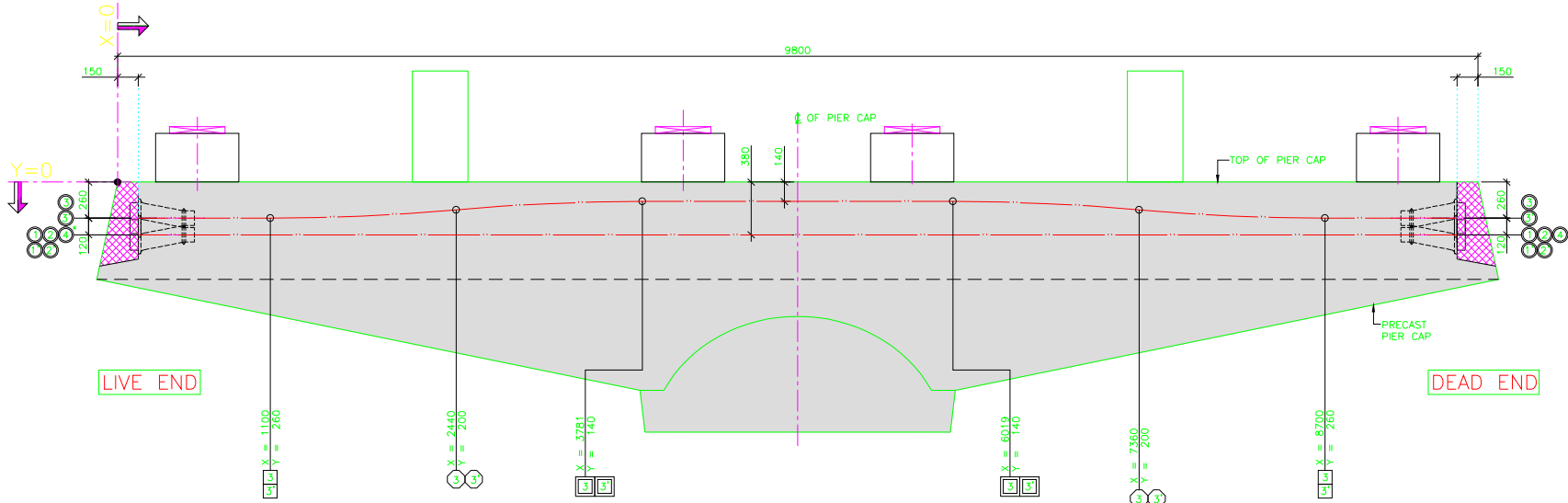
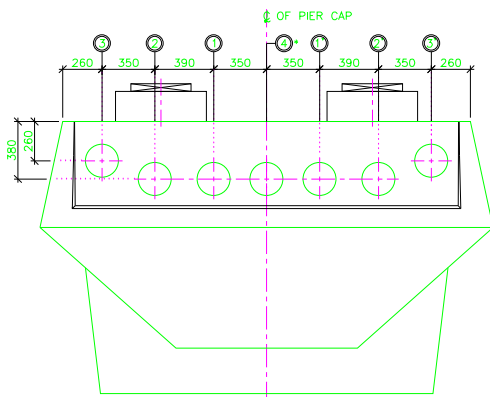


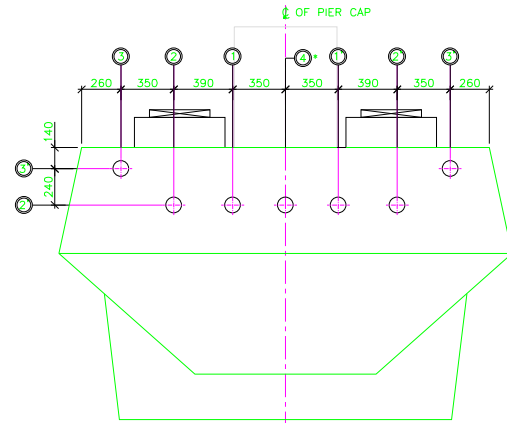
PLAN AT TOP OF PIER CAP  
(SCALE 1:25)



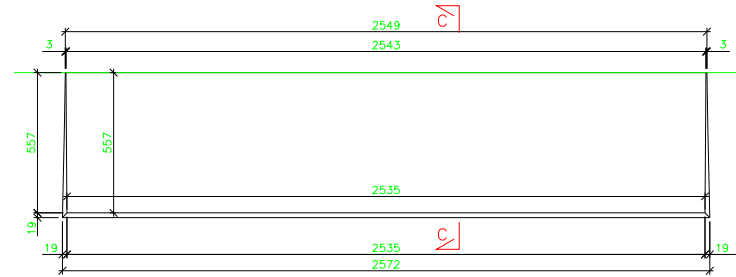
SECTION A-A  
(SCALE 1:25)



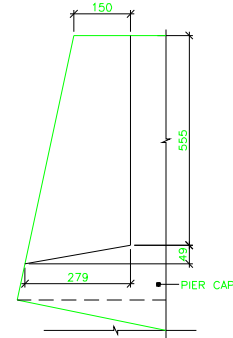
VIEW - 'C'  
(SCALE 1:25)



SECTION B-B  
(SCALE 1:25)



DETAILS OF RECESS BOX  
(SCALE 1:15)



SECTION C-C  
(SCALE 1:10)

#### SCHEDULE OF CABLE CO-ORDINATES AT DISTANCE 'X' FROM END OF PIER CAP:

CABLE NOS.	150		500		1000		1500		2000		2500		3000		3500		4000		UP TO MID SPAN	
	Y	Z	Y	Z	Y	Z	Y	Z	Y	Z	Y	Z	Y	Z	Y	Z	Y	Z	Y	Z
①	380	350	380	350	380	350	380	350	380	350	380	350	380	350	380	350	380	350	380	350
①'	380	-350	380	-350	380	-350	380	-350	380	-350	380	-350	380	-350	380	-350	380	-350	380	-350
②	380	740	380	740	380	740	380	740	380	740	380	740	380	740	380	740	380	740	380	740
②'	380	-740	380	-740	380	-740	380	-740	380	-740	380	-740	380	-740	380	-740	380	-740	380	-740
③	260	1090	260	1090	260	1090	255	1090	233	1090	194	1090	160	1090	143	1090	140	1090	140	1090
③'	260	-1090	260	-1090	260	-1090	255	-1090	233	-1090	194	-1090	160	-1090	143	-1090	140	-1090	140	-1090
④	380	0	380	0	380	0	380	0	380	0	380	0	380	0	380	0	380	0	380	0

#### DETAILS OF CABLES:

CABLE NO.	CABLE TYPE	NO. OF STRANDS IN CABLE	STAGE OF PRESTRESSING	STRESSING SEQUENCE	ELONGATION AT STRESSING END (mm)	LENGTH OF CABLE (m)	JACKING FORCE (kN)	REMARK
①	19 T 15.2	18	1	1	67.32	9.500	3515.4	
①'	19 T 15.2	18	1	1	67.32	9.500	3515.4	
②	19 T 15.2	17	1	2	67.32	9.500	3320.1	
②'	19 T 15.2	17	1	2	67.32	9.500	3320.1	
③	19 T 15.2	17	2	3	65.20	9.507	3320.1	
③'	19 T 15.2	17	2	3	65.20	9.507	3320.1	
④	19 T 15.2	-	-	-	-	-	-	FUTURE PT.

\* = FUTURE PT.  
\*DUCT FOR FUTURE PT. CABLE SHALL BE LEFT UNGROUTED AND IT SHALL BE GROUTED AFTER COMPLETIONS OF STRESSING OPERATION OF FUTURE PT.

#### NOTES:-

- ALL DIMENSIONS ARE IN MILLIMETERS.
- DIMENSIONS ARE NOT TO BE SCALED. ONLY WRITTEN DIMENSIONS SHALL BE FOLLOWED.

#### PRE-STRESSING SYSTEM

- ALL PRE-STRESSING STRANDS SHALL BE UNCOATED STRESS RELIEVED LOW RELAXATION 15.2mm DIA. 7 PLY STRANDS CONFORMING TO CLASS 2 OF IS 14268-1995, WITH MINIMUM UTS OF 1862 N/mm<sup>2</sup>.
- ANCHORAGE TYPE -- 19 T 15.2
- TYPE OF SHEATHING: CORRUGATED HDPE SHEATHING.
- PARAMETERS CONSIDERED FOR DESIGN:
  - MODULUS OF ELASTICITY OF STEEL ----- 1.95x10<sup>5</sup> MPA
  - CROSS SECTIONAL AREA OF EACH STRAND ----- 140mm<sup>2</sup>
  - WOBBLE COEFFICIENT OF SHEATHING (K) ----- 0.002 PER METER
  - FRICTION COEFFICIENT (μ) ----- 0.17 PER RADIAN
  - SLIP AT JACKING END ----- 6mm
  - JACK EFFICIENCY ----- 100% (INCLUDED IN SCHEDULE)
  - SHEATHING ----- 120 OD FOR 19 T 15 CABLES
  - NOMINAL ULTIMATE BREAKING LOAD OF EACH STRAND --- 260.7kN
- STRESSING OF ALL CABLES SHALL BE DONE USING MULTI STRAND STRESSING SYSTEM FROM ONE END OF PIER ARM.
- ALL THE DESIGN PARAMETERS SHALL BE VERIFIED AT SITE BEFORE USE.
- SUITABLE SUPPORTS SHALL BE PROVIDED FOR THE CABLES ALONG THE LENGTH TO MAINTAIN THE PROFILE.
- GROUTING SHOULD BE DONE SOON AFTER STRESSING OF THE CABLES WITH NEAT CEMENT GROUT (WITH APPROVED ADMIXTURES IF REQUIRED) AS PER SPECIFICATION
- REINFORCEMENT SHALL BE ADJUSTED LOCALLY WHEREVER INTERFERING WITH THE SHEATHING.
- PRE-STRESSING OPERATION
  - ALL CABLES SHALL BE LAID IN SMOOTH CURVES PASSING THROUGH THE GIVEN ORDINATES AND SHALL BE SUPPORTED AT A SPACING NOT EXCEEDING 1000 mm BY A 16 mm DIA CROSS BAR/TACK WELDED SECURELY HELD IN POSITION WITH VERTICAL WEB REINFORCEMENT.
  - STRESSING FOR ALL THE CABLES SHALL BE CARRIED OUT FROM ONE END ONLY. STRESSING END AND DEAD END CAN BE INTERCHANGED AS PER SITE REQUIREMENT.
  - CABLE LENGTH MENTIONED ARE FROM ANCHORAGE TO ANCHORAGE
  - JACKING FORCES GIVEN IN TABLE SHALL BE INCREASED BY RELEVANT PERCENTAGE TO ACCOUNT FOR ANCHORAGE AND JACK FRICTION & EFFICIENCY AS PER MANUFACTURER'S INSTRUCTIONS.
  - EXTENSIONS SHALL BE RECHECKED AFTER 24 HOURS AFTER ANCHORING TO OBSERVE SLOW SLIPPAGE, THE MATTER SHALL BE REPORTED FOR EXCESSIVE SLIPPAGE IF ANY
  - FOR ANY VARIATIONS IN PARAMETERS, EXPECTED ELONGATION TO BE COMPUTED AS  
(THEORETICAL ELONGATION x 140 x 1.95 x 10<sup>5</sup>)  
(ACTUAL A<sub>st</sub> x ACTUAL E<sub>s</sub>)
  - JACK FORCE SHALL BE CORRECTED FOR VARIATION IN JACK EFFICIENCY AS FOLLOWS:  
JACK FORCE =  $\frac{\text{JACK FORCE IN TABLE}}{\text{NEW JACK EFFICIENCY}}$
  - MAX. ELONGATION SHOULD NOT BE MORE THAN 1.05 X CALCULATED ELONGATION. ALSO MAX. PRESSURE SHOULD NOT BE MORE THAN 1.05 TIMES THE GAUGE PRESSURE.
  - IF THE ELONGATION AT 1.05 TIMES THE CALCULATED GAUGE PRESSURE IS LESS THAN 0.95 TIMES THE CALCULATE 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 LEAD.
    - 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 FOUND FREE.
  - IF THE ELONGATION IS NOT OBTAINED FURTHER FINISHING OPERATIONS SUCH AS CUTTING OR SEALING SHOULD NOT BE UNDERTAKEN WITHOUT THE APPROVAL OF ENGINEER-IN-CHARGE
  - APPLY 1<sup>ST</sup> STAGE PRESTRESS AFTER CAST IN-SITU CONCRETE ATTAINS A STRENGTH OF 40 MPa.
  - APPLY 2<sup>ND</sup> STAGE PRESTRESS AFTER COMPLETING LAUNCHING AND ERECTION ACTIVITIES OF SUPERSTRUCTURE BEFORE APPLICATION OF SIDL AND RAIL PLINTH.
  - THE EXTENSION VALUES SHOWN IN THE TABLE ARE FOR CABLE LENGTH BETWEEN ANCHORAGES
  - GROUTING OF CABLES SHALL BE DONE IN SAME SEQUENCE AS STRESSING AND SHALL CONFORM TO IRC:112-2011 AND ALSO TO MORT & H SPECIFICATIONS.
  - ALL ANCHORAGE PLATES ARE TO BE SET AT RIGHT ANGLES TO THE TENDON AXIS AT ANCHORAGE LOCATION.
  - AFTER THE PRESTRESSING OPERATIONS ARE COMPLETED AND PRESTRESSING STRANDS ARE CUT, THE SURFACE SHALL BE PAINTED WITH TWO COATS OF EPOXY OF SUITABLE FORMULATION HAVING A DRY FILM THICKNESS OF 80 MICRONS PER COAT ACCORDING TO TECHNICAL SPECIFICATION AND ENTIRE RECESS SHALL BE FILLED WITH CONCRETE OR NON-CRINK/ PRE-PACKAGED MORTAR OF EPOXY CONCRETE.
  - SYSTEM MANUFACTURES CERTIFICATES OF MATERIALS TESTS (NOT OLDER THAN ONE YEAR) SHALL BE OBTAINED PRIOR TO PRESTRESSING OPERATION. THIS WILL ALSO INCLUDE SATISFACTORY RESULTS OF ANCHORAGE EFFICIENCY AND LOAD TRANSFER TESTS.
  - IN CASE THERE IS ANY CONFLICT BETWEEN THE NUMBER OF TENDONS AND PROFILE OF TENDONS, THE MATTER SHALL BE IMMEDIATELY BROUGHT TO THE NOTICE OF ENGINEER-IN-CHARGE.
  - IF ANY AMBIGUITY IS FOUND IN DRAWING OR AT SITE, THE SAME SHALL BE BOUGHT TO DESIGNER'S ENGINEER'S NOTICE BEFORE EXECUTION.
  - PRESTRESSING WILL BE EFFECTED SYMMETRICALLY WITH REFERENCE TO THE VERTICAL AXIS
  - ALL DIAL GAUGES SHALL BE CALIBRATED WELL IN ADVANCE OF PRESTRESS WORK.
  - JACK EFFICIENCY TEST SHALL BE CONDUCTED AT SITE AND PRESSURE GAUGE READING ADJUSTED SUITABLY.
  - EXTRA LENGTH OF STRANDS PROJECTING BEYOND END BLOCK SHALL NOT BE CUT AFTER STRESSING PRIOR TO APPROVAL OF STRESSING OPERATIONS THESE SHALL BE CUT ONLY WHEN INSTRUCTION FOR GROUTING ARE ISSUED BY ENGINEER IN CHARGE.
  - PRESTRESSING MANUFACTURE AUTHORISED TECHNICAL REPRESENTATIVE SHALL BE REQUIRED TO SUPERVISE EVERY OPERATION RELATING TO LAYING & STRESSING & GROUTING OF PRESTRESS CABLES.
  - ALL PRESTRESSING STEEL SHALL BE SUITABLY CONNECTED TO THE UNTENSIONED REINFORCEMENT IN ORDER TO AVOID ELECTRIC CORROSION AFTER PRESTRESSING OPERATION THROUGH THE ANCHOR PLATE.
  - PROTECTION OF END ANCHORAGE WILL BE DONE AS PER GIVEN SPECIFICATION OF VIADUCT
  - ALL PRESTRESSING STEEL SHALL BE SUITABLY CONNECTED TO THE UNTENSIONED REINFORCEMENT IN ORDER TO AVOID ELECTRIC CORROSION AFTER PRESTRESSING OPERATION THROUGH THE ANCHOR PLATE.

#### LEGEND:

- CABLE MARK
- ANCHORAGE POINT
- START OF CURVED SEGMENT OF CABLE
- END OF CURVED SEGMENT OF CABLE
- POST-TENSIONED CABLES
- FUTURE PT.
- MID OF 'S' CURVED SEGMENT OF CABLE
- GROUTING AFTER STRESSING OPERATION

#### CONCEPTUAL / TENDER DRAWING

EMPLOYER :	PROJECT :
RAIL INFRASTRUCTURE DEVELOPMENT COMPANY (KARNATAKA) LIMITED	BENGALURU SUBURBAN RAILWAY PROJECT (BSRP)
GENERAL CONSULTANTS :	DRAWING TITLE :
ASCOM @egis wsp AECOM-EGIS-WSP	TYPICAL PRESTRESSING DETAILS OF PRECAST POST TENSIONED PIER CAP FOR DOUBLE TRACK
DRAWING NO. :	SCALE : AS SHOWN
Q22077-BSRP-CR4-C-VD-GEN-30-1152	PRELIMINARY DWG (P), DEFINITIVE DWG (D), CONSTRUCTION DWG (C), AS BUILT DWG (B), SHOP DWG (S), MANUFACTURED DWG (M) SHEET SIZE - A1