



MARYLAND DEPARTMENT OF TRANSPORTATION  
STATE HIGHWAY ADMINISTRATION  
OFFICE OF HIGHWAY DEVELOPMENT  
HIGHWAY HYDRAULICS DIVISION

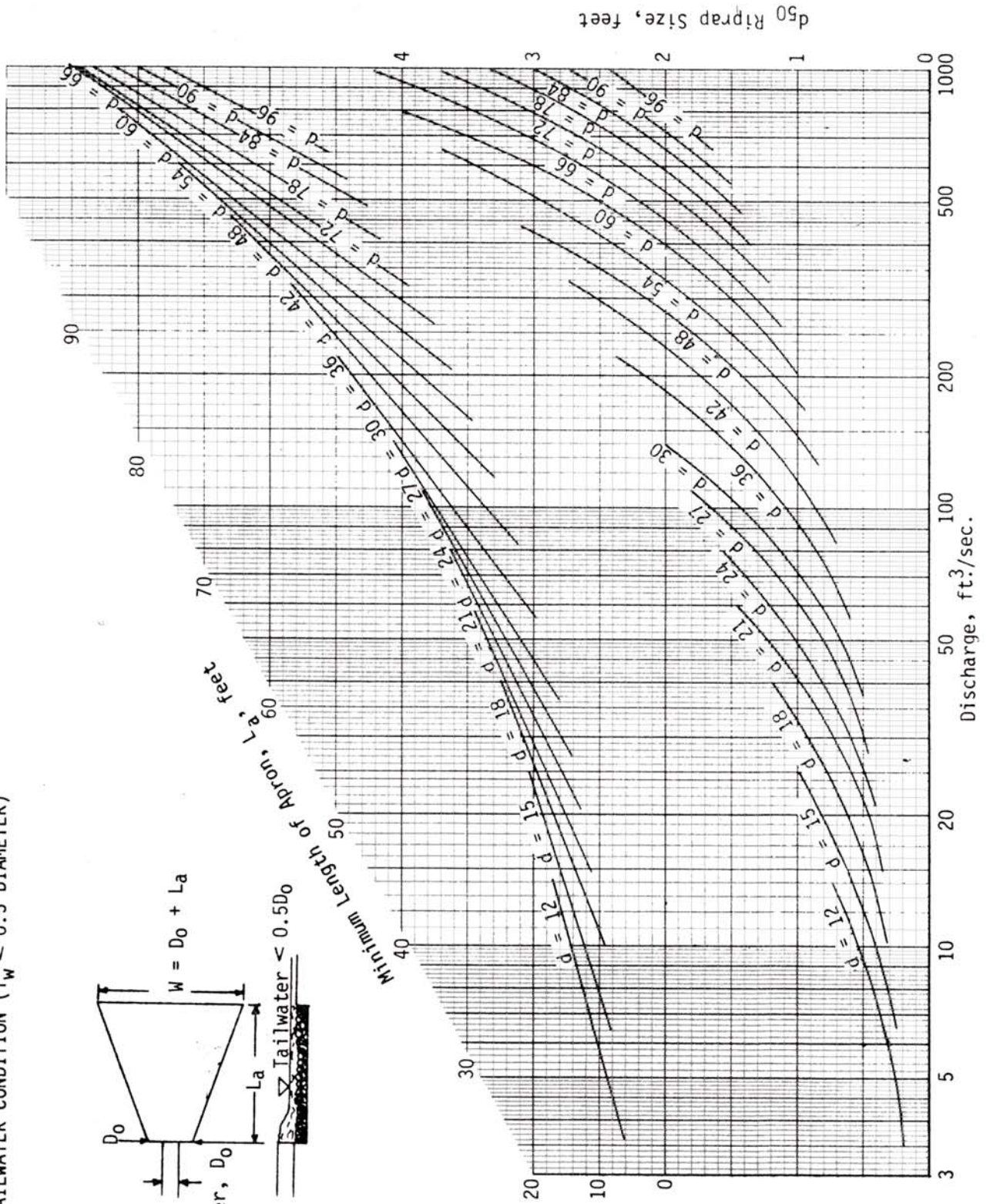
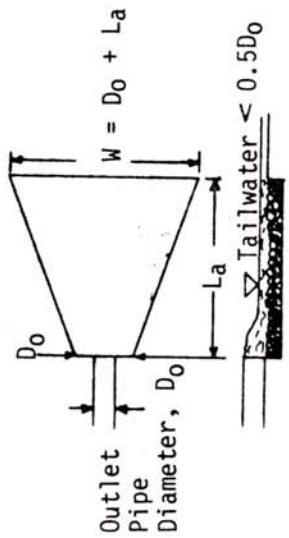
## Highway Drainage Manual Design Guidelines Culverts

### Appendix 2. Culvert Design Supplements

The following figures, tables and formulae are approved for use.

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DESIGN OF OUTLET PROTECTION FROM A ROUND PIPE FLOWING FULL  
 MINIMUM TAILWATER CONDITION ( $T_w < 0.5$  DIAMETER)



DESIGN OF OUTLET PROTECTION FROM A ROUND PIPE FLOWING FULL  
 MAXIMUM TAILWATER CONDITION ( $T_w \approx 0.5$  DIAMETER)

