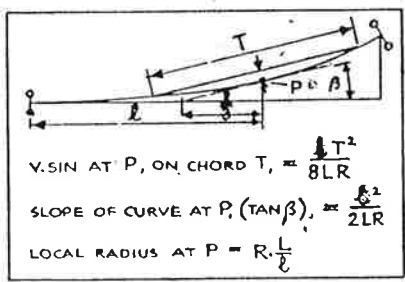


# PERMANENT WAY NOTES

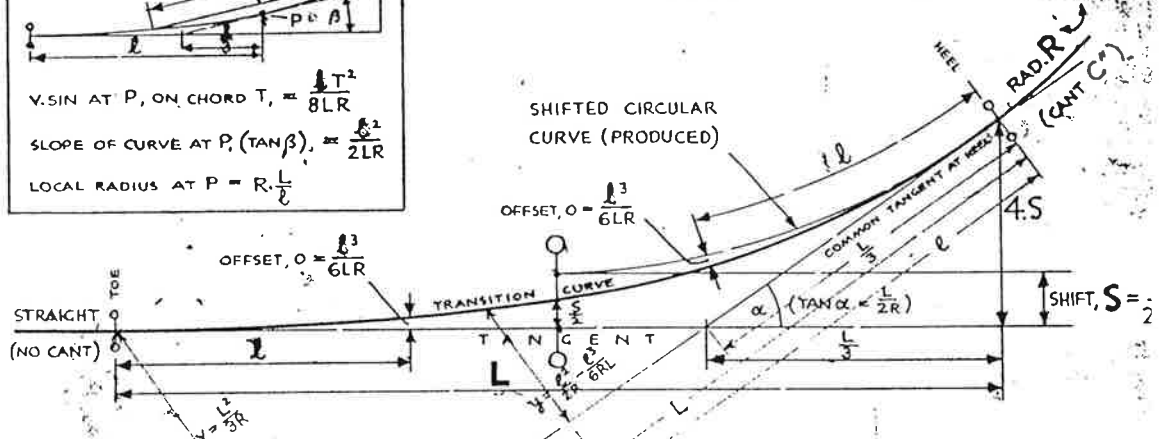
# TRANSITION CURVES

THESE NOTES ARE INTENDED FOR THE GUIDANCE AND ASSISTANCE OF STAFF ENGAGED UPON PERMANENT WAY WORK. THEY DO NOT IN ANY WAY MODIFY OR AMEND THE INSTRUCTIONS LAID DOWN IN E.D.I., STANDARD DRAWING, AND OTHER ETC., WHICH SHOULD BE REFERRED TO IN ALL CASES.

FORM OF CURVE IS USUALLY THE CUBIC PARABOLA (SHOWN BELOW) SET OUT BY RECTANGULAR OFFSET OFF THE TANGENT (RANGED BY THEODOLITE) FROM THE TOE OF THE TRANSITION TO ITS MID-POINT, AND BY RADIAL OFFSETS OFF THE SHIFTED CURVE FROM THE HEEL OF THE TRANSITION TO ITS MID-POINT.



## FORMULAE ETC.



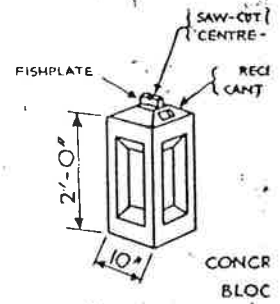
**LENGTH OF TRANSITION,  $L = C \times D$**  ... WHERE  $C =$  CANT ON CIRCULAR CURVE (IN INS.)  
 $D =$  DISTANCE (IN FT.) TO RUN UP 1" OF  $C$

FOR OVER 65 M.P.H. ...  $D = 120$  FT.  
 FROM 50-65 M.P.H. ...  $D = 90$  FT.  
 UP TO 50 M.P.H. ...  $D = 66$  FT.  
 IN EXCEPTIONAL CASES  $D = 40$  FT.

E.D.I. § 239  
 E.D.I. § 244.  
 (INTERMEDIATE VALUES MAY BE USED WHEN NECESSARY)

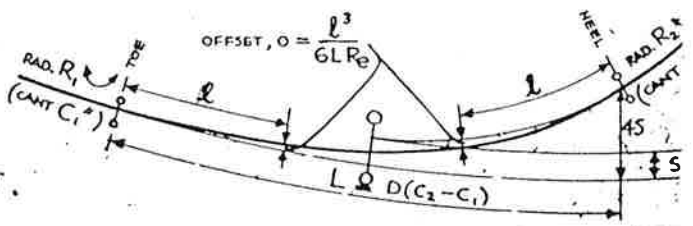
THE **SHIFT, S**, CAN VARY CONSIDERABLY WITH DIFFERENT COMBINATIONS OF CURVE AND CANT, BUT AMOUNTS TOO SMALL TO MAKE A TRANSITION WORTH WHILE (SAY LESS THAN  $\frac{1}{4}$ "); TO SEVERAL FEET. TO FACILITATE QUICK EVALUATIONS OF THE FORMULA,  $S = \frac{L^2}{24R}$ , THE GRADE ON SHEET R.1773 "TRANSITION CURVES (2)" SHOULD BE USED.

**CONCRETE BLOCKS** ALL SUCH TRANSITIONS SHOULD BE MARKED ON THE GROUND IMMEDIATELY AFTER SETTING OUT, WITH PERMANENT CONCRETE BLOCKS, AT INTERVALS CORRESPONDING TO  $\frac{1}{2}$ " INCREMENTS OF CANT ( $\frac{1}{4}$ " IF THE RUN-UP IS FLAT) INDICATING THE CENTRE-LINE AND CORRECT CANT AT EACH POINT. (E.D.I. § 238 & 242).



DETAILS OF NEW TRANSITIONS IN CONNECTION WITH CURVE REALIGNMENTS MUST BE SENT TO THE CHIEF ENGINEER, IN THE PRESCRIBED FORM (CIRC. NO 9/283 13-12-34)

**SIMILAR CURVES** A TRANSITION FROM A FLAT CURVE OF RADIUS  $R_1$  TO A SHARPER CURVE OF RADIUS  $R_2$  MAY BE CALCULATED BY USING THE "EQUIVALENT RADIUS"  $R_e = \frac{R_1 R_2}{R_1 - R_2}$  IN PLACE OF  $R$  IN THE FORMULAE ABOVE. THE OFFSETS ARE SET OUT, RADially, OFF THE FLATTER CURVE FROM THE TOE OF THE TRANSITION TO ITS MID-POINT; AND OFF THE SHARPER CURVE FROM THE HEEL OF THE TRANSITION TO ITS MID-POINT. THE LENGTH OF TRANSITION,  $L = D \times \text{DIFF. OF CANT (IN INS.)}$ . N.B. A TRANSITION BETWEEN CURVE AND CURVE (OR STRAIGHT AND CURVE) IS GENERALLY UNNECESSARY WHEN THE SHIFT IS LESS THAN  $\frac{1}{4}$ ".



**REVERSE CURVES** TRANSITIONS BETWEEN REVERSE CURVES MAY BE SET OUT TOE-TO-TOE, WITHOUT A LENGTH OF STRAIGHT BETWEEN THEM, PROVIDED  $D$  IS MADE SAME FOR BOTH AND LEVELS ARE SET. ENSURE AN UNBROKEN GRADIENT ON EACH RAIL. (SEE SKETCH ON LEFT) ELEVATION THROUGH REVERSE CURV...

