

6. Curved Horizontal Alignment.

a. General.

- 1) Horizontal curves for sewer pipelines can only be used when a “must fit” situation occurs and the alignment is approved by WSSC during the preliminary design phase.

b. Sewers 24-inch and Smaller Diameter.

- 1) Design with straight alignment (no curves) between manholes.

c. Sewers 27-inch and Larger Diameter.

- 1) Design with straight alignment between manholes, unless the alignment can be designed with a horizontal curve, in accordance with the following criteria:

- a) The pipe in a horizontal curve must be RCP, PVC Closed Profile, PVC AWWA C905 or DIP.
- b) Set the curved alignment and determine the pipe material to be specified.
- c) After determining the curved alignment, provide data and computations on the curved pipe. For RCP, include recommendations for the design of the pipe joint from the manufacturer.

- 2) Allowable Pipe Material for Horizontal Curved Alignments.

a) Design Using RCP.

- (1) For RCP minimum design radius, see Table "10". This is based on twelve (12) foot lengths of straight pipe with a 3/8-inch joint opening. (For design purposes, the joint opening in Table "10" is based on eighty (80%) percent of the allowable joint opening in accordance with the Specifications.)

TABLE "10"

Minimum Curve Radius for 27-inch and Larger RCP Sewer Pipelines

Pipe Size	Minimum Radius	Pipe Size	Minimum Radius
27-inch	1072 feet	48-inch	1856 feet
30-inch	1184 feet	54-inch	2080 feet
33-inch	1296 feet	60-inch	2304 feet
36-inch	1408 feet	66-inch	2528 feet
42-inch	1632 feet	72-inch	2752 feet

- (2) RCP can be designed along a curved alignment without joint openings by using beveled or mitered joints. (i.e., using only the joint deflection of the bevel or miter and not allowing the opening of the joint). Angling the joints makes the curve.

- (a) The maximum angle allowed by WSSC is three (3°) degrees or less per bevel joint. Verify with the pipe manufacturer before designing the alignment.

- (b) To determine the allowable radius, contact the pipe manufacturer for pipe lengths. Using the longest pipe length provided by each pipe manufacturer and three (3°) degrees or less



per bevel joint, determine the minimum allowable radius, see Formula "A", in Part One, Section 13 (Allowable Joint Deflections).

- (3) Consider the following prior to designing the curved pipeline alignment for RCP: availability and cost of manufacturing beveled joint versus straight pipe; hydraulic limitations, if any; and constructability (trenching, sheeting, pipe laying, etc.).
 - b) Design Using DIP or PVC AWWA C905. For design guidelines using joint deflections, see Part One, Section 13 (Allowable Joint Deflections).
 - c) Design Using PVC Closed Profile. The minimum allowable radius for PVC Closed Profile pipe is 372 feet. This is based on WSSC maximum allowable joint deflection for PVC Closed Profile pipe, which is two (2°) degrees, and a pipe length of thirteen (13) feet. Verify with the pipe manufacturer before designing the alignment.

