

VIRGINIA DEPARTMENT OF TRANSPORTATION

LOCATION AND DESIGN DIVISION

DRAINAGE DESIGN MEMORANDUM

GENERAL SUBJECT: MINOR STRUCTURE EXCAVATION	NUMBER: DDM 3.1
SPECIFIC SUBJECT: Measurement of Excavation for Pipe and Box Culverts and Appurtenances	Date: September 1, 2005
	SUPERSEDES: DDM3 & IIM-LD-91 (D) 71.8
ADMINISTRATOR APPROVAL: <i>R. T. Mills</i> State Hydraulics Engineer	

POLICY

- Quantities for minor structure excavation will be computed for pipes and box culverts with a diameter or span of 48 inch and larger. For multiple pipe installations, the span is measured between the interiors of the outside walls of the outer most pipes and is measured along a line perpendicular to the barrel of the pipe. Minor structure excavation will be computed to a point 18 inches outside the periphery of the barrel section, or to a point bound by vertical planes coincident with the bedding limits shown on the Standard PB-1 drawings.
- The minor structure excavation quantity for wingwalls and other appurtenances will be based on the “ratio” of the plan area of the wingwalls or appurtenances to the plan area of the barrel.

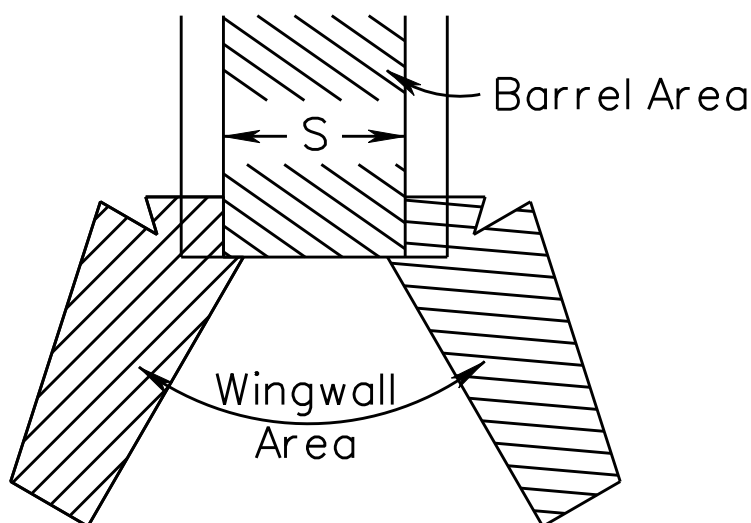
PROCEDURE

- For single line culverts, the width of the barrel will be the nominal span or opening of the pipe or box culvert; for multiple spans, the barrel width will be the overall distance between inner faces of the outermost barrel openings. This dimension is defined by the S+2D value noted on the standard drawings for endwalls for multiple barrel culverts in the Road and Bridge Standards. The length of all culverts will be from end to end of the culvert. The outside wall thickness and the 18 inches outside the neatlines of the periphery of the culvert are not to be included in the computing the “ratio.”

- Once the “ratio” has been determined, it is used to compute the total cubic yards of Minor Structure Excavation for the structure and appurtenances, by using the excavation quantity for the barrel section and increasing this quantity by the “ratio.”
 - The sketch below denotes the area to compute the typical plan area for determination of box culvert “ratio.” For computation of “ratio” for pipes see Appendix D, Table D-28 through D-31 in the Road Design Manual.
 - Where End Sections are required and the pipe option of metal or concrete is allowed, use the area of the ES-2 (metal) end section for computing the “ratio.”
 - Where there is not sufficient survey data to accurately determine minor structure excavation quantities, additional survey must be secured and incorporated before making final quantity determinations.
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MEASUREMENT/PAYMENT

- Minor Structure Excavation will be measured in cubic yards and paid for on a Plan Quantity basis.
- Excavation for wingwalls and other appurtenances will be based on the “ratio” of the plan area of the wingwalls or appurtenances to the plan area of the barrel.
- A separate entry is to be shown on the Drainage Summary Sheet for cubic yards of Minor Structure Excavation for Pipes and cubic yards of Minor Structure Excavation for Box Culverts.



TYPICAL BOX CULVERT