
BRONCO WASH PALEOFLOOD SITE
HOUSE & PEARTHREE
1994


1994


1994

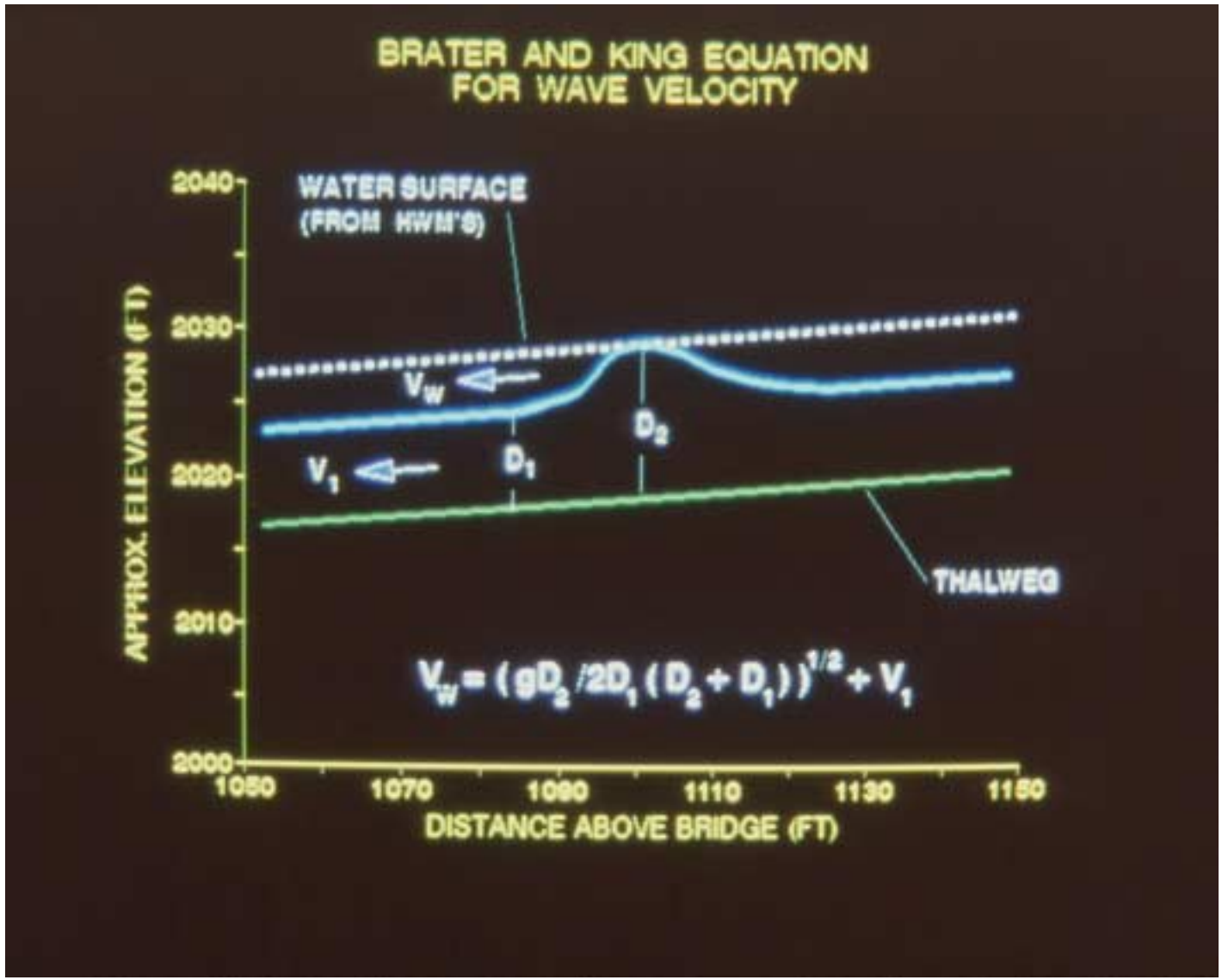
EYEWITNESS ACCOUNT

(ADOT EMPLOYEE WHO CLOSED HWY TO TRAFFIC)

"Waves 4 -5 ft high
at 4-5 minute intervals"

"Waves traveled 400-500 yards
in 30-45 sec."

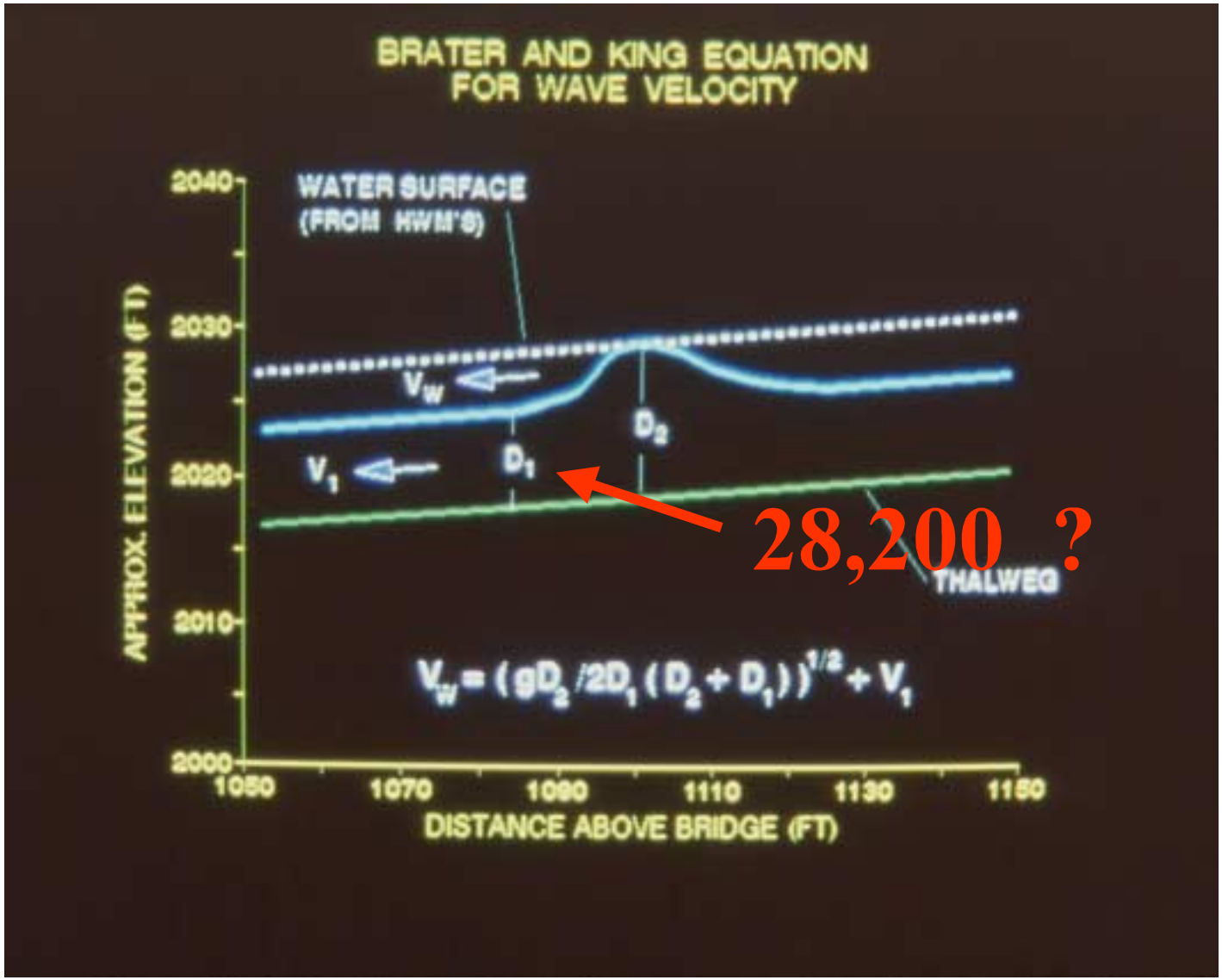
"2 hour duration of waves"


BRATER AND KING EQUATION
FOR WAVE VELOCITY
WATER SURFACE
(FROM HWM'S)
APPROX. ELEVATION (FT)
2040
2030
2020
2010
2000
V_W
V_1
D_1
D_2
THALWEG
$V_W = (gD_2/2D_1(D_2 + D_1))^{1/2} + V_1$
1050
1070
1090
1110
1130
1150
DISTANCE ABOVE BRIDGE (FT)

DISCHARGES (ft^3/s)

23,900	Sum of paleoflood estimates (House & Pearthree 1995)
38,000	Sum of conveyance-slope estimates (Hjalmarson, 1971)
28,200	at Bridge (Carmody, 1980)(House & Pearthree, 1995)
~~73,500~~	~~at Bridge (published by USGS)~~
96,700	at Bridge (original computation by Hjalmarson, 1971)

?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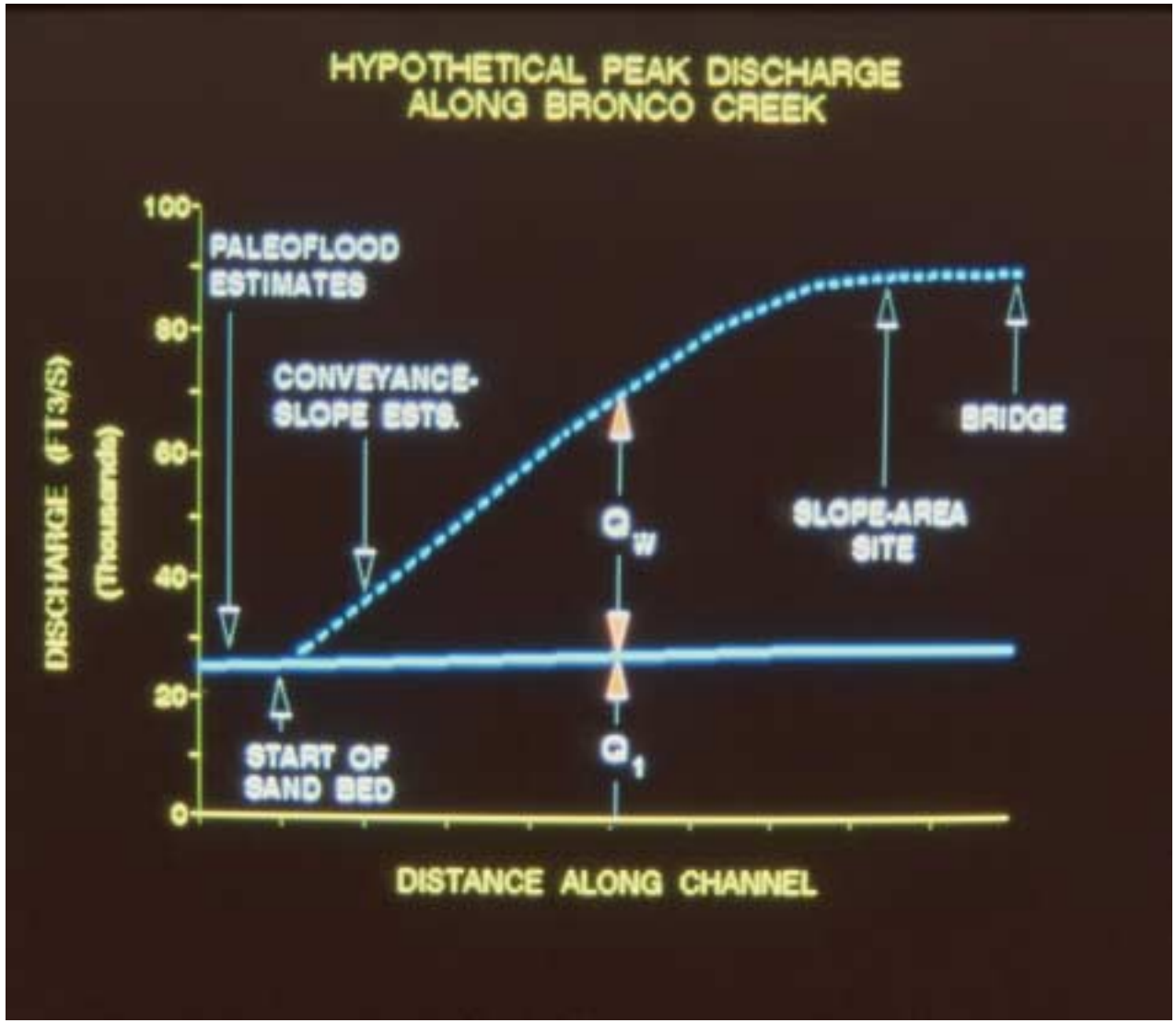
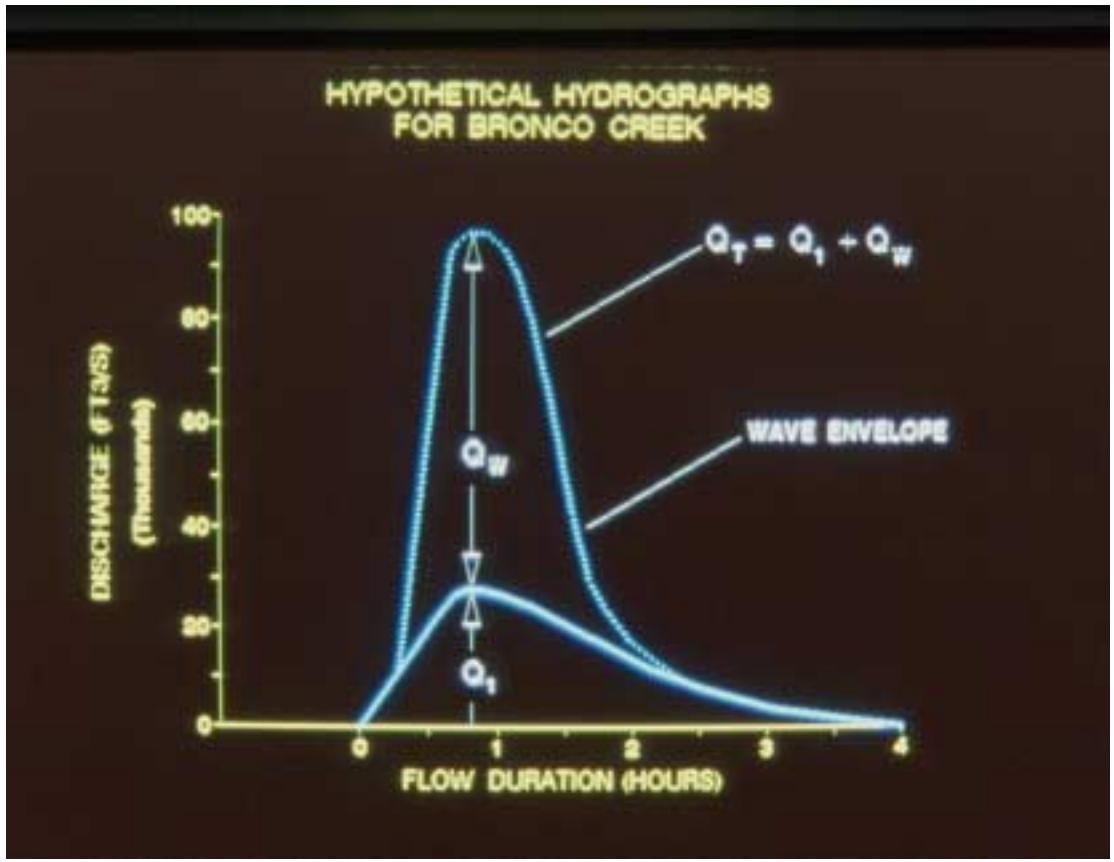

HYPOTHETICAL PEAK DISCHARGE
ALONG BRONCO CREEK
DISCHARGE (FT3/S)
(Thousands)
100
80
60
40
20
0
PALEOFLOOD
ESTIMATES
CONVEYANCE-
SLOPE ESTS.
BRIDGE
SLOPE-AREA
SITE
Q_w
Q_1
START OF
SAND BED
DISTANCE ALONG CHANNEL


HYPOTHETICAL HYDROGRAPHS
FOR BRONCO CREEK
DISCHARGE (FT3/S)
(Thousands)
100
80
60
40
20
0
$Q_T = Q_1 + Q_W$
WAVE ENVELOPE
Q_W
Q_1
0
1
2
3
4
FLOW DURATION (HOURS)

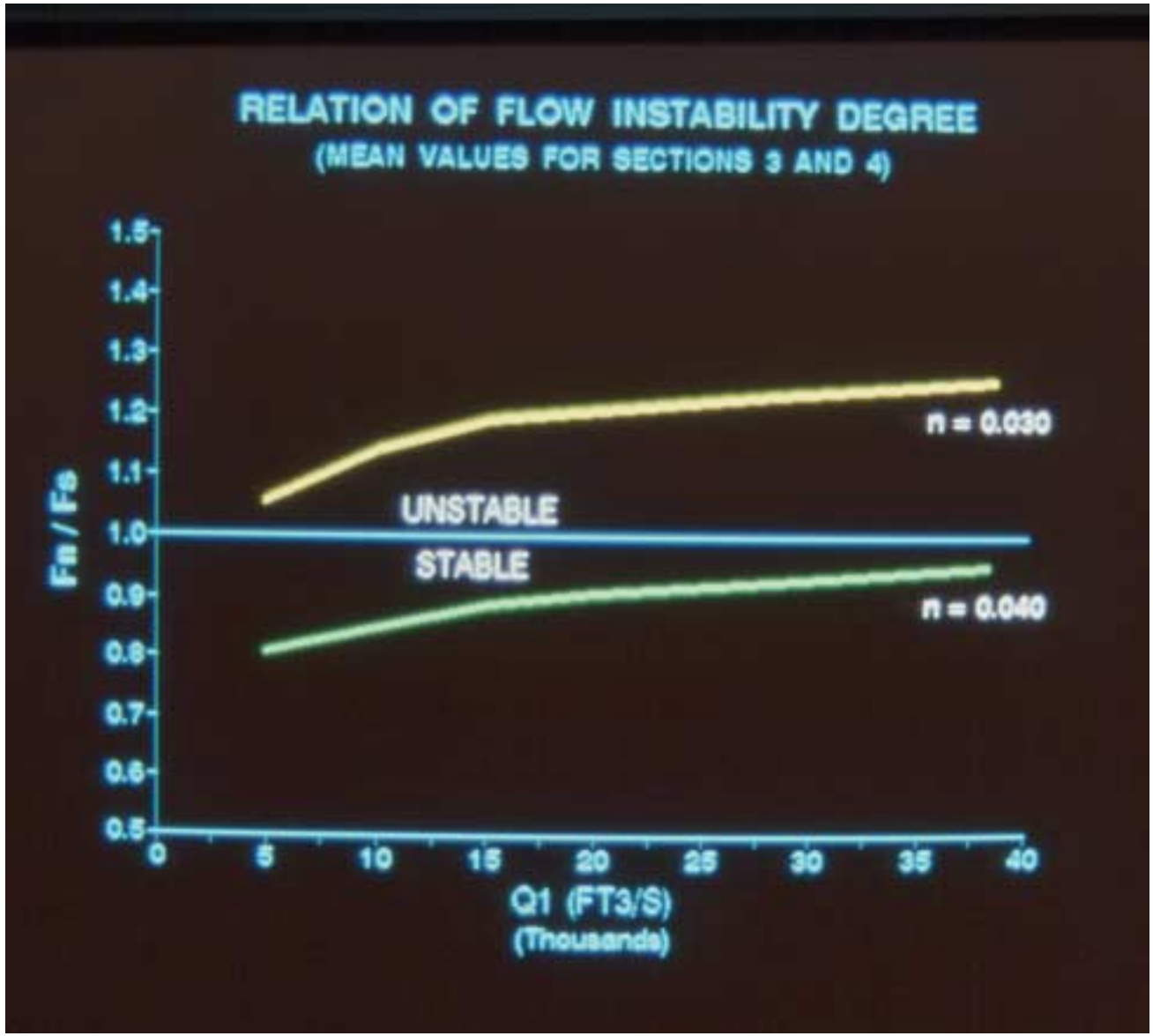
Mr. & Mrs. H. Hialmarson

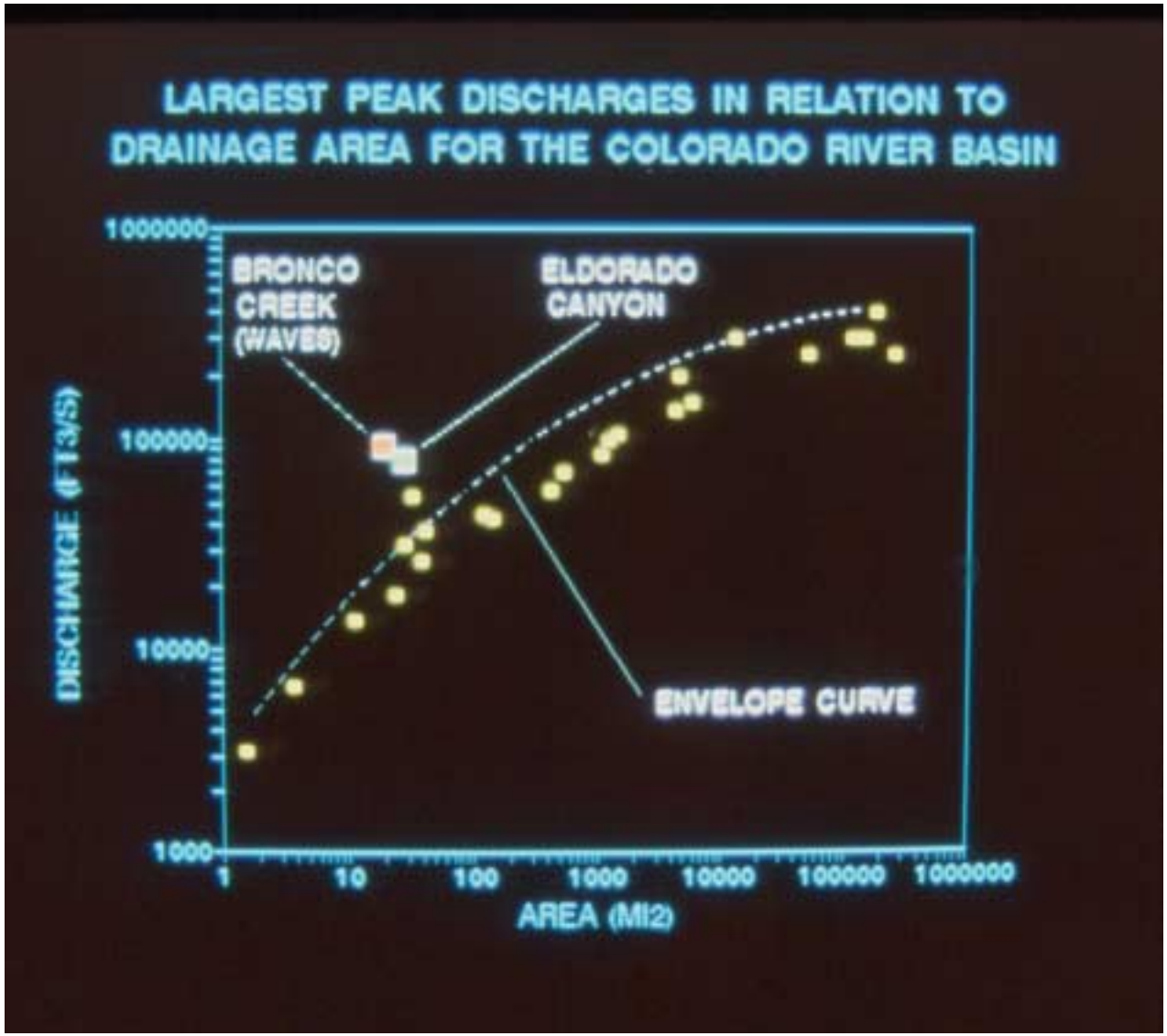
1549-C
KOLOSEUS
DAVIDIAN

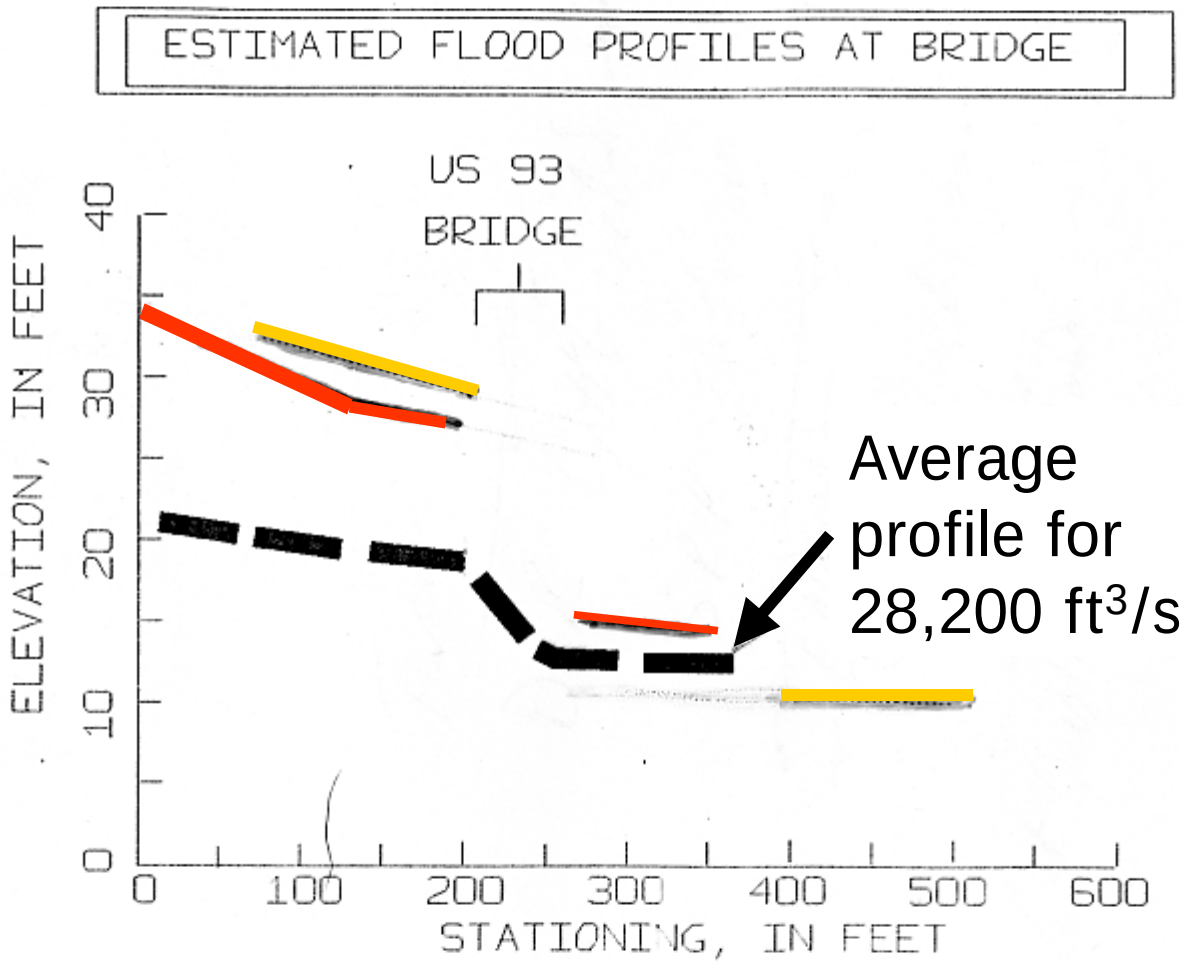
Free-Surface Instability Correlations *and* Roughness-Concentration Effects on Flow Over Hydrodynamically Rough Surfaces

GEOLOGICAL SURVEY WATER-SUPPLY PAPER 1592-C, D

Prepared in cooperation with the Iowa Institute of Hydraulic Research


RELATION OF FLOW INSTABILITY DEGREE
(MEAN VALUES FOR SECTIONS 3 AND 4)
Fn / Fs
1.5
1.4
1.3
1.2
1.1
1.0
0.9
0.8
0.7
0.6
0.5
n = 0.030
UNSTABLE
STABLE
n = 0.040
0
5
10
15
20
25
30
35
40
Q1 (FT3/S)
(Thousands)


LARGEST PEAK DISCHARGES IN RELATION TO
DRAINAGE AREA FOR THE COLORADO RIVER BASIN
BRONCO
CREEK
(WAVES)
ELDORADO
CANYON
ENVELOPE CURVE
DISCHARGE (FT3/S)
1000000
100000
10000
1000
1
10
100
1000
10000
100000
1000000
AREA (MI2)


ESTIMATED FLOOD PROFILES AT BRIDGE
US 93
BRIDGE
ELEVATION, IN FEET
0
10
20
30
40
0
100
200
300
400
500
600
STATIONING, IN FEET
Average profile for 28,200 ft³/s

SITE	ASSUMPTION	CONDITION
Bridge	Gradually varied flow	Large drop of water surf.
Slope-area	Stable flow	Steep-smooth channel
	Stable channel	Mobile sand bed
Paleoflood	Known hydraulics	Rough-steep-irregular channels
	Stable flow	Steep-smooth channel

UNSTABLE FLOW

GRAVITY FORCE > BOUNDARY RETARDING FORCE

$$V_{WAVE} = CELERITY + V_{BASE}$$

FAVORABLE CONDITIONS

LARGE WIDTH-DEPTH RATIO

LOW ROUGHNESS COEFFICIENT

REFERENCES

HUNTER ROUSE & USGS WSP 1592-C

CHARACTERISTICS

Roll waves travel downstream

Breaking front

Waves grow (perhaps always)

Large waves overtake small waves

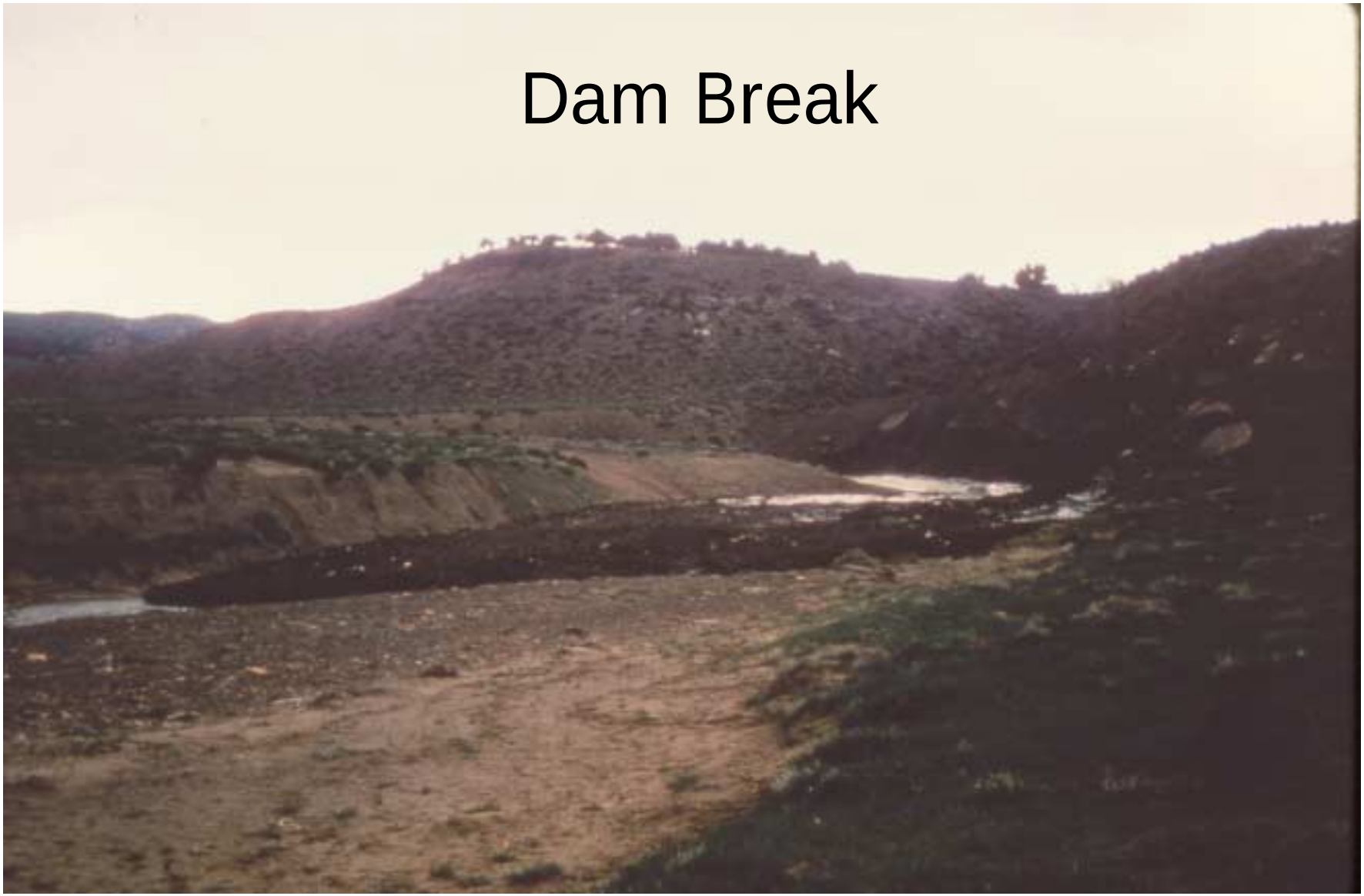
Waves can be separated by dry sections of channel

WAVES IN SOUTHWEST

Standing waves and antidunes in Arizona

Standing waves and antidunes

Dam Break



Roll waves from unstable flow

PALM CANYON

NEAR

BOREGGO SPRINGS, CA

AUGUST 16, 1979