



GOVERNMENT OF SIKKIM
OFFICE OF THE DIVISIONAL FOREST OFFICER
TERRITORIAL DIVISION MANGAN
MANGAN, NORTH SIKKIM

Memo No.: 223 /TDM/F&ED

Dated 30/05/2022

To,

The Addl. Chief Secretary-cum-PCCF
Forest & Environment Department
Forest Secretariat
Deorali, Gangtok.

Sub: **Diversion of 11.1521ha of forest land for widening of existing road (NH 310A) to NHDL specification with paved shoulder from Mangan to Chungthang in Chungthang under Chungthang Territorial Range in North Sikkim by BRO, Government of India- reg**

Sir,

With reference to letter no: IRO/KOL/SK/ROAD/146764/2021/160 dated: 22/04/2022, the additional information that was requested for further processing of the proposal has been completed offline for the above mentioned proposal by Territorial Division Mangan.

Response for letter no: IRO/KOL/SK/ROAD/146764/2021/160 dated: 22/04/2022, are as follows:

- 1. Kml file of the entire forest land proposed for diversion is not uploaded. Complete kml file may be uploaded.**
Uploaded.
- 2. Some portion (approx. 2Ha) of proposed CA Land in Rangma CA site is categorized as moderately Dense Forest as per decision support system. It may be Rechecked.**
The same has been clarified and will be uploaded in parivesh.
Enclosed.

o/c

- 3. **Some components (like CII, DI & DIII) of Compensatory Afforestation (CA) scheme is not in accordance of para 2.8.(iii) of Handbook of Forest (Conservation) Act,1980 and Forest conservation rules, 2003 (Guidelines and clarification). It may be revised**

Components C II is necessary for the supervision of the CA site at there is shortage of staff in Range and also their supervision will help in avoiding any illegal activities during the process of widening.

Components DI & D III is necessary for meeting of the unseen expenses like purchase of stationeries, for providing TA & DA for the field staff to monitor the Project site and CA Site.

- 4. **It is not clear, whether Biodiversity Conservation and Management Plan for the Project is duly approved by CWLW, Sikkim or not. Copy of the approval of the said is required to be uploaded.**

A space is managed in the Management plan for the observation to be made by CWLW.

- 5. **Biodiversity Conservation and Management plan should be based on publication of WII- Eco friendly measures to mitigate impact of linear Infrastructure on Wildlife and direction issued by the CWLW from time to time.**

Rectified and re-submitted
Enclosed.

- 6. **Plot- wise/ village wise details of Forest land proposed for diversion need to be uploaded.**

Enclosed.

- 7. **In part II, vegetation density of the proposed site is mentioned as 0.01% but in site inspection report it is reported 0.1%. It may be clarified.**

While submitting the report, there were some typing errors in part II. The actual density cover of vegetation is 0.1%

Hence, it is rectified and uploaded in parivesh.

Enclosed.

- 8. **Copy of the Gram Sabha resolutions related to FRA Certificate.**

Uploaded in Parivesh.

- 9. **It is not clear, whether the cost of the project i.e. Rs. 29635.4cr as mentioned is for this project or for some consolidated projects.**

Replied by User Agency (Enclosed).

- 10. **Details and current status of the other widening proposals of NH310A or proposals under same package.**

Replied by User Agency (Enclosed).



[Signature]
Divisional Forest Officer
Mangan Territorial Division
DFO (T) Mangan

FORM – I
(For linear projects)
Government of Sikkim
Office of the District Collector, North District, Mangan

TO WHOMSOEVER IT MAY CONCERN

In compliance of the Ministry of Environment and Forests (MoEF), Government of India's letter no.11-9/98-FC (pt.) dated 3/8/2009 wherein the MoEF issued guidelines on submission of evidences for having initiated and completed the process of settlement of rights under the Schedules Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 ('FRA', for short) on the forestland proposed to be diverted for non-forest purposes read with MoEF's letter dated 05/02/2013 wherein the MoEF have issued certain relaxation in respect of linear projects, it is certified that **11.1521ha** of forest land proposed to be diverted in favour of **BRO**, (name of user agency) for diversion of **11.1521ha** of forest land for widening of existing road (NH 310A) to NHDL specification with paved shoulder from **Mangan to Chungthang in Chungthang** under Chungthang Territorial Range by **BRO**, Government of India (purpose for diversion of forest land) in **North** district falls within jurisdiction of Naga Namgor village and Chungthang village (s) in **Chungthang** tehsil.

It is further certified that:-

- a. The complete process of recognition and vesting of forest rights under the FRA has been carried out for the entire 11.1521 hectares of forest land proposed for diversion. The Gram Sabha's consent is not required vide Ministry of Environment and Forests (FC Division), Govt. of India letter F. No. 11-9/98-FC (pt) dated 05/02/2013
- b. The diversion of forest land for facilities managed by the Government as required under section 3 (2) of the FRA have been completed and the concerned Gram Panchayats/Dzumsas have given their consent to it. Copy of consent letter(s) annexed at Annexure 1 (a).
- c. The proposal does not involve recognised rights of Primitive Tribal Groups and Pre-Agricultural communities.

Encl:- As above.


Signature
District Collector
North District
Mangan
21/12/2017
(Full name and official seal of the District Collector)

OFFICE OF THE GRAM PANCHAYAT
14 - Toong Naga Gram Panchayat Unit
Mangan, North Sikkim



Panchayati Raj

Date: 13 / 12 / 2021

Annexure 1 (a)


TO WHOM IT MAY CONCERN

This is to certify that we The Panchayat Member of 14Tong Naga GPU have no objection regarding acquisition of Forest Land measuring 2.5214 Ha. under Chungthang Territorial Range, Toong vilge for Package I (Mangan-Chungthang Road) under Bharatmala Pariyojana in the district of North in the state of Sikkim.

Further there should not be any encroachment in Forest Land other than the proposed.

TOONG NAGA GRAM PANCHAYAT
Jnit No. 14, North Sikkim


President
(Naga Ward)


Vice President,
(Meyong Ward)


LATE
Member
'Toong Ward


Member
(Kimrong Ward)


Member
(Rel Ward)


Member
(Manul Ward)


Member
(Nadey Ward)


Sub-Divisional Magistrate
Sub-division Office
Land Revenue & Disaster Management Deptt.
Chungthang, North Sikkim

181
101

211/Bharatmala/Pkg-I/ 64 /E2

23 Sep 2022

O/o The Divisional Forest Officer
North Territorial, Mangan
Pin 737116

CONSULTANCY SERVICE FOR CARRYING OUT FEASIBILITY STUDY, PREPERATION OF DETAILED PROJECT REPORT AND PROVIDING PRECONSTRUCTION SERVICES ON RESPECT OF UPGRADATION OF TWO LANE WITH PAVED SHOULDERS NH CONFIGURAION OF CORRIDORS UNDER BHARATMALA PROJECT, NH CONNECTIVITY TO BACKWARD AREAS /RELIGIOUS/TOURISTS PLACES OF THE COUNTRY AND ADB FUNDED PROJECTS IN THE STATE OF SIKKIM : MANGAN (310A) KODIYONG CHUNGTHANG – LACHUNG – YUMTHANG – YEME-SAMDONG BORDER & CHUNGTHANG – LACHEN MONASTERY LOG BRIDGE – MUGUTHANG & NAKU TO NAKULA IN STATE OF SIKKIM

Sub.: DIVERSION OF 11.1521 HA FOR WIDENING OF EXISTING ROAD (NH 310A) TO NHDL SPECIFICATION WITH PAVED SHOULDER FROM MANGAN OF DESIGN KM 0+000 TO CHUNGTHANG OF DESIGN KM 27+476 IN CHUNGTHANG FOREST DIVISION IN SIKKIM BY BRO – **Submission of compliance of User Agency part for observations raised by RO-Kolkata, MoEF&CC for PKG-I (Chungthang) - req.**

- Ref.:** A. FC proposal no.: FP/SK/ROAD/148024/2021 submitted on 04/10/2021
B. RO-Kolkata, MoEF&CC IRO/KOL/SK/Road/148024/2021/160 dated 20.04.2022

Sir,

- Please refer to the above cited subject and references. In this regard, it is to submit the compliance of User Agency (BRO) part for observations raised by RO-Kolkata, MoEF&CC vide above ref. B.
- The details of compliance as per the para/EDS no. of the above ref.B observations are as tabulated below:

EDS / Para no.	Observation by RO-Kolkata, MoEF&CC, Govt. of India	Compliance by User Agency	Remarks
i.	kml file of the entire forest land proposed for diversion is not uploaded. Complete kml file may be uploaded.	Correct kml file for total forestland proposed for diversion is re-submitted in red colour polygon overlapping with the Proposed Right of Way (PRoW) in cyan colour. The same is uploaded on Parivesh portal by consultant (EPTISA) on 19.09.2022 on our behalf.	Same uploaded on Parivesh portal. ✓
ii.	Some portion (approx. 2 nd ha) of proposed CA land in Rangma CA site is categorized as moderately dense forest as per Decision Support System. It may be rechecked	Not under User Agency	Compliance by State Government
iii.	Some components (like C.II, D.I & D.III) of Compensatory Afforestation (CA) scheme is not in accordance of para 2.8(iii) of Handbook of Forest (Conservation) Act, 1980 and Forest Conservation Rules, 2003 (Guidelines & Clarification), it may be revised.	Not under User Agency	Compliance by State Government
iv.	It is not clear, whether Biodiversity Conservation and Management Plan for the project is duly approved by CWLW, Sikkim or not. Copy of the approval of the said is required to be uploaded	Not under User Agency	Compliance by State Government

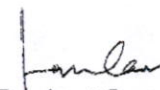
29/09

/ Para no.	Observation by RO-Kolkata, MoEF&CC, Govt. of India	Compliance by User Agency	Remarks
v.	Biodiversity Conservation and Management Plan should be based on publication of WII-Eco-friendly Measures to Mitigate Impacts of Linear Infrastructure on Wildlife and direction issued by the CWLW from time to time. It should be specific to mitigate the disturbance expected to arise from the implementation of this project.	Not under User Agency	Compliance by State Government
vi.	Plot-wise/ village wise details of forest land proposed for diversion need to be uploaded	Details are attached and the same is updated in the Forest Clearance proposal on Parivesh portal	Same is updated in the Forest Clearance proposal on Parivesh portal
vii.	In Part-II, vegetation density of the proposed site is mentioned as 0.01% but in Site Inspection Report it is reported 0.1%. It may be clarified.	Not under User Agency	Compliance by State Government
viii.	Copy of the Gram Sabha resolution related to FRA certificate	Not under User Agency	Compliance by State Government
ix.	It is not clear, whether the cost of the project i.e. Rs.29635.4 cr as mentioned is for this project or for some consolidated projects.	The cost of project has been erroneously entered on Parivesh Portal by the Consultant (EPTISA). The project consists of nine (9) financial packages. The tentative cost of project for all nine (9) packages is Rs.5,981.19 cr and Package I (Mangan Forest Division & Chungthang Forest Division) is Rs.290.37 cr is that of the under which the subject FC proposal of 11.1521 ha is submitted for Chungthang Forest Division.	Same updated in the Forest Clearance proposal on Parivesh portal
x.	Details and current status of the other widening proposals of NH310A or proposals under same Package.	Details are attached and the same is uploaded on Parivesh portal	Same uploaded on Parivesh portal

3. In view of the above, all observations raised by RO-Kolkata, MoEF&CC have been rectified & resubmitted/reuploaded on "Parivesh" for further processing of above ref. A Forest Clearance proposal. The FC proposal was submitted 04.10.2021 and observations from RO-Kolkata, MoEF&CC, Govt. of India was received on 20.04.2022. At present FC Proposal is pending at your good office (DFO) as per EDS raised by Regional Office Kolkata (attached Timeline of MoEF&CC).

4. You are kindly requested to treat this matter most urgent for your necessary action please.

5. Your kind consideration in this regard is highly solicited please.


 (Prashant Suregaonkar)
 Maj
 Officer Commanding

Encl.:

- A. kml file of forest land proposed for diversion (11.1521 ha)
- B. Plot-wise details of forest land proposed for diversion (11.1521 ha)
- C. Details & current status of NH 310 A project
- D. Timeline of MoEF&CC

The Addl. Chief Secretary cum PCCF,
Forest and Environment Department,
Government of Sikkim
Forest Secretariat, Deorali-737 102
Gangtok, East Sikkim
Email: pccf-fewd@sikkim.gov.in , sik@envvis.nic.in

- For info please

The CCF-cum-Nodal Officer,
Forest Conservation Act (FCA),
Office of the Addl. Chief Secretary-cum-PCCF,
Forest and Environment Department,
Forest Secretariat, Deorali, Gangtok-737 102,
Government of Sikkim
Email: fca.sikkim@gmail.com

- For info please

HQ CE (P) Swastik
C/o 99 APO
Pin 931717

- For info please

HQ 758 BRTF
C/o 99 APO
Pin 930758

- For info please

M/S EPTISA India Private Limited
Unit 1203, 12th Floor, Tower-1,
PS Srijan Corporate Park, Plot No. 2,
Block EP & GP, Sector V, Salt Lake City
Kolkata – 700 091, (W.B)
E – Mail: Vsehgal@eptisa.com
saibalkumarbanerjee@eptisa.com


- For info w.r.t your letter No. EPTISA/BRO /DPR/22-23/Sikkim Pr.- 109 dated 19 Sep 2022 requested to liaise with state Govt for early rectification of shortcomings raised by RO, Kolkata at the earliest.

Diversion of 11.1521 ha in Chungthang Forest Sub Division for "WIDENING OF EXISTING ROAD (NH 310A) TO NHDL SPECIFICATION WITH PAVED SHOULDER FROM MANGAN OF DESIGN KM 0+000 TO CHUNGTHANG OF DESIGN KM 27+476 IN THE STATE OF SIKKIM UNDER PROJECT SWASTIK OF BRO"

Sl. No.	Plot no.	Area	GPS Co-ordinate	
			Longitude	Latitude
1	922	0.4701	88°38'38.366"E	27°33'2.68"N
2	930	0.1095	88°38'38.366"E	27°33'2.68"N
3	935	0.0005	88°39'4.214"E	27°33'1.144"N
4	922	0.2596	88°39'4.122"E	27°33'1.11"N
5	1588	0.3000	88°39'13.545"E	27°33'14.76"N
6	1592	0.3410	88°39'15.791"E	27°33'14.468"N
7	1600	0.2410	88°39'17.932"E	27°33'17.998"N
8	1582	0.0588	88°39'15.12"E	27°33'22.132"N
9	1544	0.0207	88°39'8.787"E	27°33'33.701"N
10	1578	0.0201	88°39'9.07"E	27°33'35.697"N
11	1547	0.0114	88°39'5.249"E	27°33'44.72"N
12	1549	0.0133	88°39'5.26"E	27°33'45.502"N
13	1526	0.0080	88°39'4.56"E	27°33'51.136"N
14	1556	0.0764	88°39'5.534"E	27°33'49.979"N
15	1472	0.0027	88°39'4.544"E	27°33'53.086"N
16	1096	0.0894	88°39'8.706"E	27°34'51.738"N
17	1134	0.2735	88°39'5.261"E	27°34'37.359"N
18	1142	0.0281	88°38'58.844"E	27°34'26.243"N
19	1149	0.0299	88°39'4.79"E	27°34'32.877"N
20	1130	0.0943	88°39'6.634"E	27°34'39.026"N
21	1126	0.0247	88°39'5.726"E	27°34'43.788"N
22	1474	0.1000	88°39'4.682"E	27°33'54.145"N
23	1301	0.9340	88°38'59.677"E	27°34'22.416"N
24	1342	1.2200	88°39'1.236"E	27°34'11.814"N
25	1472	0.2000	88°39'4.544"E	27°33'53.086"N
26	1476	0.1500	88°39'4.649"E	27°33'56.499"N
27	1487	0.3440	88°39'2.806"E	27°34'4.45"N
28	1385	0.2460	88°39'1.87E	27°34'4.448"N
29	1387	0.1720	88°39'2.814"E	27°34'7.274"N
30	1409	0.2580	88°39'3.767"E	27°34'4.47"N
31	1394	1.0170	88°39'2.654"E	27°34'11.159"N
32	1276	2.0560	88°39'0.929"E	27°34'21.61"N
33	1473	0.0580	88°39'4.605"E	27°33'53.504"N
34	1475	0.0240	88°39'4.663"E	27°33'54.979"N
35	1374	0.2040	88°38'59.907"E	27°34'6.697"N
36	1344	0.0520	88°38'59.706"E	27°34'7.943"N

Diversion of 11.1521 ha in Chungthang Forest Sub Division for "WIDENING OF EXISTING ROAD (NH 310A) TO NHDL SPECIFICATION WITH PAVED SHOULDER FROM MANGAN OF DESIGN KM 0+000 TO CHUNGTHANG OF DESIGN KM 27+476 IN THE STATE OF SIKKIM UNDER PROJECT SWASTIK OF BRO"

Sl. No.	Plot no.	Area	GPS Co-ordinate	
			Longitude	Latitude
37	704	0.2411	88°38'48.484"E	27°35'58.803"N
38	734	0.5212	88°38'59.762"E	27°35'42.233"N
39	732	0.1170	88°38'59.848"E	27°35'42.17"N
40	728	0.0038	88°39'1.997"E	27°35'41.714"N
41	1026	0.7610	88°39'6.345"E	27°35'12.865"N
Forest Area required for diversion		11.1521		


(VAIBHAV SRIVASTAVA)
 Major,
 OC Contract
 86 RCC(GREF)

National Highway 310 A project under BORDER ROADS ORGANIZATION, GOVERNMENT OF INDIA

Details and current status of the other widening proposals of NH 310 A or proposals under same package.

The project is of total length 242.200 km starts from Mangan to Karem via Chungthang and Chungthang to Nakula in the state of Sikkim which is presently targeted with total nine (9) financial packages with sub-packages.

The submitted Forest Clearance proposal no. FP/SK/ROAD/146764/2021 is from Toong Bridge to Chungthang under Chungthang Forest Sub-Division of financial Package no. I.

The details of targeted road stretch which is of strategic importance of Government of India is tabulated as below:

Package No.	Sub Package No.	Project Stretches	Design Start Chainage (km)	Design End Chainage (km)	Length (m)	Status
PKG-I	Mangan	Mangan Forest Division	0+000	17+830	27476	Project Status: Under DPR stage. Clearance status: Forest Clearance proposal is submitted vide no. FP/SK/ROAD/146764/2021 on 03.09.2021 for forest land area 10.6759 ha and presently under RO-Kolkata, MoEF&CC for checking.
	Chungthang	Chungthang Forest Division	17+830	27+476		Project Status: Under DPR stage. Clearance status: Forest Clearance proposal is submitted vide no. FP/SK/ROAD/148024/2021 on 04.10.2021 for forest land area 11.1521 ha presently EDS raised by RO-Kolkata, MoEF&CC on 21.04.2022.
PKG-II	-	Chungthang Bypass	0+000	3+042	3042	Project Status: Under DPR stage. Clearance status: Yet to be submitted
PKG-III	PKG-III A	Chungthang to Lachen along approved alignment including first Tunnel	0+000	27+600	27600	Project Status: Under DPR stage. Clearance status: Yet to be submitted
	PKG-III B	Lachen to Zeema via Lachen 2nd Tunnel	27+600	33+938	6338	Project Status: Under DPR stage. Clearance status: Yet to be submitted
	PKG-III C	Lachen Bypass	0 (27+600)	5+200 (33+938)	5200	Project Status: Under DPR stage. Clearance status: Yet to be submitted

National Highway 310 A project under BORDER ROADS ORGANIZATION, GOVERNMENT OF INDIA

Package No.	Sub Package No.	Project Stretches	Design Start Chainage (km)	Design End Chainage (km)	Length (m)	Status
	PKG-IIID	Realignment near 86 RCC camp	0 (1+000)	5+000 (6+500)	5000	Project Status: Under DPR stage. Clearance status: Yet to be submitted
PKG-IV	PKG-IVA	Chunghthang to Lachung	0+000	21+000	21000	Project Status: Under DPR stage. Clearance status: Yet to be submitted
	PKG-IVB	Lachung Tunnel	21+000	23+950	2950	Project Status: Under DPR stage. Clearance status: Yet to be submitted
PKG-V	PKG-VA	Lachung to Shingba	23+950	31+746	7796	Project Status: Under DPR stage. Clearance status: Yet to be submitted
	PKG-VB	Shingba to Yumthang	31+746	52+808	21062	Project Status: Under DPR stage. Clearance status: Yet to be submitted
PKG-VI	-	Yumthang to Yumesumdong	52+808	84+160	31352	Project Status: Under DPR stage. Forest Clearance proposal is submitted vide no. FP/SK/ROAD/154584/2021 on 18.04.2022 for forest land area 116.1 ha presently "DFO" stage with Nodal Officer, FCA, Sikkim
PKG-VIA	-	Yumesumdong to Kareng	0+000	19+000	19000	Project Status: Under DPR stage. Clearance status: Yet to be submitted
PKG-VII	-	Zeema to Muguthang (Greenfield)	0+000	41+100	41100	Project Status: Under DPR stage. Clearance status: Yet to be submitted
PKG-VIII	-	Muguthang to Naku	0+000	11+700	11700	Project Status: Under DPR stage. Clearance status: Yet to be submitted
PKG-IX	-	Naku to Nakula	0+000	11+270	11270	Project Status: Under DPR stage. Clearance status: Yet to be submitted





**FOREST AND ENVIRONMENT DEPARTMENT
GOVERNMENT OF SIKKIM
GANGTOK**

Ref. No: CWLW/2023

Date: 04-3-2023

To,

The Regional Officer,
Integrated Regional Office, Kolkata
Ministry of Environment and Forests, Government of India

Subject: Approval and Forwarding of the Comprehensive Biodiversity Conservation Plan

Madam,

This is with reference to the Comprehensive Biodiversity Conservation Plan prepared in response to the six roads being constructed by CPWD and BRO in the Mangan district of Sikkim having a total declared length of 137.22 km and a declared financial outlay of Rs 2321.62 crores. The strategy to have one Comprehensive Biodiversity Conservation Plan instead of six separate plans is commendable as it will result in a perspective approach, economy of scale and avoidance of risk of overlap. The nine main components of this plan namely reducing human wildlife conflict, strengthening forest protection, strengthening participatory conservation, strengthening forest protection infrastructure, reducing wildlife predation by feral dogs, strengthening ex-situ conservation, mitigation of biodiversity loss due to project-driven landslides and erosion, building capacity and knowledge management are very relevant to this landscape to mitigate the anticipated impacts due to these six linear infrastructure projects. It is recommended that the user agencies take all due diligence measures to contain the impact of the construction activities to the Right of Way diverted. The wildlife passage plan as well as the non-structural mitigation measures are also detailed in this plan.

This plan has been prepared in consultation with the Wildlife Institute of India and their suggestions have been incorporated (enclosed in Annexure III). This area is biodiversity rich but understudied, and hence the research component is being prioritized. Other than the regular conditions imposed, an undertaking must be taken from the user agencies regarding the future installation and construction of all suggested mitigation measures derived from the results and recommendations of these biodiversity studies notwithstanding the cost or engineering modifications involved.

This Comprehensive Biodiversity Conservation Plan (CBCP) having an outlay of Rs 49.80 crore is approved and recommended for onward submission to Integrated Regional Office of the Ministry of Environment, Forest and Climate Change, Government of India.

Yours faithfully,

S. Tambe

(Dr. Sandeep Tambe, IFS)
Chief Wildlife Warden
cwlwsikkim@gmail.com

Comprehensive Biodiversity Conservation Plan

Report Submitted to the Integrated Regional Office, MoEFCC, Kolkata



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Executive summary

The Comprehensive Biodiversity Conservation Plan has been prepared in response to the six new roads of CPWD and BRO planned in the Mangan district of Sikkim. All these roads are required for providing defence purpose connectivity for rapid movement of troops, transportation of commodities, armaments and other essential facilities to defence needs. These roads give connectivity to the Indo-China border and are hence, important from strategic point of view. Instead of a piecemeal approach, a comprehensive proposal has been prepared to account for the cumulative impacts and to also ensure transparency and efficiency during execution. The project area for the Comprehensive Biodiversity Conservation Plan spans across the northern and eastern part of the Khangchendzonga landscape in the Eastern Himalaya which is the third highest landscape globally and the highest and steepest terrain in the country. This area is also a biodiversity hotspot spanning across both the greater Himalaya and the Trans-Himalaya and lies in the fringe of the Khangchendzonga National Park a UNESCO designated world heritage site. This landscape harbours significant biodiversity including two third of the country's Tibetan gazelle, one third of the Tibetan argali, the only population of southern Kiang, the only breeding population of the black-necked crane in the eastern Himalaya along with several other rare, endangered and threatened species. This region also forms the corridor of the Royal Bengal Tiger and there is evidence of it migrating from the neighbouring Neora Valley National Park in West Bengal during winter. The main thrust of this proposal is to mitigate the threats to biodiversity arising out of the new linear infrastructure coming up and the consequent rise in human presence. The main threats perceived are increased predation of wildlife by feral dogs and rising human wildlife conflict. While the main gaps are limited infrastructure, human capacity and research inputs. The project aims to address these threats and gaps by developing an integrated biodiversity management plan. The nine main components of this plan are reducing human wildlife conflict, strengthening forest protection, strengthening participatory conservation, strengthening forest protection infrastructure, reducing wildlife predation by feral dogs, strengthening ex-situ conservation, mitigation of biodiversity loss due to project-driven landslides and erosion, building capacity and knowledge management. The total budget of this plan amounts to Rs 49.80 crore for a period of 5 years. The monitoring mechanism has also been spelt out. The wildlife passage plan adapted to this steep mountain terrain is also provided along with the non-structural mitigation and management measures. This biodiversity conservation plan has been prepared in consultation with Wildlife Institute of India and their suggestions have been incorporated. The plan has been approved by the Chief Wildlife Warden for onward submission to the Integrated Regional Office of MoEFCC.

1. Unique context and biodiversity values

The impacted area spans across the northern and eastern part of the Khangchendzonga landscape in the Eastern Himalaya which is the third highest landscape globally and the highest and steepest terrain in the country. This area is also a biodiversity hotspot spanning across both the greater Himalaya and the trans-Himalaya and lies in the fringe of the Khangchendzonga National Park a UNESCO designated world heritage site. Consequently, it is designated as a separate biogeographic province 1D by the Wildlife Institute of India. The area also forms the headwaters of the river Teesta and is dotted with several glaciers and high-altitude lakes many of which are regarded as sacred. Improved ecological health of this ecosystem translates to sufficient water in the rivers and streams even in the lean season, which sustains agricultural and horticulture crops, directly translating to food and health security of the downstream towns and villages. This area is also contiguous with the Tibetan Plateau with the altitude ranging from between 4000m and 5500m. The vegetation here is sparse, devoid of trees, dominated by graminoids, forbs and a few shrubs. The biodiversity significance of the area is unmatched. This area harbours globally significant biodiversity including snow leopard, two third of the country's Tibetan gazelle, one third of the Tibetan argali, the only population of southern Kiang, the only breeding population of the black-necked crane in the eastern Himalaya along with several other rare, endangered and threatened species. This region also forms the corridor of the Royal Bengal Tiger and there is evidence of it migrating from the neighbouring Neora Valley National Park in West Bengal. The Himal is also a repository of valuable medicinal plants, which form the basis for the indigenous systems of medicine. Most of the peaks, lakes, rivers and caves here are considered sacred and are visited by pilgrims to pay homage. This area is also traditionally used by native herders for yak and sheep herding who practice transhumant rotational grazing practices. These areas are also under heavy defence deployment with extensive presence of the Indian Army and the Indo Tibetan Border Police (ITBP). After the 2017 Doklam and 2020 Galwan incidents along the Sino-Indian border, the border areas have been further reinforced with more troops and development of new infrastructure. Dogs being camp followers have benefitted from this development and their population has increased several-fold. Due to its remoteness, harsh climate and lack of infrastructure this area has a weak presence of the forest department. The detailed list of biodiversity elements (flora and fauna) is provided for in Annexure-I.

Figure 1: Endangered biodiversity of the Sikkim Trans-Himalaya



Tibetan gazelle



Tibetan argali (Nayan)



Southern Kiang



Black-necked crane

2. Proposed linear infrastructure projects

There are a total of 6 linear infrastructure projects being implemented by CPWD and BRO, for which this Comprehensive Biodiversity Conservation Plan has been prepared. All these roads are required for providing defence purpose connectivity for rapid movement of troops, transportation of commodities, armaments and other essential facilities to defence needs. These roads give connectivity to the Indo-China border and are hence, important from strategic point of view. The details of these diversions is placed below. The map of these roads is also provided in Annexure-II. The distribution of the total outlay of this plan amongst the 6 roads is in proportion to the length of the road and is also detailed in the last column with heading 'cost to be levied for BC plan'.

Table 1: Details of the 6 linear infrastructure projects

Rs in Crores

Sl no.	Diversion	User Agency	Declared Project Cost	Declared Road Length	Cost Ratio	Cost Levied for BC plan
1	Diversion of <u>141.124</u> ha. forest land for non-forest use in Toong Partem Pt. 4865 Tamze Border Road Forest Proposal	BRO	1498.89	84.42	65%	32.15
2	Diversion of <u>19.36</u> ha. of Forest land for Muguthang to 20r link road by ITBP	CPWD	278.08	10.70	12%	5.96
3	Diversion of <u>11.1521</u> ha of forest land for widening of existing road (NH310A) to NHDL specification with Paved Shoulder from Toong KM)+00 to Chungthang of design KM 27+476 in Mangan Division, Sikkim by BRO	BRO	296.40	29.00	13%	3.36

4	Diversion of 10.6759 Ha of forest land for widening of existing road (NH310A) to NHDL specification with Paved Shoulder from Mangan KM)+00 to Toong of design KM 17+870 in Chungthang Division, Sikkim by BRO	BRO				3.00
5	Diversion of 4.86 Ha. KNP/Wildlife land for construction of ITBP Ph-II road from 20r Link point to 20r (Goma)	CPWD	39.25	2.70	2%	0.84
6	18.82 Ha. Forest/WL land for construction of ITBP road from 20r Link point to Zanak	CPWD	209.00	10.40	9%	4.48
			2321.62	137.22	100%	49.80

The justification for preparing a Comprehensive Biodiversity Conservation Plan instead of six separate biodiversity conservation plans is as follows:

- Comprehensive projects with pooled resources enable perspective planning and adopt a more diagnostic approach with a futuristic outlook
- Economy of scale becomes a reality as many functions such as procurement, research, planning and evaluation can be integrated
- The cumulative impact of projects is often much more than the sum of the individual impacts as these projects have a cascading effect on biodiversity
- Implementing several projects with similar components in the same geographical area run the risk of overlap
- Review of this management plans by WII also highlights the need for adopting an integrated approach of a Comprehensive Biodiversity Conservation Plan

3. Process followed

Instead of piecemeal preparation of biodiversity conservation plan for the six roads separately, an integrated biodiversity conservation plan has been prepared to ensure that the cumulative impacts of these linear infrastructure intrusions are addressed in a comprehensive manner. The implementation of this comprehensive plan will also be efficient as the activities will all be integrated without the risk of duplicacy or overlap. A participatory process involving consultations and field visits by scientists and field managers was followed for the preparation of this biodiversity conservation plan. Field visits were undertaken by the Wildlife Institute of India during September 2022. Also, several rounds of consultations were organized by the department with other stakeholders such as Animal Husbandry and Veterinary Services Department (AHVS), Sikkim Anti Rabies and Animal Health Programme (SARAH), forest wildlife divisions, forest territorial divisions, FCA wing, WWF and others before finalizing this plan. A presentation of the draft plan was made on 21st Jan, 2023 followed by a finalization workshop on 30th Jan, 2023 in the Forest Department. This draft plan was shared with the Wildlife Institute of India (WII) and their comments obtained as well (Annexure III). The review of the plan by WII and the details of the cross drainage structures from the user agencies (CPWD and BRO) was obtained in Feb 2023, following which this plan was finalized.

4. Threats, gaps and proposed strategy

The nine main components of this plan are human wildlife conflict, participatory conservation, forest protection, strengthening forest protection infrastructure, wildlife predation by feral dogs, ex-situ conservation, building capacity and knowledge management.

4.1 Human-wildlife conflict management

Rising instances of human-wildlife conflict specially crop damage and livestock kills are being reported from the state. Crop damage by wild boar and Assamese macaque, and livestock kills by Himalayan Black Bear are reported frequently from this area. Also, at times cases of grievous human injury by Himalayan Black Bear sometimes even leading to death are reported from the forest fringe villages. Other than these animals, there are also stray incidences involving the common leopard, leopard cat, martens, civets, barking deer, snakes and squirrels as well. The scale of damage caused due to conflict is considerable and the resentment of the local populace towards wildlife and the Forest department is an understatement. There are several cases of local agriculturalists completely abandoning farming and animal husbandry due to the losses incurred because of conflict. This is a very serious threat, since livelihood options in the mountains are limited and for most farming is the only source of sustenance.

Figure 2: Grievous injury to humans caused by Himalayan Black Bear are rising



4.1.1 Anticipated impacts

Linear infrastructure intrusions into natural ecosystems such as roads and highways create disturbance to the wildlife habitats and to wildlife as well. The actual area impacted by linear projects is far more compared to area diverted. There is a direct loss of habitat during establishment and maintenance of linear project. This may happen due to clearing of vegetation, dumping of excavated earth and material movement of heavy vehicles and earth movers, creation of labour camps etc. The effect of these disturbances may persist in the landscape for years to decades. This results in higher instances of human-wildlife conflict as wildlife corridors and habitats get disturbed. Hence, there is a need to strengthen the preparedness of the forest department to deal with more instances of crop damage, livestock kills and human injury. The

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cost of the tranquilizing drugs is very high and they have a limited shelf life. Also due to the challenging mountainous terrain of the state, immobilization, capture and translocation of wildlife involves cages to be transported manually to set traps for capture. Carrying the cage with trapped animal inside is a big task. Also, there is wastage of tranquilizers and darts due to obstructions from heavy undergrowth. Hence, there is a need to be equipped with the most updated practical and effective tools to aid in immediate and future planning for managing conflict. Also, recently the ex-gratia rates for livestock kills have been rationalized to ensure adequate compensation in alignment with the market value.

4.1.2 Mitigation strategy

Hence, the proposed strategy is four-pronged namely: 1) Ex-gratia payments for livestock kill and human injury 2) Procurement of tranquilizing guns, cages, equipment and supplies 3) Mobilization of team and rescue and release operations 4) Procurement and deployment of wildlife deterrent devices. The total cost of this human wildlife conflict management component comes to Rs 6.60 crore as detailed in Section 5.

Figure 3: Transportation of cages with the animal is a herculean task in hilly terrain



Figure 4: Livestock kills by Himalayan Black Bear in winter are rising



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4.2 Participatory biodiversity conservation

About 59% of Sikkim (4187 sq. km) lies above 3000 meters and most of this is classified as Reserve Forests. This sub-alpine and alpine landscape of the Sikkim Himalayas locally referred to as Himal, has a unique ecosystem and cultural and wildlife values associated with it. Though most of lower and middle hill forests have been brought under the Joint Forest Management (JFMC/EDC) network, the upper hill forests of the Himalayas, inspite of determined efforts, still continue to be under inadequate management, beset with threats and need urgent interventions. The main threats being unplanned trekking tourism, hunting and trapping of wild animals, smuggling of medicinal and aromatic plants, wildlife predation by feral dogs and lack of awareness amongst the security forces. Effective conservation of the Himal by forest staff alone is very difficult due to its high altitude, remoteness, tough terrain, harsh climate and limited resources available. Further lack of adequate infrastructure and facilities make every patrolling visit more like an expedition, with a large contingent of support staff and resultant high attendant costs. Hence, the *Himal Rakshak* or Mountain Guardian policy was launched by Sikkim Forest Department in 2006 to strengthen community-based conservation in the high-altitudes where typical JFMCs/EDCs do not have outreach. Community resource persons were recognized as "the honorary guardians of mountains" and were given stewardship of the alpine areas. This initiative is unique, due to its aspiration of capacity-building among local community members to help conserve the alpine areas including the high reaches of the Khangchendzonga National Park (KNP).

Figure 5: Himal Rakshak initiative needs to be extended to the northern part of the state



For other parts of Northern and Eastern Sikkim which are forested, the JFMC/EDC are not as vibrant as they were during the 2000-2010 period. Hence, there is a need to revitalize these community-based institutions.

Figure 6: Participatory conservation institutions such as JFMC/EDC need to be revitalized



4.2.1 Anticipated impacts

Linear infrastructure projects open up biodiversity rich areas to the outside world by making the access and exploitation easy. Biodiversity resources that were earlier not easily accessible now become a commodity to be traded in the market. Regulatory and enforcement agencies are not able to move fast enough due to which pristine areas get depleted of biological resources. The trans-Himalayan region of Sikkim which was earlier inaccessible, will now get opened up for easy access to the outside world and subsequently also for tourism. Due to the high-altitude and harsh climate, conventional conservation needs to be supplemented with innovative means to strengthen the intelligence and surveillance network. Hence, while the *Himal Rakshak* policy has been implemented in the southern part of the KNP, it now needs to be extended to the eastern and northern part. With growing defence establishments, rising population of feral dogs, threat of trapping and hunting wildlife, accelerating impacts of climate change and other threats, the alpine areas in the northern part of Sikkim too need to be brought under the participatory conservation framework. The existing JFMC/EDC are too weak to tackle this new threat and hence they need to be revived.

4.2.2 Mitigation Strategy

It is proposed for constitution of *Himal Rakshaks* (HRs) for northern part of KNP for participatory management of trans-Himalayan unique ecosystem as the traditional knowledge and the experience of local community plays a crucial role. A total of 20 *Himal Rakshaks* are planned for the Northern part of KNP comprising members of the local Lachen Tourism Development Committee, local Eco-development Committee and the local herders (Dokpas). Subsequently, capacity building of HRs will be taken up in partnership with organizations such as World Wildlife Fund (WWF) in basic biodiversity monitoring techniques and reporting wildlife crimes. Identity cards will be provided to all the HRs. Provision of field equipment such as high-altitude trekking gears, field jackets, shoes etc. will also be provided along with one-time financial incentive. Participatory conservation will be given a further boost by constituting 'green volunteers' to strengthen the conservation of forests, environment and wildlife and supported in a similar

manner as the Himal Rakshaks. These 'green volunteers' will be enlisted and their capacity building carried to support the conservation of forests, environment and biodiversity. Similarly, 40 JFMC/EDC will be strengthened in the northern and eastern part in the forested regions. This will be done by reconstituting, institution building, capacity building and exposure visits. These institutions need be broad-based, follow democratic decision making and eventually contribute in biodiversity monitoring and surveillance. They will be trained in record keeping, accounting, forest monitoring and supported with exposure visits both within and outside the state. They will also be provided with field equipment such as high-altitude trekking gears, field jackets, shoes etc. Entry-point activities will also be carried out as a confidence-building measure. Veterinary health camps will be organized which will benefit both the livestock husbandry as well as reduce the spread of contagious diseases to wild herbivores. Also, the cultural assets will be identified especially those that help in strengthening the conservation ethos and belief systems of the sacred landscape and renovated.

The total cost of this participatory biodiversity conservation component comes to Rs 5.45 crore as detailed in Section 5.

4.3 Strengthening Forest protection infrastructure

The forest areas comprise mostly of temperate oak forests and subalpine conifer forests. Also due to natural calamities, landslides are very common impacting forests and nearby human habitations. The geology of the eastern Himalayas is weak as the mountains are young-fold. The situation is further aggravated due to the steep terrain and heavy annual precipitation of more than 250 cm. The forests specially in the 1000-2000 m zone are susceptible to forest fire. Though hunting of wildlife has come down over the last few decades, sporadic events from armed trans-border hunters, local bush meat hunting and tree felling does get reported once in a while.

4.3.1 Anticipated impacts

The wildlife predation by feral dogs, increased instances of hunting and poaching, laying traps and snares, deepening human wildlife conflict, high probability of smuggling of medicinal plants, more frequent road kills, greater probability of forest fire etc. which will need better preparedness of the forest staff. Thus, the regular monitoring of these areas, which were earlier not easily accessible, will become an absolute necessity due to the presence of heavy earth moving machineries, people and labour camps. Business as usual will result in irreversible biodiversity loss. Also, natural calamities such as landslides and forest fires will increase due to road building activity for which mitigation measures will need to be put in place. Threats from trans-border hunting and local bush meat hunting need to be also countered. The forest staff too need to be better equipped in terms of equipment, mobility, communication and infrastructure.

Figure 7: Illegal felling of trees in the reserve forests



4.3.2 Mitigation strategy

The mitigation strategy will involve equipping forest staff with gears, wireless communication and vehicles so that they can respond to crisis in a timely manner. Natural calamities such as forest fire will need to be addressed. Fencing at the vulnerable points will also be needed to secure forests. Special high-altitude gears, transportation facilities, clothing etc must be provided to the frontline staff posted in difficult areas so as to strengthen and support them. Physical presence of forest and wildlife staff in these remote high-altitude locations needs to be incentivized so that it will act as a deterrent against forest and wildlife offences. Incentive needs to be provided to the frontline staff posted and functioning in the trans-Himalaya (above 4000 m). These staff have to endure hardships such as thin mountain air, cold sub-zero temperature, limited access to medical facilities, poor infrastructure etc. Thus, providing special incentive will serve as a motivation for them.

Hence, the total investment planned in the forest protection component is Rs 6.65 crore as detailed in Section 5.

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Figure 8: Patrolling by forest staff takes on the shape of an expedition in this landscape



4.4 Strengthening forest protection infrastructure

The valleys of Lhonak chu, Tso Lhamo, Lhasar and Chopta valley that constitute the Sikkim trans-Himalaya do not have a physical presence of the forest department. The trans-Himalayas of Sikkim is characterized by sporadic presence of forest personnel due to a lack of infrastructure and severe winter and snow storms. The main reason being the high altitude and harsh climate with temperatures dipping to minus 35 degrees during winter accompanied with fierce snow storms. Forest infrastructure in the high altitudes is non-existent as there is not a single forest office or residence for forest personnel. As a result, forest protection and enforcement is sporadic and uneven. Due to heavy snow storms and harsh weather, camping in alpine tents is also not feasible. This lack of infrastructure also impacts the operationalization of research studies, biodiversity monitoring and sterilization programs. Other than this high-altitude infrastructure, even the existing infrastructure comprising of the range office complex in Lachen and Tshunghang is in a dilapidated condition and needs upgradation.

4.4.1 Anticipated impacts

Lack of infrastructure directly results in uneven monitoring, delayed response, high transportation costs as there are no 'boots on the ground'. The biodiversity in this landscape was till date protected due to lack of easy access and transportation. Accessing Muguthang from Thangu involved a back breaking trek in the high altitude with the Lunak la pass at 5900 metres posing a formidable barrier. Linear infrastructure projects open up biodiversity rich areas to the outside world by making the access and exploitation easy. Regulatory and enforcement agencies are typically not able to move fast enough due to which pristine areas get depleted of biological resources. Now with the entire stretch from Thangu to Muguthang becoming motorable it is anticipated that the entire length of the Lhonak valley will get opened up for visitors and tourists. Biodiversity resources that were earlier not easily accessible now become a commodity to be traded in the market. The trans-Himalayan region of Sikkim which was earlier inaccessible, will now get opened up for easy access to the outside world and subsequently also for tourism.

Figure 9: Passive solar housing structures in Ladakh



4.4.2 Mitigation Strategy

Hence, the imperative for biodiversity conservation in the trans-Himalayas is to establish permanent infrastructure and man it to ensure regular surveillance, monitoring and enforcement. In this regard it is proposed to establish the Trans-Himalaya Biodiversity Monitoring Station using Passive Solar Building Technology in partnership with HIAL <https://www.hial.edu.in/> Ladakh, founded by the renowned innovator Sonam Wangchuk. When the ambient temperature outside is minus 20 degrees, this technology ensures that the inside temperature is at 10 degrees without heating <https://www.youtube.com/watch?v=oBtSoWh1hJg>. HIAL has also partnered with the Indian Army and other government departments in Ladakh to scale up this technology in the high altitude areas. It is proposed to construct and furnish one such station structure using this technology in the Sikkim trans-Himalayas. The existing forest staff infrastructure at Lachen and Tshungthang will be upgraded. Also, the existing forest rest houses in the vicinity will be renovated and a transit accommodation created at Tshungthang to enable more frequent monitoring along with three new forest checkpoints on these new roads wherever needed.

The total cost of this forest protection infrastructure component comes to Rs 8.30 crore as detailed in Section 5.

4.5 Reducing wildlife predation by feral dogs

The rising populations of feral dogs in forest areas in the state of Sikkim specially in the north and eastern part is of great concern. In areas that are of high biodiversity significance, reports of wildlife depredation by these dogs have become frequent. These dogs are known to hunt in packs and have been reported to prey upon wildlife such as blue sheep, Tibetan gazelle, Himalayan marmot, musk deer, Himalayan goral, serow, red panda, etc. The population of these dogs is closely linked to the camps of military and paramilitary forces, as these dogs are known to feed on the improperly disposed food waste.

Figure 10: Feral dogs in the same niche occupied by the endangered snow leopard

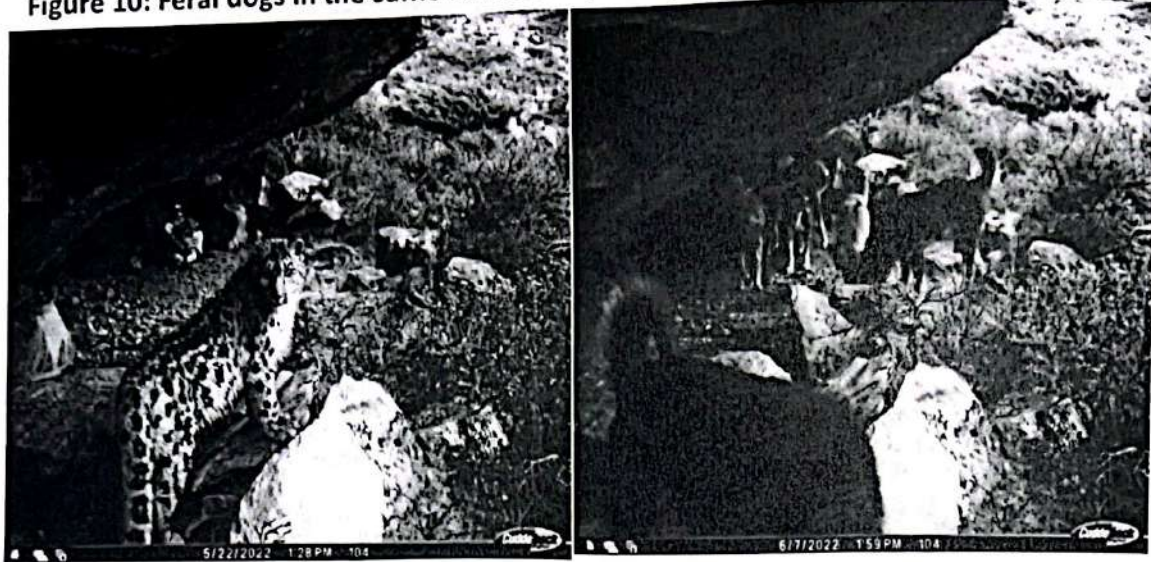
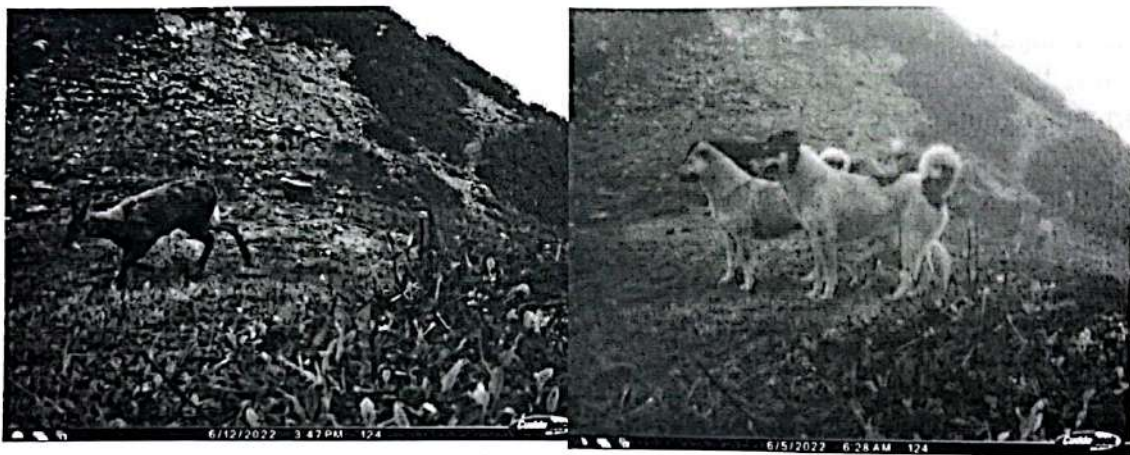


Figure 11: Feral dogs in the same niche occupied by the endangered musk deer



4.5.1 Anticipated impacts

Due east of the Lhonak valley lies the Chhombu chu valley which has an established road network with defence establishments for several decades now. This valley provides an interesting insight regarding the impacts of roads and highways on biodiversity. There are close to 600 feral dogs in this valley who hunt in packs and prey upon wildlife. Now that the Lhonak valley is being opened up and provided easy access with motorable road, the future scenario in the absence of mitigation measures will be similar. Source dog populations from the nearby towns and villages will now be able to easily disperse and occupy this new territory. The Tibetan marmots, black-necked cranes, pikas and other small mammals and birds will be easy game for these ferocious predators. Participatory research by ATREE found that in this landscape the feral dogs cause severe fatalities to yak calves. This has led to high economic losses to pastoralists, with an estimated 40% of yak calves being lost every year.

Figure 12: Ghoral killed by feral dogs in the upper reaches of Gangtok district in Nov, 2022



4.5.2 Mitigation strategy

The Animal Birth Control (ABC) programme is the suggested measure for controlling dog populations. It is a long-term intervention that will start showing results after continuous efforts of sterilizing atleast 70 percent of the dog population. While sterilization is underway, there is a need to scale it up. Also, sensitization of the armed forces and reducing their food waste is also needed to control the dog population. The strategy proposed is three-fold: i) Firstly it aims to ensure proper disposal of food waste from the security establishments by ensuring their collection by the nearby local body and by piloting of the Organic Waste Composter (OWC) ii) Secondly, it aims to scale up the ongoing ABC programme in partnership with the Animal Husbandry Department, Govt. of Sikkim to achieve higher coverage iii) Providing garbage collection vans to local bodies to support solid waste management of defence establishments. The total cost of this reducing wildlife predation by feral dogs component comes to Rs 1.90 crore as detailed in Section 5. The expected outcomes of this component is a reduction in the population of feral dogs in forests and a significant reduction in wildlife predation in the forest areas of north and east Sikkim.

4.6 Ex-situ biodiversity conservation

The Himalayan Zoological Park (HZP) is the only ex-situ conservation facility in the state situated at Bulbuley in the vicinity of Gangtok. It was established in 1997 and spreads across 230 ha. It is an ideal location for ex-situ conservation of globally threatened and endangered wildlife. Also, it has ample scope for expansion, adding new enclosures and wild animals. The zoo now has a collection of 78 specimens belonging to 18 species. The animals of interest under captivity are the Red Panda, the State animal of Sikkim, the Common Leopard, the Himalayan Black Bear, the Large Indian Civet, the Palm Civet, the Leopard Cat, the Yak, the Goral, The Himalayan Thar, Blue Sheep etc. Birds consist of the Kalij Pheasant Schedule-I species and the rest are exotic species such as Golden, Silver and Lady Amherst's Pheasants. There is a need to strengthen the ex-situ conservation infrastructure for conservation and education purposes. The HZP falls under the category of Mini Zoo as per the Central Zoo Authority's classification but it has tremendous scope

for expansion. The HZP has an approved master layout plan and the developments are proposed accordingly.

4.6.1 Anticipated impacts

Sikkim is a haven for birds with nearly 550 species constituting nearly half of the national avifaunal wealth. Growing linear infrastructure in the form roads and highways will result in fragmentation of habitat. There are several rare, endangered and threatened avifauna such as black necked crane, pheasants, partridges, owls, birds of prey, vultures etc. that need special conservation attention. This linear infrastructure poses a real threat to ground nesting birds such as partridges and pheasants due to the anticipated spread of feral dogs in their habitat. The well-known direct effects of roads on birds include habitat loss and fragmentation, vehicle-caused mortality, pollution, and poisoning. Nevertheless, indirect effects may exert a greater influence on bird populations. These effects include noise, artificial light, barriers to movement and edges associated with roads. Hence, there is a need to strengthen the avifaunal infrastructure in the zoo. The zoo has been facing the menace of feral dogs as well as wild animals posing a threat to the rescued and exhibit animals. Due to lack of fencing, there was an outbreak of canine distemper virus and the zoo lost 18 Red Pandas which effectively halted the conservation breeding programme. Also, a Himalayan Black Bear from the wild entered into the zoo premises and resulted in casualty of herbivores (Musk Deer, Barking Deer, Ghoral, Himalayan Tahr and Blue Sheep) in the exhibit areas. Also, due to the road construction activities it is anticipated that floral elements will be damaged and there is a possibility of weeds proliferating in the areas where the dense forest canopy is opened.

4.6.2 Mitigation strategy

The mitigation strategy comprises of two approaches namely strengthening the zoo infrastructure and predator proof fencing of the zoo. There is a need of an aviary which will serve the dual purpose of conservation and education. This will help to increase the foot fall in the zoo and as well further strengthen and extend the zoo. The aviary is proposed with raised platform walk way. It will have RCC fencing with predator proof design with chain link mesh above with enrichment suiting the birds and visitors experience. This intervention will bring in added revenue resulting in self-sufficiency and sustainability of the park. The aviary will be designed in consultancy with experts who have designed such walk-in aviary in the country. The total investment proposed is Rs 2.00 crore.

Chain-link (predator proof) fencing of the entire zoo (230 ha) is a priority which comes to around 12.8 Km, to safeguard the animals as well as prevent the spread of zoonotic diseases from feral dogs, cattle etc. Also, the HZP is located on prime land just 3 km from Gangtok city, and is susceptible to encroachments, hence this fencing will also safeguard the zoo from this threat. As the zoo spreads over 230 ha, it serves both as in-situ as well as ex-situ biodiversity conservation. Hence, once the external fencing is completed, subsequently, internal partitions (soft release facility) can be created as per the approved master layout plan for soft release in future. Hence, we would like to propose for half of the total perimeter amounting to Rs 3.00 crore from this plan in Phase-I.

strengthening rescue and rehabilitation of impacted floral species due to road construction activities and weed eradication will also be carried out with an outlay of Rs 4.00 crore.

Hence, the total investment planned in the ex-situ biodiversity conservation component is Rs 9.00 crore as detailed in Section 5.

4.7 Mitigation of biodiversity loss due to project driven landslides and erosion

This component will protect the valley side damage due to hill road construction comprising of managing surface runoff, treating minor landslides and slope stabilization. Due to the steep terrain of the site, often road cutting spoils roll down the valley side causing damage to the valley side slope. Also, the improper siting of cross drainage structures results in aggregation of surface runoff and its discharge along unnatural sites causing damage to the slope. The total investment planned in this component is Rs 6.00 crore as detailed in Section 5.

4.8 Building awareness and capacity building

Various stakeholders have an impact on this landscape such as the defence establishment, tourism personnel, nomadic pastoralists and the local community. Sensitizing these stakeholders and building capacity can play an important role in the implementation of this biodiversity plan as well as future conservation. The forest department personnel also have expertise and experience in managing forested habitats, but managing a cold desert will need a new set of skills.

Figure 13: Awareness programs for the forest fringe local communities



4.8.1 Anticipated impacts

Development of roads and highways in this landscape will result in new types of threats such as wildlife predation by feral dogs, increased instances of hunting and poaching, deepening human wildlife conflict, high probability of smuggling of medicinal plants, more frequent road kills etc., which will need better awareness and capacity amongst the stakeholders. Business as usual will

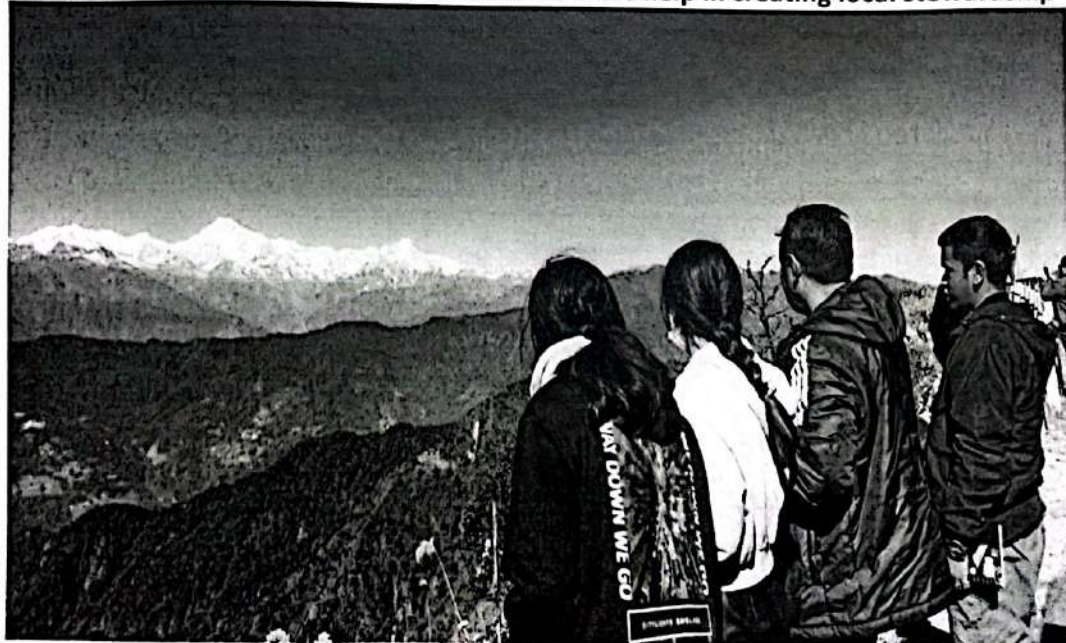
result in irreversible biodiversity loss. Improper food waste management will result in a proliferation of feral dogs and their predation of native wildlife.

4.8.2 Mitigation strategy

The mitigation strategy will need sensitization of the defence forces and training of forest frontline staff on biodiversity conservation in this unique landscape. The defence forces establishment keep on getting transferred every few years, hence this has to be an ongoing exercise. The defence forces need to manage their food waste responsibly, stop feeding the feral dogs, respect the endangered biodiversity, protect the wetlands and ensure that there is no sporadic hunting of wildlife. The native herders need to be partnered with for making participatory conservation work as they have continuous on-ground presence in this landscape. The local community-based institutions such as JFMC/EDC and others too needs to be sensitized and their capacity built. The frontline staff need to be trained to take up higher responsibilities by building capacity. The staff can be sponsored to attend various trainings and workshops including the WII Certificate course, Induction trainings, wildlife immobilization trainings and various other trainings and workshops. Exposure visits of students from the fringe villages will also help in creating awareness and local stewardship for the natural heritage.

Hence, the total investment planned in the awareness and capacity building component is Rs 1.40 crore as detailed in Section 5.

Figure 14: Exposure visit of students to forest areas help in creating local stewardship



4.9 Research and knowledge management

There is limited knowledge and data on the high altitudes and trans-Himalayan ecosystems. The population, distribution and threats faced by flora and fauna is yet to be scientifically assessed.

Action research that provides knowledge for decision making is needed to plan conservation action as well as assess the impact of biodiversity conservation interventions.

Figure 15: WWF Research team installing camera traps jointly with forest staff



4.9.1 Anticipated impacts

There is a significant gap in the knowledge about the presence, distribution, population size, habitat preference and movement patterns of many mammal species along with the prevalence of illegal activities like poaching, medicinal plant collection, etc. Long term, year-round monitoring stations can fill these knowledge gaps, providing useful data for relevant conservation actions and interventions. Also, habitat preference and movement patterns of snow leopards at a fine scale is not known. The lack of this information affects the quality of the species-specific conservation actions. There is limited baseline data available for wild ungulates and feral dogs. Hence, we are unable to quantify changes in population over time, and also aid in framing conservation objectives, assess their feasibility, concentrate efforts, and define a time-period within which progress can be evaluated. The lack of this information restricts the understanding of the population trends for wild ungulates and the effectiveness of the birth-control efforts for the feral dogs.

4.9.2 Mitigation strategy

The action research proposed jointly with WWF-India and others comprises of three studies which will be taken up jointly with forest department namely 1) Long term biological monitoring: The long-term biological monitoring will be carried out by identifying permanent to set up around 200 camera traps that will be kept functional all year round. These will be used to estimate the population size, distribution, habitat preference and movement patterns of snow leopards, other co-predators (Tibetan wolf, free-ranging dog, Pallas's cat, etc.) and prey species (blue sheep, Tibetan argali, musk deer, etc.). These will also be used to know the degree of human presence in some remote areas and the detection of poaching instances. 2) Radio collaring of snow leopards: by fitting 5 snow leopards with radio collars to study their movement patterns and

behaviour 3) Population estimation surveys for wild ungulates and free-ranging dogs: by using the 'double observer' method for wild ungulates and free-ranging dogs. Double-observer surveys will be conducted on previously identified and fixed routes once every year to estimate the population size of the wild ungulates and free-ranging dogs. These studies will help monitor the impact of the proposed interventions and create a credible baseline for evidence-based policy making an annual population estimation exercise is proposed in partnership with WWF India.

Studies planned with Wildlife Institute of India and others will cover the 1) Population, breeding ecology and ranging patterns of the black-necked crane, 2) Ecological and genetic assessment of the Southern Kiang, Tibetan Gazelle, Tibetan Argali, Himalayan Marmot etc. 3) Population assessment, monitoring and disease prevalence among mountain ungulates 4) Assessing high-altitude lakes and rivers for their biodiversity values 5) Effect of increasing border infrastructure and defence camp practices on biodiversity 6) Development of integrated conservation plan for cold desert region of Sikkim and 7) Development of Management Plan for the Pangolakha Wildlife Sanctuary.

The department also plans to take up habitat monitoring of important floral species and recovery programs. Also, procurement of equipment for field kits, camera traps, surveillance cams etc. for inhouse biodiversity monitoring and research is also included. Hence, the total investment planned in the research and knowledge management component is Rs 3.50 crore as detailed in Section 5.

Figure 16: WWF Research team conducting the snow leopard population census in Sikkim



5. Budgetary plan

The plan is prepared for a duration of 5 years keeping in mind the time taken for projects to take off after a preparatory phase.

Table 2: Summary table of the components with budget

Rs in lakhs

No.	Component	Budget
A	Human Wildlife Conflict Management	660
B	Participatory Biodiversity Conservation	545
C	Strengthening Forest Protection	665
D	Strengthening Forest Protection Infrastructure	830
E	Reducing Wildlife Predation by Feral dogs	190
F	Strengthening Ex-situ Biodiversity Conservation	900
G	Mitigation of biodiversity loss due to project driven landslides and erosion	600
H	Building Awareness and Capacity building	140
I	Research and Knowledge Management	350
	Subtotal	4880
	Administrative costs	50
	Monitoring and evaluation	50
	Total	4980

Table 3: Detailed table of the plan components with budget

Rs in lakhs

No.	Activity	Unit cost		Units		Budget
A	Human Wildlife Conflict Management					
1	Ex-gratia for livestock kill and human injury, death and medical expenses	40	Per year	5	Years	200
2	Procurement of tranquilising guns, cages, equipment and supplies	60	Per year	5	Years	300
3	Mobilization of rescue team and release operations	20	Per year	5	Years	100
4	Procurement and deployment of wildlife deterrent devices	20	Per year	3	Years	60
B	Participatory Biodiversity Conservation					

1	Strengthening of JFMC/EDCs for biodiversity conservation and EPA of the committees affected by the roads	5	per JFMC/EDC	40	JFMC/EDC	200
2	Strengthening and supporting Himal Rakshaks / Green Volunteers for forest, environment and biodiversity monitoring	25	Per year	5	Years	125
3	Veterinary health camp in the fringe villages	5	per camp	20	camps	100
4	Preservation and conservation of outstanding universal values of KNP World Heritage Site - renovation, repair and preservation of tangible and intangible cultural values and sites	15	per site	8	sites	120
C Strengthening Forest Protection						
1	Frontline staff: Arms, ammunition, equipment and gear	25	per year	4	years	100
2	Incentivization of frontline staff posted in cold desert (above 4000m)	10	per year	5	years	50
3	Forest fire protection	25	per year	4	years	100
4	Forest fencing for protection	100	per year	2	years	200
5	Strengthening of WT Communication system	50	Unit	1	unit	50
6	Procurement of vehicles	15	per vehicle	8	vehicles	120
7	Procurement of patrolling bikes	1.5	per vehicle	30	bikes	45
D Strengthening Forest Protection Infrastructure						
1	Cold Desert Biodiversity Monitoring Station CDBMS - Passive Solar Heated Structures (Construction and Furnishing)	100	per station	1	stations	100
2	Construction of forest checkpost for the new roads	40	per checkpost	3	checkposts	120
3	Renovation of forest complex at Lachen and Chungthang including staff quarters	100	per complex	2	complexes	200
4	Construction of transit accommodation at Tshungthang for high altitude monitoring	80	per unit	1	unit	80

5	Renovation of forest rest house(s) for forest monitoring	40	per year	2	years	80
6	Improving patrolling tracks and ecotrails	50	per year	5	years	250
E Reducing Wildlife Predation by Feral dogs						
1	Sterilization of feral dogs ABC in partnership with SARAH	20	per year	5	years	100
2	Piloting Organic Waste Composters (OWC) for defence establishments	12	per composter	5	composters	60
3	Providing garbage collection vans to local bodies to support solid waste management of defence establishments	15	per vehicle	2	vehicles	30
F Strengthening Ex-situ Biodiversity Conservation						
1	Predator proof fencing for the zoo	150	Per year	2	years	300
2	Avian rescue, rehabilitation, education and awareness facility	100	Per year	2	years	200
3	Strengthening rescue and rehabilitation of impacted floral species due to road construction activities	80	Per year	5	years	400
G Mitigation of biodiversity loss due to project driven landslides and erosion						
1	Surface runoff management through catchwater drains	20	per year	5	years	100
2	Moisture management through soil moisture conservation	20	per year	5	years	100
3	Checking vegetation loss through slope stabilization	100	per year	4	years	400
H Building Awareness and Capacity building						
1	Sensitization of defence establishments and other stake holders	2	per workshop	10	workshops	20
2	Sensitization, awareness and exposure visits on biodiversity of Sikkim to students	4	per program	5	programs	20

3	Training of frontline staff on biodiversity assessment, conservation, enforcement, rescue and release, human wildlife conflict, participatory conservation, immobilization etc.	5	per training	20	trainings	100
1 Research and Knowledge Management						
1	Annual population estimation studies of feral dogs, ungulates and snow leopard by WWF and others	10	per year	5	years	50
2	Procurement of field kits, camera traps and equipment for biodiversity monitoring and research	25	per year	2	years	50
3	Biodiversity studies and preparation of biodiversity conservation plans by Wildlife Institute of India and others	50	per year	4	years	200
4	Habitat mapping of important floral species and species recovery of key floral species	25	per year	2	years	50
Subtotal						4880
	Administrative costs	10	per year	5	years	50
	Monitoring and evaluation	10	per year	5	years	50
Total						4980

The justification of the budget is provided below:

- **Special biogeographic status of the area:** The area impacted by the roads is a special Biogeographic Province 1D as classified by the Wildlife Institute of India whose extent is limited to only about 1000 km². It is the only significant expanse of the unique cold desert ecosystem in the eastern Himalayas.
- **Globally significant biodiversity:** This area is a repository of significant populations of several endangered species and houses two third of the country's Tibetan gazelle, one third of the Tibetan argali, the only population of southern Kiang, the only breeding population of the black-necked crane in the eastern Himalaya along with several other rare, endangered and threatened species. This region also forms the corridor of the Royal Bengal Tiger and there is evidence of it migrating from the neighbouring Neora Valley National Park in West Bengal.
- **Area impacted versus area diverted:** While the compensatory conservation budgets are assessed in proportion of the forest area diverted or as a ratio of the project costs, what we need to assess is the area impacted and the biodiversity value of the region at stake. In this case, globally significant biodiversity values are at stake and also the area impacted is much more than the area diverted. The hill cutting, slope destabilization, rock blasting, muck disposal, establishing labour camps, increased human presence, unsuitable waste disposal and others will result in a long-term disturbance and damage to biodiversity.

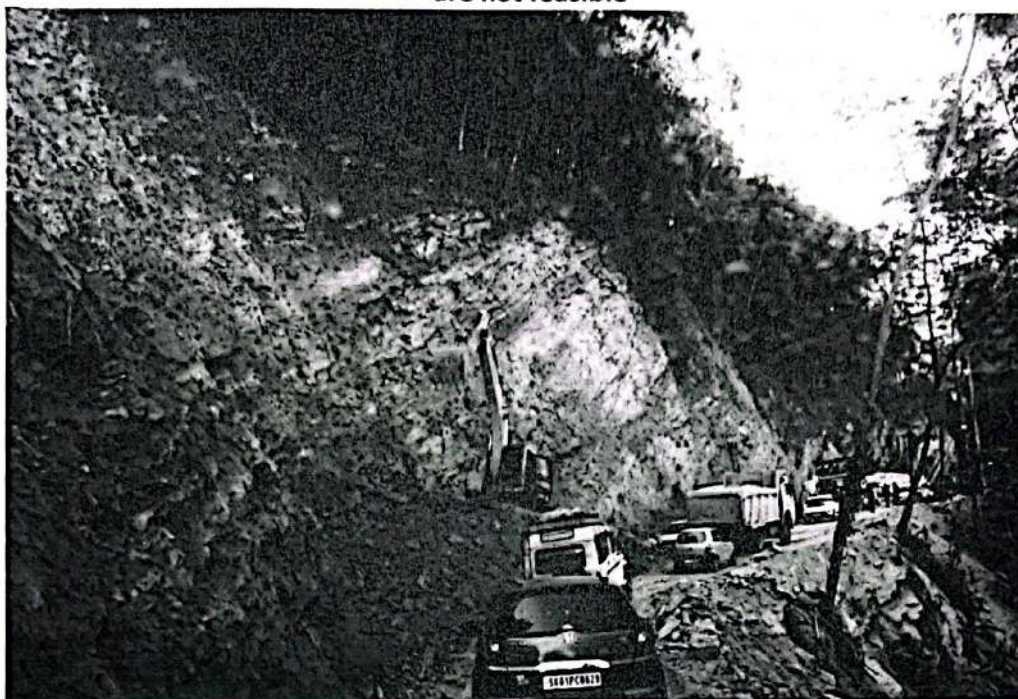
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6. Monitoring mechanism

The operational mechanism proposed to implement this plan is by having a committee at state level comprising of the heads of Forest, Environment, Wildlife, FCA, research NGOs and others. The committee will be headed by the Secretary with CEO CAMPA as the member secretary. The terms of reference of this committee will be to plan the implementation modalities, partitioning of the programme components across different geographies, circles and divisions, preparation of the APO and overall planning, monitoring, evaluation and other related matters. Items requiring centralized purchase for the purpose of economy of scale and standardization will also be done by this committee. The studies by WII, WWF and others will provide a good indication of the key performance indicators namely the population of snow leopard, ungulates, feral dogs and other threats on a yearly basis. Also, since these studies will be taken up independently, it will also function as an independent evaluation of the project impact.

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Figure 17: Mountain road construction is a challenging task and conventional wildlife over passes are not feasible



7. Wildlife Passage Plan

The landscape impacted in Sikkim by these six roads comprises of two ecosystems the Greater Himalaya and the Trans-Himalaya. Road construction in this mountain terrain is a challenging task and will involve hill cutting on steep slopes. This wildlife passage plan has been prepared keeping in mind the topographic constraints of this landscape.

- In the Greater Himalayan part, the terrain is amongst the highest, steepest and most rugged in the country. It is also characterized by young-fold mountains with weak geology and a dense drainage network. In this mountainous landscape, as there will be steep cuts along the hill side during road construction, the larger animals are expected to move along the drainage areas such as *jhoras* and streams. On the Trans-Himalayan portion which is a cold desert, the roads will pass through the southern portion of the Tibetan plateau which is a vast, arid upland with rolling hillocks and devoid of forests or trees. The visibility on this landscape is unobstructed and the alignment will run across a relatively less dense drainage network. In this relatively flat terrain, there is less hindrance perceived to animal movement in the proposed alignment.
- Therefore, the bridges across these drainages should be of adequate width and height in order to act as underpasses for wildlife. Considering the topographic constraints, the locations may be decided jointly by the User Agency and the DFO-Mangan. The height of the underpass/minor bridge may be up to 3-5 m and the span of the underpass/minor bridge may be kept up to 20-30 m for such underpass. The guidelines for animal passage have been provided in the publication "Eco-friendly measures to mitigate impacts of linear infrastructure on wildlife" prepared by WII under technical advice of MoEF&CC, NTCA and NHAI. Wildlife passage plan for linear

infrastructure has been made mandatory by NBWL which has prescribed these guidelines in several instances while according clearances to linear infrastructure projects. Ministry of Road Transport & Highways vide letter No. RW-NH-11013/02/2019-S&R (P&B) dated 29th May 2019 has also advocated the prescriptions to all implementing agencies to implement mitigation strategies as per said guidelines. On smaller drainage lines, the box culverts will need to be constructed of adequate width and vertical clearance to provide safe passage for smaller mammals, amphibians, reptiles etc. These bridges and culverts will have sufficient space between the abutments and the watercourse to enable animals to pass safely during high water levels. Also, ledges will be incorporated in the bridge and culvert design as appropriate. These bridges and culverts will assist in safe passage of animals including large animals in the region.

- Also, the roads under construction do not connect any heavily populated habitations and are primarily for use for defence purposes. Hence, the traffic on these roads is going to be naturally regulated.
- The siting and design of these bridges and culverts for both these ecosystems is provided for in Annexure-IV.

8. Non-structural mitigation and management measures

The following non-structural mitigation and management measures are also recommended:

- Typically, road construction in the mountains involves extensive damage to the valley side as the excavated material is thrown on the downhill side. This adverse impact of the road construction should be taken care by cut and fill method. The muck excavated should be used for filling embankments, retaining walls and should be used for other construction structures and the remaining muck generated should be disposed in proposed dumping sites only.
- To avoid frequent repairs and disturbances, carriageway pavement inside forest area should be rigid, having well planned road side drainage and utility ducts.
- User agency will make provision of vegetative or mechanical canopy closure option for movement of arboreal wildlife.
- User agency will install overhead signboard at every 500 meter in the forest area about animal crossing, restriction on feeding animal, garbage dumping, parking, honking, etc. specifically keeping in mind the tourists who may visit the area. These signages need to specify the code of conduct and important biodiversity of the areas, speed limit etc.
- Enough speed breakers/rumble strips should be constructed at regular intervals to prevent road accidents and wildlife collisions.
- Post completion of the road, the monitoring and maintenance of mitigation structure will be done jointly on advice of forest department and at cost of user agency.
- Traffic should not be allowed on this road for civilians between sunset to sunrise as animal movements are high during these hours and will result in collisions and mortality.
- No labour shall trespass in forest area apart from the designated construction site.
- No damage to any wildlife including habitat shall be done in the neighbouring area.
- The user agency will report all road kills or accident of any wild animals and deposit the carcasses to the office of the concerned DFO wildlife to be dealt according to the prevailing laws.
- Dumping of solid and liquid waste shall be scientifically dealt with by the User Agency in order to avoid feral/free ranging dogs to gather in the area.

- There should be no defacing of rocks and other natural formations.
- The local names of the places should not be distorted. No unusual naming of the natural area like lakes and peaks and mountains etc., which is not in the interest of local community, should be done.
- Construction of religious structures shall not be allowed.
- The Army/paramilitary personnel at all levels should be sensitised regarding the protection and conservation of the natural habitat of the area.
- The user agency shall ensure that the labourers do not indulge in illegal collection of rare and valuable medicinal plants or floral species.
- A monitoring committee shall be constituted under chairmanship of the DFO Mangan (Territorial) with the DFO Wildlife (North), DFO KNP and representatives of the User Agency as members. This Committee shall submit monthly report to the CF Wildlife/Director KNP on progress of work and compliance of the conditions laid out under this report as well as other if any.
- The User Agency shall abide by all the directions of the Hon'ble Supreme Court, provisions of the Wild Life (Protection) Act, 1972, directions of the Ministry of Environment Forest and Climate Change and conditions imposed by the monitoring committee headed by the DFO Mangan (Territorial) from time to time.
- The activities shall be liable to periodic check by officers of the Forest Department. The officers may order stoppage of work if it is found that any of the above provisions have not been complied with.
- An annual compliance certificate on the stipulated conditions shall be submitted by the project proponent to the Chief Wildlife Warden.
- Completion certificate will be issued only after written certification from chairman of monitoring committee countersigned by Chief Wildlife Warden that all the conditions are satisfactorily complied with.

9. Key references

- ATREE (2020). Designing a comprehensive human-wildlife conflict (HWC) management strategy in select districts/landscapes of Sikkim.
- Snow Leopard Population Estimation of India (SPAI) (2022). Forest and Environment Department and WWF India, Gangtok, Sikkim.

Comprehensive Biodiversity Conservation Plan

Report Submitted to the Integrated Regional Office, MoEFCC, Kolkata



February 2023

Photo Credits:

Cover photo: Black necked crane breeding in the marshy areas in Muguthang in North Sikkim

Photo credit: Dr. Gopi G.V., Wildlife Institute of India, Dehradun

Back cover photo: Tiger photo-captured in camera traps in the remote montane forests of North Sikkim

Photo credit: GTF/NTCA/FEWMD/WWF-India

Comprehensive Biodiversity Conservation Plan

Report Submitted to the Integrated Regional Office, MoEFCC, Kolkata



February, 2023

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**FOREST AND ENVIRONMENT DEPARTMENT
GOVERNMENT OF SIKKIM
GANGTOK**

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Executive summary

The Comprehensive Biodiversity Conservation Plan has been prepared in response to the six new roads of CPWD and BRO planned in the Mangan district of Sikkim. All these roads are required for providing defence purpose connectivity for rapid movement of troops, transportation of commodities, armaments and other essential facilities to defence needs. These roads give connectivity to the Indo-China border and are hence, important from strategic point of view. Instead of a piecemeal approach, a comprehensive proposal has been prepared to account for the cumulative impacts and to also ensure transparency and efficiency during execution. The project area for the Comprehensive Biodiversity Conservation Plan spans across the northern and eastern part of the Khangchendzonga landscape in the Eastern Himalaya which is the third highest landscape globally and the highest and steepest terrain in the country. This area is also a biodiversity hotspot spanning across both the greater Himalaya and the Trans-Himalaya and lies in the fringe of the Khangchendzonga National Park a UNESCO designated world heritage site. This landscape harbours significant biodiversity including two third of the country's Tibetan gazelle, one third of the Tibetan argali, the only population of southern Kiang, the only breeding population of the black-necked crane in the eastern Himalaya along with several other rare, endangered and threatened species. This region also forms the corridor of the Royal Bengal Tiger and there is evidence of it migrating from the neighbouring Neora Valley National Park in West Bengal during winter. The main thrust of this proposal is to mitigate the threats to biodiversity arising out of the new linear infrastructure coming up and the consequent rise in human presence. The main threats perceived are increased predation of wildlife by feral dogs and rising human wildlife conflict. While the main gaps are limited infrastructure, human capacity and research inputs. The project aims to address these threats and gaps by developing an integrated biodiversity management plan. The nine main components of this plan are reducing human wildlife conflict, strengthening forest protection, strengthening participatory conservation, strengthening forest protection infrastructure, reducing wildlife predation by feral dogs, strengthening ex-situ conservation, mitigation of biodiversity loss due to project-driven landslides and erosion, building capacity and knowledge management. The total budget of this plan amounts to Rs 49.80 crore for a period of 5 years. The monitoring mechanism has also been spelt out. The wildlife passage plan adapted to this steep mountain terrain is also provided along with the non-structural mitigation and management measures. This biodiversity conservation plan has been prepared in consultation with Wildlife Institute of India and their suggestions have been incorporated. The plan has been approved by the Chief Wildlife Warden for onward submission to the Integrated Regional Office of MoEFCC.

1. Unique context and biodiversity values

The impacted area spans across the northern and eastern part of the Khangchendzonga landscape in the Eastern Himalaya which is the third highest landscape globally and the highest and steepest terrain in the country. This area is also a biodiversity hotspot spanning across both the greater Himalaya and the trans-Himalaya and lies in the fringe of the Khangchendzonga National Park a UNESCO designated world heritage site. Consequently, it is designated as a separate biogeographic province 1D by the Wildlife Institute of India. The area also forms the headwaters of the river Teesta and is dotted with several glaciers and high-altitude lakes many of which are regarded as sacred. Improved ecological health of this ecosystem translates to sufficient water in the rivers and streams even in the lean season, which sustains agricultural and horticulture crops, directly translating to food and health security of the downstream towns and villages. This area is also contiguous with the Tibetan Plateau with the altitude ranging from between 4000m and 5500m. The vegetation here is sparse, devoid of trees, dominated by graminoids, forbs and a few shrubs. The biodiversity significance of the area is unmatched. This area harbours globally significant biodiversity including snow leopard, two third of the country's Tibetan gazelle, one third of the Tibetan argali, the only population of southern Kiang, the only breeding population of the black-necked crane in the eastern Himalaya along with several other rare, endangered and threatened species. This region also forms the corridor of the Royal Bengal Tiger and there is evidence of it migrating from the neighbouring Neora Valley National Park in West Bengal. The Himal is also a repository of valuable medicinal plants, which form the basis for the indigenous systems of medicine. Most of the peaks, lakes, rivers and caves here are considered sacred and are visited by pilgrims to pay homage. This area is also traditionally used by native herders for yak and sheep herding who practice transhumant rotational grazing practices. These areas are also under heavy defence deployment with extensive presence of the Indian Army and the Indo Tibetan Border Police (ITBP). After the 2017 Doklam and 2020 Galwan incidents along the Sino-Indian border, the border areas have been further reinforced with more troops and development of new infrastructure. Dogs being camp followers have benefitted from this development and their population has increased several-fold. Due to its remoteness, harsh climate and lack of infrastructure this area has a weak presence of the forest department. The detailed list of biodiversity elements (flora and fauna) is provided for in Annexure-I.

Figure 1: Endangered biodiversity of the Sikkim Trans-Himalaya



Tibetan gazelle



Tibetan argali (Nayan)



Southern Kiang



Black-necked crane

2. Proposed linear infrastructure projects

There are a total of 6 linear infrastructure projects being implemented by CPWD and BRO, for which this Comprehensive Biodiversity Conservation Plan has been prepared. All these roads are required for providing defence purpose connectivity for rapid movement of troops, transportation of commodities, armaments and other essential facilities to defence needs. These roads give connectivity to the Indo-China border and are hence, important from strategic point of view. The details of these diversions is placed below. The map of these roads is also provided in Annexure-II. The distribution of the total outlay of this plan amongst the 6 roads is in proportion to the length of the road and is also detailed in the last column with heading 'cost to be levied for BC plan'.

Table 1: Details of the 6 linear infrastructure projects

Rs in Crores						
Sl no.	Diversion	User Agency	Declared Project Cost	Declared Road Length	Cost Ratio	Cost Levied for BC plan
1	Diversion of 141.124 ha. forest land for non-forest use in Toong Partem Pt. 4865 Tamze Border Road Forest Proposal	BRO	1498.89	84.42	65%	32.15
2	Diversion of 19.36 ha. of Forest land for Muguthang to 20r link road by ITBP	CPWD	278.08	10.70	12%	5.96
3	Diversion of 11.1521 ha of forest land for widening of existing road (NH310A) to NHDL specification with Paved Shoulder from Toong KM)+00 to Chungthang of design KM 27+476 in Mangan Division, Sikkim by BRO	BRO	296.40	29.00	13%	3.36

4	Diversion of 10.6759 Ha of forest land for widening of existing road (NH310A) to NHDL specification with Paved Shoulder from Mangan KM)+00 to Toong of design KM 17+870 in Chungthang Division, Sikkim by BRO	BRO				3.00
5	Diversion of 4.86 Ha. KNP/Wildlife land for construction of ITBP Ph-II road from 20r Link point to 20r (Goma)	CPWD	39.25	2.70	2%	0.84
6	18.82 Ha. Forest/WL land for construction of ITBP road from 20r Link point to Zanak	CPWD	209.00	10.40	9%	4.48
			2321.62	137.22	100%	49.80

The justification for preparing a Comprehensive Biodiversity Conservation Plan instead of six separate biodiversity conservation plans is as follows:

- Comprehensive projects with pooled resources enable perspective planning and adopt a more diagnostic approach with a futuristic outlook
- Economy of scale becomes a reality as many functions such as procurement, research, planning and evaluation can be integrated
- The cumulative impact of projects is often much more than the sum of the individual impacts as these projects have a cascading effect on biodiversity
- Implementing several projects with similar components in the same geographical area run the risk of overlap
- Review of this management plans by WII also highlights the need for adopting an integrated approach of a Comprehensive Biodiversity Conservation Plan

3. Process followed

Instead of piecemeal preparation of biodiversity conservation plan for the six roads separately, an integrated biodiversity conservation plan has been prepared to ensure that the cumulative impacts of these linear infrastructure intrusions are addressed in a comprehensive manner. The implementation of this comprehensive plan will also be efficient as the activities will all be integrated without the risk of duplicacy or overlap. A participatory process involving consultations and field visits by scientists and field managers was followed for the preparation of this biodiversity conservation plan. Field visits were undertaken by the Wildlife Institute of India during September 2022. Also, several rounds of consultations were organized by the department with other stakeholders such as Animal Husbandry and Veterinary Services Department (AHVS), Sikkim Anti Rabies and Animal Health Programme (SARAH), forest wildlife divisions, forest territorial divisions, FCA wing, WWF and others before finalizing this plan. A presentation of the draft plan was made on 21st Jan, 2023 followed by a finalization workshop on 30th Jan, 2023 in the Forest Department. This draft plan was shared with the Wildlife Institute of India (WII) and their comments obtained as well (Annexure III). The review of the plan by WII and the details of the cross drainage structures from the user agencies (CPWD and BRO) was obtained in Feb 2023, following which this plan was finalized.

4. Threats, gaps and proposed strategy

The nine main components of this plan are human wildlife conflict, participatory conservation, forest protection, strengthening forest protection infrastructure, wildlife predation by feral dogs, ex-situ conservation, building capacity and knowledge management.

4.1 Human-wildlife conflict management

Rising instances of human-wildlife conflict specially crop damage and livestock kills are being reported from the state. Crop damage by wild boar and Assamese macaque, and livestock kills by Himalayan Black Bear are reported frequently from this area. Also, at times cases of grievous human injury by Himalayan Black Bear sometimes even leading to death are reported from the forest fringe villages. Other than these animals, there are also stray incidences involving the common leopard, leopard cat, martens, civets, barking deer, snakes and squirrels as well. The scale of damage caused due to conflict is considerable and the resentment of the local populace towards wildlife and the Forest department is an understatement. There are several cases of local agriculturalists completely abandoning farming and animal husbandry due to the losses incurred because of conflict. This is a very serious threat, since livelihood options in the mountains are limited and for most farming is the only source of sustenance.

Figure 2: Grievous injury to humans caused by Himalayan Black Bear are rising



4.1.1 Anticipated impacts

Linear infrastructure intrusions into natural ecosystems such as roads and highways create disturbance to the wildlife habitats and to wildlife as well. The actual area impacted by linear projects is far more compared to area diverted. There is a direct loss of habitat during establishment and maintenance of linear project. This may happen due to clearing of vegetation, dumping of excavated earth and material movement of heavy vehicles and earth movers, creation of labour camps etc. The effect of these disturbances may persist in the landscape for years to decades. This results in higher instances of human-wildlife conflict as wildlife corridors and habitats get disturbed. Hence, there is a need to strengthen the preparedness of the forest department to deal with more instances of crop damage, livestock kills and human injury. The

cost of the tranquilizing drugs is very high and they have a limited shelf life. Also due to the challenging mountainous terrain of the state, immobilization, capture and translocation of wildlife involves cages to be transported manually to set traps for capture. Carrying the cage with trapped animal inside is a big task. Also, there is wastage of tranquilizers and darts due to obstructions from heavy undergrowth. Hence, there is a need to be equipped with the most updated practical and effective tools to aid in immediate and future planning for managing conflict. Also, recently the ex-gratia rates for livestock kills have been rationalized to ensure adequate compensation in alignment with the market value.

4.1.2 Mitigation strategy

Hence, the proposed strategy is four-pronged namely: 1) Ex-gratia payments for livestock kill and human injury 2) Procurement of tranquilizing guns, cages, equipment and supplies 3) Mobilization of team and rescue and release operations 4) Procurement and deployment of wildlife deterrent devices. The total cost of this human wildlife conflict management component comes to Rs 6.60 crore as detailed in Section 5.

Figure 3: Transportation of cages with the animal is a herculean task in hilly terrain



Figure 4: Livestock kills by Himalayan Black Bear in winter are rising



4.2 Participatory biodiversity conservation

About 59% of Sikkim (4187 sq. km) lies above 3000 meters and most of this is classified as Reserve Forests. This sub-alpine and alpine landscape of the Sikkim Himalayas locally referred to as Himal, has a unique ecosystem and cultural and wildlife values associated with it. Though most of lower and middle hill forests have been brought under the Joint Forest Management (JFMC/EDC) network, the upper hill forests of the Himalayas, in spite of determined efforts, still continue to be under inadequate management, beset with threats and need urgent interventions. The main threats being unplanned trekking tourism, hunting and trapping of wild animals, smuggling of medicinal and aromatic plants, wildlife predation by feral dogs and lack of awareness amongst the security forces. Effective conservation of the Himal by forest staff alone is very difficult due to its high altitude, remoteness, tough terrain, harsh climate and limited resources available. Further lack of adequate infrastructure and facilities make every patrolling visit more like an expedition, with a large contingent of support staff and resultant high attendant costs. Hence, the *Himal Rakshak* or Mountain Guardian policy was launched by Sikkim Forest Department in 2006 to strengthen community-based conservation in the high-altitudes where typical JFMCs/EDCs do not have outreach. Community resource persons were recognized as “the honorary guardians of mountains” and were given stewardship of the alpine areas. This initiative is unique, due to its aspiration of capacity-building among local community members to help conserve the alpine areas including the high reaches of the Khangchendzonga National Park (KNP).

Figure 5: Himal Rakshak initiative needs to be extended to the northern part of the state



For other parts of Northern and Eastern Sikkim which are forested, the JFMC/EDC are not as vibrant as they were during the 2000-2010 period. Hence, there is a need to revitalize these community-based institutions.

Figure 6: Participatory conservation institutions such as JFMC/EDC need to be revitalized



4.2.1 Anticipated impacts

Linear infrastructure projects open up biodiversity rich areas to the outside world by making the access and exploitation easy. Biodiversity resources that were earlier not easily accessible now become a commodity to be traded in the market. Regulatory and enforcement agencies are not able to move fast enough due to which pristine areas get depleted of biological resources. The trans-Himalayan region of Sikkim which was earlier inaccessible, will now get opened up for easy access to the outside world and subsequently also for tourism. Due to the high-altitude and harsh climate, conventional conservation needs to be supplemented with innovative means to strengthen the intelligence and surveillance network. Hence, while the *Himal Rakshak* policy has been implemented in the southern part of the KNP, it now needs to be extended to the eastern and northern part. With growing defence establishments, rising population of feral dogs, threat of trapping and hunting wildlife, accelerating impacts of climate change and other threats, the alpine areas in the northern part of Sikkim too need to be brought under the participatory conservation framework. The existing JFMC/EDC are too weak to tackle this new threat and hence they need to be revived.

4.2.2 Mitigation Strategy

It is proposed for constitution of *Himal Rakshaks* (HRs) for northern part of KNP for participatory management of trans-Himalayan unique ecosystem as the traditional knowledge and the experience of local community plays a crucial role. A total of 20 *Himal Rakshaks* are planned for the Northern part of KNP comprising members of the local Lachen Tourism Development Committee, local Eco-development Committee and the local herders (Dokpas). Subsequently, capacity building of HRs will be taken up in partnership with organizations such as World Wildlife Fund (WWF) in basic biodiversity monitoring techniques and reporting wildlife crimes. Identity cards will be provided to all the HRs. Provision of field equipment such as high-altitude trekking gears, field jackets, shoes etc. will also be provided along with one-time financial incentive. Participatory conservation will be given a further boost by constituting 'green volunteers' to strengthen the conservation of forests, environment and wildlife and supported in a similar

manner as the Himal Rakshaks. These 'green volunteers' will be enlisted and their capacity building carried to support the conservation of forests, environment and biodiversity. Similarly, 40 JFMC/EDC will be strengthened in the northern and eastern part in the forested regions. This will be done by reconstituting, institution building, capacity building and exposure visits. These institutions need be broad-based, follow democratic decision making and eventually contribute in biodiversity monitoring and surveillance. They will be trained in record keeping, accounting, forest monitoring and supported with exposure visits both within and outside the state. They will also be provided with field equipment such as high-altitude trekking gears, field jackets, shoes etc. Entry-point activities will also be carried out as a confidence-building measure. Veterinary health camps will be organized which will benefit both the livestock husbandry as well as reduce the spread of contagious diseases to wild herbivores. Also, the cultural assets will be identified especially those that help in strengthening the conservation ethos and belief systems of the sacred landscape and renovated.

The total cost of this participatory biodiversity conservation component comes to Rs 5.45 crore as detailed in Section 5.

4.3 Strengthening Forest protection infrastructure

The forest areas comprise mostly of temperate oak forests and subalpine conifer forests. Also due to natural calamities, landslides are very common impacting forests and nearby human habitations. The geology of the eastern Himalayas is weak as the mountains are young-fold. The situation is further aggravated due to the steep terrain and heavy annual precipitation of more than 250 cm. The forests specially in the 1000-2000 m zone are susceptible to forest fire. Though hunting of wildlife has come down over the last few decades, sporadic events from armed trans-border hunters, local bush meat hunting and tree felling does get reported once in a while.

4.3.1 Anticipated impacts

The wildlife predation by feral dogs, increased instances of hunting and poaching, laying traps and snares, deepening human wildlife conflict, high probability of smuggling of medicinal plants, more frequent road kills, greater probability of forest fire etc. which will need better preparedness of the forest staff. Thus, the regular monitoring of these areas, which were earlier not easily accessible, will become an absolute necessity due to the presence of heavy earth moving machineries, people and labour camps. Business as usual will result in irreversible biodiversity loss. Also, natural calamities such as landslides and forest fires will increase due to road building activity for which mitigation measures will need to be put in place. Threats from trans-border hunting and local bush meat hunting need to be also countered. The forest staff too need to be better equipped in terms of equipment, mobility, communication and infrastructure.

Figure 7: Illegal felling of trees in the reserve forests



4.3.2 Mitigation strategy

The mitigation strategy will involve equipping forest staff with gears, wireless communication and vehicles so that they can respond to crisis in a timely manner. Natural calamities such as forest fire will need to be addressed. Fencing at the vulnerable points will also be needed to secure forests. Special high-altitude gears, transportation facilities, clothing etc must be provided to the frontline staff posted in difficult areas so as to strengthen and support them. Physical presence of forest and wildlife staff in these remote high-altitude locations needs to be incentivized so that it will act as a deterrent against forest and wildlife offences. Incentive needs to be provided to the frontline staff posted and functioning in the trans-Himalaya (above 4000 m). These staff have to endure hardships such as thin mountain air, cold sub-zero temperature, limited access to medical facilities, poor infrastructure etc. Thus, providing special incentive will serve as a motivation for them.

Hence, the total investment planned in the forest protection component is Rs 6.65 crore as detailed in Section 5.

Figure 8: Patrolling by forest staff takes on the shape of an expedition in this landscape



4.4 Strengthening forest protection infrastructure

The valleys of Lhonak chu, Tso Lhamo, Lhasar and Chopta valley that constitute the Sikkim trans-Himalaya do not have a physical presence of the forest department. The trans-Himalayas of Sikkim is characterized by sporadic presence of forest personnel due to a lack of infrastructure and severe winter and snow storms. The main reason being the high altitude and harsh climate with temperatures dipping to minus 35 degrees during winter accompanied with fierce snow storms. Forest infrastructure in the high altitudes is non-existent as there is not a single forest office or residence for forest personnel. As a result, forest protection and enforcement is sporadic and uneven. Due to heavy snow storms and harsh weather, camping in alpine tents is also not feasible. This lack of infrastructure also impacts the operationalization of research studies, biodiversity monitoring and sterilization programs. Other than this high-altitude infrastructure, even the existing infrastructure comprising of the range office complex in Lachen and Tshungthang is in a dilapidated condition and needs upgradation.

4.4.1 Anticipated impacts

Lack of infrastructure directly results in uneven monitoring, delayed response, high transportation costs as there are no 'boots on the ground'. The biodiversity in this landscape was till date protected due to lack of easy access and transportation. Accessing Muguthang from Thangu involved a back breaking trek in the high altitude with the Lunak la pass at 5900 metres posing a formidable barrier. Linear infrastructure projects open up biodiversity rich areas to the outside world by making the access and exploitation easy. Regulatory and enforcement agencies are typically not able to move fast enough due to which pristine areas get depleted of biological resources. Now with the entire stretch from Thangu to Muguthang becoming motorable it is anticipated that the entire length of the Lhonak valley will get opened up for visitors and tourists. Biodiversity resources that were earlier not easily accessible now become a commodity to be traded in the market. The trans-Himalayan region of Sikkim which was earlier inaccessible, will now get opened up for easy access to the outside world and subsequently also for tourism.

Figure 9: Passive solar housing structures in Ladakh



4.4.2 Mitigation Strategy

Hence, the imperative for biodiversity conservation in the trans-Himalayas is to establish permanent infrastructure and man it to ensure regular surveillance, monitoring and enforcement. In this regard it is proposed to establish the Trans-Himalaya Biodiversity Monitoring Station using Passive Solar Building Technology in partnership with HIAL <https://www.hial.edu.in/> Ladakh, founded by the renowned innovator Sonam Wangchuk. When the ambient temperature outside is minus 20 degrees, this technology ensures that the inside temperature is at 10 degrees without heating <https://www.youtube.com/watch?v=oBtSoWh1hJg>. HIAL has also partnered with the Indian Army and other government departments in Ladakh to scale up this technology in the high altitude areas. It is proposed to construct and furnish one such station structure using this technology in the Sikkim trans-Himalayas. The existing forest staff infrastructure at Lachen and Tshungthang will be upgraded. Also, the existing forest rest houses in the vicinity will be renovated and a transit accommodation created at Tshungthang to enable more frequent monitoring along with three new forest checkpoints on these new roads wherever needed.

The total cost of this forest protection infrastructure component comes to Rs 8.30 crore as detailed in Section 5.

4.5 Reducing wildlife predation by feral dogs

The rising populations of feral dogs in forest areas in the state of Sikkim specially in the north and eastern part is of great concern. In areas that are of high biodiversity significance, reports of wildlife depredation by these dogs have become frequent. These dogs are known to hunt in packs and have been reported to prey upon wildlife such as blue sheep, Tibetan gazelle, Himalayan marmot, musk deer, Himalayan goral, serow, red panda, etc. The population of these dogs is closely linked to the camps of military and paramilitary forces, as these dogs are known to feed on the improperly disposed food waste.

Figure 10: Feral dogs in the same niche occupied by the endangered snow leopard

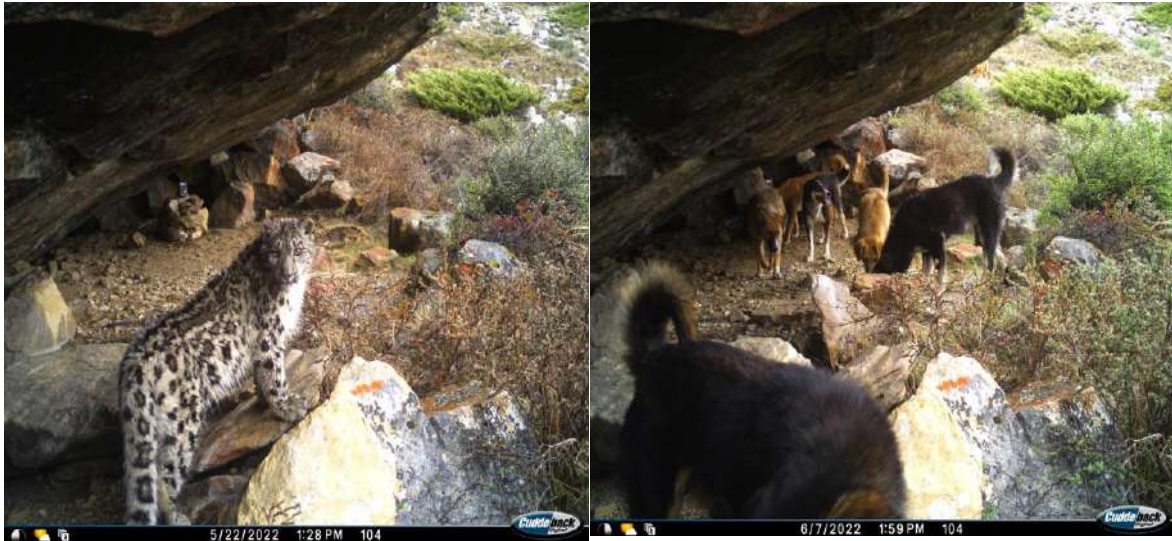


Figure 11: Feral dogs in the same niche occupied by the endangered musk deer



4.5.1 Anticipated impacts

Due east of the Lhonak valley lies the Chhombu chu valley which has an established road network with defence establishments for several decades now. This valley provides an interesting insight regarding the impacts of roads and highways on biodiversity. There are close to 600 feral dogs in this valley who hunt in packs and prey upon wildlife. Now that the Lhonak valley is being opened up and provided easy access with motorable road, the future scenario in the absence of mitigation measures will be similar. Source dog populations from the nearby towns and villages will now be able to easily disperse and occupy this new territory. The Tibetan marmots, black-necked cranes, pikas and other small mammals and birds will be easy game for these ferocious predators. Participatory research by ATREE found that in this landscape the feral dogs cause severe fatalities to yak calves. This has led to high economic losses to pastoralists, with an estimated 40% of yak calves being lost every year.

Figure 12: Ghoral killed by feral dogs in the upper reaches of Gangtok district in Nov, 2022



4.5.2 Mitigation strategy

The Animal Birth Control (ABC) programme is the suggested measure for controlling dog populations. It is a long-term intervention that will start showing results after continuous efforts of sterilizing at least 70 percent of the dog population. While sterilization is underway, there is a need to scale it up. Also, sensitization of the armed forces and reducing their food waste is also needed to control the dog population. The strategy proposed is three-fold: i) Firstly it aims to ensure proper disposal of food waste from the security establishments by ensuring their collection by the nearby local body and by piloting of the Organic Waste Composter (OWC) ii) Secondly, it aims to scale up the ongoing ABC programme in partnership with the Animal Husbandry Department, Govt. of Sikkim to achieve higher coverage iii) Providing garbage collection vans to local bodies to support solid waste management of defence establishments. The total cost of this reducing wildlife predation by feral dogs component comes to Rs 1.90 crore as detailed in Section 5. The expected outcomes of this component is a reduction in the population of feral dogs in forests and a significant reduction in wildlife predation in the forest areas of north and east Sikkim.

4.6 Ex-situ biodiversity conservation

The Himalayan Zoological Park (HZP) is the only ex-situ conservation facility in the state situated at Bulbuley in the vicinity of Gangtok. It was established in 1997 and spreads across 230 ha. It is an ideal location for ex-situ conservation of globally threatened and endangered wildlife. Also, it has ample scope for expansion, adding new enclosures and wild animals. The zoo now has a collection of 78 specimens belonging to 18 species. The animals of interest under captivity are the Red Panda, the State animal of Sikkim, the Common Leopard, the Himalayan Black Bear, the Large Indian Civet, the Palm Civet, the Leopard Cat, the Yak, the Goral, The Himalayan Thar, Blue Sheep etc. Birds consist of the Kalij Pheasant Schedule-I species and the rest are exotic species such as Golden, Silver and Lady Amherst's Pheasants. There is a need to strengthen the ex-situ conservation infrastructure for conservation and education purposes. The HZP falls under the category of Mini Zoo as per the Central Zoo Authority's classification but it has tremendous scope

for expansion. The HZP has an approved master layout plan and the developments are proposed accordingly.

4.6.1 Anticipated impacts

Sikkim is a haven for birds with nearly 550 species constituting nearly half of the national avifaunal wealth. Growing linear infrastructure in the form roads and highways will result in fragmentation of habitat. There are several rare, endangered and threatened avifauna such as black necked crane, pheasants, partridges, owls, birds of prey, vultures etc. that need special conservation attention. This linear infrastructure poses a real threat to ground nesting birds such as partridges and pheasants due to the anticipated spread of feral dogs in their habitat. The well-known direct effects of roads on birds include habitat loss and fragmentation, vehicle-caused mortality, pollution, and poisoning. Nevertheless, indirect effects may exert a greater influence on bird populations. These effects include noise, artificial light, barriers to movement and edges associated with roads. Hence, there is a need to strengthen the avifaunal infrastructure in the zoo. The zoo has been facing the menace of feral dogs as well as wild animals posing a threat to the rescued and exhibit animals. Due to lack of fencing, there was an outbreak of canine distemper virus and the zoo lost 18 Red Pandas which effectively halted the conservation breeding programme. Also, a Himalayan Black Bear from the wild entered into the zoo premises and resulted in casualty of herbivores (Musk Deer, Barking Deer, Ghoral, Himalayan Tahr and Blue Sheep) in the exhibit areas. Also, due to the road construction activities it is anticipated that floral elements will be damaged and there is a possibility of weeds proliferating in the areas where the dense forest canopy is opened.

4.6.2 Mitigation strategy

The mitigation strategy comprises of two approaches namely strengthening the zoo infrastructure and predator proof fencing of the zoo. There is a need of an aviary which will serve the dual purpose of conservation and education. This will help to increase the foot fall in the zoo and as well further strengthen and extend the zoo. The aviary is proposed with raised platform walk way. It will have RCC fencing with predator proof design with chain link mesh above with enrichment suiting the birds and visitors experience. This intervention will bring in added revenue resulting in self-sufficiency and sustainability of the park. The aviary will be designed in consultancy with experts who have designed such walk-in aviary in the country. The total investment proposed is Rs 2.00 crore.

Chain-link (predator proof) fencing of the entire zoo (230 ha) is a priority which comes to around 12.8 Km, to safeguard the animals as well as prevent the spread of zoonotic diseases from feral dogs, cattle etc. Also, the HZP is located on prime land just 3 km from Gangtok city, and is susceptible to encroachments, hence this fencing will also safeguard the zoo from this threat. As the zoo spreads over 230 ha, it serves both as in-situ as well as ex-situ biodiversity conservation. Hence, once the external fencing is completed, subsequently, internal partitions (soft release facility) can be created as per the approved master layout plan for soft release in future. Hence, we would like to propose for half of the total perimeter amounting to Rs 3.00 crore from this plan in Phase-I.

Strengthening rescue and rehabilitation of impacted floral species due to road construction activities and weed eradication will also be carried out with an outlay of Rs 4.00 crore.

Hence, the total investment planned in the ex-situ biodiversity conservation component is Rs 9.00 crore as detailed in Section 5.

4.7 Mitigation of biodiversity loss due to project driven landslides and erosion

This component will protect the valley side damage due to hill road construction comprising of managing surface runoff, treating minor landslides and slope stabilization. Due to the steep terrain of the site, often road cutting spoils roll down the valley side causing damage to the valley side slope. Also, the improper siting of cross drainage structures results in aggregation of surface runoff and its discharge along unnatural sites causing damage to the slope. The total investment planned in this component is Rs 6.00 crore as detailed in Section 5.

4.8 Building awareness and capacity building

Various stakeholders have an impact on this landscape such as the defence establishment, tourism personnel, nomadic pastoralists and the local community. Sensitizing these stakeholders and building capacity can play an important role in the implementation of this biodiversity plan as well as future conservation. The forest department personnel also have expertise and experience in managing forested habitats, but managing a cold desert will need a new set of skills.

Figure 13: Awareness programs for the forest fringe local communities



4.8.1 Anticipated impacts

Development of roads and highways in this landscape will result in new types of threats such as wildlife predation by feral dogs, increased instances of hunting and poaching, deepening human wildlife conflict, high probability of smuggling of medicinal plants, more frequent road kills etc., which will need better awareness and capacity amongst the stakeholders. Business as usual will

result in irreversible biodiversity loss. Improper food waste management will result in a proliferation of feral dogs and their predation of native wildlife.

4.8.2 Mitigation strategy

The mitigation strategy will need sensitization of the defence forces and training of forest frontline staff on biodiversity conservation in this unique landscape. The defence forces establishment keep on getting transferred every few years, hence this has to be an ongoing exercise. The defence forces need to manage their food waste responsibly, stop feeding the feral dogs, respect the endangered biodiversity, protect the wetlands and ensure that there is no sporadic hunting of wildlife. The native herders need to be partnered with for making participatory conservation work as they have continuous on-ground presence in this landscape. The local community-based institutions such as JFMC/EDC and others too needs to be sensitized and their capacity built. The frontline staff need to be trained to take up higher responsibilities by building capacity. The staff can be sponsored to attend various trainings and workshops including the WII Certificate course, Induction trainings, wildlife immobilization trainings and various other trainings and workshops. Exposure visits of students from the fringe villages will also help in creating awareness and local stewardship for the natural heritage.

Hence, the total investment planned in the awareness and capacity building component is Rs 1.40 crore as detailed in Section 5.

Figure 14: Exposure visit of students to forest areas help in creating local stewardship



4.9 Research and knowledge management

There is limited knowledge and data on the high altitudes and trans-Himalayan ecosystems. The population, distribution and threats faced by flora and fauna is yet to be scientifically assessed.

Action research that provides knowledge for decision making is needed to plan conservation action as well as assess the impact of biodiversity conservation interventions.

Figure 15: WWF Research team installing camera traps jointly with forest staff



4.9.1 Anticipated impacts

There is a significant gap in the knowledge about the presence, distribution, population size, habitat preference and movement patterns of many mammal species along with the prevalence of illegal activities like poaching, medicinal plant collection, etc. Long term, year-round monitoring stations can fill these knowledge gaps, providing useful data for relevant conservation actions and interventions. Also, habitat preference and movement patterns of snow leopards at a fine scale is not known. The lack of this information affects the quality of the species-specific conservation actions. There is limited baseline data available for wild ungulates and feral dogs. Hence, we are unable to quantify changes in population over time, and also aid in framing conservation objectives, assess their feasibility, concentrate efforts, and define a time-period within which progress can be evaluated. The lack of this information restricts the understanding of the population trends for wild ungulates and the effectiveness of the birth-control efforts for the feral dogs.

4.9.2 Mitigation strategy

The action research proposed jointly with WWF-India and others comprises of three studies which will be taken up jointly with forest department namely 1) Long term biological monitoring: The long-term biological monitoring will be carried out by identifying permanent to set up around 200 camera traps that will be kept functional all year round. These will be used to estimate the population size, distribution, habitat preference and movement patterns of snow leopards, other co-predators (Tibetan wolf, free-ranging dog, Pallas's cat, etc.) and prey species (blue sheep, Tibetan argali, musk deer, etc.). These will also be used to know the degree of human presence in some remote areas and the detection of poaching instances. 2) Radio collaring of snow leopards: by fitting 5 snow leopards with radio collars to study their movement patterns and

behaviour 3) Population estimation surveys for wild ungulates and free-ranging dogs: by using the 'double observer' method for wild ungulates and free-ranging dogs. Double-observer surveys will be conducted on previously identified and fixed routes once every year to estimate the population size of the wild ungulates and free-ranging dogs. These studies will help monitor the impact of the proposed interventions and create a credible baseline for evidence-based policy making an annual population estimation exercise is proposed in partnership with WWF India.

Studies planned with Wildlife Institute of India and others will cover the 1) Population, breeding ecology and ranging patterns of the black-necked crane, 2) Ecological and genetic assessment of the Southern Kiang, Tibetan Gazelle, Tibetan Argali, Himalayan Marmot etc. 3) Population assessment, monitoring and disease prevalence among mountain ungulates 4) Assessing high-altitude lakes and rivers for their biodiversity values 5) Effect of increasing border infrastructure and defence camp practices on biodiversity 6) Development of integrated conservation plan for cold desert region of Sikkim and 7) Development of Management Plan for the Pangolakha Wildlife Sanctuary.

The department also plans to take up habitat monitoring of important floral species and recovery programs. Also, procurement of equipment for field kits, camera traps, surveillance cams etc. for inhouse biodiversity monitoring and research is also included. Hence, the total investment planned in the research and knowledge management component is Rs 3.50 crore as detailed in Section 5.

Figure 16: WWF Research team conducting the snow leopard population census in Sikkim



5. Budgetary plan

The plan is prepared for a duration of 5 years keeping in mind the time taken for projects to take off after a preparatory phase.

Table 2: Summary table of the components with budget

Rs in lakhs

No.	Component	Budget
A	Human Wildlife Conflict Management	660
B	Participatory Biodiversity Conservation	545
C	Strengthening Forest Protection	665
D	Strengthening Forest Protection Infrastructure	830
E	Reducing Wildlife Predation by Feral dogs	190
F	Strengthening Ex-situ Biodiversity Conservation	900
G	Mitigation of biodiversity loss due to project driven landslides and erosion	600
H	Building Awareness and Capacity building	140
I	Research and Knowledge Management	350
	Subtotal	4880
	Administrative costs	50
	Monitoring and evaluation	50
	Total	4980

Table 3: Detailed table of the plan components with budget

Rs in lakhs

No.	Activity	Unit cost		Units		Budget
A	Human Wildlife Conflict Management					
1	Ex-gratia for livestock kill and human injury, death and medical expenses	40	Per year	5	Years	200
2	Procurement of tranquilising guns, cages, equipment and supplies	60	Per year	5	Years	300
3	Mobilization of rescue team and release operations	20	Per year	5	Years	100
4	Procurement and deployment of wildlife deterrent devices	20	Per year	3	Years	60
B	Participatory Biodiversity Conservation					

1	Strengthening of JFMC/EDCs for biodiversity conservation and EPA of the committees affected by the roads	5	per JFMC/EDC	40	JFMC/EDC	200
2	Strengthening and supporting Himal Rakshaks / Green Volunteers for forest, environment and biodiversity monitoring	25	Per year	5	Years	125
3	Veterinary health camp in the fringe villages	5	per camp	20	camps	100
4	Preservation and conservation of outstanding universal values of KNP World Heritage Site - renovation, repair and preservation of tangible and intangible cultural values and sites	15	per site	8	sites	120
C	Strengthening Forest Protection					
1	Frontline staff: Arms, ammunition, equipment and gear	25	per year	4	years	100
2	Incentivization of frontline staff posted in cold desert (above 4000m)	10	per year	5	years	50
3	Forest fire protection	25	per year	4	years	100
4	Forest fencing for protection	100	per year	2	years	200
5	Strengthening of WT Communication system	50	Unit	1	unit	50
6	Procurement of vehicles	15	per vehicle	8	vehicles	120
7	Procurement of patrolling bikes	1.5	per vehicle	30	bikes	45
D	Strengthening Forest Protection Infrastructure					
1	Cold Desert Biodiversity Monitoring Station CDBMS - Passive Solar Heated Structures (Construction and Furnishing)	100	per station	1	stations	100
2	Construction of forest checkpost for the new roads	40	per checkpost	3	checkposts	120
3	Renovation of forest complex at Lachen and Chungthang including staff quarters	100	per complex	2	complexes	200
4	Construction of transit accommodation at Tshungthang for high altitude monitoring	80	per unit	1	unit	80

5	Renovation of forest rest house(s) for forest monitoring	40	per year	2	years	80
6	Improving patrolling tracks and ecotrails	50	per year	5	years	250
E Reducing Wildlife Predation by Feral dogs						
1	Sterilization of feral dogs ABC in partnership with SARAH	20	per year	5	years	100
2	Piloting Organic Waste Composters (OWC) for defence establishments	12	per composter	5	composters	60
3	Providing garbage collection vans to local bodies to support solid waste management of defence establishments	15	per vehicle	2	vehicles	30
F Strengthening Ex-situ Biodiversity Conservation						
1	Predator proof fencing for the zoo	150	Per year	2	years	300
2	Avian rescue, rehabilitation, education and awareness facility	100	Per year	2	years	200
3	Strengthening rescue and rehabilitation of impacted floral species due to road construction activities	80	Per year	5	years	400
G Mitigation of biodiversity loss due to project driven landslides and erosion						
1	Surface runoff management through catchwater drains	20	per year	5	years	100
2	Moisture management through soil moisture conservation	20	per year	5	years	100
3	Checking vegetation loss through slope stabilization	100	per year	4	years	400
H Building Awareness and Capacity building						
1	Sensitization of defence establishments and other stake holders	2	per workshop	10	workshops	20
2	Sensitization, awareness and exposure visits on biodiversity of Sikkim to students	4	per program	5	programs	20

3	Training of frontline staff on biodiversity assessment, conservation, enforcement, rescue and release, human wildlife conflict, participatory conservation, immobilization etc.	5	per training	20	trainings	100
I	Research and Knowledge Management					
1	Annual population estimation studies of feral dogs, ungulates and snow leopard by WWF and others	10	per year	5	years	50
2	Procurement of field kits, camera traps and equipment for biodiversity monitoring and research	25	per year	2	years	50
3	Biodiversity studies and preparation of biodiversity conservation plans by Wildlife Institute of India and others	50	per year	4	years	200
4	Habitat mapping of important floral species and species recovery of key floral species	25	per year	2	years	50
	Subtotal					4880
	Administrative costs	10	per year	5	years	50
	Monitoring and evaluation	10	per year	5	years	50
	Total					4980

The justification of the budget is provided below:

- **Special biogeographic status of the area:** The area impacted by the roads is a special Biogeographic Province 1D as classified by the Wildlife Institute of India whose extent is limited to only about 1000 km². It is the only significant expanse of the unique cold desert ecosystem in the eastern Himalayas.
- **Globally significant biodiversity:** This area is a repository of significant populations of several endangered species and houses two third of the country's Tibetan gazelle, one third of the Tibetan argali, the only population of southern Kiang, the only breeding population of the black-necked crane in the eastern Himalaya along with several other rare, endangered and threatened species. This region also forms the corridor of the Royal Bengal Tiger and there is evidence of it migrating from the neighbouring Neora Valley National Park in West Bengal.
- **Area impacted versus area diverted:** While the compensatory conservation budgets are assessed in proportion of the forest area diverted or as a ratio of the project costs, what we need to assess is the area impacted and the biodiversity value of the region at stake. In this case, globally significant biodiversity values are at stake and also the area impacted is much more than the area diverted. The hill cutting, slope destabilization, rock blasting, muck disposal, establishing labour camps, increased human presence, unsuitable waste disposal and others will result in a long-term disturbance and damage to biodiversity.

6. Monitoring mechanism

The operational mechanism proposed to implement this plan is by having a committee at state level comprising of the heads of Forest, Environment, Wildlife, FCA, research NGOs and others. The committee will be headed by the Secretary with CEO CAMPA as the member secretary. The terms of reference of this committee will be to plan the implementation modalities, partitioning of the programme components across different geographies, circles and divisions, preparation of the APO and overall planning, monitoring, evaluation and other related matters. Items requiring centralized purchase for the purpose of economy of scale and standardization will also be done by this committee. The studies by WII, WWF and others will provide a good indication of the key performance indicators namely the population of snow leopard, ungulates, feral dogs and other threats on a yearly basis. Also, since these studies will be taken up independently, it will also function as an independent evaluation of the project impact.

Figure 17: Mountain road construction is a challenging task and conventional wildlife over passes are not feasible



7. Wildlife Passage Plan

The landscape impacted in Sikkim by these six roads comprises of two ecosystems the Greater Himalaya and the Trans-Himalaya. Road construction in this mountain terrain is a challenging task and will involve hill cutting on steep slopes. This wildlife passage plan has been prepared keeping in mind the topographic constraints of this landscape.

- In the Greater Himalayan part, the terrain is amongst the highest, steepest and most rugged in the country. It is also characterized by young-fold mountains with weak geology and a dense drainage network. In this mountainous landscape, as there will be steep cuts along the hill side during road construction, the larger animals are expected to move along the drainage areas such as *jhoras* and streams. On the Trans-Himalayan portion which is a cold desert, the roads will pass through the southern portion of the Tibetan plateau which is a vast, arid upland with rolling hillocks and devoid of forests or trees. The visibility on this landscape is unobstructed and the alignment will run across a relatively less dense drainage network. In this relatively flat terrain, there is less hindrance perceived to animal movement in the proposed alignment.
- Therefore, the bridges across these drainages should be of adequate width and height in order to act as underpasses for wildlife. Considering the topographic constraints, the locations may be decided jointly by the User Agency and the DFO-Mangan. The height of the underpass/minor bridge may be up to 3-5 m and the span of the underpass/minor bridge may be kept up to 20-30 m for such underpass. The guidelines for animal passage have been provided in the publication “Eco-friendly measures to mitigate impacts of linear infrastructure on wildlife” prepared by WII under technical advice of MoEF&CC, NTCA and NHAI. Wildlife passage plan for linear

infrastructure has been made mandatory by NBWL which has prescribed these guidelines in several instances while according clearances to linear infrastructure projects. Ministry of Road Transport & Highways vide letter No. RW-NH-11013/02/2019-S&R (P&B) dated 29th May 2019 has also advocated the prescriptions to all implementing agencies to implement mitigation strategies as per said guidelines. On smaller drainage lines, the box culverts will need to be constructed of adequate width and vertical clearance to provide safe passage for smaller mammals, amphibians, reptiles etc. These bridges and culverts will have sufficient space between the abutments and the watercourse to enable animals to pass safely during high water levels. Also, ledges will be incorporated in the bridge and culvert design as appropriate. These bridges and culverts will assist in safe passage of animals including large animals in the region.

- Also, the roads under construction do not connect any heavily populated habitations and are primarily for use for defence purposes. Hence, the traffic on these roads is going to be naturally regulated.
- The siting and design of these bridges and culverts for both these ecosystems is provided for in Annexure-IV.

8. Non-structural mitigation and management measures

The following non-structural mitigation and management measures are also recommended:

- Typically, road construction in the mountains involves extensive damage to the valley side as the excavated material is thrown on the downhill side. This adverse impact of the road construction should be taken care by cut and fill method. The muck excavated should be used for filling embankments, retaining walls and should be used for other construction structures and the remaining muck generated should be disposed in proposed dumping sites only.
- To avoid frequent repairs and disturbances, carriageway pavement inside forest area should be rigid, having well planned road side drainage and utility ducts.
- User agency will make provision of vegetative or mechanical canopy closure option for movement of arboreal wildlife.
- User agency will install overhead signboard at every 500 meter in the forest area about animal crossing, restriction on feeding animal, garbage dumping, parking, honking, etc. specifically keeping in mind the tourists who may visit the area. These signages need to specify the code of conduct and important biodiversity of the areas, speed limit etc.
- Enough speed breakers/rumble strips should be constructed at regular intervals to prevent road accidents and wildlife collisions.
- Post completion of the road, the monitoring and maintenance of mitigation structure will be done jointly on advice of forest department and at cost of user agency.
- Traffic should not be allowed on this road for civilians between sunset to sunrise as animal movements are high during these hours and will result in collisions and mortality.
- No labour shall trespass in forest area apart from the designated construction site.
- No damage to any wildlife including habitat shall be done in the neighbouring area.
- The user agency will report all road kills or accident of any wild animals and deposit the carcasses to the office of the concerned DFO wildlife to be dealt according to the prevailing laws.
- Dumping of solid and liquid waste shall be scientifically dealt with by the User Agency in order to avoid feral/free ranging dogs to gather in the area.

- There should be no defacing of rocks and other natural formations.
- The local names of the places should not be distorted. No unusual naming of the natural area like lakes and peaks and mountains etc., which is not in the interest of local community, should be done.
- Construction of religious structures shall not be allowed.
- The Army/paramilitary personnel at all levels should be sensitised regarding the protection and conservation of the natural habitat of the area.
- The user agency shall ensure that the labourers do not indulge in illegal collection of rare and valuable medicinal plants or floral species.
- A monitoring committee shall be constituted under chairmanship of the DFO Mangan (Territorial) with the DFO Wildlife (North), DFO KNP and representatives of the User Agency as members. This Committee shall submit monthly report to the CF Wildlife/Director KNP on progress of work and compliance of the conditions laid out under this report as well as other if any.
- The User Agency shall abide by all the directions of the Hon'ble Supreme Court, provisions of the Wild Life (Protection) Act, 1972, directions of the Ministry of Environment Forest and Climate Change and conditions imposed by the monitoring committee headed by the DFO Mangan (Territorial) from time to time.
- The activities shall be liable to periodic check by officers of the Forest Department. The officers may order stoppage of work if it is found that any of the above provisions have not been complied with.
- An annual compliance certificate on the stipulated conditions shall be submitted by the project proponent to the Chief Wildlife Warden.
- Completion certificate will be issued only after written certification from chairman of monitoring committee countersigned by Chief Wildlife Warden that all the conditions are satisfactorily complied with.

9. Key references

- ATREE (2020). Designing a comprehensive human-wildlife conflict (HWC) management strategy in select districts/landscapes of Sikkim.
- Snow Leopard Population Estimation of India (SPAI) (2022). Forest and Environment Department and WWF India, Gangtok, Sikkim.



**FOREST AND ENVIRONMENT DEPARTMENT
GOVERNMENT OF SIKKIM
GANGTOK**

Ref. No: CWLW/2023

Date: 04-3-2023

To,

The APCCF -cum- Nodal Officer FCA,
Forest and Environment Department
Government of Sikkim, Gangtok

Subject: Approval and Forwarding of the Comprehensive Biodiversity Conservation Plan

Sir,

This is with reference to the Comprehensive Biodiversity Conservation Plan prepared in response to the six roads being constructed by CPWD and BRO in the Mangan district of Sikkim having a total declared length of 137.22 km and a declared financial outlay of Rs 2321.62 crores. The strategy to have one Comprehensive Biodiversity Conservation Plan instead of six separate plans is commendable as it will result in a perspective approach, economy of scale and avoidance of risk of overlap. The nine main components of this plan namely reducing human wildlife conflict, strengthening forest protection, strengthening participatory conservation, strengthening forest protection infrastructure, reducing wildlife predation by feral dogs, strengthening ex-situ conservation, mitigation of biodiversity loss due to project-driven landslides and erosion, building capacity and knowledge management are very relevant to this landscape to mitigate the anticipated impacts due to these six linear infrastructure projects. It is recommended that the user agencies take all due diligence measures to contain the impact of the construction activities to the Right of Way diverted. The wildlife passage plan as well as the non-structural mitigation measures are also detailed in this plan.

This plan has been prepared in consultation with the Wildlife Institute of India and their suggestions have been incorporated (enclosed in Annexure III). This area is biodiversity rich but understudied, and hence the research component is being prioritized. Other than the regular conditions imposed, an undertaking must be taken from the user agencies regarding the future installation and construction of all suggested mitigation measures derived from the results and recommendations of these biodiversity studies notwithstanding the cost or engineering modifications involved.

This Comprehensive Biodiversity Conservation Plan (CBCP) having an outlay of Rs 49.80 crore is approved and recommended for onward submission to Integrated Regional Office of the Ministry of Environment, Forest and Climate Change, Government of India.

Yours faithfully,

(Dr. Sandeep Tambe, IFS)
Chief Wildlife Warden
cwlwsikkim@gmail.com

Annexure-I: Biodiversity checklist of North Sikkim

North Sikkim is a remote border area and not intensively explored as yet. Hence, the available scientific information is provided below as compiled largely from secondary sources by the Wildlife Institute of India. More studies are needed, to ground-truth this information.

A. List of avifauna

S.No.	ORDER	FAMILY	COMMON NAME	SCIENTIFIC NAME	REFERENCE
1	ANSERIFORMES	Anatidae	Bar-headed Goose	<i>Anser indicus</i>	Avibase,ebird
2	ANSERIFORMES	Anatidae	Greylag Goose	<i>Anser anser</i>	Avibase
3	ANSERIFORMES	Anatidae	Goosander	<i>Mergus merganser</i>	Avibase,ebird
4	ANSERIFORMES	Anatidae	Common Shelduck	<i>Tadorna tadorna</i>	Avibase,ebird
5	ANSERIFORMES	Anatidae	Ruddy Shelduck	<i>Tadorna ferruginea</i>	Avibase,ebird
6	ANSERIFORMES	Anatidae	Common Pochard	<i>Aythya farina</i>	Avibase,ebird
7	ANSERIFORMES	Anatidae	Baer's Pochard	<i>Aythya baeri</i>	Avibase
8	ANSERIFORMES	Anatidae	Ferruginous Duck	<i>Aythya nyroca</i>	Avibase
9	ANSERIFORMES	Anatidae	Tufted Duck	<i>Aythya fuligula</i>	Avibase,ebird
10	ANSERIFORMES	Anatidae	Northern Shoveler	<i>Spatula clypeata</i>	Avibase
11	ANSERIFORMES	Anatidae	Gadwall	<i>Mareca strepera</i>	Avibase
12	ANSERIFORMES	Anatidae	Eurasian Wigeon	<i>Mareca Penelope</i>	Avibase,ebird
13	ANSERIFORMES	Anatidae	Mallard	<i>Anas platyrhynchos</i>	Avibase,ebird
14	ANSERIFORMES	Anatidae	Northern Pintail	<i>Anas acuta</i>	Avibase,ebird
15	ANSERIFORMES	Anatidae	Common Teal	<i>Anas crecca</i>	Avibase
16	GALLIFORMES	Phasianidae	Common Hill Partridge	<i>Arborophila torqueola</i>	Avibase,ebird
17	GALLIFORMES	Phasianidae	Rufous-throated Hill Partridge	<i>Arborophila rufogularis</i>	Avibase
18	GALLIFORMES	Phasianidae	Common Quail	<i>Coturnix coturnix</i>	Avibase
19	GALLIFORMES	Phasianidae	Tibetan Snowcock	<i>Tetraogallus tibetanus</i>	Avibase,ebird
20	GALLIFORMES	Phasianidae	Snow Partridge	<i>Lerwa lerwa</i>	Avibase,ebird
21	GALLIFORMES	Phasianidae	Red Junglefowl	<i>Gallus gallus</i>	Avibase,ebird
22	GALLIFORMES	Phasianidae	Himalayan Monal	<i>Lophophorus impejanus</i>	Avibase,ebird
23	GALLIFORMES	Phasianidae	Satyr Tragopan	<i>Tragopan satyra</i>	Avibase,ebird
24	GALLIFORMES	Phasianidae	Kalij Pheasant	<i>Lophura leucomelanos</i>	Avibase,ebird
25	GALLIFORMES	Phasianidae	Tibetan Partridge	<i>Perdix hodgsoniae</i>	Avibase
26	GALLIFORMES	Phasianidae	Blood Pheasant	<i>Ithaginis cruentus</i>	Avibase,ebird
27	PHOENICOPTERIFORMES	Podicipedidae	Great Crested Grebe	<i>Podiceps cristatus</i>	Avibase,ebird
28	COLUMBIFORMES	Columbidae	Rock Dove	<i>Columba livia</i>	Avibase,ebird
29	COLUMBIFORMES	Columbidae	Hill Pigeon	<i>Columba rupestris</i>	Avibase,ebird
30	COLUMBIFORMES	Columbidae	Snow Pigeon	<i>Columba leuconota</i>	Avibase,ebird
31	COLUMBIFORMES	Columbidae	Freckled Pigeon	<i>Columba hodgsonii</i>	Avibase,ebird
32	COLUMBIFORMES	Columbidae	Ashy Pigeon	<i>Columba pulchricollis</i>	Avibase,ebird
33	COLUMBIFORMES	Columbidae	Oriental Turtle Dove	<i>Streptopelia orientalis</i>	Avibase,ebird
34	COLUMBIFORMES	Columbidae	Spotted-necked Dove	<i>Streptopelia chinensis</i>	Avibase,ebird

35	COLUMBIFORMES	Columbidae	Laughing Dove	<i>Streptopelia senegalensis</i>	Avibase,ebird
36	COLUMBIFORMES	Columbidae	Barred Cuckoo Dove	<i>Macropygia unchall</i>	Avibase,ebird
37	COLUMBIFORMES	Columbidae	Pin-tailed Green Pigeon	<i>Treron apicauda</i>	Avibase,ebird
38	COLUMBIFORMES	Columbidae	Wedge-tailed Green Pigeon	<i>Treron sphenurus</i>	Avibase,ebird
39	COLUMBIFORMES	Columbidae	Emerald Dove	<i>Chalcophaps indica</i>	Avibase,ebird
40	COLUMBIFORMES	Columbidae	Mountain Imperial Pigeon	<i>Ducula badia</i>	Avibase,ebird
41	PTEROCLIFORMES	Pteroclididae	Tibetan Sandgrouse	<i>Syrrhaptes tibetanus</i>	Avibase,ebird
42	CAPRIMULGIFORMES	Podargidae	Hodgson's Frogmouth	<i>Batrachostomus hodgsoni</i>	Avibase
43	CAPRIMULGIFORMES	Caprimulgidae	Grey Nightjar	<i>Caprimulgus indicus</i>	Avibase,ebird
44	CAPRIMULGIFORMES	Apodidae	Crested Treeswift	<i>Hemiprocne coronata</i>	Avibase
45	CAPRIMULGIFORMES	Apodidae	White-throated Needletail	<i>Hirundapus caudacutus</i>	Avibase,ebird
46	CAPRIMULGIFORMES	Apodidae	Silver-backed Needletail	<i>Hirundapus cochinchinensis</i>	Avibase
47	CAPRIMULGIFORMES	Apodidae	Himalayan Swiftlet	<i>Aerodramus brevirostris</i>	Avibase,ebird
48	CAPRIMULGIFORMES	Apodidae	Alpine Swift	<i>Tachymarptis melba</i>	Avibase
49	CAPRIMULGIFORMES	Apodidae	Fork-tailed Swift	<i>Apus pacificus</i>	Avibase
50	CAPRIMULGIFORMES	Apodidae	House Swift	<i>Apus nipalensis</i>	Avibase,ebird
51	CAPRIMULGIFORMES	Apodidae	Little Swift	<i>Apus affinis</i>	Avibase
52	CAPRIMULGIFORMES	Apodidae	Blyth's Swift	<i>Apus leuconyx</i>	ebird
53	CUCULIFORMES	Cuculidae	Greater Coucal	<i>Centropus sinensis</i>	Avibase
54	CUCULIFORMES	Cuculidae	Green-billed Malkoha	<i>Phaenicophaeus tristis</i>	Avibase,ebird
55	CUCULIFORMES	Cuculidae	Jacobin Cuckoo	<i>Clamator jacobinus</i>	Avibase,ebird
56	CUCULIFORMES	Cuculidae	Common Koel	<i>Eudynamis scolopaceus</i>	Avibase
57	CUCULIFORMES	Cuculidae	Asian Emerald Cuckoo	<i>Chrysococcyx maculatus</i>	Avibase,ebird
58	CUCULIFORMES	Cuculidae	Banded Bay Cuckoo	<i>Cacomantis sonneratii</i>	Avibase,ebird
59	CUCULIFORMES	Cuculidae	Plaintive Cuckoo	<i>Cacomantis merulinus</i>	Avibase,ebird
60	CUCULIFORMES	Cuculidae	Grey-bellied Cuckoo	<i>Cacomantis passerinus</i>	Avibase,ebird
61	CUCULIFORMES	Cuculidae	Drongo Cuckoo	<i>Surniculus lugubris</i>	Avibase,ebird
62	CUCULIFORMES	Cuculidae	Large Hawk Cuckoo	<i>Hierococcyx sparveroides</i>	Avibase,ebird
63	CUCULIFORMES	Cuculidae	Common Hawk Cuckoo	<i>Hierococcyx varius</i>	Avibase,ebird
64	CUCULIFORMES	Cuculidae	Whistling Hawk Cuckoo	<i>Hierococcyx nasicolor</i>	Avibase,ebird
65	CUCULIFORMES	Cuculidae	Indian Cuckoo	<i>Cuculus micropterus</i>	Avibase,ebird
66	CUCULIFORMES	Cuculidae	Common Cuckoo	<i>Cuculus canorus</i>	Avibase,ebird
67	CUCULIFORMES	Cuculidae	Himalayan Cuckoo	<i>Cuculus saturatus</i>	Avibase,ebird
68	CUCULIFORMES	Cuculidae	Lesser Cuckoo	<i>Cuculus poliocephalus</i>	Avibase,ebird
69	GRUIFORMES	Rallidae	Slaty-legged Crake	<i>Rallina eurizonoides</i>	Avibase
70	GRUIFORMES	Rallidae	Ruddy-breasted Crake	<i>Zapornia fusca</i>	Avibase
71	GRUIFORMES	Rallidae	Black-tailed Crake	<i>Zapornia bicolor</i>	Avibase
72	GRUIFORMES	Rallidae	Common Moorhen	<i>Gallinula chloropus</i>	Avibase
73	GRUIFORMES	Rallidae	Common Coot	<i>Fulica atra</i>	Avibase,ebird

74	GRUIFORMES	Gruidae	Black-necked Crane	<i>Grus nigricollis</i>	Avibase,ebird
75	PELECANIFORMES	Ardeidae	Cinnamon Bittern	<i>Ixobrychus cinnamomeus</i>	Avibase,ebird
76	PELECANIFORMES	Ardeidae	Indian Pond Heron	<i>Ardeola grayii</i>	Avibase
77	PELECANIFORMES	Ardeidae	Great Egret	<i>Ardea alba</i>	Avibase
78	PELECANIFORMES	Ardeidae	Little Egret	<i>Egretta garzetta</i>	Avibase
79	PELECANIFORMES	Phalacrocoracidae	Great Cormorant	<i>Phalacrocorax carbo</i>	Avibase,ebird
80	PELECANIFORMES	Phalacrocoracidae	Indian Cormorant	<i>Phalacrocorax fuscicollis</i>	Avibase
81	CHARADRIIFORMES	Haematopodidae	Ibisbill	<i>Ibidorhyncha struthersii</i>	Avibase,ebird
82	CHARADRIIFORMES	Recurvirostridae	Pied Avocet	<i>Recurvirostra avosetta</i>	Avibase,ebird
83	CHARADRIIFORMES	Charadriidae	Kentish Plover	<i>Charadrius alexandrinus</i>	Avibase
84	CHARADRIIFORMES	Charadriidae	Lesser Sand Plover	<i>Charadrius mongolus</i>	Avibase,ebird
85	CHARADRIIFORMES	Charadriidae	River Lapwing	<i>Vanellus duvaucelii</i>	Avibase
86	CHARADRIIFORMES	Charadriidae	Red-wattled Lapwing	<i>Vanellus indicus</i>	Avibase,ebird
87	CHARADRIIFORMES	Jacanidae	Pheasant-tailed Jacana	<i>Hydrophasianus chirurgus</i>	Avibase
88	CHARADRIIFORMES	Scolopacidae	Eurasian Curlew	<i>Numenius arquata</i>	Avibase
89	CHARADRIIFORMES	Scolopacidae	Eurasian Woodcock	<i>Scolopax rusticola</i>	Avibase,ebird
90	CHARADRIIFORMES	Scolopacidae	Solitary Snipe	<i>Gallinago solitaria</i>	Avibase,ebird
91	CHARADRIIFORMES	Scolopacidae	Wood Snipe	<i>Gallinago nemoricola</i>	Avibase
92	CHARADRIIFORMES	Scolopacidae	Jack Snipe	<i>Lymnocyptes minimus</i>	Avibase,ebird
93	CHARADRIIFORMES	Scolopacidae	Terek Sandpiper	<i>Xenus cinereus</i>	Avibase,ebird
94	CHARADRIIFORMES	Scolopacidae	Common Redshank	<i>Tringa totanus</i>	Avibase,ebird
95	CHARADRIIFORMES	Glareolidae	Oriental Pratincole	<i>Glareola maldivarum</i>	Avibase
96	CHARADRIIFORMES	Laridae	Brown-headed Gull	Avibase,ebird	
97	CHARADRIIFORMES	Laridae	Black-headed Gull	<i>Chroicocephalus ridibundus</i>	Avibase,ebird
98	CHARADRIIFORMES	Laridae	Pallas's Gull	<i>Ichthyaetus ichthyaeus</i>	Avibase,ebird
99	CHARADRIIFORMES	Laridae	River Tern	<i>Sterna aurantia</i>	Avibase
100	ACCIPITRIFORMES	Accipitridae	Oriental Honey Buzzard	<i>Pernis ptilorhynchus</i>	Avibase,ebird
101	ACCIPITRIFORMES	Accipitridae	Jerdon's Baza	<i>Aviceda jerdoni</i>	Avibase,ebird
102	ACCIPITRIFORMES	Accipitridae	Bearded Vulture	<i>Gypaetus barbatus</i>	Avibase,ebird
103	ACCIPITRIFORMES	Accipitridae	Crested Serpent Eagle	<i>Spilornis cheela</i>	Avibase,ebird
104	ACCIPITRIFORMES	Accipitridae	Short-toed Eagle	<i>Circaetus gallicus</i>	Avibase
105	ACCIPITRIFORMES	Accipitridae	Red-headed Vulture	<i>Sarcogyps calvus</i>	Avibase
106	ACCIPITRIFORMES	Accipitridae	Himalayan Vulture	<i>Gyps himalayensis</i>	Avibase,ebird
107	ACCIPITRIFORMES	Accipitridae	White-rumped Vulture	<i>Gyps bengalensis</i>	Avibase
108	ACCIPITRIFORMES	Accipitridae	Griffon Vulture	<i>Gyps fulvus</i>	Avibase
109	ACCIPITRIFORMES	Accipitridae	Cinereous Vulture	<i>Aegypius monachus</i>	Avibase
110	ACCIPITRIFORMES	Accipitridae	Mountain Hawk Eagle	<i>Nisaetus nipalensis</i>	Avibase,ebird
111	ACCIPITRIFORMES	Accipitridae	Rufous-bellied Eagle	<i>Lophotriorchis kienerii</i>	Avibase,ebird
112	ACCIPITRIFORMES	Accipitridae	Black Eagle	<i>Ictinaetus malaiensis</i>	Avibase,ebird

113	ACCIPITRIFORMES	Accipitridae	Steppe Eagle	<i>Aquila nipalensis</i>	Avibase,ebird
114	ACCIPITRIFORMES	Accipitridae	Eastern Imperial Eagle	<i>Aquila heliaca</i>	Avibase
115	ACCIPITRIFORMES	Accipitridae	Golden Eagle	<i>Aquila chrysaetos</i>	Avibase,ebird
116	ACCIPITRIFORMES	Accipitridae	Bonelli's Eagle	<i>Aquila fasciata</i>	Avibase
117	ACCIPITRIFORMES	Accipitridae	Booted Eagle	<i>Hieraaetus pennatus</i>	Avibase
118	ACCIPITRIFORMES	Accipitridae	Hen Harrier	<i>Circus cyaneus</i>	Avibase,ebird
119	ACCIPITRIFORMES	Accipitridae	Pied Harrier	<i>Circus melanoleucos</i>	Avibase
120	ACCIPITRIFORMES	Accipitridae	Crested Goshawk	<i>Accipiter trivirgatus</i>	Avibase,ebird
121	ACCIPITRIFORMES	Accipitridae	Shikra	<i>Accipiter badius</i>	Avibase
122	ACCIPITRIFORMES	Accipitridae	Besra	<i>Accipiter virgatus</i>	Avibase,ebird
123	ACCIPITRIFORMES	Accipitridae	Eurasian Sparrowhawk	<i>Accipiter nisus</i>	Avibase,ebird
124	ACCIPITRIFORMES	Accipitridae	Northern Goshawk	<i>Accipiter gentilis</i>	Avibase,ebird
125	ACCIPITRIFORMES	Accipitridae	Pallas's Fish Eagle	<i>Haliaeetus leucoryphus</i>	Avibase
126	ACCIPITRIFORMES	Accipitridae	White-tailed Sea Eagle	<i>Haliaeetus albicilla</i>	Avibase
127	ACCIPITRIFORMES	Accipitridae	Black Kite	<i>Milvus migrans</i>	Avibase,ebird
128	ACCIPITRIFORMES	Accipitridae	Eurasian Buzzard	<i>Buteo buteo</i>	Avibase,ebird
129	ACCIPITRIFORMES	Accipitridae	Himalayan Buzzard	<i>Buteo refectus</i>	Avibase,ebird
130	ACCIPITRIFORMES	Accipitridae	Long-legged Buzzard	<i>Buteo rufinus</i>	Avibase
131	ACCIPITRIFORMES	Accipitridae	Upland Buzzard	<i>Buteo hemilasius</i>	Avibase,ebird
132	STRIGIFORMES	Strigidae	Collared Owlet	<i>Glaucidium brodiei</i>	Avibase,ebird
133	STRIGIFORMES	Strigidae	Asian Barred Owlet	<i>Glaucidium cuculoides</i>	Avibase,ebird
134	STRIGIFORMES	Strigidae	Little Owl	<i>Athene noctua</i>	Avibase,ebird
135	STRIGIFORMES	Strigidae	Mountain Scops Owl	<i>Otus spilocephalus</i>	Avibase,ebird
136	STRIGIFORMES	Strigidae	Collared Scops Owl	<i>Otus bakkamoena</i>	Avibase,ebird
137	STRIGIFORMES	Strigidae	Northern Long-eared Owl	<i>Asio otus</i>	Avibase
138	STRIGIFORMES	Strigidae	Brown Wood Owl	<i>Strix leptogrammica</i>	Avibase,ebird
139	STRIGIFORMES	Strigidae	Tawny Owl	<i>Strix aluco</i>	Avibase
140	STRIGIFORMES	Strigidae	Himalayan Owl	<i>Strix nivicolum</i>	ebird
141	STRIGIFORMES	Strigidae	Rock Eagle Owl	<i>Bubo bengalensis</i>	Avibase
142	STRIGIFORMES	Strigidae	Spot-bellied Eagle Owl	<i>Bubo nipalensis</i>	Avibase,ebird
143	TROGONIFORMES	Trogonidae	Red-headed Trogon	<i>Harpactes erythrocephalus</i>	Avibase,ebird
144	BUCEROTIFORMES	Upupidae	Common Hoopoe	<i>Upupa epops</i>	Avibase,ebird
145	PICIFORMES	Indicatoridae	Yellow-rumped Honeyguide	<i>Indicator xanthonotus</i>	Avibase,ebird
146	PICIFORMES	Picidae	White-browed Piculet	<i>Sasia ochracea</i>	Avibase,ebird
147	PICIFORMES	Picidae	Speckled Piculet	<i>Picumnus innominatus</i>	Avibase,ebird
148	PICIFORMES	Picidae	Rufous Woodpecker	<i>Micropternus brachyurus</i>	Avibase,ebird
149	PICIFORMES	Picidae	Greater Yellow-naped Woodpecker	<i>Chrysophlegma flavinucha</i>	Avibase,ebird
150	PICIFORMES	Picidae	Lesser Yellow-naped Woodpecker	<i>Picus chlorolophus</i>	Avibase,ebird
151	PICIFORMES	Picidae	Grey-headed Woodpecker	<i>Picus canus</i>	Avibase,ebird

152	PICIFORMES	Picidae	Great Slaty Woodpecker	<i>Mulleripicus pulverulentus</i>	Avibase
153	PICIFORMES	Picidae	Bay Woodpecker	<i>Blythipicus pyrrhotis</i>	Avibase,ebird
154	PICIFORMES	Picidae	Greater Flame-backed Woodpecker	<i>Chrysocolaptes guttaeristatus</i>	Avibase,ebird
155	PICIFORMES	Picidae	Grey-capped Pygmy Woodpecker	<i>Dendrocopos canicapillus</i>	Avibase,ebird
156	PICIFORMES	Picidae	Fulvous-breasted Woodpecker	<i>Dendrocopos macei</i>	Avibase,ebird
157	PICIFORMES	Picidae	Crimson-breasted Woodpecker	<i>Dendrocopos cathpharius</i>	Avibase,ebird
158	PICIFORMES	Picidae	Darjeeling Woodpecker	<i>Dendrocopos darjellensis</i>	Avibase,ebird
159	PICIFORMES	Picidae	Rufous-bellied Woodpecker	<i>Dendrocopos hyperythrus</i>	Avibase,ebird
160	PICIFORMES	Ramphastidae	Great Barbet	<i>Psilopogon virens</i>	Avibase,ebird
161	PICIFORMES	Ramphastidae	Lineated Barbet	<i>Psilopogon lineatus</i>	Avibase
162	PICIFORMES	Ramphastidae	Golden-throated Barbet	<i>Psilopogon franklinii</i>	Avibase,ebird
163	PICIFORMES	Ramphastidae	Blue-throated Barbet	<i>Psilopogon asiaticus</i>	Avibase,ebird
164	PICIFORMES	Ramphastidae	Blue-eared Barbet	<i>Psilopogon australis</i>	Avibase
165	CORACIIFORMES	Meropidae	Chestnut-headed Bee-eater	<i>Merops leschenaulti</i>	Avibase
166	CORACIIFORMES	Meropidae	Blue-tailed Bee-eater	<i>Merops philippinus</i>	Avibase,ebird
167	CORACIIFORMES	Coraciidae	Indian Roller	<i>Coracias benghalensis</i>	Avibase
168	CORACIIFORMES	Coraciidae	Dollarbird	<i>Eurystomus orientalis</i>	Avibase
169	CORACIIFORMES	Alcedinidae	Common Kingfisher	<i>Alcedo atthis</i>	Avibase
170	CORACIIFORMES	Alcedinidae	Crested Kingfisher	<i>Megaceryle lugubris</i>	Avibase,ebird
171	CORACIIFORMES	Alcedinidae	Ruddy Kingfisher	<i>Halcyon coromanda</i>	Avibase
172	CORACIIFORMES	Alcedinidae	White-throated Kingfisher	<i>Halcyon smyrnensis</i>	Avibase,ebird
173	FALCONIFORMES	Falconidae	Collared Falconet	<i>Microhierax caerulescens</i>	Avibase,ebird
174	FALCONIFORMES	Falconidae	Common Kestrel	<i>Falco tinnunculus</i>	Avibase,ebird
175	FALCONIFORMES	Falconidae	Amur Falcon	<i>Falco amurensis</i>	Avibase
176	FALCONIFORMES	Falconidae	Merlin	<i>Falco columbarius</i>	Avibase
177	FALCONIFORMES	Falconidae	Eurasian Hobby	<i>Falco subbuteo</i>	Avibase
178	FALCONIFORMES	Falconidae	Oriental Hobby	<i>Falco severus</i>	Avibase
179	FALCONIFORMES	Falconidae	Laggar Falcon	<i>Falco jugger</i>	Avibase
180	FALCONIFORMES	Falconidae	Saker Falcon	<i>Falco cherrug</i>	Avibase,ebird
181	FALCONIFORMES	Falconidae	Peregrine Falcon	<i>Falco peregrinus</i>	Avibase,ebird
182	PSITTACIFORMES	Psittaculidae	Slaty-headed Parakeet	<i>Psittacula himalayana</i>	Avibase,ebird
183	PSITTACIFORMES	Psittaculidae	Red-breasted Parakeet	<i>Psittacula alexandri</i>	Avibase
184	PSITTACIFORMES	Psittaculidae	Alexandrine Parakeet	<i>Psittacula eupatria</i>	Avibase
185	PSITTACIFORMES	Psittaculidae	Vernal Hanging Parrot	<i>Loriculus vernalis</i>	Avibase
186	PASSERIFORMES	Pittidae	Blue-naped Pitta	<i>Pitta nipalensis</i>	Avibase
187	PASSERIFORMES	Pittidae	Indian Pitta	<i>Pitta brachyura</i>	Avibase
188	PASSERIFORMES	Pittidae	Hooded Pitta	<i>Pitta sordida</i>	Avibase
189	PASSERIFORMES	Eurylaimidae	Long-tailed Broadbill	<i>Psarisomus dalhousiae</i>	Avibase,ebird
190	PASSERIFORMES	Campephagidae	Grey-chinned Minivet	<i>Pericrocotus solaris</i>	Avibase,ebird

191	PASSERIFORMES	Campephagidae	Short-billed Minivet	<i>Pericrocotus brevirostris</i>	Avibase,ebird
192	PASSERIFORMES	Campephagidae	Long-tailed Minivet	<i>Pericrocotus ethologus</i>	Avibase,ebird
193	PASSERIFORMES	Campephagidae	Scarlet Minivet	<i>Pericrocotus flammeus</i>	Avibase,ebird
194	PASSERIFORMES	Campephagidae	Rosy Minivet	<i>Pericrocotus roseus</i>	Avibase
195	PASSERIFORMES	Campephagidae	Black-winged Cuckooshrike	<i>Lalage melaschistos</i>	Avibase,ebird
196	PASSERIFORMES	Vireonidae	Black-headed Shrike-babbler	<i>Pteruthius rufiventer</i>	Avibase,ebird
197	PASSERIFORMES	Vireonidae	Himalayan Shrike-babbler	<i>Pteruthius ripleyi</i>	Avibase
198	PASSERIFORMES	Vireonidae	Blyth's Shrike-babbler	<i>Pteruthius aeralatus</i>	Avibase,ebird
199	PASSERIFORMES	Vireonidae	Green Shrike-babbler	<i>Pteruthius xanthochlorus</i>	Avibase,ebird
200	PASSERIFORMES	Vireonidae	Black-eared Shrike-babbler	<i>Pteruthius melanotis</i>	Avibase,ebird
201	PASSERIFORMES	Vireonidae	Erpornis	<i>Erpornis zantholeuca</i>	Avibase,ebird
202	PASSERIFORMES	Oriolidae	Maroon Oriole	<i>Oriolus trailii</i>	Avibase,ebird
203	PASSERIFORMES	Oriolidae	Slender-billed Oriole	<i>Oriolus tenuirostris</i>	Avibase,ebird
204	PASSERIFORMES	Vangidae	Bar-winged Flycatcher-shrike	<i>Hemipus picatus</i>	Avibase,ebird
205	PASSERIFORMES	Aegithinidae	Common Iora	<i>Aegithina tiphia</i>	Avibase,ebird
206	PASSERIFORMES	Dicruridae	Black Drongo	<i>Dicrurus macrocercus</i>	Avibase,ebird
207	PASSERIFORMES	Dicruridae	Ashy Drongo	<i>Dicrurus leucophaeus</i>	Avibase,ebird
208	PASSERIFORMES	Dicruridae	Crow-billed Drongo	<i>Dicrurus annectens</i>	Avibase
209	PASSERIFORMES	Dicruridae	Bronzed Drongo	<i>Dicrurus aeneus</i>	Avibase,ebird
210	PASSERIFORMES	Dicruridae	Lesser Racket-tailed Drongo	<i>Dicrurus remifer</i>	Avibase,ebird
211	PASSERIFORMES	Dicruridae	Hair-crested Drongo	<i>Dicrurus hottentottus</i>	Avibase,ebird
212	PASSERIFORMES	Rhipiduridae	White-throated Fantail	<i>Rhipidura albicollis</i>	Avibase,ebird
213	PASSERIFORMES	Laniidae	Brown Shrike	<i>Lanius cristatus</i>	Avibase,ebird
214	PASSERIFORMES	Laniidae	Long-tailed Shrike	<i>Lanius schach</i>	Avibase,ebird
215	PASSERIFORMES	Laniidae	Grey-backed Shrike	<i>Lanius tephronotus</i>	Avibase,ebird
216	PASSERIFORMES	Corvidae	Rufous Treepie	<i>Dendrocitta vagabunda</i>	Avibase,ebird
217	PASSERIFORMES	Corvidae	Grey Treepie	<i>Dendrocitta formosae</i>	Avibase,ebird
218	PASSERIFORMES	Corvidae	Collared Treepie	<i>Dendrocitta frontalis</i>	Avibase,ebird
219	PASSERIFORMES	Corvidae	Red-billed Chough	<i>Pyrrhocorax pyrrhocorax</i>	Avibase,ebird
220	PASSERIFORMES	Corvidae	Alpine Chough	<i>Pyrrhocorax graculus</i>	Avibase,ebird
221	PASSERIFORMES	Corvidae	Yellow-billed Blue Magpie	<i>Urocissa flavirostris</i>	Avibase,ebird
222	PASSERIFORMES	Corvidae	Red-billed Blue Magpie	<i>Urocissa erythroryncha</i>	Avibase,ebird
223	PASSERIFORMES	Corvidae	Common Green Magpie	<i>Cissa chinensis</i>	Avibase,ebird
224	PASSERIFORMES	Corvidae	Eurasian Jay	<i>Garrulus glandarius</i>	Avibase,ebird
225	PASSERIFORMES	Corvidae	Eurasian Magpie	<i>Pica pica</i>	Avibase
226	PASSERIFORMES	Corvidae	Eurasian Nutcracker	<i>Nucifraga caryocatactes</i>	Avibase,ebird
227	PASSERIFORMES	Corvidae	Common Raven	<i>Corvus corax</i>	Avibase,ebird
228	PASSERIFORMES	Corvidae	House Crow	<i>Corvus splendens</i>	Avibase,ebird
229	PASSERIFORMES	Corvidae	Large-billed Crow	<i>Corvus macrorhynchos</i>	Avibase,ebird

230	PASSERIFORMES	Monarchidae	Black-naped Monarch	<i>Hypothymis azurea</i>	Avibase
231	PASSERIFORMES	Dicaeidae	Yellow-bellied Flowerpecker	<i>Dicaeum melanozanthum</i>	Avibase,ebird
232	PASSERIFORMES	Dicaeidae	Yellow-vented Flowerpecker	<i>Dicaeum chrysorrheum</i>	Avibase
233	PASSERIFORMES	Dicaeidae	Pale-billed Flowerpecker	<i>Dicaeum erythrorhynchos</i>	Avibase
234	PASSERIFORMES	Dicaeidae	Plain Flowerpecker	<i>Dicaeum minullum</i>	Avibase
235	PASSERIFORMES	Dicaeidae	Scarlet-backed Flowerpecker	<i>Dicaeum cruentatum</i>	Avibase
236	PASSERIFORMES	Dicaeidae	Fire-breasted Flowerpecker	<i>Dicaeum ignipectus</i>	Avibase,ebird
237	PASSERIFORMES	Nectariniidae	Little Spiderhunter	<i>Arachnothera longirostra</i>	Avibase
238	PASSERIFORMES	Nectariniidae	Streaked Spiderhunter	<i>Arachnothera magna</i>	Avibase,ebird
239	PASSERIFORMES	Nectariniidae	Fire-tailed Sunbird	<i>Aethopyga ignicauda</i>	Avibase,ebird
240	PASSERIFORMES	Nectariniidae	Black-throated Sunbird	<i>Aethopyga saturata</i>	Avibase,ebird
241	PASSERIFORMES	Nectariniidae	Green-tailed Sunbird	<i>Aethopyga nipalensis</i>	Avibase,ebird
242	PASSERIFORMES	Nectariniidae	Mrs. Gould's Sunbird	<i>Aethopyga gouldiae</i>	Avibase,ebird
243	PASSERIFORMES	Nectariniidae	Crimson Sunbird	<i>Aethopyga siparaja</i>	Avibase,ebird
244	PASSERIFORMES	Irenidae	Orange-bellied Leafbird	<i>Chloropsis hardwickii</i>	Avibase,ebird
245	PASSERIFORMES	Prunellidae	Altai Accentor	<i>Prunella himalayana</i>	Avibase,ebird
246	PASSERIFORMES	Prunellidae	Alpine Accentor	<i>Prunella collaris</i>	Avibase,ebird
247	PASSERIFORMES	Prunellidae	Maroon-backed Accentor	<i>Prunella immaculata</i>	Avibase,ebird
248	PASSERIFORMES	Prunellidae	Robin Accentor	<i>Prunella rubeculoides</i>	Avibase,ebird
249	PASSERIFORMES	Prunellidae	Rufous-breasted Accentor	<i>Prunella strophiata</i>	Avibase,ebird
250	PASSERIFORMES	Prunellidae	Brown Accentor	<i>Prunella fulvescens</i>	Avibase,ebird
251	PASSERIFORMES	Estrildidae	White-rumped Munia	<i>Lonchura striata</i>	Avibase,ebird
252	PASSERIFORMES	Estrildidae	Scaly-breasted Munia	<i>Lonchura punctulata</i>	Avibase,ebird
253	PASSERIFORMES	Passeridae	House Sparrow	<i>Passer domesticus</i>	Avibase,ebird
254	PASSERIFORMES	Passeridae	Russet Sparrow	<i>Passer cinnamomeus</i>	Avibase,ebird
255	PASSERIFORMES	Passeridae	Eurasian Tree Sparrow	<i>Passer montanus</i>	Avibase,ebird
256	PASSERIFORMES	Passeridae	Chestnut-shouldered Bush Sparrow	<i>Gymnoris xanthocollis</i>	Avibase
257	PASSERIFORMES	Passeridae	Black-winged Snowfinch	<i>Montifringilla adamsi</i>	Avibase,ebird
258	PASSERIFORMES	Passeridae	White-rumped Snowfinch	<i>Onychostruthus taczanowskii</i>	Avibase,ebird
259	PASSERIFORMES	Passeridae	Rufous-necked Snowfinch	<i>Pyrgilauda ruficollis</i>	Avibase,ebird
260	PASSERIFORMES	Passeridae	Blanford's Snowfinch	<i>Pyrgilauda blanfordi</i>	Avibase,ebird
261	PASSERIFORMES	Motacillidae	Olive-backed Pipit	<i>Anthus hodgsoni</i>	Avibase,ebird
262	PASSERIFORMES	Motacillidae	Rosy Pipit	<i>Anthus roseatus</i>	Avibase,ebird
263	PASSERIFORMES	Motacillidae	Upland Pipit	<i>Anthus sylvanus</i>	Avibase,ebird
264	PASSERIFORMES	Motacillidae	Richard's Pipit	<i>Anthus richardi</i>	Avibase
265	PASSERIFORMES	Motacillidae	Paddyfield Pipit	<i>Anthus rufulus</i>	Avibase
266	PASSERIFORMES	Motacillidae	Blyth's Pipit	<i>Anthus godlewskii</i>	Avibase,ebird
267	PASSERIFORMES	Motacillidae	Long-billed Pipit	<i>Anthus similis</i>	Avibase
268	PASSERIFORMES	Motacillidae	Western Yellow Wagtail	<i>Motacilla flava</i>	Avibase

269	PASSERIFORMES	Motacillidae	Eastern Yellow Wagtail	<i>Motacilla tschutschensis</i>	ebird
270	PASSERIFORMES	Motacillidae	Grey Wagtail	<i>Motacilla cinerea</i>	Avibase,ebird
271	PASSERIFORMES	Motacillidae	Citrine Wagtail	<i>Motacilla citreola</i>	Avibase,ebird
272	PASSERIFORMES	Motacillidae	White-browed Wagtail	<i>Motacilla maderaspatensis</i>	Avibase,ebird
273	PASSERIFORMES	Motacillidae	White Wagtail	<i>Motacilla alba</i>	Avibase,ebird
274	PASSERIFORMES	Fringillidae	Collared Grosbeak	<i>Mycerobas affinis</i>	Avibase,ebird
275	PASSERIFORMES	Fringillidae	Spot-winged Grosbeak	<i>Mycerobas melanozanthos</i>	Avibase,ebird
276	PASSERIFORMES	Fringillidae	White-winged Grosbeak	<i>Mycerobas carnipes</i>	Avibase,ebird
277	PASSERIFORMES	Fringillidae	Common Rosefinch	<i>Erythrura erythrura</i>	Avibase,ebird
278	PASSERIFORMES	Fringillidae	Scarlet Finch	<i>Haematospiza sipahi</i>	Avibase,ebird
279	PASSERIFORMES	Fringillidae	Streaked Rosefinch	<i>Carpodacus rubicilloides</i>	Avibase,ebird
280	PASSERIFORMES	Fringillidae	Great Rosefinch	<i>Carpodacus rubicilla</i>	Avibase,ebird
281	PASSERIFORMES	Fringillidae	Red-fronted Rosefinch	<i>Carpodacus puniceus</i>	Avibase
282	PASSERIFORMES	Fringillidae	Crimson-browed Finch	<i>Carpodacus subhimachalus</i>	Avibase,ebird
283	PASSERIFORMES	Fringillidae	Himalayan White-browed Rosefinch	<i>Carpodacus thura</i>	Avibase,ebird
284	PASSERIFORMES	Fringillidae	Beautiful Rosefinch	<i>Carpodacus pulcherrimus</i>	Avibase
285	PASSERIFORMES	Fringillidae	Dark-rumped Rosefinch	<i>Carpodacus edwardsii</i>	Avibase,ebird
286	PASSERIFORMES	Fringillidae	Pink-browed Rosefinch	<i>Carpodacus rodochroa</i>	Avibase,ebird
287	PASSERIFORMES	Fringillidae	Spot-winged Rosefinch	<i>Carpodacus rodopeplus</i>	Avibase
288	PASSERIFORMES	Fringillidae	Brown Bullfinch	<i>Pyrrhula nipalensis</i>	Avibase,ebird
289	PASSERIFORMES	Fringillidae	Red-headed Bullfinch	<i>Pyrrhula erythrocephala</i>	Avibase,ebird
290	PASSERIFORMES	Fringillidae	Grey-headed Bullfinch	<i>Pyrrhula erythaca</i>	Avibase
291	PASSERIFORMES	Fringillidae	Blanford's Rosefinch	<i>Agraphospiza rubescens</i>	Avibase
292	PASSERIFORMES	Fringillidae	Golden-naped Finch	<i>Pyrrhoplectes epauletta</i>	Avibase,ebird
293	PASSERIFORMES	Fringillidae	Dark-breasted Rosefinch	<i>Procarduelis nipalensis</i>	Avibase,ebird
294	PASSERIFORMES	Fringillidae	Plain Mountain Finch	<i>Leucosticte nemoricola</i>	Avibase,ebird
295	PASSERIFORMES	Fringillidae	Brandt's Mountain Finch	<i>Leucosticte brandti</i>	Avibase,ebird
296	PASSERIFORMES	Fringillidae	Yellow-breasted Greenfinch	<i>Chloris spinoides</i>	Avibase,ebird
297	PASSERIFORMES	Fringillidae	Twite	<i>Linaria flavirostris</i>	Avibase
298	PASSERIFORMES	Fringillidae	Red Crossbill	<i>Loxia curvirostra</i>	Avibase,ebird
299	PASSERIFORMES	Fringillidae	Red-fronted Serin	<i>Serinus pusillus</i>	Avibase
300	PASSERIFORMES	Fringillidae	Tibetan Siskin	<i>Spinus thibetanus</i>	Avibase,ebird
301	PASSERIFORMES	Emberizidae	Crested Bunting	<i>Melophus lathami</i>	Avibase
302	PASSERIFORMES	Emberizidae	Little Bunting	<i>Schoeniclus pusillus</i>	Avibase,ebird
303	PASSERIFORMES	Emberizidae	Yellow-breasted Bunting	<i>Schoeniclus aureolus</i>	Avibase
304	PASSERIFORMES	Stenostiridae	Fairy-fantail	<i>Chelidorhynch hypoxanthus</i>	Avibase,ebird
305	PASSERIFORMES	Stenostiridae	Grey-headed Canary-flycatcher	<i>Culicicapa ceylonensis</i>	Avibase,ebird
306	PASSERIFORMES	Paridae	Fire-capped Tit	<i>Cephalopyrus flammiceps</i>	Avibase
307	PASSERIFORMES	Paridae	Yellow-browed Tit	<i>Sylviparus modestus</i>	Avibase,ebird

308	PASSERIFORMES	Paridae	Sultan Tit	<i>Melanochlora sultanea</i>	Avibase,ebird
309	PASSERIFORMES	Paridae	Coal Tit	<i>Periparus ater</i>	Avibase,ebird
310	PASSERIFORMES	Paridae	Rufous-vented Tit	<i>Periparus rubidiventris</i>	Avibase,ebird
311	PASSERIFORMES	Paridae	Fulvous Tit	<i>Lophophanes dichrous</i>	Avibase,ebird
312	PASSERIFORMES	Paridae	Groundpecker	<i>Pseudopodoces humilis</i>	Avibase,ebird
313	PASSERIFORMES	Paridae	Green-backed Tit	<i>Parus monticolus</i>	Avibase,ebird
314	PASSERIFORMES	Paridae	Cinereous Tit	<i>Parus cinereus</i>	Avibase
315	PASSERIFORMES	Paridae	Black-lored Tit	<i>Machlolophus xanthogenys</i>	Avibase
316	PASSERIFORMES	Paridae	Yellow-cheeked Tit	<i>Machlolophus spilonotus</i>	Avibase,ebird
317	PASSERIFORMES	Alaudidae	Tibetan Lark	<i>Melanocorypha maxima</i>	Avibase
318	PASSERIFORMES	Alaudidae	Hume's Short-toed Lark	<i>Calandrella acutirostris</i>	Avibase,ebird
319	PASSERIFORMES	Alaudidae	Greater Short-toed Lark	<i>Calandrella brachydactyla</i>	Avibase,ebird
320	PASSERIFORMES	Alaudidae	Mongolian Short-toed Lark	<i>Calandrella dukhunensis</i>	ebird
321	PASSERIFORMES	Alaudidae	Horned Lark	<i>Eremophila alpestris</i>	Avibase,ebird
322	PASSERIFORMES	Alaudidae	Oriental Sky Lark	<i>Alauda gulgula</i>	Avibase,ebird
323	PASSERIFORMES	Cisticolidae	Striated Prinia	<i>Prinia crinigera</i>	Avibase
324	PASSERIFORMES	Cisticolidae	Hill Prinia	<i>Prinia atrogularis</i>	Avibase,ebird
325	PASSERIFORMES	Cisticolidae	Rufescent Prinia	<i>Prinia rufescens</i>	Avibase
326	PASSERIFORMES	Cisticolidae	Ashy Prinia	<i>Prinia socialis</i>	Avibase
327	PASSERIFORMES	Cisticolidae	Common Tailorbird	<i>Orthotomus sutorius</i>	Avibase,ebird
328	PASSERIFORMES	Locustellidae	Lanceolated Warbler	<i>Locustella lanceolata</i>	Avibase
329	PASSERIFORMES	Locustellidae	Brown Bush Warbler	<i>Locustella luteoventris</i>	Avibase
330	PASSERIFORMES	Locustellidae	Spotted Bush Warbler	<i>Locustella thoracica</i>	Avibase
331	PASSERIFORMES	Locustellidae	Russet Bush Warbler	<i>Locustella mandelli</i>	Avibase
332	PASSERIFORMES	Locustellidae	Striated Grassbird	<i>Megalurus palustris</i>	Avibase
333	PASSERIFORMES	Acrocephalidae	Thick-billed Warbler	<i>Arundinax aedon</i>	Avibase
334	PASSERIFORMES	Acrocephalidae	Booted Warbler	<i>Iduna caligata</i>	Avibase
335	PASSERIFORMES	Acrocephalidae	Sykes's Warbler	<i>Iduna rama</i>	Avibase,ebird
336	PASSERIFORMES	Acrocephalidae	Blyth's Reed Warbler	<i>Acrocephalus dumetorum</i>	Avibase
337	PASSERIFORMES	Pnoepygidae	Pygmy Wren Babbler	<i>Pnoepyga pusilla</i>	Avibase,ebird
338	PASSERIFORMES	Pnoepygidae	Scaly-breasted Wren Babbler	<i>Pnoepyga albiventer</i>	Avibase,ebird
339	PASSERIFORMES	Hirundinidae	Northern House Martin	<i>Delichon urbicum</i>	Avibase
340	PASSERIFORMES	Hirundinidae	Asian House Martin	<i>Delichon dasypus</i>	Avibase,ebird
341	PASSERIFORMES	Hirundinidae	Nepal House Martin	<i>Delichon nipalense</i>	Avibase,ebird
342	PASSERIFORMES	Hirundinidae	Red-rumped Swallow	<i>Cecropis daurica</i>	Avibase,ebird
343	PASSERIFORMES	Hirundinidae	Barn Swallow	<i>Hirundo rustica</i>	Avibase,ebird
344	PASSERIFORMES	Hirundinidae	Eurasian Crag Martin	<i>Ptyonoprogne rupestris</i>	Avibase,ebird
345	PASSERIFORMES	Hirundinidae	Plain Martin	<i>Riparia chinensis</i>	Avibase
346	PASSERIFORMES	Hirundinidae	Pale Martin	<i>Riparia diluta</i>	Avibase

347	PASSERIFORMES	Pycnonotidae	White-throated Bulbul	<i>Alophoixus flaveolus</i>	Avibase
348	PASSERIFORMES	Pycnonotidae	Ashy Bulbul	<i>Hemixos flavala</i>	Avibase,ebird
349	PASSERIFORMES	Pycnonotidae	Mountain Bulbul	<i>Ixos mccllelandii</i>	Avibase,ebird
350	PASSERIFORMES	Pycnonotidae	Black Bulbul	<i>Hypsipetes leucocephalus</i>	Avibase,ebird
351	PASSERIFORMES	Pycnonotidae	Striated Bulbul	<i>Pycnonotus striatus</i>	Avibase,ebird
352	PASSERIFORMES	Pycnonotidae	Black-crested Bulbul	<i>Rubigula flaviventris</i>	Avibase,ebird
353	PASSERIFORMES	Pycnonotidae	Red-whiskered Bulbul	<i>Pycnonotus jocosus</i>	Avibase
354	PASSERIFORMES	Pycnonotidae	Himalayan Bulbul	<i>Pycnonotus leucogenys</i>	Avibase,ebird
355	PASSERIFORMES	Pycnonotidae	White-eared Bulbul	<i>Pycnonotus leucotis</i>	Avibase
356	PASSERIFORMES	Pycnonotidae	Red-vented Bulbul	<i>Pycnonotus cafer</i>	Avibase,ebird
357	PASSERIFORMES	Phylloscopidae	Yellow-browed Warbler	<i>Abrornis inornatus</i>	Avibase,ebird
358	PASSERIFORMES	Phylloscopidae	Hume's Leaf Warbler	<i>Abrornis humei</i>	Avibase,ebird
359	PASSERIFORMES	Phylloscopidae	Lemon-rumped Warbler	<i>Abrornis chloronotus</i>	Avibase,ebird
360	PASSERIFORMES	Phylloscopidae	Buff-barred Warbler	<i>Abrornis pulcher</i>	Avibase,ebird
361	PASSERIFORMES	Phylloscopidae	Ashy-throated Warbler	<i>Abrornis maculipennis</i>	Avibase,ebird
362	PASSERIFORMES	Phylloscopidae	Dusky Warbler	<i>Phylloscopus fuscatus</i>	Avibase
363	PASSERIFORMES	Phylloscopidae	Smoky Warbler	<i>Phylloscopus fulgiventis</i>	Avibase,ebird
364	PASSERIFORMES	Phylloscopidae	Sulphur-bellied Warbler	<i>Phylloscopus griseolus</i>	Avibase
365	PASSERIFORMES	Phylloscopidae	Tickell's Leaf Warbler	<i>Phylloscopus affinis</i>	Avibase,ebird
366	PASSERIFORMES	Phylloscopidae	White-spectacled Leaf Warbler	<i>Seicercus affinis</i>	Avibase,ebird
367	PASSERIFORMES	Phylloscopidae	Grey-cheeked Leaf Warbler	<i>Seicercus poliogenys</i>	Avibase,ebird
368	PASSERIFORMES	Phylloscopidae	Golden-spectacled Leaf Warbler	<i>Seicercus burkii</i>	Avibase,ebird
369	PASSERIFORMES	Phylloscopidae	Whistler's Leaf Warbler	<i>Seicercus whistleri</i>	Avibase,ebird
370	PASSERIFORMES	Phylloscopidae	Chestnut-crowned Leaf Warbler	<i>Seicercus castaniceps</i>	Avibase,ebird
371	PASSERIFORMES	Phylloscopidae	Greenish Leaf Warbler	<i>Seicercus trochiloides</i>	Avibase,ebird
372	PASSERIFORMES	Phylloscopidae	Large-billed Leaf Warbler	<i>Seicercus magnirostris</i>	Avibase,ebird
373	PASSERIFORMES	Phylloscopidae	Yellow-vented Leaf Warbler	<i>Seicercus cantator</i>	Avibase,ebird
374	PASSERIFORMES	Phylloscopidae	Blyth's Leaf Warbler	<i>Seicercus reguloides</i>	Avibase,ebird
375	PASSERIFORMES	Phylloscopidae	Western Crowned Leaf Warbler	<i>Seicercus occipitalis</i>	Avibase
376	PASSERIFORMES	Phylloscopidae	Grey-hooded Leaf Warbler	<i>Seicercus xanthoschistos</i>	Avibase,ebird
377	PASSERIFORMES	Scotocercidae	Slaty-bellied Tesia	<i>Tesia olivea</i>	Avibase,ebird
378	PASSERIFORMES	Scotocercidae	Grey-bellied Tesia	<i>Tesia cyaniventer</i>	Avibase,ebird
379	PASSERIFORMES	Scotocercidae	Chestnut-crowned Bush Warbler	<i>Cettia major</i>	Avibase
380	PASSERIFORMES	Scotocercidae	Grey-sided Bush Warbler	<i>Cettia brunnifrons</i>	Avibase,ebird
381	PASSERIFORMES	Scotocercidae	Chestnut-headed Tesia	<i>Cettia castaneocoronata</i>	Avibase,ebird
382	PASSERIFORMES	Scotocercidae	Pale-footed Bush Warbler	<i>Hemitesia pallidipes</i>	Avibase
383	PASSERIFORMES	Scotocercidae	Yellow-bellied Warbler	<i>Abroscopus superciliaris</i>	Avibase,ebird
384	PASSERIFORMES	Scotocercidae	Rufous-faced Warbler	<i>Abroscopus albogularis</i>	Avibase
385	PASSERIFORMES	Scotocercidae	Black-faced Warbler	<i>Abroscopus schisticeps</i>	Avibase,ebird

386	PASSERIFORMES	Scotocercidae	Leafworker	<i>Phyllergates cucullatus</i>	Avibase,ebird
387	PASSERIFORMES	Scotocercidae	Broad-billed Warbler	<i>Tickellia hodgsoni</i>	Avibase,ebird
388	PASSERIFORMES	Scotocercidae	Brown-flanked Bush Warbler	<i>Horornis fortipes</i>	Avibase,ebird
389	PASSERIFORMES	Scotocercidae	Hume's Bush Warbler	<i>Horornis brunnescens</i>	Avibase,ebird
390	PASSERIFORMES	Scotocercidae	Aberrant Bush Warbler	<i>Horornis flavolivaceus</i>	Avibase,ebird
391	PASSERIFORMES	Aegithalidae	White-browed Tit Warbler	<i>Leptopoecile sophiae</i>	Avibase
392	PASSERIFORMES	Aegithalidae	Black-throated Tit	<i>Aegithalos concinnus</i>	Avibase,ebird
393	PASSERIFORMES	Aegithalidae	Black-browed Tit	<i>Aegithalos iouschistos</i>	Avibase,ebird
394	PASSERIFORMES	Sylviidae	Fire-tailed Myzornis	<i>Myzornis pyrrhura</i>	Avibase,ebird
395	PASSERIFORMES	Sylviidae	Golden-breasted Fulvetta	<i>Lioparus chrysotis</i>	Avibase,ebird
396	PASSERIFORMES	Sylviidae	White-browed Fulvetta	<i>Fulvetta vinipectus</i>	Avibase,ebird
397	PASSERIFORMES	Sylviidae	Greater Rufous-headed Parrotbill	<i>Psittiparus ruficeps</i>	Avibase
398	PASSERIFORMES	Sylviidae	Grey-headed Parrotbill	<i>Psittiparus gularis</i>	Avibase
399	PASSERIFORMES	Sylviidae	Great Parrotbill	<i>Conostoma aemodium</i>	Avibase,ebird
400	PASSERIFORMES	Sylviidae	Brown Parrotbill	<i>Cholornis unicolor</i>	Avibase,ebird
401	PASSERIFORMES	Sylviidae	Fulvous-fronted Parrotbill	<i>Suthora fulvifrons</i>	Avibase
402	PASSERIFORMES	Sylviidae	Black-throated Parrotbill	<i>Suthora nipalensis</i>	Avibase,ebird
403	PASSERIFORMES	Sylviidae	Lesser Rufous-headed Parrotbill	<i>Chleuasicus atrosuperciliaris</i>	Avibase,ebird
404	PASSERIFORMES	Zosteropidae	Striated Yuhina	<i>Yuhina castaniceps</i>	Avibase
405	PASSERIFORMES	Zosteropidae	Black-chinned Yuhina	<i>Yuhina nigrimenta</i>	Avibase,ebird
406	PASSERIFORMES	Zosteropidae	Stripe-throated Yuhina	<i>Yuhina gularis</i>	Avibase,ebird
407	PASSERIFORMES	Zosteropidae	Whiskered Yuhina	<i>Yuhina flavicollis</i>	Avibase,ebird
408	PASSERIFORMES	Zosteropidae	Rufous-vented Yuhina	<i>Yuhina occipitalis</i>	Avibase,ebird
409	PASSERIFORMES	Zosteropidae	White-naped Yuhina	<i>Yuhina bakeri</i>	Avibase,ebird
410	PASSERIFORMES	Zosteropidae	Oriental White-eye	<i>Zosterops palpebrosus</i>	Avibase,ebird
411	PASSERIFORMES	Timaliidae	Rufous-throated Wren Babbler	<i>Spelaeornis caudatus</i>	Avibase,ebird
412	PASSERIFORMES	Timaliidae	Elachura	<i>Elachura formosa</i>	Avibase,ebird
413	PASSERIFORMES	Timaliidae	Coral-billed Scimitar Babbler	<i>Pomatorhinus ferruginosus</i>	Avibase,ebird
414	PASSERIFORMES	Timaliidae	Slender-billed Scimitar Babbler	<i>Pomatorhinus superciliaris</i>	Avibase,ebird
415	PASSERIFORMES	Timaliidae	White-browed Scimitar Babbler	<i>Pomatorhinus schisticeps</i>	Avibase,ebird
416	PASSERIFORMES	Timaliidae	Streak-breasted Scimitar Babbler	<i>Pomatorhinus ruficollis</i>	Avibase,ebird
417	PASSERIFORMES	Timaliidae	Rusty-cheeked Scimitar Babbler	<i>Erythrogonys erythrogonys</i>	Avibase,ebird
418	PASSERIFORMES	Timaliidae	Grey-throated Babbler	<i>Stachyris nigriceps</i>	Avibase,ebird
419	PASSERIFORMES	Timaliidae	Wedge-billed Babbler	<i>Stachyris humei</i>	Avibase
420	PASSERIFORMES	Timaliidae	Chestnut-capped Babbler	<i>Timalia pileata</i>	Avibase
421	PASSERIFORMES	Timaliidae	Golden Babbler	<i>Cyanoderma chrysaemum</i>	Avibase,ebird
422	PASSERIFORMES	Timaliidae	Rufous-capped Babbler	<i>Cyanoderma ruficeps</i>	Avibase,ebird
423	PASSERIFORMES	Timaliidae	Buff-chested Babbler	<i>Cyanoderma rufifrons</i>	Avibase
424	PASSERIFORMES	Pellorneidae	White-hooded Babbler	<i>Gampsorhynchus rufulus</i>	Avibase

425	PASSERIFORMES	Pellorneidae	Yellow-throated Fulvetta	<i>Schoeniparus cinereus</i>	Avibase,ebird
426	PASSERIFORMES	Pellorneidae	Rufous-winged Fulvetta	<i>Schoeniparus castaneiceps</i>	Avibase,ebird
427	PASSERIFORMES	Pellorneidae	Puff-throated Babbler	<i>Pellorneum ruficeps</i>	Avibase,ebird
428	PASSERIFORMES	Pellorneidae	Long-billed Wren Babbler	<i>Rimator malacoptilus</i>	Avibase,ebird
429	PASSERIFORMES	Leiothrichidae	Brown-cheeked Nun Babbler	<i>Alcippe poiocephala</i>	Avibase
430	PASSERIFORMES	Leiothrichidae	Nepal Nun Babbler	<i>Alcippe nipalensis</i>	Avibase,ebird
431	PASSERIFORMES	Leiothrichidae	Striated Laughing-thrush	<i>Grammatoptila striata</i>	Avibase,ebird
432	PASSERIFORMES	Leiothrichidae	Cutia	<i>Cutia nipalensis</i>	Avibase,ebird
433	PASSERIFORMES	Leiothrichidae	Lesser Necklaced Laughing-thrush	<i>Garrulax monileger</i>	Avibase,ebird
434	PASSERIFORMES	Leiothrichidae	White-crested Laughing-thrush	<i>Garrulax leucolophus</i>	Avibase,ebird
435	PASSERIFORMES	Leiothrichidae	Spotted Laughing-thrush	<i>Garrulax ocellatus</i>	Avibase,ebird
436	PASSERIFORMES	Leiothrichidae	Rufous-chinned Laughing-thrush	<i>Garrulax rufogularis</i>	Avibase
437	PASSERIFORMES	Leiothrichidae	Greater Necklaced Laughing-thrush	<i>Garrulax pectoralis</i>	Avibase,ebird
438	PASSERIFORMES	Leiothrichidae	White-throated Laughing-thrush	<i>Garrulax albogularis</i>	Avibase,ebird
439	PASSERIFORMES	Leiothrichidae	Grey-sided Laughing-thrush	<i>Garrulax caerulatus</i>	Avibase,ebird
440	PASSERIFORMES	Leiothrichidae	Rufous-necked Laughing-thrush	<i>Garrulax ruficollis</i>	Avibase,ebird
441	PASSERIFORMES	Leiothrichidae	Scaly Laughing-thrush	<i>Trochalopteron subunicolor</i>	Avibase,ebird
442	PASSERIFORMES	Leiothrichidae	Blue-winged Laughing-thrush	<i>Trochalopteron squamatum</i>	Avibase,ebird
443	PASSERIFORMES	Leiothrichidae	Streaked Laughing-thrush	<i>Trochalopteron lineatum</i>	Avibase,ebird
444	PASSERIFORMES	Leiothrichidae	Striped Laughing-thrush	<i>Trochalopteron virgatum</i>	Avibase
445	PASSERIFORMES	Leiothrichidae	Variegated Laughing-thrush	<i>Trochalopteron variegatum</i>	Avibase
446	PASSERIFORMES	Leiothrichidae	Black-faced Laughing-thrush	<i>Trochalopteron affine</i>	Avibase,ebird
447	PASSERIFORMES	Leiothrichidae	Chestnut-crowned Laughing-thrush	Avibase,ebird	
448	PASSERIFORMES	Leiothrichidae	Long-tailed Sibia	<i>Heterophasia picaoides</i>	Avibase
449	PASSERIFORMES	Leiothrichidae	Rufous Sibia	<i>Heterophasia capistrata</i>	Avibase,ebird
450	PASSERIFORMES	Leiothrichidae	Grey Sibia	<i>Heterophasia gracilis</i>	Avibase
451	PASSERIFORMES	Leiothrichidae	Silver-eared Mesia	<i>Leiothrix argentauris</i>	Avibase,ebird
452	PASSERIFORMES	Leiothrichidae	Red-billed Leiothrix	<i>Leiothrix lutea</i>	Avibase,ebird
453	PASSERIFORMES	Leiothrichidae	Rufous-backed Sibia	<i>Leioptila annectens</i>	Avibase
454	PASSERIFORMES	Leiothrichidae	Red-tailed Minla	<i>Minla ignotincta</i>	Avibase,ebird
455	PASSERIFORMES	Leiothrichidae	Red-faced Liocichla	<i>Liocichla phoenicea</i>	Avibase,ebird
456	PASSERIFORMES	Leiothrichidae	Hoary-throated Barwing	<i>Sibia nipalensis</i>	Avibase,ebird
457	PASSERIFORMES	Leiothrichidae	Blue-winged Minla	<i>Siva cyanouroptera</i>	Avibase,ebird
458	PASSERIFORMES	Leiothrichidae	Chestnut-tailed Minla	<i>Chrysominla strigula</i>	Avibase,ebird
459	PASSERIFORMES	Leiothrichidae	Rusty-fronted Barwing	<i>Actinodura egertoni</i>	Avibase,ebird
460	PASSERIFORMES	Regulidae	Goldcrest	<i>Regulus regulus</i>	Avibase,ebird
461	PASSERIFORMES	Certhiidae	Rusty-flanked Treecreeper	<i>Certhia nipalensis</i>	Avibase,ebird
462	PASSERIFORMES	Certhiidae	Sikkim Treecreeper	<i>Certhia discolor</i>	Avibase,ebird
463	PASSERIFORMES	Certhiidae	Hodgson's Treecreeper	<i>Certhia hodgsoni</i>	Avibase,ebird

464	PASSERIFORMES	Sittidae	Chestnut-bellied Nuthatch	<i>Sitta castanea</i>	Avibase,ebird
465	PASSERIFORMES	Sittidae	White-tailed Nuthatch	<i>Sitta himalayensis</i>	Avibase,ebird
466	PASSERIFORMES	Sittidae	Velvet-fronted Nuthatch	<i>Sitta frontalis</i>	Avibase,ebird
467	PASSERIFORMES	Sittidae	Beautiful Nuthatch	<i>Sitta formosa</i>	Avibase
468	PASSERIFORMES	Sittidae	Wallcreeper	<i>Tichodroma muraria</i>	Avibase,ebird
469	PASSERIFORMES	Troglodytidae	Eurasian Wren	<i>Troglodytes troglodytes</i>	Avibase,ebird
470	PASSERIFORMES	Sturnidae	Brahminy Starling	<i>Sturnia pagodarum</i>	Avibase
471	PASSERIFORMES	Sturnidae	Chestnut-tailed Starling	<i>Sturnia malabarica</i>	Avibase
472	PASSERIFORMES	Sturnidae	Common Myna	<i>Acridotheres tristis</i>	Avibase,ebird
473	PASSERIFORMES	Sturnidae	Spot-winged Starling	<i>Saroglossa spilopterus</i>	Avibase,ebird
474	PASSERIFORMES	Sturnidae	Hill Myna	<i>Gracula religiosa</i>	Avibase,ebird
475	PASSERIFORMES	Cinclidae	White-throated Dipper	<i>Cinclus cinclus</i>	Avibase,ebird
476	PASSERIFORMES	Cinclidae	Brown Dipper	<i>Cinclus pallasii</i>	Avibase,ebird
477	PASSERIFORMES	Muscicapidae	Oriental Magpie Robin	<i>Copsychus saularis</i>	Avibase,ebird
478	PASSERIFORMES	Muscicapidae	Dark-sided Flycatcher	<i>Muscicapa sibirica</i>	Avibase,ebird
479	PASSERIFORMES	Muscicapidae	Asian Brown Flycatcher	<i>Muscicapa dauurica</i>	Avibase
480	PASSERIFORMES	Muscicapidae	Rusty-tailed Flycatcher	<i>Muscicapa ruficauda</i>	Avibase
481	PASSERIFORMES	Muscicapidae	Ferruginous Flycatcher	<i>Muscicapa ferruginea</i>	Avibase,ebird
482	PASSERIFORMES	Muscicapidae	Pale Blue Flycatcher	<i>Cyornis unicolor</i>	Avibase,ebird
483	PASSERIFORMES	Muscicapidae	Large Blue Flycatcher	<i>Cyornis magnirostris</i>	Avibase
484	PASSERIFORMES	Muscicapidae	Blue-throated Blue Flycatcher	<i>Cyornis rubeculoides</i>	Avibase,ebird
485	PASSERIFORMES	Muscicapidae	White-gorgetted Flycatcher	<i>Anthipes monileger</i>	Avibase,ebird
486	PASSERIFORMES	Muscicapidae	Rufous-bellied Niltava	<i>Niltava sundara</i>	Avibase,ebird
487	PASSERIFORMES	Muscicapidae	Vivid Niltava	<i>Niltava oatesi</i>	Avibase
488	PASSERIFORMES	Muscicapidae	Large Niltava	<i>Niltava grandis</i>	Avibase,ebird
489	PASSERIFORMES	Muscicapidae	Small Niltava	<i>Niltava macgrigoriae</i>	Avibase,ebird
490	PASSERIFORMES	Muscicapidae	Asian Verditer Flycatcher	<i>Eumyias thalassinus</i>	Avibase,ebird
491	PASSERIFORMES	Muscicapidae	Lesser Shortwing	<i>Brachypteryx leucophris</i>	Avibase,ebird
492	PASSERIFORMES	Muscicapidae	Himalayan Shortwing	<i>Brachypteryx cruralis</i>	ebird
493	PASSERIFORMES	Muscicapidae	Gould's Shortwing	<i>Heteroxenicus stellatus</i>	Avibase,ebird
494	PASSERIFORMES	Muscicapidae	Indian Blue Robin	<i>Larvivora brunnea</i>	Avibase,ebird
495	PASSERIFORMES	Muscicapidae	White-bellied Redstart	<i>Luscinia phaenicuroides</i>	Avibase,ebird
496	PASSERIFORMES	Muscicapidae	Little Forktail	<i>Enicurus scouleri</i>	Avibase,ebird
497	PASSERIFORMES	Muscicapidae	Black-backed Forktail	<i>Enicurus immaculatus</i>	Avibase
498	PASSERIFORMES	Muscicapidae	Slaty-backed Forktail	<i>Enicurus schistaceus</i>	Avibase,ebird
499	PASSERIFORMES	Muscicapidae	White-crowned Forktail	<i>Enicurus leschenaulti</i>	Avibase
500	PASSERIFORMES	Muscicapidae	Spotted Forktail	<i>Enicurus maculatus</i>	Avibase,ebird
501	PASSERIFORMES	Muscicapidae	Blue-fronted Robin	<i>Cinclidium frontale</i>	Avibase,ebird
502	PASSERIFORMES	Muscicapidae	Blue Whistling Thrush	<i>Myophonus caeruleus</i>	Avibase,ebird

503	PASSERIFORMES	Muscicapidae	White-tailed Rubythroat	<i>Calliope pectoralis</i>	Avibase
504	PASSERIFORMES	Muscicapidae	Siberian Rubythroat	<i>Calliope calliope</i>	Avibase
505	PASSERIFORMES	Muscicapidae	White-tailed Robin	<i>Myiomela leucura</i>	Avibase,ebird
506	PASSERIFORMES	Muscicapidae	White-browed Bush Robin	<i>Tarsiger indicus</i>	Avibase,ebird
507	PASSERIFORMES	Muscicapidae	Golden Bush Robin	<i>Tarsiger chrysaeus</i>	Avibase,ebird
508	PASSERIFORMES	Muscicapidae	Himalayan Bluetail	<i>Tarsiger rufilatus</i>	Avibase,ebird
509	PASSERIFORMES	Muscicapidae	Rufous-breasted Bush Robin	<i>Tarsiger hyperythrus</i>	Avibase,ebird
510	PASSERIFORMES	Muscicapidae	Taiga Flycatcher	<i>Ficedula albicilla</i>	Avibase,ebird
511	PASSERIFORMES	Muscicapidae	Snowy-browed Flycatcher	<i>Ficedula hyperythra</i>	Avibase,ebird
512	PASSERIFORMES	Muscicapidae	Rufous-gorgetted Flycatcher	<i>Ficedula strophitata</i>	Avibase,ebird
513	PASSERIFORMES	Muscicapidae	Ultramarine Flycatcher	<i>Ficedula superciliaris</i>	Avibase,ebird
514	PASSERIFORMES	Muscicapidae	Little Pied Flycatcher	<i>Ficedula westermanni</i>	Avibase,ebird
515	PASSERIFORMES	Muscicapidae	Slaty-blue Flycatcher	<i>Ficedula tricolor</i>	Avibase,ebird
516	PASSERIFORMES	Muscicapidae	Pygmy Blue Flycatcher	<i>Ficedula hodgsoni</i>	Avibase,ebird
517	PASSERIFORMES	Muscicapidae	Slaty-backed Flycatcher	<i>Ficedula sordida</i>	Avibase
518	PASSERIFORMES	Muscicapidae	Sapphire Flycatcher	<i>Ficedula sapphira</i>	Avibase,ebird
519	PASSERIFORMES	Muscicapidae	Blue-fronted Redstart	<i>Phoenicurus frontalis</i>	Avibase,ebird
520	PASSERIFORMES	Muscicapidae	White-throated Redstart	<i>Phoenicurus schisticeps</i>	Avibase,ebird
521	PASSERIFORMES	Muscicapidae	Plumbeous Water Redstart	<i>Rhyacornis fuliginosa</i>	Avibase,ebird
522	PASSERIFORMES	Muscicapidae	White-capped Water Redstart	<i>Chaimarrornis leucocephalus</i>	Avibase,ebird
523	PASSERIFORMES	Muscicapidae	Hodgson's Redstart	<i>Phoenicurus hodgsoni</i>	Avibase,ebird
524	PASSERIFORMES	Muscicapidae	Black Redstart	<i>Phoenicurus ochruros</i>	Avibase,ebird
525	PASSERIFORMES	Muscicapidae	Daurian Redstart	<i>Phoenicurus aureoreus</i>	Avibase
526	PASSERIFORMES	Muscicapidae	Güldenstädt's Redstart	<i>Phoenicurus erythrogastrus</i>	Avibase,ebird
527	PASSERIFORMES	Muscicapidae	Blue-capped Rock Thrush	<i>Monticola cinclorhyncha</i>	Avibase,ebird
528	PASSERIFORMES	Muscicapidae	Chestnut-bellied Rock Thrush	<i>Monticola rufiventris</i>	Avibase,ebird
529	PASSERIFORMES	Muscicapidae	Blue Rock Thrush	<i>Monticola solitarius</i>	Avibase,ebird
530	PASSERIFORMES	Muscicapidae	Eastern Stonechat	<i>Saxicola maurus</i>	Avibase,ebird
531	PASSERIFORMES	Muscicapidae	Pied Bush Chat	<i>Saxicola caprata</i>	Avibase
532	PASSERIFORMES	Muscicapidae	Grey Bush Chat	<i>Saxicola ferreus</i>	Avibase,ebird
533	PASSERIFORMES	Muscicapidae	Northern Wheatear	<i>Oenanthe oenanthe</i>	Avibase,ebird
534	PASSERIFORMES	Muscicapidae	Isabelline Wheatear	<i>Oenanthe isabellina</i>	Avibase,ebird
535	PASSERIFORMES	Muscicapidae	Desert Wheatear	<i>Oenanthe deserti</i>	Avibase,ebird
536	PASSERIFORMES	Turdidae	Grandala	<i>Grandala coelicolor</i>	Avibase,ebird
537	PASSERIFORMES	Turdidae	Long-tailed Thrush	<i>Zoothera dixonii</i>	Avibase,ebird
538	PASSERIFORMES	Turdidae	Plain-backed Thrush	<i>Zoothera mollissima</i>	Avibase,ebird
539	PASSERIFORMES	Turdidae	Dark-sided Thrush	<i>Zoothera marginata</i>	Avibase,ebird
540	PASSERIFORMES	Turdidae	Long-billed Thrush	<i>Zoothera monticola</i>	Avibase,ebird
541	PASSERIFORMES	Turdidae	Scaly Thrush	<i>Zoothera dauma</i>	Avibase,ebird

542	PASSERIFORMES	Turdidae	Purple Cochoa	<i>Cochoa purpurea</i>	Avibase,ebird
543	PASSERIFORMES	Turdidae	Green Cochoa	<i>Cochoa viridis</i>	Avibase
544	PASSERIFORMES	Turdidae	Orange-headed Thrush	<i>Geokichla citrina</i>	Avibase,ebird
545	PASSERIFORMES	Turdidae	Grey-winged Blackbird	<i>Turdus boulboul</i>	Avibase,ebird
546	PASSERIFORMES	Turdidae	Tickell's Thrush	<i>Turdus unicolor</i>	Avibase,ebird
547	PASSERIFORMES	Turdidae	Eyebrowed Thrush	<i>Turdus obscurus</i>	Avibase,ebird
548	PASSERIFORMES	Turdidae	Kessler's Thrush	<i>Turdus kessleri</i>	Avibase,ebird
549	PASSERIFORMES	Turdidae	Tibetan Blackbird	<i>Turdus maximus</i>	Avibase,ebird
550	PASSERIFORMES	Turdidae	White-collared Blackbird	<i>Turdus albocinctus</i>	Avibase,ebird
551	PASSERIFORMES	Turdidae	Chestnut Thrush	<i>Turdus rubrocanus</i>	Avibase,ebird
552	PASSERIFORMES	Turdidae	Dusky Thrush	<i>Turdus eunomus</i>	Avibase,ebird
553	PASSERIFORMES	Turdidae	Black-throated Thrush	<i>Turdus atrogularis</i>	Avibase,ebird
554	PASSERIFORMES	Turdidae	Red-throated Thrush	<i>Turdus ruficollis</i>	Avibase,ebird

Taxonomy based on Avibase data

B. List of mammals

S.No.	ORDER	FAMILY	COMMON NAME	SCIENTIFIC NAME	IUCN STATUS
1	Cetartiodactyla	Bovidae	Tibetan argali	<i>Ovis ammon hodgsonii</i>	NT
2	Cetartiodactyla	Bovidae	Tibetan gazelle	<i>Procapra picticaudata</i>	NT
3	Cetartiodactyla	Bovidae	Chiru	<i>Pantholops hodgsonii</i>	NT (locally extinct)
4	Cetartiodactyla	Bovidae	Himalayan tahr	<i>Hemitragus jemlahicus</i>	NT
5	Cetartiodactyla	Bovidae	Mainland serow	<i>Naemorhedus sumatraensis</i>	VU
6	Cetartiodactyla	Bovidae	Himalayan Goral	<i>Naemorhedus goral</i>	NT
7	Cetartiodactyla	Bovidae	Gaur	<i>Bos gaurus</i>	VU
8	Cetartiodactyla	Bovidae	Takin	<i>Budorcas taxicolor</i>	VU
9	Cetartiodactyla	Cervidae	Indian muntjac	<i>Muntiacus muntjak</i>	LC
10	Cetartiodactyla	Moschidae	Himalayan musk deer	<i>Moschus chrysogaster</i>	EN
11	Cetartiodactyla	Moschidae	Black musk deer	<i>Moschus fuscus</i>	EN
12	Cetartiodactyla	Suidae	Wild pig	<i>Sus scrofa</i>	LC
13	Cetartiodactyla	Equidae	Kiang	<i>Equus kiang polygodon</i>	LC
14	Primates	Cercopithecidae	Assamese macaque	<i>Macaca assamensis</i>	NT
15	Primates	Cercopithecidae	Rhesus Monkey	<i>Macaca mulatta</i>	LC
16	Primates	Cercopithecidae	Tarai Gray Langur	<i>Semnopithecus hector</i>	NT
17	Primates	Cercopithecidae	Central Himalayan langur	<i>Semnopithecus schistaceus</i>	LC
18	Rodentia	Sciuridae	Particoloured Flying Squirrel	<i>Hylopetes alboniger</i>	LC
19	Rodentia	Sciuridae	Spotted Giant Flying Squirrel	<i>Petaurista elegans</i>	LC
20	Rodentia	Sciuridae	Woolly Flying Squirrel	<i>Eupetaurus cinereus</i>	EN
21	Rodentia	Sciuridae	Black Giant Squirrel	<i>Ratufa bicolor</i>	NT
22	Rodentia	Sciuridae	Bhutan Giant Flying Squirrel	<i>Petaurista nobilis</i>	NT

23	Rodentia	Sciuridae	Red Giant Flying Squirrel	<i>Petaurista petaurista</i>	LC
24	Rodentia	Sciuridae	Pallas's Squirrel	<i>Callosciurus erythraeus</i>	LC
25	Rodentia	Sciuridae	Orange-bellied Himalayan squirrel	<i>Dremomys lokriah</i>	LC
26	Rodentia	Sciuridae	Hoary-bellied Himalayan squirrel	<i>Callosciurus pygerythrus</i>	LC
27	Rodentia	Sciuridae	Five-striped palm squirrel	<i>Funambulus pennantii</i>	LC
28	Rodentia	Sciuridae	Himalayan Striped Squirrel	<i>Tamiops mccllellandii</i>	LC
29	Rodentia	Sciuridae	Himalayan marmot	<i>Marmota himalayana</i>	LC
30	Rodentia	Hystricidae	Malayan Porcupine	<i>Hystrix brachyura</i>	LC
31	Rodentia	Hystricidae	Himalayan crestless porcupine	<i>Hystrix brachyura</i>	LC
32	Rodentia	Muridae	Sikkim rat	<i>Rattus sikkimensis</i>	LC
33	Pholidota	Manidae	Chinese pangolin	<i>Manis pentadactyla</i>	CR
34	Lagomorpha	Ochotonidae	Large-eared pika	<i>Ochotona macrotis</i>	LC
35	Lagomorpha	Ochotonidae	Moupin's pika	<i>Ochotona thibetana</i>	LC
36	Lagomorpha	Ochotonidae	Forrest's pika	<i>Ochotona forresti</i>	LC
37	Lagomorpha	Ochotonidae	Plateau pika	<i>Ochotona curzoniae</i>	LC
38	Lagomorpha	Ochotonidae	Indian Hare	<i>Lepus nigricollis</i>	LC
39	Lagomorpha	Ochotonidae	Woolly Hare	<i>Lepus oiostolus</i>	LC
40	Chiroptera	Rhinolophidae	Pearson's Horseshoe Bat	<i>Rhinolophus pearsonii</i>	LC
41	Carnivora	Felidae	Tiger	<i>Panthera tigris</i>	EN
42	Carnivora	Felidae	Snow leopard	<i>Panthera uncia</i>	VU
43	Carnivora	Felidae	Common leopard	<i>Panthera pardus</i>	VU
44	Carnivora	Felidae	Jungle cat	<i>Felis chaus</i>	LC
45	Carnivora	Felidae	Leopard cat	<i>Prionailurus bengalensis</i>	LC
46	Carnivora	Felidae	Marbled Cat	<i>Pardofelis marmorata</i>	NT
47	Carnivora	Felidae	Eurasian Lynx	<i>Lynx lynx</i>	LC
48	Carnivora	Felidae	Fishing Cat	<i>Prionailurus viverrinus</i>	VU
49	Carnivora	Ursidae	Asiatic black bear	<i>Ursus thibetanus</i>	VU
50	Carnivora	Ailuridae	Red panda	<i>Ailurus fulgens</i>	EN
51	Carnivora	Canidae	Wild dog	<i>Cuon alpinus</i>	EN
52	Carnivora	Canidae	Tibetan wolf	<i>Canis lupus chanco</i>	LC
53	Carnivora	Canidae	Tibetan fox	<i>Vulpes ferrilata</i>	LC
54	Carnivora	Canidae	Red fox	<i>Vulpes vulpes</i>	LC
55	Carnivora	Canidae	Golden jackal	<i>Canis aureus</i>	LC
56	Carnivora	Viverridae	Himalayan palm civet	<i>Paguma larvata</i>	LC
57	Carnivora	Viverridae	Large Indian civet	<i>Viverra zibetha</i>	LC
58	Carnivora	Viverridae	Small Indian civet	<i>Viverricula indica</i>	LC
59	Carnivora	Viverridae	Common Palm Civet	<i>Paradoxurus hermaphroditus</i>	LC
60	Carnivora	Viverridae	Binturong	<i>Arctictis binturong</i>	VU

61	Carnivora	Mustelidae	Himalayan yellow throated marten	<i>Martes flavigula</i>	LC
62	Carnivora	Mustelidae	Greater hog-badger	<i>Arctonyx collaris</i>	VU
63	Carnivora	Mustelidae	Stone marten	<i>Martes foina</i>	LC
64	Carnivora	Mustelidae	Large-toothed Ferret Badger	<i>Melogale personata</i>	LC
65	Carnivora	Mustelidae	Eurasian otter	<i>Lutra lutra</i>	NT
66	Carnivora	Mustelidae	Oriental small-clawed Otter	<i>Aonyx cinereus</i>	VU
67	Carnivora	Mustelidae	Siberian weasel	<i>Mustela sibirica</i>	LC
68	Carnivora	Mustelidae	Mountain Weasel	<i>Mustela altaica</i>	NT
69	Carnivora	Mustelidae	Short-tailed Weasel	<i>Mustela ermine</i>	LC
70	Carnivora	Mustelidae	Yellow-bellied Weasel	<i>Mustela kathiah</i>	LC
71	Carnivora	Mustelidae	Black-striped Weasel	<i>Mustela strigidorsa</i>	LC
72	Carnivora	Prionodontidae	Spotted linsang	<i>Prionodon pardicolor</i>	LC
73	Carnivora	Herpestidae	Small indian mongoose	<i>Herpestes auropunctatus</i>	LC
74	Carnivora	Herpestidae	Crab eating mongoose	<i>Herpestes urva</i>	LC
75	Carnivora	Herpestidae	Indian grey mongoose	<i>Herpestes edwardsii</i>	LC

C. List of reptiles

S. No.	Family	Common Name	Species	IUCN
1	Gekkonidae	Common House Gecko	<i>Hemidactylus frenatus</i>	LC
2	Gekkonidae	Bowring's Smooth Gecko	<i>Hemidactylus bowringii</i>	LC
3	Gekkonidae	Fox Gecko	<i>Hemidactylus garnotii</i>	LC
4	Gekkonidae	Flat-tailed house gecko	<i>Cosymbotus platyurus</i>	LC
5	Gekkonidae	Khasi Hills bent-toed Gecko	<i>Cyrtodactylus khasiensis</i>	DD
6	Gekkonidae	Sikkimese Bent-toed Gecko	<i>Cyrtodactylus gubernatoris</i>	DD
7	Agamidae	Changeable Lizard	<i>Calotes versicolor</i>	LC
8	Agamidae	Jerdon's Forest Lizard	<i>Calotes jerdoni</i>	LC
9	Agamidae	Three Keeled Mountain Lizard	<i>Oriotaric tricarinata</i>	LC
10	Agamidae	Variiegated Mountain Lizard	<i>Japalura variegata</i>	LC
11	Scincidae	Indian Forest Skink	<i>Sphenomorphus indicus</i>	LC
12	Scincidae	Spotted Forest Skink	<i>Sphenomorphus maculatus</i>	LC
13	Scincidae	Keeled Indian Mabuya	<i>Mabuya carinata</i>	LC
14	Scincidae	Sikkim Ground Skink	<i>Asymblepharus sikkimensis</i>	LC
15	Lacertidae	Sikkim Grass Lizard	<i>Takydromus sikkimensis</i>	EN
16	Anguidae	Burmese Glass Lizard	<i>Ophisaurus gracilis</i>	LC
17	Varanidae	Bengal Monitor Lizard	<i>Varanus bengalensis</i>	NT
18	Typhlopidae	Wall's Worm Snake	<i>Typhlops oligolepis</i>	DD
19	Typhlopidae	Jerdon's Blind Snake	<i>Typhlops jerdoni</i>	LC
20	Typhlopidae	Brahminy Blindsnake	<i>Ramphotyphlops braminus</i>	LC
21	Boidae	Indian Rock Python	<i>Python molurus</i>	NT
22	Boidae	Rough-tailed Sand Boa	<i>Eryx conicus</i>	NT
23	Colubridae	Green Trinket Snake	<i>Elaphe prasina</i>	LC

24	Colubridae	Copper-head Trinket Snake	Coelognathus radiatus	LC
25	Colubridae	Elaphe hodgsonii	Orthriophis hodgsonii	LC
26	Colubridae	Eastern Trinket Snake	Orthriophis cantoris	LC
27	Colubridae	Black-banded Trinket Snake	Oreocryptophis porphyraceus	LC
28	Colubridae	Cave Racer	Orthriophis taeniurus	VU
29	Colubridae	Trinket Snake	Coelognathus helena	LC
30	Colubridae	Montane Slug-eating Snake	Pareas monticola	LC
31	Colubridae	Mountain Slug Snake	Pareas macularius	LC
32	Colubridae	Indian Egg-eater	Elachistodon westermanni	LC
33	Colubridae	Oriental Ratsnake	Ptyas mucosa	LC
34	Colubridae	Javan Rat Snake	Ptyas korros	NT
35	Colubridae	Green Rat Snake	Ptyas nigromarginata	LC
36	Colubridae	Banded Racer	Argyrogena fasciolata	LC
37	Colubridae	Stoliczka's Ringneck	Liopeltis stoliczkae	LC
38	Colubridae	Himalayan Stripe-necked Snake	Liopeltis rappi	LC
39	Colubridae	White-barred Kukri Snake	Oligodon albocinctus	LC
40	Colubridae	Nagarkot Kukri Snake	Oligodon erythrogaster	NT
41	Colubridae	Bluebelly Kukri Snake	Oligodon melaneus	DD
42	Colubridae	Walnut Kukri Snake	Oligodon juglandifer	VU
43	Colubridae	Daudin's Bronzeback	Dendrelaphis tristis	LC
44	Colubridae	Common Bronzeback	Dendrelaphis pictus	LC
45	Colubridae	Wall's Bronzeback	Dendrelaphis cyanochloris	LC
46	Colubridae	Gore's Bronzeback	Dendrelaphis gorei	LC
47	Colubridae	Ornate Flying Snake	Chrysopelea ornata	LC
48	Colubridae	Twin-spotted Wolf Snake	Lycodon jara	LC
49	Colubridae	Common Wolf Snake	Lycodon aulicus	LC
50	Colubridae	Banded Wolf Snake	Lycodon fasciatus	LC
51	Colubridae	Gammie's Wolf Snake	Dinodon gammiei	NT
52	Colubridae	Northern Large-toothed Snake	Dinodon septentrionalis	LC
53	Colubridae	Chequered Keelback	Xenochrophis piscator	LC
54	Colubridae	St John's Keelback Water Snake	Xenochrophis sanctijohannis	LC
55	Colubridae	Collared Black-headed Snake	Sibynophis collaris	LC
56	Colubridae	Striped Keelback	Amphiesma parallelum	DD
57	Colubridae	Buff Striped Keelback	Amphiesma stolatum	LC
58	Colubridae	Himalayan Keelback	Amphiesma platyceps	LC
59	Colubridae	Red-necked Keelback	Rhabdophis subminiatus	LC
60	Colubridae	Himalayan Keelback	Rhabdophis himalayanus	LC
61	Colubridae	Large-eyed False Cobra	Pseudoxenodon macrops	LC
62	Colubridae	Blackbelly Worm-eating Snake	Trachischium fuscum	LC

63	Colubridae	Rosebelly Worm-eating Snake	Trachischium guentheri	VU
64	Colubridae	Yellowbelly Worm-eating Snake	Trachischium tenuiceps	DD
65	Colubridae	Indian Gamma Snake	Boiga trigonata	LC
66	Colubridae	Tawny Cat Snake	Boiga ochraceus	LC
67	Colubridae	Eastern Cat Snake	Boiga gokool	LC
68	Colubridae	Many-banded Tree Snake	Boiga multifasciata	LC
69	Colubridae	Gray Cat Snake	Boiga ocellata	LC
70	Colubridae	Forsten's Cat Snake	Boiga forsteni	LC
71	Colubridae	Common Mock Viper	Psammodynastes pulverulentus	LC
72	Colubridae	Gunther's Whip Snake	Ahaetulla prasina	LC
73	Colubridae	River Vine Snake	Ahaetulla fronticincta	LC
74	Elapidae	King Cobra	Ophiophagus hannah	VU
75	Elapidae	Monocled Cobra	Naja kaouthia	LC
76	Elapidae	Banded Krait	Bungarus fasciatus	LC
77	Elapidae	Himalayan Krait	Bungarus bungaroides	LC
78	Elapidae	Lesser Black Krait	Bungarus lividus	LC
79	Elapidae	Greater Black Krait	Bungarus niger	LC
80	Elapidae	Common Krait	Bungarus caeruleus	LC
81	Elapidae	MacLelland's Coral Snake	Sinomicrurus maccllellandi	LC
82	Viperidae	Russell's Viper	Daboia russelii	LC
83	Viperidae	Himalayan Pit-viper	Gloydius himalayanus	LC
84	Viperidae	Common Bamboo Viper	Trimeresurus gramineus	LC
85	Viperidae	Chinese Mountain Pit Viper	Ovophis monticola	LC
86	Viperidae	Jerdon's pitviper	Protobothrops jerdonii	LC
87	Viperidae	Pope's Pit Viper	Trimeresurus popeiorum	LC
88	Viperidae	Redtail (Bamboo) Pit Viper	Trimeresurus erythrurus	LC
89	Viperidae	White-lipped Tree Viper	Trimeresurus albolabris	LC
90	Viperidae	Gumprecht's Pit Viper	Trimeresurus gumprechtii	LC
91	Viperidae	Trimeresurus sp		

Source:

1. Chettri, B., Bhupathy, S., & Acharya, B. K. (2011). An overview of the herpetofauna of Sikkim with emphasis on the elevational distribution pattern and threats and conservation issues. *Biodiversity of Sikkim: exploring and conserving a global hotspot. Gangtok: Information and Public Relations Department, Government of Sikkim*, 233-254.

D. List of amphibians

S. No.	Order	FAMILY	SCIENTIFIC NAME	IUCN
1	Anura	Bufo	<i>Duttaphrynus himalayanus</i>	LC
2	Anura	Bufo	<i>Duttaphrynus melanostictus</i>	LC
3	Anura	Bufo	<i>Duttaphrynus stuarti</i>	DD
4	Anura	Bufo	<i>Bufo stomaticus</i>	LC
5	Anura	Bufo	<i>Scutigera sikkimensis</i>	LC

6	Anura	Dicroglossidae	<i>Euphlyctis cyanophlyctis</i>	LC
7	Anura	Dicroglossidae	<i>Fejervarya limnocharis</i>	LC
8	Anura	Dicroglossidae	<i>Fejervarya nepalensis</i>	LC
9	Anura	Dicroglossidae	<i>Fejervarya teraiensis</i>	LC
10	Anura	Dicroglossidae	<i>Hoplobatrachus tigerinus</i>	LC
11	Anura	Dicroglossidae	<i>Nanorana annandalii</i>	NT
12	Anura	Dicroglossidae	<i>Nanorana blanfordii</i>	LC
13	Anura	Dicroglossidae	<i>Nanorana ercepeae</i>	NT
14	Anura	Dicroglossidae	<i>Nanorana gammii</i>	NT
15	Anura	Dicroglossidae	<i>Nanorana liebighii</i>	LC
16	Anura	Dicroglossidae	<i>Nanorana minica</i>	VU
17	Anura	Dicroglossidae	<i>Nanorana polunini</i>	LC
18	Anura	Dicroglossidae	<i>Ingerana borealis</i>	VU
19	Anura	Dicroglossidae	<i>Ombrana sikimensis</i>	LC
20	Anura	Dicroglossidae	<i>Sphaerotheca breviceps</i>	LC
21	Anura	Microhylidae	<i>Microhyla ornata</i>	LC
22	Anura	Megophryidae	<i>Megophrys boettgeri</i>	LC
23	Anura	Megophryidae	<i>Megophrys major</i>	LC
24	Anura	Megophryidae	<i>Megophrys parva</i>	LC
25	Anura	Megophryidae	<i>Megophrys robusta</i>	DD
26	Anura	Megophryidae	<i>Scutiger sikimensis</i>	LC
27	Anura	Megophryidae	<i>Scutiger boulengeri</i>	LC
28	Anura	Ranidae	<i>Amolops afghanus</i>	LC
29	Anura	Ranidae	<i>Amolops formosus</i>	NE
30	Anura	Ranidae	<i>Amolops gerbillus</i>	LC
31	Anura	Ranidae	<i>Amolops himalayanus</i>	LC
32	Anura	Ranidae	<i>Amolops marmoratus</i>	LC
33	Anura	Ranidae	<i>Amolops monticola</i>	LC
34	Anura	Ranidae	<i>Clinotarsus alticola</i>	LC
35	Anura	Ranidae	<i>Amolops assamensis</i>	DD
36	Anura	Ranidae	<i>Hylarana taipehensis</i>	LC
37	Anura	Rhacophoridae	<i>Philautus annandalii</i>	LC
38	Anura	Rhacophoridae	<i>Philautus argus</i>	DD
39	Anura	Rhacophoridae	<i>Philautus dubius</i>	DD
40	Anura	Rhacophoridae	<i>Philautus microdiscus</i>	DD
41	Anura	Rhacophoridae	<i>Philautus jerdonii</i>	DD
42	Anura	Rhacophoridae	<i>Chiromantis simus</i>	LC
43	Anura	Rhacophoridae	<i>Polypedates leucomystax</i>	LC
44	Anura	Rhacophoridae	<i>Polypedates maculatus</i>	LC
45	Anura	Rhacophoridae	<i>Polypedates himalayanus</i>	
46	Anura	Rhacophoridae	<i>Polypedates megacephalus</i>	LC

47	Anura	Rhacophoridae	<i>Polypedates taeniatus</i>	LC
48	Anura	Rhacophoridae	<i>Frankixalus jerdonii</i>	DD
49	Anura	Rhacophoridae	<i>Raorchestes annandalii</i>	LC
50	Anura	Rhacophoridae	<i>Rhacophorus bipunctatus</i>	LC
51	Anura	Rhacophoridae	<i>Rhacophorus tuberculatus</i>	DD
52	Anura	Rhacophoridae	<i>Rhacophorus reinwardtii</i>	NT
53	Anura	Rhacophoridae	<i>Rhacophorus maximus</i>	LC
54	Gymnophiona	Salamandridae	<i>Tylotriton verrucosus</i>	NT
55	Urodela	Ichthyophiidae	<i>Ichthyophis sikkimensis</i>	DD
56	Urodela	Ichthyophiidae	<i>Ichthyophis glutinosus</i>	VU
57	Urodela	Ichthyophiidae	<i>Ichthyophis monochrous</i>	DD

Source:

1. Chettri, B., Bhupathy, S., & Acharya, B. K. (2011). An overview of the herpetofauna of Sikkim with emphasis on the elevational distribution pattern and threats and conservation issues. *Biodiversity of Sikkim: exploring and conserving a global hotspot. Gangtok: Information and Public Relations Department, Government of Sikkim*, 233-254.
2. Subba, B., Aravind, N. A., & Ravikanth, G. (2017). Amphibians of the Sikkim Himalaya, India: an annotated checklist. *Check List*, 13(1), 2033-2033.
3. Acharya, B. K., & Chettri, B. (2012). Effect of climate change on birds, herpetofauna and butterflies in Sikkim Himalaya: a preliminary investigation. *Climate change in Sikkim: patterns, impacts and initiatives. Gangtok: Information and Public Relations Department*, 141-60.
4. ENVIS CENTRE SIKKIM. <http://sikenvis.nic.in/WriteReadData/UserFiles/file/List%20of%20Amphibians%20of%20Sikkim.pdf>

D. List of plants

S.No.	Plant Group	Family	Species & Authority
1	Dicots	DILLENIACEAE	<i>Dillenia indica</i> L.
2		DILLENIACEAE	<i>Dillenia pentagyna</i> Roxb.
3		MAGNOLIACEAE	<i>Magnolia campbelli</i> Hook. f. & Thomson
4		MAGNOLIACEAE	<i>Magnolia globosa</i> Hook. f. & Thomson
5		MAGNOLIACEAE	<i>Magnolia hodgsonii</i> (Hook. f. & Thomson) H. Keng
6		MAGNOLIACEAE	<i>Magnolia insignis</i> Wall.
7		MAGNOLIACEAE	<i>Magnolia pterocarpa</i> Roxb.
8		MAGNOLIACEAE	<i>Michelia cathcartii</i> Hook. f. & Thomson
9		MAGNOLIACEAE	<i>Michelia champaca</i> L.
10		MAGNOLIACEAE	<i>Michelia doltsopa</i> Buch. - Ham. ex DC.
11		MAGNOLIACEAE	<i>Michelia glabra</i> P.Pann.
12		MAGNOLIACEAE	<i>Michelia kisopa</i> Buch.-Ham. ex DC.
13		MAGNOLIACEAE	<i>Michelia punduana</i> Hook. f. & Thomson
14		MAGNOLIACEAE	<i>Michelia velutina</i> DC.
15		TETRACENTRACEAE	<i>Tetracentron sinense</i> Oliver
16		ANNONACEAE	<i>Miliusa globosa</i> (DC)Pani gr. & S.C.Mishra
17		ANNONACEAE	<i>Miliusa longiflora</i> (Hook. f. & Thomson)
18		ANNONACEAE	<i>Miliusa macrocarpa</i> Hook. f. & Thomson
19		BERBERIDACEAE	<i>Mahonia acanthifolia</i> G.Don
20		BERBERIDACEAE	<i>Mahonia sikkimensis</i> Takeda
21		LARDIZABALACEAE	<i>Decaisnea insignis</i> (Griffith) Hook. f. & Thomson

22		CAPPARACEAE	<i>Capparis cantoniensis</i> Lour.
23		CAPPARACEAE	<i>Capparis multiflora</i> Hook. f. & Thomson
24		CAPPARACEAE	<i>Capparis olacifolia</i> Hook. f. & Thomson
25		CAPPARACEAE	<i>Crateva religiosa</i> Forster f.
26		CAPPARACEAE	<i>Crateva unilocularis</i> Buch.-Ham.
27		VIOLACEAE	<i>Rinorea bengalensis</i> (Wall.) O. Kuntze
28		BIXACEAE	<i>Bixa orellana</i> L.
29		FLACOURTIACEAE	<i>Casearia glomerata</i> Roxb. ex DC.
30		FLACOURTIACEAE	<i>Casearia graveolens</i> Dalz.
31		FLACOURTIACEAE	<i>Casearia kurzii</i> C.B. Clarke
32		FLACOURTIACEAE	<i>Casearia tomentosa</i> Roxb.
33		POLYGALACEAE	<i>Polygala arillata</i> D. Don
34		CLUSIACEAE	<i>Calophyllum polyanthum</i> Wall.
35		CLUSIACEAE	<i>Garcinia anomala</i> Planch. & Triana
36		CLUSIACEAE	<i>Garcinia cowa</i> Roxb. ex DC.
37		CLUSIACEAE	<i>Garcinia stipulata</i> T. Anderson
38		CLUSIACEAE	<i>Garcinia xanthochymus</i> Hook f.
39		CLUSIACEAE	<i>Mesua ferrea</i> L.
40		CLUSIACEAE	<i>Mesua floribunda</i> (Wall.) Kosterm.
41		THEACEAE	<i>Camellia kissi</i> Wall.
42		THEACEAE	<i>Eurya acuminata</i> DC.
43		THEACEAE	<i>Eurya cavinervis</i> Vesque
44		THEACEAE	<i>Eurya cerasifolia</i> (D. Don) Kobuski
45		THEACEAE	<i>Eurya japonica</i> Thunb.
46		THEACEAE	<i>Gordonia excelsa</i> Blume
47		THEACEAE	<i>Schima wallichii</i> (DC.) Korth.
48		THEACEAE	<i>Ternstroemia Mutis ex L.f.</i>
49		ACTINIDIACEAE	<i>Saurauia fasciculata</i> Wall.
50		ACTINIDIACEAE	<i>Saurauia griffithi</i> Dyer
51		ACTINIDIACEAE	<i>Saurauia macrotricha</i> Kurz ex Dyer
52		ACTINIDIACEAE	<i>Saurauia napaulensis</i> DC.
53		ACTINIDIACEAE	<i>Saurauia punduana</i> Wall.
54		ACTINIDIACEAE	<i>Saurauia roxburghii</i> Wall.
55		STACHYURACEAE	<i>Stachyurus himalaicus</i> Hook. f. & Thomson
56		DIPTEROCARPACEAE	<i>Shorea robusta</i> Gaertn.
57		MALVACEAE	<i>Kydia calycina</i> Roxb.
58		MALVACEAE	<i>Nayariophyton ziziphifolium</i> (Griff.) D.G. Long & A.G. Miller
59		MALVACEAE	<i>Thespesia lampas</i> (Cav.) Dalzell & Gibson
60		BOMBACACEAE	<i>Bombax ceiba</i> L.

61		BOMBACACEAE	Ceiba pentandra (L.) Gaertn.
62		STERCULIACEAE	Abroma augusta (L.) L.f.
63		STERCULIACEAE	Eriolaena hookeriana Wright & Am.
64		STERCULIACEAE	Eriolaena wallichii DC.
65		STERCULIACEAE	Firmiana colorata (Roxb.) R. Br.
66		STERCULIACEAE	Firmiana fulgens (Wall. ex Master) Comer
67		STERCULIACEAE	Pterospermum acerifolium (L.) Willd.
68		STERCULIACEAE	Pterygota alata (Roxb.) R.Br.
69		STERCULIACEAE	Reevesia pubescens Master
70		STERCULIACEAE	Reevesia wallichii R. Br.
71		STERCULIACEAE	Sterculia hamiltonii (Kuntze) Adelbert
72		STERCULIACEAE	Sterculia kingii Prain
73		STERCULIACEAE	Sterculia roxburghii Wall.
74		STERCULIACEAE	Sterculia villosa Roxb. ex W.W.Smith
75		TILIACEAE	Grewia abutilifolia Vent.
76		TILIACEAE	Grewia eriocarpa A. Juss.
77		TILIACEAE	Grewia optiva Burret
78		TILIACEAE	Grewia rothii DC.
79		TILIACEAE	Grewia sepiaria G.Don
80		TILIACEAE	Grewia serrulata DC.
81		TILIACEAE	Microcos paniculata L.
82		ELAEOCARPACEAE	Elaeocarpus aristatus Roxb.
83		ELAEOCARPACEAE	Elaeocarpus floribundus Blume
84		ELAEOCARPACEAE	Elaeocarpus lanceifolius Roxb.
85		ELAEOCARPACEAE	Elaeocarpus serratus L.
86		ELAEOCARPACEAE	Elaeocarpus sikkimensis Masters
87		ELAEOCARPACEAE	Elaeocarpus sphaericus (Gaertn.) K.Schum.
88		ELAEOCARPACEAE	Elaeocarpus tectorius (Lour.) Poiret
89		ELAEOCARPACEAE	Elaeocarpus varunus Buch.-Ham. Ex Master
90		ELAEOCARPACEAE	Sloanea dasycarpa (Benth.) Hemsl.
91		ELAEOCARPACEAE	Sloanea sterculiacea (Benth.) Rehder & Wilson var. assamaica (Benth.) Coode
92		ELAEOCARPACEAE	Sloanea sterculiacea (Benth.) Rehder & Wilson var. sterculiacea
93		ELAEOCARPACEAE	Sloanea tomentosa (Benth.) Rehder & Wilson
94		RUTACEAE	Acronychia pedunculata (L.) Miq.
95		RUTACEAE	Aegle marmelos (L) Correa
96		RUTACEAE	Citrus reticulata Blanco
97		RUTACEAE	Micromelum integerrimum (Co1ebr.)
98		RUTACEAE	Melicope lunu-ankenda (Gaertn.) Hartley
99		RUTACEAE	Murraya koenigii (L.) Spreng.

100		RUTACEAE	<i>Murraya paniculata</i> (L.) Jack
101		RUTACEAE	<i>Skimmia arborescens</i> Gamble
102		RUTACEAE	<i>Skimmia aureola</i> (DC.) Walp. subsp. <i>multinervia</i> (Huang) Taylor & Airy Shaw
103		RUTACEAE	<i>Tetradium fraxinifolium</i> (Hook.) Hartley
104		RUTACEAE	<i>Tetradium glabrifolium</i> (Benth.) Hartley
105		RUTACEAE	<i>Tetradium ruticarpum</i> (Juss.) Hartley
106		RUTACEAE	<i>Zanthoxylum acanthopodium</i> DC.
107		RUTACEAE	<i>Zanthoxylum armatum</i> DC.
108		RUTACEAE	<i>Zanthoxylum myriacanthum</i> Hook. f.
109		RUTACEAE	<i>Zanthoxylum ovalifolium</i> Wight
110		RUTACEAE	<i>Zanthoxylum rhesta</i> (Roxb.) DC.
111		SIMAROUACEAE	<i>Ailanthus integrifolia</i> Lam.
112		SIMAROUACEAE	<i>Brucea mollis</i> Wall. ex Kurz.
113		SIMAROUACEAE	<i>Picrasma javanica</i> Blume
114		BURSERACEAE	<i>Canarium strictum</i> Roxb.
115		BURSERACEAE	<i>Garuga floribunda</i> Decne.
116		BURSERACEAE	<i>Garuga pinnata</i> Roxb.
117		MELIACEAE	<i>Aglaia perviridis</i> Hiern
118		MELIACEAE	<i>Aglaia spectabilis</i> (Miq.) Jain & Bennet
119		MELIACEAE	<i>Aphanamixis polystachya</i> (Wall.)
120		MELIACEAE	<i>Azadirachta indica</i> Juss.
121		MELIACEAE	<i>Chisocheton cumingianus</i> (C.DC.) Hanns
122		MELIACEAE	<i>Chukrasia tabularis</i> Juss.
123		MELIACEAE	<i>Cipadessa baccifera</i> (Roth) Miq.
124		MELIACEAE	<i>Dysoxylum binectariferum</i> (Roxb.) Beddome
125		MELIACEAE	<i>Dysoxylum excelsum</i> Blume
126		MELIACEAE	<i>Dysoxylum mollissimum</i> Blume
127		MELIACEAE	<i>Dysoxylum reticulatum</i> King
128		MELIACEAE	<i>Heynea trijuga</i> Roxb.
129		MELIACEAE	<i>Melia azedarach</i> L.
130		MELIACEAE	<i>Sphaerosacme decandra</i> (Wall.) Penn.
131		MELIACEAE	<i>Toona ciliata</i> Roem.
132		MELIACEAE	<i>Toona microcarpa</i> (C. DC) Harms
133		MELIACEAE	<i>Toona sureni</i> (Blume) Merr.
134		MELIACEAE	<i>Walsura tubulata</i> Hiem
135		MELIACEAE	<i>Walsura robusta</i> Roxb.
136		OLACEAE	<i>Olax acuminata</i> Wall. ex Benth.
137		ICACINACEAE	<i>Platea latifolia</i> Blume
138		ICACINACEAE	<i>Nothapodytes foetida</i> (Wright) Sleumer

139		OPILACEAE	Lepionurus sylvestris Blume
140		AQUIFOLIACEAE	Ilex dipyrena Wall.
141		AQUIFOLIACEAE	Ilex fragilis Hook. f.
142		AQUIFOLIACEAE	Ilex godajam (Colebr.) Hook.f.
143		AQUIFOLIACEAE	Ilex hookeri King
144		AQUIFOLIACEAE	Ilex kingiana Cockerell
145		AQUIFOLIACEAE	Ilex sikkimensis Kurz
146		CELASTRACEAE	Bhesha robusta (Roxb.) Ding
147		CELASTRACEAE	Cassine glauca (Rottb.) Kuntze
148		CELASTRACEAE	Euonymus hamiltonianus Wall.
149		CELASTRACEAE	Lophopetalum wightianum Am.
150		CELASTRACEAE	Maytenus hookeri Loes.
151		CELASTRACEAE	Maytenus kurzii Bennet & Sahn
152		CELASTRACEAE	Maytenus rufa (Wall.) Kara
153		CELASTRACEAE	Maytenus sikkimensis (Prain) Raju & Babu
154		CELASTRACEAE	Microtropis discolor (Wall.) Wall.
155		CELASTRACEAE	Siphonodon celastrineus Griff.
156		RHAMNACEAE	Hovenia acerba Lindley
157		RHAMNACEAE	Ziziphus incurva Roxb.
158		RHAMNACEAE	Ziziphus mauritiana Lam.
159		SAPINDACEAE	Lepisanthes rubiginosa (Roxb.) Leenb.
160		SAPINDACEAE	Sapindus detergens Wall.
161		HIPPOCASTANACEAE	Aesculus assamica Wall.
162		HIPPOCASTANACEAE	Aesculus indica (Carnbess.) Hook.f.
163		ACERACEAE	Acer cappadocicum Gled.
164		ACERACEAE	Acer campbellii Hook. f. & Thomson ex Hiern
165		ACERACEAE	Acer caudatum Wall.
166		ACERACEAE	Acer oblongum Wall. ex DC.
167		ACERACEAE	Acer osmastonii Gamble
168		ACERACEAE	Acer hookeri Miq.
169		ACERACEAE	Acer laevigatum Wall.
170		ACERACEAE	Acer pectinatum Wall. ex Pax
171		ACERACEAE	Acer sikkimense Miq.
172		ACERACEAE	Acer stachyophyllum Hiern
173		ACERACEAE	Acer sterculiaceum Wall.
174		ACERACEAE	Acer thomsonii Miq.
175		STAPHYLEACEAE	Turpinia nepalensis Wight & Am.
176		STAPHYLEACEAE	Turpinia pomifera (Roxb.) DC.
177		SABIACEAE	Meliosma dilleniifolia (Wight & Am.) Walp.

178		SABIACEAE	Meliosma pinnata (Roxb.) Maxim.
179		SABIACEAE	Meliosma simplicifolia (Roxb.) Walp. var. thomsonii (Brandis) Beuseicon
180		ANACARDIACEAE	Choerospondias axillaris (Roxb.) Burt & Hill
181		ANACARDIACEAE	Drimycarpus racemosus (Roxb.) Hook. f.
182		ANACARDIACEAE	Lannea coromandelica (Houtt.) Merr.
183		ANACARDIACEAE	Mangifera indica L.
184		ANACARDIACEAE	Mangifera sylvatica Roxb.
185		ANACARDIACEAE	Rhus griffithii Hook. f.
186		ANACARDIACEAE	Rhus hookeri Sahni & Bahadur
187		ANACARDIACEAE	Rhus chinensis Mill.
188		ANACARDIACEAE	Rhus succedanea L.
189		ANACARDIACEAE	Semecarpus anacardium L.f.
190		ANACARDIACEAE	Spondias pinnata (L.f.) Kurz
191		MORINGACEAE	Moringa oleifera L am.
192		FABACEAE (s.l.)	Acacia auriculiformis A. Cunn. & Benth.
193		FABACEAE (s.l.)	Acacia catechu (L.f.) Willd.
194		FABACEAE (s.l.)	Acacia decurrens Willd.
195		FABACEAE (s.l.)	Acacia famesiana (L.) Willd.
196		FABACEAE (s.l.)	Acacia lenticularis Benth.
197		FABACEAE (s.l.)	Acacia melanoxylum R.Br.
198		FABACEAE (s.l.)	Acrocarpus fraxinifolius Am.
199		FABACEAE (s.l.)	Adenanthera pavonina L.
200		FABACEAE (s.l.)	Albizia chinensis (Osbeck.) Merr.
201		FABACEAE (s.l.)	Albizia gamblei Prain
202		FABACEAE (s.l.)	Albizia julibrissin Durazz.
203		FABACEAE (s.l.)	Albizia lebbeck (L.) Benth.
204		FABACEAE (s.l.)	Albizia lucidior (Steud.) Hara
205		FABACEAE (s.l.)	Albizia odoratissima (L.f.) Benth.
206		FABACEAE (s.l.)	Albizia procera (Roxb.) Benth.
207		FABACEAE (s.l.)	Archidendron monadelphum (Roxb.) I.C. Nielson
208		FABACEAE (s.l.)	Archidendron clypearia (Jack) I.C.Neilsen
209		FABACEAE (s.l.)	Bauhinia malabarica Roxb.
210		FABACEAE (s.l.)	Bauhinia purpurea L.
211		FABACEAE (s.l.)	Bauhinia variegata L.
212		FABACEAE (s.l.)	Butea monosperma (Lam.) Kuntze
213		FABACEAE (s.l.)	Cassia fistula L.
214		FABACEAE (s.l.)	Dalbergia assamica Benth.
215		FABACEAE (s.l.)	Dalbergia latifolia Roxb.
216		FABACEAE (s.l.)	Dalbergia rimosa Roxb.

217		FABACEAE (s.l.)	Dalbergia sericea G. Don
218		FABACEAE (s.l.)	Dalbergia sissoo DC.
219		FABACEAE (s.l.)	Delonix regia (Hook.) Raf.
220		FABACEAE (s.l.)	Erythrina stricta Roxb.
221		FABACEAE (s.l.)	Erythrina arborescens Roxb.
222		FABACEAE (s.l.)	Erythrina variegata L.
223		FABACEAE (s.l.)	Leucaena leucocephala (Lam.) de Wit
224		FABACEAE (s.l.)	Ormosia glauca Wall.
225		FABACEAE (s.l.)	Pongamia pinnata (L.) Pierre
226		FABACEAE (s.l.)	Ougeinia oojeinensis Hochr.
227		FABACEAE (s.l.)	Samanea saman (Jacq.) Merr.
228		FABACEAE (s.l.)	Tamarindus indicus L.
229		ROSACEAE	Cotoneaster bacillaris Lindl.
230		ROSACEAE	Cotoneaster frigidus Lindl.
231		ROSACEAE	Docynia indica (Wall.) Decne.
232		ROSACEAE	Eriobotrya hookeriana Decne.
233		ROSACEAE	Eriobotrya dubia (Lindley) Decne.
234		ROSACEAE	Eriobotrya petiolata Hook. f.
235		ROSACEAE	Malus pumila Mill.
236		ROSACEAE	Malus sikkimensis (Wenz.) Koehne
237		ROSACEAE	Photinia integrifolia Lindl.
238		ROSACEAE	Prunus arborea (Blume) Kalkman
239		ROSACEAE	Prunus armeniaca L.
240		ROSACEAE	Prunus carmesina Hara
241		ROSACEAE	Prunus cerasoides D. Don
242		ROSACEAE	Prunus cerasus L.
243		ROSACEAE	Prunus ceylanica (Wight) Miq.
244		ROSACEAE	Prunus cornuta (Royle) Steud.
245		ROSACEAE	Prunus domestica L.
246		ROSACEAE	Prunus napaulensis (Ser.) Steud.
247		ROSACEAE	Prunus persica (L.) Batsch
248		ROSACEAE	Prunus rufa Hook. f.
249		ROSACEAE	Prunus undulata D. Don
250		ROSACEAE	Prunus venosa Koehne
251		ROSACEAE	Pyrus pashia D. Don
252		ROSACEAE	Pyrus communis L.
253		ROSACEAE	Sorbus arachnoidea Koehne
254		ROSACEAE	Sorbus ferruginea (Wenz.) Rehder
255		ROSACEAE	Sorbus foliolosa (Wall.) Spach

256		ROSACEAE	<i>Sorbus griffithii</i> (Decne.) Rehder
257		ROSACEAE	<i>Sorbus hedlundii</i> A.Schneid.
258		ROSACEAE	<i>Sorbus insignis</i> (Hook, f.) HedL
259		ROSACEAE	<i>Sorbus kurzii</i> (Prain) A.Schneid.
260		ROSACEAE	<i>Sorbus microphylla</i> Wenz.
261		ROSACEAE	<i>Sorbus pratti</i> Koehne
262		ROSACEAE	<i>Sorbus rhamnoides</i> (Decne.) Rehder
263		ROSACEAE	<i>Sorbus rufopilosa</i> A.Schneid.
264		ROSACEAE	<i>Sorbus thibetica</i> (Cardot) Hand-Mazz.
265		ROSACEAE	<i>Sorbus thomsonii</i> (Hook, f.) Rehder
266		ROSACEAE	<i>Sorbus vestita</i> (G.Don) Lodd.
267		ROSACEAE	<i>Sorbus wallichii</i> (Hook. f.) Yu
268		HYDRANGEACEAE	<i>Hydrangea heteromala</i> D.Don
269		HYDRANGEACEAE	<i>Hydrangea robusta</i> Hook. f. & Thomson
270		ITEACEAE	<i>Itea macrophylla</i> Roxb.
271		HAMAMELIDACEAE	<i>Exbucklandia populnea</i> (R. Br. ex. Griff.) R.Br.
272		RHIZOPHORACEAE	<i>Carallia brachiata</i> (Lour.) Merr.
273		COMBRETACEAE	<i>Anogeissus acuminata</i> (DC.) Guill. & Perr.
274		COMBRETACEAE	<i>Terminalia alata</i> Roth
275		COMBRETACEAE	<i>Terminalia bellirica</i> (Gaertn.) Roxb.
276		COMBRETACEAE	<i>Terminalia catappa</i> L.
277		COMBRETACEAE	<i>Terminalia chebula</i> Retz.
278		COMBRETACEAE	<i>Terminalia crinata</i> (Gaertn.) Roxb.
279		COMBRETACEAE	<i>Terminalia myriocarpa</i> Van Heurck & A. Muell.
280		MYRTACEAE	<i>Callistemon citrinus</i> (Curtis) Skeel
281		MYRTACEAE	<i>Eucalyptus tereticornis</i> W.W.Smith
282		MYRTACEAE	<i>Eugenia bracteata</i> (Willd.) Roxb.
283		MYRTACEAE	<i>Psidium guajava</i> L.
284		MYRTACEAE	<i>Syzygium balsameum</i> (Wight) Cowan & Cowan
285		MYRTACEAE	<i>Syzygium claviflorum</i> (Roxb.) Cowan & Cowan
286		MYRTACEAE	<i>Syzygium cumini</i> (L.) Skeel
287		MYRTACEAE	<i>Syzygium formosum</i> (Wall) Masam.
288		MYRTACEAE	<i>Syzygium jambos</i> (L.) Alston
289		MYRTACEAE	<i>Syzygium kurzii</i> (Duthie) N.P. Balakr.
290		MYRTACEAE	<i>Syzygium leptantha</i> Benth.
291		MYRTACEAE	<i>Syzygium operculatum</i> (Roxb.) Neidenzu
292		MYRTACEAE	<i>Syzygium praecox</i> (Roxb.) Rathakr. & Nair
293		MYRTACEAE	<i>Syzygium ramosissimum</i> (Blume) N.P. Balakr.
294		MYRTACEAE	<i>Syzygium tetragonum</i> (Wight) Walp.

295		MYRTACEAE	<i>Syzygium venosum</i> DC.
296		LECYTHIDACEAE	<i>Careya arborea</i> Roxb.
297		LECYTHIDACEAE	<i>Careya herbacea</i> Roxb.
298		LYTHRACEAE	<i>Lagerstroemia minuticarpa</i> Debb. ex P.C. Kanjilal
299		LYTHRACEAE	<i>Lagerstroemia parviflora</i> Roxb.
300		LYTHRACEAE	<i>Lagerstroemia reginae</i> Roxb.
301		SONNERATIACEAE	<i>Duabanga grandiflora</i> (DC.) Walp.
302		DATISCAEAE	<i>Tetrameles nudiflora</i> R. Br.
303		ARALIACEAE	<i>Aralia foliosa</i> Seem.
304		ARALIACEAE	<i>Brassaiopsis glomerulata</i> (Blume) Regel
305		ARALIACEAE	<i>Brassaiopsis hainla</i> (D. Don) Seem.
306		ARALIACEAE	<i>Brassaiopsis hispida</i> Seem.
307		ARALIACEAE	<i>Brassaiopsis mitis</i> C.B. Clarke
308		ARALIACEAE	<i>Gamblea ciliata</i> C.B. Clarke
309		ARALIACEAE	<i>Heteropanax fragrans</i> Seem.
310		ARALIACEAE	<i>Macropanax dispermus</i> (Blume) Kuntze
311		ARALIACEAE	<i>Macropanax undulatus</i> (G. Don) Seem.
312		ARALIACEAE	<i>Merrillioanax alpinus</i> (C.B. Clarke) Shang
313		ARALIACEAE	<i>Pentapanax fragrans</i> (D. Don) Ha
314		ARALIACEAE	<i>Pentapanax leschenaultia</i> Seem.
315		ARALIACEAE	<i>Pentapanax racemosus</i> Seem.
316		ARALIACEAE	<i>Schefflera eleta</i> (D. Don) Harms
317		ARALIACEAE	<i>Schefflera impressa</i> (C.B. Clarke) Harms
318		ARALIACEAE	<i>Trevesia palmata</i> (Roxb.) Vis.
319		CORNACEAE	<i>Benthamidia capitata</i> (Wall.) Kara
320		CORNACEAE	<i>Mastixia arborea</i> C.B. Clarke
321		CORNACEAE	<i>Mastixia pentandra</i> Blume subsp. <i>chinensis</i> (Merr.) Mathews
322		CORNACEAE	<i>Swida controversa</i> (Hemsl.) Sojak
323		CORNACEAE	<i>Swida macrophylla</i> (Wall.) Sojak
324		TORICELLIACEAE	<i>Toricellia tillifolia</i> DC.
325		ALANGIACEAE	<i>Alangium alpinum</i> (C.B. Clarke) W.W. Smith & Cave
326		ALANGIACEAE	<i>Alangium chinense</i> (Lour.) Harms
327		ALANGIACEAE	<i>Alangium salviifolium</i> (L.f.) Wangerin
328		NYSSACEAE	<i>Nyssa javanica</i> Wengelin
329		CAPRIFOLIACEAE	<i>Viburnum coriaceum</i> Blume
330		CAPRIFOLIACEAE	<i>Viburnum erubescens</i> DC.
331		CAPRIFOLIACEAE	<i>Viburnum grandiflorum</i> DC.
332		CAPRIFOLIACEAE	<i>Viburnum mullaha</i> D. Don
333		SAMBUCEAE	<i>Sambucus javanica</i> Reinw. ex Blume

334		RUBIACEAE	Canthium glabrum Blume
335		RUBIACEAE	Catunaregam longispina (Link) Tirveng.
336		RUBIACEAE	Cephalanthus tetrandra (Roxb.)Ridsdale exBakh. f.
337		RUBIACEAE	Gardenia turgida Roxb.
338		RUBIACEAE	Haldinia flaccidum Wall.
339		RUBIACEAE	Haldinia cordifolia (Roxb.)Ridsdale
340		RUBIACEAE	Hymenodictyon orixense (Roxb.) Mabblerlev
341		RUBIACEAE	Hyptianthera stricta (W.W.Smith) Wight & Arn.
342		RUBIACEAE	Khasiaclunea oligocephala (Havil.) Ridsdale
343		RUBIACEAE	Meyna spinosa Roxb. ex Link
344		RUBIACEAE	Mitragyna rotundifolia (Roxb.) Kuntze
345		RUBIACEAE	Morinda angustifolia Roxb.
346		RUBIACEAE	Neolamarckia cadamba (Roxb.) Bosser
347		RUBIACEAE	Neonauclea griffithii Hook. f.
348		RUBIACEAE	Pavetta tomentosa Roxb. ex Sm.
349		RUBIACEAE	Psydrax kingii (Hook.f.) D.M. Bridson & L.S.Springate
350		RUBIACEAE	Tamilnadia uliginosa (Retz.) Tirveng. & Sastre
351		RUBIACEAE	Tarrenoidea wallichii (Hook. f.) Tirveng. & Sastre
352		RUBIACEAE	Wendlandia grandis (Hook, f.) Cowan
353		RUBIACEAE	Wendlandia heynei (A.Roem. & Schultes) Santapau & Merchant
354		RUBIACEAE	Wendlandia pendula (Roxb.) DC.
355		RUBIACEAE	Wendlandia puberula DC.
356		RUBIACEAE	Wendlandia sikkimensis Cowan
357		RUBIACEAE	Wendlandia tinctoria (Roxb.) DC.
358		RUBIACEAE	Wendlandia wallichii Wight & Arn.
359		RUBIACEAE	Wendlandia coriacea (Wall.) DC.
360		ASTERACEAE (COMPOSITAE)	Vernonia talaumifolia Hook. f. & Thomson
361		ASTERACEAE (COMPOSITAE)	Vernonia volkameriifolia DC.
362		ERICACEAE	Enkianthus deflexus (Griff.) C.K.Schneid
363		ERICACEAE	Lyonia ovalifolia (Wall.) Drude
364		ERICACEAE	Lyonia villosa (Hook. f. ex C.B. Clarke) Hand-Mazz.
365		ERICACEAE	Pieris formosa (Wall.) D.Don
366		ERICACEAE	Rhododendron arboreum Sm.
367		ERICACEAE	Rhododendron arboretum Sm. subsp. cinnamomeum (G. Don) Tagg
368		ERICACEAE	Rhododendron arboreum Sm. subsp. cinnamomeum (G. Don) Tagg var. roseum Lindl.
369		ERICACEAE	Rhododendron arboreum Sm.subsp. delavayi (Franch.) D.F.Chamberlain
370		ERICACEAE	Rhododendron barbatum Wall. ex G.Don
371		ERICACEAE	Rhododendron argipeplum Balfour f. & Cooper

372		ERICACEAE	Rhododendron campanulatum D.Don
373		ERICACEAE	Rhododendron falconeri Hook. f.
374		ERICACEAE	Rhododendron cinnabarinum Hook. f. subsp. cinnabarinum
375		ERICACEAE	Rhododendron grande Wight
376		ERICACEAE	Rhododendron griffithianum Wight
377		ERICACEAE	Rhododendron hodgsonii Hook. F.
378		ERICACEAE	Rhododendron kendrikii Nuttall
379		ERICACEAE	Rhododendron niveum Hook.f
380		ERICACEAE	Rhododendron thomsonii Hook.f.
381		MYRSINACEAE	Embelia tsjeriam-cottam A. DC.
382		MYRSINACEAE	Maesa argentea (Wall.) A. DC.
383		MYRSINACEAE	Maesa chisia D.Don
384		MYRSINACEAE	Maesa macrophylla (Wall.) A. DC.
385		MYRSINACEAE	Maesa montana A. DC.
386		MYRSINACEAE	Myrsine semiserrata Wall.
387		MYRSINACEAE	Rapanea capitellata (Wall.) Mez.
388		SAPOTACEAE	Diploknema butyracea (Roxb.) H.J.Lam
389		SAPOTACEAE	Mimusops elengi L.
390		SAPOTACEAE	Sacrosperma arboreum Hook. f.
391		SAPOTACEAE	Xantolis hookeri (C.B.Clarke) Royen
392		EBENACEAE	Diospyros lanceifolia Roxb.
393		EBENACEAE	Diospyros lotus L.
394		EBENACEAE	Diospyros malabarica (Desr.) Kostel.
395		EBENACEAE	Diospyros montana Roxb.
396		STYRACACEAE	Styrax grandiflorus Griff.
397		STYRACACEAE	Styrax serrulatus Roxb.
398		SYMPLOCACEAE	Symplocos caudata Wall.
399		SYMPLOCACEAE	Symplocos cochinchinensis (Lour.) S. Moore
400		SYMPLOCACEAE	Symplocos dryophila C.B.Clarke
401		SYMPLOCACEAE	Symplocos glomerata King ex C.B.Clarke
402		SYMPLOCACEAE	Symplocos lucida (Thunb.) Siebold & Zucc.
403		SYMPLOCACEAE	Symplocos paniculata (Thunb.) Miq.
404		SYMPLOCACEAE	Symplocos pyrifolia Wall. ex G.Don
405		SYMPLOCACEAE	Symplocos racemosa Roxb.
406		SYMPLOCACEAE	Symplocos ramosissima Wall. ex. G.Don
407		SYMPLOCACEAE	Symplocos spicata Roxb.
408		SYMPLOCACEAE	Symplocos sumuntia Buch.-Ham. ex D.Don
409		SYMPLOCACEAE	Symplocos theifolia D.Don
410		OLEACEAE	Chionanthus ramiflorus Roxb.

411		OLEACEAE	Fraxinus floribunda Wall.
412		OLEACEAE	Fraxinus paxiana Lingelsh. var. sikkimense Lingelsh.
413		OLEACEAE	Ligustrum compactum (Wall. ex DC.) Hook.f. & Thorn ex Brandis
414		OLEACEAE	Ligustrum confusum Decne.
415		OLEACEAE	Ligustrum robustum (Roxb.) Blume
416		OLEACEAE	Nyctanthes arbor-tristis L.
417		OLEACEAE	Olea dioica Roxb.
418		OLEACEAE	Olea gamblei C.B. Clarke
419		OLEACEAE	Osmanthus fragrans Lour. var. longifolius DC. Hara
420		OLEACEAE	Osmanthus suavis King ex C.B. Clarke
421		APOCYNACEAE	Alstonia neriifolia D. Don
422		APOCYNACEAE	Alstonia scholaris (L.) R.Br.
423		APOCYNACEAE	Cerbera manghas L.
424		APOCYNACEAE	Holarrhena pubescens (Buch.-Ham.) Wall, ex G. Don
425		APOCYNACEAE	Nerium oleander L.
426		APOCYNACEAE	Plumeria rubra L.
427		APOCYNACEAE	Thevetia peruviana (Pers.) Schum.
428		APOCYNACEAE	Wrightia arborea (Dennst.) Mabberly
429		APOCYNACEAE	Wrightia coccinea (Roxb.) Sims
430		APOCYNACEAE	Wrightia sikkimensis Gamble
431		BUDDLEJACEAE	Buddleja colvilei Hook. f. & Thomson
432		BUDDLEJACEAE	Buddleja paniculata Wall.
433		BUDDLEJACEAE	Buddleja macrostachya Benth.
434		GENTIANACEAE	Fagrea obovata Wall.
435		EHRETIACEAE	Cordia grandis Roxb.
436		EHRETIACEAE	Cordia obliqua Willd.
437		EHRETIACEAE	Ehretia serrata Roxb.
438		EHRETIACEAE	Ehretia laevis Roxb.
439		EHRETIACEAE	Ehretia macrophylla Wall.
440		EHRETIACEAE	Ehretia psilosiphon Mill.
441		EHRETIACEAE	Ehretia wallichiana Hook. f. & Thomson
442		SOLANACEAE	Solanum erianthum D. Don
443		SCROPHULARIACEAE	Wightia speciosissima (D. Don) Merr.
444		GESNERIACEAE	Rhynchochum ellipticum (Wall. ex. D. Dietr.) A. DC.
445		BIGNONIACEAE	Jacaranda mimosifolia D. Don
446		BIGNONIACEAE	Oroxylum indicum (L.) Vent.
447		BIGNONIACEAE	Radermachera sinica (Hance) Hemsley
448		BIGNONIACEAE	Stereospermum colais (Dillwyn) Mabberly
449		BIGNONIACEAE	Stereospermum chelonoides (L.f.) DC.

450		ACANTHACEAE	Phlogacanthus thyriflorus (Roxb.) Nees
451		VERBENACEAE	Callicarpa lobata C.B.Clarke
452		VERBENACEAE	Callicarpa longifolia Lam.
453		VERBENACEAE	Callicarpa macrophylla Vahl
454		VERBENACEAE	Callicarpa vestita Wall. ex C.B. Clarke
455		VERBENACEAE	Callicarpa arborea Roxb.
456		VERBENACEAE	Clerodendrum bracteatum Walp.
457		VERBENACEAE	Clerodendrum serratum (L.) Moon
458		VERBENACEAE	Clerodendrum colebrookeanum Walp.
459		VERBENACEAE	Gmelina arborea Roxb.
460		VERBENACEAE	Premna coriacea C.B. Clarke var. oblonga C.B. Clarke
461		VERBENACEAE	Premna flavescens Buch.-Ham. ex C.B.Clarke
462		VERBENACEAE	Premna interrupta Wall. ex Schauer
463		VERBENACEAE	Premna latifolia Roxb.
464		VERBENACEAE	Premna lucidula Miq.
465		VERBENACEAE	Premna barbata Schauer
466		VERBENACEAE	Premna benghalensis C. B.Clarke
467		VERBENACEAE	Premna bracteata Wall. ex C.B. Clarke
468		VERBENACEAE	Tectona grandis L.f.
469		VERBENACEAE	Vitex negundo L.
470		VERBENACEAE	Vitex pinnata L.
471		VERBENACEAE	Vitex quinata (Lour.) Williams
472		VERBENACEAE	Vitex heterophylla Roxb.
473		VERBENACEAE	Vitex peduncularis Schauer
474		LAMIACEAE (LABIATAE)	Leucosceptrum canum Sm.
475		MYRISTICACEAE	Horsfieldia kingii (Hook. f.) Warb.
476		MYRISTICACEAE	Knema tenuinervia W.J.J.O. de Willd.
477		MYRISTICACEAE	Knema erratica (Hook. f. & Thomson) Sinclair
478		MYRISTICACEAE	Knema linifolia Warb.
479		LAURACEAE	Actinodaphne angustifolia (Blume) Nees
480		LAURACEAE	Actinodaphne longipes Kosterm.
481		LAURACEAE	Actinodaphne obovata (Nees) Blume
482		LAURACEAE	Actinodaphne sikkimensis Meisn.
483		LAURACEAE	Alseodaphne owdenii Parker
484		LAURACEAE	Beilschmiedia assamica Meisn.
485		LAURACEAE	Beilschmiedia clarkei Hook. f.
486		LAURACEAE	Beilschmiedia dalzellii (Meisn.) Kosterm.
487		LAURACEAE	Beilschmiedia gammieana Hook. f.
488		LAURACEAE	Beilschmiedia roxburghiana Nees

489		LAURACEAE	<i>Beilschmiedia sikkimensis</i> Hook. f.
490		LAURACEAE	<i>Cinnadenia paniculata</i> (Hook. f.) Kosterm.
491		LAURACEAE	<i>Cinnamomum bejolghota</i> (Ham.) Sweet
492		LAURACEAE	<i>Cinnamomum cecidodaphne</i> Meisn.
493		LAURACEAE	<i>Cinnamomum glanduliferum</i> (Wall.) Meisn.
494		LAURACEAE	<i>Cinnamomum glaucescens</i> (Nees.) Hand-Mazz
495		LAURACEAE	<i>Cinnamomum impressinervium</i> Meisn.
496		LAURACEAE	<i>Cinnamomum tamala</i> (Buch.-Ham.) Nees & Eberm.
497		LAURACEAE	<i>Cinnamomum tenuipilis</i> Kosterm.
498		LAURACEAE	<i>Cryptocarya amygdalina</i> Nees
499		LAURACEAE	<i>Dodecadenia grandiflora</i> Nees
500		LAURACEAE	<i>Lindera assamica</i> (Meisn.) Kurz
501		LAURACEAE	<i>Lindera hamiltonii</i> Kosterm.
502		LAURACEAE	<i>Lindera heterophylla</i> Meisn.
503		LAURACEAE	<i>Lindera latifolia</i> Hook.f
504		LAURACEAE	<i>Lindera neesiana</i> (Wall. ex Nees) Kurz
505		LAURACEAE	<i>Lindera pulcherrima</i> (Nees) Hook. f.
506		LAURACEAE	<i>Litsea albescens</i> (Hook. f.) D.G.Long
507		LAURACEAE	<i>Litsea chartacea</i> (Nees) Hook. f.
508		LAURACEAE	<i>Litsea citrata</i> Blume
509		LAURACEAE	<i>Litsea cubeba</i> (Lour.) Pers.
510		LAURACEAE	<i>Litsea elongata</i> (Nees) Hook.f.
511		LAURACEAE	<i>Litsea glutinosa</i> (Lour.) Robins.
512		LAURACEAE	<i>Litsea hookeri</i> (Meisn.) D.G.Long
513		LAURACEAE	<i>Litsea kingii</i> Hook.f.
514		LAURACEAE	<i>Litsea laeta</i> (Nees) Hook. .
515		LAURACEAE	<i>Litsea monopetala</i> (Roxb.) Pers.
516		LAURACEAE	<i>Litsea panananja</i> (Nees) Hook.f.
517		LAURACEAE	<i>Litsea polyantha</i> Juss.
518		LAURACEAE	<i>Litsea salicifolia</i> (Nees) Hook. f.
519		LAURACEAE	<i>Litsea sikkimensis</i> (Meisn.) D.G.Long
520		LAURACEAE	<i>Machilus edulis</i> King
521		LAURACEAE	<i>Neocinnamomum caudatum</i> (Nees) Merr.
522		LAURACEAE	<i>Neolitsea cuipala</i> (D.Don) Kosterm.
523		LAURACEAE	<i>Neolitsea foliosa</i> (Nees) Gamble
524		LAURACEAE	<i>Persea americana</i> Mill.
525		LAURACEAE	<i>Persea clarkeana</i> (Hook, f.) Kostenn.
526		LAURACEAE	<i>Persea duthiei</i> (Hook. f.) Kosterm.
527		LAURACEAE	<i>Persea fructifera</i> Kosterm.

528		LAURACEAE	<i>Persea gamblei</i> (Hook, f.) Kosterm.
529		LAURACEAE	<i>Persea glaucercens</i> (Nees) D.G.Long
530		LAURACEAE	<i>Persea kurzii</i> (Hook, f.) Kostenn.
531		LAURACEAE	<i>Persea minutiflora</i> Kosterm.
532		LAURACEAE	<i>Persea odoratissima</i> (Nees) Kosterm.
533		LAURACEAE	<i>Persea robusta</i> (Sm.) Kosterm.
534		LAURACEAE	<i>Phobe attenuata</i> (Nees) Nees
535		LAURACEAE	<i>Phobe halesiana</i> Brandis
536		LAURACEAE	<i>Phobe lanceolata</i> (Nees) Nees
537		PROTEACEAE	<i>Helicia nilagirica</i> Beddome
538		SANTALACEAE	<i>Pyralia edulis</i> (Wall.) A. DC.
539		EUPHORBIACEAE	<i>Alchomea mollis</i> Muell.
540		EUPHORBIACEAE	<i>Alchomea tiliifolia</i> (Benth.) Muell.
541		EUPHORBIACEAE	<i>Antidesma acidum</i> Retz.
542		EUPHORBIACEAE	<i>Antidesma acuminatum</i> Wight
543		EUPHORBIACEAE	<i>Antidesma buniis</i> (L.) Spreng.
544		EUPHORBIACEAE	<i>Antidesma ghaesembila</i> Gaertn.
545		EUPHORBIACEAE	<i>Aporosa octandra</i> (D.Don) Vickery
546		EUPHORBIACEAE	<i>Baccaurea ramiflora</i> Lour.
547		EUPHORBIACEAE	<i>Bischofia javanica</i> Blume
548		EUPHORBIACEAE	<i>Bridelia tomentosa</i> Blume
549		EUPHORBIACEAE	<i>Bridelia pubescens</i> Kurz
550		EUPHORBIACEAE	<i>Bridelia retusa</i> (L.) Spreng.
551		EUPHORBIACEAE	<i>Cleidion spiciflorum</i> (Burm. f.) Merr.
552		EUPHORBIACEAE	<i>Croton caudatus</i> Geiseler
553		EUPHORBIACEAE	<i>Croton himalaicus</i> D.G.Long
554		EUPHORBIACEAE	<i>Croton roxburghii</i> N.P.Balacr.
555		EUPHORBIACEAE	<i>Croton tiglium</i> L.
556		EUPHORBIACEAE	<i>Drypetes assamica</i> (Hook.f.) Pax & Hoffman
557		EUPHORBIACEAE	<i>Drypetes indica</i> (Muell.) Pax & Hoffman
558		EUPHORBIACEAE	<i>Drypetes subsessilis</i> (Kurz) Pax & Hoffman
559		EUPHORBIACEAE	<i>Endospermum chinense</i> Benth.
560		EUPHORBIACEAE	<i>Flueggea virosa</i> Willd
561		EUPHORBIACEAE	<i>Flueggea acuminatum</i> Muell.
562		EUPHORBIACEAE	<i>Flueggea assamicum</i> (Muell.) Hook, f.
563		EUPHORBIACEAE	<i>Flueggea daltonii</i> (Muell.) Kurz
564		EUPHORBIACEAE	<i>Glochidion hirsutum</i> (Roxb.) Voigt
565		EUPHORBIACEAE	<i>Glochidion lanceolarium</i> (Roxb.) Voigt
566		EUPHORBIACEAE	<i>Glochidion nubigenum</i> Hook. f.

567		EUPHORBIACEAE	Glochidion sphaerogynum (Muell.) Kurz
568		EUPHORBIACEAE	Glochidion thomsoni Hook. f.
569		EUPHORBIACEAE	Glochidion velutinum Voight
570		EUPHORBIACEAE	Lasiococca symphyllifolia (Gamble) Hook.f.
571		EUPHORBIACEAE	Macaranga denticulata (Blume) Muell.
572		EUPHORBIACEAE	Macaranga gamblei Hook. f.
573		EUPHORBIACEAE	Macaranga indica Wight
574		EUPHORBIACEAE	Macaranga pustulata Hook. f.
575		EUPHORBIACEAE	Mallotus nepalensis Muell.
576		EUPHORBIACEAE	Mallotus oreophilus Muell.
577		EUPHORBIACEAE	Mallotus philippensis (Lam.) Muell.
578		EUPHORBIACEAE	Mallotus repandus (Willd.) Muell.
579		EUPHORBIACEAE	Mallotus roxburghianus Muell.
580		EUPHORBIACEAE	Mallotus tetracoccus (Roxb.) Kurz
581		EUPHORBIACEAE	Ostodes paniculata Blume
582		EUPHORBIACEAE	Phyllanthus acidus (L.) Skeel
583		EUPHORBIACEAE	Phyllanthus emblica L.
584		EUPHORBIACEAE	Sapium baccatum Roxb.
585		EUPHORBIACEAE	Sapium eugeniaefolium Buch.-Ham. ex Hook.f.
586		EUPHORBIACEAE	Sapium insigne (Royle) Benth. ex Hook.f.
587		EUPHORBIACEAE	Suregada multiflora (Juss.) Baillon
588		EUPHORBIACEAE	Trewia nudiflora L.
589		EUPHORBIACEAE	Vernicia cordata (Thunb.) Airy Shaw
590		DAPHNIYLLACEAE	Daphniphyllum himalense (Benth.) Mull.-Arg. var. chartaceum (Rosenthal) Huang
591		DAPHNIYLLACEAE	Boehmeria rugulosa Wedd.
592		DAPHNIYLLACEAE	Boehmeria longifolia (Burm. f.) Wedd.
593		DAPHNIYLLACEAE	Debregeasia wallichiana Wedd.
594		DAPHNIYLLACEAE	Oreocnida frutescens (Thunb.) Miq.
595		DAPHNIYLLACEAE	Dendrocnide sinuata (Blume) Chew.
596		DAPHNIYLLACEAE	Oreocnida rubescens (Blume) Miq.
597		ULMACEAE	Celtis tetrandra Roxb.
598		ULMACEAE	Celtis timorensis Span.
599		ULMACEAE	Gironniera cupsidata (Blume) Kurz
600		ULMACEAE	Gironniera reticulata Thw.
601		ULMACEAE	Gironniera thomsoni King
602		ULMACEAE	Trema orientalis (L.) Blume
603		ULMACEAE	Trema politoria (Planch.) Blume
604		ULMACEAE	Ulmus lanceifolia Roxb. ex Wall
605		MORACEAE	Artocarpus chama Ham.

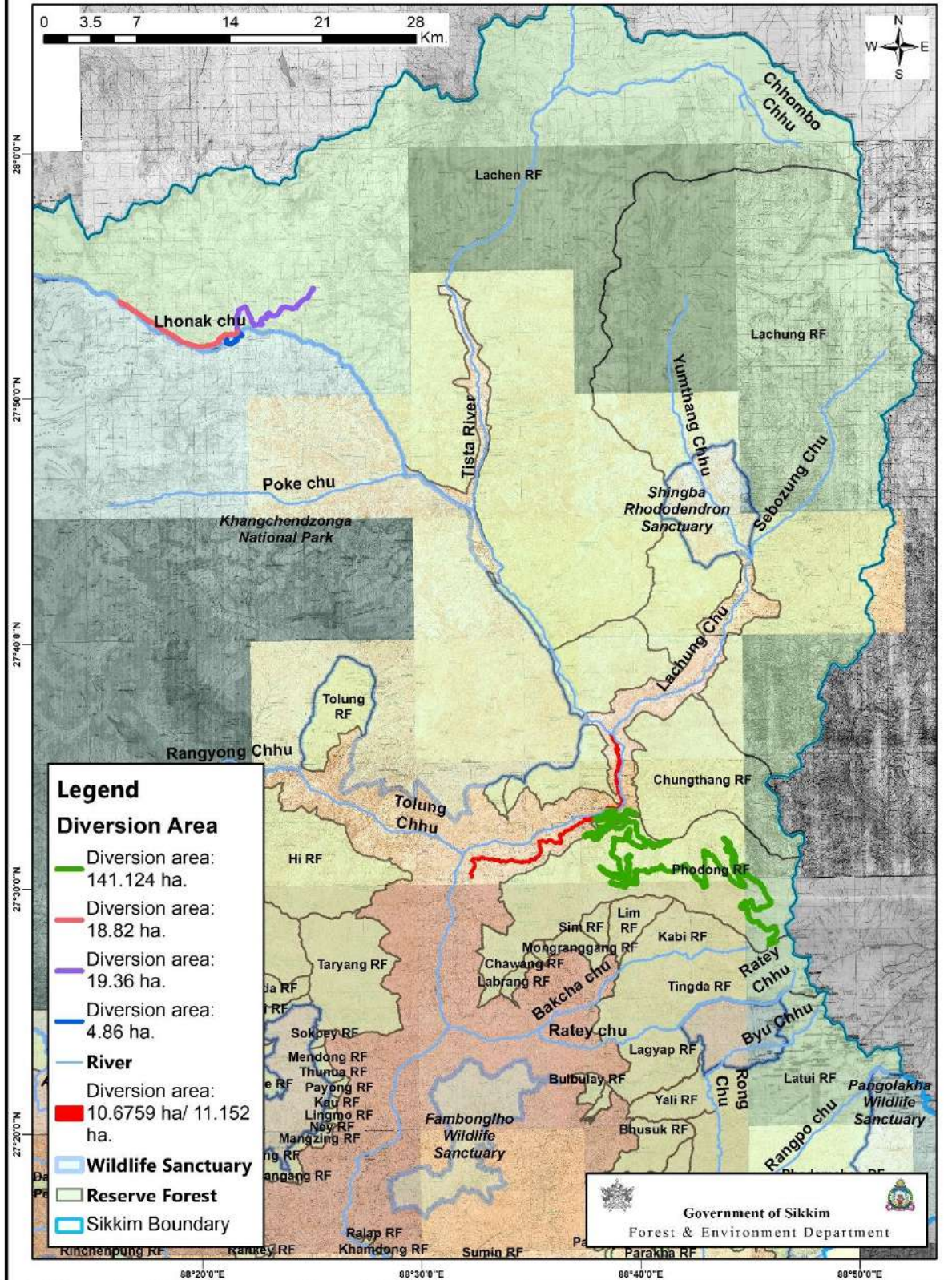
606		MORACEAE	Artocarpus heterophyllum Lam.
607		MORACEAE	Artocarpus lacucha Ham.
608		MORACEAE	Broussonetia papyrifera Vent.
609		MORACEAE	Ficus altissima Blume
610		MORACEAE	Ficus auriculata Lour.
611		MORACEAE	Ficus benghalensis L.
612		MORACEAE	Ficus benjamina L.
613		MORACEAE	Ficus concinna Miq.
614		MORACEAE	Ficus conglobata King
615		MORACEAE	Ficus curtipes Corner
616		MORACEAE	Ficus cyrtophylla Miq.
617		MORACEAE	Ficus drupacea Thunb.
618		MORACEAE	Ficus elastica Hornem.
619		MORACEAE	Ficus geniculata Kurz
620		MORACEAE	Ficus glaberrima Blume
621		MORACEAE	Ficus glabrata H.B. & K.
622		MORACEAE	Ficus hirta Vahl
623		MORACEAE	Ficus hookeriana Corner
624		MORACEAE	Ficus laevis Blume
625		MORACEAE	Ficus maclellandii King var. rhododendrifolia (Miq.) Corner.
626		MORACEAE	Ficus microcarpa L.f.
627		MORACEAE	Ficus neriifolia J.E. Smith
628		MORACEAE	Ficus oligodon Miq.
629		MORACEAE	Ficus prostrata Miq.
630		MORACEAE	Ficus racemosa L.
631		MORACEAE	Ficus religiosa L.
632		MORACEAE	Ficus rumphii Blume
633		MORACEAE	Ficus semicordata J.E. Smith
634		MORACEAE	Ficus subincisa J.E. Smith
635		MORACEAE	Ficus subulata Blume
636		MORACEAE	Ficus tinctoria A.Forst. subsp. parasitica (Willd) Corner
637		MORACEAE	Ficus virens Aiton var. sublanceolata (Miq.) Corner
638		MORACEAE	Morus australis Poir.
639		MORACEAE	Morus macroura Miq.
640		MORACEAE	Streblus asper Lour.
641		JUGLANDACEAE	Engelhardia spicata Blume
642		JUGLANDACEAE	Juglans regia L.
643		BETULACEAE	Alnus nepalensis D.Don
644		BETULACEAE	Betula alnoides D.Don

645		BETULACEAE	Betula utilis D.Don
646		BETULACEAE	Carpinus viminea Lindl.
647		BETULACEAE	Corylus ferox Wall.
648		FAGACEAE	Castanea sativa Mill.
649		FAGACEAE	Castanopsis clarkei King
650		FAGACEAE	Castanopsis armata Spach
651		FAGACEAE	Castanopsis indica Roxb. ex A.DC.
652		FAGACEAE	Castanopsis hystrix A. DC.
653		FAGACEAE	Castanopsis lanceifolia (Roxb.) Hickel et A. Camus
654		FAGACEAE	Castanopsis tribuloides (Sm.) A.DC.
655		FAGACEAE	Lithocarpus elegans (Blume) Hatus ex Soepadmo
656		FAGACEAE	Lithocarpus fenestratus (Roxb.) Rehder.
657		FAGACEAE	Lithocarpus pachyphyllus (Kurz) Rehder
658		FAGACEAE	Quercus glauca Thunb.
659		FAGACEAE	Quercus griffithii Miq.
660		FAGACEAE	Quercus lamellosa Sm.
661		FAGACEAE	Quercus leucotrichophora Camus
662		FAGACEAE	Quercus semiserrata Roxb.
663		FAGACEAE	Quercus thomsoniana A.DC.
664		SALICACEAE	Populus ciliata Royle
665		SALICACEAE	Populus gamblei Dode
666		SALICACEAE	Populus glauca Haines
667		SALICACEAE	Salix babylonica L.
668		SALICACEAE	Salix longifolia Anderson
669		SALICACEAE	Salix myrtilleacea Anderson
670		SALICACEAE	Salix obscura Anderson
671		SALICACEAE	Salix tetrasperma Roxb.
672		SALICACEAE	Salix wallichiana Anderson
673		PINACEAE	Abies densa Griff.
674		PINACEAE	Cunninghamia lanceolata (Lamb.) Hook.f.
675		PINACEAE	Cedrus deodara
676		PINACEAE	Larix griffithiana Carriere
677		PINACEAE	Picea spinulosa (Griff.) Henry
678		PINACEAE	Pinus kesiya Gorton
679		PINACEAE	Pinus roxburghii Sarg.
680		PINACEAE	Pinus wallichiana A.B. Jacks.
681		PINACEAE	Tsuga dumosa (D.Don) Eichler
682		TAXODIACEAE	Cryptomeria japonica (L.) D.Don
683		TAXODIACEAE	Taxodium distichum (L.) Rich

684		CUPRESSACEAE	Juniperus pseudosabina Fischer & Meyer.
685		CUPRESSACEAE	Juniperus recurva D.Don
686		CUPRESSACEAE	Juniperus squamata D. Don
687		CUPRESSACEAE	Thuja orientalis L.
688		PODOCARPACEAE	Podocarpus neriifolius D.Don
689		TAXACEAE	Taxus wallichiana (Zucc.) Pilger
	MONOCOTYLEDONS		
690		ARECACEAE	Areca catechu L.
691		ARECACEAE	Caryota urens L.
692		ARECACEAE	Cocos nucifera L.
693		ARECACEAE	Livistona chinensis (Jacquin) Mart.
694		ARECACEAE	Livistona jenkinsiana Griff.
695		ARECACEAE	Phoenix sylvestris (L.) Roxb.
696		ARECACEAE	Trachycarpus fortunei (Hook.) H. Wendland
697		PANDANACEAE	Pandanus furcatus Roxb.
698		POACEAE (GRAMINAE)	Bambusa bambos (L.) Voss
699		POACEAE (GRAMINAE)	Bambusa balcooa Roxb.
700		POACEAE (GRAMINAE)	Bambusa nutans Wall. ex Munro subsp. cupulata Stapleton
701		POACEAE (GRAMINAE)	Bambusa pallida Munro
702		POACEAE (GRAMINAE)	Bambusa tulda Roxb.
703		POACEAE (GRAMINAE)	Himalayacalamus hookerianus (Munro) Stapleton
704		POACEAE (GRAMINAE)	Cephalostachyum capitatum Monro
705		POACEAE (GRAMINAE)	Cephalostachyum latifolium Monro
706		POACEAE (GRAMINAE)	Dendrocalamus hamitonii Monro
707		POACEAE (GRAMINAE)	Dendrocalamus hookeri Munro
708		POACEAE (GRAMINAE)	Dendrocalamus patellaris Gamble
709		POACEAE (GRAMINAE)	Dendrocalamus sikkimensis Gamble
710		POACEAE (GRAMINAE)	Melocanna baccifera (Roxb) Kurz
711		POACEAE (GRAMINAE)	Phyllostachys assamica Gamble ex Brandis
712		POACEAE (GRAMINAE)	Yushania pantlingii (Gamble) R.B. Majumdar

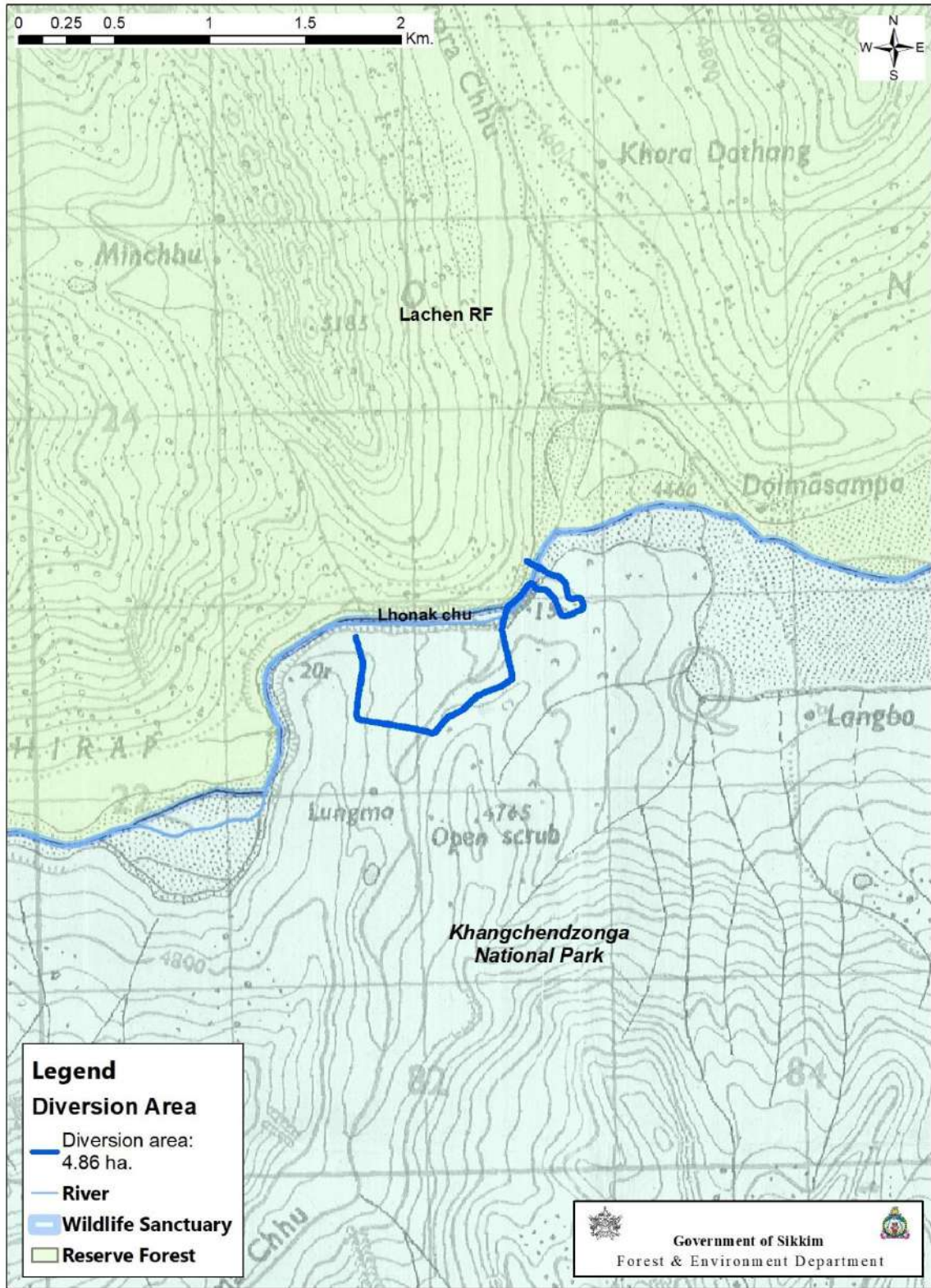
Source: ENVIS Sikkim

MAP SHOWING THE PROPOSED DIVERSION OF FOREST LAND UNDER MANGAN (T), CHUNGTANG (T) AND LACHEN (T) RANGE, NORTH SIKKIM



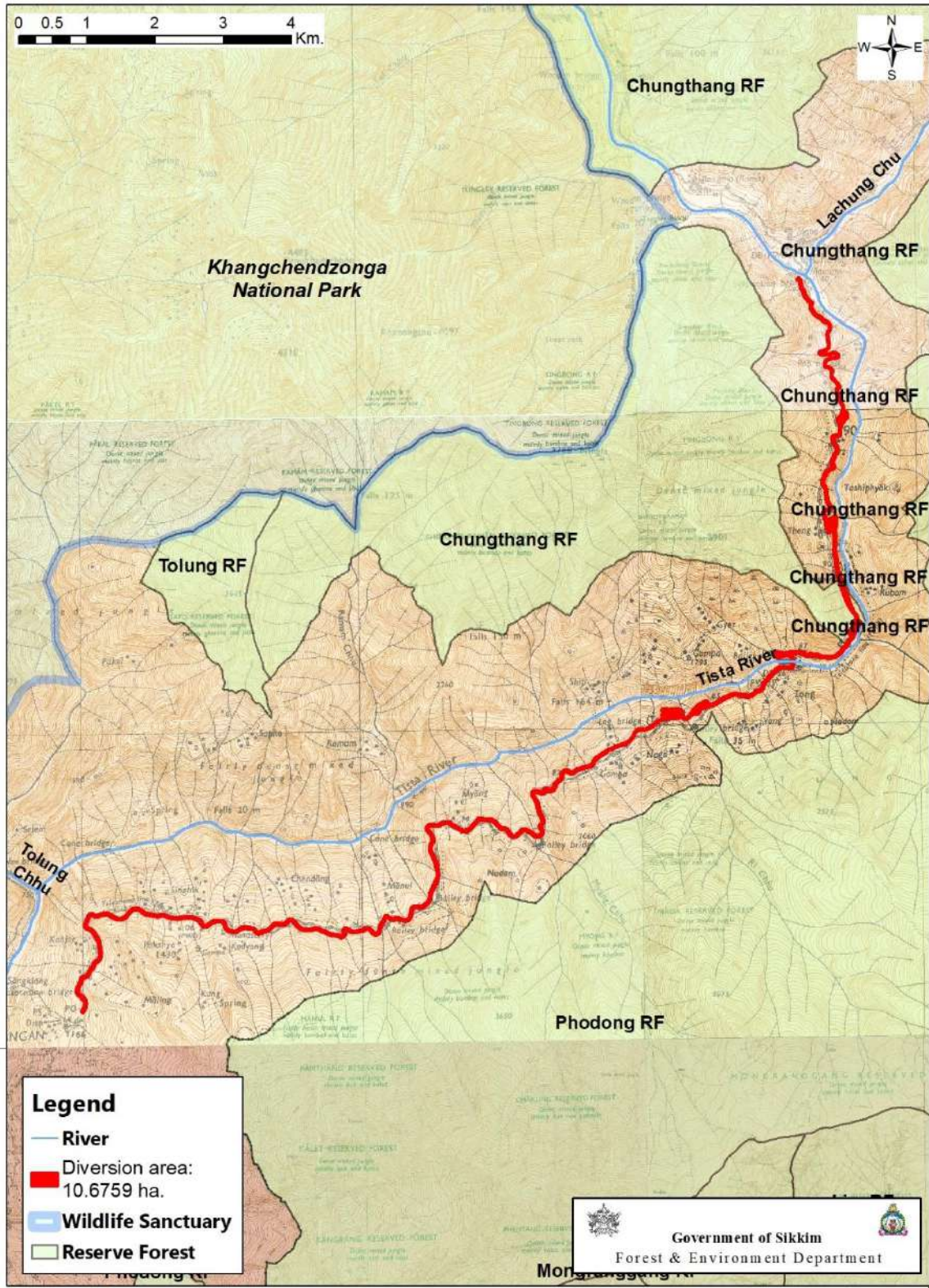
Note: This map is not for legal purpose. This map is for reference use only.

MAP SHOWING THE PROPOSED DIVERSION OF FOREST LAND AREA OF 4.86 HA. FOR CONST. OF ITBP PH-II ROAD FROM 20R LINK POINT TO 20 R (GOMA) BY ITBP UNDER KNP/KBR (NORTH), NORTH SIKKIM



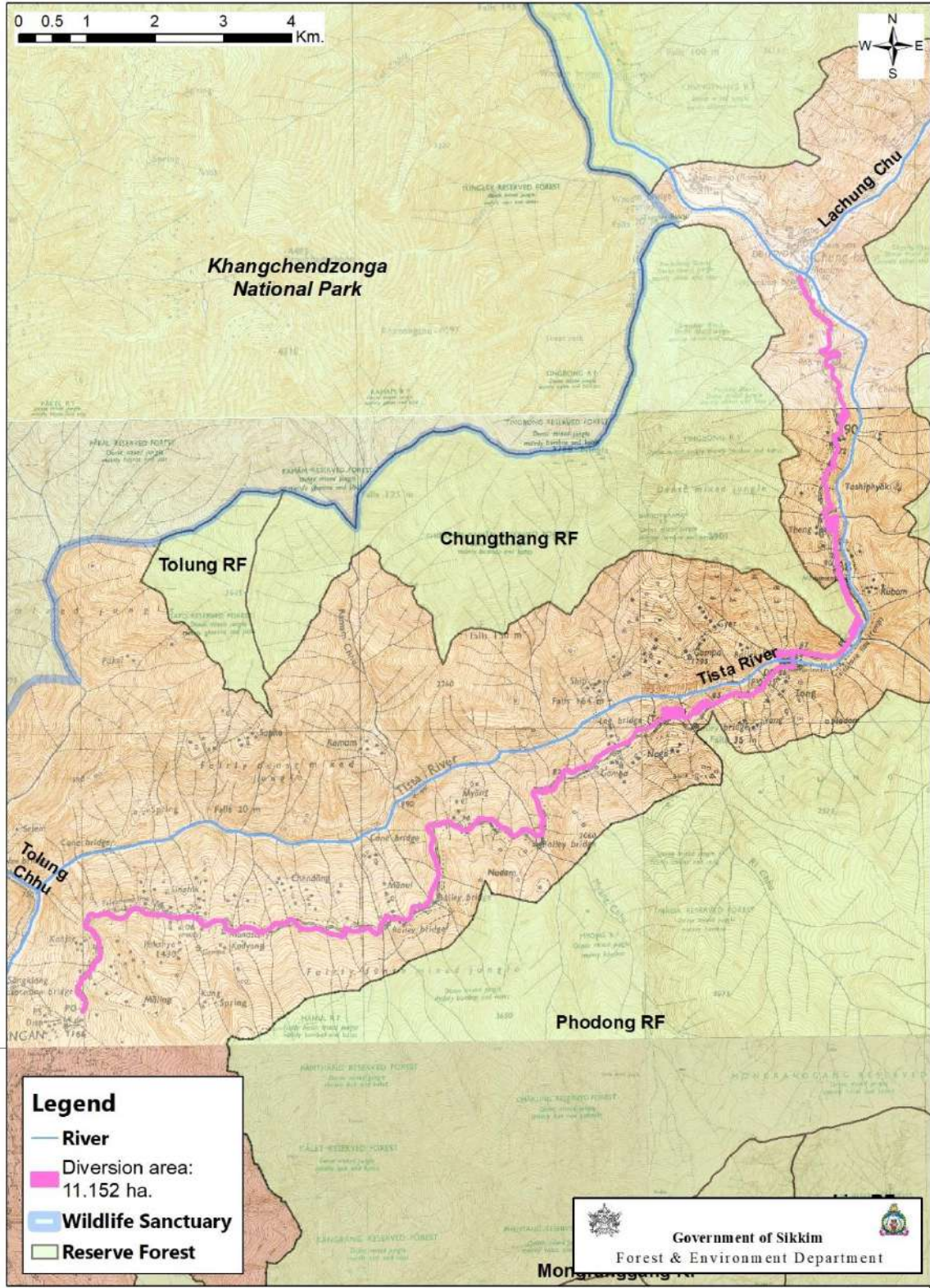
Note: This map is not for legal purpose. This map is for reference use only.

MAP SHOWING THE PROPOSED DIVERSION OF FOREST LAND AREA OF 10.6759 HA.
FOR WIDENING OF EXISTING ROAD (NH310A) BY BRO PASSES THROUGH GOVT. LAND AND
RF UNDER MANGAN (T) AND CHUNGTHANG (T) RANGE, NORTH SIKKIM



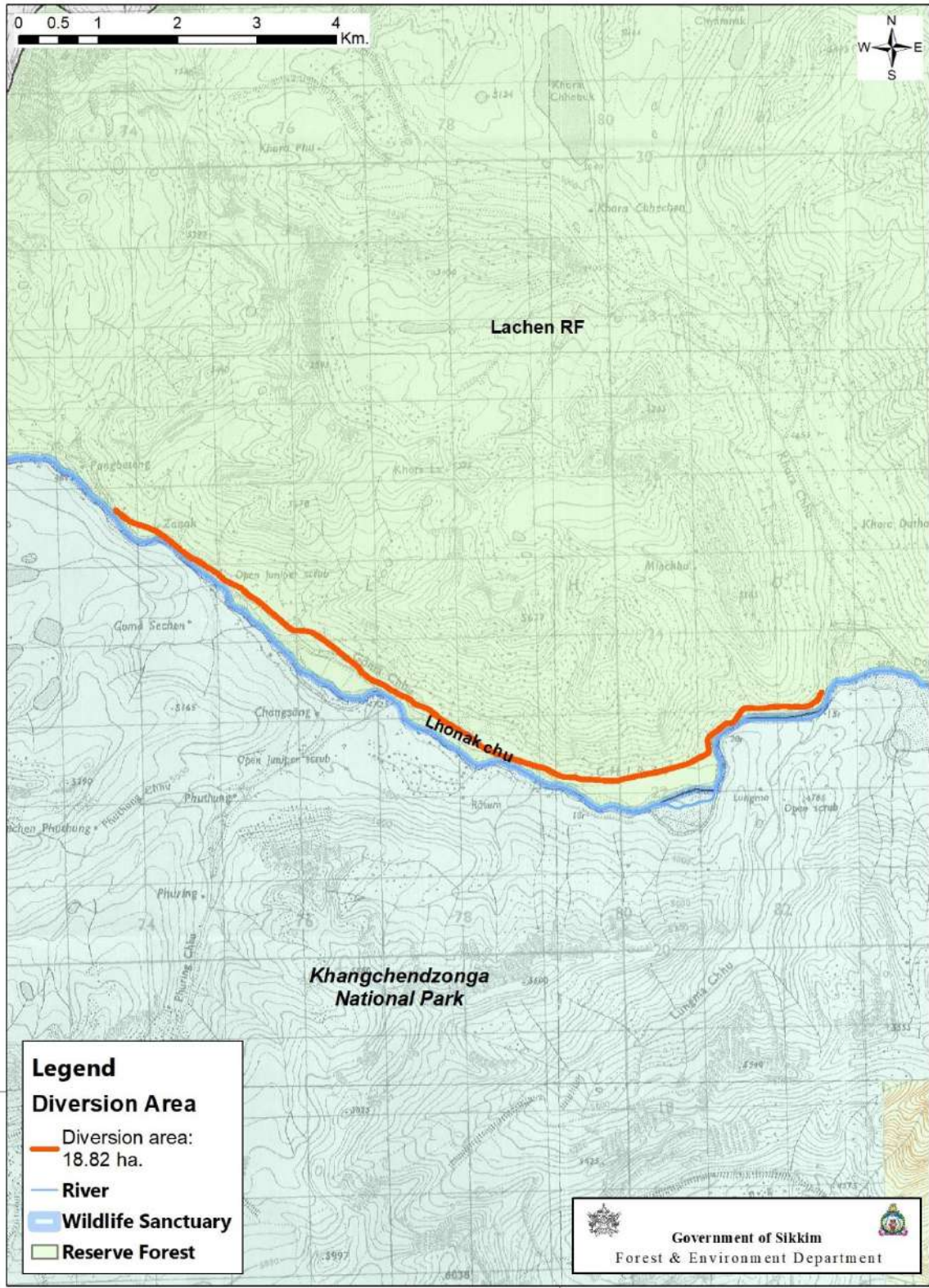
Note: This map is not for legal purpose. This map is for reference use only.

MAP SHOWING THE PROPOSED DIVERSION OF FOREST LAND AREA OF 11.152 HA. FOR WIDENING OF EXISTING ROAD (NH310A) BY BRO PASSES THROUGH GOVT. LAND AND RF UNDER MANGAN (T) AND CHUNGTHANG (T) RANGE, NORTH SIKKIM



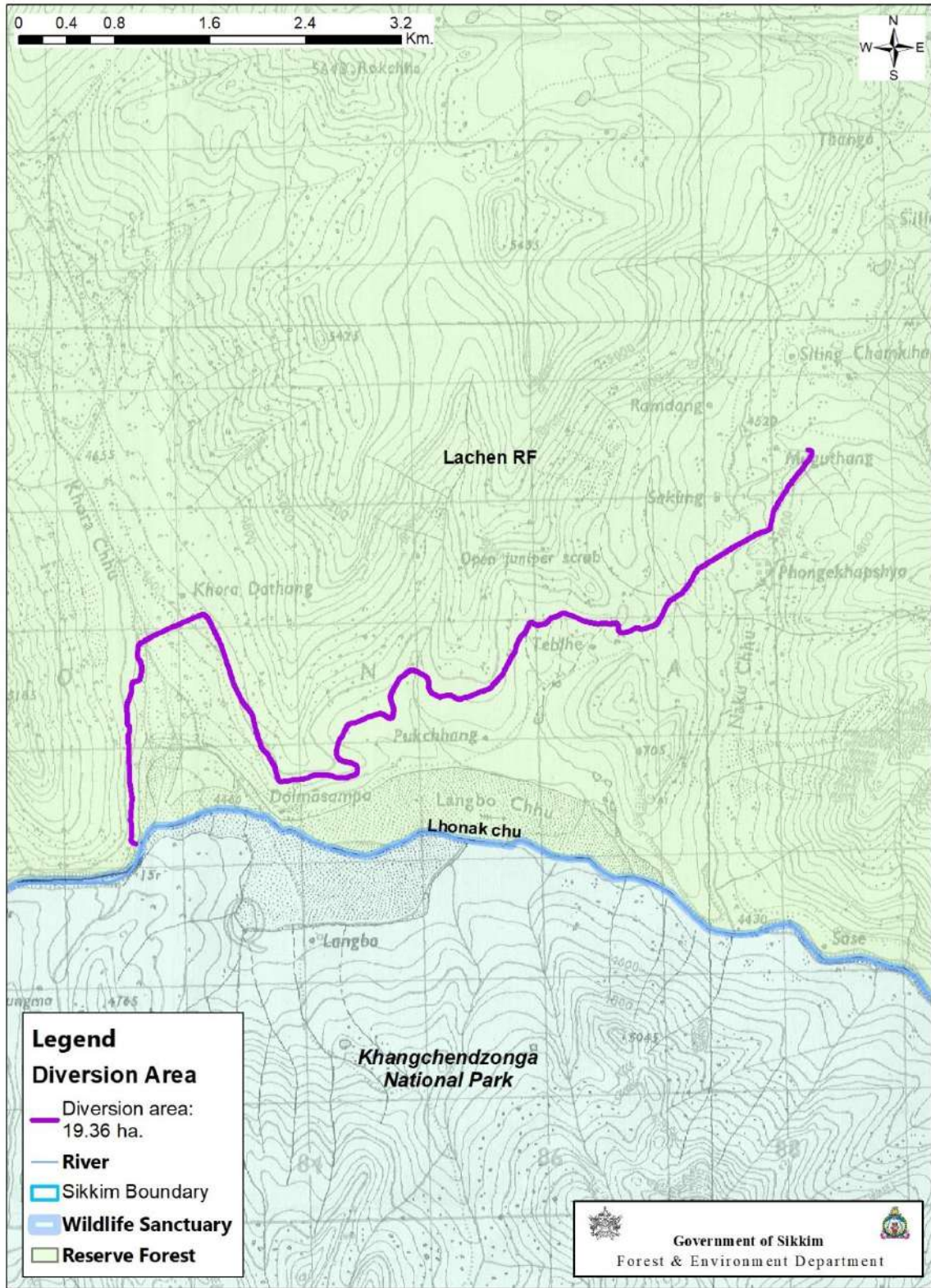
Note: This map is not for legal purpose. This map is for reference use only.

MAP SHOWING THE PROPOSED DIVERSION OF FOREST LAND AREA OF 18.82 HA. FOR CONST. OF ITBP ROAD FROM 20R LINK POINT TO ZANAK BY ITBP UNDER LACHEN(T) RANGE NORTH SIKKIM



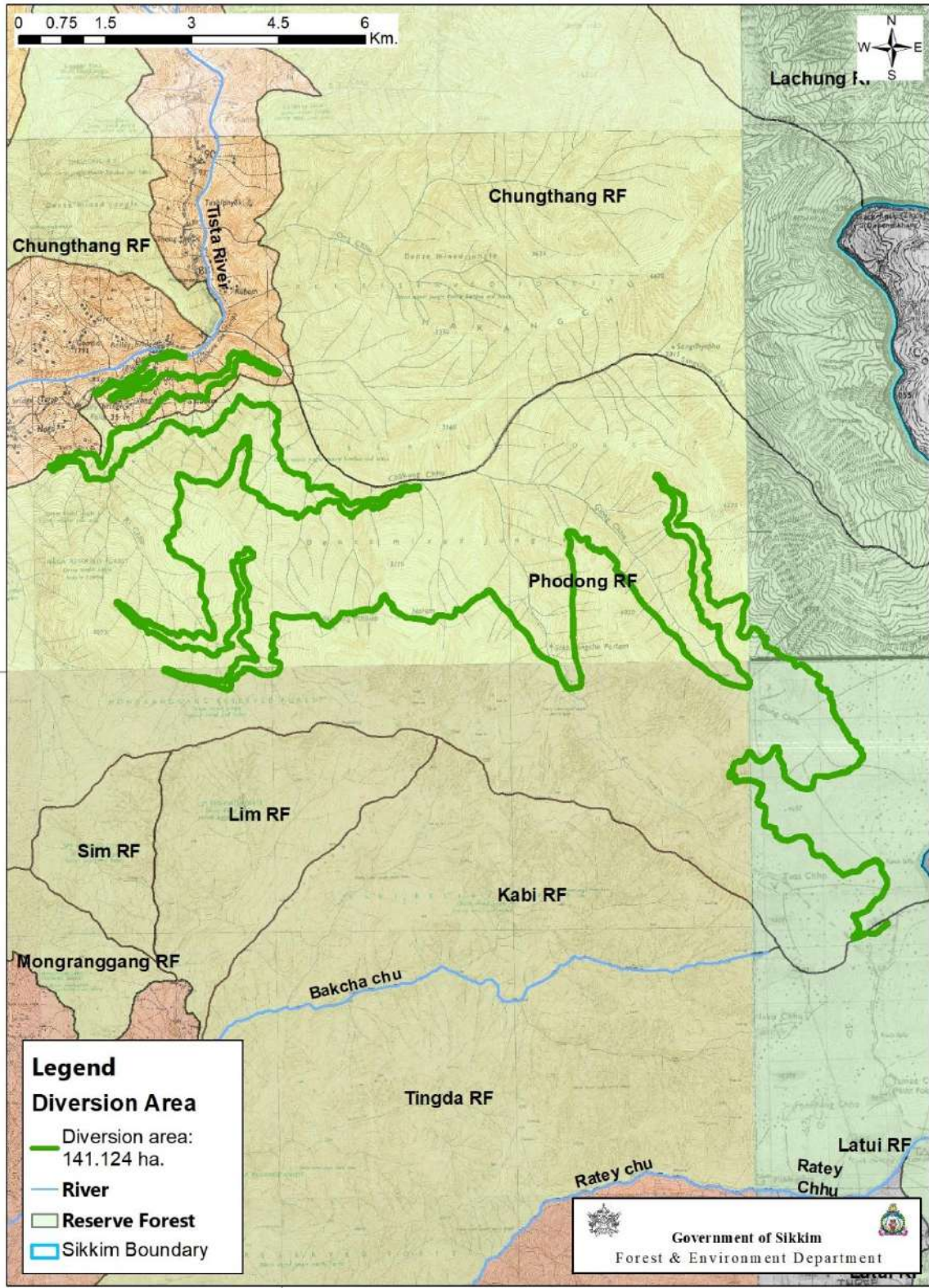
Note: This map is not for legal purpose. This map is for reference use only.

MAP SHOWING THE PROPOSED DIVERSION OF FOREST LAND AREA OF 19.36 HA. FOR CONST. OF LINK ROAD FROM MUGUTHANG TO 20R BY ITBP PASSES THROUGH LACHEN RF UNDER LACHEN (T) RANGE, NORTH SIKKIM



Note: This map is not for legal purpose. This map is for reference use only.

MAP SHOWING THE PROPOSED DIVERSION OF FOREST LAND AREA OF 141.124 HA.
FOR CONST. OF ROAD FROM TOONG TO PT. 4865 TAMZE BY BRO PASSES THROUGH GOVT.
KHASHMAL AND PHODONG RF UNDER MANGAN (T) RANGE, NORTH SIKKIM



Note: This map is not for legal purpose. This map is for reference use only.

Annexure-III: Comments of the Wildlife Institute of India on the Comprehensive Biodiversity Conservation Plan (CBCP) and the response of the state forest department

Biodiversity Conservation and Management Plans of BRO and ITBP Roads in Sikkim – Review by WII

SUBMITTED TO

FOREST AND ENVIRONMENT DEPARTMENT | GOVERNMENT OF SIKKIM

Review Team:

**Dr. G.V.Gopi, Scientist F & Head,
Department of Endangered Species Management and Nodal Officer, EIA Cell
Mr. Rohit Jha, Senior Project Associate**



2023

PREFACE

Roads are crucial for human civilisation and are a prominent part of modern society enabling movement of people and goods. In conservation biology, roads, railways, canals, etc. through biodiversity-rich areas are considered as “linear intrusions” that may affect flora and fauna in several deleterious ways. Construction of linear intrusions, both directly and indirectly, leads to loss and degradation of wildlife habitats. Linear intrusions can also act as movement barriers, thereby contributing to animal population declines and restricting gene flow between populations over the long term. The most direct and visible effect of roads and railways through biodiverse areas is seen through habitat destruction (including loss of forest canopy) and animal injuries/fatalities due to direct vehicular collision. The effect of linear intrusions may extend few hundreds of meters beyond the edge of the intrusion itself through the edge effect, particularly on vegetation composition.

Hence, a well-drafted Biodiversity Conservation & Management (BC&M) Plan must first define and delineate a ‘Road Effect Zone’ (REZ) based on the local environmental/biodiversity context, within which most mitigating measures may be implemented. Additionally, since disproportionately large areas get affected due to habitat fragmentation through new or expansion of existing linear intrusions, it is extremely essential to provide for non-structural wildlife/forest conservation measures in the larger landscape impact zone (LIZ) as well towards habitat improvement measures, strengthening infrastructure, research and monitoring activities etc. An indicative list of such activities is being provided as Appendix 1 to this report. A site-specific ‘Wildlife Passage Plan’ with suggested dimensions and locations of structures such as underpasses, overpasses, culverts, viaducts etc. incorporating all available wildlife occurrence, movement and behaviour data, and following all national laws, regulations, guidelines incorporating best practices is a critical part of all BC&M Plans. These interventions, alongside any infrastructure strengthening capital cost/expenditure are to be directly executed by the user agency (UA), a sample/indicative list of activities is provided as Appendix 2.

A chapter describing the existing situation within the REZ and the larger LIZ describing inhabiting biodiversity (with flora and fauna check lists), wildlife corridors, forest types, forest cover, LULC etc. with several maps and figures is important to have a detailed overview of the impact zones. Such BC&M Plans must also list and describe all possible project impacts at various stages (pre-construction, construction and post-construction) on wildlife and corresponding mitigation measures suggested. All suggested mitigation/compensating measures must follow general wildlife conservation principles and borrow from available scientific evidence and researches carried out within the country and around the world. BC&M Plans must also establish clear post-project monitoring protocols so that compliance is ensured with clear roles and responsibilities for the monitoring authority, so that timely course-corrections, whenever necessary, can be suggested and implemented with an overarching objective to benefit native flora, fauna and wildlife habitats while ameliorating negative impacts from linear infrastructures.

A suggested outline of BC&M Plans that could be adopted for such linear intrusion projects (or in general for forest diversion proposals) is supplied as Appendix 3.

I. INTRODUCTION & BACKGROUND

In July 2022, WII was approached by the Forest & Environment Department (FED), Govt. of Sikkim to review four (04) Biodiversity & Conservation Management Plans prepared for four forest diversion proposals with respect to road construction projects in North Sikkim district. Brief details of the proposals are as follows.

Forest Clearance Proposal no.	Name	Forestland diversion	Road length	Division	Current Status (as per PARIVESH portal)
124229/2021	Muguthang to 20R Link Point (UA – CPWD)	19.36 ha (greenfield)	10.70 km	North (T) (277 m from KNP)	Pending with DFO, FC Stage-I not accorded
148024/2021	Toong bridge to Chungthang (UA – BRO)	11.15 ha (widening as per NHDL specification)	9.60 km	North (T)	Pending with DFO, FC Stage-I not accorded
36928/2018	Toong-Partem-Tamze (UA – BRO)	141.124 ha (greenfield)	84.42 km	North (T)	FC Stage-I with working permission accorded
146764/2021	Rafom Khola (Mangan) to Toong bridge (UA – BRO)	10.67 ha (widening as per NHDL specification)	~ 18 km	North (T)	Pending with DFO, FC Stage-I not accorded

The BC&M Plans are well-drafted, however certain shortcomings and inconsistencies were noted by the MoEF&CC's Integrated Regional Office, Kolkata in April 2022. Thereafter, WII made a rapid field visit to the areas and habitats where the above projects were to be implemented, interacted with various stakeholders and provided various comments in the field during these interactions. Overall, we felt the need for more site-specific conservation and mitigation measures following biodiversity studies, and the adoption of an integrated approach for the whole of North Sikkim since several strategic road construction and other defence infrastructure strengthening projects are in the pipeline for the district. Such an integrated approach was later adopted by the FED, and an Integrated 'Comprehensive Biodiversity Conservation Plan' (CBCP) for six (06) road constructions proposals (four mentioned above and an additional two submitted for clearance) was drafted in February 2023. The CBCP is a thoroughly revised document and contains all relevant forest and wildlife conservation measures with a suggested financial proposal as well.

We have gone through the four sets of individual BC&M Plans prepared earlier and submitted for WII's review/comments, and the CBCP as well. Our comments and suggestions provided herein – both general and specific to the landscape derived from our field learnings and interactions in Sikkim – are meant to further strengthen the Plans in any manner deemed feasible and appropriate by the FED, and provide certain general guidelines for future reference.

II. WII general comments and suggestions on four (04) ‘Draft Biodiversity Conservation and Management Plan’ prepared by the North Territorial Division of Forest & Environment Department, Government of Sikkim in lieu of road construction (greenfield/expansion) forest diversion proposals

The BC&M Plans are overall well drafted, they may only lack a more comprehensive and a more uniform structure and certain finer-scale details to enable easy comprehension and analyses. A suggested outline for BC&M Plans is provided as Appendix 3. Additionally, the following general comments and suggestions are provided to further improve the drafted Plans. It must be noted though that any such Plan must follow a detailed biodiversity/environment impact assessment study or at least a thorough analyses of available relevant data.

1. For all road construction/widening projects, two kinds of impact zones – Road Effect Zone (REZ) & Landscape Impact Zone (LIZ) or Infrastructure Effects Zone – need to be defined and delineated, so that biodiversity and other impact assessment studies could be conducted within these areas, and suitable structural and non-structural mitigating and compensating measures be targeted within such identified zones.

Response: These four Biodiversity Conservation and Management Plans prepared by the North Territorial Division have been now replaced with a Comprehensive Biodiversity Conservation Plan (CBCP) which has been prepared in consultation with WII, WWF and other stakeholders. This plan has been prepared in response to the six new roads of CPWD and BRO planned in the Mangan district of Sikkim. The maps provided for in Annexure-II delineate the road diversion zone, while the landscape impacted includes the two districts of Mangan and Gangtok. The detailed delineation of the zones will be done while taking up the studies.

2. Site-specific ‘Wildlife Passage Plan’ with appropriate suggested structures (such as overpasses, underpasses, viaducts, culverts etc.) and their respective dimensions (following national and international guidelines, and according to inhabiting biodiversity) needs to be supplied as part of the BC&M Plans. So that the planned structures are appropriately sited, data regarding wildlife occurrence, movement, wildlife mortality/injury/rescue locations, human-wildlife conflict hotspots need to be generated following at least a year-long study covering multiple seasons. It is recommended that all Beat Offices maintain a register of significant wildlife sightings (including of indirect evidence such as spoor, dung/pellets, antlers/horns etc.) observed during each of their routine forest patrols. Each wildlife rescue event must also be scrupulously recorded. Details such as species, their numbers, location geo-coordinates, date, animal activity and any such relevant data must be logged.

Response: The site-specific wildlife passage plan has been prepared and is detailed in Section 7 and Annexure-III. The record keeping of wildlife sightings as well as rescue events will be strengthened as suggested.

3. Wherever several linear infrastructure project proposals are received situated close to each other, a cumulative impact assessment study describing cumulative impacts with suggested mitigation strategies might be more useful as part of a combined BC&M Plan.

Response: This has been done now and instead of a piecemeal approach, a comprehensive proposal has been prepared to account for the cumulative impacts and to also ensure transparency and efficiency during execution.

4. Lists of taxonomically accurately organised flora (tree, herb, shrub, climber, orchid) and fauna (butterflies, moths, odonates, amphibians, reptiles, birds and mammals) species occurring within the delineated impact zones must be necessarily supplied with their conservation status (both local/national and worldwide) and WLPA schedule as part of the BC&M Plans. We have provided such an updated list of flora and fauna for the region/impact zone as Appendix 4. Information on whether the listed species are endemic, migratory (breeding or winter visitor), locally threatened/rare etc. must also be provided along with any ethnobotanical information (for flora). For rare, endangered, threatened and endemic species, specific conservation plans with dedicated budget must be formulated and provided for as part of the BC&M Plans.

Response: The biodiversity check list has been provided for in Annexure-I. Specific budgets for conservation of faunal and floral species is provided for in Section 5 of the plan.

5. A list of important wildlife-rich habitats and sites of cultural and religious importance within the impact zones must be supplied, and all measures to protect them from the negative impacts of the planned linear infrastructure be proposed as part of the BC&M Plans.

Response: The biodiversity and cultural values of the landscapes are detailed in Section 1, and measures to protect have been budgeted for in Section 5.

6. Detailed socio-economic information of people living in the vicinity of and within the delineated impact zones of the planned infrastructure must also be provided as part of the BC&M Plans. This is important since, in a densely populated country such as India, human communities often co-occur with wildlife and may be partly/wholly dependent and competing for resources from wildlife habitats. Hence, appropriate measures to reduce dependency on forest resources as much as is feasible and permissible (according to local laws, regulations and socio-religious practices) may be provided for in the BC&M Plans.

Response: The Mangan district is sparsely populated with only 10 persons per square km. However, this district borders with China and consequently has a strong deployment of defence forces. Also, the tourism footprint is also growing over the years. In order to improve the protection status of these high-altitude areas a comprehensive strategy comprising of 8 components namely reducing human wildlife conflict, strengthening forest protection, strengthening participatory conservation, strengthening forest protection infrastructure, reducing wildlife predation by feral dogs, strengthening ex-situ

conservation, building capacity and knowledge management has been detailed in Section 5.

7. The various ecological and environmental impacts of the concerned road construction projects need to be listed phase-wise (pre-construction, during construction and post-construction) and their various mitigation and management measures proposed accordingly with scientific justification and rationale.

Response: The main threats perceived are increased predation of wildlife by feral dogs and rising human wildlife conflict. While the main gaps are limited infrastructure, human capacity and research inputs. The project aims to address these threats and gaps by developing a comprehensive biodiversity conservation plan. Also, the non-structural mitigation and management measures are detailed in Section 8.

8. Establishment of a ‘Compliance Monitoring’ team/protocol with specified roles and responsibilities is critical to ensure that suggested mitigation and management measures are complied with, and necessary inspection, audit and improvements are regularly carried out. This must be clearly described in the BC&M Plan itself. A third-party audit by reputed government/non-government organisations with experience in the biodiversity sector is recommended, and sufficient budget for such a team’s field inspection and members’ honorarium be provided for in the BC&M Plan’s budget.

Response: Monitoring mechanism is provided for in Section 6 and includes partnerships with third party organizations such as WWF, WII and others.

9. Since linear infrastructure through a densely forested region such as in North Sikkim will involve large-scale tree-felling and opening of the canopy, such ecological conditions might encourage colonisation and spread of certain exotic invasive vegetation. Hence, a chapter on invasive weed management and eradication must be a part of any BC&M Plan.

Response: Rescue and rehabilitation of floral species and weed eradication has been included in Section 4.6 of the plan.

10. Linear infrastructure also increases the probability of incidences of direct wildlife mortality and/or injury through vehicular collision, thereby necessitating requisite infrastructure for wildlife rescue and rehabilitation (including personnel safety and animal handling equipment). Hence, the BC&M plans must provide for the establishment of a veterinary hospital (if not already available in the Division/impact area) with a full-time veterinarian doctor, requisite drugs in enough quantities and any such requirement.

Response: This aspect has been covered in detail in Section 8 - Non-structural mitigation and management measures as well as in Section 4.1 and 4.5 of the plan.

11. Roads and railways may also cause a change in the movement patterns of native wildlife and an increase in the incidence of human-wildlife negative interactions. To ensure that such events are quickly responded to and mitigated, relevant Quick Response Teams (QRTs), as required, must be formed with required infrastructure and manpower support, budget for which must be provisioned for in the BC&M Plans.

Response: This aspect has been covered in detail in Sections 4.1, 4.2, 4.3 and 4.4 of the plan. In the context of these six roads, low vehicular movement for defence purposes only in daytime will help mitigate the incidences of human-wildlife negative interactions. In the cold desert ecosystem, the long sight distance available due to lack of tree vegetation will also help reduce any untoward incidences.

12. Linear infrastructure such as roads greatly improves access to hitherto inaccessible forested areas, thereby facilitating illegal activities such as tree-felling, hunting etc. Hence, improving and increasing patrolling infrastructure – both in terms of manpower and equipment – in the impact areas is a crucial activity in any BC&M Plan.

Response: This aspect has been covered in detail in Sections 4.1, 4.2, 4.3, 4.4 and 4.5 of the plan.

13. To ensure that all stakeholders agree to and ensure carrying out all activities prescribed in the BC&M Plans, several meetings with all stakeholders must be held regularly at all stages of the project's life-cycle, and a detailed log of such meetings and deliberations/decisions taken therein be maintained.

Response: This aspect has been covered in detail in Section 4.8 – Awareness and capacity building.

14. Since Sikkim is a frontier Indian state sharing an international border with the People's Republic of China, there is a large presence of uniformed security personnel almost everywhere. Sikkim is also a place of high tourism activity. Combined together, the region suffers from a lack of sufficient solid-waste management system and a general lack of awareness regarding the same, resulting in visitors and even uniformed personnel throwing away single-use plastic and other wastes in wildlife habitats. Since the planned roads are primarily meant to facilitate movement of armed personnel and possibly for civilian use as well, it is extremely important that all measures for solid-waste management and prevention of garbage disposal into wildlife habitats are to be included in the BC&M Plans.

Response: Solid waste management has been covered in Section 4.5 - Reducing predation of wildlife from feral/free ranging dogs in detail. Also, Section 4.8 delves into the activities proposed for building awareness amongst the stakeholders.

15. A comprehensive Biodiversity Research and Monitoring programme covering all aspects such as wild flora and fauna occurrence (distribution, diversity and density), human-wildlife interactions, conservation issues and challenges etc. to plug existing knowledge gaps and to generate wildlife-specific information for the region.

Response: This has been included in Section 4.9 – Strengthening Research and Knowledge Management in detail.

16. A chapter on fire management with identification of fire-prone zones within the impact landscape, and provisioning for adequate manpower and infrastructure as part of BC&M Plans may be added, as needed.

Response: This has been included in Section 4.3 – Strengthening Forest Protection in detail.

17. Wildlife signage at regular intervals (at least one every 500 m) all along the planned roads indicating right of way for wildlife must be put up, and especially at locations with observed frequent wildlife crossings and occurrence. At such locations, speed-breakers and rumble strips must be constructed to help reduce vehicle speed and minimise the probability of accidental wildlife collisions.

Response: This has been included in Section 4.3 – Strengthening Forest Protection in detail.

III. WII specific comments and suggestions considering conservation issues in the landscape

To understand the landscape-specific context and wildlife/biodiversity conservation issues, a rapid visit by a WII team was conducted during September 12-22, 2022. During the visit, the team met with relevant forest department officials and conducted joint rapid field inspections of areas where road-upgradation/construction is planned. To understand any technical difficulties and considerations of constructing high-altitude roads, the team also interacted with concerned user agencies – Border Roads Organisation (BRO) and Central Public Works Department (CPWD). The following comments are derived from learnings and interactions from the field visit.

1. The Toong-Partem-Tamze Road is a greenfield road of length 84.42 km proposed through a densely forested landscape in Toong RF (Mangan Range), within a large altitudinal range of 1300 m – 4600 m above mean sea level (msl) requiring the diversion of 141.124 hectares of forestland. Toong RF and adjoining areas in East and North Sikkim districts have recorded the confirmed presence and movement of tigers (camera-trapped images) as recently as in 2019. Hence, the construction of a greenfield road through such a dense landscape necessitates the UA scrupulously following and the Forest & Environment Department (FED), Govt. of Sikkim strictly enforcing all existing forest and wildlife rules, laws and guidelines, and the careful planning animal passage plans i.e structural mitigation measures such as overpasses, underpasses, culverts etc at suitable place in consultation with forest department officials.

Response: The site specific wildlife passage plan has been prepared and is detailed in Section 7 and Annexure-III.

2. Since almost all existing roads in the North Sikkim landscape are being either upgraded/widened to NHDL specification or being newly built, it is necessary that a Regional Transportation Plan jointly prepared by ministries overseeing road construction activities such as the Ministry of Defence, Ministry of Housing & Urban Affairs, Ministry of Road Transport & Highways and the Roads & Bridges Department, Govt. of Sikkim is submitted to the FED, Govt. of Sikkim. Such a Plan must clearly demonstrate and depict all road-building/widening activities that are planned for North Sikkim in the foreseeable future (at least 10 years). This will enable that a clear and comprehensive perspective on all linear infrastructure is available to the FED, Govt. of Sikkim, and a cumulative impact assessment study on wildlife and forests of this biodiversity-rich region due to such a massive road-building exercise be planned and executed. This will avoid a piecemeal approach where individual road-building/widening projects are appraised without any cumulative impact assessment, thereby endangering the long-term ecological security and biodiversity of the region. A thoroughly researched 'Integrated Wildlife Action Plan' (IWAP) for the region/district comprising of structural and non-structural impact mitigation and compensation measures geared towards wildlife, forest and natural/cultural heritage conservation in the region needs to be compiled through careful biodiversity and socio-economic studies. Some of the research programs that could be initiated are as follows.
 - i. Population Status, Breeding Ecology, Ranging Patterns of Black-necked Crane *Grus nigricollis* with particular emphasis on their conservation aspects in North Sikkim.
 - ii. Ecological and genetic assessment of the Southern Kiang *Equus kiang polyodon*, Tibetan gazelle *Procapra picticaudata*, Tibetan argali *Ovis ammon* and Himalayan marmot *Marmota himalayana* and their conservation in the high-altitude areas of North Sikkim.
 - iii. Population assessment/monitoring and disease prevalence among mountain ungulates in North Sikkim.
 - iv. Assessing high-altitude lakes and rivers of North Sikkim for their biodiversity values with particular reference to breeding avifauna.
 - v. Effect of increasing border infrastructure and defence camp practices on wildlife with special emphasis on free-ranging dog population ecology, management and zoonosis.
 - vi. Cumulative Impact Study within the Landscape Impact Zone of planned/ongoing road infrastructure on wildlife and habitats in North Sikkim, emphasising conservation and mitigation measures.

Response: These studies has been included as a part of Section 4.9.2 where studies with WII and WWF are proposed. Development of a biodiversity conservation plan for the cold desert region of Sikkim has also been included so that a perspective approach can be adopted for the long term conservation of this landscape.

3. Almost all the planned road-construction activities in the region requiring the diversion of vast areas of forestland are being justified and their clearances prioritised on the basis of defence and national security needs. Hence, it is crucial that, as much as possible, the usage of roads be kept exclusively for defence purposes. Even when being used for defence purposes, movement of vehicles outside daylight hours must be discouraged during peacetime to enable unimpeded animal movement and avoid accidental road collisions of wildlife. An undertaking in this regard from the highest responsible officials must be obtained from the user agency and the end users.

Response: This is a policy issue, and the state government will be briefed about this for initiating appropriate policy measures.

4. During the field visit, it was observed that there is a general lack of awareness among defence personnel regarding solid waste management practices. It was also observed that significant amounts of cooked food/raw materials is wasted on a daily basis, which is then left for dogs to scavenge. Some armed personnel camps (ITBP/Army/BRO etc.) have huge packs of free-ranging dogs that hang around and gain nutrition from such leftover and excess food. Free-ranging ‘ownerless’ dogs incur huge costs on native wildlife through predation, competition, hybridisation and elevating disease transmission risks. Hence, certain best practices of solid waste and food management need to be compiled and strictly implemented within and around these camps as well as by the personnel themselves. Relevant rules and guidelines governing the issue of waste management need to be implemented and fully complied with by all agencies and their personnel operating in the region. Additionally, a ‘Free-Ranging Dog Population Monitoring & Management’ Plan needs to be formulated and implemented as part of either BC&M Plans or in an IWAP, in order to ameliorate threats to wildlife from an increasing free-ranging dog population in the region. All necessary infrastructure and manpower required to manage the free-ranging dog issue needs to be budgeted for in the above Plans, in consultation with the FED and Department of Animal Husbandry & Veterinary Services, Govt. of Sikkim.

Response: Reducing predation of wildlife from feral/free ranging dogs has been included in Section 4.5 in detail. While Section 4.8 delves into the activities proposed for building awareness amongst the stakeholders.

5. Establishment of a full-fledged ‘High Altitude Research Station’ (HARS) with necessary infrastructure suitable to accommodate at least ten (10) researchers at either of Lachen or Thangu might encourage and support year-round and continuous wildlife research activities in Sikkim’s biodiversity-rich high-altitude regions. The Research Station’s architecture and design may be modelled on the main building of the Himalayan Institute of Alternatives, Ladakh (HIAL) with necessary modifications. The HARS may also serve as a hub to help better monitor high-altitude wildlife of the region.

Response: Establishing high altitude infrastructure has been included in Section 4.4 - Strengthening Protection Infrastructure, where a Cold Desert Biodiversity Monitoring Stations (CDBMS) is proposed jointly with HIAL.

6. Since the submitted road proposals are through mountainous terrain requiring regular and heavy blasting and drilling through rocks, it must be ensured that these activities are not conducted during the breeding period of birds such as the Black-necked Crane and other threatened wildlife in the region. Such non-construction period must be carefully prescribed by the FED and fully complied by the user agencies.

Response: This direction will be conveyed to the user agencies.

7. Since relevant wildlife distribution and movement data are not currently available, it is crucial that all suggested biodiversity research studies are immediately initiated. It is also recommended that an undertaking by the user agencies be taken regarding the future installation and construction of all suggested structural mitigation measures derived from the results and recommendations of the impact assessment/biodiversity studies notwithstanding the cost or engineering modifications involved.

Response: This undertaking from the user agencies will be taken.

Annexure-IV: Siting and design of the bridges and culverts



भारत सरकार Government of India
केन्द्रीय लोक निर्माण विभाग Central Public Works Department
कार्यालयकार्यपालक अभियंता O/o Executive Engineer
सीमासड़कपरियोजना गंडल-I Border Road Project Division-I
एस टी लामा बिल्डिंग, तीसरी मंजिल S. T. Lama Building, 3rd Floor
चुंगथांग, उत्तरसिक्किम- 737120 Chungthang, North Sikkim - 737120.
E-MAIL: chueeccd1.cpwd@nic.in



संख्या: 23(7)/Forest/EE/BRPD-I/NS/2023/ 35 (H)

दिनांक: 17.02.2023

सेवा में,

✓ APCCF -cum-Nodal Officer, FCA
Forest and Environmental Department,
Forest Secretariat, Deorali,
Gangtok-737102.
Email: fca_sikkim@gmail.com

विषय: Diversion of 19.36 Ha of Forest land for c/o ITBP Ph-II road from Muguthang to 20r link pt. under Lachen(T) Range in Mangan District of Sikkim by CPWD.
Reg- Review of Biodiversity Conservation and Management Plans in lieu of road-construction forest diversion proposal towards providing specific suggestions.

संदर्भ: (i) आपके कार्यालय के पत्र सं. 11/FCA/F&ED/2022/341 दिनांक: 02.11.2022
(ii) T.O. even letter no. 316(H) Dated: 06.12.2022

महोदय,

A review meeting was held on 09.02.2023 for preparation of Biodiversity Conservation and Management Plans in lieu of road-construction forest diversion. The following documents are further required to be submitted for preparation of Biodiversity Conservation and Management Plans as decided in the meeting:

- I) Location of culverts along with GPS co-ordinates,
- II) Design drawing of culvert,
- III) Alignment map showing culvert location
- IV) Undertaking for Animal Passage Plan.

It is mention that, the project of construction of road along Indo China Border for ITBP under Ph-II is important from strategic point of view. These roads provide passage to border guiding forces to reach up to end point. The forest clearance of these roads is closely monitored at highest level in PMO office.

It is therefore requested to issue In-principle approval and Demand note at the earliest.

सलभक: As above.


(राकिश कुमार जैन)
कार्यपालक अभियंता

प्रतिलिपि :

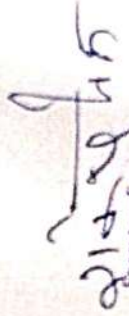
1. अधीक्षण अभियंता, सीमा सड़क परियोजना परिमंडल, के०लो०नि०वि०, मंगन, उत्तर सिक्किम – 737116 सूचनार्थ हेतु।

कार्यपालक अभियंता

ANNEXURE – 1 – DETAILS & PARTICULARS OF DATA REQUESTED FROM SIKKIM FED AND PROJECT PROPONENTS

Sub: Diversion of 19.36 Ha of Forest land for c/o ITBP Ph-II road from Muguthang to 20r link pt. under Lachen(T) Range in Mangan District of Sikkim by CPWD.


Sr. No.	PA/ Division / RF/PF/Region	Data particulars	Preferred format	Note	Alternative format	Source	Reply BY CPWD
13.	Chainage-wise line diagrams of the four (04) road construction proposals against terrain	High -res diagram file	PDF/ any other	The diagram must preferably be for every one 901) or every few kilometers for easy interpretation, and must contain locations of proposed culverts and /or other planned wildlife passages.		CPWD	On an average Culvert will be provided in every 500 meter interval of road and Chainage wise Line diagram is attached in Annexure-A
14.	Locations and other details of planned culverts and / or other wildlife passages.		Excel spreadsheet	All planned culverts/water passage /wildlife crossing structures with their chainage-wise locations, latitude, longitude, type, design details, material to be used, specifications (length * width * height), along with all other important details must be mentioned in separate well-labelled columns.		CPWD	Location of culverts & bridges along with GPS co-ordinates are attached in Annexure-B
15.	Detailed Project Reports of the four (04) roads construction		Word/PFD	If not for the entire project, all general and specific details of the proposals passing through forestland must be provided.		CPWD	DPR is attached in Annexure-C

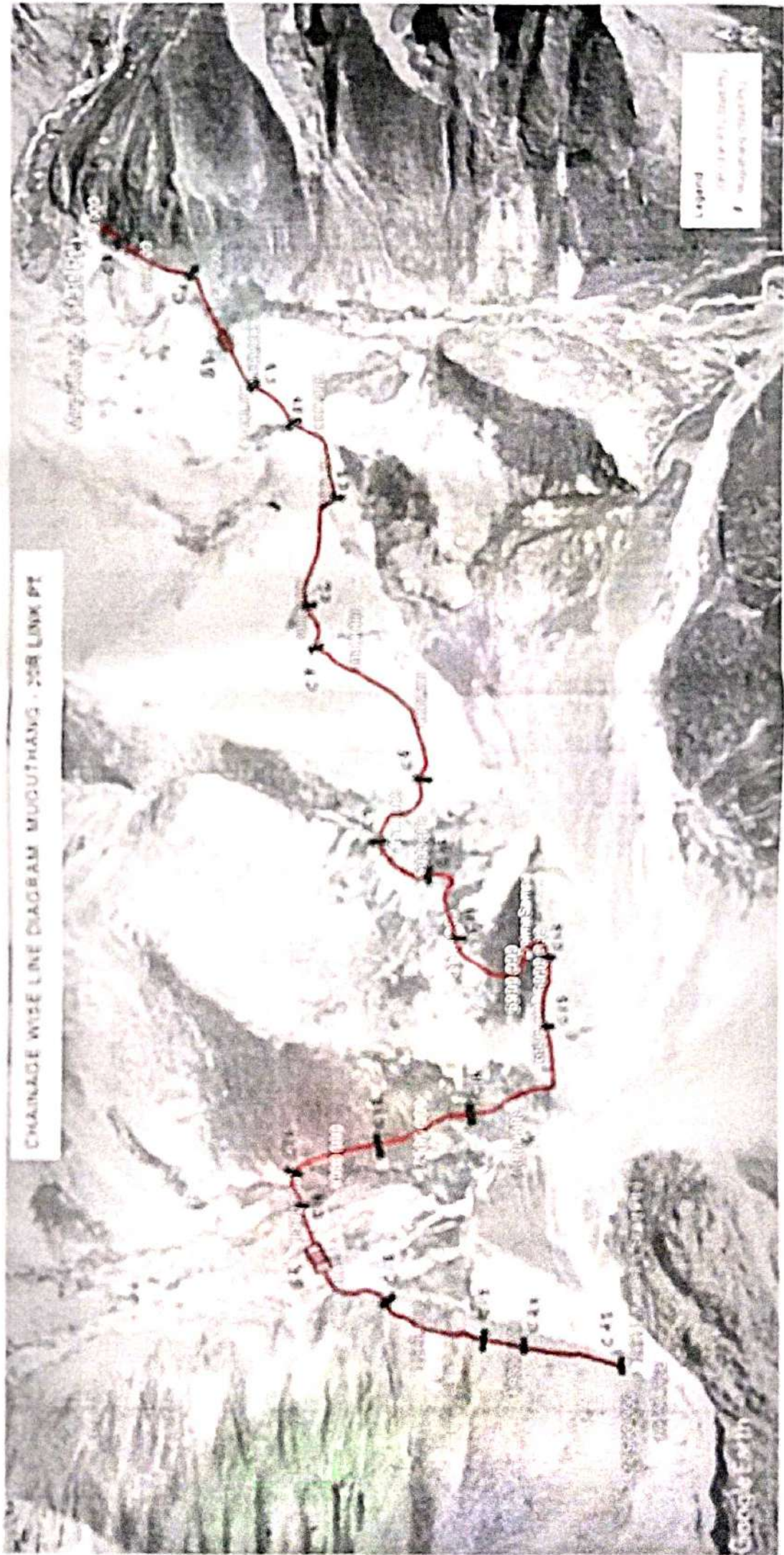

 Executive Engineer
 HRPD-L, CPWD, Chungthang
 North Sikkim

ANNEXURE-2: SAMPLE LIST OF ACTIVITIES/INTERVENTIONS BY THE USER AGENCY/ PROJECT PROPONENTS

Sub: Diversion of 19.36 Ha of Forest land for c/o ITBP Ph-II road from Muguthang to 20r link pt. under Lachen(T) Range in Mangan District of Sikkim by CPWD.

Sl. No.	Activity	Remarks	EE/BRPD-I reply
1.	2	3	4
A.	STRENGTHING OF INFRASTRUCTURE FOR WILDLIFE CONSERVATION		
1.	Underpass/ overpass/ culverts /other structural mitigation structures along / near proposed alignment in accordance with WH and other national and international guidelines to facilitate elephant / wildlife movement.	Exact numbers, specifications and locations will be detailed in the final IWAP after a comprehensive biodiversity assessment.	Culverts = 20 no.s & Bridge= 02 no.s
2.	Sound proof fences on both sides of railway track all along the alignment	Specification etc. will be decided in consultation with DFO, Wildlife Division after a comprehensive biodiversity assessment as part of the IWAP.	Since the proposal is defense road project, The sound proof fences are not applicable.
3.	Provision for tunneling of underpass/ overpasses / other structural mitigation measures	Same as above.	Not Applicable.
4.	Turfing in high embankment and construction of guide bounds in all major streams and rivers, for soil moisture conservation and to prevent erosion of soil.		Since the road is constructed in hilly area, so the provision of Turfing is not applicable.
5.	Installation of Solar Street light in villages close to the railway alignment (either side) prone to human-wildlife negative interactions		There will be no traffic movement at night, only limited vehicles of ITBP/Army will pass at day light, so the provision of solar street light is not applicable.
13.	Installation of Speed limit monitoring devices & their annual maintenance at high animal use locations/ mitigation structures and other places, with a control unit at "Research & Wildlife Monitoring Cell"		The proposed road is of linear project for Defense purpose, so the provision of speed limit monitoring device is not considered in the project. However Signage board of Speed limit will be provided along the road in regular interval.
B.	WILDLIFE AWARENESS & TRAINING		
15.	Appropriate signages on both side of the alignment/track		
a)	Signages with speed limit at regular intervals		Yes, The provision is considered in the project.
b)	Signages / Hoardings related to conservation at DFCCIL, working place, station, cabins etc. and at identified elephant habitats (if any)		Yes, The provision is considered in the project.
c)	Signages with awareness and warning for wildlife as per DFOs suggestions		Yes, The provision is considered in the project.


Executive Engineer
 BRPD-I, CPWD, Chungthang
 North Sikkim



Signature
Executive Engineer
RRTD, PWD, Chungking
North India

Details Location of Culvert for proposed road from Muguthang - 20r Link point Road (10.70 K.M.)

Sl. No.	Chainage	Location	Design Detail	Specification			GPS Coordinates		Remarks
				Length (meter)	Width (meter)	Height (Meter)	Northing	Easting	
1	250	Muguthang	RRM/RCC Slab Culvert	3.00	7.50	2.50	27°54'17.66"N	88°25'18.68"E	
2	750	Muguthang	RRM/RCC Slab Culvert	3.00	7.50	2.50	27°54'3.81"N	88°25'10.08"E	
3	1500	Muguthang	RRM/RCC Slab Culvert	3.00	7.50	2.50	27°53'51.34"N	88°24'47.10"E	
4	1800	Muguthang	RRM/RCC Slab Culvert	3.00	7.50	2.50	27°53'44.07"N	88°24'40.13"E	
5	2450	Muguthang	RRM/RCC Slab Culvert	3.00	7.50	2.50	27°53'37.50"N	88°24'21.68"E	
6	3000	Muguthang	RRM/RCC Slab Culvert	3.00	7.50	2.50	27°53'39.43"N	88°24'4.12"E	
7	3250	Muguthang	RRM/RCC Slab Culvert	3.00	7.50	2.50	27°53'37.76"N	88°23'56.12"E	
8	4250	Muguthang	RRM/RCC Slab Culvert	3.00	7.50	2.50	27°53'18.09"N	88°23'31.70"E	
9	4750	Muguthang	RRM/RCC Slab Culvert	3.00	7.50	2.50	27°53'24.50"N	88°23'17.96"E	
10	5000	Muguthang	RRM/RCC Slab Culvert	3.00	7.50	2.50	27°53'17.66"N	88°23'13.00"E	
11	5500	Muguthang	RRM/RCC Slab Culvert	3.00	7.50	2.50	27°53'11.39"N	88°23'2.80"E	
12	6000	Muguthang	RRM/RCC Slab Culvert	3.00	7.50	2.50	27°53'0.38"N	88°22'59.29"E	
13	6500	Muguthang	RRM/RCC Slab Culvert	3.00	7.50	2.50	27°52'56.84"N	88°22'48.97"E	
14	7250	Muguthang	RRM/RCC Slab Culvert	3.00	7.50	2.50	27°53'9.10"N	88°22'31.72"E	
15	7750	Muguthang	RRM/RCC Slab Culvert	3.00	7.50	2.50	27°53'23.99"N	88°22'24.30"E	
16	8350	Muguthang	RRM/RCC Slab Culvert	3.00	7.50	2.50	27°53'38.81"N	88°22'18.01"E	
17	8500	Muguthang	RRM/RCC Slab Culvert	3.00	7.50	2.50	27°53'39.27"N	88°22'10.70"E	
18	9300	Muguthang	RRM/RCC Slab Culvert	3.00	7.50	2.50	27°53'23.53"N	88°21'56.13"E	
19	9750	Muguthang	RRM/RCC Slab Culvert	3.00	7.50	2.50	27°53'8.94"N	88°21'52.70"E	
20	10000	Muguthang	RRM/RCC Slab Culvert	3.00	7.50	2.50	27°53'0.91"N	88°21'52.74"E	
21	10500	Muguthang	RRM/RCC Slab Culvert	3.00	7.50	2.50	27°52'45.02"N	88°21'52.98"E	

Details Location of Bridge for proposed road from Muguthang - 20r Link point Road (10.70 K.M.)

Sl. No.	Chainage	Location	Design Detail	Specification			GPS Coordinates		Remarks
				Length (meter)	Width (meter)	Height (Meter)	Northing	Easting	
1	1125	Muguthang	RCC Bridge	40.00	12000.00	6.00	27°53'57.62"N	88°24'58.59"E	
2	8850	Muguthang	RCC Bridge	40.00	12000.00	6.00	27°53'36.04"N	88°22'2.29"E	



Executive Engineer

BRPD-I, CPWD, Chungthang

Executive Engineer

BRPD-I, CPWD, Chungthang

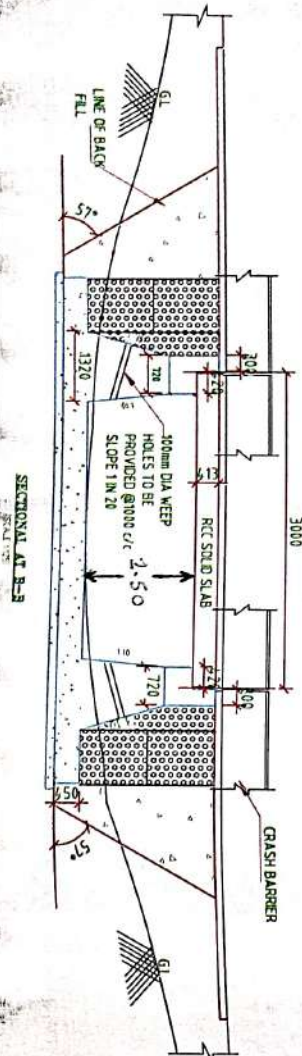
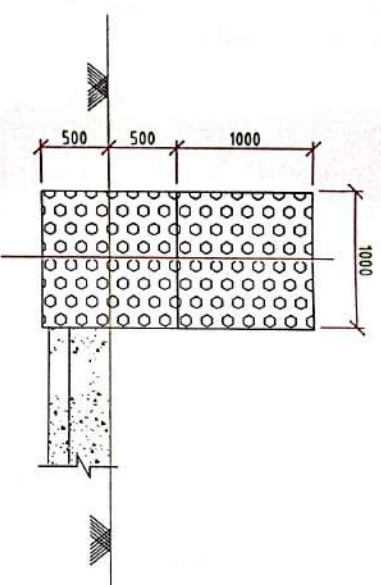
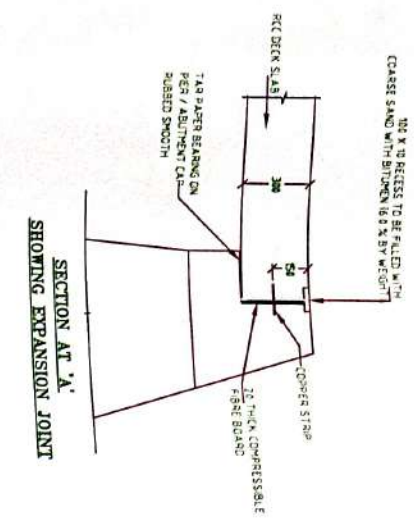
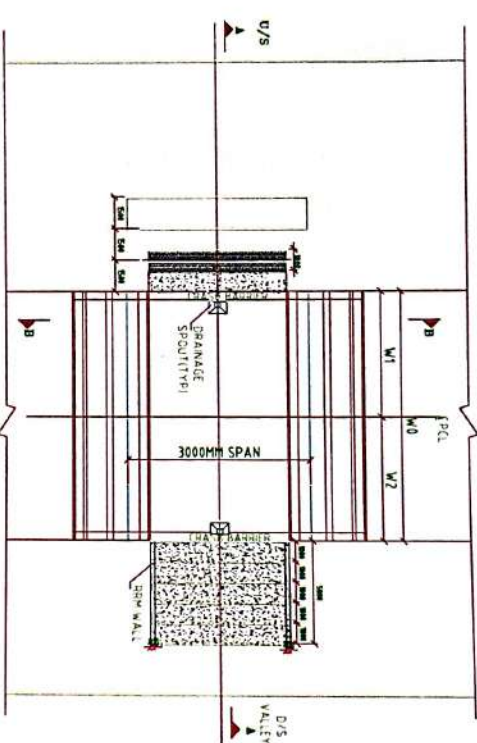
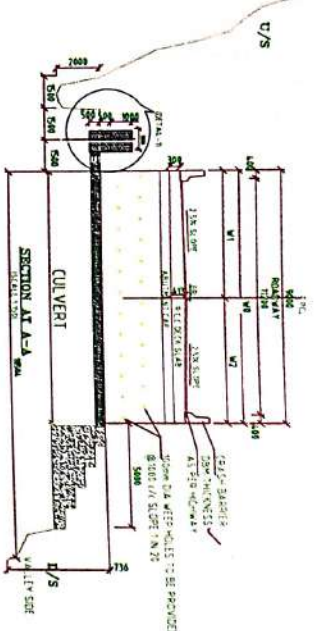
North Sikkim

UNDERTAKING FOR ANIMAL PASSAGE PLAN

This is to certify that for Diversion of forest land for construction of ITBP Phase-II road from Muguthang to 20r link point L=10.70 km, The Animal Passage Plan is submitted as per the site requirement in form of Box Culvert at a frequency of 2 nos. per km of length. We also undertake, if need be in future that any other requirements for safe passage of animal. Then design may be implemented as per the guidelines and requirements of Department of Forest & Environment, Govt. of Sikkim.



Executive Engineer
BRPD-I, CPWD,
Chungthang, N. Sikkim.
Executive Engineer
BRPD-I, CPWD, Chungthang
North Sikkim



TCS-17

NOTES:-
1. ALL DIMENSIONS ARE IN MM AND LEVELS ARE IN METRE UNLESS OTHERWISE SPECIFIED.

TITLE
GENERAL ARRANGEMENT
DRAWING FOR
SLAB CULVERTS
1X3m

L.N. MALVIYA INFRA PROJECTS PVT. LTD.
Head Office : T-10 3rd Floor city center zone 1,
M.P. Nagar Bhopal 462011
Ph: 07551-4258317
E-mail: lnmalviya@rediffmail.com

Corporate Office : Plot No. 31, 2nd Floor, Behind HDFC Bank,
Dwarka Sector 12A,
New Delhi-110075.
E-mail: lnmalviya@gmail.com

Website: www.lninfra.com

DESIGNED BY	M.S.	DESIGN BY	APPROVED BY



REVISION - 0	NOVEMBER - 2017	SIZE - A1	SHEET NO. 17
NAME OF WORK	CONSULTANCY SERVICES FOR PREPARATION OF DETAILED PROJECT REPORT TO IMPLEMENT HIGH RISE BRIDGE PROJECT IN THE STATE OF BIHAR USING STATE-LEVEL INNOVATION.		

- NOTES:
1. ALL DIMENSIONS ARE IN MM AND LEVELS IN METRES UNLESS OTHERWISE MENTIONED. ONLY WRITTEN DIMENSIONS ARE TO BE FOLLOWED. NO DIMENSION IS TO BE SCALED.
 2. PROPOSED CULVERT IS DESIGNED FOR ONE LANE OF R/C TRUCK LOADING ON TWO LANE OF R/C CLASS A WHOEVER GOVERNS.
 3. MINIMUM GRADE OF CONCRETE SHALL BE AS FOLLOWS:
a) FOR FOUNDATION & SUBSTRUCTURE - M30
b) FOR SUPERSTRUCTURE - M25
c) FOR SUBSTRUCTURE - M20
 4. CLEAR COVER TO OUTER MOST STEEL SHALL BE AS FOLLOWS:
a) FOR SUPERSTRUCTURE - 40mm
b) FOR SUBSTRUCTURE - 50mm
c) FOR FOUNDATION - 75mm
 5. HIGH YIELD STRENGTH DEFORMED BARS OF GRADE DESIGNATION Fe-500 CONFORMING TO IS 786 SHALL ONLY BE USED.
 6. BACK FILLING BEHIND ABUTMENTS & RETURN WALLS SHALL CONSIST OF SELECTED EARTH CONFORMING TO APPENDIX 6 OF IRC 78-2000 HAVING PROPERTIES OF $d_{20} \leq 0.42 \phi$, $d_{40} \leq 0.3 \phi$, $d_{60} \leq 0.25 \phi$.
 7. 60mm THICK FILTER MEDIA SHALL BE PROVIDED BEHIND ABUTMENT AND RETURN WALLS AS PER NORTH SPECIFICATIONS SECTION 350A.
 8. WEIR HOLES, OF 100mm ϕ SPACED AT 900mm C/C BOTH HORIZONTALLY AND VERTICALLY SHALL BE PROVIDED IN A STAGGERED MANNER IN ABUTMENT & RETURN WALLS ABOVE 1500mm FROM L.M. OR G.L. WHOEVER IS HIGHER.
 9. FILLER TYPE EXPANSION JOINTS OF PROVEN QUALITY SHALL BE PROVIDED IN TERMS OF MODIFIED INTERIM SPECIFICATIONS IN ANNEXURE-1 TO NORTH CIRCULAR No. R/M/MP-34059/196-SAR DATED 30.11.2004. THE MATERIAL SPECIFICATIONS OF THE FILLER JOINTS SHALL BE IN ACCORDANCE WITH SECTION 2465 OF NORTH SPECIFICATIONS, FOURTH REVISION.
 10. NOMINAL STEEL OR TEMPERATURE REINFORCEMENT OF TOR @ 150 MM C/C IN BOTH DIRECTIONS IN ABUTMENT & RETURNS ON ALL FACES SHALL BE PROVIDED.
 11. SAFETY BARRIERS OR BARRICADES SHALL BE PROVIDED AS SAFETY FOR TRAFFIC MOVEMENT DURING WIDENING OF SLAB CULVERT.



भारत सरकार Government of India
केन्द्रीय लोक निर्माण विभाग Central Public Works Department
कार्यालयकार्यपालक अभियंता O/o Executive Engineer
सीमासड़कपरियोजना मंडल-I Border Road Project Division-I
एस० टी० लामा बिल्डिंग, तीसरी मंजिल S. T. Lama Building, 3rd Floor
चुंगथांग, उत्तरसिक्किम- 737120 Chungthang, North Sikkim - 737120.
E-MAIL: chueeccd1.cpwd@nic.in



संख्या: 23(7)/Fores/EE/BRPD-I/NS/2023/36(F)

दिनांक: 17.02.2023

सेवा में,

✓ APCCF –cum-Nodal Officer, FCA
Forest and Environmental Department,
Forest Secretariat, Deorai,
Gangtok-737102.
Email: fca.sikkim@gmail.com

विषय: Diversion of 4.86 Ha of Forest land for c/o ITBP Ph-II road from 20r link pt. to 20r Goma along the Indo China Border passing through Kanchendzonga National Park (KNP) in Mangan District of Sikkim by CPWD. **Reg-Review of Biodiversity Conservation and Management Plans In lieu of road-construction forest diversion proposal towards providing specific suggestions.**

संदर्भ: आपके कार्यालय के पत्र सं. 11/FCA/F&ED/2022/341 दिनांक: 02.11.2022

महोदय,

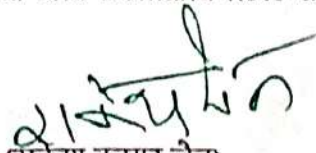
A review meeting was held on 09.02.2023 for preparation of Biodiversity Conservation and Management Plans in lieu of road-construction forest diversion. The following documents are further required to be submitted for preparation of Biodiversity Conservation and Management Plans as decided in the meeting:

- I) Location of culverts along with GPS co-ordinates,
- II) Design drawing of culvert,
- III) Alignment map showing culvert location
- IV) Undertaking for Animal Passage Plan.

It is mention that, the project of construction of road along Indo China Border for ITBP under Ph-II is important from strategic point of view. These roads provide passage to border guiding forces to reach up to end point. The forest clearance of these roads is closely monitored at highest level in PMO office.


It is therefore requested to issue In-principle approval and Demand note at the earliest.

सलग्रक: As above.


(रकेश कुमार जैन)
कार्यपालक अभियंता

प्रतिलिपि :

1. अधीक्षण अभियंता, सीमा सड़क परियोजना परिमंडल, के०लो०नि०वि०, मंगन, उत्तर सिक्किम – 737116 सूचनार्थ हेतु।


कार्यपालक अभियंता

ANNEXURE – 1 – DETAILS & PARTICULARS OF DATA REQUESTED FROM SIKKIM FED AND PROJECT PROPONENTS

Sub: Diversion of 4.86 Ha of Forest land for c/o ITBP Ph-II road from 20r link pt. to 20r Goma along the Indo China Border passing through Kanchendzonga National Park (KNP) in Mangan District of Sikkim by CPWD.

Sr. No.	PA/ Division / RF/PF/Region	Data particulars	Preferred format	Note	Alternative format	Source	Reply BY CPWD
13.	Chainage-wise line diagrams of the four (04) road construction proposals against terrain	High-res diagram file	PDF/ any other	The diagram must preferably be for every one 901) or every few kilometers for easy interpretation, and must contain locations of proposed culverts and /or other planned wildlife passages.		CPWD	On an average Culvert will be provided in every 500 meter interval of road and Chainage wise Line diagram is attached in Annexure-A
14.	Locations and other details of planned culverts and / or other wildlife passages.		Excel spreadsheet	All planned culverts/water passage /wildlife crossing structures with their chainage-wise locations, latitude, longitude, type, design details, material to be used, specifications (length * width * height), along with all other important details must be mentioned in separate well-labelled columns.		CPWD	Location of culverst & bridges are attached in Annexure-B
15.	Detailed Project Reports of the four (04) roads construction		Word/PFD	If not for the entire project, all general and specific details of the proposals passing through forestland must be provided.		CPWD	DPR is attached in Annexure-C

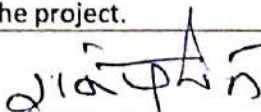
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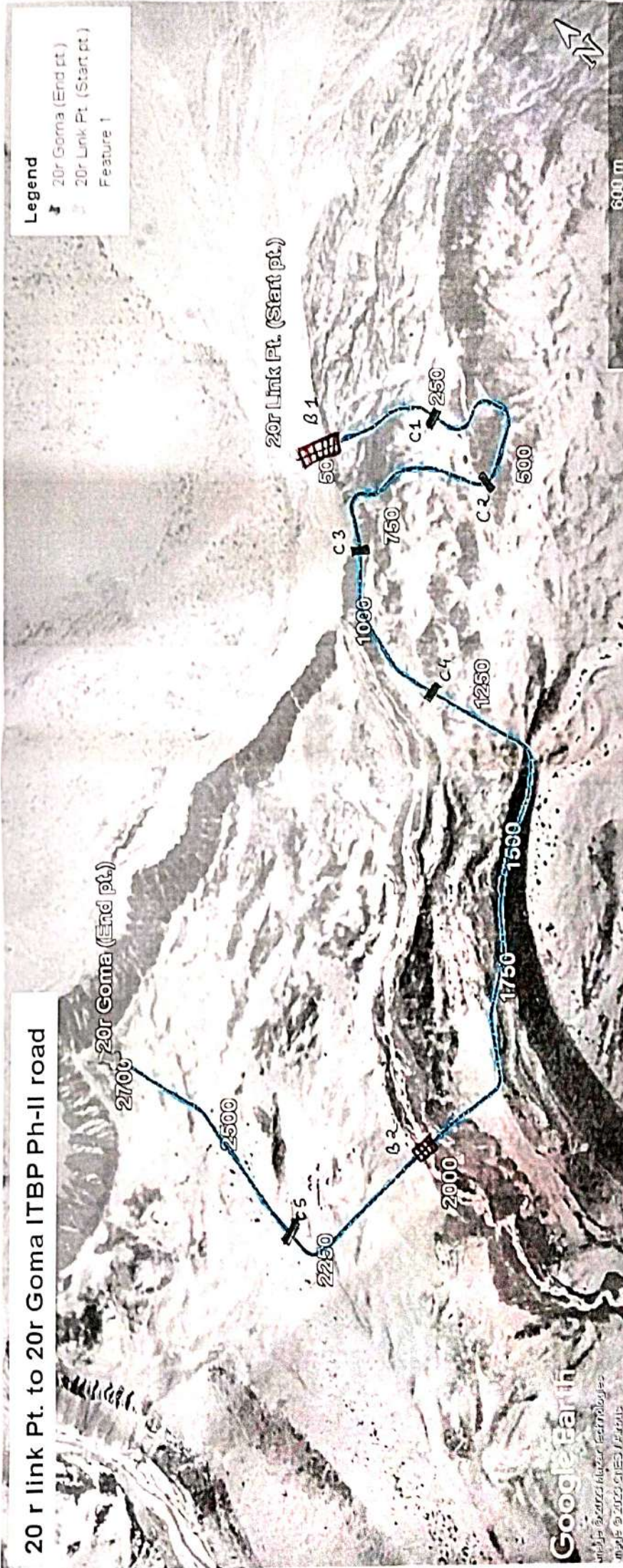
Executive Engineer
BRPD-I, CPWD, Chungthang
North Sikkim

ANNEXURE-2: SAMPLE LIST OF ACTIVITIES/INTERVENTIONS BY THE USER AGENCY/ PROJECT PROPONENTS

Sub: Diversion of 4.86 Ha of Forest land for c/o ITBP Ph-II road from 20r link pt. to 20r Goma along the Indo China Border passing through Kanchendzonga National Park (KNP) in Mangan District of Sikkim by CPWD.

Sl. No.	Activity	Remarks	EE/BRPD-I reply
1.	2	3	4
A.	STRENGTHING OF INFRASTRUCTURE FOR WILDLIFE CONSERVATION		
1.	Underpass/ overpass/ culverts /other structural mitigation structures along / near proposed alignment in accordance with WH and other national and international guidelines to facilitate elephant / wildlife movement.	Exact numbers, specifications and locations will be detailed in the final IWAP after a comprehensive biodiversity assessment.	Culverts = 05 no.s & Bridge= 02 no.s
2.	Sound proof fences on both sides of railway track all along the alignment	Specification etc. will be decided in consultation with DFO, Wildlife Division after a comprehensive biodiversity assessment as part of the IWAP.	Since the proposal is defense road project, The sound proof fences are not applicable.
3.	Provision for tunneling of underpass/ overpasses / other structural mitigation measures	Same as above.	Not Applicable.
4.	Turfing in high embankment and construction of guide bounds in all major streams and rivers, for soil moisture conservation and to prevent erosion of soil.		Since the road is constructed in hilly area, so the provision of Turfing is not applicable.
5.	Installation of Solar Street light in villages close to the railway alignment (either side) prone to human-wildlife negative interactions		There will be no traffic movement at night, only limited vehicles of ITBP/Army will pass at day light, so the provision of solar street light is not applicable.
13.	Installation of Speed limit monitoring devices & their annual maintenance at high animal use locations/ mitigation structures and other places, with a control unit at "Research & Wildlife Monitoring Cell"		The proposed road is of linear project for Defense purpose, so the provision of speed limit monitoring device is not considered in the project. However Signage board of Speed limit will be provided along the road in regular interval.
B.	WILDLIFE AWARENESS & TRAINING		
15.	Appropriate signages on both side of the alignment/track		
a)	Signages with speed limit at regular intervals		Yes, The provision is considered in the project.
b)	Signages / Hoardings related to conservation at DFCCIL, working place, station, cabins etc. and at identified elephant habitats (if any)		Yes, The provision is considered in the project.
c)	Signages with awareness and warning for wildlife as per DFOs suggestions		Yes, The provision is considered in the project.


 Executive Engineer
 BRPD-I, CPWD, Chungthang
 North Sikkim



Signature
Executive Engineer
BRPD-I, CPWD, Chongthang
North Sikkim

Details Location of Culvert for proposed road from 2Dr Link point to Goma point Road (2.70 K.M.)

Sl. No.	Chainage	Location	Design Detail	Specification			GPS Coordinates		Remarks
				Length (meter)	Width (meter)	Height (Meter)	Northing	Easting	
1	250	Goma	RRM/RCC Slab Culvert	3.00	7.50	2.50	27°52'35.58"N	88°22'1.02"E	
2	550	Goma	RRM/RCC Slab Culvert	3.00	7.50	2.50	27°52'29.31"N	88°22'1.49"E	
3	800	Goma	RRM/RCC Slab Culvert	3.00	7.50	2.50	27°52'34.20"N	88°21'55.92"E	
4	1150	Goma	RRM/RCC Slab Culvert	3.00	7.50	2.50	27°52'26.14"N	88°21'49.67"E	
5	2300	Goma	RRM/RCC Slab Culvert	3.00	7.50	2.50	27°52'12.48"N	88°21'21.53"E	

Details Location of Bridge for proposed road from 2Dr Link point to Goma point Road (2.70 K.M.)

Sl. No.	Chainage	Location	Design Detail	Specification			GPS Coordinates		Remarks
				Length (meter)	Width (meter)	Height (Meter)	Northing	Easting	
1	50	Goma	RCC Bridge	40.00	12000.00	6.00	27°52'38.50"N	88°21'54.73"E	
2	2050	Goma	RCC Bridge	40.00	12000.00	6.00	27°52'10.76"N	88°21'30.65"E	



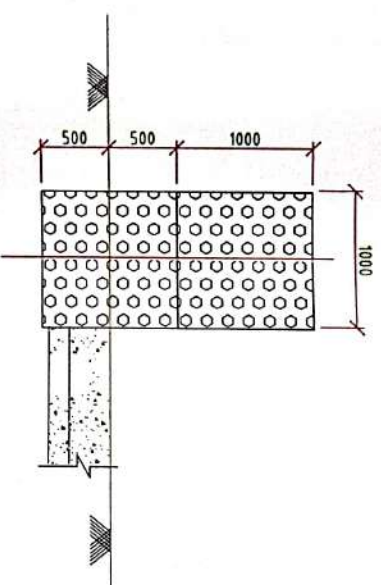
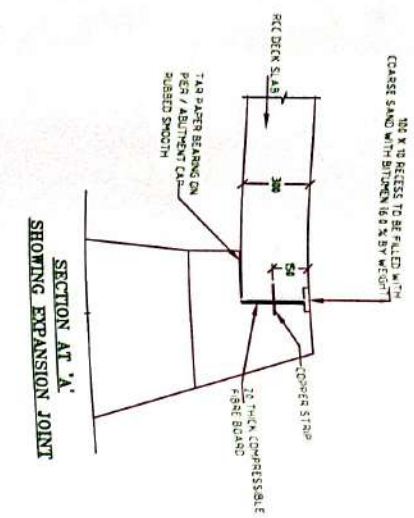
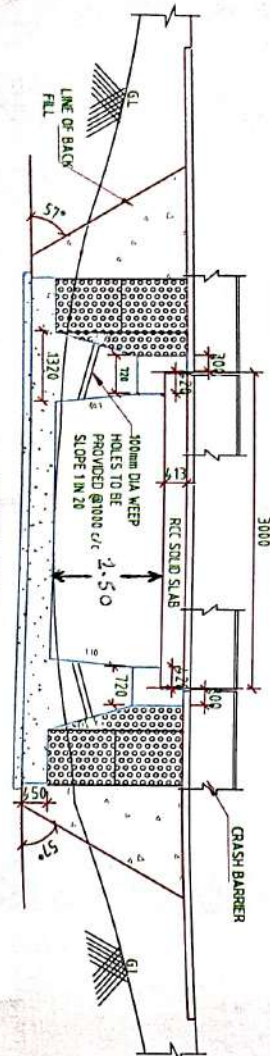
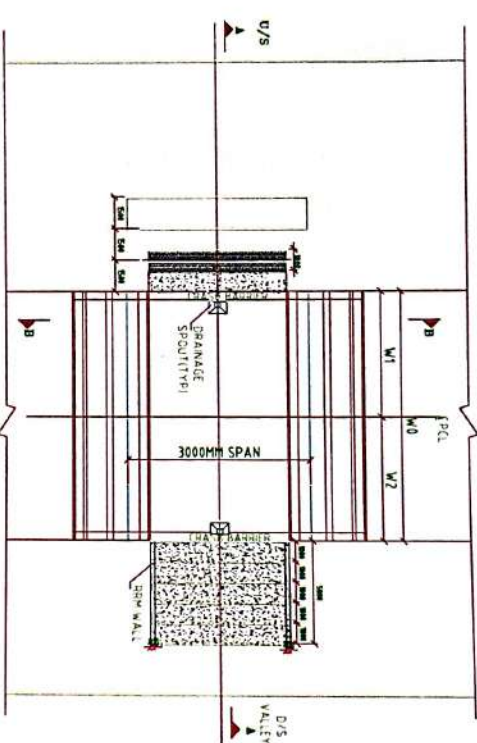
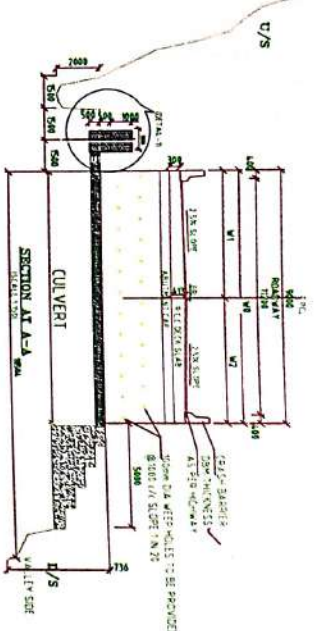
Executive Engineer
BRPD-I, CPWD, Chungthang
Executive Engineer
BRPD-I, CPWD, Chungthang
North Sikkim

UNDERTAKING FOR ANIMAL PASSAGE PLAN

This is to certify that for Diversion of forest land for construction of ITBP Phase-II road from 20r link point to 20r (Goma) L=2.70 km, The Animal Passage Plan is submitted as per the site requirement in form of Box Culvert at a frequency of 2 nos. per km of length. We also undertake, if need be in future that any other requirements for safe passage of animal. Then design may be implemented as per the guidelines and requirements of Department of Forest & Environment, Govt. of Sikkim.



Executive Engineer
BRPD-I, CPWD,
Chungthang, N. Sikkim.
Executive Engineer
BRPD-I, CPWD, Chungthang
North Sikkim



TCS-17

NOTES:-
1. ALL DIMENSIONS ARE IN MM AND LEVELS ARE IN METRE UNLESS OTHERWISE SPECIFIED.

TITLE
GENERAL ARRANGEMENT
DRAWING FOR
SLAB CULVERTS
1X3m

L.N. MALVIYA INFRA PROJECTS PVT. LTD.
Head Office : T-10 3rd Floor city center zone 1,
M.P Nagar Bhopal 462011
Ph: 0755-4258317
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Corporate Office : Plot No. 31, 2nd Floor, Behind HDFC Bank,
Dussehra 12A,
New Delhi-110075.
E-mail: lnmalviya@gmail.com

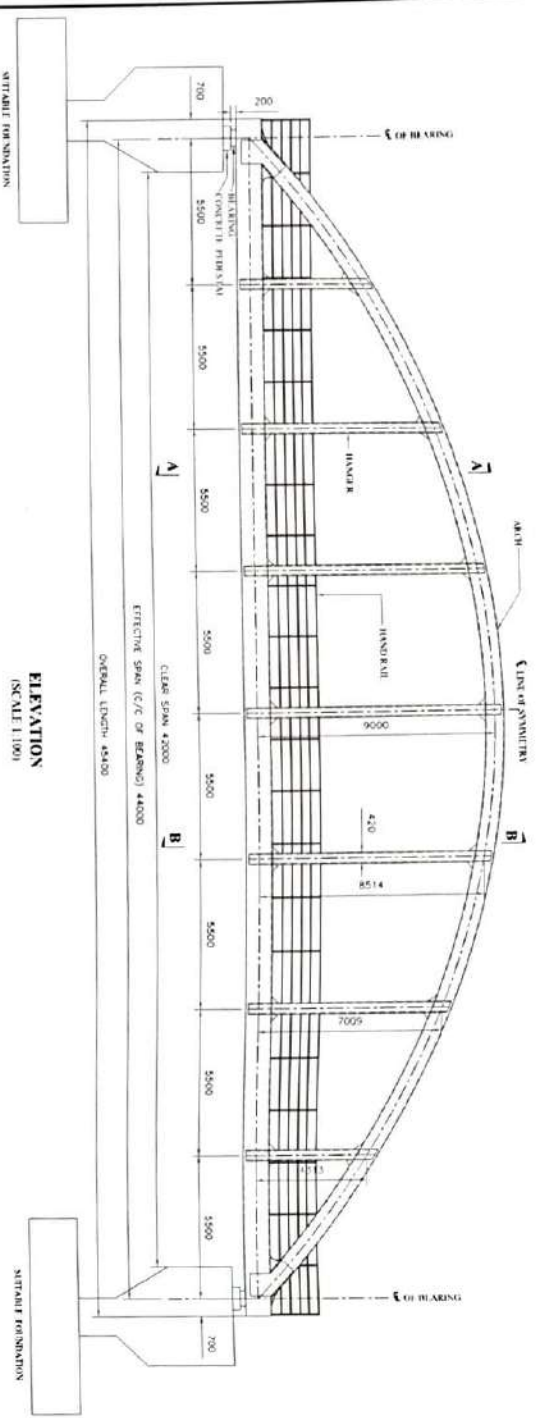
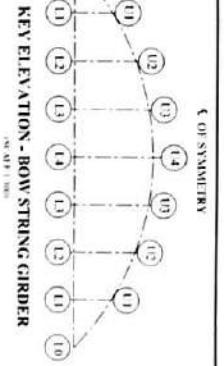
Website: www.lninfra.com

DESIGNED BY	M.S.	DESIGN BY	APPROVED BY



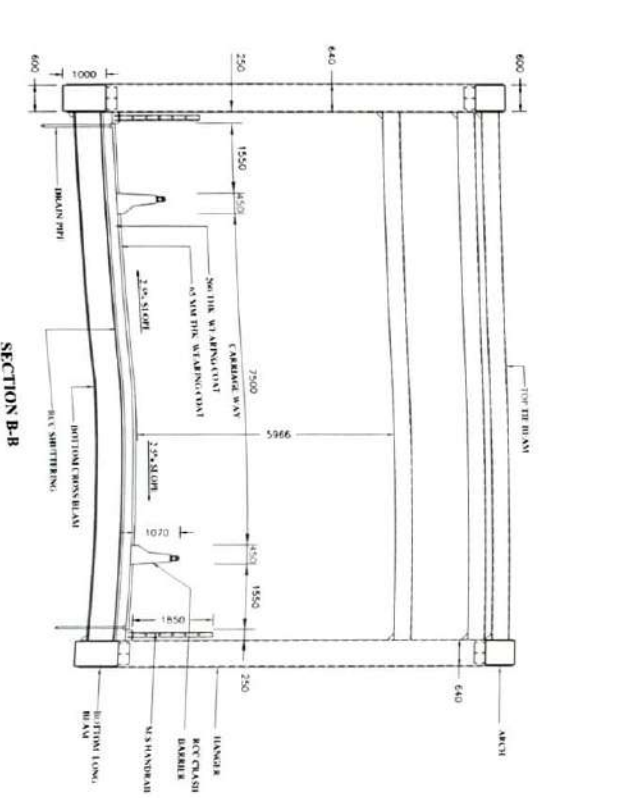
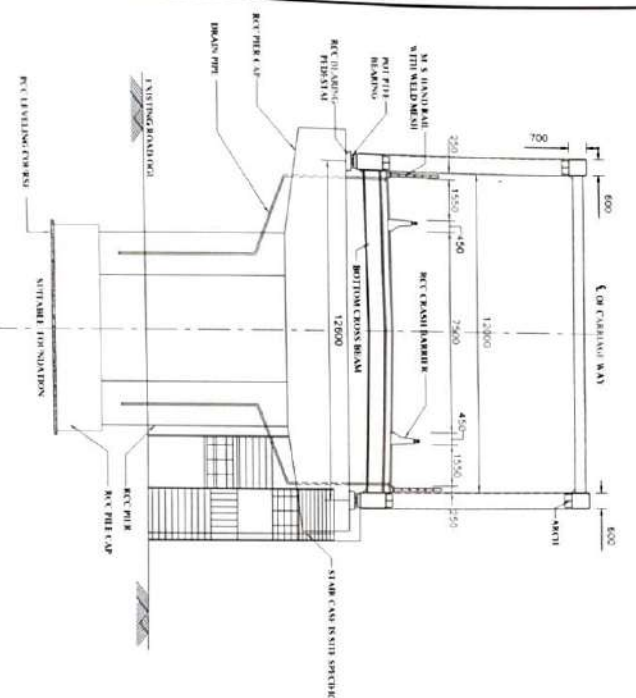
REVISION - 0	NOVEMBER - 2017	SIZE: A1	SHEET NO: 17
CONSULTANCY SERVICES FOR PREPARATION OF DETAILED PROJECT REPORT TO IMPLEMENT HIGH RISE BRIDGE PROJECT IN THE STATE OF BIHAR USING STATE-LEVEL INNOVATION.			

- NOTES:
1. ALL DIMENSIONS ARE IN MM AND LEVELS IN METRES UNLESS OTHERWISE MENTIONED. ONLY WRITTEN DIMENSIONS ARE TO BE FOLLOWED. NO DIMENSION IS TO BE SCALED.
 2. PROPOSED CULVERT IS DESIGNED FOR ONE LANE OF R/C TRUCK LOADING ON TWO LANE OF R/C CLASS A WHOEVER GOVERNS.
 3. MINIMUM GRADE OF CONCRETE SHALL BE AS FOLLOWS:
a) FOR FOUNDATION & SUBSTRUCTURE: M30
b) FOR SUPERSTRUCTURE: M25
c) FOR SUBSTRUCTURE: M20
 4. CLEAR COVER TO OUTER MOST STEEL SHALL BE AS FOLLOWS:
a) FOR SUPERSTRUCTURE: 40mm
b) FOR SUBSTRUCTURE: 50mm
c) FOR FOUNDATION: 75mm
 5. HIGH YIELD STRENGTH DEFORMED BARS OF GRADE DESIGNATION Fe-500 CONFORMING TO IS 786 SHALL ONLY BE USED.
 6. BACK FILLING BEHIND ABUTMENTS & RETURN WALLS SHALL CONSIST OF SELECTED EARTH CONFORMING TO APPENDIX 6 OF IRC 78-2000 HAVING PROPERTIES OF $d_{20} \leq 0.4$, $d_{4.75} \leq 0.075$, $d_{0.075} \leq 0.0075$.
 7. 60mm THICK FILTER MEDIA SHALL BE PROVIDED BEHIND ABUTMENT AND RETURN WALLS AS PER NORTH SPECIFICATIONS SECTION 350A.
 8. WEIR HOLES, OF 100mm ϕ SPACED AT 900mm C/C BOTH HORIZONTALLY AND VERTICALLY SHALL BE PROVIDED IN A STAGGERED MANNER IN ABUTMENT & RETURN WALLS ABOVE 1500mm FROM L.M. OR G.L. WHOEVER IS HIGHER.
 9. FILLER TYPE EXPANSION JOINTS OF PROVEN QUALITY SHALL BE PROVIDED IN TERMS OF MODIFIED INTERIM SPECIFICATIONS IN ANNEXURE-1 TO NORTH CIRCULAR No. R/M/MP-34059/196-SAR DATED 30.11.2004. THE MATERIAL SPECIFICATIONS OF THE FILLER JOINTS SHALL BE IN ACCORDANCE WITH SECTION 2465 OF NORTH SPECIFICATIONS, FOURTH REVISION.
 10. NOMINAL STEEL OR TEMPERATURE REINFORCEMENT OF TOR @ 150 MM C/C IN BOTH DIRECTIONS IN ABUTMENT & RETURNS ON ALL FACES SHALL BE PROVIDED.
 11. SAFETY BARRIERS OR BARCADES SHALL BE PROVIDED AS SAFETY FOR TRAFFIC MOVEMENT DURING WIDENING OF SLAB CULVERT.



S.NO.	DRG. NO.	DESCRIPTION
1	RDSO/B - 10408	GENERAL ARRANGEMENT
2	RDSO/B - 10408.1	DETAILS OF STEEL FRAME
3	RDSO/B - 10408.2	DETAILS OF ARCH & TOP JOINTS
4	RDSO/B - 10408.3	DETAILS OF TOP DE BEAM
5	RDSO/B - 10408.4	DETAILS OF HANGER & JOINT L/D
6	RDSO/B - 10408.5	DETAILS OF BOTTOM LONG BEAM
7	RDSO/B - 10408.6	DETAILS OF BOTTOM CROSS BEAM
8	RDSO/B - 10408.7	DETAILS OF CONCRETE DECK SLAB
9	RDSO/B - 10408.8	SPLICING LOCATIONS

WEIGHT OF STEEL	REMARKS
176000	THIS VALUE IS APPROXIMATE. IT SHOULD NOT BE USED FOR PAYMENT PURPOSES.



NOTE:
 1. All dimensions are in mm.
 2. No dimensions shall be scaled from this drawing, only written dimension shall be followed.

- This bridge spans designed for 70R and A-class loading as per IRC 8:2010 followed.
- This bridge spans designed for earthquake zone V.
- Analysis and design of steel frame as per IRC 24:2001
- Analysis and design of composite concrete deck as per IRC 22:1996.
- This bridge shall not be constructed until after removal of RCC arch barrier because it is designed for two lane loading only as per IRC 8:2010.
- All steel plates used in fabrication of this bridge are of grade Fe 410W.
- Grade of concrete for deck, arch barrier and concrete piers shall be M40.
- All material shall pass test analysis prescribed by relevant IS specifications.
- All steel work fabrication shall be done in accordance with Indian codes.
- Workshop welding.
- All workshop fabrication shall be done using SAW (Submerged Arc Welding) process only.
- On site welding.
- All welding other than workshop welding shall be done through Gas Shielded FCAW (Flux Cored Arc Welding) process only. SAW (Shielded Metal Arc Welding) also known as Manual Metal Arc Welding shall NOT be permitted anywhere in the structure.
- The gas shield to be used in the FCAW process may be CO₂, Argon or CO₂/Argon mixture.
- In FCAW process, wind screen and/or enclosures shall be provided around the welding location to prevent shielding gas from blowing out.
- Welding shall be performed on prepared metal surfaces free from rust, dirt, moisture etc. and before every new pass, slag must be carefully chipped off from acid surface.
- Background test shall be conducted as minor acid quality.
- Method of launching shall be approved by RDSO.
- Per and foundation load here are to represent arrangement of bow string girder. Actual dimension of pier and foundation is the specific.
- Structure is situated and may be modified as per local requirement.

R. D. S. O.
 ROAD OVER BRIDGE
 BOW STRING STEEL GIRDER
 42m CLEAR SPAN
 GENERAL ARRANGEMENT
 PROVISIONAL
 RDSO/B - 10408



भारत सरकार Government of India
केन्द्रीय लोक निर्माण विभाग Central Public Works Department
कार्यालयकार्यपालक अभियंता O/o Executive Engineer
सीमासड़कपरियोजना मंडल-I Border Road Project Division-I
एस० टी०लामा बिल्डिंग, तीसरी मंजिल S. T. Lama Building, 3rd Floor
चुंगथांग, उत्तरसिक्किम- 737120 Chungthang, North Sikkim - 737120.
E-MAIL: chueeccd1.cpwd@nic.in



संख्या: 23(7)/Forest/EE/BRPD-I/NS/2023/ 37(14)

दिनांक: 17.02.2023

सेवा में,

✓ APCCF -cum-Nodal Officer, FCA
Forest and Environmental Department,
Forest Secretariat, Deorali,
Gangtok-737102.
Email: fca.sikkim@gmail.com

विषय: Diversion of 18.82 Ha of Forest land for C/o High Altitude Hill roads to Indo China Border from 20r link pt. to Zanak (L=10.40 km) under Phase-II in the state of Sikkim by CPWD. **Reg-Review of Biodiversity Conservation and Management Plans in lieu of road-construction forest diversion proposal towards providing specific suggestions.**

महोदय,

A review meeting was held on 09.02.2023 for preparation of Biodiversity Conservation and Management Plans in lieu of road-construction forest diversion. The following documents are further required to be submitted for preparation of Biodiversity Conservation and Management Plans as decided in the meeting:

- I) Location of culverts along with GPS co-ordinates,
- II) Design drawing of culvert,
- III) Alignment map showing culvert location
- IV) Undertaking for Animal Passage Plan.

It is mention that, the project of construction of road along Indo China Border for ITBP under Ph-II is important from strategic point of view. These roads provide passage to border guiding forces to reach up to end point. The forest clearance of these roads is closely monitored at highest level in PMO office.

It is therefore requested that proposal may be processed for forest clearance on priority basis.

सलग्नक: As above.

(राकेश कुमार जैन)
कार्यपालक अभियंता

प्रतिलिपि :


1. अधीक्षण अभियंता, सीमा सड़क परियोजना परिमंडल, के०लो०नि०वि०, मंगन, उत्तर सिक्किम – 737116 सूचनार्थ हेतु।

कार्यपालक अभियंता

ANNEXURE – 1 – DETAILS & PARTICULARS OF DATA REQUESTED FROM SIKKIM FED AND PROJECT PROPONENTS

Sub: Diversion of 18.82 Ha of Forest land for C/o High Altitude Hill roads to Indo China Border from 20r link pt. to Zanak (L=10.40 km) under Phase-II in the state of Sikkim by CPWD.


Sr. No.	PA/ Division / RE/PF/Region	Data particulars	Preferred format	Note	Alternative format	Source	Reply BY CPWD
13.	Chainage-wise line diagrams of the four (04) road construction proposals against terrain	High-res diagram file	PDF/ any other	The diagram must preferably be for every one 901) or every few kilometers for easy interpretation, and must contain locations of proposed culverts and /or other planned wildlife passages.		CPWD	On an average Culvert will be provided in every 500 meter interval of road and Chainage-wise Line diagram is attached In Annexure-A
14.	Locations and other details of planned culverts and / or other wildlife passages.		Excel spreadsheet	All planned culverts/water passage /wildlife crossing structures with their chainage-wise locations, latitude, longitude, type, design details, material to be used, specifications (length * width * height), along with all other important details must be mentioned in separate well-labelled columns.		CPWD	Location of culverts & bridges are attached In Annexure-B
15.	Detailed Project Reports of the four (04) roads construction		Word/PFD	If not for the entire project, all general and specific details of the proposals passing through forestland must be provided.		CPWD	DPR is attached In Annexure-C


 Executive Engineer
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 North Sikkim

ANNEXURE-2: SAMPLE LIST OF ACTIVITIES/INTERVENTIONS BY THE USER AGENCY/ PROJECT PROPONENTS

Sub: Diversion of 18.82 Ha of Forest land for C/o High Altitude Hill roads to Indo China Border from 20r link pt. to Zanak (L=10.40 km) under Phase-II in the state of Sikkim by CPWD.

Sl. No.	Activity	Remarks	EE/BRPD-I reply
1.	2	3	4
A.	STRENGTHING OF INFRASTRUCTURE FOR WILDLIFE CONSERVATION		
1.	Underpass/ overpass/ culverts /other structural mitigation structures along / near proposed alignment in accordance with WH and other national and international guidelines to facilitate elephant / wildlife movement.	Exact numbers, specifications and locations will be detailed in the final IWAP after a comprehensive biodiversity assessment.	Culverts = 21 no.s & Bridge= 0 no.s
2.	Sound proof fences on both sides of railway track all along the alignment	Specification etc. will be decided in consultation with DFO, Wildlife Division after a comprehensive biodiversity assessment as part of the IWAP.	Since the proposal is defense road project, The sound proof fences are not applicable.
3.	Provision for tunneling of underpass/ overpasses / other structural mitigation measures	Same as above.	Not Applicable.
4.	Turfing in high embankment and construction of guide bounds in all major streams and rivers, for soil moisture conservation and to prevent erosion of soil.		Since the road is constructed in hilly area, so the provision of Turfing is not applicable.
5.	Installation of Solar Street light in villages close to the railway alignment (either side) prone to human-wildlife negative interactions		There will be no traffic movement at night, only limited vehicles of ITBP/Army will pass at day light, so the provision of solar street light is not applicable.
13.	Installation of Speed limit monitoring devices & their annual maintenance at high animal use locations/ mitigation structures and other places, with a control unit at "Research & Wildlife Monitoring Cell"		The proposed road is of linear project for Defense purpose, so the provision of speed limit monitoring device is not considered in the project. However Signage board of Speed limit will be provided along the road in regular interval.
B.	WILDLIFE AWARENESS & TRAINING		
15.	Appropriate signages on both side of the alignment/track		
a)	Signages with speed limit at regular intervals		Yes, The provision is considered in the project.
b)	Signages / Hoardings related to conservation at DFCCIL, working place, station, cabins etc. and at identified elephant habitats (if any)		Yes, The provision is considered in the project.
c)	Signages with awareness and warning for wildlife as per DFOs suggestions		Yes, The provision is considered in the project.


 Executive Engineer
 BRPD-I, CPWD, Chungthang
 North Sikkim

Details Location of Culvert for proposed road from 20r Link point to Zanak Road (10.40 K.M.)

Sl. No.	Chainage	Location	Design Detail	Specification			GPS Coordinates		Remarks
				Length (meter)	Width (meter)	Height (Meter)	Northing	Easting	
1	250	Zanak	RRM/RCC Slab Culvert	3.00	7.50	2.50	27°52'33.87"N	88°21'47.25"E	
2	750	Zanak	RRM/RCC Slab Culvert	3.00	7.50	2.50	27°52'33.40"N	88°21'28.67"E	
3	950	Zanak	RRM/RCC Slab Culvert	3.00	7.50	2.50	27°52'33.26"N	88°21'19.78"E	
4	1750	Zanak	RRM/RCC Slab Culvert	3.00	7.50	2.50	27°52'18.66"N	88°21'0.66"E	
5	2250	Zanak	RRM/RCC Slab Culvert	3.00	7.50	2.50	27°52'9.82"N	88°20'47.38"E	
6	2750	Zanak	RRM/RCC Slab Culvert	3.00	7.50	2.50	27°52'6.23"N	88°20'29.79"E	
7	3250	Zanak	RRM/RCC Slab Culvert	3.00	7.50	2.50	27°52'4.29"N	88°20'12.07"E	
8	3500	Zanak	RRM/RCC Slab Culvert	3.00	7.50	2.50	27°52'4.83"N	88°20'3.04"E	
9	4000	Zanak	RRM/RCC Slab Culvert	3.00	7.50	2.50	27°52'9.32"N	88°19'45.77"E	
10	4500	Zanak	RRM/RCC Slab Culvert	3.00	7.50	2.50	27°52'14.20"N	88°19'28.35"E	
11	4750	Zanak	RRM/RCC Slab Culvert	3.00	7.50	2.50	27°52'17.04"N	88°19'19.90"E	
12	5250	Zanak	RRM/RCC Slab Culvert	3.00	7.50	2.50	27°52'26.05"N	88°19'4.94"E	
13	5500	Zanak	RRM/RCC Slab Culvert	3.00	7.50	2.50	27°52'30.45"N	88°18'57.17"E	
14	6000	Zanak	RRM/RCC Slab Culvert	3.00	7.50	2.50	27°52'39.04"N	88°18'42.10"E	
15	6500	Zanak	RRM/RCC Slab Culvert	3.00	7.50	2.50	27°52'46.57"N	88°18'25.88"E	
16	7100	Zanak	RRM/RCC Slab Culvert	3.00	7.50	2.50	27°52'57.29"N	88°18'12.37"E	
17	7650	Zanak	RRM/RCC Slab Culvert	3.00	7.50	2.50	27°53'7.00"N	88°17'52.37"E	
18	7710	Zanak	RRM/RCC Slab Culvert	3.00	7.50	2.50	27°53'7.26"N	88°17'49.59"E	
19	8250	Zanak	RRM/RCC Slab Culvert	3.00	7.50	2.50	27°53'18.64"N	88°17'34.88"E	
20	9750	Zanak	RRM/RCC Slab Culvert	3.00	7.50	2.50	27°53'46.64"N	88°16'50.16"E	
21	10250	Zanak	RRM/RCC Slab Culvert	3.00	7.50	2.50	27°53'53.16"N	88°16'34.18"E	

Details Location of Bridge for proposed road from 20r Link point to Zanak Road (10.40 K.M.)

Sl. No.	Chainage	Location	Design Detail	Specification			GPS Coordinates		Remarks
				Length (meter)	Width (meter)	Height (Meter)	Easting	Northing	
1	-	Zanak	RCC Bridge	-	-	-	-	-	No Bridges are required as per site conditions.

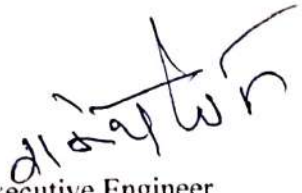


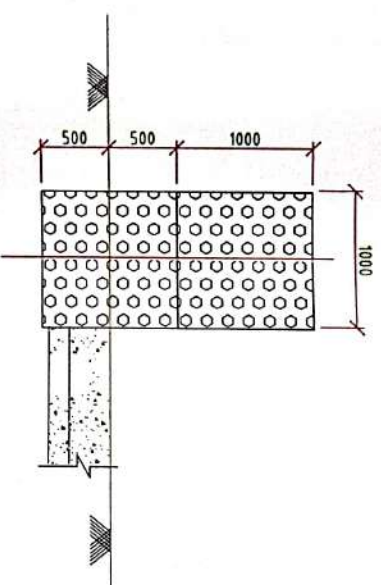
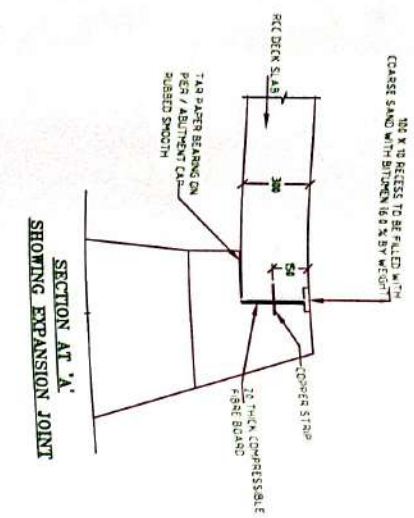
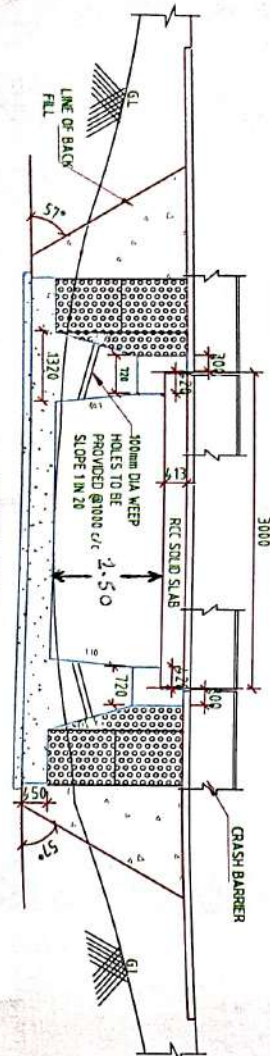
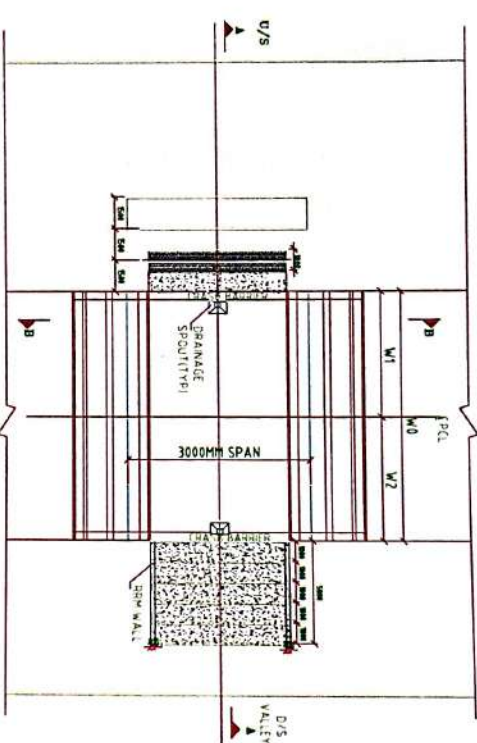
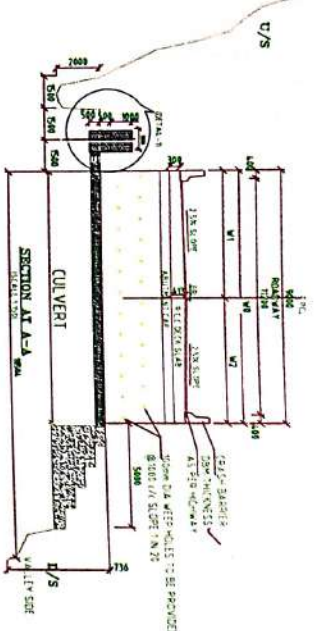
Executive Engineer
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Executive Engineer
BRPD-I, CPWD, Chungthang
North Sikkim

UNDERTAKING FOR ANIMAL PASSAGE PLAN

This is to certify that for Diversion of forest land for construction of ITBP Phase-II road from 20r link point to Zanak L=10.40 km, The Animal Passage Plan is submitted as per the site requirement in form of Box Culvert at a frequency of 2 nos. per km of length. We also undertake, if need be in future that any other requirements for safe passage of animal. Then design may be implemented as per the guidelines and requirements of Department of Forest & Environment, Govt. of Sikkim.


Executive Engineer
BRPD-I, CPWD,
Chungthang, N. Sikkim.
Executive Engineer
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Dwarka Sector 12A,
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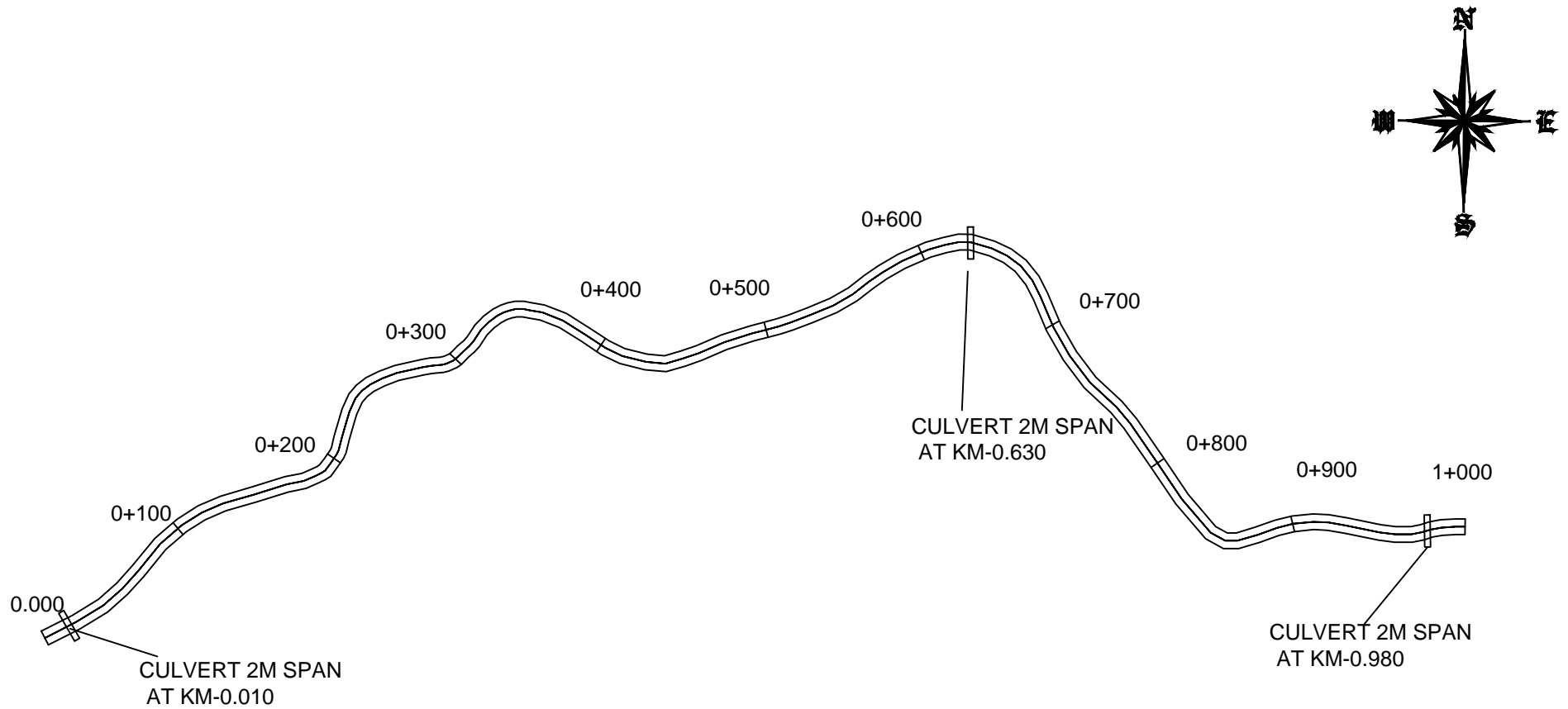
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DRAWN BY	TL		

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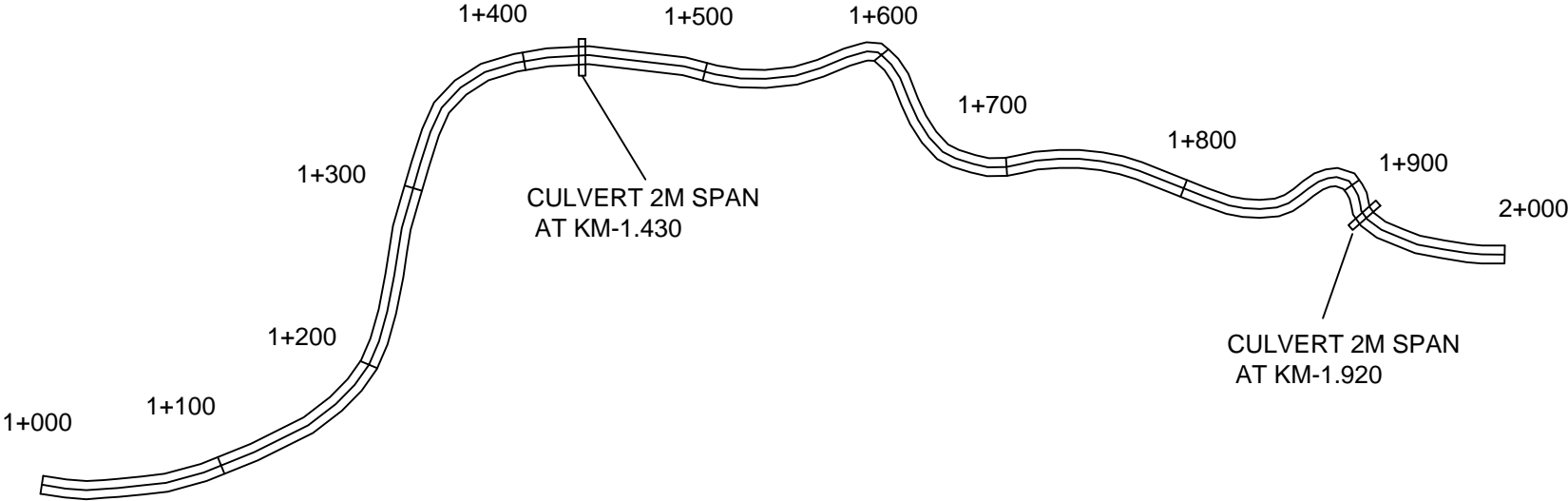
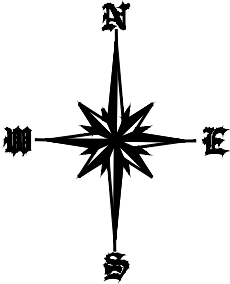
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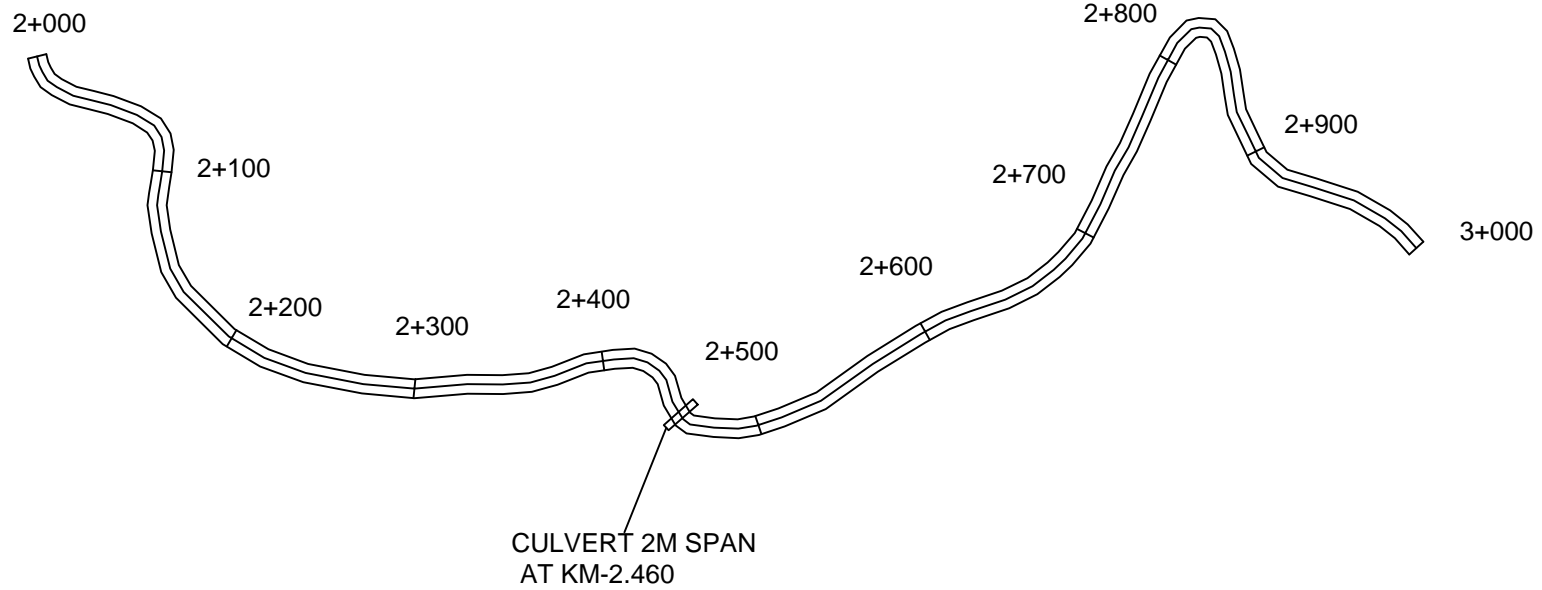
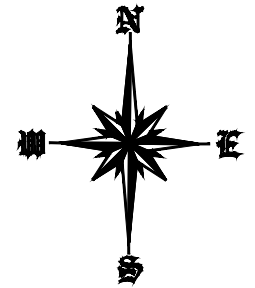
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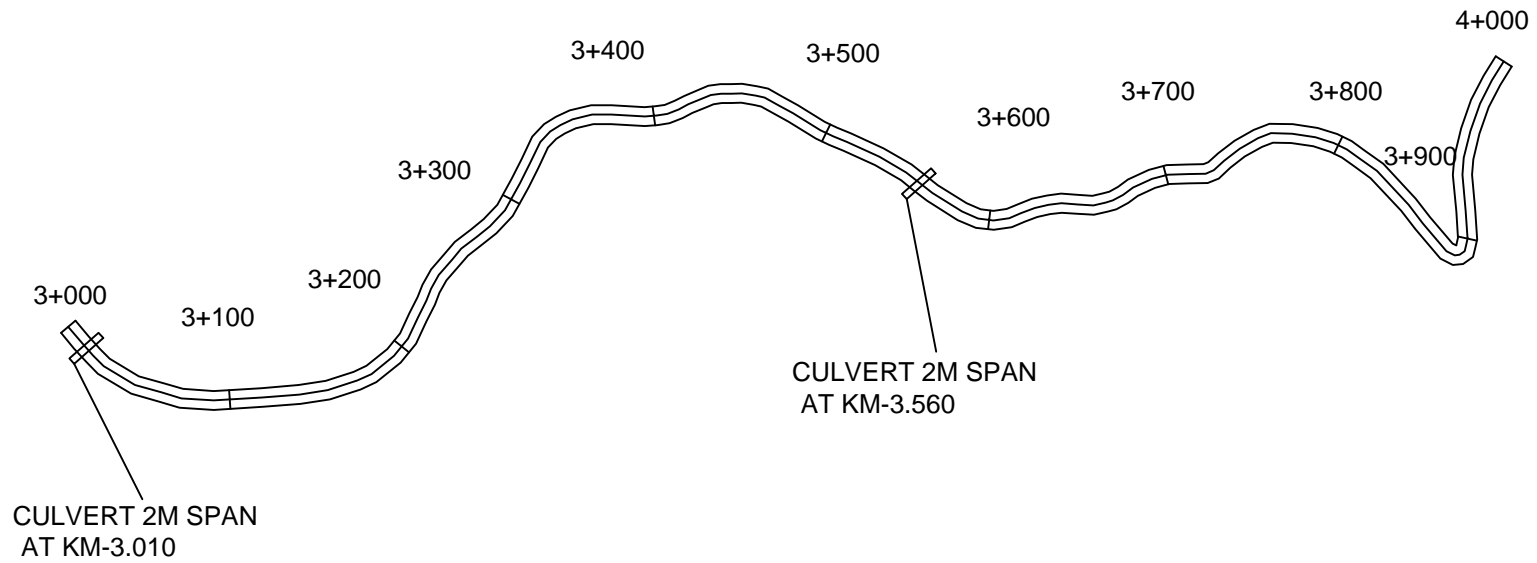
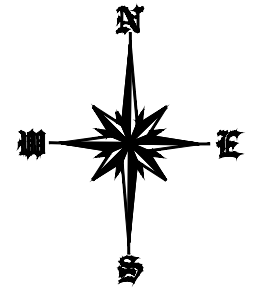
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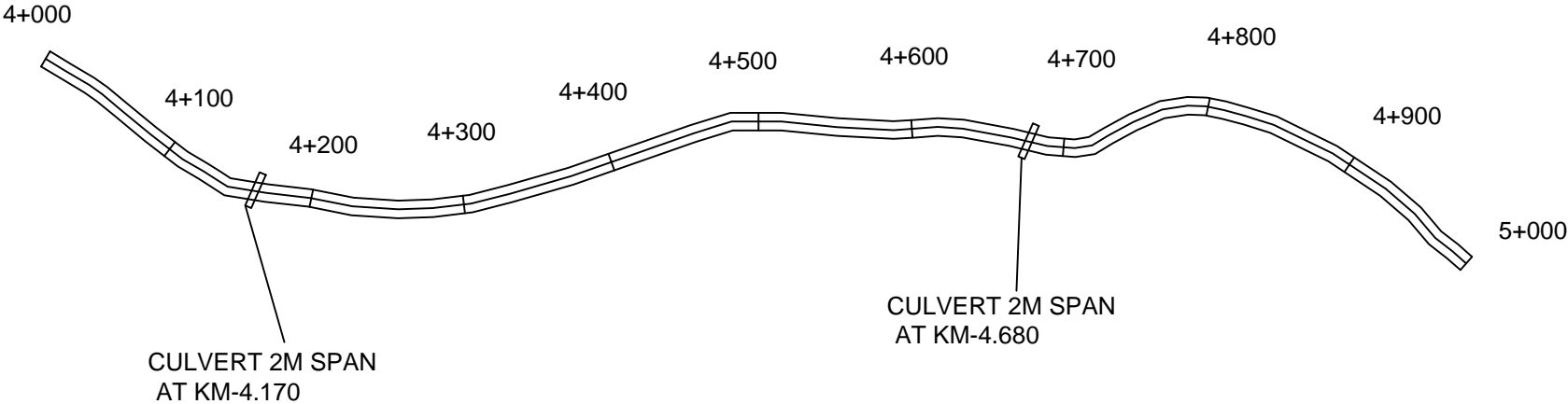
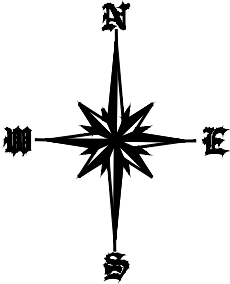
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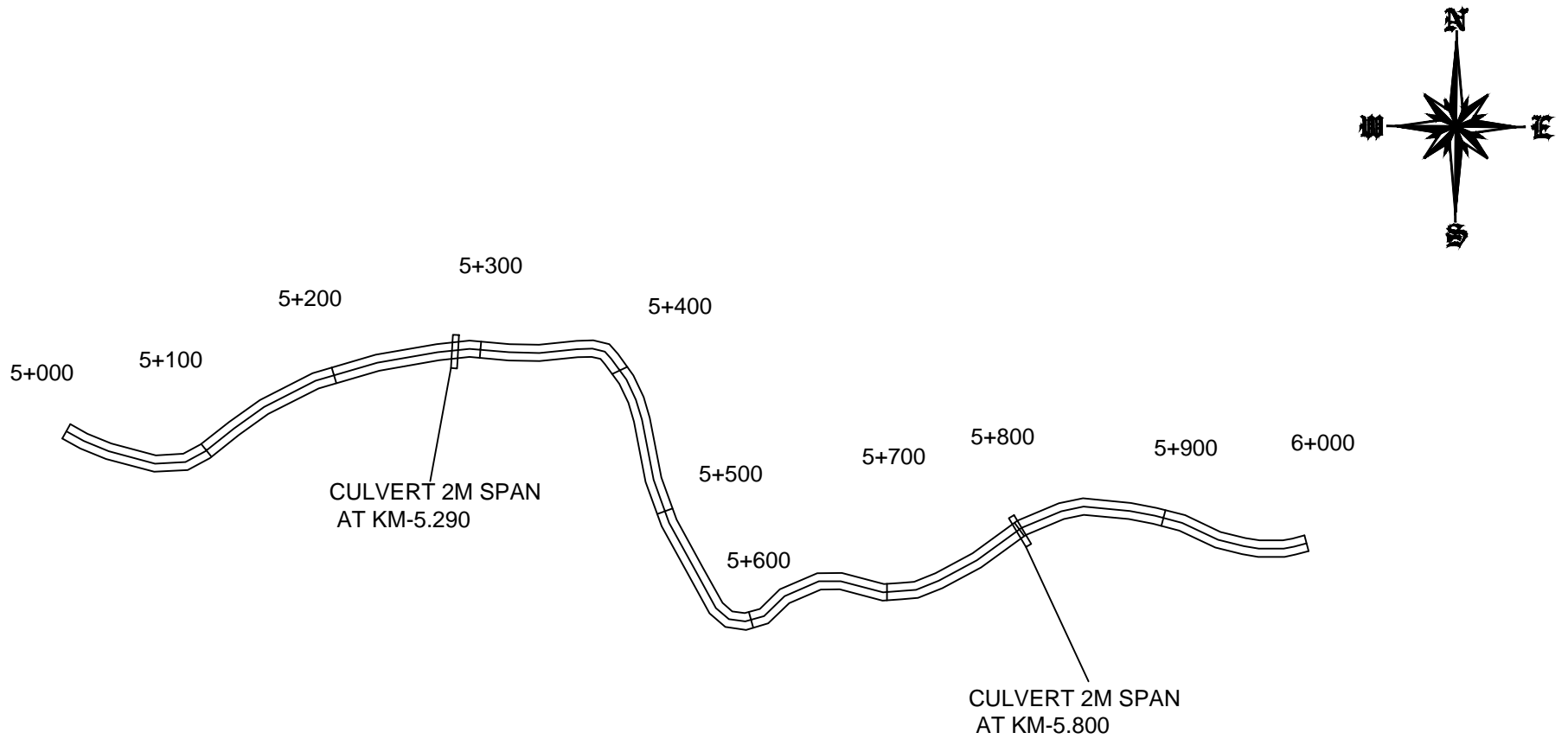
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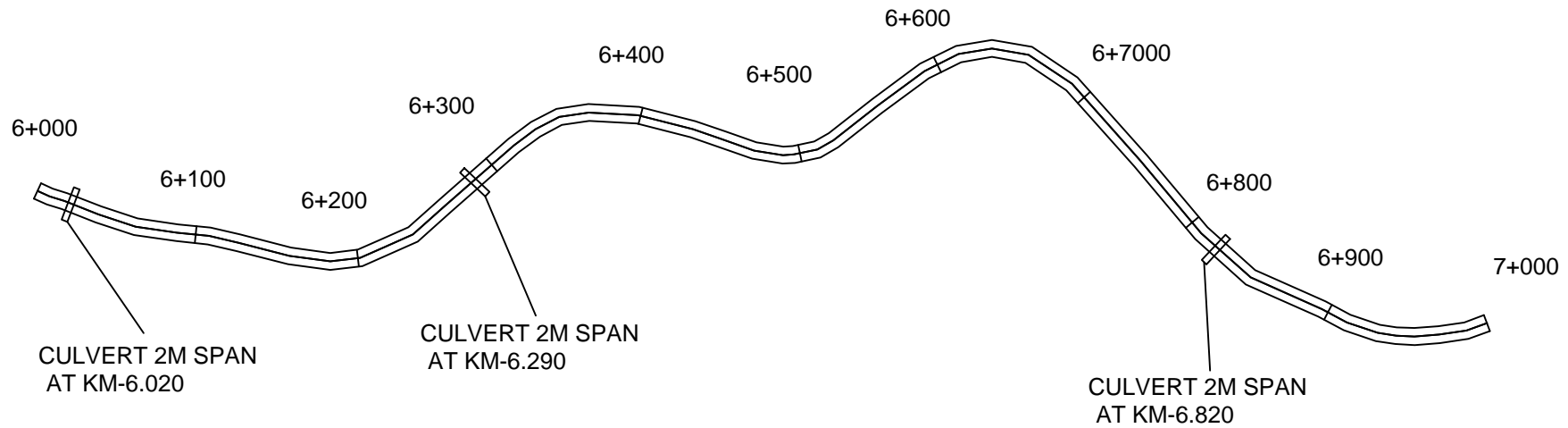
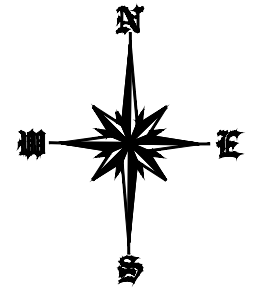
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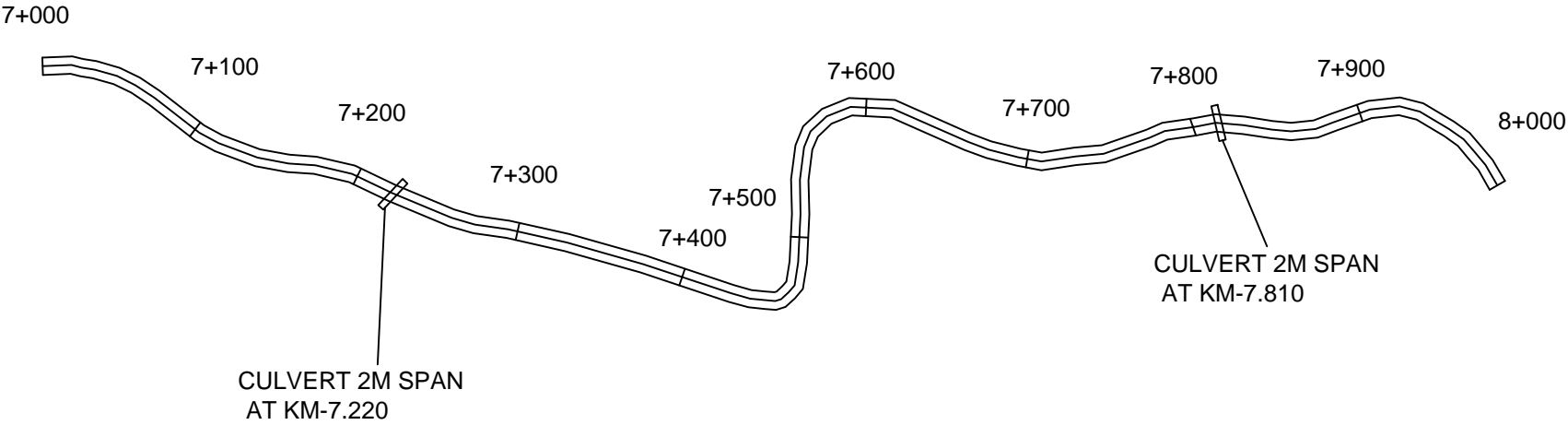
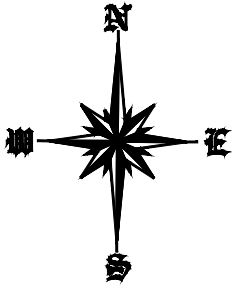
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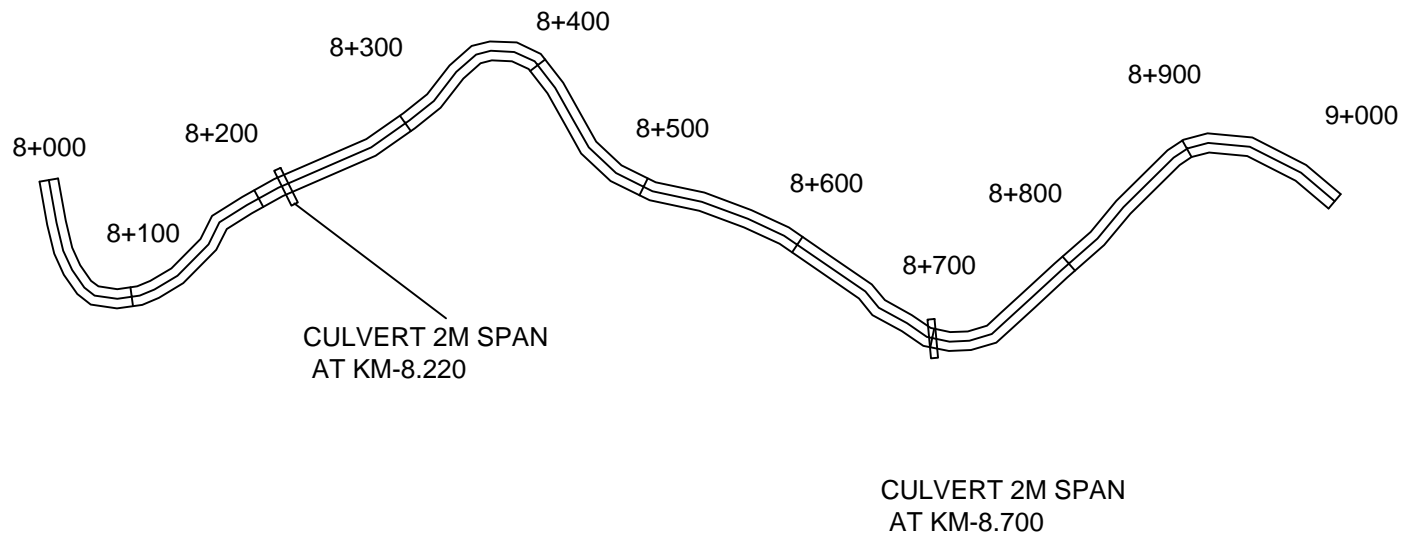
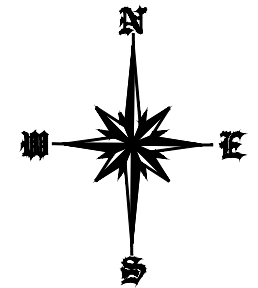
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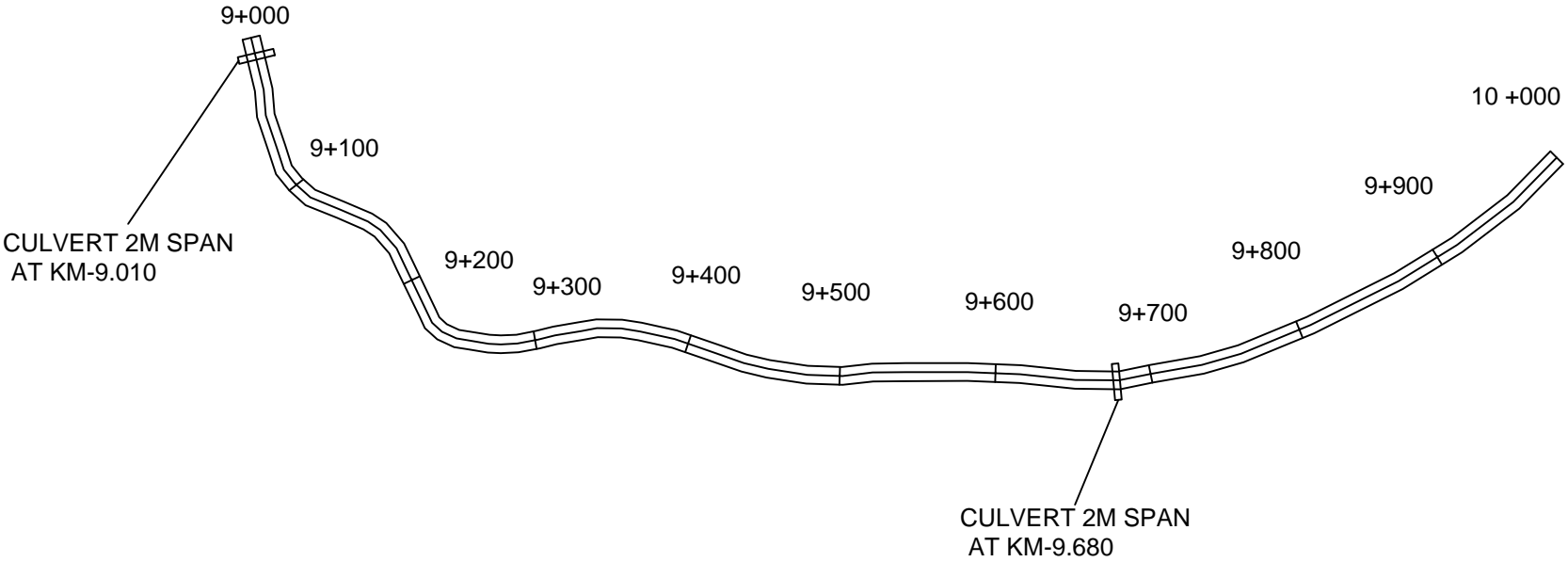
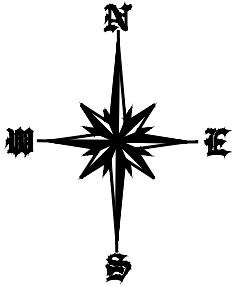
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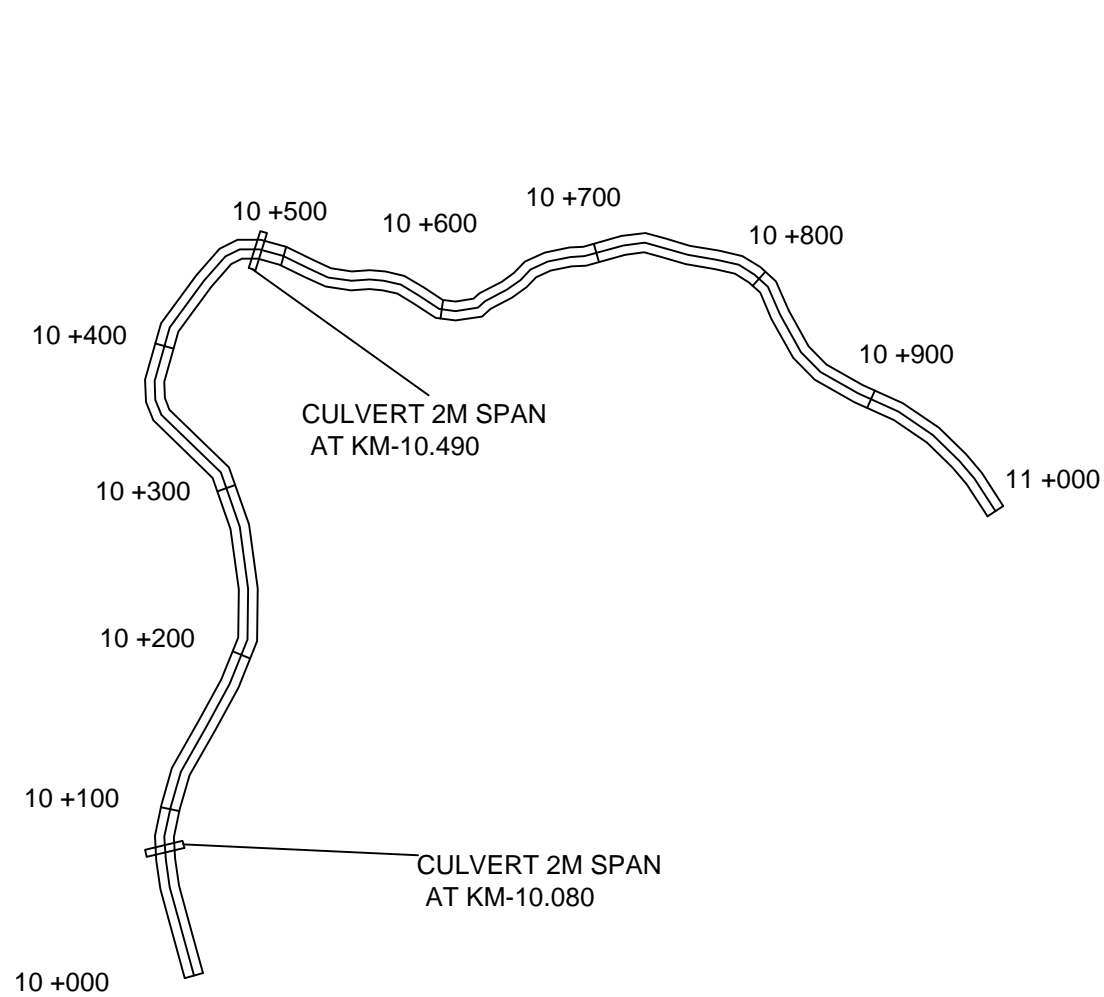
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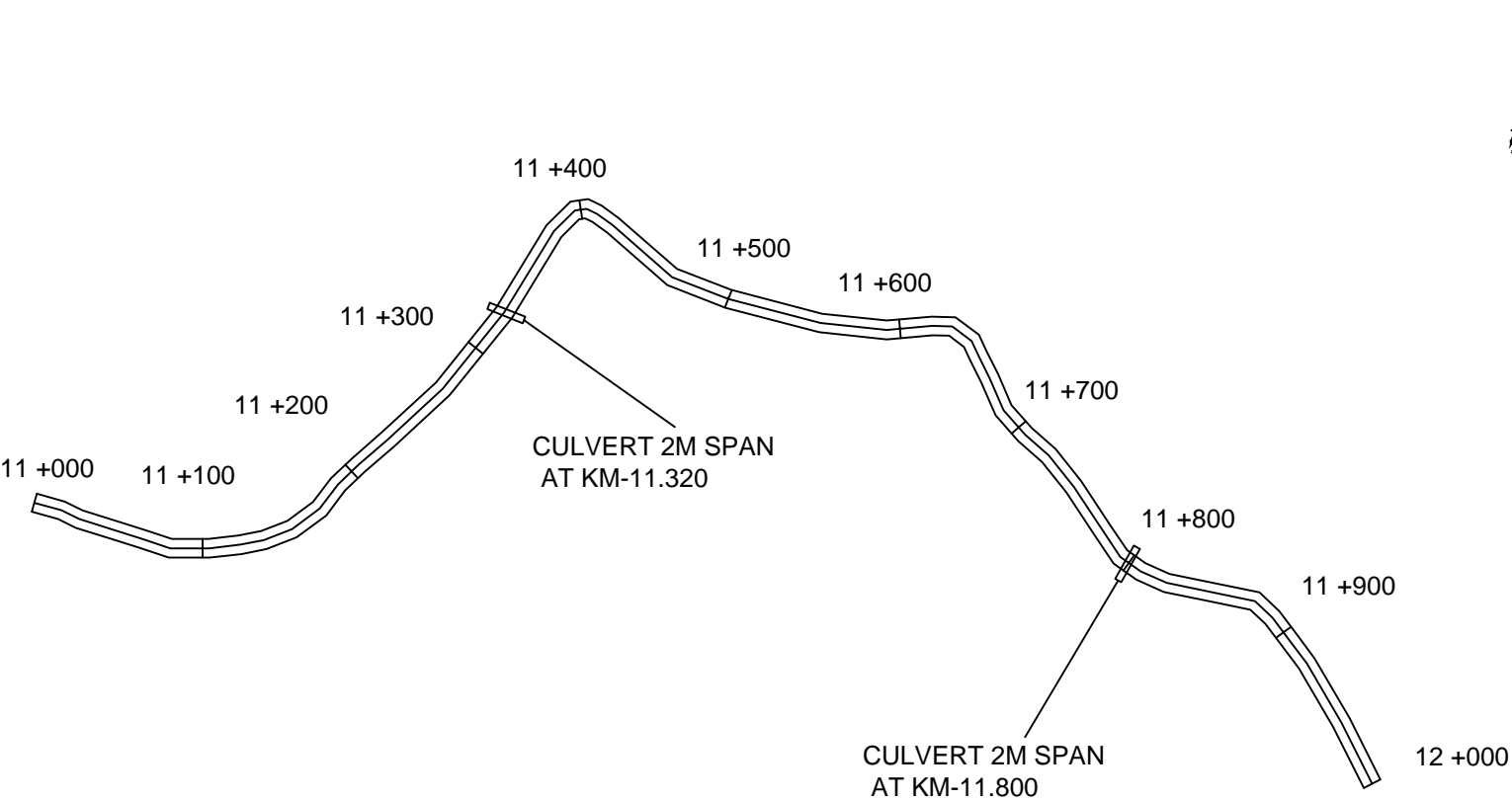
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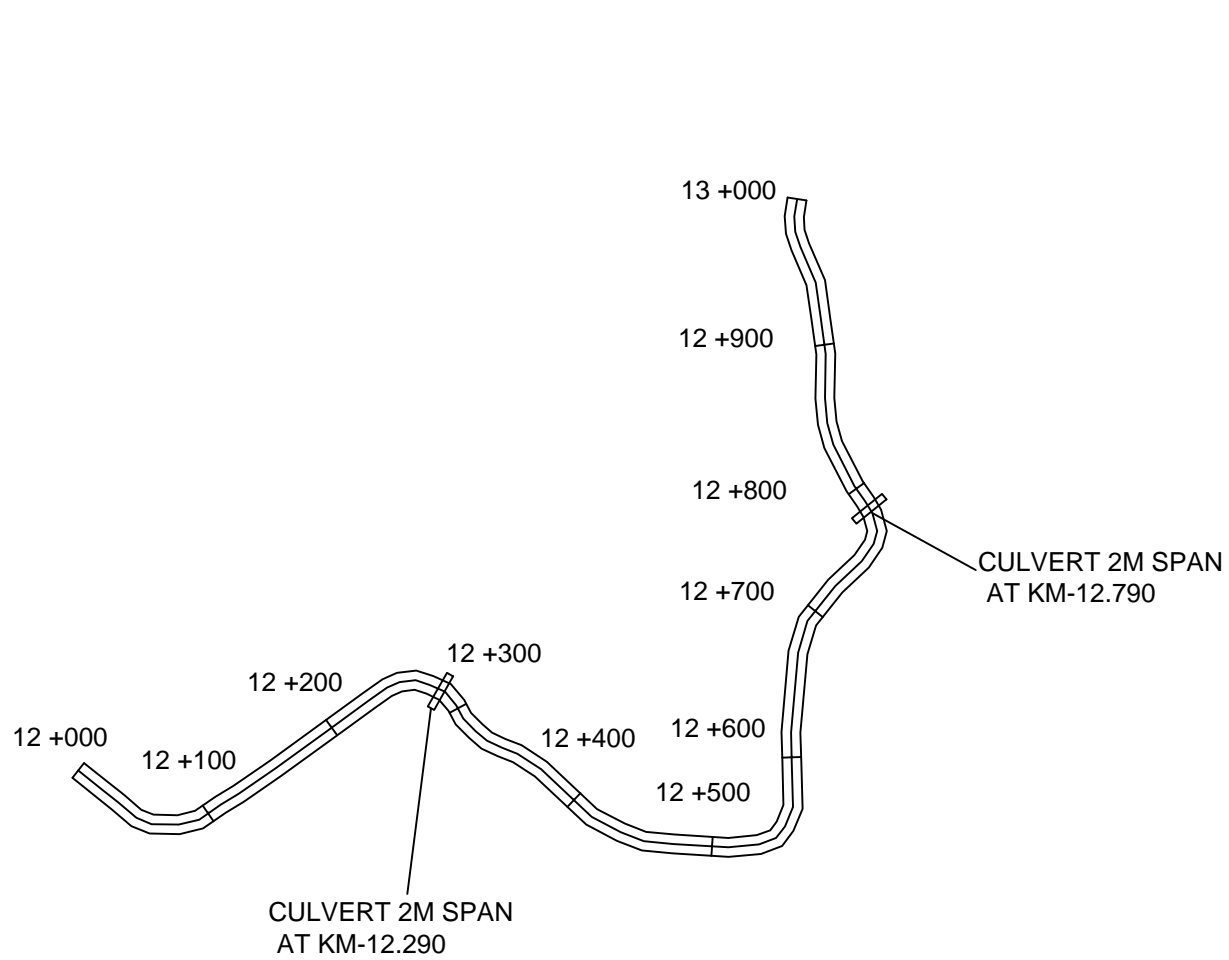
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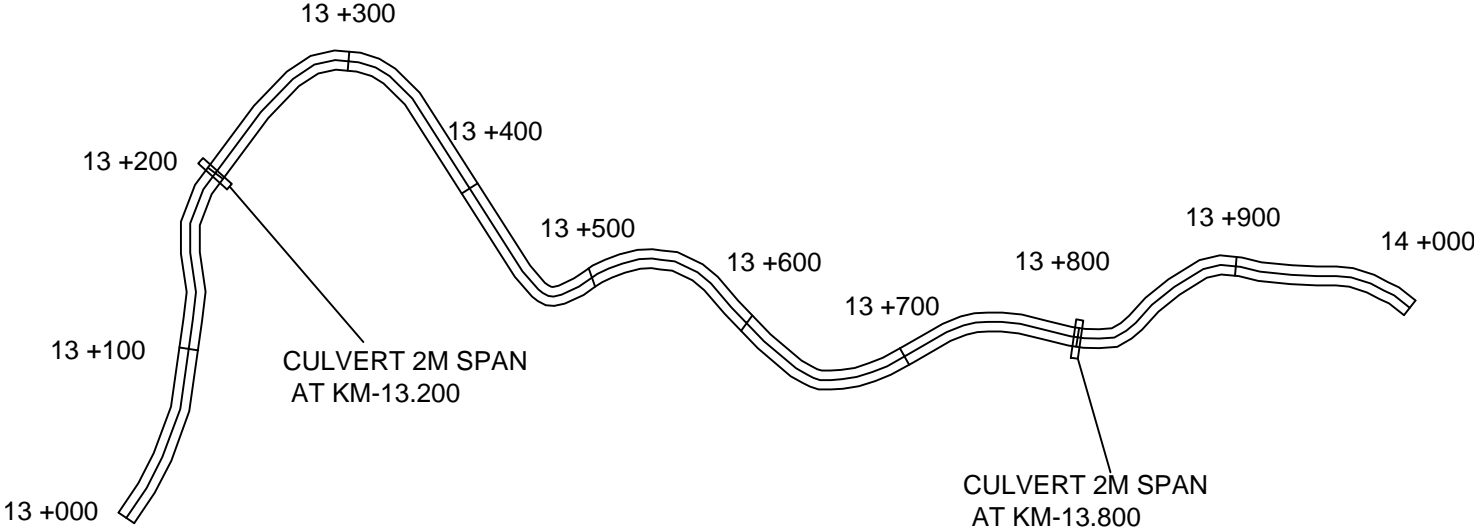
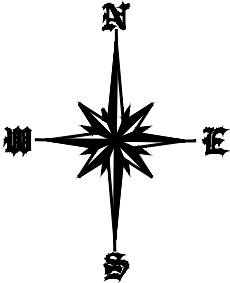
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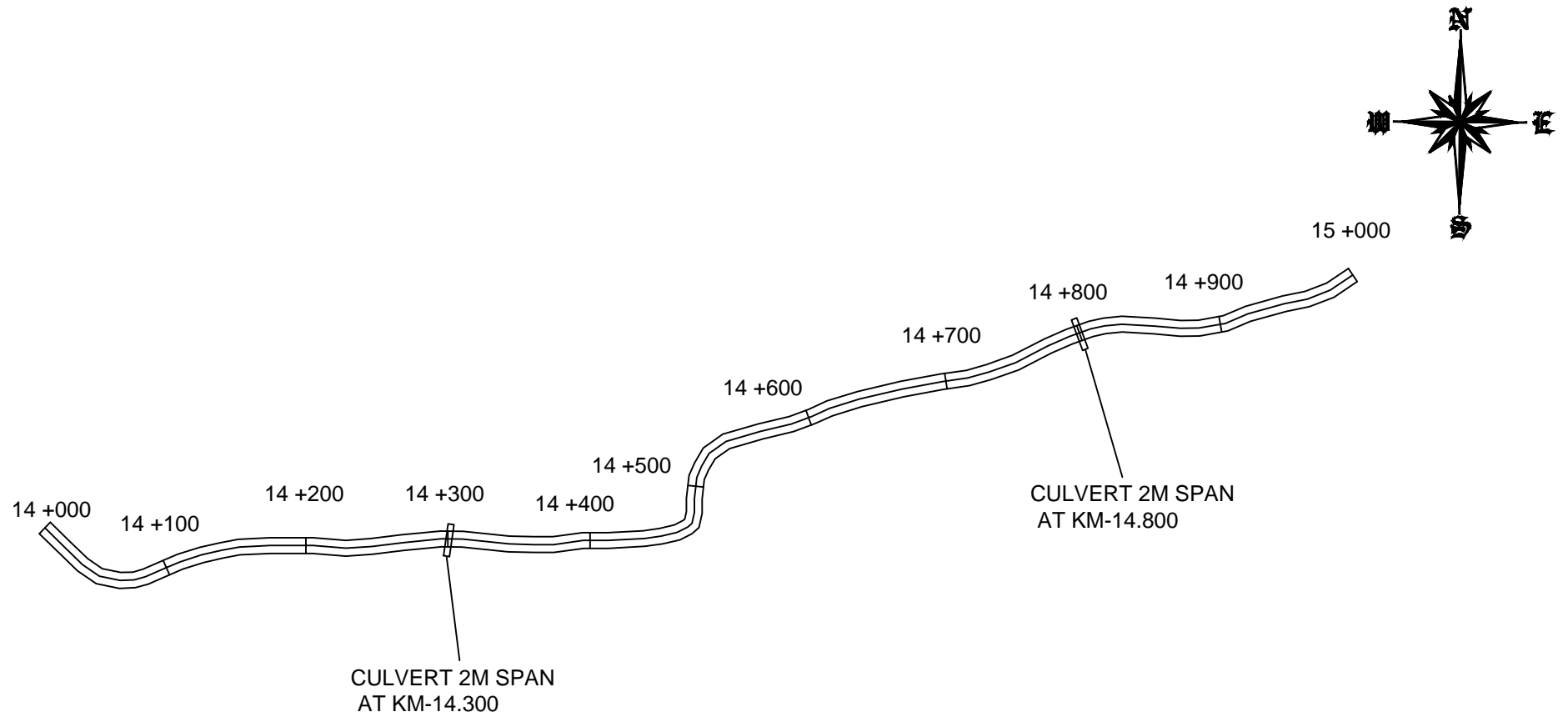
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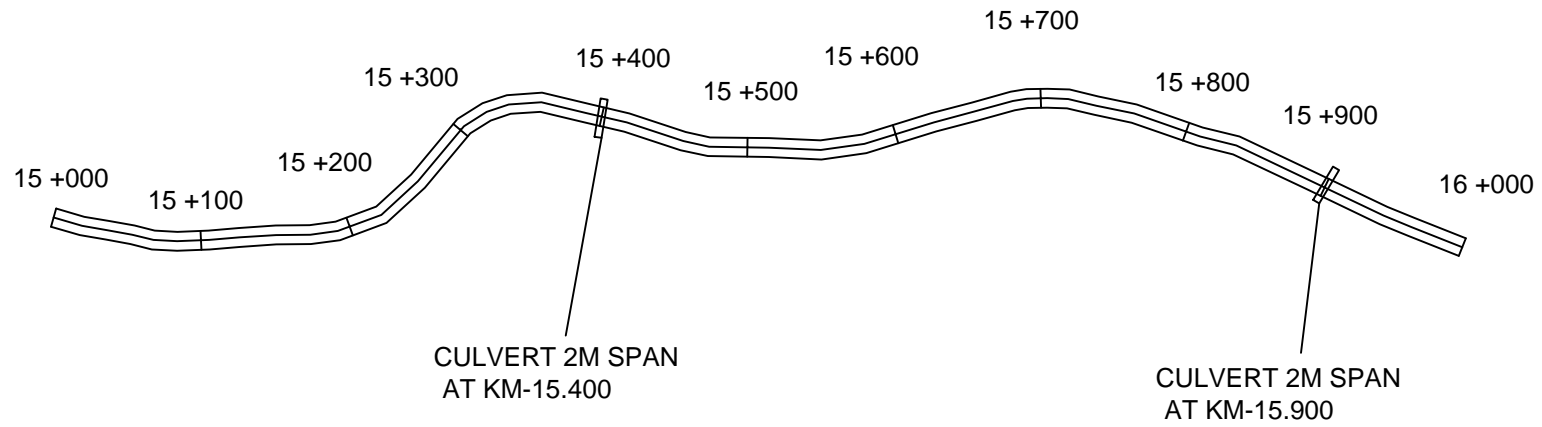
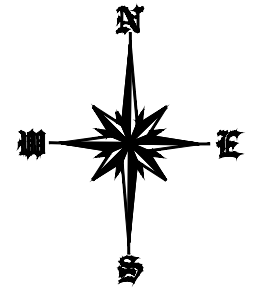
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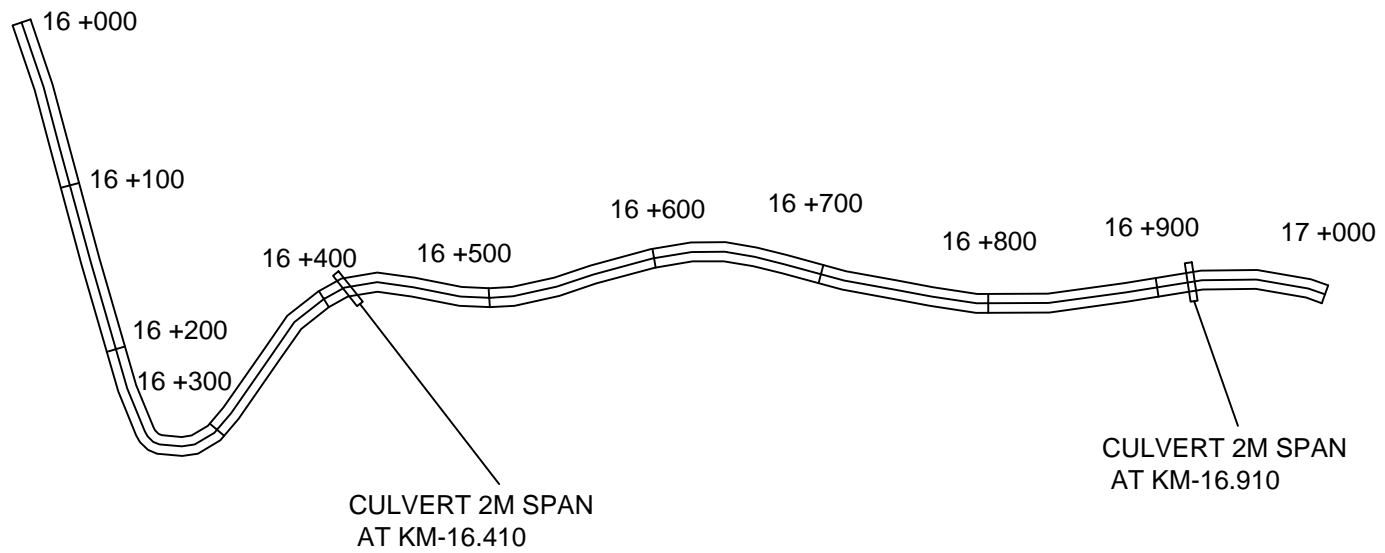
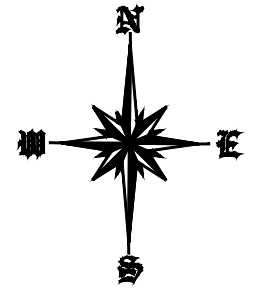
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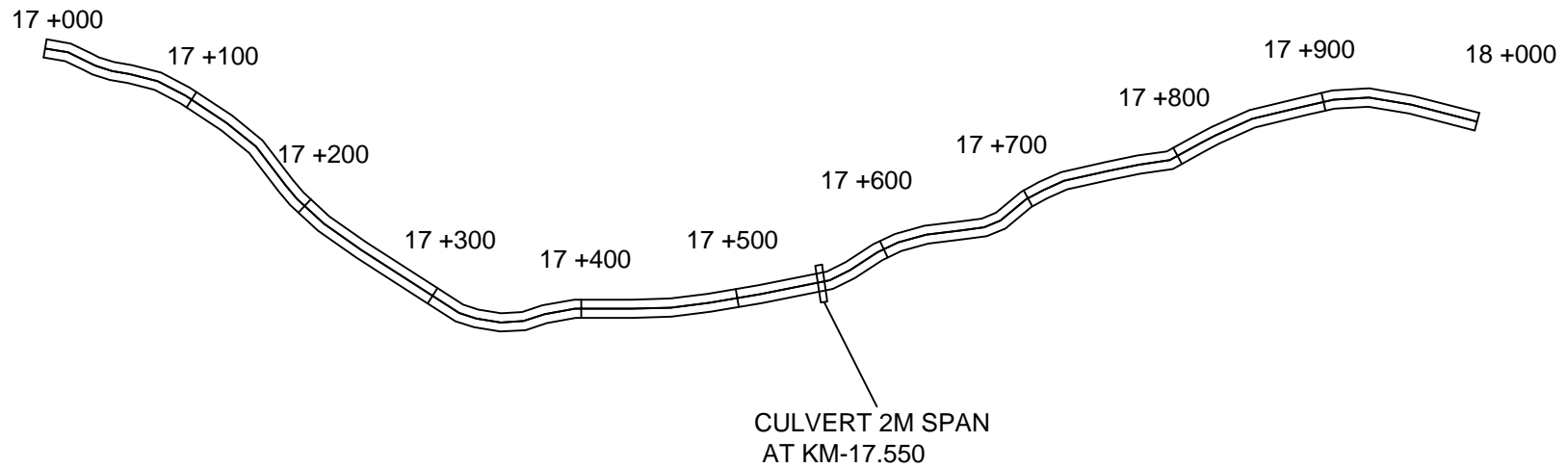
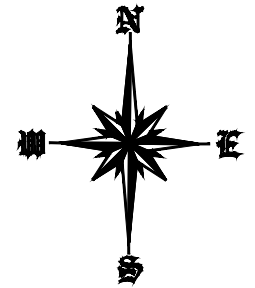
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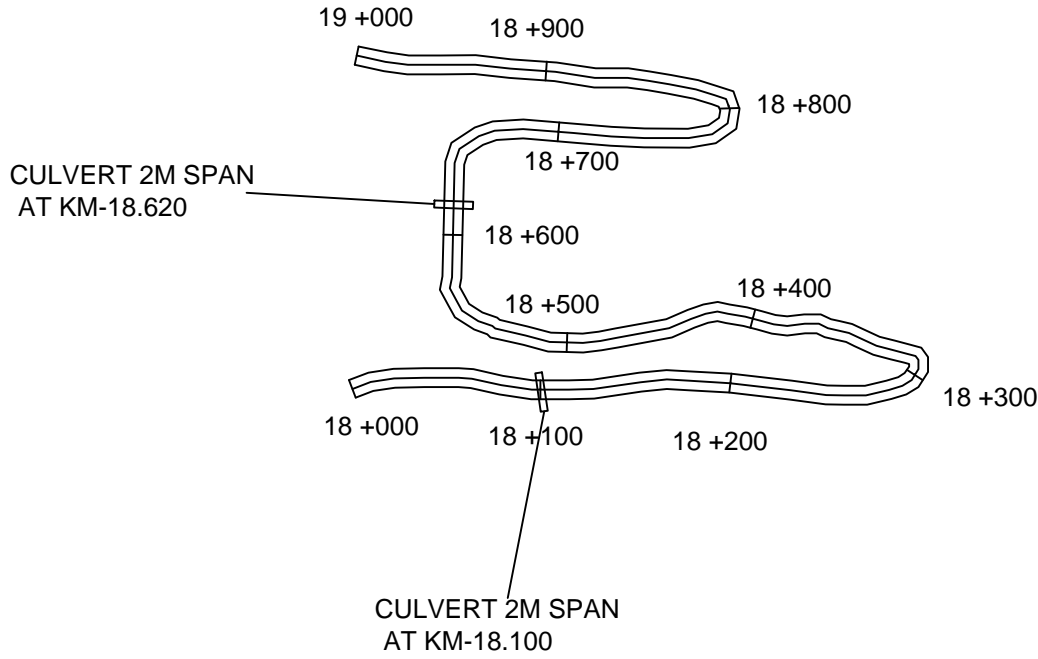
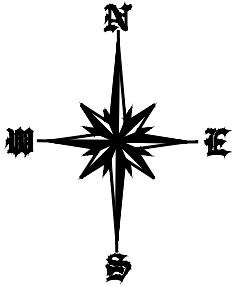
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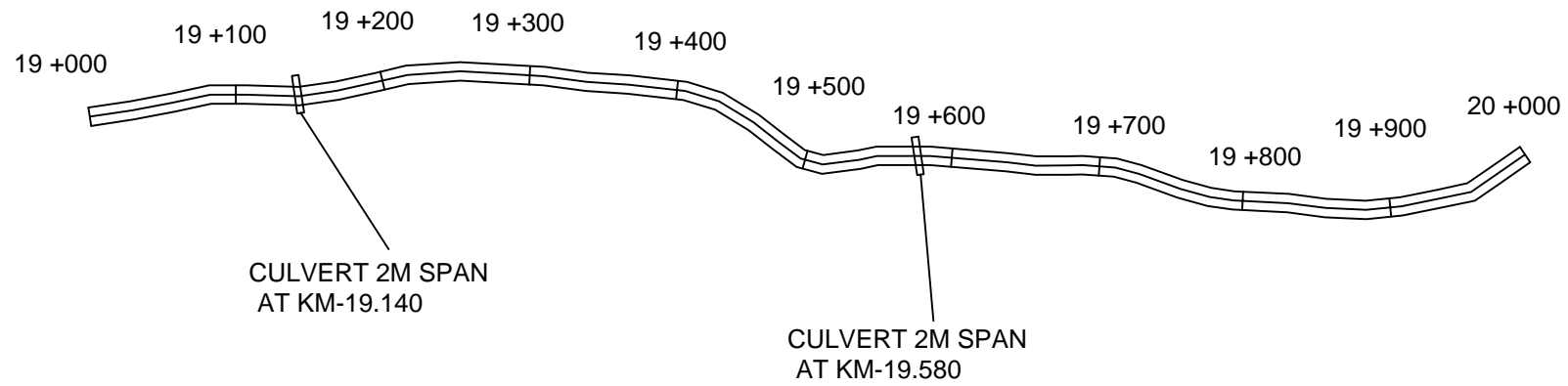
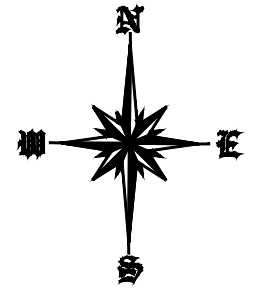
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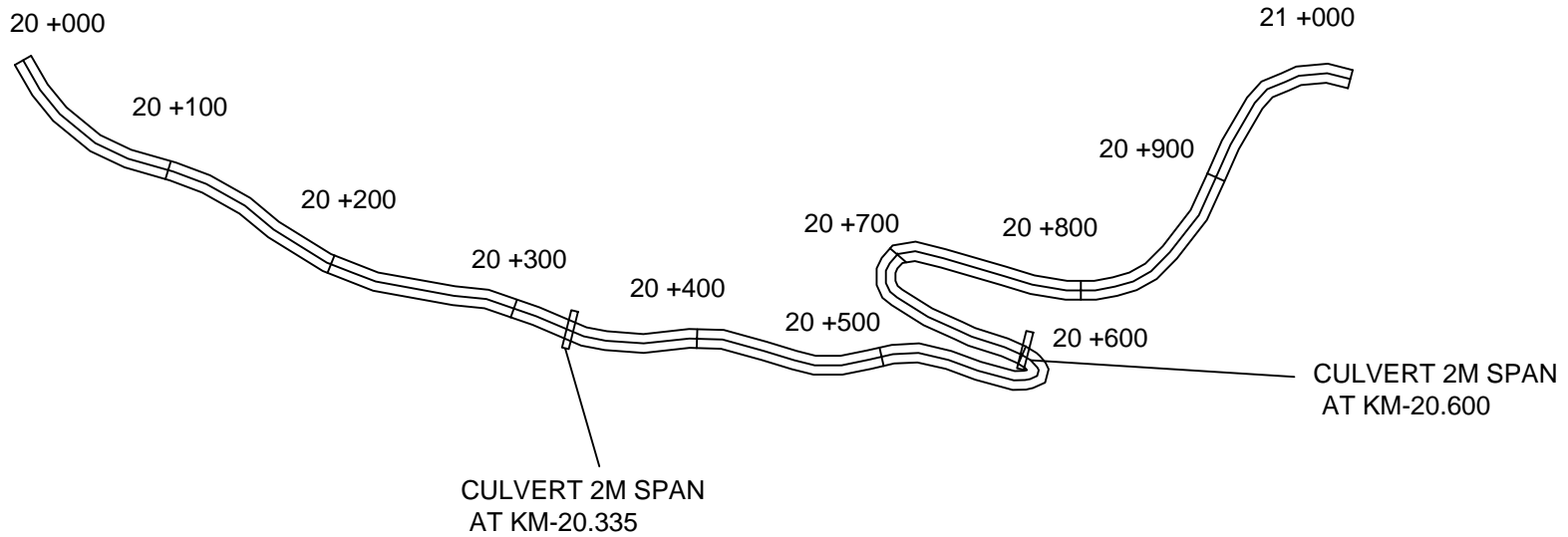
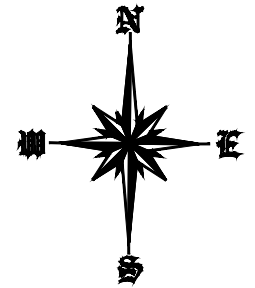
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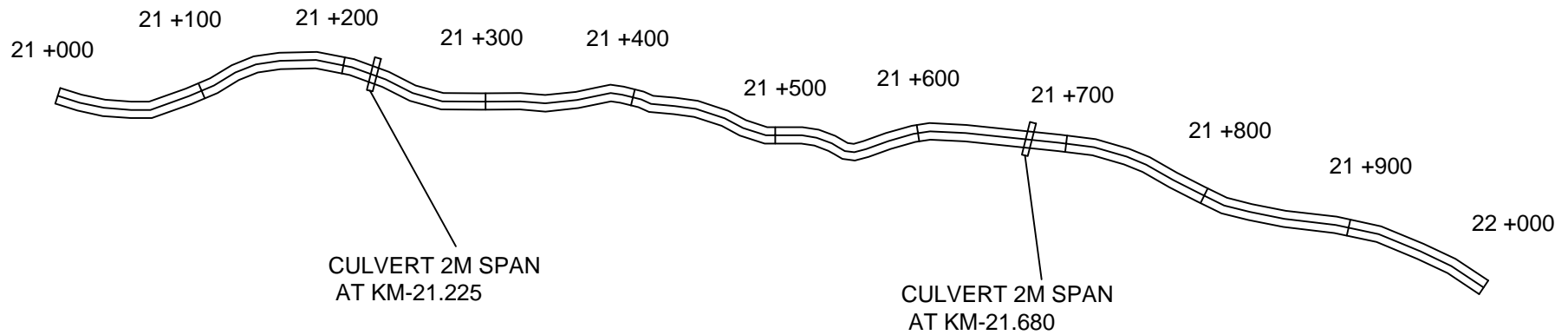
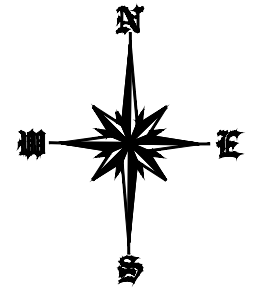
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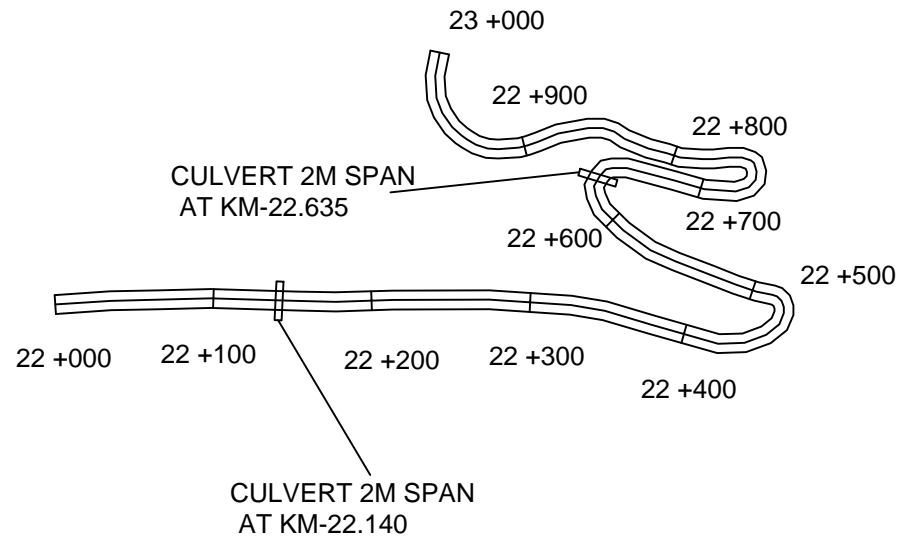
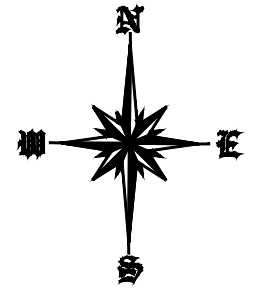
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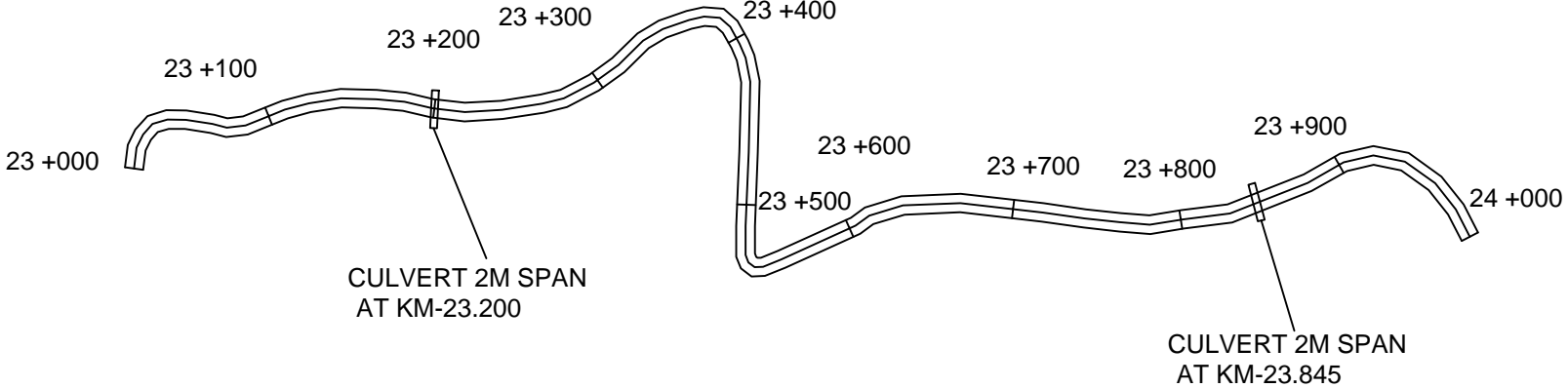
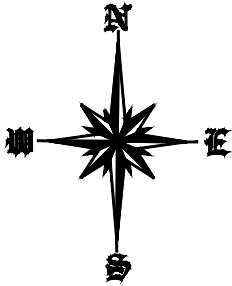
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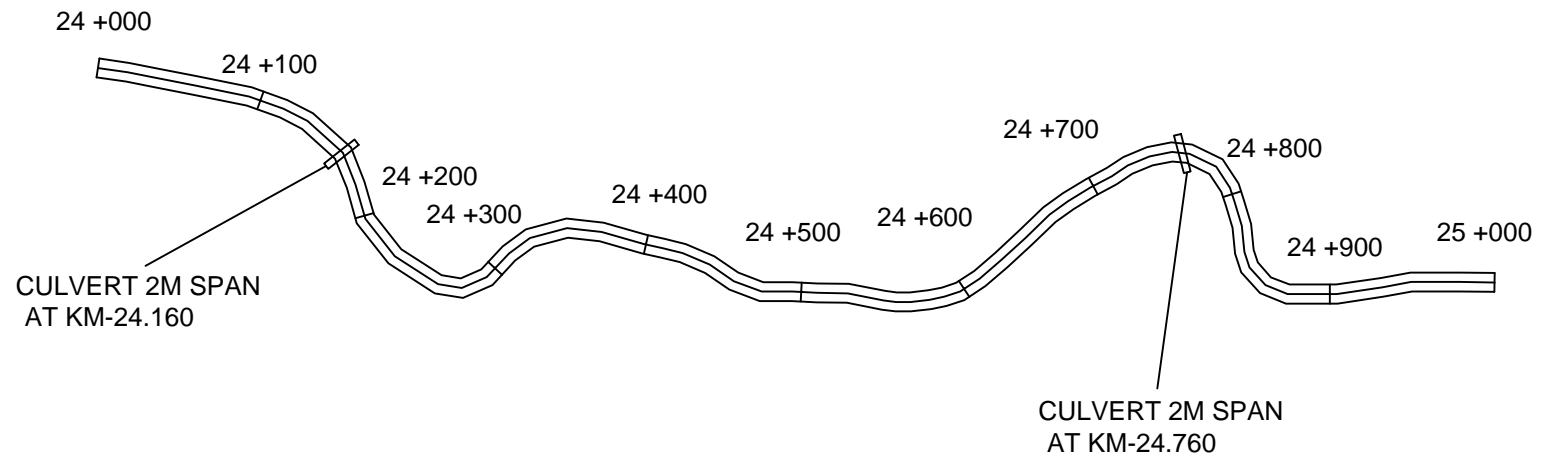
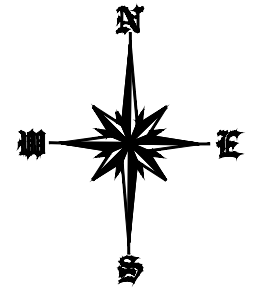
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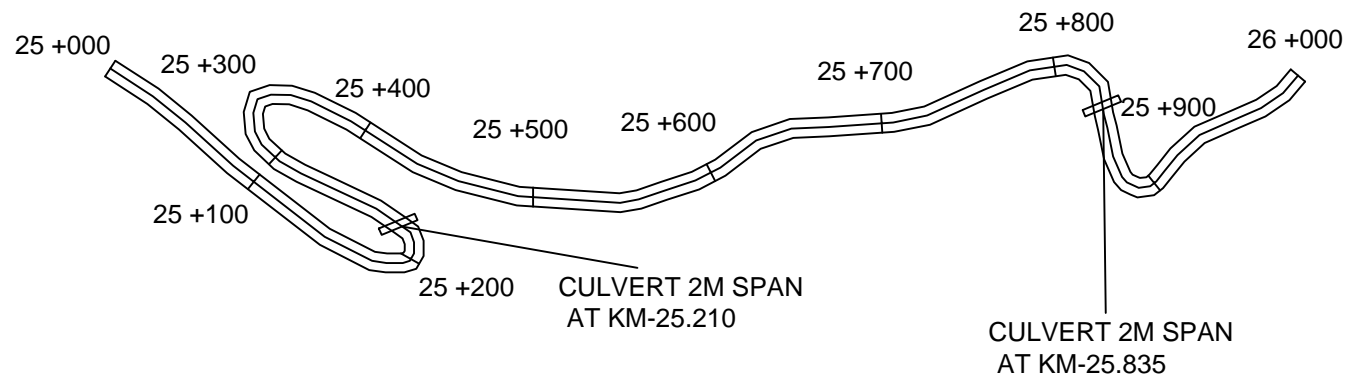
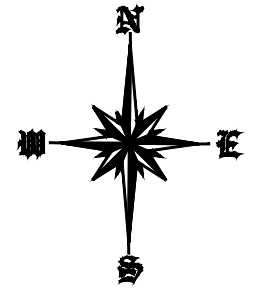
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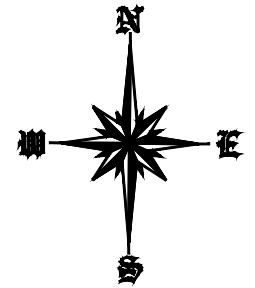
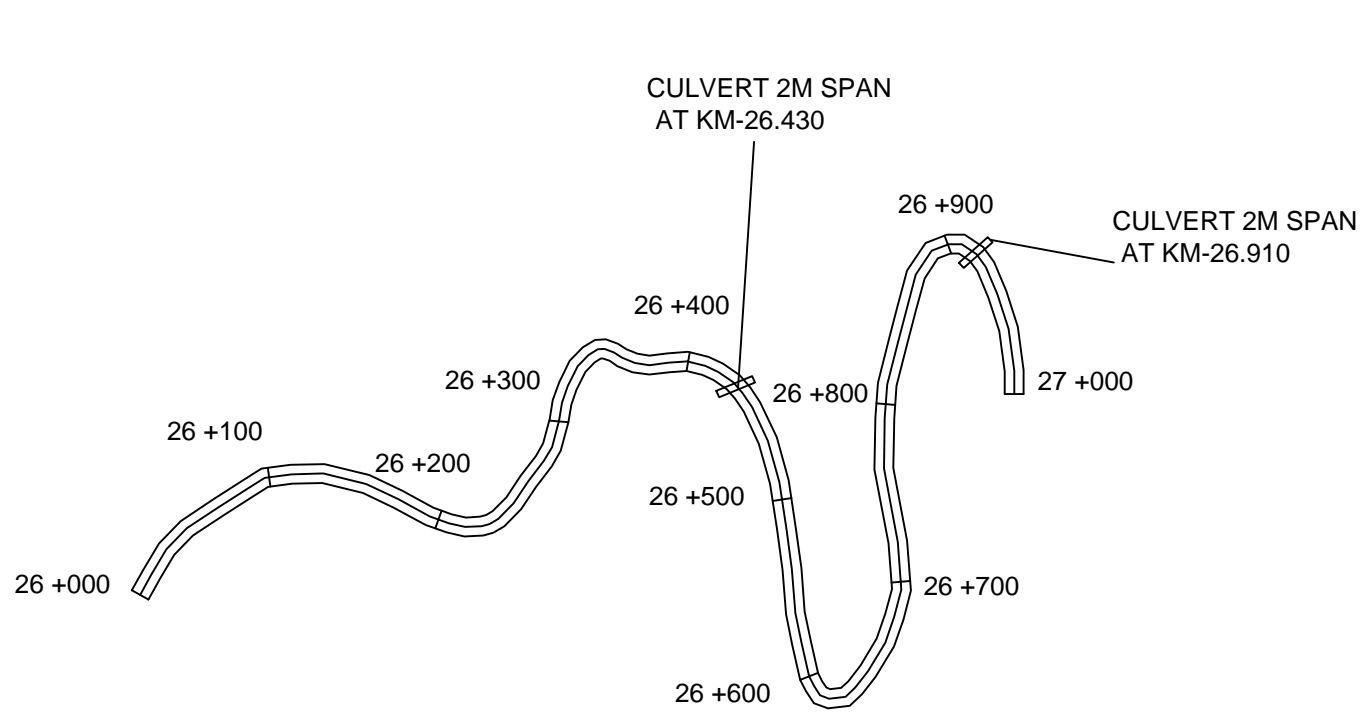
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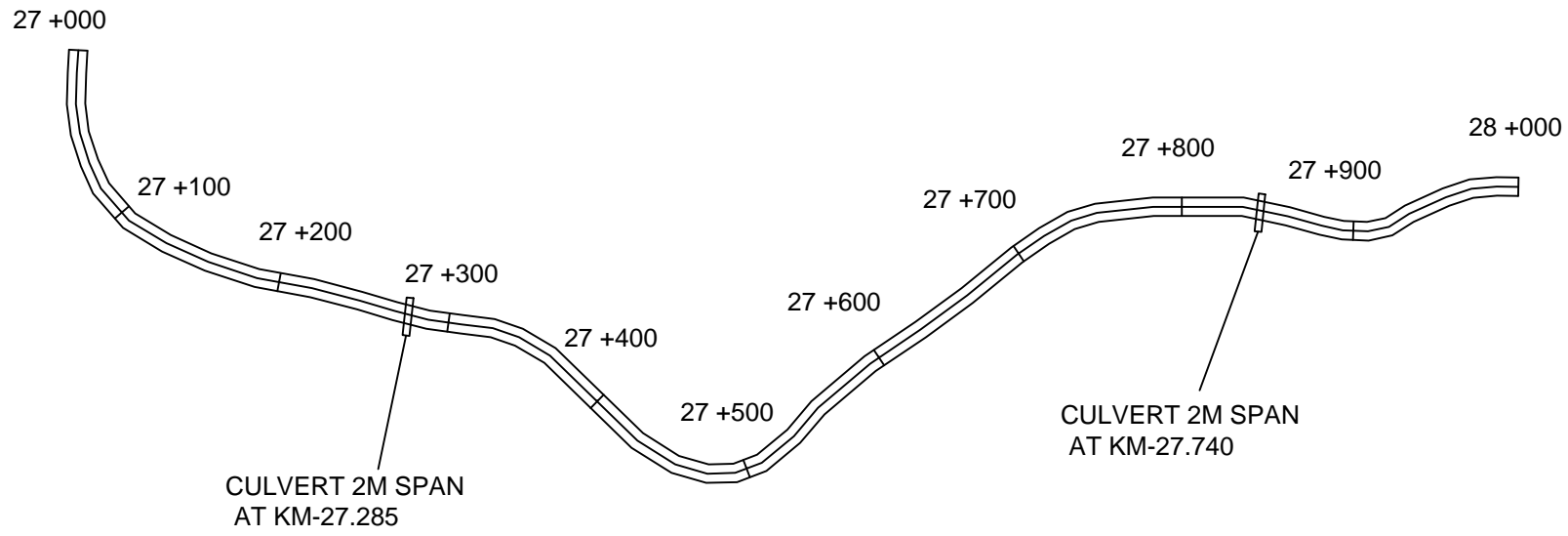
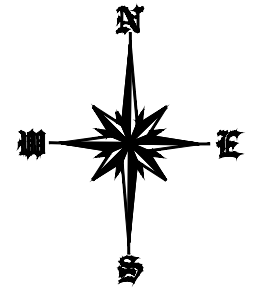
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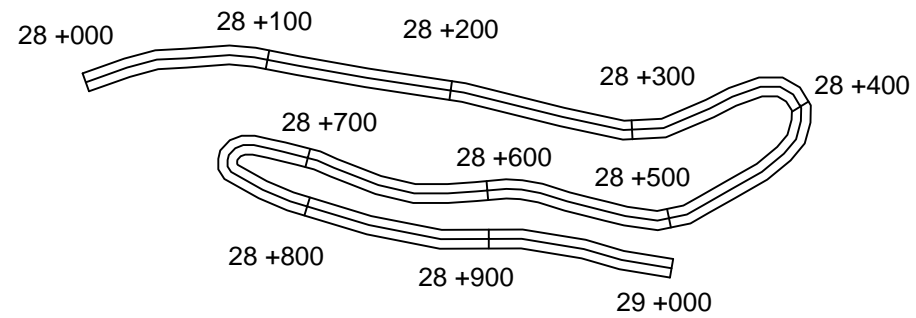
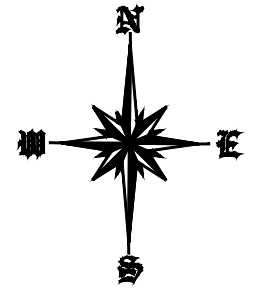
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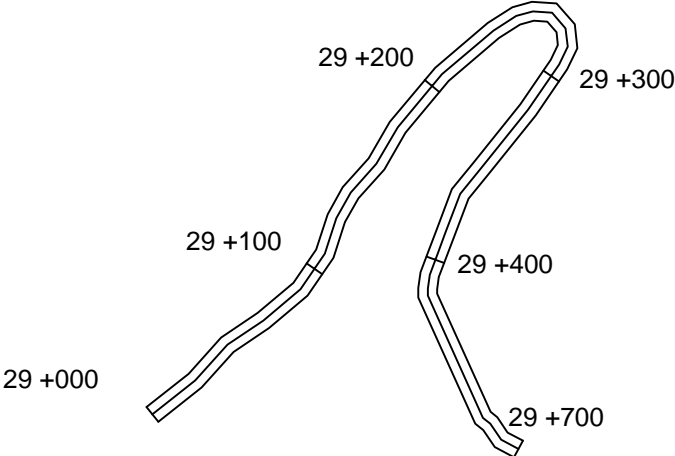
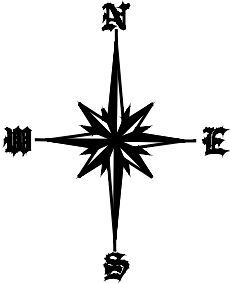
ANIMAL CROSSING LOCATION ON ROAD MANGAN-CHUNGTHANG



ANIMAL CROSSING LOCATION ON ROAD MANGAN-CHUNGTHANG



ANIMAL CROSSING LOCATION ON ROAD MANGAN-CHUNGTHANG



DETAILS OF ANIMAL CROSSING LOCATION ON ROAD MANGAN-CHUNGTHANG

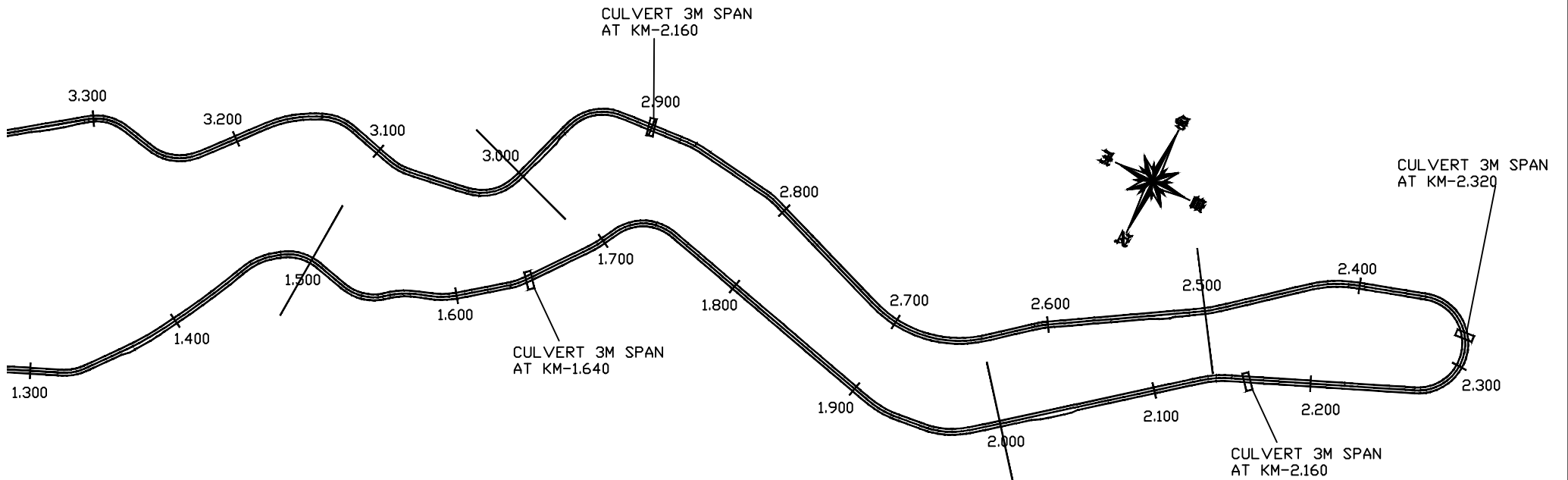
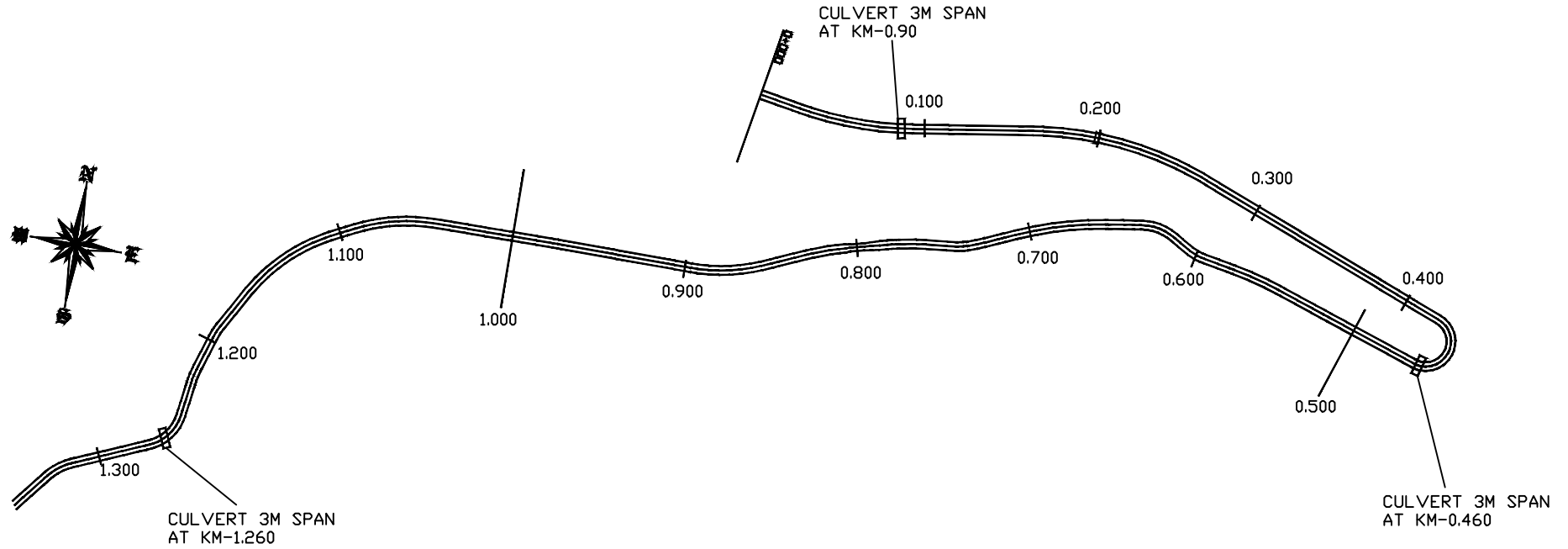
Sl No	Proposed Chainage of Animal crossing	Width of crossing in Mtr	Geographical coordinates		Remarks
1	0.010	2	27°30'14.81" N	88°32'21.65"E	7.45 Mtr Length
2	0.630	2	27°30'27.12" N	88°32'17.62"E	
3	0.980	2	27°30'33.28" N	88°32'22.00"E	
4	1.430	2	27°30'43.76" N	88°32'28.35"E	
5	1.920	2	27°30'59.13" N	88°32'20.87"E	
6	2.460	2	27°30'59.44" N	88°32'36.07"E	
7	3.010	2	27°30'58.44" N	88°32'53.52"E	
8	3.560	2	27°30'59.56" N	88°33'05.79"E	
9	4.170	2	27°30'55.73" N	88°33'22.27"E	
10	4.680	2	27°30'47.80" N	88°33'36.60"E	
11	5.290	2	27°30'44.71" N	88°33'44.47"E	
12	5.800	2	27°30'48.57" N	88°33'52.38"E	
13	6.020	2	27°30'55.15" N	88°33'58.80"E	
14	6.290	2	27°30'57.06" N	88°34'07.28"E	
15	6.820	2	27°30'54.79" N	88°34'19.18"E	
16	7.220	2	27°30'51.42" N	88°34'35.12"E	
17	7.810	2	27°30'53.36" N	88°34'46.74"E	
18	8.220	2	27°30'53.48" N	88°34'53.15"E	
19	8.700	2	27°30'52.85" N	88°34'56.32"E	
20	9.010	2	27°30'54.46" N	88°34'58.20"E	
21	9.680	2	27°30'57.42" N	88°35'09.80"E	
22	10.080	2	27°31'04.34" N	88°35'20.83"E	
23	10.490	2	27°31'31.30" N	88°35'26.63"E	
24	11.320	2	27°31'41.53" N	88°35'38.45"E	
25	11.800	2	27°31'34.81" N	88°35'59.73"E	
26	12.290	2	27°31'38.32" N	88°36'25.64"E	
27	12.790	2	27°31'57.08" N	88°36'20.52"E	
28	13.200	2	27°31'59.56" N	88°36'29.62"E	
29	13.800	2	27°32'05.28" N	88°36'36.07"E	
30	14.300	2	27°32'04.85" N	88°36'37.25"E	
31	14.800	2	27°32'03.97" N	88°36'38.25"E	
32	15.400	2	27°32'05.87" N	88°36'37.54"E	
33	15.900	2	27°32'07.45" N	88°36'42.37"E	
34	16.410	2	27°32'10.19" N	88°36'49.67"E	
35	16.910	2	27°32'17.10" N	88°36'10.97"E	
36	17.550	2	27°32'22.17" N	88°37'12.22"E	
37	18.100	2	27°32'28.39" N	88°37'22.32"E	
38	18.620	2	27°32'32.54" N	88°37'34.91"E	
39	19.140	2	27°32'34.92" N	88°37'32.30"E	

DETAILS OF ANIMAL CROSSING LOCATION ON ROAD MANGAN-CHUNGTHANG

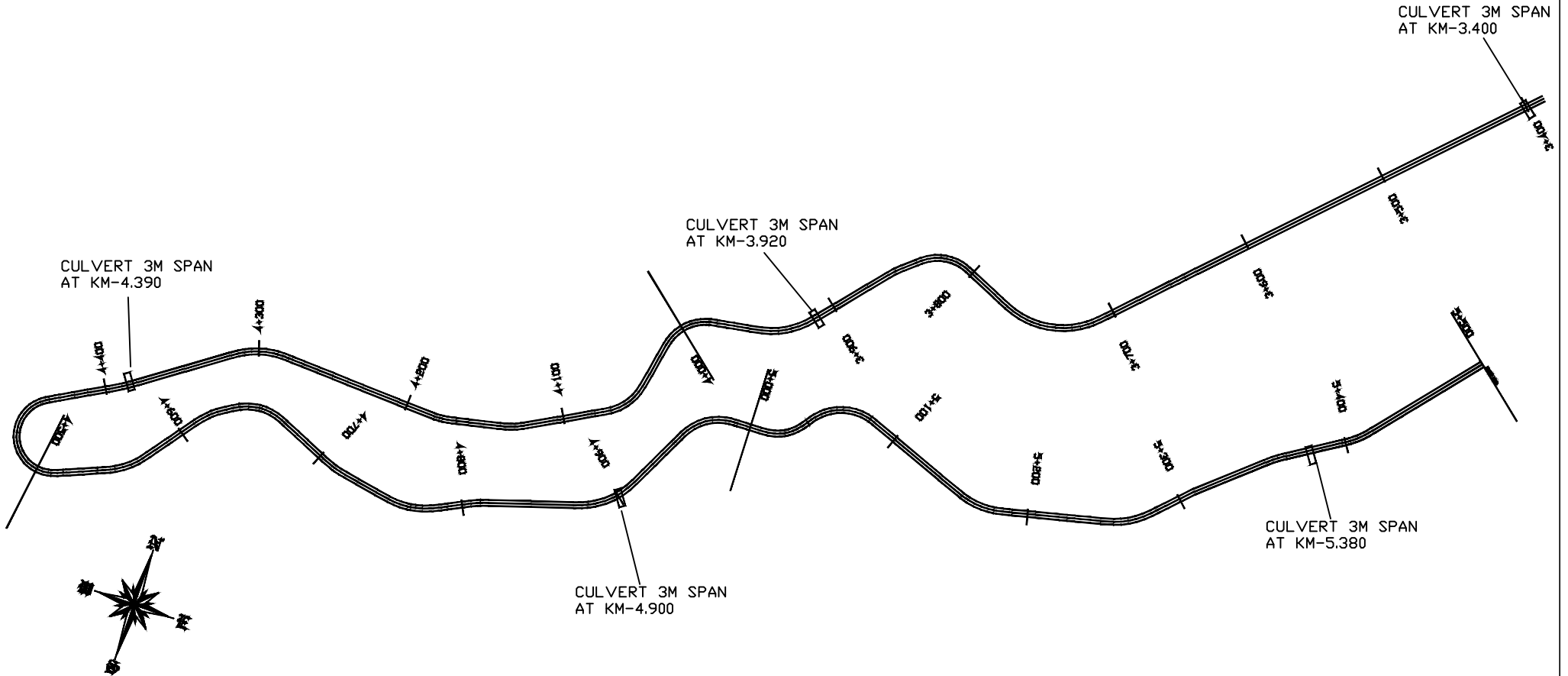
SI No	Proposed Chainage of Animal crossing	Width of crossing in Mtr	Geographical coordinates		Remarks
40	19.580	2	27°32'37.31" N	88°37'40.78"E	7.45 Mtr Length
41	20.600	2	27°32'37.69" N	88°37'50.20"E	
42	20.335	2	27°32'44.56" N	88°38'13.92"E	
43	21.225	2	27°32'50.21" N	88°38'25.52"E	
44	21.680	2	27°32'55.23" N	88°38'37.29"E	
45	22.140	2	27°33'00.62" N	88°38'38.38"E	
46	22.635	2	27°33'03.50" N	88°38'33.99"E	
47	23.220	2	27°33'04.10" N	88°38'41.08"E	
48	23.845	2	27°33'02.75" N	88°38'50.78"E	
49	24.160	2	27°33'03.91" N	88°39'08.12"E	
50	24.760	2	27°33'15.09" N	88°39'15.62"E	
51	25.210	2	27°33'21.82" N	88°39'08.72"E	
52	25.835	2	27°33'37.87" N	88°39'07.92"E	
53	26.430	2	27°33'54.61" N	88°39'05.19"E	
54	26.910	2	27°34'02.08" N	88°39'04.88"E	
55	27.285	2	27°34'04.77" N	88°39'04.02"E	
56	27.740	2	27°34'20.87" N	88°39'00.39"E	
57	28.300	2	27°35'12.96" N	88°39'04.35"E	
58	28.830	2	27°35'25.19" N	88°39'07.53"E	
59	29.240	2	27°35'41.01" N	88°38'59.35"E	

Details for Existing Minor and Major Bridge of Road Mangan-Chungthang					
Sr No	Location	Width (Mtr)	Latitude	Longitude	Remarks
1	5.400	27.43	27 ⁰ 30'53.33"N	88 ⁰ 33'53.80"E	7.45 Mtr Length
2	17.070	21.34	27 ⁰ 32'44.50"N	88 ⁰ 38'19.03"E	
3	18.500	48.77	27 ⁰ 32'58.14"N	88 ⁰ 38'41.00"E	
4	29.330	55.00	27 ⁰ 36'05.68"N	88 ⁰ 38'47.43"E	

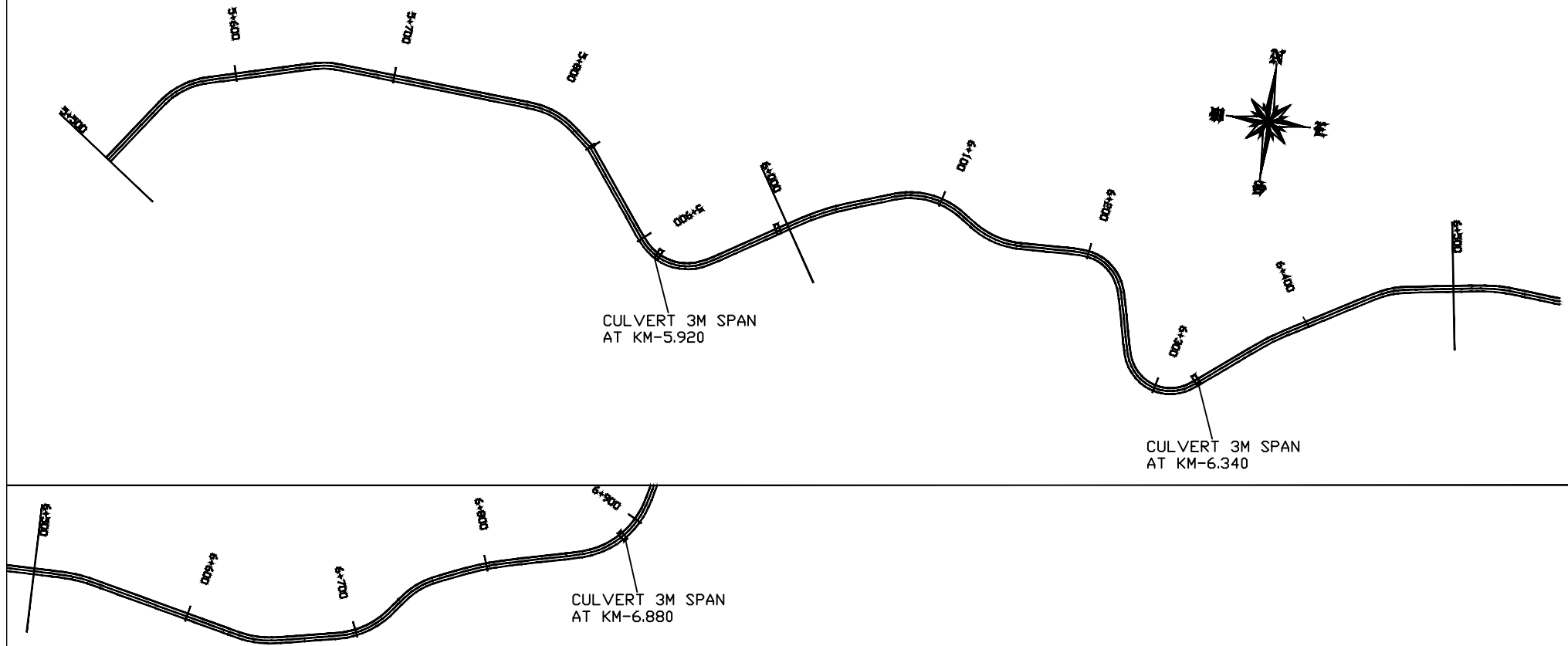
ANIMAL CROSSING LOCATION ON ROAD TOONG-PARTEM



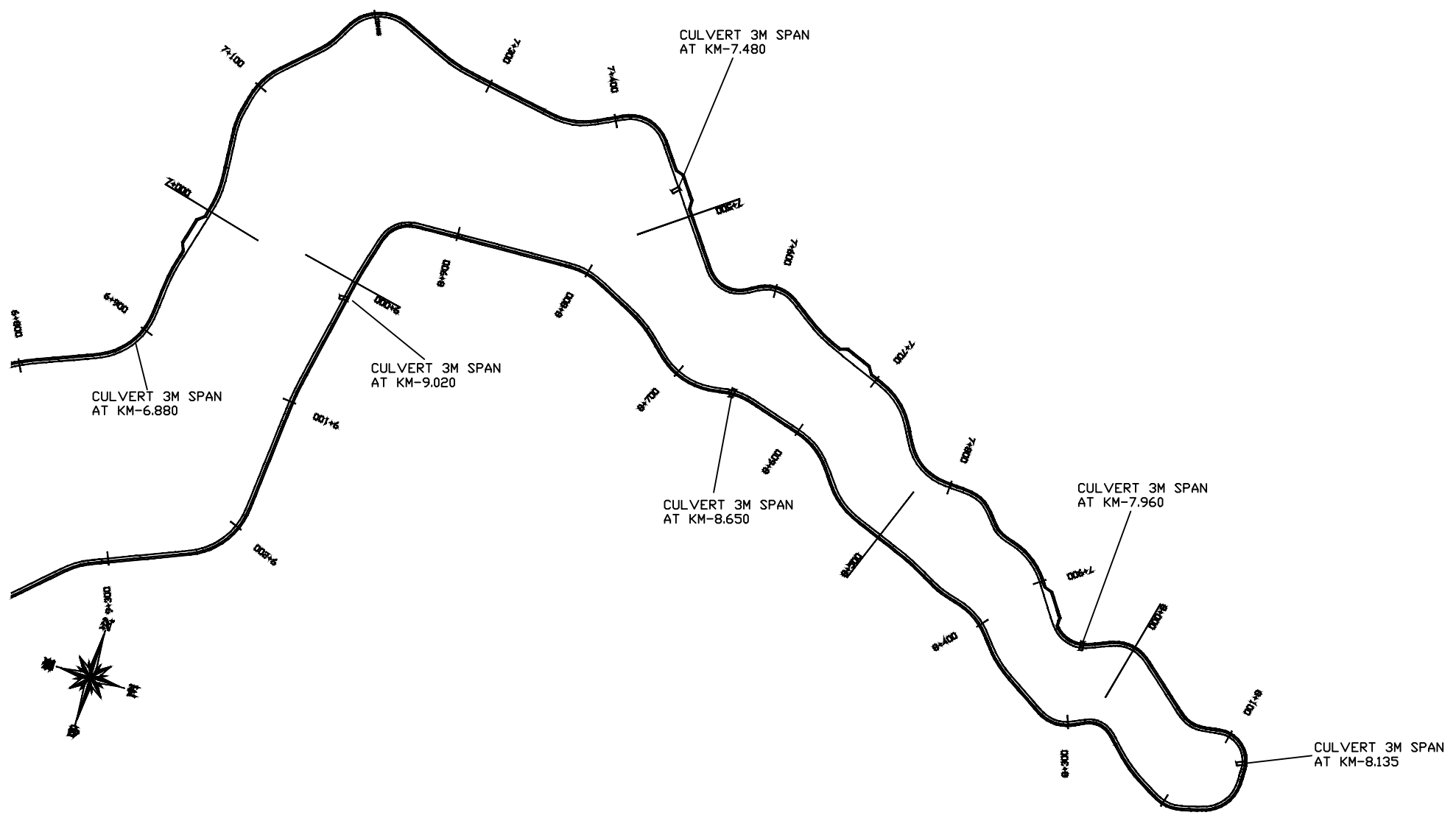
ANIMAL CROSSING LOCATION ON ROAD TOONG-PARTEM



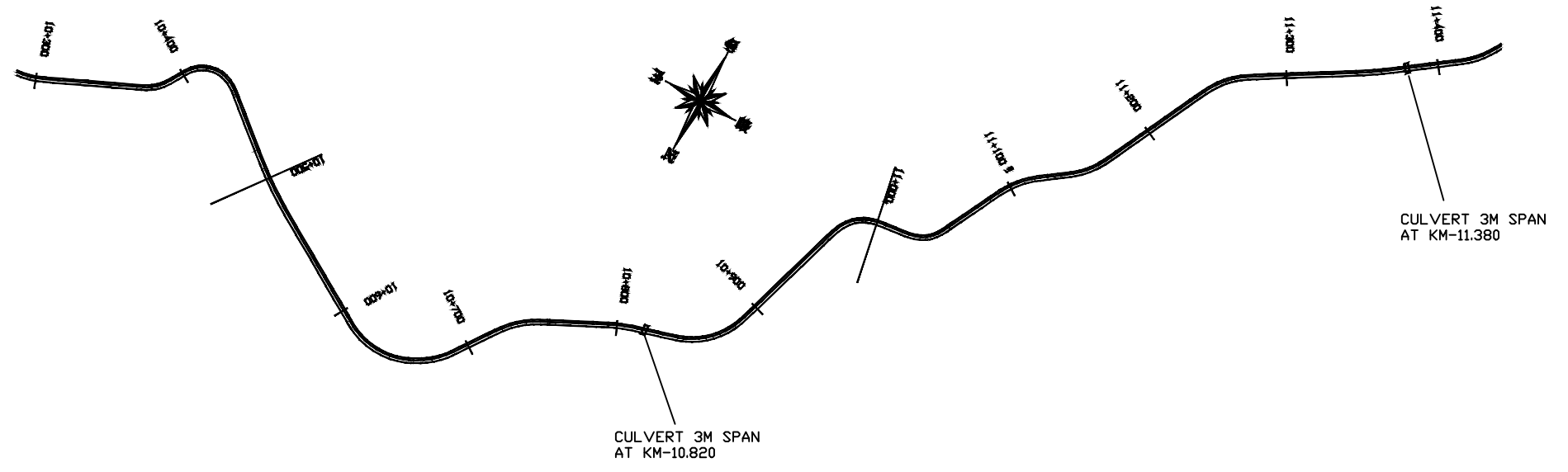
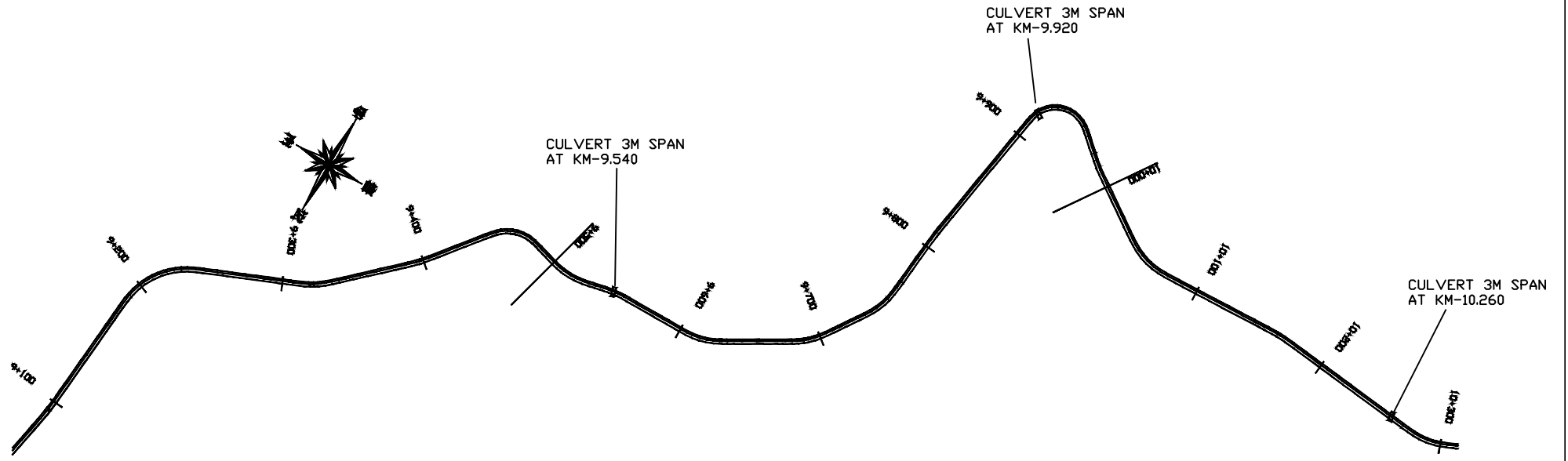
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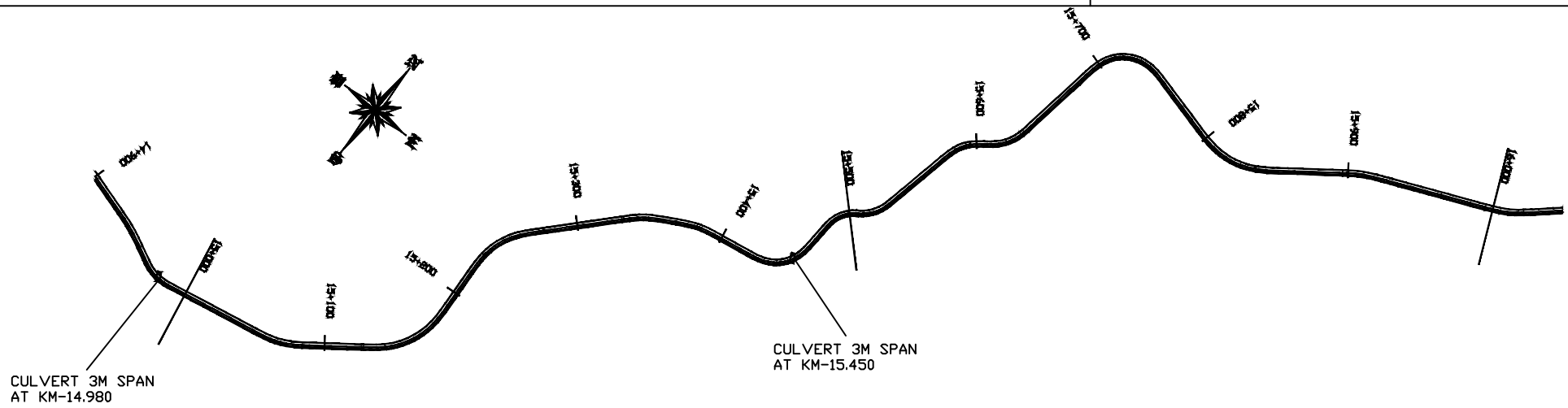
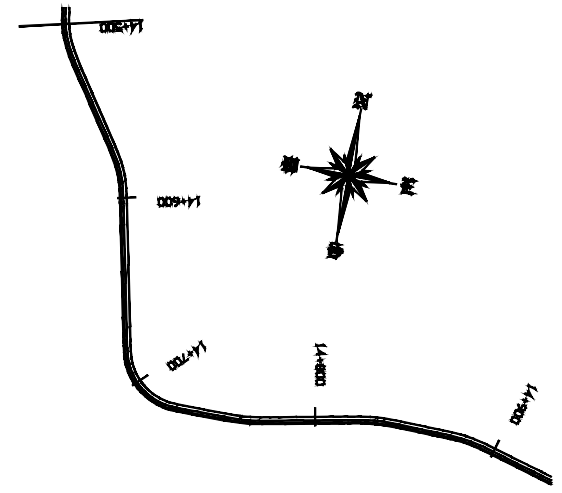
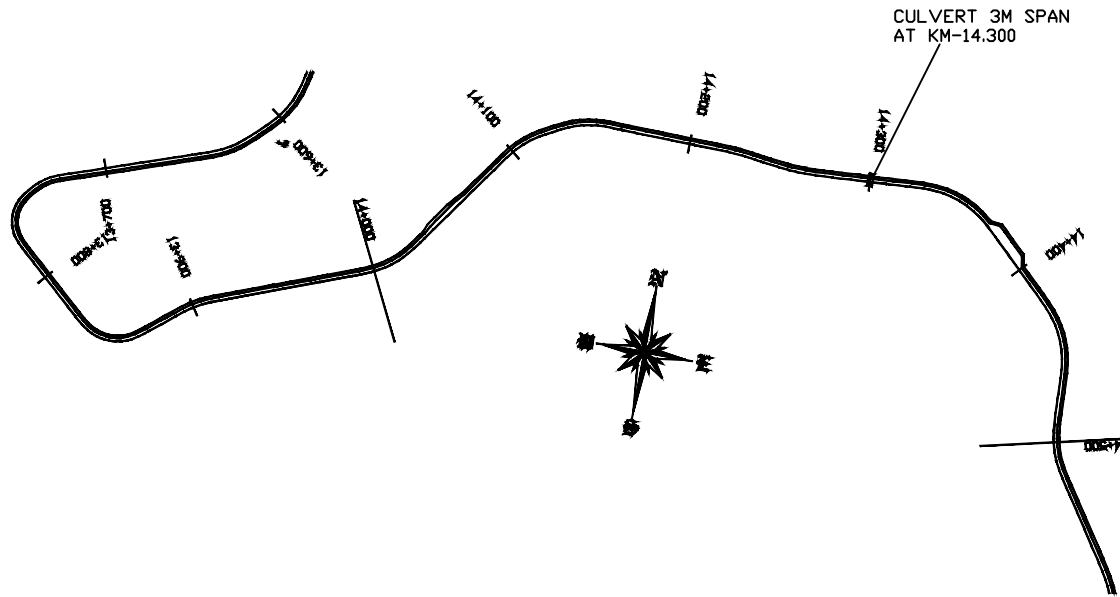
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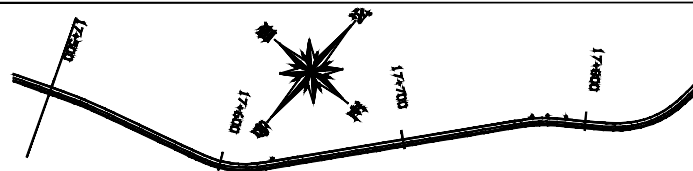
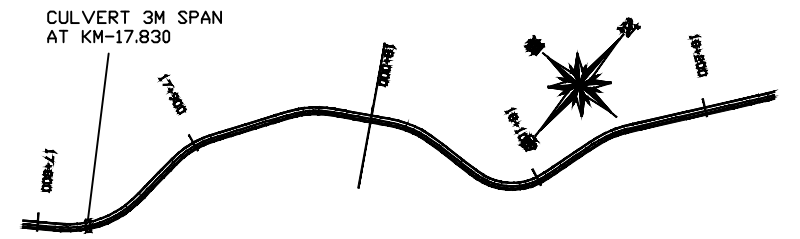
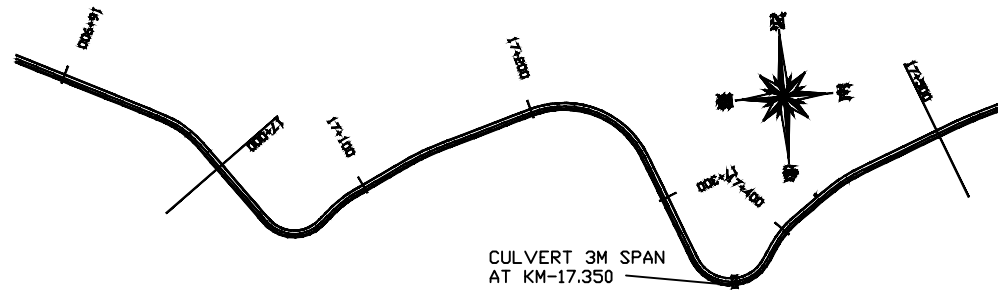
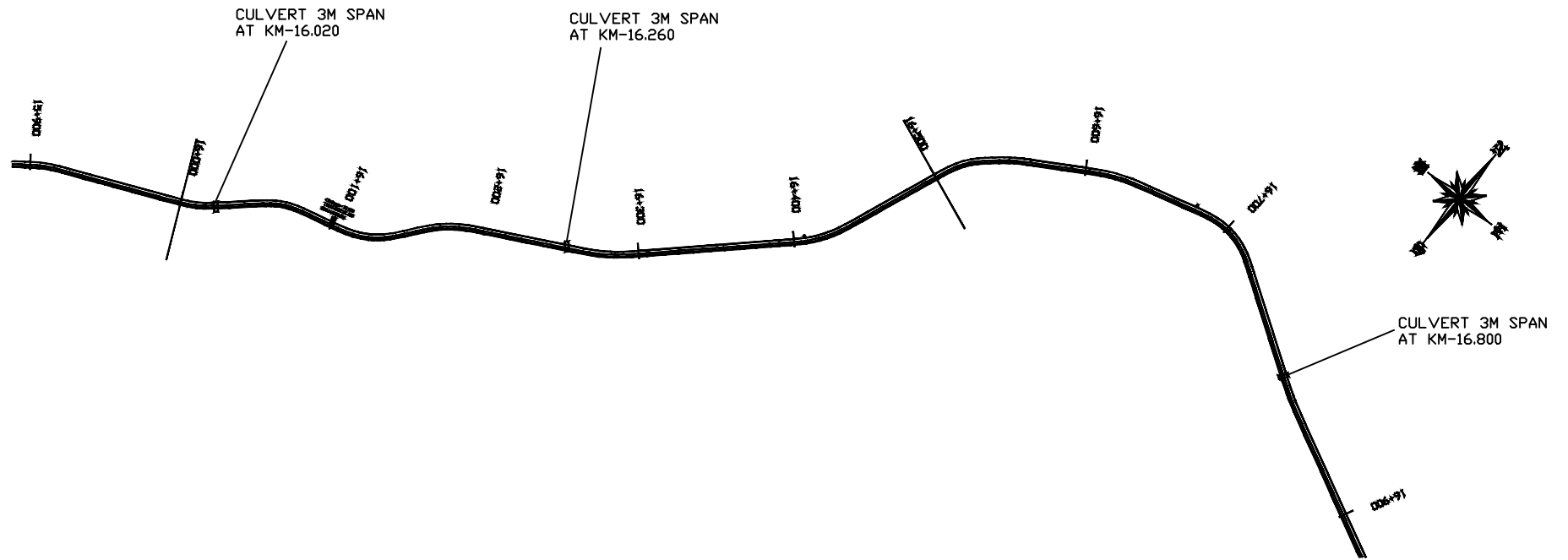
ANIMAL CROSSING LOCATION ON ROAD TOONG-PARTEM



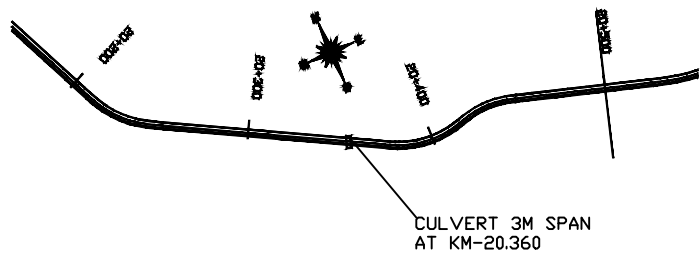
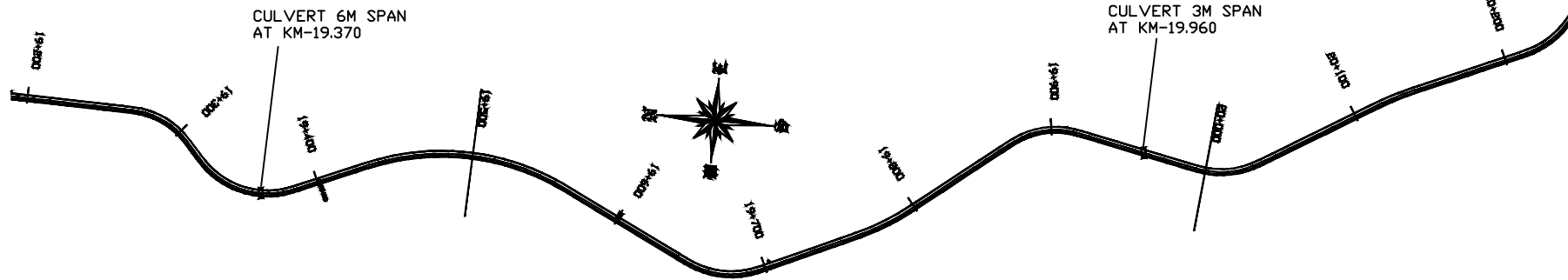
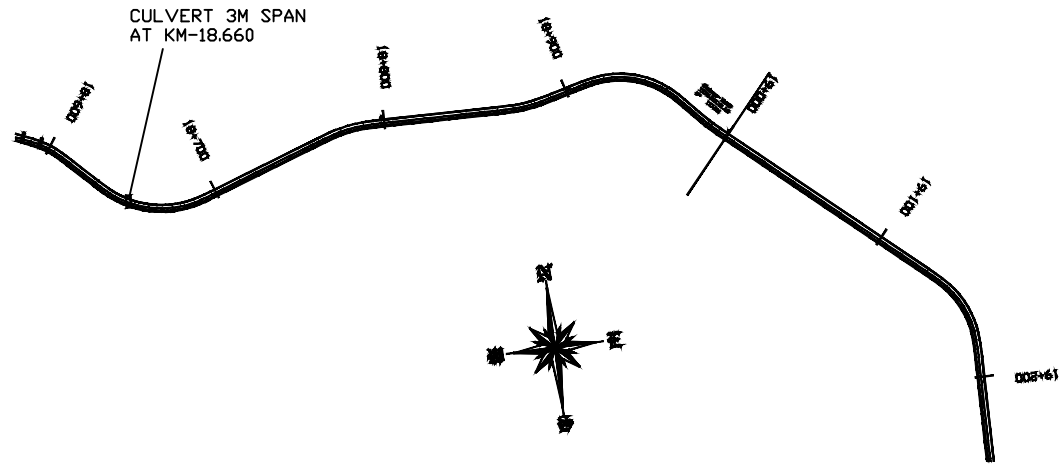
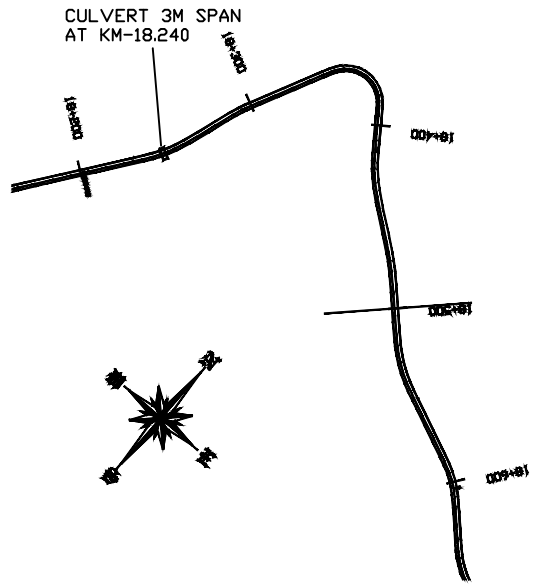
ANIMAL CROSSING LOCATION ON ROAD TOONG-PARTEM



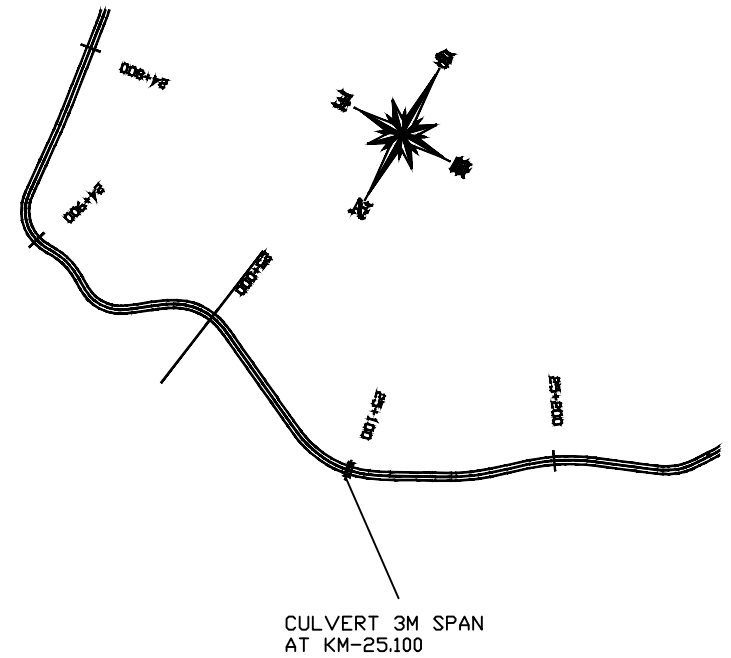
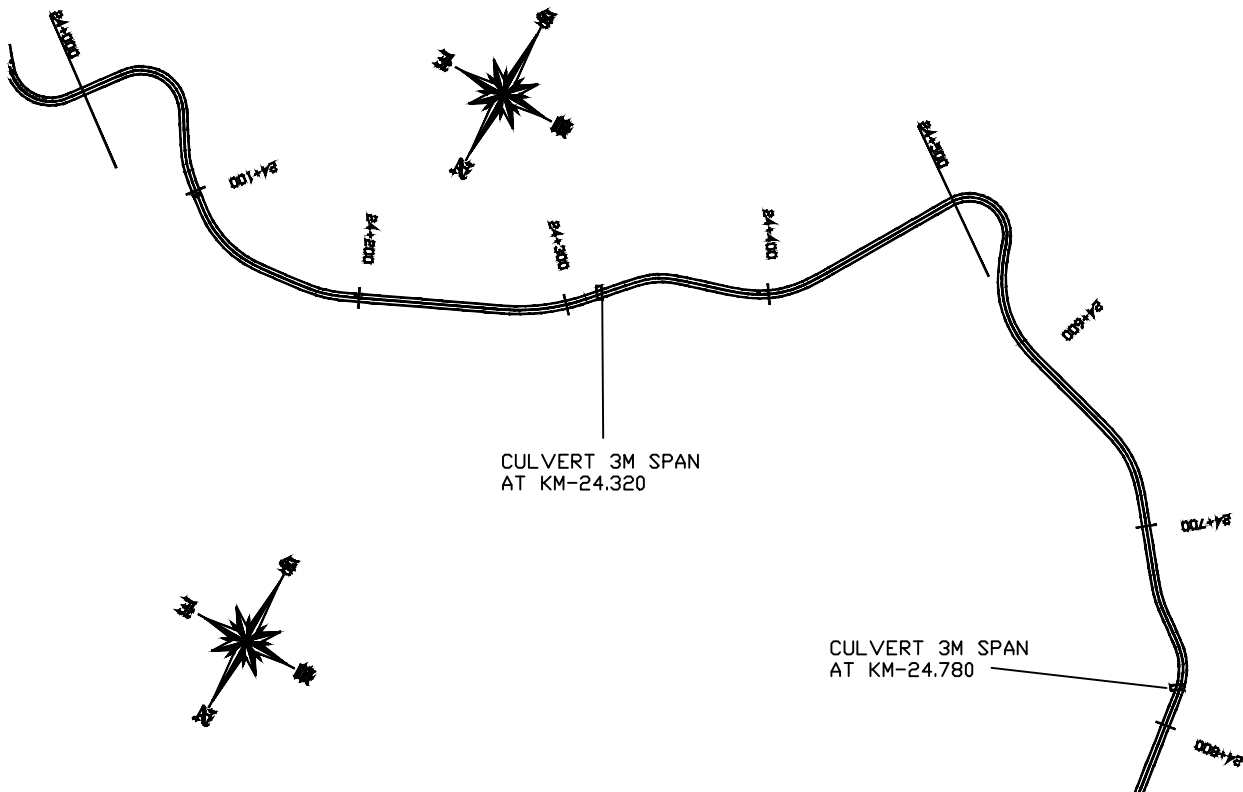
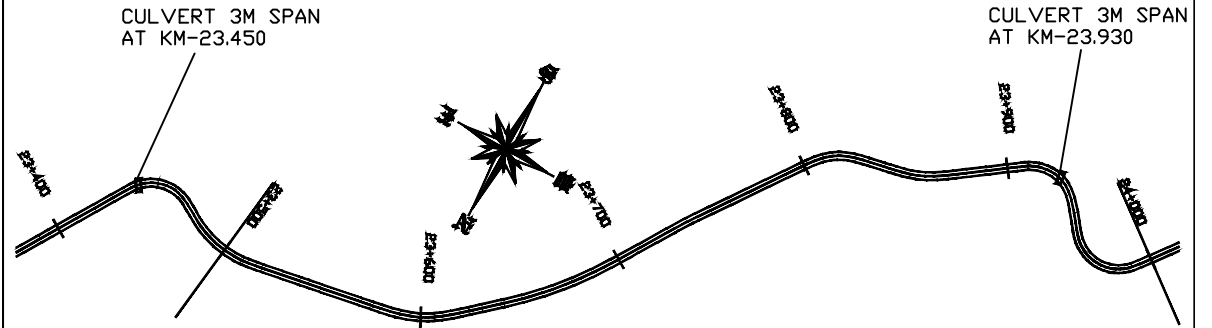
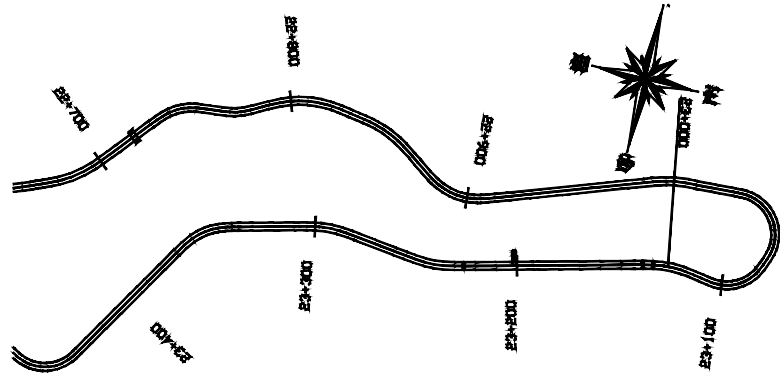
ANIMAL CROSSING LOCATION ON ROAD TOONG-PARTEM



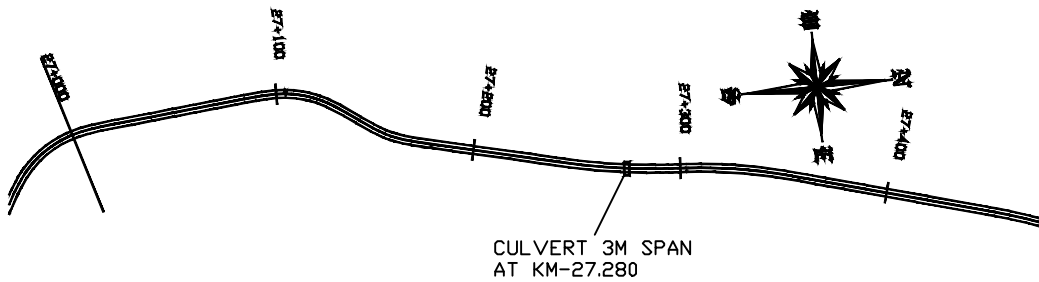
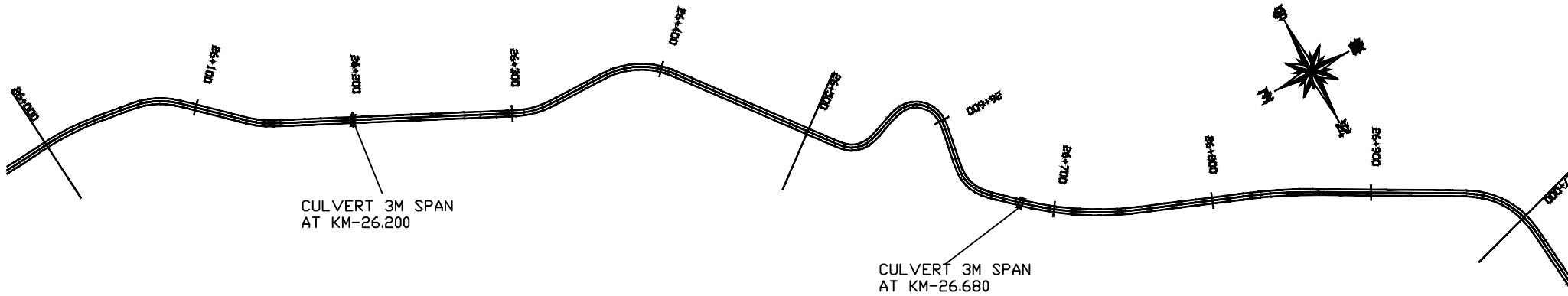
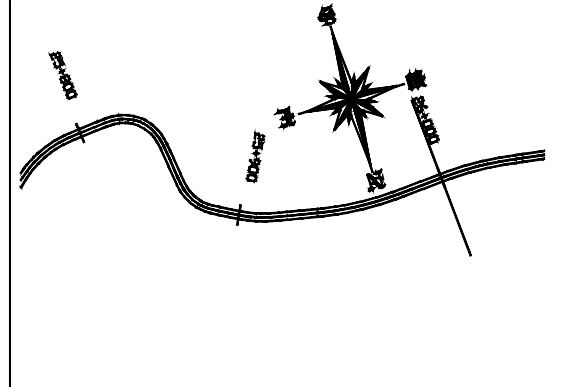
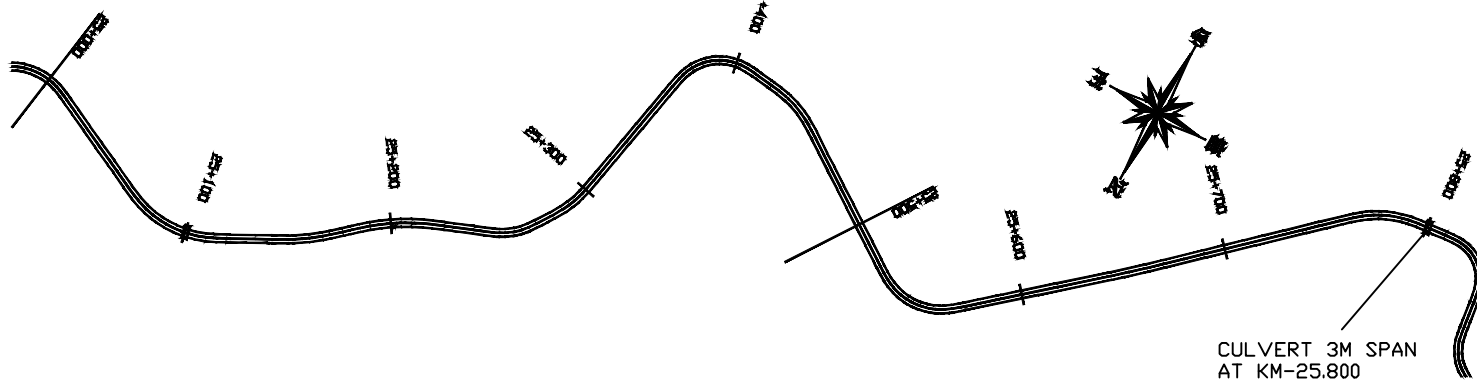
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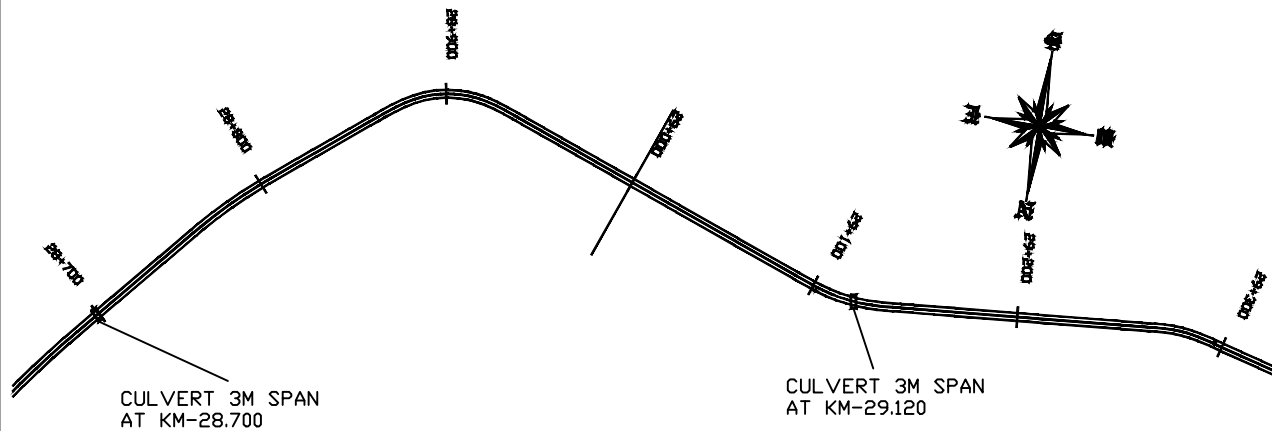
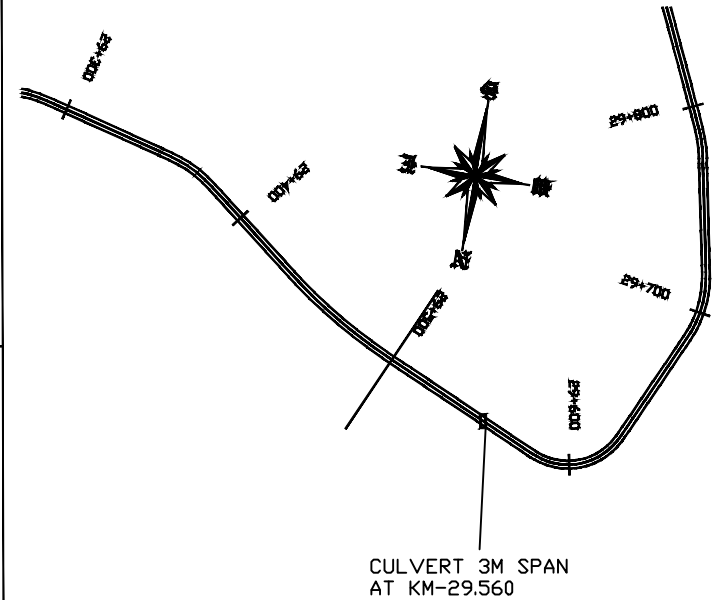
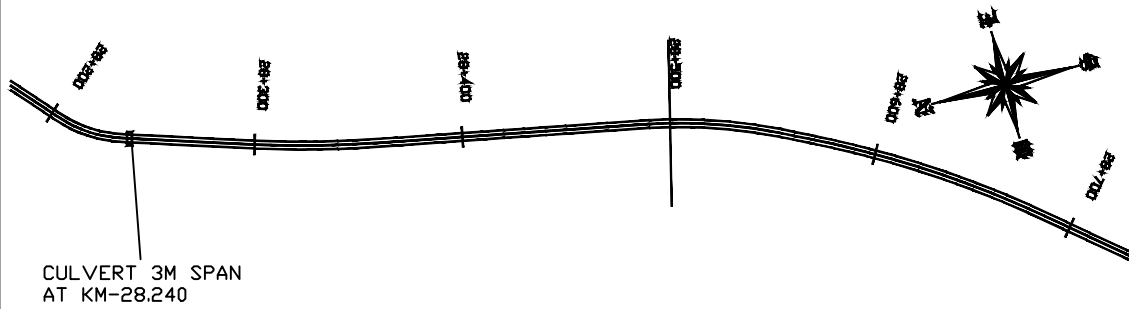
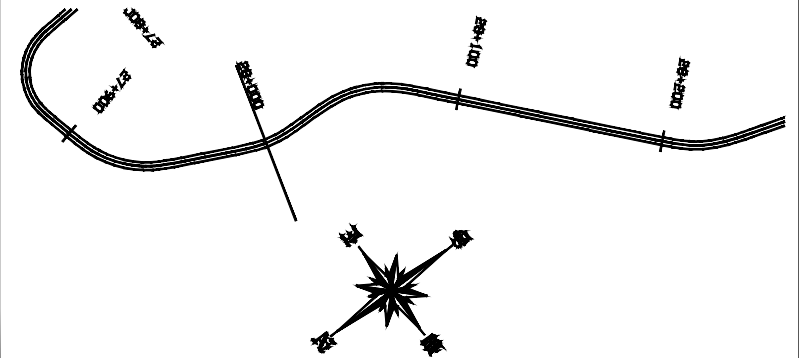
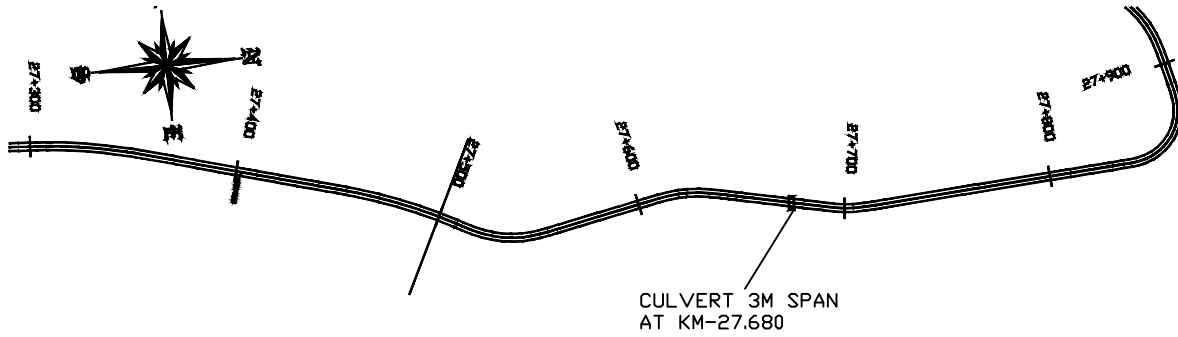
ANIMAL CROSSING LOCATION ON ROAD TOONG-PARTEM



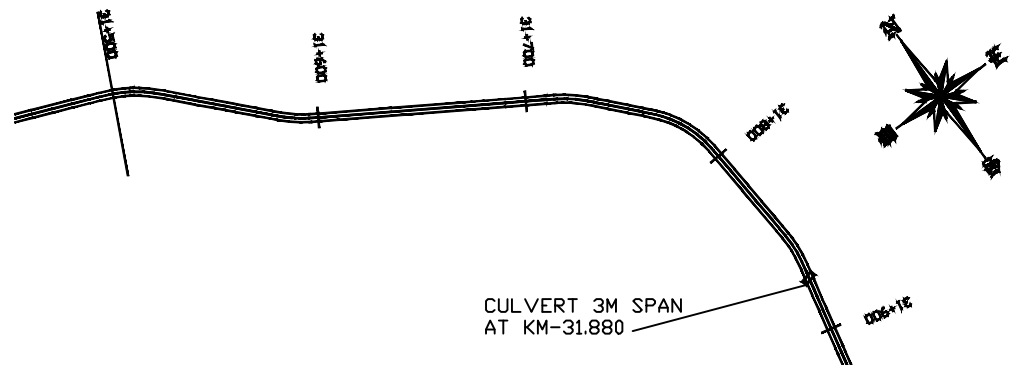
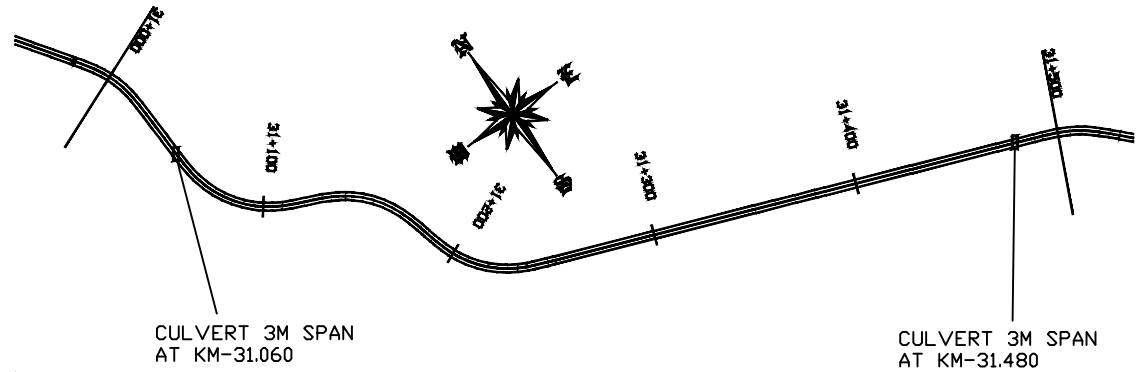
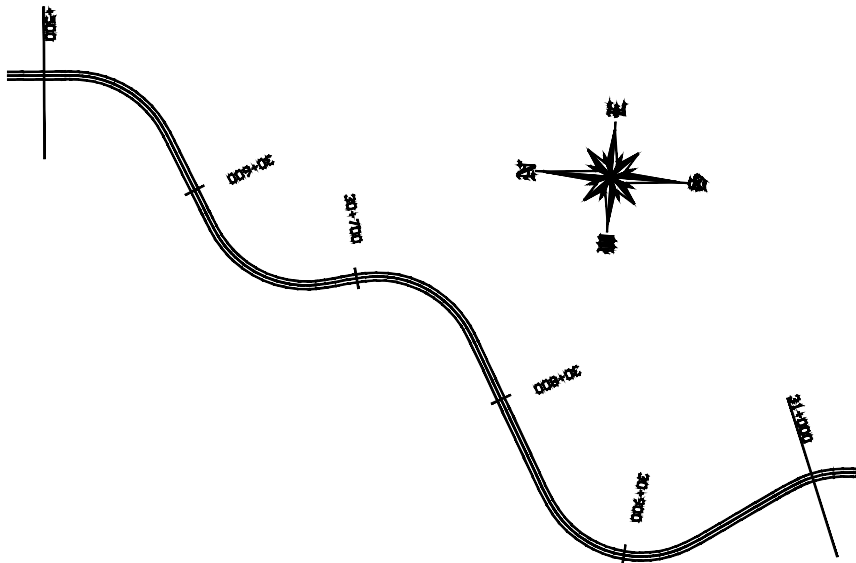
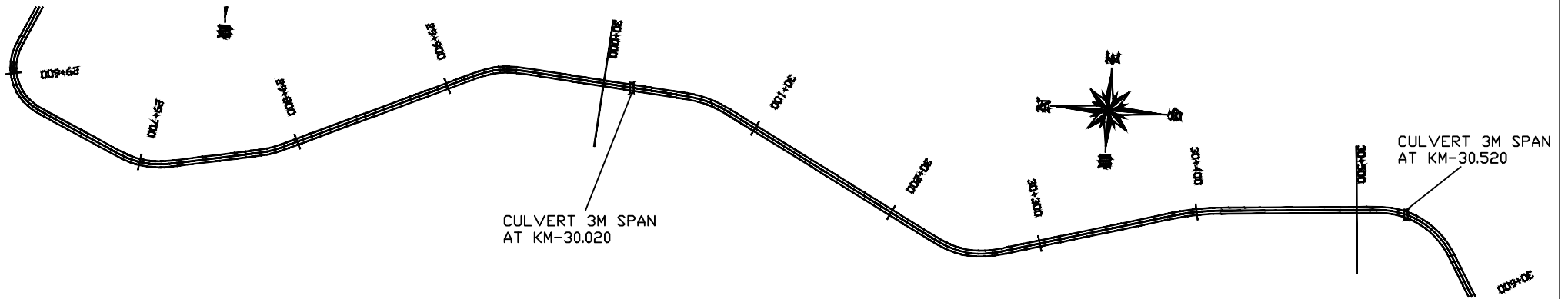
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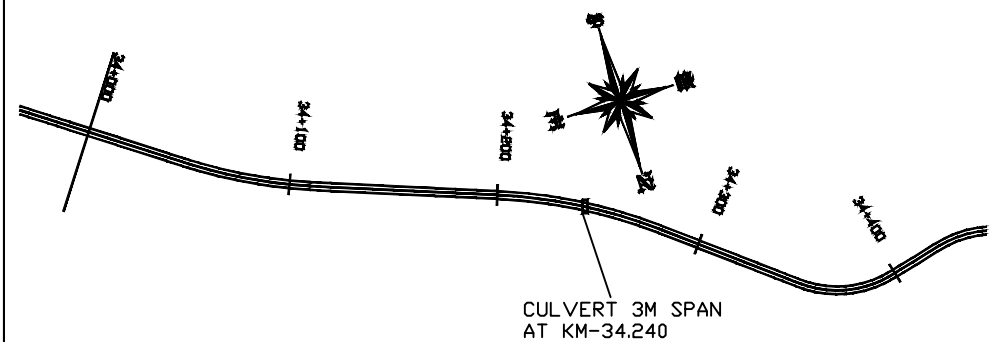
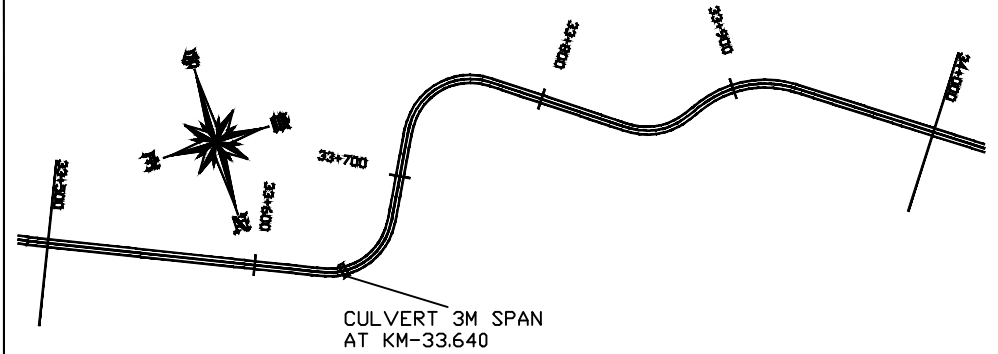
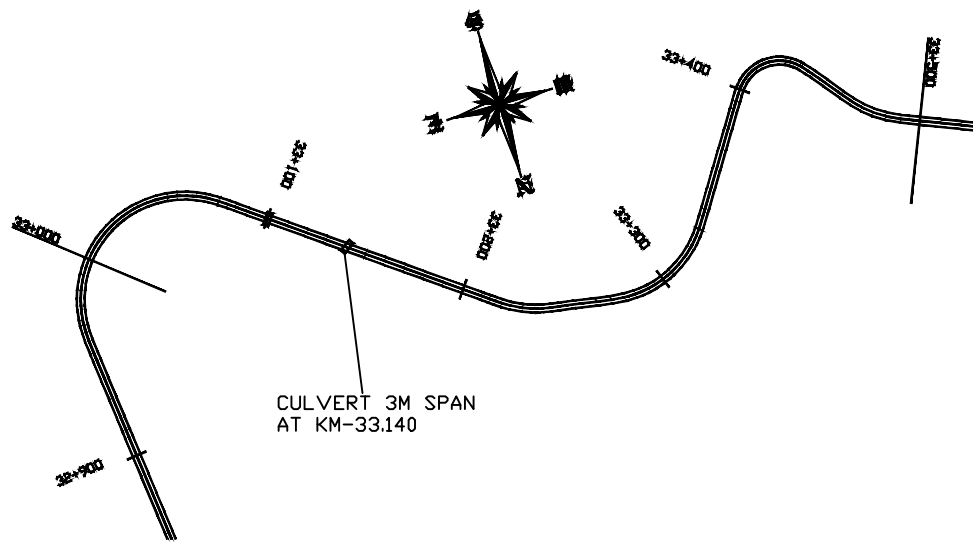
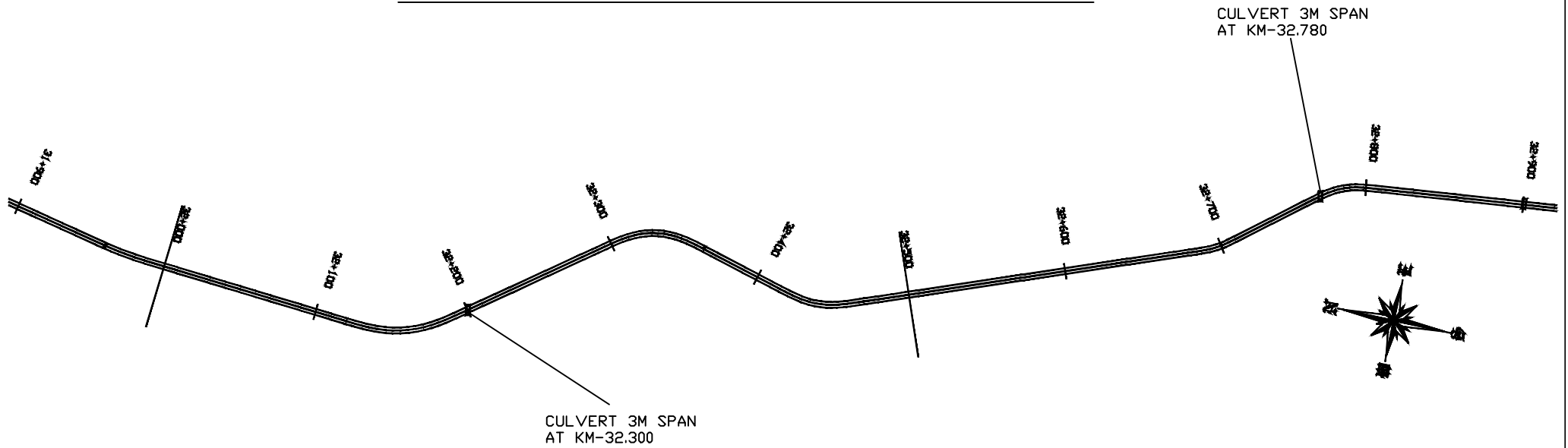
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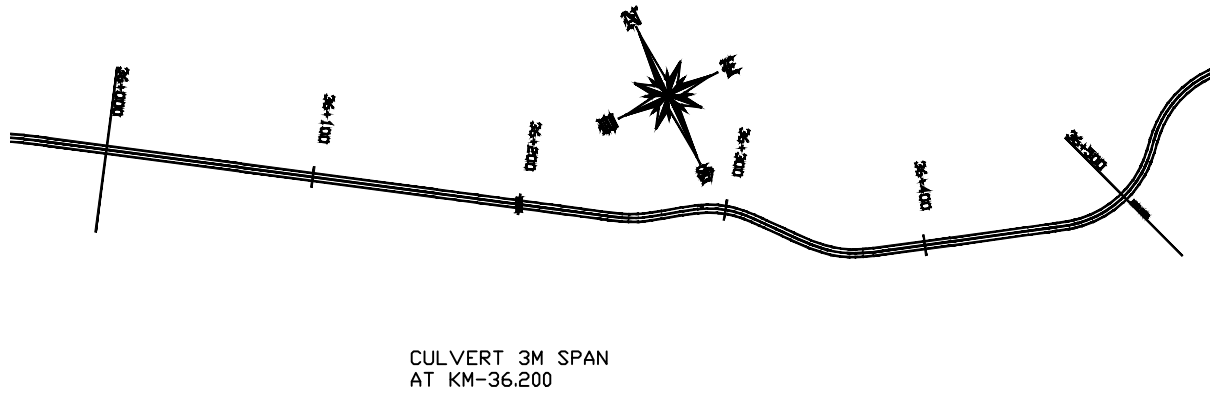
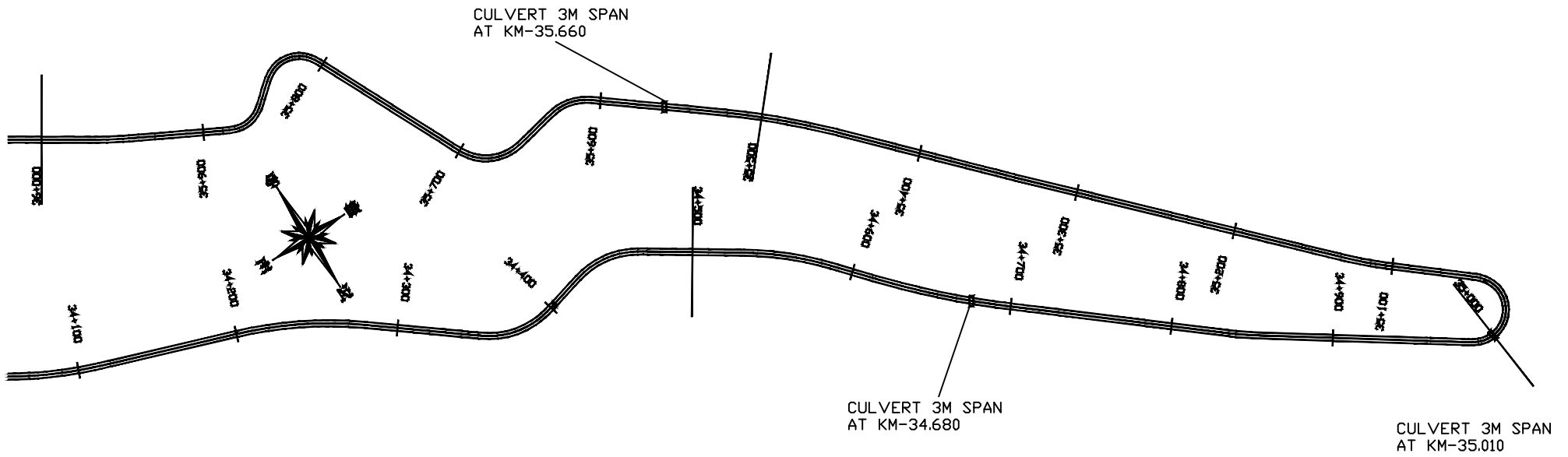
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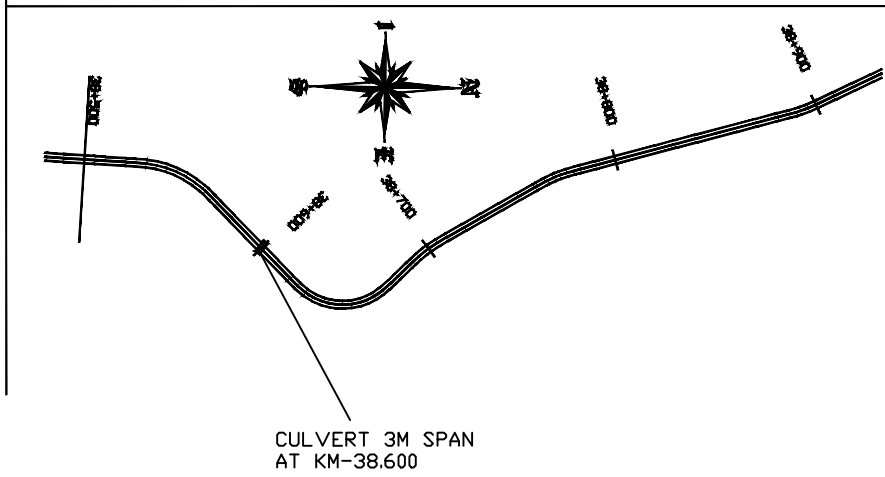
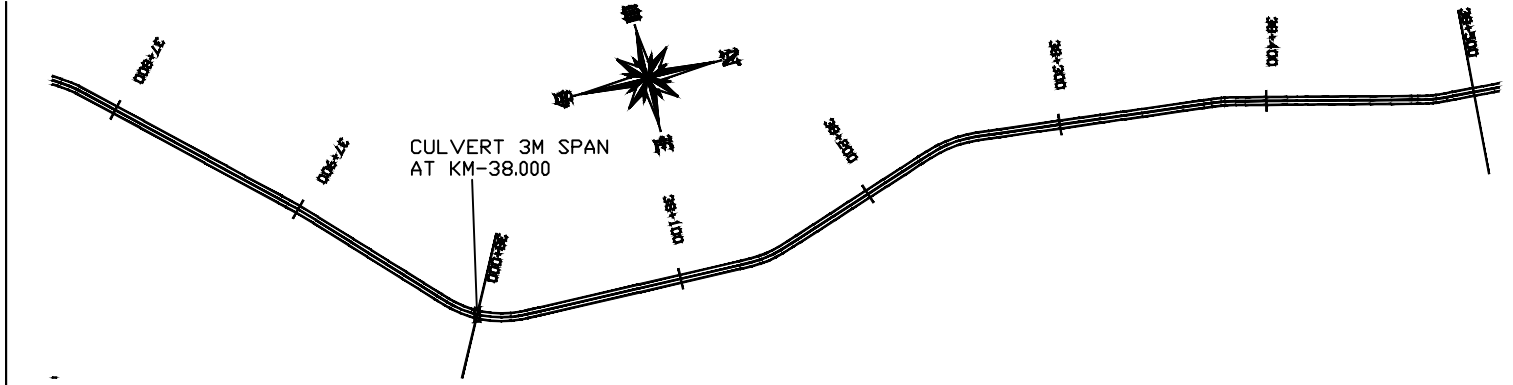
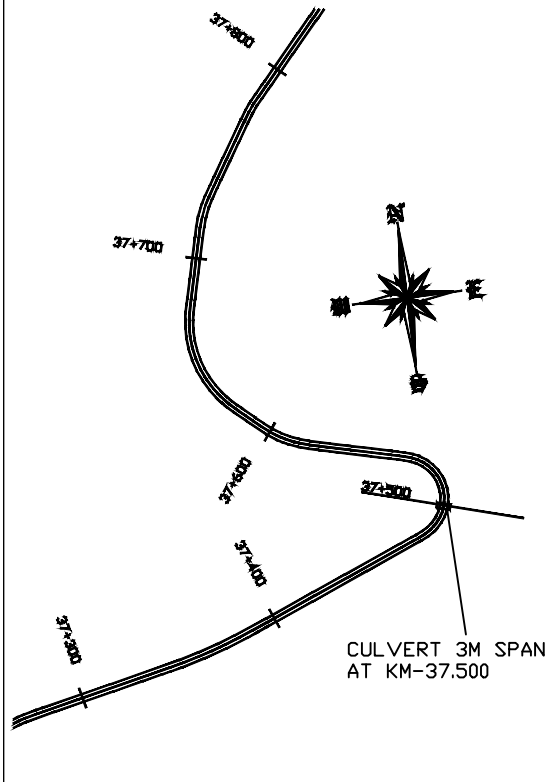
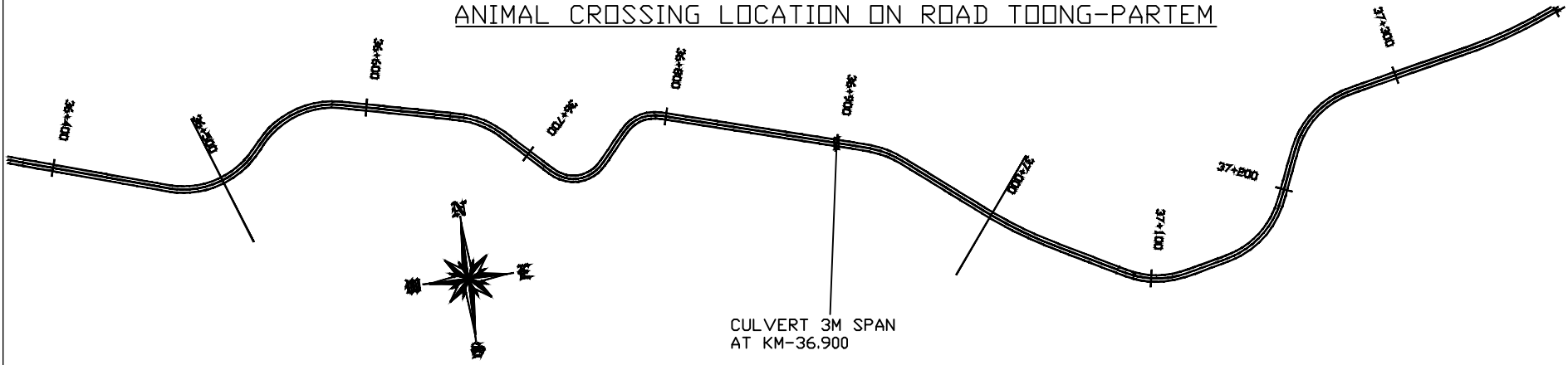
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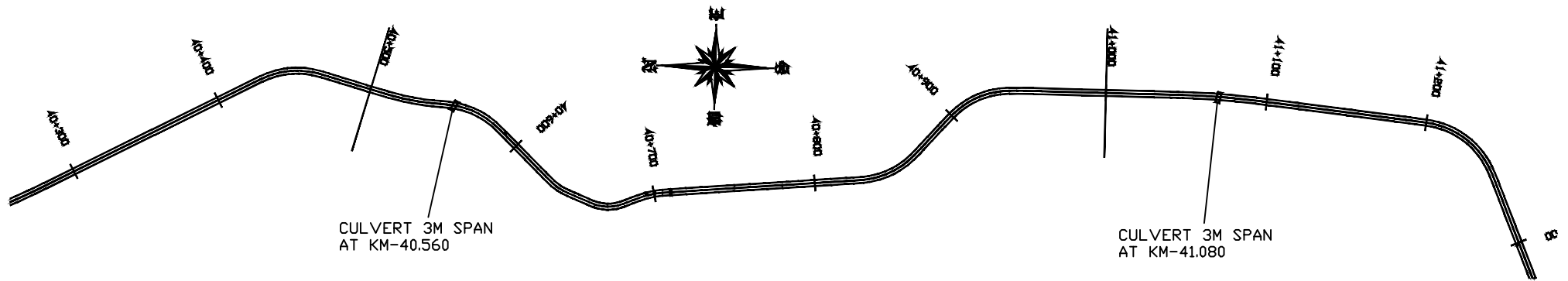
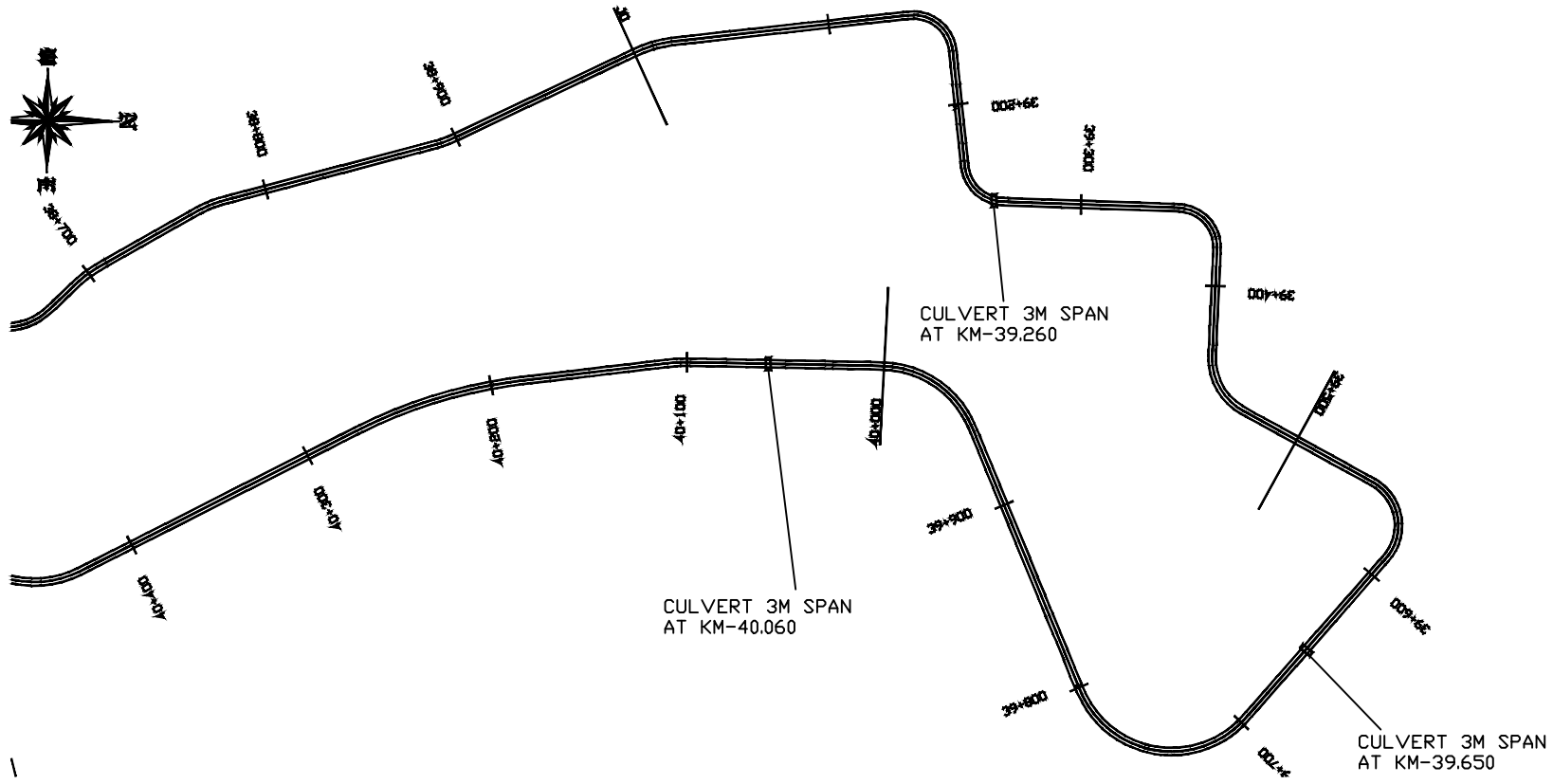
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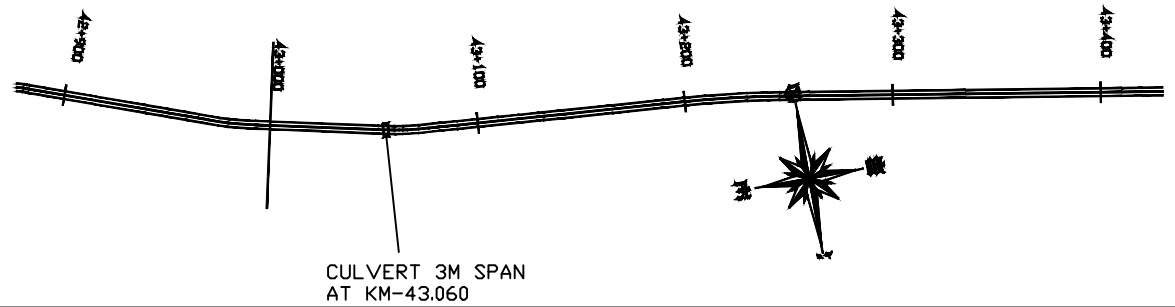
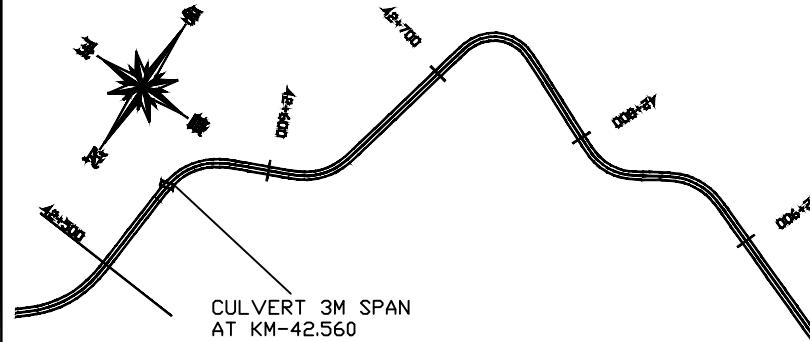
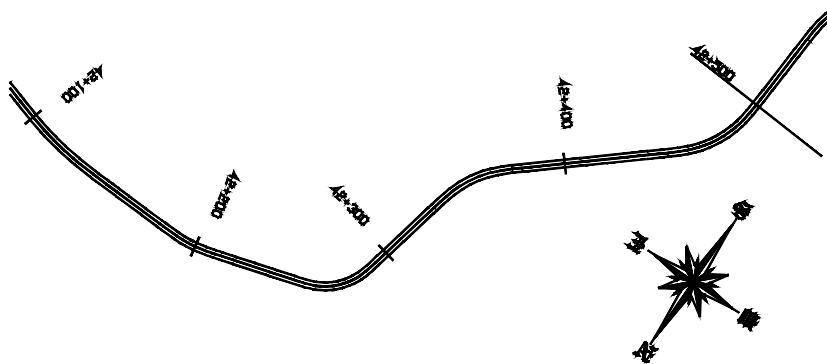
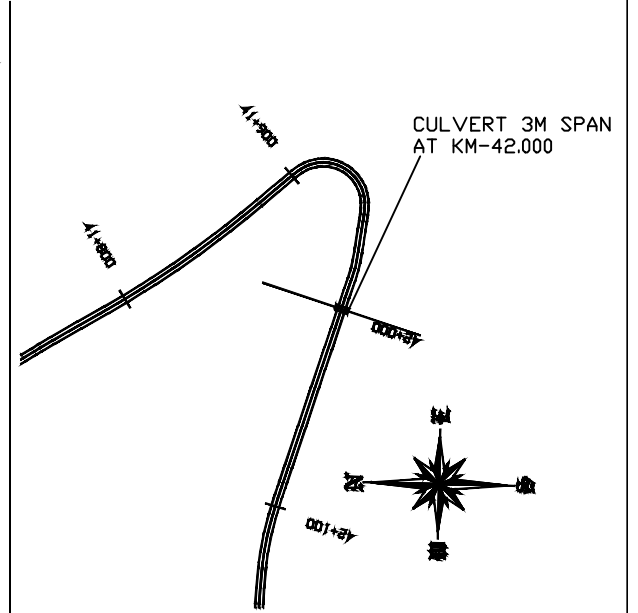
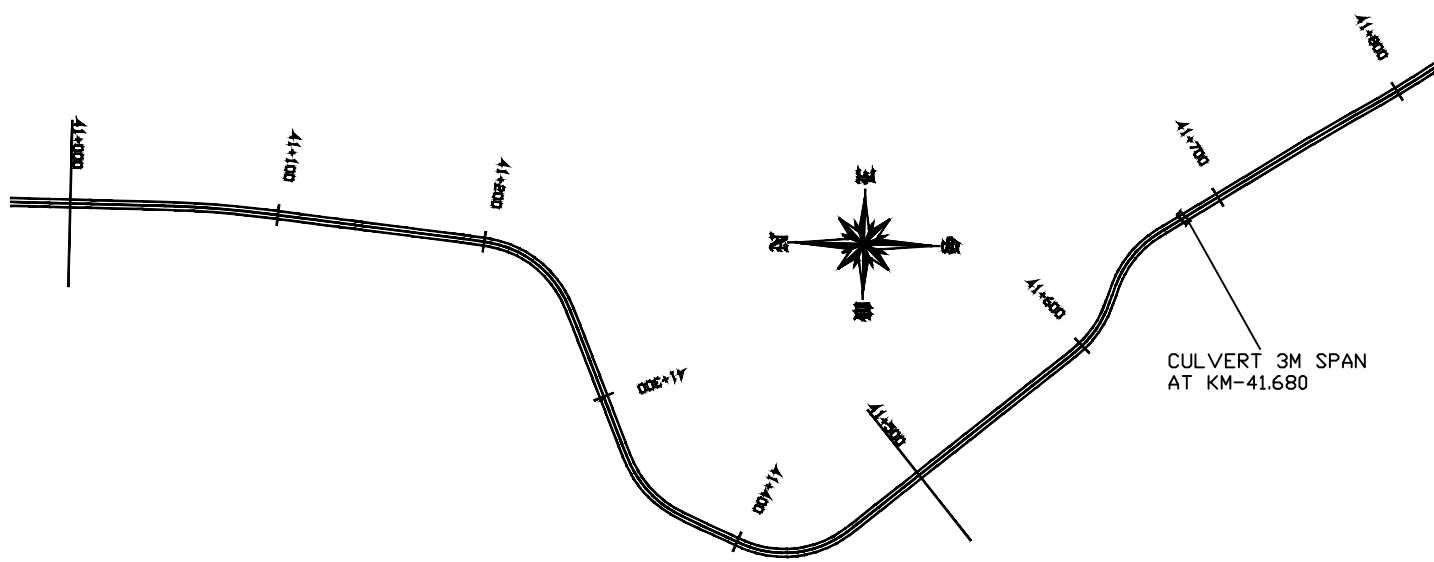
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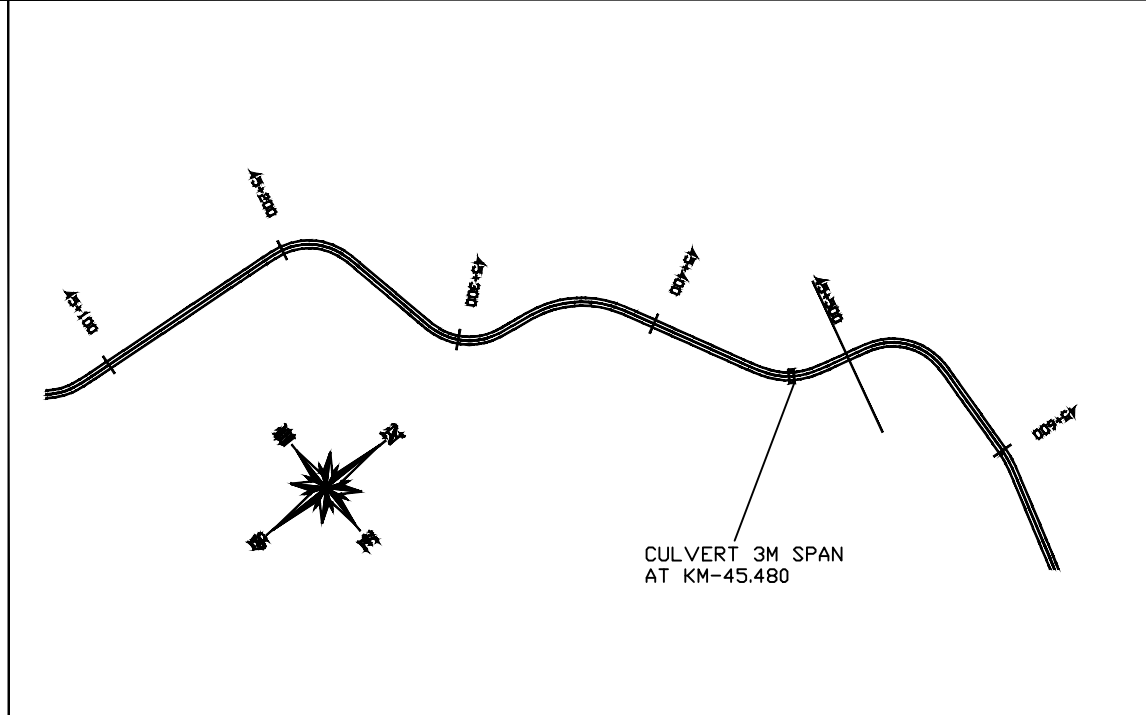
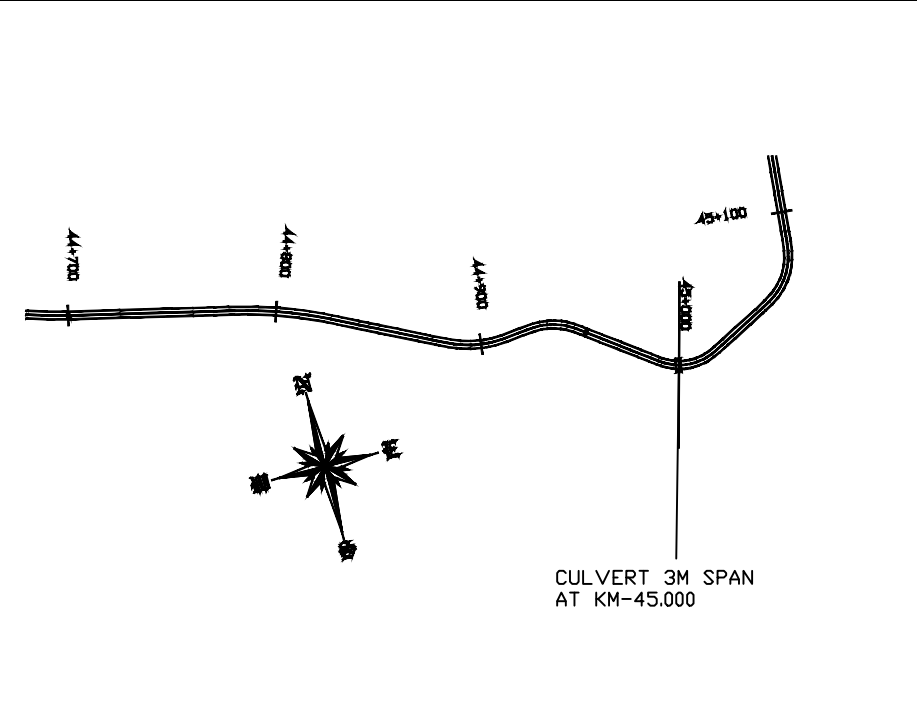
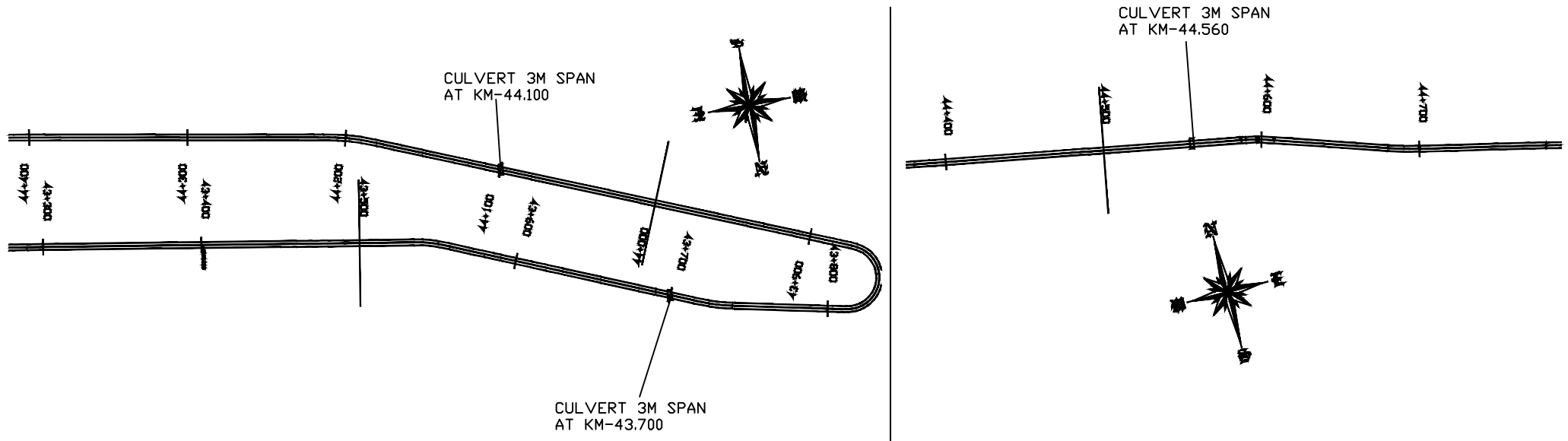
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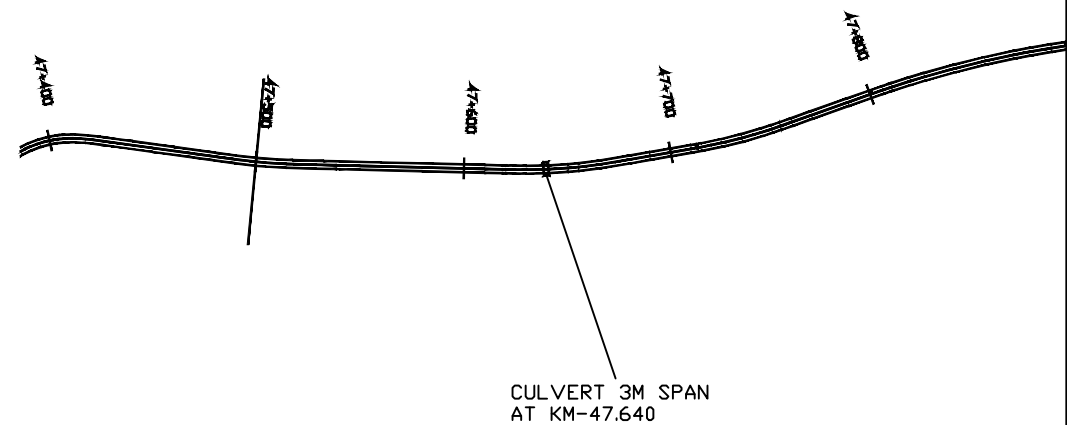
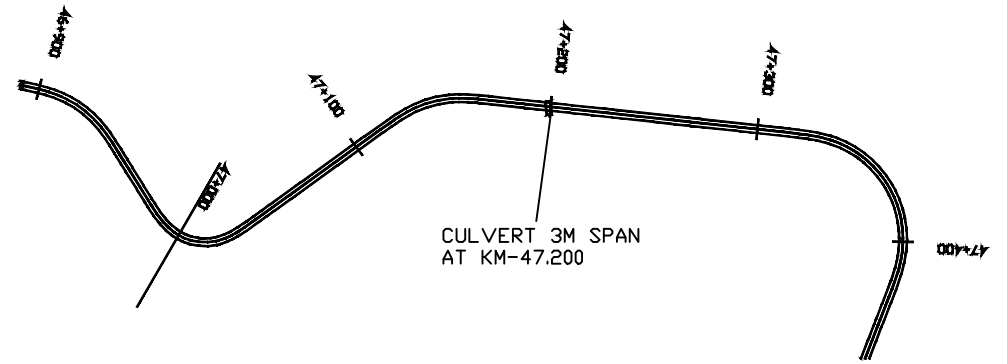
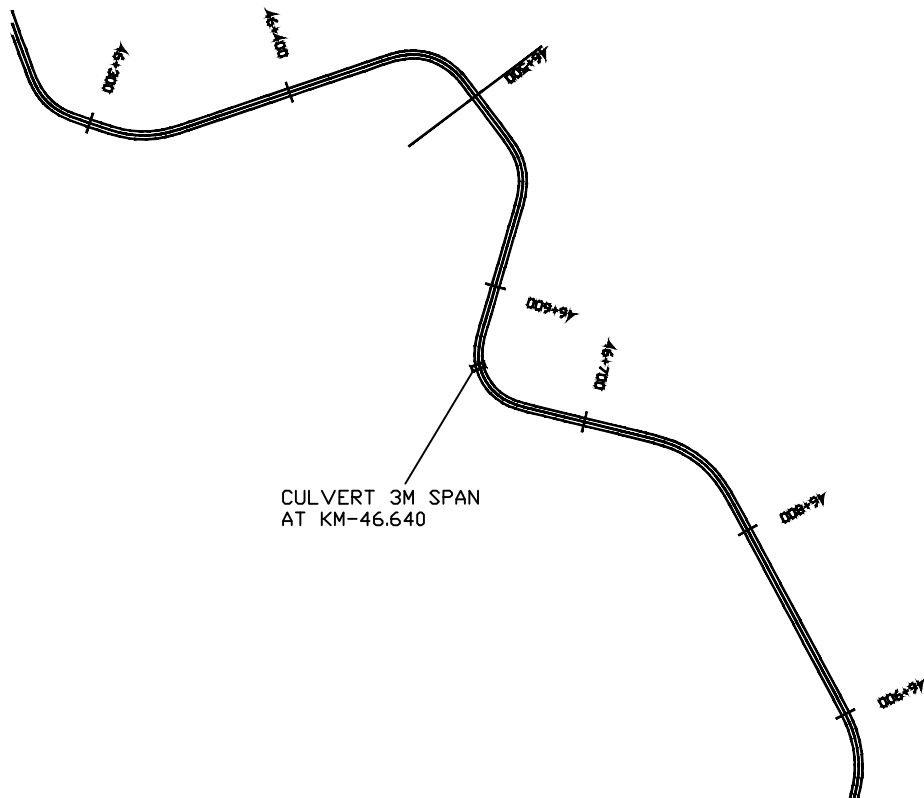
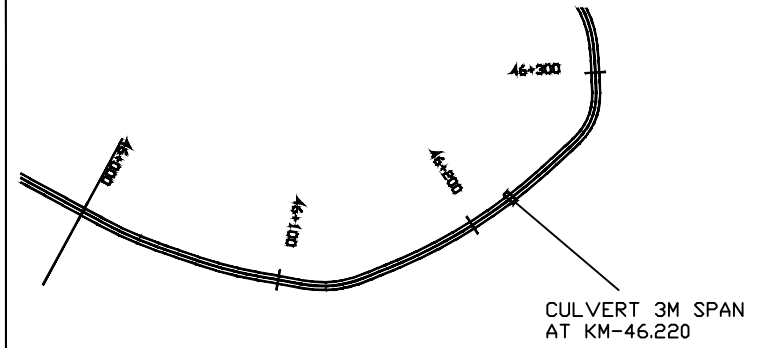
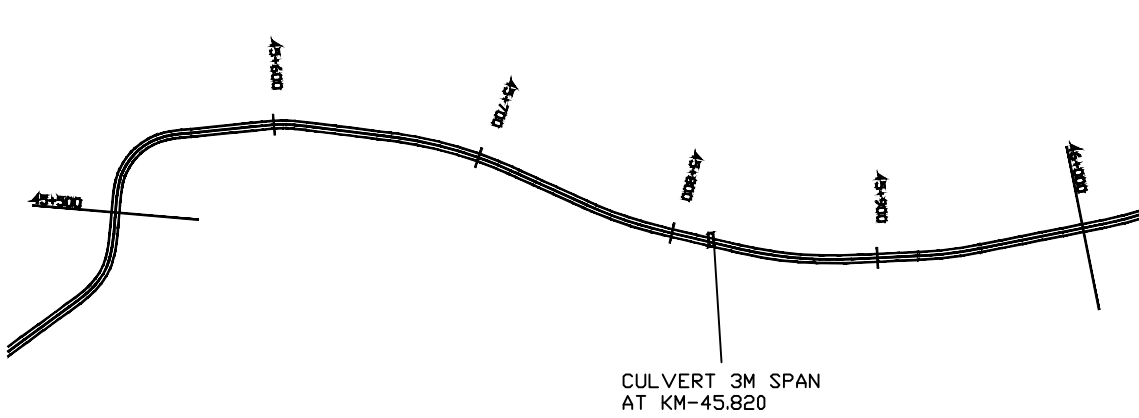
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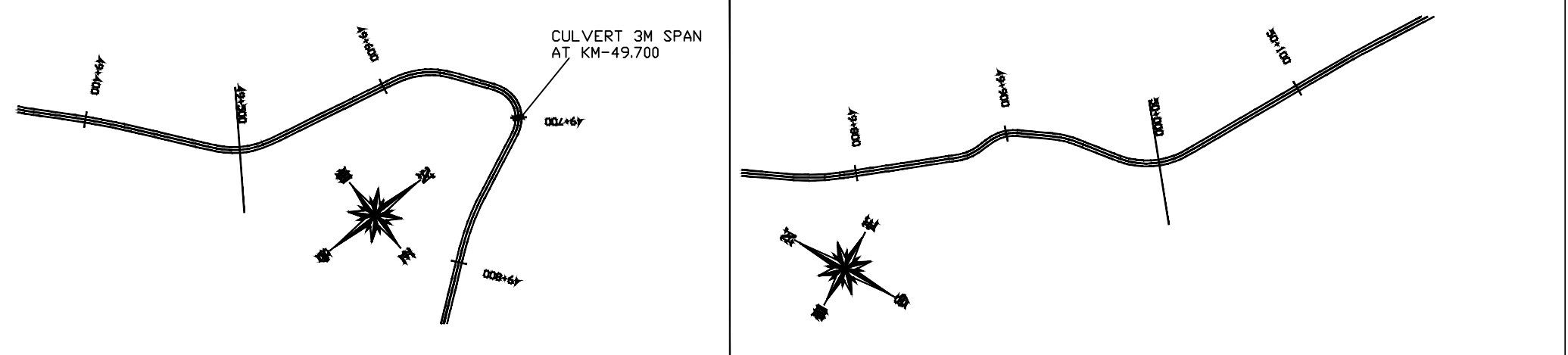
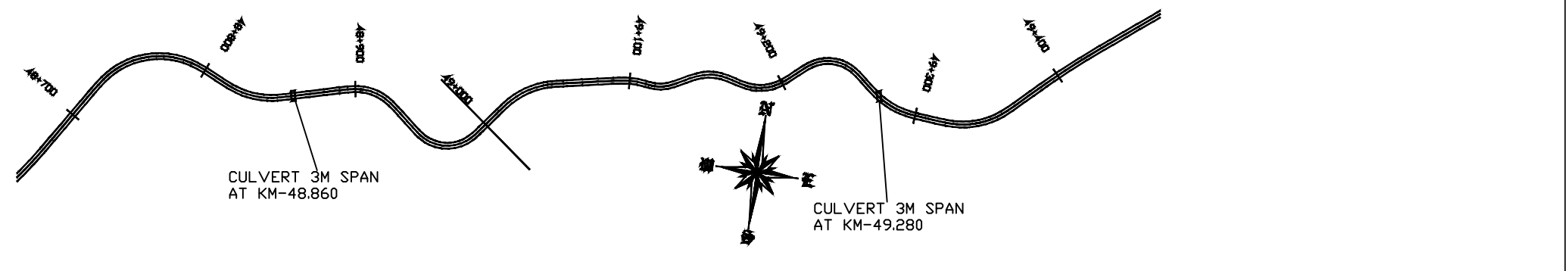
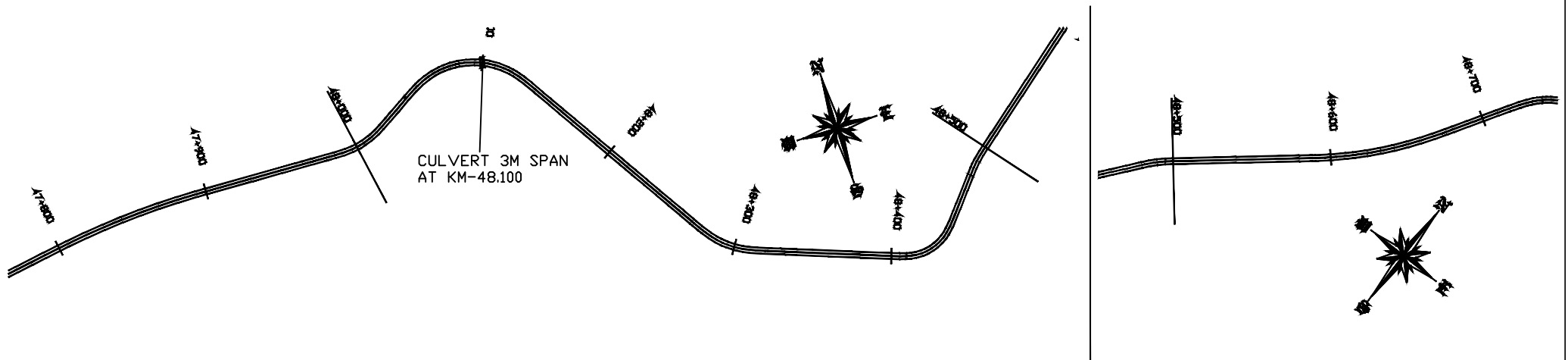
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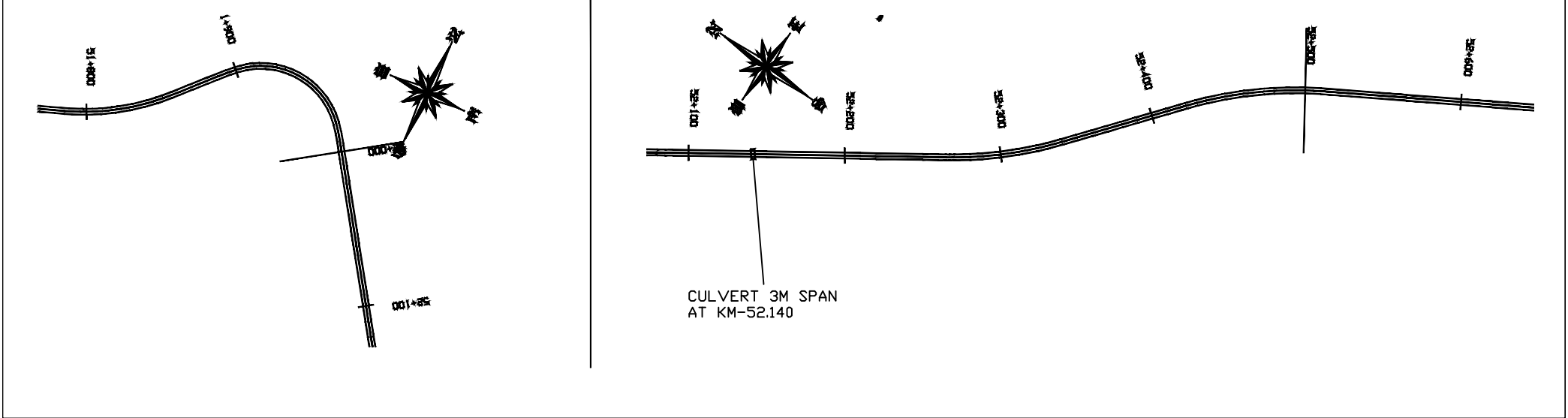
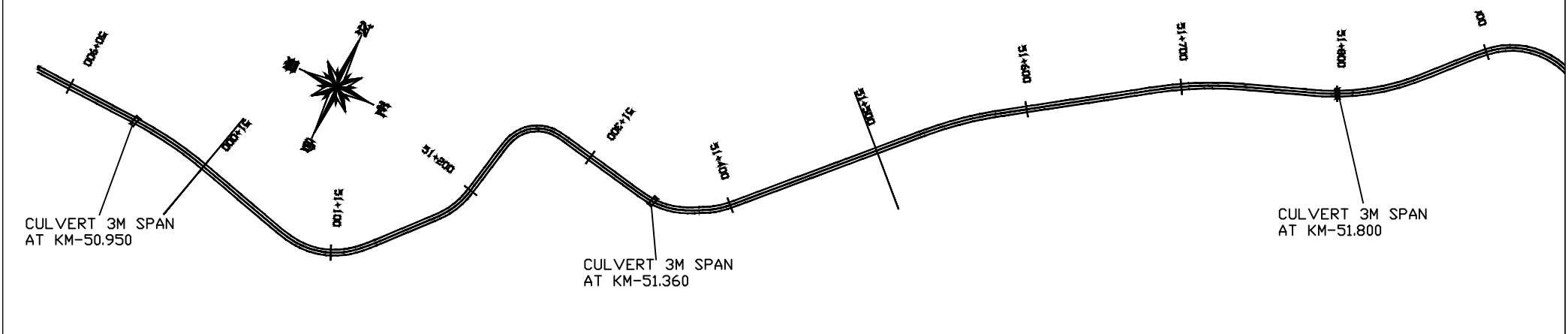
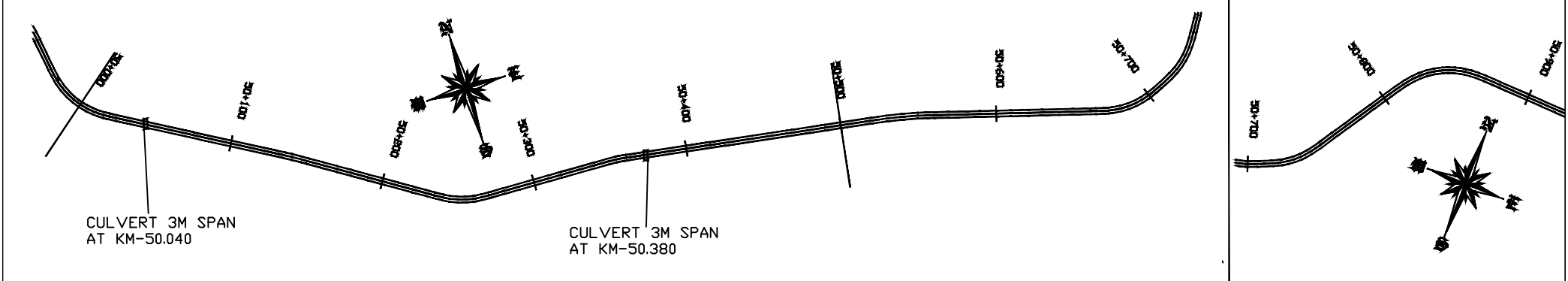
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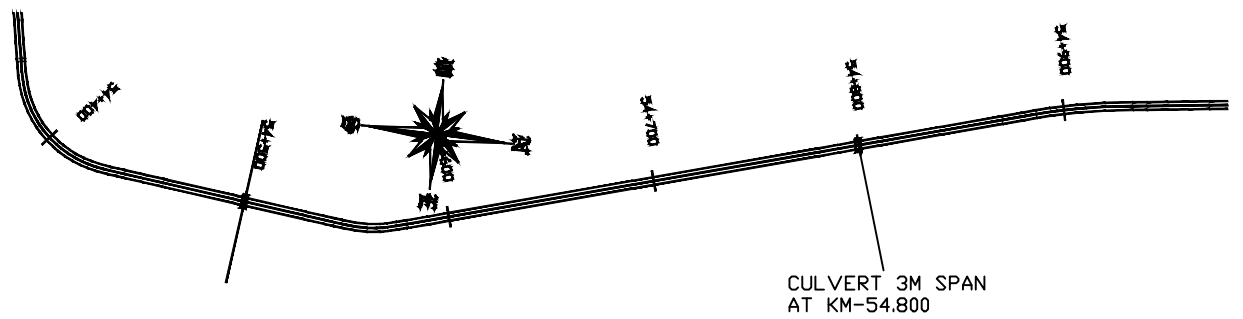
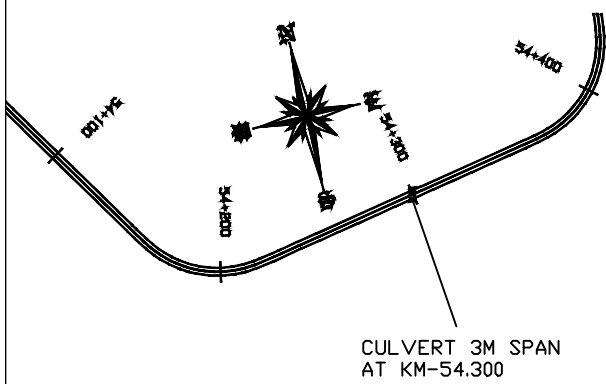
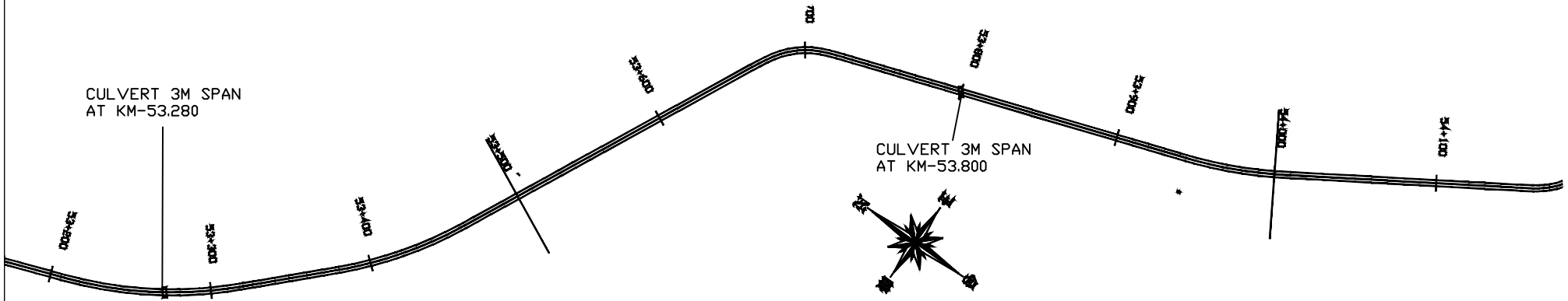
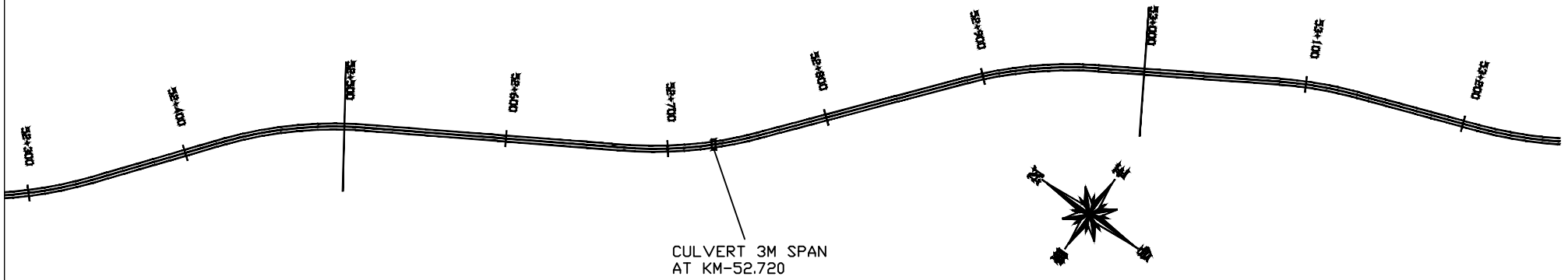
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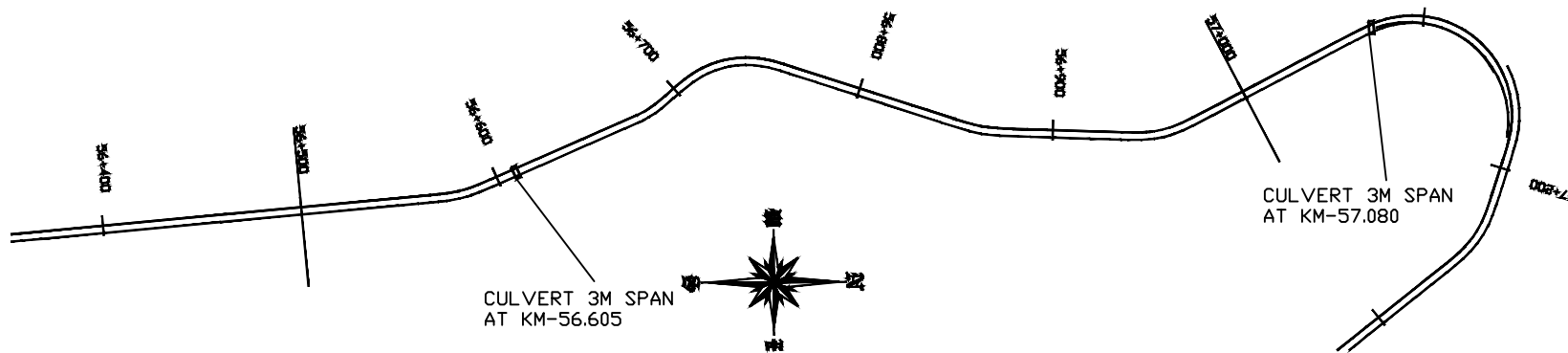
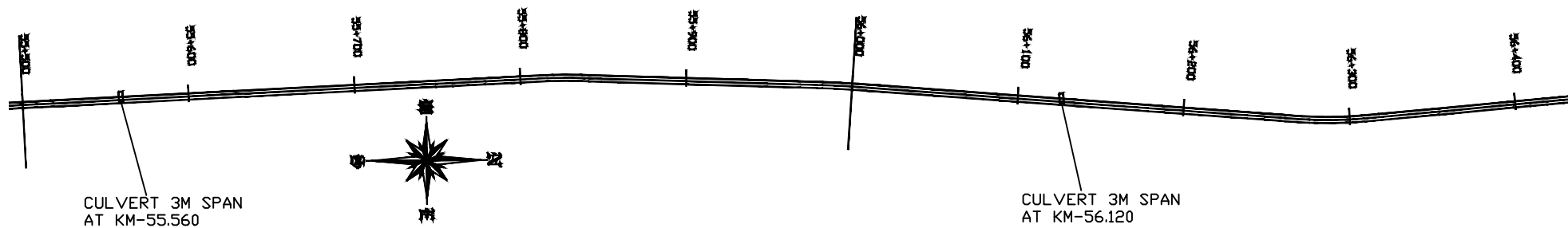
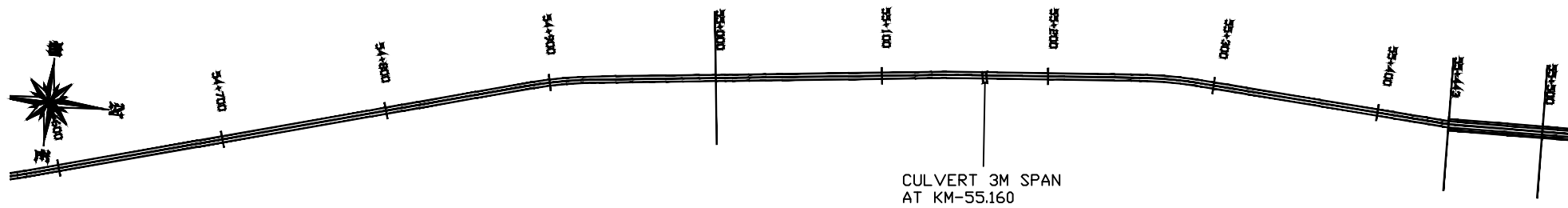
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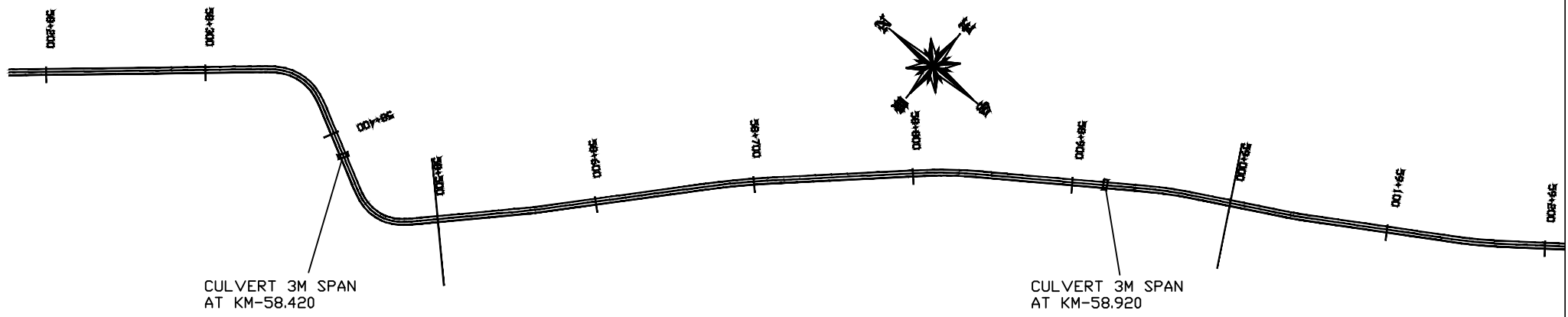
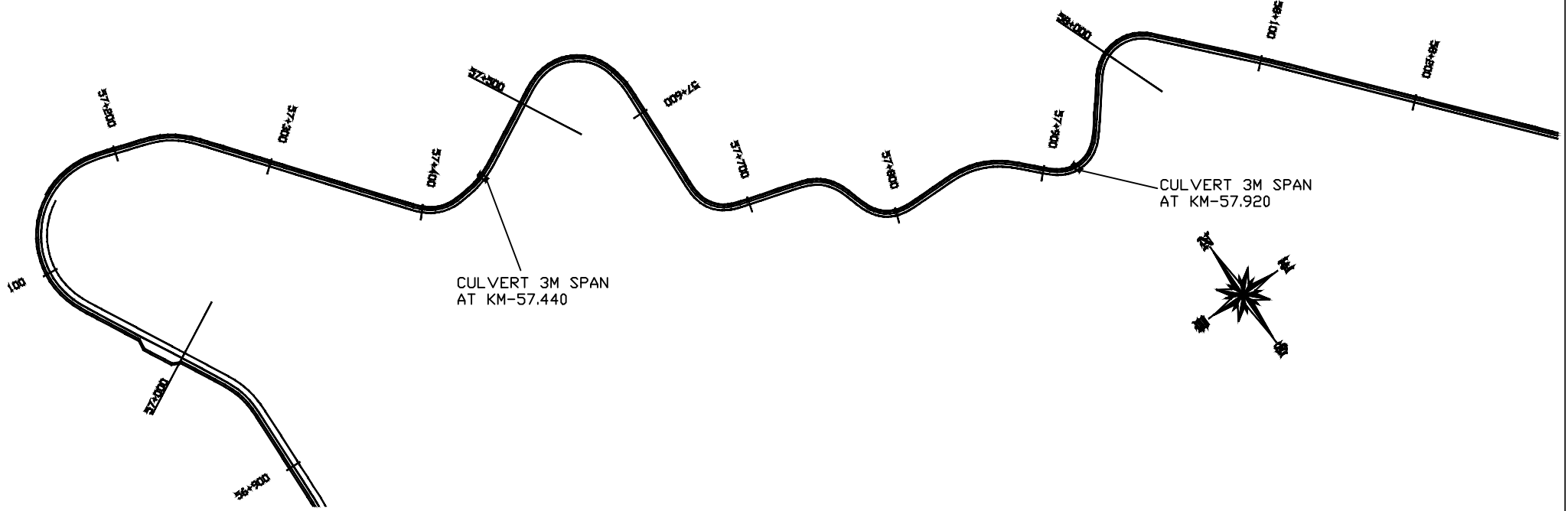
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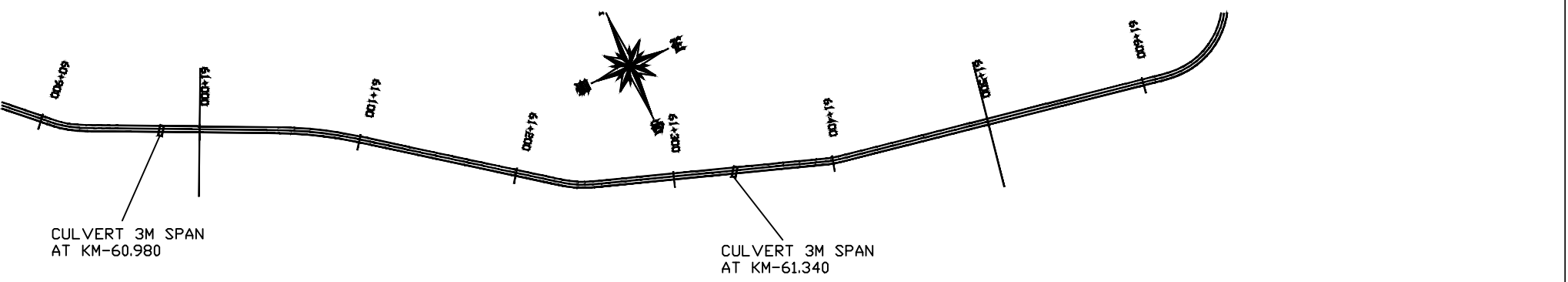
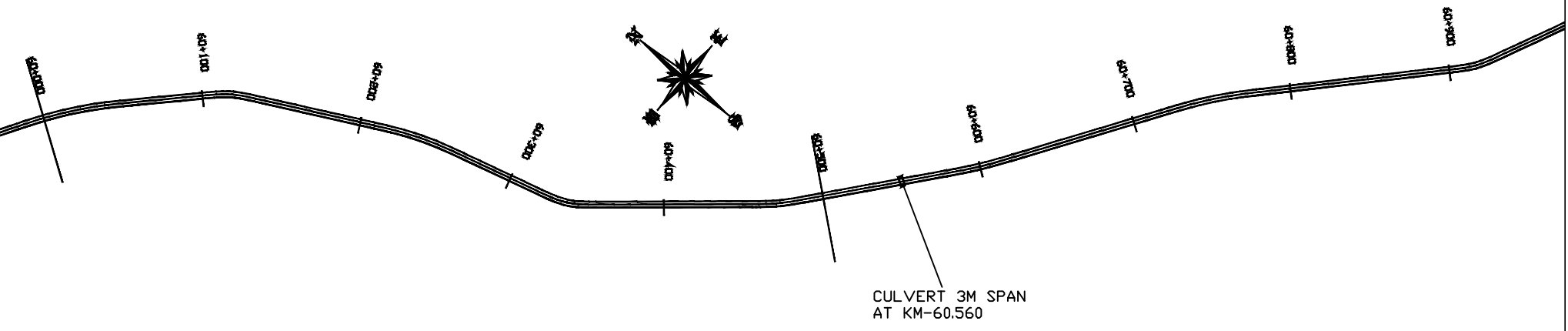
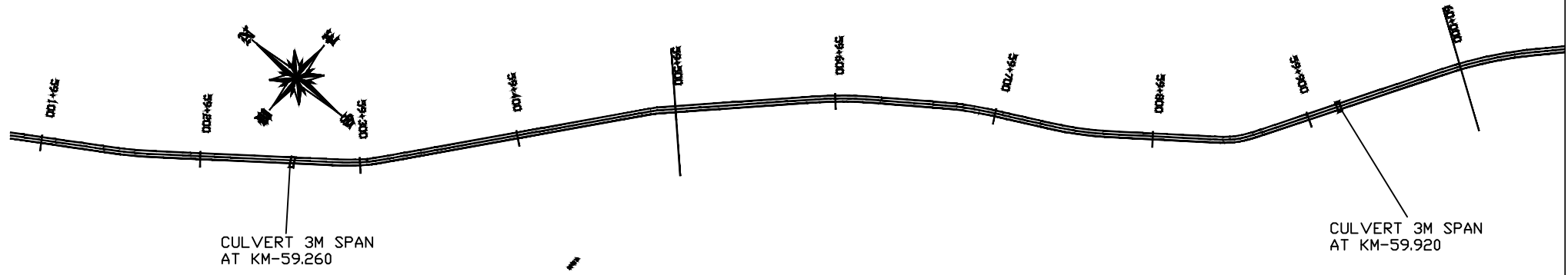
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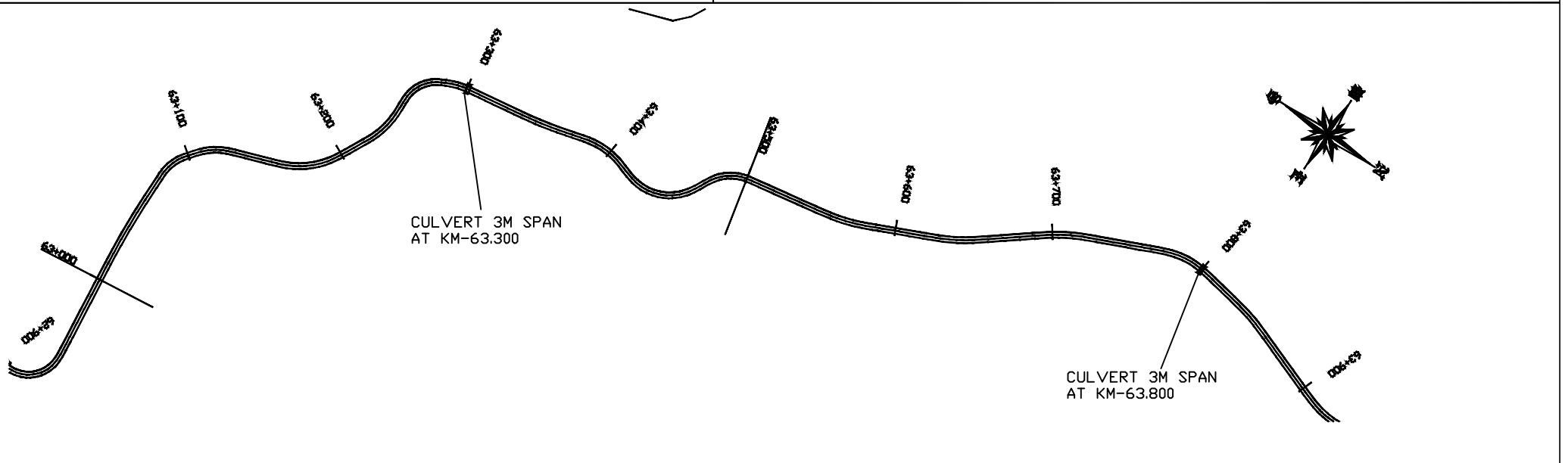
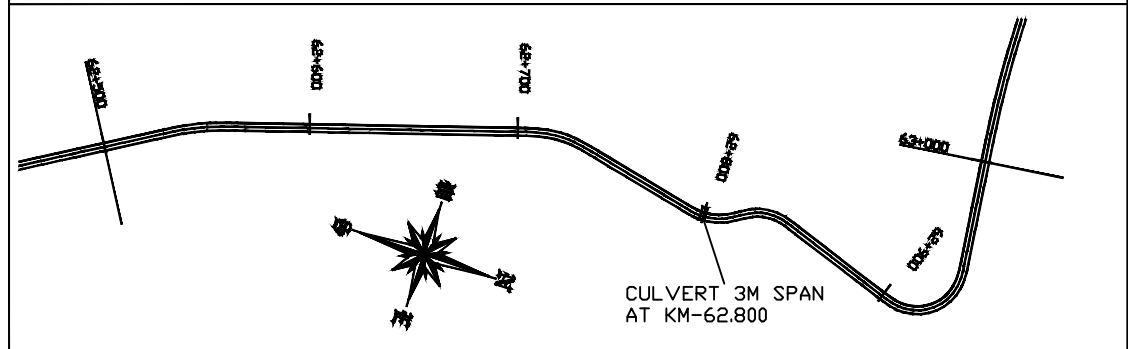
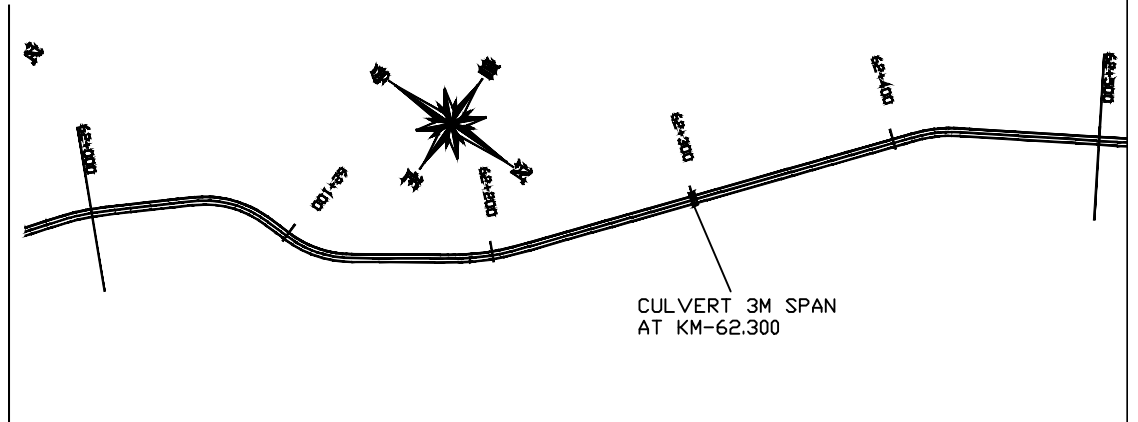
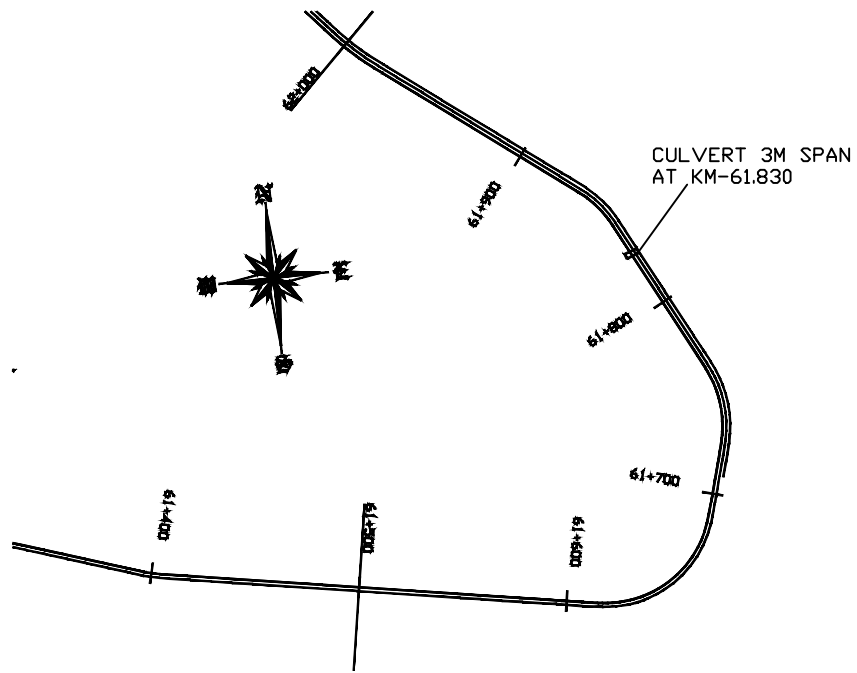
ANIMAL CROSSING LOCATION ON ROAD TOONG-PARTEM



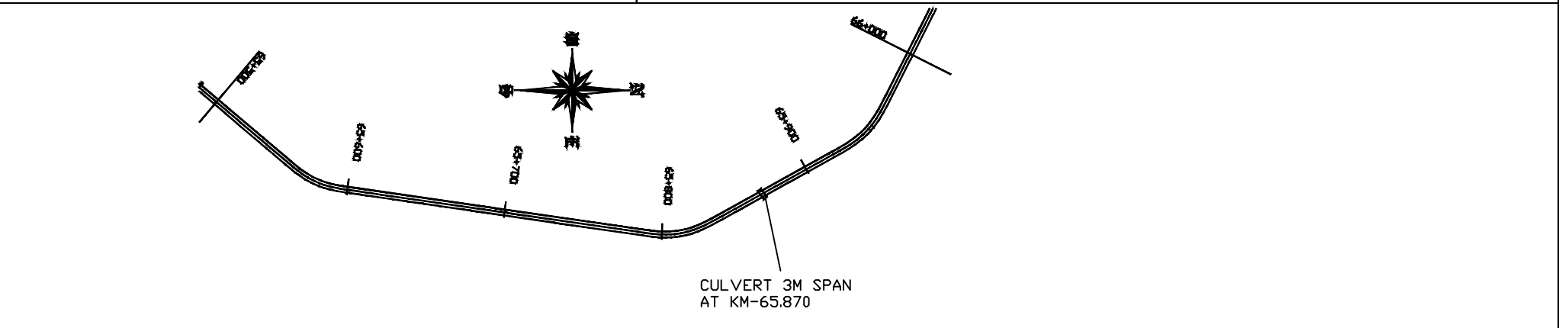
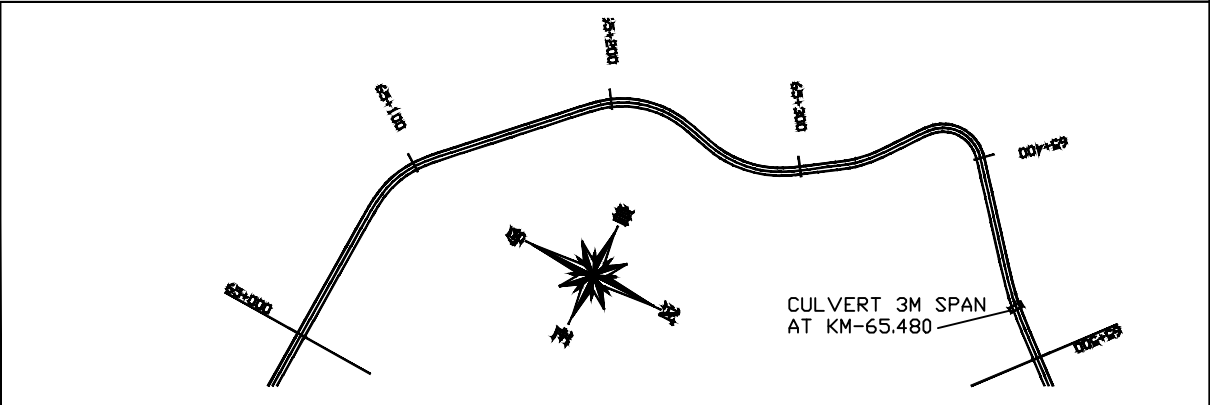
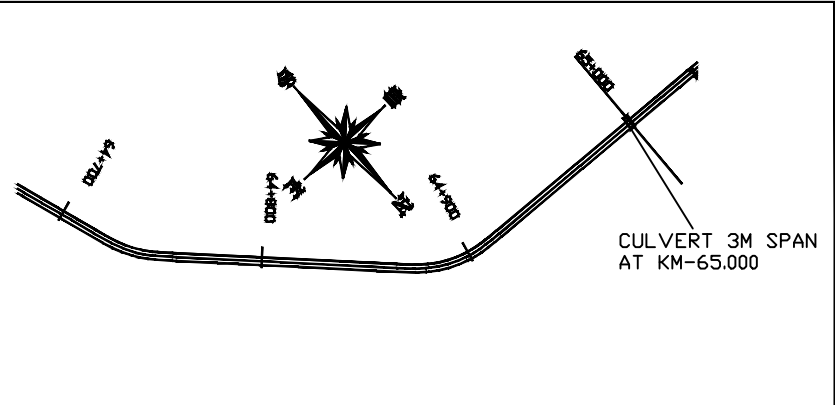
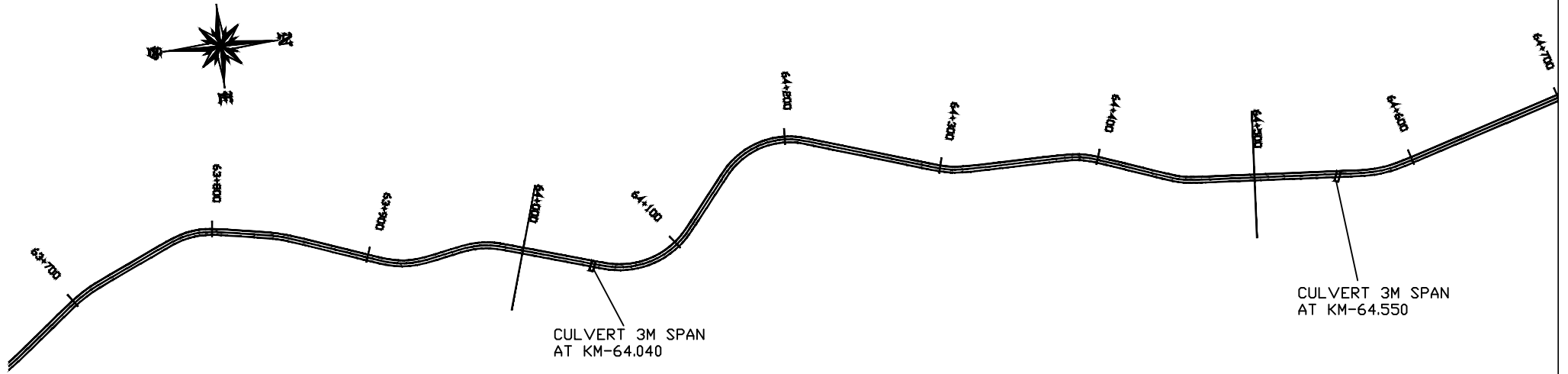
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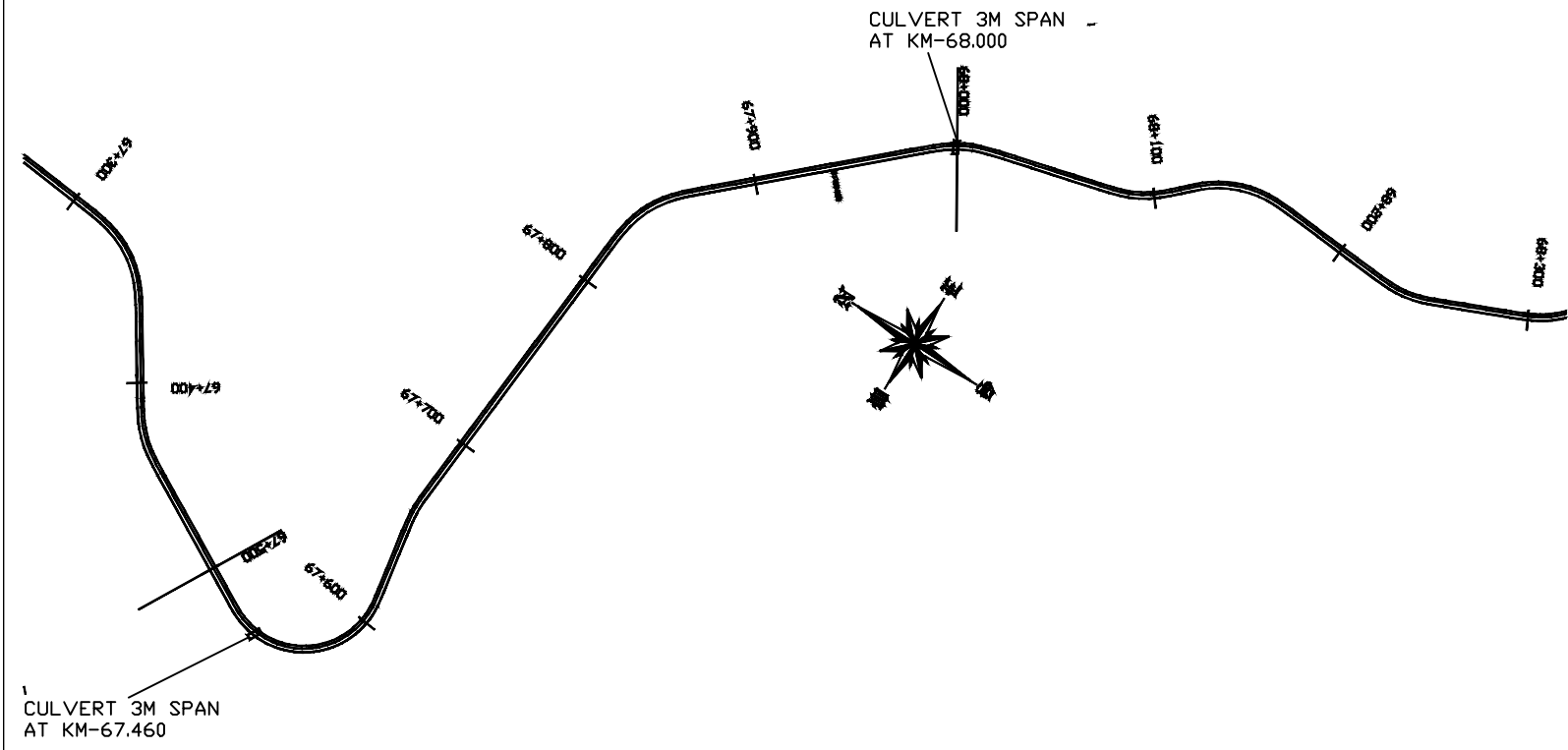
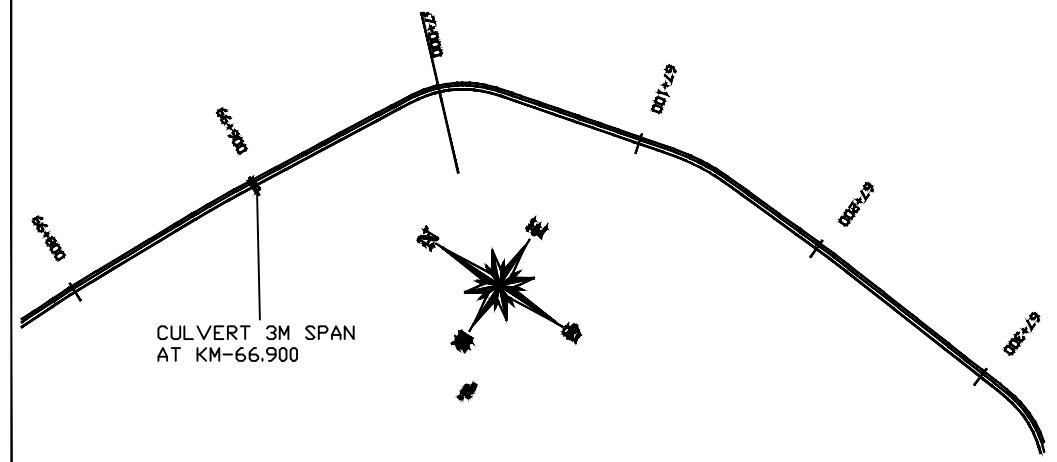
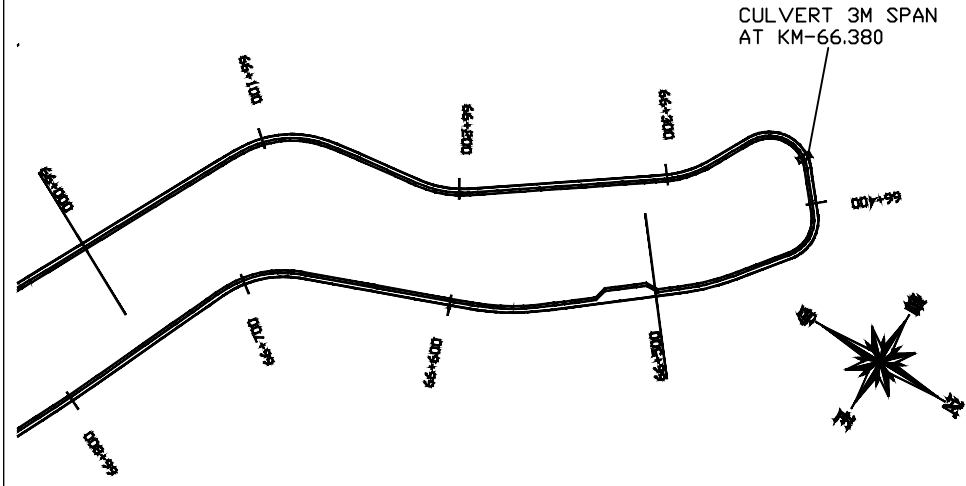
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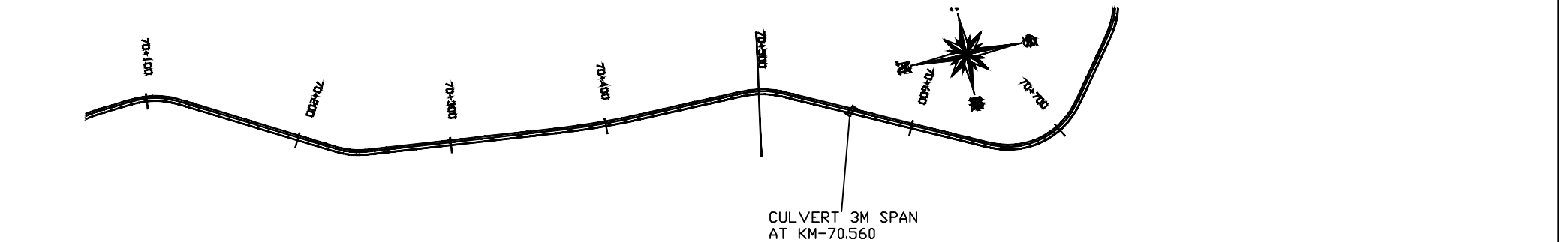
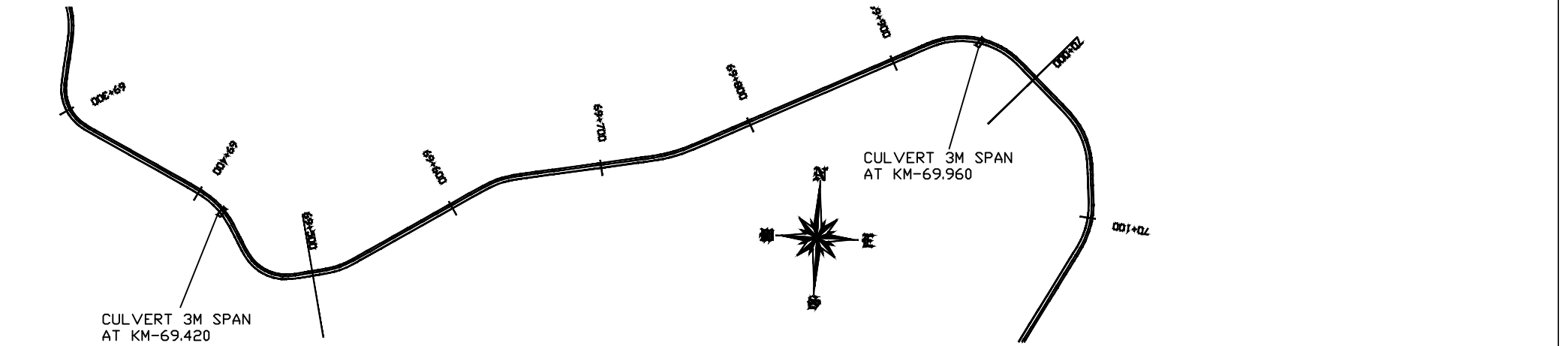
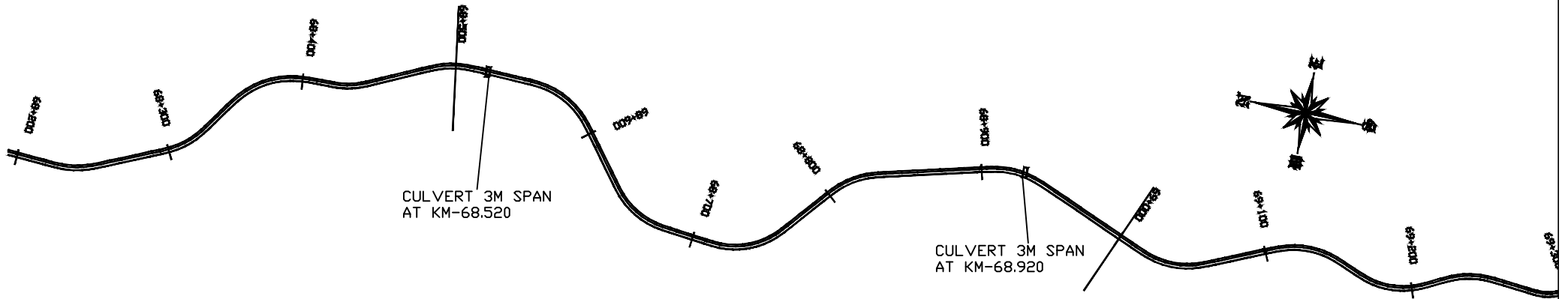
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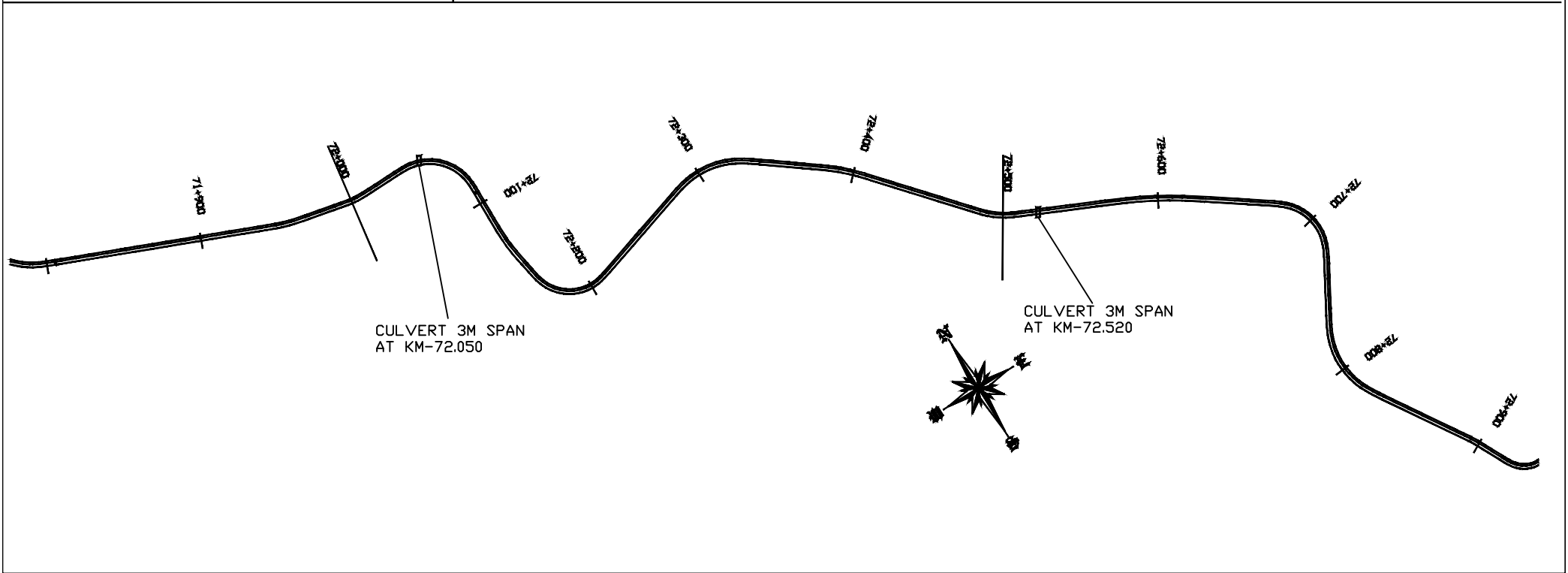
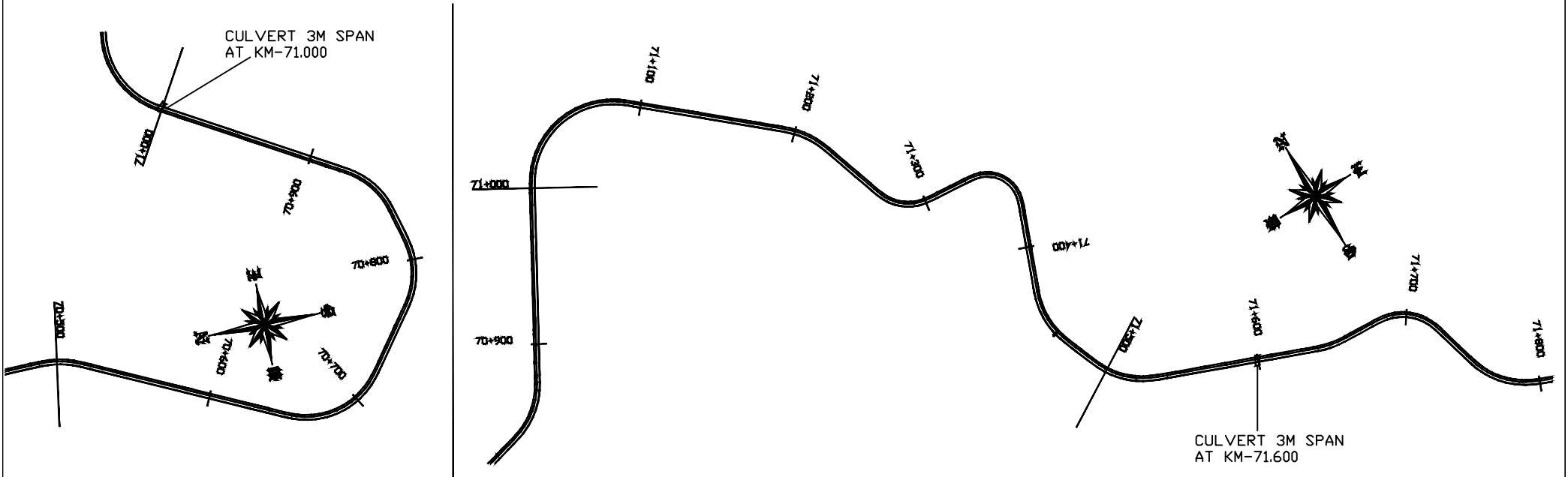
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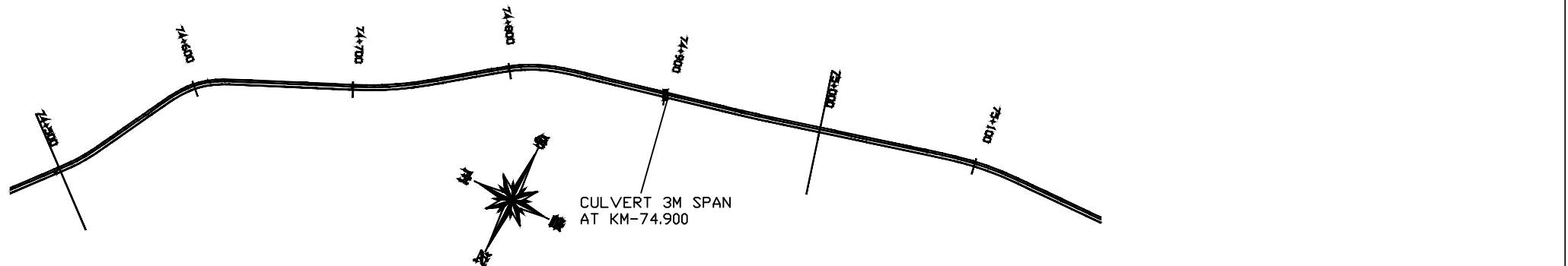
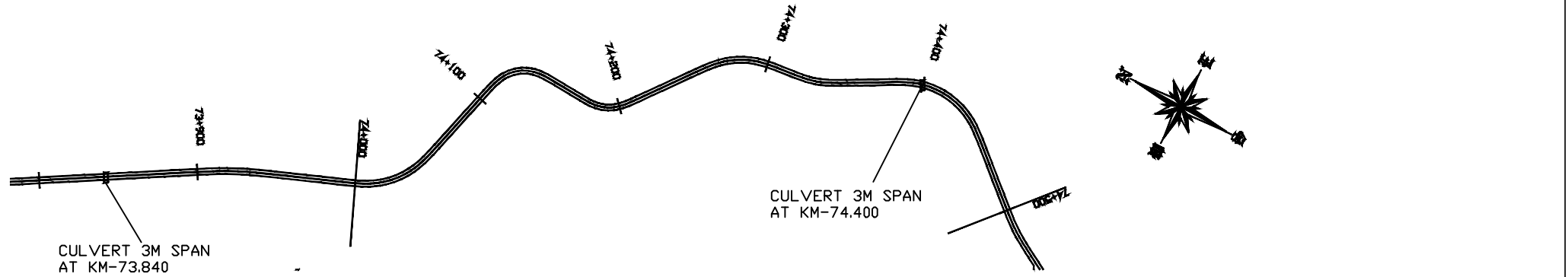
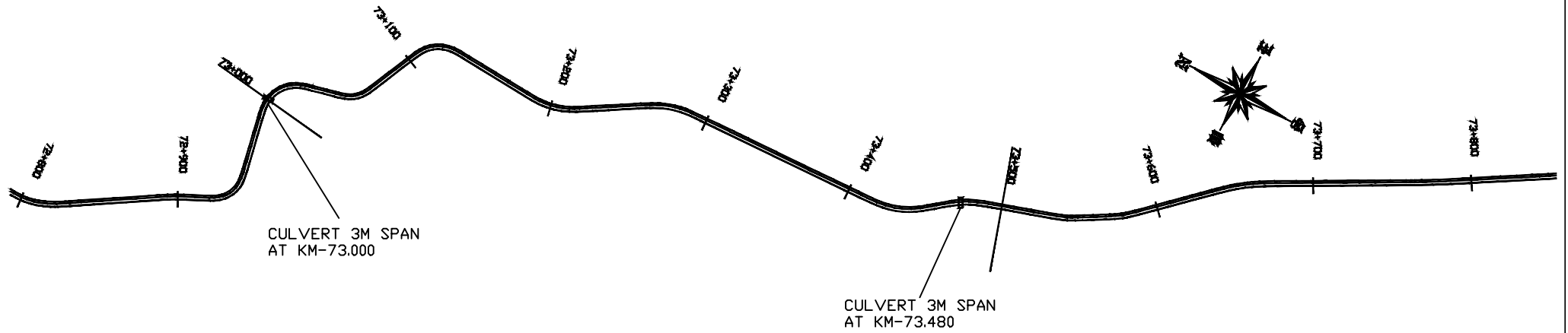
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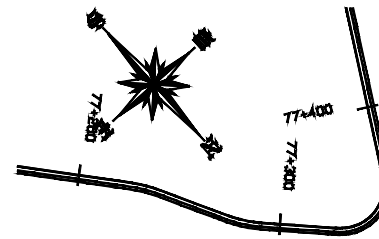
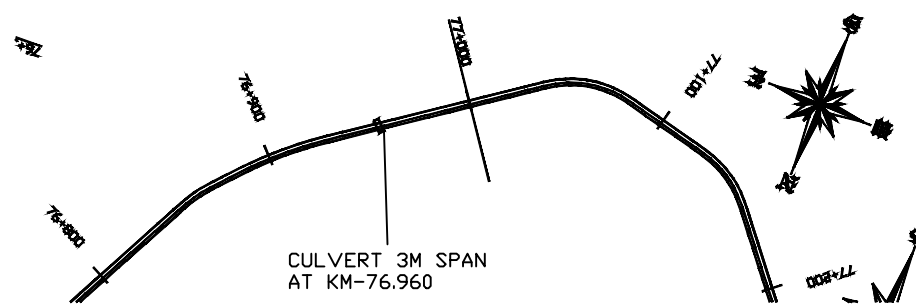
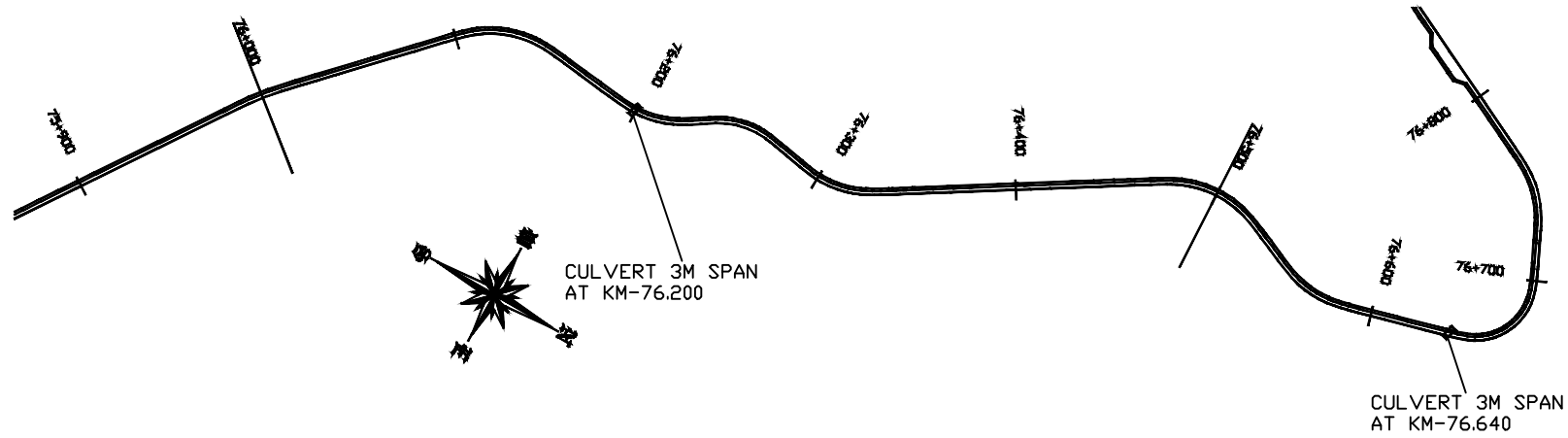
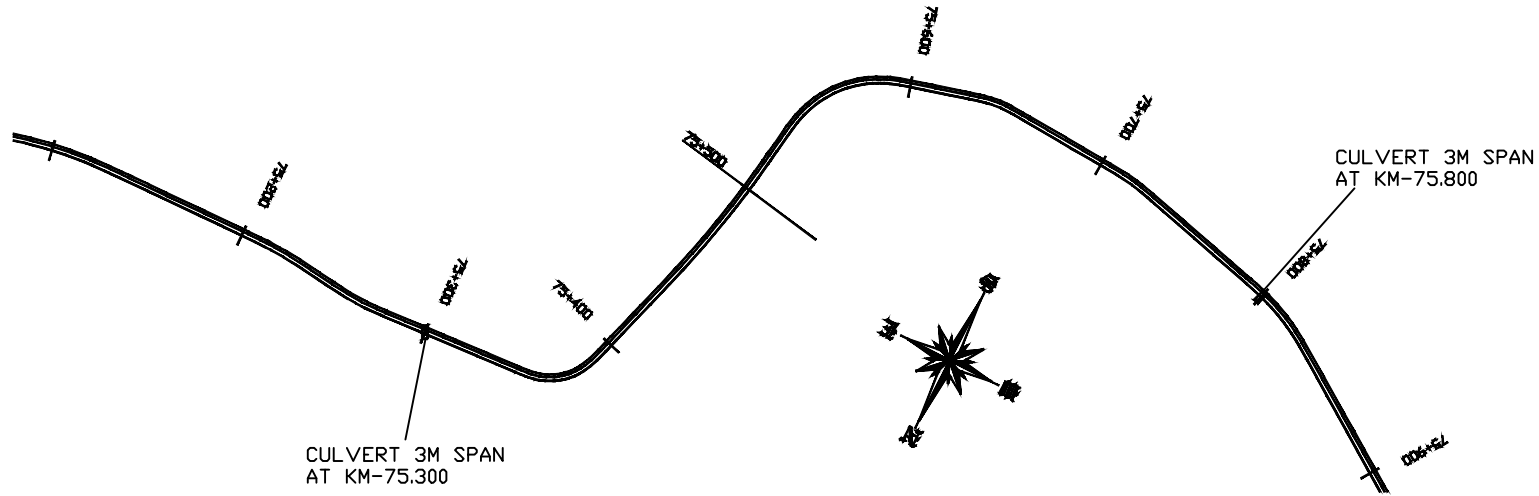
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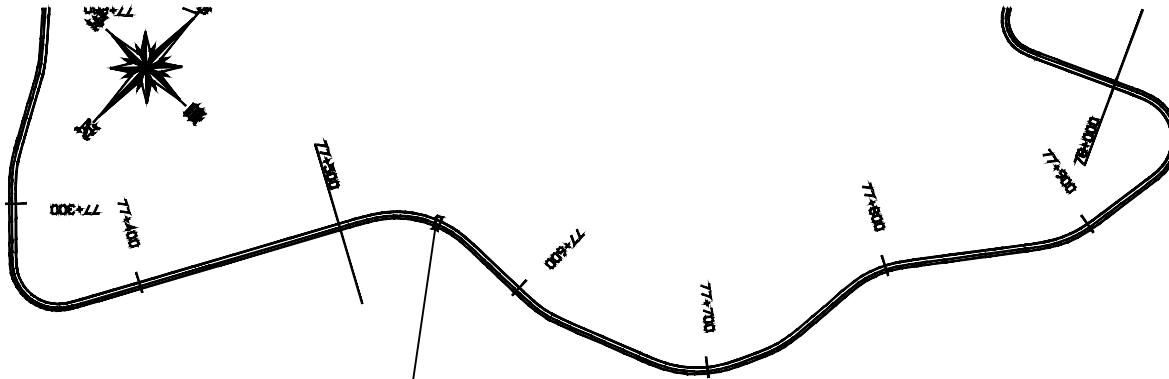
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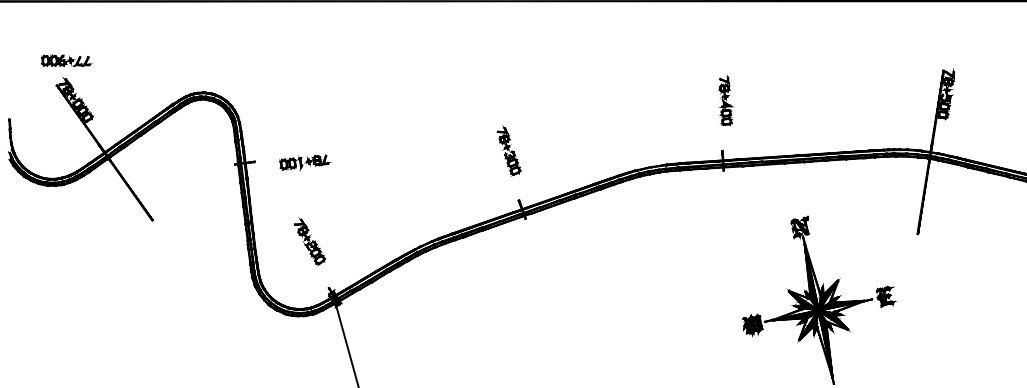
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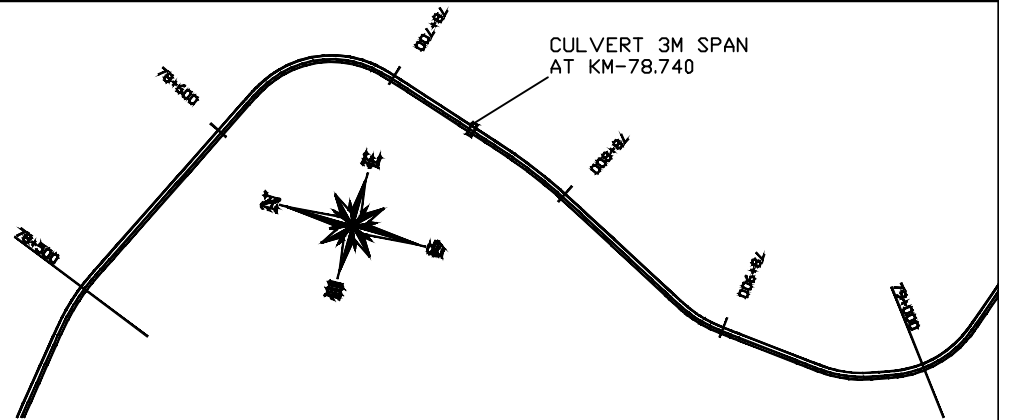
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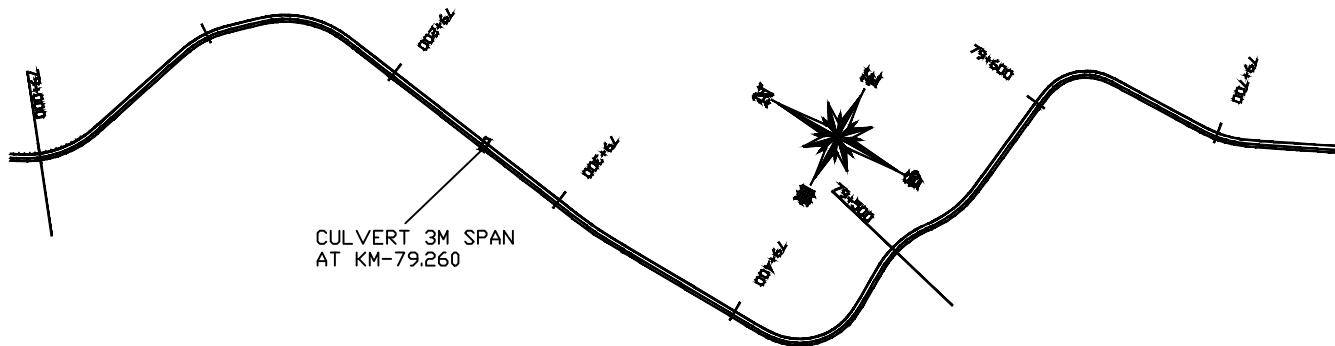
CULVERT 3M SPAN
AT KM-77.540



CULVERT 3M SPAN
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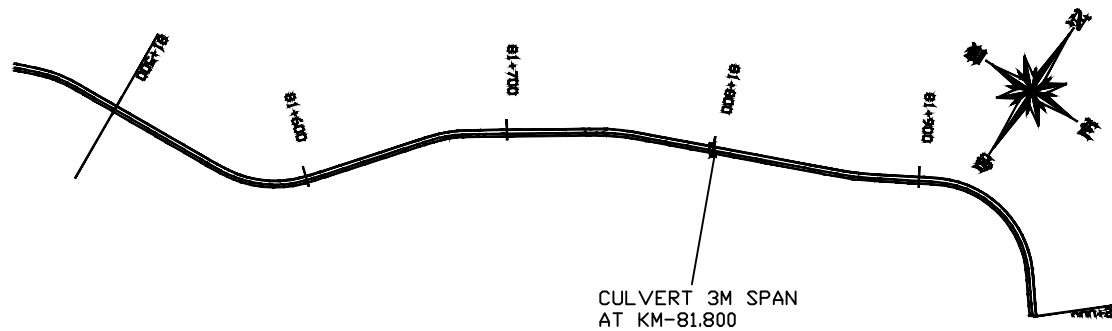
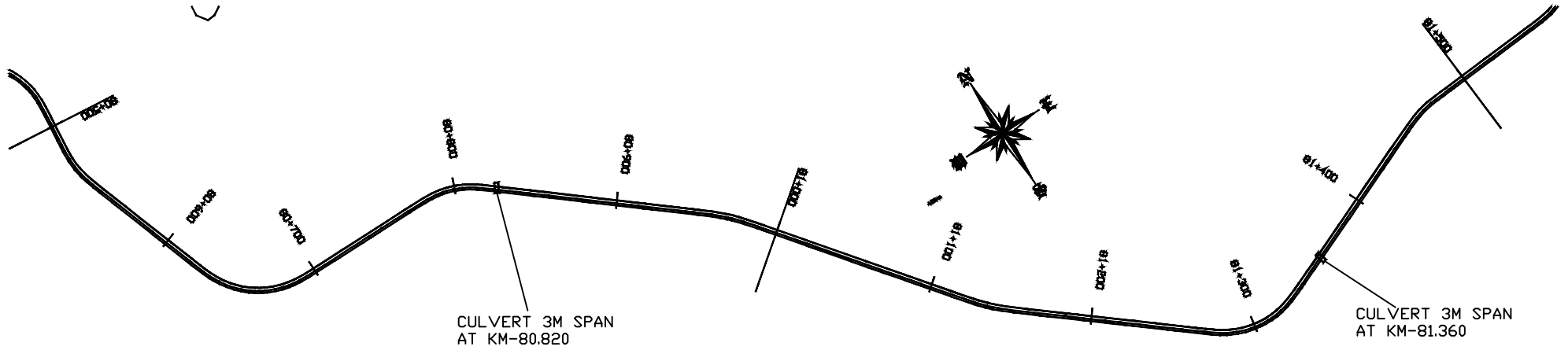
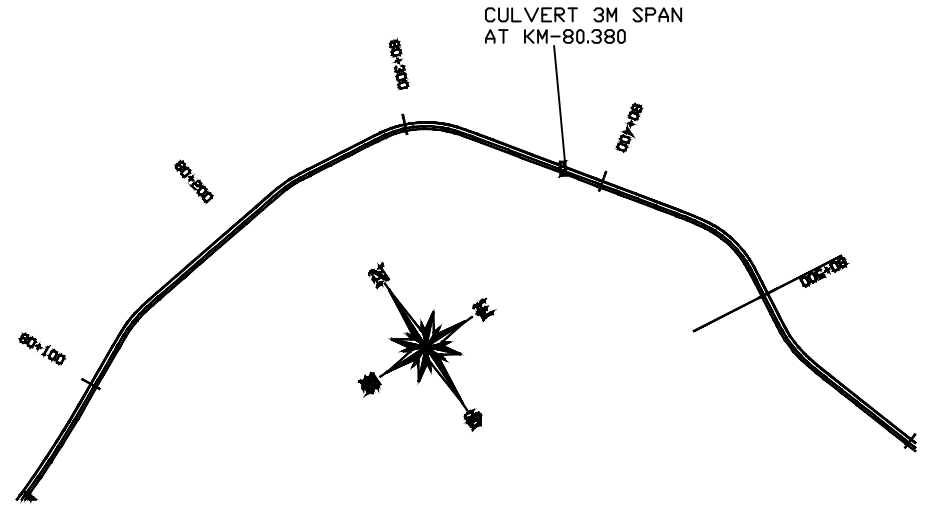
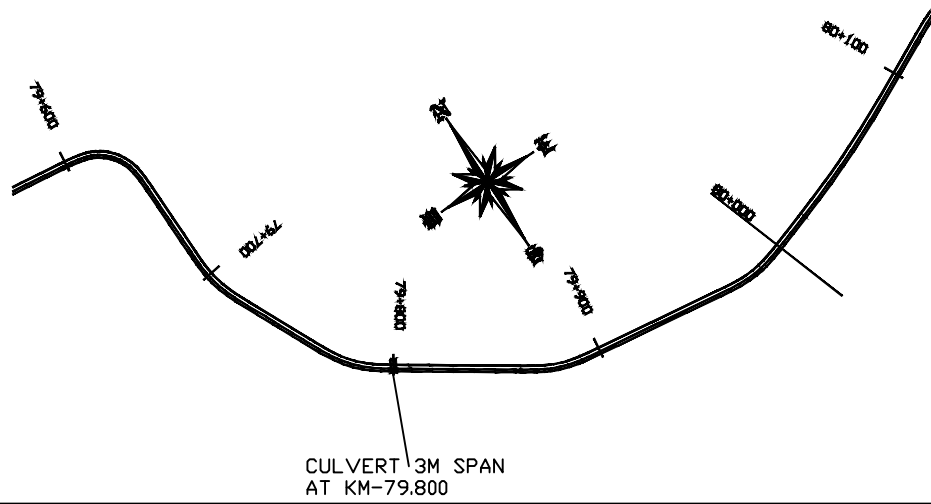


CULVERT 3M SPAN
AT KM-78.740



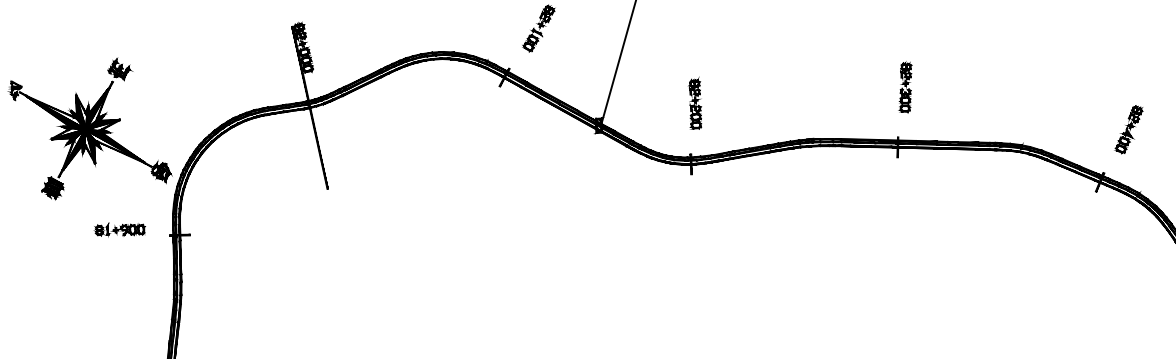
CULVERT 3M SPAN
AT KM-79.260

ANIMAL CROSSING LOCATION ON ROAD TOONG-PARTEM

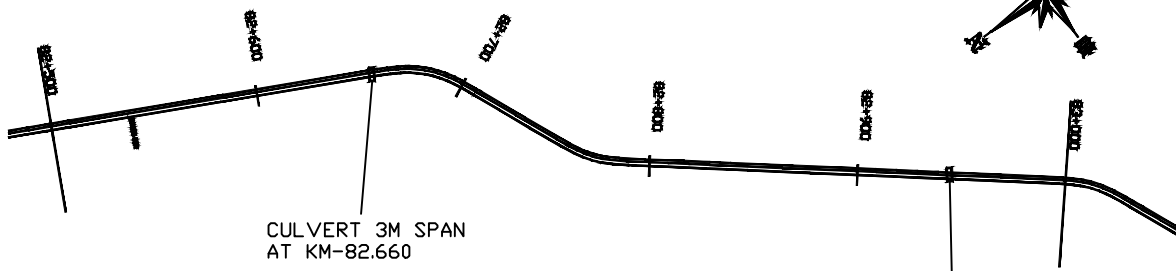


ANIMAL CROSSING LOCATION ON ROAD TOONG-PARTEM

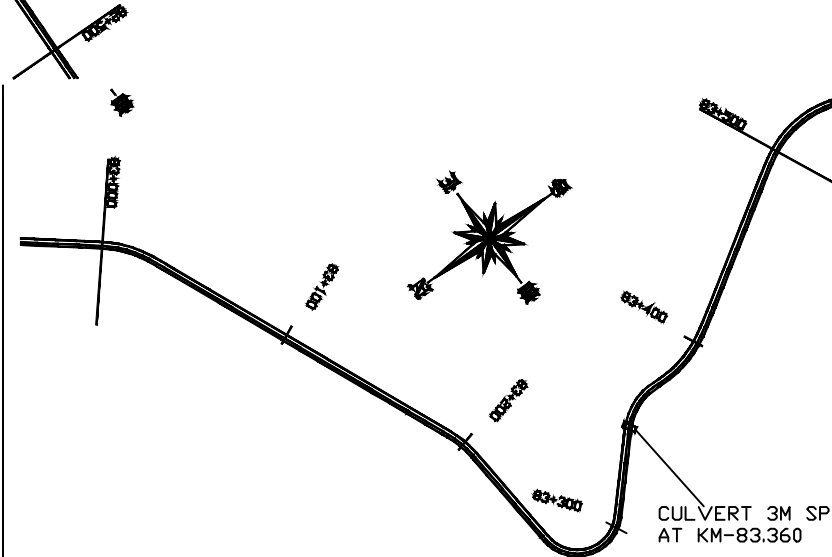
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AT KM-82.150



CULVERT 3M SPAN
AT KM-82.660

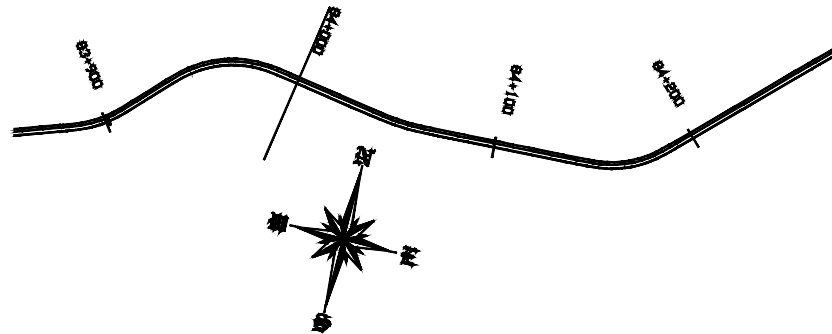
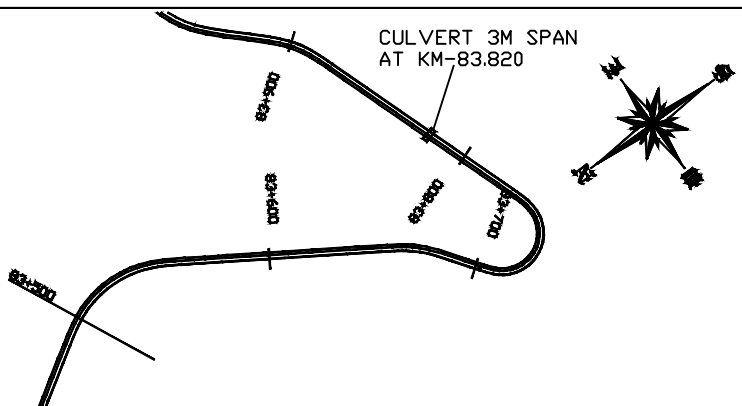


CULVERT 3M SPAN
AT KM-82.940

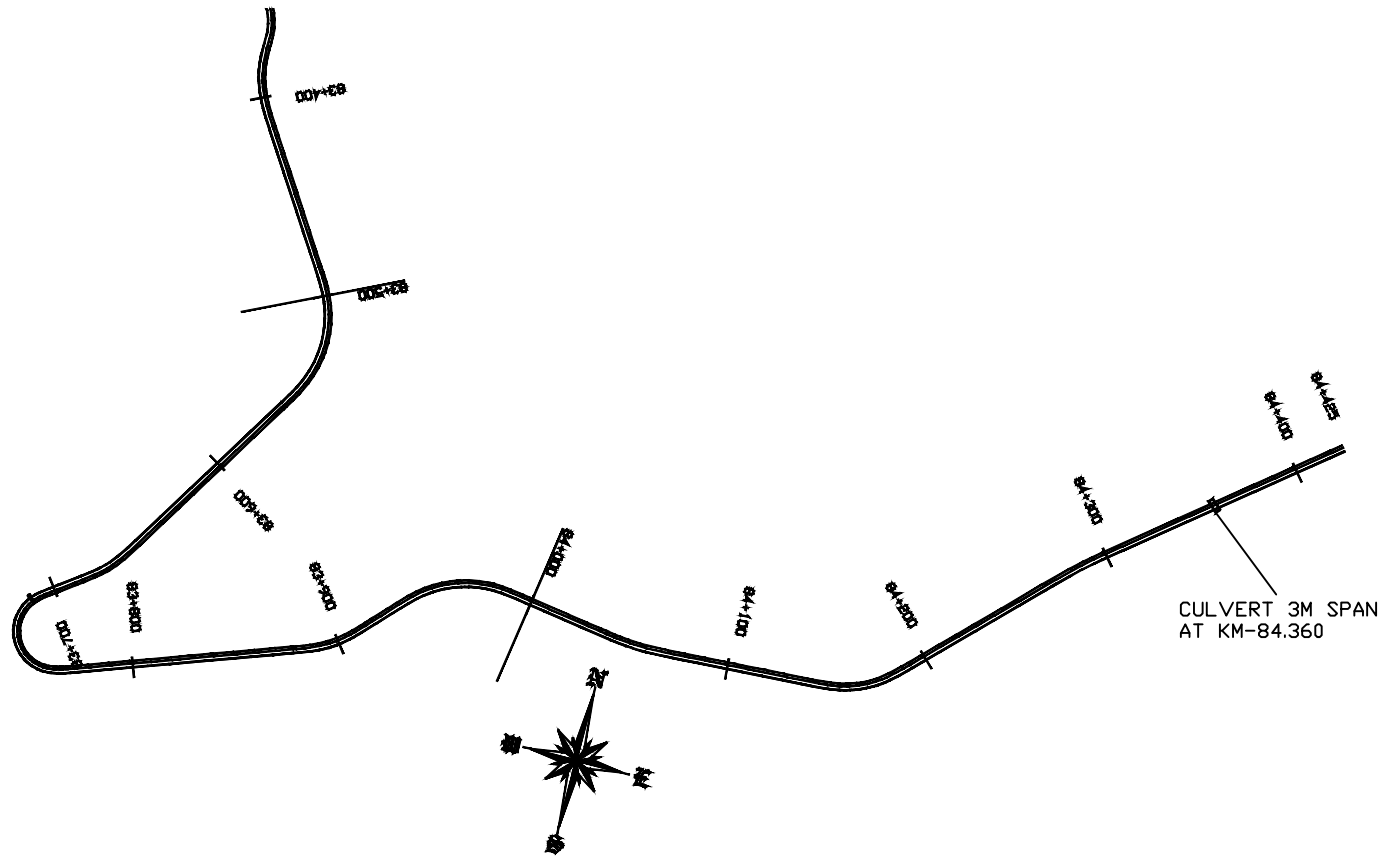


CULVERT 3M SPAN
AT KM-83.360

CULVERT 3M SPAN
AT KM-83.820



ANIMAL CROSSING LOCATION ON ROAD TOONG-PARTEM



DETAILS OF ANIMAL CROSSING LOCATION ON ROAD TOONG -PARTEM

SI No	Proposed Chainage of Animal crossing	Width of crossing in Mtr	Geographical cordinates		Remarks
1	0.090	3	27°32'57.50" N	88°38'44.71"E	7.45 Mtr Length
2	0.460	3	27°32'54.66" N	88°38'55.66"E	
3	1.260	3	27°32'50.42" N	88°38'32.01"E	
4	1.640	3	27°32'43.10" N	88°38'20.25"E	
5	2.160	3	27°32'38.16" N	88°38'04.07"E	
6	2.320	3	27°32'35.52" N	88°38'59.94"E	
7	2.900	3	27°32'38.89" N	88°38'18.77"E	
8	3.400	3	27°32'46.39" N	88°38'34.07"E	
9	3.920	3	27°32'40.12" N	88°38'25.96"E	
10	4.390	3	27°32'34.08" N	88°38'11.15"E	
11	4.900	3	27°32'34.95" N	88°38'22.77"E	
12	5.380	3	27°32'40.56" N	88°38'37.23"E	
13	5.920	3	27°32'42.81" N	88°38'53.37"E	
14	6.340	3	27°32'41.88" N	88°39'05.15"E	
15	6.880	3	27°32'48.26" N	88°39'23.26"E	
16	7.480	3	27°32'55.20" N	88°39'34.35"E	
17	7.960	3	27°32'48.42" N	88°39'47.10"E	
18	8.135	3	27°32'46.62" N	88°39'54.62"E	
19	9.540	3	27°32'39.53" N	88°39'16.25"E	
20	9.920	3	27°32'31.18" N	88°39'09.66"E	
21	10.260	3	27°32'33.26" N	88°38'58.35"E	
22	10.820	3	27°32'31.74" N	88°38'41.36"E	
23	11.380	3	27°32'19.10" N	88°38'28.42"E	
24	11.720	3	27°32'16.06" N	88°38'17.23"E	
25	12.220	3	27°32'04.32" N	88°38'08.64"E	
26	12.600	3	27°31'54.00" N	88°38'00.97"E	
27	13.240	3	27°32'00.38" N	88°37'45.63"E	
28	13.640	3	27°31'56.00" N	88°37'33.46"E	
29	13.800	3	27°31'52.59" N	88°37'31.41"E	
30	14.300	3	27°31'56.43" N	88°37'46.70"E	
31	14.980	3	27°31'45.79" N	88°38'02.65"E	
32	15.450	3	27°31'55.21" N	88°38'15.03"E	
33	16.020	3	27°32'05.92" N	88°38'28.18"E	
34	16.260	3	27°32'09.86" N	88°38'35.83"E	
35	16.800	3	27°32'17.08" N	88°38'50.48"E	
36	17.350	3	27°32'11.10" N	88°39'06.10"E	
37	17.830	3	27°32'19.80" N	88°39'19.96"E	
38	18.240	3	27°32'29.33" N	88°39'28.62"E	
39	18.660	3	27°32'27.11" N	88°39'39.31"E	
40	19.370	3	27°32'17.34" N	88°39'53.43"E	
41	19.960	3	27°31'58.81" N	88°39'55.74"E	
42	20.360	3	27°31'48.97" N	88°40'03.52"E	
43	20.850	3	27°31'39.70" N	88°40'13.96"E	
44	21.220	3	27°31'41.55" N	88°40'56.66"E	
45	21.690	3	27°31'32.41" N	88°40'37.28"E	
46	22.270	3	27°31'33.81" N	88°40'56.83"E	
47	22.720	3	27°31'39.68" N	88°41'11.68"E	
48	23.060	3	27°31'40.45" N	88°41'22.65"E	

49	23.450	3	27°31'35.58" N	88°41'09.32"E
50	23.930	3	27°31'29.71" N	88°40'56.20"E
51	24.320	3	27°31'27.95" N	88°40'45.19"E
52	24.780	3	27°31'28.98" N	88°40'33.36"E
53	25.100	3	27°31'33.68" N	88°40'26.00"E
54	25.800	3	27°31'24.25" N	88°40'06.510"E
55	26.200	3	27°31'29.27" N	88°39'54.28"E
56	26.680	3	27°31'31.40" N	88°39'41.97"E
57	27.280	3	27°31'51.16" N	88°39'33.69"E
58	27.680	3	27°32'04.08" N	88°39'36.28"E
59	28.240	3	27°32'01.85" N	88°39'27.56"E
60	28.700	3	27°31'47.47" N	88°39'21.36"E
61	29.120	3	27°31'45.44" N	88°39'08.18"E
62	29.560	3	27°31'49.19" N	88°38'53.75"E
63	30.020	3	27°31'37.04" N	88°38'52.80"E
64	30.520	3	27°31'21.33" N	88°38'51.09"E
65	31.060	3	27°31'08.08" N	88°38'45.08"E
66	31.480	3	27°31'00.36" N	88°38'57.24"E
67	31.880	3	27°30'51.18" N	88°39'05.51"E
68	32.300	3	27°30'38.40" N	88°39'07.20"E
69	32.780	3	27°30'24.16" N	88°39'11.74"E
70	33.140	3	27°30'18.42" N	88°39'07.37"E
71	33.640	3	27°30'20.70" N	88°38'52.80"E
72	34.240	3	27°30'24.85" N	88°38'34.03"E
73	34.680	3	27°30'31.88" N	88°38'31.21"E
74	35.010	3	27°30'37.86" N	88°38'11.56"E
75	35.660	3	27°30'24.13" N	88°38'27.85"E
76	36.200	3	27°30'15.24" N	88°38'42.93"E
77	36.900	3	27°30'10.42" N	88°39'05.34"E
78	37.500	3	27°30'12.38" N	88°39'23.95"E
79	38.000	3	27°30'24.16" N	88°39'27.18"E
80	38.600	3	27°30'42.79" N	88°39'29.10"E
81	39.260	3	27°31'00.30" N	88°39'27.95"E
82	39.650	3	27°31'05.67" N	88°39'36.15"E
83	40.060	3	27°30'56.83" N	88°39'31.04"E
84	40.560	3	27°30'41.09" N	88°39'34.20"E
85	41.080	3	27°30'25.90" N	88°39'34.72"E
86	41.680	3	27°30'11.48" N	88°39'34.31"E
87	42.000	3	27°30'04.31" N	88°39'36.80"E
88	42.560	3	27°29'56.64" N	88°39'22.57"E
89	43.060	3	27°29'54.47" N	88°39'08.31"E
90	43.700	3	27°29'58.99" N	88°38'45.56"E
91	44.100	3	27°29'55.81" N	88°38'48.69"E
92	44.560	3	27°29'52.14" N	88°39'05.25"E
93	45.000	3	27°29'47.58" N	88°39'20.04"E
94	45.480	3	27°29'58.03" N	88°39'30.57"E
95	45.820	3	27°29'56.51" N	88°39'40.96"E
96	46.220	3	27°29'59.83" N	88°39'53.88"E
97	46.640	3	27°30'08.36" N	88°39'50.99"E
98	47.200	3	27°30'24.31" N	88°39'49.62"E
99	47.640	3	27°30'27.92" N	88°40'00.31"E
100	48.100	3	27°30'29.16" N	88°40'16.45"E
101	48.860	3	27°30'29.87" N	88°40'37.12"E
102	49.280	3	27°30'31.30" N	88°40'51.02"E

7.45 Mtr Length

103	49.700	3	27°30'39.54" N	88°41'00.63"E
104	50.040	3	27°30'30.54" N	88°41'07.29"E
105	50.380	3	27°30'26.54" N	88°41'18.54"E
106	50.950	3	27°30'27.78" N	88°41'37.50"E
107	51.360	3	27°30'30.84" N	88°41'49.35"E
108	51.800	3	27°30'38.85" N	88°42'02.22"E
109	52.140	3	27°30'37.01" N	88°42'10.62"E
110	52.720	3	27°30'24.67" N	88°42'21.76"E
111	53.280	3	27°30'15.96" N	88°42'30.56"E
112	53.800	3	27°29'56.78" N	88°42'49.19"E
113	54.300	3	27°29'46.00" N	88°42'59.53"E
114	54.800	3	27°29'59.70" N	88°43'01.52"E
115	55.160	3	27°30'11.17" N	88°42'59.30"E
116	55.560	3	27°30'41.03" N	88°42'59.41"E
117	56.120	3	27°30'59.78" N	88°42'58.06"E
118	56.605	3	27°31'13.99" N	88°42'57.23"E
119	57.080	3	27°31'08.43" N	88°43'09.50"E
120	57.440	3	27°31'03.64" N	88°43'18.60"E
121	57.920	3	27°30'52.14" N	88°43'26.51"E
122	58.420	3	27°30'40.67" N	88°43'38.07"E
123	58.920	3	27°30'27.41" N	88°43'50.02"E
124	59.260	3	27°30'19.12" N	88°43'56.92"E
125	59.920	3	27°30'02.96" N	88°44'11.38"E
126	60.560	3	27°29'50.84" N	88°44'29.94"E
127	60.980	3	27°29'45.48" N	88°44'44.04"E
128	61.340	3	27°29'51.67" N	88°44'47.56"E
129	61.830	3	27°30'02.94" N	88°44'36.50"E
130	62.300	3	27°30'16.66" N	88°44'30.96"E
131	62.800	3	27°30'24.86" N	88°44'20.26"E
132	63.300	3	27°30'39.45" N	88°44'14.66"E
133	63.800	3	27°30'54.44" N	88°44'14.90"E
134	64.040	3	27°31'01.85" N	88°44'16.05"E
135	64.550	3	27°31'11.41" N	88°44'03.12"E
136	65.000	3	27°31'22.19" N	88°44'01.78"E
137	65.480	3	27°31'37.78" N	88°43'58.67"E
138	65.870	3	27°31'45.44" N	88°43'53.51"E
139	66.380	3	27°31'35.14" N	88°44'06.42"E
140	66.900	3	27°31'20.96" N	88°44'06.87"E
141	67.460	3	27°31'13.37" N	88°44'18.86"E
142	68.000	3	27°31'56.93" N	88°44'25.33"E
143	68.520	3	27°30'42.53" N	88°44'24.08"E
144	68.920	3	27°30'31.69" N	88°44'29.65"E
145	69.420	3	27°30'36.83" N	88°44'46.41"E
146	69.960	3	27°30'20.38" N	88°44'46.06"E
147	70.560	3	27°30'17.82" N	88°44'54.66"E
148	71.000	3	27°30'07.22" N	88°45'01.65"E
149	71.600	3	27°29'57.89" N	88°45'18.31"E
150	72.050	3	27°29'51.79" N	88°45'31.48"E
151	72.520	3	27°29'41.37" N	88°45'39.38"E
152	73.000	3	27°29'27.63" N	88°45'44.16"E
153	73.480	3	27°29'14.30" N	88°45'53.08"E
154	73.840	3	27°29'05.44" N	88°46'00.91"E
155	74.400	3	27°28'55.03" N	88°45'46.29"E
156	74.900	3	27°28'52.28" N	88°45'29.82"E

7.45 Mtr Length

157	75.300	3	27°28'48.73" N	88°45'19.16"E	7.45 Mtr Length
158	75.800	3	27°29'01.39" N	88°45'10.27"E	
159	76.200	3	27°29'10.65" N	88°44'58.95"E	
160	76.640	3	27°29'04.81" N	88°44'52.89"E	
161	76.960	3	27°29'05.13" N	88°44'46.56"E	
162	77.540	3	27°28'54.72" N	88°44'40.72"E	
163	78.200	3	27°28'47.34" N	88°44'56.77"E	
164	78.740	3	27°28'33.02" N	88°44'58.72"E	
165	79.260	3	27°28'20.57" N	88°45'06.29"E	
166	79.800	3	27°28'19.51" N	88°45'24.79"E	
167	80.380	3	27°28'07.67" N	88°45'36.87"E	
168	80.820	3	27°27'58.79" N	88°45'48.65"E	
169	81.360	3	27°28'06.00" N	88°46'06.01"E	
170	81.800	3	27°27'55.96" N	88°46'14.52"E	
171	82.150	3	27°27'45.62" N	88°46'10.37"E	
172	82.660	3	27°27'36.12" N	88°45'56.13"E	
173	82.940	3	27°27'29.96" N	88°45'56.67"E	
174	83.360	3	27°27'24.18" N	88°45'58.25"E	
175	83.820	3	27°27'29.69" N	88°45'13.07"E	
176	84.360	3	27°27'35.07" N	88°46'29.36"E	

Details for Proposed Minor and Major Bridge of road Toong-Partem -PT-4865-Tamze					
Sr No	Location	Width (Mtr)	Latitude	Longitude	Remarks
1	2.220	6.00	27°32'37.05"N	88°38'01.51"E	7.45 Mtr Length
2	3.920	6.00	27°32'39.41"N	88°38'24.97"E	
3	4.900	6.00	27°32'35.06"N	88°38'22.80"E	
4	7.480	6.00	27°32'55.21"N	88°39'35.92"E	
5	10.420	10.00	27°32'31.22"N	88°38'53.28"E	
6	10.980	6.00	27°32'27.51"N	88°38'38.13"E	
7	19.360	10.00	27°32'16.19"N	88°39'53.39"E	
8	21.320	10.00	27°31'38.92"N	88°40'28.05"E	
9	22.200	6.00	27°31'33.33"N	88°40'55.40"E	
10	24.520	10.00	27°31'23.73"N	88°40'40.63"E	
11	25.480	10.00	27°31'27.72"N	88°40'16.27"E	
12	26.580	10.00	27°31'34.30"N	88°39'43.18"E	
13	27.120	6.00	27°31'46.16"N	88°39'31.83"E	
14	28.060	10.00	27°32'04.63"N	88°39'31.72"E	
15	29.880	6.00	27°31'43.15"N	88°39'16.97"E	
16	33.740	10.00	27°30'18.37"N	88°38'50.55"E	
17	36.500	10.00	27°30'11.14"N	88°38'52.81"E	
18	36.740	10.00	27°30'10.20"N	88°39'00.06"E	
19	39.040	6.00	27°30'55.65"N	88°39'24.97"E	
20	40.800	6.00	27°30'33.97"N	88°39'32.70"E	
21	41.560	6.00	27°30'13.36"N	88°39'31.41"E	
22	47.000	6.00	27°30'18.31"N	88°39'52.23"E	
23	48.420	10.00	27°30'22.28"N	88°40'24.70"E	
24	48.630	10.00	27°30'26.52"N	88°40'30.36"E	
25	50.220	6.00	27°30'27.18"N	88°41'13.11"E	
26	58.460	10.00	27°30'37.29"N	88°43'40.03"E	
27	62.140	10.00	27°30'11.51"N	88°44'31.15"E	
28	63.900	6.00	27°30'57.53"N	88°44'15.61"E	
29	66.320	10.00	27°31'35.80"N	88°44'04.85"E	
30	68.140	10.00	27°30'53.33"N	88°44'22.61"E	
31	68.580	6.00	27°30'40.17"N	88°44'25.04"E	
32	69.240	10.00	27°30'34.64"N	88°44'40.48"E	
33	70.440	10.00	27°30'16.96"N	88°44'51.18"E	
34	71.700	10.00	27°29'56.78"N	88°45'20.93"E	
35	73.000	10.00	27°29'27.46"N	88°45'44.21"E	
36	73.100	10.00	27°29'25.11"N	88°45'40.40"E	
37	74.880	10.00	27°28'52.62"N	88°45'30.05"E	
38	76.500	10.00	27°29'03.44"N	88°44'57.67"E	
39	78.060	10.00	27°28'50.51"N	88°44'55.42"E	
40	79.420	10.00	27°28'18.41"N	88°45'11.83"E	

