

Central Coalfields Limited

(A Subsidiary of Coal India Limited)

**Basantpur-Tapin Coking Coal Washery (4.0 MTPA)
Hazaribagh Area, Charhi**



**Approval for Construction of "Approach road for
Basantpur-Tapin Coking Coal Washery (4.0 MTPA) at
Basantpur, Hazaribagh Area for making forest
Application**

GM(H)/P2P/490
22/02/2022

Sub: Approval for Construction of "Approach road for Basantpur-Tapin Coking Coal Washery (4.0 MTPA) at Basantpur, Hazaribagh Area for making forest Application.

To setting up the proposed Basantpur- Tapin Coking Coal washery (4.0 MTPA) heavy machinery will be deployed at the project site. The present road to approach the site is very narrow and passing through densely populated village. Therefore an alternate route has been proposed for approaching the proposed site.

Total 4.37 Ha Land is required for the proposed road. 4.21 Ha land is GMJJ land and 0.16 Ha land is tenancy land. Out of 4.21 Ha, 2.09 Ha GMJJ land lies under Kotre Basantpur Pachmo Project, therefore, land required for Approach Road for Basantpur Tapin Coking Coal washery is 2.28 Ha., out of which 2.12 Ha GMJJ land and 0.16 tennacy land. The Diversion of remaining 2.09 GMJJ land which was earlier incorporated for this proposal is now in Kotre basantpur Pachmo project, for which FRA-NOC and forest clearance is being processed by Kotre Basantpur Project.

The diversion of 2.12 ha GMJJ land is required for the proposed road. The administrative approval of "Approach road for Basantpur-Tapin Coking Coal Washery (4.0 MTPA) at Basantpur, Hazaribagh Area" is required for applying the forestry clearance in PARIVESH portal.

Approval for Scheme cum estimate for the construction of approach road for Basantpur-Tapin Coking Coal Washery (4.0 MTPA) at Basantpur, Hazaribagh Area has already been processed vide e-office computer no. 156042 and revised scheme is being processed with same e office no for approval of the estimated amount of Rs. 9, 39, 50,668.

Extract of Plan prepared for construction of "Approach road for Basantpur-Tapin Coking Coal Washery (4.0 MTPA) at Basantpur, Hazaribagh Area" is as under:

Purpose :

Approval is required for making online forest application for diversion of 2.12 Ha of Forest land (Notified Forest = Nil & GMJJ= 2.12 Ha) for non forest purpose under FC Act 1980.

Reason for the carrying out the work and Justification:

1. Existing road for Basantpur-Tapin Coking Coal Washery site is very narrow and passing through densely populated area
2. Compliance of instruction of Additional Collector, Ramgarh vide letter no. 1538 dated 31.08.2018 regarding Coal transportation routes should be away from densely populated areas.
3. Local peoples would be away from pollution borne by Coal Transportation.
4. There is no requirement of R&R plan in the proposal.
5. Profit from the Basantpur-Tapin Coking Coal Washery is much more than the cost of the washery and the approach road, therefore this project is techno-economically justified.

Land requirement:

Total length of the road: 1.70 KM

Length of road under KBP: 0.822 KM

Length of the road for this proposal: 0.878 KM

Right of way: 26.00 m

Component wise land details

Component	Notified forest (ha)	GMJJ (Ha)	Total forest (Ha)	Non forest (ha.)	Total (ha.)
PQC Road	0	0.816	0.816	0.062	0.878
Shoulder		1.183	1.183	0.09	1.273
Bridge	0	0	0	0	0
Drain	0	0.112	0.112	0.008	0.12
Culvert	0	0.009	0.009	0	0.009
Total	0.00	2.12	2.12	0.16	2.28

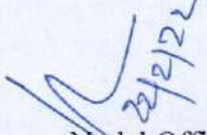
- i. Total 2.28 ha. Land is required for the road. 2.12 ha land is GMJJ land and 0.16 ha land is tenancy land
- ii. Land has been acquired under the Coal Bearing Areas (Acquisition and Development) Act, 1957 vide S.O. no. 2082 dated 30th June, 1981.
- iii. Gram sabha has been conducted on 12.09.2019 for the issuance of FRA-NOC for the 4.21 ha GMJJ land. FRA and NOC has been granted.

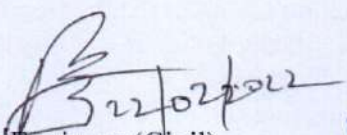
Capital requirement vis-à-vis budget provision/projection:

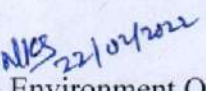
The estimate is prepared based on approved CPWD schedule of rates and Jharkhand SOR . The **Total estimated cost (approx.) is Rs 9, 39, 50,668** (Nine crore thirty Nine lakh Fifty thousand six hundred Sixty Eight only)

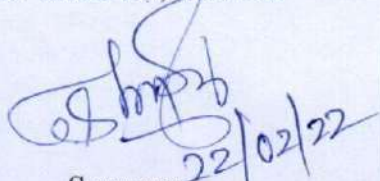
Profit from the Basantpur-Tapin Coking Coal Washery is much more than the cost of the washery and the approach road, therefore this project is techno-economically justified.

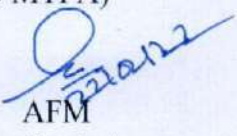
Submitted for the Approval of approach road for Basantpur-Tapin Coking Coal Washery (4.0 MTPA) at Basantpur, Hazaribagh Area" for making application for forest clearance to MoEFCC, Govt. of India.

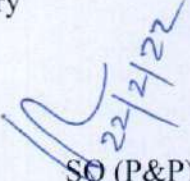

22/2/22
Nodal Officer
Basantpur-Tapin Coking
Coal Washery (4.0 MTPA)

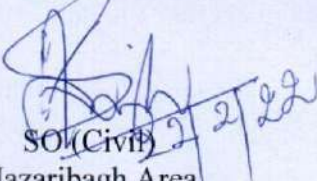

22/02/2022
Project Engineer (Civil)
Kedla Washery

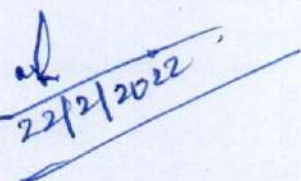

22/02/2022
Area Environment Officer
Hazaribagh Area


22/02/22
Surveyor
Kedla Washery


22/02/22
AFM
Hazaribagh Area


22/2/22
SO (P&P)
Hazaribagh Area


22/2/22
SO (Civil)
Hazaribagh Area


22/2/2022
GM (H)
Hazaribagh Area

**ABSTRACT OF COST (CONSTRUCTION OF APPROACH ROAD TO NEW WASHERY AT
BASANTPUR)**

PART A(PQC ROAD) =	59670558
PART B (DRAIN)=	4725215.87
PART C (CULVERT)=	6028390.42
PART D(TOE WALL & STONE PITCHING) =	9195045.76
TOTAL =	79619210
GST =	14331457.8
GROSS TOTAL =	93950667.9

Certificate:-

- This work has not been executed in advance without any proper work order.
- No splitting of work has been done in this proposal and it is a complete proposal as per requirement.


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PART- A (PQC ROAD)

Sl No	Description	Unit	Quantity	Rate	Amount	Updated Rate	Updated Amount	Remarks
1	Excavation in Soil using Hydraulic Excavator CK 90 and Tippers with disposal upto 1000 metres. (Excavation for roadwork in soil with hydraulic excavator of 0.9 cum bucket capacity including cutting and loading in tippers, trimming bottom and side slopes, in accordance with requirements of lines, grades and cross sections, and transporting to the embankment location within all lifts and lead upto 1000m)	cum	19508	77	1502116	36	702288	JH SOR 3.6(i)(excluding royalty)
2	Construction of Embankment with Material Deposited from Roadway Cutting (Construction of embankment with approved materials deposited at site from roadway cutting and excavation from drain and foundation of other structures graded and compacted to meet requirement of table 300-2). Rolling with vibratory roller	cum	37199	125	4649875	124	4612676	3.17(ii)
3	Embankment Construction with Material Obtained from Borrow Pits (Construction of embankment with approved material obtained from borrow pits with all lifts and leads, transporting to site, spreading, grading to required slope and compacting to meet requirement of table 300-2). Rolling with vibratory roller	cum	19508	192	3745536	183	3569964	3.16(i)
4	Granular Sub-base with Close Graded Material (Table:- 400-1) Plant Mix Method (Construction of granular sub-base by providing close graded Material, mixing in a mechanical mix plant at OMC, carriage of mixed Material to work site, spreading in uniform layers with motor grader on prepared surface and compacting with vibratory power roller to achieve the desired density, complete as per clause 401)for grading- II Material	cum	4420	1313	5803460	1804	7973680	4.1A(ii)
5	Dry Lean Cement Concrete Sub- base (Construction of dry lean cement concrete Sub- base over a prepared sub-grade with coarse and fine aggregate conforming to IS: 383, the size of coarse aggregate not exceeding 25 mm, aggregate cement ratio not to exceed 15:1, aggregate gradation after blending to be as per table 600-1, cement content not to be less than 150 kg/ cum, optimum moisture content to be determined during trial length construction, concrete strength not to be less than 10 Mpa at 7 days, mixed in a batching plant, transported to site, laid with a paver with electronic sensor, compacting with 8-10 tonnes vibratory roller, finishing and curing.)	cum	2805	2318	6501990	3499	9814695	6.1

6	Cement Concrete Pavement (Construction of unreinforced, dowel jointed, plain cement concrete pavement over a prepared sub base with 43 grade cement @ 400 kg per cum, coarse and fine aggregate conforming to IS 383, maximum size of coarse aggregate not exceeding 25 mm, mixed in a batching and mixing plant as per approved mix design, transported to site, laid with a fixed form, or slip form paver, spread, compacted and finished in a continuous operation including provision of contraction, expansion, construction and longitudinal joints, joint filler, separation membrane, sealant primer, joint sealant, debonding strip, dowel bar, tie rod, admixtures as approved, curing compound, finishing to lines and grades as per drawing)	cum	5100	5238	26713800	6322	32242200	6.2
7	Construction of Subgrade and Earthen Shoulders (Construction of subgrade and earthen shoulders with approved material obtained from borrow pits with all lifts & leads, transporting to site, spreading, grading to required slope and compacted to meet requirement of table No. 300-2) Rolling with vibratory roller	cum	2040	228	465120	187	381480	3.18(i)
8	Construction of Subgrade and Earthen Shoulders (Construction of subgrade and earthen shoulders with approved material obtained from borrow pits with all lifts & leads, transporting to site, spreading, grading to required slope and compacted to meet requirement of table No. 300-2) Rolling with vibratory roller	sqm	637.5	514	327675	586	373575	8.13

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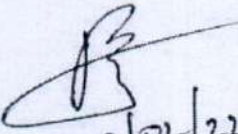
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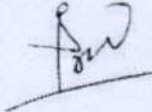
PART B (RCC DRAIN)

SI No.	Description	Unit	Quantity	Rate	Amount	Updated Rate	Updated Amount	Remarks
1	Excavation for Structures (Earth work in excavation of foundation of structures as per drawing and technical specification, including setting out, construction of shoring and bracing, removal of stumps and other deleterious matter, dressing of sides and bottom and backfilling with approved material.) Ordinary soil. Mechanical Means. Depth upto 3 m	cum	1273	61	77653	55.00	70015	12.1(I)B(i)
2	PCC 1:3:6 in Foundation (Plain cement concrete 1:3:6 nominal mix in foundation with crushed stone aggregate 40 mm nominal size mechanically mixed, placed in foundation and compacted by vibration including curing for 14 days.)	cum	134	3879	519786	5978.00	801052	12.4
3	Plain/Reinforced cement concrete in open foundation complete as per drawing and technical specifications. RCC Grade M20	cum	308.2	4864	1499085	7318.00	2255408	12.8 ©
4	Supplying, fitting and placing un-coated HYSD bar reinforcement in foundation complete as per drawing and technical specifications	tonne	21.574	66645	1437799	74105.00	1598741	12.40

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PART-C(CULVERT)

No.	Description	Unit	Quantity	Rate	Amount	Updated Rate	Updated Amount	Remarks
1	Excavation for Structures (Earth work in excavation of foundation of structures as per drawing and technical specification, including setting out, construction of shoring and bracing, removal of stumps and other deleterious matter, dressing of sides and bottom and backfilling with approved material.) Ordinary soil. Mechanical Means. Depth upto 3 m.	cum	396.18	61	24166.98	55	21789.9	12.1(I)B(i)
2	PCC 1:3:6 in Foundation (Plain cement concrete 1:3:6 nominal mix in foundation with crushed stone aggregate 40 mm nominal size mechanically mixed, placed in foundation and compacted by vibration including curing for 14 days.)	cum	157.39	3879	610515.8	5978	940877.4	12.4
3	Plain/Reinforced cement concrete in open foundation complete as per drawing and technical specifications. RCC Grade M25. With Batching Plant, Transit Mixer and Concrete Pump	cum	124.46	5214	648934.4	6677	831019.4	12.8(E) case-II
4	Supplying, fitting and placing un-coated HYSD bar reinforcement in foundation complete as per drawing and technical specifications	tonne	9.9568	66645	663570.9	74105	737848.7	12.40
5	Plain/Reinforced cement concrete in sub-structure complete as per drawing and technical specifications. RCC Grade M25. Height upto 5m	cum	165.96	5652	938005.9	8225	1365021	13.5F(p) case-I
6	Supplying, fitting and placing HYSD bar reinforcement in sub-structure complete as per drawing and technical specifications	tonne	13.2768	66758	886332.6	74364.00	987316	13.6
7	Furnishing and Placing Reinforced/Prestressed cement concrete in super-structure as per drawing and Technical Specification. RCC Grade M25. Using Batching Plant, Transit Mixer and Concrete Pump. For T-beam & slab. Height upto 5m.	cum	72.9	6246	455333.4	8011.00	584001.9	14.1B Case-II(ii)(p)
8	Supplying, fitting and placing HYSD bar reinforcement in super-structure complete as per drawing and technical specifications	tonne	5.832	67683	394727.3	76455.00	445885.6	14.2
9	Providing weep holes in Brick masonry/Plain/Reinforced concrete abutment, wing wall/return wall with 100 mm dia AC pipe, extending through the full width of the structure with slope of 1V :20H towards drawing face. Complete as per drawing and Technical specifications	metre	779.8	124	96695.2	147.00	114630.6	13.8

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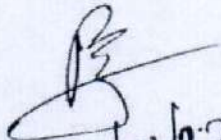
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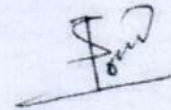
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PART D :- TOE WALL & STONE PITCHING

SL NO	Description	Unit	Quantity	Rate	Amount	Updated Rate	Updated Amount	Remarks
1	Excavation for Structures (Earth work in excavation of foundation of structures as per drawing and technical specification, including setting out, construction of shoring and bracing, removal of stumps and other deleterious matter, dressing of sides and bottom and backfilling with approved material.Mechanical means; upto 3 mt.	cum	686	61	41846	55	37730	12.1(I)B(i)
2	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level :1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size)	cum	134.75	5466.3	736583.9	6220.78	838250.105	cpwd sor 2014 (4.1.3)
3	Random rubble masonry with hard stone in foundation and plinth including levelling up with cement concrete 1:6:12 (1 cement : 6 coarse sand : 12 graded stone aggregate 20 mm nominal size) upto plinth level with :Cement mortar 1:6 (1 cement : 6 coarse sand)	cum	1323	3918.1	5183646	4356.27	5763345.21	cpwd sor 2014 (7.1.1)
4	Pointing on stone work with cement mortar 1:3 (1 cement : 3 fine sand) :Flush/ Ruled pointing	sqm	1176	152.85	179751.6	213.94	251593.44	cpwd sor 2014 13.33.1
5	Dry stone pitching 22.5 cm thick including supply of stones and preparing surface complete.	sqm	4900	422.8	2071720	470.23	2304127	cpwd sor 2014 16.11
					8213548		9195045.76	

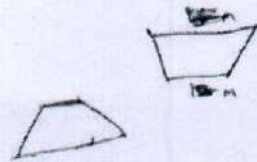

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PART-A - Road

① Earthwork in excavation:

$$19508.00 \text{ m}^3$$



② construction of embankment (from borrow pits)

$$37193.00 \text{ m}^3$$

$$\frac{1}{2} \times (15 + 13) \times 0.50 \times 1700 \times 15 = 11300.00 \text{ m}^3$$



③ construction of embankment
(from available excavated
earth)

$$19508.00 \text{ m}^3$$

$$\text{Total E/W in bill} = 11300.00 \text{ m}^3 + 44807.00 \text{ (attached sheet)} = 56707.00 \text{ m}^3$$

④ GSB Gr-II

$$1700.00 \times 13.00 \times 0.20 = 4420.00 \text{ m}^3$$

⑤ DLC

$$1700.00 \times 11.00 \times 0.15 = 2805.00 \text{ m}^3$$

⑥ PQC

$$1700.00 \times 10.00 \times 0.30 = 5100.00 \text{ m}^3$$

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⑦ Construction of embankment
(Shoulder)

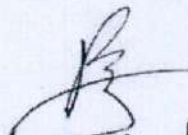
$$2 \times 1700.0 \times 1.0 \times 0.15 = 510.0 \text{ m}^3$$

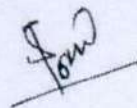
$$2 \times 1700.0 \times 1.50 \times 0.30 = 1530.0 \text{ m}^3$$

$$\underline{2040.0 \text{ m}^3}$$

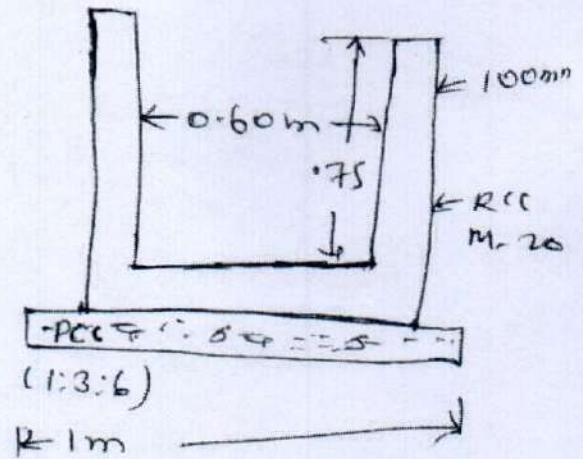
⑧ Paving on road

$$1700.0 \times 0.15 \times 2.5 \text{ Times} = 637.50 \text{ m}^2$$


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$$\text{Total length} = (2 \times 60 \cdot w + 2 \times 50 \cdot w + 2 \times 60 \cdot w + 2 \times 500 \cdot w) \\ = 1340 \cdot w \text{ m}$$



① Earthwork

$$1 \times 1340 \cdot w \times 1 \cdot w \times 0.95 = 1273 \cdot w \text{ m}^3$$

② PCC (1:3:6)

$$1 \times 1340 \cdot w \times 1 \cdot w \times 0.10 = 134 \cdot w \text{ m}^3$$

③ RCC (1:1.5:3)

$$\text{base} = 1340 \cdot w \times 0.80 \times 0.10 = 107.20 \text{ m}^3$$

$$\text{wall} = 2 \times 1340 \cdot w \times 0.75 \times 0.10 = 201 \cdot w \text{ m}^3$$

$$308.20 \text{ m}^3$$

④ Steel reinforcement

$$\text{same as item ③} \times 7014 / \text{m}^3$$

$$308.20 \times 70 = 21574 \cdot w \text{ kg}$$

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Culvert - Part - c

Abstract of quantities

① Earthwork:-

$$226.65\text{m}^3 + 169.53\text{m}^3 = 396.18\text{m}^3$$

② PCC (1:3:6)

$$90.21\text{m}^3 + 67.18\text{m}^3 = 157.39\text{m}^3$$

③ RCC (M-25) in boundh/pierth

$$(40.50\text{m}^3 + 27.60\text{m}^3 + 39.15\text{m}^3 + 17.21\text{m}^3) \\ = 124.46\text{m}^3$$

④ Steel reinforcement (60⁵F/p)

$$124.46\text{m}^3 \times 80\text{kg/m}^3 = 9956.80\text{kg}$$

⑤ RCC (M-25) in wall & stem

$$(54.00 + 26.25 + 67.50 + 3.26 + 12.25 + 2.70) \\ = 165.96\text{m}^3$$

⑥ Steel reinforcement

$$165.96\text{m}^3 \times 80\text{kg/m}^3 = 13276.80\text{kg}$$

⑦ RCC in slabs (M-25)

$$33.75 + 39.15 = 72.90\text{m}^3$$

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⑧ steel reinforcement

$$2.30 \text{ m}^3 \times 80 \text{ kg/m}^3 = 5832.0 \text{ kg}$$

⑨ weep holes pipes -

$$\text{wing wall } 2 \times 4 = 32 \text{ nos} \times 0.35 = 11.20 \text{ m}$$

$$8 \times 4 \times 3 = 96 \text{ nos} \times 0.35 = 33.60 \text{ m}$$

$$\text{R/L masonry wall } 980 \times 0.75 \text{ m} = 735.00 \text{ m}$$

$$\underline{44.80 \text{ m}}$$

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Calculation for 2m x 2m box culvert (3 nos) (part C)

① E/W

$$3 \times 18.00 \times 3.70 \times 0.50 = 99.90 \text{ m}^3$$

$$\text{wing wall } 4 \times 3 \times 5.00 \times 1.55 \times 0.85 = 79.05 \text{ m}^3$$

$$\text{cut-off } 3 \times 2 \times 10.00 \times 0.30 \times 1.00 = 18.00$$

$$\text{for apron } 3 \times 2 \times 3.00 \times \left(\frac{2.50 + 8.50}{2} \right) \times 0.30 = 29.70 \text{ m}^3$$

$$\underline{226.65 \text{ m}^3}$$

② PCC (1:3:6)

$$\text{Rabb } 3 \times 18.00 \times 3.70 \times 0.20 = 39.96 \text{ m}^3$$

$$\text{wall } 3 \times 4 \times 5.00 \times 1.55 \times 0.15 = 13.95 \text{ m}^3$$

$$\text{cut-off } 3 \times 2 \times 10.00 \times 0.30 \times 0.50 = 9.00 \text{ m}^3$$

$$3 \times 2 \times 10.00 \times 0.25 \times 0.50 = 7.50 \text{ m}^3$$

$$\text{for apron } 3 \times 2 \times 3.00 \times \left(\frac{2.50 + 8.50}{2} \right) \times 0.20 = 19.80 \text{ m}^3$$

$$\underline{90.21 \text{ m}^3}$$

③ RCC (M-20)

$$\text{Base } 3 \times 18.00 \times 2.50 \times 0.30 = 40.50 \text{ m}^3$$

$$\text{wall } 3 \times 2 \times 18.00 \times 0.25 \times 2.00 = 54.00 \text{ m}^3$$

$$\text{Top } 3 \times 18.00 \times 2.50 \times 0.25 = 33.75$$

$$\left. \begin{array}{l} 54.00 \\ 33.75 \end{array} \right\} 87.75 \text{ m}^3$$

$$\text{wing wall } 4 \times 3 \times 5.00 \times 1.55 \times 0.20 = 18.60$$

$$4 \times 3 \times 5.00 \times \left(\frac{1.55 + 0.45}{2} \right) \times 0.15 = 9.00$$

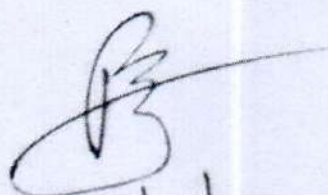
$$\left. \begin{array}{l} 18.60 \\ 9.00 \end{array} \right\} 27.60$$

$$\text{stem } 4 \times 3 \times 5.00 \times \left(\frac{0.45 + 0.25}{2} \right) \times \left(\frac{2.00 + 0.50}{2} \right) = 26.25$$

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Parapet - $3 \times 2 \times 2.10 \times 0.25 \times 0.90 = 2.70 \text{ m}^3$


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Calculation for 3m x 3m bored cast (cone no.)

PART - I

① Earthwork:-

$$18.00 \times 7.85 \times 0.60 = 84.78 \text{ m}^3$$

$$\text{Wall } 4 \times 4.00 \times 2.55 \times 1.35 = 55.08$$

$$4 \times 1.00 \times 1.45 \times 0.90 = 5.22$$

$$2 \times 10.00 \times 0.30 \times 1.00 = 6.00$$

$$\text{bore apron } 2 \times \left(\frac{7.25 + 13.25}{2} \right) \times 3.00 \times 0.30 = 18.45 \text{ m}^3$$

$$151.08 \text{ m}^3$$

② P.C.C. (1:3:6)

$$169.53 \text{ m}^3$$

$$1 \times 18.00 \times 7.85 \times 0.30 = 42.39 \text{ m}^3$$

$$4 \times 4.00 \times 2.55 \times 0.15 = 6.12 \text{ m}^3$$

$$4 \times 1.00 \times 1.45 \times 0.15 = 0.87 \text{ m}^3$$

$$2 \times 10.00 \times 0.30 \times 0.50 = 3.00 \text{ m}^3$$

$$2 \times 10.00 \times 0.25 \times 0.50 = 2.50 \text{ m}^3$$

$$\text{bore apron } 2 \times \left(\frac{7.25 + 13.25}{2} \right) \times 3.00 \times 0.20 = 54.88 \text{ m}^3$$

$$12.30 \text{ m}^3$$

③ R.C.C. (M 20)

$$\text{base } 1 \times 18.00 \times 7.25 \times 0.30 = 39.15 \text{ m}^3$$

$$\text{Side wall } 1 \times 18.00 \times 0.35 \times 3.00 = 18.90 \text{ m}^3$$

$$2 \times 18.00 \times 0.45 \times 3.00 = 48.60 \text{ m}^3$$

$$67.50 \text{ m}^3$$

$$\text{Top slab } 1 \times 18.00 \times 7.25 \times 0.30 = 39.15 \text{ m}^3$$

$$\text{Pavement } 2 \times 7.25 \times 0.25 \times 0.30 = 3.26 \text{ m}^3$$

$$42.41 \text{ m}^3$$

wing wall

$$\text{base } 4 \times 4 \times 2.55 \times 0.25 = 10.20 \text{ m}^3$$

$$4 \times 4.00 \times \left(\frac{2.55 + 0.45}{2} \right) \times 2.00 = 4.90$$

$$4 \times 1.00 \times 1.45 \times 0.25 = 1.45$$

$$4 \times 1 \times \left(\frac{1.45 + 0.45}{2} \right) \times 2.00 = 0.76$$

$$17.31 \text{ m}^3$$

B

Sum

$$\text{wall } 4 \times 4.0 \times \left(\frac{45 + .25}{2} \right) \times \left(\frac{3.0 + 1.0}{2} \right) = 11.20 \text{ m}^3$$

$$4 \times 1 \text{ m} \times \left(\frac{45 + .25}{2} \right) \times \left(\frac{1.0 + 0.50}{2} \right) = 1.05 \text{ m}^3$$

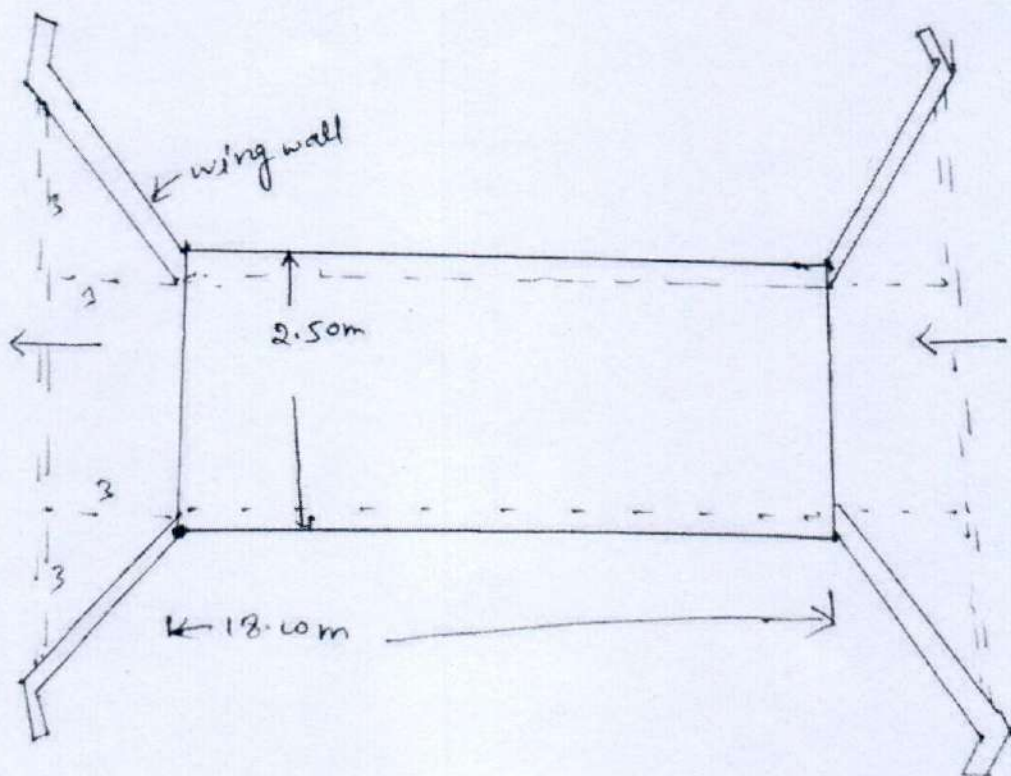
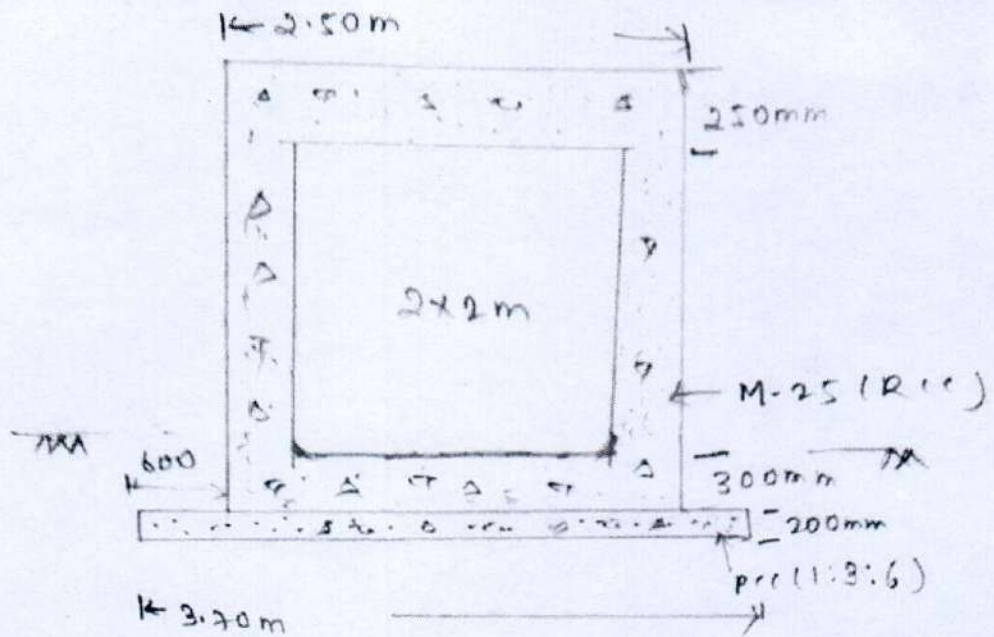
$$\sqrt{12.25 \text{ m}^3}$$

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(Part C.)

Box culvert 3m x 2m

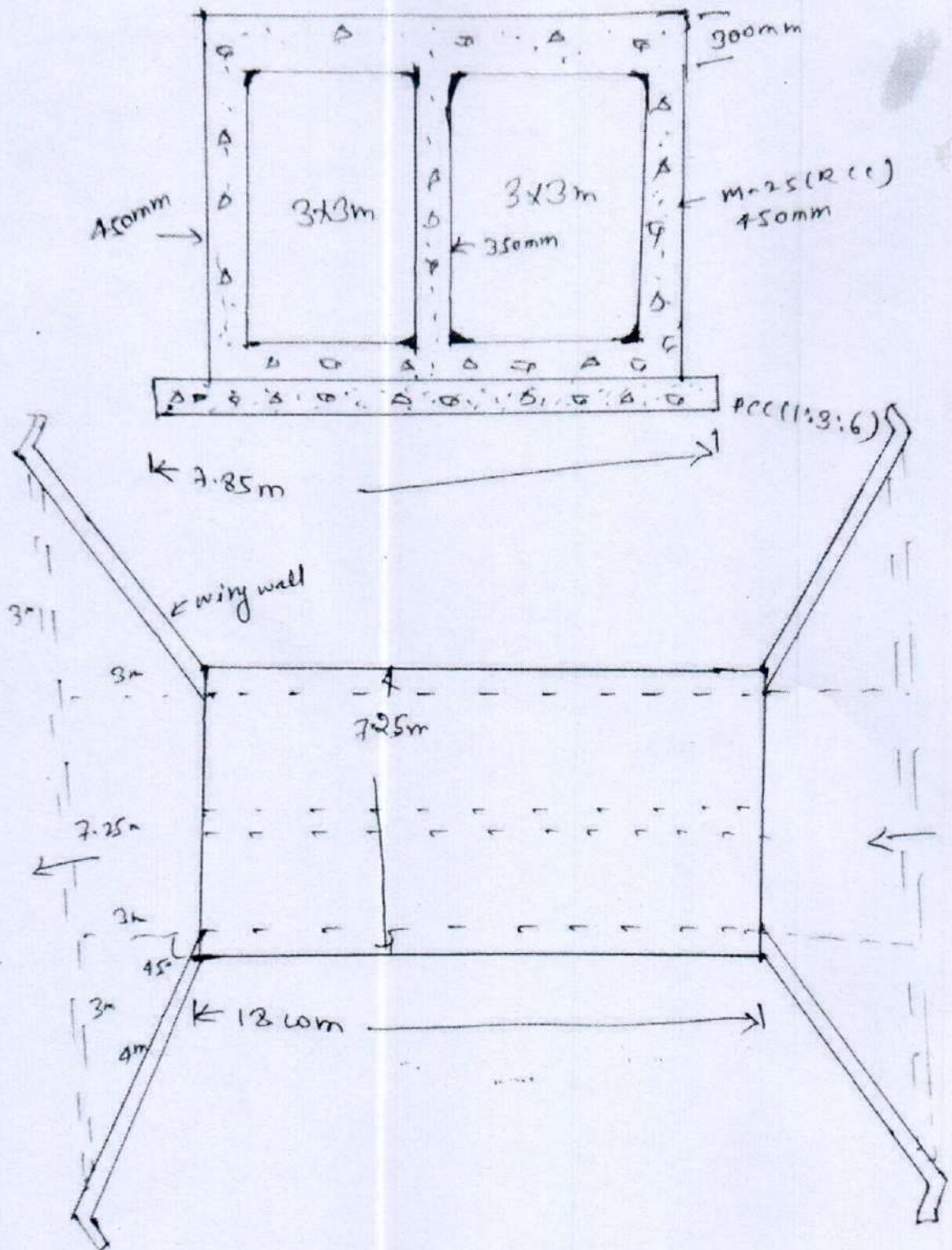


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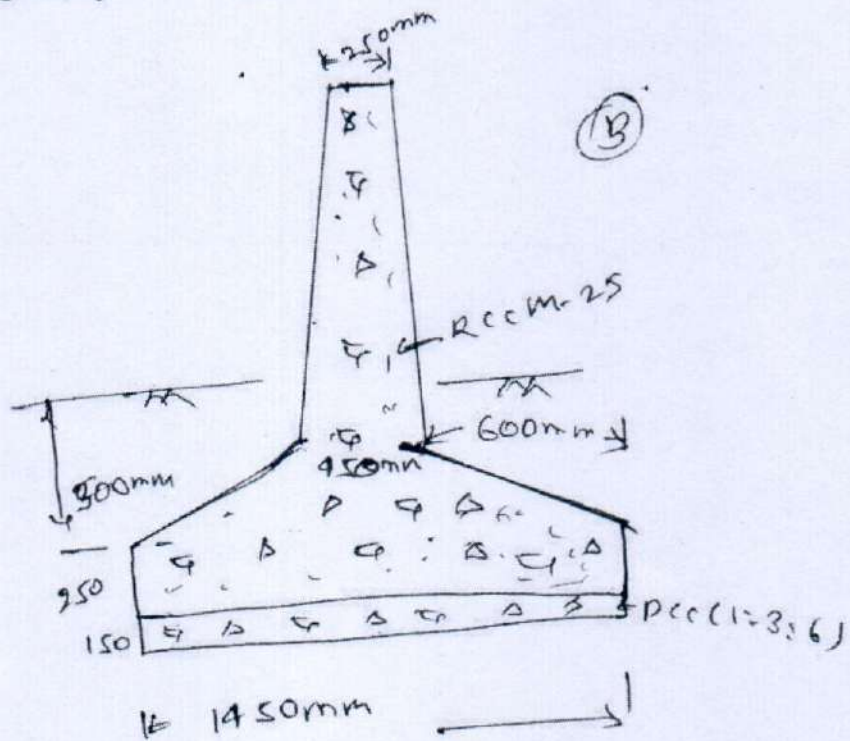
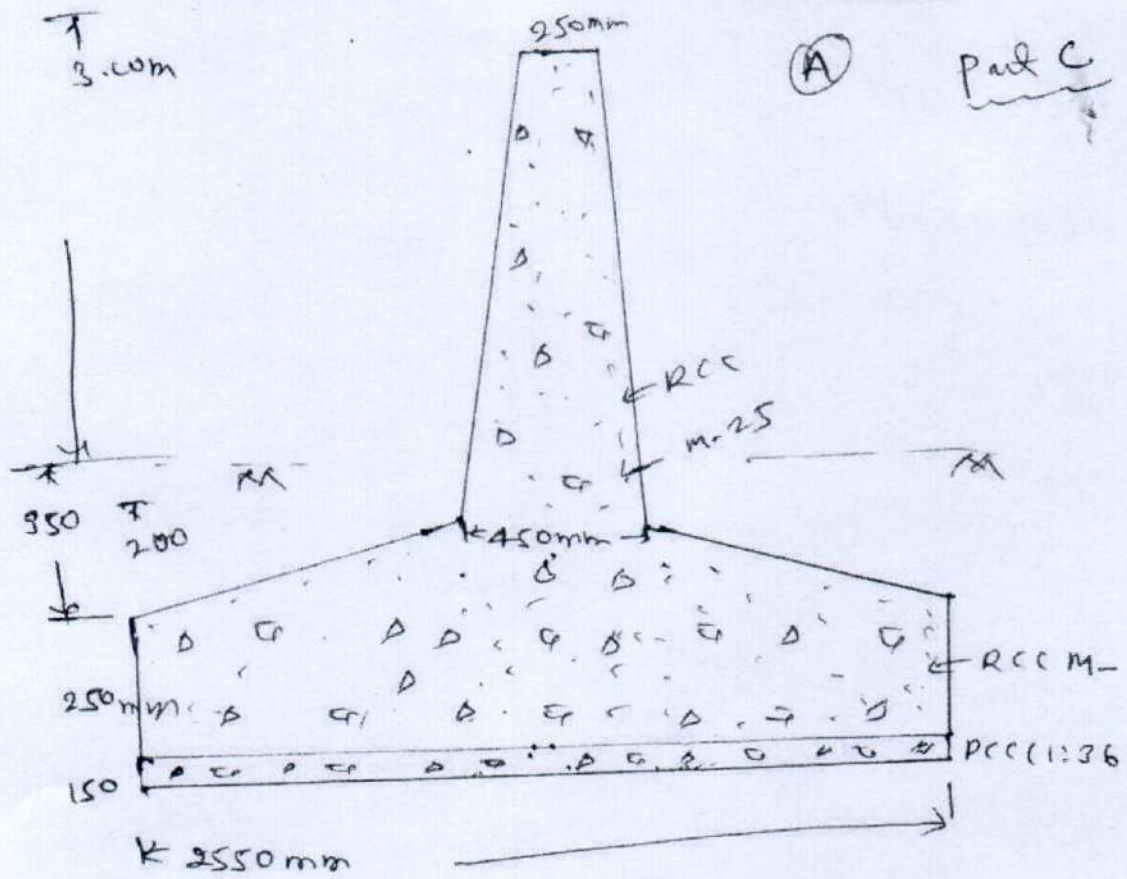
Part C

Box culvert 3m x 3m



B

50

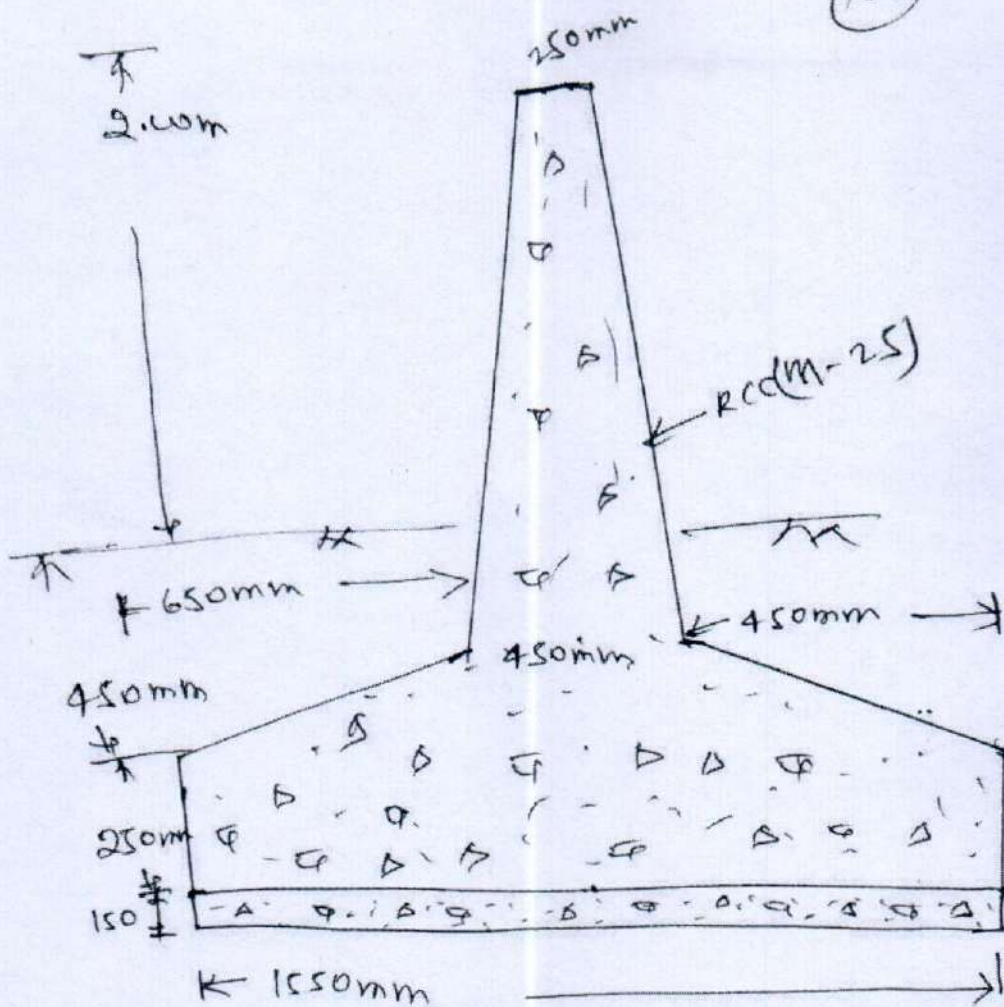


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Part C

(C)



B

San

(Part - D) Toe wall & stone pitching

① Earthwork

$$CH-110-310 \rightarrow 200m$$

$$430-500 \rightarrow 70m$$

$$570-670 \rightarrow 100m$$

$$840-900 \rightarrow 60m$$

$$1030-1050 \rightarrow 20m$$

$$1660-1680 \rightarrow 20m$$

$$\underline{490m \times 2 \text{ (both sides)}}$$

$$= 980.0m$$

$$Qty - 980.0 \times 1.0 \times 0.70 = 686.0m^3$$

② PCC (1:2:4)

$$\text{found'n } 980.0 \times 0.80 \times 0.10 = 78.4$$

$$\text{Topob wall } 980.0 \times 0.50 \times 0.075 = 36.75$$

$$\underline{115.15m^3}$$

③ Randon Rubble masonry

$$1 \times 980.0 \times \left(\frac{1.0 + 0.50}{2} \right) \times 1.80 = 1323.0m^3$$

④ Polistry work

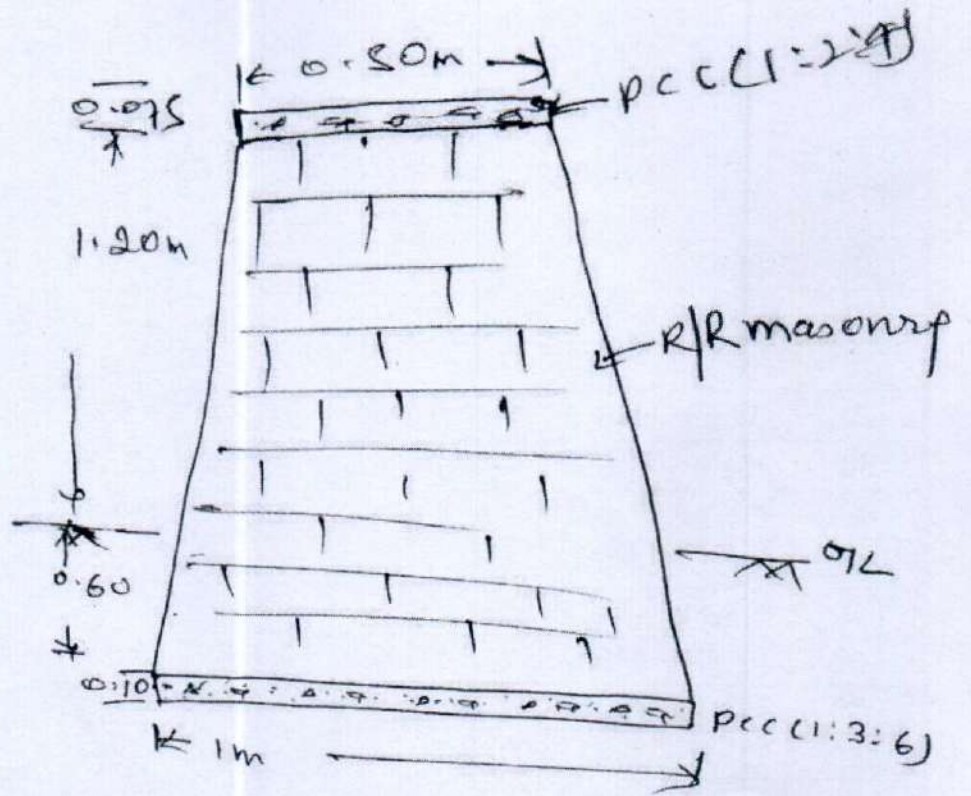
$$980.0 \times 1.20 = 1176.0m^2$$

⑤ stone pitching

$$980.0 \times 5.0 = 4900.0m^2$$

B

San



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(1)

Chainage	R.L	Formation R.L	cutting/fill ing	cutting/fil ling	C/S area	Volume
0	353	353	0	0	0	0
10	352.98	352.862	-0.118	0.118	1.7978	8.9892
15					0	4.4946
20	352.25	352.724	0.474	0.474	7.5594	18.898
30	351.3	352.586	1.286	1.286	22.598	150.78
40	351.36	352.448	1.088	1.088	18.687	206.43
45					0	46.719
50	353.11	352.31	-0.8	0.8	13.28	33.2
60	353.07	352.172	-0.898	0.898	15.083	141.81
70	352.75	352.034	-0.716	0.716	11.765	134.24
80	352.38	351.896	-0.484	0.484	7.7285	97.469
90	352.81	351.758	-1.052	1.052	17.993	128.61
100	352.35	351.62	-0.73	0.73	12.016	150.05
105					0	30.039
110	349.28	351.482	2.202	2.202	42.728	106.82
120	348.32	351.344	3.024	3.024	63.649	531.88
130	348.32	351.206	2.886	2.886	59.948	617.99
140	347.22	351.068	3.848	3.848	87.334	736.41
150	345.72	350.93	5.21	5.21	132.44	1098.9
160	345.6	350.792	5.192	5.192	131.79	1321.2
170	345.94	350.654	4.719	4.719	115.32	1235.6
180	345.79	350.516	4.731	4.731	115.73	1155.3
190	346.04	350.378	4.343	4.343	102.87	1093
200	346.09	350.24	4.155	4.155	96.853	998.61
210	346.14	350.102	3.967	3.967	90.979	939.16
220	346.53	349.964	3.439	3.439	75.238	831.09
230	346.44	349.826	3.391	3.391	73.863	745.51
240	346.34	349.688	3.353	3.353	72.78	733.21
250	345.26	349.55	4.295	4.295	101.32	870.5
260	345.57	349.412	3.847	3.847	87.304	943.11
270	345.91	349.274	3.369	3.369	73.235	802.7
280	345.8	349.136	3.336	3.336	72.298	727.67
290	345.5	348.998	3.498	3.498	76.942	746.2
300	345.4	348.86	3.46	3.46	75.843	763.93

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310	345	348.722	3.722	3.722	83.537	796.9
320	347.21	348.584	1.379	1.379	24.488	540.12
330	347.68	348.446	0.771	0.771	12.754	186.21
335					0	31.885
340	348.32	348.308	-0.012	0.012	0.1803	0.4507
350	348.42	348.17	-0.25	0.25	3.875	20.276
360	348.67	348.032	-0.638	0.638	10.384	71.295
370	348.92	347.894	-1.026	1.026	17.495	139.4
380	349.12	347.756	-1.364	1.364	24.181	208.38
390	349.06	347.618	-1.437	1.437	25.685	249.33
400	350.3	347.48	-2.815	2.815	58.073	418.79
410	350.2	347.342	-2.853	2.853	59.074	585.74
415					0	147.69
420	347.19	347.204	0.019	0.019	0.2857	0.7143
430	344.79	347.224	2.439	2.439	48.482	243.84
440	344.87	347.244	2.379	2.379	47.004	477.43
450	346.04	347.264	1.229	1.229	21.456	342.3
460	345.02	347.284	2.269	2.269	44.332	328.94
470	344.92	347.304	2.389	2.389	47.25	457.91
480	344.82	347.324	2.509	2.509	50.225	487.37
490	344.92	347.344	2.429	2.429	48.235	492.3
500	344.92	347.364	2.449	2.449	48.73	484.83
510	346.29	347.384	1.099	1.099	18.901	338.15
520	346.3	347.404	1.109	1.109	19.095	189.98
530	346.3	347.424	1.129	1.129	19.484	192.9
540	345.99	347.444	1.459	1.459	26.142	228.13
550	345.89	347.464	1.579	1.579	28.671	274.07
560	345.69	347.484	1.799	1.799	33.458	310.65
570	345.29	347.504	2.219	2.219	43.133	382.95
580	344.88	347.524	2.649	2.649	53.769	484.51
590	345	347.544	2.544	2.544	51.104	524.37
600	344.65	347.564	2.914	2.914	60.693	558.98
610	344.3	347.584	3.284	3.284	70.829	657.61
620	344.65	347.604	2.959	2.959	61.896	663.63
630	344.25	347.624	3.374	3.374	73.378	676.37
640	344.3	347.644	3.344	3.344	72.525	729.51

B

For

(3)

650	344.5	347.664	3.164	3.164	67.482	700.03
660	344.1	347.684	3.584	3.584	79.45	734.66
670	344.2	347.704	3.504	3.504	77.116	782.83
680	346.08	347.724	1.544	1.644	30.065	535.91
690	345.93	347.744	1.814	1.814	33.791	319.28
700	347.03	347.764	0.734	0.734	12.088	229.39
710	346.9	347.784	0.884	0.884	14.823	134.55
720	346.83	347.804	0.974	0.974	16.507	156.65
730	347.03	347.824	0.794	0.794	13.171	148.39
740	347.13	347.844	0.714	0.714	11.73	124.5
750	347.23	347.864	0.634	0.634	10.314	110.22
760	347.33	347.884	0.554	0.554	8.9238	96.189
770	347.73	347.904	0.174	0.174	2.6706	57.972
780	347.83	347.924	0.094	0.094	1.4277	20.491
790	347.93	347.944	0.014	0.014	0.2104	8.1903
800	347.24	348.183	0.943	0.943	15.923	80.669
810	346.67	348.422	1.757	1.757	32.529	242.26
820	346.87	348.661	1.796	1.796	33.391	329.6
830	346.97	348.9	1.935	1.935	36.513	349.52
840	347.07	349.139	2.074	2.074	39.713	381.13
850	346.36	349.378	3.023	3.023	63.622	516.68
860	346.25	349.617	3.372	3.372	73.321	684.71
870	346.25	349.856	3.611	3.611	80.244	767.82
880	346.96	350.095	3.14	3.14	66.819	735.31
890	348.5	350.334	1.839	1.839	34.349	505.84
900	348.33	350.573	2.248	2.248	43.827	390.88
910	349.4	350.812	1.412	1.412	25.167	344.97
920	349.62	351.051	1.431	1.431	25.561	253.64
930	349.92	351.29	1.37	1.37	24.304	249.32
940	350.02	351.529	1.509	1.509	27.189	257.46
945					0	67.973
950	352.69	351.768	-0.922	0.922	15.53	38.825
960	352.79	352.007	-0.783	0.783	12.971	142.51
970	353.09	352.246	-0.844	0.844	14.085	135.28
980	353.19	352.485	-0.705	0.705	11.569	128.27
990	353.29	352.724	-0.566	0.566	9.1307	103.5

B

J. Ben

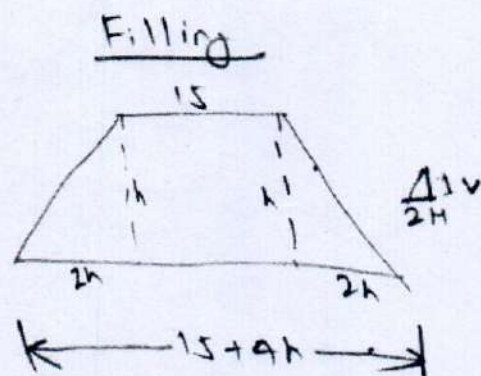
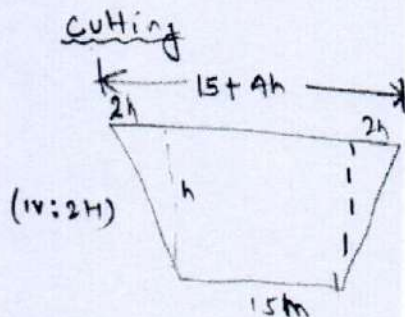
1000	353.37	352.963	-0.402	0.402	6.3532	77.42
1005					0	15.883
1010	353.11	353.202	0.092	0.092	1.3969	3.4923
1020	352.11	353.441	1.331	1.331	23.508	124.53
1030	352.61	353.68	1.07	1.07	18.34	209.24
1040	352.61	353.919	1.309	1.309	23.062	207.01
1050	352.11	354.158	2.048	2.048	39.109	310.85
1060	353.56	354.397	0.837	0.837	13.956	265.32
1070	353.56	354.636	1.076	1.076	18.456	162.06
1080	354.11	354.875	0.765	0.765	12.645	155.51
1090	354.38	355.114	0.734	0.734	12.088	123.66
1100	353.88	355.353	1.473	1.473	26.434	192.61
1110	354.38	355.592	1.212	1.212	21.118	237.76
1120	353.38	355.831	2.451	2.451	48.78	349.49
1124	355.92	355.926	0.006	0.006	0.0901	244.35
1127					0	0.1351
1130	359.25	356.052	-3.198	3.198	68.424	102.64
1140	360.25	356.263	-3.987	3.987	91.597	800.11
1150	360.2	356.474	-3.726	3.726	83.656	876.27
1160	360.47	356.685	-3.785	3.785	85.427	845.42
1170	360.85	356.896	-3.954	3.954	90.578	880.03
1180	360.82	357.107	-3.713	3.713	83.268	869.23
1190	359.99	357.318	-2.672	2.672	54.359	688.13
1200	359	357.529	-1.469	1.469	26.351	403.55
1210	358.49	357.74	-0.75	0.75	12.375	193.63
1220	358.99	357.951	-1.039	1.039	17.744	150.6
1230	361.49	358.162	-3.328	3.328	72.071	449.08
1240	361.86	358.373	-3.487	3.487	76.623	743.47
1250	361.85	358.584	-3.266	3.266	70.324	734.73
1260	361.84	358.795	-3.045	3.045	64.219	672.71
1270	360.07	359.006	-1.064	1.064	18.224	412.22
1280	361.99	359.217	-2.773	2.773	56.974	375.99
1290	362.09	359.428	-2.662	2.662	54.102	555.38
1300	362.19	359.639	-2.551	2.551	51.28	526.91
1310	362.09	359.85	-2.24	2.24	43.635	474.58
1320	361.89	360.061	-1.829	1.829	34.125	388.8

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1330	362.49	360.272	-2.218	2.218	43.109	386.17
1340	362.39	360.483	-1.907	1.907	35.878	394.94
1345					0	89.696
1350	358.99	360.694	1.704	1.704	31.367	78.418
1355					0	78.418
1360	361.52	360.905	-0.615	0.615	9.9815	24.954
1365					0	24.954
1370	361	361.116	0.116	0.116	1.7669	4.4173
1380	360.9	361.327	0.427	0.427	6.7697	42.683
1390	359.5	361.538	2.038	2.038	38.877	228.23
1400	359.5	361.749	2.249	2.249	43.851	413.64
1410	361.93	361.96	0.03	0.03	0.4518	221.51
1415					0	1.1295
1420	363.2	362.171	-1.029	1.029	17.553	43.882
1430	363.79	362.382	-1.403	1.403	24.982	212.67
1440	363.25	362.593	-0.657	0.657	10.718	178.5
1450	363.15	362.804	-0.346	0.346	5.4294	80.739
1460	365.45	363.015	-2.435	2.435	48.383	269.06
1465					0	120.96
1470	363.15	363.226	0.076	0.076	1.1516	2.8789
1480	363.05	363.437	0.387	0.387	6.1045	36.28
1490	362.95	363.648	0.698	0.698	11.444	87.745
1495					0	28.611
1500	363.95	363.859	-0.091	0.091	1.3816	3.4539
1510	364.46	364.07	-0.39	0.39	6.1542	37.679
1520	366.43	364.281	-2.144	2.144	41.353	237.54
1530	366.33	364.492	-1.833	1.833	34.215	377.84
1540	366.53	364.703	-1.822	1.822	33.969	340.92
1550	366.73	364.914	-1.811	1.811	33.724	338.47
1560	366.84	365.125	-1.71	1.71	31.498	326.11
1570	366.84	365.336	-1.499	1.499	26.979	292.39
1580	367.72	365.547	-2.168	2.168	41.92	344.5
1590	367.62	365.758	-1.857	1.857	34.752	383.36
1600	367.52	365.969	-1.546	1.546	27.97	313.61
1610	367.52	366.18	-1.335	1.335	23.589	257.8
1615					0	58.974

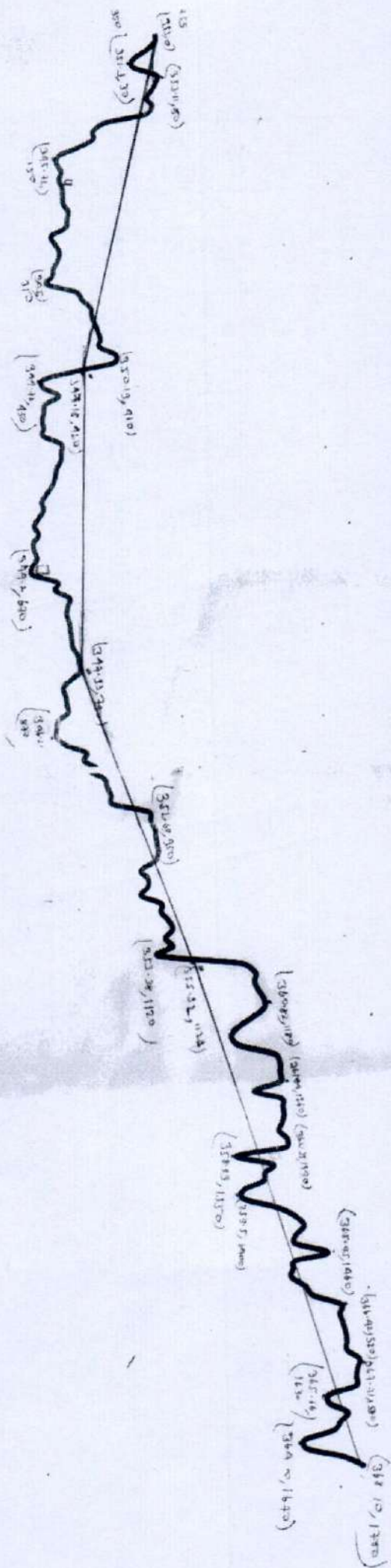
1620	365.67	366.391	0.726	0.726	11.944	29.86
1630	365.67	366.602	0.937	0.937	15.811	138.78
1635					0	39.527
1640	366.98	366.813	-0.162	0.162	2.4825	6.2062
1645					0	6.2062
1650	366.48	367.024	0.549	0.549	8.8378	22.095
1660	365.98	367.235	1.26	1.26	22.075	154.57
1670	364	367.446	3.446	3.446	75.44	487.58
1680	364.13	367.657	3.532	3.532	77.93	766.85
1690	366.74	367.868	1.133	1.133	19.562	487.46
1695					0	48.906
1700	368.11	368.079	-0.026	0.026	0.3914	0.9784

Cutting volume = 19508
Filling volume = 44807

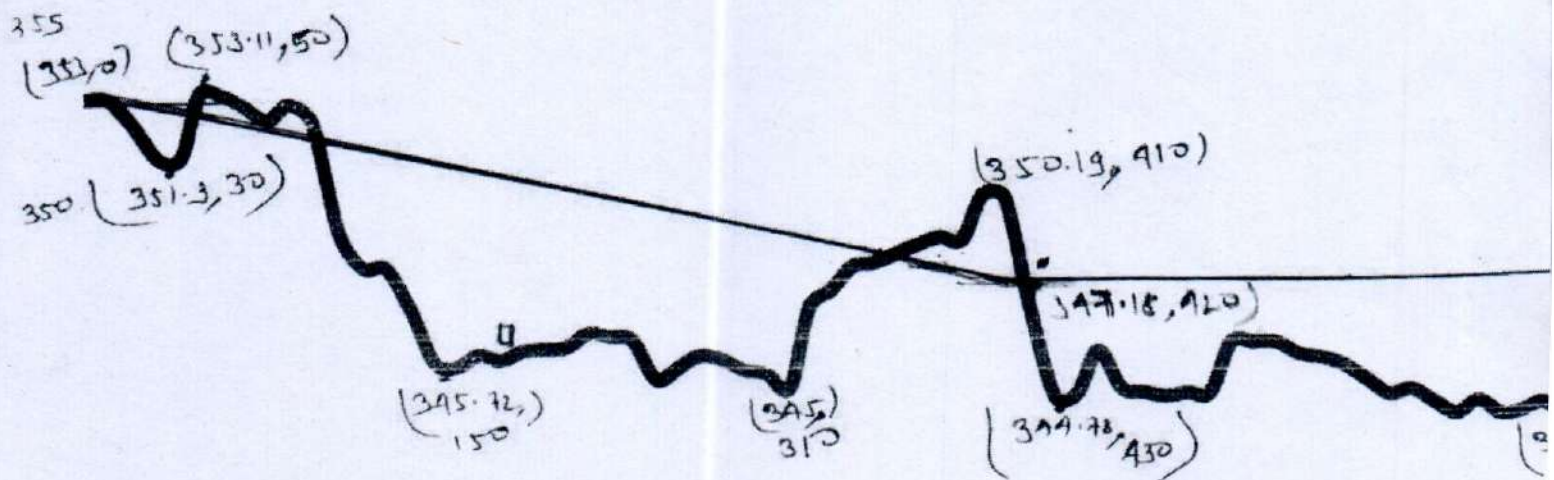


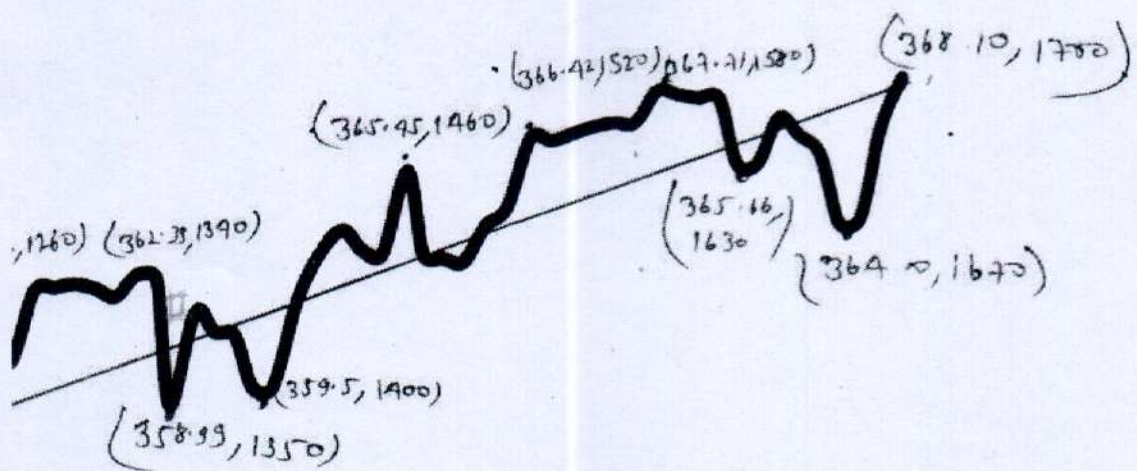
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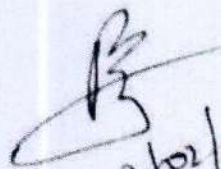
Low



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02/02/22

