DESIGN CALCULATION AND DRAWING FOR FIXED BEARING

(Ch. 516+938)

PROJECT: FOUR LANING OF JHANJHI TO DEMOW SECTION OF NH-37 FROM EXISTING CH. K 491+050 TO KM 535+250 (DESIGN CH. KM 4900+800 TO KM 534+800) IN THE STATE OF ASSAM UNDER EPC MOD

CLIENT: *NATIONAL HIGHWAYS & INFRASTRUCTURE DEVELOPMENT CORPORATION LTD. (NHIDCL)*

CONTRACTOR : *M/S KAMAC-SHIVA HARLALKA (JV)*

MANUFACTURER:

M/S KARMA ENTERPRISE, GUWAHATI,ASSAM

Design Calculation of SLS- 1647 KN, ULS- 2365 KN Fixed Bearing

TYPE OF BEARING : **FIX** **TYPE: B1** **Conc. Grade for Pedestal M 45**
REVISION : **00** **CH: 516+938** **Conc. Grade for Superstructure M 50**

DESIGN DATA FOR BEARING DESIGN (LOADS)

LOADING PARAMETERS	SLS			ULS	
UNITS	MT	kN		MT	kN
VERTICAL MAXIMUM LOAD	167.94	1647.00		241.16	2365.00
VERTICAL MINIMUM LOAD	68.63	673.00		117.27	1150.00
VERTICAL PERMANENT LOAD	85.96	843.00			
HORIZONTAL LOADS					
ACTING IN LONGITUDINAL DIRECTION	5.10	50.00		7.65	75.00
ACTING IN TRANSVERSE DIRECTION	0.00	0.00		0.00	0.00
RESULTANT HORIZONTAL LOADS		50.00			75.00
DISPLACEMENT	0.00			0.00	
LONGITUDINAL (MM)	0.00			0.00	
TRANSVERSE (MM)	0.00			0.00	
ROTATION (RADIAN)	0.0038	+	0	=	0.004

Assume Permanent Rotation	q p	=	0.41	x	0.004	=	0.002
Assume Varriable Rotation	q v	=	0.59	x	0.004	=	0.002

MATERIALS

Steel Stress (Working) for Design Use 340 MPa (Grade-340-570W) AS PER IS - 1030
HT Bolts shall conform to Grade 8.8 of IS : 1364
Elastomer shall be of hardness 50 + / - 5 conforming to IRC : 83 (Part III) - 2018 Table - 4.3

DIMENSION DETAILS OF BEARING COMPONENTS

ELASTOMERIC PAD			
PAD DIAMETER	=	di	325 mm
PAD TICKNESS	=	hc	24 mm
CYLINDER			
CYLINDER CONCRETE CONTACT DIAMETER	=	Do	395 mm
CYLINDER BASE THICKNESS	=	kb	20 mm
CYLINDER INNER DIAMETER	=	Di = di	325 mm
CYLINDER OUTER DIAMETER	=	do	375 mm
HEIGHT OF CYLINDER	=	hc	36 mm
WALL THICKNESS	=	Tcw	25.0 mm
TOP COMPONENT	=		
TOP COMPONENT CONCRETE CONTACT DIA.	=	Dpeff	375 mm
TOP COMPONENT DIA.	=	Dp	375 mm
TOP COMPONENT ABOVE THICKNESS	=	**Tp**	22 mm
TOP COMPONENT PROJECTION	=	**hp**	22 mm
VERTICAL FACE	=	**w**	6 mm
ANCHORAGE			
BOLTS DIAMETER	=	Dbolt	16 mm
BOLTS LENGTH	=	Lbolt	35 mm
BOLTS PER COMPONENT	=	Nbolt	4 NOS.
GRADE OF BOLTS	=	GR.bolt	8.8
ANCHORAGE COLLOR LENGTH	=	CL	56 mm
ANCHORAGE COLLOR THICKNESS	=	C thk	12 mm
SLEEVE LENGTH (Superstructure)	=	Ls	110 mm
SLEEVE DIAMETER (Superstructure)	=	Ds	40 mm
SLEEVE LENGTH (Pedestal)	=	Lp	120 mm
SLEEVE DIAMETER (Pedestal)	=	Dp	40 mm
GENERAL			
NO. OF BRASS SEALING RINGS	=	Nbr	2 NOS.
TOTAL THICKNESS OF RINGS	=	Tbr	4.0 mm
GAP BETWEEN CYLINDER & TOP COMPONENT	=	h4	10 mm
TOTAL BEARING ASSEMBLY HEIGHT	=	HT	88 mm

Design Calculation of SLS- 1647 KN, ULS- 2365 KN Fixed Bearing

Calculation for Permissible Stresses in Pedestal Concrete

Bottom

Cylinder Concerte Contact Diameter =		395		mm
Loaded area (Aco p x Db ^ 2/4) =		122541.75		mm^2
Required Pedestal Size for Dispersion =	790.00	x	790	mm
Dispersed area ($A_{c1 = p x d ^ 2/4}$) =		490167		mm^2

Top

Top Component Contact Diameter =		375		mm
Loaded area (A_2 = p x Db ^ 2/4) =		110446.62		mm^2
Required Superstructure Size for Dispersion =	750.00	x	750	mm
Dispersed area ($A_{1\ p x d ^ 2/4}$) =		441786.47		mm^2

DESIGN CALCULATIONS :-
REF. CODE : IRC:83 (Part-III)-2018

Design of Pad (Clause - 5.2.3.2)

Effective diameter of Pad	Dpad		325	mm
Area of pad = p x d ^ 2/4	a		82991.0714	mm^2
Vertical Load	Nsd	2365.00		kN
Direct Pressure Nsd / a	pa	28.50		N/mm^2
(Nsd / a) x Ym		37.05		N/mm^2
fc,k		60.00		N/mm^2
		OK		

Check Compression at edge of Neoprene Pad (Clause - 5.2.3.4)

Max. Permitted = 15 % of hc		3.60	mm	
Desired Rotation		0.00380	radians	
Available Rotation in Radius due to Compression of Pad		0.02215	radians	**OK**
Diameter / Thickness Ratio	13.54	Maximum (Dpad/hc)	15	**OK**

Check for Min. average Stress (Clause - 5.2.3.3)

Min. average stress	= (Nsd min. / a)	8.11	N/mm^2	
Permissible Min. average stress	=	2.00	N/mm^2	
		OK		

Stress in bottom concrete

Bottom dispersion width			**Do**	**395**
Thickness of Bottom Plate			**kb**	**20**
Area of Bottom Dispersion= p x d ^ 2/4	a		122591.071	mm^2
Section Modulus = p x d ^ 3/32	Z		6052934.152	mm^3
Vertical Load	Nsd	2365.00		kN
Horizontal force	Vsd	75.00		kN
Moment of resistance due to rotation:				
Rotation due to dead load	θ p	0.00155		radians
Live Load	θ v	0.00225		radians
Ratio = di / he		13.54		
For induced moment	k1	1.97		
	k2	76.38		
Induced moment due to rotation Me.d				
di^3 x (k1x qp+K2 x qv)/1000	Me.d	5997.30		kN-mm

Design Calculation of SLS- 1647 KN, ULS- 2365 KN Fixed Bearing

Moment of resistance due to HF:			
Horizontal distance	C	162.50	mm
Resultant HF	Vsd	75.00	kN
Moment of resistance due to HF: 0.2 x C x Vsd	Mr.d	2437.50	kN-mm
Total Movement = Me.d+Mr.d =	Mt	8434.80	kN-mm
Direct Pressure Nsd / a	pa	19.29	N/mm²
Permissible Stress (0.67 x fck) / 1.5	fcd	20.10	N/mm²
		OK	
Bending Stress Mt / Z	pb	1.39	N/mm²
Permissible bending stress		14.85	N/mm²
		OK	
Area on Pedestal	Ac1	490167.00	mm²
Frdu= Aco x fcd x (sqrt(Ac1 / Ac0)		4926.18	kN
3 x fcd x Aco		7389.27	kN
Frdu </= 3 x fcd x Aco		**OK**	

Stress in top concrete

Top dispersion width			**Dpeff 375**	
Thickness of Top Plate			**Tp 22**	
Area of Top Dispersion = p x d ^ 2/4	a		110491.071	mm²
Section Modulus = p x d ^ 3/32	Z		5179268.973	mm³
Vertical Load	Nsd	2365.00		kN
Horizontal force	Vsd	75.00		kN
Moment of resistance due to rotation:				
Rotation due to dead load	θ p	0.00155		radians
Live Load	θ v	0.00225		radians
Ratio = di / he		13.54		
For induced moment	k1	1.97		
	k2	76.38		
Induced moment due to rotation	Me.d			
di³ x (k1x qp+K2 x qv)/1000		5997.30		kN-mm
Moment of resistance due to HF:				
Horizontal distance	C	162.50		mm
Resultant HF	Vsd	75.00		kN
Moment of resistance due to HF: 0.2 x C x Vsd	Mr.d	2437.50		kN-mm
Total Movement = Me.d+Mr.d =	Mt	8434.80		kN-mm
Direct Pressure Nsd / a	pa	21.40		N/mm²
Permissible Stress (0.67 x fck) / 1.5	fcd	22.33		N/mm²
		OK		
Bending Stress Mt / Z	pb	1.63		N/mm²
Permissible bending stress		16.50		N/mm²
		OK		
Area on Superstructure	Ac1	441786.47		mm²
Frdu= Aco x fcd x (sqrt(Ac1 / Ac0)		4933.28		kN
3 x fcd x Aco		7399.92		kN
Frdu </= 3 x fcd x Aco		**OK**		

Pot walls subjected to tensile force (Clause 5.3.1.2.3)

AR = (do - di) x hc	AR	1800.00		mm²
Ve,sd = 4 x Nsd x he / π x di	Ve,sd	222.48		kN
Vfxy,sd		75.00		kN
Vsd = Ve,sd + Vfxy,sd		297.48		kN
Vrd = fy x AR / Ym Ym =	1.1	556.36		kN
		OK		

Pot walls subjected to shear force (Clause 5.3.1.2.4)

$V'_{sd} \leq V'_{Rd}$				
V'_{sd} = Ve,sd + 1.5 x Vfxy,sd /di		1.03		kN
V'_{Rd} = (fy x (do - di)) / (2 x Ym x (sqrt(3)))	Ym = 1.1	5.15		kN
		OK		

Pot base subjected to tensile force (Clause 5.3.1.2.5)

$V_{sd} \leq V_{Rd}$				
Ap = do x kb		7500.00		mm²
Vsd = Ve,sd + Vfxy,sd		297.48		kN
VRd = fy x Ap / Ym Ym =	1.1	2318.18		kN
		OK		

Design Calculation of SLS- 1647 KN, ULS- 2365 KN Fixed Bearing

Anchor Bolts

Max Horzontal Force			75.00	kN
Min. Vertical Load			**1150.00**	kN
Frictional Force			**0.00**	kN
Diameter of Bolt			**16.00**	mm
Length of Bolt			**35.00**	mm
Number of Bolts		*n*	**4.00**	Nos.
Thickness of Collar		Ct	12.00	mm
Factor for Net Area		kn	0.78	
Effec. Area of Bolt (p x d274² x kn / 4)		Abolt	156.89	mm²
αv			0.60	
fub			800.00	N/mm²
Ym²			1.25	
fu			570.00	N/mm²
k2			0.90	
Shear resistance Fv,Rd = αv x fub x A / Ym²		Fv,Rd	60.25	kN
Resultant horizontal force / bolt Vfxy,sd / n		Fv,sd	18.75	kN
			OK	
Bearing resistance Fb,Rd = 1.25 x fu x d x t / Ym²		Fb,Rd	109.44	kN
Resultant horizontal force / bolt Vfxy,sd / n			18.75	kN
			OK	
Tension resistance Ft,Rd = k2 x fub x As / Ym²		Ft,Rd	90.37	kN
Design tension resistance		Ft,sd	4.53	kN
Combined shear and tension=Fv,sd / Fv,Rd + Ft,sd / (1.4 x Ft,Rd)			0.35	
			OK	

Anchor Sleeves (Clause - 5.3.6.4.2)

Top Plate				
Length of Sleeve			**110.00**	mm
Diameter of Sleeve			**40.00**	mm
Number of Sleeves			4.00	Nos.
Resistance offered by concrete FRdu = 1.33 D x L x fcd / sqrt(3)			75.46	kN
Design resistance in shear			18.75	kN
			OK	
Bottom Plate				
Length of Sleeve			**120.00**	mm
Diameter of Sleeve			**40.00**	mm
Number of Sleeves			4.00	Nos
Resistance offered by concrete FRdu = 1.33 D x L x fcd / sqrt(3)			74.08	kN
Design resistance in shear			18.75	kN
			OK	

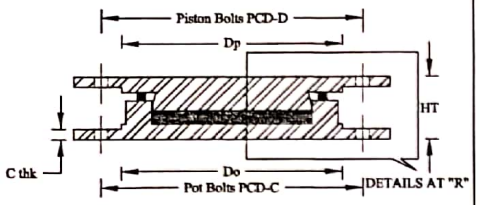
Requirement of clearance

δ = 0.01 x Di min. = 3			3.25	<	10	mm
hc - he - (w - we) x 0.5 - (Θ x 0.5 x Di)			8.60			mm
δ			**3.25**			mm
			OK			
hp - (hc - he) - (Θ x 0.5 x Dp)			**9.29**			mm
δ			**3.25**			mm
			OK			

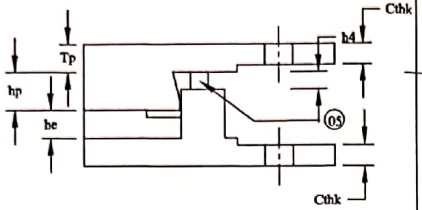
Curved Contact Surface (Clause - 5.3.1.4.2)

Vsd ≤ Vrd	R	=	162.50	mm
	fu	=	570.00	N/mm²
	θ	=	0.004	Radian
	Ym	=	1.10	
Vrd = 15 x fu^2 x R x Di / Es x Ym^2		=	1063.6	kN
Vsd		=	75.00	kN
			OK	
we = 3.04 x (sqrt(1.5 x Vsd x R / Es x Di)		=	**0.43**	mm
we + Θ x Di		=	**1.66**	mm
Provided	w	=	6.00	mm
			OK	

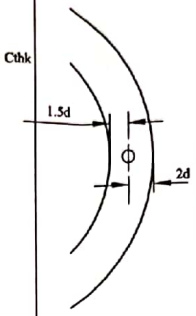
KARMA ENTERPRISE * Guwahati *



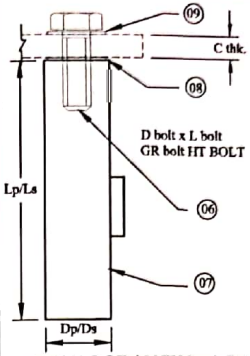
SECTIONAL ELEVATION OF BEARING ASSEMBLY



DETAILS OF BEARING ASSEMBLY AT "R"



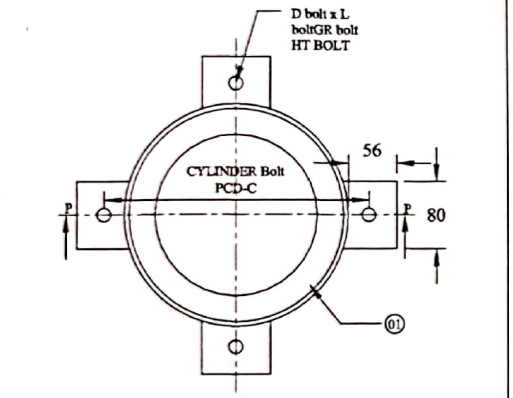
DETAILS OF FLANGE

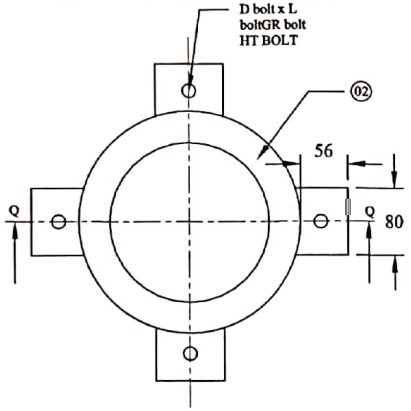


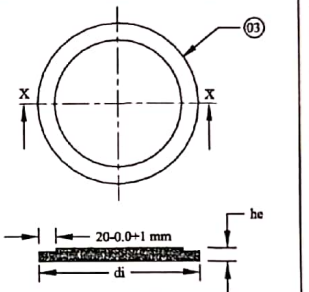
DETAILS OF ANCHORAGE

9	FLAT WASHER	STEEL	08	STD
8	NEOPRENE WASHER		08	ELASTOMER
7	DOWELS	MILD STEEL	08	IS : 2062 / IS : 226
6	BOLT M 16	Gr. 8.8 HT	08	IS : 1367
5	DUST SEAL	ELASTOMER	1	BITUMEN IMPREGNATED
4	BRASS RINGS	BRASS	2	HALF HARD BRASS
3	NEOPRENE PAD	NEOPRENE	1	MOST CLAUSE 2006.3
2	PISTON	CAST STEEL	1	IS : 1030 Gr. 340 - 570 W
1	POT	CAST STEEL	1	IS : 1030 Gr. 340 - 570 W
Sl. No.	DESCRIPTION	MATERIAL	QTY	SPECIFICATION

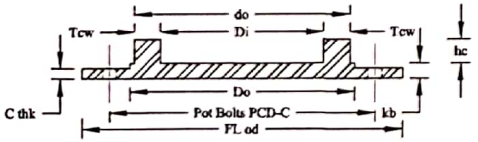
Bearing Type	Case	Vertical Load (KN) Max.	Min.	Hor. Load (KN) Long.	Trans.	Movement T : L (mm)
Fixed Bearing	SLS	1647.00	673.00	50.00	0.00	± 0 : ± 0
	ULS	2365.00	1150.00	75.00	0.00	



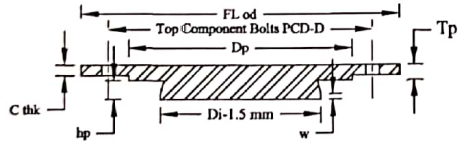




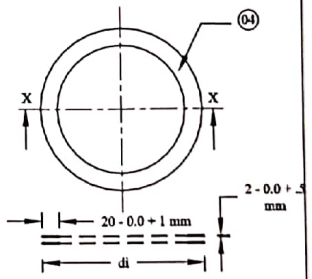
PLAN OF PAD (TOP VIEW)



SECTIONAL ELEVATION OF BOTTOM CYLINDER AT P-P



SECTIONAL ELEVATION OF TOP COMPONENT AT Q-Q



PLAN OF BRASS RING (TOP VIEW)

NOTES

MATERIALS :

1. CONFINED ELASTOMER INSIDE POT WILL HAVE FOLLOWING PROPERTIES
   a) HARDNESS IRHD IS:3400 (PART II) 50±5
   b) MIN. TENSILE STRENGTH MPa IS:3400 (PART I) 15.5
   c) MIN ELONGATION AT BREAK , MAX COMPRESSION SET & ACCELERATED AGING WILL BE AS PER TABLE -1 - PROPERTIES OF ELASTOMER IN IRC:83(PART II)
2. ANCHORES: HT BOLTS OF Gr. 8.8 & SLEEVE MATERIAL AS PER IS 2062.
3. ACESSORIES TO IS 226 / 2062.
4. **CONCRETE GRADE FOR PEDESTAL IS M45.**
5. **CONCRETE GRADE FOR SUPERSTRUCTURE IS M50.**

WELDING :

ALL WELDING WILL BE MANUAL METAL ARC PROCESS CONFORMING TO IS: 814,PRE HEATING & POST WELD STRESS RELIEVING TO BE DONE IF REQUIRED.

FINISHING :

a) ALL NONWORKING SURFACES WILL BE COATED WITH 2 COATS OF EPOXY PRIMER & ONE OR MORE COATS EACH OF EPOXY INTERMEDIATE AND FINISH PAINT. TOTAL DRY FILM THICKNESS > 160 MICRONS.
b) ANCHORE SLEEVES WILL BE CEMENT COATED AT SITE (IF REQUIRED).

TESTS :

a) TESTS ON CASTING: TESTS SPECIFIED IN IS : 1030 WILL BE PERFORMED. CASTINGS SHALL BE ULTRASONICALLY TESTED & CERTIFICATES SUBMITTED. QUALITY LEVEL 3 AS PER IS : 9565.

b) ACCPETANCE TEST ON BEARINGS.

c) ALL TESTS ON BEARINGS WILL BE CARRIED OUT IN PRESENCE OF REPRESENTATIVE OF DPT./ P.M.C. NECESSARY TEST CERTIFICATES FOR RAW MATERIALS SHALL BE FURNISHED AT THE TIME OF SUPPLY.

d) TEST ON WELDING: WELDING WILL BE TESTED BY DYE PENETRATION METHOD. BUTT WELDING WILL BE TESTED BY ULTRASONIC METHOD SOUNDNESS OF WELDING SHALL BE CERTIFIED BY THE MANUFACTURER

2365 KN-FIX	395	20	325	375	36	25	443	507	375	22	22	06	423	487	325	24	04	02	40	120	40	110	16	35	04/04	8.8	12	10	88
CAPACITY	Do	kb	Di	do	hc	Tcw	PCD	FL od	Dp	Tp	hp	w	PCD	FL od	di	he	Tbr	Nbr	Dp	Lp	Ds	Ls	Dbolt	Lbolt	Nbolt	GRbolt	Cthk.	h4	HT
	DIMENSION DETAILS OF CYLINDER								TOP COMPONENT DIM.						PAD & BRASS RING				ANCHORAGE & SLEEVE										

1) ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE MENTIONED.

2) PCD = PITCH CIRCLE DIAMETER

3) TOLERANCES
   a) PLAN DIMENSIONS : - 0 TO + 5mm
   b) OVERALL HEIGHT : - 0 TO + 3mm
   c) HEIGHT OF ELASTOMER : - 0 / + 5%
   d) HEIGHT OF ANY STEEL COMPONENT
      1) MACHINED : - 0 TO + 1mm
      2) UNMACHINED : CLASS 2 OF IS :4897

TYPE :- FIXED BEARING
TYPE :- B1
CH. :- 516+938

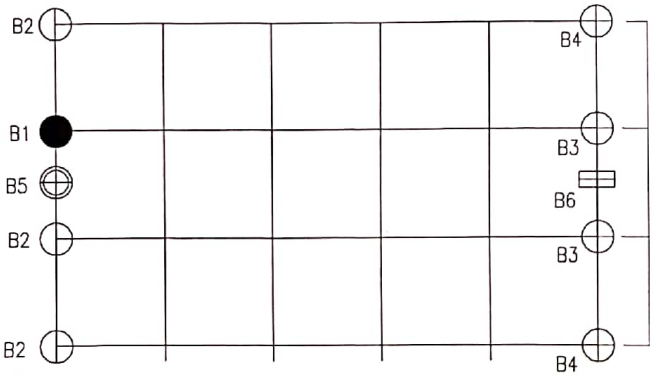
TRANSEVERSE DIRECTION OF BRIDGE

TRAFFIC DIRECTION OF BRIDGE

Project	Four Laning of Jhanjhi to Demow Section from KM. 491+050 to 533+250 (Design KM. 490+800 to KM. 534+800) of NH-37 in the State of Assam under SARDP on Engineering Procurement & Construction (EPC) mode
Client	NHIDCL
Authority Engineer	M/s Voyants Solutions Pvt. Ltd.
Contractor	M/s Kanna Engineers Pvt. Ltd., M/s Shiva Harlalka (JV)
Title	GAD of SLS-1647 KN, ULS-2365 KN Fixed Bearing

Manufacturer & Supplier :-
KANNA ENTERPRISE, GUWAHATI

BEARING TYPE & LOAD DETAILS				FIXED BEARING	LONG FIXED BEARING	TRANS FIXED BEARING	FREE BEARING	PIN BEARING	MEATALIC GUIDED BEARING
BEARING MARK				B1	B2	B3	B4	B5	B6
TOTAL QUANTITY (NO)				1	3	1	3	1	1
GRADE OF CONCRETE	UPPER SURFACE	SLS		M50	M50	M50	M50	M50	M50
		ULS		M50	M50	M50	M50	M50	M50
	LOWER SURFACE	SLS		M45	M45	M45	M45	M45	M45
		ULS		M45	M45	M45	M45	M45	M45
DESIGN LOAD (KN)	SLS	VERTICAL	MAX	1647	1647	1647	1647	-	-
			PERMENANT	843	843	843	843	-	-
			MIN	673	673	673	673	-	-
		LONGITUDINAL		50	50	0	0	-	-
		TRANSVERSE		0	0	0	0	-	-
	ULS	VERTICAL	MAX	2365	2365	2365	2365	-	-
			PERMENANT	1150	1150	1150	1150	-	-
			MIN	1	1	1	1	-	-
		LONGITUDINAL		75	75	0	0	5548	0
		TRANSVERSE		0	0	0	0	2755	2755
TRANSLATION (MM)	SLS	IRREVERSABLE	LONG	-	-	-	-	-	-
			TRAN	-	-	-	-	-	-
		REVERSABLE	LONG	-	-	14	14	-	-
			TRAN	-	13	-	13	-	-
	ULS	IRREVERSABLE	LONG	-	-	-	-	-	-
			TRAN	-	-	-	-	-	-
		REVERSABLE	LONG	-	-	21	21	-	21
			TRAN	-	20	-	20	-	-
ROTATION (RED)	SLS	IRREVERSABLE	LONG	0.00253	0.00253	0.00253	0.00253	-	-
			TRAN	-	-	-	-	-	-
		REVERSABLE	LONG	0.00253	0.00253	0.00253	0.00253	-	-
			TRAN	-	-	-	-	-	-
	ULS	IRREVERSABLE	LONG	0.00380	0.00380	0.00380	0.00380	0.00380	0.00380
			TRAN	-	-	-	-	-	-
		REVERSABLE	LONG	0.00380	0.00380	0.00380	0.00380	0.00380	0.00380
			TRAN	-	-	-	-	-	-



KEY PLAN SHOWING ARRANGEMENT OF BEARING LOCATIONS FOR POT cum PTFE BEARINGS

B1 FIXED BEARING
B2 TRANS GUIDED BEARING
B3 LONG GUIDED BEARING
B4 FREE BEARING
B5 PIN BEARING
B6 METALLIC GUIDED BEARING

KARMA ENTERPRISE Guwahati

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES, LEVELS ARE IN METRES AND UNLESS OTHERWISE SPECIFIED. ONLY WRITTEN DIMENSIONS SHALL BE FOLLOWED.
2. THE CONTRACTOR SHALL SUBMIT DESIGN/ DRAWING OF INDIVIDUAL BEARINGS BASED ON LOAD DATA AS GIVEN IN THIS DRAWING FOR APPROVAL OF THE ENGINEER.
3. BEARINGS SHALL BE PROCURED FROM THE LIST OF APPROVED MANUFACTURER BY MORTH.
4. ALL BEARINGS SHALL CONFORM TO THE LATEST MORTH SPECIFICATION, IRC:83 (PART III)-2018 AND TENDER STIPULATION, IF ANY.
5. THE TESTING OF RAW MATERIALS, METALIC COMPONENTS, ELASTOMER & PTFE AND ACCEPTANCE TESTS ON BEARINGS SHALL CONFORM TO MOST SPECIFICATION/TENDER SPECIFICATION.
6. MANUFACTURER SHALL SUBMIT THE CERTIFICATES FOR LOAD TESTING AND DIMENSIONS OF BEARING.
7. SUITABLE ERECTION CLAMPS FOR SAFE TRANSPORTATION AND HANDLING ALONG WITH TEMPLATE FOR ALIGNMENT SHALL BE PROVIDED BY THE MANUFACTURER
8. THE PLAN SIZE AND HEIGHT OF PEDESTAL SHALL BE ADJUSTED TO SUIT THE FINALISED SIZE OF BEARINGS AT THE TIME OF EXECUTION.
9. THE GROUT/BEDDING MORTAR SHALL BE OF HIGH STRENGTH FREE FLOWING NON-SHRINK TYPE.

REV	DATE	DESCRIPTION

CLIENT: National Highways & Infrastructure Development Corporation Limited.

PROJECT: FOUR LANING OF JHANJHI TO DEMOW SECTION FROM KM. 491+050 TO 834+230 (DESIGN KM. 492+800 TO KM. 834+900) OF NH-37 IN THE STATE OF ASSAM UNDER BARDP ON ENGINEERING PROCUREMENT & CONSTRUCTION (EPC) MODE.

CONTRACTOR: M/S KAMAC ENGINEERS PVT.LTD M/S BHIVA HARLALKA (JV).

DESIGN DIRECTOR: Prateek Srivastava

PROOF CONSULTANT: TASPL TECHNOCRATS ADVISORY SERVICES PVT.

SAFETY CONSULTANT: UA INFRATECH LEGATO & CO

AUTHORITY ENGINEER: VOYANTS SOLUTIONS PVT.LTD.

SCALE: AS SHOWN

PREPARED	DESIGNED	CHECKED	APPROVED
K.R	G.R	P.S	P.S

DRG. NO. NHIDCL/KS/UA/SUP/MNB/07-08

DATE : MAR. 2023 REVISION: R0

TITLE: BEARING LOAD DATA FOR MINOR BRIDGE AT KM-516+938