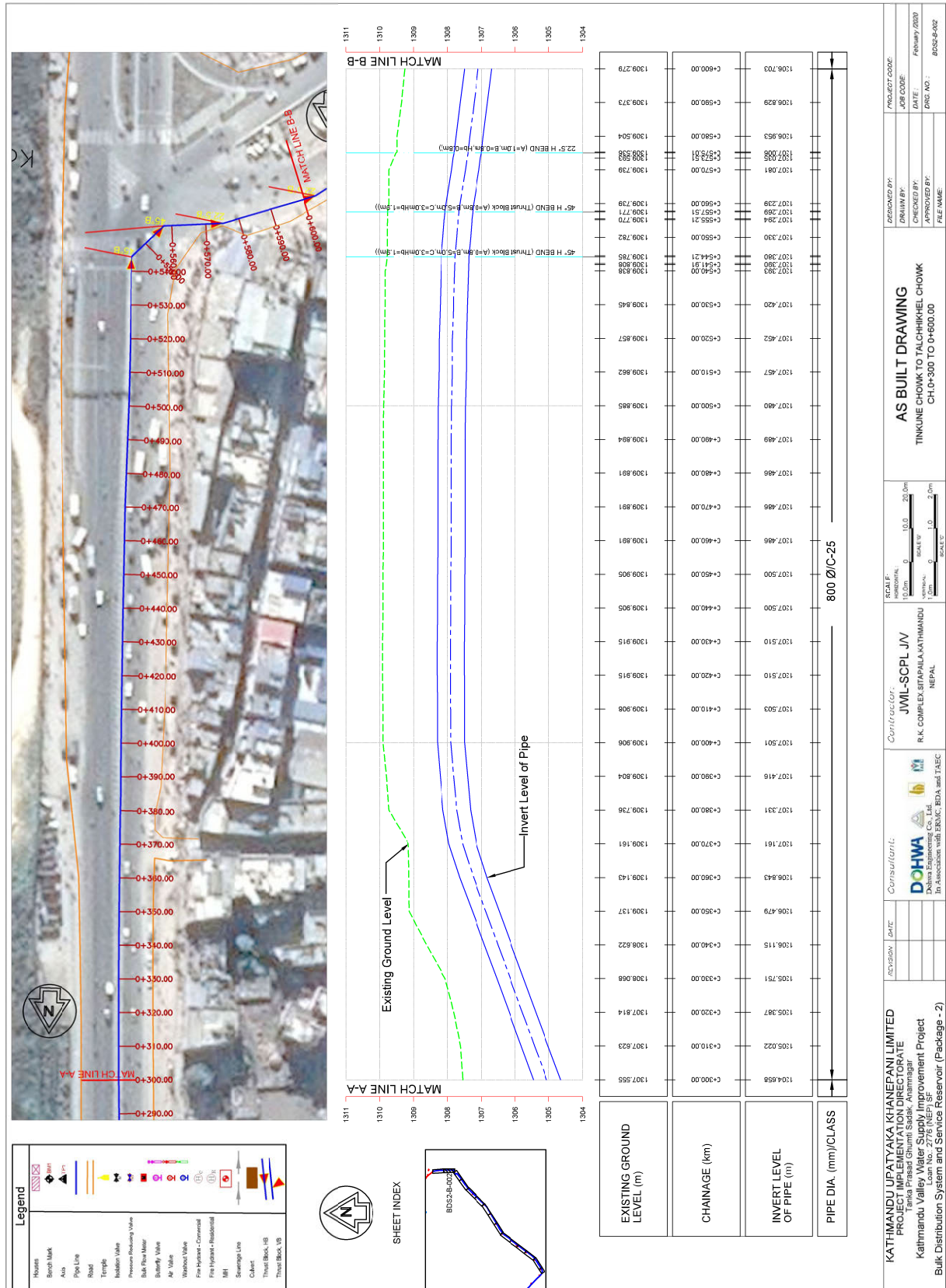
G-G

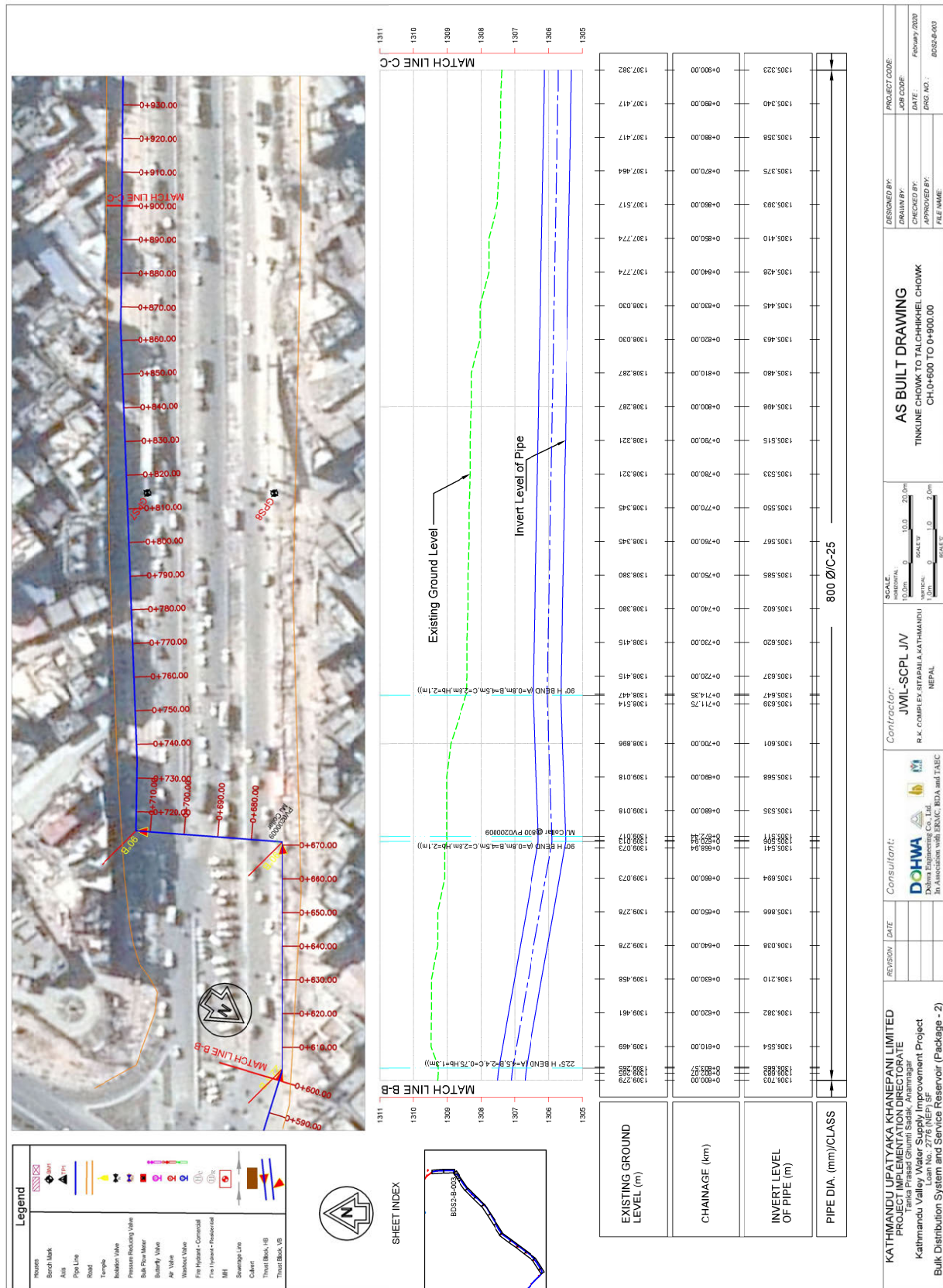




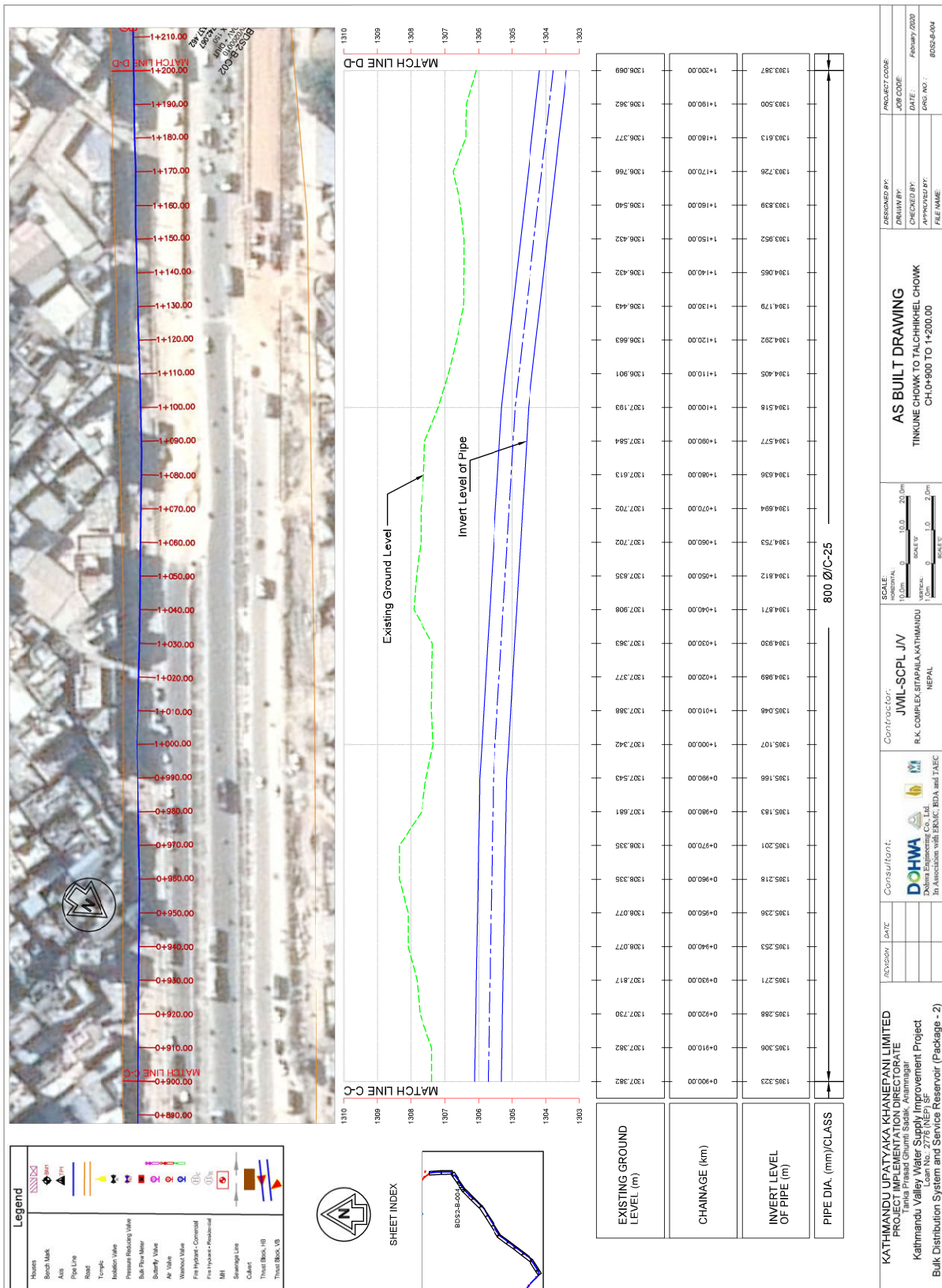


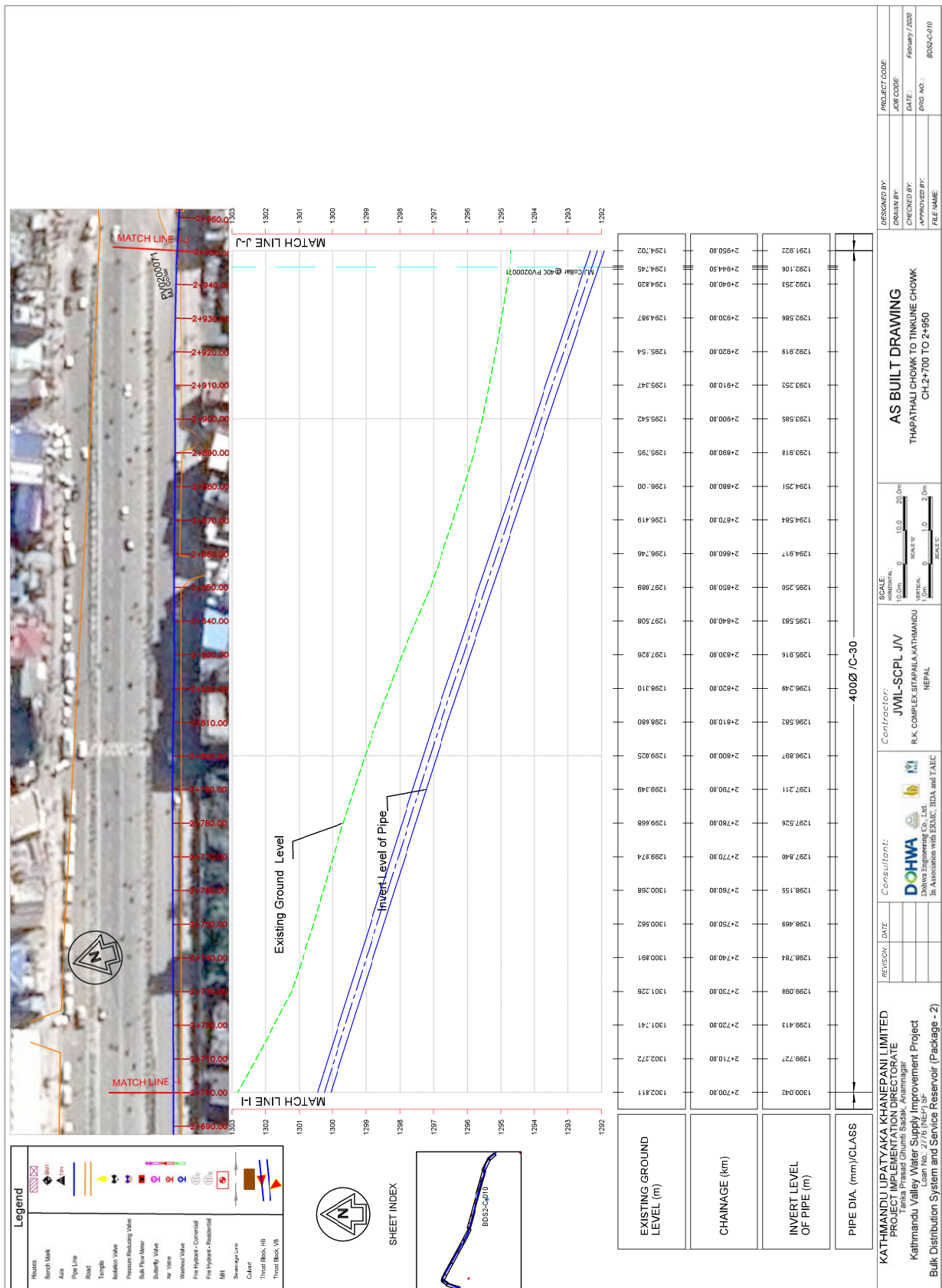


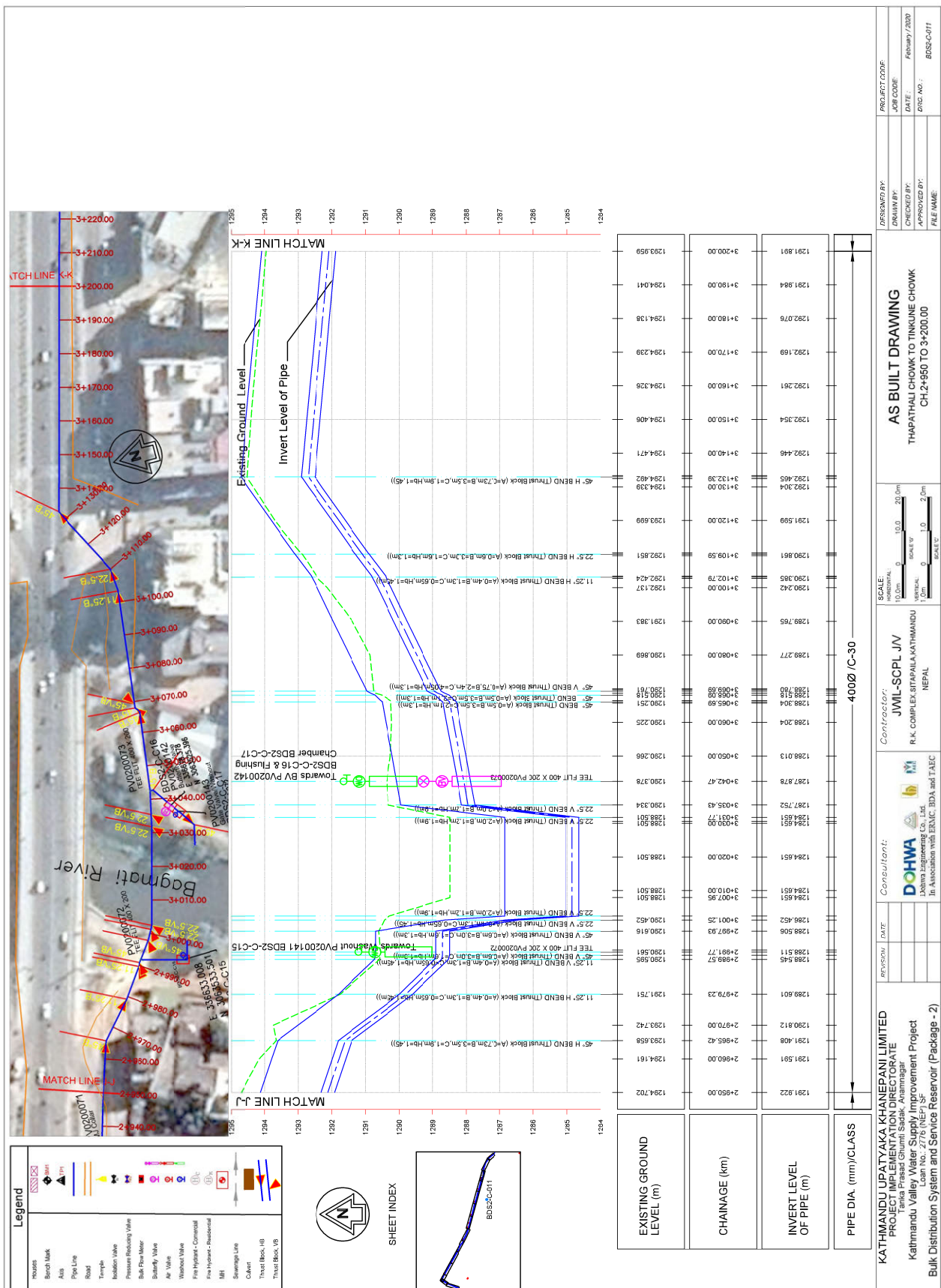


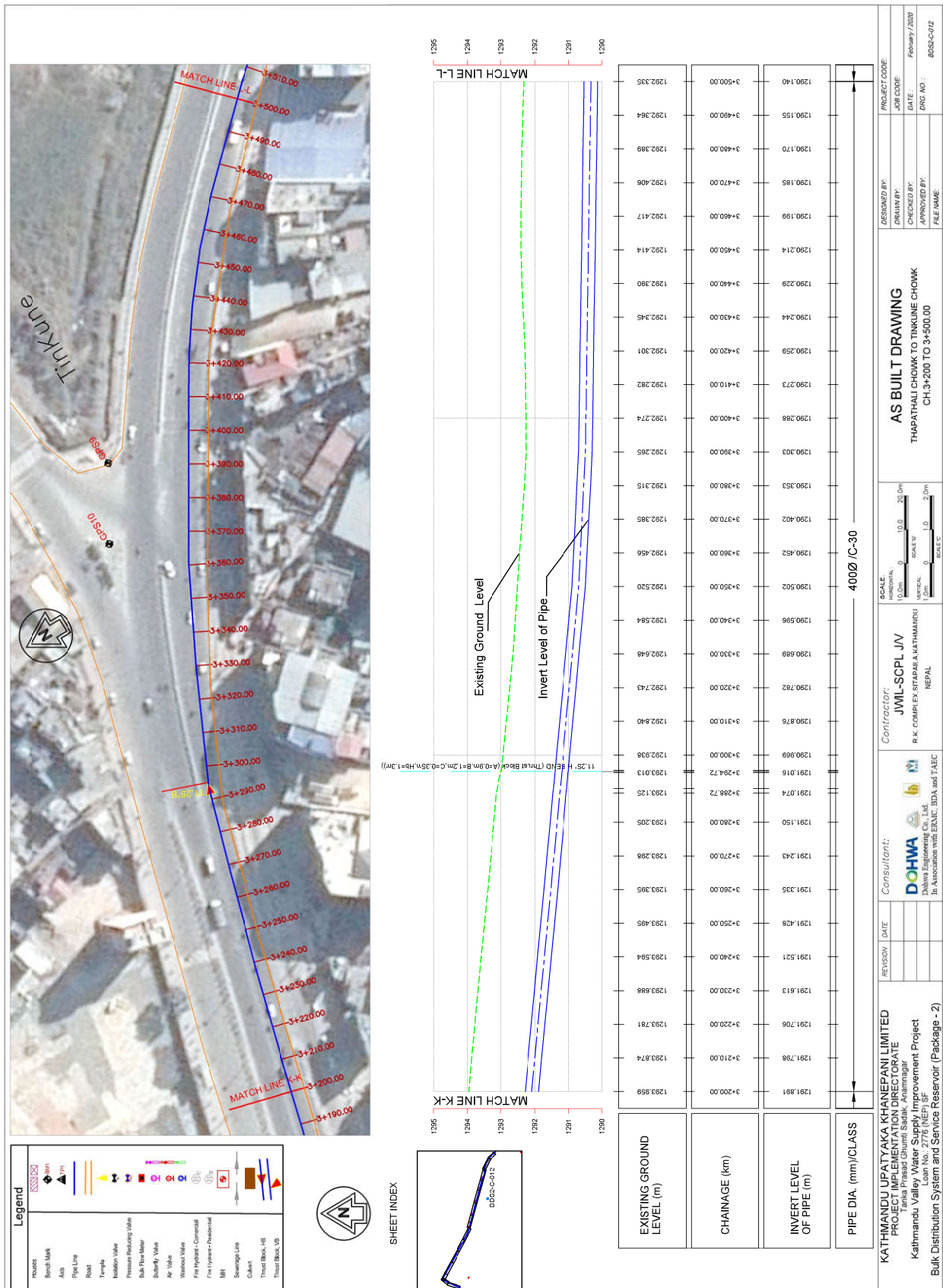


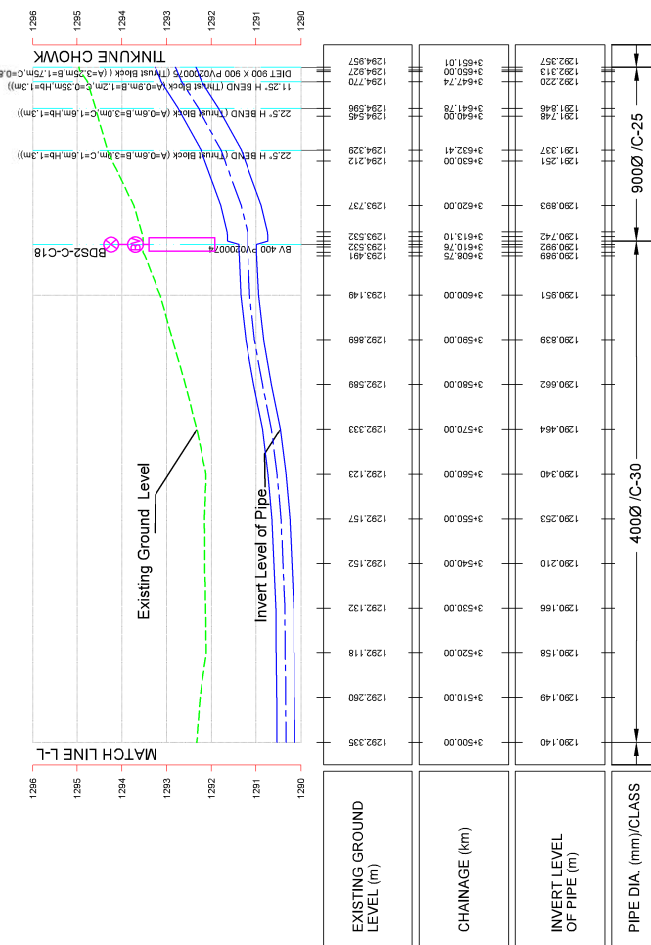
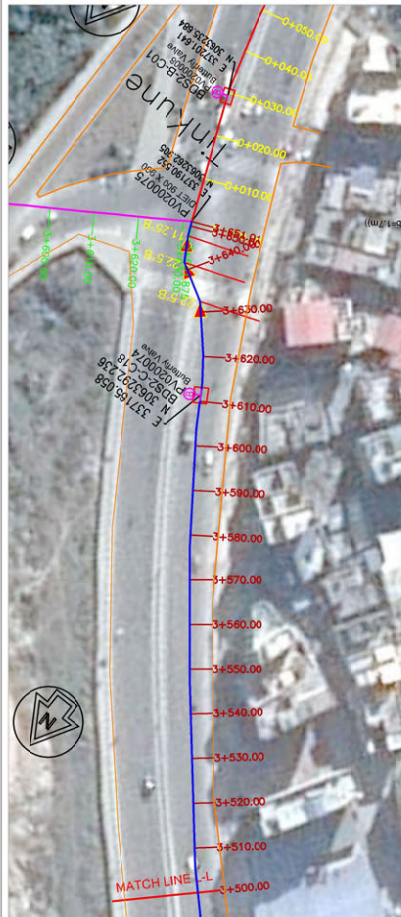
Appendix 2-8











KATHMANDU UPAITYAKA KHANEPANI LIMITED PROJECT: PROPOSED SEWAGE TREATMENT PLANT Tanka Prasad Gurung Sadak, Annapurna Kathmandu Valley Water Supply Improvement Project Loan No. 2776 (NFC) SF Bulk Distribution System and Service Reservoir (Package - 2)	REVISION DATE	Consultant:  DOHWA Dohwa Engineering Co., Ltd. In Association with EPC: BDA and TAEC	Contractor:  JWIL-SCPL JV R.K. KOSHI-SITAPALA KATHMANDU NEPAL	SCALE: HORIZONTAL: 10 cm = 10.0 m 20 cm VERTICAL: 1 cm = 0.5 m 2 cm 1 cm = 0.5 m 2 cm	DESIGNED BY: DRAWN BY: CHECKED BY: DATE: February / 2020 APPROVED BY: ENG. NO.: 8052-C-013 FILE NAME:
	AS BUILT DRAWING THAPATHALI CHOWK TO TINKUNE CHOWK CH 3+500 TO 3+651.01				PROJECT CODE: JOB CODE: DATE: February / 2020 APPROVED BY: ENG. NO.: 8052-C-013 FILE NAME:

APPENDIX 3.
BOREHOLE LOGS

Drilling Log



Project: Geotechnical Investigation for Preparatory Survey on the Project for Intersection Improvement Project in Kathmandu (Koteshwor – Tinkune)

Client: Joint Venture of Oriental Consultants Global Co. Ltd., PADECO Co. Ltd. and CTI

Location: Tinkune (BH#01)

Identification: BH#01 Tinkune Junction

Start Date: 08-29-2022

Coordinates: 337126.866, 3063376.827

Hole Location: Tinkune

End Date: 04-09-2022

Ground water: 3.9m

Soil Description	Symbol	Depth, m	Sample No. & Type	No. of blow			N-Value	N-Value	
				15 cm	15 cm	15 cm		SPT	DCPT
Top filling soil (Bricks, organic traces, concrete, gravel)		- 1	SPT	19	9	12	21		
		- 2	SPT	3	4	3	7		
Loose medium sized, grey medium sand with traces of silt		- 3	SPT	2	3	4	7		
		- 4	SPT	4	5	5	10		
		- 5	SPT	4	6	6	12		
Medium to coarse grey medium dense sand with traces of silt		- 6	SPT	3	4	8	12		
		- 7	SPT	2	6	7	13		
Blackish grey soft low plastic clayey silt with micaceous fine sand.		- 8	SPT	4	5	7	12		
		- 9	SPT	2	5	7	12		
		- 10	SPT	2	4	8	12		
Blackish grey medium soft to stiff low to medium plastic clayey silt with some micaceous fine sand (micaceous especially at 13.0m depth).		- 11	SPT	2	7	8	15		
		- 12	SPT	2	4	6	10		
		- 13	SPT	4	4	6	10		
		- 14	SPT	3	5	9	14		
		- 15	SPT	3	5	9	14		
Blackish grey medium soft to stiff low to medium plastic clayey silt with micaceous fine sand of Patan formation. (Patan formation (after Yamanaka 1982): It consist fluvio-lacustrine deposit consisting of laminated arkosic sand, silt, clay and peat layers)		- 16	SPT	3	5	10	15		
		- 17	SPT	3	6	10	16		
		- 18	SPT	3	6	16	22		
		- 19	SPT	3	6	7	13		
		- 20	SPT	3	4	6	10		
20+0.45m depth									
Types of Soil		N Value							
Granular Soil	Compactness	0 to 4	4 to 10	10 to 30	30 to 50	50 to 100	100 to 200	200 to 300	> 300
		Very Loose	Loose	Med. Dense	Dense	Very Dense			
Cohesive Soil	Consistency	0 to 2	2 to 4	4 to 8	8 to 16	16 to 32	32 to 64	64 to 128	> 128
		Very Soft	Soft	Med. Soft	Stiff	Very Stiff	Hard		



Drilling Log



Project: Geotechnical Investigation for Preparatory Survey on the Project for Intersection Improvement Project in Kathmandu (Koteshwor – Tinkune)

Client: Joint Venture of Oriental Consultants Global Co. Ltd., PADECO Co. Ltd. and CTI

Area Location: Tinkune (BH#01)

Identification: BH#01 Tinkune Junction

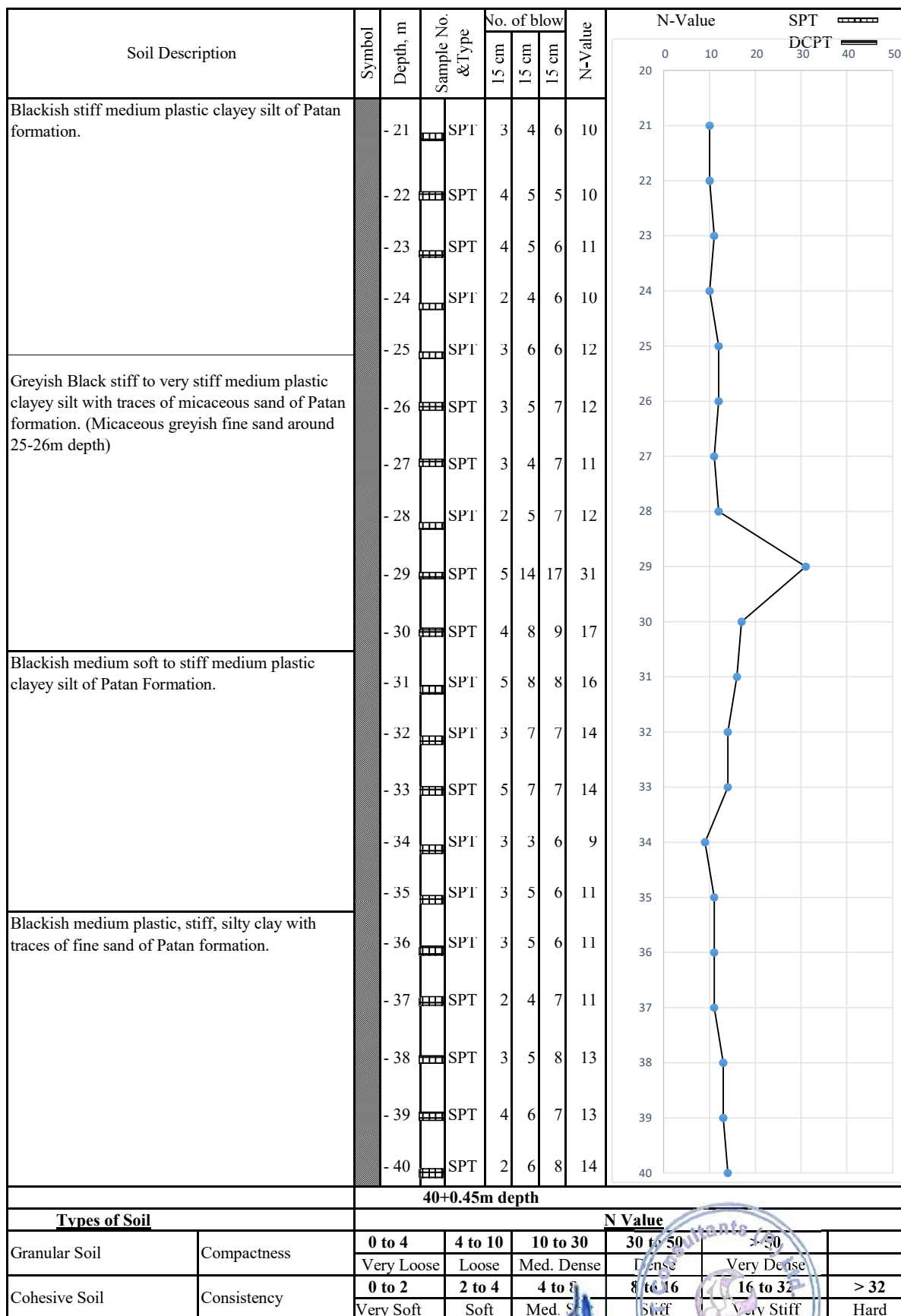
Start Date: 08-29-2022

Coordinates: 337126.866, 3063376.827

Hole Location: Tinkune

End Date: 04-09-2022

Ground water: 3.9m



Drilling Log



Project: Geotechnical Investigation for Preparatory Survey on the Project for Intersection Improvement Project in Kathmandu (Koteshwor – Tinkune)

Client: Joint Venture of Oriental Consultants Global Co. Ltd., PADECO Co. Ltd. and CTI

Location: Tinkune (BH#01)

Identification: BH#01 Tinkune Junction

Start Date: 08-29-2022

Coordinates: 337126.866, 3063376.827

Hole Location: Tinkune

End Date: 04-09-2022

Ground water: 3.9m

Soil Description		Symbol	Depth, m	Sample No. & Type	No. of blows			N-Value	N-Value	SPT	DCPT
					15 cm	15 cm	15 cm				
Greyish black medium plastic stiff clayey silt with traces of fine sand of Patan formation.			- 41	SPT	6	8	8	16			
			- 42	SPT	4	6	8	14			
			- 43	SPT	4	5	8	13			
			- 44	SPT	4	7	8	15			
			- 45	SPT	4	8	10	18			
Greyish black medium plastic stiff laminated clayey silt with micaceous some fine sand & some interbedded organic traces (termed as Patan formation)			- 46	SPT	5	6	8	14			
			- 47	SPT	6	8	9	17			
			- 48	SPT	7	9	9	18			
			- 49	SPT	2	4	8	12			
			- 50	SPT	2	6	10	16			
End Depth		Terminated at 50+0.45m depth									
Types of Soil		N Value									
Granular Soil	Compactness	0 to 4	4 to 10	10 to 30	30 to 50	> 50					
		Very Loose	Loose	Med. Dense	Dense	Very Dense					
Cohesive Soil	Consistency	0 to 2	2 to 4	4 to 8	8 to 16	16 to 32	> 32				
		Very Soft	Soft	Med. Soft	Stiff	Very Stiff	Hard				



Drilling Log



Project: Geotechnical Investigation for Preparatory Survey on the Project for Intersection Improvement Project in Kathmandu (Koteshwor – Tinkune)

Client: Joint Venture of Oriental Consultants Global Co. Ltd. ,PADECO Co. Ltd. and CTI

Hole Location: Tinkune

Area Location: Munibhairav (BH#02)

Start Date: 09-09-2022

End Date: 09-14-2022

Identification: BH#2 Munibhairav

Coordinates: 337252.6094, 3063094.546

Ground water: 6.0m

Soil Description	Symbol	Depth, m	Sample No. & Type	No. of blows			N-Value	N-Value SPT
				15 cm	15 cm	15 cm		
Top filling micaceous fine sand		- 1	SPT	3	5	6	11	
Loose fine silty sand with clayey lumps		- 2	SPT	4	5	6	11	
Medium dense grey micaceous silty sand		- 3	SPT	4	4	14	18	
Soft low plastic clayey silt and fine sand		- 4	SPT	20	25	24	49	
		- 5	SPT	13	23	26	49	
Medium dense to dense medium to coarse sand with some silt		- 6	SPT	13	21	26	47	
		- 7	SPT	5	15	26	41	
Blackish low plastic medium soft clayey silt with fine sand		- 8	SPT	7	12	18	30	
		- 9	SPT	8	10	12	22	
Greyish dense to very dense sand with silt		- 10	SPT	2	3	5	8	
		- 11	SPT	5	10	13	23	
		- 12	SPT	3	9	12	21	
		- 13	SPT	3	7	10	17	
Blackish low plastic medium soft clayey silt with fine sand		- 14	SPT	4	8	10	18	
		- 15	SPT	4	6	10	16	
		- 16	SPT	4	6	9	15	
		- 17	SPT	5	9	11	20	
Medium dense to dense medium to coarse sand with some silt		- 18	SPT	3	8	11	19	
		- 19	SPT	3	5	10	15	
		- 20	SPT	5	9	11	20	
20+0.45m depth								
Types of Soil		N Value						
Granular Soil	Compactness	0 to 4	4 to 10	10 to 30	30 to 50	> 50		
		Very Loose	Loose	Med. Dense	Dense	Very Dense		
Cohesive Soil	Consistency	0 to 2	2 to 4	4 to 8	8 to 16	16 to 32	> 32	
		Very Soft	Soft	Med. Soft	Stiff	Very Stiff	Hard	

Drilling Log



Project: Geotechnical Investigation for Preparatory Survey on the Project for Intersection Improvement Project in Kathmandu (Koteshwor – Tinkune)

Client: Joint Venture of Oriental Consultants Global Co. Ltd., PADECO Co. Ltd. and CTI

Hole Location: Tinkune

Area Location: Munibhairav (BH#02)

Start Date:

End Date: 09-14-2022

Identification: BH#2 Munibhairav

Coordinates: 337252.6094, 3063094.546 Ground water: 6.0m

Soil Description	Symbol	Depth, m	Sample No. & Type	No. of blows			N-Value	N-Value	SPT DCPT
				15 cm	15 cm	15 cm			
Blackish low plastic medium soft clayey silt with fine sand		- 21	SPT	4	7	8	15	20	
		- 22	SPT	3	5	6	11	21	
		- 23	SPT	6	7	8	15	22	
		- 24	SPT	6	8	11	19	23	
		- 25	SPT	6	7	7	14	24	
		- 26	SPT	4	5	6	11	25	
Medium dense to dense medium to coarse sand		- 27	SPT	3	5	7	12	26	
		- 28	SPT	6	7	7	14	27	
Blackish low to medium plastic, laminated layers of clayey silt with traces of fine sand (Patan formation (after Yamanaka 1982): It consist fluvio-lacustrine deposit consisting of laminated arkosic sand, silt, clay and peat layers)		- 29	SPT	5	6	8	14	28	
		- 30	SPT	4	7	9	16	29	
		- 31	SPT	6	9	10	19	30	
		- 32	SPT	6	10	10	20	31	
		- 33	SPT	6	6	8	14	32	
		- 34	SPT	4	8	9	17	33	
		- 35	SPT	9	11	11	22	34	
		- 36	SPT	8	10	12	22	35	
		- 37	SPT	5	6	7	13	36	
		- 38	SPT	6	8	9	17	37	
		- 39	SPT	4	7	11	18	38	
		- 40	SPT	5	7	11	18	39	
40+0.45m depth									40
Types of Soil		N Value							
Granular Soil	Compactness	0 to 4	4 to 10	10 to 30	30 to 50	> 50			
		Very Loose	Loose	Med. Dense	Dense	Very Dense			
Cohesive Soil	Consistency	0 to 2	2 to 4	4 to 8	8 to 16	16 to 32	> 32		
		Very Soft	Soft	Med. Soft	Stiff	Very Stiff	Hard		



Drilling Log



Project: Geotechnical Investigation for Preparatory Survey on the Project for Intersection Improvement Project in Kathmandu (Koteshwor – Tinkune)

Client: Joint Venture of Oriental Consultants Global Co. Ltd., PADECO Co. Ltd. and CTI

Location: Munibhairav (BH#02)

Identification: BH#02 Munibhairav

Start Date: 09-09-2022

Coordinates:

Hole Location: Tinkune

End Date: 09-14-2022

Ground water: 6.0m

Soil Description	Symbol	Depth, m	Sample No & Type	No. of blows			N-Value	N-Value	SPT
				15 cm	15 cm	15 cm			
Blackish low plastic stiff clayey silt with fine sand of Patan Formation		- 41	SPT	5	8	10	18	41	
		- 42	SPT	4	8	12	20	42	
		- 43	SPT	9	10	11	21	43	
		- 44	SPT	8	10	10	20	44	
		- 45	SPT	10	11	12	23	45	
		- 46	SPT	10	10	12	22	46	
		- 47	SPT	4	10	11	21	47	
		- 48	SPT	6	11	13	24	48	
		- 49	SPT	5	10	12	22	49	
		- 50						50	
End Depth		50+0.45m depth							
Types of Soil		N Value							
Granular Soil	Compactness	0 to 4	4 to 10	10 to 30	30 to 50	> 50			
		Very Loose	Loose	Med. Dense	Dense	Very Dense			
Cohesive Soil	Consistency	0 to 2	2 to 4	4 to 8	8 to 16	16 to 32	> 32		
		Very Soft	Soft	Med. Soft	Stiff	Very Stiff	Hard		



Drilling Log



Project: Geotechnical Investigation for Preparatory Survey on the Project for Intersection Improvement Project in Kathmandu (Koteshwor – Tinkune)

Client: Joint Venture of Oriental Consultants Global Co. Ltd., PADECO Co. Ltd. and CTI

Location: Koteshwor (BH#03)

Identification: BH#01 Koteshwor Junction

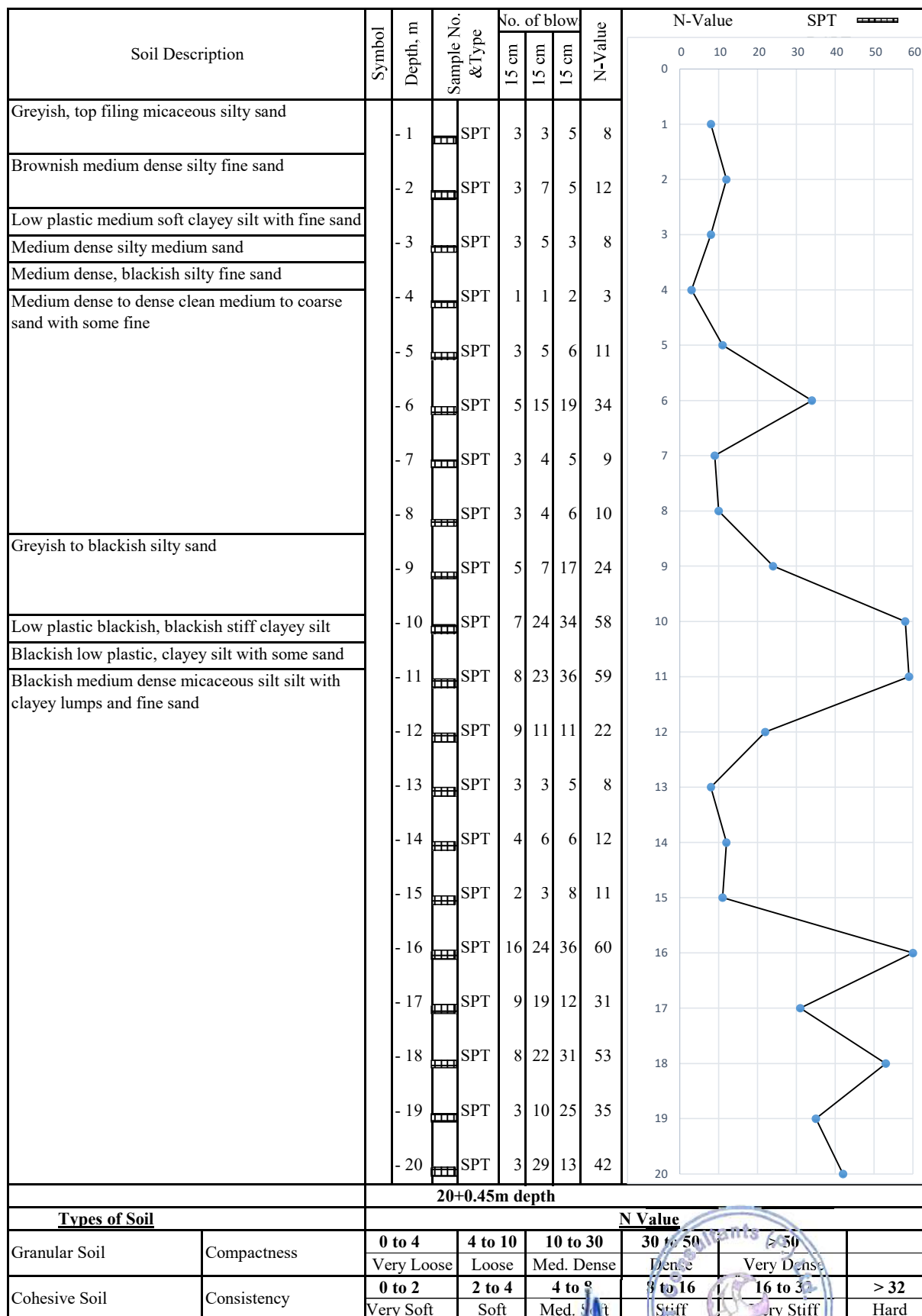
Start Date: 09-08-2022

Coordinates: 337264.0533, 3062580.872

Hole Location: Tinkune

End Date: 09-15-2022

Ground water: 12.0m



Drilling Log



Project: Geotechnical Investigation for Preparatory Survey on the Project for Intersection Improvement Project in Kathmandu (Koteshwor – Tinkune)

Client: Joint Venture of Oriental Consultants Global Co. Ltd. ,PADECO Co. Ltd. and CTI

Hole Location: Tinkune

Area Location: Koteshwor (BH#03)

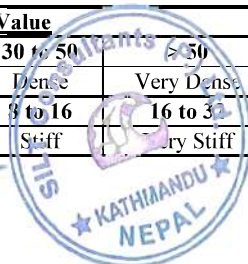
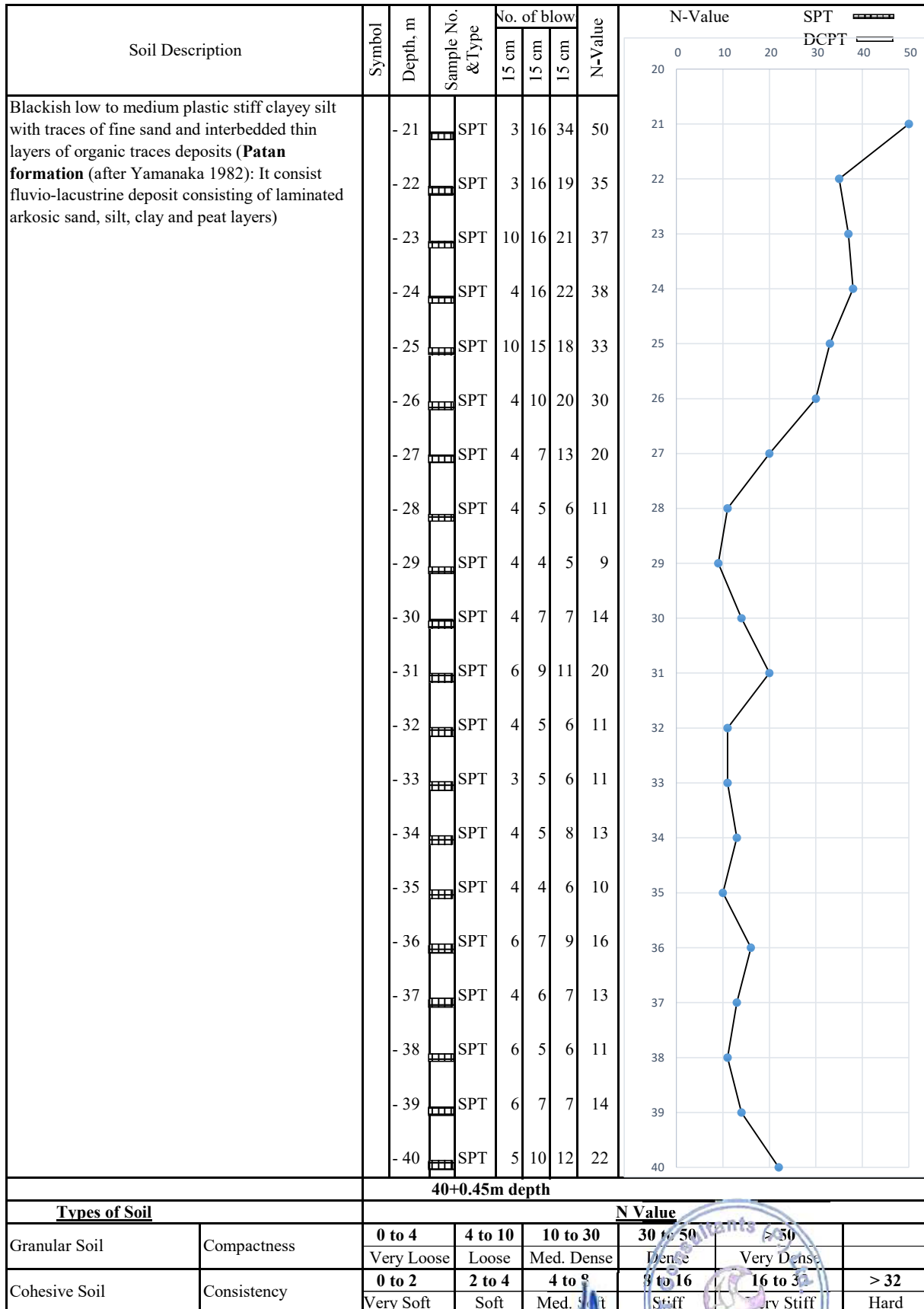
Start Date: 09-08-2022

End Date: 09-15-2022

Identification: BH#03 Koteshwor Junction

Coordinates

Ground water: 12.0m



Drilling Log



Project: Geotechnical Investigation for Preparatory Survey on the Project for Intersection Improvement Project in Kathmandu (Koteshwor – Tinkune)

Client: Joint Venture of Oriental Consultants Global Co. Ltd. ,PADECO Co. Ltd. and CTI

Location: Koteshwor (BH#03)

Identification: BH#03 Koteshwor Junction

Start Date: 09-08-2022

Coordinates: 337264.0533, 3062580.872

Hole Location: Tinkune

End Date: 09-15-2022

Ground water: 12.0m

Soil Description		Symbol	Depth, m	Sample No. & Type	No. of blows			N-Value	N-Value		SPT	DCPT
					15 cm	15 cm	15 cm		0	10	20	30
Blackish low to medium plastic stiff clayey silt with traces of fine sand and interbedded thin layers of organic traces deposits (Patan Formation)			- 41		SPT	7	10	11	21	40		
			- 42		SPT	7	6	6	12	41		
			- 43		SPT	8	8	10	18	42		
			- 44		SPT	6	6	7	13	43		
			- 45		SPT	5	6	6	12	44		
			- 46		SPT	6	12	12	24	45		
			- 47		SPT	8	11	13	24	46		
			- 48		SPT	9	10	10	20	47		
			- 49		SPT	5	4	8	12	48		
			- 50		SPT	4	6	10	16	49		
End Depth		50+0.45m depth										
Types of Soil		N Value										
Granular Soil	Compactness	0 to 4		4 to 10		10 to 30		30 to 50		> 50		
		Very Loose		Loose		Med. Dense		Dense		Very Dense		
Cohesive Soil	Consistency	0 to 2		2 to 4		4 to 8		8 to 16		16 to 32		> 32
		Very Soft		Soft		Med. Soft		Stiff		Very Stiff		Hard



Drilling Log



Project: Geotechnical Investigation for the Preparatory Survey on the Project for Intersection Improvement in Kathmandu

Client: Oriental Consultants Global Co., Ltd. JV with PADECO Co., Ltd. and CTI

Engineering International Co., Ltd.

Location: Jadibuti

Identification: BH_4 Jadibuti Junction

Start Date: 08/30/2022

Coordinates: 337572.7437, 3062325.214

Hole Location: BH-4

End Date: 09/06/2022

Ground Water: 6.0m

Soil Description	Symbol	Depth, m	Sample No. & Type	No. of blow			N-Value	N-Value		SPT	DCPT		
				15 cm	15 cm	15 cm		0	10	20	30	40	50
Top residual followed by filling material (rocks fragments, boulder to bricks)		- 1	SPT	7	8	12	20						
(Dense) clean medium to coarse sand with traces of silt.		- 2	SPT	10	6	11	17						
		- 3	SPT	3	2	9	11						
		- 4	SPT	13	15	13	28						
		- 5	SPT	14	4	10	7						
		- 6	SPT	5	4	10	14						
(Dense) sandy soil with traces of cobbles and silt.		- 7	SPT	13	11	20	21						
Dense, greyish medium to coarse sand with some silt.		- 8	SPT	5	14	18	32						
		- 9	SPT	11	15	17	32						
		- 10	SPT	7	3	7	10						
		- 11	SPT	2	3	5	8						
		- 12	SPT	3	2	3	5						
Blackish grey low plastic clayey silt with traces of fine sand. (Patan formation (after Yamanaka 1982): It consist fluvio-lacustrine deposit consisting of laminated arkosic sand, silt, clay and peat layers)		- 13	SPT	2	3	6	9						
		- 14	SPT	4	4	4	8						
		- 15	SPT	4	5	6	11						
		- 16	SPT	4	7	7	14						
		- 17	SPT	4	7	7	14						
Blackish grey low plastic clayey silt with some fine sand. (Patan Formation)		- 18	SPT	4	6	7	13						
		- 19	SPT	2	4	7	11						
		- 20	SPT	4	5	6	11						
* Completed at 20+0.45m depth													
Types of Soil		N Value											
Granular Soil	Compactness	0 to 4	4 to 10	10 to 30	30 to 50	> 50							
		Very Loose	Loose	Med. Dense	Dense	Very Dense							
Cohesive Soil	Consistency	0 to 2	2 to 4	4 to 8	8 to 16	16 to 32	> 32						
		Very Soft	Soft	Med. Stiff	Stiff	Very Stiff	Hard						



Drilling Log



Project: Geotechnical Investigation for the Preparatory Survey on the Project for Intersection Improvement in Kathmandu

Client: Oriental Consultants Global Co., Ltd. JV with PADECO Co., Ltd. and CTI Engineering International Co., Ltd.

Location: Jadibuti

Identification: BH_4 Jadibuti Junction

Start Date: 08/30/2022

Coordinates: 337572.7437, 3062325.214

Hole Location: BH-4

End Date: 09/06/2022

Ground Water: 6.0m

Soil Description	Symbol	Depth, m	Sample No. & Type	No. of blow			N-Value	N-Value		SPT
				15 cm	15 cm	15 cm		0	10	
Blackish grey low plastic stiff clayey silt with traces of fine sand. (Patan Formation)		- 21	SPT	3	4	4	8	20		
		- 22	SPT	3	4	7	11	21		
		- 23	SPT	3	4	6	10	22		
		- 24	SPT	3	5	8	13	23		
		- 25	SPT	4	5	8	13	24		
Blackish grey to blackish low plastic stiff to very stiff clayey silt with traces of fine sand. (Patan Formation)		- 26	SPT	3	5	7	12	25		
		- 27	SPT	3	6	7	13	26		
		- 28	SPT	3	5	7	12	27		
		- 29	SPT	8	7	8	15	28		
		- 30	SPT	8	10	11	21	29		
Blackish grey low plastic stiff clayey silt with traces of fine sand. (Patan Formation)		- 31	SPT	5	7	8	15	30		
		- 32	SPT	4	6	6	12	31		
		- 33	SPT	6	7	7	14	32		
		- 34	SPT	5	6	4	10	33		
		- 35	SPT	7	9	7	16	34		
Blackish grey low to medium plastic, stiff to very stiff clayey silt with traces of fine sand. (Patan Formation)		- 36	SPT	5	6	8	14	35		
		- 37	SPT	5	10	10	20	36		
		- 38	SPT	6	8	7	15	37		
		- 39	SPT	4	6	8	14	38		
		- 40	SPT	3	7	10	17	39		
* Completed at 40+0.45m depth										
Types of Soil		N Value								
Granular Soil	Compactness	0 to 4	4 to 10	10 to 30	30 to 50	> 50				
		Very Loose	Loose	Med. Dense	Dense	Very Dense				
Cohesive Soil	Consistency	0 to 2	2 to 4	4 to 8	8 to 16	16 to 32	> 32			
		Very Soft	Soft	Med. Stiff	Stiff	Very Stiff	Hard			



Drilling Log



Project: Geotechnical Investigation for the Preparatory Survey on the Project for Intersection Improvement in Kathmandu

Client: Oriental Consultants Global Co., Ltd. JV with PADECO Co., Ltd. and CTI

Location: Jadibuti

Identification: BH_4 Jadibuti Junction

Start Date: 08/30/2022

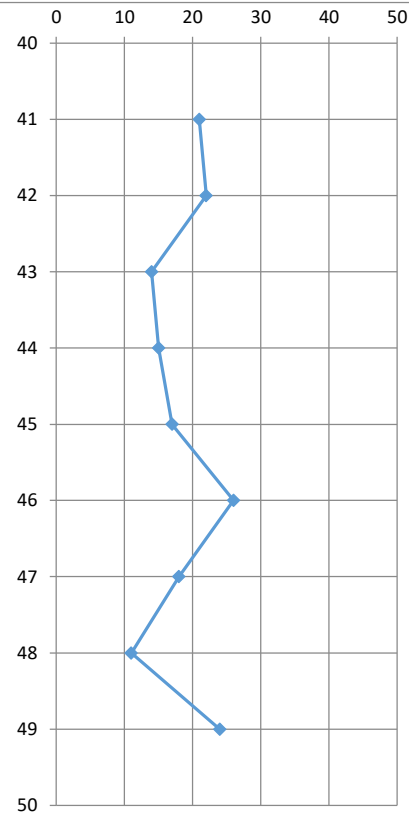
Coordinates: 337572.7437, 3062325.214

Hole Location: BH-4

End Date: 09/06/2022

Ground Water: 6.0m

Soil Description	Symbol	Depth, m	Sample No. & Type	No. of blows			N-Value	N-Value SPT DCPT
				15 cm	15 cm	15 cm		
Blackish grey low plastic, stiff to very stiff clayey silt with some fine sand. (Patan Formation)		- 41	SPT	7	11	10	21	
		- 42	SPT	5	10	12	22	
		- 43	SPT	4	6	8	14	
		- 44	SPT	6	8	7	15	
		- 45	SPT	10	9	8	17	
Blackish grey low plastic, stiff to very stiff clayey silt with some fine sand. (Patan Formation)		- 46	SPT	9	12	14	26	
		- 47	SPT	7	8	10	18	
		- 48	SPT	3	4	7	11	
		- 49	SPT	5	11	13	24	
		- 50	SPT	6	8	9	17	
* Completed at 50+0.45m depth								
Types of Soil		N Value						
Granular Soil	Compactness	0 to 4	4 to 10	10 to 30	30 to 50	> 50		
		Very Loose	Loose	Med. Dense	Dense	Very Dense		
Cohesive Soil	Consistency	0 to 2	2 to 4	4 to 8	8 to 16	16 to 32	> 32	
		Very Soft	Soft	Med. Soft	Stiff	Very Stiff	Hard	



APPENDIX 4.

HOW THE ADB-TA OD FOR 2020 WAS ADJUSTED TO MATCH THE OBSERVED TRAFFIC AT TARGET INTERSECTIONS

APPENDIX 4 HOW THE ADB-TA OD FOR 2020 WAS ADJUSTED TO MATCH THE OBSERVED TRAFFIC AT TARGET INTERSECTIONS

1. Background of Adjustment

It was found that the forecasted traffic volume near the target intersections using the 2020 OD table projected in ADB-TA 2018 was overestimated compared to the observed traffic count data. This was because i) as much as 30% of the floating population was added to the nighttime population by zone and ii) the traffic growth associated with the optimistic development scenario of the New Eastern City was included.

Since the base OD table for ADA-TA 2018 could not be used to forecast future traffic demand in this Project, three sections of the screen line were set and the OD table was adjusted to match the volume of traffic passing through those cross-sections.

2. Aggregation Zone

In order to perform the three-section screen line adjustment shown in Figure 4.3.1 in the main body of the F/R, the OD table for the 171 zones used and forecasted in the Project were consolidated into the following four zones, naming as (East, Southwest, North, and Center).

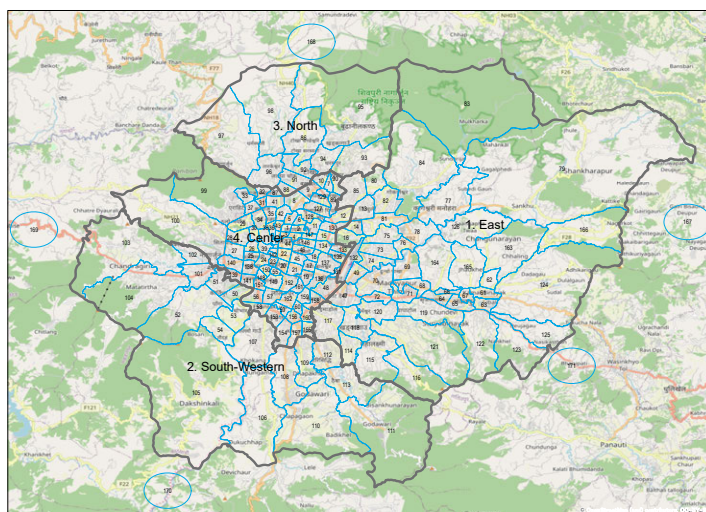


Figure-1 Aggregated Zoning Map

Table -1 Section Traffic Volume (East)

1. Observed traffic

(unit: veh/day)

	Motorbike	Car	Truck	Bus	Total
E1	6,000	1,000	102	209	7,311
E2	6,000	1,000	102	209	7,311
E3	12,644	2,359	188	2,992	18,183
E4	8,710	3,903	480	1,580	14,673
E5	34,836	15,613	1,921	6,319	58,689
E6	10,116	1,887	151	2,394	14,548
E7	94,728	29,766	5,239	12,533	142,266
E8	51,772	10,192	1,102	3,837	66,903
Total	224,806	65,720	9,285	30,073	329,884

2. Traffic passing through the screenline (forecasted 2020OD in ADT-TA 2018)

398,140 148,305 33,049 24,653 604,147

3. Adjustment factor

0.5646406 0.4431408 0.2809465 1.2198515 -

(2) South-west section

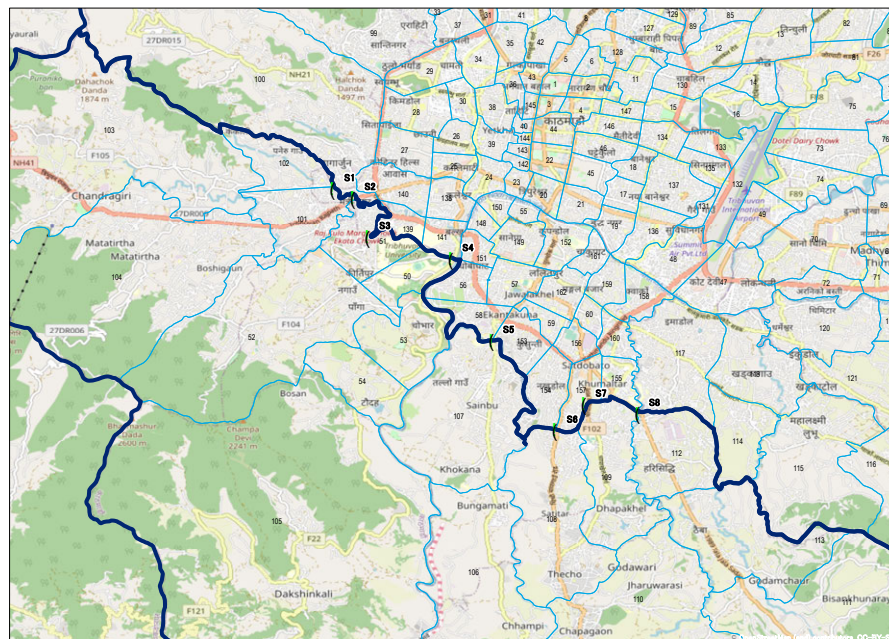


Figure-3 Screen-line (South-west)

Table -2 Section Traffic Volume (South-west)

1. Observed traffic

(unit: veh/day)

	Motorbike	Car	Truck	Bus	Total
S1	6,000	1,000	102	209	7,311
S2	31,716	11,123	6,364	10,965	60,168
S3	6,000	1,000	102	209	7,311
S4	18,728	8,034	1,718	3,014	31,494
S5	17,646	10,079	2,536	913	31,174
S6	18,424	5,849	1,158	1,965	27,396
S7	18,424	5,849	1,158	1,965	27,396
S8	20,036	8,023	731	2,627	31,417
Total	136,974	50,957	13,869	21,867	223,667

2. Traffic passing through the screenline (forecasted 2020OD in ADT-TA 2018)

129,403 51,556 21,304 11,919 214,182

3. Adjustment factor

1.0585071 0.9883816 0.6510045 1.8346338 -

(3) North section

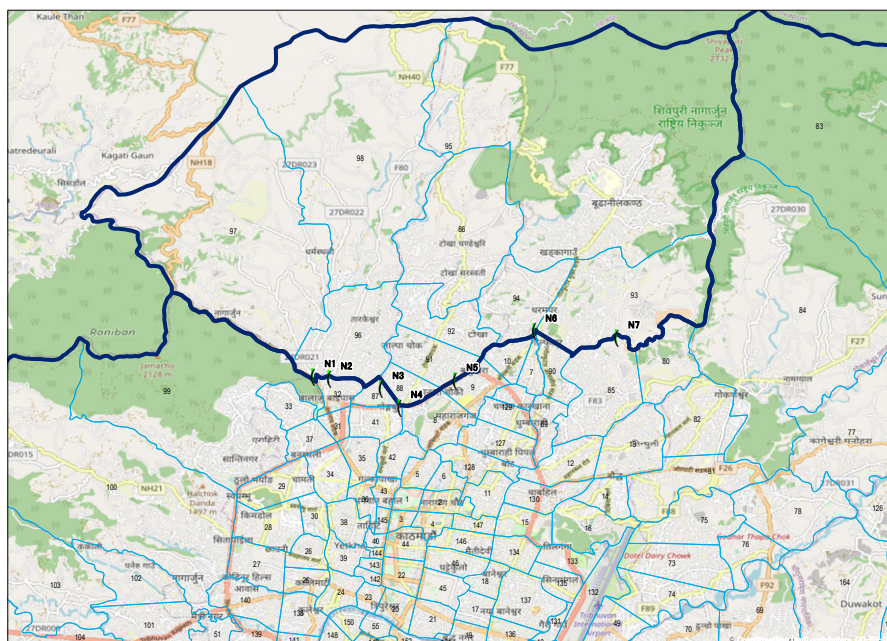


Figure-4 Screen-line (North)

Table-3 Section Traffic Volume (North)

1. Observed traffic (unit: veh/day)					
	Motorbike	Car	Truck	Bus	Total
N1	5,994	4,492	1,178	1,601	13,265
N2	9,702	5,628	1,820	3,930	21,080
N3	6,000	1,000	102	209	7,311
N4	7,762	4,502	1,456	3,144	16,864
N5	6,000	1,000	102	209	7,311
N6	38,704	17,815	1,172	4,958	62,649
N7	6,000	1,000	102	209	7,311
Total	80,162	35,437	5,932	14,260	135,791
2. Traffic passing through the screenline (forecasted 2020OD in ADT-TA 2018)					
	65,804	28,483	8,126	4,535	106,948
3. Adjustment factor					
	1.2181934	1.2441456	0.7300025	3.1444322	-

5. OD after the screen-line adjustment

With the screen-line adjustment, traffic in the Kathmandu Metropolitan Area in 2020 was significantly reduced from 2,066,800 vehicles/day to 1,215,300 vehicles/day. This OD table is treated as the current OD for the Project.

Table -4 Results of Screen-line Adjustment

	2020 OD updated in ADB-TA2018						Revised 2020 OD by screen-line adjustment					
	1:East	2:South-W	3:North	4:Center	total		1:East	2:South-W	3:North	4:Center	Total	
Motor-bike	1	209,165	36,372	22,473	339,295	607,305	1	71,831	10,269	6,334	95,926	184,360
	2	0	8,371	1,811	127,592	137,774	2	0	2,862	757	57,276	60,895
	3	0	0	279	65,804	66,083	3	0	0	92	33,389	33,481
	4	0	0	0	367,756	367,756	4	0	0	0	126,185	126,185
	tot	209,165	44,743	24,563	900,447	1,178,918	tot	71,831	13,131	7,183	312,776	404,921
				Intra Vol.	585,571					Intra Vol.	200,970	
				Intra vol. R	49.7%					Intra vol. R	49.6%	
Car	1	115,797	7,139	4,487	136,679	264,102	1	74,251	3,065	1,940	60,416	139,672
	2	0	9,363	706	50,850	60,919	2	0	5,999	702	47,641	54,342
	3	0	0	116	28,483	28,599	3	0	0	67	32,662	32,729
	4	0	0	0	281,941	281,941	4	0	0	0	180,606	180,606
	tot	115,797	16,502	5,309	497,953	635,561	tot	74,251	9,064	2,709	321,325	407,349
				Intra Vol.	407,217					Intra Vol.	260,923	
				Intra vol. R	64.1%					Intra vol. R	64.1%	
Truck	1	25,202	2,848	1,460	28,741	58,251	1	22,005	1,728	872	16,764	41,369
	2	0	3,410	762	20,542	24,714	2	0	2,976	859	24,398	28,233
	3	0	0	433	8,126	8,559	3	0	0	389	9,624	10,013
	4	0	0	0	70,557	70,557	4	0	0	0	61,798	61,798
	tot	25,202	6,258	2,655	127,966	162,081	tot	22,005	4,704	2,120	112,584	141,413
				Intra Vol.	99,602					Intra Vol.	87,168	
				Intra vol. R	61.5%					Intra vol. R	61.6%	
Bus	1	5,748	1,125	1,639	21,889	30,401	1	16,783	2,614	3,863	50,720	73,980
	2	0	412	523	11,396	12,331	2	0	1,228	1,756	37,610	40,594
	3	0	0	198	4,535	4,733	3	0	0	575	21,746	22,321
	4	0	0	0	42,737	42,737	4	0	0	0	124,684	124,684
	tot	5,748	1,537	2,360	80,557	90,202	tot	16,783	3,842	6,194	234,760	261,579
				Intra Vol.	49,095					Intra Vol.	143,270	
				Intra vol. R	54.4%					Intra vol. R	54.8%	
Total	1	355,912	47,484	30,059	526,604	960,059	1	184,870	17,676	13,009	223,826	439,381
	2	0	21,556	3,802	210,380	235,738	2	0	13,065	4,074	166,925	184,064
	3	0	0	1,026	106,948	107,974	3	0	0	1,123	97,421	98,544
	4	0	0	0	762,991	762,991	4	0	0	0	493,273	493,273
	tot	355,912	69,040	34,887	1,606,923	2,066,762	tot	184,870	30,741	18,206	981,445	1,215,262
				Intra Vol.	1,141,485					Intra Vol.	692,331	
				Intra vol. R	55.2%					Intra vol. R	57.0%	

5. Confirmation of reproducibility of current OD forecasted using population by new zone

The current OD table shown in Table- 5 was re-forecasted by substituting 2020 OD table updated by the screen-line adjustment and the 2020 population by zone set in Table 4.3.2 in the main body of the F/R into the demand forecast model.

The results of comparing that OD table by screen line are shown in Table 4.3.1 in the same volume, and the differences are less than 6%, which is sufficiently reproducible.

Table-5 Result of the OD Reproduction: Final OD

	Revised 2020 OD by screen-line adjustment						Reproduced 2020 OD					
	1:East	2:South-W	3:North	4:Center	Total		1:East	2:South-W	3:North	4:Center	Total	
Motor bike	1	71,831	10,269	6,334	95,926	184,360	1	71,864	14,420	8,308	95,404	189,996
	2	0	2,862	757	57,276	60,895	2	0	2,897	4,228	51,589	58,714
	3	0	0	92	33,389	33,481	3	0	0	84	29,044	29,128
	4	0	0	0	126,185	126,185	4	0	0	0	127,164	127,164
	tot	71,831	13,131	7,183	312,776	404,921	tot	71,864	17,317	12,620	303,201	405,002
				Intra Vol.	200,970					Intra Vol.	202,009	
				Intra vol. R	49.6%					Intra vol. R	49.9%	
Car	1	74,251	3,065	1,940	60,416	139,672	1	74,656	6,328	4,370	58,801	144,155
	2	0	5,999	702	47,641	54,342	2	0	5,998	3,138	44,643	53,779
	3	0	0	67	32,662	32,729	3	0	0	59	29,532	29,591
	4	0	0	0	180,606	180,606	4	0	0	0	180,318	180,318
	tot	74,251	9,064	2,709	321,325	407,349	tot	74,656	12,326	7,567	313,294	407,843
				Intra Vol.	260,923					Intra Vol.	261,031	
				Intra vol. R	64.1%					Intra vol. R	64.0%	
Truck	1	22,005	1,728	872	16,764	41,369	1	22,219	2,916	1,097	16,603	42,835
	2	0	2,976	859	24,398	28,233	2	0	2,994	1,569	23,871	28,434
	3	0	0	389	9,624	10,013	3	0	0	410	9,113	9,523
	4	0	0	0	61,798	61,798	4	0	0	0	60,919	60,919
	tot	22,005	4,704	2,120	112,584	141,413	tot	22,219	5,910	3,076	110,506	141,711
				Intra Vol.	87,168					Intra Vol.	86,542	
				Intra vol. R	61.6%					Intra vol. R	61.1%	
Bus	1	16,783	2,614	3,863	50,720	73,980	1	16,893	6,758	4,253	49,090	76,994
	2	0	1,228	1,756	37,610	40,594	2	0	1,204	2,707	33,539	37,450
	3	0	0	575	21,746	22,321	3	0	0	572	21,038	21,610
	4	0	0	0	124,684	124,684	4	0	0	0	126,030	126,030
	tot	16,783	3,842	6,194	234,760	261,579	tot	16,893	7,962	7,532	229,697	262,084
				Intra Vol.	143,270					Intra Vol.	144,699	
				Intra vol. R	54.8%					Intra vol. R	55.2%	
Total	1	184,870	17,676	13,009	223,826	439,381	1	185,632	30,422	18,028	219,898	453,980
	2	0	13,065	4,074	166,925	184,064	2	0	13,093	11,642	153,642	178,377
	3	0	0	1,123	97,421	98,544	3	0	0	1,125	88,727	89,852
	4	0	0	0	493,273	493,273	4	0	0	0	494,431	494,431
	tot	184,870	30,741	18,206	981,445	1,215,262	tot	185,632	43,515	30,795	956,698	1,216,640
				Intra Vol.	692,331					Intra Vol.	694,281	
				Intra vol. R	57.0%					Intra vol. R	57.1%	

APPENDIX 5.

STUDY ON AT GRADE INTERSECTION OPTION

APPENDIX 5. STUDY ON AT GRADE INTERSECTION OPTION

5.1 Study Background

This appendix describes the study on Koteswor intersection option for Koteswor intersection considering the utilization of south of Tribhuvan airport land.

5.2 At Grade Improvement Options

The Koteswor Intersection is studied under three improvement options with the help of micro-simulation using the VISSIM. The options are listed as below:

Table 5.1 List of Identified Options

Option-1	Improvement at with single intersection at Koteswor
Option-2	Improvement at with a triangular plan with a new bypass
Option-3	Improvement with a roundabout plan

The outlines under the listed options are summarized below.

(1) Outline of Option-1: Single Intersection Option

Under this option, Koteswor Intersection will be improved by providing additional lanes within the available 50m of ROW. This forms only one intersection similar to the existing layout and the traffic flow is controlled installing the traffic signal at the intersection. This is the only option available if additional land acquisition for intersection improvement is not possible.

(2) Outline of Option-2: Triangular Plan Option

Under this option, a bypass link across TIA land will be constructed between Araniko Highway leg and Ring Road South leg of the Koteswor Intersection. This forms a triangular road network similar at Tinkune intersection with three road intersections on three apex of the triangle thus formed. The traffic flow at the Koteswor Intersection will be controlled with the separate traffic signals installed on the three apex intersections. This option requires the land transfer from TIA as a new bypass road is to be constructed on the southern land of TIA.

(3) Outline of Option-3: Roundabout Option

Under this option, a bypass road similar to Option-2 will be constructed across TIA land between Araniko Highway and Ring Road South and this will be utilized to form a wide roundabout. Provision is made for merging and diverging of traffic from/to the intersecting legs. This enables the circular flow of traffic eliminating the direct crossing of vehicles and thus eliminating the need of traffic signals. Circular road traffic is given the higher priority. Hence the traffic entering the roundabout must yield to the circulating traffic. This option also requires the land transfer from TIA as a new bypass road is to be constructed on the southern land of TIA.

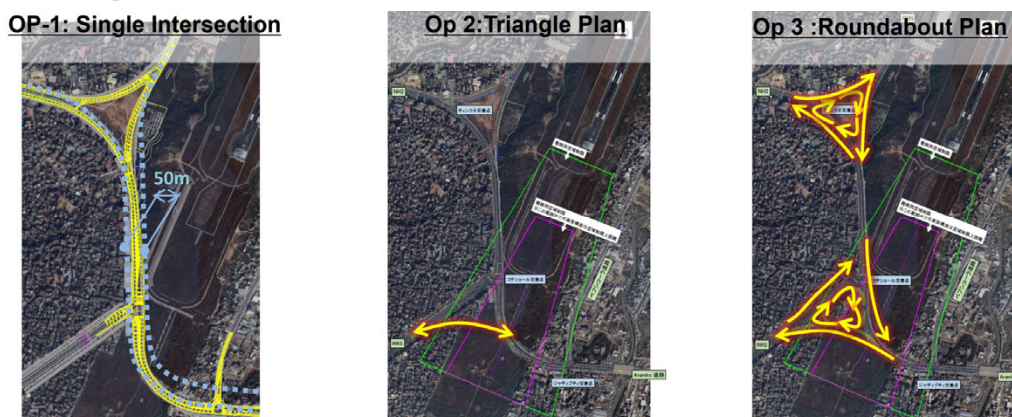


Figure 5.1 Outlines of Traffic Flow under Identified Options

5.3 Traffic Signal Timing

The traffic operation across the Koteswor Intersection as observed in the survey year showed that the existing traffic signalization has average length of phase cycle in the peak hour as high as 420 sec. This causes the significant delay to the traffic crossing the intersection.

The length of signal cycle is desired to keep lower. But this should be sufficient enough for pedestrian crossing. For the improvement options described above the signal timing is redesigned and a cycle time of 180 secs is planned as the optimum cycle for vehicles and pedestrian. Also the number of phases in a cycle should be as low as possible. Currently there is a minor leg from the west (From Seti-Opi Marga) connected directly to the intersection. The direct access from/to this leg is prohibited. Which enables to reduce the no of phases too.

(1) Single Intersection Plan

The single intersection is planned to have three phases. The green time is split proportionately to the volume of traffic in each phases. The design output of the signal timing is shown in as in the figure5.2.



Legend

T: Through Direction

L: Left Direction

R: Right Direction

Yellow: No. of veh./h

Green Arrow: Go

Red Arrow: Stop

1 ϕ	2 ϕ	3 ϕ	
G:61 Y:4 R1	G:71 Y:4 R1	G:33 Y:4 R1	Cycle Time: 180

Figure 5.2 Traffic Flow and Phase Design for Single Intersection Option

(2) Triangular Intersection Plan

There will be separate traffic lights in three intersections at three apex of triangles but they are synchronized to function as single intersection. The integrated intersection is planned to have four phases. The green time is split proportionately to the volume of traffic flowing in each phases. The design output of the signal timing is as in the figure5.3.



Legend

T: Through Direction
 L: Left Direction
 R: Right Direction
 Yellow: No. of veh./h

$\phi 1$	$\phi 2$	$\phi 3$	$\phi 4$	
G:10 Y:4 R1	G:71 Y:4 R1	G:34 Y:4 R1	G:46 Y:4 R1	Cycle Time: 180

Green Arrow: Go
 Red Arrow: Stop

Figure 5.3 Traffic Flow and Phase Design for Triangular Plan Option

5.4 Roundabout Plan

Roundabout plan provides the opportunity of continuous flow of traffic in the circular path with merging and diverging flows only. Hence, it does not require the traffic signals for the intersection control.



Figure 5.4 Showing Peak Traffic Flow for Roundabout Option

5.5 Traffic Improvement Effects

The improvement capacity of different options identified were studied based on the microsimulation of the future traffic using VISSIM Software. This method analyses the change in the vehicle trips per hour and the change in the delay time experienced by road users passing the intersection.

(1) Microsimulation Setting

The simulation tasks were carried out for the projected traffic at the design year 2032 based on the traffic survey carried out in 2019. The simulation was carried out by taking the traffic for the evening peak hour (i.e 17:00 – 18:00 Hrs) traffic of the design year for the without-project scenario of the grade separated facility. That means the simulation results are the estimation of the impacts at Koteswori Intersection at the end of design life without building the grade separated intersection infrastructures. In this analysis, only the Koteswori Intersection was considered for the simulation purpose.

(2) Microsimulation Result

The simulation was run for one-hour duration for each of the options discussed above for at-grade intersection improvement at Koteswori Intersection with adequate calibration. The results of the simulation run is summarized in table5.2.

The simulation result shows the Option-1 accommodates 22,899 vehicle trips with average delay of 102 secs per vehicle. Option-2 accommodates 23,344 vehicle trips with average delay of 51

secs per vehicle and Option-3 accommodates 18,995 vehicle trips with average delay of 238 sec per vehicle.

Table 5.2 Microsimulation Results of Different Improvement Options at Koteswor Intersection

Koteswor Intersection	OP-1 Single intersection	OP-2 Triangle Plan	OP-3 Roundabout Plan
No. Trip completed vehicle (Veh.)	22,899	23,344 (445)	18,995 (-3,904)
Average Delay(s)	102.8	51.8 (51.01)	238.24 (-145.3)
3. Cycle Time(s)	180	180	None

PS: Values inside parenthesis shows the difference of values from that with Option-1

From the microsimulation, the Option-2 of Triangular Intersection arrangement is the best option with maximum intersection capacity and minimum control delay. If Option-2 is chosen considering the difficulty of land acquisition from TIA land and private land owners, almost equal capacity of intersection can be achieved with double the delay (ie. 102 secs) than the best option (Option-2). Still this improves about 4 times of the current value of delay experienced by road users.

5.6 Geometric Study

Requirement for developing the road structure under the airspace limitation area is that road surface fully covered. In addition considering the utilization of TIA, tunnel structure should be applied to avoid the division of land. Geometric study for applying tunnel structure is shown in the figure5.5. As result of that, following issues are raised.

- Residential area will be divided by new road. Crossing structure will be required
- Even if maximum vertical grade is applied, the structure is exposed throughout entire airport land
- There are traffic safety issues due to steep grade; Rear-end collision with the signal waiting car and Collison during channelization in circular road
- Drainage system is required

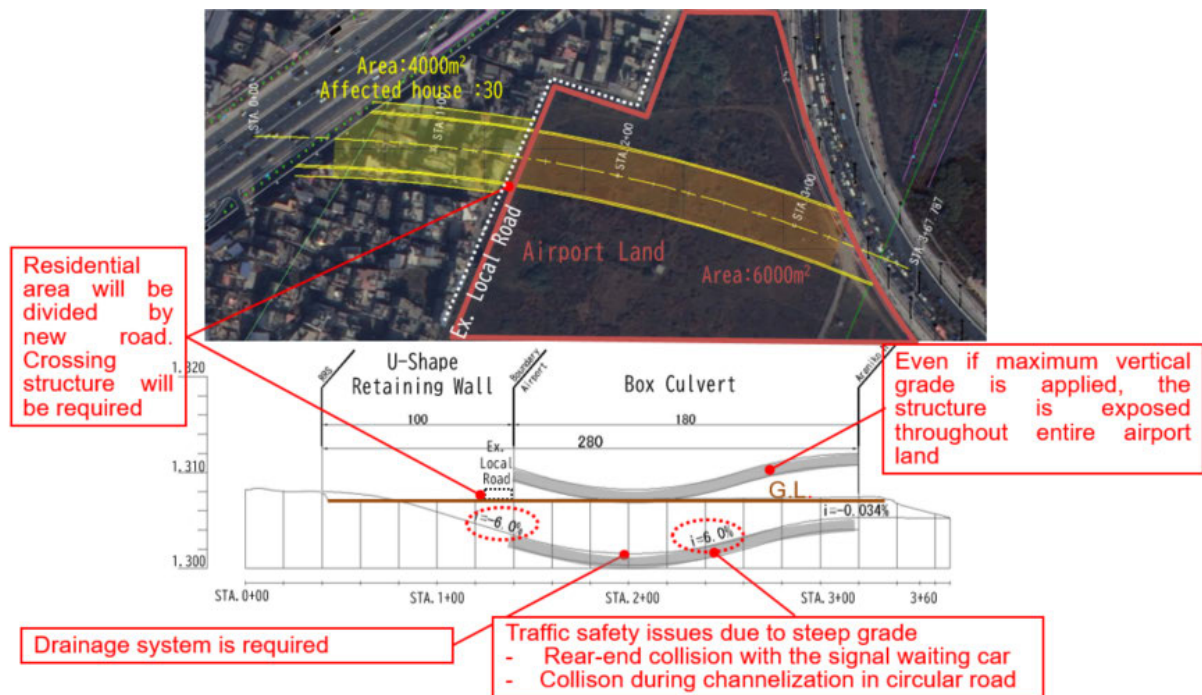


Figure 5.5 Geometric Study for Applying the Tunnel Structure

5.7 Result

The result of this study is summarized in Table 5.3

Table 5.3 Summary of At Grade intersection Option Study

	OP-1: Single Intersection	OP-2: Triangle Plan	OP-3 : Roundabout Plan
Image			
Traffic Improvement	Ave. Delay time: 102.8s Trip comp. veh.: 22,899 veh/h	Ave. Delay time: 51.8s Trip comp. veh.: 23,344 veh/h	Ave. Delay time: 238.2s Trip comp. veh.: 18,995 veh/h
Geometric Issue	None	- Traffic safety issues due to steep grade near signal intersection.	- Traffic safety issues due to steep grade near signal intersection.
Aviation Issue	None	- Tunnel is exposed throughout airport land	- Tunnel is exposed throughout airport land
Land Issue	None	- Residential land is divided by new route, new crossing structure is necessary.	- Residential land is divided by new route, new crossing structure is necessary.
Required Land	None	Private: 4,000m ² Airport: 6,000m ²	Private: 4,000m ² Airport: 6,000m ²
Affected house	None	30	30
Add. Cost*	None	24 Mil. USD	24 Mil. USD

* Rough estimation for new bypass route only. Land acquisition cost is not included .

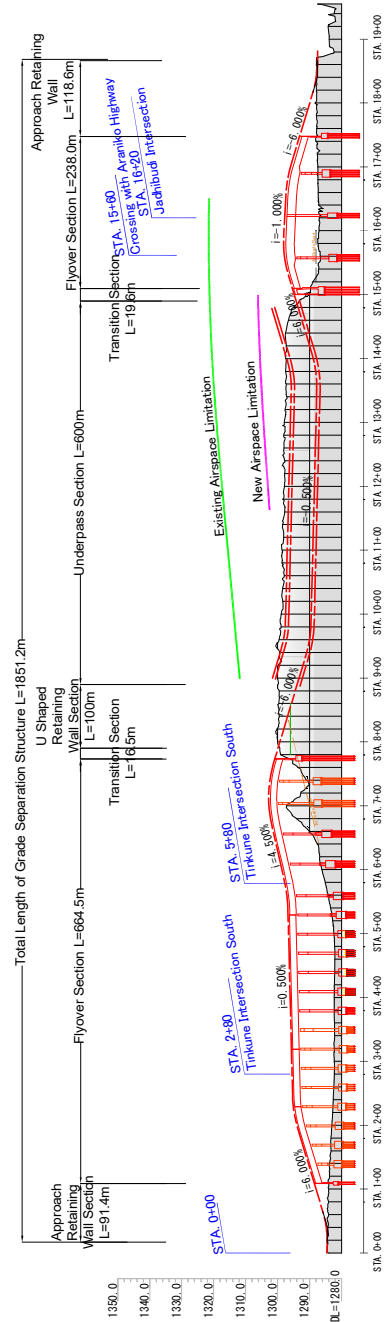
APPENDIX 6.

DRAWING

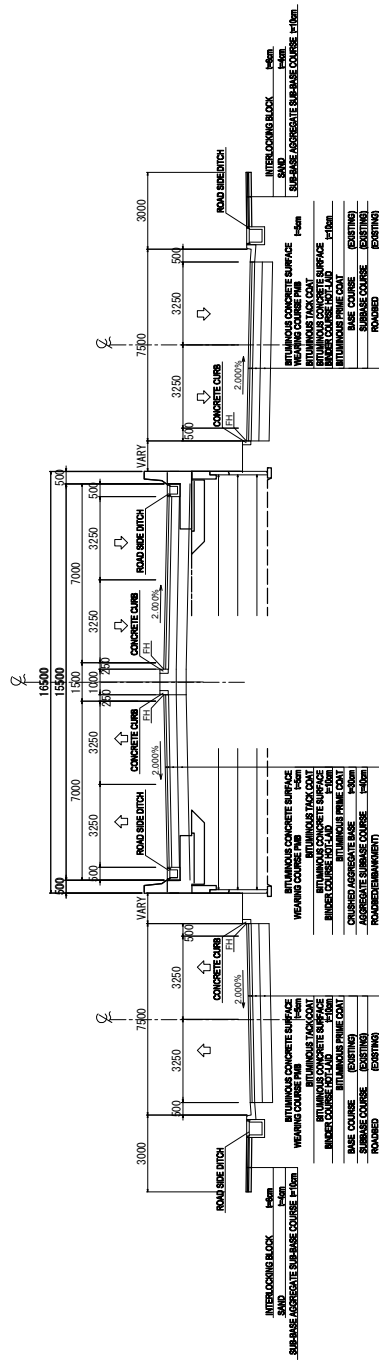
Preparatory Survey
for
Koteshwor Intersection Improvement Project
INDEX OF DRAWINGS

DWG NO.	SHEET CONTENTS	SHEET NO.
I	INDEX OF DRAWINGS	
A	GRADE SEPARATION STRUCTURE	
A 1	GENERAL VIEW OF STRUCTURE TYPE OF GRADE SEPARATION	1
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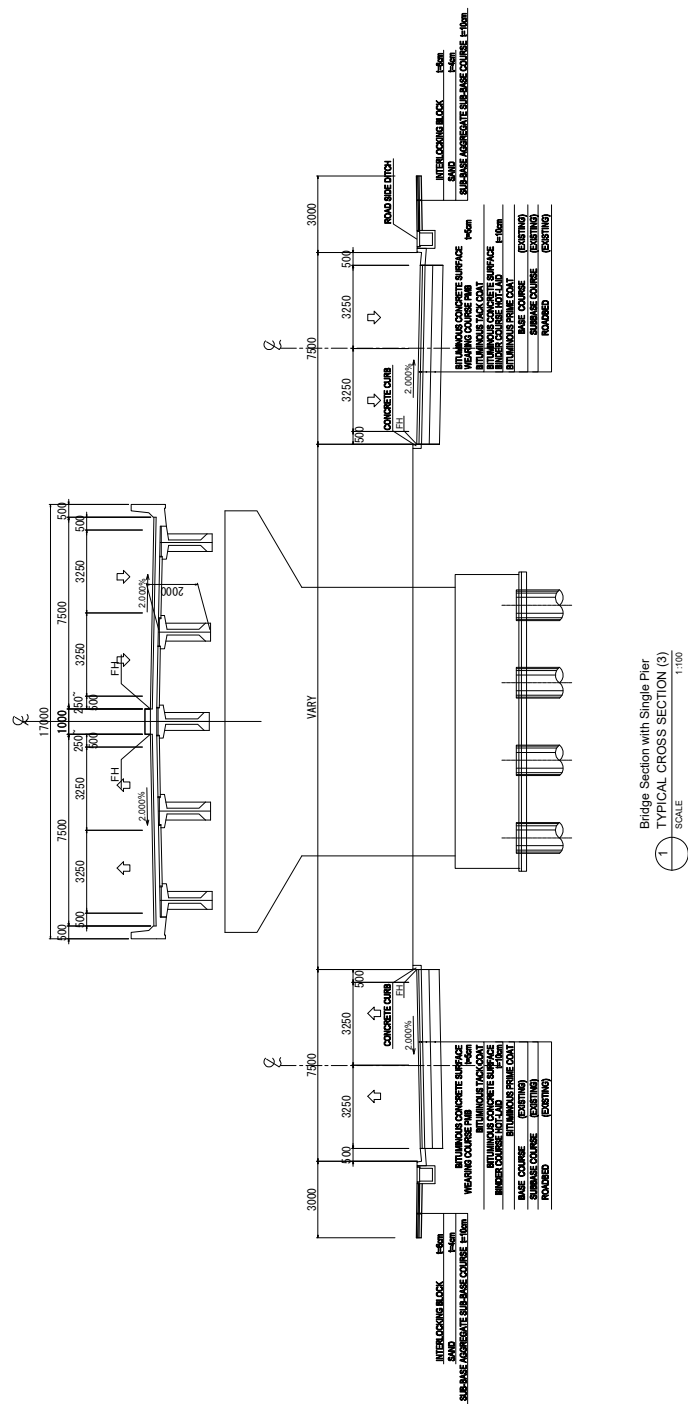
A. GRADE SEPARATION STRUCTURE



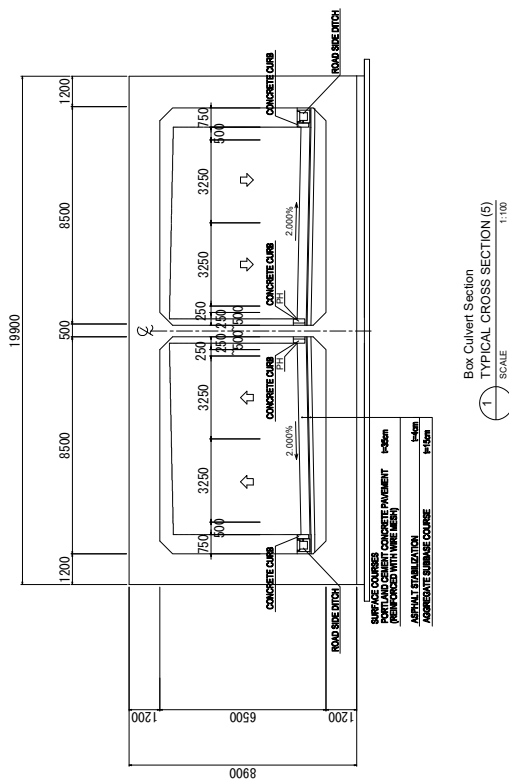
Appendix 6-3



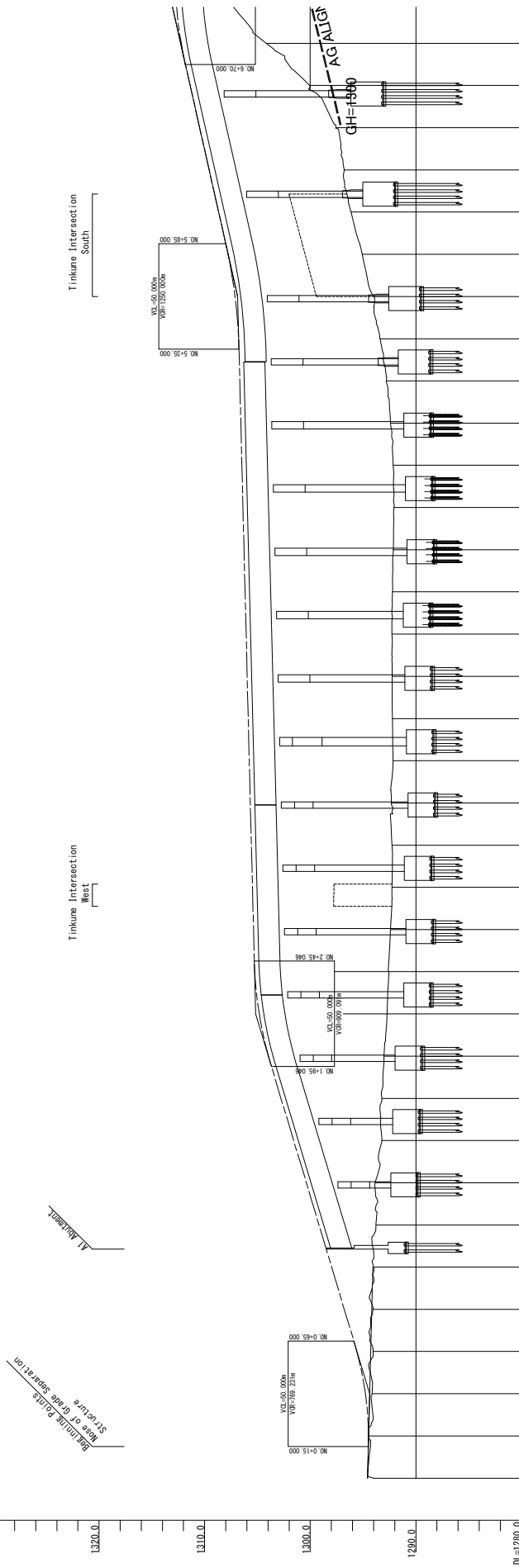
Bridge Approach Retaining Wall Section
TYPICAL CROSS SECTION (1)
SCALE 1/100



Transition Section Between Bridges and Box Culvert 1 TYPICAL CROSS SECTION (4) SCALE 1:100	Preparatory Survey for Koteswor Intersection Improvement Project IN FEDERAL DEMOCRATIC REPUBLIC OF NEPAL MOPIT Ministry of Physical Infrastructure and Transport DOR Department of Road JICA PADCO CITI Engineering International Co., Ltd. SCALE: 1/100 JANUARY 2024 TYPICAL CROSSSECTION 4 DWG. NO: A 5
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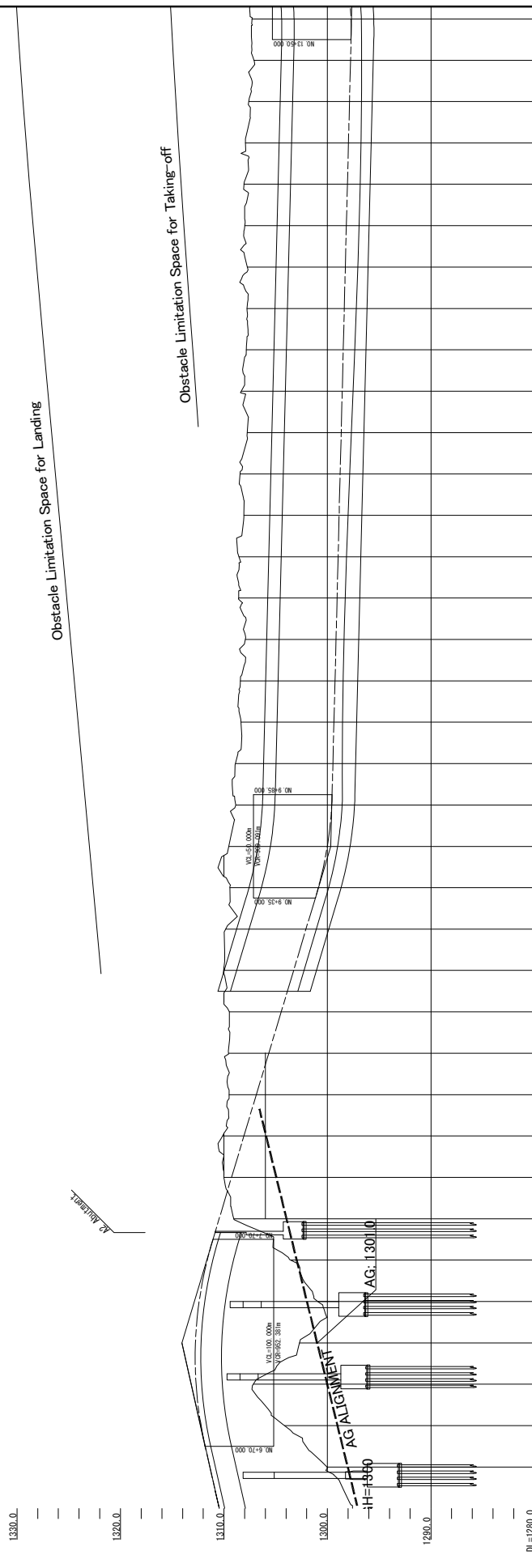


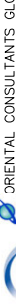
PROFILE (1)
H: 1/1000 V:1/200



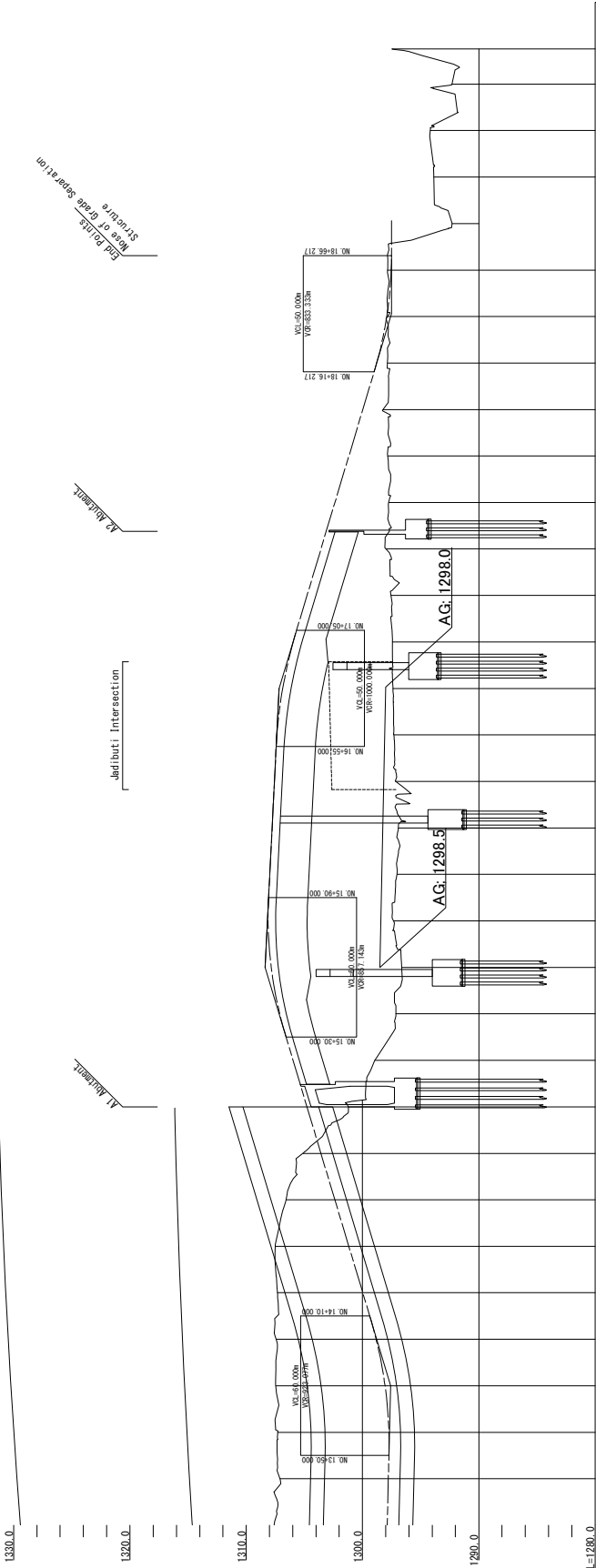
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1280.0	1280.0	1280.0	1280.0	0.000	0.000	0.000	0.000	1280.0	1280.0	1280.0
1285.0	1285.0	1285.0	1285.0	0.000	0.000	0.000	0.000	1285.0	1285.0	1285.0
1290.0	1290.0	1290.0	1290.0	0.000	0.000	0.000	0.000	1290.0	1290.0	1290.0
1295.0	1295.0	1295.0	1295.0	0.000	0.000	0.000	0.000	1295.0	1295.0	1295.0
1300.0	1300.0	1300.0	1300.0	0.000	0.000	0.000	0.000	1300.0	1300.0	1300.0
1305.0	1305.0	1305.0	1305.0	0.000	0.000	0.000	0.000	1305.0	1305.0	1305.0
1310.0	1310.0	1310.0	1310.0	0.000	0.000	0.000	0.000	1310.0	1310.0	1310.0
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PROFILE (2)
H: 1/1000 V:1/200

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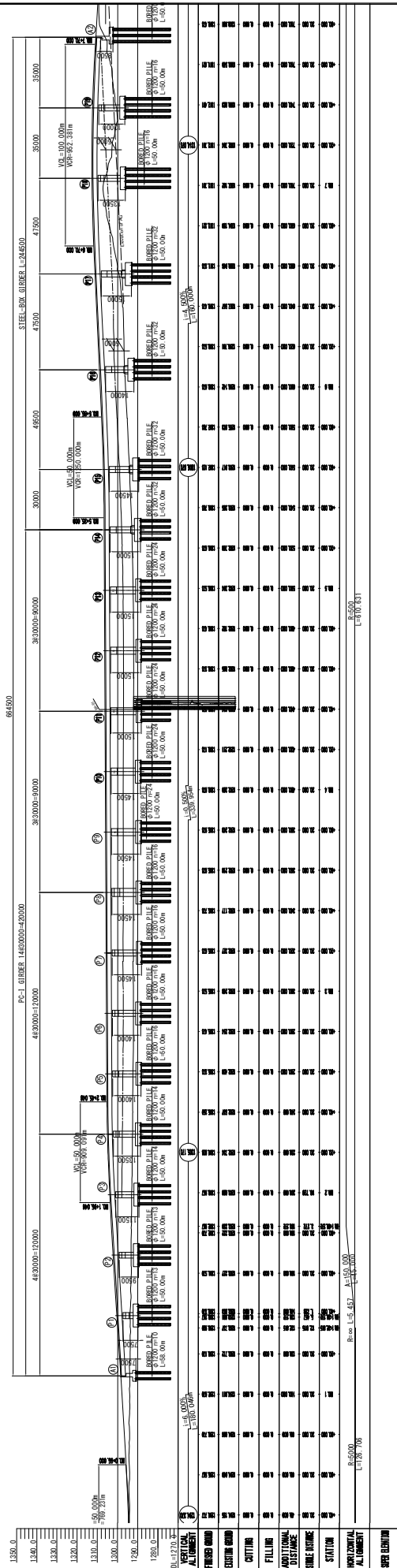
Preparatory Survey for Koteswhor Intersection Improvement Project IN FEDERAL DEMOCRATIC REPUBLIC OF NEPAL	 MOPIT Ministry of Physical Infrastructure and Transport DOR Department of Road	 ORIENTAL CONSULTANTS GLOBAL Co.,Ltd. H:110000 V:1200 PADECO Co.,Ltd. CTI Engineering International Co., Ltd	SCALE: H: 1/10000 V:1200 JANUARY 2024	PROFILE (2)	DWG. NO: A 8
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PROFILE (3)
H: 1/1000 V:1/250



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FINISHED GROUND	1297.575	1300.375	1297.575	1297.500	1297.500	1297.500
EXISTING GROUND	1297.575	1300.375	1297.575	1297.500	1297.500	1297.500
CUTTING	1297.575	1300.375	1297.575	1297.500	1297.500	1297.500
FILLING	1297.575	1300.375	1297.575	1297.500	1297.500	1297.500
ADDITIONAL DISTANCE	1297.575	1300.375	1297.575	1297.500	1297.500	1297.500
SINGLE DISTANCE	1297.575	1300.375	1297.575	1297.500	1297.500	1297.500
STATION	1297.575	1300.375	1297.575	1297.500	1297.500	1297.500
HORIZONTAL ALIGNMENT	1297.575	1300.375	1297.575	1297.500	1297.500	1297.500
SUPER ELEVATION	1297.575	1300.375	1297.575	1297.500	1297.500	1297.500

TINKUNE BRIDGE GENERAL VIEW (1) PROFILE Scale: A1: 1/1000, A3: 1/2000



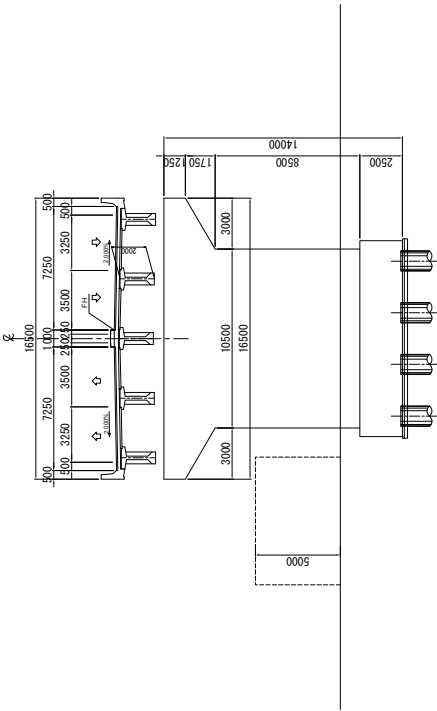
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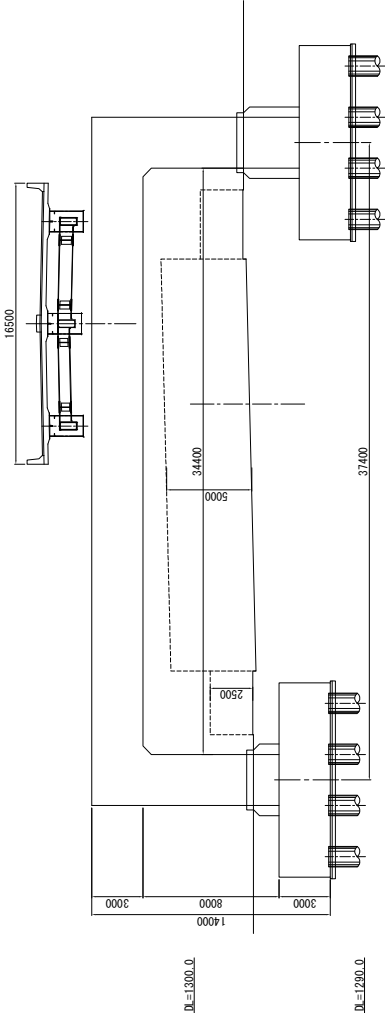
Preparatory Survey for Koteswor Intersection Improvement Project IN FEDERAL DEMOCRATIC REPUBLIC OF NEPAL			SCALE: JANUARY 2024	TINKUNE BRIDGE GENERAL VIEW (1)	DWG. NO: A 10
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TINKUNE BRIDGE GENERAL VIEW (2)
FRONT VIEW Scale: A1: 1/300, A3: 1/600

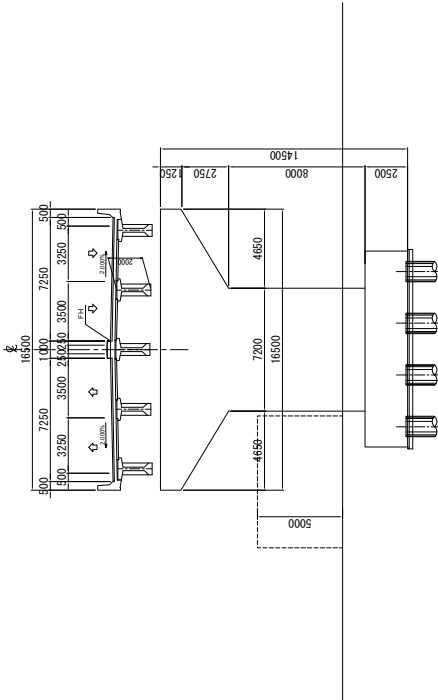
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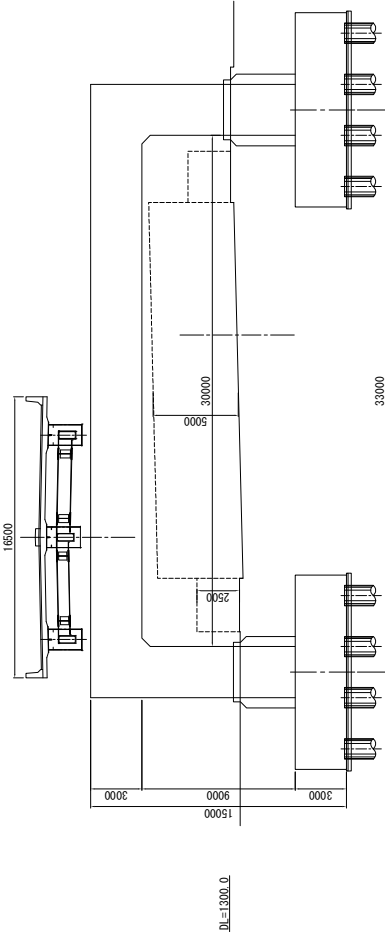
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P8-PIER

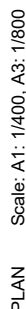
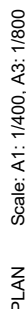


P17-PIER

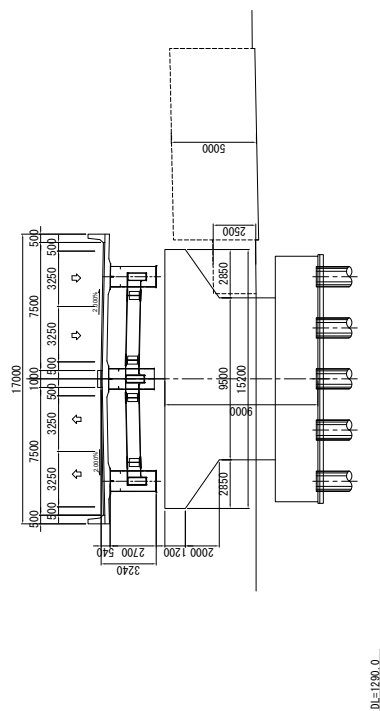
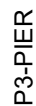
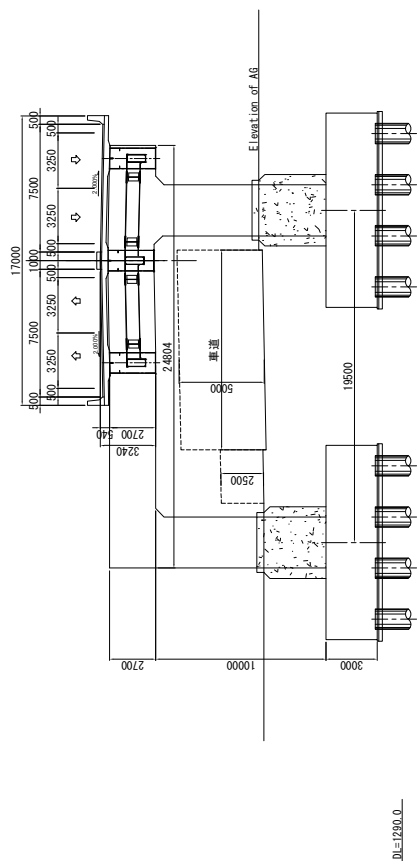
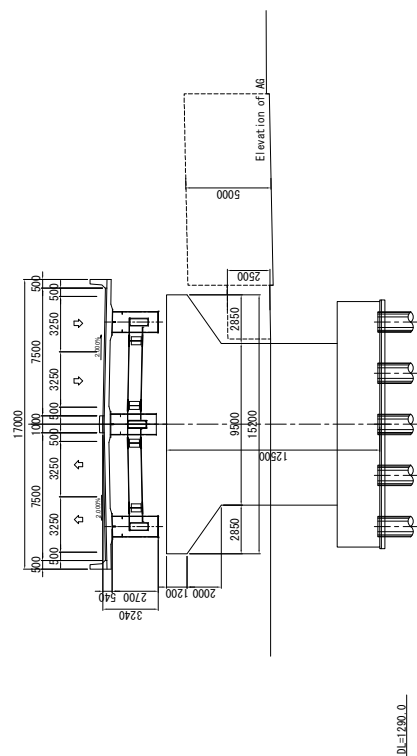


Preparatory Survey for Koteswhor Intersection Improvement Project IN FEDERAL DEMOCRATIC REPUBLIC OF NEPAL	 MOPIT Ministry of Physical Infrastructure and Transport DOR Department of Road	 jica PADCO CITI Engineering International Co., Ltd.	SCALE: JANUARY 2024	TINKUNE BRIDGE GENERAL VIEW (2)	DWG. NO: A 11

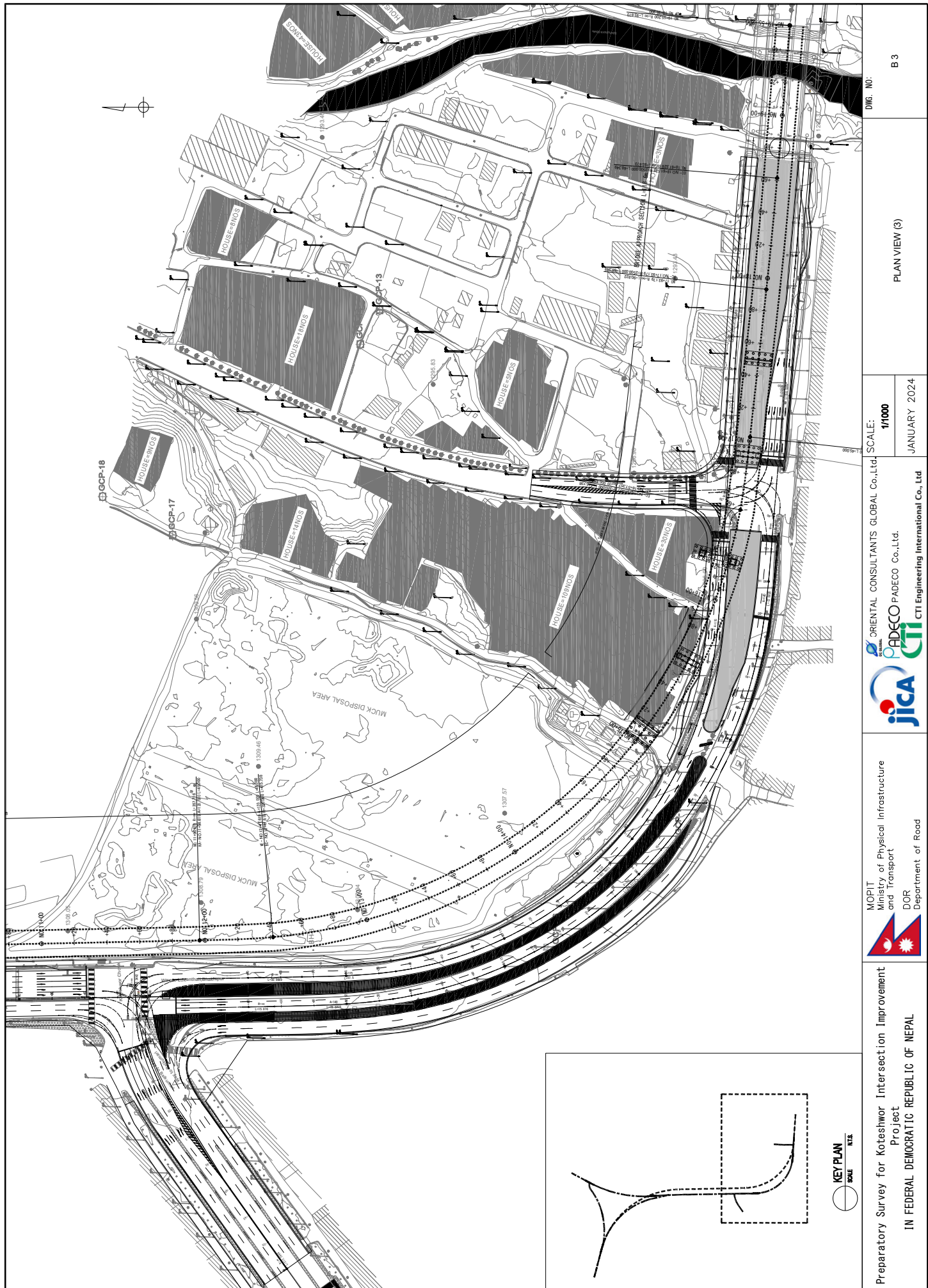
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P2-PIER



B. AT GRADE ROAD



Appendix 6-20

Preparatory Survey for Koteswar Intersection Improvement Project
IN FEDERAL DEMOCRATIC REPUBLIC OF NEPAL



MOPIT
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and Transport
DOR
Department of Road



ORIENTAL CONSULTANTS GLOBAL Co., Ltd.
PADECO Co., Ltd.
CII Engineering International Co., Ltd.

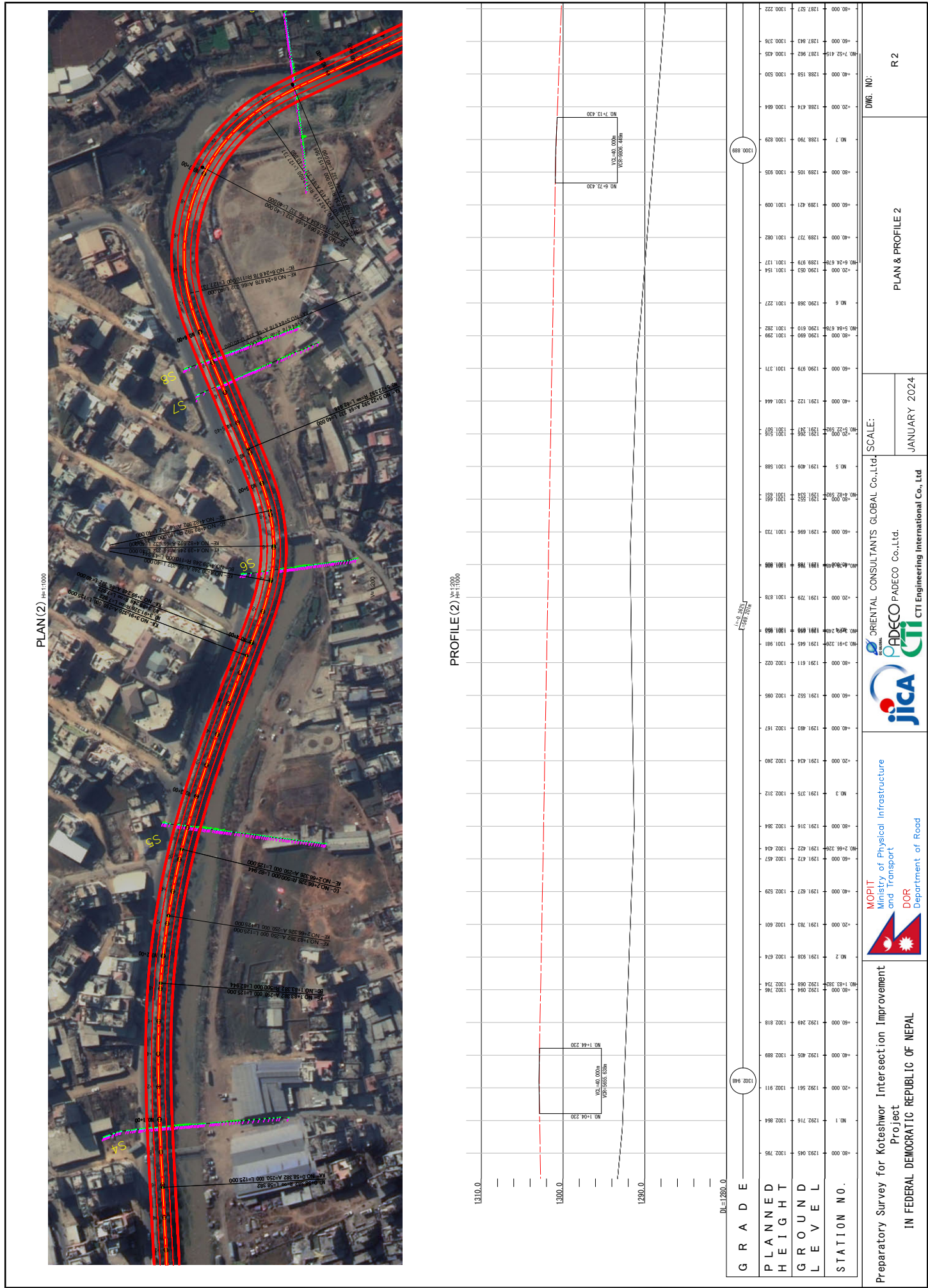
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1/1000
JANUARY 2024

PLAN VIEW (3)

B 3

DWG. NO:

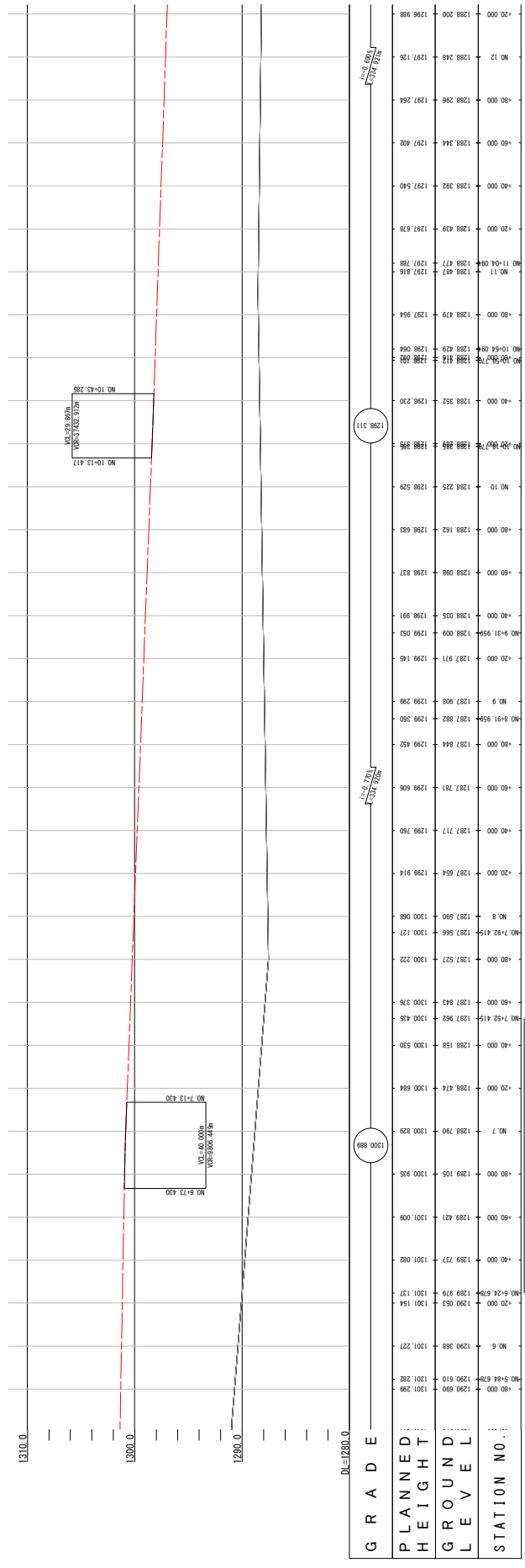
R. REFERENCE MANOHARA RIVER BYPASS PLAN



PLAN (3) H=1:1000



PROFILE (3) H=1:200
H=1:1000



Preparatory Survey for Koteswar Intersection Improvement Project
IN FEDERAL DEMOCRATIC REPUBLIC OF NEPAL



ORIENTAL CONSULTANTS GLOBAL Co.,Ltd.
PADECO Co.,Ltd.
CIT Engineering International Co., Ltd.

PLAN & PROFILE 3

R 3

JANUARY 2024

DWG. NO:

[illegible]

OWG. NO.:

PLAN & PROFILE 3

R3

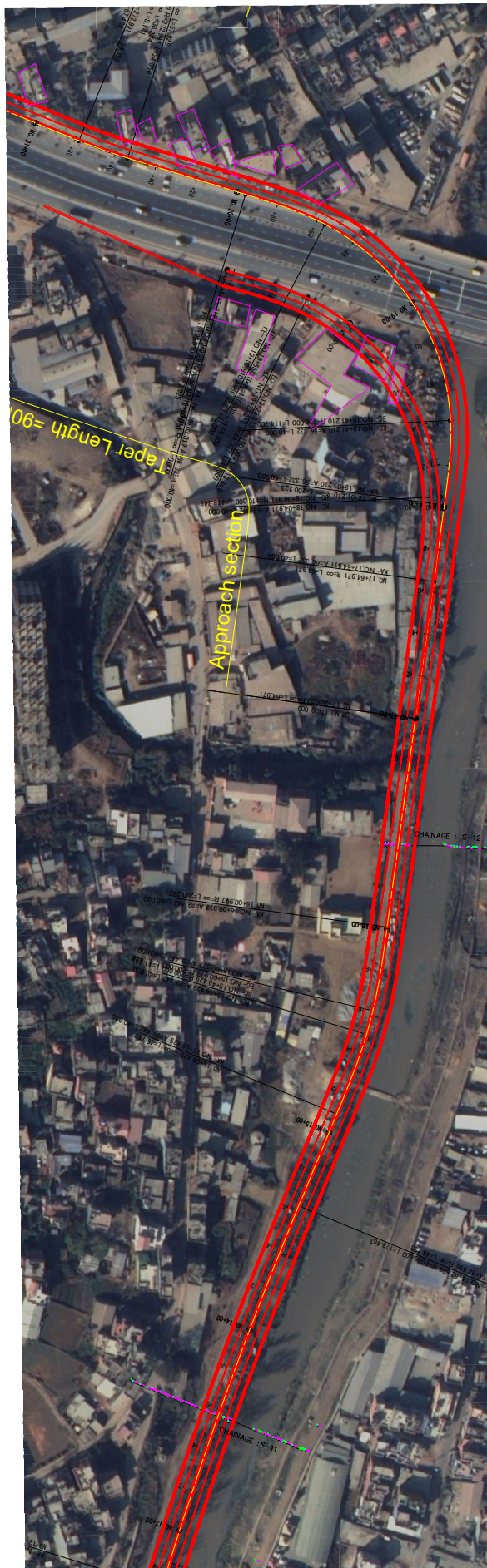
jica
ORIENTAL CONSULTANTS GLOBAL Co., Ltd.
ADECO PADECO Co., Ltd.
CTI
CTI Engineering International Co., Ltd.



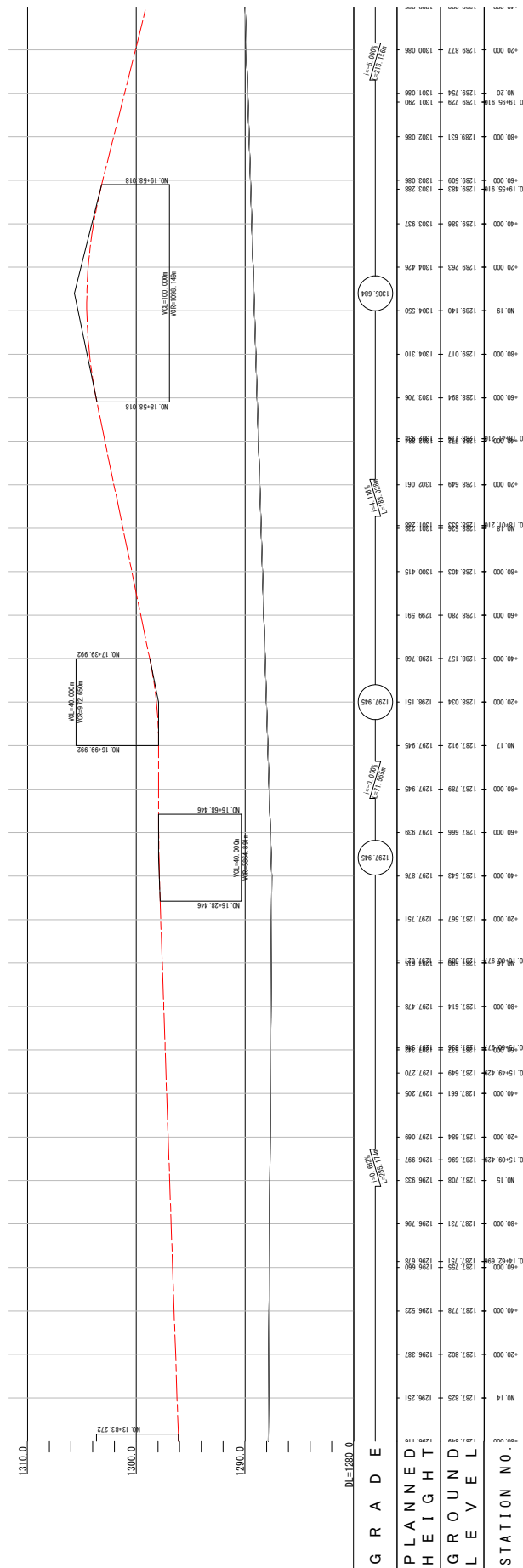
MOPIT
Ministry of Physical Infrastructure
and Transport
DOR
Department of Road

Preparatory Survey for Koteswhor Intersection Improvement Project
IN FEDERAL DEMOCRATIC REPUBLIC OF NEPAL

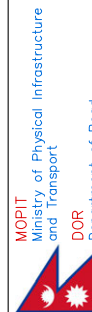
PLAN (5) H=1:500



PROFILE (5) V=1:200



Preparatory Survey for Koteshwor Intersection Improvement Project
IN FEDERAL DEMOCRATIC REPUBLIC OF NEPAL



SCALE:
JANUARY 2024

PLAN & PROFILE 5

DWG. NO:

R 5