

DCP-II_ANNEXURE 4: BILL OF QUANTITIES

DORJILUNG CONTRACT PACKAGE II (DCP-II): CONSTRUCTION OF HEAD RACE TUNNEL FROM RD 2,485 m to 13,898 m INCLUDING CONSTRUCTION ADIT-2, ADIT-3, 559 m REMAINING LENGTH OF ADIT 4, ADIT-5 AND HYDRO-MECHANICAL GATES

Item No.	Ref. to TS	Price Adjustment Category Ref.	Description	Unit	Quantity	Rate (Nu./Rs.)		Amount (Nu./Rs.)
						In Figures	In Words	
PART 1	CIVIL WORKS							
A1	B.1		Dewatering During Construction					
A1.1		V	Dewatering of Surface Construction Sites	kWh	20,600			
A1.2		V	Dewatering of Underground Construction Sites	kWh	2,636,000			
A2	B.2		Surface Excavation					
A2.1		IV	Common excavation	cum	2,700			
A2.2		IV	Rock excavation	cum	3,300			
A2.3		IV	Dental excavation	cum	165			
A2.4		IV	Minor excavation	cum	60			
A2.5			Additional excavation					
A2.5.1		IV	- Additional common excavation	cum	135			
A2.5.2		IV	- Additional rock excavation	cum	165			
A2.6		IV	Control Perimeter Blasting	sqm	1,800			
A2.7		IV	Removal of material arising from over-break accepted due to adverse geological conditions	cum	165			
A2.8		IV	Extra for haulage of excavated materials (beyond 3 km)	cum-km	6,000			
A3	B.3		Underground Excavation					
A3.1			Excavation of tunnels					
A3.1.1		IV	- Type A, B and C	cum	984,000			
A3.1.2		IV	- Type D and E	cum	570,000			
A3.1.3		IV	- Type F	cum	89,100			



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						In Figures	In Words	
A3.2		IV	Excavation by multi-drift or multi-segmental method	cum	19,800			
A3.3		IV	Extra for haulage of excavated materials (beyond 3 km)	cum-km	625,773			
A3.4		IV	Line Drilling	m	66,500			
A3.5		IV	Dental excavation	cum	49,300			
A3.6		IV	Removal of material arising from over-break accepted due to adverse geological conditions	cum	115,000			
A4	B.4		Rock Supports					
A4.1			Expansion shell rock bolts, 25 mm dia., Grade Fe 500 (drilling included), underground works					
A4.1.1		II	- Length up to 4.0 m	m	2,400			
A4.1.2		II	- Length more than 4.0 m and up to 6.0 m	m	13,500			
A4.2			Expansion shell rock bolts, 32 mm dia., Grade Fe 500 (drilling included), underground works					
A4.2.1		II	- Length up to 6.0 m	m	1,200			
A4.2.2		II	- Length more than 6.0 m and up to 9.0 m	m	6,750			
A4.3			Expansion shell rock bolts, 36 mm dia., Grade Fe 500 (drilling included), underground works					
A4.3.1		II	- Length up to 6.0 m	m	1,200			
A4.3.2		II	- Length more than 6.0 m and up to 9.0 m	m	6,750			
A4.4		II	Rock Dowels, GFRP type, 25 mm dia.	m	19,000			
A4.5			Resin / Cement grouted rock bolts, 25 mm dia., Grade Fe 500 (drilling included)					
A4.5.1		II	- Length up to 4.0 m, underground works	m	94,500			
A4.5.2		II	- Length up to 4.0 m, surface works	m	240			
A4.5.3		II	- Length more than 4.0 m and up to 6.0 m, underground works	m	539,000			



Item No.	Ref. to TS	Price Adjustment Category Ref.	Description	Unit	Quantity	Rate (Nu./Rs.)		Amount (Nu./Rs.)
						In Figures	In Words	
A4.5.4		II	- Length more than 4.0 m and up to 6.0 m, surface works	m	240			
A4.6			Resin / Cement grouted rock bolts, 32 mm dia., Grade Fe 500 (drilling included), underground works					
A4.6.1		II	- Length up to 6.0 m	m	2,400			
A4.6.2		II	- Length more than 6.0 m and up to 9.0 m	m	13,500			
A4.7			Resin / Cement grouted rock bolts, 36 mm dia., Grade Fe 500 (drilling included), underground works					
A4.7.1		II	- Length up to 6.0 m	m	1,200			
A4.7.2		II	- Length more than 6.0 m and up to 9.0 m	m	6,750			
A4.8			Rock Anchors, 25 mm dia., Grade Fe 500 (drilling included)					
A4.8.1		II	- Length up to 4.0 m, surface works	m	240			
A4.8.2		II	- Length more than 4.0 m and up to 6.0 m, underground works	m	85			
A4.9			Rock Anchors, 32 mm dia., Grade Fe 500 (drilling included), surface works					
A4.9.1		II	- Length up to 6.0 m	m	95			
A4.9.2		II	- Length more than 6.0 m and up to 9.0 m	m	95			
A4.9.3		II	- Length 9.0 m and up to 12.0 m	m	50			
A4.10			Rock Anchors, 36 mm dia., Grade Fe 500 (drilling included), surface works					
A4.10.1		II	- Length more than 6.0 m and up to 9.0 m	m	95			
A4.10.2		II	- Length 9.0 m and up to 12.0 m	m	50			
A4.11		II	Water expandable friction anchors (3 m - 6 m), underground works	m	6,900			
A4.12			Self-drilling Hollow core anchors, underground works					
A4.12.1		II	- 25 mm dia. / length up to 6.0 m	m	690			
A4.12.2		II	- 32 mm dia. / length up to 9.0 m	m	700			



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						In Figures	In Words	
A4.12.3		II	- 32 mm dia. / length more than 9m and up to 15.0 m	m	700			
A4.13			Grouted anchor bars (drilling included), underground works					
A4.13.1		II	- 25 mm dia. / length up to 4m	m	3,450			
A4.13.2		II	- 32 mm dia. / length up to 6m	m	2,800			
A4.13.3		II	- 36 mm dia. / length up to 9m	m	2,100			
A4.14		II	Rock bolt or rock anchor extensions into concrete (welded)	kg	165			
A4.15		V	Testing and monitoring of reinforcing elements	nos.	3,300			
A4.16		I	Miscellaneous steel profiles used in conjunction with rock reinforcement	ton	10			
A4.17			Mesh reinforcement					
A4.17.1		II	- Chain link fabric	sqm	20			
A4.17.2		II	- Welded wiremesh	sqm	10,900			
A4.18		I	Lattice girder	MT	1,900			
A4.19		I	Steel ribs, supply and installation (including accessories)	MT	6,550			
A4.20			Lagging					
A4.20.1		I	- Steel Lagging	MT	1,350			
A4.20.2		III	- Concrete Lagging	cum	32,700			
A4.21			Pre-grouting					
A4.21.1		V	- Drilling of holes of 45/57 mm diameter	m	250,000			
A4.21.2		V	- Grouting operations	nos.	49,900			
A4.22			Fore poling					
A4.22.1		I	- Installation of fore poles	m	42,200			
A4.22.2		V	- Grouting of fore poles	nos.	2,850			
A4.23		II	Pipe roofing	kg	312,000			
A4.24		V	Drilling of the pre-drainage holes	m	50,000			
A4.25		V	Protective coating (galvanization and epoxy)	kg	1,350			



Item No.	Ref. to TS	Price Adjustment Category Ref.	Description	Unit	Quantity	Rate (Nu./Rs.)		Amount (Nu./Rs.)
						In Figures	In Words	
A5	B.5		Shotcrete					
A5.1		III	<i>SFR shotcrete, underground works</i>	cum	96,200			
A5.2			<i>Plain shotcrete</i>					
A5.2.1		III	<i>- Surface works</i>	cum	220			
A5.2.2		III	<i>- Underground works</i>	cum	1,050			
A5.3		III	<i>Variation in cement content*</i>	kg	1,461,000			
A5.4		V	<i>Superplasticizer</i>	kg	487,000			
A5.5		V	<i>Steel fibers</i>	kg	3,364,000			
A5.6		V	<i>Micro silica</i>	kg	4,806,000			
			<i>* Quantity of cement variation may be both negative as well as positive during the actual execution depending upon the mix design</i>					
A6	B.6		Backfill					
A6.1			<i>Backfill / fill</i>					
A6.1.1		IV	<i>- Random Backfill</i>	cum	25			
A6.1.2		IV	<i>- Compacted Backfill</i>	cum	100			
A6.1.3		IV	<i>- Free Draining Backfill</i>	cum	100			
A6.1.4		IV	<i>- Sand gravel Backfill / fill</i>	cum	25			
A7	B.7		Drilling, Grouting and Pressure Relief Holes					
A7.1			<i>Drilling for contact / consolidation grouting or pre-grouting</i>					
A7.1.1		V	<i>- Contact grouting holes</i>	m	17,300			
A7.1.2		V	<i>- Consolidation grouting holes</i>	m	117,000			



Item No.	Ref. to TS	Price Adjustment Category Ref.	Description	Unit	Quantity	Rate (Nu./Rs.)		Amount (Nu./Rs.)
						In Figures	In Words	
A7.1.3		V	- Re-drilling for consolidation grouting where the grout has been allowed by the Engineer-in-Charge	m	11,700			
A7.2			Drilling of pressure relief / drainage holes					
A7.2.1		V	- Drilling and washing out of the hole	m	159,000			
A7.2.2		V	- Supply and installation of slotted PVC pipes / liner	m	66,500			
A7.2.3		V	- Supply and installation of drain holes outlet devices	nos.	2,250			
A7.2.4		V	- Re-drilling to set at the direction of the Engineer-in-Charge (50% of rate)	m	6,650			
A7.3			Drilling of exploratory holes, check holes, and holes for instrumentation at any inclination					
A7.3.1		V	- 45 mm minimum hole diameter with and without core recovery	m	6,650			
A7.3.2		V	- 76 mm minimum hole diameter with and without core recovery	m	670			
A7.3.3		V	- 115 mm minimum hole diameter with and without core recovery	m	450			
A7.3.4		V	- Extra over for drilling with triple tube core barrels	m	500			
A7.3.5		V	- Core recovery and logging for exploratory holes ordered by the Engineer-in-Charge	m	670			
A7.4		V	Water pressure testing - Lugeon water test	nos.	140			
A7.5		I	Embedded steel pipes and fittings for grouting (left in place)	kg	1,700			
A7.6		V	Drilling for probe holes (≥ 50 mm dia.)	m	1,700			
A7.7			Placing grout (excluding cement)					
A7.7.1		III	- Contact grouting	nos.	8,750			
A7.7.2		III	- Fill grouting of temporary drainage system	m	880			
A7.7.3		III	- Fill grouting of exploratory or control holes where directed by the Engineer-in-Charge	m	880			



Item No.	Ref. to TS	Price Adjustment Category Ref.	Description	Unit	Quantity	Rate (Nu./Rs.)		Amount (Nu./Rs.)
						In Figures	In Words	
A7.7.4		III	- Consolidation grouting and pre-grouting in single stage	nos.	164,000			
A7.7.5		III	- Consolidation grouting and pre-grouting in multiple stage	nos.	54,600			
A7.8			Grouting materials					
A7.8.1		III	- Cement	MT	8,350			
A7.8.2		IV	- Sand	MT	1,250			
A7.8.3		V	- Bentonite	MT	210			
A7.8.4		V	- Admixtures	kg	41,600			
A7.8.5		III	- Micro fine / Ultra fine Cement	kg	2,078,000			
A7.8.6		V	- Colloidal Silica	kg	41,600			
A8	B.8		NOT USED					
A.9	B.9		Concrete (incl. formworks)					
A9.1			Class M40 / A20 (selected locations)					
A9.1.1		III	- Second Stage Concreting and concrete in blockouts for equipment embedding	cum	2,750			
A9.1.2		III	- Self compacting concrete zoning of steel liners at inlet	cum	2,750			
A9.2			Class M30 / A20					
A9.2.1		III	- Self compacting concrete behind steel liners	cum	2,750			
A9.3			Class M25 / A40					
A9.3.1		III	- Concrete Lining of Tunnels invert	cum	138,000			
A9.3.2		III	- Inlet, outlet and portal structures	cum	25			
A9.3.3		III	- Inlet and/or outlet transition	cum	25			
A9.3.4		III	- Pavement concrete	cum	42,000			
A9.4			Class M25 / A20					
A9.4.1		III	- Concrete Lining of Tunnels overt	cum	145,000			



Item No.	Ref. to TS	Price Adjustment Category Ref.	Description	Unit	Quantity	Rate (Nu./Rs.)		Amount (Nu./Rs.)
						In Figures	In Words	
A9.4.2		III	- Inlet, outlet and portals	cum	240			
A9.5			Class M20 / A40					
A9.5.1		III	- Concrete for plugs and gated plugs	cum	8,250			
A9.6			Class M15 / A80					
A9.6.1		III	- Backfill concrete in surface works	cum	165			
A9.7			Class M15 / A40					
A9.7.1		III	- Backfill concrete behind liners in tunnels in geologically approved overbreaks	cum	115,000			
A9.7.2		III	- Mass concrete	cum	280			
A9.7.3		III	- Lean and plum concrete	cum	3,100			
A9.8		III	Cement variation in concrete	kg	424,000			
A9.9		V	Superplasticizer	kg	565,000			
A10	B.10		NOT USED					
A11	B.11		Reinforcing Steel					
A11.1		II	Reinforcing Bars	MT	50,900			
A11.2			Couplers					
A11.2.1		II	- 32 mm dia.	nos.	20,300			
A11.2.2		II	- 36 mm dia.	nos.	5,100			
A12	B.12		Waterstop and Joints in concrete structures					
A12.1		V	PVC waterstop	m	1,450			
A12.2			Joint filler					
A12.2.1		V	- 12 mm thick	sqm	1,450			
A12.2.2		V	- 24 mm thick	sqm	1,450			
A12.2.3		V	- 10 mm thick (expanded polystyrene)	sqm	1,450			



Item No.	Ref. to TS	Price Adjustment Category Ref.	Description	Unit	Quantity	Rate (Nu./Rs.)		Amount (Nu./Rs.)
						In Figures	In Words	
A12.3		V	Joint sealant	m	2,850			
A12.4		V	Bituminous coating	sqm	1,450			
A13	B.13		Metalworks					
A13.1		I	Steel pipes	kg	23,500			
A13.2		I	Miscellaneous steel sections	kg	23,500			
A13.3		I	Steel covers and frames	kg	6,350			
A13.4		I	Steel gratings	kg	6,350			
A13.5		I	Handrails and railings (GI pipe)	kg	29,200			
A13.6		I	Ladders and climbing irons with protection cage	kg	6,350			
A13.7		I	Erection hooks	kg	1,750			
A13.8		I	Steel anchoring	kg	1,750			
A14	B.14		NOT USED					
A15	B.15		NOT USED					
A16	B.16		Miscellaneous and Ancillary Works					
A16.1			Fencing and gates					
A16.1.1		I	- Fencing	m	220			
A16.1.2		I	- Gates	MT	15			
A16.2			Concrete and SWG Pipes					
A16.2.1		III	- Concrete pipe 300 mm dia. fully embedded in concrete	m	45			
A16.2.2		III	- Concrete pipe 450 mm dia. fully embedded in concrete	m	25			
A16.2.3		III	- Concrete pipe 600 mm dia. fully embedded in concrete	m	25			
A16.2.4		III	- Concrete pipe 750 mm dia. fully embedded in concrete	m	25			



Item No.	Ref. to TS	Price Adjustment Category Ref.	Description	Unit	Quantity	Rate (Nu./Rs.)		Amount (Nu./Rs.)
						In Figures	In Words	
A16.2.5		III	- Concrete pipe 900 mm dia. fully embedded in concrete	m	25			
A16.2.6		III	- Drain pipe 300 mm dia. on concrete / sand base	m	45			
A16.2.7		III	- Drain pipe 450 mm dia. on concrete / sand base	m	25			
A16.2.8		III	- Drain pipe 600 mm dia. on concrete / sand base	m	25			
A16.2.9		III	- Drain pipe 750 mm dia. on concrete / sand base	m	25			
A16.2.10		III	- Drain pipe 900 mm dia. on concrete / sand base	m	25			
A16.3			PVC Pipes					
A16.3.1		V	- 50 mm dia.	m	650			
A16.3.2		V	- 75 mm dia.	m	650			
A16.3.3		V	- 100 mm dia.	m	5,800			
A16.3.4		V	- 200 mm dia.	m	650			
A16.4		V	Weep Holes	m	2,500			
A17	B.17		Slope Protection					
A17.1		IV	Rock paving	cum	10			
A17.2		IV	Stone Pitching	cum	230			
A17.3			Gabions					
A17.3.1		V	- Gabions / Wire crates	sqm	19,000			
A17.3.2		V	- Boulder filling	cum	1,900			
A17.4			Random rubble masonry					
A17.4.1		V	- Wet Masonry	cum	1,250			
A17.4.2		V	- Dry Masonry	cum	30			
A17.5		III	Precast Concrete Blocks	cum	20			
A17.6		V	Slope protection Netting	sqm	50			
A17.7			Bio-Engineering Measures					
A17.7.1		V	- Wattling Trenches	m	50			



Item No.	Ref. to TS	Price Adjustment Category Ref.	Description	Unit	Quantity	Rate (Nu./Rs.)		Amount (Nu./Rs.)
						In Figures	In Words	
A17.7.2		V	- Mulching / Plantation of Grass / Shrubs	sqm	500			
A17.7.3		V	- Jute-Geo Textile	sqm	200			
A17.7.4		V	- Balley Benching	nos.	100			
A17.7.5		V	- Bamboo Piling	nos.	100			
A18	B.18		Monitoring Instruments					
A18.1		V	Topographical markers	nos.	75			
A18.2		V	Load cells	nos.	75			
A18.3		V	Convergence measurement including optical techniques	nos.	610			
A18.4		V	Single and multiple point borehole extensometers	nos.	220			
A18.5		V	Pore pressure meters (Piezometers)	nos.	30			
A18.6		V	Total pressure cells	nos.	25			
A18.7		V	Water level measuring automatic and gauge-mechanical type	nos.	15			
A18.8			Laboratory tests.					
A18.8.1		V	- Point Load Test	nos.	145			
A18.8.2		V	- Uniaxial compression for calculation of the elastic modulus and strength	nos.	290			
A18.8.3		V	- Triaxial Test	nos.	100			
A18.9		V	Readout Unit for Electrical Instruments	nos.	15			
A19	B.19		NOT USED					
A20	B.20		NOT USED					
A21	B.21		Road Works					



Item No.	Ref. to TS	Price Adjustment Category Ref.	Description	Unit	Quantity	Rate (Nu./Rs.)		Amount (Nu./Rs.)
						In Figures	In Words	
A21.1		V	Repair and maintenance of access roads	Km-Month	1,021			
SUB-TOTAL (PART 1)								
PART 2	HYDRAULIC STEEL STRUCTURE (HSS) EQUIPMENTS							
A22	B.22		Gates and hoists					
A22.1			<i>Design, procurement, fabrication/manufacturing, inspection, shop assembly, testing, painting and supply including necessary spares</i>					
A22.1.1		VI	<i>First stage inserts (anchors with plates), embedded parts, corner angles, etc. for watertight doors complete in all respects, in accordance with the specifications and drawings.</i>	Set	1			
A22.1.2		VI	<i>Second stage embedded parts for watertight doors complete with wheel track assembly, bumper track, seal seats, seat bases, sill beams, lintel beams, guides, second stage anchor bolts with double nuts and washers etc. complete in all respect in accordance with specifications and drawings.</i>	Set	1			
A22.1.3		VI	<i>Watertight doors for opening size 2.2m X 2.2m including skin plate, vertical stiffeners, horizontal girders including bottom lip, diaphragm, side, top and bottom seal assemblies, end vertical girders, wheel assemblies, all other accessories and appurtenances, complete in all respects in accordance with specifications and drawings.</i>	Set	1			
A22.1.4		VI	<i>Mandatory Spare parts – As per details given in Particular Technical Specification</i>	Set	1			
A22.2			<i>Transportation from fabrication shop to site (including insurance)</i>					



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						In Figures	In Words	
A22.2.1		V	- Item A22.1.1 above	Set	1			
A22.2.2		V	- Item A22.1.2 above	Set	1			
A22.2.3		V	- Item A22.1.3 above	Set	1			
A22.2.4		V	- Item A22.1.4 above	Set	1			
A22.3			Site assembly, erection/installation, field painting, testing and commissioning of supplied equipment					
A22.3.1		VII	- Item A22.1.1 above	Set	1			
A22.3.2		VII	- Item A22.1.2 above	Set	1			
A22.3.3		VII	- Item A22.1.3 above	Set	1			
SUB-TOTAL (PART 2)								
GRAND TOTAL (PART 1 + PART 2)								
IN FIGURES Nu./Rs.....								
IN WORDS:								

