



SOIL CEMENT BLOCK

Introduction

Soil is the most commonly available material. Soil as a construction material has been used for thousands of years by civilisations all over the world. It is the most abundant building material known and available in majority of the locations. It is also the basic material for the production of bricks. Burnt brick has been considered as a satisfactory material for masonry construction. They are produced by employing a burning process and hence consume considerable amount of thermal energy during production. Also, very often they are transported over great distances. Pressed Soil Cement Block is an alternative to burnt bricks. Soil cement blocks are also known as stabilized mud blocks (SMB) or stabilized compressed earth block (SCEB). It is one such technology, in which blocks are made by compressing earth/soil mixed with Suitable stabilizer (cement/ lime) at optimum moisture content by simple mechanical means. Ordinary Portland cement is the most usual stabiliser added 5 to 10% by weight to the soil. Other stabilisers like lime, puzzolana or a combination of cement and lime are also used. Soil cement blocks being usually 2 ½ times larger in size the normal burnt clay bricks, the construction is faster and the joints are consequently reduced. The less number of joints also result in cutting down the amount of mortar required. From the environmental considerations also, use of soil cement blocks in construction work result a substantial saving of energy as no fuel is required for its production. These blocks can be used in construction of houses, government buildings, toilets etc. Production of CSEB helps in generating employment for mostly unskilled labourers.

The model DPR has been prepared on the basis of existing market rates.

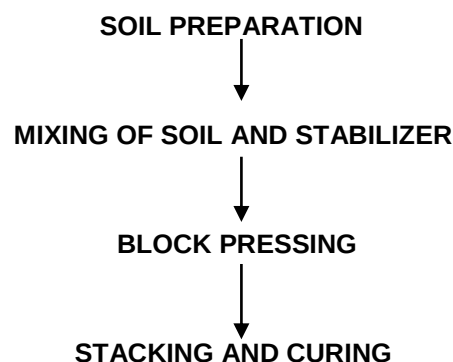
Market Potential

Shelter is a basic need of human; it is one of the basic human needs just next to food and clothing. The requirement of housing is growing in the context of the development of knowledge, changes in the civilization, people becoming more aware about the privacy, sanitation, consciousness of health, environment, infrastructural facilities etc. Soil cement blocks are the ideal construction materials for low cost housing projects undertaken. A number of government agencies are promoting the usage of this alternative building material in the construction activities.

Public awareness about the low cost housing using alternative building materials is more pronounced in urban areas rather than in rural areas where it is more required to be promoted. There is a need for suitable mechanism by which more and more rural housing schemes using low cost building materials are encouraged. The rising average levels of income in rural India have led to increasing demand for all amenities, including housing. There is a strong impact of household income on housing development in terms of space, durability of construction or amenities. As income increases, demand for housing can be expected to rise.

Manufacturing Process

The flow diagram of the process is as follows:



1. **SOIL PREPARATION:** Soil should be dried and sieved (to remove large lumps, stones, leaves, and other impurities) before it can be used properly mixed with cement and compressed into blocks. Sturdy frames with metallic meshes can be used for sifting of soil. The soil has the proper moisture content for sifting when (1) a handful can be squeezed without water appearing on its surface and (2) the ball of soil disintegrates without lumps as it is released.

2. **MIXING:** Sieved soil is spread into a thin layer on level ground and then the cement is spread on top and mixed thoroughly using a spade. Now water is sprinkled on the dry soil-cement mixture and mixed manually, such that the water gets dispersed uniformly. The wetted soil-cement mixture is pressed into a block using the machine. Soil preparation has to be carried out in batches such that the wetted soil-cement mixture should be converted into blocks within 40 minutes. This is mainly to avoid setting of the cement before pressing into a block.

3. **BLOCK PRESSING:** The processed soil is compacted into a block using a machine. "This operation consists of the following activities: (a) Feeding the processed soil into the mould, (b) block compaction and (c) block ejection. The Block press machine should be anchored in position. The moist mixture of soil and stabilizer may now be taken in a scoop and weighed. The weight of the soil should be such that desired block density is achieved. The stabilized soil mixture is poured in to the mould through quick up and down motion of scoop. It is to be compacted in the block press machine to a CSEB block.

4. **STACKING AND CURING:** Place the blocks as soon as possible on a flat, non-absorbent surface in a shady environment to cure. Set each block on edges and space the blocks far enough apart so that they do not touch each other. After 24

hours of moulding, blocks must be thoroughly sprinkled three times a day with the fine water spray. Blocks may be stacked after four days, but the sprinkling should be continued for another eight days. Fresh blocks may be stacked on a levelled ground under polythene sheet to avoid quick loss of moisture. So, during the first four days of curing, blocks be covered with plastic. The slower the block dry, the stronger they will be. The stacking yard should be as close to the machine as possible. The blocks may be stacked one above the other up to six layers. Finally, three weeks after leaving the mould, the blocks can be used in construction.

Cost of Project

Particulars	Amount (Rs. in Lakhs)
Land (Owned)	-
Land Development Cost	2.00
Civil Works and Building	24.00
Plant and Machinery	17.85
Miscellaneous Fixed Assets	0.90
DG Set	1.50
Escalation & Contingencies	2.31
Preliminary & Preoperative Expenses	1.98
Sub-total (A)	50.54
Working Capital Margin @40% of Total WC Requirement	2.00
Total Project Cost	52.54
Total Working Capital Requirements (20% of 1st Year Project Turnover) (B)	5.00
MEANS OF FINANCE	
Total funds required (A+B)	55.54
<u>Loan component-</u>	
Term loan (60% of A)	30.33
Working capital (60% of B)	3.00
TOTAL	33.33
Equity	22.22
TOTAL	55.54

Detailed Cost Element

SL. NO.	Particulars	Quantity	Rate	Amount (Rs. in Lakhs)
1	Hydraulic Block Making Machine with 15	1	1450000	14.50
2	Concrete Mixer with 5 HP Motor	1	83000	0.83
3	Water Dosing Pump	1	72000	0.72
4	Moulds	4	8000	0.32
5	Wheel Barrows	4	7000	0.28
6	Wooden Pallets	LS	--	0.70
7	Tools, Equipments and Miscellaneous	LS	--	0.50
	TOTAL			17.85

Contingencies and Escalations

It has been assumed at approximately 5% at cost.

Preliminary Expenses

Particulars	Amount (Rs. in Lakhs)
Incorporation Expenses	0.15
Project Report Preparation and Consultation	0.35
Feasibility and Engineer's/Architect's Report and Plans	0.60
Legal Charges - Drafting for agreements, contracts, stamp paper, notary and affidavit cost	0.05
Other recurring expenses of revenue nature upto start of commercial operations -salary, etc	0.45
Interest Cost for period before commercial operations	0.38
Total	1.98

Salary

Designation	Manpower	Amount (Rs. In lakhs)
Office Staff cum accountant	1	1.80
Machine operators	4	4.32
Workers	4	3.36
Security Guard	1	1.20

Profitability Statement

Particulars	Amount (Rs. In lakhs)				
	Year- 1	Year- 2	Year- 3	Year- 4	Year- 5
A. INCOME					
Production Capacity (Items /per annum)	550000	550000	550000	550000	550000
Capacity utilisation	60%	65%	70%	75%	80%
Production During the year	330000	357500	385000	412500	440000
Annual turnover	54,45,000	58,98,750	63,52,500	68,06,250	72,60,000
Total income during the year	54.45	58.99	63.53	68.06	72.60
B. OPERATING EXPENSES					
Raw Material	21.90	23.73	25.55	27.38	29.21
Salary	10.68	11.21	11.77	12.36	12.98
Repair & Maintenance	1.09	1.18	1.27	1.36	1.45
Power & utilities	3.19	3.26	3.32	3.39	3.46
Depreciation and Amortisation	2.69	2.69	2.69	2.69	2.69
Total Operating Expenses	39.55	42.07	44.61	47.18	49.78
Operating Profit (A-B)	14.90	16.92	18.92	20.88	22.82
C. FINANCIAL EXPENSES					
Interest on term loan	2.41	2.04	1.67	1.30	0.94
Interest on working capital loan	0.26	0.26	0.26	0.26	0.26
D. Other Expenses					
Administrative and general Expenses	1.09	1.18	1.27	1.36	1.45
Total Expenses	3.75	3.48	3.20	2.92	2.64
Profit Before Tax	11.14	13.45	15.72	17.96	20.18
Provision for Tax	2.79	3.36	3.93	4.49	5.04
Profit after Tax (PAT)	8.36	10.08	11.79	13.47	15.13
Dividend Declared	0.00	0.00	0.00	0.00	0.00
Retained Profit	8.36	10.08	11.79	13.47	15.13

Breakeven Point

		Amount (Rs. In Lakhs)				
SL	Particulars	Year - 1	Year - 2	Year - 3	Year - 4	Year - 5
A.	Net Sales	54.45	58.99	63.53	68.06	72.60
B.	Variable Cost					
	Raw Material	21.90	23.73	25.55	27.38	29.21
	Power and Utility	3.19	3.26	3.32	3.39	3.46
	Total Variable Cost	25.10	26.99	28.88	30.77	32.66
C.	Contribution (A-B)	29.35	32.00	34.65	37.29	39.94
D.	Fixed					
	Salary	10.68	11.21	11.77	12.36	12.98
	Interest on term loan	2.41	2.04	1.67	1.30	0.94
	interest on working capital	0.26	0.26	0.26	0.26	0.26
	Repair & Maintenance	1.09	1.18	1.27	1.36	1.45
	Depreciation and Amortisation	2.69	2.69	2.69	2.69	2.69
	Total Fixed Cost	17.12	17.37	17.66	17.97	18.31
E.	Breakeven Point	58%	54%	51%	48%	46%
F.	Cash BEP	49%	46%	43%	41%	39%

Debt-Service Coverage Ratio

		Amount (Rs. In Lakhs)				
SL	Particulars	Year - 1	Year - 2	Year - 3	Year - 4	Year - 5
i	Profit	8.36	10.08	11.79	13.47	15.13
ii	Depreciation	2.69	2.69	2.69	2.69	2.69
iii	Interest on term loan	2.41	2.04	1.67	1.30	0.94
A	Total (i + ii + iii)	13.45	14.81	16.15	17.46	18.75
i	Interest on term loan	2.41	2.04	1.67	1.30	0.94
ii	Principal repayment on term loan	4.33	4.33	4.33	4.33	4.33
B	Total (i + ii)	6.74	6.37	6.00	5.64	5.27
	DSCR (A / B)	2.00	2.32	2.69	3.10	3.56

Interest on Term Loan and Principal Repayment

Refer Annexure I for Loan Repayment Schedule.

We have assumed the repayment tenure of term loan for a period of 7 years, Rate of interest being 8.5% p.a.

Address of Vendors

Name of Vendor	Address and Contact Number
Constro Enterprises	B, Annai Thangammal Nagar, Ganapathy, Coimbatore-641006, Tamil Nadu, India Contact No.- 08046060209
Weber Construction Machinery	Road No 11,plot No 447,odhav,kathwada G I D C,kathwada, Ahmedabad - 382415, Gujarat, India Contact No.- 08048762029
Future Metering Pumps & System	W 68/A, MIDC Ambad Nashik - 422010, Maharashtra, India Contact No.- 08048110161
Nipshell Hydraulics	A 6, Sector 3 Noida - 201301, Gautam Budh Nagar, Uttar Pradesh, India Contact No.- 08045323681

ANNEXURE- I

Year	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12	Annually
I													
Principal													
Opening	30.33	29.96	29.60	29.24	28.88	28.52	28.16	27.80	27.44	27.08	26.72	26.35	
Repaid	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	4.33
Closing	29.96	29.60	29.24	28.88	28.52	28.16	27.80	27.44	27.08	26.72	26.35	25.99	
Interest	0.21	0.21	0.21	0.21	0.20	0.20	0.20	0.20	0.19	0.19	0.19	0.19	2.41
II													
Principal													
Opening	25.99	25.63	25.27	24.91	24.55	24.19	23.83	23.47	23.11	22.74	22.38	22.02	
Repaid	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	4.33
Closing	25.63	25.27	24.91	24.55	24.19	23.83	23.47	23.11	22.74	22.38	22.02	21.66	
Interest	0.18	0.18	0.18	0.18	0.17	0.17	0.17	0.17	0.16	0.16	0.16	0.16	2.04
III													
Principal													
Opening	21.66	21.30	20.94	20.58	20.22	19.86	19.49	19.13	18.77	18.41	18.05	17.69	
Repaid	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	4.33
Closing	21.30	20.94	20.58	20.22	19.86	19.49	19.13	18.77	18.41	18.05	17.69	17.33	
Interest	0.15	0.15	0.15	0.15	0.14	0.14	0.14	0.14	0.13	0.13	0.13	0.13	1.67
IV													
Principal													
Opening	17.33	16.97	16.61	16.25	15.88	15.52	15.16	14.80	14.44	14.08	13.72	13.36	
Repaid	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	4.33
Closing	16.97	16.61	16.25	15.88	15.52	15.16	14.80	14.44	14.08	13.72	13.36	13.00	
Interest	0.12	0.12	0.12	0.12	0.11	0.11	0.11	0.10	0.10	0.10	0.10	0.09	1.30
V													
Principal													
Opening	13.00	12.64	12.27	11.91	11.55	11.19	10.83	10.47	10.11	9.75	9.39	9.03	
Repaid	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	4.33
Closing	12.64	12.27	11.91	11.55	11.19	10.83	10.47	10.11	9.75	9.39	9.03	8.66	
Interest	0.09	0.09	0.09	0.08	0.08	0.08	0.08	0.07	0.07	0.07	0.07	0.06	0.94
VI													
Principal													
Opening	8.66	8.30	7.94	7.58	7.22	6.86	6.50	6.14	5.78	5.42	5.05	4.69	
Repaid	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	4.33
Closing	8.30	7.94	7.58	7.22	6.86	6.50	6.14	5.78	5.42	5.05	4.69	4.33	
Interest	0.06	0.06	0.06	0.05	0.05	0.05	0.05	0.04	0.04	0.04	0.04	0.03	0.57
VII													
Principal													
Opening	4.33	3.97	3.61	3.25	2.89	2.53	2.17	1.81	1.44	1.08	0.72	0.36	
Repaid	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	4.33
Closing	3.97	3.61	3.25	2.89	2.53	2.17	1.81	1.44	1.08	0.72	0.36	0.00	
Interest	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.00	0.20