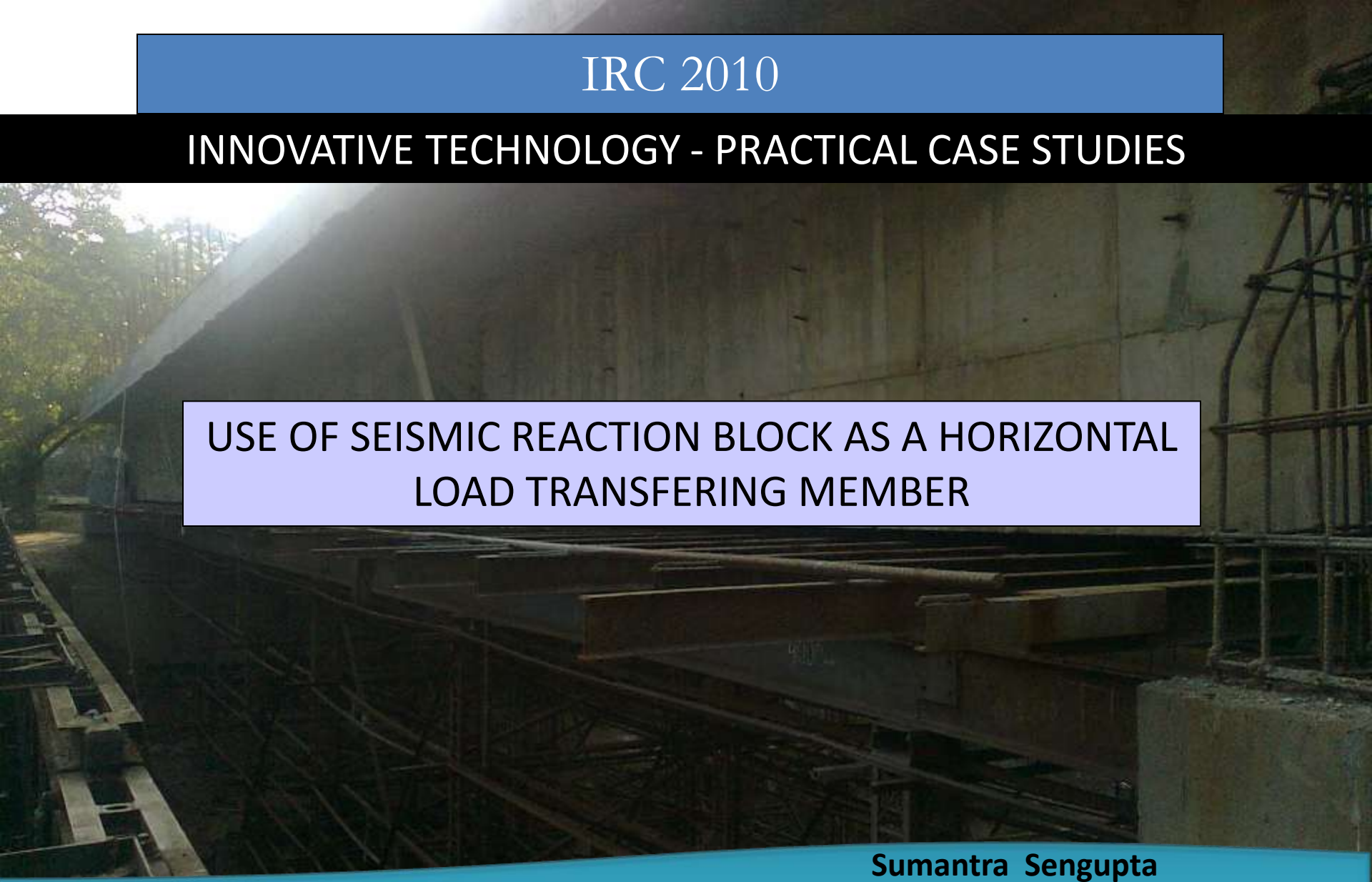
IRC 2010

INNOVATIVE TECHNOLOGY - PRACTICAL CASE STUDIES

USE OF SEISMIC REACTION BLOCK AS A HORIZONTAL LOAD TRANSFERING MEMBER



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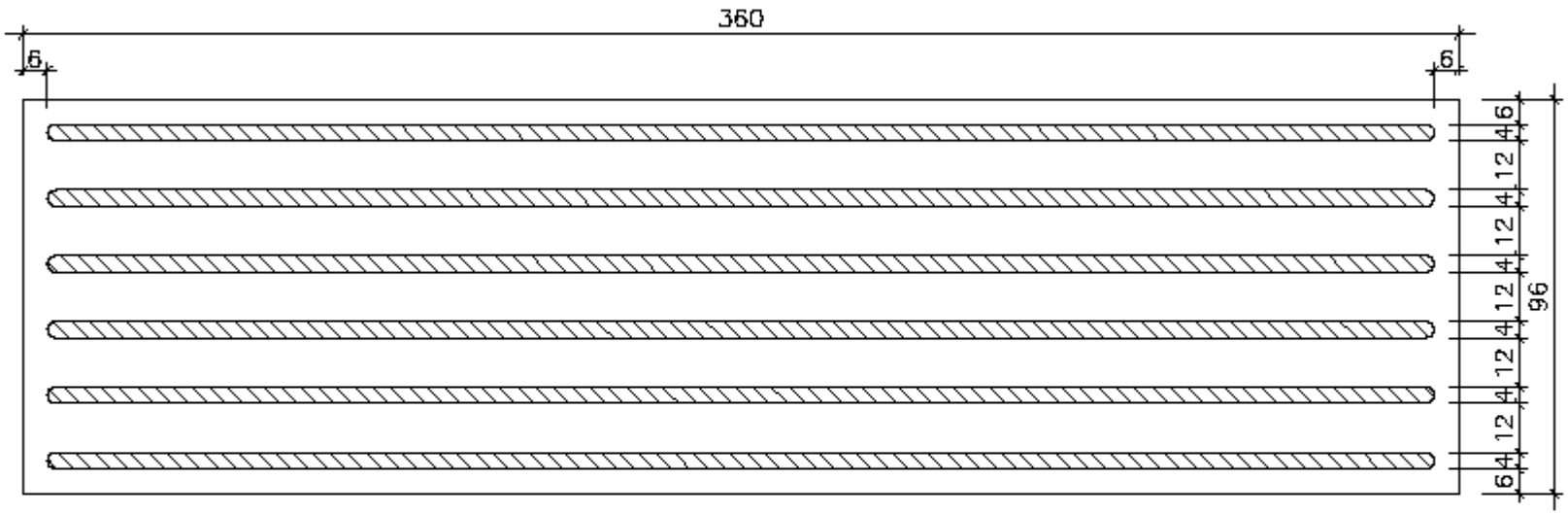
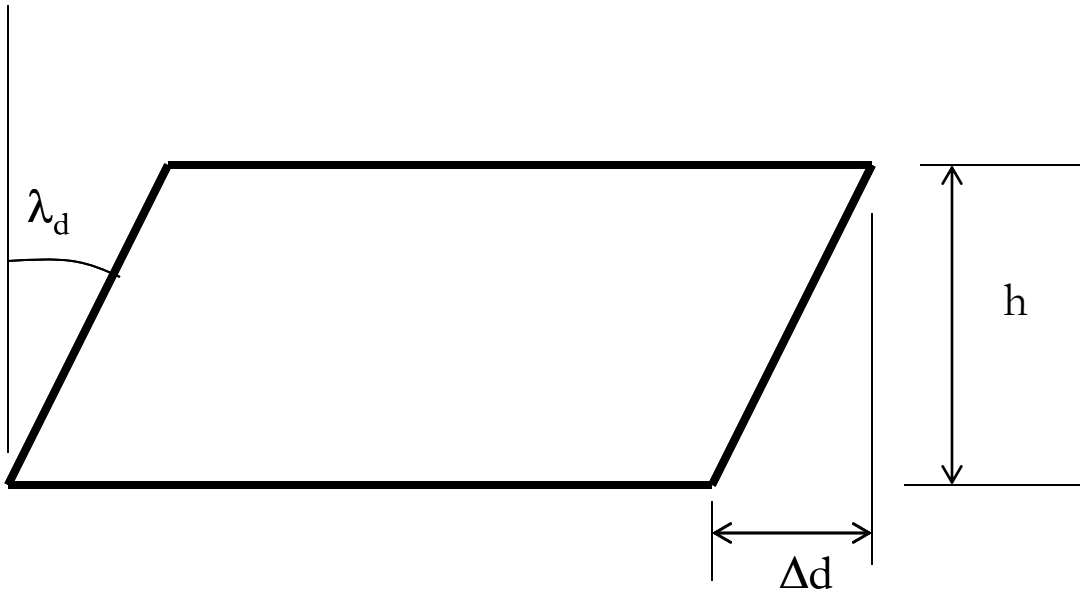


SECTION THROUGH ELASTOMERIC BEARING

NEOPRENE BEARING



$\lambda_d = 0.7$

G = 1 MPa

σ_m = 10 MPa

Shear strain due to creep, shrinkage etc = 0.2

Balance shear strain allows max shear forec = 12t

Shear force develops = 35t (approx) for 35m span box girder

NEOPRENE BEARING

- IN ZONE IV AND V TO PREVENT DISLODGEMENT OF SUPERSTRUCTURE, REACTION BLOCKS OR OTHER TYPES OF SEISMIC ARRESTERS SHALL BE PROVIDED
- THIS IS IN ADDITION TO THE BEARING SYSTEM WHICH WILL CARRY VERTICAL LOAD AS WELL AS HORIZONTAL LOAD FROM SUPERSTRUCTURE AND TRANSFER IT TO THE SUBSTRUCTURE

RECOMMENDATION OF IRC 6

- TRIPURA PWD IS CONVERTING THE EXISTING SPT BRIDGES ON THE STATE ROADS TO PERMANENT RCC OR STEEL BRIDGES
- TRIPURA IS IN SEISMIC ZONE V
- THE DESIGN HORIZONTAL SEISMIC COEFFICIENT IS 0.27
- NEOPRENE BEARINGS ARE NOT SUITABLE FOR HIGH SESIMIC ZONE AS THE RATIO OF HORIZONTAL LOAD DUE TO SEISMIC TO VERTICAL LOAD IS BEYOND THE SHEAR CAPACITY OF THE NEOPRENE BEARING

NEOPRENE BEARINGS NOT SUITABLE IN HIGH SEISMIC ZONE

- ALTERNATE CHOISE OF BEARING IS POT-PTFE BEARING
- NEOPRENE BEARING IS COMPARATIVELY SIMPLER THAN POT-PTFE
- IN TRIPURA THE BRIDGE BEARINGS ARE DESIGNED FOR VERTICAL LOAD ONLY
- SEISMIC REACTION BLOCKS ARE DESIGNED FOR HORIZONTAL LOAD DUE TO SEISMIC

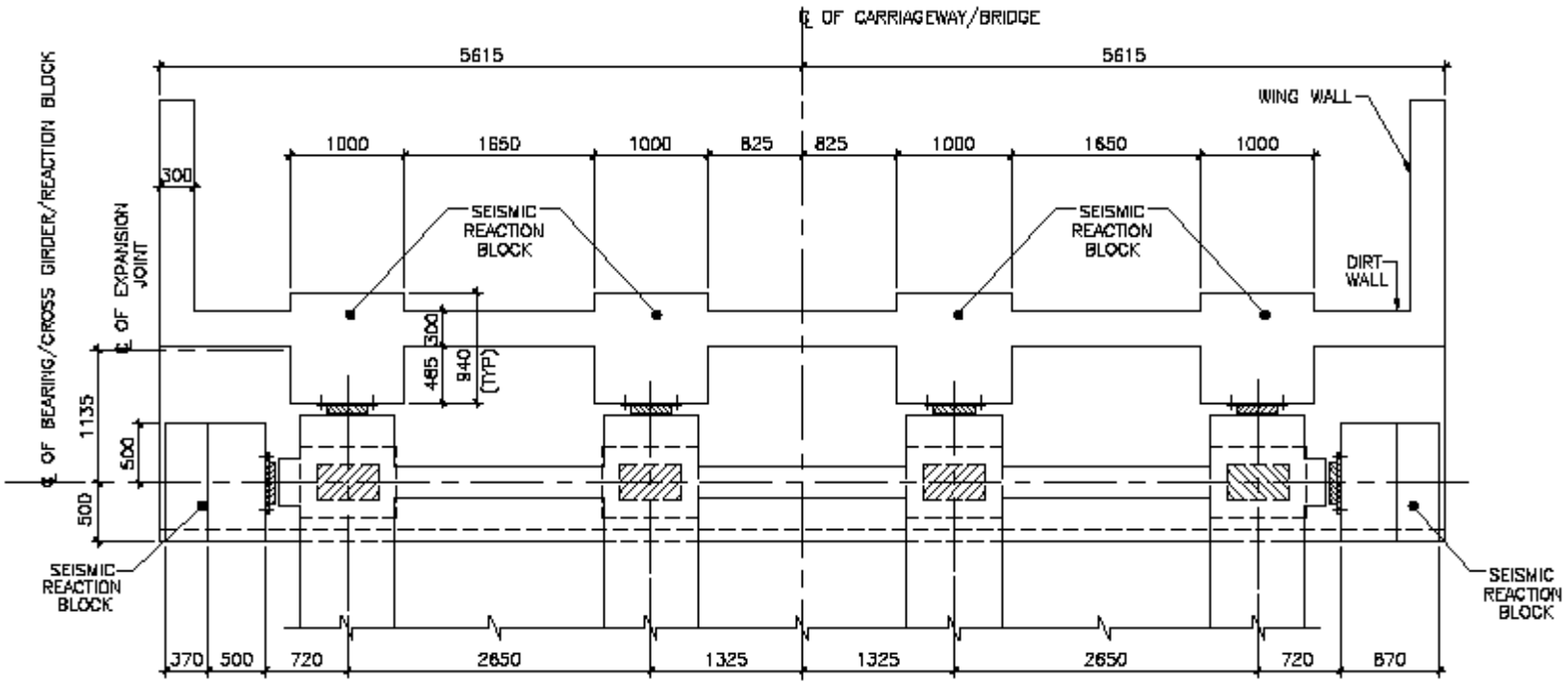
USE OF NEOPRENE BEARING IN HIGH SEISMIC ZONE

- THUS THE SEISMIC REACTION BLOCKS ARE CONSIDERED TO BE PERFORMING AS A MEMBER CARRYING HORIZONTAL LOAD FROM SUPERSTRUCTURE AND TRANSFER IT TO SUBSTRUCTURE IN ADDITION TO ITS ORIGINAL FUNCTION OF ARRESTING THE DISLODGEMENT OF THE SUPERSTRUCTURE

SEISMIC REACTION BLOCKS AS HORIZONTAL LOAD TRASFERING UNITS

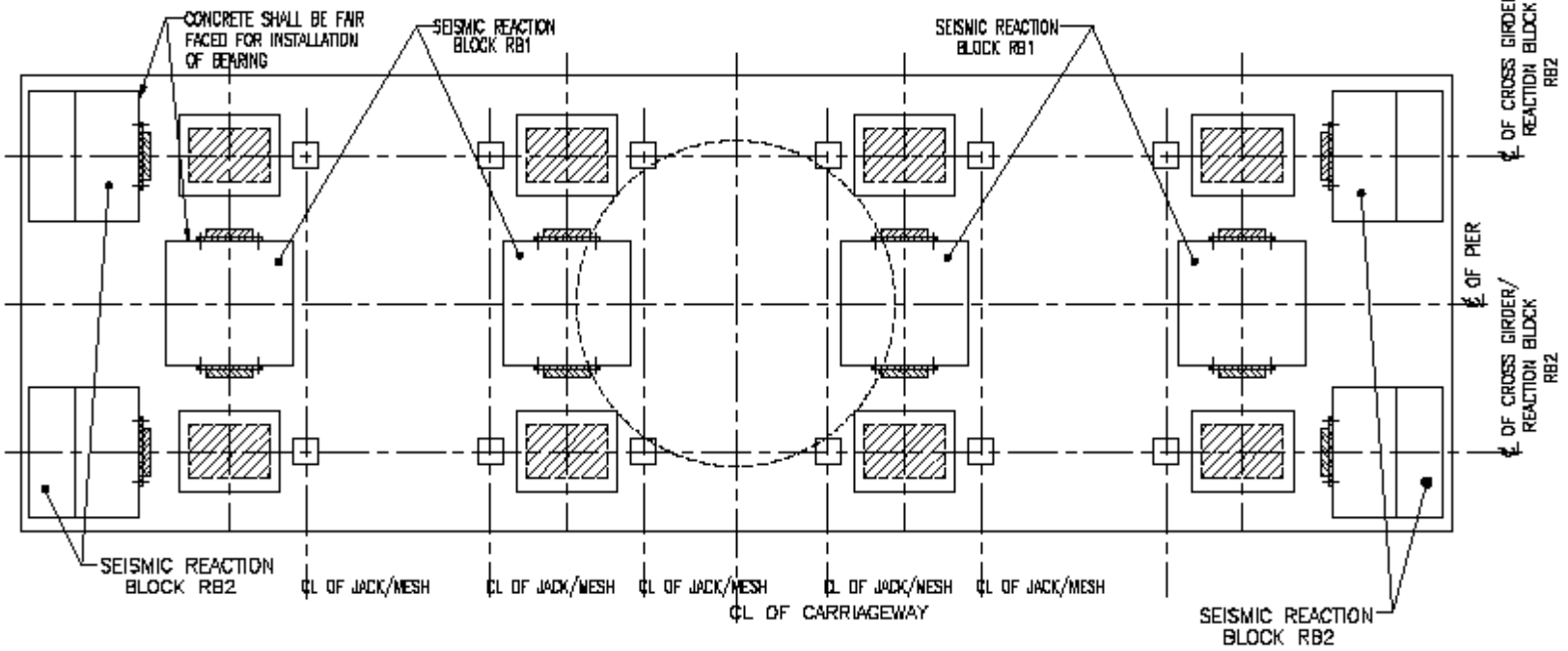
- NEOPRENE BEARING ARE PROVIDED IN HORIZONTAL PLANE TO CARRY ONLY THE VERTICAL LOAD FROM SUPERSTRUCTURE
- SEISMIC REACTION BLOCKS WITH NEOPRENE PAD ATTCHED IN VERTICAL DIRECTION CARRY THE HORIZONTAL LOAD DUE TO SEISMIC AND TRANSFER IT TO SUBSTRUCTURE

METHODOLOGY



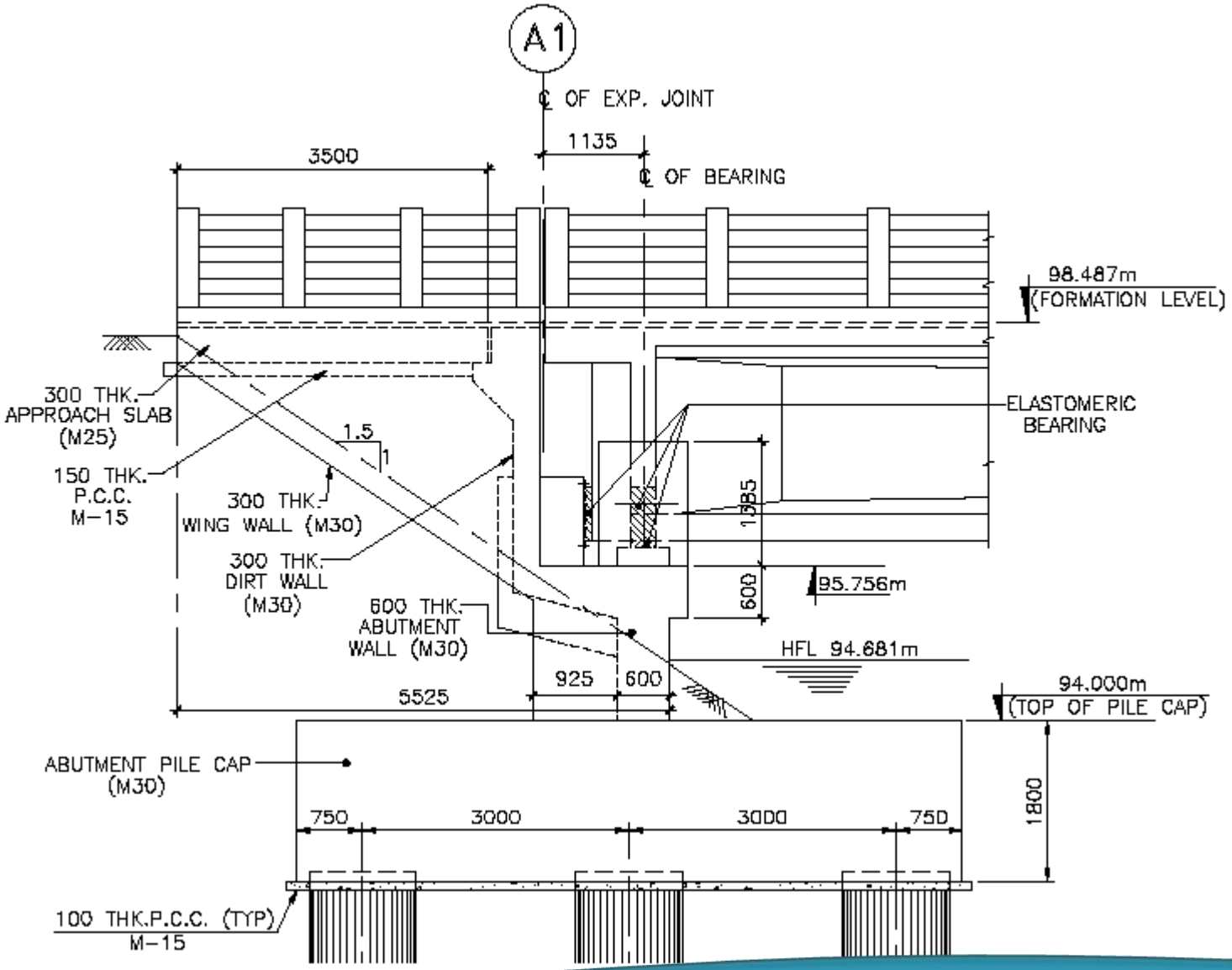
PLAN OF ABUTMENT CAP SHOWING
ARRANGEMENT OF SEISMIC REACTION BLOCKS

DETAILING

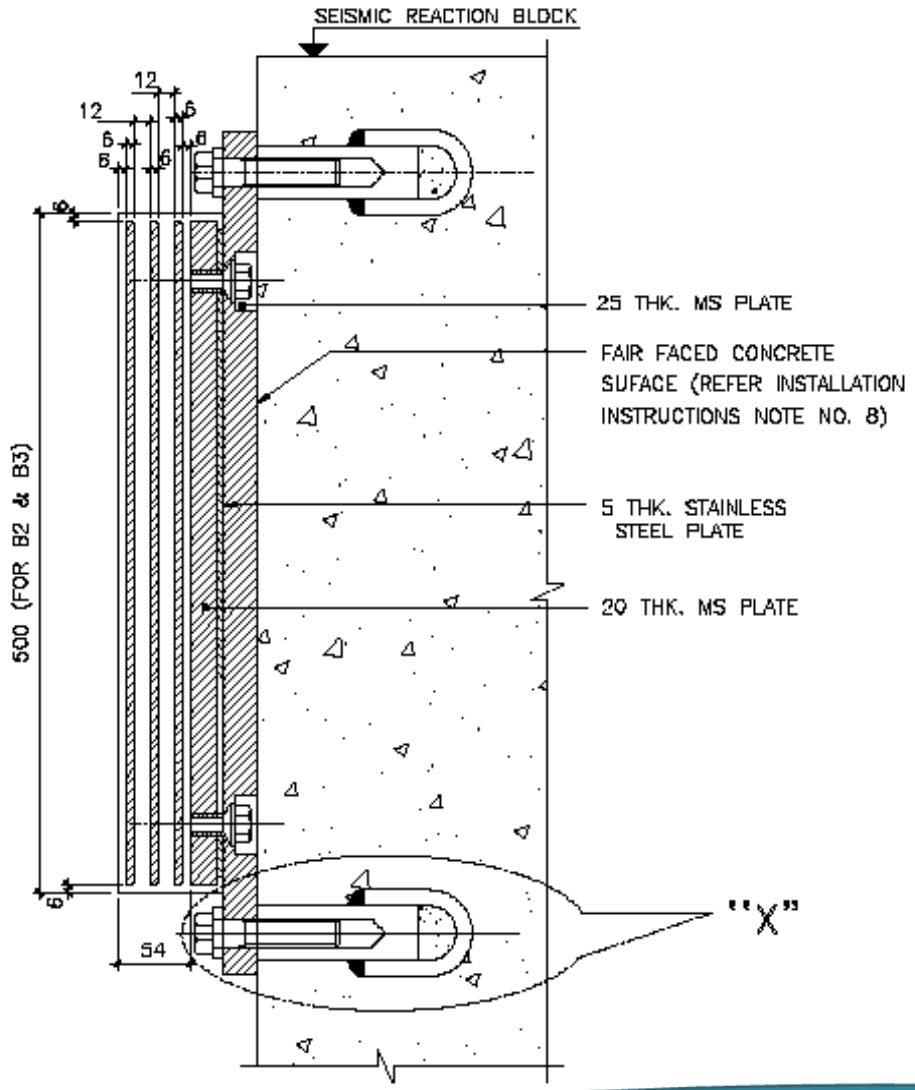


PLAN OF PIER CAP SHOWING ARRANGEMENT OF SEISMIC REACTION BLOCKS

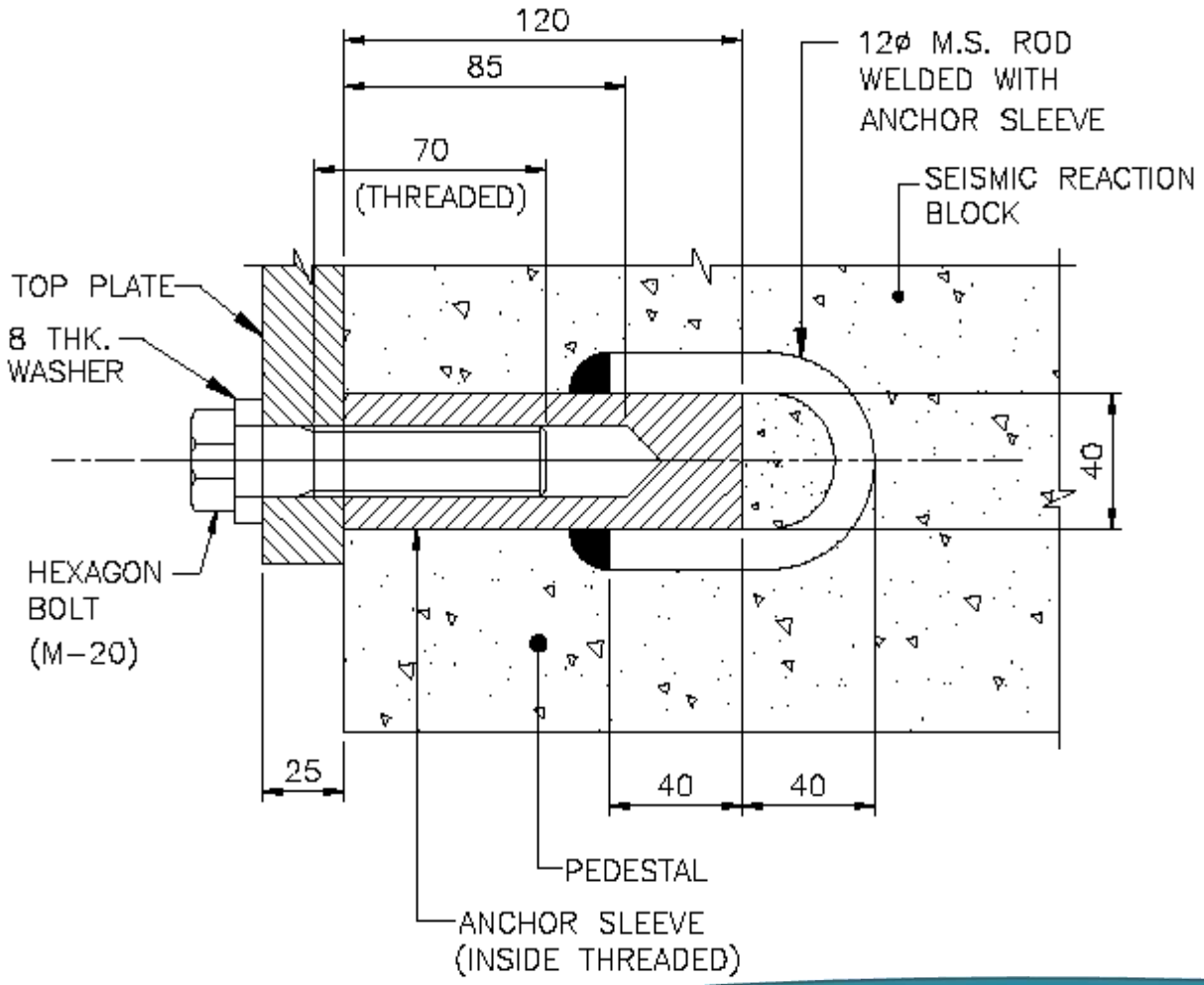
DETAILING


A1
℄ OF EXP. JOINT
1135
℄ OF BEARING
3500
98.487m
(FORMATION LEVEL)
300 THK.
APPROACH SLAB
(M25)
150 THK.
P.C.C.
M-15
1.5
1
300 THK.
WING WALL (M30)
300 THK.
DIRT WALL
(M30)
600 THK.
ABUTMENT
WALL (M30)
ELASTOMERIC
BEARING
1385
600
95.756m
HFL 94.681m
925
600
5525
94.000m
(TOP OF PILE CAP)
ABUTMENT PILE CAP
(M30)
1800
750
3000
3000
750
100 THK.P.C.C. (TYP)
M-15

DETAILING


SEISMIC REACTION BLOCK
12
12
6
6
6
6
6
6
25 THK. MS PLATE
FAIR FACED CONCRETE
SUFACE (REFER INSTALLATION
INSTRUCTIONS NOTE NO. 8)
5 THK. STAINLESS
STEEL PLATE
20 THK. MS PLATE
500 (FOR B2 & B3)
54
"X"

DETAILING


120
85
70
(THREADED)
12ø M.S. ROD
WELDED WITH
ANCHOR SLEEVE
SEISMIC REACTION
BLOCK
TOP PLATE
8 THK.
WASHER
HEXAGON
BOLT
(M-20)
40
25
40
40
PEDESTAL
ANCHOR SLEEVE
(INSIDE THREADED)

DETAILING


D-302/MK-1
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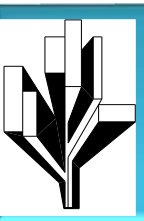
SPAN OF THE BRIDGE	35M
TYPE	RCC BOX
S/W OF THE SUPERSTRUCTURE	710 T
MAX VERTICAL LOAD ON BEARING	185 T
MIN VERTICAL LOAD ON BEARING	110 T
MAX TRANSVERSE HORIZONTAL LOAD DUE TO SEISMIC	210 T
MAX LONGITUDINAL HORIZONTAL LOAD DUE TO SEISMIC	210 T
HORIZONTAL LOAD PER BEARING DUE TO SEISMIC	35 T
SIZE OF VERTICAL LOAD CARRYING BEARING	340 X 585
HORIZONTAL LOAD CAPACITY OF IT	12 T

EXAMPLE

SIZE OF HORIZONTAL LOAD CARRYING NEOPRENE PAD	400 X 620
LOAD ON TRANSVERSE SEISMIC ARRESTER	110 T
LOAD ON LONGITUDINAL SEISMIC ARRESTER	70 T
TEMPERATURE ELONGATION IN LONG DIRECTION	20 MM
GAP BET NEOPRENE PAD AND SUPERSTRUCTURE IN LONG DIRECTION	10 MM
TEMPERATURE ELONGATION IN TRANSVERSE DIRECTION	2.3 MM
GAP BET NEOPRENE PAD AND SUPERSTRUCTURE IN TRANSVERSE DIRECTION	6 MM



EXAMPLE

- NEOPRENE BEARING IS MOST SIMPLE BEARING SYSTEM
- IN HIGH SEISMIC ZONE NEOPERENE BEARING CAN NOT CARRY HORIZONTAL FORCE DUE TO SEISMIC AS IT CROSSES ITS SHEAR CAPACITY
- WITH SESIMIC REACTION BLOCK AS HORIZONTAL LOAD CARRYING MEMBER NEOPRENE BEARING CAN BE USED IN HIGH SEISMIC ZONE
- THIS SYSTEM OF LOAD TRANSFER INTRODUCES USE OF SEISMIC REACTION BLOCKS AS PERMANENT HORIZONTAL LOAD CARRYING MEMBER

CONCLUSION

THANK YOU