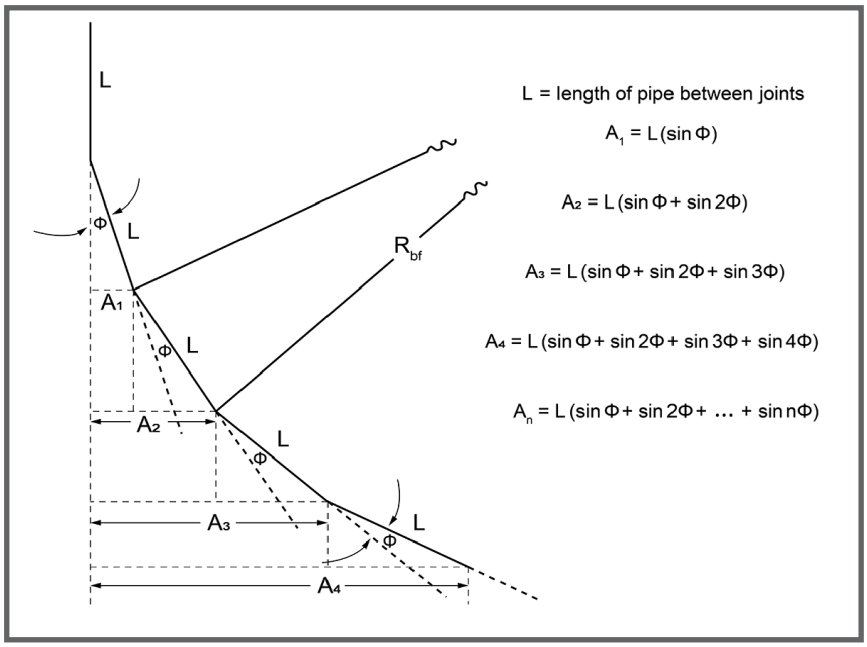
CHANGING DIRECTION: AXIAL JOINT DEFLECTION EXPLAINED

To achieve a change in direction (vertical, horizontal, or a combination of both), one method is axial deflection of the gasketed pipe joints. This is appropriate where gradual changes in direction are planned without bending the pipe barrel. The Uni-Bell *Handbook of PVC Pipe*, sixth edition, covers this subject in Chapter 8, section 8.3.2.

Axial joint deflection can be explained using the figure and equations below and a link to several spreadsheets.

DESIGN CONSIDERATIONS

- Allowable deflection angle, Φ (degrees) – the angle varies by manufacturer and pipe size. The designer/installer needs to verify the allowable angle (which is found on the print line) for the pipe to be used.
- Lay length, L (feet) – typically, PVC pressure pipe lay length is 20 feet. However, shorter lengths of pipe can be used to achieve a tighter curvee.
- Offset, A (feet)
  - For 1°, A = 0.350 feet = 4.2 inches at the end of a 20-foot length of pipe
  - For 1°, A = 0.175 feet = 2.1 inches at the end of a 10-foot length of pipe
- Radius of curvature, R_{bf} (feet) = 57.3 L / Φ
- Slope (%) – vertical direction change of 1° is equivalent to change in slope of 1.75%.



DESIGN

The design process is simple: the number of deflected joints required is equal to the desired angular change in direction divided by the allowable angular deflection per joint. For example, to turn an angle of 12°, it would take:

- 12 joints deflected 1° per joint, or
- 8 joints deflected 1.5° per joint, or
- 6 joints deflected 2° per joint, etc.

The geometry of the pipeline curve depends on the allowable deflection at each joint and the length between joints. Two parameters are in play:

- The shorter the distance between joints, the quicker the change in direction
- The larger the allowable angle at each joint, the quicker the change in direction

Click here to access "Joint Deflection Design Aid." **Click here** for "Joint Deflection Offset Tables."

References: "Handbook of PVC Pipe Design & Construction," Uni-Bell PVC Pipe Association