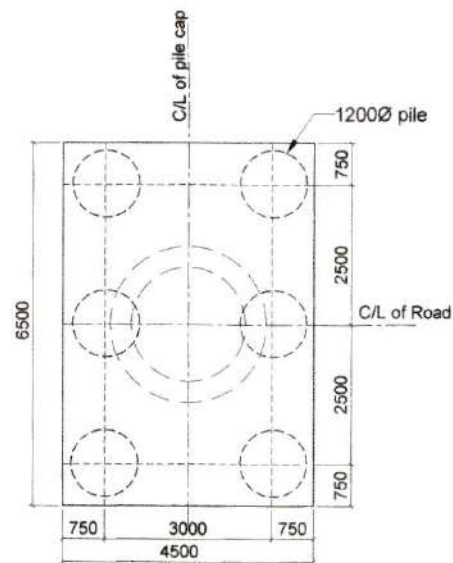
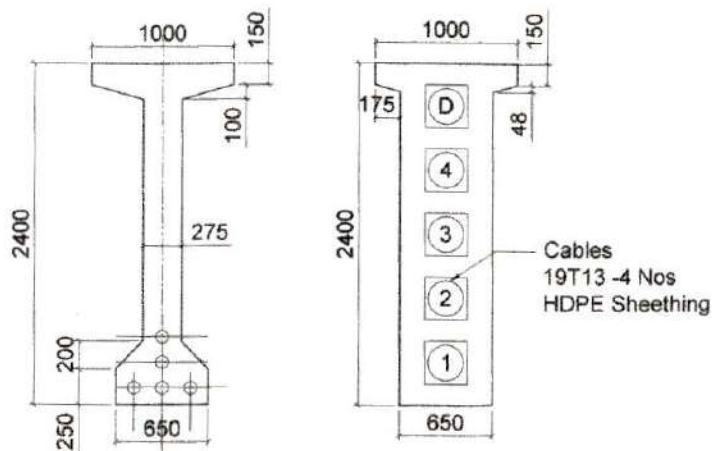


**ARRANGEMENT OF PILE
UNDER ABUTMENT A2**
Scale (1:100)



**ARRANGEMENT OF PILE
UNDER PIERS P1-P6**
Scale (1:100)

SL NO:	LEVEL POINTS	LEVEL MARKS	A1	P1 & P6	P2 to P5	A2
1	ROAD LEVEL (R1)	R1	+116.000	+116.000	+116.000	+116.000
2	BOTTOM OF DECK (R2)	R2	+113.319	+113.319	+113.319	+113.319
3	BEARING BOTTOM (R3)	R3	+113.255	+113.255	+113.255	+113.255
4	BEARING BOTTOM (R4)	R4	+113.180	+113.180	+113.180	+113.180
5	PEDESTAL BOTTOM (R5)	R5	+112.955	+112.955	+112.955	+112.955
6	BOTTOM OF PIER CAP -STRAIGHT PORTION(R6)	R6	-	+111.455	+111.455	-
7	BOTTOM OF PIER CAP -VARYING PORTION(R7)	R7	-	+110.455	+110.455	-
8	PIER/ABUTMENT BOTTOM (R8)	R8	+111.000	+103.500	+97.700	+112.455
9	PILECAP BOTTOM (R9)	R9	-	+101.700	+95.900	+110.655



SECTION AT MIDSPAN SECTION AT SUPPORT
SECTION OF PRECAST GIRDERS

Scale (1:50)

TABLE A: CONCRETE MIX FOR BRIDGE COMPONENTS						
Sl. No.	Component	Grade of concrete	Max. W/C ratio	Min. cement content (kg/cum)	Clear cover	Exposure condition
1	Superstructure (All spans)	M45	0.45	340	As per superstructure dwg.	Moderate
2	Pedestals	M40	0.45	340	50	Moderate
3	Abutments A1 & A2					
(a)	Abutment A1	M35	0.45	340	50	Moderate
(b)	Open foundation (First step)	M30	0.45	360	75	Severe
(c)	Open foundation (Second step)	M25	0.45	360	75	Severe
(d)	Open foundation (Remaining steps)	M20	0.45	360	75	Severe
(e)	Pile cap	M35	0.45	360	75	Severe
(f)	Pile	M40	0.40	400	75	Severe
4	Piers P1 to P6					
(a)	Pier & Pier cap	M35	0.45	340	50	Moderate
(b)	Pile cap	M35	0.45	360	75	Severe
(c)	Pile	M40	0.40	400	75	Severe

TABLE B : DESIGN PARAMETERS OF FOUNDATION						
Abutment/ Pier No.	Foundation type	Size of foundation/ Diameter of Pile (mm)	Base pressure (kN/m ²)/ Maximum Working load on Pile (kN)	Horizontal load on pile(kN)	Embed ment/ Socket depth into hard rock/strata (mm)	Estimated length of MS liner/Casing pipe for pile (mm)
A1	Open	6400x6400	600	-	1500	-
P1	Pile	1200	3000	60	1500	8750
P2	Pile	1200	3000	55	1500	11250
P3	Pile	1200	3000	55	1500	11250
P4	Pile	1200	3000	55	1500	11250
P5	Pile	1200	3000	55	1500	11250
P6	Pile	1200	3000	60	1500	7500
A2	Pile	1200	1800	270	1500	-

NOTES

I. GENERAL

- All dimensions are in millimetres and all levels are in metres unless otherwise mentioned.
- Only written dimensions are to be followed. No drawing shall be scaled.
- The design is according to the following codes:
 - IRC-5 - 2015 - CoP for road bridge: General features of design.
 - IRC-5 - 2014 - CoP for road bridge: Loads and stresses.
 - IRC-112 - 2011 - CoP for concrete road bridge.
 - IRC-78 - 2014 - CoP for road bridge: Foundations and substructure.
 - IRC-83 (Part-II) - 2015 - CoP for road bridge: Elastomeric bearings.
 - IRC-83 (Part-III) - 2002 - CoP for road bridge: Pot, Pot cum PTFE and metallic bearings.
 - IS 2911 (Part-I/Sec-2) - 2010 - Code of practice for Bored Cast-in-situ Concrete piles.

- The construction shall be in accordance with the above codes, PWD Quality Manual and latest edition of MoRTH Specifications for Road and Bridge works.
- The carriageway width is 7500mm and footpath width is 1500 on either sides.
- The following live loads have been considered in the design:
 - Carriageway - two lane of IRC Class A OR single lane of IRC Class 70R, whichever governs.
 - Footpath - 5kN/sq.m.
- This drawing is the property of the Chief Engineer (Design), Kerala Public Works Department, Govt. of Kerala. Copying or reproduction of this drawing in any form without the permission of Chief Engineer (Design) is a crime liable to punishment.

II. MATERIAL SPECIFICATION

A. CONCRETE:

- The type of cement used for preparation of concrete shall be any one as specified in Cl.18.4.1 of IRC: 112-2011 and the selected one shall be appropriate for the intended use.
- All coarse and fine aggregates shall conform to IS: 383 and shall be tested to conform to IS: 2386 (Parts I to VIII).
- Water used for mixing and curing of concrete shall be as per the requirements of Cl. 18.4.5 of IRC: 112-2011.
- Chemical admixtures conforming to IS: 9103 may be used to improve the properties of fresh concrete such as workability. Chemical admixtures as per Cl. 18.4.3 of IRC: 112-2011 may be used in concrete to improve its performance.
- Concrete shall have minimum 28 days characteristic strength on 150mm cubes for all elements of structure as indicated in Table A.
- Design mix is preferred for ordinary concrete. In the absence of design mix, the proportion of ordinary concrete (M15 and M20 grades) shall be based on nominal mix as specified Table 18.7 of IRC: 112-2011.
- Design mix shall invariably be used for standard concrete (M25 and higher grade) and shall be established by laboratory/field testing and controlled at site by conducting tests to confirm suitability of constituent materials.
- The concrete shall meet the acceptance criteria as per Cl. 18.6 of IRC: 112-2011. The mix design shall be modified, if it does not meet the acceptance criteria.

B. REINFORCEMENT:

- All reinforcement shall be high yield strength deformed (HYSD) bars with grade/designation, Fe500/Fe500D conforming to IS: 1786 which shall be manufactured by primary steel producers classified as per notification No 4(8)2010-SD-I, dated 12/12/2013 of Ministry of Steel, Government of India. Thermo-mechanically treated (TMT) bars shall be preferred compared to cold twisted deformed (CTD) bars.

III. FOUNDATION

A. OPEN FOUNDATION:

- For foundations resting on hard rock ($N > 500$ or unconfined strength (UCS) more than 12.5MPa), the minimum embedment depth shall be 600mm. The rock surface shall be cleaned of any flaky layers and loose material and then levelled with a layer of the same grade as that of overlying foundation.
- The concrete for foundation shall be laid, as far as possible in dry condition with suitable method available at site such as pumping or depression of water by well point etc. In case the concreting cannot be laid dry or situation is such that the percolation is too heavy for keeping the foundation dry, the concrete shall be laid under water only by tremie pipe. In case of flowing water or artesian springs, the flow shall be stopped or reduced as far as possible at the time of placing of concrete.
- No pumping of water shall be permitted from the time of placing of concrete upto 24 hours after placement of concrete.
- All spaces excavated and not occupied by abutment, pier or other permanent works shall be refilled with compacted earth upto the surface of the surrounding ground. In case of excavation in rock, the trenches around the footing shall be filled-up with concrete of M15 grade up to the top of the rock surface. If the depth of fill required is more than 1.5m in soft rock or 0.6m in hard rock above the foundation level, then the M15 grade concrete may be filled up to this level and portion above may be filled by lean concrete or by boulders grouted with cement.
- It shall be ensured that founding strata is capable of withstanding the maximum base pressure from foundation as mentioned in Table B.

B. PILE FOUNDATION:

- Bored cast-in-situ piles having diameter as indicated in the Drawing shall be provided and socketed as required into hard rock.
- Piles shall be constructed as per the guidelines given in IS: 2911 subject to limitations/stipulations given in IRC: 78.
- Piles have minimum working load carrying capacity as mentioned in Table B.
- Routine load test as per IS: 2911 (Part-IV) shall be done for a working pile in a group of alternate foundations of piers and abutments, if the same is resting on hard rock, to reconfirm the allowable pile capacity mentioned above. Test load shall be 1.5 times the working load capacity of pile.
- The permissible tolerance for piles shall be such that the shift at platform level not exceeding 75mm and the tilt not exceeding 1 in 150.
- Drilling mud such as bentonite suspension having properties in confirmation with Annexure-D of IS: 2911 (Part-I/Sec 2): 2010 shall be maintained throughout the boring process to ensure the stability of the walls of bore holes until the pile has been concreted.

ESTIMATED QUANTITIES PER SPAN OF SUPERSTRUCTURE

CONCRETE	: 225 M3
PRE-STRESSING STEEL	: 6801.25 kg
REINFORCEMENT	: 36000 kg
SHEETHING	: HDPE WITH CORRUGATION ON BOTH SIDES

*NOTE: The quantities are excluding handrails

- Permanent mild steel liner (casing pipe) having thickness 6mm shall be provided for all piles from bottom of pile cap to atleast 1.0 metre below the Mean Scour Level (MSL). Wherein the walls of boreholes cannot be stabilized by bentonite suspension for situations mentioned in Cl. 709.1.4 of IRC:78 and for short piles to be socketed into hard rock, additional length of permanent liner below scour level shall be provided. The total estimated length of permanent liner/casing pipe, required for each pile is given Table B.

IV. SUBSTRUCTURE

A. ABUTMENTS AND PIERS:

- Vertical construction joints are not permitted and horizontal construction joints shall be avoided as far as possible by arranging the concrete pour in one single operation.
- Adequate number of weep holes having 75mm diameter at spacing not exceeding one metre in both directions shall be provided to prevent any accumulation of water and building up of hydrostatic pressure behind the abutment and wing wall.

B. ELASTOMERIC BEARING:

- Elastomeric bearing shall have the dimensions as indicated in this Drawing and properties as specified in IRC: 83 (Part-II).
- The Contractor shall furnish the Quality Control report and the acceptance criteria for elastomeric bearings and shall be based on IRC: 83 (Part-II).
- The elastomeric bearing shall be seated such a way that the lesser dimension is parallel and greater dimension is perpendicular to the traffic direction.
- The concrete surface where the bearing is to be seated shall be clean of all laitance and levelled true.

V. SUPERSTRUCTURE

The superstructure shall be constructed as per subsequent drawings issued from this office

A. HANDRAILS:

- Hand rails shall be as per MOST standard drawings, Drwg. No. SD/202.
- Grade of concrete for hand rails shall be same as that of deck slab.

B. EXPANSION JOINT

- Single strip seal joint for expansion gap shall be provided for all expansion joints of superstructure in confirmation with IRC: SP-69

VI. APPROACH EMBANKMENT

A. BACK FILLING:

- Type of material to be used for filling behind abutments and wing wall shall be selected as per the guidelines given in Appendix-6 of IRC: 78-2014.
- The filter material shall be well packed to a thickness of not less than 600mm with smaller size towards the soil and bigger size towards the wall and provided over the entire surface behind abutment and wing wall to the full height.

B. APPROACH EMBANKMENT:

- Approach embankment on either sides of the bridge shall be constructed as per the guidelines given in Section 305 of MoRTH Specifications for Road and Bridge Works (5th Revision).

VII. RIVER TRAINING AND PROTECTION WORKS

- Adequate River training and protection works such as guide bunds, guide walls, spurs, groyne, bank protection, flooring, cut-off walls, apron and approach embankment protection, for ensuring safety of the bridge structure and its approach embankment protection shall be provided as per Section 2500 of MoRTH Specifications for Road and Bridge Works (5th Revision) in confirmation with IRC: 89 and IS: 10751.

VIII. SPECIAL NOTES






- This drawing is prepared based on the relevant correspondence of Chief Engineer (Roads & Bridges) vide file numbers mentioned below:
 - Investigation details : U. No. CE(R&B)/7425/TVM/2016 dtd.10/03/2017.
- This is a Tentative General Design drawing, the feasibility of various provisions in this drawing may be examined at site and reported to this office. If all the provisions made in this drawing are suitable at site, it may be considered as the Final General Design drawing.
- If this drawing is feasible at site, it can be used for preparing DPR for Administrative Sanction (AS). On getting the AS from the Government, the same shall be intimated to this office for preparing Detailed Design Drawings. Technical Sanction (TS) shall be issued only after the receipt of the Detailed Design Drawings from this office. Slight changes in the dimensions of the bridge elements may happen during the preparation of Detailed Design Drawing.
- If the construction of this work is not arranged within 2 years from the date of approval of this Drawing, this drawing shall be revised for incorporating the provisions of the latest revisions/amendments of the above mentioned codes of practices.
- Founding levels are designed based on the geotechnical investigation report furnished. Any significant deviation in soil profile and founding strata other than those observed in the investigation report should be reported to this office for suitable modification of design and drawing.
- Quality control at various stages of construction from start to end shall be maintained as per the guidelines of PWD Manual 2012 and PWD Quality Control Manual 2015.
- Sand mining in the vicinity of the bridge for a stretch of at least 500m on upstream or downstream shall be strictly prohibited to prevent the scouring of soil around piers and abutments.
- Periodic inspection and maintenance of the bridge after completion shall be carried out as per PWD Manual and other relevant codes.



KERALA PUBLIC WORKS DEPARTMENT
DRIO BOARD, THIRUVANANTHAPURAM

BRIDGE AT KUMBICHALKADAVU ACROSS KARI PRAYAR
RIVER IN THIRUVANANTHAPURAM DISTRICT

TENTATIVE GENERAL DESIGN DRAWING

File No.		Loading		Scale
BD/15/2017/Design/HW		Class A -2 Lane / Class 70R - 1 Lane		1:100, 1:400, 1:50
Drawn by	Drawing No.		Sheet. No.	Date
Ileela R	CEDO/BD/17		1/2	13/07/2017
Designed by	Checked by	Reviewed by	Recommended by	Approved by
 Suma R Nair Assistant Director	 Divya Sathesh Deputy Director	 Saju S Joint Director	 Huygheen Albert Director	 M. Pennamma Chief Engineer (Design & Admin)