APPENDIX F
NOMOGRAPHS AND CHARTS FOR CULVERT DESIGN

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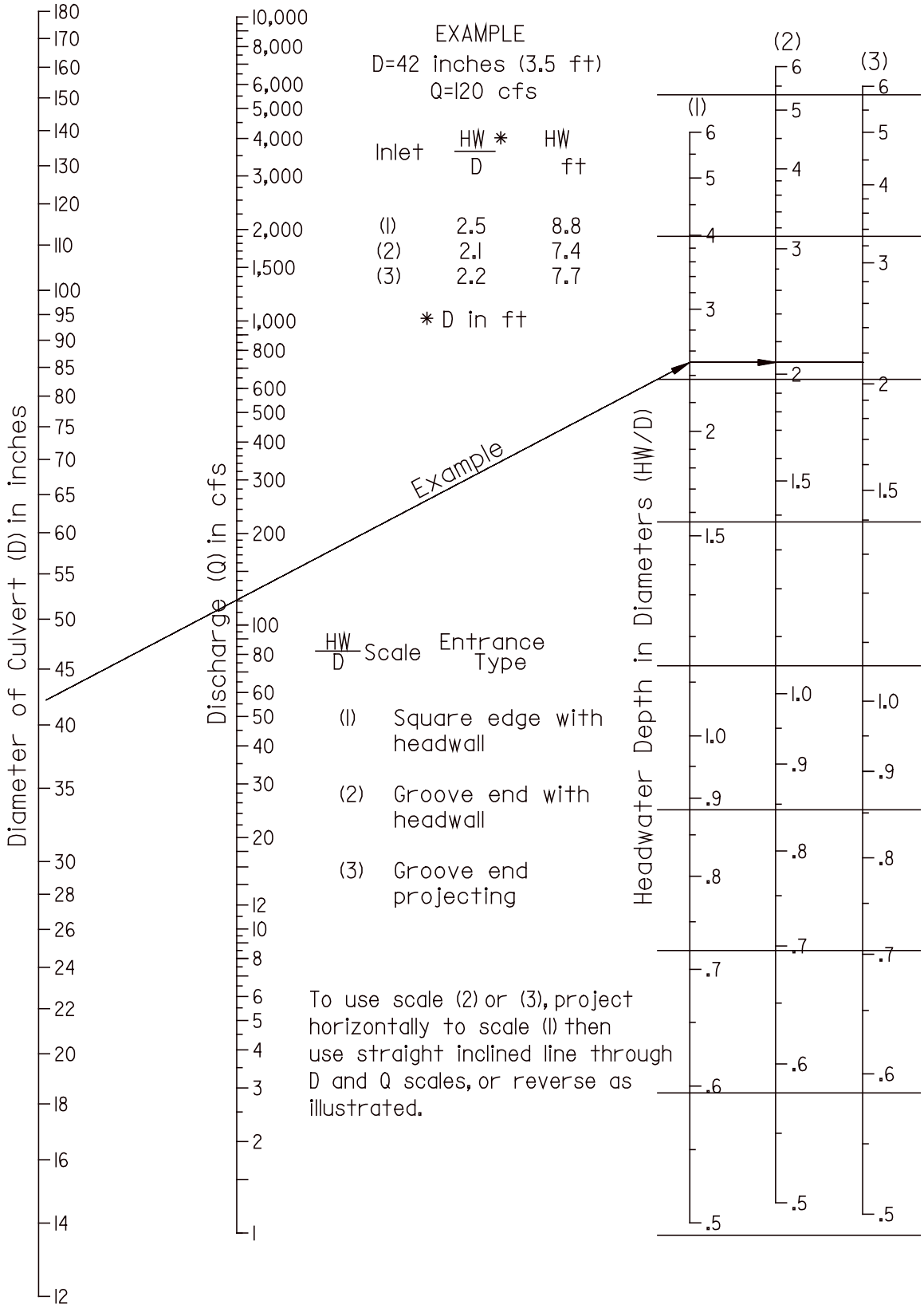


Exhibit F.1 Headwater Depth for Concrete Pipe Culverts with Inlet Control (Source: Reference F.1)

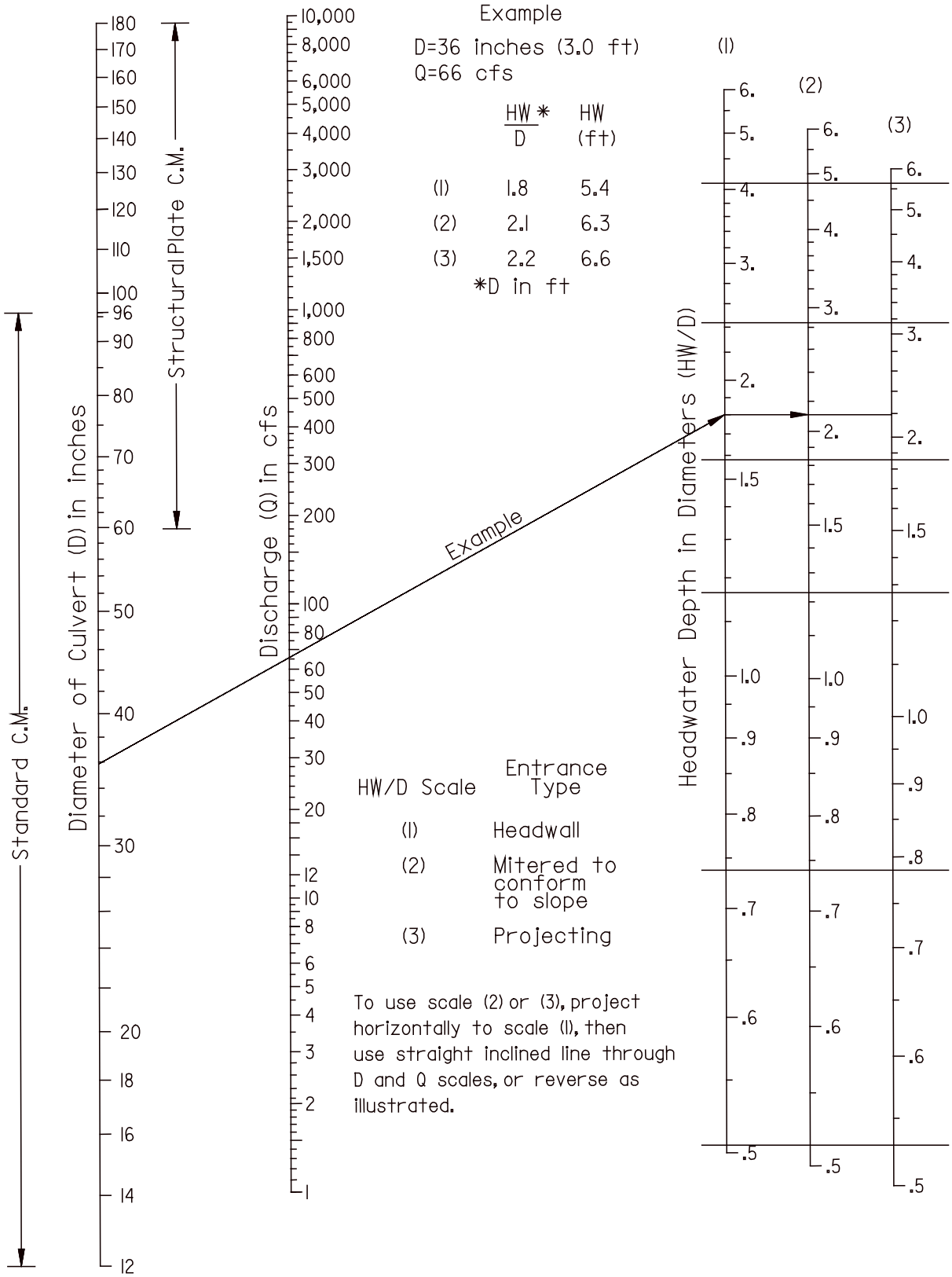
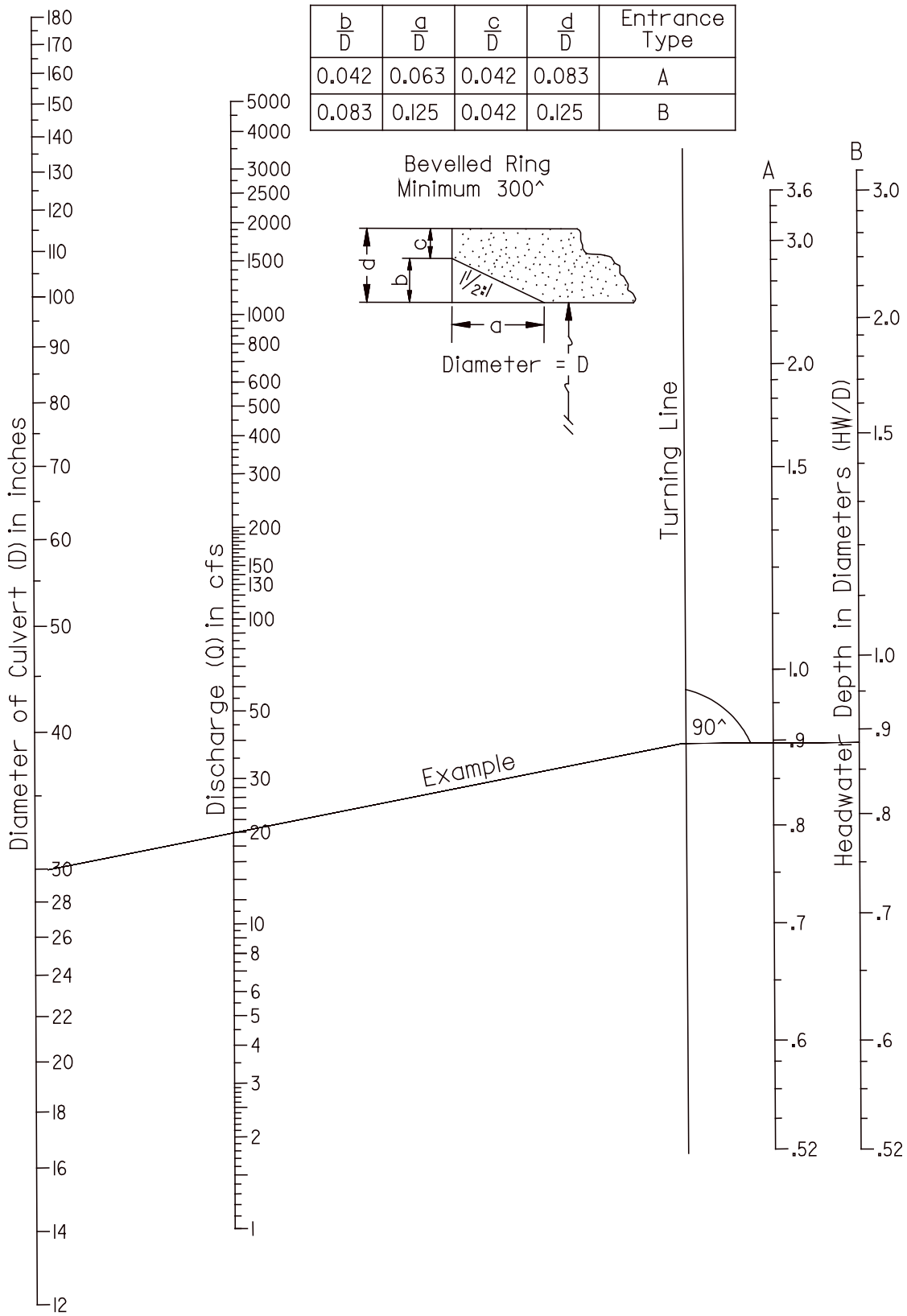


Exhibit F.2 Headwater Depth for CMP Culverts with Inlet Control (Source: Reference F.1)



$\frac{b}{D}$	$\frac{a}{D}$	$\frac{c}{D}$	$\frac{d}{D}$	Entrance Type
0.042	0.063	0.042	0.083	A
0.083	0.125	0.042	0.125	B

Exhibit F.3 Headwater Depth for Circular Pipe Culverts with Beveled Ring Inlet Control (Source: Reference F.1)

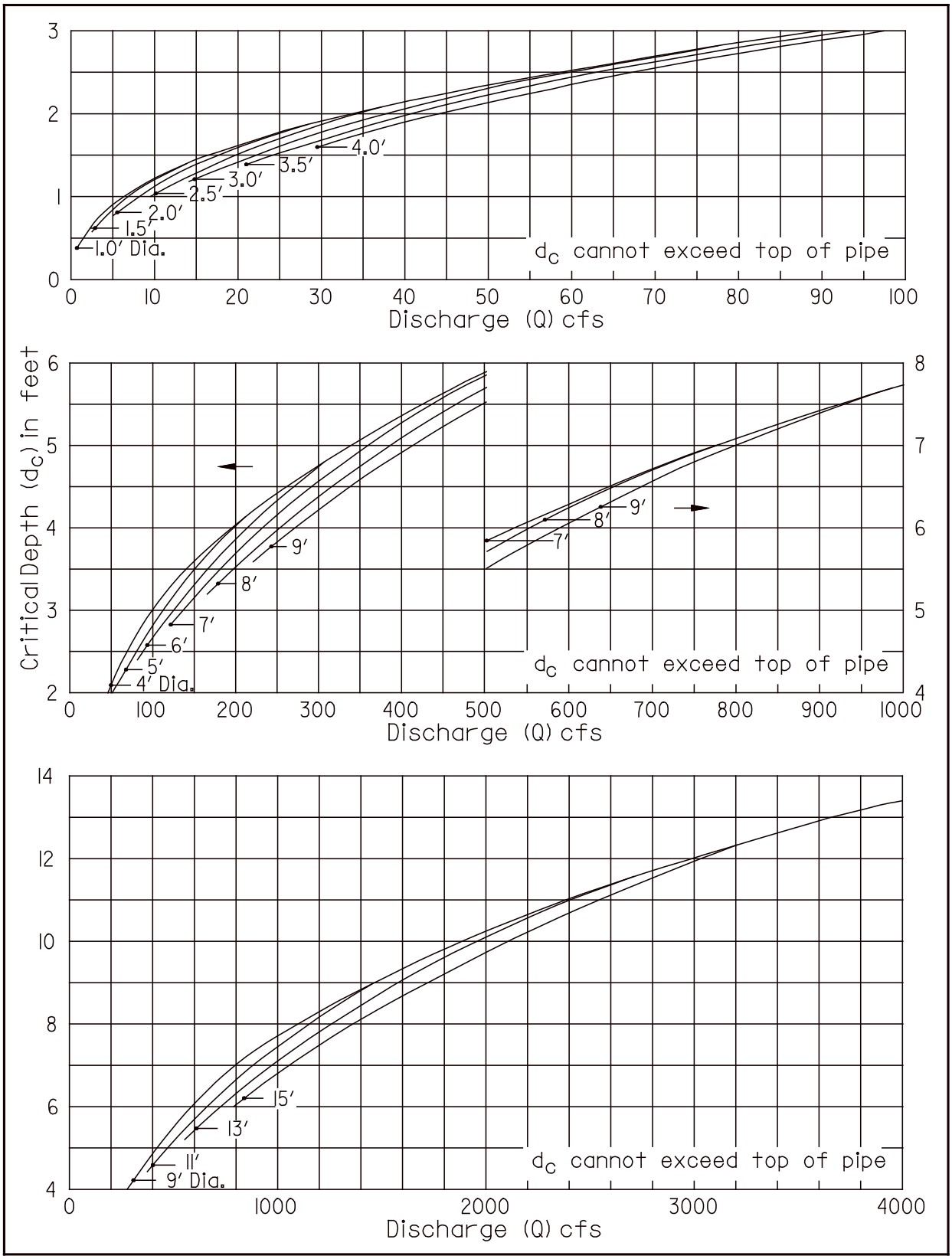


Exhibit F.4 Critical Depth for Circular Pipe
(Source: Reference F.1)

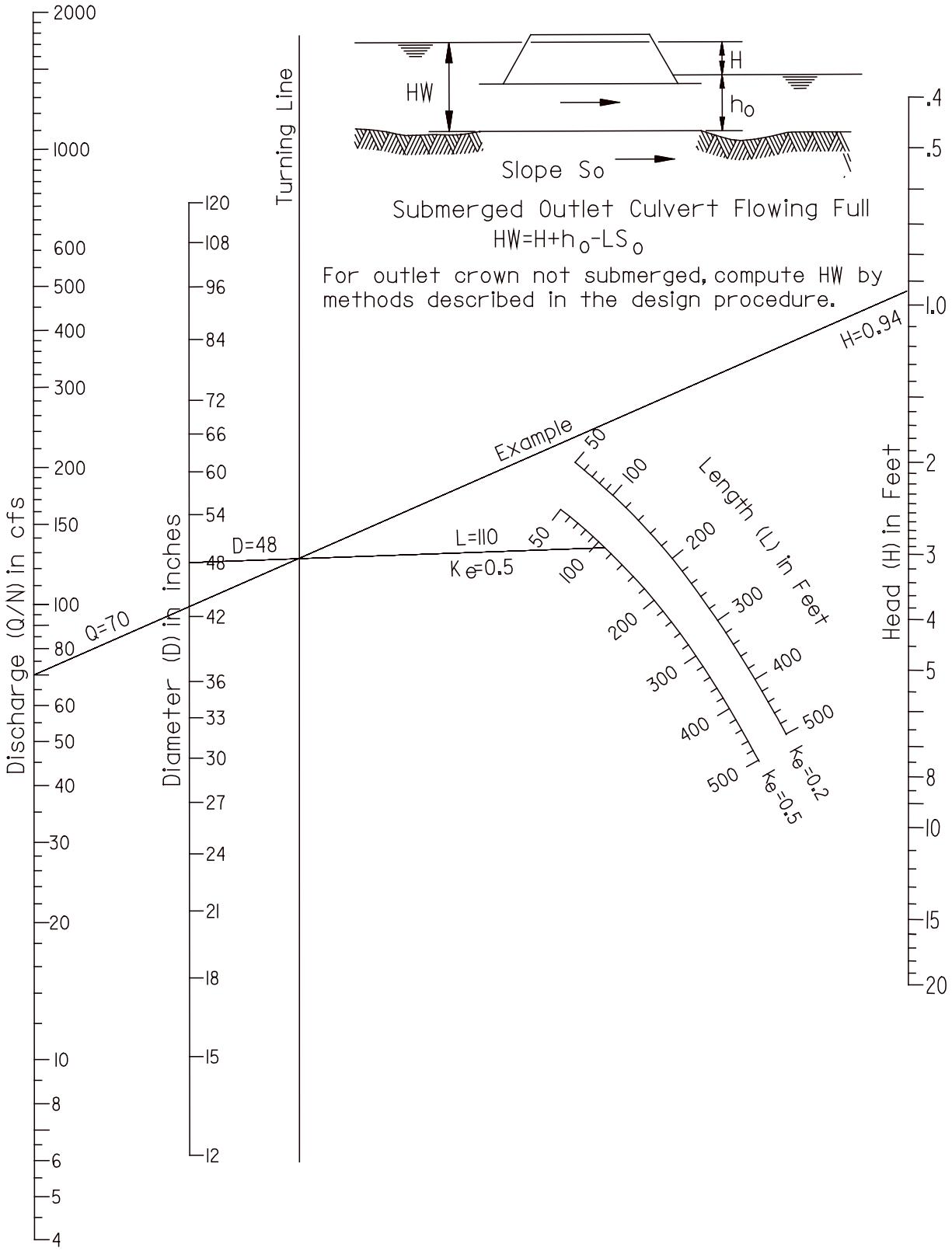


Exhibit F.5 Head for Concrete Pipe Culverts Flowing Full (n=0.012)
(Source: Reference F.1)

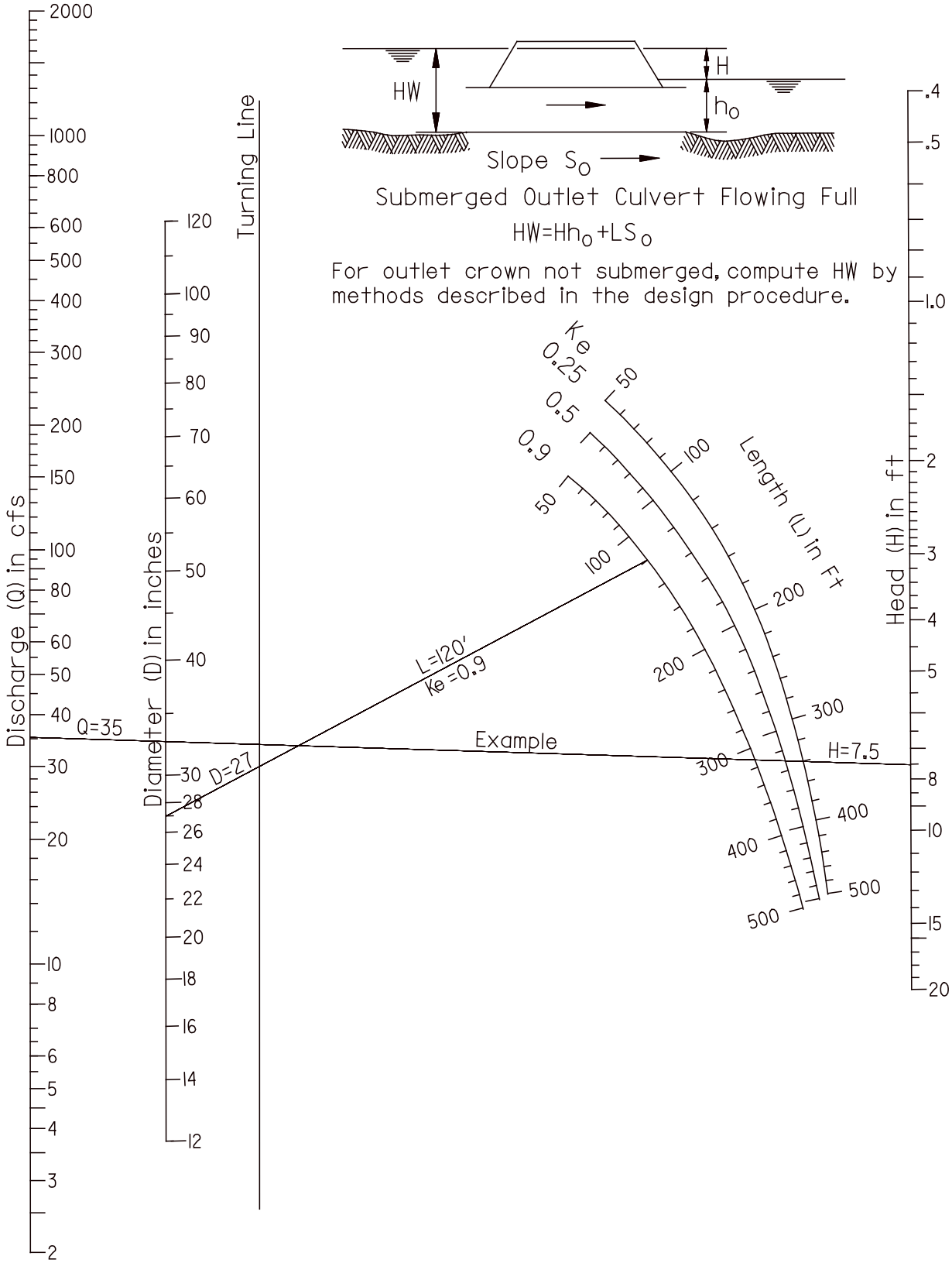


Exhibit F.6 Head for Standard CMP Culverts Flowing Full (n=0.024)
(Source: Reference F.1)

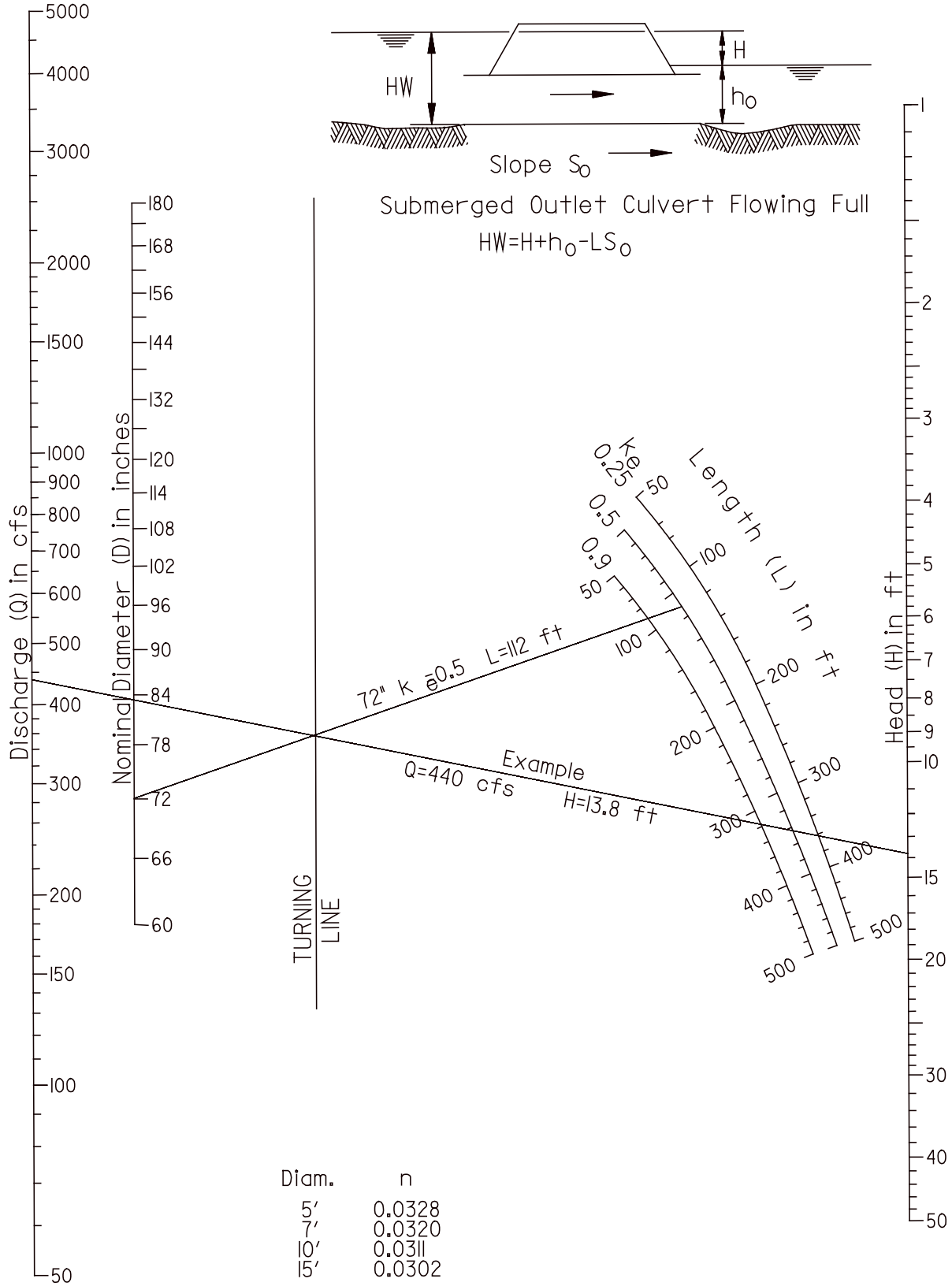


Exhibit F.7 Head for Structural Plate CMP Culverts Flowing Full (n=0.0328 to 0.0302) (Source: Reference F.1)

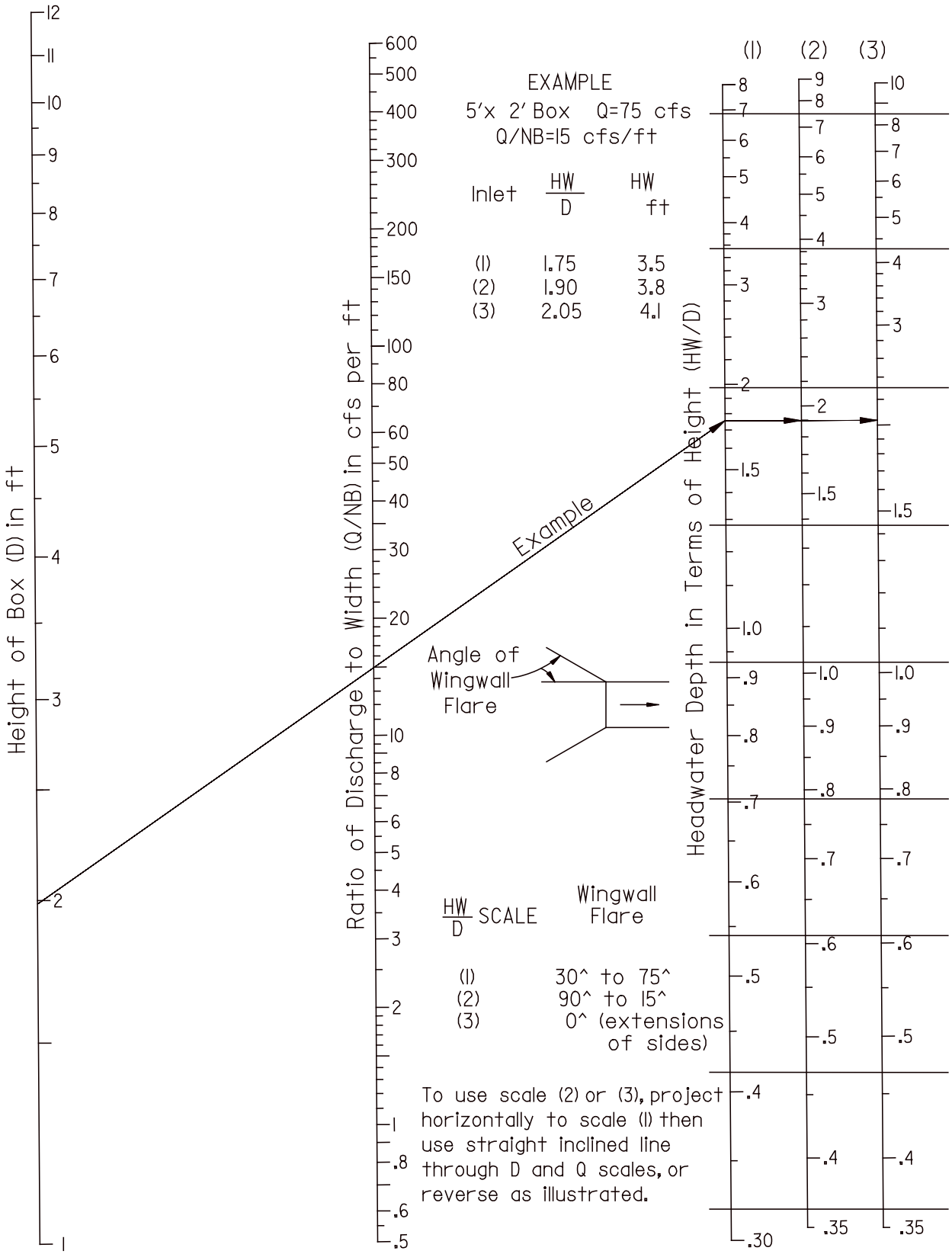


Exhibit F.8 Headwater Depth for Box Culverts with Inlet Control (Source: Reference F.1)

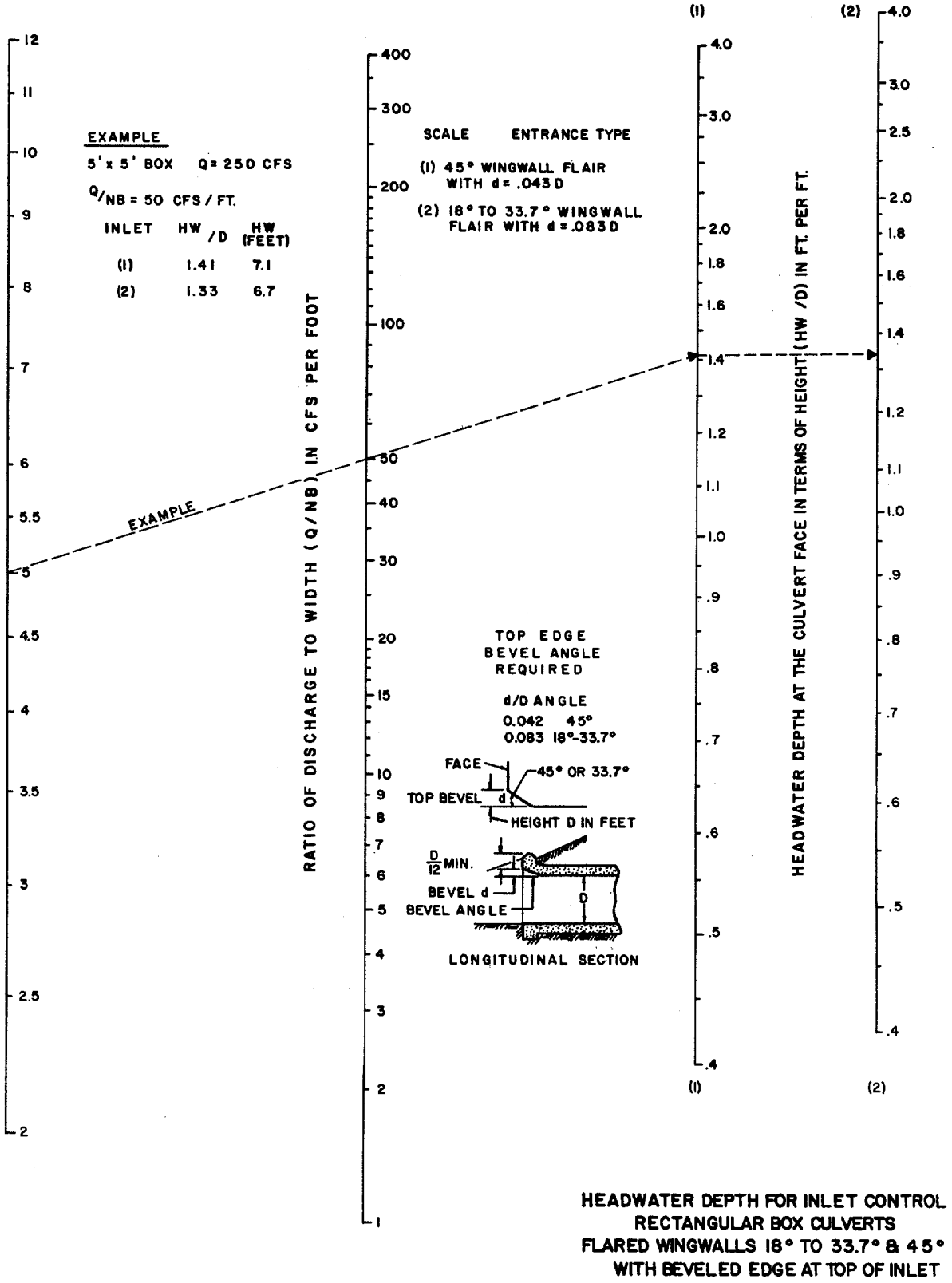


Exhibit F.9 Headwater Depth for Inlet Control Rectangular Box Culverts (Flared Wingwalls 18° to 33.7° & 45° with Beveled Edge at Top of Inlet) (Source: Reference F.1)

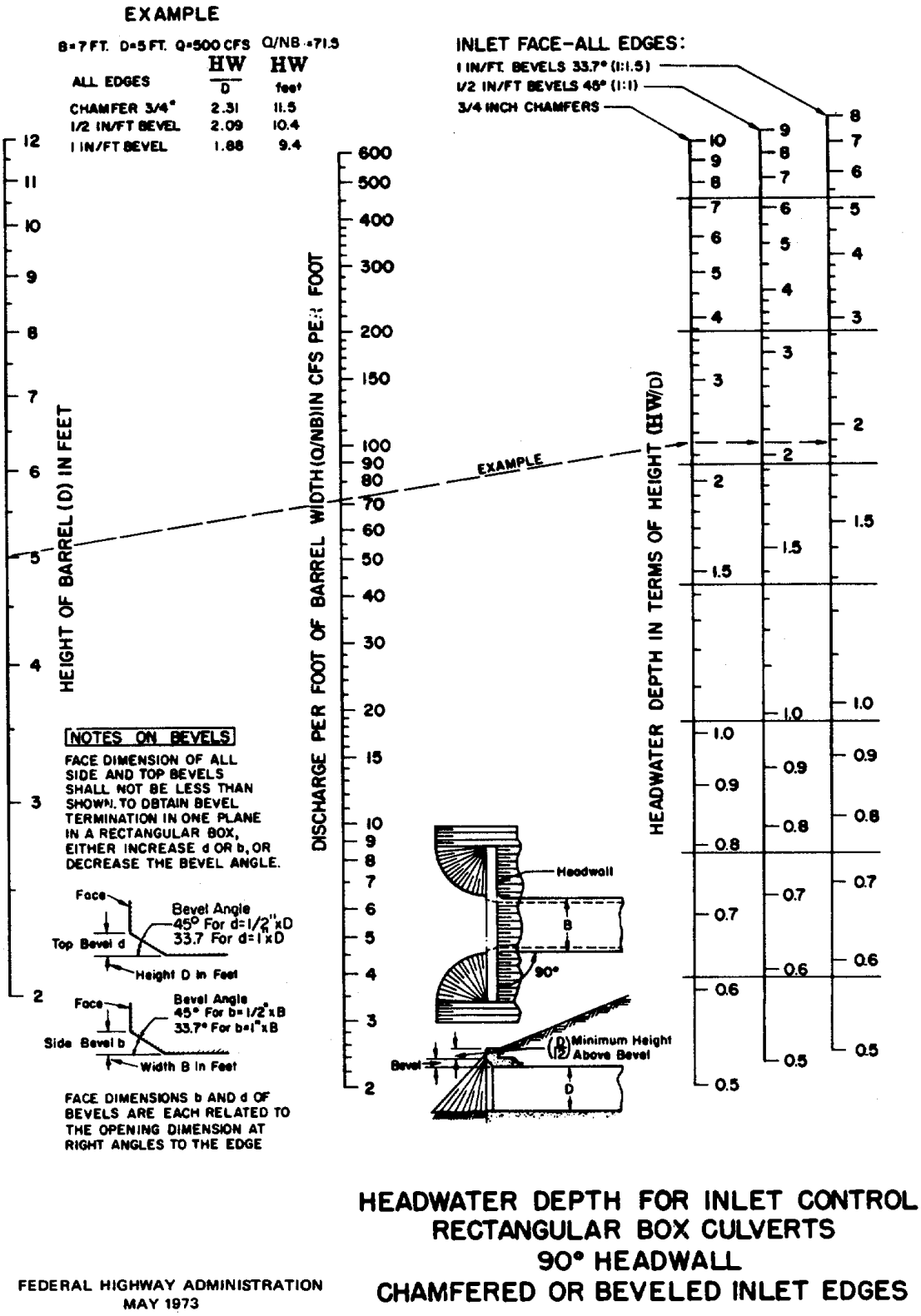


Exhibit F.10 Headwater Depth for Inlet Control Rectangular Box Culverts (90° Headwall – Chamfered or Beveled Inlet Edges) (Source: Reference F.1)

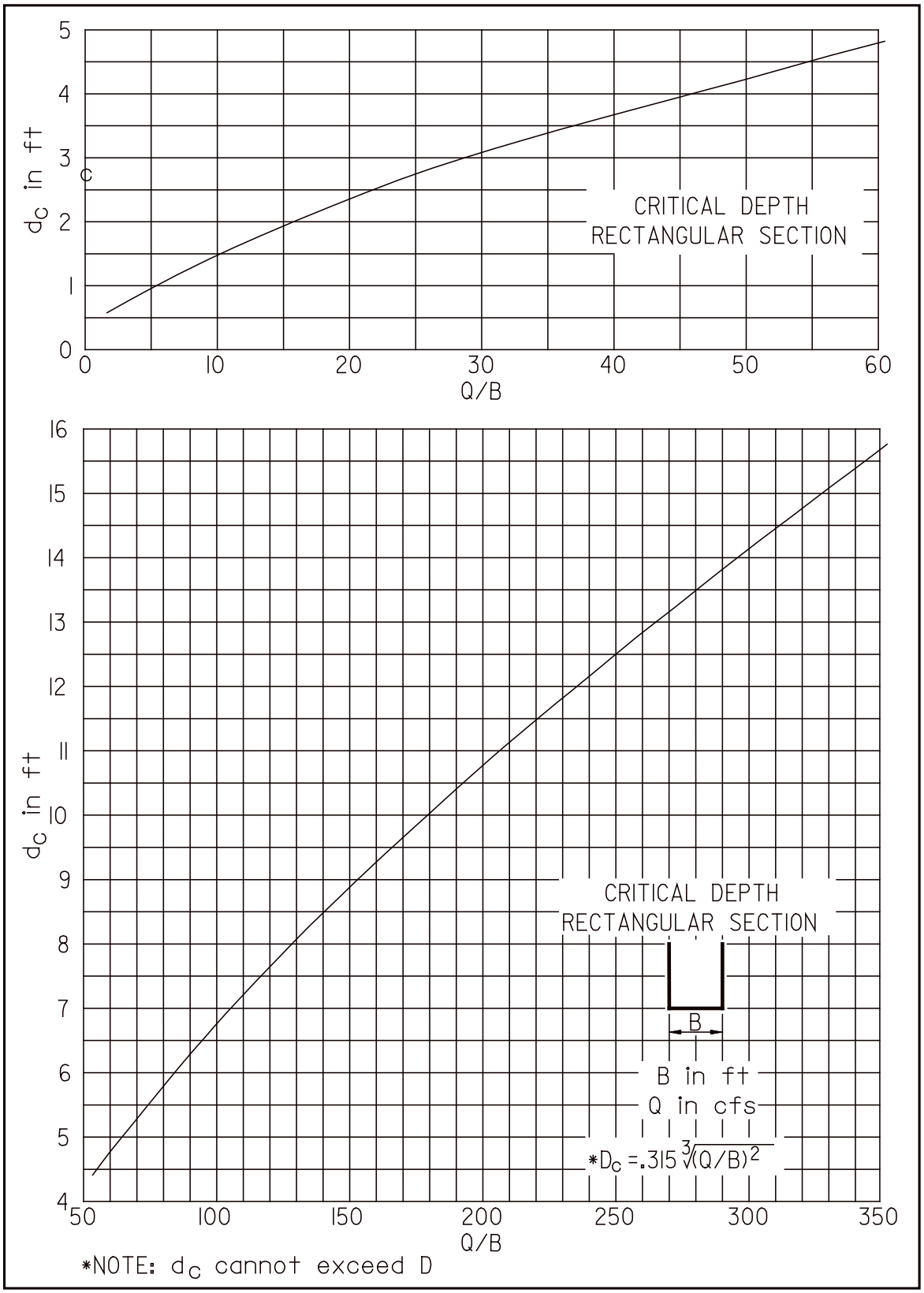


Exhibit F.11 Critical Depth for Box Culvert
(Source: Reference F.1)

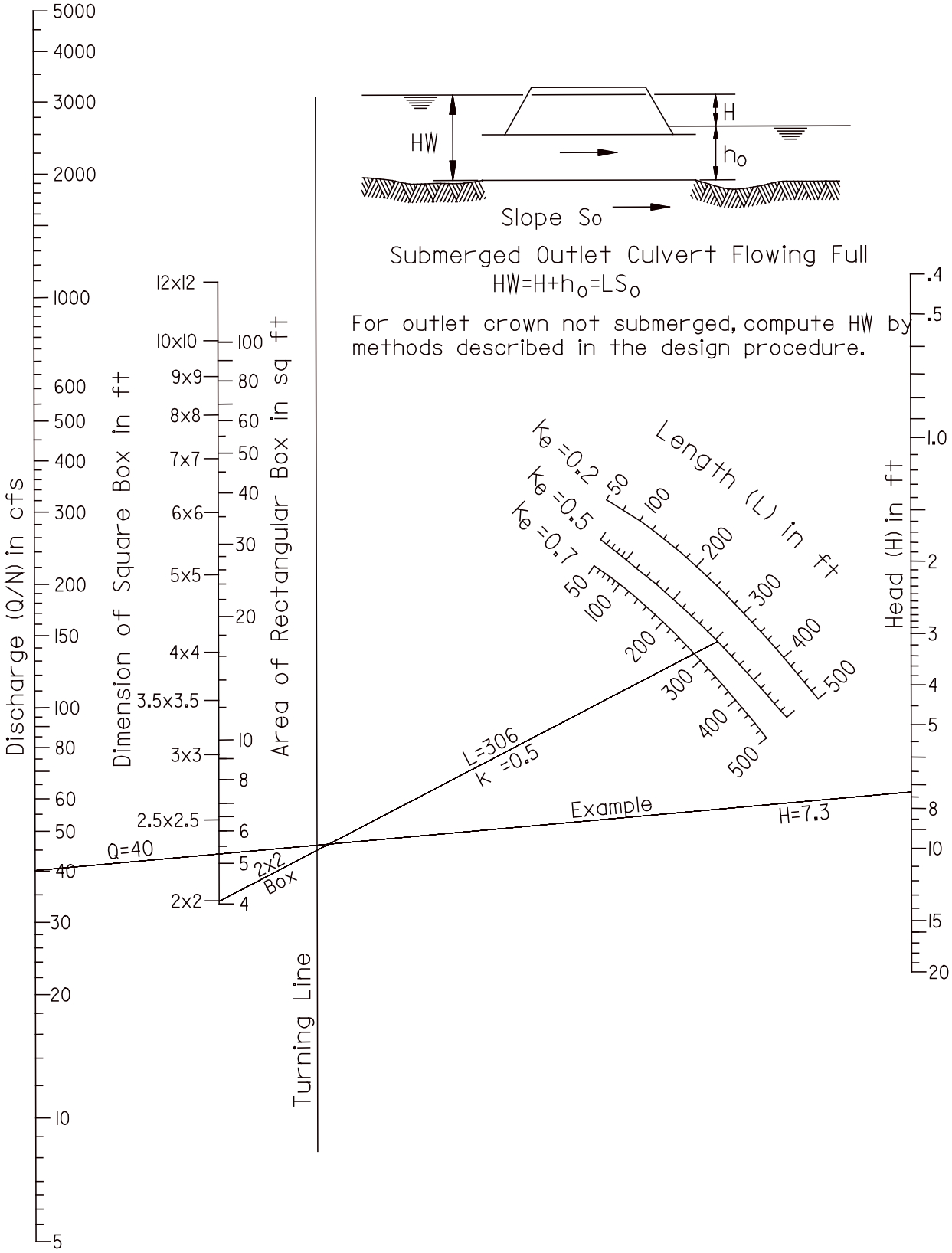


Exhibit F.12 Head for Concrete Box Culverts Flowing Full (n=0.012)
(Source: Reference F.1)

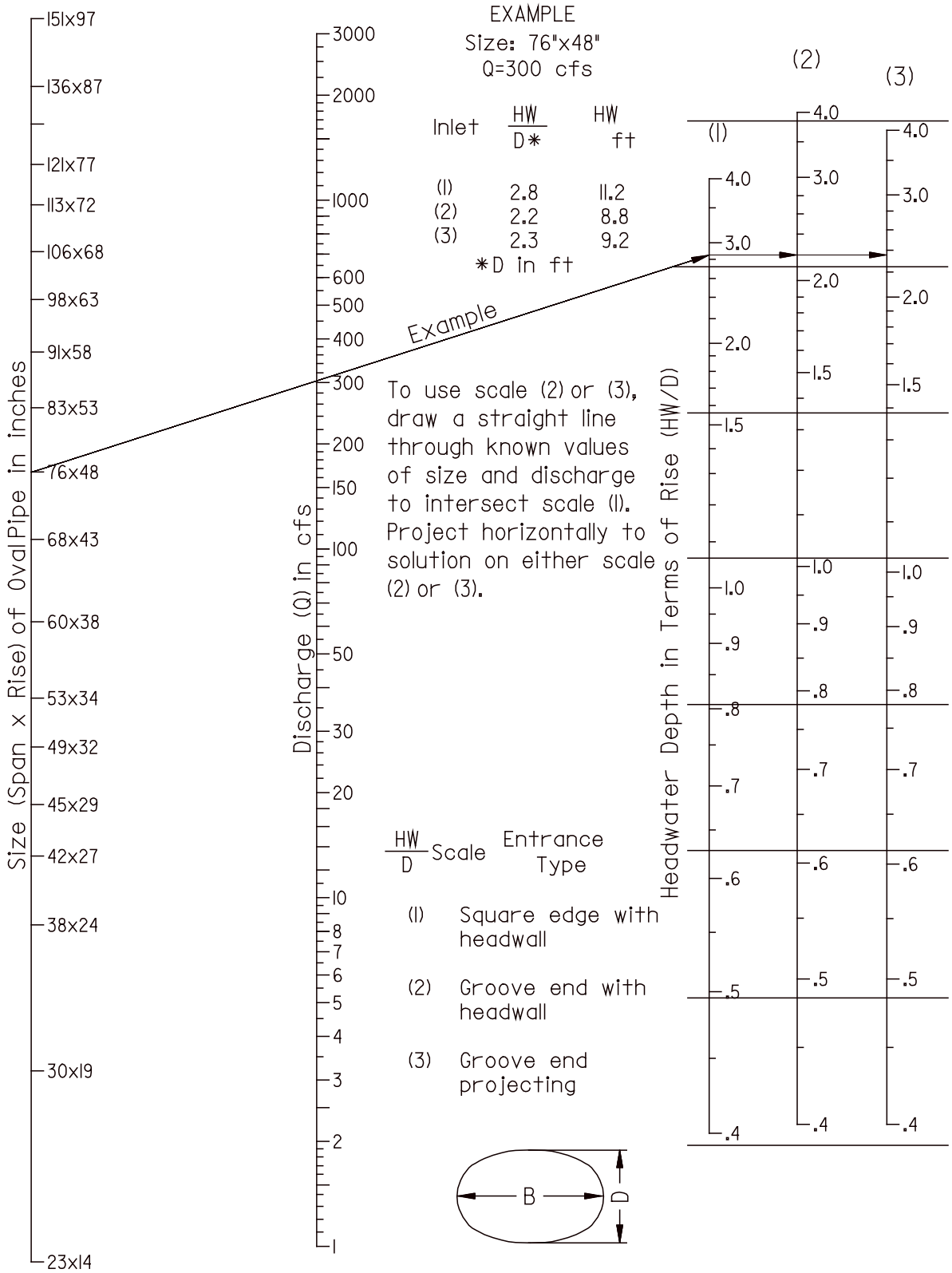


Exhibit F.13 Headwater Depth for Elliptical Concrete Pipe Culverts Long Axis Horizontal with Inlet Control (Source: Reference F.1)

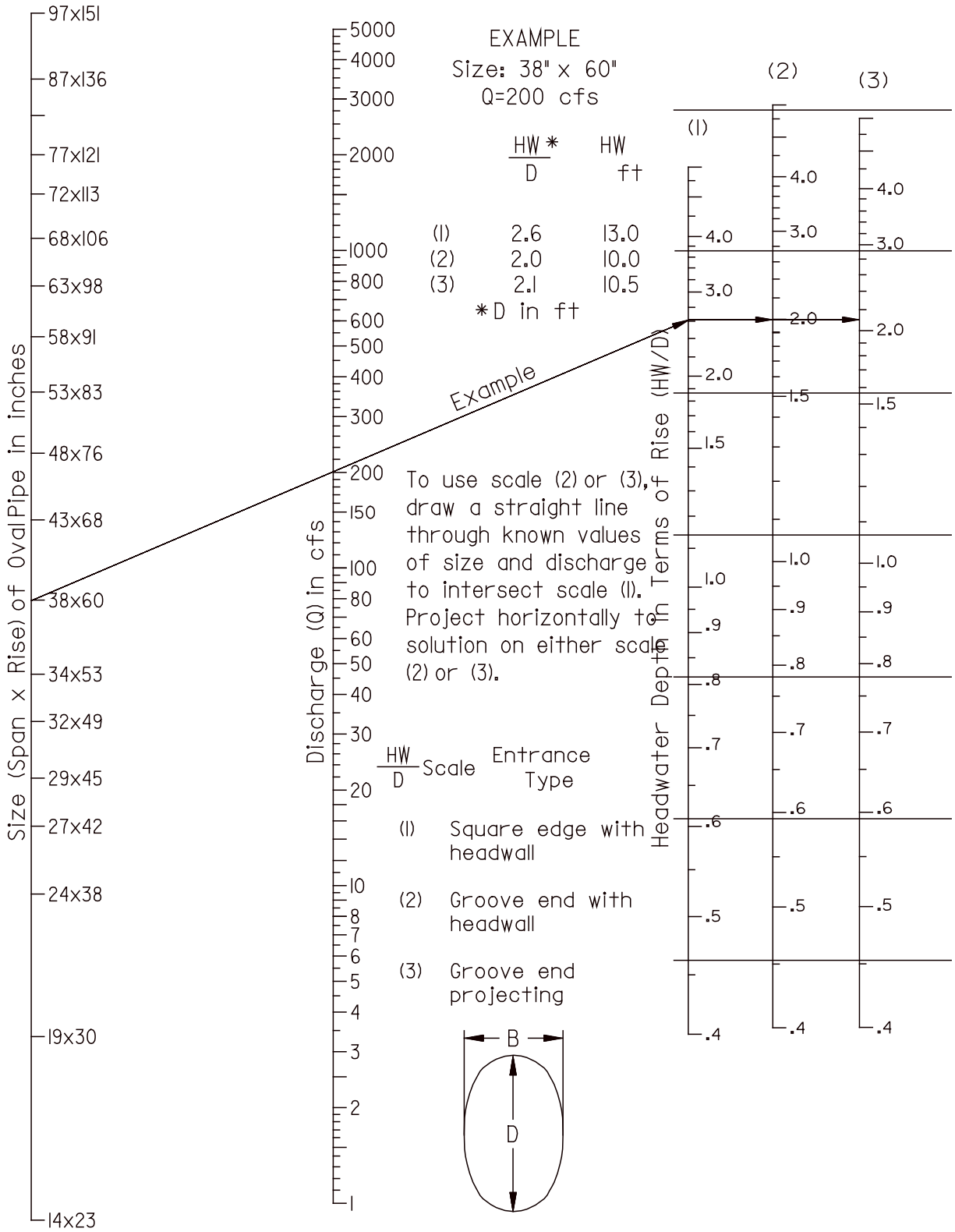


Exhibit F.14 Headwater Depth for Elliptical Concrete Pipe Culverts Long Axis Vertical with Inlet Control (Source: Reference F.1)

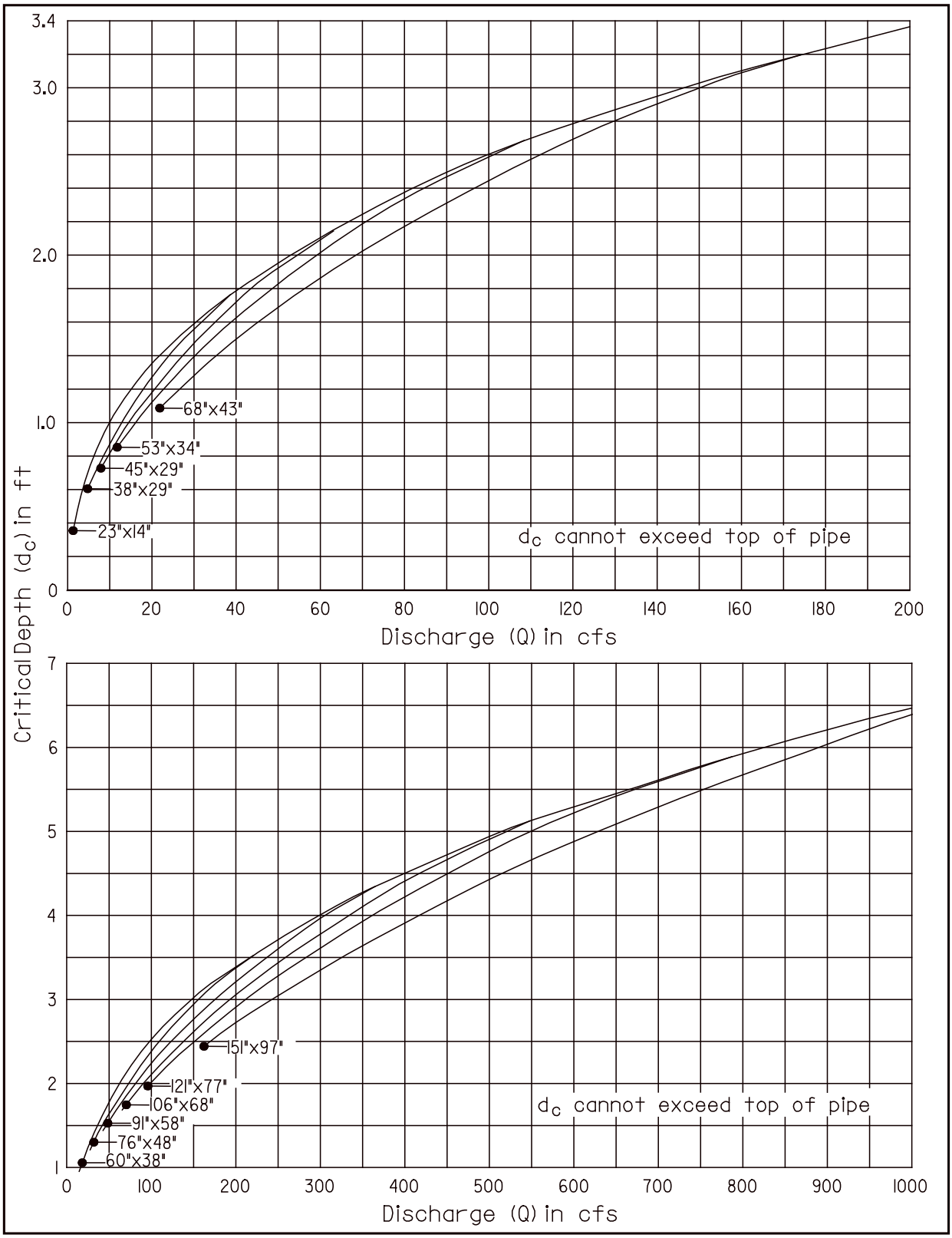


Exhibit F.15 Critical Depth for Elliptical Concrete Pipe
Long Axis Horizontal
(Source: Reference F.1)

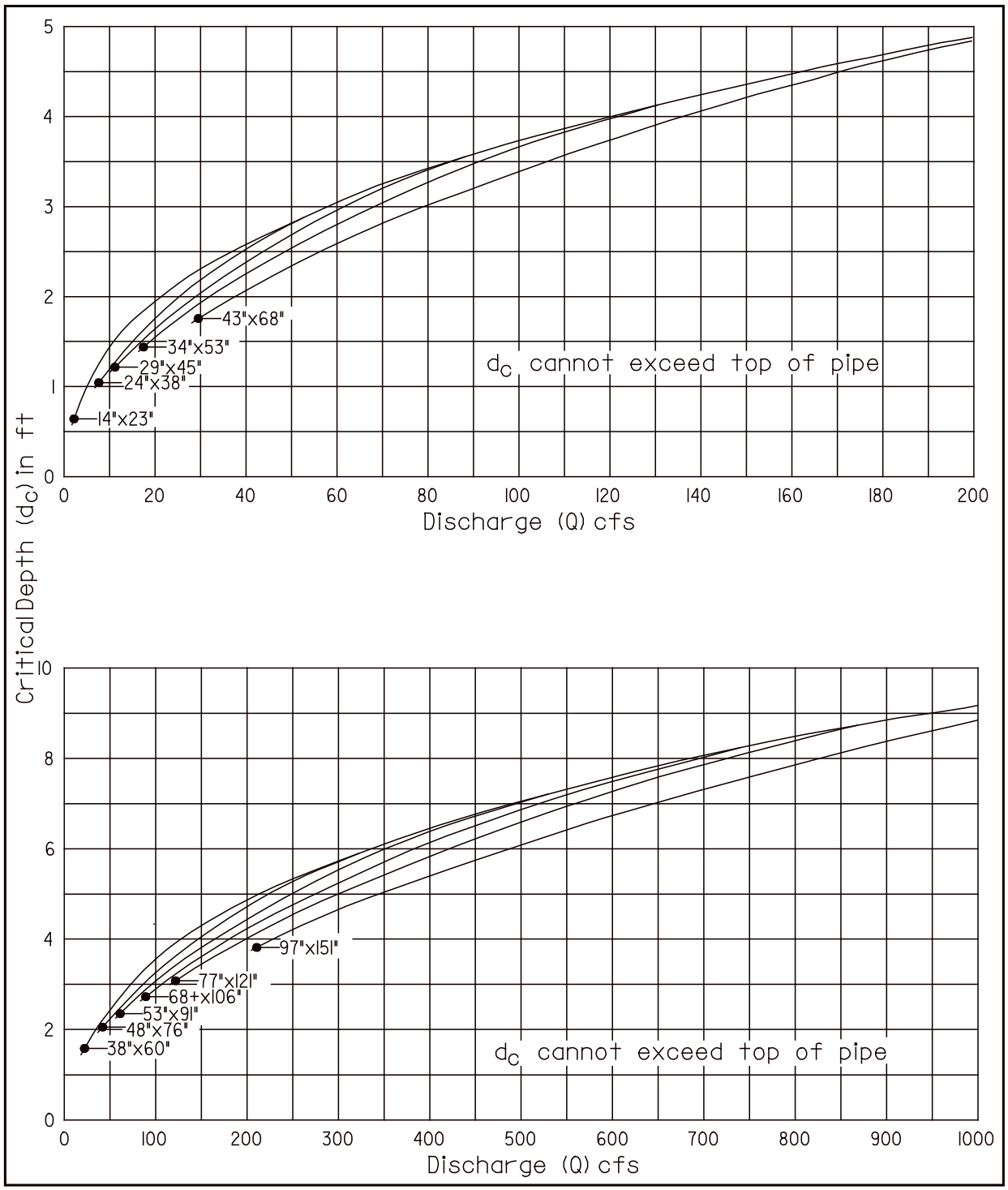


Exhibit F.16 Critical Depth for Elliptical Concrete Pipe
Long Axis Vertical
(Source: Reference F.1)

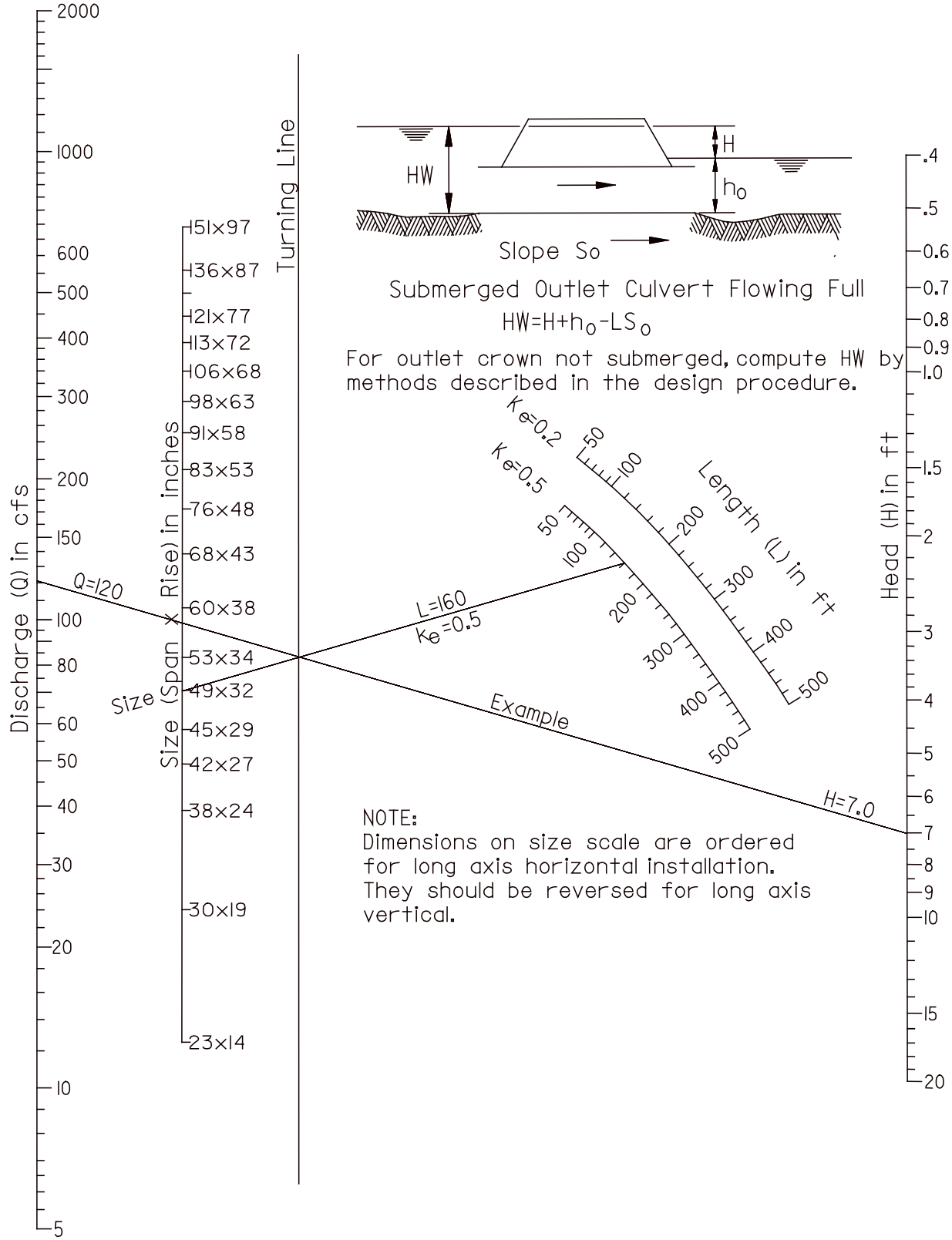


Exhibit F.17 Head for Elliptical Concrete Pipe Culverts Long Axis Horizontal or Vertical Flowing Full (n=0.012) (Source: Reference F.1)

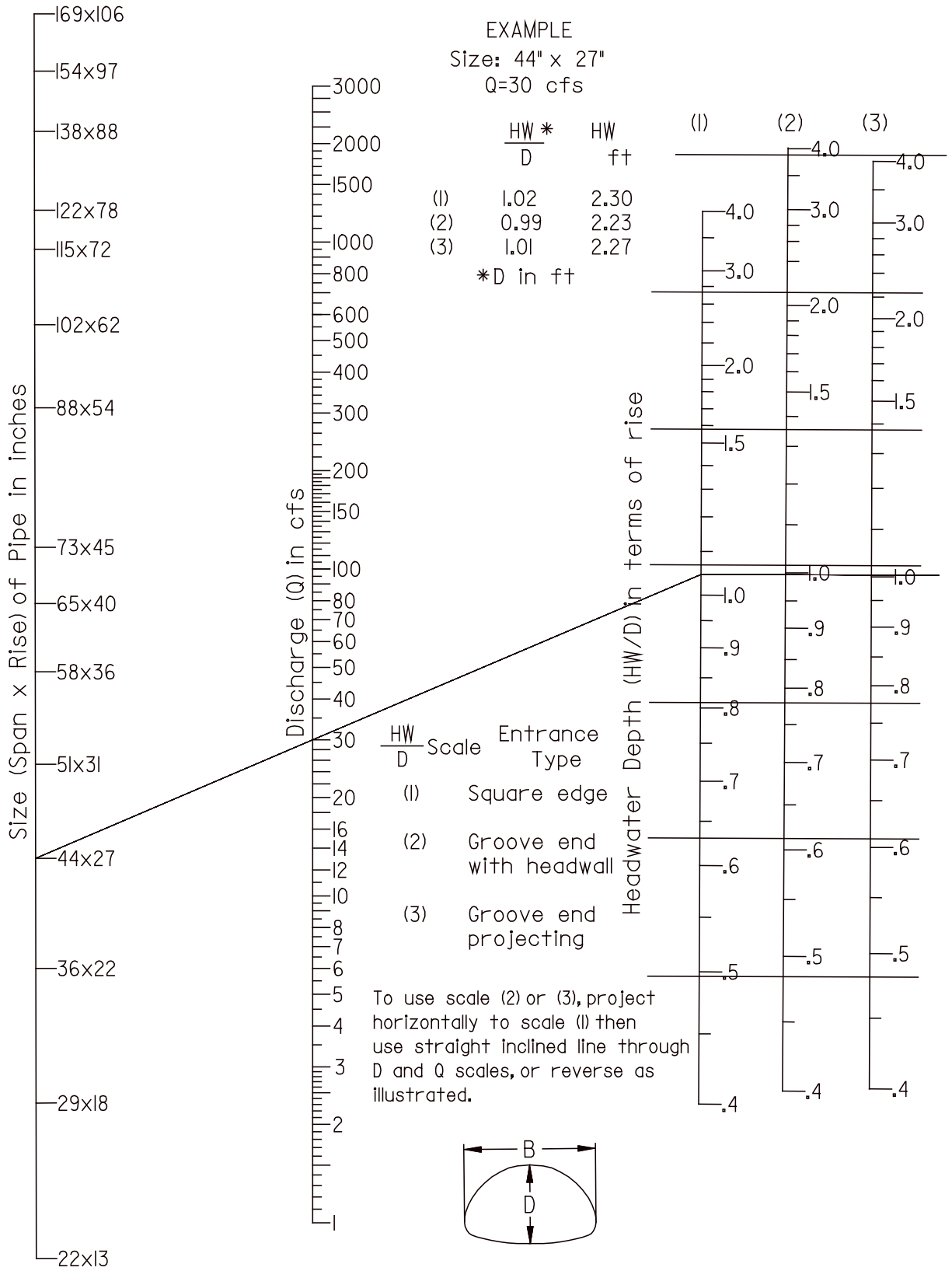


Exhibit F.18 Headwater Depth for Concrete Arch Culverts with Inlet Control (Source: Reference F.2)

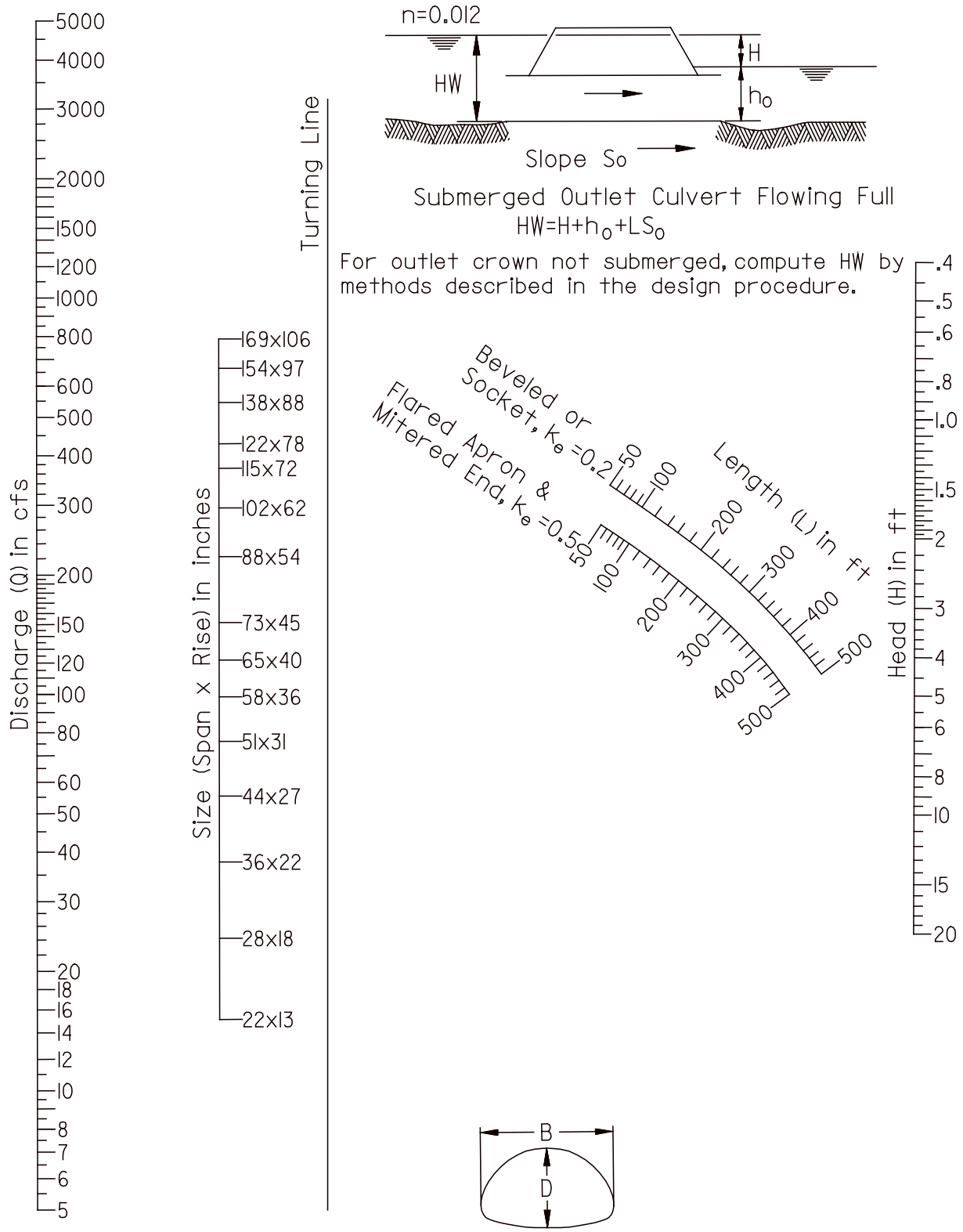
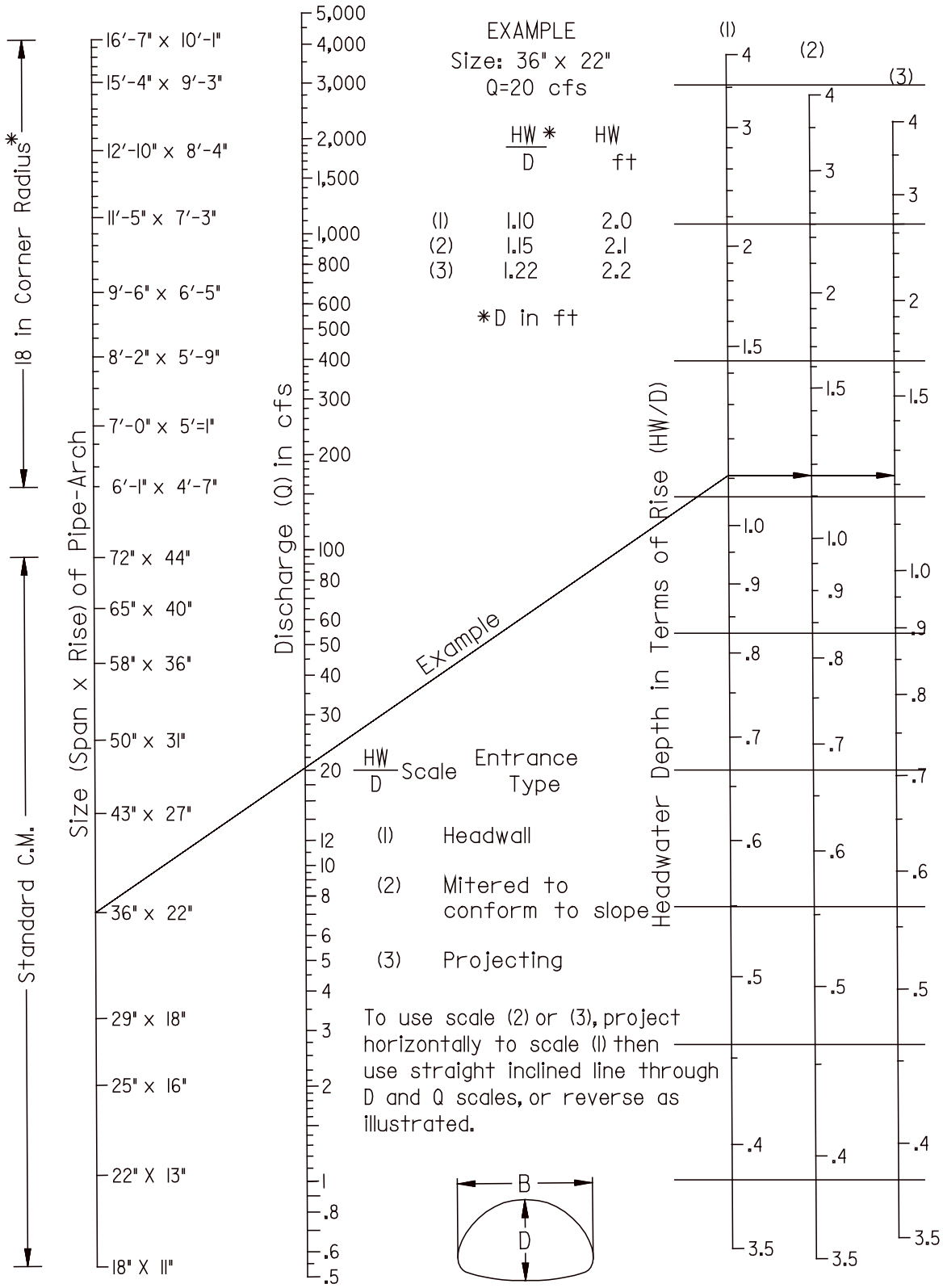


Exhibit F.19 Head for Concrete Arch Culverts Flowing Full
(Source: Reference F.2)



*Additional sizes not dimensioned are listed in fabricator's catalog

Exhibit F.20 Headwater Depth for CMP-Arch Culverts with Inlet Control (Source: Reference F.1)

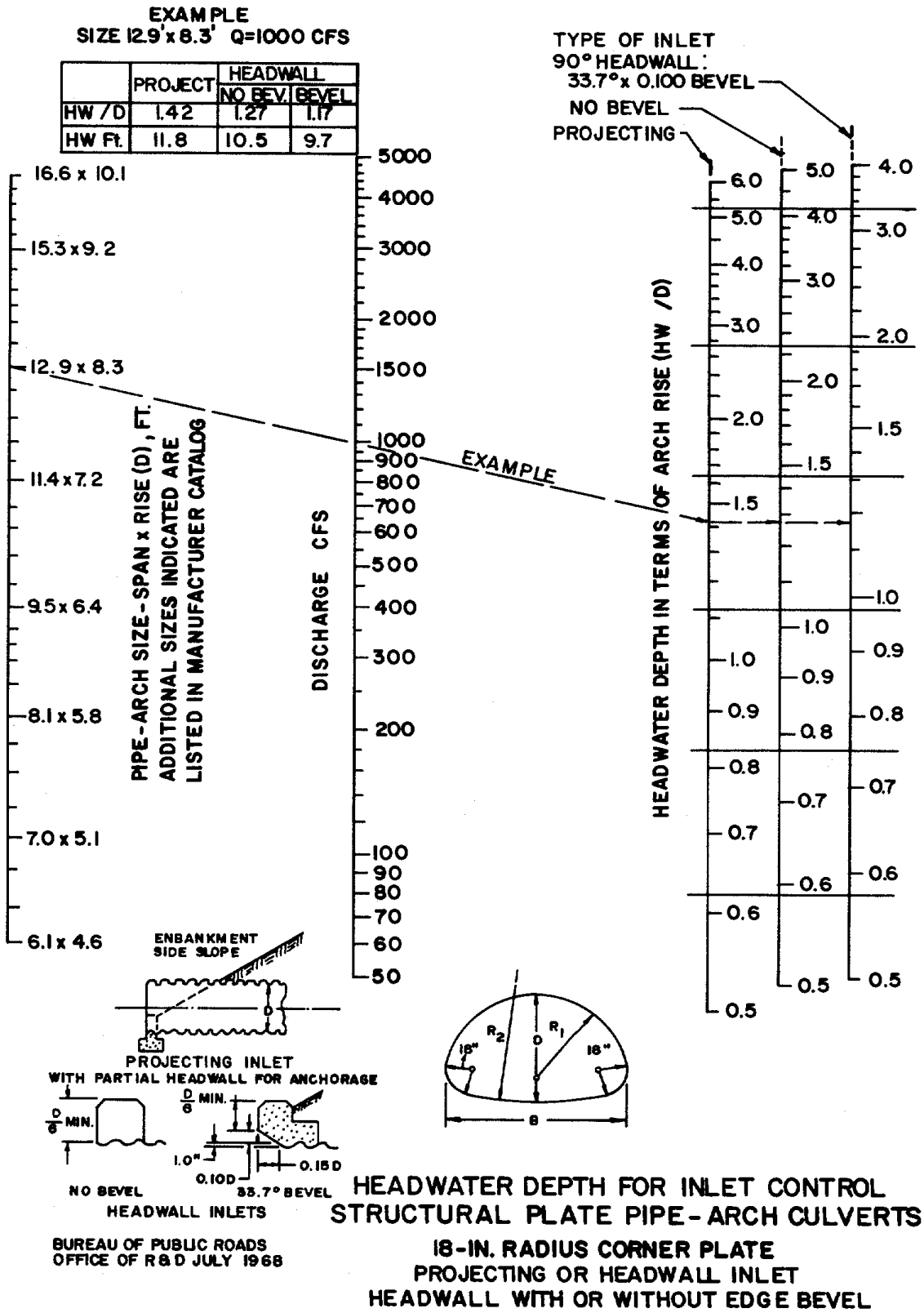


Exhibit F.21 Headwater Depth for Inlet Control Structural Plate Pipe-Arch Culverts With 18 in. Radius Corner Plate (Source: Reference F.1)

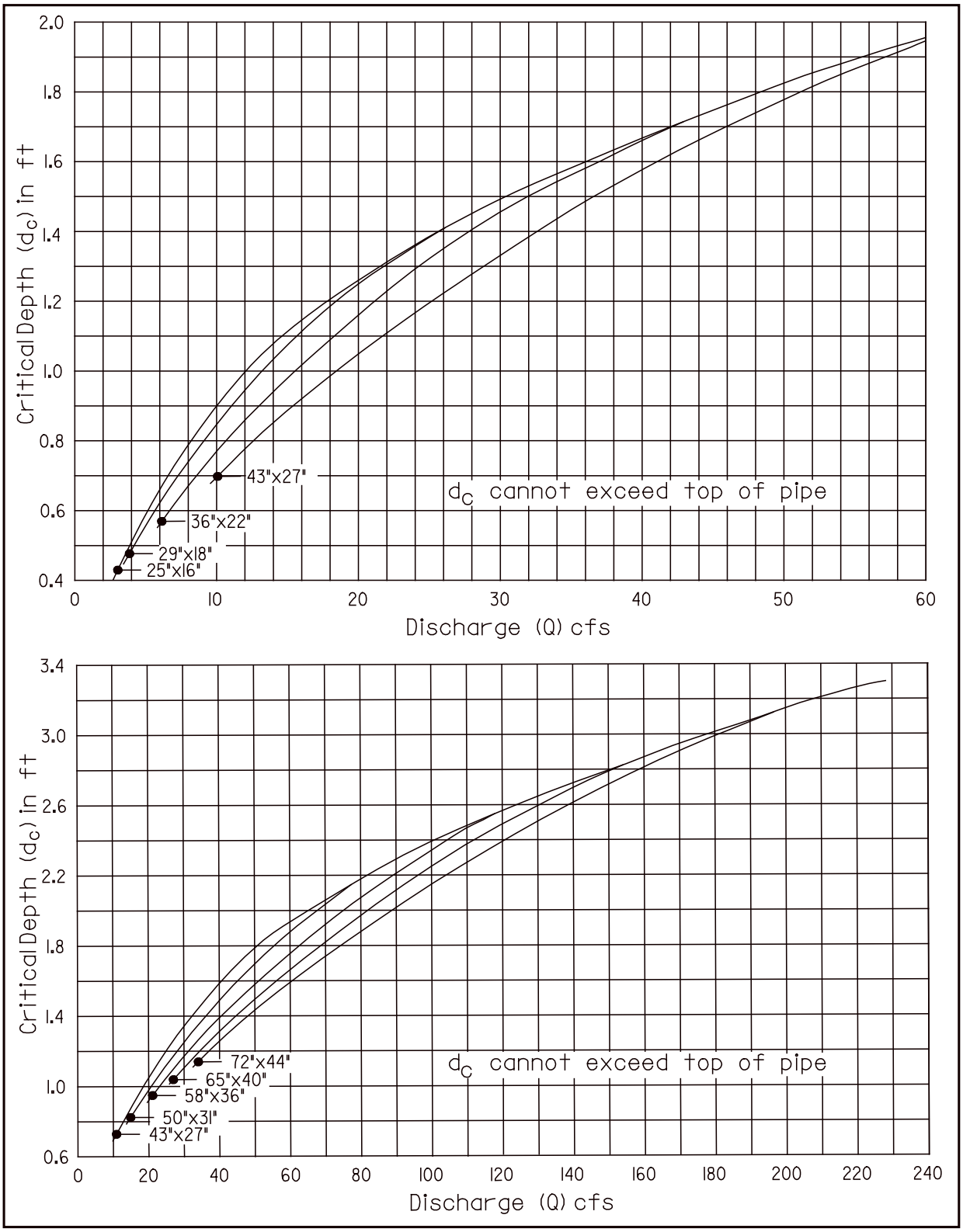


Exhibit F.22 Critical Depth for Standard CMP-Arch Culverts
(Source: Reference F.1)

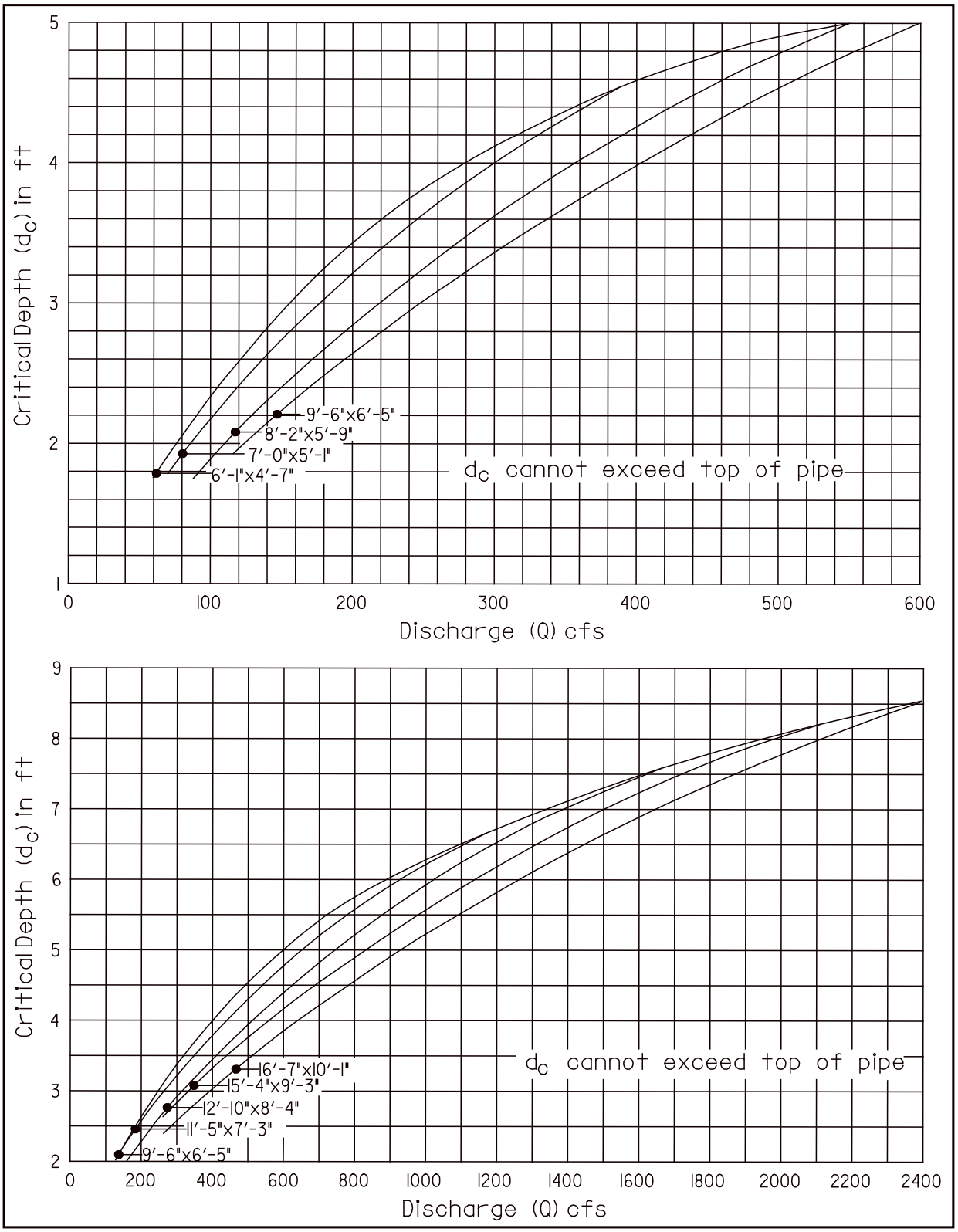


Exhibit F.23 Critical Depth for Structural Plate CMP-Arch Culverts with 18 in. Corner Radius Plate (Source: Reference F.1)

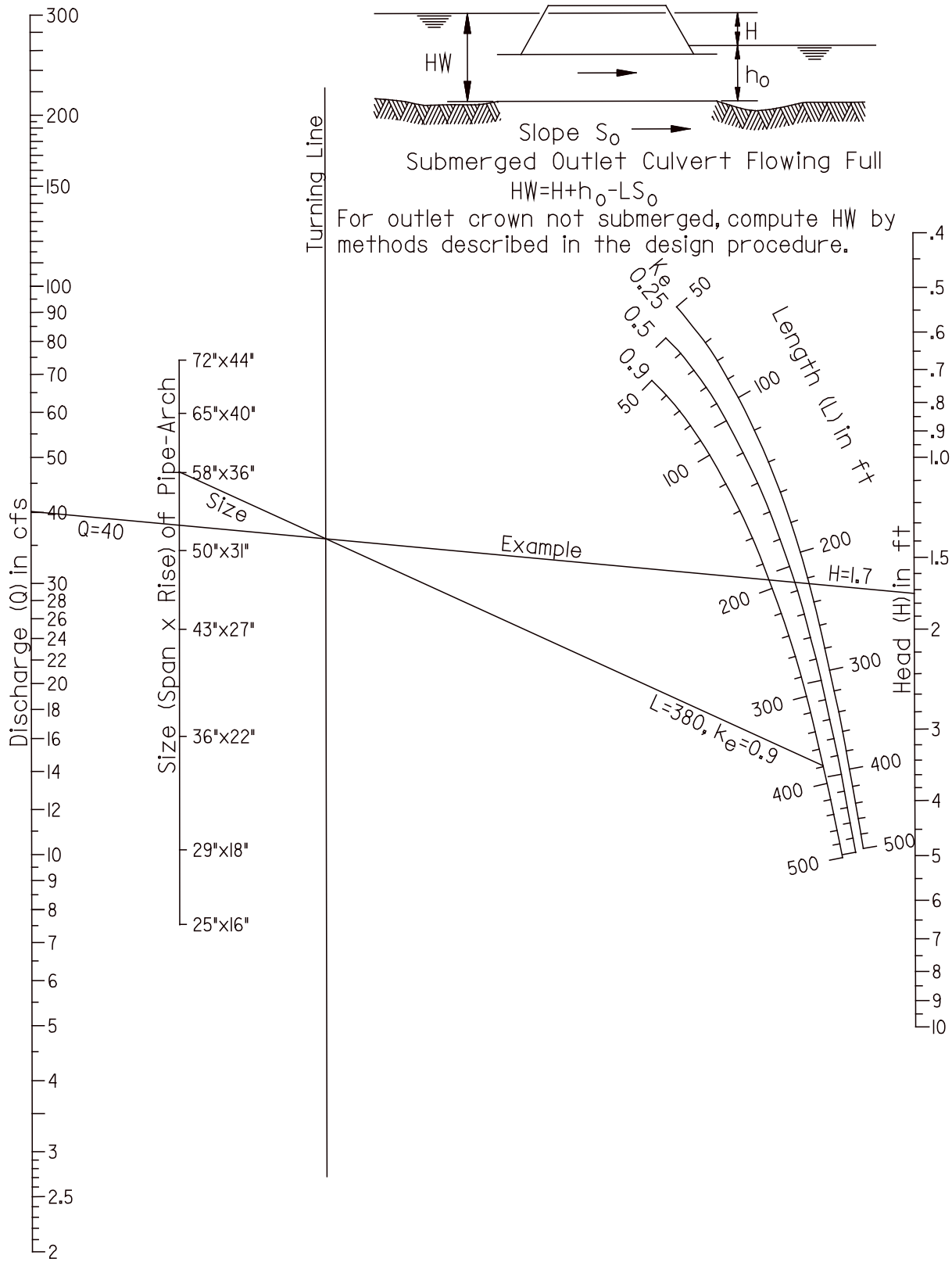


Exhibit F.24 Head for Standard CMP-Arch Culverts Flowing Full (n=0.024)
(Source: Reference F.1)

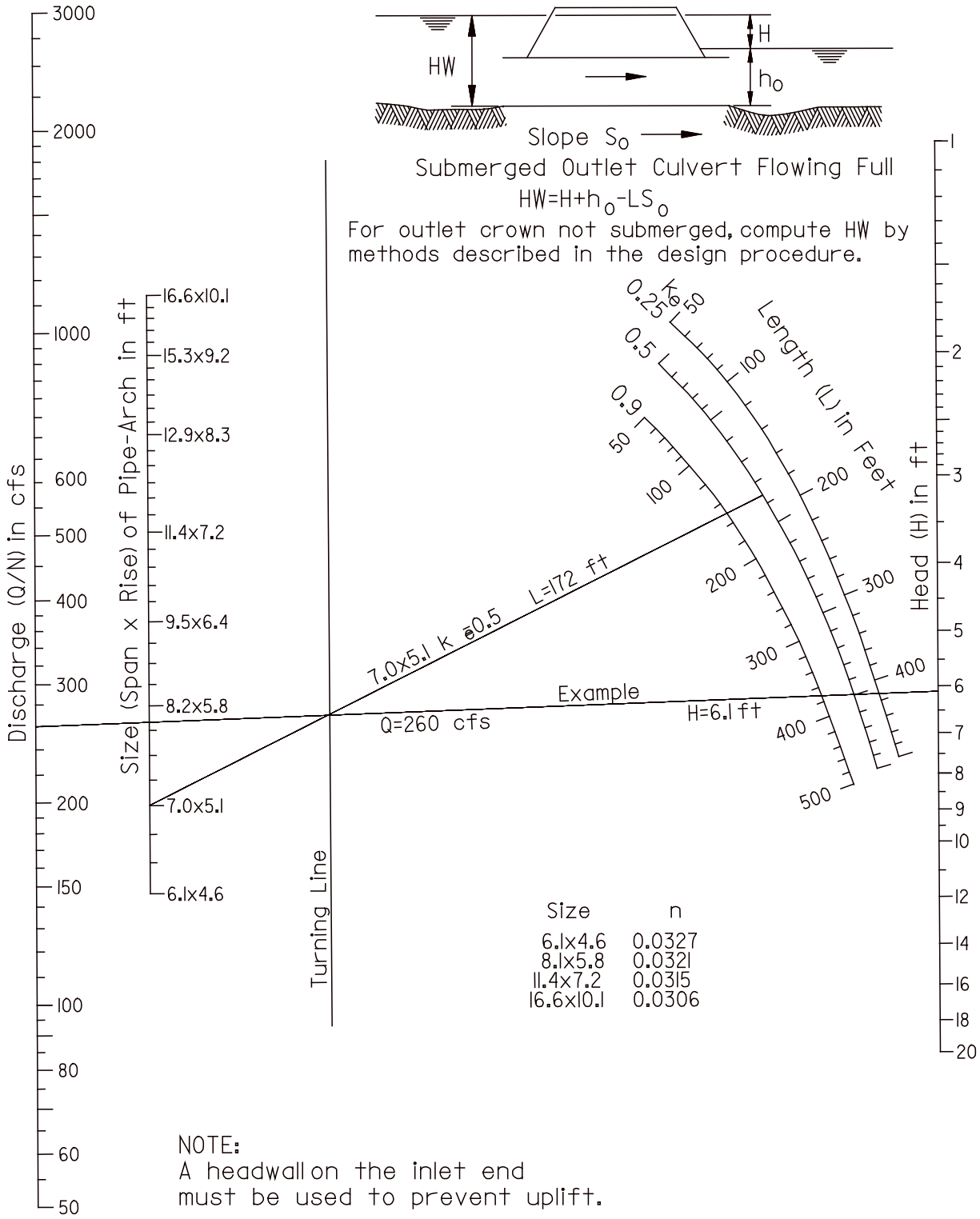


Exhibit F.25 Head for Structural Plate CMP-Arch Culverts with 18 in. Corner Radius Plate Flowing Full (n=0.0327 to 0.0306) (Source: Reference F.1)

REFERENCES

F.1 U.S. Department of Transportation, Federal Highway Administration, Hydraulic Design of Highway Culverts, Hydraulic Design Series No. 5, September, 1985. (http://www.fhwa.dot.gov/bridge/hydpub.htm#hec)

F.2 American Concrete Pipe Association. (http://www.concrete-pipe.org/index.php?cp_Session=805edca166f308d21f57c53735e572af)