CHAPTER-2
PROJECT DESCRIPTION

2.0 Introduction

In view of the availability of suitable quality and quantity of all raw materials needed for cement manufacture M/s Valley Strong Cements (Assam) Ltd., has proposed to establish a cement manufacturing plant at Debendra Nagar, Badarpurghat, Dist. Karimganj (Assam). The raw materials such as Limestone and Coal shall be transported by road from Meghalaya to the proposed site covering a distance of about 80 km. Quantity wise type of cement to be manufacturing of cement is given in Table 2.1.

TABLE 2.1 : Manufacturing Capacities

S.No	Details	Capacity-TPA
1	Ordinary Port Land Cement (OPC)	132000
2	Portland Pozzolana Cement (PPC)	528000
Total		**660000**
3	Clinker	528000

2.2 Raw Material Requirement

2.2.1 Raw Materials

The requirement of all raw materials for the 0.528 mtpa of clinker production along with 0.66 mtpa of cement production (OPC & PPC) is presented in the Table 2.2 given below.

TABLE 2.2: QUANTITY & SOURCE OF RAW MATERIALS

Raw Material	Consumption (in TPD)	Source
Limestone	2140	Lumshnong
Lateritic Clay	320	Local mines
Coal	200	Bapung/Surupi coal fields
Gypsum	32	Bhutan/Rajasthan
Fly ash	560	Farakka / Kahalgaon

- Lateritic clay will be required as an additive which is available nearby the plant site at 2 km distance.
- Coal shall be procured from Bapung or Surupi coal belts in Meghalaya which are at a distance of 80-100 kms from the plant site.
- Gypsum shall be procured from Bhutan or Rajasthan and the annual requirement is estimated at about 13,200 metric tones.
- The limestone mine is at Lumshnong in Meghalaya at 75 km shall be procured by trucks.

VSCL has initiated the process for obtaining the statutory clearances for the identified limestone mine. Chemical analysis of the main raw materials is given in Table 2.3.

TABLE 2.3: Chemical Analysis of Limestone

Parameters	Limestone (%)	Lateritic Clay (%)
SiO_2	6.95	66.00
Al_2O_3	1.53	18.89
Fe_2O_3	1.73	10.89
CaO	47.80	1.76
MgO	1.54	0.00
LOI	40.45	2.46

- The raw materials are suitable for cement manufacture.
- For making ordinary portland cement(OPC) gypsum is required as a setting retarder to the extent of 2% along with clinker and ground to desired Blaine.
- For making Portland Pozzolana Cement (PPC), Fly ash can be added upto 35% with clinker.

Fuel/Coal Consumption

The coal consumption works out to 200TPD considering specific heat consumption of clinker as 850 K.cal/kg. It is proposed to use Meghalaya coal as a fuel. The proximate analysis of coal is given in Table 2.4.

TABLE 2.4: Chemical Analysis of Meghalaya Coal

Parameter	Results
Fixed Carbon	46.53%
Ash	6.55%
Volatile Matter	39.69%
Sulphur	4.0%
Moisture	2.41%
GCV	6000 kcal/kg

2.2.2 Raw Mix Design

Consumption factor of the raw materials is considered as 1.55 tonnes per tonne of Clinker, considering Average specific heat consumption 750 Kcal/ kg clinker. Based on the chemical composition of limestone and lateritic clay, tentative raw-mix design for the clinker production is given in Table 2.5

TABLE 2.5: Raw Materials Composition

Raw Materials	%
Limestone	87
Lateritic Clay	13
Total	100

2.2.3 Mass Balancing

The mass balancing for the raw material input and the clinker as out put is given in Table 2.6.

TABLE 2.6: Mass Balancing for Raw Materials and Clinker

Sl. No.	Raw Materials Input		Product Out Put	
	Raw Materials	**Quantity ,TPA**	**Material**	**Quantity (in TPA)**
1	**Limestone**	706223	**Clinker**	**499800**
2	**Lateritic Clay**	105527	**Cement Kiln Dust**	28059*
3	**Coal**	74800		
			Gases + Dust	349891
	Total	**877750**	**Total**	**877750**

**cement kiln dust is recycled with the raw materials*

The material balance for Ordinary Portland Cement and Portland Pozzolana Cement production is given in Table 2.7.

TABLE 2.7: Mass Balancing for Cement Production

Sl. No.	Raw Materials Input			Product Out Put	
	Raw Materials	%	Quantity (in TPA)	Material	Quantity (in TPA)
Ordinary Port Land Cement (OPC)					
1	Clinker	98	129360	OPC	132000
2	Gypsum	2	2640		
	Total	**100**	**132000**	**Total**	**132000**
Port Pozzolana Cement (PPC)					
1	Clinker	63	332640	**PSC**	528000
2	Fly Ash	35	184800		
2	Gypsum	2	10560		
	Total	**100**	**528000**	**Total**	**528000**

Perusal of the above table shows that the total clinker production is 4,99,800 TPA. Out of which 1,29,360 TPA and 3,32,640 TPA of clinker will be used for the production of OPC & PPC respectively and rest 37,800 TPA shall be sold out to the mini cement plants. The raw meal is designed to meet the quality of clinker and resulting portland cement as per IS:269-1989(Grade-33), IS:6112-1989(Grade-43), IS:12269-1987(Grade-53).

2.2.4 Finished Product Mix

The details of proposed product mix are as given below in Table-2.8 below:

TABLE 2.8: Composition of Finished Product

Sl. No.	Components	Proportion, % by weight	
		OPC	PPC
1	Clinker	98	63
2	Flyash	--	35
3	Gypsum	2	2
Total		**100**	**100**

2.3 Manufacturing Process

The proposed plant of VSCL shall be based on the dry process technology of cement manufacture with suspension pre-heater and calcinator. The main features of the process are given here under. It is proposed to install Bag-House system for cleaning of the kiln flue gas and hence no gas - conditioning tower is envisaged. The process flow diagram is shown in Figure 2.1. Various stages of cement manufacture are given hereunder.

Plant Design

Plant design has been considered on the following basis:

- Process Technological Solution
- Engineering Considerations
- Operational Objectives

Sizing of main machinery and storages has been analysed considering “Industry Norms” and making appropriate corrections in view of “project specific requirements”. The system design for the proposed plant is described in the following paragraphs.

Excavation and Transport of Limestone

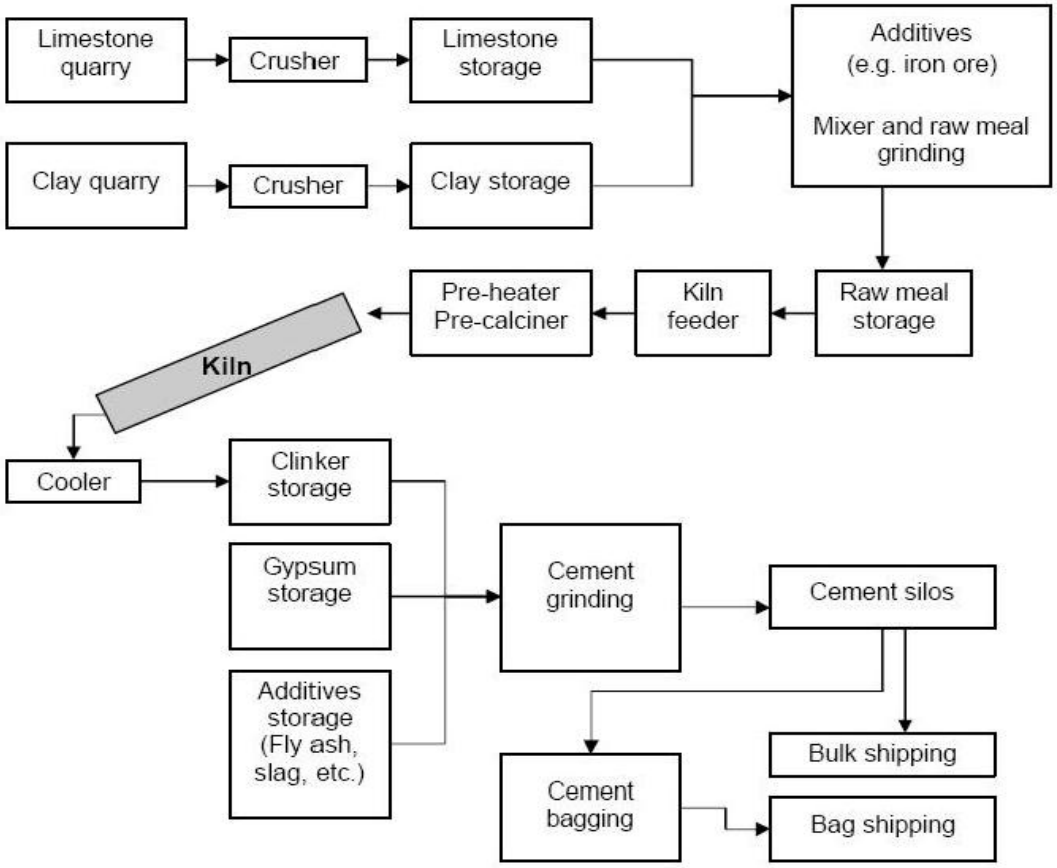
The limestone bed(s) as well as overburden and inter burden beds shall be drilled and blasted. The blasted material shall be excavated and loaded by hydraulic excavators into Dumpers. *The excavated limestone shall be transported by Dumpers and unloaded into Lime stone dump hopper which is located in the plant site*.

Raw material Preparation

The Crusher shall cater for limestone requirements for 1600 TPD of clinker production for the proposed plant. The crushed limestone shall be transported through a set of belt conveyors to the covered storage.

Corrective materials, brought by trucks would be unloaded and stored in different covered storages. From the proposed storage’s, the raw materials are extracted though suitable extraction equipments and further transported to mill hoppers through a set of Belt Conveyors.

Figure 2.1: Process Flow Diagram



Raw meal for the plant shall be 88% Limestone and 12% clay. For this report a close circuit ball mill of 150 tph capacity is considered for raw material grinding.

Limestone and corrective shall be extracted through pin gate and weigh feeders provided below hoppers and transported by belt conveyors to the close circuit ball mill, having capacity of 150 tph using ESP/bag house for venting the mill. Pre-heater gases after suitable conditioning to correct temperature shall be used for drying of raw material in the mill. The average moisture in the raw meal at the outlet shall be less than 1%.

The system envisaged comprises of 1 no. continuous blending-cum-storage silo of 12500 t capacity. The blending-cum-storage system shall reduce the quality variation in the raw meal so that the kiln feed is of a sustained desired quality within the permissible range.

Pyro-Processing System

The system shall comprise of a 5 stage preheater with pre-calciner, rotary kiln, reciprocating type grate cooler. The pyro-processing plant will be designed with 100 % coal firing. The system capacity of the pyro-processing plant shall be 1600t/d and fuel consumption of 850 Kcal/kg clinker. For fuel firing to kiln, a fine coal bin is proposed. The fuel shall be transported to kiln by pneumatic screw pumps.

Clinker Cooler, Transport and Storage

New Generation cooler/equipment has been envisaged for cooling the clinker. Cooler shall be kept above ground level to avoid installation of clinker conveyor in the tunnel. *Electrostatic Precipitator is envisaged for venting of cooler.* Clinker transport from cooler to the storage yard shall be through deep pan / bucket conveyor.

Coal Handling

A coal crusher of 60 tph has been conceived for the system. A set of belt conveyor shall transport the coal to storage.

Cement Grinding

For this project a closed circuit ball mill of 120 tph is considered for grinding cement. Clinker, Fly Ash and Gypsum shall be transported to the hoppers from the clinker storage yard with the help of tunnel extraction hoppers and belt conveyor. Clinker and Gypsum shall be extracted through pin gates and weight feeders provided below hopper and transported by belt conveyors to the mill. Clinker and gypsum fed by mill feed belt conveyor to ball mill is ground and the smaller particles after grinding are air swept and passed through an air dynamic separator. The coarse material discharged from separator is fed back to mill for further grinding.

2.4 Cement Storage and Packing

2.4.1 Storage

Ground Cement collected in the Bag Filter and cyclone shall be transported to storage silo by a system of air slides and bucket elevator. Bag filters at silo top shall be installed for pollution control. The storage capacity of the silo is kept as 15000 t**.**

2.4.2 Packing

Cement from the silo shall be reclaimed by control flow gates and fed to the packing plant through the bucket elevator. Discharge of the Bucket Elevator shall be fed to a vibrating screen for segregating nibs, and than fed to a rotary packing machine. 1 No. electronic rotary packing machine of 175 tph has been considered.

2.5 Utility and Services

2.5.1 Power

Total connected load requirement for the plant and staff quarters is estimated at 10 MW. Power will be fed from 132 kV/ 33KV Substation of A.S.E.B. through double circuit step down transformers. For Power distribution inside plant 6.6KV Voltage has been selected.

2.5.2 Central Control System

The central control system near the kiln shall have programmable logic controllers (PLC) with remote input/output panel located close to the process MCCS from where it will get digital signals. The PLC shall monitor and control process variables for efficient plant operation.

2.5.3 Field Devices.

Flow switches, Pressure Gauze & temperature gauze at important places. Special measuring units to be provided such as gas analyzing system, Kiln shell temperature measurement, thrust roller pressure, upward & downward travel limit switches has also been provided for efficient running of the plant.

2.5.4 Water Supply

Total water requirement will be approximately 500 M^3/day. Water treatment and supply shall be from central pumping station to the plant has been considered. The water distribution system includes an underground raw water tank and a pump house. Four distinct circuits have been considered for water distribution. These circuits are:

- Process water (which is consumed in process e.g. for raw mill, cement mill spray).
- Cooling Water (required for machine cooling). Make up water shall be provided while recirculating water shall be in a close loop.
- Potable water (for drinking, etc.)
- Other services (Fire fighting, horticulture, sanitation, etc.).

Treatment facilities based on quality of water and intended use has been suitably considered for the project.

2.5.5 Compressed Air Supply

It is proposed to install the compressors / Roots blowers, for compressed air requirements, at one centralised location in the plant, near the cement silos for the sake of overall economy/ effectiveness and ease of operation & maintenance.

2.6 Plant Engineering

2.6.1 Seismicity

The proposed plant site falls under seismic zone V (An earthquake prone area). Hence, seismic effect has been considered in civil structure designing.

2.6.2 Sub-surface Conditions

Data of sub-surface conditions of the area is not available. Rock is expected to be met at 1.0 to 1.5 m below ground level as such, isolated foundation, shall be adopted for the civil structures based on the detail soil investigation report.

2.6.3 Ground Water

Ground water table is expected to be encountered at about 5 – 6 m below ground level. During the design engineering stage, underground structures namely tunnels, basements etc. shall be avoided as far as possible. However, where such underground structures are unavoidable, special precautions for water proofing shall be taken.

2.6.4 Plant Structures

The civil engineering design and construction of structures shall primarily meet the load data conditions and functional requirements as stipulated by the main machinery supplier.

In general silos, storages and process buildings shall be in RCC construction. Conveyor galleries and trestles shall be in steel construction. Single storey buildings have been envisaged for utilities.

2.6.5 Fire Detection and alarm system for electrical buildings

For detection of fires in electrical buildings, ionisation type dual chamber/ dual source smoke detectors will be used where incipient fires are likely, e.g. in cable cellars, switchgear rooms, control rooms etc. Fixed temperature cum rate of rise type heat detectors will be installed in transformer rooms, battery rooms etc.

Multizone type fire alarm panels will be installed in the electrical buildings. The fire detectors will be wired in zones. On detection of fire/ fault in any zone, audio-visual alarm will be sounded in control panel and also by electronic hooters fixed in various locations in the electrical buildings. The alarm shall also be sounded at the central position.

2.6.6 Infrastructure

VSCL will install complete utilities and other infrastructural facilities in the cement plant. Adequate storage facility for limestone in open stack yard and clinker, lateritic clay, gypsum, coal and flyash under closed sheds will be provided to meet the requirements of the plant. Workshop facility both for mechanical and electrical equipment repairs and maintenance is also proposed.

2.7 Manpower

The total manpower requirement of the plant will be 280. The local residents shall be given preference for the employment subject to skills, experience and qualification needed for the job.

2.8 Land Break Up

VSCL acquired 30 hectares of land in Jhoom Basti ,Devendra Nagar for its proposed Cement Plant and township. The land break up is given in Table 3.9. A layout plan of the proposed plant is shown in Figure 2.2

TABLE 2.9 Land requirement

S.No	Land requirement	Area (in Hectares)
1.	Cement Plant and Roads	11
2.	Truck Parking	1
3	Green Belt	10
4.	Township with infrastructure	5
5.	Space around Cement Plant	3
Total		**30**

Township

VSCL will provide a common full-fledged township comprising of housing facilities for plant, security personnel and supporting staff along with other amenities such as School, Guest House, Dispensary, and Shopping Complex etc.

Figure 2.2: Plant Layout