



### SPECIAL NOTES FOR PRESTRESSING

- (A) ELONGATION REACHED BUT PRESSURE NOT REACHED
- IF THE CALCULATED ELONGATION IS REACHED BEFORE THE CALCULATED GAUGE PRESSURE IS OBTAINED, CONTINUE TENSIONING TILL ATTAINING THE CALCULATED GAUGE PRESSURE. PROVIDED THE ELONGATION DOES NOT EXCEED 1.05 TIMES THE CALCULATED ELONGATION. IF THIS ELONGATION IS ACHIEVED BEFORE THE CALCULATED GAUGE PRESSURE IS ATTAINED, STOP STRESSING AND INFORM THE ENGINEER.
- (B) ELONGATION NOT REACHED BUT PRESSURE REACHED
- IF THE CALCULATED ELONGATION HAS NOT BEEN REACHED CONTINUE TENSIONING BY INTERVALS OF 5kg/cm UNTIL THE CALCULATED ELONGATION IS REACHED PROVIDED THE GAUGE PRESSURE DOES NOT EXCEED 1.05 TIMES THE CALCULATED GAUGE PRESSURE. IF THE ELONGATION AT 1.05 TIMES THE CALCULATED GAUGE PRESSURE IS LESS THAN 0.95 TIMES THE CALCULATED ELONGATION, THE FOLLOWING MEASURES MUST BE TAKEN, IN SUCCESSION, TO DEFINE THE CAUSE OF THIS LACK OF ELONGATION.
- RECALIBRATE THE PRESSURE GAUGE
  - CHECK THE CORRECT FUNCTIONING OF THE JACK, PUMP AND LEADS.
  - DE-TENSION THE CABLE, SLIDE IT IN ITS DUCT TO CHECK THAT IT IS NOT BLOCKED BY MORTAR WHICH HAS ENTERED THROUGH HOLES IN THE SHEATH. RE-TENSION THE CABLE, IF FREE.
- (C) IF THE REQUIRED ELONGATION IS NOT OBTAINED, FURTHER FINISHING OPERATIONS SUCH AS CUTTING OR SEALING, SHOULD NOT BE UNDERTAKEN WITHOUT THE APPROVAL OF THE ENGINEER.

### NOTES:-

- ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT WHERE OTHERWISE SHOWN.
- CABLE AND ANCHORAGES SHALL BE OF ANY APPROVED STANDARD SYSTEM WITH FOLLOWING PROPERTIES:-
  - PRESTRESSING CABLES:- 19 NOS 12.7 NOMINAL DIA STRESS RELIEVED LOW RELAXATION HIGH TENSILE STEEL STRAND (CLASS-I) CONFORMING TO IS:14298 WITH ULTIMATE TENSILE STRENGTH 1861 N/mm.
  - STRESSING MULTI STRAND SYSTEM.
  - SHEATHING 85mm ID CONFORMING TO CLAUSE 7.2.6.4.2 OF IRS CONCRETE BRIDGE CODE.
- TRANSFER OF FIRST STAGE PRESTRESSING FORCE (CABLE NUMBER 1 & 3) SHALL BE DONE WHEN CONCRETE ATTAINS A MINIMUM STRENGTH OF 30 N/mm<sup>2</sup> OR 7 DAYS AFTER CASTING OF GIRDER, WHICHEVER IS LATER. TRANSFER OF SECOND STAGE PRESTRESSING FORCE (CABLE NO. 2&4) SHALL BE DONE WHEN THE CONCRETE OF CAST-IN-SITU SLAB ATTAINS A MINIMUM STRENGTH OF 30 N/mm<sup>2</sup> OR 14 DAYS AFTER CASTING OF SLAB WHICHEVER IS LATER.
- STRESSING SHALL BE DONE SIMULTANEOUSLY FROM BOTH ENDS STRESSING SEQUENCE TO BE FOLLOWED IN EACH STAGE IS AS UNDER:- 1st STAGE- CABLE NO. 1&3 2nd STAGE- CABLE NO. 2&4
- PARAMETERS ASSUMED IN THE DESIGN ARE AS UNDER:-
  - FRICTION CO-EFFICIENT ( $\mu$ ) = 0.25 PER RADIAN
  - WOBBLE CO-EFFICIENT ( $k$ ) = 0.0046/m
  - MODULUS OF ELASTICITY OF STRAND  $E_s = 1.95 \times 10^5$  N/mm<sup>2</sup>
  - 1000 hrs. RELAXATION VALUE OF STRAND AT 0.7 UTS = 2.5%
  - ASSUMED SLIP AT EACH END= 6mm.
- THE ELONGATION GIVEN IN TABLE IS THE VALUE OF THEORETICAL ELONGATION OF STRAND AT EACH END INCLUDING 1000mm GRIP LENGTH WITHIN THE JACK. THE CUTTING LENGTH OF CABLES SHALL BE TOTAL CABLE LENGTH GIVEN IN TABLE OF STRESSING SCHEDULE PLUS 1000mm EXTRA LENGTH OF CABLE AT EACH END FOR FIXING THE JACK.
- IN CASE OF ANY VARIATION IN AREA OF STRAND AND MODULUS OF ELASTICITY OF STRAND, THE ACTUAL ELONGATION SHALL BE CALCULATED AS UNDER:-  
THEORETICAL ELONGATION AS PER TABLE OF STRESSING SCHEDULE X 98.7 X 1.95 X 10<sup>5</sup> / ACTUAL AREA OF STRAND X ACTUAL  $E_s$
- THE MAXIMUM ELONGATION SHALL NOT BE MORE THAN 1.05 TIMES THE CALCULATED ELONGATION. MAXIMUM JACK PRESSURE SHALL ALSO NOT BE MORE THAN 1.05 TIMES THE GAUGE PRESSURE CALCULATED ON THE BASIS OF RAM AREA OF JACK AND THE CABLE FORCE.
- GROUTING OF DUCTS SHALL BE DONE AS PER CLAUSE 9 (APPENDIX-D) OF IRS: CBC-1997 SOON AFTER PRESTRESSING OF ALL THE CABLES IN EACH STAGE WITHIN ONE WEEK OF PRESTRESSING.
- SUITABLE SPACERS AT A SPACING OF 1.0m c/c SHALL BE PROVIDED TO MAINTAIN THE CABLE PROFILE AS STIPULATED.
- THE PROVISION FOR EMERGENCY STRANDS HAS BEEN KEPT IN CABLE NO.-4 (3 STRANDS) ONLY THOSE STRANDS WHICH ARE REQUIRED TO MAKE UP THE DEFICIENCY IN ACHIEVING DESIGNED PRESTRESSING FORCE SHALL BE STRESSED AND THE REMAINING PULLED OUT AND THE DUCT HOLES GROUTED.
- TIME SHOWN IN THE CONSTRUCTION SEQUENCE AGAINST EACH ACTIVITY ARE TIME ASSUMED IN DESIGN, DURING CONSTRUCTION ACTIVITIES SHOULD NOT BE EXECUTED PRIOR TO TIME MENTIONED AGAINST THEM.

### REFERENCES :

- GENERAL ARRANGEMENT DRG.
- GENERAL ARRANGEMENT BASED ON DRG NO. RS050/B--10273

### DRG. NO.

### REV. NO. DATE DESCRIPTION

CE/C-I

DY CE/C ID

DY CE/C IV

CONTRACTOR

CONSULTANTS

PROJECT : VIADUCT ON RINGAS DETOUR RGS DETOUR IN CONNECTION WITH DFCCIL WORK-CONSTRUCTION OF VIADUCT(164X18.30M PSC GIRDER),5X18.30M PSC GIRDER ON MINDA RIVER, + 3X18.30 COMPOSITE GIRDER ON RPC AND DFCCIL TRACK.

CLIENTS : NORTH WESTERN RAILWAY, 5TH FLOOR, HQ OFFICE NEAR JAWAHAR CIRCLE, MALVIYANAGAR JAIPUR - 302 017

CONTRACTORS : M.H. KHANUSIA-APEX TARMAC PVT. LTD.(JV) FF, Divine India Building, Near RTO Office : Bye pass Road, Po-Savgadha (Panpur) : Himatnagar 383 001

CONSULTANTS : PANKAJ M PATEL CONSULTANTS PVT. LTD. 303, CHAKRAVARTY COMPLEX, OPP. KIRAN PARK CIRCLE, NAWA WADAJ, AHMEDABAD-380013, PH : (079)27643175, FAX : (079)27640428 E-mail : ppat\_99@yahoo.co.in, ppat99@gmail.com

TITLE : CABLE PROFILE STRESS CHART AND DEFLECTION

DRAWN BY : NILESH

CHECKED BY : PANKAJ PATEL

SCALE : AS SHOWN

DATE : 28-03-2017

DESIGNED BY PANKAJ PATEL

DRG. NO.

VIADUCT

10

REVISION

RO

### CONSTRUCTION SEQUENCE

SL. NO	DESCRIPTION OF ACTIVITIES	MINIMUM TIME FOR FOR STARTING (DAYS)
1	CASTING OF GIRDERS (EXCLUDING END BRACKET, SLAB AND DIAPHRAGM ETC.) IN SITU OR YARD.	0
2	STRESSING AND GROUTING OF FIRST STAGE CABLES.	7
3	RELEASE OF SOFFIT SHUTTER, TRANSPORTING AND LAUNCHING OF PRECAST GIRDERS OVER PIERS, IF REQUIRED.	21
4	CASTING OF SLAB AND DIAPHRAGM.	28
5	STRESSING THE SECOND STAGE CABLES INCLUDING EMERGENCY CABLES (IF REQUIRE) AND GROUTING OF SECOND STAGE CABLES.	42
6	CASTING OF BALLAST RETAINERS AND WEARING COAT.	BETWEEN 42 TO 56
7	LAYING OF BALLAST & TRACK.	BETWEEN 42 TO 56
8	CASTING OF END BRACKET AND SEALING OF ANCHORAGES WITH M45 CONCRETE.	BETWEEN 42 TO 56
9	FINISHING WORKS LIKE HAND RAILS, FOOTPATH, TROLLEY REFUSE, LADDERS ETC.	BETWEEN 42 TO 56
10	LINKING OF TRACK.	BETWEEN 42 TO 56
11	APPLICATION OF LIVE LOAD.	56

### ORDINATES OF CABLES(mm)

CABLE NO	CONSTANT OF PARABOLA (K)	ORDINATES AT MID SPAN	ORDINATES AT QUARTER SPAN	ORDINATES AT 3L/8 SPAN	ORDINATES AT CENTRE OF BEARING	ORDINATES AT JACKING END
1	0.00000278	125	181	252	350	359
2	0.00000500	295	396	523	700	717
3	0.00000784	465	624	822	1100	1126
4	0.00001068	635	851	1122	1500	1536

### STRESSING SCHEDULE

CABLE NO.	STRANDS TO BE PROVIDED	STRANDS TO BE STRESSED	TOTAL CABLE LENGTH UP TO 125mm INSIDE THE FACE OF GIRDER (mm)*	INITIAL PRESTRESSING FORCE AT JACKING END (kN)	THEORETICAL ELONGATION AT EACH END BEFORE SLIP (mm)	STAGE OF PRESTRESSING
1	19	19	18360	2617.73	72.0	1ST STAGE
2	19	19	18376	2617.73	71.0	2ND STAGE
3	19	19	18420	2617.73	71.0	1ST STAGE
4	19	16**	18480	2204.40	70.0	2ND STAGE

\* EXCLUDING 1m EXTRA LENGTH REQUIRED AT EACH SIDE FOR JACK ATTACHMENT.

\*\* 3 NOS EMERGENCY STRANDS

26/10/17

JE/C ID/JP

26/10/17

SSE/C/DESIGN