

Shuangjiangkou hydropower Project

Shuangjiangkou hydropower station is a controlling project in hydropower development of upper reaches of Dadu River, which has an annual runoff of $16.6 \times 10^9 \text{ m}^3$ and mean annual flux of $527 \text{ m}^3/\text{s}$. The controlled catchment area of the project is $39\,330 \text{ km}^2$. Normal storage water level of the reservoir is $2\,500 \text{ m}$. The total storage capacity and regulating storage are $3135 \times 10^6 \text{ m}^3$ and $2151 \times 10^6 \text{ m}^3$ respectively, which means the reservoir has the capability for annual regulation. Purpose of the project is power generation. The power plant is located underground, where 4 hydraulic turbine generator sets are installed, with the total capacity of 2000MW and a mean annual power generation of $8128 \times 10^6 \text{ kW.h}$. The designed firm capacity in dry year is 503MW.

Layout of the project consists of earth core rockfill dam, spillway channel, deep hole discharging tunnel, shaft discharging tunnel, emptying tunnel, power plant, diversion and tail water tunnel. The general

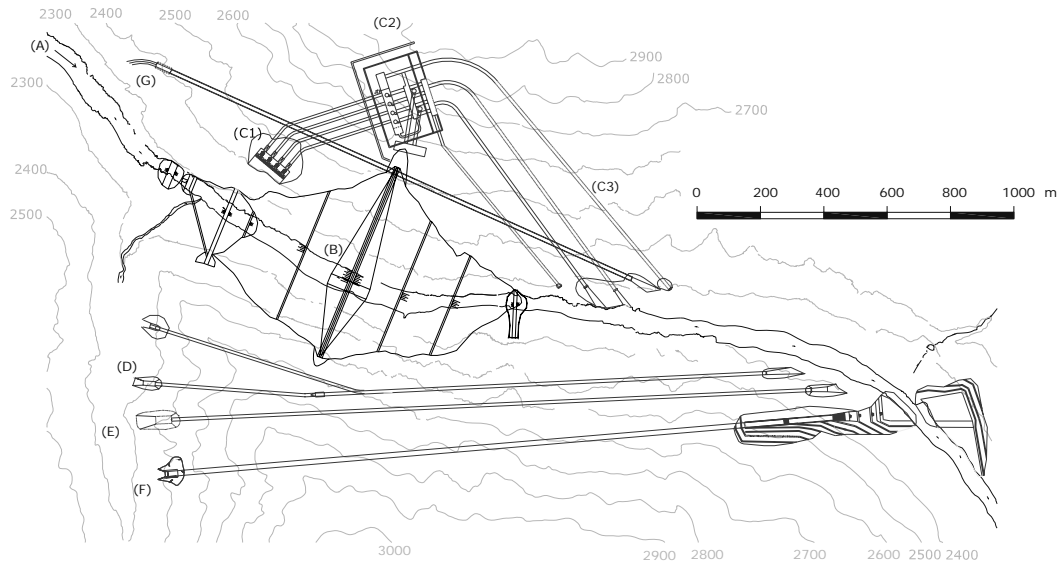
layout of Shuang Jiang Kou project is illustrated in Fig.1.

The recommended section design of the dam is illustrated in Fig.2. The rockfill dam has a height of 312 m above the foundation. After completion, Shuangjiangkou rockfill dam will become the highest dam and highest rockfill dam in the world. The width of dam crest is 16 m. The dam slope on upstream side and downstream is 1:20 and 1:1.9 respectively. The dam consists of a relatively impervious core, with 5m width at the crest, protected by two layers of filter at both sides, with thickness of 4.0 m for each layer at upstream side and 6.0 m for each layer at downstream side. Earth core is placed on a concrete cushion which is cast on the top of bedrock. A contact layer is placed between concrete cushion and earth core. The cut slope of abutment at earth core is 1:1.25 at left side and 1:0.7 at right side.

Main features of the Shuangjiangkou project are shown in Table 1.

Table 1 Shuangjiangkou hydropower station main features

Hydrology	catchment area above dam site	39,330km ²
	mean annual flux	522m ³ /s
	design flood frequency and flow (1/1000)	6900m ³ /s
	check flood frequency and flow (PMF)	8860m ³ /s
	design discharging flow	8000m ³ /s
Main dam	crest elevation	2510m
	crest length	648.66m
	crest width	16.00m
	maximum height	312m
	Ratio of length to height	2.4
	upstream dam slope	1:2.0
	downstream dam slope	1:1.9
	total filling volume	$39.9 \times 10^6 \text{ m}^3$
	core filling volume	$5.04 \times 10^6 \text{ m}^3$
Reservoir	normal water level	2500m
	dead water level	2420m
	design flood level	2501.54m
	exceptional flood level	2504.42m
	total reservoir capacity	$3115 \times 10^6 \text{ m}^3$
	regulating storage	$2151 \times 10^6 \text{ m}^3$
Hydropower station	installed capacity	2000MW
	firm capacity	503MW
	mean annual generate energy	$8128 \times 10^6 \text{ kW.h}$
	annual utilization time	4064h
	diversion flow of hydropower station	1090m ³ /s
	weighted mean working head	226.4m

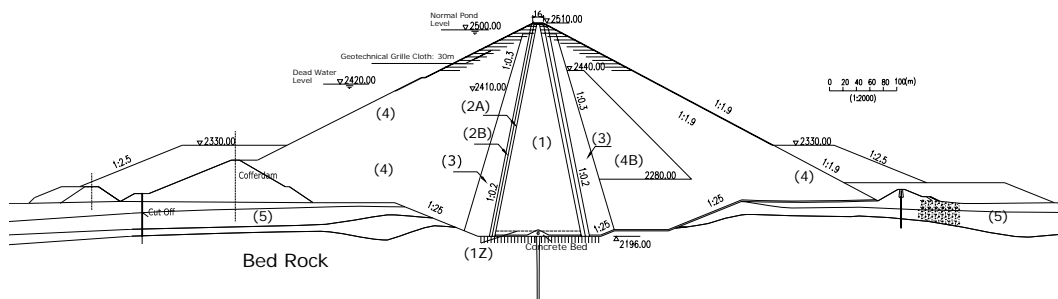


(A) Da Du River; (B) Rockfill dam;

(C1) Diversion tunnel of power station; (C2) Underground power plant; (C3) Tail water tunnel;

(D) Emptying tunnel; (E) Flood discharging tunnel 1; (F) Flood discharging tunnel 2; (G) Diversion tunnel

Fig. 1 plan view of Shuang Jiang Kou project



(1) Impervious gravel soil core; (1Z) Contact layer of clay; (2A) Filter layer A; (2B) Filter layer B;

(3) Transition zone; (4) Compacted rockfill shell zone; (4B) Compacted rockfill shell zone;

(5) Overburden layer in which three different layers was consisted

Fig. 2 Typical section of Shuang Jiang Kou rockfill dam