**Generalized Culvert Layout Procedure**

Asymmetrical wing walls are shown. However, wing walls may be symmetrical.

The length and parapet offsets will be calculated first. Generally the parapet offsets are equal. Determine the lengths of the wings such that the normal roadway slope intersects the ends of the structure at a minimum of 1' above the top of culvert at the centerline of the culvert.

Wing lengths can vary due to elevation differences.

At each corner of the structure a wingwall layout will be needed. First, select a wing angle and make an initial guess at a wing length. Using these parameters, determine the station of the wing tip. Determine the headwall offset and the roadway fill slope. Using the wing tip elevation, calculate the edge of stream operation for the edge of the stream. Compare this to the actual elevation of the edge of stream. Repeat this procedure using different wing lengths until the computed edge of stream elevation equals the actual elevation of the edge of stream. Repeat this procedure for the other wing walls.

Lengths 1B, 2B, 3B, and 4B may need to be adjusted by actual field measurements.

Angle {2 + 3 + 4} = 90° - Wing Angle

Length 1A = Wing Length x Sin (Wing 1 Angle) (Same for other wings)

Length 1B = Wing Length x Sin (Wing 2 Angle) (Same for other wings)

Length 2A, 2B, 3B, and 4B are usually assumed to be 2:1.

*Parapet Walls Perpendicular to Stream*
Culvert Layout Procedure
Skewed Culverts

Generalized Culvert Layout Procedure

Asymmetrical Wing Walls are shown. However, wing walls may be symmetrical.

The length and parapet offsets will be calculated first. Determine the length of culvert needed such that the normal roadway slopes intersect the edge of the stream. At each corner of the structure a wing wall layout will be needed. First select a wing angle and make an initial guess at a wing length. Using these parameters, determine the station of the wing tip. For arch shapes, assume the top of the culvert elevation at the controlling corner is equal to the top of the culvert at the centerline. In this drawing the controlling corner is located at Parapet Offset 4, and Parapet Offset 4, for arch shapes, assume the top of the culvert elevation at the controlling corner is equal to the top of the culvert at the centerline.

At each corner of the structure a wing wall layout will be needed. First select a wing angle and make an initial guess at a wing length. Using these parameters, determine the station of the wing tip. Calculate the wing length based on the computed elevation of the wing tip using the shoulder elevation, Length 1A, and Parapet Offset 1 and the roadway fill slope. Using the computed length and Parapet Offset 1, calculate an elevation for the edge of the stream. Compare this to the actual elevation of the edge of stream. Repeat this procedure using different wing lengths until the computed edge of stream elevation is less than or equal to the actual edge of stream elevation. Repeat this procedure for the other wing walls.

Lengths 1B, 2B, 3B, & 4B may need to be adjusted by actual field measurements.

Angles 1, 3 = 90° - Culvert Skew - Wing Angle

Angles 2, 4 = 90° + Wing Angle + Culvert Skew

Length 1A = Wing Length x Sin (Wing 1 Angle) (Same for other wings)

Length 1B = Wing Length x Sin (Wing 2 Angle) (Same for other wings)

Slopes 1B, 2B, 3B & 4B are usually assumed to be 2:1.

Skewed Culverts
Culvert Layout Procedure

It is important to note that long 3-sided culverts may have a slope. Short 3-sided culverts are generally level along their length. However, long 3-sided culverts may have a slope.

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