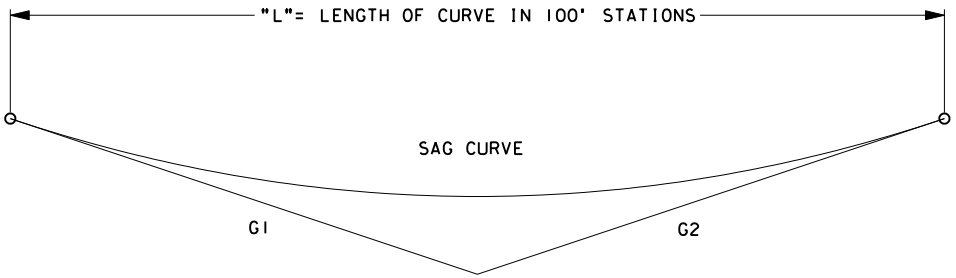

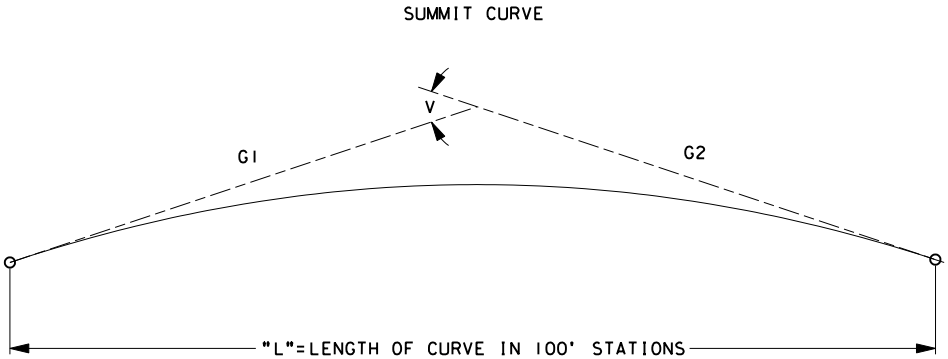

$$V/L = \frac{|(G2-G1)|}{L}$$

G1 AND G2 DESIGNATE GRADES IN PERCENT.
L=LENGTH OF CURVE IN 100' STATIONS.
V=ALGEBRAIC DIFFERENCE IN GRADES IN PERCENT(G2-G1)
V/L=AVERAGE CHANGE IN GRADIENT PER 100' STATION.
TO DETERMINE LENGTH (L). DIVIDE V BY THE DESIRED V/L
ROUND UP THE RESULT TO THE NEAREST 100' STATION.

EXAMPLES:
GIVEN G1=1.05 AND G2=-0.71 V=(-.71)-(1.05)=1.76%
GIVEN V/L=.10 L=-1.76/.10=17.6' STATION.
VERTICAL CURVE LENGTH=1800' (ROUNDED UP).

TRACK	MAXIMUM V/L	
	SAG	SUMMIT
ALL MAIN TRACKS	0.06	0.10
BRANCH TRACK SPEEDS 40 MPH AND GREATER	0.06	0.10
BRANCH TRACK SPEEDS UNDER 40 MPH	0.12	0.20
YARD TRACKS	0.40	0.80
INDUSTRIAL LEADS	0.60	1.00
INDUSTRY TRACK	1.20	2.00

NOTES:
VERTICAL CURVES SHALL NOT FALL WITHIN THE LIMITS OF HORIZONTAL CURVES OR TURNOUTS UNLESS AUTHORIZED BY THE CHIEF ENGINEER.

UNION PACIFIC RAILROAD
ENGINEERING STANDARDS

VERTICAL CURVE DESIGN

ADOPTED: DEC. 31, 1996
REVISED:
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STD DWG
0016

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