Design and Construction Status of Raw Water Transmission Facilities in the Omoi River Development Project

— Kurokawa Canal Tunnel, Oashi River Canal Tunnel, Water Conveyance Channel Tunnel —

Naoki MORIHARA ▸ Chief, Design Division, Dam Project Dept., Japan Water Agency

1. Introduction

The Omoi River development project is a multi-purpose dam project currently implemented in Kanuma City, Tochigi Prefecture, by Japan Water Agency. Construction of Nanma Dam on the Nanma River, a tributary of Omoi River of Tone River system, and installation of adjacent raw water transmission facilities between the Kurokawa River / the Oashi River (tributaries of the same river) and the Nanma Dam reservoir, will establish efficient water resource development which enables raw water transmission outside the basin to the dam reservoir as well as water interchange between tributary basins. The maximum raw water transmission from the Kurokawa River / the Ooashi River to the dam reservoir is 20m^3/s; and the maximum water conveyance from the dam reservoir to the Kurokawa River / the Oashi River is 4.6m^3/s.

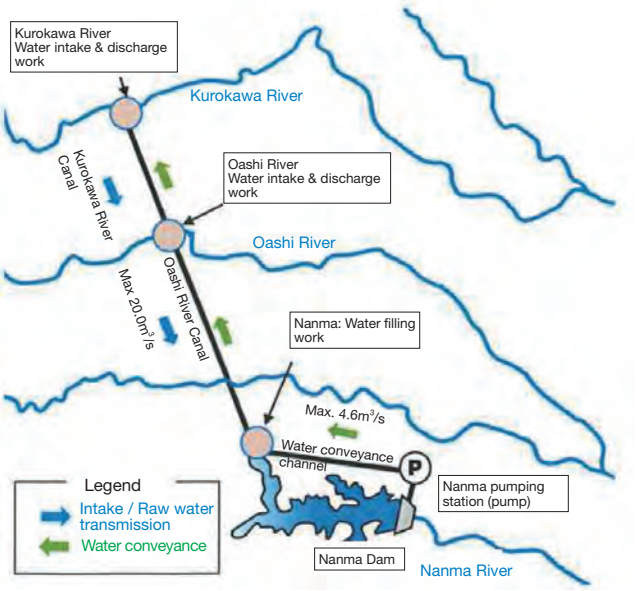

Fig. 1 Overview of the facilities for the Omoi River development project

2. Design and Construction of Raw Water Transmission facilities

(1) Canals

The canal tunnel extends for approx. 8.6 km, with two types of inner diameter: 2.3 m and 2.8 m, and largely passes through mountain areas. The largest overburden from the ground is 495m; and external water pressure up to about 3.8 MPa is applied to the tunnel structure during construction and after completion. In the surrounding areas, mountain stream water and groundwater is used as domestic water. Therefore, to minimize the impact of the canal tunnel on the water use, the tunnel structure after completion has been designed to be completely waterproof against the applied pressure. Furthermore, we have adopted "the slurry shield method" which enables a certain level of waterproof during the construction (Photo 1). A total of three shield machines, having pressure tightness up to approx. 2.4 Mpa which is the highest level in Japan, have been used.

Photo 1 Slurry shield machine

(2) Water conveyance channel

The water conveyance channel extends for approx. 4.2km, with the inner diameter of 1.9 m, and passes through the mountain areas; however there is no water use in the surrounding areas, and therefore "the open-face shield method (double shield type)" allowing a high construction speed has been adopted.

3. Conclusion

Since the inner diameters of canals and water conveyance channel are small, construction has been conducted by the smallest drilling diameter which is close to the limit for tunnelling work by the shield method and the open-face shield method. We will continue to proceed with construction in a safe and secure manner.

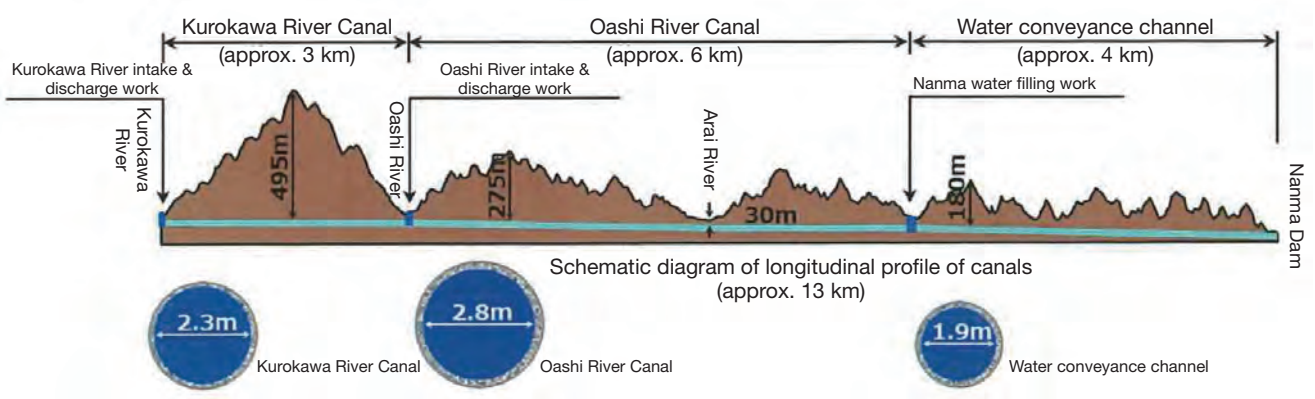

Fig. 2 Longitudinal view of the raw water transmission facilities