

Carriage of Materials by Truck

S. No.	Items	Basic assumptions for 5 tonne truck	Sample calculations for 5 tonne truck Diesel	Rate of carriage of 1 tonne material by truck	Remark	
1.	Cost of Variables (A) (i) Cost of truck exclusive of tyres (ii) Repair charges @ 60% over life time (iii) Life of truck (iv) Depreciation and repair charges of truck per km	Rs A	2,80,000.00 Rs	Carriage of 1 tonne of material by truck (both included) on tarred or concrete roads for a lead of L km = Rs 0.0227 $\left[1.7 S L \times \left\{ \frac{1.6 A}{12000 \times S} + \frac{1.2 B}{C} + \frac{2 D}{105} \right\} + \frac{K}{N} \right]$		
		Rs 0.6 A	1,68,000.00 Rs			
		2,85,000 kms	2,85,000 km			
		Rs $\frac{1.6 A}{2,85,000}$ per km	4,448,000.00 $\frac{4,448,000.00}{2,85,000} = \text{Rs } 1.51/\text{km}$			
	(B) (i) Cost of 6 tyres and tubes (ii) Repair and casualties (iii) Life of Tyres (iv) Hence depreciation of tyres and tubes	Rs B	6,000 × 6 = 36,000 Rs	where, L = Lead in km (one side) The cost of variables in the empty return journey has been assumed as 75% of that in loaded journey. S = Average speed in km per hour, which shall be taken upto 5 km lead as 16 km/hr. Upto 16 km lead as 24 km/hr. Upto 32 km lead as 32 km/hr. Above 32 km lead as 40 km/hr. A = Cost of truck in Rupees B = Cost of tyres and tubes in Rs C = Cost of diesel per litre in Rs K = $1.25 (E + F) + 6 G$ H + I + J + 0.0225 (A + B) + $\frac{274}{274}$ E = Daily labour of driver in Rs F = Daily labour of cleaner in Rs G = Daily labour rate of labourers in Rs		
		Rs 0.2 B	7,200 Rs			
		24,000 kms	24,000 km			
		Rs $\frac{1.2 B}{24,000}$ per km	43,200 = Rs 1.8/km 24,000			
	(C) Cost of operation materials per km	(i) Cost of fuel per litre	Rs C	Rs 4.00 per litre		
		Distance covered in 1 lit.	3.5 km	3.5 km		
		Cost of fuel per km	$\frac{C}{3.5}$ per km	$\frac{4}{3.5} = \text{Rs } 1.14/\text{km}$		
		(ii) Cost of mobil oil per lit.	Rs D	20 Rs/litre		
		Distance covered in 1 lit.	105 km	105 km		
		Cost of mobil oil per km	Rs $\frac{D}{105}$ per km	20 = Rs 0.19/km 105		
Cost of constants per day of 8 hours	(iii) Other oils and stores per km	Rs $\frac{D}{105}$ per km	Rs 0.19/km			
	Total cost of operation materials per km	Rs $\left(\frac{C}{3.5} + \frac{2 D}{105} \right)$	Rs 1.52/km			
2.	(A) (i) Cost of staff per day of 8 working hours (ii) Add 25% of the above for idle days	Driver @ Rs E per day Cleaner @ Rs F per day	Driver's pay Rs 45/day Cleaner's pay Rs 20/per day			
		Rs $(E + F) \times \frac{1}{4}$ per day	Rs $65 \times \frac{1}{4}$ = Rs 16.25 per day			

Continued

24 Estimating for Civil Engineers

including supply of all materials, labour and T & P, etc., required for completion of work.

Take a size of opening as 4' × 7', section of chaukhat as 4" × 3"

Wood — $1 \times 18 \times \frac{1}{3} \times \frac{1}{4}$ = 105 c.ft.

Wastage @ 5% = 0.075 c.ft

Total = 1.575 c.ft say 1.6 c.ft.

Wood	1.6 cft	Rs 120.00/cft	Rs 192.00
Carpenter Mistri	1/16 No.	Rs 40/day	Rs 2.50
Carpenter	1/2 No.	Rs 40/day	Rs 20.00
Sundries L.S.			Rs 10.00
			Rs 224.50
Contractor's profit @ 10%			Rs 22.45
			<u>Rs 246.95</u>

or Rs $\frac{247.00}{1.5}$ = Rs 164.66 per c.ft or Rs 5,800 per cu. m.

3. Supplying and fixing of 4.5 cm (1¾") thick C.P. teak wood part panelled and part glazed doors and window shutters, including supply and fixing of wooden cleats and stops and including fixing and adjustment of hinges, bolts, locks, handles, springs and other fittings, but excluding their supplies and including painting with 2 coats of black Japan on all iron fittings, if necessary and excluding fixing the glass panes with putty and brad. Glass to be 0.64 kg. Fittings with necessary screws to be supplied departmentally.

Taking a door size 4' × 7', size of shutter 3' 2¾" × 6' ¾" = 24.75 sq. ft.

Wood required including 10% wastage	3.25 cft	Rs 120/cft	Rs 390.00
Glass panes 12" × 8"	16 No.	Rs 2/each	Rs 32.00
Putty and brad L.S.			Rs 3.00
Mistri	1/8 No.	Rs 40/day	Rs 5.00
Carpenter	4 No.	Rs 40/day	Rs 160.00
Beldar	1 No.	Rs 20/day	Rs 20.00
Glazier	1/4 No.	Rs 30/day	Rs 7.50
Sundries such as glue, black Japan, etc.			Rs 5.00
			Rs 622.50
Contractor's profit @ 10%			Rs 62.25
Total			<u>684.75</u>

Rate per sq. ft. $\frac{684.75}{24.75}$ = Rs 27.70/sq. ft. or Rs 300.00 per sq.m.

4. Additional cost for fixing glass panes with C.P. teak wood beading and felt as directed by engineer in charge, instead of putty including cost of all materials, labour and T & P, etc., required for proper completion of the work.

Taking 10 Nos. glass panes C.P. Teak Wood $5 \times \frac{1}{3} \times \frac{1}{32}$ = 0.05 cft

Wastage 10% = 0.005 cft.

= 0.055 cft. say 0.06 cft.

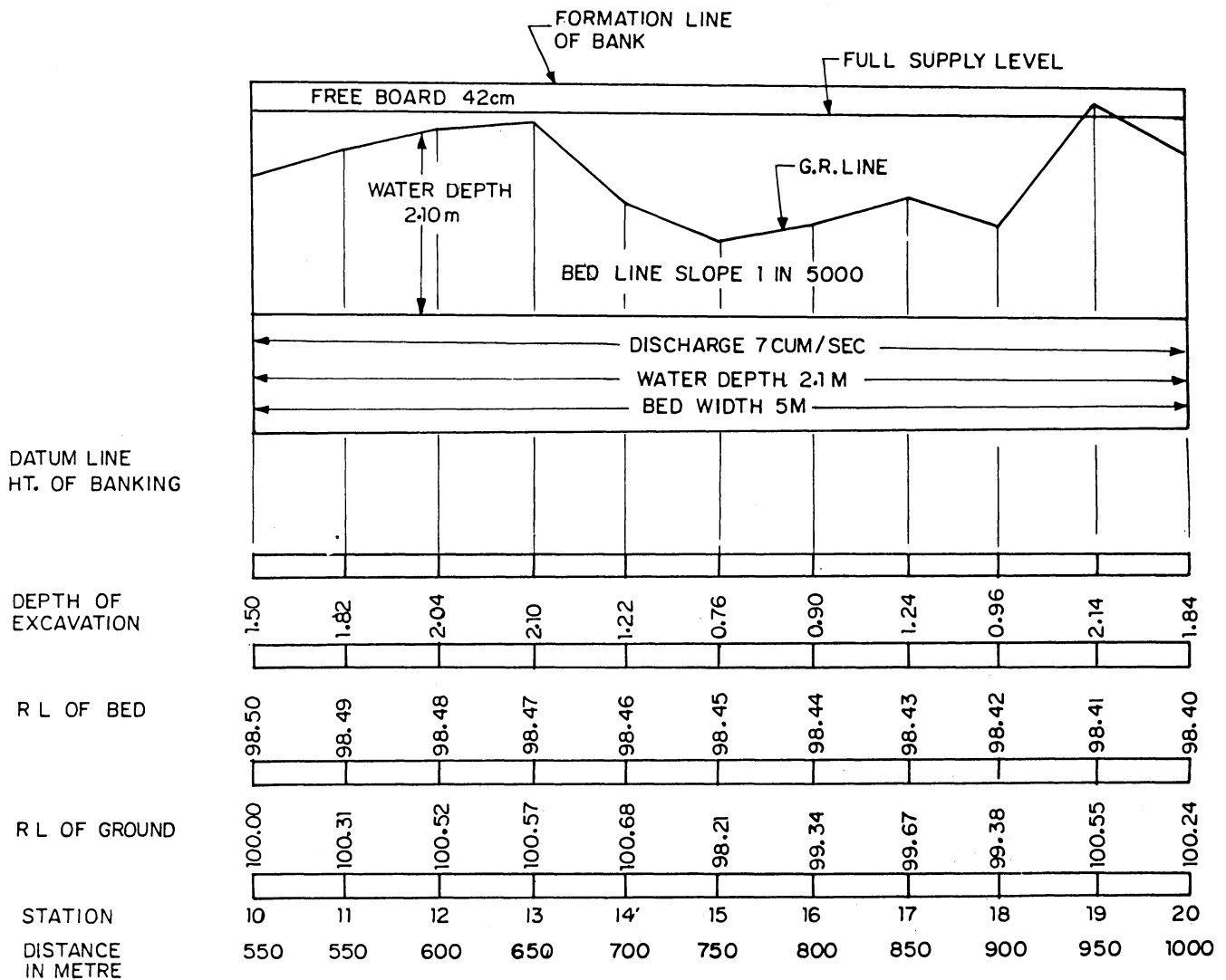
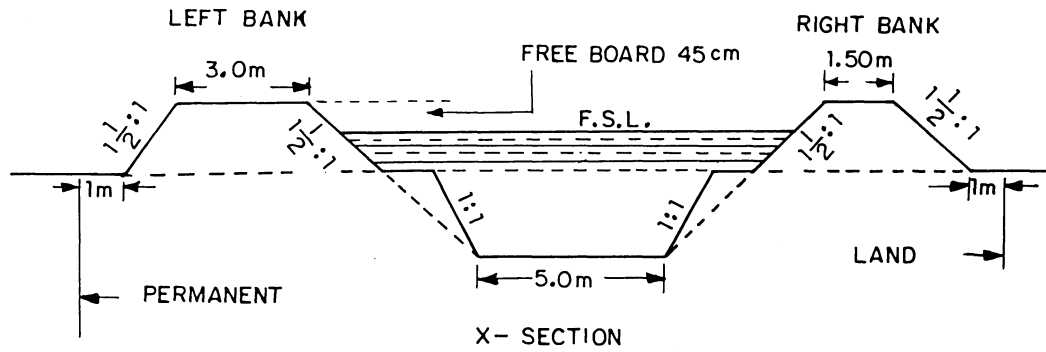
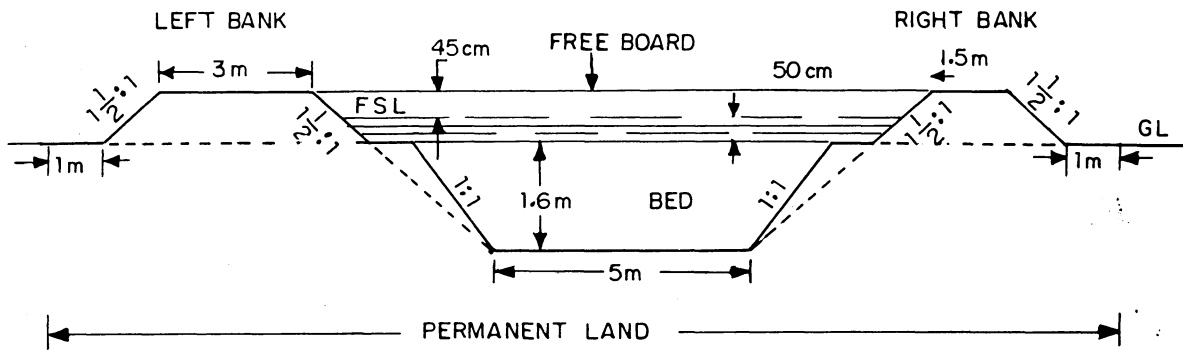


Fig. 5.2 (b)

Calculation of Quantities																
Excavation in Digging in Channel and in Banking in Embankments																
Excavation										Banking						
Station or Chaining	Depth of Digging	Mean Depth	Central Area	Side Area	Total Area	Length	Quantity	Height of Bank Above Bed	Height of Bank Above G.L.	Central Areas	Side Areas	Total Areas	Length	Quantity	Balance Quantity of Banks	Remark
		d	bd	bs^2	$bd + s^2$	L	$Q_1 = (bd + \frac{s^2}{2})L$	H	$H - d$	$(\frac{b_1 + b_2}{2})L$	$2sL^2$	$(\frac{b_1 + b_2}{2})L + 2sL^2$	L	Q_2	$Q_2 - Q_1$	
	m	m	m ²	m ²	m ²	m	m ³	m	m	m ²	m ²	m ²	m	m ³	m ³	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
10	1.50	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Column 2 — Difference of R.L. of Ground and R.L. of Bed
11	1.82	1.66	8.30	2.756	11.056	50	552.80	2.55	0.89	4.005	2.376	6.381	50	319.05	+233.75	
12	2.04	1.93	9.65	3.725	13.375	50	668.75	2.55	0.62	2.790	1.153	3.943	50	197.15	+471.60	
13	2.10	2.07	10.35	4.285	14.635	50	731.75	2.55	0.48	2.160	0.691	2.851	50	147.55	+589.20	
14	1.22	1.66	8.30	2.756	11.056	50	552.80	2.55	0.89	4.005	2.376	6.381	50	315.05	+237.75	
15	0.76	0.99	4.85	0.980	5.930	50	206.50	2.55	1.56	1.020	7.302	14.321	50	116.05	-419.55	
16	0.90	0.83	4.15	0.689	4.839	50	241.95	2.55	1.72	7.140	8.875	16.615	50	830.75	-588.80	
17	1.24	1.07	5.30	1.145	6.495	50	324.75	2.55	1.48	6.660	6.577	12.237	50	661.85	-337.10	
18	0.96	1.10	5.50	1.210	6.710	50	335.50	2.55	1.45	6.525	6.308	12.833	50	641.50	-306.00	
19	2.14	1.55	7.75	2.403	10.153	50	507.65	2.55	1.00	4.500	3.000	7.500	50	375.00	+132.65	
20	1.84	1.99	19.95	3.960	13.910	50	695.50	2.55	0.56	2.520	0.941	3.461	50	173.05	+512.45	
						Total	4907.5				Total	87.523		4376.00	+534.95	

Note : Surplus excavated earth will be embanked as spoil bank near the channel to be utilised subsequently in repair work.

Quantity of earthwork in channel = 4907.5 cum.
 Quantity of earthwork in bank (balance quantity required to be disposed of) = +534.95.
 As per the analysis of rates in previous problems, rate of excavation is Rs 8.80/m³.
 Hence, cost of channel excavation = 8.80 × 4907.50 = 43,186.00.