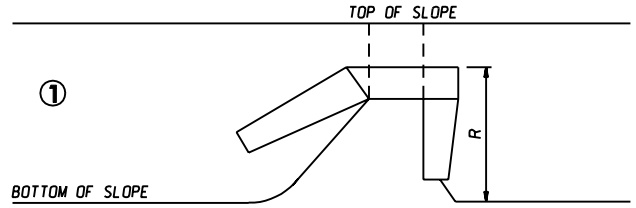
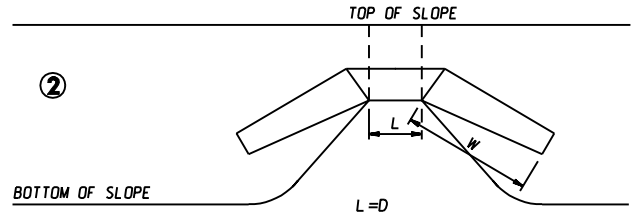


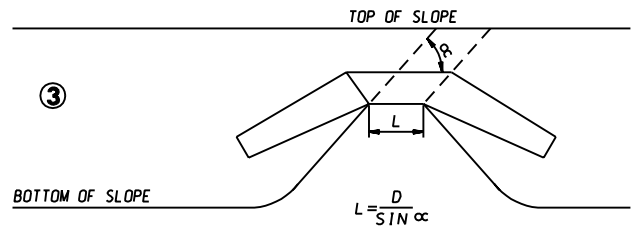
CASE ①. STANDARD TYPE "F" ENDWALL



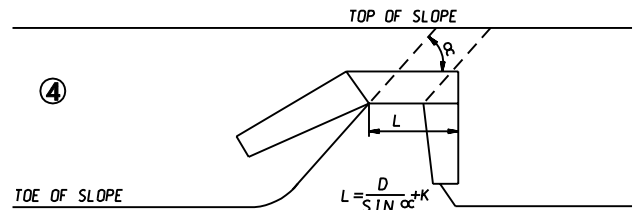
CASE ②. WHEN A WATER COURSE IS PERPENDICULAR OR ASKEW TO THE \mathcal{C} , AND THE SIDE DITCH DRAINAGE IS IN BOTH DIRECTIONS AND IT IS MORE ECONOMICAL OR BETTER PRACTICE TO PLACE THE PIPE AT RIGHT ANGLES TO THE \mathcal{C} , THE "F" ENDWALL CAN BE USED BY MAKING THE SHORTER WING EQUAL IN LENGTH AND ANGLE TO THE LONGER WING.



CASE ③. WHEN THE DRAINAGE CONDITIONS ARE SIMILAR TO CASE 2 BUT IT IS DESIRED TO PLACE THE PIPE ASKEW, THE "F" ENDWALL CAN BE USED. THE WINGS WILL BE PLACED THE SAME AS IN CASE 2, BUT THE LENGTH OF THE HEADWALL WILL BE INCREASED DUE TO THE INCREASED AREA OF THE PIPE.

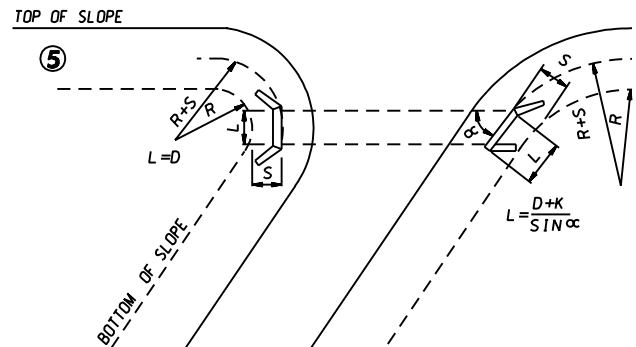


CASE ④. WHEN A PIPE IS PLACED ASKEW TO FOLLOW THE NATURAL WATER COURSE AND THE SIDE DITCH DRAINAGE IS IN ONE DIRECTION, THE "F" ENDWALL WILL BE USED WITH THE EXCEPTION THAT THE HEADWALL WILL BE LENGTHENED DUE TO THE INCREASED AREA OF THE PIPE.



CASE ⑤. WHEN AN ASKEWED ROAD OR ENTRANCE INTERSECTS THE MAIN LINE AND THE DRAINAGE IS PARALLEL TO THE MAIN LINE AND INTERSECTING ROAD OR ENTRANCE, THE "F" ENDWALL CAN BE USED AS FOLLOWS:

A. DETERMINE DIRECTION OF PIPE. B. COMPUTE "S", THEN A LINE WHICH IS PERPENDICULAR TO THE \mathcal{C} OF THE PIPE AND TANGENT TO THE ARC WHOSE RADIUS IS $R + S$ DETERMINES THE LOCATION OF THE HEADWALL. THE LENGTH OF THE WINGWALLS IS STANDARD BUT THE ANGLE IS SUCH, THAT THE END OF THE WINGWALL IS 6" FROM THE TOE OF THE SLOPE, AS SHOWN. "S" IS COMPUTED IN LIKE MANNER, AND THE LOCATION OF THE HEADWALL IS THE INTERSECTION OF THE ARC $R + S$, AND THE \mathcal{C} OF THE PIPE. THE WINGS ARE LOCATED AS DESCRIBED ABOVE, OR AS SHOWN.



SPECIFICATION	CATEGORY CODE ITEMS
APPROVED	<i>Kirk G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT
	APPROVAL • SHA REVISIONS
	APPROVAL 1-26-72
	REVISED 10-1-01
	REVISED
APPROVAL • FEDERAL HIGHWAY ADMINISTRATION	APPROVAL 3-23-56
REVISED	REVISED
REVISED	REVISED

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
 STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

STANDARD TYPE F ENDWALL MODIFICATIONS

STANDARD NO. MD 358.03