Research on direct launch arrival method by electrolytic corrosion technology		
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(Purpose)

Direct launch arrival method by the electrolytic corrosion technology is the method that by placing the pile core in passed part of shaft earth-retaining wall by shield machine for electrolytic corrosion, it is made to deteriorate by the galvanic action, and directly cut the shaft wall by the shield machine without using the supplementary construction method, thus the work of launch and arrival are carried out. On the method, it has come to practical application now through element experiment and demonstration experiment conducted by the experimental shaft. However, it needs electric quantity of 1.7 times of theoretical value to deteriorate the steel product, so it can be anticipated that the construct process will be affected because of the long time for the electrolytic corrosion. Therefore, in this study, the element experiment was carried out in order to improve the electrolytic corrosion efficiency (proportion of flowing electric quantity for the theory electric quantity), and in addition, workability was verified by the demonstration construction.

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(1) Improvement of the electrolytic corrosion efficiency

In order to improve the electrolytic corrosion efficiency, it is necessary to prevent the degradation of the electrolytic solution property, and remove the hindrance of the electrolytic solution circulation. Therefore, various shapes of the pile core (the rectangle tube) for the electrolytic corrosion were reviewed aiming at the improvement of the electrolytic corrosion efficiency, and by introducing the hydroxide eliminator and controlling the property of the electrolytic solution, the flow of the circulation liquid got to smooth, the element experiment was carried out. As result of the devising countermeasure which removed the hindrance of electrolytic solution circulation of pile core and electrolytic corrosion facility for electrolytic corrosion, it was possible to raise the electrolytic corrosion efficiency from about 63% to about 99%.

(2) Establishment of grasping method of electrolytic corrosion completing time.

The pile core for electrolytic corrosion is energized in the constant current set from DC power supply. Since rectangle tube (the anode tube) cross section as energized part decreases with the progress of electrolytic corrosion, the resistance increases, accordingly, the voltage gradually rises by keeping the fixed current, and when it reaches setting voltage (30Vmax),the current value rapidly declines. Still, though there is no the potential difference in electrolytic corrosion commencing time, when the negligible voltage value (the following, IR value) between top and bottom of the rectangle tube is measured, the potential difference occurs with the electrolytic corrosion progress, and negligible potential difference rises between top and bottom of the electrolytic corrosion rectangle tube, and it rapidly rises in the electrolytic corrosion end. Moreover, though the voltage is not early generated at the beginning of electrolytic corrosion, when the voltage of the IR measurement terminal is individually measured, the voltage is generated as the end time of electrolytic corrosion approaches. As the result that the pile core was dismantled after the current was stopped in the time when these phenomena were confirmed, the electrolytic corrosion uniformly progressed in the whole pile core. Therefore, the method for grasping the electrolytic corrosion completion time that measures current, voltage, IR value, and based on these changes synthetically judge the electrolytic corrosion completion time was obtained.

(3) Demonstration construction

While above result of element experiment was reflected, step estimate of construction was collected, as well as workability and cutting ability was evaluated by the demonstration construction. The demonstration construction was conducted by the direct cutting of shield machine after the electrolytic corrosion completion in 2 sites, and cutting torque and removing situations of the cutting pieces and so on were verified. It was identified that the average cutting torque was 360kN-m about 30% of usual cutting torque, and the excavation was shown well, in of example construction of Osaka City, which was excavated at average penetration rate 3mm/min. In addition, the cut piece was smaller than that of size (f110mm) of the

insulating material about 2mm, so there was no problem to remove it through entrapping in the excavated soil by the screw conveyor.

By collecting of the research results till now, the technical manual which showed basic items of plan, design, estimate was issued. Future popularization of this method can be expected by publishing the technical manual.

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