



FORUM E

DEVELOPMENTAL

GO. LTD

**Ag: EXD**

The approved project has fulfilled the investment requirements, which are: -

- (a) Minimum finance investment threshold has been exceeded, the project expects to invest ..... 8.571 M USD .....
- (b) Legal entity has been incorporated under certificate No. .... 68 603 ..... of ..... 20/11/2008 .....

Based on the above, the letter of approval is hereby submitted for signature in order for the project to comply with the requirements of Section 17 of Tanzania Investment Act, 1997.

Submitted for signature.



Revocatus Arbogast

**Ag: DIF**

30<sup>th</sup> December 2008

**Ag EXD** ✓ OK  06/01/09

In response to the TIC letter of registration dated ..... 30<sup>th</sup> December 2008 .....

the project has submitted the required documents namely: -

- (a) Company Board Resolution.
  - (b) Reference letter/Financing from ..... HABIBU BANK LTD .....
  - (c) ..... Evidence of land from Capital Development Authority of Dodoma in the letter with ref no CPA/DP/007 .....
- With the above submission EXD is requested to sign Certificate of Incentives No. .... 041623 ..... herein attached. dated 18<sup>th</sup> Dec 2008

6/01/09

  
**DIF**

MINUTE

PAGE NO. \_\_\_\_\_

# FORTUNE DEVELOPMENT (T) COMPANY LIMITED

①

**P.O. Box 106271  
Dar es salaam  
Tanzania**

Date: December 18<sup>th</sup> 2008

The Executive Director  
Tanzania Investment Centre  
P.O. Box 938  
**Dar es salaam**  
TANZANIA



Dear Sir,

## **RE: APPLICATION FOR TIC CERTIFICATE OF INCENTIVES**

We are in the process of establishing manufacturing facilities for building materials in Dodoma. It is due to this reason that we kindly submit our application for TIC Certificate of Incentives to facilitate smooth implementation of our programme.

Attached herewith please find the following basic documents for your perusal and necessary action:

1. Three (3) sets of duly completed and signed Application Form for TIC Certificate.
2. A copy of our Certificate of Incorporation
3. A copy of the company's Memorandum and Articles of Association
4. Evidence of land ownership for the Project Location.
5. A letter of Credibility from our Bankers
6. Company Board Resolution to register with TIC
7. A copy of our Business Plan showing the Implementation Period, Programme of Implementation and Operative Date.

Thank you in for your kind consideration

Yours' sincerely

**FORTUNE DEVELOPMENT (T) COMPANY LIMITED**

  
**Eng. Hassan Saad  
DIRECTOR**

# FORTUNE DEVELOPMENT (T) COMPANY LIMITED

## EXTRACT FROM A MEETING OF THE BOARD OF DIRECTORS AND SHAREHOLDERS OF

### FORTUNE DEVELOPMENT (T) COMPANY LIMITED

AT A DULY CONVENED AND CONSTITUTED MEETING OF THE BOARD OF DIRECTORS OF FORTUNE DEVELOPMENT (T) COMPANY LIMITED HELD AT THE REGISTERED OFFICES OF THE COMPANY IN DAR ES SALAAM ON THE 4TH DAY OF DECEMBER 2008, THE FOLLOWING RESOLUTIONS WERE PASSED:

1. THAT FUNDS BE CONTRIBUTED BY SHAREHOLDERS TO FINANCE ESTABLISHMENT OF A PROJECT FOR MANUFACTURING BUILDING MATERIALS AT COST OF USD. 8,571,350.
2. THAT ENG. HASSAN SAAD IS THE DIRECTOR TO OVERSEE IMPLEMENTATION OF THE PROJECT
3. THAT THE PROJECT BE REGISTERED WITH TANZANIA INVESTMENT CENTRE SO AS TO ENJOY FULLY INVESTMENT INCENTIVES, BENEFITS AND PROTECTION AS STATUTORILY PROVIDED FOR UNDER TANZANIA INVESTMENT ACT, 1997.

CERTIFIED TRUE EXTRACT  
(By order of the Board)

  
-----  
**CHAIRMAN**

  
-----  
**SECRETARY**

UNITED REPUBLIC OF TANZANIA

THE TANZANIA INVESTMENT ACT

(No. 26 of 1997)

APPLICATION FOR REGISTRATION

(Made under Regulation 42)

To: The Executive Director  
Tanzania Investment Centre  
P. O. Box 938  
DAR ES SALAAM  
Tanzania

1. I/We ENG HASSAN SAAD  
(director/directors/agent of FORTUNE DEVELOPMENT (T) CO. LTD  
(name of business enterprise) apply for registration of CERTIFICATE OF LICENCES  
under Section 17 of the Act and Part IV of the Investment Regulations, 2002.

2. The registered office of the company will be situated at PLOT NO. 386,  
MIKOCHEMI B, DAR ES SALAAM

Copies of the following documents are attached to this application:

- (i) The Memorandum and Articles of Association/or partnership agreement
- (ii) Certificate of Incorporation/Registration
- (iii) A copy of the Project Profile or Feasibility Study showing the implementation period, programme of implementation and operative date
- (iv) Evidence of financing and evidence of land ownership for the project

3. The Head Office of the Company will be situated at PLOT 386, MIKOCHEMI B,  
DAR ES SALAAM

4. The Principal Officers of the Company are I. SIFA M. MWITU  
(ii) WANG SIEM (iii) LIN YIGUO  
(iv) TO TAO (v) ENG. HASSAN SAAD

5. Auditors of the Company are .....

6. The authorized share capital of the Company is Tshs./US\$ 5,000,000,000/=

7. The intended capital investment of the Company in terms of Section 2(2) of the Act is Tshs./US\$ 8,571,350
8. The month and day of the financial year end is DEC 31ST

Note: *failure to provide all the required information will result in the return of the application by the Centre.*

I/We enclose a cheque/cash made payable to the **Tanzania Investment Centre** for Tshs./US\$ 100 Being the Registration Fees. *In the event this application is unsuccessful we understand that this fee will not be refunded.*

I, HASSAN SAAD of Post Office Number 106271 DAR  
ES SALAAM do solemnly and sincerely declare that I am a director/duly authorized agent of FORTUNE DEVELOPMENT (T) COMPANY LTD

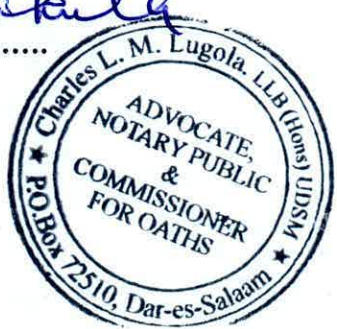
**AND** that all the requirements of the Tanzania Investment Act, 1997 in respect of matters precedent to the registration of the business enterprise under the Act and incidental thereto have been complied with, **AND** I make this solemn declaration conscientiously believing the same to be true.

✓ Declared at Dar es Salaam }  
 The 22<sup>ND</sup> day of DECEMBER 2008 }

[Signature]  
 Applicant

Before me:

[Signature]  
 Commissioner for Oaths



**APPLICATION SUMMARY**

Company Name: FORTUNE DEVELOPMENT (T) CO. LTD

Certificate of Incorporation Number: 68603 Status: IVEW

Certificate of Incorporation Date: 20/11/2008

Post Box: 106271

Town: DAR ES SALAAM

Sector: MANUFACTURING Sub-Sector: BUILDING MATERIALS

**Investment Financing Plan in ~~Million~~ US\$/Tshs**

Foreign Equity	Local Equity	Foreign Loan	Local Loan
<u>8,571,350</u>	<u>-</u>	<u>-</u>	<u>-</u>

Project Objectives: TO ESTABLISH MANUFACTURING FACILITIES FOR BUILDING MATERIALS INCLUDING AGGREGATES, BUILDING BLOCKS, PAVING BLOCKS, ASPHALT AND CONCRETE

Capacity: .....

Employment: Foreign: 5 Local: 75 Total: 80

Implementation Period: 5 YEARS

**Project Location**

Site/Plot/Block No.: .....

Street: CHIGONGWE VILLAGE District: DODOMA MUNICIPALITY Region: Dodoma

(Attach sketch map showing project location)

Shareholders	Nationality	%
<u>WANG SIEN</u>	<u>CHINESE</u>	<u>20</u>
<u>LIN YIGUO</u>	<u>CHINESE</u>	<u>14</u>
<u>WANG ZHOUJUN</u>	<u>CHINESE</u>	<u>7</u>
<u>CHEN GUOYIN</u>	<u>CHINESE</u>	<u>7</u>
<u>ENG HASSAN SAAD</u>	<u>LEBANESE</u>	<u>7</u>
<u>SIFA M. MWITU</u>	<u>TANZANIAN</u>	<u>26</u>
<u>XIA WENQIN</u>	<u>CHINESE</u>	<u>3</u>
<u>TO TAO</u>	<u>CHINESE</u>	<u>13</u>
<u>LUO MINGTIE</u>	<u>CHINESE</u>	<u>1</u>
<u>ZHANG XUEJUN</u>	<u>CHINESE</u>	<u>1</u>
<u>RICHARD PETER MUSHI</u>	<u>TANZANIAN</u>	<u>1</u>

**Investment Breakdown** ~~US\$/Tsh.M~~

Land/Building	662,350
Plant	6,502,000
Vehicles	890,000
Furniture & Fittings	55,000
Pre-expenses	112,000
Others	50,000
Working Capital	300,000
<b>TOTAL</b>	<b>8,571,350</b>

**Contact Details:**

Name: HASSAN SAAD Title: MANAGING DIRECTOR  
Telephone: 0784 458843 Fax: .....  
Email: HSAAD950@HOTMAIL.COM

**Payments to be made payable to:**

TANZANIA INVESTMENT CENTRE  
STANDARD CHARTERED BANK TANZANIA LTD.  
SWIFT ADDRESS: **SCBLTZTX**  
ACCOUNT NO.: **8702006002000**

## TANZANIA



## Certificate of Incorporation

Section 15

No 68603

I HEREBY CERTIFY THAT

**FORTUNE DEVELOPMENT (T) COMPANY LIMITED**  
=====

is this day incorporated under the Companies Act, 2002 and that the Company is Limited

Given under my hand at Dar es salaam

this 20TH day of NOVEMBER**TWO THOUSAND AND EIGHT**  
Assist. Registrar of Companies

**CAPITAL DEVELOPMENT  
AUTHORITY**  
P.O. Box 1 OR 913 DODOMA



**MAMLAKA YA USTAWISHAJI  
MAKAO MAKUU**  
S.L.P 1 AU 913 DODOMA

Telephone 2324053/2321569 Fax 2322650 E - mail: cda@yahoo.com

CDA/DP/CON-7

18<sup>th</sup> December, 2008

Managing Director,  
FORTUNE DEVELOPMENT (T) CO. LTD.,  
P.O. Box 106271,  
**DAR-ES-SALAAM.**

Re: **STONE CRUSHING AND STONE AGGREGATES PRODUCTION  
FACILITY AT CHIGONGWE VILLAGE - DODOMA MUNICIPALITY**

Refer to your application letter Ref. No. FORTUNE/CDA/01 dated 24<sup>th</sup> November, 2008.

The Capital Development Authority (CDA) has gone through your application letter, brochures and copies of your certificates and has vouched your authenticity in the establishment of a stone crushing and aggregate production facility for infrastructure and building purposes thereby facilitating the Capital Development Programme.

The Capital Development Authority is in agreement with the proposal of your Company in establishing and operating a stone quarry at Chigongwe Village within the Capital Development Area for the purpose of supplying quarry materials and aggregates, and the establishment of a base for bitumen mixing and sales centre within commuting distance in the Municipality.

The Authority has therefore earmarked a 22 hectare site subdivided into 12 blocks at Chigongwe as indicated in the Site Plan. The coordinates for each block are shown in the Table attached to this letter. The Authority will earmark an industrial site within the Western Industrial Area (Kizota) for asphalt mixing plant and sales centre.

This is an initial offer to enable your Company process the necessary permits from other authorities like the Tanzania Investment Centre (TIC) and the Ministry of Energy and Minerals. A leasehold arrangement for

*Correspondence should be addressed to the Director - General*


the area will be expedited after necessary statutory committees have met, deliberated and approved your proposal.

You are requested to liase with the Department of Planning within the Capital Development Authority on matters related to land use and development and the Department of Estate Development on leasehold matters.

Yours,  
**CAPITAL DEVELOPMENT AUTHORITY**

  
Martin L. Kitilla  
**DIRECTOR GENERAL**

Copy: Director of Estate Development, CDA.

**JUDICIAL OFFICE**  
**RESIDENT MAGISTRATE**  
I hereby certify that the foregoing is  
a true and correct copy of the original  
  
Resident Magistrate  
Date 19-12-08

**FORTUNE DEVELOPMENT (T) CO. LTD.**

35° 32' 04.04"  
06° 01' 28.88"

35° 32' 15.79"  
06° 01' 27.89"

1	7
2	8
3	9
4	10
5	11
6	12

35° 32' 05.48"  
06° 01' 47.07"

35° 32' 17.20"  
06° 01' 45.60"

*TOTAL AREA = 20.15 HECTARES*

**FORTUNE DEVELOPMENT (T) LTD.**

<b>Block Number:</b>	<b>Co-ordinates of the Block</b>	
<b>1</b>	A: 35° 32' 04.04"	06° 01' 28.88"
	B: 35° 32' 09.98"	06° 01' 28.40"
	C: 35° 32' 10.22"	06° 01' 31.35"
	D: 35° 32' 04.27"	06° 01' 31.84"
	<i>Size = 1.676 Hectares</i>	
<b>2</b>	A: 35° 32' 04.27"	06° 01' 31.84"
	B: 35° 32' 10.22"	06° 01' 31.35"
	C: 35° 32' 10.45"	06° 01' 34.14"
	D: 35° 32' 04.48"	06° 01' 34.65"
	<i>Size = 1.594 Hectares</i>	
<b>3</b>	A: 35° 32' 04.48"	06° 01' 34.65"
	B: 35° 32' 10.45"	06° 01' 34.14"
	C: 35° 32' 10.70"	06° 01' 36.90"
	D: 35° 32' 04.70"	06° 01' 37.46"
	<i>Size = 1.593 Hectares</i>	
<b>4</b>	A: 35° 32' 04.70"	06° 01' 37.46"
	B: 35° 32' 10.70"	06° 01' 36.90"
	C: 35° 32' 10.95"	06° 01' 40.07"
	D: 35° 32' 04.97"	06° 01' 40.70"
	<i>Size = 1.836 Hectares</i>	
<b>5</b>	A: 35° 32' 04.97"	06° 01' 40.70"
	B: 35° 32' 10.95"	06° 01' 40.07"
	C: 35° 32' 11.18"	06° 01' 43.26"
	D: 35° 32' 05.27"	06° 01' 44.00"
	<i>Size = 1.847 Hectares</i>	
<b>6</b>	A: 35° 32' 05.48"	06° 01' 47.07"
	B: 35° 32' 05.27"	06° 01' 44.00"
	C: 35° 32' 11.18"	06° 01' 43.26"
	D: 35° 32' 11.45"	06° 01' 46.28"
	<i>Size = 1.738 Hectares</i>	
<b>7</b>	A: 35° 32' 09.98"	06° 01' 28.40"
	B: 35° 32' 15.79"	06° 01' 27.89"
	C: 35° 32' 16.02"	06° 01' 30.88"
	D: 35° 32' 10.22"	06° 01' 31.35"
	<i>Size = 1.647 Hectares</i>	
<b>8</b>	A: 35° 32' 10.22"	06° 01' 31.35"
	B: 35° 32' 16.02"	06° 01' 30.88"
	C: 35° 32' 16.25"	06° 01' 33.64"
	D: 35° 32' 10.45"	06° 01' 34.14"
	<i>Size = 1.539 Hectares</i>	
<b>9</b>	A: 35° 32' 10.45"	06° 01' 34.14"
	B: 35° 32' 16.25"	06° 01' 33.64"
	C: 35° 32' 16.48"	06° 01' 36.37"
	D: 35° 32' 10.70"	06° 01' 36.90"
	<i>Size = 1.521 Hectares</i>	

10	A: 35° 32' 10.70"	06° 01' 36.90"
	B: 35° 32' 16.48"	06° 01' 36.37"
	C: 35° 32' 16.70"	06° 01' 39.46"
	D: 35° 32' 10.95"	06° 01' 40.07"
	<i>Size = 1.725 Hectares</i>	
11	A: 35° 32' 10.95"	06° 01' 40.07"
	B: 35° 32' 16.70"	06° 01' 39.46"
	C: 35° 32' 16.93"	06° 01' 42.53"
	D: 35° 32' 11.18"	06° 01' 43.26"
	<i>Size = 1.719 Hectares</i>	
12	A: 35° 32' 11.18"	06° 01' 43.26"
	B: 35° 32' 16.93"	06° 01' 42.53"
	C: 35° 32' 17.20"	06° 01' 45.60"
	D: 35° 32' 11.45"	06° 01' 46.28"
	<i>Size = 1.677 Hectares</i>	



# Habib African Bank Limited

India Street P. O. Box 70086 Dar-es-Salaam, Tanzania.  
Telephone: 255(22) 2111107/ 9 Facsimile: 255(22) 2111014.

Ref: HABL/786/OPR/159

Date: December 16, 2008

## TO WHOM IT MAY CONCERN

This is to confirm that Mr. Hassan Saad of Dar es Salaam is maintaining a US Dollar Current Account Number 0044873-0011 with our bank since October 16<sup>th</sup>, 2008.

The above information is provided at the request of our customer and without any guarantee or responsibility on the part of this bank or its officers.

Halima Kinabo  
Asst. Manager

Catherine Mkello  
Snr. Supervisor



This Certificate is issued in accordance with the provisions of Section 17 of the Tanzania Investment Act, 1997 and subject to the conditions prescribed under item 14 and 15 hereafter:—

1. Shareholders
 

	Nationality	Shareholding (%)
Sifa M. Mwitu	Tanzanian	26
Wang Sien	Chinese	20
Lin Yiguo	Chinese	14
To Tao	Chinese	13
Wang Zhoujun	Chinese	7
Chen Guoyin	Chinese	7
Eng. Hassan Saad	Lebanese	7
Xia Wenqin	Chinese	3
Others	Chinese/Tanzanian	3
2. Proposed Activities : To establish a project for manufacturing of building materials including aggregates, building blocks, paving blocks, asphalt and concrete
3. Sector: Manufacturing Subsector Building materials
4. Investment cost: Foreign USD 8.571m. Local - Total USD 8.571m.
5. Project Financing: Equity USD 8.571m. Loans - Total USD 8.571m.
6. Source, terms and conditions of loan.....
7. Assets to be invested:
 

	Foreign	Local	Total
Capital items:	USD 8.571m.	-	USD 8.571m.
8. Technology Agreement ..... None
9. Date of TIC Registration: ..... 30th December 2008
10. Implementation period ..... December 2008 - November 2011
11. Operative date..... December 2011
12. Investment Incentive Grade: As defined in part III Section 19 (1), (2) and Section 20 of the Tanzania Investment Act, 1997
  - (i) Applicable Import Duty ..... And VAT as per Customs Tariff Act, 1976 & VAT Act, 1997
  - (ii) Applicable with-holding Tax ..... As per Income Tax Act, 2004 (as amended)
  - (iii) Eligibility of Capital Allowances ..... As per Income Tax Act, 2004 (as amended)
13. Protection of Investment, Arbitration and Transfer of Foreign Currency: as defined in part III Section 21, 22 and 23 of the Act.
14. Conditions attached to this Certificate of Incentives
  - (i) Date of Commencement of investment has to be notified to the Centre.
  - (ii) Certificate not to be transferred, assigned or amended
  - (iii) Failure to commence implementation within two years invalidates Certificate
  - (iv) Failure to operate investment must be notified to the Centre
  - (v) Changes in shareholding, project activities and level of invested capital must be notified to the centre
15. Additional conditions attached to Certificate
 

Finished goods are not allowed under this Certificate.

Signed   
Executive Director

JAMHURI YA MUUNGANO WA TANZANIA  
THE UNITED REPUBLIC OF TANZANIA  
STAKABADHI YA SERIKALI  
EXCHEQUER RECEIPT

TFN. 614 (Rev. 8.94)

30324561 1

HIMEPOKEA KWA  
Received from

JUMLA YA SHILINGI (Kwa maneno)  
The Sum of Shillings (Words)

KWA MALIPO YA  
In Respect of

KWA FEDHA TASLIM/HUNDI NAMBA  
by Cash/Cheque No.

SAHIHI YA MPOKEAJI-  
Signature

Govt. Press, Dsm.



KIASI  
Amount

Shs.		Cts.
0	750	00

FOR TUNE DEVELOPMENT (P) CO. LTD  
USD SEVEN HUNDRED FIFTY ONLY

NA SENTI  
And Cents

Executive Director  
Tanzania Investment Centre

CERTIFICATE

CASH

KITUO - Station

DSM

AG

30/1/08

TICC/PP.10/041623/2

30<sup>th</sup> December 2008

Managing Director,  
Fortune Development (T) Ltd,  
P.O. Box 106271,  
**DAR ES SALAAM**

**RE: CERTIFICATE OF INCENTIVES FOR INVESTMENT IN THE  
ESTABLISHMENT OF MANUFACTURING FACILITIES FOR  
BUILDING MATERIALS**

We wish to acknowledge receipt of your project proposal to manufacture building materials as presented in the TIC P.A. 1 Form No. 07600 and Feasibility Study with a projected investment of USD 8.571m.

We have studied your project proposal and are pleased to inform you that your investment proposal is now officially registered and therefore your project will be granted a CERTIFICATE OF INCENTIVES, given under authority conferred upon TIC under Part III, Section 17 (1-8) of the Tanzania Investment Act, 1997.

You will be required to submit to the Centre a Progress Report on the implementation of the project after every six months for our information and review. Guidelines for the preparation of the report are contained in annexure 2 also attached to this letter. Please do not hesitate to contact the Centre for any clarification if the need arises. Please also note that a facilitation fee equivalent to US\$ 750.00 is payable at the ruling exchange rate before collection of your Certificate of Incentives. Please arrange to make payments at your earliest convenience.

.../2

TICC/PP.10/041623/2

30<sup>th</sup> December 2008

We wish you every success in the implementation of the project.

Yours sincerely,  
**Tanzania Investment Centre**



**R.P. MBILINYI**  
Ag: Executive Director

Copy to: Permanent Secretary,  
Ministry of Finance and Economic Affairs,  
P. O. Box 9111,  
**DAR ES SALAAM**

Permanent Secretary,  
Ministry of Industry, Trade and Marketing,  
P.O. Box 9503,  
**DAR ES SALAAM**

Commissioner General,  
Tanzania Revenue Authority,  
P. O. Box 11491,  
**DAR ES SALAAM**



## TIC Evaluation Report

Name of the Company  
**Fortune Development (T) Ltd.**

Post Box	Chigongwe Village	COI Number	68603	Contact	Mr. Hassan Saad
Post Office	106271	COI Date	20/11/2008	Designation	Managing Director
Region	Dodoma	Application F. No	07600	Phone	0
Country	Tanzania	Status	New	Direct Phone	0
		Sector	Manufacturing	Cell Phone	0784 458 843
		Sub Sector	Building Materials	Fax	0
		File No	041623	E-Mail Address	Hsaad950@Hotmail.Com

Project Location		Investment Finance Plan in Millions USD											
Plot/Block	Chigongwe Village	<table border="1"> <tr> <th>Foreign Equity</th> <th>Local Equity</th> <th>Foreign Loan</th> <th>Local Loan</th> </tr> <tr> <td>8.571</td> <td>0</td> <td>0</td> <td>0</td> </tr> </table>	Foreign Equity	Local Equity	Foreign Loan	Local Loan	8.571	0	0	0			
Foreign Equity	Local Equity		Foreign Loan	Local Loan									
8.571	0		0	0									
Street	Chigongwe												
District	Dodoma Urban												
Region	Dodoma												

Shareholders Detail			Investment Breakdown (USD Million)	
Name	Nationality	(%)	Land/Building	Plant
Richard Peter Mushi	Tanzanian	1	0.662	6.502
Zhang Xuejun	Chinese	1	Vehicles	0.89
Luo Mingjie	Chinese	1	Furniture & Fittings	0.055
To Tao	Chinese	13	Pre-expenses	0.112
Xia Wen Qin	Chinese	3	Others	0.05
Sifa M. Mwitw	Tanzanian	26	Working Capital	0.3
Eng. Hassan Saad	Lebanese	7	Total	8.571
Chen Guoyin	Chinese	7		
Wang Zhoujun	Chinese	7		
Lin Yiguo	Chinese	14		
Wang Sien	Chinese	20		

Employment	80	Evaluated By	Zakaria kingu
Capacity	xxxxx	Drawn By	Dorah Registry
Project Turn Over			

### Description

To establish manufacturing facilities for building materials including aggregates, building blocks/bricks, paving blocks, asphalt and concrete.

### Recommendations

Be approved subject to providing evidence as required by section 17 of Tanzania Investment Act, 1997

### Decision

*Approved*  
 → Ag EXD 24/12/08

**FORTUNE DEVELOPMENT (T) COMPANY LIMITED**

**ESTABLISHMENT OF FACILITIES FOR MANUFACTURE  
OF  
BUILDING MATERIALS**

**A BUSINESS PLAN**

Prepared by:  
Fortune Development (T) Company Ltd.  
P. O. Box 106271  
Dar es Salaam.

## 1.0 INTRODUCTION

- 1.1 Foreword
- 1.2 Objectives of the Study
- 1.3 Project Promoters
- 1.4 Study Layout

## 2.0 EXECUTIVE SUMMARY

- 2.1 Introduction
- 2.2 Market and Marketing Aspects
- 2.3 Process and Technology
- 2.4 Quality Control
- 2.5 By Products/Waste
- 2.6 Production Inputs
- 2.7 Location
- 2.8 Manpower Requirements
- 2.9 Implementation
- 2.10 Project Economics
- 2.11 Recommendations

## 3.0 MARKET AND MARKETING

- 3.1 Product
- 3.2 Demand
- 3.6 Distribution Channel

## 4.0 PRODUCTION PROCESS AND TECHNOLOGY

- 4.1 Basic Production Process
- 4.2 Quality Control System
- 4.3 Environment Protection

## 5.0 MACHINERY, EQUIPMENT AND CIVIL WORKS

- 5.1 Machinery
- 5.2 Plant Location and Civil Works
- 5.3 Utility Services

## 6.0 RAW MATERIALS AND OTHER PRODUCTION INPUTS

- 6.1 Basic Materials
- 6.2 Utilities

## 7.0 MANPOWER AND ORGANIZATION

- 7.1 Organization
- 7.2 Responsibilities

- 7.3 Manpower Requirement
- 7.4 Source of Manpower and Wage Bill

## 8.0 INVESTMENT AND FINANCING

- 8.1 Assumptions
- 8.2 Summary of Capital Costs
- 8.3 Building and Civil Works Costs
- 8.4 Plant, Machinery and Equipment Costs
- 8.5 Furniture and Fittings
- 8.6 Motor Vehicles
- 8.7 Pre-Production Expenditure
- 8.8 Initial Working Capital
- 8.9 Financing Pattern

## 9.0 COST OF OPERATIONS

- 9.1 Office Rent & Operation
- 9.2 Administrative Overheads
- 9.3 Motor Vehicles Running Expenses
- 9.4 Salaries and Wages
- 9.5 Depreciation

## 10.0 FINANCIAL ANALYSIS

- 10.1 Income and Expenditure
- 10.2 Net Income Statement Highlights
- 10.3 Cash Flow Highlights

## 11. ECONOMIC BENEFITS

- 12. CONCLUSION AND RECOMMENDATIONS
- 12.1 Conclusion
- 12.2 Recommendations

## 1. INTRODUCTION

### FOREWORD

This Project Feasibility Study Report sets out proposals by M/s Fortune Development (T) Company Limited to establish manufacturing facilities for building materials including Aggregates, Vibrated Building Blocks, Paving Blocks, Asphalt and Concrete. The project also involves development of a modern and well equipped distribution network. Fortune Development (T) Company Limited was incorporated on 20<sup>th</sup> November 2008 under Certificate of Incorporation No: 68603

### OBJECTIVE OF STUDY

The purpose of this Feasibility Study is to work out the technical and commercial details and the financial viability for the establishment of manufacturing facilities for various building materials.

### PROJECT PROMOTERS

The following sponsors are promoting the proposed building materials manufacturing project. Directors (shareholders) are namely:

NO	NAME AND ADDRESS	SHARES	% SHAREHOLDING
1	Wang Sien	20	20%
2	Eng. Hassan Saad	7	7%
3	Lin Yiguo	14	14%
4	Eng. Richard Peter Mushi	1	1%
5	Wang Zhoujun	7	7%
6	Chen Guoyin	7	7%
7	Sifa M. Mwitu	26	26%
8	Xia Wenqin	3	3%
9	To Tao	13	13%
10	Luo Mingjie	1	1%
11	Zhang Xuejun	1	1%

## STUDY LAYOUT

This study is presented in one document comprising the following major chapters.

Chapter One	-Introduction
Chapter Two	-Executive Summary
Chapter Three	-Market Analysis
Chapter Four	-Production Technology
Chapter Five	-Machinery and Equipment
Chapter Six	-Production Inputs
Chapter Seven	-Manpower and Plant Organization
Chapter Eight	-Investment and Financing
Chapter Nine	-Operating Costs
Chapter Ten	-Financial Analysis
Chapter Eleven	-Economic Benefits
Chapter Twelve	-Conclusion and Recommendations

## 2. EXECUTIVE SUMMARY

### 2.1 INTRODUCTION

The Study examines the possibility of establishing manufacturing facilities for building materials for both industrial and domestic usage. The targeted Building Materials include Aggregates, Vibrated Building Blocks, Paving Blocks, Asphalt and Concrete. A techno-economic evaluation has been carried out to determine the feasibility of project.

#### 2.1.2 Background

Construction aggregate, or simply "aggregate", is a broad category of coarse particulate material used in construction, including sand, gravel, crushed stone, slag, recycled concrete, and geosynthetic aggregates such as Ring Industrial Group's EZflow polymer based aggregates used mainly in lieu of gravel in drainage and septic applications. Aggregates are a component of composite materials such as concrete and asphalt concrete; the aggregate serves as reinforcement to add strength to the overall composite material. Due to the relatively high hydraulic conductivity value as compared to most soils, aggregates are widely used in drainage applications such as foundation and french drains, septic drain fields, retaining wall drains, and road side edge drains. Aggregates are also used as base material under foundations, roads, and railroads. To put it another way, aggregates are used as a stable foundation or road/rail base with predictable, uniform properties (e.g. to help prevent differential settling under the road or building), or as a low-cost extender that binds with more expensive cement or asphalt to form concrete.

The American Society for Testing and Materials publishes an exhaustive listing of specifications for various construction aggregate products, which, by their individual design, are suitable for specific construction purposes. These products include specific types of coarse and fine aggregate designed for such uses as additives to asphalt and concrete mixes, as well as other construction uses. State transportation departments further refine aggregate material specifications in order to tailor aggregate use to the needs and available supply in their particular locations.

Sources for these basic materials can be grouped into three main areas: Mining of mineral aggregate deposits, including sand, gravel, and stone; use of waste slag from the manufacture of iron and steel; and recycling of concrete, which is itself chiefly manufactured from mineral aggregates. In addition, there are some (minor) materials that are used as specialty lightweight aggregates: clay, pumice, perlite, and vermiculite.

A brick is a block of ceramic material used in masonry construction and sized to be laid with one hand using mortar. Bricks formed from concrete are usually termed blocks, and are typically pale grey in colour. They are made from a dry, small aggregate concrete which is formed in steel moulds by vibration and compaction in either an "egglayer" or static machine. The finished blocks are cured rather than fired using low-pressure steam. Concrete blocks are manufactured in a much wider range of shapes and sizes than clay bricks and are also available with a wider range of face treatments - a number of which are to simulate the appearance of clay bricks.

An impervious and ornamental surface may be laid on brick either by salt glazing, in which salt is added during the burning process, or by the use of a "slip," which is a glaze material into which the bricks are dipped. Subsequent reheating in the kiln fuses the slip into a glazed surface integral with the brick base.

Natural stone bricks are of limited modern utility, due to their enormous comparative mass, the consequent foundation needs, and the time-consuming and skilled labour needed in their construction and laying. They are however very durable and considered more handsome than clay bricks. Only a few stones are suitable for bricks, common materials are granite, limestone and sandstone. Other stones may be used (e.g. marble, slate, quartzite, etc.) but this tend to be limited to a particular locality

Bricks are used for building and pavement. In the USA, brick pavement was found incapable of withstanding heavy traffic, but it is coming back into use as a method of traffic calming or as a decorative surface in pedestrian precincts.

Bricks are also used in the metallurgy and glass industries for lining furnaces. They have various uses, especially refractory bricks such as silica, magnesia, chamotte and neutral (chromomagnesite) refractory bricks. This type of brick must have good thermal shock resistance, refractoriness under load, high melting point, and satisfactory porosity. There is a large refractory brick industry, especially in the United Kingdom, Japan and the U.S.A..

Asphalt is a sticky, black and highly viscous liquid or semi-solid that is present in most crude petroleum and in some natural deposits sometimes termed asphaltum. It is most commonly

modeled as a colloid, with asphaltenes as the dispersed phase and maltenes as the continuous phase (though there is some disagreement amongst chemists regarding its structure).

In U.S. terminology, asphalt (or asphalt cement) is the carefully refined residue from the distillation process of selected crude oils. Outside North America, the product is called bitumen.

The primary use of asphalt is in road construction, where it is used as the glue or binder for the aggregate particles. The road surfacing material is usually called 'asphaltic concrete' or simply AC in North America, or simply 'asphalt' elsewhere. Within North America the apparent interchangeability of the words 'asphalt' and 'bitumen' causes confusion outside the road construction industry despite quite clear definitions within industry circles.

Asphalt can be separated from the other components in crude oil (such as naphtha, gasoline and diesel) by the process of fractional distillation, usually under vacuum conditions. A better separation can be achieved by further processing of the heavier fractions of the crude oil in a de-asphalting unit, which uses either propane or butane in a supercritical phase to dissolve the lighter molecules which are then separated. Further processing is possible by "blowing" the product: namely reacting it with oxygen. This makes the product harder and more viscous.

Natural deposits of asphalt include lake asphalts (primarily from the Pitch Lake in Trinidad and Tobago and Bermudez Lake in Venezuela), Gilsonite, the Dead Sea between Israel & Jordan, and Tar Sands. Asphalt was mined at Ritchie Mines in Macfarlan in Ritchie County, West Virginia in the United States from 1852 to 1873.

Asphalt is typically stored and transported at temperatures around 300 degrees Fahrenheit (150° C). Sometimes diesel oil or kerosene are mixed in before shipping to retain liquidity; upon delivery, these lighter materials are separated out of the mixture. This mixture is often called bitumen feedstock, or BFS. Some dump trucks route the hot engine exhaust through pipes in the dump body to keep the material warm. The backs of tippers carrying asphalt, as well as some handling equipment, are also commonly sprayed with a releasing agent before filling to aid release. Diesel oil is sometimes used as a release agent, although it can mix with and thereby reduce the quality of the asphalt.

Concrete is a combination of cement, aggregate such as sand or gravel, and water. It is used in construction process to make hard structures.

## 2.2 MARKET AND MARKETING ASPECTS

The market survey carried out reveals that the current demand for building materials is higher than the local production. There is wide gap between supply and demand and therefore, business opportunity exists for setting up additional manufacturing facilities to satisfy the market requirement. The project plans to acquire appropriate vehicles and recruit qualified personnel for distribution of the products.

## 2.3 PROCESS AND TECHNOLOGY

### 2.3.1 Aggregates

A rock crusher is a machine designed to take large rocks and reduce them to smaller rocks, gravel, or rock dust. Rock crushers produce aggregates and ready-to-process mining ores, as well as rock fill material for landscaping and erosion control. They can be used with virgin rock or other materials such as reclaimed concrete. Rock crushers can be mobile (although usually very heavy) machines or they can be fixed installations.

Crushing is the first step in converting shot rock or demolition rubble into usable products, by taking large rocks and breaking them into smaller pieces. Crushing is sometimes continued until only the sand-like 'fines' remain, and in mining applications it is usually followed by milling. At some operations, all the crushing is accomplished in one step, by a single crusher. At other operations, crushing is done in two or more steps, with a primary crusher that is followed by a secondary crusher, and sometimes a tertiary or even quaternary crusher. Each crusher is designed to work with a certain maximum size of raw material, and often delivers its output to a screening machine which sorts and directs the product for further processing.

In operation, the raw material (of various sizes) is usually delivered to the primary crusher's hopper by dump trucks, excavators or wheeled front-end loaders. A feeder device such as a conveyor or vibrating grid controls the rate at which this material enters the crusher, and often contains a preliminary screening device which allows smaller material to bypass the crusher itself, thus improving efficiency. Primary crushing reduces the large pieces to a size which can be handled by the downstream machinery.

#### Types of Crushers

##### Jaw Crushers

The jaw crusher squeezes rock between two ridged surfaces (jaws) which taper to form a funnel. In most designs one jaw is fixed while the other oscillates at a rate of somewhere around 3 times a second. Raw material enters the jaw crusher from the top. Pieces of rock that are larger than the opening at the bottom of the jaw lodge between the two metal plates of the jaw, and the motion of the oscillating jaw against the fixed jaw continues to pound the lodged pieces until they are broken into pieces small enough to drop through the opening at the bottom.

##### Gyratory Crushers

A gyratory crusher breaks rock by squeezing it between an eccentrically gyrating spindle (which is covered by a wear resistant mantle) and the enclosing concave hopper. As run-of-mine rock enters the top of the gyratory crusher, it becomes wedged and squeezed between the mantle and concaves. Large pieces of ore are broken once and then fall to a lower

position (because they are now smaller) where they are broken again. This process continues until the pieces are small enough to fall through the narrow opening at the bottom of the crusher.

### Impact Crushers

There are two types of impact crushers which are Horizontal Shaft Impactor and the Vertical Shaft Impactor.

- Horizontal Shaft Impactor (HSI) Crushers

The HSI crushers break rock by impacting the rock with hammers that swing on a rotating shaft. The practical use of HSI crushers is limited to soft materials and non abrasive materials, such as limestone, phosphate, gypsum, weathered shales.

- Vertical Shaft Impactor (VSI)

VSI Crushers use a different approach involving a high speed rotor with wear resistant tips and a crushing chamber designed to 'throw' the rock against. The VSI crushers utilize velocity rather than surface force as the predominant force to break rock. In its natural state, rock has a jagged and uneven surface. Applying surface force (pressure) results in unpredictable and typically non-cubicle resulting particles. Utilizing velocity rather than surface force allows the breaking force to be applied evenly both across the surface of the rock as well as through the mass of the rock. Rock, regardless of size, has natural fissures (faults) throughout its structure. As rock is 'thrown' by a VSI Rotor against a solid anvil, it fractures and breaks along these fissures. Final particle size can be controlled by 1) the velocity at which the rock is thrown against the anvil and 2) the distance between the end of the rotor and the impact point on the anvil. The product resulting from VSI Crushing is generally of a consistent cubicle shape such as that required by modern SUPERPAVE highway asphalt applications. Using this method also allows materials with much higher abrasiveness to be crushed than is capable with an HSI and most other crushing methods.

VSI Crushers generally utilize a high speed spinning rotor at the center of the crushing chamber and an outer impact surface of either abrasive resistant metal anvils or crushed rock. Utilizing cast metal surfaces 'anvils' is traditionally referred to as a "Shoe and Anvil VSI". Utilizing crushed rock on the outer walls of the crusher for new rock to be crushed against is traditionally referred to as "rock on rock VSI".

### Cone Crusher

A cone crusher is similar in operation to a gyratory crusher, with less steepness in the crushing chamber and more of a parallel zone between crushing zones. A cone crusher breaks rock by squeezing the rock between an eccentrically gyrating spindle, which is covered by a wear resistant mantle, and the enclosing concave hopper, covered by a manganese concave or a bowl liner. As rock enters the top of the cone crusher, it becomes

wedged and squeezed between the mantle and the bowl liner or concave. Large pieces of ore are broken once, and then fall to a lower position (because they are now smaller) where they are broken again. This process continues until the pieces are small enough to fall through the narrow opening at the bottom of the crusher.

For the most part advances in crusher design have moved slowly. Jaw crushers have remained virtually unchanged for sixty years. More reliability and higher production have been added to basic cone crusher designs that have also remained largely unchanged. Increases in rotating speed, have provided the largest variation. For instance, a 48 inch (120 cm) cone crusher manufactured in 1960 may be able to produce 170 tons/hr of crushed rock, whereas the same size cone manufactured today may produce 300 tons/hr. These production improvements come from speed increases and better crushing chamber designs.

The largest advance in cone crusher reliability has been seen in the use of hydraulics to protect crushers from being damaged when uncrushable objects enter the crushing chamber. Foreign objects, such as steel, can cause extensive damage to a cone crusher, and additional costs in lost production. The advance of hydraulic relief systems has greatly reduced downtime and improved the life of these machines.

### 2.3.2 Concrete Blocks/Bricks

The production of concrete blocks consists of four basic processes: mixing, molding, curing, and cubing. Some manufacturing plants produce only concrete blocks, while others may produce a wide variety of precast concrete products including blocks, flat paver stones, and decorative landscaping pieces such as lawn edging. Some plants are capable of producing 2,000 or more blocks per hour.

The following steps are commonly used to manufacture concrete blocks

#### Mixing

- The sand and gravel are stored outside in piles and are transferred into storage bins in the plant by a conveyor belt as they are needed. The Portland cement is stored outside in large vertical silos to protect it from moisture.
- As a production run starts, the required amounts of sand, gravel, and cement are transferred by gravity or by mechanical means to a weigh batcher which measures the proper amounts of each material.
- The dry materials then flow into a stationary mixer where they are blended together for several minutes. There are two types of mixers commonly used. One type, called a planetary or pan mixer, resembles a shallow pan with a lid. Mixing blades are attached to a vertical rotating shaft inside the mixer. The other type is called a horizontal drum mixer. It resembles a coffee can turned on its side and has mixing blades attached to a horizontal rotating shaft inside the mixer.
- After the dry materials are blended, a small amount of water is added to the mixer. If the plant is located in a climate subject to temperature extremes, the water may first pass through a heater or chiller to regulate its temperature. Admixture chemicals and

coloring pigments may also be added at this time. The concrete is then mixed for six to eight minutes.

## Molding

- Once the load of concrete is thoroughly mixed, it is dumped into an inclined bucket conveyor and transported to an elevated hopper. The mixing cycle begins again for the next load.
- From the hopper the concrete is conveyed to another hopper on top of the block machine at a measured flow rate. In the block machine, the concrete is forced downward into molds. The molds consist of an outer mold box containing several mold liners. The liners determine the outer shape of the block and the inner shape of the block cavities. As many as 15 blocks may be molded at one time.
- When the molds are full, the concrete is compacted by the weight of the upper mold head coming down on the mold cavities. This compaction may be supplemented by air or hydraulic pressure cylinders acting on the mold head. Most block machines also use a short burst of mechanical vibration to further aid compaction.
- The compacted blocks are pushed down and out of the molds onto a flat steel pallet. The pallet and blocks are pushed out of the machine and onto a chain conveyor. In some operations the blocks then pass under a rotating brush which removes loose material from the top of the blocks.

## Curing

- The pallets of blocks are conveyed to an automated stacker or loader which places them in a curing rack. Each rack holds several hundred blocks. When a rack is full, it is rolled onto a set of rails and moved into a curing kiln.
- The kiln is an enclosed room with the capacity to hold several racks of blocks at a time. There are two basic types of curing kilns. The most common type is a low-pressure steam kiln. In this type, the blocks are held in the kiln for one to three hours at room temperature to allow them to harden slightly. Steam is then gradually introduced to raise the temperature at a controlled rate of not more than 60°F per hour (16°C per hour). Standard weight blocks are usually cured at a temperature of 150-165°F (66-74°C), while lightweight blocks are cured at 170-185°F (77-85°C). When the curing temperature has been reached, the steam is shut off, and the blocks are allowed to soak in the hot, moist air for 12-18 hours. After soaking, the blocks are dried by exhausting the moist air and further raising the temperature in the kiln. The whole curing cycle takes about 24 hours.

Another type of kiln is the high-pressure steam kiln, sometimes called an autoclave. In this type, the temperature is raised to 300-375°F (149-191°C), and the pressure is raised to 80-185 psi (5.5-12.8 bar). The blocks are allowed to soak for five to 10 hours. The pressure is then rapidly vented, which causes the blocks to quickly release their trapped moisture. The autoclave curing process requires more energy and a more expensive kiln, but it can produce blocks in less time.

## Cubing

- The racks of cured blocks are rolled out of the kiln, and the pallets of blocks are unstacked and placed on a chain conveyor. The blocks are pushed off the steel pallets, and the empty pallets are fed back into the block machine to receive a new set of molded blocks.
- If the blocks are to be made into split-face blocks, they are first molded as two blocks joined together. Once these double blocks are cured, they pass through a splitter, which strikes them with a heavy blade along the section between the two halves. This causes the double block to fracture and form a rough, stone-like texture on one face of each piece.

The blocks pass through a cuber which aligns each block and then stacks them into a cube three blocks across by six blocks deep by three or four blocks high. These cubes are carried outside with a forklift and placed in storage

### 2.3.3 Asphalt

An asphalt plant is a plant used for the manufacture of asphalt, macadam and other forms of coated road stone, sometimes collectively known as blacktop.

The manufacture of coated road stone demands the combination of a number of aggregates, sand and a filler (such as stone dust), in the correct proportions, heated, and finally coated with a binder, usually bitumen based or, in some cases, tar. The temperature of the finished product must be sufficient to be workable after transport to the final destination. A temperature in the range of 100 - 200 degrees Celsius is normal.

Increasingly, recycled asphalt pavement (RAP) is used as part of the mix. The binder used is flammable, and the heaters are large liquid or gas fired burners. RAP is introduced after the heating process and must be accounted for in the overall mix temperature calculations.

There are three main classes of plant: batch heater, semi-continuous (or "asphalt plant"), and continuous (or "drum mix"). The batch heater has the lowest throughput, the continuous plant the highest at up to around 500 Tonnes per hour.

Supply of road stone for large contracts is generally by tender with considerable pressure on price. A faulty batch of road stone must be planed up and re-laid, often with additional lane rental charges, at a cost which may be orders of magnitude higher than the original price, so sophisticated control systems are a necessity.

## Sand

One key ingredient of most road stones is sand. Sand generally has high water content. Boiling off this water is a large part of the energy cost of heating the aggregate, in turn a

significant part of the overall cost of operation. The water content of sand also varies considerably, especially when stored outdoors, being typically of the order of some tens of percent of the overall mass of wet sand. Since sand takes the form of small grains, with a high surface area per unit volume, and binder attaches to the surface of the aggregates, the amount of dry sand in the mix is particularly critical to the overall blend; the moisture content must be measured and the equivalent dry weight calculated.

#### Binder

Binder comes in different grades known as "penetration" or "pen" grades, with values varying between around 30 and 300. The pen value is an expression of the depth to which a standard needle will penetrate the surface of the binder at a specified temperature (the higher the value, the softer the binder). This has an effect on the workability of hot asphalt and the stiffness of the asphalt when cooled. Lower pen values give harder wearing. Asphalt wearing courses are typically 35-50 pen, base courses will be higher, typically 200 or 300 pen. The coating plant may combine binder of different grades to achieve a grade between those held on site.

#### Filler

Filler, as the name implies, fills the voids between aggregate grains and improves the wearing capabilities of the overall mix. It is stored and fed dry into the mix, during or after addition of binder. A common source of filler is fines from the heating process recovered by bag filters or wet filtration ponds from the exhaust of the heating drum.

#### Types of plant

##### Batch heater

A batch heater plant weighs the raw aggregates into a heater drum, where the batch is then heated up to temperature. The hot aggregate is discharged into a mixing drum where (dry) filler and binder are added. The blend is mixed and discharged either directly into the delivery vehicles or into a small weighing and collecting hopper. To increase throughput, the heater can be heating the next batch while the previous is being mixed. Capacity is usually of the order of tens of tonnes per hour.

Batch heater plant is used where short production runs are common (a different recipe can be used on each mix) or where total volume is low. Mobile batch heaters are available.

##### Continuous

In the continuous plant, raw aggregate is brought up from ground hoppers at a precisely controlled rate and fed into a heater drum similar to that used in the asphalt plant. Once heated it is immediately coated in the same drum (with the binder spray bars situated behind the burner) or in a smaller drum situated immediately behind it. Finished product is almost invariably discharged into a hot store rather than directly into delivery vehicles.

Changing mix is achieved by varying the feed rates of the aggregate, filler and binder feeders, with time delays so that the change of blend occurs at the same point in the coating drum. Sand tends to move more slowly through the heating drum, so the blend proportions will not necessarily change at the same point on the feed conveyor. It is common to divert a small amount of material to a waste chute when the transition point reaches the hot elevator.

Drum mix plants are not really suitable for short production runs; although with sophisticated controls the change of mix can be accurate to within some seconds, production rates of hundreds of tonnes per hour may equate to a tonne every ten seconds or so.

### Hot storage

Finished road stone must be kept heated to avoid setting. It is commonly stored in large electrically heated insulated stainless steel silos, from which it is weighed into delivery vehicles. This may be achieved by intermediate weigh hoppers (which may shuttle between hoppers) or by mounting the hoppers directly on load cells. Control of load out by this method involves accurately predicting the material "in flight" between the discharge door and the vehicle.

### Control

Precise control is a necessity. Asphalt mixing and load out plant typically use a combination of industrialized computer control and programmable logic controllers to achieve this.

With asphalt being a real-time product, timing is important when it comes to delivering product amounts to job sites, etc. 2008 has provided plants with a level of control over equipment by utilizing GPS, RFID and other forms of tracking systems. Tracking provides information throughout the supply chain to make sure that the right amount and type of product is delivered to the correct site in a timely manner and with better accuracy.

### 2.3.4 Concrete

A concrete mixer (also commonly called a cement mixer) is a device that homogeneously combines cement, aggregate such as sand or gravel, and water to form concrete. A typical concrete mixer uses a revolving drum to mix the components. For smaller volume works portable concrete mixers are often used so that the concrete can be made at the construction site, giving the workers ample time to use the concrete before it hardens. An alternative to a machine is mixing concrete or cement by hand. This is usually done in a wheelbarrow; however, several companies have recently begun to sell modified tarps for this purpose.

### Industrial mixers

Today's market increasingly requires consistent homogeneity and short mixing times for the industrial production of ready-mix concrete, and more so for precast/prestressed concrete. This has resulted in new technologies for concrete production. Worldwide, therefore, twin-

shaft batch mixers are becoming more important for high-quality concrete production. They introduce very high turbulence into the mix and achieve about 95% homogeneity at only around 30 seconds mixing time per batch.

Special concrete transport trucks (in-transit mixers) are made to transport and mix concrete from a factory/plant to the construction yard. They are charged with dry materials and water, with the mixing occurring during transport. With this process, the material has already been mixed, and then is loaded into the truck. The ready mix truck maintains the material's liquid state, through agitation, or turning of the drum, until delivery.) The interior of the drum on a concrete truck is fitted with a spiral blade. In one rotational direction, the concrete is pushed deeper into the drum. This is the direction the drum is rotated while the concrete is being transported to the building site. This is known as "charging" the mixer. When the drum rotates in the other direction, the Archimedes screw-type arrangement "discharges", or forces the concrete out of the drum. From there it may go onto chutes to guide the viscous concrete directly to the job site. If the truck cannot get close enough to the site to use the chutes, the concrete may be discharged into a concrete pump connected to a flexible hose, or onto a conveyor belt which can be extended some distance (typically ten meters). A pump provides the means to move the material to precise locations, multi-floor buildings, and other distance prohibitive locations.

"Rear discharge" trucks require both a driver and a "chuteman" to guide the truck and chute back and forth to place concrete in the manner suitable to the contractor. Newer "front discharge" trucks have controls inside the cab of the truck to allow the driver to move the chute in all directions.

A six-axle truck has three "lift axles" -- the first two axles behind the cab (the pusher axles) and the rear-most axle (the tag axle) -- which can be lifted out of the way for off-road operation. When loaded, these axles distribute the weight of the truck. This distribution of weight is essential. Otherwise, roads most traveled on by vehicles of this size begin to break down. As an added benefit, these axles provide the driver better control of the vehicle during transport. The lift axles are equipped with brakes, and a system that lets them actually turn with the truck during turns, allowing maneuvering that would otherwise be nearly impossible.

Concrete mixers generally do not travel far from their plant, as many contractors require that the concrete be in place within 90 minutes after loading. If the truck breaks down or for some other reason the concrete hardens in the truck, workers need to enter the barrel with jackhammers; dynamite is still occasionally used to break up hardened concrete in the barrel under certain circumstances.

## QUALITY CONTROL

We facilitate stone quality control by ensuring that our products are inspected for the highest quality before delivery. Similarly, sourcing of materials is done with great care to ensure that the best materials are used in the manufacturing processes for various products.

## 2.5 BYPRODUCTS/WASTE

The by products from our various processes are collected and sent out the factory for proper disposal to ensure that no harm is done to the environment

## 2.6 PRODUCTION INPUTS

As explained earlier, the basic Raw Materials used in the manufacture of building materials include rocks, gravel, cement, sand, asphalt and water. These are used in the different processes during the manufacturing of the different types of building materials.

## 2.7 LOCATION

The project location is in a prime industrial area in Dodoma at Chigongwe, Dodoma Municipality. This is the location of company operations and it has an area which is large enough to contain all the manufacturing operations, materials storage, and stockyard and office space

## 2.8 MANPOWER REQUIREMENTS

The whole project will comprise of a total work force of 75 permanent employees and several part time employees. Initially there will be a few technical expatriates and engineers who will give training to the local staff. Maximum employment will be given to the local work force.

The plant will be organized into three functions namely:

Production and Technical Services  
Marketing  
Finance and administration

## 2.9 IMPLEMENTATION

The project is planned to undergo two phases:

**Phase I:** Major activities involved include registration of the project and approvals by the Tanzania Investment Centre (TIC), and mobilization of funds from Sponsors. Other activities include identification of appropriate production technology, sourcing of machinery and equipment, renovation of factory buildings, staff recruitment and training of core personnel. A total of five months period is planned for the above activities after completion of this study.

Phase II: The second phase will involve full production of various building materials envisaged to start in the second half of year 2009.

## 2.10 PROJECT ECONOMICS

### 2.10.1 Capital Investment Requirements

COST STRUCTURE	
PARTICULAR	AMOUNT USD
Land and Buildings	662,350
Plant and Equipment	6,502,000
Motor Vehicles	890,000
Furniture & Fixtures	55,000
Pre expenses (& workshop & support)	112,000
Others/ Misc	50,000
Working Capital	300,000
<b>TOTAL</b>	<b>8,571,350</b>

### 2.10.2 Expenditure and Profitability

The major expenditure item is the purchase of raw materials used in the manufacture of various building materials such as rocks, gravel, cement, sand, asphalt and water

Project revenue will accrue from sales of building materials. Total revenue from this project will increase from USD 1,480,750 in the first year of operation to USD 1,666,597 in the fifth year. This is shown in the following summary.

REVENUE PROJECTION					
PRODUCTS	YEARS				
	YEAR 1 USD	YEAR 2 USD	YEAR 3 USD	YEAR 4 USD	YEAR 5 USD
Revenue	1,480,750	1,525,173	1,570,928	1,618,056	1,666,597
	<b>1,480,750</b>	<b>1,525,173</b>	<b>1,570,928</b>	<b>1,618,056</b>	<b>1,666,597</b>

## 2.11 RECOMMENDATIONS

The study shows the establishment of production facilities for building materials including aggregates, building blocks, paving blocks, asphalt and concrete is both technically and financially a feasible undertaking. Furthermore, it will create local employment for the national benefit. In view of the findings, the project is recommended for implementation.

## 3 MARKET AND MARKETING

In this chapter, we look into whether there is a market for the proposed products and how the promoters would approach that market.

### 3.1 PRODUCTS

The products which this project will produce for sale are building materials including aggregates, building blocks, paving blocks, asphalt and concrete.

### 3.2 DEMAND

The company projections show increasing demand for various building materials. Their use has been on the increase taking into consideration the growth occurring in construction industry in Tanzania.

### 3.3 DISTRIBUTION CHANNEL

The company will involve itself with a product that will be distributed to final consumers either directly (one level channel) or by using only one intermediary who will resale to final consumers (two level channel). It is important for these channels to be adopted because they reduce costs of distribution and avoid several profit margins of distributors, hence making the product price competitive in the market place. However, the company is exploring all sales and distribution avenues that will work to the company's advantage, given the stiff competition anticipated in the market. The company has budgeted for the development of a modern distribution/sales network that will comprise of modern and adequate number of distribution trucks as well as recruitment and training of qualified sales and marketing personnel.

## 4 PRODUCTION PROCESS AND TECHNOLOGY

### 4.1 BASIC PRODUCTION PROCESS

#### 4.1.1 Aggregates

Crushing is the first step in converting shot rock or demolition rubble into usable products, by taking large rocks and breaking them into smaller pieces. Crushing is sometimes continued until only the sand-like 'fines' remain, and in mining applications it is usually followed by milling. At some operations, all the crushing is accomplished in one step, by a single crusher. At other operations, crushing is done in two or more steps, with a primary crusher that is followed by a secondary crusher, and sometimes a tertiary or even quaternary crusher. Each crusher is designed to work with a certain maximum size of raw material, and often delivers its output to a screening machine which sorts and directs the product for further processing.

In operation, the raw material (of various sizes) is usually delivered to the primary crusher's hopper by dump trucks, excavators or wheeled front-end loaders. A feeder device such as a conveyor or vibrating grid controls the rate at which this material enters the crusher, and often contains a preliminary screening device which allows smaller material to bypass the crusher itself, thus improving efficiency. Primary crushing reduces the large pieces to a size which can be handled by the downstream machinery.

## Types of Crushers

### Jaw Crushers

The jaw crusher squeezes rock between two ridged surfaces (jaws) which taper to form a funnel. In most designs one jaw is fixed while the other oscillates at a rate of somewhere around 3 times a second. Raw material enters the jaw crusher from the top. Pieces of rock that are larger than the opening at the bottom of the jaw lodge between the two metal plates of the jaw, and the motion of the oscillating jaw against the fixed jaw continues to pound the lodged pieces until they are broken into pieces small enough to drop through the opening at the bottom.

### Gyratory Crushers

A gyratory crusher breaks rock by squeezing it between an eccentrically gyrating spindle (which is covered by a wear resistant mantle) and the enclosing concave hopper. As run-of-mine rock enters the top of the gyratory crusher, it becomes wedged and squeezed between the mantle and concaves. Large pieces of ore are broken once and then fall to a lower position (because they are now smaller) where they are broken again. This process continues until the pieces are small enough to fall through the narrow opening at the bottom of the crusher.

### Impact Crushers

There are two types of impact crushers which are Horizontal Shaft Impactor and the Vertical Shaft Impactor.

- Horizontal Shaft Impactor (HSI) Crushers

The HSI crushers break rock by impacting the rock with hammers that swing on a rotating shaft. The practical use of HSI crushers is limited to soft materials and non abrasive materials, such as limestone, phosphate, gypsum, weathered shales.

- Vertical Shaft Impactor (VSI)

VSI Crushers use a different approach involving a high speed rotor with wear resistant tips and a crushing chamber designed to 'throw' the rock against. The VSI crushers utilize velocity rather than surface force as the predominant force to break rock. In its natural state, rock has a jagged and uneven surface. Applying surface force (pressure) results in unpredictable and typically non-cubicle resulting particles. Utilizing velocity rather than surface force allows the breaking force to be applied evenly both across the surface of the rock as well as through the mass of the rock. Rock, regardless of size, has natural fissures (faults) throughout its structure. As rock is 'thrown' by a VSI Rotor against a solid anvil, it fractures and breaks along these fissures. Final particle size can be controlled by 1) the velocity at which the rock is thrown against the anvil and 2) the distance between the end of the rotor and the impact point on the anvil. The product resulting from VSI Crushing is generally of a consistent cubicle shape such as that required by modern supersave highway asphalt applications. Using this

method also allows materials with much higher abrasiveness to be crushed than is capable with an HSI and most other crushing methods.

VSI Crushers generally utilize a high speed spinning rotor at the center of the crushing chamber and an outer impact surface of either abrasive resistant metal anvils or crushed rock. Utilizing cast metal surfaces 'anvils' is traditionally referred to as a "Shoe and Anvil VSI". Utilizing crushed rock on the outer walls of the crusher for new rock to be crushed against is traditionally referred to as "rock on rock VSI".

### Cone Crusher

A cone crusher is similar in operation to a gyratory crusher, with less steepness in the crushing chamber and more of a parallel zone between crushing zones. A cone crusher breaks rock by squeezing the rock between an eccentrically gyrating spindle, which is covered by a wear resistant mantle, and the enclosing concave hopper, covered by a manganese concave or a bowl liner. As rock enters the top of the cone crusher, it becomes wedged and squeezed between the mantle and the bowl liner or concave. Large pieces of ore are broken once, and then fall to a lower position (because they are now smaller) where they are broken again. This process continues until the pieces are small enough to fall through the narrow opening at the bottom of the crusher.

### Technology

For the most part advances in crusher design have moved slowly. Jaw crushers have remained virtually unchanged for sixty years. More reliability and higher production have been added to basic cone crusher designs that have also remained largely unchanged. Increases in rotating speed, have provided the largest variation. For instance, a 48 inch (120 cm) cone crusher manufactured in 1960 may be able to produce 170 tons/hr of crushed rock, whereas the same size cone manufactured today may produce 300 tons/hr. These production improvements come from speed increases and better crushing chamber designs.

The largest advance in cone crusher reliability has been seen in the use of hydraulics to protect crushers from being damaged when uncrushable objects enter the crushing chamber. Foreign objects, such as steel, can cause extensive damage to a cone crusher, and additional costs in lost production. The advance of hydraulic relief systems has greatly reduced downtime and improved the life of these machines.

### 4.1.2 Concrete Blocks/Bricks

The production of concrete blocks consists of four basic processes: mixing, molding, curing, and cubing. Some manufacturing plants produce only concrete blocks, while others may produce a wide variety of precast concrete products including blocks, flat paver stones, and decorative landscaping pieces such as lawn edging. Some plants are capable of producing 2,000 or more blocks per hour.

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The following steps are commonly used to manufacture concrete blocks

### Mixing

- 1 The sand and gravel are stored outside in piles and are transferred into storage bins in the plant by a conveyor belt as they are needed. The Portland cement is stored outside in large vertical silos to protect it from moisture.
- 2 As a production run starts, the required amounts of sand, gravel, and cement are transferred by gravity or by mechanical means to a weigh batcher which measures the proper amounts of each material.
- 3 The dry materials then flow into a stationary mixer where they are blended together for several minutes. There are two types of mixers commonly used. One type, called a planetary or pan mixer, resembles a shallow pan with a lid. Mixing blades are attached to a vertical rotating shaft inside the mixer. The other type is called a horizontal drum mixer. It resembles a coffee can turned on its side and has mixing blades attached to a horizontal rotating shaft inside the mixer.
- 4 After the dry materials are blended, a small amount of water is added to the mixer. If the plant is located in a climate subject to temperature extremes, the water may first pass through a heater or chiller to regulate its temperature. Admixture chemicals and coloring pigments may also be added at this time. The concrete is then mixed for six to eight minutes.

### Molding

- 5 Once the load of concrete is thoroughly mixed, it is dumped into an inclined bucket conveyor and transported to an elevated hopper. The mixing cycle begins again for the next load.
- 6 From the hopper the concrete is conveyed to another hopper on top of the block machine at a measured flow rate. In the block machine, the concrete is forced downward into molds. The molds consist of an outer mold box containing several mold liners. The liners determine the outer shape of the block and the inner shape of the block cavities. As many as 15 blocks may be molded at one time.
- 7 When the molds are full, the concrete is compacted by the weight of the upper mold head coming down on the mold cavities. This compaction may be supplemented by air or hydraulic pressure cylinders acting on the mold head. Most block machines also use a short burst of mechanical vibration to further aid compaction.
- 8 The compacted blocks are pushed down and out of the molds onto a flat steel pallet. The pallet and blocks are pushed out of the machine and onto a chain conveyor. In some operations the blocks then pass under a rotating brush which removes loose material from the top of the blocks.

## Curing

- 9 The pallets of blocks are conveyed to an automated stacker or loader which places them in a curing rack. Each rack holds several hundred blocks. When a rack is full, it is rolled onto a set of rails and moved into a curing kiln.
- 10 The kiln is an enclosed room with the capacity to hold several racks of blocks at a time. There are two basic types of curing kilns. The most common type is a low-pressure steam kiln. In this type, the blocks are held in the kiln for one to three hours at room temperature to allow them to harden slightly. Steam is then gradually introduced to raise the temperature at a controlled rate of not more than 60°F per hour (16°C per hour). Standard weight blocks are usually cured at a temperature of 150-165°F (66-74°C), while lightweight blocks are cured at 170-185°F (77-85°C). When the curing temperature has been reached, the steam is shut off, and the blocks are allowed to soak in the hot, moist air for 12-18 hours. After soaking, the blocks are dried by exhausting the moist air and further raising the temperature in the kiln. The whole curing cycle takes about 24 hours.

Another type of kiln is the high-pressure steam kiln, sometimes called an autoclave. In this type, the temperature is raised to 300-375°F (149-191°C), and the pressure is raised to 80-185 psi (5.5-12.8 bar). The blocks are allowed to soak for five to 10 hours. The pressure is then rapidly vented, which causes the blocks to quickly release their trapped moisture. The autoclave curing process requires more energy and a more expensive kiln, but it can produce blocks in less time.

## Cubing

- 11 The racks of cured blocks are rolled out of the kiln, and the pallets of blocks are unstacked and placed on a chain conveyor. The blocks are pushed off the steel pallets, and the empty pallets are fed back into the block machine to receive a new set of molded blocks.
- 12 If the blocks are to be made into split-face blocks, they are first molded as two blocks joined together. Once these double blocks are cured, they pass through a splitter, which strikes them with a heavy blade along the section between the two halves. This causes the double block to fracture and form a rough, stone-like texture on one face of each piece.
- 13 The blocks pass through a cuber which aligns each block and then stacks them into a cube three blocks across by six blocks deep by three or four blocks high. These cubes are carried outside with a forklift and placed in storage.

### 4.1.3 Asphalt Plant

An asphalt plant is a plant used for the manufacture of asphalt, macadam and other forms of coated road stone, sometimes collectively known as blacktop.

The manufacture of coated road stone demands the combination of a number of aggregates, sand and a filler (such as stone dust), in the correct proportions, heated, and finally coated

with a binder, usually bitumen based or, in some cases, tar. The temperature of the finished product must be sufficient to be workable after transport to the final destination. A temperature in the range of 100 - 200 degrees Celsius is normal.

Increasingly, recycled asphalt pavement (RAP) is used as part of the mix. The binder used is flammable, and the heaters are large liquid or gas fired burners. RAP is introduced after the heating process and must be accounted for in the overall mix temperature calculations.

There are three main classes of plant: batch heater, semi-continuous (or "asphalt plant"), and continuous (or "drum mix"). The batch heater has the lowest throughput, the continuous plant the highest at up to around 500 Tonnes per hour.

Supply of road stone for large contracts is generally by tender with considerable pressure on price. A faulty batch of road stone must be planed up and re-laid, often with additional lane rental charges, at a cost which may be orders of magnitude higher than the original price, so sophisticated control systems are a necessity.

## Sand

One key ingredient of most roadstones is sand. Sand generally has a high water content. Boiling off this water is a large part of the energy cost of heating the aggregate, in turn a significant part of the overall cost of operation. The water content of sand also varies considerably, especially when stored outdoors, being typically of the order of some tens of percent of the overall mass of wet sand. Since sand takes the form of small grains, with a high surface area per unit volume, and binder attaches to the surface of the aggregates, the amount of dry sand in the mix is particularly critical to the overall blend; the moisture content must be measured and the equivalent dry weight calculated.

## Binder

Binder comes in different grades known as "penetration" or "pen" grades, with values varying between around 30 and 300. The pen value is an expression of the depth to which a standard needle will penetrate the surface of the binder at a specified temperature (the higher the value, the softer the binder). This has an effect on the workability of hot asphalt and the stiffness of the asphalt when cooled. Lower pen values give harder wearing. Asphalt wearing courses are typically 35-50 pen, base courses will be higher, typically 200 or 300 pen. The coating plant may combine binder of different grades to achieve a grade between those held on site.

## Filler

Filler, as the name implies, fills the voids between aggregate grains and improves the wearing capabilities of the overall mix. It is stored and fed dry into the mix, during or after addition of binder. A common source of filler is fines from the heating process recovered by bag filters or wet filtration ponds from the exhaust of the heating drum.

## Types of plant

- Batch heater

A batch heater plant weighs the raw aggregates into a heater drum, where the batch is then heated up to temperature. The hot aggregate is discharged into a mixing drum where (dry) filler and binder are added. The blend is mixed and discharged either directly into the delivery vehicles or into a small weighing and collecting hopper. To increase throughput, the heater can be heating the next batch while the previous is being mixed. Capacity is usually of the order of tens of tonnes per hour.

Batch heater plant is used where short production runs are common (a different recipe can be used on each mix) or where total volume is low. Mobile batch heaters are available.

- Continuous

In the continuous plant, raw aggregate is brought up from ground hoppers at a precisely controlled rate and fed into a heater drum similar to that used in the asphalt plant. Once heated it is immediately coated in the same drum (with the binder spray bars situated behind the burner) or in a smaller drum situated immediately behind it. Finished product is almost invariably discharged into a hot store rather than directly into delivery vehicles.

Changing mix is achieved by varying the feed rates of the aggregate, filler and binder feeders, with time delays so that the change of blend occurs at the same point in the coating drum. Sand tends to move more slowly through the heating drum, so the blend proportions will not necessarily change at the same point on the feed conveyor. It is common to divert a small amount of material to a waste chute when the transition point reaches the hot elevator.

Drum mix plants are not really suitable for short production runs; although with sophisticated controls the change of mix can be accurate to within some seconds, production rates of hundreds of tonnes per hour may equate to a tonne every ten seconds or so.

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## Hot storage

Finished road stone must be kept heated to avoid setting. It is commonly stored in large electrically heated insulated stainless steel silos, from which it is weighed into delivery vehicles. This may be achieved by intermediate weigh hoppers (which may shuttle between hoppers) or by mounting the hoppers directly on load cells. Control of load out by this method involves accurately predicting the material "in flight" between the discharge door and the vehicle.

## Control

Precise control is a necessity. Asphalt mixing and load out plant typically use a combination of industrialized computer control and programmable logic controllers to achieve this.

With asphalt being a real-time product, timing is important when it comes to delivering product amounts to job sites, etc. 2008 has provided plants with a level of control over equipment by utilizing GPS, RFID and other forms of tracking systems. Tracking provides information throughout the supply chain to make sure that the right amount and type of product is delivered to the correct site in a timely manner and with better accuracy.

#### 4.1.4 Concrete Mixer

A concrete mixer (also commonly called a cement mixer) is a device that homogeneously combines cement, aggregate such as sand or gravel, and water to form concrete. A typical concrete mixer uses a revolving drum to mix the components. For smaller volume works portable concrete mixers are often used so that the concrete can be made at the construction site, giving the workers ample time to use the concrete before it hardens. An alternative to a machine is mixing concrete or cement by hand. This is usually done in a wheelbarrow; however, several companies have recently begun to sell modified tarps for this purpose.

#### Industrial mixers

Today's market increasingly requires consistent homogeneity and short mixing times for the industrial production of ready-mix concrete, and more so for precast/prestressed concrete. This has resulted in new technologies for concrete production. Worldwide, therefore, twin-shaft batch mixers are becoming more important for high-quality concrete production. They introduce very high turbulence into the mix and achieve about 95% homogeneity at only around 30 seconds mixing time per batch.

Special concrete transport trucks (in-transit mixers) are made to transport and mix concrete from a factory/plant to the construction yard. They are charged with dry materials and water, with the mixing occurring during transport. With this process, the material has already been mixed, and then is loaded into the truck. The ready mix truck maintains the material's liquid state, through agitation, or turning of the drum, until delivery.) The interior of the drum on a concrete truck is fitted with a spiral blade. In one rotational direction, the concrete is pushed deeper into the drum. This is the direction the drum is rotated while the concrete is being transported to the building site. This is known as "charging" the mixer. When the drum rotates in the other direction, the Archimedes screw-type arrangement "discharges", or forces the concrete out of the drum. From there it may go onto chutes to guide the viscous concrete directly to the job site

## 4.2 QUALITY CONTROL

The company will facilitate quality control by ensuring that its products are inspected for the highest quality before delivery. Similarly, sourcing of materials will be done with great care to ensure that the best materials are used in the manufacturing processes for various products.

#### 4.3 ENVIRONMENT PROTECTION

Our aim is to make this project environment friendly. The company will strive to observe stringent environment protection in its production process. It will seek environmental friendly technologies. All by products will be properly handled so as not to pollute the environment. The factory surroundings will be kept clean and trees are to be planted as part of environment conservation efforts.

### 5 MACHINERY EQUIPMENT AND CIVIL WORKS

#### 5.1 MACHINERY

The complete set of requisite plant, machinery and equipment for production of Aggregates, Vibrated Building Blocks, Paving Blocks, Asphalt and Concrete is listed hereunder for reference. Prices indicated are based on quotations received from suppliers

S/N	PARTICULARS / ITEMS	UNITS REQUIRED	UNIT COST US \$	TOTAL COST US\$
1	CHAIN EXCAVATOR	4	140,000	560,000
2	WHEEL LOADER	4	135,000	540,000
3	BULDOZER	1	140,000	140,000
4	DRILLING MACHINE	2	115,000	230,000
5	COMPRESSORS	6	40,000	240,000
6	WELDING MACHINE	3	10,000	30,000
7	SET OF TOOLS	3	10,000	30,000
8	WEIGH BRIDGE 80 TONS	1	80,000	80,000

9	GRIZZLY FEEDER	2	38,000	76,000
10	JAW CRUSHER	2	120,000	240,000
11	CONE CRUSHER	2	110,000	220,000
12	COMPACT CRUSHER	2	100,000	200,000
13	VIBRATING SCREENS	4	45,000	180,000
14	CONVOYER BELTS	8	15,000	120,000
15	NECESSARY MOTORS	16	8,000	128,000
16	CONCRETE MIXER 1 CUBIC METRE	1	22,000	22,000
17	VIBRATING MACHINES	15	3,000	45,000
18	PAVEMENTS MACHINES	10	3,000	30,000
19	CONCRETE PIPES MOLES	20	350	7,000
20	MOLES	40	250	10,000
21	CONCRETE MIXER 1 CUBIC METRE	1	22,000	22,000
22	CONCRETE MIXER 15 TONS	1	180,000	180,000
23	MOBILE MIXER VEHICLES	5	60,000	300,000
24	PUMP	1	75,000	75,000
25	CONCRETE MIXER 15 TONS	1	180,000	180,000
26	ASPHALT MIXER 15 TONS	1	220,000	220,000

## 5.2 PLANT LOCATION AND CIVIL WORKS

### 5.2.1 Site and Location

As mentioned earlier, the project location is in an industrial area at Chigongwe, Dodoma Municipality. This is the location of company operations and it has an area which is large enough to contain all the manufacturing operations, materials storage, and stockyard and office space.

### 5.2.2 Production Building Required

The buildings required include residential houses, garage house, staff houses and public toilet. A warehouse will also be needed for storage of raw materials and some finished building materials and for onward delivery to the customers. Details appear below

S/N	PARTICULARS / ITEMS	UNITS REQUIRED	UNIT COST US \$	TOTAL COST US\$
A	LAND AND BUILDING			
1	QUARRY ACQUISITION	200,000 Sq m	200,000	200,000
2	RESIDENTIAL HOUSES	4	12,000	48,000
3	WARE HOUSE	2	15,000	30,000
4	GARAGE HOUSE	2	10,000	20,000
5	STAFF HOUSES	COMPLEX 3	10,000	30,000
6	PUBLIC TOILETS	8	1,000	8,000
7	WATER TANK	4	5,000	20,000
8	DIESEL TANK 30,000 LITRES	1	30,000	30,000
9	FOUNDATION FOR THE CRUSHER	1	100,000	100,000
10	AIR CONDITIONS	12	450	5,400
11	AIR CONDITIONS HORIZONTAL	5	750	3,750

### 5.2.3 Office Building

An office block to accommodate the clerical staff will be constructed within the premises at cost shown hereunder

S/N	PARTICULARS / ITEMS	UNITS REQUIRED	UNIT COST US \$	TOTAL COST US\$
1	OFFICE	1	10,000	10,000

## 5.3 UTILITY SERVICES

### 5.3.1 Water

A three-inch diameter pipeline to the location from the main pipeline is available. The plant water requirement is basically for making of building and paving blocks and for other factory uses. About 5,000 liters of water will be required per day. Therefore, a water reservoir with capacity of around 10,000 liters is planned for construction.

### 5.3.2 Electricity

The Tanzania Electric Supply Company Ltd. (TANESCO) has no problem in providing electricity to us to facilitate smooth production of various types of building materials.

S/N	PARTICULARS / ITEMS	UNITS REQUIRED	UNIT COST US \$	TOTAL COST US\$
1	TANESCO INSTALLATION + TRANSFORMER	SET	150,000	150,000

The project will also require the following machinery and equipment to facilitate generation of power for this project

S/N	PARTICULARS / ITEMS	UNITS REQUIRED	UNIT COST US \$	TOTAL COST US\$
	POWER GENERATION			
1	ELECTRIC PANEL BOARD	1	35,000	35,000
2	GENERATOR 600 KVA	2	110,000	220,000
3	GENERATOR 60 KVA	1	18,000	18,000
				-

## **6 RAW MATERIALS AND OTHER PRODUCTION INPUTS: REQUIREMENTS AND AVAILABILITY**

### **6.1 BASIC MATERIALS**

The basic Raw Materials used in the manufacture of different building materials include rocks, gravel, powdered portland cement, water, asphalt and sand.

### **6.2 UTILITIES**

#### **6.2.1 Power**

As said earlier in this report, the source of energy for the proposed project will be electric power. Power is consumed in quite large quantities and is among the higher cost elements.

A standby power generator has also been budgeted for to avoid inconveniences caused by frequent power cuts by TANESCO.

## **7 MANPOWER AND ORGANIZATION**

The proposed project will have three independent departments, namely:

- Production and Technical Services
- Sales and Marketing
- Administration and Finance

### **7.1 ORGANIZATION**

The Board of Directors shall manage the project at policy level. The top most person in the day to day running of the project will be the Managing Director who will be the project manager. Under the Managing Director's office will be the three departments mentioned above. Each department will comprise a number of sections each headed by a section head as follows.

#### **PRODUCTION AND TECHNICAL SERVICES DEPARTMENT**

- Aggregate section
- Building Block/Brick section
- Paving Block section
- Asphalt section

- Concrete section
- Raw Materials Stores
- Quality Control section
- Research and Development section
- Repair / Maintenance section

## SALES AND MARKETING

- Marketing Section
- Sales and Distribution Section
- Finished Goods Stores
- Procurement and Logistics Section

## ADMINISTRATION AND FINANCE DEPARTMENT:

- Procurement
- Accounts
- Personnel and Administration
- Security

Each section will be manned by a number of personnel with varying education levels and work experiences.

The management team will comprise the Managing Director/Project Manager, Site Manager/Production Manager and the Marketing Manager.

## 7.2 RESPONSIBILITIES

Responsibilities will be as follows:

### 7.2.1 Production and Technical Services Department

This will be responsible for production planning and overseeing that daily production activities are carried. It will further be responsible for repair and maintenance of company assets and research and development activities.

Technical Staff in each of the other sections will likewise assist the Site/Production Manager execute his duties. We recommend that expatriates be employed to man these positions at least for the initial 2 - 3 years.

## 7.2.2 Finance and Administration Department

A qualified accountant with experience in administrative issues will head the department. He will be responsible for the administration of the company as well as overseeing the financial aspects of the company. The administration and finance department will comprise three sections, namely:

- The administrative section which will be responsible for the general administrative matters of the company as well as personnel issues.
- The finance section, which will be responsible for financial issues. It will also be responsible for the proper maintenance of books of accounts and financial planning.
- The purchasing section which will be responsible for the purchase of raw materials, spare parts and equipment. This section will also be responsible for the receipt, storage and issue of purchased materials.

## 7.2.3 Sales and Marketing Department.

This Department will be headed by the Sales and Marketing Manager who will be responsible for the development of a sustainable sales and distribution network throughout the country. This will involve developing and maintaining a fleet of distribution vehicles and recruitment and training of qualified and well motivated marketing and sales personnel.

## 7.3 MANPOWER REQUIREMENT

The permanent manpower requirement for running the proposed plant is 75, with the breakdown mentioned in attached schedule 5.

## 7.4 SOURCE OF MANPOWER AND WAGE BILL

Manpower for proposed project will be employed from local sources, except for a few expatriates who would basically be engaged in the training of local staff. The workers will be given on-the-job training to familiarize them with the proposed machinery and equipment. The total wage bill per annum will be US\$ 259,294 as shown in schedule 5

## 8. INVESTMENT AND FINANCING

### 8.1 ASSUMPTIONS

The financial projections to determine the viability of the project are based on the following key assumptions:

- The production of various building materials will start from second half of the year 2009.
- The whole project output will be sold locally during initial years of project implementation.
- Financial calculations are based on current market prices and costs are assumed constant throughout the operating period under review on the assumption that if operation costs change, selling prices will change proportionally to preserve the profit margins.
- The project has adopted the currency exchange rate of United States Dollar 1 = Tanzania Shilling 1,300.00.

### 8.2 SUMMARY OF CAPITAL COSTS

On completion of project implementation, the total investment will reach US\$ 8,571,350 as per attached schedule 3.

### 8.3 BUILDING AND CIVIL WORKS COSTS

The main civil works required for the building for the plants to be installed and operated will be construction of factory, construction of warehouse, construction of residential houses for staff, electrification and water supply, installation of overhead tank, etc. This aspect is expected to cost US\$ 662,350 .

### 8.4 PLANT MACHINERY AND EQUIPMENT COSTS

The main machines for the envisaged project have been explained earlier. The total investment on machinery and equipment is based on a quotation received from suppliers for main production machinery and amount of to US\$ 6,502,000 approximately.

### 8.5 FURNITURE AND FITTINGS

The costs for this item have been estimated at US\$ 55,000. The items to be purchased will comprise office furniture, computers, & other equipments for the office and factory use.

S/N	PARTICULARS / ITEMS	UNITS REQUIRED	UNIT COST US \$	TOTAL COST US\$
1	COMPUTER APPLIANCES	8	2,500	20,000
2	PRINTERS	6	500	3,000
3	FURNITURE AND FIXTURE	4	6,000	24,000
4	RECORDS BOOKS	2	400	800
5	STATIONERIES	2	600	1,200
6	UNIFORMS	2	3,000	6,000

## 8.6 MOTOR VEHICLES

For company work, we intend to procure the following vehicles at cost of US\$ 890,000

S/N	PARTICULARS / ITEMS	UNITS REQUIRED	UNIT COST US \$	TOTAL COST US\$
1	DUMPER TRUCKS	4	65,000	260,000
2	TIPPER TRUCKS	6	60,000	360,000
3	FORCKLIFT	1	15,000	15,000
4	CRANE 60 TONS	1	75,000	75,000

## 8.7 PRE-PRODUCTION CAPITAL EXPENDITURES

These include project development cost for feasibility study and start-up expenses, transportation of machinery, installation, and other overheads during installation. A budget of US\$ 112,000 is considered adequate for this item

## 8.8 INITIAL WORKING CAPITAL

Initial net working capital requirement at maximum for the proposed project works out at about US\$ 300,000. This is mainly for the procurement of initial stocks of raw materials. Rest of the requirement of the working capital will be raised from commercial banks as and when the need arises. This will fluctuate as per stocks in hand.

## 8.9 FINANCING PATTERN

The financing of the project will be from 100% shareholder's equity. It is anticipated that the financing of the project will take the following form.

EQUITY (FOREIGN) US \$	LOAN
8,571,350	0

## 9 COST OF OPERATIONS

The anticipated costs for operating the project are detailed in the following sections and summarized in attached schedule 2.

### 9.1 OFFICE RENT & OPERATION

This includes cost for Water and Energy for various manufacturing units for building materials. The costs are expected to increase from US\$ 14,760 in the first year of operation to US\$ 16,613 in the fifth year.

### 9.2 ADMINISTRATIVE OVERHEADS

This cost item has been estimated to cost US\$ 139,952 in the first year of operation. This is anticipated to increase to US\$ 157,518 during the fifth year of operation.

### 9.3 VEHICLE RUNNING EXPENSES

Vehicle running expenses include fuel, lubricants, road licenses, insurance, etc. This is expected to increase from US\$ 28,235 in first year of operation to US\$ 209,991 in the fifth year of operation.

## 9.4 SALARIES AND WAGES

The number of employees, along with their incomes, is shown in attached schedule 5. The total annual wage package is estimated at US\$ 259,294 in first year of operation. The figure is calculated to grow to US\$ 291,838 when the project reaches its fifth year of operation.

## 9.5 DEPRECIATION

The depreciation cost element has been estimated to stand at US\$ 405,468 per annum during 5 years of project implementation.

# 10 FINANCIAL ANALYSIS

## 10.1 INCOME AND EXPENDITURE

### 10.1.1 Income

The proposed project expects to earn its income through the sale of various building materials. At sustainable level of production, the total sales are expected to increase from US\$ 1,480,750 in the first year of production to US\$ 1,666,597 in the fifth year of operation.

### 10.1.2 Expenditure

All project costs have been discussed in Chapter 9 above and are summarized in attached schedule 2.

## 10.2 NET INCOME STATEMENT

The project generates profit from the first year of operation and can easily meet both its long term and short-term obligations in less than five years.

## 10.3 CASH FLOW HIGHLIGHTS

The project's cash flow is impressive as the project has positive end of the year cash flow from first to fifth year of operation.

## 11. ECONOMIC BENEFITS OF THE PROJECT

### 11.1 EMPLOYMENT

The expansionary project will provide additional permanent direct employment to 75 individuals mostly local Tanzanians.

### 11.2 TAXES

The government will earn revenue from taxes.

### 11.3 FOREIGN CURRENCY EARNINGS

The project will bring in the country foreign currency when the company starts exporting some of the building materials to neighbouring countries at later stages of project implementation.

### 11.4 PRODUCTION OF HIGH QUALITY BUILDING MATERIALS

People will be able to buy high quality building materials as the company will employ state of the art technology in manufacturing the products.

## 12. CONCLUSION AND RECOMMENDATIONS

### 12.1 CONCLUSION

In all aspects, the project is feasible, sustainable and beneficial not only to the investors but also to the ultimate consumers and the economy as a whole. M/S Fortune Development (T) Company Limited is expected to produce useful building materials initially for domestic market and later for export market.

### 12.2 RECOMMENDATIONS

Provided all other economic factors remain substantially the same, it is strongly recommended that the project be implemented with immediate effect. It is further recommended that an application for TIC Certificate of Investment Incentives be submitted to Tanzania Investment Centre with a view to benefit from investment benefits and protection as statutorily allowed under Tanzania Investment Act, 1997.

FORTUNE DEVELOPMENT (T) COMPANY LTD						
PROJECTED INCOME & EXPENDITURE STATEMENT						
		YEAR 1 USD	YEAR 2 USD	YEAR 3 USD	YEAR 4 USD	YEAR 5 USD
Sales Revenue		1,480,750	1,525,173	1,570,928	1,618,056	1,666,597
Cost of Sales		148,075	152,517	157,093	161,806	166,660
Gross Profit		1,332,675	1,372,655	1,413,835	1,456,250	1,499,937
Operating Expenses:						
Motor Vehicle running expenses		28,235	29,082	29,955	30,853	209,991
Salaries and wages		259,294	267,073	275,085	283,338	291,838
Pension contribution		25,929	26,707	27,509	28,334	29,184
Depreciation		405,468	405,468	405,468	405,468	405,468
Milling cost		46,660	48,060	50,463	52,986	55,635
Mining cost		226,885	233,692	245,376	257,645	270,527
Office Rent & Operation		14,760	15,203	15,659	16,129	16,613
Administrative Overhead		139,952	144,151	148,475	152,930	157,518
Communication cost		18,824	19,388	19,970	20,569	22,186
Total Expenses		1,166,007	1,188,823	1,217,959	1,248,251	1,458,959
Profit before Tax		166,668	183,832	195,876	207,999	40,979
Tax (30%)		50,000	55,150	58,763	62,400	12,294
Profit After Tax		116,667	128,682	137,113	145,600	28,685

FORTUNE DEVELOPMENT (T) COMPANY LTD						
PROJECTED BALANCE SHEET						
		YEAR 1 USD	YEAR 2 USD	YEAR 3 USD	YEAR 4 USD	YEAR 5 USD
<b>Fixed Assets</b>						
Long-term Assets		8,109,350	7,703,883	7,298,415	6,892,948	6,487,480
Depreciation		405,468	405,468	405,468	405,468	405,468
Total Long-term Assets		7,703,883	7,298,415	6,892,948	6,487,480	6,082,013
<b>Current Assets</b>						
Cash		840,694	1,346,109	1,861,051	2,385,525	2,740,308
Inventory		58,333	61,250	64,312	67,528	70,904
Accounts Receivable		104,358	130,753	155,925	179,914	256,538
Total Current Assets		1,003,385	1,538,112	2,081,288	2,632,967	3,067,750
Total Assets		8,707,268	8,836,527	8,974,235	9,120,447	9,149,763
<b>Current Liabilities</b>						
Accounts Payable		4,442	4,576	4,713	4,854	5,000
Other Current Liabilities		14,808	15,252	15,709	16,181	16,666
Subtotal Current Liabilities		19,250	19,827	20,422	21,035	21,666
<b>Long-term Liabilities</b>						
Long-term Liabilities						
Total Liabilities		19,250	19,827	20,422	21,035	21,666
Net Assets		8,688,018	8,816,700	8,953,813	9,099,412	9,128,097
<b>Capital and Reserves</b>						
Owners Contribution		8,571,350	8,571,350	8,571,350	8,571,350	8,571,350
Retained Earnings		116,667	245,350	382,463	528,062	556,747
Total Capital		8,688,017	8,816,700	8,953,813	9,099,412	9,128,097

FORTUNE DEVELOPMENT (T) COMPANY LTD						
PROJECTED CASHFLOW						
		YEAR 1 USD	YEAR 2 USD	YEAR 3 USD	YEAR 4 USD	YEAR 5 USD
<b>CASHFLOW FROM OPERATIONS:</b>						
Cash Sales		1,184,600	1,220,138	1,256,742	1,294,444	1,333,278
VAT Receipt		222,113	228,776	235,639	242,708	249,990
Subtotal Cash Received		1,406,713	1,448,914	1,492,381	1,537,153	1,583,267
<b>Expenditures from Operations:</b>						
Purchases		125,864	129,640	133,529	137,535	141,667
Additional Cash Spent		760,540	783,356	812,492	842,783	1,053,497
VAT payments		29,615	30,503	31,419	32,361	33,332
Subtotal Cash payment		916,018	943,499	977,439	1,012,679	1,228,489
<b>CASH FLOW FROM OPERATIONS</b>		<b>490,694</b>	<b>505,415</b>	<b>514,942</b>	<b>524,474</b>	<b>354,781</b>
<b>CASH FLOW FROM INVESTMENTS:</b>						
Purchase of Assets		8,109,350	-	-	-	-
Pre- expenses		112,000	-	-	-	-
<b>CASH FLOW FROM INVESTMENTS:</b>		<b>8,221,350</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>CASH FLOW FROM FINANCING:</b>						
Owners Equity Contribution		8,571,350	-	-	-	-
<b>CASH FLOW FROM FINANCING</b>		<b>8,571,350</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>NET CASHFLOW FOR PERIOD</b>		<b>840,694</b>	<b>505,415</b>	<b>514,942</b>	<b>524,474</b>	<b>354,781</b>
<b>CASHFLOW AT START OF YEAR</b>		<b>-</b>	<b>840,694</b>	<b>1,346,109</b>	<b>1,861,051</b>	<b>2,385,522</b>
<b>CASHFLOW AT THE END OF YEAR</b>		<b>840,694</b>	<b>1,346,109</b>	<b>1,861,051</b>	<b>2,385,525</b>	<b>2,740,303</b>

FORTUNE DEVELOPMENT (T) COMPANY LTD						
SCHEDULES AND GRAPHS						
SCHEDULE 1						
REVENUE PROJECTION						
		YEARS				
PRODUCTS	YEAR 1 USD	YEAR 2 USD	YEAR 3 USD	YEAR 4 USD	YEAR 5 USD	
Revenue	1,480,750	1,525,173	1,570,928	1,618,056	1,666,597	
	<b>1,480,750</b>	<b>1,525,173</b>	<b>1,570,928</b>	<b>1,618,056</b>	<b>1,666,597</b>	

### SCHEDULE 2

OTHER OPERATING COSTS						
		YEARS				
OTHER OPERATING COST	YEAR 1 USD	YEAR 2 USD	YEAR 3 USD	YEAR 4 USD	YEAR 5 USD	
Motor vehicle running expenses	28,235	29,082	29,955	30,853	209,991	
Salaries and wages	259,294	267,073	275,085	283,338	291,838	
Pension contribution	25,929	26,707	27,509	28,334	29,184	
Depreciation	405,468	405,468	405,468	405,468	405,468	
Milling cost	46,660	48,060	50,463	52,986	55,635	
Mining cost	226,885	233,692	245,376	257,645	270,527	
Office Rent & Operation	14,760	15,203	15,659	16,129	16,613	
Administrative Overhead	139,952	144,151	148,475	152,930	157,518	
Communication cost	18,824	19,388	19,970	20,569	21,186	
<b>Total costs</b>	<b>1,166,007</b>	<b>1,188,823</b>	<b>1,217,959</b>	<b>1,248,251</b>	<b>1,457,959</b>	

### SCHEDULE 3

COST STRUCTURE	
PARTICULAR	AMOUNT USD
Land and Buildings	662,350
Plant and Equipment	6,502,000
Motor Vehicles	890,000
Furniture & Fixtures	55,000
Pre expenses (& workshop & support)	112,000
Others/ Misc	50,000
Working Capital	300,000
<b>TOTAL</b>	<b>8,571,350</b>

### SCHEDULE 4

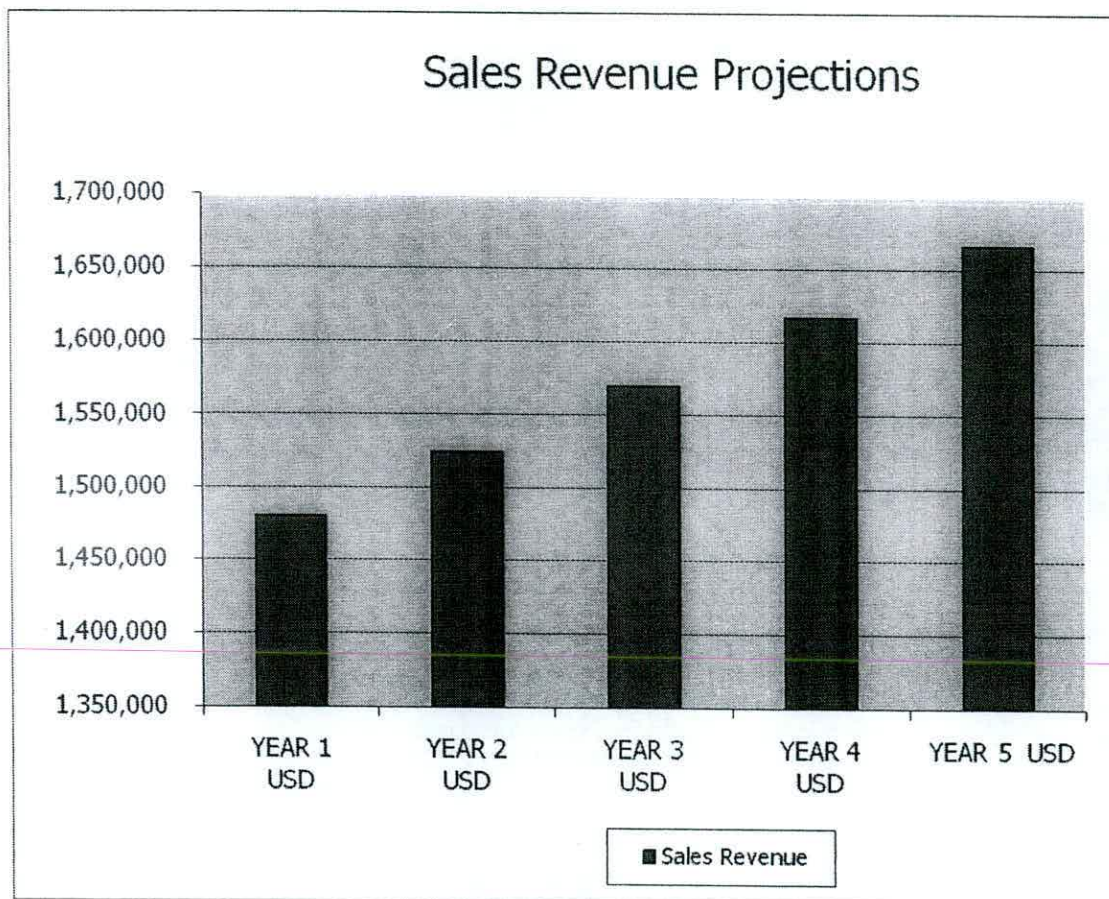
FIXED ASSETS SCHEDULE						
NAME OF ASSETS	YEAR 1 USD	YEAR 2 USD	YEAR 3 USD	YEAR 4 USD	YEAR 5 USD	
Land and Buildings	662,350	629,233	596,115	562,998	529,880	
Machinery, tools & Equipment	6,502,000	6,176,900	5,851,800	5,526,700	5,201,600	
Motor Vehicles	890,000	845,500	801,000	756,500	712,000	
Furniture & Fixtures	55,000	52,250	49,500	46,750	44,000	
<b>TOTAL</b>	<b>8,109,350</b>	<b>7,703,883</b>	<b>7,298,415</b>	<b>6,892,948</b>	<b>6,487,480</b>	
DEPRECIATION	YEAR 1 USD	YEAR 2 USD	YEAR 3 USD	YEAR 4 USD	YEAR 5 USD	
Land and Buildings	33,118	33,118	33,118	33,118	33,118	
Machinery, tools & Equipment	325,100	325,100	325,100	325,100	325,100	
Motor Vehicles	44,500	44,500	44,500	44,500	44,500	
Furniture & Fixtures	2,750	2,750	2,750	2,750	2,750	
<b>ANNUAL DEPRECIATION</b>	<b>405,468</b>	<b>405,468</b>	<b>405,468</b>	<b>405,468</b>	<b>405,468</b>	
<b>CLOSING FIXED ASSETS</b>	<b>7,703,883</b>	<b>7,298,415</b>	<b>6,892,948</b>	<b>6,487,480</b>	<b>6,082,013</b>	

**SCHEDULE 5**

<b>SALARIES &amp; WAGES</b>					
<b>NO</b>	<b>DEPARTMENTS/DESIGNATION</b>	<b>NO.</b>	<b>SALARY PER MONTH</b>	<b>SUBTOTAL MONTHLY SALARY</b>	<b>ANNUAL GROSS SALARY</b>
1	Project Manager	1	2353	2353	28,235
2	Site Manager	3	980	2941	35,294
3	Marketing Manager	1	1176	1176	14,118
4	Technical Officers	6	471	2824	33,882
5	Technical Assistants	8	314	2510	30,118
6	Operators/Drivers	14	196	2745	32,941
7	Quarry Staff	6	314	1882	22,588
8	Crusher staff	4	235	941	11,294
9	Concrete Mixer staff	8	157	1255	15,059
10	Asphalt Plant staff	8	157	1255	15,059
11	Secretary	4	118	471	5,647
12	Messenger	2	78	157	1,882
13	Security Guards	10	110	1098	13,176
-	<b>TOTAL USD \$</b>	<b>75</b>	<b>6,659</b>	<b>21,608</b>	<b>259,294</b>

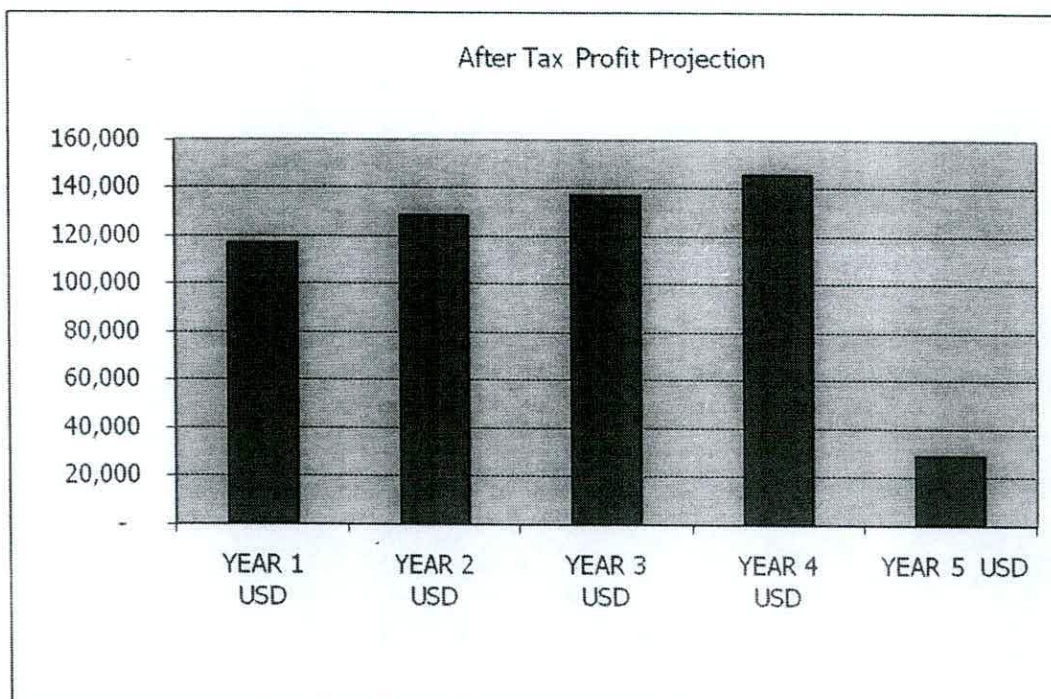
### REVENUE PROJECTION

	YEAR 1 USD	YEAR 2 USD	YEAR 3 USD	YEAR 4 USD	YEAR 5 USD
Sales Revenue	1,480,750	1,525,173	1,570,928	1,618,056	1,666,597



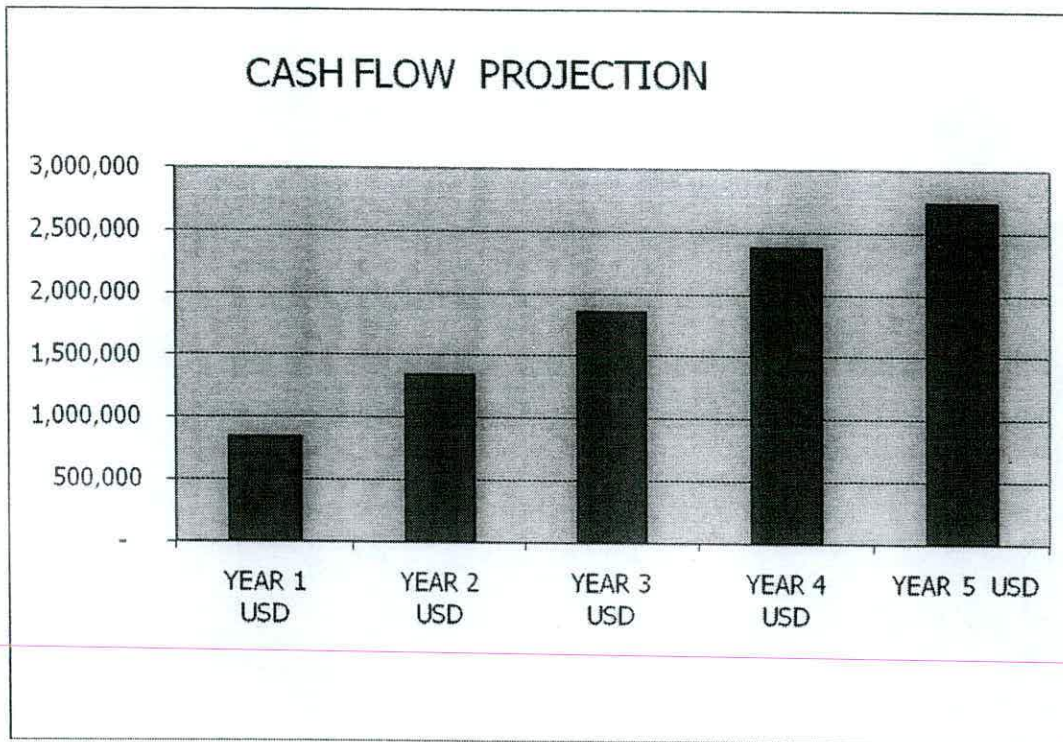
PROFIT PROJECTION

	YEAR 1 USD	YEAR 2 USD	YEAR 3 USD	YEAR 4 USD	YEAR 5 USD
Profit After Tax	116,667	128,682	137,113	145,600	28,685



CASH FLOW PROJECTION

	YEAR 1 USD	YEAR 2 USD	YEAR 3 USD	YEAR 4 USD	YEAR 5 USD
CASH FLOW AT THE END OF THE YEAR	840,694	1,346,109	1,861,051	2,385,525	2,740,308



**THE COMPANIES ACT, ACT NO.12 OF 2002**

**COMPANY LIMITED BY SHARES**

.....

**MEMORANDUM**

**AND**

**ARTICLES OF ASSOCIATION**

**OF**

***FORTUNE DEVELOPMENT (T) COMPANY LIMITED***

Incorporated this.....day of .....2008

Drawn by: Eng Hassan Saad  
P. O. Box: 106271  
Dar es Salaam

TANZANIA



Certificate of Incorporation

Section 15

No 68603

I HEREBY CERTIFY THAT

**FORTUNE DEVELOPMENT (T) COMPANY LIMITED**

=====

is this day incorporated under the Companies Act, 2002 and that the Company is Limited

Given under my hand at Dar es salaam

this **20TH** day of **NOVEMBER**

**TWO THOUSAND AND EIGHT**

Assist. Registrar of Companies

THE UNITED REPUBLIC OF TANZANIA

**Certificate of Incorporation**

No.....

\_\_\_\_\_ . O . \_\_\_\_\_

**I HEREBY CERTIFY THAT**

**FORTUNE DEVELOPMENT (T) COMPANY LIMITED**

Is this day incorporated under the companies act, act no.12 of 2002 and the company is Limited

GIVEN under my hand at Dar es Salaam, this.....day of ..... Two Thousand and Eight.

**SEAL**

\_\_\_\_\_  
Registrar of Companies



- 3.4 To engage in the business of all kind of minerals such as cooper ore, iron ore, leads, tantalite and gemstone exploration, Drilling, mining, and production of energy products and equipment including but not limited to oil, gas, biogas, electricity.
- 3.5 To carry on the business of manufacturer or assemblers, wholesalers and / or retailers of industrial, automotive, mechanical, electrical, electronic, building and commercial goods, components and parts and to engage in agricultural construction machinery, and equipment, motor vehicles, crafts, mechanical, electrical and electronic equipment and appliances of every description and to operate workshop and other facilities necessary for the achievement of the aforementioned objectives.
- 3.6 To engage in and carry on the business of milling and to purchase, hire or in any other way acquire flourmills, sugar mills, oil mills, to deal in the production, processing, manufacture, import and export thereof or deal in any business necessary or incidental thereof
- 3.7 To engage in the commercial farming of agricultural crops, herbs, horticultural products and distribution of all agricultural inputs, buying and selling, import and export of agricultural crops and development of natural resources including forestry products.
- 3.8 To carry on the business of livestock, cropping of wildlife, all types of skins, hides; leather products related thereto, footwear and livestock products, export/import of the aforementioned.
- 3.9 To carry on the business of transporters, haulage contractors and general carries and conveyors of goods, mail, animals and minerals by land, water or air and deal in the business of passenger transporters and for this purpose purchase, charter hire, or otherwise acquire all kinds, of motor vehicles, aircrafts, marine, river and lake going vessels and use the same for the purposes mention above.
- 3.10 To carry on the business of manufacturing; merchandising, exporting/ importing and general dealers in wood, forest products, bee-keeping, saw-millers, timber merchants, furniture makers, joinery, carpenters, cushion makers, wholesaler/retail and general merchants. To carry on the business of timber and lumber merchants as sellers, exporters and importers, and engages in the manufacture and or distribution of prefabricated timber furniture and all types of wood products, pump and paper, and to carry on the business of planters, growers and sellers

- 3.11 To engage in the business of banking, insurance, building societies, credit societies, exchange bureaus, pension scheme fund, trusteeship funds, stock exchanges and to provide general and specialist financial services to industrial agriculture, commerce mining export/import trade, construction and transportation including but not limited to credit guarantees, loan, equity participation dept factoring and collection, here financing and any other types of financial services or support that can conveniently and profitably be carried on by the company.
- 3.12 To carry on the business assembling, repairing, and servicing and dealing in the spare parts and components, of radio, television, computer industrial, the processing and/ or distribution of radio and television products of every kind
- 3.13 To carry on the business of operating garages, and workshops for maintenance of own crafts or for public use and generally operate park facilities for own and public use.
- 3.14 To trade and deal in commission distribution, marketing, commercial, industrial, manufacturing and financial business and to carry on the business as traders, general and representatives.
- 3.15 To carry on any other business commercial, large scale farming may seem to the company capable of being conveniently carried on in connection with any of the business of the company or calculated Directly or indirectly to enhance the value of or under-profitable any of The Companies property of and rights, and Hotel business.
- 3.16 To purchase, lease or otherwise, acquire, and to hold, sell, improve, Develop, exchange, mortgage or otherwise dispose of any lands, buildings, Machinery or plants, mills, factories, warehouse or any hereditaments,
- 
- 3.17 To adopt such means of making known the products of the Company as may seem expedient and in particulars by advertising in the press by circulars, by purchase and exhibition of works art or Interest, by Publication of books and periodicals, and granting prizes, rewards and donations.
- 3.18 To enter into (partnership or into) any arrangements for sharing profits, Union or interests co-operation, joint venture, reciprocal, concession, or otherwise with any persons, or Company carrying on or engaged in any business or transaction which this Company is authorized to carry or engage in, or any business or transaction

capable of being conducted so as directly to benefit this Company and to lend money to, guarantee the contracts or, otherwise assist, any such person, firm or Company, and to take or otherwise acquire shares and securities of any such Company, Sell, hold, re-issue with or without guarantee or otherwise deal with thee same.

- 3.19 To promote any other Company for purpose of acquiring all or Any of the property and undertaking or any of the liabilities of this company, or of undertaking any business or operation which may appear likely to assist or benefit this Company, or to enhance the value of the property or business of this Company, and place or guarantee the placing of underwrite, Subscribe for or otherwise acquire all or any part of the shares or securities or each Company as aforesaid.
- 3.20 To lend and advance money or credit to such persons, firm or Companies and on such terms as may seem expedient and in particular to customers and others having dealings with the Company, and to give guarantee to become surety for any persons firms or companies for due payment of money for performance of any obligations or liabilities.
- 3.21 To receive money or deposit or loan and borrow or raise money In Such manner as the company shall think fit, and in particular by the issue of Debentures, or debenture stocks (perpetual or otherwise) and to ensure the repayment of any money borrowed, raised or owing by mortgage charge or lieu upon all or any of the property or assets of the Company (both present and future) including its uncalled capital and also by a similar mortgage charge or I to secure and guarantee the performance by the Company or any other person or company of any obligation undertaken by the Company or any other person or Company as the case may be.
- 3.22 To draw, make, accept, endorse, discount, execute and issue Promissory notes, bills of exchange, bills of landing, warrant, debentures and other negotiable or transferable instruments,
- 3.23 To establish and support aid in the establishment and support of association, institutions, funds, trusts, and clubs calculated to benefit employees or ex-employees off the company, or any of its predecessors in business, or of any Company, which is a subsidiary company of the company or its allied there to or associated therewith, or dependants or connections of such persons, and to grant or provide pensions and allowances, to make or to enter into arrangements for pensions or other benefits

or any Directors or employees of the company, or the relations, connections, or dependent of any such persons. To pay contribute policies, pension or benefits to establish or support funds, trusts and scheme (including fund, trusts and scheme towards insurance) which may be considered calculated to promote such purpose or benefit.

- 3.24 To sell or otherwise dispose of the whole or any part of the business or property of the Company purchasing the same.
- 3.25 To purchase or otherwise acquire letters patent brevets d'invention concessions, licenses lights and privileges subjects to royalty or otherwise. And whether exclusive or non-exclusive or limited, or any part interest in such letters patent, brevet, d'invention, concessions licenses, inventions Rights and privilèges, whether in East Africa or any other part of the World.
- 3.26 To take all necessary and proper steps with the authorities national, local, municipal or otherwise, of any place in which the company may have interests. And to carry on any negotiations or operations for the purpose of directly or indirectly carrying out the objects of the company or affecting any modification into constitutions of the Company or furthering interest of its members. And to oppose any step taken by the Company or person who may be considered likely directly or indirectly prejudices the interest of the company or indirectly to prejudice the interest of the Company or its members.
- 3.27 To take part information, of management, supervision or control of the business or operations of any Company, and for that purpose to act as Directors, Administrators, Managers, Secretaries, or any other capacity, and to appoint and remunerate Directors, Administrators, Managers, Accountants or other experts or agents.
- 3.28 To procure the registration of the Company in or under the law of any place outside Tanzania.
- 3.29 To purchase, sell subscribe for, underwrite, or otherwise acquire and holds shares, stocks, or other interest in, or obligations of any other Company or Corporation.
- 3.30 To do all such other things as are incidental and conclusive to the attainment of the above objects or any of them. And it is hereby declared to this Company, shall be deemed to include any partnership or other body of persons, whether incorporated or

not incorporated, and whether Domiciled in Tanzania or else where, and that the intention is that each of the objects set forth in any sub-clause shall not, except when the context expressly so requires, be in any wise limited or restricted by reference from terms of any other sub-clauses or the objects therein specified or the powers thereby conferred by any part of this clause and not withstanding that the business undertaking, property or act proposed to be transacted, acquired, dealt with are performed do not fail within the objects of the first-clause of this clause.

- 3.31 To distribute among the members of the Company in kind any property of the Company, and in particular any shares or securities of other Companies belonging to this Company.
- 3.32 To advise on or prepare plans, drawings, binders, documents and specification of projects of all kinds including civil, mechanical and electronic engineering works and advise generally regarding construction, maintenance, improvement, development, supervision, management and control of such works.
- 3.33 To carry on the business of general cargo handlers, to be Shipping agents, clearing and forwarding agents, transshipment agents and generally to provide courier services. To be mailing agents and to provide postal services
- 3.34 To carry the business of general air charters and to provide Scheduled and non-scheduled air services for cargo and passengers. To be operators of taxicabs and provide car rental services of all kinds of description.
- 3.35 To sink wells, and shafts, and to make, build and construct, lay down, acquire and maintain factories, engines, machinery, tramways, docks, plant and appliances and to execute and to do all other works and things necessary or convenient for working, obtaining, storing, treating, preserving, refining, mineralizing, bottling, canning and discharging any such fruit products or otherwise for the purpose of the company
- 3.36 To cultivate, grow, buy, prepare any kind of fruit such as

Pineapples, oranges, lime, grapefruits, passion fruits, guavas, vegetables of all kinds and deal in any such products either in its raw form.

- 3.37 To manufacture, buy, sell, improve, treat, preserve, refine aerate, mineralize, bottle, can and otherwise deal in mineral, aerated waters, juice and other liquids of every description
- 3.38 To carry on the business of veterinary surgeons in all its branches for the treatment of animals, cattle, sheep, goats, poultry and livestock generally to attend animals dispense any medicines, perform operations and to do all other acts and things necessary for the carrying on the business of the veterinary dispensary and general pharmacy and to carry on the business of wholesale and retail of agricultural inputs and plant medicines of all kinds and dealers in surgical instrument appliances and deal in all requisites of veterinary hospitals
- 3.39 To carry on the business or trade and deal in the export of all wildlife birds, animals, and generally and kind of pets for sale and export, to improve, import, deal and trade in carvings, paintings, paintings, curios game skins, pottery, leather and coconut by-products, beeswax, meat, ghee, cooking oils, charcoal, corn flour, cloves, cheese and commodities from by-products of milk
- 4.0 The Liability of the members is limited:

5.0 The authorized capital of the company is T shillings Five Billion only (TShs. 5,000,000,000/=) divided into 100,000 shares of TShs. 50,000/= (Fifty Thousand each). And the company shall have the power to divide the original or any increased capital into several classes, and to attach thereto any preferential, deferred, qualified or other special rights privileges restrictions.

No.	NAME AND ADDRESS	NO. OF SHARES TAKEN	SIGNATURES
1.	Mr. Wang Sien P.O.Box 106271 DAR ES SALAAM	TWENTY	王思恩
2.	Mr. Lin Yiguo P.O.Box 106271 DAR ES SALAAM	FORTEEN	林以国
3.	Mr. Wang Zhoujun P.O.Box 106271 DAR ES SALAAM	SEVEN	王海君
4.	Mr. Chen Guoyin P.O.Box 106271 DAR ES SALAAM	SEVEN	陈国印
5.	Eng. Hassan Saad P. O. BOX 106271 DAR ES SALAAM	SEVEN	<i>Hassan Saad</i>
6.	M/S Sifa M. Mwitw P. O. BOX 106271 DAR ES SALAAM	TWENTY SIX	<i>Sifa</i>
7.	M/S Xia Wenqin P. O. BOX 106271 DAR ES SALAAM	THREE	<i>Xia Wenqin</i>
8.	Mr. To Tao P. O. BOX 106271 DAR ES SALAAM	THIRTEEN	<i>To Tao</i>
9.	Mr. Luo MingJie P. O. BOX 106271 DAR ES SALAAM	ONE	<i>Luomingjie</i>
10.	Mr. Zhang Xuejun P.O.BOX 106271 DAR ES SALAAM	ONE	<i>Zhang Xuejun</i>
11.	ENG. Richard Peter Mushi P.O.BOX 106271 DAR ES SALAAM	ONE	<i>Richard Mushi</i>

Dated at Dar es Salaam this 18<sup>TH</sup> day of NOV, 2008

Signature *[Signature]*

Name.....

Postal Address.....

Qualification .....



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**FORTUNE DEVELOPMENT (T) COMPANY LIMITED**

**THE COMPANIES ACT, 2002  
COMPANY LIMITED BY SHARES  
ARTICLES OF ASSOCIATION  
OF**

**INTERPRETATION**

1. In these articles:-

"the Act" means the Companies Act;

"the articles" means the articles of the company;

"clear days" in relation to the period of a notice means that period excluding the day when the notice is given or deemed to be given and the day for which it is given or on which it is to take effect;

"the seal" means the Common Seal of the Company;

"Secretary" shall mean any person appointed to perform the duties of Secretary of the Company;

Expressions referring to writing shall, unless the contrary intention appears, be construed as including references to printing, lithography, photograph, and other modes of representing or reproducing words in a visible form.

Unless the context otherwise requires, words or expressions contained in these articles shall bear the same meaning as in the Act or any statutory modification thereof in force at the date at which these articles become binding on the company.

**PRIVATE COMPANY**

2. The company is a Private Company and accordingly:-
- (a) The right to transfer shares is restricted in manner hereinafter prescribed.
  - (b) The number of members of the company (exclusive of persons who are in the employment of the company and persons who have been formerly in the employment to be the member of the were while in such employment to be the member of the company) is limited

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[Signature]

fifty, provided that where two or more persons hold one or more shares in the company jointly they shall for the purpose of this regulation be tested as a single member.

- (c) Any invitation to the public to subscribe for any shares or debentures of the Company is prohibited.
- (d) The company shall not have power to issue share warrants to bearer.

### **MEMBERS**

- 3. The number of members with which the company proposes to be registered is five (5) but the directors may from time to time register an increase of members.
- 4. The subscribers to the memorandum of association and such other persons as the directors shall admit to membership shall be members of the company.

### **GENERAL MEETINGS**

- 5. The Company shall in each year hold a general meeting as its annual general meeting in addition to any other meetings in that year, and shall specify the meeting as such in the notice calling it; and not more than fifteen months shall elapse between the date of one annual general meeting of the company and that of the next.

Provided that so long as the company holds its first annual general meeting within eighteen months of its incorporation, it need not hold it in the year of its incorporation or in the following year. The annual general meeting shall be held at such time and place, as the directors shall appoint.

- 6. All general meetings other than annual general meetings shall be called extraordinary general meetings.
- 7. The directors may, whenever they think fit, convene an extraordinary general meeting, and extraordinary general meetings shall also be convened on such requisition, or in default, may be convened by such requisitionists, as provided by section 133 of the Act. If at any time there are not within the Tanzania sufficient directors capable of acting to form a quorum, any director or any two members of the company may convene an extraordinary general meeting in the same manner as nearly as possible as that in which meeting may be convened by the directors.

## **NOTICE OF GENERAL MEETINGS**

8. Every general meeting shall be called by twenty-one clear days' notice in writing at the least. The notice shall specify the place, the day and hour of meeting and, in case of special business, the general nature of that business:

Provided that a meeting of the company shall, notwithstanding that it is called by shorter notice than that specified in this article be deemed to have been duly called if it so agreed:-

- (a) in the case of a meeting called as the annual general meeting, by all the members entitled to attend and vote thereat; and
  - (b) in the case of any other meeting, by a majority in number of the members having a right to attend and vote at the meeting, being a majority together representation not less than ninety – five percent of the total voting rights at that meeting of all the members.
9. Subject to the provisions of the articles, the notice shall be given to all the members, to all persons entitled to a share in consequence of the death or bankruptcy of a member and to the directors and auditors. The accidental omission to give notice of a meeting to, or the non receipt to notice of a meeting by, any person entitled to receive notice shall not invalidate the proceedings at that meeting.

## **PROCEEDINGS AT GENERAL MEETINGS**

10. All business shall be deemed special that is transacted at an extraordinary general meeting, and also all that is transacted at an annual general meeting, with the exception of declaring a dividend, the consideration of the accounts, balance sheets, and the reports of the directors and auditors, the election in the place of those retiring and the appointment of, and the fixing of the remuneration of the auditors.
11. No business shall be transacted at any general meeting unless a quorum of members is present at the time when the meeting proceeds to business; two persons, entitled to vote on the business to be transacted, each being a member or a proxy for a member or a duly authorized representative of a corporation, shall be a quorum.
12. If within half an hour from the time appointed for the meeting quorum is not present, or if during the course of a meeting a quorum is not present, the meeting shall stand adjourned to the same day in the next week, at the same time and place, or to such other day and at such other time and place as the directors may determine.

13. The Chairman, if any, of the board of directors or in his absence some other director nominated by the directors shall preside as chairman of the general meeting, but if neither the chairman nor such other director (if any) be present within fifteen minutes after the time appointed for the holding of the meeting and willing to act, the directors present shall elect one of their member to be chairman of the meeting and, if there is only one director and willing to act, he shall be chairman.
14. If at any meeting no director is willing to act as chairman or if no director is present within fifteen minutes after the time appointed for holding the meeting, the members present shall choose one of their member to be a chairman of the meeting.
15. The Chairman may, with the consent of any meeting at which a quorum is present (and shall if so directed by the meeting), adjourn the meeting from time to time and from place to place, but no business shall be transacted at any adjourned meeting other than the business which might properly have been transacted at the meeting had the adjournment not taken place. When a meeting is adjourned for fourteen days or more, at least seven clear days notice of the adjourned meeting shall be given specifying the time and place of the meeting and the general nature of the business to be transacted. Save as aforesaid it shall not be necessary to give any notice of an adjournment or of the business to be transacted at an adjourned meeting.
16. At any general meeting a resolution put to the vote of the meeting shall be decided on a show of hands unless a poll is (before or on the declaration of the result of the show of hands demand:-
  - (a) by the chairman; or
  - (b) by at least (three) members present in person or by proxy; or
  - (c) by any member or members present in person or by proxy and representing not less than one – tenth of the total voting rights of all the members having the right to vote at the meeting.

Unless a poll be so demanded a declaration by the chairman that a resolution has on a show of hands been carried or carried unanimously, or by a particular majority, or lost and an entry to the effect in the book containing the minutes of proceedings of the company shall be conclusive evidence of the fact without proof of the number or proportion of the votes recorded in favour of or against such resolution.

The demand for a poll may, before the poll is taken, be withdrawn

17. Except as provided in article 18, if a poll is duly demanded it shall be taken in such manner as the chairman directs, and the result of the poll shall be deemed to be the resolution of the meeting at which the poll was demanded.
18. In the case of an equality of votes, whether on a show of hands or on a poll, the chairman of the meeting shall be entitled to a second or casting vote.
19. A poll demanded on the election of a chairman, or on a question of adjournment, shall be taken immediately. A poll demanded on any other question shall be taken either immediately or at such time as the chairman of the meeting directs, and any business other than upon which a poll has been demanded may be proceeded with pending the taking of the poll.
20. A resolution in writing executed by or on behalf of each member who would have been entitled to vote upon it if it had been proposed at a general meeting at which he was present shall have effect as if it had been passed at a general meeting duly convened and held, and consist of several instruments in the like form each executed by or on behalf of one or more member.

#### **VOTE OF MEMBERS**

21. Every member shall have one vote.
22. A member in respect of whose estate a manager has been appointed under section 26 of the Mental Diseases Ordinance, may vote, whether on a show of hands or on a poll, by his said manager, and any such manager may, on a poll, vote by proxy.
23. No member shall be entitled to vote at any general meeting unless all moneys presently payable by him to the company have been paid.
24. On a poll votes may be given either personally or by proxy.
25. The instrument appointing a proxy shall be in writing under the hand of the appointer or of his attorney duly authorized in writing, or, if the appointer is a corporation, either under seal or under the hand of an officer or attorney duly authorized. A proxy need not be a member of the company.

26. The instrument appointing a proxy and the power of attorney or other authority, if any, under which it is signed or a notarially certified copy of that power or authority shall be deposited at the registered office of the company or at such other place within the Territory as is specified for that purpose in the notice convening the meeting, not less than 48 hours before the time for holding the meeting of adjourned meeting at which the person named in the instrument proposes to vote, or, in the case of a poll, not less than 24 hours before the time appointed for the taking of the poll, and in default the instrument of proxy shall not be treated as valid.

27. An instrument appointing a proxy shall be in the following form or a form as near hereto as circumstances admit:-

"..... Limited  
I/We ..... of ....., being a member/ members of the above- named company, hereby appoint ....., of or failing him ..... of ....., as my/our proxy to vote for me/us on my/or behalf at the {annual or extraordinary, as the case maybe} general meeting of the company to be held on the .....day of .....200....., and at any adjournment thereof.

Signed ..... day of, .....200 ....."

28. "Where it is desired to afford members an opportunity of voting for or against a resolution the instrument appointing a proxy shall be in the following form or a form as near thereto as circumstances admit:-

"..... Limited  
I/We .....of ..... Being a member/members of the above named company, hereby appoint of ..... of ..... or failing him ..... of ....., as my/our proxy to vote for me/us on my/our behalf at the {annual or extraordinary, as the case may be}general meeting of the company to be held on the .....day of.....200....., and at any adjournment thereof.

Signed ..... day of, .....200 ....."

This form is to be used\* in favour of/against the resolution. Unless otherwise instructed, the proxy will vote as he thinks fit.

\*Strike out which ever is not desire"

29. The instrument appointing a proxy shall be deemed to confer authority to demand or join in demanding a poll.
30. A vote given in accordance with the terms of an instrument of proxy, or poll demanded by proxy, or by the duly authorized representative of a corporation shall be valid notwithstanding the previous determination of the authority of the person voting or demanding a poll unless notice of the determination was received by the company at its registered office (or at such other place at which the instrument of proxy was duly deposited) before the commencement of the meeting or adjourned meeting at which the proxy is used.

#### **CORPORATIONS ACTING BY REPRESENTATION AT MEETINGS**

31. Any corporation which is a member of the company may by resolution of its directors or other governing body authorize such person as it thinks fit to act as its representative at any meeting of the company, and the person so authorized shall be entitled to exercise the same powers on behalf of the corporation which he represents as that corporation could exercise if it were an individual member of the company.

#### **DIRECTORS**

32. The Number of the directors and the names of the first directors shall be determined in writing by the subscribers of the memorandum of association or a majority of them and until such determination the signatories to the Memorandum of Association shall be the first directors. Unless otherwise determined by ordinary resolution, the number of directors shall not be subject to any maximum but shall be not less than two.
33. The following persons shall be first Directors to the Company:-
- |                            |                                     |
|----------------------------|-------------------------------------|
| 1. <b>WANG SIEN</b>        | 7. <b>XIA WENQIN</b>                |
| 2. <b>LIN YIGUO</b>        | 8. <b>TO TAO</b>                    |
| 3. <b>WANG ZHOIJUN</b>     | 9. <b>LUO MING JIE</b>              |
| 4. <b>CHEN GUOYIN</b>      | 10. <b>ZHANG XUEJUN</b>             |
| 5. <b>ENG. HASSAN SAAD</b> | 11. <b>ENG. RICHARD PETER MUSHI</b> |
| 6. <b>SIFA M. MWITU</b>    |                                     |

34. The remuneration of the directors shall from time to time be determined by the Company in general meeting. Such remuneration shall be deemed to accrue from day to day. The directors shall also be paid all traveling, hotel and other expenses properly incurred by them in attending and returning from meetings of the directors or any committee of the directors or general meetings of the company or in connection with the business of the company.

### **BORROWING POWERS**

35. The director may exercise all the powers of the company to borrow money, and to mortgage or charge its undertaking and property, or any part thereof, and to issue debentures, debenture stock and other securities, whether outright or as security for any debt, liability or obligation of the company or any third party.

### **POWERS AND DUTIES OF DIRECTORS**

36. Subject to the provisions of the Act, the memorandum and the articles and to any directions given by special resolution, the directors, who may exercise all the powers of the company, shall manage the business of the company. No alteration of the memorandum or articles and no such directions shall invalidate any prior act of the directors, which would otherwise have been valid. The powers given by this article shall not be limited by any special power given to the directors by the articles and a meeting of directors at which a quorum is present may exercise all powers exercisable by the directors.
37. The directors may by power of attorney appoint any person to be the attorney or agent of the company for such purposes and on such conditions as they determine, including authority for the attorney or agent to delegate all or any of his powers.
38. All cheques, promissory notes, drafts, bills of exchange and other negotiable instruments, and all receipts for moneys paid to the company, shall be signed, drawn, accepted, endorsed, or otherwise executed, as they case may be, in such manner as the directors shall from time to time by resolution determine,
39. The directors shall cause minutes to be made in books provided for the purpose:-
- (a) of all appointments of officers made by the directors;
  - (b) of the names of the directors present at each meeting of the directors and of any committees of the directors;
  - (c) of all resolutions and proceedings at all meetings of the company, and of the directors, and of committees of directors.

## DISQUALIFICATION OF DIRECTORS

40. The office of director shall be vacated if the directors:-
- (a) Without the consent of the company in general meeting holds any other office of profit under the company; or
  - (b) Becomes bankrupt or makes any arrangement or composition with his creditors generally; or
  - (c) Ceases to be a director by virtue of any provision of the Act or becomes prohibited by law from being a director; or
  - (d) Becomes of unsound mind; or
  - (e) Resigns his office by notice in writing to the company; or
  - (f) Is directly or indirectly interested in any contract with the company and fails to declare the nature of his interest in manner required by the Act.

A director shall not vote in respect of any contract in which he is interested or any matter arising thereat, and if he does so vote shall not be counted.

41. The company may by ordinary resolution appoint a person who is willing to act as director to fill a vacancy or be an additional director.
42. The directors may appoint a person who is to act to be a director, either to fill a vacancy or as an additional director, but so that the total number of directors shall not at anytime exceed the number fixed by or in accordance with these articles. Any director so appointed shall hold office only until the next following annual general meeting, and shall then be eligible for re – election.
43. The company may by ordinary resolution, of which special notice had been given in accordance with section 144 of the Act, remove any director before the expiration of his period of office notwithstanding anything in the article or any agreement between the company and such director. Such removal shall be without prejudice to any claim such director may have for damages for breach of any contract of service between him and the company.
44. The company may by ordinary resolution appoint another person in place of a director removed from office under the immediately preceding article. Without prejudice to the powers of the directors under article 40 the company in general meeting may appoint any person to be a director either to fill a vacancy or as an additional director.

45. Subject to the provisions of the articles, the directors may regulate their meetings as they think fit. Questions arising at a meeting shall be decided by a majority of votes. In case of an equality of votes, the chairman shall have a second or casting vote. A director may, and the secretary at the request of a director shall, call a meeting of the directors. It shall not be necessary to give notice of a meeting of directors to any directors who are absent from Tanzania.
46. The quorum necessary for the transaction of the business of the directions may be fixed by the directors, and unless so fixed shall be two.
47. The continuing directors may act notwithstanding any vacancy but, if and so long as their number is reduced below the number fixed by or pursuant to the articles of the act for the purpose of increasing the number of directors to that number, or summoning a general meeting of the company, but for no other purpose.
48. The directors may appoint one of their numbers to be the chairman of the board of directors and determine the period of which he is to hold office. Unless he is unwilling to do so, the director so appointed shall preside at every meeting of directors at which he is present. But if no such chairman is appointed, or if he is unwilling to preside, or if at any meeting the chairman is not present within five minutes after the time appointed for holding the same, the directors present may choose one of their number to be chairman of the meeting.
49. The directors may delegate any of their powers to any committee consisting of one or more directors; any committees so formed shall in the exercise of the powers so to any such regulations, the proceedings of a committee with two or more members shall be governed by the articles regulating the proceedings of directors so far as they are capable of applying.
50. All act done by a meeting of the directors or of a committee of directors or by a person acting as a director shall, notwithstanding that it be afterwards discovered that there was some defect in the appointment of any such director, or that any of them were disqualified from holding office, or had vacated office, or were not entitled to vote, be as valid as if every such person had been duly appointed and was qualified and had continued to be a director and was entitled to vote.
51. A resolution in writing signed by all the directors entitled to receive notice of a meeting of the directors, or of a committee of directors, shall be as valid and effectual as if it had been passed at a meeting of the directors

or {as the case may be} a committee of directors duly convened and held, and may consist of several documents in the like form each signed by one or more directors.

### **SECRETARY**

52. The Secretary shall be appointed by the directors for such term, at such remuneration and upon such conditions as they may think fit; and any secretary so appointed may be removed by them.
53. A provisions of the Act or these articles requiring or authorizing a thing to be done by or to a director and the secretary shall not be satisfied by its being done by or to the same person acting both as director and as, or in place of, the secretary.

### **THE SEAL**

54. The seal shall only be used by the authority of the directors or of a committee of the directors authorized by the directors. The directors may determine who shall sign any instrument to which the seal is affixed and unless otherwise so determined it shall be signed by a director and by the secretary or by a second director.
55. The directors shall cause proper books of account to be kept with respect to:-
  - (a) all sums of money received and expended by the company and the matters in respect to which the receipt and expenditure takes place;
  - (b) all sales and purchase of goods by the company; and
  - (c) the assets and liabilities of the company.

Property books shall not be deemed to be kept if there are not kept such books of account as are necessary to give a true and air view of the state of the company's affairs and to explain its transactions.

56. The books of account shall be kept at the registered officer of the company, or subject to section 151 (4) of the Act, at such other place or places as the directors think fit, and shall always be open to the inspection of the directors.
57. No member shall (as such) have right of inspecting any accounting records or other book or document of the company except as conferred by statue or authorized by the directories or by ordinary resolution of the company.

58. The directors shall from time to time in accordance with sections 153,155 and 150 of the Act, cause to be prepared and to be laid before the company in general meeting, such profit and loss accounts, balance sheets, group accounts (if any) and reports as are referred to in those sections.
59. In accordance with section 164 of the Act, the copy of the company's annual accounts to be laid before the company in general meeting together with a copy of the directors' report and the auditors shall not less than twenty - one days before the date of the meeting be sent to every member of, and every holder of debentures of, the company. Provided that this regulation shall not require a copy of those documents to be sent to any person of whose address the company is not aware or to more than one of the joint holders of any debentures.

### AUDIT

60. Auditors shall be appointed and their duties regulated in accordance with sections 170 to 179 of the Act.
61. Any notice to be given to or by any person pursuant to the articles shall be in writing except that a notice calling a meeting of directors need not be in writing. The company may give any notice to a member either personally or by sending it by post in a prepared envelope addressed to the member at his registered address, or by leaving it at that address. Where a notice is sent by post, service of the notice shall be deemed to be effected by properly addressing, prepaying, and posting a letter containing the notice, and to have been effected at the expiration of seventy - two hours after the letter containing the same was posted. A member whose registered address is not within the Tanzania and who gives to the company an address within the Tanzania at which notices may be given him shall be entitled to have notices given to him at that address, but otherwise no such member shall be entitled to receive any notice from the company.

No.	NAME AND ADDRESS	NO. OF SHARES TAKEN	SIGNATURES
1.	Mr. Wang Sien P.O.Box 106271 DAR ES SALAAM	TWENTY	王思思
2.	Mr. Lin Yiguo P.O.Box 106271 DAR ES SALAAM	FORTEEN	林以国
3.	Mr. Wang Zhoujun P.O.Box 106271 DAR ES SALAAM	SEVEN	王舟君
4.	Mr. Chen Guoyin P.O.Box 106271 DAR ES SALAAM	SEVEN	陈国印
5.	Eng. Hassan Saad P. O. BOX 106271 DAR ES SALAAM	SEVEN	<i>Handwritten signature</i>
6.	M/S Sifa M. Mwitw P. O. BOX 106271 DAR ES SALAAM	TWENTY SIX	<i>Handwritten signature</i>
7.	M/S Xia Wenqin P. O. BOX 106271 DAR ES SALAAM	THREE	<i>Handwritten signature</i>
8.	Mr. To Tao P. O. BOX 106271 DAR ES SALAAM	THIRTEEN	<i>Handwritten signature</i>
9.	Mr. Luo MingJie P. O. BOX 106271 DAR ES SALAAM	ONE	Luomingjie
10.	Mr. Zhang Xuejun P. O. BOX 106271 DAR ES SALAAM	ONE	<i>Handwritten signature</i>
11.	ENG. Richard Peter Mushi P.O.BOX 106271 DAR ES SALAAM	ONE	<i>Handwritten signature</i>

Dated at Dar es Salaam this 18<sup>th</sup> day of NOV, 2008

**WITNESS:**

Signature *Handwritten signature*

Full Name.....

Qualification .....

Postal Address.....



**FORTUNE DEVELOPMENT (T) COMPANY LIMITED**

**ESTABLISHMENT OF FACILITIES FOR MANUFACTURE  
OF  
BUILDING MATERIALS**

**A BUSINESS PLAN**

Prepared by:  
Fortune Development (T) Company Ltd.  
P. O. Box 106271  
Dar es salaam.

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## 1. INTRODUCTION

### FOREWORD

This Project Feasibility Study Report sets out proposals by M/s Fortune Development (T) Company Limited to establish manufacturing facilities for building materials including Aggregates, Vibrated Building Blocks, Paving Blocks, Asphalt and Concrete. The project also involves development of a modern and well equipped distribution network. Fortune Development (T) Company Limited was incorporated on 20<sup>th</sup> November 2008 under Certificate of Incorporation No: 68603

### OBJECTIVE OF STUDY

The purpose of this Feasibility Study is to work out the technical and commercial details and the financial viability for the establishment of manufacturing facilities for various building materials.

### PROJECT PROMOTERS

The following sponsors are promoting the proposed building materials manufacturing project. Directors (shareholders) are namely:

NO	NAME AND ADDRESS	SHARES	% SHAREHOLDING
1	Wang Sien	20	20%
2	Eng. Hassan Saad	7	7%
3	Lin Yiguo	14	14%
4	Eng. Richard Peter Mushi	1	1%
5	Wang Zhoujun	7	7%
6	Chen Guoyin	7	7%
7	Sifa M. Mwitw	26	26%
8	Xia Wenqin	3	3%
9	To Tao	13	13%
10	Luo Mingjie	1	1%
11	Zhang Xuejun	1	1%

## STUDY LAYOUT

This study is presented in one document comprising the following major chapters.

Chapter One	-Introduction
Chapter Two	-Executive Summary
Chapter Three	-Market Analysis
Chapter Four	-Production Technology
Chapter Five	-Machinery and Equipment
Chapter Six	-Production Inputs
Chapter Seven	-Manpower and Plant Organization
Chapter Eight	-Investment and Financing
Chapter Nine	-Operating Costs
Chapter Ten	-Financial Analysis
Chapter Eleven	-Economic Benefits
Chapter Twelve	-Conclusion and Recommendations

## 2. EXECUTIVE SUMMARY

### 2.1 INTRODUCTION

The Study examines the possibility of establishing manufacturing facilities for building materials for both industrial and domestic usage. The targeted Building Materials include Aggregates, Vibrated Building Blocks, Paving Blocks, Asphalt and Concrete. A techno-economic evaluation has been carried out to determine the feasibility of project.

#### 2.1.2 Background

Construction aggregate, or simply "aggregate", is a broad category of coarse particulate material used in construction, including sand, gravel, crushed stone, slag, recycled concrete, and geosynthetic aggregates such as Ring Industrial Group's EZflow polymer based aggregates used mainly in lieu of gravel in drainage and septic applications. Aggregates are a component of composite materials such as concrete and asphalt concrete; the aggregate serves as reinforcement to add strength to the overall composite material. Due to the relatively high hydraulic conductivity value as compared to most soils, aggregates are widely used in drainage applications such as foundation and french drains, septic drain fields, retaining wall drains, and road side edge drains. Aggregates are also used as base material under foundations, roads, and railroads. To put it another way, aggregates are used as a stable foundation or road/rail base with predictable, uniform properties (e.g. to help prevent differential settling under the road or building), or as a low-cost extender that binds with more expensive cement or asphalt to form concrete.

The American Society for Testing and Materials publishes an exhaustive listing of specifications for various construction aggregate products, which, by their individual design, are suitable for specific construction purposes. These products include specific types of coarse and fine aggregate designed for such uses as additives to asphalt and concrete mixes, as well as other construction uses. State transportation departments further refine aggregate material specifications in order to tailor aggregate use to the needs and available supply in their particular locations.

Sources for these basic materials can be grouped into three main areas: Mining of mineral aggregate deposits, including sand, gravel, and stone; use of waste slag from the manufacture of iron and steel; and recycling of concrete, which is itself chiefly manufactured from mineral aggregates. In addition, there are some (minor) materials that are used as specialty lightweight aggregates: clay, pumice, perlite, and vermiculite.

A brick is a block of ceramic material used in masonry construction and sized to be laid with one hand using mortar. Bricks formed from concrete are usually termed blocks, and are typically pale grey in colour. They are made from a dry, small aggregate concrete which is formed in steel moulds by vibration and compaction in either an "egglayer" or static machine. The finished blocks are cured rather than fired using low-pressure steam. Concrete blocks are manufactured in a much wider range of shapes and sizes than clay bricks and are also available with a wider range of face treatments - a number of which are to simulate the appearance of clay bricks.

An impervious and ornamental surface may be laid on brick either by salt glazing, in which salt is added during the burning process, or by the use of a "slip," which is a glaze material into which the bricks are dipped. Subsequent reheating in the kiln fuses the slip into a glazed surface integral with the brick base.

Natural stone bricks are of limited modern utility, due to their enormous comparative mass, the consequent foundation needs, and the time-consuming and skilled labour needed in their construction and laying. They are however very durable and considered more handsome than clay bricks. Only a few stones are suitable for bricks, common materials are granite, limestone and sandstone. Other stones may be used (e.g. marble, slate, quartzite, etc.) but this tend to be limited to a particular locality

Bricks are used for building and pavement. In the USA, brick pavement was found incapable of withstanding heavy traffic, but it is coming back into use as a method of traffic calming or as a decorative surface in pedestrian precincts.

Bricks are also used in the metallurgy and glass industries for lining furnaces. They have various uses, especially refractory bricks such as silica, magnesia, chamotte and neutral (chromomagnesite) refractory bricks. This type of brick must have good thermal shock resistance, refractoriness under load, high melting point, and satisfactory porosity. There is a large refractory brick industry, especially in the United Kingdom, Japan and the U.S.A..

Asphalt is a sticky, black and highly viscous liquid or semi-solid that is present in most crude petroleum and in some natural deposits sometimes termed asphaltum. It is most commonly

modeled as a colloid, with asphaltenes as the dispersed phase and maltenes as the continuous phase (though there is some disagreement amongst chemists regarding its structure).

In U.S. terminology, asphalt (or asphalt cement) is the carefully refined residue from the distillation process of selected crude oils. Outside North America, the product is called bitumen.

The primary use of asphalt is in road construction, where it is used as the glue or binder for the aggregate particles. The road surfacing material is usually called 'asphaltic concrete' or simply AC in North America, or simply 'asphalt' elsewhere. Within North America the apparent interchangeability of the words 'asphalt' and 'bitumen' causes confusion outside the road construction industry despite quite clear definitions within industry circles.

Asphalt can be separated from the other components in crude oil (such as naphtha, gasoline and diesel) by the process of fractional distillation, usually under vacuum conditions. A better separation can be achieved by further processing of the heavier fractions of the crude oil in a de-asphalting unit, which uses either propane or butane in a supercritical phase to dissolve the lighter molecules which are then separated. Further processing is possible by "blowing" the product: namely reacting it with oxygen. This makes the product harder and more viscous.

Natural deposits of asphalt include lake asphalts (primarily from the Pitch Lake in Trinidad and Tobago and Bermudez Lake in Venezuela), Gilsonite, the Dead Sea between Israel & Jordan, and Tar Sands. Asphalt was mined at Ritchie Mines in Macfarlan in Ritchie County, West Virginia in the United States from 1852 to 1873.

Asphalt is typically stored and transported at temperatures around 300 degrees Fahrenheit (150° C). Sometimes diesel oil or kerosene are mixed in before shipping to retain liquidity; upon delivery, these lighter materials are separated out of the mixture. This mixture is often called bitumen feedstock, or BFS. Some dump trucks route the hot engine exhaust through pipes in the dump body to keep the material warm. The backs of tippers carrying asphalt, as well as some handling equipment, are also commonly sprayed with a releasing agent before filling to aid release. Diesel oil is sometimes used as a release agent, although it can mix with and thereby reduce the quality of the asphalt.

Concrete is a combination of cement, aggregate such as sand or gravel, and water. It is used in construction process to make hard structures.

## 2.2 MARKET AND MARKETING ASPECTS

The market survey carried out reveals that the current demand for building materials is higher than the local production. There is wide gap between supply and demand and therefore, business opportunity exists for setting up additional manufacturing facilities to satisfy the market requirement. The project plans to acquire appropriate vehicles and recruit qualified personnel for distribution of the products.

## 2.3 PROCESS AND TECHNOLOGY

### 2.3.1 Aggregates

A rock crusher is a machine designed to take large rocks and reduce them to smaller rocks, gravel, or rock dust. Rock crushers produce aggregates and ready-to-process mining ores, as well as rock fill material for landscaping and erosion control. They can be used with virgin rock or other materials such as reclaimed concrete. Rock crushers can be mobile (although usually very heavy) machines or they can be fixed installations.

Crushing is the first step in converting shot rock or demolition rubble into usable products, by taking large rocks and breaking them into smaller pieces. Crushing is sometimes continued until only the sand-like 'fines' remain, and in mining applications it is usually followed by milling. At some operations, all the crushing is accomplished in one step, by a single crusher. At other operations, crushing is done in two or more steps, with a primary crusher that is followed by a secondary crusher, and sometimes a tertiary or even quaternary crusher. Each crusher is designed to work with a certain maximum size of raw material, and often delivers its output to a screening machine which sorts and directs the product for further processing.

In operation, the raw material (of various sizes) is usually delivered to the primary crusher's hopper by dump trucks, excavators or wheeled front-end loaders. A feeder device such as a conveyor or vibrating grid controls the rate at which this material enters the crusher, and often contains a preliminary screening device which allows smaller material to bypass the crusher itself, thus improving efficiency. Primary crushing reduces the large pieces to a size which can be handled by the downstream machinery.

#### Types of Crushers

##### Jaw Crushers

The jaw crusher squeezes rock between two ridged surfaces (jaws) which taper to form a funnel. In most designs one jaw is fixed while the other oscillates at a rate of somewhere around 3 times a second. Raw material enters the jaw crusher from the top. Pieces of rock that are larger than the opening at the bottom of the jaw lodge between the two metal plates of the jaw, and the motion of the oscillating jaw against the fixed jaw continues to pound the lodged pieces until they are broken into pieces small enough to drop through the opening at the bottom.

##### Gyratory Crushers

A gyratory crusher breaks rock by squeezing it between an eccentrically gyrating spindle (which is covered by a wear resistant mantle) and the enclosing concave hopper. As run-of-mine rock enters the top of the gyratory crusher, it becomes wedged and squeezed between the mantle and concaves. Large pieces of ore are broken once and then fall to a lower

position (because they are now smaller) where they are broken again. This process continues until the pieces are small enough to fall through the narrow opening at the bottom of the crusher.

### Impact Crushers

There are two types of impact crushers which are Horizontal Shaft Impactor and the Vertical Shaft Impactor.

- Horizontal Shaft Impactor (HSI) Crushers

The HSI crushers break rock by impacting the rock with hammers that swing on a rotating shaft. The practical use of HSI crushers is limited to soft materials and non abrasive materials, such as limestone, phosphate, gypsum, weathered shales.

- Vertical Shaft Impactor (VSI)

VSI Crushers use a different approach involving a high speed rotor with wear resistant tips and a crushing chamber designed to 'throw' the rock against. The VSI crushers utilize velocity rather than surface force as the predominant force to break rock. In its natural state, rock has a jagged and uneven surface. Applying surface force (pressure) results in unpredictable and typically non-cubicle resulting particles. Utilizing velocity rather than surface force allows the breaking force to be applied evenly both across the surface of the rock as well as through the mass of the rock. Rock, regardless of size, has natural fissures (faults) throughout its structure. As rock is 'thrown' by a VSI Rotor against a solid anvil, it fractures and breaks along these fissures. Final particle size can be controlled by 1) the velocity at which the rock is thrown against the anvil and 2) the distance between the end of the rotor and the impact point on the anvil. The product resulting from VSI Crushing is generally of a consistent cubicle shape such as that required by modern SUPERPAVE highway asphalt applications. Using this method also allows materials with much higher abrasiveness to be crushed than is capable with an HSI and most other crushing methods.

VSI Crushers generally utilize a high speed spinning rotor at the center of the crushing chamber and an outer impact surface of either abrasive resistant metal anvils or crushed rock. Utilizing cast metal surfaces 'anvils' is traditionally referred to as a "Shoe and Anvil VSI". Utilizing crushed rock on the outer walls of the crusher for new rock to be crushed against is traditionally referred to as "rock on rock VSI".

### Cone Crusher

A cone crusher is similar in operation to a gyratory crusher, with less steepness in the crushing chamber and more of a parallel zone between crushing zones. A cone crusher breaks rock by squeezing the rock between an eccentrically gyrating spindle, which is covered by a wear resistant mantle, and the enclosing concave hopper, covered by a manganese concave or a bowl liner. As rock enters the top of the cone crusher, it becomes

wedged and squeezed between the mantle and the bowl liner or concave. Large pieces of ore are broken once, and then fall to a lower position (because they are now smaller) where they are broken again. This process continues until the pieces are small enough to fall through the narrow opening at the bottom of the crusher.

For the most part advances in crusher design have moved slowly. Jaw crushers have remained virtually unchanged for sixty years. More reliability and higher production have been added to basic cone crusher designs that have also remained largely unchanged. Increases in rotating speed, have provided the largest variation. For instance, a 48 inch (120 cm) cone crusher manufactured in 1960 may be able to produce 170 tons/hr of crushed rock, whereas the same size cone manufactured today may produce 300 tons/hr. These production improvements come from speed increases and better crushing chamber designs.

The largest advance in cone crusher reliability has been seen in the use of hydraulics to protect crushers from being damaged when uncrushable objects enter the crushing chamber. Foreign objects, such as steel, can cause extensive damage to a cone crusher, and additional costs in lost production. The advance of hydraulic relief systems has greatly reduced downtime and improved the life of these machines.

### 2.3.2 Concrete Blocks/Bricks

The production of concrete blocks consists of four basic processes: mixing, molding, curing, and cubing. Some manufacturing plants produce only concrete blocks, while others may produce a wide variety of precast concrete products including blocks, flat paver stones, and decorative landscaping pieces such as lawn edging. Some plants are capable of producing 2,000 or more blocks per hour.

The following steps are commonly used to manufacture concrete blocks

#### Mixing

- The sand and gravel are stored outside in piles and are transferred into storage bins in the plant by a conveyor belt as they are needed. The Portland cement is stored outside in large vertical silos to protect it from moisture.
- As a production run starts, the required amounts of sand, gravel, and cement are transferred by gravity or by mechanical means to a weigh batcher which measures the proper amounts of each material.
- The dry materials then flow into a stationary mixer where they are blended together for several minutes. There are two types of mixers commonly used. One type, called a planetary or pan mixer, resembles a shallow pan with a lid. Mixing blades are attached to a vertical rotating shaft inside the mixer. The other type is called a horizontal drum mixer. It resembles a coffee can turned on its side and has mixing blades attached to a horizontal rotating shaft inside the mixer.
- After the dry materials are blended, a small amount of water is added to the mixer. If the plant is located in a climate subject to temperature extremes, the water may first pass through a heater or chiller to regulate its temperature. Admixture chemicals and

coloring pigments may also be added at this time. The concrete is then mixed for six to eight minutes.

### Molding

- Once the load of concrete is thoroughly mixed, it is dumped into an inclined bucket conveyor and transported to an elevated hopper. The mixing cycle begins again for the next load.
- From the hopper the concrete is conveyed to another hopper on top of the block machine at a measured flow rate. In the block machine, the concrete is forced downward into molds. The molds consist of an outer mold box containing several mold liners. The liners determine the outer shape of the block and the inner shape of the block cavities. As many as 15 blocks may be molded at one time.
- When the molds are full, the concrete is compacted by the weight of the upper mold head coming down on the mold cavities. This compaction may be supplemented by air or hydraulic pressure cylinders acting on the mold head. Most block machines also use a short burst of mechanical vibration to further aid compaction.
- The compacted blocks are pushed down and out of the molds onto a flat steel pallet. The pallet and blocks are pushed out of the machine and onto a chain conveyor. In some operations the blocks then pass under a rotating brush which removes loose material from the top of the blocks.

### Curing

- The pallets of blocks are conveyed to an automated stacker or loader which places them in a curing rack. Each rack holds several hundred blocks. When a rack is full, it is rolled onto a set of rails and moved into a curing kiln.
- The kiln is an enclosed room with the capacity to hold several racks of blocks at a time. There are two basic types of curing kilns. The most common type is a low-pressure steam kiln. In this type, the blocks are held in the kiln for one to three hours at room temperature to allow them to harden slightly. Steam is then gradually introduced to raise the temperature at a controlled rate of not more than 60°F per hour (16°C per hour). Standard weight blocks are usually cured at a temperature of 150-165°F (66-74°C), while lightweight blocks are cured at 170-185°F (77-85°C). When the curing temperature has been reached, the steam is shut off, and the blocks are allowed to soak in the hot, moist air for 12-18 hours. After soaking, the blocks are dried by exhausting the moist air and further raising the temperature in the kiln. The whole curing cycle takes about 24 hours.

Another type of kiln is the high-pressure steam kiln, sometimes called an autoclave. In this type, the temperature is raised to 300-375°F (149-191°C), and the pressure is raised to 80-185 psi (5.5-12.8 bar). The blocks are allowed to soak for five to 10 hours. The pressure is then rapidly vented, which causes the blocks to quickly release their trapped moisture. The autoclave curing process requires more energy and a more expensive kiln, but it can produce blocks in less time.

## Cubing

- The racks of cured blocks are rolled out of the kiln, and the pallets of blocks are unstacked and placed on a chain conveyor. The blocks are pushed off the steel pallets, and the empty pallets are fed back into the block machine to receive a new set of molded blocks.
- If the blocks are to be made into split-face blocks, they are first molded as two blocks joined together. Once these double blocks are cured, they pass through a splitter, which strikes them with a heavy blade along the section between the two halves. This causes the double block to fracture and form a rough, stone-like texture on one face of each piece.

The blocks pass through a cuber which aligns each block and then stacks them into a cube three blocks across by six blocks deep by three or four blocks high. These cubes are carried outside with a forklift and placed in storage

### 2.3.3 Asphalt

An asphalt plant is a plant used for the manufacture of asphalt, macadam and other forms of coated road stone, sometimes collectively known as blacktop.

The manufacture of coated road stone demands the combination of a number of aggregates, sand and a filler (such as stone dust), in the correct proportions, heated, and finally coated with a binder, usually bitumen based or, in some cases, tar. The temperature of the finished product must be sufficient to be workable after transport to the final destination. A temperature in the range of 100 - 200 degrees Celsius is normal.

Increasingly, recycled asphalt pavement (RAP) is used as part of the mix. The binder used is flammable, and the heaters are large liquid or gas fired burners. RAP is introduced after the heating process and must be accounted for in the overall mix temperature calculations.

There are three main classes of plant: batch heater, semi-continuous (or "asphalt plant"), and continuous (or "drum mix"). The batch heater has the lowest throughput, the continuous plant the highest at up to around 500 Tonnes per hour.

Supply of road stone for large contracts is generally by tender with considerable pressure on price. A faulty batch of road stone must be planed up and re-laid, often with additional lane rental charges, at a cost which may be orders of magnitude higher than the original price, so sophisticated control systems are a necessity.

## Sand

One key ingredient of most road stones is sand. Sand generally has high water content. Boiling off this water is a large part of the energy cost of heating the aggregate, in turn a

significant part of the overall cost of operation. The water content of sand also varies considerably, especially when stored outdoors, being typically of the order of some tens of percent of the overall mass of wet sand. Since sand takes the form of small grains, with a high surface area per unit volume, and binder attaches to the surface of the aggregates, the amount of dry sand in the mix is particularly critical to the overall blend; the moisture content must be measured and the equivalent dry weight calculated.

## Binder

Binder comes in different grades known as "penetration" or "pen" grades, with values varying between around 30 and 300. The pen value is an expression of the depth to which a standard needle will penetrate the surface of the binder at a specified temperature (the higher the value, the softer the binder). This has an effect on the workability of hot asphalt and the stiffness of the asphalt when cooled. Lower pen values give harder wearing. Asphalt wearing courses are typically 35-50 pen, base courses will be higher, typically 200 or 300 pen. The coating plant may combine binder of different grades to achieve a grade between those held on site.

## Filler

Filler, as the name implies, fills the voids between aggregate grains and improves the wearing capabilities of the overall mix. It is stored and fed dry into the mix, during or after addition of binder. A common source of filler is fines from the heating process recovered by bag filters or wet filtration ponds from the exhaust of the heating drum.

## Types of plant

### Batch heater

A batch heater plant weighs the raw aggregates into a heater drum, where the batch is then heated up to temperature. The hot aggregate is discharged into a mixing drum where (dry) filler and binder are added. The blend is mixed and discharged either directly into the delivery vehicles or into a small weighing and collecting hopper. To increase throughput, the heater can be heating the next batch while the previous is being mixed. Capacity is usually of the order of tens of tonnes per hour.

Batch heater plant is used where short production runs are common (a different recipe can be used on each mix) or where total volume is low. Mobile batch heaters are available.

### Continuous

In the continuous plant, raw aggregate is brought up from ground hoppers at a precisely controlled rate and fed into a heater drum similar to that used in the asphalt plant. Once heated it is immediately coated in the same drum (with the binder spray bars situated behind the burner) or in a smaller drum situated immediately behind it. Finished product is almost invariably discharged into a hot store rather than directly into delivery vehicles.

Changing mix is achieved by varying the feed rates of the aggregate, filler and binder feeders, with time delays so that the change of blend occurs at the same point in the coating drum. Sand tends to move more slowly through the heating drum, so the blend proportions will not necessarily change at the same point on the feed conveyor. It is common to divert a small amount of material to a waste chute when the transition point reaches the hot elevator.

Drum mix plants are not really suitable for short production runs; although with sophisticated controls the change of mix can be accurate to within some seconds, production rates of hundreds of tonnes per hour may equate to a tonne every ten seconds or so.

### Hot storage

Finished road stone must be kept heated to avoid setting. It is commonly stored in large electrically heated insulated stainless steel silos, from which it is weighed into delivery vehicles. This may be achieved by intermediate weigh hoppers (which may shuttle between hoppers) or by mounting the hoppers directly on load cells. Control of load out by this method involves accurately predicting the material "in flight" between the discharge door and the vehicle.

### Control

Precise control is a necessity. Asphalt mixing and load out plant typically use a combination of industrialized computer control and programmable logic controllers to achieve this.

With asphalt being a real-time product, timing is important when it comes to delivering product amounts to job sites, etc. 2008 has provided plants with a level of control over equipment by utilizing GPS, RFID and other forms of tracking systems. Tracking provides information throughout the supply chain to make sure that the right amount and type of product is delivered to the correct site in a timely manner and with better accuracy.

### 2.3.4 Concrete

A concrete mixer (also commonly called a cement mixer) is a device that homogeneously combines cement, aggregate such as sand or gravel, and water to form concrete. A typical concrete mixer uses a revolving drum to mix the components. For smaller volume works portable concrete mixers are often used so that the concrete can be made at the construction site, giving the workers ample time to use the concrete before it hardens. An alternative to a machine is mixing concrete or cement by hand. This is usually done in a wheelbarrow; however, several companies have recently begun to sell modified tarps for this purpose.

### Industrial mixers

Today's market increasingly requires consistent homogeneity and short mixing times for the industrial production of ready-mix concrete, and more so for precast/prestressed concrete. This has resulted in new technologies for concrete production. Worldwide, therefore, twin-

shaft batch mixers are becoming more important for high-quality concrete production. They introduce very high turbulence into the mix and achieve about 95% homogeneity at only around 30 seconds mixing time per batch.

Special concrete transport trucks (in-transit mixers) are made to transport and mix concrete from a factory/plant to the construction yard. They are charged with dry materials and water, with the mixing occurring during transport. With this process, the material has already been mixed, and then is loaded into the truck. The ready mix truck maintains the material's liquid state, through agitation, or turning of the drum, until delivery.) The interior of the drum on a concrete truck is fitted with a spiral blade. In one rotational direction, the concrete is pushed deeper into the drum. This is the direction the drum is rotated while the concrete is being transported to the building site. This is known as "charging" the mixer. When the drum rotates in the other direction, the Archimedes screw-type arrangement "discharges", or forces the concrete out of the drum. From there it may go onto chutes to guide the viscous concrete directly to the job site. If the truck cannot get close enough to the site to use the chutes, the concrete may be discharged into a concrete pump connected to a flexible hose, or onto a conveyor belt which can be extended some distance (typically ten meters). A pump provides the means to move the material to precise locations, multi-floor buildings, and other distance prohibitive locations.

"Rear discharge" trucks require both a driver and a "chuteman" to guide the truck and chute back and forth to place concrete in the manner suitable to the contractor. Newer "front discharge" trucks have controls inside the cab of the truck to allow the driver to move the chute in all directions.

A six-axle truck has three "lift axles" -- the first two axles behind the cab (the pusher axles) and the rear-most axle (the tag axle) -- which can be lifted out of the way for off-road operation. When loaded, these axles distribute the weight of the truck. This distribution of weight is essential. Otherwise, roads most traveled on by vehicles of this size begin to break down. As an added benefit, these axles provide the driver better control of the vehicle during transport. The lift axles are equipped with brakes, and a system that lets them actually turn with the truck during turns, allowing maneuvering that would otherwise be nearly impossible.

Concrete mixers generally do not travel far from their plant, as many contractors require that the concrete be in place within 90 minutes after loading. If the truck breaks down or for some other reason the concrete hardens in the truck, workers need to enter the barrel with jackhammers; dynamite is still occasionally used to break up hardened concrete in the barrel under certain circumstances.

## QUALITY CONTROL

We facilitate stone quality control by ensuring that our products are inspected for the highest quality before delivery. Similarly, sourcing of materials is done with great care to ensure that the best materials are used in the manufacturing processes for various products.

## 2.5 BYPRODUCTS/WASTE

The by products from our various processes are collected and sent out the factory for proper disposal to ensure that no harm is done to the environment

## 2.6 PRODUCTION INPUTS

As explained earlier, the basic Raw Materials used in the manufacture of building materials include rocks, gravel, cement, sand, asphalt and water. These are used in the different processes during the manufacturing of the different types of building materials.

## 2.7 LOCATION

The project location is in a prime industrial area in Dodoma at Chigongwe, Dodoma Municipality. This is the location of company operations and it has an area which is large enough to contain all the manufacturing operations, materials storage, and stockyard and office space

## 2.8 MANPOWER REQUIREMENTS

The whole project will comprise of a total work force of 75 permanent employees and several part time employees. Initially there will be a few technical expatriates and engineers who will give training to the local staff. Maximum employment will be given to the local work force.

The plant will be organized into three functions namely:

- Production and Technical Services
- Marketing
- Finance and administration

## 2.9 IMPLEMENTATION

The project is planned to undergo two phases:

**Phase I:** Major activities involved include registration of the project and approvals by the Tanzania Investment Centre (TIC), and mobilization of funds from Sponsors. Other activities include identification of appropriate production technology, sourcing of machinery and equipment, renovation of factory buildings, staff recruitment and training of core personnel. A total of five months period is planned for the above activities after completion of this study.

Phase II: The second phase will involve full production of various building materials envisaged to start in the second half of year 2009.

## 2.10 PROJECT ECONOMICS

### 2.10.1 Capital Investment Requirements

COST STRUCTURE	
PARTICULAR	AMOUNT USD
Land and Buildings	662,350
Plant and Equipment	6,502,000
Motor Vehicles	890,000
Furniture & Fixtures	55,000
Pre expenses (& workshop & support)	112,000
Others/ Misc	50,000
Working Capital	300,000
<b>TOTAL</b>	<b>8,571,350</b>

### 2.10.2 Expenditure and Profitability

The major expenditure item is the purchase of raw materials used in the manufacture of various building materials such as rocks, gravel, cement, sand, asphalt and water

Project revenue will accrue from sales of building materials. Total revenue from this project will increase from USD 1,480,750 in the first year of operation to USD 1,666,597 in the fifth year. This is shown in the following summary.

REVENUE PROJECTION					
PRODUCTS	YEARS				
	YEAR 1 USD	YEAR 2 USD	YEAR 3 USD	YEAR 4 USD	YEAR 5 USD
Revenue	1,480,750	1,525,173	1,570,928	1,618,056	1,666,597
	<b>1,480,750</b>	<b>1,525,173</b>	<b>1,570,928</b>	<b>1,618,056</b>	<b>1,666,597</b>

## 2.11 RECOMMENDATIONS

The study shows the establishment of production facilities for building materials including aggregates, building blocks, paving blocks, asphalt and concrete is both technically and financially a feasible undertaking. Furthermore, it will create local employment for the national benefit. In view of the findings, the project is recommended for implementation.

## 3 MARKET AND MARKETING

In this chapter, we look into whether there is a market for the proposed products and how the promoters would approach that market.

### 3.1 PRODUCTS

The products which this project will produce for sale are building materials including aggregates, building blocks, paving blocks, asphalt and concrete.

### 3.2 DEMAND

The company projections show increasing demand for various building materials. Their use has been on the increase taking into consideration the growth occurring in construction industry in Tanzania.

### 3.3 DISTRIBUTION CHANNEL

The company will involve itself with a product that will be distributed to final consumers either directly (one level channel) or by using only one intermediary who will resale to final consumers (two level channel). It is important for these channels to be adopted because they reduce costs of distribution and avoid several profit margins of distributors, hence making the product price competitive in the market place. However, the company is exploring all sales and distribution avenues that will work to the company's advantage, given the stiff competition anticipated in the market. The company has budgeted for the development of a modern distribution/sales network that will comprise of modern and adequate number of distribution trucks as well as recruitment and training of qualified sales and marketing personnel.

## 4 PRODUCTION PROCESS AND TECHNOLOGY

### 4.1 BASIC PRODUCTION PROCESS

#### 4.1.1 Aggregates

Crushing is the first step in converting shot rock or demolition rubble into usable products, by taking large rocks and breaking them into smaller pieces. Crushing is sometimes continued until only the sand-like 'fines' remain, and in mining applications it is usually followed by milling. At some operations, all the crushing is accomplished in one step, by a single crusher. At other operations, crushing is done in two or more steps, with a primary crusher that is followed by a secondary crusher, and sometimes a tertiary or even quaternary crusher. Each crusher is designed to work with a certain maximum size of raw material, and often delivers its output to a screening machine which sorts and directs the product for further processing.

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VSI Crushers use a different approach involving a high speed rotor with wear resistant tips and a crushing chamber designed to 'throw' the rock against. The VSI crushers utilize velocity rather than surface force as the predominant force to break rock. In its natural state, rock has a jagged and uneven surface. Applying surface force (pressure) results in unpredictable and typically non-cubicle resulting particles. Utilizing velocity rather than surface force allows the breaking force to be applied evenly both across the surface of the rock as well as through the mass of the rock. Rock, regardless of size, has natural fissures (faults) throughout its structure. As rock is 'thrown' by a VSI Rotor against a solid anvil, it fractures and breaks along these fissures. Final particle size can be controlled by 1) the velocity at which the rock is thrown against the anvil and 2) the distance between the end of the rotor and the impact point on the anvil. The product resulting from VSI Crushing is generally of a consistent cubicle shape such as that required by modern supersave highway asphalt applications. Using this

method also allows materials with much higher abrasiveness to be crushed than is capable with an HSI and most other crushing methods.

VSI Crushers generally utilize a high speed spinning rotor at the center of the crushing chamber and an outer impact surface of either abrasive resistant metal anvils or crushed rock. Utilizing cast metal surfaces 'anvils' is traditionally referred to as a "Shoe and Anvil VSI". Utilizing crushed rock on the outer walls of the crusher for new rock to be crushed against is traditionally referred to as "rock on rock VSI".

## Cone Crusher

A cone crusher is similar in operation to a gyratory crusher, with less steepness in the crushing chamber and more of a parallel zone between crushing zones. A cone crusher breaks rock by squeezing the rock between an eccentrically gyrating spindle, which is covered by a wear resistant mantle, and the enclosing concave hopper, covered by a manganese concave or a bowl liner. As rock enters the top of the cone crusher, it becomes wedged and squeezed between the mantle and the bowl liner or concave. Large pieces of ore are broken once, and then fall to a lower position (because they are now smaller) where they are broken again. This process continues until the pieces are small enough to fall through the narrow opening at the bottom of the crusher.

## Technology

For the most part advances in crusher design have moved slowly. Jaw crushers have remained virtually unchanged for sixty years. More reliability and higher production have been added to basic cone crusher designs that have also remained largely unchanged. Increases in rotating speed, have provided the largest variation. For instance, a 48 inch (120 cm) cone crusher manufactured in 1960 may be able to produce 170 tons/hr of crushed rock, whereas the same size cone manufactured today may produce 300 tons/hr. These production improvements come from speed increases and better crushing chamber designs.

The largest advance in cone crusher reliability has been seen in the use of hydraulics to protect crushers from being damaged when uncrushable objects enter the crushing chamber. Foreign objects, such as steel, can cause extensive damage to a cone crusher, and additional costs in lost production. The advance of hydraulic relief systems has greatly reduced downtime and improved the life of these machines.

### 4.1.2 Concrete Blocks/Bricks

The production of concrete blocks consists of four basic processes: mixing, molding, curing, and cubing. Some manufacturing plants produce only concrete blocks, while others may produce a wide variety of precast concrete products including blocks, flat paver stones, and decorative landscaping pieces such as lawn edging. Some plants are capable of producing 2,000 or more blocks per hour.

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The following steps are commonly used to manufacture concrete blocks

### Mixing

- 1 The sand and gravel are stored outside in piles and are transferred into storage bins in the plant by a conveyor belt as they are needed. The Portland cement is stored outside in large vertical silos to protect it from moisture.
- 2 As a production run starts, the required amounts of sand, gravel, and cement are transferred by gravity or by mechanical means to a weigh batcher which measures the proper amounts of each material.
- 3 The dry materials then flow into a stationary mixer where they are blended together for several minutes. There are two types of mixers commonly used. One type, called a planetary or pan mixer, resembles a shallow pan with a lid. Mixing blades are attached to a vertical rotating shaft inside the mixer. The other type is called a horizontal drum mixer. It resembles a coffee can turned on its side and has mixing blades attached to a horizontal rotating shaft inside the mixer.
- 4 After the dry materials are blended, a small amount of water is added to the mixer. If the plant is located in a climate subject to temperature extremes, the water may first pass through a heater or chiller to regulate its temperature. Admixture chemicals and coloring pigments may also be added at this time. The concrete is then mixed for six to eight minutes.

### Molding

- 5 Once the load of concrete is thoroughly mixed, it is dumped into an inclined bucket conveyor and transported to an elevated hopper. The mixing cycle begins again for the next load.
- 6 From the hopper the concrete is conveyed to another hopper on top of the block machine at a measured flow rate. In the block machine, the concrete is forced downward into molds. The molds consist of an outer mold box containing several mold liners. The liners determine the outer shape of the block and the inner shape of the block cavities. As many as 15 blocks may be molded at one time.
- 7 When the molds are full, the concrete is compacted by the weight of the upper mold head coming down on the mold cavities. This compaction may be supplemented by air or hydraulic pressure cylinders acting on the mold head. Most block machines also use a short burst of mechanical vibration to further aid compaction.
- 8 The compacted blocks are pushed down and out of the molds onto a flat steel pallet. The pallet and blocks are pushed out of the machine and onto a chain conveyor. In some operations the blocks then pass under a rotating brush which removes loose material from the top of the blocks.

## Curing

- 9 The pallets of blocks are conveyed to an automated stacker or loader which places them in a curing rack. Each rack holds several hundred blocks. When a rack is full, it is rolled onto a set of rails and moved into a curing kiln.
- 10 The kiln is an enclosed room with the capacity to hold several racks of blocks at a time. There are two basic types of curing kilns. The most common type is a low-pressure steam kiln. In this type, the blocks are held in the kiln for one to three hours at room temperature to allow them to harden slightly. Steam is then gradually introduced to raise the temperature at a controlled rate of not more than 60°F per hour (16°C per hour). Standard weight blocks are usually cured at a temperature of 150-165°F (66-74°C), while lightweight blocks are cured at 170-185°F (77-85°C). When the curing temperature has been reached, the steam is shut off, and the blocks are allowed to soak in the hot, moist air for 12-18 hours. After soaking, the blocks are dried by exhausting the moist air and further raising the temperature in the kiln. The whole curing cycle takes about 24 hours.

Another type of kiln is the high-pressure steam kiln, sometimes called an autoclave. In this type, the temperature is raised to 300-375°F (149-191°C), and the pressure is raised to 80-185 psi (5.5-12.8 bar). The blocks are allowed to soak for five to 10 hours. The pressure is then rapidly vented, which causes the blocks to quickly release their trapped moisture. The autoclave curing process requires more energy and a more expensive kiln, but it can produce blocks in less time.

## Cubing

- 11 The racks of cured blocks are rolled out of the kiln, and the pallets of blocks are unstacked and placed on a chain conveyor. The blocks are pushed off the steel pallets, and the empty pallets are fed back into the block machine to receive a new set of molded blocks.
- 12 If the blocks are to be made into split-face blocks, they are first molded as two blocks joined together. Once these double blocks are cured, they pass through a splitter, which strikes them with a heavy blade along the section between the two halves. This causes the double block to fracture and form a rough, stone-like texture on one face of each piece.
- 13 The blocks pass through a cuber which aligns each block and then stacks them into a cube three blocks across by six blocks deep by three or four blocks high. These cubes are carried outside with a forklift and placed in storage.

### 4.1.3 Asphalt Plant

An asphalt plant is a plant used for the manufacture of asphalt, macadam and other forms of coated road stone, sometimes collectively known as blacktop.

The manufacture of coated road stone demands the combination of a number of aggregates, sand and a filler (such as stone dust), in the correct proportions, heated, and finally coated

with a binder, usually bitumen based or, in some cases, tar. The temperature of the finished product must be sufficient to be workable after transport to the final destination. A temperature in the range of 100 - 200 degrees Celsius is normal.

Increasingly, recycled asphalt pavement (RAP) is used as part of the mix. The binder used is flammable, and the heaters are large liquid or gas fired burners. RAP is introduced after the heating process and must be accounted for in the overall mix temperature calculations.

There are three main classes of plant: batch heater, semi-continuous (or "asphalt plant"), and continuous (or "drum mix"). The batch heater has the lowest throughput, the continuous plant the highest at up to around 500 Tonnes per hour.

Supply of road stone for large contracts is generally by tender with considerable pressure on price. A faulty batch of road stone must be planed up and re-laid, often with additional lane rental charges, at a cost which may be orders of magnitude higher than the original price, so sophisticated control systems are a necessity.

## Sand

One key ingredient of most roadstones is sand. Sand generally has a high water content. Boiling off this water is a large part of the energy cost of heating the aggregate, in turn a significant part of the overall cost of operation. The water content of sand also varies considerably, especially when stored outdoors, being typically of the order of some tens of percent of the overall mass of wet sand. Since sand takes the form of small grains, with a high surface area per unit volume, and binder attaches to the surface of the aggregates, the amount of dry sand in the mix is particularly critical to the overall blend; the moisture content must be measured and the equivalent dry weight calculated.

## Binder

Binder comes in different grades known as "penetration" or "pen" grades, with values varying between around 30 and 300. The pen value is an expression of the depth to which a standard needle will penetrate the surface of the binder at a specified temperature (the higher the value, the softer the binder). This has an effect on the workability of hot asphalt and the stiffness of the asphalt when cooled. Lower pen values give harder wearing. Asphalt wearing courses are typically 35-50 pen, base courses will be higher, typically 200 or 300 pen. The coating plant may combine binder of different grades to achieve a grade between those held on site.

## Filler

Filler, as the name implies, fills the voids between aggregate grains and improves the wearing capabilities of the overall mix. It is stored and fed dry into the mix, during or after addition of binder. A common source of filler is fines from the heating process recovered by bag filters or wet filtration ponds from the exhaust of the heating drum.

## Types of plant

- Batch heater

A batch heater plant weighs the raw aggregates into a heater drum, where the batch is then heated up to temperature. The hot aggregate is discharged into a mixing drum where (dry) filler and binder are added. The blend is mixed and discharged either directly into the delivery vehicles or into a small weighing and collecting hopper. To increase throughput, the heater can be heating the next batch while the previous is being mixed. Capacity is usually of the order of tens of tonnes per hour.

Batch heater plant is used where short production runs are common (a different recipe can be used on each mix) or where total volume is low. Mobile batch heaters are available.

- Continuous

In the continuous plant, raw aggregate is brought up from ground hoppers at a precisely controlled rate and fed into a heater drum similar to that used in the asphalt plant. Once heated it is immediately coated in the same drum (with the binder spray bars situated behind the burner) or in a smaller drum situated immediately behind it. Finished product is almost invariably discharged into a hot store rather than directly into delivery vehicles.

Changing mix is achieved by varying the feed rates of the aggregate, filler and binder feeders, with time delays so that the change of blend occurs at the same point in the coating drum. Sand tends to move more slowly through the heating drum, so the blend proportions will not necessarily change at the same point on the feed conveyor. It is common to divert a small amount of material to a waste chute when the transition point reaches the hot elevator.

Drum mix plants are not really suitable for short production runs; although with sophisticated controls the change of mix can be accurate to within some seconds, production rates of hundreds of tonnes per hour may equate to a tonne every ten seconds or so.

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## Hot storage

Finished road stone must be kept heated to avoid setting. It is commonly stored in large electrically heated insulated stainless steel silos, from which it is weighed into delivery vehicles. This may be achieved by intermediate weigh hoppers (which may shuttle between hoppers) or by mounting the hoppers directly on load cells. Control of load out by this method involves accurately predicting the material "in flight" between the discharge door and the vehicle.

## Control

Precise control is a necessity. Asphalt mixing and load out plant typically use a combination of industrialized computer control and programmable logic controllers to achieve this.

With asphalt being a real-time product, timing is important when it comes to delivering product amounts to job sites, etc. 2008 has provided plants with a level of control over equipment by utilizing GPS, RFID and other forms of tracking systems. Tracking provides information throughout the supply chain to make sure that the right amount and type of product is delivered to the correct site in a timely manner and with better accuracy.

#### 4.1.4 Concrete Mixer

A concrete mixer (also commonly called a cement mixer) is a device that homogeneously combines cement, aggregate such as sand or gravel, and water to form concrete. A typical concrete mixer uses a revolving drum to mix the components. For smaller volume works portable concrete mixers are often used so that the concrete can be made at the construction site, giving the workers ample time to use the concrete before it hardens. An alternative to a machine is mixing concrete or cement by hand. This is usually done in a wheelbarrow; however, several companies have recently begun to sell modified tarps for this purpose.

#### Industrial mixers

Today's market increasingly requires consistent homogeneity and short mixing times for the industrial production of ready-mix concrete, and more so for precast/prestressed concrete. This has resulted in new technologies for concrete production. Worldwide, therefore, twin-shaft batch mixers are becoming more important for high-quality concrete production. They introduce very high turbulence into the mix and achieve about 95% homogeneity at only around 30 seconds mixing time per batch.

Special concrete transport trucks (in-transit mixers) are made to transport and mix concrete from a factory/plant to the construction yard. They are charged with dry materials and water, with the mixing occurring during transport. With this process, the material has already been mixed, and then is loaded into the truck. The ready mix truck maintains the material's liquid state, through agitation, or turning of the drum, until delivery.) The interior of the drum on a concrete truck is fitted with a spiral blade. In one rotational direction, the concrete is pushed deeper into the drum. This is the direction the drum is rotated while the concrete is being transported to the building site. This is known as "charging" the mixer. When the drum rotates in the other direction, the Archimedes screw-type arrangement "discharges", or forces the concrete out of the drum. From there it may go onto chutes to guide the viscous concrete directly to the job site

## 4.2 QUALITY CONTROL

The company will facilitate quality control by ensuring that its products are inspected for the highest quality before delivery. Similarly, sourcing of materials will be done with great care to ensure that the best materials are used in the manufacturing processes for various products.

#### 4.3 ENVIRONMENT PROTECTION

Our aim is to make this project environment friendly. The company will strive to observe stringent environment protection in its production process. It will seek environmental friendly technologies. All by products will be properly handled so as not to pollute the environment. The factory surroundings will be kept clean and trees are to be planted as part of environment conservation efforts.

### 5 MACHINERY EQUIPMENT AND CIVIL WORKS

#### 5.1 MACHINERY

The complete set of requisite plant, machinery and equipment for production of Aggregates, Vibrated Building Blocks, Paving Blocks, Asphalt and Concrete is listed hereunder for reference. Prices indicated are based on quotations received from suppliers

S/N	PARTICULARS / ITEMS	UNITS REQUIRED	UNIT COST US \$	TOTAL COST US\$
1	CHAIN EXCAVATOR	4	140,000	560,000
2	WHEEL LOADER	4	135,000	540,000
3	BULDOZER	1	140,000	140,000
4	DRILLING MACHINE	2	115,000	230,000
5	COMPRESSORS	6	40,000	240,000
6	WELDING MACHINE	3	10,000	30,000
7	SET OF TOOLS	3	10,000	30,000
8	WEIGH BRIDGE 80 TONS	1	80,000	80,000

9	GRIZZLY FEEDER	2	38,000	76,000
10	JAW CRUSHER	2	120,000	240,000
11	CONE CRUSHER	2	110,000	220,000
12	COMPACT CRUSHER	2	100,000	200,000
13	VIBRATING SCREENS	4	45,000	180,000
14	CONVOYER BELTS	8	15,000	120,000
15	NECESSARY MOTORS	16	8,000	128,000
16	CONCRETE MIXER 1 CUBIC METRE	1	22,000	22,000
17	VIBRATING MACHINES	15	3,000	45,000
18	PAVEMENTS MACHINES	10	3,000	30,000
19	CONCRETE PIPES MOLES	20	350	7,000
20	MOLES	40	250	10,000
21	CONCRETE MIXER 1 CUBIC METRE	1	22,000	22,000
22	CONCRETE MIXER 15 TONS	1	180,000	180,000
23	MOBILE MIXER VEHICLES	5	60,000	300,000
24	PUMP	1	75,000	75,000
25	CONCRETE MIXER 15 TONS	1	180,000	180,000
26	ASPHALT MIXER 15 TONS	1	220,000	220,000

## 5.2 PLANT LOCATION AND CIVIL WORKS

### 5.2.1 Site and Location

As mentioned earlier, the project location is in an industrial area at Chigongwe, Dodoma Municipality. This is the location of company operations and it has an area which is large enough to contain all the manufacturing operations, materials storage, and stockyard and office space.

### 5.2.2 Production Building Required

The buildings required include residential houses, garage house, staff houses and public toilet. A warehouse will also be needed for storage of raw materials and some finished building materials and for onward delivery to the customers. Details appear below

S/N	PARTICULARS / ITEMS	UNITS REQUIRED	UNIT COST US \$	TOTAL COST US\$
A	LAND AND BUILDING			
1	QUARRY ACQUISITION	200,000 Sq m	200,000	200,000
2	RESIDENTIAL HOUSES	4	12,000	48,000
3	WARE HOUSE	2	15,000	30,000
4	GARAGE HOUSE	2	10,000	20,000
5	STAFF HOUSES	3 COMPLEX	10,000	30,000
6	PUBLIC TOILETS	8	1,000	8,000
7	WATER TANK	4	5,000	20,000
8	DIESEL TANK 30,000 LITRES	1	30,000	30,000
9	FOUNDATION FOR THE CRUSHER	1	100,000	100,000
10	AIR CONDITIONS	12	450	5,400
11	AIR CONDITIONS HORIZONTAL	5	750	3,750

### 5.2.3 Office Building

An office block to accommodate the clerical staff will be constructed within the premises at cost shown hereunder

S/N	PARTICULARS / ITEMS	UNITS REQUIRED	UNIT COST US \$	TOTAL COST US\$
1	OFFICE	1	10,000	10,000

## 5.3 UTILITY SERVICES

### 5.3.1 Water

A three-inch diameter pipeline to the location from the main pipeline is available. The plant water requirement is basically for making of building and paving blocks and for other factory uses. About 5,000 liters of water will be required per day. Therefore, a water reservoir with capacity of around 10,000 liters is planned for construction.

### 5.3.2 Electricity

The Tanzania Electric Supply Company Ltd. (TANESCO) has no problem in providing electricity to us to facilitate smooth production of various types of building materials.

S/N	PARTICULARS / ITEMS	UNITS REQUIRED	UNIT COST US \$	TOTAL COST US\$
1	TANESCO INSTALLATION + TRANSFORMER	SET	150,000	150,000

The project will also require the following machinery and equipment to facilitate generation of power for this project

S/N	PARTICULARS / ITEMS	UNITS REQUIRED	UNIT COST US \$	TOTAL COST US\$
	POWER GENERATION			
1	ELECTRIC PANEL BOARD	1	35,000	35,000
2	GENERATOR 600 KVA	2	110,000	220,000
3	GENERATOR 60 KVA	1	18,000	18,000
				-

## **6 RAW MATERIALS AND OTHER PRODUCTION INPUTS: REQUIREMENTS AND AVAILABILITY**

### **6.1 BASIC MATERIALS**

The basic Raw Materials used in the manufacture of different building materials include rocks, gravel, powdered portland cement, water, asphalt and sand.

### **6.2 UTILITIES**

#### **6.2.1 Power**

As said earlier in this report, the source of energy for the proposed project will be electric power. Power is consumed in quite large quantities and is among the higher cost elements.

A standby power generator has also been budgeted for to avoid inconveniences caused by frequent power cuts by TANESCO.

## **7 MANPOWER AND ORGANIZATION**

The proposed project will have three independent departments, namely:

- Production and Technical Services
- Sales and Marketing
- Administration and Finance

### **7.1 ORGANIZATION**

The Board of Directors shall manage the project at policy level. The top most person in the day to day running of the project will be the Managing Director who will be the project manager. Under the Managing Director's office will be the three departments mentioned above. Each department will comprise a number of sections each headed by a section head as follows.

#### **PRODUCTION AND TECHNICAL SERVICES DEPARTMENT**

- Aggregate section
- Building Block/Brick section
- Paving Block section
- Asphalt section

- Concrete section
- Raw Materials Stores
- Quality Control section
- Research and Development section
- Repair / Maintenance section

## SALES AND MARKETING

- Marketing Section
- Sales and Distribution Section
- Finished Goods Stores
- Procurement and Logistics Section

## ADMINISTRATION AND FINANCE DEPARTMENT:

- Procurement
- Accounts
- Personnel and Administration
- Security

Each section will be manned by a number of personnel with varying education levels and work experiences.

The management team will comprise the Managing Director/Project Manager, Site Manager/Production Manager and the Marketing Manager.

## 7.2 RESPONSIBILITIES

Responsibilities will be as follows:

### 7.2.1 Production and Technical Services Department

This will be responsible for production planning and overseeing that daily production activities are carried. It will further be responsible for repair and maintenance of company assets and research and development activities.

Technical Staff in each of the other sections will likewise assist the Site/Production Manager execute his duties. We recommend that expatriates be employed to man these positions at least for the initial 2 - 3 years.

## 7.2.2 Finance and Administration Department

A qualified accountant with experience in administrative issues will head the department. He will be responsible for the administration of the company as well as overseeing the financial aspects of the company. The administration and finance department will comprise three sections, namely:

- The administrative section which will be responsible for the general administrative matters of the company as well as personnel issues.
- The finance section, which will be responsible for financial issues. It will also be responsible for the proper maintenance of books of accounts and financial planning.
- The purchasing section which will be responsible for the purchase of raw materials, spare parts and equipment. This section will also be responsible for the receipt, storage and issue of purchased materials.

## 7.2.3 Sales and Marketing Department.

This Department will be headed by the Sales and Marketing Manager who will be responsible for the development of a sustainable sales and distribution network throughout the country. This will involve developing and maintaining a fleet of distribution vehicles and recruitment and training of qualified and well motivated marketing and sales personnel.

## 7.3 MANPOWER REQUIREMENT

The permanent manpower requirement for running the proposed plant is 75, with the breakdown mentioned in attached schedule 5.

## 7.4 SOURCE OF MANPOWER AND WAGE BILL

Manpower for proposed project will be employed from local sources, except for a few expatriates who would basically be engaged in the training of local staff. The workers will be given on-the-job training to familiarize them with the proposed machinery and equipment. The total wage bill per annum will be US\$ 259,294 as shown in schedule 5

## 8. INVESTMENT AND FINANCING

### 8.1 ASSUMPTIONS

The financial projections to determine the viability of the project are based on the following key assumptions:

- The production of various building materials will start from second half of the year 2009.
- The whole project output will be sold locally during initial years of project implementation.
- Financial calculations are based on current market prices and costs are assumed constant throughout the operating period under review on the assumption that if operation costs change, selling prices will change proportionally to preserve the profit margins.
- The project has adopted the currency exchange rate of United States Dollar 1 = Tanzania Shilling 1,300.00.

### 8.2 SUMMARY OF CAPITAL COSTS

On completion of project implementation, the total investment will reach US\$ 8,571,350 as per attached schedule 3.

### 8.3 BUILDING AND CIVIL WORKS COSTS

The main civil works required for the building for the plants to be installed and operated will be construction of factory, construction of warehouse, construction of residential houses for staff, electrification and water supply, installation of overhead tank, etc. This aspect is expected to cost US\$ 662,350 .

### 8.4 PLANT MACHINERY AND EQUIPMENT COSTS

The main machines for the envisaged project have been explained earlier. The total investment on machinery and equipment is based on a quotation received from suppliers for main production machinery and amount of to US\$ 6,502,000 approximately.

### 8.5 FURNITURE AND FITTINGS

The costs for this item have been estimated at US\$ 55,000. The items to be purchased will comprise office furniture, computers, & other equipments for the office and factory use.

S/N	PARTICULARS / ITEMS	UNITS REQUIRED	UNIT COST US \$	TOTAL COST US\$
1	COMPUTER APPLIANCES	8	2,500	20,000
2	PRINTERS	6	500	3,000
3	FURNITURE AND FIXTURE	4	6,000	24,000
4	RECORDS BOOKS	2	400	800
5	STATIONERIES	2	600	1,200
6	UNIFORMS	2	3,000	6,000

## 8.6 MOTOR VEHICLES

For company work, we intend to procure the following vehicles at cost of US\$ 890,000

S/N	PARTICULARS / ITEMS	UNITS REQUIRED	UNIT COST US \$	TOTAL COST US\$
1	DUMPER TRUCKS	4	65,000	260,000
2	TIPPER TRUCKS	6	60,000	360,000
3	FORCKLIFT	1	15,000	15,000
4	CRANE 60 TONS	1	75,000	75,000

## 8.7 PRE-PRODUCTION CAPITAL EXPENDITURES

These include project development cost for feasibility study and start-up expenses, transportation of machinery, installation, and other overheads during installation. A budget of US\$ 112,000 is considered adequate for this item

## 8.8 INITIAL WORKING CAPITAL

Initial net working capital requirement at maximum for the proposed project works out at about US\$ 300,000. This is mainly for the procurement of initial stocks of raw materials. Rest of the requirement of the working capital will be raised from commercial banks as and when the need arises. This will fluctuate as per stocks in hand.

## 8.9 FINANCING PATTERN

The financing of the project will be from 100% shareholder's equity. It is anticipated that the financing of the project will take the following form.

EQUITY (FOREIGN) US \$	LOAN
8,571,350	0

## 9 COST OF OPERATIONS

The anticipated costs for operating the project are detailed in the following sections and summarized in attached schedule 2.

### 9.1 OFFICE RENT & OPERATION

This includes cost for Water and Energy for various manufacturing units for building materials. The costs are expected to increase from US\$ 14,760 in the first year of operation to US\$ 16,613 in the fifth year.

### 9.2 ADMINISTRATIVE OVERHEADS

This cost item has been estimated to cost US\$ 139,952 in the first year of operation. This is anticipated to increase to US\$ 157,518 during the fifth year of operation.

### 9.3 VEHICLE RUNNING EXPENSES

Vehicle running expenses include fuel, lubricants, road licenses, insurance, etc. This is expected to increase from US\$ 28,235 in first year of operation to US\$ 209,991 in the fifth year of operation.

## 9.4 SALARIES AND WAGES

The number of employees, along with their incomes, is shown in attached schedule 5. The total annual wage package is estimated at US\$ 259,294 in first year of operation. The figure is calculated to grow to US\$ 291,838 when the project reaches its fifth year of operation.

## 9.5 DEPRECIATION

The depreciation cost element has been estimated to stand at US\$ 405,468 per annum during 5 years of project implementation.

## 10 FINANCIAL ANALYSIS

### 10.1 INCOME AND EXPENDITURE

#### 10.1.1 Income

The proposed project expects to earn its income through the sale of various building materials. At sustainable level of production, the total sales are expected to increase from US\$ 1,480,750 in the first year of production to US\$ 1,666,597 in the fifth year of operation.

#### 10.1.2 Expenditure

All project costs have been discussed in Chapter 9 above and are summarized in attached schedule 2.

### 10.2 NET INCOME STATEMENT

The project generates profit from the first year of operation and can easily meet both its long term and short-term obligations in less than five years.

### 10.3 CASH FLOW HIGHLIGHTS

The project's cash flow is impressive as the project has positive end of the year cash flow from first to fifth year of operation.

## 11. ECONOMIC BENEFITS OF THE PROJECT

### 11.1 EMPLOYMENT

The expansionary project will provide additional permanent direct employment to 75 individuals mostly local Tanzanians.

### 11.2 TAXES

The government will earn revenue from taxes.

### 11.3 FOREIGN CURRENCY EARNINGS

The project will bring in the country foreign currency when the company starts exporting some of the building materials to neighbouring countries at later stages of project implementation.

### 11.4 PRODUCTION OF HIGH QUALITY BUILDING MATERIALS

People will be able to buy high quality building materials as the company will employ state of the art technology in manufacturing the products.

## 12. CONCLUSION AND RECOMMENDATIONS

### 12.1 CONCLUSION

In all aspects, the project is feasible, sustainable and beneficial not only to the investors but also to the ultimate consumers and the economy as a whole. M/S Fortune Development (T) Company Limited is expected to produce useful building materials initially for domestic market and later for export market.

### 12.2 RECOMMENDATIONS

Provided all other economic factors remain substantially the same, it is strongly recommended that the project be implemented with immediate effect. It is further recommended that an application for TIC Certificate of Investment Incentives be submitted to Tanzania Investment Centre with a view to benefit from investment benefits and protection as statutorily allowed under Tanzania Investment Act, 1997.

FORTUNE DEVELOPMENT (T) COMPANY LTD						
PROJECTED INCOME & EXPENDITURE STATEMENT						
		YEAR 1 USD	YEAR 2 USD	YEAR 3 USD	YEAR 4 USD	YEAR 5 USD
Sales Revenue		1,480,750	1,525,173	1,570,928	1,618,056	1,666,597
Cost of Sales		148,075	152,517	157,093	161,806	166,660
Gross Profit		1,332,675	1,372,655	1,413,835	1,456,250	1,499,937
Operating Expenses:						
Motor Vehicle running expenses		28,235	29,082	29,955	30,853	209,991
Salaries and wages		259,294	267,073	275,085	283,338	291,838
Pension contribution		25,929	26,707	27,509	28,334	29,184
Depreciation		405,468	405,468	405,468	405,468	405,468
Milling cost		46,660	48,060	50,463	52,986	55,635
Mining cost		226,885	233,692	245,376	257,645	270,527
Office Rent & Operation		14,760	15,203	15,659	16,129	16,613
Administrative Overhead		139,952	144,151	148,475	152,930	157,518
Communication cost		18,824	19,388	19,970	20,569	22,186
Total Expenses		1,166,007	1,188,823	1,217,959	1,248,251	1,458,959
Profit before Tax		166,668	183,832	195,876	207,999	40,979
Tax (30%)		50,000	55,150	58,763	62,400	12,294
Profit After Tax		116,667	128,682	137,113	145,600	28,685

FORTUNE DEVELOPMENT (T) COMPANY LTD						
PROJECTED BALANCE SHEET						
		YEAR 1 USD	YEAR 2 USD	YEAR 3 USD	YEAR 4 USD	YEAR 5 USD
<b>Fixed Assets</b>						
Long-term Assets		8,109,350	7,703,883	7,298,415	6,892,948	6,487,480
Depreciation		405,468	405,468	405,468	405,468	405,468
Total Long-term Assets		7,703,883	7,298,415	6,892,948	6,487,480	6,082,013
<b>Current Assets</b>						
Cash		840,694	1,346,109	1,861,051	2,385,525	2,740,308
Inventory		58,333	61,250	64,312	67,528	70,904
Accounts Receivable		104,358	130,753	155,925	179,914	256,538
Total Current Assets		1,003,385	1,538,112	2,081,288	2,632,967	3,067,750
Total Assets		8,707,268	8,836,527	8,974,235	9,120,447	9,149,763
<b>Current Liabilities</b>						
Accounts Payable		4,442	4,576	4,713	4,854	5,000
Other Current Liabilities		14,808	15,252	15,709	16,181	16,666
Subtotal Current Liabilities		19,250	19,827	20,422	21,035	21,666
<b>Long-term Liabilities</b>						
Long-term Liabilities						
Total Liabilities		19,250	19,827	20,422	21,035	21,666
Net Assets		8,688,018	8,816,700	8,953,813	9,099,412	9,128,097
<b>Capital and Reserves</b>						
Owners Contribution		8,571,350	8,571,350	8,571,350	8,571,350	8,571,350
Retained Earnings		116,667	245,350	382,463	528,062	556,747
Total Capital		8,688,017	8,816,700	8,953,813	9,099,412	9,128,097

FORTUNE DEVELOPMENT (T) COMPANY LTD						
PROJECTED CASHFLOW						
		YEAR 1 USD	YEAR 2 USD	YEAR 3 USD	YEAR 4 USD	YEAR 5 USD
<b>CASHFLOW FROM OPERATIONS:</b>						
Cash Sales		1,184,600	1,220,138	1,256,742	1,294,444	1,333,278
VAT Receipt		222,113	228,776	235,639	242,708	249,990
<b>Subtotal Cash Received</b>		<b>1,406,713</b>	<b>1,448,914</b>	<b>1,492,381</b>	<b>1,537,153</b>	<b>1,583,267</b>
<b>Expenditures from Operations:</b>						
Purchases		125,864	129,640	133,529	137,535	141,667
Additional Cash Spent		760,540	783,356	812,492	842,783	1,053,497
VAT payments		29,615	30,503	31,419	32,361	33,332
<b>Subtotal Cash payment</b>		<b>916,018</b>	<b>943,499</b>	<b>977,439</b>	<b>1,012,679</b>	<b>1,228,489</b>
<b>CASH FLOW FROM OPERATIONS</b>		<b>490,694</b>	<b>505,415</b>	<b>514,942</b>	<b>524,474</b>	<b>354,780</b>
<b>CASH FLOW FROM INVESTMENTS:</b>						
Purchase of Assets		8,109,350	-	-	-	-
Pre- expenses		112,000	-	-	-	-
<b>CASH FLOW FROM INVESTMENTS:</b>		<b>8,221,350</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>CASH FLOW FROM FINANCING:</b>						
Owners Equity Contribution		8,571,350	-	-	-	-
<b>CASH FLOW FROM FINANCING</b>		<b>8,571,350</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>NET CASHFLOW FOR PERIOD</b>		<b>840,694</b>	<b>505,415</b>	<b>514,942</b>	<b>524,474</b>	<b>354,780</b>
<b>CASHFLOW AT START OF YEAR</b>		<b>-</b>	<b>840,694</b>	<b>1,346,109</b>	<b>1,861,051</b>	<b>2,385,525</b>
<b>CASHFLOW AT THE END OF YEAR</b>		<b>840,694</b>	<b>1,346,109</b>	<b>1,861,051</b>	<b>2,385,525</b>	<b>2,740,305</b>

FORTUNE DEVELOPMENT (T) COMPANY LTD						
SCHEDULES AND GRAPHS						
SCHEDULE 1						
REVENUE PROJECTION						
		YEARS				
PRODUCTS	YEAR 1 USD	YEAR 2 USD	YEAR 3 USD	YEAR 4 USD	YEAR 5 USD	
Revenue	1,480,750	1,525,173	1,570,928	1,618,056	1,666,597	
	1,480,750	1,525,173	1,570,928	1,618,056	1,666,597	

### SCHEDULE 2

OTHER OPERATING COSTS						
		YEARS				
OTHER OPERATING COST	YEAR 1 USD	YEAR 2 USD	YEAR 3 USD	YEAR 4 USD	YEAR 5 USD	
Motor vehicle running expenses	28,235	29,082	29,955	30,853	209,991	
Salaries and wages	259,294	267,073	275,085	283,338	291,838	
Pension contribution	25,929	26,707	27,509	28,334	29,184	
Depreciation	405,468	405,468	405,468	405,468	405,468	
Milling cost	46,660	48,060	50,463	52,986	55,635	
Mining cost	226,885	233,692	245,376	257,645	270,527	
Office Rent & Operation	14,760	15,203	15,659	16,129	16,613	
Administrative Overhead	139,952	144,151	148,475	152,930	157,518	
Communication cost	18,824	19,388	19,970	20,569	21,186	
<b>Total costs</b>	<b>1,166,007</b>	<b>1,188,823</b>	<b>1,217,959</b>	<b>1,248,251</b>	<b>1,457,959</b>	

**SCHEDULE 3**

<b>COST STRUCTURE</b>	
<b>PARTICULAR</b>	<b>AMOUNT USD</b>
Land and Buildings	662,350
Plant and Equipment	6,502,000
Motor Vehicles	890,000
Furniture & Fixtures	55,000
Pre expenses (& workshop & support)	112,000
Others/ Misc	50,000
Working Capital	300,000
<b>TOTAL</b>	<b>8,571,350</b>

**SCHEDULE 4**

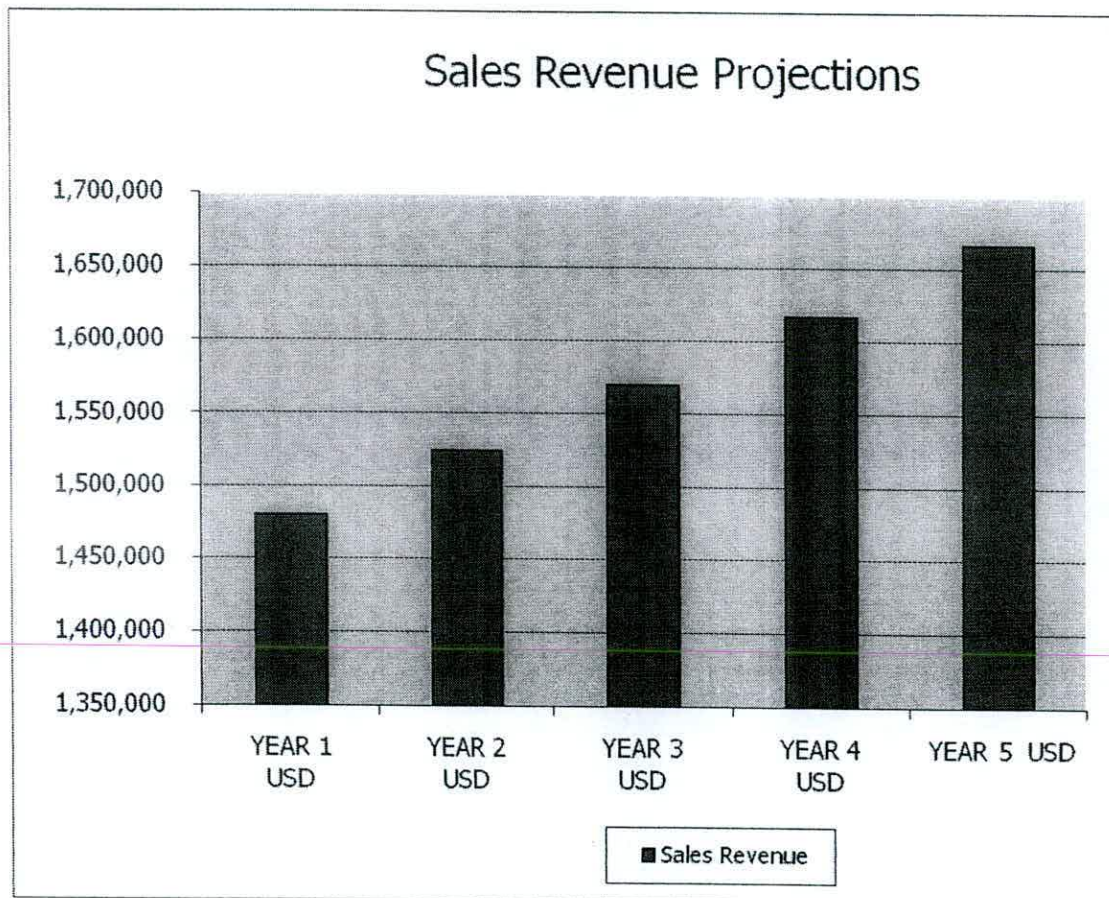
<b>FIXED ASSETS SCHEDULE</b>						
<b>NAME OF ASSETS</b>	<b>YEAR 1 USD</b>	<b>YEAR 2 USD</b>	<b>YEAR 3 USD</b>	<b>YEAR 4 USD</b>	<b>YEAR 5 USD</b>	
Land and Buildings	662,350	629,233	596,115	562,998	529,880	
Machinery, tools & Equipment	6,502,000	6,176,900	5,851,800	5,526,700	5,201,600	
Motor Vehicles	890,000	845,500	801,000	756,500	712,000	
Furniture & Fixtures	55,000	52,250	49,500	46,750	44,000	
<b>TOTAL</b>	<b>8,109,350</b>	<b>7,703,883</b>	<b>7,298,415</b>	<b>6,892,948</b>	<b>6,487,480</b>	
<b>DEPRECIATION</b>	<b>YEAR 1 USD</b>	<b>YEAR 2 USD</b>	<b>YEAR 3 USD</b>	<b>YEAR 4 USD</b>	<b>YEAR 5 USD</b>	
Land and Buildings	33,118	33,118	33,118	33,118	33,118	
Machinery, tools & Equipment	325,100	325,100	325,100	325,100	325,100	
Motor Vehicles	44,500	44,500	44,500	44,500	44,500	
Furniture & Fixtures	2,750	2,750	2,750	2,750	2,750	
<b>ANNUAL DEPRECIATION</b>	<b>405,468</b>	<b>405,468</b>	<b>405,468</b>	<b>405,468</b>	<b>405,468</b>	
<b>CLOSING FIXED ASSETS</b>	<b>7,703,883</b>	<b>7,298,415</b>	<b>6,892,948</b>	<b>6,487,480</b>	<b>6,082,013</b>	

**SCHEDULE 5**

<b>SALARIES &amp; WAGES</b>					
<b>NO</b>	<b>DEPARTMENTS/DESIGNATION</b>	<b>NO.</b>	<b>SALARY PER MONTH</b>	<b>SUBTOTAL MONTHLY SALARY</b>	<b>ANNUAL GROSS SALARY</b>
1	Project Manager	1	2353	2353	28,235
2	Site Manager	3	980	2941	35,294
3	Marketing Manager	1	1176	1176	14,118
4	Technical Officers	6	471	2824	33,882
5	Technical Assistants	8	314	2510	30,118
6	Operators/Drivers	14	196	2745	32,941
7	Quarry Staff	6	314	1882	22,588
8	Crusher staff	4	235	941	11,294
9	Concrete Mixer staff	8	157	1255	15,059
10	Asphalt Plant staff	8	157	1255	15,059
11	Secretary	4	118	471	5,647
12	Messenger	2	78	157	1,882
13	Security Guards	10	110	1098	13,176
	<b>TOTAL USD \$</b>	<b>75</b>	<b>6,659</b>	<b>21,608</b>	<b>259,294</b>

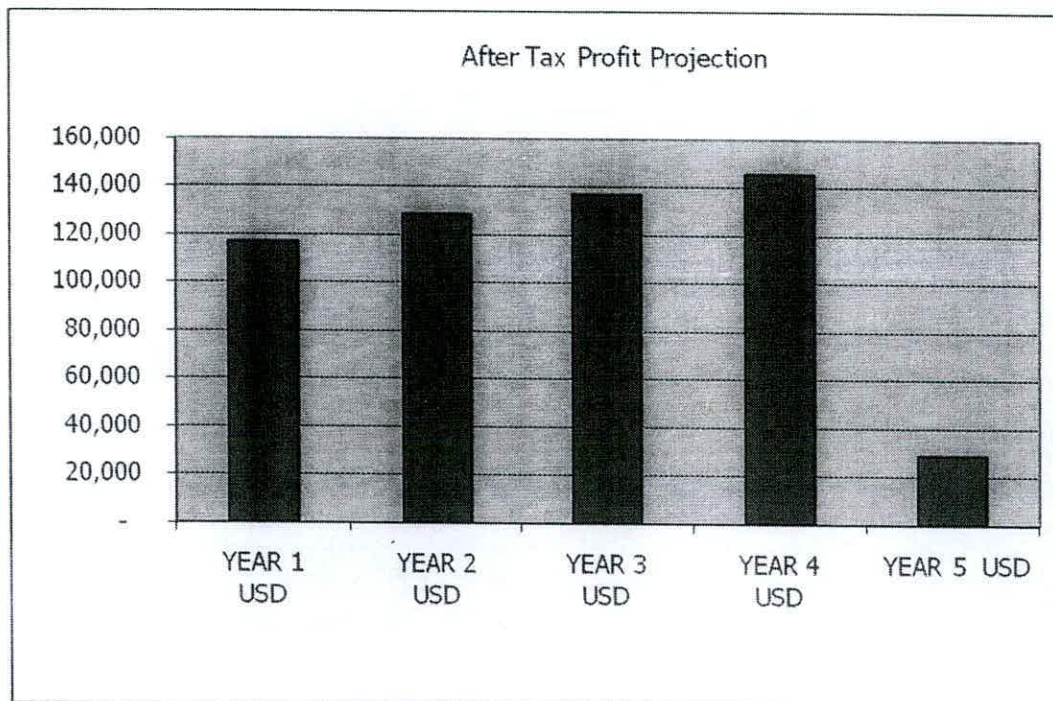
### REVENUE PROJECTION

	YEAR 1 USD	YEAR 2 USD	YEAR 3 USD	YEAR 4 USD	YEAR 5 USD
Sales Revenue	1,480,750	1,525,173	1,570,928	1,618,056	1,666,597



### PROFIT PROJECTION

	YEAR 1 USD	YEAR 2 USD	YEAR 3 USD	YEAR 4 USD	YEAR 5 USD
Profit After Tax	116,667	128,682	137,113	145,600	28,685



CASH FLOW PROJECTION

	YEAR 1 USD	YEAR 2 USD	YEAR 3 USD	YEAR 4 USD	YEAR 5 USD
CASH FLOW AT THE END OF THE YEAR	840,694	1,346,109	1,861,051	2,385,525	2,740,308

