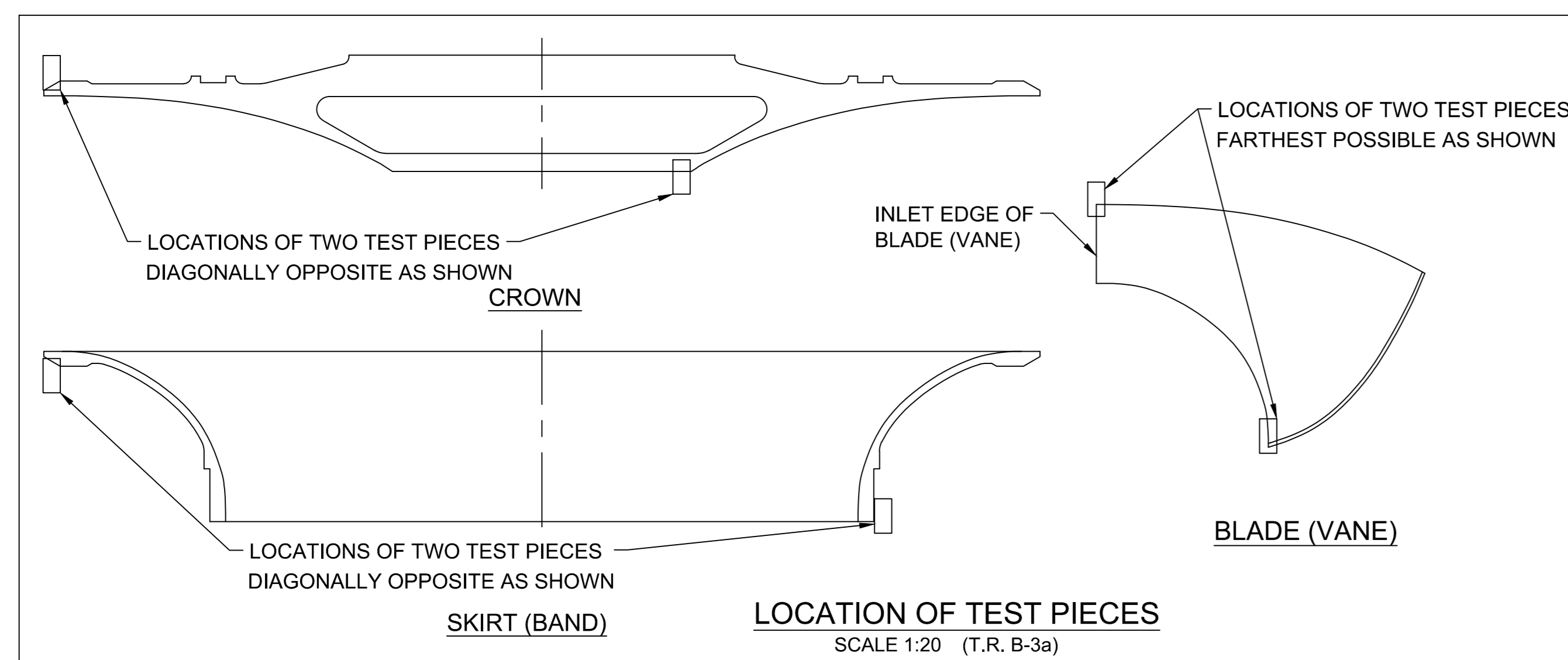


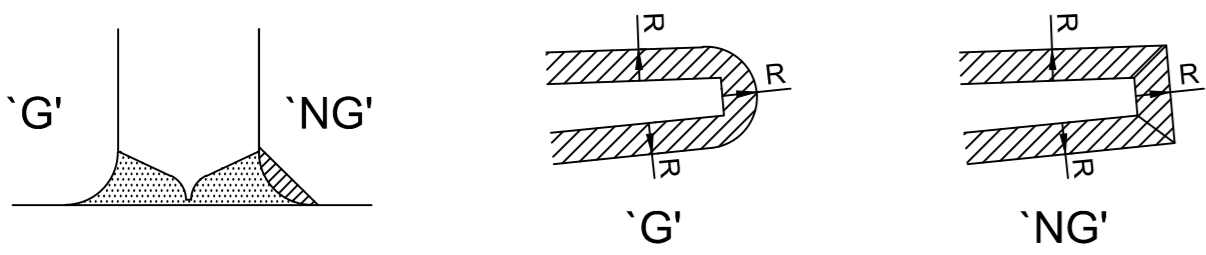
CAST FABRICATED RUNNER - ALTERNATIVE OPTION



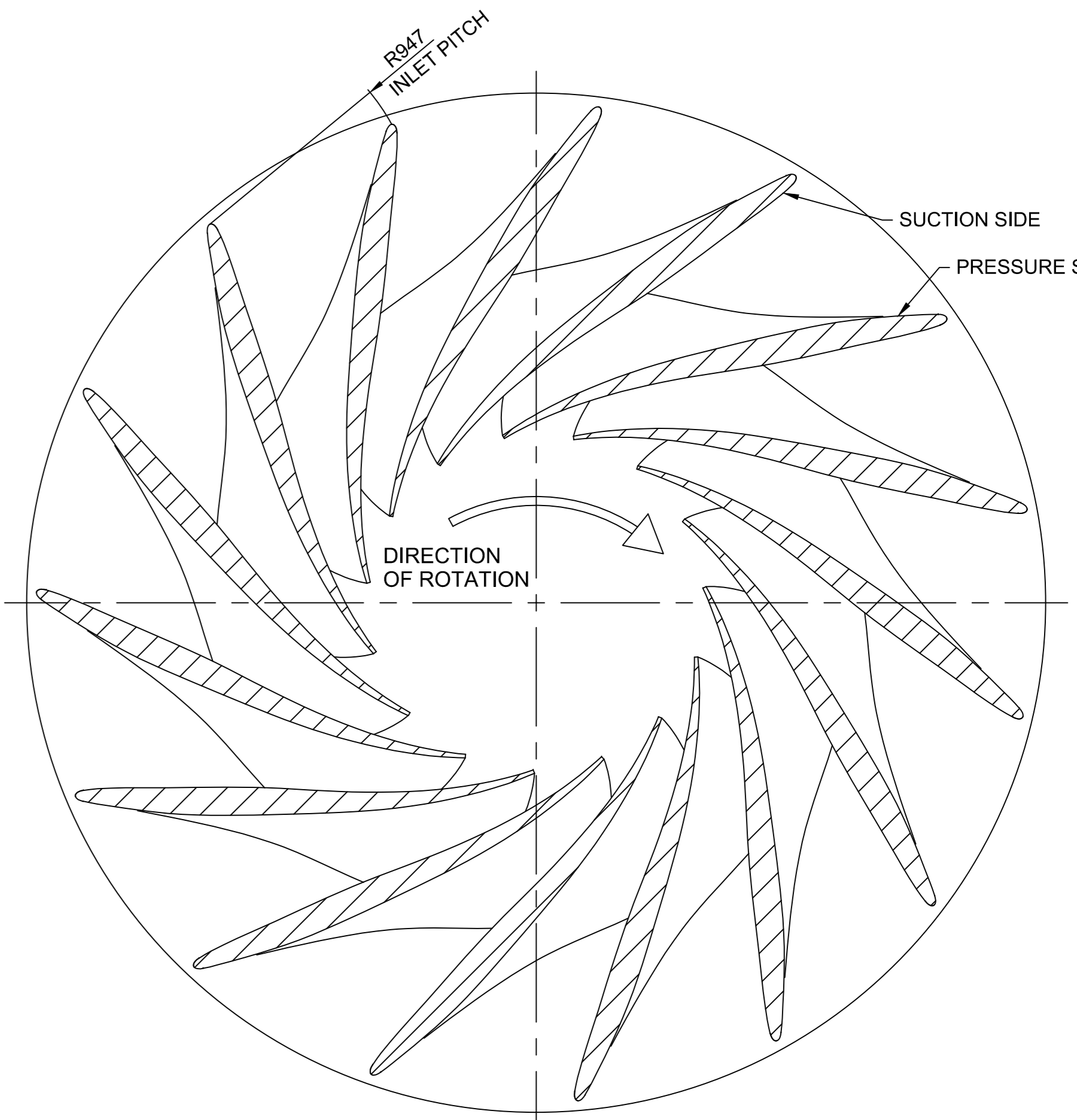
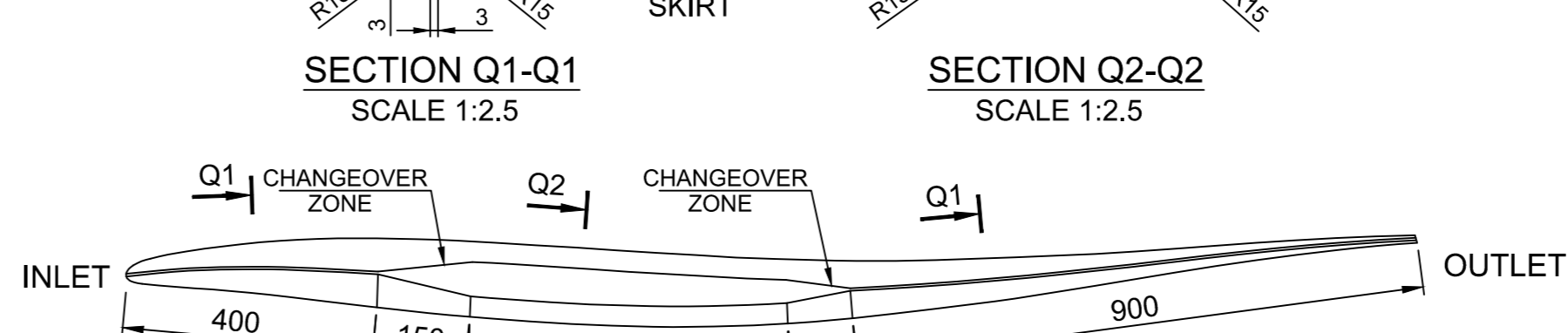
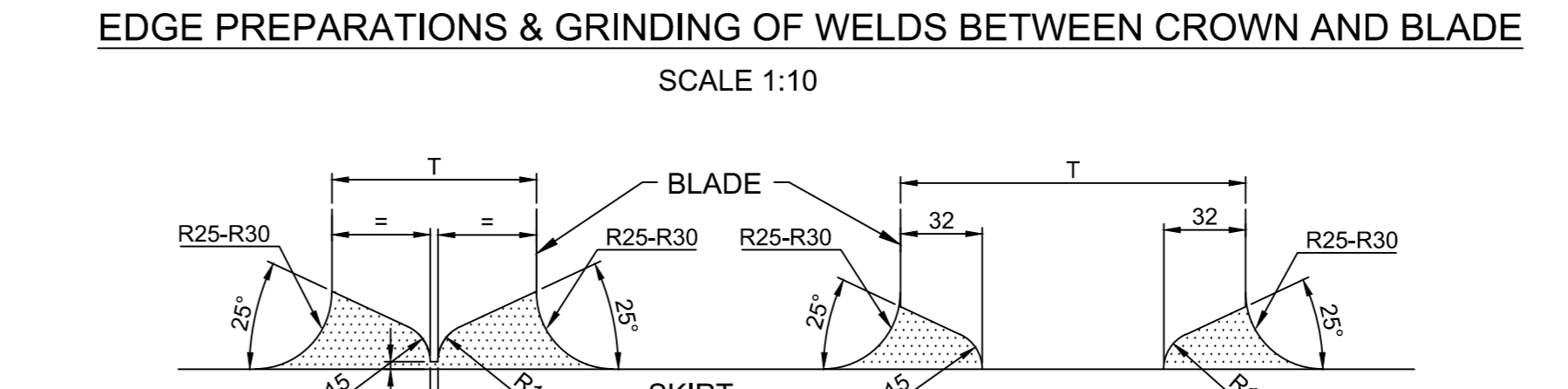
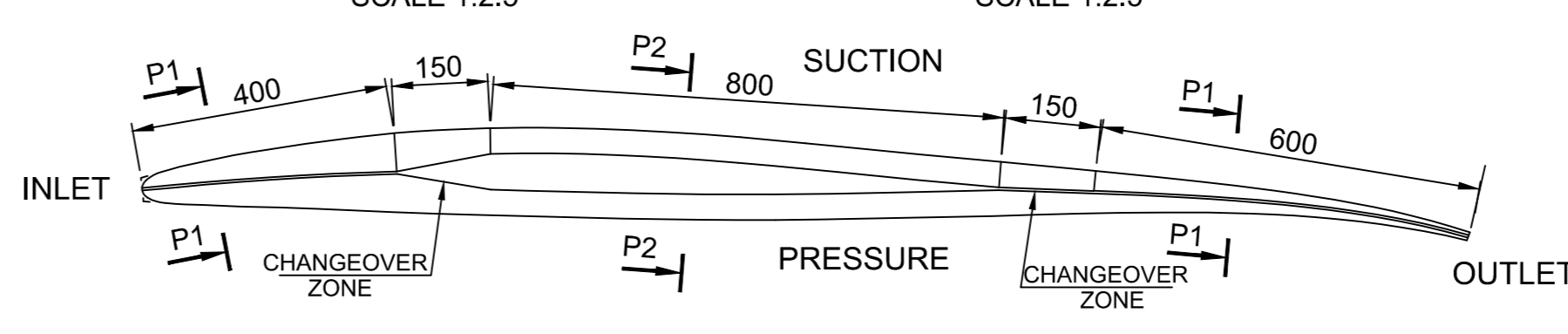
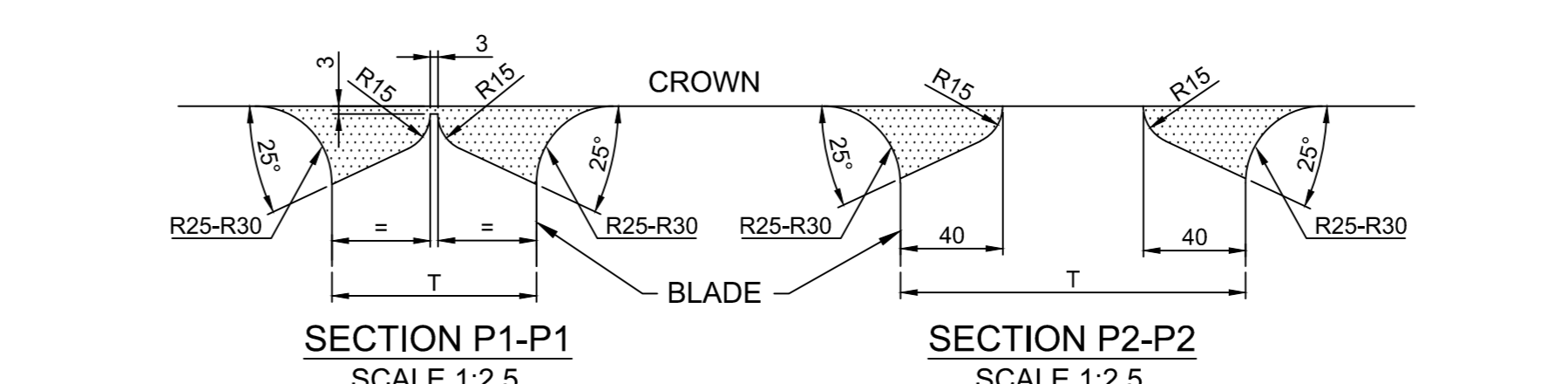
LOCATION OF TEST PIECES SCALE 1:20 (T.R. B-3a)

ADDITIONAL TECHNICAL REQUIREMENTS FOR CAST FABRICATED OPTION ONLY :-

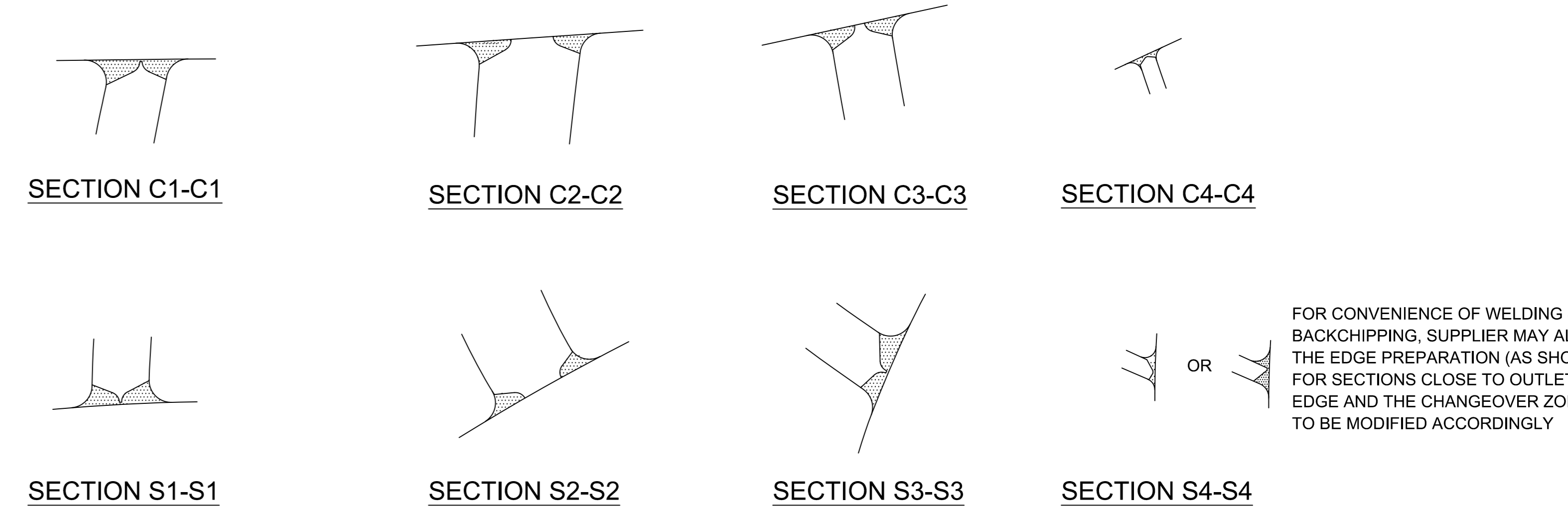
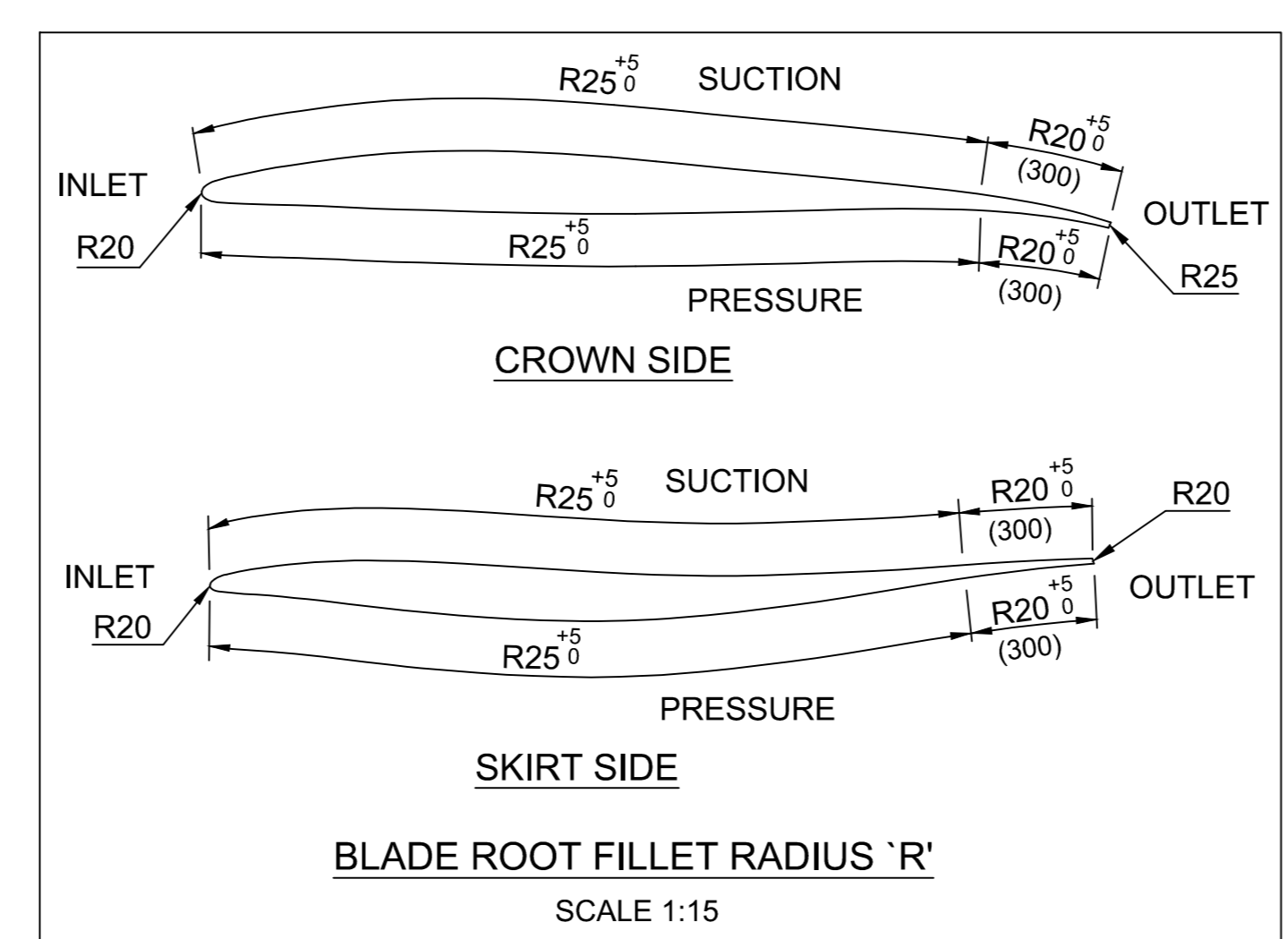
- B1. OPTIONS FOR CAST FABRICATED RUNNER :-**
- BLADES, SKIRT AND CROWN ALL CAST SEPARATELY.
 - BLADES & CROWN INTEGRALLY CAST AND SKIRT CAST SEPARATELY.
 - FROM CONSIDERATIONS OF ACCESSIBILITY FOR WELDING, BACKCHIPPING AND NON DESTRUCTIVE TESTING, SKIRT IS ALLOWED TO BE MADE IN TWO CONCENTRIC PARTS AS SHOWN. THE TWO PARTS ARE THEN TO BE FULL PENETRATION WELDED AND GROUND SMOOTH FROM INSIDE. SUPPLIER TO MENTION THE TYPE OF OPTION IN THE OFFER TO BE USED FOR CAST FABRICATED RUNNER.
- B2. ALL DIMENSIONS, MACHINING AND SURFACE FINISH AS PER SHEET 1 OF INTEGRALLY CAST RUNNER.**
- B3. NON DESTRUCTIVE EXAMINATION BEFORE WELDING**
- MATERIAL TESTING SHALL BE PERFORMED IN ACCORDANCE WITH ASTM A743. TEST COUPONS SHALL RECEIVE THE SAME HEAT TREATMENT PROCESS AS THE PRODUCT.
 - BLADES, SKIRT AND CROWN CASTINGS SHALL BE TESTED SEPARATELY AS PER T.R. A-3 OF SHEET 1.
 - MAGNETIC TEST & PENETRATION TEST SHALL BE CARRIED OUT ON THE WATER PASSAGE BOTH CROWN & SKIRT. ACCEPTANCE CRITERIA SHALL BE ACCORDING TO ASME SEC. VIII.
- B4. CENTERING / ASSEMBLY SHALL BE CARRIED OUT BY PORTIONS MARKED**
- CROWN AND SKIRT SHALL BE SET WITH REFERENCE TO MACHINED DIMENSIONS MAINTAINING THE CONCENTRICITY AND WATER PASSAGE HEIGHT AS PER DRAWING.
 - SET 15 BLADES BETWEEN THE CROWN AND SKIRT IN ACCORDANCE WITH SCRIBE LINE OF RUNNER CENTRE LINE AT BLADE INLET EDGE.
 - AFTER POSITIONING OF ALL THE BLADES, CHECK INLET PITCH AND OUTLET CLEARANCE AS PER PROFILE DRAWING AND SAMPLE INSPECTION SHEETS MENTIONED IN T.R. A-7 OF SHEET 1.
- B5. STRUCTURAL WELDING**
- WELDING SHALL BE CARRIED OUT IN ACCORDANCE WITH WPS AND PQR FOR MATERIAL GRADE CA 6NM.
 - WELDING HAVE TO BE PERFORMED SYMMETRICALLY AND EQUALLY PLACED.
 - WELDS AS PER SECTION P1-P1 AND SECTION Q1-Q1 ARE FULL PENETRATION WELDS.
 - WELDING PERFORMED LIKE 'G' TO REDUCE GRINDING WORK.
 - BLADE ROOT PORTIONS AFTER COMPLETE WELDING SHALL BE GROUND SMOOTH TO 12.5 Ra.



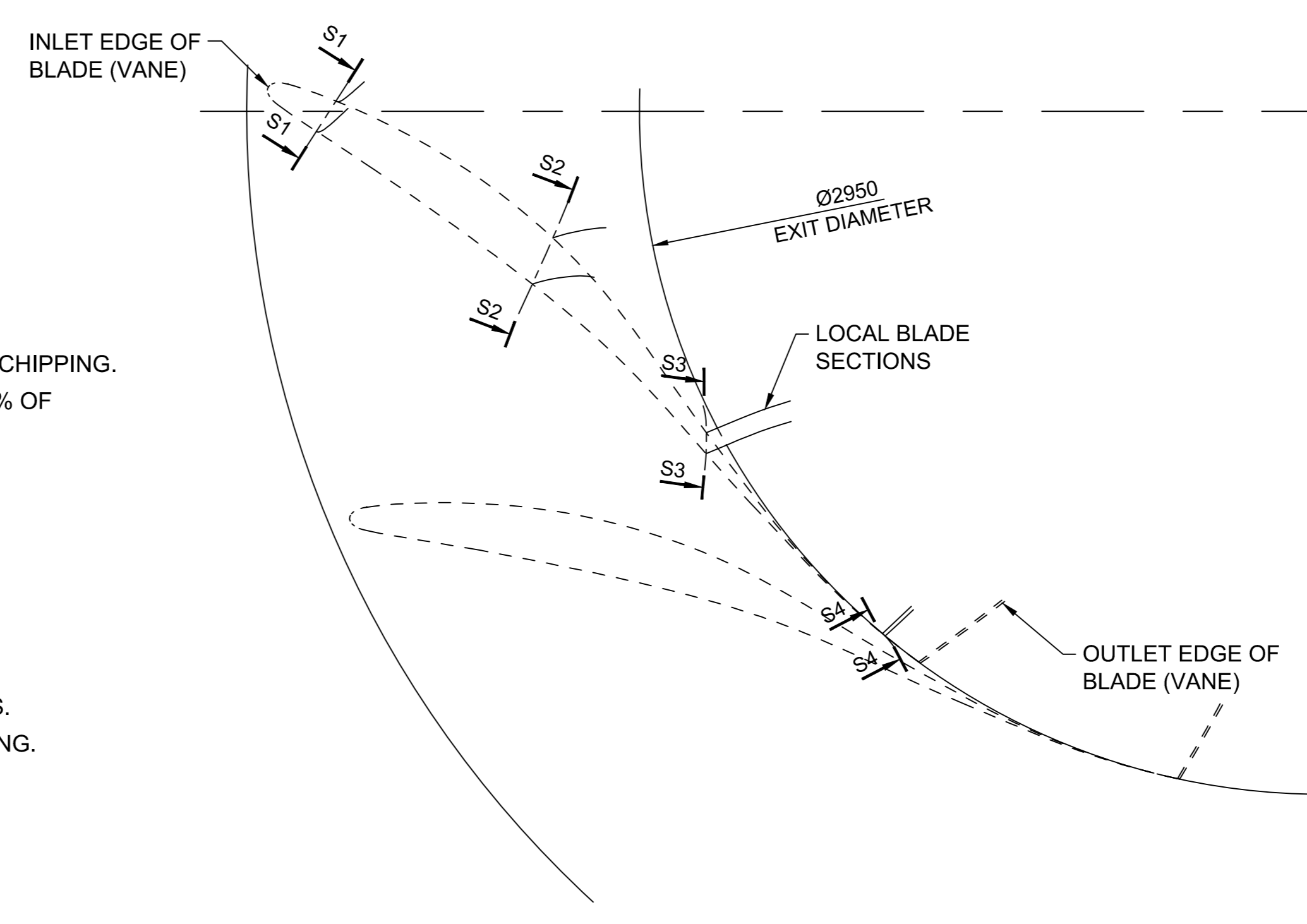
- B6. NON DESTRUCTIVE EXAMINATION AFTER STRUCTURAL WELDING FOR ALL WELD SEAM LINE.**
- FOR FULL PENETRATION WELD JOINTS, 100% PT (PENETRATION TEST) SHALL BE DONE AFTER BACK CHIPPING.
 - INTERMEDIATE INSPECTION BY MT (MAGNETIC TEST) SHALL BE CARRIED OUT AFTER COMPLETED 50% OF DEPTH OF WELDING FOR ALL WELD SEAM LINE.
 - FOR THE EXCAVATED AREA, COMPLETE REMOVAL OF DEFECT SHALL BE ENSURED BY PT.
 - 100% MT SHALL BE CARRIED FOR ALL WELD SEAM LINE AFTER FINISH GRINDING.
 - FOR FULL PENETRATION WELDS, 100% UT (ULTRASONIC TEST) SHALL BE CARRIED OUT.
 - ACCEPTANCE CRITERIA IS ACCORDING TO ASME SEC. VIII.
- B7. ROUGH MACHINING SHALL BE CARRIED OUT BEFORE STRESS RELIEVING HEAT TREATMENT.**
- B8. GRINDING**
- BLADE ROOT PORTION SHALL BE GROUND SMOOTH AS SHOWN IN DETAILS OF EDGE PREPARATIONS.
 - GRINDING FOR BLADE INLET EDGE AND OUTLET EDGE SHALL BE FINISHED BEFORE STRESS RELIEVING.
 - SURFACE FINISH AS PER T.R. A-5 OF SHEET 1 SHALL BE FINISHED BEFORE STRESS RELIEVING.
- B9. MAGNETIC TESTING SHALL BE CARRIED OUT AS PER T.R. A-6 OF SHEET 1.**
- B10. STRESS RELIEVING SHALL BE CARRIED OUT AFTER ALL WELDING WORK INCLUDING REPAIR WELDING.**
- B11. APPROXIMATE WEIGHTS**
- WEIGHT OF CROWN = 15860 kg (WITHOUT Ø100 HOLES).
 - WEIGHT OF 15 BLADES = 13000 kg.
 - WEIGHT OF SKIRT = 5300 kg.



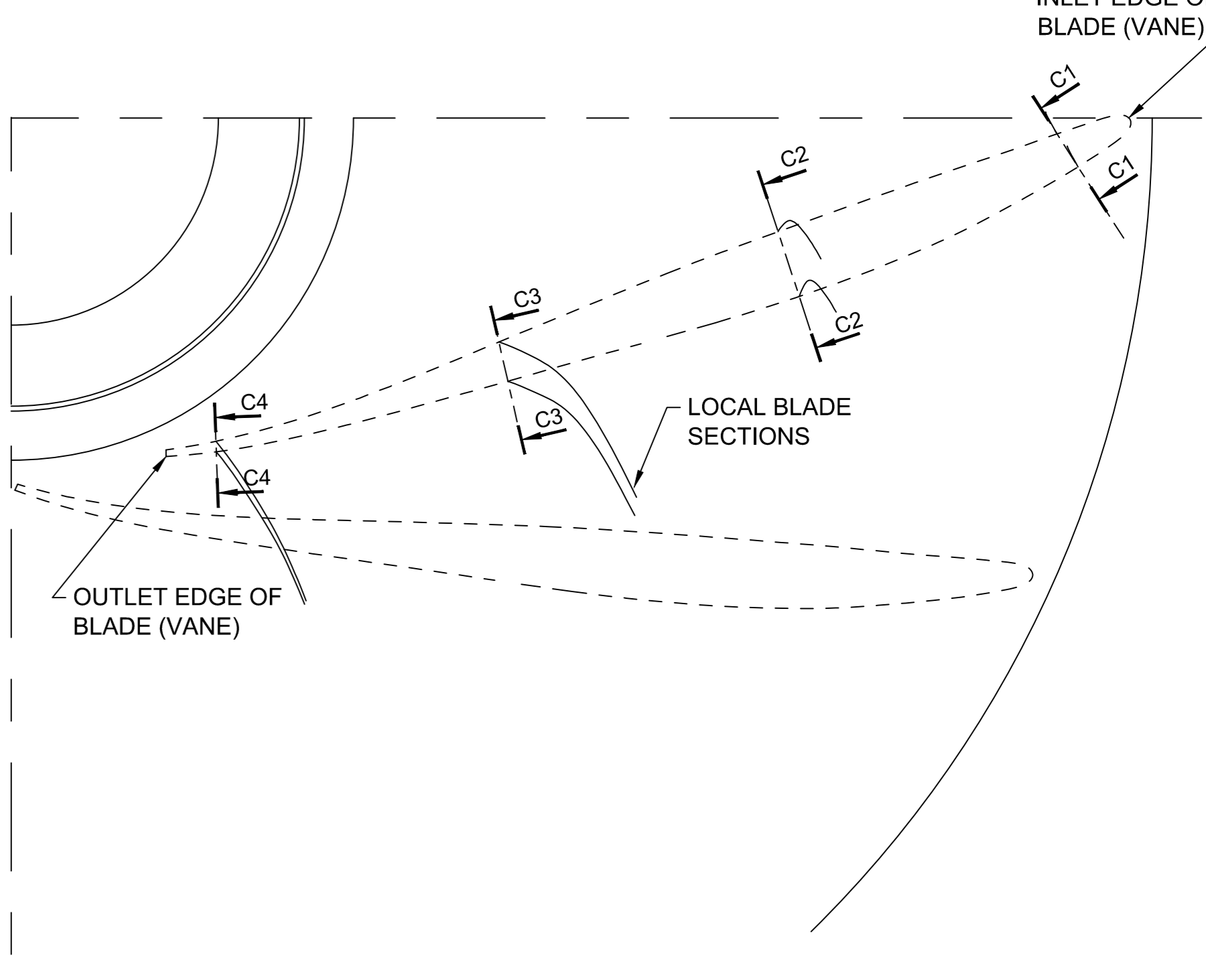
SECTION AA SCALE 1:20



FOR CONVENIENCE OF WELDING & BACKCHIPPING, SUPPLIER MAY ALTER THE EDGE PREPARATION (AS SHOWN) FOR SECTIONS CLOSE TO OUTLET EDGE AND THE CHANGEOVER ZONES TO BE MODIFIED ACCORDINGLY



INTERSECTION OF BLADE AND SKIRT SCALE 1:10



INTERSECTION OF BLADE AND CROWN SCALE 1:10

REMARKS	VAR. NO.	ITEM NO.	DESCRIPTION	DRAWING NO.	DATE	BY	CHKD.	APPD.	MATL. CODE	UNIT WT. (kg)	NO. OF
ADDITIONAL INFORMATION W.O. NO. 39022X0205 STATUS OF DRAWING U TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT 6x200 MW. V. FRANCIS TURBINE PUNATSANGCHHU-I H.E.P DISTRIBUTION OF PRINTS HTE-2 THX-1 WTM-5 NAME SIGN DATE GURPREET 24.02.12 K.PRASAD 24.02.12 K.PRASAD 24.02.12 DEPT. H.T.E. AS PER DRG. SCALE 1:5 & AS STATED T.R. B11 REF. TO ASSY.DRG. ITEM NO. 001 CODE 402 32000049014 WEIGHT(K.G.) 0 204 07 18602 NO. OF 001 TITLE RUNNER CASTING DRAWING NO. 0 204 07 18603 REV. 00 SH. NO. 2 NO. OF SH. 2											