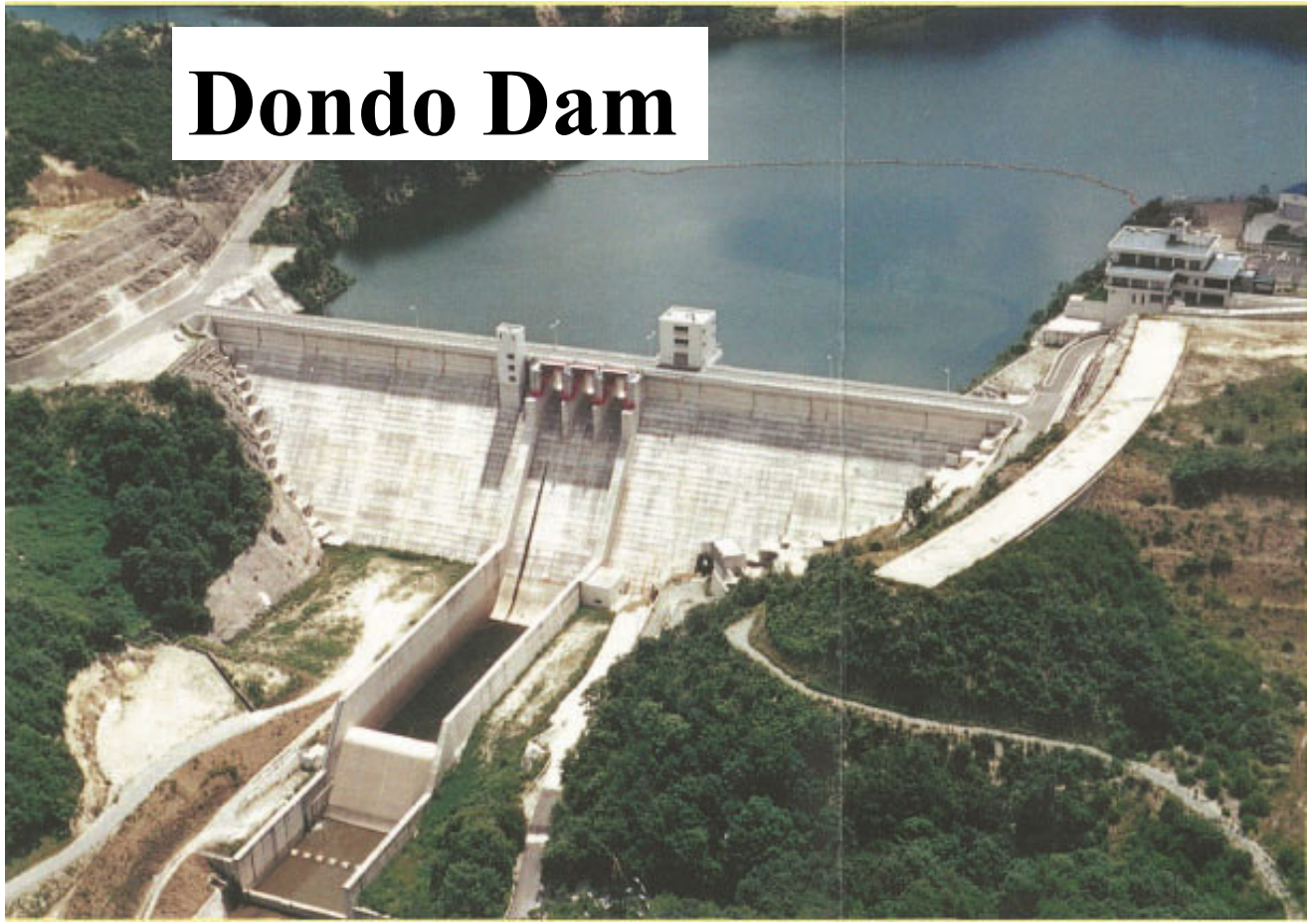
Kako River System Wide-Area Agricultural Irrigation Facility Control Project



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Overview of the Dondo Dam

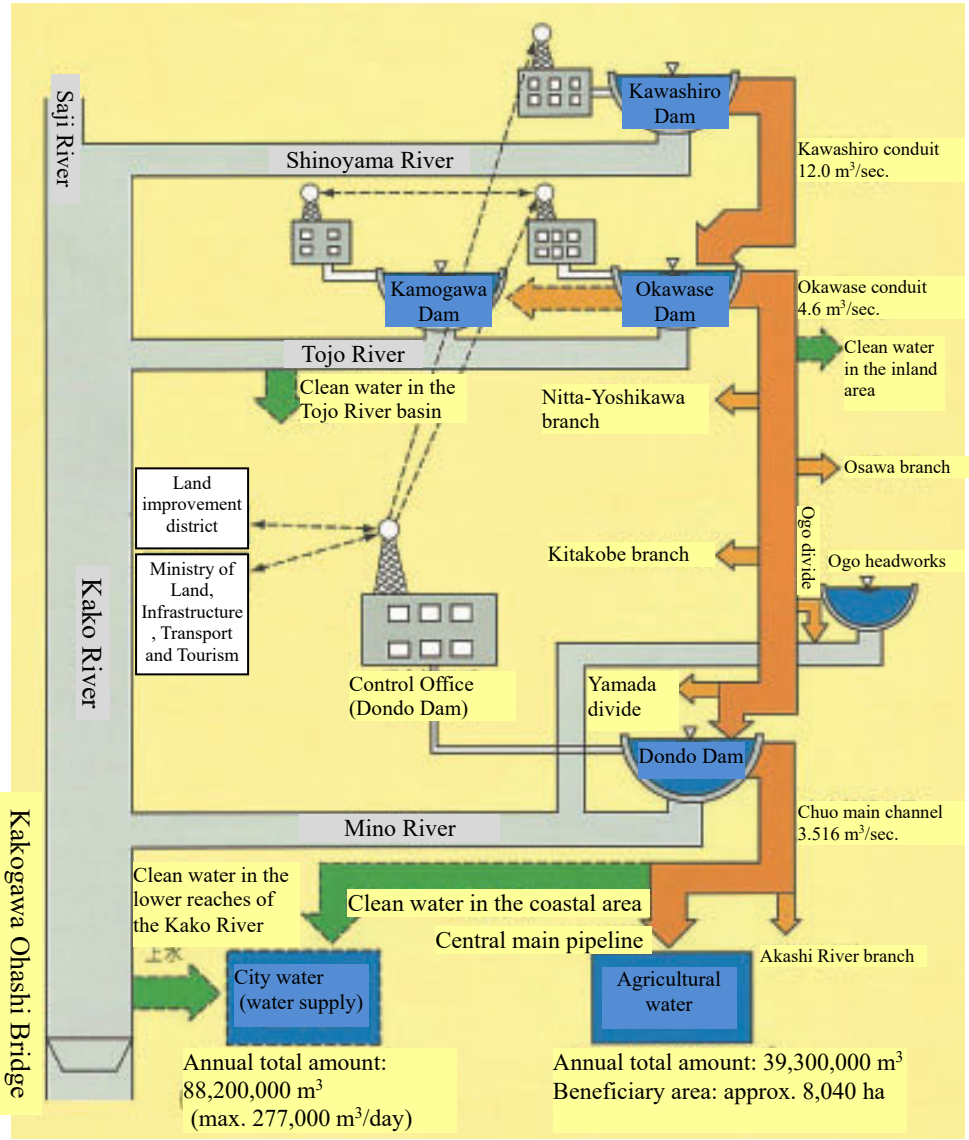
☆Purpose

The Dondo Dam was constructed as part of the National Toban Agricultural Irrigation Project, whose purposes were: 1. to solve the chronic water shortage in paddy and upland fields in the eastern part of the Harima Plain and the Kitakobe area extending over the left bank of the Kako River in southern Hyogo; 2. to promote modern agricultural management and improve productivity; and 3. to develop new upland fields and supply water to them in order to expand the scale of local agriculture.

The project also served as a wide-area water utilization initiative implemented in conjunction with the Hyogo Prefecture Water Supply Project, whose aim was to supply city water in line with rapidly progressing urbanization in the area.

The project's basic design was developed in FY 1967, its launch was in FY 1970, and its completion was in FY 1992.

Flowchart of water intake and management



☆Project details

This project aims to produce and supply 127,500,000 m^3/year of water in total. This includes 39,300,000 m^3/year to cover water shortages over an area of 8,040 ha – of which 7,650 ha are paddy and upland fields in four cities and one town (Kobe, Akashi, Miki, Kakogawa and Inami) and 390 ha (six estates) are upland fields newly developed under the project – and 88,200,000 m^3/year (daily max. 277,000 m^3) to eight cities (including Kobe) and two towns.

As basic water source facilities necessary for this initiative, the Kawashiro Dam in the Shinoyama River upstream of the Kako River, the Osegawa Dam in the Tojo River, the Dondo Dam in the Yamada River (a branch of the Mino River) and conduits that connect them in series were constructed. Water taken from these dams is sent to branch channels and pump stations or is discharged into rivers through the Okawase conduit and the Chuo main channel, and is supplied to beneficiary farmland and water purification plants.

Facility management

☆Dam safety management

Analysis of data on dam bodies, measurements from instruments placed inside them and dam leakage is conducted to monitor the structures and ensure their safety.
At times of flooding caused by heavy rain or other factors, the safety of residents downstream and people using rivers is ensured by issuing warnings, and dam inflow is discharged to the lower reaches to create conditions similar to those of a natural river.

☆Water management

Efforts are made to secure the amount of water required, and sound water usage is promoted with consideration of the balance between rational water storage and the water utilization needs of beneficiaries.

☆Facility maintenance/management

Appropriate operation, maintenance and management are conducted to ensure long-term provision of dam functions.

Roles of the Dondo Dam

The Dondo Dam located on the Yamada River, which is a branch of the Mino River in the Kako river system (in the Mitsuda area of Shijimi-cho in Miki City), is the lowermost of the three dams, and plays the following roles:

☆Water source development

The dam derives approximately 36,300,000 m^3/year of water from its own basin (49.8 km2), stores approximately 30,000,000 m^3/year of water developed by the Okawase Dam and sent via the Okawase conduit, and supplies agricultural and city water through the Chuo main channel and via discharge into rivers.

☆Agricultural water supply

The Dondo Dam supplies approximately 210,000 m^3/day (max.) of agricultural water to 4,040 ha of farmland in southern Kobe, Akashi, Miki, Kakogawa and Inami.

☆City water supply

The dam supplies approximately 140,000 m^3/day (max.) of city water to Kobe, Akashi, Miki, Inami and Harima via the Kande purification plant and 61,000 m^3/day (max.) to Kakogawa and Takasago via the Nakasaijo purification plant in the lower reaches of the Kako River.

Flooding from the Dondo Dam

No. of houses flooded	33
Public buildings	1 shrine, 1 temple, 1 community center and 4 others
Residential land	3.9 ha
Fields	Paddy fields: 24.0 ha　Upland fields: 1.6 ha
Mountain forests	Forest land: 69.8 ha　Plains: 10.3 ha　Other: 18.6 ha
Road replacement	Prefectural: 5.5 km　Municipal: 5.3 km

Dam scale

Dam name	Dondo Dam	Okawase Dam	Kawashiro Dam
Location	Shimizu-cho, Miki	Okawase, Mita	Oyamashita, Shinoyama
Type	Gravity type, concrete	Gravity type, concrete	Gate type
Height	71.50 m	50.80 m	9.00 m
Length	260.00 m	164.00 m	95.00 m
Volume	370,000 m^3	145,000 m^3	17,000 m^3
Effective storage capacity	17,800,000 m^3	8,150,000 m^3	1,280,000 m^3
Design discharge	925.0 m^3/s	1,050.0 m^3/s	1,600.0 m^3/s
Maximum intake	3.520 m^3/s	9.400 m^3/s	12.00 m^3/s
Full water area	105 ha	68 ha	River channel storage
Catchment area	Direct: 49.8 km^2 Indirect: 279.7 km^2	60.6 km^2 Indirect: 219.1 km^2	219.1 km^2 — km^2

Facilities of the Dondo Dam

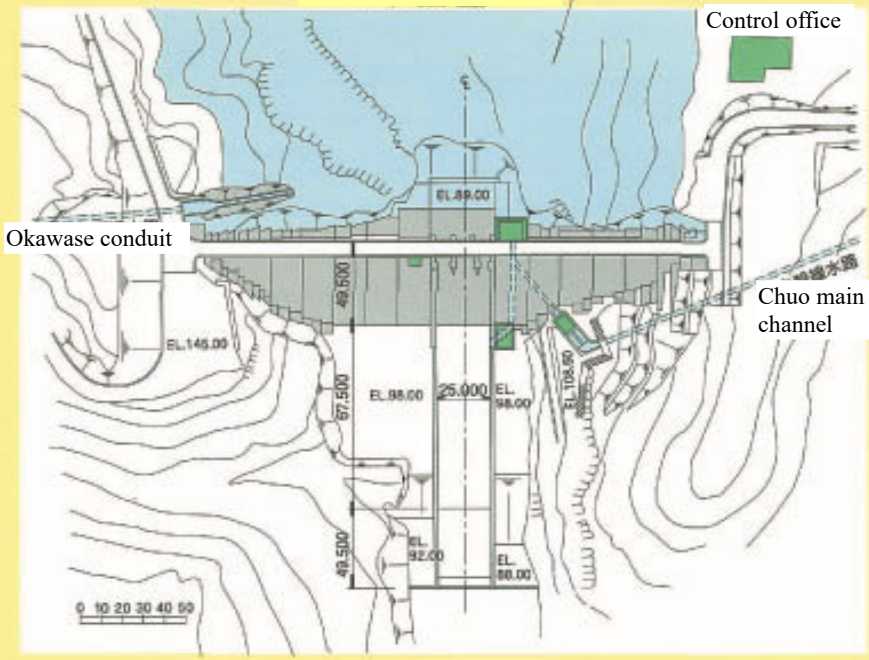
Facility	Type	Specifications	No. of facilities
Overflow facility	Radial gate	H 8.055 m × B 7.0 m	3
Surface/selective intake facility	Roller gate (3 levels)	H 32.0 m × B 3.0 m	1
Intake facility	Jet flow gate	ϕ1.0 m	2
Discharge facility	Jet flow gate	ϕ0.5 m ϕ1.2 m	1 1
Lifting/lowering facility	Elevator	750 kg (11 passengers) × H 65.7 m	1
Vessel mooring facility	Incline (winch)	L 6.0 m × W 2.0 m × 3 tons	1
Water quality improvement facility	Intermittent air-lift pump	H 20 m × ϕ50 cm × 4 units × 22 kW	4

Conduits and main channel

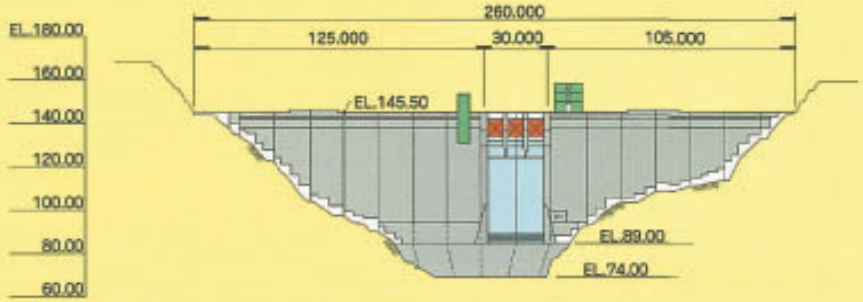
Area	Channel	Length	Flow volume	Control area	Remarks
Toban Irrigation District	Kawashiro conduit	13.4 km	12.000 m^3/s	8,040 ha	Tunnels
	Osegawa conduit	22.7 km	4.60 m^3/s	8,040 ha	Tunnels, pipelines, etc.
	Chuo main channel	9.1 km	3.52 m^3/s	3,590 ha	Tunnels, pipelines, etc.

Dondo Dam

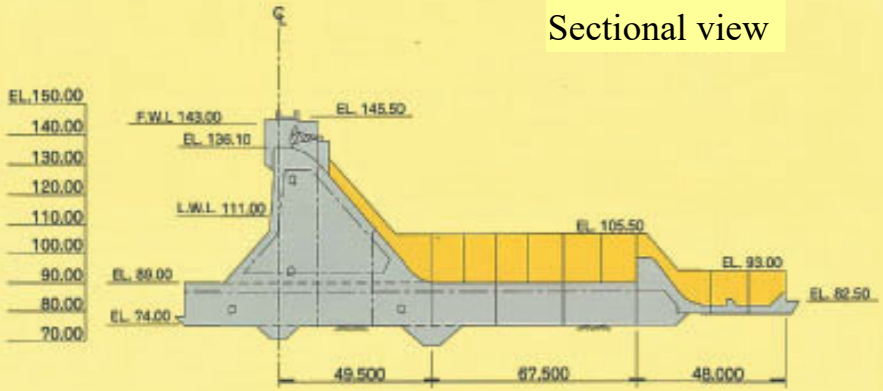
Plan view



Front view (downstream side)

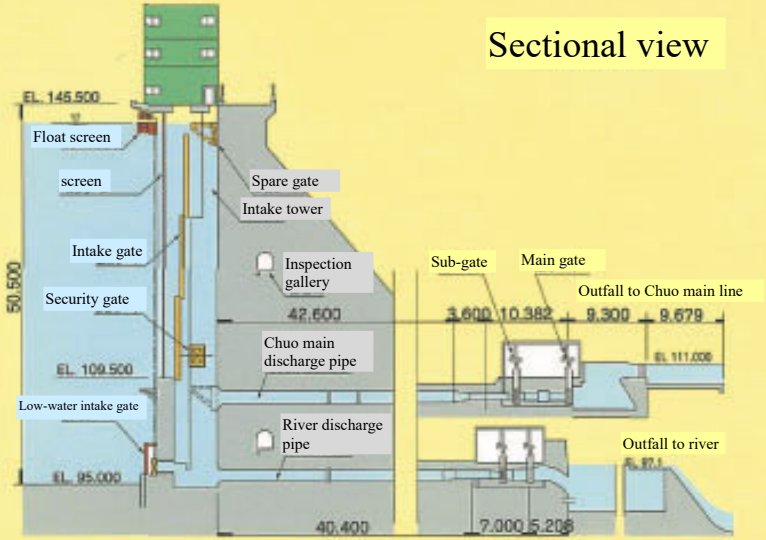


Sectional view



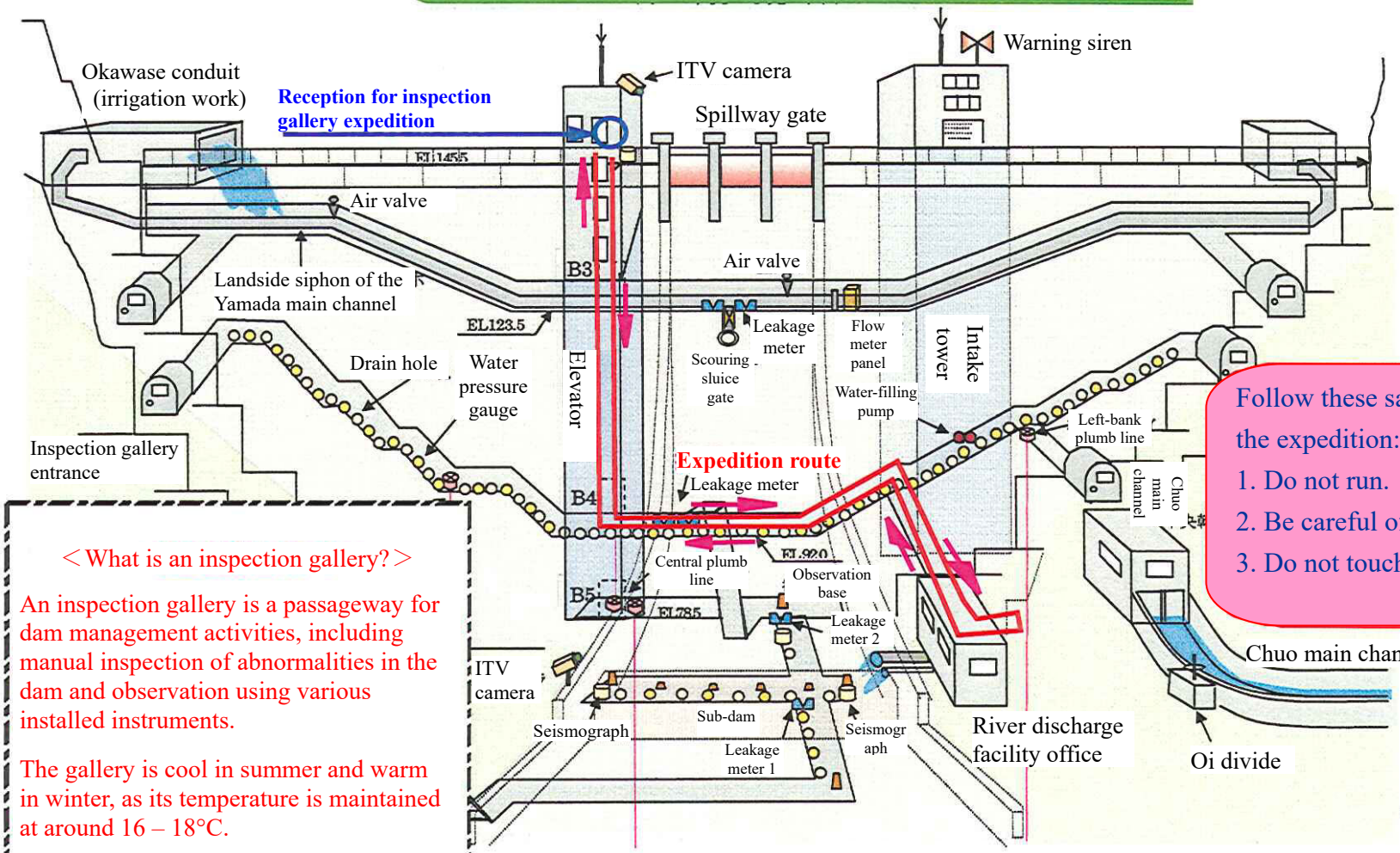
Intake/discharge facilities

Sectional view



Dondo Dam inspection gallery expedition

Front view of the Dondo Dam



- **Dam height: 71.5 m**
- **Dam width: 260 m**
- **Dam storage capacity: 1.78 million m^3 (equivalent to 14 Tokyo Domes)**

＜What is an inspection gallery?＞

An inspection gallery is a passageway for dam management activities, including manual inspection of abnormalities in the dam and observation using various installed instruments.

The gallery is cool in summer and warm in winter, as its temperature is maintained at around 16 – 18°C.

Follow these safety rules during the expedition:

1. Do not run.
2. Be careful of bumps.
3. Do not touch instruments.