

Joint Research on Shield Shifting Type Micro Tunneling Method Technology

Year of Research

2011 • 2012

Implementation of anti-inundation measures

(Purpose)

For renewal of decrepitude pipe, frequent downpour measures and besides improvement of combined sewer system etc. reconstruction works are pushing forward in sewer projects nowadays. Above all, pipe installation case at narrow and sharp curve road are increasing at new construction works of the main branch line. A save and reliable construction method are demanded, considering surroundings environment.

Figuer-1 shows the 「Shield Shifting Type Micro Tunneling Method」. Pipe installation start from departure shaft by micro tunneling method and will shift in to the shield method from sharp curve point. Because of micro tunneling method can't apply for sharp curves or jacking force etc and pipe installation works done by shield method from this point. And this is the method which can do correspondence to the severe construction conditions mentioned above, cost reduction, substantial timesaving etc.

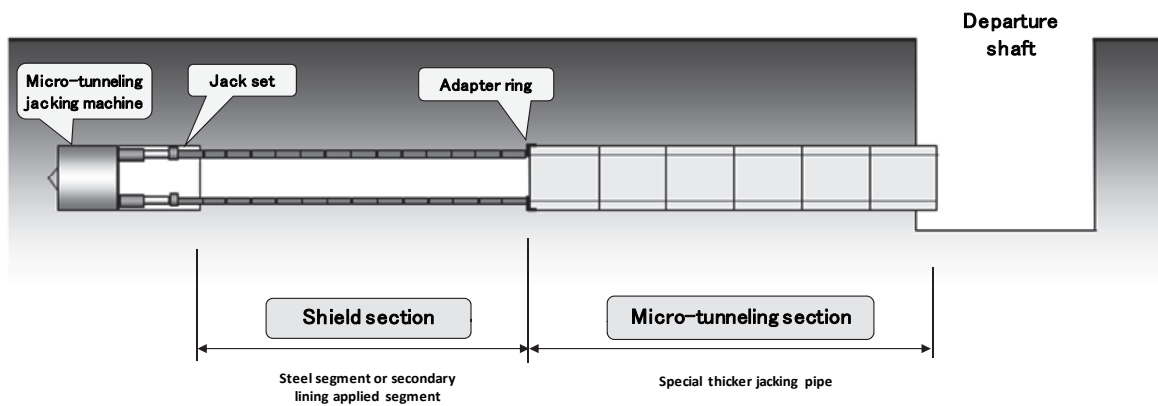


Figure-1 Sketch of shield shifting type micro tunneling method

In this study, we have targeted to define the coverage range and selection procedure, summarize the necessary content to design and construction of the method based on the specialty of this method.

(Results)

(1) Clarification of application condition

We have shown the soil conditions, finishing inner bore, maximum construction length, minimum curve radius, minimum soil depth, under ground water level, working yard arrangement, coverage range and selection procedure flowchart as the apply condition of the method.

(2) Improvement of segment transport system

We have improved carry, transport and assembling system with the development of secondary lining applied RC segment. By the adoption of the jacking machine that contained hydraulic pressure unit facilities, make possible the transportation of the segment using the center of the tunnel and secured enough working spaces.

(3) Establishment of pipe materials

1. Specification and characteristic of jacking pipe

Thickness of jacking pipe and segment is different. In case of using standard jacking pipe tail void become larger. We have stipulated specification and characteristic of special thicker jacking pipe to solve the problem.

2. Specification and characteristic of segment

We have determined specification and characteristic of nine kinds of steel segment and four kinds of secondary lining applied RC segment.

3. View of earthquake-resistant calculation

Regarding the earthquake-resistant calculation of jacking pipe and segment, we have arranged the earthquake-resistant design method based on confirming the performance. Again, we developed adapter ring (**figure-2**) for the joint section of jacking pipe and segment, and made coupling structure considering the effective length of jacking pipe.

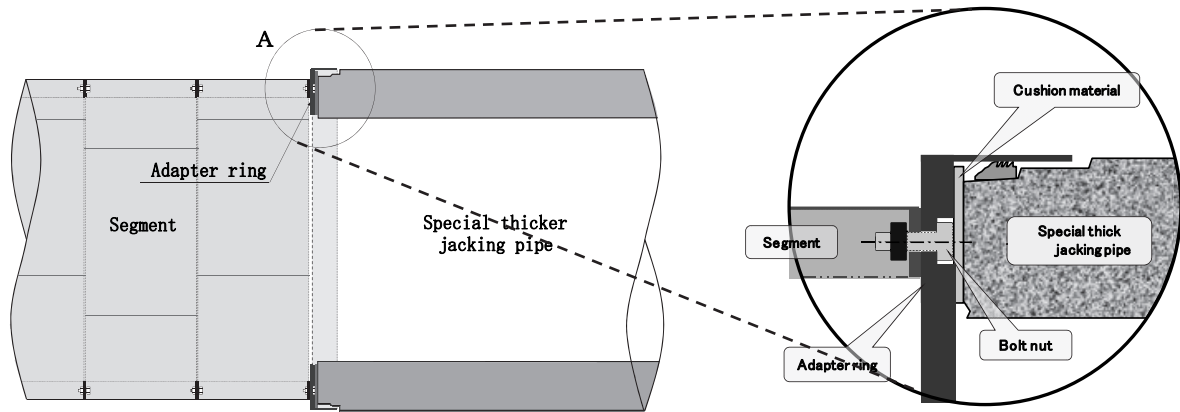


Figure-2 Adapter ring concept

4. Standardization of the micro- tunneling and shield facilities

We have stipulated each construction facilities according to the finishing inner bore by the employing original jacking machine and lining materials.

(Conclusion)

It becomes easy to utilize this new technology by these compiled technical documents and will accelerate pipe maintenance.

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Key words

Micro- tunneling method, Shield method, Shifting type, Sharp curve, Secondary lining applied RC segment