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On the existence and construction of bounded curvature paths in narrow roadways

General experience shows that narrower roadways are harder to traverse for vehicles with a bounded turning radius. One way to quantify this is to establish a sharp width threshold τ such that

(i) every roadway of width at least τ (independent of its layout) is guaranteed to have a unit curvature-bounded traversal, and

(ii) for any width $w < \tau$ there exist roadways of width w that admit no such traversal.

I will discuss the threshold τ, extremal roadways, and related questions: if a given roadway has width less than τ, how hard is it to determine its traversibility; if a traversal exists, how hard is it to construct? Applications to cutting logs (as opposed to log-factors) will also be mentioned.