KAWASAKI STEEL TECHNICAL REPORT
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Installation of Oxygen Submarine Pipeline in Mizushima Port*

Synopsis:

In the installation work of the oxygen pipeline from Mizushima Works of Kawasaki Steel to Okayama Works of Tokyo Steel Mfg. Co., Ltd., a submarine pipeline was installed in the Mizushima Port by the floating tow method after various studies. A long and deformed pipeline was


Installation place

was suggested. These determination and suggestion were observed in carrying out the work. Also, especially

3.3 Determination of Earth-Covering Thickness

tion to see if there were any dangerous objects such as

lowing order:

mines or blind shells.

(1) Studying the Largest Ships Expected to Navigate

$$v_c = \sqrt{\frac{A}{B}} \quad \cdots\cdots (2)$$

$$A = \left(1 - \frac{w_o}{w_s}\right) g$$

$$\Delta H = 0.520 + 0.235 \frac{E}{S} \quad \cdots\cdots (5)$$

$$E = \frac{1}{2} \frac{W}{g} v_m^2$$

$$B = \frac{w_o}{2W} \times C_D S$$

where,

w_o, w_s: Unit volume weights (kg/cm^3) of sea water and anchor, respectively

W: Anchor weights (2.1 t)

estimated as follows:

(a) When the anchor is fallen on sand soil, $\Delta H = 0.54$ m

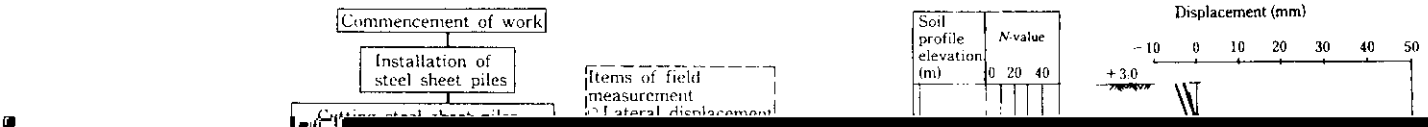
(b) When the anchor is fallen on cohesive soil, $\Delta H = 1.55$ m

(4) Estimation of the Depth of Encroaching by Anchor Running

(5) Determination of Earth-Covering Thickness
The depth of penetration by anchoring and draging anchor is estimated as follows for the location where

loads due to earthquake or temperature variation, and pressures caused by the combinations of these loads in the pipeline were estimated. The most severe condition

(2) Because of the short work period, a high work effi-


Commencement of work
Installation of steel sheet piles
Items of field measurement
Soil profile elevation (m)
N-value
0 20 40
Displacement (mm)
−10 0 10 20 30 40 50
+3.0

6 Fabrication, Towing, and Sinking of Long Pipe

45 t and 36 t, were arranged on the quay wall and, for the other riser part, a 50-t floating crane was positioned. After the last ferryboat passed following the complete

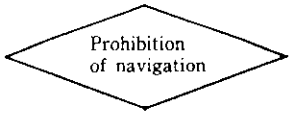
The long pipe was fabricated at the temporary yard in Mizushima Works of Kawasaki Steel, and towed into the inner area of Mizushima Port, then sunk.

Chief, the pipeline sinking operation was started. **Photo 3** and **Fig. 12** shows operation conditions and **Fig. 13** indicates the flow diagram of the sinking work. The

7 Conclusions

A submarine pipeline was installed at Mizushima

with no trouble.



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work are as follows:

(1) To excavate hard seabed within a limited work area, a large backhoe dredger fixed with spuds was used.
(2) A complex shape double wall pipeline was fabricated on land and sunk by floating tow method.
(3) Since the excavation work at Tokyo Steel side had to