G-1

MISCELLANEOUS

GREENVILLE BRIDGE MODEL STUDY

Greenville E

area around the Leland Bar Vane Dikes. This narrowed the channel in that area. In the model the navigation channel was from miles 535.5 to 533.7 AHP and followed a straighter course from 4.0 to 533.0 AHP than the prototype, which curved more toward the

60. These tendencies should be considered in the evaluation of the model results. Tests of improvement plans should be based on only those changes caused by these plans compared with the results reproduced in the model during verification. It should also be considered that the model does not reproduce the movement of material in suspension, and the bank lines were fixed, with no attempt made to reproduce the degree of erodibility of the banks and sandbars. Also to be considered are the average annual, 1973 flood, and low water hydrographs used for the testing of plans, which could be considerably different from what actually occurs in the river in the future, and the fact that the model surveys were always made during a low-water period.

Summary of Results and Conclusions

61. The following results and general indications were developed from the model study:

a. Model tests A through C, N, and N-1 showed that significant improvements in navigation could not be achieved within the confines of the existing channel alignment.

b. Model tests analyzing sill height and length demonstrated that the highest and longest sills tested (Plan I-3) were the most effective in: widening the channel, improving the top-water current patterns (both in direction and velocity), and encouraging deposition on the outside bank of the bendway.

c. Plan I-4 demonstrated that additional sills were needed downstream of the sill field used in Plan I-3.

d. Plans focused on evaluating optimum sill angle showed that Plans I-3, (30 degree upstream angle) and L, (20 degree upstream angle) were clearly superior to the other angles examined (perpendicular in Plan J and 30 degrees downstream in Plan K). Overall current patterns and the increase in channel width through the sill field appeared equally improved in both Plans I-3 and L. Sediment deposition on the outside of the bend was superior in Plan I-3 and the largest increase in channel width downstream of the sill field was recorded in Plan L. Also, in Plan L an average of 9 ft of sediment was deposited in the deep scour hole upstream of the bridge (4 ft more than in Plan I-3).

e. When compared to all other plans tested in the model, Plan M was the best. The results after three runs on Plan M show a smooth, wide, well-aligned navigation channel throughout the entire

[redacted]nd 84 reach of the river from miles 535.5 to 531.3 AHP, [redacted]ving an average width of 2,230 ft. The narrowest width of the navigation channel was 1,660 ft at mile 533.7 AHP, 2.4 miles upstream of the bridge. An average of 7 ft of deposition occurred in the deep scour hole upstream of the Highway 82 bridge, bringing the average elevation in that area to el -50 ft. Confetti pictures showed that flow through the bend is uniform, with no significant convergence of flow on the outside bank of the bendway. Velocities appeared slightly higher on the inside of the bendway than on the outside.

f. Two problems evident in Plan M were the deep scour around Warfield Point Dike 1 and upstream and off the end of Warfield Point Dike 2, and Island 84 Sills 6 and 7 directing currents toward the left bank upstream of the bridge causing both upbound and downbound tows to engage in a steering correction to avoid getting too close to the left bank. It is felt that changing the angles of these sills from 20 degrees to 10 and 0 degrees, respectively, would rectify this problem.

David L. Derrick
Engineer