

## **4. PROFILE ON GRANITE CUTTING**

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## **I. SUMMARY**

This profile envisages the establishment of a plant for the production of granite with a capacity of 300,000 m<sup>2</sup> per annum.

The present demand for the proposed product is estimated at 192,098 m<sup>2</sup> per annum. The demand is expected to reach at 442,404 m<sup>2</sup> by the year 2017.

The plant will create employment opportunities for 58 persons.

The total investment requirement is estimated at Birr 29.43 million, out of which Birr 19.13 million is required for plant and machinery.

The project is financially viable with an internal rate of return (IRR) of 20 % and a net present value (NPV) of Birr 13.07 million discounted at 8.5%.

## **II. PRODUCT DESCRIPTION AND APPLICATION**

Granite is a natural igneous rock composed of granular limestone or dolomite, which is crystallized by the influence of heat, pressure and aqueous solutions. This Metamorphic rock can be found in nature with different attractive colors and variegated varieties as well as quality.

Cutting granite has got wide application in the building construction sector and can be processed in industries to produce various kinds of dimension stones. The products of dimension stone processing industries can be used for monuments, interiors decoration, statuary, table tops and novelties. But the principal application of granite is for exterior building works to provide a lasting endurance to walls.

### **III. MARKET STUDY AND PLANT CAPACITY**

#### **A. MARKET STUDY**

##### **1. Past Supply and Present Demand**

Granite is a common type of hardest affordable natural stone. Although available in a wide variety of colors it is usually white. Its massive, hard and tough nature makes a wide spread use as construction stone. Its application includes floor, tiles, bathrooms, gardens, steps and many more. The extensive usage of granite as a dimension stone as well as flooring and tiles for public and commercial buildings and monuments constitute the top demand sectors of the granite market. Recently, application of natural stone in the rapidly developing urban areas has increased.

Supply of granite is met mainly from the domestic producers. Although the expanding building and construction sector has given rise to granite cutting opportunities and it is a well known fact that more granite is produced, official statistics is not available. Failing to assess the demand for granite based on the supply, end use approach is applied.

The demand for granite primarily is concerned with the construction sector. According to a study conducted on Problems and Prospects of Housing Development in Ethiopia with particular emphasis on the city of Addis Ababa, the annual new dwelling units required is 29,272. Assuming a minimum average consumption of 5.5m<sup>2</sup> granite per housing unit, the current effective demand for granite at Addis Ababa is estimated to be 153,678m<sup>2</sup>. Further assuming this volume to cover 80% of the national consumption of granite, the current effective demand for granite is estimated at 192,098m<sup>2</sup>.

##### **2. Projected Demand**

The rapid development of urban areas, high-rise buildings, housing complexes, malls, governmental and non governmental buildings make use of granite for both their interiors and exteriors. Once limited to the wealthy, granite has now become a part of the common people's use because of the supply of granite from the new granite industries.

The demand for granite is directly related with the growth in the construction sector which in turn depends on the overall economic development of the country. Therefore, demand is projected at the annual GDP growth rate achieved in 2004/5 or 8.7%. Projected demand is presented in Table 3.1.

**Table 3.1**  
**PROJECTED DEMAND FOR GRANITE**

<b>Year</b>	<b>Projected Demand (M<sup>2</sup>)</b>
2008	208,811
2009	226,977
2010	246,724
2011	268,189
2012	291,521
2013	316,884
2014	344,453
2015	374,420
2016	406,995
2017	442,404

### **3. Pricing and Distribution**

Considering the current retail price of the product and margin for distributors and transportation cost a factory-gate price of Birr 150 per m<sup>2</sup> is recommended for the envisaged plant. The product can be distributed through direct delivery to construction companies as well as through the existing building material shops.

### **B. PLANT CAPACITY AND PRODUCTION PROGRAMME**

#### **1. Plant Capacity**

Based on the market study indicated above, the envisaged plant for manufacturing of granite cutting plant with a capacity of 300,000 sq. meters per annum.

## 2. Production Programme

The plant is expected to operate in 3 shifts of 8 hours per shift for a total of 300 working days a year. It's anticipated that the plant will run at 70%, 85% and 100% in the first, second and third years, respectively.

## IV. MATERIALS AND INPUTS

### A. RAW MATERIALS

The raw materials used for dimension stone cutting are granite rock. The annual requirement of granite or other dimension stones is indicated in the Table 4.1.

**Table 4.1**  
**RAW MATERIAL REQUIREMENT**

Description	Qty	Cost '000 Birr
Marble or dimension stones (Tons)	18,000	36,000
<b>Total</b>		<b>36,000</b>

### B. UTILITIES

The major utilities required by the plant are electricity and water. The estimated annual requirement of utilities of the plant at 100% capacity utilization rate and their estimated costs are given in Table 4.2.

**Table 4.2**  
**UTILITIES REQUIREMENT AND COST**

Description	Qty	Cost '000 Birr
Electricity , kWh	750,000	355.20
Water, m <sup>3</sup>	25,000	250.00
<b>Total</b>		<b>355.45</b>

## **V. TECHNOLOGY AND ENGINEERING**

### **A. TECHNOLOGY**

#### **1. Process Description**

The processing of granite dimension stones essentially involves the following major operations: quarry opening; blasting; cutting; polishing and ornamenting.

Quarrying for dimension stone requires a specialized method of extraction. Normal quarrying methods use large quantities of explosives to move huge volumes for breaking down into aggregate. This creates cracking throughout the stone, which renders it unsuitable for this purpose. Many a dimension stone quarry has been rendered useless by the over use of explosives.

Wire sawing is used for primary block extraction. The system consists of a long stranded wire or diamond tipped wire fed through a series of pulleys and assisted by abrasives. Stranded wire has been used for many years in marble and sandstone, whilst improvements in diamond technology, has seen the recent introduction of wire sawing in granite quarries. The yield from wire sawing is much higher and gives a semi finished surface which allows a close examination of the material before further working.

Cutting is performed by a gang-saw for producing granite slabs. Gang sawing uses a reciprocating frame with up to 120 steel blades working their way through the block. It can take up to one week to saw each block.

Surface finishing or polishing of shaped marble blocks by rubbing beds and polishing machines in order to attain attractive color and uniform texture,

#### **2. Source of Technology**

The address of machinery supplier is given below:-

Laxmi Engineers  
Address: G-588 (B), 2<sup>nd</sup> Phase, M.I.A., Basni  
Jodhpur-342 005, (INDIA)  
Tel:+(91)-(291)-2740588/2740589  
Fax:+(91)-(291)-2741692  
Mobile:9829027588  
Email:laxmigroup@sify.com

## B. ENGINEERING

### 1. Machinery and Equipment

Plant machinery and equipment required for granite cutting plant is presented in Table 5.1. The total investment cost of plant machinery and equipment is estimated at Birr 19.9 million.

**Table 5.1.**  
**MACHINERY AND EQUIPMENT REQUIREMENT AND COST**

Sr. No.	Description	Qty. (No.)	Cost (Birr)		
			LC	FC	Total
1	Gang Saw	2		940,000	940,000
2	Slide Cutting Machine	2		350,000	350,000
3	Circular Cutting Machine	2		390,000	390,000
4	Polishing Machine	1		750,000	750,000
5	Chamfering & Trimming Machine	2		185,000	185,000
6.	Polishing Machine (Hand Operated)	2		150,000	150,000
7	Mining Equipment	L.S		11,500,000	11,500,000
7	Quarry Equipment	L.S		1,425,000	1,425,000
8	Tools	L.S		250,000	250,000
<b>Total</b>			-	<b>15,940,000</b>	<b>15,940,000</b>
<i>INSURANCE, CUSTOMS DUTY, INLAND TRANSPORT, BANK CHARGE, ETC.</i>			3,188,000	-	3,188,000
<b>Grand Total</b>			<b>3,188,000</b>	<b>15,940,000</b>	<b>19,128,000</b>

### 2. Land, Building and Civil Works

Total land space required is about 5,000 m<sup>2</sup> and at the lease rate of Birr 0.625 per square meter. The total land lease value for 80 years of land holding will be Birr 250,000.00. A built up area of about 1,000 square meter will be required for production, storage of space parts and office rooms. The construction cost of the built-up area at a rate of Birr 2,300.00 per m<sup>2</sup> is estimated to be Birr 2,300,000.



### 3. Proposed Location

The main factors of selecting the location for granite cutting plant are: availability of raw material and easy to get utilities. Hence, it is proposed to establish the plant in Banatsemay woreda Kayafer town which can fulfill the above requirement.

## VI. MANPOWER AND TRAINING REQUIREMENT

### A. MANPOWER REQUIREMENT

The plant requires a total of 58 persons and the details of their position along with the annual labour cost are indicated in the Table 6.1.

**Table 6.1**  
**MANPOWER REQUIREMENT AND ESTIMATED LABOUR COST**

Sr. No	Job Title	No. of Persons	Salary (Birr)	
			Monthly	Annual
1	General Manager	1	2,000	24,000
2	Secretary	1	800	9,600
3	Production & Technical Head	1	1,700	20,400
4	Commercial Head	1	1,600	19,200
5	Finance & Administration Head	1	1,600	19,200
6	Personnel	1	800	9,600
7	Accountant	1	750	9,000
8	Accounts Clerk	1	400	4,800
9	Cashier	1	500	6,000
10	Sales person	1	500	6,000
11	Purchaser	1	500	6,000
12	Store Keeper	1	500	6,000
13	Quality Controller	1	800	9,600
14	Shift Leader	3	750x3	27,000
15	Operator	9	400x9	43,200
16	Assistant Operation	9	250x9	27,000
17	Laborer	10	150x10	18,000
18	Mechanic	3	700x3	25,200
19	Electrician	3	700x3	25,200
20	Driver	4	400x4	19,200
21	Guard	4	200x4	9,600
	<b>Sub – Total</b>	<b>58</b>		<b>413,800.00</b>
	Employee's Benefit 25% basic salary			103,450.00
	<b>Grand Total</b>			<b>517,250.00</b>

## B. TRAINING REQUIREMENT

Training of production worker is required. It can be conducted during the erection period and the cost is embodied in the machinery cost as the training will be provided by the supplier

## VII. FINANCIAL ANALYSIS

The financial analysis of the granite cutting project is based on the data presented in the previous chapters and the following assumptions:-

Construction period	1 year
Source of finance	30 % equity 70 % loan
Tax holidays	3 years
Bank interest	8%
Discount cash flow	8.5%
Accounts receivable	30 days
Raw material local	60days
Work in progress	3 days
Finished products	30 days
Cash in hand	5 days
Accounts payable	30 days

## A. TOTAL INITIAL INVESTMENT COST

The total investment cost of the project including working capital is estimated at Birr 29.43 million, of which 19 per cent will be required in foreign currency.

The major breakdown of the total initial investment cost is shown in Table 7.1.

**Table 7.1****INITIAL INVESTMENT COST**

<b>Sr. No.</b>	<b>Cost Items</b>	<b>Total Cost ('000 Birr)</b>
1	Land lease value	250
2	Building and Civil Work	2300
3	Plant Machinery and Equipment	19128
4	Office Furniture and Equipment	125
5	Vehicle	250
6	Pre-production Expenditure*	1578.73
7	Working Capital	5801.9
	<b>Total Investment cost</b>	<b>29433.63</b>
	Foreign Share	19

\* N.B Pre-production expenditure includes interest during construction ( Birr 1.43 million ) and Birr 150 thousand costs of registration, licensing and formation of the company including legal fees, commissioning expenses, etc.

**B. PRODUCTION COST**

The annual production cost at full operation capacity is estimated at Birr 40.62 million (see Table 7.2). The material and utility cost accounts for 89.50 per cent, while repair and maintenance take 0.47 per cent of the production cost.

**Table 7.2****ANNUAL PRODUCTION COST AT FULL CAPACITY ('000 BIRR)**

<b>Items</b>	<b>Cost</b>	<b>%</b>
Raw Material and Inputs	36,000.00	88.62
Utilities	355.45	0.88
Maintenance and repair	191.28	0.47
Labour direct	206.9	0.51
Factory overheads	103.45	0.25
Administration Costs	310.35	0.76
Total Operating Costs	37,167.43	91.50
Depreciation	2120.3	5.22
Cost of Finance	1333.94	3.28
<b>Total Production Cost</b>	<b>40,621.67</b>	<b>100</b>

## C. FINANCIAL EVALUATION

### 1. Profitability

According to the projected income statement, the project will start generating profit in the first year of operation. Important ratios such as profit to total sales, net profit to equity (Return on equity) and net profit plus interest on total investment (return on total investment) show an increasing trend during the life-time of the project.

The income statement and the other indicators of profitability show that the project is viable.

### 2. Break-even Analysis

The break-even point of the project including cost of finance when it starts to operate at full capacity (year 3) is estimated by using income statement projection.

$$\text{BE} = \frac{\text{Fixed Cost}}{\text{Sales} - \text{Variable Cost}} = 16 \%$$

### 3. Pay Back Period

The investment cost and income statement projection are used to project the pay-back period. The project's initial investment will be fully recovered within 5 years.

### 4. Internal Rate of Return and Net Present Value

Based on the cash flow statement, the calculated IRR of the project is 20 % and the net present value at 8.5% discount rate is Birr 13.07 million.

## D. ECONOMIC BENEFITS

The project can create employment for 58 persons. In addition to supply of the domestic needs, the project will generate Birr 10.72 million in terms of tax revenue. The establishment of such factory will enable the country to earn foreign currency by exporting its products.