

GUIDELINES FOR PREPARING THE CIVIL COST ESTIMATE OF TRANSMISSION SYSTEM PROJECT

The following shall be considered while preparing the cost estimate of Transmission System Project:

1. General Layout of Transmission System Project:

The following drawings shall be provided with the civil cost estimate of the Transmission System Project:

- (a) The single line diagram of the Transmission Lines plotted on the map of India showing the different wind zones through which the Line is passing.
- (b) The typical foundation drawings showing the type of foundations proposed to be used for transmission line towers in the Transmission Line Project.
- (c) The arrangement of tie beams and pile caps in case of pile foundation proposed to be used in the river crossing towers or towers in the water logged area.
- (d) The general layout of the substation proposed to be considered.
- (e) The layout of control room building proposed to be constructed inside the sub-station area.

2. Technical Specification and Salient Features in brief:

The Technical Specification and Salient Features of the transmission system project in brief shall be given. The following information shall be appended with civil cost estimate of the transmission system project:

- (a) The design criteria followed in the design of the transmission line and sub-station civil works.
- (b) The terrain of the route of transmission line and site of the substation.
- (c) The details of the river crossing to be encountered in the route of the transmission line.
- (d) Report of the survey and soil investigation conducted for the proposed transmission lines and sub station.

- (e) Type of tower configuration used and type of the conductor and earth wire used in the construction of transmission line.
- (f) The switchyard equipment to be used in the switchyard area.

3. Quantity Calculations:

The format for abstract of quantity of civil works of Transmission Lines and Substation as given in Annexure-1 & Annexure-2 respectively. Quantity calculations in support of the details included in the abstract of item wise cost should be appended with the DPR along with the relevant drawings/outline diagrams etc. as considered essential in the case. The total quantity of an item of the work shall be coordinated to avoid any duplicity of the items.

4. Rate Analysis:

The cost estimates of the Civil Works shall be based on the prevailing basic rates of materials, equipment and labour rates. These rates shall be based on Standard Schedule of Rates of CPWD/State PWD/District/SEB's and a copy of the rates from the Standard Schedule of Rates shall be appended with the DPR. Wherever the items differ from Standard Schedule of Rates, the analysis of rates based on standard procedures duly approved by the Competent Authority shall be attached invariably. The rates based on similar projects in the vicinity and percentage provisions shall be utilized for checking of the overall provision, however these rates cannot be the basis of the estimate. The rate analysis shall be compiled in the format enclosed at Annexure-3 for ready reference.

5. Abstract of Cost:

Abstract of cost of civil works including expenditure incurred already up to date and the provision required for the balance work including the quantity, rate and amount of each of the item included in the estimate.

6. Revised Cost Estimate/Completed Cost Estimate:

- 6.1 In case of transmission line projects which have been approved by the Planning Commission and where the revised cost estimate have increased by more than 15% of the original estimates, excluding escalation due to price rise or where there is change in scope, will be required to be furnished to CEA for examination in the same way as new transmission system projects irrespective of the fact whether the revision is due to change in scope or not. The procedure for scrutiny for such revised cost estimate is same as outlined in the preceding paragraphs.
- 6.2 In respect of revised projects estimates where there is no change in the scope and where the cost excluding escalation due to price rise has not changed by more than 15%, detailed revised cost estimate need not to be furnished by the Project Authorities. For such projects the Project

Authorities should send an excess note. The note shall include the salient features of the project as originally proposed and as being executed at site. The CEA will examine such estimates broadly and send its view to the Advisory Committee for consideration and recommendation of the Planning Commission.

- 6.3 In case of the projects which undergo modification and revision subsequent to their approval, the information required to be prepared in good time so that approval from the Planning Commission is received before any commitment over and above the sanctioned cost estimate.

The revised cost estimate should also include variation statement showing the variation in cost of different subheads. The quantities and rates of important items should be furnished in the enclosed Performa at Annexe-5. Other items should be included in the revised cost estimate as miscellaneous items.

The revised cost estimate should include an analysis of the reasons for the increase in the cost of different subheads as detailed below:

1. Rise in prices including variation due to exchange rate.
2. Rise due to change in scope.
3. Rise due to inadequate provisions in earlier estimate.
4. Rise due to change in design.
5. Additional requirements/new items.
6. Rise due to other causes such as inadequate plan allocation, arbitration, legal cases, poor performance of equipment, procurement problems etc.

- 6.4 When revised cost estimate is prepared during the construction of the project, the quantities of the items completed should be indicated separately and the cost thereof assessed on the basis of actual expenditure. Any liability arising out of the contract for the completed work and affecting the cost should also be considered in the estimate.

For work in progress the estimates should be based on the contract rates. If the contract document contains any clause for escalation on the prices of the materials and labour wages subsequent to the award of the contract, the amount involved should be assessed and included in the estimate.

For the balance work to be done, the cost should be estimated on the basis of rates prevalent at the time of the preparation of the revised estimates.

DESIGN AND COST ENGINEERING UNITS

The States and the Power Utilities shall have their Centralized Design and Cost estimating units for adequate timely attention to the needs of preparation of cost estimates based on the standard design practices. These centralized design organizations will scrutinize the designs and cost estimates of the projects. The designs and cost estimates prepared by the consultancy organizations shall be duly wetted by the central design units of the Power Utilities. The duplicity in the cost estimates or their design and construction procedures or in any manner directly or indirectly is not allowed and therefore needs to be checked and controlled by the central design and cost engineering units of the organizations. Cost estimates duly checked and certified by the central design and cost engineering units of the organizations only shall be considered.

ANNEXURE

LIST OF RELEVANT DOCUMENTS

- Indian Electricity Act, 2003
- Electricity Supply Act, 1948 (E(s)Act)
- Indian Companies Act, 1956
- Forest Conversion Act, 1980
- Latest Electric Power Survey Report of CEA

FORMAT FOR PREPARING THE CIVIL COST OF TRANSMISSION LINES

1. TRANSMISSION LINE PARTICULARS:

Type of line : 400/220/132/66 kV, DC/SC
 Length of line : -----km
 Length falling under Hilly Region & %age : -----km (----- %)
 Wind Zone through which line is passing : I/II/III/IV/V
 Wind Velocity : -----m/sec.
 Whether area is cyclone prone : Yes/No
 Number of river crossings :
 Span of river at crossing point :
 No. of foundations inside the river bed :

1.1 Number of towers :

Type of Towers	Deviation Angle in degrees	No. of Tower per 10 kms Length of line	No. of towers in the entire length of transmission line
Type A	0-2		
Type B	2-15		
Type C	15-30		
Type D	30-60		
Total number of towers in the Transmission Line			

2. ABSTRACT OF TOWER QUANTITY:

TYPE OF TOWERS	Excavation (cum)	R.C.C. (cum)	P.C.C. (cum)	Reinforcement (MT)
Type-A				
Type-B				
Type-C				
Type-D				
Total				

Annexure-1
(Sheet-2)

2.1 Type of tower - A

Type of foundation	No. of Tower (Nos)	Excavation (cum)		Concrete (cum)				Reinforcement (MT)	
		Per tower	Total	R.C.C.		P.C.C.		M.S./TOR	
				Per tower	Total	Per tower	Total	Per Tower	Total
Dry									
Wet									
PS									
FS									
WBC									
DFR									
WFR									
SFR									
HR									
Total									

2.2 Type of tower - B

Type of foundation	No. of Tower (Nos)	Excavation (cum)		Concrete (cum)				Reinforcement (MT)	
		Per tower	Total	R.C.C.		P.C.C.		M.S./TOR	
				Per tower	Total	Per tower	Total	Per Tower	Total
Dry									
Wet									
PS									
FS									
WBC									
DFR									
WFR									
SFR									
HR									
Total									

2.3 Type of tower - C

Type of foundation	No. of Tower (Nos)	Excavation (cum)		Concrete (cum)				Reinforcement (MT)	
		Per tower	Total	R.C.C.		P.C.C.		M.S./TOR	
				Per tower	Total	Per tower	Total	Per Tower	Total
Dry									
Wet									
PS									
FS									
WBC									
DFR									
WFR									
SFR									
HR									
Total									

2.4 Type of tower - D

Type of foundation	No. of Tower (Nos)	Excavation (cum)		Concrete (cum)				Reinforcement (MT)	
		Per tower	Total	R.C.C.		P.C.C.		M.S./TOR	
				Per tower	Total	Per tower	Total	Per Tower	Total
Dry									
Wet									
PS									
FS									
WBC									
DFR									
WFR									
SFR									
HR									
Total									

NOTE:- PS – Partially Submerged, FS-Fully Submerged, WBC-Wet Black Cotton, DFR-Dry Fissured Rock, SFR-Submerged Fissured Rock, HR-Hard Rock

3. ABSTRACT OF COST

3.1 Cost of Tower Foundation :

Civil Works	Unit	Total Quantities/10 km	Rates per Unit	Cost of 10 km line	
Preliminary Survey	Kms				
Soil Investigation	Kms				
Check Survey	Kms				
Excavation	Cum				
Concreting					
a) R.C.C.	Cum				
b) P.C.C.	Cum				
Reinforcement	Tonne				
Revetment	Cum				
Benching	Cum				
Cost per 10 km					
Cost/km of line					

3.2 Cost of River Crossings :

No. of River Crossings	Span of River Crossing	No. of Foundations inside the River Bed	Type of Foundation Pile or Well	Cost per Foundation	Total Cost of River Crossing Foundation

3.3 Land & Crop Compensation :

Land Compensation	per km	Total
Crop Compensation	per km	

3.4 Transmission Line Facilities :

Sl.No.	Item	Size of Building	Nos.	Unit	Quantity	Rate per Unit	Total Cost
	Residential Quarters :						
	a) Type A Quarters			SQM			
	b) Type B Quarters			SQM			
	c) Type C Quarters			SQM			
	d) Type D Quarters			SQM			
	e) Other facilities to be shared with Sub station						

Total Cost of Transmission Line =

FORMAT FOR PREPARING CIVILCOST OF SUB-STATION

Type of Sub-station:

Area acquired for sub-station (in hectare):

Land cost/hectare:

Total cost of land for sub station:

Type of soil strata at sub-station location:

(a) Cost of substation facilities:

Sl. No	Item	Plinth area of building	Nos.	unit	Quantity	Rate per unit	Total cost
1.	Buildings (Size) i) Plant Buildings a) Control Room (-----) b) Maintenance shed(----) c) Fire Water Pump house(---) d) Storage shed(-----) e) D.G. Set (-----) ii) Residential (Size) f) Type A quarters (-----) g) Type B quarters (-----) h) Type C quarters (-----) i) Type D quarters (-----) j) Community Centre(-----) k) Dispensary(-----) l) Guest house cum hostel (----) m) Open space for parks, horticulture n) Internal development for water supply, drainage sewerage etc.				SQM SQM SQM SQM SQM SQM SQM SQM SQM SQM SQM SQM SQM SQM		
2.	Roads i) 3.8m wide road ii) 7.0m wide road iii) 15.0m wide road				M M M		
3.	Boundary walls (height-----m) (length-----m)						
	Total cost						

(b) Cost of Switchyard:

ABSTRACT COST OF SWITCHYARD

Sl.No	ITEM	COST
1	Equipment Foundation	
2.	Cost of Transformer Foundations including drainage of oil	
3	Cost of Road cum rail track	
4.	Cost of Switchyard fencing	
5.	Cost of Earthing	
6	Cost of Cable Trenches	
	Total cost	

(i) Equipment Foundation:

Type of Equipment	Size of chimney (-----m x-----m)	Size of foundation (-----m x-----m)	Nos.	Quantity (cum)	Rate	Total
WT						
PI						
ISO						
LA						
CT						
CVT						
CB						
LM						
Total						
Total cost						

(ii) Cost of Transformer Foundations including drainage of oil:

Sl.No	TYPE	SIZE(mx n)	ITEM	UNIT	QUANTITY	RATE	COST
1	-----MVA		Excavation	Cum			
			RCC	Cum			
			PCC	Cum			
			Reinforcement	Ton			
			Structural steel	Ton			
			Gravel filling	Cum			
			PVC pipe	RM			
			Manhole	Nos.			
	Total cost						

(iii) Cost of Road cum rail track:

Sl.No	WIDTH	LENGTH (m)	ITEM	UNIT	QUANTITY	RATE	COST
1	-----m wide road cum rail track		Excavation	Cum			
			RCC	Cum			
			PCC	Cum			
			Reinforcement	Ton			
			Structural steel	Ton			
			Rail	RM			
	Total cost						

(iv) Cost of Switchyard Fencing:

Sl.No	HEIGHT	LENGTH (M)	ITEM	UNIT	QUANTITY	RATE	COST
1	-----m wide high fencing		Excavation PCC Structural steel Barbed wire	Cum Cum Ton Kg.			
	Total cost						

(v) Cost of Earthing:

Sl.No	LENGTH (m)	BREDTH (M)	ITEM	UNIT	QUANTITY	RATE	COST
1			Excavation Wire mesh	Cum Kg			
	Total cost						

(vi) Cost of Cable Trenches:

Sl.No	SIZE	LENGTH (M)	ITEM	UNIT	QUANTITY	RATE	COST
1	----M x---M		Excavation RCC PCC Reinforcement Structural steel Pre-cast cover	RMCum Cum Cum Ton Ton SQM			
	Total Cost						

Note: WT- Wave Trap, PI- Post Insulator, ISO- Isolator, LA-Lightening Arrester,
CT- Current Transformer, CVT- Current Voltage Transformer, CB- Circuit Breaker,
RCC- reinforced Cement Concrete, PCC- Plain Cement Concrete, MS-Mild Steel, TOR-Torsion steel

ABBREVIATIONS:

PS	Partially Submerged	WT	Wave Trap
FS	Fully Submerged	PI	Post Insulator
WBC	Wet Black Cotton	ISO	Isolator
DFR	Dry Fissured Rock	LA	Lightning Arrester
SFR	Submerged Fissured Rock	CT	Current Transformer
HR	Hard Rock	CVT	Current Voltage Transformer
R.C.C.	Reinforced Cement Concrete	CB	Circuit Breaker
P.C.C.	Plain Cement Concrete	LM	Lightening Mast
M.S.	Mild Steel		
TOR	Torsion Steel		