

Exercise 2. Hydrology: By-Pass Flows

Unnamed Tributary to Rountree at West Main Street

By-Pass Pumping

Assume a new structure can be placed in a few days and that pumping is a viable alternative to pass flows around the construction site. Using the information provided below, determine the drainage area (page 4), the construction period, flow rate per sq mi of drainage area for that period (page 2) and the pump capacity that would be needed to by-pass the flow (page 3). In this case, use the average of the 11 Platteville area streamflow gages and the highest monthly flow for that period. What additional pump capacity might you want to have readily available?

Drainage Area (sq mi): 0.64 Construction Period (months): June - Oct

Ave Flow During Construction Period: 1.0 (cfs/sq mi) x 0.64 (sq mi) =
0.64 (cfs) = 300 (gal/min)

Diversion Pipe

Assume that construction of a new culvert will require several weeks and a diversion pipe with the capacity to pass Q_2 will need to be installed. From the information provided below, determine the drainage area and Q_2 (page 4), culvert type (circular or pipe-arch) and culvert size (assuming inlet control, page 5 or 6). State your assumption regarding HW/D ratio keeping in mind the diversion dam (sheet piling, sand bags, etc) must allow for the planned headwater without overtopping.

Drainage Area (sq mi): 0.64 Q_2 (cfs): 89.4 HW/D Ratio: 1.0

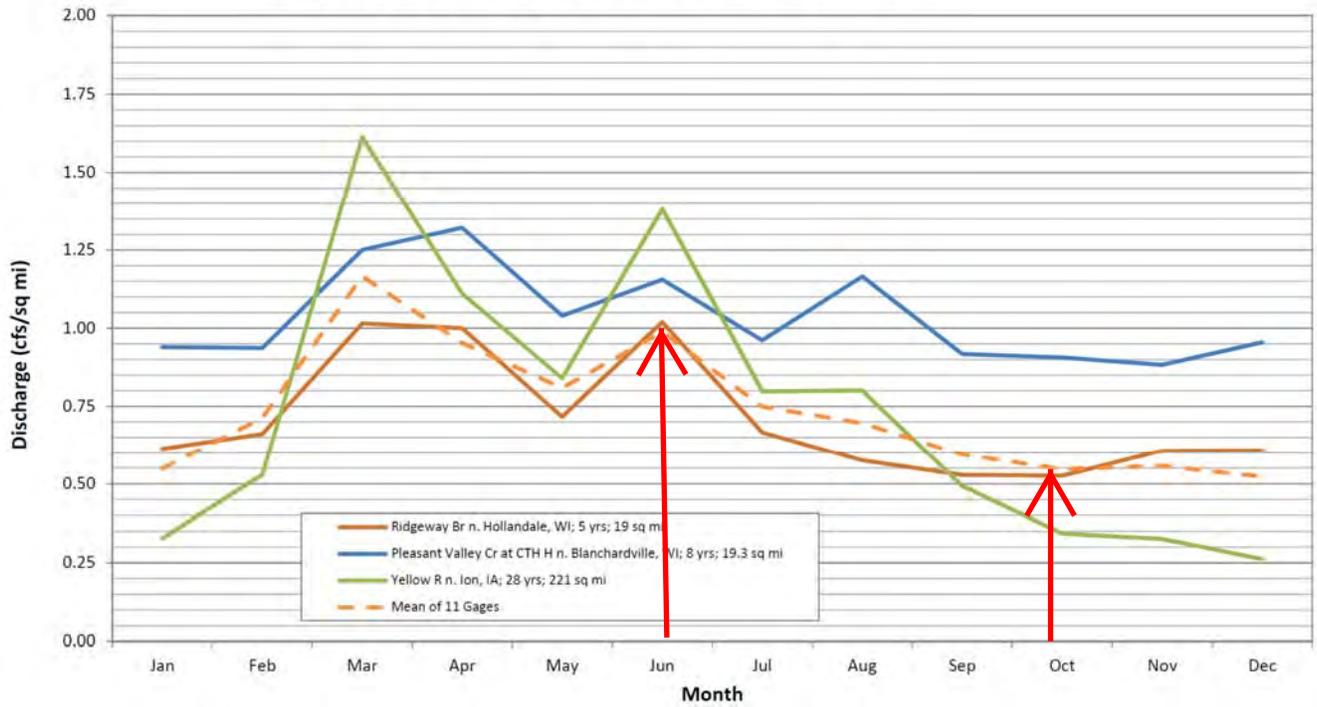
Culvert Type (circle one): circular / pipe-arch Culvert Size (inches): 54"

(top of sheet piling or coffer dam about 60" or 5' above invert)

(or a 72"x44" cmp pipe-arch with top of sheet piling or cofferdam about 48" or 4' above the invert)

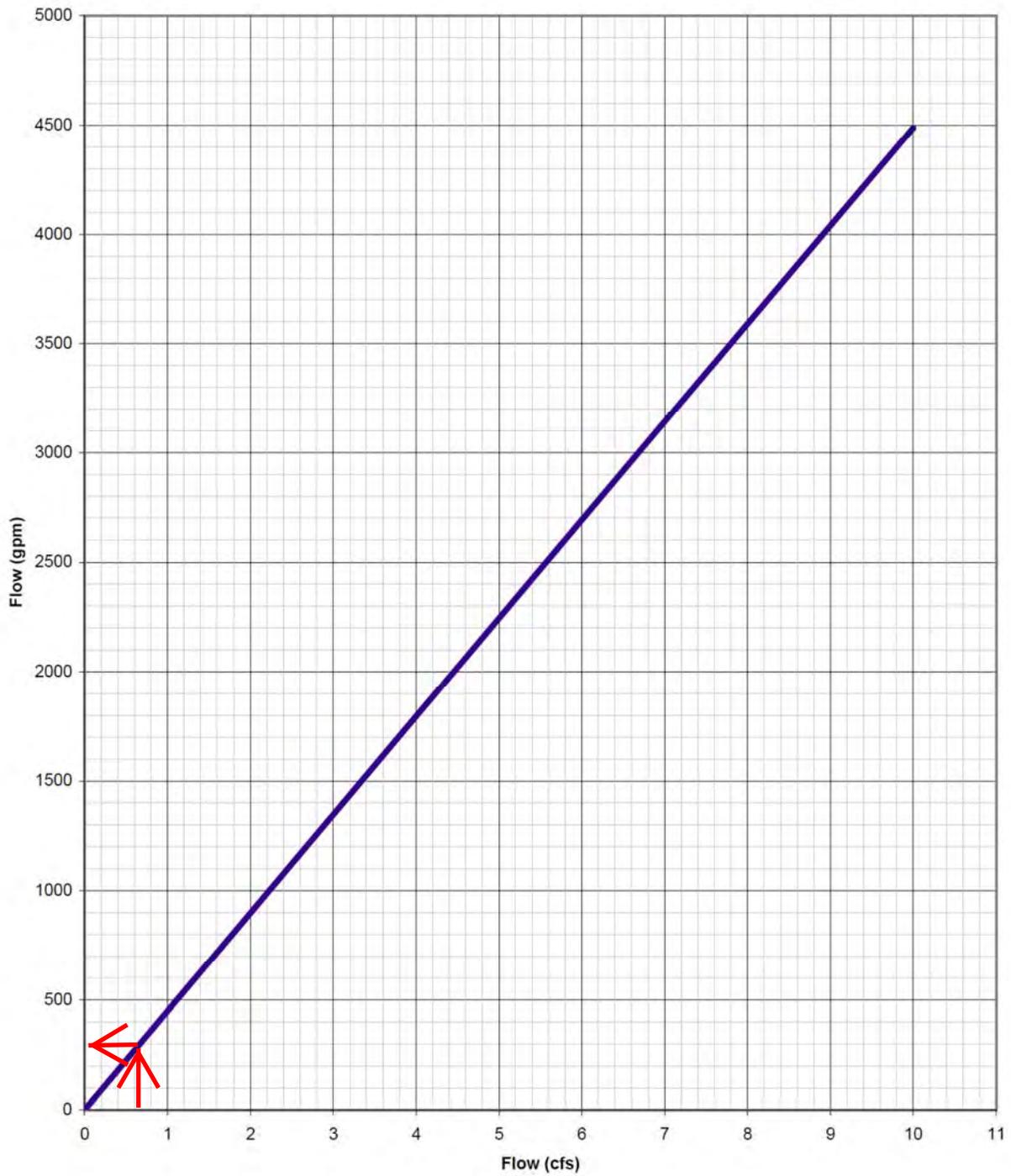
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Average Monthly Flows for Platteville, WI Area



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Conversion of Flow from Cubic Ft/Sec (cfs) to Gallons/Min (gpm)



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routree_w-main-st_flood_flow_report_rural2-wi.txt
 National Streamflow Statistics Program
 Version 6.1
 Based on Techniques and Methods Book 4-A6
 Equations from database C:\Users\dhiggins\Documents\hydro\nss\NSS_v6_2014-10-07.mdb
 Updated by tkoenig 10/7/2014 2:48:48 PM Add statlabels for MO 2013-5090 and WV
 2010-5185

Site: Rountree Trib at W Main St, Platteville, WI, Wisconsin

User:

Date: Friday, February 19, 2016 09:15 PM

Equations for Wisconsin developed using English units

Rural Estimate: Rural 2

Basin Drainage Area: 0.64 square miles

I Region

Region: Area_1 (Walker, J.F., and Krug, W.R., 2003, Flood-Frequency Characteristics of Wisconsin Streams: U.S. Geological Survey Water-Resources Investigations Report 03-4250, 37 p.)

Drainage_Area = 0.64 square miles

24_Hour_25_Year_Precipitation = 5.29 inches

Stream_Slope_10_and_85_Method = 121 feet per mi

Percent_Forest = 5.31 percent

Crippen & Bue Region 6

Results for: Rural 2

Equations used:

PK2 = 99.9* (DRNAREA)^{(0.652)*} (I24H25Y-4.2)^{(7.52)*} (FOREST+1)^(-0.254)

PK5 = 190* (DRNAREA)^{(0.634)*} (I24H25Y-4.2)^{(8.45)*} (FOREST+1)^(-0.26)

PK10 = 35* (DRNAREA)^{(0.857)*} (I24H25Y-4.2)^{(6.92)*} (CSL10_85)^{(0.463)*}
 (FOREST+1)^(-0.302)

PK25 = 38.1* (DRNAREA)^{(0.876)*} (I24H25Y-4.2)^{(7.16)*} (CSL10_85)^{(0.518)*}
 (FOREST+1)^(-0.308)

PK50 = 41.4* (DRNAREA)^{(0.884)*} (I24H25Y-4.2)^{(7.36)*} (CSL10_85)^{(0.545)*}
 (FOREST+1)^(-0.31)

PK100 = 44.2* (DRNAREA)^{(0.893)*} (I24H25Y-4.2)^{(7.56)*} (CSL10_85)^{(0.571)*}
 (FOREST+1)^(-0.312)

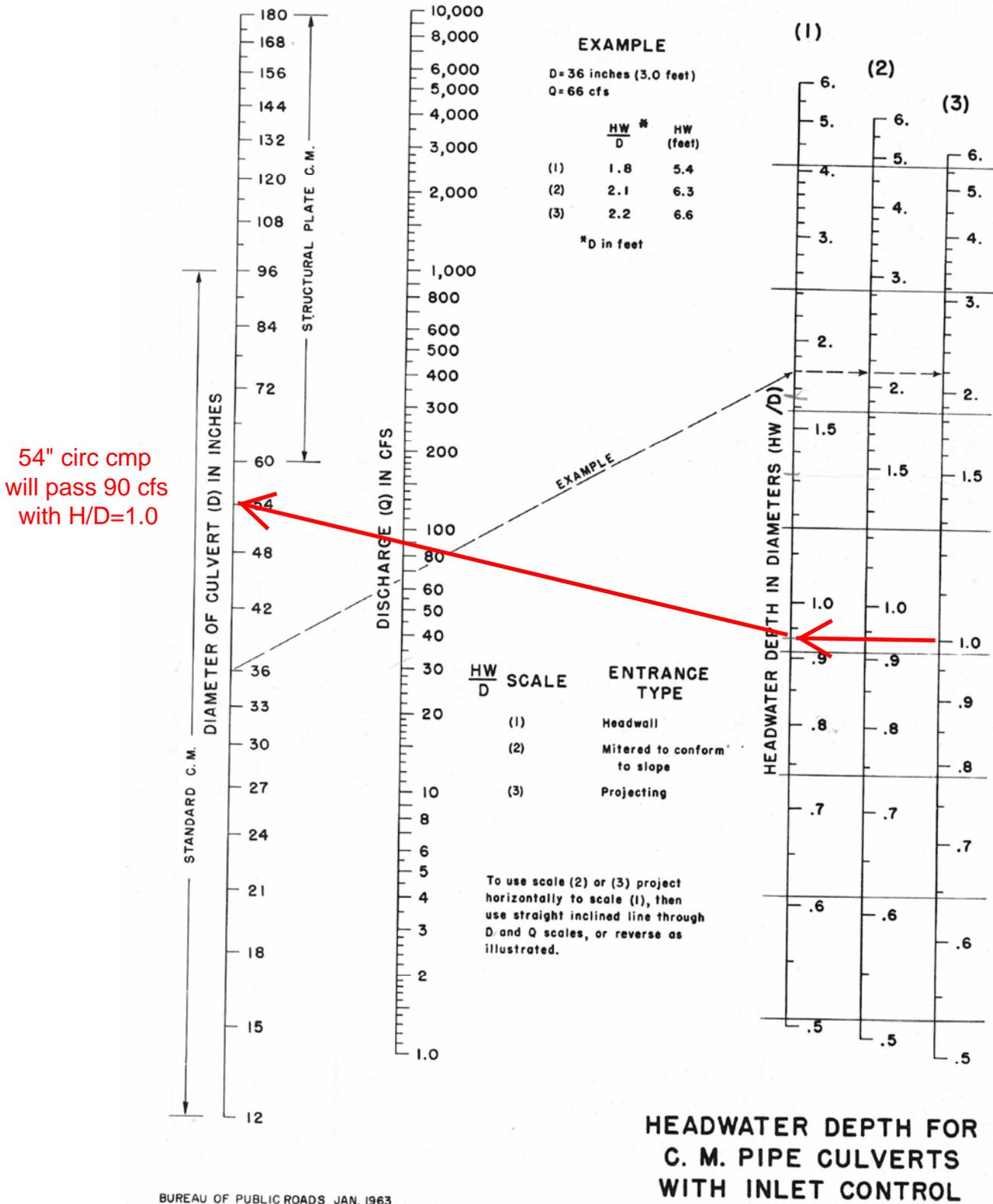
PK500 = 0

| Statistic | Value, cfs | Estimate Error, % |
|-----------|---------------|----------------------|
| PK2 | 89.4 | 43 |
| PK5 | 184 | 40 |
| PK10 | 229 | 38 |
| PK25 | 325 | 40 |
| PK50 | 406 | 42 |
| PK100 | 495 | 44 |
| PK500 | 694 * | |

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CHART 2

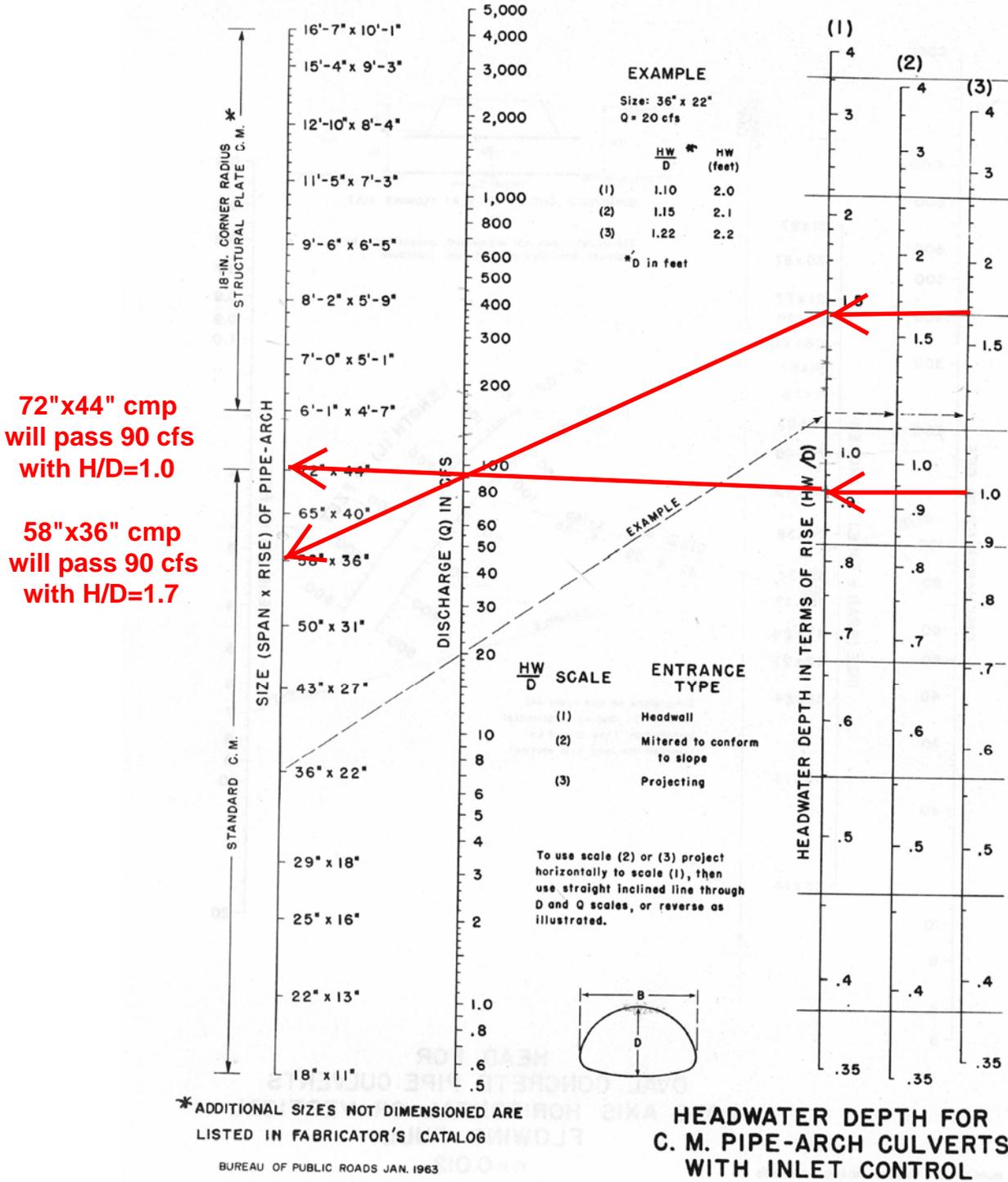


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CHART 34



72"x44" cmp will pass 90 cfs with H/D=1.0

58"x36" cmp will pass 90 cfs with H/D=1.7