

DEVELOPMENT OF NEW MID-STREAM VELOCITY-CAP TYPE RAW-WATER INTAKE ON THE CHATAHOOCHEE RIVER, GEORGIA

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A fixed-bed physical model of DeKalb County Raw Water intake facility, located on the left bank of the Chattahoochee River immediately downstream from Holcomb Bridge Road, Georgia, was built at an undistorted geometrical scale of 1:16 and used to evaluate existing intake structures with regard to sediment management schemes. No feasible solutions were found in controlling sediment intrusion problems with the existing plant. However, a velocity-cap type mid-stream intake scheme developed in the study was found to be a potential alternative for the site. The newly developed water intake consists of an octagonal cap whose sides are covered by intake screens, a cylindrical support structure which is similar to a circular bridge pier, and an intake conduit which is buried in the river bed. The full-scale detailed dimensions of the mid-stream intake developed in this study are shown in Fig. 1. This unconventional water intake could be sediment free because of its self-cleaning action in continually scouring riverbed as river flow passes by, as shown in Fig. 2. The river reach surrounding the intake area is characterized by an alluvial bed lying on solid bed rocks, and the mode of sediment transport is primarily bed loads. No objectionable flow characteristics were observed either at the surface or subsurface of the intake, as determined with the use of dye injection. The flow into the intake appeared to be drawn in from an elevation similar to the structural opening. Little flow seemed to be drawn from above or below the opening. No surface vortices were seen even at the lowest river stage and with a high intake flow rate of 8.8 m³/s, and no surface turbulence was observed in the model. Flow past the old rock weir and present intake became much more uniform with the mid-stream intake under the extremely low flow conditions that the river channel flow approximated more closely that in a uniform trapezoidal channel. However, design considerations must be given to debris controls, screen cleaning schemes, future plans for further increase of the intake flow rate, etc., during a developmental study.

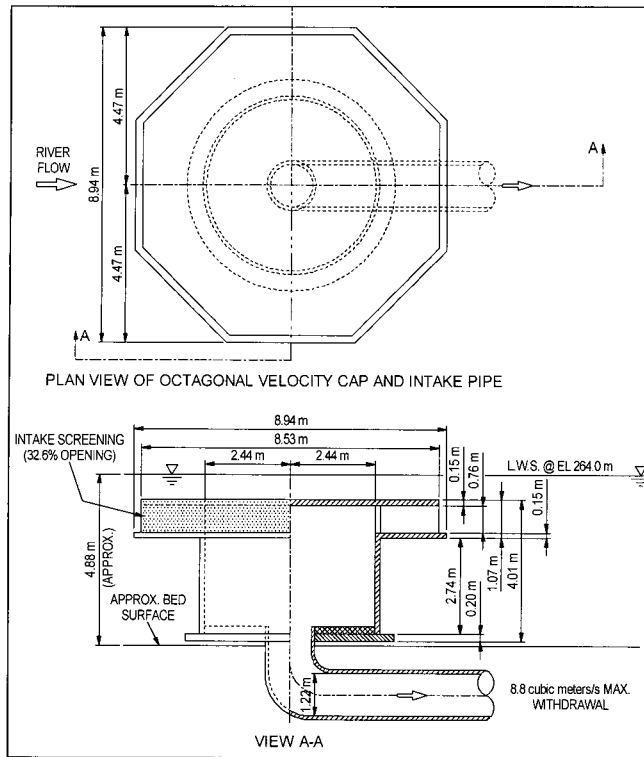


Fig. 1 Mid-stream velocity-cap type water intake that was developed (shown in full scale).



Fig. 2 Scour hole developed around the circular support structure of the mid-stream intake. Note that the model's vertical withdrawal pipe did not have to be buried in the bed because a significant length of the withdrawal pipe was already laid under the river bed downstream from the intake structure (flow direction: from top to bottom of the picture).