COACHELLA CANAL

UNDERWATER CONCRETE LINING STUDY

BY

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MS-884 (10-83)
Bureau of Reclamation

UNITED STATES GOVERNMENT

memorandum

D-3751 [illegible] P564

Memorandum

TO : Chief, Water Conveyance Branch

Denver, Colorado
DATE:
January 30, 1990

FROM : Chief, Hydraulics Branch

SUBJECT: Coachella Canal Underwater Concrete Lining Study - Request for Assistance (Canal Lining)

During the initial underwater lining tests at Coachella Canal, it was reported that erosion occurred underneath the leading edge of the side current dam. The erosion occurred in an area where repairs are impossible before the secondary pass of the paver.

A 1:12 scale sectional model was constructed and installed in the Hydraulic Laboratory's 3-foot sloping flume (see figs. 1 and 2). Prototype flow of 700 ft^3/s, with flow depth of 10 feet (10 inches model), was simulated in the model.

Originally, it was thought that the pressure differential between the canal water surface elevation and the water surface elevation inside the current dam caused the erosion. Model velocity measurements were taken near the upstream corners of the current dam (see fig. 3). The data show that the highest velocities occur diagonally across the leading corner, underneath the current dam. Various combinations of open area to the side current dam were tried to lower the velocities. This approach was not effective in decreasing the flow velocities. A 5-foot radius bull nose, open half cylinder, was installed on the leading current dam. This helped the flows considerably (see fig. 4) and lowered the velocities under the current dam by about 20 percent. A 10-foot-wide (10-inch model) section on the side current dam was then lowered to within 3 inches (prototype) of the bottom of the canal (see fig. 5). From the measured velocities, it was determined that only a 6-foot-long section of the side current dam was necessary and that it should be as thin as structurally possible to prevent the blunt nose effect, as witnessed before. This extension acts like a current guide vane.

It is recommended that a 5-foot radius, half cylinder, bull nose be installed on the leading current dam. The bull nose should not extend down beyond the bottom of the leading current dam and should not extend out beyond the side current dam. The leading section (first 6 feet) of the side current dam should extend down to within 3 inches of the bottom of the canal. This extension should be as thin as structurally possible and will act to guide the flow parallel to the side current dam. A short video tape of the test was made and is available upon request.

Enclosures 3

cc: D-3750 FAP file
D-3752
D-3752 (Fitzwater)
(w/ encl to each)

WBR:JRFitzwater:mw:1/31/90:236:66165
a:\coachell.ftz

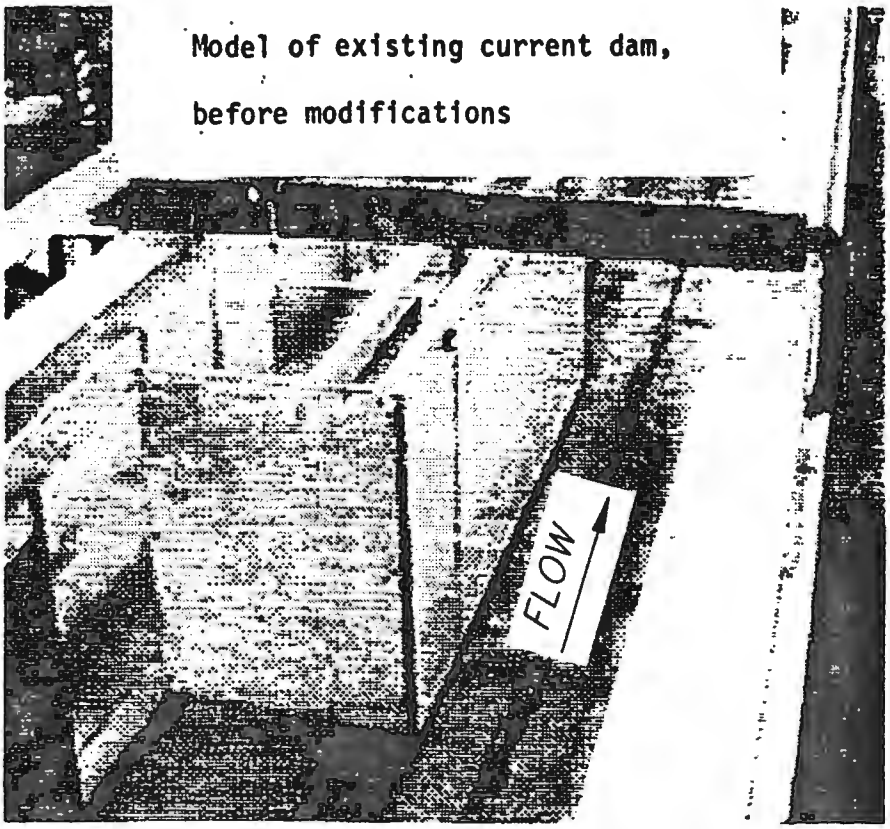

Figure 1

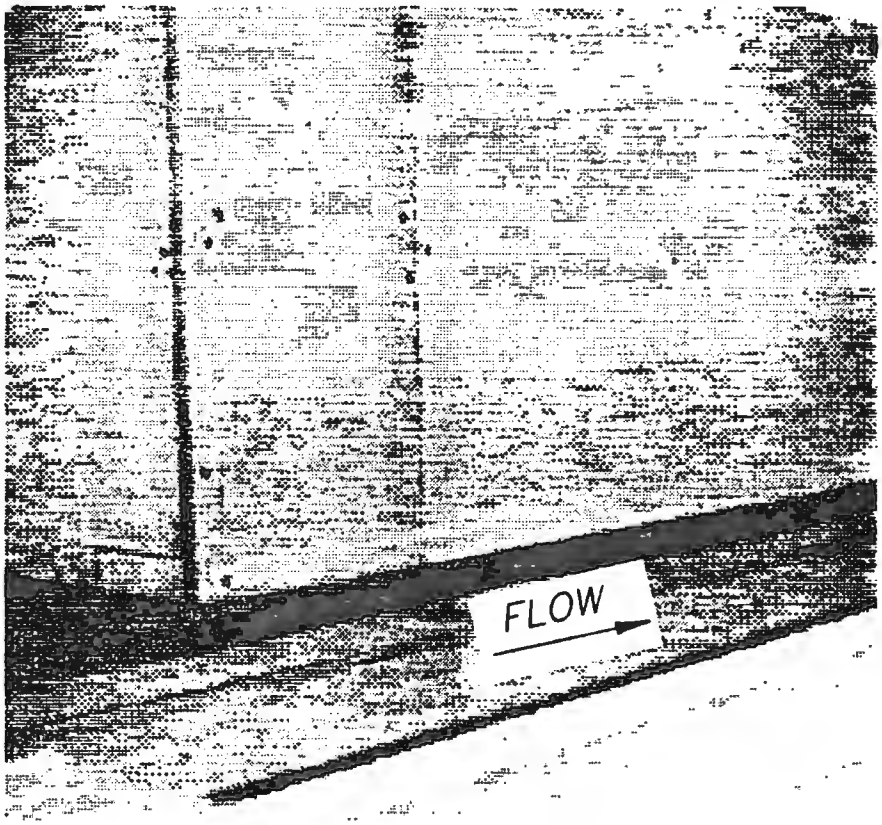

Figure 2

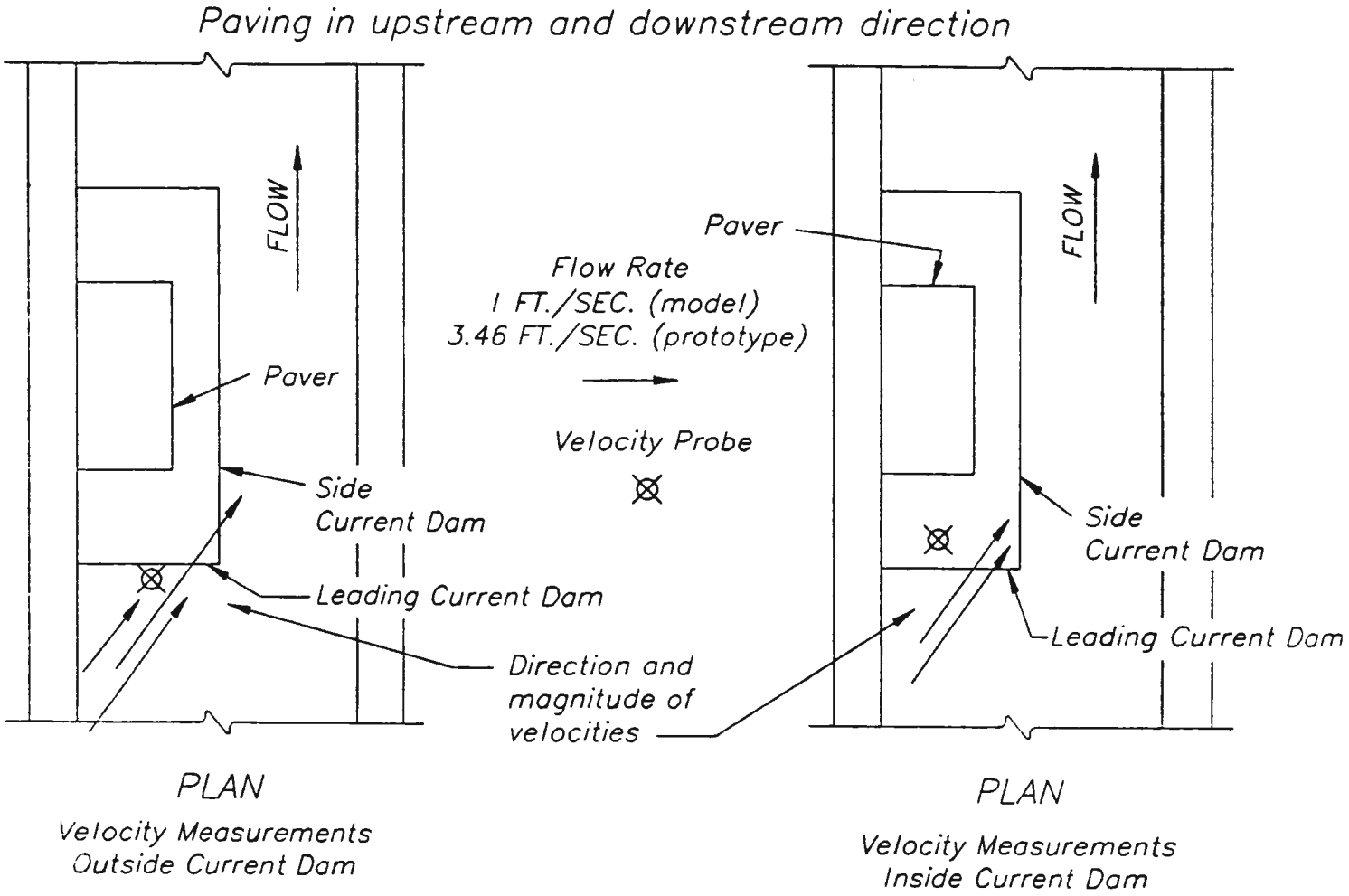

FIGURE 3 Relative Velocities Past Current Dam
Canal discharge = 700 cfs

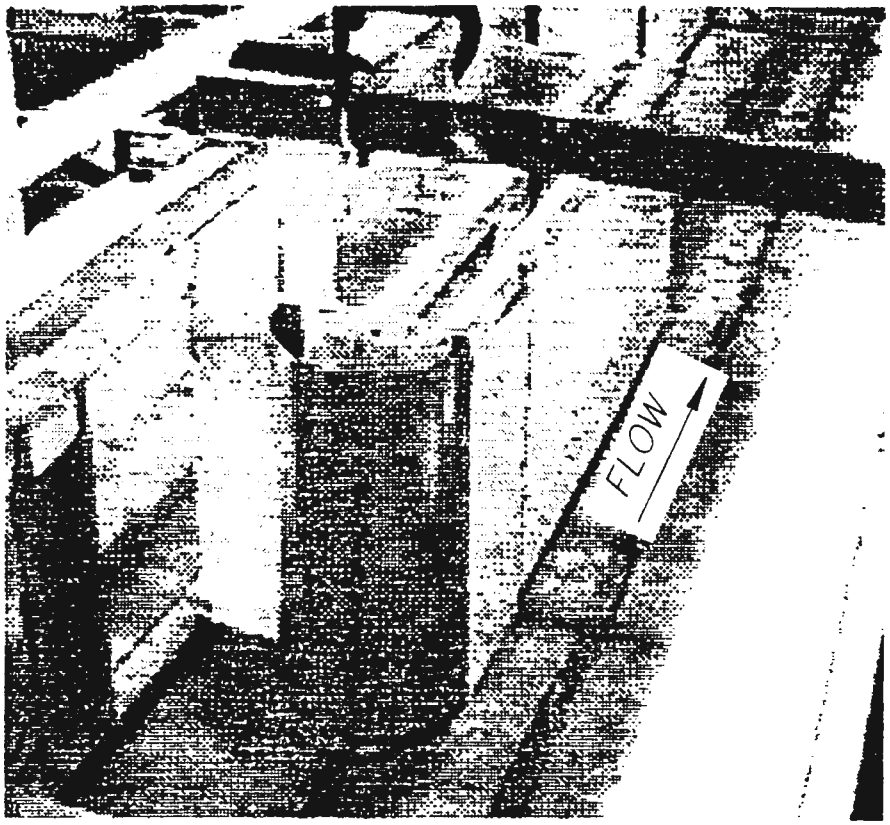

Figure 4 - 1:12 scale model of current dam with "bull nose"

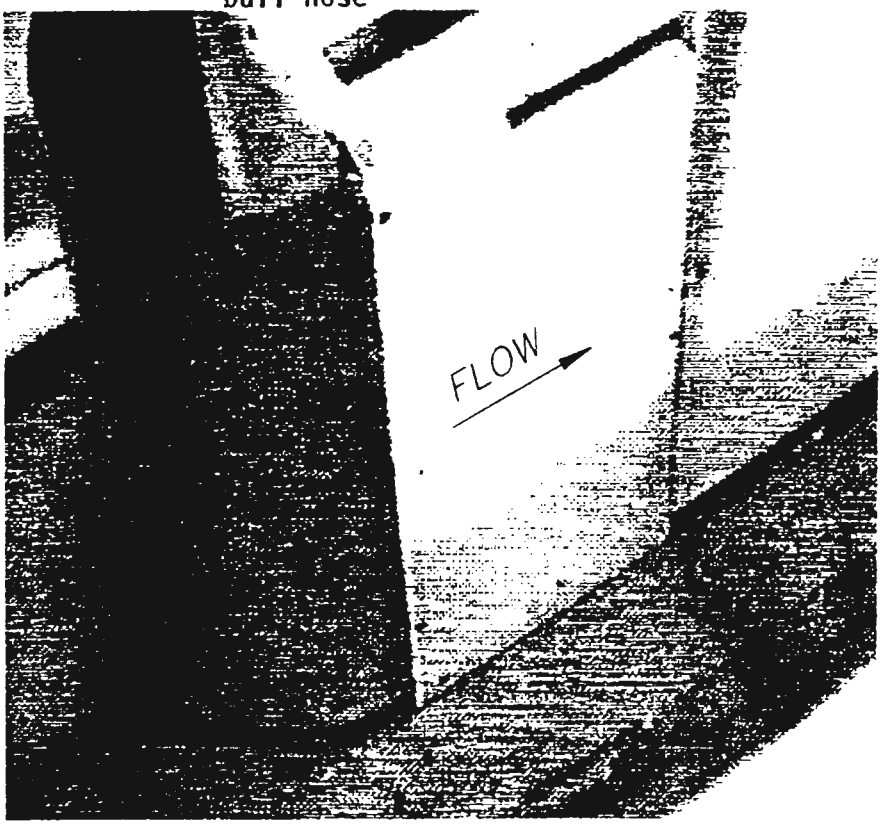

Figure 5 - Closeup view of flow guiding modifications to current dam.