# Status of Progress of the installation of ALPS treated water dilution/discharge facility and related facilities

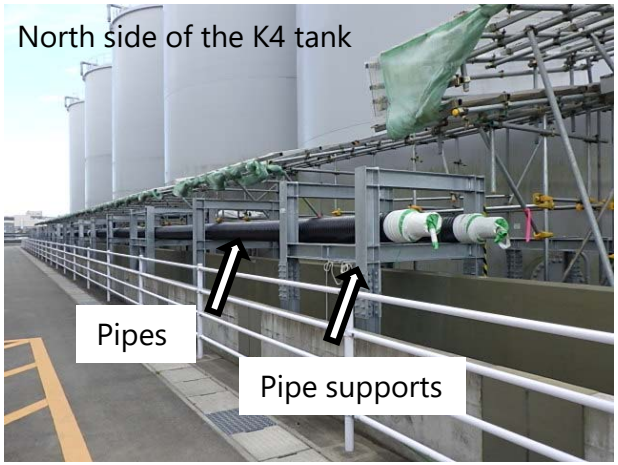
October 27, 2022

Tokyo Electric Power Company Holdings, Inc.

# 1. Status of construction

## ■ Masurement/confirmation facility and transfer facility

The installation of pipe supports and pipes for the measurement/confirmation facility and the transfer facility began on August 4 from the area aroud K4 tank area.

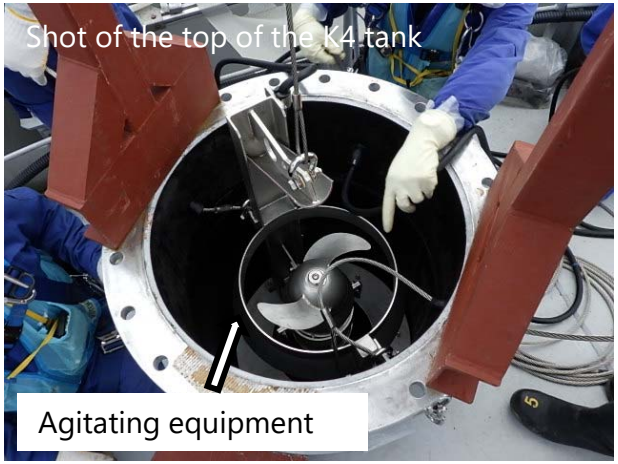



Installing circulation pipes and pipe supports

Installing the piping supports/pipes

【 Measurement/confirmation facility 】
・Supports
Approx. 276 out of approx. 540m
・Pipes
Approx. 316 out of approx. 1,000m

【Transfer facility】
・Supports
Approx. 433 out of approx. 1,820m
・Pipes
Approx. 108 out of approx. 1,820m
<As of October 21>




Installing agitating equipment

Installing agitating equipment

20 out of 30 units
（hung inside the tank）
<As of October 21>

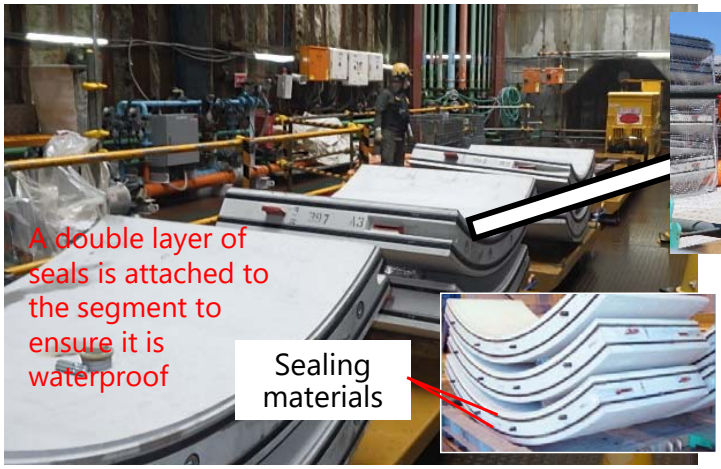
## ■ Discharge facility

On August 4, the shield machine began tunneling through the bedrock layer as construction of the discharge tunnel commenced.


Safety equipment inside the tunnel

A tunnel is being dug
（Main digging work in progress※1）
Approx. 301m out of Approx. 1,030m
<As of September 27>

※ 1 Initial digging was completed and the main digging work was started on October 9



Segments carried in

The surface contamination density of the segments is measured. The segments are stored covered in the yard outside of the premises.

# 1. Status of construction (cont.)

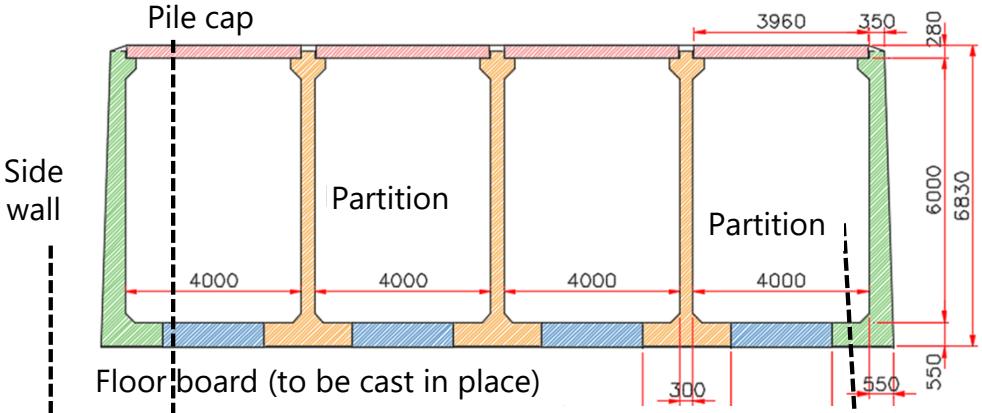
■ Dilution facility

Ground improvement work for the discharge vertical shaft (upper-stream storage), as part of earthquake measures, was started on October 7.

Ground improvement work

■ Dilution facility

Manufacturing of the discharge vertical shaft (upper-stream storage) precast block was started on September 14 at a factory in Fukushima Prefecture.




Cross-sectional diagram of the upper-stream

Pile cap of the upper-stream storage

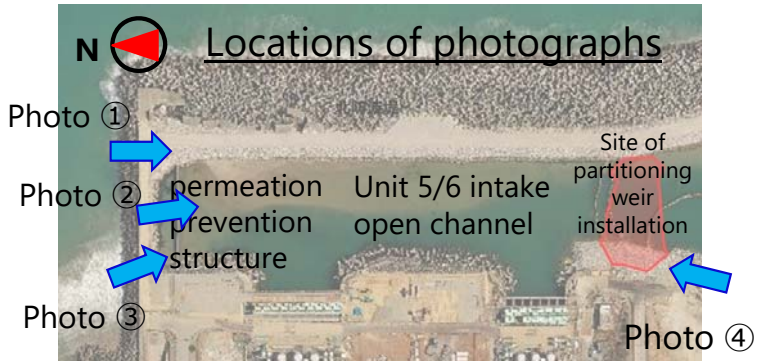
Side wall of the upper-stream storage

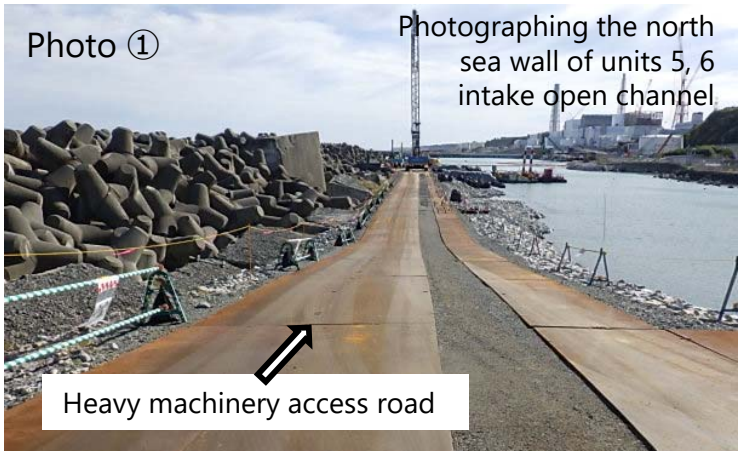
Partition of the upper-stream storage

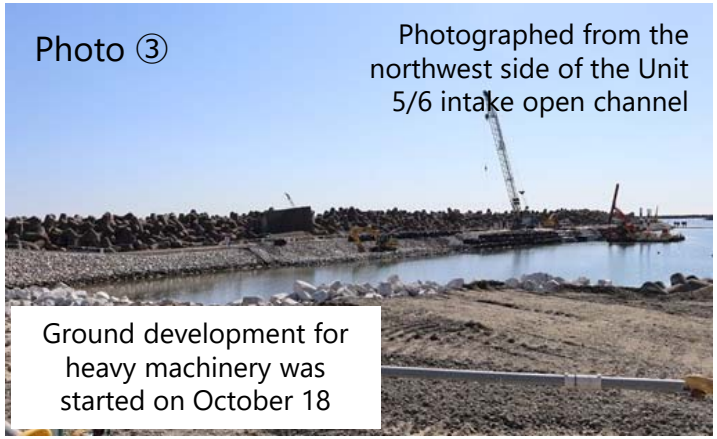
# 1. Status of construction (cont.)

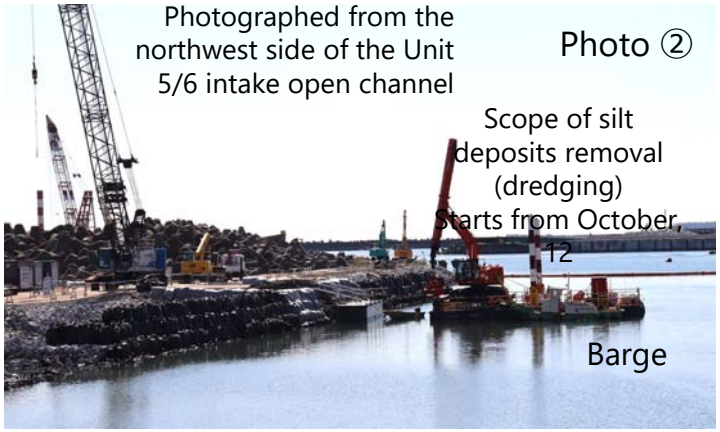
■ Other construction (building partitioning weir, etc.)

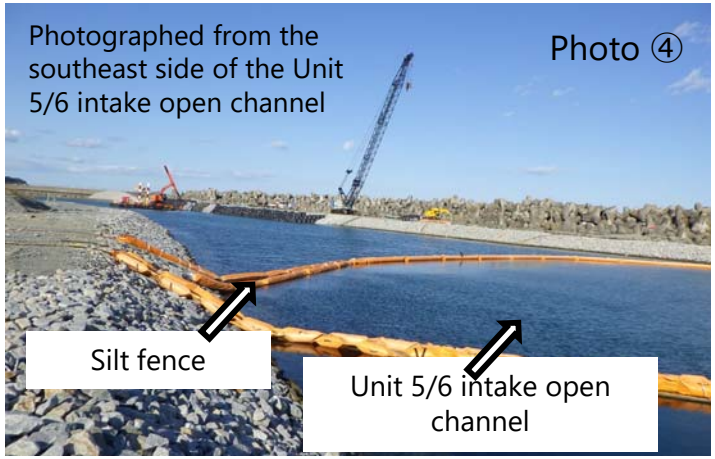
Preparatory construction for developing roads for heavy machinery started on August 4 as part of efforts to build a partitioning weir. In the Units 5 and 6 sea-side construction area, silt deposits inside the open intake channel are being removed (dredging) and the grounds for heavy machinery are being developed simultaneously. After construction of the partitioning weir, the permeation prevention structure will be removed.




Work area on the sea side of Units 5/6

# 1. Status of construction (cont.)

■ Discharge facility
On October 22, the crane ship, steel barge with the caisson, and a CP ship entered the Onahama Port.



# (Reference) Overview of the ALPS treated water dilution/discharge facility and related facilities

**Secondary treatment facility（newly installed reverse osmosis membrane facility）**

Secondary treatment of treated water to be re-purified (sum of the ratios of nuclides, excluding tritium, is between 1 and 10)

**Secondary treatment facility（ALPS）**

Secondary treatment of Treated water to be re-purified (sum of the ratios of nuclides, excluding tritium, is 1 or higher)

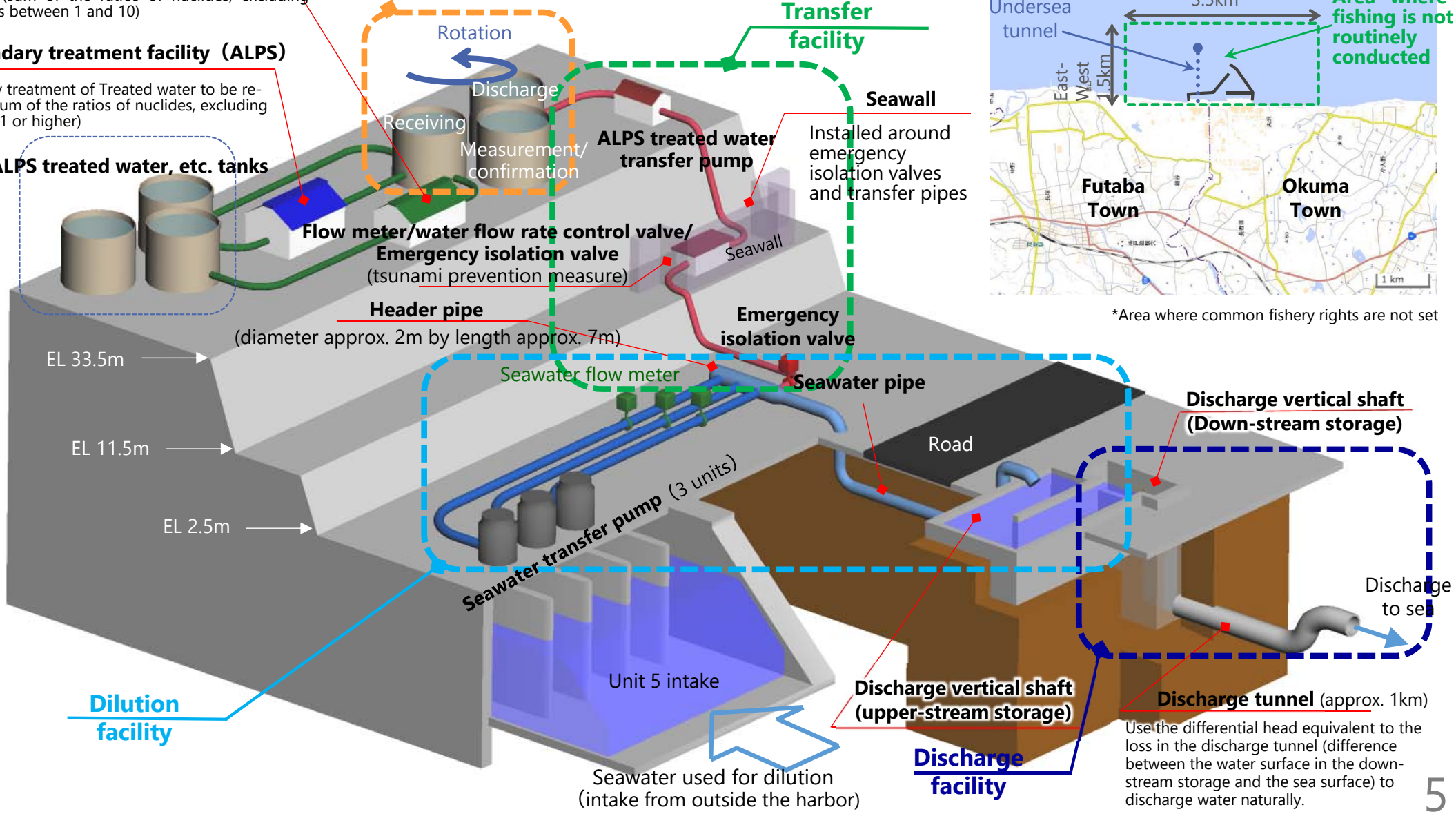
**Measurement/confirmation facility (K4 tank group)**

Comprised of three sets of tank groups each with the role of receiving, measurement/confirmation, and discharge. In the measurement/confirmation stage, water that has been made homogenized through circulation and agitating is sampled and analyzed (approx. 10,000m³ × 3 groups)

**Transfer facility**

**Seawall**

Installed around emergency isolation valves and transfer pipes




Use the differential head equivalent to the loss in the discharge tunnel (difference between the water surface in the down-stream storage and the sea surface) to discharge water naturally.

Source: Developed by Tokyo Electric Power Company Holdings, Inc. based on the map developed by the Geospatial Information Authority of Japan (electronic territory web)
https://maps.gsi.go.jp/#13/37.422730/141.044970/&base=std&ls=std&disp=1&vs=c1j0h0k0l0u0t0z0r0s0m0f1

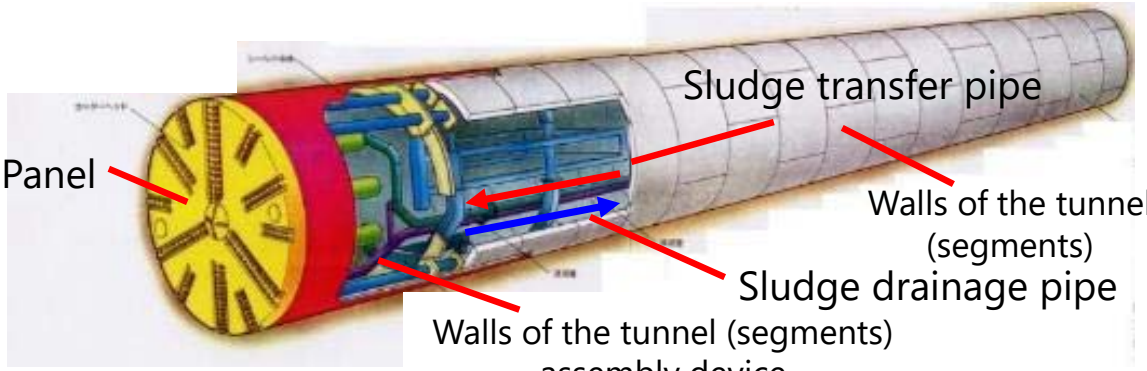



*Area where common fishery rights are not set

# (Reference) Discharge Tunnel

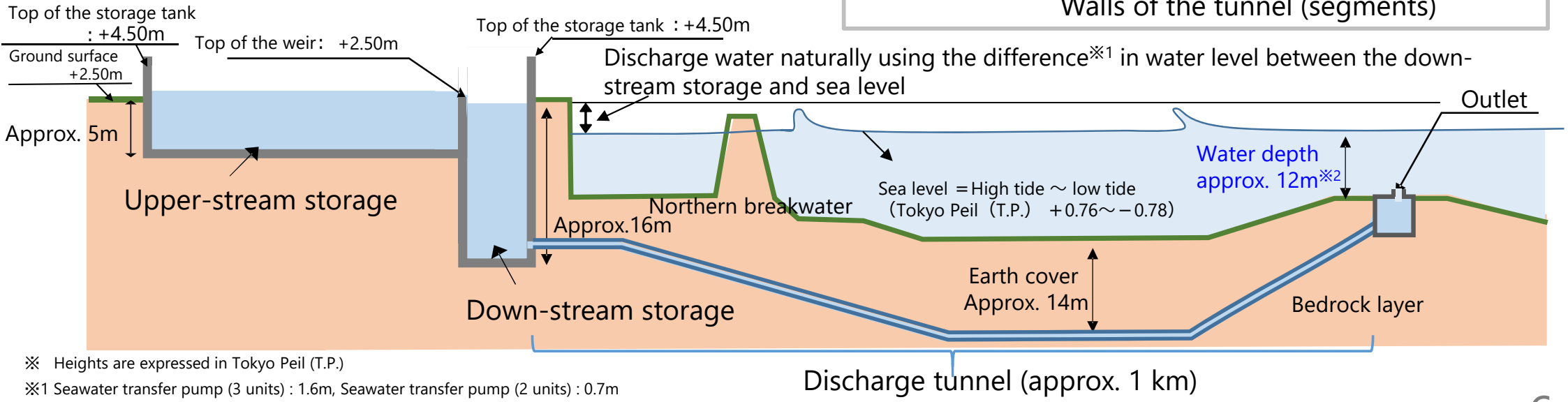
- The discharge tunnel has low leakage risk and is earthquake resistant※ because it goes through the bedrock layer. The design of the tunnel takes into account typhoons (high waves) and storm tides (increased sea levels). Furthermore, the tunnel is designed to use the differential head equivalent to the loss in the discharge tunnel (difference between the water surface in the down-stream storage and the sea surface) to discharge water naturally (taking into account the adhesion of shellfishes).
- A slurry shield tunneling method will be used, and the walls of the tunnel (segments) will be made of reinforced concrete combined with two layers of sealing material to prevent water from coming in.

※ Designed based on the quake-resistant design concept suggested by NRA.




Overview of shield machine


Walls of the tunnel (segments)




※ Heights are expressed in Tokyo Peil (T.P.)

※1 Seawater transfer pump (3 units) : 1.6m, Seawater transfer pump (2 units) : 0.7m

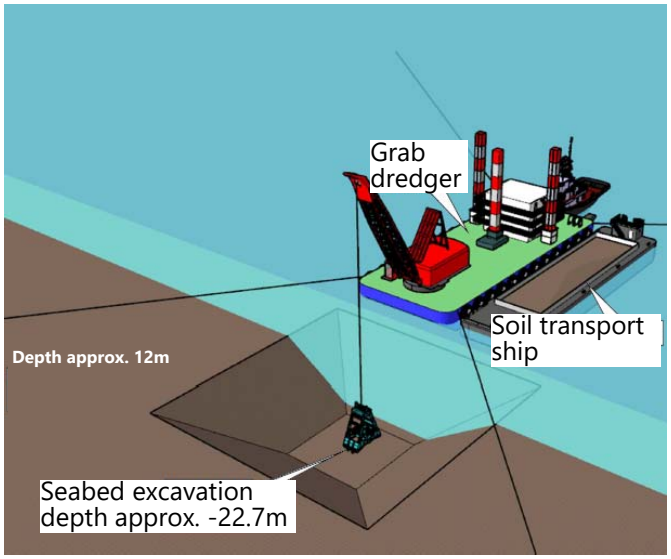
※2 Based on the standard time tide level in Tokyo Peil (T.P.)

Discharge facility conceptual diagram

# (Reference) Discharge Outlet Caisson (General Pproject Overview)

- Seafloor excavation and depositing/covering of rubble work at the discharge outlet of the discharge tunnel and its confirmation have been completed on July 22th. The caisson (a large concrete box) made of reinforced concrete will be installed on the seafloor using large crane ship while watching the weather and sea conditions. The area around the caisson will then be back filled with concrete.
- After the shield machine drilling the discharge tunnel reaches the caisson, a crane ship will be used to extract the shield arrival tube (containing the shield machine) from the outlet caisson.

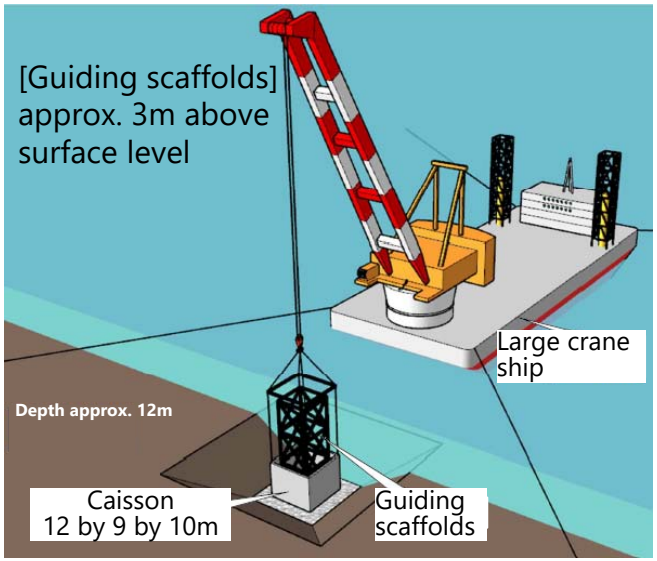
**— Improvements in the Surroundings (completed) —**




**[Bedrock excavation, caisson fabrication]**

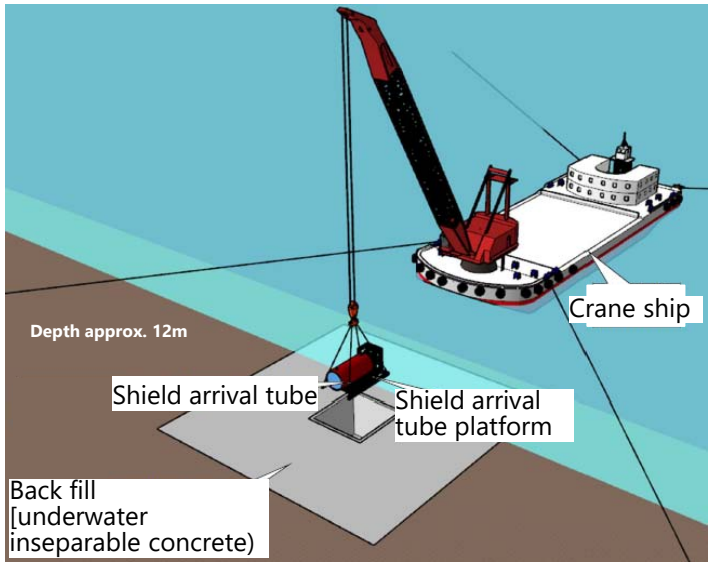
1. Use grab dredger (seafloor excavation ship) to excavate bedrock
2. Carry excavated soil to power station site
3. Deposit foundation rubble

**— Project to install discharge outlet caisson —**




**[Install caisson]**

1. The caisson transported by sea from outside the power station is installed using a large crane ship
2. Refill the area around the caisson with concrete
3. In preparation for the arrival of the shield machine, manage locational information of the discharge outlet by using the metal guiding scaffolds connected to the caisson




**[Remove excavator, install lid]**

1. After the shield machine arrives inside the shield arrival tube in the caisson, fill the tunnel interior with seawater
2. Separate the collector and the tunnel, and collect the shield machine from the vertical shaft using a crane ship
3. Finally, install the caisson lid

# (Reference) Discharge Outlet Caisson (Installation of Discharge Outlet Caisson)

- Fix crane ship to the pre-installed sinker blocks (110t) and anchors using mooring wire.
- Guide crane ship to the installation location using GPS installed on the crane ship and surveying the guiding scaffolds installed on the caisson from the ground side (from two locations on the South seawall and North seawall). Fine adjustments for the positioning of the subject crane ship will be performed by winding and releasing the mooring wire using the crane ship's winch. Discharge caisson will be installed after moving the ship to the point of installation.

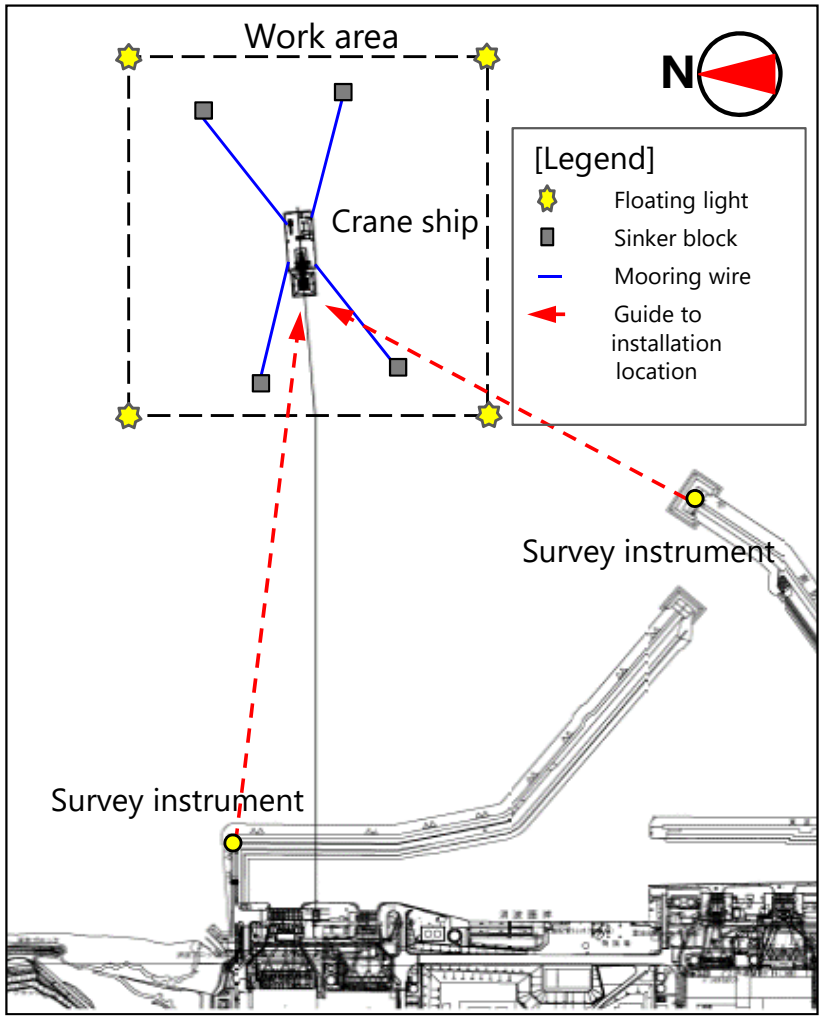



Figure of Work to Install Discharge outlet Caisson (plan view)

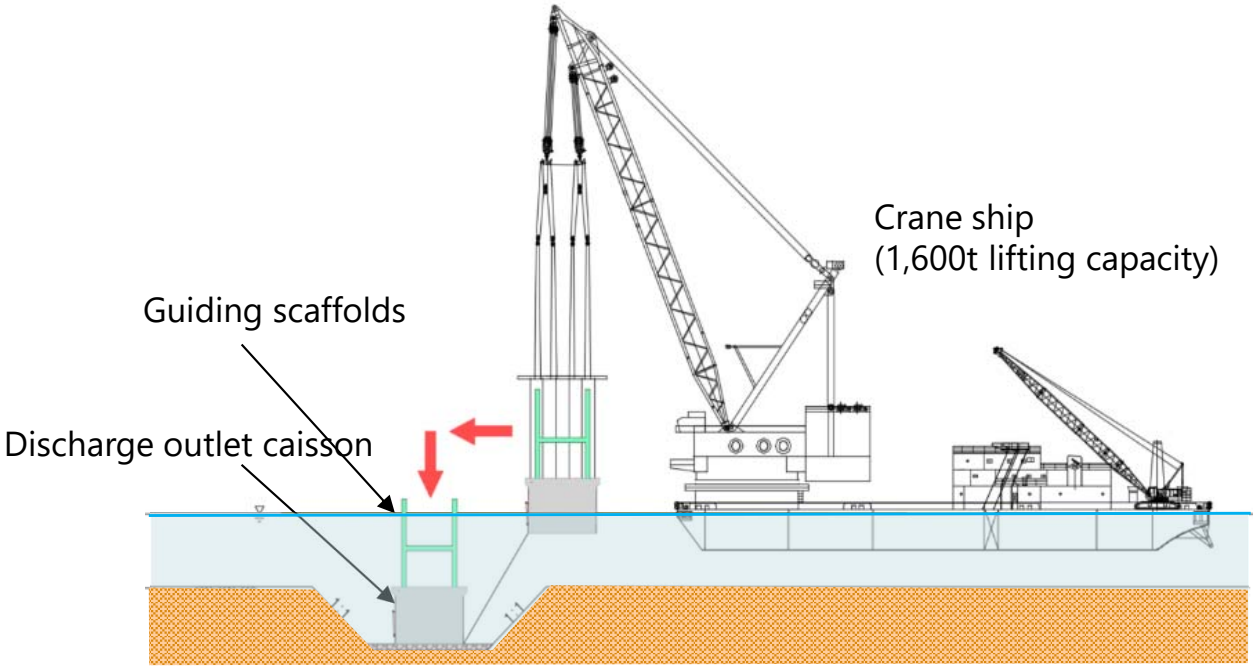
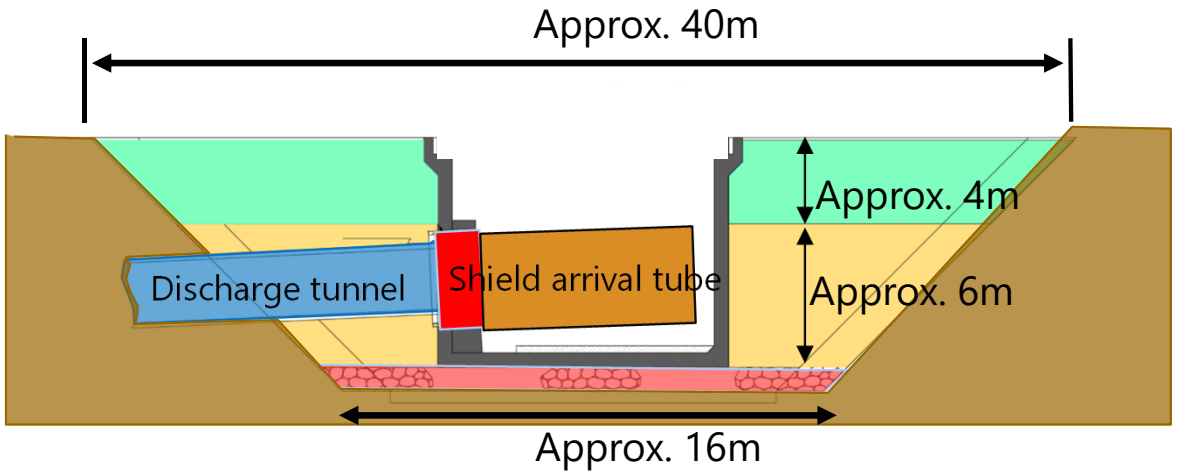
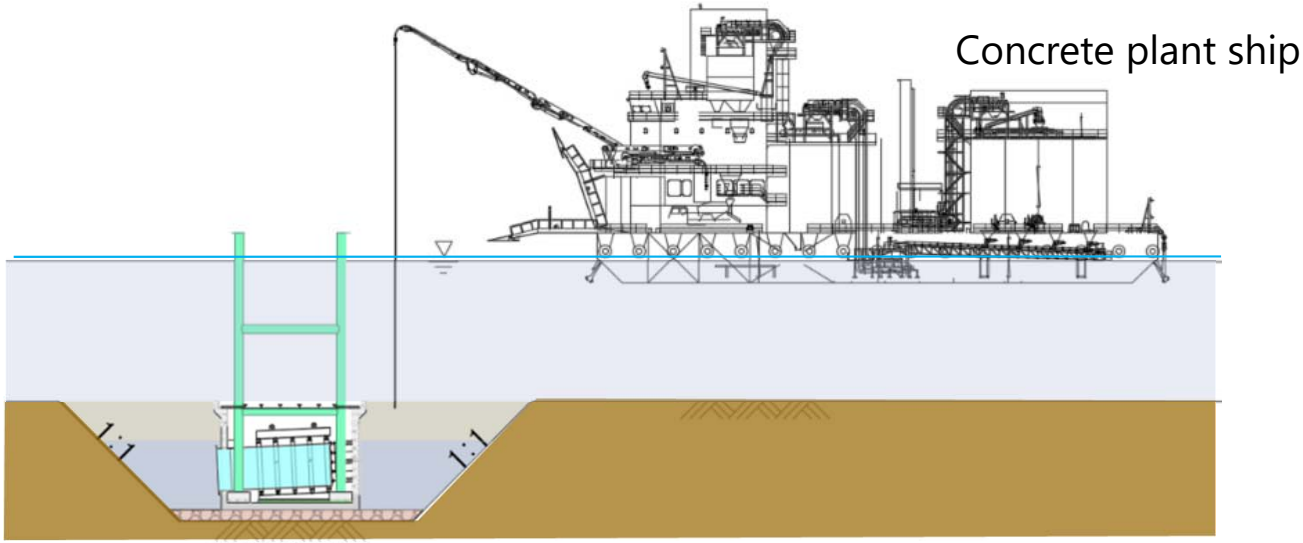



Figure of Work to Install Discharge outlet Caisson (cross section)

# (Reference) Discharge Outlet Caisson (Back Fill)

- After installing the discharge outlet caisson, pour underwater inseparable mortar (area where the shield machine passes) and underwater inseparable concrete using a concrete plant ship for back filling.

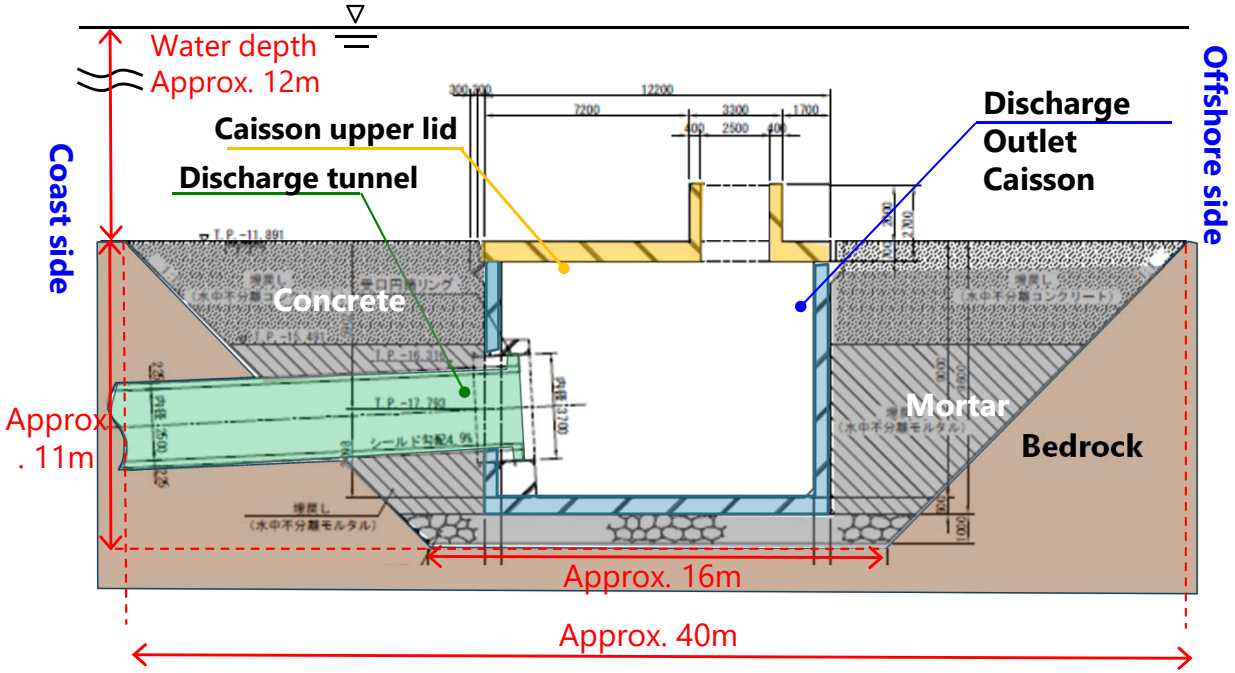



Cross section figure for back filling work

# (Reference) Discharge Outlet Caisson (Overview of Discharge Outlet Caisson)

- A guiding scaffold used to manage location information while the tunnel is being excavated, and the shield arrival tube have been installed in advance inside the caisson.




Cross section figure of discharge outlet

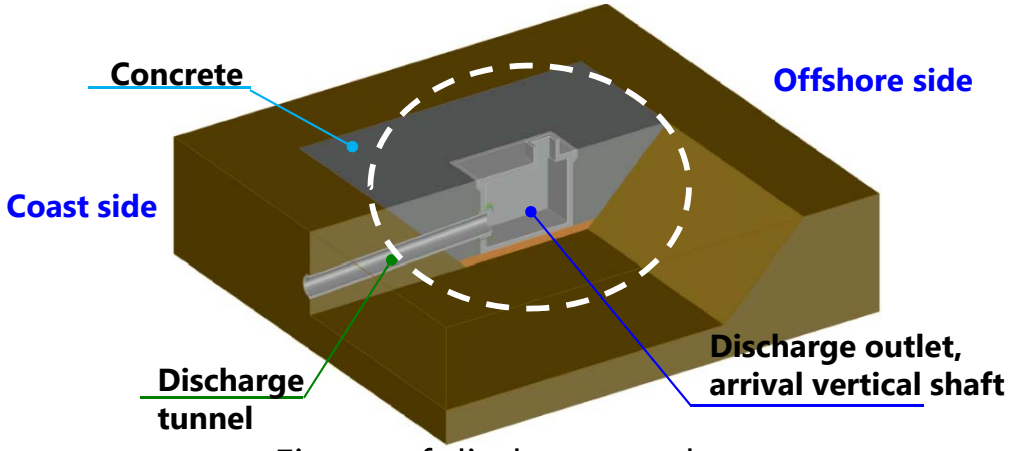



Figure of discharge outlet

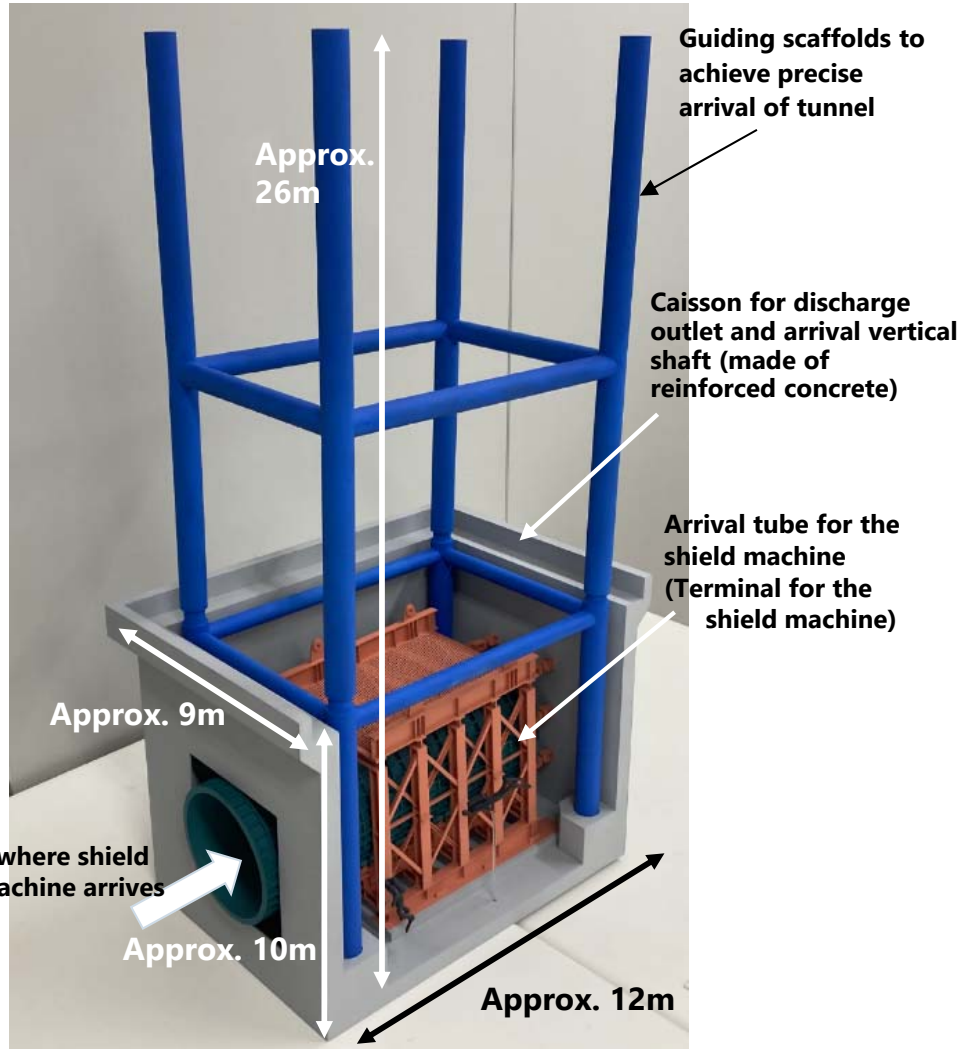
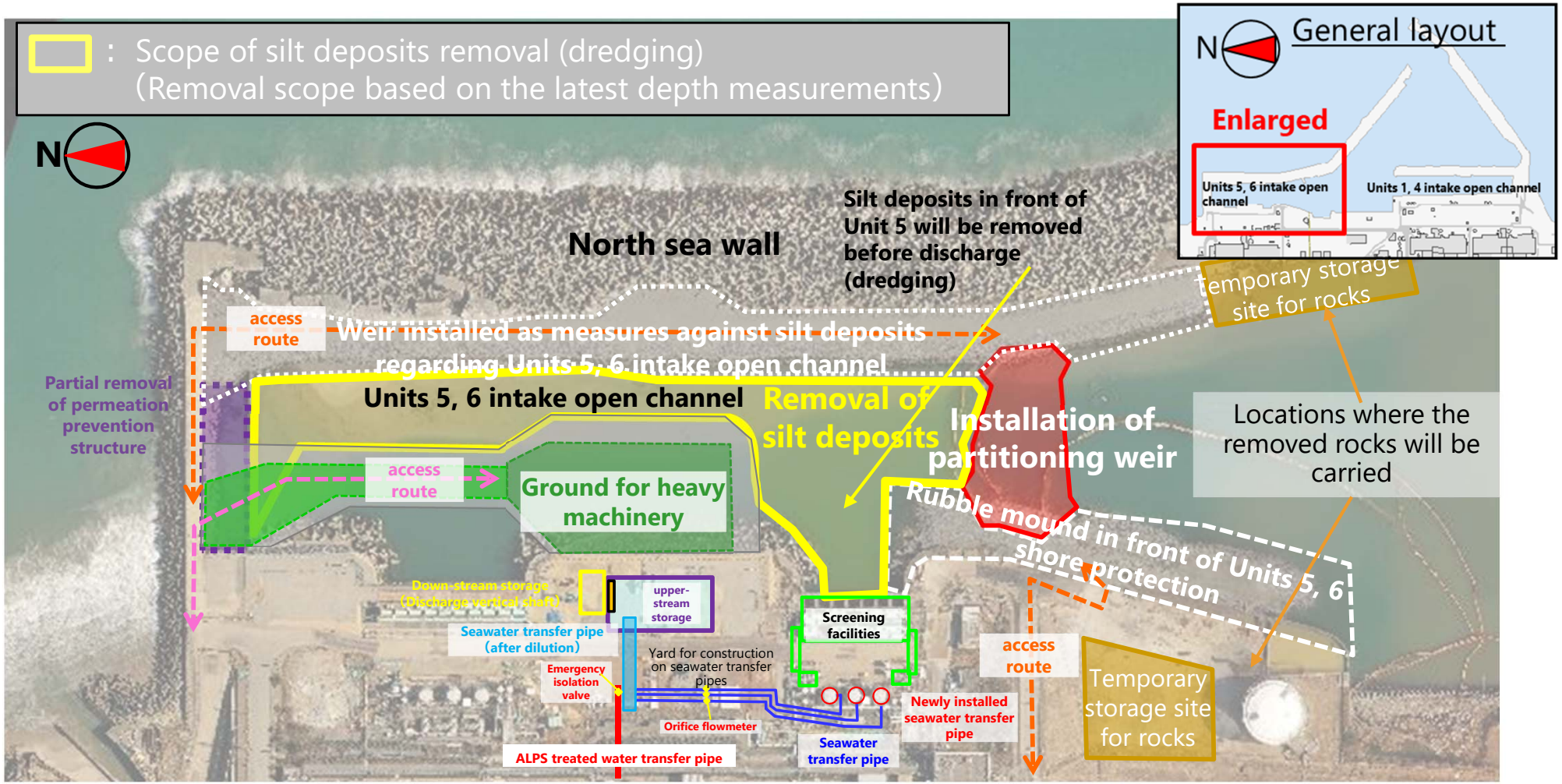



Figure for the fabrication of discharge outlet caisson

# (Reference) Construction Projects Within the Harbor for Intake

- As a construction project for the harbor intake, a partitioning weir will be installed in the Units 5, 6 intake open channel (using rubble mound breakwater + sheet*) to divide the harbor from the harbor on the Units 1-4 side with comparatively high concentration of radioactive material.
- Also, to take in seawater for dilution from outside the harbor, work to partially remove permeation prevention structure from the North sea wall shall be initiated from November 2022. Furthermore, silt deposits will be removed (dredged) for the purpose of improving the environment inside the Units 5, 6 intake open channel.

* Flexible polyvinyl chloride mat, thickness = 5mm

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