

**A. GENERAL****Project Location**

State	Arunachal Pradesh
District	Tawang
River	Tawang Chu
Nearest Rail Head (Broad Gauge)	Guwahati, Assam
Nearest Rail Head (Meter Gauge)	Bhalukpong (Arunachal Pradesh)
Nearest Airport	Guwahati, Assam
Latitude	27° 36' 51.34" N (At Barrage)
Longitude	92° 00' 8.78" E (At Barrage)

B. PROJECT HYDROLOGY

Catchment area	2893 km ²
Area under snow	2025 km ²
Rain fed area	868 km ²
Elevation of snow line	El. 5000.0m
Standard Project Flood (SPF)	3904 m ³ /sec
Glof	1406 m ³ /sec
Design flood (1 in 100 year flood)	990 m ³ /sec
Diversion flood	415 m ³ /sec
Riparian Flow	June to September – 25.52 m ³ /sec (20% of the average flow of monsoon period in 90% dependable year)

October to May – 7.36 m³/sec (20% of the Average flow of Non monsoon period)

C. CIVIL WORKS

Reservoir

Full reservoir level (F.R.L.)	El. 2240.0m
Maximum reservoir level (H.F.L.)	El. 2241.0m
Minimum Draw -down Level (M.D.D.L.)	El. 2232.0m
Live Storage	0.251 MCM
Submergence Area (Up to F.R.L.)	4.74 Hect.

Barrage-Spillway

Latitude	27° 36' 51.34" N
Longitude	92° 00' 8.78" E
Top of Barrage	El. 2242.0m
Free Board (Above F.R.L.)	2.0m
River Bed Level at Barrage	El. 2216.0m
Barrage Height above River Bed	26.0m
Energy dissipation arrangement	stilling basin type
Cistern level of Stilling Basin	El. 2209.0m
Barrage Length	155.0m
Width of Spillway	54.5m
Number of Bays	5 Nos.

Spillway Crest Elevation	El. 2216.0m
Gate Type	Radial gates
Gate opening size (W x H)	7.5m x 9.5m
Seismic Coefficients (PGA)	
MCE	0.38g
DBE	0.19g
Intake	
Crest elevation of intake	El. 2224.50m
Design discharge for intake	127.0 m ³ /sec
Trash rack size	3.0m (W) x 8.5m (H)
Number of rack opening	8 Nos.
Feeder Tunnels	
Number of tunnels	2 Nos.
Shape & Size (W x H)	Modified D-Shaped, 5.0m x 5.0m
Length	165.57 m & 141.88 m
Desanding Chambers	
Type	Underground, Du four type
Number	2 Nos.
Shape & Size (W x H x L)	14.0m x 18.8m x 176.0m
Size of particle to be removed	0.25mm and above
Average discharge for each desilting	58.21 m ³ /sec

Flushing discharge through each chamber

Silt flushing duct shape, size & length

(a)	At start (W x H)	0.6m x 1.0m
(b)	At the end (W x H)	1.6m x 2.2m

Silt flushing tunnel shape, size & length

(a)	U/S of gate chamber (W x H)	1.6m x 2.2m (Rectangular Shaped)
(b)	D/S of gate chamber (W x H)	1.8m x 2.2m (Modified D-Shaped)
(c)	Main flushing tunnel (W x H)	2.5m x 2.5m (Modified D-Shaped)
(d)	Length of main flushing tunnel	629.3m
(e)	Flushing tunnel outfall invert level	El. 2195.0m

Link Tunnels

Number of tunnels	2 Nos.
Shape & Size (W x H)	Modified D-Shaped, 5.0m x 5.0m
Length	140.8 m & 120.62 m

Head Race Tunnel

Number of tunnel	1 No.
Shape & Size	Modified horse shoe, 6.0m diameter
Lining type & lining thickness	Concrete lined, 350mm thick
Length of head race tunnel	1552.06m
Design discharge	105.83 m ³ /sec
Flow through velocity	3.61 m/sec
Number of adits	2 Nos.

Surge Shaft

Type	Underground, Restricted orifice type
Diameter of surge shaft	16.0m
Dia. of orifice	2.7m
Surge Shaft top elevation (Crown)	El. 2266.39m
Gate operation platform elevation	El. 2254.64m
Maximum upsurge level	El. 2253.64m
Minimum downsurge level	El. 2213.96m
Tunnel invert level at surge shaft	El. 2203.95m

Pressure Shaft

	Main PS	Intermediate PS	Unit PS
Type	Steel lined	Steel Lined	Steel lined
Number	1	1	3
Diameter (m)	5.1	4.1	2.9
Maximum discharge (m ³ /sec)	105.83	70.55	35.28
Maximum velocity (m/sec)	5.18	5.18	5.18
Length	135.41m	24.08m	245.02m
Steel liner grade	ASTM-537 Grade-II		
Liner thickness	20mm to 36mm		

Main Inlet valve

Type	Butterfly Valve
Number	3 Nos.

C/L axis elevation	EI. 2124.10m
Diameter	2.3m
Power House	
Type	Underground
Size (W x H x L)	21.0m x 95.0m x 38.15m
Number of units	3 units
Rated capacity of each unit	31.0 MW
Total installed capacity	93 MW
Type of turbine	Vertical axis Francis
Turbine centerline elevation	EI. 2124.10m
Rated discharge for each unit	35.28 m ³ /sec
Net Head/ Design head	96.33m
Erection bay elevation	EI. 2134.90m
No. of draft tubes	3 Nos.
Size (W x H)	6.0m x 3.50m
Bus Duct Tunnel	
Shape & size	D-Shaped, 4.0m x 4.5mm
Number	3 Nos.
Transformer / GIS Cavern	
Type	Underground
Size (W x H x L)	12.0m x 22.0m x 64.9m
Number of transformers	3 unit transformer

Cable Gallery Shape & Size (W x H)	D-Shaped, 3.0m x 3.0m
Unit Tail Race Tunnel	
Number of tunnels	3 Nos.
Length	30.0m
Shape & Size (W x H)	6.00m x 3.50m
Collection Gallery	
Width	10.0m (At Bottom) 11.5m (Above gate operation platform)
Total height	31.95m
Length	55.0m
Invert level of collection gallery	El. 2122.0m
Normal tail water level in collection gallery (All machines running at full capacity)	El. 2134.7m
Minimum Tail water level in collection gallery (One machine running at 10% of full capacity)	El. 2129.5m
Maximum water level during flood (SPF+Glof)	El. 2141.8m
Tail Race tunnel	
Shape & Size	Modified Horse Shoe, 6.0m diameter
Length	248.74m
Outlet invert elevation	El. 2128.65m
Pot Head Yard	
Type	Outdoor

Size (W x L) 28.0m x 56.0m

Adits to Desanding Chamber & Head Race Tunnel

Shape of tunnel Modified D-shaped

Name of Adit	Size (W x H)	Length (m)
(a) To bottom of desanding chamber	5.0m x 6.0m	218.12m
(b) To flushing tunnel gate chamber	5.0m x 6.0m	161.99m
(c) To gate operation chamber	5.0m x 6.0m	269.70m
(d) To Head Race Tunnel	5.0m x 6.0m	293.85m

Adits to Surge Shaft Area

Shape of tunnel Modified D-shaped

Name of Adit	Size (W x H)	Length
(a) To top of Surge Shaft	5.0m x 6.0m	93.0m
(b) To pressure shaft erection Chamber at top	7.0m x 8.0m	180.92m
(c) To downstream of Head Race Tunnel	5.0m x 6.0m	170.61m

Adits to Power House Complex Area

Shape of tunnel Modified D-shaped

Name of Adit	Size (W x H)	Length
(a) Main Access Tunnel	7.0m x 8.0m	613.23m
(b) To collection gallery	5.0m x 6.0m	98.88m
(c) To pressure shaft erection chamber At bottom	7.0m x 8.0m	175.83m
(d) To top of power house cavern	5.0m x 6.0m	183.64m

(e)	To top of transformer cavern	5.0m x 6.0m	87.0m
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D. HYDRO MECHANICAL EQUIPMENTS

Barrage Radial Gates

No. of gates	5 Nos.
Size of gate (W x H)	7.5m x 9.5m
Type of Hoist	Twin hydraulic cylinder
Operating condition	Raising & lowering under unbalanced water head condition

Barrage Stop log Gate

Type of stop log	Vertical lift slide type
No. of stop log set	1 set
No. of opening	5 Nos.
Size of opening (W x H)	7.5m x 12.66m
Type of hoist	Electrically operated gantry crane with trolley mounted on top girders of crane
Operating condition	Raised & lowered under balanced head condition

Trash Rack for Intake

Number of opening	8 Nos.
Size of opening (W x H)	3.0m x 8.5m
Sill level	2224.50m

Intake Gates

Type of gate	Vertical lift fixed wheel type
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No. of gate	2 Nos.
No. of opening	2 Nos.
Size of opening (W x H)	4.6m x 5.0m
Type of Hoist	Rope drum hoist mounted on steel trestles
Operating condition	Lowering under unbalanced head & lifting under balanced condition
Intake Bulkhead gates	
Type of gate	Vertical lift slide type
No. of gate	2 Nos.
No. of opening	2 Nos.
Size of opening (W x H)	4.6m x 5.0m
Type of Hoist	Rope drum hoist mounted on steel trestles
Operating condition	Raising & lowering under balanced head condition
Desanding Chamber Gates	
Type of gate	Vertical lift fixed wheel type
No. of gate	2 Nos.
No. of opening	2 Nos.
Size of opening (W x H)	4.6m x 5.0m
Type of Hoist	Rope drum hoist mounted on steel trestles

Operating condition	Lowering & lifting under balanced condition
Silt Flushing Tunnel Gates	
Type of gate	Vertical lift slide type
No. of gate	4 (2 service & 2 emergency gates)
Size of opening (W x H)	1.6m x 2.2m
Type of Hoist	Double acting Hydraulic Hoist
Operating condition	Opened under unbalanced head & closed against flowing water & unbalanced head condition
Surge Shaft Gate	
Type of gate	Vertical lift, fixed wheel type
No. of gates	1 Nos.
Size of opening (W x H)	4.00m x 5.10m
Type of Hoist	Rope drum hoist mounted on steel trestles
Operating condition	Lowering & lifting under balanced head condition
Draft Tube gates	
Type of gate	Vertical lift, fixed wheel type
No. of gates	3 Nos.
Size of opening	6.00m x 3.50m
Type of Hoist	Electrically operated rope drum hoist

Operating condition	Lowering under unbalanced head & lifting under balanced head condition
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Tail Race Tunnel Outfall Gate

Type of gate	Vertical lift fixed wheel type
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No. of gates	1 Nos.
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Size of opening	6.0m x4.8m
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Type of Hoist	Rope drum hoist mounted on steel trestles
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Operating condition	Lowering under unbalanced head & raised under balanced head condition
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Adit Gate

Type of gate	Hinged type
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No. of gates	1 No.
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Size of opening	2.2m x 2.2m
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Operating condition	Manually under un watered condition
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E. ELECTRO MECHANICAL EQUIPMENTS

Turbine

Type of turbine	Francis- Vertical axis
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No. of turbines	3 Nos.
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Rated output of each turbine	31.0 MW
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Design discharge	105.83 m ³ /sec
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Rated output	93.0 MW
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Generator

Type of generator	Semi umbrella type
Rated power	34.44 MVA
Power factor	0.90
Generator voltage	11 ± 10% kV
Number of phases	3 Phase
Frequency	50 Hz

Transformer

Number of transformers	3 Unit transformers
Voltage	40MVA, 11KV/132KV

EOT Cranes

In power house	132 T capacity
In GIS Building	10 T capacity

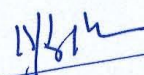
F. COST ESTIMATION

Estimated Cost

Civil Cost	611.69 Crores
E & M works	171.72 Crores
Total basic cost	783.41 Crores
Escalation for Civil & E & M works	203.03 Crores
Interest during construction & financing charges	174.31 Crores
Total Cost	1160.75 Crores



G. CONSTRUCTION PERIOD	18 Months for pre construction activities
	& 45 months for main construction work
H. POWER GENERATION	
Energy generation in 90% dependable year	493.97 MU
Energy generation in 50% dependable year	476.21 MU
Free power to home state	13%
I. Tariff	
Levellised tariff (Rs. /Kwh) (With free power to state)	5.19 Rs. /Kwh


Jayaprakash N.,
Business Associate

