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ON SOME PROBLEMS IN THE HAIKI CHANNEL[1)]

By

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From Vol. 3 No. 2 and No. 3.

The Haiki Channel is the channel which communicates between the Sasebo and Ômura Bay in northwestern Kyûshû and its length is about seven kilometers (Fig. 1). Its mean width is about 100 meters, but it is strongly reduced by two jetties at Haiki Machi and Haenosaki Village.

Early in 1944, for the communication between Haenosaki and Akago, the opposite side of Haenosaki across the channel, a project was formed to construct a bridge over the channel near the Haenosaki jetty. This has created a necessity for partial removal of the jetty and for openning a new course in it, since the ship traffic in the channel was seriously checked by the construction of bridge. This project was opposed by villagers on the ground that it made inflow into the channel increase and a part of rice fields became danger of flooding.

The Railway authorities also demanded to investigate its effect upon the railway truck along the channel.

To investigate these problems, I estimated the state of flow after the completion of construction from hydraulic calculations and model tests. Rigorously speaking, these were problems on the flow in the channel connecting to two oscilating water surfaces, i.e. unsteady flow, but for simplicity, they were treated as one of steady flow at the case of the most unfavourable condition.

The width of the channel near the jetty is about 90 m, that of reduced portion 15 m, and that of new opening portion (removed part of the jetty) 15 m. Its intended spot is illustrated in Fig. 2.

Maximum difference of water level by tidal flow before and behind the reduced portion was estimated to be 0.5 m. The change of this difference by partial removal of the jetty has been calculated hydraulically. It has

1) Abstract from the same articles printed in the Reports of Ryutai-Kogaku Kenkyusyo (the Research Institute for Fluid Engineering), Vol. 3, No. 2 and No. 3, 1946 & 1947.

been concluded that the upstream water level was lowered by 0.3 m at most and the downstream one risen by 0.1 m at most. The velocity at the reduced portion might be reduced by half.

The state of flow has been observed by model. It has contained the district of length of about 1200 m in the proximity of the jetty. The horizontal scale was 1 : 500 and the vertical 1 : 50.

As observed maximum discharge in the channel was estimated 40～60 m^3/sec., this was worthy of 1.2～2 *l*/sec. in the model if the Manning law of similarity was established.

The maximum slope of water surface comes to be 1 : 4000, as the maximum difference of water level between the Sasebo and Ômura Bay is observed to be about 1.5 m. Considering the effect of distorted model, the state of flow was observed in the experiments at the conditions in which discharge was 1.2 and 1.8 *l*/sec, and surface slope was 1 : 370 and 1 : 900.

As the effect of partial removal of the jetty, following three cases were considered

(A) the actual state

(B) a part of the jetty is removed near the root (the intended spot)

(C) a part of the jetty is removed at the extremity (for reference)

In each cases, flowing state was observed both at the rising and falling tide. Some of the state of flow is shown in the Figures 3～7 and the Photograph 1～3.

From the model test, the followings were formed as the effect of partial removal of the jetty upon the flow in the channel

(1) The velocity along the Akago shore is considerably reduced and the scouring action along the shore is fairly diminished.

(2) Development of vortex in the central part of the channel near the jetty is sensively decreased and flowing state smoothened

(3) The velocity of tidal flow along the Haenosaki shore increase to some extent, especially at rising tide. The scouring is feared to be increased along the Haenosaki shore at the portion from the jetty to 100 m apart it for Ômura Bay.
There is no sensible change along the revetment of railway truck even at falling tide flow.

It comes to this conclusion that it is the only fact to mind that the water level along the Haenosaki shore will be raised to some extent by this project. The present height of revetment is enough to increase of water level, but it is necessary to strengthen it as its construction is deficient in water tightness.

This project was finished at the summer 1944 and later condition was nearly consistent with the results which were expected from experiments and calculations.

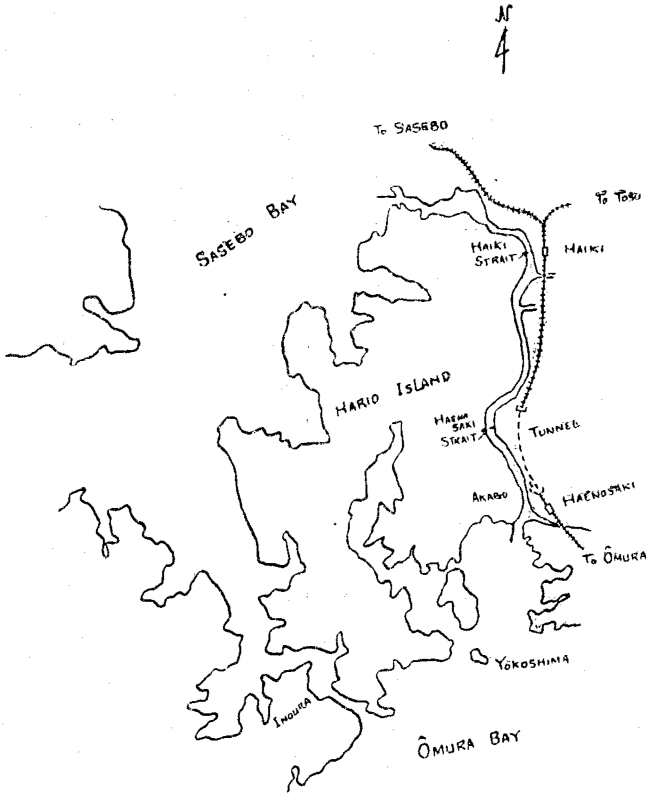

Fig. 1

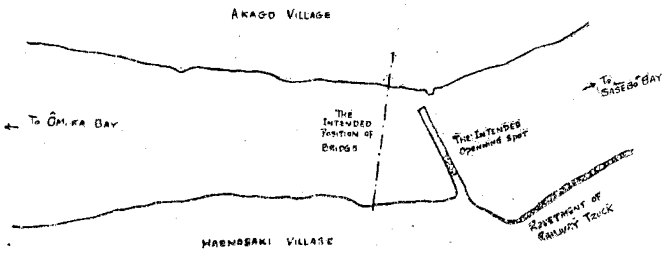

Fig. 2

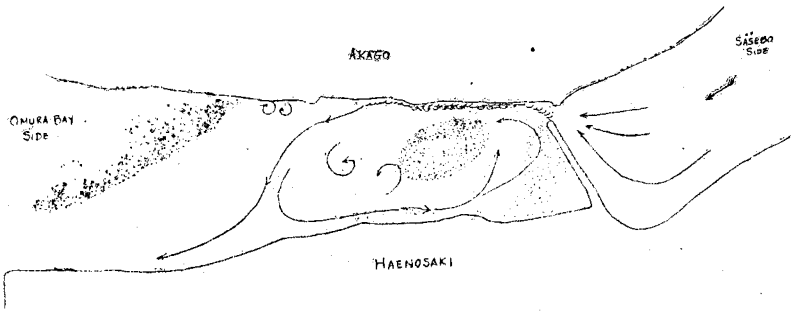

Fig. 3 State A, at the rising tide flow

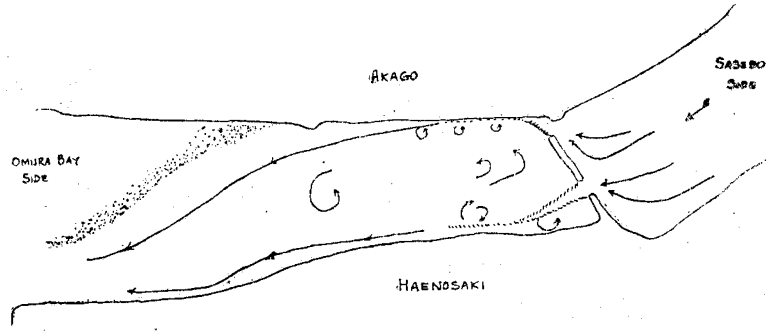

Fig. 4 State B, at the rising tide flow

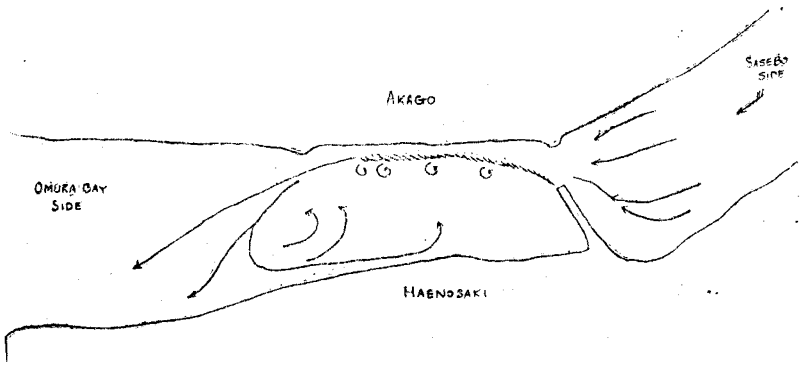

Fig. 5 State C, at the rising tide flow

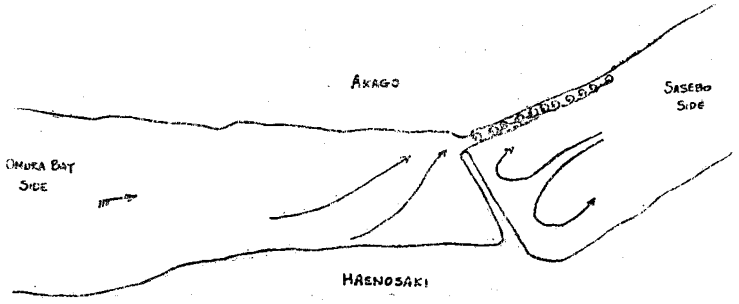

Fig. 6 State A, at the falling tide flow

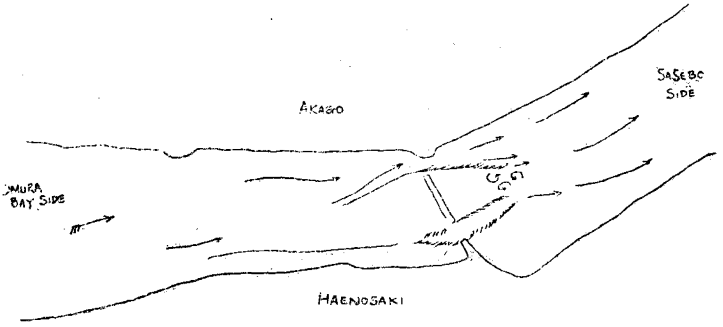

Fig. 7 State B, at the falling tide flow

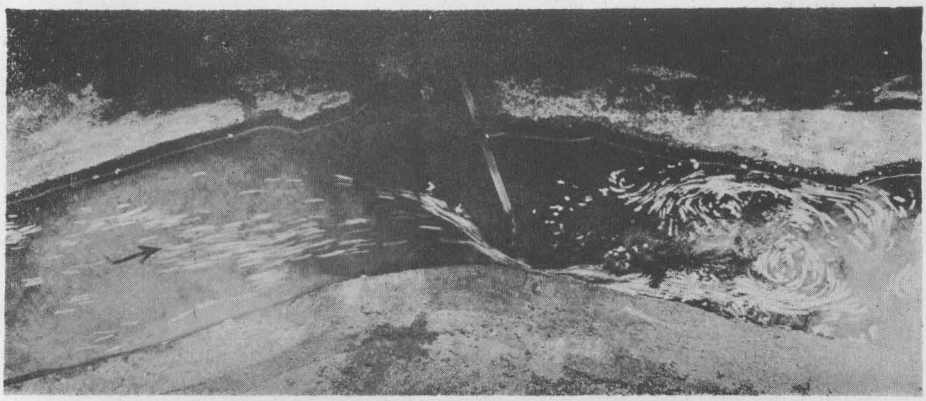

Photo 1 Present state at the rising tide flow

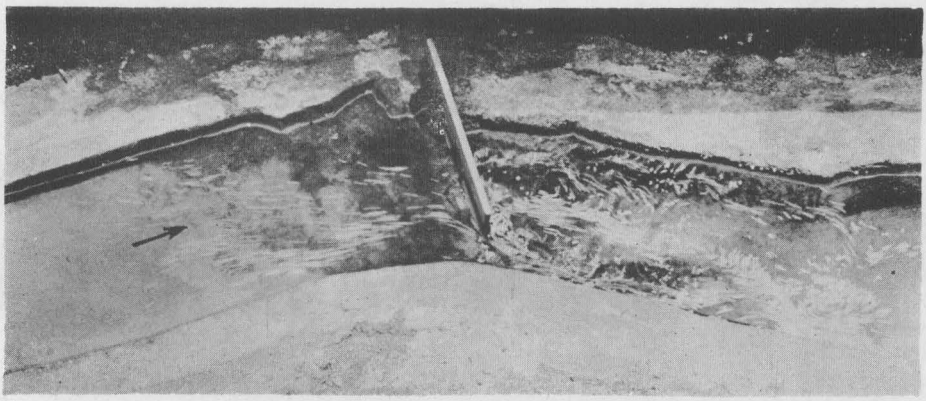

Photo 2 State in (B) at the rising tide flow

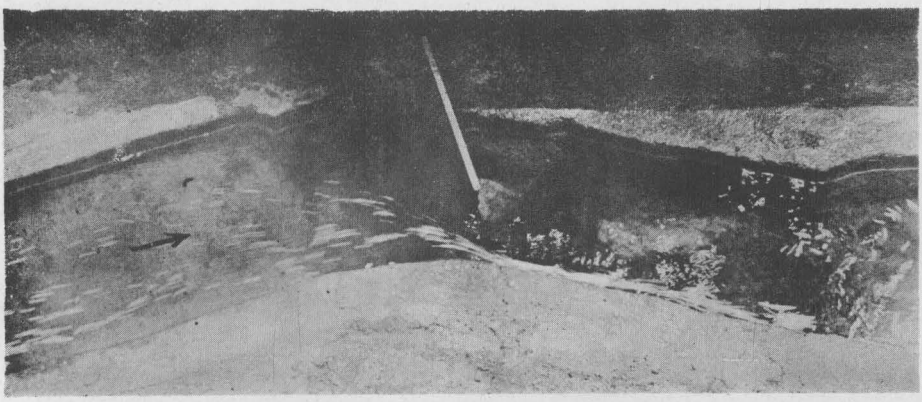

Photo 3 State in (C) at the rising tide flow