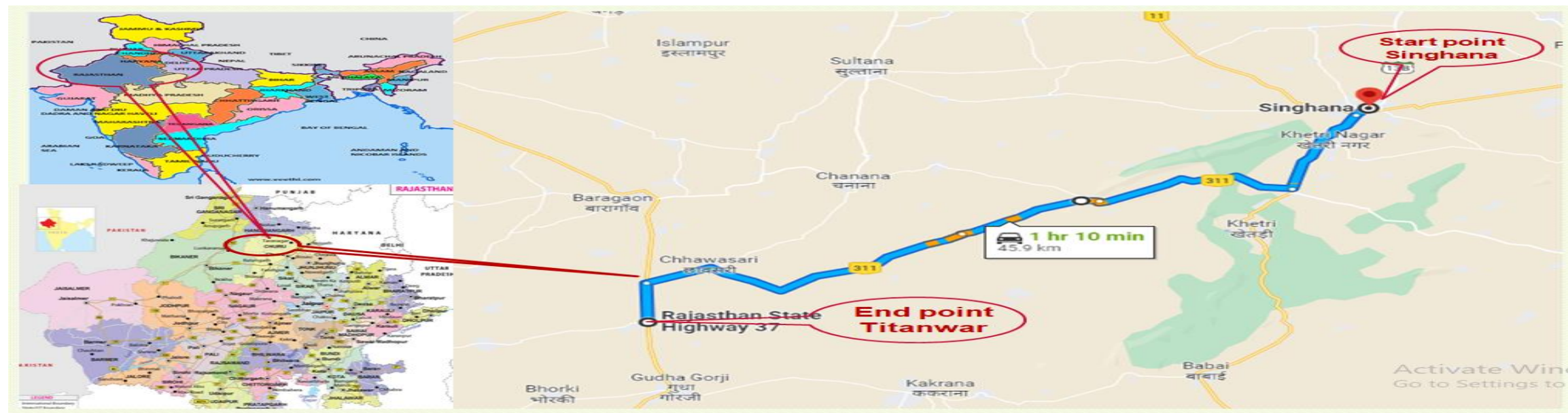


Consultancy Services For Feasibility/Detail Engineering Report for Construction of Karauli Bypass on NH-23 in the state of Rajasthan under Annual Plan 2024-25.

Final - DPR

Drawings



FEBRUARY-2025



TECHNICAL CUNSLTANCY SERVICES

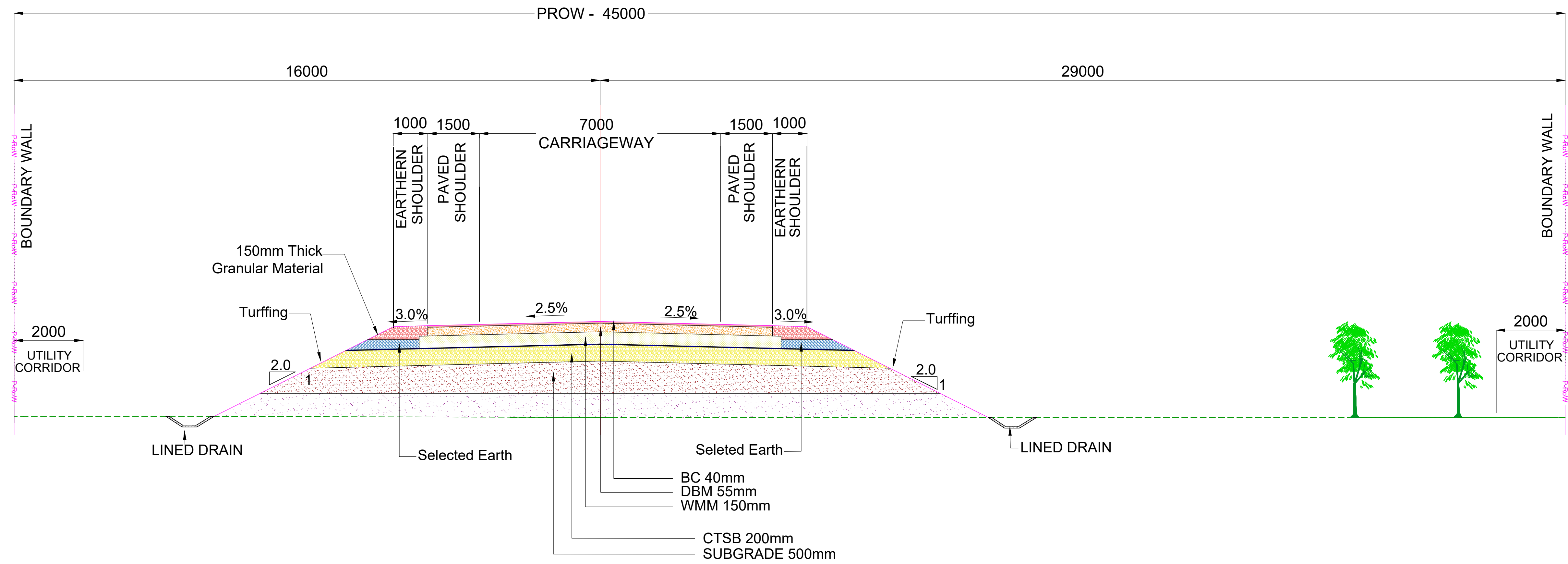
In Association
with



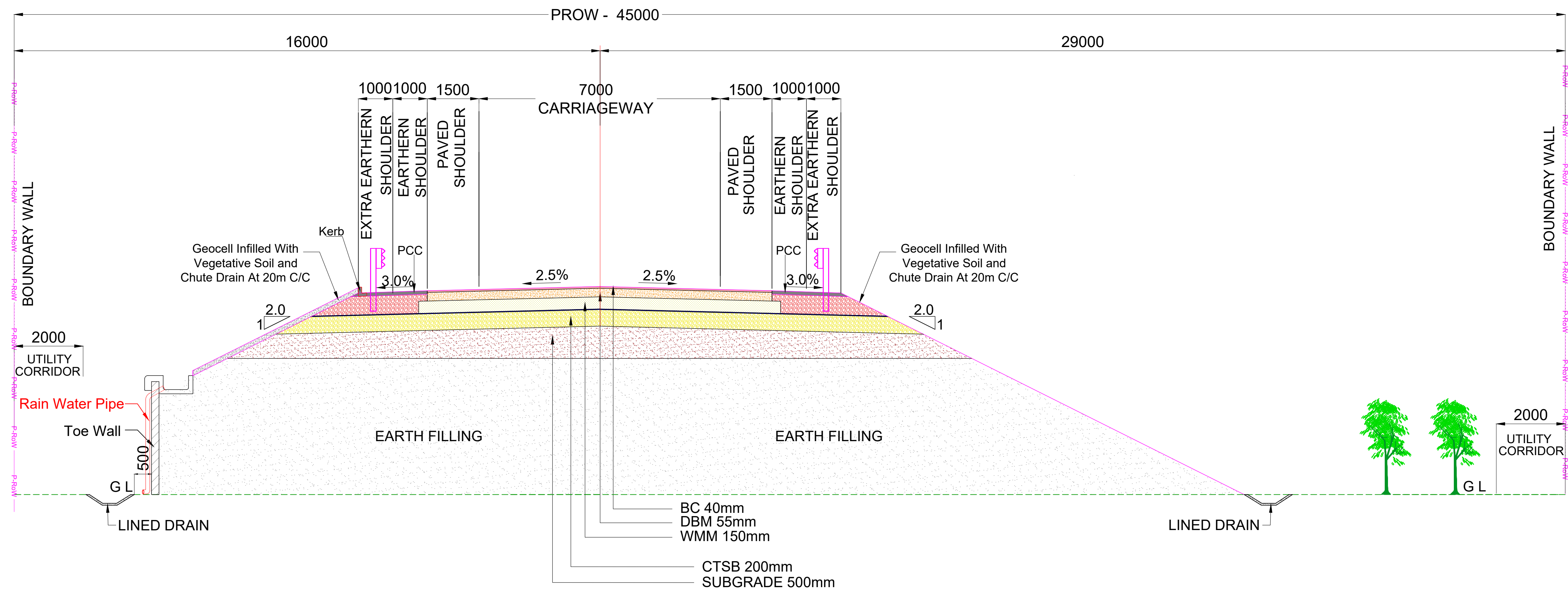
P.K. ENGINEERS

Jaipur (Raj.) – 302019, email: pkengineers83@gmail.com

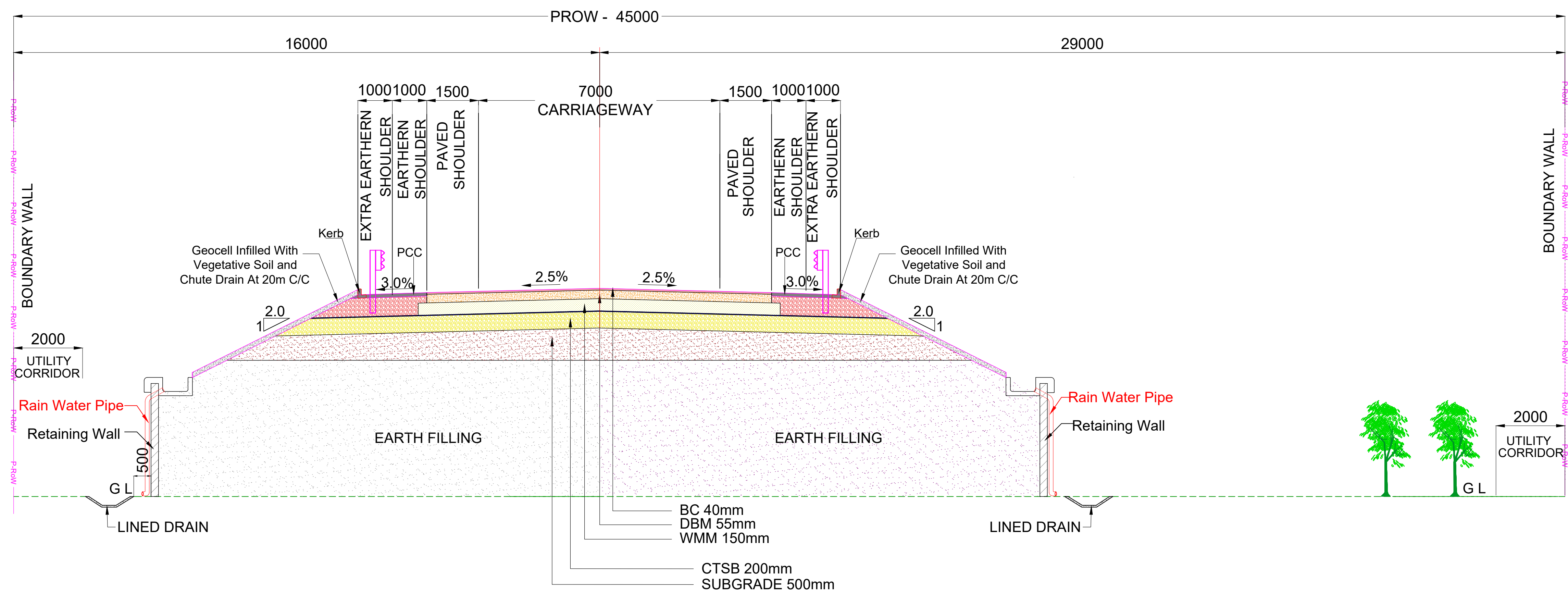
Typical Cross Section



TCS - 1
TWO LANE CARRIAGEWAY WITH PAVED SHOULDER ECCENTRICALLY PLACE BYPASS
IN GREENFIELD AREA (EMBANKMENT<3m) IN PLAIN & ROLLING TERRAIN

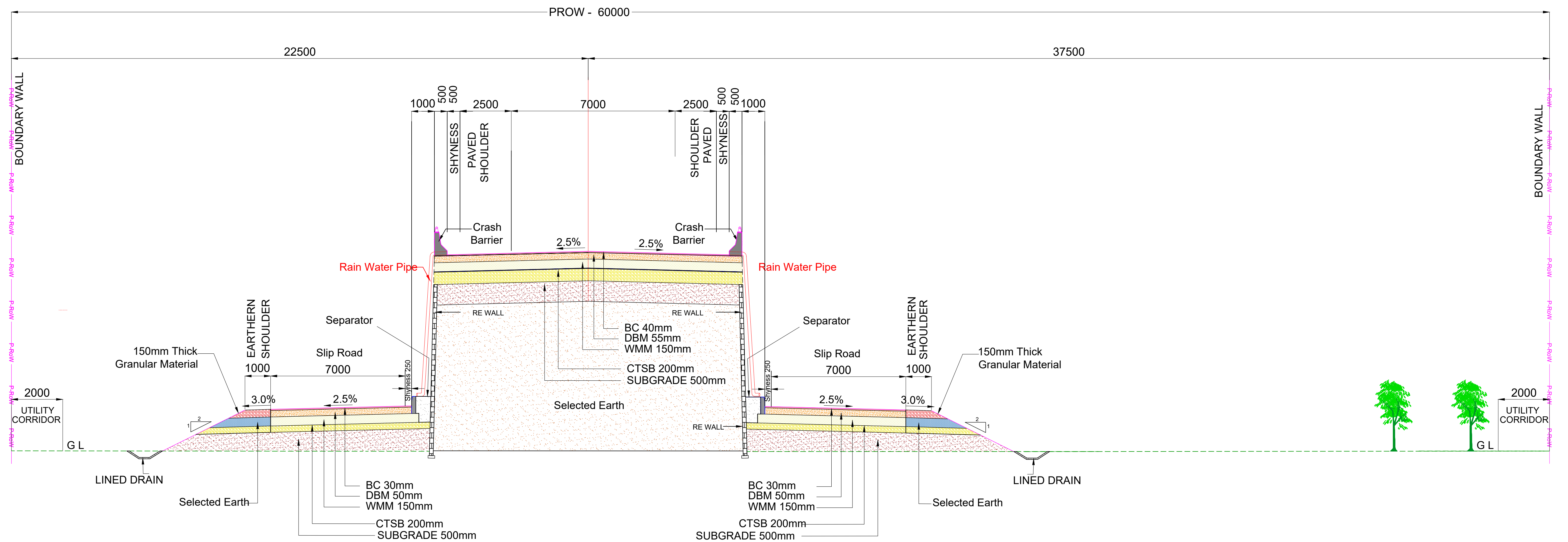


TCS - 2
TWO LANE CARRIAGEWAY WITH PAVED SHOULDER ECCENTRICALLY PLACE BYPASS
IN GREENFIELD AREA (EMBANKMENT>3m) IN PLAIN & ROLLING TERRAIN



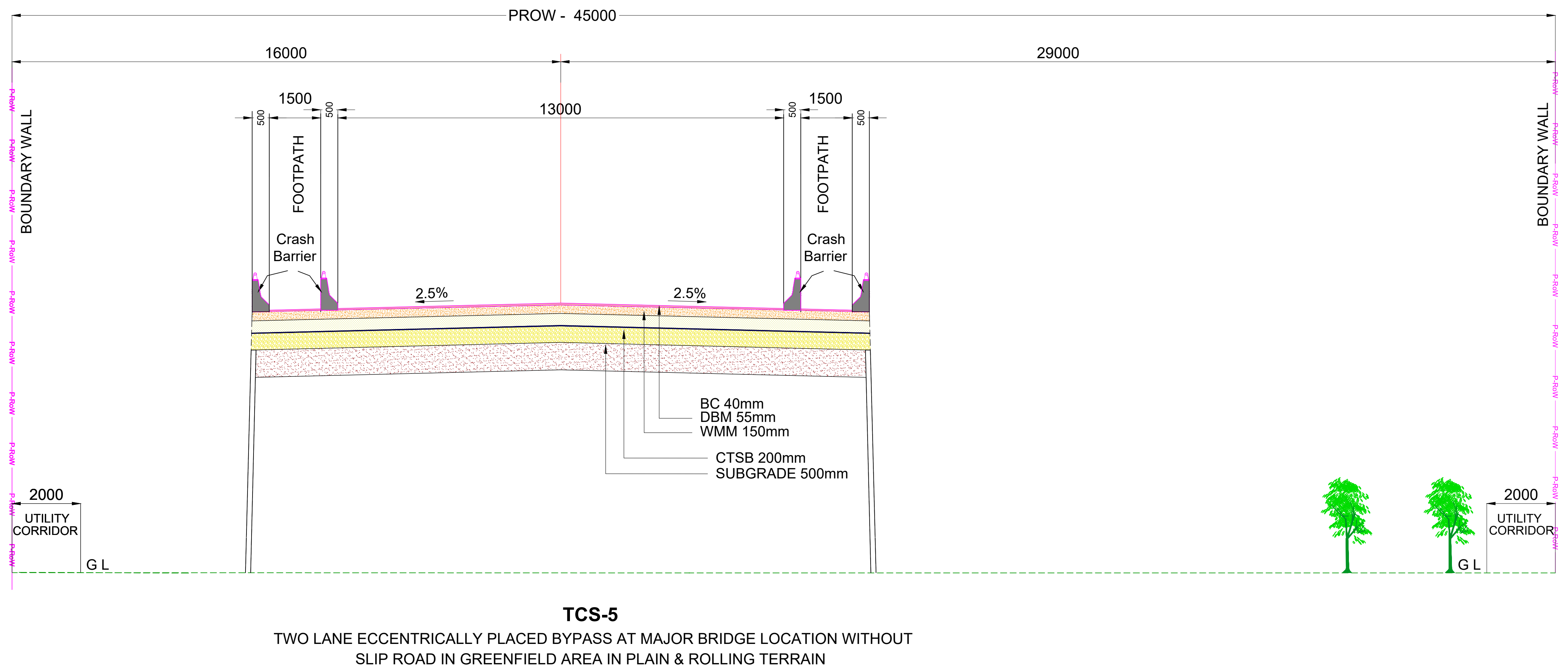
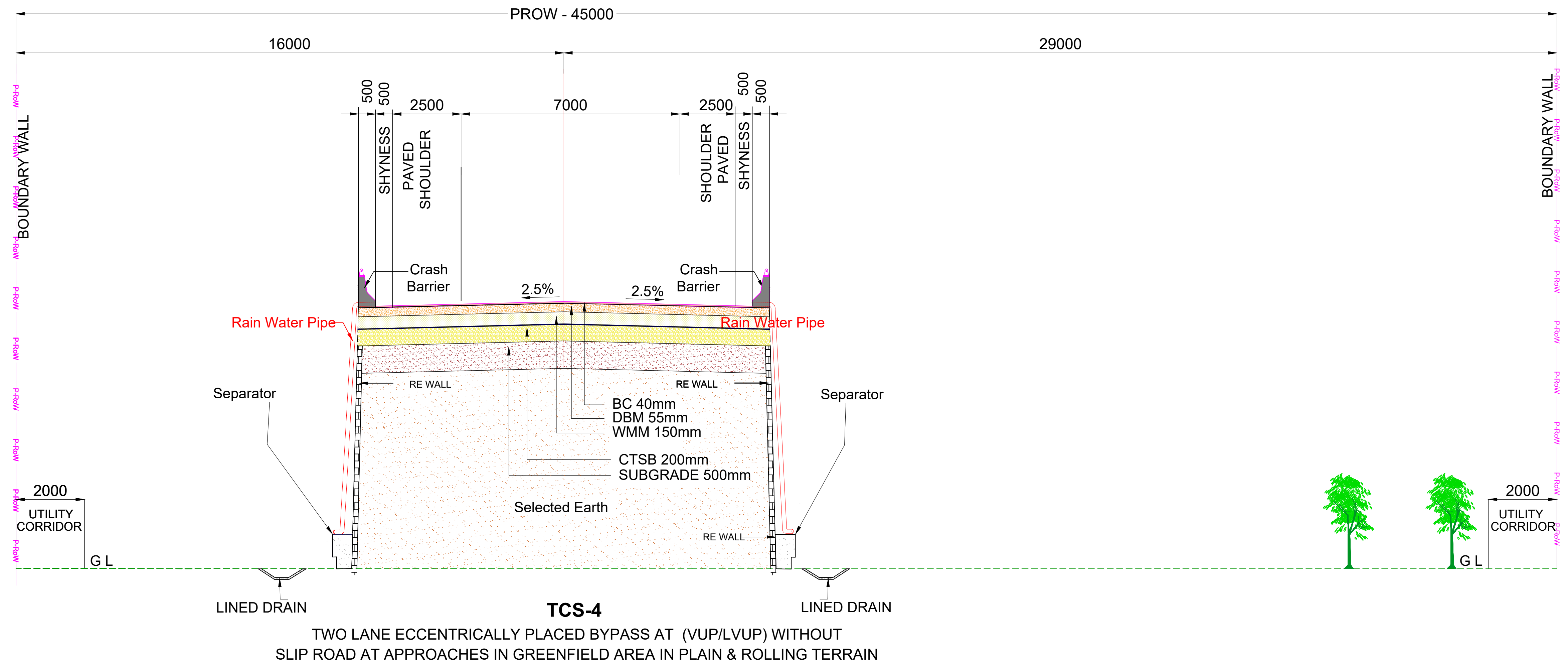
TCS - 2A

TWO LANE CARRIAGEWAY WITH PAVED SHOULDER ECCENTRICALLY PLACE BYPASS IN GREENFIELD AREA (EMBANKMENT >3M) IN PLAIN & ROLLING TERRAIN (WITH RETAINING WALL)



TCS-3

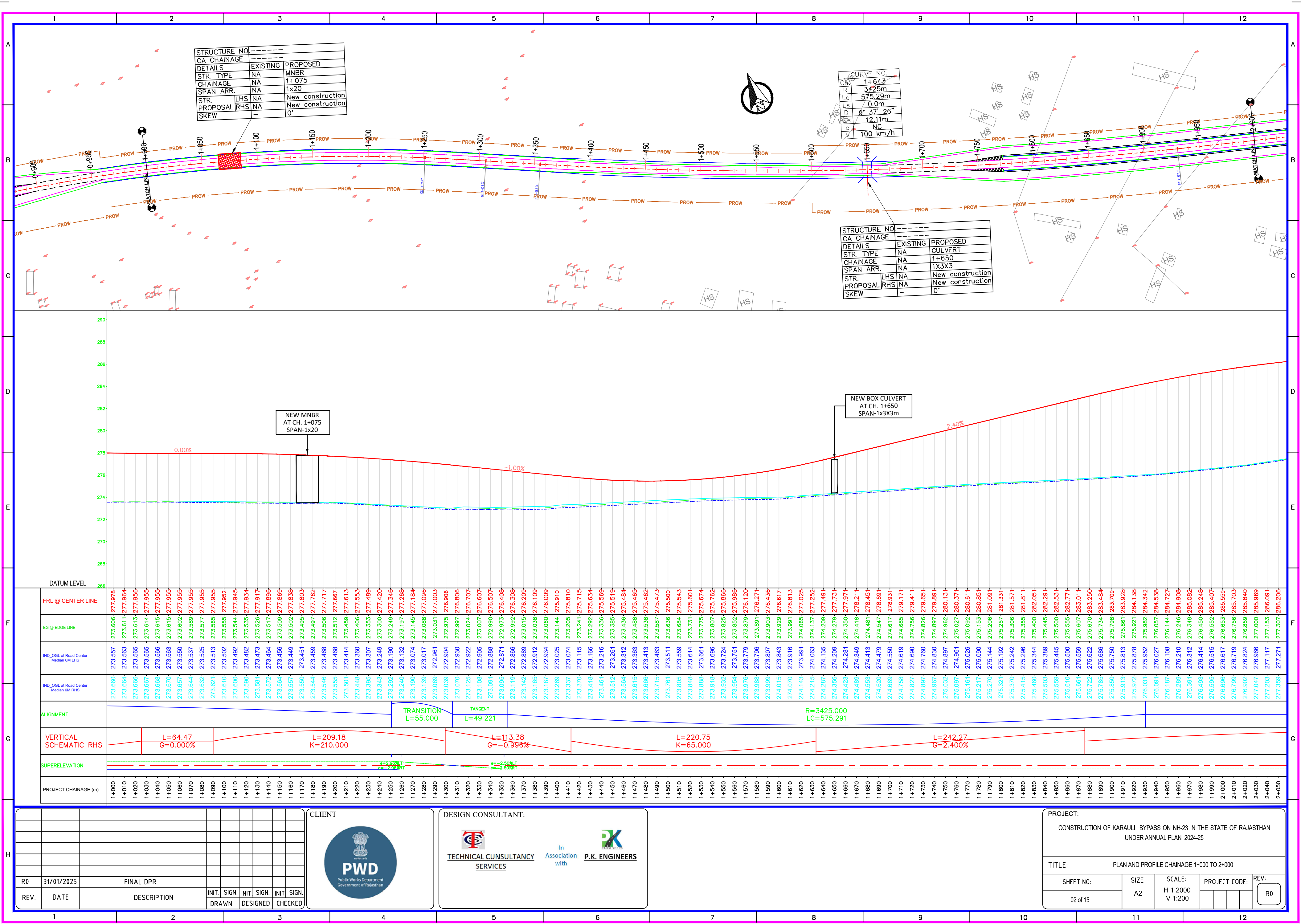
TWO LANE ECCENTRICALLY PLACED BYPASS AT APPROACHES OF GRADE SEPARATED AT MAIN STRUCTURE (VUP/LVUP) WITH SLIP ROAD (7.0M) IN GREENFIELD AREA IN PLAIN & ROLLING TERRAIN

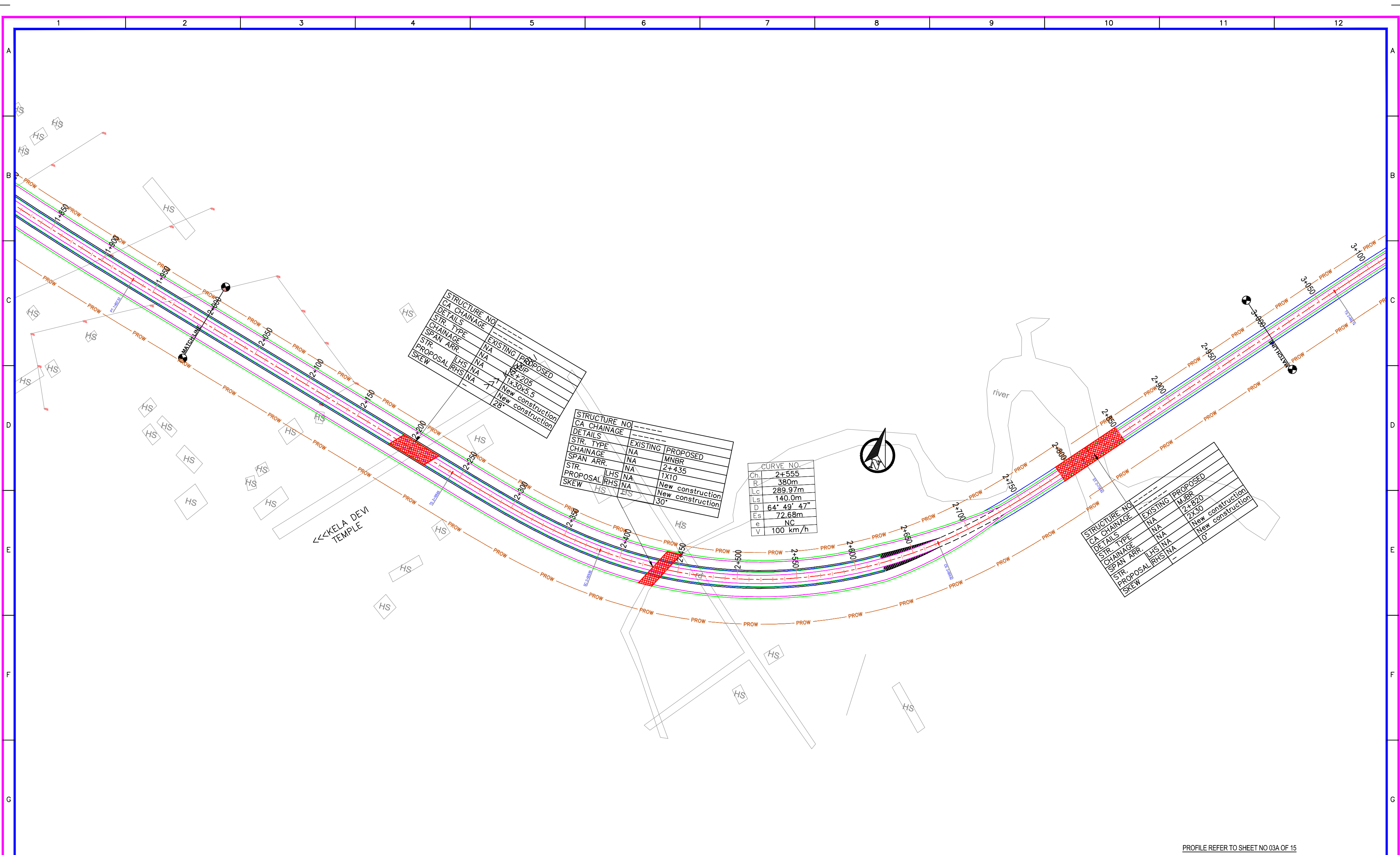


Plan and Profile

Vertical Alignment										
PVI No.	PVI		Element	Start		End		Length	Grade In	Type
	Chainage	RL		Chainage	RL	Chainage	RL			
				0	278.417					
1	427.498	287.428	Curve	143.467	281.442	711.528	281.464	568.06		Summit
			Grade	711.528	281.464	731.624	281.042	20.096	-2.1%	
2	878.624	277.955	Curve	731.624	281.042	1025.624	277.955	294		Valley
			Grade	1025.624	277.955	1090.098	277.955	64.475	0.0%	
3	1194.69	277.955	Curve	1090.098	277.955	1299.281	276.913	209.183		Summit
			Grade	1299.281	276.913	1412.666	275.784	113.385	-1.0%	
4	1523.039	274.684	Curve	1412.666	275.784	1633.413	277.333	220.747		Valley
			Grade	1633.413	277.333	1875.679	283.147	242.267	2.4%	
5	2199.679	290.923	Curve	1875.679	283.147	2523.679	283.147	648		Summit
			Grade	2523.679	283.147	2896.329	274.204	372.65	-2.4%	
6	3035.592	270.862	Curve	2896.329	274.204	3174.855	273.984	278.526		Valley
			Grade	3174.855	273.984	3182.585	274.157	7.729	2.2%	
7	3492.141	281.098	Curve	3182.585	274.157	3801.697	273.842	619.112		Summit
			Grade	3801.697	273.842	3966.811	269.972	165.114	-2.3%	
8	4065.897	267.65	Curve	3966.811	269.972	4164.983	267.945	198.172		Valley
			Grade	4164.983	267.945	4581.451	269.188	416.468	0.3%	
9	4623.241	269.313	Curve	4581.451	269.188	4665.031	269.179	83.581		Summit
			Grade	4665.031	269.179	4871.864	268.515	206.833	-0.3%	
10	5002.901	268.095	Curve	4871.864	268.515	5133.938	271.109	262.074		Valley
			Grade	5133.938	271.109	5135.194	271.138	1.257	2.3%	
11	5256.694	273.932	Curve	5135.194	271.138	5378.194	274.54	243		Summit
			Grade	5378.194	274.54	5420.486	274.751	42.292	0.5%	
12	5487.986	275.089	Curve	5420.486	274.751	5555.486	274.751	135		Summit
			Grade	5555.486	274.751	5694.523	274.056	139.037	-0.5%	
13	5749.773	273.78	Curve	5694.523	274.056	5805.023	274.443	110.5		Valley
			Grade	5805.023	274.443	6269.505	280.016	464.482	1.2%	
14	6369.505	281.216	Curve	6269.505	280.016	6469.505	283.216	200		Valley
			Grade	6469.505	283.216	6718.747	288.201	249.242	2.0%	

15	6988.747	293.601	Curve	6718.747	288.201	7258.747	288.201	540		Summit
			Grade	7258.747	288.201	7367.23	286.032	108.483	-2.0%	
16	7414.522	285.086	Curve	7367.23	286.032	7461.814	284.828	94.584		Valley
			Grade	7461.814	284.828	7779.773	283.096	317.959	-0.5%	
17	7868.377	282.613	Curve	7779.773	283.096	7956.982	280.967	177.209		Summit
			Grade	7956.982	280.967	8201.713	276.421	244.731	-1.9%	
18	8359.589	273.489	Curve	8201.713	276.421	8517.465	275.541	315.752		Valley
			Grade	8517.465	275.541	8774.203	278.879	256.739	1.3%	
19	9173.203	284.066	Curve	8774.203	278.879	9572.203	274.091	798		Summit
			Grade	9572.203	274.091	9693.205	271.065	121.002	-2.5%	
20	9757.299	269.463	Curve	9693.205	271.065	9821.393	269.125	128.188		Valley
			Grade	9821.393	269.125	10352.134	266.323	530.741	-0.5%	
21	10491.168	265.589	Curve	10352.134	266.323	10630.201	268.37	278.067		Valley
			Grade	10630.201	268.37	10663.782	269.041	33.581	2.0%	
22	10933.782	274.441	Curve	10663.782	269.041	11203.782	269.041	540		Summit
			Grade	11203.782	269.041	11250.169	268.114	46.387	-2.0%	
23	11340.169	266.314	Curve	11250.169	268.114	11430.169	265.864	180		Valley
			Grade	11430.169	265.864	11873.512	263.647	443.344	-0.5%	
24	11971.037	263.159	Curve	11873.512	263.647	12068.562	264.574	195.049		Valley
			Grade	12068.562	264.574	12260.824	267.363	192.262	1.5%	
25	12379.287	269.081	Curve	12260.824	267.363	12497.751	268.72	236.928		Summit
			Grade	12497.751	268.72	12573.634	268.489	75.883	-0.3%	
26	12668.676	268.2	Curve	12573.634	268.489	12763.719	269.156	190.085		Valley
			Grade	12763.719	269.156	13247.827	274.028	484.108	1.0%	
27	13328.836	274.844	Curve	13247.827	274.028	13409.845	276.668	162.018		Valley
			Grade	13409.845	276.668	13573.784	280.362	163.938	2.3%	
28	13881.091	287.284	Curve	13573.784	280.362	14188.398	280.216	614.614		Summit
			Grade	14188.398	280.216	14329.738	276.965	141.34	-2.3%	
				14329.738	276.965					





PROFILE REFER TO SHEET NO 03A OF 15

R0	31/01/2025	FINAL DPR								
REV.	DATE	DESCRIPTION	INIT.	SIGN.	INIT.	SIGN.	INIT.	SIGN.		
			DRAWN		DESIGNED		CHECKED			



DESIGN CONSULTANT:



TECHNICAL CUNSLTANCY SERVICES

In
Association
with



P.K. ENGINEERS

PROJECT:

CONSTRUCTION OF KARAU LI BYPASS ON NH-23 IN THE STATE OF RAJASTHAN
UNDER ANNUAL PLAN 2024-25

TITLE:	PLAN CHAINAGE 2+000 TO 3+000
--------	------------------------------

SHEET NO:

SIZE
A2

SCALE:	PROJECT CODE:	REV
--------	---------------	-----

—

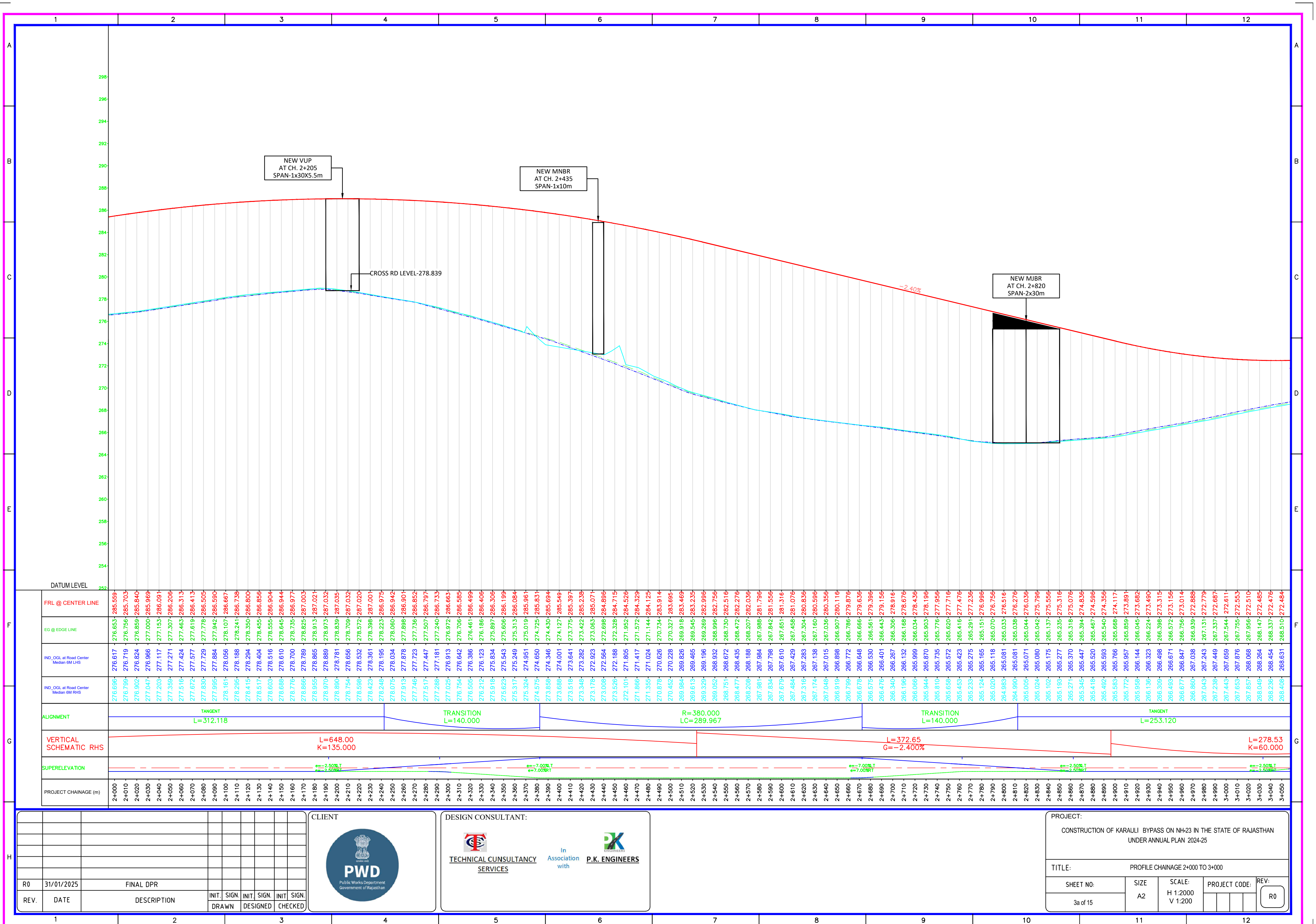
—

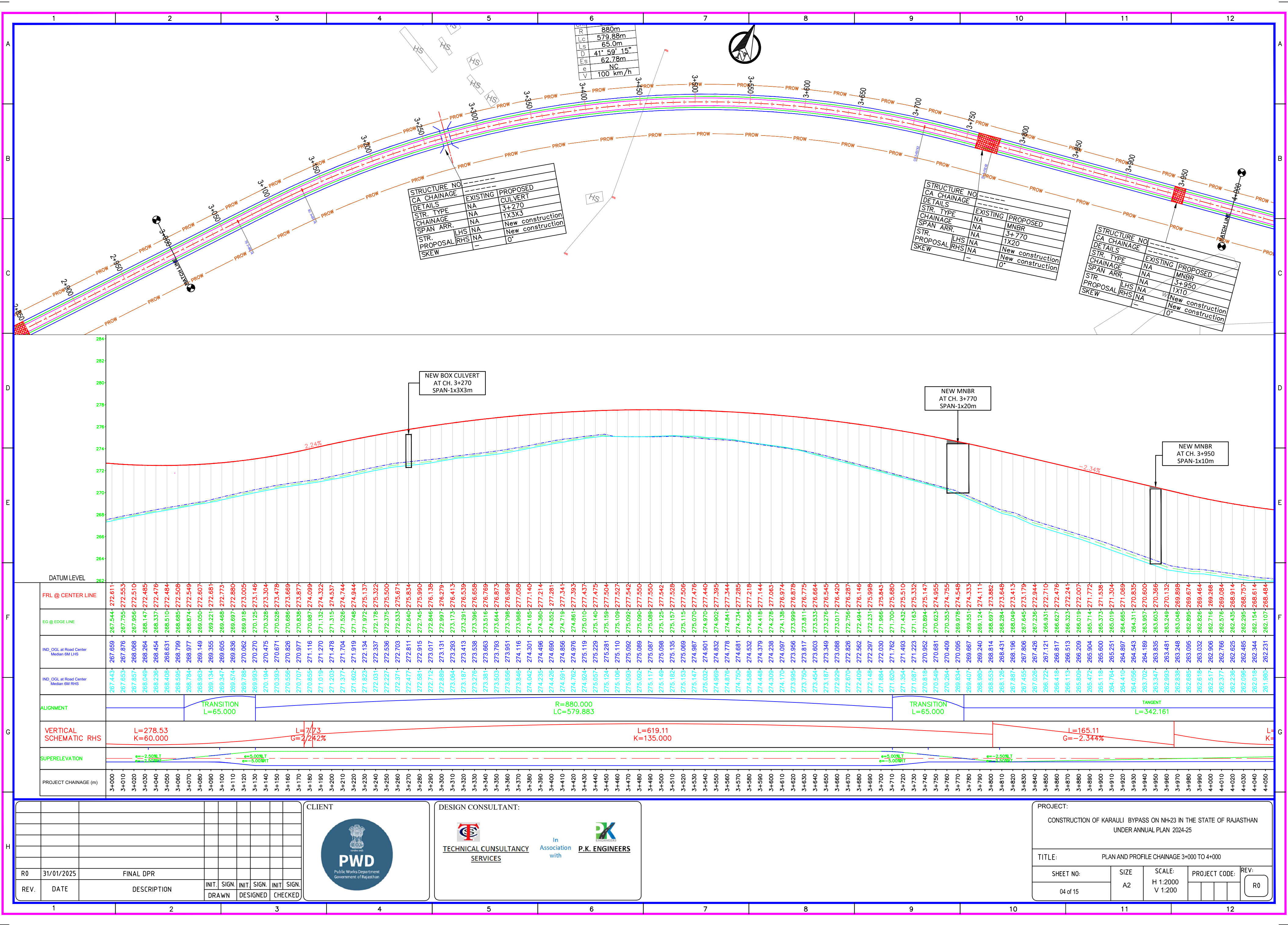
03 of 15

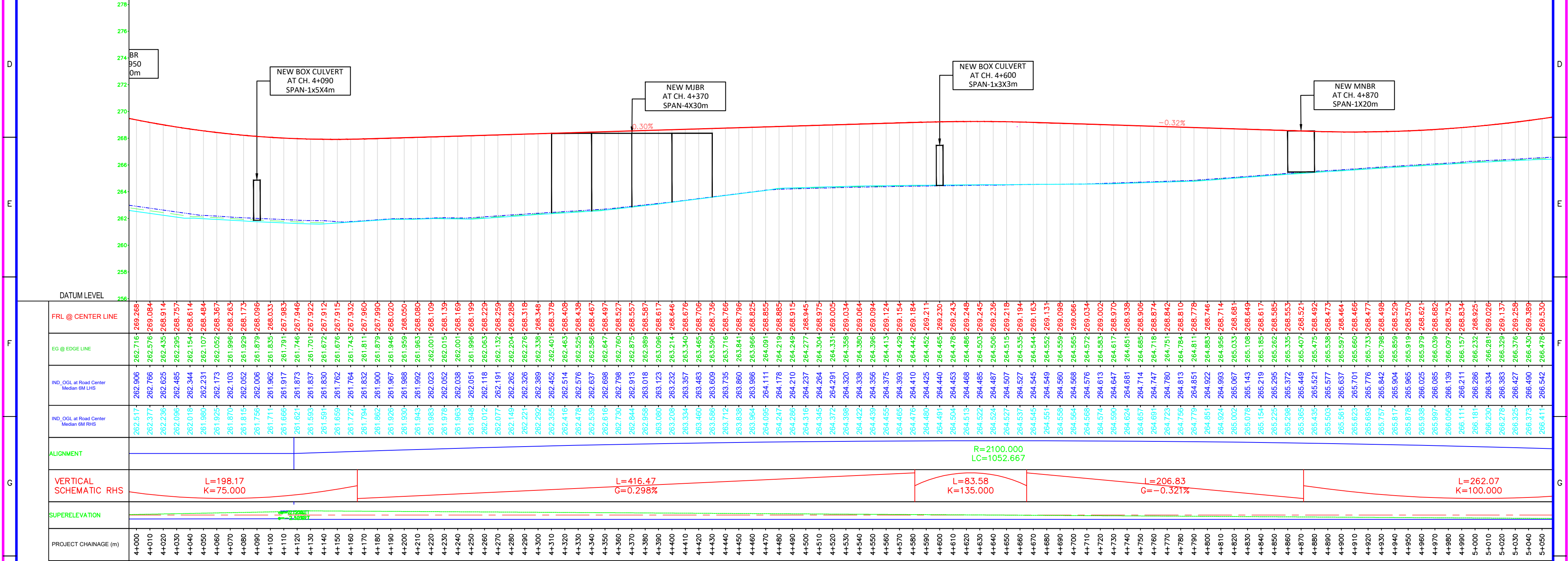
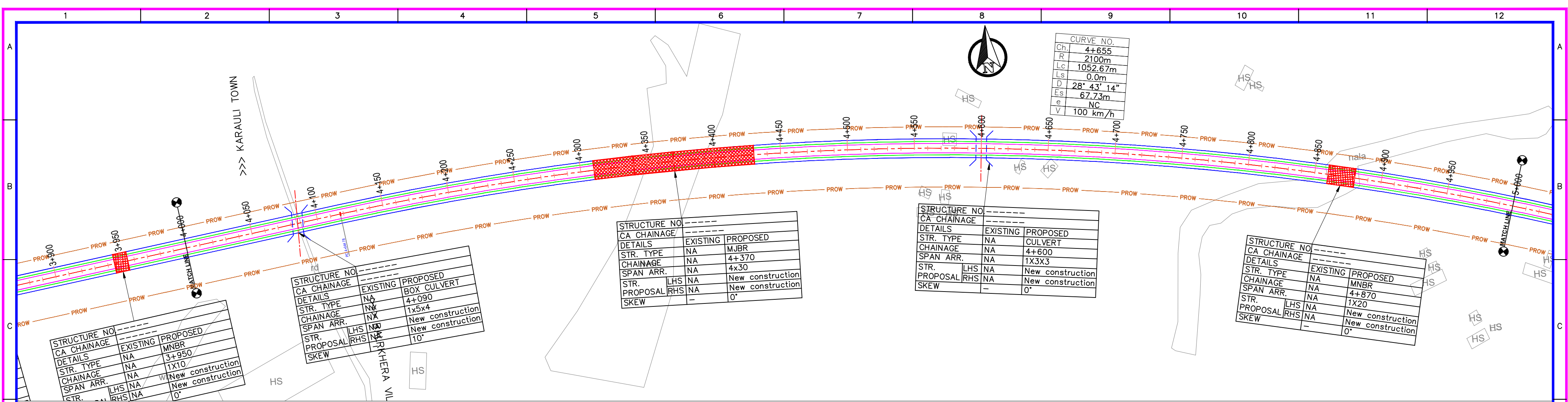
A2

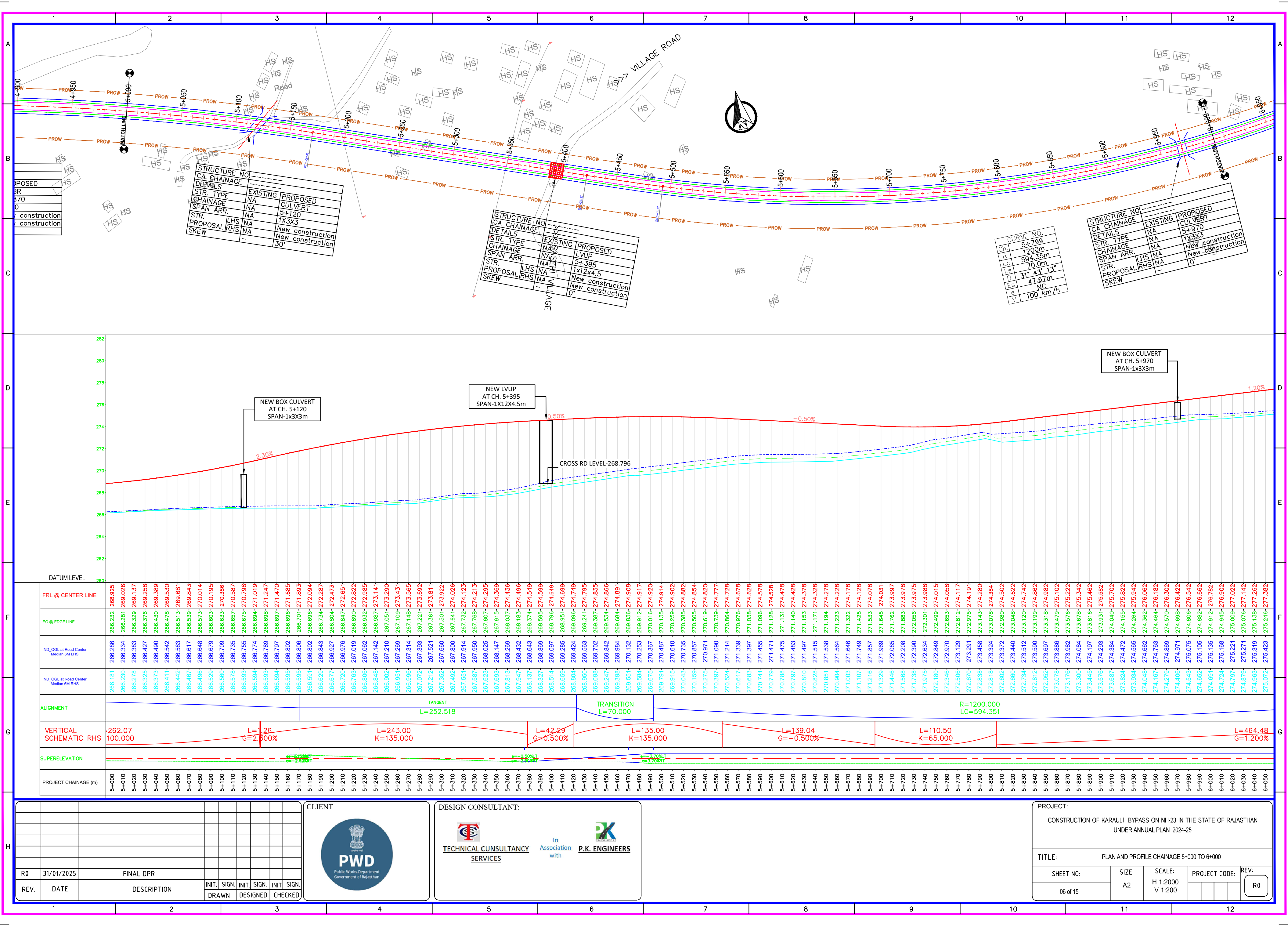
V 1:200

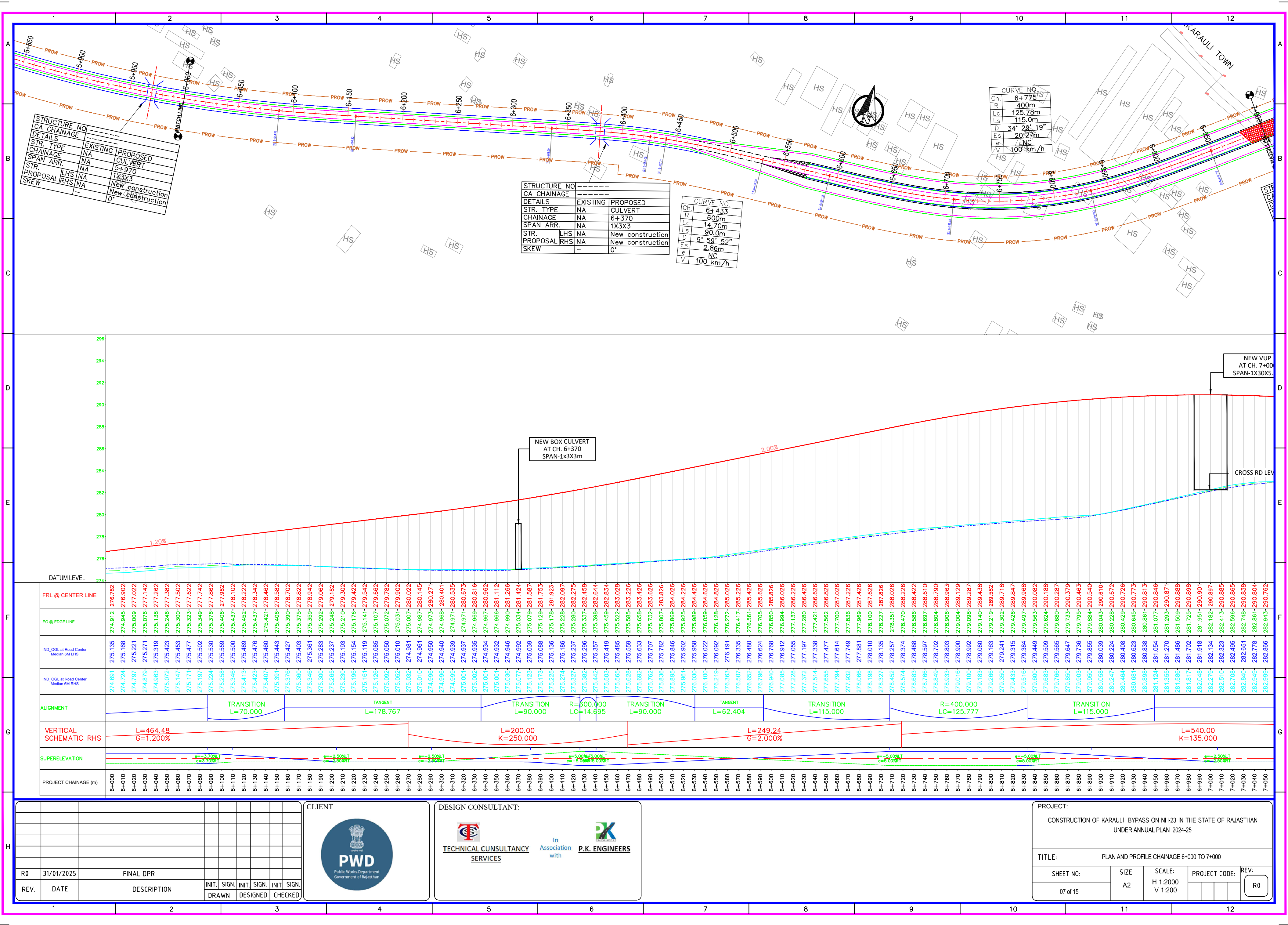
R0]

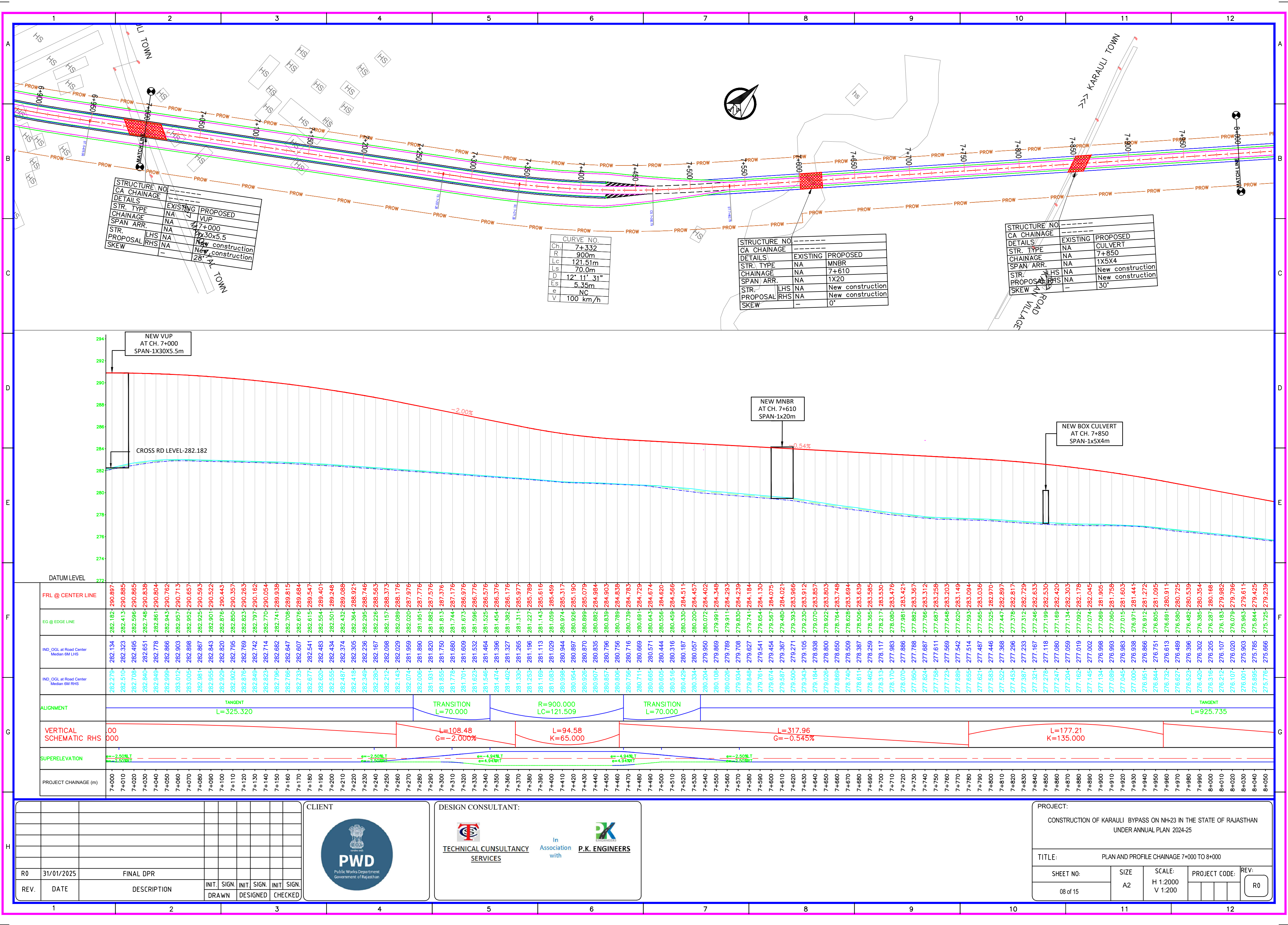


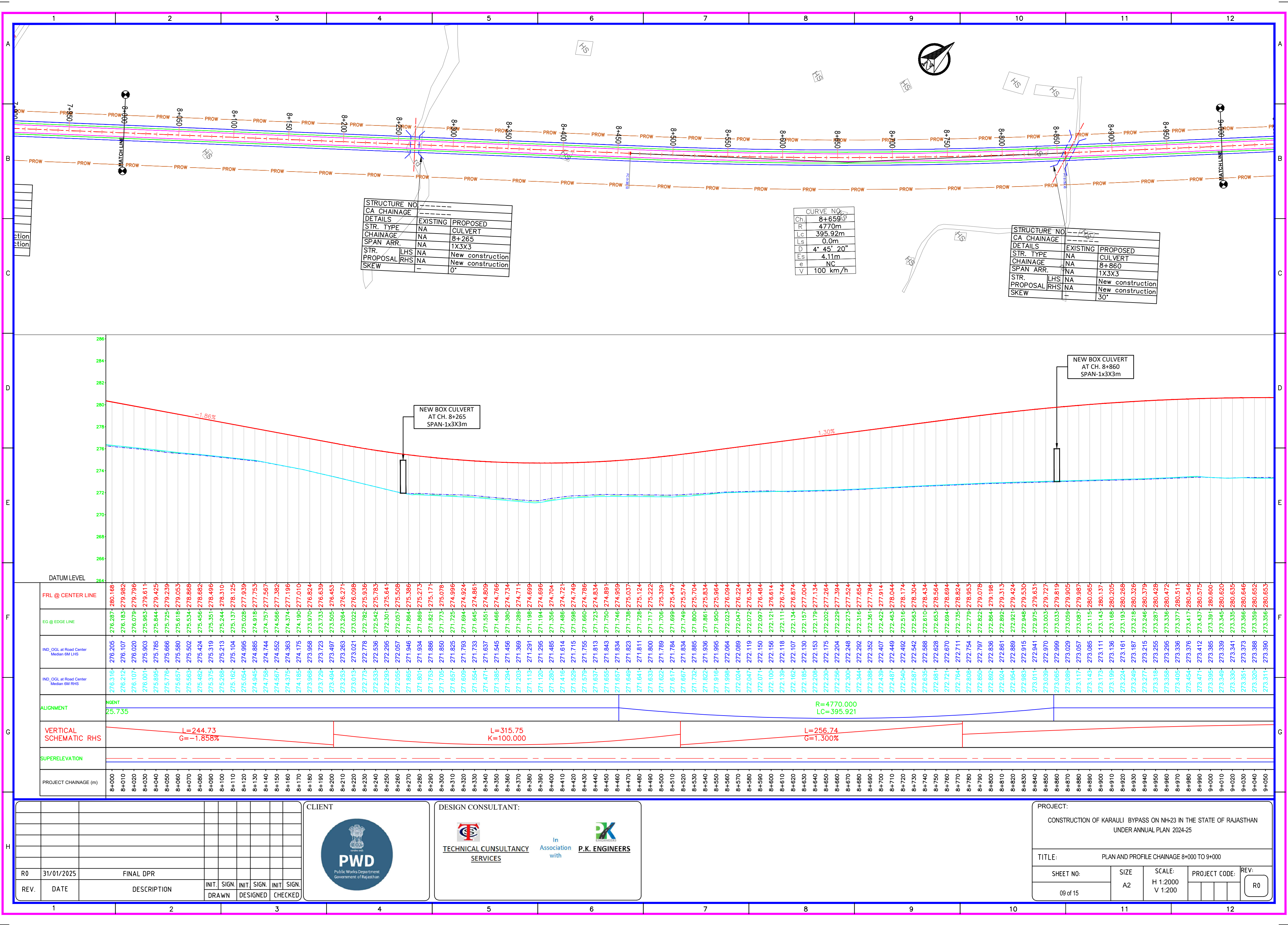


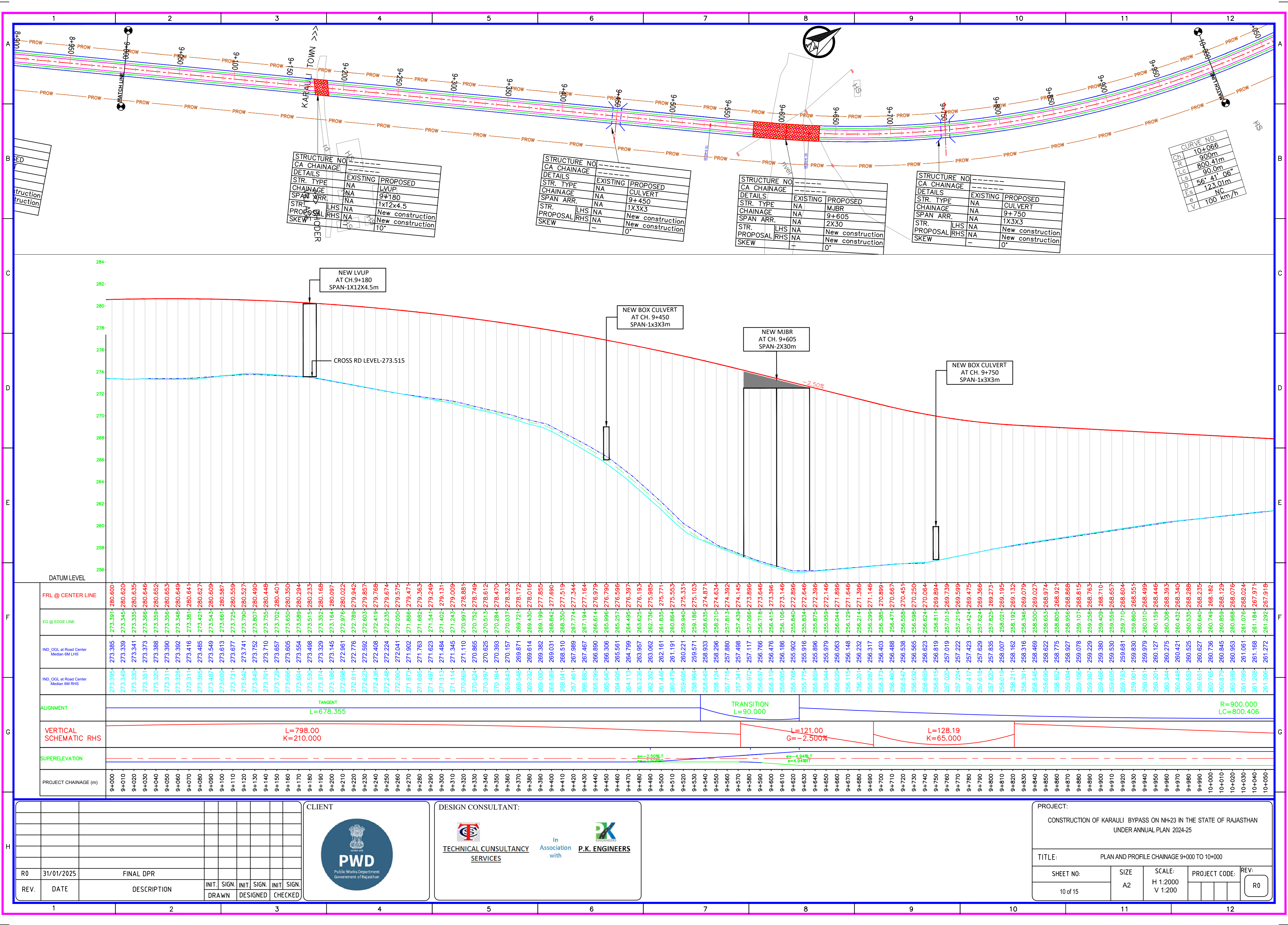
[illegible]

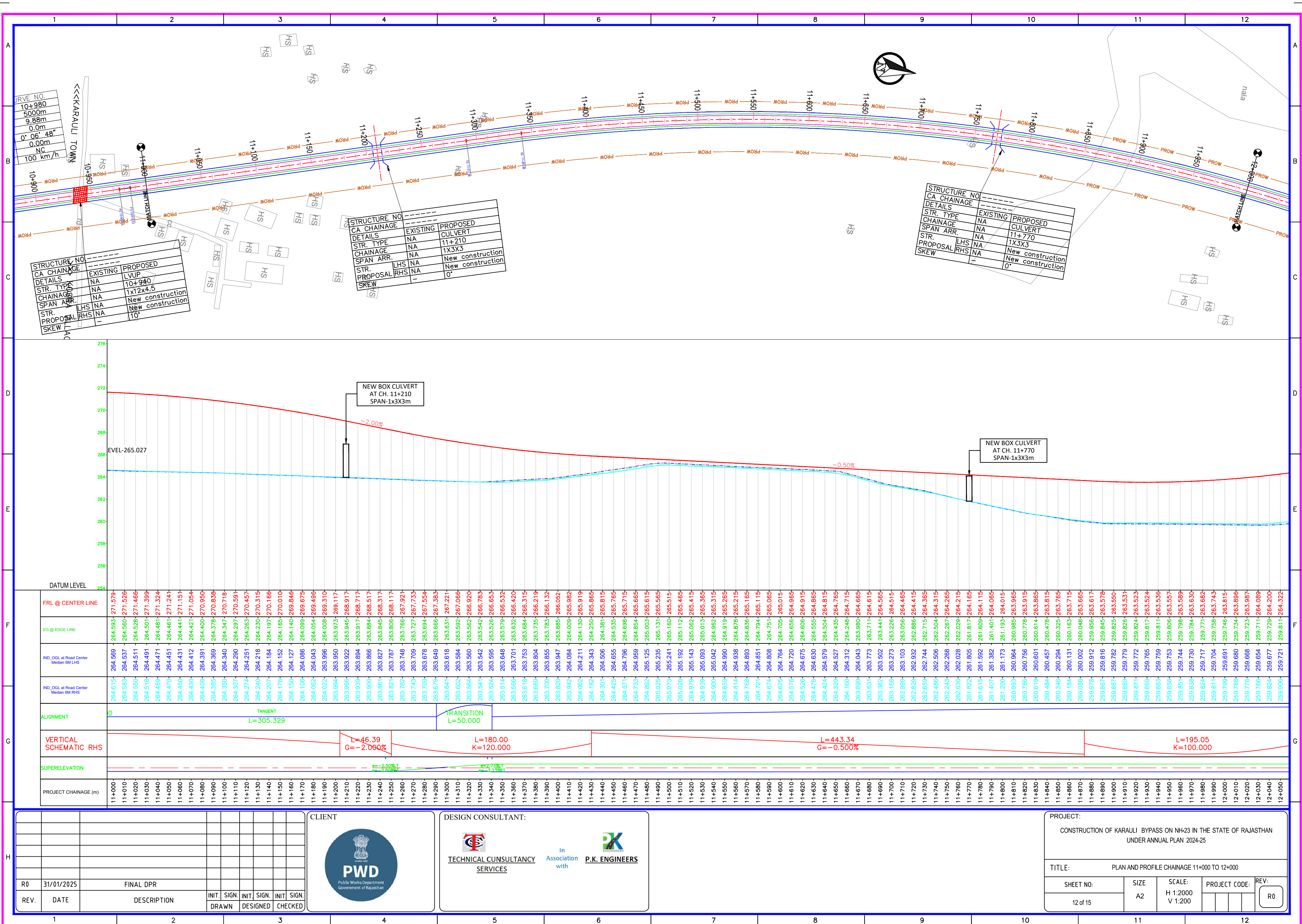


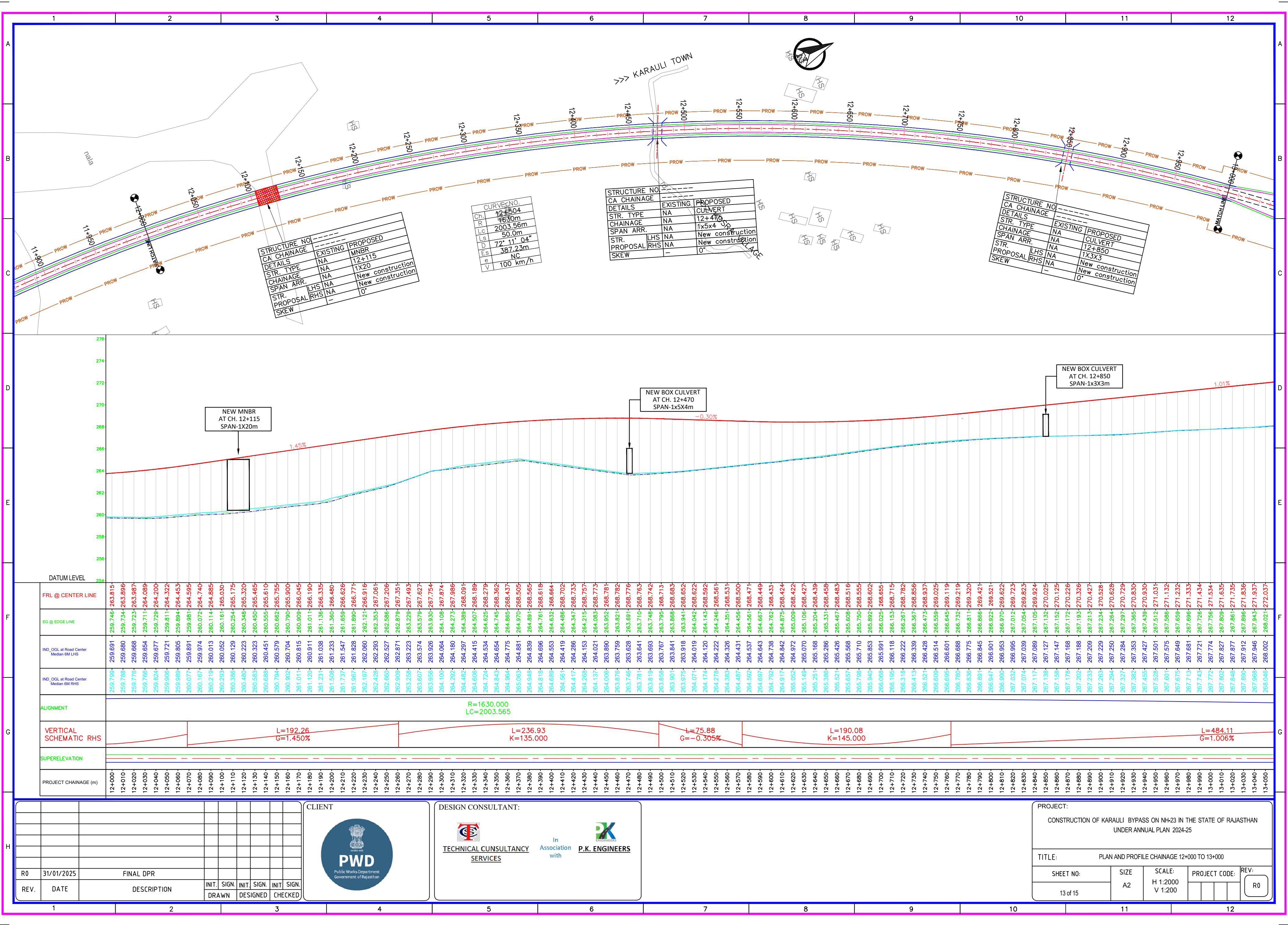


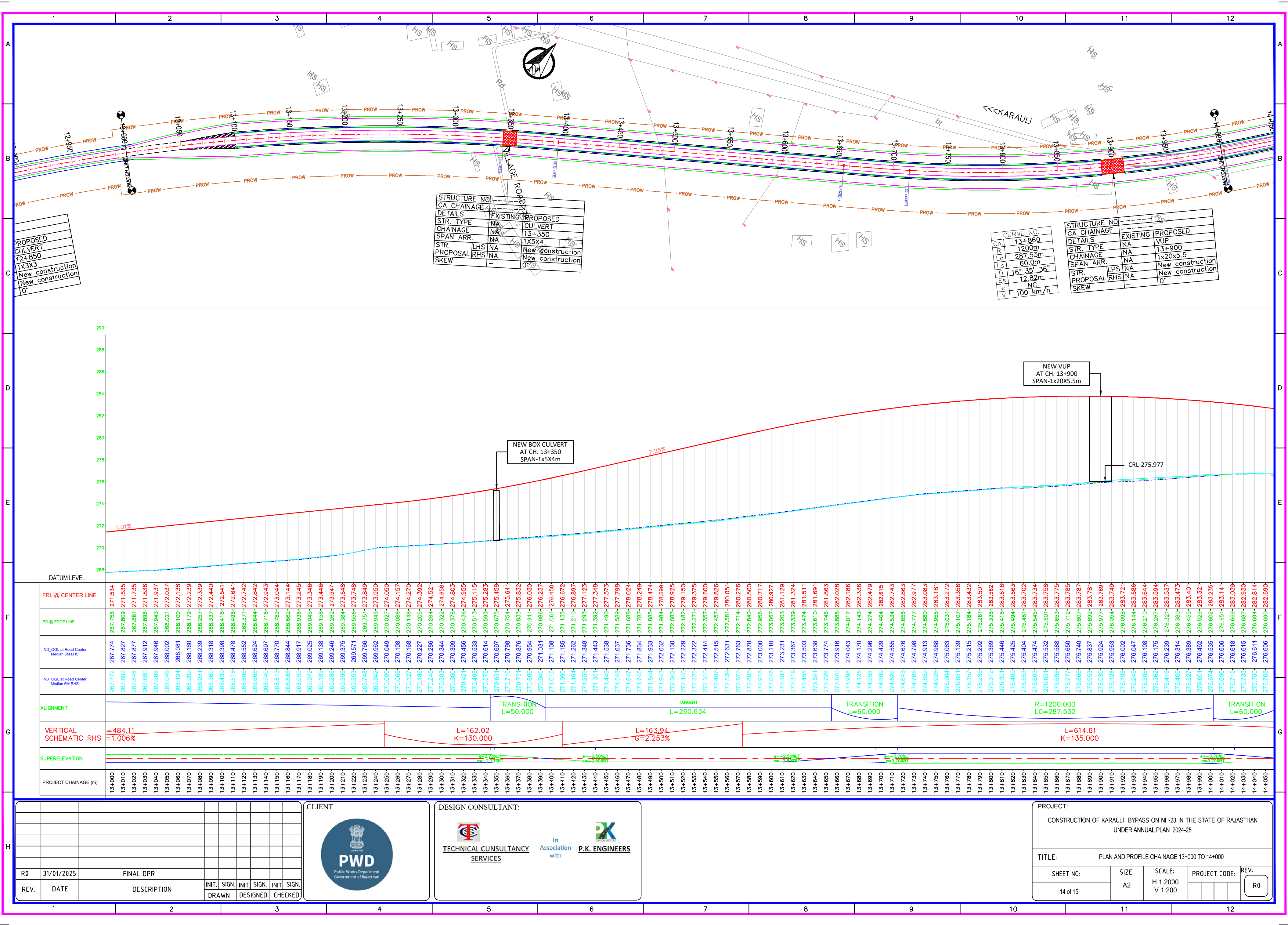




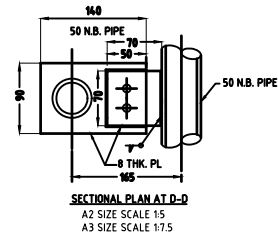
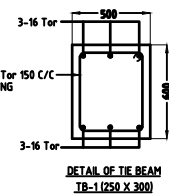
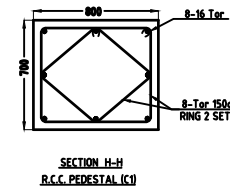
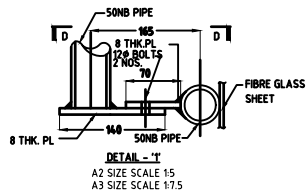
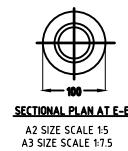
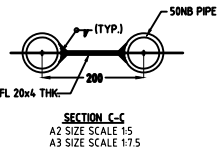
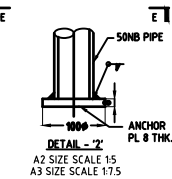
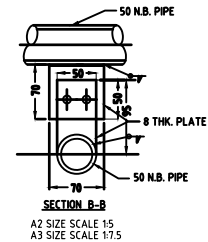
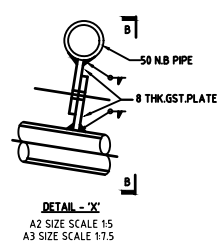
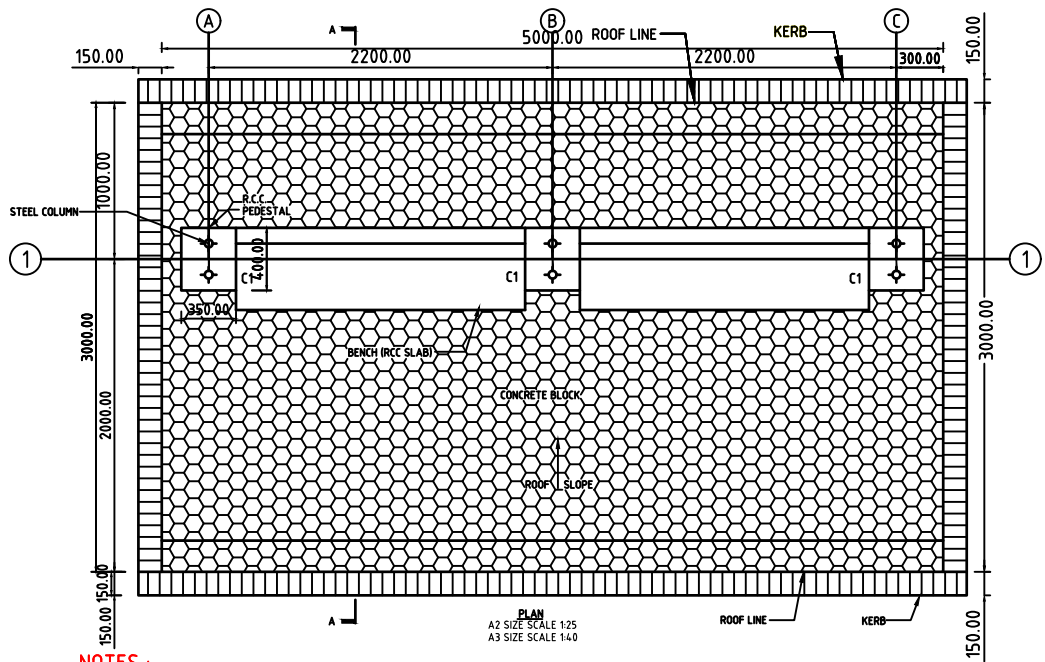
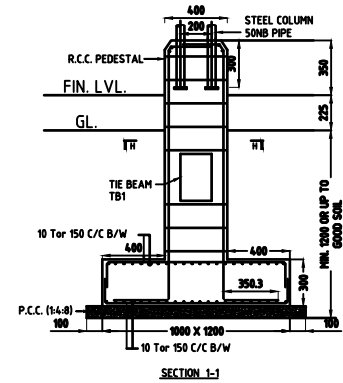
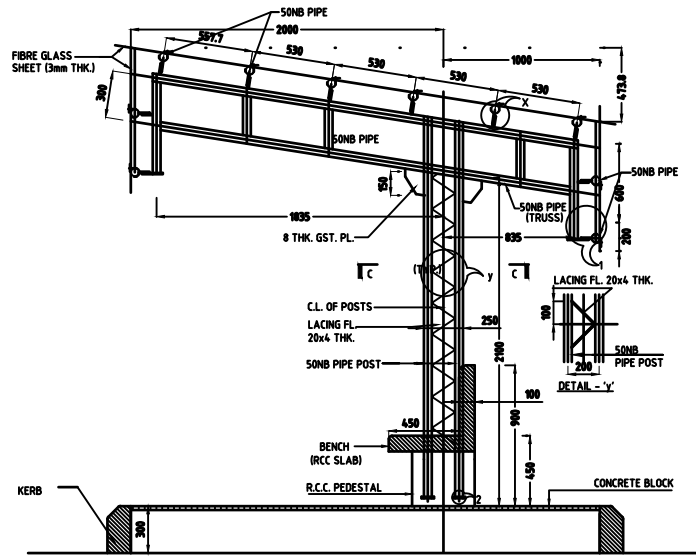
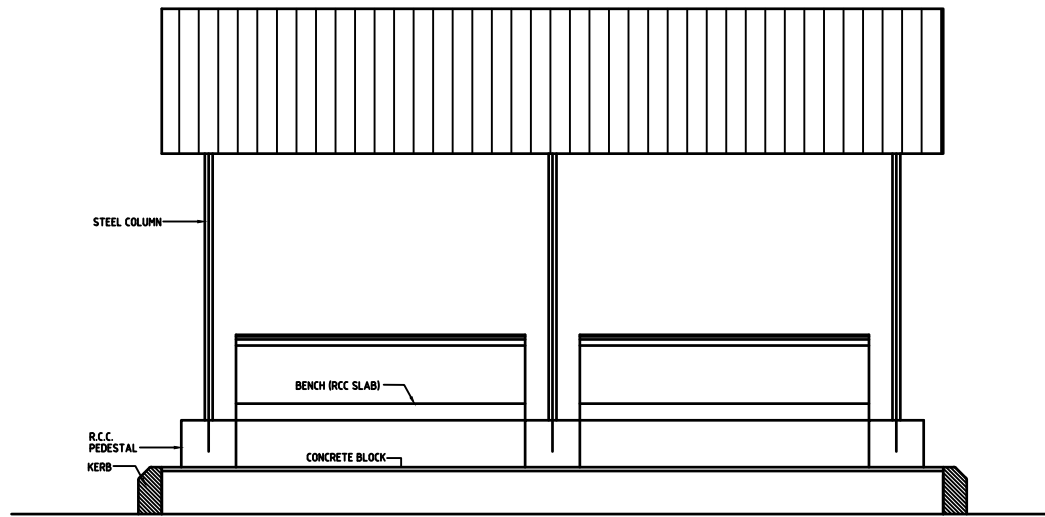








Bus Shelter





NOTES:

1. ALL DIMENSIONS ARE IN mm & LEVELS ARE IN m. UNLESS OTHERWISE SPECIFIED. DIMENSION SHALL NOT BE SCALED. ONLY WRITTEN DIMENSIONS SHALL BE FOLLOWED.
2. CONCRETE GRADE SHALL BE M20 UNLESS OTHERWISE NOTED.
3. PORTLAND SLAG CEMENT CONFORMING TO IS-455-1976 (LATEST AMENDMENT) MAY BE PERMITTED FOR ALL CONCRETE WORKS APPROVAL OF INDEPENDENT ENGINEER
4. CLEAR COVER TO MAIN REINFORCEMENT SHALL BE 40mm IN COLUMN AND 50mm IN FOOTINGS FOR PORTLAND CEMENT.
5. UNLESS OTHERWISE NOTED BOND/LAP LENGTH SHALL BE EQUAL TO DEVELOPMENT LENGTH OF BAR (Ld). Ld=50XBAR DIA. NOT MORE THAN 1/2 THE BARS SHALL BE OVERLAPPED AT ANY SECTION.
6. ALL WELDS SHALL CONFORM TO I.S. 816 AND I.S. 9595.
7. FABRICATION, ERECTION, INSPECTION OF STEEL STRUCTURE SHALL BE DONE AS PER I.S.800-1984
8. MINIMUM THICKNESS OF FILLET WELD SHALL BE 6 mm. OR THE THICKNESS REQUIRED AS PER DESIGN LOAD.
9. ALL BLACK BOLTS & NUTS SHALL CONFORM TO I.S.1363-1992 & I.S.1364-1992. WASHER SHALL CONFORM TO I.S.5369-1975
10. WELD LENGTH MENTIONED IN DRAWING IS MINIMUM REQUIRED HOWEVER FULL CONTACT LENGTH TO BE WELDED.
11. ALL PIPES SHALL BE MEDIUM DUTY CONFORM TO I.S.1239(PART-I.S.1990)
12. ALL BOLTS ARE 12 ϕ BLACK BOLTS UNLESS NOTED OTHERWISE.
13. PAINTING : TWO COATS OF EPOXY. PRIMER AND ONE COAT OF EPOXY FINISH PAINT (LIGHT GREY)
14. N.B.-NOMINAL BORE, PL.-PLATE, G.S.T.-GUSSETED STEEL, F.L.-FLAT
15. FIBER GLASS SHEETS OF 3mm THK. SHALL BE USED AS COVERING ROOF.

Rev.	Date	Description

CLIENT:	

DESIGN CONSULTANT		

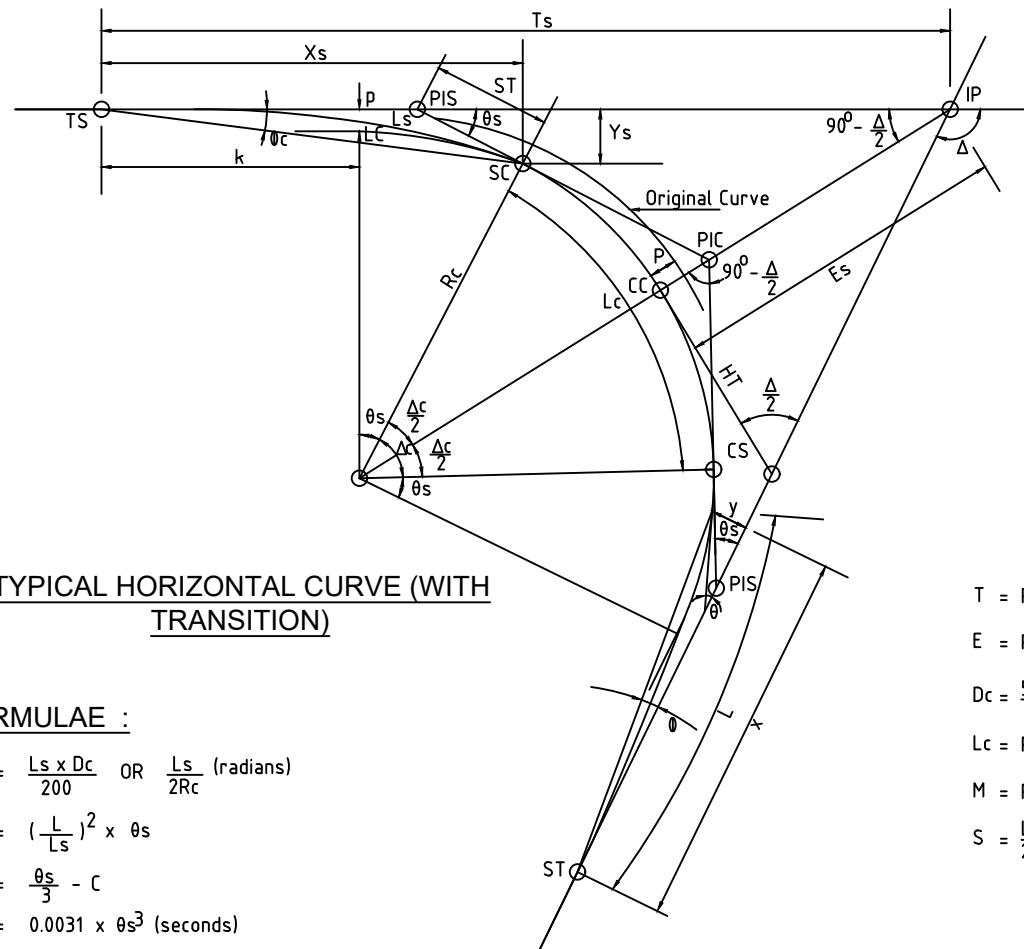
PROJECT:	CONSTRUCTION OF KARALI BYPASS ON NH-23 IN THE STATE OF RAJASTHAN UNDER ANNUAL PLAN 2024-2025

DRAWN	
DESIGNED	
CHECKED	
REVIEW	

TITLE:	TYPICAL BUS STAND
DRAWING NO.	
SCALE: NTS	PAPER SIZE- A1

SHEET NO:	1 of 1
REVISION:	R0

Misc. Drawings



TYPICAL HORIZONTAL CURVE (WITH TRANSITION)

FORMULAE :

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

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

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

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

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

$$\Delta_c = \Delta - 2\theta_s$$

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

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

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

$$LT = X_s - Y_s \cot \theta_s$$

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

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

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

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

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

$$k = X_s - R_c \sin \theta_s$$

$$L_c = \Delta_c \text{ (Radians) } R_c$$

$$\text{Radius on any point on spiral } R = \frac{R_c L_s}{L}$$

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

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

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

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

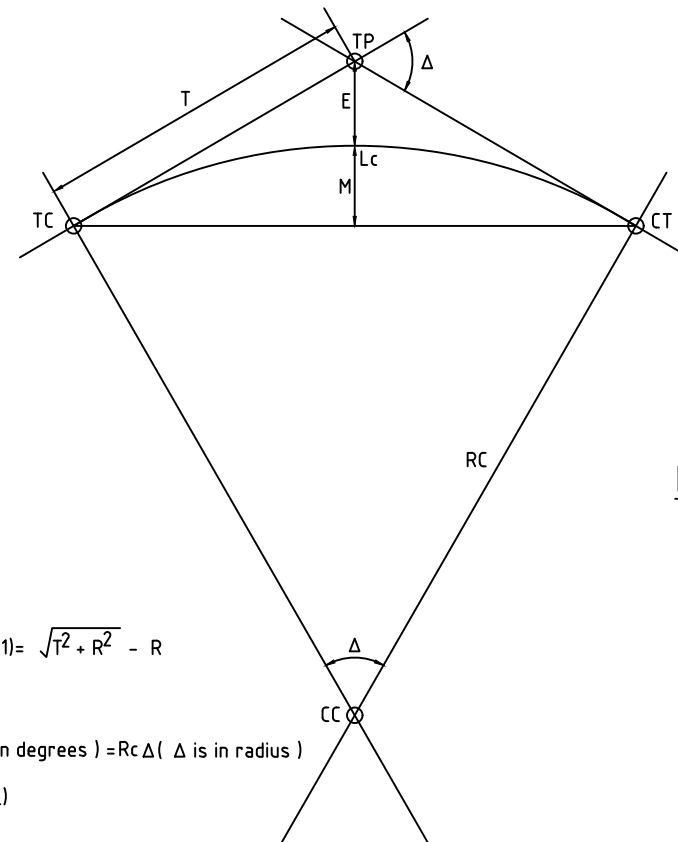
$$E = R_c \left(\sec \frac{\Delta}{2} - 1 \right) = \sqrt{T^2 + R_c^2} - R_c$$

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

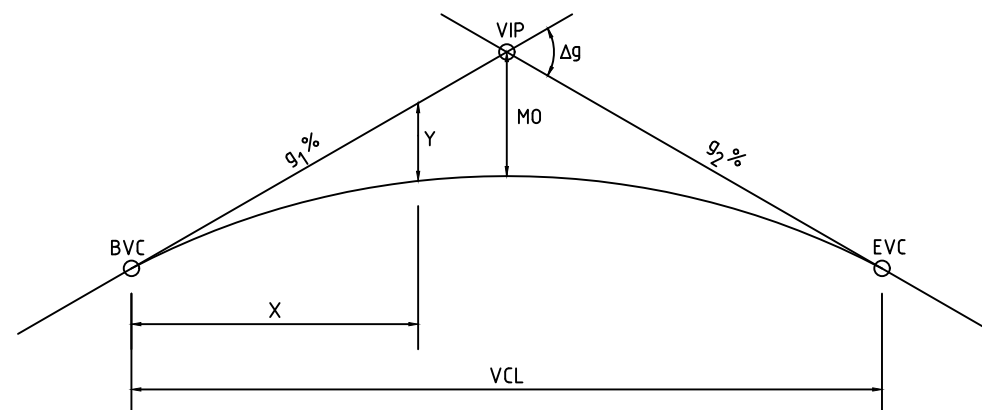
$$L_c = R_c \frac{\Delta \pi}{180} \text{ (} \Delta \text{ is in degrees)} = R_c \Delta \text{ (} \Delta \text{ is in radius)}$$

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

$$S = \frac{L_s}{24R_c}$$



TYPICAL HORIZONTAL CIRCULAR CURVE



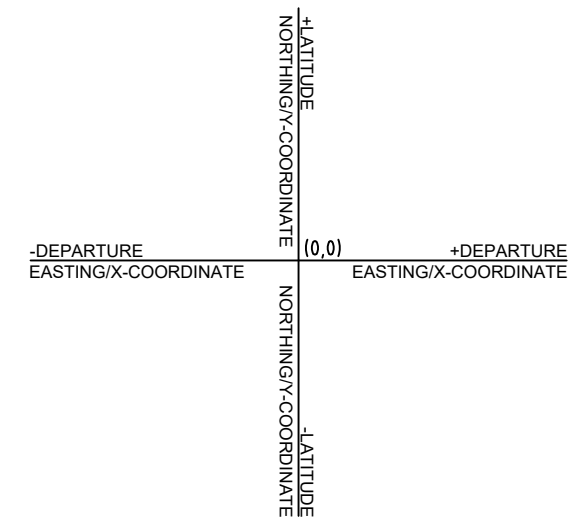
$$\Delta g = g_1\% - g_2\%$$

$$Y = \frac{\Delta g}{200 VCL} \times X^2$$

$$MO = \frac{\Delta g VCL}{800}$$

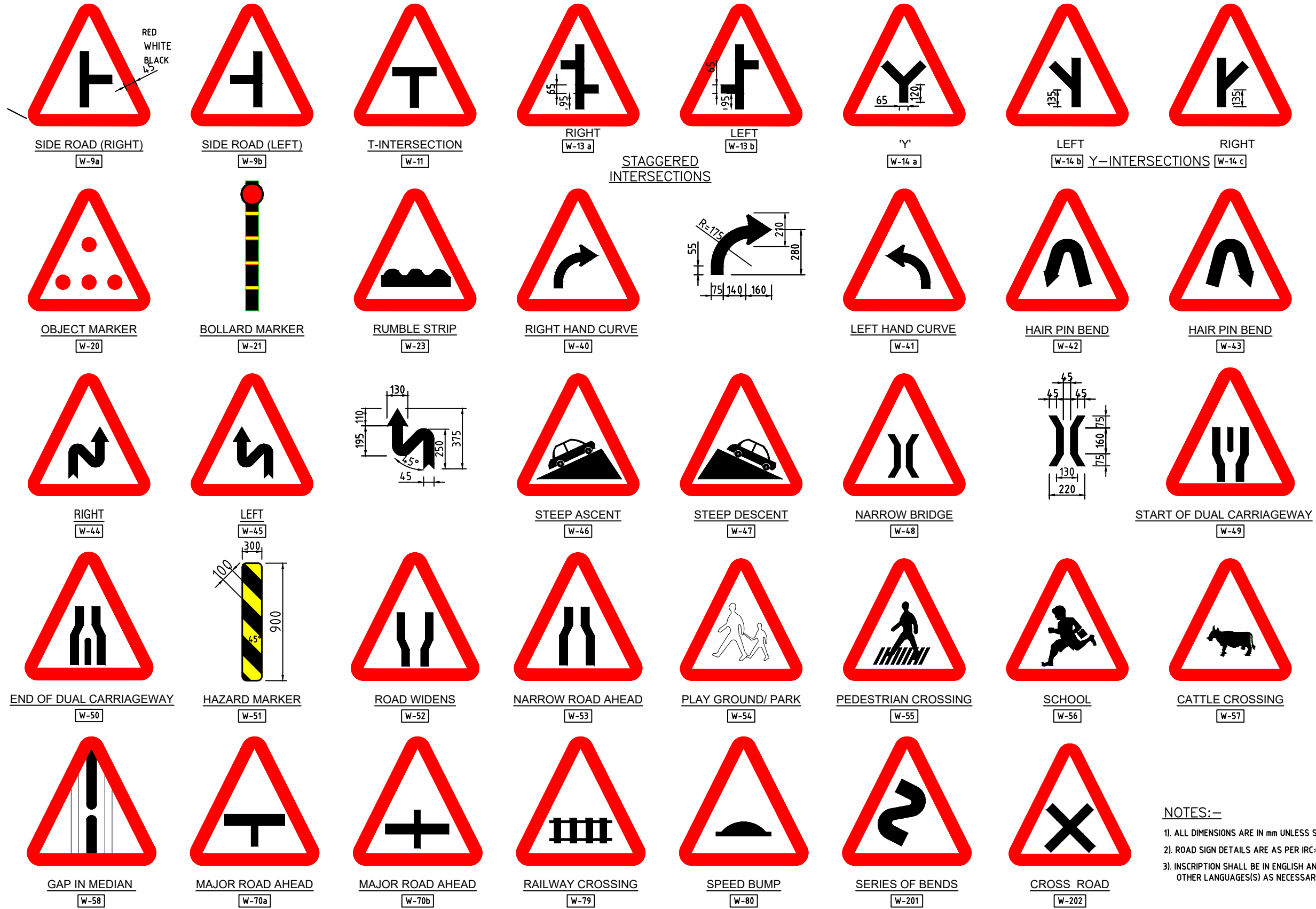
$$K = \frac{VCL}{\Delta g}$$

TYPICAL VERTICAL CURVE PARABOLIC CURVE



NOTATION.

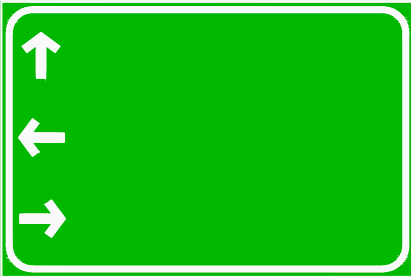
- Δ TOTAL DEFLECTION ANGLE (CURVE DELTA)
- IP INTERSECTION POINT OF TANGENTS (HORIZONTAL POINT OF INTERSECTION)
- TS POINT OF CHANGE FROM TANGENT TO SPIRAL
- ST POINT OF CHANGE FROM SPIRAL TO TANGENT
- SC POINT OF CHANGE FROM SPIRAL TO CIRCULAR CURVE
- TC POINT OF CHANGE FROM TANGENT TO CIRCULAR CURVE
- CT POINT OF CHANGE FROM CIRCULAR CURVE TO TANGENT
- CS POINT OF CHANGE FROM CIRCULAR CURVE TO SPIRAL
- CC CIRCULAR CURVE CENTER
- θ_s CENTRAL ANGLE OF SPIRAL ARC L_s (SPIRAL ANGLE)
- θ_c DEFLECTION ANGLE AT TS FROM INITIAL TANGENT TO SC OR AT ST FROM INITIAL TANGENT TO CS
- R_c RADIUS OF CIRCULAR CURVE.
- L_s LENGTH OF SPIRAL CURVE FROM TS TO SC OR ST TO CS.
- L_c LENGTH OF CIRCULAR CURVE
- L TOTAL LENGTH OF CURVE FROM TS TO ST.
- Δ_c CENTRAL ANGLE OF CIRCULAR CURVE.
- X_s TANGENT DISTANCE FOR SC/CS WITH REFERENCE TO TS/ST.
- Y_s TANGENT OFFSET AT SC/CS WITH REFERENCE TO TS /ST.
- ST SHORT TANGENT.
- LT LONG TANGENT.
- k TANGENT DISTANCE FROM TS TO PC OF THE SHIFTED CIRCULAR CURVE.
- T_s TOTAL TANGENT DISTANCE (IP TO TS OR ST)
- E_s EXTERNAL DISTANCE (OFFSET FROM IP TO MIDDLE OF THE CURVE) FOR HORIZONTAL CURVE WITH TRANSITION.
- LR LENGTH OF RUN OFF.
- SE SUPERELEVATION IN PERCENTAGE.
- LC LONG CHORD (TS TO SC OR ST TO CS).
- p OFFSET FROM THE INITIAL TANGENT TO A PARALLEL TANGENT OF SHIFTED CURVE.
- P CENTRAL SHIFT OF CIRCULAR CURVE.
- HT HALF TANGENT DISTANCE.
- D_c DEGREE OF CIRCULAR CURVE.
- PIS INTERSECTION OF LONG TANGENT AND SHORT TANGENT OF SPIRAL.
- A PARAMETER OF CLOTHOID.
- T TANGENT LENGTH (CIRCULAR CURVE).
- C CORRECTION FACTOR FOR SPIRAL DEFLECTION ANGLE.
- E LENGTH OF EXTERNAL DISTANCE ORDINATES
- Δg ALGEBRAIC DIFFERENCE IN GRADES (PERCENT) OF THE GRADES TANGENTS.
- VIP VERTICAL POINT OF INTERSECTION.
- BVC BEGINNING OF VERTICAL CURVE (POINT OF TANGENT TO CURVE).
- EVC END OF VERTICAL CURVE (POINT OF CURVE TO TANGENT).
- g GRADIENT.
- MO MID-ORDINATE (VERTICAL OFFSET FROM VIP TO THE MIDDLE OF CURVE).
- VCL VERTICAL CURVE LENGTH MEASURED HORIZONTALLY.
- L SPIRAL ARC FROM TS OR ST TO ANY POINT ON SPIRAL.
- θ SPIRAL ANGLE AT ANY POINT ON THE SPIRAL I.E THE ANGLE BETWEEN THE TANGENT AT THE SPIRAL AND TANGENT DISTANCE.
- ϕ DEFLECTION FROM TANGENT AT TS TO ANY POINT ON THE SPIRAL.
- K HORIZONTAL DISTANCE REQUIRED TO EFFECT A ONE PERCENT CHANGE IN GRADIENT.
- M LENGTH OF MIDDLE ORDINATE DISTANCE
- S SHIFT



NOTES:—

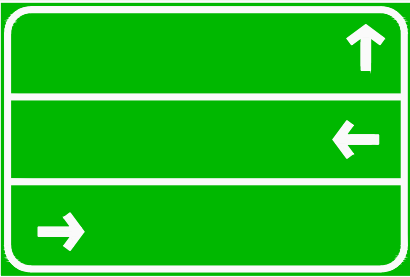
- 1). ALL DIMENSIONS ARE IN mm UNLESS SPECIFIED.
- 2). ROAD SIGN DETAILS ARE AS PER IRC-67.
- 3). INSCRIPTION SHALL BE IN ENGLISH AND OTHER LANGUAGE(S) AS NECESSARY.

FACILITY INFORMATION SIGNS



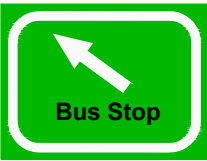
DESTINATION SIGN

I-21



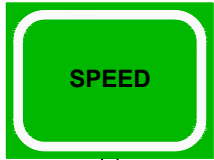
ADVANCE DIRECTION/
DESTINATION SIGN

I-25(a)



BUS BAY SIGN

I-103



GATE WAY SIGN



POLICE STATION

I-105



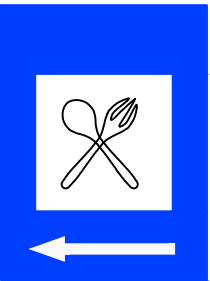
PETROL PUMP

I-106



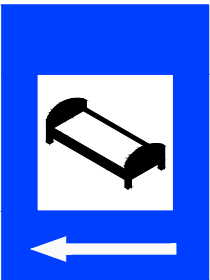
HOSPITAL SIGN

I-107



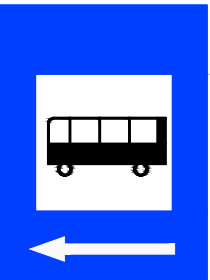
EATING PLACE

I-109



RESTING PLACE SIGN

I-111



BUS STOP

I-121

- NOTES:-
- 1). ALL DIMENSIONS ARE IN MM UNLESS SPECIFIED.
 - 2). ROAD SIGN DETAILS ARE AS PER IRC:67.
 - 3). INSCRIPTION SHALL BE IN ENGLISH AND OTHER LANGUAGE(S) AS NECESSARY.

Rev.	Date	Description

CLIENT:	

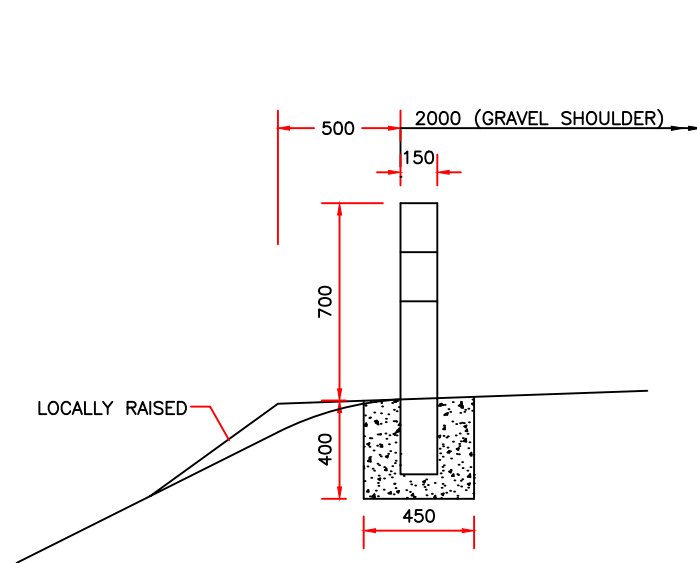
DESIGN CONSULTANT	
	In Association with
TECHNICAL CONSULTANCY SERVICES	P.K. ENGINEERS

PROJECT:
CONSTRUCTION OF KARAU LI BYPASS ON NH-23 IN THE STATE OF RAJASTHAN UNDER ANNUAL PLAN 2024-2025

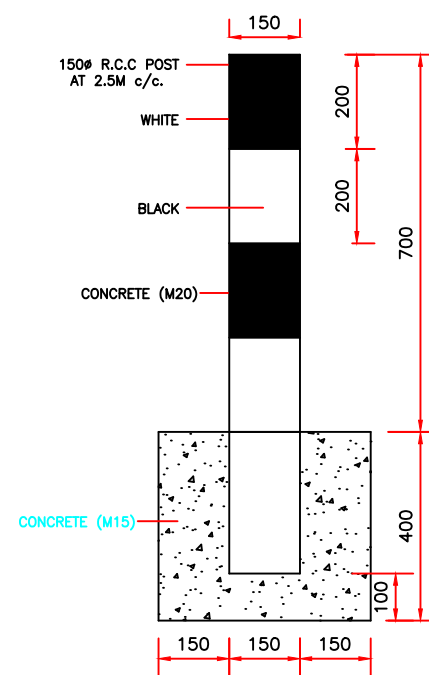
DRAWN	
DESIGNED	
CHECKED	
REVIEW	

TITLE:	MISCELLANEOUS DRAWING INFORMATORY ROAD SIGN
DRAWING NO.	
SCALE:	NTS
PAPER SIZE-	A1

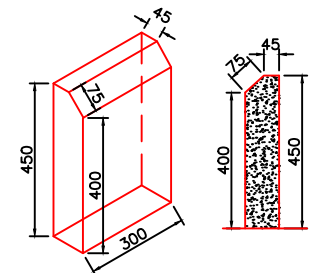
SHEET NO:	4 of 5
REVISION:	R0



FIXING DETAILS OF GUARD POST

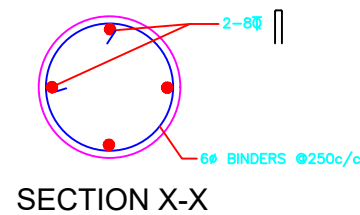


TYPICAL DETAILS OF GUARD POST

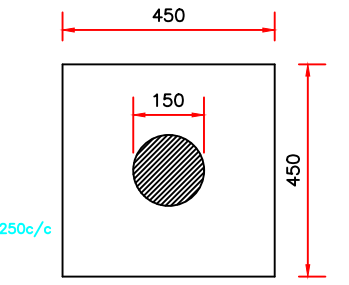


ISOMETRIC VIEW SIDE VIEW

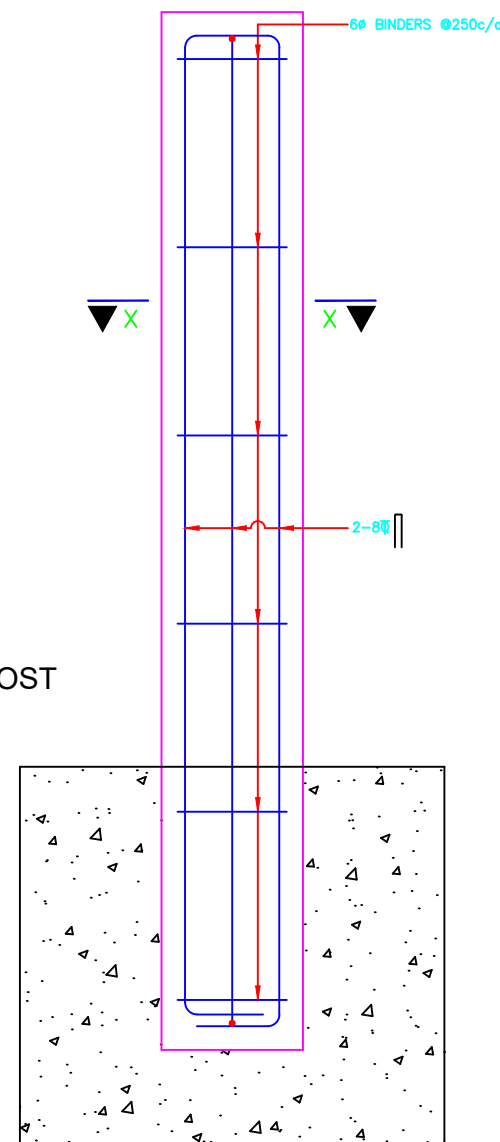
KERB STONE DETAILS



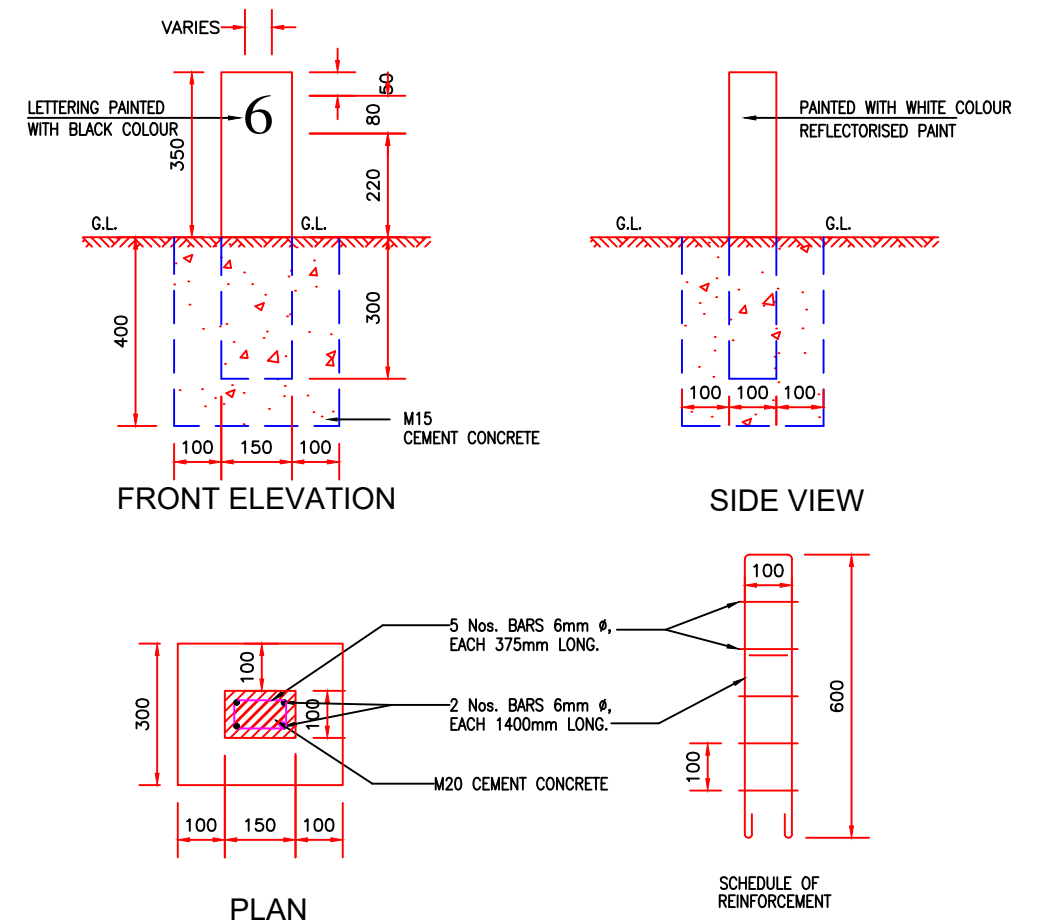
SECTION X-X



PLAN OF GUARD POST



REINFORCEMENT DETAIL OF GUARD POST



TYPICAL DESIGN FOR 200m STONES

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. REFLECTORISED PAINT SHALL BE IN ACCORDANCE WITH CL.803.5 OF M.O.R.T & H SPEC.
3. FOR TYPE & STYLE SIZE OF LETTERING RELEVANT IRC CODE OF PRATICE SHALL BE REFERED.
4. LETTERING IS DONE WITH APPROVED QUALITY BLACK ENAMEL PAINT USING STENCIL

NOTES:

1. ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE MENTIONED.
2. FOR EXACT DETAILS OF W-BEAM, REFER MANUFACTURER DRAWING.
3. W-BEAM BARRIER IS INSTALLED WHERE EMBANKMENT HEIGHT IS MORE THAN 6 METRES & AT IMMEDIATE BRIDGE APPROACHES.
4. R.C.C. GUARD POSTS IS INSTALLED WHERE EMBANKMENT HEIGHT IS BETWEEN 3M TO 6M & AT OTHER HAZARD LOCATIONS.

Rev.	Date	Description

CLIENT:	

DESIGN CONSULTANT		

PROJECT:	CONSTRUCTION OF KARAU LI BYPASS ON NH-23 IN THE STATE OF RAJASTHAN UNDER ANNUAL PLAN 2024-2025

DRAWN	
DESIGNED	
CHECKED	
REVIEW	

TITLE:	MISCELLANEOUS DRAWING Distance Stones & Guard Post
DRAWING NO.	
SCALE:	NTS
PAPER SIZE:	A1

SHEET NO:	5 of 5
REVISION:	R0

Rain Water Harvesting (RWH)

