

constrained shape. The strip will naturally avoid any concentration of bending and will assume a shape in which the bend is as uniform

as possible. In each of the four cases shown here this shape is a sine-generated curve and indeed a good model of a river meander.

was clearly steeper than that in the straight reach; moreover, the water-surface profile of the meandering reach was nearly a straight sloping line, whereas the straight reach had a stepped profile, steep over the riffle bars and comparatively flat over the intervening pools.

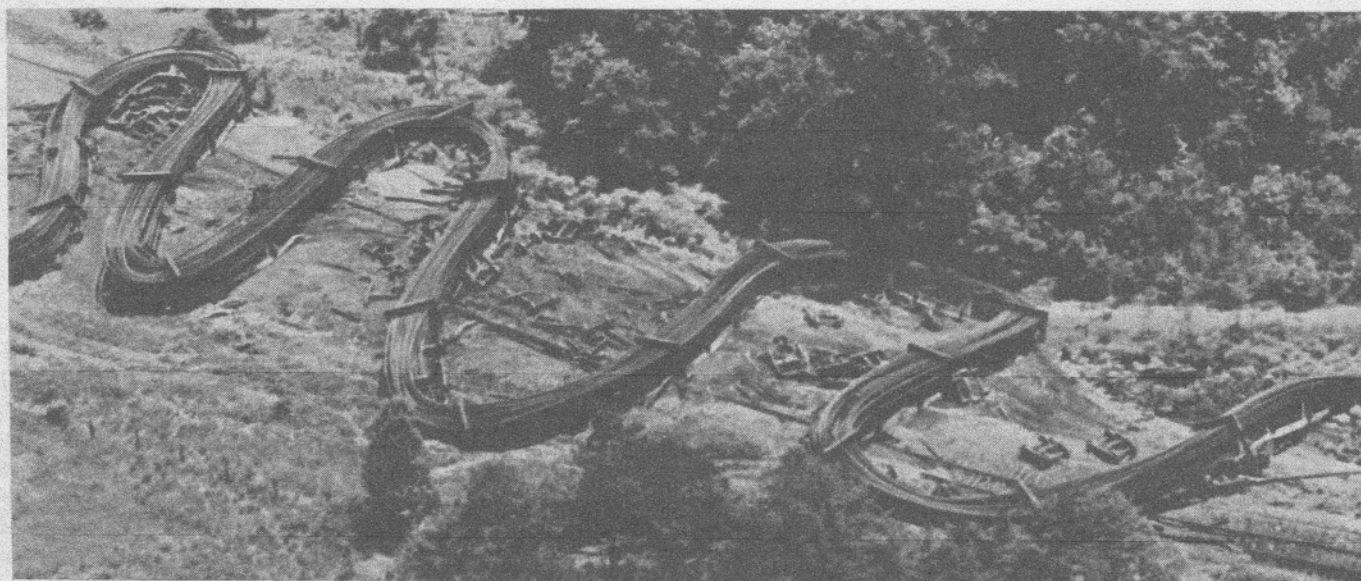
What did this mean? It was as if the

river had, to use somewhat anthropomorphic terms, chosen to cut a meander curve in order to achieve a more uniform water-surface profile. This suggested that the river had chosen the curved path in order to achieve the objective of uniform energy loss for each unit of distance along the channel, but had paid a price in terms of the

larger total energy loss inherent in a curved path.

#### Conclusions

These data provided the key to further research, which ultimately resulted in several conclusions. First, it appears that a meandering channel more



**CATASTROPHIC EXAMPLE** of a sine-generated curve on a much larger scale was provided by the wreck of a Southern Railway freight train near Greenville, S.C., on May 31, 1965. Thirty adjacent flatcars carried as their load 700-foot sections of track rails chained in a bundle to the car beds. The train, pulled by five locomotives, collided with a bulldozer and was derailed. The violent

compressive strain folded the trainload of rails into the drastically foreshortened configuration shown in this aerial photograph. The elastic properties of the steel rails tended to minimize total bending exactly as in the case of the spring-steel strip shown at top of these two pages, and the wrecked train assumed the shape of a sine-generated curve that distributed the bending as uniformly as possible.