STRINGLINING OF RAILROAD CURVES

1995 ROADMASTERS & MAINTENANCE OF WAY ASSOCIATION

COMMITTEE REPORT

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In this age of automatic tampers, computers, geometry cars and, of course, reduced forces, why bother teaching the traditional methods of stringlining? The answer to that question is that the traditional methods of stringlining will allow the practitioner to rapidly field determine curvature and, if necessary, line track with low-tech hardware.

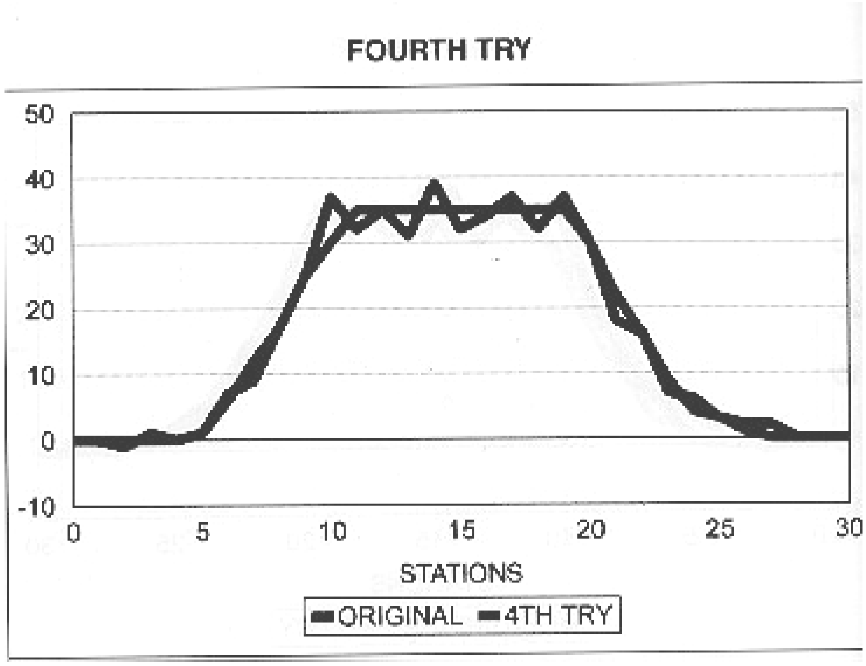
Railroad track is a dynamic structure, and there are many causes of its movement from design alignment to one of irregular alignment, particularly on curves. Train operations impart forces to the track structure, which, over time, tend to change the alignment. Our predecessors who discovered that as speeds increased, the alignment entering and leaving simple curves became distorted recognized this early, which in turn lead to the development of transition curves between the tangents and simple curves and spirals.

However, even with perfectly designed curves with the correct superelevation and spiral length for the associated curvature and track speed, lateral forces will still occur as not every train will be operating at design speed. Running traffic at an unbalanced condition is a compensation for this, but lateral forces will still be imparted to the track related to directional tonnage, grades and current of traffic operation.

Therefore, alignment should be expected to change or deteriorate as time goes by through normal operations, eventually requiring surfacing and lining. Compounding the above, there exist locations not blessed with perfectly designed or constructed subgrades, which for various reasons, poor original location, poorly constructed fill, slides or high water, the alignment changes.

Another type of track instability relates to thermal expansion and contraction, primarily the dreaded sun-kink, which can make the alignment most irregular, possibly leading to catastrophic results. Less dramatic changes in alignment will occur also, as I am sure most of you have seen curves gradually shift in and out during the different seasons, especially where insufficient ballast exists.

Another cause of irregular curve alignment, or at least alignment different from what was originally designed, is previous lining. Years of smoothing and surfacing without staking will result in a curve that while perhaps not particularly bad looking or poor riding might be off alignment. Likewise, normal maintenance operations, such as tie



STATION	MID-ORDINATE	REVISED M.O. (4TH TRY)	ERROR (B-C)	SUM OF ERRORS	HALF-THROW	THROW
1	0	0	0	0	0	0
2	-1	0	-1	-1	0	0
3	1	0	1	0	-1	-2
4	0	0	0	0	-1	-2
5	1	1	0	0	-1	-2
6	7	8	1	1	-1	-2
7	9	12	-3	-2	0	0
8	17	17	0	-2	-2	-4
9	25	23	2	0	-4	-8
10	37	30	7	7	-4	-8
11	32	35	-3	4	3	8
12	35	35	0	4	7	14
13	31	35	-4	0	11	22
14	39	35	4	4	11	22
15	32	35	-3	1	15	30
16	34	35	-1	0	16	32
17	37	35	2	2	16	32
18	32	35	-3	-1	18	36
19	37	35	2	1	17	34
20	30	30	0	1	18	36
21	18	22	-4	-3	19	38
22	16	16	0	-3	16	32
23	7	9	-2	-5	13	26
24	6	4	2	-3	8	16
25	3	3	0	-3	2	4
26	2	1	1	-2	0	0
27	2	0	2	0	0	0
28	0	0	0	0	0	0
29	0	0	0	0	0	0
30	0	0	0	0	0	0
TOTALS	489	489	0			